HONG TAI ELECTRIC INDUSTRIAL CO., LTD.
ELECTRONIC MATERIALS DIVISOIN.
No 2,Kuo-Chien 1 Rd., Kuan-Yin Hsiang Taoyuan, Taiwan R.O.C.
TEL: 03-4833888 FAX: 03-4834553 www.hong-tai.com.tw

HTE-560（FR-4）
Copper clad laminate

● FEATURES：（Nominal Tg150）

1.HTE (High Temp. Elongation) copper foil for fine line and multilayer board (copper<=2oz).
2.Excellent electrical and chemical resistance characteristics.
3.Improved heat resistance and dimensional stability
4.Fluoresced and U.V. Blocked

Characteristics	Unit	Conditioning	Spec	Typical values
Glass transition temp.(Tg)	℃	DSC	>=145℃	150℃
Flammability	-	C-24/23/50+E-24/125	94V-0	94V-0
Moisture absorption	%	D-24/23	<=0.50	0.15
Permitivity 1M HZ(Dk)	-	C-24/23/50 (thickness>0.5mm)	<=5.4	4.2～4.8
Loss tangent 1 M HZ(Df)	-	C-24/23/50(thickness=1.0mm)	<=0.035	0.023
Volume resistivity	MΩ-cm	C-96/35/90	>=10^6	>=10^8
Surface resistivity	MΩ	C-96/35/90	>=10^4	>=10^7
Dielectric breakdown	KV	D-48/50	>=40	60
Arc resistance	SEC	D-48/50+D-0.5/23	>=60	>=120
Thermal stress	SEC	288℃ solder floating	>=10	>=60
Peel strength (1oz)	lb/in	A	>=6.0	9～12
Peel strength (1oz)	lb/in	288℃ 10sec solder floating	>=4.5	>=8
Flexural strength Lengthwise Crosswise	 1000psi 1000psi	A (Board thickness 1.6mm)	 >=60 >=50	 >=70 >=60
Dimensional stability X-Y axis	+/-%	E-4/105+E-2/150(1.0mm thickness)	<=0.03	<=0.03
CTE Z axis – before Tg after Tg	PPM/℃	TMA	- -	60 300
CTE Z axis – 50～260℃	%	TMA	-	4.0%

Note 1: Data shown are for information purposes only and are not guaranteed.
Note 2: The tests were preformed according to IPC test method TM-650 , except some item without IPC test method standard.

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● General product size & thickness:

Thickness Inch (mm)	Copper cladding weight OZ (um)	Typical size Inch mm	Note
0.002 (0.05) to 0.062 (1.57)	0.33 (12) to 2.00 (70)	36.8*48.8 0935*1239 40.8*48.8 1036*1239 42.8*48.8 1087*1239	Class C/M

Note: Special thickness (eg:2.0mm/2.4mm/3.2mm) & special copper cladding (eg:3.0oz /5.0 oz) & special size (eg:40.8inch*42.8inch) are available upon customer request.

● Construction:

