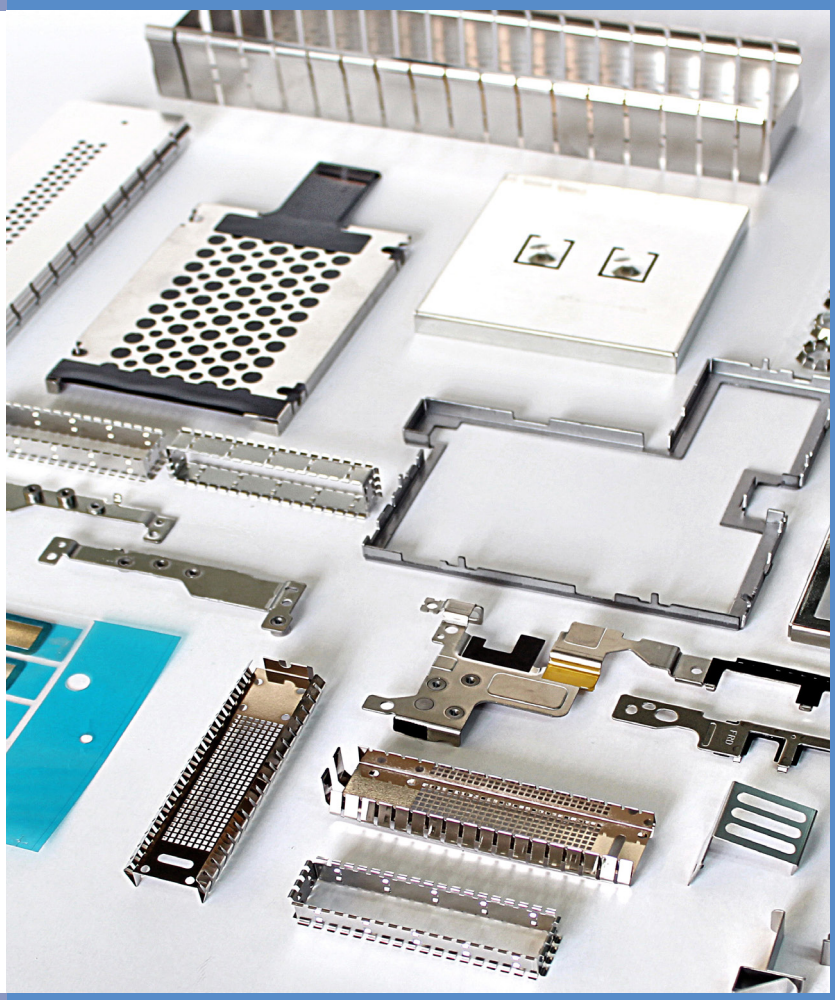
EMI Metal Product

FRD’ s EMI metal shielding products are suitable for a wide range of electronic devices which have EMI/RFI or ESD problems. There are many kinds of products with different profile and dimension. Most of products are made by beryllium copper, phosphor-bronze and stainless steel. The superiorities of metal shielding products are shown as the following:

- EMI metal shielding products will not burn, without influence of ray, ultraviolet radiation or ozone.They not only solve the tangential slip joint problems of other gasket materials, but also have excellent shielding performance over a broad band of frequencies.
- Excellent elasticity and reusability.
- Excellentmechanical property, Suitable for a variety of applications.
- EMI metal shielding products can work well in many kinds of environments (e.g. high temperature), having different plating to guarantee the compatibility with other contact surface.
- Little joint pressure, light weight, sundry installation mode.Excellent thermal conductivity, pressure resistance, wearing resistance and plasticity.

Therefore, incommunication equipments, computers, portableelectronic devices, medical instruments and military equipments field, most engineer use metal finger stock as the ideal EMI shielding materials.



FRD's EMI metal shielding products are suitable for a wide range of electronic devices which have EMI / RFI or ESD problems.

- ► A wide range of product types and diverse installation can be used for a variety of shielded room/door/ cabinet doors/cover/printed circuit board(PCB)/integrated circuits shielding.
- ► Can be well used in many occa sions which the shielding material needs to sliding friction and can be installed on the top or side of the shielding.
- ► Applied from small handheld devices to large shielding room.

- Excellent elastic recovery
- Low compression force, can bear bidirectional compression
- Persistent fatigueresistance
- Does not exist stress relaxation phenomenon, with stable size
- Material properties is almost free from the rounded corners and the rolling direction
- Easily processed and into many shapes
- Easily designed to miniaturization
- Suitable for larger gap fill
- Easy to install, having a variety of installation methods
- Easy to plating and welding
- Excellent conductivity
- Ultra-low permeability
- A wide range of temperature-change adaptation
- Incombustible material
- Corrosion-resistant
- Excellent shielding efficacy

Beryllium Copper

Beryllium copper(BeCu) is a high-performance metal, it can be cast and used in a wide range of part field. Its mechanical and electrical properties make it to be an ideal shielding materials resistant to electromagnetic and radio frequency interference.

The electrical characteristics of beryllium copper provides a shielding effect in a wide range of frequency. Meanwhile, it’ s superior mechanical properties such as maximum flexibility and fatigue resistance make it have a long life cycle. In addition, BeCu has excellent conductivity and different plating. Therefore, it used as the best material in shielding area.

Beryllium Copper Specifications

Chemical Composition			
Be	1.8-2.0%		
Co + Ni	0.2% (Min.)		
Co + Ni + Fe	0.6% (Max.)		
Cu	Remainder		
General plating thickness	About 2.6μm (including no rare metals)		
Physical Characteristics			
Electrical conductivity (% IACS)	22-25		
Elastic Modulus (psi)	$18.5x10^6$		
Mechanical properties (after heat treatment)			
Temper grade	1/4 HT	1/2 HT	HT
Tensile strength (kgf/m^2)	123 (Min.)	130 (Min.)	133 (Min.)
Yield strength (kgf/m^2)	105 (Min.)	112 (Min.)	116 (Min.)
Hardness range (HV)	350-430	360-440	380-450

Mounting Options

1. Slot Mounting

Snap-on Slot and Edge Symmetrical fingers using single or double fingers are very economical for applications such as sliding drawers, doors, rack-mounted assemblies and covers. They perform well in bidirectional applications and the snap-on capability makes them easy to install.

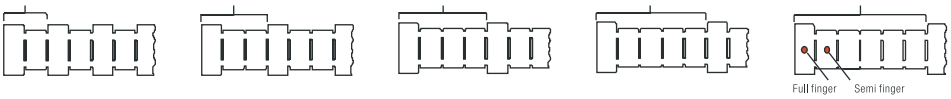
Slot Mount



Edge Mount



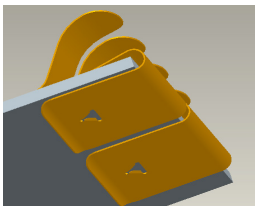
The 23 to 25 series utilizing the same snap on mounting feature can be used in continuous shielding condition. Available repeating finger patterns for the 23 to 25 series are shown here:



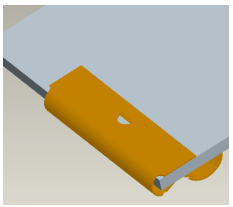
*Consult FRD for the availability of other patterns.

