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Company Profile

2008

Pressure Gasket (Definition)

- EMI/RFI focus is to do everything but metal cans



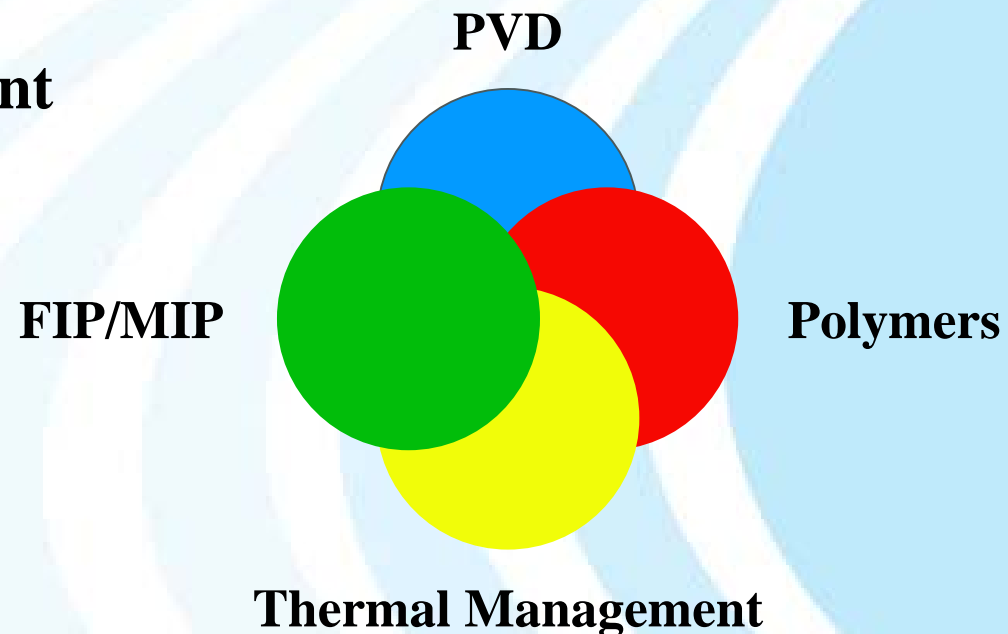
Typical Applications

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



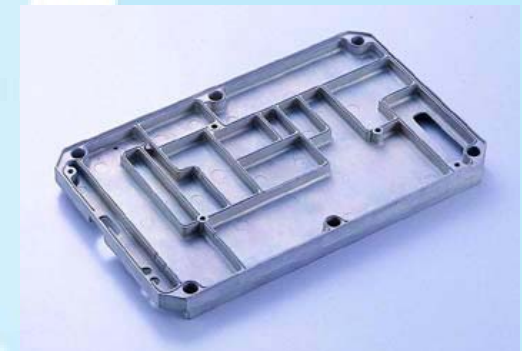
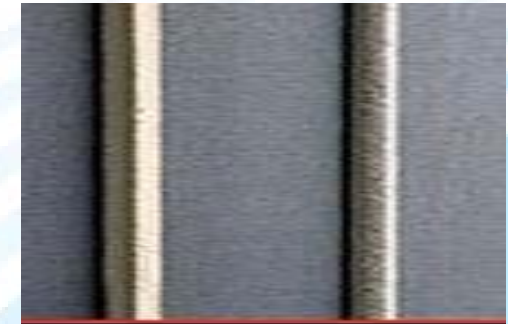
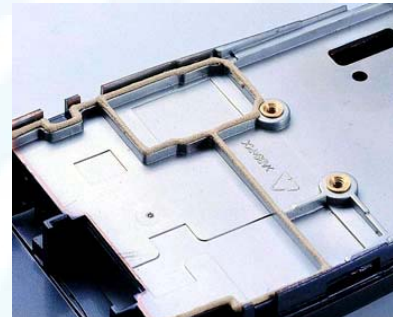
Core Technologies

- * **Physical Vapor Deposition**
- * **Conductive Silicone (FIP/MIP)**
- * **Polymers**
- * **Thermal Management**

