HITACHI CHEMICAL

Low Dielectric Constant & Low Dissipation Factor Multilayer Material for RF & High-Speed Applications

MCL-LX-67Y
GXA-67Y(prepreg)

Hitachi Chemical Co., Ltd.
PWB Materials Business Unit

Attn. The data shown here are based on the technical information and available as of Apr. 2004
and not intended to guarantee the quality. The contents may be revised as necessary according to new findings.

General Properties of Laminates

Table Characteristics of Laminates

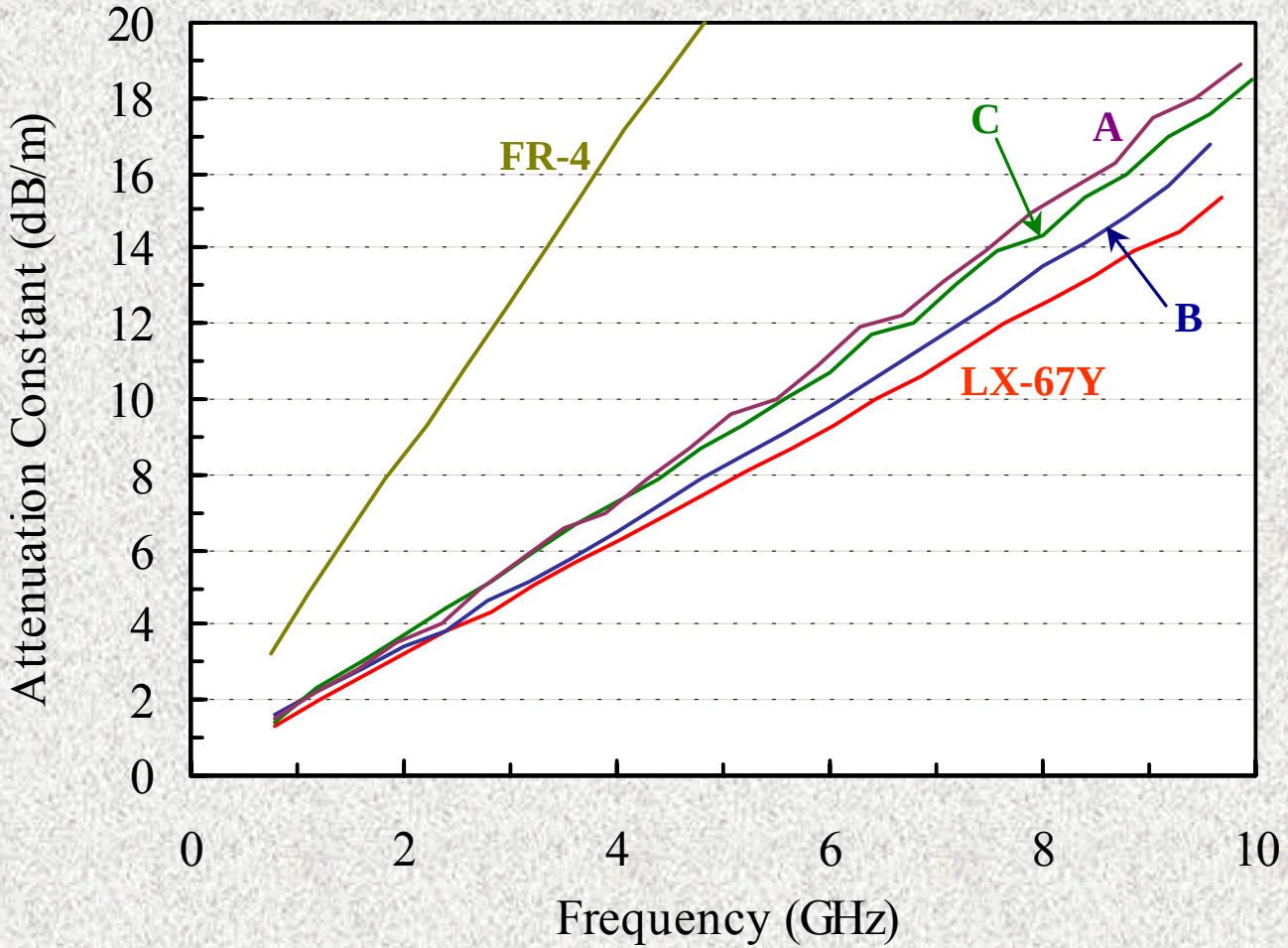
Item	Cond.	Unit	**LX-67Y**	Material A	Material B	Material C	FR-4
Glass Fabric Type	–	–	E	E	E	E	E
Dielectric Constant (Dk)*1	1GHz	–	3.45～3.55	3.71	3.65	3.55	4.20
	3GHz		3.45～3.55	3.69	3.64	3.54	4.10
Dissipation factor (Df)*1	1GHz	–	0.0048～0.0055	0.0058	0.0055	0.0063	0.0215
	3GHz		0.0058～0.0065	0.0074	0.0068	0.0081	0.0230
Copper Peel Strength(18μm)	Standard (Rz:7-9μm)	kN/m	–	1.5	0.9	0.9	1.5
	VLP (Rz:2-3μm)		1.0～1.1	<0.9	<0.5	<0.5	1.1
Glass Transition Temperature(Tg)	TMA	℃	185～190	180	185	171	130
CTE	αx1	ppm/℃	14～15	15	16	18	16
	αz1		50～55	62	84	65	60
	αz2		280～300	236	360	194	282
Flexural Modulus	A	GPa	18～19	21	17	18	20
	200℃		10～15	8	5	6	4
Flexural Strength	A	MPa	590～620	498	358	384	500
	200℃		200～250	97	132	185	85
Heat Resistance	260℃/20s*2	–	>5h	4h	4h	4h	3h
	288℃/20s*3		>168h	–	–	–	>168h
Water Absorption	PCT-5h	wt%	0.45～0.50	0.45	0.40	0.50	1.10
	C-168/40/90		0.25～0.30	0.28	0.26	0.24	0.43
CAF Restraining Property*4	–	h	>1000	–	–	–	>1000
Hole Wall Roughness*5	–	μm	10～20	15～25	15～20	–	15～25
Flammability	UL-94	–	V-0	V-0	V-0	V-0	V-0
Prepreg	–	–	available	available	available	available	available

*1) Triplate-line resonator by Network Analyzer(25℃), *2) Moisture treatment cond.:PCT(121℃/0.22MPa), *3) Moisture treatment cond.:40℃/90%RH
*4) TH/TH wall apart 0.3mm, cond.:85℃/85%RH, applied 100V, *5) Drilling cond.:φ0.4mm, 80000rpm, 2400mm/min, 10000hits

High-Frequency Property (Transmission Loss)