2. Clip-on Mounting

Clip-on Mounting provides a reliable mechanical installation by the friction between shielding materials and structures. Meanwhile, “D” -shape and “T” -shape lance can be incorporated to enhance the holding force. Some barbed-bit installation location or installation of thickness may be different from your existing structure, please contact our engineering staff to determine changes.



"T"-shaped barb



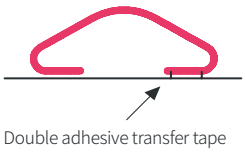
"D” -shaped barb

Certain clip-on strips have lance locations or plate thickness other than shown above. Consult our engineer to determine the specific dimensions.

3. PSA Mounting

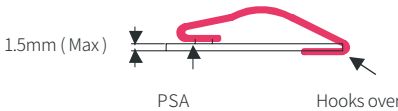
Pressure Sensitive Mounting provides double-sided pressure sensitive transfer tape for a fast, reliable installation, 3M 467 transfer tape or equivalent may be used at ambient temperature from -55 to 230°C . Apply only on a clean, oil-free surface, and allow a 24-hour cure time. Please consult our engineer to provide other sticky tapes and expanded products.Hook and viscous fingers are low pressure and small-gap shield the edges of an ideal material for applications.

PSA gasket



Double adhesive transfer tape

Hook and PSA gasket



Hook and stick fingers are ideal for flange mounting applications requiring low compression forces and small gap shielding.

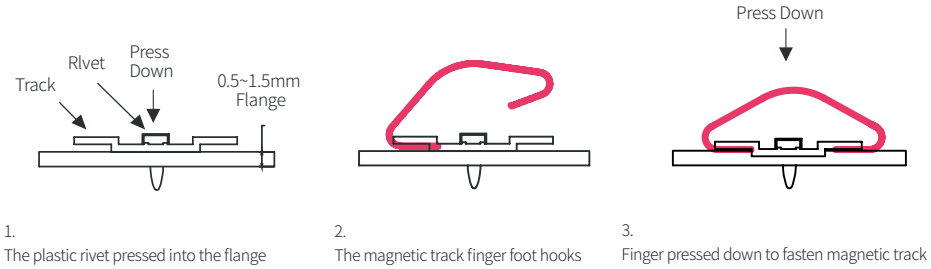
Spider gaskets, featuring a continuous, smooth web of fingers on each side, are available in both PSA and Hook & PSA mounting configurations. Non-conductive 0.25mm thick adhesive may be specified for improved adhesion on rough surfaces. Conductive adhesives are also available.

4. Track Mounting

The following are two ways to provide track:

- By the risings and fallings of the structure itself
- By adding other material to the structure

Three-step Installation



1. The plastic rivet pressed into the flange
2. The magnetic track finger foot hooks
3. Finger pressed down to fasten magnetic track

5. Special Mounting

Special mounting shielding strips can be installed by spot welding or soldering.

Galvanic Compatibility Design

Materials in adjacent groups may be safely used together in order to avoid the influence between the base material and the electroplated layer. The materials chose from the same group provide better resistance to corrosion. For example, since BeCu is in group III, so it' s safe to choose the material in group II, III & IV to use together.

FRD EMI metal shield products for more than 20 variety of plating layer, in order to ensure compatibility with the substrate electrochemical specific please consult our engineering department.

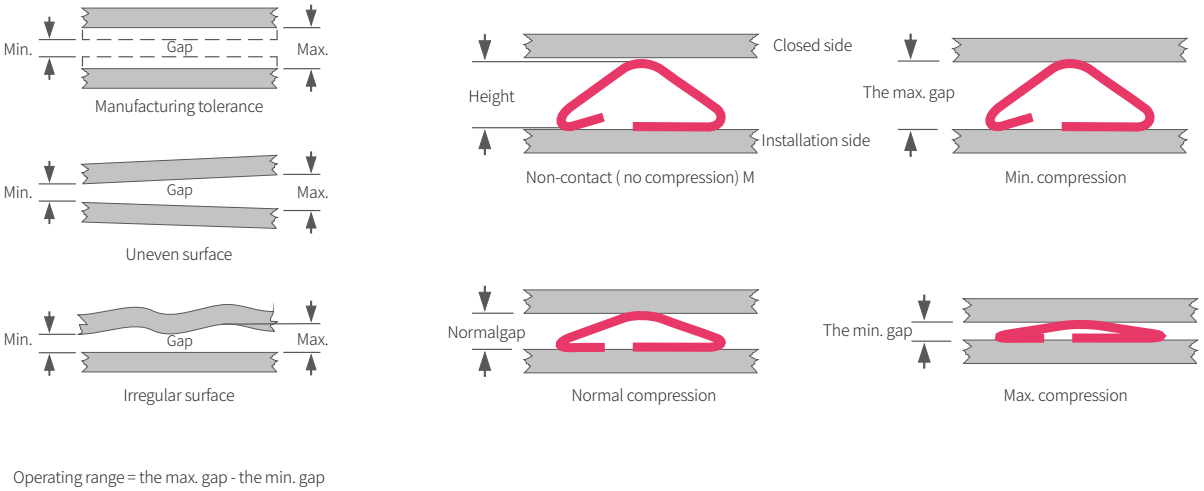
Grouping of Metals by Decreasing Galvanic Activity			
I	II	III	IV
Mg	Al	Chrome Plating	Brass
Magnesium Alloys	Aluminum Alloys	Carbon Steel	Stainless Steel
Al	Zinc/Zinc plating	Steel	Be Cu
Aluminum Alloys	Chromium Plating	Ni/ Nickel Plating	Cu/Copper Alloy
Zinc/Zinc plating	Cadmium Plating	Sn/Tin plating	Ni/ Copper Alloy
Chromium Plating	Carbon steel	Sn/Lead solder	Monel
	Cu	Pb	Ag
	Ni/ Nickel Plat ing	Brass	Graphite
	Sn/Tin plating	Stainless Steel	Rh
	Sn/Lead solder	BeCu	Ti
		Cu/Copper Alloy	Pt
		Ni/Copper Alloy	Au

