EMI SHIELDING SOLUTIONS

ELECTRICALLY CONDUCTIVE ELASTOMER

Company Overview

Established in Shenzhen, China, in 1993, FRD manufactures a wide range of products including EMI Shielding Materials, Thermal Interface Materials and other related electronic materials. FRD is a registered National Hi-Tech Enterprise and certificate of ISO9001, ISO14001, QC080000 and OHSAS18001.

FRD works to satisfy the needs of its customers and we excels in speed and flexibility. FRD has long-term business relationships with customers such as Huawei, ZTE, Cisco, Nokia, Alcatel-Lucent, Juniper, Dell, H3C, Microsoft, Lenovo, Xiaomi, Samsung, Foxconn, Flextronics, Jabil, PEGATRON, SANMINA-SCI, O-Film Emerson, GREE, BYD, FUJI XEROX, TOSHIBA, etc.

As a leading manufacturer in its industry, FRD is growing tremendously. We are willing to provide quality products and services for more customers in various industries than our competition. These industries include networks & telecommunication equipment, consumer electronics, automotive, power supplies, lighting, military, aerospace, etc.

In future, FRD will continue to meet the challenge, to grow the FRD brand name, and to strive to become a world-class technology leader in new materials for all of our manufacturing processes.

FRD Building (Shenzhen)

New South China Base
Shenzhen Guangming FRD New Materials Park

East China Base
Kunshan FRD Electronic Materials Co.,Ltd.

North China Base
Tianjin FRD Science & Technology Co.,Ltd.

ISO 9001 ISO 14001 QC 080000 OHSAS 18001 ISO/TS 16949 UL CSA

CONTENTS

Electrically Conductive Elastomer

FRD ® Electrically Conductive Elastomer

Electrically Conductive Elastomer is to point to in the silica gel base material, surface treatment technology is used to change the pure silver, silver plated copper, silver, nickel, aluminum, silver plated nickel plating graphite conductive particles filled in the silica gel, the formation of homogeneous mixture, then through chemical crosslinking to form excellent shielding performance and environmental sealing function of the product.

FRD production extruder, co-extruded conductive silicone (conductive and non conductive) extrusion conductive silicone, compression moulding products, transfer moulding, co-moulding and sheet cutting and other conductive products series, and we are more proficient in according to customer requirements, designs and manufactures custom products you need.

Design Consideration

In addition to choices of size and shape dictated by the enclosing structure and the joint geometry itself, the following factors greatly influence the suitability of ECE gasket materials:

(1) Shielding Effectiveness

Design Consideration should include intensity and frequency of interference source, The intensity and frequency of the interference present, the predominance of electrical (E) or magnetic (H) fields, and system power and signal attenuation requirements will automatically exclude certain types of EMI shielding materials.

(2) Closure Force

Solid electrically conductive elastomer materials stand up better to high closure forces, environment pressure and repeated opening and closing of the joint. Elastomers accommodate pressure by change shapes rather than volume to get environmental sealing. Therefore, a potential space for shape changes at heat or pressure situation should be taken into account. Closure forces accommodate sealing requirements. For example, 6 pounds/inch force is enough for electromagnetic shielding. To meet water proof as well as electromagnetic shielding, the closure force should be 8 pound/inch or more. If low closure force is a consideration,however, the use of hollow extruded profiles such as hollow "O" and hollow "D" in conjunction with softer durometer elastomers will dramatically reduce closure force requirements.

(3) Percent Gland Fill

Design of an elastomeric O-ring gland, or groove and contacting surfaces which make up the seal assembly, is as important as percent gland fill. For most static seal applications, it is necessary to calculate the area of the seal and the gland it will occupy, to determine whether the latter is large enough to receive the ring. Overfill and underfill may cause sealing failure.

Overfill Underfill Optimum

As a general rule we recommend a gland fill of 70% –85% for optimum shielding effectiveness. However, for critical applications that require both shielding and environmental sealing, a 95%-98% gland fill is suggested.

(4) Compression

Compression data provide the engineer or designer with a qualitative comparison of the deformability of different profiles of electrically conductive elastomer. Deflection is defined as the change in the cross-sectional height of a gasket under compressive load and is a function of material hardness and profile.

Note: That wall thickness of hollow profiles has a major effect on deflection.

Profiles	Compression
Rectangle	5-10
Solid O	20-25
Solid D	15-20
Hollow O	20-50
Hollow D	25-50
Hollow P	25-50
Overfill	15-25

The recommended deflection ranges of various electrically conductive elastomer profiles are shown in Table 1. In no case however, should the amount of actual deflection be less than 10% for ElectroSeal materials. Remember that the minimum unevenness of the mating flanges must be taken into consideration in determining the original (uncompressed) and installed (compressed) height of the seal.

