1. Part Numbering System):

HV	06	J	B	1M5
Series Name Chip Resistor: HV : High Voltage Chip-r	Type Inch (mm) 03-0603(1608) 05-0805(2012) 06-1206(3216) 0A - 2010(5025) 12 - 2512(6332)	Tolerance B= ± 0.1% D= ± 0.5% F= ± 1% J= ± 5 % P : Jumper	Package A=4Kpcs/7"Reel B=5Kpcs/7"Reel C=10Kpcs/7"Reel M=15Kpcs/7"Reel D=10Kpcs/10"Reel E=20Kpcs/10"Reel	Resistance 1R2=1.2Ω 10K=10KΩ 10K5=10.5KΩ 100K=100KΩ 1M2=1.2MΩ

2 . FEATURE

- Special material and design for high working voltage require.
- Compatible with flow and reflow soldering
- Suitable for lead free soldering.
- High limiting voltage

3 . APPLICATION

- Power supply
- Automotive industry
- Measurement instrument
- Back light inverter
- Medical or Military equipment

4 . DESCRIPTION

The resistors are constructed in a high grade ceramic body (aluminum oxide). Internal metal electrodes are added at each end and connected by a resistive paste that is applied to the top surface of the substrate. The composition of the paste is adjusted to give the approximate resistance required and the value is trimmed to nominated value within tolerance which controlled by laser trimming of this resistive layer.

The resistive layer is covered with a protective coat. Finally, the two external end terminations are added. For ease of soldering the outer layer of these end terminations is a Tin (lead free) alloy.

