

# Properties of MEGTRON6

## 1. Basic Properties

## 2. Electrical Properties

- Transmission Loss
- Dk/Df

## 3. Reliability

- CAF test (85°C85%50V)
- Insulation resistance between layer to layer (85°C85%50V)
- Thermal cycle test (-65°C⇔125°C)
- Solder float test (288°C10s × 6times)

## 4. Process Conditions

## 5. Line up

*2005.Sep.*

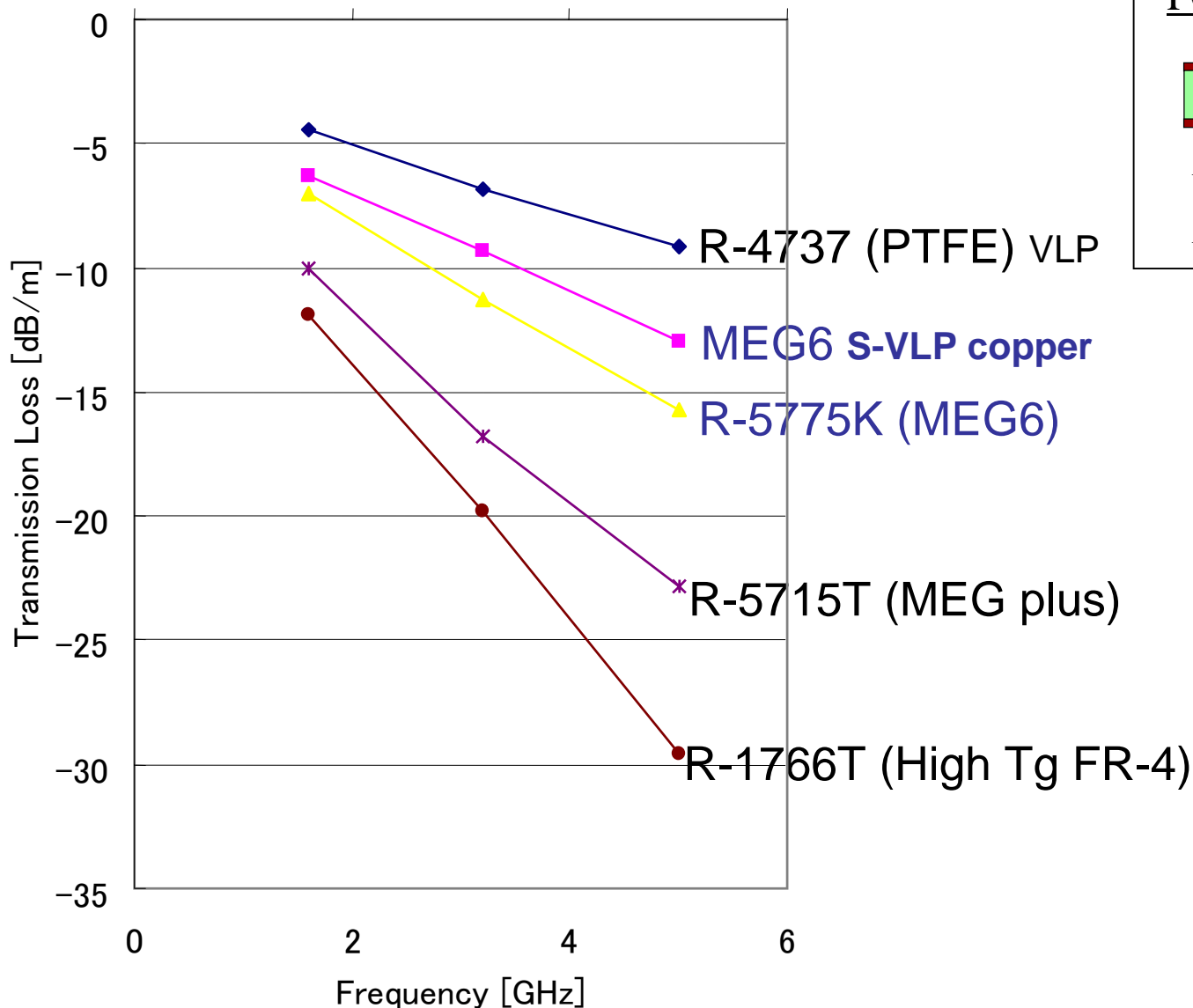
