

Specifications Per

- IEC 60115-1 60115-2
- CECC 40101
- DIN 44061

Features

- SMD enabled structure with excellent solderability
- Conformal coating against humidity
- 5% is 3-band coded, 2% and under is 4-band coded
- RoHS / REACH Compliant

DIMENSIONS

Type	Body Length (L, mm)	Body Diameter (D, mm)	Soldering Spot (B, mm)	Net Weight Per 1000 pcs
SM16	3.52 ± 0.08	1.35 ± 0.1	0.6 Min.	17 grams
SM204	3.52 ± 0.08	1.35 ± 0.1	0.6 Min.	17 grams
SM207	5.90 ± 0.2	2.2 ± 0.1	1.0 Min.	66 grams
SM52	5.90 ± 0.2	2.2 ± 0.1	1.0 Min.	66 grams

GENERAL SPECIFICATIONS

Type	Power Rating (at 70°C)	Max. Working Voltage	Max. Overload Voltage	Resistance Range Min.	Resistance Range Max.	Resistance Tolerance	Standard Resistance Value
SM16	1/6W	200V	400V	0.51 Ω	10M Ω	±1%	E-24/E-96
						±2%, 5%	E-24
SM204	1/4W	200V	400V	0.51 Ω	10M Ω	±1%	E-24/E-96
						±2%, 5%	E-24
SM207	1/3W	250V	500V	0.51 Ω	10M Ω	±1%	E-24/E-96
						±2%, 5%	E-24
SM52	1/2W	250V	500V	0.51 Ω	10M Ω	±1%	E-24/E-96
						±2%, 5%	E-24

For zero-ohm jumper, please see ZMM series. For 0.5Ω & under, please see CSM series. Special sizes, values, and specifications not listed available on special order.

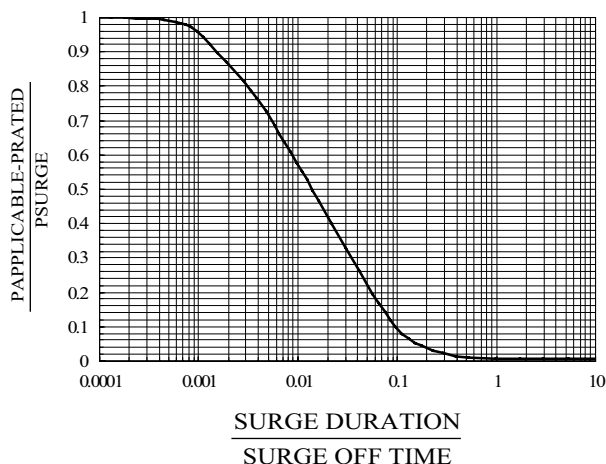
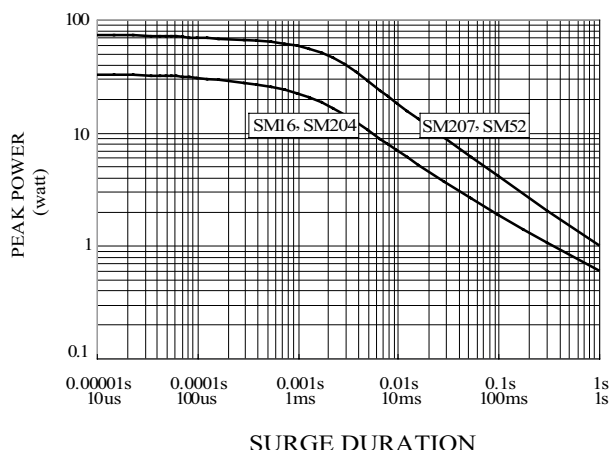
ORDERING INFORMATION (EXAMPLE)

Type	Tolerance	Temperature Coefficient	Resistance Value	Packaging	Special Request (Optional)
SM16 SM204	F (1%) G (2%) J (5%)	TK50 TK100	R875 84K5 1M69	TR3 (3K/reel) TR6 (6K/reel) TR10 (10K/reel)	HV (High value) LV (Low value)
SM207 SM52				TR2 (2K/reel) TR6 (6K/reel) TR10 (10K/reel)	

