



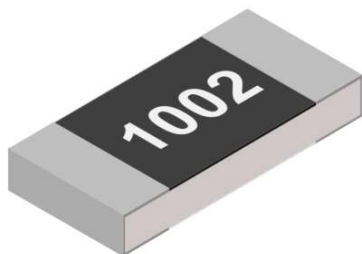
TQ Series AEC-Q200 Compliant Thin Film Chip Resistor Product Specifications

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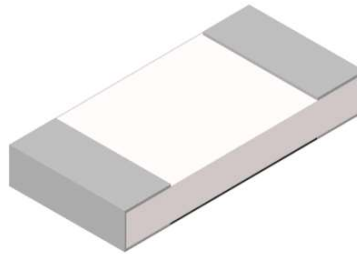
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AEC-Q200 Compliant Thin Film Chip Resistor — TQ Series



Top view



Bottom view

Applications

- Industrial electronics
- Communication devices
- Measuring instrument
- Converters

Features

- Tolerance to $\pm 0.05\%$
- Low TCR to $\pm 10 \text{ ppm}/^\circ\text{C}$
- AEC-Q200 qualified
- Halogen free and lead free
- RoHS compliant

Parts Number Explanation

Example:

TQ	1206	B	10K0	P	05	25	Z
Product Type	Size (Inch)	Tolerance	Resistance	Package	Quantity (PCS)	TCR (ppm/ $^\circ\text{C}$)	Optional
TQ Series AEC-Q200 Compliant Thin Film Chip Resistor	0402 0603 0805 1206	A : $\pm 0.05\%$ B : $\pm 0.1\%$ C : $\pm 0.25\%$ D : $\pm 0.5\%$ F : $\pm 1\%$	4 digits EX. 10R0 = 10Ω 100R = 100Ω 2K20 = $2.2 \text{ K}\Omega$ 332K = $332 \text{ K}\Omega$ 1M00 = $1 \text{ M}\Omega$	P : Paper Taping (0603~1206) Q : Paper Taping (0402) E : Embossed Taping	05 : 5000 10 : 10000	10 : ± 10 15 : ± 15 25 : ± 25 50 : ± 50	Z : Default Code



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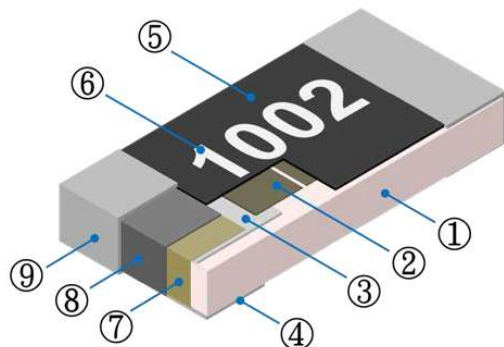
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Standard Electrical Specifications

項目 Item 型別 Type	額定功率 Rated Power at 70°C	最大 工作電壓 Max Working Voltage	最大 過負載電壓 Max Overload Voltage	溫度係數 T.C.R. (PPM/°C)	阻值範圍 Resistance Range				
					A ±0.05%	B ±0.1%	C ±0.25%	D ±0.5%	F ±1.0%
TQ0402	0.063W	50V	100V	±10, ±15	49.9 Ω ~ 12 KΩ	10 Ω ~ 68 KΩ			
				±25, ±50		4.7 Ω ~ 220 KΩ			
TQ0603	0.1W	75V	150V	±10, ±15	49.9 Ω ~ 30 KΩ	10 Ω ~ 332 KΩ			
				±25, ±50		4.7 Ω ~ 680 KΩ			
TQ0805	0.125W	150V	300V	±10, ±15	49.9 Ω ~ 50 KΩ	10 Ω ~ 680 KΩ			
				±25, ±50		4.7 Ω ~ 1 MΩ			
TQ1206	0.25W	200V	400V	±10, ±15	49.9 Ω ~ 100 KΩ	10 Ω ~ 1 MΩ			
				±25, ±50		4.7 Ω ~ 1.5 MΩ			

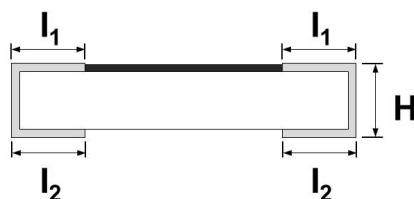
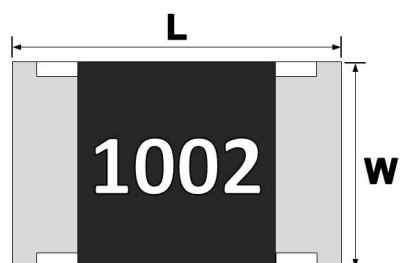
- Operating Temperature Range : -55°C ~ +155°C.
- For non-standard parts, please contact our sales department.

