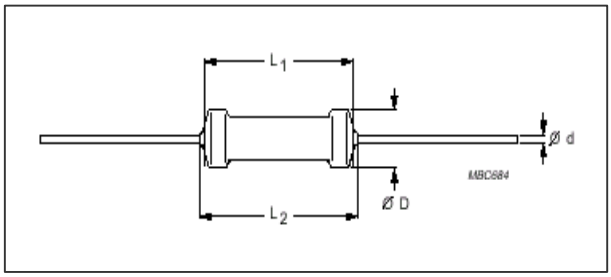
High voltage metal surge resistors MSR16/25/37/37L/52

FEATURES

- New product
- Low cost
- Excellent anti-surge characteristics
- Good replacement for metal glazed and carbon composition resistors.



APPLICATIONS

- CRT-RGB witch is used TV, Monitor
- Devices which need protection surge voltage between power preliminary and secondary.

TYPE	Dimensions (mm)			
	D ±0.8	L 1 ±0.8	L 2 Max.	d (±0.05)
MSR16	2.0	3.2	3.4	0.45
MSR25	2.7	6.5	7.5	0.6
MSR37	4.0	9.0	12	0.7
MSR37L	4.0	12	14	0.8
MSR52	5.7	16.5	18.5	0.8

DESCRIPTION

The multi layer metal film is 3 layers deposited on a high grade ceramic body. After that helical groove has been cut by laser at the resistive layer, tinned electrolytic copper wire are welded to the end-caps. The resistors are coated with a brown and blue non flammable lacquer witch provides electrical, mechanical and climatic protection.

QUICK REFERENCE DATA

DESCRIPTION	VALUE				
	MSR16	MSR25	MSR37	MSR37L	MSR52
resistance range	10 kΩ to 5.6 MΩ	10 kΩ to 10 MΩ			
resistance tolerance	±10%,±5%, ±2% (E12, E24 series)				
temperature coefficient	R ≤4.7 MΩ ; ± 250 ppm / ℃ R >4.7 MΩ ; ± 350 ppm / ℃				
rated dissipation at T_{amb} = 70 ℃	0.25 W	0.25W	0.5W	1Ws	1W
max. working voltage	800 V	1600 V	3600 V	7000 V	10000 V
max. overload voltage	800 V	1600 V	3600 V	7000 V	10000 V
basic specifications	IEC 60 115-1B				
safety requirements 1) 125V : 480 kΩ ~ 12 MΩ 2) 250V : 960 kΩ ~ 12 MΩ	-	-	C-UL: 1676 VDE : 0860 CQC	C-UL:1676 VDE ; 0860 CQC	C-UL:1676 VDE ; 0860
climatic category (IEC60)	55 / 155 / 56				
stability, $\Delta R/R_{max}$ after load : 1000 hours	± 1.5% +0.01 Ω				
soldering heat	± 0.5% +0.01 Ω				

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ORDERING INFORMATION

Ordering code indicating resistor types and packing

Table 1

Type	Bandolier width	Packing	Quantity	Resistance range	Tol. ± %	Ordering code
MSR16 (0.25W)	52mm	ammo	5000	10 kΩ to 10 MΩ	2 5	PMSR 249 14xxx PMSR 249 13xxx

Table 2

Type	Bandolier width	Packing	Quantity	Resistance range	Tol. ± %	Ordering code
MSR25 (0.25W)	52mm	ammo	5000	10 kΩ to 10 MΩ	2 5 10	PMSR 245 14xxx PMSR 245 13xxx PMSR 245 15xxx

*** PMSR 245 45xxx : yellow color is used to code resistance tolerance ± 5%**

Table 3

Type	Bandolier Width	Packing	Quantity	Resistance range	Tol. ± %	Ordering code
MSR37 (0.5W)	52mm	ammo	1000	10 kΩ to 10 MΩ	2 5 10	PMSR 240 14xxx PMSR 240 13xxx PMSR 240 15xxx

