



**Glass cloth base epoxy resin
 Flame retardant copper clad laminate**

NP-155FR

■ FEATURES

- Dicy-Free
- Lead free Compatible
- Excellent dimensional stability and through-hole reliability
- Superior CAF-Resistance (Anti-migration)
- High luminance of multi-functional epoxy contrast with copper for A.O.I
- IPC-4101C/99

■ PERFORMANCE LIST

Characteristics	Unit	Conditioning	Typical Values	SPEC	Test Method	
Volume resistivity	MΩ-cm	C-96/35/90	5 x10 ⁹ ~ 5x10 ¹⁰	10 ⁶ ↑	2.5.17	
Surface resistivity	MΩ	C-96/35/90	5 x10 ⁸ ~ 5x10 ⁹	10 ⁴ ↑	2.5.17	
Permittivity 1MHZ	-	C-24/23/50	4.6-4.8	5.4 ↓	2.5.5.9	
Permittivity 1GHZ	-	C-24/23/50	4.2-4.4	-	2.5.5.9	
Loss Tangent 1MHZ	-	C-24/23/50	0.016-0.020	0.035 ↓	2.5.5.9	
Loss Tangent 1GHZ	-	C-24/23/50	0.014-0.016	-	2.5.5.9	
Arc resistance	SEC	D-48/50+D-0.5/23	120 ↑	60 ↑	2.5.1	
Dielectric breakdown	KV	D-48/50	60 ↑	40 ↑	2.5.6	
Moisture absorption	%	D-24/23	0.05-0.10	0.35 ↓	2.6.2.1	
Flammability	-	C-48/23/50	94V0	94V0	UL94	
Peel strength 1 oz	lb/in	288°Cx10" solder floating	8-10	6 ↑	2.4.8	
Thermal stress	SEC	288 : solder dipping	600 ↑	10 ↑	2.4.13.1	
Pressure cooker (2 atm 120 :)	1/2 hr	SEC	288 : dipping	600 ↑	N/A	-
	1 hr	SEC	288 : dipping	600 ↑	N/A	-
	2 hr	SEC	288 : dipping	600 ↑	N/A	-
Flexural strength	LW	N/mm ²	A	480-550	415 ↑	2.4.4
	CW	N/mm ²	A	415-480	345 ↑	2.4.4
Dimensional stability X-Y axis	%	E-0.5/170	0.005-0.030	0.050 ↓	2.4.39	
Coefficient of thermal expansion						
Z-axis before Tg	ppm/ :	TMA	40-60	60 ↓	2.4.24	
Z-axis after Tg	ppm/ :	TMA	250-270	300 ↓		
50-260 :	%	TMA	3.5%	3.5% ↓		
Glass transition temp	:	DSC	155 5	150 ↑	2.4.25	
T260	min	TMA	>60	30 ↑	2.4.24.1	
T288	min	TMA	>20	5 ↑	2.4.24.1	
Decomposition Temperature (Td 5% W/L)	:	TGA	350	325 ↑	2.4.24.6	

Data shown are nominal values for reference only.

NOTE:

The average value in the table refers to samples of .062" 1/1.

Test method per IPC-TM-650



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NP-155FTL

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■ PERFORMANCE LIST

Characteristics	Unit	Conditioning	Typical Values	SPEC	Test Method
Volume resistivity	MΩ-cm	C-96/35/90	5.0 x10 ⁹	10 ⁶ ↑	2.5.17
Surface resistivity	MΩ	C-96/35/90	5.0 x10 ⁸	10 ⁴ ↑	2.5.17
Permittivity 1 MHZ	-	C-24/23/50	4.4-4.6	5.4 ↓	2.5.5.9
Permittivity 1 GHZ	-	C-24/23/50	3.9-4.1	-	2.5.5.9
Loss Tangent 1 MHZ	-	C-24/23/50	0.016-0.020	0.035 ↓	2.5.5.9
Loss Tangent 1GMHZ	-	C-24/23/50	0.012-0.014	-	2.5.5.9
Arc resistance	SEC	D-48/50+D-0.5/23	120 ↑	60 ↑	2.5.1
Dielectric breakdown	KV	D-48/50	60 ↑	40 ↑	2.5.6
Moisture absorption	%	D-24/23	0.20-0.30	0.35 ↓	2.6.2.1
Flammability	-	C-48/23/50	94V0	94V0	UL94
Peel strength 1 oz	lb/in	288°Cx10" solder floating	8-10	6 ↑	2.4.8
Thermal stress	SEC	288 : solder dipping	600 ↑	10 ↑	2.4.13.1
Glass transition temp	:	DSC	155 ± 5	150 ↑	2.4.25
Dimensional stability X-Y axis	%	E 4/105	0.01-0.03	0.05 ↓	2.4.39
Coefficient of thermal expansion					
Z-axis before Tg	ppm/ :	TMA	40-60	60 ↓	2.4.24
Z-axis after Tg	ppm/ :	TMA	250-270	300 ↓	
50-260 :	%	TMA	3.5%	3.5% ↓	
T260	min	TMA	>60	30 ↑	2.4.24.1
T288	min	TMA	>20	5 ↑	2.4.24.1
Decomposition Temperature (Td 5% W/L)	:	TGA	350	325 ↑	2.4.24.6

Data shown are nominal values for reference only.

NOTE:

The average value in the table refers to samples of .020" 1/1.

Test method per IPC-TM-650



■ CONSTRUCTION:

THICKNESS		CONSTRUCTION	THICKNESS		CONSTRUCTION
mm	mil		mm	mil	
0.05	2	106 1 PLY	0.35	14	7628 2 plies
0.08	3	2112 1PLY	0.38	15	7628 2 plies
0.10	4	1080 2 plies	0.45	17	7628x2+1080x1
0.11	4	2116 1 ply	0.50	20	7628 3 plies
0.13	5	1080 2 plies	0.53	21	7628 3 plies
0.13sp 5		2116 1 ply	0.60	24	7628 3 plies
0.15	6	1506 1 ply	0.77	30	7628 4 plies
0.16	6	2112 2 plies	0.8	31.5	7628 4 plies
0.21	8	7628 1 ply	0.9	36	7628 5 plies
0.26	10	2116 2 plies	1.0	39	7628 5 plies
0.30	12	2116 3 plies	1.1	43	7628 6 plies
0.30sp	12	1506 2 plies	1.2	47	7628 6 plies

• 1.2, 1.1, 1.0, 0.9 0.77 mm THICKNESS INCLUDE CLADDING, ALL OTHERS EXCLUDE CLADDING

■ PRODUCT SIZE & THICKNESS

THICKNESS	COPPER CLADDING		SIZE		THICKNESS TOLERANCE
	INCH (mm)	OZ (µm)	INCH	mm	
0.004 (0.1) to 0.039 (1.0)	Q (9)	3.0 (105)	48.8 x 36.6	1240 x 0930	IPC-4101C SPEC CLASS C/M
	T (12)	4.0 (140)			
	H (17)	5.0 (175)	48.8 x 40.5	1240 x 1030	
	1.0 (35)	6.0 (210)	48.8 x 42.5	1240 x 1080	
	2.0 (70)				

■ Keeping the core and prepreg in the same grain direction is crucial to ensure the flatness of multilayer boards.

Grain direction is shown on the Certificate of Conformance.

■ We recommend to evaluate the drilling property.

■ Different oxide treatment may result in variations in the heat resistance properties of the laminates after processing. Pre-production batch runs are recommended to ensure compatibility of materials with chemicals.