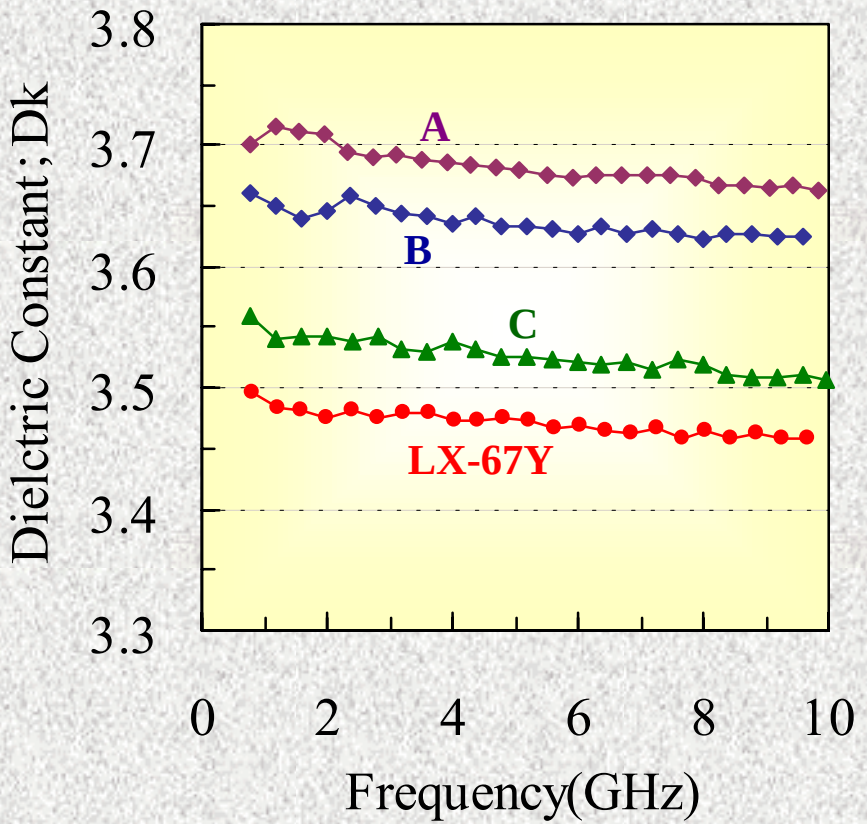
< Measurement Conditions >

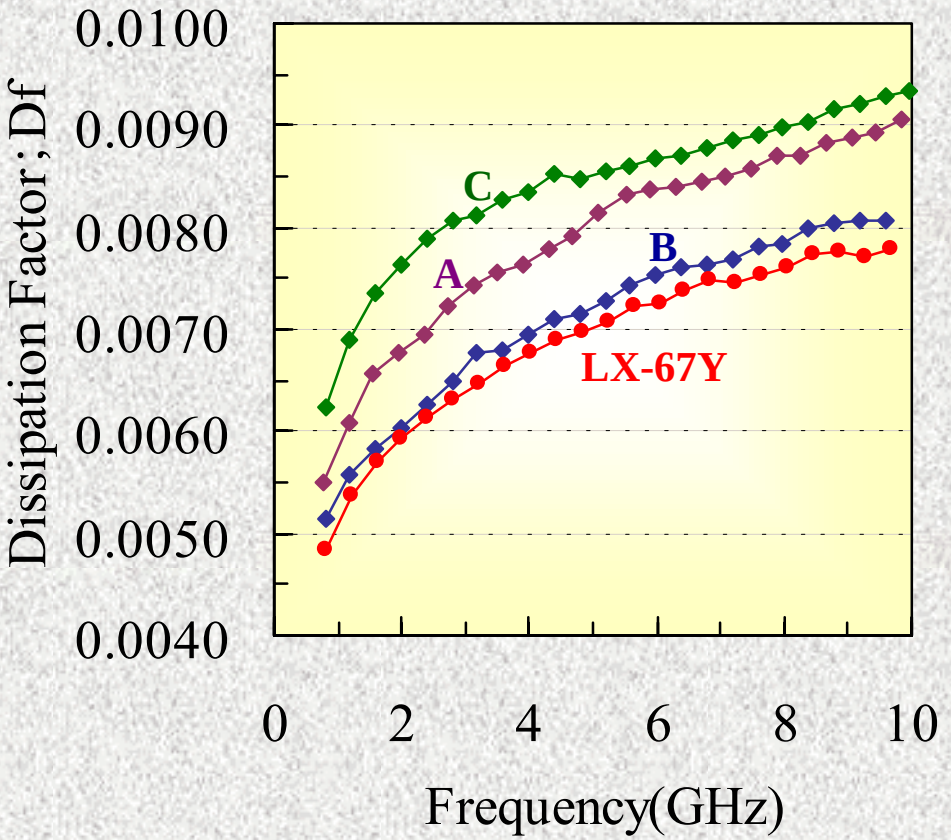
/ Triplate-Line Resonator Method(S_{21}) by Vector Network Analyzer
/ Temperature & Humidity: 25°C / 60%RH
/ Laminate Thickness: 0.8mm(Signal/Ground: 800μm), Copper foil: 18μm
/ Signal Conductor Line Width: 1mm(Zo: approx.50Ω)



Dielectric Properties (vs. Frequency)

< Measurement Conditions >
/ Triplate-Line Resonator Method(S_{21}) by Vector Network Analyzer
/ Temperature & Humidity: 25°C / 60%RH



