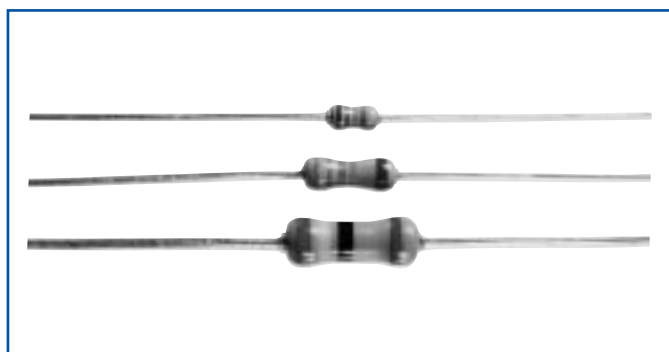


Metal Film Resistors



MFR SERIES

- Approved to BSCECC 40101-803 and 019
- Tolerances down to 0.5%
- Temperature coefficient down to 50ppm/°C



Electrical Data

Commercial		MFR3	MFR4	MFR5
Power rating at 70°C	watts	0.4	0.5	0.75
Resistance range	ohms	1R0 - 1M	1R0 - 10M	1R0 - 1M
Limiting element voltage	volts	200	350	350
TCR	ppm/°C	<10 and >150K: 100* 10 to 150K:50	50	≤10:150 >10:100*
Resistance tolerance	%	1,2	0.5, 1,2	0.5, 1,2

* Note:- Tighter TCR'S are available, consult factory for details.

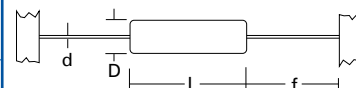
Approved CECC 40101 - 019 Style		GZ	GX	FZ	FX	EZ	EX
Power rating at 70°C	watts	0.125	0.125	0.25	0.25	0.5	0.5
Resistance range.	ohms	1 to 1M	1 to 1M	1 to 1M	1 to 1M	10 to 1M0	10 to 1M
Limiting element voltage	volts	175	175	250	250	350	350
TCR	ppm/°C	5.1 to 9.1 : 200 ≥10 : 100	5.1 to 9.1 : 500 ≥10 : 250	100 5.1 to 9.1 : 200	250 5.1 to 9.1 : 500	100	250
Resistance tolerance	%	1,2	1,2	1,2	1,2	1,2	1,2

Approved CECC 40101 - 803 Style		BC	BK	CC	CK
Power rating at 70°C	watts	0.125	0.125	0.25	0.25
Resistance range.	ohms	10 to 1M	10 to 1M	10 to 1M	10 to 1M
Limiting element voltage	volts	200	200	250	250
TCR	ppm/°C	50	100	50	100
Resistance tolerance	%	0.5, 1, 2	0.5, 1, 2	0.5, 1, 2	0.5, 1, 2

Standard values	E24, E96 preferred		
Thermal impedance °C/watt	150	140	112
Ambient temperature range °C	-55 to 155		

Physical Data

Dimensions (mm) & Weight (g)							
Type	L Max	D Max	f min	d nom	PCB mounting centres	Min Bend Radius	Wt. nom
MFR3	3.5	1.8	22.4	0.5	7.6	0.5	0.1
MFR4	6.2	2.5	21.0	0.6	10.2	0.6	0.3
MFR5	9.0	3.6	19.6	0.8	12.7	1.2	0.5



General Note

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

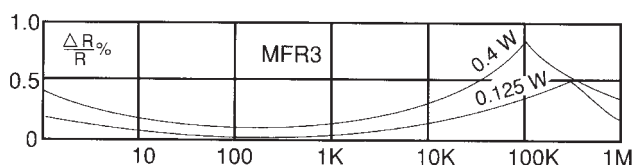
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Performance Data - Type MFR 3

