

Halogen Free, Low Dielectric Constant, High Tg and High Heat Resistance Multilayer Material

MCL-E-78G GEA-78G <Prepreg>

Low Dielectric Constant Epoxy Multilayer Material (FR-4)

■ Features

- Halogen-free with low dielectric property.
(Dk 3.5 (@1GHz, Resin cont. = 70%))
- High Tg and elastic modulus is higher than standard FR-4 at high temperature.
- Superior heat resistance. (Suitable for the lead free process)

■ Applications

- Smartphone.
- Tablet PC.

■ Standard Specifications

Part Number	Type	Copper Foil Thickness	Code Name	Actual Thickness and Tolerance
MCL-E-78G	—	12, 18, 35 μ m	0.04	0.04 \pm 0.02mm
			0.05	0.05 \pm 0.02mm
			0.06	0.06 \pm 0.02mm
		12 μ m 18 μ m 35 μ m 70 μ m	0.07	0.07 \pm 0.02mm
			0.08	0.08 \pm 0.02mm
			0.09	0.09 \pm 0.02mm
			0.1	0.10 \pm 0.02mm
			0.15	0.15 \pm 0.03mm

Note 1) In case laminate thickness lies in between two thickness figures shown above, the tolerance of such laminate would be equal to the tolerance of the thicker one.

■ Characteristics

● Thin Laminate

(t0.8mm)

Item	Condition	Unit	Actual Value	Test Method (IPC-TM-650)
			MCL-E-78G	
Tg	TMA	°C	160~170	2.4.24
	DMA		200~220	—
CTE *1	X Y	(30~120°C)	13~15	2.4.24
			15~17	
	Z	(<Tg)	35~45	
		(>Tg)	180~230	
Solder Heat Resistance (260°C)	A	sec.	>300	—
T-260 (Without Copper)	TMA	min.	>60	2.4.24.1
T-288 (Without Copper)				
Decomposition Temperature (5% Weight Loss)	TGA	°C	380~400	2.3.40
Copper Peel Strength	18 μ m	A	1.0~1.2	2.4.8
	35 μ m		1.1~1.3	
Flexural Modulus (Lengthwise)	A	GPa	25~29	2.4.4
Dielectric Constant (R.C.:70%)	1GHz	C-96/20/65	3.4~3.6	2.5.5.1
	10GHz*2		3.3~3.5	2.5.5.5
Dissipation Factor (R.C.:70%)	1GHz	C-96/20/65	0.009~0.011	2.5.5.1
	10GHz*2		0.012~0.014	2.5.5.5
Volume Resistivity	C-96/20/65+C-96/40/90	$\Omega \cdot$ cm	$1 \times 10^{14} \sim 1 \times 10^{16}$	2.5.17
Surface Resistance	C-96/20/65+C-96/40/90	Ω	$1 \times 10^{13} \sim 1 \times 10^{15}$	
Insulation Resistance	C-96/20/65	Ω	$1 \times 10^{14} \sim 1 \times 10^{16}$	—
	C-96/20/65+D-2/100		$1 \times 10^{13} \sim 1 \times 10^{15}$	—
Water Absorption	E-24/50+D-24/23	%	0.1~0.3	2.6.2.1
Flammability (UL-94)	A	—	V-0	2.3.10

*1) Heating Rate:10°C/min.

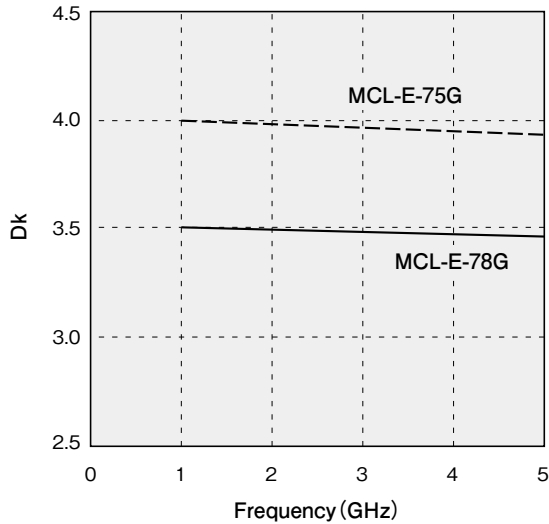
*2) Measured by Triplate-Line Resonator.

