

Proposal for

**Network
equipment**

**Measuring
instruments**

High Reliable PCB Materials

HiPER Series

R-1755 V

New High-Tg material

1. Materials Concept (HI-Tg HIPER Line up)

[Hi-Tg]
Product No.

R-1755

R-1755 V

R-1755 S

R-1755 T

Our High Reliable Resin Technology

-High Tg

-Excellent Heat Resistance (High Degradation Temp)

-For Lead free Assembly Substrate

-Low Moisture Absorption

-Excellent CAF Resistance

High Tg
170 /DSC + CTE (x,y,z)
60ppm

High Tg
170 /DSC + CTE (x,y,z)
45ppm

High Tg
170 /DSC + CTE (x,y,z)
50ppm

High Tg
170 /DSC + Low CTE (x,y,z)
30ppm

Network equipment

Measuring instruments

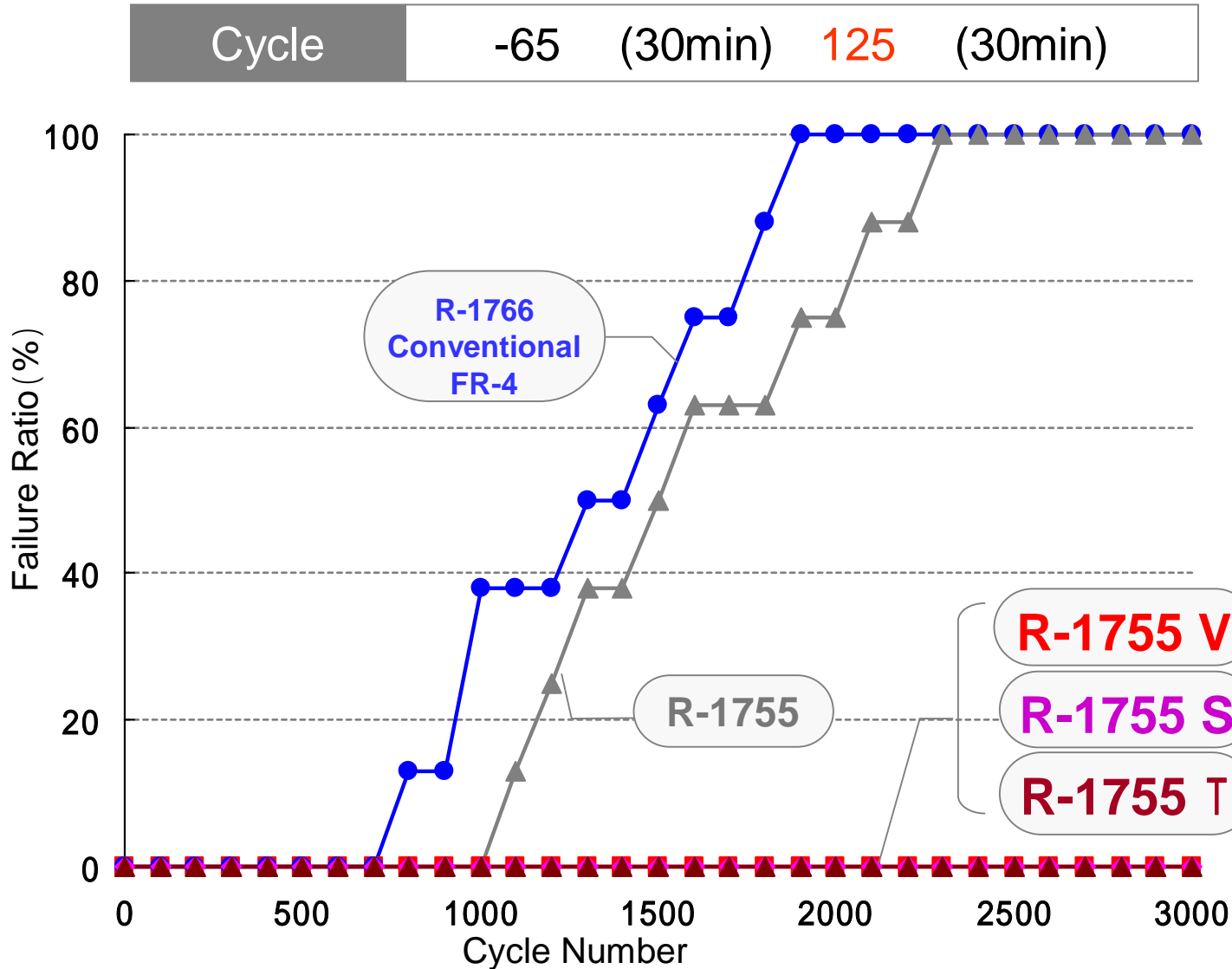
Good for PCB process

- Desmear
- Electroless plating
- Adhesion etc.

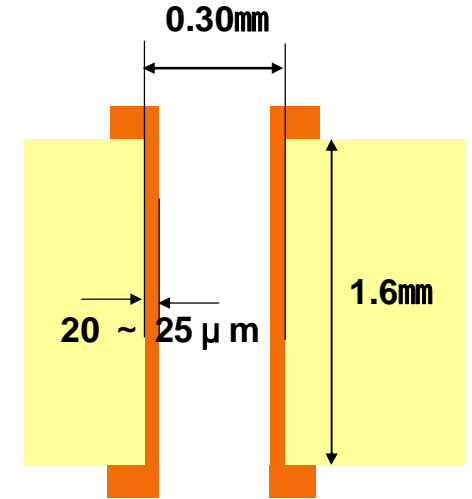
(Compare with R-1755S)

The above data are our actual values and not assured values.

Result



Test Sample



Throwing power
(Uniformity of plating thickness)
: 80% or more

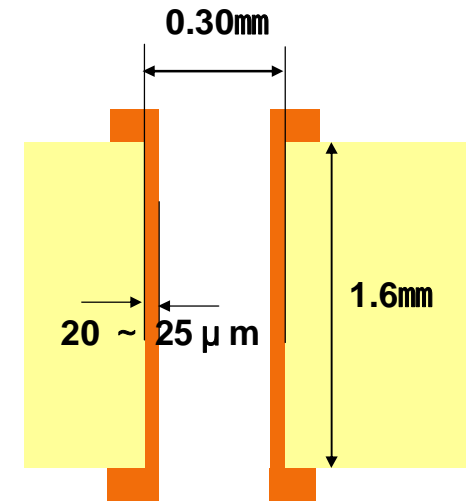
- R-1755 V**
- R-1755 S**
- R-1755 T**

The above data are our actual values and not assured values.