Construction



①	Alumina Substrate	④	Bottom Inner Electrode	⑦	Side Inner Electrode
②	Resistive Layer	⑤	Protective Overcoat	⑧	Nickel Barrier
③	Top Inner Electrode	⑥	Marking	⑨	Solder coating (Sn)

Dimensions



Unit : mm

TYPE	L	W	H	l ₁	l ₂
TQ0402	1.00 ± 0.10	0.50 ± 0.05	0.30 ± 0.05	0.20 ± 0.10	0.20 ± 0.10
TQ0603	1.60 ± 0.15	0.80 ± 0.10	0.45 ± 0.10	0.30 ± 0.20	0.30 ± 0.20
TQ0805	2.00 ± 0.15	1.25 ± 0.15	0.55 ± 0.10	0.35 ± 0.20	0.40 ± 0.20
TQ1206	3.10 ± 0.15	1.60 ± 0.15	0.55 ± 0.10	0.45 ± 0.20	0.50 ± 0.20



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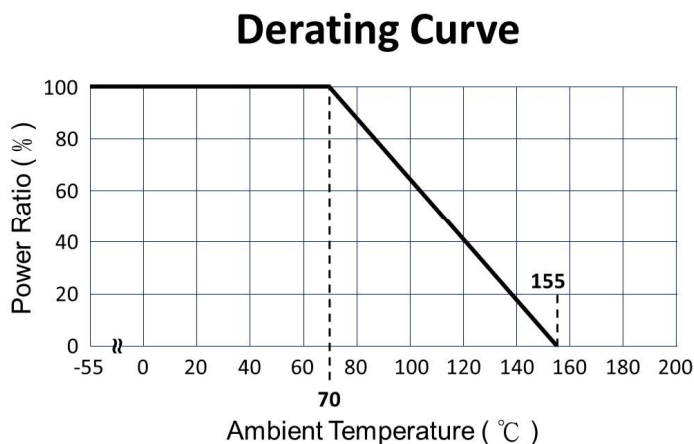
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■ Performance Characteristics

■ Power Derating Curve

The Operating Temperature Range: -55°C ~+155°C.

Power rating is in the case based on continuous full-load at ambient temperature of 70°C. For operation at ambient temperature in excess of 70°C, the load should be derated in accordance with figure of derating Curve.



■ Rated Voltage

Resistance Range: $\geq 1\Omega$

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:

$$V = \sqrt{P \times R}$$

V = Rated voltage (V)

P = Rated power (W)

R = Nominal resistance (Ω)



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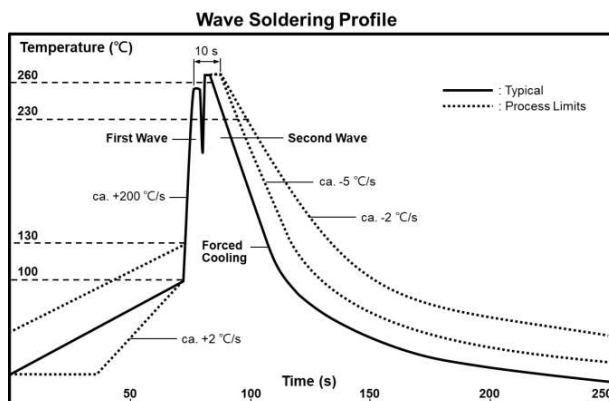
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Reliability Tests and Requirements

