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File Name: TR03、TR05、TR06 SERIES	Date	2015.04.23	Edition No.	1
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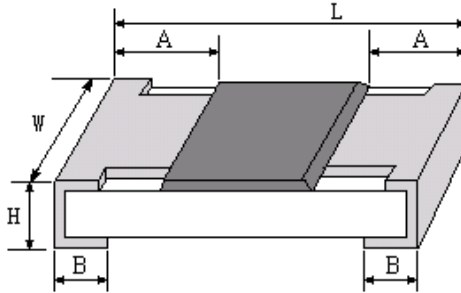
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Edition	Prescription of amendment	Amend Page	Amend Date	Amended by	Checked by

1.0 Scope:

This sheet is the statement of the Trimmable Thick Film Chip Resistors specification that ROYALOHM productions can meet.

2.0 Ratings & Dimension:

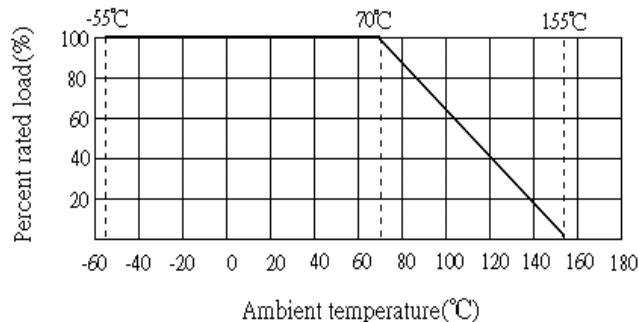


Dimension (mm)

Type		TR03	TR05	TR06
Power Rating at 70°C		1/16W (1/10WS)	1/10W (1/8WS)	1/8W 1/4WS
Dimension(mm)	L	1.60±0.10	2.00±0.15	3.10±0.15
	W	0.80±0.10	1.25+0.15/-0.10	1.55+0.15/-0.10
	H	0.45±0.10	0.55±0.10	0.55±0.10
	A	0.30±0.20	0.40±0.20	0.45±0.20
	B	0.30±0.20	0.40±0.20	0.45±0.20
Max Working Voltage		75V	150V	200V
Max Overload Voltage		150V	300V	400V
Resistance Range		1Ω~1MΩ	1Ω~1MΩ	1Ω~1MΩ
Tolerance		0~30%、0~20%、0~10%、-10~0%、-20~0%、-30~0%、±10%、±20%、±5%		
Operating Temperature		-55 ~ +155°C		

3.0 Power Rating:

Resistors shall have a power rating based on continuous load operation at an ambient temperature from -55°C to 70°C. For temperature in excess of 70°C, the load shall be derate as shown in figure 1



3.1 Voltage rating:

Resistors shall have a rated direct-current (DC) continuous working voltage or an approximate sine-wave root-mean-square (RMS) alternating-current (AC) continuous working voltage at commercial-line frequency and waveform corresponding to the power rating, as determined from the following formula:

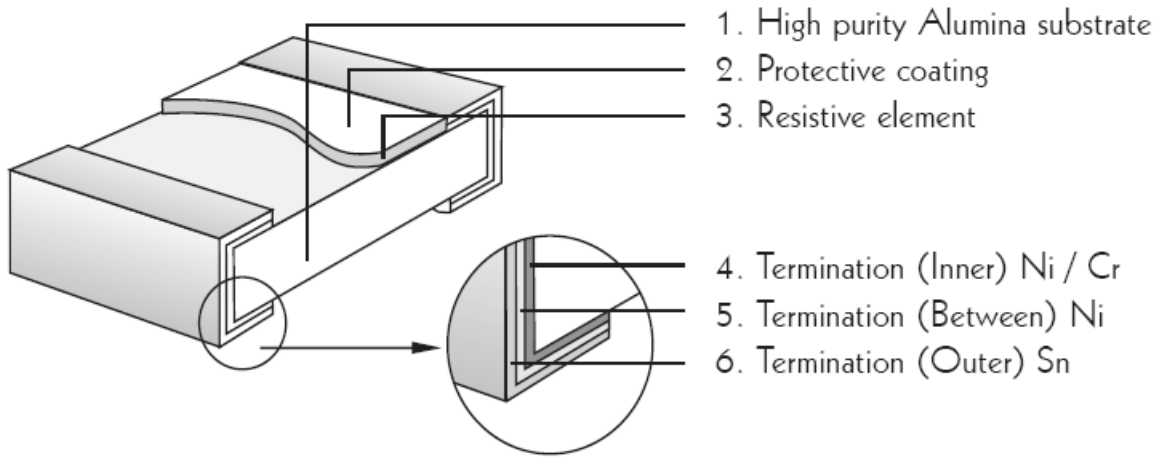
$$RCWV = \sqrt{P * R}$$

Where: RCWV= Rated dc or RMS ac continuous working voltage at commercial-line frequency and waveform (VOLT.)