*** PMSR 240 55xxx : yellow color is used to code resistance tolerance ± 5%**

Table 4

Type	Bandolier width	Packing	Quantity	Resistance range	Tol. ± %	Ordering code
MSR37L (1Ws)	52mm	ammo	1000	10 kΩ to 10 MΩ	5	PMSR 246 33xxx

Table 5

Type	Bandolier width	Packing	Quantity	Resistance range	Tol. ± %	Ordering code
MSR52 (1W)	64mm	ammo	500	10 kΩ to 10 MΩ	2 5 10	PMSR 247 14xxx PMSR 247 13xxx PMSR 247 15xxx

Table 6. Last digit of 12NC

Resistance decade	Last digit
10 to 97.6 kΩ	3
100 to 976 kΩ	4
1 to 9.76 MΩ	5
10 to 97.6 MΩ	6
100 to 976 MΩ	7

Ordering Example

The ordering code of a MSR37- 0.5W resistor, value 8.2 MΩ ±5%, taped on a bandolier of 1000 units in ammopack is: PMSR 240 13825.

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Limiting values

Table 7

TYPE	LIMITING VOLTAGE(1) (V)	LIMITING POWER (W)
MSR16	800	0.25
MSR25	1600	0.25
MSR37	3600	0.5
MSR37L	7000	1 (small)
MSR52	10000	1

Note

1. the maximum voltage that may be continuously applied to the resistor element, see "IEC publication 60 115-1"

The maximum permissible hot – spot temperature is 155 ℃.

DERATING

The power that the resistor can dissipate depends on the operating temperature : Fig. 1

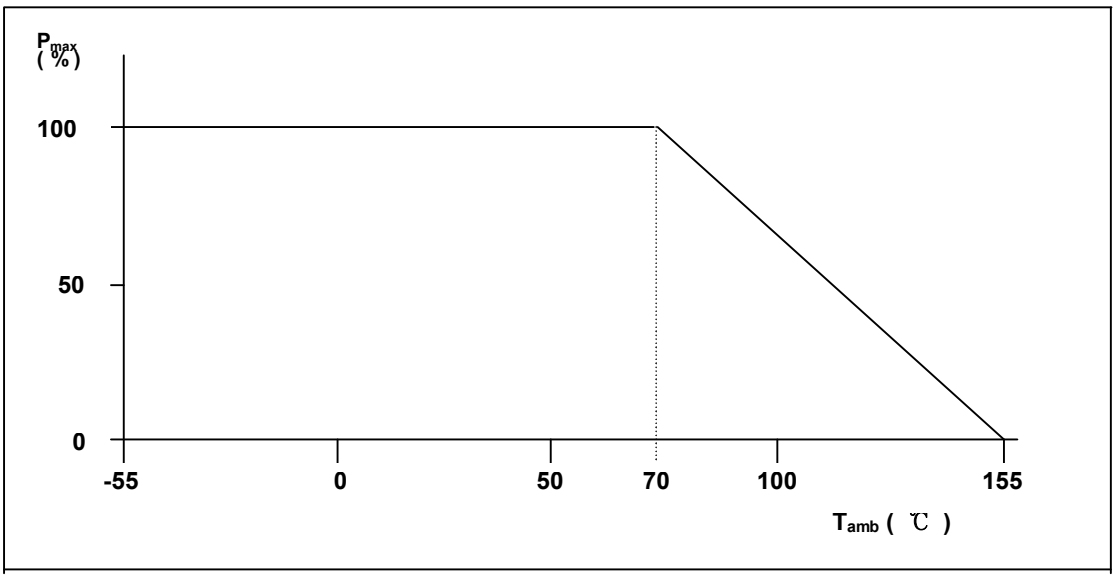

Fig. 1 Maximum dissipation (P_{max}) in percentage of rated power as a function of the ambient Temperature (T_{amb})

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Surge resistance characteristics