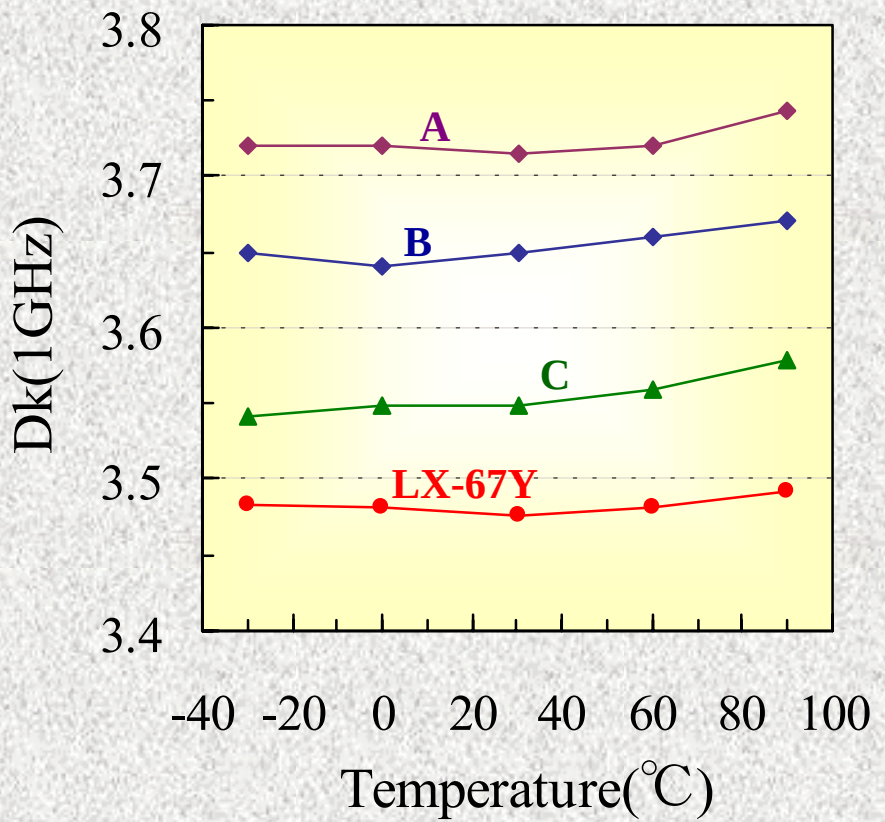


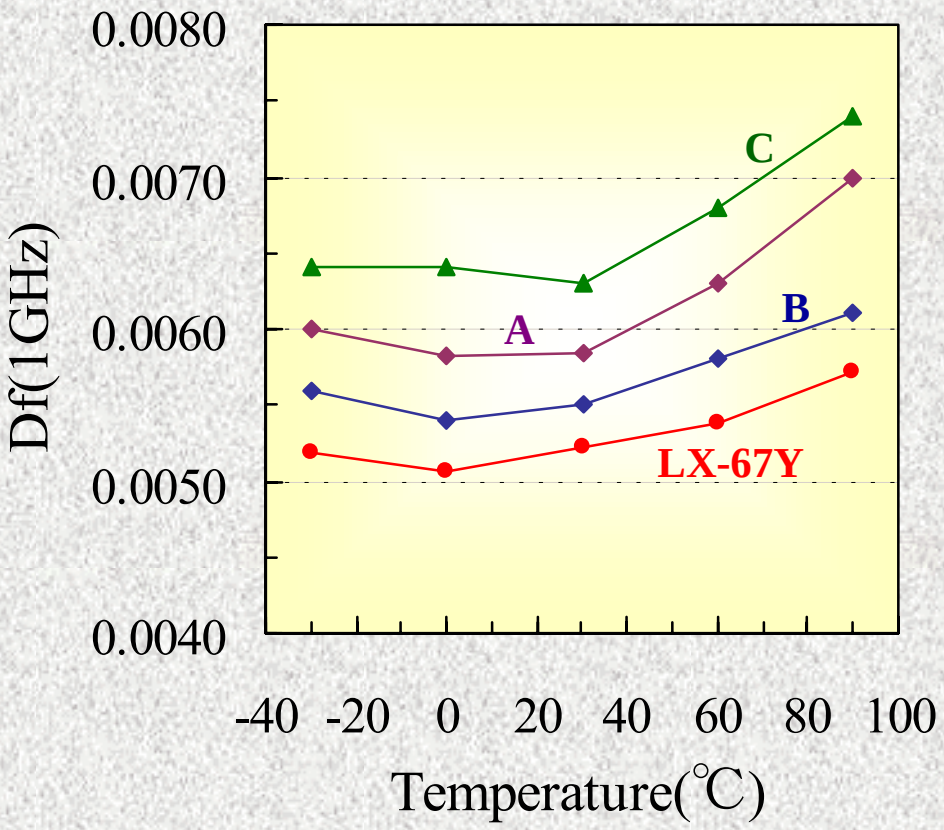
Dielectric Properties (vs. Temperature)

< Measurement Conditions >

/ Triplate-Line Resonator Method(S_{21}) by Vector Network Analyzer

/ Temperature Range: -30～90℃



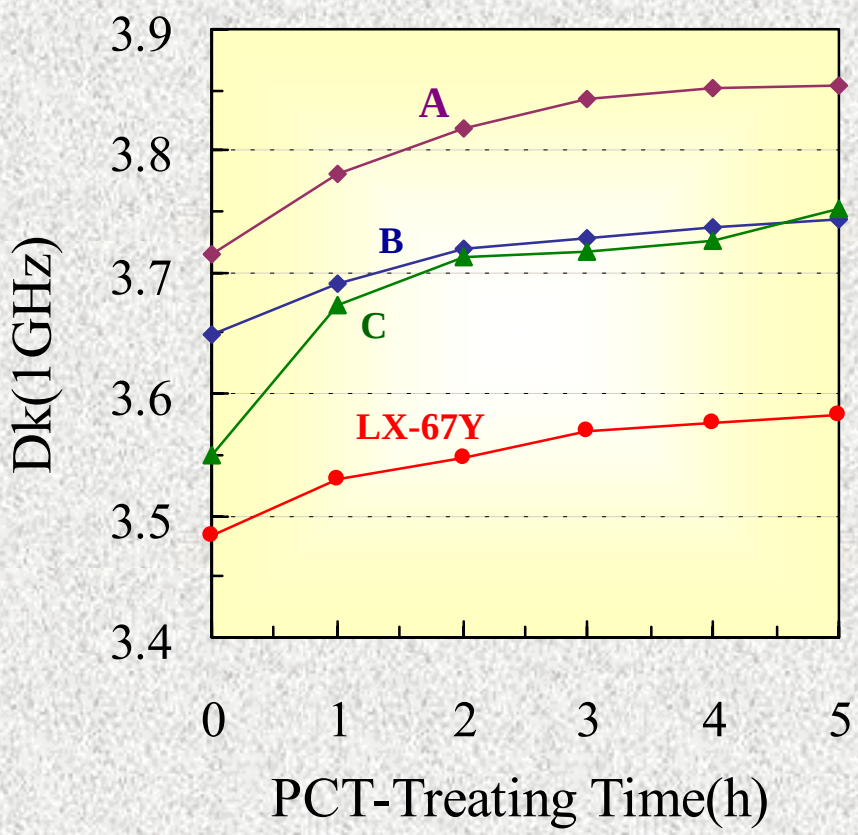


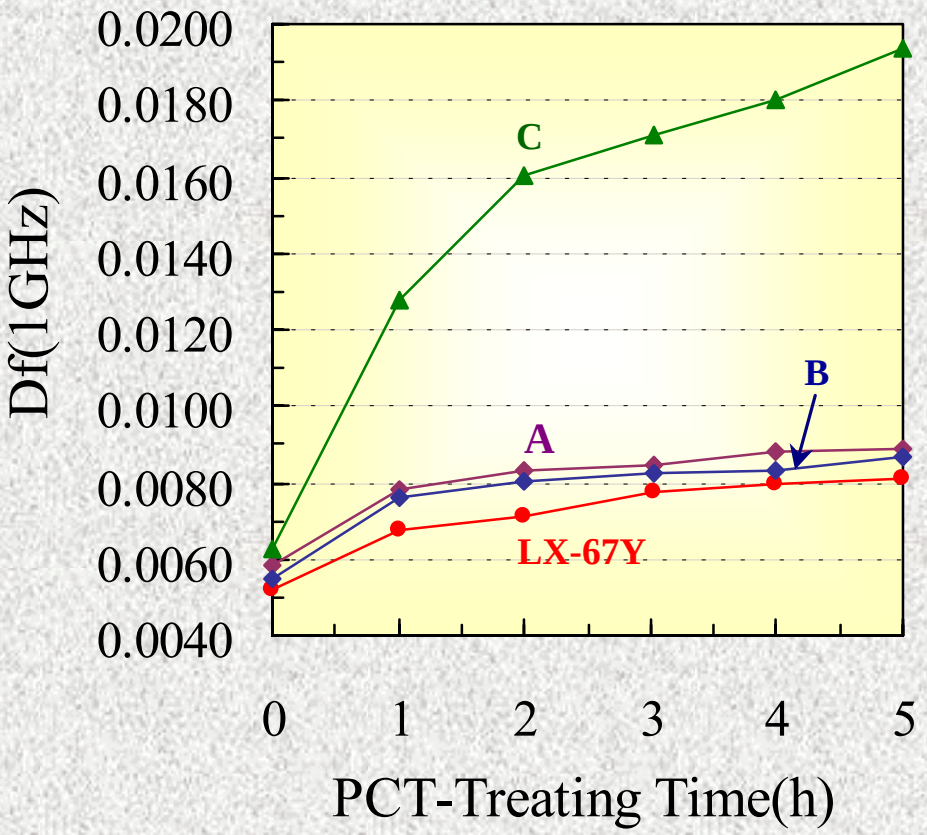
Dielectric Properties (vs. Moisture Absorption)

