

Proposal for

**Network
equipment**

**Measuring
instruments**

Automotive

High Reliable PCB Materials

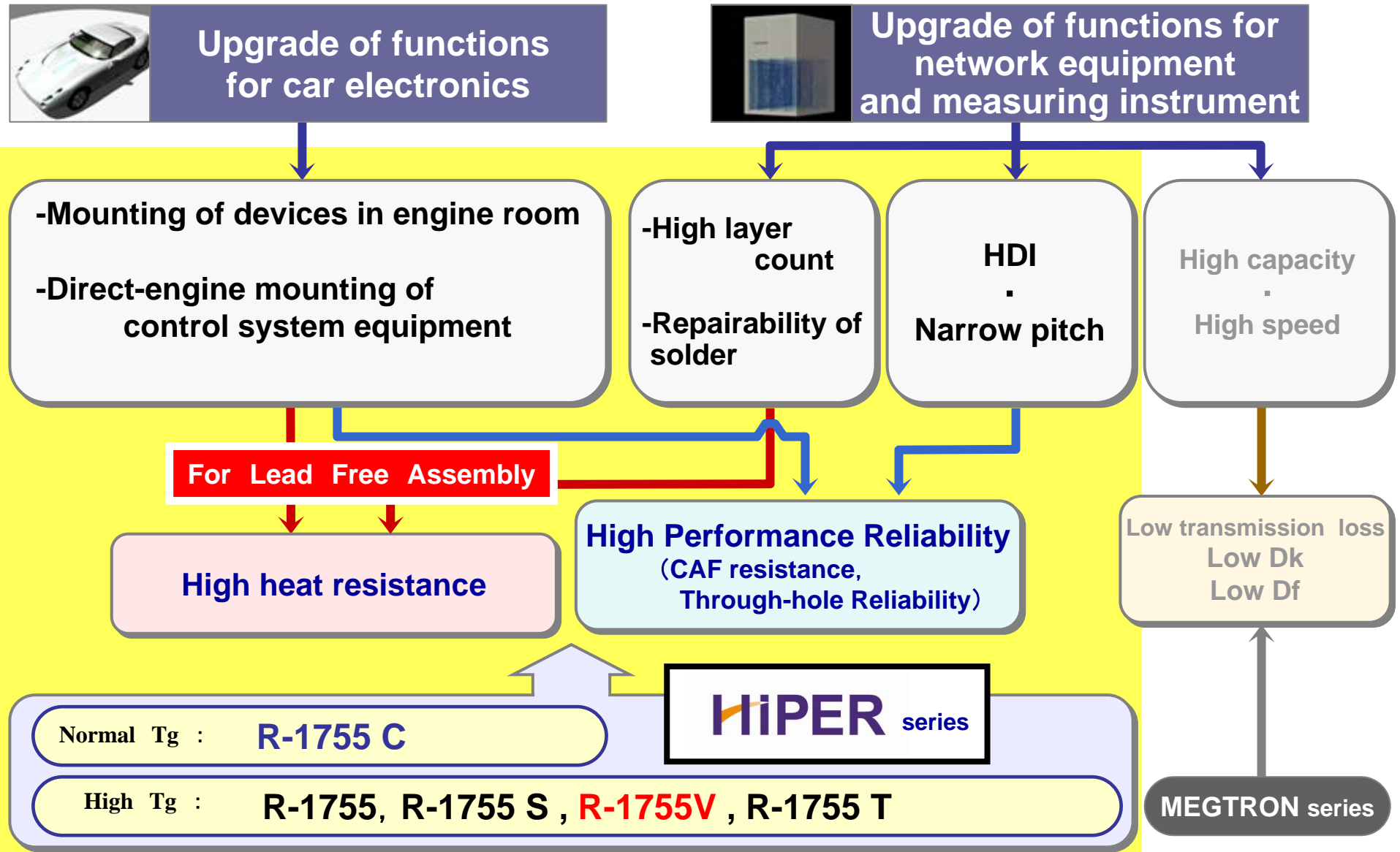
New **HiPER**

R-1755 V

Mar, 2007

Matsushita Electric Works, Ltd.
Electronic Materials Division

1. Trend & Our Material Proposal



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

Our High Reliable Resin Technology

【Hi-Tg】
Product No.

