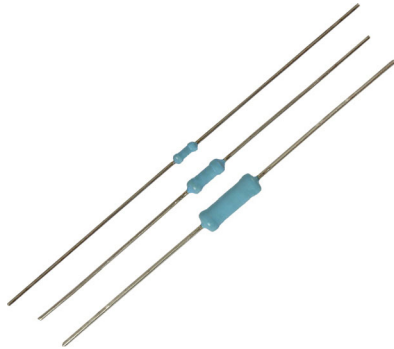


## Metal Film Resistors, Axial, Industrial, Precision



### 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 [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

STANDARD ELECTRICAL SPECIFICATIONS						
GLOBAL MODEL	HISTORICAL MODEL	MAXIMUM WORKING VOLTAGE <sup>(1)</sup> V	POWER RATING $P_{70^{\circ}\text{C}}$ W	RESISTANCE RANGE $\Omega$	TOLERANCE $\pm \%$	TEMPERATURE COEFFICIENT $\pm \text{ppm}/^{\circ}\text{C}$
CMF50	CMF-50	200	0.4	43 to 332K	0.1	25
				22 to 332K	0.25	
				10 to 475K	0.5, 1	
				43 to 332K	0.1	50
				22 to 332K	0.25	
				10 to 475K	0.5	
				1 to 10M	1, 2	
				0.22 to 10M	5	
				1 to 10M	1, 2	100, 150, 200
				0.22 to 10M	5	
CMF55	CMF-55	350	0.6	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	
				0.22 to 22M	5	100, 150, 200
				1 to 10M	1	
				0.22 to 10M	2	
				0.22 to 22M	5	
				0.22 to 10M	2	
				0.22 to 22M	5	300
CMF60	CMF-60	500	1	43 to 1M	0.1	25
				22 to 1.5M	0.25	
				10 to 2.43M	0.5, 1	
				43 to 1M	0.1	50
				22 to 1.5M	0.25	
				10 to 2.43M	0.5	
				1 to 22M	1, 2	
				0.22 to 22M	5	
				1 to 22M	1, 2	100, 150, 200
				0.22 to 22M	5	
				1 to 22M	2	
				0.22 to 22M	5	300

#### Note

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

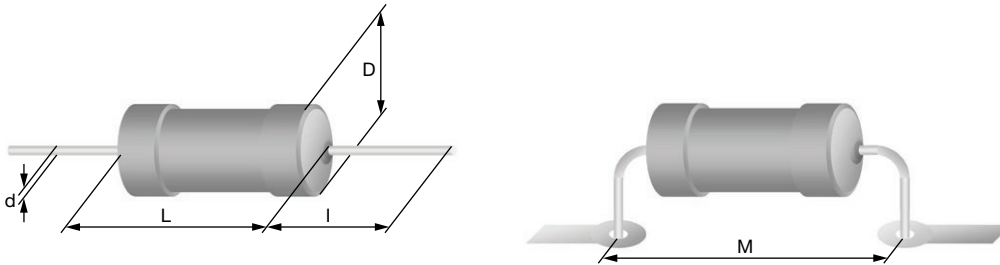
**GLOBAL PART NUMBER INFORMATION**

Global Part Numbering: CMF55301R00FKEA

C	M	F	5	5	3	0	1	R	0	0	F	K	E	A
GLOBAL MODEL (See Standard Electrical Specifications table)			RESISTANCE VALUE R = $\Omega$ K = k $\Omega$ M = M $\Omega$ R10000 = 0.1 $\Omega$ 680K00 = 680 k $\Omega$ 1M0000 = 1.0 M $\Omega$			TOLERANCE CODE B = $\pm 0.1\%$ C = $\pm 0.25\%$ D = $\pm 0.5\%$ F = $\pm 1\%$ G = $\pm 2\%$ J = $\pm 5\%$			TEMPERATURE COEFFICIENT E = 25 ppm H = 50 ppm K = 100 ppm L = 150 ppm N = 200 ppm M = 300 ppm			PACKAGING EA = lead (Pb)-free, T/R (full) EB = lead (Pb)-free, ammo pack (1000 pieces)		

**Note**

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

**DIMENSIONS** in millimeters


GLOBAL MODEL	D <sub>max.</sub>	L <sub>max.</sub>	d <sub>nom.</sub>	I <sub>min.</sub>	M <sub>min.</sub>	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 <sub>≡</sub>	≤ 200	≤ 350	≤ 500
Insulation Voltage (1 Min)	V <sub>eff</sub>	300	500	800
Dielectric Strength	V <sub>AC</sub>	300	450	750
Insulation Resistance	$\Omega$	≥ 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
H	50 ppm/°C
K	100 ppm/°C
L	150 ppm/°C
N	200 ppm/°C
M	300 ppm/°C

