APPROVAL SHEET

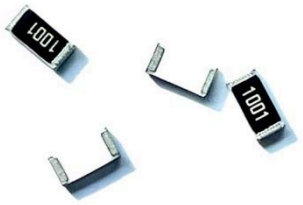
Product Name	**: Thick Film High / Triple Power Chip Resistor**
Part No.	**: TWR**
Description	**: Size 0402~2512**

For more contact information, please refer to our website: www.rideetech.com

Thick Film High / Triple Power Chip Resistor－TWR Series

■ Applications

—Consumer electrical
—Home Appliance
—Computer & relative products
—Power equioment
—Measuring instrument



■ Features

—Small size and light weight
—High quality , reliability

■ Part Number Explanation

TWR	0603	J	10R0	T	U
Product Type	**Size (Inch)**	**Tolerance**	**Resistance**	**Packaging**	**Functional**
Thick Film Ultra High Power Chip Resistor	0402 0603 0805 1206 1210 2010 2512	D：±0.5% F：±1% G：±2% J：±5%	0R00=0Ω 1R00=1Ω 1001=1KΩ 1004=1MΩ	T=Tape & Reel	S=Standard U=Ultra High (Triple) Power M=Meet AEC-Q200

■ Standard Electrical Specifications

Item / Type	Rated Power at 70℃	Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/℃)	Resistance Range	
					F (±1%)	J (±5%)
0402	0.1 W	50V	100V	±200	1Ω≦R≦9.76Ω	1Ω≦R≦9.76Ω
				±100	10Ω≦R≦1MΩ	10Ω≦R≦1MΩ
0603	0.125 W	50V	100V	±200	1Ω≦R≦9.76Ω	1Ω≦R≦1MΩ
				±100	10Ω≦R≦1MΩ	-
0805	0.25 W	150V	300V	±200	-	1Ω≦R≦1MΩ
				±150	1Ω≦R≦9.76Ω	-
				±100	10Ω≦R≦1MΩ	-
1206	0.5 W	200V	400V	±200	-	1Ω≦R≦1MΩ
				±100	1Ω≦R≦1MΩ	-
1210	0.5W	200V	400V	±200	-	1Ω≦R≦1MΩ
				±100	1Ω≦R≦1MΩ	-
2010	1 W	200V	400V	±200	-	1Ω≦R≦1MΩ
				±100	1Ω≦R≦1MΩ	-
2512	2 W	300V	600V	±200	-	1Ω≦R≦1MΩ
				±100	1Ω≦R≦1MΩ	-

- For non-standard parts, please contact our sales dept.
- Operating Temperature Range:-55℃~+155℃
- Functional code: S

Standard Type	0603	0805	1206	1210	2010	2512
Jumper Resistance Value	20mΩ					
Jumper Rated Current	2A	4A			6A	

■ Triple Power Electrical Specifications

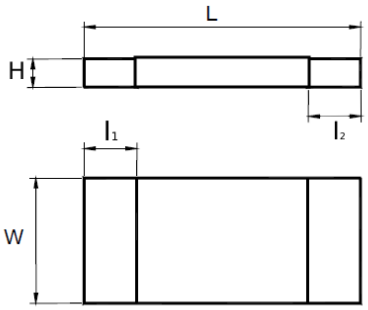
Item / Type	Rated Power at 70℃	Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/℃)	Resistance Range	
					F (±1%)	J (±5%)
0402	0.125W	50V	100V	±200	1Ω≦R≦9.76Ω	1Ω≦R≦9.76Ω
				±100	10Ω≦R≦1MΩ	10Ω≦R≦1MΩ
0603	0.33 W	75V	125V	±200	1Ω≦R≦9.76Ω	1Ω≦R≦1MΩ
				±100	10Ω≦R≦1MΩ	-
0805	0.5 W	200V	300V	±200	-	1Ω≦R≦1MΩ
				±150	1Ω≦R≦9.76Ω	-
				±100	10Ω≦R≦1MΩ	-
1206	0.75 W	250V	500V	±200	-	1Ω≦R≦1MΩ
				±100	1Ω≦R≦1MΩ	-
1210	0.75 W	250V	500V	±200	-	1Ω≦R≦1MΩ
				±100	1Ω≦R≦1MΩ	-
2010	1.5 W	250V	500V	±200	-	1Ω≦R≦1MΩ
				±100	1Ω≦R≦1MΩ	-
2512	3 W	250V	500V	±200	-	1Ω≦R≦1MΩ
				±100	1Ω≦R≦1MΩ	-

- For non-standard parts, please contact our sales dept.
- Operating Temperature Range:-55℃~+155℃
- Functional code: U

