KITAGAWA GmbH

EMC PRODUCTS

FILTERING
SHIELDING
GROUNDING

ELECTRO–**M**AGNETIC **C**OMPATIBILITY

SYMBIOSIS & COLLABORATION

KITAGAWA INDUSTRIES CO., LTD.
A global technology group providing high quality for life' s amenities through "Symbiosis & Collaboration"
The high pace of industrial technology innovationcan lead to various problems. We carry out the research and propose the solutions to the problems in order to provide a clean electromagnetic environment.

R&D bases

Technology Center


Kasugai factory

Inazawa factory


Thailand factory

Wuxi (China) factory

Shenzhen factory

Material Developments

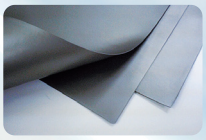
FUNCTIONAL FILM

Sputtering technology applied at the nano-Level for producing functional coatings provides greater design exibility for high density electronic equipment.

KG-GEL (Vibration damping and shock buffering)

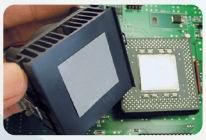
KG-GEL is a special polystyrene gel with super-low hardness of ASKER FP, which provides excellent shock buffering, vibration and noise damping for equipment and sub-assembly components.

LOSTOMER (Vibration damping)



High vibration damping and heat resistant properties (100℃) for a wide range of applications. Can be produced in customized configurations.

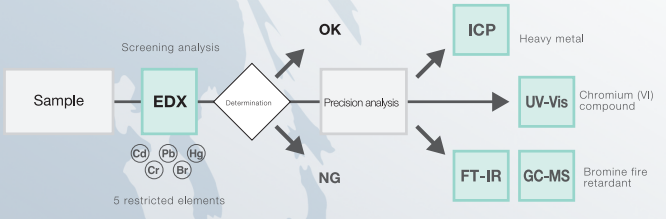
COOLPROVIDE (Heat+EMC)



Using our original composite technology we develop multifunctional materials for simultaneous management of EMC and thermal problems.

Environmental policy

Example of hazardous element Analysis



KGS is equipped with hazardous element analyticalequipment to provide safe products.

CONTENTS

SMARTPLY / FFSX-H

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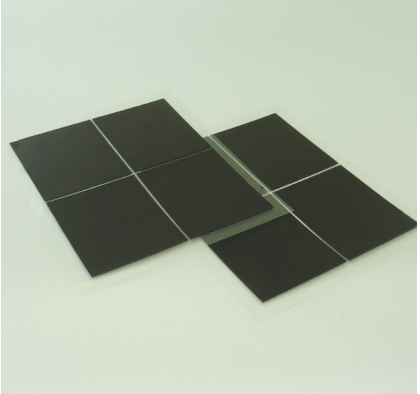

RFID・NFC(13.56MHz)

Ferrite sheet for metal interference solution for RFID and NFC (13.56MHz).

Features

- Improve the communication performance of RFID reader and tag by suppressing the metal interference.
- Ferrite material in which Q factor has been maximized at 13.56MHz is used for the sheet.
- Sintered material but thin with excellent in flexibility that enables easy design of custom profiles.

SMARTPLY / FFSW

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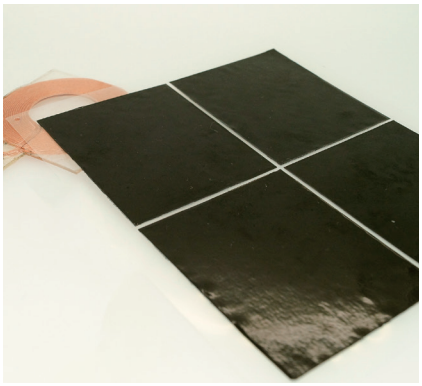

Thinner and flexible ferrite sheet for wireless charging

Features

- It is higher permeability magnetic sheet which is suitable for magnetic shield and improving performance of wireless charging system according to international standard around 100kHz such as Qi standard.
- Sintered ferrite material with flexibility enables higher drop impact resistance.
- Suitable for thinner design of module. (Total thickness of product: 0.21mm)
- Custom profile is available upon request.

COOLPROVIDE / EMPV4

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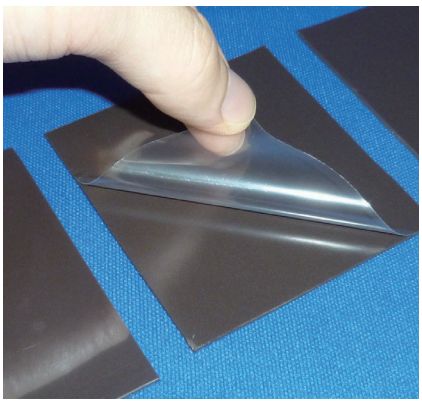

Electromagnetic noise suppression sheet with high permeability and posible thermal management

Features

- Lower hardness(ASKER C40), high permeability(μ'=13) was realized as non silicone thermally conductive sheet.
- Due to lower hardness, it enables intimate contact and low load to the element while in mounting.
- Because of a non-silicon material, siloxane is not contained.
- Recommended operating temperature range is -40℃110℃.

HIGH μ FERRITE CLAMP／KRFC

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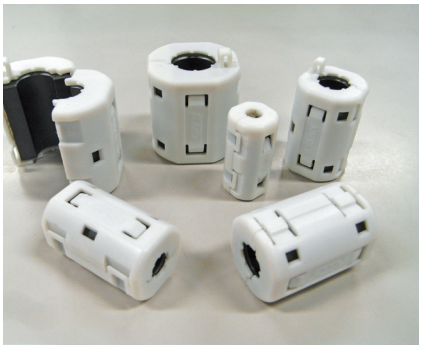

Split ferrite clamp for intermediate frequency range from 3 to 50MHz.

Features

- Effective for suppression both of conducted noise up to 30MHz and radiated noise over 30MHz.
- Split ferrite clamp with plastic housing enables to attach assembled cable and cables with connecter.
- Cable tie can assist to hold electric wires and enables the product to be fixed to wire harness. (Excluding KRFC-4)
- Wire guiding system prevent wires from being pinched when winding assembly.

BROAD EFFECT CORE／BRE

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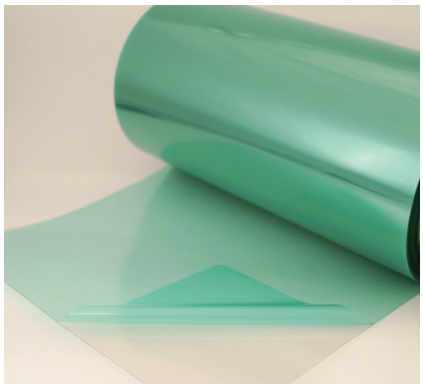
Highly effective measure for EMC noise suppression in broad frequency band

Features

- Effective for suppression of conducted/radiated noise.
- High impedance characteristics decrease the number of cable turns.
- Since the variation in impedance characterisctics against temperature is small, stable effect is ensured in wide temperature range.
- Plastic housing provides higher insulation properties.
- The material of the plastic housing is UL94V-0 certified.

TRANSPARENT CONDUCTIVE FILM / WINAL 100-020

P.94



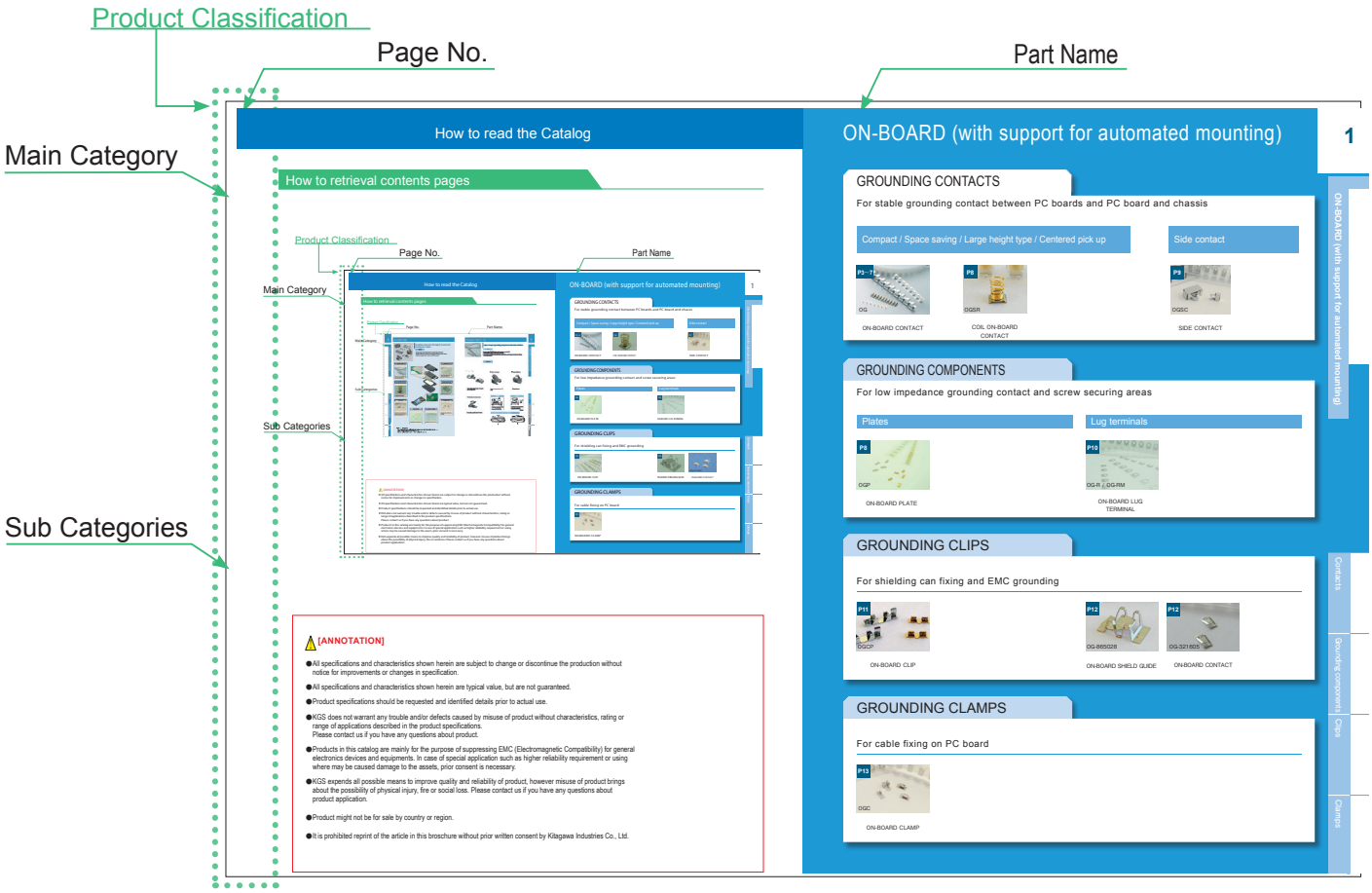
Usable for EMC measures around liquid crystal displays and as various kinds of electrodes

Features

- Low surface electric resistance gives higher shielding effectiveness.
- Electrically conductive film with superior optical transparency.
- Conductive surface is laminated by protection film.
- Grounding terminal with aluminum foil can be provided upon.

How to read the Catalog

How to retrieval contents pages



[ANNOTATION]

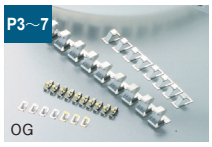
- All specifications and characteristics shown herein are subject to change or discontinue the production without notice for improvements or changes in specification.
- All specifications and characteristics shown herein are typical value, but are not guaranteed.
- Product specifications should be requested and identified details prior to actual use.
- KGS does not warrant any trouble and/or defects caused by misuse of product without characteristics, rating or range of applications described in the product specifications.
  Please contact us if you have any questions about product.
- Products in this catalog are mainly for the purpose of suppressing EMC (Electromagnetic Compatibility) for general electronics devices and equipments. In case of special application such as higher reliability requirement or using where may be caused damage to the assets, prior consent is necessary.
- KGS expends all possible means to improve quality and reliability of product, however misuse of product brings about the possibility of physical injury, fire or social loss. Please contact us if you have any questions about product application.
- Product might not be for sale by country or region.
- It is prohibited reprint of the article in this broschure without prior written consent by Kitagawa Industries Co., Ltd.

ON-BOARD (with support for automated mounting)

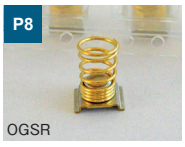
GROUNDING CONTACTS

For stable grounding contact between PC boards and PC board and chassis

Compact / Space saving / Large height type / Centered pick up



ON-BOARD CONTACT



COIL ON-BOARD CONTACT

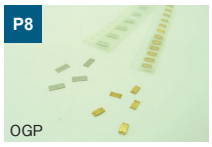
Side contact

SIDE CONTACT

GROUNDING COMPONENTS

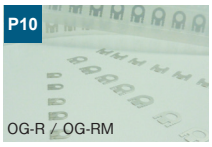
For low impedance grounding contact and screw securing areas

Plates



ON-BOARD PLATE

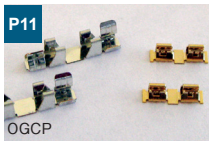
Lug terminals



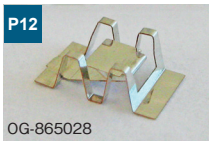
ON-BOARD LUG TERMINAL

GROUNDING CLIPS

For shielding can fixing and EMC grounding



ON-BOARD CLIP

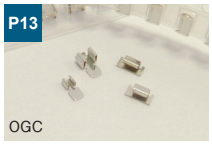


ON-BOARD SHIELD GUIDE

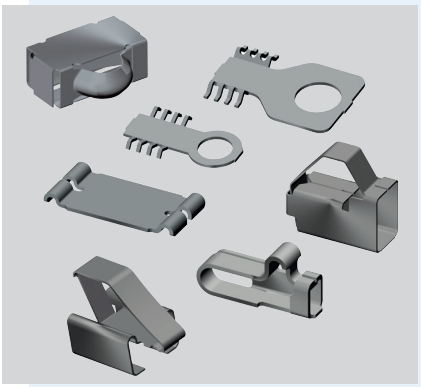
ON-BOARD CONTACT

GROUNDING CLAMPS

For cable fixing on PC board



ON-BOARD CLAMP

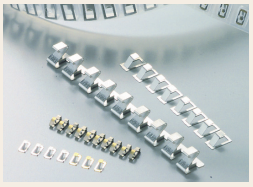


Grounding components, with support for automated mounting on PC board.

Feature

- Space saving and FG reinforcement at design stage of PC board.
- Supplied with embossed tape for automated mounting by chip mounter.
- Suitable management for emission and ESD immunity.

ON-BOARD CONTACT

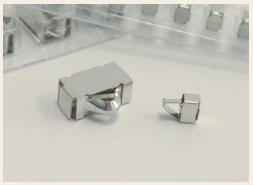


Upper faces of mounted make contact with chassis, PC board and component, etc.

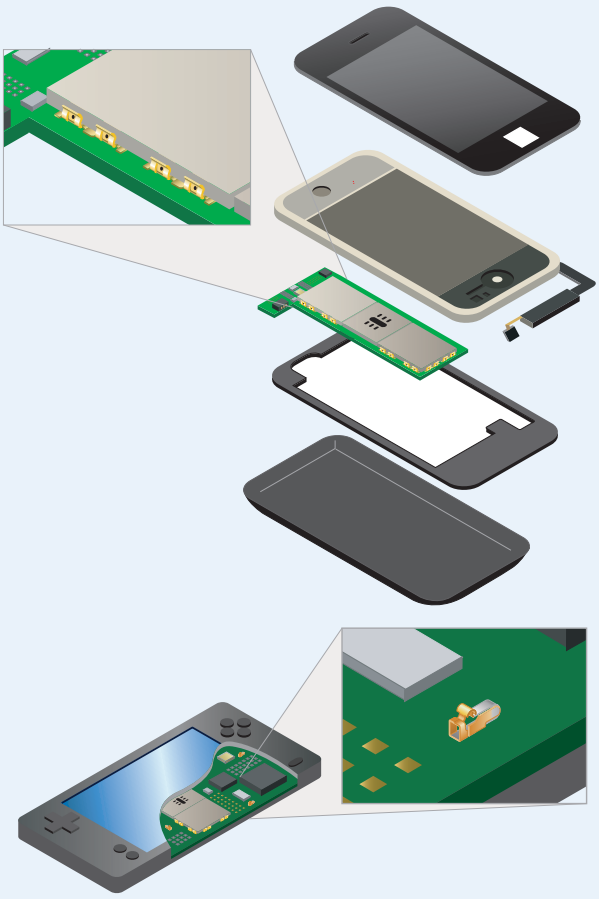
COIL ON-BOARD CONTACT

Durable components for grounding against vibrations and repeated compressions.

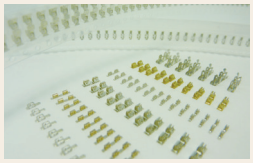
SIDE CONTACT



Side face of mounted parts makes contact with chassis, PC board and metal frame, etc.

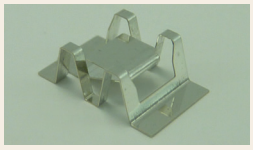


ON-BOARD CLIP



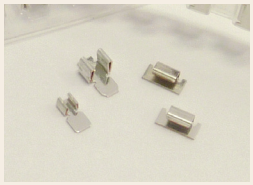
Clip mechanism enables stable fixing and grounding for shielding can.

ON-BOARD SHIELDING GUIDE



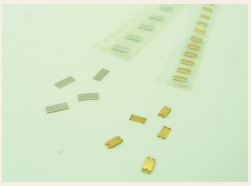
Displacement prevention mechanism improves shielding can grounding.

ON-BOARD CLAMP



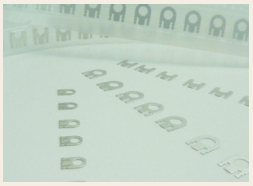
Space-saving cable wiring on PC boards.

ON-BOARD PLATE



Reinforcement at contact points provided for reliable grounding.

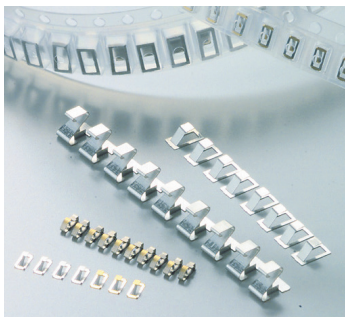
ON-BOARD LUG TERMINAL



Improved grounding reliability at screw area.

●Notes for On-Board series

Please contact our sales department for mounting specifications such as recommended pad dimensions, etc.
Trial mounting using our products is required prior to purchase. Please check the notes indicated on the back cover.
Galvanic corrosion may occur by contact with other metals.
With regard to sales lot and delivery lead time, please contact our sales department.



Super-compact grounding components with wide variations

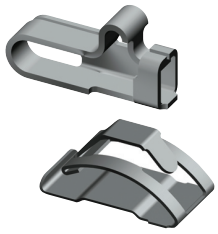
Feature

- Space saving, FG facilitated even where screws are precluded.
- Automated mounting on PC board is applicable.
- Box structure is introduced for distortion, deformation and damage prevention.(excluding some part numbers)

Material

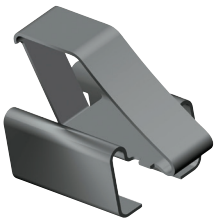
- As described below

■ Compact type



Down-sized compact type for narrow space configurations.

■ Space saving type



For space saving at pad area on PC board

■ Large height type

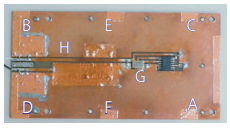
For large clearances

■ Centered vacuum pick-up type

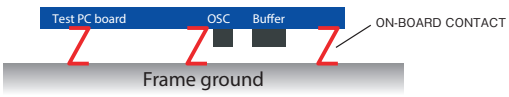
Vacuum pick-up point is placed at center

■ Suppression of radiated emission by multi point grounding

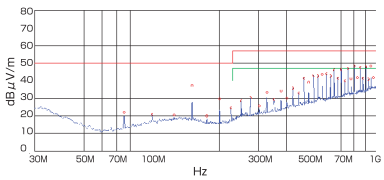
<Experimental contents>
- Exp 1: PC board + Aℓ metal plate (without grounding)
- Exp 2: PC board + Aℓ metal plate (4 points：A, B, C, D)
- Exp 3: PC board + Aℓ metal plate (8 points ：A, B, C, D, E, F, G, H)

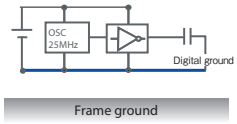


GND point on test PC board

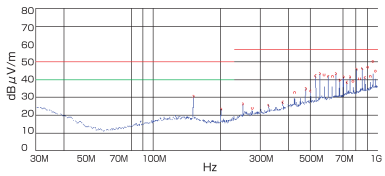


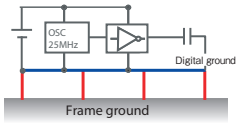
1. Without FG connection



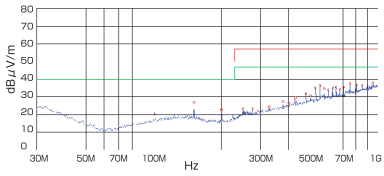


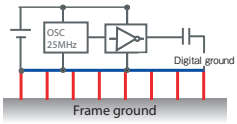
2. 4 points grounding





3. 8 points grounding

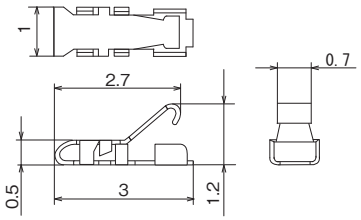




Multi point grounding enables large suppression effectiveness. (Multi point ground spacing is defined less than 1/8 of wavelength)

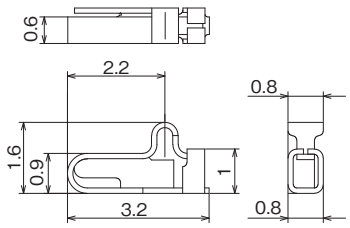
ON-BOARD CONTACT／OG

OG-301012



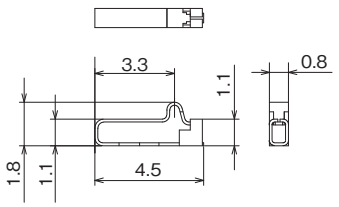
Material :Phosphor bronze for spring(t=0.08mm)
Surface treatment : Partial Au plating
Recommended height :0.6～1.1mm

OG-320816



Material :Phosphor bronze for spring(t=0.12mm)
Surface treatment :Partial Au plating
Recommended height :1.1～1.4mm

OG-450818

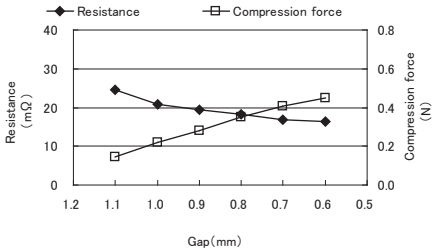


Material :Beryllium copper(t=0.12mm)
Surface treatment : Partial Au plating
Recommended height :1.2～1.6mm

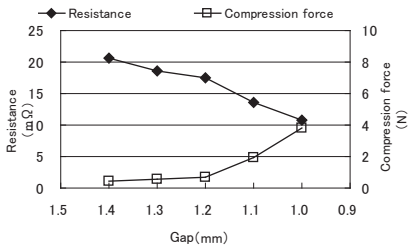
Unit:mm

Characteristics between Compression Force and Resistance

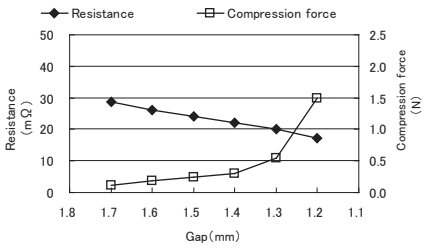
OG-301012



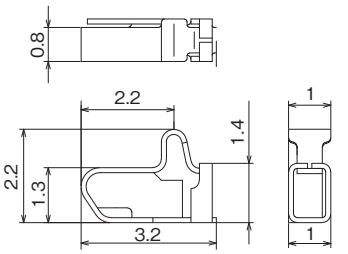
OG-320816



OG-450818

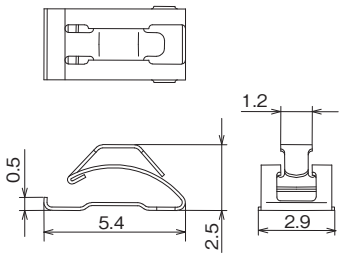


OG-321022



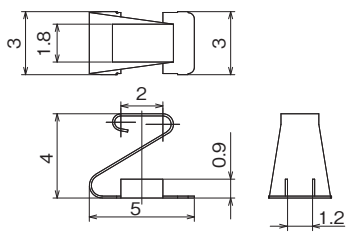
Material :Phosphor bronze for spring(t=0.12mm)
Surface treatment :PartialAu plating
Recommended height :1.5～2mm

OG-542925



Material :Phosphor bronze for spring(t=0.12mm)
Surface treatment : Partial Au plating
Recommended height :1.5～2.3mm

OG-503040

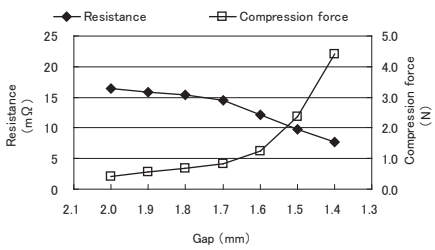


Material :Beryllium copper(t=0.1mm)
Surface treatment : Sn plating
Recommended height :2.2～3.6mm

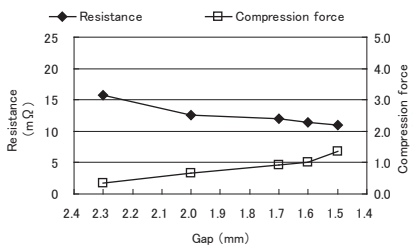
Unit:mm

Characteristics between Compression Force and Resistance

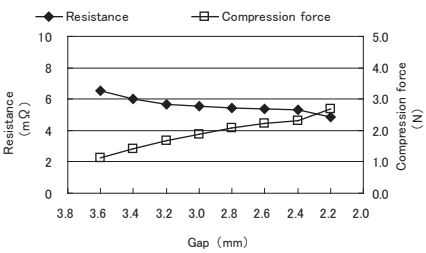
OG-321022



OG-542925



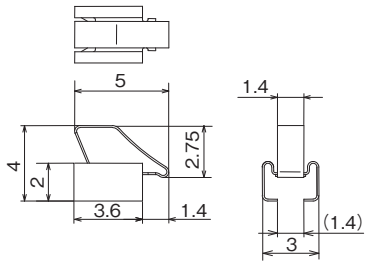
OG-503040



※Please confirm "Notes for Onboard series" on page 2 prior to purchase.
※The values are measured data for reference, not guaranteed.

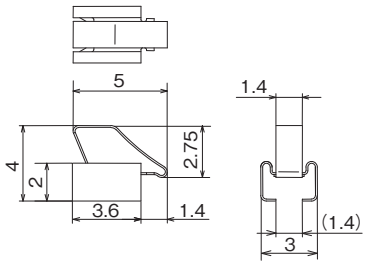
ON-BOARD CONTACT／OG

OG-363040



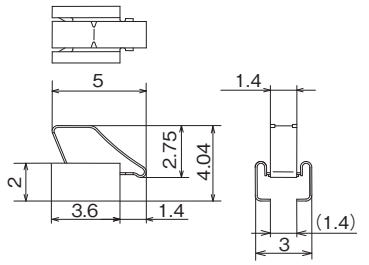
Material : Beryllium copper(t=0.1mm)
Surface treatment :Sn reflow plating(Ni plated contacts)
Recommended height :2.2～3.4mm

OG-363040G



Material : Beryllium copper(t=0.1mm)
Surface treatment :Partial Au plating
Recommended height :2.2～3.4mm

OG-363040HD

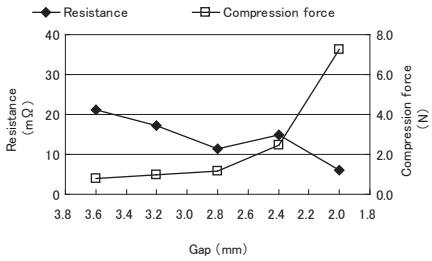


Material : Beryllium copper(t=0.1mm)
Surface treatment :Sn reflow plating(Ni plated contacts)
Recommended height :2.2～3.4mm

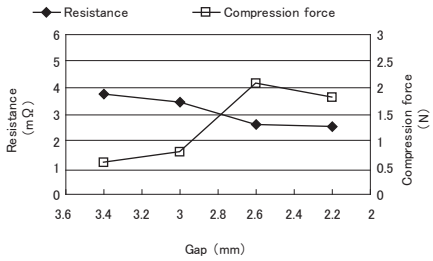
Unit:mm

Characteristics between Compression Force and Resistance

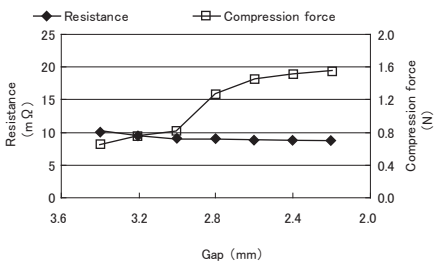
OG-363040



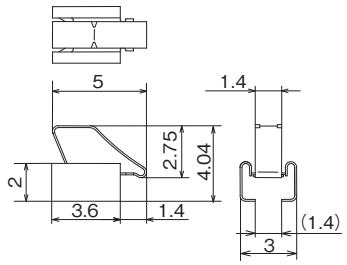
OG-363040G



OG-363040HD

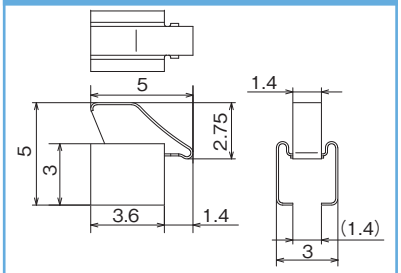


OG-363040HDR



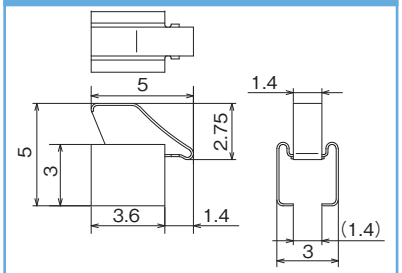
Material : Phosphor bronze for spring(t=0.1mm)
Surface treatment :Sn reflow plating
Recommended height :2.2～3.4mm

OG-363050



Material :Beryllium copper(t=0.1mm)
Surface treatment :Sn reflow plating(Ni plated contacts)
Recommended height :3.2～4.4mm

OG-363050G

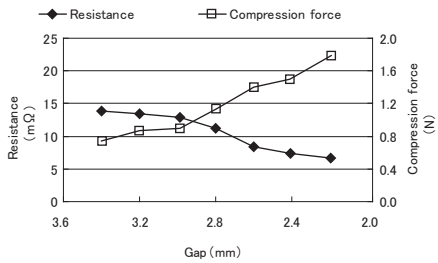


Material :Beryllium copper(t=0.1mm)
Surface treatment :Partial Au plating
Recommended height :3.2～4.4mm

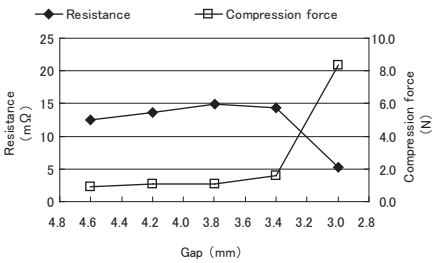
Unit:mm

Characteristics between Compression Force and Resistance

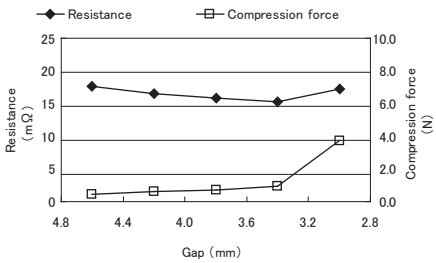
OG-363040HDR



OG-363050



OG-363050G



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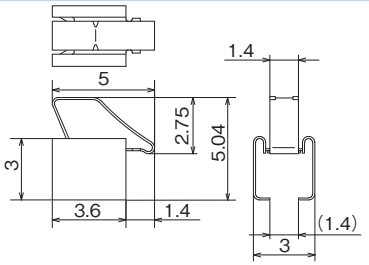
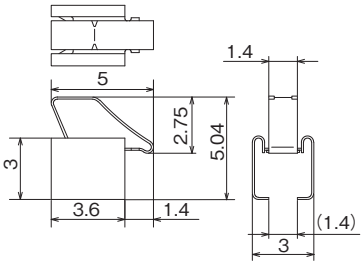
ON-BOARD CONTACT／OG

OG-363050HD



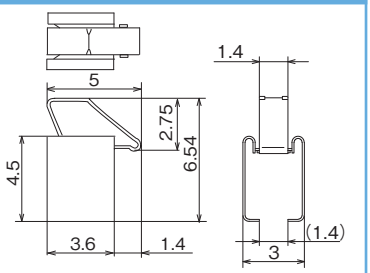
Material :Beryllium copper(t=0.1mm)
Surface treatment :Sn reflow plating(Ni plated contacts)
Recommended height :3.2～4.4mm

OG-363050HDR



Material :Phosphor bronze for spring(t=0.1mm)
Surface treatment :Sn reflow plating
Recommended height :3.2～4.4mm

OG-363065HD

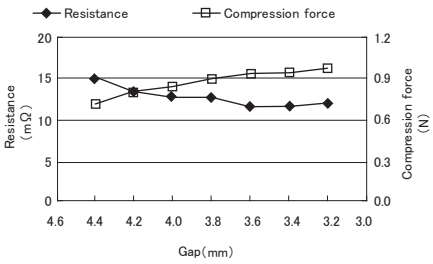


Material :Beryllium copper(t=0.1mm)
Surface treatment :Sn reflow plating(Ni plated contacts)
Recommended height :4.7～5.9mm

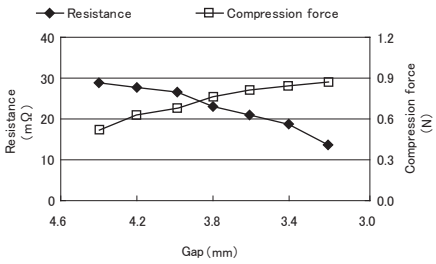
Unit:mm

Characteristics between Compression Force and Resistance

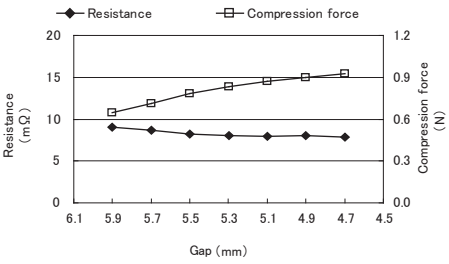
OG-363050HD



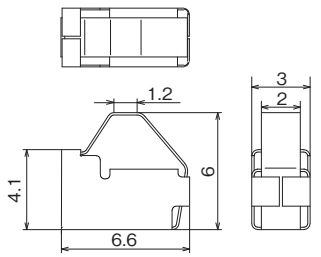
OG-363050HDR



OG-363065HD

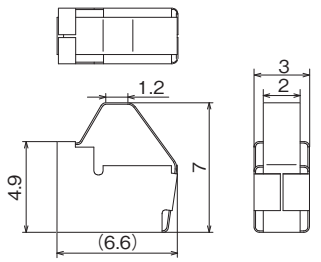


OG-603060



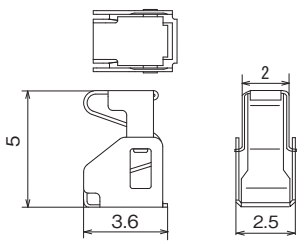
Material :Phosphor bronze for spring (t=0.12mm)
Surface treatment :Sn reflow plating
Recommended height :4.2～5.5mm

OG-603070



Material :Phosphor bronze for spring(t=0.08mm)
Surface treatment :Sn reflow plating
Recommended height :5～6.5mm

OG-362550

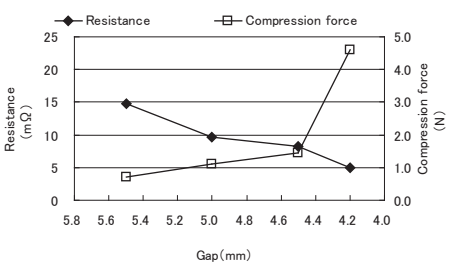


Material :Phosphor bronze for spring(t=0.15mm)
Surface treatment :Sn reflow plating
Recommended height :3.6～4.5mm

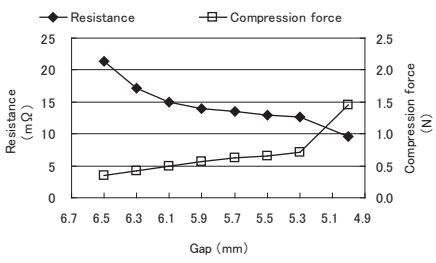
Unit:mm

Characteristics between Compression Force and Resistance

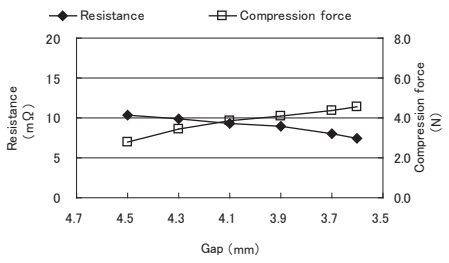
OG-603060



OG-603070



OG-362550



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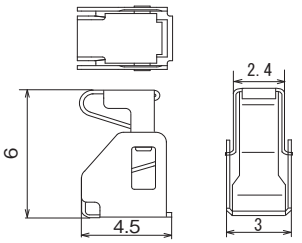
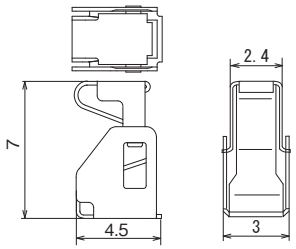
ON-BOARD CONTACT／OG

OG-453060



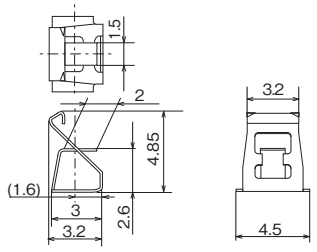
Material :Phosphor bronze for spring(t=0.2mm)
Surface treatment :Sn reflow plating
Recommended height :4.2～5.5mm

OG-453070



Material :Phosphor bronze for spring(t=0.2mm)
Surface treatment :Sn reflow plating
Recommended height :5.3～6.5mm

OG-453048

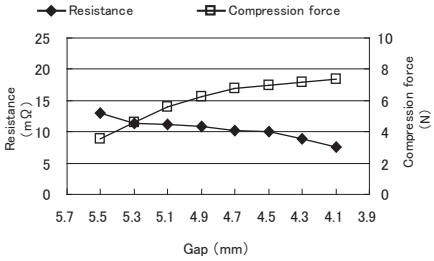


Material :Phosphor bronze for spring(t=0.1mm)
Surface treatment :Sn reflow plating
Recommended height :2.7～4.4mm

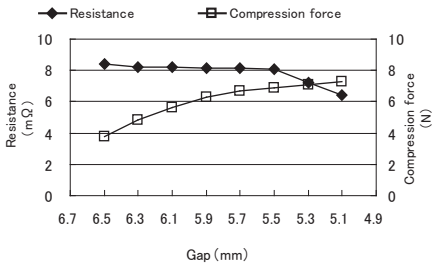
Unit:mm

Characteristics between Compression Force and Resistance

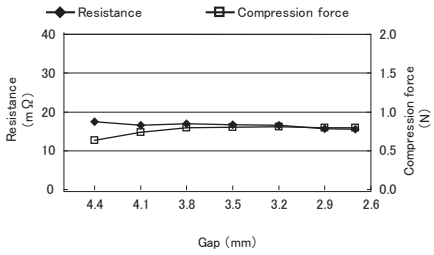
OG-453060



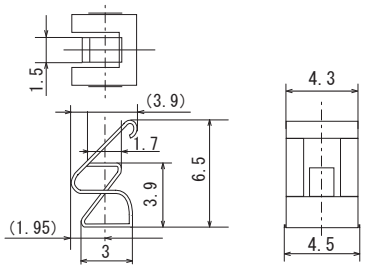
OG-453070



OG-453048



OG-453065

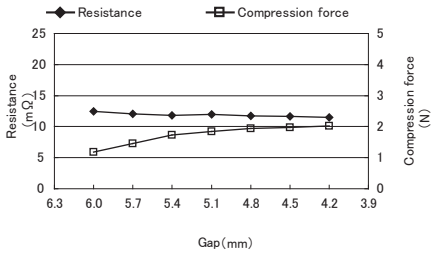


Material :Phosphor bronze for spring(t=0.15mm)
Surface treatment :Sn reflow plating.
Recommended height :4.2～6.0mm

Unit:mm

Characteristics between Compression Force and Resistance

OG-453065



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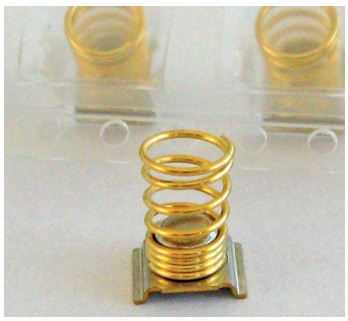
COIL ON-BOARD CONTACT／OGSR



Durable components for grounding against vibrations and repeated compressions

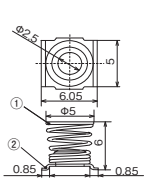
Feature

- Durable components for grounding against repeated compressions.
- Products with wide range of use.

Material

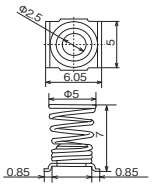
- Piano wire(Φ0.45)(Au plating)
- Brass(t=0.3mm)(Sn reflow plating)

OGSR-506060



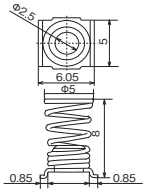
Recommended height :4.5～5.5mm

OGSR-506070



Recommended height :4.7～6.5mm

OGSR-506080

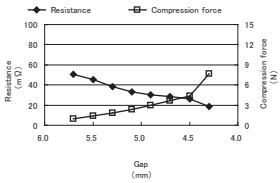


Recommended height :5.0～7.5mm

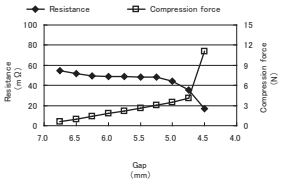
Unit：mm

Characteristics between Compression Force and Resistance

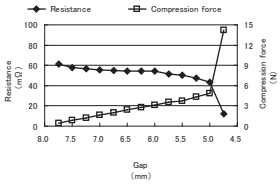
OGSR-506060



OGSR-506070



OGSR-506080



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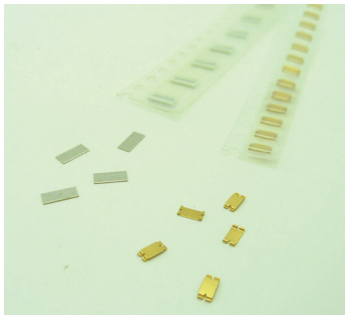
ON-BOARD PLATE／OGP



OGP configuration ensures reliable contact

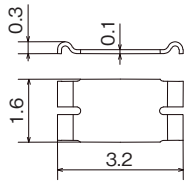
Feature

- OGP solves contact failure problems caused by solder flux.
- Reliable contact is provided at FG reinforcement of PC board.

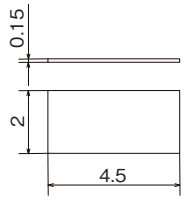
Material

- Brass (OGP-3216 / Au plating , OGP-4520 / Sn reflow plating)

OGP-3216



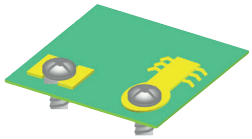
OGP-4520



Unit：mm

Application examples

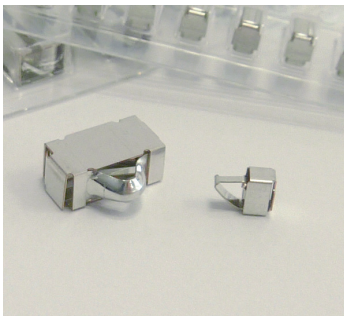
●Effective contact
·OGP protects PC board from damage such as circuit pattern damage by vibration etc at FG area.
·Gold plating is available at the required location on PC board.



●Alternative components to washers and lug terminals
·More compact than conventional lug terminals.
·OGP prevents loosening of screws when subject to vibration.

※Please confirm "Notes for Onboard series" on page 2 prior to purchase.

SIDE CONTACT／OGSC

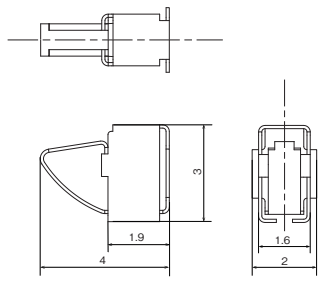


Automated mounting applicable component for grounding with side-contact on PC board.

Feature

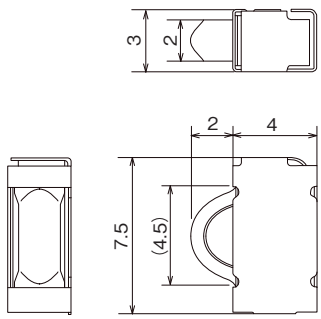
- Side-contact is applicable on PC board edge against chassis.
- Grounding contact is applicable between mother PC board and vertically placed daughter board.
- OGSC-402030:Down-sized compact design has been reduced by 80% of foot print area on PCB compared with existing part.
- OGSC-756030:Structure resists deformation even during lateral sliding.

OGSC-402030



Unit:mm

OGSC-756030



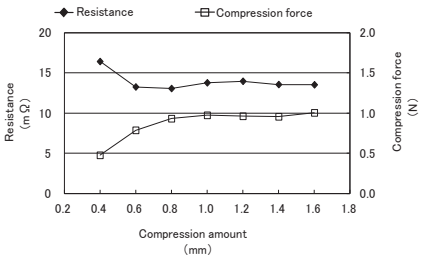
Unit:mm

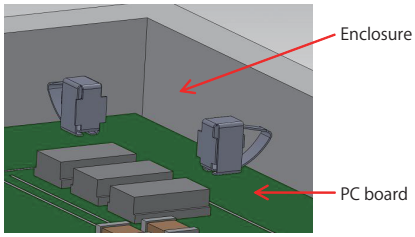
Material

- Phosphor bronze for spring (Sn reflow plating)

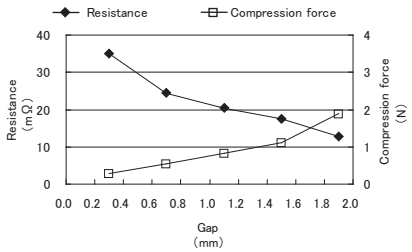
Characteristics between Compression Force and Resistance

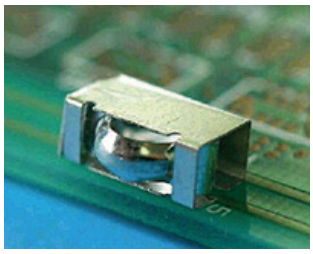
■ OGSC-402030





■ OGSC-756030





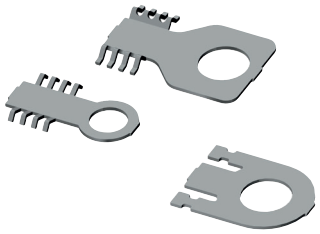
※Please confirm "Notes for Onboard series" on page 2 prior to purchase.

ON-BOARD LUG TERMINAL／OG-R・OG-RM

Secure contact of screwed area

Feature

- FG reinforcement and reliable contact are achieved.
- Prevention of screw loosening caused by vibration.
- OG-RM is a space-saving fully-flat shape.
- OG-RM30HF provides even further space saving.

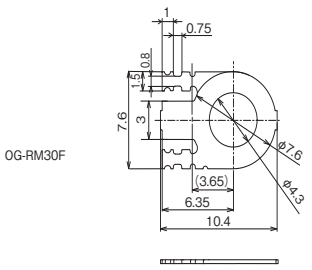


Material

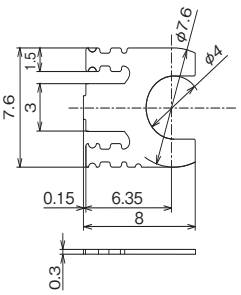
- Tough pitch copper※(Sn plating)

※OG-RM26 is made of brass.

