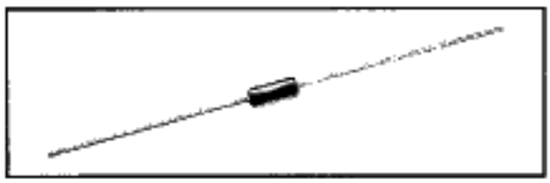
MODEL CMF
Metal Film Resistors
Military, MIL-R-10509 Qualified, Type RN
Military, MIL-R-22684 Qualified, Type RL

VISHAY DALE®



FEATURES

- Very low noise
- Very low voltage coefficient
- Controlled temperature coefficient
- Excellent high frequency characteristics
- Flame retardant epoxy coating

- Commercial alternatives to military styles are available with higher power ratings. See catalog page 76.

STANDARD ELECTRICAL SPECIFICATIONS

MODEL	MAXIMUM WORKING VOLTAGE	DALE® MILITARY APPROVED VALUE RANGE (Ohms)			
		MIL-R-10509			MIL-R-22684
		CHARACTERISTIC D	CHARACTERISTIC C	CHARACTERISTIC E	
CMF-50	200	—	10 - 100k	10 - 100k	—
CMF-55	200	10 - 301k	49.9 - 100k	49.9 - 100k	—
CMF-07	250	—	—	—	51 - 150k
CMF-60	300	10 - 1M	49.9 - 499k	49.9 - 499k	—
CMF-20	350	—	—	—	4.3 - 470k
CMF-65	350	10 - 2M	49.9 - 1M	49.9 - 1M	—
CMF-70	500	10 - 2.49M	24.9 - 1M	24.9 - 1M	—

Dale® commercial value range: Extended resistance ranges are available in commercial equivalent types. Consult factory.

MECHANICAL SPECIFICATIONS

Terminal Strength: 5 pound pull test for CMF-07 and CMF-20; 2 pound pull test for all others.

Solderability: Continuous satisfactory coverage when tested in accordance with MIL-R-10509 and MIL-R-22684.

MATERIAL SPECIFICATIONS

Core: Fire-cleaned high purity ceramic.

Element: Nickel-chrome alloy.

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

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

ENVIRONMENTAL SPECIFICATIONS

General: Environmental performance is shown in the Environmental Performance table. Test methods are those specified in MIL-R-10509 and MIL-R-22684.

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

APPLICABLE MIL-SPECIFICATIONS

MIL-R-10509 and MIL-R-22684: The CMF models meet or exceed the electrical, environmental and dimensional requirements of MIL-R-10509 and MIL-R-22684.

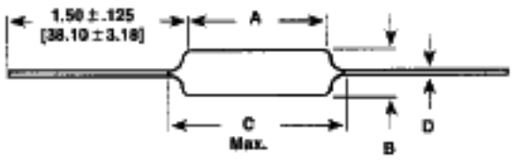
Noise: Dale® metal film resistors have exceptionally low noise level. Average for standard resistance range is 0.10 micro-volt per volt over a decade of frequency, with low and intermediate resistance values typically below 0.05 micro-volt per volt.

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 and CMF-60.
500 VAC for CMF-07.
700 VAC for CMF-20.
900 VAC for CMF-65 and CMF-70.

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

DIMENSIONAL CONFIGURATIONS [Numbers in brackets indicate millimeters]



MODEL	A	B	C (Max.)	D
CMF-50	.150 ± .020 [3.81 ± .508]	.065 ± .015 [1.65 ± .381]	.244 [6.20]	.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]

* .290" [7.37mm] for ± 0.25% and ± 0.1% resistance tolerances.

