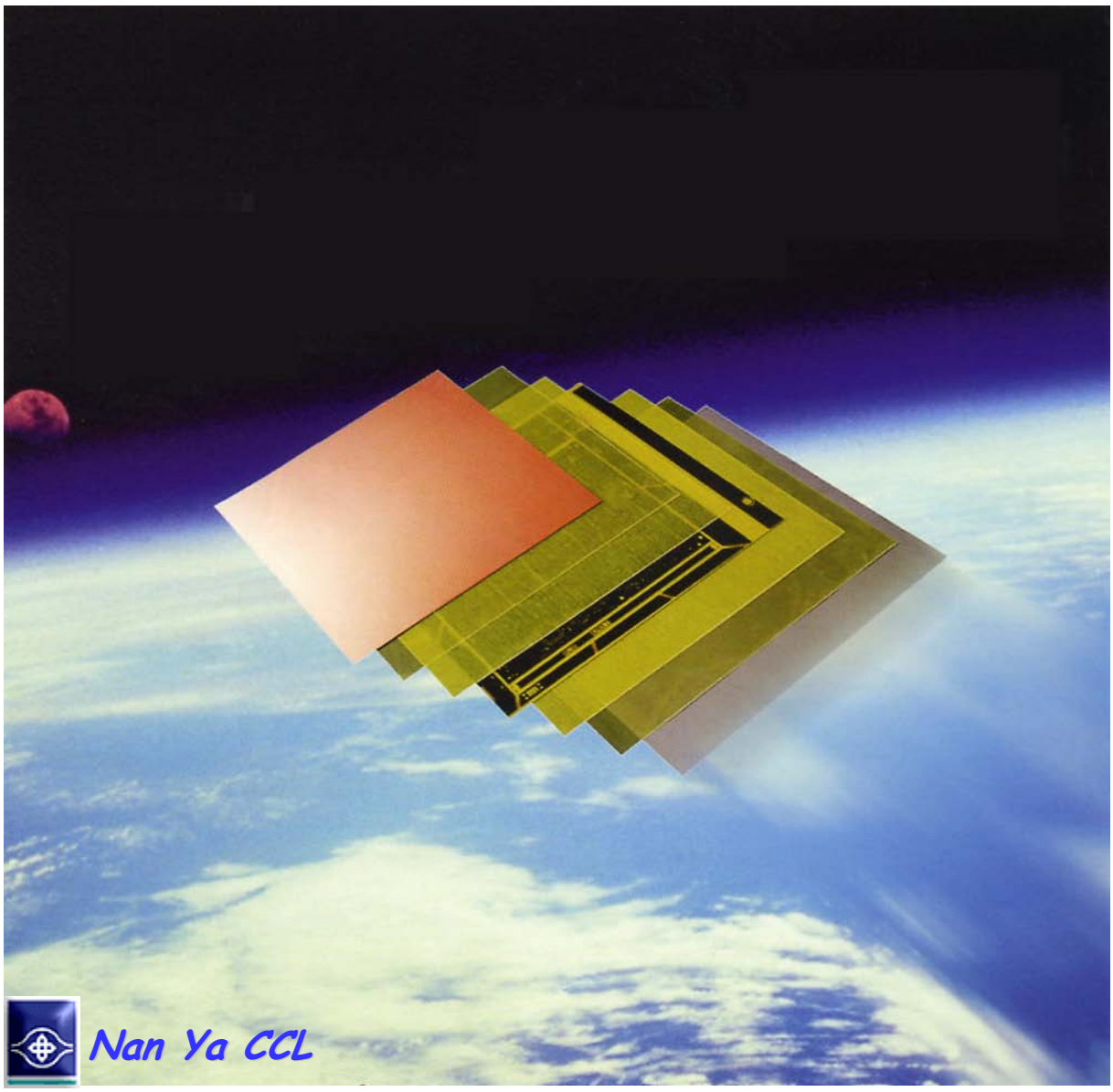
TECHNOLAM®

the laminate company

Data sheet NP-140

- multifunctional laminates and prepregs with a Tg of 140 °C (DSC)
- exceptionally consistent laminate quality due to exclusive use of Nan Ya's raw materials
- common PTH process parameters results in very good through hole reliability and copper foil peel strength
- high luminance of epoxy contrast with copper for laser type AOI
- IPC-4101B / 21, CTI: PLC 3 = 175 V ~ 249 V