< Measurement Conditions >

/ Triplate-Line Resonator Method(S_{21}) by Network Analyzer

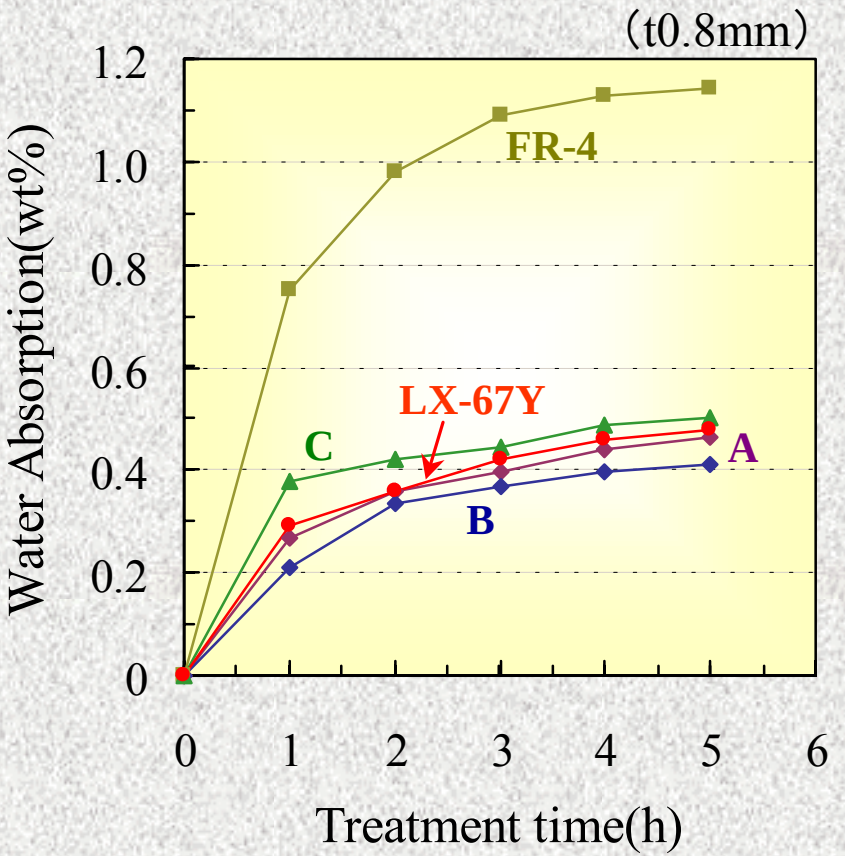
/ Moisture Absorption Treatment : PCT-1～5h(121°C/0.22MPa)



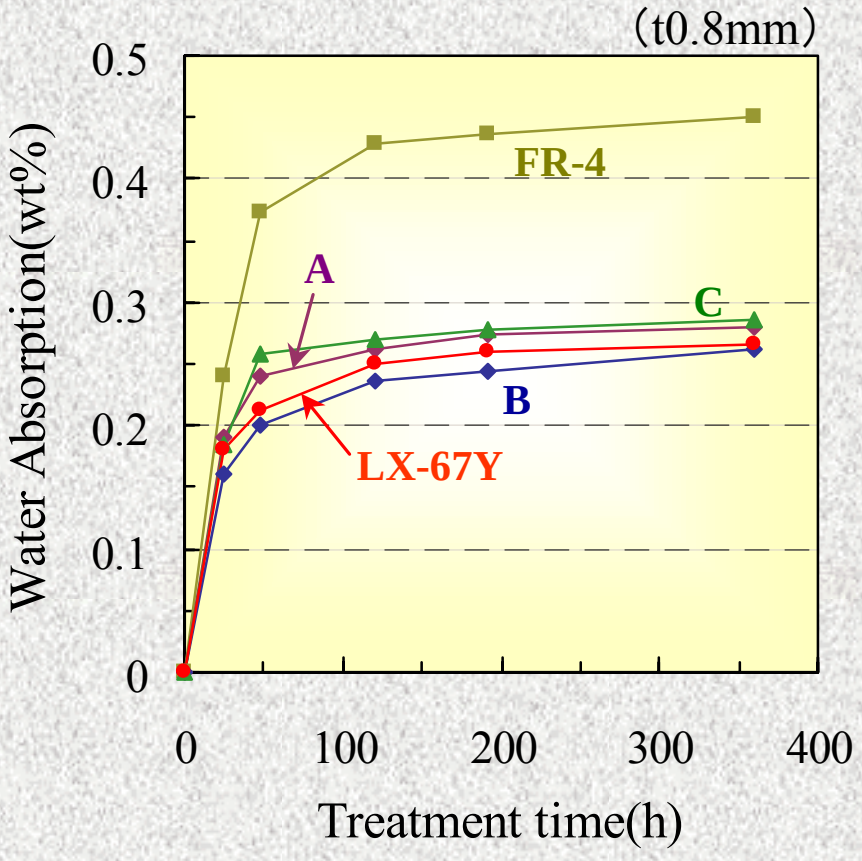


Water Absorption

PCT(121℃/0.22MPa)

