

PTFE Glass Fiber Cloth Copper Clad Laminate F4BM、F4BME

■ Product introduction

This product is made of glass fiber cloth, polytetrafluoroethylene resin and polytetrafluoroethylene film through scientific preparation and strict process. Its electrical performance is improved to a certain extent than F4B, mainly due to the wider range of dielectric constant, low dielectric loss, increased insulation resistance, and more stable performance, which can replace foreign products of the same type.

F4BM and F4BME have the same dielectric layer, but the copper foil used together is different: F4BM and ED copper foil are suitable for applications without PIM indicators; F4BME with reverse RTF copper foil has excellent PIM index, more accurate line control and lower conductor loss.

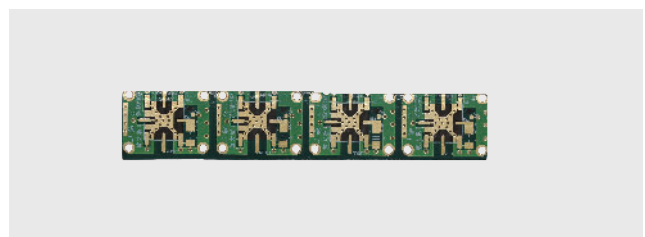
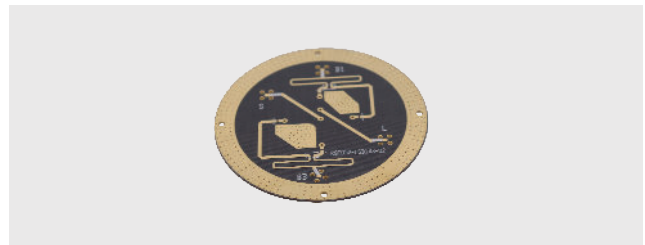
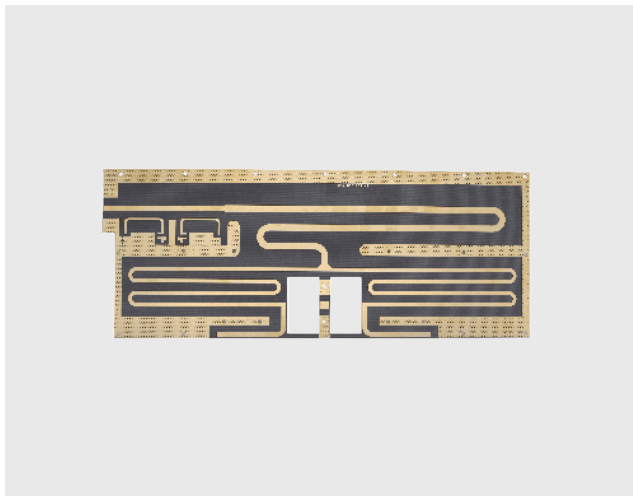
F4BM and F4BME precisely adjust the dielectric constant by adjusting the ratio between polytetrafluoroethylene and glass fiber cloth, which not only achieves low loss, but also enhances the dimensional stability of the material; The higher the dielectric constant is, the higher the proportion of glass fiber is, so the dimensional stability is better, the coefficient of thermal expansion is lower, the temperature fluctuation is better, and the dielectric loss is increased.

■ Product features

- ◆ DK2.17 ~ 3.0 is optional, and DK can be customized
- ◆ F4BME with RTF copper foil has excellent PIM indicators
- ◆ Diversified size and cost saving
- ◆ Irradiation resistant, low exhaust
- ◆ Commercialization, mass production and high cost performance

■ Classic case

- ◆ Microwave, RF, radar
- ◆ Phase shifter, passive device
- ◆ Power divider, coupler, combiner
- ◆ Feed network, phased array antenna
- ◆ Satellite communication, base station antenna





