

**Data Sheet**

**Halogen-free  
Glass Epoxy Multi-layer Materials**

**Halogen-free**

**Laminate R-1566(W/WN)  
Prepreg R-1551(W/WN)**

Jul. 2019 No.19070540

# Specification / Laminate R-1566(W/WN)

Property		Units	Test Method	Condition	Typical Value		
					R-1566(W)	R-1566(WN)	
THERMAL	Glass Transition Temp ( Tg )	°C	DSC	As received	148	148	
			TMA	As received	145	145	
			DMA	As received	170	170	
	Thermal Decomposition Temp ( Td )	°C	TGA	As received	350	355	
	Time to Delam ( T288 )	Without Cu	Min	IPC TM-650 2.4.24.1	As received	> 120	> 120
		With Cu	Min	IPC TM-650 2.4.24.1	As received	3	10
	CTE : α1	X - axis	ppm / C	IPC TM-650 2.4.24	< Tg	11 – 13	11 – 13
		Y - axis	ppm / C	IPC TM-650 2.4.24	< Tg	13 – 15	13 – 15
Z - axis		ppm / C	IPC TM-650 2.4.24	< Tg	40	40	
CTE : α2	Z - axis	ppm / C	IPC TM-650 2.4.24	> Tg	180	180	
ELECTRICAL	Volume Resistivity		MΩ - cm	IPC TM-650 2.5.17.1	C-96/35/90	1 x 10 <sup>9</sup>	1 x 10 <sup>9</sup>
	Surface Resistivity		MΩ	IPC TM-650 2.5.17.1	C-96/35/90	1 x 10 <sup>8</sup>	1 x 10 <sup>8</sup>
	Dielectric Constant ( Dk )	@ 1MHz	-	IPC TM-650 2.5.5.9	C-24/23/50	4.9	4.9
		@ 1GHz	-	IPC TM-650 2.5.5.9	C-24/23/50	4.6	4.6
	Dissipation Factor ( Df )	@ 1MHz	-	IPC TM-650 2.5.5.9	C-24/23/50	0.010	0.010
		@ 1GHz	-	IPC TM-650 2.5.5.9	C-24/23/50	0.010	0.010
PHYSICAL	Water Absorption		%	IPC TM-650 2.6.2.1	D-24/23	0.14	0.14
	Peel Strength	1oz	kN / m	IPC TM-650 2.4.8	As Received	1.8	1.8
	Flammability		-	UL	C-48/23/50	94V-0	94V-0

Sample thickness ; 32 mil ( 0.8 mm )

\* The data in the above table are not guaranteed values.

# Specification / Laminate R-1566(W/WN)

1MHz - 1GHz ; IPC TM650-2.5.5.9

Nominal Thickness		Cloth Style	Typical Resin Content (%)	ply	Typical Dk			Typical Df		
mil	mm				1MHz	100MHz	1GHz	1MHz	100MHz	1GHz
2	0.05	1067	65	1	4.5	4.3	4.2	0.012	0.012	0.012
2.5	0.06	1080	56	1	4.7	4.5	4.4	0.011	0.011	0.011
4	0.1	2116	46	1	4.9	4.7	4.6	0.010	0.010	0.010
5	0.13	1504	43	1	5.0	4.8	4.7	0.010	0.010	0.010
6	0.15	1501	44	1	5.0	4.8	4.7	0.010	0.010	0.010
		1080	63	2	4.6	4.4	4.3	0.012	0.012	0.012
8	0.2	7628	46	1	4.9	4.7	4.6	0.010	0.010	0.010
		2116	46	2	4.9	4.7	4.6	0.010	0.010	0.010
9	0.22	2116	52	2	4.8	4.6	4.5	0.010	0.010	0.010
10	0.25	1504	43	2	5.0	4.8	4.7	0.010	0.010	0.010
12	0.3	1501	44	2	5.0	4.8	4.7	0.010	0.010	0.010
16	0.4	7628	46	2	4.9	4.7	4.6	0.010	0.010	0.010
20	0.5	7628 / 2116	46	2 / 1	4.9	4.7	4.6	0.010	0.010	0.010
24	0.6	7628	46	3	4.9	4.7	4.6	0.010	0.010	0.010

\* The data in the above table are not guaranteed values.

