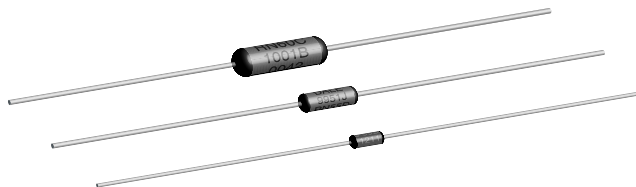


## Metal Film Resistors, Military, MIL-R-10509 Qualified, Precision, Type RN and MIL-PRF-22684 Qualified, Type RL



### 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

VISHAY DALE MODEL	MIL STYLE	MIL SPEC. SHEET	POWER RATING		TOLERANCE ± %	MAX. WORKING VOLTAGE <sup>(1)</sup> V	RESISTANCE RANGE Ω				DIELECTRIC STRENGTH V <sub>AC</sub>
			P <sub>70 °C</sub> W	P <sub>125 °C</sub> W			MIL-R-10509			MIL- PRF- 22684	
							± 100 ppm/°C (D)	± 50 ppm/°C (C)	± 25 ppm/°C (E)		
CMF50	RN50	08	-	0.05	0.1, 0.25, 0.5, 1	200	-	10 to 100K	10 to 100K	-	450
CMF55	RN55	07	0.125	0.10	0.1, 0.25, 0.5, 1	200	10 to 301K	49.9 to 100K	49.9 to 100K	-	450
CMF60	RN60	01	0.25	0.125	0.1, 0.25, 0.5, 1	300	10 to 1M	49.9 to 499K	49.9 to 499K	-	500
CMF65	RN65	02	0.50	0.25	0.1, 0.25, 0.5, 1	350	10 to 2M	49.9 to 1M	49.9 to 1M	-	900
CMF70	RN70	03	0.75 <sup>(2)</sup>	0.50	0.1, 0.25, 0.5, 1	500	10 to 2.49M	24.9 to 1M	24.9 to 1M	-	900
CMF07	RL07	01	0.25	-	2, 5	250	-	-	-	51 to 150K	450
CMF20	RL20	02	0.50	-	2, 5	350	-	-	-	4.3 to 470K	700

#### Notes

<sup>(1)</sup> Continuous working voltage shall be  $\sqrt{P \times R}$  or maximum working voltage, whichever is less.

<sup>(2)</sup> Formerly rated at 1 W and is the direct replacement for RN70 of MIL-R-10509 Rev. D.

### 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)

Metal Film Resistors, Military, MIL-R-10509 Qualified,  
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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>	
<b>MIL STYLE</b>	<b>CHARACTERISTIC</b>			<b>RESISTANCE VALUE</b>				<b>TOLERANCE CODE</b>		<b>PACKAGING</b>			<b>SPECIAL</b>
RN50 RN55 RN60 RN65 RN70	E = 25 ppm C = 50 ppm D = 100 ppm			3 digit significant figure, followed by a multiplier Use "R" for values < 100 $\Omega$ 10R0 = 10 $\Omega$ 2152 = 21.5 k $\Omega$ 2494 = 2.49 M $\Omega$				B = $\pm 0.1\%$ C = $\pm 0.25\%$ D = $\pm 0.5\%$ F = $\pm 1\%$		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			Blank = Standard (Dash number)

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)

<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>
<b>MIL STYLE</b>	<b>LEAD MATERIAL</b>			<b>RESISTANCE VALUE</b>				<b>TOLERANCE CODE</b>		<b>PACKAGING</b>	
RL07 RL20	S = Solderable			2 digit significant figure, followed by a multiplier Use "R" for values < 10 $\Omega$ 4R3 = 4.3 $\Omega$ 202 = 2.0 k $\Omega$ 474 = 470 k $\Omega$				G = $\pm 2\%$ J = $\pm 5\%$		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	

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

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.

### 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  $\mu\text{V}$  per V over a decade of frequency, with low and intermediate resistance values typically below 0.05  $\mu\text{V}$  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.

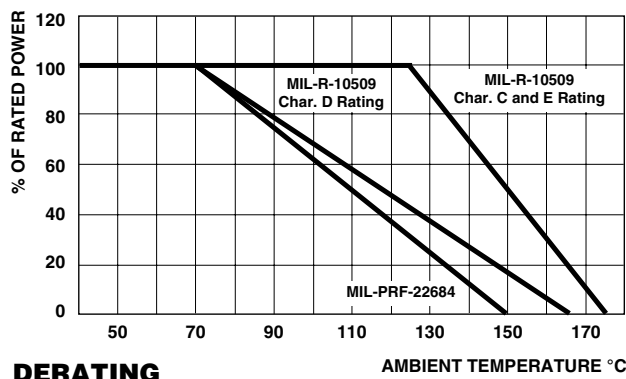
# CMF (Military RN and RL)



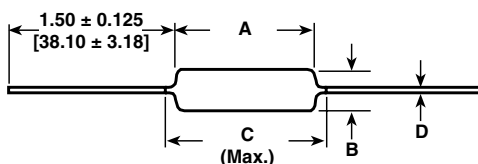
Vishay Dale

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

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



## 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
0.75 <sup>(1)</sup>	RN70	-	-

### Notes

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

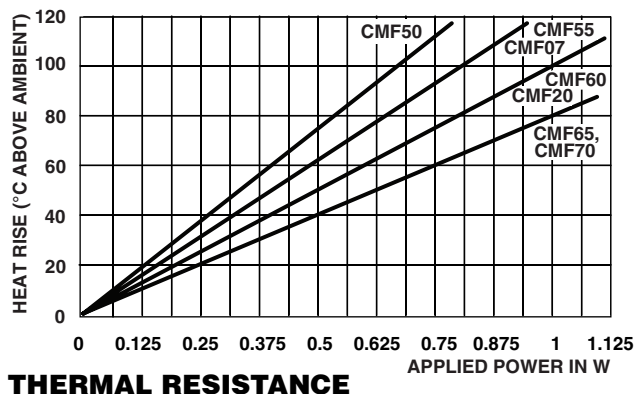
<sup>(1)</sup> Formerly rated at 1 W and is the direct replacement for RN70 of MIL-R-10509 Rev. D.



## CMF (Military RN and RL)

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

Vishay Dale



### 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)

J50D JAN, type, characteristic

1211 Value

F137 Tolerance and 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

### 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 ppm/°C - 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
TEST	MIL <sub>max.</sub>	MIL <sub>max.</sub>	MIL <sub>max.</sub>	MIL <sub>max.</sub>
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



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