R-1755

R-1755 V

R-1755 S

R-1755 T

-High Tg

-Excellent Heat Resistance (High Degradation Temp)

-For Lead free Assembly Substrate

-Low Moisture Absorption

-Excellent CAF Resistance

High Tg
170°C/DSC + CTE ($\alpha_{1,z}$)
60ppm

High Tg
170°C/DSC + CTE ($\alpha_{1,z}$)
45ppm

High Tg
170°C/DSC + CTE ($\alpha_{1,z}$)
50ppm

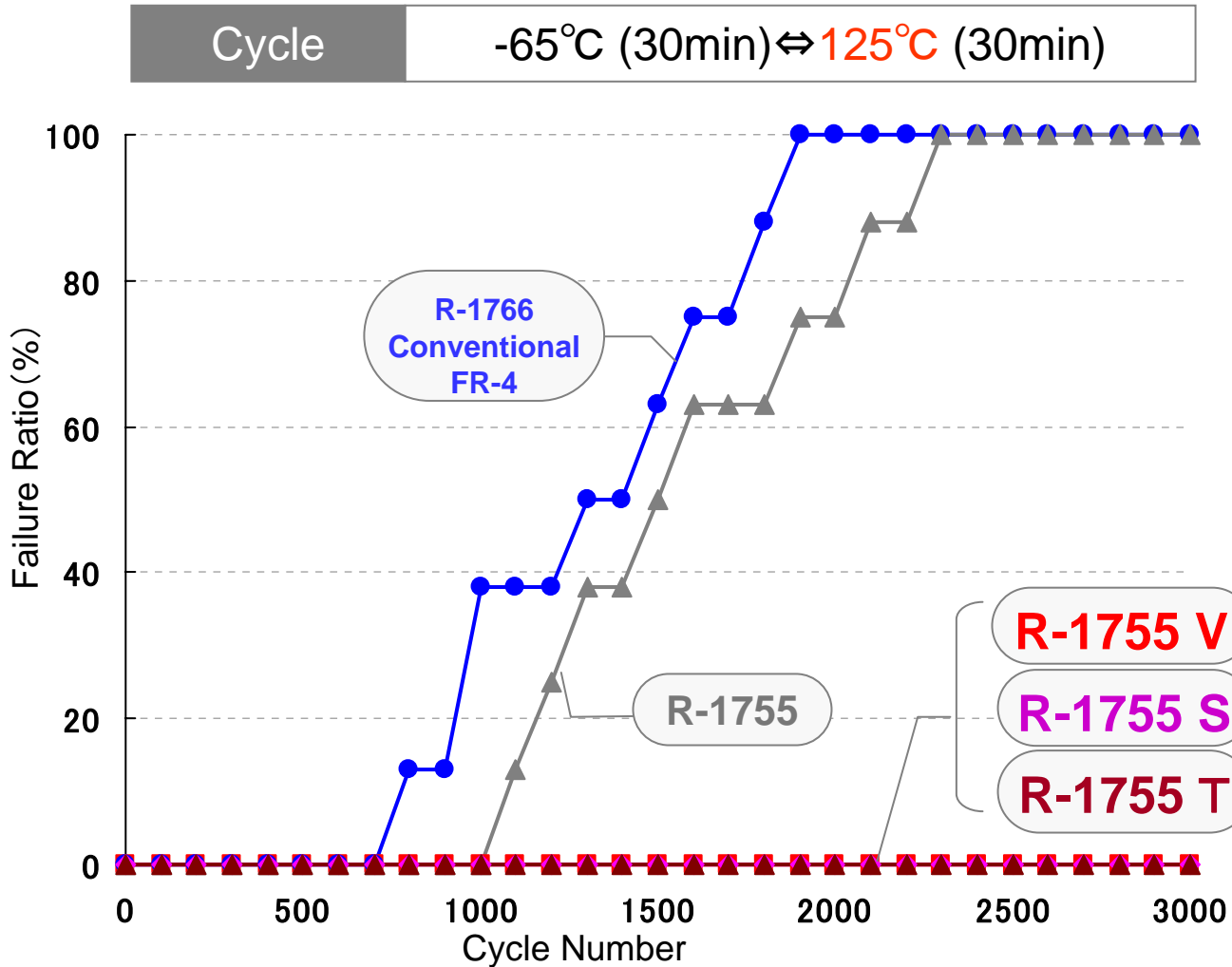
High Tg
170°C/DSC + Low CTE ($\alpha_{1,z}$)
30ppm