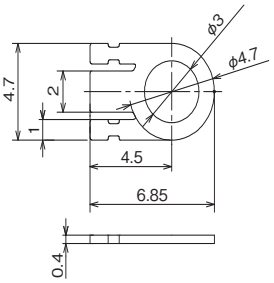
OG-RM30F



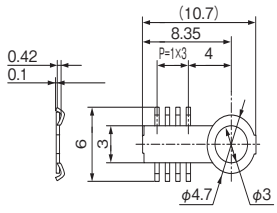
OG-RM30HF



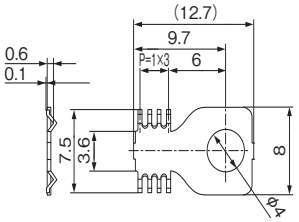
OG-RM26



OG-R26 SN

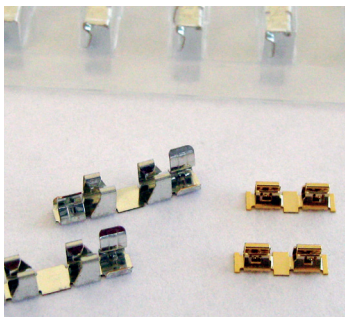


OG-R30 SN



Unit：mm

ON-BOARD CLIP／OGCP



Automated mounting applicable fixture “On-Board Clip” for shielding can.

Feature

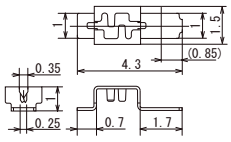
- Clip structure enables easy removal of shielding can.
- Multi-point GND is provided to shielding can. Improved shielding effect can be achieved.
- OGCP-421510:Low height design, such as 1mm height.
- OGCP-1182435:Separate structure of clip and support portion resistant to side slide loading.
- OGCP-702020:Locking structure provides “click feel” on installation.
  It provides certainty and improved workability.

Material

- OGCP-421510:Phosphor bronze for spring(Hot-dip Sn plating)
- OGCP-650813R/OGCP-1182435:Phosphor bronze for spring(Sn reflow plating/Primary plating Cu)
- OGCP-650813G:Titanium Copper alloy(One side Au plating/The under plating by Ni)
- OGCP-702020:Phosphor bronze for spring(Sn reflow plating)
- OGCP-702020G:Phosphor bronze for spring(Gold plating)

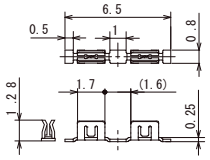
OGCP-421510

Applicable thickness:t=0.15±0.03



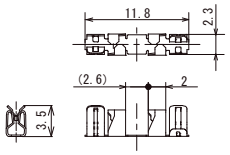
OGCP-650813R

Applicable thickness:t=0.15±0.2



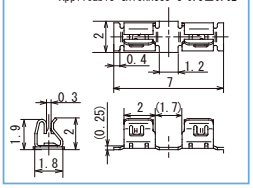
OGCP-1182435

Applicable thickness:t=0.3±0.02



OGCP-702020

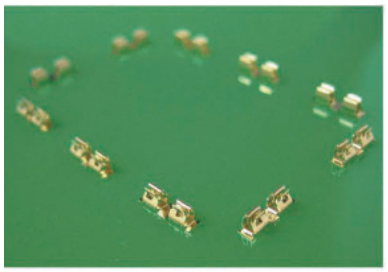
Applicable thickness:t=0.3±0.02



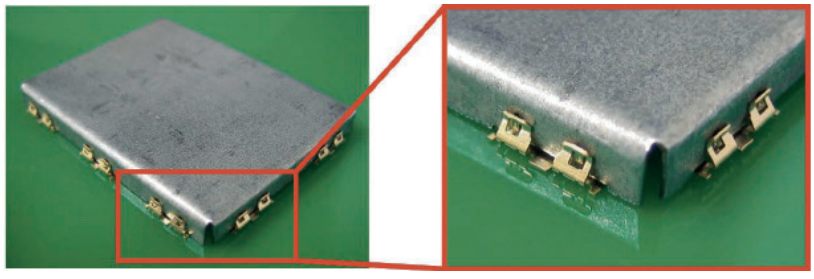
※Suffix "G" means Au plating. Please contact our sales representatives for details.

Unit：mm

Installation example：OGCP-702020(G)



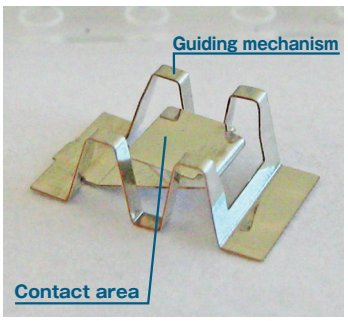
Before shielding can installed



After shielding can installed

※※Shielding can fixing is not guaranteed if the clip only is used.
※Verification of actual use conditions is required prior to use,since resistance against drop impact varies according to the weight of the shielding can.
※Please confirm “Annotation” on the last page prior to purchase.

ON-BOARD SHIELD GUIDE／OG-865028



Displacement prevention mechanism improves grounding of shielding cans.

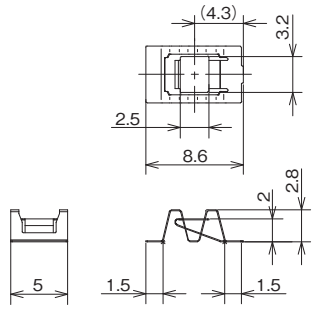
Feature

- Guiding mechanism makes easy installation for shielding cans.
- Applicable even at corners of shielding cans.
- Multi-point contact with the shielding can provides higher shielding effectiveness.

Material

- Phosphor bronze for spring (Sn reflow plating)

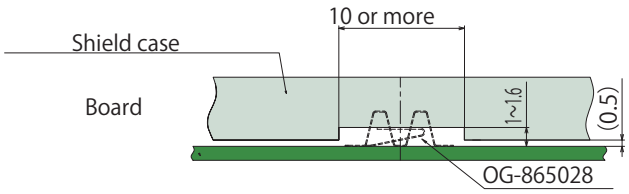
OG-865028



Unit：mm

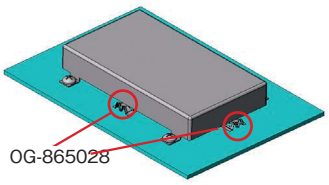
Reference Installation Specifications

Applicable plate thickness : t=1.9 or less

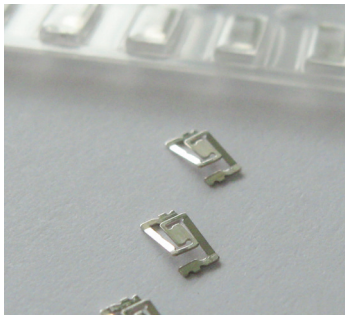


※The product has no holding function for shielding cans.

※Please confirm "Notes for Onboard series" on page 2 prior to purchase.



ON-BOARD CONTACT／OG-321605



Grounding components applicable to narrow clearance

Feature

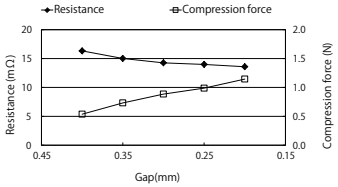
- It is surface mount components with space-saving and low contact pressure.
- It enables high restorability and contributes to low height design of the equipment.
- Applicable clearance 0.35 mm or less.

Material

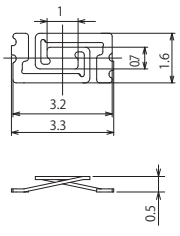
- Basis material: Phosphor bronze for spring (t0.1mm)
- Surface treatment:Sn reflow plating (Underlying Cu plating)

■ Properties

● Compression force vs Electric resistance

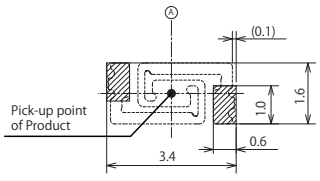


● Dimensions

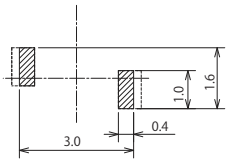


● Recommended pad design (mounting surface side top view)

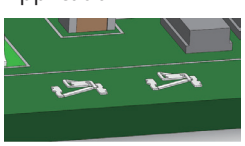
<Pad design>

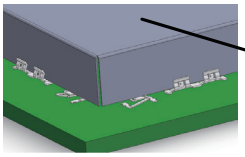


<Mask design>

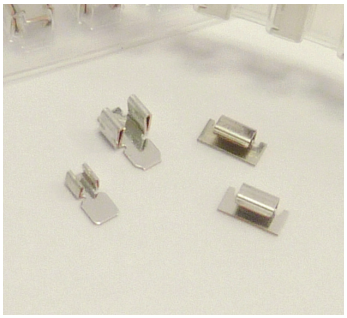


● Application





ON-BOARD CLAMP／OGC



Compact cable clamp applicable to automated mounting on PC board.

Feature

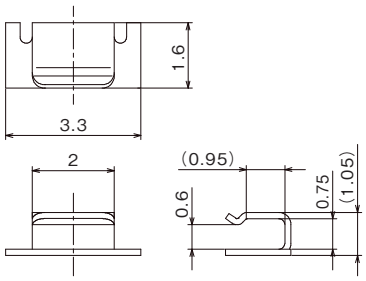
- Supporting wire harness on PC board.
- Side and top insertion types are available.
- Automated mounting and reflow soldering onPC board are applicable without boring.
- Wiring on PC board edges is available which brings space saving of equipment design.

Material

- Phosphor bronze for spring (Sn reflow plating)

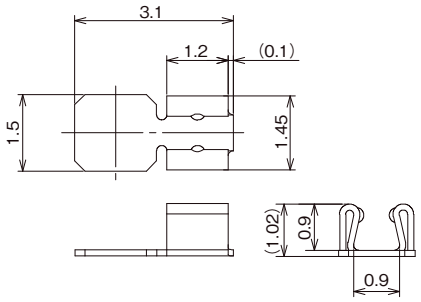
OGC-331610

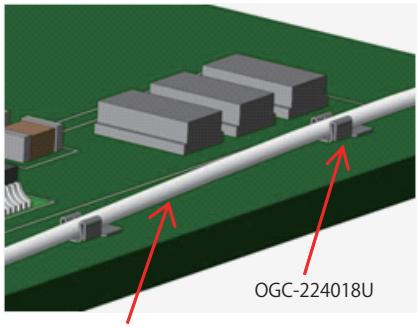
Applicable harness diameter : ϕ0.8



OGC-311510U

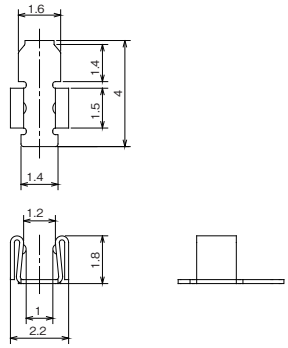
Applicable harness diameter : ϕ0.8





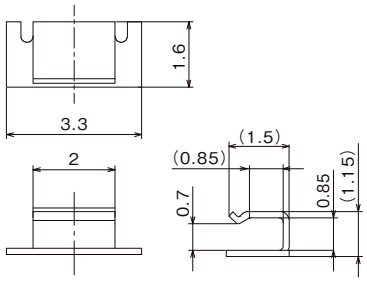
OGC-224018U

Applicable harness diameter : ϕ1.3~1.4



OGC-331612

Applicable harness diameter : ϕ0.86



Unit : mm

※Please confirm "Notes for Onboard series" on page 2 prior to purchase.

Metal grouping (reference)

※Galvanic corrosion may occourby contact with other metals.

anode			
Group Ⅰ	Group Ⅱ	Group Ⅲ	Group Ⅳ
Mg	Al	Cd plating	Brass
Mg alloy	Al alloy	carbon steel	stainless steel
Al	Zn・Zn plating	Fe	Be-Cu
Al alloy	Cr plating	Ni-Cr plating	Cu, Cu alloy
Zn・Zn plating	Cd plating	Sn・Sn plating	Ni-Cu alloy
Cr plating	carbon steel	Sn・Pb solder	Monel
	Fe	Pb	Ag
	Ni, Ni plating	Brass	Graphite
	Sn, Sn plating	stainless steel	Rb
	Sn・Pb solder	Be-Cu	Ti
		Cu, Cu alloy	Pt
		Ni-Cu alloy	Au
cathode			

EMC GROUNDING

For CABLES

Plastic clamps with grounding function

Clamps

P16


FG CLAMP

P16


FG CLAMP

For BOARDS, ENCLOSURES

Plastic fasteners with grounding function

Spacers

P17


FG SPACER

Guide rail for PC boards

P18


FG GUIDE RAIL

Metal grounding components

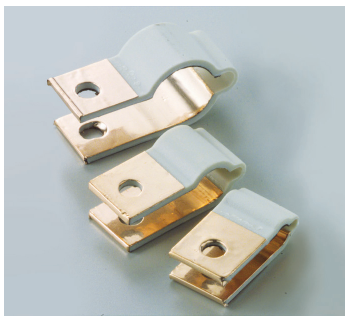
Straps

Wire mesh

P18


FG MESH

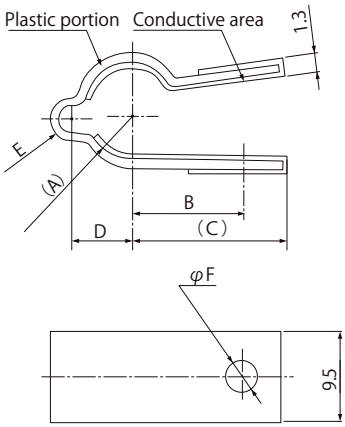
FG CLAMP／FGC



Plastic fastening and reliable copper foil grounding is provided simultaneously.

Feature

- Plastic body enables conductive layer to fit the cable and provides stable effectivity.
- Conductive area employs highly reliable copper foil.
- Plastic materials prevent the clamp from damaging the cable.



Material

- Plastic portion / nylon 66 (light gray / UL94V-0)
- Conductive area / Copper foil

■ M3 screw assembly type

Unit：mm

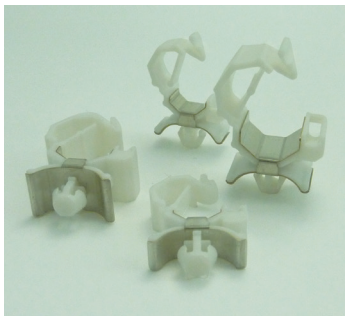
Part No.	(A)	B	(C)	D	E	F	Applicable cable diameter
FGC-3	R1.8	9.5	13.5	3.0	R1.5	φ3.2	φ2.7～φ3.5
FGC-5	R3.0	10.7	14.7	4.3	R2.0		φ5.0～φ5.5
FGC-8	R4.8	12.5	16.6	6.5	R2.3		φ8.2～φ9.0

■ M4 screw assembly type

Unit：mm

Part No.	(A)	B	(C)	D	E	F	Applicable cable diameter
FGC-3 M4	R1.8	9.5	13.5	3.0	R1.5	φ4.2	φ2.7～φ3.5
FGC-5 M4	R3.0	10.7	14.7	4.3	R2.0		φ5.0～φ5.5
FGC-8 M4	R4.8	12.5	16.6	6.5	R2.3		φ8.2～φ9.0

FG CLAMP／FGCS



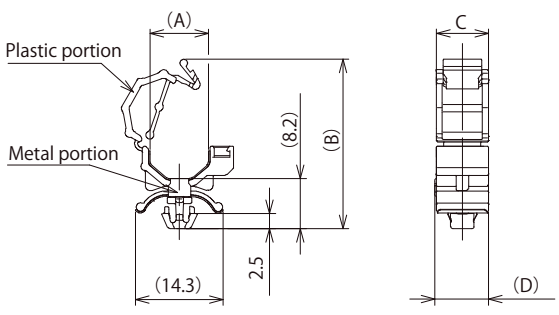
FG function combined wiring clamps

Feature

- Part numbers reduced through the integration of the plastic clamp and the metal FG component.
- Plastic and metal portions can be separated for disposal.
- Easily detachable cables allow improvement for maintenance.

Material

- Plastic portion / nylon 66 (Natural / UL94V-0)
- Metal portion / Phosphor bronze (Sn plating)



Installation specifications

- Board thickness : t0.8～1.6
- Hole diameter : $\phi 4.8^{+0.2}_{0}$

Unit：mm

Part No.	(A)	(B)	C	(D)	Applicable cable diameter
FGCS-5	7.0	23.3	5.5	5.7	φ5.0～φ5.5
FGCS-8	9.5	27.5	8.5	8.7	φ7.0～φ8.5

FG SPACER／FGS

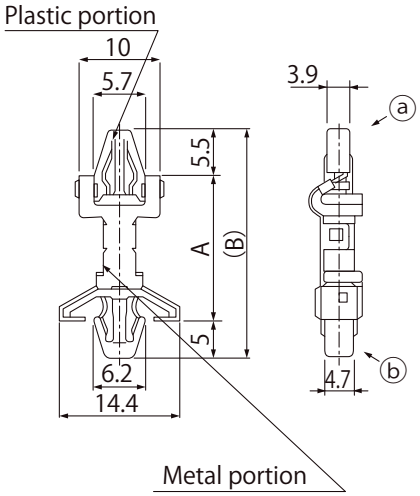
Screw free fixing spacer is combined with EMC grounding function.

Feature

- Grounding at the center of the PC board is easily achieved.
- Suitable for total cost downsizing through high workability and reduction of part numbers.

Material

- Plastic portion / PPHOX(Black / UL94V-0)
- Metal portion / Phosphor bronze (Sn plating)



Installation specifications

■ ⓐ : Board thickness／t＝1.6～2.0mm
Hole diameter／ϕ 4.0$^{+0.1}_{0}$ mm

■ ⓑ : Board thickness／t＝1～2.0mm
Hole diameter／ϕ 4.8$^{+0.1}_{0}$ mm

Unit : mm

Part No.	A	(B)
FGS-3S	9.8	20.3
FGS-4S 1	11.4	21.9
FGS-6S	14.4	24.9
FGS-8S	17.7	28.2
FGS-9S	20.0	30.5

FG GUIDE RAIL／FGR-80WSP

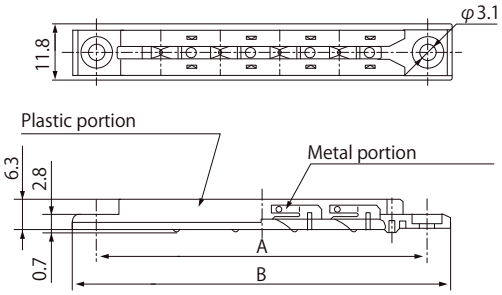
Grounding function added to the PC board guide rail

Feature

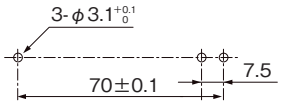
- Contact fingers of the guide sandwiches the PC board so that grounding is achieved from either top or bottom face.
- Spherical profile of the contact area prevents any damage to the PC board pattern.
- Assemble using M3 screws or nylon rivets.

Material

- Plastic portion / Polycarbonate (Black / UL94V-2)
- Metal portion / Phosphor bronze (Sn plating)



Installation specifications



Unit：mm

Part No.	A	B
FGR-80WSP	70	80

FG MESH／FGM

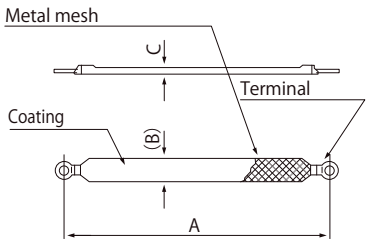
Metal mesh employed EMC grounding material

Feature

- Excellent flexible structure comprises metal wires braided into a cylinder mesh, coated with insulator.
- Large surface area of conductive mesh provides excellent impedance characteristics in the high frequency range.

Material

- Mesh / Tinned copper wire
- Terminal / Round terminal
- Coating / Heat shrink tube (black)



■ M3 screw assembly type

Unit：mm

Part No.	A	(B)	C
FGM-50-M3	50	8.5	2.5
FGM-100-M3	100		
FGM-150-M3	150		
FGM-200-M3	200		

■ M4 screw assembly type

Unit：mm

Part No.	A	(B)	C
FGM-50-M4	50	8.5	2.5
FGM-100-M4	100		
FGM-150-M4	150		
FGM-200-M4	200		

※Please contact our sales department for sizes outside of those specified.

ELECTROMAGNETIC WAVE MANAGEMENT SHEET

ELECTROMAGNETIC NOISE SUPPRESSION SHEETS

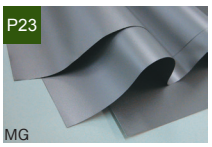
Near field EMI suppression with easy assembly. Simply attach, sandwich and wrap around

Magnetic metal filler type
Heat resistance upto 150°

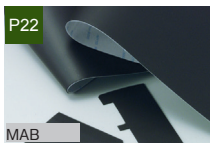
Soft ferrite

Thermal conductivity

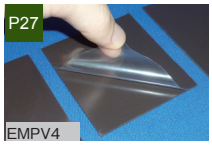
Ferrite sheet



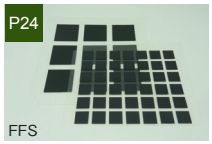
MG ABSORPTION SHEET



EMI ABSORPTION SHEET



COOLPROVIDE®

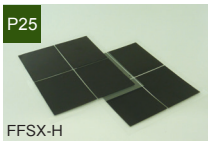


SMARTPLY®

FERRITE SHEET For RFID/NFC

Improvement of the communication efficiency of RFID/NFC(13.56MHz)

Ferrite sheet

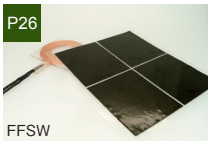


SMARTPLY®

FERRITE SHEET For WIRELESS CHARGING

Suitable for improvement of wireless charging efficiency and its shielding of leakage magnetic field.

Ferrite sheet

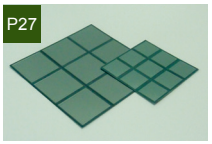


SMARTPLY®

MAGNETIC SHIELDING SHEET

Effective suppression against electromagnetic noise at low frequency and leakage of magnetic flux

Magnetic foil film



MAGNEFILM

ELECTROMAGNETIC NOISE SUPPRESSION SHEET

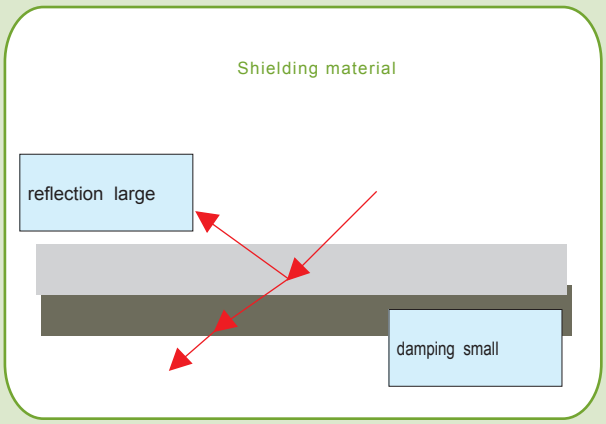
Effective suppression of electronic equipment noise

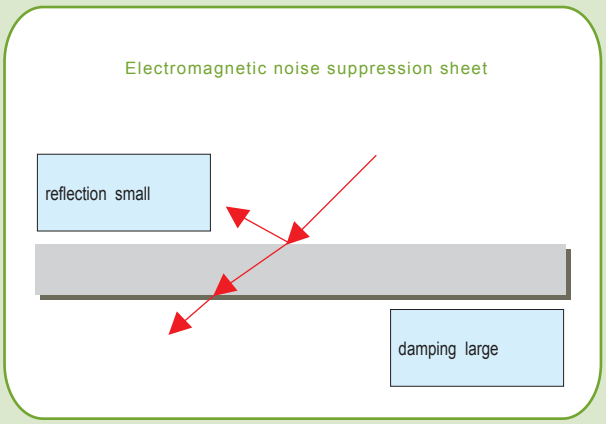
Feature

- Noise is easily suppressed with the simple assembly. Attach, sandwich and wrap around.
- Broad range of variations, sheet, core, heat-conductive types etc.
- Custom cutting and secondary processing are available.

Noise damping

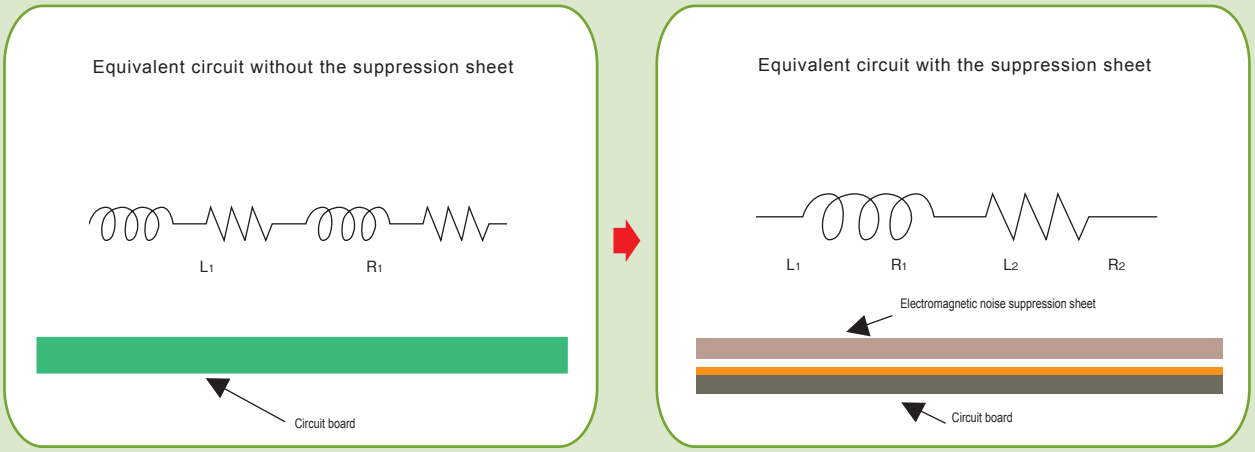
Noise level is lowered by loss effect of magnetic substance,
with smaller reflection suffered by conductive shielding materials.





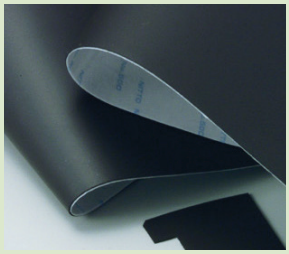
Suppression of antenna effects decreases the noise.

Radiation noise is emitted by cables or patterns acting as an antenna.
The magnetic substance reduce the noise by minimizing such antenna effects.



Electromagnetic Noise Suppression Sheets

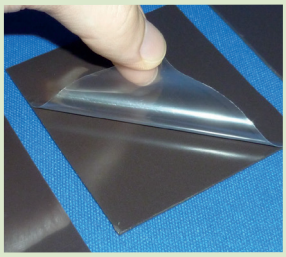
Sheet



MAB / MG-03A

Flexible resin based product has a wide range of applications.

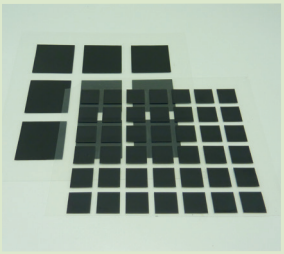
Electromagnetic noise suppression sheet



EMPV4

Electromagnetic noise suppression sheet with high permeability and posible thermal management.

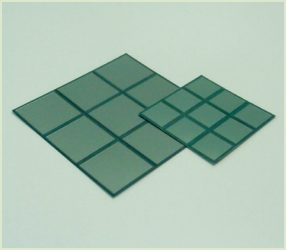
Ferrite sheet



FFS/FFSX-H/FFSW

Achieve a good balance between thinned ferrite and high-performance with the new manufacturing process.

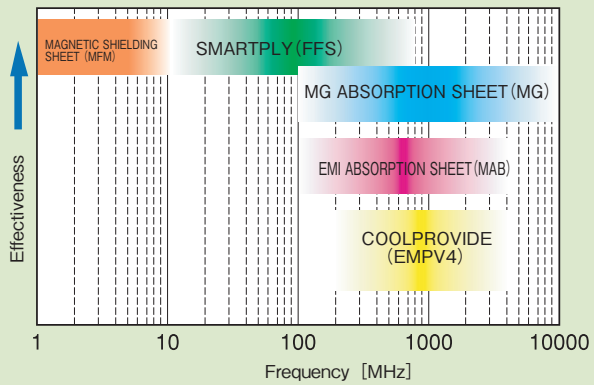
Magnetic shielding sheet

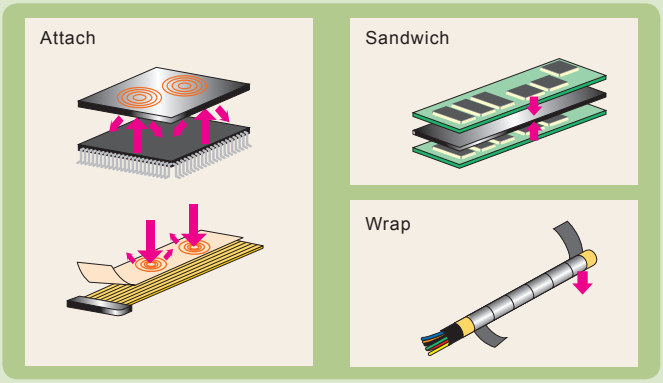


MFM

Effective for reducing electromagnetic noise at low frequencies and against leakage of magnetic flux. Problems for which the usual absorption sheet is not sufficient.

Property comparison (reference)





EMI ABSORPTION SHEET／MAB

Flexible sheet consists of resin with soft ferrite filler

Feature

- Sheet thickness, 0.4 - 4.0mm are available.
- Flexible and easy handling.

Material

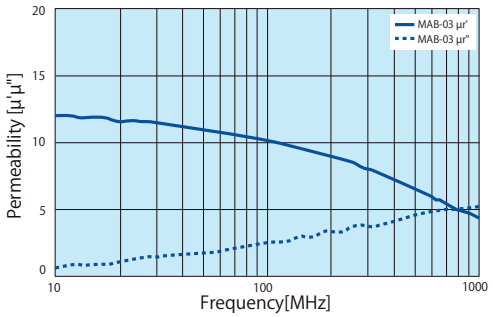
- Soft ferrite + resin

Part No.	MAB-03
(mm)※ Thickness	0.4/1.0/2.0/4.0
(Ω·cm) Volume resistivity	10^{12}
Flame resistance	UL94V-0※
Material	Soft ferrite + resin
Feature	Various thickness

※Adhesive tape not included

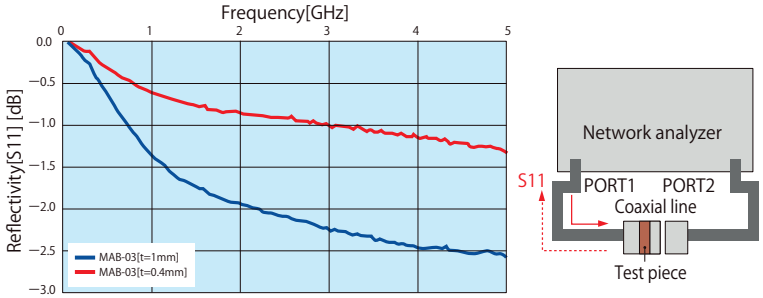
Properties

Permeability

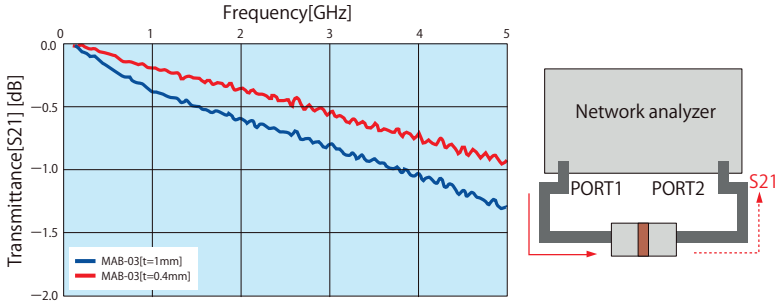


※The values are measured data for reference, not guaranteed.

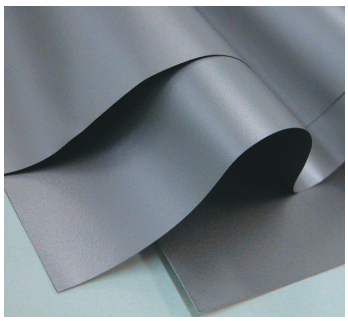
Reflection loss



Transmission loss



MG ABSORPTION SHEET／MG-03A



High performance type mixed with magnetic metal filler

Feature

- Excellent processability, with secondary processing provided to fit the specific application.

Material

- Refer to the table below.

Variations

Part No.	MG-03A
(mm)／Thickness※	0.5/1.0
(μr')／Permeability	25/10MHz
Ω·cm) Volume resistivity	10^7
Flame resistance	UL94HB Equivalent to UL 94 HB
Material	Magnetic metal material + rubber

※Adhesive tape not included

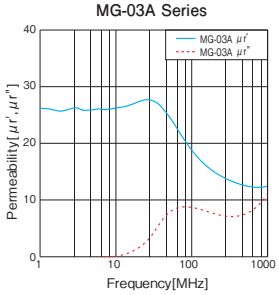
MG-03A

Heat-resistance has been improved up to 150℃.

- Heat-resistant rubber based material enables application at wide range of temperature from -40 to 150℃.
- No chlorine or bromine materials are used.

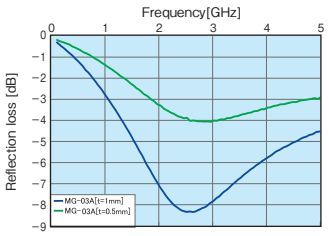
■ Permeability

MG-03A Series



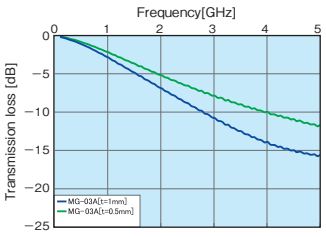
■ Reflection loss

MG-03A Series



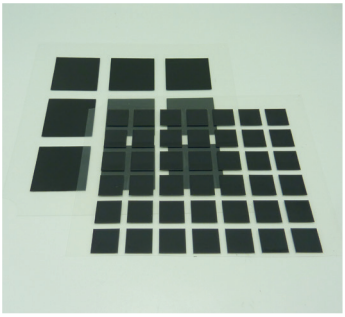
■ Transmission loss

MG-03A Series



※The values are measured data for reference, not guaranteed.

SMARTPLY／FFS



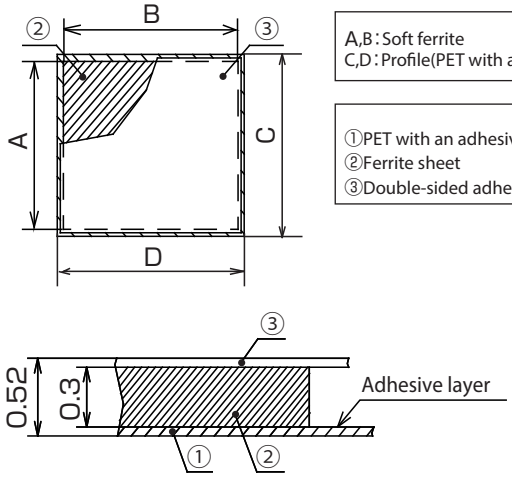
High performance ferrite sheet achieves excellent noise suppression simply by affixing it to desired areas.

Feature

- Excellent noise suppression in low frequency range compared to metal filler electromagnetic noise suppression sheet.
- Heat resistant tape allows application for areas where temperature can be elevated.
- Excellent insulation property due to its sintered body.

Material

- PET with adhesive layer
- Ferrite sheet
- Double-sided adhesive tape



A,B：Soft ferrite
C,D：Profile(PET with adhesive layer)

①PET with an adhesive layer
②Ferrite sheet
③Double-sided adhesive tape

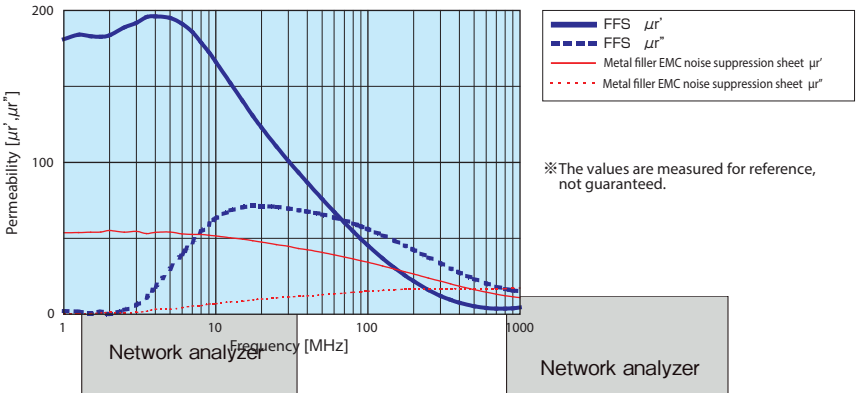
Dimensions

Unit：mm

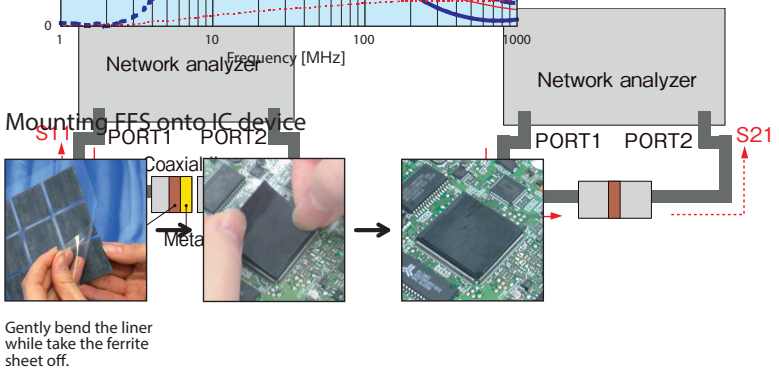
Part No.	A	B	C	D
FFS-0.3-1010T	10	10	11.5	11.5
FFS-0.3-1020T		20		21.5
FFS-0.3-1515T	15	15	16.5	16.5
FFS-0.3-2020T	20	20	21.5	21.5
FFS-0.3-2030T		30		31.5
FFS-0.3-2525T	25	25	26.5	26.5
FFS-0.3-3030T	30	30	31.5	31.5
FFS-0.3-5050T	50	50	55	55

※Custom designs available.
Please contact our sales representative for further information.

Properties



※The values are measured for reference, not guaranteed.

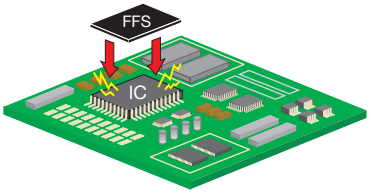


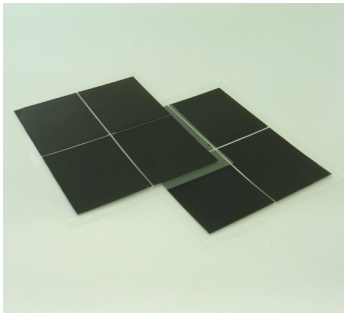
Gently bend the liner while take the ferrite sheet off.

※It is not advisable to reuse the product once it is removed.

Application

■ EMC suppression for IC



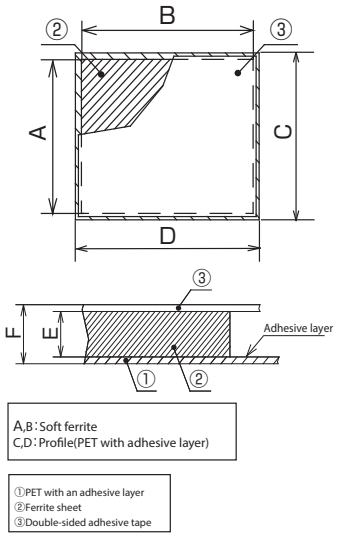


RFID・NFC(13.56MHz)

Ferrite sheet for metal interference solution for RFID and NFC (13.56MHz).

Feature

- Improve the communication performance of RFID reader and tag by suppressing the metal interference.
- Ferrite material in which Q factor has been maximized at 13.56MHz is used for the sheet.
- Sintered material but thin with excellent in flexibility that enables easy design of custom profiles.



Material

- PET with adhesive layer
- Ferrite sheet
- Double-sided adhesive tape

Dimensions

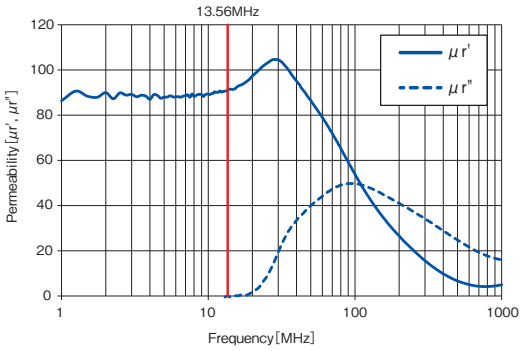
Unit：mm

Part No.	A	B	C	D	E	F
FFSX-0.1H-5060T	50	60	51.5	61.5	0.1	0.21
FFSX-0.2H-5060T					0.2	0.31
FFSX-0.3H-5060T					0.3	0.41

※Custom designs available. Please contact our sales representative for further information.

Properties

■ Permeability



※The values are measured data for reference, not guaranteed.

■ Coupling loss between antennas

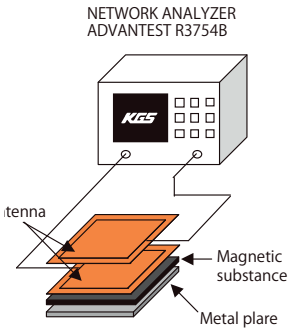
◆Test specification

Antenna

Size	31×42mm(Inner diameter)
Number of turn	3turns
Gap between antennas	3mm
Gap to metal plate	1mm

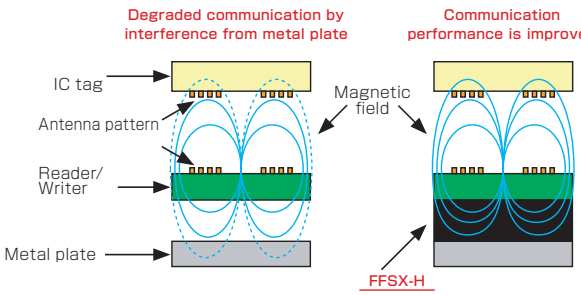
Magnetic substance

Size	50×60mm
Gap to antenna	0mm(Contact)
Thickness	FFSX-0.3H:t0.3mm
	FFS-0.3:t0.3mm

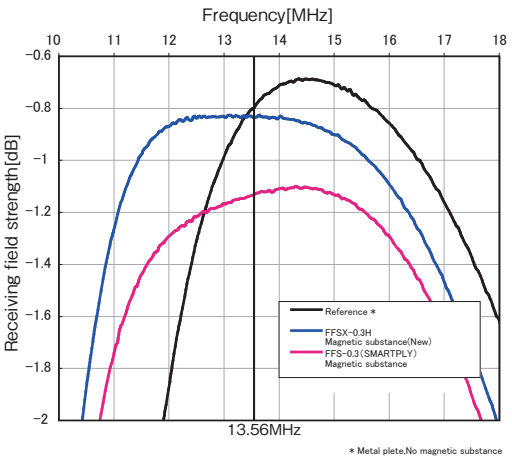


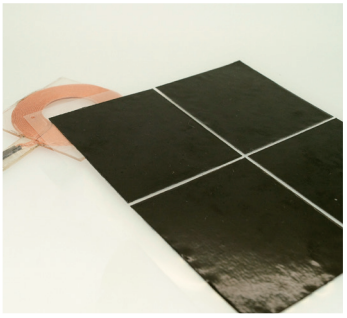
Application

■ Contactless IC smart card system



◆Receiving field strength measurement





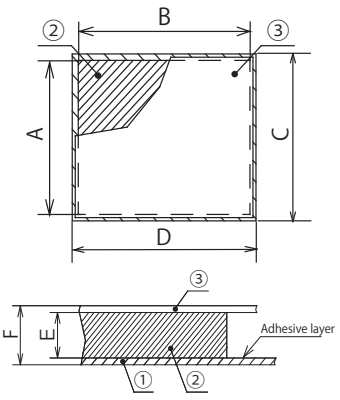
Thinner and flexible ferrite sheet for wireless charging

Feature

- It is higher permeability magnetic sheet which is suitable for magnetic shield and improving performance of wireless charging system according to international standard around 100kHz such as Qi standard.
- Sintered ferrite material with flexibility enables higher drop impact resistance.
- Suitable for thinner design of module. (Total thickness of product: 0.21mm)
- Custom profile is available upon request.

Material

- PET with adhesive layer
- Ferrite sheet
- Double-sided adhesive tape



A,B：Soft ferrite
C,D：Profile(PET with adhesive layer)

①PET with an adhesive layer
②Ferrite sheet
③Double-sided adhesive tape

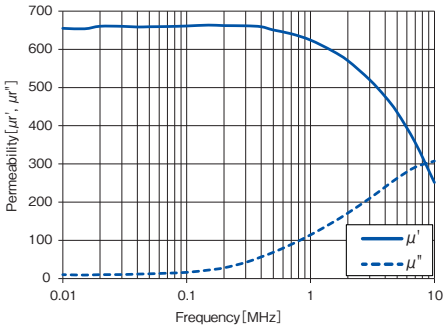
Unit：mm

Part No.	A	B	C	D	E	F
FFSW-0.1-5060T	50	60	52	62	0.1	0.21

※Custom designs available. Please contact our sales representative for further information.

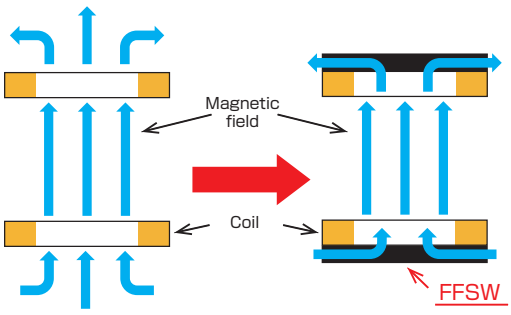
Properties

■ Permeability



Application

■ Wireless charging system

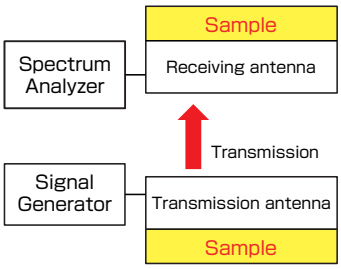


・Magnetic field generated in charge is shield, and do not affect the other elements.
・It is improved magnetic rotation and charging efficiency, too.

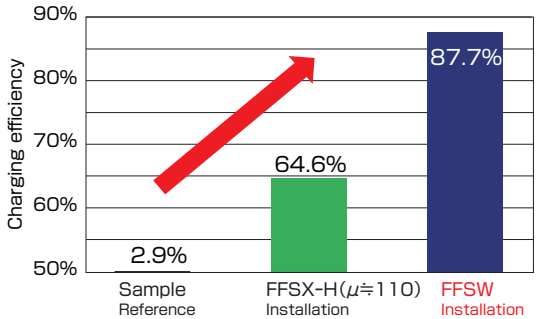
■ Charging efficiency between antennas.

◆**Test specification**

Operating frequency	100kHz
Gap between two antennas	10mm
Antenna size	φ50mm



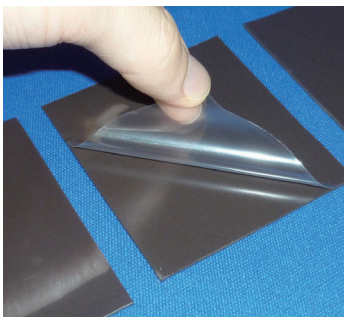
◆**Measurement results**



Charging efficiency is improved !!

※The values are measured data for reference, not guaranteed.