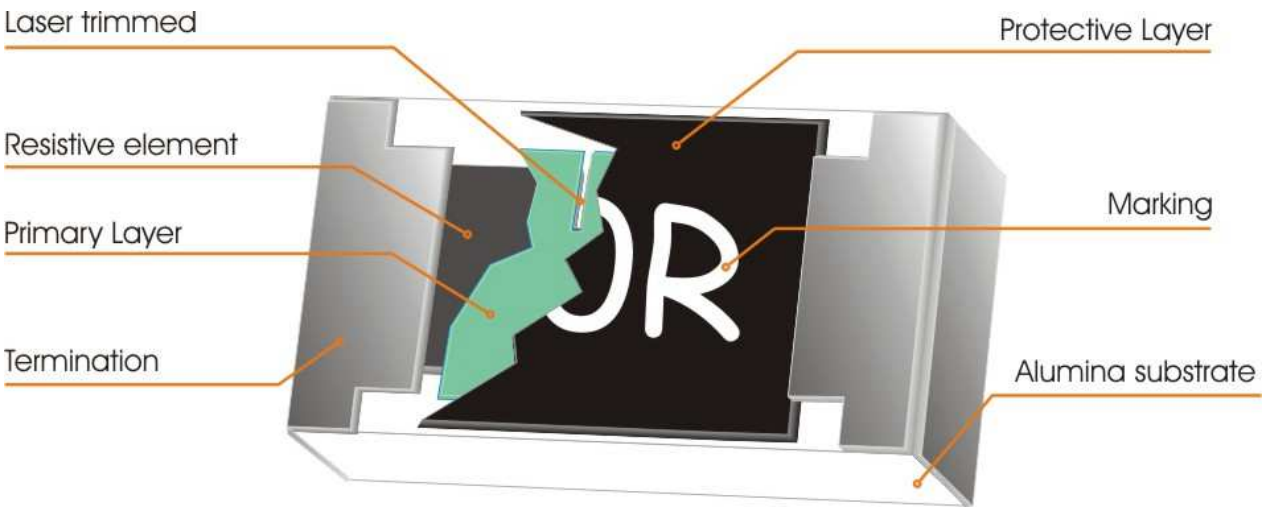


Fig 1. Construction of Chip-R

5 . QUICK REFERENCE DATA

Item	General Specification				
Series No.	HV12	HV0A	HV06	HV05	HV03
Size code	2512	2010	1206	0805	0603
Resistance Tolerance	±0.5%, ±1%, ±2%, ±5%,				
Resistance Range	±5%: 47Ω ~ 51MΩ ±1%, ±2%: 47Ω ~ 20MΩ ±0.5%: 47Ω ~ 10MΩ		±5%: 47Ω ~ 51MΩ ±0.5%, ±1%, ±2%: 47Ω ~ 10MΩ		47Ω ~10MΩ
TCR (ppm/°C)					
+500~ -200	47Ω ~ 97.6Ω	-	-	-	-
±200	100Ω ~ 549Ω	47Ω ~ 464Ω	47Ω ~ 97.6Ω	47Ω ~ 97.6Ω	47Ω ~ 464Ω
±100	560Ω ~ 51MΩ	470Ω ~ 51MΩ	100Ω ~ 51MΩ	100Ω ~ 51MΩ	470Ω ~ 10MΩ
Max. Dissipation at T_{amb}=70°C	1 W	1/2 W	1/4 W	1/8 W	1/10W
Max. Operation Voltage (DC or RMS)	800V	500V	500V	400V	200V
Max. Overload Voltage (DC or RMS)	1600V	1000V	1000V	800V	400V
Climatic category (IEC 60068)	55/155/56				

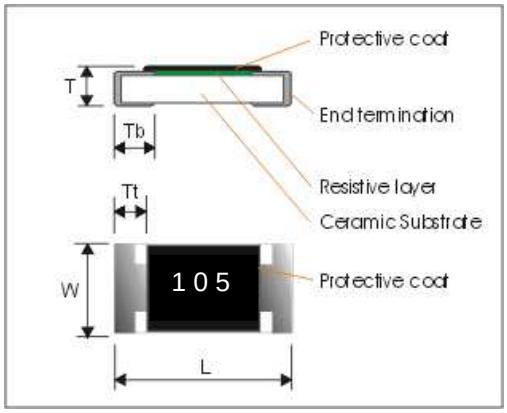
Note:

1. This is the maximum voltage that may be continuously supplied to the resistor element, see “IEC publication 60115-8”

2. Max. Operation Voltage : So called RCWV (Rated Continuous Working Voltage) is determined by

$$RCWV = \sqrt{Rated\,Power \times Resistance\,Value}$$ or Max. RCWV listed above, whichever is lower.

MECHANICAL DATA (unit : mm)



6.DIMENSIONS (unit : mm)

Symbol	HV12	HV0A	HV06	HV05	HV03
L	6.30 ± 0.15	5.00 ± 0.15	3.20 ± 0.15	2.00 ± 0.10	1.60 ± 0.10
W	3.20 ± 0.15	2.50 ± 0.150	1.60 ± 0.15	1.25 ± 0.10	0.80 +0.15/-0.05
T	0.550 ± 0.15	0.55 ± 0.15	0.55 ± 0.10	0.55 ± 0.10	0.45 ± 0.10
Tt	0.60 ± 0.20	0.60 ± 0.20	0.50 ± 0.25	0.40 ± 0.20	0.30 ± 0.10
Tb	0.60 ± 0.20	0.60 ± 0.20	0.50 ± 0.25	0.40 ± 0.20	0.30 ± 0.10

7 . FUNCTIONAL DESCRIPTION

7.1 Product characterization

Standard values of nominal resistance are taken from the E24/E96 series for resistors with a tolerance of ±1%, ±5%. The values of the E24/E96 series are in accordance with “IEC publication 60063”.

7.2 Derating curve

The power that the resistor can dissipate depends on the operating temperature; see Fig.2

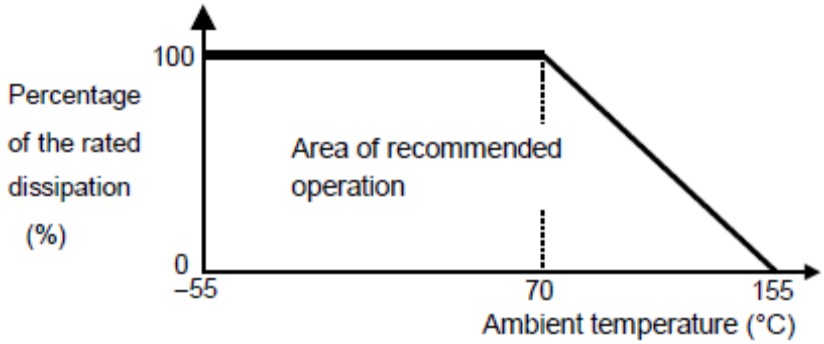


Figure 2 Maximum dissipation in percentage of rated power as a function of the ambient temperature

7.3 MOUNTING

Chip placement can be on ceramic substrates and printed-circuit boards (PCBs).

