

TLX-8

High Volume Fiberglass Reinforced Microwave Substrate

Benefits

- Excellent PIM Values in PCBs (measured at lower than -160 dBc*)
- Excellent Mechanical & Thermal Properties
- Low and Stable Dk
- Dimensionally Stable
- Low Moisture Absorption
- Tightly Controlled DK
- Low DF
- UL 94 VO Rating
- For Low Layer Count Microwave Designs

Applications

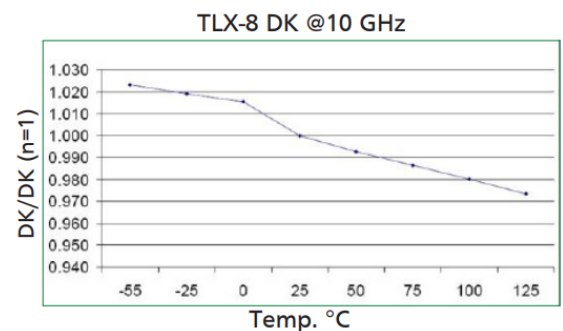
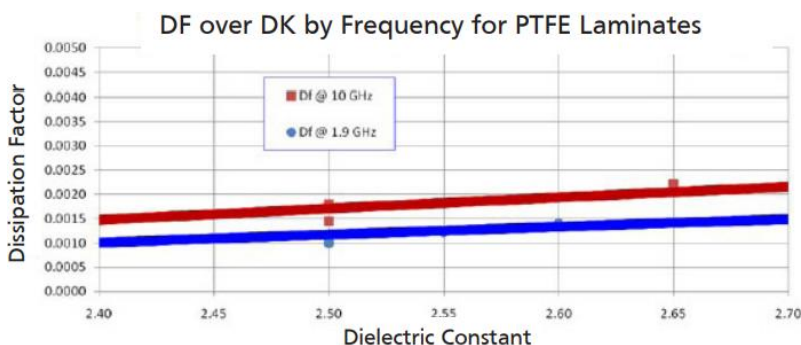
- Antennas
- Mixers, Splitters, Filters & Combiners
- Passive Components



TLX-8 offers reliability in a wide range of RF applications. This material is versatile due to its 2.45 - 2.65 DK range and available thicknesses and copper cladding. It is suitable for low layer count microwave designs. TLX-8 PTFE fiberglass laminates are ideal for use in radar systems, mobile communications, microwave test equipment, microwave transmission devices and RF components. TLX-8 is a workhorse in the RF microwave substrate world where the fiberglass offers mechanical reinforcement wherever a substrate experiences severe environments such as:

- Resistance to creep for PWBs bolted to a housing that encounters high levels of vibration during space launch
- High temperature exposure in engine modules
- Radiation resistance in space (see NASA's website for low outgassing materials)
- Resistance to extreme environments at sea for warship antennas
- Resistance to a wide temperature range for altimeter substrates during flight.

The wide range of dielectric constants available enable the manufacture of couplers, splitters, combiners, amplifiers, antennas and other components.



TLX-8 has a long space heritage and is used wherever a woven fiberglass reinforcement is required.

TLX-8 has $\sim \pm 2\%$ variation in DK from -55 to 125 °C. If more temperature stability is required, TSM-DS3 should be considered.

*Measurement using manufactured PCB coupon with 20 watts per channel @ 800 and 1800 MHz.

Properties	Conditions	Typical Value	Unit	Test Method
Electrical Properties				
Dielectric Constant	@ 10 GHz	2.55 ± 0.04		IPC-650 2.5.5.3
Dissipation Factor	@ 10 GHz	0.0018		IPC-650 2.5.5.5.1
Outgassing	% TML	0.03	4 H 257 °F @ ≤ 5 x 10 ⁻⁵ Torr	ASTM E 595
	% CVCM	0.00		
	% WVR	0.01		
Surface Resistivity		6.605 x 10 ⁸	Mohm	IPC-650 2.5.17.1 Sec. 5.2.1 (Elevated Temp.)
		3.550 x 10 ⁶	Mohm	IPC-650 2.5.17.1 Sec. 5.2.1 (Humidity Cond.)
Volume Resistivity		1.110 x 10 ¹⁰	Mohm/cm	IPC-650 2.5.17.1 Sec. 5.2.1 (Elevated Temp.)
		1.046 x 10 ¹⁰	Mohm/cm	IPC-650 2.5.17.1 Sec. 5.2.1 (Humidity Cond.)
Dimensional Stability	MD	0.06	mm/M (mils/in)	IPC-650 2.4.39 Sec. 5.4 (After Bake)
	CD	0.08	mm/M (mils/in)	
	MD	0.09	mm/M (mils/in)	IPC-650 2.4.39 Sec. 5.5 (Thermal Stress)
	CD	0.10	mm/M (mils/in)	
Thermal Properties				
Thermal Conductivity		0.19	W/M*K	ASTM F433/ASTM 1530-06
CTE (25-260 °C)	X	21	ppm/°C	IPC-650 2.4 .41/ASTM D 3386
	Y	23		
	Z	215		
T _d	2% Weight Loss	535	°C	IPC-650 2.4.24.6 (TGA)
	5% Weight Loss	553	°C	
Mechanical Properties				
Peel Strength	1 oz. ED	2.63 (15)	N/mm (lbs/in)	IPC-650 2.4.8 Sec. 5.2.2 (Thermal Stress)
	1 oz. RTF	2.98 (17)	N/mm ² (kpsi)	
	½ oz. ED	2.45 (14)	N/mm ² (kpsi)	IPC-650 2.4.8.3 (Elevated Temp.)
	½ oz. ED	1.93 (11)	N/mm ² (kpsi)	IPC-650 2.4.8 Sec. 5.2.2 (Thermal Stress)
	1 oz. rolled	2.28 (13)	N/mm ² (kpsi)	
Young's Modulus	MD	6,757 (980)	N/mm ² (psi)	ASTM D 902
	CD	8,274 (1,200)	N/mm ² (psi)	
	MD	11,238 (1,630)	N/mm ² (psi)	ASTM D 3039
Chemical / Physical Properties				
Moisture Absorption		0.02	%	IPC-650 2.6.2.1
Dielectric Breakdown		> 45	Kv	IPC-650 2.5.6
Flammability Rating		V-0		UL-94

* As reported by NASA. See http://outgassing.nasa.gov/og_disclaimer.html

Dielectric Thickness			
Inches		mm	
0.0025 - 0.250		0.064 - 6.35	
Available Sheet Sizes			
Inches	mm	Inches	mm
12 x 18	305 x 457	24 x 36	610 x 914
16 x 18	406 x 457	18 x 48	457 x 1,220
18 x 24	457 x 610	36 x 48	914 x 1,220
16 x 36	406 x 914		

* 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.

* TLX-8 can be manufactured in increments of 0.005" (0.125mm).

* Standard panel size is 18" x 24" (457 mm x 610 mm).

* Please contact AGC for availability of additional thicknesses, other sizes & any other type of cladding.