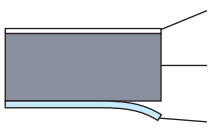
COOLPROVIDE／EMPV4



Electromagnetic noise suppression sheet with high permeability and posible thermal management

Feature

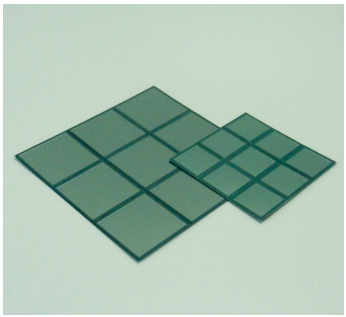
- Lower hardness(ASKER C40), high permeability(μ'=13) was realized as non silicone thermally conductive sheet.
- Due to lower hardness, it enables intimate contact and low load to the element while in mounting.
- Because of a non-silicon material, siloxane is not contained.
- Recommended operating temperature range is -40℃～110℃.



※The values are measured data for reference, not guaranteed.

Part No.	EMPV4
Thickness	1.0／1.5／2.0
(W/m･K) Thermal conductivity	1.5
Hardness	40
(at 10MHz) Permeability	13
(Ω･cm) Volume resistivity	1.0×10^{12}
Color	Black
Flammability	Equivalent to V-0

MAGNEFILM／MFM



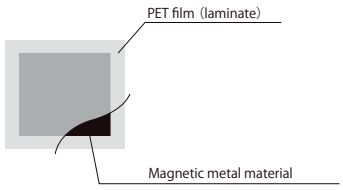
Effective for electromagnetic noise at low frequency and leakage of magnetic flux

Feature

- Magnetic foil laminated with plastic film.

Material

- Magnetic metal foil + PET film

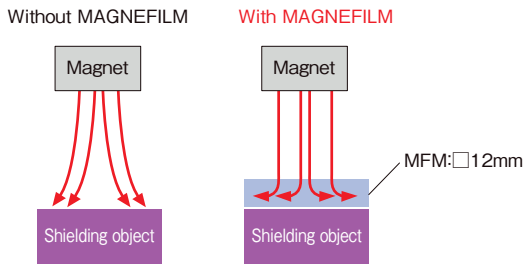


Part No.	MFM-1-0.2-012012T	MFM-1-0.2-020020T
(mm) Dimension	□12(Magnetic foil) □12 (Magnetic foil) □14(Laminate)	□20(Magnetic foil) □20 (Magnetic foil) □22(Laminate)
(mm) Thickness	0.2(Including adhesive layer)	
(10MHz) Permeability	65	

Properties

■ For Magnetic interference

●Magnetic measurement using a gauss meter

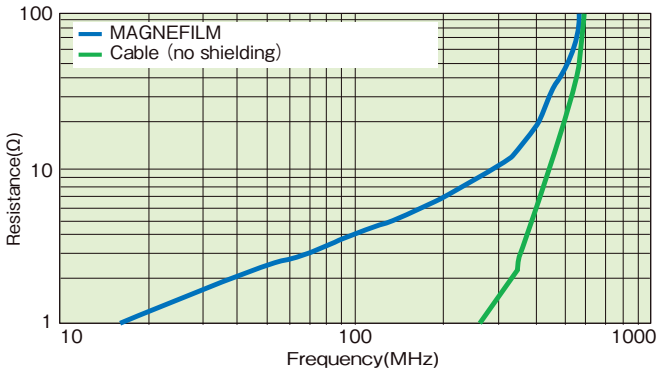


MAGNEFILM	Reading	Attenuation
None	4.78mT	———
1 sheet	3.39mT	29%
2 sheets	2.14mT	55%

(mT：Milli-Tesla)

■ For Electromagnetic wave

●Measurement of resistance element



High loss effect is achieved at low frequency with MAGNEFILM on both sides of FPC (Length : 10cm).

FERRITE CORE PRODUCTS

TOROIDAL / SLEEVE TYPE

Provided with plastic housing and fixtures for labor-saving assembly

Sleeve cores with plastic housing

Split type

P30


SLEEVE FERRITE CLAMP

P31


HIGH μ FERRITE CLAMP

P32


LOW CUT FERRITE CLAMP

Heat resistant type

P33


LOW CUT FERRITE CLAMP

Toroidal cores with plastic housing

Split type

P34


TOROIDAL FERRITE CLAMP

P35


TOROIDAL FERRITE CLAMP

P35


TOROIDAL FERRITE CLAMP

Toroidal cores with plastic housing

P36


SLEEVE FERRITE CLAMP

Sleeve cores

Non Split type

P37


RIB CORE

P38

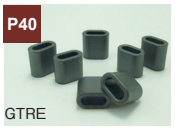

SLEEVE CORE

P40


GRIP CORE

Toroidal cores

Non Split type

P40


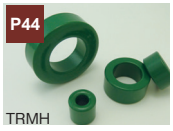
TOROIDAL CORE

P41

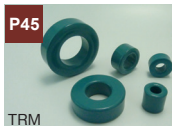

TOROIDAL CORE

P43

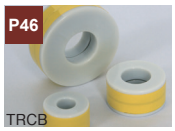

BROAD EFFECT CORE

P44


LOW CUT CORE (High μ type)

P45


LOW CUT CORE

P46


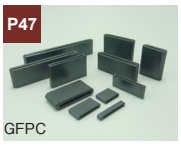
LOW CUT CORE TOROIDAL CORE

FLAT TYPE

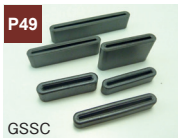
For a flat cable and FPC

Flat cores

Non Split type

P47


FPC CORE

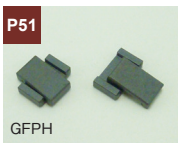
P49


FLAT CORE

Split type

P50


FLAT CORE

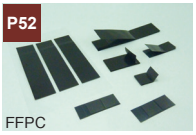
P51


SPLIT FPC CORE

P51


OPEN CIRCUIT CORE

Smartply

P52


SMARTPLY

Flat cores with resin clamp

EFC

P53


BLOCK CORE

Split type

P54


BLOCK CORE

Split type

P55


FLAT CORE

Others

Other ferrite

Non Split type

P56


FINEMET CORE

P57

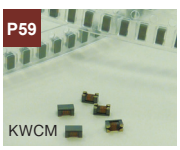

AMORPHOUS CORE

P57


METAL CORE

P58


RADIATION NOISE ELIMINATION FILTER

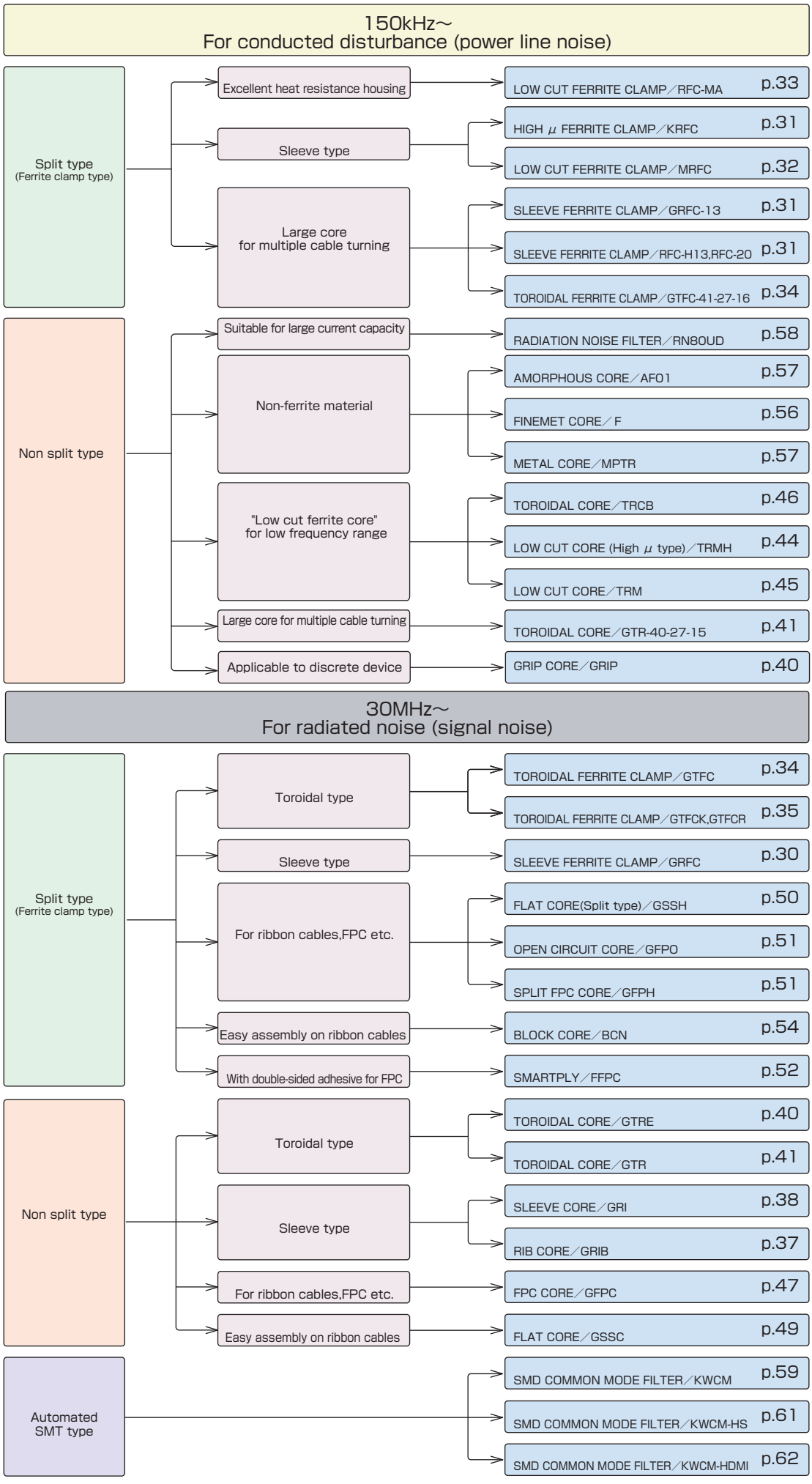
P59


SMD COMMON MODE FILTER

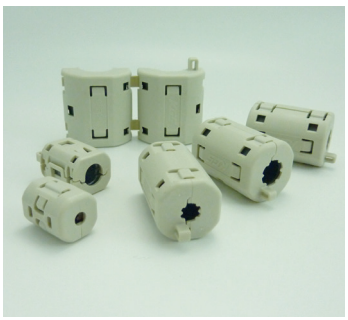
P63


CHIP BEADS FILTER

FERRITE CORE SELECTION CHART



SLEEVE FERRITE CLAMP／GRFC ／ RFC



Fair-Surface type with no protrusion of snap or hinge parts

Feature

- Split ferrite cores with plastic housing for easy fixing on assembled cables or cables with connectors.
- Cable tie can assist to hold electric wires and enables the product to be fixed to wire harness. (Excluding GRFC-3/4,RFC-H13,RFC-20)
- Wire guiding system prevents wires from being pinched when winding assembly.

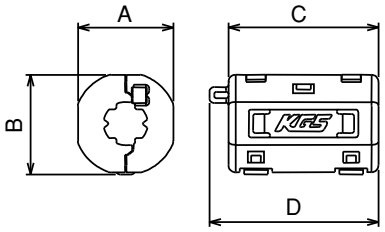
RFCK2-20 (RFC-20 with mounting fixture is available. Contact us for the details.)

Material

- Ferrite Core：Soft ferrite
  Housing：PA66　(Color：Light gray／Flammability：UL94V-0)
  (Color：Black／Flammability：UL94V-2)

※ Black type has "BK" at the end of the part number.

※RFC-H13, RFC-20 have different configurations. Contact us for the details.

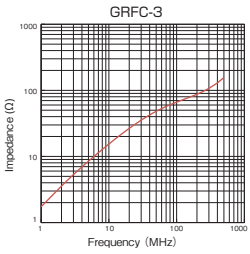


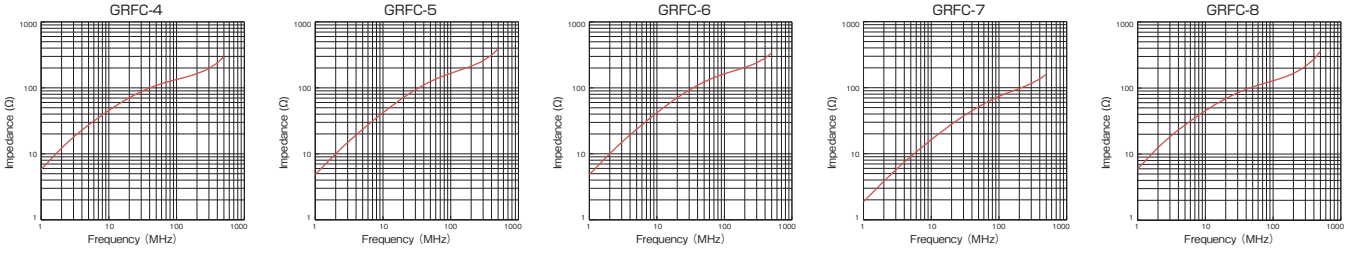
Unit：mm

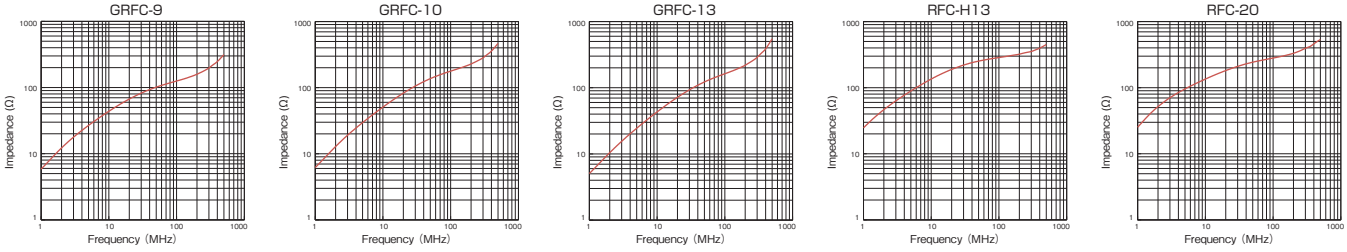
Part No.	A	B	C	D	Applicable cable diameter	Impedance* Ω/100MHz (1 turn)
GRFC-3	13.7	13.5	18.0	–	φ3.0～4.0	≧ 35
GRFC-4	13.7	13.5	27.5	–	φ3.5～4.5	≧ 75
GRFC-5	18.1	18.4	31.5	35.5	φ4.5～5.5	≧100
GRFC-6	18.1	18.4	31.5	35.5	φ5.5～6.5	≧100
GRFC-7	14.25	15.8	20.0	24.0	Max.φ7	≧ 45
GRFC-8	20.1	20.4	31.5	35.5	φ7.5～8.5	≧ 75
GRFC-9	20.1	20.4	31.5	35.5	φ8.5～9.5	≧ 75
GRFC-10	26.3	26.4	32.4	37.2	φ9.5～10.5	≧105
GRFC-13	29.1	29.4	31.5	36.3	φ12.5～13.5	≧ 95
RFC-H13	31.7	29.4	41.0	–	φ12.5～13.5	≧170
RFC-20	40.0	40.0	47.0	–	Max.φ20	≧180

※Contact us for the measurement conditions.

Impedance vs frequency

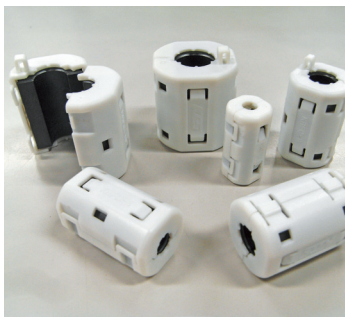






※The values are measured data for reference, not guaranteed.

HIGH μ FERRITE CLAMP／KRFC



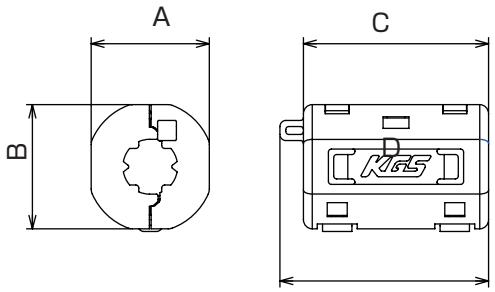
Split ferrite clamp for intermediate frequency range from 3 to 50MHz.

Feature

- Effective for suppression both of conducted noise up to 30MHz and radiated noise over 30MHz.
- Split ferrite clamp with plastic housing enables to attach assembled cable and cables with connecter.
- Cable tie can assist to hold electric wires and enables the product to be fixed to wire harness. (Excluding KRFC-4)
- Wire guiding system prevent wires from being pinched when winding assembly.

Material

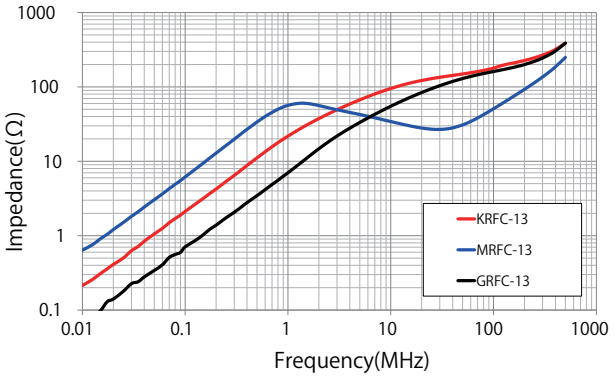
- Ferrite Core：Soft ferrite
  Housing：PA66　(Color：natural／Flammability：UL94V-0)

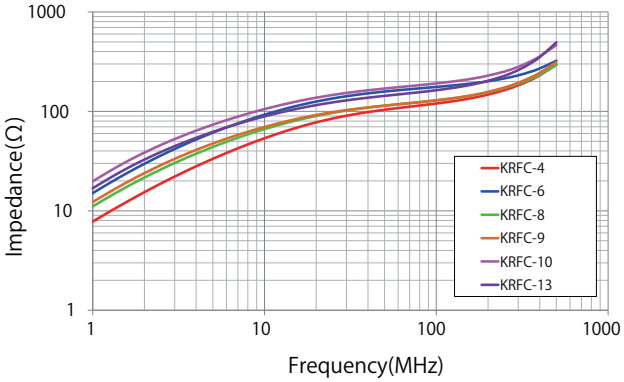


Unit：mm

Part No.	A	B	C	D	Applicable cable diameter	Impedance(Ω) 100MHz (1 Turn)
KRFC-4	13.7	13.5	27.5	–	φ3.5~4.5	≧ 70
KRFC-6	18.1	18.4	31.5	35.5	φ5.5~6.5	≧ 110
KRFC-8	20.1	20.4	31.5	35.5	φ7.5~8.5	≧ 80
KRFC-9	20.1	20.4	31.5	35.5	φ8.5~9.5	≧ 80
KRFC-10	26.3	26.4	32.4	37.2	φ9.5~10.5	≧ 120
KRFC-13	29.1	29.4	31.5	36.3	φ12.5~13.5	≧ 105

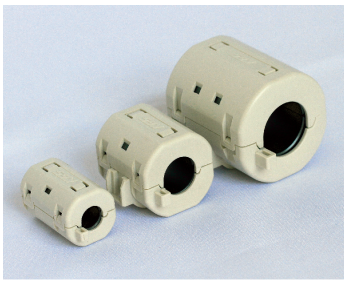
Impedance vs frequency





※The values are measured data for reference, not guaranteed.

LOW CUT FERRITE CLAMP／MRFC



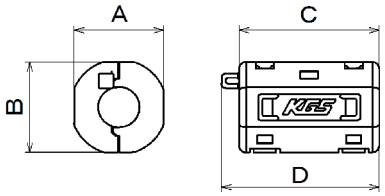
Ferrite clamp or low-frequency range with UL94V-0 housing.

Feature

- Effective solutions for suppression of disturbance from switching power supply and motor.
- Due to conditioning the ferrite material, the product is suitable for suppressing low frequency noise from 150kHz to 30MHz.
- With optional mounting fixture, the product can be assembled on enclosure by screw.(MRFC-13, MRFC-20)

Material

- Ferrite Core：Soft ferrite
  Housing：PA66　(Color：Light gray／Flammability：UL94V-0)

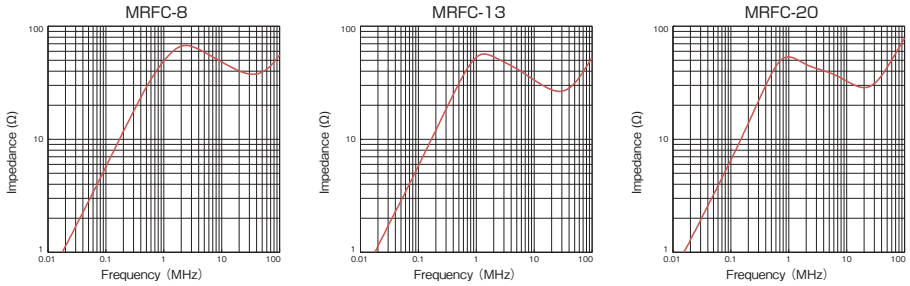


※MRFCK2-20 is provided
with mounting fixtures on both side.

Unit：mm

Part No.	P/N for the product with fixture	Applicable cablediameter	A	B	C	D	Impedance Ω/10MHz (1turn)
MRFC-8	—	Max.φ8.5	20.1	20.4	31.5	35.5	≧ 20
MRFC-13	MRFCK-13	Max.φ13.5	29.1	33.05	32.3	37.1	≧ 20
MRFC-20	MRFCK2-20	Max.φ20.0	40.3	40	47	53.5	≧ 20

Impedance vs frequency



LOW CUT FERRITE CLAMP／RFC-**MA

Ferrite clamp with excellent heat resistance, effective for prevention of conducted/radiated noise in low-frequency range

Feature

- Operating temperature: -40°C to +125°C
- Suitable for suppression of low-frequency noise (150kHz to 30MHz) of power supply system.
- Split type Ferrite Clamp, making it easy to apply to assembled wires.
- Housing with anti-slip means for cable tie around its outer side. Highly reliable because of the lock of the housing as well as the fastening of the tie. *Excluding RFC-20MA
- The material of the plastic housing is UL94V-2 certified.

Material

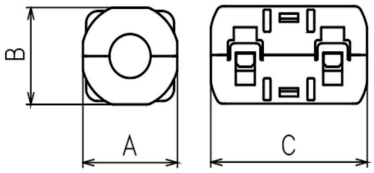
- Ferrite Core：Soft ferrite
  Housing：PA66　(Color：Natural／Flammability：UL94V-2)

Application

● Vehicle ECU, inverter, low-frequency noise prevention by motor drive

Specification

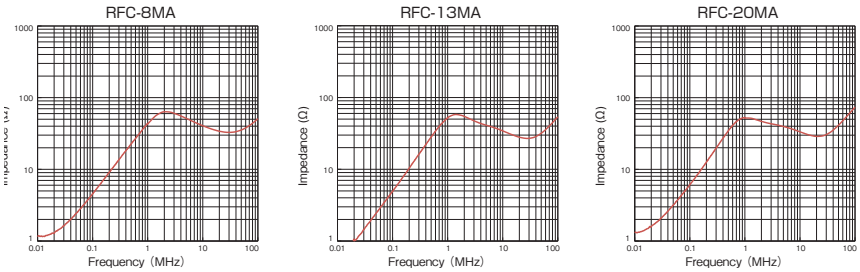
slip-proof for band



Unit：mm

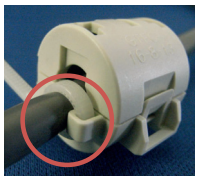
Part No.	A	B	C	Applicable cable diameter
RFC-8MA	20.6	19.8	34.0	ϕ8.5(MAX)
RFC-13MA	29.6	28.4	34.0	ϕ12.5～ 13.5
RFC-20MA	40.0	40.0	47.0	ϕ20(MAX)

Impedance vs frequency



※The values are measured data for reference, not guaranteed.

TOROIDAL FERRITE CLAMP／GTFC



Toroidal design that makes cable easy to turn around it

Feature

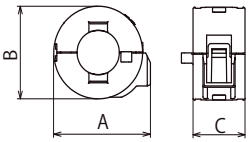
- Split ferrite cores with plastic housing for easy fixing on assembled cables or cables with connectors.
- Cable tie can assist to hold electric wires and enables the product to be fixed to wire harness. (Excluding GTFC-41-27-16)
- Wire guiding system prevents wires from being pinched when winding assembly.

Material

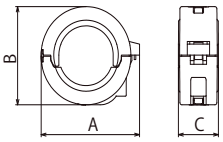
- Ferrite Core：Soft ferrite
- Housing：PA66　(Color：Light gray／Flammability：UL94V-0)

GTFC-**-***-**

Profile ①



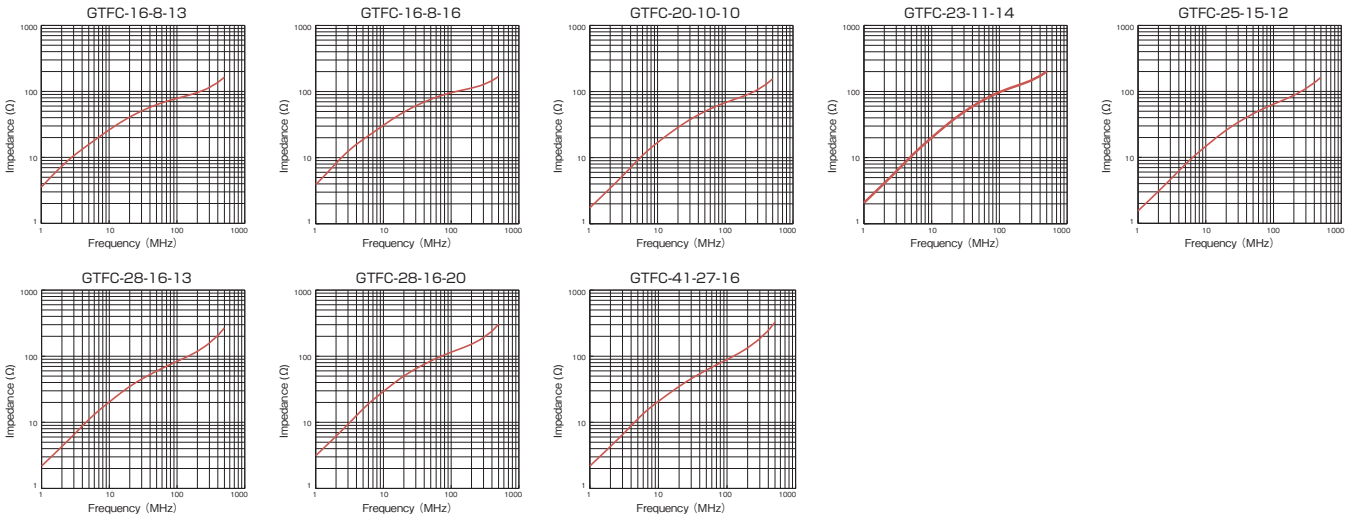
Profile ②(GTFC-41-27-16)



Unit：mm

Part No.	Profile	Applicable cable diameter	A	B	C	Impedance Ω/100MHz (1turn)
GTFC-16-8-13	①	Max.φ7.2	22.3	20.1	18.9	≧ 45
GTFC-16-8-16	①	Max.φ7.2	22.3	20.1	21.9	≧ 55
GTFC-20-10-10	①	Max.φ8.5	27.1	24.9	16	≧ 40
GTFC-23-11-14	①	Max.φ10.5	30.5	28.3	20.2	≧ 55
GTFC-25-15-12	①	Max.φ13	31.1	28.9	17.8	≧ 40
GTFC-28-16-13	①	Max.φ14.7	35.1	32.9	18.8	≧ 50
GTFC-28-16-20	①	Max.φ14.7	35.1	32.9	25.8	≧ 70
GTFC-41-27-16	②	Max.φ26	48.2	44.5	19.6	≧ 50

Impedance vs frequency



※Contact us for the measurement conditions.

TOROIDAL FERRITE CLAMP／GTFCK

Toroidal cores with easily mounting fixture on chassis

Feature

- GTFCK series, which are provided with mounting fixtures, can be assembled on chassis by using a screw.

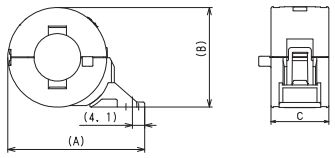
Material

- Ferrite Core：Soft ferrite
- Housing：PA66　(Color：Light gray／Flammability：UL94V-0)

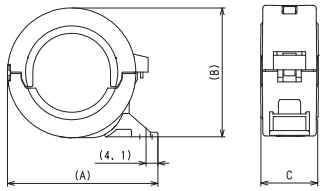
Unit：mm

Part No.	Profile	Applicable cable diameter	A	B	C	Impedance Ω/100MHz (1turn)
GTFCK-16-8-13	①	Max.φ7.2	32.5	20.4	18.9	≧ 45
GTFCK-16-8-16	①	Max.φ7.2	32.5	20.4	21.9	≧ 55
GTFCK-20-10-10	①	Max.φ8.5	37.1	24.9	16	≧ 40
GTFCK-23-11-14	①	Max.φ10.5	40.5	28.3	20.2	≧ 55
GTFCK-25-15-12	①	Max.φ13	41.2	28.9	17.8	≧ 40
GTFCK-28-16-13	①	Max.φ14.7	45.3	32.9	18.8	≧ 50
GTFCK-28-16-20	①	Max.φ14.7	45.3	32.9	25.8	≧ 70
GTFCK-41-27-16	②	Max.φ26	51.8	44.5	19.6	≧ 50

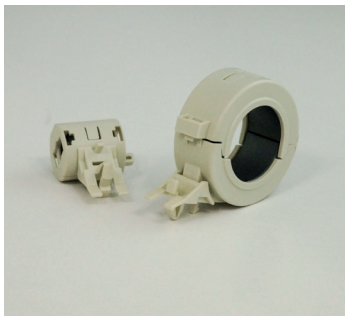
Profile ①



Profile ②



TOROIDAL FERRITE CLAMP／GTFCR



Toroidal cores with removable fixture

Feature

- Snap fastener for re-use is available for the product with fixture "GTFCR".

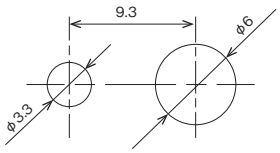
Material

- Ferrite Core：Soft ferrite
- Housing：PA66　(Color：Light gray／Flammability：UL94V-0)

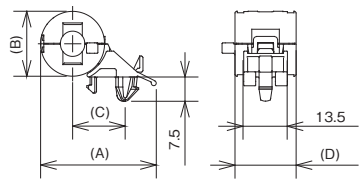
Unit：mm

Part No.	Profile	Applicable cable diameter	A	B	C	D	Impedance Ω/100MHz (1turn)
GTFCR-16-8-16	①	Max.φ7.2	35.8	20.1	16.3	21.9	≧ 55
GTFCR-41-27-16	②	Max.φ26	55.2	44.5	23.6	19.6	≧ 50

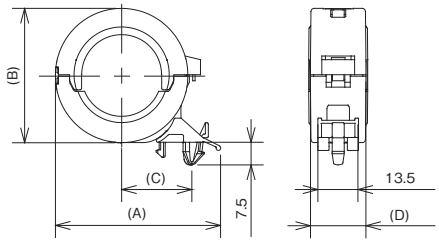
Mount hole



Profile①

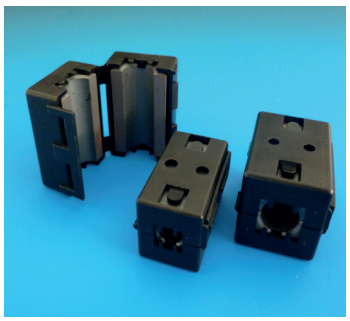


Profile②



※The values are measured data for reference, not guaranteed.

SLEEVE FERRITE CLAMP／KCF



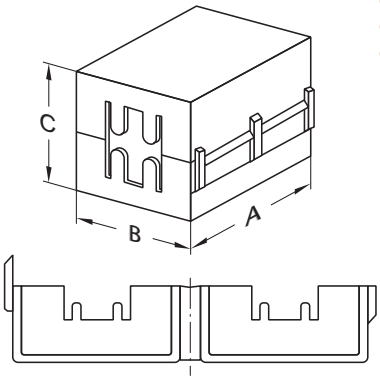
Split cores with plastic housing for easy installation on wired cables

Feature

- Split construction permits easy insertion on pre-installed cable and installed or cables with connectors.
- Kept in a plastic case, ferrite will not crack or chip. (UL 94 V-2)
- Cable is fixed firmly by plastic housing

Applications

- For noise problems arising from office automation equipment or other digital equipment.
- Internal and external power cable.
- Internal cables between PC boards and data connectors.
- White Plastic case available.



Unit: mm

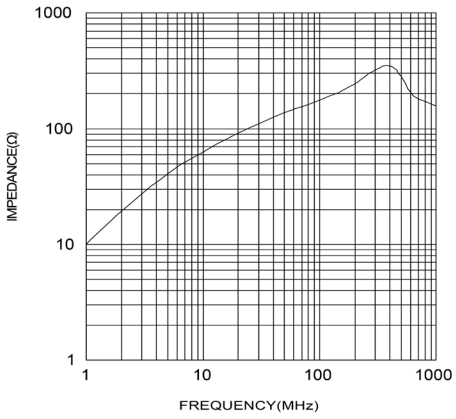
Part No.	(A)	(B)	C	Max. cable diameter	Impedance* (Ω) 25MHz	Impedance* (Ω) 100MHz
KCF-50*	23.0	15.0	14.0	ø5.0	93	157
KCF-65*	32.6	17.8	19.2	ø6.5	176	267
KCF-100*	32.6	22.5	23.0	ø10.0	151	226
KCF-130*	32.7	29.2	30.2	ø13.0	152	228

*Contact us for the measurement conditions.

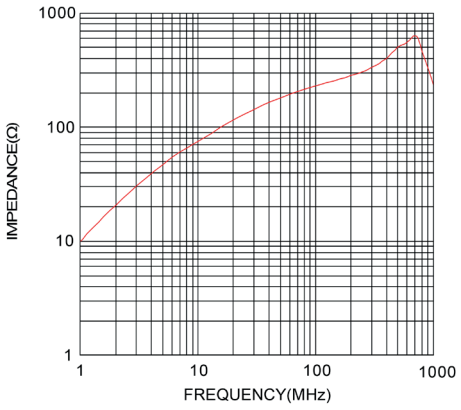
* White type is without ending / Black type has "BK" at the end of the part number

Impedance vs frequency properties*

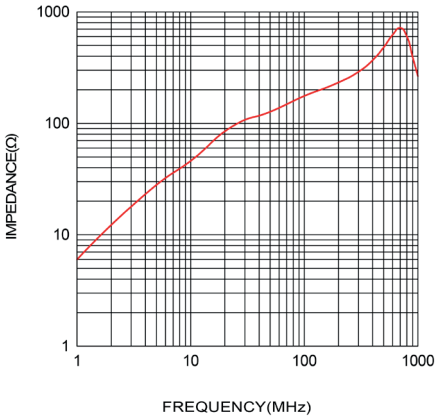
KCF-50



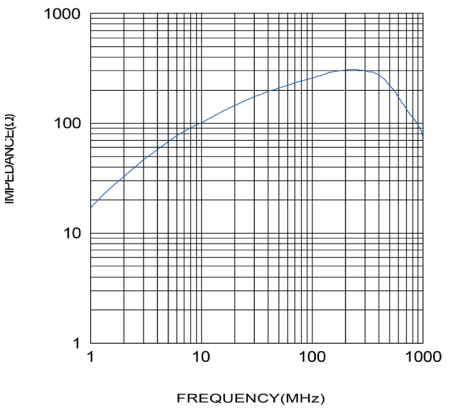
KCF-65



KCF-100



KCF-130



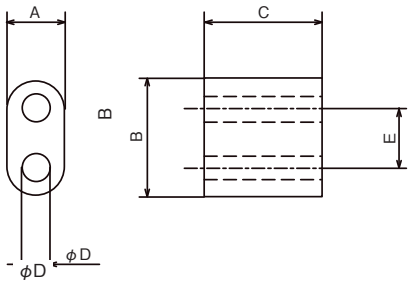
*The values are measured data for reference, not guaranteed.

2 hole type small core

Material

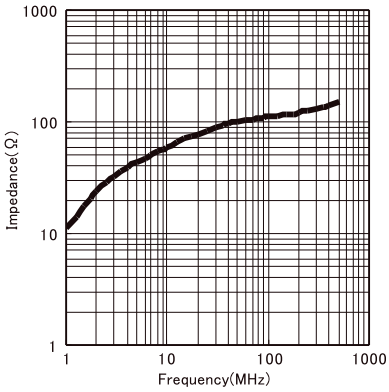
- Soft ferrite

Unit：mm



Impedance vs frequency

GRIB-3.5-7-7



※The values are measured data for reference, not guaranteed.

Part No.	A	B	C	ϕD	E	Impedance* Ω/100MHz (1 turn)
GRIB-3.5-7-7	3.4	6.9	7.0	1.5	3.5	≧ 75

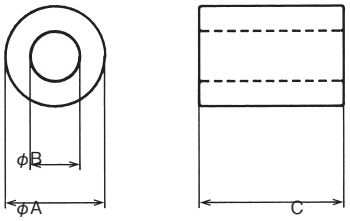
※Contact us for the measurement conditions.

SLEEVE CORE／GRI

Non-split sleeve cores

Material

- Soft ferrite



Part No.	φ A	φ B	C	Impedance*Ω/100MHz（1turn）
GRI-3-4-1	3	1	4	≧ 25
GRI-3.5-3.5-1.2	3.5	1.2	3.5	≧ 25
GRI-3.5-7-1.2	3.5	1.2	7	≧ 40
GRI-4-5-1.5	4	1.5	5	≧ 30
GRI-11-18-5	11	5	18.5	≧ 85
GRI-11-20-5	11	5	20	≧ 90
GRI-11-25-5	11	5	25	≧105
GRI-12-16-8.5	12	8.5	16	≧ 35
GRI-12.3-20-7	12.3	7	20	≧ 70
GRI-14-28-6	14.3	6.3	28.6	≧130
GRI-16-20-7	16	7	20	≧ 95
GRI-16-28-7	16	7	28	≧130
GRI-16-28-8	16	8	28	≧115
GRI-16-28-9	16	9	28	≧ 95
GRI-17.5-28.5-10.7	17.5	10.7	28.5	≧ 85
GRI-18-28-10	18	10	28	≧100
GRI-26-28-13	26	13	28	≧120

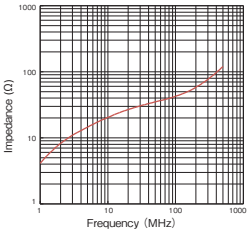
Unit：mm

Contact us for other numbered parts not listed above, and for measurement conditions.
※Contact us for the measurement conditions.

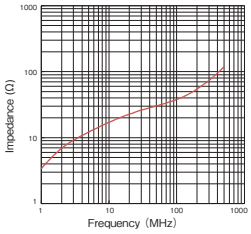
*The values are measured data for reference, not guaranteed.

Impedance vs frequency

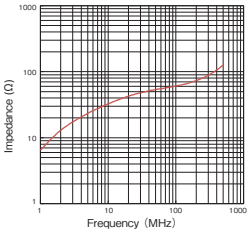
GRI-3-4-1



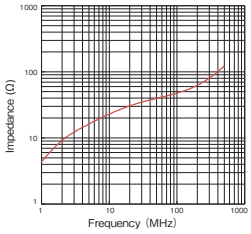
GRI-3.5-3.5-1.2



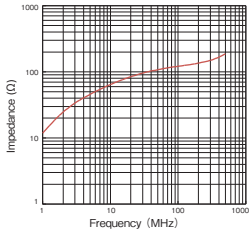
GRI-3.5-7-1.2



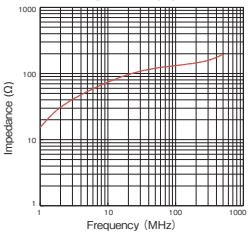
GRI-4-5-1.5



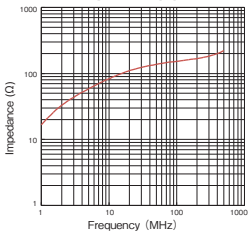
GRI-11-18-5



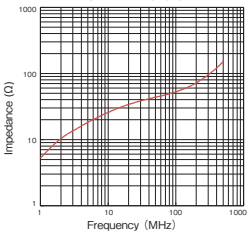
GRI-11-20-5



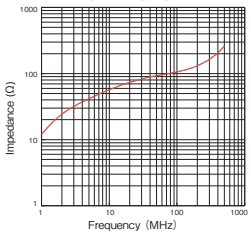
GRI-11-25-5



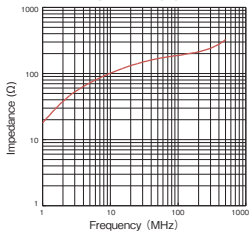
GRI-12-16-8.5



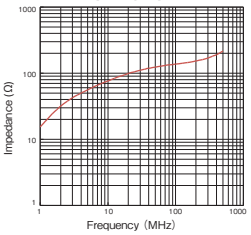
GRI-12.3-20-7



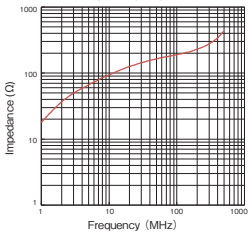
GRI-14-28-6



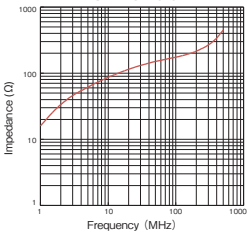
GRI-16-20-7



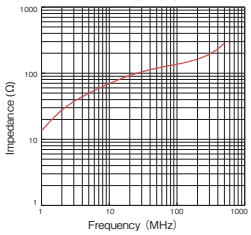
GRI-16-28-7



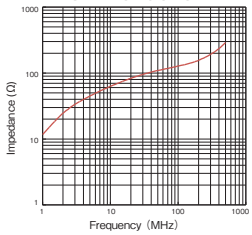
GRI-16-28-8



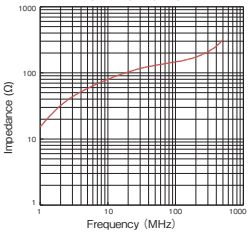
GRI-16-28-9



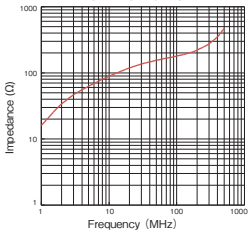
GRI-17.5-28.5-10.7



GRI-18-28-10



GRI-26-28-13



GRIP CORE／GRIP-3.5-1.8-2

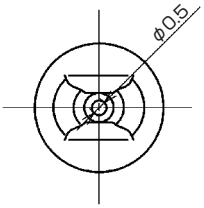
Ferrite core applicable to discrete device without adhesive

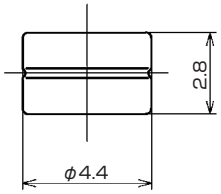
Feature

- Because temporaly fasten is available, it is much easy installation of discrete device with the product onto PC board.
- Fastening with no adhesive can be reduced conventional adhesive dispensing process.
- Ringing suppression is available from FET or diode.

Material

- Soft ferrite
- Silicone rubber

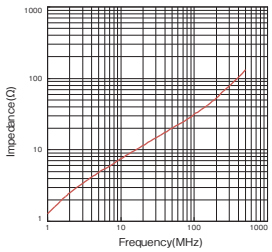




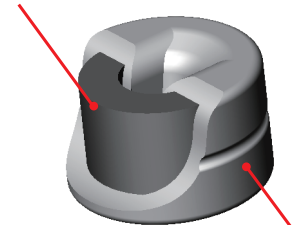
Unit：mm

Part No.	Profile	Height	Clindrical Lead Outer Diameter	Rectangular Leadcross-sectional dimension
GRIP-3.5-1.8-2	ϕ4.4	2.8	ϕ0.6～1.6	0.8～1.5(Width)/0.3～0.7(Thickness)

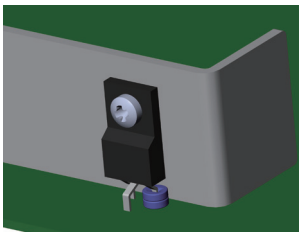
Impedance vs frequency



Ferrite core



■ Application



*The values are measured data for reference, not guaranteed.

TOROIDAL CORE／GTRE

Oval style enables space-saving compared with toroidal type

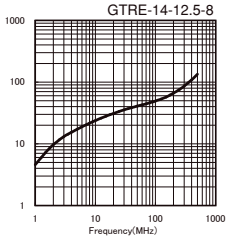
Feature

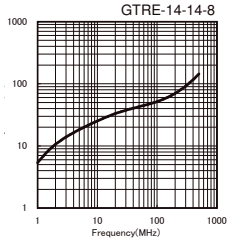
- With cable either single or multiple turns, the over-all profile is lower than toroidal cores (refer to Fig. below).
- Oval shape allows assembly on connected cables with rectangular connectors, etc.

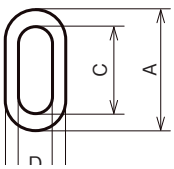
Material

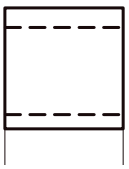
- Soft ferrite

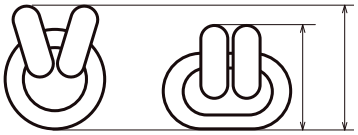
Impedance vs frequency











Unit：mm

Part No.	A	B	C	D	E	Impedance* Ω/100MHz (1 turn)
GTRE-14-12.5-8	14.0	8.0	10.0	4.0	12.5	≧ 30
GTRE-14-14-8					14.0	≧ 35

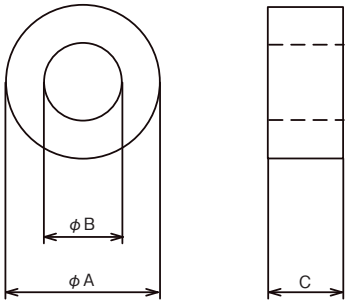
※Contact us for the measurement conditions.

※The values are measured data for reference, not guaranteed.

Non-split toroidal cores

Material

- Soft ferrite



Unit：mm

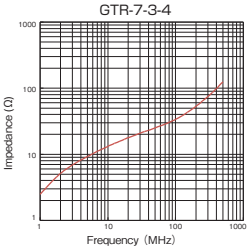
Part No.	φA	φB	C	Impedance* Ω/100MHz (1 turn)
GTR-7-3-4	7	3.5	4	≧20
GTR-9-5-8	9	5	8	≧30
GTR-10-5-5	10	5	5	≧25
GTR-11-5-9	11	5	9	≧45
GTR-12.5-8-12	12.6	8.1	12	≧35
GTR-13-7-6	13	7	6	≧25
GTR-13-7-12.7	13	7.1	12.7	≧45
GTR-14.5-10-8	14.5	10.2	8	≧20
GTR-16-8-13	16.5	8.2	13	≧55
GTR-16-8-16	16.5	8.2	16	≧65
GTR-16-10-7	16	10	7	≧25
GTR-16-10-10	16	10	10	≧30
GTR-18-10-6	18	10	6	≧25
GTR-20-10-5	20.5	10.2	5	≧25
GTR-20-10-10	20.5	10.2	10	≧45
GTR-21-13-6	21.2	12.7	6	≧25
GTR-22-14-10	22	14	10	≧30
GTR-23-11-14	23.6	11.4	14	≧60
GTR-25-15-8	25	15	8	≧30
GTR-25-15-12	25	15	12	≧40
GTR-28-16-13	28	16	13	≧45
GTR-28-16-20	28	16	20	≧70
GTR-31-19-8	31	19	8	≧30
GTR-40-27-15	40.6	27.4	15	≧45

*Contact us for the measurement conditions.