MODEL CMF

ENVIRONMENTAL PERFORMANCE

REQUIREMENT	MIL-R-10509			MIL-R-22684
	CHARACTERISTIC D	CHARACTERISTIC C	CHARACTERISTIC E	
RN50	CMF-50	CMF-50	CMF-50	—
RN55	CMF-55	CMF-55	CMF-55	—
RN60	CMF-60	CMF-60	CMF-60	—
RN65	CMF-65	CMF-65	CMF-65	—
RN70	CMF-70	CMF-70	CMF-70	—
RL07	—	—	—	CMF-07
RL20	—	—	—	CMF-20
MIL. Temp. Coefficient	+ 200 - 500PPM/°C	± 50PPM/°C	± 25PPM/°C	± 200PPM/°C
Applicable Dale® TC Code	T-1 (100PPM/°C)	T-2 (50PPM/°C)	T-9 (25PPM/°C)	T-00 (± 200PPM/°C)
POWER RATING	@ + 70°C	@ + 125°C	@ + 125°C	@ + 70°C
RN50	—	1/20 Watt	1/20 Watt	—
RN55	1/8 Watt	1/10 Watt	1/10 Watt	—
RN60	1/4 Watt	1/8 Watt	1/8 Watt	—
RN65	1/2 Watt	1/4 Watt	1/4 Watt	—
RN70	3/4 Watt	1/2 Watt	1/2 Watt	—
RL07	—	—	—	1/4 Watt
RL20	—	—	—	1/2 Watt
TEST	MIL. (Max.)	MIL. (Max.)	MIL. (Max.)	MIL. (Max.)
Thermal Shock	± 0.50% ΔR	± 0.25% ΔR	± 0.25% ΔR	± 1.00% ΔR
Short Time Overload	± 0.50% ΔR	± 0.25% ΔR	± 0.25% ΔR	± 0.50% ΔR
Low Temperature Operation	± 0.50% ΔR	± 0.25% ΔR	± 0.25% ΔR	± 0.50% ΔR
Moisture Resistance	± 1.50% ΔR	± 0.50% ΔR	± 0.50% ΔR	± 1.50% ΔR
Shock	± 0.50% ΔR	± 0.25% ΔR	± 0.25% ΔR	± 0.50% ΔR
Vibration	± 0.50% ΔR	± 0.25% ΔR	± 0.25% ΔR	± 0.50% ΔR
Load Life	± 1.00% ΔR	± 0.50% ΔR	± 0.50% ΔR	± 2.00% ΔR
Dielectric Withstanding Voltage	± 0.50% ΔR	± 0.25% ΔR	± 0.25% ΔR	± 0.50% ΔR
Effect of Solder	± 0.50% ΔR	± 0.10% ΔR	± 0.10% ΔR	± 0.50% ΔR

MILITARY POWER RATING

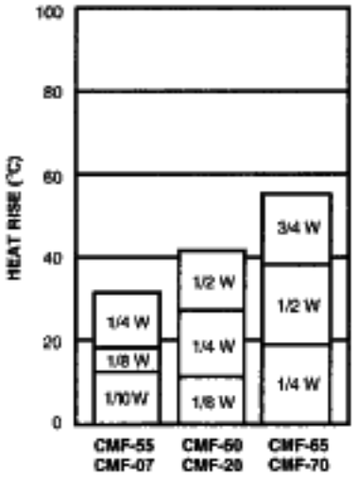
WATTAGE	MILITARY QUALIFIED		
	MIL-R-10509		MIL-R-22684
	@ + 70°C (D)	@ + 125°C (C & E)	@ + 70°C
1/20	—	CMF-50 (RN50)	—
1/10	—	CMF-55 (RN55)	—
1/8	CMF-55 (RN55)	CMF-60 (RN60)	—
1/4	CMF-60 (RN60)	CMF-65 (RN65)	CMF-07 (RL07)
1/2	CMF-65 (RN65)	CMF-70 (RN70)	CMF-20 (RL20)
3/4	CMF-70 (RN70)	—	—

Note: Commercial equivalents of military styles are available with higher power ratings. Consult factory.

MODEL CMF

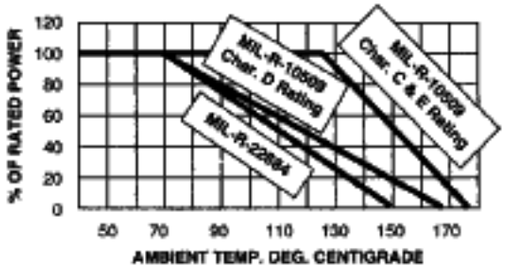
HEAT RISE

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



DERATING

Dale® CMF resistors have an operating temperature range of - 65°C to + 175°C. They must be derated according to the following curves:



POWER RATING

Dale® CMF resistors have two power ratings depending on operating temperatures of + 70°C and + 125°C. Both are based on a maximum ΔR of .5% in 1,000 hour load life.

TEMPERATURE COEFFICIENT CODE

DALE® TC CODE	TEMPERATURE COEFFICIENT	TEMPERATURE RANGE
T-1	0 ± 100PPM/°C	- 55°C to + 175°C
T-2	0 ± 50PPM/°C	- 55°C to + 175°C
T-9	0 ± 25PPM/°C	- 55°C to + 175°C
T-00	0 ± 200PPM/°C	- 55°C to + 150°C

PART MARKING

— RN, per MIL-R-10509

— RL, per MIL-R-22684

HOW TO ORDER - MILITARY PART NUMBER

RN — MIL. TYPE Per MIL-R-10509

60 — SIZE: 50 65 / 55 70 / 60

D — CHARACTERISTIC: E = ± 25PPM/°C; C = ± 50PPM/°C; D = + 200PPM/°C - 500PPM/°C

3483 — VALUE: First three digits are significant figures. Last digit specifies the number of zeros to follow. (348 kilohm illustrated.)

F — TOLERANCE: B = ± 0.1%; C = ± 0.25%; D = ± 0.5%; F = ± 1%

RL — MIL. TYPE Per MIL-R-22684

07 — SIZE: 07 / 20

S — LEAD: S = Solderable

471 — VALUE: First two digits are significant figures. Last digit specifies the number of zeros to follow. (470 ohm illustrated.)

J — TOLERANCE: G = ± 2%; J = ± 5%