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# Pressure Gasketing

# Pressure Gasket (Definition)

- EMI/RFI shielding of the PCB without the use of solder



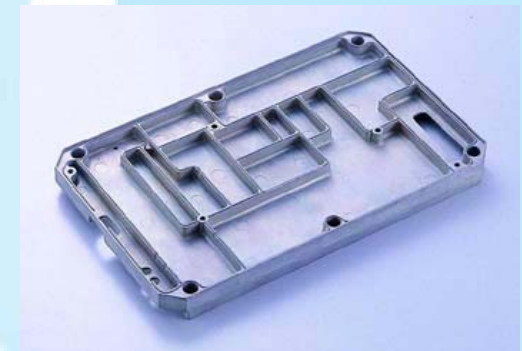
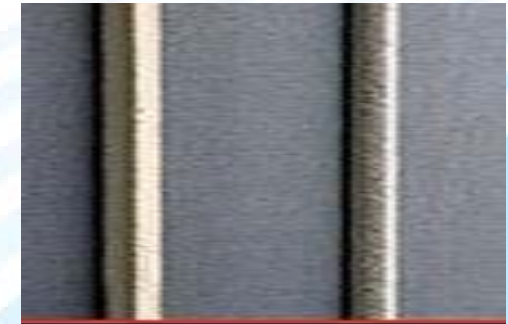
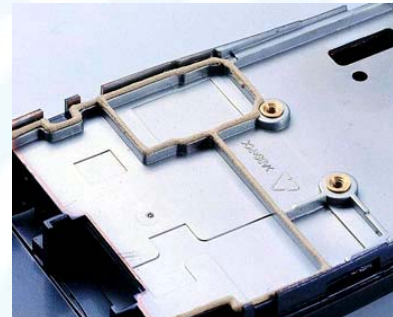
# Typical Applications

- **Base Stations**
- **Hand held devices**
- **Cell Phones**
- **PDA**
- **Test Equipment**
- **Wifi/Bluetooth**



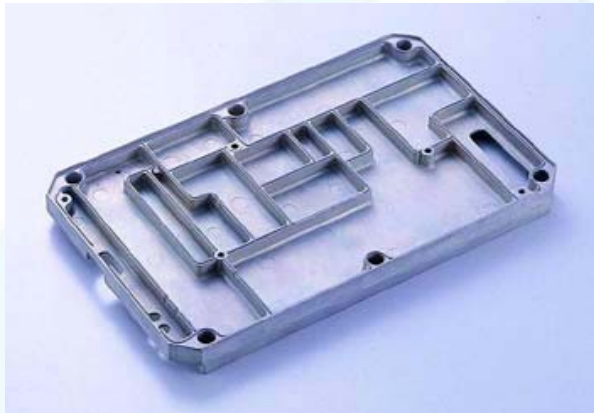
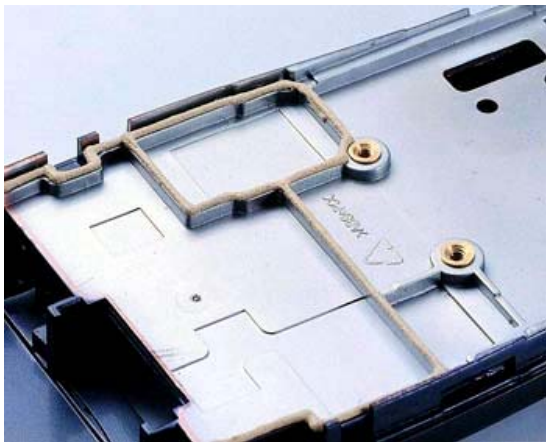
# Common Components

- Conductive Silicone**
- Conductive Adhesive**
- Metallized Plastic**
- Cast Metal**
- Formed Metal**



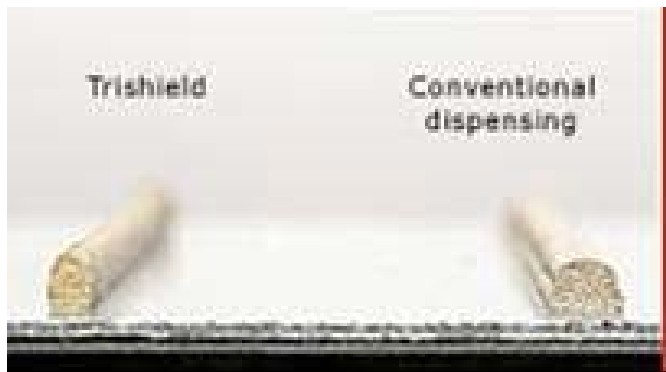
# Max - Shield

FIP

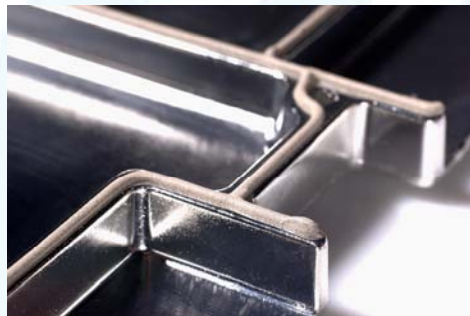


- **Conductive gasket dispensed by high precision XYZ-robots on a carrier of aluminium, magnesium or metallized plastic.**
- **Bead height from 0,5 to 2,0 mm.**
- **No assembly work.**
- **No expensive tooling required.**
- **Rapid prototyping.**
- **Cost effective even in small volumes.**

