

www.vishay.com

Vishay Dale

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)	$\begin{array}{c} \text{RESISTANCE} \\ \text{RANGE} \\ \Omega \\ \text{MIL-R-10509} \\ \pm 50 \text{ ppm/°C} \\ \text{(C)} \end{array}$	RANGE Ω MIL-R-10509	RESISTANCE RANGE Ω MIL-PRF-22684	TOL. ⁽³⁾ ± %	DIELECTRIC STRENGTH V _{AC}
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 ⁽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	-	ı	-	51 to 150K	2, 5	450
CMF20	RL20	02	0.50	_	350	-	-	-	4.3 to 470K	2, 5	700

Notes

⁽³⁾ 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				

⁽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.



www.vishay.com

Vishay Dale

GLOBAL PART NUMBER INFORMATION								
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	d)	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	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$								
Historical Part Numbe	r exa	ample: RL07S471J (will	continu	e to be accepte	d)			
RL07		s		471		J	R36	
MIL STYLE LE		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 Flame retardant epoxy, formulated for superior moisture protection				
Coating					
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.

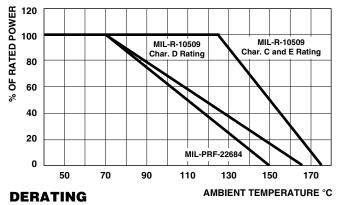
		0400=
CAGE	CODE:	91637

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.						

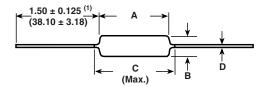
www.vishay.com

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	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	0.290	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 ± 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	0.290	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

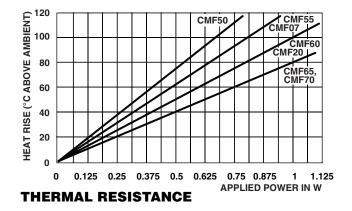
⁽¹⁾ Lead length for product in bulk pack. For product supplied in tape and reel, the actual lead length would be based on the body size, tape spacing and lead trim.

MILITARY POWER RATING							
	MILITARY QUALIFIED						
WATTAGE	MIL-I	R-10509	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.

Vishay Dale



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 _{max} .	MIL _{max} .	MIL _{max} .	MIL _{max} .			
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			



Legal Disclaimer Notice

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.

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Vishay:

RN60C5111FRE	6 RN60C5112FRE	6 RN60C52R3FRE	6 RN60C5361FB1	4 RN60C5361FRE	6 RN60C53R6FB14
RN60C5601DB14	RN60C5620FRE6	RN60C5621BB14	RN60C5622FRE6	RN60C5623BRE6	RN60C56R2BB14
RN60C5901FB14	RN60C6190BB14	RN60C6190BRE6	RN60C6262DB14	RN60C6340FRE6	RN60C6492FB14
RN60C6493BB14	RN60C64R9FRE6	RN60C6652DB14	RN60C6810FRE6	RN60C69R8FB14	RN60C7061DB14
RN60C7150FB14	RN60C7151DB14	RN60C7151FRE6	RN60C7152BB14	RN60C7152BRE6	RN60C7153FB14
RN60C7320BB14	RN60C7320BRE6	RN60C7320FRE6	RN60C7323FRE6	RN60C7501BRE6	RN60C7503FRE6
RN60C75R0FRE6	RN60C7872FB14	RN60C7872FRE6	RN60C7873FRE6	RN60C7961BB14	RN60C8041FB14
RN60C8062FRE6	RN60C80R6FRE6	RN60C8200DB14	RN60C8201DB14	RN60C8251BB14	RN60C8251DRE6
RN60C8251FRE6	RN60C8252FRE6	RN60C8253FB14	RN60C8451BB14	RN60C8451FRE6	RN60C8452BB14
RN60C8661BB14	RN60C8662DB14	RN60C86R6FB14	RN60C8871FRE6	RN60C9001BB14	RN60C9002BB14
RN60C9092DRE6	RN60C9093FRE6	RN60C90R9DB14	RN60C90R9FB14	RN60C90R9FRE6	RN60C9312BB14
RN60C9312DB14	RN60C9321BB14	RN60C9420DB14	RN60C9531FRE6	RN60C9532FB14	RN60C9532FRE6
RN60C9761FB14	RN60C9762DB14	RN60C98R8DB14	RN60D1053FRE6	RN60D1101FRE6	RN60D1131FRE6
RN60D1132FRE6	RN60D1152FRE6	RN60D1180FB14	RN60D1181FB14	RN60D1181FRE6	RN60D1213FRE6
RN60D1214FRE6	RN60D1240FRE6	RN60D1241FRE6	RN60D1250FB14	RN60D1251FB14	RN60D1272FRE6
RN60D1273FRE6	RN60D1300FB14	RN60D1300FRE6	RN60D1303FRE6	RN60D1331FRE6	RN60D1371FB14
RN60D1371FRE6	RN60D1430FB14	RN60D1430FRE6	RN60D1431FRE6		
RN60D1273FRE6	RN60D1300FB14	RN60D1300FRE6	RN60D1303FRE6		