The appropriate choice of Force, Compression and Resistance

Compression

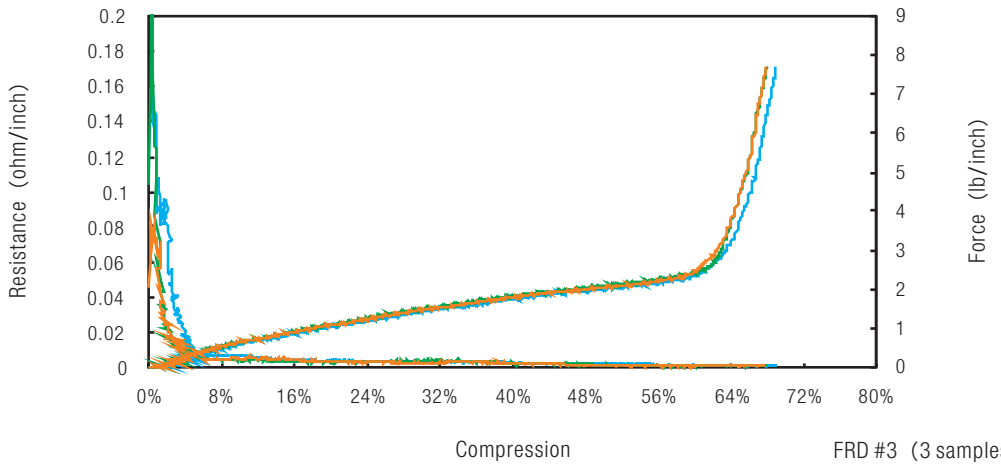
The purpose of shielding is to shade the clearance between two conjoint surface. The shielding materials must take up the maximal and minimal gap to make itself effectively. The clearance exists due to the manufacturing tolerance, irregular surface and arraying, so appropriate compression can provide the shielding of electromagnetic interference.

At the maximum gap the gasket should be compressed approximately 25%. Gaskets may be compressed to 50% of the height or more.



Operating range = the max. gap - the min. gap

The following figure shows that the compression resistance is small and steady with the deflection between 15% to 60%. Meanwhile, the compression force is small comparatively. That is the reason we often suggest the deflection to be around 30%.



Shielding Effectiveness

Attenuation

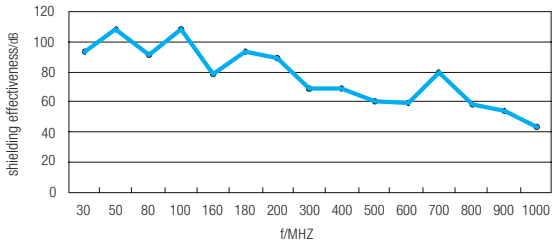
For maximum attenuation of a gasket gap, the contact resistance of the mounting joint and closing joint must be very low and remain so throughout the life of the product. While a gasket may have the potential for very high attenuation under ideal conditions, over time oxidation, corrosion and dirt at the mounting and closing joints may reduce effectiveness.

Factors influencing contact resistant are pressure(closing pressure), plating and wiping action. Our engineer can help you determine the optimal specifications to ensure sustained attenuation.

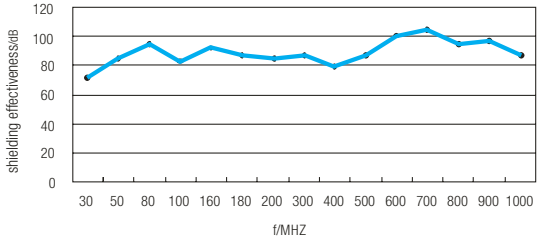
The test result best embodies the shielding characteristics. However, many factors such as specifications, tolerance, spacing, electroplated layer, installation and the rigidity of cover boards may cause measurement error even in the same standard of MIL-DTL-83528 or SAE ARP 1705.

FRD engineering team has rich experience in analyzing and improving the shielding effectiveness of materials and complete appliances together with customers. Contact us if having some doubts in this respect.

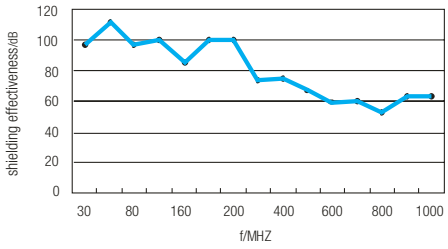
The following are the test results of our typical shielding products.



1. The shielding effectiveness of 1-58E0-06096 sample compressed to a thickness of 0.5mm



2. The shielding effectiveness of 1-73A2-03430 sample

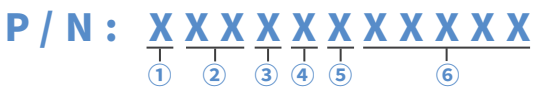


3. The shielding effectiveness of 1-22B1-04080 sample compressed to a thickness of 2.0mm

If the standard series are still unable to fully meet your requirements, please contact the engineering staff to confirm the following information:

- Products may be using the machine the desired frequency band and the value of shielding effectiveness
- Material selection and characteristic parameters
- Structural parts can be set aside for the design of the cushioning material gap value
- Whether particular compression force and Plug Power requirements
- Lining force forms and expectations of installation
- Structural parts can be reserved for the other direction of the cushioning material installation space or hole location and other requirements
- With regard to the requirements of pressure-sensitive adhesive (For Use)
- The choice of coating
- The use of special occasions and environmental requirements
- A special packaging (eg, SMT) and follow-up of production installation requirements
- Other special requirements

Part Number System



① FRD shielding product style
② Metal products series
③ Metal products sub-series
④ Special property
⑤ Surface finishing
⑥ Length or series number of metal products

① **The first number indicates FRD shielding products categories by 1-9**
"1" indicates finger stock and other metal strip

② **The second and third numbers indicates products categories of different functions by 1-9**
For example: 20-29, indicate slot mounting series
30-39, indicate clip-on mounting series
.....

③ **The fourth character means sub-series by letter from A to Z**

④ **The fifth number indicates different function that derived from standard material**
0 Indicated beryllium copper products with normal thickness
1 Other thickness series
2 Stainless steel series of standard products
.....

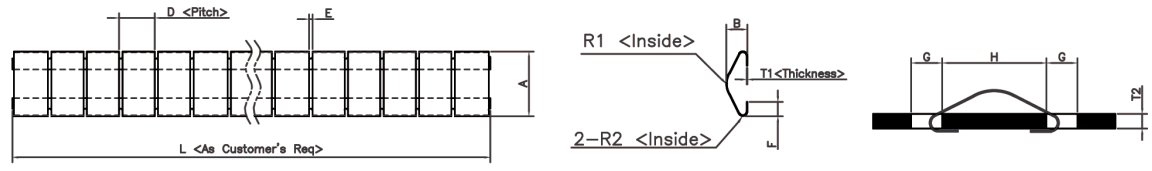
⑤ **The sixth character indicates available finishes**
A clean and bright
B gold plated
C silver plated
D bright tin plated
E dull tin plated
F bright nickel plated
G dull nickel plated
H electroless nickel plated
J white zinc plated
K blue zinc plated
.....