***Matsushita Electric works,LTD.***

# 1. Basic Properties

Item	Measuring Condition	Unit	Treating Condition	MEGTRON 6	MEGTRON 5	High Tg FR-4
				R5775K	R5755	R1766T
Dk	2GHz (IPC TM-650 2.5.5.5)	-	A	3.5	3.5	4.1
Df		-	A	0.002	0.004	0.017
Tg	DMA	°C	A	210	200	200
Z-CTE	$\alpha$ 1	ppm/°C	A	45	60	60
Copper peel Strength	S-VLP 1.0 oz.	lbs/in	A	4.6	-	-
	Conventional 1/2 oz.	lbs/in	A	6.3	5.7	9.1
T-260	-	min.	A	>120	>120	20
Oven Heat Resistance (1H)	-	°C	A	260	260	240
Flexural Strength	Fill direction	MPa	A	420	470	490
Flexural Modulus	Fill direction	GPa	A	19	17	21
Flamability	UL	-	A and E-168/70	94V-0	94V-0	94V-0

### 2-1. Transmission Loss

at R.T.



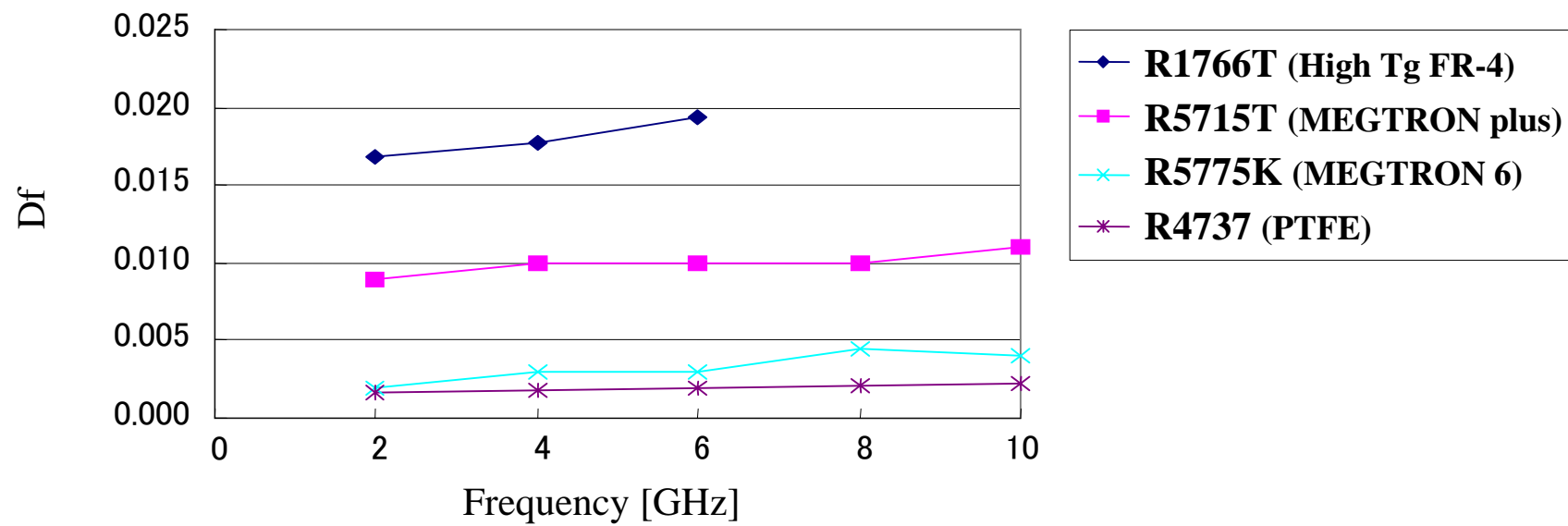
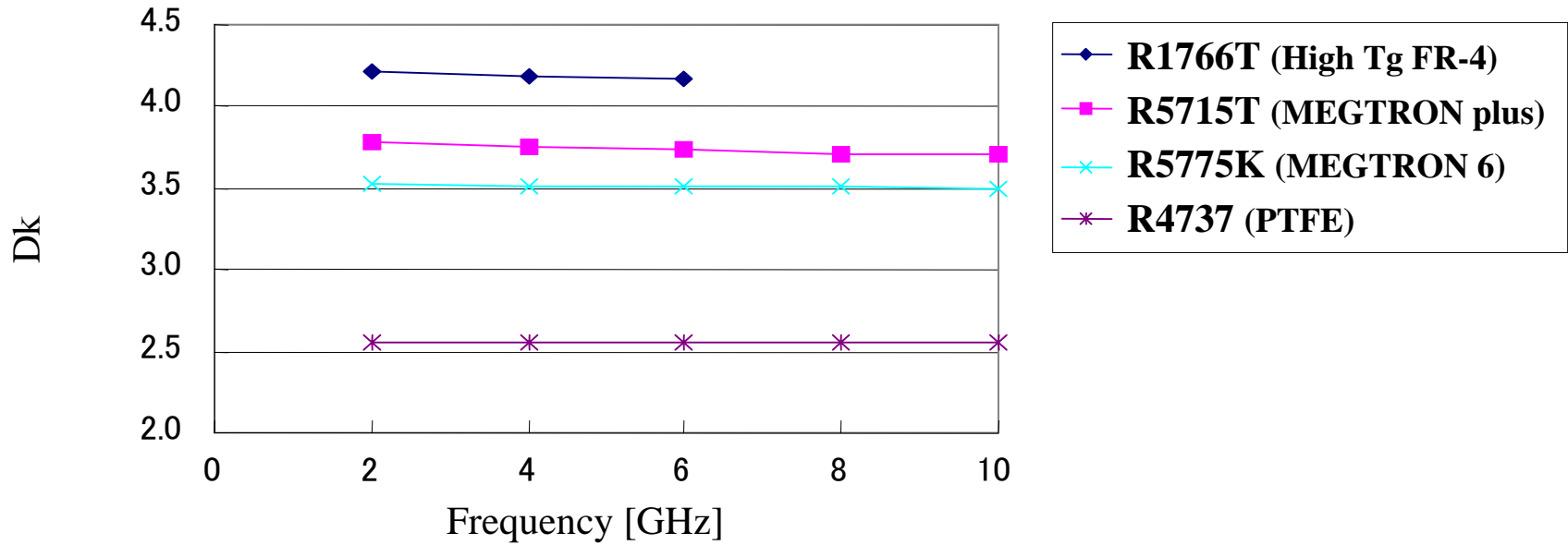
#### PCB construction



