

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 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)	$\begin{array}{c} \text{RESISTANCE} \\ \text{RANGE} \\ \Omega \\ \text{MIL-R-10509} \\ \pm 50 \text{ ppm/°C} \\ \text{(C)} \end{array}$	RESISTANCE RANGE Ω MIL-R-10509 ± 25 ppm/°C (E)	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	-	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	Ib	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.



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New Global Part Numbering: RN60D3483FR36 (preferred part numbering format) R	GLOBAL PART NUMBER INFORMATION								
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	New Global Part Numbering: RN60D3483FR36 (preferred part numbering format)								
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$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	MIL STYLE	CHAF	RACTERISTIC	ALUE	-	-	PACKAGING	SPECIAL	
RN60 RN65 RN70							1	- 1011111	
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			10R	$0 = 10 \Omega$				(300)	
Historical Part Number example: RN60D3483F (will continue to be accepted) RN60 D 3483 F R36 MIL STYLE CHARACTERISTIC RESISTANCE VALUE TOLERANCE CODE PACKAGING New Global Part Numbering: RL07S471JR36 (preferred part numbering format) R L O T S 4 T J R 3 6 PACKAGING SPECIAL Blank = Standard (Dash number) RL20 FRL20 Historical Part Number example: RL07S471J (will continue to be accepted) RL07 S 471 J R RESISTANCE CODE G S B14 = Tin/lead, bulk, single lot date code R36 = Tin/lead, T/R (full) RE6 = Tin/lead, T/R (1000 pieces) RSL = Tin/lead, T/R, single lot date code			_	-					
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$			2494	= 2.49 MΩ]				
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New Global Part Numbering: RL07S471JR36 (preferred part numbering format) R L 0 7 S 4 7 1 J R 3 6	RN60		D		3483		F	R36	
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figure, followed by a multiplier Use "R" for values < 10Ω $4R3 = 4.3 \Omega$ $202 = 2.0 k\Omega$ $474 = 470 k\Omega$ Historical Part Number example: RL07S471J (will continue to be accepted) RL20 Figure, followed by a multiplier Use "R" for values < 10Ω $4R3 = 4.3 \Omega$ $4R3 = $	MIL STYLE	LEAD N	MAILBIAI II				PACKAGING	SPECIAL	
a multiplier Use "R" for values < 10Ω 4R3 = 4.3Ω 202 = $2.0 k\Omega$ 474 = $470 k\Omega$ Historical Part Number example: RL07S471J (will continue to be accepted)		S = S			G = ± 2 %				
Use "R" for values < 10 Ω 4R3 = 4.3 Ω 202 = 2.0 k Ω 474 = 470 k Ω Historical Part Number example: RL07S471J (will continue to be accepted) RE6 = Tin/lead, T/R (1000 pieces) RSL = Tin/lead, T/R, single lot date code 143 = Non-magnetic RA71 J RA6	RL20				$J = \pm 5 \%$	BSL =			
$values < 10 \ \Omega \\ 4R3 = 4.3 \ \Omega \\ 202 = 2.0 \ k\Omega \\ 474 = 470 \ k\Omega$ Historical Part Number example: RL07S471J (will continue to be accepted) RSL = Tin/lead, T/R, single lot date code									
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$									
						RSL =	: Tin/lead, T/R, single lot date o	code	
RL07 S 471 J R36									
RL07 S 471 J R36									
RL07 S 471 J R36	Historical Part Number example: RL07S471J (will continue to be accepted)								
MIL STYLE LEAD MATERIAL RESISTANCE VALUE TOLERANCE CODE PACKAGING	RL07		S		471		J	R36	
	MIL STYLE	:	LEAD MATERIAL	RES	ISTANCE 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 μ V per V over a decade of frequency, with low and intermediate resistance values typically below 0.05 μ V per V.

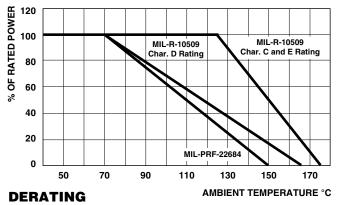
CAGE CODE: 91637

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.					

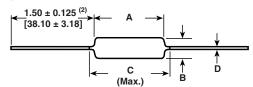
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Vishay Dale CMF resistors have an operating temperature range of - 65 °C to + 175 °C. They must be derated according to the following curves:



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 ± 0.008	0.278	0.025 ± 0.002
	(6.10 ± 0.51)	(2.29 ± 0.20)	(7.06) ⁽¹⁾	(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	0.278	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 ± 0.015	0.425	0.032 ± 0.002
	(9.53 ± 1.02)	(3.68 ± 0.38)	(10.80)	(0.81 ± 0.05)

Notes

⁽²⁾ 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-	R-10509	MIL-PRF-22684			
WALLAGE	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 (3)	RN70	-	-			

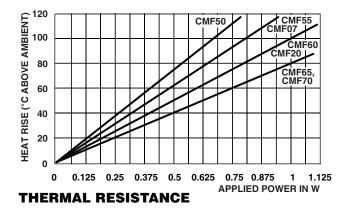
Notes

 $^{^{(1)}}$ 0.290" (7.37) for \pm 0.25 % and \pm 0.1 % resistance tolerances.

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

⁽³⁾ 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

RN55; (3 lines) RN55, RN60, RN65, RN70 (4 lines)

J50D JAN, type, characteristic DALE Company logo

John Jan, type, characteristic

1211 Value

O137J 4 digit date code and JAN brand
RN55D Type and characteristic

F137 Tolerance and 3 digit date code 1211F Value and Tolerance

Note

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

PERFROMANCE						
REQUIREMENT		MIL-PRF-22684				
REQUIREMENT	CHARACTERISTIC D CHARACTERIS		CHARACTERISTIC E	WIIL-PHF-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 _{max} .	MIL _{max} .	MIL _{max} .	MIL _{max} .		
Thermal Shock	± 0.50 % ΔR	± 0.25 % ΔR	± 0.25 % ΔR	± 1.00 % ∆R		
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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Revision: 02-Oct-12 Document Number: 91000

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