

Features:

- MFR4 available to IECQ-CECC40101-019 and 803
- Tolerances down to 0.5%
- Temperature coefficient of resistance down to 50ppm/°C



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

Electrical Data

MFR Actual Data		MFR3	MFR4	MFR5
Power rating @70°C	W	0.4	0.5	0.75
Resistance range	ohms	10R – 1M0	1R0 – 1M0	
Limiting element voltage	V	200	350	
TCR	ppm/°C	50		≤10R: 150, >10R: 100
Resistance tolerance	%	1	0.5, 1	
Standard values		E24 & E96 preferred		
Thermal impedance	°C/W	150	140	112
Ambient temperature range	°C	-55 to 155		
Product grades available		Commercial (...C)	Commercial (...C), Professional (...I)	Professional (...I)

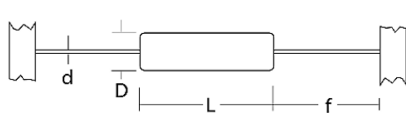
The requirements of the following standards are met or exceeded by the corresponding MFR series products above.

IECQ-CECC 40101-019 Requirements		FZ	FX
Required power rating @70°C	W	0.25	
Qualified resistance range	ohms	1R0 – 1M0	
Required limiting element voltage	V	250	
Required TCR	ppm/°C	≥5R1 - ≤9R1: 200, >9R1: 100	≥5R1 - ≤9R1: 500, >9R1: 250
Required resistance tolerance	%	1	

IECQ-CECC 40101-803 Requirements		BC	BK
Required power rating @70°C	W	0.125	
Qualified resistance range	ohms	10R – 1M0	
Required limiting element voltage	V	200	
Required TCR	ppm/°C	50	100
Required resistance tolerance	%	0.5, 1	

Physical Data

Dimensions in mm and weight in g								
Type	Grade	L max	D max	f min	d nom	PCB mount centres	Min. bend radius	Wt. nom
MFR3	Commercial	3.7	2	22.4	0.45	7.6	0.5	0.1
MFR4		6.8	3	21	0.55	10.2	0.6	0.3
	Professional	6.2	2.5		0.6			
MFR5			9	3.6	19.6	0.8	12.7	1.2



Construction

The resistance element is a precisely controlled thin film of metal alloy sputtered on to a high purity ceramic core, protected by a moisture-resistant, high dielectric strength coating applied so that terminations remain completely clear.

Terminations

Terminations are hot tin dipped copper wire. They meet the strength requirements of IEC 60115-1 clause 9.5 and the solderability requirements of IEC 60115-1 clause 11.1.

Marking

0.5% and 1% tolerance resistors are colour coded with 5 bands according to IEC 60062.

Solvent Resistance

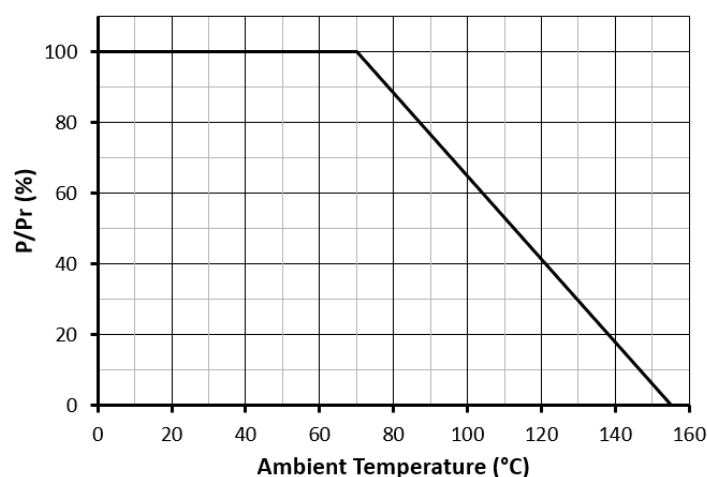
The body protection and marking are resistant to all normal industrial cleaning solvents suitable for printed circuit boards.