Electrical connection to the circuit is by individual soldering condition.

The end terminations guarantee a reliable contact.

7.4 SOLDERING CONDITION

The robust construction of chip resistors allows them to be completely immersed in a solder bath of 260°C for 10 seconds. Therefore, it is possible to mount Surface Mount Resistors on one side of a PCB and other discrete components on the reverse (mixed PCBs).

Surface Mount Resistors are tested for solderability at 235°C during 2 seconds. The test condition for no leaching is 260°C for 30 seconds. Typical examples of soldering processes that provide reliable joints without any damage are given in Fig 3.

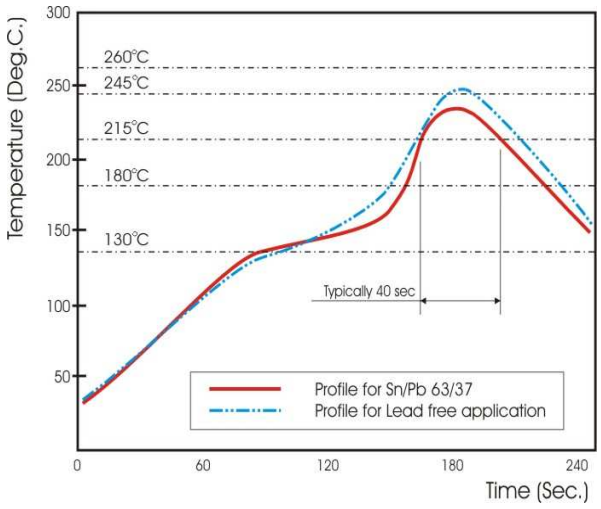


Fig 3. Infrared soldering profile

7.5 TEST AND REQUIREMENTS(JIS C 5201-1 : 1998)

Essentially all tests are carried out according to the schedule of IEC publication 115-8, category **LCT**/**UCT**/56(rated temperature range : **L**ower **C**ategory **T**emperature, **U**pper **C**ategory **T**emperature; damp heat, long term, 56 days). The testing also meets the requirements specified by EIA, EIAJ and JIS.

The tests are carried out in accordance with IEC publication 68, “Recommended basic climatic and mechanical robustness testing procedure for electronic components” and under standard atmospheric conditions according to IEC 60068-1, subclause 5.3. Unless otherwise specified, the following value supplied :

Temperature: 15°C to 35°C.

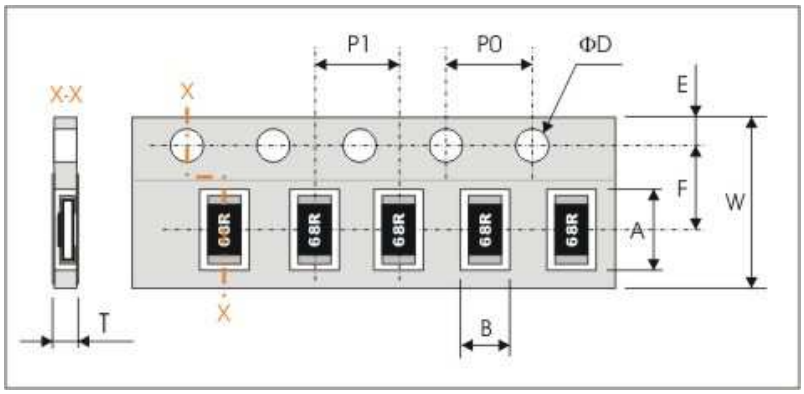
Relative humidity: 45% to 75%.

Air pressure: 86kPa to 106 kPa (860 mbar to 1060 mbar).

