Product Approval Sheet

Customer :

Issued no :

Revision no :

- Product description : High Voltage Surge Resistors, (SR25- 0.25W)
- Product code : PPSR 241 45xxx
- Application :

CUSTOMER			
PILKOR	Checked	Confirmed	Approved
	01/23/2009	01/23/2009	01/23/2009

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* Please returned to us this sheet before the order.

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1. GENERAL

1.1 Features

- High voltage loading capability
- Small size.

1.2 Applications

- Where high resistance, high stability and high reliability at high voltage are required
- High humidity environment
- Power supplies.

1.3 Description

A metal glazed film is deposited on a high grade ceramic body. After a helical groove has been cut in the resistive layer, tinned connecting leads of electrolytic copper or electrolytic iron are welded to the end-caps. The resistors are coated with a silicone brown lacquer which provides electrical, mechanical and climatic protection. The encapsulation is resistant to all cleaning solvents in accordance with "*MIL-STD-202E, method 215*", and "*IEC 60068-2045*".

1.4 Quick reference data

DESCRIPTION	VALUE
Resistance range	51 kΩ to 33 MΩ
Resistance tolerance	± 1% (24E/E96 series) ± 2% / ± 5% (E24 series)
Maximum dissipation at $T_{amb.}$ = 70 °C	0.25W
Thermal resistance, R_{th}	200K/W
Temperature coefficient	± 350ppm /
Maximum permissible voltage DC RMS	 1600V 1150V
Dielectric withstanding voltage of the insulation for 1 minute	700V
Basic specifications	IEC 60115-1B
Climatic category (IEC 60068)	55 / 155 / 56

2. ORDERING INFORMATION

2.1 12NC Ordering code

Type	Packaging type	Tape width	Quantity	Resistance range	Tol. [%]	Lead wire [Φ]	Ordering code
SR25 0.25W	ammopack	52mm	5,000	51 kΩ to 33 MΩ	1	0.60	PPSR 241 3xxxx
					2		PPSR 241 63xxx
					5		PPSR 241 45xxx

*** Notes**

- The resistors have a 12-digit ordering code starting with PPSR 241
- The remaining digits indicate the resistance value
  ; the first 2 or 3 digits indicate the resistance value.
  ; the last digit indicate the resistance decade in accordance with Table 1.

Table 1 : Last digit of 12NC

Resistance decade	Last digit
10 kΩ to 99 kΩ	3
100 kΩ to 990 kΩ	4
1 MΩ to 9.9 MΩ	5
10 MΩ to 99 MΩ	6
100 MΩ	7

ORDERING EXAMPLE
The ordering code for a SR 25, resistor value120 kΩ, 5% tolerance, supplied on a bandolier of 5000 units in ammopack, is :
PPSR 241 45124

PPSR 241 45 12 4

- 4 → Multiplier ---------- ⓐ
- 12 → Resistance ---------- ⓑ
- 45 → Packaging Q'ty / Taping type / Tolerance ---------- ⓒ
- 241 → Names of product ---------- ⓓ
- PPSR → Metal glaze Resistor ---------- ⓔ

12NC code	ⓐ+ⓑ	ⓒ	ⓓ	ⓔ
PPSR 241 45124	120 kΩ	ammopack 52mm 5,000pcs 5%	SR25	PPSR

3. FUNCTIONAL DESCRIPTION

3.1 Product characterization

- Standard values of nominal resistance are taken from the E24 series for resistors with a tolerance of ±1%. 2% or 5%.The values of the E24/E96 series are in accordance with *"IEC publication 60063"*.

3.2 Limiting values

Type	Limiting Voltage (V)		Limiting Power (W)
	DC	RMS	
SR25-0.25W	1600	1150	0.25

- The maximum voltage that may be continuously applied to the resistor element, see *"IEC publication 60115-1"*.
- The maximum permissible hot-spot temperature is 155

3.3 Derating

- The power that the resistor can dissipate depends on the operating temperature; see Fig.1.

