FR-4 Multilayer Material

MCL-E-67 GEA-67N〈Prepreg〉 [UV Block Type MCL-E-67 Type(W)]

Glass Epoxy Multilayer Material(FR-4)

■Features

●Superior electrical and mechanical characteristics.
●Laminating time can be reduced depending on prepreg types and conditions.

■Applications

●Personal computers and high-density electronic equipment.
●Small and midsize computers and their peripheral devices.
●Electronic branch exchanges, portable terminal devices, etc.

■Standard Specifications

Part Number	Type	Copper Foil Thickness	Code Name	Actual Thickness and Tolerance
MCL-E-67	—	12μm 18μm 35μm 70μm	0.06	0.06±0.03mm
			0.1	0.10±0.03mm
			0.15	0.15±0.04mm
			V0.2	0.20±0.05mm
			0.3	0.30±0.05mm
	(W)		V0.4	0.40±0.08mm
			0.5	0.50±0.08mm
			V0.6	0.60±0.09mm
			0.8	0.80(0.70)±0.10mm
			1.0	1.00(0.90)±0.12mm
			1.2	1.20(1.10)±0.12mm

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.
Note 2)The thickness means that of dielectric layer. Figure in bracket ( ) means thickness of dielectric layer of MCL using 70μm copper foil.

■Characteristics

●Thin Laminate

(t0.8mm)

Item		Condition	Unit	Actual Value	Test Method(IPC-TM-650)
				MCL-E-67	
Tg		TMA	℃	120～130	2.4.24
		DMA		150～160	—
CTE *1	X	(30～120℃)	ppm/℃	13～16	2.4.24
	Y			14～17	
	Z	(<Tg)		50～70	
		(>Tg)		200～300	
Solder Heat Resistance(260℃)		A	sec.	>120	—
T-260(Without Copper)		TMA	min.	>10	2.4.24.1
T-288(Without Copper)				—	
Decomposition Temperature(5% Weight Loss)		TGA	℃	300～320	2.3.40
Copper Peel Strength	18μm	A	kN/m	1.4～1.6	2.4.8
	35μm			1.7～2.1	
Flexural Modulus(Lengthwise)		A	GPa	23～25	2.4.4
Dielectric Constant	1MHz	C-96/20/65	—	4.7～4.8	2.5.5.1
	1GHz*2			4.1～4.2	2.5.5.5
Dissipation Factor	1MHz	C-96/20/65	—	0.0130～0.0170	2.5.5.1
	1GHz*2			0.0180～0.0200	2.5.5.5
Volume Resistivity		C-96/35/90	Ω·cm	1×10^{15}～1×10^{16}	2.5.17.1
Surface Resistance			Ω	1×10^{13}～1×10^{15}	
Insulation Resistance		C-96/20/65	Ω	1×10^{14}～1×10^{16}	—
		C-96/20/65+D-2/100		1×10^{13}～1×10^{15}	—
Water Absorption		E-24/50+D-24/23	%	0.12～0.14	2.6.2.1
Flammability(UL-94)		A	—	V−0	2.3.10

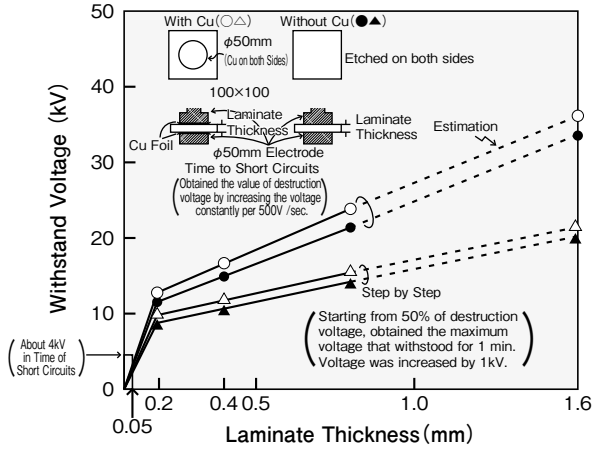
*1)Heating Rate:10℃/min.
*2)Measured by Triplate-Line Resonator.

●Prepreg

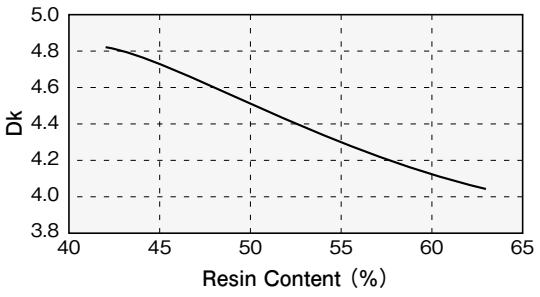
Part Number	Type	Natural Color	UV Block	Glass Cloth Style	Glass Cloth Yarn Count (warp×fill)	Properties Resin Content (%)	Volatile content (%)	Gelation Time (sec.)	Resin Flow (%)	Dielectric Thickness after Lamination*1 (mm)
GEA-67N	0.06	(KLN)	(WKLN)	1080	60×48	62±2	≦0.5	125±25	42±5	0.076
		(LPN)	–			68±2			48±5	0.093
	0.1	(VAGN)	(WAGN)	2116	60×58	52±2			31±5	0.126
		(VAJN)	–			55±2			37±5	0.136
	0.15	(VEFP)	–	1504	60×50	48±2		105±25	27±5	0.158
		(VEGJ)	(WEGJ)			51±2		120±25	32±5	0.171
	0.2	(VHDN)	(WHDN)	7629	44×34	45±2			27±5	0.208
		(VHGQ)	–			52±2		105±25	35±8	0.249
Test Method (IPC-TM-650)						2.3.16	2.3.19	2.3.18	2.3.17	–

*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.

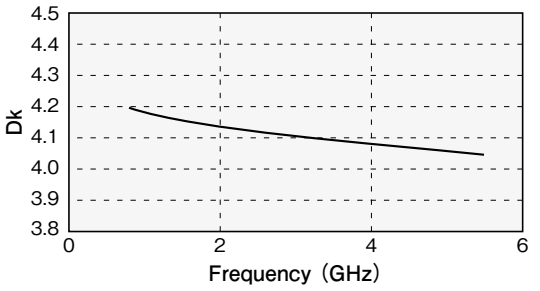
●Result of Withstand Voltage Test



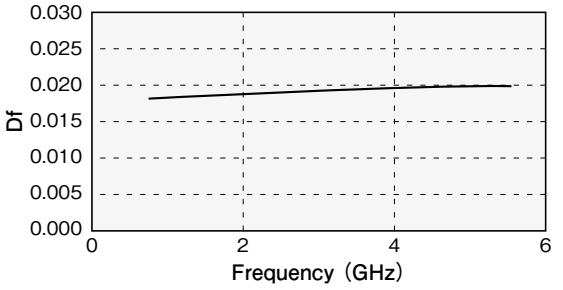
●Dielectric Constant vs Resin Content of Laminate(1MHz)



●Correlation between Dielectric Constant and Frequency



●Correlation between Dissipation Factor and Frequency



Note) Measured by Triplate-line Resonator.