# Specification / Laminate R-1566(W/WN)

2GHz-10GHz ; IPC TM650-2.5.5.5

Nominal Thickness		Cloth Style	Typical Resin Content (%)	ply	Typical Dk					Typical Df				
mil	mm				2GHz	4GHz	6GHz	8GHz	10GHz	2GHz	4GHz	6GHz	8GHz	10GHz
2	0.05	1067	65	1	4.2	4.2	4.2	4.2	4.2	0.014	0.014	0.014	0.015	0.018
2.5	0.06	1080	56	1	4.4	4.4	4.4	4.4	4.4	0.013	0.013	0.013	0.014	0.017
4	0.1	2116	46	1	4.6	4.6	4.6	4.6	4.6	0.012	0.012	0.012	0.013	0.016
5	0.13	1504	43	1	4.7	4.7	4.7	4.7	4.6	0.012	0.012	0.012	0.013	0.015
6	0.15	1501	44	1	4.7	4.7	4.7	4.6	4.6	0.012	0.012	0.012	0.013	0.015
		1080	63	2	4.3	4.2	4.2	4.2	4.2	0.014	0.014	0.014	0.015	0.018
8	0.2	7628	46	1	4.6	4.6	4.6	4.6	4.6	0.012	0.012	0.012	0.013	0.016
		2116	46	2	4.6	4.6	4.6	4.6	4.6	0.012	0.012	0.012	0.013	0.016
9	0.22	2116	52	2	4.5	4.5	4.5	4.5	4.5	0.012	0.012	0.012	0.013	0.016
10	0.25	1504	43	2	4.7	4.7	4.7	4.7	4.6	0.012	0.012	0.012	0.013	0.015
12	0.3	1501	44	2	4.7	4.7	4.7	4.6	4.6	0.012	0.012	0.012	0.013	0.015
16	0.4	7628	46	2	4.6	4.6	4.6	4.6	4.6	0.012	0.012	0.012	0.013	0.016
20	0.5	7628 / 2116	46	2 / 1	4.6	4.6	4.6	4.6	4.6	0.012	0.012	0.012	0.013	0.016
24	0.6	7628	46	3	4.6	4.6	4.6	4.6	4.6	0.012	0.012	0.012	0.013	0.016

\* The data in the above table are not guaranteed values.

# Specification / Laminate R-1551(W/WN)

1MHz - 1GHz ; IPC TM650-2.5.5.9

Cloth Style	Resin Contents (%)	Typical Thickness (um)	Typical Dk			Typical Df		
			1MHz	100MHz	1GHz	1MHz	100MHz	1GHz
1037	72	48	4.4	4.2	4.1	0.012	0.012	0.012
	74	53	4.3	4.1	4.1	0.013	0.013	0.013
1067	70	60	4.4	4.2	4.1	0.012	0.012	0.012
	72	65	4.4	4.2	4.1	0.012	0.012	0.012
	75	73	4.3	4.1	4.1	0.013	0.013	0.013
106	72	51	4.4	4.2	4.1	0.012	0.012	0.012
	74	56	4.3	4.1	4.1	0.013	0.013	0.013
	77	64	4.3	4.1	4.1	0.013	0.013	0.013
1078	65	78	4.5	4.3	4.2	0.012	0.012	0.012
	67	84	4.5	4.3	4.2	0.012	0.012	0.012
	70	93	4.4	4.2	4.1	0.012	0.012	0.012
1080	62	69	4.6	4.4	4.3	0.011	0.011	0.011
	65	76	4.5	4.3	4.2	0.012	0.012	0.012
	70	91	4.4	4.2	4.1	0.012	0.012	0.012

\* The data in the above table are not guaranteed values.

# Specification / Laminate R-1551(W/WN)

1MHz - 1GHz ; IPC TM650-2.5.5.9

Cloth Style	Resin Contents (%)	Typical Thickness (um)	Typical Dk			Typical Df		
			1MHz	100MHz	1GHz	1MHz	100MHz	1GHz
3313	53	93	4.8	4.6	4.5	0.011	0.011	0.011
	55	98	4.7	4.5	4.4	0.011	0.011	0.011
	57	104	4.7	4.5	4.4	0.011	0.011	0.011
2116	47	102	4.9	4.7	4.6	0.010	0.010	0.010
	50	110	4.8	4.7	4.6	0.010	0.010	0.010
	54	122	4.7	4.6	4.5	0.011	0.011	0.011
1504	46	142	4.9	4.7	4.6	0.010	0.010	0.010
	50	157	4.8	4.7	4.6	0.010	0.010	0.010
1501	46	159	4.9	4.7	4.6	0.010	0.010	0.010
	50	175	4.8	4.7	4.6	0.010	0.010	0.010
	54	194	4.7	4.6	4.5	0.011	0.011	0.011
7628	47	206	4.9	4.7	4.6	0.010	0.010	0.010
	50	222	4.8	4.7	4.6	0.010	0.010	0.010
	52	233	4.8	4.6	4.5	0.010	0.010	0.010

\* The data in the above table are not guaranteed values.

