

Data Sheet

**Halogen-free Ultra-low transmission loss
Multi-layer Circuit board materials**

XPEDION 1 **Laminate R-5515**
Prepreg R-5410

Any letters with parentheses () at the end of a part number are for identification code in our company and are not included in the part numbers registered for UL certification.

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General Properties / Laminate R-5515

Items		Units	Test Method	Condition	Typical Values		
					R-5515 (5mil #1078x1)		
THERMAL	Glass Transition Temperature (Tg)		C	TMA	As received	170	
			C	DMA (Tensile)	As received	200	
	Thermal Decomposition Temperature (Td)		C	TGA	As received	410	
	Time to Delamination (T288)		Without Cu	Min	IPC TM-650 2.4.24.1	As received	> 120 *1
			With Cu	Min	IPC TM-650 2.4.24.1	As received	> 120 *1
	Thermal Stress (288C)		With Cu	Sec	IPC TM-650 2.4.13.1	As received	-
	CTE : α1		X - axis	ppm / C	IPC TM-650 2.4.24	< Tg	19 - 21
			Y - axis	ppm / C	IPC TM-650 2.4.24	< Tg	19 - 21
			Z - axis	ppm / C	IPC TM-650 2.4.24	< Tg	50 *1
CTE : α2		Z - axis	ppm / C	IPC TM-650 2.4.24	> Tg	300 *1	
ELECTRICAL	Dielectric Constant (Dk)		@ 14GHz	-	IEC 63185 (2020) *2	C-24/23/50	3.06
	Dissipation Factor (Df)		@ 14GHz	-	IEC 63185 (2020) *2	C-24/23/50	0.0021
	Volume Resistivity			MΩ m	IPC TM-650 2.5.17.1	C-96/35/90	1 x 10 ⁷
	Surface Resistivity			MΩ	IPC TM-650 2.5.17.1	C-96/35/90	1 x 10 ⁸
PHYSICAL Flammability	Water Absorption			%	IPC TM-650 2.6.2.1	D-24/23	0.19
	Peel Strength	H oz (H-VLP2)		kN / m	IPC TM-650 2.4.8	As Received	0.6
	Flammability			-	UL 94V	A&E-168/70	94V-0+1
	Young's Modulus (X,Y direction)			GPa	ASTM D3039	As received	9.7
	Poisson's Ratio (X,Y direction)			-	JIS K7161-1	As received	0.2

†1 The value represents Panasonic internal test results based on the UL94 test method for flammability and is NOT intended to indicate that the product is UL certified. If UL certification is required, use R-5515X for the UL recognized grades.

*1 : Sample Thickness ; 20mil = 0.5 mm

*2 : Balanced-type Circular Disk Resonance Method [IEC 63185 (2020)]

* The data in the above table represents typical values for your reference and are not guaranteed values.

Dielectric Properties / Laminate R-5515 : Low-Dk glass

Test Method ; Balanced-type Circular Disk Resonance Method [IEC 63185 (2020)]

Core Type (mil)	Actual Thickness		Cloth Style	Ply	Typical Resin Content (%)	Typical Dk				
	mil	mm				14GHz	26GHz	37GHz	48GHz	60GHz
4	4.1	0.105	1067	1	82	3.01	3.00	3.00	3.00	3.00
5	5	0.127	1078	1	78	3.06	3.05	3.05	3.05	3.05
10	10	0.254	1078	2	78	3.06	3.05	3.05	3.05	3.05

Core Type (mil)	Actual Thickness		Cloth Style	Ply	Typical Resin Content (%)	Typical Df				
	mil	mm				14GHz	26GHz	37GHz	48GHz	60GHz
4	4.1	0.105	1067	1	82	0.0023	0.0025	0.0027	0.0029	0.0030
5	5	0.127	1078	1	78	0.0021	0.0024	0.0026	0.0029	0.0031
10	10	0.254	1078	2	78	0.0021	0.0024	0.0026	0.0029	0.0031

* The data in the above table represents typical values for your reference and are not guaranteed values.

Dielectric Properties / Laminate R-5410 : Low-Dk glass

Test Method ; Balanced-type Circular Disk Resonance Method [IEC 63185 (2020)]

Cloth Style	Resin Content (%)	Typical Thickness (um)	Typical Dk				
			14GHz	26GHz	37GHz	48GHz	60GHz
1067	82	105	3.01	3.00	3.00	3.00	3.00
1078	78	127	3.06	3.05	3.05	3.05	3.05

Cloth Style	Resin Content (%)	Typical Thickness (um)	Typical Df				
			14GHz	26GHz	37GHz	48GHz	60GHz
1067	82	105	0.0023	0.0025	0.0027	0.0029	0.0030
1078	78	127	0.0021	0.0024	0.0026	0.0029	0.0031

* The data in the above table represents typical values for your reference and are not guaranteed values.

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