



GLOBAL LAMINATES, INC.



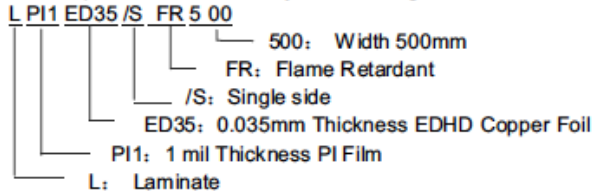
LPI FR Flame Retardant & RoHS Laminates of Polyimide Copper

1. Description & Designation:

LPI FR product consists of PI film clad copper by coating adhesive. It includes various types according to different copper and PI film utilized to meet the specific needs of customers.

Materials		Thickness	Supplier
Base film	Polyimide film	0.5, 1.0 and 2.0 mils (0.0125, 0.025, 0.050mm) etc.	Kaneka, Dupont
Copper Foil	EDHD Copper	1/3, 1/2, 1.0 and 2.0 Oz/SF (0.012, 0.018, 0.035, 0.070mm) etc.	Mitsui, Fukuda
	RA Copper	1/3, 1/2, 1.0 and 2.0 Oz/SF (0.012, 0.018, 0.035, 0.070mm) etc.	Nikko, Olin
Adhesive	Modified epoxy adhesive	Translucence, 0.5 0.7 mils (0.0125 0.017mm) etc.	USA, Japan
Laminate structure		Single side (S), Double sides (D)	

- The ED copper is the type of EDHD and is classified by the treatment surface color: ED as coffee, EDPM as pink; The RA copper is classified by the treatment surface color: RA as pink, RAB as black
- Some special types appointed by customers can also be produced besides the common types of PI and copper listed in the above form.
- LPI FR product is identified by the following method:



2. Features & Applications:

LPI FR products are widely used in the data communication, avionics, aerospace, defense, personal computer and automotive fields. It possesses following features:

- Meet the RoHS requirement and pass SGS certificate.
- High bond strength, excellent electrical properties and good dimensional stability.
- Excellent solderability, good chemical resistant to process chemicals and solvents.
- UL 94V0 approved and UL file No.E192337 for main products.

3. Package

- Standard roll: 50+0.25 square meters or 500+2.0square feet per roll, maximum 2 splices and minimum 20m distance during two splices.
- Standard width: 500mm or 24 inches width except the customer's special instruction within the maximum width 24 inches.
- Inner diameter core: 6 inches (152mm) or 3inches (76mm), packed in carton and outside wrapped with PE film.

4. Storage:

- Storage time: 12 months since production date; please use after inspection again passed for the materials over the storage time.
- Recommended storage condition: temperature 68 86? (about room Temp. and cool no needed), maximum relative humidity 75%.
- Excessive exposure to heat and moisture may cause copper oxidation.



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LPI FR Flame Retardant & RoHS Laminates of Polyimide Copper Data Sheet of Performance

Property To Be Tested	Test Method	Typical Product Value LPI1ED35/S FR	Typical Product Value LPI1RAB35/S FR
Peel strength, minimum, lb./in. width	IPC TM 650 2.4.9		
As received	Method B	9.0	9.0
After sold float	Method D	9.0	9.0
Tensile strength, minimum lb./in. ²	IPC TM 650 2.4.19	24,000	24,000
Elongation, minimum percent	IPC TM 650 2.4.19	40	40
Flexural endurance, minimum cycles	IPC TM 650 2.4.3	In 2000 Out 1500	In 2000 Out 1500
Creasing endurance, minimum cycles	JIS C5016 1994 8.7	MD: ≥90 TD: ≥90	MD: ≥90 TD: ≥95
Adhesive Appearance	By eye	Translucence	Translucence
Adhesive Thickness	Q000463	0.023mm	0.023mm
Dimensional stability, maximum, percentage,	IPC TM 650 2.2.4 Method B Method C	+ / 0.20 + / 0.20	+ / 0.15 + / 0.15
Solder float	IPC TM 650 2.4.13 Method A Method B	500? 30seconds Pass 550? 30seconds Pass	500? 30seconds Pass 550? 30seconds Pass
Flammability	IPC TM 650 2.3.8.1	UL94V 0	UL94V 0
Chemical resistance, percentage	IPC TM 650 2.3.2	80	80
Dielectric constant, maximum (at 1 MHz)	IPC TM 650 2.5.5.3	3.50	3.50
Dissipation factor, maximum (at 1 MHz)	IPC TM 650 2.5.5.3	0.018	0.018
Volume resistivity, minimum, megohm cm	IPC TM 650 2.5.17	10 ⁹	10 ⁹
Surface resistance, minimum, megohms	IPC TM 650 2.5.17	10 ⁵	10 ⁵
Dielectric strength, minimum, volts/mil	ASTM D1 49	2500	2500
Insulation resistance, minimum, megohms, at ambient	IPC TM 650 2.6.3.2	10 ⁵	10 ⁵
Moisture and insulation resistance, minimum, megohms	IPC TM 650 2.6.3.2	10 ⁵	10 ⁵
Moisture absorption, maximum, percent	IPC TM 650 2.6.2	4.0	4.0

Mark: Above data sheet are base on the typical products values. The final data for specific products supplied, please check the testing report attached with the shipment. These data are only for user's reference. The user should determine the suitability of JJFlex LPI FR materials for each application.