

# Data Sheet

## NP-155F

- Phenolic cured and filled Laminates and Prepregs, Tg 150 °C (DSC)
- Exceptional consistent laminate quality due to exclusive use of Nan Ya's raw materials
- Low CTE z provides excellent reliability in thermo cycle test
- Superior properties in CAF precarious conditions and very high thermal resistance
- IPC-4101C specification sheets 21, 24, 97, 98, 99, 101 are applicable

# NP-155F

Revision Date: August 2012

## NAN YA SPECIFICATION SHEET FOR NP-155F - Medium Tg filled, multifunctional Epoxy Laminates and Prepregs

SPECIFICATION SHEET #:

IPC-4101 / 21, 24, 97, 98, 99, 101

FLAME RETARDANT MECHANISM:

RoHS compliant Bromine, UL94 V-0

FILLERS (≥ 5 %):

Contains inorganic fillers

ID REFERENCE:

UL/ANSI: FR-4 / 21, 24, 97, 98, 99, 101

### LAMINATE DATA SHEET

Laminate Properties	Specification < 0,50 mm [0,0197 in] 50% RC		Specification ≥ 0,50 mm [0,0197 in] 40% RC		Units metric [English]	Test Method (IPC-TM-650)	Ref. Para.	
	Typical Value	Specification	Typical Value	Specification				
Glass Transition Temperature (Tg) by DSC / TMA	>150 / >140	≥ 150 (DSC)	>150 / >140	≥ 150 (DSC)	°C	2.4.25	3.10.1.6	
Decomposition Temperature (Td) TGA	5% wt. loss onset wt. loss	350 347	- -	350 347	≥ 325 -	°C	2.4.24.6	3.10.1.8
CTE, z-axis	prior Tg above Tg	40 - 60 250 - 270	AABUS -	40 - 60 250 - 270	≤ 60 ≤ 300	ppm/°C	2.4.24	3.10.1.11
CTE, x/y-axis	prior Tg above Tg	11 - 15 11 - 15	AABUS -	11 - 15 11 - 15	AABUS -	ppm/°C	2.4.24	3.10.1.11
Thermal Expansion (50 °C - 260 °C) z-axis	TE	3,4	-	3,4	≤ 3,5	%	2.4.24	3.10.1.11
Thermal Conductivity	λ	0,49	-	0,49	-	W/mK	Laser Flash	-
Thermal Resistance: Time to Delamination	T260 T288	> 60 > 20	- -	> 60 > 20	≥ 30 ≥ 5	minutes	2.4.24.1	3.10.1.12
Pressure Cooker Test - 2 hours (10 s solder dip @ 288 °C)		pass	pass visual	pass	pass visual	pass visual	-	-
Thermal Stress 10 s at 288 °C [550,4 °F], minimum	A. unetched B. etched	pass pass	pass visual pass visual	pass pass	pass visual pass visual	rating	2.4.13.1	3.10.1.2
CAF Resistance		pass	AABUS	pass	AABUS	pass / fail	2.6.25	3.12.1.4
Peel Strength, minimum								3.9.1.1
A. Low profile copper foil and very low profile copper foil - all copper foil >17µm [0,669 mil]		0,78 [4,50]	0,70 [4,00]	0,78 [4,50]	0,70 [4,00]	N/mm [lb/in]	2.4.8	
B. Standard profile copper foil								
1. after thermal stress (35 µm)		1,40 [8,00]	0,80 [4,57]	1,40 [8,00]	1,05 [6,00]	N/mm [lb/in]	2.4.8.2	3.9.1.1.1
2. at 125 °C [257 °F]		0,78 [4,50]	0,70 [4,00]	0,88 [5,00]	0,70 [4,00]	N/mm [lb/in]	2.4.8.3	3.9.1.1.2
3. after process solutions		0,70 [4,00]	0,55 [3,14]	0,88 [5,00]	0,80 [4,57]	N/mm [lb/in]	2.4.8	3.9.1.1.3
C. all other foil - composite		-	AABUS	-	AABUS			
Volume Resistivity, minimum								
A. C-96/35/90		5,0*10 <sup>9</sup>	10 <sup>6</sup>	5,0*10 <sup>9</sup>	-	MΩcm	2.5.17.1	3.11.1.3
B. after moisture resistance		-	-	-	10 <sup>4</sup>			
C. at elevated temperature E-24/125		7,4*10 <sup>9</sup>	10 <sup>3</sup>	5,3*10 <sup>9</sup>	10 <sup>3</sup>			
Surface Resistivity, minimum								
A. C-96/35/90		5,0*10 <sup>8</sup>	10 <sup>4</sup>	5,0*10 <sup>8</sup>	-	MΩ	2.5.17.1	3.11.1.4
B. after moisture resistance		-	-	-	10 <sup>4</sup>			
C. at elevated temperature E-24/125		6,1*10 <sup>8</sup>	10 <sup>3</sup>	6,1*10 <sup>8</sup>	10 <sup>3</sup>			
Dielectric Breakdown, minimum		60	-	60	40	kV	2.5.6	3.11.1.6
Electric Strength, minimum		40	30	-	-	kV/mm	2.5.6.2	3.11.1.7
(laminate & prepreg as laminated)		[1000]	[750]	-	-	[V/mil]		3.11.2.3
Arc Resistance, minimum		120	60	120	60	s	2.5.1	3.11.1.5
Comparative Tracking Index (CTI)		3 / 175 - 249	-	3 / 175 - 249	-	PLC / V	ASTM D3638	-
Permittivity, spec. maximum	A. @ 1MHz B. @ 100MHz C. @ 1 GHz D. @ 2 GHz E. @ 5 GHz	4,45 4,25 4,10 4,08 -	5,40 - - - -	4,70 4,45 4,30 4,20 -	5,40 - - - -	- - - - -	2.5.5.2 2.5.5.3 2.5.5.9 2.5.5.5	3.11.1.1 3.11.2.11
Loss Tangent, spec. maximum	A. @ 1MHz B. @ 100MHz C. @ 1 GHz D. @ 2 GHz E. @ 5 GHz	0,020 0,019 0,014 0,013 -	0,035 - - - -	0,019 0,018 0,015 0,013 -	0,035 - - - -	- - - - -	2.5.5.2 2.5.5.3 2.5.5.9 2.5.5.5	3.11.1.2 3.11.2.2
Flexural Strength, minimum	A. Length direction B. Cross direction	- -	- -	515 440	415 [60190] 345 [50040]	N/mm <sup>2</sup> [lb/in <sup>2</sup> ]	2.4.4	3.9.1.3
Flexural Strength at elevated temperature, length direction, minimum		-	-	-	-	N/mm <sup>2</sup> [lb/in <sup>2</sup> ]	2.4.4.1	3.9.1.4
Dimensional stability x/y-axis E-0,5/170(R)/E-4/105(TL)		0,01 - 0,03	< 0,05	0,01 - 0,03	< 0,05	%	2.4.39	3.9.1.2
Moisture Absorption, maximum		0,30	-	0,10	0,50	%	2.6.2.1	3.12.1.1
Flammability (laminate & prepreg as laminated)		V-0	V-0 minimum	V-0	V-0 minimum	rating	UL94	3.10.1.1
Density (50 % resin content)		1,90	-	1,90	-	g/cm <sup>3</sup>	-	-