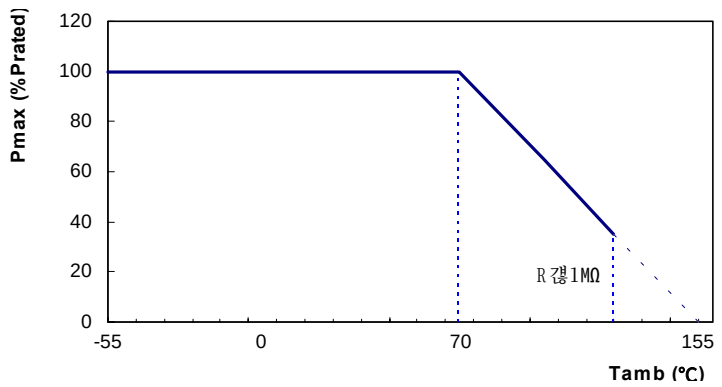
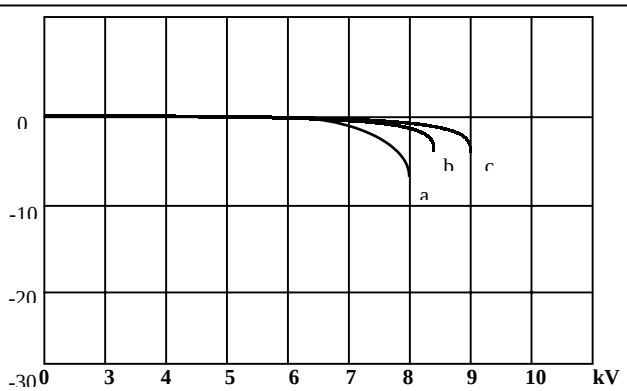


Fig. 1 Maximum dissipation(P_{max}) in percentage of rated power as a function of the ambient Temperature(T_{amb})

3-4. Surge resistor character



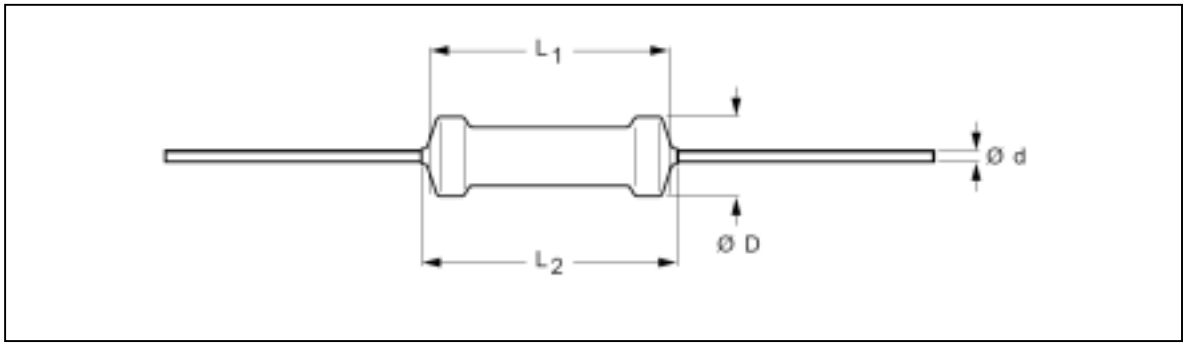
a : 51 kΩ~ 91 kΩ
b : 100 kΩ ~ 470 kΩ
c : 480 kΩ ~ 33 MΩ

50 discharges from a 1nF capacitor charged to V max.; 12discharges / minute
51K – 33M : 7KV

4. PRODUCT SPECIFICATION

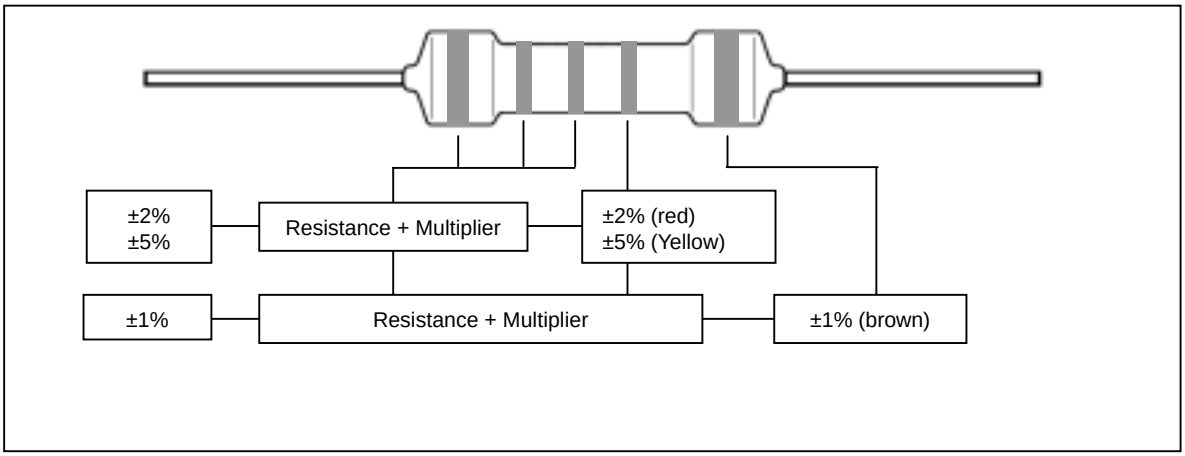
4.1 Mechanical data

- Body dimension



Type	Dimension (mm)				Mass (g/100EA)	Body color
	D_{max}	$L1_{max}$	$L2_{max}$	Φd ±0.05		
SR25	2.5	6.5	7.5	0.60	25	brown

- Marking



The nominal resistance and tolerance are marked on the resistor using four or five colored bands in accordance with IEC publication 60062 “Color codes for fixed resistors”.