P=power Rating (WATT.) R=nominal Resistance (OHM)

In no case shall the rated dc or RMS ac continuous working voltage be greater than the applicable maximum value.

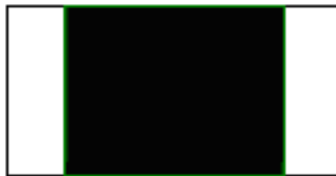
4.0 Structure:



5.0 Marking:

(1) Trimmable Thick Film Chip Resistors, there is no marking on the body.

Example:



6.0 Performance Specification:

Characteristic	Limits	Test Method (JIS-C-5201&5202)
Temperature Coefficient	TR03: 1Ω~10Ω: ±400PPM/°C >10Ω: ±200PPM/°C	4.8 natural resistance changes per temp. Degree centigrade $\frac{R_2 - R_1}{R_1(T_2 - T_1)} \times 10^6 \text{ (PPM/°C)}$ R ₁ : resistance value at room temp. (T ₁) R ₂ : resistance value at room temp. +100°C (T ₂) Test pattern: room temp. (T ₁), room temp. +100°C (T ₂)
	TR05、TR06: ±200PPM/°C	

Short-time overload	$\pm(2.0\%+0.1\Omega)$	4.13 Permanent resistance change after the application of 2.5 times RCWV for 5 seconds.															
Terminal bending	$\pm(1.0\%+0.05\Omega)$	4.33 Twist of test board: Y/x = 3/90 mm for 60Seconds															
Solderability	95% coverage min.	Wave solder: Test temperature of solder: $245^{\circ}\text{C}\pm 3^{\circ}\text{C}$ dipping time in solder: 2-3 seconds.															
Soldering heat	Resistance change rate must be in $\pm(1.0\%+0.05\Omega)$	4.18 dip the resistor into a solder bath having a temperature of $260^{\circ}\text{C}\pm 5^{\circ}\text{C}$ and hold it for 10 ± 1 seconds.															
Temperature cycling	$\pm(1.0\%+0.05\Omega)$	4.19 Resistance change after continuous five cycles for duty cycle specified below: <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>STEP</th> <th>TEMPERATURE</th> <th>TIME</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>$-55^{\circ}\text{C}\pm 3^{\circ}\text{C}$</td> <td>30 MINS</td> </tr> <tr> <td>2</td> <td>ROOM TEMP.</td> <td>10 --- 15 MINS</td> </tr> <tr> <td>3</td> <td>$+155^{\circ}\text{C}\pm 2^{\circ}\text{C}$</td> <td>30 MINS</td> </tr> <tr> <td>4</td> <td>ROOM TEMP.</td> <td>10 --- 15 MINS</td> </tr> </tbody> </table> *Step1-4 Continuous 5 cycles	STEP	TEMPERATURE	TIME	1	$-55^{\circ}\text{C}\pm 3^{\circ}\text{C}$	30 MINS	2	ROOM TEMP.	10 --- 15 MINS	3	$+155^{\circ}\text{C}\pm 2^{\circ}\text{C}$	30 MINS	4	ROOM TEMP.	10 --- 15 MINS
STEP	TEMPERATURE	TIME															
1	$-55^{\circ}\text{C}\pm 3^{\circ}\text{C}$	30 MINS															
2	ROOM TEMP.	10 --- 15 MINS															
3	$+155^{\circ}\text{C}\pm 2^{\circ}\text{C}$	30 MINS															
4	ROOM TEMP.	10 --- 15 MINS															
Load life in humidity	$\pm(3.0\%+0.1\Omega)$	7.9 Resistance change after 1,000 hours (1.5 hours "ON", 0.5 hour "OFF") at RCWV in a humidity chamber controlled at $40^{\circ}\text{C}\pm 2^{\circ}\text{C}$ and 90 to 95% relative humidity.															
Load life	$\pm(3.0\%+0.1\Omega)$	4.25.1 Permanent resistance change after 1,000 hours operating at RCWV with duty cycle 1.5 hours "ON", 0.5 hour "OFF" at $70^{\circ}\text{C}\pm 2^{\circ}\text{C}$ ambient.															

