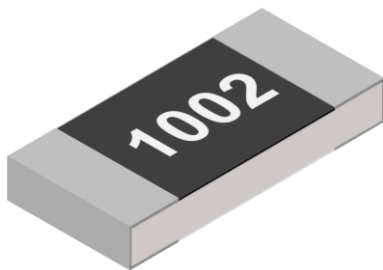




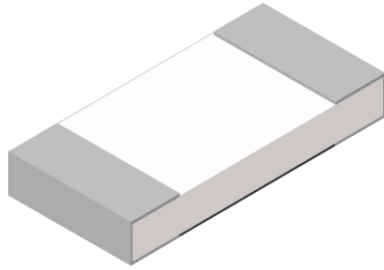
TQ Series AEC-Q200 Compliant Thin Film
Chip Resistor Product Specifications

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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/°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 = 10 Ω 100R = 100 Ω 2K20 = 2.2 K Ω 332K = 332 K Ω 1M00 = 1 M Ω	P : Paper Taping (0603~1206) Q : Pape Taping (0402) E : Embossed Taping	05 : 5000 10 : 10000	10 : ± 10 15 : ± 15 25 : ± 25 50 : ± 50	Z : Default Code



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

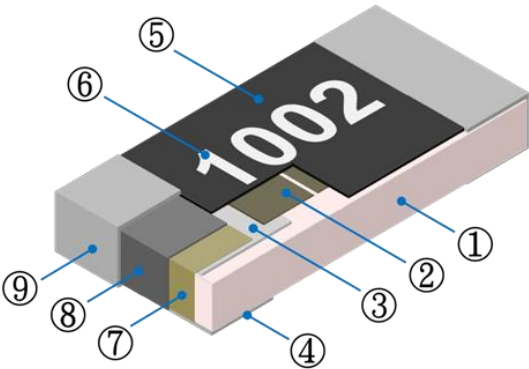
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Standard Electrical Specifications

Item Type	Rated Power at 70°C	Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/°C)	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



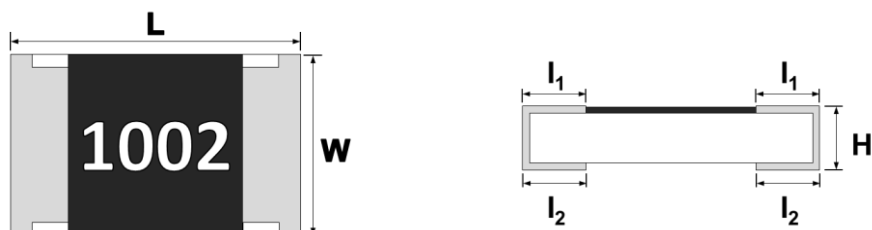
①	Alumina Substrate	④	Bottom Inner Electrode	⑦	Side Inner Electrode
②	Resistive Layer	⑤	Protective Overcoat	⑧	Nickel Barrier
③	Top Inner Electrode	⑥	Marking	⑨	Solder coating (Sn)



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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

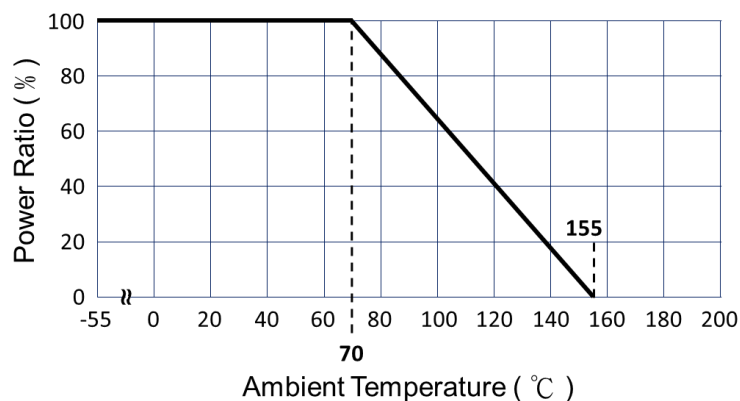
Performance Characteristics

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.