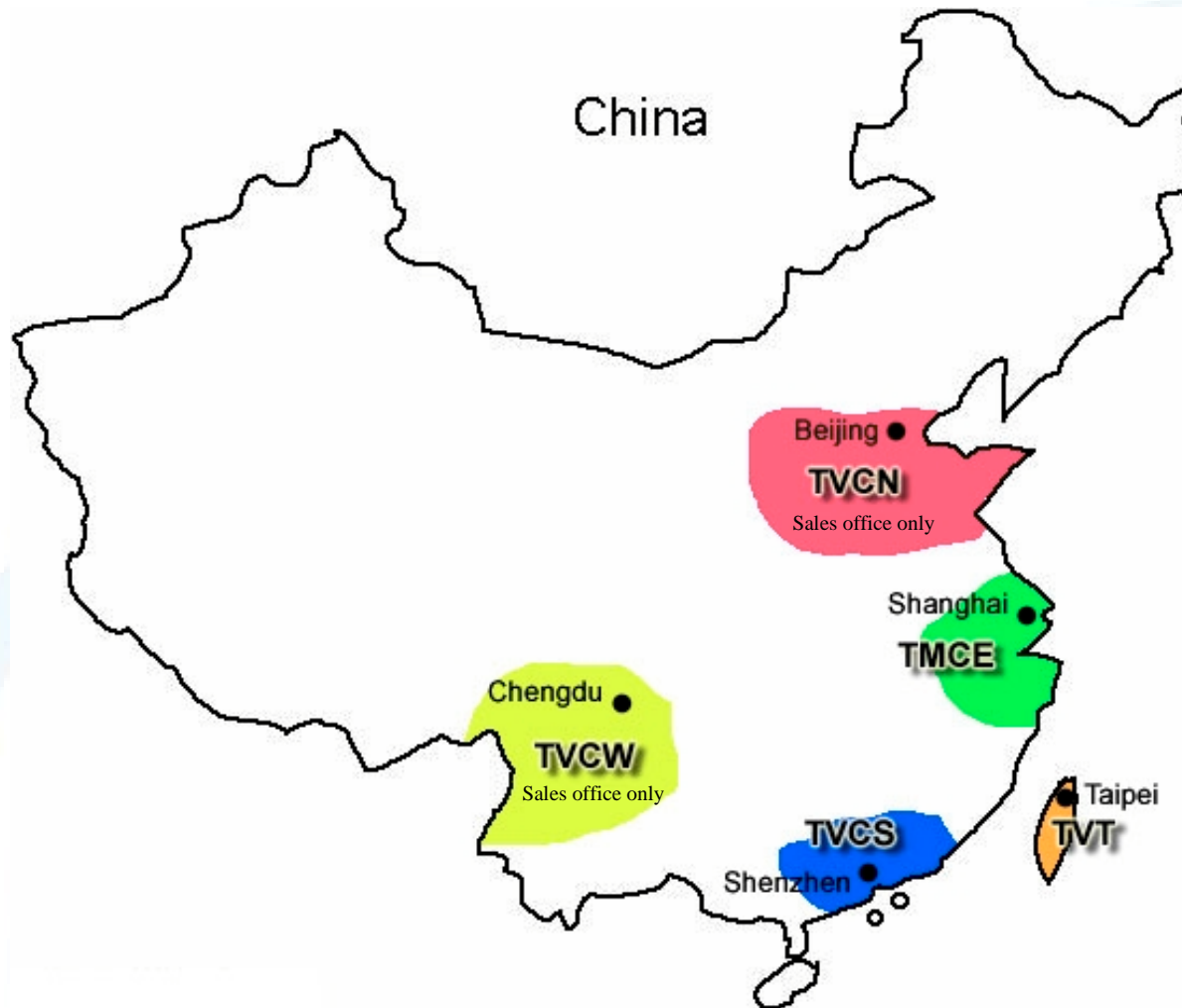


Common Components

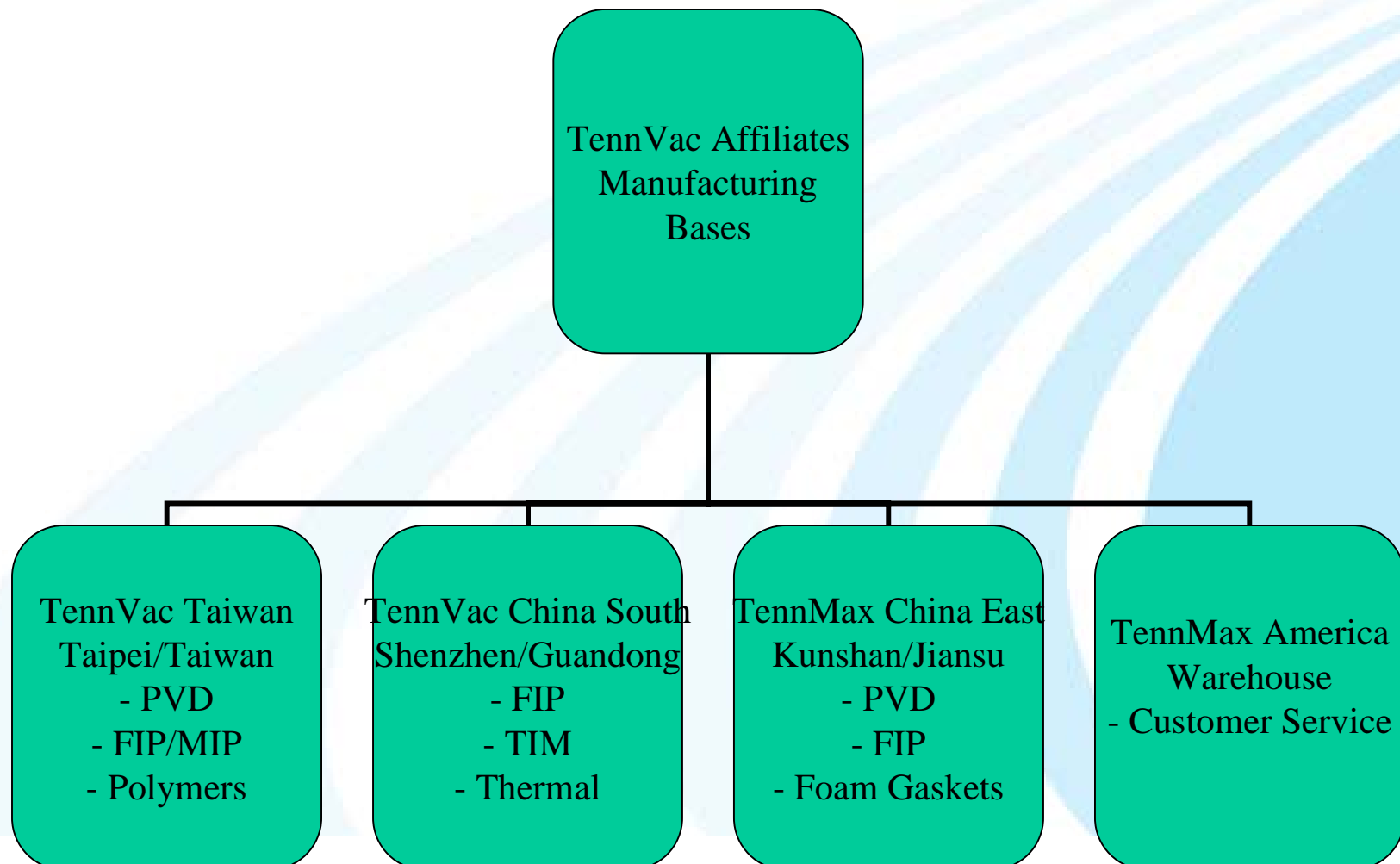
- Conductive Silicone**
- Conductive Adhesive**
- Metallized Plastic**
- Cast Metal**
- Formed Metal**



Manufacturing Locations

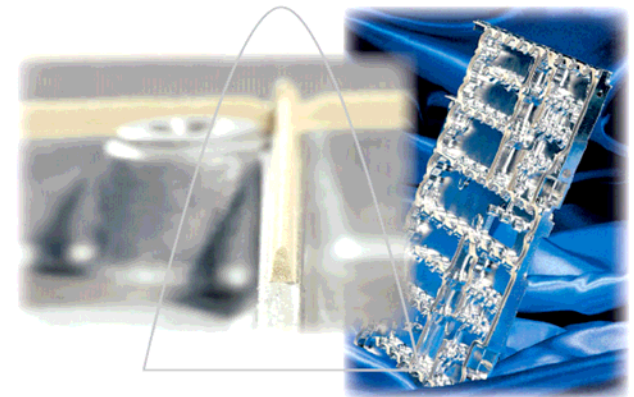


Manufacturing Locations



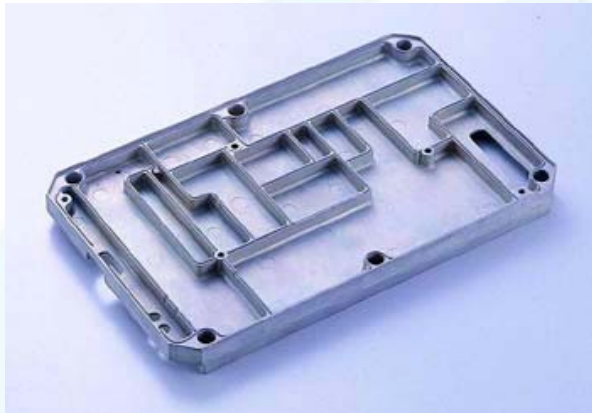
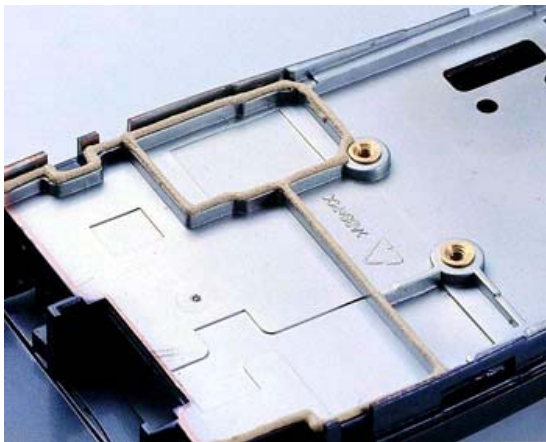
FIP (Form In Place)