⑥ **The 7th to 11th numbers indicate approximate length or series number by 0-9**

Slot Mounting Series

P/N	A	B	T1	D	E	F	L	R1	R2	Recommended installation design dimensions			Finger quantity
										G	H	T2	
*120A0X00043	7.10	2.80	0.08	-	-	1.90	4.30	2.80	0.75	2.30	5.60	1.00	1
*120A0X00090	7.10	2.80	0.08	4.75	0.46	1.90	9.00	2.80	0.75	2.30	5.60	1.00	2
*120A0X00138	7.10	2.80	0.08	4.75	0.46	1.90	13.75	2.80	0.75	2.30	5.60	1.00	3
*120A0X00185	7.10	2.80	0.08	4.75	0.46	1.90	18.50	2.80	0.75	2.30	5.60	1.00	4
120B0X00043	8.15	2.80	0.08	-	-	2.15	4.30	2.80	0.50	2.30	6.60	1.00	1
120B0X00090	8.15	2.80	0.08	4.75	0.46	2.15	9.00	2.80	0.50	2.30	6.60	1.00	2
120B0X00138	8.15	2.80	0.08	4.75	0.46	2.15	13.75	2.80	0.50	2.30	6.60	1.00	3
120B0X00185	8.15	2.80	0.08	4.75	0.46	2.15	18.50	2.80	0.50	2.30	6.60	1.00	4
120B0X00233	8.15	2.80	0.08	4.75	0.46	2.15	23.25	2.80	0.50	2.30	6.60	1.00	5
120B0X00280	8.15	2.80	0.08	4.75	0.46	2.15	28.00	2.80	0.50	2.30	6.60	1.00	6
120B0X04080	8.15	2.80	0.08	4.75	0.46	2.15	408.00	2.80	0.50	2.30	6.60	1.00	86
120B1X04080	8.15	2.80	0.05	4.75	0.46	2.15	408.00	2.80	0.50	2.30	6.60	1.00	86
120C0X04080	8.15	2.80	0.08	4.75	0.46	2.15	408.00	2.80	0.90	2.30	6.60	1.50	86
120C1X04080	8.15	2.80	0.05	4.75	0.46	2.15	408.00	2.80	0.90	2.30	6.60	1.50	86
120C0X00043	8.15	2.80	0.08	-	-	2.15	4.30	2.80	0.90	2.30	6.60	1.50	1
120D0X00057	9.40	3.30	0.08	-	-	2.15	5.70	2.80	0.50	2.30	7.60	1.00	1
120D0X00120	9.40	3.30	0.08	6.35	0.64	2.15	12.05	2.80	0.50	2.30	7.60	1.00	2
120D0X00184	9.40	3.30	0.08	6.35	0.64	2.15	18.40	2.80	0.50	2.30	7.60	1.00	3
120D0X00248	9.40	3.30	0.08	6.35	0.64	2.15	24.75	2.80	0.50	2.30	7.60	1.00	4
120D0X00311	9.40	3.30	0.08	6.35	0.64	2.15	31.10	2.80	0.50	2.30	7.60	1.00	5
120D0X00375	9.40	3.30	0.08	6.35	0.64	2.15	37.45	2.80	0.50	2.30	7.60	1.00	6
120D0X04058	9.40	3.30	0.08	6.35	0.64	2.15	405.75	2.80	0.50	2.30	7.60	1.00	64
120E1X00064	15.25	5.60	0.05	-	-	3.55	6.35	4.60	1.00	3.55	13.20	1.80	1
120E1X00135	15.25	5.60	0.05	7.15	0.80	3.55	13.50	4.60	1.00	3.55	13.20	1.80	2
120E1X00207	15.25	5.60	0.05	7.15	0.80	3.55	20.65	4.60	1.00	3.55	13.20	1.80	3
120E1X00278	15.25	5.60	0.05	7.15	0.80	3.55	27.80	4.60	1.00	3.55	13.20	1.80	4
120E1X00350	15.25	5.60	0.05	7.15	0.80	3.55	34.95	4.60	1.00	3.55	13.20	1.80	5
120E1X00421	15.25	5.60	0.05	7.15	0.80	3.55	42.10	4.60	1.00	3.55	13.20	1.80	6
120E1X04068	15.25	5.60	0.05	7.15	0.80	3.55	406.75	4.60	1.00	3.55	13.20	1.80	57
120F1X00091	4.00	2.60	0.05	3.20	0.50	1.40	9.10	1.95	0.40	1.40	3.10	0.80	3

1-20 Series Sketch

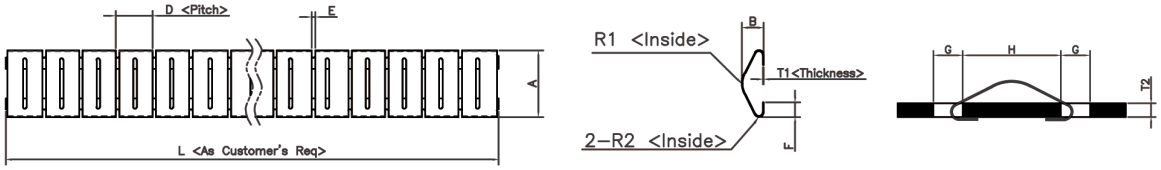


Note: please consult the sales and engineering personnel of our company before type selection of the marked *

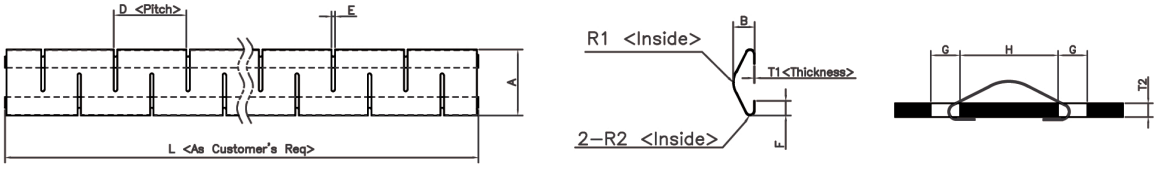
Slot Mounting Series

P/N	A	B	T1	D	E	F	L	R1	R2	Recommended installation design dimensions			Finger quantity
										G	H	T2	
*121A0X04080	8.25	2.55	0.08	4.75	0.46	1.90	408.00	2.80	0.50	2.30	6.60	1.00	86
121D0X04080	8.25	3.55	0.08	4.75	0.46	2.15	408.00	2.80	0.50	2.30	6.60	1.00	86
121S1X04080	8.13	2.80	0.05	4.75	0.46	2.15	408.00	2.80	0.50	2.30	6.60	1.00	86
122B0X03705	8.15	2.80	0.08	9.50	0.46	2.15	370.50	2.80	0.50	2.30	6.60	1.00	39
123A0X02608	8.15	2.80	0.08	4.75	0.50	2.15	260.80	2.80	0.50	2.30	6.60	1.00	55
123A0X04080	8.15	2.80	0.08	4.75	0.50	2.15	408.00	2.80	0.50	2.30	6.60	1.00	86
123A8X04080	8.00	3.00	0.05	4.75	0.66	2.00	408.00	2.80	0.50	2.10	7.00	1.00	86