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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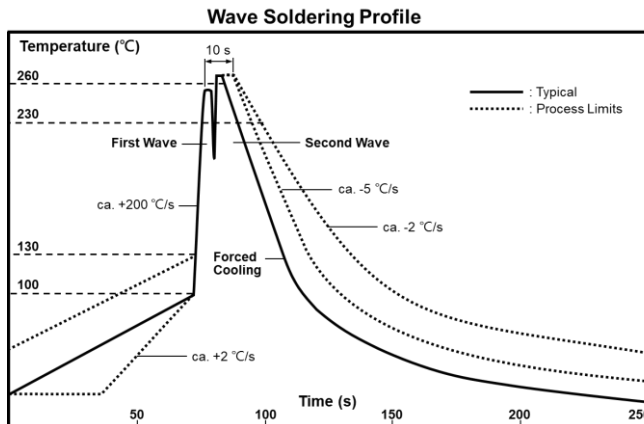
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Reliability Tests and Requirements

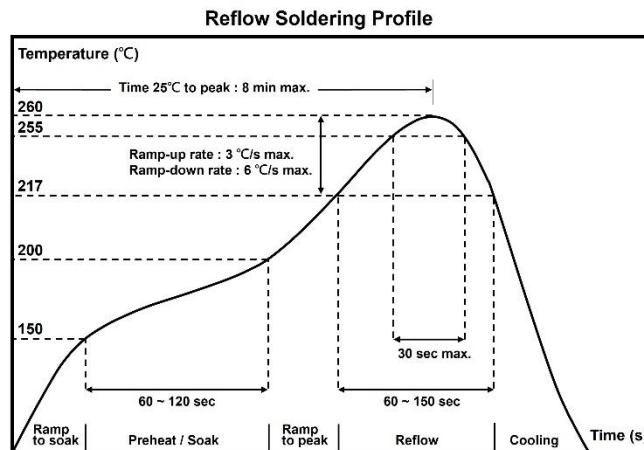
Test Item	Test Method	Procedure	Requirements
Temperature Coefficient of Resistance (T.C.R)	JIS-C-5201-1 4.8 IEC-60115-1 4.8	At 25 / -55°C and 25°C /+125°C, 25°C is the reference temperature.	Refer to Standard Electrical Specifications
Short Time Overload	JIS-C-5201-1 4.13 IEC-60115-1 4.13	2.5 times RCWV 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	JJIS-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 HZ.	±(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



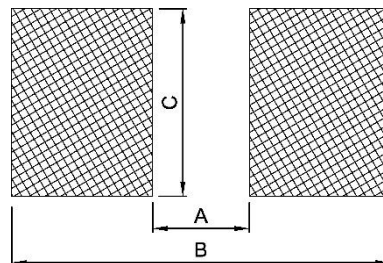
Rework temperature (hot air equipment) : 350°C, 3~5seconds

Recommended reflow methods

IR, vapor phase oven, hot air oven

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

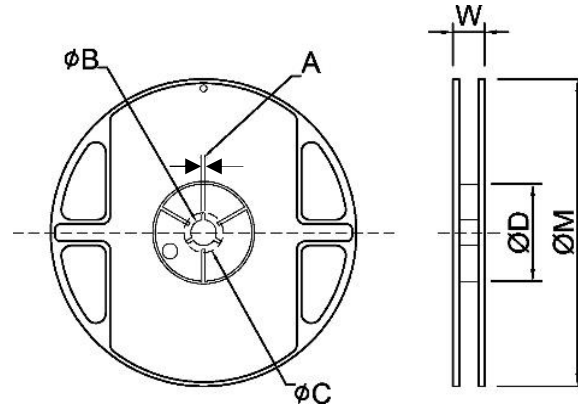
Recommend Land Pattern Design



Type Item	0402	0603	0805	1206
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