- Dispensable Gasket
- Gasket types:
 - Conductive
 - Enviromental
- Composition:
 - Base Resin: Silicone
 - Conductive metals: Ag/Cu, Ag/Ni, Ni/Gr



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™



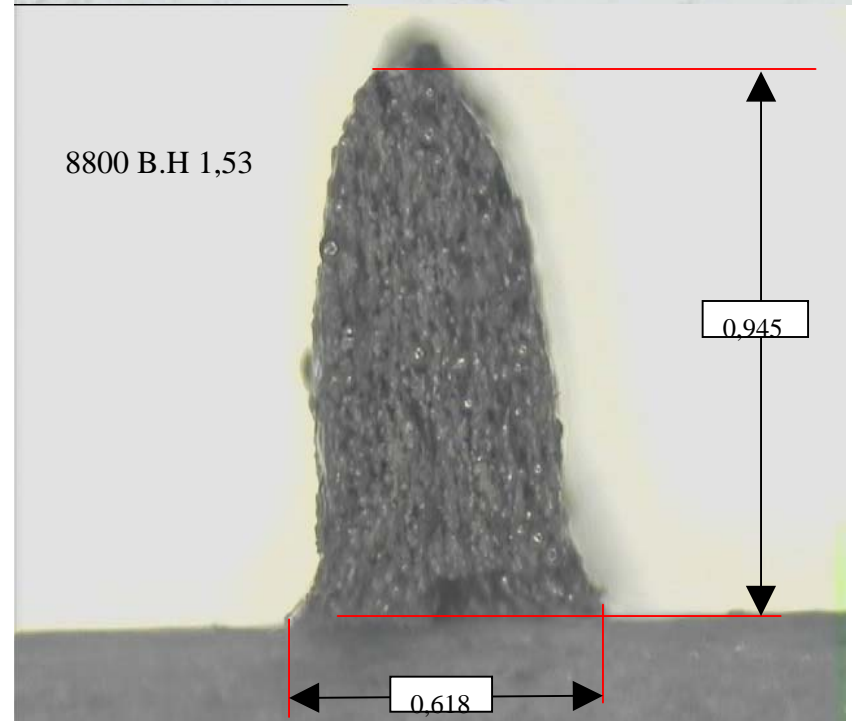
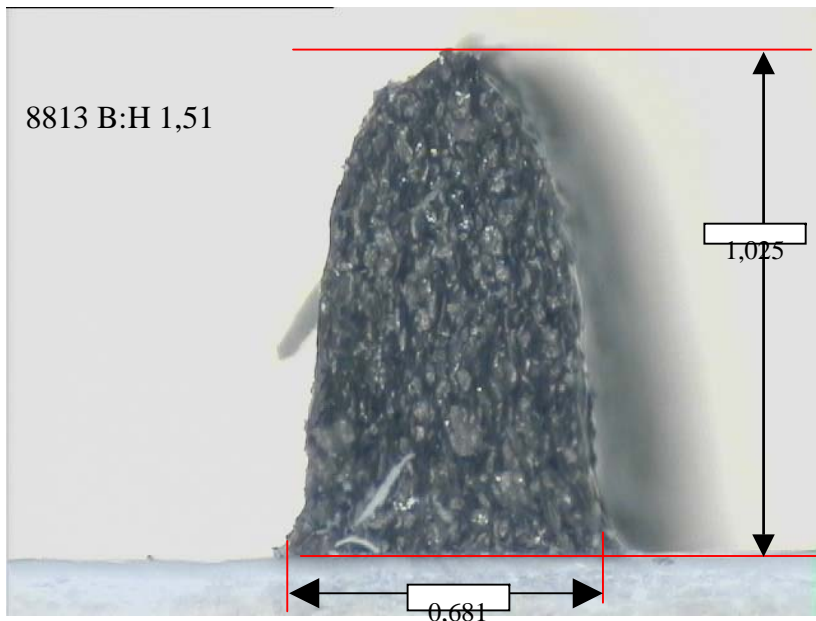
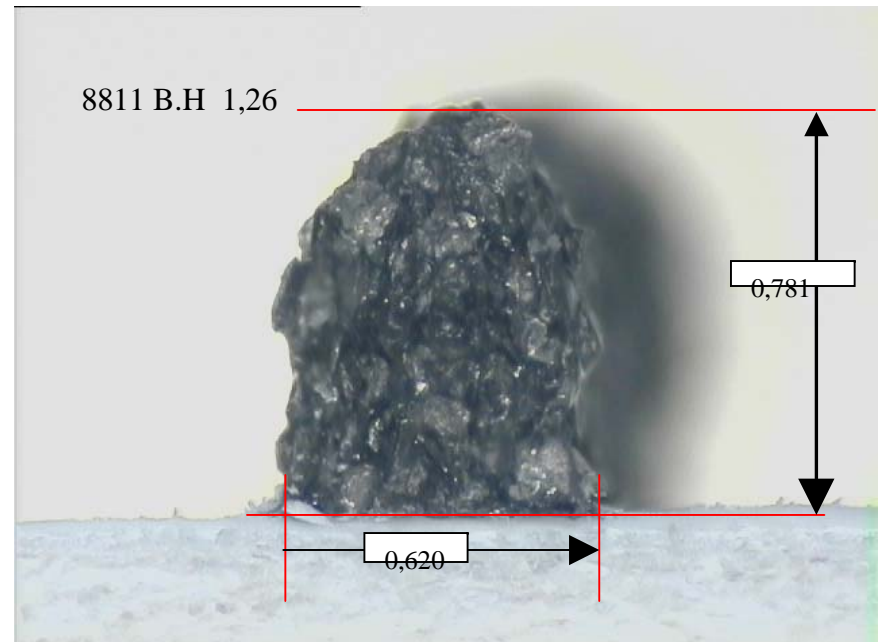
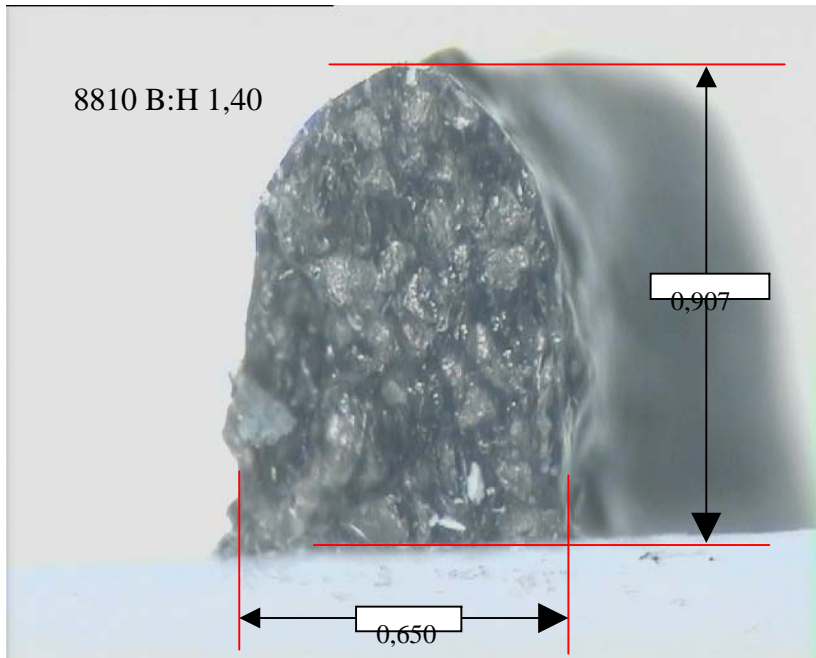
- Post dispensing for thinner and taller gaskets
- Thinner ridge to reduce board space
- Better alignment of metal particals improves shielding
- Reduces housing wall thickness