Standard Type	0603	0805	1206	2010	2512
Jumper Resistance Value	10mΩ				
Jumper Rated Current	6A	7A	9A	12A	14A
Jumper Overload Current	12A	14A	18A	24A	28A

■ Type Dimension

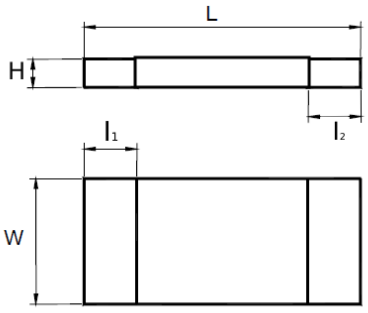
■ Standard



Unit: mm

TYPE	L	W	H	I_1	I_2
0402	1.00 ±0 .05	0 .50 ±0 .05	0 .35 ±0 .05	0 .20 ±0 .10	0 .25 ±0 .10
0603	1.60 ± 0.10	0.80 ± 0.10	0.45 ± 0.10	0.30 ± 0.20	0.30 ± 0.20
0805	2.00 ± 0.10	1.25 ± 0.10	0.50 ± 0.10	0.40 ± 0.20	0.40 ± 0.20
1206	3.10 ± 0.10	1.60 ± 0.10	0.55 ± 0.10	0.50 ± 0.25	0.50 ± 0.25
1210	3.10 ± 0.10	2.60 ± 0.10	0.55 ± 0.10	0.50 ± 0.25	0.50 ± 0.25
2010	5.00 ± 0.20	2.50 ± 0.20	0.60 ± 0.10	0.65 ± 0.25	0.60 ± 0.25
2512	6.40 ± 0.20	3.10 ± 0.20	0.60 ± 0.15	0.60 ± 0.25	1.80 ± 0.25

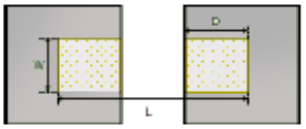
■ Triple Power



Unit: mm

TYPE	L	W	H	I_1	I_2
0402	1.00 ±0 .05	0 .50 ±0 .05	0 .35 ±0 .05	0 .20 ±0 .10	0 .25 ±0 .10
0603	1.60 ± 0.10	0.80 ± 0.10	0.45 ± 0.10	0.30 ± 0.20	0.30 ± 0.20
0805	2.00 ± 0.10	1.25 ± 0.10	0.50 ± 0.10	0.40 ± 0.20	0.40 ± 0.20
1206	3.10 ± 0.10	1.60 ± 0.10	0.55 ± 0.10	0.50 ± 0.25	0.50 ± 0.25
1210	3.10 ± 0.10	2.60 ± 0.10	0.55 ± 0.10	0.50 ± 0.25	0.50 ± 0.25
2010	5.00 ± 0.20	2.50 ± 0.20	0.60 ± 0.10	0.65 ± 0.25	0.60 ± 0.25
2512	6.40 ± 0.20	3.20 ± 0.25	1.10 ± 0.20	0.45 ± 0.25	1.80 ± 0.25

■ Recommend Land Pattern Design Dimension



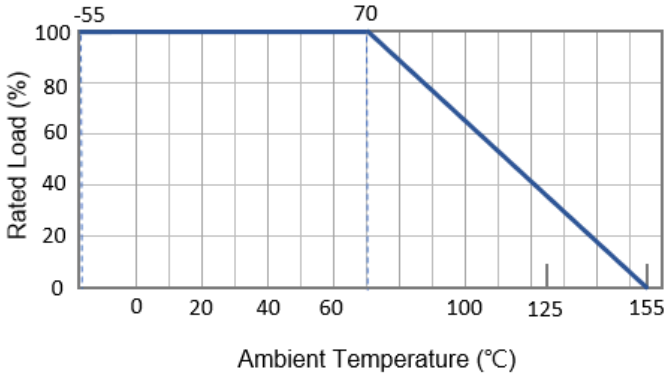
Unit: mm

Type	Standard			Triple Power		
	W	D	L	W	D	L
0402	0.60	0.45	1.40	0.60	0.45	1.40
0603	0.90	1.00	3.00	0.90	1.00	3.00
0805	1.30	1.15	3.50	1.30	1.15	3.50
1206	1.80	1.30	4.70	1.80	1.30	4.70
1210	3.00	1.30	4.70	3.00	1.30	4.70
2010	3.00	1.50	6.80	3.00	1.50	6.80
2512	3.70	2.45	7.60	3.70	2.45	7.60