TECHNICAL SUMMARY

Characteristics	Ranges & Limits	
Operating Temperature Range, °C	-55 ~ +125	
Temperature Coefficient, PPM / °C	±1%, 2%	±25, ±50
	±5%	±100
Dielectric Withstanding Voltage, VAC or DC	SM16, SM204	200
	SM207, SM52	500
Insulation Resistance, MΩ	>10 ⁴	
Film Temperature, °C	SM16, SM204, SM207	125
	SM52	140
Voltage Coefficient, PPM / V	<0.5	
Current noise, μV / V	<10KΩ	<0.05
	10KΩ ~ 100KΩ	<0.2
	100KΩ ~ 1MΩ	<1
	1MΩ ~ 10MΩ	<3
Power derating	100% for temp. < 70 °C, linearly down to 0% at 125 °C	
Failure Rate, pcs/10 ⁹ device hours	<1	
Thermal Resistance, K/W	<220	
Tin Whisker (JESD201 Temperature Cycling & High Temp./Humidity Storage), μm	<5	

SURGE PERFORMANCE



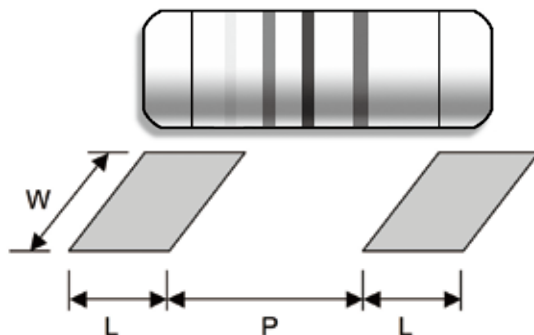
Notes:

1. SINGLE SURGE PERFORMANCE graph is good for NON REPETITIVE applications operating in an ambient temperature of 70°C or less. For temperatures above 70°C, the graph power must be derated further linearly down to zero at 125°C.
2. To determine applicable surge power in continuous-surge applications:
 - Identify allowable duration and peak power P_{surge} of single surge;
 - Determine ratio of surge duration/surge OFF time in application;
 - Calculate $P_{\text{applicable}}$ backwardly according to Y-axis of SURGE POWER DERATING CURVE.

■ PERFORMANCE SPECIFICATIONS

Test Characteristics	Test Conditions	Limits	
Short Time Overload	IEC 60115-1 4.13 2 seconds 2.5x rated voltage (not over max. overload voltage)	± (0.05%+0.05R)	
Load Life	IEC 60115-1 4.25.1 Rated load 1.5 hours ON, 0.5 hours OFF, at 70°C	1,000 hrs	± (0.25%+0.05R)
		8,000 hrs	± (0.5%+0.05R)
		225,000 hrs	± (1.5%+0.05R)
Load Life In Humidity	IEC 60115-1 4.24 56 days rated load at 40°C and 93% relative humidity	± (0.25%+0.05R)	
Load Life In Humidity (accelerated mode)	IEC 60115-1 4.39 1,000 hours at 85°C and 85% relative humidity with 0.1x rated voltage (not over 100V)	± (0.5%+0.05R)	
Periodic Electric Overload	IEC 60115-1 4.37 3.9x rated voltage (not over max. overload voltage) with 0.1s ON, 2.5s OFF for 1,000 cycles	± (2.5%+0.05R)	
Resistance To Soldering Heat	IEC 60115-1 4.18 10 seconds at 260°C solder bath temperature	± (0.05%+0.05R)	
Thermal Endurance	IEC 60115-1 4.25.3 1,000 hours without load	85°C	± (0.2%+0.05R)
		125°C	± (0.25%+0.05R)
Thermal Shock	IEC 60115-1 4.19 -55°C 30minutes, +125°C 30minutes	5 cycles	± (0.05%+0.05R)
		1,000 cycles	± (0.5%+0.05R)
Single pulse high voltage overload	IEC 60115-1 4.27 • 5 pulses of 1.2/50µs at 44.7x rated voltage (not over 2KV for SM16 & SM204; not over 4KV for SM207 & SM52) with interval of 12 sec. • 10 pulses of 10/700µs at 31.6x rated voltage (not over 2KV for SM16 & SM204; not over 4KV for SM207 & SM52) with interval of 60 sec.	± (0.5%+0.05R)	
		± (1.0%+0.05R)	
Electrostatic discharge (Human body mode)	IEC 60115-1 4.40 3 positive & 3 negative discharges with 2KV for SM16 & SM204 or 4KV for SM207 & SM52 (For continuous surge application please see Surge Performance paragraph)	± (2.5%+0.05R)	
Climatic test	IEC 60115-1 4.23 4.23.2 - dry heat: 16 hours 125°C 4.23.3 - damp heat: 24 hours 55°C with 95% relative humidity 4.23.4 - cold: 2 hours -55°C 4.23.5 - negative air pressure: 2 hour 8.5KPa at 25°C 4.23.6 - damp heat cyclic: 5 days 55°C with 95% relative humidity 4.23.7 - DC load: rated voltage at -55°C and 125oC each 1 min.	± (0.5%+0.05R)	
Solderability	MIL-STD-202 Method 208 Solder area covered after 230±5°C/5±0.5 seconds w/flux applied	> 95%	
Vibration	MIL-STD-202 Method 204 Six hours in each parallel and axial direction with a simple harmonic motion having an amplitude of 1.52mm and 10 to 20,000 Hz.	± (1.0%+0.1R)	
Bending test	IEC 60115-1 4.33 Pressing depth 2mm, 3 times	± (0.25%+0.05R)	
Flammability	IEC 60115-1 4.35 Needle flame test 10s	No burning after 30s	