Good for PCB process

- Desmear
- Electroless plating
- Drill wear
- Adhesion etc.

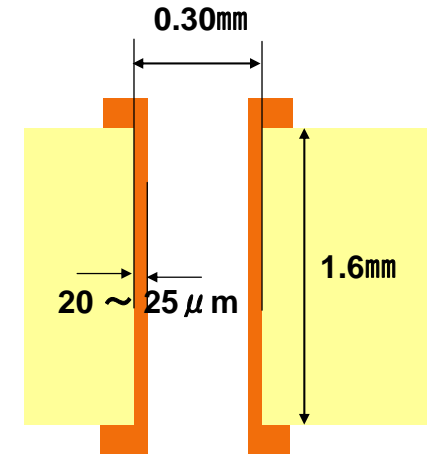
The above data are our actual values and not assured values.

Result



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

Test Sample

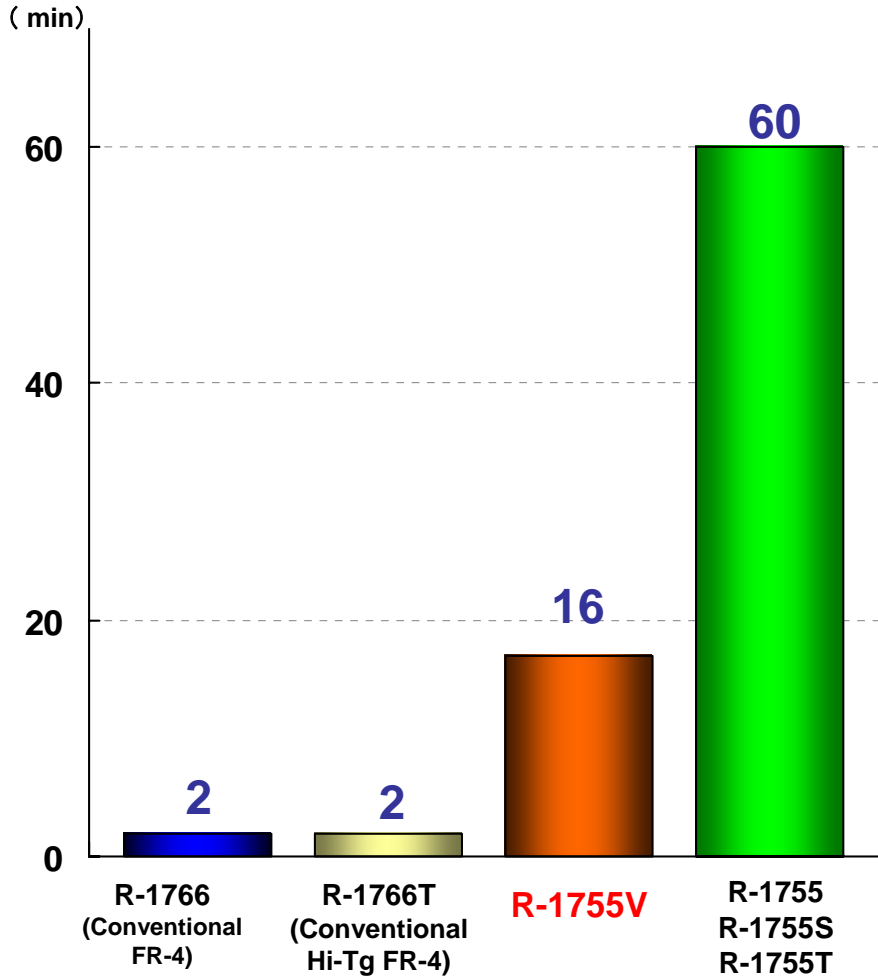