Result

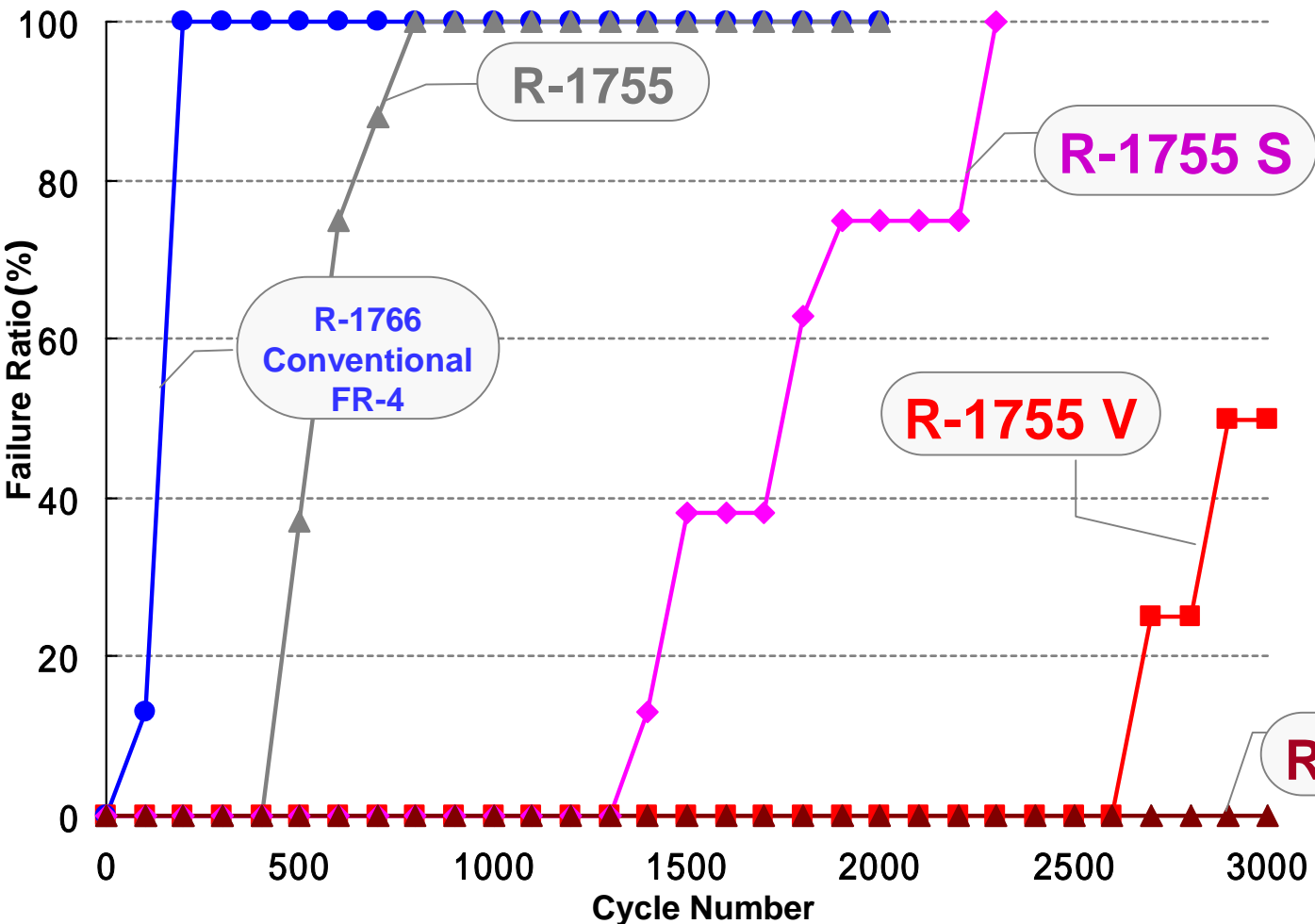
Very High Temperature Condition

Test Sample



Throwing power
(Uniformity of plating thickness)
: 80% or more

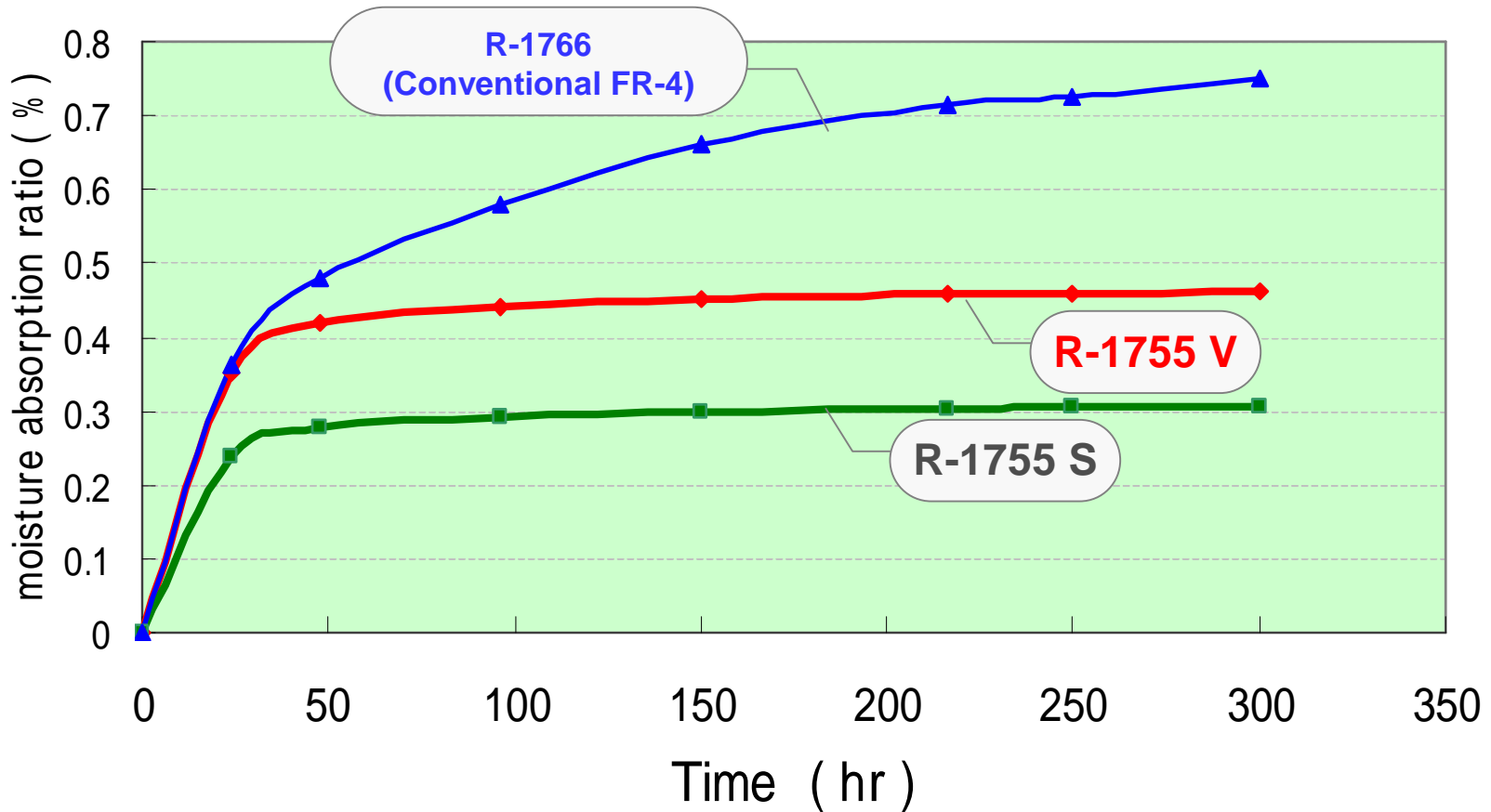
Failure :
10 % of resistance value increase



The above data are our actual values and not assured values.