# Trishield™



- Post dispensing for thinner and taller gaskets
- Thinner ridge to reduce board space
- Better alignment of metal particles improves shielding
- Reduces housing wall thickness



# Trishield™

	Test procedure	Unit	8800	8810	8811
Base material			Silicone rubber	Silicon rubber	Silicone rubber
Conductive filler			Silver / Nickel	Nickel / C	Nickel / C
Volume resistivity	Mil-G-835388	mOhmcm	15	150	15
Density	ISO 2781	g/cm <sup>3</sup>	3,1	1,8	2,1
Hardness	ISO 7619	Shore A	55	60	70
Tensile strength	ISO 37	Mpa	2,9	3,6	3,3
Elongation at break	ISO 37	%	240	210	150
Tear strength	ISO 34-1C	N/mm	14	18	16
Compression set, 72 hours, 100 C 168 hours, 70 C	ISO 815	%	25 25	20 20	45 45
Avg. shielding effect, 0,3 – 9 GHz Gasket on Ni/Sn plated aluminium Gasket on untreated Al	Nolato, modified MIL STD 285	dB	100 70	60 65	90 100
Flammability	UL 94		HB	HB	HB
Compression modulus, 10% strain 20% strain	ISO 7743	MPa	3,8 6,5	6,2 6,5	12,4 14,6

## New Ni/C materials

- 8813 is the standard Ni/C material
- 8812 is a flame retardent version of 8813

	Test procedure	Unit	8813	8812
Base material			Silicone rubber	Silicone rubber
Conductive filler			Ni/C	Ni/C
Volume resistivity	Mil-G-835388	mOhmcm	15	15
Density	ISO 2781	g/cm <sup>3</sup>	2,1	2,2
Hardness	ISO 7619	Shore A	75	80
Tensile strength	ISO 37	Mpa	2,5	2,8
Elongation at break	ISO 37	%	170	100
Tear strength	ISO 34-1C	N/mm	15	13
Compression set, 72 hours, 100 C	ISO 815	%	55	55
Avg. shielding effect, 0,3 – 9 GHz Gasket on untreated Al	Nolato, modified MIL STD 285	dB	105	105
Flammability	UL 94		HB	V0
Compression modulus, 10% strain 20% strain	ISO 7743	MPa	17,8 24,1	25,2 25,5