Product technical parameters			Product model/data				
Product characteristics	Test conditions	Unit	F4BM217	F4BM220	F4BM233	F4BM245	
			F4BME217	F4BME220	F4BME233	F4BME245	
Dielectric constant (typical value)	10GHz	/	2.17	2.2	2.33	2.45	
Permittivity tolerance	/	/	±0.04	±0.04	±0.04	±0.05	
Loss factor (typical value)	10GHz	/	0.001	0.001	0.0011	0.0012	
	20GHz	/	0.0014	0.0014	0.0015	0.0017	
Temperature coefficient of dielectric constant	-55°C~150°C	PPM/°C	-150	-142	-130	-120	
Peeling strength	1 OZ F4BM	N/mm	>1.8	>1.8	>1.8	>1.8	
	1 OZ F4BME	N/mm	>1.6	>1.6	>1.6	>1.6	
Volume resistivity	normal behavior	MΩ.cm	≥6×10 ⁶	≥6×10 ⁶	≥6×10 ⁶	≥6×10 ⁶	
Surface resistance	normal behavior	MΩ	≥1×10 ⁶	≥1×10 ⁶	≥1×10 ⁶	≥1×10 ⁶	
Electrical strength (Z direction)	5KW, 500V/s	KV/mm	>23	>23	>23	>25	
Breakdown voltage (XY direction)	5KW, 500V/s	KV	>30	>30	>32	>32	
thermal expansion coefficient	XY direction	-55 °~288°C	ppm/°C	25,34	25,34	22,30	20,25
	Z direction	-55 °~288°C	ppm/°C	240	240	205	187
Thermal stress	260°C, 10s, 3 times		Non layered	Non layered	Non layered	Non layered	
Water absorption	20±2°C 24hours	%	≤0.08	≤0.08	≤0.08	≤0.08	
Density	normal temperature	g/cm ³	2.17	2.18	2.20	2.22	
Long-term service temperature	High and low temperature box	°C	-55~+260	-55~+260	-55~+260	-55~+260	
Thermal conductivity	Z direction	W/(M.K)	0.24	0.24	0.28	0.30	
PIM	Only applicable to F4BME	dBc	≤-159	≤-159	≤-159	≤-159	
Fire resistance	/	UL-94	V-0	V-0	V-0	V-0	
Material composition	/	/	PTFE, Glass fiber cloth F4BM with ED copper foil, F4BME with reverse RTF copper foil				

1. The dielectric constant (typical value) is measured in the Z direction of the material, using the strip line method of GB/T 12636-1990 or IPC-TM650 2.5.5.5;
2. Other performance tests shall adopt or refer to the test methods specified in IPC-TM-650 or GBT4722-2017;
3. All test data are typical measurement data and are intended to help customers select materials. They are not intended and do not constitute any express or implied warranty, nor do they ensure that customers can achieve all the performance in the data sheet in specific occasions. Customers are responsible for verifying and determining the adaptability of Wangling materials in each application.

Product technical parameters			Product model/data					
Product characteristics	Test conditions	Unit	F4BM255	F4BM265	F4BM275	F4BM294	F4BM300	
			F4BME255	F4BME265	F4BME275	F4BME294	F4BME300	
Dielectric constant (typical value)	10GHz	/	2.55	2.65	2.75	2.94	3.0	
Permittivity tolerance	/	/	±0.05	±0.05	±0.05	±0.06	±0.06	
Loss factor (typical value)	10GHz	/	0.0013	0.0013	0.0015	0.0016	0.0017	
	20GHz	/	0.0018	0.0019	0.0021	0.0023	0.0025	
Temperature coefficient of dielectric constant	-55 °~150°C	PPM/°C	-110	-100	-92	-85	-80	
Peeling strength	1 OZ F4BM	N/mm	>1.8	>1.8	>1.8	>1.8	>1.8	
	1 OZ F4BME	N/mm	>1.6	>1.6	>1.6	>1.6	>1.6	
Volume resistivity	Normal behavior	MΩ.cm	≥6×10 ⁶	≥6×10 ⁶	≥6×10 ⁶	≥6×10 ⁶	≥6×10 ⁶	
Surface resistance	Normal behavior	MΩ	≥1×10 ⁶	≥1×10 ⁶	≥1×10 ⁶	≥1×10 ⁶	≥1×10 ⁶	
Electrical strength (Z direction)	5KW, 500V/s	MΩ	>25	>25	>28	>30	>30	
Breakdown voltage (XY direction)	5KW, 500V/s	KV	>34	>34	>35	>36	>36	
thermal expansion coefficient	XY direction	-55 °~288°C	ppm/°C	16,21	14,17	14,16	12,15	12,15
	Z direction	-55 °~288°C	ppm/°C	173	142	112	98	95
Thermal stress	260°C, 10s, 3times		Non layered	Non layered	Non layered	Non layered	Non layered	
Water absorption	20±2°C 24hours	%	≤0.08	≤0.08	≤0.08	≤0.08	≤0.08	
Density	normal temperature	g/cm ³	2.25	2.25	2.28	2.29	2.29	
Long-term use temperature	High and low temperature box	°C	-55~+260	-55~+260	-55~+260	-55~+260	-55~+260	
Thermal conductivity	Z direction	W/(M.K)	0.33	0.36	0.38	0.41	0.42	
PIM	Applicable only to F4BME	dBc	≤-159	≤-159	≤-159	≤-159	≤-159	
Fire resistance	/	UL-94	V-0	V-0	V-0	V-0	V-0	
Material composition	/	/	PTFE, glass fiber cloth F4BM with ED copper foil, F4BMEwith reverse RTF copper foil					