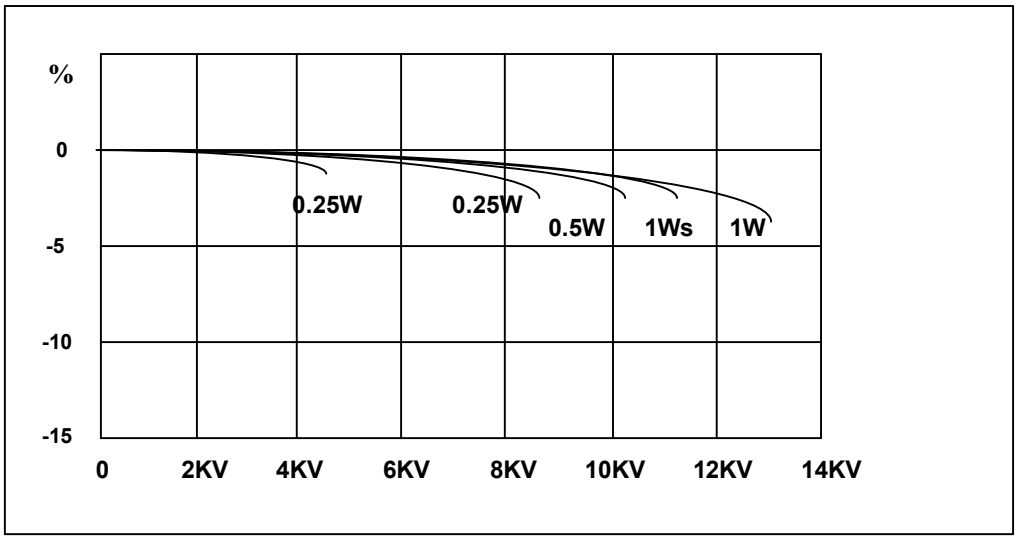

Fig. 2 Maximum allowed peak surge voltage in accordance with "IEC 60065 chapter 14.1" 10 discharges form a 1nF or 10nF capacitor charged to V_{max} ; 12 discharges / minute

Application information

MSR25 - 0.25W

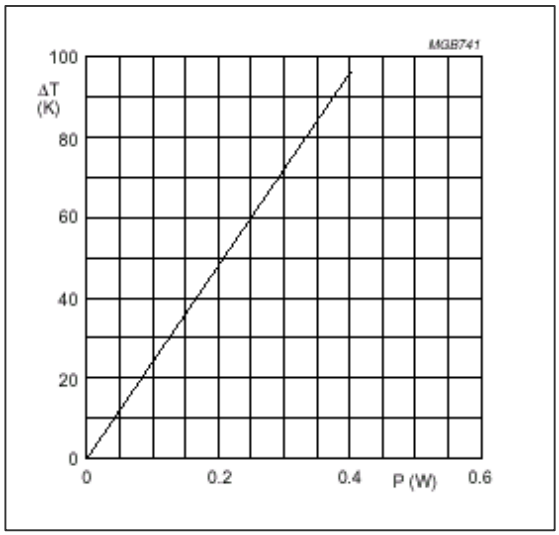

Fig. 3 Hot – spot temperature rise (Δ T) as a function of dissipated power

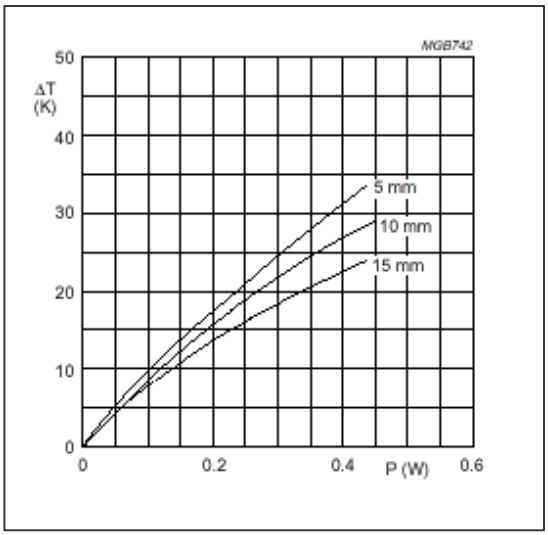

Fig.4 Temperature rise (Δ T) at the lead end of the lead (soldering point) as a f function of dissipated Power at various lead lengths after mounting