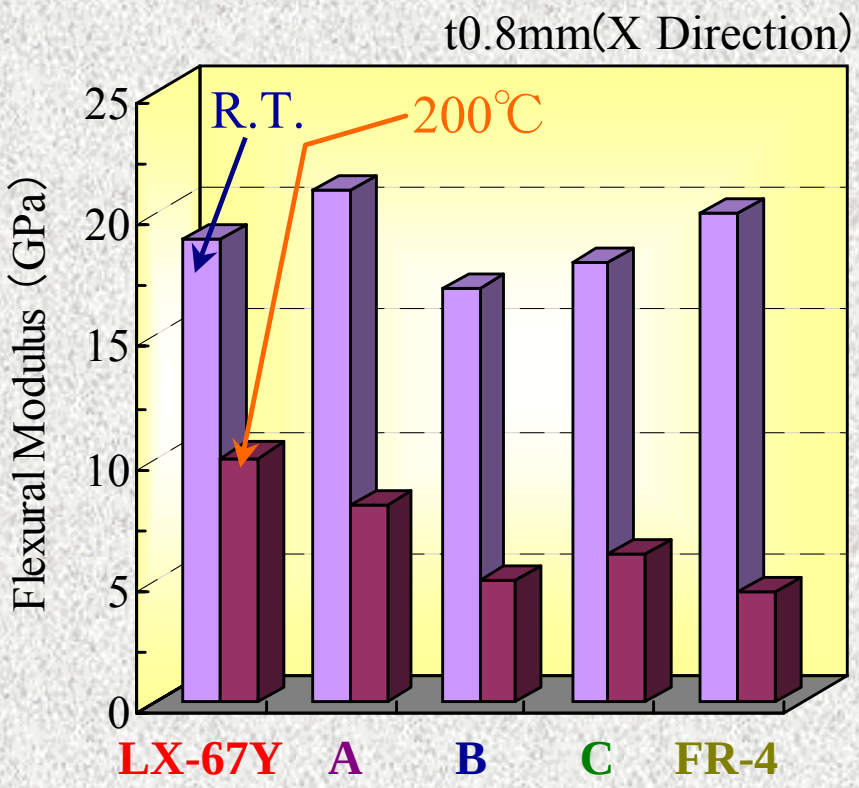


40℃/90%RH

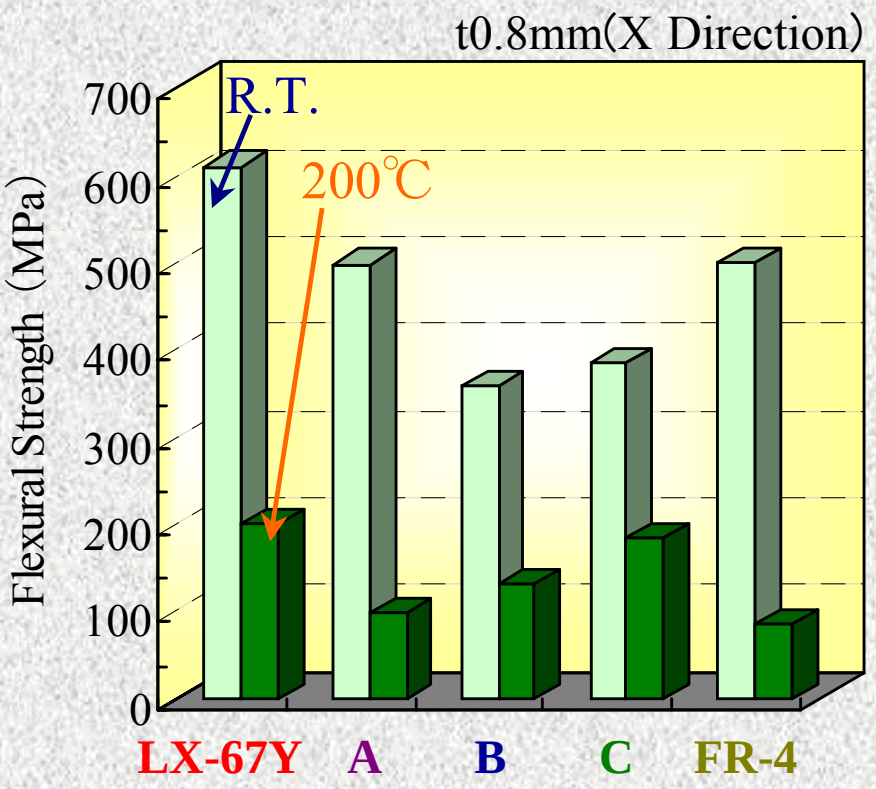


Mechanical Properties

Flexural Modulus



Flexural Strength



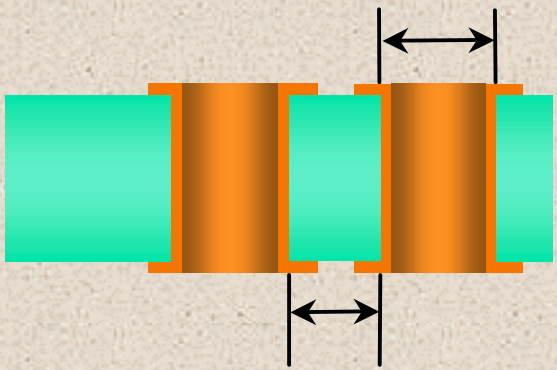
Insulation Reliability (CAF Preventing Property)

CAF : Conductive Anodic Filaments

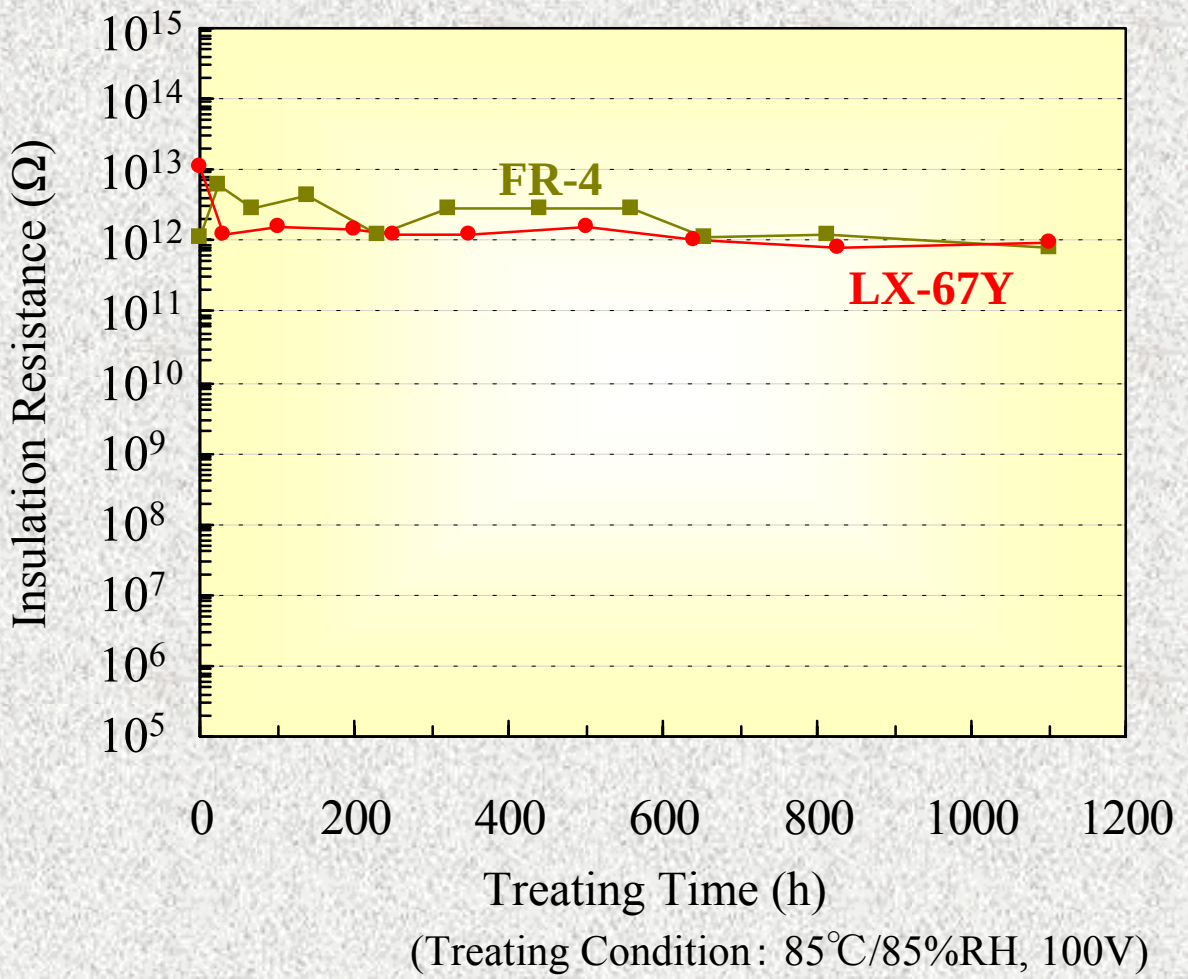
< Conditions >

- 85℃ / 85%RH, 100V
- t0.8mm (Cu : 18μm)

Diameter : ϕ0.4mm



TH/TH distance : 0.3mm



(Treating Condition : 85℃/85%RH, 100V)