(Yellow color is used Instead of gold because metal particles in the lacquer could affect high voltage properties) for ±5% tolerance

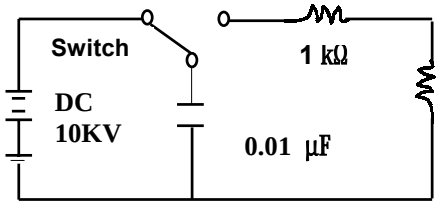
5. Reliability test

Electrical and mechanical characteristics the following characteristics must be inspected regularly for compliance with the requirements according to the instruction

IEC 60115-1 CLAUSE	IEC 60068 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS
4.16 4.16.2 4.16.3 4.16.4	U Ua Ub Uc	robustness of terminations: tensile all samples bending half number of samples torsion other half number samples	ϕ 0.6 mm: load 10N:10s ϕ 0.6 mm: load 5N: 4x90° 3x360°in opposite directions	number of failures < 10 ppm number of failures < 10 ppm no damage ±0.5% + 0.05 Ω
4.17	Ta	Solder ability	2 s ; 235℃ flux 600	good tinning; no damage
4.18	Tb	soldering heat	thermal shock: 3 s; 350℃ 6mm from body	± 0.5% +0.05Ω
4.19	Na	rapid change of temperature	30 minutes at –55℃ and 30 minutes at +155℃;5cycles	± 0.5% +0.05Ω
4.22	Fc	vibration	frequency 10 to 500 Hz; displacement 1.5mm or acceleration 10g; 3 directions total 6 hours(3x2 hours)	no damage ± 0.5% +0.05Ω
4.23 4.23.2 4.23.3 4.23.4 4.23.5 4.23.6	Ba Db Aa M Db	Climatic sequence dry heat damp heat (accelerated) 1st cycle cold low air pressure damp heat (accelerated) remaining cycles	16 hours;155℃ 24h;55℃; 90 to 100% RH 2 hours; - 55℃ 2 hours;8.5 Kpa; 15 to 35℃ 5 days;55℃;95 to 100% RH	Rins min.; 1000 MΩ ± 1.5% + 0.1Ω
4.24.2	Ca	damp heat	56 days; 40℃; 90 to 95% RH dissipation 0.01 Pn	± 1.5% + 0.1Ω
4.25.1		endurance	1000 hours at 70 ℃; Pn or V max.	± 1.5% + 0.1Ω
4.8.4.2		temperature coefficient	between –55 ℃and +155 ℃	± 350 ppm/ ℃

High Voltage Surge Resistor

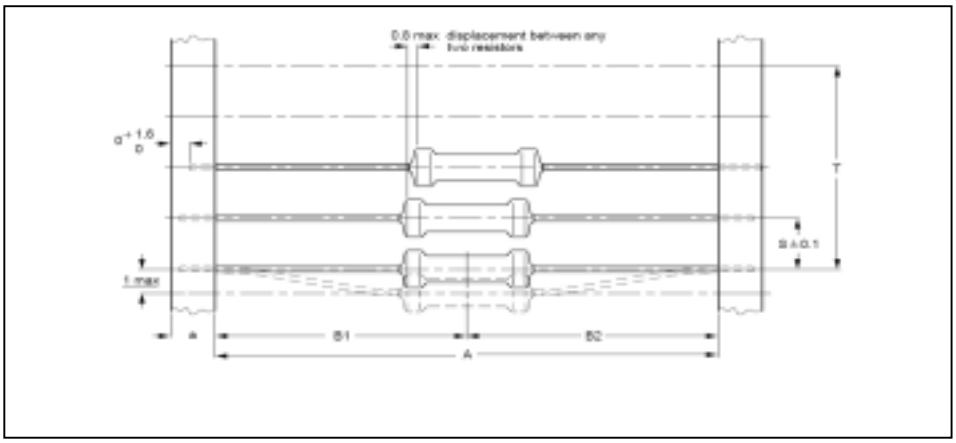
SR25
0.25W

IEC 60115-1 CLAUSE	IEC 60068 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS
4.7		dielectric withstanding voltage	700V (RMS) during 1min. v- block method	no breakdown
4.6.1.1		insulation resistance	500V (DC) during 1 minute ; v – block method	min. : 10^4 MΩ
4.13		short time overload	rated voltage x 2.5 time 5 s on 45 s off (v ≤2 x v max.) 10 cycles	± 2% + 0.05Ω
-		pressure cook test	1) temp. ; 121℃ 2) pressure ; 2.1 3) humidity ; 100% 4) time ; 1 hours	± 5% + 0.1Ω
60065		high voltage surge test	 **Circuits**	no evidence of flash over, mechanical damage, arcing or Insulation breakdown ± 2% +0.1Ω

