

Metal Foil on Ceramic Chip Resistors

MFC Series

Features:

- Small size down to 0402
- Tolerance to 0.5%
- TCR to $\pm 50\text{ppm}/^\circ\text{C}$
- High power density
- AEC-Q200 qualified



All parts are Pb-free and comply with EU Directive 2011/65/EU amended by (EU) 2015/863 (RoHS3)

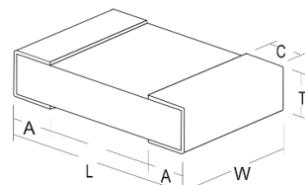
Electrical Data

		0402	0603	0805	1206	2010	2512
Power rating at 70°C	W	0.25	0.5	0.75	1	1.5 ¹	2
Overload rating 5s	W	1.25	2.5	3.75	5	7.5 ²	8
Resistance range	mΩ	10 - 50	5 - 100		3 - 100		2 - 100
Resistance tolerance	%			<R03; 1, 2, 5	≥R03; 0.5, 1, 2, 5		
TCR (-55 to +125°C)	ppm/°C	100	<R01; 200 ≥R01; 100	<R01; 100 ≥R01; 50	R002; 200 ≥R01; 50	R002; 200 ≥R01; 100 ≥R01; 50	
Standard values				E24 plus integer milliohm values below R01 preferred			
Ambient temperature	°C				-55 to +170		

Note 1: 1W below R01 Note 2: 5W below R01

Physical Data

Dimensions in mm and weight in mg								
	Value	L	W	T max.	A	C	Wt. nom.	
0402	All	1.05 ±0.1	0.55 ±0.1	0.55	0.27 ±0.1	-	0.8 – 1.1	
0603	5 - 9	1.6 ±0.2	0.8 ±0.2	0.85	0.35 ±0.2	≤0.6	2.5 – 3.2	
	≥10	1.7 ±0.15	1 ±0.15	0.77		0.35 ±0.25		
0805	3 - 4	2±0.2	1.25 ±0.15	0.85	0.7 ±0.3	0.4 ±0.25	5.6 – 8.1	
	5 - 9				0.4 ±0.3			
1206	≥10	2.15 ±0.15	1.4 ±0.15	0.9	0.4 ±0.25		11.6 – 13.2	
	3 - 4	3.2 ±0.2	1.6 ±0.2		0.9 ±0.3	0.5 ±0.3		
2010	5 - 9				0.5 ±0.3			
	≥10	3.2 ±0.15	1.7 ±0.15		0.5 ±0.25			
2512	2	5 ±0.2	2.5 ±0.2	0.95	1.8 ±0.3	0.6 ±0.3	28.3 – 33.2	
	3				1.6 ±0.3			
	4 – 5				1.3 ±0.3			
	5 – 9				0.8 ±0.3			
	≥10				0.6 ±0.3			
2512	2	6.4 ±0.2	3.2 ±0.2	0.95	2.3 ±0.3	0.9 ±0.3	43 – 46	
	3				1.9 ±0.3			
	4				1.7 ±0.3			
	5 – 6				1.2 ±0.3			
	7				1.1 ±0.3			
	8 – 9				0.9 ±0.3			
	≥10				0.7 ±0.3			



Construction

Metal foil resistor material is bonded onto an alumina substrate and connected to wraparound terminations with nickel barrier and 100% Sn finish. Protection and marking are applied and each resistor is measured immediately before packing into tape.

Marking

MFC parts larger than 0402 are marked indicating ohmic value. Where possible "R" is used to indicate the decimal point location but if it is omitted, the value is in milliohms. MFC0603 is marked with 3 characters, e.g. "R01" = 10mΩ, "047" = 47mΩ. Larger sizes are marked with 4 characters, e.g. "R010" = 10mΩ, "R047" = 47mΩ. Reels are marked with type, value, tolerance, date code and quantity.

General Note

TT Electronics reserves the right to make changes in product specification without notice or liability.

All information is subject to TT Electronics' own data and is considered accurate at time of going to print.

Metal Foil on Ceramic Chip Resistors

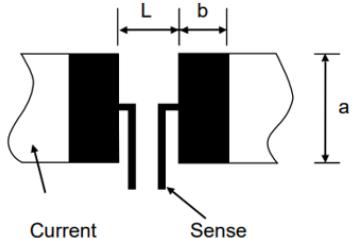
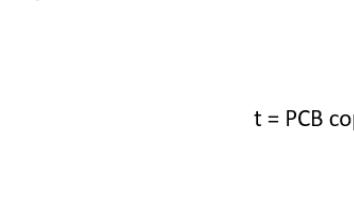
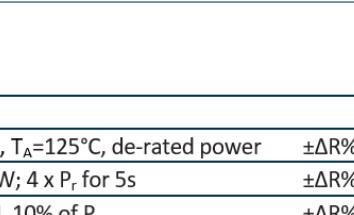


MFC Series

Solvent Resistance

The body protection and marking are resistant to all normal industrial cleaning solvents suitable for printed circuits.