■ SUGGESTED PAD LAYOUT

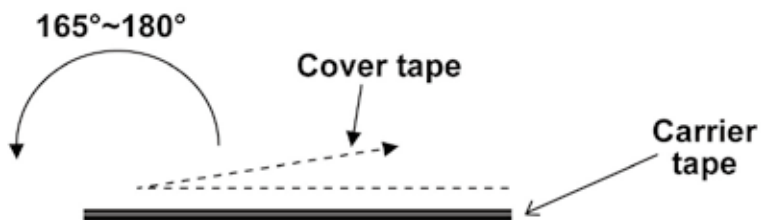


Type	Soldering mode	Pad Length (L, mm, min.)	Pad Spacing (P, mm)	Pad Width (W, mm, min.)
SM16 SM204	Reflow	1.0	2.0 ± 0.2	1.6
	Wave	1.2	2.0 ± 0.2	1.6
SM207 SM52	Reflow	2.0	3.0 ± 0.3	3.0
	Wave	2.5	3.0 ± 0.3	3.0

For better heat dissipation / lower heat resistance, increase W & L.

■ COVER TAPE PEELING SPECIFICATION

Recommended peeling force: 50gf



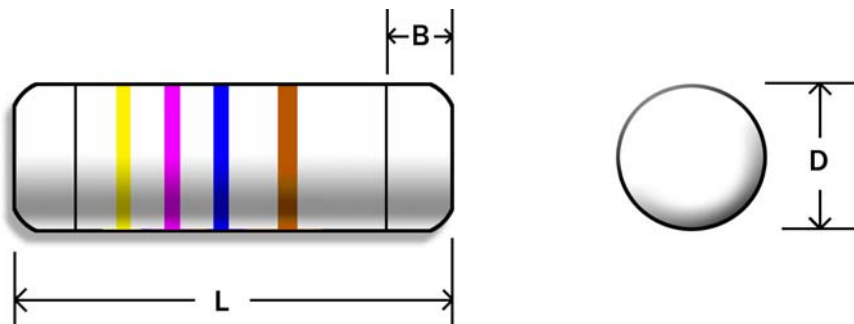
SM- Stabilized Metal Film MELF Resistor

Specifications Per

- IEC 60115-1 60115-2
- CECC 40101
- DIN 44061

Features

- SMD enabled structure
- Conformal coating against humidity
- Excellent solderability termination
- 5% is 3-band coded, 2% and under is 4-band coded