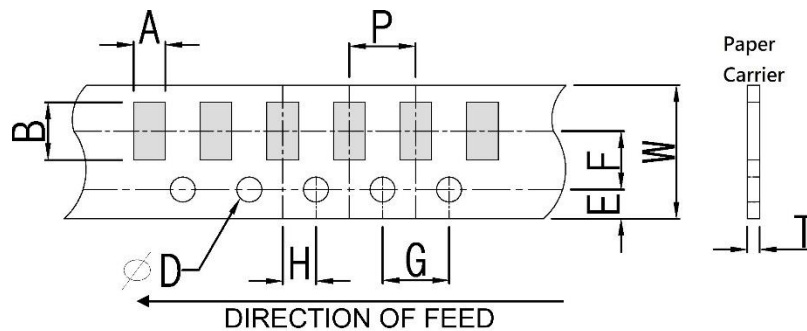
■ Reel Dimensions



Unit: mm

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	178±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	178±2.0

■ Paper Tape Dimensions



Unit: mm

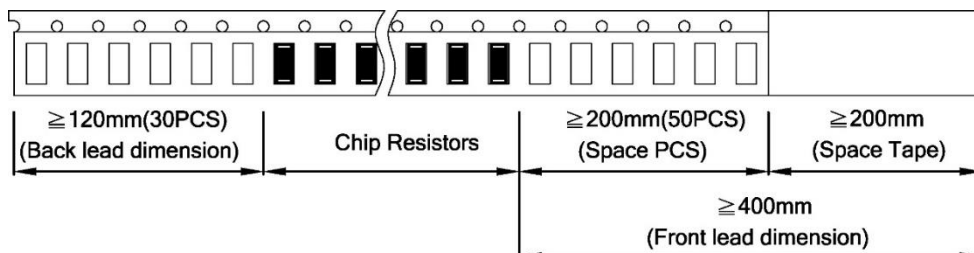
Type	A	B	W	E	F	G	H	T	ϕD	P
0402	0.70±0.10	1.20±0.10	8.0±0.20	1.75±0.10	3.5±0.05	4.0±0.10	2.0±0.05	0.45±0.10	1.50 ^{+0.10} ₋₀	2.0±0.10
0603	1.05±0.20	1.80±0.20	8.0±0.20	1.75±0.10	3.5±0.05	4.0±0.10	2.0±0.05	0.60±0.10		4.0±0.10
0805	1.55±0.20	2.30±0.20	8.0±0.20	1.75±0.10	3.5±0.05	4.0±0.10	2.0±0.05	0.75±0.10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



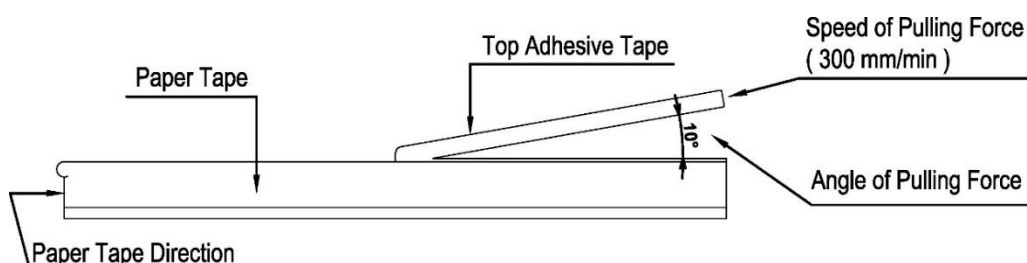
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Front & Back Lead Dimensions

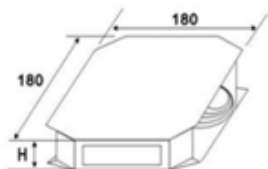


Top Adhesive Peel Off Strength : 10~70g

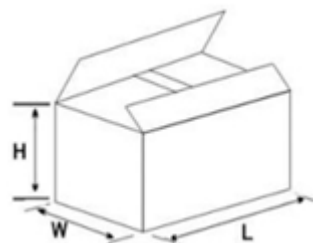


Package

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±5°C& humidity: 60±20% is valid for two years.