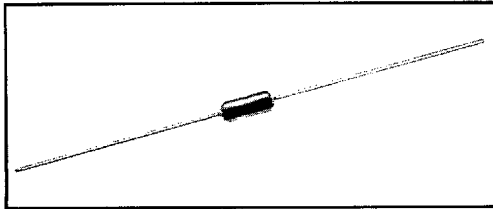


MODEL CMF Metal Film Resistors Industrial



FEATURES

- Small size - conformal coated
- Flame retardant epoxy coating
- Controlled temperature coefficient
- Excellent high frequency characteristics
- Low noise
- Low voltage coefficient

Dale® Model CMF is also available as Military Qualified Styles RN and RL. See pages 90 - 92 for the MIL-SPEC ratings/attributes. (Except for marking, the product in these two catalog sections is the same.)

STANDARD ELECTRICAL SPECIFICATIONS

MODEL	MAXIMUM WORKING VOLTAGE	RESISTANCE RANGE (Ohms) VS - BEST AVAILABLE TOLERANCE/TC				
		±2%** T-00	±1% T-0	±1% T-1	±1% T-2	±0.1% T-9
CMF-50	200 V	—	10 - 1M	10 - 1M	10 - 500k	10 - 500k
CMF-55	250 V	.1 - .49	.5 - 22.1M	1 - 22.1M	10 - 5M	10 - 2.5M
CMF-07*	250 V	—	1 - 5M	5 - 5M	—	—
CMF-60	350 V	.1 - .49	.5 - 8M	1 - 8M	10 - 8M	10 - 2.5M
CMF-20*	350 V	—	1 - 8M	5 - 8M	—	—
CMF-65	500 V	.1 - .49	.5 - 15M	1 - 15M	10 - 10M	10 - 2.5M
CMF-70	500 V	—	1 - 15M	1 - 15M	10 - 10M	10 - 2.5M

* CMF-07 and CMF-20 are available in ±2% (G) or ±5% (J) tolerances only.
** A .0005 ohm bridge error is allowed in resistance measurement. It has the greatest effect on values in this range and should be taken into account when verifying tolerance and TC.

ELECTRICAL SPECIFICATIONS

Resistance Tolerance: ±5%, ±2%, ±1%, ±0.5%, ±0.25%, ±0.1% standard. Special tolerance and/or TC matching is available on request.

Temperature Coefficient: CMF resistors are available in ±200PPM, ±150PPM, ±100PPM, ±50PPM and ±25PPM (-55°C to +175°C) depending on resistance range and tolerance.

Noise: Dale® metal film resistors have exceptionally low noise level. Average for standard resistance range is 0.10 micro-volts per volt over a decade of frequency, with low and intermediate resistance values typically below 0.05 micro-volts per volt.

Voltage Coefficient: Maximum voltage coefficient is ±5PPM per volt when measured between 10% and full rated voltage.

Dielectric Strength: 450 VAC for CMF-50, CMF-55, CMF-07. 750 VAC for CMF-60, CMF-20. 900 VAC for all others.

Insulation Resistance: 10,000 Megohm minimum dry, 100 Megohm minimum after moisture test.

Shelf Life: Resistance shifts due to storage at room temperature are negligible.

MECHANICAL SPECIFICATIONS

Terminal Strength: 2 pound pull test for CMF-50, CMF-55, CMF-60 and CMF-65. 5 pound test for all others.

Solderability: Continuous satisfactory coverage when tested in accordance with MIL-R-10509.

MATERIAL SPECIFICATIONS

Element: Vacuum-deposited nickel-chrome alloy.

Core: Fire-cleaned high purity ceramic.

Coating: Flame retardant epoxy, formulated for superior moisture protection.

Termination: Standard lead material is solder-coated copper. Solderable and weldable.

COMMERCIAL POWER RATING

WATTAGE	@ +70°C	@ +125°C
1/20	CMF-50	CMF-50
1/10	CMF-50, -55	CMF-50, -55
1/8	CMF-50, -55, -60	CMF-50, -55, -60
1/4	CMF-55, -60, -65, -70, -07	CMF-55, -60, -65, -70
1/2	CMF-55, -60, -65, -70, -20	CMF-60, -65, -70
3/4	CMF-60, -65, -70	CMF-65, -70
1	CMF-65, -70	—

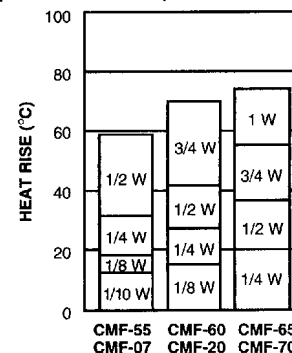
Note: Power ratings are based on full power at temperatures and typical ΔR shown in the Environmental Performance table (1,000 hours load life).

TEMPERATURE COEFFICIENT CODES

TC CODE	TEMPERATURE COEFFICIENT
T-00	0 ± 200PPM/°C
T-0	0 ± 150PPM/°C
T-1	0 ± 100PPM/°C
T-2	0 ± 50PPM/°C
T-9	0 ± 25PPM/°C

HEAT RISE

The increase in resistor surface temperature due to the rated load is shown below. Resistor surface temperature = heat rise plus ambient temperature.

