承 認 規 格 書
SPECIFICATION

客戶名稱 CUSTOMER： 欣旺達電子

品名規格 DESCRIPTION：貼片電阻系列

增加專案 ADDITIONAL ITEM：

承認 APPROVED BY：

廠商 VENDOR		客戶 CUSTOMER		
CHECKED 確 認	APPROVED 承 認	CHECKED 確 認	APPROVED 承 認	APPROVED 承 認
DATE（日期）		DATE（日期）		

京亮（香港）有限公司
東華電子（深圳）有限公司
DONGHUA ELECTRONICS （SHEN ZHEN）CO.,LTD
TEL：0755-27800603 27800199 27831233 FAX：0755-27808163
地址：深圳寶安 26 區裕安路全寶小區 A 棟 2 樓
Add：2nd/F.Bldg a.QuanBao Gardon. YuAnRoad.26th District BaoAn.ShenZhen

FEATURE

1. High reliability and stability
2. Reduced size of final equipment
3. Lower assembly costs
4. Higher component and equipment reliability

APPLICATION

- Consumer electrical equipment
- Automotive application
- EDP, Computer application
- Telecom application

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 within tolerance by laser cutting 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 Lead-tin solder alloy.

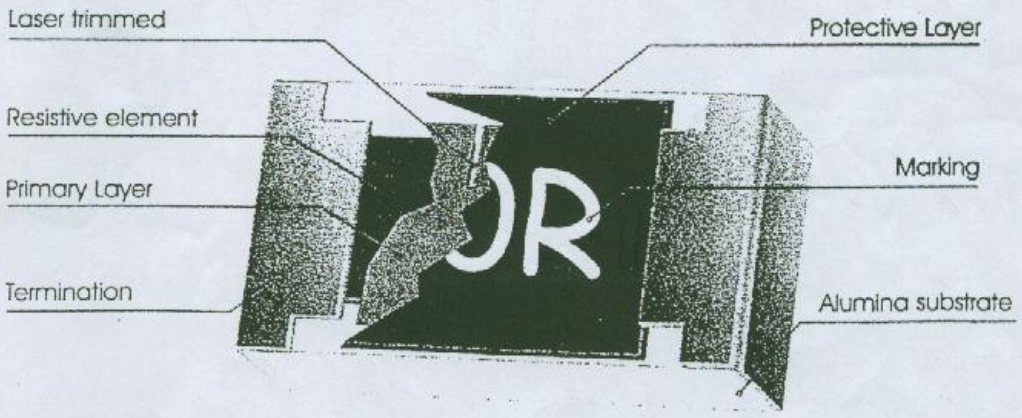


Fig 1. Consctruction of a Chip-R

QUICK REFERENCE DATA

Item	General Specification		
Series No.	WR12	WR08	WR06
Size code	1206 (3216)	0805 (2012)	0603 (1608)
Resistance Tolerance	±1% (E96 series), ±5% (E24 series)		
Resistance Range	1Ω ~ 10MΩ (±5% tolerance), 10Ω ~ 1MΩ (±1% tolerance)		
TCR (ppm/°C) ≥10Ω ±5% Tolerance ≥10Ω ±1% Tolerance <10Ω	≤ ± 200 ppm/°C ≤ ± 100 ppm/°C -300~+500 ppm/°C		
Max. dissipation at T_{amb}=70°C	1/4 W	1/8 W	1/10 W
Max. Operation Voltage (DC or RMS)	200V	150V	50V
Climatic category (IEC 60068)	55/125/56	55/125/56	55/125/56

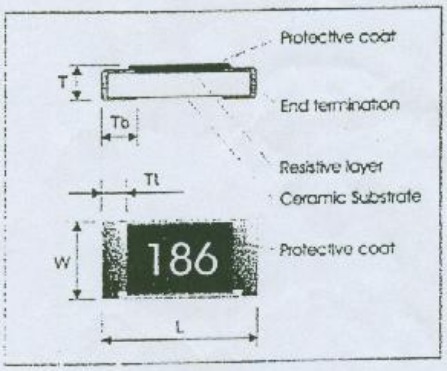
Note :

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.

Dimensions

	WR12	WR08	WR06
L	3.10 ± 0.10	2.00 ± 0.10	1.60 ± 0.10
W	1.60 ± 0.10	1.25 ± 0.10	0.80 ± 0.10
T	0.60 ± 0.15	0.50 ± 0.15	0.45 ± 0.15
Tb	0.45 ± 0.20	0.40 ± 0.20	0.30 ± 0.10
Tt	0.50 ± 0.20	0.40 ± 0.20	0.30 ± 0.10



Marking

Size / tolerance	±5%	±1%
1206	3-digits marking	4-digits marking
0805	3-digits marking	4-digits marking
0603	3-digits marking	No marking (3-digits marking upon requested)

3-digits marking

Each resistor is marked with a three digits code on the protective coating to designate the nominal resistance value.