(5) Galvanic Compatibility

Galvanic compatibility is another important factor. 3 conditions are necessary to trigger galvanic corrosion. 1) Two different conductive materials are directly contacted or through conductor; 2) Conductive environment is existed. Such as electrolyte, salty spray, water vapor, etc. 3) huge electric potential difference between the two materials. All the 3 conditions are complied; galvanic corrosion will happen and influence environmental sealing. Otherwise, penetrability of polymer will limit the electrolyte to get inside of electrically conductive elastomer to avoid galvanic corrosion.

(6) Other

1) Always try to avoid stretch the elastomer more than 5% when assemble.

Because in a over stretch condition, conductive particles will disconnect inside the electrically conductive elastomer and lead to conductivity and shielding effectiveness failure.

2) Do not choose O shape when shearing force exists, use D, O or P shape instead.

3) The less compression set, the better performance. Generally compression set should be less than 30%.

Service Life

Three fundamental factors are involved when considering the service life of an EMI gasket:

- The presence of detrimental chemicals and fluids, ozone aging and temperature extremes.
- The number of times the joint will be opened and closed during the projected operating life of the equipment.
- Potential exposure to inadvertent damage during initial installation and future maintenance.

Application Environments

Proper material selection for effective EMI shielding depends on the total environmental envelope within which the seal/shield will be expected to function. The material selection process should begin with a careful analysis of the following major environmental conditions:

- Temperature
- Aging/Shelf Life
- Pressure/Vacuum
- Fluid Compatibility
- Galvanic Compatibility

Electrically Conductive Elastomer Gasket Install Guide

- Electrically conductive elastomer need to be compressed to get good conductivity, therefore the structure should be designed to provide proper pressure but not over pressed.
- Generally grooves are needed to install conductive elastomer. And the dimensions of groove should be right to keep compression within defined limits.
- The D and rectangle profiles have both with and without adhesive type to be according with adhesive or groove mount types.

Naming Rule of Elastomer Material Code

P/N: M S 0 D - 50 - HB
① ② ③ ④ ⑤ ⑥

① Processing

M:	Compression Molding	A:	Extrusion

② Based Material

S:	Silicon rubber	N:	NBR （Nitrile Butadiene Rubber）
V:	Fluororubber	P:	PU （Polyurethane）
E:	EPDM （Ethylene Propylene Diene Monomer）	R:	NR （Natural Rubber）
D:	SBR （Butadiene Styrene Rubber）	B:	BR （Butadiene Rubber）

③ Major Filling Material

0:	Non-conductive	1:	Ag/Al
2:	Ag/Glass	3:	Ag/Cu
4:	Ag/Ni	5:	Ni/C
6:	Ni/Al	7:	Al_2O_3

④ Colour of Product

B:	Blue	O:	Orange	D:	Dark
R:	Red	G:	Grey	F:	French Grey
C:	Transparent	W:	White	Y:	Yellow
L:	Green	P:	Pink	T:	Tan

⑤ Hardness（Shore A）

The number show the hardness (shore A) of material.

⑥ Flame Rating of Material

HB: the material meet UL94-HB requirment; V0: the material meet UL94-V0 requirmen; V1:the material meet UL94-V1 requirment; V2: the material meet UL94-V2 requirment; No identification: the material no have flame rating.

Ⅱ、Naming Rule of the Co-extrusion Material

P/n: SS--×××C--×××AB—1#

SS: cross-sectional shape is doublet; OS: cross-sectional shape is O shape; DS: cross-sectional shape is D shape; RS: cross-sectional shape is rectangle; MS: cross-sectional shape is other shape.

×××C: Means conductive elastomer formula number,for example 428C and 629C.

×××AB: Means non-conductive elastomer formula number,for example 428AB and 629AB.