7.0 Explanation of Part No. System:

The standard Part No. includes 14 digits with the following explanation:

7.1 This is to indicate the Trimmable Thick Film Chip Resistors.

Example: TR03、TR05、TR06

7.2 5th~6th digits:

7.2.1 This is to indicate the wattage or power rating. To distinguish the size and the numbers, the following codes are used; and please refer to the following chart for details:

W=Normal Size; S=Small Size; And "1" ~ "16" as Hexadecimal:

1/16W~ 1W:

Wattage	1/2	1/3	1/4	1/5	1/6	3/4	1/8	1/10	1/16	1
Normal Size	W2	W3	W4	W5	W6	/	W8	WA	WG	1W
Small Size	S2	S3	S4	S5	S6	07	S8	SA	SG	1S

7.2.2 For power rating less than 1 watt, the 5th digit will be the letters "W" or "S" to represent the size required & the 6th digit will be a number or a letter code.

Example: WA=1/10W; S4=1/4W-S

7.3 The 7th digit is to denote the Resistance Tolerance. The following letter code is to be used for indicating the standard Resistance Tolerance.

R=0~30% Q=0~20% N=0~-20% P= 0~-30% K= $\pm 10\%$ M= $\pm 20\%$

7.4 The 8th to 11th digits is to denote the Resistance Value.

7.4.1 For the standard resistance values of E-24 series in 5%&10% tolerance, the 8th digit is “0” ,the 9th & 10th digits are to denote the significant figures of the resistance and the 11th digit is the number of zeros following;

For the standard resistance values of E-96 series in $\leq 2\%$ tolerance, the 8th digit to the 10th digits is to denote the significant figures of the resistance and the 11th digit is the zeros following.

7.4.2 The following number s and the letter codes as to be used to indicate the number of zeros in the 11th digit:

0=10⁰ 1=10¹ 2=10² 3=10³ 4=10⁴ 5=10⁵ 6=10⁶ J=10⁻¹ K=10⁻² L=10⁻³ M=10⁻⁴

7.4.3 The 12th, 13th & 14th digits.

The 12th digit is to denote the Packaging Type with the following codes:

C=Bulk in (Chip Product)

T=Tape/Reel

7.4.4 The 13th digit is normally to indicate the Packing Quantity of Tape/Box & Tape/Reel packaging types.

The following letter code is to be used for some packing quantities:

3=3000pcs 4=4000pcs 5=5000pcs C=10000pcs D=20000pcs E=15000pcs

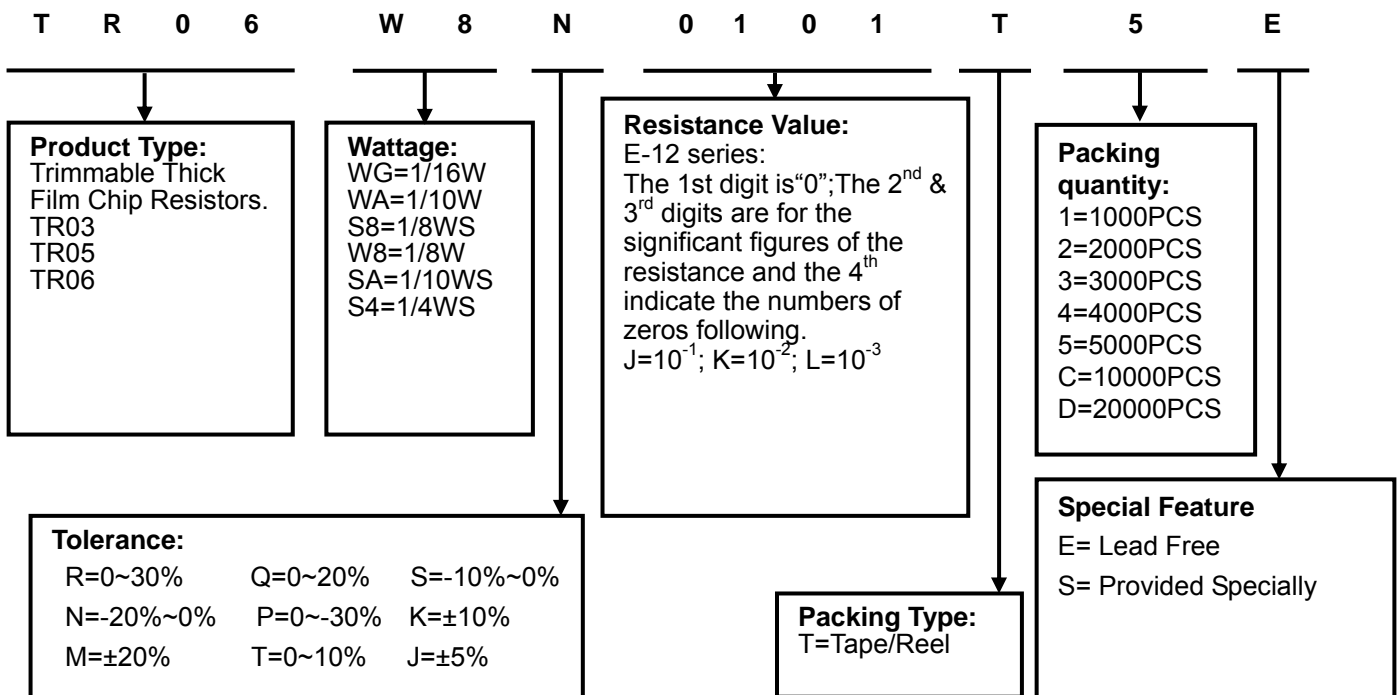
Chip Product: BD=B/B-20000pcs TC=T/R-10000pcs

