



CYBERSHIELD

Form-in-Place Conductive Gasket

Design Guidelines Material Specifications

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Cybershield

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PRESENTATION TOPICS

- Introduction to Cybershield
- Gasket Design Guidelines
- Shielding Effectiveness
- Form-in-Place Materials
- RoHS
- Summary

CYBERSHIELD OPERATION

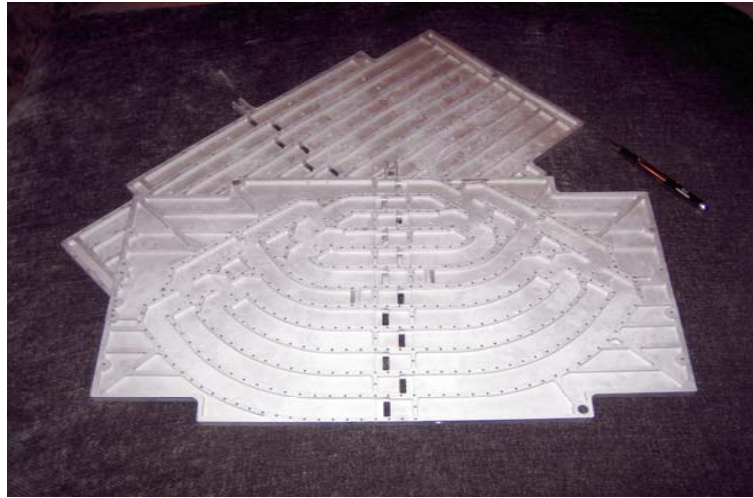
- Based in Lufkin, TX
- Business Focus Since 1987
 - Metallization of Plastics
 - EMI Shielding Systems
 - Electroless & Electrolytic Plating and Conductive Paint
 - Form-in-Place Gasket
 - Mechanical Assembly
- Electronic Component & Equipment Manufacturers

Registered ISO 9001:2008

SERVED MARKETS

Connectors	Wireless Devices
Telecom Equipment	Networking Equipment
Servers/Routers	Storage Devices
Medical Electronics	Barcode/RFID Equipment
Military/Aerospace	Antenna
Industrial Equipment	ATM Equipment
Instrumentation	Test Equipment
Automotive Electronics	Mobile Handsets
Audio Electronics	GPS Systems

PLATING ON PLASTICS



All-Over Electroless

Acid/Caustic Etch or Abrade

Activate with Catalyst

Plate 1-10 μm (40-400 μ'')
Copper, Nickel, Tin, Gold

Selective Plating Catalyst

Mask Part

Apply Auto-Catalytic Primer

Plate 1-5 μm (40-200 μ'')
Copper, Nickel, Tin, Gold

Electrolytic Plating

All-Over Electroless Plate

Rack & Contact

Plate 5-75 μm (200 μ'' -.003'')
Copper, Nickel, Chrome

CONDUCTIVE PAINT

- Air Atomization of Metallic Paints
- Coatings



- Graphite, Ni, Cu, Ag, Hybrid Cu-Ag
- Thickness: 0.5-2.0 mils (0.0125-0.050 mm)
- Electro-Form Mask for Selective Application

Thickness Uniformity & Repeatability
via Robotic Application

Widest Resin Capability

- “Flexible” Conductive Paint for Application onto Paper or Fabric

FORM-IN-PLACE OVERVIEW

- Silicone with Silver Plated Nickel, Copper or Aluminum Filler
- Dispense onto Metal, Painted or Plated Plastic via PC Controlled Robot
- Shielding Effectiveness: 85-120 dB
- Compression Set: 10-20% @ 50% Deflection
- Shore A Hardness: 48-70
- Gasket Size Range
 - Height: 0.015"-0.090" (0.38-2.30 mm)
 - Width: 0.018"-0.125" (0.46 -3.20 mm)