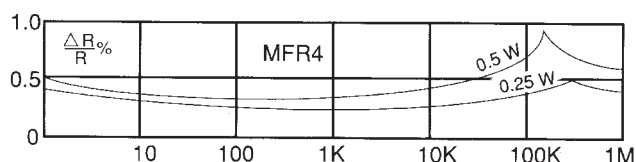
	CECC 40101-019 Requirements	Actual Performance	
		Maximum	Typical
Load at commercial rating : 1000 hours at 70°C ΔR %		0.8	See Graph 1
Load at CECC rating : 1000 hours at 70°C ΔR %	2	0.5	See Graph 1
Shelf life : 12 months at room temperature ΔR %	Not Specified	0.1	0.07
Derating	zero at 155°C		
Short term overload ΔR %	0.5	0.25	0.03
Climatic ΔR %	2	0.5	0.2
Climatic category	55/125/56		
Long term damp heat ΔR %	2	0.5	0.3
Temperature rapid change ΔR %	0.5	0.25	0.05
Resistance to solder heat ΔR %	0.5	0.25	0.02
Vibration and bump ΔR %	0.5	0.1	0.01
Noise. (in a decade of frequency) $\mu V/V$	Not specified	0.1	0.07
Insulation resistance ohms	>1G	>1G	>1G
Voltage proof volts	350 min	400 min	400 min
Pulse handling	Data available upon request		



Graph 1 – Load for 1000 hours at 70°C: maximum changes

Performance Data - Type MFR 4

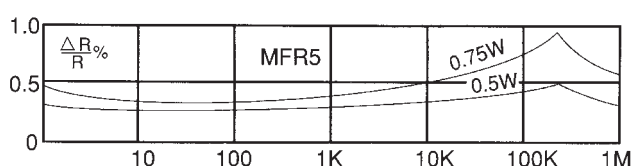
	CECC 40101-019 Requirements	CECC 40101-803 Requirements	Actual Performance	
			Maximum	Typical
Load at commercial rating : 1000 hours at 70°C ΔR %			0.8	See Graph 2
Load at CECC rating : 1000 hours at 70°C ΔR %	2	1	0.5	See Graph 2
Shelf life : 12 months at room temperature ΔR %	Not specified	Not Specified	0.1	0.07
Derating	zero at 155°C	zero at 155°C		
Short term overload ΔR %	0.5	0.25	0.25	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	0.04
Resistance to solder heat ΔR %	0.5	0.25	0.25	0.07
Vibration and bump ΔR %	0.5	0.25	0.1	0.01
Noise. (in a decade of frequency) $\mu V/V$	Not Specified	Not Specified	0.1	0.1
Insulation resistance ohms	>1G	>1G	>1G	>1G
Voltage proof volts	500 min	400 min	500 min	500 min
Pulse handling	Data available upon request			



Graph 2 – Load for 1000 hours at 70°C: maximum changes

Performance Data - Type MFR 5

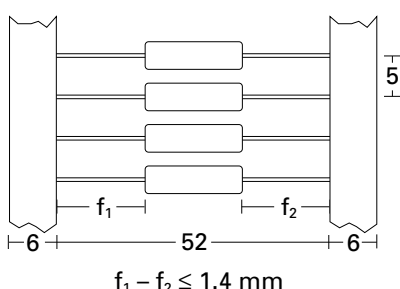
	CECC 40101-019 Requirements	CECC 40101-803 Requirements	Actual Performance	
			Maximum	Typical
Load at commercial rating : 1000 hours at 70°C ΔR %			0.9	See Graph 3
Load at CECC rating : 1000 hours at 70°C ΔR %	2	1	0.5	See Graph 3
Shelf life : 12 months at room temperature ΔR %	Not specified	Not Specified	0.1	0.07
Derating	zero at 155°C	zero at 155°C		
Short term overload ΔR %	0.5	0.25	0.25	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	0.04
Resistance to solder heat ΔR %	0.5	0.25	0.25	0.07
Vibration and bump ΔR %	0.5	0.25	0.1	0.01
Noise. (in a decade of frequency) $\mu V/V$	Not Specified	Not Specified	0.1	0.07
Insulation resistance ohms	>1G	>1G	>1G	>1G
Voltage proof volts	700 min	500 min	700 min	700 min
Pulse handling	Data available upon request			



Graph 3 – Load for 1000 hours at 70°C: maximum changes

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. Alternative packaging available by request.



Lead Formed resistors can also be supplied. Standard options of Lancet, Radial and Goalpost forming are shown in Lead Form Information section.

STANDARD QUANTITIES PER PACKAGE

Type	MFR3	MFR4	MFR5
Large Ammo Pack	5,000	5,000	2,500

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

Material Solder-coated copper wire.
Strength The terminations meet the requirements of IEC 68.2.21
Solderability The terminations meet the requirements of IEC 115-1, Clause 4.17.3.2

MARKING

0.5% and 1% tolerance resistors are colour coded with 5 bands, 2% tolerance has 4. IEC 62 colours are used.

SOLVENT RESISTANCE

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