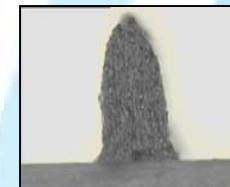
# Trishield™

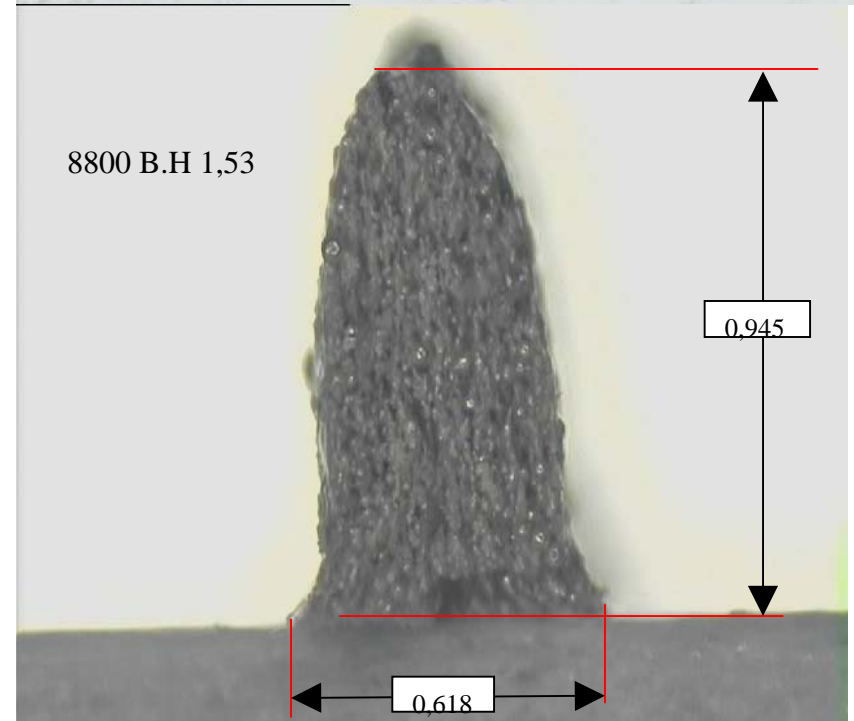
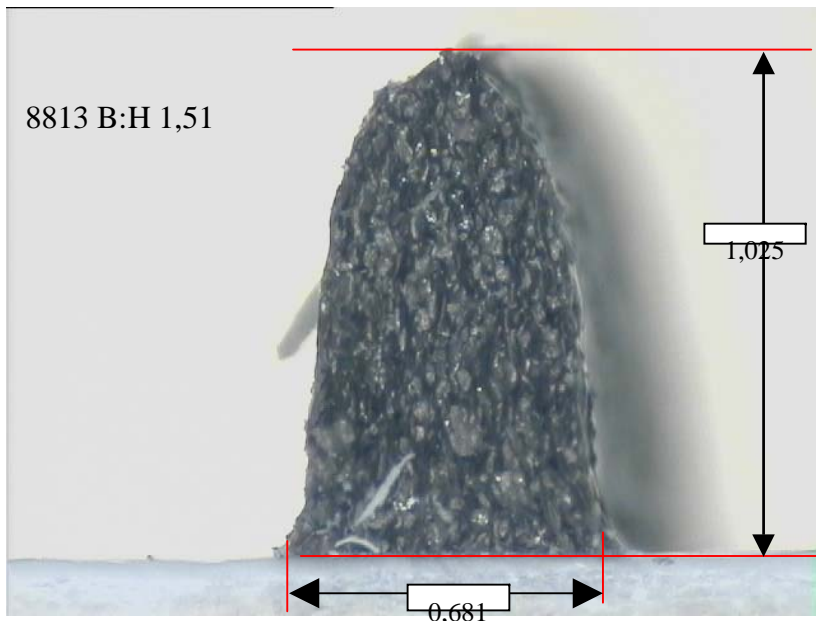
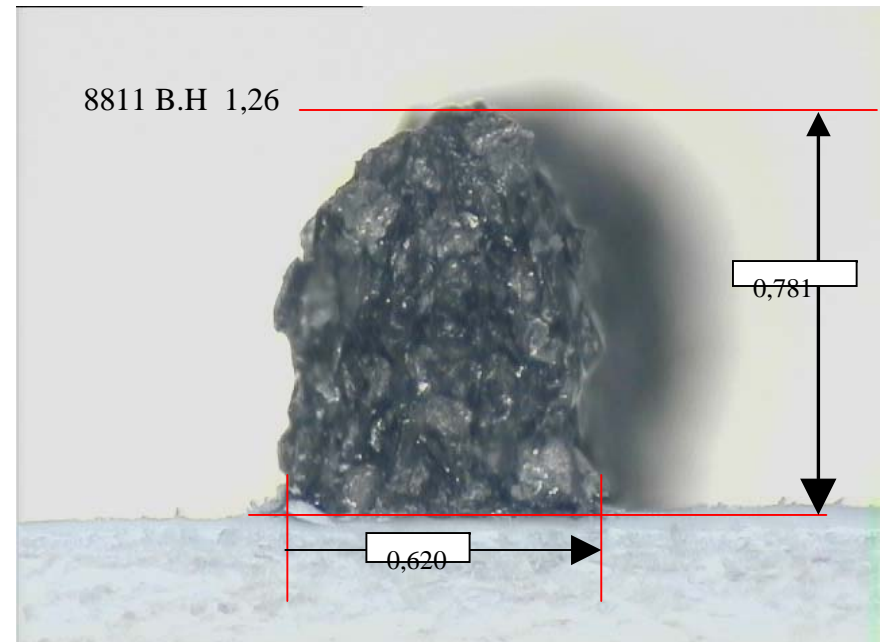
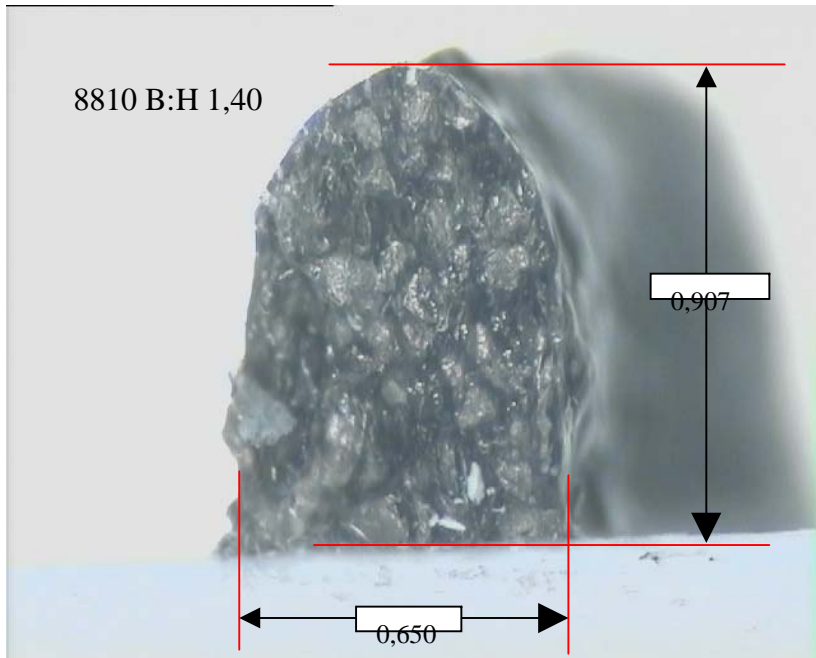
- **Modified MIL STD 285.**
- **Measured on shield can Anna.**
- **Average shielding effect 0,3-9 GHz in dB.**

