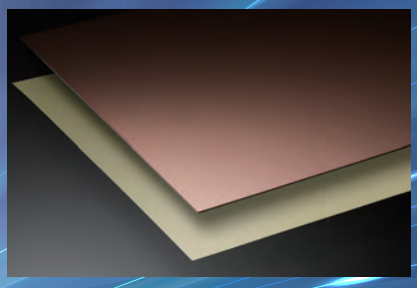
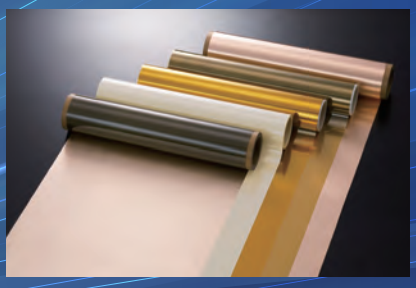
Panasonic
INDUSTRY

Circuit Board Materials





Dk 3.08 Df 0.0012 @14GHz

Tg (DMA) 220˚C

T288 (with copper) >120min

Applications

Network / Wireless

Routers, Switches, Optical Transmission Equipment, Servers, AI Servers, Base Stations, Semiconductor Test Equipment, Probe Cards

MEGTRON8

Laminate

R-5795(U)* R-5795(N)**

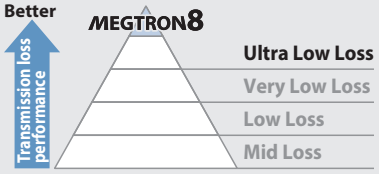
Prepreg

R-5690(U)* R-5690(N)**

*Ultra-low Df glass cloth type **Low Dk glass cloth type

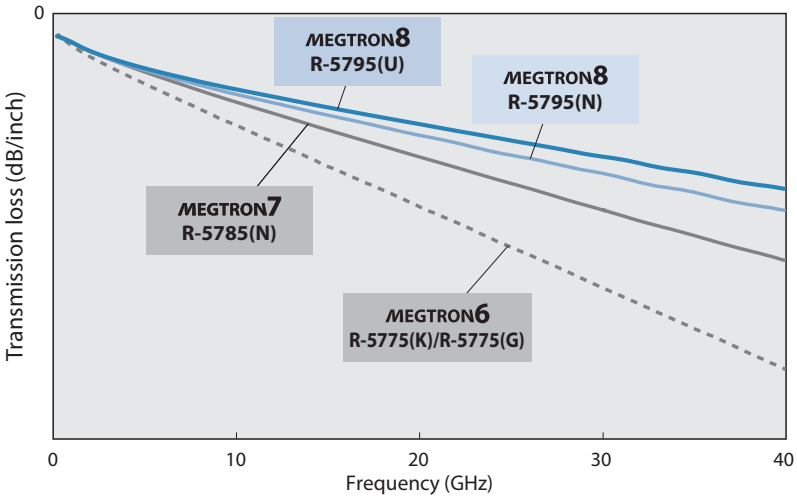
Ultra-low transmission loss, highly heat-resistant multi-layer circuit board materials

The new materials support 800GbE used for next-generation high-speed communication technology. Comparison of MEGTRON8 R-5795(U) and MEGTRON7 R-5785(N), improving transmission loss by about 30% (@28GHz).



Frequency dependence by transmission loss

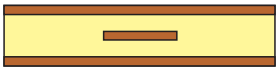
About 30% improvement in transmission loss compared to MEGTRON7 R-5785(N)*



* Improvement at 28GHz

$$\frac{\Delta\text{Transmission loss (MEGTRON7}-\text{MEGTRON8)}}{\text{Transmission loss (MEGTRON7)}} \times 100 \fallingdotseq 30(\%)$$

Evaluation sample (cross section)



PCB construction	3L PCB Strip line
Copper thickness	18 µm (IL)
Core	0.13mm
Prepreg	0.15mm
Z_0 Impedance	50Ω
Inner treatment	No-surface treatment
Measurement method	2 port S-parameter
Frequency range	0.2 - 40GHz
De-embedded	Multiline TRL method

The above data are our company measurement values and not guaranteed values.

General properties

Item		Test method	Condition	Unit	MEGTRON8 R-5795(U) Ultra-low Df glass cloth	MEGTRON8 R-5795(N) Low Dk glass cloth
Tg		DMA	A	˚C	**220**	**220**
CTE z-axis	α1	IPC-TM-650 2.4.24	A	ppm/˚C	**50**	**50**
	α2				**270**	**270**
T288(with copper)		IPC-TM-650 2.4.24.1	A	min	**>120**	**>120**
Dk	14GHz	Balanced-type circular disk resonator method	C-24/23/50	-	**3.08**	**3.13**
Df					**0.0012**	**0.0016**
Peel strength	1oz(35µm)	IPC-TM-650 2.4.8	A	kN/m(lb/inch)	**0.7(4.0)** [H-VLP3]	**0.7(4.0)** [H-VLP3]

The sample thickness is 0.75mm.
The sample structure is #1078 x 10 ply.

The above data are typical values and not guaranteed values.

Dk 3.31 Df 0.0023 @14GHz

Tg (DSC) 200˚C

T288 (with copper) >120min

Applications

Network / Wireless

ICT Infrastructure Equipment, Supercomputer, Measuring Instrument, Antenna (Base Station, Automotive Millimeter-Wave Radar)

MEGTRON7

Laminate

R-5785(N)* R-5785(GN)* R-5785(GE)

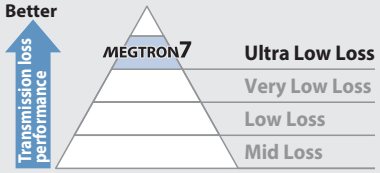
Prepreg

R-5680(N)* R-5680(GN)* R-5680(GE)

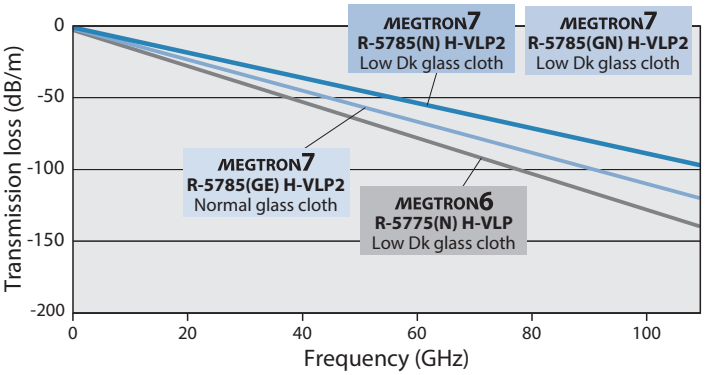
*Low Dk glass cloth type

Ultra-low transmission loss, highly heat-resistant multi-layer circuit board materials

Due to our industry leading low dielectric constant and dissipation factor, these materials are suitable for high-speed data transmission by servers and routers using high-layer-count, large-size PCB designs.

