

Metal Film Resistors, Axial, 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 CMF Industrial data sheet: (www.vishay.com/doc?31018)

STANE	STANDARD ELECTRICAL SPECIFICATIONS										
global Model	MIL STYLE	MIL SPEC. SHEET	-	POWER RATING P _{125 °C} W	MAX. WORKING VOLTAGE ⁽¹⁾ V	RESISTANCE RANGE Ω MIL-R-10509 ± 100 ppm/°C (D)	RESISTANCE RANGE Ω MIL-R-10509 ± 50 ppm/°C (C)	RANGE Ω	RESISTANCE RANGE Ω MIL-PRF-22684	TOL. ⁽³⁾ ± %	DIELECTRIC STRENGTH V _{AC}
CMF50	RN50	08	-	0.05	200	-	10 to 100K	10 to 100K	-	0.1, 0.25, 0.5, 1	450
CMF55	RN55	07	0.125	0.10	200	10 to 301K	49.9 to 100K	49.9 to 100K	-	0.1, 0.25, 0.5, 1	450
CMF60	RN60	01	0.25	0.125	300	10 to 1M	49.9 to 499K	49.9 to 499K	-	0.1, 0.25, 0.5, 1	500
CMF65	RN65	02	0.50	0.25	350	10 to 2M	49.9 to 1M	49.9 to 1M	-	0.1, 0.25, 0.5, 1	900
CMF70	RN70	03	0.75 ⁽²⁾	0.50	500	10 to 2.49M	24.9 to 1M	24.9 to 1M	-	0.1, 0.25, 0.5, 1	900
CMF07	RL07	01	0.25	-	250	-	-	-	51 to 150K	2, 5	450
CMF20	RL20	02	0.50	-	350	-	-	-	4.3 to 470K	2, 5	700

Notes

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

⁽²⁾ Formerly rated at 1 W and is the direct replacement for RN70 of MIL-R-10509 rev. D.

 $^{(3)}$ Tolerances of ± 0.1 %, ± 0.25 % and ± 0.5 % are not applicable to characteristic D.

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			

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CMF (Military RN and RL)



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GLOBAL PART NU	MBER INFORMAT	ION					
New Global Part Numbering: RN60D3483FR36 (preferred part numbering format)							
R	N 6 0 D	3 4	83	F	R 3 6		
MIL STYLE CHAR			TOLERANC	E	PACKAGING	SPECIAL	
RN55 C RN60 D RN65 RN70	= 50 ppm = 100 ppm (100 ppm) (100 pp	significan ollowed b ultiplier "R" for $s < 100 \Omega$ $= 10 \Omega$ $= 21.5 k\Omega$ 2.49 MΩ	$ \mathbf{C} = \pm 0.25 \\ \mathbf{D} = \pm 0.5 \\ \mathbf{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 pie RSL = tin/lead, T/R, single lot date code	Blank = standard (Dash number) 88 = hot solder dip 143 = non-magnetic	
Historical Part Number exa RN60	ample: RN60D3483F (will D	continu	e to be accepted 3483	" 	F	R36	
	CHARACTERISTIC	RESIS	TANCE VALUE	Ē	TOLERANCE CODE	PACKAGING	
New Global Part Numberi		4 7			3 6		
MIL STYLE LEAD M	IATERIAL		TOLERANCE CODE		PACKAGING	SPECIAL	
RL07 RL20 S = so	2 digit sig figure, fold a multi Use "R values < 4R3 = 4 202 = 2 474 = 47	owed by plier " for : 10 Ω 4.3 Ω .0 kΩ	$G = \pm 2 \%$ $J = \pm 5 \%$	RE	B14 = tin/lead, bulk tin/lead, bulk, single lot date ca R36 = tin/lead, T/R (full) 6 = tin/lead, T/R (1000 pieces) tin/lead, T/R, single lot date ca	88 = hot solder dip 143 = non-magnetic	
Historical Part Number ex	cample: RL07S471J (will	continue	e to be accepted)			
RL07	S		471		J	R36	
MIL STYLE	LEAD MATERIAL	RE	SISTANCE VALU	JE	TOLERANCE CODE	PACKAGING	

Note

For additional information on packaging, refer to the Through Hole Resistor Packaging document (<u>www.vishay.com/doc?31544</u>).

MATERIAL SPECIFICATIONS				
Element Nickel-chrome alloy				
Coating Flame retardant epoxy, formulat 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 μ V per V over a decade of frequency, with low and intermediate resistance values typically below 0.05 μ V per V.

CAGE CODE: 91637

ENVIRON	MENTAL SPECIFICATIONS
General Environmental performance is shown in the Environmental Performance table. Test method are those specified in MIL-R-10509 and MIL-PRF-22684.	
Shelf Life	Resistance shifts due to storage at room temperature are negligible.