Throwing power
(Uniformity of plating thickness)
: 80% or more

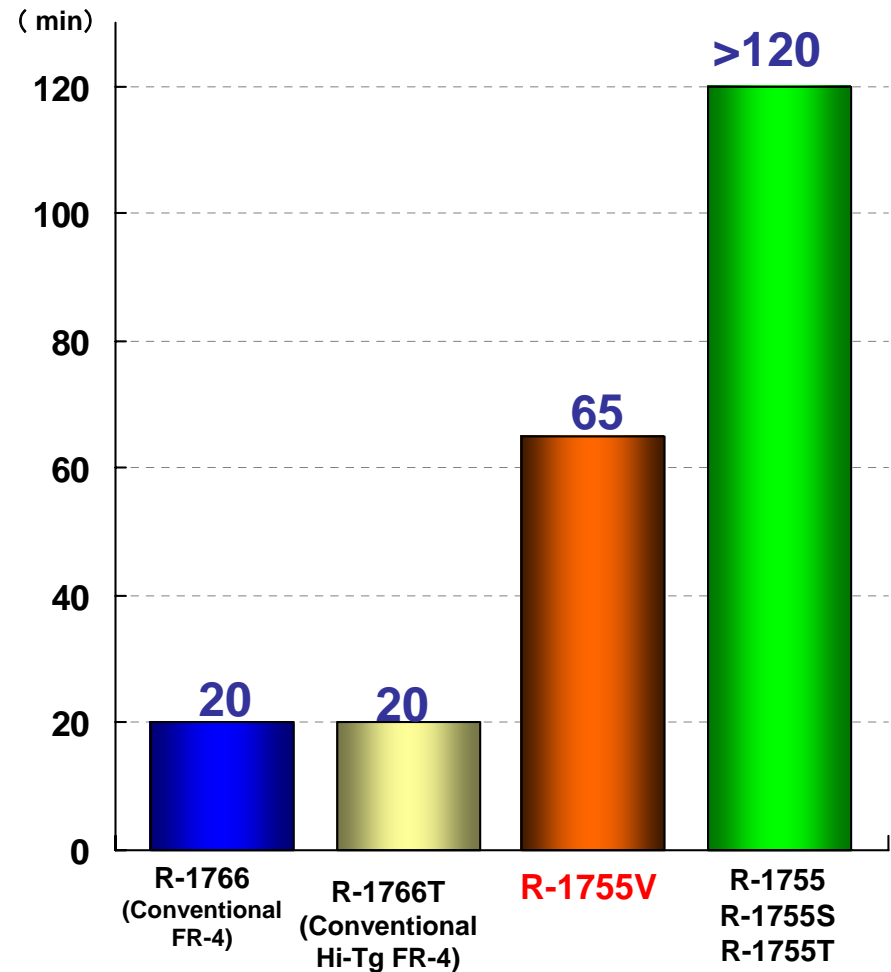
- R-1755 V**
- R-1755 S**
- R-1755 T**

4. Heat Resistance

■ **T-288** (IPC-TM-650 TMA method)
(No blister time at 288°C)



■ **T-260** (IPC-TM-650 TMA method)
(No blister time at 260°C)

