

# Halogen Free, High Tg, High Elastic Modulus, Low CTE Multilayer Material

# MCL-E-700G Type(R) GEA-700G (Prepreg)

## High Tg Glass Epoxy Multilayer Materials

### ■ Features

- Has low CTE values in X,Y directions and reduces warpage of package substrate significantly.
- Well-suited for build-up construction.
- Good drill processability : lower process cost.

### ■ Standard Specifications

Part Number	Type	Copper Foil Thickness	Code Name	Actual Thickness and Tolerance
MCL-E-700G	(R)	2μm	U0.03	0.03±0.013mm
		3μm	U0.04	0.04±0.013mm
		5μm	T0.04	0.04±0.013mm
		12μm	U0.05	0.05±0.013mm
		(LP,PF)	T0.06	0.06±0.013mm
		2μm	M0.06	0.06±0.02mm
	(R)	3μm	0.1	0.11±0.02mm
		5μm	M0.11	0.10±0.02mm
		12μm	M0.15	0.15±0.02mm
		18μm	M0.22	0.21±0.03mm
		(STD,LP,PF)	0.2	0.20±0.03mm
		2μm	0.31	0.30±0.03mm
	(RL)	3μm	0.41	0.40±0.04mm
		5μm	0.51	0.50±0.05mm
		12μm	0.61	0.60±0.06mm
		18μm	0.71	0.70±0.07mm
		35μm	0.81	0.80±0.08mm
		70μm	(STD,LP,PF)	

Note1) STD:Standard copper foil, LP:Low profile copper foil, PF:Hitachi profile-free copper foil.

Note2) STD:12μm,18μm,35μm,70μm; LP:2μm,3μm,5μm,12μm,18μm; PF:2μm,3μm,5μm,12μm. Please contact us for details. Note3) "U" for 1-ply; "T" for 2-ply.

Note4) 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.

Note5) The thickness means that of dielectric layer.

### ■ Characteristics

#### ● Thin Laminate

(t0.1mm)

Item	Condition *3	Unit	Actual Value		Test Method (IPC-TM-650)	
			MCL-E-700G Type(R)	MCL-E-700G Type(RL)		
Tg	TMA	°C	250~270		2.4.24	
	DMA		295~305		—	
CTE *1	X	ppm/°C	7~9	5~7	2.4.24	
			Y	7~9		5~7
	Z		(<Tg)	15~25		
			(>Tg)	90~120		
Solder Heat Resistance (260°C)	A	sec.	>300		—	
T-260 (Without Copper)	TMA	min.	>60		2.4.24.1	
T-288 (Without Copper)			>60			
Decomposition Temperature (5% Weight Loss)	TGA	°C	430~450		2.3.40	
Heat Resistance for HDI Process (Semi-Additive)	260°C reflow	cycle	>20		—	
Copper Peel Strength	12μm	A	kN/m	0.9~1.1		2.4.8
	18μm			1.0~1.2		
Surface Roughness (Ra)	A	μm	2~3		2.2.17	
Flexural Modulus (Lengthwise)	A	GPa	32~34	34~36	2.4.4	
Dielectric Constant	1MHz	C-96/20/65	—	4.8~5.0	4.6~4.8	2.5.5.9
	1GHz*2			4.6~4.8	4.2~4.4	JPCA TM-001
Dissipation Factor	1MHz	C-96/20/65	—	0.0080~0.0100	0.0080~0.0100	2.5.5.9
	1GHz*2			0.0090~0.0110	0.0100~0.0120	JPCA TM-001
Volume Resistivity	C-96/35/90+C-96/40/90	Ω·cm	1×10 <sup>15</sup> ~1×10 <sup>16</sup>		2.5.17	
Surface Resistance			1×10 <sup>13</sup> ~1×10 <sup>15</sup>			
Insulation Resistance	C-96/20/65	Ω	1×10 <sup>14</sup> ~1×10 <sup>16</sup>		—	
	C-96/20/65+D-2/100		1×10 <sup>13</sup> ~1×10 <sup>15</sup>		—	
Water Absorption	E-24/50+D-24/23	%	0.4~0.6		2.6.2.1	
Flammability	A	—	V-0		UL94	