3. Moisture Absorption

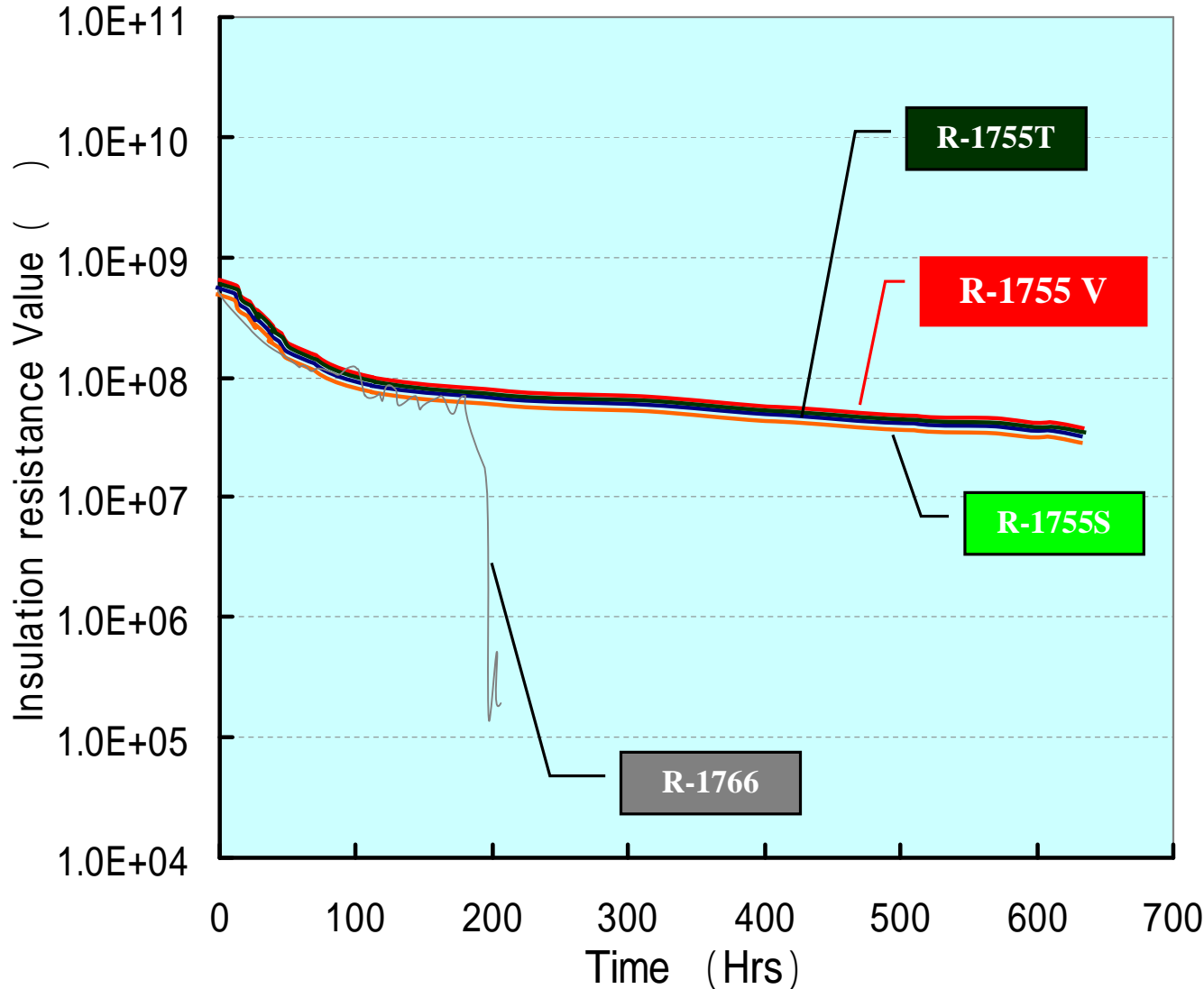
Result



| Test Condition | Test Sample |
|----------------|------------------|
| 85 85%RH | Thickness: 0.8mm |

The above data are our actual values and not assured values.

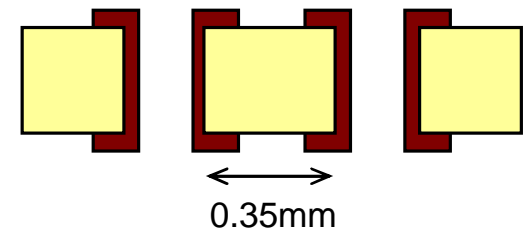
(Insulation resistance is measured into the camber once a hour continuously)



CAF TEST Condition

121 85%RH DC50V (HAST)

