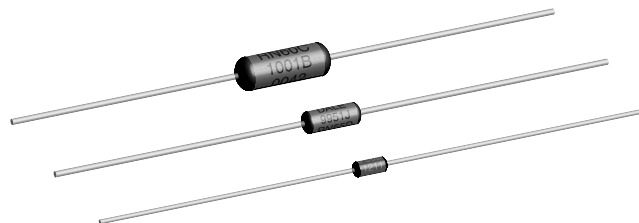


Metal Film Resistors

Military, MIL-R-10509 Qualified, Type RN

Military, MIL-PRF-22684 Qualified, Type RL

**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 appropriate catalog or web page

STANDARD ELECTRICAL SPECIFICATIONS

MODEL	MAXIMUM WORKING VOLTAGE	VISHAY DALE® MILITARY APPROVED VALUE RANGE (Ω)				DIELECTRIC STRENGTH VAC
		MIL-R-10509			MIL-PRF-22684	
		CHARACTERISTIC D	CHARACTERISTIC C	CHARACTERISTIC E		
CMF-50	200	—	10R - 100k	10R - 100k	—	450
CMF-55	200	10R - 301k	49R9 - 100k	49R9 - 100k	—	450
CMF-07	250	—	—	—	51R - 150k	450
CMF-60	300	10R - 1M	49R9 - 499k	49R9 - 499k	—	500
CMF-20	350	—	—	—	4R3 - 470k	700
CMF-65	350	10R - 2M	49R9 - 1M	49R9 - 1M	—	900
CMF-70	500	10R - 2.49M	24R9 - 1M	24R9 - 1M	—	900

Vishay Dale commercial value range: Extended resistance ranges are available in commercial equivalent types. Please contact us by using the email at the bottom of this page.

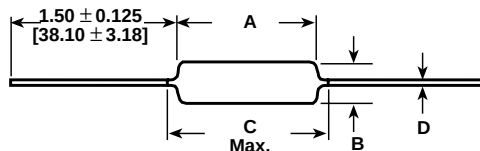
TECHNICAL SPECIFICATIONS

PARAMETER	UNIT	CONDITION
Voltage Coefficient	ppm/V	5 when measured between 10% and full rated voltage
Insulation Resistance	Ω	≥ 10 ¹⁰ minimum dry; ≥ 10 ⁸ minimum after moisture test
Operating Temperature Range	°C	- 65 / + 175 (See derating curves for military range)
Terminal Strength	lb	5 pound pull test for RL07/RL20; 2 pound pull test for all others
Solderability		Continuous satisfactory coverage when tested in accordance with MIL-R-10509 and MIL-PRF-22684

ORDERING INFORMATION - MILITARY PART NUMBER

RN MIL. TYPE Per MIL-R-10509	60 SIZE	D CHARACTERISTIC	3483 VALUE	F TOLERANCE
	50 65 55 70 60	E = ± 25ppm/°C C = ± 50ppm/°C *D = + 200ppm/°C - 500ppm/°C	First three digits are significant figures. Last digit specifies the number of zeros to follow. (348 kilohm illustrated.)	B = ± 0.1% C = ± 0.25% D = ± 0.5% F = ± 1%
RL MIL. TYPE Per MIL-PRF-22684	07 SIZE	S LEAD	471 VALUE	J TOLERANCE
	07 20	S = Solderable	First two digits are significant figures. Last digit specifies the number of zeros to follow. (470 ohm illustrated.)	G = ± 2% J = ± 5%

*Vishay Dale supplies ± 100ppm parts for characteristic D.

**DIMENSIONS** in inches [millimeters]

MODEL	A	B	C (Max.)	D
CMF-50	0.150 ± 0.020 [3.81 ± 0.51]	0.065 ± 0.015 [1.65 ± 0.38]	0.244 [6.20]	0.016 ± 0.002 [0.41 ± 0.05]
CMF-55	0.240 ± 0.020 [6.10 ± 0.51]	0.090 ± 0.008 [2.29 ± 0.20]	0.278 [7.06]*	0.025 ± 0.002 [0.64 ± 0.05]
CMF-60	0.344 ± 0.031 [8.74 ± 0.79]	0.145 ± 0.015 [3.68 ± 0.38]	0.425 [10.80]	0.025 ± 0.002 [0.64 ± 0.05]
CMF-65	0.562 ± 0.031 [14.27 ± 0.79]	0.180 ± 0.015 [4.57 ± 0.38]	0.687 [17.45]	0.025 ± 0.002 [0.64 ± 0.05]
CMF-70	0.562 ± 0.031 [14.27 ± 0.79]	0.180 ± 0.015 [4.57 ± 0.38]	0.687 [17.45]	0.032 ± 0.002 [0.81 ± 0.05]
CMF-07	0.240 ± 0.020 [6.10 ± 0.51]	0.090 ± 0.008 [2.29 ± 0.20]	0.278 [7.06]	0.025 ± 0.002 [0.64 ± 0.05]
CMF-20	0.375 ± 0.040 [9.53 ± 1.02]	0.145 ± 0.015 [3.68 ± 0.38]	0.425 [10.80]	0.032 ± 0.002 [0.81 ± 0.05]

