



Synamic 6N

Ultra Low Loss & Heat Resistance Multilayer PCB Material

FEATURES

- High Tg and high Td
- Excellent thermal reliability
- Excellent anti-CAF performance
- Low Dk/Df (@10GHz): 3.35/0.0021
- Lower Z-axis CTE, offering superior PTH reliability

APPLICATIONS

Ultra high speed network equipment,
Server, Switch, Storage, Routers and BBU of
Base station, High performance computing,
High frequency measuring instruments,
Optical communication products

GENERAL PROPEAIES

Test Items	Test Method	Test Condition	Unit	Typical Value
Tg	IPC-TM-650 2.4.24.4	DMA	°C	205
	IPC-TM-650 2.4.25D	DSC		185
Td	IPC-TM-650 2.4.24.6	5% wt. loss	°C	402
T288	IPC-TM-650 2.4.24.1	TMA	min	> 120
T300	IPC-TM-650 2.4.24.1	TMA	min	> 60
Thermal Stress	IPC-TM-650 2.4.13.1	288°C, solder dip	-	Pass
CTE (Z-axis)	IPC-TM-650 2.4.24	Before Tg	ppm/°C	50
	IPC-TM-650 2.4.24	After Tg	ppm/°C	210
	IPC-TM-650 2.4.24	50-260°C	%	2.0
Dielectric Constant	IPC-TM-650 2.5.5.9	C-24/23/50, 1GHz	-	3.41
	IPC-TM-650 2.5.5.5	C-24/23/50, 10GHz	-	3.35
	IEC61189-2-721	C-24/23/50, 10GHz	-	3.52
Dissipation Factor	IPC-TM-650 2.5.5.9	C-24/23/50, 1GHz	-	0.0013
	IPC-TM-650 2.5.5.5	C-24/23/50, 10GHz	-	0.0021
	IEC61189-2-721	C-24/23/50, 10GHz	-	0.0026
Peel Strength (1oz)	IPC-TM-650 2.4.8	288°C/10s	N/mm [lb/in]	0.82 [4.68]
Water Absorption	IPC-TM-650 2.6.2.1	D-24/23	%	0.10
Flammability	UL94	C-48/23/50	Rating	V-0

Remarks: 1. All the typical value is based on the 0.76mm (6*2116) thickness specimen, but not guarantee data.

2. All the typical value listed above is for your reference only, please turn to Shengyi Technology Co., Ltd. for detailed information, and all rights from this data sheet are reserved by Shengyi Technology Co., Ltd.



PROCESSING GUIDELINES

Laminate: Synamic 6N
Prepreg: Synamic 6NB

Ultra Low Loss & Heat Resistance Multilayer Material



THE PREFACE

This product uses IPC-4101E Standards as a reference, and Shengyi make some changes according to the product characteristics of the actual situation as to make it more suitable for the Shengyi Synamic 6N / Synamic 6NB product use.

1. Storage Condition

1.1 Laminate core

1.1.1 Store Condition

- Pack with original forms on the platform or on the appropriate frame, avoiding stress, prevent sheet deformation caused by inappropriate storage which may impact the subsequent PCB processes.

1.1.2 Storage Environment

- Sheets should be stored in ventilated, dry, at room temperature under environment control, avoiding direct sunlight, rain and avoid erosion of corrosive gas (stored environment directly affect the quality of material).
- For double-sided copper-clad boards (cores), to minimize shifting as to avoid scratching the surface of the product, with a suitable environment and condition for storage, the shelf life can be up to two years.

1.1.3 Operation Manual

- Wear clean gloves and carefully operate the cores. Copper foil collisions, sliding will cause damage of the cores.
- Bare hands action will cause contamination to copper foil surface. These defects are likely to cause adverse effects.

1.2 Prepreg

1.2.1 Storage Condition

- Levels stored in original packaging form, avoiding stress, prevent sheet deformation caused by inappropriate storage condition.
- Leftover or cut Prepregs should pack and seal with vacuum foil packaging and put it back in the original packaging tray.

1.2.2 Storage Environment

- Prepreg sealed packaging should be stored in free of UV irradiation environment, specific storage conditions and the storage period as follows:
 - Condition 1. At a temperature of $<5^{\circ}\text{C}$, storage period for 6 months.
 - Condition 2. At a temperature of $<23^{\circ}\text{C}$, relative humidity $<50\%$ when stored, storage period for 3 months
- Note: Relative humidity affect prepreg quality the most, pay special attention on weather (conduct dehumidification process is necessary for wet weather).

1.2.3 Cutting Guideline

- Cutting the best way is left to professional staff wear clean gloves during operation, prevent the pollution of prepreg surface; operation must be careful to prevent prepreg wrinkle or crack, to avoid affect



prepregs.

1.2.4 Prepregs Use Recommendations

- If moving from a low temperature storage space to a higher temperature or ambient temperature storage space, it must go through the temperature settle process, (8 - 24 hours, settle time is varies depending on temperature variation in between two storage conditions). Open package after temperature settle process is completed as to avoid affecting the quality and adhesion of prepregs.
- For PP package stored in above conditions 1 or 2, after open is required to complete the use as soon as possible, for packages opened more than 3 day, it must re-inspect and insure quality before use.
- Leftover or cut prepregs should pack and seal with vacuum foil packaging and put it back in the above stated storage condition 1 or 2.

2. PCB Process Recommendations

2.1 Baking on the cores should be carried out before use to eliminate internal stress. Baking conditions should be 150~160°C/4~6 hours or 170~180°C/2~4 hours;

2.2 After Brown Oxide treatment, it is recommended to bake 120°C/60-120min as to remove any surface moisture before press lamination process. Material should be used within 4 hours after baking.