01: means that cross-sectional shape presented the first product;

02: means that cross-sectional shape presented the second product; 03: and so on…

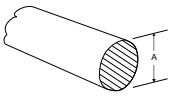
Ⅲ、Naming rule of the Relevance Material

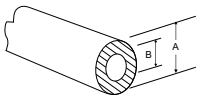
For fine-tuning a performance and form a kind of new material, its naming rules is: after the original naming with "-1#", "-2#", "-3# "..... Example: 428AB-1#,

Electrical Conductive Material Performance Parameters -- Extrusion Series

Material Number	Test Method	AS5G-70-HB	AS5G-65-V0	AS1B-65-HB	AS2T-60-HB	AS3T-75-HB
Base Material		Silicone	Silicone	Silicone	Silicone	Silicone
Conductive Particle		Ni/C	Ni/C	Ag/Al	Ag/Glass	Ag/Cu
Color		Grey	Grey	Blue	Tan	Tan
Electrical Property						
Volume Resistivity (ohm-cm)	ENG-WI-550RevA2	≤0.07	≤0.2	≤0.004	≤0.003	≤0.002
Shielding Effectiveness (dB)	MIL-DTL-83528E	> 70	> 70	> 70	> 70	> 70
Electrical Stability						
Heat Aging Test (100℃ ,168H) (ohm-cm)	ENG-WI-550RevA2	≤0.2	≤0.5	≤0.006	≤0.003	≤0.004
Mechanical Property						
Hardness (shore A)	ASTM D2240	70±5	65±10	65±5	60±5	75±5
Density (g/cm^3)	ASTM D792	1.85±0.05	2.08±0.05	1.95±0.05	1.91±0.05	3.53±0.05
Tensile Strength (MPa)	ASTM D421	≥1.6	≥1.0	≥1.3	≥1.3	≥1.7
Elongation (%)	ASTM D421	≥110	≥250	≥350	≥450	≥250
Tear Strength (KN/mm)	ASTM D624	≥8.0	≥9.5	≥8.5	≥4.8	≥11.0
Compression Set (%) (100℃ ,24H, 30% Compressed)	ASTM D395 Method B	≤20	≤20	≤20	≤35	≤20
Environment Standard						
Lower Operating Temperature (℃)		-40	-40	-40	-40	-40
Upper Operating Temperature (℃)		200	200	200	200	200
Environment	EU-RoHS	Yes	Yes	Yes	Yes	Yes
Flame Rating	UL-94	HB	V0	HB	HB	HB

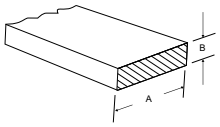
Extruded Regular Profiles



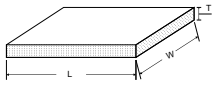


O-StripTube		
A	B	Note
0.81	0.00	
0.70	0.00	
1.25	0.00	
1.35	0.00	
1.35	0.51	
1.40	0.00	
1.57	0.00	
2.00	0.00	
2.00	1.00	
2.00	1.30	
2.10	0.88	
2.10	1.30	
2.20	1.10	
2.30	1.30	
2.30	1.20	
2.30	1.10	
2.60	1.00	
2.62	0.00	
2.62	1.52	
2.60	1.90	
3.00	1.00	
3.20	1.60	
3.00	0.00	
3.20	1.10	
3.20	1.00	
3.50	0.00	
3.50	1.80	
3.50	1.80	
3.50	1.50	
3.70	1.50	
3.80	1.60	
4.00	0.00	
4.00	1.30	
4.00	1.50	
4.00	2.40	
4.00	3.00	
4.20	2.30	
4.20	2.40	
5.00	0.00	
11.00	5.00	
15.50	4.60	

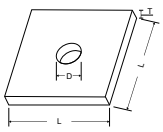
Extruded Regular Profiles



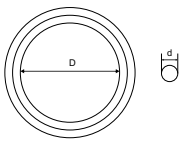
Rectangular Strip		
A	B	Note
2.4	1.0	
3.0	1.0	
3.0	1.5	
14.5	1.0	
14.5	1.5	
20.0	2.0	
4.0	4.0	
5.0	5.0	
6.0	6.0	
12.0	12.0	



Sheet Gasket		
T	W	L
0.5	100	100
0.5	254	254
1.0	120	120
1.5	120	120
1.5	254	508
2.0	120	120

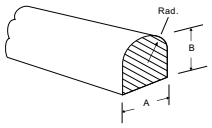


Washer Gasket		
T	L	D
0.8	9.5	6.2
1.5	8.0	5.0
1.5	15.6	8.0
1.5	67.0	49.5
1.6	15.9	12.8
1.7	26.0	20.0
3.5	26.0	16.5

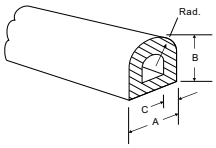


O Ring		
Outer Diameter(d)	Inner Dimeter(D)	Note
1.5	5.0	
1.8	14.0	
1.8	26.5	
2.6	39.9	

