



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

NPG-200R

FEATURES

- High Tg 205°C (DMA)
- Excellent dimension stability through-hole reliability
- Excellent electrical, chemical and heat resistance properties
- Outstanding heat resistance

Product Application

- BGA Multilayers
- High layers count PWB
- Wireless communication
- MCM
- Direct Chip Attach

PERFORMANCE LIST

Characteristics		Unit	Condition	Typical Values	SPEC	Test Method
Volume resistivity		MΩ-cm	C-96/35/90	$3 \times 10^9 \sim 3.4 \times 10^{10}$	$10^6 \uparrow$	2.5.17
Surface resistivity		MΩ	C-96/35/90	$5 \times 10^8 \sim 5.7 \times 10^9$	$10^4 \uparrow$	2.5.17
Permittivity 1MHz		-	C-24/23/50	4.1-4.5	5.4 ↓	2.5.5.9
Permittivity 1GHz		-	C-24/23/50	3.9-4.3	-	2.5.5.9
Loss Tangent 1MHz		-	D-24/23/50	0.012-0.014	0.035 ↓	2.5.5.9
Loss Tangent 1GHz		-	D-24/23/50	0.010-0.012	-	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	0.10-0.14	0.8 ↓	2.6.2.1
Flammability		-	C-48/23/50	V-0	V-0	UL94
Peel strength 1 oz (≥0.5mm)		lb/in	288°Cx10" solder floating	7-9	6 ↑	2.4.8
Thermal stress		SEC	288°C solder dipping	600 ↑	10 ↑	2.4.13.1
Pressure cooker (2 atm 120°C)	1/2 hr	SEC	288°C dipping	600 ↑	N/A	-
	1 hr	SEC	288°C dipping	600 ↑	N/A	-
	2 hrs	SEC	288°C dipping	600 ↑	N/A	-
Flexural strength	LW	N/mm ²	A	440-520	415 ↑	2.4.4
	CW	N/mm ²	A	380-440	345 ↑	2.4.4
Dimensional stability X-Y axis		%	E-2/150	0.008-0.020	0.050 ↓	2.4.39
Coefficient of thermal expansion						
X-Y axis		ppm/°C	TMA	12-16	N/A	2.4.24
Z-axis before Tg		ppm/°C	TMA	35-45		
Z-axis after Tg		ppm/°C	TMA	180-210		
Glass transition temperature		°C	DMA	205 ± 10	N/A	2.4.24.4
Decomposition temperature (Td 5% W/L)		°C	TGA	383	N/A	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.



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NPG-200TL

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■ Product Application

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■ PERFORMANCE LIST

Characteristics	Unit	Condition	Typical Values	SPEC	Test Method
Volume resistivity	MΩ-cm	C-96/35/90	3.4 x10 ¹⁰	10 ⁶ ↑	2.5.17
Surface resistivity	MΩ	C-96/35/90	5.7 x10 ⁹	10 ⁴ ↑	2.5.17
Permittivity 1 MHz	-	C-24/23/50	3.9-4.3	5.4 ↓	2.5.5.9
Permittivity 1 GHz	-	C-24/23/50	3.7-4.1	-	2.5.5.9
Loss Tangent 1 MHz	-	C-24/23/50	0.012-0.014	0.035 ↓	2.5.5.9
Loss Tangent 1 GHz	-	C-24/23/50	0.010-0.012	-	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	0.15-0.18	0.8 ↓	2.6.2.1
Flammability	-	C-48/23/50	V-0	V-0	UL94
Peel strength 1oz (≥0.5mm)	lb/in	288°Cx10" solder floating	7-9	6 ↑	2.4.8
Thermal stress	SEC	288°C solder dipping	600 ↑	10 ↑	2.4.13.1
Glass transition temperature	°C	DMA	205 ± 10	N/A	2.4.24.4
Dimensional stability X-Y axis	%	E-4/105	0.010-0.020	0.05 ↓	2.4.39
Coefficient of thermal expansion X-Y axis	ppm/°C	TMA	11-15	N/A	2.4.24
Z-axis before Tg	ppm/°C	TMA	30-45		
Z-axis after Tg	ppm/°C	TMA	160-210		
Decomposition temperature (Td 5% W/L)	°C	TGA	383	N/A	2.4.24.6

NOTE:

The average value in the table refers to samples of .020" 1/1.
Test method per IPC-TM-650

Data shown are nominal values for reference only.



■ CONSTRUCTION

THICKNESS mm mil	CONSTRUCTION	THICKNESS mm mil	CONSTRUCTION
0.05 2	106 1 ply	0.35 14	7628 2 plies
0.08 3	2112 1 ply	0.38 15	7628 2 plies
0.10 4	1080 2 plies	0.45 18	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
0.13 sp 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
0.30 sp 12	1506 2 plies	1.2 47	7628 6 plies

• 1.2, 1.1, 1.0, 0.9, 0.8, 0.77 mm THICKNESS INCLUDE CLADDING, ALL OTHERS EXCLUDE CLADDING

■ PRODUCT SIZE & THICKNESS

THICKNESS inch (mm)	COPPER CLADDING oz (μm)	SIZE inch mm	THICKNESS TOLERANCE
0.002 (0.05) to 0.047 (1.2)	H (17) 1.0 (35) 2.0 (70) 3.0 (102)	48.8 x 36.6 1240 x 0930 48.8 x 40.5 1240 x 1030 48.8 x 42.5 1240 x 1080	IPC-4101E SPEC CLASS C/M

■ 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: No ANSI