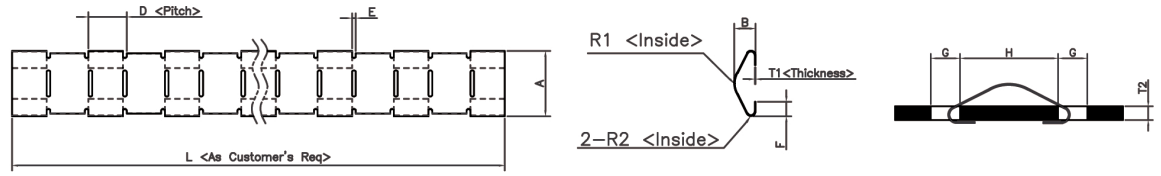
1-21 Series Sketch



1-22 Series Sketch



1-23 Series Sketch

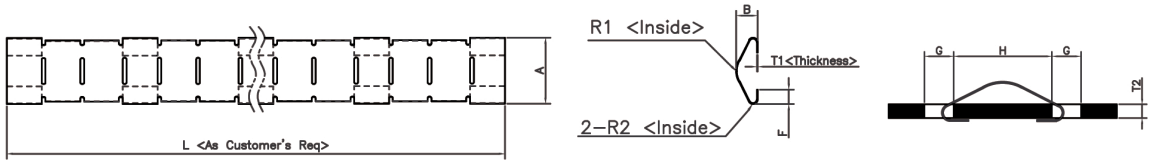


Note: please consult the sales and engineering personnel of our company before type selection of the marked *

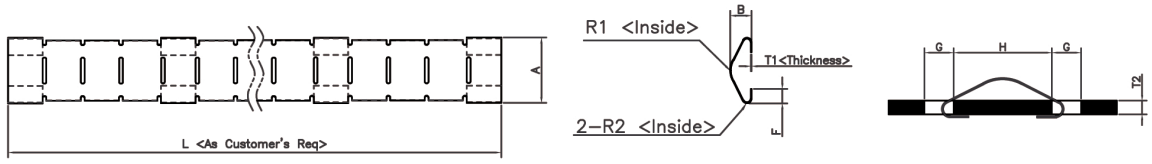
Slot Mounting Series

P/N	A	B	T1	D	E	F	L	R1	R2	Recommended installation design dimensions			Finger quantity
										G	H	T2	
124A0X02608	8.15	2.80	0.08	4.75	0.46	2.15	260.80	2.80	0.50	2.30	6.60	1.00	55
124A0X04080	8.15	2.80	0.08	4.75	0.46	2.15	408.00	2.80	0.50	2.30	6.60	1.00	86
125A0X02680	8.15	2.80	0.08	4.75	0.46	2.15	260.80	2.80	0.50	2.30	6.60	1.00	55
125A0X04080	8.15	2.80	0.08	4.75	0.46	2.15	408.00	2.80	0.50	2.30	6.60	1.00	86
126A1X04060	4.85	1.65	0.05	6.35	0.46	1.35	406.00	1.33	0.25				
126B1X04060	4.85	1.57	0.05	4.57	0.51	1.48	406.00	2.50	0.25				

1-24 Series Sketch



1-25 Series Sketch



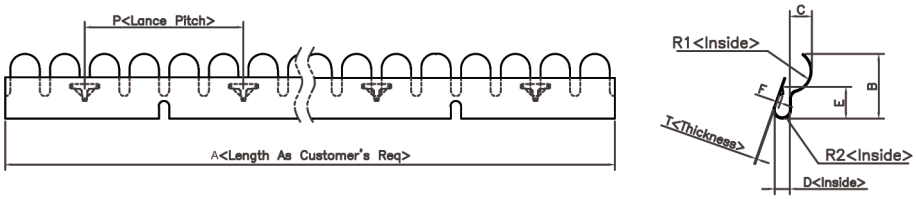
1-26 Series Sketch



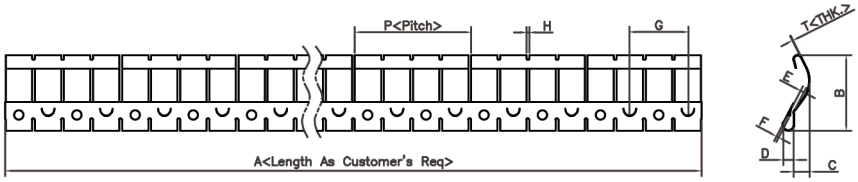
Clip-on Mounting Series

P/N	A	B	C	D	E	F	G	H	J	P	R	R1	R2	T	Lance shape
131A0X04056	405.60	7.54	2.55	1.80	3.70	0.50				18.50		2.35	0.89	0.12	"T"
*131B0X04056	405.60	7.54	2.55	1.80	3.70	0.50				18.50		2.35	0.89	0.12	"D"
*131C0X04980	498.00	7.54	2.55	1.27	3.50	0.50				18.50		2.35	0.65	0.12	"T"
*131D0X04980	498.00	7.54	2.55	1.27	3.50	0.50				18.50		2.35	0.65	0.12	"D"
*132A0X04202	420.20	9.10	2.65	1.80	0.80	0.50	9.55	0.50		19.10				0.08	
*132B0X04198	419.80	13.00	2.75	2.00	0.65	0.50	9.55	0.50		19.10				0.08	
*133A0X04056	405.60	7.10	7.00	-	2.00	6.35	0.75	-						0.15	NO "D"
*133B0X04056	405.60	7.10	7.00	0.60	2.00	6.35	0.75	25.40						0.15	with "D"
*133C0X06096	609.60	6.35	7.00	-	5.35	6.35	0.75	-						0.15	NO "D"
*133D0X06096	609.60	6.35	7.00	1.80	5.35	6.35	0.75	25.40						0.15	with "D"
133F0D00348	34.80	6.35	5.34	0.63	1.78	5.08	0.76	-						0.08	"D"

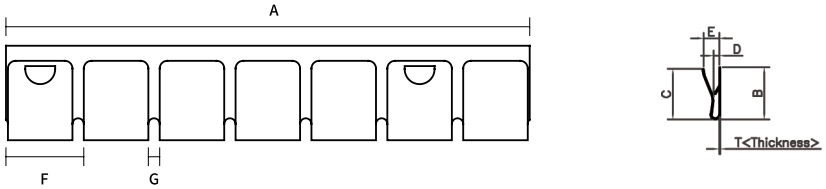
1-31 Series Sketch



1-32 Series Sketch



1-33 Series Sketch

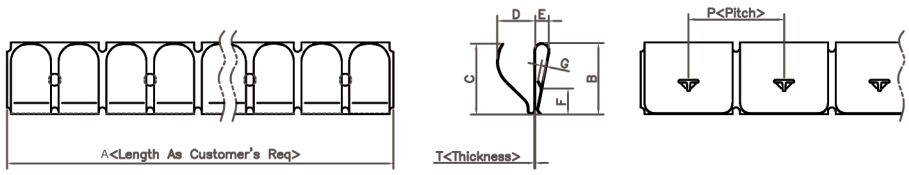


Note: please consult the sales and engineering personnel of our company before type selection of the marked *

