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Vishay Dale

Metal Film Resistors, Axial, Industrial, Precision



FEATURES

- · Small size conformal coated
- Flammability tested according to IEC/EN 60695-11-5
- Controlled temperature coefficient
- Excellent high frequency characteristics
- Material categorization: for definitions of compliance please see <u>www.vishav.com/doc?99912</u>



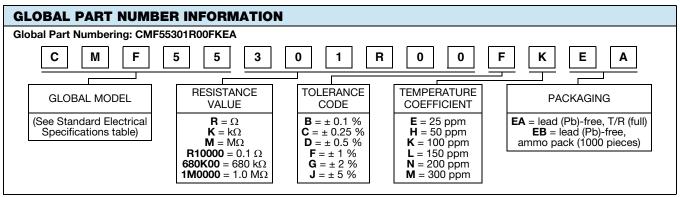
ROHS COMPLIANT HALOGEN FREE

STANDA	STANDARD ELECTRICAL SPECIFICATIONS						
GLOBAL MODEL	HISTORICAL MODEL	MAXIMUM WORKING VOLTAGE ⁽¹⁾ V	POWER RATING P _{70°C} W	RESISTANCE RANGE Ω	TOLERANCE ± %	TEMPERATURE COEFFICIENT ± ppm/°C	
				43 to 332K	0.1		
				22 to 332K	0.25	25	
				10 to 475K	0.5, 1		
				43 to 332K	0.1		
CMEEC	OME 50	000	0.4	22 to 332K	0.25		
CMF50	CMF-50	200	0.4	10 to 475K	0.5	50	
				1 to 10M	1, 2		
				0.22 to 10M	5	100, 150, 200	
				1 to 10M	1, 2		
				0.22 to 10M	5		
014555	CMF-55 350 0.6	252		10 to 1M	0.1, 0.25, 0.5, 1	25	
				10 to 1M	0.1, 0.25, 0.5	50	
				1 to 10M	1		
				0.22 to 10M	2		
			0.0	0.22 to 22M	5		
CMF55		350	0.6	1 to 10M	1	100, 150, 200	
				0.22 to 10M	2		
				0.22 to 22M	5		
				0.22 to 10M	2	200	
		0.22 to 22M	5	300			
				43 to 1M	0.1		
				22 to 1.5M	0.25	25	
				10 to 2.43M	0.5, 1		
				43 to 1M	0.1		
		500	1	22 to 1.5M	0.25		
CMF60	CMF-60			10 to 2.43M	0.5	50	
CIVIFOU	CIVIT-00			1 to 22M	1, 2		
				0.22 to 22M	5		
				1 to 22M	1, 2	100 150 000	
				0.22 to 22M	5	100, 150, 200	
				1 to 22M	2	200	
				0.22 to 22M	5	300	

Note

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

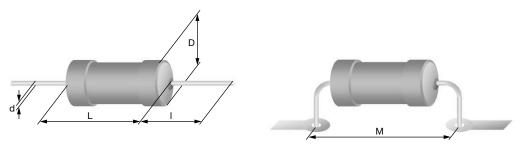
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Note

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

DIMENSIONS in millimeters



GLOBAL MODEL	D _{max.}	L _{max.}	d _{nom.}	I _{min.}	M _{min.}	MASS (mg)
CMF50	1.6	3.6	0.5	29	5	125
CMF55	2.5	6.5	0.6	28	10	220
CMF60	4.2	11.9	0.8	31	15	700

TECHNICAL SPECIFICATIONS						
PARAMETER	UNIT	CMF50	CMF55	CMF60		
Maximum Working Voltage	V≅	≤ 200	≤ 350	≤ 500		
Insulation Voltage (1 Min)	V _{eff}	300	500	800		
Dielectric Strength	V_{AC}	300	450	750		
Insulation Resistance	Ω		≥ 1G			
Operating Temperature Range	°C	-55 to +155				
Terminal Strength (Pull Test)	lb	2 2 2				

TEMPERATURE COEFFICIENT CODES				
GLOBAL TC CODE	TEMPERATURE COEFFICIENT			
E	25 ppm/°C			
Н	50 ppm/°C			
K	100 ppm/°C			
L	150 ppm/°C			
N	200 ppm/°C			
M	300 ppm/°C			

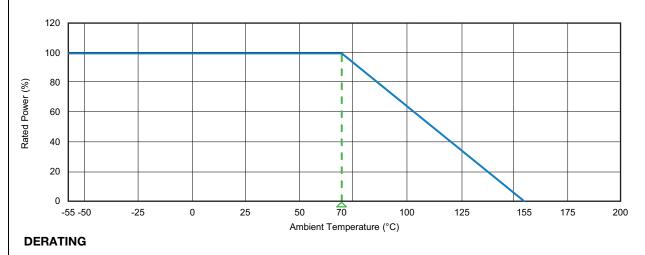


LOAD LIFE SHIFT DUE TO POWER AND DERATING AT +70 °C

The power rating for the CMF parts is tied to the derating temperature, the heat rise of the parts, and the ΔR for the load life performance. When the tables/graphs below are used together they show that when the parts are run at their higher power ratings, the parts will run hotter, which has the potential of causing the resistance of the parts to shift more over the life of the part.

