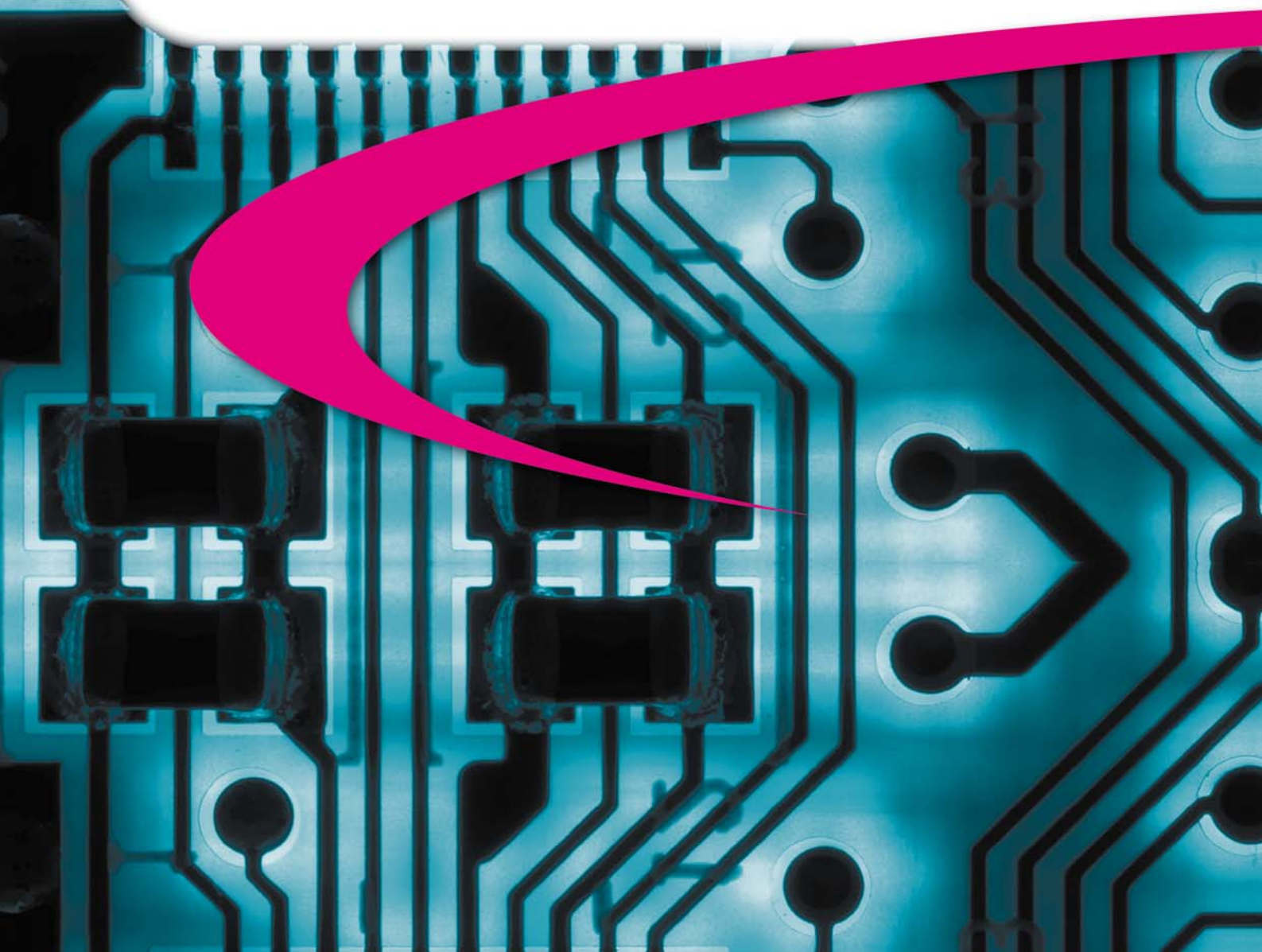
TECHNOLAM®
the laminate company

Data Sheet

NP-140

- Multifunctional Laminates and Prepregs, Tg 140 °C (DSC)
- Exceptional consistent laminate quality due to exclusive use of Nan Ya's raw materials
- Common PTH process parameters result in very good through hole reliability and copper foil peel strength
- High luminance of Epoxy contrast with Copper for Laser Type AOI
- IPC-4101C specification sheet 21 is applicable



NP-140

Revision Date: April 2011

NAN YA SPECIFICATION SHEET FOR NP-140 - Medium Tg multifunctional Epoxy Laminates and Prepregs

SPECIFICATION SHEET #:	IPC-4101 / 21
FLAME RETARDANT MECHANISM:	RoHS compliant Bromine, UL94 V-0
FILLERS:	N/A
ID REFERENCE:	UL/ANSI: FR-4 / 21

