ALTERNATION HISTORY RECORDS 变更记录

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Part Numbering System

<u>TR</u>	<u>03</u>	<u>J</u>	B	<u>10K</u>
			I	
Series Name Chip Resistor: TR: Triple Power	TypeInch (mm) 03-0603(1608) 05-0805(2012) 06-1206(3216) 12-2512(6432)	Tolerance F= ± 1.0% J= ± 5.0% P=Jumper	Package A=4Kpcs/7"Reel B=5Kpcs/7"Reel C=10Kpcs/7"Reel	Resistance 1R2=1.2 Ω 10K=10K Ω 10K5=10.5K Ω 100K=100K Ω 1M2=1.2M Ω

FEATURE

- 1. Small size and light weight
- 2. High reliability and stability
- 3. Reduced size of final equipment
- 4. High power
- 5. RoHS compliant and Lead free products

APPLICATION

- High accuracy dc-power supply
- Digital multi-meter
- Telecommunication
- Computer
- Automotive industry
- Medical and military equipment

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

QUICK REFERENCE DATA

Туре	Size	Power	Max.	Max.	Resistance	Temperature	Resis	stance	Standard
		Rating	RCWV	Overload	Tolerance	Coefficient	Ra	nge	Resistance
		at 70℃		Voltage		(ppm/℃)	Min.	Max.	Values
					±1%(F)	±100ppm	10Ω	1MΩ	E96/E24
TR03	0603	1/3W	75V	125V	±1%(F)	±200ppm	1Ω	9.76Ω	E96/E24
					±5%(J)	±200ppm	1Ω	1MΩ	E24
					±1%(F)	±100ppm	10Ω	1MΩ	E96/E24
TR05	0805	1/2W	200V	300V	±1%(F)	±150ppm	1Ω	9.76Ω	E96/E24
					±5%(J)	±200ppm	1Ω	1MΩ	E24
TDAC	1000	2/4/4/	2501	5001/	±1%(F)	±100ppm	1Ω	1MΩ	E96/E24
IRUO	1206	3/411	2500	5000	±5%(J)	±200ppm	1Ω	1MΩ	E24
TD40	1210	2/4/4/	2501	5001/	±1%(F)	±100ppm	1Ω	1MΩ	E96/E24
TRIU	1210	3/400	2500	5000	±5%(J)	±200ppm	1Ω	1MΩ	E24
трол	2010	1.514	2501	E001/	±1%(F)	±100ppm	1Ω	1MΩ	E96/E24
IKUA	2010	1.500	2500	5000	±5%(J)	±200ppm	1Ω	1MΩ	E24
TD42	2512	214/	2501/	5001/	±1%(F)	±100ppm	1Ω	1MΩ	E96/E24
	2012	300	2500	5000	±5%(J)	±200ppm	1Ω	1MΩ	E24

Application Note : RCWV=(P×R)^{1/2} or Max. RCWV listed above, whichever is lower.

 $\mathsf{RCWV}:\mathsf{Working}\;\mathsf{Voltage}\;(\mathsf{V})\mathrel{,}\mathsf{P}:\mathsf{Rated}\;\mathsf{Power}\;(\mathsf{W})\mathrel{,}\mathsf{R}:\mathsf{Resistance}\;\mathsf{Value}\;(\Omega)$

Solder-pad and trace size should be evaluated and board surface temperature should not exceed 105° C when applied full rated power.

High Current Power Jumpers:

Туре	Size	Description	Max. Rated Current	Max. Overload Current	Resistance
TR03	0603	Zero Ohm · Jumper	6 A	12 A	\leq 10m Ω
TR05	0805	Zero Ohm · Jumper	7 A	14 A	\leq 10m Ω
TR06	1206	Zero Ohm , Jumper	9 A	18 A	$\leq 10m\Omega$
TR0A	2010	Zero Ohm · Jumper	12 A	24 A	\leq 10m Ω
TR12	2512	Zero Ohm · Jumper	14 A	28 A	$\leq 10m\Omega$

DIMENSIONS (unit : mm)