TEST Sample

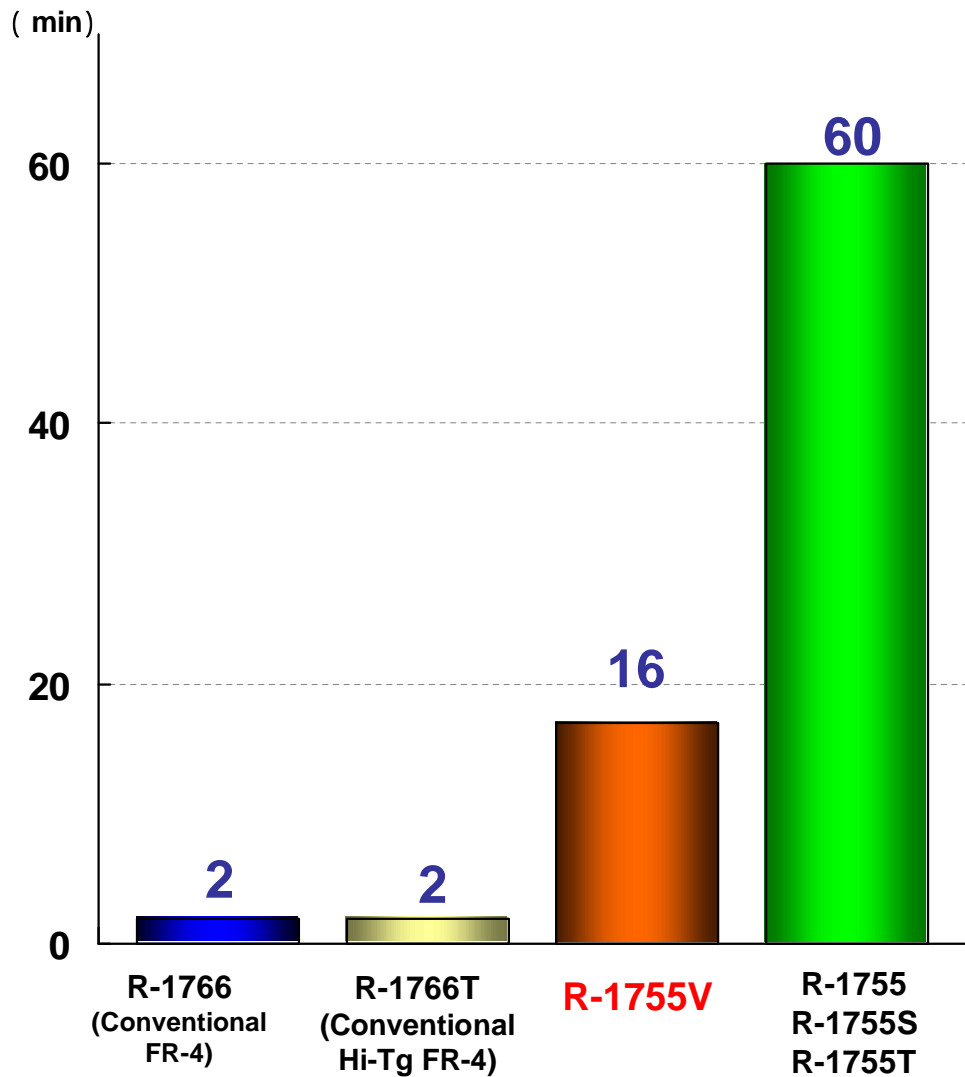


CCL thickness : 1.6mm
(7628-8ply)
Drill bit : 0.35mm

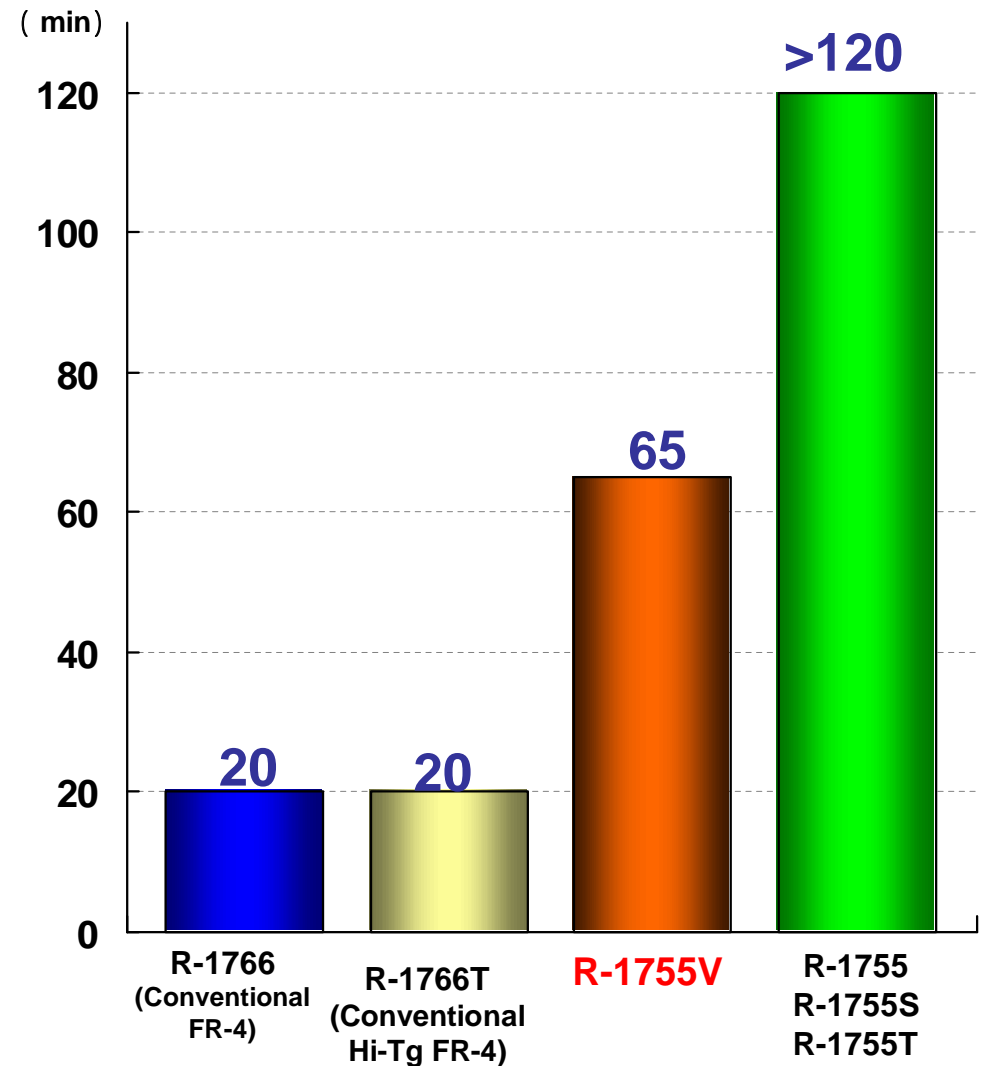
* 上記データは弊社での実測値であり、保証値ではありません。

5. Heat Resistance

T-288 (IPC-TM-650 TMA method)
(No blister time at 288)



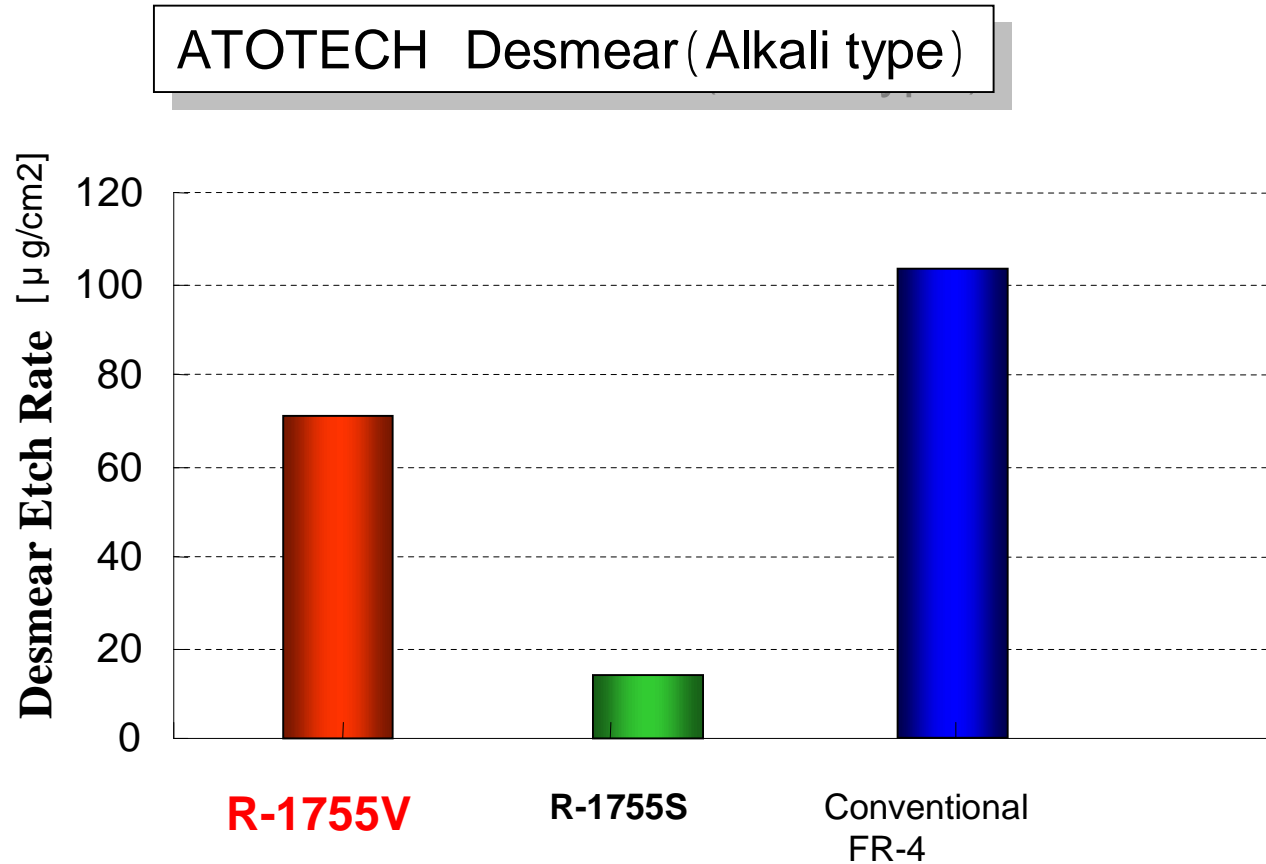
T-260 (IPC-TM-650 TMA method)
(No blister time at 260)