Sample	8800	8810	8811
	Shielding effect	Shielding effect	Shielding effect
Surface	dB	dB	dB
Ni/Sn	100	60	90
Al	70	65	100
E-CLPS 4600	68	69	100

# Specification on Gasket

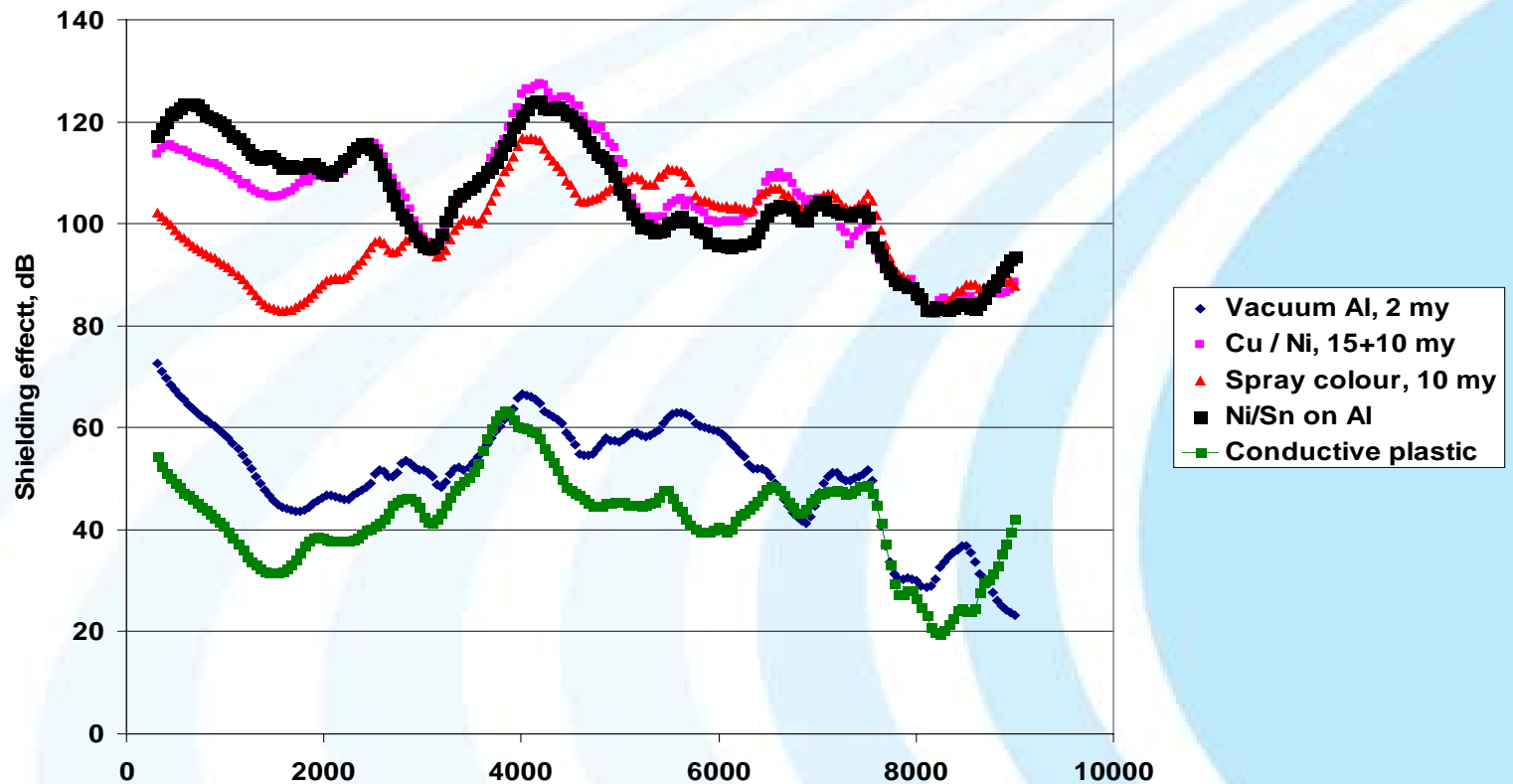
Height of bead [mm]	0.5	0.8	1.0	1,7
Width of bead [mm]	0.3	0.6	0.7	0.9
Width of track [mm]	0.7	1.0	1.1	1.3
Compr. 0.1mm F [N/cm]	2,9	2.9	3.1	5,3
Tolerance [mm]	h+/- 0.1	h+/- 0.1	h+/- 0.1	h+/- 0.1





# Shielding Effectiveness of Metallized Plastic

Substrate is made of PC/ABS. Gasket Nolato 8800. Comparing different methods for metallizing plastic.