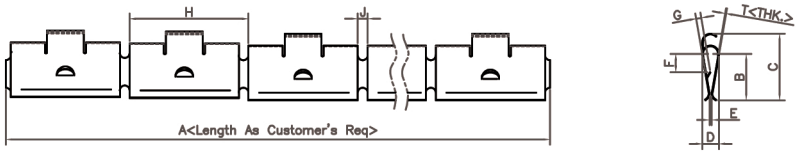
Clip-on Mounting Series

P/N	A	B	C	D	E	F	G	H	J	P	R	R1	R2	T	Lance shape
135C0X04056	405.60	9.50	9.50	5.10	1.80	1.67	0.33			12.70					"T"
*135D0X04056	405.60	9.50	9.50	7.00	1.80	3.45	0.75			12.70					"D"
136A0X00127	12.70	5.40	7.50	1.80	0.25	2.10	0.50	-	-					0.08	
136A0X00751	75.10	5.40	7.50	1.80	0.25	2.10	0.50	12.70	1.15					0.08	
136A0X01523	152.30	5.40	7.50	1.80	0.25	2.10	0.50	12.70	1.15					0.08	
137A0X00127	12.70	6.35	5.75	0.90	0.50	4.40	-			-	0.60			0.08	
137A0X00831	83.10	6.35	5.75	0.90	0.50	4.40	1.15			13.85	0.60			0.08	

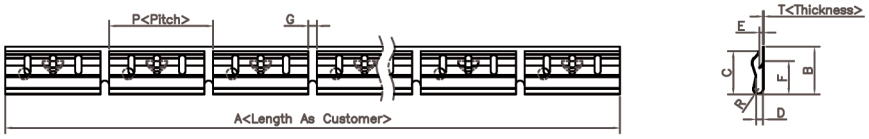
1-35 Series Sketch



1-36 Series Sketch



1-37 Series Sketch

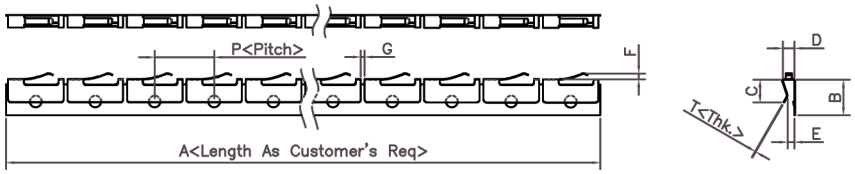


Note: please consult the sales and engineering personnel of our company before type selection of the marked *

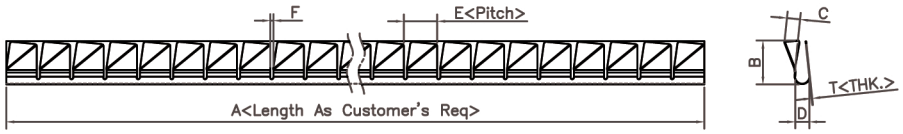
Clip-on Mounting Series

P/N	A	B	C	D	E	F	G	H	I	J	P	R	T	Lance shape
138C0X03048	304.80	4.65	2.95	1.65	0.90	0.75	0.50				20.00		0.08	"D"
*138F0X04080	408.00	3.80	0.75	1.80	2.40	0.50	-						0.08	
139B0X01180	118.00	6.70	3.18	5.80	4.80	2.30	2.30	3.80	1.10	0.55	15.00	1.50		

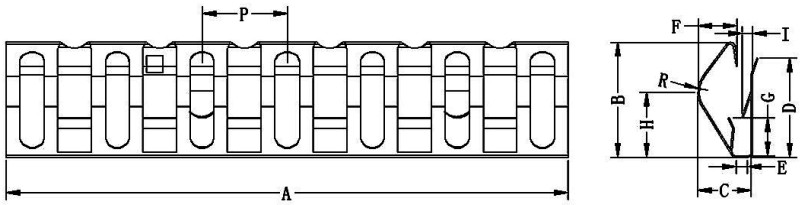
1-38C Series Sketch



1-38F Series Sketch



1-39B Series Sketch

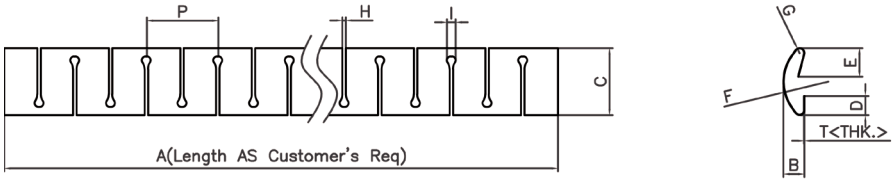


Note: please consult the sales and engineering personnel of our company before type selection of the marked *

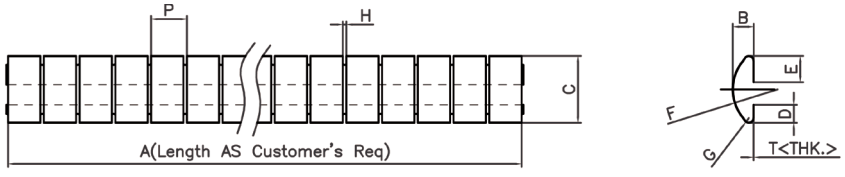
Track Mounting Series

P/N	A	B	C	D	E	F	G	H	I	P	T	S
140F1X03605	360.50	2.50	8.13	2.29	2.29	5.54	0.51	0.46	1.50	9.50	0.05	
140G1X04230	423.00	2.80	8.89	2.54	3.71	6.35	0.60	0.46	1.20	9.50	0.05	
140H0X02655	265.50	2.80	8.89	2.40	3.50	5.90	0.60	0.46	-	4.75	0.08	
141A0X04080	408.00	6.35	28.10	3.55						9.50	0.12	1.00