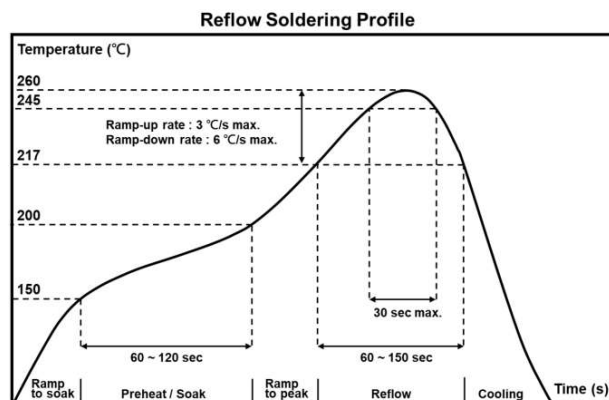
Test Item	Test Method	Procedure	Requirements
Temperature Coefficient of Resistance (T.C.R)	JIS-C-5201-1 4.8 IEC-60115-1 4.8	At 25 / -55°C and 25°C / +125°C, 25°C is the reference temperature.	Refer to Standard Electrical Specifications
Short Time Overload	JIS-C-5201-1 4.13 IEC-60115-1 4.13	2.5 times RCWV or Max. Overload voltage whichever is less for 5 seconds.	±(0.1%+0.05Ω) No Visual damage
Leaching	JIS-C-5201-1 4.18 IEC-60068-2-58 8.2.1	260±5°C for 30 seconds.	>95% Coverage No Visual damage
Resistance to Soldering Heat	JIS-C-5201-1 4.18 IEC-60115-1 4.18	260±5°C for 10 seconds.	±(0.1%+0.05Ω) No Visual damage
Insulation Resistance	JIS-C-5201-1 4.6 IEC-60115-1 4.6	Apply 100VDC for 1 minute.	≥ 10GΩ
Temperature Cycling	JESD22 Method JA-104	1000 Cycles (-55°C to +125°C) Measurement at 24±4 hours after test conclusion. 30min maximum dwell time at each temperature extreme.	±(0.3%+0.05Ω) No Visual damage
Resistance to Solvent	MIL-STD-202 Method 215	Add Aqueous wash chemical - OKEM Clean or equivalent.	±(0.1%+0.05Ω) No Visual damage
Biased Humidity	MIL-STD-202 Method 103	1,000 hours; 85°C / 85% RH, 10% of operating power. Measurement at 24±4 hours after test conclusion.	±(0.3%+0.05Ω)
High Temperature Exposure (Storage)	MIL-STD-202 Method 108	1000 hrs. @ T=155°C. Unpowered. Measurement at 24±4 hours after test conclusion.	±(0.3%+0.05Ω)
Operational Life	MIL-STD-202 Method 108	Condition D Steady State TA=125°C at derated power. Measurement at 24±4 hours after test conclusion.	±(0.3%+0.05Ω)
External Visual	MIL-STD-883 Method 2009	Electrical test not required. Inspect device construction, marking and workmanship.	No Visual damage
Mechanical Shock	MIL-STD-202 Method 213	Wave Form: Tolerance for half sine shock pulse. Peak value is 100g's. Normal duration(D) is 6(ms).	±(0.1%+0.05Ω)
Vibration	MIL-STD-202 Method 204	5 g's for 20 min., 12 cycles each of 3 orientations. Note: Test from 10-2000 H.	±(0.1%+0.05Ω)
ESD	AEC-Q200- 002 or ISO/DIS 10605	Human body model 0402 : 400 V / 0603 : 1000 V 0805 : 1500 V / 1206 : 2000 V	±(0.5%+0.05Ω)
Solderability	J-STD-002	(1) 4 hrs 155°C dry heat. (2) 245±5°C 3 sec.	>95% Coverage No Visual damage
Terminal Strength (SMD)	AEC Q200-006	Pressurizing force for 60 seconds 0402 / 0603 : 8N ; 0805 / 1206 : 17.7N	No broken
Board Flex	AEC Q200-005	Beading once for 60 seconds 0402 / 0603 / 0805 / 1206 : 3mm	±(0.1%+0.05Ω)
Sulfur Test (FoS)	ASTM B809-95 ANSI/EIA-977	105±2°C, no power rating for 1000 hrs.	±(1.0%+0.05Ω)

■ Recommended Customer Soldering Parameters

■ Wave solder Temperature condition



■ Solder reflow Temperature condition



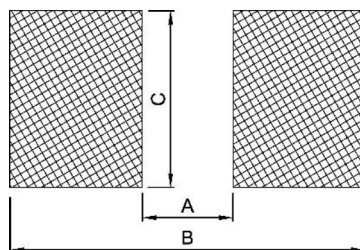
■ Rework temperature (hot air equipment) : 350°C, 3~5seconds

■ Recommended reflow methods

IR, vapor phase oven, hot air oven

If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.