# Trishield™

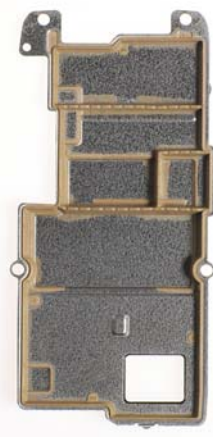
- **Gasket height should be enough to fill gap between housing and PCB.**
- **Min compression 5 % for electrical contact.**
- **Recommended compression 10-50%.**
- **Normal gasket height between 0,5 and 2 mm.**
- **The gasket width should be as narrow as possible but it is set by the gasket height.**

# COMPASHIELD™

- It is a metal can with an over-moulded .  
conductive silicone gasket.
- The metal is used as a shielded housing around  
components on a PCB.
- The gasket is used to build internal walls and  
to contact the PCB

## ➤ Advantages

- Light Weight
- Low Cost
- Board Space
- Ease of Assembly



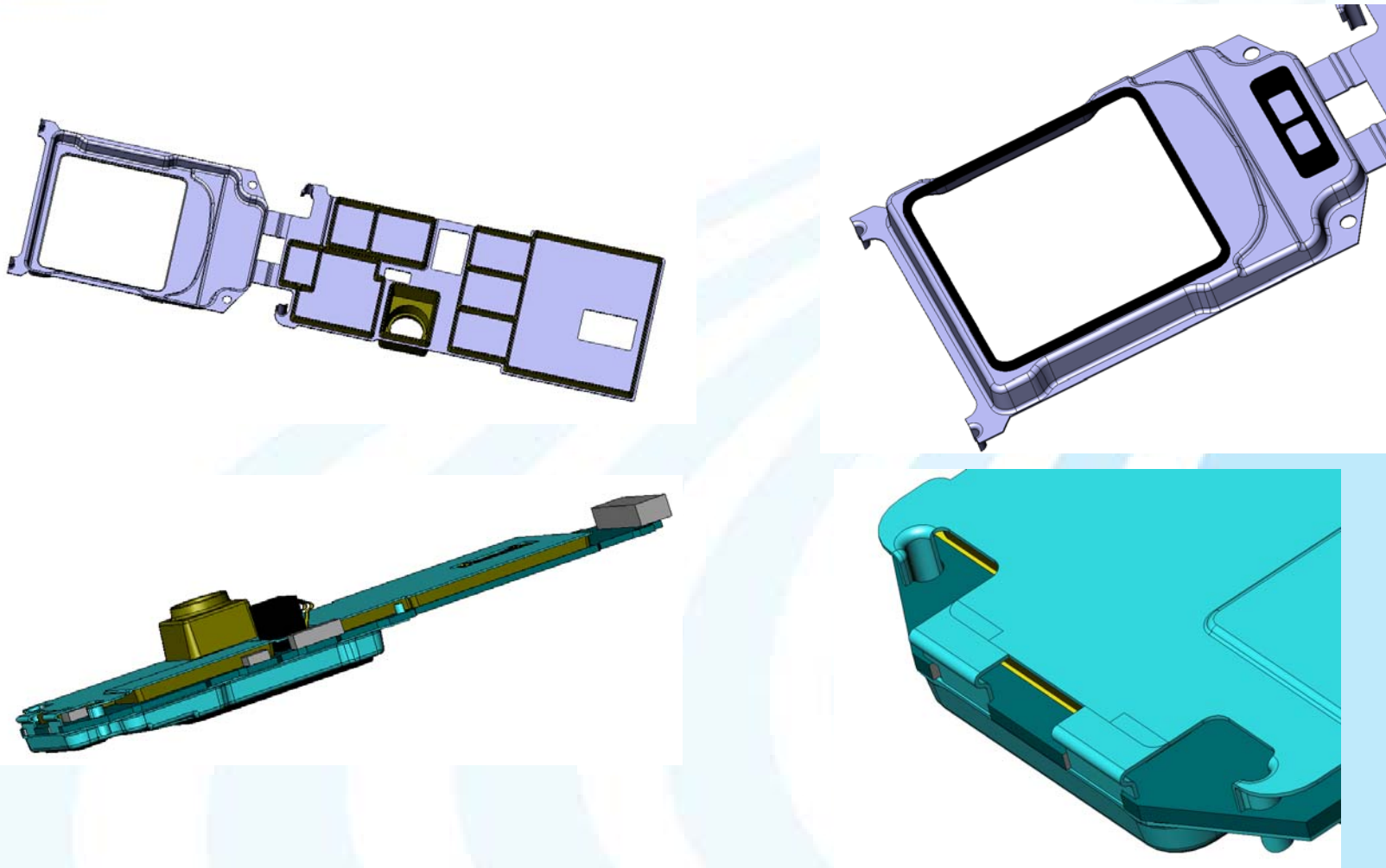
# COMPASHIELD™

Property	Test procedure	Unit	Nolato 8604	Nolato 8630
Base material			Silicone rubber	Silicone rubber
Conductive filler			Silver / copper	Silver / glass
Volume resistivity	Mil-G-835388	mOhmcm	1	2
Density	ISO 2781	g/cm <sup>3</sup>	3,4	1,9
Hardness	ISO 7619	Shore A	75	75
Tensile strength	ISO 37	Mpa	1,8	1,5
Elongation at break	ISO 37	%	430	90
Tear strength	ISO 34-1C	N/mm	10	11
Compression set, 22h/125 C	ISO 815	%	40	20
Compression modulus, 10% strain , 20% strain	ISO 7743	MPa	8,9 9,0	9,2 9,8