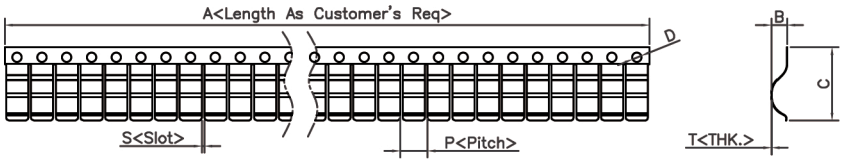
1-40G Series Sketch



1-40H Series Sketch



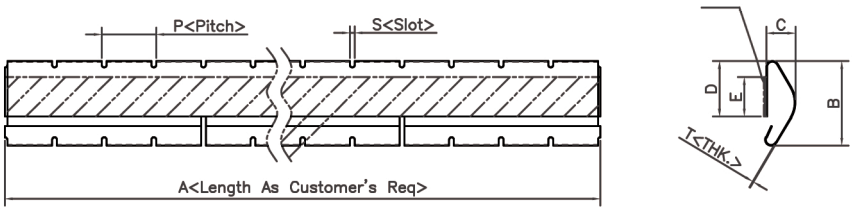
1-41 Series Sketch



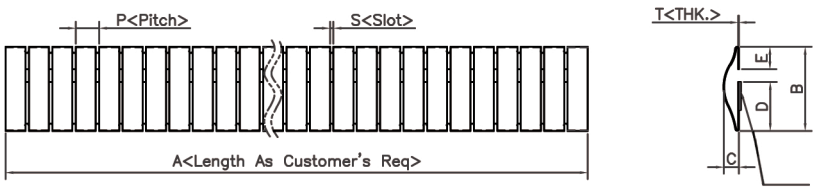
PSA Mounting Series

P/N	A	B	C	D	E	F	S	P	T
150A0X06096	609.60	8.15	2.80	5.35	3.80		0.50	4.75	0.05
152A0X04080	408.00	11.45	2.05	6.65	3.05		0.50	3.20	0.08
153A0X04129	412.90	11.45	1.55	1.65	3.45	6.80	0.50	3.20	0.08
154A0X04080	408.00	7.10	6.05	2.70	0.25		0.50	4.80	0.05
154B0X04080	408.00	9.40	8.40	3.60	0.50		0.55	6.40	0.05
154D0X06096	609.60	15.25	12.70	5.85	0.25		0.80	9.50	0.05

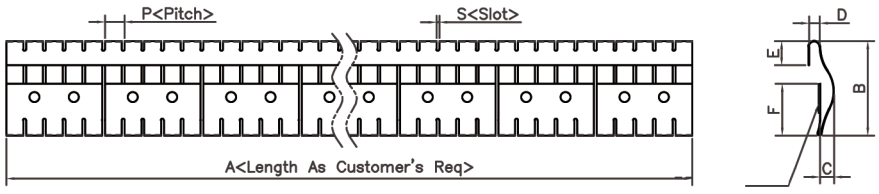
1-50 Series Sketch



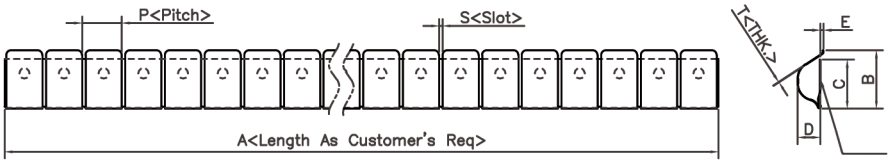
1-52 Series Sketch



1-53 Series Sketch



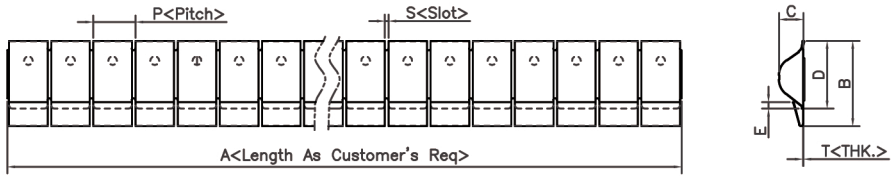
1-54 Series Sketch



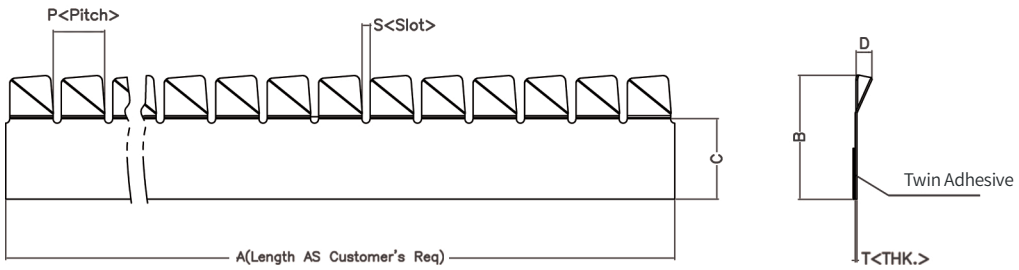
PSA Mounting Series

P/N	A	B	C	D	E	F	S	P	T
*155A0X04080	408.00	6.35	2.05	4.90	0.70		0.50	4.80	0.06
*155B0X04080	408.00	9.65	2.70	7.30	0.50		0.50	4.80	0.06
*155D0X06096	609.60	19.30	5.85	15.30	0.75		0.80	9.50	0.08
158E0X06096	609.60	5.80	3.60	0.80			0.40	2.40	0.08
160A0X06096	609.60	4.05	0.75	2.05			0.40	2.40	0.08
160S0X06096	609.60	4.05	0.75	2.05			0.40	2.40	0.08

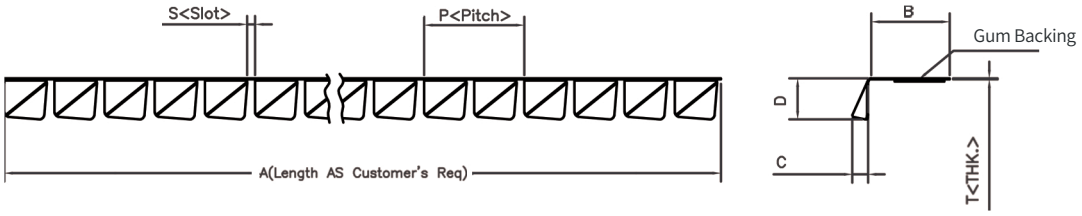
1-55 Series Sketch



1-58 Series Sketch



1-60 Series Sketch

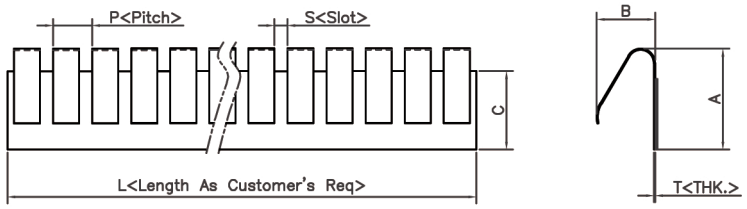


Note: please consult the sales and engineering personnel of our company before type selection of the marked *

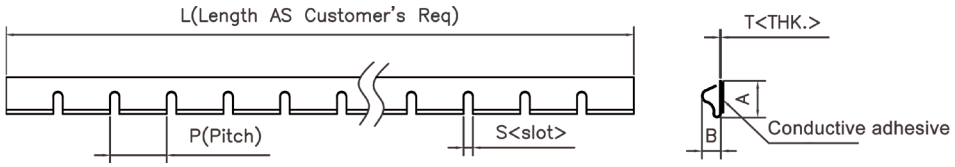
Contact Series

P/N	A	B	C	D	E	F	L	P	S	S1	S2	T
170A0X03050	3.20	1.80	2.30				305.00	1.60	0.50			0.08
170D0X04060	12.20	7.10	9.40				406.00	4.80	1.60			0.15
172K1X03460	1.92	1.00	3.00				346		0.50			0.05
173A2X03430	5.25	2.00	0.70	3.10	5.00	5.40	343	14.82		5.00	5.40	0.05