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





Tri shield™

- **Gasket height should be enough to fill gap between housing and PCB.**
- **Min compression 5 % for electrical contact.**
- **Recommended compression 25%.**
- **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.**

F-5301 NiGr Filled FIP

The shielding effectiveness of TennVac's F-5301 is designed to replace high cost Ag plated particles at a fraction of the cost

Properties	Units	F-5301
Elastomer Binder		Silicone
Conductive Filler		Ni/Gr
Physical Properties		
Specific Gravity	g/cm	2.0
Shore A Hardness		60
	psi	150
	%	80
	lb/in	40
Compression Set	%	30
Color		Dark Grey
Temperature Range	°C	-45 ~+150
	°C	200
Electrical Properties		
Volume Resistivity	Ohm .cm	0.08

F-5304 Ultrasoft FIP

F-5304 is extremely soft version of F-5301, it remains the same shielding effectiveness but much softer for easier

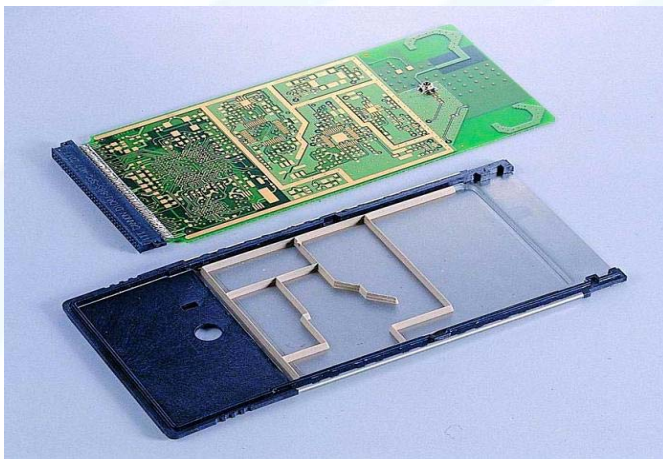
Properties	Unite	F-5304
Elastomer Binder		Silicone
Conductive Filler		Ni/Gr
Physical Properties		
Specific Gravity	g/cm	2.2
Shore A Hardness		15
	psi	80
	%	200
	lb/in	300
Compression Set	%	30
Color		Dark Grey
Temperature Range	°C	-45 ~+150
	°C	200
Electrical Properties		
Volume Resistivity	Ohm -cm	0.08



MIP (Mold in Place)



- 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



Clamshell Gasket

Traditional gasket using Aluminum and FIP. Also can be used to help remove heat from components



CNC for Prototype and low volume Production

Cast Units for volume Production



P-Can



Plastic Housing

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

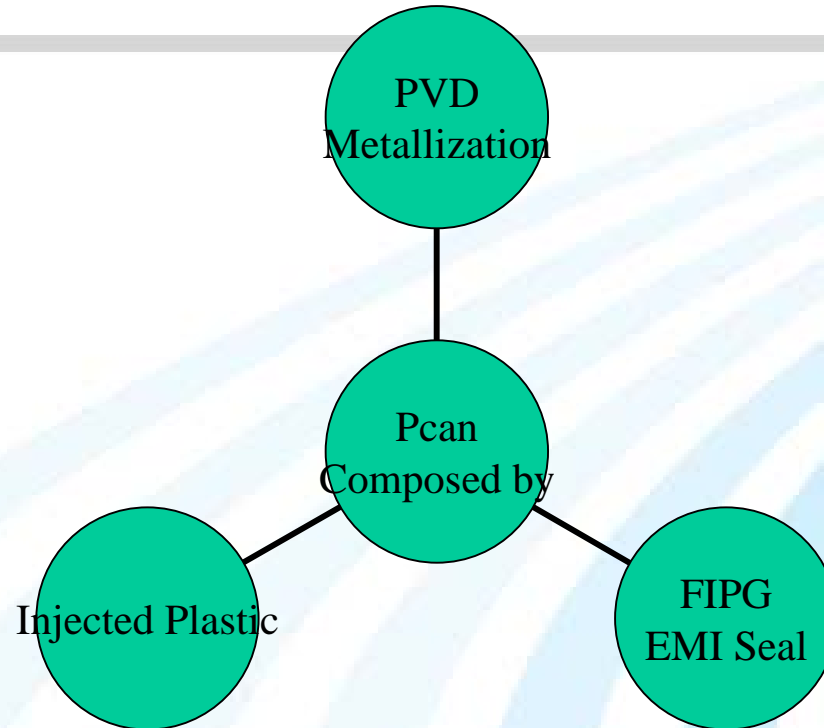
Conductive Silicon Gasket

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

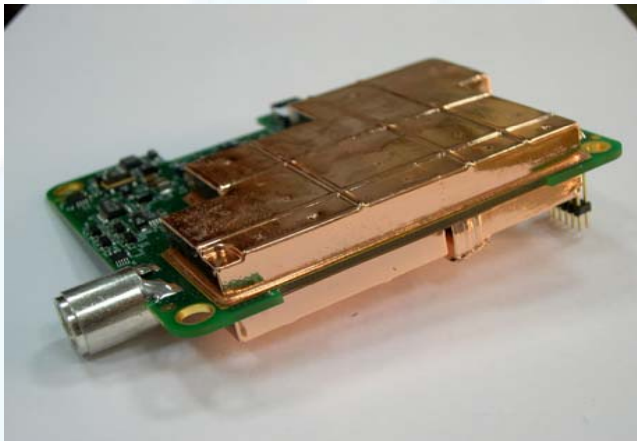
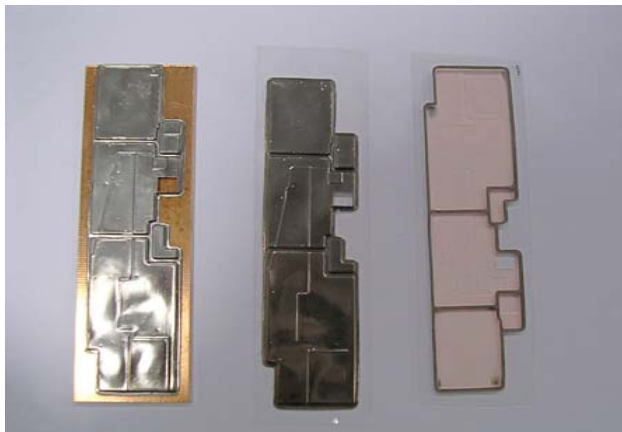
Physical Vapor Deposition