For values up to 910Ω the R is used as a decimal point. For values of 1KΩ or greater the first 3 digits apply to the resistance value and fourth indicate the number of zeros to follow.

4-digits marking

Each resistor is marked with a four digits code on the protective coating to designate the nominal resistance value.

For values of 976Ω the R is used as a decimal point. For values of 1KΩ or greater the first 3 digits are significant, the fourth indicates the number of zeros to follow.

Example

RESISTANCE	10Ω	12Ω	100Ω	6800Ω	47000Ω
3-digits marking	100	120	101	682	473
4-digits marking	10R0	12R0	1000	6801	4702

FUNCTIONAL DESCRIPTION

Product characterization

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

Derating

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

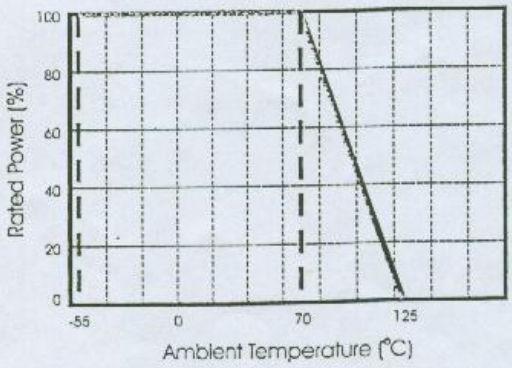


Fig.2 Maximum dissipation in percentage of rated power
As a function of the ambient temperature

MOUNTING

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.

SOLDERING CONDITION

The robust construction of chip resistors allows them to be completely immersed in a solder bath of 260°C for one minute. 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 60 seconds. Typical examples of soldering processes that provide reliable joints without any damage are given in Fig 3.

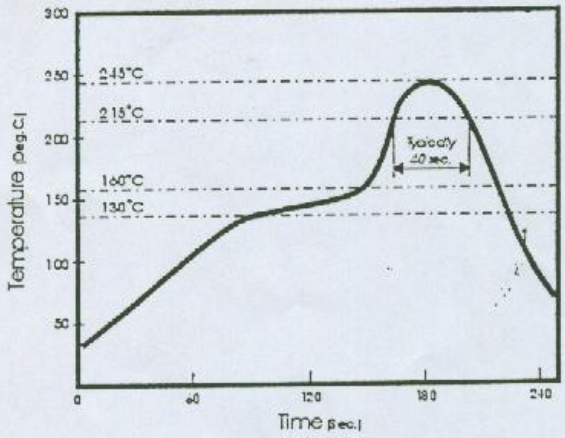


Fig 3. Infrared soldering profile for Chip Resistors

TEST AND REQUIREMENTS

TEST	PROCEDURE	REQUIREMENT	
		Resistor	Jumper
DC resistance	DC resistance values measured at the test voltages specified below : Resistance: <100Ω / <1KΩ / <10KΩ Test voltage: 0.3V / 1.0V / 3.0V Resistance: <100KΩ / <1MΩ / <10MΩ Test voltage: 10V / 25V / 50V	Within the specified tolerance	< 50mΩ
TCR	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 : 25°C	Test temperature –55~+125°C ≥10Ω, ±5% ≤±200ppm/°C ≥10Ω, ±1% ≤±100ppm/°C <10Ω -300~+500ppm/°C	N/a
Short time overload	Permanent resistance change after a 5second application of a voltage 2.5 times RCWV or the maximum overload voltage specified in the above list, whichever is less.	ΔR/R max. ±(2%+0.10Ω)	< 50mΩ
Resistance to soldering heat	Unmounted chips 10±1 seconds, 260±5°C	no visible damage Δ R/R max. ±(1.0%+0.05Ω)	no visible damage, < 50mΩ
Solderability	Unmounted chips completely immersed for 5 seconds in a solder bath at 230±5°C	good tinning (>95% covered) no visible damage	
Temperature cycling	1. 30 minutes at -55°C±3°C, 2. 10~15minutes at room temperature, 3. 30 minutes at +125°±3°C, 4. 10~15minutes at room temperature, 5 continuous cycles	no visible damage ΔR/R max. ±(1%+0.05Ω)	no visible damage, < 50mΩ
Load life (endurance)	70±2°C, 1000 hours, loaded with RCWV or Vmax,1.5 hours on and 0.5 hours off	10Ω~1MΩ ±(3%+0.1Ω) <10Ω or ≥1MΩ ±(5%+0.1Ω)	< 50mΩ
Load life in Humidity (Damp heat)	1000 hours, at rated continuous working voltage in humidity chamber controller at 40°C±2°C and 90~95% relative humidity, 1.5hours on and 0.5 hours off	10Ω~1MΩ ±(3%+0.1Ω) <10Ω or ≥1MΩ ±(5%+0.1Ω)	< 50mΩ
Bending and Termination strength	Resistors mounted on a 90mm glass epoxy resin PCB(FR4); bending : 5 mm, once for 10seconds Pulling test : >500grams	no visible damage ΔR/R max. ±(1%+0.05Ω)	no visible damage, < 50mΩ