Nominal Thickness		Tolerance		IPC4101B Thickness level	Normal construction
mil	mm	mil	mm		
2	0.05	+/- 0.5	+/- 0.013	Class C	106*1
3	0.08	+/- 0.5	+/- 0.013	Class C	1080*1
4	0.11	+/- 0.5	+/- 0.013	Class C	2116*1
5	0.13	+/- 0.7	+/- 0.018	Class C	2116*1
6	0.15	+/- 0.7	+/- 0.018	Class C	1506*1
7	0.18	+/- 1.0	+/- 0.025	Class C	7628*1
8	0.20	+/- 1.0	+/- 0.025	Class C	7628*1
10	0.25	+/- 1.0	+/- 0.025	Class C	2116*2
12	0.30	+/- 1.5	+/- 0.038	Class C	1506*2
14	0.35	+/- 1.5	+/- 0.038	Class C	7628*2
15	0.38	+/- 1.5	+/- 0.038	Class C	7628*2
18	0.45	+/- 1.5	+/- 0.038	Class C	7628*2+1080*1
20	0.50	+/- 2.0	+/- 0.050	Class C	7628*2+2116*1
21	0.53	+/- 2.0	+/- 0.050	Class C	7628*3
24	0.60	+/- 2.0	+/- 0.050	Class C	7628*3
28	0.71	+/- 2.0	+/- 0.050	Class C	7628*4
31	0.80	+/- 3.0	+/- 0.075	Class M	7628*4
36	0.90	+/- 3.0	+/- 0.075	Class M	7628*5
39	1.00	+/- 3.0	+/- 0.075	Class M	7628*5
43	1.10	+/- 3.0	+/- 0.075	Class M	7628*6
47	1.20	+/- 3.0	+/- 0.075	Class M	7628*6
50	1.27	+/- 3.0	+/- 0.075	Class M	7628*7
55	1.40	+/- 3.0	+/- 0.075	Class M	7628*7
59	1.50	+/- 3.0	+/- 0.075	Class M	7628*8
62	1.60	+/- 5.1	+/- 0.130	Class L	7628*8

Note1: Laminate thickness <0.71mm is excluding copper; thickness≧0.74mm is including copper
Note2: Position for thickness measurement shall be no closer than 1 inch from any edge.
Note3: Special thickness (eg:2.0mm/2.4mm/3.2mm) and special construction(eg:1080*2 for 6mil) are available upon customer request.

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HTE-56B（FR-4）
Prepreg(PP)

● FEATURES：

1.Tg≧145℃（Nominal Tg150）
2.Rheology of resin controlled to benefit the lamination of the boards.
3.With multi-functional epoxy resin.

Glass type	Type	Resin content (%)	Resin Flow (%)	Gel time (sec)	Volatile Content (%)
7628	R50	50%+/-3%	32.0+/-5.0	100+/-20	<=0.75
7628	R47	47%+/-3%	28.0+/-5.0	100+/-20	<=0.75
7628	R43	43%+/-3%	23.0+/-5.0	100+/-20	<=0.75
1506	R48	48%+/-3%	27.0+/-5.0	100+/-20	<=0.75
2116	R57	57%+/-3%	36.0+/-5.0	100+/-20	<=0.75
2116	R53	53%+/-3%	30.0+/-5.0	100+/-20	<=0.75
2116	R50	50%+/-3%	26.0+/-5.0	100+/-20	<=0.75
2113	R56	56%+/-3%	30.0+/-5.0	100+/-20	<=0.75
2313	R55	55%+/-3%	27.0+/-5.0	100+/-20	<=0.75
1086(LDP)	R61	61%+/-3%	37.0+/-5.0	100+/-20	<=0.75
1080	R68	68%+/-3%	47.0+/-5.0	100+/-20	<=0.75
1080	R65	65%+/-3%	41.0+/-5.0	100+/-20	<=0.75
1080	R63	63%+/-3%	36.0+/-5.0	100+/-20	<=0.75
106	R73	73%+/-3%	45.0+/-5.0	100+/-20	<=0.75

Note1: prepreg gel time are tested at 171℃ platen
Note2: Special prepreg type (eg:7628R45.106R68) and special fiber glass (eg:1086=1080LDP,3313) are available upon customer request.

● STORAGE

Storage of HTE-56B prepreg should be stored below 20+/-2℃ and 50%+/-10% relative humidity. Temperatures and humidity above recommended conditions should be avoided during shipment and transport of prepreg materials. Prepreg stored below recommended temperatures should be allowed to equilibrate to the above specified conditions for a minimum of eight hours prior to use. A variety of inner layer copper bonding treatments, including oxides, oxide alternative and double-treat coppers, can be used successfully with Hong-Tai materials.

