

METEORWAVE M1

High Frequency / Ultra Low Loss Laminate & Prepreg for Automotive Radar and mmWave Applications

Benefits

- Stable dielectric performance over a wide frequency range
- Excellent electrical properties utilizing SI® Technology
- Very high reliability and fracture toughness
- High Conductive Anodic Filament (CAF) resistance
- Available in a variety of constructions

Applications

- Automotive radar (77GHz)
- mmWave antenna
- Aerospace & Defense
- Satellite communication



Meteorwave® M1 high frequency / ultra-low loss electronic materials offer advanced electrical performance and high reliability for automotive radar applications. Meteorwave® M1 is ideal for automotive radar programs up to 77GHz.

Excellent Electrical Properties Utilizing SI® Technology

- Stable Dk/Df versus frequency and temperature
- Ultra-low loss
- High aging resistance

Very High Reliability

- Low thermal expansion
- $T_{300} > 120$ minutes
- High fracture toughness
- Very high Conductive Anodic Filament (CAF) resistance
- Lead-free assembly compatibility
- Tight thickness and resin content controls

Highly CAF Resistant

- All constructions utilize super spread weaves and fiberglass finishes optimized for CAF performance.

High-Tg FR-4 Processing

- Processes similar to other high-Tg materials
- 90 minutes cure at 216°C and 400-500 psi

Meets UL 94V-0 and IPC4101/102, IPC 4103/240 laminate and IPC 4103/540 prepreg specifications
 UL file number: E36295

Properties	Conditions	Typical Value	Unit	Test Method
Electrical Properties				
Dielectric Constant	@ 10 GHz	3.1		IPC-TM-650.2.5.5.5
	@ 77 GHz (RTF2 copper)	3.10		Ring Resonator method
Dissipation Factor	@ 10 GHz	0.0018		Split-Post Dielectric Resonator
TcDk (-50 – 140°C)	Dk vs Temp. @ 10 GHz	12	ppm/ °C	IPC-TM-650.2.5.5.5
Volume Resistivity	C - 96 / 35 / 90	2.8x10 ⁸	MΩ	IPC-TM-650.2.5.17.1
	E - 24 / 125	1.9x10 ⁸	MΩ	IPC-TM-650.2.5.17.1
Surface Resistivity	C - 96 / 35 / 90	4.0x10 ⁷	MΩ	IPC-TM-650.2.5.17.1
	E - 24 / 125	7.7x10 ⁷	MΩ	IPC-TM-650.2.5.17.1
Electric Strength		69	kV / mm	IPC-TM-650.2.5.6.2
Dielectric Breakdown		>50	kV	IPC-TM-650.2.5.6
Arc Resistance		> 180	seconds	IPC-TM-650.2.5.1
Thermal Properties				
Glass Transition Temperature (Tg)	DMA(°C) (Tan d Peak)	230	°C	IPC-TM-650.2.4.24.2
Degradation Temperature (TGA)	5% wt. loss	391	°C	IPC-TM-650.2.3.40
T-300	Time to delamination @ 300°C	>120	minutes	IPC-TM-650.2.4.24.1
Thermal Conductivity	RT	0.54	W/mK	ASTM E1461
Specific Heat	20°C	0.95	J/gK	ASTM E1461
Mechanical Properties				
Peel Strength	1/2 oz Cu (18μm) (RTF2 copper)	0.6	N/mm	IPC-TM-650.2.4.8
	After Solder Float	0.6	N/mm	IPC-TM-650.2.4.8
X / Y CTE	-40°C to + 125°C	18 / 18	ppm/°C	IPC-TM-650.2.4.41 (modified): 5 mil 1x1078 construction
Z Axis CTE Alpha 1 / Alpha 2	50°C to Tg / Tg to 260°C	47 / 178	ppm/°C	IPC-TM-650.2.4.24
Z Axis Expansion	50°C to 260°C	2.4	%	IPC-TM-650.2.4.24
Flexural Modulus	125 °C (W/F)	12/11	GPa	IPC-TM-650.2.4.4.1
Chemical / Physical Properties				
Moisture Absorption		0.088	wt. %	IPC-TM-650.2.6.2.1
Flammability		V-0	Rating	UL94

- All test data provided are typical values and not intended to be specification values. For review of critical specification tolerances, please contact a company representative directly
- Meteorwave® M1 is available in most common panel sizes.
- Please contact AGC for availability of any other constructions, copper weights and glass styles including ultra-low profile copper and RTFOIL®
- The resistor foil manufacturer covers the warranty for the copper foil that includes the resistor layer, as well as the performance and workability related to the copper foil. Our company does not take responsibility for the processing of resistor layers and the performance or workability of the final products.