Teamed with Laird Technologies
to Dispense Form-in-Place
Conductive Gaskets

FIP PLACEMENT

On Side



On Ridge



Into Groove



Onto Flat Surface



- Programmable 3-axis CNC Dispensing Robot
- Gasket on Multiple Levels & Slopes up to 70°
- Tolerances
 - Placement Tolerance $\pm 0.001''$
 - Gasket Cross-Sectional Tolerances from $\pm 0.003''$

STANDARD GASKET DIMENSIONS

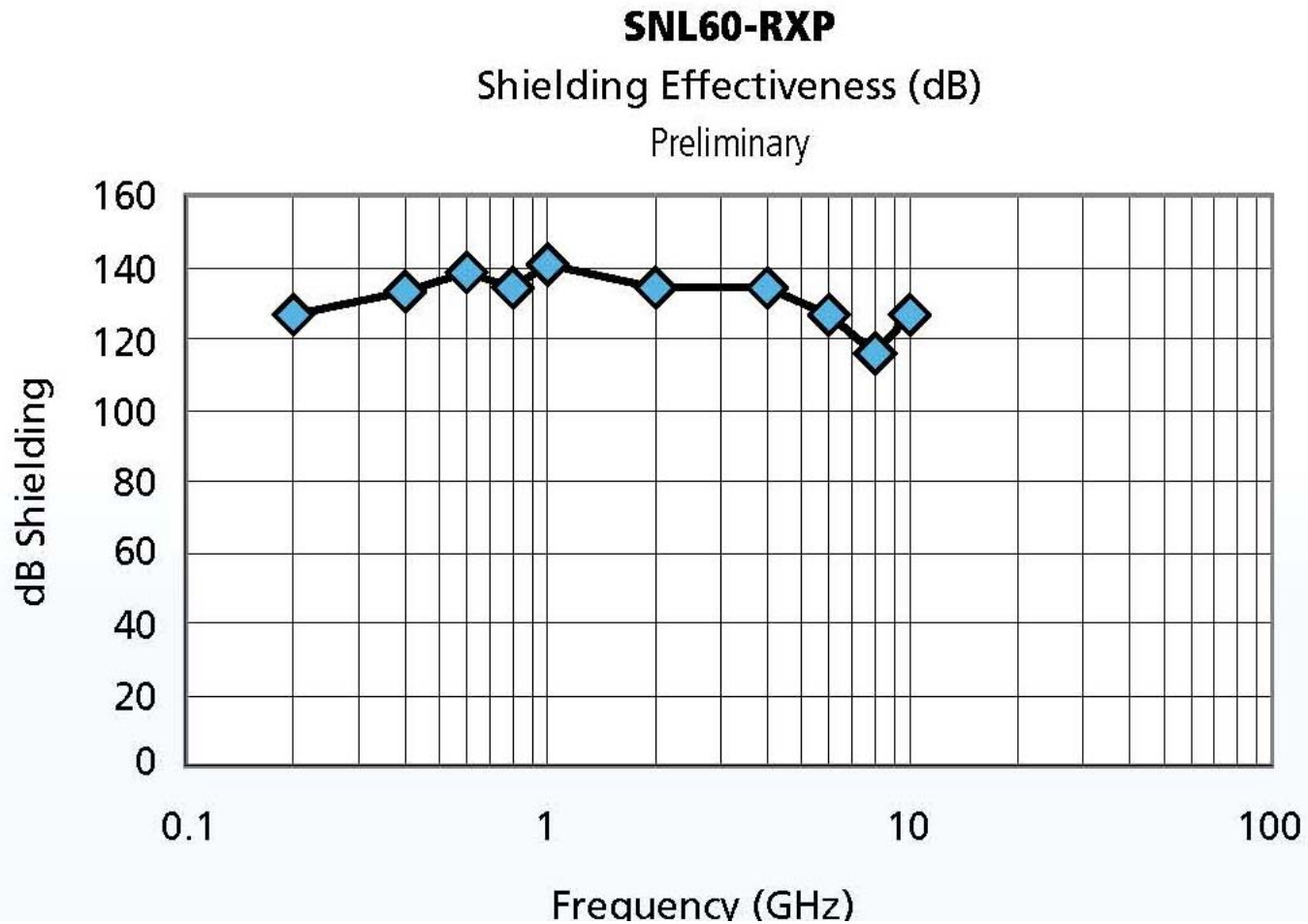
Inches (mm) Height	Inches (mm) Width	Inches (mm) Minimum Landing Area
0.015 ± 0.003 (0.4 ± 0.1)	0.020 ± 0.003 (0.5 ± 0.1)	0.025 (0.6)
0.020 ± 0.003 (0.5 ± 0.1)	0.024 ± 0.003 (0.6 ± 0.1)	0.029 (0.7)
0.027 ± 0.004 (0.7 ± 0.1)	0.030 ± 0.004 (0.8 ± 0.1)	0.036 (0.9)
0.030 ± 0.004 (0.8 ± 0.1)	0.034 ± 0.004 (0.9 ± 0.1)	0.040 (1.0)
0.040 ± 0.004 (1.0 ± 0.1)	0.048 ± 0.005 (1.2 ± 0.1)	0.055 (1.4)
0.045 ± 0.005 (1.1 ± 0.1)	0.059 ± 0.006 (1.5 ± 0.2)	0.067 (1.7)
0.055 ± 0.006 (1.4 ± 0.2)	0.075 ± 0.007 (1.9 ± 0.2)	0.084 (2.1)