Electrical Performance in High Frequencies

Approach to the Evaluation

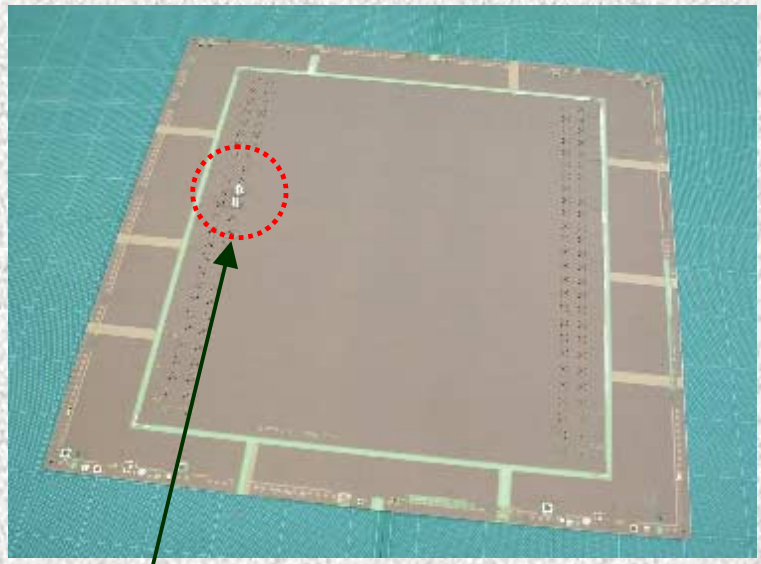
＜ Contents of Evaluation ＞

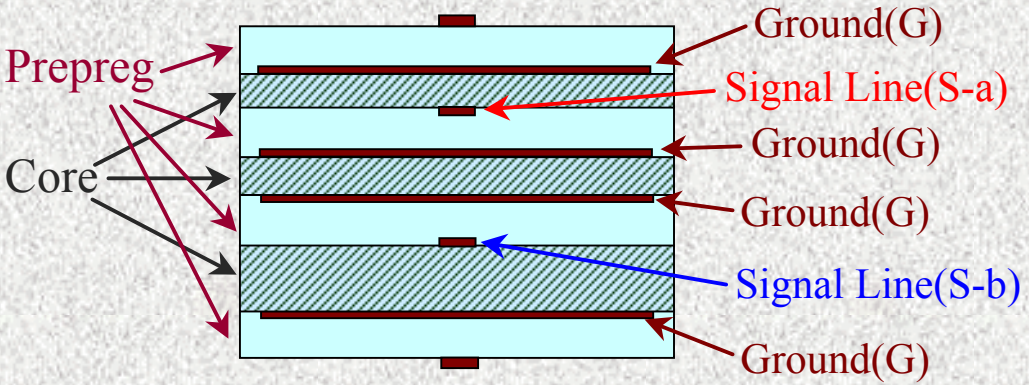
①Transmission Loss ②Eye Pattern Diagram

＜ Specifications of Testing Board ＞

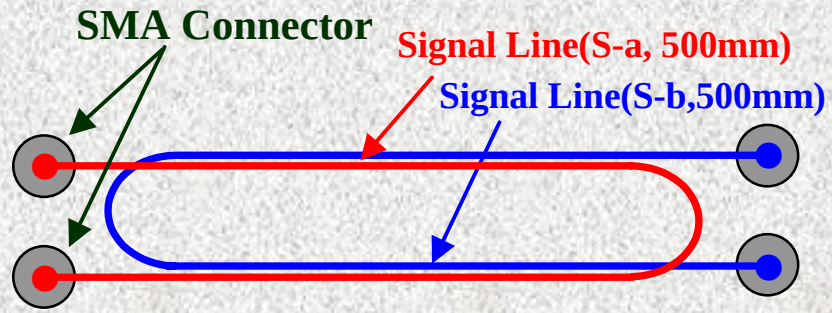
/Size：510mm × 510mm
/Layer Count：8 Layers
/Line Structure:Strip-line
/Dimension Parameters
- **Line-Width：0.06～0.184mm**
- **Dielectric Thickness(G/G)：0.16～0.32mm**
- **Conductor Thickness：approx.12, 18, 35, 70 μm**
- **Line-Length：500mm**

/Connector：SMA(φ3.5mm)
/Connection(SMA/TH)：Solder joint





Layer structure



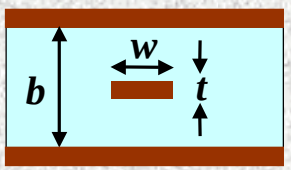
Line Layout

Electrical Performance in High Frequencies

Transmission Loss（S-Parameter(S21)）

＜ Measurement Conditions ＞

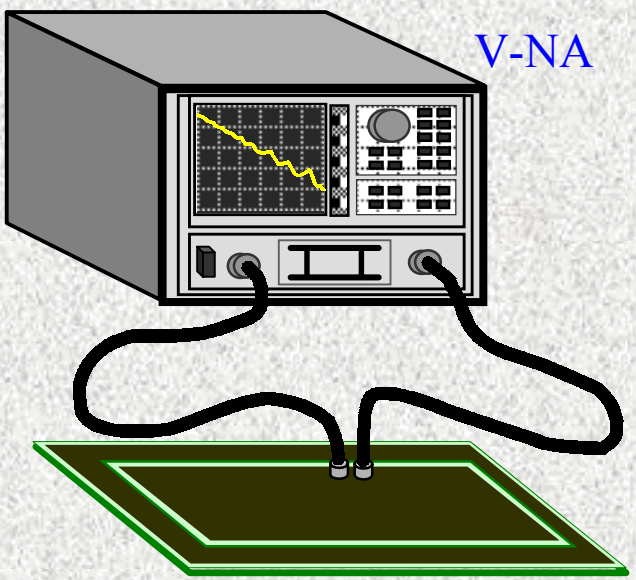
/ Materials：LX-67Y vs. Conventional FR-4
/ Temperature & humidity：25℃／60%RH
/ Dimension Parameters