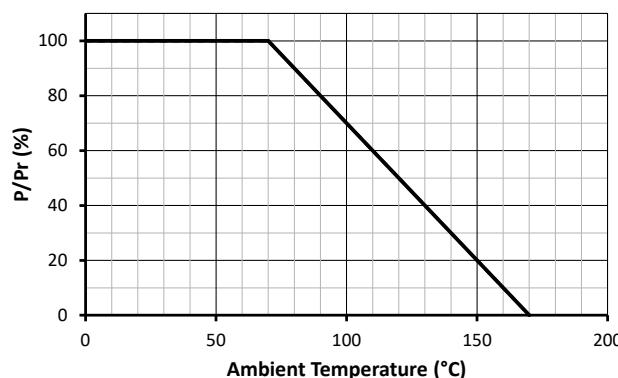
Mounting Recommendations

Size	Value (mΩ)	L (mm)	a (mm)	b (mm)	t (μm)		
0402	10 - 50	0.5	0.6	0.5	35		
0603	5 - 9	0.6	1	1.1			
0805	10 - 100	0.5	0.9	1	70		
	3 - 4	0.5		1.4			
	5 - 9		1.4	1.2			
1206	10 - 100	0.8		1.3	105		
	3 - 4	0.8		1.8			
	5 - 9	1.8		1.3			
2010	10 - 100	1.5	1.7	1.4		$t = \text{PCB copper thickness}$	
	2	1		2.7			
	3 - 9	1.6		2.4			
2512	10 - 100	2.7		1.8			
	2 - 4	1		3.5			
	5 - 100	3.8	3.4	2.1			

Performance Data

Test				Maximum
Load life	MIL-STD-202 Method 108	1000 hours, steady state, $T_A=125^\circ\text{C}$, de-rated power	$\pm\Delta R\%$	1
Short term overload	IEC-60115-1 4.13	$P_r < 2\text{W}$; 5 x P_r for 5s, $P_r = 2\text{W}$; 4 x P_r for 5s	$\pm\Delta R\%$	1
Biased humidity	MIL-STD-202 Method 103	1000 hours, 85°C , 85%RH, 10% of P_r	$\pm\Delta R\%$	1
High temperature exposure	MIL-STD-202 Method 108	1000 hours, 155°C	$\pm\Delta R\%$	1
Low temperature operation	IEC-60115-1 4.36	-55°C , 45 mins P_r , 15 mins no load	$\pm\Delta R\%$	1
Temperature rapid change	IEC-60115-1 4.19	-55°C to $+155^\circ\text{C}$, 5 cycles	$\pm\Delta R\%$	1
Voltage proof	IEC-60115-1 4.7	1.42 x max operating voltage for 1 minute	$\pm\Delta R\%$	No breakdown
Board flex	JIS-C-521-1 4.33	3mm deflection for 5 seconds	$\pm\Delta R\%$	1
Solderability	IEC-60115-1 4.17	$245 \pm 5^\circ\text{C}$ for 3 seconds		$>95\%$ coverage
Resistance to solder heat	IEC-60115-1 4.18	$260 \pm 5^\circ\text{C}$ for 10 seconds	$\pm\Delta R\%$	1
Resistance to solvents	MIL-STD-202 Method 215	Aqueous wash OKEM or equivalent. No banned solvents.		No damage

Temperature De-rating



General Note

TT Electronics reserves the right to make changes in product specification without notice or liability.
All information is subject to TT Electronics' own data and is considered accurate at time of going to print.

Metal Foil on Ceramic Chip Resistors



MFC Series

Packaging

MFC0402 is packed in flip-chip orientation (resistance element on the underside) in 8mm paper tape at 2mm component pitch.

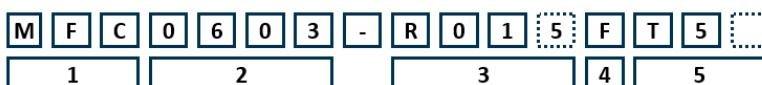
MFC0603, 0805 & 1206 are packed on 8mm paper tape at 4mm component pitch. MFC2010 & 2512 are packed in 12mm plastic tape at 4mm component pitch. All sizes are on 178mm diameter reels.

For full details of packaging dimensions see:

<https://www.ttelectronics.com/TTElectronics/media/ProductFiles/Application-Note/PS001-Packing-of-General-Purpose-Chip-Resistors.pdf>

Ordering Procedure

Example: MFC0603-R015FT5 (0603, 15 milliohms $\pm 1\%$, Pb-free)



1 Type	2 Size	3 Value	4 Tolerance	5 Packing		
MFC	0402	E24 3/4 characters R = ohms	D = $\pm 0.5\%$	T10	0402	10,000/reel
	0603		F = $\pm 1\%$	T5	0603 to 1206	5000/reel
	0805		G = $\pm 2\%$	T4	2010, 2512	4000/reel
	1206		J = $\pm 5\%$			
	2010					
	2512					

General Note

TT Electronics reserves the right to make changes in product specification without notice or liability.

All information is subject to TT Electronics' own data and is considered accurate at time of going to print.

© TT Electronics plc

BI Technologies IRC Welwyn

www.ttelectronics.com/resistors

09.25