

# MSC-Ditron FR-4 copper clad Laminate *EP-84*



MSC-Ditron FR-4 copper clad laminate is a glass fabric / epoxy resin laminate available with thicknesses from 0.8 mm to 3.2 mm. Single and double sided copper cladding is available from 5 µm up to 105 µm.

Small quantities can be delivered from our facility in Italy in short lead time to your plant. Sheets of 1060 mm\*1280 mm, 1065 mm\*1155 mm and 1280 mm\*1150 mm are available. Special panel sizes can be realized upon your request.

Material designation according NEMA: FR-4  
 according IPC 4101B: Sheet 21  
 according IEC 249-2-5: EP-GC-CU  
 Identification mark: "DTR" in red

## Available Thicknesses and Tolerances:

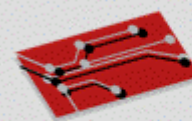
## Available Copper Thicknesses:

Thickness [mm]	Tolerance Class L [mm]	Thickness Class M [mm]	Copper Thickness [µm]	Area Weight Copper [g/m <sup>2</sup> ]	Area Weight Copper [oz/ft <sup>2</sup> ]
0.8	± 0.100	± 0.075	5	45	1/8
1.0	± 0.100	± 0.075	9	80	1/4
1.2	± 0.130	± 0.075	12	107	3/8
1.5	± 0.130	± 0.075	18	153	1/2
1.6	± 0.130	± 0.075	35	305	1
2.0	± 0.180	± 0.100	70	610	2
2.4	± 0.180	± 0.100	105	916	3
3.2	± 0.230	± 0.140			

## Thermal Properties (Reference: laminate 1.6 mm thick, cladged 35 µm copper):

Thermal Properties	Unit	Test Method IPC TM-650	Specified Value	Measured Value	
Glass Transition Temperature	°C	2.4.24	---	>130	
	°F	2.4.24	---	> 266	
Coefficient of Linear Expansion					
	x,y-Direction	cm/°C*cm	2.4.41	---	1.4*10 <sup>-5</sup>
	z-Direction	cm/°C*cm	2.4.41.1	---	7*10 <sup>-5</sup>

These data are average values. They were obtained with reliable analytical methods in the production in Ditron s.r.l. plant. They are a guideline only and do not give rise to any rights under warrant terms. The end user should always verify the suitability of this product / these products for processing and final applications.



# MSC-Ditron FR-4 copper clad Laminate EP-84



## Physical Properties

(Reference: laminate 1.6 mm thick, cladged 35 µm copper):

	Unit	Test Method IPC TM-650	Specified Value	Measured Value
<b>Peel Strength</b>				
as received	N/mm (min)	2.4.8	1.05	1.80
after thermal stress	N/mm (min)	2.4.8	1.05	1.60
at 125 °C (257 °F)	N/mm (min)	2.4.8	0.70	1.40
after exposure to processing solutions	N/mm (min)	2.4.8	0.80	1.60
<b>Flexural Strength</b>				
Lengthwise	N/mm <sup>2</sup> (min)	2.4.4	415	540
Crosswise	N/mm <sup>2</sup> (min)	2.4.4	345	440
Water Adsorption	% (max)	2.6.2.1	0.35	0.15
Flammability	Rating	UL94	V-0	V-0

## Electrical Properties (Reference: laminate 1.6 mm thick, cladged 35 µm copper):

	Unit	Test Method IPC TM-650	Specified Value	Measured Value
<b>Volume Resistivity</b>				
	Rating			
after moisture resistance	MΩ/cm (min)	2.5.17.1	10 <sup>6</sup>	1*10 <sup>8</sup>
at elevated temperatures	MΩ/cm (min)	2.5.17.1	10 <sup>3</sup>	1*10 <sup>9</sup>
<b>Surface Resistivity</b>				
after moisture resistance	MΩ (min)	2.5.17.1	10 <sup>4</sup>	7*10 <sup>7</sup>
at elevated temperatures	MΩ (min)	2.5.17.1	10 <sup>3</sup>	7*10 <sup>8</sup>
<b>Dielectric Breakdown</b>				
Step by step	kV (min)	2.5.6	40	85
<b>Loss Tangent</b>				
at 1 MHz	tg δ	2.5.5.3	0.035	0.020
<b>Permittivity</b>				
at 1 MHz	ε (max)	2.5.5.3	5.4	4.5
Arc Resistance	S (min)	2.5.1	60	120
<b>Q (Resonance)</b>				
at 1 MHz	(min)	2.5.28		90
at 50 MHz	(min)	2.5.28	MSC-Ditron FR4 copper clad Laminate	120
Comparative Tracking Index CTI	V	IEC-112		200