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		140 ± 5 / 130	≥ 110	140 ± 5 / 130	≥ 110	°C	2.4.25	3.10.1.6
Decomposition Temperature (Td) TGA	5% wt. loss	310	-	310	-	°C	2.4.24.6	3.10.1.8
	onset wt. loss	305	-	305	-			
CTE, z-axis	prior Tg	50 - 70	-	50 - 70	-	ppm/°C	2.4.24	3.10.1.11
	above Tg	270-300	-	270-300	-			
CTE, x/y-axis	prior Tg	15 - 18	-	15 - 18	-	ppm/°C	2.4.24	3.10.1.11
	above Tg	15 - 18	-	15 - 18	-			
Thermal Expansion (50 °C - 260 °C) z-axis	TE	4,4	-	4,2	-	%	2.4.24	3.10.1.11
Thermal Conductivity	λ	0,49	-	0,49	-	W/mK	Laser Flash	-
Thermal Resistance: Time to Delamination	T260	20-30	-	20-30	-	minutes	2.4.24.1	3.10.1.12
	T288	2 - 5	-	2 - 5	-			
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		pass	pass visual	pass	pass visual	rating	2.4.13.1	3.10.1.2
B. etched		pass	pass visual	pass	pass visual			
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]		0,88 [5,00]	0,70 [4,00]	0,96 [5,50]	0,70 [4,00]	N/mm [lb/in]	2.4.8	
B. Standard profile copper foil								
1. after thermal stress (35 µm)		1,75 [10,00]	0,80 [4,57]	1,75 [10,00]	1,05 [6,00]	N/mm [lb/in]	2.4.8.2	3.9.1.1.1
2. at 125 °C [257 °F]		1,22 [7.00]	0,70 [4,00]	1,22 [7.00]	0,70 [4,00]	N/mm [lb/in]	2.4.8.3	3.9.1.1.2
3. after process solutions		1,13 [6,50]	0,55 [3,14]	1,13 [6,50]	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		$5,0*10^9$	10^6	$5,9*10^8$	-	MΩcm	2.5.17.1	3.11.1.3
B. after moisture resistance		-	-	-	10^6			
C. at elevated temperature E-24/125		-	10^3	$4,4*10^9$	10^3			
Surface Resistivity, minimum								
A. C-96/35/90		$5,0*10^7$	10^4	$5,0*10^7$	-	MΩ	2.5.17.1	3.11.1.4
B. after moisture resistance		-	-	-	10^4			
C. at elevated temperature E-24/125		-	10^3	$2,0*10^8$	10^3			
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	4,21	5,40	4,58	5,40	-	2.5.5.2	3.11.1.1
(laminate & prepreg as laminated)	B. @ 100MHz	4,08	-	4,32	-	-	2.5.5.3	3.11.2.11
	C. @ 1 GHz	3,84	-	4,13	-	-	2.5.5.9	
	D. @ 2 GHz	3,83	-	4,11	-	-	2.5.5.5	
	E. @ 5 GHz	-	-	-	-	-		
Loss Tangent, spec. maximum	A. @ 1MHz	0,021	0,035	0,019	0,035	-	2.5.5.2	3.11.1.2
(laminate & prepreg as laminated)	B. @ 100MHz	0,018	-	0,016	-	-	2.5.5.3	3.11.2.2
	C. @ 1 GHz	0,013	-	0,012	-	-	2.5.5.9	
	D. @ 2 GHz	0,012	-	0,011	-	-	2.5.5.5	
	E. @ 5 GHz	-	-	-	-	-		
Flexural Strength, minimum								
A. Length direction		-	-	500	415 [60190]	N/mm^2 [lb/in^2]	2.4.4	3.9.1.3
B. Cross direction		-	-	400	345 [50040]			
Flexural Strength at elevated temperature, length direction, minimum		-	-	-	-	N/mm^2 [lb/in^2]	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	0,80	%	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)		1,92	-	1,92	-	g/cm^3	-	-

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	0,75	%	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-140

Prepreg NP-140B

Glass Fabric	Resin Content	Resin Flow	Gel Time @ 170 °C	Thickn. after lamination per ply [µm] [1]	@ 1 MHz[2]		@ 1 GHz[2]	
	[%]	[%]	[s]	[µm]	Dk	Df	Dk	Df
106	68 ± 3	40 ± 5	130 ± 20	39 ± 8	3,74	0,015	3,58	0,011
106MR	72 ± 3	43 ± 5		47 ± 8	3,61	0,016	3,46	0,012
106HR	74 ± 3	46 ± 5		52 ± 8	3,54	0,015	3,39	0,011
1080	62 ± 3	38 ± 5		69 ± 8	3,94	0,017	3,76	0,012
1080MR	65 ± 3	43 ± 5		77 ± 8	3,84	0,015	3,67	0,011
1080HR	68 ± 3	47 ± 5		86 ± 8	3,74	0,017	3,58	0,013
2112	60 ± 3	37 ± 5		99 ± 8	4,01	0,016	3,83	0,011
2113	56 ± 3	32 ± 5		96 ± 10	4,14	0,015	3,95	0,012
2116	50 ± 3	25 ± 5		111 ± 10	4,34	0,016	4,14	0,012
2116MR	54 ± 3	30 ± 5		124 ± 10	4,21	0,015	4,01	0,011
2116HR	58 ± 3	35 ± 5		136 ± 10	4,07	0,017	3,89	0,013
1506	48 ± 3	25 ± 5		166 ± 10	4,41	0,015	4,20	0,011
1506MR	52 ± 3	30 ± 5		185 ± 10	4,27	0,015	4,07	0,013
7628	43 ± 3	20 ± 5		190 ± 10	4,57	0,017	4,35	0,012
7628MR	47 ± 3	25 ± 5		210 ± 10	4,44	0,017	4,23	0,013
7628HR	50 ± 3	28 ± 5		227 ± 10	4,34	0,016	4,14	0,012

[1] acc. recommended press cycle, 75 % remaining copper, 1 oz
[2] data shown are actual values and are not guaranteed
Revision date: April 2011

Recommended press cycle