- Copper/NiCr coating
- Excellent adhesion and conformity

Pcan



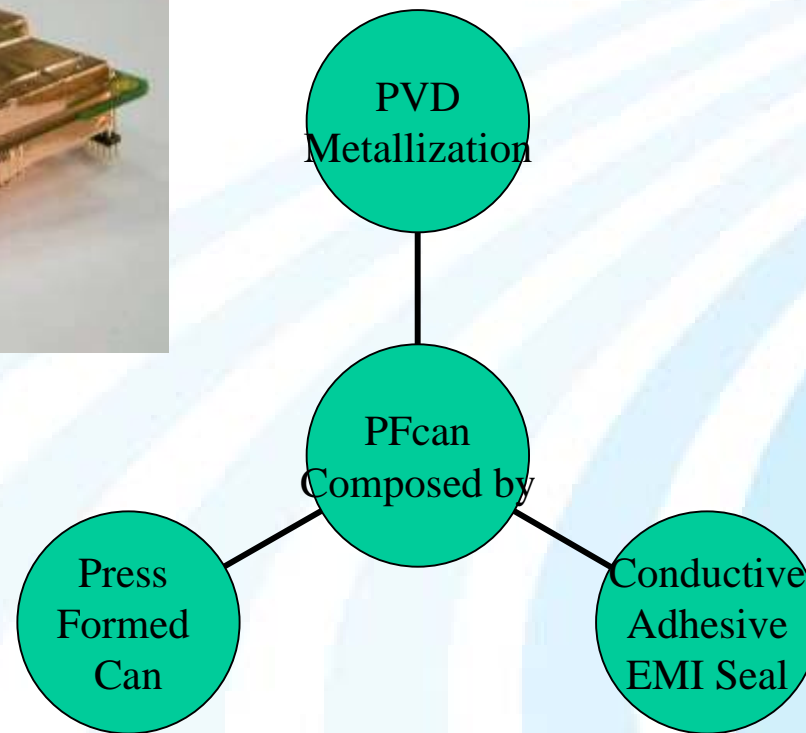
Pressure Formed P-Can



- 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

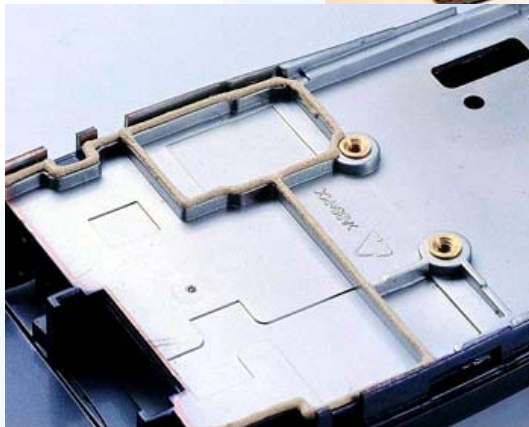


PFcan



Shielded Housing

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



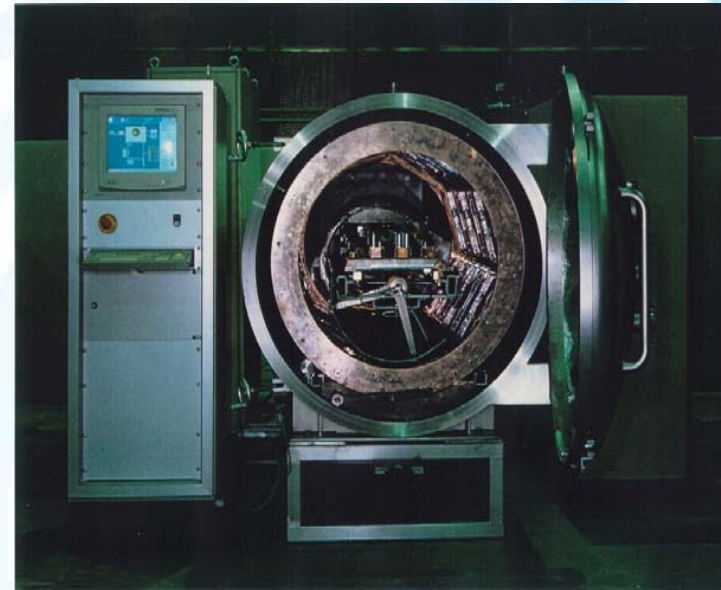
➤ Advantages

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

Max – Plate

Physical Vapor Deposition

PVD



Max – Plate

Physical Vapor Deposition

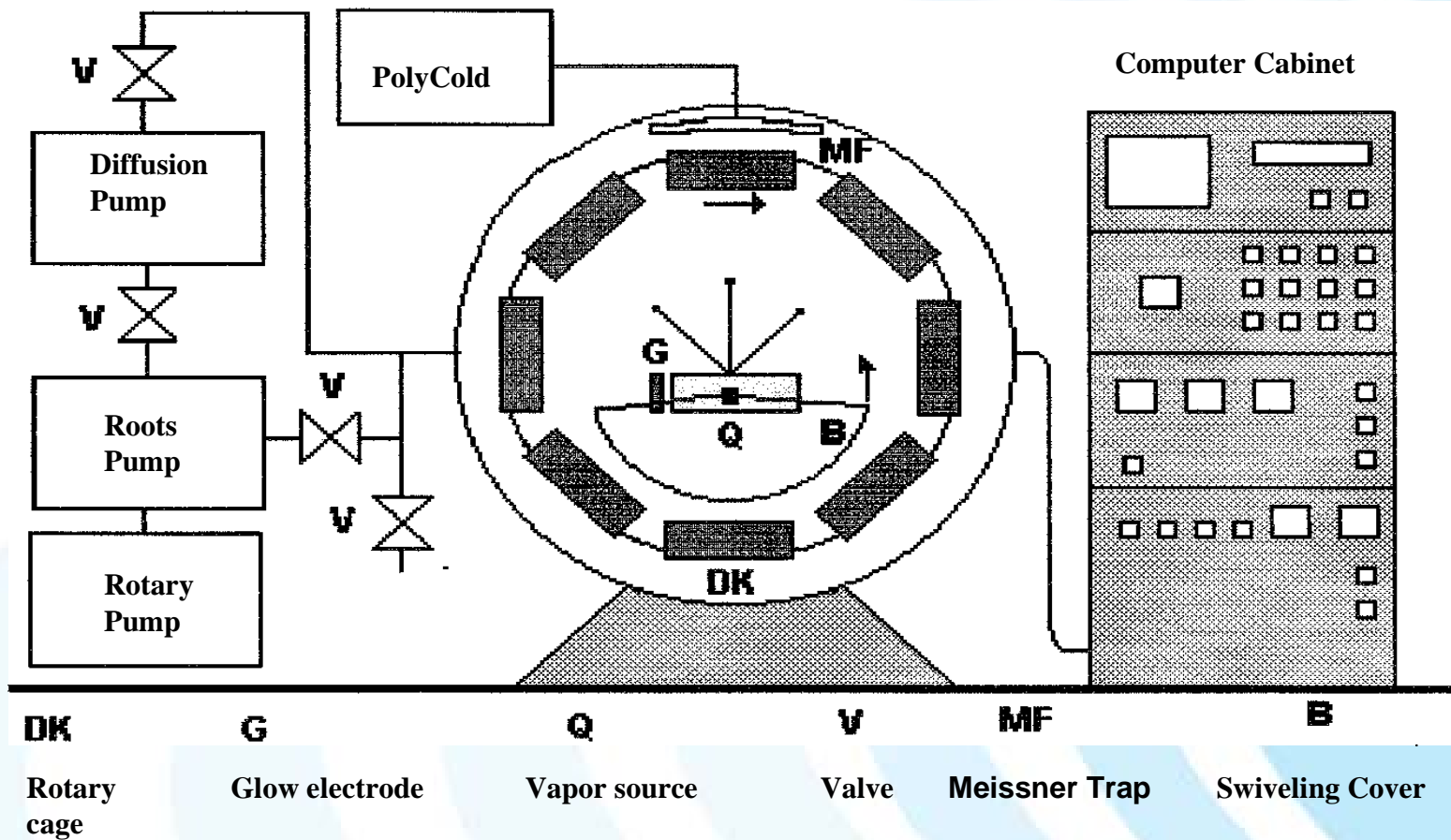
PVD



Max – Plate PVD

Physical Vapor Deposition

How it works

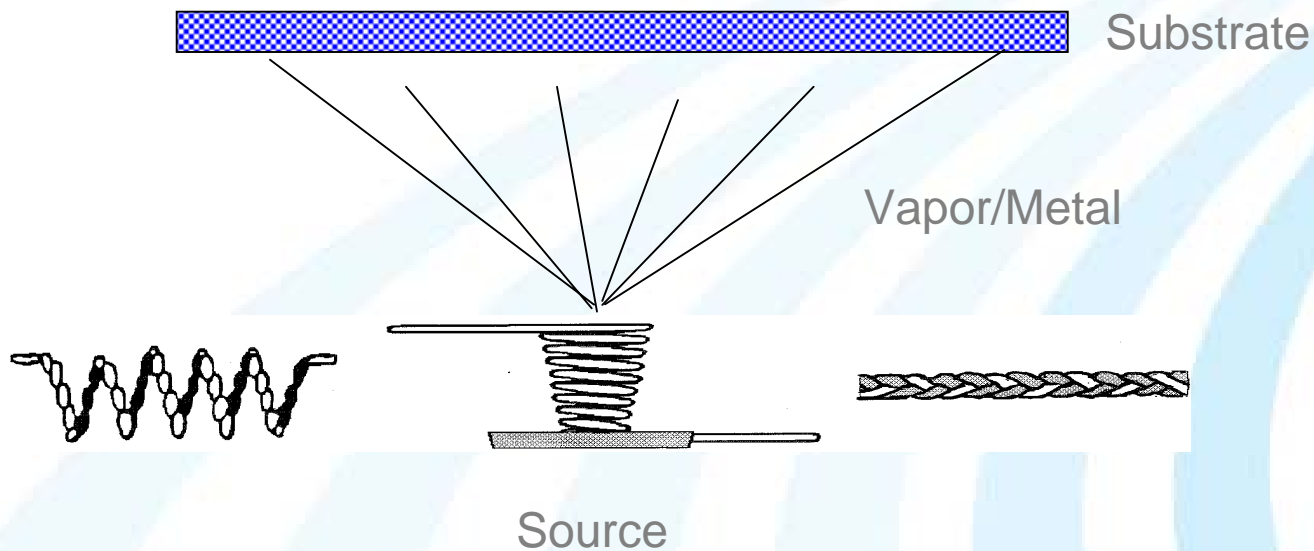


Max – Plate

PVD

Physical Vapor Deposition

Vacuum Metallization