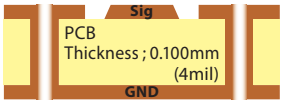


Frequency dependence by transmission loss



Construction

Microstrip line



Measurement	2 port S-Parameter
Frequency	10MHz-110GHz
De-embedded	TRL method
Measurement line	adjust to 50Ω(Zo)

Layer1: Signal line (line width: 270µm, Cu thickness: 24µm)
Layer2: GND plane (Cu thickness: 24µm)

Heat resistance of high multi-layered

Result

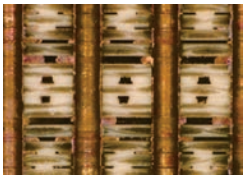
Drill diameter	φ0.3mm		
Wall to wall distance	0.4mm	0.5mm	0.6mm
R-5785(N) Low Dk glass cloth/H-VLP2	pass	pass	pass
R-5785(GN) Low Dk glass cloth/H-VLP2	pass	pass	pass

Condition

260˚C reflow x 20times

Construction

32 Layers
Board thickness: 4.5mm


R-5785 (N)


R-5785 (GN)

General properties

Item		Test method	Condition	Unit	MEGTRON7 R-5785(N) Low Dk glass cloth	MEGTRON7 R-5785(GN) Low Dk glass cloth	MEGTRON7 R-5785(GE) Normal glass cloth
Tg		DSC	A	˚C	**200**	**200**	**200**
CTE z-axis	α1	IPC-TM-650 2.4.24	A	ppm/˚C	**42**	**42**	**42**
	α2				**280**	**280**	**280**
T288(with copper)		IPC-TM-650 2.4.24.1	A	min	**>120**	**>120**	**>120**
Dk	13, 14GHz	Balanced-type circular disk resonator method	C-24/23/50	-	**3.31** [14GHz]	**3.31** [14GHz]	**3.60** [13GHz]
Df					**0.0023** [14GHz]	**0.0023** [14GHz]	**0.0034** [13GHz]
Peel strength*	1oz(35µm)	IPC-TM-650 2.4.8	A	kN/m(lb/inch)	**0.8(4.6)**	**0.8(4.6)**	**0.8(4.6)**

The sample thickness is 0.75mm.
* R-5785(GN), R-5785(GE): H-VLP2, R-5785(N): H-VLP Copper

The above data are typical values and not guaranteed values.

Dk 3.34 Df 0.0037 @13GHz

Tg (DSC) 185˚C

T288 (with copper) >120min

Applications

Network / Wireless

ICT Infrastructure Equipment, Supercomputer, Measuring Instrument, Antenna (Base Station, Automotive Millimeter-Wave Radar)

MEGTRON6

Laminate

R-5775(N)* R-5775(K) R-5775(G)

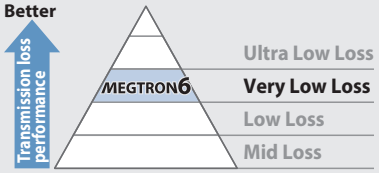
Prepreg

R-5670(N)* R-5670(K) R-5670(G)

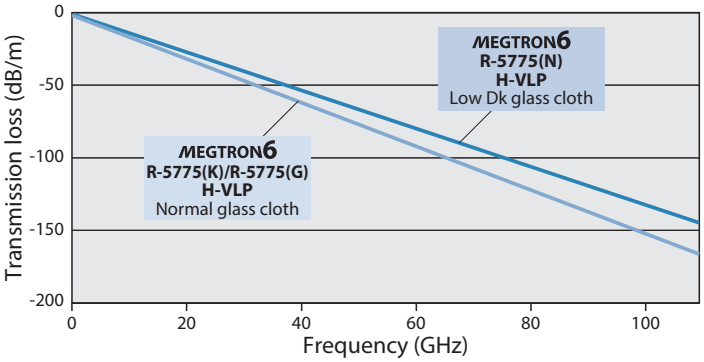
*Low Dk glass cloth type

Ultra-low transmission loss, highly heat-resistant multi-layer circuit board materials

The industry standard for high speed, ultra-low loss PCB material.
Excellent HDI and thermal performance.

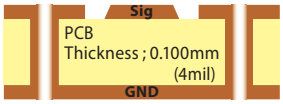


Frequency dependence by transmission loss



Construction

Microstrip line



Measurement	2 port S-Parameter
Frequency	10MHz-110GHz
De-embedded	TRL method
Measurement line	adjust to 50Ω(Zo)

Layer1: Signal line (line width: 270μm, Cu thickness: 24μm)
Layer2: GND plane (Cu thickness: 24μm)

Heat resistance of high multi-layered

Result

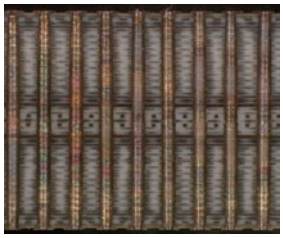
Drill diameter	φ0.3mm	
Wall to wall distance	0.5mm	0.6mm
MEGTRON6 (Low Dk glass cloth)	pass	pass

Condition

260˚C reflow x 10times

Construction

32 Layers
Board thickness: 4.5mm



General properties

Item		Test method	Condition	Unit	MEGTRON6 R-5775(N) Low Dk glass cloth	MEGTRON6 R-5775(K)/R-5775(G) Normal glass cloth
Tg		DSC	A	˚C	185	185
CTE z-axis	α1	IPC-TM-650 2.4.24	A	ppm/˚C	45	45
	α2				260	260
T288(with copper)		IPC-TM-650 2.4.24.1	A	min	>120	>120
Dk	13GHz	Balanced-type circular disk resonator method	C-24/23/50	-	3.34	3.62
Df					0.0037	0.0046
Peel strength*	1oz(35μm)	IPC-TM-650 2.4.8	A	kN/m(lb/inch)	0.8(4.6)	0.8(4.6)

The sample thickness is 0.75mm.
* H-VLP Copper

The above data are typical values and not guaranteed values.