Line length : 1m  
Cu Thickness : 35  $\mu$ m  
Impedance : 50  $\Omega$

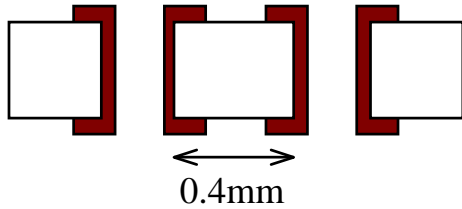
VLP copper

## 2-2. Dk/Df (IPC TM-650 2.5.5.5)



**3-1. CAF test (85°C85%50V)**

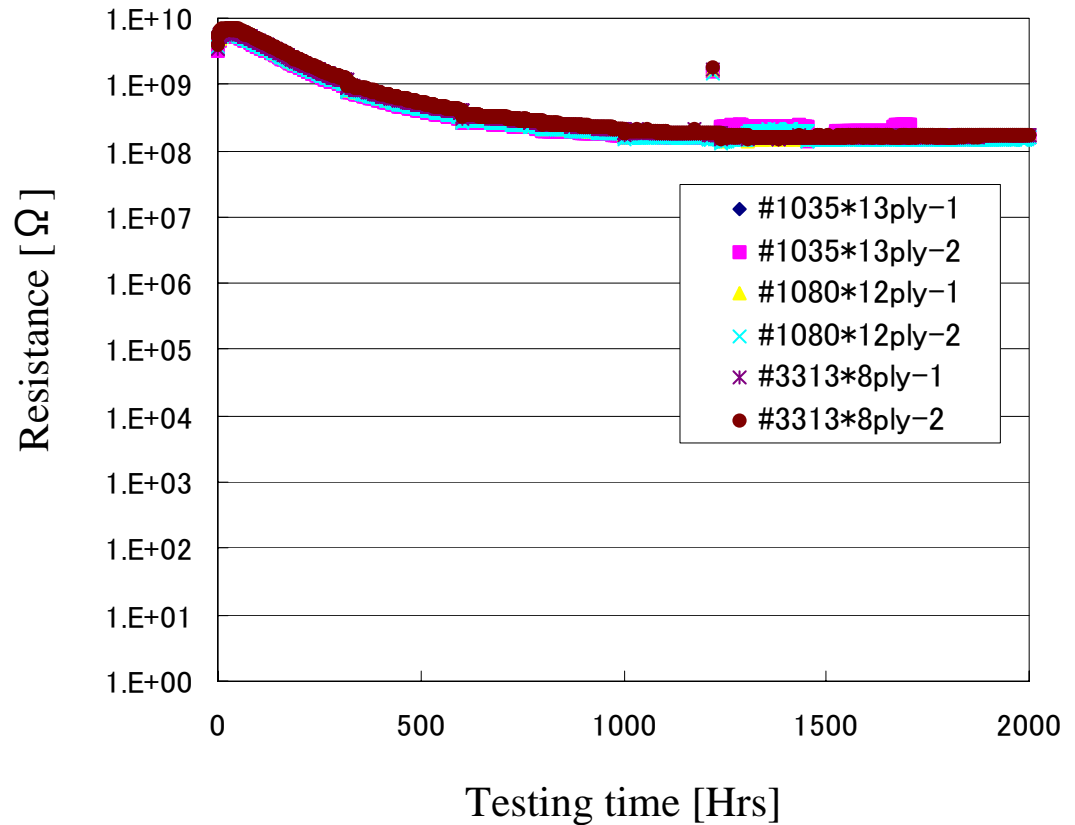
① Test pattern



Sample thickness 0.75mm  
 Through-hole diameter 0.25mm  
 Construction #1035 \* 13ply  
                   #1080 \* 12ply  
                   #3313 \* 8ply

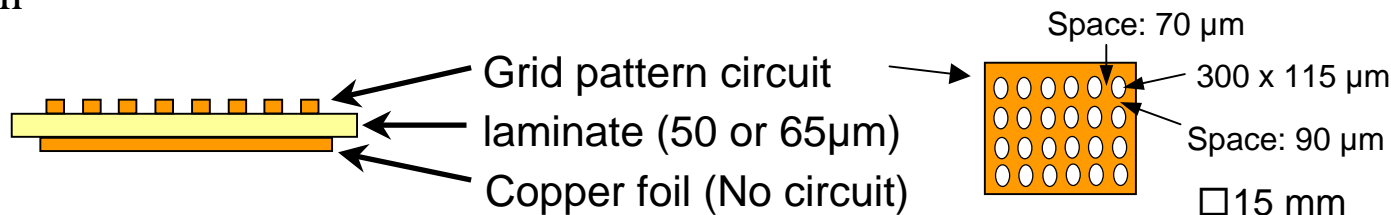
Number of through hole pairs on each board  
 = 50 pairs (Grain 25pairs, Fill 25pairs)

