

## 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

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



# CMF (Military RN and RL)

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

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 10R0 = 10 Ω 2152 = 21.5 k Ω 2494 = 2.49 M Ω			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)**

<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 4R3 = 4.3 Ω 202 = 2.0 k Ω 474 = 470 k Ω			G = ± 2 % J = ± 5 %		B14 = Tin/Lead, Bulk R36 = Tin/Lead, T/R (Full) RE6 = Tin/Lead, T/R (1000 pcs)			

**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.

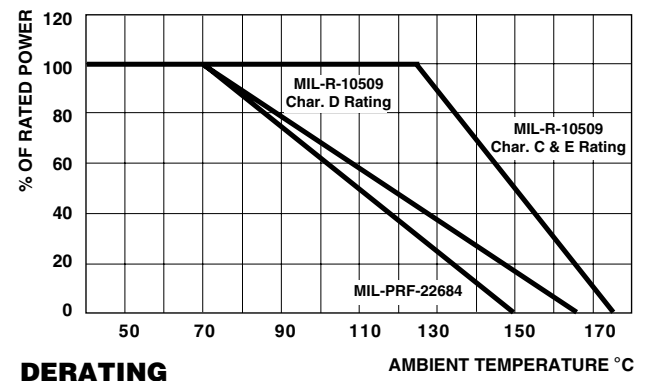
### APPLICABLE MIL-SPECS

**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.

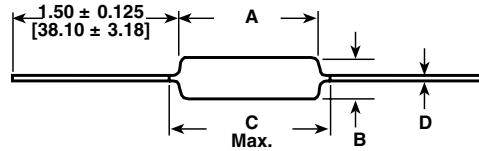
**Noise:** Vishay Dale metal film resistors have exceptionally low noise level. Average for standard resistance range is 0.10 micro-volt per volt over a decade of frequency, with low and intermediate resistance values typically below 0.05 micro-volt per volt.

**CAGE CODE: 91637**

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]

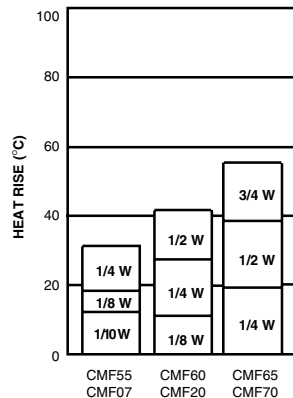


VISHAY DALE MODEL	A	B	C (Max.)	D
CMF50	0.150 ± 0.020 [3.81 ± 0.51]	0.065 ± 0.015 [1.65 ± 0.38]	0.244 [6.20]	0.016 ± 0.002 [0.41 ± 0.05]
CMF55	0.240 ± 0.020 [6.10 ± 0.51]	0.090 ± 0.008 [2.29 ± 0.20]	0.278 [7.06]*	0.025 ± 0.002 [0.64 ± 0.05]
CMF60	0.344 ± 0.031 [8.74 ± 0.79]	0.145 ± 0.015 [3.68 ± 0.38]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

\* 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 & 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.



# CMF (Military RN and RL)

Metal Film Resistors, Military,  
MIL-R-10509 Qualified, 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)	RN55, RN60, RN65, RN70 (4 lines)
J50D J50D JAN, type, characteristic	DALE Company Logo
1211 1211 Value	0137J 4 digit date code and JAN brand
F137 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 - 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. (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



## Notice

Specifications of the products displayed herein are subject to change without notice. Vishay Intertechnology, Inc., or anyone on its behalf, assumes no responsibility or liability for any errors or inaccuracies.

Information contained herein is intended to provide a product description only. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document. Except as provided in Vishay's terms and conditions of sale for such products, Vishay assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of Vishay products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Vishay for any damages resulting from such improper use or sale.