- Gasket Dimensions Can Be Tailored to Requirements
- Gasket Height Nominally 80% of Width
- Double Dispensed Gaskets Possible to Meet Extraordinary Height to Width Specs
- Gasket Compression Range: 20-40%
- Comprehend Tolerance “Stack-up” and Impact on Gasket Compression

GASKET MATERIAL PROPERTIES

Properties	Test Method	Units	SNK55-RXP	SNN60-RXP	SNL60-RXP
Conductive Particle Filler			Silver Plated Cu	Silver Plated Ni	Silver Plated Al
Volume Resistivity		Ohm-cm	0.002	0.005	0.003
Shielding Effectiveness	MIL-DTL-83528C				
200 MHz to 10 GHz	Para. 4.5.12	dB	>90	>100	>100
Hardness	ASTM D2240	Shore A	55	60	60
Tensile Strength	ASTM D412	kPa	1300	192	850
Tensile Elongation	ASTM D412	%	300	110	140
Density (cured)	ASTM D792	g/cm ³	3.0	3.9	2.1
Density (uncured)	LT-FIP-CLE-09	g/cm ³	2.3	3.1	1.8
Compression Set	ASTM D575	%	10	15	10
Adhesion Strength to Al	LT-FIP-CLE-03	N/cm ²	200	180	140
Compression Deflection	LT-FIP-CLE-07				
at 20% compression		lb/in	1.2	1.7	1.9
at 40% compression		lb/in	5.2	6.4	8.3
Temperature Range		°C	-50 to 100	-50 to 125	-50 to 125
UL Rating	UL-94		V0	V0	V0

SHIELDING EFFECTIVENESS



RoHS & REACH COMPLIANCE

- RoHS: EU Directive - Restriction of Hazardous Substances
 - ❑ Lead, Cadmium, Mercury, Hexavalent Chromium, Polybrominated Biphenyl (PBB), Polybrominated Diphenyl Ether (PBDE) Flame Retardants
 - ❑ All Laird FIP Gasket Materials RoHS Compliant
- European Chemical Association Identified Substances of Very High Concern (SVHC)
 - ❑ Toxic, Carcinogenic, Long Term Environmental and/or Health Issues
 - ❑ Laird FIP Gasket Materials Contain No SVHC

SUMMARY

- Demonstrated FIP Processes
 - Excellent EMI Shielding Effectiveness
 - Cost Effective
 - High Volume Production Capacity
- Design Flexibility
 - Gasket Dimensions
 - Gasket Pattern/Locations
 - Straightforward Design Modifications