# Shielding Effect



# Single Piece/Double Sided Pressure Gasket



# P-Can



## Plastic Housing

- Max Temp 70-150 Deg C
- ABS, PCABS,PA,PPA,PPS
- Rigid

## Conductive Silicon Gasket

- Robotic Placement for repeatability
- Highly conductive for superior shielding
- Minimum contact width of .3mm
- Grounds to PCB

## Physical Vapor Deposition

- Copper/NiCr coating
- Excellent adhesion and conformity

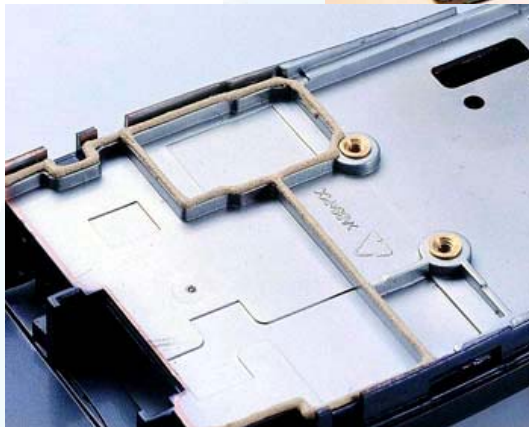
# Pressure Formed P-Can



- Applications –
  - Mobiles
  - High Volume Low Cost Devices
- Metals –
  - Al
  - Cu/Ni-Cr
  - Cu/Ni-Cr/Sn
- Plastic Materials –
  - PET, ABS, PVC...etc.
- Attaching Methods –
  - Screw/Clip Mount
  - Conductive PSA Mount
- Features –
  - Light Weight, Multi-Cavities Integrated Design
  - Easy Installation, Reworkable
  - Low Cost
  - Short Design Cycle, Fast Delivery
  - Requires less PCB space
  - Low Tooling Cost