Dimensions

Type	Body Length (L, mm)	Body Diameter (D, mm)	Soldering spot (B, mm)	Net Weight Per 1000 pcs
SM16	3.45 ± 0.1	1.35 ± 0.1	0.6 Min.	17 grams
SM204	3.45 ± 0.1	1.35 ± 0.1	0.6 Min.	17 grams
SM207	5.9 ± 0.2	2.2 ± 0.1	1.0 Min.	66 grams
SM52	5.9 ± 0.2	2.2 ± 0.1	1.0 Min.	66 grams

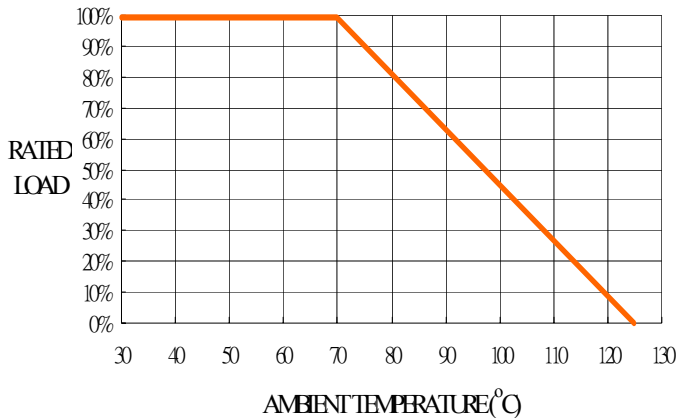
General Specifications

Type	Power Rating (at 70°C)	Max. Working Voltage	Max. Overload Voltage	Resistance Range Min.	Resistance Range Max.	Resistance Tolerance	Standard Resistance Value
SM16	1/6W	200V	400V	0.1	1M	±1%	E-24/E-96
						±2%, 5%	E-24
SM204	1/4W	200V	400V	0.1	1M	±1%	E-24/E-96
						±2%, 5%	E-24
SM207	1/3W	250V	500V	0.1	1M	±1%	E-24/E-96
						±2%, 5%	E-24
SM52	1/2W	250V	500V	0.1	1M	±1%	E-24/E-96
						±2%, 5%	E-24

For zero ohm jumper, please see ZMM series. For 1m~100mohm, please see CSM series. Special sizes, values, and specifications not listed available on special order.