LOAD LIFE SHIFT VS. POWER RATING					
LOAD LIFE	MAXIMUM ∆R/R FOR 8000 h				
LOAD LIFE	± 0.5 %	± 1.0 %			
APPLIED MAXIMUM FILM TEMPERATURE	125 °C	155 °C			
MODEL	POWER RATING AT +70 °C				
CMF50	0.25 W	0.4 W			
CMF55	0.4 W	0.6 W			
CMF60	0.65 W	1 W			

CMF resistors have an operating temperature range of -55 °C to +155 °C. They must be derated at high ambient temperatures according to the derating curve.



MATERIAL SPECIFICATIONS					
Element Material and application process dependent on type, R-value, TCR, and tolerance		Coating	Polyurethane based lacquer, formulated for superior moisture protection. Flammability		
Core	Fire-cleaned high purity ceramic		tested according to IEC/EN 60695-11-5		
Terminals	Matte tin-plated copper termination with whisker resistant diffusion barrier	Solderability	Continuous satisfactory coverage when tested in accordance with JSTD-002		

MARKING

	CMF50	CMF55	CMF60
Line 1	*ohmic value*	CMF55	CMF60
Line 2	*tolerance* *ohmic value*		value*
Line 3	-	*tolerance*TCR*	

Stamp text never contains spaces! Max. 7 characters per line.

ORIVIIC VALUE			
0.1	0R1		
0.12	0R12		
1	1R0		
1.2	1R2		
1.23	1R23		
12	12R		
12.3	12R3		
123	123R		
1000	1K0		
1200	1K2		
10 000	10K		
1 000 000	1M0		
1 200 000	1M2		
123 456 000	123M456		

OHMIC VALUE

TOLERANCE			TC	R
0.1	.1%		25	T9
0.25	.25%		50	T2
0.5	.5%		100	T1
1	1%		150	T0
2	2%		200	T00
5 5%			300	М
0.5 1 2	.5% 1% 2%		100 150 200	T1 T0 T00

Without leading zeroes!

Leading zero if < 1; at least two numeric digits (trailing zero if only one digit before the R, K, M)



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PERFORMANCE						
	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE ($\triangle R_{ ext{max.}}$)				
	Stability for product line:	STABILITY CLASS 0.5	STABILITY CLASS 1	STABILITY CLASS 2		
TEST	CMF50	1 Ω to 332 Ω	0.22 Ω to < 1 Ω	> 332 Ω		
	CMF55	1 Ω to 1 M Ω	0.22 Ω to < 1 Ω	> 1 MΩ		
	CMF60	1 Ω to 2.43 M Ω	0.22 Ω to < 1 Ω	> 2.43 MΩ		
Short time overload	Room temperature $U = 2.5 \times \sqrt{P_{70} \times R}$ or $U = 2 \times U_{max}$; 5 s	± (0.1 % R + 0.01 Ω) no visible damage	± (0.25 % R + 0.05 Ω) no visible damage	± 0.5 % R no visible damage		
Shock	Shock duration: 6 ms Peak value: 100 gn Waveform: half-sine Number of shocks: 3 in both directions of the 3 axes (Σ 18)	\pm (0.1 % R + 0.01 Ω) no visible damage	± (0.25 % R + 0.05 Ω) no visible damage	± 0.5 % R no visible damage		
Vibration	10 sweep cycles per direction; 10 Hz to 2000 Hz; 1.5 mm or 200 m/s ²	\pm (0.1 % R + 0.01 Ω) no visible damage	± (0.25 % R + 0.05 Ω) no visible damage	± 0.5 % R no visible damage		
Tomporeture eveling	30 min at -55 °C 30 min at 155 °C 5 cycles	± (0.1 % R + 0.01 Ω)	± (0.25 % R + 0.05 Ω)	± 0.5 % R		
Temperature cycling	CMF50: 500 cycles CMF55: 200 cycles CMF60: 100 cycles	± (0.5 % R + 0.05 Ω)				
Load life	Varies based on power rating	g used; see "Load Life Shift Due To Power And Derating" table				
Dielectric withstanding voltage	$U_{RMS} = U_{ins}$; 60 s	No flashover or breakdown				
Effect of solder	Unmounted components; (260 ± 5) °C, (10 ± 1) s			± 0.5 % R no visible damage		



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