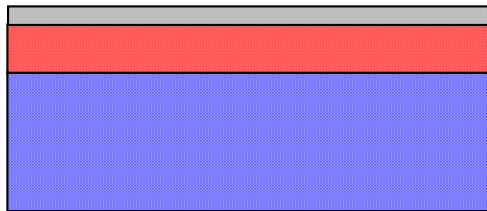
Standard Process

thickness

structure

layer

0.15 μm
2.0 μm



nickel chromium
copper (electrical conductive layer)

substrate (plastic material)

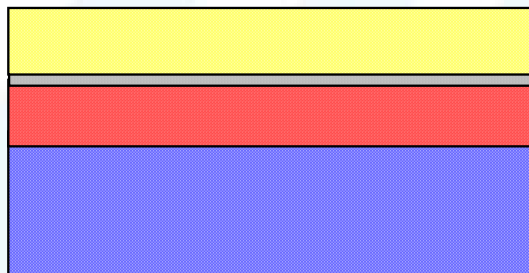
Solder Capable Application

thickness

structure

layer

1.5–3.0 μm
0.15 μm
2.0 μm



tin
nickel chromium
copper (electrical conductive layer)

substrate (plastic material)

* Other Metals available upon request

Max – Plate

PVD

Physical Vapor Deposition

- **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

PVD

Physical Vapor Deposition

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 μ	>3.0 μ	2 μ	2 μ	2 μ	< 1 μ
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