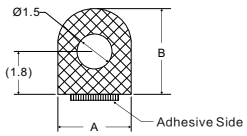
Extruded Regular Profiles



D-StripTube		
A	B	Wall Thickness(c)
3.2	3.56	

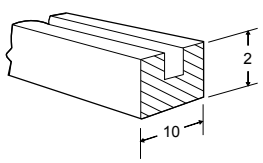


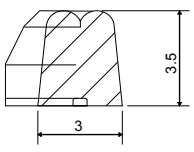
10	8	0.7

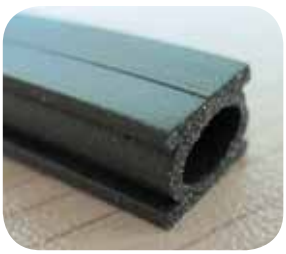


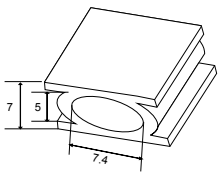
3.2	3.6	

Typical Irregular Extruded Profiles









Co-Extruded Material Performance Parameters -- Co-Extruded Series

Salient Features	428AB（Non Conductive）	629AB（Non Conductive）	629C（Conductive）	428C（Conductive）	Test Method
Color	Orange	Purple	Gray	Silver	visual test
Base Material	Silicone	Silicone	Silicone	Silicone	/
Conductive Particle	/	/	Ni/C	Senior silver Al	/
Hardness (shore A)	50±5	60±5	70±5	60±5	ASTM D2240
Density (g/cm^3)	1.16±0.05	1.41±0.05	2.0±0.05	2.5±0.05	ASTM D792
Volume Resistivity (ohm-cm)	/	/	≤0.100	≤0.004	ENG-WI-550RevA2
Tensile Strength (MPa)	≥4.0	≥4.5	≥2.4	≥2.2	ASTM D412
Elongation (%)	≥340	≥200	≥300	≥200	ASTM D412
Tear Strength (KN/mm)	≥14	≥25	≥14.5	≥6.5	ASTM D642
Compression Set (%)（100℃, 24H, 30% Compressed）	< 15	< 25	< 30.0	< 30.0	ASTM D395
Temperature（℃）	-40 ~ 160	-35 ~ 160	-40 ~ 160	-40 ~ 160	/

Co-Extruded Strip Aging Test

SS-428C-428AB-02 Compression Set and Resistivity After Heat Aging Test

Item		Condition	1	2	3	4	5	AVE
Compression Set（%）		100℃ ,168H; After 30 min test 30% Compressed	4.64	5.64	6.14	5.64	5.63	5.54
Surface Resistivity (Ω/inch)	Before		0.19	0.16	0.15	0.16	0.12	0.15
	After		0.44	0.46	0.28	0.32	0.24	0.41

Note: Compression Set use ASTM D395 test method A.

SS-428C-428AB-02 Compression Set and Resistivity After Salt Spray Test

Item		Condition	1	2	3	4	5	AVE
Compression Set（%）		100℃ ,168H; After 30 min test 30% Compressed	5.54	4.80	4.79	5.05	5.54	5.14
Surface Resistivity (Ω/inch)	Before		0.19	0.12	0.20	0.16	0.20	0.17
	After		0.20	0.32	0.22	0.30	0.21	0.25

Note: Compression Set use ASTM D395 test method A.

Co-Extruded Strip Aging Test

SS-428C-428AB-01 Double 85 (85℃ and 85% Humidity) Test

Test Item	Test Data			Requirment	Result
IPX5 Water Test	No Leaking Phenomenon			No Leaking	pass
Surface Resistivity （Ω-inch）	0.68	0.82	0.89	AVE ≤8，MAX ≤20	pass
Compression Set （%）	15.24	14.29	15.24	＜ 20%	pass
Judgment	Pass				

Note： Compression Set use ASTM D395 test method A.

SS-428C-428AB-01 UV Test

Material	Grey Scale Rating
428C	4-5
428AB	4-5

SS-428C-428AB-01 Mould-proof Test

Fungi-growth Grade	Fungi-growth Level	Test Standard
0 Grade	Magnified 50 times, no fungi-grade	GB/T 2423.16-2008

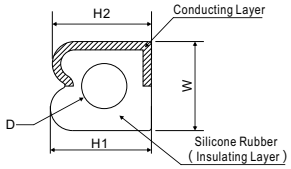
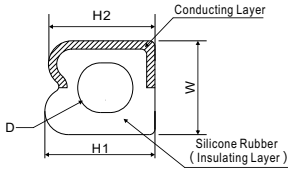
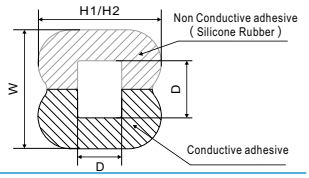
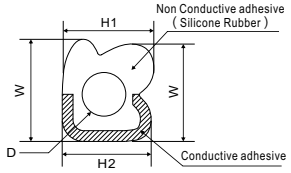
SS-428C-428AB-01 Ozone Resistance Test

