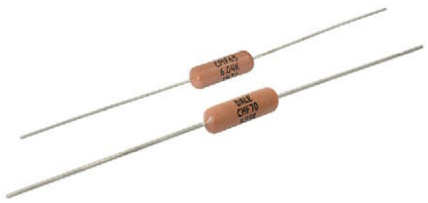
Metal Film Resistors, Axial, Industrial, Pulse Withstanding Protective



FEATURES

- Special Vishay Dale design provides lightning withstand characteristics along with resistor functionality
- Provides lightning surge absorption capabilities
- Protect against a variety of electrical hazards which can change or destroy sensitive electronic equipment including high energy voltage surges caused by power line anomalies (direct power crosses or inductively coupled effects) and other momentary over voltages
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free Available

e3 RoHS* Available

Note

* This datasheet provides information about parts that are RoHS-compliant and / or parts that are non-RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS-compliant. Please see the information / tables in this datasheet for details.

MATERIAL SPECIFICATIONS

Element	Vacuum-deposited nickel-chrome alloy
Core	Fire-cleaned high purity ceramic
Coating	Flame retardant epoxy, with flameproof undercoat; formulated for higher power, with superior moisture and mechanical protection
Solderability	Continuous satisfactory coverage when tested in accordance with MIL-R-10509

STANDARD ELECTRICAL SPECIFICATIONS

GLOBAL MODEL	POWER RATING (1) $P_{25\,°C}$ W	POWER RATING (1) $P_{70\,°C}$ W	POWER RATING (1) $P_{125\,°C}$ W	MAXIMUM WORKING VOLTAGE V	RESISTANCE RANGE (2) Ω	TOLERANCE ± %	TEMPERATURE COEFFICIENT ± ppm/°C
CMF65..147	2.5	1.75	1.25	500	1 to 15M	1, 2, 5	100
CMF70..147	3	2	1.5	500	1 to 15M	1, 2, 5	100

Notes

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

(2) Pulse withstanding capabilities are value dependent, and are most effective in values greater than 200 Ω.

TECHNICAL SPECIFICATIONS

PARAMETER	UNIT	CMF65...147	CMF70...147
Maximum Working Voltage	V≅	≤ 500	
Insulation Voltage (1 min)	V_{eff}	> 500	
Voltage Coefficient (Max.)	ppm/V	± 5 (measured between 10 % and full rated voltage)	
Dielectric Strength	V_{AC}	900	
Insulation Resistance	Ω	≥ 10^{11}	
Operating Temperature Range	°C	-55 to +175	
Terminal Strength (Pull test)	lb	2	5
Noise	dB	0.10 µV/V over a decade of frequency, with low and intermediate resistance values typically below 0.5 µV/V	
Weight (Max.)	g	1.20	1.30

GLOBAL PART NUMBER INFORMATION

Global Part Numbering: CMF701K0000FKCP147 (preferred part numbering format)

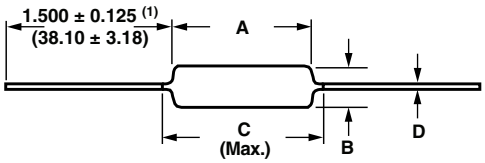
C	M	F	7	0	1	K	0	0	0	0	F	K	C	P	1	4	7

GLOBAL MODEL	RESISTANCE VALUE	TOLERANCE CODE	TEMP. COEFFICIENT	PACKAGING	SPECIAL
CMF65 **CMF70**	**R** = Ω **K** = kΩ **M** = MΩ **10R000** = 10 Ω **1K3300** = 1.33 kΩ **1M0000** = 1.0 MΩ	**F** = ± 1 % **G** = ± 2 % **J** = ± 5 %	**K** = 100 ppm	**EK** = lead (Pb)-free, bulk **EA** = lead (Pb)-free, T/R (1000 pieces) **BF** = tin/lead, bulk **CP** = tin/lead, T/R (1000 pieces)	(Dash number) **147** = pulse withstanding

Note

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

DIMENSIONS in inches (millimeters)

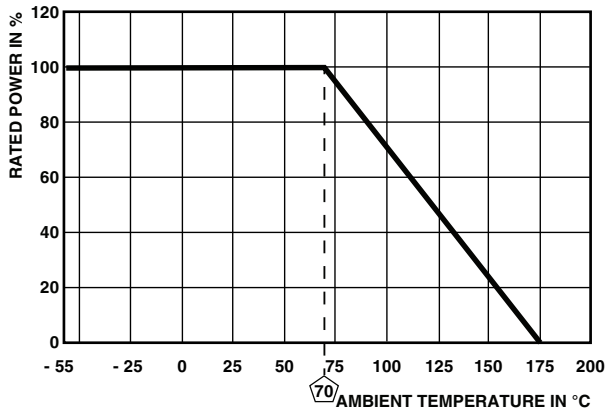


GLOBAL MODEL	A	B	C (Max.)	D
CMF65..147	0.562 ± 0.031 (14.27 ± 0.79)	0.215 ± 0.015 (5.46 ± 0.38)	0.687 (17.45)	0.025 ± 0.002 (0.64 ± 0.05)
CMF70..147	0.562 ± 0.031 (14.27 ± 0.79)	0.230 ± 0.015 (5.84 ± 0.38)	0.687 (17.45)	0.032 ± 0.002 (0.81 ± 0.05)