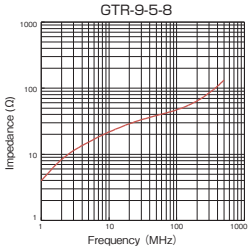
TOROIDAL CORE／GTR

Impedance vs frequency

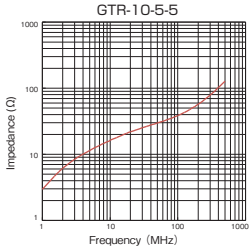
GTR-7-3-4



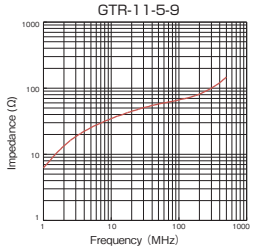
GTR-9-5-8



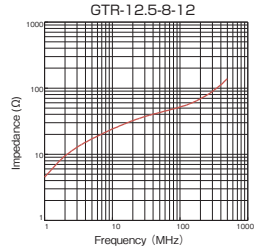
GTR-10-5-5



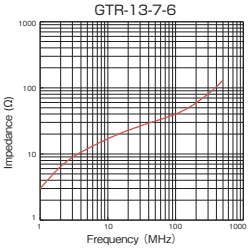
GTR-11-5-9



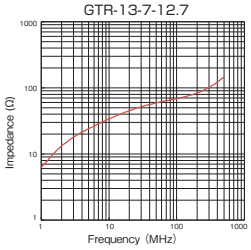
GTR-12.5-8-12



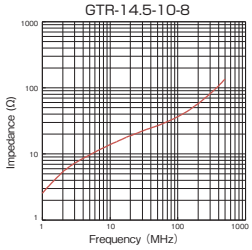
GTR-13-7-6



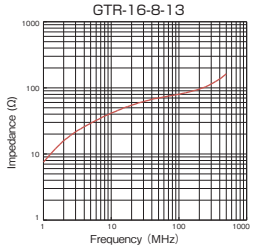
GTR-13-7-12.7



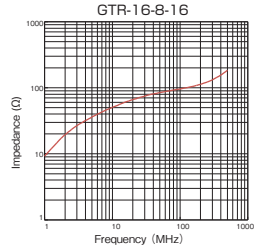
GTR-14.5-10-8



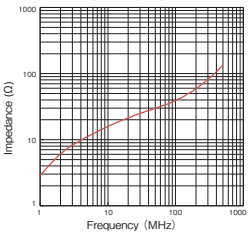
GTR-16-8-13



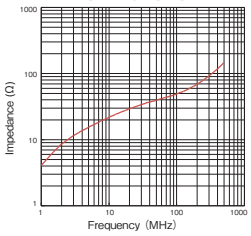
GTR-16-8-16



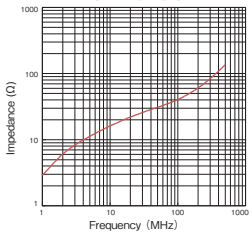
GTR-16-10-7



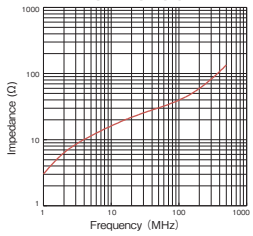
GTR-16-10-10



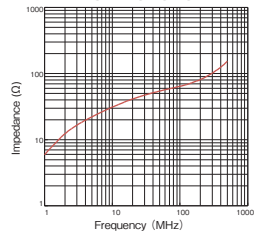
GTR-18-10-6



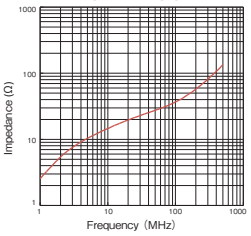
GTR-20-10-5



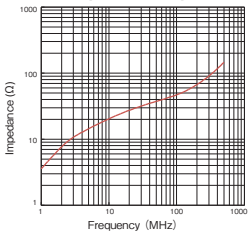
GTR-20-10-10



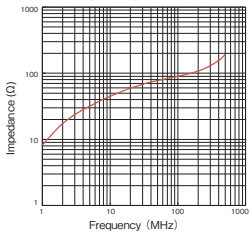
GTR-21-13-6



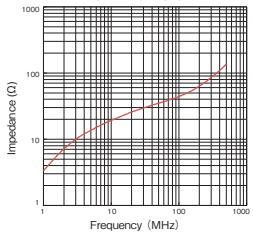
GTR-22-14-10



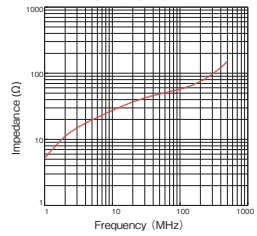
GTR-23-11-14



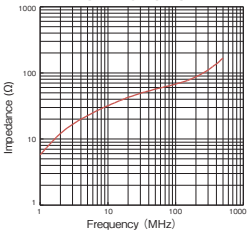
GTR-25-15-8



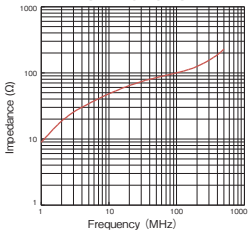
GTR-25-15-12



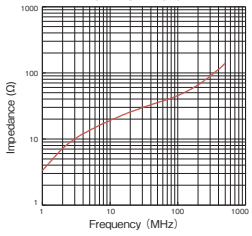
GTR-28-16-13



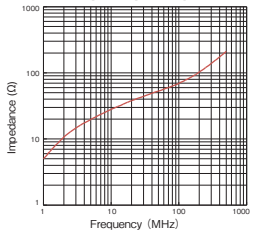
GTR-28-16-20



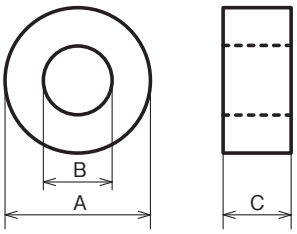
GTR-31-19-8



GTR-40-27-15



*The values are measured data for reference, not guaranteed.



Highly effective measure for EMC noise suppression in broad frequency band

Feature

- Effective for suppression of conducted/radiated noise.
- High impedance characteristics decrease the number of cable turns.
- Since the variation in impedance characterisctics against temperature is small, stable effect is ensured in wide temperature range.
- Plastic housing provides higher insulation properties.
- The material of the plastic housing is UL94V-0 certified.

Unit：mm

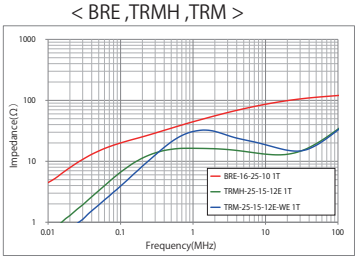
Part No.	A	B	C	Impedance* Ω/ 1MHz (1turn)
BRE-16-25-10	27.5	13.8	12.6	≧ 28
BRE-20-30-15	33.5	17.7	17.9	≧ 36
BRE-23-33-15	36.3	21.0	18.0	≧ 28
BRE-50-65-25	68.4	46.7	28.7	≧ 34
BRE-50-80-25	84.0	47.0	29.2	≧ 38
BRE-76-102-25	107.9	70.2	30.4	≧ 31

Properties

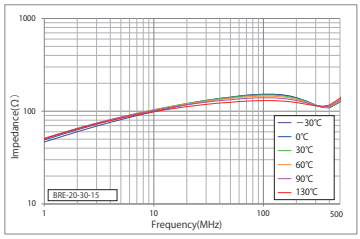
Op. Temp: - 30°C ~+130°C

● Impedance Property

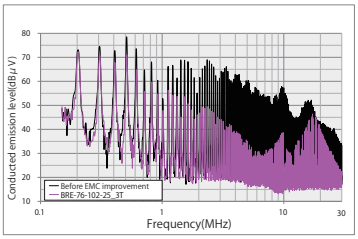
< BRE ,TRMH ,TRM >



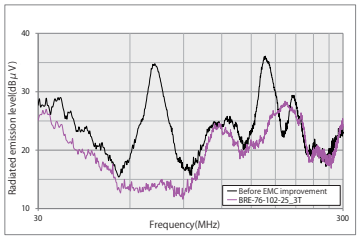
● Impedance Property vs. Temperature



● Test result of conducted emission



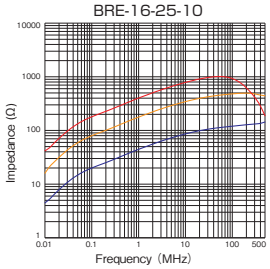
● Test result of radiated emission



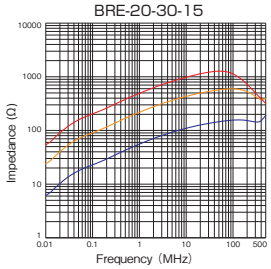
Impedance vs frequency

1 Turn　2 Turn　3 Turn

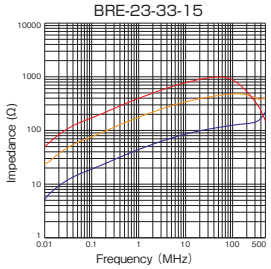
BRE-16-25-10



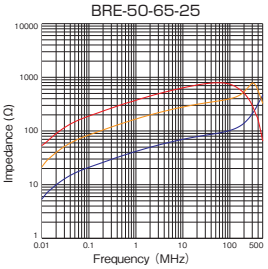
BRE-20-30-15



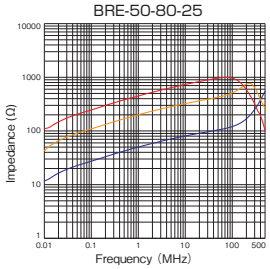
BRE-23-33-15



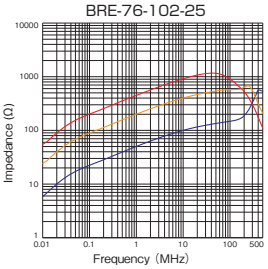
BRE-50-65-25



BRE-50-80-25

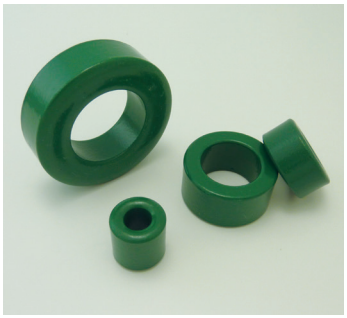


BRE-76-102-25



※The values are measured data for reference, not guaranteed.

LOW CUT CORE (High μ type)／TRMH



Most suitable ferrite core for suppressing conductive noise at 1 MHz or less

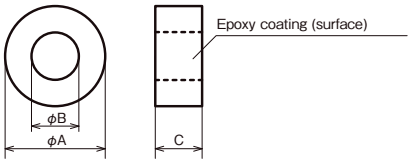
Feature

- Due to the higher impedance in the frequency range of 1 MHz or less, the product is effective for suppressing conductive noise around 150kHz.
- As the number of turns increases, the impedance improves and a better effectiveness of noise suppression can be obtained.
- Resin coated core prevents from cables getting damaged by the edge of the core.
- The wide variation of size is available. (ϕ7.2~ϕ87.9)

Material

- Mn-Zn soft ferrite (epoxy coating)

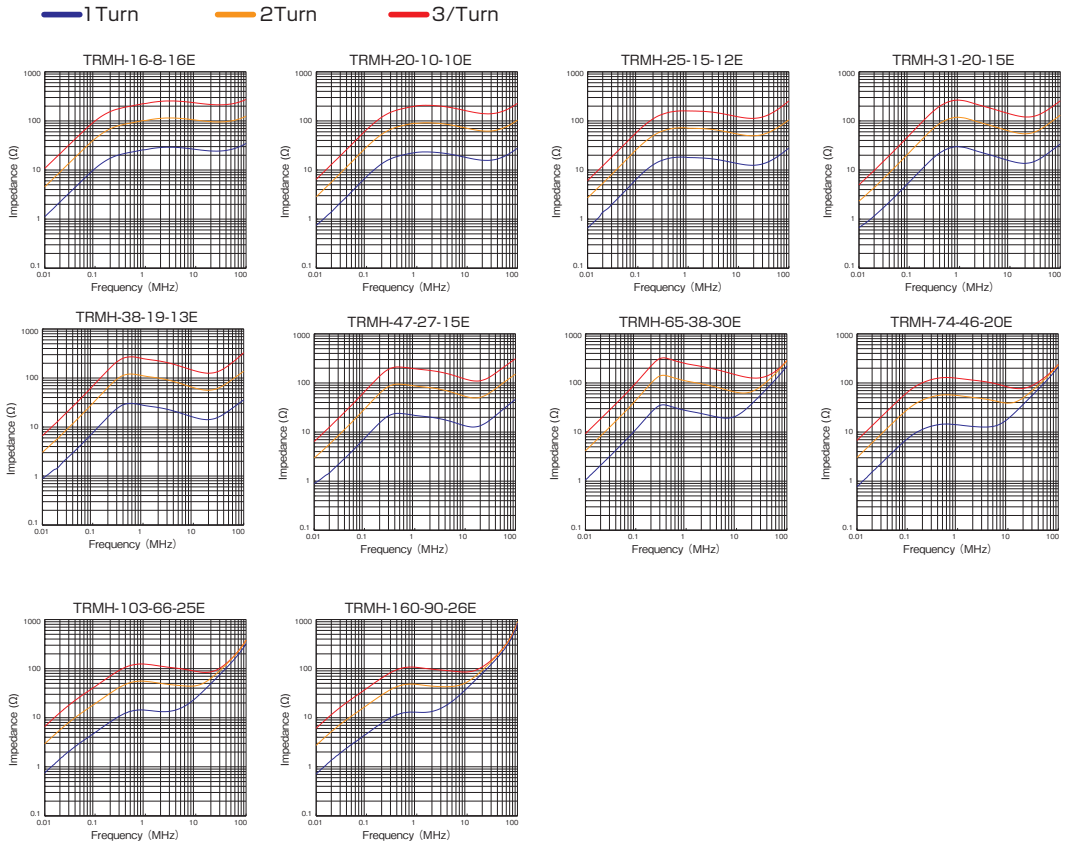
Specification



Unit：mm

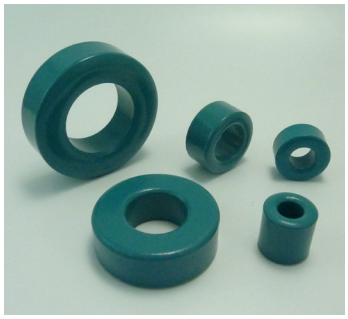
Part No.	A	B	C	Impedance Ω/1MHz (1turn)
TRMH-16-8-16E	16.9	7.2	16.8	≧ 18
TRMH-20-10-10E	21.0	9.2	10.9	≧ 11
TRMH-25-15-12E	25.9	14.1	12.8	≧ 9
TRMH-31-20-15E	32.1	19.0	15.9	≧ 9
TRMH-38-19-13E	39.1	18.0	13.9	≧ 11
TRMH-47-27-15E	48.3	26.0	15.9	≧ 10
TRMH-65-38-30E	67.3	36.6	31.1	≧ 12
TRMH-74-46-20E	75.76	44.22	21.0	≧ 6
TRMH-103-66-25E	105.6	63.1	26.9	≧ 6
TRMH-160-90-26E	165.1	87.9	28.1	≧ 6

Impedance vs frequency



※The values are measured data for reference, not guaranteed.

LOW CUT CORE／TRM



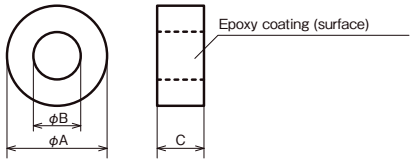
"Mn" ferrite cores, suitable solutions for conductive and radiation noise in low frequency range

Feature

- High impedance noise filter in low frequency (kHz to MHz) range.
- Epoxy coated ferrite core has rounded corners to reduce load on cable.

Material

- Mn-Zn soft ferrite (epoxy coating)



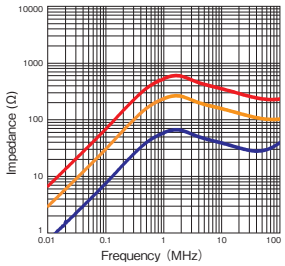
Unit：mm

Part No.	A	B	C	Impedance* Ω/10MHz (2turn)
TRM-16-8-16E-WE	17.0	7.1	16.9	≧ 70
TRM-20-10-10E-WE	21.0	9.1	10.9	≧ 35
TRM-25-15-12E-WE	26.0	14.1	12.9	≧ 35
TRM-31-20-15E-WE	32.1	19.0	15.9	≧ 30
TRM-38-19-13E-WE	39.2	17.9	14.0	≧ 35
TRM-47-27-15E-WE	48.5	25.7	16.3	≧ 25

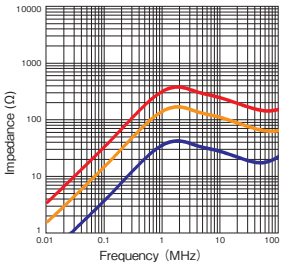
Impedance vs frequency

1 Turn　2 Turn　3 Turn

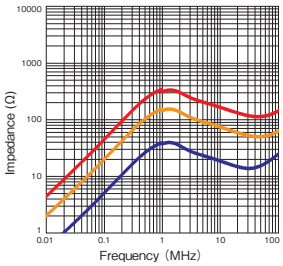
TRM-16-8-16E-WE



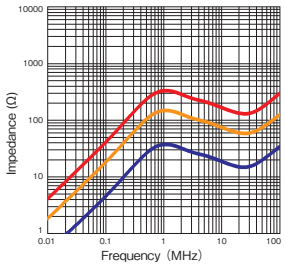
TRM-20-10-10E-WE



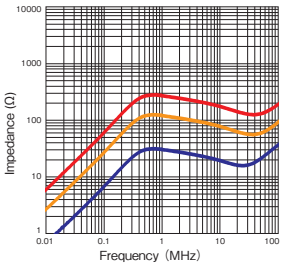
TRM-25-15-12E-WE



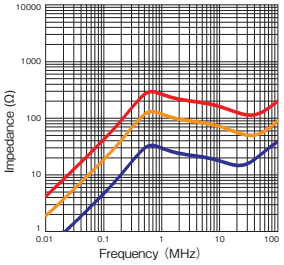
TRM-31-20-15E-WE



TRM-38-19-13E-WE

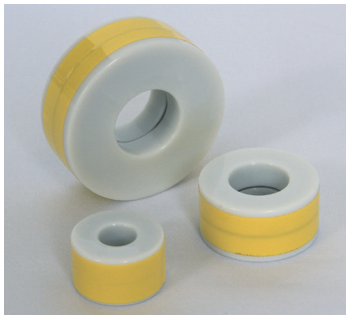


TRM-47-27-15E-WE



※The values are measured data for reference, not guaranteed.

TOROIDAL CORE／TRCB



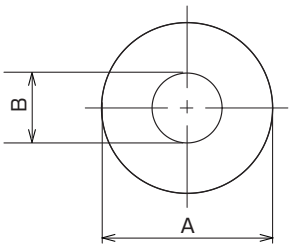
TOROIDAL CORE with housing which is suitable solution for suppressing noise in low-frequency range.

Feature

- With plastic housing preventing from cracking and chipping of the ferrite core.
- Effective noise filter for suppresing low-frequency noise in kHz to MHz range with the higher impedance characteristics.

Material

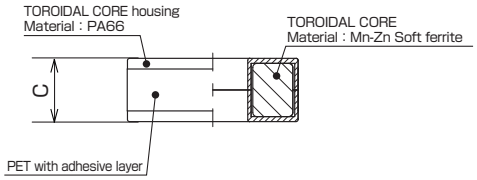
- Torodial Core: Mn-Zn Soft ferrite
- Housing:PA66(Color:Natural / Flammability:UL94V-0)
- PET with adhesive layer



Unit：mm

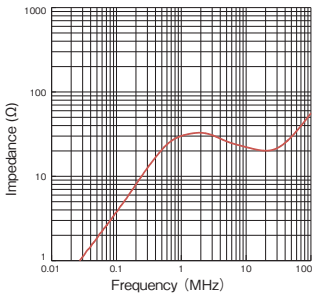
Part No.	A	B	C	Impedance* Ω/10MHz (1 turn)
TRCB-19-10-10	20.0	8.1	(11.7)	≧ 11
TRCB-25-15-12	26.7	13.3	(13.5)	≧ 8
TRCB-38-19-13	40.5	16.6	(15.1)	≧ 7

※Contact us for the measurement conditions.

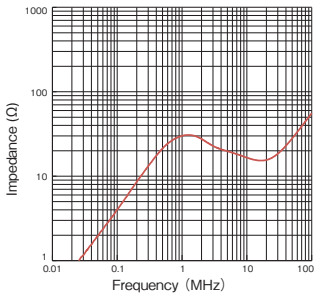


Impedance vs frequency

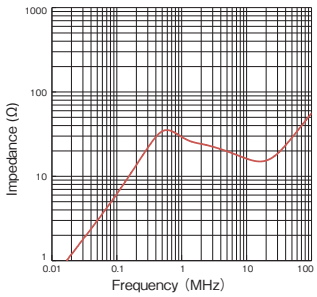
TRCB-19-10-10



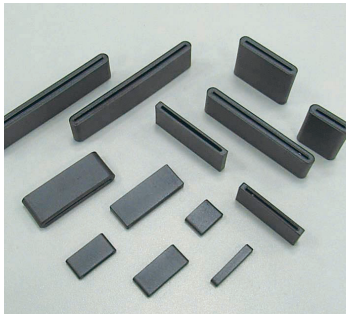
TRCB-25-15-12



TRCB-38-19-13



※The values are measured data for reference, not guaranteed.



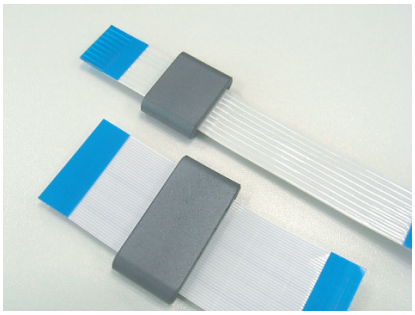
Suitable solutions for FPC noise problems

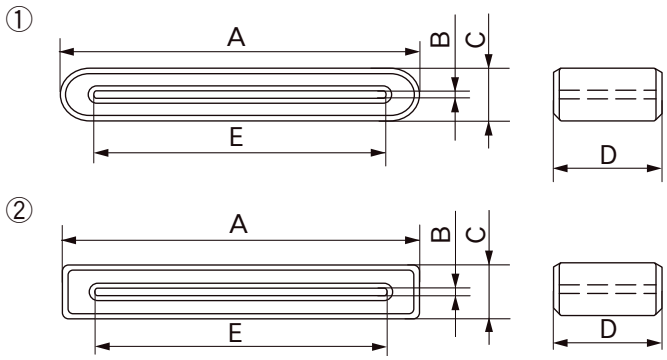
Feature

- Provided with 3mm and 5mm and 2.3mm thickness types.
- Effective filtering performance for emission noise from FPC.

Material

- Soft ferrite





Unit：mm

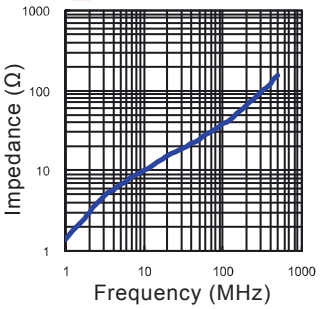
Part No.	Profile	A	B	C	D	E	Impedance*Ω/100MHz（1turn）
GFPC-11-8-2	①	11.0	0.7	2.3	8.0	9.0	≧ 25
GFPC-16-8-2	①	15.5	0.7		8.0	12.0	≧ 25
GFPC-18-3-2	①	18.0	0.7		3.0	14.5	≧ 20
GFPC-18-8-2	①	18.0	0.7		8.0	14.5	≧ 25
GFPC-22-8-2	①	21.5	0.7		8.0	18.0	≧ 25
GFPC-16-5-3	①	16.0	0.5	3.0	5.0	11.5	≧ 20
GFPC-16-8-3	①	16.0	0.5		8.0	11.5	≧ 25
GFPC-24-12-3	②	23.3	0.9		12.0	20.0	≧ 30
GFPC-25-10-3	②	25.5	0.8		10.0	21.5	≧ 25
GFPC-25-15-3	②	25.5	0.8		15.0	21.5	≧ 35
GFPC-31-12-3	②	31.0	1.0		12.0	27.0	≧ 30
GFPC-16-12	①	16.0	0.5	5.0	12.0	11.5	≧ 45
GFPC-16-20	①	16.0	0.8		20.0	11.5	≧ 60
GFPC-25-12	①	24.5	0.5		12.0	20.0	≧ 35
GFPC-25-20	①	24.5	0.5		20.0	20.0	≧ 50
GFPC-31-12	①	31.0	0.5		12.0	27.0	≧ 40
GFPC-46-12	①	46.0	0.5		12.0	41.5	≧ 40
GFPC-56-12	①	56.2	0.5		12.0	52.4	≧ 35

*Contact us for the measurement conditions.

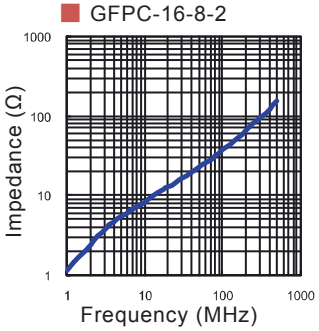
GFPC CORE／GFPC

Impedance vs frequency

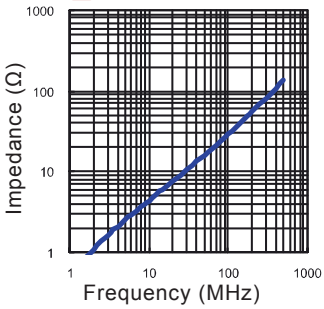
GFPC-11-8-2



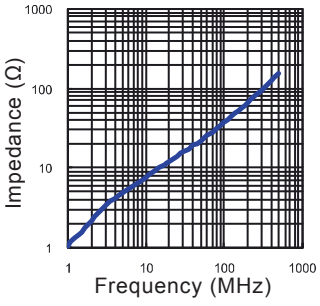
GFPC-16-8-2



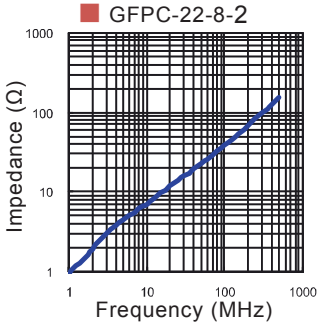
GFPC-18-3-2



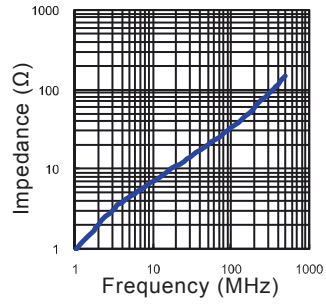
GFPC-18-8-2



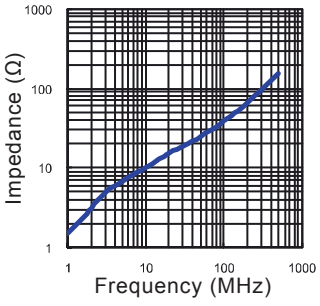
GFPC-22-8-2



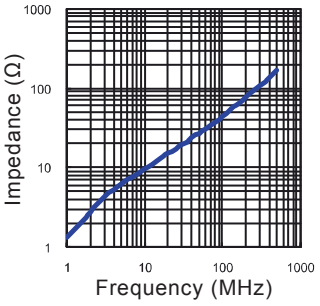
GFPC-16-5-3



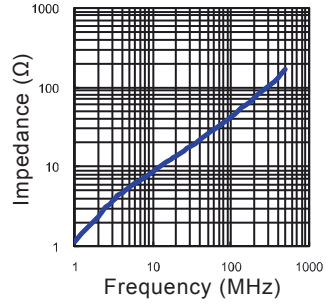
GFPC-16-8-3



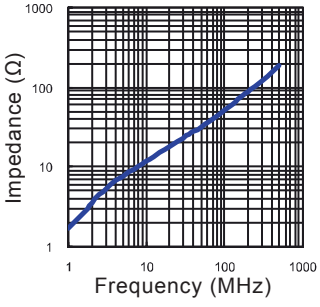
GFPC-24-12-3



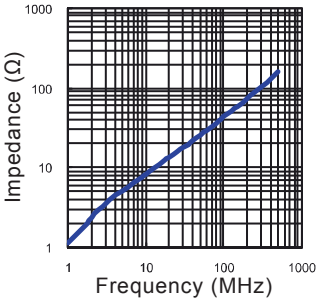
GFPC-25-10-3



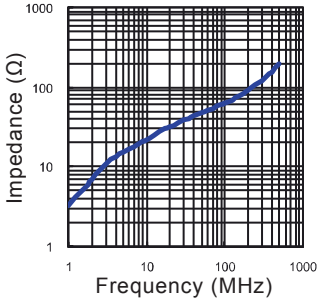
GFPC-25-15-3



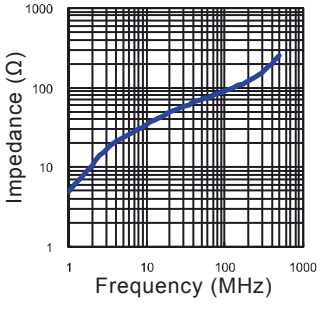
GFPC-31-12-3



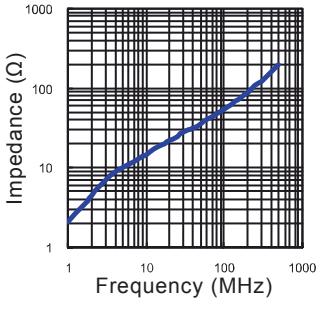
GFPC-16-12



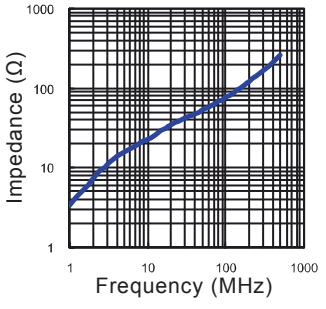
GFPC-16-20



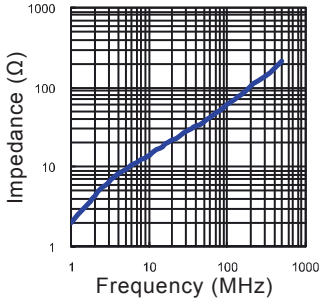
GFPC-25-12



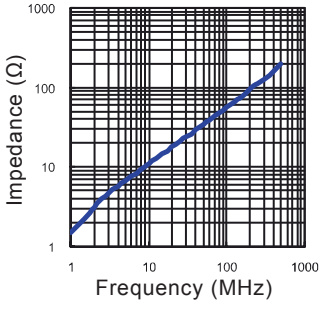
GFPC-25-20



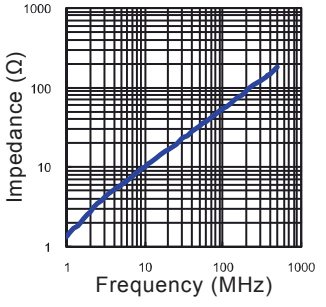
GFPC-31-12



GFPC-46-12



GFPC-56-12



*The values are measured data for reference, not guaranteed.

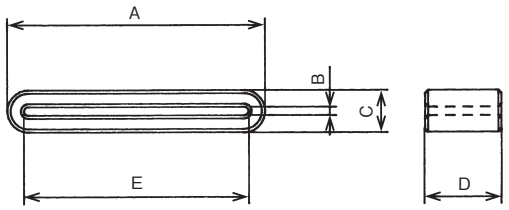
Noise suppression for ribbon cables

Feature

- SSC suppresses emission noise for ribbon cables, FPC etc.

Material

- Soft ferrite



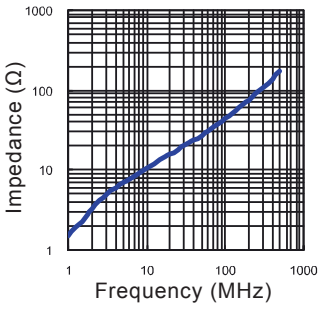
Unit：mm

Part No.	A	B	C	D	E	Impedance*Ω/100MHz (1turn)
GSSC-33.5-8	33.5	1.4	6.5	8.0	28.4	≧ 30
GSSC-33.5-10	33.5	1.4		10.0	28.4	≧ 30
GSSC-33.5-10-2	33.5	2.2	7.4	10.0	27.0	≧ 30
GSSC-33.5-12	33.5	1.4	6.5	12.0	28.4	≧ 35
GSSC-33.5-20	33.5	1.3		20.0	27.8	≧ 50
GSSC-40-12	40.0	1.3		12.0	35.0	≧ 35
GSSC-45-8	45.2	1.3		8.0	40.0	≧ 30
GSSC-45-12	45.2	1.3		12.0	40.0	≧ 35
GSSC-50-12	50.0	1.4		12.0	44.9	≧ 35
GSSC-58-12	57.6	1.3		12.0	52.0	≧ 35

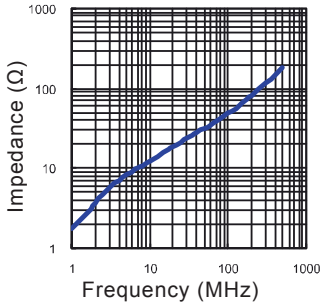
※Contact us for the measurement conditions.

Impedance vs frequency

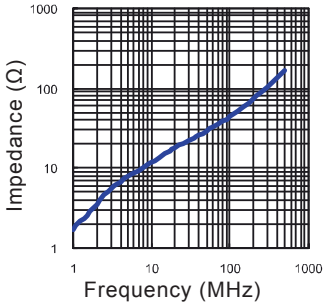
GSSC-33.5-8



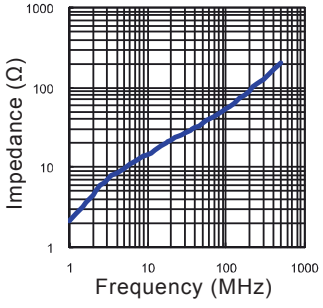
GSSC-33.5-10



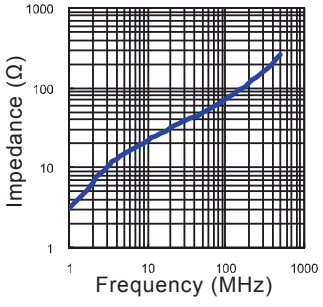
GSSC-33.5-10-2



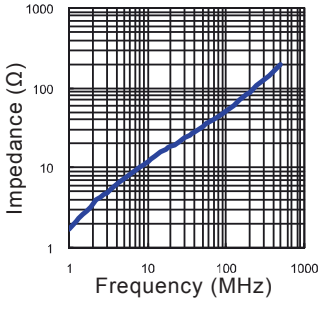
GSSC-33.5-12



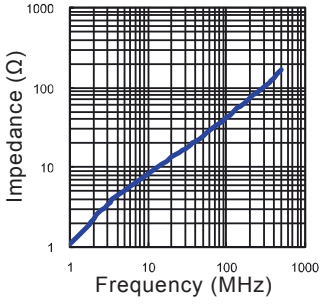
GSSC-33.5-20



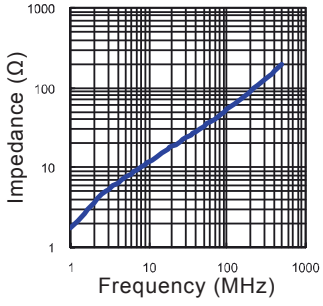
GSSC-40-12



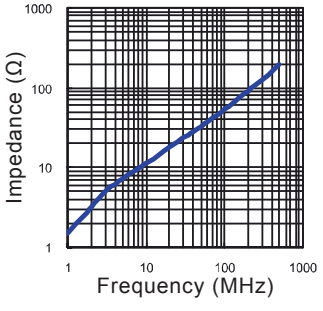
GSSC-45-8



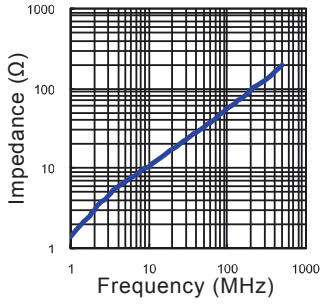
GSSC-45-12



GSSC-50-12

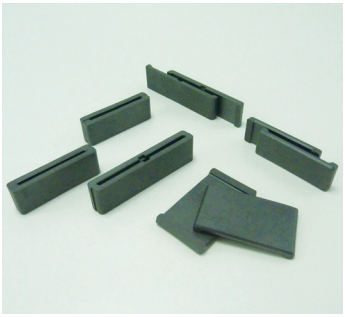


GSSC-58-12



*The values are measured data for reference, not guaranteed.

FLAT CORE／GSSH



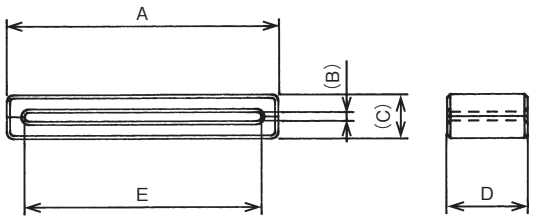
Split core type for easy assembly on wired or connected cables

Feature

- For filtering noise emission from ribbon cables, FPC etc..

Material

- Soft ferrite

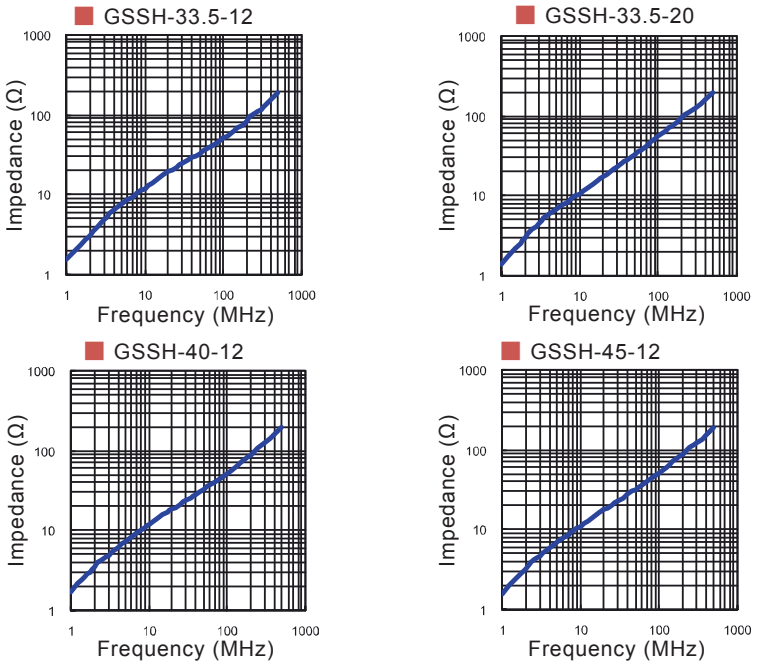


Unit：mm

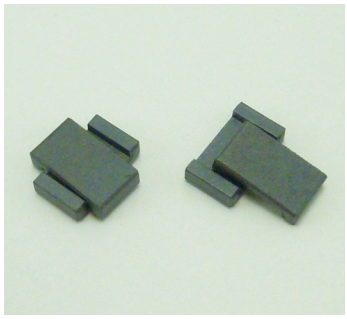
Part No.	A	(B)	(C)	D	E	Impedance* Ω/100MHz (1 turn)
GSSH-33.5-12	33.5	1.2	6.6	12.0	27.0	≧ 35
GSSH-33.5-20	33.5			20.0	27.0	≧ 50
GSSH-40-12	40.0			12.0	34.8	≧ 35
GSSH-45-12	45.2			12.0	40.0	≧ 35

※Contact us for the measurement conditions.

Impedance vs frequency



GFPH CORE／GFPH



Split core for convenient fitting on pre-wired cables

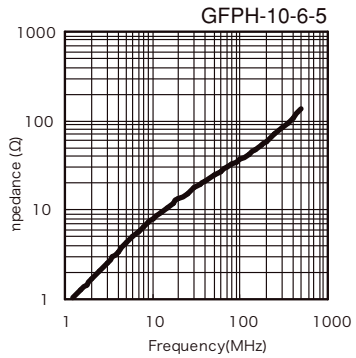
Feature

- FPH ferrite core for effective filtering emission noise from FPC.

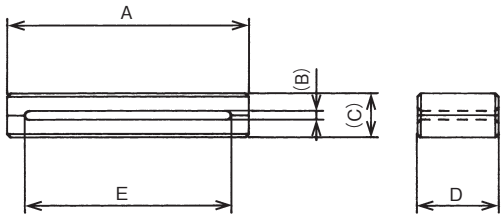
Material

- Soft ferrite

Impedance vs frequency



*The values are measured data for reference, not guaranteed.

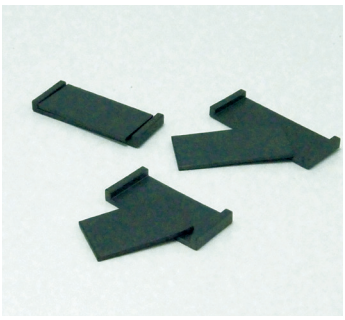


Unit：mm

Part No.	A	(B)	(C)	D	E	Impedance* Ω/100MHz (1 turn)
GFPH-10-6-5	10.0	1.8	5.0	6.0	6.8	25

※Contact us for the measurement conditions.

OPEN CIRCUIT CORE／GFPO



Open magnetic circuit structure provides high impedance with close contact on FPC

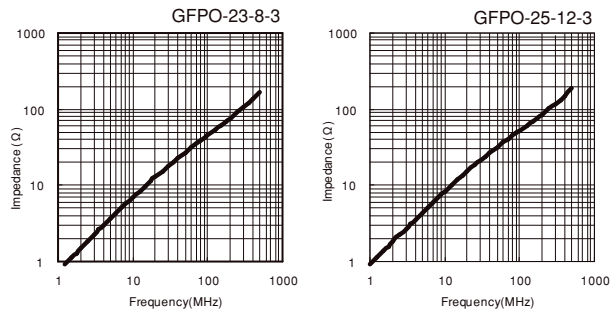
Feature

- Effective for noise attenuation over a broad frequency range, because the structure leads to a small impedance difference between individual cables of the FPC.

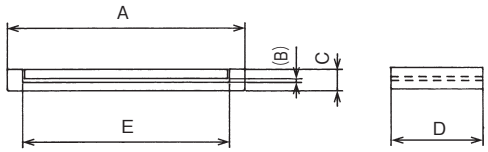
Material

- Soft ferrite

Impedance vs frequency



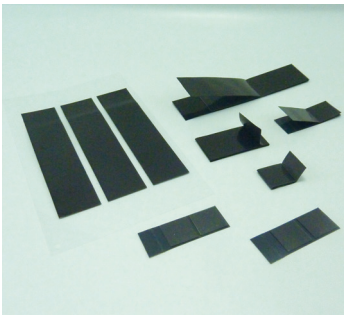
*The values are measured data for reference, not guaranteed.



Unit：mm

Part No.	A	B	C	D	E	Impedance＊Ω/100MHz(1turn)
GFPO-23-8-3	23.0	0.5	2.8	8.0	19.0	30
GFPO-25-12-3	25.0			12.0	21.0	35
GFPO-31-12-3	31.0			12.0	27.0	35

*Contact us for the measurement conditions.



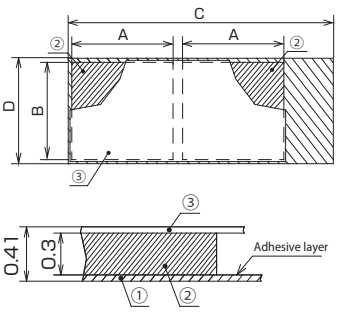
Thin Ferrite Sheet provides optimal EMC solution for FPC and FFC.

Feature

- Product design enables the sandwiching of FPC or FFC from top and bottom to suppress EMC.
- Suitable for mobile devices with its thin and light properties.
- Its flexible property does not impair FPC's flexibility.
- Prevent cracking and scattering of ferrite with PET and adhesives.

Material

- PET with adhesive layer
- Ferrite sheet
- Double-sided adhesive tape



A,B：Soft ferrite
C,D：Profile(PET with adhesive layer)

①PET with an adhesive layer
②Ferrite sheet
③Double-sided adhesive tape

Dimensions

Unit：mm

Part No.	A	B	C	D	Applicable cable width
FFPC-0.3-10-5	10	5	32.5	6.5	10
FFPC-0.3-10-10		10	30	11	
FFPC-0.3-12-8	12	8	38.5	9.5	12
FFPC-0.3-14-14	14	14	38	15	14

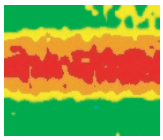
Part No.	A	B	C	D	Applicable cable width
FFPC-0.3-22-8	22	8	60.5	9.5	22
FFPC-0.3-22-14		14	54	15	
FFPC-0.3-27-14	27		70.5	15.5	27
FFPC-0.3-44-14	44		98	15	44

※Custom profiles design is also available. Please contact our sales representative for further information.

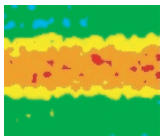
Properties

Higher insertion loss and excellent EMC suppression in low frequency range (30MHz~300MHz) compared to metal filler electromagnetic noise suppression sheet.

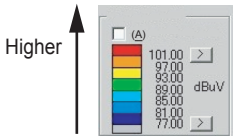
Radiated emission level from differential signal cable with component.



Metal filler EMC noise suppression sheet

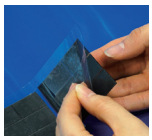


SMARTPLY

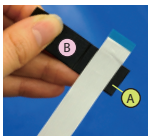


Emission level

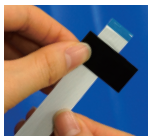
Mounting FFPC onto flexible cable



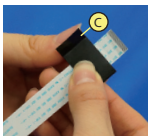
1.Gently bend the liner while take the ferrite sheet off.



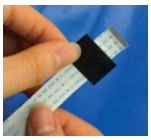
2.Attach SMARTPLY to the cable on part (A).

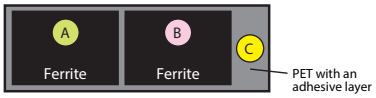


3.Attach on part (B) and wrap with SMARTPLY around the cable.



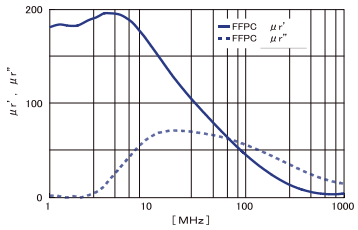
4.Fold part so as to attach part (C) on the back side of part (A). It's ready by simple procedure.



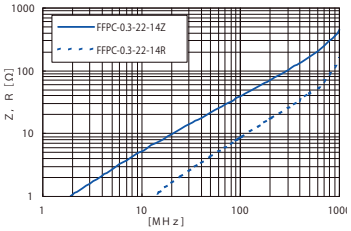


※ It is not advisable to reuse the product once it is removed.

Permeability



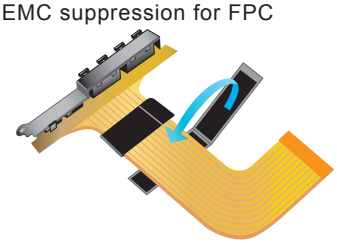
Impedance vs frequency



※The values are measured data for reference, not guaranteed.

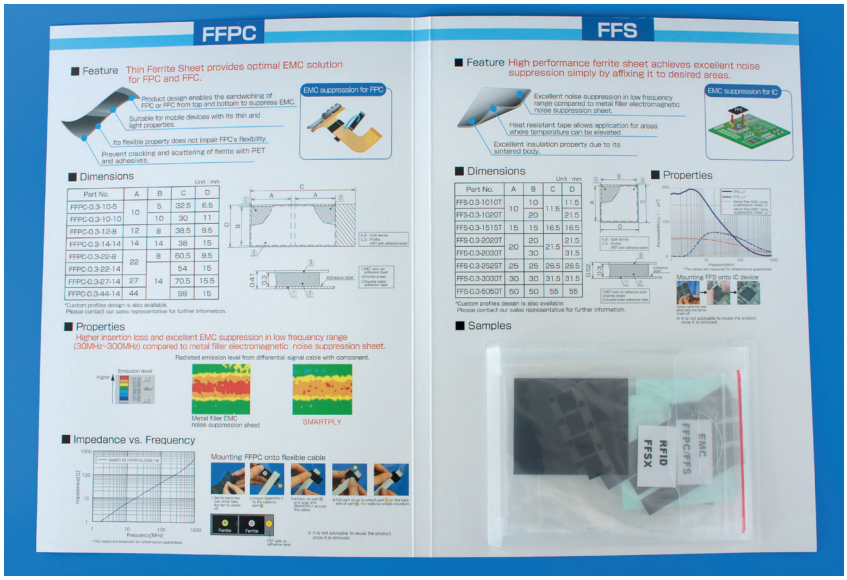
Application

EMC suppression for FPC

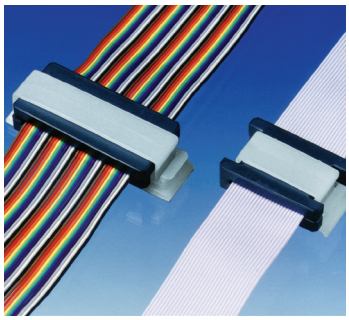


SMARTPLY ENGINEERING SAMPLE KIT／ESF-18

Various Smartplys in one booklet

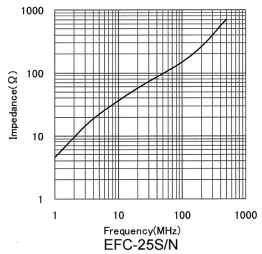


BLOCK CORE／EFC

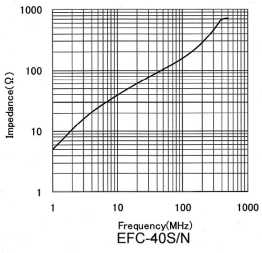


Labor-saving assembly and fixing by combination with plastic clamp

Impedance vs frequency



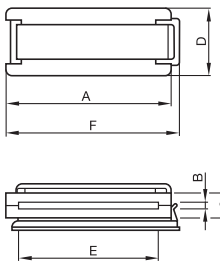
EFC-25S/N



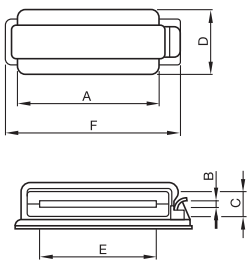
EFC-40S/N

*The values are measured data for reference, not guaranteed.