Material	Performance	Test Standard
428C	No crack	ASTM D1149-07 (2002)
428AB	No crack	

Co-Extruded Shielding Ring Gasket -- O Shape Cross Section

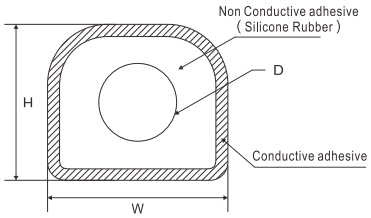
Item	Minimum thickness of Conductive layer (mm)	Core Diameter Range (mm)
Ø 1.0	0.08	0.5
Ø 1.5~2.0	0.25	0.6~0.8
Ø 2.0~2.5	0.25	0.6~1.0
Ø 2.5~3.0	0.25	0.6~1.5
Ø 3.0~3.5	0.25	0.6~1.5
Ø 3.5~4.0	0.25	0.6~1.8
Ø 4.0~5.0	0.25	0.6~2.0
Ø 5.0~6.0	0.25	2.0~3.0
Ø 6.0~7.0	0.25	3.0~4.5
Ø 7.0~8.0	0.25	3.0~5.0

Co-Extruded Shielding Ring Gasket -- Dual Peak Shape Cross Section

Product Number	H1 (mm)	H2 (mm)	D (mm)	W (mm)	Pictorial View
SS-01	3.63	3.53	1.60	3.20	
SS-02	3.99	3.86	2.00	3.40	
SS-03	4.75	4.75	1.70/2.20	4.58	
SS-04	3.40	3.30	1.60	3.80/3.60	

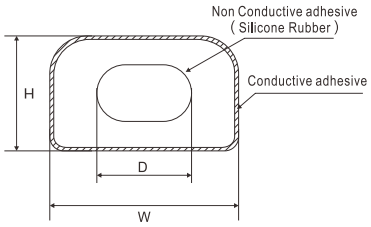
Co-Extruded Shielding Ring Gasket -- Other Shape Cross Section

DS, Cross-sectional shape is D shape co-extruded ring

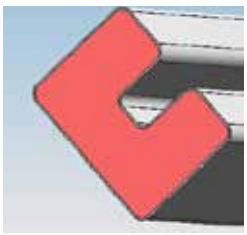
W (mm)	H (mm)	T (mm)	D (mm)	Pictorial View
2.00	1.00	≤0.15 (428C)	0.50	
2.40	1.60	≤0.15 (428C) ≤0.35 (629C)	0.60	
3.00	2.60		1.30	
3.60	3.00		1.60	
4.00	3.00		2.00	

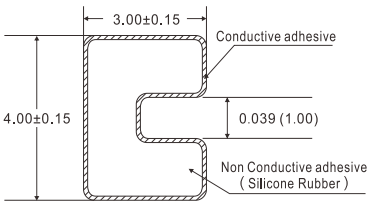
RS, Cross-sectional shape is rectangular co-extruded ring

W (mm)	H (mm)	T (mm)	D (mm)
2.00	1.00	≤0.15 (428C)	1.00 (L-X) 0.60 (N-X)



MS, Cross-sectional shape is irregularity co-extruded ring





SMT EMI Gaskets

SMT EMI Gaskets are mounted on the PCB by surface mount technology (SMT), they can solve EMI, electrical grounding and electrical connection problem, they also offer buffering.

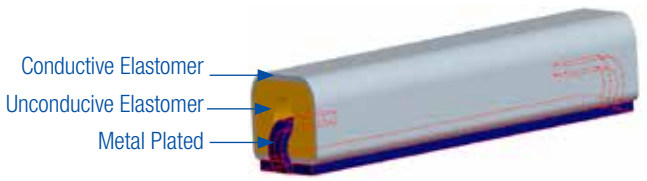
Characteristics:

- Low electrical resistance, used for shielding, grounding, and electrical connection;
- Excellent elasticity, used for buffering;
- Due to reflow soldering, it has good electrical connection to PCB;
- Carrier tape packaging, massive automatic installing, and high production efficiency.