Ultra-low transmission loss circuit board materials with Buried Resistor Copper Foil

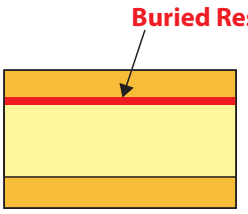
MEGTRON6 with Buried Resistor Copper Foil

● **Product Number**

R-5775(S) Low Dk-glass cloth with Buried Resistor Copper Foil

R-5775(R) E-glass cloth with Buried Resistor Copper Foil

● **Material Construction**



Buried Resistor Copper Foil 1/2oz

MEGTRON6 E-glass cloth or Low Dk-glass cloth

H-VLP or RTF

● **Copper Foil Combination**

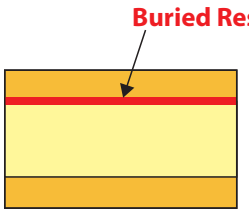
		H-VLP	RTF
Buried Resistor Copper Foil 1/2oz	25 Ohm	●	●
	50 Ohm	●	●
	100 Ohm	●	●

MEGTRON7 with Buried Resistor Copper Foil

● **Product Number**

R-5785(R) Low Dk-glass cloth with Buried Resistor Copper Foil

● **Material Construction**



Buried Resistor Copper Foil 1/2oz

MEGTRON7 Low Dk-glass cloth

H-VLP2 or H-VLP

● **Copper Foil Combination**

		H-VLP2	H-VLP
Buried Resistor Copper Foil 1/2oz	25 Ohm	●	●
	50 Ohm	●	●
	100 Ohm	●	●

* Buried Resistor Copper Foil thickness is only 1/2oz (18um).
* All laminate thickness available for this copper foil option is same as conventional MEGTRON6 and MEGTRON7.
* 25, 50 and 100 Ohm are the available resistor values from copper foil supplier.
Panasonic Industry takes no responsibility for the processing and end product performance of these resistor layers.

Buried Resistor Copper Foil Variations

Item	Unit	Condition	Specification	Guaranteed value
Resistance of resistor layer*1	Ω / sq	A	25	23.7 – 26.2
			50	47.5 – 52.5
			100	95.0 – 105.0

*1 The Guaranteed value mentioned in above table are guaranteed by copper foil supplier.

Copper foil properties comparison

Item	Unit	Test method	Buried Resistor Copper Foil						H-VLP	
			25Ω	50Ω	100Ω	25Ω	50Ω	100Ω		
Peel strength (1/2oz)	kN/m(lb/inch)	IPC-TM-650 2.4.8	0.8(4.6)	0.8(4.6)	0.8(4.6)	0.8(4.6)	0.8(4.6)	0.8(4.6)	0.5(2.9)	0.7(4.0)
			MEGTRON6			MEGTRON7			MEGTRON6	MEGTRON7

■Remarks: Buried Resistor Copper Foil
Panasonic Industry takes no responsibility with respect to the processing of the resistive foil and the laminate performance effected by the resistive foil.
Questions related to the resistive foil are best answered by its supplier or the PCB fabricator.
Panasonic Industry is able to provide the supplier contact information. If you need, Please contact Panasonic Industry local representatives.

The above data are typical values and not guaranteed values.

Dk 3.36 Df 0.0029 @13GHz

Tg (DMA) 250˚C

T320 (with copper) >120min

Applications

Network / Wireless

ICT Infrastructure Equipment, High-Speed Networking (High-End Server/Router, Optical Network, Switch), High-Layer-Count PCB

Halogen -free

Halogen-free MEGTRON6

Laminate

R-5375(N)* R-5375(E)

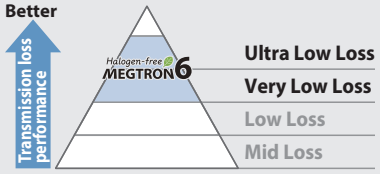
Prepreg

R-5370(N)* R-5370(E)

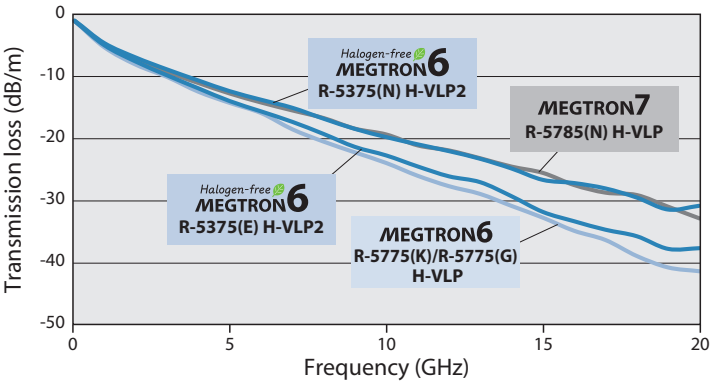
*Low Dk glass cloth type

Halogen-free ultra-low transmission loss multi-layer circuit board materials

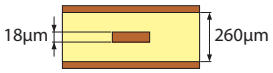
The industry standard high-speed, ultra-low loss material.
Transmission loss is between MEGTRON6 R-5775(K)/R-5775(G) and MEGTRON7 R-5785(N).
Excellent HDI and thermal performance.