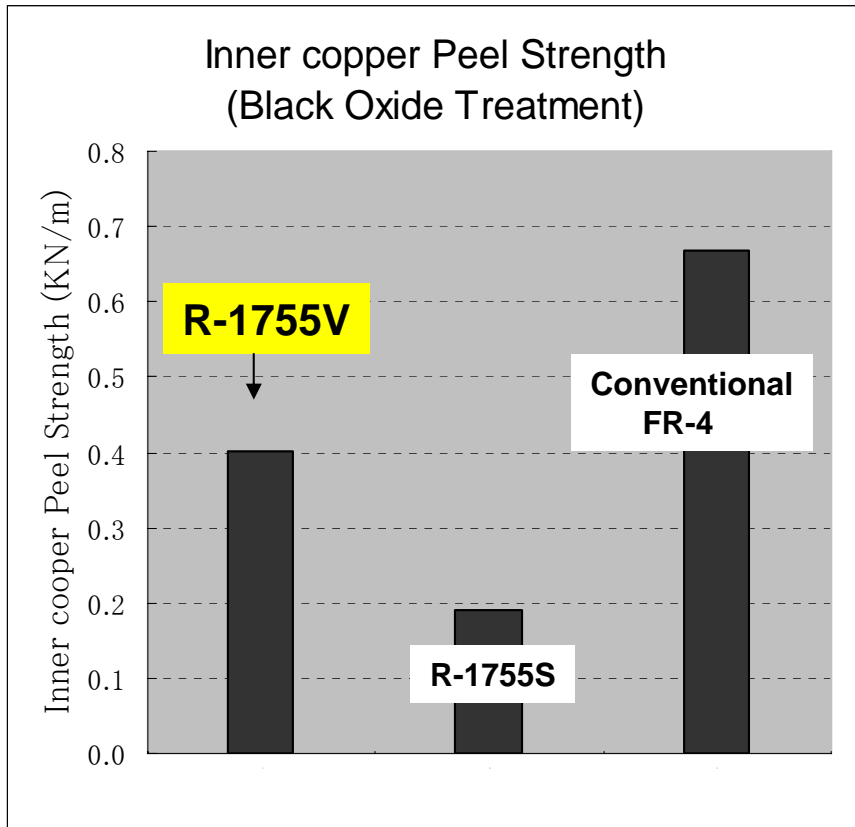


The above data are our actual values and not assured values.

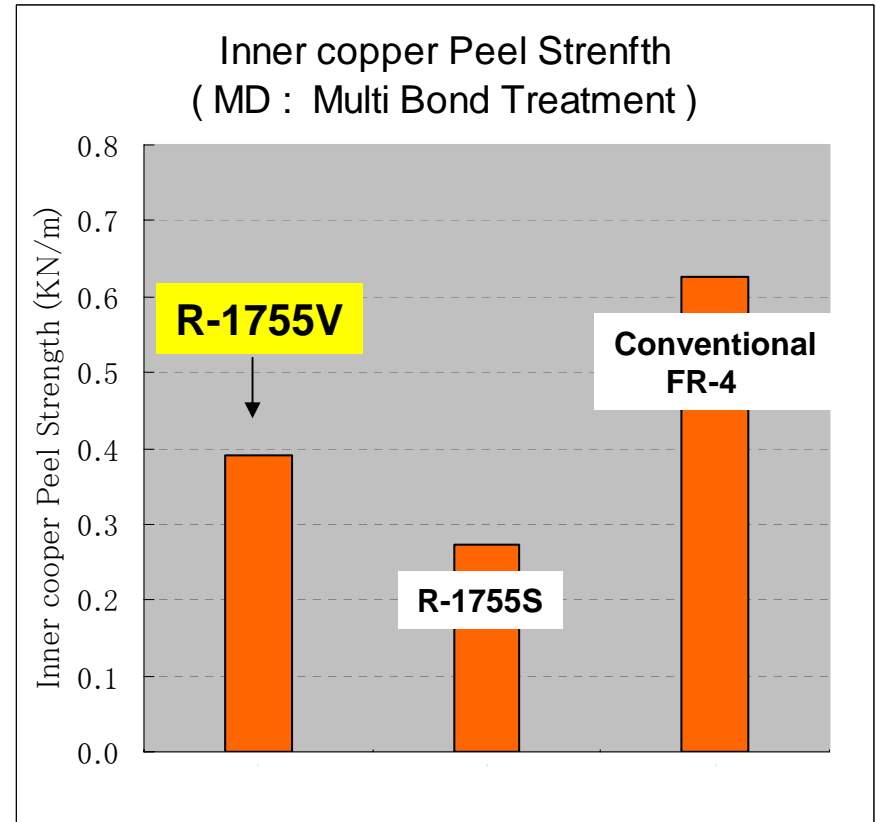
(Sample thickness : 1.0mm)