NP-140

TECHNOLAM®
the laminate company

Revision Date: December 2007

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

SPECIFICATION SHEET #:	IPC- 4101 / 21
CURING AGENT:	Dicy
FLAME RETARDANT MECHANISM:	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 spec min.			140±5 / 130	110 - 150	140±5 / 130	110 - 150	°C	2.4.25	3.10.1.6
Decomposition Temperature (Td) TGA	10 °C/min	(5% wt. Loss) (onset wt. loss)	312 305	- -	312 305	- -	°C	ASTM D3850	3.10.1.10
Decomposition Temperature (Td) TGA	20 °C/min	(5% wt. Loss) (onset wt. loss)	324 320	- -	324 320	- -	°C	ASTM D3850	3.10.1.10
CTE, Z-axis		Pre-Tg Post-Tg	50 - 70 270-300	AABUS -	50 - 70 270-300	AABUS -	ppm/°C	2.4.24	3.10.1.11
CTE, X - Y axis		Pre-Tg Post-Tg	15 - 18 15 - 18	AABUS -	15 - 18 15 - 18	AABUS -	ppm/°C	2.4.24	3.10.1.11
% Z-Axis Expansion (50 °C - 260 °C)			4,4	-	4,2	AABUS	%	2.4.24	3.10.1.11
Thermal Conductivity			0,49	-	0,49	-	W/mK	-	-
Thermal Resistance: Time to Delamination	(100 °C/min)	T260 T288	20-30 2 - 5	- -	20-30 2 - 5	- -	minutes	2.4.24.1	3.10.1.12
Pressure Cooker - 2 hours (10 s solder dip @ 288 °C)			Pass	Pass Visual	Pass	Pass Visual	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	$5,9*10^8$	-	MΩ-cm	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			
Moisture Absorption, maximum			0,30	-	0,10	0,80	%	2.6.2.1	3.12.1.1
Dielectric Breakdown, minimum			60	-	60	40	kV	2.5.6	3.11.1.6
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
Arc Resistance, minimum			120	60	120	60	s	2.5.1	3.11.1.5
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			
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
Flammability (Laminate & prepreg as laminated)			V-0	V-1 minimum	V-0	V-1 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	Units	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-1 minimum	rating	UL94	3.10.2.1
6. Other					

Data shown are nominal values for reference only

*AABUS = As Agreed upon Between User and Supplier.

All Nan Ya laminates are in conformance with RoHS regulations

Nan Ya CCL

Prepreg NP-140 B

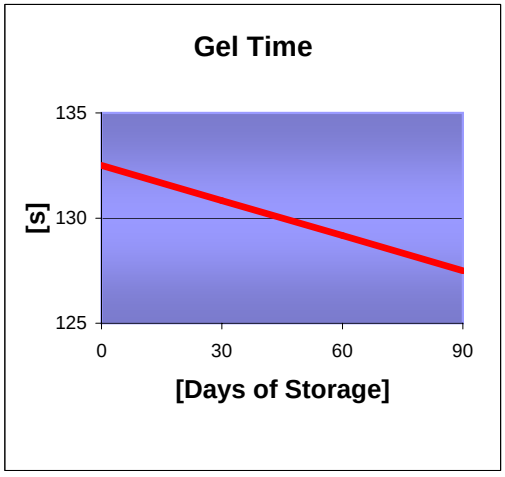
- rheology of resin controlled and adjusted within very small tolerances
- tactile surface of prepreg sheets and negligible resin dust
- climate controlled storage enshures shelf life
- prepregs with tooling holes, delivery to customers vacuum packed

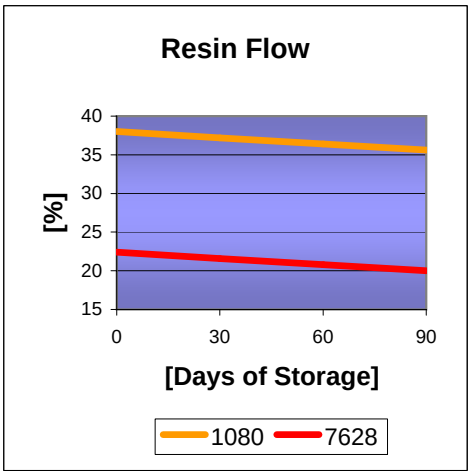
Glass Style	Resin Content [%]	Resin Flow [%]	Gel Time 170 °C [s]	Volatile Content [%]	Thickness after lamination[1] per ply [mm]
7628 HR	50 ± 3	28 ± 5	130 ± 20	< 0,75	0,200 ± 0,010
7628 MR	47 ± 3	25 ± 5			0,190 ± 0,010
7628 TR	45 ± 3	23 ± 5			0,188 ± 0,010
7628	43 ± 3	20 ± 5			0,180 ± 0,010
1506 MR	52 ± 3	30 ± 5			0,160 ± 0,010
1506	48 ± 3	25 ± 5			0,150 ± 0,010
2116 HR	58 ± 3	35 ± 5			0,130 ± 0,010
2116 MR	54 ± 3	30 ± 5			0,118 ± 0,010
2116	50 ± 3	25 ± 5			0,105 ± 0,010
2125	53 ± 3	30 ± 5			0,100 ± 0,010
2113	56 ± 3	32 ± 5			0,090 ± 0,010
2112	60 ± 3	37 ± 5			0,075 ± 0,008
1080 HR	68 ± 3	47 ± 5			0,071 ± 0,008
1080 MR	65 ± 3	43 ± 5			0,068 ± 0,008
1080	62 ± 3	38 ± 5			0,065 ± 0,008
106 HR	74 ± 3	46 ± 5			0,057 ± 0,008
106 MR	72 ± 3	43 ± 5			0,055 ± 0,008
106	68 ± 3	40 ± 5			0,053 ± 0,008
1086 LD	62 ± 3	38 ± 5			0,074 ± 0,008