■ Performance Characteristics

■ Power Derating Curve

Operating Temperature Range: -55 to +155℃



■ Voltage Rating or Current Rating

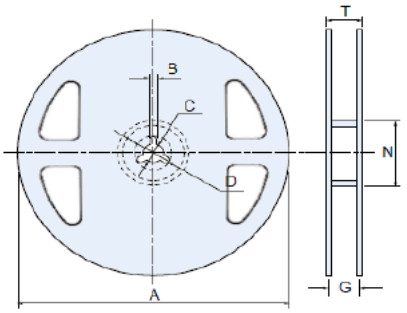
Resistance Range: ≧1Ω
Rated Voltage: The resistor shall have a DC continuous working voltage or a RMS AC continuous working voltage at commercial-line frequency and wave form corresponding to the power rating, as determined formula as following:

■ Reliability Test and Requirement

Test Item	Test Method	Procedure	Requirements
Temperature Coefficient of Resistance (T.C.R)	IEC-60115-1 4.8,	At 25 / -55℃ and 25℃ /+155℃, 25℃ is the reference temperature TCR (ppm/℃) = $(R_2-R_1)/R_1 \times 1 / (T_2-T_1) \times 10^6$	As Spec
High Temperature Exposure	AEC-Q200 TABLE 7.3	1000 hrs. @ T=125℃. Unpowered. Measurement at 24 ±2 hours after test conclusion.	1%：±(1%+0.05Ω) 5%：±(3%+0.1Ω)
Moisture Resistance	AEC-Q200 TABLE 7.6	Test 65℃/80~100%RH/10Cycles. Measurement at 24±2 hours after test conclusion. (t=24hrs/cycle).	1%：±(0.5%+0.05Ω) 5%：±(1%+0.1Ω)
Short Time Overload	IEC-60115-1 4.13	Ultra Power：5 x Rated power for 5 seconds.	1%：±(1% +0.05Ω)* 5%：±(2%+0.1Ω)
Load life	IEC 60115-1, Clause 4.25	Rated voltage for 1.5 hours for followed by a pause 0.5 hour at 70±2℃. Cycle repeated 1000 hours.	1%：±(1%+0.05Ω) 5%：±(3%+0.1Ω)
Rapid Change of Temperature	AEC-Q200 TABLE 7.4	-55℃ to +125℃ ,1000 cycles. Measurement at 24±2 hours after test conclusion.	1%：±(0.5%+0.05Ω) 5%：±(1%+0.1Ω)
Biased Humidity	AEC-Q200 TABLE 7.7	1000 hours 85℃/85%RH. 10% of operating power. Measurement at 24 ±2 hours after test conclusion	1%：±(1%+0.05Ω) 5%：±(3%+0.1Ω)
Operational Life	AEC-Q200 TABLE 7.8	Test 1000hr @ TA=125℃ at specified rated power. Measurement at 24±2 hours after test conclusion.	1%：±(1.0%+0.05Ω) 5%：±(3.0%+0.10Ω)
Insulation Resistance	IEC-60115-1 4.6	Test Voltage: 100±15V	Between termination and coating must over 1000MΩ
External Visual	AEC-Q200 TABLE 7.9	Inspect device construction, marking and workmanship.	No visual damage and refer Ridee marking code.

Test Item	Test Method	Procedure	Requirements
Physical Dimension	AEC-Q200 TABLE 7.10	Verify physical dimensions to the applicable device detail specification.	Within the spec.
Mechanical Shock	AEC-Q200 TABLE 7.13	Test Peak value:100g's,Wave:Hail-sine, Duration:6ms,Velocity:12.3ft/sec.	Within product specification tolerance and no visible damage.
Vibration	AEC-Q200 TABLE 7.14	5 g's for 20 min., 12 cycles each of 3 orientations. Test from 10-2000 Hz.	No mechanical damage.
Resistance to Solder Heat	AEC-Q200 TABLE 7.15	Solder dipping @ 270℃±5℃ for 10sec.±1sec.	1%：±(0.5%+0.05Ω) 5%：±(1.0%+0.1Ω)
Thermal Shock	AEC-Q200 TABLE 7.16	-55 to 155℃/ dwell time 15min/ Max transfer time 20sec/ 300cycles.	1%：±(0.5%+0.05Ω) 5%：±(1.0%+0.1Ω)
ESD	AEC-Q200-002	Test contact min. 1KV.	ΔR≦ ±(1%＋0.1Ω) No mechanical damage.
Solder Ability	AEC-Q200 TABLE 7.18	a)Baking 155℃ 4H, dipping 235℃ 5s b)Steam 1H, dipping 215℃ 5s c)Steam 1H, dipping 260℃ 7s	Over 95% of termination must be covered with solder.
Board Flex	AEC-Q200 TABLE 7.21	Bending 2mm 2512.2010.1210.1206, 3mm 0805.0603. 0402	1%：±(0.5%+0.05Ω) 5%：±(1.0%+0.1Ω)
Terminal Strength	AEC-Q200 TABLE 7.22	Force 1 Kg for 60 seconds.	No mechanical damage
Damp Heat	IEC 60115-1, Clause 4.24	40±2℃ with relative humidity 90% ~ 95% D.C. rated voltage for 1.5 hours ON 30 minutes OFF. Cycle repeated 1000 hours.	1%：±(1.0%+0.05Ω) 5%：±(3.0%+0.10Ω)