Structure:

The SMT EMI Gaskets consist of three parts, see figure:

1. The blue is metal base used for reflow-soldering;
2. The gray is conductive elastomer;
3. The middle part golden is unconducive elastomer.



SMT EMI Gaskets Named rule

XX - YYYY - ZZZZZ - AA - SMT

① ② ③ ④ ⑤

① **XX: The cross sectional shape (SS: double peaks; DS:D shape)**

② **YYYY: Conductive elastomer material code**

③ **ZZZZZ: Unconducive elastomer material code**

④ **AA: Mould number**

⑤ **SMT: SMT function series**

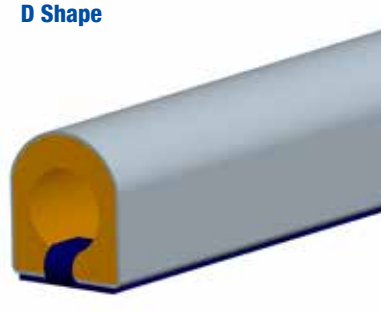
Like: SS-428C-428AB-01-SMT means cross-sectional shape is double peaks; conductive elastomer is 428C; unconducive elastomer is 428AB; mould number is 01; and belongs to SMT function series.

SMT EMI Gaskets Dimension

Double Peaks Shape

Product P/N
SS-428C-428AB-01-SMT
SS-629C-428AB-01-SMT
SS-428C-428AB-02-SMT
SS-629C-428AB-02-SMT
SS-629C-428AB-03-SMT
SS-629C-428AB-04-SMT

D Shape



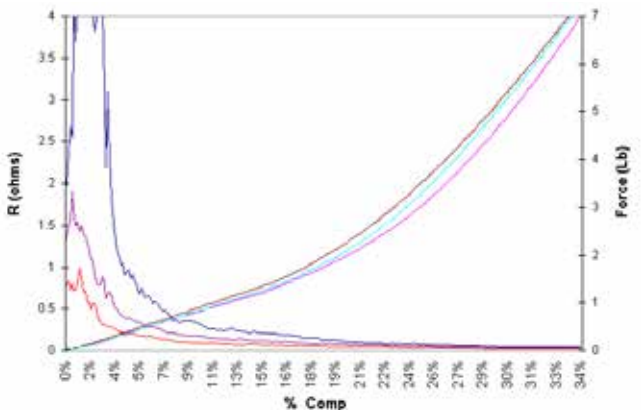
Product P/N
DS-428C-428AB-01-SMT
DS-629C-428AB-01-SMT
DS-428C-428AB-02-SMT
DS-629C-428AB-02-SMT

SMT EMI Gaskets Properties Tests (the below tests finished by DS-428C-428AB-01-SMT specimen)

DFR Test — Compression Distance . Force and Resistance performances

Compressibility (%)	Compressive Force (N)	Resistance (Ω)
10	2.13	0.2
30	21.5	0.043

From the table above shows when produce compressed to 10%, the resistance is 0.2Ω, it is satisfy to gasket resistance general requirements.



SMT EMI Gaskets High Temperature Ageing Test (the below tests finished by DS-428C-428AB-01-SMT specimen)

Before test:

- Test the specimen height and resistance in the room temperature.
- Put the specimen into the compressive set fixture, use right thickness spacer, ensure the 30% compressed. Then put the fixture into the oven for 168 hours under 100℃ .
- Remove the fixture from oven, cool to room temperature, then take out the specimen and wait 30 min.

Measure the final height and resistance:

High Temperature Ageing Test Data (30% compressed, T: 100℃ , Time: 168H)

Item		No.1	No.2	No.3	No.4	No.5	Avg
Before	Volume Resistance(mΩ))100Psi	6.2	5.9	5.0	4.1	8.3	5.9
After	Volume Resistance(mΩ))100Psi	9.5	7.0	7.0	8.2	8.9	8.1
	Compression Set % (method B)	22.5	25.0	27.5	27.5	27.5	26.0

Conclusion:

Pass by 100℃ , 168H ageing test, the compression set does not exceed 30%, test result: Pass. The specimen show the volume resistance has small variations, it is satisfying for PCB electrical grounding request.

SMT EMI Gaskets Thermal Shock Test (the below tests finished by DS-428C-428AB-01-SMT specimen)

Before test:

- Test the specimen height and resistance at room temperature.
- Put the specimen into the compressive set fixture, use right thickness spacer, ensure the 30% compressed. Then put the fixture into the thermal shock chamber for -40℃ x 0.5hr <—> 85℃ x 0.5hr x 168 cycles.
- Remove the fixture from thermal shock chamber, cool to room temperature, then take out the specimen and wait 30 min.