The above data are our actual values and not assured values.

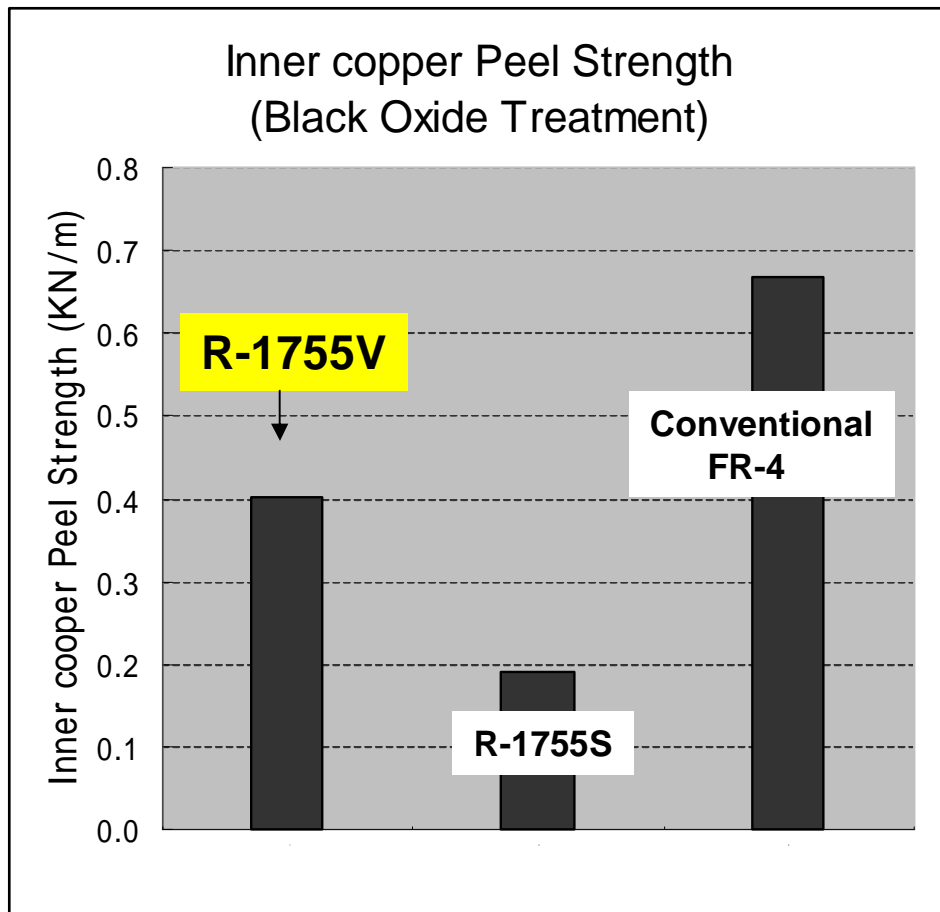
(Sample thickness : 1.0mm, with 35 μ copper)

6. Desmear Etch Rate

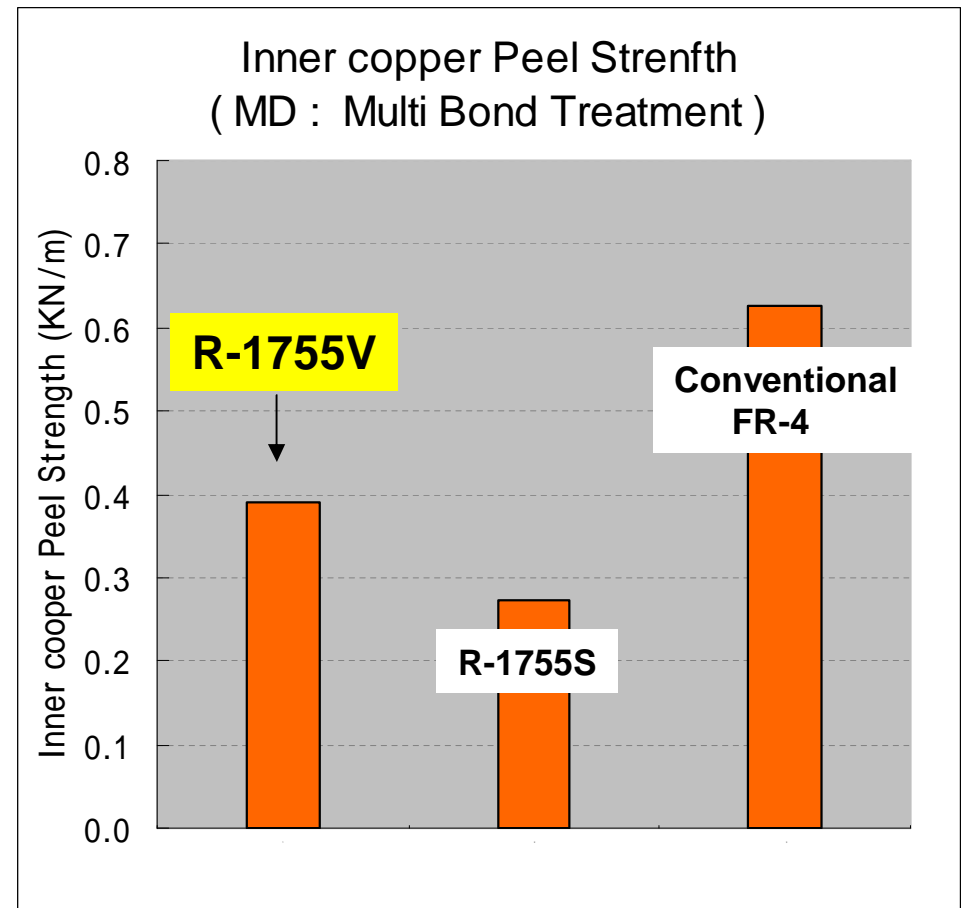


The above data are our actual values and not assured values.

