

# Panasonic Industrial Devices Materials Europe GmbH

## Specification Sheet

Specification sheet #	IPC-4101D/21	
Reinforcement	<b>1:</b> Woven E-Glass	<b>2:</b> N/A
Resin System:	<b>Primary:</b> Difunctional Epoxy	
	<b>Secondary 1:</b> Multifunctional Epoxy	<b>Secondary 2:</b> N/A
Flam retardant mechanism	Bromine	<b>Minimum UL94 Requirement: V0</b>
Fillers:	N/A	
ID Reverence:	<b>UL/ANSI:</b> FR-4.0	<b>Mil-S-13949:</b> /04-GF,GFN,GFK,GFP,GFM
	<b>ANSI:</b> FR-4.0 / 21	
	secondary ----	
Glass transition (TG):	110°C -150°C	

<b>Product name</b>	<b>Laminate: MC-100MS/EX</b>	<b>Prepreg: MC-Rheopreg</b>
<b>UL - Designation</b>	MC-100MS/MC-100EX	MC-Rheopreg

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	0,9	0,9	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		1,8	1,9	
2. at 125°C		0,7	0,7		1,7	1,8	
3. after process solutions		0,55	0,8		1,8	1,9	
<b>Moisture Absorptions, maximum</b>		-	0,8	%	-	0,11	2.6.2.1
<b>Flexural strength, minimum</b>	A: Length direction	-	415	N/mm2	-	580	2.4.4
	B: Cross direction	-	345		-	410	
Flammability (Laminate and prepreg as laminated)		V0 min	V0 min	Rating	V0	V0	UL 94
<b>CTE (pre / post Tg)</b>				ppm/°C			2.4.24
Z		-	-		-	65/290	
X		-	-		-	13	
Y		-	-		-	15	
<b>T260 (TMA)</b>	copper removed	-	-	minutes	-	15	2.4.24.1
<b>T288 / T300 (TMA)</b>	copper removed	-	-	minutes	-	1 / -	2.4.24.1
<b>Density</b>		-	-	g/cm3	1,91	1,91	
<b>Decomposition Temperature</b>		-	-	°C	-	310	TGA
<b>Electrical Property</b>							
<b>Volume resistivity, minimum</b>	A: 96 / 35 / 90	1,0 E+06	-	MΩm-cm	1,9 E+08	-	2.5.17.1
	B: after moisture resistance	-	1,0 E+06		-	8,6 E+08	
	C: at elevated temp. E-24/125	1,0 E+03	1,0 E+03		2,5 E+07	3,1 E+07	
<b>Surface resistivity, minimum</b>	A: 96 / 35 / 90	1,0 E+04	-	MΩm	3,8 E+07	-	2.5.17.1
	B: after moisture resistance	-	1,0 E+04		-	6,9 E+06	
	C: at elevated temp. E-24/125	1,0 E+03	1,0 E+03		8,6 E+06	4,8 E+06	
<b>Dielectric breakdown, minimum</b>		-	40	kV	-	> 50	2.5.6
<b>Permittivity, maximum (laminate and prepreg as laminated)</b>	at 1 MHz	5,4	5,4	-	N/A	4,77	2.5.5.2/3/9
	at 1 GHz	-	-	-	N/A	4,32	
<b>Loss tangent, maximum (laminate and prepreg as laminated)</b>	at 1 MHz	0,035	0,035	-	0,018	0,018	2.5.5.2/3/9
	at 1 GHz	-	-	-	0,018	0,018	
<b>Arc resistance, minimum</b>		60	60	sec	NI	NI	2.5.1
<b>Electrical strength, minimum / laminate and prepreg as laminated</b>		30	-	kV/mm	56	-	2.5.6.2
<b>CTI (comparative tracking index)</b>		-	-	V	-	200	IEC 112
<b>CAF resistance</b>		-	-	pass/fail	-	-	2.6.25
<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>		110min	110min	°C	134,8	137(138/147)	2.4.25
<b>Thermal conductivity</b>		-	-	W/mK	-	0,38	Laser flash
<b>Specific heat</b>		-	-	J/kgK	-	920	DSC
<b>2. Prepreg Property</b>		IPC-Specification		Units	Typical Values		
<b>Shelf life, minimum (from date of delivery)</b>	A: Condition <20°C, rel. H. <50%	90		Days	meets requirements		AABUS
	B: Condition < 5°C	180			meets requirements		
<b>Volatile content, maximum</b>		0,75		%	< 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 Industrial Devices Materials representative. Panasonic Industrial Devices Materials serve the right to change these typical values as a natural process of referring our test equipment and technics.