② Result

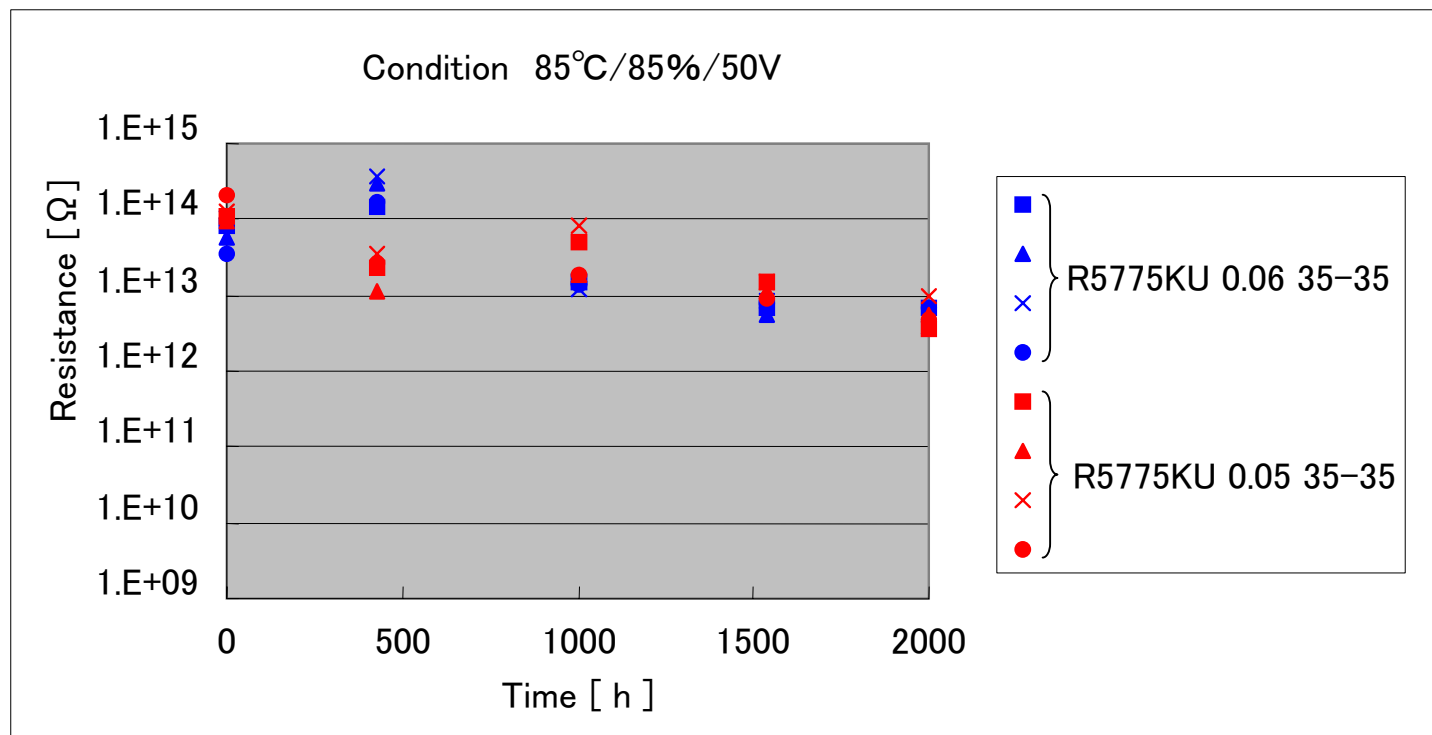


### 3-2. Insulation resistance between layer to layer (85°C/85%/50V)

#### ① Test Pattern



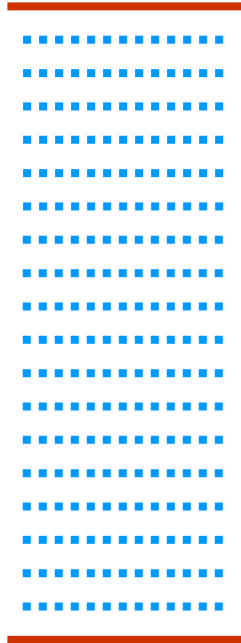
#### ② Result



\* Resistance with Continuous measurement > 1E+12

### 3-3. Thermal Cycle Reliability

#### ① Construction



Copper foil (1/2oz)