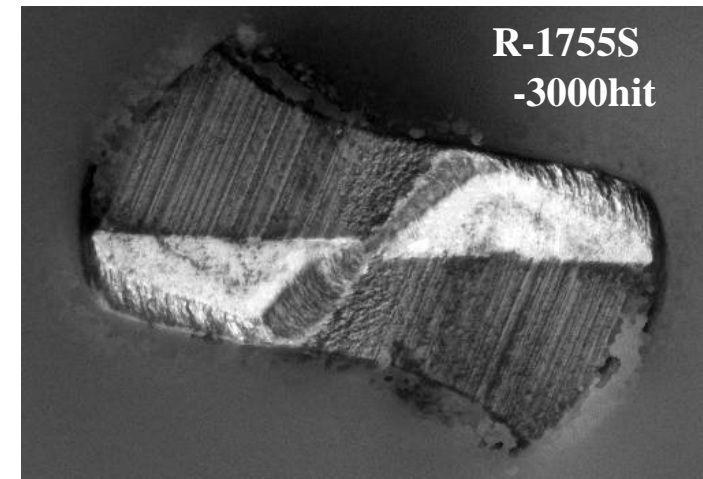
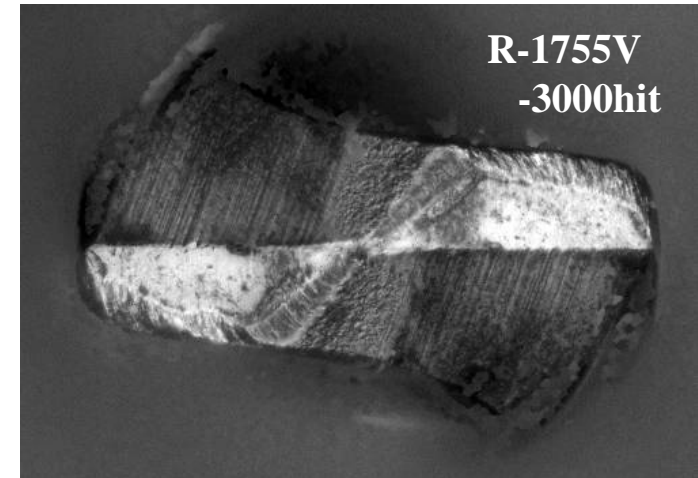
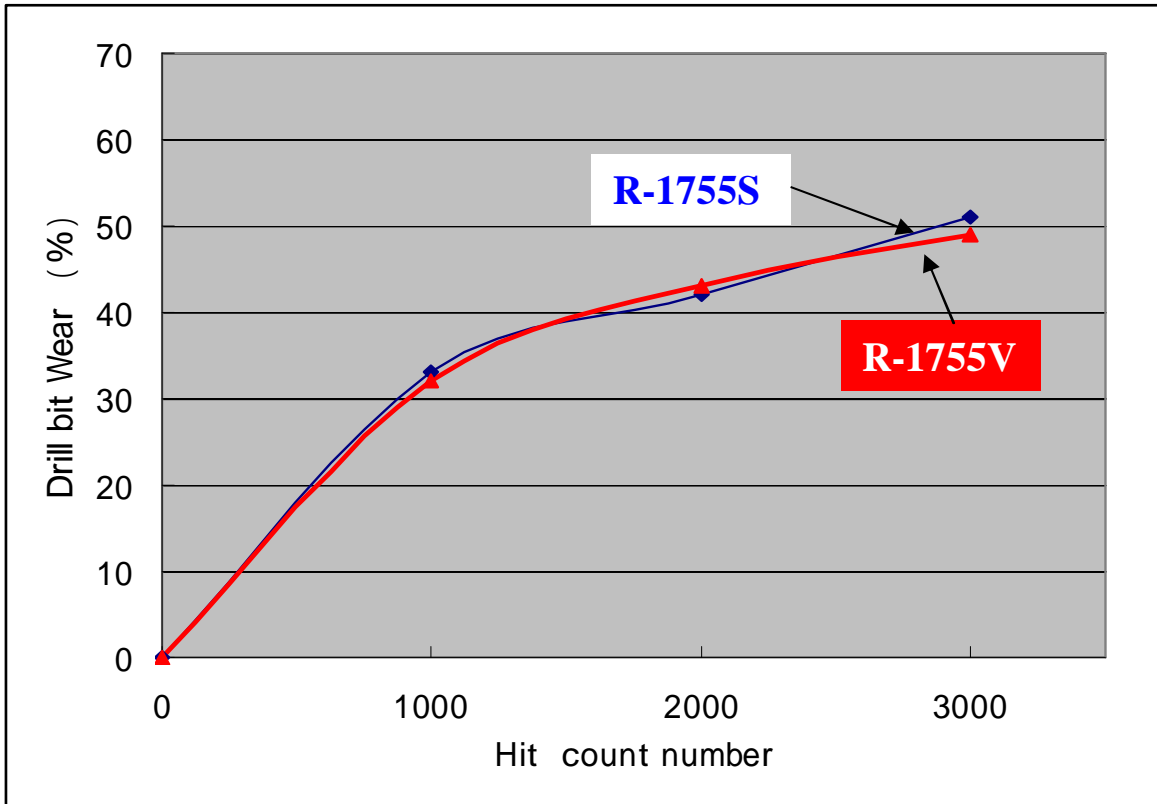
Black Oxide Treatment



