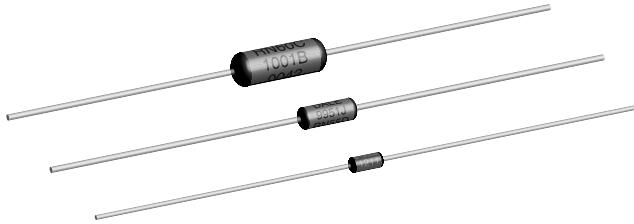


## Metal Film Resistors

### 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							
MIL STYLE	VISHAY DALE 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		
RN50	CMF50	200	—	10R - 100k	10R - 100k	—	450
RN55	CMF55	200	10R - 301k	49R9 - 100k	49R9 - 100k	—	450
RN60	CMF60	300	10R - 1M	49R9 - 499k	49R9 - 499k	—	500
RN65	CMF65	350	10R - 2M	49R9 - 1M	49R9 - 1M	—	900
RN70	CMF70	500	10R - 2.49M	24R9 - 1M	24R9 - 1M	—	900
RL07	CMF07	250	—	—	—	51R - 150k	450
RL20	CMF20	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 <sup>10</sup> minimum dry; ≥ 10 <sup>8</sup> 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**

<b>MIL STYLE</b> RN50 RN55 RN60 RN65 RN70	<b>CHARACTERISTIC</b> E = 25ppm C = 50ppm D = 100ppm	<b>RESISTANCE VALUE</b> 3 digit significant figure, followed by a multiplier 10R0 = 10Ω 2152 = 21.5KΩ 2494 = 2.49MΩ	<b>TOLERANCE CODE</b> B = ± 0.1% C = ± 0.25% D = ± 0.5% F = ± 1%	<b>PACKAGING</b> B14 = Tin/Lead, Bulk R36 = Tin/Lead, T/R (Full) RE6 = Tin/Lead, T/R (1000 pcs)	<b>SPECIAL</b> Blank = Standard (Dash Number) (up to 1 digit)
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Historical Part Number example: **RN60D3483F** (will continue to be accepted)

<b>RN60</b>	<b>D</b>	<b>3483</b>	<b>F</b>	<b>R36</b>
MIL STYLE	CHARACTERISTIC	RESISTANCE VALUE	TOLERANCE CODE	PACKAGING

New Global Part Numbering: **RL07S471JR36** (preferred part numbering format)

**R L 0 7 S 4 7 1 J R 3 6**

<b>MIL STYLE</b> RL07 RL20	<b>LEAD MATERIAL</b> S = Solderable	<b>RESISTANCE VALUE</b> 2 digit significant figure, followed by a multiplier 4R3 = 4.3Ω 202 = 2.0KΩ 474 = 470KΩ	<b>TOLERANCE CODE</b> G = ± 2% J = ± 5%	<b>PACKAGING</b> B14 = Tin/Lead, Bulk R36 = Tin/Lead, T/R (Full) RE6 = Tin/Lead, T/R (1000 pcs)
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Historical Part Number example: **RL07S471J** (will continue to be accepted)

<b>RL07</b>	<b>S</b>	<b>471</b>	<b>J</b>	<b>R36</b>
MIL STYLE	LEAD MATERIAL	RESISTANCE VALUE	TOLERANCE CODE	PACKAGING

**MATERIAL SPECIFICATIONS**

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

**ENVIRONMENTAL SPECIFICATIONS**

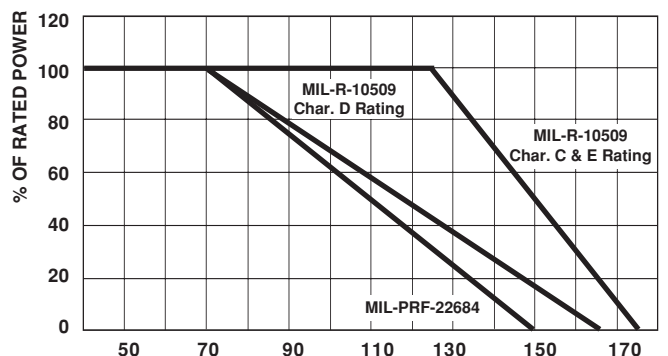
<b>General:</b>	Environmental performance is shown in the Environmental Performance table. Test methods are those specified in MIL-R-10509 and MIL-PRF-22684.
<b>Shelf Life:</b>	Resistance shifts due to storage at room temperature are negligible.

**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.

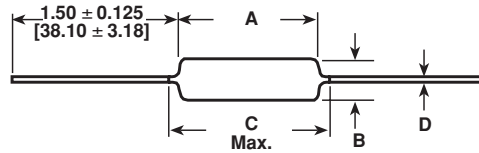
Vishay Dale CMF resistors have an operating temperature range of -65°C to +175°C. They must be derated according to the following curves:



**DERATING**

AMBIENT TEMPERATURE °C

**DIMENSIONS** in inches [millimeters]

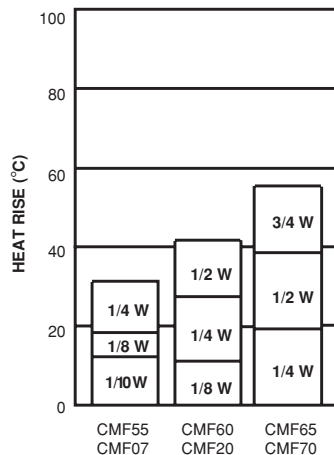


VISHAY DALE MODEL	A	B	C (Max.)	D
CMF50	$0.150 \pm 0.020$ [3.81 ± 0.51]	$0.065 \pm 0.015$ [1.65 ± 0.38]	0.244 [6.20]	$0.016 \pm 0.002$ [0.41 ± 0.05]
CMF55	$0.240 \pm 0.020$ [6.10 ± 0.51]	$0.090 \pm 0.008$ [2.29 ± 0.20]	0.278 [7.06]*	$0.025 \pm 0.002$ [0.64 ± 0.05]
CMF60	$0.344 \pm 0.031$ [8.74 ± 0.79]	$0.145 \pm 0.015$ [3.68 ± 0.38]	0.425 [10.80]	$0.025 \pm 0.002$ [0.64 ± 0.05]
CMF65	$0.562 \pm 0.031$ [14.27 ± 0.79]	$0.180 \pm 0.015$ [4.57 ± 0.38]	0.687 [17.45]	$0.025 \pm 0.002$ [0.64 ± 0.05]
CMF70	$0.562 \pm 0.031$ [14.27 ± 0.79]	$0.180 \pm 0.015$ [4.57 ± 0.38]	0.687 [17.45]	$0.032 \pm 0.002$ [0.81 ± 0.05]
CMF07	$0.240 \pm 0.020$ [6.10 ± 0.51]	$0.090 \pm 0.008$ [2.29 ± 0.20]	0.278 [7.06]	$0.025 \pm 0.002$ [0.64 ± 0.05]
CMF20	$0.375 \pm 0.040$ [9.53 ± 1.02]	$0.145 \pm 0.015$ [3.68 ± 0.38]	0.425 [10.80]	$0.032 \pm 0.002$ [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
<b>TEST</b>	<b>MIL. (Max.)</b>	<b>MIL. (Max.)</b>	<b>MIL. (Max.)</b>	<b>MIL. (Max.)</b>
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