2.3 Avoid turn over actions in prepreg and core stacking, to reduce possible deformation.

2.4 Press Recommendations

2.4.1 Vacuum press.

2.4.2 Press lamination suggested heating rate 2.5~4°C/min (suggested 3.0~3.5°C/min), material temperatures 80~140°C in the region.

2.4.3 Lamination pressure setting, outer material temperature at about 80~100°C when increasing pressure (Note: The full pressure to use is 400-500PSI).

2.4.4 Curing material temperature above 210°C, and keep at this temperature at above 120min. After curing, cooling rate should be less than 2.5°C/min, material's temperature for die open should be less than 130°C.

2.4.5 If used dummy layer without copper foil or single sided board in multilayer lamination, please roughen the surface of the dummy board or single-sided board, to avoid weak adhesive in bonding strength.

2.4.6 The net dimensional movement of laminate after etching, oxidation and lamination processes is typically shrinkage. This shrinkage is due to the relaxation of stresses that were induced when the laminate was pressed as well as shrinkage contribution from the resin system and glass fabric. Synamic6N/Synamic6NB is reinforced by low Dk Glass, whose shrinkage is larger than the CCLs with normal E-glass yet. The specific data table as follow:

Configuration	Copper thickness	Direction	Shrinkage Ratio (‰)	
			E-glass	Low Dk-glass



Signal/Signal	1oz/1oz	Warp	0.10—0.30	0.80—1.20
		Weft	0.10—0.30	0.10—0.30
Signal/Ground	1oz/1oz	Warp	0.10—0.30	0.80—1.20
		Weft	0.10—0.30	0.10—0.30
Ground/Ground	1oz/1oz	Warp	0.10—0.30	0.80—1.20
		Weft	0.10—0.30	0.10—0.30

2.5 Drilling

2.5.1 New drilling bit is recommended to use when drilling.

2.5.2 After drilling, it's recommend to bake for 3-4 hours at 190°C. Avoid direct contact with heat.

2.5.3 Laser drilling is acceptable, whose specific parameters should be adjusted according to different devices.

2.5.4 LE aluminum or bakelite cushion board is recommended to help.

Table 1: Drilling parameters (reference only)

Diameter		Infeed	Spindle Speed	Retract Rate	Hit counts	Chip load
mm	inch	ipm	krpm	ipm	H	mil/rev
0.20	0.0078	67	95	500	500	0.71
0.25	0.0097	71	95	500	500	0.75
0.30	0.0117	76	95	500	500	0.80
0.35	0.0136	81	95	500	500	0.85
0.40	0.0156	105	63	500	500	1.67
0.45	0.0175	110	60	500	500	1.83
0.50	0.0195	125	62	1000	500	2.02
0.55	0.0214	127	60	1000	500	2.12
0.60	0.0233	130	58	1000	500	2.24
0.65	0.0253	125	55	1000	500	2.27
0.70	0.0272	125	53	1000	500	2.36
0.75	0.0292	125	51	1000	500	2.45
0.80	0.0311	125	50	1000	500	2.50
0.85	0.0331	124	49	1000	500	2.53
0.90	0.0350	123	48	1000	500	2.56
0.95	0.0370	122	47	1000	500	2.60
1.00	0.0389	121	46	1000	500	2.63
1.05	0.0409	121	45	1000	500	2.69
1.10	0.0428	120	44	1000	500	2.73
1.30	0.0506	120	35	1000	500	3.43
1.50	0.0584	115	32	1000	500	3.59
1.70	0.0661	100	28	1000	500	3.57
1.90	0.0739	90	23	1000	500	3.91

Note: Drilling parameters should be adjusted depending on hole size, layer count, panel thickness, stack



count and stack height etc.

2.6 Desmear

- Desmear rate of this material is smaller than most of the existing lead-free compatible FR-4 materials. To achieve a better desmearing, it's recommended to use the following conditions:
- Use plasma at first → followed with ultrasonic rinse → add chemical demear after.
- On the premise of ensuring the desmear effect, the total demear rate is recommended to be controlled less than 0.4mg/cm².

Table 2: Plasma parameters (Refence only)

Parameter	Gas Flow Rate (L/min)			Watts	Time (min)	Temp	Flow Rate	Pressure
	O ₂	N ₂	CF ₄				(SLM)	mTorr
Seg 1	2.25	0.25	0.00	9000	45.0	80.0	2.50	250
Seg 2	2.46	0.24	0.30	6500	15.0	105.0	3.00	220
Seg 3	2.50	0.00	0.00	5000	5.0	100.0	2.50	250

2.7 Punching is not suitable for PCB profiling process, routing is recommended with reduced routing speed. Try to avoid sudden vibration during routing process which may cause board edge detonation.

2.8 Baking is recommended before packing, condition 125°C/4~6h.

2.9 Vacuum sealed with aluminum plastic pack.

3. Soldering

- For finished PCBs, basing on the differences of PCB constructions, the packing and storage condition, the shelf life should change accordingly. Normal shelf life should be finishing assembly within 3 months. After expiration of shelf life, baking is recommended and the condition should be 120-140°C/4-6 hours.
- Applicable for regular lead-free soldering.

4. Design Recommendations

- Due to Fiberglass structure and weft density differences, when manufacturing it's recommended to use symmetrical PCB construction stackup.
- Selected dielectrics and to the adjacent cores must be compatible in bonding, weft and grain directions, as to avoid warpage and deformations.
- A different resin system with a large variation in resin density, therefore, even with the same resin content (RC) if a different resin, the dielectric thickness will be varies. A specific resin content (RC) for an



actual dielectric thickness should consult with Technical Service Engineer.

- During using the Shengyi Synamic 6N/Synamic 6NB material, if you have any questions and suggestions, please feel free to contact Shengyi, and Shengyi will provide you with an efficient and effective technical services.