TEST	PROCEDURE	REQUIREMENT
Temperature Coefficient of Resistance(T.C.R) **Clause 4.8**	Natural resistance change per change in degree centigrade. $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6$ (ppm/°C) R_1 : Resistance at reference temperature R_2 : Resistance at test temperature t_1 : 20℃+5℃-1℃	Refer to “QUICK REFERENCE DATA”
Short time overload (S.T.O.L) **Clause 4.13**	Permanent resistance change after a 2 second application of a voltage 2.5 times RCWV or the maximum overload voltage specified in the above list, whichever is less.	No visible damage ΔR/R max. ±(1%+0.05Ω)
Resistance to soldering heat(R.S.H) **Clause 4.18**	Un-mounted chips completely immersed for 10±1second in a SAC solder bath at 260℃±5°C	no visible damage ΔR/R max. ±(1%+0.05Ω)
Solderability **Clause 4.17**	Un-mounted chips completely immersed for 2±0.5second in a SAC solder bath at 235℃±5℃	good tinning (>95% covered) no visible damage
Temperature cycling **Clause 4.19**	30 minutes at -55°C±3°C, 2~3 minutes at 20℃+5℃-1℃, 30 minutes at +155°C±3°C, 2~3 minutes at 20℃+5℃-1℃, total 5 continuous cycles	no visible damage ΔR/R max. ±(1%+0.05Ω)
Load life (endurance) **Clause 4.25**	1000 +48/-0 hours, loaded with RCWV or Vmax in chamber controller 70±2°C, 1.5 hours on and 0.5 hours off	no visible damage ΔR/R max. ±(5%+0.1Ω)
Load life in Humidity **Clause 4.24**	1000 +48/-0 hours, loaded with RCWV or Vmax in humidity chamber controller at 40°C±2°C and 95% relative humidity, 1.5hours on and 0.5 hours off	no visible damage ΔR/R max. ±(5%+0.1Ω)
Endurance at high temperature **Clause 4.25.3**	155°C, no load, 1000hours	no visible damage ΔR/R max. ±(5%+0.1Ω)
Bending strength **Clause 4.33**	Resistors mounted on a 90mm glass epoxy resin PCB(FR4), 2512, 2010 bending : 1 mm once for 10 seconds 1206, 0805, 0603 bending: 3mm once for 10 seconds	ΔR/R max. ±(1%+0.05Ω)
Adhesion **Clause 4.32**	Pressurizing force: 5N, Test time: 10±1sec.	No remarkable damage or removal of the terminations
Insulation Resistance **Clause 4.6**	Apply the maximum overload voltage (DC) for 1minute	R≧1GΩ
Dielectric Withstand Voltage **Clause 4.7**	Apply the maximum overload voltage (AC) for 1 minute	No breakdown or flashover

8 . PACKAGING

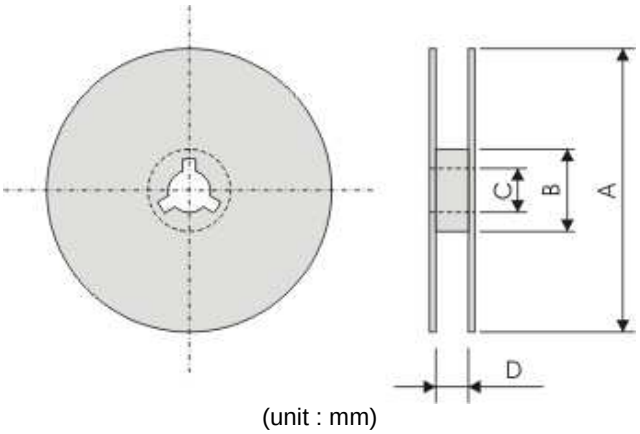
8.1 Tape specifications (unit :mm)



Series No.	A	B	W	F	E
HV12	6.90±0.20	3.60±0.20	12.00±0.30	5.50±0.10	1.75±0.10
HV0A	5.50±0.20	3.10±0.20			
HV06	3.60±0.20	2.00±0.15	8.00±0.30	3.50±0.20	1.75±0.10
HV05	2.50±0.20	1.65±0.15	8.00±0.30	3.50±0.20	1.75±0.10
HV03	1.90±0.20	1.15±0.15	8.00±0.30	3.50±0.20	1.75±0.10

Series No.	P1	P0	ΦD	T
HV12	4.00±0.10	4.00±0.10	$\Phi 1.50^{+0.1}_{-0.0}$	1.1±0.15
HV0A				
HV06				Max. 1.0
HV05				
HV03				Max. 0.8

8.2 Reel dimensions



(unit : mm)

Reel / Tape	A	B	C	D
7” reel for 12mm tape	Φ180.0+0/-1.5	Φ60.0+1/0	13.0±0.2	13+1/0
7” reel for 8mm tape				9+1/0