# Shielded Housing

- Metallized Plastic Housing (PVD)
- Conductive Silicone Dispensed onto ridges



## ➤ Advantages

- Lower Cost
- Single Part Number
- Manufacturability
- Board Space
- Weight

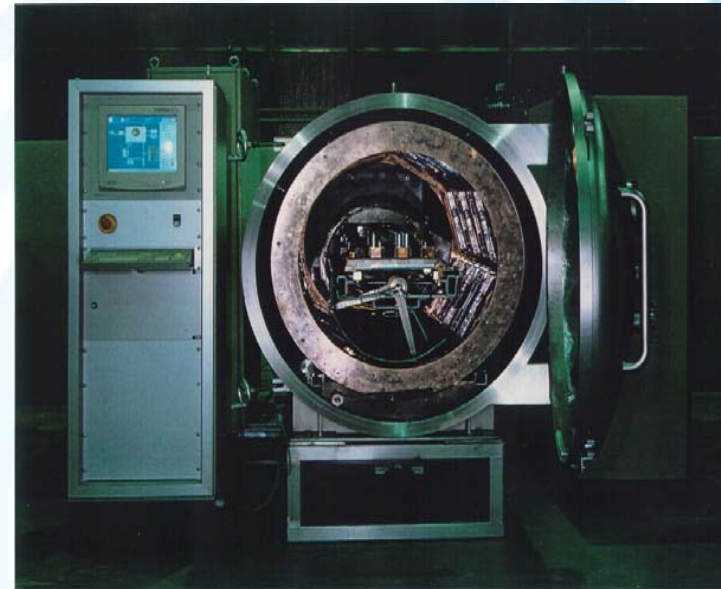
# Max – Plate

## Physical Vapor Deposition

PVD

 **TennVac**

**EMI**



# Max – Plate

## Physical Vapor Deposition

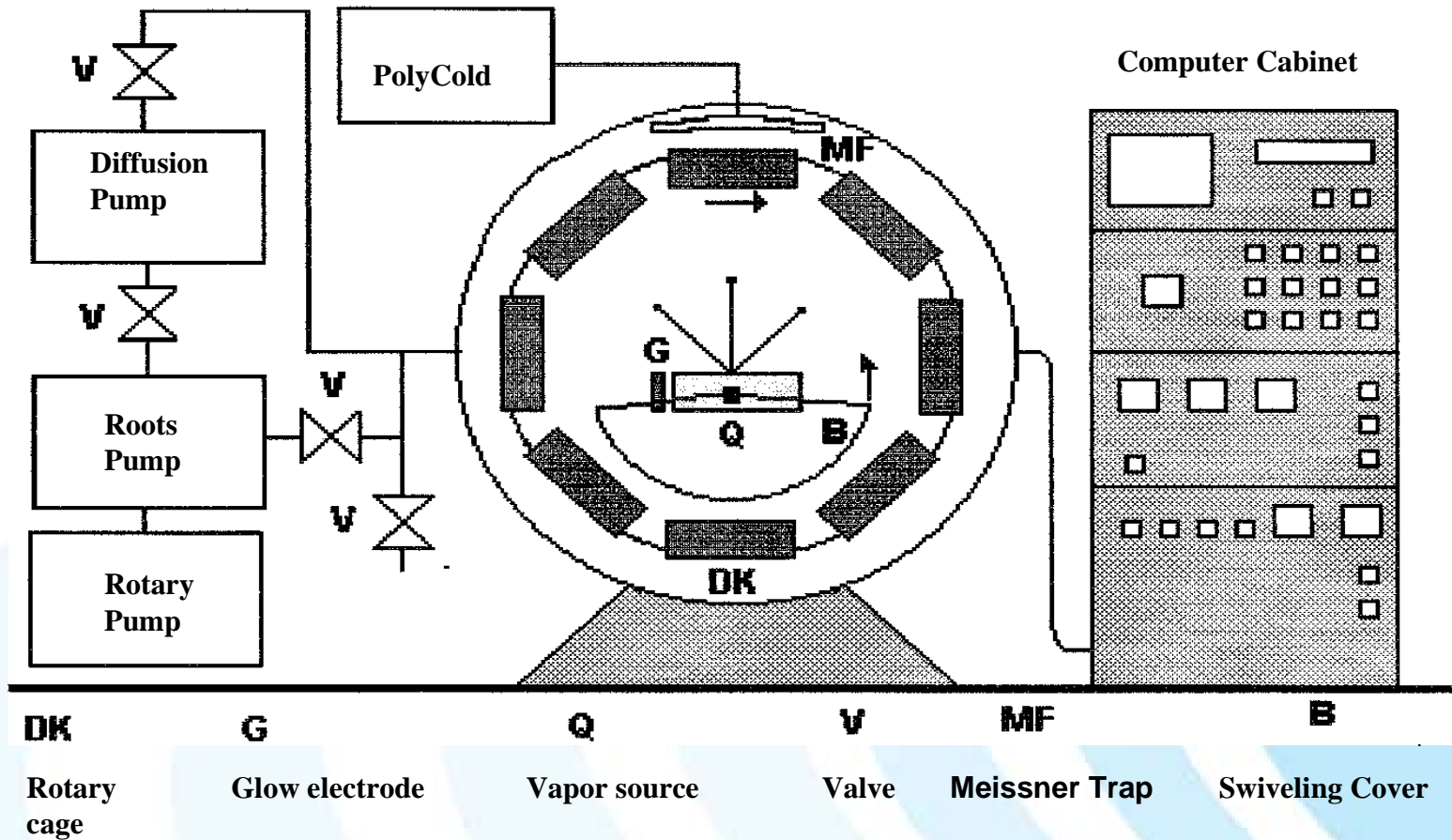
PVD



# Max – Plate PVD

## Physical Vapor Deposition

### How it works

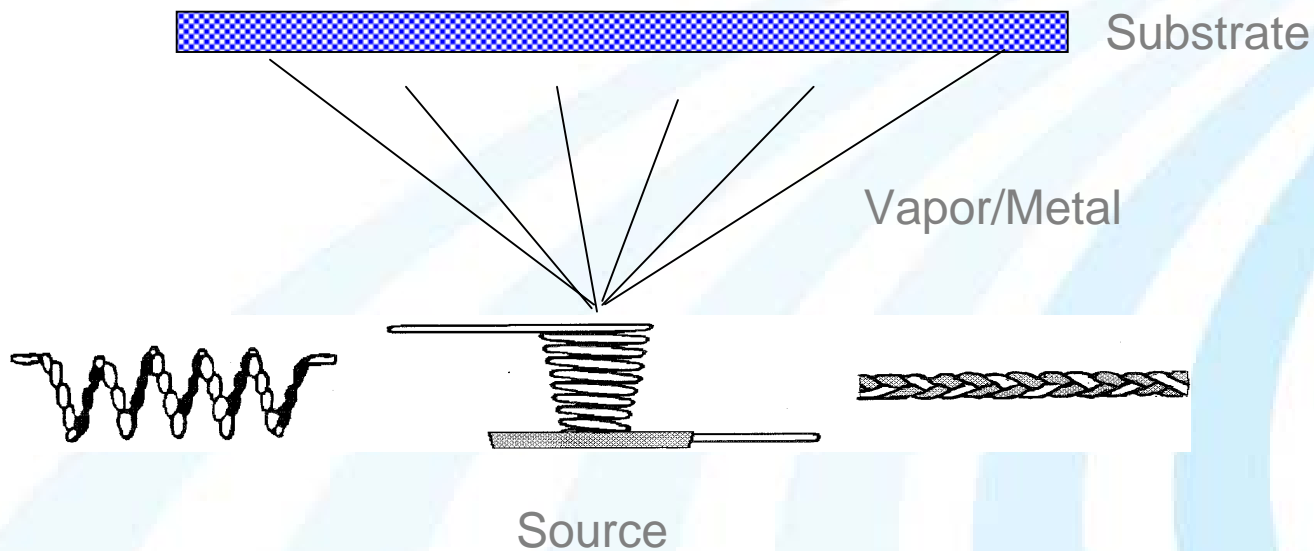


# Max – Plate

PVD

Physical Vapor Deposition

## Vacuum Metallization



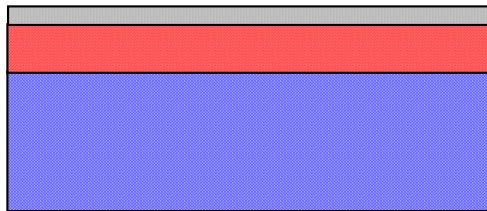
# Standard Process

**thickness**

**structure**

**layer**

0.15  $\mu\text{m}$   
2.0  $\mu\text{m}$



nickel chromium  
copper (electrical conductive layer)

substrate (plastic material)

