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# 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 <sub>125°C</sub> W	MAX. WORKING VOLTAGE <sup>(1)</sup> V	RESISTANCE RANGE Ω MIL-R-10509 ± 100 ppm/°C (D)	$\begin{array}{c} \text{RESISTANCE} \\ \text{RANGE} \\ \Omega \\ \text{MIL-R-10509} \\ \pm 50 \text{ ppm/°C} \\ \text{(C)} \end{array}$	RANGE Ω MIL-R-10509	RESISTANCE RANGE Ω MIL-PRF-22684	TOL. <sup>(3)</sup> ± %	DIELECTRIC STRENGTH V <sub>AC</sub>
CMF50	RN50	80	-	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 <sup>(2)</sup>	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	-	ı	-	51 to 150K	2, 5	450
CMF20	RL20	02	0.50	_	350	-	-	-	4.3 to 470K	2, 5	700

#### Notes

<sup>(3)</sup> Tolerances of  $\pm$  0.1 %,  $\pm$  0.25 % and  $\pm$  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			

<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.



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GLOBAL PART N	<b>NUN</b>	BER INFORMAT	ION				
New Global Part Numbering: RN60D3483FR36 (preferred part numbering format)							
	R	N 6 0 D	3	4 8 3	F	R 3 6	
MIL STYLE CH	IARA		STANCE	TOLERAN		PACKAGING	SPECIAL
RN50 RN55 RN60 RN65 RN70	C=	25 ppm 50 ppm 100 ppm 3 digit figure, 1 Use value: 10Rc 2152 =	significa	nt by $\mathbf{B} = \pm 0.$ $\mathbf{C} = \pm 0.2$ $\mathbf{D} = \pm 0.$ $\mathbf{F} = \pm 1.$	1 % 25 % 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 piec RSL = tin/lead, T/R, single lot date code	Blank = standard (Dash number) 88 = hot solder dip 143 = non-magnetic
Historical Part Number	exa	mple: RN60D3483F (will	contin	ue to be accepte 3483	<b>d)</b>	F	R36
MIL STYLE		CHARACTERISTIC	RESI	STANCE VALUE		TOLERANCE CODE	PACKAGING
New Global Part Numl	New Global Part Numbering: RL07S471JR36 (preferred part numbering format)  R L 0 7 S 4 7 1 J R 3 6						
MIL STYLE LEAL	D MA	ATERIAL RESIST		TOLERANCE		PACKAGING	SPECIAL
RL07 RL20	11=11						
Historical Part Numbe	r exa	ample: RL07S471J (will	continu	e to be accepte	d)		
RL07		s		471		J	R36
MIL STYLE	]	LEAD MATERIAL	R	ESISTANCE VAL	.UE	TOLERANCE CODE	PACKAGING

#### Note

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

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.

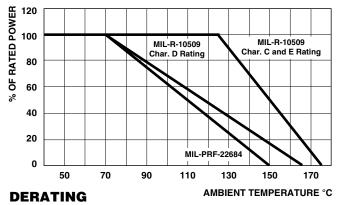
		0400=
CAGE	CODE:	91637

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.					

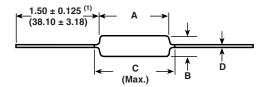
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Vishay Dale CMF resistors have an operating temperature range of -65 °C to +175 °C. They must be derated according to the following curves:



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



VISHAY DALE MODEL	A	В	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	$0.090 \pm 0.008$	0.290	0.025 ± 0.002
	(6.10 ± 0.51)	(2.29 ± 0.20)	(7.37)	(0.64 ± 0.05)
CMF60	0.344 ± 0.031	$0.145 \pm 0.015$	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	$0.090 \pm 0.008$	0.290	0.025 ± 0.002
	(6.10 ± 0.51)	(2.29 ± 0.20)	(7.37)	(0.64 ± 0.05)
CMF20	0.375± 0.040	0.145 ± 0.015	0.425	0.032 ± 0.002
	(9.53 ± 1.02)	(3.68 ± 0.38)	(10.80)	(0.81 ± 0.05)

#### Note

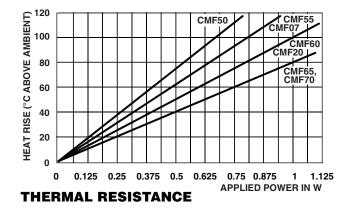
<sup>(1)</sup> Lead length for product in bulk pack. For product supplied in tape and reel, the actual lead length would be based on the body size, tape spacing and lead trim.

MILITARY POWER RATING						
	MILITARY QUALIFIED					
WATTAGE	MIL-I	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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## MARKING (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, RN60, RN65, RN70 (4 lines)

J50D JAN, type, characteristic DALE Company logo

1211 Value 0137J 4 digit date code and JAN brand

F137 Tolerance and 3 digit date code RN55D Type and characteristic Value and Tolerance

#### Note

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

PERFROMANCE						
DECHIDEMENT		MIL DDF 00004				
REQUIREMENT	CHARACTERISTIC D	CHARACTERISTIC C	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 <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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