Frequency dependence by transmission loss



Construction



Line length	200mm , 100mm
Line width	125µm
Impedance	50Ω
Inner Cu treatment	No-surface treatment
Core	0.13mm
Prepreg	#2116 56% x 1ply

Heat resistance of high multi-layered

Result

Drill diameter	φ0.3mm	
Wall to wall distance	0.3mm	0.5mm
Halogen-free MEGTRON6 R-5375(E)	pass	pass

Condition

260˚C reflow x 10times

Construction

32 Layers
Board thickness: 4.5mm

General properties

Item		Test method	Condition	Unit	Halogen-free MEGTRON6 R-5375(N) Low Dk glass cloth	Halogen-free MEGTRON6 R-5375(E) E glass cloth	MEGTRON6 R-5775(K)/R-5775(G) E glass cloth
Tg		DMA (1Hz)	A	˚C	**250**	**250**	**210*1**
Thermal expansion		TMA (Z direction)	50-260˚C	%	**1.7**	**1.7**	**2.9**
T288(with copper)		IPC-TM-650 2.4.24.1	A	min	**>120**	**>120**	**>120**
T320(with copper)					**>120**	**>120**	**50**
Dk	13GHz	Balanced-type circular disk resonator method	C-24/23/50	-	**3.36**	**3.66**	**3.6**
Df					**0.0029**	**0.0037**	**0.004**
Peel strength	1oz(35µm)	IPC-TM-650 2.4.8	A	kN/m(lb/inch)	**0.6*2(3.4)**	**0.6*2(3.4)**	**0.8*3(4.6)**

The sample thickness is 0.75mm.
*1 10Hz *2 H-VLP2 Copper *3 H-VLP Copper

Our Halogen-free materials are based on JPCA-ES-01-2003 standard and others.
The above data are typical values and not guaranteed values.

Dk 3.7 Df 0.007 @13GHz

Tg (DSC) 176˚C

T288 (with copper) 30min

Applications

Network / Wireless

ICT Infrastructure Equipment, Supercomputer, Measuring Instrument, Antenna

MEGTRON4 MEGTRON4S

Laminate

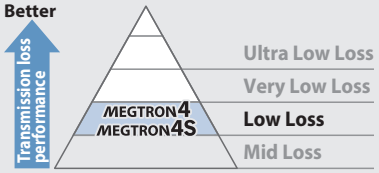
R-5725 R-5725S

Prepreg

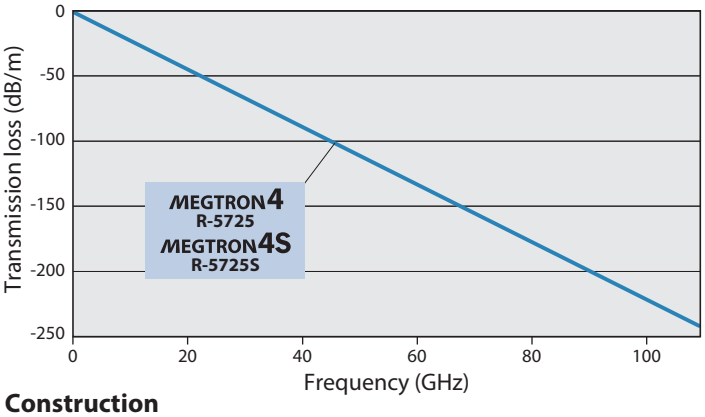
R-5620 R-5620S

Low transmission loss, highly heat-resistant multi-layer circuit board materials

Suitable for high-speed large-volume data transmission by servers and routers at high-end and volume designs.

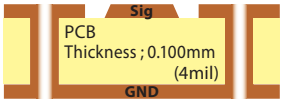


Frequency dependence by transmission loss



Construction

Microstrip line



Measurement	2 port S-Parameter
Frequency	10MHz-110GHz
De-embedded	TRL method
Measurement line	adjust to 50Ω(Zo)

Layer1: Signal line (line width: 270μm, Cu thickness: 24μm)
Layer2: GND plane (Cu thickness: 24μm)

Heat resistance of high multi-layered

Result

Drill diameter	φ0.3mm	
Wall to wall distance	0.6mm	0.7mm
MEGTRON4	pass	pass
MEGTRON4S	pass	pass

Condition

260˚C reflow x 10times

Construction

28 Layers
Board thickness: 3.8mm

General properties

Item		Test method	Condition	Unit	MEGTRON4 R-5725	MEGTRON4S R-5725S
Tg		DSC	A	˚C	176	200
CTE z-axis	α1	IPC-TM-650 2.4.24	A	ppm/˚C	35	32
	α2				265	250
T288(with copper)		IPC-TM-650 2.4.24.1	A	min	30	50
Dk	10,13GHz	*1	C-24/23/50	-	3.7 [13GHz]	3.8 [10GHz]
Df					0.007 [13GHz]	0.007 [10GHz]
Peel strength	1oz(35μm)	IPC-TM-650 2.4.8	A	kN/m(lb/inch)	1.2(6.9)	1.4(8.0)

The sample thickness is 0.8mm.
*1 MEGTRON4: Balanced-type circular disk resonator method
MEGTRON4S: IPC-TM-650 2.5.5.5

The above data are typical values and not guaranteed values.

Halogen -free

XPEDION 1

Laminate **R-5515**

Prepreg **R-5410**

Halogen-free ultra-low transmission loss multi-layer circuit board materials

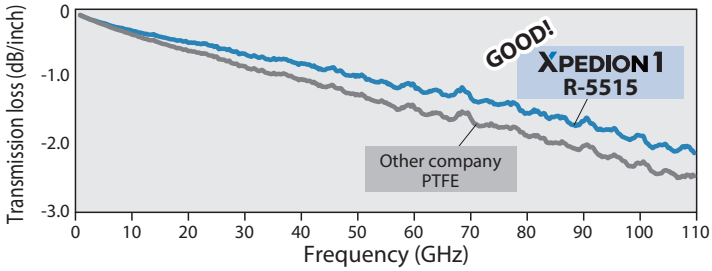
Prepreg R-5410 enables multi-layer antenna constructions and improves the design flexibility of high-frequency circuit boards; especially suitable for millimeter-wave antennas.
This material achieves higher efficiency and lower loss, with the added benefit of reduced processing costs.