TEST CONDITION FOR JUMPER (0 Ω)

Item	WR12	WR08	WR06
Power Rating At 70°C	1/4W	1/8W	1/10W
Resistance	MAX.50mΩ		
Rated Current	2A	1.5A	1A
Peak Current	5A	3.5A	3A
Operating Temperature	-55~125°C		

Catalogue numbers

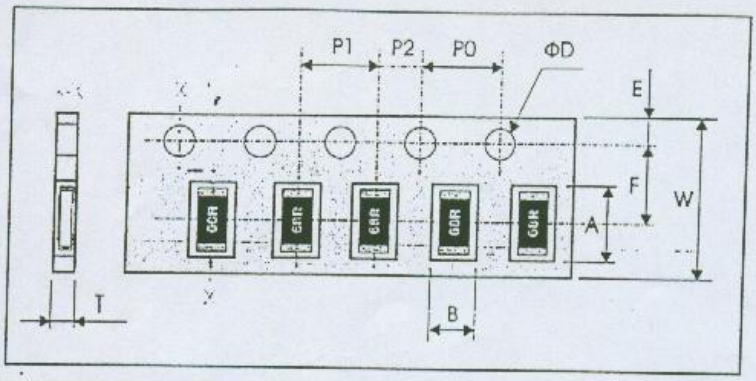
The resistors have a catalogue number starting with .

WR12	X	472	J	T
Size code WR12 : 1206 WR08 : 0805 WR06 : 0603	**Type code** X : Normal Y : Special A : Lead-Free	**Resistance code** E24: 2 significant digits followed by no. of zeros 4.7Ω =4R7 10Ω =100 220Ω =221 Jumper =000 E96: 3 significant digits followed by no. of zeros 102Ω =1020 37.4KΩ =3742	**Tolerance** F : ±1% J : ±5% P : Jumper	**Packaging code** T : Reeled B : Bulk

1. Reeled tape packaging : 8mm width paper taping 5000pcs per reel.
2. Bulk packaging : 5000pcs per polybag

PACKAGING

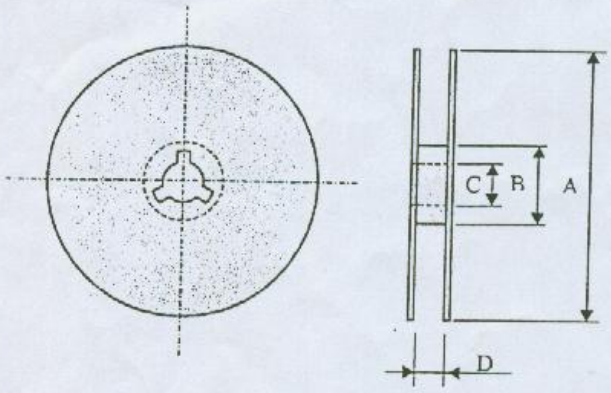
Paper Tape specifications (unit :mm)



Series No.	A	B	W	F	E
WR12	3.60±0.20	2.00±0.20	8.00±0.30	3.50±0.20	1.75±0.10
WR08	2.40±0.20	1.65±0.20	8.00±0.30	3.50±0.20	1.75±0.10
WR06	1.90±0.20	1.10±0.20	8.00±0.30	3.50±0.20	1.75±0.10

Series No.	P1	P2	P0	ΦD	T
WR12 / WR08	4.00±0.10	2.00±0.10	4.00±0.10	$\Phi 1.50^{+0.1}_{-0.0}$	Max. 1.0
WR06	4.00±0.10	2.00±0.10	4.00±0.10	$\Phi 1.50^{+0.1}_{-0.0}$	0.65±0.05

Reel dimensions



Symbol	A	B	C	D
(unit : mm)	Φ178.0±2.0	Φ60.0±1.0	13.0±0.2	9.0±0.5