5. Inner copper Peel Strength

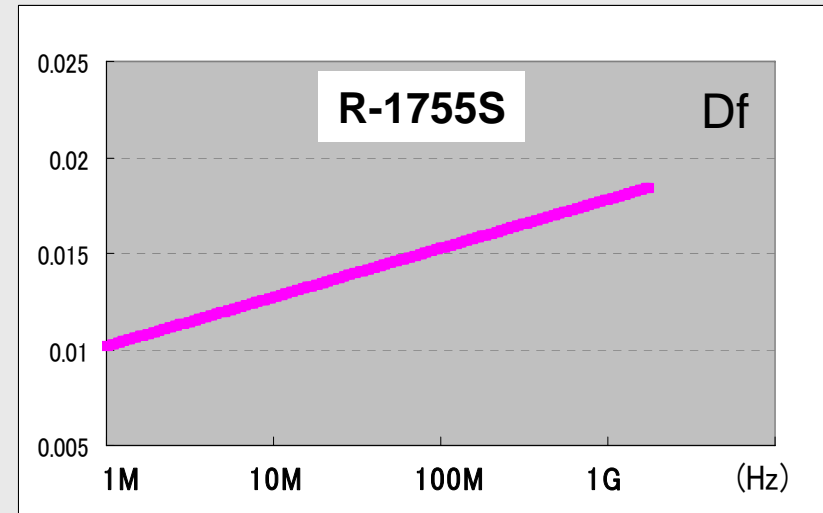
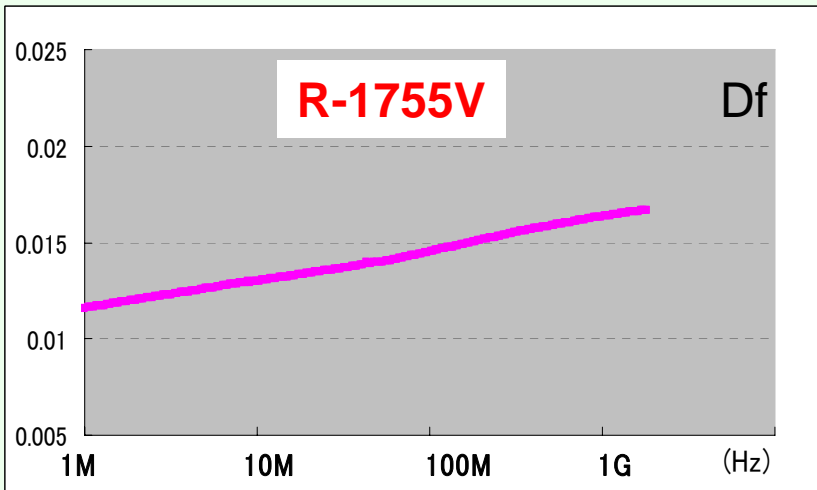
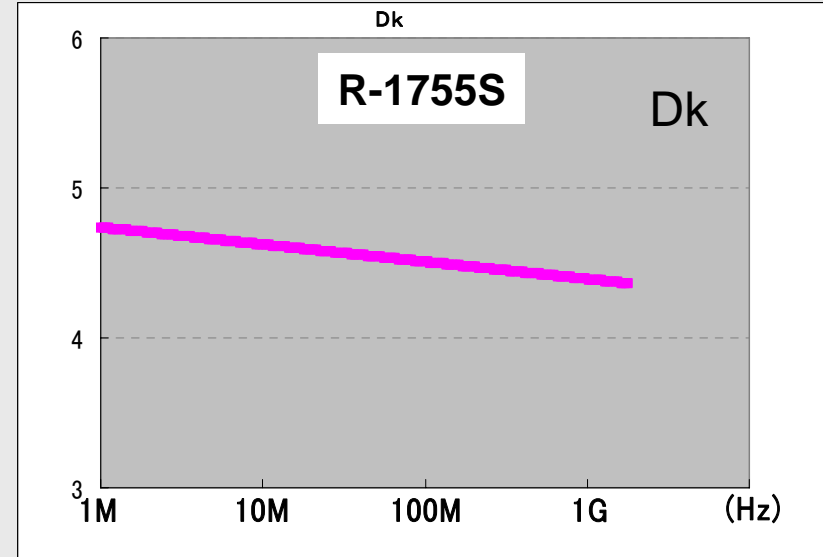
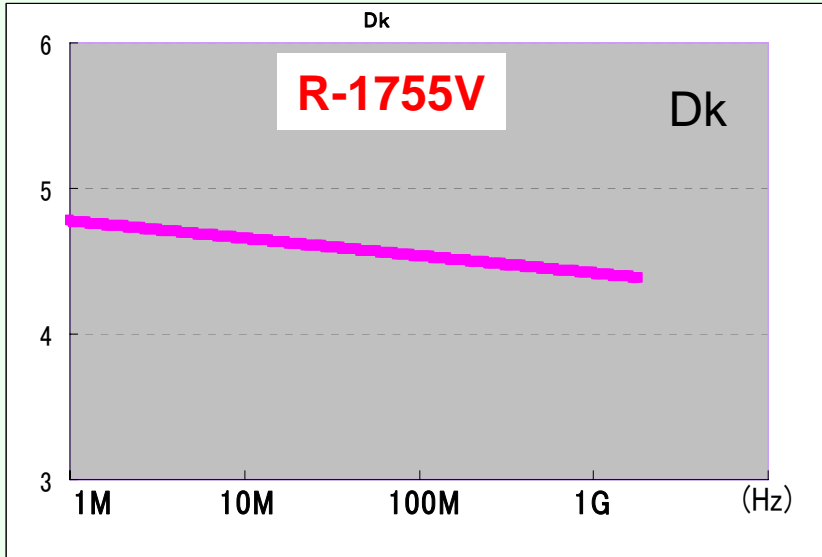
■ Black Oxide Treatment