Applications

Wireless/Automotive

Antenna (Automotive Millimeter-Wave Radar, Base Station)

Frequency dependence by transmission loss

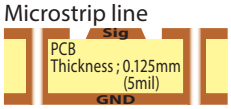


Transmission loss at 77GHz

Material	Transmission loss (dB/inch)	Modeling Dk
XPEDION 1 R-5515	-1.4	3.14
Other company PTFE	-1.8	3.13

Construction

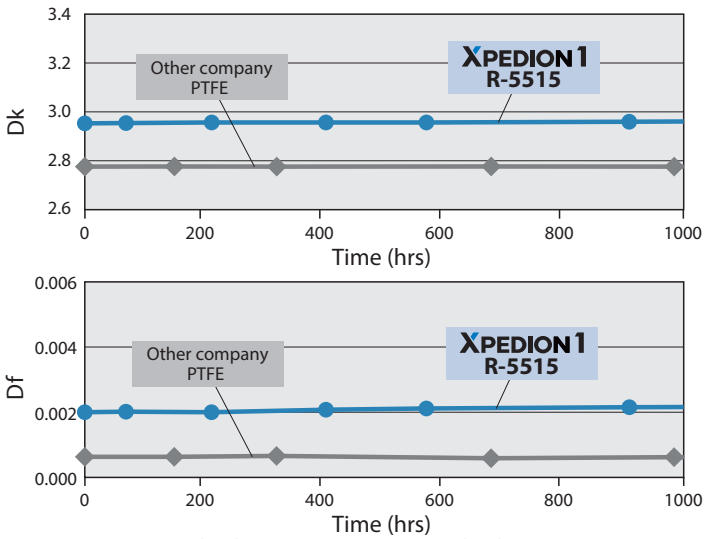
Microstrip line



Measurement	2 port S-Parameter
Frequency	10MHz-110GHz
De-embedded	TRL method
Measurement line	adjust to 50Ω(Zo)

Layer1: Signal line (line width: 300μm, Cu thickness: 24μm)
Layer2: GND plane (Cu thickness: 24μm)

Long-term stability under high temperature (Dk, Df)



· Measurement method : Cavity resonator method
· Aging temperature : 125˚C (without humidity control)
· Measurement frequency : 10GHz

General properties

Item		Test method	Condition	Unit	XPEDION 1 R-5515
Tg		DMA	A	˚C	200
CTE z-axis	α1	IPC-TM-650 2.4.24	A	ppm/˚C	50*1
	α2				300*1
T288(with copper)		IPC-TM-650 2.4.24.1	A	min	>120*1
Dk	14GHz	Balanced-type circular disk resonator method	C-24/23/50	-	3.06
Df					0.0021
Peel strength*2	1/2oz(18μm)	IPC-TM-650 2.4.8	A	kN/m(lb/inch)	0.6(3.4)

The sample thickness is 0.13mm.
*1 The sample thickness is 0.5mm.
*2 H-VLP2 Copper

Please contact us about the thickness specification.
Our Halogen-free materials are based on JPCA-ES-01-2003 standard and others.
The above data are typical values and not guaranteed values.

Halogen -free

XPEDION T1

Laminate **R-5575**

Prepreg **R-5470**

High thermal conductivity, low transmission loss Halogen-free multi-layer circuit board materials

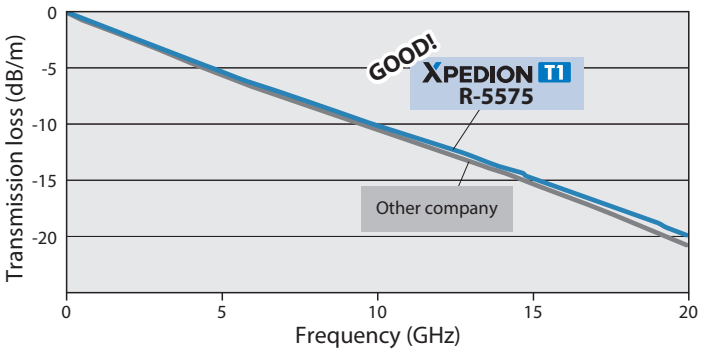
Leveraging multi-layer processability, low transmission loss, high thermal conductivity and Halogen-free, these materials are suitable for miniaturized and 5G small cell PCBs

Applications

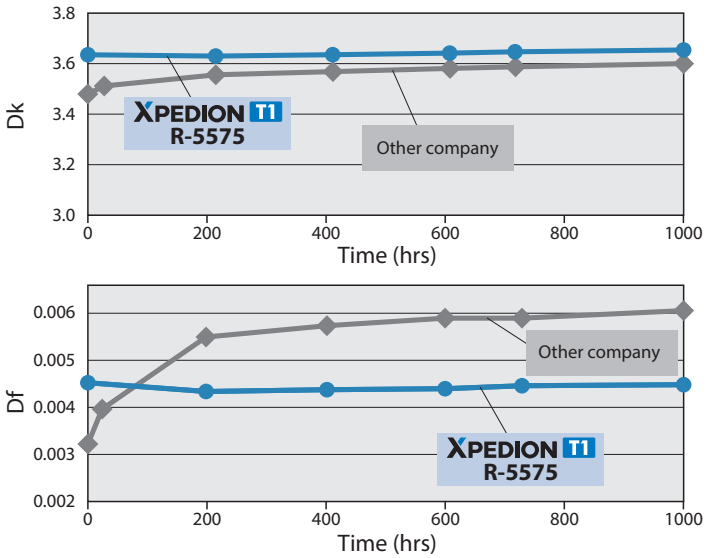
Wireless/Automotive

Power Amplifier Board (Base Station for Wireless Communication, Small Cell), Antenna (Automotive Millimeter-Wave Rader)

Frequency dependence by transmission loss

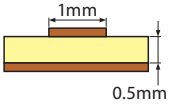


Long-term stability under high temperature (Dk, Df)



· Measurement method : Balanced-type circular disk resonator method
· Aging temperature : 125˚C (without humidity control)
· Measurement frequency : 18GHz

Construction
Microstrip line



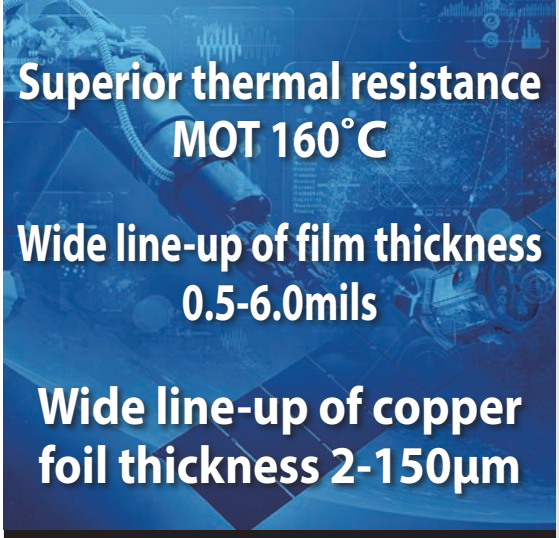
Item	R-5575	Other company
Line length	1000mm	1000mm
Impedance	50±1Ω	50±1Ω
Copper thickness	18μm→ +20μm plating	18μm→ +20μm plating
Copper	RT	ST
Core	0.5mm	0.5mm