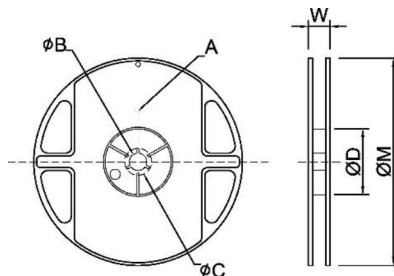
■ Recommend Land Pattern Design



Type	0402	0603	0805	1206
Item				
A	0.50	0.80	1.30	2.20
B	1.60	2.40	2.90	4.20
C	0.70	1.00	1.40	1.70

■ Packaging Information

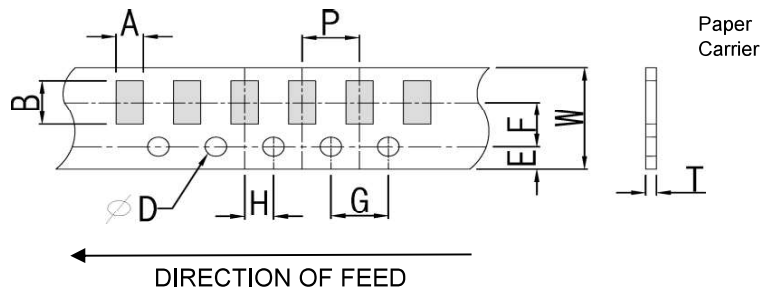
■ Reel Dimensions



Unit: mm t

TYPE	SIZE	A	ΦB	ΦC	ΦD	W	ΦM
0402	7"	10K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	11.5±2.0
0603/0805/1206	7"	5K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	11.5±2.0

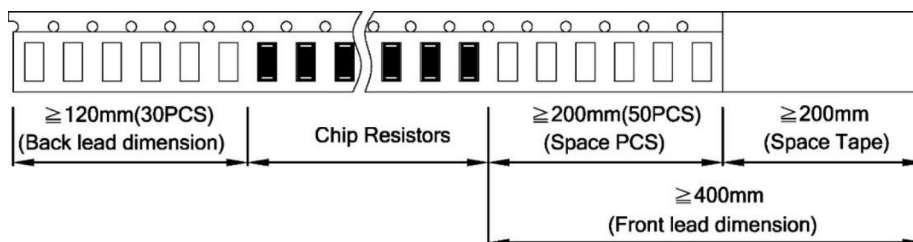
■ Paper Tape Dimensions



Unit: mm

Type	A	B	W	E	F	G	H	T	ΦD	P
0402	0.70±0.10	1.20±0.10	8.0±0.20	1.75±0.10	3.5±0.05	4.0±0.10	2.0±0.05	0.45±0.10	1.50 ^{+0.10} ₋₀	2.0±0.10
0603	1.05±0.20	1.80±0.20	8.0±0.20	1.75±0.10	3.5±0.05	4.0±0.10	2.0±0.05	0.60±0.10		4.0±0.10
0805	1.55±0.20	2.30±0.20	8.0±0.20	1.75±0.10	3.5±0.05	4.0±0.10	2.0±0.05	0.75±0.10		
1206	1.90±0.20	3.50±0.20	8.0±0.20	1.75±0.10	3.5±0.05	4.0±0.10	2.0±0.05	0.75±0.10		

■ Front & Back Lead Dimensions





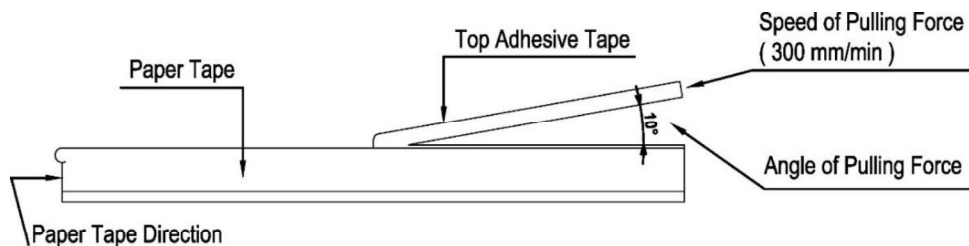
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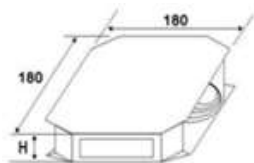
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■ Top Adhesive Peel Off Strength : 10~70g

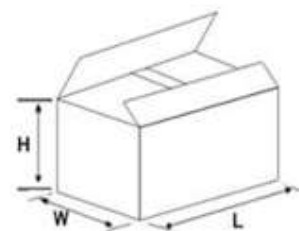


■ Package

Inner Box Size	
Reel	Size H(mm)
1	13
2	24
3	36
5	60
10	113



External Box Size			
Contain (Kpcs)	Length (mm)	Width (mm)	Height (mm)
25K	180	180	60
50K	180	180	110
150K	430	200	200
300K	400	400	200



■ Storage Data :

Storage time at the environment temp: $25\pm5^{\circ}\text{C}$ & humidity: $60\pm20\%$ is valid for one year from the date of delivery.