

# Panasonic Electric Works Electronic Materials Europe GmbH

## Specification Sheet

Specification sheet #	IPC-4101C/99	2: N/A
Reinforcement	1: Woven E-Glass	
Resin System:	<b>Primary:</b> Epoxy	
	<b>Secondary 1:</b> Multifunctional Epoxy	<b>Secondary 2:</b> Modified Epoxy (max. wt. 5%)
Flam retardant mechanism	Bromine	<b>Minimum UL94 Requirement: V0</b>
Fillers:	Inorganic fillers	
ID Reverence:	<b>UL/ANSI:</b> FR-4	
	<b>ANSI:</b> FR4 / 99	
Glass transition (TG):	150°C minimum	

<b>Product name</b>	<b>Laminate: R-1755M</b>	<b>Prepreg: R-1650M</b>
<b>UL - Designation</b>	R-1755M	R-1650M

1. Laminate		IPC Specification < 0, 5mm	IPC Specification >= 0, 5mm	Units	Typical Values < 0, 5mm	Typical Values >= 0, 5mm	Methode IPC-TM-650 (or as noted)
<b>Physical Property</b>							
<b>Peel strength, minimum</b>							
A: Low profile and very low profile copper foil, all copper foils > 18µm	18µm	0,7	0,7	N/mm	-	-	2.4.8 2.4.8.2 2.4.8.3
B: Standard profile copper foil	35µm	-	-		-	-	
1. after thermal stress		0,8	1,05		1,4	1,5	
2. at 125°C		0,7	0,7		1,3	1,3	
3. after process solutions		0,55	0,8		1,4	1,5	
<b>Moisture Absorptions, maximum</b>		-	0,5	%	-	0,11	2.6.2.1
<b>Flexural strength, minimum</b>	A: Length direction	-	415	N/mm2	-	520	2.4.4
	B: Cross direction	-	345	-	-	440	
<b>Flammability</b> (Laminate and prepreg as laminated)		V0 min	V0 min	Rating	V0	V0	UL 94
<b>CTE (pre / post Tg)</b>							
Z		-	60/300 max.	ppm/°C	-	40/240	2.4.24
X		-	-		-	13	
Y		-	-		-	15	
<b>T260 (TMA)</b>	copper removed	-	30 min.	minutes	-	>120	2.4.24.1
<b>T288 / T300 (TMA)</b>	copper removed	-	15 min.	minutes	-	35 / N/A	2.4.24.1
<b>Density</b>		-	-	g/cm3	2,0	2,0	
<b>Decomposition Temperature</b>		-	325 min.	°C	-	355	TGA
<b>Electrical Property</b>							
<b>Volume resistivity, minimum</b>	A: 96 / 35 / 90	1,0 E+06	-	MΩm-cm	5 E+07	-	2.5.17.1
	B: after moisture resistance	-	1,0 E+04		-	N/A	
	C: at elevated temp. E-24/125	1,0 E+03	1,0 E+03		5 E+08	-	
<b>Surface resistivity, minimum</b>	A: 96 / 35 / 90	1,0 E+04	-	MΩm	5,0 E+08	-	2.5.17.1
	B: after moisture resistance	-	1,0 E+04		-	N/A	
	C: at elevated temp. E-24/125	1,0 E+03	1,0 E+03		N/A	N/A	
<b>Dielectric breakdown, minimum</b>		-	40	kV	-	> 50	2.5.6
<b>Permittivity, maximum</b> ( laminate and prepreg as laminated)	at 1 MHz	5,4	5,4	-	N/A	4,95	2.5.5.2/3/9
	at 1 GHz	5,2	5,2	-	N/A	4,60	
<b>Loss tangent, maximum</b> ( laminate and prepreg as laminated)	at 1 MHz	0,035	0,035	-	0,014	0,014	2.5.5.2/3/9
	at 1 GHz	-	-	-	0,014	0,014	
<b>Arc resistance, minimum</b>		60	60	sec	NI	NI	2.5.1
<b>Electrical strength, minimum</b> (laminated and prepreg as laminated)		30	-	kV/mm	80	-	2.5.6.2
<b>CTI (comparative tracking index)</b>		-	-	V	-	200	IEC 112
<b>Thermal Property</b>							
<b>Thermal stress 10 sec at 288°C, minimum</b>	A: unetched	Pass	Pass	Rating	Pass	Pass	2.4.13.1
	B: etched	Pass	Pass	-	Pass	Pass	
<b>Tg by DSC (TMA / DMA)</b>		150min	150min	°C	152	153(145/175)	2.4.25
<b>Thermal conductivity</b>		-	-	W/mK	-	0,57	Laser flash
<b>Specific heat</b>		-	-	J/kgK	-	930	DSC
<b>2. Prepreg Property</b>		IPC-Specification		Units	Typical Values		
<b>Shelf life, minimum</b> (from date of delivery)	A: Condition <20°C, rel. H. <50%	90		Days	meets requirements		AABUS
	B: Condition < 5°C	180			meets requirements		
<b>Volatile content, maximum</b>		1,5		%	< 0,3		2.3.19
<b>Prepreg parameters</b>		-	-	-	AABUS		AABUS

AABUS= As agreed between user and supplier

Note:

Text data contained in this data sheet represents typical values and does not constitute any warranty or guarantee. For review of critical specification tolerances, please contact a Panasonic Electric Works representative. Panasonic Electric Works reserve the right to change these typical values as a natural process of referring our test equipment and technics.