General properties

Item		Test method	Condition	Unit	XPEDION T1 R-5575	Other company
Tg		DMA	A	˚C	245	Tg less
CTE z-axis	α1/α2	IPC-TM-650 2.4.24	A	ppm/˚C	20/155	21/42
T288(with copper)		IPC-TM-650 2.4.24.1	A	min	>120	>120
Thermal conductivity		Laser flash	A	W/m·K	0.6	0.6
Dk	13GHz	Balanced-type circular disk resonator method	C-24/23/50	-	3.60	3.5
Df					0.0045	0.004
Peel strength*	1oz(35μm)	IPC-TM-650 2.4.8	A	kN/m(lb/inch)	0.80(4.6)	0.58(3.3)

The sample thickness is 0.5mm.
* RT Copper

Our Halogen-free materials are based on JPCA-ES-01-2003 standard and others.
The above data are typical values and not guaranteed values.



Applications

Avionics / Industry

Consumer Mobile Products (Smartphone, Tablet PC), Medical, Industrial, Avionics/Space Applications

Halogen -free

FELIOS

Double-sided copper clad

R-F775

Single-sided copper clad

R-F770

Flexible circuit board materials

Felios adhesiveless flex materials are available in a wide-range of film and copper foil thicknesses to support all applications. Felios offers superior thermal resistance, dimensional stability and quality.

Line-up

Available in various film and copper foil combinations. **Roll-cut type** MAX 610mm(MD) x 500mm(TD) **Roll type** W=250mm, 500mm

Copper foil thickness		Film thickness (Unit: mil (mm))						
		0.5 (0.013)	1.0 (0.025)	2.0 (0.050)	3.0 (0.075)	4.0 (0.100)	5.0 (0.125)	6.0 (0.150)
RA copper foil	1/4oz (9µm)	●*1	●*1	●*1	-	-	-	●*1
	1/3oz (12µm)	●	●	●	●	●	-	-
	1/2oz (18µm)	●	●*2	●*2	●*2	●*2	●*2	●
	1oz (35µm)	●*1	●*2	●*2	●*2	●*2	●*2	●
	2oz (70µm)	-	●*2	●*2	●	●	●	-
	3oz(105µm)	-	●	●	-	-	-	-
ED copper foil	- (2µm)	●	●	●	●	-	-	-
	1/6oz (6µm)	●	●	●	-	-	-	-
	1/4oz (9µm)	●	●	●	●	●	●	●
	1/3oz (12µm)	●	●	●	●	●	●	●
	1/2oz (18µm)	●	●	●	●	●	-	-
	1oz (35µm)	-	●	●	●	●	-	-

*1 Special option *2 W=610mm is optional.

General properties

Item		Test method	Condition	Unit	FELIOS R-F775
Solder heat resistance		JIS C 6471	A	˚C	>330
			C-96/40/90		260
Tensile modulus		ASTM D882	A	GPa	7.1
Tensile strength		Internal method	A	MPa	542
Peel strength	RA: 1/3oz(12µm)	JIS C 6471	A	N/mm(lb/inch)	1.35(7.6)
CTE	MD/TD/Z-axis	JIS R 3251	50-200˚C	ppm/˚C	17/19/101
Thermal conductivity		Laser flash	A	W/m·K	0.16
Dimensional stability		IPC-TM-650	After etching MD direction	%	0.00±0.10
			After etching TD direction		0.00±0.10
Outgas	TML/CVCM/WVR*	ASTM E595-07/ASTM E595-15	-	%	0.62 / 0.05 / 0.55

The sample thickness is film 25µm, copper foil 12µm.
* TML: Total Mass Loss, CVCM: Collected Volatile Condensable Material, WVR: Water Vapor Recovered

Our Halogen-free materials are based on JPCA-ES-01-2003 standard and others.
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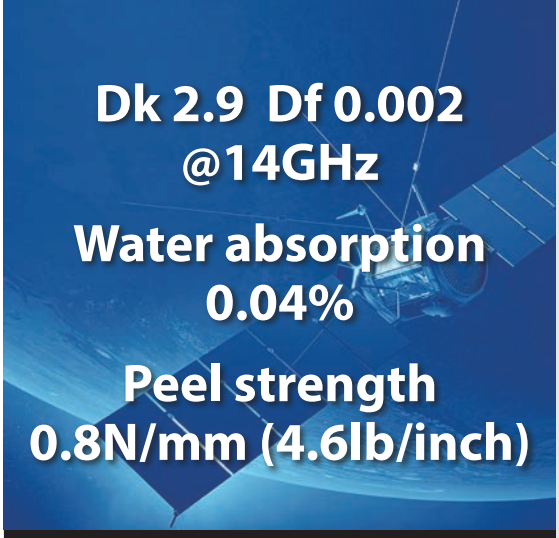


Dk 2.9 Df 0.002 @14GHz

Water absorption 0.04%

Peel strength 0.8N/mm (4.6lb/inch)

Halogen -free

FELIOS LCP

Double-sided
R-F705S

Flexible circuit board materials LCP (Liquid Crystal Polymer)

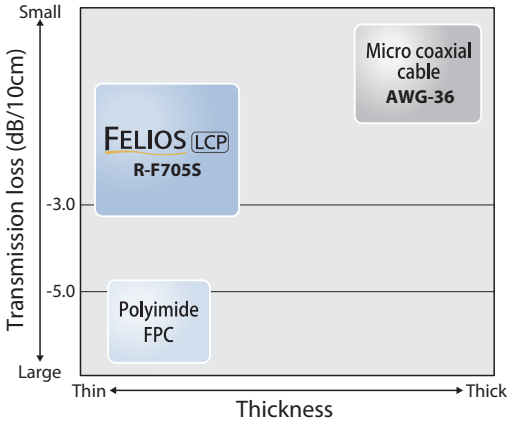
Good high-frequency properties make this material suitable for high-speed large-volume data transmission by mobile devices. R-F705S may be used as a replacement of micro coaxial cable and millimeter-wave radar antenna.