Optional copper foil:

F4BM pair with ED copper foil, optional thickness: 0.5OZ (0.018mm), 1OZ (0.035mm), 1.5OZ (0.05mm), 2OZ (0.07mm)

F4BME pair with RTF copper foil, optional thickness: 0.5OZ (0.018mm), 1OZ (0.035mm)

Available in regular sizes:

460×610mm 500×600mm 850×1200mm 914×1220mm 1000×1200mm

Unconventional dimensions can be specified (please contact us for special dimensions):

300×250mm 350×380mm 500×500mm 840×840mm 1000×1500mm

Note: When the thickness is $\geq 4.0\text{mm}$ or $\leq 0.2\text{mm}$, the size cannot exceed 500 × 610mm

Thickness and tolerance can be provided (the following are conventional thicknesses, and unconventional thicknesses can be customized by contacting our company)

The following thicknesses are the total thickness of copper or the thickness of the medium, which can be produced. Please indicate whether it is "the total thickness of copper" or "the thickness of the medium" when placing an order.

Thickness (mm)	0.1 (Mesophyll thickness)	0.127 (Mesophyll thickness)	0.2	0.25	0.5	0.508	0.762
Public errand (mm)	±0.01	±0.01	±0.02	±0.02	±0.04	±0.04	±0.05
Thickness (mm)	0.8	1.0	1.5	1.524	1.575	2.0	2.5
Public errand (mm)	±0.05	±0.05	±0.06	±0.06	±0.06	±0.08	±0.08
Thickness (mm)	3.0	4.0	5.0	6.0	8.0	10.0	12.0
Public errand (mm)	±0.09	±0.1	±0.1	0.12	±0.15	±0.18	±0.2

When the dielectric constant is ≤ 2.65 , the thinnest available medium thickness is 0.1mm, and when the dielectric constant is 2.7-3.0, the thinnest available medium thickness is 0.2mm.

F4BM and F4BME series aluminum/copper substrates:

This series of products can be provided with aluminum based or copper based materials, that is, one side of the dielectric layer is covered with copper foil, and the other side of the dielectric layer is covered with copper based or aluminum based materials which plays a shielding or heat dissipation role, the model is F4BM***-AL, F4BME***-AL, F4BM***-CU, F4BME***-CU.

Model	Metal base	Proportion	Thermal conductivity	Copper or aluminum based Available thickness (mm)	Metal base thickness tolerance (mm)	Available in sizes (mm)
F4BM***-CU	Red copperbrass	8.9	380	0.48, 0.98, 1.48 1.98, 2.98, 3.98 Other thickness connections formulate	+0.02, -0.05	460×610 460×305 Other dimensions Contact us
F4BME***-CU						
F4BM***-AL	Aluminum base	2.7	180			
F4BME***-AL						

Model example:

F4BM220-AL Aluminum clad base plate representing F4BM220

F4BME255-CU Copper clad base plate representing F4BME255