Maximum allowed peak pulse voltage in accordance with “IEC 60065 chapter 14.1”,
50 discharges from a 1nF capacitor charged to V max.; 12discharges / minute
51K – 33M : 7KV

6.Taping & packing

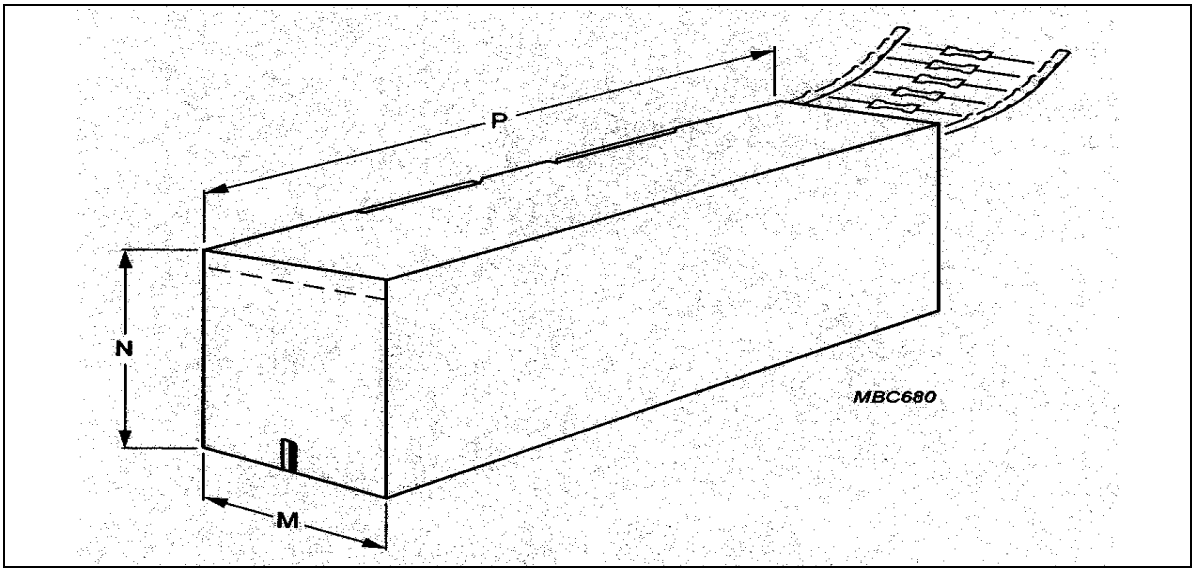
6-1. Taping dimension



unit : mm

Packaging	Tape width	Axial taped on bandolier			
		a	A	B1-B2	S
ammo	52	6 ±0.5	52 ±1.5	±1.2	5

6-2. Packing dimension



Quantity	M	N	P
Ammo 5000pcs	78	98	270

7. Flow Chart

Process	Material	Flow Chart	Check Point	Owner
Firing	- Ceramic dish	Rods	- Lot No. - Temp. (600℃) - Time (3hrs)	P.O
Storage	- Ceramic dish		- Temperature (120℃)	P.O
Dipping	- R-Paste	glaze	- Air / Tamp - Viscosity - Value / Tolerance	P.O
Storage	- Plastic Box		- Temperature	P.O
Capping	- Steel Cap	Cap	- Length - Pull-off	P.O
Helixing	- Stone	Stone	- Groove / Value - T. H. I	P.I
Welding	- Lead Wire (Cu+Sn)	Wire	- Welding Condition - W. I. U	P.I
Lacquering	- Prime Lacquer - Outer Lacquer	Lacquer	- Temperature - Viscosity - Visual insp.	P.I
Color coding	Color Paint	Color	- Visual insp.	P.I
Taping	- Adhesive tape - Paper tape - Inner box	Tape & box	- Visual insp.	P.I
Final Inspection	- Label			Q.I

8. Raw materials

Materials name	Component	Supplier
Ceramic	Alumina 85%	Meiwa / yuen jinn
Body Lacquer	R-paste (Metal glazed)	Dae joo
Cap	Fe body Sn coating	Song-Ho Accuracy
Lead Wire	Lead free	SK metal
Lacquer	Silicone (Brown Color)	Hokuriku / Pelnox