●Prepreg

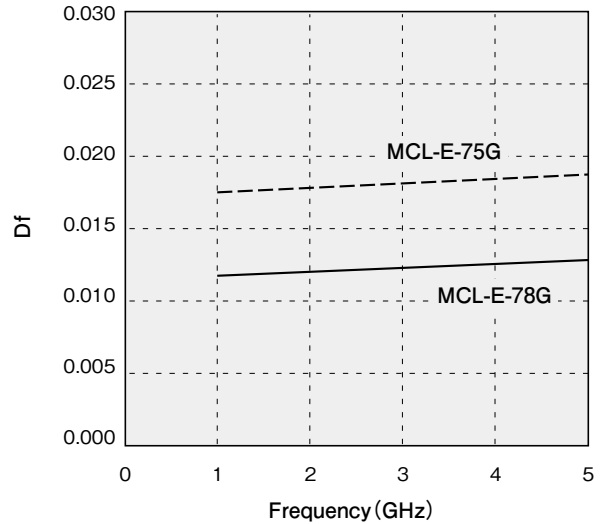
Part Number	Type		Glass Cloth		Properties			
			Style	Yarn Count (warp×fill)	Resin Content (%)	Volatile Content (%)	Gelation Time (sec.)	Dielectric Thickness after Lamination*1 (mm)
GEA-78G	0.03	(1027N72)	1027	75×75	72±2	≤3.0	280±40	0.044
	0.04	(106N70)	106	56×56	70±2			0.049
	0.04	(106N72)	106	56×56	72±2			0.052
	0.04	(1037N70)	1037	69×72	70±2			0.049
	0.04	(1037N74)	1037	69×72	74±2			0.057
	0.05	(1067N69)	1067	70×70	69±2			0.060
	0.05	(1067N72)	1067	70×70	72±2			0.068
	0.06	(1080N62)	1080	60×48	62±2			0.073
	0.06	(1078N62)	1078	53×53	62±2		0.073	
Test Method (IPC-TM-650)					2.3.16.1	2.3.19	2.3.18	—

*1) The dielectric thickness after lamination is defined as the thickness of one sheet of prepreg when the resin flow is 0%. This value changes depending on the press condition or inner layer pattern.

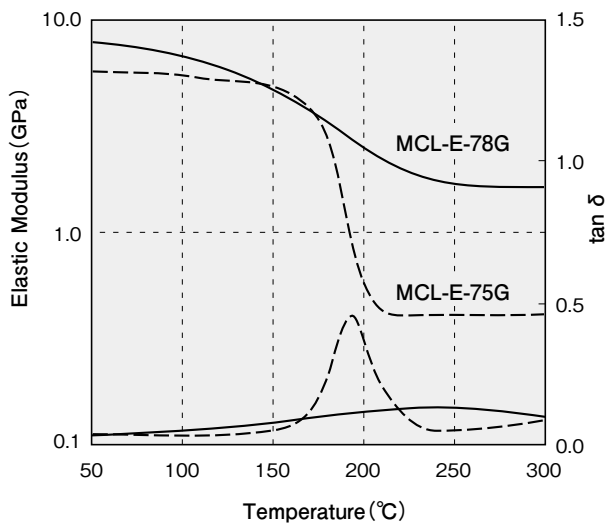
●Correlation between Dielectric Constant and Frequency



●Correlation between Dissipation Factor and Frequency



●Elastic Modulus



Note) Measured by Triplate-line Resonator.