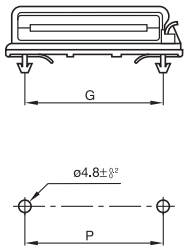
EFC-25-N/S
EFC-50-N/S



EFC-40-N/S



Snap on type mounting hole and pitch

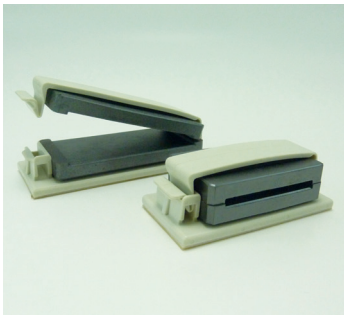


Unit: mm

Part No.	A	B	C	D	E	F	G	P	Impedance* Ω/100MHz(1 turn)
EFC-25S	44	2+1,2/-1	13,0	28,5	33,0+0,5/-0	47,0	33,0	33,0+/-0,1	116
EFC-40S	63				52,0+1,1/-0	77,0	64,5	64,5+/-0,15	135
EFC-50S	76,5				64,5+1,3/-1	79,5			141
EFC-25N-R	44				33,0+0,5/-0	47,0			116
EFC-40N-R	63				52,0+1,1/-0	77,0			135
EFC-50N-R	76,5				64,5+1,3/-1	79,5			141

*Contact us for the measurement conditions.

BLOCK CORE／BCN



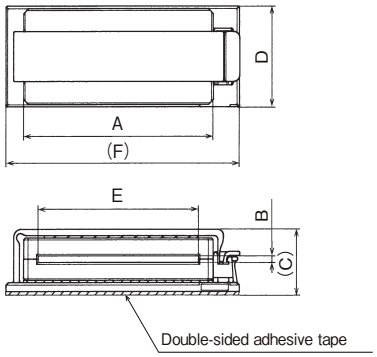
Labor-saving assembly and fixing by combination with plastic clamp

Feature

- Split core type, easy assembly on wired or connected ribbon cables.
- Plastic clamp integrated type allows easy assembly.

Material

- Core / Soft ferrite
- Clamp / Nylon 66 (Light gray / UL94V-0)

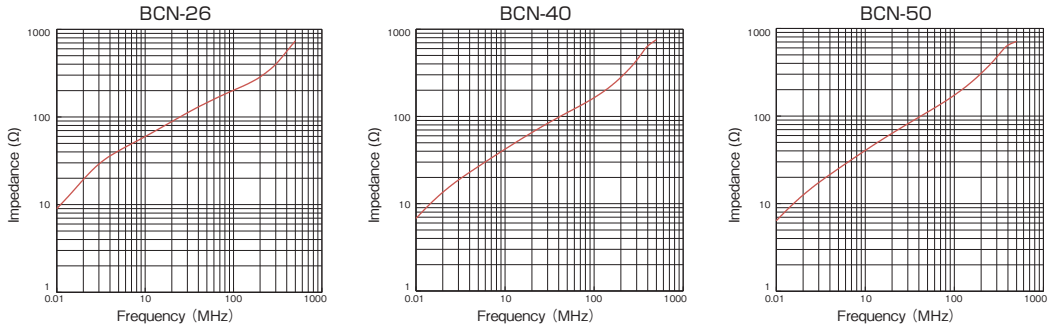


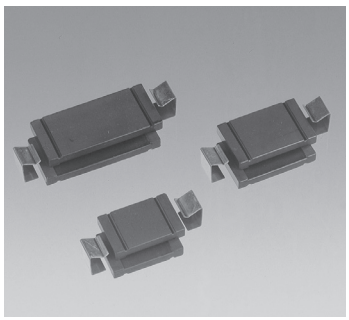
Unit：mm

Part No.	A	B	(C)	D	E	(F)	Impedance* Ω/100MHz (1 turn)
BCN-26-R	45.0	2.0	19.6	30.0	34.0	59.5	≧125
BCN-40-R	63.0		19.5		52.0	76.5	≧137
BCN-50-R	76.5				64.5	90.7	≧142

※Contact us for the measurement conditions.

Impedance vs frequency





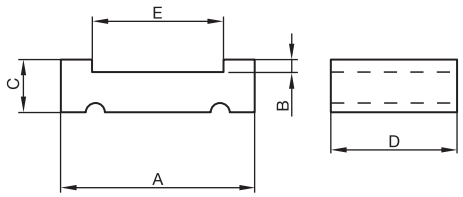
Split core with metal clip (FP16.5-2-10.25 excluded)

Feature

- Kitagawa offers a line of bisected flat cable suppression cores to attenuate radiated EMI emissions from ribbon cables.
- Ferrite assembly press-fitted into a pair of metal clips.
- Metal clips included, except FP 16.5-2-10.25

Material

- Soft ferrite



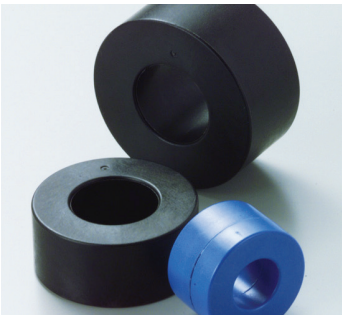
Part No.		Unit: mm					Impedance (Ω)	
		A	B	C	D	E	25 MHz	100 MHz
FP 16.5-2-10.25		16.5±0.25	0.6±0.2	2.0±0.2	10.25±0.2	12.5±0.3	29	72
FP 38-6.35-10	*	38.0±1.0	0.8±0.2	6.35±0.25	10.0±0.4	26.6±0.7	45	107
FP 38-6.35-25.4	*	38.0±1.0	0.8±0.2	6.35±0.25	25.4±0.7	26.6±0.7	103	173
FP 45-6.35-10	*	45.0±0.75	0.8±0.2	6.35±0.25	10.0±0.4	34.4±0.7	41	98
FP 45-6.35-28.5	**	45.0±0.75	0.8±0.2	6.35±0.25	28.5±0.7	34.4±0.7	84	166
FP 55.1-6.35-28.5	**	55.1±1.2	0.8±0.2	6.35±0.25	28.5±0.7	43.7±1.0	78	179
FP 63.5-6.35-13	*	63.5±1.3	0.8±0.2	6.35±0.25	13.0±0.4	52.0±1.1	45	114
FP 63.5-6.35-15	*	63.5±1.3	0.8±0.2	6.35±0.25	15.0±0.4	52.0±1.1	50	124
FP 63.5-6.35-28.5	**	63.5±1.3	0.8±0.2	6.35±0.25	28.5±0.7	52.0±1.1	74	155

The values are measured data for reference, not guaranteed.

*Metal clips (KE-MC-10 or KE MC-13) are included
**Metal clips (KE-MC-13) are included

Shape of FP 16.5-2-10.25 is slightly different.

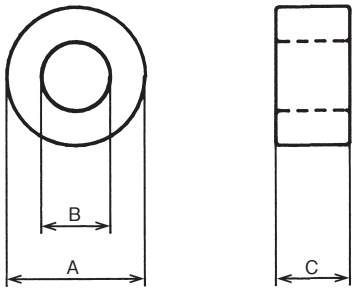
*Contact us for the measurement conditions.



Toroidal cores employing “FINEMET”, nanocrystalline soft magnetic material

Feature

- High impedance in MHz frequency range and under.
- FINEMET has very high Curie temperature (570°C) which results in stable magnetic characteristics at high temperatures.
- As FINEMET has high saturation magnetic flux density, three times higher than ordinary ferrite cores, superior suppression of spike current is possible with smaller cores.

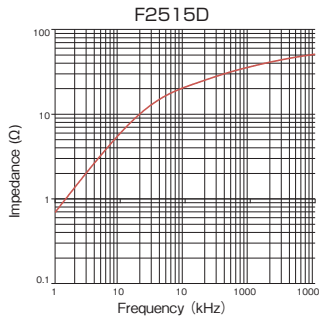


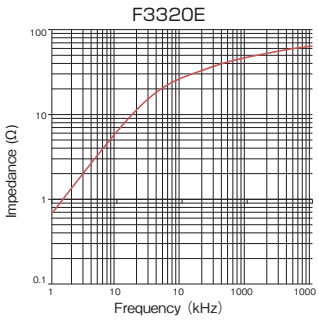
Unit: mm

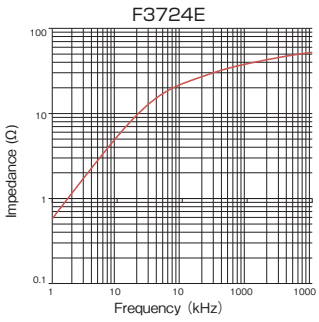
Part No.	A	B	C
F2515D	28.0	12.8±0.5	16.8
F3320E	35.8	17.3±0.5	17.5
F3724E	40.0	21.1±0.5	17.6
F4424G	46.5	21.5±0.5	22.8
F4535G	49.0	31.0±0.5	25.0
F6045G	64.0	41.0±0.7	25.0
F7555G	79.0	51.0±0.7	25.0

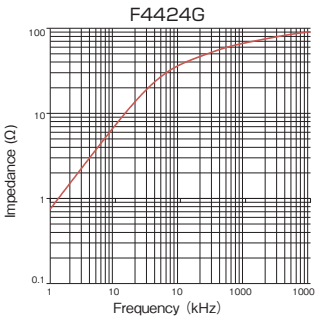
FINEMET is a registered trademark of Hitachi Metals, Ltd.
Contact our sales department for details.

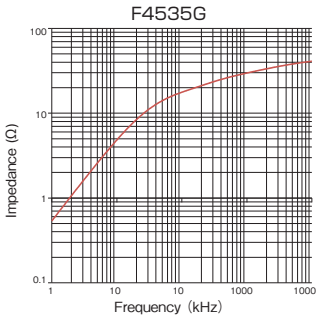
Impedance vs frequency

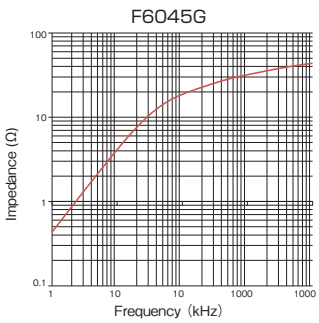


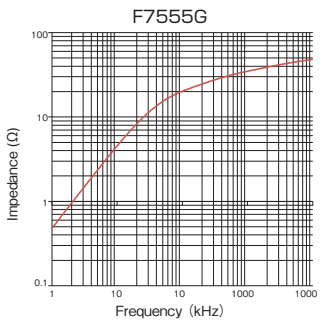




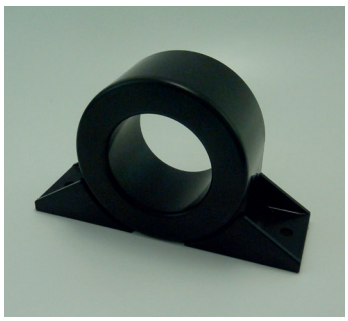








AMORPHOUS CORE／AF01-40



Suitable solution for power line noise

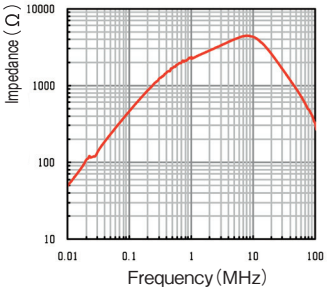
Feature

- Higher magnetic permeability and saturated magnetic density than a ferrite core.
- Effective solution for suppressing noise from 150KHz to 30MHz generated by switching regulator or an inverter.
- UL94V-0 flammability rating material is used for the plastic housing.
- Can be stably fixed by screws.

Properties

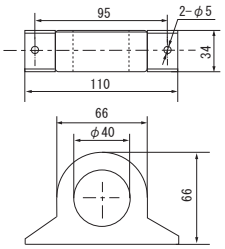
Initial magnetic permeability	15000
Saturation magnetic flux density	1.56T
(Flammability Rating)	UL94V-0

Impedance vs frequency (10 turns)

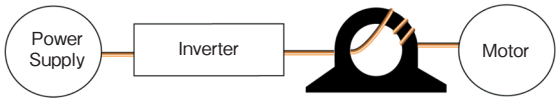


※The values are measured data for reference, not guaranteed.

Dimensions



Application



METAL CORE／MPTR

Normal-mode noise suppressing core with excellent DC superposition property

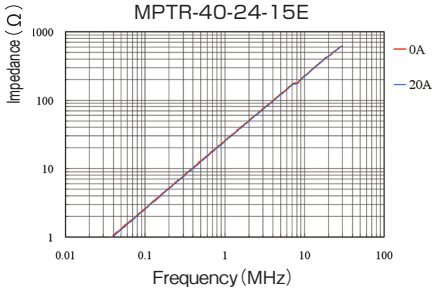
Feature

- Impedance is not lowered by current superposition (Current at 20A or less) because of higher saturation magnetic flux density compare to ferrite. Possible to suppress normal-mode noise.
- High Curie temperature. Stable temperature property under condition of -40 °C to +140 °C, which does not allow impedance to be lowered.
- Resin-coated surface of the core, preventing its edge from damaging cables.

Properties

● Impedance-frequency properties:
Impedance with DC superposition

MPTR-40-24-15E



※Measurement conditions: Impedance measurement: 5 turns / DC superposition: 1 turn

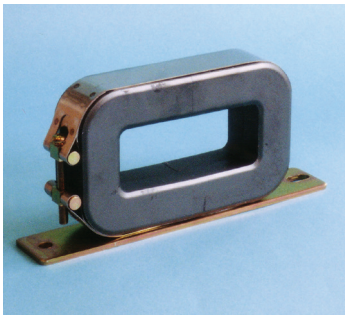
Dimensions

Unit：mm

Part No.	Outer Diameter max.	Internal Diameter min.	Length max.	Impedance* Ω/1MHz (5turn)
MPTR-20-13-10E	21.2	11.8	10.9	≧ 7
MPTR-27-15-11E	27.8	13.8	12.1	≧ 12
MPTR-40-24-15E	40.9	23.1	15.48	≧ 12

※The values are measured data for reference, not guaranteed.

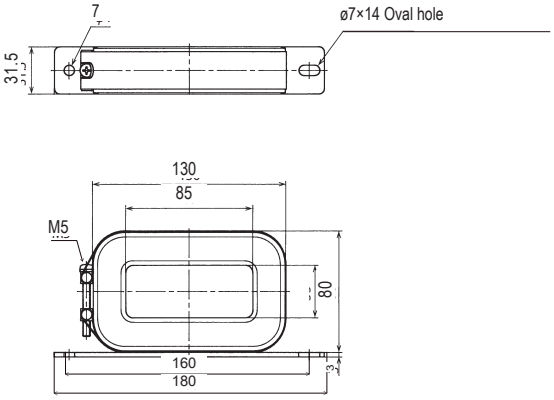
RADIATION NOISE FILTER／RN80UD



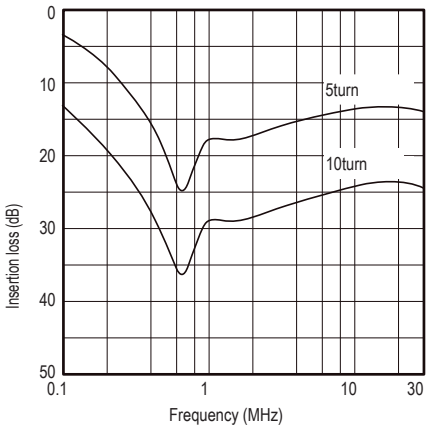
Effective noise suppression at radio frequency range

Feature

- Large core suits application to power supply lines for large current capacity.

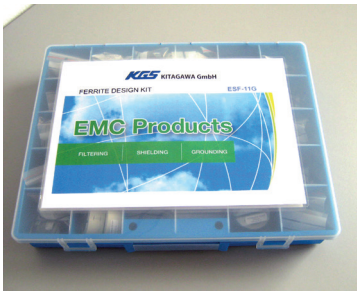


Insertion loss frequency properties*



*The values are measured data for reference, not guaranteed.

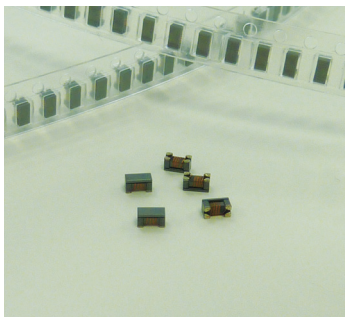
FERRITE DESIGN KIT ESF-11G



LOW CUT KIT ESF-13

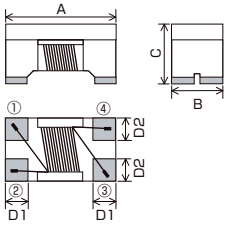
FERRITE CORE ENGINEERING KIT G-TOWER

Over 80 kinds of new product line up of KGS Ferrite "G-Core" in a compact tower. Cores are placed in 48 drawers which enables easy pick up. Ideal to support EMC engineering or as sample stock holder

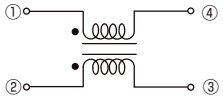


Wire-wound Common Mode Filter applicable to automated mounting on PC board.

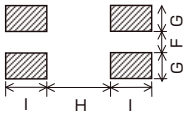
■ Outside dimensions



■ Equivalent circuit



■ Recommended pad dimensions



KWCM Series

- Wire-wound Common Mode Filter optimal for the High-speed differential signal(Applicable reflow soldering.)
- 2012 (2.0×1.2mm),3216 (3.2×1.6mm):2 size variation.

Unit:mm

Part Number / Size	A	B	C	D1 TYP	D2 TYP	F TYP	G TYP	H TYP	I TYP
KWCM-2012	2.0±0.2	1.2±0.2	1.2±0.2	0.45	0.4	0.4	0.4	0.8	0.9
KWCM-3216	3.2±0.2	1.6±0.2	2.0±0.2	0.6	0.6	0.4	0.6	1.6	1.05

Part Number Guide

KWCM - 2012 - 900 T
(1) (2) (3) (4)

(1) Product classification
(2) Size
(3) Impedance
(4) Packing specification

Electrical characteristics

Part No.	Common Mode Impedance (Ω) at 100MHz	DC Resistance (Ω) max.	Rated Current (mA.) max.	Rated Voltage (V) max.
KWCM-2012-120T	≧ 12±25%	0.20	450	50 (DC)
KWCM-2012-240T	≧ 24±25%	0.25	420	50 (DC)
KWCM-2012-320T	≧ 32±25%	0.25	400	50 (DC)
KWCM-2012-500T	≧ 50±25%	0.25	400	50 (DC)
KWCM-2012-670T	≧ 67±25%	0.25	400	50 (DC)
KWCM-2012-900T	≧ 90±25%	0.30	400	50 (DC)
KWCM-2012-121T	≧ 120±25%	0.30	370	50 (DC)

Part No.	Common Mode Impedance (Ω) at 100MHz	DC Resistance (Ω) max.	Rated Current (mA.) max.	Rated Voltage (V) max.
KWCM-2012-141T	≧ 140±25%	0.32	360	50 (DC)
KWCM-2012-161T	≧ 160±25%	0.35	350	50 (DC)
KWCM-2012-181T	≧ 180±25%	0.35	330	50 (DC)
KWCM-2012-201T	≧ 200±25%	0.40	300	50 (DC)
KWCM-2012-221T	≧ 220±25%	0.40	300	50 (DC)
KWCM-2012-261T	≧ 260±25%	0.40	300	50 (DC)
KWCM-2012-371T	≧ 370±25%	0.45	280	50 (DC)

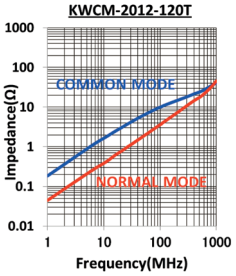
Part No.	Common Mode Impedance (Ω) at 100MHz	DC Resistance (Ω) max.	Rated Current (mA.) max.	Rated Voltage (V) max.
KWCM-3216-330T	≧ 33±25%	0.20	400	50 (DC)
KWCM-3216-500T	≧ 50±25%	0.25	400	50 (DC)
KWCM-3216-900T	≧ 90±25%	0.35	400	50 (DC)
KWCM-3216-121T	≧ 120±25%	0.30	400	50 (DC)
KWCM-3216-161T	≧ 160±25%	0.40	350	50 (DC)
KWCM-3216-221T	≧ 220±25%	0.45	300	50 (DC)
KWCM-3216-261T	≧ 260±25%	0.50	310	50 (DC)

Part No.	Common Mode Impedance (Ω) at 100MHz	DC Resistance (Ω) max.	Rated Current (mA.) max.	Rated Voltage (V) max.
KWCM-3216-501T	≧ 500±25%	0.80	260	50 (DC)
KWCM-3216-601T	≧ 600±25%	0.80	260	50 (DC)
KWCM-3216-102T	≧ 1000±25%	1.20	250	50 (DC)
KWCM-3216-222T	≧ 2200±25%	1.20	200	50 (DC)

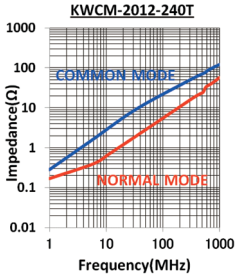
SMD COMMON MODE FILTER／KWCM

Impedance vs Frequency characteristics

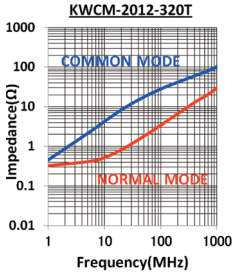
KWCM-2012-120T



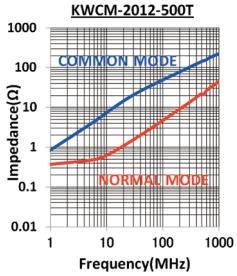
KWCM-2012-240T



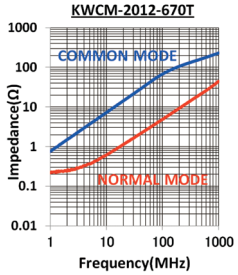
KWCM-2012-320T



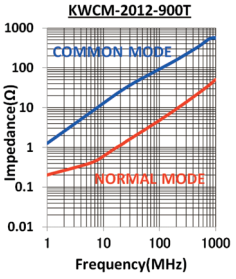
KWCM-2012-500T



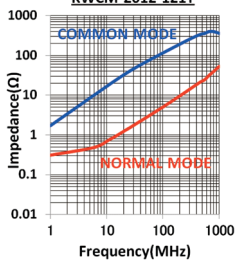
KWCM-2012-670T



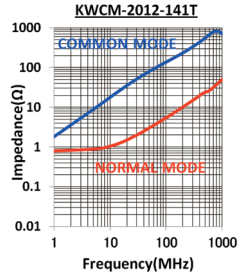
KWCM-2012-900T



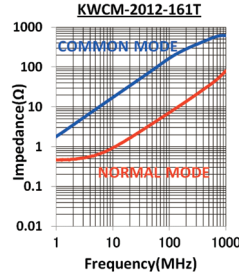
KWCM-2012-121T



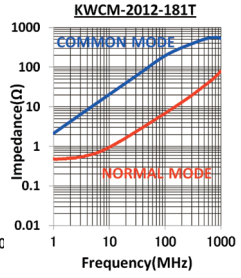
KWCM-2012-141T



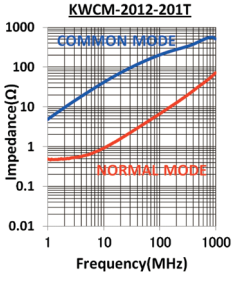
KWCM-2012-161T



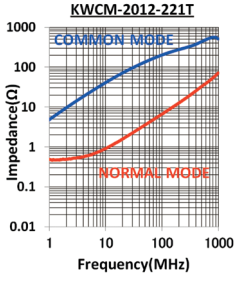
KWCM-2012-181T



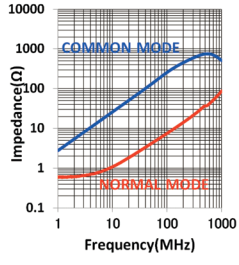
KWCM-2012-201T



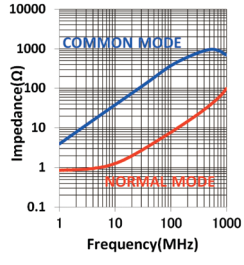
KWCM-2012-221T



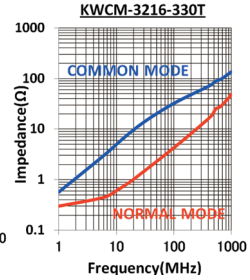
KWCM-2012-261T



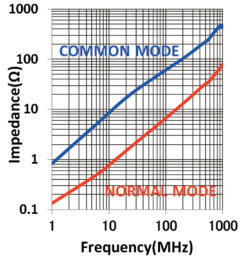
KWCM-2012-371T



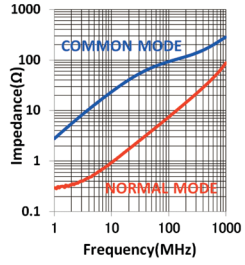
KWCM-3216-330T



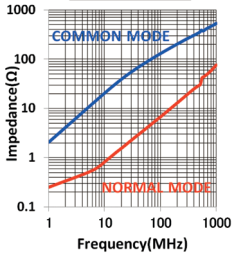
KWCM-3216-500T



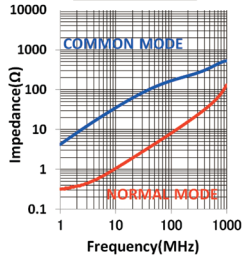
KWCM-3216-900T



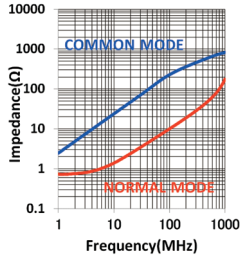
KWCM-3216-121T



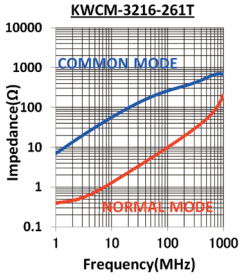
KWCM-3216-161T



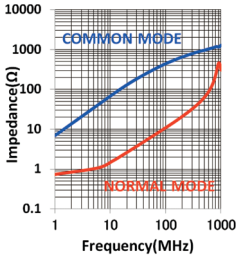
KWCM-3216-221T



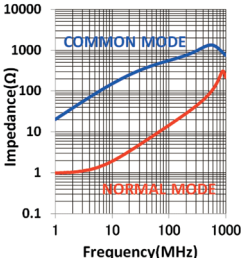
KWCM-3216-261T



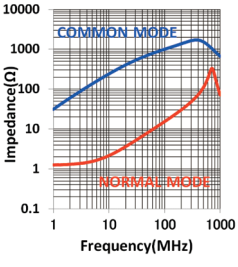
KWCM-3216-501T



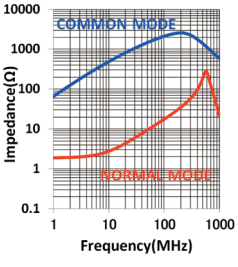
KWCM-3216-601T



KWCM-3216-102T

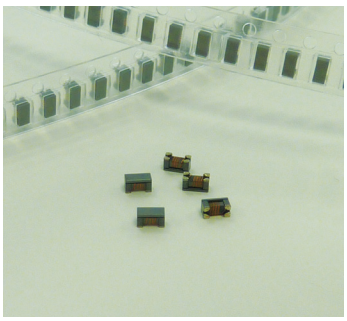


KWCM-3216-222T



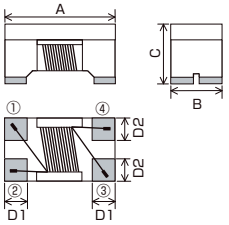
※The values are measured data for reference, not guaranteed.

SMD COMMON MODE FILTER／KWCM

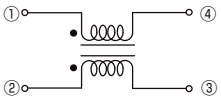


Wire-wound Common Mode Filter applicable to automated mounting on PC board.

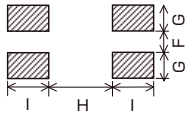
■ Outside dimensions



■ Equivalent circuit



■ Recommended pad dimensions



KWCM-HS Series

- Wire-wound Common Mode Filter optimal for the ultra-high-speed differential signal. (reflow applicable)
- 1210 (1.2×1.0mm) , 2012 (2.0×1.2mm): 2 size variation.
- Smaller negative effect to high speed differential signal due to the lower insertion-loss.

Unit：mm

Part Number / Size	A	B	C	D1 TYP	D2 TYP	F TYP	G TYP	H TYP	I TYP
KWCM-1210HS	1.2±0.2	1.0±0.2	0.9±0.2	0.36	0.38	0.3	0.45	0.6	0.45
KWCM-2012HS	2.0±0.2	1.2±0.2	1.2±0.2	0.45	0.4	0.4	0.4	0.8	0.9

Part Number Guide

KWCM - 2012 - HS - 900 T
(1) (2) (3) (4) (5)

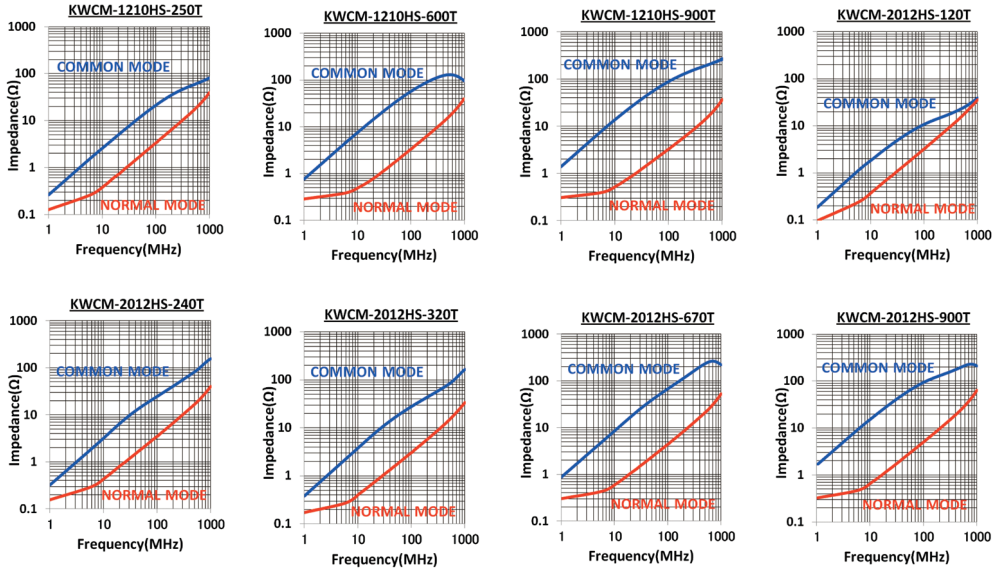
(1) Product classification
(2)Size
(3) Type
(4) Impedance
(5) Packing specification

Electrical characteristics

Part No.	Common Mode Impedance (Ω) at 100MHz	DC Resistance (Ω) max.	Rated Current (mA.) max.	Rated Voltage (V) max.
KWCM-1210HS-250T	≧ 25±25%	0.25	420	50 (DC)
KWCM-1210HS-600T	≧ 60±25%	0.25	400	50 (DC)
KWCM-1210HS-900T	≧ 90±25%	0.30	400	50 (DC)
KWCM-2012HS-120T	≧ 12±25%	0.20	450	50 (DC)

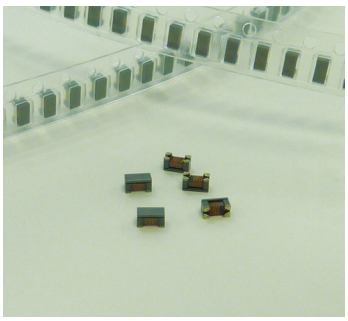
Part No.	Common Mode Impedance (Ω) at 100MHz	DC Resistance (Ω) max.	Rated Current (mA.) max.	Rated Voltage (V) max.
KWCM-2012HS-240T	≧ 24±25%	0.25	420	50 (DC)
KWCM-2012HS-320T	≧ 32±25%	0.25	400	50 (DC)
KWCM-2012HS-670T	≧ 67±25%	0.25	400	50 (DC)
KWCM-2012HS-900T	≧ 90±25%	0.30	400	50 (DC)

Impedance vs Frequency characteristics



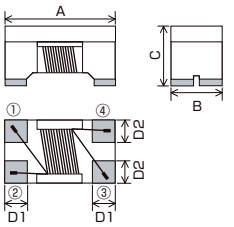
※The values are measured data for reference, not guaranteed.

SMD COMMON MODE FILTER／KWCM

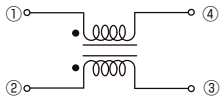


Wire-wound Common Mode Filter applicable to automated mounting on PC board.

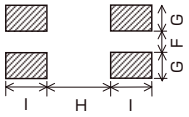
■ Outside dimensions



■ Equivalent circuit



■ Recommended pad dimensions



KWCM-HDMI Series

- Wire-wound Common Mode Filter optimal for the signal HDMI. (reflow applicable)
- Matching the characteristic impedance of 100Ω.
- Smaller negative effect to high speed differential signal due to the lower insertion-loss.

Unit:mm

Part Number / Size	A	B	C	D1 TYP	D2 TYP	F TYP	G TYP	H TYP	I TYP
KWCM-2012HDMI	2.0±0.2	1.2±0.2	1.2±0.2	0.45	0.4	0.4	0.4	0.8	0.9

Part Number Guide

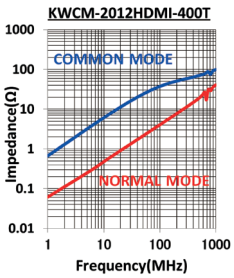
KWCM - 2012 - HDMI - 900 T
(1) (2) (3) (4) (5)

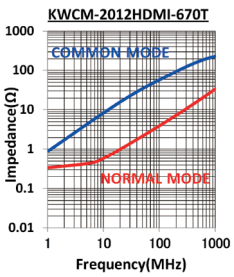
(1) Product classification
(2) Size
(3) Type
(4) Impedance
(5) Packing specification

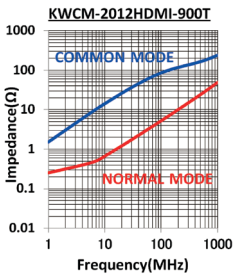
Electrical characteristics

Part No.	Common Mode Impedance (Ω) at 100MHz	DC Resistance (Ω) max.	Rated Current (mA.) max.	Rated Voltage (V) max.
KWCM-2012HDMI-400T	≧ 40±25%	0.25	400	50 (DC)
KWCM-2012HDMI-670T	≧ 67±25%	0.25	400	50 (DC)
KWCM-2012HDMI-900T	≧ 90±25%	0.30	400	50 (DC)

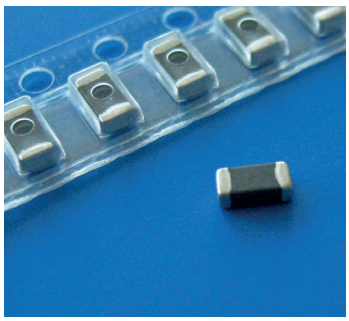
Impedance vs Frequency characteristics







※The values are measured data for reference, not guaranteed.



Ferrite Chip Bead, normal type

Feature

- MLB (Normal type) generates an impedance from the relatively lower to high frequency.
- Effective in noise suppression in the wide frequency range
- Impedance Range : 28 to 2000 ohm
- Rated Current Range : 100 mA to 500 mA
- Operating temperature Range : -40°C to +125°C
- Soldering Method : Reflow of Wave soldering, suitable for lead free soldering
- Packaging Method : Tape & Reel (per EIA Specifications)
- Storage Temperature : max.40°C, RH 70%

Application

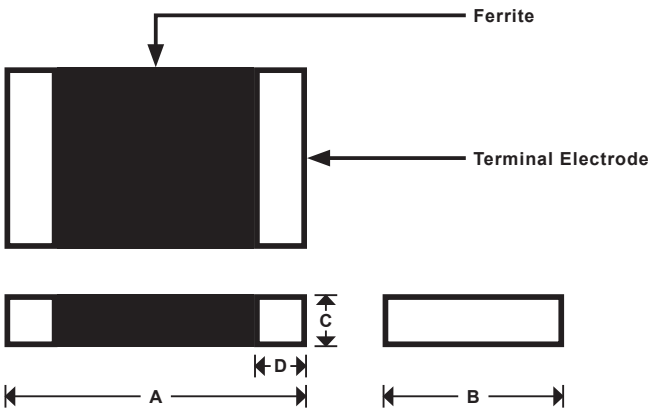
- General I/O wide band EMI suppression
- It is particular effective with unstable grounding.
- High frequency EMI preventation of computers, printers, VCRs,TVs, and portable telephone.

Part Number Code

MLB	-	160808	-	0010	N	01
Series Name		Size Code		Impedance (ex.0010=10 Ω ± 25%)	Classification	Rated Current
					N=Normal	01=100 mA

Notes for MLB Series
Please contact our sales department for the application other than above mentioned indication.
Please ask individual data sheet to verify detailed specification and performance.

Shape and Dimensions



Unit: mm

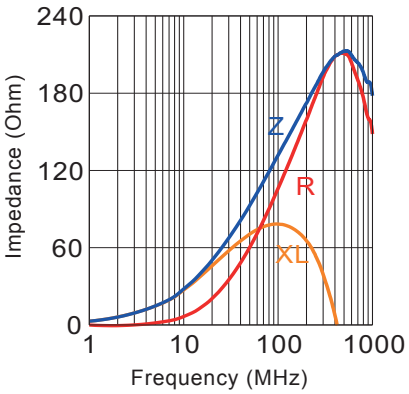
SIZE CODE	A	B	C	D	Chips/reel
100505(0402)	1.00+/-0.1	0.50+/-0.1	0.50+/-0.1	0.25+/-0.1	10000
160808(0603)	1.60+/-0.2	0.80+/-0.2	0.80+/-0.2	0.3+/-0.2	4000
201209(0805)	2.00+/-0.2	1.20+/-0.2	0.90+/-0.2	0.5+/-0.3	4000
321611(1206)	3.20+/-0.2	1.60+/-0.2	1.10+/-0.2	0.5+/-0.3	3000

FERRITE CHIP BEAD／MLB

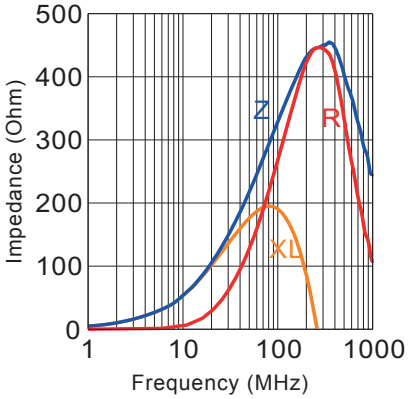
Part No.	Impedance (Ω)@100MHz±25%	DCR (Ω)max	Rated Current (mA) max
MLB-100505-0120N015	120	0,500	150
MLB-100505-0300N01	300	0,800	100
MLB-100505-0600N01	600	1,000	100
MLB-160808-0028N03	28	0,300	300
MLB-160808-0060N03	60	0,200	300
MLB-160808-0080N03	80	0,300	300
MLB-160808-0090N03	90	0,300	300
MLB-160808-0120N02	120	0,300	200
MLB-160808-0150N02	150	0,400	200
MLB-160808-0220N02	220	0,400	200
MLB-160808-0300N02	300	0,500	200
MLB-160808-0600N02	600	0,600	200
MLB-160808-1000N01	1000	1,000	100
MLB-201209-0030N05	30	0,150	500
MLB-201209-0060N04	60	0,300	400
MLB-201209-0080N04	80	0,300	400
MLB-201209-0090N03	90	0,300	300
MLB-201209-0120N03	120	0,300	300
MLB-201209-0300N02	300	0,400	200
MLB-201209-0600N02	600	0,600	200
MLB-201209-1000N02	1000	0,800	200
MLB-321611-0032N05	32	0,150	500
MLB-321611-0090N04	90	0,300	400
MLB-321611-0120N04	120	0,300	400
MLB-321611-0300N03	300	0,500	300
MLB-321611-0600N02	600	0,600	200
MLB-321611-1000N02	1000	0,800	200
MLB-321611-1200N01	1200 (50MHz)	0,900	100
MLB-321611-1500N01	1500 (50MHz)	0,900	100
MLB-321611-2000N01	2000 (50MHz)	1,200	100

Please contact us if other specification
(Size,Impedance, Rated Current etc.) is needed.