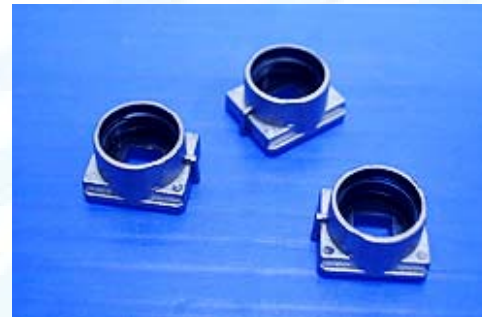
Max – Plate

Physical Vapor Deposition

PVD



1. Mobile Phone Camera Lens



2. Optical Fiber Connector

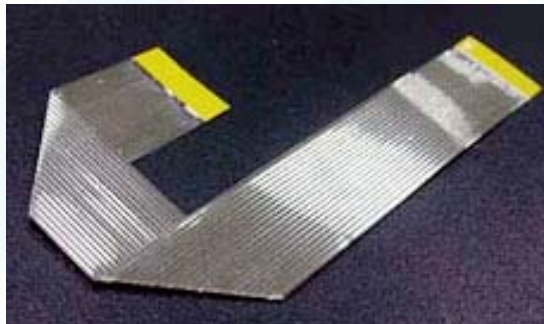


Max – Plate

Physical Vapor Deposition

PVD

EMI



Products – EMI

Polymers



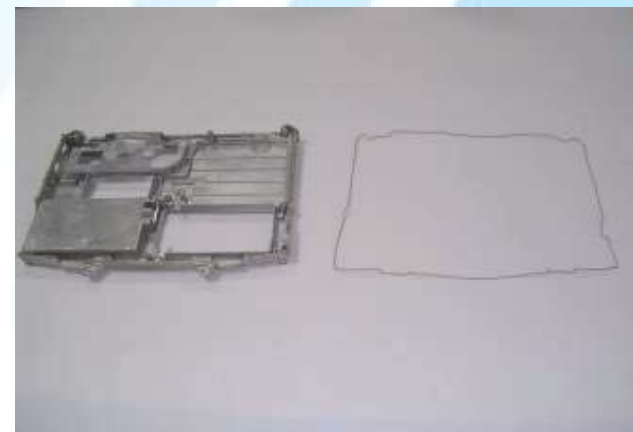
- Ag/Glass, Ni/Gr filled silicone
- Sheet Stock
- Extrusion
- Molded



Roll form



Die cut

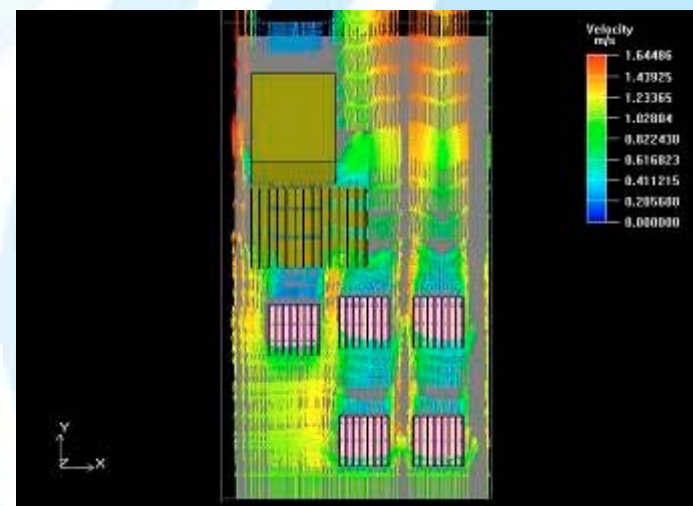
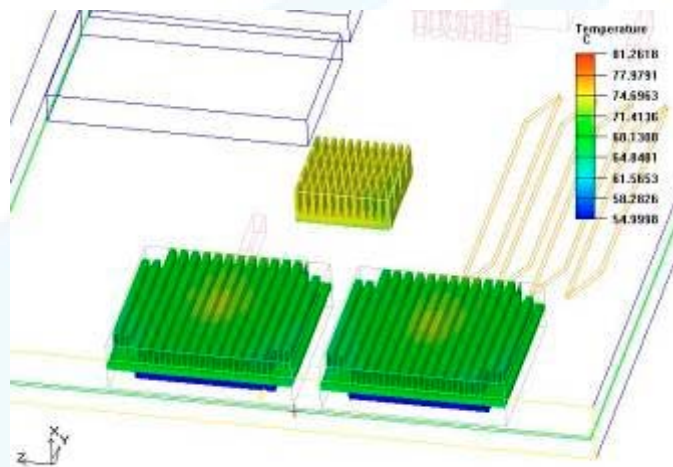
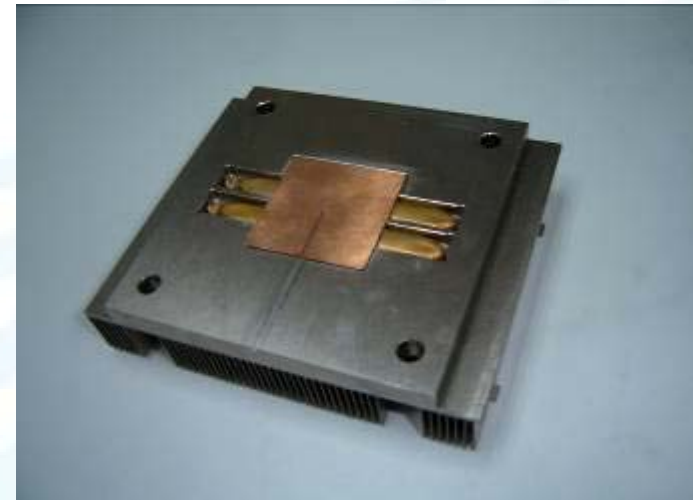


Molded

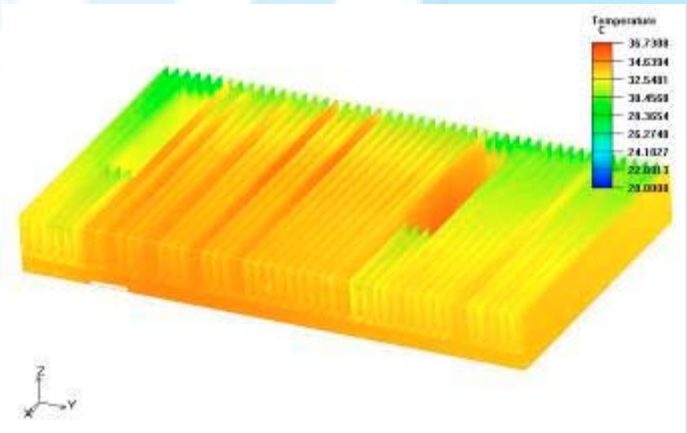
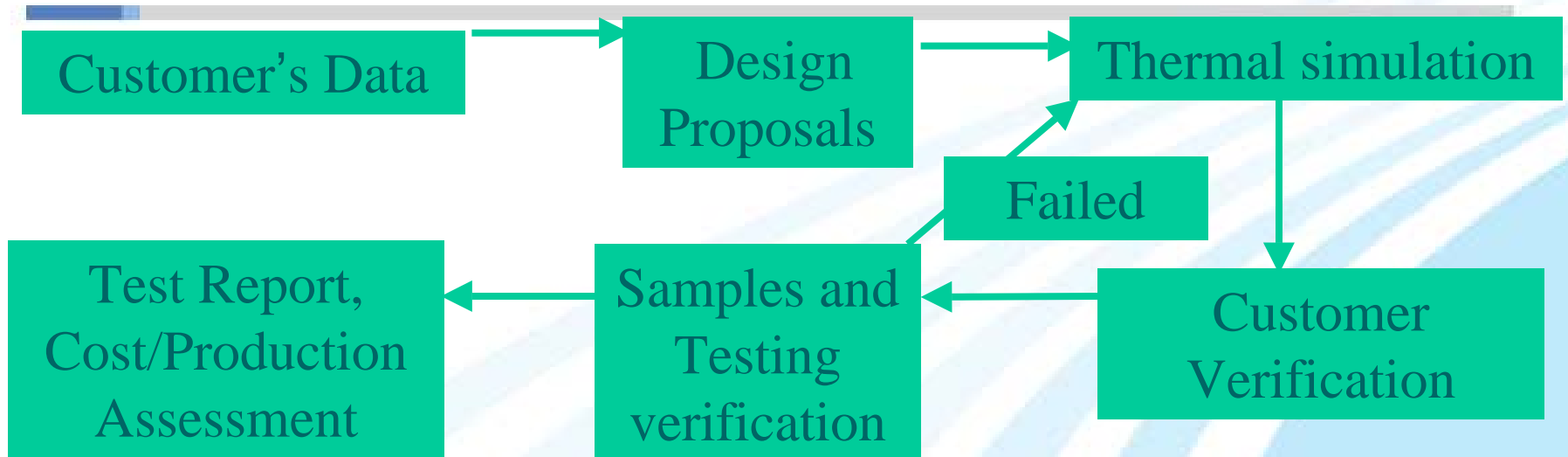
Thermal Solutions