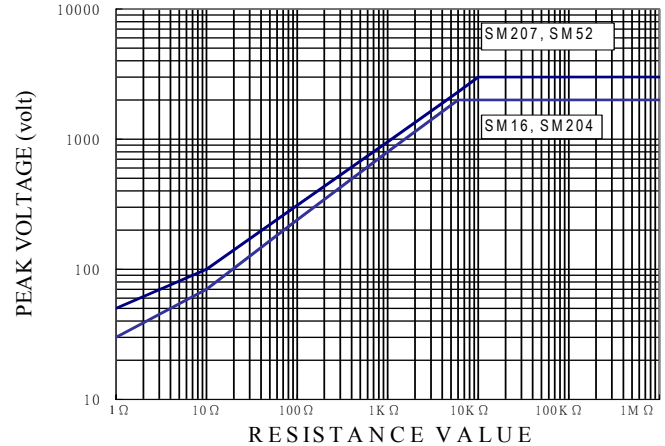
SM- Stabilized Metal Film MELF Resistor

POWER DERATING CURVE

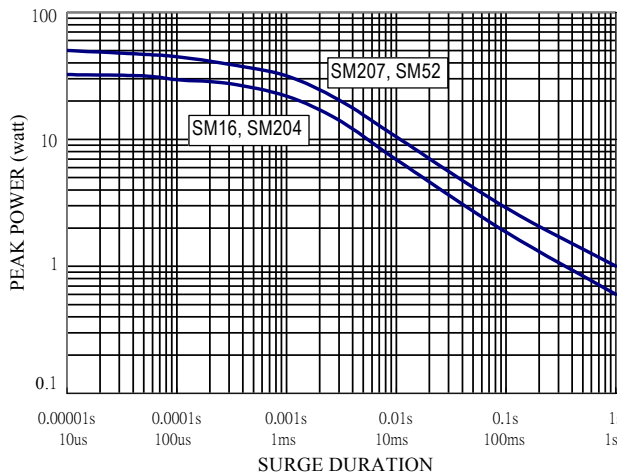


1.2/50us PEAK PULSE

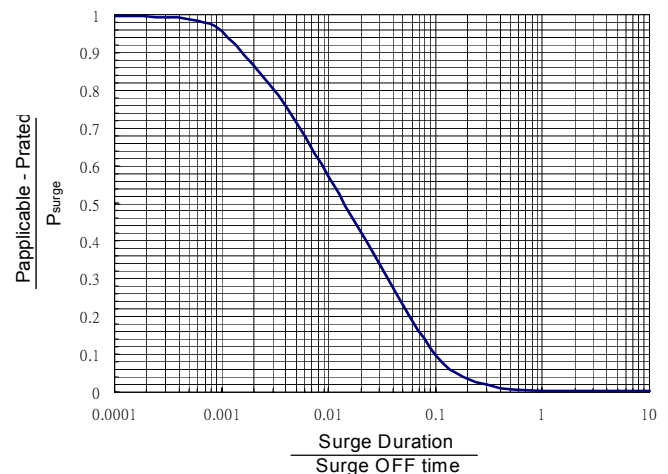
5 pulses at 12-sec interval for 0.5% permanent change



SINGLE SURGE PERFORMANCE



SURGE POWER DERATING CURVE



Notes:

1. Above graph is accurate for NON REPETITIVE applications operating in an ambient temperature of 70°C or less. For temperatures above 70°C, the graph power must be derated further linearly down to zero at 125°C.
2. For applicable surge power in continuous-surge applications please see SURGE POWER DERATING CURVE above.

SM- Stabilized Metal Film MELF Resistor

Technical Summary:

Characteristics	Limits			
Dielectric Withstanding Voltage, VAC or DC	SM16, SM204: 200 SM207, SM52: 500			
Temperature Coefficient, PPM / °C	±1%, 2%	±50		
	±5%	±100		
Operating Temperature Range, °C	-55 ~ +125			
Film Temperature, °C	SM16	SM204	SM207	SM52
	125	125	125	140
Insulation Resistance, MΩ	>10 ⁴			

Performance Specifications

Test Characteristics	Test Conditions	Limits
Short Time Overload	IEC 60115-1 4.13 5 seconds 2.5x rated voltage (not over max. overload voltage)	±(0.5%+0.05R)
Load Life In Humidity	IEC 60115-1 4.24 56 days at 40°C and 93% relative humidity	±(1.5%+0.05R)
Load Life 1,000 hours	IEC 60115-1 4.25.1 Rated load 1.5 hours ON, 0.5 hours OFF, at 70°C	±(0.25%+0.05R)
Load Life 8,000 hours		±(0.5%+0.05R)
Load Life 225,000 hours		±(1.5%+0.05R)
Resistance To Soldering Heat	IEC 60115-1 4.18 10 seconds at 260°C solder bath temperature	±(0.5%+0.05R)
Solderability	MIL-STD-202 Method 208 Solder area covered after 230±5°C/5±0.5 seconds w/ flux applied	95% Min.
Vibration	IEC 60115-1 4.22 Six hours in each parallel and axial direction w/ a simple harmonic motion having an amplitude of 0.75mm and 10 to 500 Hz.	±(1%+0.1R)
Thermal Endurance	IEC 60115-1 4.25.3 1000 hours at 125°C without load	±(0.5%+0.05R)
Thermal Shock	IEC 60115-1 4.19 -55°C 30minutes, +125°C 30minutes, 5 cycles	±(0.5%+0.05R)

Ordering Information

Type	Tolerance	Temperature Coefficient	Resistance Value	Packaging	Special Request (Optional)
SM204	F (1%) G (2%) J (5%)	TK50 TK100	562R 84K5 1M69	B (Bulk) TR (Tape/Reel)	HV (High value)