Vishay Dale



## 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.

STAN	NDARD ELECTRICAL SPECIFICATIONS						
			VISHAY I				
MIL STYLE	VISHAY DALE MODEL	MAXIMUM WORKING VOLTAGE		MIL-R-10509			DIELECTRIC STRENGTH V <sub>AC</sub>
	MODEL	VOLIAGE	CHARACTERISTIC D	CHARACTERISTIC C	CHARACTERISTIC E	MIL-PRF-22684	¥AC
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

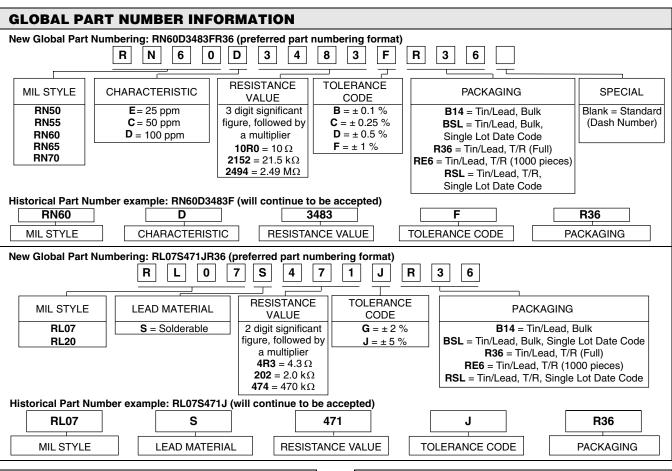
• Vishay Dale commercial value range: Extended resistance ranges are available in commercial equivalent types. Please contact us by using the email at the bottom of this page.

TECHNICAL SPECIFICATIONS				
PARAMETER	UNIT	CONDITION		
Voltage Coefficient	ppm/V	5 when measured between 10 % and full rated voltage		
Insulation Resistance	Ω	$\geq 10^{10}$ min. dry; $\geq 10^8$ 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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### **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**

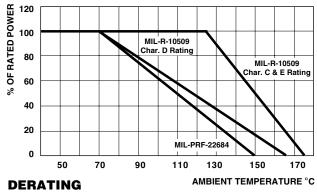
**MIL-R-10509 and MIL-PRF-22684:** The CMF models meet or exceed the electrical, environmental and dimensional requirements of MIL-R-10509 and MIL-PRF-22684.

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

CAGE CODE: 91637

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.			

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



Document Number: 31027 Revision: 03-Jul-08 For technical questions, contact: ff2bresistors@vishay.com

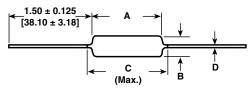
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### **DIMENSIONS** in inches [millimeters]



VISHAY DALE MODEL	A	В	C (Max.)	D
CMF50	0.150 ± 0.020	0.065 ± 0.015	0.244	0.016 ± 0.002
	[3.81 ± 0.51]	[1.65 ± 0.38]	[6.20]	[0.41 ± 0.05]
CMF55	0.240 ± 0.020	0.090 ± 0.008	0.278	0.025 ± 0.002
	[6.10 ± 0.51]	[2.29 ± 0.20]	[7.06] <sup>(1)</sup>	[0.64 ± 0.05]
CMF60	0.344 ± 0.031	0.145 ± 0.015	0.425	0.025 ± 0.002
	[8.74 ± 0.79]	[3.68 ± 0.38]	[10.80]	[0.64 ± 0.05]
CMF65	0.562 ± 0.031	0.180 ± 0.015	0.687	0.025 ± 0.002
	[14.27 ± 0.79]	[4.57 ± 0.38]	[17.45]	[0.64 ± 0.05]
CMF70	0.562 ± 0.031	0.180 ± 0.015	0.687	0.032 ± 0.002
	[14.27 ± 0.79]	[4.57 ± 0.38]	[17.45]	[0.81 ± 0.05]
CMF07	0.240 ± 0.020	0.090 ± 0.008	0.278	0.025 ± 0.002
	[6.10 ± 0.51]	[2.29 ± 0.20]	[7.06]	[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]	$\begin{array}{c} 0.032 \pm 0.002 \\ [0.81 \pm 0.05] \end{array}$

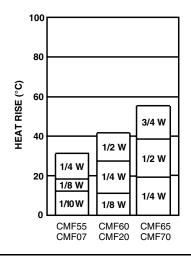
#### Note

 $^{(1)}$  0.290" [7.37] for  $\pm$  0.25 % and  $\pm$  0.1 % resistance tolerances

MILITARY POWER RATING					
	MILITARY QUALIFIED				
WATTAGE	MIL-F	MIL-PRF-22684			
WATTAGE	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.



# CMF (Military RN and RL)

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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, F	RN60, RN65, RN70 (4 lines)
J50D JAN, type, characteristic 1211 Value F137 Tolerance and 3 digit date code		DALE 0137J RN55D 1211F	Company Logo 4 digit date code and JAN brand Type and characteristic Value and Tolerance

Note

• RL series are color banded per MIL-PRF-22684

PERFORMANCE					
REQUIREMENT		MIL-PRF-22684			
	CHARACTERISTIC D CHARACTERISTIC C		CHARACTERISTIC E	₩II <b>L-F</b> NF-22004	
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	
TEST	MIL <sub>max.</sub>	MIL <sub>max.</sub>	MIL <sub>max.</sub>	MIL <sub>max</sub> .	
Thermal Shock	± 0.50 % Δ <i>R</i>	± 0.25 % ∆R	± 0.25 % ∆ <i>R</i>	± 1.00 % ∆ <i>R</i>	
Short Time Overload	± 0.50 % Δ <i>R</i>	± 0.25 % Δ <i>R</i>	± 0.25 % ∆ <i>R</i>	$\pm 0.50 \% \Delta R$	
Low Temperature Operation	± 0.50 % Δ <i>R</i>	± 0.25 % Δ <i>R</i>	± 0.25 % ∆ <i>R</i>	$\pm 0.50 \% \Delta R$	
Moisture Resistance	± 1.50 % Δ <i>R</i>	± 0.50 % Δ <i>R</i>	± 0.50 % Δ <i>R</i>	± 1.50 % ∆ <i>R</i>	
Shock	± 0.50 % Δ <i>R</i>	± 0.25 % Δ <i>R</i>	± 0.25 % ∆ <i>R</i>	$\pm 0.50 \% \Delta R$	
Vibration	± 0.50 % Δ <i>R</i>	± 0.25 % Δ <i>R</i>	± 0.25 % ∆ <i>R</i>	$\pm 0.50 \% \Delta R$	
Load Life	± 1.00 % Δ <i>R</i>	± 0.50 % Δ <i>R</i>	± 0.50 % ∆ <i>R</i>	$\pm 2.00 \% \Delta R$	
Dielectric Withstanding Voltage	± 0.50 % Δ <i>R</i>	± 0.25 % Δ <i>R</i>	± 0.25 % ∆ <i>R</i>	$\pm 0.50 \% \Delta R$	
Effect of Solder	± 0.50 % Δ <i>R</i>	± 0.10 % Δ <i>R</i>	± 0.10 % ∆R	± 0.50 % ∆ <i>R</i>	



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