Measure the final height and resistance:

Thermal Shock Test Data (30% compression, -40℃ * 0.5H—85℃ * 0.5H * 168 cycles)

Item		No.1	No.2	No.3	No.4	No.5	Avg
Before	Volume Resistance(mΩ))100Psi	7.5	10.3	8.7	7.3	6.4	8.0
After	Volume Resistance(mΩ))100Psi	9.4	7.6	3.5	6.8	5.1	6.5
	Compression Set % (method B)	10.0	7.5	7.5	5.0	7.5	7.5

Conclusion:

Compression set does not exceed 10%, and test result is passed. Volume resistance less than 0.02, it is satisfying for using.

SMT EMI Gaskets Damp Heat Test (the below tests finished by DS-428C-428AB-01-SMT specimen)

Before test:

- Test the specimen height and resistance in the room temperature.
- Put the specimen into the fixture, use right thickness spacer, ensure the 30% compressed. Then put the fixture into the temperature humidity chamber for 168 hours under 85℃ and 85% RH.
- Remove the fixture from temperature humidity chamber, cool to room temperature, then take out the specimen and wait 30 min.

Measure the final height and resistance:

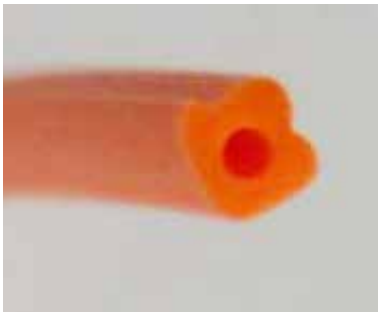
Damp Heat Test Data (30% compressed, temperature: 85℃ , humidity: 85%, time: 168H)

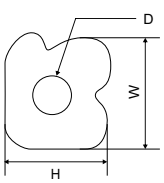
Item		No.1	No.2	No.3	No.4	No.5	Avg
Before	Volume Resistance(mΩ))100Psi	5.5	5.9	5.2	8.0	7.1	6.3
After	Volume Resistance(mΩ))100Psi	6.6	10.6	7.6	13.1	5.7	8.7
	Compression Set % (method B)	22.5	22.5	25	30	27.5	25.5

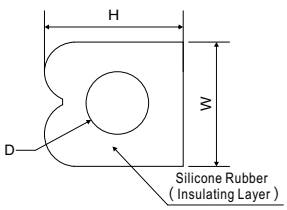
Soldering Strength:

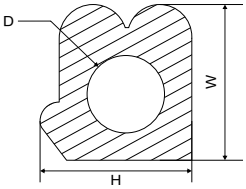
Soldering strength more than 1kgf/cm (between PCB and Gasket), depends on metal sizes.

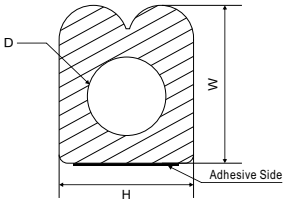
Pure Environmental Seal Extruded Product