# Specification / Laminate R-1551(W/WN)

2GHz-10GHz ; IPC TM650-2.5.5.5

Cloth Style	Resin Contents (%)	Typical Thickness (um)	Typical Dk					Typical Df				
			2GHz	4GHz	6GHz	8GHz	10GHz	2GHz	4GHz	6GHz	8GHz	10GHz
1037	72	48	4.1	4.1	4.1	4.0	4.0	0.014	0.014	0.014	0.015	0.018
	74	53	4.1	4.1	4.0	4.0	4.0	0.015	0.015	0.015	0.016	0.019
1067	70	60	4.1	4.1	4.1	4.1	4.1	0.014	0.014	0.014	0.015	0.018
	72	65	4.1	4.1	4.1	4.0	4.0	0.014	0.014	0.014	0.015	0.018
	75	73	4.1	4.0	4.0	4.0	4.0	0.015	0.015	0.015	0.016	0.019
106	72	51	4.1	4.1	4.1	4.0	4.0	0.014	0.014	0.014	0.015	0.018
	74	56	4.1	4.1	4.0	4.0	4.0	0.015	0.015	0.015	0.016	0.019
	77	64	4.0	4.0	4.0	4.0	4.0	0.015	0.015	0.015	0.016	0.019
1078	65	78	4.2	4.2	4.2	4.2	4.2	0.014	0.014	0.014	0.015	0.018
	67	84	4.2	4.2	4.1	4.1	4.1	0.014	0.014	0.014	0.015	0.018
	70	93	4.1	4.1	4.1	4.1	4.1	0.014	0.014	0.014	0.015	0.018
1080	62	69	4.3	4.3	4.3	4.2	4.2	0.013	0.013	0.013	0.014	0.017
	65	76	4.2	4.2	4.2	4.2	4.2	0.014	0.014	0.014	0.015	0.018
	70	91	4.1	4.1	4.1	4.1	4.1	0.014	0.014	0.014	0.015	0.018

\* The data in the above table are not guaranteed values.

# Specification / Laminate R-1551(W/WN)

2GHz-10GHz ; IPC TM650-2.5.5.5

Cloth Style	Resin Contents (%)	Typical Thickness (um)	Typical Dk					Typical Df				
			2GHz	4GHz	6GHz	8GHz	10GHz	2GHz	4GHz	6GHz	8GHz	10GHz
3313	53	93	4.5	4.5	4.5	4.4	4.4	0.013	0.013	0.013	0.014	0.017
	55	98	4.4	4.4	4.4	4.4	4.4	0.013	0.013	0.013	0.014	0.017
	57	104	4.4	4.4	4.4	4.4	4.3	0.013	0.013	0.013	0.014	0.017
2116	47	102	4.6	4.6	4.6	4.6	4.6	0.012	0.012	0.012	0.013	0.016
	50	110	4.5	4.5	4.5	4.6	4.5	0.012	0.012	0.012	0.013	0.016
	54	122	4.5	4.4	4.4	4.4	4.4	0.013	0.013	0.013	0.014	0.017
1504	46	142	4.6	4.6	4.6	4.6	4.6	0.012	0.012	0.012	0.013	0.016
	50	157	4.5	4.5	4.5	4.6	4.5	0.012	0.012	0.012	0.013	0.016
1501	46	159	4.6	4.6	4.6	4.6	4.6	0.012	0.012	0.012	0.013	0.016
	50	175	4.5	4.5	4.5	4.6	4.5	0.012	0.012	0.012	0.013	0.016
	54	194	4.5	4.4	4.4	4.4	4.4	0.013	0.013	0.013	0.014	0.017
7628	47	206	4.6	4.6	4.6	4.6	4.6	0.012	0.012	0.012	0.013	0.016
	50	222	4.5	4.5	4.5	4.6	4.5	0.012	0.012	0.012	0.013	0.016
	52	233	4.5	4.5	4.5	4.5	4.5	0.012	0.012	0.012	0.013	0.016

\* The data in the above table are not guaranteed values.



## ++ Before purchase ++

### 【Notes before you use】

- Please 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 the datasheet.
- 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 somewhat differ from the actual product in color.
- Please note that specifications and external design are subject to change for product improvement without notice.
- For details on products in the datasheet, 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 in order to use the product correctly.
- The products in the datasheet are Electronic circuit board materials for electronic and electrical devices. Please do not use them for other than specified use.

### Please Contact us of more

#### 【Technical Marketing】

- Japan (Osaka) TEL: 81-6-6904-2771
- USA (Mountain view) TEL: 1-408-861-3946
- Austria (Enns) TEL: 43-7223-883
- China (Guangzhou) TEL: 86-20-8713-0888

#### 【Sales Offices】

- China (Hong Kong) TEL: 852-2529-3956
- China (Suzhou) TEL: 86-512-6825-1565
- China (Guangzhou) TEL: 86-20-8713-0888
- Korea (Seoul) TEL: 82-2-361-7873
- Taiwan (Hsinchu) TEL: 886-3-598-3201
- Thailand (Ayuthaya) TEL: 66-3533-0846
- Austria (Enns) TEL: 43-7223-883
- USA (Mountain view) TEL: 1-408-861-3946
- Japan (Osaka) TEL: 81-6-6904-2771

Panasonic Corporation  
 Industrial Solutions Company  
 Electronic Materials Business Division  
 Circuit Board Materials Business Unit.  
 Head Office: 1006 Kadoma, Kadoma City, Osaka 571-8506  
 TEL: 81-6-6908-1101  
[industrial.panasonic.com/ww/electronic-materials](http://industrial.panasonic.com/ww/electronic-materials)