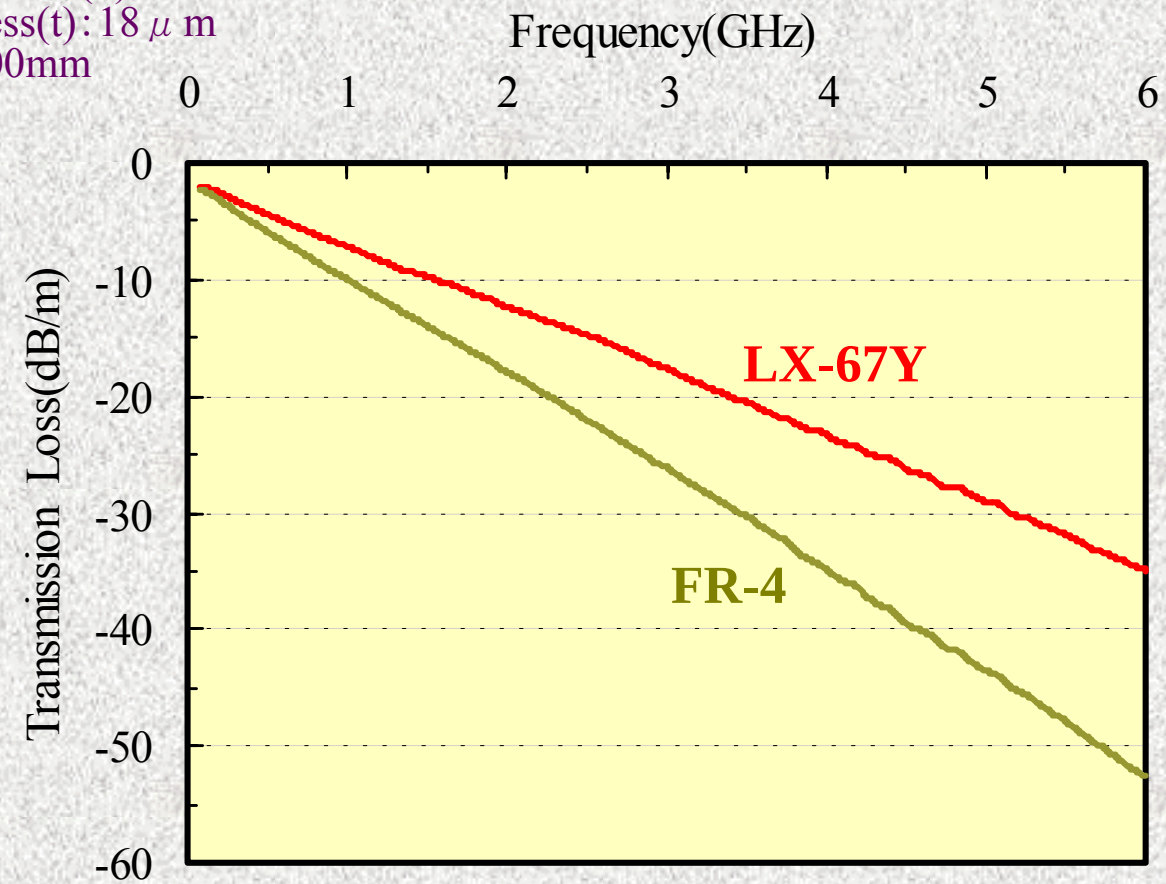


・Line-Width(w)：0.138mm(LX-67Y)/0.124mm(FR-4)
・Dielectric Thickness(b)：0.22mm
・Copper Thickness(t)：18μm
・Line-Length：500mm

/ Characteristic Impedance：50Ω

＜ Evaluation System ＞





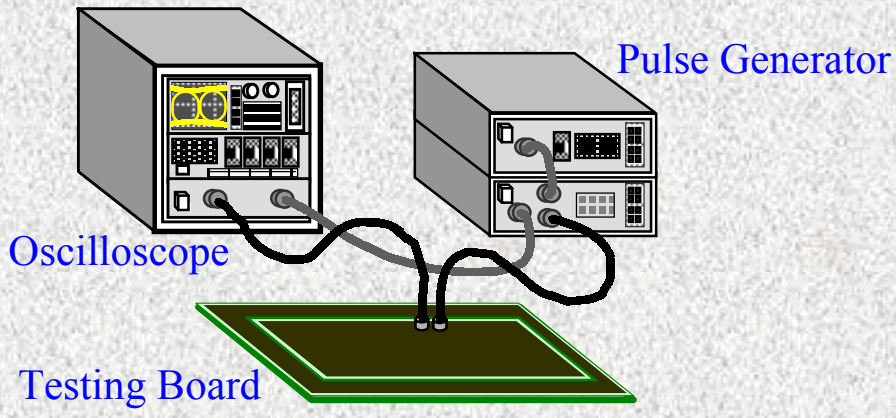
Electrical Performance in High Frequencies

Eye Pattern Diagrams

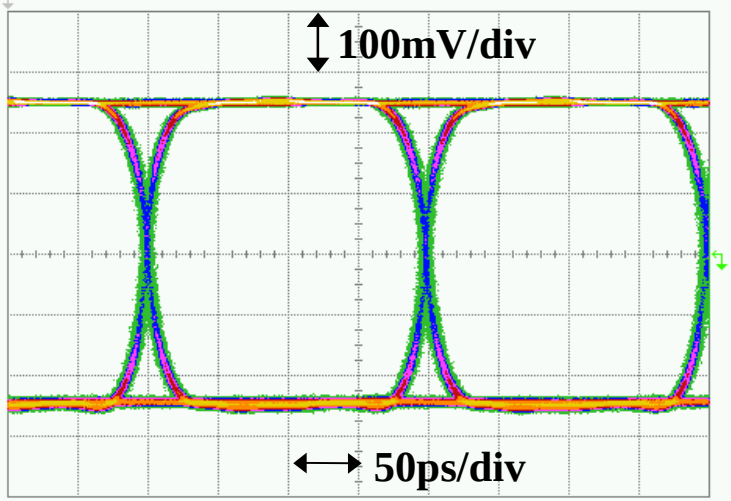
< Measurement Conditions >

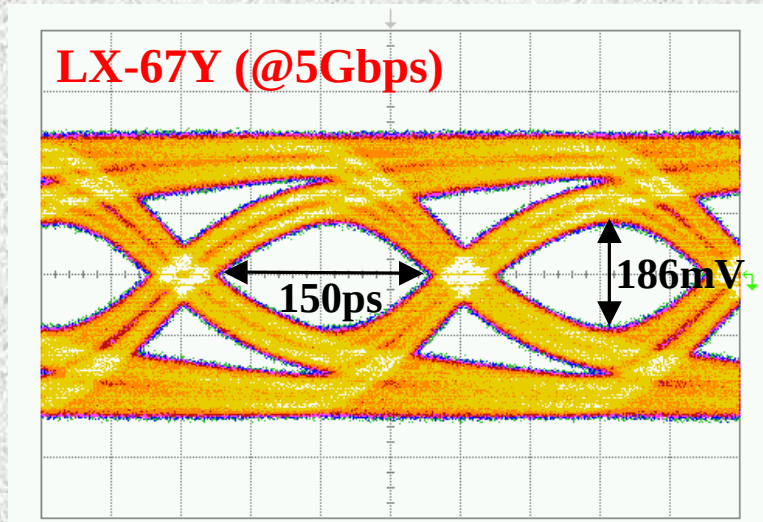
/ Same as the Preceding Sheet

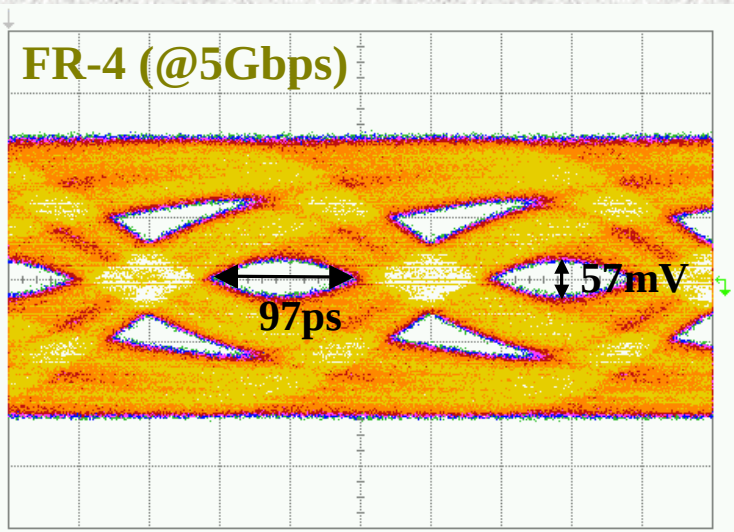
< Evaluation System >



Input Pulse(Bit Rate : 5Gbps)