Total Thickness 2mmt

TH Diameter 0.3mm

Copper Plating 15 μ m

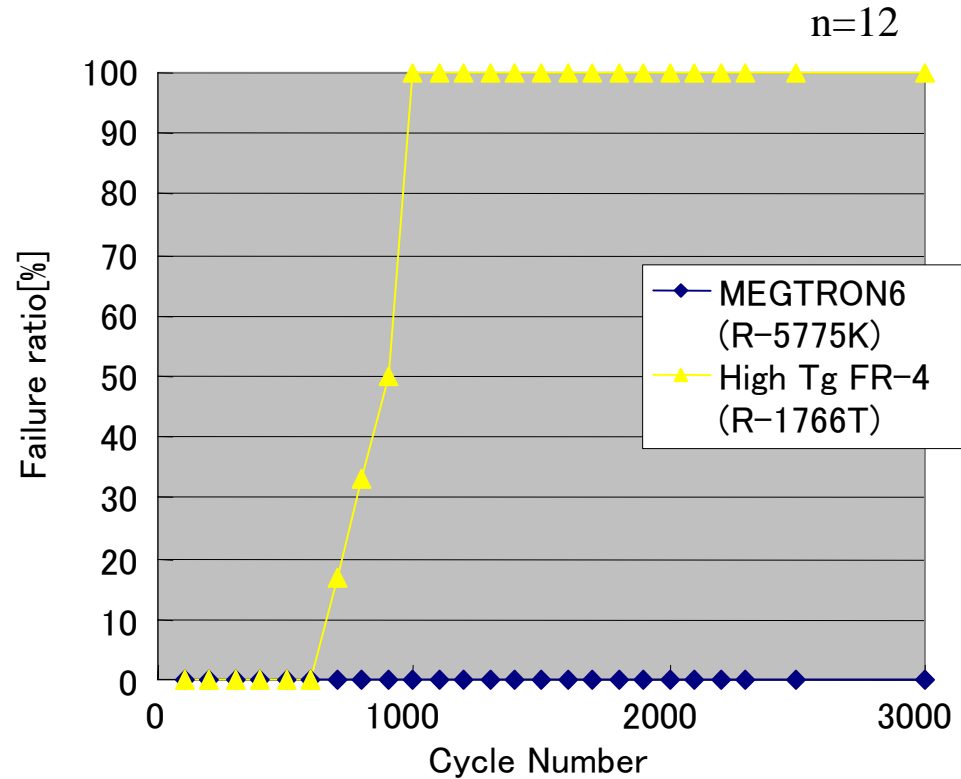
Daisy chain 160 Holes

n=12

#### ② Test condition

-65C/30min ↔ 125C/30min

#### ③ Result

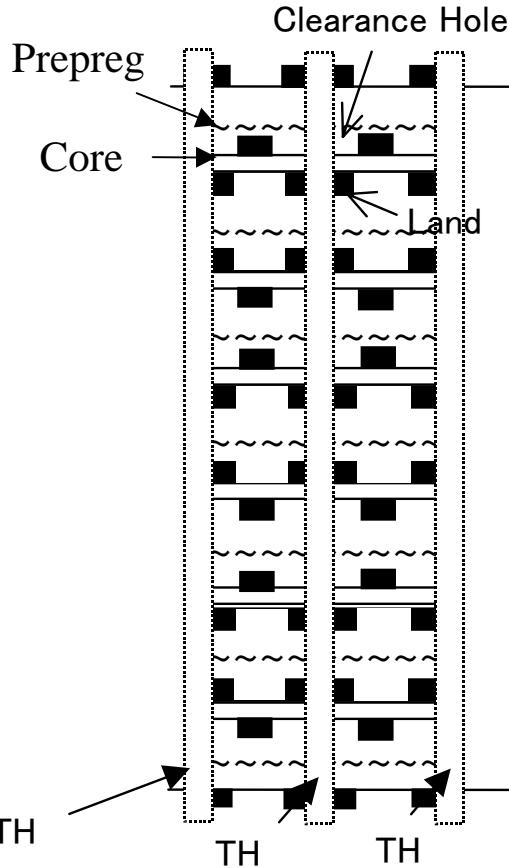


\*Failure is over 10% changes of resistivity

### 3-4. Solder float test (288°C10s × 6Times)

#### ① Test pattern

- Thickness : 3mm
- Layer count : 14layers



- L1 PP #1080 69% \*2ply
- L2 Core 0.3 35-35
- L3 PP #1080 69% \*2ply
- L4 Core 0.3 35-35
- L5 PP #1080 69% \*2ply
- L6 Core 0.3 35-35
- L7 PP #1080 69% \*2ply
- L8 Core 0.3 35-35
- L9 PP #1080 69% \*2ply
- L10 Core 0.3 35-35
- L11 PP #1080 69% \*2ply
- L12 Core 0.3 35-35
- L13 PP #1080 69% \*2ply
- L14 PP #1080 69% \*2ply

#### ② Process Condition

- Desmear : Twice of FR-4 condition by KMnO4
- Cu thickness of TH : 15-25 μ m
- Entry board : W sheet (by showa denko)  
#WS10030-25 μ  
\*equivalent to LE sheet (by Mitsubishi)
- Back up board : Bakelite

Table. Drill parameter

Drill φ [mm]	PN of Drill	Feed [m/min]	Roatation Speed [krpm]	Chip Load [μ /rev.]	Hit Number [Hits]
0.25	NEU L026	1.22	100	12.2	500
0.3	NHU L020	1.65	100	16.5	600
0.5	UC L155E	2.29	81.2	28.2	1,200
0.8	UC35	3.08	52	59.2	700

