Adhesivless Polyimide Copper Clad Laminate ESPANEX® M Series

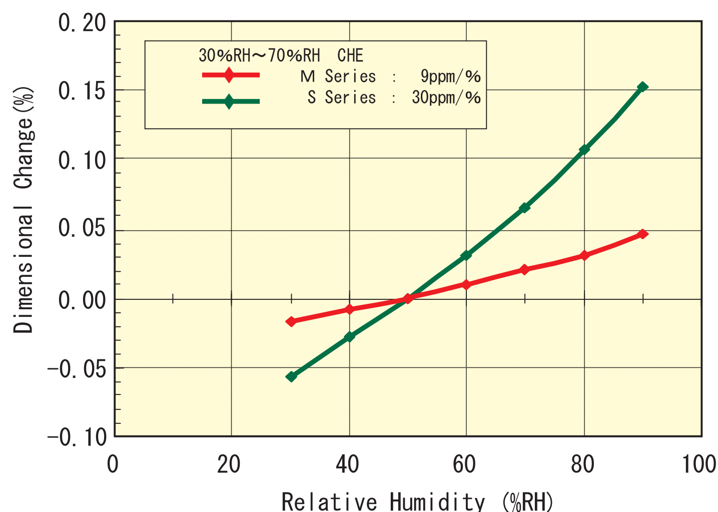
Fleatures of ESPANEX®M Series

- Excellent Fine Line Capability
  Smooth Metal to Polyimide Interface
- Excellent dimensional stability in circuit manufacturing process
  Low Moisture Absorption Polyimide
  Low CHE (Coefficient of Humidity Expansion)
- High Reliability under Hard Circumstance
  High Reliability under High Temperature and Humidity.
- Excellent folding endurance

Table. Properties*

Property		Unit	Single Sided CCL		Double Sided CCL		Test Method
			S series	M Series	S series	M Series	
PI Tensile Strength		MPa	330	390	280	310	IPC-TM-650, 2.4.19
PI Elongation		%	75	45	55	40	
PI Tensile Modulus		MPa	4300	7500	4300	7100	
PI Propagation Tear Strength		kN/m	2.3	5.7	2.3	5.7	ASTM D 1922
Peel Strength	Side A	kN/m	1.4	1.3	0.9	1.3	JIS C 5016 B
	Side B	kN/m	–	–	0.9	1.4	
Dimension Stability After Etching (3σ)	MD	%	X±0.04	X±0.02	X±0.04	X±0.02	IPC-TM-650, 2.2.4(B)
	TD	%	X±0.04	X±0.02	X±0.04	X±0.02	
Dimension Stability After heating (3σ)	MD	%	X±0.04	X±0.02	X±0.04	X±0.02	IPC-TM-650, 2.2.4(C)
	TD	%	X±0.04	X±0.02	X±0.04	X±0.02	250℃, 30min
Dielectric Constant(1MHz)		–	3.5	3.0	3.5	3.0	IPC-TM-650, 2.5.5.3
Dissipation Factor(1MHz)		–	0.007	0.006	0.007	0.006	
Dielectric Constant(14.5GHz)		–	3.3	3.1	3.3	3.1	Cavity Resonator
Dissipation Factor(14.5GHz)		–	0.017	0.006	0.017	0.006	Perturbation
Moisture Absorption		%	1.6	0.7	1.6	0.7	23℃, 50%RH, 24h

Coefficient Humid Elongation (at 23℃)



Soldering Durability**

Material \ Exposure Period	After Dried 0 day	After 40℃/90%RH 4 Days	After 40℃/90%RH 8 Days
S Series (Double sided)	400℃	230℃	220℃
M Series (Double Sided)	400℃	310℃	300℃

**Test Method: Solder Bath Dipping for 10 Seconds

Nippon Steel Chemical Co., Ltd.