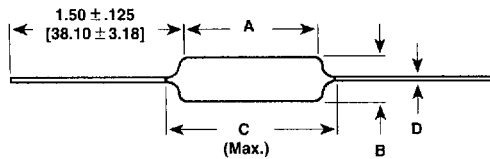


SPECIAL MODIFICATIONS

1. Terminals may be supplied in any commercial material with several type finishes.
2. Special pre-conditioning (power aging, temperature cycling, etc.) to customer specifications.
3. Non-helixed resistors can be supplied for critical high frequency applications.
4. Fusible, flameproof versions available.

MODEL CMF

DIMENSIONAL CONFIGURATIONS [Numbers in brackets indicate millimeters]					
MODEL	DIMENSIONS				
	A	B	C (Max.)	D	
CMF-50	.150 ± .020 [3.81 ± .508]	.065 ± .015 [1.65 ± .381]	.187 [4.75]	.016 ± .002 [.406 ± .051]	
CMF-55	.240 ± .020*** [6.10 ± .508]	.090 ± .008 [2.29 ± .203]	.278 [7.06]**	.025 ± .002 [.635 ± .051]	
CMF-60	.344 ± .031 [8.74 ± .787]	.145 ± .015 [3.68 ± .381]	.425 [10.80]	.025 ± .002* [.635 ± .051]	
CMF-65	.562 ± .031 [14.27 ± .787]	.180 ± .015 [4.57 ± .381]	.687 [17.45]	.025 ± .002* [.635 ± .051]	
CMF-70	.562 ± .031 [14.27 ± .787]	.180 ± .015 [4.57 ± .381]	.687 [17.45]	.032 ± .002 [.813 ± .051]	
CMF-07	.240 ± .020 [6.10 ± .508]	.090 ± .008 [2.29 ± .203]	.278 [7.06]	.025 ± .002 [.635 ± .051]	
CMF-20	.375 ± .040 [9.53 ± 1.02]	.145 ± .015 [3.68 ± .381]	.425 [10.80]	.032 ± .002 [.813 ± .051]	



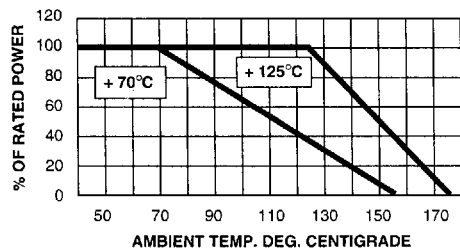
* Available with .032" [.813mm] lead. ** 290° [7.37mm] for ± 0.25% and ± 0.1% resistance tolerances and values above 1 Megohm. *** .260" ± .020" [6.60mm ± .508mm] for values above 5 Megohm.

MODEL	POWER RATING					
	@ + 70°C			@ + 125°C		
	CMF-50	1/10 Watt	1/8 Watt	—	1/20 Watt	1/10 Watt
CMF-55	1/8 Watt	1/4 Watt	1/2 Watt	1/10 Watt	1/8 Watt	1/4 Watt
CMF-60	1/4 Watt	1/2 Watt	3/4 Watt	1/8 Watt	1/4 Watt	1/2 Watt
CMF-65	1/2 Watt	3/4 Watt	1 Watt	1/4 Watt	1/2 Watt	3/4 Watt
CMF-70	1/2 Watt	3/4 Watt	1 Watt	1/4 Watt	1/2 Watt	3/4 Watt
CMF-07	—	1/4 Watt	—	—	—	—
CMF-20	—	1/2 Watt	—	—	—	—
TEST*	MAXIMUM ΔR (Typical Test Lots)					
Short Time Overload	—	± 0.05%	—	—	± 0.05%	—
Low Temperature Operation	—	± 0.05%	—	—	± 0.05%	—
Moisture Resistance	—	± 0.05%	—	—	± 0.05%	—
Shock	—	± 0.01%	—	—	± 0.01%	—
Vibration	—	± 0.04%	—	—	± 0.04%	—
Temperature Cycling	—	± 0.15%	—	—	± 0.15%	—
Load Life	± 0.15%	± 0.5%	± 1.0%	± 0.15%	± 0.5%	± 1.0%
Dielectric Withstanding Voltage	—	± 0.01%	—	—	± 0.01%	—
Effect of Solder	—	± 0.03%	—	—	± 0.03%	—

* Test methods per MIL-STD-202.

DERATING

CMF resistors have an operating temperature range of - 55°C to + 175°C. They must be derated at high ambient temperatures according to the derating curve.



PART MARKING

- Dale
- Model
- Value
- Tolerance and TC
- Date code

HOW TO ORDER

CMF-55	3010	F	T-1
MODEL	RESISTANCE* VALUE	TOLERANCE**	TEMPERATURE*** COEFFICIENT
CMF-50 CMF-70 CMF-55 CMF-07 CMF-60 CMF-20 CMF-65	First three digits are significant. (Two for ± 2% and ± 5% tolerance.) Last digit specifies the number of zeros to follow.	B = ± 0.1% C = ± 0.25% D = ± 0.5% F = ± 1% G = ± 2% J = ± 5%	T-00 = ± 200PPM/°C T-0 = ± 150PPM/°C T-1 = ± 100PPM/°C T-2 = ± 50PPM/°C T-9 = ± 25PPM/°C

* Examples: R27 = 0.27 ohm, 49R9 = 49.9 ohm, 1000 = 100 ohm, 1001 = 1 kilohm, 1004 = 1 Megohm, R511 = 0.511 ohm.

** CMF-07 and CMF-20 available only in ± 2% and ± 5% tolerances.

*** Tolerances of ± 0.5% (D), ± 0.25% (C) and ± 0.1% (B) are available only in T-2 and T-9 temperature coefficients.