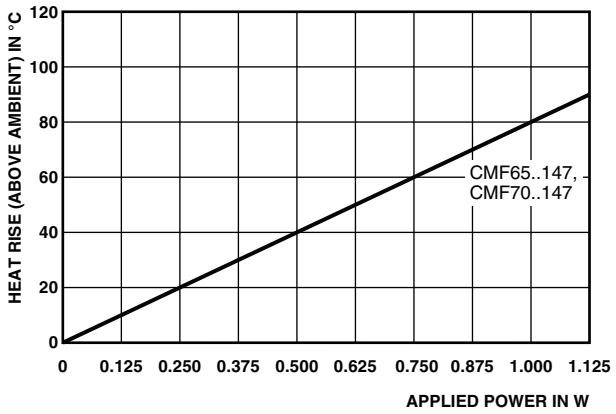
Note

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

DERATING



THERMAL RESISTANCE



PERFORMANCE

TEST (TEST METHODS - MIL-STD-202)	AT +70 °C	AT +125 °C
	MAXIMUM ΔR (TYPICAL TEST LOTS)	
Short Time Overload	± 0.05 %	± 0.05 %
Low Temperature Operation	± 0.05 %	± 0.05 %
Moisture Resistance	± 0.05 %	± 0.05 %
Shock	± 0.01 %	± 0.01 %
Vibration	± 0.04 %	± 0.04 %
Temperature Cycling	± 0.15 %	± 0.15 %
Load Life	± 1.0 %	± 1.0 %
Dielectric Withstanding Voltage	± 0.01 %	± 0.01 %
Effect of Solder	± 0.03 %	± 0.03 %

MARKING

CMF65-147, CMF70-147: (5 lines):

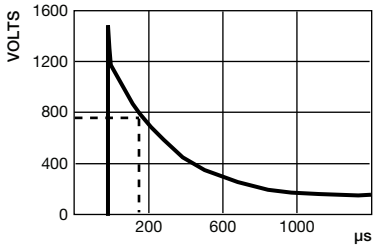
DALE	Manufacturer
C70-147	Model (C65-147 = CMF65-147, C70-147 = CMF70-147)
24.3KΩ	Value
1% T1	Tolerance and TC (T1 = 100 ppm)
1309	4-digit date code

LIGHTNING PULSE WAVE FORMS

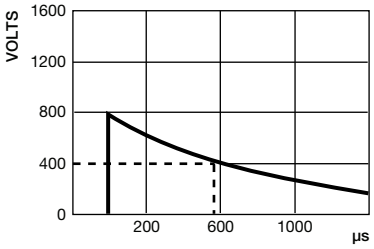
Lightning pulse wave forms are defined by three numbers:

- Maximum time to reach peak voltage level (typically 10 µs)
- Minimum time for voltage to decrease to half value
- The peak voltage level

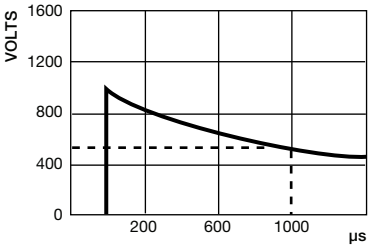
Three examples are shown below.



10 by 160 µs up to 1500 V FCC - Longitudinal Surge

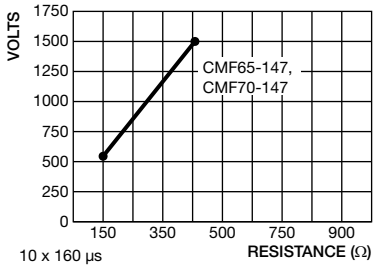


10 by 560 µs up to 800 V FCC - Metallic Surge

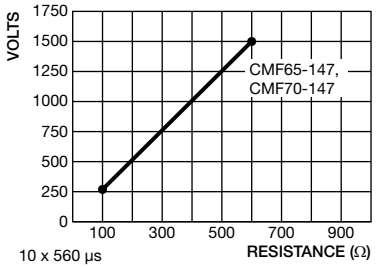


10 by 1000 µs up to 1000 V REA - Current Surge

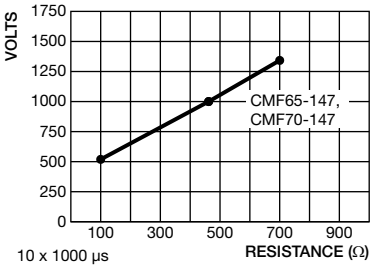
These graphs show the relationship value and pulse withstanding voltage for CMF-65-147 and CMF-70-147 using a 1.0 % resistance shift after 10 pulses as the figure of merit. The stable operating region of each package is on the right side of the appropriate line. Pulse withstanding capabilities are value dependent, and are most effective in values greater than 200 Ω.



10 x 160 µs



10 x 560 µs



10 x 1000 µs

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.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Vishay products are not designed for use in life-saving or life-sustaining applications or any application in which the failure of the Vishay product could result in personal injury or death unless specifically qualified in writing by Vishay. 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.