MLB-100505-0120N015



MLB-100505-0300N01



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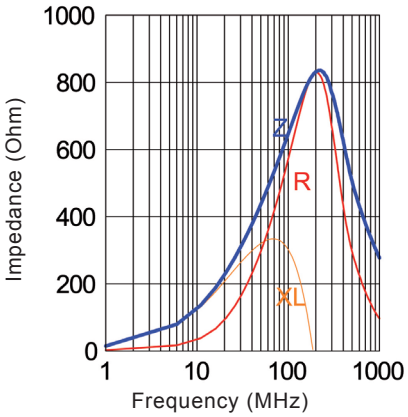
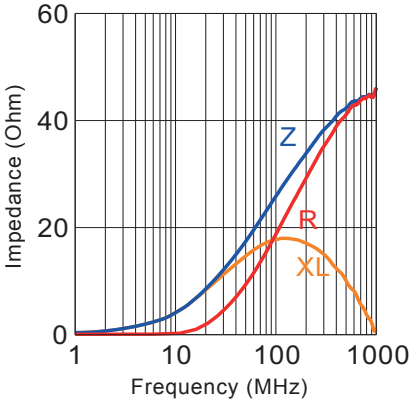


MLB-160808-0028N03



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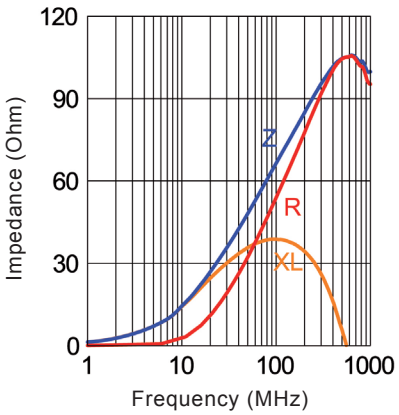

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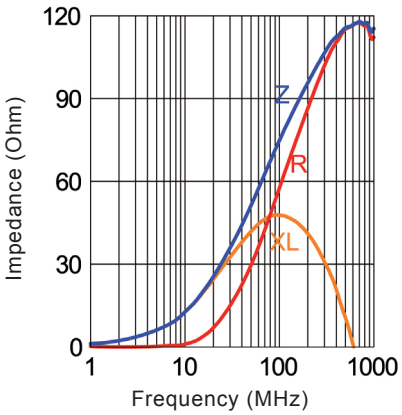

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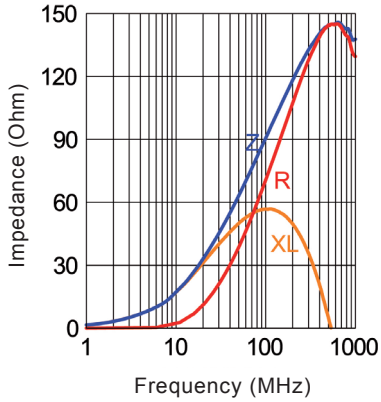

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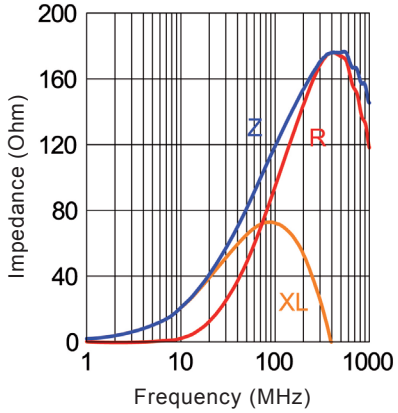

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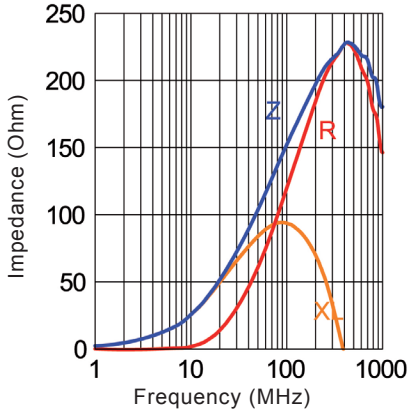

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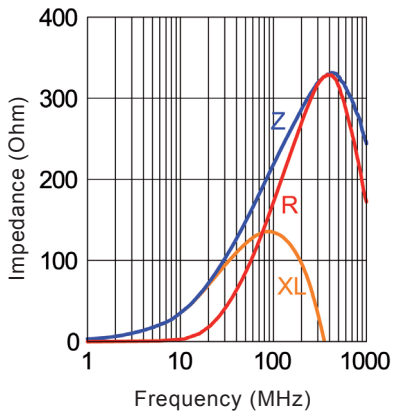

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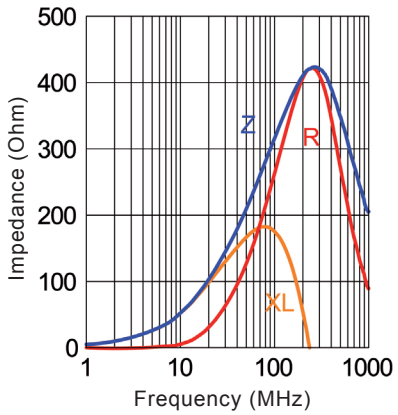

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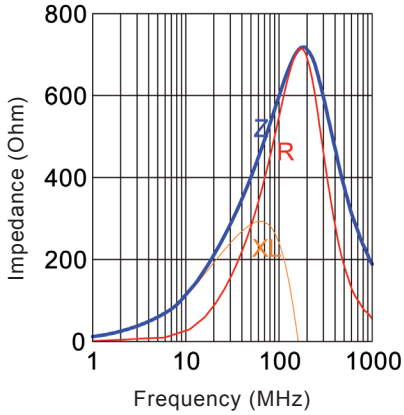

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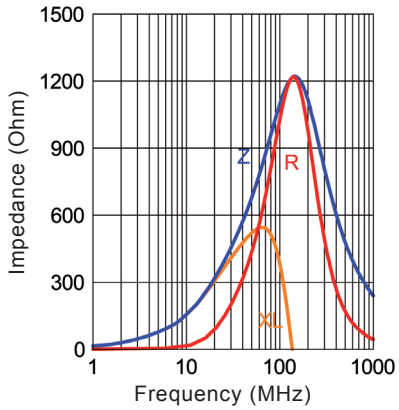

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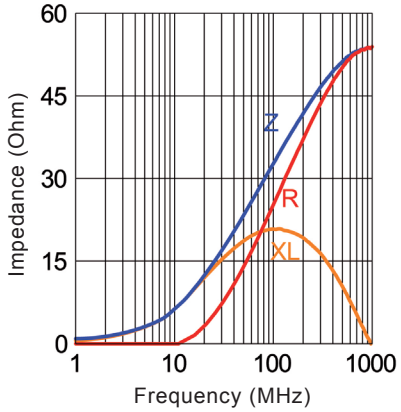

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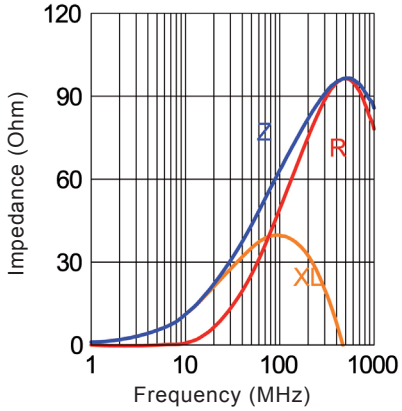

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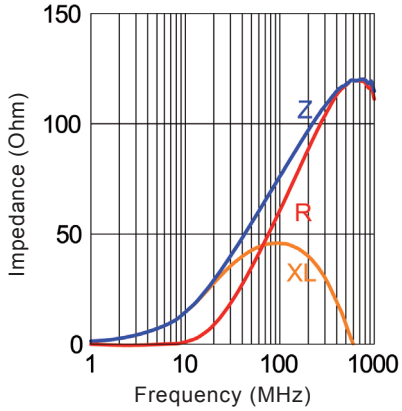

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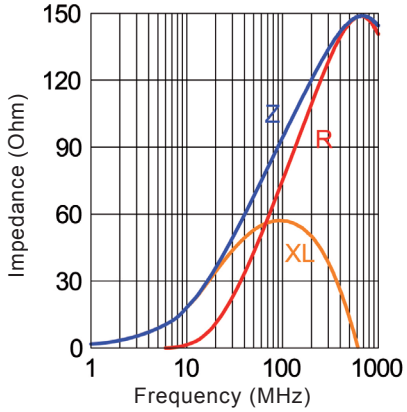

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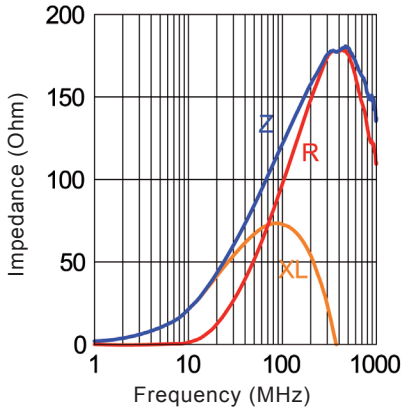

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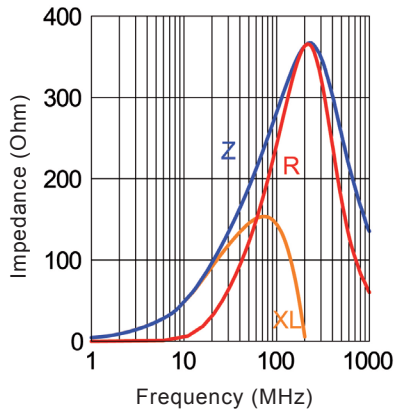

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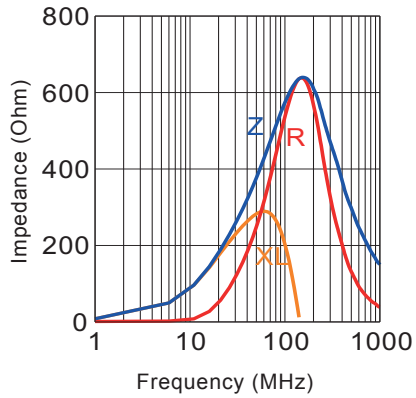

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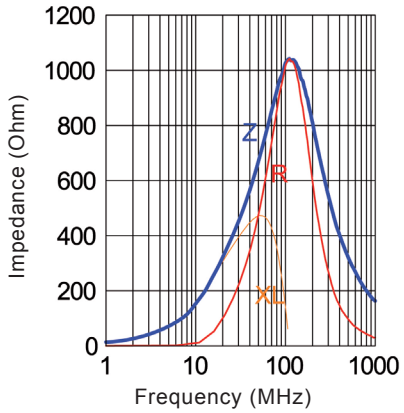

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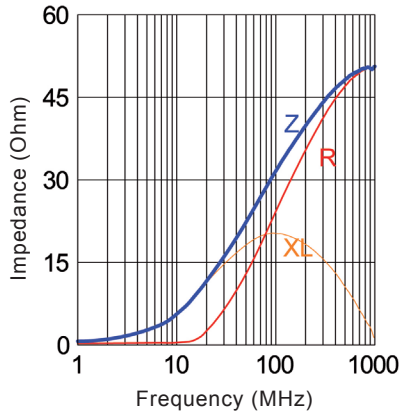

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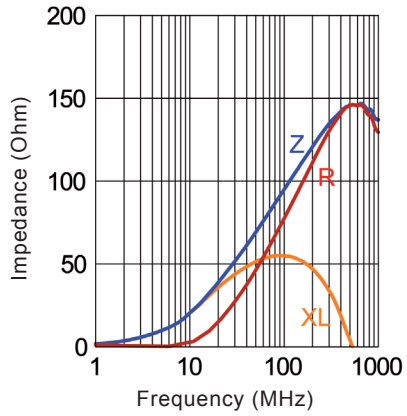

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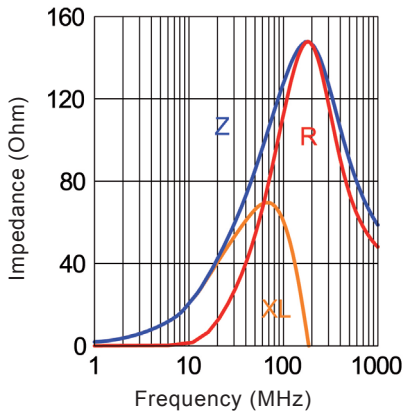

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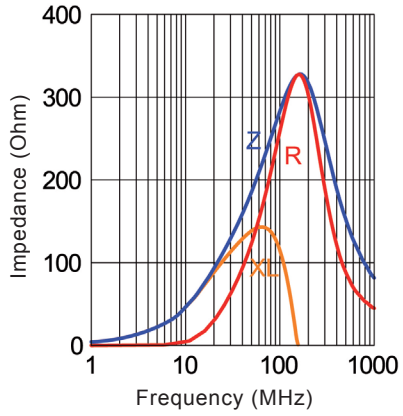

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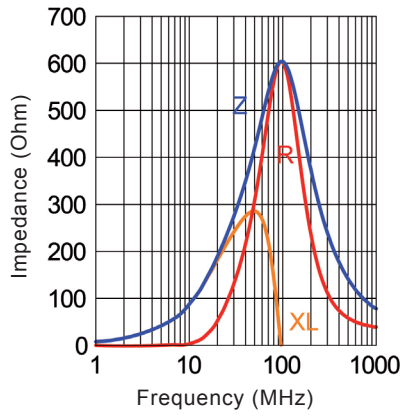

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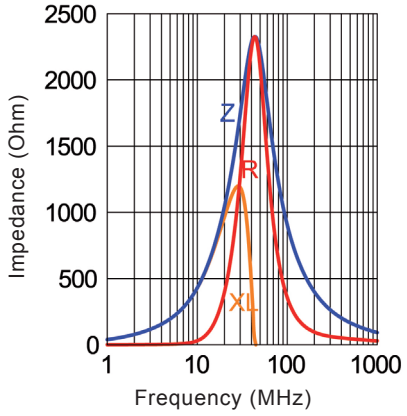
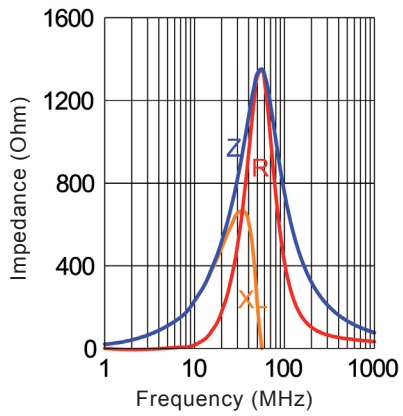
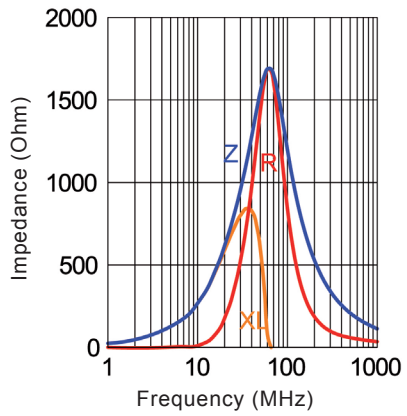


MLB-321611-1200N01



MLB-321611-1500N01



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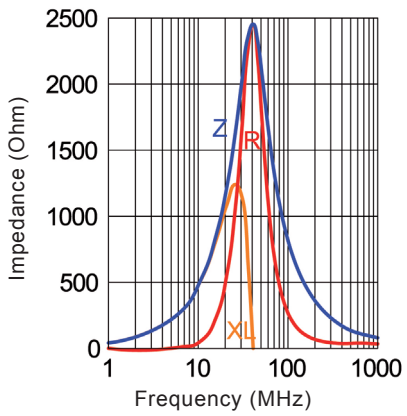
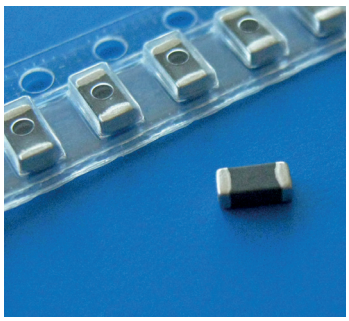




Ferrite Chip Bead, high current type

Feature

- MLB (high current type) can be used in high current circuit due to ist low DC resistance.
- It can match power line to a maximum of 6A DC.
- Impedance Range : 30 to 1000 ohm
- Rated Current Range : 1000 mA to 6000 mA
- Operating temperature Range : -40°C to +125°C
- Soldering Method : Reflow of Wave soldering, suitable for lead free soldering
- Packaging Method : Tape & Reel (per EIA Specifications)
- Storage Temperature : max.40°C, RH 70%

Application

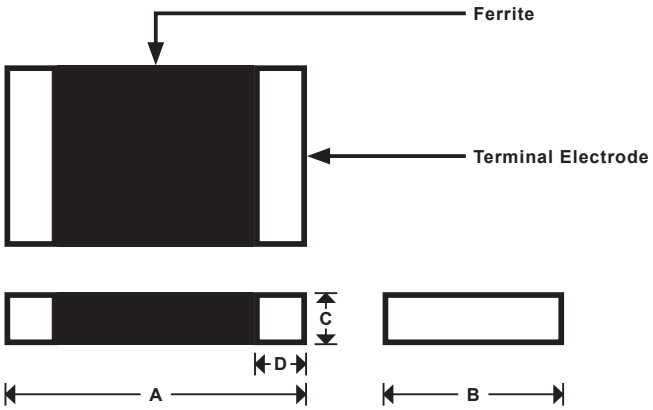
- EMI preventation for power line to a maximum of 6A DC.
- It is particular effective with unstable grounding.
- High frequency EMI preventation of computers, printers, VCRs,TVs, and portable telephone.

Part Number Code

MLB	-	160808	-	0010	C	25
Series Name		Size Code		Impedance (ex.0030=30 Ω ± 25%)	Classification	Rated Current
					C=High Current application	25=2500 mA

Notes for MLB Series
Please contact our sales department for the application other than above mentioned indication.
Please ask individual data sheet to verify detailed specification and performance.

Shape and Dimensions

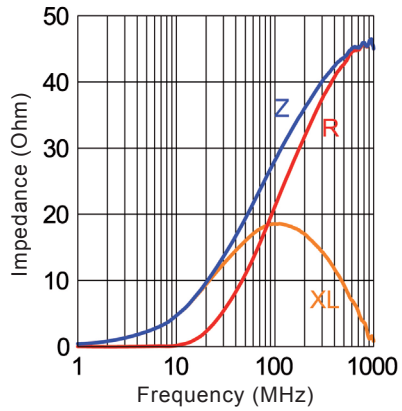


Unit: mm

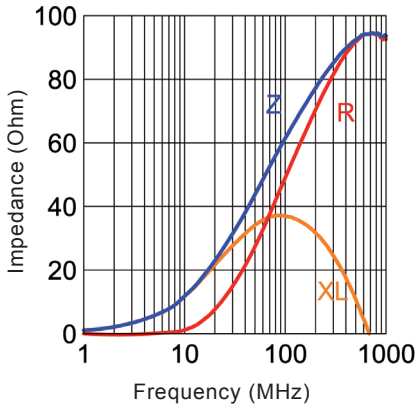
SIZE CODE	A	B	C	D	Chips/reel
160808(0603)	1.60+/-0.2	0.80+/-0.2	0.80+/-0.2	0.3+/-0.2	4000
201209(0805)	2.00+/-0.2	1.20+/-0.2	0.90+/-0.2	0.5+/-0.3	4000
321611(1206)	3.20+/-0.2	1.60+/-0.2	1.10+/-0.2	0.5+/-0.3	3000

HIGH CURRENT FERRITE CHIP BEAD／MLB

MLB-160808-0030C25



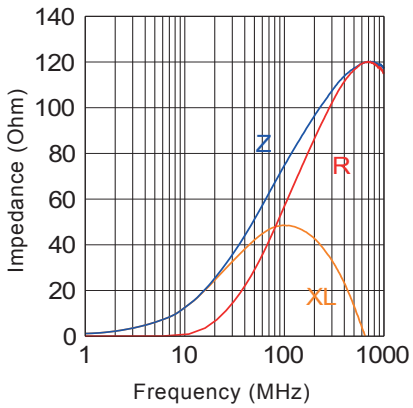
MLB-160808-0060C30



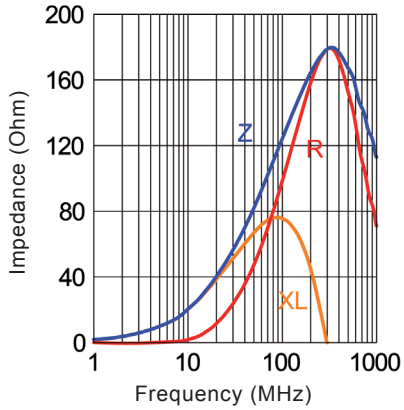
Part Co.	Impedance (Ω)@100MHz±25%	DCR (Ω)max	Rated Current (mA) max
MLB-160808-0030C25	30	0,050	2500
MLB-160808-0060C30	60	0,040	3000
MLB-160808-0080C30	80	0,040	3000
MLB-160808-0120C30	120	0,040	3000
MLB-160808-0220C15	220	0,150	1500
MLB-160808-0300C20	300	0,100	2000
MLB-160808-0600C10	600	0,200	1000
MLB-201209-0033C40	33	0,035	4000
MLB-201209-0060C40	60	0,035	4000
MLB-201209-0080C50	80	0,020	5000
MLB-201209-0120C50	120	0,020	5000
MLB-201209-0250C30	250	0,040	3000
MLB-201209-0300C30	300	0,040	3000
MLB-201209-0600C20	600	0,100	2000
MLB-201209-1000C10	1000	0,200	1000
MLB-321611-0080C40	80	0,035	4000
MLB-321611-0120C60	120	0,010	6000
MLB-321611-0300C10	300	0,200	1000
MLB-321611-0600C30	600	0,040	3000
MLB-321611-1000C10	1000	0,200	1000

Please contact us if other specification
(Size,Impedance, Rated Current etc.) is needed.

MLB-160808-0080C30



MLB-160808-0120C30



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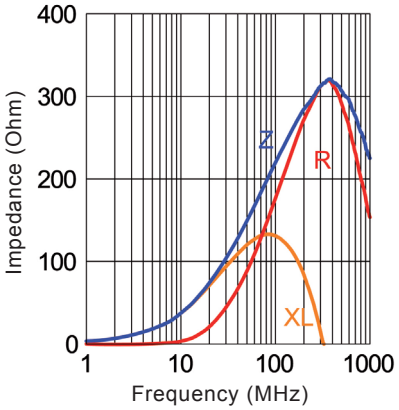
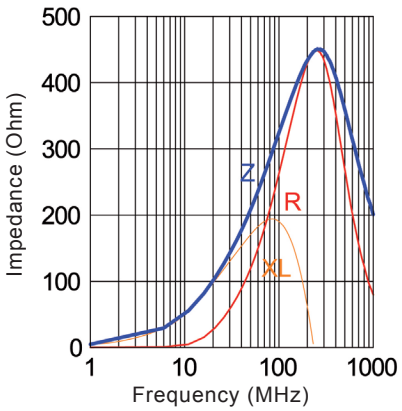


MLB-160808-0300C20



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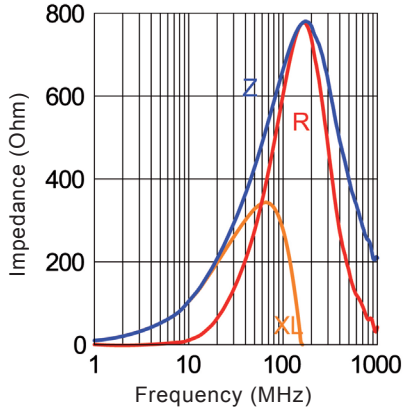
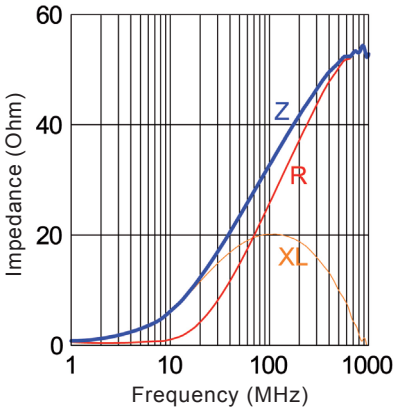


MLB-201209-0033C40



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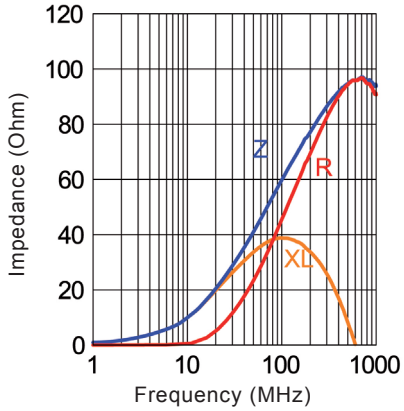
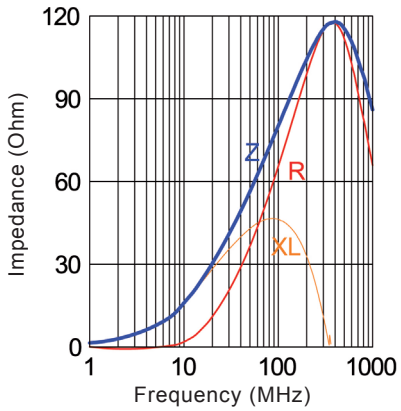


MLB-201209-0080C50



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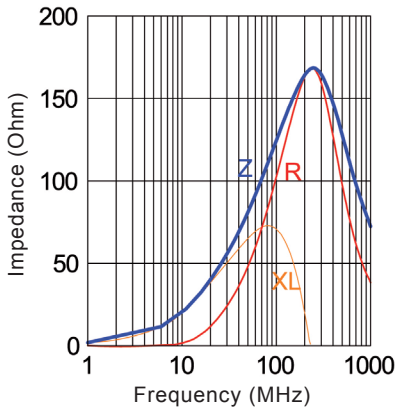

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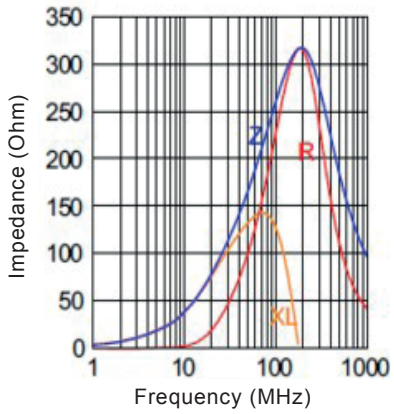

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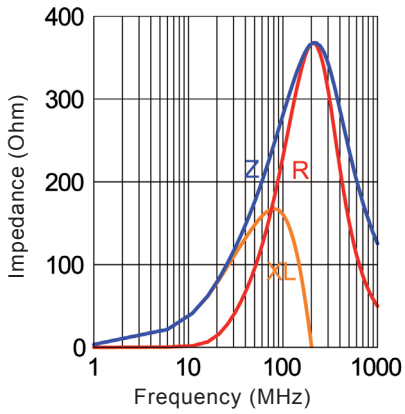

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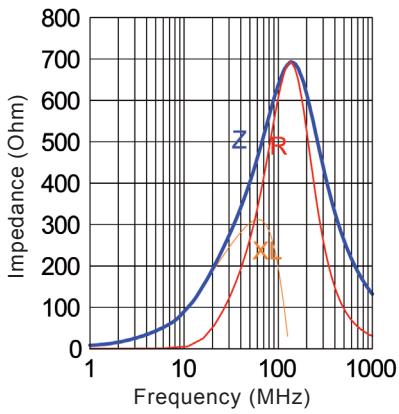

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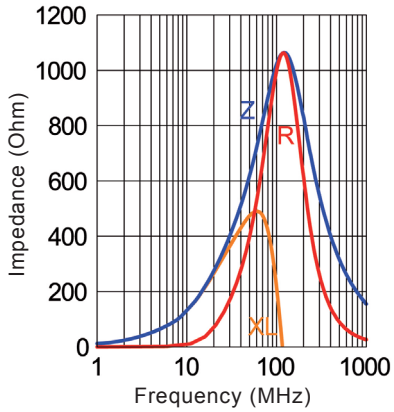
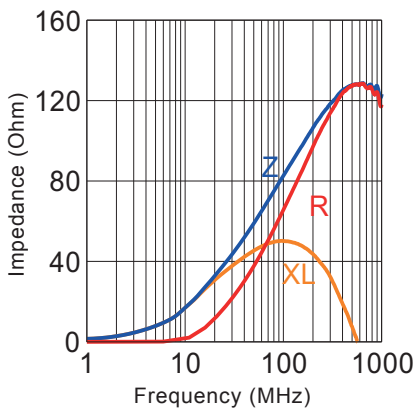


MLB-321611-0080C40



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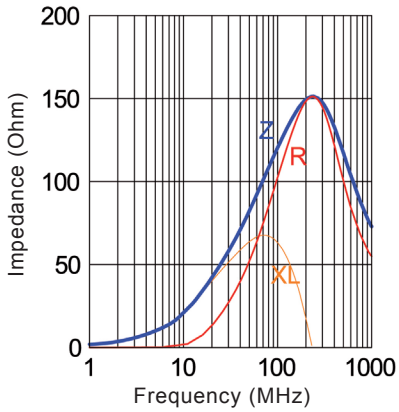

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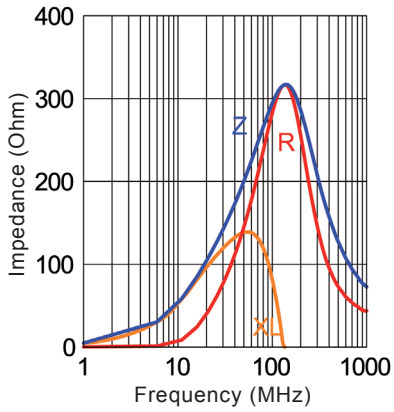

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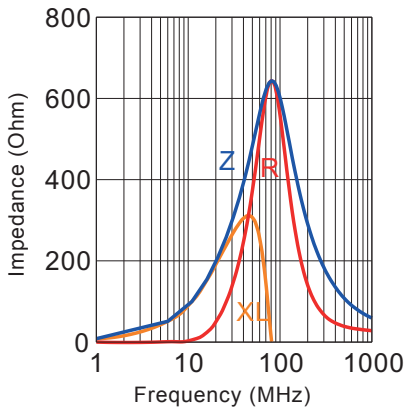

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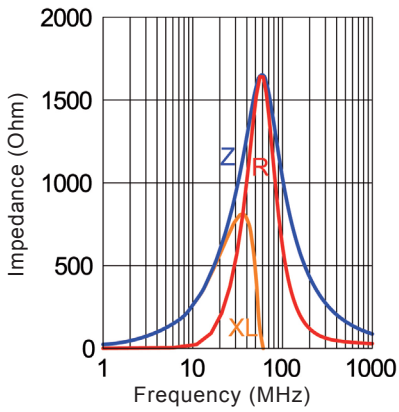
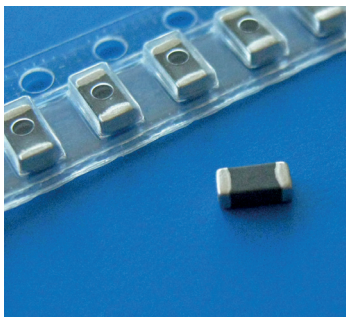


FERRITE CHIP BEAD FOR HIGH SPEED／MLB



Ferrite Chip Bead for high speed application

Feature

- MLB (for High speed) can minimize attenuation of the signal wave form for high speed signal due to ist sharp impedance characteristics.That is much lower impedance in frequency range lower than 100MHz.
- Impedance Range: 26 to 1000 ohm
- Rated Current Range: 100 mA to 500 mA
- Operating temperature Range: -40°C to +125°C
- Soldering Method: Reflow of Wave soldering, suitable for lead free soldering
- Packaging Method : Tape & Reel (per EIA Specifications)
- Storage Temperature : max.40°C, RH 70%

Application

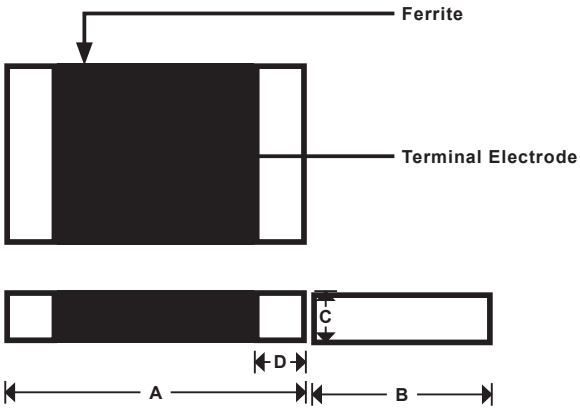
- EMI suppression for various electric equipment by addition of impedance to the circuit.
- It is particular effective with unstable grounding.
- High frequency EMI preventation of computers, printers, VCRs,TVs, and portable telephone.
- High speed signal or frequency (clock) harmonics EMI suppression.
- Clock, VGA data

Part Number Code

MLB	-	160808	-	0600	S	01
Series Name		Size Code		Impedance (ex.0600=600 Ω ± 25%)	Classification	Rated Current
					S=For High Speed Application	01=200 mA

Notes for MLB Series
Please contact our sales department for the application other than above mentioned indication.
Please ask individual data sheet to verify detailed specification and performance.

Shape and Dimensions



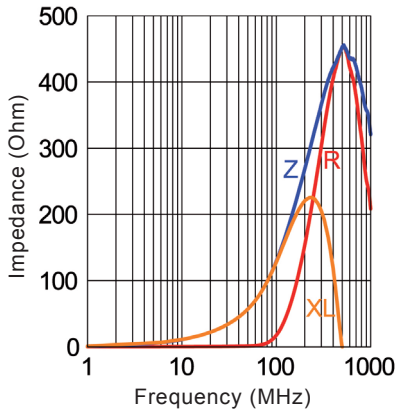
Unit: mm

SIZE CODE	A	B	C	D	Chips/reel
100505(0402)	1.00+/-0.1	0.50+/-0.1	0.50+/-0.1	0.25+/-0.1	10000
160808(0603)	1.60+/-0.2	0.80+/-0.2	0.80+/-0.2	0.3+/-0.2	4000
201209(0805)	2.00+/-0.2	1.20+/-0.2	0.90+/-0.2	0.5+/-0.3	4000
321611(1206)	3.20+/-0.2	1.60+/-0.2	1.10+/-0.2	0.5+/-0.3	3000

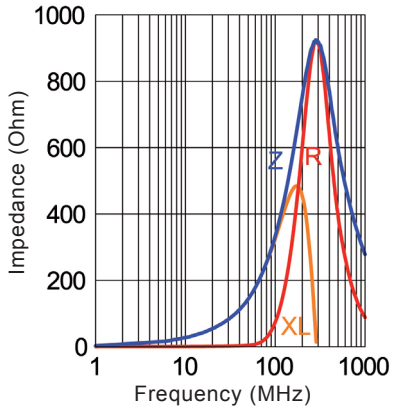
Part No.	Impedance (Ω)@100MHz±25%	DCR (Ω)max	Rated Current (mA) max
MLB-100505-0120S015	120	0,500	150
MLB-100505-0300S01	300	0,900	100
MLB-160808-0030S03	30	0,300	300
MLB-160808-0060S03	60	0,300	300
MLB-160808-0080S03	80	0,300	300
MLB-160808-0120S02	120	0,300	200
MLB-160808-0150S02	150	0,400	200
MLB-160808-0220S02	220	0,400	200
MLB-160808-0300S02	300	0,500	200
MLB-160808-0600S02	600	0,600	200
MLB-160808-1000S01	1000	1,000	100
MLB-201209-0026S05	26	0,200	500
MLB-201209-0060S04	60	0,300	400
MLB-201209-0120S03	120	0,300	300
MLB-201209-0300S02	300	0,500	200
MLB-201209-0600S02	600	0,600	200
MLB-201209-1000S02	1000	0,800	200
MLB-321611-0120S04	120	0,300	400
MLB-321611-0600S02	600	0,600	200

Please contact us if other specification
(Size,Impedance, Rated Current etc.) is needed.

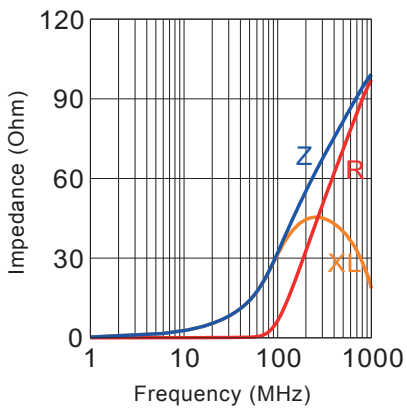
■ MLB-100505-0120S015



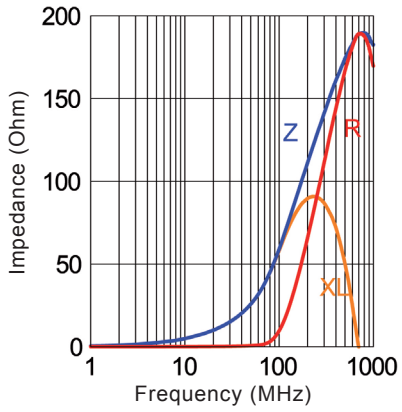
■ MLB-100505-0300S01



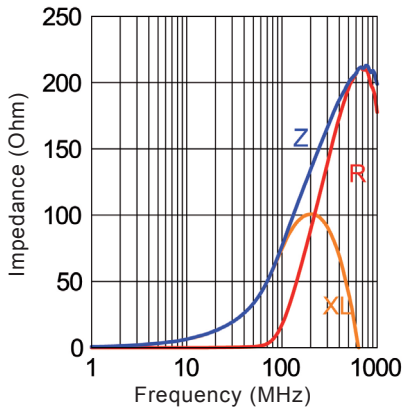
■ MLB-160808-0030S03



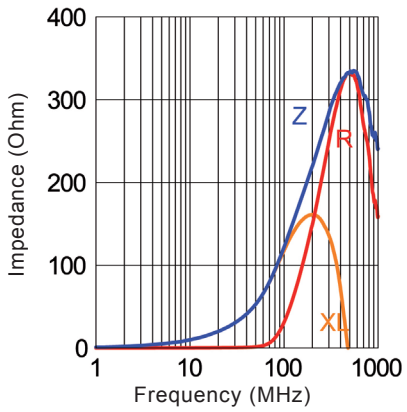
■ MLB-160808-0060S03



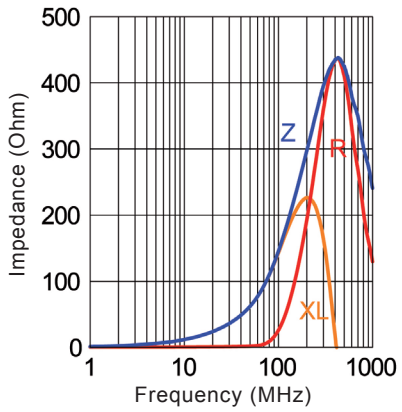
■ MLB-160808-0080S03



■ MLB-160808-0120S02

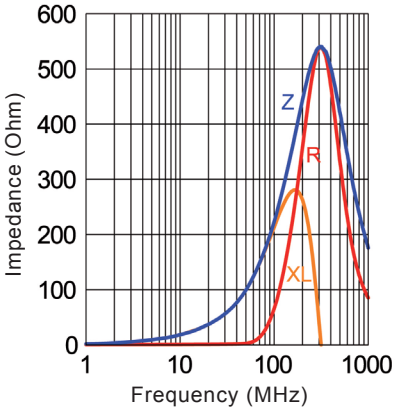


■ MLB-160808-0150S02

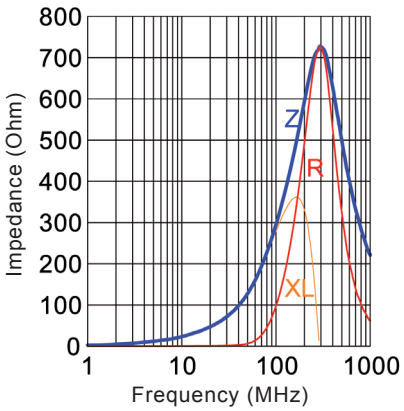


FERRITE CHIP BEAD FOR HIGH SPEED／MLB

MLB-160808-0220S02



MLB-160808-0300S02



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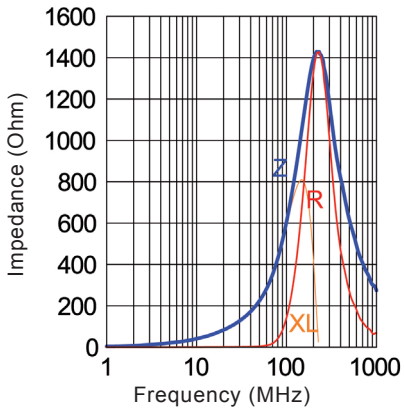
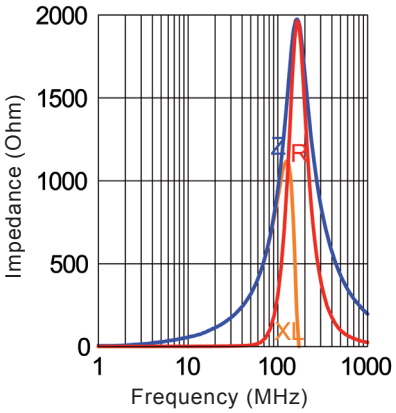


MLB-160808-1000S01



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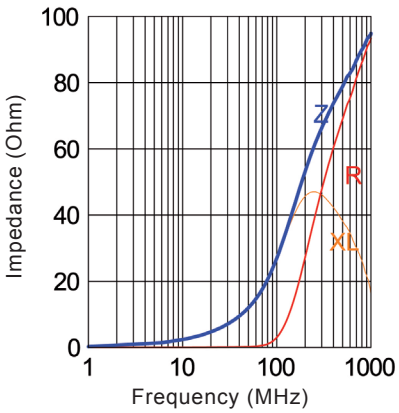
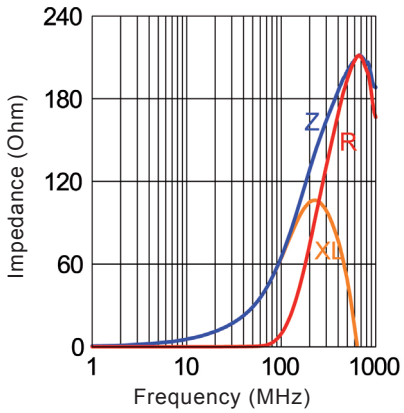


MLB-201209-0060S04



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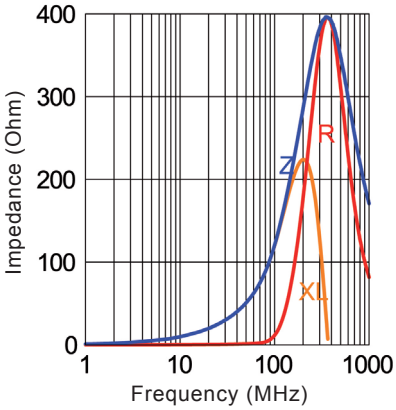
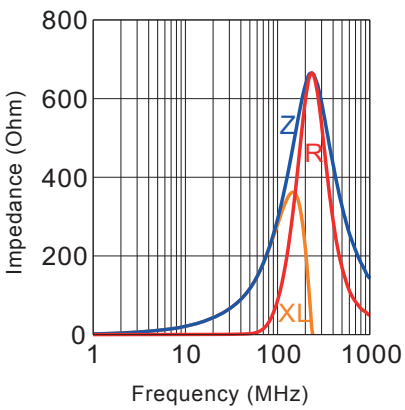


MLB-201209-0300S02



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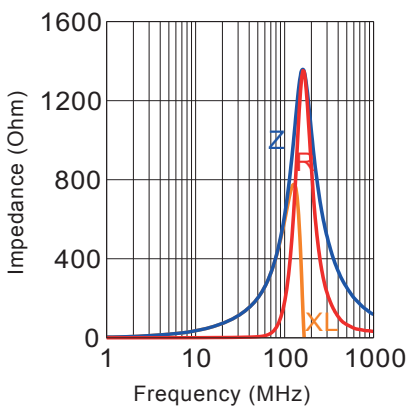
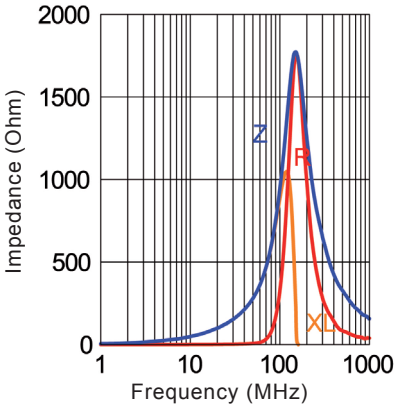
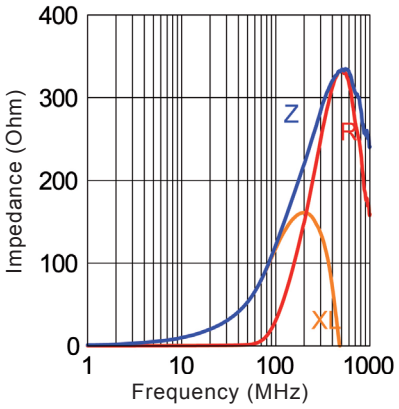


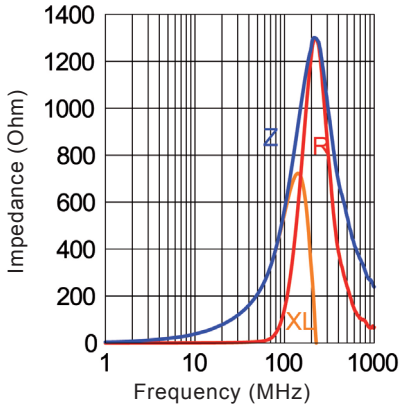
MLB-201209-1000S02



MLB-321611-0120S04



MLB-321611-0600S02



CHIP BEADS DESIGN KIT ESF-17CB

Various Chip Beads in compact booklet

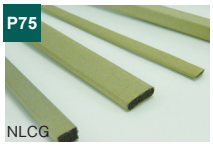
MEMO

GASKETS

SOFT

Stable performance provided with low-compression force

Foam

P75


SOFT GASKET

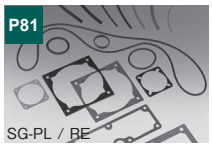
P79


CONDUCTIVE FOAM

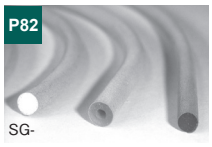
Elastomer

P80


CARBON RUBBER

P81


CONDUCTIVE ELASTOMER

P82


CONDUCTIVE ELASTOMER

WIRE MESH

Wire braided mesh type

Wire mesh

P83


WIRE MESH

Wire mesh+Elastomer core

P83

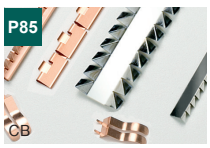

ELASTO MESH

P84

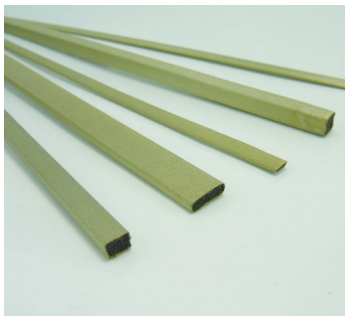

ELASTO MESH

Copper Beryllium Finger Strips

Hard Gasket

P85


HARD GASKET



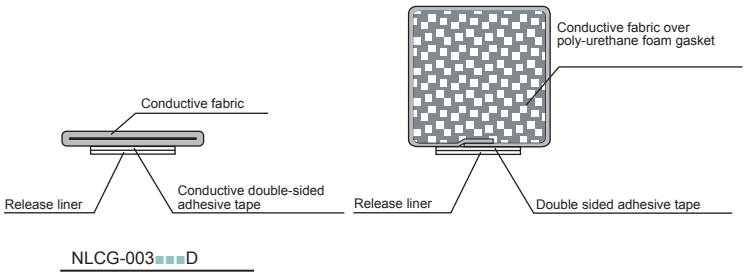
Stable electrical conductivity provided with low-compression force.

Feature

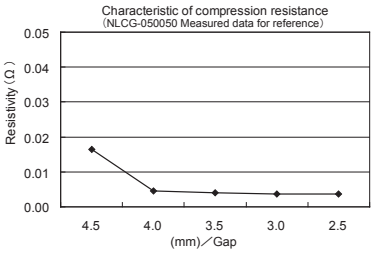
- Easy installation onto enclosure, etc. by adhesive tape.
  (Conductive adhesive tape is also available)
- UL94V-0 certified.(Conductive fabric over poly-urethane foam gasket portion.)
  (Except gaskets thinner 1.0 mm)
- UL94 VTM-0 certified adhesive tape.
  (Except conductive adhesive tape)
- Easy processing by scissors.
  (Please contact sales division for custom processing)
- Operating temperature range: -20°C to +70°C

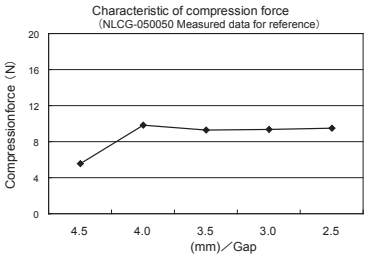
■ Standard length：1m

Structure



Properties





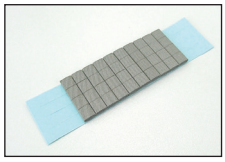
Part Number Guide

NLCG-■■■■■■ ■ L:■■■■

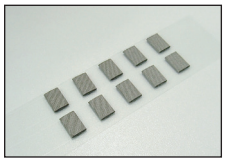
- L:■■■■ → Length in mm (not necessary for the standard length of 1 m)
- ■ → **Suffix "(D)":** *means customer can choose between conductive adhesive tape or adhesive tape.*
  Suffix "D ": *means conductive adhesive tape.*
  Suffix "NO TAPE": *means without adhesive tape.*
  Without Suffix: *means adhesive tape.*
- ■■■ → Width：e.g）050=5mm / 100=10mm
- ■■■ → Height：e.g）010=1mm / 120=12mm

e.g)：NLCG-010050 → Height 1mm × Width 5mm

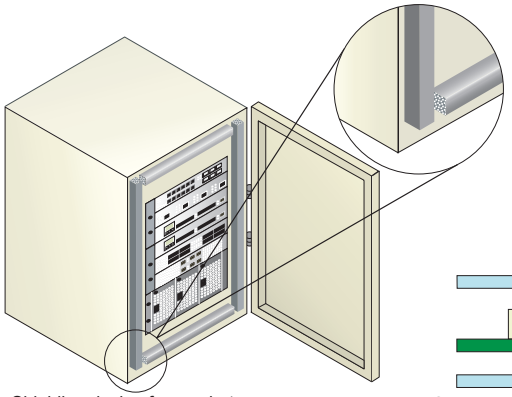
Secondary processing



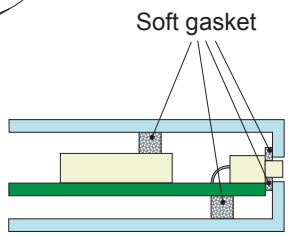
Kiss cut



Customized thin-out kiss cut



① Shielding design for gap between metal enclosure and door structure

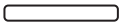
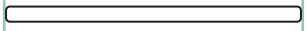


② Stable grounding between PCB and Chassis

※All specifications and characteristics shown herein are subject to change without notice for improvements or changes in specification.
※Galvanic corrosion may occourby contact with other metals.

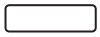
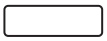
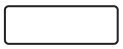
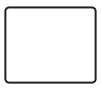
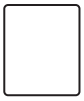
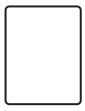
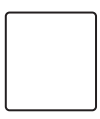
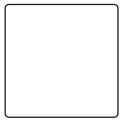
※The values are measured data for reference, not guaranteed.

SOFT GASKET／NLCG　R-PROFILE

NLCG-003030(D)	NLCG-003050 D	NLCG-003300 D	NLCG-010030 D
Height:0.3mm Width:3mm	Height:0.3mm Width:5mm	Height:0.3mm Width:30mm	Height:1mm Width:3mm
NLCG-010040	NLCG-010050(D)	NLCG-010070(D)	NLCG-010100(D)
Height:1mm Width:4mm	Height:1mm Width:5mm	Height:1mm Width:7mm	Height:1mm Width:10mm
NLCG-010130	NLCG-010250	NLCG-015030(D)	NLCG-015050(D)
Height:1mm Width:13mm	Height:1mm Width:25mm	Height:1.5mm Width:3mm	Height:1.5mm Width:5mm
NLCG-015070(D)	NLCG-015100(D)	NLCG-020040	NLCG-020050(D)
Height:1.5mm Width:7mm	Height:1.5mm Width:10mm	 Height:2mm Width:4mm	 Height:2mm Width:5mm
NLCG-020060 D	NLCG-020070(D)	NLCG-020100(D)	NLCG-020150
 Height:2mm Width:6mm	 Height:2mm Width:7mm	 Height:2mm Width:10mm	 Height:2mm Width:15mm
NLCG-020210	NLCG-020235	NLCG-020350	NLCG-020510
Height:2mm Width:21mm	Height:2mm Width:23.5mm	Height:2mm Width:35mm	Height:2mm Width:51mm
NLCG-020560	NLCG-025100	NLCG-030040(D)	NLCG-030050(D)
 Height:2mm Width:56mm	 Height:2.5mm Width:10mm	 Height:3mm Width:4mm	 Height:3mm Width:5mm

※**Suffix "(D)":** *means customer can choose between conductive adhesive tape or adhesive tape.*
※**Suffix "D ":** *means conductive adhesive tape.*
※**Suffix "NO TAPE":** *means without adhesive tape.*
※**Without Suffix:** *means adhesive tape.*
※The values are measured data for reference, not guaranteed.

SOFT GASKET／NLCG　R-PROFILE

NLCG-030060	NLCG-030100(D)	NLCG-035090	NLCG-035120
			
Height:3mm Width:6mm	Height:3mm Width:10mm	Height:3.5mm Width:9mm	Height:3.5mm Width:12mm
NLCG-040040(D)	**NLCG-040050(D)**	**NLCG-040080(D)**	**NLCG-040100(D)**
			
Height:4mm Width:4mm	Height:4mm Width:5mm	Height:4mm Width:8mm	Height:4mm Width:10mm
NLCG-040130	**NLCG-050050(D)**	**NLCG-050080**	**NLCG-050100(D)**
			
Height:4mm Width:13mm	Height:5mm Width:5mm	Height:5mm Width:8mm	Height:5mm Width:10mm
NLCG-050150 D	**NLCG-060060**	**NLCG-060100**	**NLCG-065060**
			
Height:5mm Width:15mm	Height:6mm Width:6mm	Height:6mm Width:10mm	Height:6.5mm Width:6mm
NLCG-070100	**NLCG-070130**	**NLCG-080100**	**NLCG-095090**
			
Height:7mm Width:10mm	Height:7mm Width:13mm	Height:8mm Width:10mm	Height:9.5mm Width:9mm
NLCG-100100	**NLCG-100120**	**NLCG-120100**	**NLCG-130100(D)**
			
Height:10mm Width:10mm	Height:10mm Width:12mm	Height:12mm Width:10mm	Height:13mm Width:10mm
NLCG-130120	**NLCG-150150**		
			
Height:13mm Width:12mm	Height:15mm Width:15mm		

※**Suffix "(D)":** *means customer can choose between conductive adhesive tape or adhesive tape.*
※**Suffix "D ":** *means conductive adhesive tape.*
※**Suffix "NO TAPE":** *means without adhesive tape.*
※**Without Suffix:** *means adhesive tape.*
※The values are measured data for reference, not guaranteed.