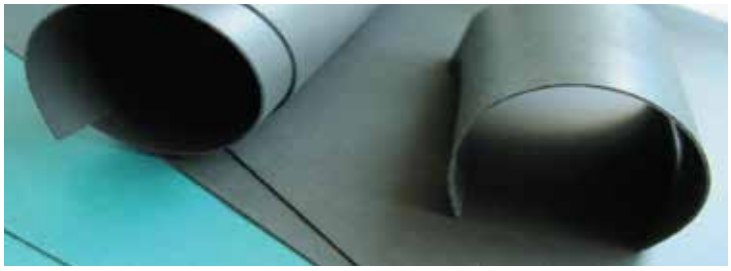




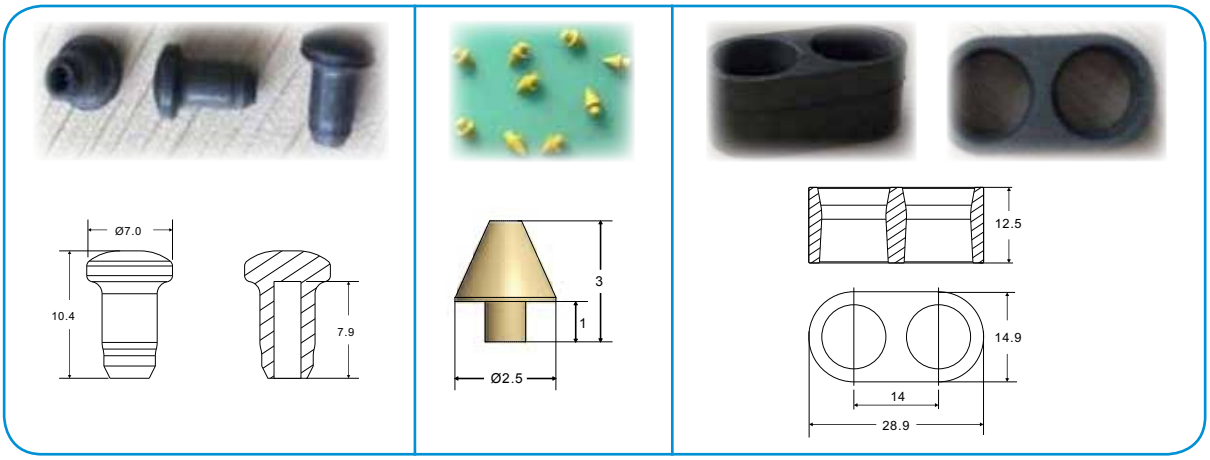


Electrically Conductive Elastomer Material Performance Parameters -- Molded Series

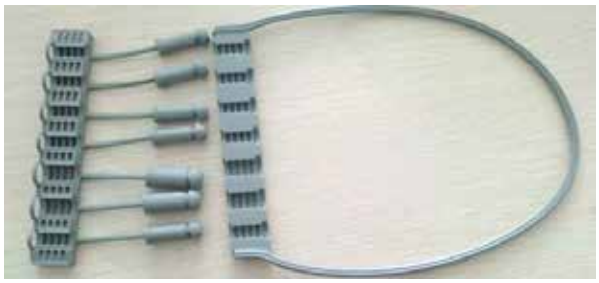
Material Number	Test Method	MS5G-55-HB	MS5G-70-HB	MS5G-65-V0	MS1B-65-HB	MS2T-60-HB	MS3T-75-HB
Base Material		Silicone	Silicone	Silicone	Silicone	Silicone	Silicone
Conductive Particle		Ni/C	Ni/C	Ni/C	Ag/Al	Ag/Glass	Ag/Cu
Color		Dark Grey	Dark Grey	Dark Grey	Blue	Tan	Tan
Electrical Property							
Volume Resistivity (ohm-cm)	ENG-WI-550RevA2	≤0.06	≤0.07	≤0.2	≤0.004	≤0.003	≤0.002
Shielding Effectiveness (dB)	MIL-DTL-83528E	> 70	> 70	> 70	> 70	> 70	> 70
Electrical Stability							
Heat aging test (100℃ ,168H) (ohm-cm)	ENG-WI-550RevA2	≤0.1	≤0.2	≤0.5	≤0.006	≤0.003	≤0.004
Mechanical Property							
Hardness (shore A)	ASTM D2240	55±5	70±5	65±10	65±5	60±5	75±5
Density (g/cm3)	ASTM D792	1.85±0.05	1.85±0.05	2.08±0.05	1.95±0.05	1.91±0.05	3.53±0.05
Tensile Strength (MPa)	ASTM D421	≥1.2	≥1.6	≥1.0	≥1.3	≥1.3	≥1.7
Elongation (%)	ASTM D421	≥450	≥110	≥250	≥350	≥400	≥250
Tear Strength (KN/mm)	ASTM D624	≥8.0	≥8.0	≥9.5	≥8.5	≥4.8	≥11.0
Compression Set (%) (100℃ ,24H, 30% Compressed)	ASTM D395 Method B	≤25	≤20	≤20	≤20	≤35	≤20
Environment Standard							
Lower Operating Temperature (℃)		-40	-40	-40	-40	-40	-40
Upper Operating Temperature (℃)		200	200	200	200	200	200
Environment	EU-RoHS	Yes	Yes	Yes	Yes	Yes	Yes
Flame Rating	UL-94	HB	HB	V0	HB	HB	HB



Molded Product



Maintenance Windows Sealing Piece



Silicone Product Dimension Range

Extruded Products		Molded Products	
Conductive Filler	Ni/C, Ag/Glass, Ag/Al	Conductive Filler	Ni/C, Ag/Glass, Ag/Al, Ag/Cu
Diameter(mm)	Conductive Type: 0.7-12 Non Conductive Type: 0.5-20	Diameter(mm)	Conductive Type: 0.3-20 Non Conductive Type: 0.1-25
Min Thickness(mm)	Conductive Type: 0.2 Non Conductive Type: 0.1	Max Dimension(mm)	500*500

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