ROGERS CORPORATION

Data Sheet

ELECTRICAL PROPERTIES[1]	TYPICAL VALUES[2]						DIRECTION	UNITS	CONDITIONS	TEST METHOD
	TMM3	TMM4	TMM6	TMM10	TMM10i	TMM13i				
[1] Dielectric Constant (process)	3.27 ± 0.032	4.50 ± 0.045	6.00 ± 0.080	9.20 ± 0.230	9.80 ± 0.245	[3]12.85 ± 0.35	Z	-	10 GHz	IPC-TM-650 method 2.5.5.5
[2] Dielectric Constant (design)	3.45	4.70	6.3	9.8	9.9	12.2	-	-	8 GHz - 40 GHz	Differential Phase Length Method
[1] Dissipation Factor (process)	0.0020	0.0020	0.0023	0.0022	0.0020	0.0019	Z	-	10 GHz	IPC-TM-650 method 2.5.5.5
Thermal Coefficient of Dielectric Constant	+37	+15	-11	-38	-43*	-70	-	ppm/°K	-55 to +125°C	IPC-TM-650 method 2.5.5.5
Insulation Resistance	>2000	>2000	>2000	>2000	>2000	>2000	-	Gohm	C/96/60/95	ASTM D257
Volume Resistivity	$3X10^9$	$6X10^8$	$1X10^8$	$2X10^8$	$2X10^8$	-	-	Mohm cm	-	ASTM D257
Surface Resistivity	$>9X10^9$	$1X10^9$	$1X10^9$	$4X10^7$	$4X10^7$	-	-	Mohm	-	ASTM D257
Electrical Strength (dielectric strength)	441	371	362	285	267	213	Z	V/mil	-	IPC-TM-650 method 2.5.6.2
Thermal Properties[1]										
Decomposition Temperature (Td)	425	425	425	425	425	425	425	°C TGA	-	ASTM D3850
Coefficient of Thermal Expansion - x	15	16	18	21	19	19	X	ppm/K	0 to 140°C	ASTM E 831 IPC-TM-650, 2.4.41
Coefficient of Thermal Expansion - y	15	16	18	21	19	19	Y	ppm/K	0 to 140°C	ASTM E 831 IPC-TM-650, 2.4.41
Coefficient of Thermal Expansion - z	23	21	26	20	20	20	Z	ppm/K	0 to 140°C	ASTM E 831 IPC-TM-650, 2.4.41
Thermal Conductivity	0.70	0.70	0.72	0.76	0.76	-	Z	W/m/K	80°C	ASTM C518
Mechanical Properties[1]										
Copper Peel Strength after Thermal Stress	5.7 (1.0)	5.7 (1.0)	5.7 (1.0)	5.0 (0.9)	5.0 (0.9)	4.0 (0.7)	X,Y	lb/inch (N/mm)	after solder float 1 oz. EDC	IPC-TM-650 Method 2.4.8
Flexural Strength (MD/CMD)	16.53	15.91	15.02	13.62	-	-	X,Y	kpsi	A	ASTM D790
Flexural Modulus (MD/CMD)	1.72	1.76	1.75	1.79	1.80*	-	X,Y	Mpsi	A	ASTM D790
Physical Properties[1]										
Moisture Absorption (2X2) 1.27mm (0.050")	0.06	0.07	0.06	0.09	0.16	0.16	-	%	D/24/23	ASTM D570
Moisture Absorption (2X2) 3.18mm (0.125")	0.12	0.18	0.20	0.20	0.13	0.13	-	%	D/24/23	ASTM D570
Specific Gravity	1.78	2.07	2.37	2.77	2.77	3.0	-	-	A	ASTM D792
Specific Heat Capacity	0.87	0.83	0.78	0.74	0.72*	-	-	J/g/K	A	Calculated
Lead-Free Process Compatible	YES	YES	YES	YES	YES	YES	-	-	-	-

Notes: ASTM E831 corresponds to IPC-TM-650, method 2.4.41 * estimated
Typical values are a representation of an average value for the population of the property. For specification values contact Rogers Corporation.

(1) Prolonged exposure in an oxidative environment may cause changes to the dielectric properties of hydrocarbon based materials. The rate of change increases at higher temperatures and is highly dependent on the circuit design. Although Rogers' high frequency materials have been used successfully in innumerable applications and reports of oxidation resulting in performance problems are extremely rare, Rogers recommends that the customer evaluate each material and design combination to determine fitness for use over the entire life of the end product.

(2) The design Dk is an average number from several different tested lots of material and on the most common thickness/s. If more detailed information is required, please contact Rogers Corporation. Refer to Rogers Technical paper "Dielectric Properties of High Frequency Materials" available on www.rogerscorp.com/acs.

(3) Method 2.5.5.6.

Standard Thickness	Standard Panel Size	Standard Copper Cladding
0.015" (0.381mm), 0.020" (0.508mm), 0.025" (0.635mm), 0.030" (0.762mm), 0.050" (1.270mm), 0.060" (1.524mm), 0.075" (1.905mm), 0.100" (2.540mm), 0.125" (3.175mm), 0.150" (3.810mm), 0.200" (5.080mm), 0.250" (6.350mm), 0.275" (6.985mm), 0.300" (7.620mm), 0.500" (12.70mm)	18" X 12" (457 X 305mm) 18" X 24" (457 X 610mm)	½ (18µm), 1 oz (35µm), 2 oz. (70µm) electrodeposited copper foil. Heavy metal cladding available. Contact Rogers customer service.