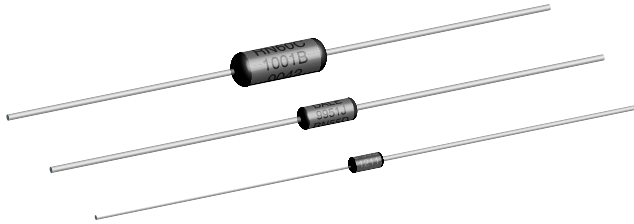


Metal Film Resistors

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						
	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		
	200	—	10R - 100k	10R - 100k	—	450
	200	10R - 301k	49R9 - 100k	49R9 - 100k	—	450
	300	10R - 1M	49R9 - 499k	49R9 - 499k	—	500
	350	10R - 2M	49R9 - 1M	49R9 - 1M	—	900
	500	10R - 2.49M	24R9 - 1M	24R9 - 1M	—	900
	250	—	—	—	51R - 150k	450
	350	—	—	—	4R3 - 470k	700

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



GLOBAL PART NUMBER INFORMATION

New Global Part Numbering: RN60D3483FR36 (preferred part numbering format)

R	N	6	0	D	3	4	8	3	F	R	3	6	
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MIL STYLE	CHARACTERISTIC	RESISTANCE VALUE	TOLERANCE CODE	PACKAGING	SPECIAL
RN50 RN55 RN60 RN65 RN70	E = 25ppm C = 50ppm D = 100ppm	3 digit significant figure, followed by a multiplier 10R0 = 10Ω 2152 = 21.5KΩ 2494 = 2.49MΩ	B = ± 0.1% C = ± 0.25% D = ± 0.5% F = ± 1%	B14 = Tin/Lead, Bulk R36 = Tin/Lead, T/R (Full) RE6 = Tin/Lead, T/R (1000 pcs)	Blank = Standard (Dash Number) (up to 1 digit)

Historical Part Number example: RN60D3483F (will continue to be accepted)

RN60	D	3483	F	R36
MIL STYLE	CHARACTERISTIC	RESISTANCE VALUE	TOLERANCE CODE	PACKAGING

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.

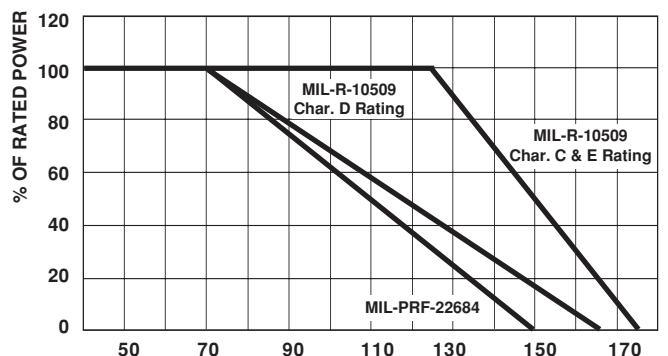
ENVIRONMENTAL SPECIFICATIONS	
General:	Environmental performance is shown in the Environmental Performance table. Test methods are those specified in MIL-R-10509 and MIL-PRF-22684.
Shelf Life:	Resistance shifts due to storage at room temperature are negligible.

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.

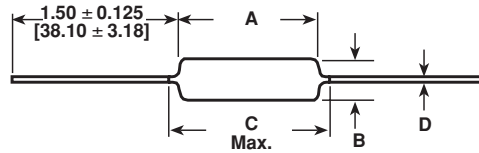
Noise: Vishay Dale metal film resistors have exceptionally low noise level. Average for standard resistance range is 0.10 micro-volt per volt over a decade of frequency, with low and intermediate resistance values typically below 0.05 micro-volt per volt.

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 AMBIENT TEMPERATURE °C

DIMENSIONS in inches [millimeters]

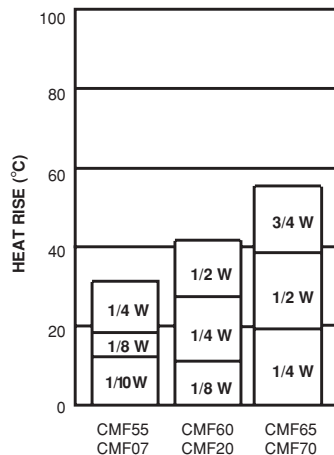


VISHAY DALE MODEL	A	B	C (Max.)	D
CMF50	0.150 ± 0.020 [3.81 ± 0.51]	0.065 ± 0.015 [1.65 ± 0.38]	0.244 [6.20]	0.016 ± 0.002 [0.41 ± 0.05]
CMF55	0.240 ± 0.020 [6.10 ± 0.51]	0.090 ± 0.008 [2.29 ± 0.20]	0.278 [7.06]*	0.025 ± 0.002 [0.64 ± 0.05]
CMF60	0.344 ± 0.031 [8.74 ± 0.79]	0.145 ± 0.015 [3.68 ± 0.38]	0.425 [10.80]	0.025 ± 0.002 [0.64 ± 0.05]
CMF65	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]
CMF70	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]
CMF07	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]
CMF20	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.

MILITARY POWER RATING			
WATTAGE	MILITARY QUALIFIED		
	MIL-R-10509		MIL-PRF-22684
	AT + 70°C (D)	AT + 125°C (C & E)	
			AT + 70°C
0.05	—	RN50	—
0.10	—	RN55	—
0.125	RN55	RN60	—
0.25	RN60	RN65	RL07
0.50	RN65	RN70	RL20
1.0	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.



MARKING				
Characteristics: D = 100ppm, C = 50ppm, E = 25ppm 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)		RN55, RN60, RN65, RN70 (4 lines)		
J50D	JAN, type, characteristic	DALE	Company Logo	
1211	Value	0137J	4 digit date code and JAN brand	
F137	Tolerance & 3 digit date code	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	
MIL. Temperature Coefficient	+ 200 - 500ppm/°C	± 50ppm/°C	± 25ppm/°C	± 200ppm/°C
Applicable Vishay Dale Temperature Coefficient	± 100ppm/°C	± 50ppm/°C	± 25ppm/°C	± 200ppm/°C
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