


Data Sheet

Halogen-free Glass Epoxy Multi-layer Materials

Laminate R-1566(W)
Prepreg R-1551(W)

UL/ANSI	FR-4.1	
IPC-4101 Slash Sheet	Primary:/127 Secondary:/92 /93 /94 /95 /122 /125 /128	

Dec. 2013 No.13120140

Partnering to go beyond.

Electronic Materials
Panasonic Corporation

Specification / Laminate R-1566(W)

Property		Units	Test Method	Condition	Value	
THERMAL	Glass Transition Temp (Tg)	°C	DSC	As received	148	
			TMA	As received	145	
			DMA	As received	170	
	Thermal Decomposition Temp (Td)		°C	TGA	As received	350
	Time to Delam (T288)	Without Cu	Min	IPC TM-650 2.4.24.1	As received	> 120
		With Cu	Min	IPC TM-650 2.4.24.1	As received	3
	CTE : α 1	X - axis	ppm / C	IPC TM-650 2.4.24	< Tg	11 – 13
		Y - axis	ppm / C	IPC TM-650 2.4.24	< Tg	13 – 15
		Z - axis	ppm / C	IPC TM-650 2.4.24	< Tg	40
CTE : α 2	Z - axis	ppm / C	IPC TM-650 2.4.24	> Tg	180	
ELECTRICAL	Volume Resistivity		M Ω - cm	IPC TM-650 2.5.17.1	C-96/35/90	1 x 10 ⁹
	Surface Resistivity		M Ω	IPC TM-650 2.5.17.1	C-96/35/90	1 x 10 ⁸
	Dielectric Constant (Dk)	@ 1MHz	-	IPC TM-650 2.5.5.9	C-24/23/50	4.9
		@ 1GHz	-	IPC TM-650 2.5.5.9	C-24/23/50	4.6
	Dissipation Factor (Df)	@ 1MHz	-	IPC TM-650 2.5.5.9	C-24/23/50	0.010
		@ 1GHz	-	IPC TM-650 2.5.5.9	C-24/23/50	0.010
PHYSICAL	Water Absorption		%	IPC TM-650 2.6.2.1	D-24/23	0.14
	Peel Strength	1oz	kN / m	IPC TM-650 2.4.8	As Received	1.8
	Flammability		-	UL	C-48/23/50	94V-0

Sample thickness ; 32 mil (0.8 mm)

*The data above show actual values and are not guaranteed.

Specification / Laminate R-1566(W)

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

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Specification / Laminate R-1566(W)

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

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Specification / Prepreg R-1551(W)

1MHz - 1GHz ; IPC TM650-2.5.5.9

Cloth Style	Resin Contents (%)	Typical Thickness (μm)	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
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 above show actual values and are not guaranteed.

Specification / Prepreg R-1551(W)

2GHz-10GHz ; IPC TM650-2.5.5.5

Cloth Style	Resin Contents (%)	Typical Thickness (μm)	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
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	4.5	4.5	4.6	4.5	0.012	0.012	0.012	0.013	0.016
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	4.5	4.5	4.6	4.5	0.012	0.012	0.012	0.013	0.016
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	4.6	4.5	0.012	0.012	0.012	0.013	0.016

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