Vishay Dale



# 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	MIL STYLE	MIL SPEC. SHEET	POWER RATING			MAX.	RESISTANCE RANGE $\Omega$				DIELECTRIC
			D	70 °C	± % VOLTA	VOLTAGE (1)	MIL-R-10509		MIL-	STRENGTH	
MODEL			W W					± 50 ppm/°C (C)	± 25 ppm/°C (E)	PRF- 22684	V <sub>AC</sub>
CMF50	RN50	08	-	0.05	0.1, 0.25, 0.5, 1	200	-	10 to 100K	10 to 100K	ı	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 (2)	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>(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				

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For technical questions, contact: ff2aresistors@vishay.com

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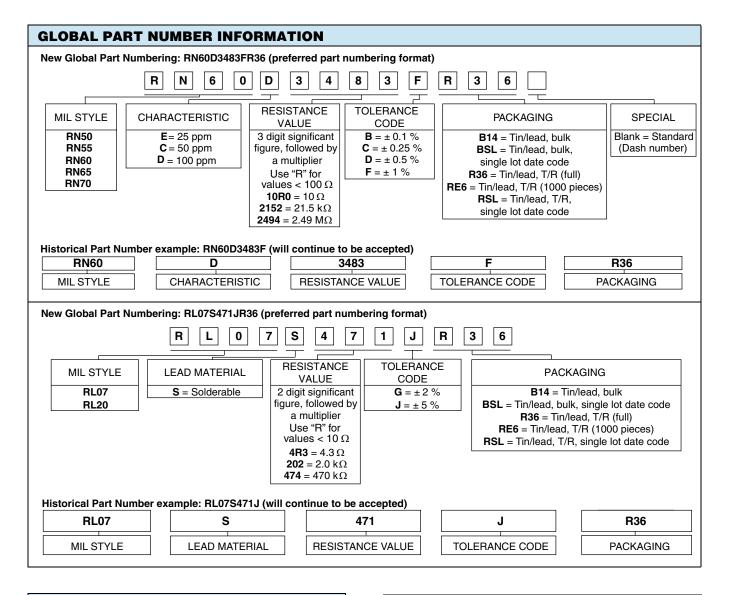
<sup>(1)</sup> Continuous working voltage shall be  $\sqrt{P \times R}$  or maximum working voltage, whichever is less.





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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.

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1 - N	 		1767

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.					

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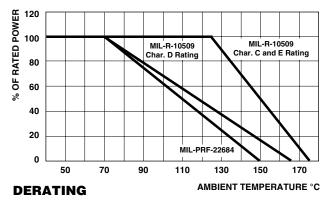
# CMF (Military RN and RL)

## Vishay Dale

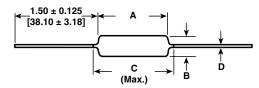
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Vishay Dale CMF resistors have an operating temperature range of - 65 °C to + 175 °C. They must be derated according to the following curves:



#### **DIMENSIONS** in inches (millimeters)



VISHAY DALE MODEL	А	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	$0.240 \pm 0.020$	$0.090 \pm 0.008$	0.278	$0.025 \pm 0.002$
	(6.10 ± 0.51)	(2.29 ± 0.20)	(7.06) <sup>(1)</sup>	(0.64 ± 0.05)
CMF60	$0.344 \pm 0.031$	$0.145 \pm 0.015$	0.425	$0.025 \pm 0.002$
	(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	$0.090 \pm 0.008$	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	$0.145 \pm 0.015$	0.425	0.032 ± 0.002
	(9.53 ± 1.02)	(3.68 ± 0.38)	(10.80)	(0.81 ± 0.05)

#### Note

 $<sup>^{(1)}</sup>$  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				
0.75 <sup>(1)</sup>	RN70	-	-				

#### Notes

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Document Number: 31027

Revision: 11-Mar-10

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

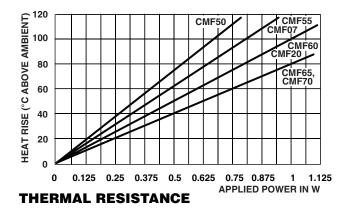
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#### **MARKING**

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

RN55; (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

RN55D Type and characteristic 1211F Value and Tolerance

#### Note

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

F137 Tolerance and 3 digit date code

PERFORMANCE							
REQUIREMENT		MIL-PRF-22684					
REGUINEMENT	CHARACTERISTIC D	CHARACTERISTIC C	CHARACTERISTIC E	WIL-P NF-22004			
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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