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MSR37 – 0.5W

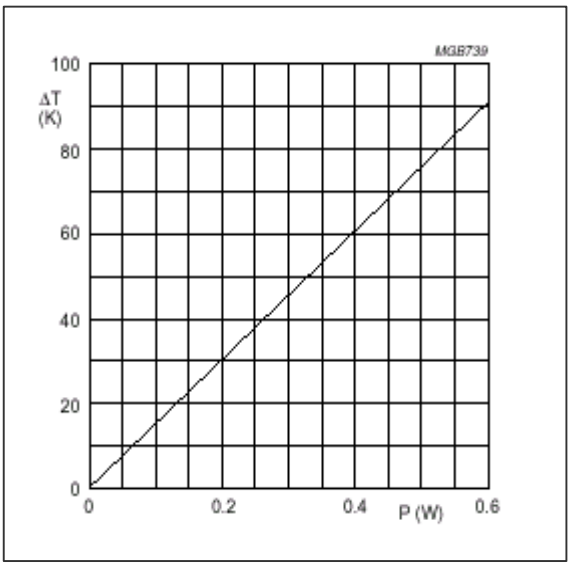

Fig. 5 Hot – spot temperature rise (Δ T) as a function of dissipated power

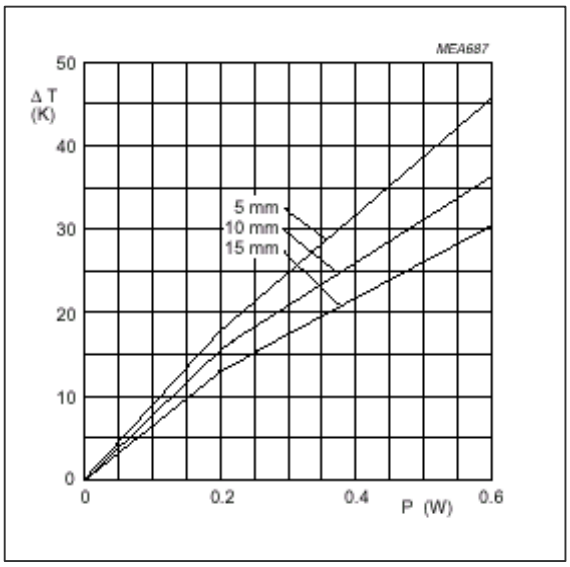

Fig.6 Temperature rise (Δ T) at the lead end of the lead soldering point as a function of dissipated power at various lead lengths after mounting