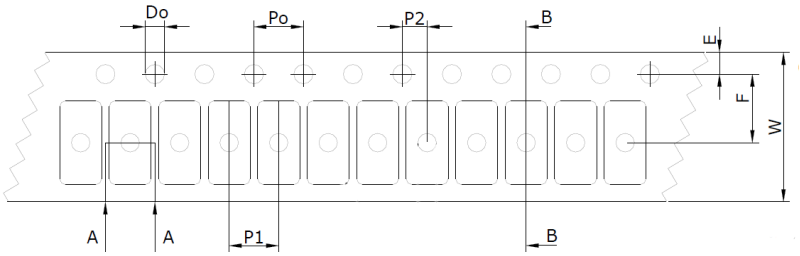
■ Packaging Information



Unit : mm

Size	Type		A	N	C	D	B	G	T
0402	7”	10K/Reel	178±2.0	60.0±0.5	13.0±0.5	20min	2.0±0.5	10.0±1.5	14.9 max
0603 / 0805 / 1206 / 1210	7”	5K/Reel	178±2.0	60.0±0.5	13.0±0.5	20min	2.0±0.5	10.0±1.5	14.9 max
2010/2512	7”	4K/Reel	178±2.0	60.0±0.5	13.0±0.5	20min	2.0±0.5	13.8±1.5	16.7 max.

■ Tapping Specification



Unit : mm

Packaging	Size	A	B	W	E	F	P1	P2	D0	P0
Paper Type	0402	0.70±0.10	1.20±0.10	8.00±0.30	1.75±0.10	3.50±0.05	2.00±0.10	2.00±0.05	1.50+0.10/-0	4.00±0.10
	0603	1.10±0.20	1.90±0.20	8.00±0.30	1.75±0.10	3.50±0.05	4.00±0.10	2.00±0.05	1.50+0.10/-0	4.00±0.10
	0805	1.65±0.20	2.40±0.20	8.00±0.30	1.75±0.10	3.50±0.05	4.00±0.10	2.00±0.05	1.50+0.10/-0	4.00±0.10
	1206	2.00±0.20	3.60±0.20	8.00±0.30	1.75±0.10	3.50±0.05	4.00±0.10	2.00±0.05	1.50+0.10/-0	4.00±0.10
	1210	3.00±0.20	3.60±0.20	8.00±0.30	1.75±0.10	3.50±0.05	4.00±0.10	2.00±0.05	1.50+0.10/-0	4.00±0.10

Packaging	Size	A	B	W	E	F	P1	P2	D0	P0
Embossed Type	2010	2.80±0.20	5.50±0.20	12.00±0.30	1.75±0.10	5.50±0.05	4.00±0.10	2.00±0.05	1.50+0.10/-0	4.00±0.10
	2512	3.50±0.20	6.70±0.20	12.00±0.30	1.75±0.10	5.50±0.05	4.00±0.10	2.00±0.05	1.50+0.10/-0	4.00±0.10

Recommended Customer Soldering Parameters

Recommended IR Reflow Soldering Conditions

Preliminary heating: 150℃~180℃, 120s max
Soldering: 220℃, 60s max
Peak temperature: 245℃, 15s max

Recommended WAVE Soldering Conditions

Reservoir Temperature: 260℃, 10s max
Number of times: two times max

Marking

E24 ±5%: 3 digits marking

0603/0805/1206/1210/2010/2512

Resistance	470Ω	5.6KΩ	62KΩ	680KΩ
3 digits code	471	562	623	684

E24/E96 ±1%：4 digits marking

0805/1206/1210/2010/2512

Resistance	1.1KΩ	10KΩ	332KΩ	1MΩ
4 digits code	1101	1002	3323	1004

E24 ±1%: 3 digits marking

0603

Resistance	470Ω	5.6KΩ	62KΩ	680KΩ
3 digits code	471	562	623	684

E96 ±1%: 3 digits marking

0603

Resistance	1KΩ
3 digits code	01B

No marking code for 0402 size