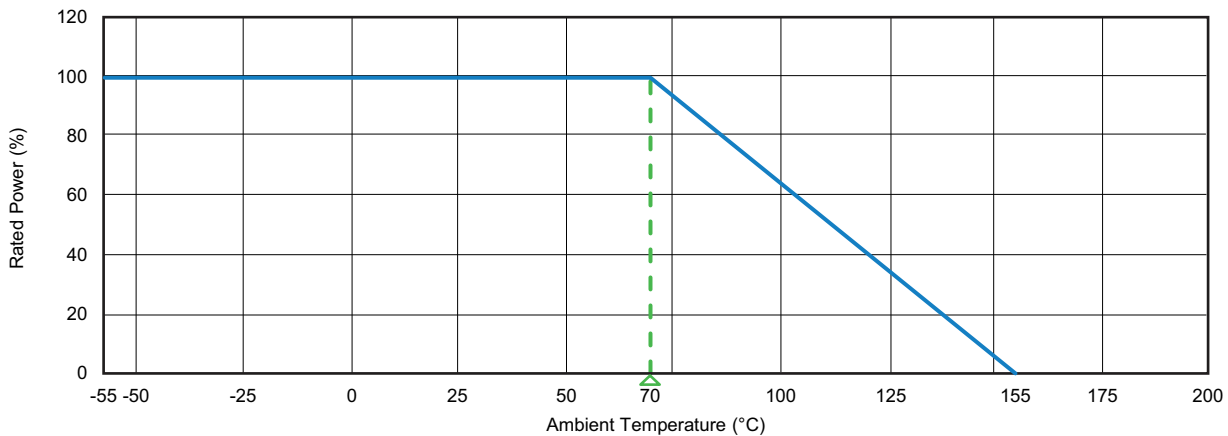


**LOAD LIFE SHIFT DUE TO POWER AND DERATING AT +70 °C**

The power rating for the CMF parts is tied to the derating temperature, the heat rise of the parts, and the  $\Delta R$  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 $\Delta R/R$ FOR 8000 h	
	$\pm 0.5\%$	$\pm 1.0\%$
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.



**DERATING**

**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 tested according to IEC/EN 60695-11-5
Core	Fire-cleaned high purity ceramic		
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*	
Line 3	-	*tolerance*TCR*	

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

OHMIC 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

TOLERANCE		TCR	
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	M

Without leading zeroes!

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



PERFORMANCE				
TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE ( $\Delta R_{max.}$ )		
		STABILITY CLASS 0.5	STABILITY CLASS 1	STABILITY CLASS 2
	Stability for product line:			
	CMF50	1 $\Omega$ to 332 $\Omega$	0.22 $\Omega$ to < 1 $\Omega$	> 332 $\Omega$
	CMF55	1 $\Omega$ to 1 M $\Omega$	0.22 $\Omega$ to < 1 $\Omega$	> 1 M $\Omega$
	CMF60	1 $\Omega$ to 2.43 M $\Omega$	0.22 $\Omega$ to < 1 $\Omega$	> 2.43 M $\Omega$
Short time overload	Room temperature $U = 2.5 \times \sqrt{P_{70} \times R}$ or $U = 2 \times U_{max.}$ ; 5 s	$\pm (0.1 \% R + 0.01 \Omega)$ no visible damage	$\pm (0.25 \% R + 0.05 \Omega)$ no visible damage	$\pm 0.5 \% R$ 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 ( $\Sigma$ 18)	$\pm (0.1 \% R + 0.01 \Omega)$ no visible damage	$\pm (0.25 \% R + 0.05 \Omega)$ no visible damage	$\pm 0.5 \% R$ no visible damage
Vibration	10 sweep cycles per direction; 10 Hz to 2000 Hz; 1.5 mm or 200 m/s <sup>2</sup>	$\pm (0.1 \% R + 0.01 \Omega)$ no visible damage	$\pm (0.25 \% R + 0.05 \Omega)$ no visible damage	$\pm 0.5 \% R$ no visible damage
Temperature cycling	30 min at -55 °C 30 min at 155 °C 5 cycles	$\pm (0.1 \% R + 0.01 \Omega)$	$\pm (0.25 \% R + 0.05 \Omega)$	$\pm 0.5 \% R$
	CMF50: 500 cycles CMF55: 200 cycles CMF60: 100 cycles	$\pm (0.5 \% R + 0.05 \Omega)$		
Load life	Varies based on power rating 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 $\pm$ 5) °C, (10 $\pm$ 1) s	$\pm (0.1 \% R + 0.01 \Omega)$ no visible damage	$\pm (0.25 \% R + 0.05 \Omega)$ no visible damage	$\pm 0.5 \% R$ no visible damage



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