

## 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)	RESISTANCE RANGE Ω MIL-R-10509 ± 50 ppm/°C (C)	RANGE Ω	RESISTANCE RANGE Ω MIL-PRF-22684	TOL. <sup>(3)</sup> ± %	DIELECTRIC STRENGTH V <sub>AC</sub>
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 <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	-	-	-	51 to 150K	2, 5	450
CMF20	RL20	02	0.50	-	350	-	-	-	4.3 to 470K	2, 5	700

#### Notes

<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.

 $^{(3)}$  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			

1

# CMF (Military RN and RL)



Vishay Dale

GLOBAL PART NU	MBER INFORMAT	ION					
New Global Part Numbering: RN60D3483FR36 (preferred part numbering format)							
R	N 6 0 D	3 4	83	<b>F</b>	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	<b>88</b> = hot solder dip <b>143</b> = 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  $\mu$ 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

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.

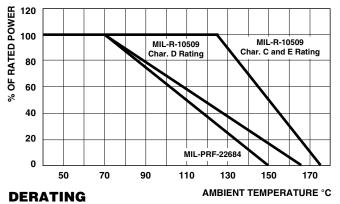
2

# CMF (Military RN and RL)

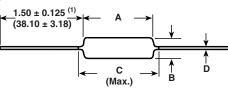


## Vishay Dale

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

<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-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	-	-				

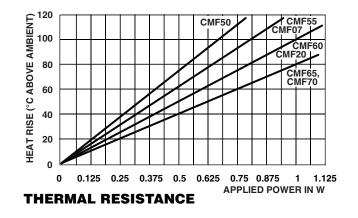
#### Notes

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

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



Vishay Dale



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 <sub>max.</sub>	MIL <sub>max.</sub>	MIL <sub>max.</sub>	MIL <sub>max.</sub>	
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 % $\Delta R$	
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 % $\Delta R$	
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	

Revision: 16-Sep-16

Document Number: 31027



Vishay

# Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.

# **X-ON Electronics**

Largest Supplier of Electrical and Electronic Components

Click to view similar products for vishay manufacturer:

Other Similar products are found below :

 M39006/22-0577H
 Y00892K49000BR13L
 VSKT250-16PBF
 M8340109M6801GGD03
 NTCALUG01A103F291L
 ITU1341SM3
 VS 

 MBRB1545CTPBF
 1KAB100E
 1KAB20E
 CP0005150R0JE1490
 562R5GAD47RR
 \$472M69Z5UR84K0R
 MKP1848C65090JY5L

 CRCW1210360RFKEA
 VSMF4720-GS08
 TSOP34438SS1V
 CRCW04024021FRT7
 001789X
 CRCW08054K00FKTA
 LVR10R0200FE03

 CRCW12063K30FKEAHP
 009923A
 CRCW2010331JR02
 CRCW25128K06FKEG
 CS6600552K000B8768
 CSC07A0110K0GPA

 M34C156K100BZSS
 M39003/01-2289
 M39003/01-2784
 M39006/25-0133
 M39006/25-0228
 M64W101KB40
 M64Z501KB40

 CW001R5000JS73
 CW0055R000JE12
 CW0056K800JB12
 CW0106K000JE73
 672D826H075EK5C
 CWR06JC105KC
 CWR06NC475JC

 MAL219699001E3
 MCRL007035R00JHB00
 92MT80KPBF
 PTF56100K00QYEK
 PTN0805H1502BBTR1K
 RCWL1210R130JNEA

 RH005220R0FE02
 RH005330R0FC02
 RH010R0500FC02
 132B20103
 132B20103