

## Metal Film Resistors, Military, MIL-R-10509 Qualified, Type RN and MIL-PRF-22684 Qualified, Type RL



### FEATURES

- Very low noise (- 40 dB)
- Very low voltage coefficient (5 ppm/V)
- Controlled temperature coefficient
- 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 V <sub>AC</sub>
			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

**Note**

- 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> min. dry; ≥ 10 <sup>8</sup> min. 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



# CMF (Military RN and RL)

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Vishay Dale

### GLOBAL PART NUMBER INFORMATION

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

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

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

<b>R</b>	<b>L</b>	<b>0</b>	<b>7</b>	<b>S</b>	<b>4</b>	<b>7</b>	<b>1</b>	<b>J</b>	<b>R</b>	<b>3</b>	<b>6</b>
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<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 = 4.3 Ω 202 = 2.0 kΩ 474 = 470 kΩ	<b>TOLERANCE CODE</b> G = ± 2 % J = ± 5 %	<b>PACKAGING</b> B14 = Tin/Lead, Bulk BSL = Tin/Lead, Bulk, Single Lot Date Code R36 = Tin/Lead, T/R (Full) RE6 = Tin/Lead, T/R (1000 pieces) RSL = Tin/Lead, T/R, Single Lot Date Code
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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.

### 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.

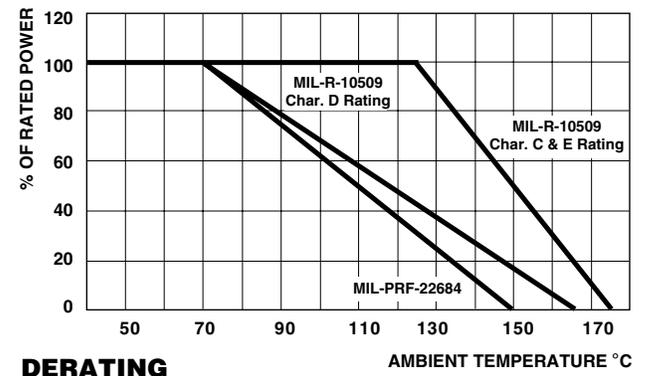
**Noise:** Vishay Dale metal film resistors have exceptionally low noise level. Average for standard resistance range is 0.10 μV per V over a decade of frequency, with low and intermediate resistance values typically below 0.05 μV per V.

**CAGE CODE: 91637**

### 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.

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



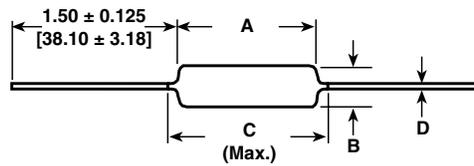
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## DIMENSIONS in inches [millimeters]



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] <sup>(1)</sup>	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]

### Note

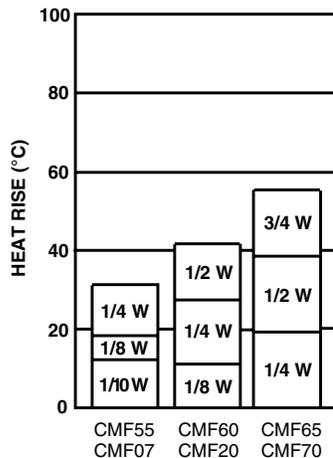
<sup>(1)</sup> 0.290" [7.37] for ± 0.25 % and ± 0.1 % resistance tolerances

## MILITARY POWER RATING

WATTAGE	MILITARY QUALIFIED		
	MIL-R-10509		MIL-PRF-22684
	AT + 70 °C (D)	AT + 125 °C (C and 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 resistors surface temperature due to rated load is shown in the chart above. Resistor temperature = heat rise + ambient temperature.



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MARKING	
Characteristics: D = 100 ppm, C = 50 ppm, E = 25 ppm 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 and 3 digit date code	RN55D Type and characteristic
	1211F Value and Tolerance

**Note**

- 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 - 500 ppm/°C	± 50 ppm/°C	± 25 ppm/°C	± 200 ppm/°C
Applicable Vishay Dale Temperature Coefficient	± 100 ppm/°C	± 50 ppm/°C	± 25 ppm/°C	± 200 ppm/°C
<b>TEST</b>	<b>MIL<sub>max.</sub></b>	<b>MIL<sub>max.</sub></b>	<b>MIL<sub>max.</sub></b>	<b>MIL<sub>max.</sub></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



## Disclaimer

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