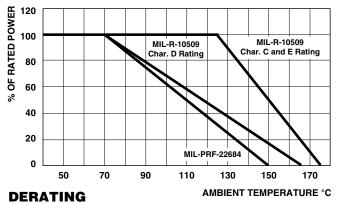
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CMF (Military RN and RL)

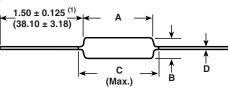


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Vishay Dale CMF resistors have an operating temperature range of -65 °C to +175 °C. They must be derated according to the following curves:



DIMENSIONS in inches (millimeters)



VISHAY DALE MODEL	A	В	С (МАХ.)	D
CMF50	0.150 ± 0.020 (3.81 ± 0.51)	0.065 ± 0.015 (1.65 ± 0.38)	0.244 (6.20)	$\begin{array}{c} 0.016 \pm 0.002 \\ (0.41 \pm 0.05) \end{array}$
CMF55	0.240 ± 0.020 (6.10 ± 0.51)	0.090 ± 0.008 (2.29 ± 0.20)	0.290 (7.37)	$\begin{array}{c} 0.025 \pm 0.002 \\ (0.64 \pm 0.05) \end{array}$
CMF60	0.344 ± 0.031 (8.74 ± 0.79)	0.145 ± 0.015 (3.68 ± 0.38)	0.425 (10.80)	$\begin{array}{c} 0.025 \pm 0.002 \\ (0.64 \pm 0.05) \end{array}$
CMF65	0.562 ± 0.031 (14.27 ± 0.79)	0.180 ± 0.015 (4.57 ± 0.38)	0.687 (17.45)	$\begin{array}{c} 0.025 \pm 0.002 \\ (0.64 \pm 0.05) \end{array}$
CMF70	0.562 ± 0.031 (14.27 ± 0.79)	0.180 ± 0.015 (4.57 ± 0.38)	0.687 (17.45)	$\begin{array}{c} 0.032 \pm 0.002 \\ (0.81 \pm 0.05) \end{array}$
CMF07	0.240 ± 0.020 (6.10 ± 0.51)	0.090 ± 0.008 (2.29 ± 0.20)	0.290 (7.37)	$\begin{array}{c} 0.025 \pm 0.002 \\ (0.64 \pm 0.05) \end{array}$
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⁾ Lead length for product in bulk pack. For product supplied in tape and reel, the actual lead length would be based on the body size, tape spacing and lead trim.

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 ⁽¹⁾	RN70	-	-				

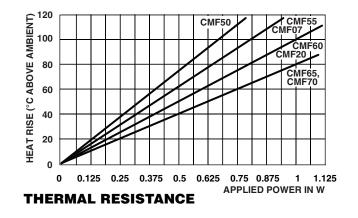
Notes

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

⁽¹⁾ Formerly rated at 1 W and is the direct replacement for RN70 of MIL-R-10509 rev. D.



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MAR	KING (per MIL-PRF-10509)			
		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, R	N60, RN65, RN70 (4 lines)
J50D 1211 F137	JAN, type, characteristic Value 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.

PERFROMANCE					
REQUIREMENT					
REQUIREMENT	CHARACTERISTIC D	CHARACTERISTIC E	MIL-PRF-22684		
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 _{max.}	MIL _{max.}	MIL _{max.}	MIL _{max.}	
Thermal Shock	± 0.50 % ∆R	± 0.25 % ∆R	± 0.25 % ∆R	± 1.00 % ∆R	
Short Time Overload	± 0.50 % ∆R	± 0.25 % ∆R	± 0.25 % ∆R	$\pm 0.50 \% \Delta R$	
Low Temperature Operation	± 0.50 % ∆R	± 0.25 % ∆R	± 0.25 % ∆R	\pm 0.50 % ΔR	
Moisture Resistance	± 1.50 % ∆R	± 0.50 % ∆R	± 0.50 % ∆R	± 1.50 % ∆R	
Shock	± 0.50 % ∆R	± 0.25 % ∆R	± 0.25 % ∆R	$\pm 0.50 \% \Delta R$	
Vibration	± 0.50 % ∆R	± 0.25 % ∆R	± 0.25 % ∆R	\pm 0.50 % ΔR	
Load Life	± 1.00 % ∆R	± 0.50 % ∆R	± 0.50 % ∆R	± 2.00 % ΔR	
Dielectric Withstanding Voltage	± 0.50 % Δ <i>R</i>	± 0.25 % ∆R	± 0.25 % ΔR	± 0.50 % ∆R	
Effect of Solder	± 0.50 % ∆R	± 0.10 % ∆R	± 0.10 % ∆R	± 0.50 % ∆R	

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