8.3 Taping Quantity:

Tape	Paper Tape						Embossed Tape	Bulk Cassette
	4mm pitch			2mm pitch			4mm pitch	
	7"	10"	13"	7"	10"	13"	7"	
0603	5000	10000	20000	10000	20000	-	-	20000
0805	5000	10000	20000	-	-	-	-	10000
1206	5000	10000	20000	-	-	-	-	5000
2010	4000	-	-	-	-	-	-	-
2512	4000	-	-	-	-	-	-	-

9.Performance of Taping :

9.1.Strength of Carrier Tape and Top Cover Tape

-Carrier Tape

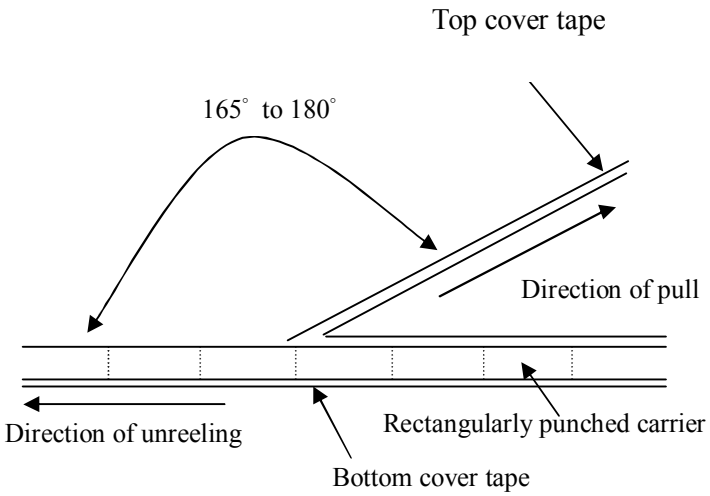
When a tensile force 1.02kgf is applied in the direction of unreeling the tape, the tape shall withstand this force.

-Top cover Tape

When a tensile force 1.02kgf is applied to the tape, the tape shall withstand this force.

9.2 Peel Force of Top Cover Tape

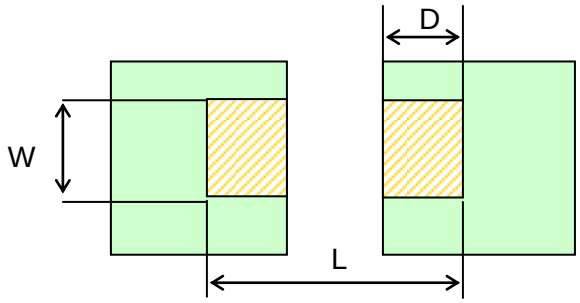
Unless otherwise specified, the peel force of top cover tape shall be 10.2 to 71.4 g f when the top cover tape is pulled at a speed of 300mm/min with the angle between the taped during peel and the direction of unreeling maintained at 165 to 180°as illustrated in Fig.



10.Resistance Marking Explanation:

Size	E-24	E-96
0603 (1608)	3-digits marking	**No Marking**
0805 (2012) **1206 (3216)** **2010 (5025)** **2512(6332)**	3-digits marking 123= 12KW 1%, 5% 105= 1MW 1% , 5%	4-digits marking 49R9 = 49.9W 1% 3-digits marking 105= 1MW 1% , 5%

11.Recommended Solder Pad Dimensions



Type	W (mm)	L (mm)	D (mm)
01(0201)	0.25~0.3	0.7~0.9	0.3~0.4
02(0402)	0.5~0.6	1.4~1.6	0.4~0.6
03(0603)	0.7~0.9	2.0~2.2	0.8~1.0
05(0805)	1.0~1.4	3.2~3.8	0.9~1.4
06(1206)	2.0~2.4	4.4~5.0	1.2~1.8
10(1210)	2.0~2.4	4.4~5.0	2.3~3.5
0A(2010)	3.3~3.7	5.7~6.5	2.3~3.5
12(2512)	3.6~4.0	7.8~8.6	2.3~3.5

Note :

Due to their rectangular shapes and small tolerances, Surface Mountable Resistors are suitable for handling by automatic placement systems.

Chip placement can be on ceramic substrates and printed-circuit boards (PCBs).

Electrical connection to the circuit is by individual soldering condition.

The end terminations guarantee a reliable contact.