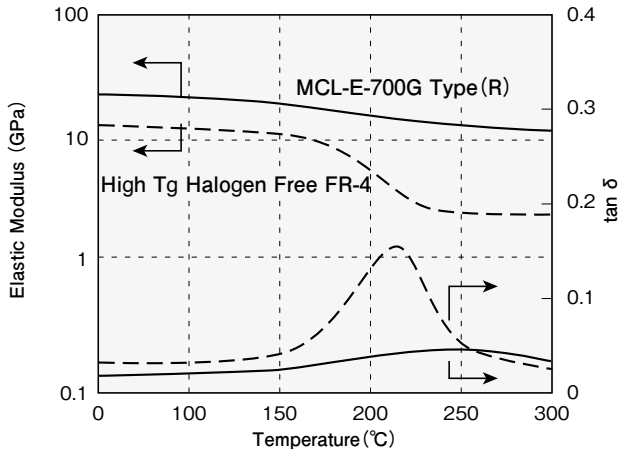
\*1) Heating Rate:10°C/min. \*2) Measured by Triplate-Line Resonator. \*3) Refer to last page "Condition Note"  
0.4mm thickness core is used depending on test item.

●Prepreg

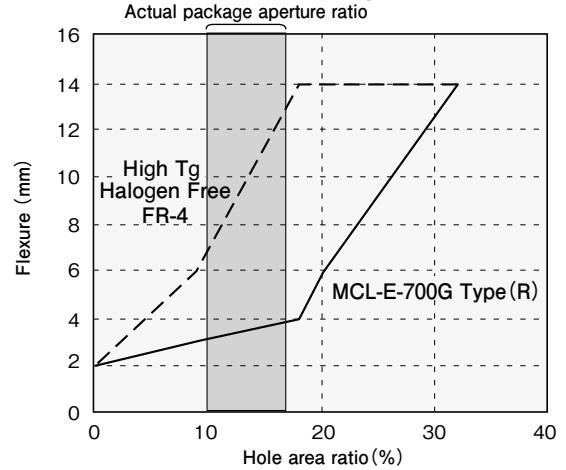
Part Number	Type			Glass Cloth		Properties			
				Style	Yarn Count (warp×fill)	Resin Content (%)	Volatile Content (%)	Gelation Time (sec.)	Dielectric Thickness after Lamination*1 (mm)
GEA-700G	(−)	0.025	(1017N74)	1017	95×95	74±2	≤2.0	160±30	0.025
		0.03	(1027N74)	1027	75×75	74±2			0.040
		0.04	(1037N74)	1037	69×72	74±2			0.048
		0.06	(1078N66)	1078	53×53	66±2			0.072
	(L)	0.1	(2116N59)	2116	60×58	59±2		130±30	0.127
		0.03	(L1027N74)	1027	75×75	74±2		160±30	0.040
		0.04	(L1037N74)	1037	69×72	74±2		160±30	0.048
		0.06	(L1078N66)	1078	53×53	66±2		130±30	0.072
Test Method(IPC-TM-650)						2.3.16	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.

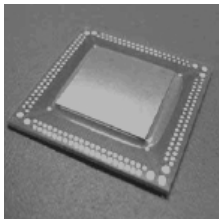
●Elastic Modulus



●Amount of deflection by hole area



●Warpage of FC-BGA



TEG Chip  
 \*Chip size : 20mm×20mm  
 \*Chip thickness : 0.725mm  
 \*Bump diameter : 80μm  
 \*Bump pitch : 200μm  
 TEG Substrate  
 \*Sub size : 35mm×35mm  
 \*Core thickness : 0.7mm  
 \*Build up thickness : 30μm×2 stack  
 \*SR thickness : 20μm