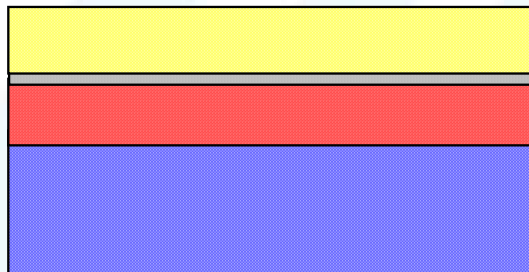
# Solder Capable Application

**thickness**

**structure**

**layer**

1.5–3.0  $\mu\text{m}$   
0.15  $\mu\text{m}$   
2.0  $\mu\text{m}$



tin  
nickel chromium  
copper (electrical conductive layer)

substrate (plastic material)

# Max – Plate

## Physical Vapor Deposition

PVD

	<b>Electrical Conductivity (*ohms per square)</b>	<b>Shielding Effectiveness</b>	<b>Thickness</b>	<b>Adhesion / Cohesion</b>	<b>Weight</b>	<b>Cost</b>
Sheet Metal	<b>0.05 - 0.15</b>	<b>80db - 95db</b>	<b>5.0m</b>	<b>N/A</b>	<b>High</b>	<b>Med</b>
Conductive Paint	<b>0.20 - 0.50</b>	<b>55db - 70db</b>	<b>3.0m</b>	<b>Moderate</b>	<b>High</b>	<b>Med</b>
PVD	<b>0.05 - 0.20</b>	<b>60db - 80db</b>	<b>2.15m Standard</b>	<b>Excellent</b>	<b>1.0 Grams/ Sq. Ft.</b>	<b>Low</b>

\*OHMS Per Square - A reading of 0.20 ohm/sq is approximately 50-60dB of shielding effectiveness

# Max – Plate

PVD

## Physical Vapor Deposition

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- **UL 764C Certification**
- **No Flaking**
- **Adhesion Commitment**

**Primer**

**Glow Discharge**

**Nickel Chromium**

- **Groves, Corners, Edges**

**Minimum 1 X 1 depth ratio**

**Consistent and Predictable**

# Max – Plate

## Physical Vapor Deposition

PVD

Common Plastics	Max. Temperature °C		Coating Behavior		
	Short	Long	Good	Moderate	Fair
ABS	95	85	X		
ABS/PC	110	95		X	
PA-66	190	120	X		
PBT	165	100	X		
PC	150	130		X	
PEEK	240	240		X	
PEI	200	180	X		
PES	190	190		X	
PET	200	100	X		
PI (Polyimide)				X	
PMMA	95	85		X	
PP	140	100		X	
PPA	185	180	X		
PTFE (Teflon)	300	250		X	
PVC	75	65	X		

# Max – Plate

## Metal Selection

PVD

Metals	Cu/Ni-Cr	Cu/Ni-Cr/Sn	Cu/SS	Al	Al/CVD	Ni-Cr
Applications	Plastic enclosures	Antenna	Camera Lens Mount	Automotive	Stringent Applications	Heater
	Antenna		Optical Fiber			
Products	Mobile Devices, FPC, GPS	Mobile Devices	Mobile Phone, Broad Band	GPS, Display	Automotive, Samsung	Copier
Thickness	2 $\mu$	>3.0 $\mu$	2 $\mu$	2 $\mu$	2 $\mu$	< 1 $\mu$
Features	General	Solderable	Finger Print Resistance	General	Salt Spray Resistance	Controllable Resistivity
			Long time Color Stability	Low Galvanic Corrosion		
Cost	Low	High	Moderate	Low	Moderate	High

# Max – Plate

## Physical Vapor Deposition

PVD



1.GPS



2.Mobile



3.Network Device



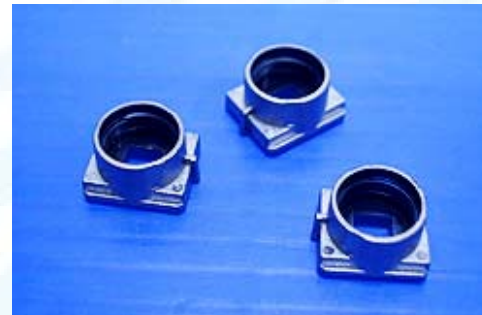
# Max – Plate

## Physical Vapor Deposition

PVD



### 1. Mobile Phone Camera Lens



### 2. Optical Fiber Connector



# Max – Plate

PVD

Physical Vapor Deposition