Applications

Avionics / Wireless

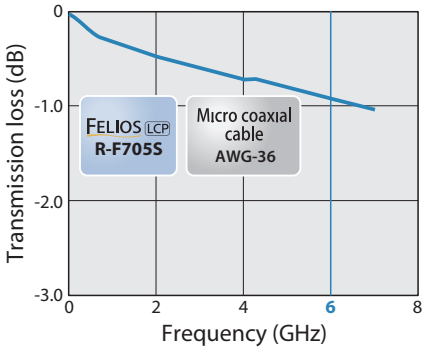
Avionics/Space Application, Laptop, Tablet PC, 4K/8K Display (High-Speed FPC Cable), Automotive Components

Concept



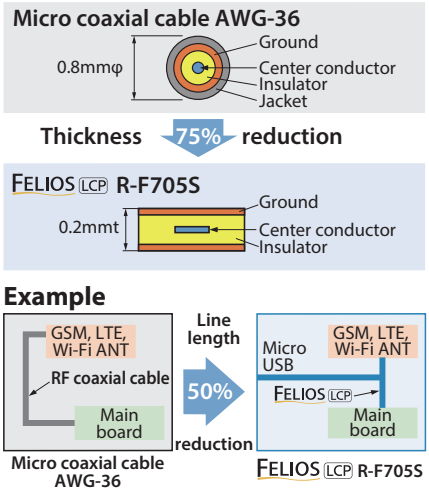
In addition the thickness advantage, one FPC cable can replace several coaxial cables.

Frequency dependence by transmission loss



Result @6GHz

FELIOS LCP **R-F705S**	-1.0dB / **5cm**
Micro coaxial cable AWG-36	-1.0dB / **10cm**



General properties

Item		Test method	Condition	Unit	FELIOS LCP **R-F705S**
Solder heat resistance		JIS C 6471	288˚C solder float for 1min	-	**No abnormality**
Dielectric constant(Dk)	14GHz	Balanced-type circular disk resonator method	A	-	**2.9**
Dissipation factor(Df)					**0.002**
Dielectric constant(Dk)	10GHz	Cavity resonator method	A	-	**3.3**
Dissipation factor(Df)					**0.002**
Water absorption		Internal method	25˚C 50h immersion	%	**0.04**
Peel strength	ED:18μm	IPC-TM-650 2.4.8	A	N/mm (lb/inch)	**0.8(4.6)**
Dimensional stability		IPC-TM-650 2.2.4	After etching MD/TD	%	**0.008/0.007**
			After E-0.5/150 MD/TD		**0.052/0.035**
Outgas	TML/CVCM/WVR*	ASTM E595-07/ASTM E595-15	-	%	**0.05 / <0.01 / 0.04**

The sample thickness is 0.1mm.

ED(TP4S) 18-100-18

* TML: Total Mass Loss, CVCM: Collected Volatile Condensable Material, WVR: Water Vapor Recovered

Our Halogen-free materials are based on JPCA-ES-01-2003 standard and others.
The above data are typical values and not guaranteed values.

Innovative semiconductor device materials to meet the challenges of leading-edge devices

LEXCM

[l é k s i m]

Panasonic Industry is proud to launch LEXCM brand semiconductor packaging materials. Innovation through collaboration is our path to developing advanced IC Substrates and IC Encapsulants ready for the demands of next-generation devices.

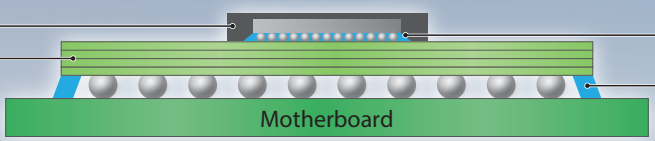
Semiconductor package

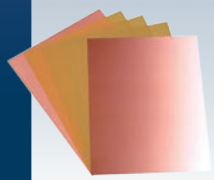
Semiconductor encapsulation materials (Overmold)

LEXCM CF

Semiconductor encapsulation materials (Underfill)

LEXCM DF





LEXCM GX

IC substrate materials (Core/Prepreg)

LEXCM DF

Liquid materials for board level sidefill/underfill

IC Packaging Materials

Granule Overmold

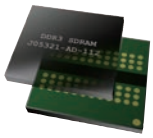
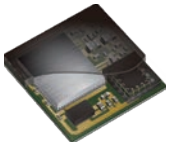
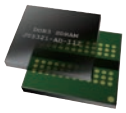
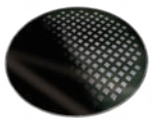
LEXCM CF Series

Liquid Underfill, Board Level Sidefill/Underfill

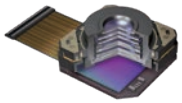
LEXCM DF Series

Line-up

LEXCM CF Series

IC Encapsulants Laminate Packages, Wafer Level Packages					
CV8580MUA	**CV8710U** **CV8715BU**	**CV8713UB**	**CV8712BMA** **CV8712BMB** **CV8712BMC**	**CV8710MYC** **CV8714MYT**	**CV8511CUA** **CV8511CUB**
					
fcBGA MUF	fcCSP MUF	SiP MUF	FBGA EMC	NAND EMC	WLP/PLP EMC

LEXCM DF Series

Board-Level Underfill			Sidefill & Corner Bond		Adhesives
CV5794	**CV5313**	**CV5350**	**CV5797**	**CV5314**	**CV5390**
					

General properties

Item	Tg (TMA)	CTE-1 (TMA)	CTE-2 (TMA)	Flexural Modulus (@25˚C)	Flexural Strength (@25˚C)	Mold Shrinkage	Viscosity (@175˚C)	Filler Size (Max)	Gelation Time
Unit	˚C	ppm/˚C	ppm/˚C	GPa	MPa	%	Pa·s	μm	sec
CV8580MUA	161	15	57	18	160	0.21	13	20	33
CV8710U	160	9	36	24	200	0.21	15	20	53
CV8715BU	150	21	70	12	150	0.55	8	20	40
CV8713UB	145	9	38	24	170	0.20	12	20	45
CV8712BMA	155	8	30	27	180	0.21	25	55	70
CV8712BMB	155	7.5	27	27	177	0.22	25	55	70
CV8712BMC	125	9	33	33	170	0.30	15	55	60
CV8710MYC	150	9	36	26	170	0.19	13	55	60
CV8714MYT	150	9	36	26	170	0.19	13	55	60
CV8511CUA	218	9	50	10	50	0.11	15	20	59
CV8511CUB	210	8	56	8	63	0.15	13	20	56

Item	Viscosity	Thixotrophy	Tg	CTE	Flexural Modulus	Volume Resistivity	Gelation Time
Unit	Pa·s	–	˚C	˚C	GPa	Ω·cm	sec
CV5794	8	1.0	160	23 ppm	13	–	–
CV5313	2	1.0	105	7.1×10^{-5}	3.2	1×10^{15}	40
CV5350	4	1.0	150	3.0×10^{-5}	10	5×10^{15}	75
CV5797	180	3.5	160	14 ppm	18	–	–
CV5314	80	4.5	40	7.0×10^{-5}	2.5	1×10^{15}	–
CV5390	3	1.0	60	6.0×10^{-5}	2.5	–	15

The above data are typical values and not guaranteed values.