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

MATERIAL SPECIFICATIONS	
Element:	Nickel-chrome alloy
Coating:	Flame retardant epoxy, formulated for superior moisture protection
Core:	Fire-cleaned high purity ceramic
Termination:	Standard lead material is solder-coated copper. Solderable and weldable.

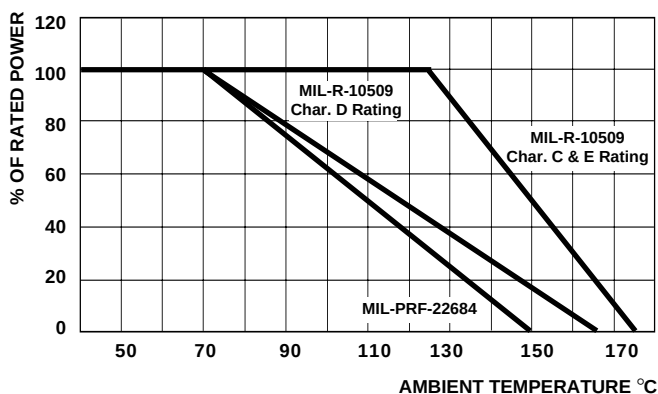
ENVIRONMENTAL SPECIFICATIONS	
General:	Environmental performance is shown in the Environmental Performance table. Test methods are those specified in MIL-R-10509 and MIL-PRF-22684.
Shelf Life:	Resistance shifts due to storage at room temperature are negligible.

APPLICABLE MIL-SPECS

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

Noise: Vishay 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.

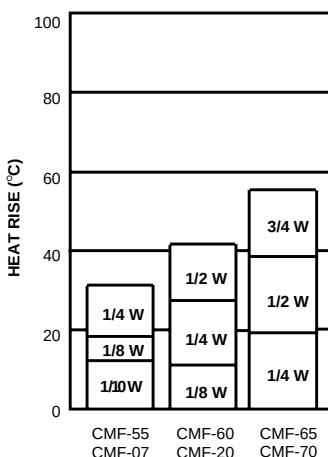
Vishay Dale CMF resistors have an operating temperature range of - 65°C to +175°C. They must be derated according to the following curves:

**DERATING**

MILITARY POWER RATING

WATTAGE	MILITARY QUALIFIED		
	MIL-R-10509		MIL-PRF-22684
	@ + 70°C (D)	@ + 125°C (C & E)	
			@ + 70°C
0.05	—	CMF-50 (RN50)	—
0.10	—	CMF-55 (RN55)	—
0.125	CMF-55 (RN55)	CMF-60 (RN60)	—
0.25	CMF-60 (RN60)	CMF-65 (RN65)	CMF-07 (RL07)
0.50	CMF-65 (RN65)	CMF-70 (RN70)	CMF-20 (RL20)
1.0	CMF-70 (RN70)	—	—

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

**HEAT RISE**

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

TEMPERATURE COEFFICIENT CODE

VISHAY DALE TEMPERATURE COEFFICIENT 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

**MARKING**

Characteristics: D = T-1, C = T-2, E = T-9
Tolerance: F = 1%, D = 0.5%, C = 0.25%, B = 0.1%
Value = three significant figures and multiplier
J = JAN (joint Army - Navy) brand

RN50: (3 lines)

J50D JAN, type, characteristic
1211 Value
F137 Tolerance & 3 digit date code

RN55, RN60, RN65, RN70 (4 lines)

DALE Company Logo
0137J 4 digit date code and JAN brand
RN55D Type and characteristic
1211F Value and Tolerance

(RL series are color banded per MIL-PRF-22684)

PERFORMANCE

REQUIREMENT	MIL-R-10509			MIL-PRF-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. Temperature Coefficient	+ 200 - 500ppm/°C	± 50ppm/°C	± 25ppm/°C	± 200ppm/°C
Applicable Vishay 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	—	0.05Watt	0.05 Watt	—
RN55	0.125 Watt	0.10 Watt	0.10 Watt	—
RN60	0.25 Watt	0.125 Watt	0.125 Watt	—
RN65	0.5 Watt	0.25 Watt	0.25 Watt	—
RN70	0.75 Watt	0.50 Watt	0.50 Watt	—
RL07	—	—	—	0.25 Watt
RL20	—	—	—	0.5 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