- Thermal Simulation
- Thermal Design
- Thermal Manufacturing

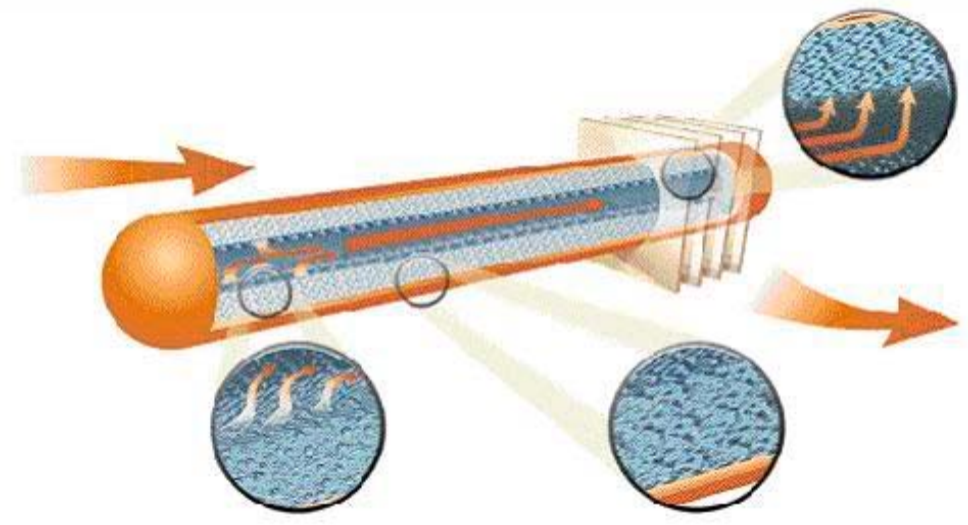
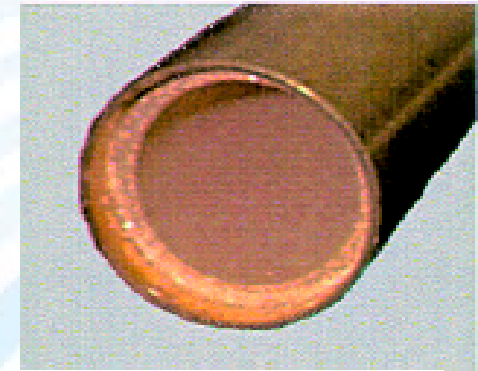


● Design Flow Chart



Thermal Products-Heatpipe Module

Heatpipes are composed by Distilled Liquid (Water), Wicks and Cu tube; transport heat by vapor phase of Liquid. It has over 10 times of conduction speed than Cu to move heat from one position to the other





Max-Therm TIM

THERMAL

	GP2000	GP3000	GP5000	GP7000	GP8000	IP1000	PP5000
Form	Gap filler	Gap filler	Gap filler	Gap filler	Gap filler	Insulator Pad	Putty
Polymer	Silicone / ceramic particles	Silicone / ceramic particles	Silicone / ceramic particles	Silicone / ceramic particles	Silicone / ceramic particles	Silicone / ceramic particles	Silicone / ceramic particles
Color	Blue	Grey	Light Blue	Light Grey	Light Grey	Magenta	Green
Thickness	0.13 - 5	0.13 - 5	0.13 - 5	0.13 - 5	0.13 - 3	0.13-0.5	0.5-6.0
Density	2.60	2.8	3.26	2.7	2.55	2.85	2.96
Thermal Conductivity	1.2	2.0	3.0	5.0	7.8	3.8	3.2
Sheet stock	yes	yes	yes	yes	yes	yes	yes
Fabrication	Die cut	Die cut	Die cut	Die cut	Die cut	Die cut	Die cut
Feature	Low cost	Ultra soft	Highly compressible	High thermal conductivity	High thermal conductivity	Fiberglass-reinforced	Ultra highly compressibility
Applications	Information products	BGA	Power module	Power module	Micro processors	Power conversion	Cooling multiple components

Max-Grease Thermally Conductive Grease

THERMAL

Properties	Test method	TG-1000	TC-5002	TC-5006	TSG-6001	TSG-6003	TC-7013
Resin		1 comp. silicone	1 comp. silicone	1 comp. silicone	1 comp. silicone	1 comp. silicone	1 comp. silicone
Filler		Metal oxide	Metal oxide	Metal oxide	Metal oxide	Metal oxide	Metal oxide & Metal powder
Color	Visual	Light grey	Grey	Grey	Light grey	Grey	Grey
Viscosity (25°C)	Brookfield RVF, #7	Non flowing	Non flowing	Non flowing	Non flowing	Non flowing	Non flowing
Specific Gravity		2.8	3.24	3.4	2.98	3.4	2.3
Solvent Content (%)		none	none	none	none	none	none
Operation Temperature (°C)		-40~+150	-40~+150	-40~+150	-45~+200	-45~+200	-40~+150
Physical properties							
Thermal Conductivity (W/mK)	ASTM D5470	1.5	2.1	3.0	1.6	3.25	3.5
Penetration,10-1 ,mm	GB/T 269-91	180~200	<200	<200	180~200	180~200	180~200
Dielectric Strength (V/mil)	(ASTM D217)	220	220	220	220	220	200
Volume Resistance (ohm-cm)	ASTM D149	3×10^{14}	3×10^{14}	9×10^{13}	3×10^{12}	3×10^{12}	1.5×10^8
Reliability properties							
Bleed (%)	200°C,24 hrs	0.01	0.01	0.01	0.01	0.01	0.01
Evaporation (%)	200°C,24 hrs	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Thermal Cycle (-%)	25°C/30~80°C /30 min. 100 cycles	No Thermal Impedance Degradation	No Thermal Impedance Degradation	No Thermal Impedance Degradation	No Thermal Impedance Degradation	No Thermal Impedance Degradation	No Thermal Impedance Degradation