### PREPREG DATA SHEET

Prepreg Requirements	Typical Value	Specification	Unit	Test Method	Ref. Para.
1. Shelf Life, minimum (Condition 1/ Condition 2)	meets requirements	180 / 90	Days	AABUS	3.17
2. Reinforcement	woven E-glass	as per IPC-4412 or AABUS	-	-	-
3. Volatile content maximum	0,75	1,50	%	2.3.19	3.9.2.8
4. Prepreg Parameters	-	-	AABUS	AABUS	1.1.7
5. Flammability (as laminated)	V-0	V-0 minimum	rating	UL94	3.10.2.1
6. Other					

Data shown are nominal values for reference only, no review according MIL-S-13949

\*AABUS = As Agreed upon Between User and Supplier.

all Nan Ya laminates are in conformance with RoHS regulations

# NP-155F

## Prepreg NP-155FB

Glass Fabric	Resin Content	Resin Flow	Gel Time @ 170 °C [s]	Thickn. after lamination per ply [μm] <sup>1)</sup>	@ 1 MHz <sup>2)</sup>		@ 1 GHz <sup>2)</sup>	
	[%]	[%]			Dk	Df	Dk	Df
106	70 ± 3	42 ± 5	130 ± 20	40 ± 8	3,94	0,015	3,78	0,014
106MR	74 ± 3	47 ± 5		49 ± 8	3,81	0,015	3,66	0,014
106HR	76 ± 3	54 ± 5		54 ± 8	3,74	0,016	3,60	0,013
1080	64 ± 3	40 ± 5		70 ± 8	4,14	0,015	3,97	0,013
1080MR	67 ± 3	45 ± 5		78 ± 8	4,04	0,016	3,87	0,013
1080HR	70 ± 3	50 ± 5		88 ± 8	3,94	0,015	3,78	0,013
2112	62 ± 3	35 ± 5		100 ± 8	4,21	0,018	4,03	0,017
2113	58 ± 3	35 ± 5		98 ± 10	4,34	0,018	4,15	0,017
2116	52 ± 3	28 ± 5		112 ± 10	4,54	0,016	4,34	0,015
2116MR	56 ± 3	34 ± 5		126 ± 10	4,41	0,016	4,21	0,014
2116HR	60 ± 3	40 ± 5		142 ± 10	4,27	0,015	4,09	0,013
1506	50 ± 3	27 ± 5		168 ± 10	4,61	0,015	4,40	0,013
1506MR	54 ± 3	34 ± 5		188 ± 10	4,48	0,016	4,28	0,013
7628	45 ± 3	21 ± 5		110 ± 20	192 ± 10	4,78	0,016	4,55
7628MR	49 ± 3	28 ± 5	130 ± 20	212 ± 10	4,64	0,015	4,43	0,014
7628HR	52 ± 3	31 ± 5		230 ± 10	4,54	0,016	4,34	0,014

<sup>1)</sup> acc. recommended press cycle, 75 % remaining copper, 1 oz

<sup>2)</sup> data shown are actual values and are not guaranteed

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## Recommended press cycle

