



**Glass cloth base modified epoxy resin
flame retardant copper clad laminate**

NPLDIII-R

■ FEATURES

- Low dielectric constant and low dissipation factor at high frequency range
- Greater design flexibility by allowing the same impedance
- High Tg 180°C (DSC)
- UL file number E98983
- Excellent dimensional stability and through-hole reliability

■ PERFORMANCE LIST

Characteristics	Unit	Conditioning	Typical Values	SPEC	Test Method	
Volume resistivity	MΩ-cm	C-96/35/90	5.0 x 10 ⁸ ~5 x 10 ⁹	10 ⁶ ↑	2.5.17	
Surface resistivity	MΩ	C-96/35/90	5.0 x 10 ⁶ ~5 x 10 ⁷	10 ⁴ ↑	2.5.17	
Permittivity 1GHZ	-	C-24/23/50	3.8-4.0	-	2.5.5.9	
Loss Tangent 1GHZ	-	C-24/23/50	0.004-0.005	-	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	0.2~0.3	0.35 ↓	2.6.2.1	
Flammability	-	C-48/23/50	94V0	94V0	UL94	
Peel strength 1 oz	lb/in	288°Cx10" solder floating	5~6	5 ↑	2.4.8	
Thermal stress	SEC	288°C dipping	300 ↑	10 ↑	2.4.13.1	
Pressure cooker 1/2 hr (2 atm 120°C)	SEC	288°C dipping	300 ↑	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/°C	TMA	40-60	N/A	2.4.24	
Z-axis after Tg	ppm/°C	TMA	250-300			
Glass transition temp	°C	DMA	190 ± 5	N/A	2.4.25	
Decomposition Temperature (Td 5% W/L)	°C	TGA	380	325 ↑	2.4.24.6	

NOTE:

The average value in the table refers to samples of .062" 1/1.
Test method per IPC-TM-650

Data shown are nominal values for reference only.



■ CONSTRUCTION:

THICKNESS		CONSTRUCTION		THICKNESS		CONSTRUCTION	
mm	mil			mm	mil		
0.10	4	1080	2 plies	0.38	15	7628	2 plies
0.11	4	2116	1 ply	0.45	18	7628 x 2 + 1080 x 1	
0.13	5	1080	2 plies	0.50	20	7628	3 plies
0.13sp	5	2116	1 ply	0.53	21	7628	3 plies
0.15	6	1506	1 ply	0.60	24	7628	3 plies
0.16	6	2112	2 plies	0.77	31	7628	4 plies
0.21	8	7628	1 ply	0.8	32	7628	4 plies
0.26	10	2116	2 plies	0.9	36	7628	5 plies
0.30	12	2116	3 plies	1.0	39	7628	5 plies
0.30sp	12	1506	2 plies	1.1	43	7628	6 plies
0.35	14	7628	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 INCH (mm)	COPPER CLADDING OZ (µm)	SIZE		THICKNESS TOLERANCE
		INCH	mm	
0.004 (0.1)	0.5 (17)	48.8 x 36.6	1240 x 0930	IPC-4101C SPEC CLASS C/M
to	1.0 (35)	48.8 x 40.5	1240 x 1030	
0.039 (1.0)	2.0 (70)	48.8 x 42.5	1240 x 1080	

■ 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.

■ CERTIFICATION UL

• UL File No. : E98983 • ANSI TYPE:FR-4.0