Multi Bond Treatment



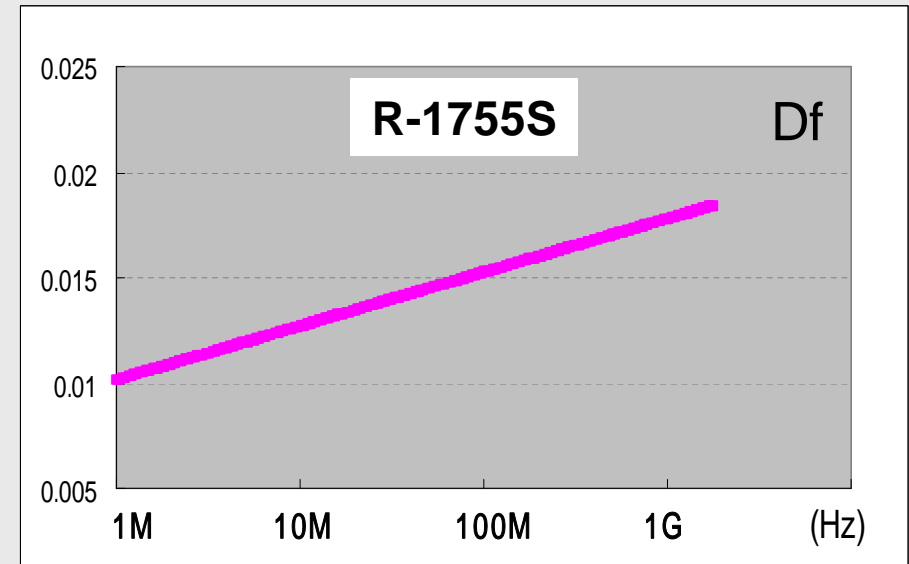
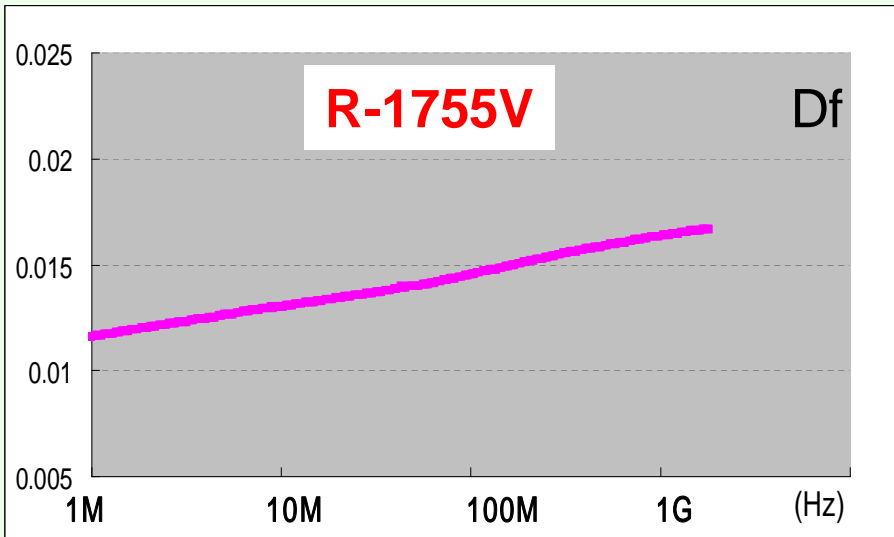
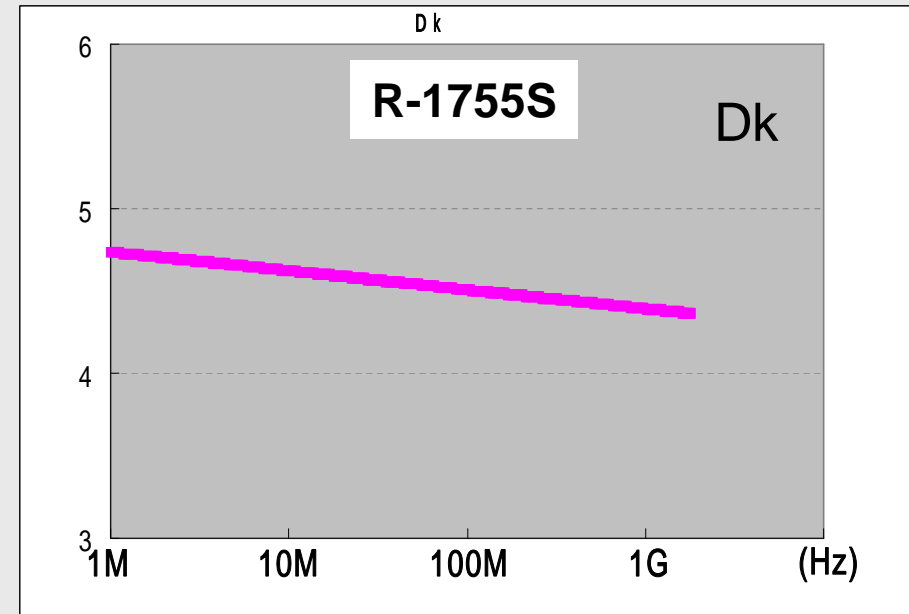
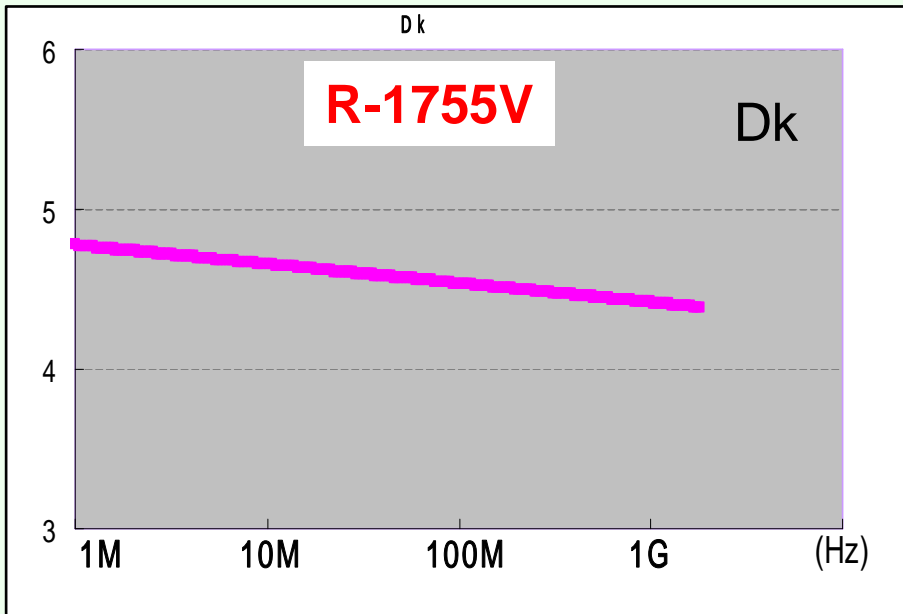
8. Drill bit Wear