Туре	TR03	TR05	TR06	TR10	TR0A	TR12
L	1.60 ± 0.10	2.00 ± 0.10	$\textbf{3.10}\pm\textbf{0.10}$	$\textbf{3.10} \pm \textbf{0.10}$	5.00 ± 0.20	$\textbf{6.40} \pm \textbf{0.20}$
W	$\textbf{0.80} \pm \textbf{0.10}$	1.25 ± 0.10	1.60 ± 0.10	$\textbf{2.60} \pm \textbf{0.10}$	2.50 ± 0.20	$\textbf{3.20} \pm \textbf{0.25}$
Tt	0.30 ± 0.20	$\textbf{0.40} \pm \textbf{0.20}$	$\textbf{0.50} \pm \textbf{0.25}$	0.50 ± 0.25	$\textbf{0.65} \pm \textbf{0.25}$	0.45 ± 0.25
Tb	0.30 ± 0.20	0.40 ± 0.20	$\textbf{0.50} \pm \textbf{0.25}$	0.50 ± 0.25	0.60 ± 0.25	1.80 ± 0.25
Т	$\textbf{0.45} \pm \textbf{0.10}$	0.50 ± 0.10	0.55 ± 0.10	0.55 ± 0.10	$\textbf{0.60} \pm \textbf{0.10}$	1.10 ± 0.20

RECOMMENDED SOLDERING PAD DIMENSIONS:

Туре	W	D	L
TR03	0.90	1.00	3.00
TR05	1.30	1.15	3.50
TR06	1.80	1.30	4.70
TR10	3.00	1.30	4.70
TR0A	3.00	1.50	6.80
TR12	3.70	2.45	7.60

Unit:mm



MARKING

E24 $\pm 5\%$: 3 Digits marking to identify the resistance value 0603/0805/1206



E24/E96 ±1% : 4 Digits marking to identify the resistance value 0805/1206



E24 $\pm 1\%$: 3 Digits marking to identify the resistance value 0603



E96 $\pm 1\%$: 3 Digits marking to identify the resistance value 0603



Appendix

0603	1%	Marking	Table	(Table	1)
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Code	E48	E96	Code	E48	E96	Code	E48	E96	Code	E48	E96
01	100	100	25	178	178	49	316	316	73	562	562
02		102	26		182	50		324	74		576
03	105	105	27	187	187	51	332	332	75	590	590
04		107	28		191	52		340	76		604
05	110	110	29	196	196	53	348	348	77	619	619
06		113	30		200	54		357	78		634
07	115	115	31	205	205	55	365	365	79	649	649
08		118	32		210	56		374	80		665
09	121	121	33	215	215	57	383	383	81	681	681
10		124	34		221	58		392	82		698
11	127	127	35	226	226	59	402	402	83	715	715
12		130	36		232	60		412	84		732
13	133	133	37	237	237	61	422	422	85	750	750
14		137	38		243	62		432	86		768
15	140	140	39	249	249	63	442	442	87	787	787
16		143	40		255	64		453	88		806
17	147	147	41	261	261	65	464	464	89	825	825
18		150	42		267	66		475	90		845
19	154	154	43	274	274	67	487	487	91	866	866
20		158	44		280	68		499	92		887
21	162	162	45	287	287	69	511	511	93	909	909
22		165	46		294	70		523	94		931
23	169	169	47	301	301	71	536	536	95	953	953
24		174	48		309	72		549	96		976
Code		4	P	c D	F	F	G	ш	v	v	7
Multi-1		100	101 1	$\frac{1}{0^2}$ $\frac{1}{10}$	3 10	4 10.5	106	107	10 1	10-2	10-3
Multiple	ier	10 -	10. 1	0 - 10	10	10	10 °	10 '	10 .	10 -	10 -

FUNCTIONAL DESCRIPTION

Product characterization

Standard values of nominal resistance are taken from the E96&E24 series for resistors with a tolerance of $\pm 1\%, \pm 5\%$. The values of the E96/E24 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

STORAGE TEMPERATURE

... Products are recommended to be used up within one year as ensured shelf life.

Check solder ability in case shelf life extension is needed.

... To store products with following condition:

Temperature:5 to 40℃ ; Humidity: 20 to 70% relative humidity.