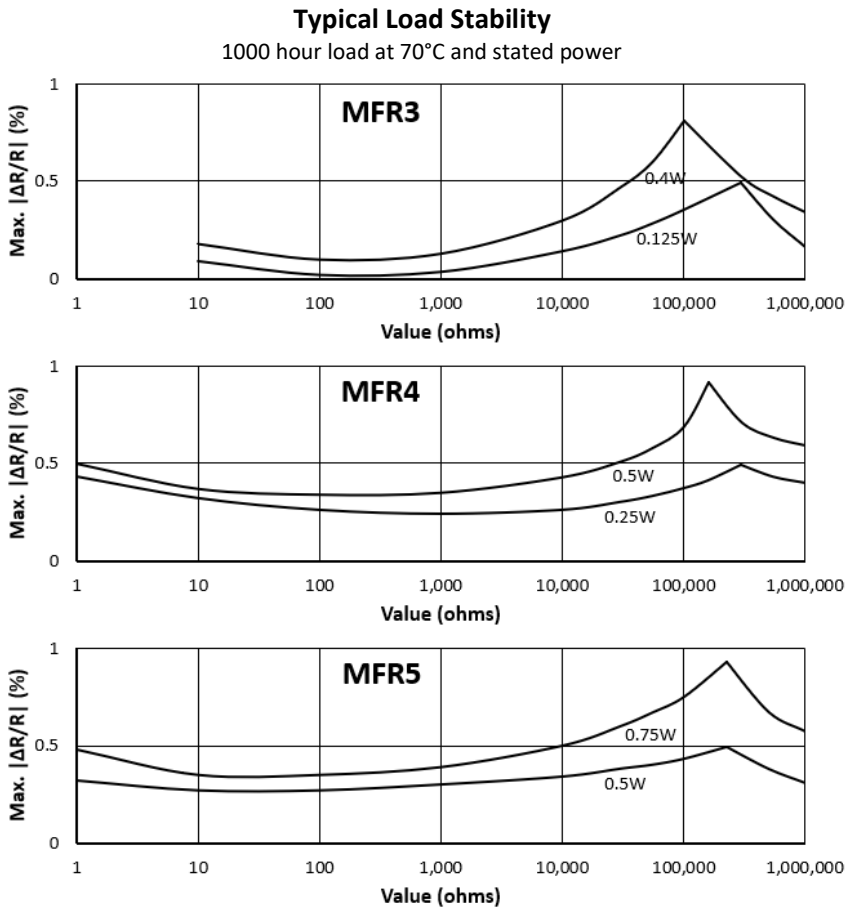
Performance Data

		IECQ-CECC 40101 Requirements (MFR4)		Actual Performance (all types)	
		-019	-803	Maximum	Typical
Load at full rated power: P _r for 1000 hours at 70°C	±ΔR%	Not specified		MFR3, MFR4: 0.8 MFR5: 0.9	See Typical Load Stability graphs
Load at IECQ-CECC40101 ratings: 1000 hours at 70°C	±ΔR%	2	1	0.5	
Shelf-life test: 12 months at room temperature	±ΔR%	Not specified		0.1	0.07
Derating from rated power at 70°C		35.3% @125°C	50% @125°C ¹	Zero @155°C	
Short term overload: Lesser of 6.25xP _r or 2.5xLEV for 5s	±ΔR%	0.5	0.25	0.25	MFR3: 0.03 MFR4, MFR5: 0.01
Climatic	±ΔR%	2	1	0.5	0.2
Climatic category		55/125/56		55/125/56	
Long term damp heat	±ΔR%	2	1	0.5	0.3
Temperature rapid change	±ΔR%	0.5	0.25	0.25	MFR3: 0.05 MFR4, MFR5: 0.04
Resistance to solder heat	±ΔR%	0.5	0.25	0.25	MFR3: 0.02 MFR4, MFR5: 0.07
Vibration & bump	±ΔR%	0.5	0.25	0.1	0.01
Noise in a decade of frequency	μV/V	Not specified		0.1	MFR3, MFR5: 0.07 MFR4: 0.1
Insulation resistance	ohms	>1GΩ		>1GΩ	
Voltage proof	V	500	400	MFR3: 400, MFR4: 500, MFR5: 700	

Note 1: This is 50% of the IECQ-CECC 40101-803 required rating, which itself is only ¼ of the full rated power. It is therefore within the actual zero at 155°C derating characteristic.

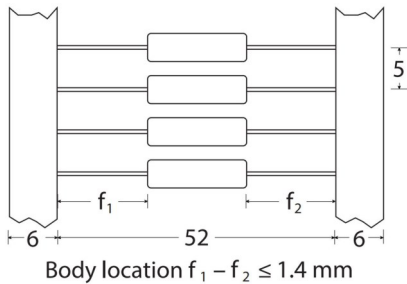
Temperature Derating





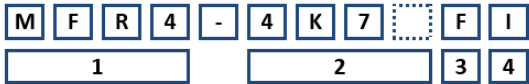
Packaging

All MFR resistors are supplied tape packed ready for loading on to automatic sequencing and insertion machines. Component wires will not protrude beyond the outside edge of the tapes.



Ordering Procedure

Example: MFR4-4K7FI (Professional grade MFR4 at 4.7 kilohms $\pm 1\%$, Pb-free)



1	2	3	4		
Type	Value	Tolerance	Grade, Finish & Packing		
MFR3	E24 = 3/4 characters E96 = 3/4 characters R = ohms K = kilohms M = megohms	D = $\pm 0.5\%$	C	MFR3, MFR4	Commercial grade
MFR4		F = $\pm 1\%$	I	MFR4, MFR5	Professional grade
MFR5					Standard Packing
				MFR3, MFR4	Standard Packing
				MFR5	
					5000/box
					2500/box

Note: CECC release is available only for professional grade Pb-free parts (code I). For CECC released product follow the MPN with text indicating the relevant release and style. Note that this additional text does not form part of our MPN.
Example: **MFR4-4K7FI** IECQ-CECC 40101-019 FZ