MSR37L – 1Ws

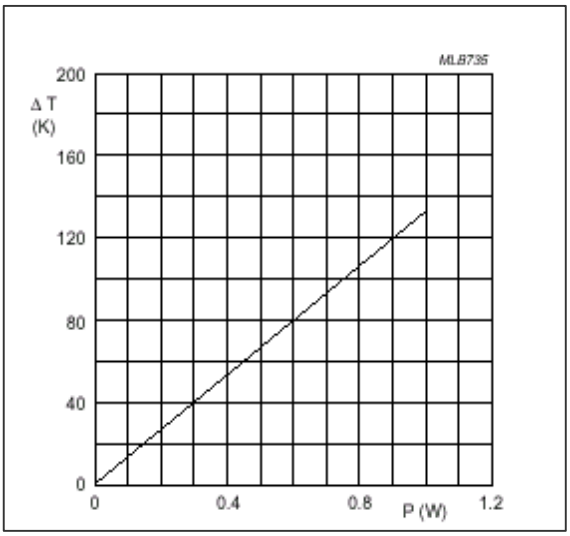

Fig. 7 Hot – spot temperature rise (Δ T) as a function of dissipated power

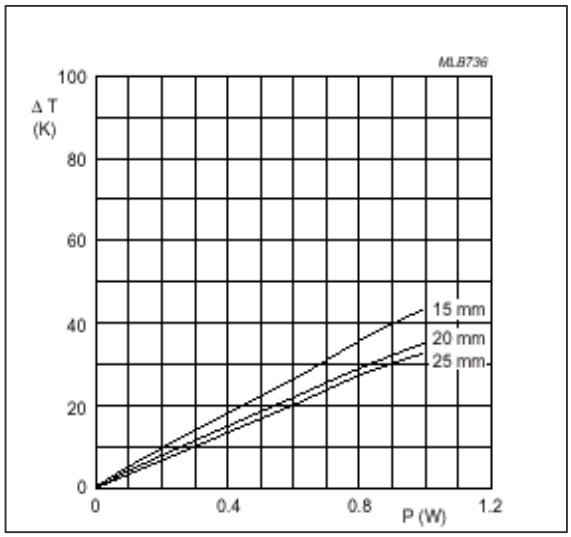

Fig.8 Temperature rise (Δ T) at the lead end of the lead soldering point as a function of dissipated power at various lead lengths after mounting

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MSR52 – 1W

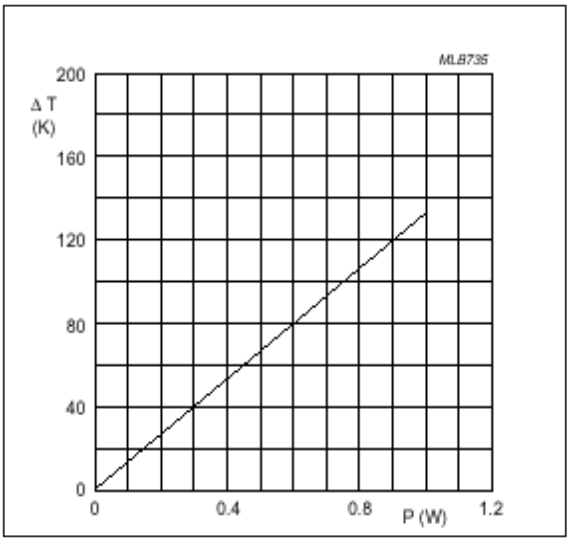

Fig. 9 Hot – spot temperature rise (Δ T) as a function of dissipated power

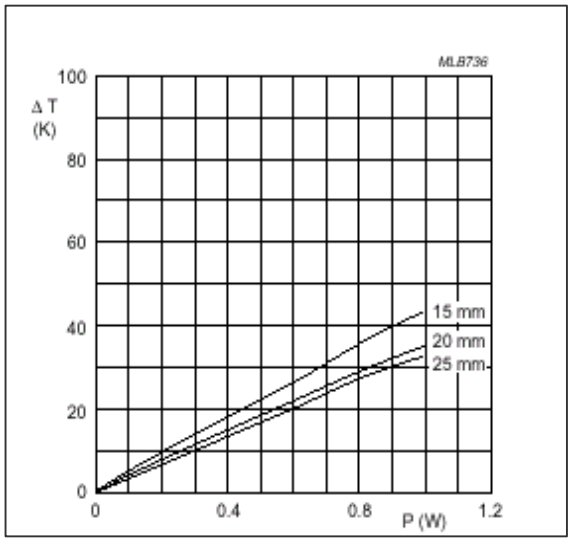

Fig.10 Temperature rise (Δ T) at the lead end of the lead soldering point as a function of dissipated power at various lead lengths after mounting

MECHANICAL DATA

Table 8. Mass per 100 units

TYPE	MASS (g)
MSR16- 0.25W	12.5
MSR25- 0.25W	25
MSR37 - 0.5W	42
MSR37L - 1Ws	67
MSR52 - 1W	148

MARKING

The nominal resistance and tolerance are marked on the resistor using four or five colored Bands in accordance with IEC publication 60 062 “color codes for fixed resistors”

Table 9. BODY COLORS

TYPE	COLORS
MSR16 – 0.25W	Brown
MSR25 – 0.25W	Brown
MSR37 – 0.5W	Brown
MSR37L – 1Ws	Brown
MSR52 – 1W	Blue

