

## Custom & Built-To-Print Products



Our advanced manufacturing methods ensure sheet uniformity, metallization adhesion, and thickness control allowing PPI to meet or exceed custom requirements from simple patterned submounts to highly complex boards that include: Transmission Lines Combiners & Splitters, Interposers, Inductors, Filters, Direct Patterns, and Integrated tight tolerance resistors.

### ◆ Design Characteristics

Resistance Tolerance	±0.01% to ±20%
Resistance Ratio	0.01% available
TCR Tracking	±2 ppm/°C
Termination Material	Gold (Standard)
Wafer: Size Thickness Tolerances	Up to 4 in x 4 in As low as ±.5 mils for height matching applications
Line Width Definition (Resistor)	0.1 mils
Line Width Definition (Conductor)	0.2 mils
Metals Available	Gold, Nickel, NiChrome, Palladium, Platinum, Tantalum, Tantalum Nitride, Titanium, Titanium Tungsten (TiW), Silver
Specialty Materials	Metallization available on 1 - 6 sides Through-holes (vias), edge wraps, and custom laser cutouts
Patterning Processes	Full Photolithography capabilities and Lift-off patterning available
100% Electrical	Laser test and trim with full mapping (read and record data)
Photolithography	Patterning, wet and dry etching
Electroplating	Nickel and Gold
Wafer Dicing	Silicon, Alumina, Quartz, Beryllium Oxide, Aluminum Nitride, and custom substrates
RF & DC Sputtering	Supporting Au, Pt, Ag, Ni, Pd, Ta, TiW, Ti, Tan, NiCr, and SiO <sub>2</sub> . Custom plating stacks available
Repackaging	Tape and Reel, waffle pack, gel pak, and film frame
Other Capabilities	Gold filled Vias, Gold Bumping

Full In-House Design Capabilities

Low NRE

100% Visual and DC Electrical Inspection

Element Evaluation & Test Capabilities per MIL-PRF-55342 and MIL-STD-883

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◆ **Resistive Material Characteristics**

Code	Resistive Material	Sheet Resistivity	Passivation	Standard TCR	Optional TCR
T	Tantalum Nitride	5 Ω/sq - 300 Ω/sq	Ta <sub>2</sub> O <sub>5</sub> (self-Passivating)	± 150 ppm/°C	± 50 ppm/°C
N	NiChrome	5 Ω/sq - 250 Ω/sq	SiO <sub>2</sub>	± 25 ppm/°C	± 5 ppm/°C

◆ **Standard Substrate Characteristics**

Code	Substrate Material	Available Thickness (standard)	Dielectric Constant (@ 1MHz)	Thermal Conductivity (W × m <sup>-1</sup> × K <sup>-1</sup> )
20	Quartz	0.005 in - 0.010 in	3.8	1.38
22	Silicon	0.005 in - 0.010 in	N/A (SiO <sub>2</sub> K = 3.8)	149 (SiO <sub>2</sub> 1.38)
25	Beryllium Oxide (BeO)	0.005 in - 0.025 in	6.6	285
28	Aluminum Nitride (AlN)	0.005 in - 0.025 in	8.7	170
35	Alumina (Al <sub>2</sub> O <sub>3</sub> )	0.005 in - 0.025 in	9.8	26.9

**Custom Design Capability Diagram**