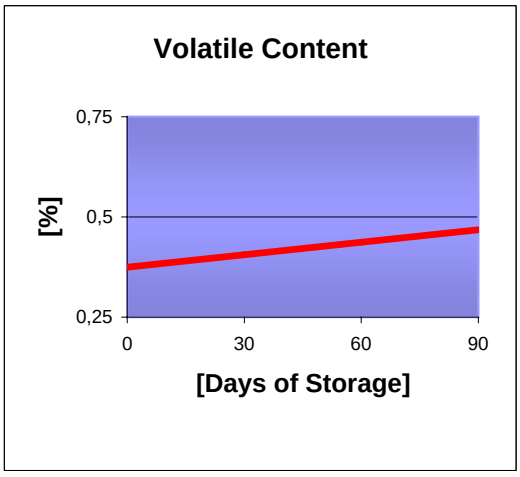
LD = Laser drillable

[1] acc. IPC-TM-650 / 2.4.38 Scaled Flow Testing

Storage Stability





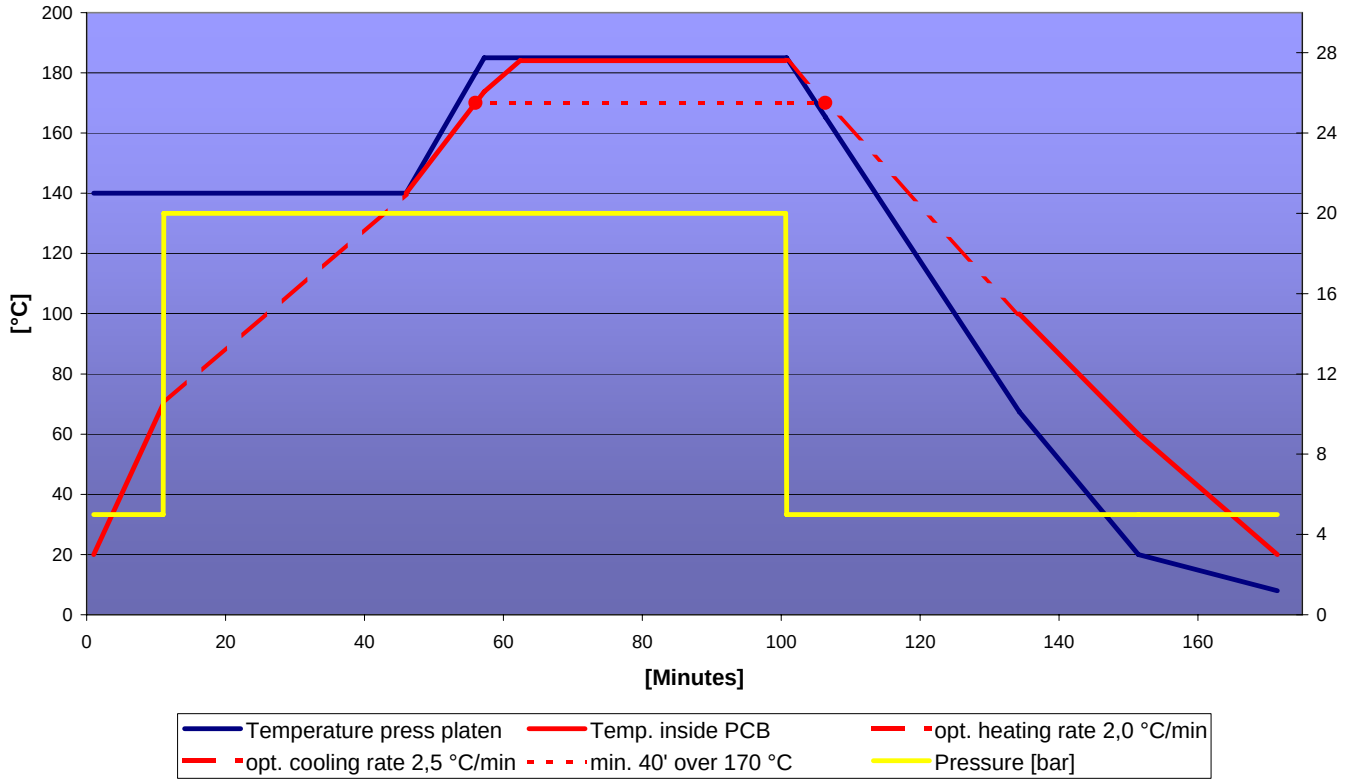


Storage Condition 3 months @ < 23 °C, < 50 % rH - 6 months @ max. 5 °C

Data shown are nominal values for reference only

Recommended press cycles **NP-140**

2 temperature steps



1 temperature step