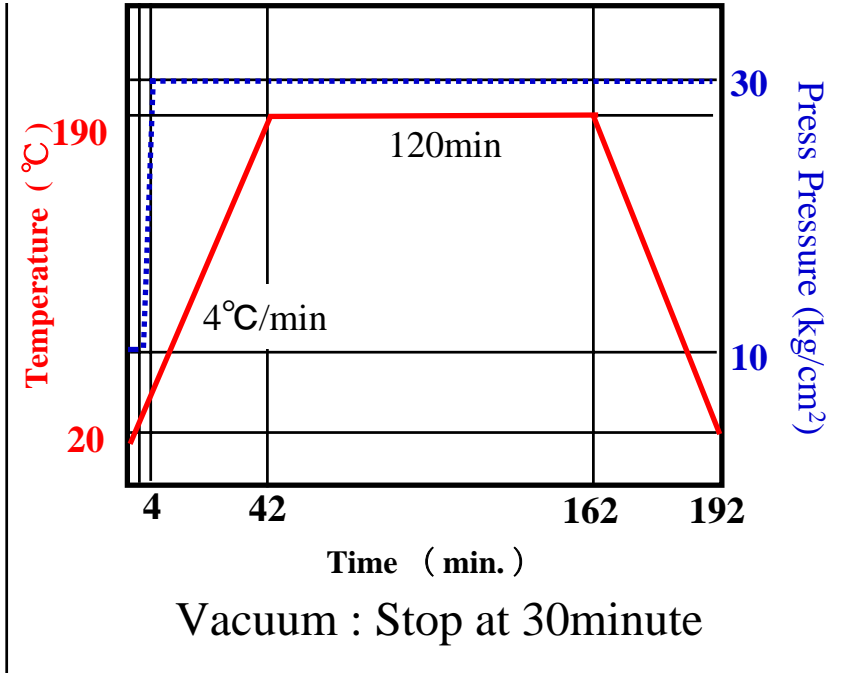
Drill Diameter [mm]	Land Diameter [mm]	Clearance Hole Diameter [mm]	Pitch [mm]
0.25	0.51	0.66	0.76
0.3	0.56	0.815	0.89
0.5	0.76	1.015	1.27
0.8	1.435	1.69	2.54

#### ③ Result

- No Abnormality
- Slight resin recession

### 1) Press Condition

#### Set point Conditions



#### Points

- ROR of Material : over 4.0°C / min (100-140°C)
- Pressure : 30kg/cm<sup>2</sup> (425 psi) at the very start of temp ramp up. (Example about 4min after starting)
- Material Temp. should be kept at over 185°C (365 °F) and for over 75min
- Cool down to R.T., keeping 30kg/cm<sup>2</sup> pressure
- Vacuum : for 30 min after initial cycle start and stop vacuum
- Press pads for Pressure evenness is needed. (Sheets of Craft paper etc.)
- Pressure is optimized according to Circuit Pattern by our customers.