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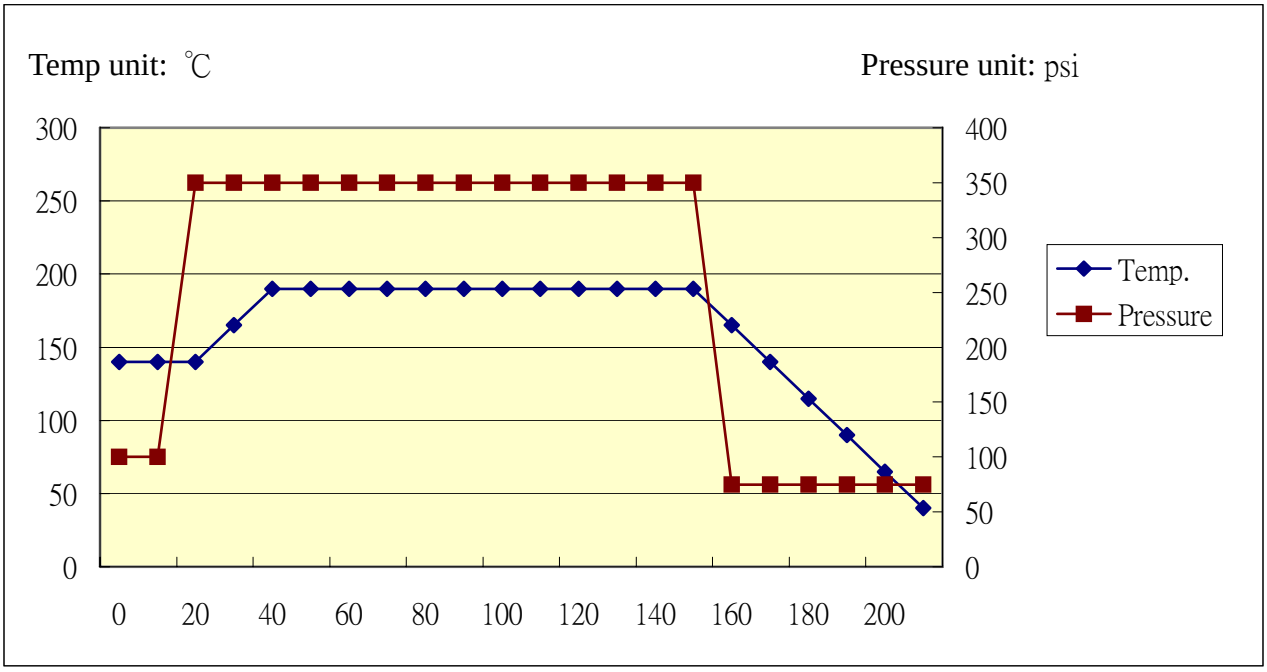
● Recommended press cycles:



Note 1: temperature unit -℃ ; pressure unit – psi
Note 2: 1 psi (pound/inch^2) = 0.0704 Kg/cm^2= 0.0069 MPa (Mega-Pascal)=0.069 bar
Note 3: 140℃=284℉;165℃=329℉;185℃=365℉;190℃=374℉
Suggestions:
1.Heating rate of material between 80℃~130℃,1.0~3.0℃/min (1.8~5.4℉/min) is acceptable.
1.5℃~2.5℃/min (2.7~4.5℉/min) would be better.
It is recommended that optimize heating rate condition according to lay-up and pattern.
2.Temperature of material over 170℃ must be held for at least 50 minutes to allow epoxy resin to fully cure.
3.The pressure should be kept below 100psi(7.04 Kg/cm^2) during cooling to ambient temperature.
4.Cooling rate of material should be kept under 2.5℃/min when the temperature of material is over 100 ℃, in order to avoid introducing twist.
5.It is recommended that apply full pressure between 284psi~426psi(20~30 Kg/cm^2) according to lay-up & pattern.

● Certification UL

1.UL File no: E188094
2.ANSI TYPE: FR4