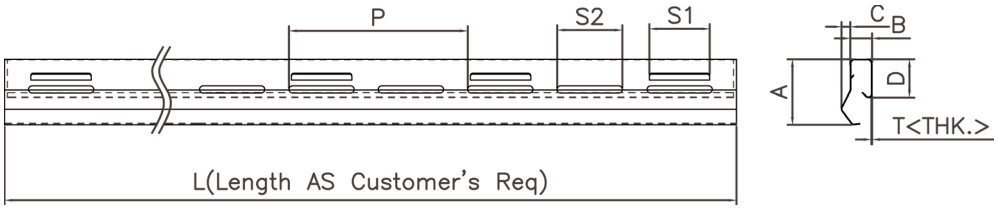
1-70 Series Sketch



1-72K Series Sketch



1-73A Series Sketch



Metal Fingerstock Products



Slot Mounting Series



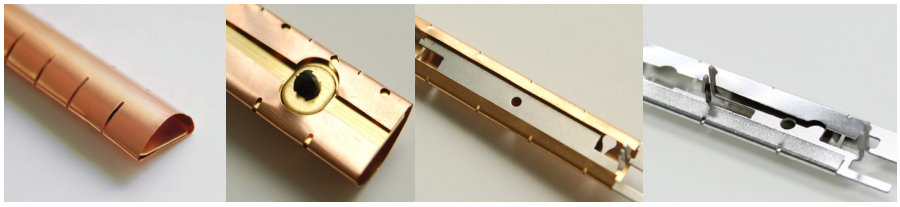


Clip-on Mounting Series



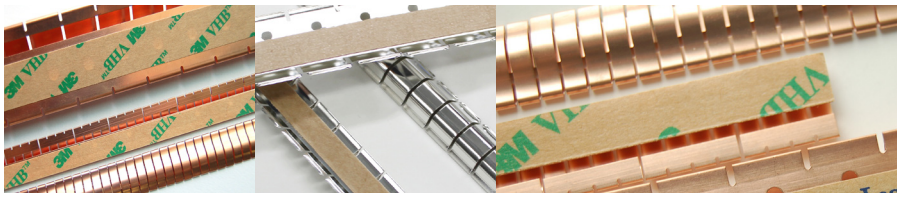


Track Mounting Series





PSA Mounting Series



Other Metal Products

Shielding Can

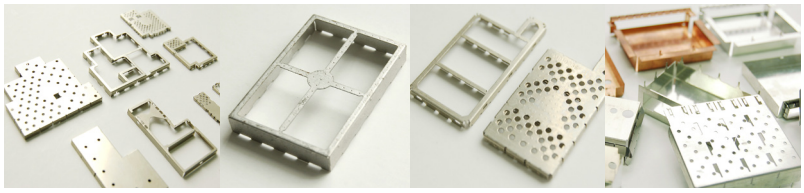
- This product is mainly used in mobile phones, GPS and so on, it is used for electromagnetic shielding(EMI), and it protects the components and LCM on the PCB from EMI.
- The shield material generally uses T=0.1mm~0.2mm stainless steel, nickel silver & tin plated CRS.
- The shielding can is soldered to the PCB directly.

SFP Cage

- The SFP Cage is a metal assembly part with PIN needles, the Cage will be soldered onto the PCB ,and the SFP model will be insert the Cage.
- It is suitable for the high-performance switches, routers, servers, and the hot-plugging interface of the host bus adapter in computing and telecommunications applications.

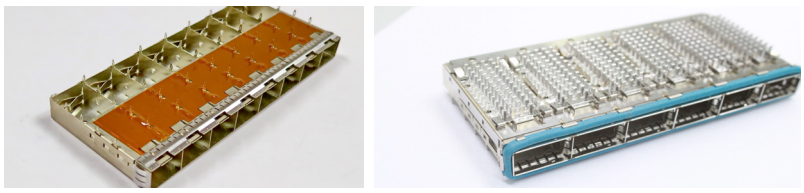


Metal Shielding Can



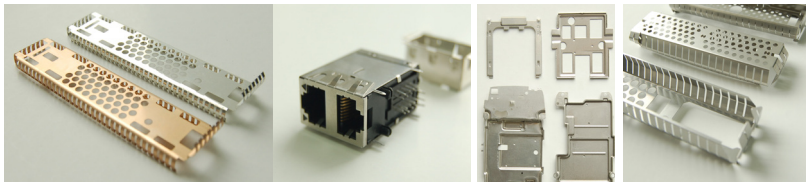


Optical Connector



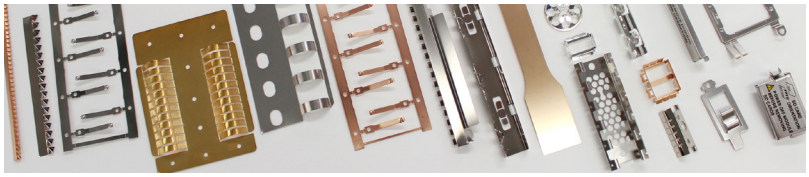


Custom Metal products



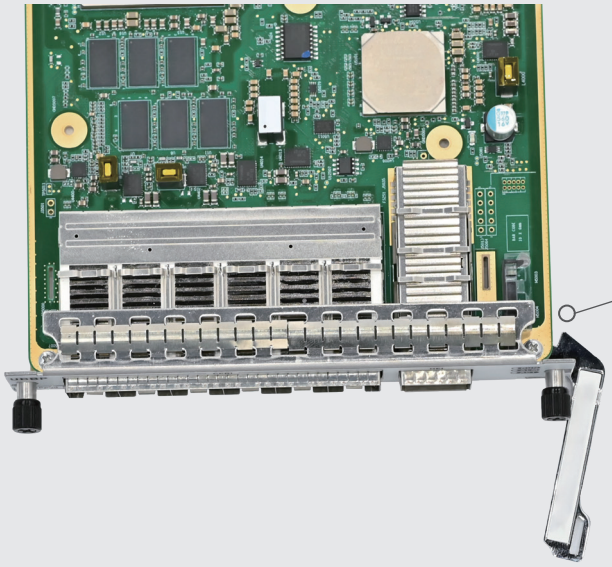


Conductive Contact Strip and Non-standard Mount and Metal Hardware



Applications Of Metal Shielding Products

Application Of Metal Reed In Communication Equipment



The metal spring used in communication equipment makes the installation device in close contact with the metal shell, plays the role of grounding and antistatic while balancing the stress, and protects the safety of the equipment.



Embedded Power Supply