Applications
IC Package
FC-xGA, Module, CSP, FC-CSP

Halogen -free

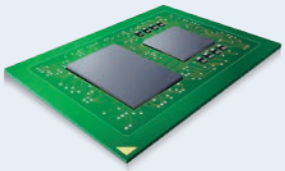
Circuit board materials for IC substrate
LEXCM GX Series

Enables thinner and smaller IC substrates with lower warpage.

Line-up

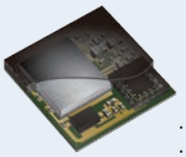
Package Application

FC-xGA



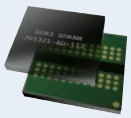
- CPU for Sever/ Desktop/Laptop
- GPU for AI/ADAS/ Gaming
- FPGA

Module



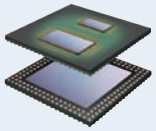
- AiP
- PAM
- FEM

CSP



- DRAM
- NAND/PMIC
- Mini LED

FC-CSP



- APU
- RF-IC

Product

LEXCM GX

Ultra Low CTE / High Reliability

R-1515V / R-1515K
- Low warpage
- Stress release

Low CTE / High Heat Resistance

R-1515W
- Low warpage
- High modulus

R-1515A
- Low warpage
- High heat resistance

Low Dk / Low Df

R-G545L / R-G545E
- Excellent transmission loss
- Excellent low Dk/Df performance in wide frequency
- Low warpage

Low CTE / Ultra Thin Material

R-G515S / R-G515E
- Low warpage
- Fine laminate-ability
- Ultra thin prepreg line-up

R-1515E
- Low warpage
- High modulus

General properties

Item	Glass transition temp.(Tg)	CTE x-axis	CTE y-axis	Dielectric constant(Dk)*1	Dissipation factor(Df)*1	Flexural modulus*1		Peel strength	Product thickness line-up
		α1		1GHz				1/3oz(12μm)	
Test method	DMA*2	Internal method		IPC-TM-650 2.5.5.9		JIS C 6481		IPC-TM-650 2.4.8	
Condition	A	A		C-24/23/50		25˚C	250˚C	A	
Unit	˚C	ppm /˚C		-		GPa		kN/m(lb/inch)	mm
R-1515V	260	3-5	3-5	4.4	0.016	30	14	0.6(3.4)	0.20~1.8
R-1515K	260	7	7	4.6	0.015	27	12	0.6(3.4)	0.20~1.8
R-G545L	230	10	10	3.6	0.002	23	10	0.6(3.4)	0.04~0.2
R-G545E	230	10	10	4.1	0.002	27	13	0.6(3.4)	0.04~0.2
R-1515E	270	9	9	4.7	0.011	33	18	0.9(5.1)	0.04~0.2
R-G515S	220-240	4-6	4-6	4.2	0.008	28	-	0.7(4.0)	0.03~0.1
R-G515E	220-240	6-8	6-8	4.4	0.008	24	-	0.7(4.0)	0.03~0.1
R-1515W	250	9	9	4.8	0.015	35	21	0.9(5.1)	0.20~0.8
R-1515A	205	12	12	4.8	0.015	27	10	0.9(5.1)	0.10~0.8

The sample thickness is 0.1 mm.
*1 0.8mm *2 Measurement in tensile mode. R-1515W, R-1515A: Measurement in bending mode.

Our Halogen-free materials are based on JPCA-ES-01-2003 standard and others.
The above data are typical values and not guaranteed values.

Panasonic Material Outgas Report Summary

Outgassing Data Per ASTM Specification E595

Panasonic Product	Total Mass Loss (TML 1% MAX)	Collectable Volatile Condensable Materials (CVCM 0.10%)	Water Vapor Recovered (WVR% Report)
MEGTRON7 R-5785(N)	0.07	0.01	0.01
MEGTRON6 R-5775(K)	0.03	<0.01	0.01
MEGTRON4S R-5725S	0.02	<0.01	0.01
Halogen-free MEGTRON2 R-1577	0.03	<0.01	0.02
Halogen-free MEGTRON6 R-5375(E)	0.21	<0.01	0.11
XPEDION1 R-5515	0.40	<0.01	0.08
HiPER R-1755S	0.17	<0.01	0.14
HiPER V R-1755V	0.16	0.02	0.13
HiPER M R-1755M	0.18	<0.01	0.13
R-1566S	0.47	<0.01	0.40
LEXCM GX R-G545L	0.23	<0.01	0.02
FELIOS R-F775	0.62	0.05	0.55
FELIOS LCP R-F705S	0.05	<0.01	0.04
LEXCM DF CV5350AS	0.21	<0.01	0.08
LEXCM DF CV5794L	0.25	<0.01	0.09
LEXCM DF CV5797U	0.13	<0.01	0.04

Our Halogen-free materials are based on JPCA-ES-01-2003 standard and others.

The above data are typical values and not guaranteed values.

Notes before you use

- User must verify the suitability and fitness for intended application by quality testing, evaluation or other means at your own option before any adoption, use or change of use conditions of a product listed in this catalog.
- We would like to have a delivery specifications mutually agreed for the product that you have decided to use. The agreements defined in the delivery specifications are assigned higher priority.
- Please note that images shown may differ from the actual product in color.
- Please note that specifications and external design are subject to change without notice.
- For details on products in this catalog, please contact your distributor or our sales department.

Safety Information

- Before using the product, please read the delivery specifications carefully or contact the distributor from which you purchased the product or our sales department.
- The products in this catalog are Electronic circuit board materials for electronic and electrical devices. Do not use them for other than specified use.

Panasonic
INDUSTRY

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Panasonic Industrial Search

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