■ Multi Bond Treatment

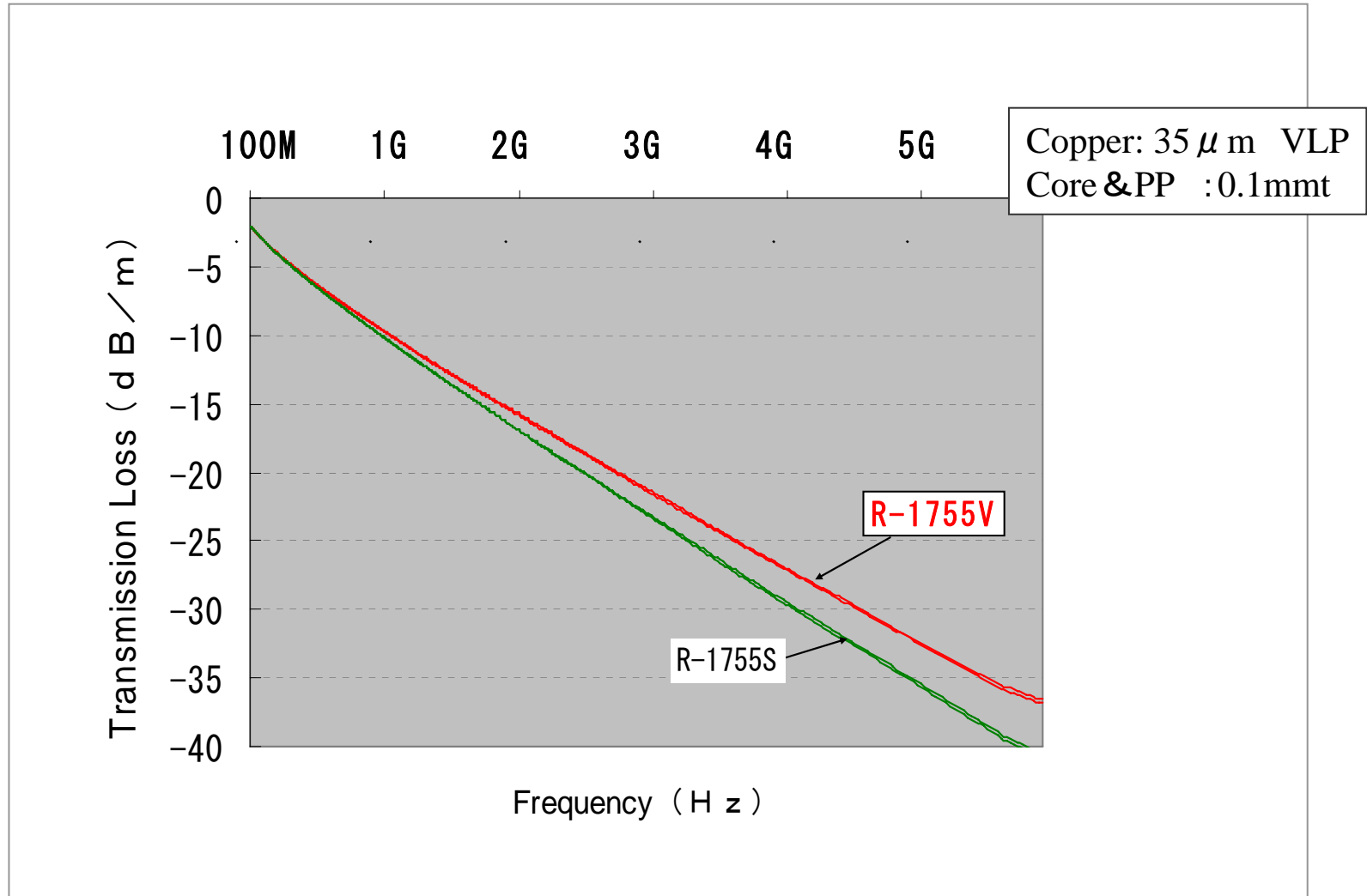


6. D_k / D_f (1M Hz ~ 1G Hz)



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

7. Transmission Loss



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

8. General Properties

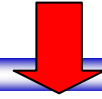
Conventional FR-4

High-Tg HIPER series

test items	test condition	Unit	R-1766	R-1755	R-1755 S	R-1755 T	R-1755V	
Volume Resistivity	A	MΩ · m	5 × 10 ⁷	5 × 10 ⁷	5 × 10 ⁷	5 × 10 ⁷	5 × 10 ⁷	
Surface resistivity	A	MΩ	5 × 10 ⁸	5 × 10 ⁸	5 × 10 ⁸	5 × 10 ⁸	5 × 10 ⁸	
Insulation Resistivity	A	MΩ	1 × 10 ⁸	1 × 10 ⁸	1 × 10 ⁸	1 × 10 ⁸	1 × 10 ⁸	
Dk (1MHz)	JIS	—	4.7	4.7	4.7	4.7	4.8	
Df (1MHz)	JIS	—	0.015	0.015	0.015	0.011	0.015	
Peel strength	18 μ m	kN/m	1.30	1.25	1.25	1.25	1.30	
	35 μ m	kN/m	1.45	1.35	1.35	1.35	1.40	
Heat Resistance	A	—	240°C 60min	280°C 60min	280°C 60min	280°C 60min	265°C 60min	
Tg	DSC	°C	135	170	170	170	170	
	DMA	°C	150	190	190	190	190	
Decomposition Temp	TGA	°C	310	364	364	364	340	
T288	IPC-TM-650	Min	2	60	50	50	16	
CTE	X	× 10 ⁻⁶ /°C	10~14	10~14	10~14	9~13	10~14	
	Y	× 10 ⁻⁶ /°C	12~16	12~16	12~16	10~14	12~16	
	Z	α ₁	× 10 ⁻⁶ /°C	65	60	50	30	45
		α ₂	× 10 ⁻⁶ /°C	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	× 10 ⁻⁴ W/m°C	3822	3800	4800	6500	5000	

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

Production Mix Plan (Draft)



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