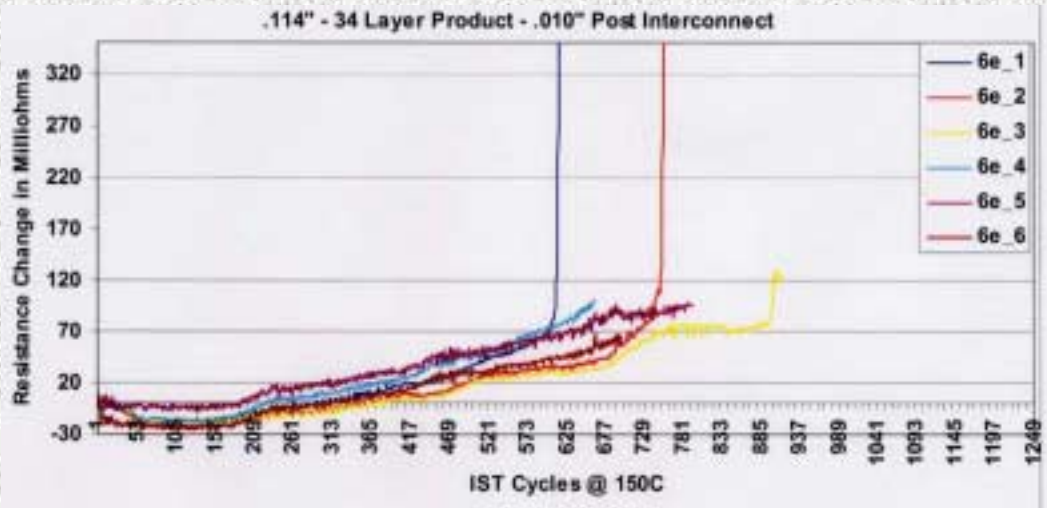






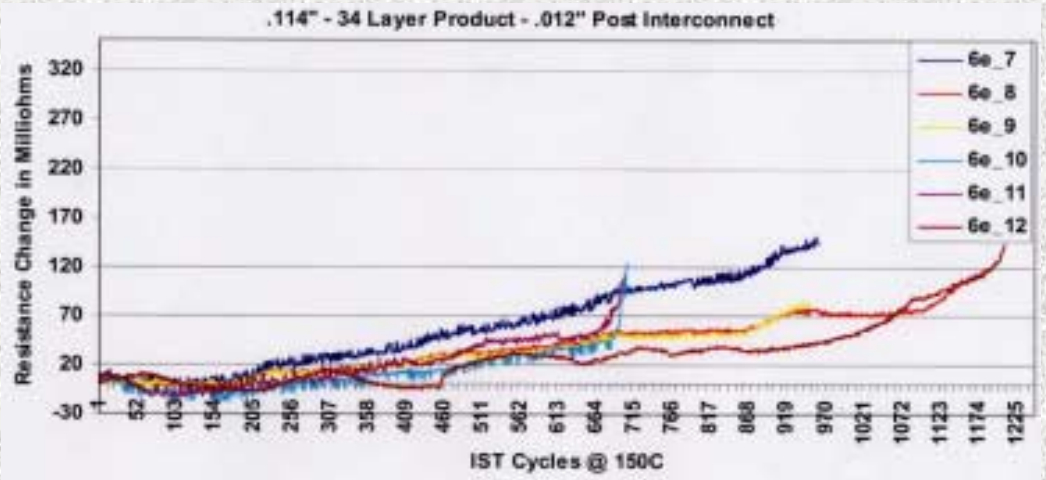
◆ Interconnection Reliability (IST Testing)

Test condition ; 150℃, 3min←→ 25℃, 2min PWB (LX-67Y) ; 34 layer



φ 0.25mm(.010") Vias		
No.	IST cycle to fail	Failure mode
1	613	Interconnect
2	753	〃
3	916	PTH Barrel
4	663	〃
5	794	〃
6	699	〃
mean	740	

The traditional mean performance baseline of 225 cycles



φ 0.30mm(.012") Vias		
No.	IST cycle to fail	Failure mode
7	971	PTH Barrel
8	1193	〃
9	957	〃
10	706	Interconnect
11	699	〃
12	1244	〃
mean	962	

The traditional mean performance baseline of 225 cycles

Good Interconnection Reliability

Product Line-Up of MCL-LX-67Y & GXA-67Y

MCL-LX-67Y(Laminate)

Nominal Thickness *1 (mm)	Copper Foil (μ m)	Tolerance (mm)
0.06	12 18 35 70	±0.01
0.10		±0.01
0.13		±0.02
0.20		±0.02
0.26		±0.03
0.40		±0.04
0.60		±0.06
0.80		±0.10
1.00		±0.10
1.20		±0.12
1.60		±0.13

*1 Thickness not listed above will be available at a customer's request.

GXA-67Y(Prepreg)

Nominal Thickness(mm)	Glass Style	Type Name	Resin Content(wt%)
0.03	#1037	YZNC	70±2
0.06	#1080	YUQC	61±2
0.08	#3313	YGHB	54±2
0.10	#2116	YAGB	52±2

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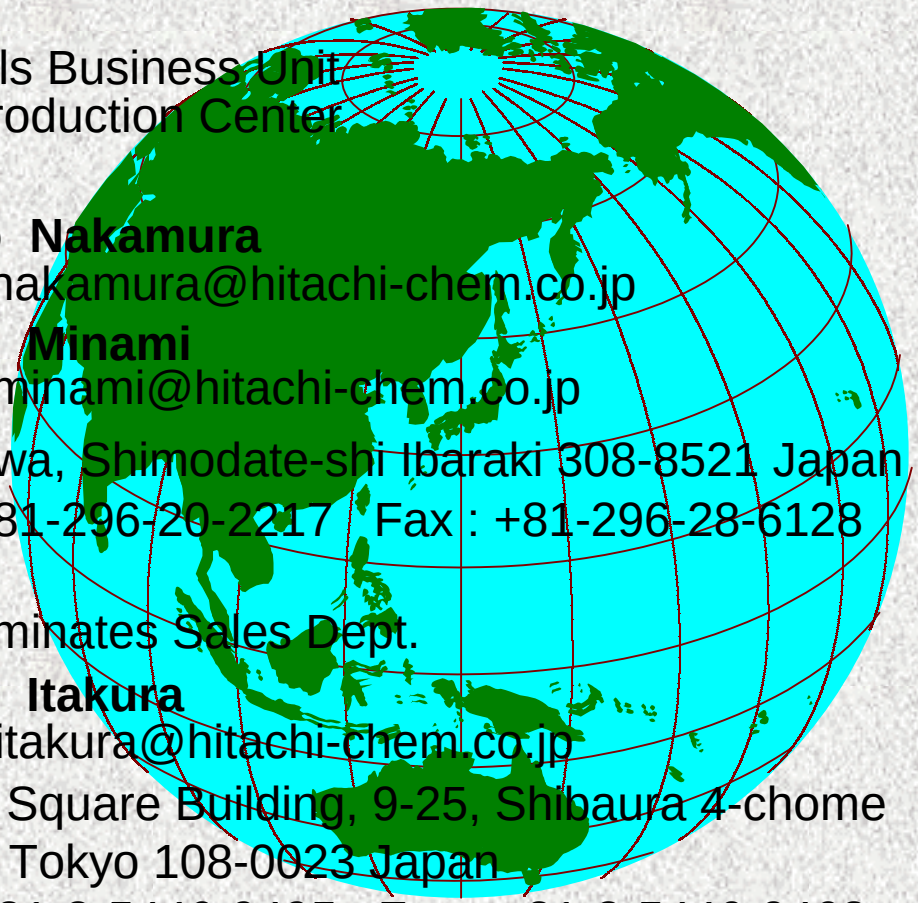

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