7.4.6 For some items, the 14th digit alone can use to denote special features of additional information with the following codes:

E= For “Environmental Protection, Lead Free type” .

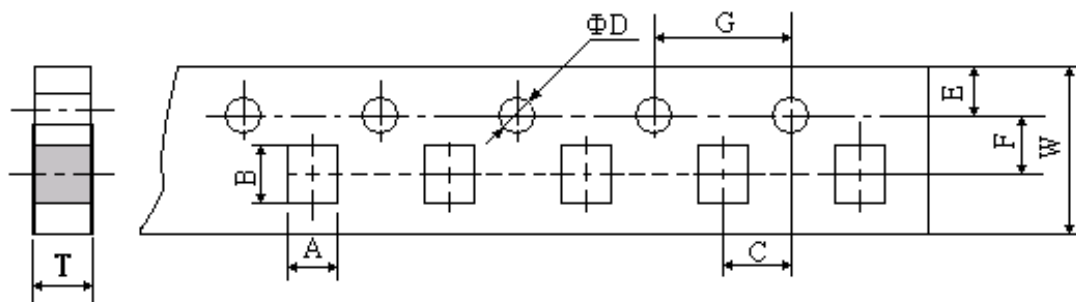
S= Provided Specially.

8.0 Ordering Procedure (Example: TR06 1/8W -20%~ 0% 100Ω T/R-5000)



9.0 Packaging:

9.1 Tapping Dimension:

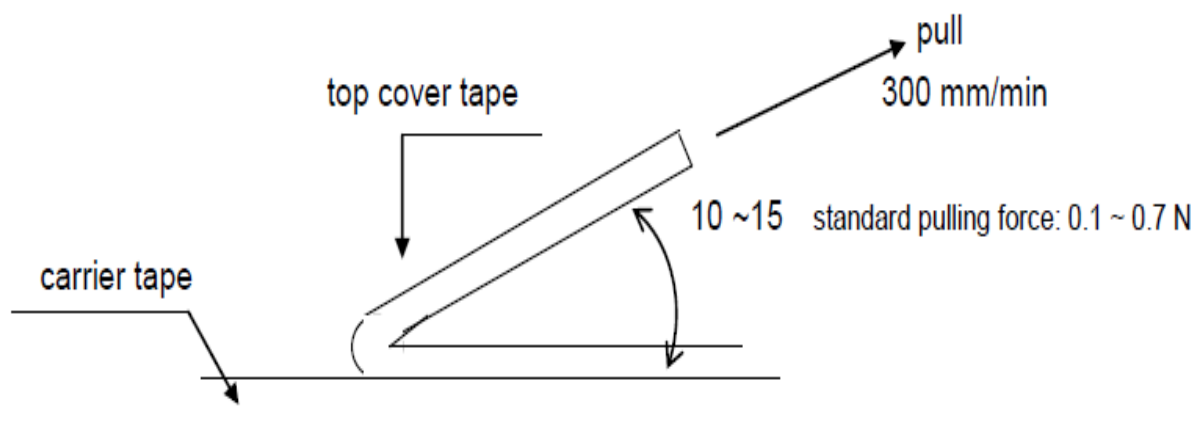


UNIT: mm

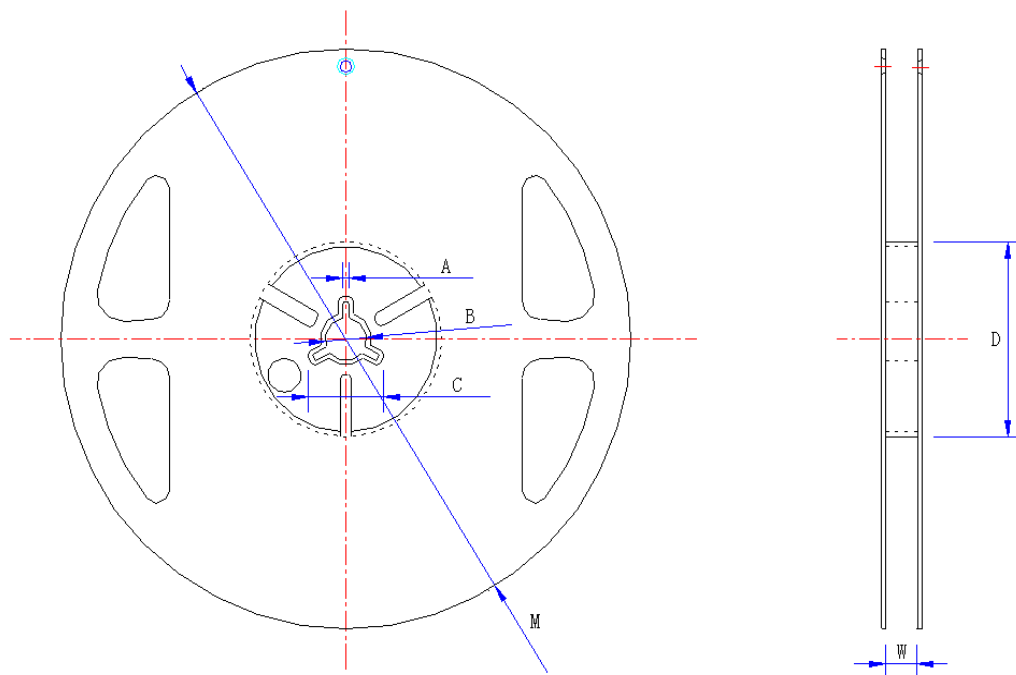
TYPE	A ± 0.2	B ± 0.2	C ± 0.05	ϕD + 0.1 - 0	G ± 0.1	E ± 0.1	F ± 0.05	W ± 0.2	T ± 0.10
TR03	1.10	1.90	2.00	1.50	4.00	1.75	3.50	8.00	0.67
TR05	1.65	2.40	2.00	1.50	4.00	1.75	3.50	8.00	0.81
TR06	2.00	3.60	2.00	1.50	4.00	1.75	3.50	8.00	0.81

9.2 Peeling Strength of Top Cover Tape:

Test Condition: 0.1 to 0.7 N at a peel-off speed of 300 mm / min.



9.3 Dimension:



UNIT: mm

TYPE	TAPING	SIZE	A±0.5	B±0.5	C±0.5	D±1	M±2	W±1
TR03	Paper	5000pcs reel	2.0	13.0	21.0	60.0	178.0	10.0
TR05	Paper	5000pcs reel	2.0	13.0	21.0	60.0	178.0	10.0
TR06	Paper	5000pcs reel	2.0	13.0	21.0	60.0	178.0	10.0

10.0 Precaution for storage/Transportation:

10.1 ROYALOHM recommend the storage condition temperature: 5°C~35°C, humidity :25%~75%RH.
(Put condition for individual product).

Even under ROYALOHM recommended storage condition, solderability of products over 1 year old.
(Put condition for each product) may be degraded.

10.2 Store / transport cartons in the correct direction, which is indicated on a carton as a symbol.

Otherwise bent leads may occur due to excessive stress applied when dropping of a carton.

10.3 Product performance and soldered connections may deteriorate if the products are stored in the following places:

- Storage in high Electrostatic.
- Storage in direct sunshine、rain and snow or condensation.
- Where the products are exposed to sea winds or corrosive gases, including Cl₂, H₂S₃ NH₃, SO₂, NO₂.