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 for Chip Resistors

TEST AND REQUIREMENTS

Basic specification : JIS C 5201-1 : 1998

TEST	PROCEDURE	REQUIREMENT
Clause 4.8 Temperature Coefficient of Resistance (TCR)	Natural resistance change per change in degree centigrade. $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{ (ppm/°C)}$ R ₁ : Resistance at reference temperature R ₂ : Resistance at test temperature t ₁ : 25°C+1°C-1°C.	Refer to quick reference data for T.C.R specification
Clause 4.18 Resistance to soldering heat(R.S.H)	Un-mounted chips completely immersed for 10 ± 1 second in a SAC solder bath at 260° C $\pm5^\circ$ C.	No visible damage J: Δ R/R max. : $\leq \pm$ (1%+0.05 Ω) F: Δ R/R max. : $\leq \pm$ (0.5%+0.05 Ω) Jumper : \leq 10m Ω
Clause 4.17 Solderability	Un-mounted chips completely immersed for 3 ± 0.5 second in a SAC solder bath at $245^{\circ}C\pm2^{\circ}C$.	Good tinning (>95% covered) No visible damage
Clause 4.33 Bending strength	Resistors mounted on a 90mm glass epoxy resin PCB(FR4); bending : 2 mm, once for 10 seconds.	No visible damage J: Δ R/R max. $\leq \pm (1\%+0.05\Omega)$ F: Δ R/R max. : $\leq \pm (0.5\%+0.05\Omega)$ Jumper : $\leq 10m\Omega$
Clause 4.13 Short time overload	5 × Rated power for 5 sec. Measure resistance after 30 minutes.	$\begin{array}{l} J: \ \Delta R/R \ max.: \leq \ \pm (2\% + 0.05\Omega) \\ F: \ \Delta R/R \ max.: \leq \pm (1\% + 0.05\Omega) \\ Jumper: \ \leq 10m\Omega \end{array}$
Clause 4.25 Load life (endurance)	1000 +48/-0 hours, loaded with RCWV or Vmax in chamber controller $70\pm2^\circ\text{C}$, 1.5 hours on and 0.5 hours off.	No visible damage J: Δ R/R max. $\leq \pm(3\%+0.05\Omega)$ F: Δ R/R max. : $\leq \pm(1\%+0.05\Omega)$ Jumper : $\leq 10m\Omega$
Clause 4.24 Load life in Humidity	1000 +48/-0 hours, loaded with RCWV or Vmax in humidity chamber controller at 40°C±2°C and 90~95% relative humidity, continuous on.	No visible damage J: $\Delta R/R \max \le \pm (3\%+0.05\Omega)$ F: $\Delta R/R \max : \le \pm (1\%+0.05\Omega)$ Jumper : $\le 10m\Omega$
Clause 4.19 Temperature cycling	 30 minutes at -55°C±3°C, 2~3 minutes at 20°C+5°C-1°C, 30 minutes at +155°±3°C, 2~3 minutes at 20°C+5°C-1°C, Total 5 continuous cycles. 	No visible damage J: Δ R/R max. $\leq \pm (1\%+0.05\Omega)$ F: Δ R/R max. : $\leq \pm (0.5\%+0.05\Omega)$ Jumper : ≤ 10 m Ω
Clause 4.6 Insulation Resistance	Apply the insulation voltage 100+15Vdc for 1minute.	$R \ge 1G\Omega$

PACKAGING

Tape specifications (unit :mm)



Series No.	А	В	W	F	E
TR03	1.90±0.20	1.10±0.20	8.00±0.30	$3.50{\pm}0.05$	1.75±0.10
TR05	2.40±0.20	1.65±0.20	8.00±0.30	3.50±0.05	1.75±0.10
TR06	3.60±0.20	2.00±0.20	8.00±0.30	3.50±0.05	1.75±0.10
TR10	3.60±0.20	3.00±0.20	8.00±0.30	3.50±0.05	1.75±0.10
TR0A	5.50±0.20	2.80±0.20	12.00±0.30	5.50±0.05	1.75±0.10
TR12	6.70±0.20	3.50±0.20	12.00±0.30	5.50±0.05	1.75±0.10

Series No.	P1	P0	ΦD	Т
TR03	4.00±0.10	4.00±0.10	Φ 1.50 ^{+0.1} 0.0	Max. 0.80
TR05	4.00±0.10	4.00±0.10	Φ 1.50 ^{+0.1} 0.0	Max. 1.00
TR06	4.00±0.10	4.00±0.10	Φ 1.50 ^{+0.1} 0.0	Max. 1.00
TR10	4.00±0.10	4.00±0.10	Φ 1.50 ^{+0.1} _{-0.0}	Max. 1.00
TR0A	4.00±0.10	4.00±0.10	Φ 1.50 ^{+0.1} _{-0.0}	Max. 1.00
TR12	4.00±0.10	4.00±0.10	Φ 1.50 ^{+0.1} _{-0.0}	Max. 1.50

Reel dimensions



Symbol	A	В	С	D
7" 8mm tape	Φ178.0±2.0	Φ60.0±1.0	13.0±0.2	9.0+1/-0
7" 12mm tape	Φ178.0±2.0	Φ60.0±1.0	13.0±0.5	13.8±1.5