SOFT GASKET／NLCG R-PROFILE

Size variation Rectangular Profile

●: Double sided adhesive tape type
○: Conductive adhesive tape type

Height \ Width	3	4	5	6	7	8	9	10	12	13	15	21	23.5	25	30	35	51	56
0.3	●○		○												○			
1	○	●	●○		●○			●○		●				●	○			
1.5	●○		●○		●○			●○										
2		●	●○	○	●○			●○			●	●				●		●
2.5								●										
3		●○	●○	●				●○										
3.5							●		●									
4		●○	●○			●○		●○										
5			●○			●		●○			○							
6				●				●										
6.5				●														
7	●							●										
8								●										
9.5							●											
10								●	●									
12								●										
13								●○										
15											●							

Unit: mm

SOFT GASKET／NLCG D-PROFILE

NLCG-D015030(D)

Height:1.5mm Width:3mm

NLCG-D020050

Height:2mm Width:5mm

NLCG-D025020 D

Height:2.5mm Width:2mm

NLCG-D030030(D)

Height:3mm Width:3mm

NLCG-D030070

Height:3mm Width:7mm

NLCG-D035030

Height:3.5mm Width:3mm

NLCG-D040060

Height:4mm Width:6mm

NLCG-D065090

Height:6.5mm Width:9mm

NLCG-D095120

Height:9.5mm Width:12mm

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※**Suffix "D ":** *means conductive adhesive tape.*
※**Suffix "NO TAPE":** *means without adhesive tape.*
※**Without Suffix:** *means adhesive tape.*
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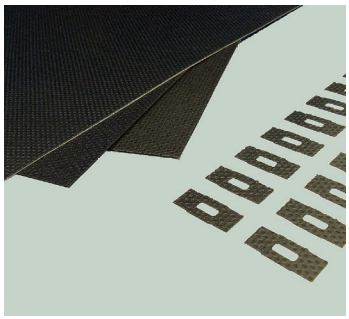


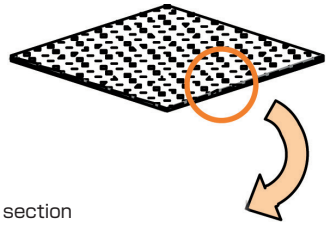
Thin EMI sheet gasket made with conductive foam

Feature

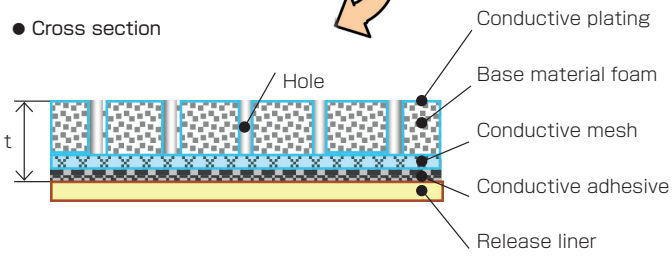
- Suitable solution for grounding for space saving areas such as mobile equipments, flat panel monitors etc.
- Thin and well cushioned foam gasket.
- Through hole process is provided. Conductivity between top and bottom surface is available. Custom profiles such as cutting, punching etc. are also available. (Conductive adhesive is used.)

Product structure

● Outline



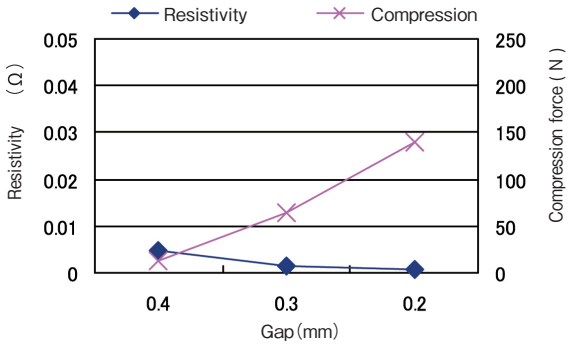
● Cross section



Properties

● Compression vs. Contact resistance (XYT-0.5)

Size: 25 x 25 mm



Specifications

Part No.	XYT-0.3	XYT-0.5	XYT-0.7
Base material	Foam: Olefinic foam / Mesh: Polyester		
Plating	Ni-Sn/Cu plating		
Conductive adhesive	Acrylic conductive adhesive		
Color	Black		
Total thickness t (mm)	0.3	0.5	0.7
Resistivity in the thickness direction (25mm² / 1kg load)	< 0.1 Ω		
Peel adhesion at 180°(25mm width)	Min 1kgf		

※All specifications and characteristics shown herein are typical values, but are not guaranteed.
※All specifications and characteristics shown herein are subject to change without notice for improvements or changes in specification.

CARBON RUBBER／CSR

Carbon filled silicone based rubber.

Feature

- Carbon Rubber is a good shielding gasket and an excellent environmental seal.
- Excellent formability available , various extruded shapes as shown below.

Material

- Conductive silicone

- Standard length: 10m

R type

Unit: mm

Part No.	A
CSR-R-15	1.5
CSR-R-20	2.0
CSR-R-30	3.0
CSR-R-40	4.0
CSR-R-50	5.0

O type

Unit: mm

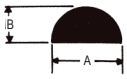
Part No.	A	B
CSR-0-25-15	2.5	1.5
CSR-0-60-30	6.0	3.0
CSR-0-65-30	6.5	3.0
CSR-0-100-65	10.0	6.5

P type

Unit: mm

Part No.	A	B	C
CSR-P-125-50	12.5	5.0	6.0
CSR-P-170-72	17.0	7.2	7.5
CSR-P-240-77	24.0	7.7	11.0

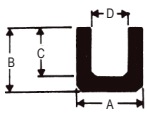
D type



Unit: mm

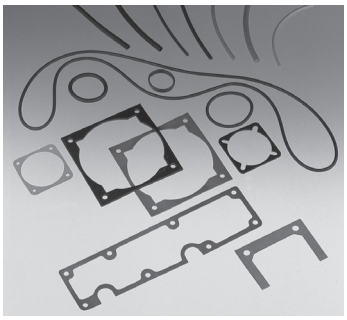
Part No.	A	B
CSR-D-40-15	4.0	1.5
CSR-D-45-25	4.5	2.5

U type



Unit: mm

Part No.	A	B	C	D
CSR-U-48-48	4.8	4.8	3.2	1.6
CSR-U-55-110	5.5	11.0	8.0	2.5
CSR-U-80-130	8.0	13.0	9.5	3.5
CSR-U-95-130	9.5	13.0	9.5	5.0



Conductive Elastomer as sheet and strip

Feature

- The Kitagawa Electrically Conductive Elastomers offer excellent shielding and environmental sealing. They are offered in a range of materials and outlines to meet various applications.

Material

- Silicone/Nickel

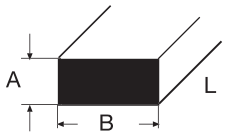
Shore A hardness		68±6
Volume Resistivity (Ω/cm)		0,1
Temperature Range (°C)		-55 to +200
Density (g/cm^3)		3.5
Tensile strength (%)		75
Colour		Black
Shielding Effectiveness (dB)	H-Field 10 KHz	72
	E-Field 1MHz	115
	P-Field 1GHz	85

Standard Sheets - PL -

Part No.	A(mm)	B (mm)	T (mm)	Tolerance (mm)
SG-PL-	200.00	-200.00	-0.50	± 0.08
SG-PL-	200.00	-200.00	-0.80	± 0.13
SG-PL-	200.00	-200.00	-1.00	± 0.15
SG-PL-	200.00	-200.00	-1.50	± 0.20
SG-PL-	200.00	-200.00	-2.00	± 0.20

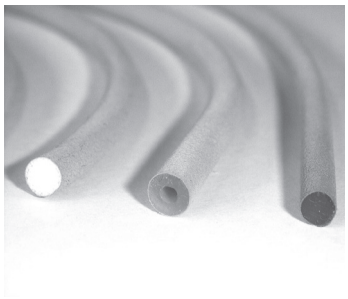
Max. size 350x1040 (Rolled)

Rectangular Strips - RE -



Part No.	A (mm)	B (mm)	L (mm)	A Tolerance (mm)	B
SG-RE-	1.00	-3.00	-1.000	± 0.15	± 0.18
SG-RE-	1.50	-3.00	-1.000	± 0.20	± 0.20
SG-RE-	2.00	-2.50	-1.000	± 0.20	± 0.18
SG-RE-	2.00	-3.00	-1.000	± 0.20	± 0.18
SG-RE-	2.00	-4.00	-1.000	± 0.20	± 0.20

CONDUCTIVE ELASTOMER



Conductive Elastomer in 3 different materials

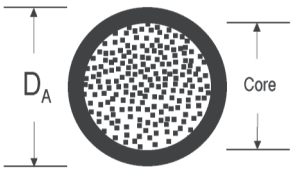
Feature

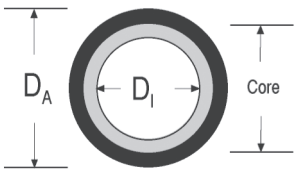
- The Kitagawa Conductive Elastomer EMI-Gaskets feature an abrasion-resistant, silver-filled elastomer applied over a non-conductive extruded silicon core.

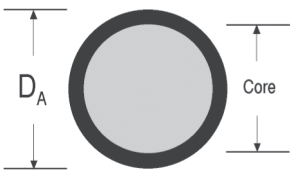
Material

- Elastomer binder : Silicone
- Conductive particles : Ag/Cu

Volume Resistivity (Ω/cm)	0,008		
Coating Thickness (mm)	0,15±0,1		
Breaking Elongation	+25%		
Colour	Beige		
Shielding Effectiveness (dB)	SG-FO	SG-TU	SG-RO
H-Field 10KHz	72	60	67
E-Field 1MHz	115	100	130
P-Field 1GHz	85	90	110







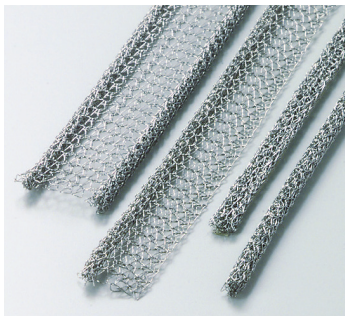
Elastomer core: Silicon foam (non conductive)	
Density	0,43 g/cm3
Shore A hardness	30°+/-6
Breaking elongation	>40 %
Compression Set	< 40 %
Temperature resistance	-55/+125° C
Part No. D_A (mm)	Tolerance (mm)
SG-FO-1.50	± 0.18
SG-FO-1.80	± 0.20
SG-FO-2.00	± 0.20
SG-FO-2.30	± 0.20
SG-FO-2.50	± 0.25
SG-FO-2.80	± 0.25
SG-FO-3.00	± 0.25
SG-FO-3.30	± 0.25
SG-FO-3,80	± 0.30
SG-FO-4.00	± 0.30
SG-FO-4.30	± 0.30
SG-FO-4.50	± 0.30
SG-FO-4.80	± 0.35
SG-FO-5.00	± 0.35
SG-FO-5.30	± 0.35
SG-FO-5.50	± 0.35
SG-FO-6.00	± 0.35

Elastomer core: Silicon tube (non conductive)	
Density	1,14 g/cm3
Shore A hardness	60°±6
Breaking elongation	>40 %
Compression Set	< 35 %
Temperature resistance	-55/+125° C
Part No. D_A D_I (mm)	Tolerance (mm)
SG-TU-1.30 -0.50	± 0.15
SG-TU-1.50 -0.50	± 0.15
SG-TU-1.60 -0.50	± 0.20
SG-TU-1.80 -1.00	± 0.20
SG-TU-2.00 -1.00	± 0.20
SG-TU-2.10 -1.00	± 0.20
SG-TU-2.30 -1.00	± 0.20
SG-TU-2.60 -1.00	± 0.25
SG-TU-3.00 -1.00	± 0.25
SG-TU-3.30 -1.50	± 0.25
SG-TU-3.80 -1.50	± 0.25
SG-TU-4.30 -1.50	± 0.25
SG-TU-4.80 -2.00	± 0.25
SG-TU-5.30 -2.00	± 0.30
SG-TU-5.80 -2.00	± 0.35

Elastomer core: Silicon solid round (non conductive)	
Density	1,08 g/cm3
Shore A hardness	60° ±7
Breaking elongation	>40 %
Compression Set	< 35%
Temperature resistance	-55/+125° C
Part No. D_A (mm)	Tolerance (mm)
SG-RO-1.20	± 0.15
SG-RO-1.50	± 0.15
SG-RO-1.80	± 0.15
SG-RO-2.00	± 0.15
SG-RO-2.30	± 0.20
SG-RO-2.50	± 0.20
SG-RO-2.80	± 0.25
SG-RO-3.00	± 0.25
SG-RO-3.30	± 0.25
SG-RO-3.50	± 0.25
SG-RO-3.80	± 0.25
SG-RO-4.00	± 0.30
SG-RO-4.30	± 0.30
SG-RO-4.50	± 0.30
SG-RO-4.80	± 0.30
SG-RO-5.50	± 0.35

Contact us for other size not listed above.

WIRE MESH／WMS・WMR・WMH・WMD



Standard wire mesh gaskets

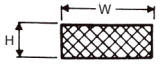
Feature

- Mesh structure conforms to irregular surfaces providing reliable shielding effects.
- No unbraiding or wire loosening type also available, allowing cutting to desired length.

Material

- Nickel-copper alloy (Monel) wire

Rectangular



Unit: mm

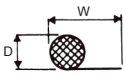
Part No.	H	W
WMS-15-15-M	1.5	1.5
WMS-15-32-M	1.5	3.2
WMS-23-23-M	2.3	2.3
WMS-23-32-M	2.3	3.2
WMS-32-32-M	3.2	3.2
WMS-32-39-M	3.2	3.9
WMS-47-47-M	4.7	4.7

Round

Unit: mm

Part No.	D
WMR-18-M	1.8
WMR-24-M	2.4
WMR-32-M	3.2
WMR-39-M	3.9
WMR-47-M	4.7
WMR-63-M	6.3
WMR-92-M	9.2

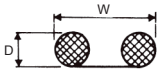
P section



Unit: mm

Part No.	D	W
WMH-19-95-M	1.9	9.5
WMH-25-128-M	2.5	12.8
WMH-32-126-M	3.2	12.6
WMH-63-158-M	6.3	15.8

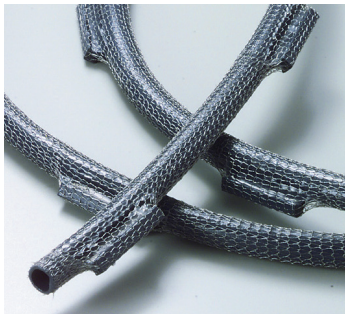
Double P section



Unit: mm

Part No.	D	W
WMD-19-92-M	1.9	9.2
WMD-19-126-M	1.9	12.6
WMD-19-158-M	1.9	15.8
WMD-25-126-M	2.5	12.6

ELASTO MESH／ETAB



Elastomer core with arrowhead allows easy installation on enclosures.

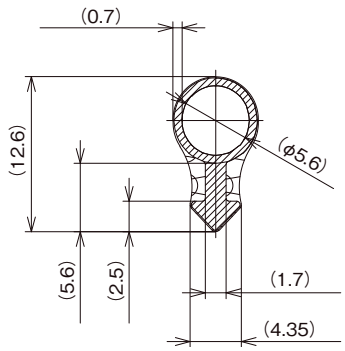
Feature

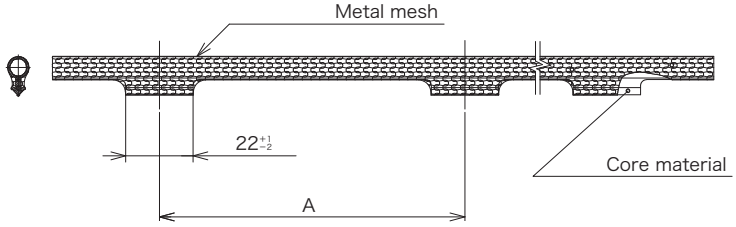
- Easier installation compared with conventional formed gaskets (rectangular or round).
- Small compression force, the special structure prevents fall-off of the gasket.
- No unbraiding or wire loosening type, allowing cutting to desired length.

Material

- Metal mesh / Nickel-copper alloy (Monel) wire
- Core material / Silicone

Cross-section

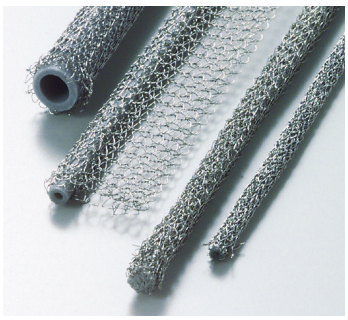




Unit: mm

Part No.	A
ETAB-79.5-***-***	79.5 +1 -2
ETAB-100 -***-***	100 +1 -2

*** indicates overall length and the length between the cut face and the starting point of the arrowhead.(Contact us for the details.)



Wire mesh gasket with an excellent elasticity elastomer core

Feature

- EMI/RFL gasket with silicone or chloroprene etc core enclosed in a wire mesh.
- High effectiveness can be gained with excellent elasticity and form recovery properties providing secure contact between the wire mesh and the metal face.

Material

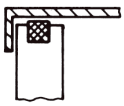
- Metal mesh / Nickel-copper alloy (Monel) wire
- Core material / Refer to the table below

■ Standard length: 10m

End of Part number	Material	
NS	Chloroprene	Sponge
SS	Silicone	
ST		Tube

Installation example

Rectangular



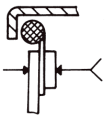
Insertion in groove assembly

Round

Rectangular

Adhesive assembly

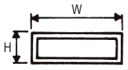
P section



Spot-welding assembly

Rivet assembly

Rectangular



Unit: mm

Part No.	H	W
EMS-100-100-MNS	10	10
EMS-100-200-MNS	10	20
EMS-120-200-MNS	12	20
EMS-150-150-MNS	15	15
EMS-150-200-MNS	15	20
EMS-200-200-MNS	20	20

(Latex sponge core type is available)

Unit: mm

Part No.	H	W
EMS-16-32-MSS	1.6	3.2
EMS-32-32-MSS	3.2	3.2
EMS-32-47-MSS	3.2	4.7
EMS-47-47-MSS	4.7	4.7

(Wire-loosening protection type is available)

Round (Gasket type)

Unit: mm

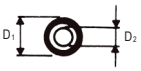
Part No.	D
EMR-15-MST	1.5
EMR-18-MST	1.8
EMR-24-MST	2.4
EMR-32-MST	3.2
EMR-47-MST	4.7
EMR-62-MST	6.2

(Wire-loosening protection type is available)

Unit: mm

Part No.	D
EMR-60-MS-NS	6
EMR-80-MS-NS	8
EMR-100-MS-NS	10
EMR-120-MS-NS	12
EMR-130-MS-NS	13
EMR-150-MS-NS	15

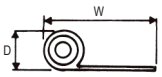
Round (Cable shield type)



Unit: mm

Part No.	D1	D2
EMC-40-20-MST	4.0	2.0
EMC-50-30-MST	5.0	3.0
EMC-60-40-MST	6.8	4.0

P section



Unit: mm

Part No.	D	W
EMH-32-126-MST	3.2	12.6
EMH-32-158-MST	3.2	15.8
EMH-32-190-MST	3.2	19.0

Round (Non silicone type)

Unit: mm

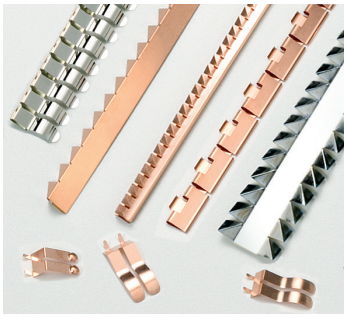
Part No.	D
ETC-20-14-FMSTT	2.4

Feature

- No Siloxane gas is generated.
- Core material generates no dioxin gas when burnt.

Material

- Metal mesh / Nickel-copper alloy (Monel) wire (Processed for wire-loosening protection)
- Core material / Elastomer tube



Various selection of Copper Beryllium Finger Strips

Feature

- Copper beryllium owns its wide range of application to the unique performance qualities it has:
  - extraordinary elasticity
  - strength
  - fatigue strength
  - high conductivity
  - resistance against environmental influences such as ozone, epipolar rays and light, also against solvents and corrosion.
- Furthermore, copper beryllium can be used under a wide temperature range and is not burnable or flammable. It does not evolve gas either. If handled correctly, it acts self purificating, for example when it is employed as a door shield for opening and closing.

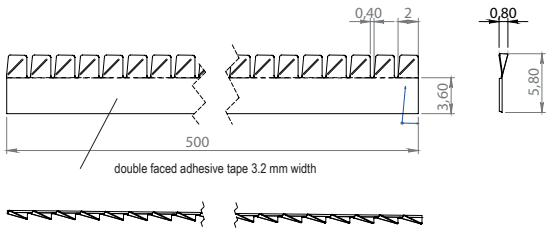
Technical Data

Specific gravity	8,4 g/cm^3
Fusing point	900 °C
Coefficient of expansion (20-200 °C)	17 10^{-6} /°C
Thermal conductivity	0.27 cal/cm s °C; 1.13 W/cm °C
Diamond pyramid hardness	350-430 kp/mm^2
Tensile strength	1200-1450 N/mm^2
Fatigue strength, load application 10^8	250-290 N/mm^2
Modulus of elasticity	135000 N/mm^2
Torsion modulus	47000 N/mm^2
Spring bending limit	820-950 N/mm^2
Electric conductivity	12.5-13 m/Ωmm^2

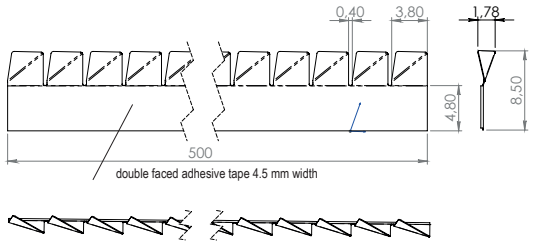
Plating finishes
-01 Bright finish
-02 Tin plated
-03 Silver plated
-04 Nickel plated
-05 Gold plated

Ordering information		Part No.		Finish-ID.		length (mm)
	CB-	xxxx	-	xx	-	xxxxx

CB-0002



CB-0004



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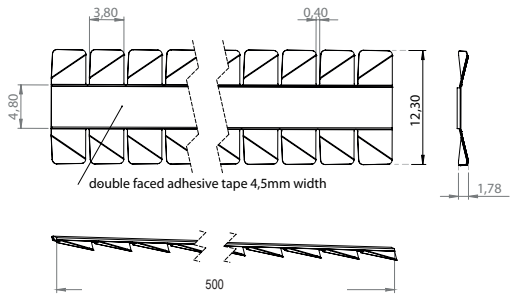

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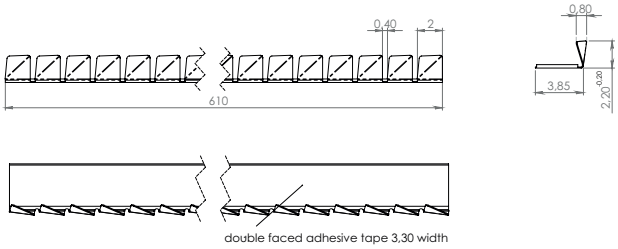

Unit: mm

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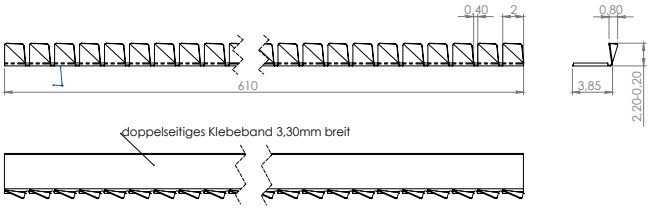
CB-0007



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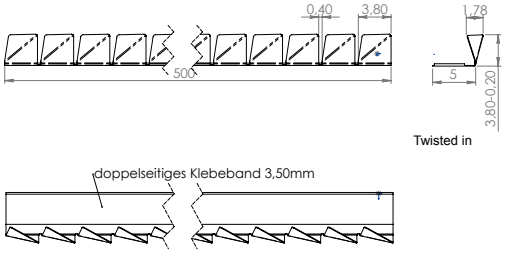

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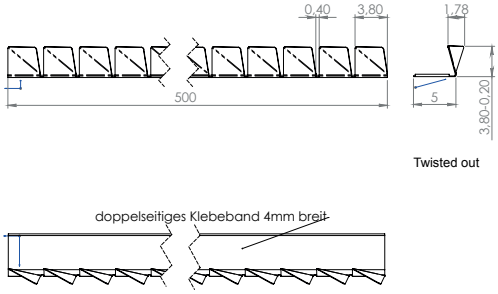

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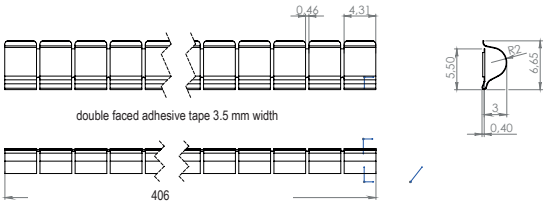

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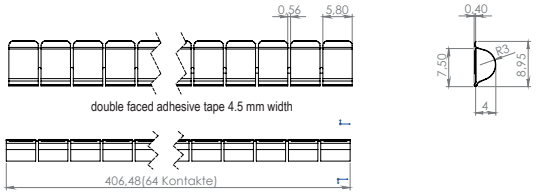

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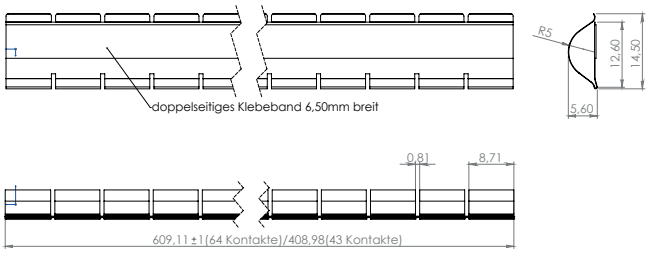

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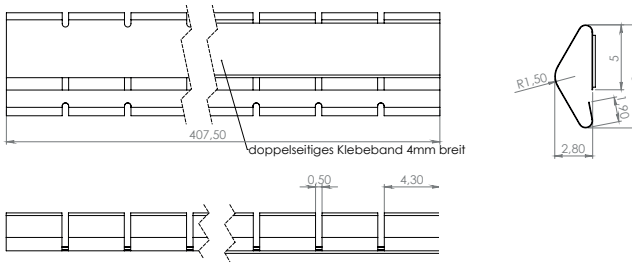

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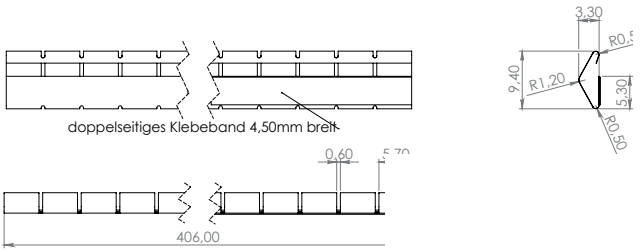

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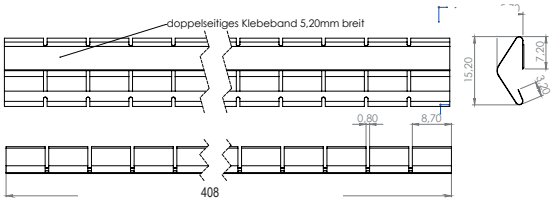

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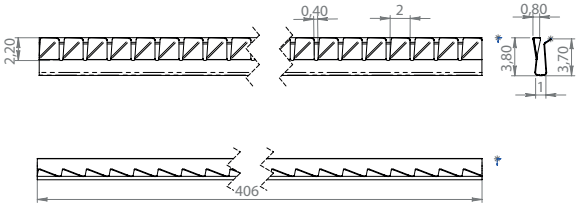
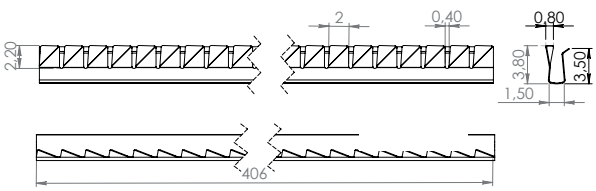


Unit: mm

CB-0017



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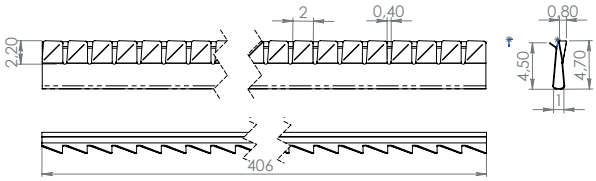

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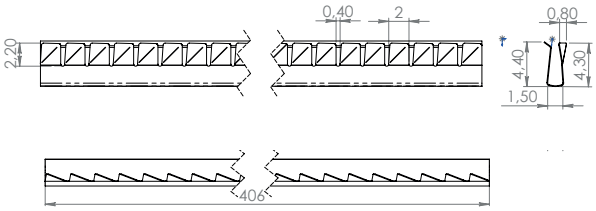

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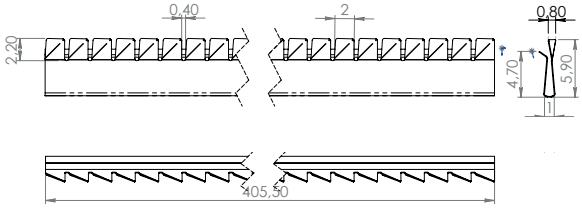

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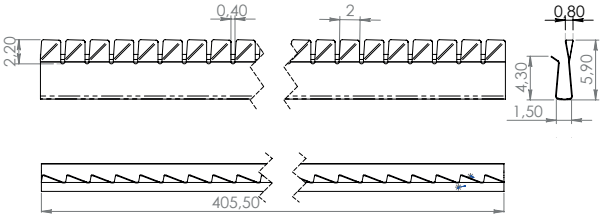
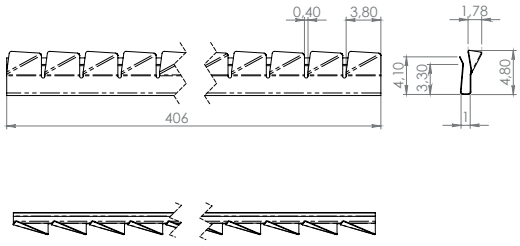


CB-0022



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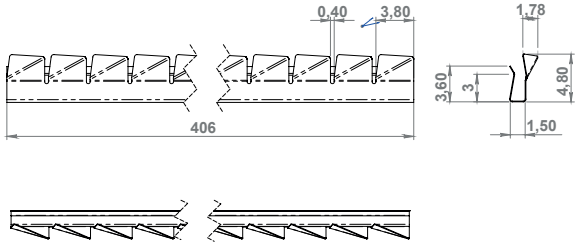
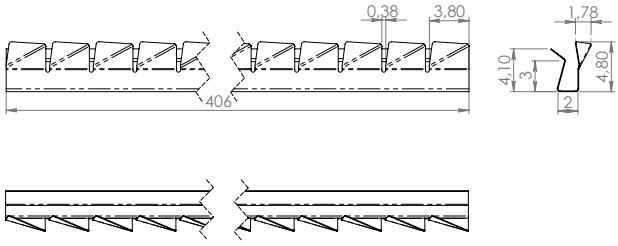


CB-0024



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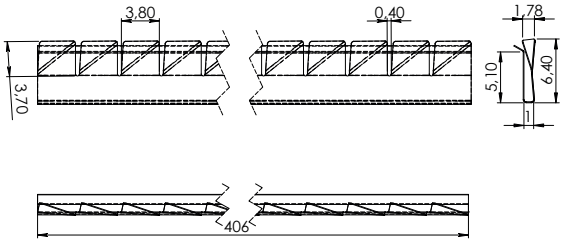

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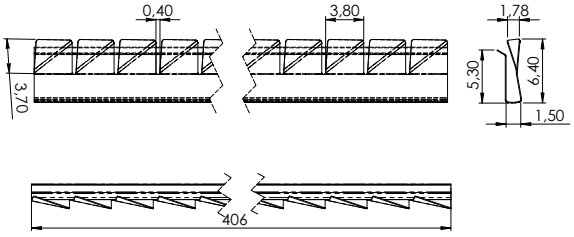
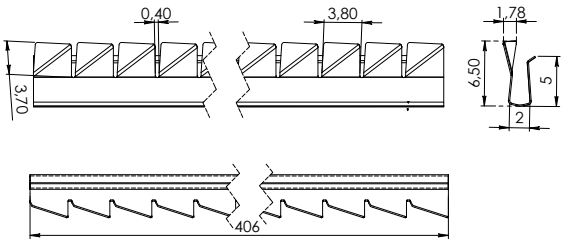


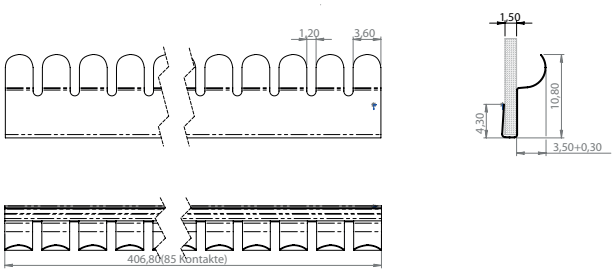
Unit: mm

COPPER BERYLLIUM FINGER STRIPS／CB

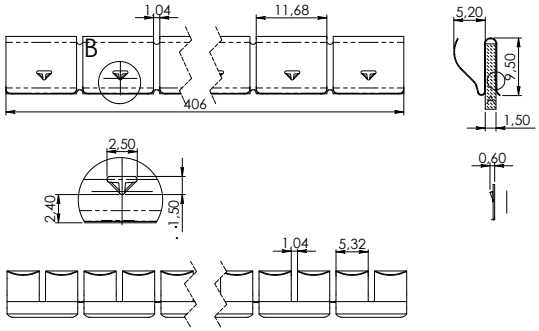
CB-0027



CB-0034



CB-0036



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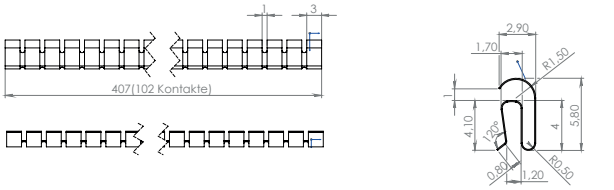

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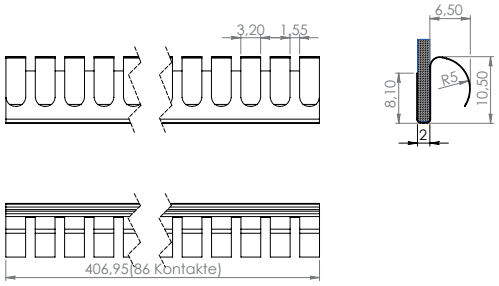

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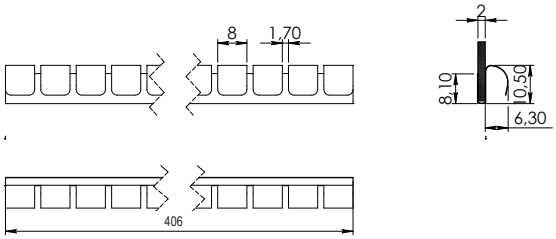

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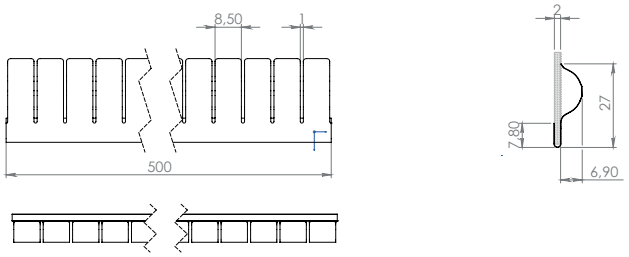

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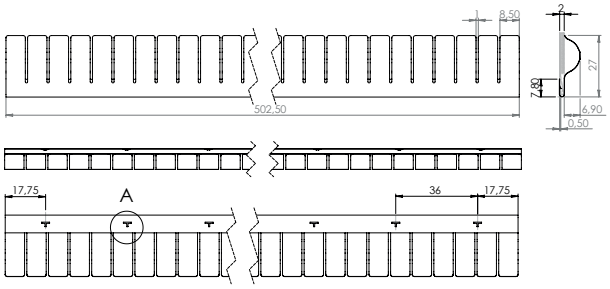

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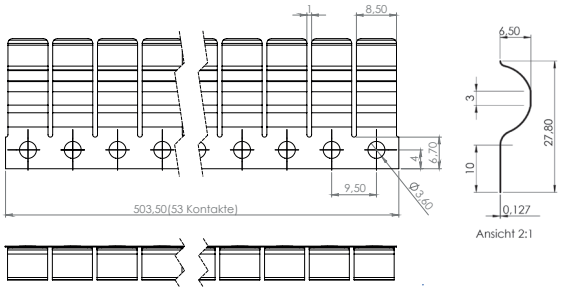

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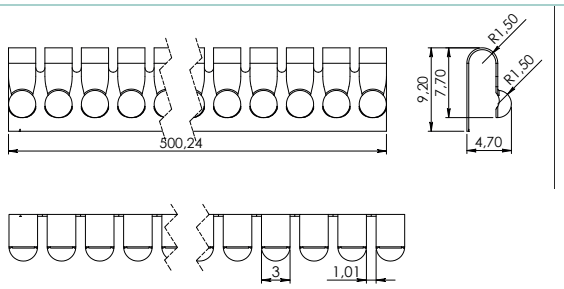
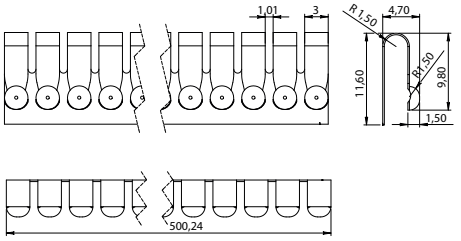


Unit: mm

CB-0049



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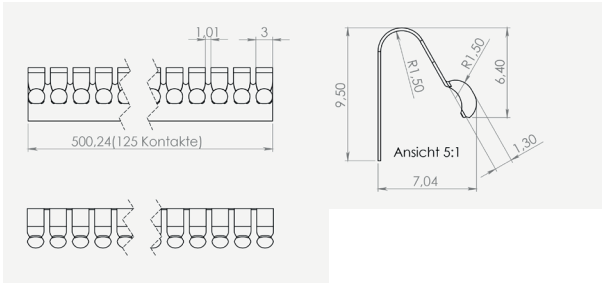

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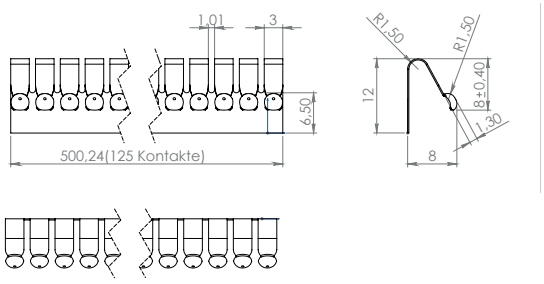

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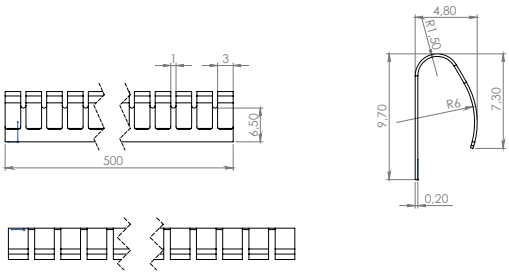

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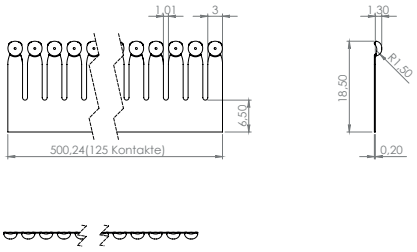
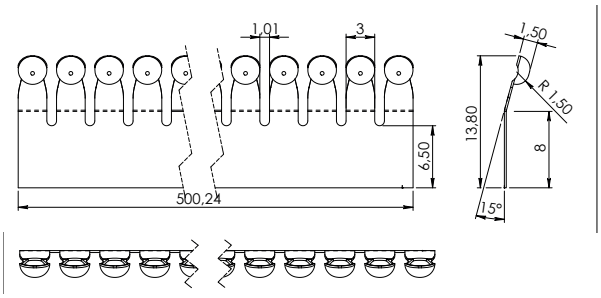
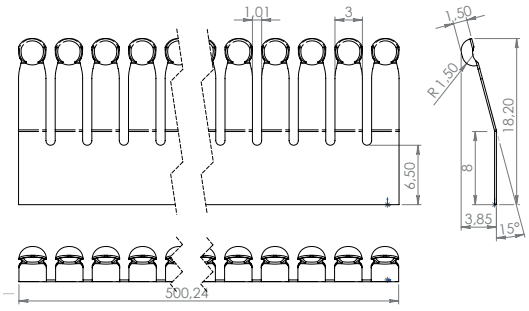


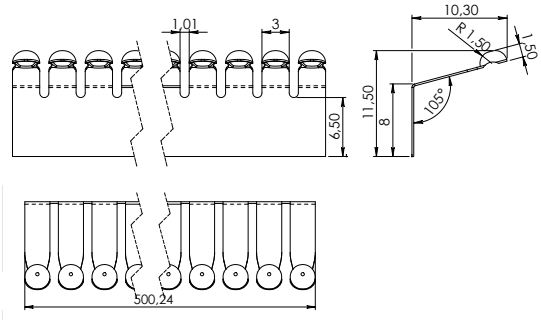
CB-0060



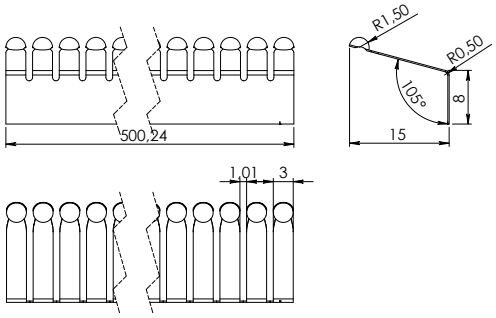
CB-0061



CB-0062



CB-0063



Unit: mm

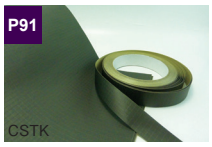
CONDUCTIVE TAPES／SHEETS

CONDUCTIVE FABRIC

Conductive fabric tape

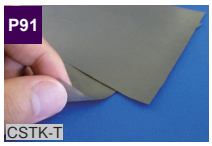
Conductive fabric

P91



CONDUCTIVE FABRIC TAPE

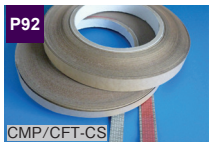
P91



CONDUCTIVE FABRIC TAPE

Technical adhesive tape

P92



TECHNICAL ADHESIVE TAPE

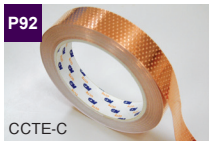
METAL FOIL

Low-resistivity type using embossed metal foil and conductive adhesive material.

Metal foil (embossed)

Embossed type

P92



COPPER EMBOSSING TAPE

Metal foil

Standard type

P93

CU/ AL TAPE

CLEAR CONDUCTIVE FILM

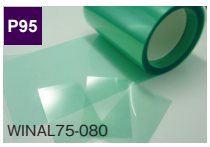
ITO, Indium Tin Oxide, conductive film has superior optical transparency.

Clear Conductive Film

P94

TRANSPARENT
CONDUCTIVE FILM

P95



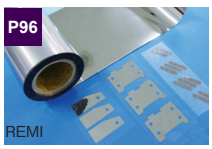
TRANSPARENT
CONDUCTIVE FILM

THIN FILM

Super-thin conductive film with thickness of 35 μm.

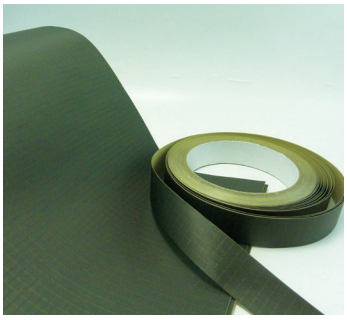
Thin film

P96



REMILESS

CONDUCTIVE FABRIC TAPE／CSTK



Thin and durable carbon-coated type

Feature

- Carbon-coating protects from the galvanic corrosion suffered by metal foils.
- Carbon-coated special knitting provides no yarn-loosening or fuzz on the surface.
- Carbon-coated tape with low resistivity, effective against electrostatic discharge.

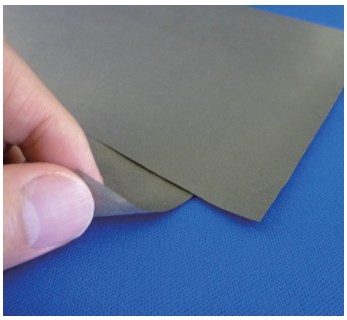
Material

- Conductive woven fabric / Cu-Ni plated woven fabric with carbon-coating (UL510FR)
- Standard length: 20m

Part No.	(mm) Width	(mm) Thickness	adhesive strength	Resistivity
CSTK-008	8	0.1	8.53 N/25mm／Width	0.04 Ω/□20mm
CSTK-010	10			
CSTK-015	15			
CSTK-020	20			
CSTK-025	25			
CSTK-030	30			
CSTK-040	40			
CSTK-060	60			
CSTK-250	250			
CSTK-300	300			

The values are measured, but not guaranteed.

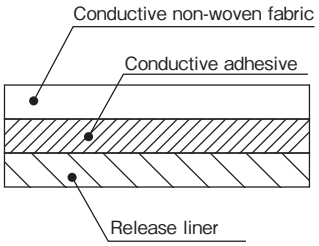
CONDUCTIVE FABRIC TAPE／CSTK-T



Thinned conductive fabric tape with 30μm in overall thickness

Feature

- Super-thin at 30μm in overall thickness suitable for mobile device.
- The flexible, and easy to fixed curved surface.
- Conductive adhesive provide top and bottom conduction.
- Surface resistivity: 0.1Ω/□ or less, Resistivity between top and bottom: 0.1Ω or less.



Material

- Base material / Conductive non-woven fabric
- Adhesive layer / Conductive adhesion

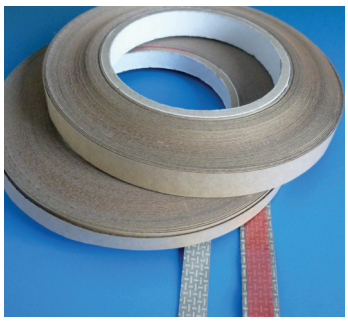
※Custom cuting is available up on request.

(mm)※1 Thickness	adhesive strength	Surface resistivity	Electric resistivity between top and bottom
0.03	≧6N/25mm	≦0.1Ω／□	≦0.1Ω

※ 1)Including adhesive layer

※The values are measured data for reference, not guaranteed.

TECHNICAL ADHESIVE TAPES / CFT-CS / CMP-CS



Polyamid-fleece, metal-coated, with high-quality acrylic adhesive and very good conductivity

Feature

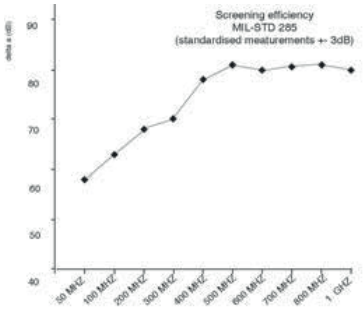
- For usage as screening material (EMC). Also available with a covering on the fleece-side.
- conductivity of the fleece: <0,08Ω/®
- conductivity of the adhesive (CFT-CS): <0,1Ω
- for usage under continuous temperature of 110°C and 180°C for 1 hour
- also available with covering for painting process applications.