Drilling Condition

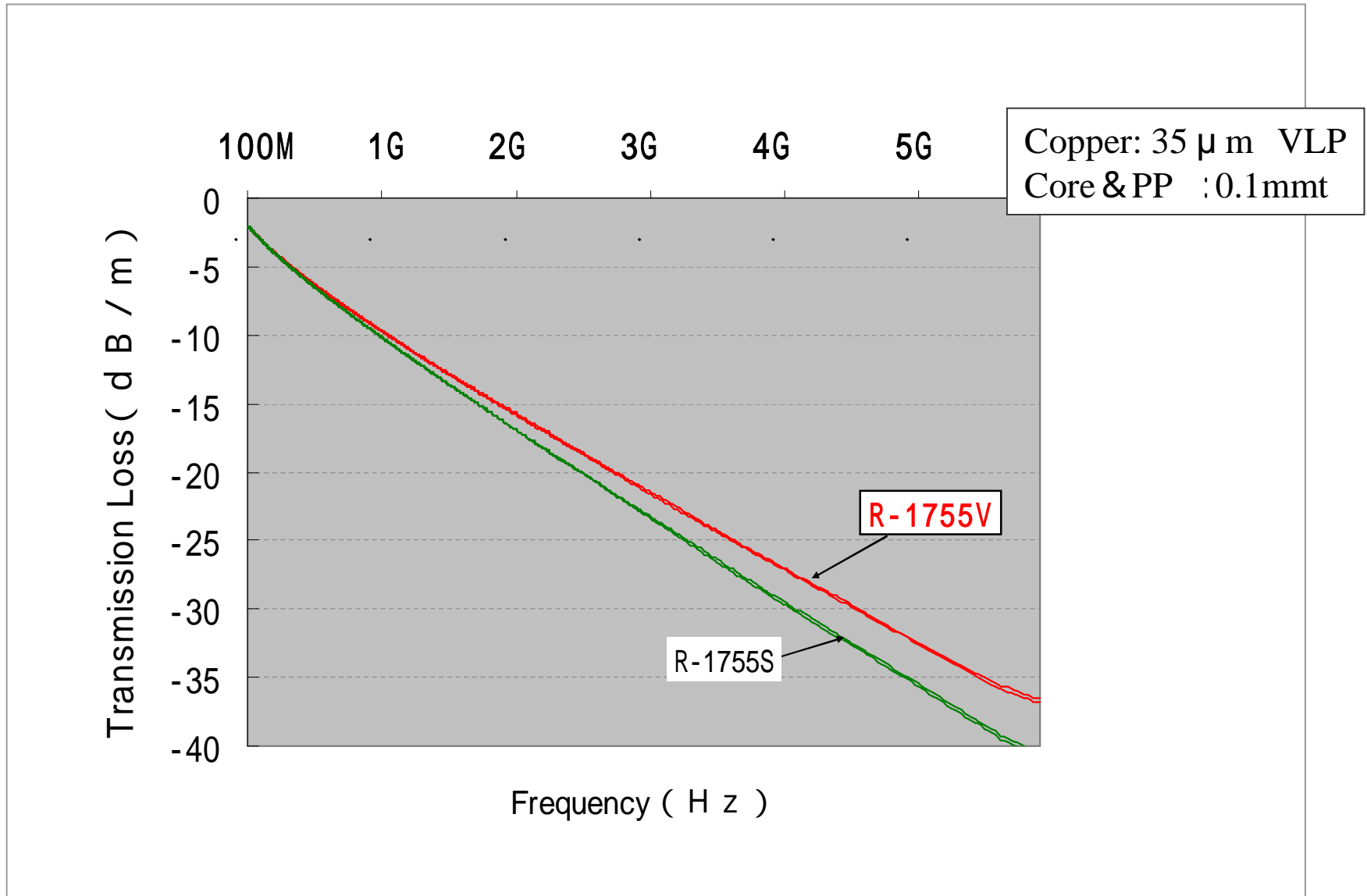
Entry board : Al (0.15 mmt)
 Back board : Phenol (1.5mmt)
 Drill bit : NHU L020 0.3 *5.5mm (Union tool)
 Speed : 160k rpm
 Chip load : 3.2m/min
 Stack up : 1.6mm(18/18) double sided CCL 3stack-up

9. D_k / D_f (1M Hz ~ 1G Hz)



The above data are our actual values and not assured values.

10. Transmission Loss



The above data are our actual values and not assured values.

11. General Properties

Conventional FR-4
High-Tg HIPER series

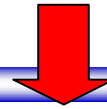
| test items | test condition | Unit | R-1766 | R-1755 | R-1755 S | R-1755 T | R-1755V | |
|------------------------|----------------|--------------------|--------------------|-----------------|-----------------|-----------------|-----------------|------|
| Volume Resistivity | A | M · m | 5×10^7 | 5×10^7 | 5×10^7 | 5×10^7 | 5×10^7 | |
| Surface resistivity | A | M | 5×10^8 | 5×10^8 | 5×10^8 | 5×10^8 | 5×10^8 | |
| Insulation Resistivity | A | M | 1×10^8 | 1×10^8 | 1×10^8 | 1×10^8 | 1×10^8 | |
| Dk (1 MHz) | IPC | - | 4.7 | 4.7 | 4.7 | 4.7 | 4.8 | |
| Df (1 MHz) | IPC | - | 0.013 | 0.013 | 0.012 | 0.010 | 0.012 | |
| Peel strength | 18 μ m | kN/m | 1.50 | 1.25 | 1.25 | 1.25 | 1.30 | |
| | 35 μ m | kN/m | 1.90 | 1.35 | 1.35 | 1.35 | 1.40 | |
| Heat Resistance | A | - | 240 60min | 280 60min | 280 60min | 280 60min | 265 60min | |
| Tg | DSC | | 135 | 170 | 170 | 170 | 170 | |
| | DMA | | 150 | 190 | 190 | 190 | 190 | |
| Degradation T(5 分) | TGA | | 310 | 364 | 364 | 364 | 340 | |
| T288 | IPC-TM-650 | Min | 2 | 60 | 50 | 50 | 16 | |
| CTE | X | $\times 10^{-6} /$ | 10 ~ 14 | 10 ~ 14 | 10 ~ 14 | 9 ~ 13 | 10 ~ 14 | |
| | Y | $\times 10^{-6} /$ | 12 ~ 16 | 12 ~ 16 | 12 ~ 16 | 10 ~ 14 | 12 ~ 16 | |
| | Z | 1 | $\times 10^{-6} /$ | 65 | 60 | 50 | 30 | 45 |
| | | 2 | $\times 10^{-6} /$ | 270 | 260 | 255 | 180 | 240 |
| Flexural Modulus | X | JISC6481 | kN/cm ² | 2300 | 2300 | 2300 | 2500 | 2350 |
| | Y | JISC6481 | kN/cm ² | 2100 | 2100 | 2100 | 2300 | 2150 |
| Density | JIS K6911 | - | 1.91 | 1.91 | 1.93 | 2.03 | 1.96 | |
| Thermal Conductivity | Laser Flash | W/m | 0.38 | 0.38 | 0.48 | 0.65 | 0.53 | |

The above data are our actual values and not assured values. *The thickness of a test piece is 1.6 mm.

12. Conclusion

- ✓ R-1755V is the material with the better processability (Desmear, Plating) of a PCB process than R-1755S.
- ✓ R-1755V is the material excellent in adhesive, heat resistance, and reliability.
- ✓ R-1755V is the optimal material for the high-layer PCB use of “Network Equipment” etc.

Production Mix Plan



| Tg (DSC) | Tg=140-150C | | | Tg=170C (High-Tg) | | | | New Hi-Tgs | |
|------------------|-------------|---------|---------|-------------------|----------|---------|---------|----------------|--------------|
| Material | Standard | Low CTE | H/F CTE | Standard | | Low CTE | | Low CTE | Low Df & CTE |
| Plant | R1766 | R1755 C | R1566 | R1766 T | R1755 | R1755 S | R1755 T | R1755 V | R2125 |
| Koriyama (Japan) | | | | | | | | In preparation | |
| Taiwan | | - | | | | - | - | In preparation | - |
| Guangzhou | | | | - | | - | - | In preparation | - |
| Suzhou | | - | | Planning | - | - | - | Planning | Planning |
| Europe | | | | - | Planning | - | - | Planning | - |