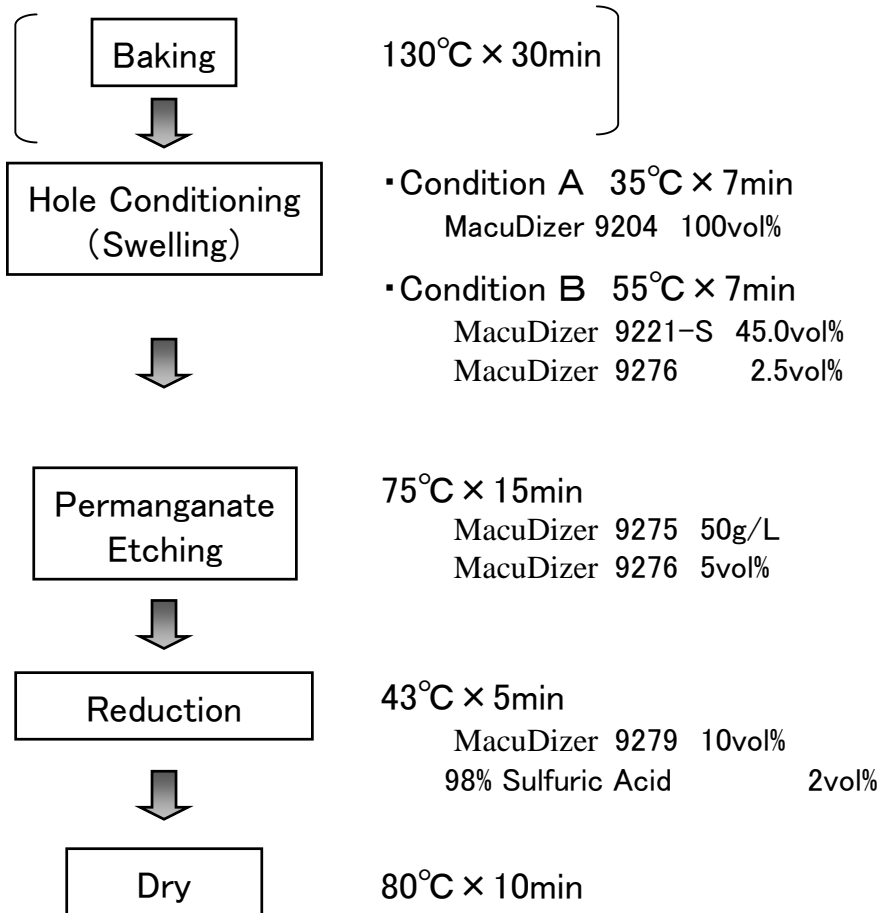
## 2) Drill Parameters

Drill Diameter	Speed	Feed	Chip Load
inches	K-rpm	inches/min	mils/rev
0.0098	100	48	0.48
0.0118	100	62	0.62
0.0138	100	71	0.71
0.0157	100	78	0.78
0.0117	92	85	0.93
0.0197	82	90	1.09
0.0217	75	92	1.23
0.0236	69	94	1.37
0.0256	63	96	1.51
0.0276	59	101	1.72
0.0295	55	107	1.95
0.0315	52	122	2.37
0.0335	49	127	2.62
0.0354	46	126	2.75
0.0374	43	119	2.75
0.0394	41	113	2.75

### 3) Desmear Rate

#### ① Test Condition

Agent : Mac Dermid



#### ② Result

(mg/dm<sup>2</sup>)

	Condition A (9204)	Condition B (9221-S)
MEGTRON6	2.2	3.8
FR-4 (1766)	13.5	11.6

\* Size of specimens = 100mm × 100mm × 0.4mmt

#### 4) Inner Copper Treatment

##### Recommendation

- Multibond (Mac Dermid) or Alternatives of Multibond
- CZ + CL8301 (MEC) ••• Surface treatment is needed.

		Multibond	CZ8101 +CL8301	B/O + Reduction
Supplier		Mac Dermid	MEC	Hitachi
Inner Peel Strength	lbs/in	2.60	4.60	1.71
Solder Heat Resistance 260°C 20s dip after boiling	Boiling Time	2h	○○○○	○○○○
		4h	○○○○	○○○○
		6h	○○○○	○○○○
Cu Surface		Organic coating		Cu2O

#### 5) Outer Copper Treatment

Japan Energy (Gould) JTM series

\*Gould is under preparation.

##### Other Recommendation

• Mitsui Oak 3EC-M2 series

\*\*Circuit Foil TWS is being tested

0.004	3313	54%	1	3.7
0.005	2116	54%	1	3.7
0.005	1080	57%	2	3.7
0.006	1080	63%	2	3.5
0.008	3313	54%	2	3.7
0.010	2116	54%	2	3.7
0.012	3313	54%	3	3.7
0.015	3313	54%	4	3.7
0.020	2116	54%	4	3.7
0.025	2116	54%	5	3.7
0.030	2116	54%	6	3.7

1080	63 <del>±5</del>	3.5
3313	54 <del>±3</del>	3.7
2116	54 <del>±3</del>	3.7
2116	56 <del>±3</del>	3.7

1078 72% and 1078 75%

are under testing.

Copper : Normal 3/8, 1/2, 1.0, 2.0 ounce

MLP 3/8, 1/2 ounce (1.0 ounce is available)

S-MLP 1.0 ounce

\*0.003inches(#1078) is under testing.