TEST AND REQUIREMENTS

Table 10. Test procedures and requirements

TEST	PROCEDURE	REQUIREMENTS			
		MSR25	MSR37	MSR37L	MSR52
robustness of terminations: tensile all samples	Φ 0.6 / 0.7 / 0.8 mm : load 10N:10s	number of failures < 10×10^{-6}			
bending half number of samples	Φ 0.6 / 0.7 / 0.8 mm : load 5N: 4x90°	number of failures < 10×10^{-6}			
torsion other half number samples	3x360°in opposite directions	no damage ±0.25% + 0.05 Ω			
solderability	2 s ; 235℃ flux 600	good tinning; no damage			
soldering heat	Thermal shock: 3 s; 360℃ 6mm from body	± 0.5% +0.05Ω			
rapid change of temperature	30 minutes at –55℃ and 30 minutes at +155℃;5cycles	± 0.5% +0.05Ω			
vibration	frequency 10 to 500 Hz; displacement 1.5mm or acceleration 10g; 3 directions total 6 hours(3x2 hours)	no damage ± 1% +0.05Ω			
Climatic sequence dry heat damp heat (accelerated) 1st cycle cold low air pressure damp heat (accelerated) remaining cycles	 16 hours;155℃ 24hours;55℃; 90 to 100% RH 2 hours; - 55℃ 2 hours;8.5 Kpa; 15 to 35℃ 5 days;55℃;95 to 100% RH	$R_{ins\ min}$; 1000 MΩ ± 2% + 0.05Ω			
damp heat	56 days; 40 ℃; 90 to 95% RH dissipation 0.01 P_n	± 1.5% + 0.05Ω			
endurance	1000 hours at 70 ℃; P_n or V_{max}	± 1.5% + 0.05Ω			
temperature coefficient	between –55 ℃and +155 ℃	R ≤ 4.7 MΩ: ± 250 ppm / ℃ R > 4.7 MΩ: ± 350 ppm / ℃			
dielectric withstanding voltage	$300V_{RMS}$ MSR16 $400V_{RMS}$ MSR25 $500V_{RMS}$ MSR37,MSR37L MSR52 during 1min. V- block method	no breakdown			

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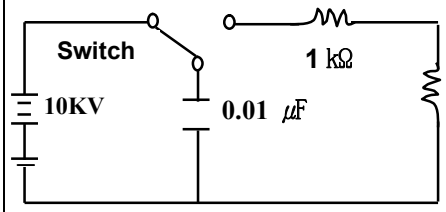
TEST AND REQUIREMENTS

TEST	PROCEDURE	REQUIREMENTS			
		MSR25	MSR37	MSR37L	MSR52
insulation resistance	500V_{DC} during 1 minute ; V – block method	min. : 10^4 MΩ			
short time overload	rated voltage x 2.5 5 s on 45 s off (V ≤V_{max}) 10 cycles	± 1% + 0.05Ω			
overload test	1) 480 kΩ ≤ R <1 MΩ;1500V_{RMS} during 5 sec. 2) R ≥ 1 MΩ; 3600V_{RMS} during 5 sec.	no evidence of flash over, mechanical damage, arcing or, insulation breakdown ± 10% + 0.1Ω			
high voltage surge test	 Circuits				
10 discharges from a 1nF or 10 nF capacitor charged to V_{max} ;12 discharges / minute					

MSR16	MSR25	MSR37	MSR37L	MSR52
10 kΩ- 91 kΩ : 1 KV	10 kΩ- 91 kΩ : 3 KV	10 kΩ- 470 kΩ : 7 KV	10 kΩ- 470 kΩ : 7 KV	10 kΩ-10 MΩ : 10 KV
100 kΩ- 470 kΩ : 2 KV	100 kΩ- 470 kΩ : 5 KV	480 kΩ-10 MΩ : 10 KV	480 kΩ- 10 MΩ : 10 KV	
510 kΩ- 10 MΩ : 3 KV	510 kΩ- 10 MΩ : 7 KV			

* MSR16 and MSR25; 1nF capacitor