Material

CFT-CS:
- Foil: Conductive, metallized PA-fleece (copper/tin)
- Coating: Conductive acrylic adhesive

CMP-CS:
- Foil: Same as CFT-CS with additional Polyester-cover (red)
- Coating: Conductive acrylic adhesive

Properties



Part No.	(mm) Width	Cover Width	Roll (m)
CFT-CS-10	10	no Cover	33
CFT-CS-20	20	no Cover	33
CMP-CS-10/7	10	7	33
CMP-CS-20/17	20	17	33
CMP-CS-13	13	13	33

Width between 2 mm - 590 mm available upon request

※The values are measured data for reference, not guaranteed.

COPPER EMBOSSING TAPE／CCTE-C

Embossed parts of the metal foil make direct contact with the object

Feature

- Embossed parts are bent to provide direct contact with the object.
- Large contact area provides stable contact.

Material

- Rolled copper foil
- Standard length:20m

※Custom cuting is available up on request.

Part No.	(mm) Width	(mm) Thickness	adhesive strength	Resistivity
CCTE-10-C	10	0.13	10.1 N/20mm／Width	0.01 Ω/□20mm
CCTE-20-C	20			
CCTE-A4-C※1	(A4)			

※ 1）Sheet type

※The values are measured data for reference, not guaranteed.

Thin and flexible metal foil tape backed by a conductive filler adhesive

Feature

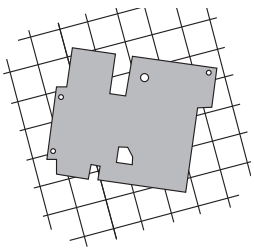
- Easy application same uses as a transparent tape.
- High shielding effectiveness due to highly conductive adhesive tape.
- Easy cutout or configuration for optimum shielding effectiveness.

Dimension		Supporting Base		
width (mm)	length (Mtr)	Soft – Copper	Soft – Aluminium	Soft – Copper doublesided tin-coated
10	33	CCT-10-C	CCT-10-A	CCT-10-CS
15	33	CCT-15-C	CCT-15-A	CCT-15-CS
20	33	CCT-20-C	CCT-20-A	CCT-20-CS
25	33	CCT-25-C	CCT-25-A	CCT-25-CS
50	33	CCT-50-C	CCT-50-A	CCT-50-CS
Other width available upon request				

Technical Data	CCT-XX-C	CCT-XX-A	CCT-XX-CS
Supporting Base	soft cooper	soft aluminum	
Colour	original	silver	silver
Thickness without adhesive (mm)	0,035 ± 10%	0,050 ± 10%	0,035 ± 10%
Total Thickness (mm)	0,065 ± 10%	0,080 ± 10%	0,065 ± 10%
Adhesive Properties			
Type of adhesive	Acrylic, electrically conductive		
Adhesive strength (N/10 mm)	≥2	≥2	≥4
Thermal Properties			
Temperature performance (°C)	-40 to +130	-40 to +130	-40 to +130
Short term Temperature performance (°C)	180	180	180
Flammability according to IEC 60454-2	flame retardant		
Electric Properties			
Electrical resistance according to PV 1006-14 (internal, measured at ambient temperature)	≤1Ω	≤1Ω	≤1Ω
Mechanical Properties			
Tensil strength (N/10 mm)	≥30	≥30	≥30
Elongation at break in %	≥10	≥5	≥10
Liner	silicone paper		
Storage conditions	cool and dry (15 – 25°C, <65% rel. humidity)		

Electrical properties will generally stay in tact up to 80°C, however they depend on the application/type of assembly. Customer specific tests are strongly recommended.

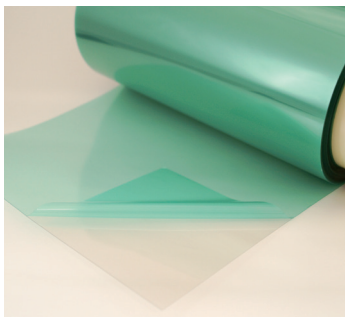
Custom Parts



Customer demands special parts made of all foils and laminates:

- for EMC/RFI shielding of system-unit covers with (partly-)insulated metal-foils
- stamped, bounded, pre-cut for easy bending
- customer supplied foils
- with sliced paper-liner for easy removing of the liner
- on rolls or as single parts
- manufacture on customer demand
- also small quantities are possible
- with fastened wire

TRANSPARENT CONDUCTIVE FILM／WINAL100-020



Usable for EMC measures around liquid crystal displays and as various kinds of electrodes

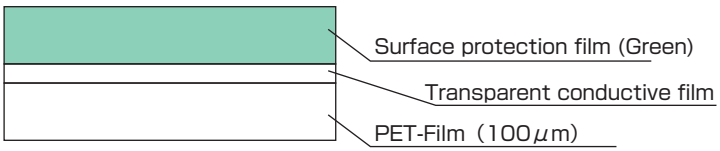
Feature

- Low surface electric resistance gives higher shielding effectiveness.
- Electrically conductive film with superior optical transparency.
- Conductive surface is laminated by protection film.
- Grounding terminal with aluminum foil can be provided upon.

Material

- Base material/PET film (100μm)
- Surface protection film (green)
- Transparent conductive film

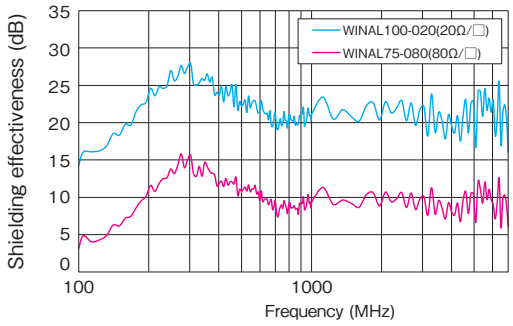
Structure



Item	Unit	Value
Surface resistance	Ω/□	20
Total light transmittance	%	76
Thickness	μm	100
Surface temperature range for use	℃	−30℃～80℃

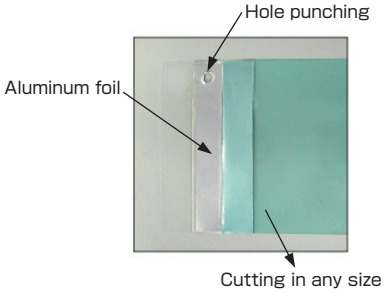
Properties

■ Electric shielding properties（MIL-STD-285）



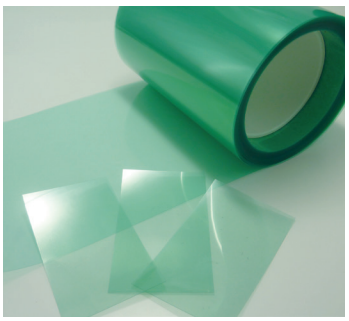
Additional process

- Attaching adhesive tape (aluminum or copper foil)
- Cutting in any size
- Holepunching, etc.



※The values are measured data for reference, not guaranteed.

TRANSPARENT CONDUCTIVE FILM／WINAL75-080



Usable for EMC measures around liquid crystal displays and as various kinds of electrodes

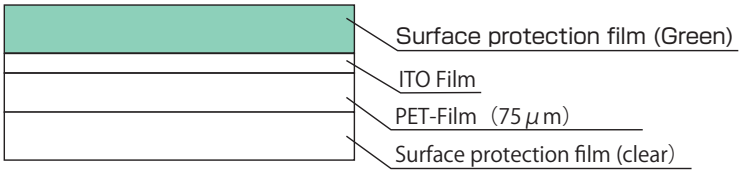
Feature

- ITO, Indium Tin Oxide, conductive film has superior optical transparency.
- Protected by PE film on both surfaces.
- Grounding terminal with aluminum foil can be provided upon

Material

- Base material: PET film (75μm)
- Surface protection film (green)
  Conductive layer (ITO film)
  Surface protection film (clear)

Structure

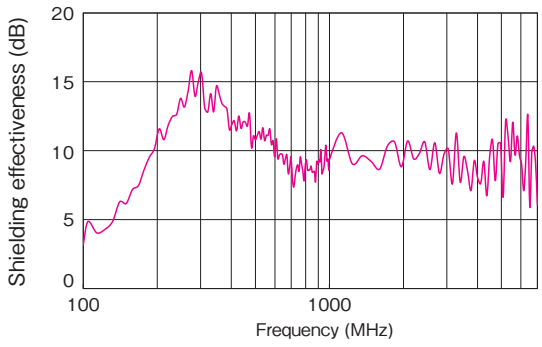


Item	Unit	Value
Surface resistance	Ω/□	80
Total light transmittance	%	76
Thickness	μm	75
Surface temperature range for use	℃	−30℃～80℃
Flame retardancy	UL94	VTM-2 equivalent

Alternative

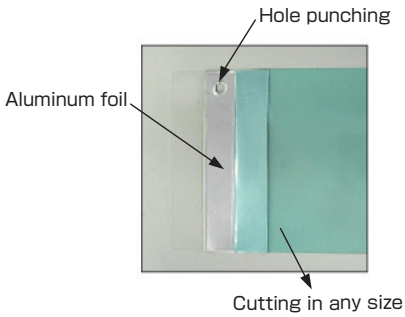
Properties

■ Electric shielding properties (MIL-STD-285)

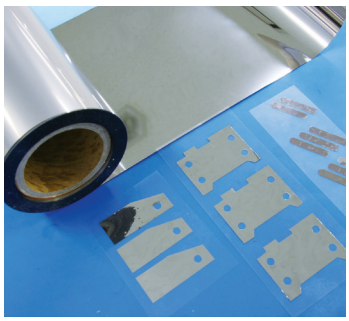


Additional process

- Attaching adhesive tape (aluminum or copper foil)
- Cutting in any size
- Holepunching



REMILESS／REMI



Super-thin surface-conductive film

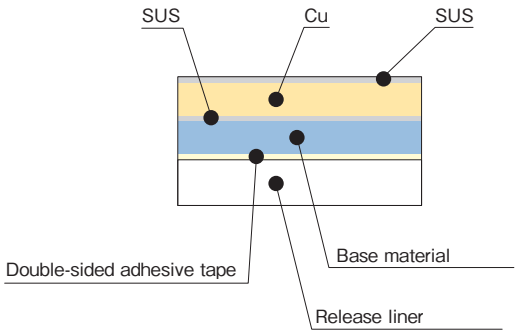
Feature

- Overall thickness 35μm (-FS,-SC)
- Provides high-shielding effectiveness and galvanic corrosion resistance.
- Safer handling compared with metal foil tapes.
- Suitable noise control for flexible cables.

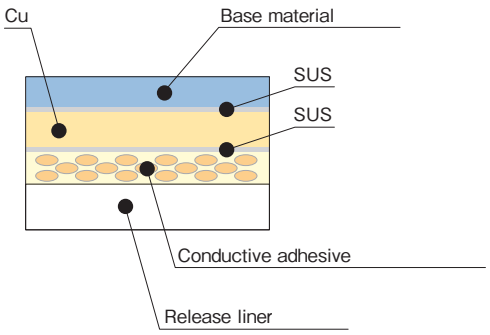
Material

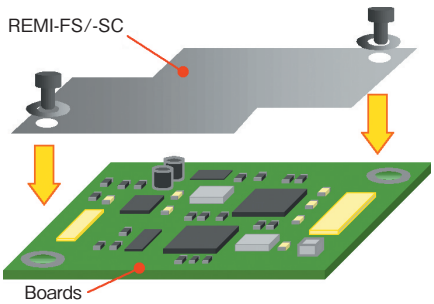
- Base material / PET(-FS,-FA) PPS(-SC,-AC)
- Metal membrane / SUS・Cu

REMI-FS/-SC（Surface conductive type）

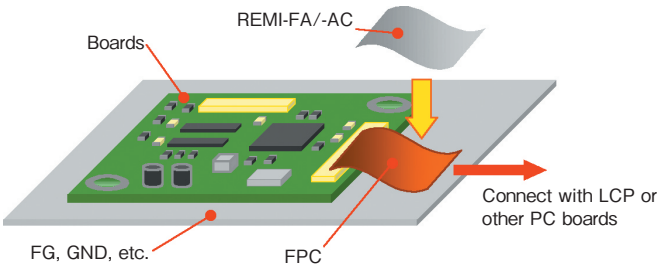


REMI-FA/-AC（Adhesive layer conductive type）



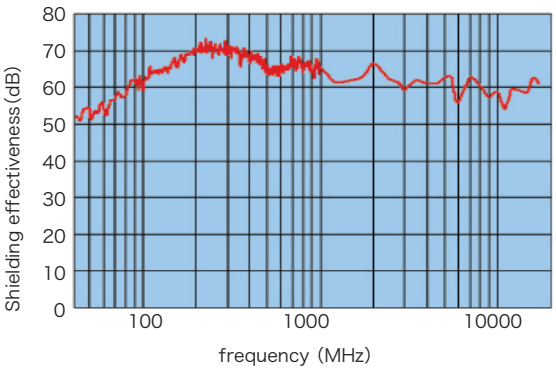


Application example) Shielding small boards using metal membrane face



Application example) Shielding and frame-grounding for FPC

Property



The values are measured data for reference, not guaranteed.

	REMI-FS	REMI-FA	REMI-SC	REMI-AC
Base material	PET		PPS	
Metal membrane	SUS/Cu			
Surface resistance[1] (Ω／□)	＜0.5		＜0.5	
Overall thickness (mm)	0.035	0.055	0.035	0.055
Flame retardant	–	–	UL94 VTM-0※2 Equivalent to UL94 VTM-0	UL510 FR

※ 1)Measured in film state ※ 2)Double-sided adhesive tape excluded

CABLE SHIELDS

WIRE MESH

Metal wire braided mesh

WIRE MESH

MESH TAPES

BRAIDED SLEEVING

Monofilament Braided Sleeve

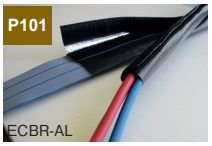
CABLE SHIELD

JACKETS

Jacket type can be assembled on wired cables.

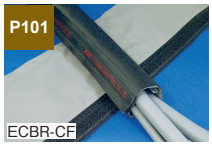
Hook and loop fastener type

Aluminium foil



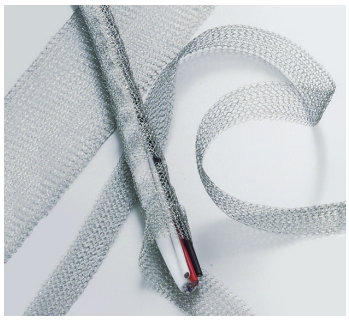
CABLE SHIELD

Conductive fabric



CABLE SHIELD

MESH TAPE／MT



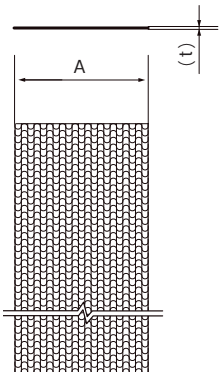
Extremely fine (0.12mm) metal wires braided into a cylinder mesh provides excellent flexibility

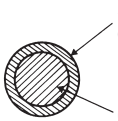
Feature

- Flexible material can be used by wrapping around cables or inserting cables in the mesh cylinder.

Material

- SN plated copper wire

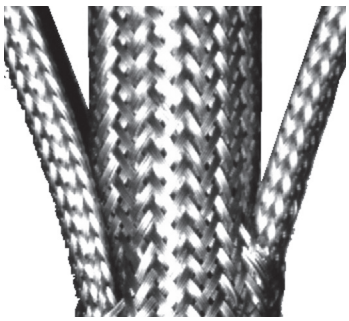




Unit: mm

Part No.	Dimensions	
	A	(t)
MT-17-CT	17	0.4
MT-25-CT	25	
MT-30-CT	30	
MT-35-CT	35	
MT-40-CT	40	
MT-55-CT	55	0.8
MT-85-CT	85	
MT-95-CT	95	
MT-120-CT	120	
MT-150-CT	150	
MT-175-CT	175	
MT-230-CT	230	

Contact us for other sizes not listed above.



Light Weight, Suitable for higher frequency range

Feature

- Wiring and I/O cables associated with an electronic device often act as an antenna or receiver that can couple EMI sources to susceptible equipment nearby. Data lines carrying broadband signals up to high frequency ranges, also need to be shielded to minimise radiated coupling.
- The MFS-AG is a highly flexible, lightweight braided sleeve made of Polyamide 6.6 with a pure silver coating that provides attenuation up to 54 dB. This braided sleeve is easy to mount, selfadjusting to convex contours and allows insertion of single wires at any place without cutting the sleeve.

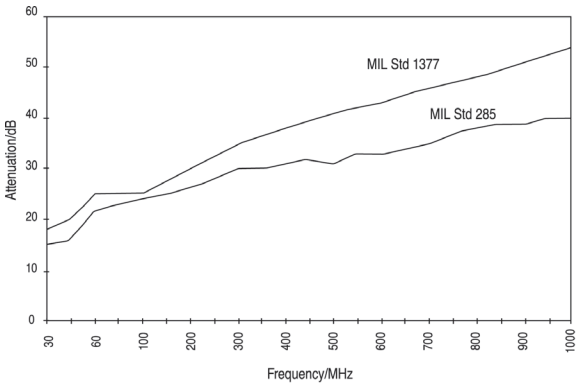
Technical Characteristics

Operating temperatures:	-40°C to + 160°C (-40°F to + 320°F)
Tensile strength:	approx. 2.1 Kg per single monofilament
Number of monofilaments:	depending on the diameter of the sleeve
Diameter of single monofilament:	0.27 ± 0.03 mm (0.01" ± 0.001")
Minimum radius of the sleeve:	1 mm
Minimum surface coverage:	> 75%
Colour:	metallic
Operating diameter range:	available from 1.5 mm to 115 mm Ø
Combustibility:	not selfextinguishing as empty sleeve***
Toxicity:	all materials are free of halogen, cadmium and formaldehyde; non toxic
Surface resistivity:	< 0.5 Ω /□
Shielding effectiveness:	depending on diameter and frequency
	- up to 54 dB as tested to MIL Std 1377 (DIN 47250 T6)
	- up to 40 dB as tested to MIL Std 285
Requirements met:	flame extinguished before first measurement point reached
	VDE II B / VDE 0304, part 3 (5.70)
	UL-94: 94 V-2, UL standard 94 (for Polyamid Material)
	Airbus Industry Technical Specification
	ATS 1000.001, 4.1 and 4,2

***

In case of burning , the silver coating keeps a temperature higher than the self ignition temperature of the Polyamide 6.6 gases. Selfextinguishing cables inside the harness cool the silver down.

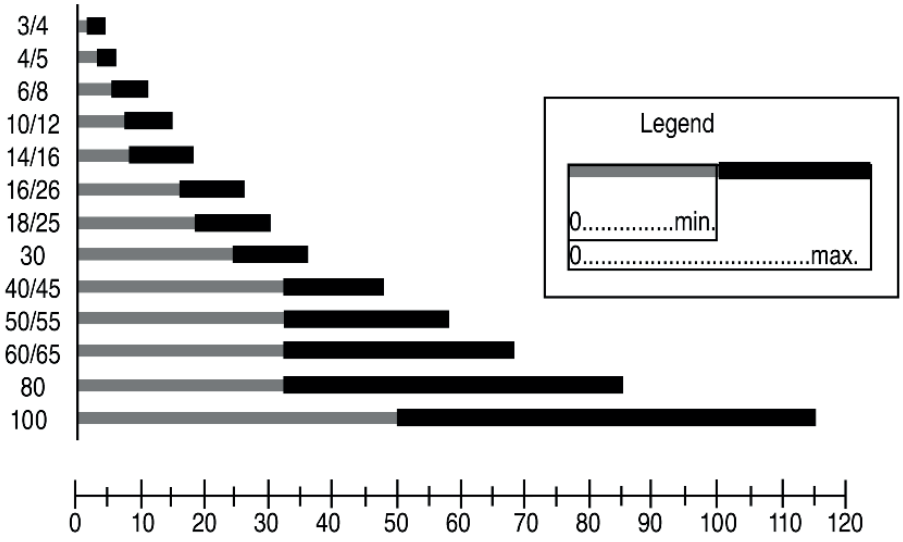
Shielding effect



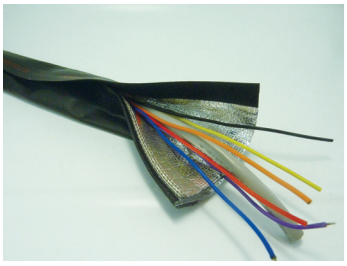
MONOFILAMENT BRAIDED SLEEVE／MFS-AG

Part.No.	Dimension	for round objects		flat width	number of	length of one
		from ø	to ø	when delivered	filaments	machine hank
MFS-AG-3/4	mm	1,5	4	4	48	over 600m
MFS-AG-4/5	mm	3	6	5	64	over 600m
MFS-AG-6/8	mm	5	11	9	96	over 600m
MFS-AG-10/12	mm	7	15	11	120	400-450m
MFS-AG-14/16	mm	8	18	17	160	300-340m
MFS-AG-16/26	mm	16	26	20	192	340-360m
MFS-AG-18/25	mm	18	30	28	252	300-340m
MFS-AG-30	mm	24	36	30	292	300-340m
MFS-AG-40/45	mm	32	47	45	384	300-340m
MFS-AG-50/55	mm	32	58	51	480	300-340m
MFS-AG-60/65	mm	32	68	57	600	260-270m
MFS-AG- 80	mm	32	85	61	720	210-250m
MFS-AG-100	mm	50	115	95	960	140-160m

Dimensioned sketch for round objects



CABLE SHIELD／ECBR-AL



Hook and loop fastener allows for easy assembly

Feature

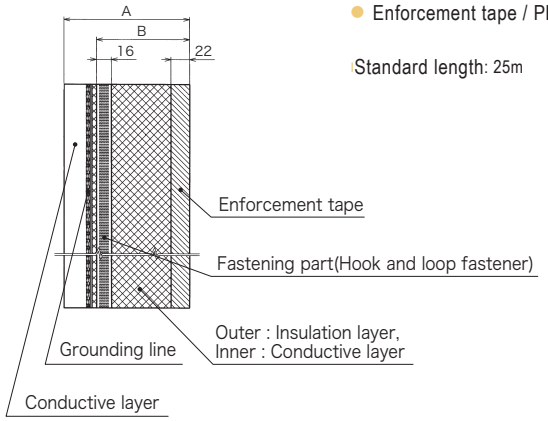
Installation on pre-wired cables or later insertion of additional cables is possible.

- Hook and loop fastener is attached on the fabric by melting so can be easily cut to the intended length without tape detachment.

Material

- Conductive layer / Aluminium foil
- Insulation layer / PET fabric based urethane
- Fastening part / Nylon
- Grounding line / Sn plated copper wire
- Enforcement tape / PET fabric based polyurethane

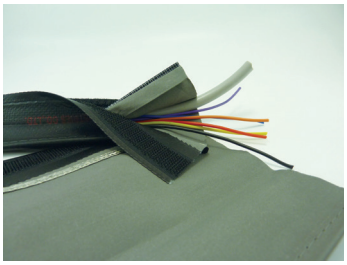
Standard length: 25m



Unit: mm

Part No.	A	B
ECBR-AL-15G	83	64
ECBR-AL-20G	135	100
ECBR-AL-30G	165	130
ECBR-AL-40G	195	160
ECBR-AL-50G	240	195
ECBR-AL-70G	295	240
ECBR-AL-100G	415	350

CABLE SHIELD／ECBR-CF



Highly flexible cable shield using conductive fabric.

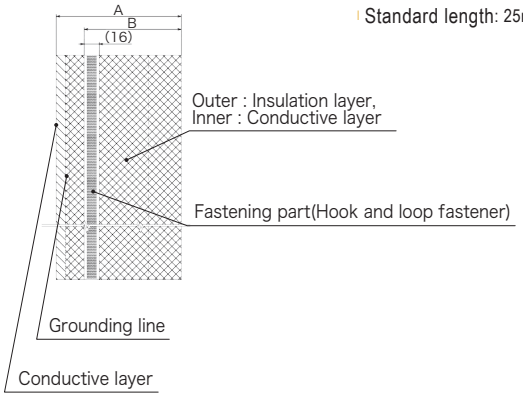
Feature

- Light weight and flexibility allowing winding along the cable.
- Assembly on pre-wired cables or later insertion of additional cables is possible.

Material

- Ni/Cu conductive fabric
- Insulation layer / PET fabric based urethane
- Fastening part / Nylon
- Grounding line / Sn plated copper wire

Standard length: 25m



Unit: mm

Part No.	A	B
ECBR-CF-20G	134	104
ECBR-CF-30G	164	134
ECBR-CF-40G	194	164
ECBR-CF-50G	224	194

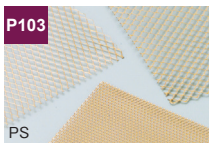
SHIELDS FOR OPENINGS

EXPANDED METALS

Expanded copper foil type for excellent shielding effectiveness

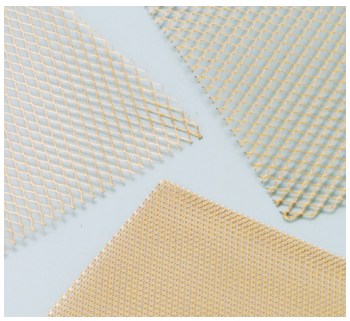
EXPANDED METALS

P103



PS

EXPANDED METAL



Expanded copper foil for shielding openings

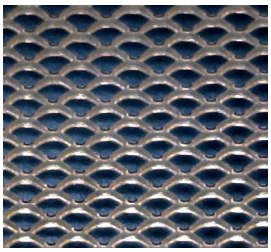
Feature

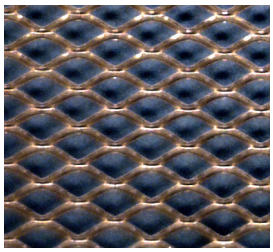
- Excellent shielding effectiveness as a shielding material or gasket for openings.
- Assembly by soldering, welding, rivet or screw (with metal plate for reinforcement).

Material

- Copper

- Standard length:500×365mm(Contact us for the dimensions.)


PS-10-20-15C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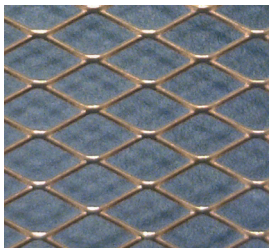
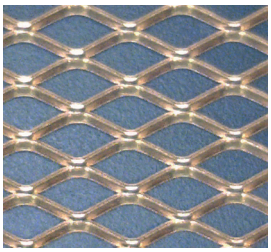
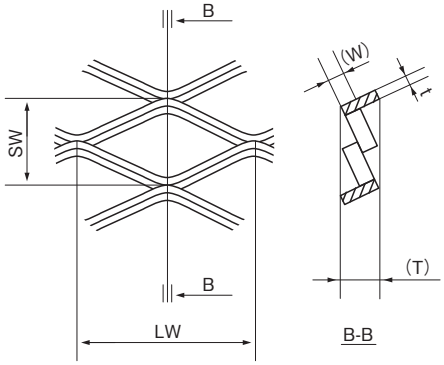

PS-10-20-30C


PS-15-30-30C

Pattern



Unit：mm

Part No.	SW	LW	W	T	t (Thickness)
PS-10-20-15C	0.8	1.5	0.2	0.28	0.1
PS-10-20-20C	1.1	2.0	0.2	0.33	
PS-10-20-30C	1.6	3.0	0.2	0.36	
PS-15-30-30C	1.5	3.0	0.3	0.45	0.15

EMC

Total support to the EMC compliance design.

EMC Center

Measurement Standards (VCCI,FCC,EN,ECE R10)

- VCA(Vehicle Certification Agency) accredited test site.
- ISO17025 certification by European Notified body.
- iNARTE EMC engineer supports the measurement and the noise suppression.

EMI / EMS tests for Electrical sub assembly.

- Radiated/Conducted disturbance measurement for CISPR 25, ECE R10.04 Annex 7, 8
- ISO 11452-4 : 2011 Road vehicles, Component test : Harness excitation methods
- Electric Vehicle conductive charging system : Requirements for conductive connection to an a.c./d.c. supply.

Conducted disturbance measurement for telecommunications port.

- Applicable standard : CISPR 22/CISPR32/EN 55022
- VCCI Registered Telecom. ports measurement site.

Radiated disturbance measurement over 1GHz.

- Applicable standard : CISPR 22/CISPR32/EN 55022
- VCCI registered Over 1GHz radiated disturbance measurement site.

Consulting Services

- Consulting for CE marking or various international standards, and EMC design support service.

Conducted/Radiated emission measurements

Items	Applicable standards	Measurement scope
Radiated disturbance	VCCI FCC Part15/Part18 CISPR 11,CISPR 22,CISPR 32 EN 55011,EN 55022 EN 61000-6-3,EN 61000-6-4 EN 60601-1-2,EN 61326-1 (Electrical Appliance and Material Safety Law)	10m Semi-anechoic chamber 3m Semi-anechoic chamber 30MHz～18GHz
Conducted disturbance at mains port	ditto CISPR14-1 , (CISPR 25)	9kHz～30MHz、 (150kHz～108MHz)
Conducted disturbance at communication port	VCCI CISPR 22 , CISPR 32 EN 55022	ISN：2W,4W,8W Current probe
Power line harmonics	EN 61000-3-2 JIS C 61000-3-2	To 40th harmonics (50Hz/60Hz Single-phase supply only)
Voltage changes, voltage fluctuations and fliker	EN 61000-3-3	(50Hz/60Hz Single-phase supply only)
Disturbance power	CISPR 14-1 (Electrical Appliance and Material Safety Law)	30MHz～300MHz
Radiated emission / conduction disturbance voltage of electronic control units on vehicle.	2004/104/EC ECE R10 CISPR 25	Available for Annex Ⅶ, Ⅷ ※Testing standards for vehicle manufacturers, please contact the EMC Center.

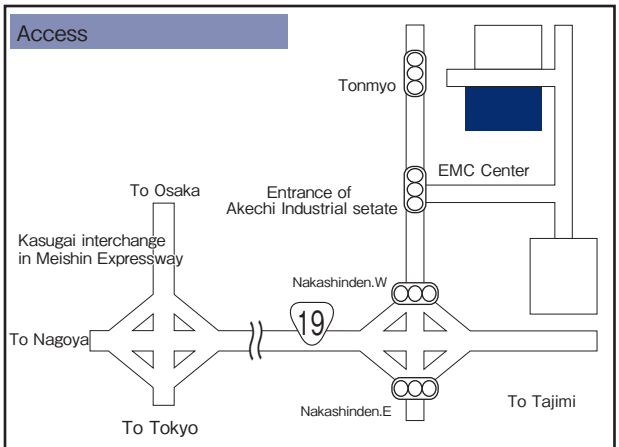
Immunity tests

Items	Applicable standards	Test scope
Electrostatic discharge	IEC 61000-4-2 JIS C 61000-4-2	(Air)：200V～16kV (Contact)：200V～9kV
Radiated, RF electromagnetic field	IEC 61000-4-3 JIS C 610004-3	80MHz～3GHz, 3～10V/m AM 1kHz 80%
Electrical fast transient/burst	IEC 61000-4-4 JIS C 61000-4-4	200V～4.4kV (5ns/50ns) (Repetition rate)：5kHz or 100kHz
Surge	IEC 61000-4-5 JIS C 61000-4-5	200V～4.4kV (1.2μV/50μV) (Only for power line)
Conducted disturbances, induced by RF fields	IEC 61000-4-6 JIS C 61000-4-6	150kHz～80MHz, 0.1～10Vrms AM 1kHz 80%
Power-frequency magnetic field	IEC 61000-4-8 JIS C 61000-4-8	0.1～40A/m (50Hz/60Hz)
Puls magnetic field	IEC 61000-4-9	100～2000A/m (8μs/20μs)
Voltage dips, short interruptions and voltage variations	IEC 61000-4-11	(Maximum power：Single-phase 3kVA)
Audible noise measurements (TTE&ITE)	CISPR 24	Annex A Automated measurements of audible noise
Harness excitation methods	ISO 11452-4	BCI 1MHz～1GHz (200mA max.) TWC 400MHz～3GHz(33dBm～26dBm)

Special test

Items	Applicable standards	Test scope
Shield effectiveness	MIL-STD-285 NDS C 0012	(Sample size) 910mm×910mm (Max.) (Frequency range) 30MHz～4GHz

Access



Access by car

19 Direction of Tajimi
Kasugai interchange in Meishin Expressway → (5.0km) → Nakashinden.w (Left turn)
↓ (1km)
EMC Center

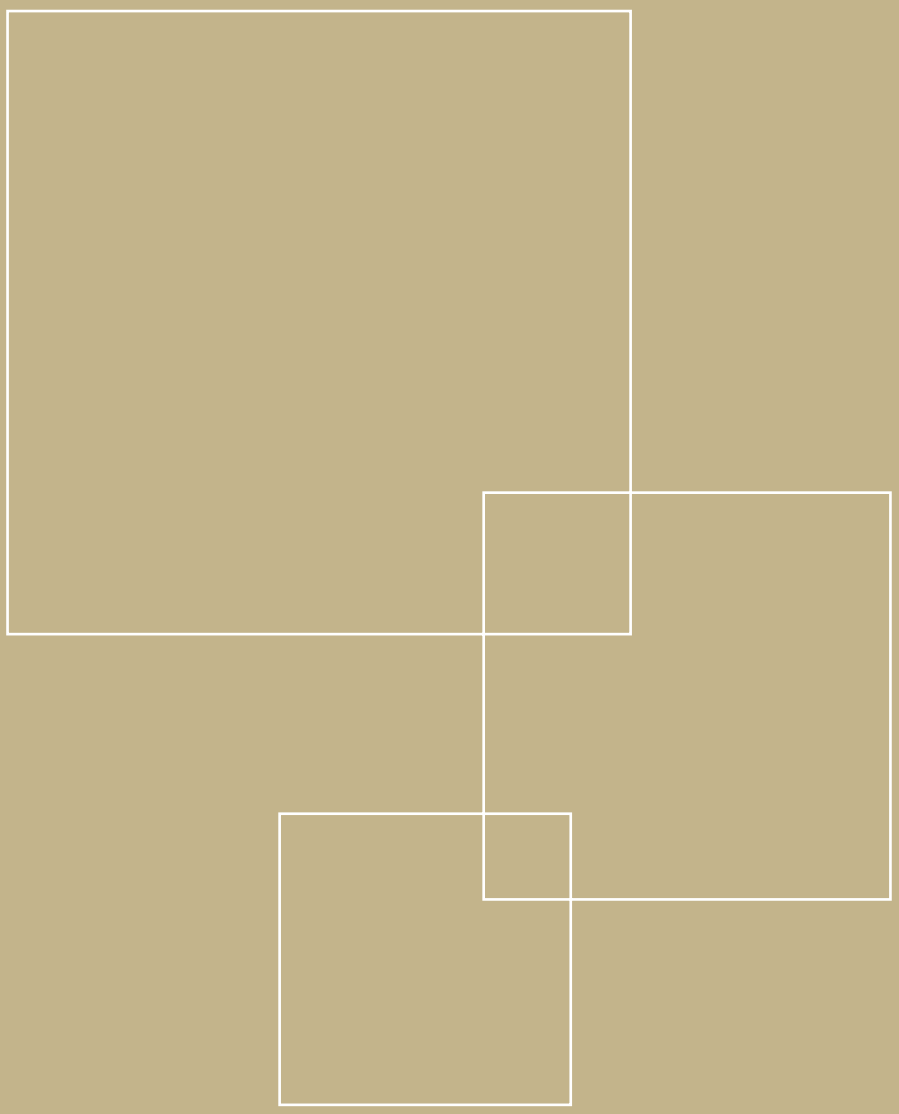
Access by JR (Public transport)

About 15 minutes from Kozoji Station of Chuou Line by taxi.

1423-101, Aza-Tonmyo, Akechi-cho, Kasugai, Aichi 480-0303

Tel.0568-88-7999 Fax.0568-93-0686

Part Name／Part No. INDEX



SGS TÜV SAAR

Certificate DE12/81839359

The management system of

KGS KITAGAWA GmbH

Birkenwaldstraße 38
D-63179 Obertshausen

has been assessed and certified as meeting the requirements of

ISO 14001:2004

For the following activities

Trading of electronic components and EMC solutions

This certificate is valid from 16/06/2015 until 15/06/2018
Issue 2. Certified since 16/06/2012

Authorised by

SGS-TÜV Saar GmbH
Am TÜV 1 66280 Sulzbach (Germany)
t +49 (0)68 97-506-60 f +49 (0)68 97-506-102 www.sgs.com

SGS TÜV SAAR ISO 14001

DAkkS Deutsche Akkreditierungsstelle D-ZM-12088-01-00

Page 1 of 1

CERTIFICATE

SGS TÜV SAAR

Certificate DE12/81839360

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t +49 (0)68 97-506-60 f +49 (0)68 97-506-102 www.sgs.com

SGS TÜV SAAR ISO 9001

DAkkS Deutsche Akkreditierungsstelle D-ZM-12088-01-00

Page 1 of 1

CERTIFICATE

GENERAL TERMS OF DELIVERY AND PAYMENT

1. Scope

1.1 The following General Terms of Delivery and Payment shall be applicable – provided nothing to the contrary is stipulated in writing – to all of the deliveries and other performance effected by us.

1.2 Deviating General Terms of Business of the Purchaser shall not bind us.

1.3 Amendments and/or supplements to the following terms and to the additionally stipulated agreements upon the conclusion of the contract must be made in writing.

2. Conclusion of the Contract

2.1 The offers of Kitagawa GmbH are made without obligation.

2.2 A contract between Kitagawa GmbH and the Purchaser shall only come into effect in accordance with the contents of the written confirmation of order on the part of Kitagawa GmbH or through the delivery of the goods or the rendering of the agreed performance by Kitagawa GmbH.

2.3 The Purchaser shall be bound to its order for three weeks. Kitagawa GmbH reserves the right to deviate from the order specifications in the acceptance of the order if this is necessary for the fulfillment of the order and is acceptable for the Purchaser.

2.4. Kitagawa GmbH shall be entitled to effect an alteration to the goods at any time without prior notification insofar as this does not result in any shortfall of the contractually stipulated characteristics of the goods and the alteration is reasonable for the Purchaser. The alteration of already delivered contract cannot be subsequently demanded.

3. Delivery Terms

3.1 The delivery period of the goods shall be determined in accordance with the written confirmation of order of Kitagawa GmbH.

3.2 Indicated delivery periods shall run from the dispatch of the written confirmation or order. If the Purchaser is obliged to effect advance performance, then the delivery period shall commence with the receipt of the contractual advance performance of the Purchaser at Kitagawa GmbH.

3.3 If the Purchaser demands alterations to the contractually stipulated performance after a written confirmation of order has been effected, then Kitagawa GmbH shall be entitled to effect a reasonable extension to the delivery period if necessary.

3.4 In cases of force majeure. interventions by sovereign powers, natural disasters, war, revolts, strikes at its own company, at supply companies or at carriers, Kitagawa GmbH shall be entitled to
make up the delivery after the cessation of the cause of the impediment and the delivery period shall be extended accordingly. The same applies if Kitagawa GmbH does not receive its own supplies in due time or in due form. There shall be no claims due to non-delivery or late delivery. This shall also be applicable if above indicated circumstances arise once the stipulated delivery period was already exceeded.

3.5 If a promised delivery date is not met by Kitagawa GmbH for reasons attributable to Kitagawa GmbH's fault,, then the Purchaser shall be entitled to set Kitagawa GmbH a two-week subsequent period after the expiry of the stipulated delivery period by means of registered letter. The Purchaser shall be entitled to withdraw from the agreement after the fruitless expiry of the period. Claims for damages, insofar as is legally permissible, as well as more extensive rights shall be excluded, provided the delay in delivery is neither due to intent nor gross negligence on the part of Kitagawa GmbH. This limitation of claims shall not apply in cases due to loss of life, bodily injury or damage of health. The burden of proof that intent or gross negligence is not applicable shall be borne by Kitagawa GmbH.

3.6 Kitagawa GmbH shall be entitled to effect part deliveries unless they should be unreasonable to be accepted by the Purchaser.

4. Shipment and passing of risk

4.1 Kitagawa GmbH shall undertake the shipments of the goods at the Purchaser's expense. Kitagawa GmbH shall select the forwarder/carrier to the best of its knowledge, without, however, assuming corresponding liability. Kitagawa GmbH shall award the shipping order on the customary terms in the sector in each case. Transport insurance shall only be taken out at the Purchaser's request and expense.

4.2 Risk shall pass when the goods leave the warehouse or upon the surrender of the goods to the forwarder/carrier.
The risk shall also pass to the Purchaser, if the goods are ready for shipment and delivery is delayed or fails for other reasons attributable to the Purchaser.

4.3 Any transport damage which occurs must be asserted by the Purchaser in due time to the forwarder/carrier or its insurance company.

5. Prices

The prices are indicated in the respective confirmation of order or Kitagawa GmbH and are expressed net in EURO plus the statutory rate of V.A.T. exclusive of packing, freight, postage, delivery charges etc.

6. Payment Terms

6.1 Insofar as no other payment terms are indicated in the confirmation of order of Kitagawa GmbH, the invoices are payable after the invoice date within 30 days net without any discount. Decisive for effecting payment on time is the receipt of the payment at Kitagawa GmbH. Cheques shall only be accepted on account of performance.

6.2 If the Purchaser is a businessman, then it shall be in default upon the exceeding of the due date without a separate warning. Kitagawa GmbH shall be entitled to assert default interest to the amount of 8 percentage points above the basic rate of interest.. The assertion of a more extensive loss caused by default remains reserved.

6.3 In the event that the Purchaser should be in default with payment, Kitagawa GmbH may upon its discretion request advance payment before

delivery of the goods. The same shall apply if the Purchaser's economic conditions give reason to concern regarding the due fulfillment of payment obligations.

6.4 The Purchaser shall only be entitled to set off the claims of Kitagawa GmbH against those claims which are undisputed or legally binding.

7. Warranty

7.1 Kitagawa warrants for the duration of 12 months that the goods contained not material or fabrication defects at the time the risks passes. This warranty ("Gewährleistung") commences upon delivery of the goods.

7.2 Warranty shall not be effected in the case of improper utilization, faulty installation, incorrect operation etc. No warranty shall similarly be effected for losses which arise through the operation of the goods together with such appliances whose compatibility has not been expressly confirmed in writing by Kitagawa GmbH.

7.3 The Purchaser shall notify Kitagawa GmbH of any defects of the delivery in writing as soon as such defects are detected under conditions of normal business operations. Section 377 German Trade Code applies.

7.4 In the case of defects the warranty shall be effected at the option of Kitagawa GmbH by subsequent rectification or substitute delivery free of charge. If the subsequent rectification also fails on the second attempt or in if the second substitute delivery also contains defects or if Kitagawa GmbH does not meet its subsequent delivery or substitute delivery obligation within a reasonable period, then the Purchaser shall be entitled to a reduction of the purchase price or rescission of the contract.

7.5 Claims for damages caused by defects shall be excluded. This exclusion shall not apply in case a defect has been fraudulently concealed, in the event that life, body or health is injured and acts of Kitagawa GmbH with intention or gross negligence. In the case a guaranteed characteristic of the goods should be lacking, liability shall be restricted to the loss which is to be expected in accordance with the customary course of events. More extensive claims on account of the faulty nature of the goods shall be excluded. This shall also be applicable to the reparation of consequential losses and to the violation of ancillary contractual obligations.

7.6 The afore mentioned exclusion of liability shall also be applicable to claims in tort and in connection with the initiation, conclusion and processing of a contract, not, however, in the case of claims in accordance with the Product Liability Act.

8. Retention of Title

8.1 Kitagawa GmbH shall retain title to all goods until the payment in full of all receivables resulting from the business relations with Kitagawa GmbH. If the value of the collateral which is in existence in favour of Kitagawa GmbH should exceed the claims against the contract partner by more than 10 per cent in total, then Kitagawa GmbH shall be obliged to release collateral at the request of the Purchaser

8.2 The Purchaser shall be entitled to resell the goods subject to retention of title in customary business transactions. The Purchaser shall not, however, be entitled to pledge the goods subject to retention of title or to assign all claims to which it is entitled from a future sale of the goods subject to retention of title against its purchasers to Kitagawa GmbH by way of security.

8.3 In the case of the processing or reconstruction of the goods subject to retention of title by the Purchaser, this shall always be effected for Kitagawa GmbH. If the goods subject to retention of title are processed with other articles which do not belong to Kitagawa GmbH, then Kitagawa shall acquire co-ownership to the new article in proportion to the value of the goods subject to retention of title to the other processed articles at the time of processing. If the Purchaser sells the goods subject to retention of title together with other goods which do not belong to Kitagawa GmbH, or after joining or processing, then the assignment shall only be effected to the amount of the outstanding invoices sum of the respective goods subject to retention of title.

8.4 The Purchaser shall be entitled to collect the assigned receivable in its own name. Kitagawa GmbH shall, however, be entitled to revoke this collection authority at any time, especially in the case of default in payment by the Purchaser. In the case of revocation the Purchaser shall be obliged to provide Kitagawa GmbH with or to surrender to it all necessary information and documentation for the assertion of the assigned receivables and to disclose the assignments to its purchasers. In the case of default in payment by the Purchaser Kitagawa GmbH shall be entitled to notify its purchasers of the assignment.

8.5 The Purchaser shall be obliged to provide Kitagawa GmbH with information at any time on the where-abouts of the goods subject to retention of title and on the receivables arising from their resale. The Purchaser shall be obliged to inform Kitagawa GmbH in writing of a seizure by a third party of the goods subject to retention of title or of the receivables assigned to Kitagawa GmbH and it shall be obliged to draw the third party's attention to the rights of Kitagawa GmbH. The Purchaser shall furthermore be obliged to support Kitagawa GmbH upon the assertion and enforcement of its rights against this third party, especially at its expense to lodge the necessary immediate remedies/appeals in order to safeguard the rights of Kitagawa GmbH.

8.6 In case of default in payment on the part of the Purchaser Kitagawa GmbH shall be entitled to take back the goods subject to retention of title. The Purchaser shall accordingly be obliged to surrender these goods. The taking back of the goods subject to retention of title does not constitute a withdrawal from the contract, unless Kitagawa GmbH expressly states such a withdrawal in writing.

8.7 The Purchaser shall be obliged to treat the delivered goods subject to retention of title with care. It shall especially be obliged to take out adequate insurance cover for the goods subject to retention of title at its own expense against loss or damage through fire, water, burglary or theft. The Purchaser hereby assigns its corresponding insurance claim to Kitagawa GmbH. Kitagawa GmbH hereby accepts this assignment and states the reassignment to the Purchaser with the proviso that this shall become effective if and as soon as the retention of title has expired.

9. Final Provisions

9.1 The Purchaser shall not be entitled to assign rights and obligations to third parties arising from the contract concluded with Kitagawa GmbH without the prior approval of Kitagawa GmbH.

9.2 The contractual relations between the contracting parties shall be subject to the Law of the Federal Republic of Germany. The provisions of the Convention on Contracts of the International Sale of Goods (CISG, Vienna Convention) shall not apply to the contract concluded with the Purchaser.

9.3 Venue for all disputes and types of proceedings arising from or in connection with the contractual relations between the parties shall be Darmstadt, Federal Republic of Germany, provided the Purchaser is a businessman.

9.4 Kitagawa GmbH shall be entitled to store and to use the personal data to which it has obtained access from the business relations with the Purchaser under the terms of the German Data Protection Act for its own business purposes.

9.5 If a provision of these General Terms of Business or of the contract concluded with the Purchaser should be or become ineffective, then this shall not affect the effectiveness of the remaining provisions of these General Terms of Business or of the concluded contract.

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Notice:

The specifications provided in this catalogue are believed to be accurate and reliable. Kitagawa GmbH reserves the right to make changes to specifications to improve manufacturing process performance and reliability.

This catalogue is intended for representation only and is not to form any part of any order. Engineering specifications are available upon request.

Any information/specification supplied by Kitagawa GmbH is based upon Kitagawa Industries laboratory test data and is believed to the reliable. It is recommended that our products are tested by the customer to ensure suitability for the intended application.

If any Kitagawa product is to be used in a life threatening application (such areas as Medical Automotive and Aerospace etc) the application must be discussed with Kitagawa GmbH and its written approval must be obtained.

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