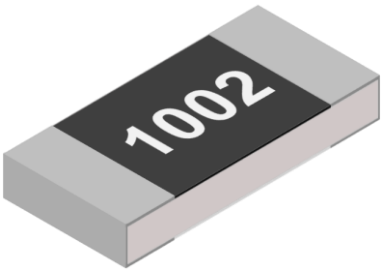
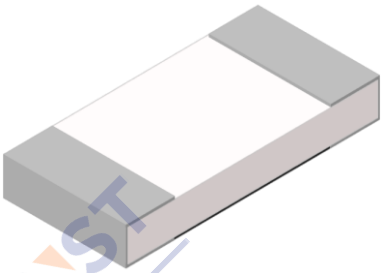
■ High Voltage Thin Film Chip Resistor — TQV Series



Top view



Bottom view

■ Applications

— Industrial electronics
— Battery management system
— Test and measuring equipment

■ Features

— Max working voltage up to 1000V
— Sulfur resistance
— AEC-Q200 qualified
— Halogen free and lead free
— RoHS compliant

■ Parts Number Explanation

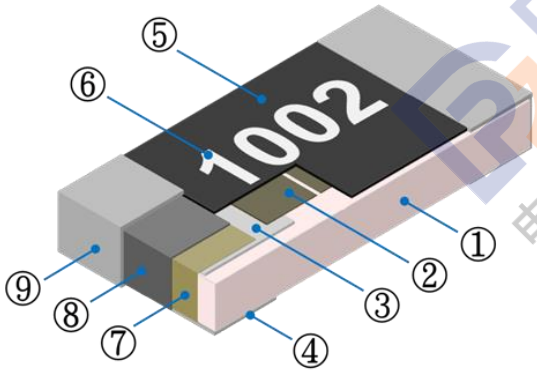
■ Example:

TQV	1206	B	160K	P	05	25	Z
Product Type	**Size (Inch)**	**Tolerance**	**Resistance**	**Package**	**Quantity (PCS)**	**TCR (ppm/℃)**	**Optional**
TQV Series High Voltage Thin Film Chip Resistor	1206 1210	B：±0.1% C：±0.25% D：±0.5% F：±1%	4 digits EX. 332K = 332 KΩ 1M00 = 1 MΩ	P：Paper Taping	05：5000	25：±25 50：±50	Z：Default Code

■ Standard Electrical Specifications

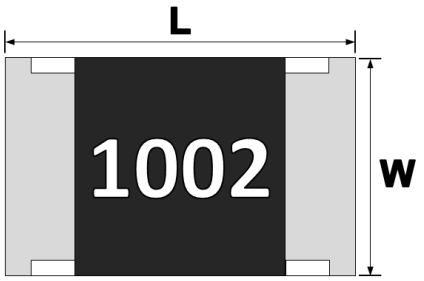
項目 Item / 型別 Type	額定功率 Rated Power at 70℃	最大工作電壓 Max Working Voltage	最大過負載電壓 Max Overload Voltage	溫度係數 T.C.R. (PPM/℃)	阻值範圍 Resistance Range			
					B ±0.1%	C ±0.25%	D ±0.5%	F ±1.0%
TQV1206	0.25W	700V	1400V	±25, ±50	10 KΩ ~ 2 MΩ			
TQV1210	0.33W	1000V	2000V	±25, ±50	10 KΩ ~ 2 MΩ			

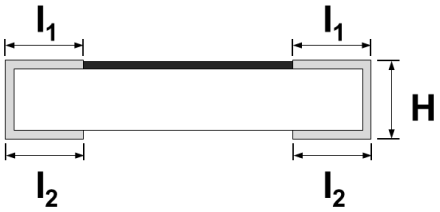
■ Construction



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





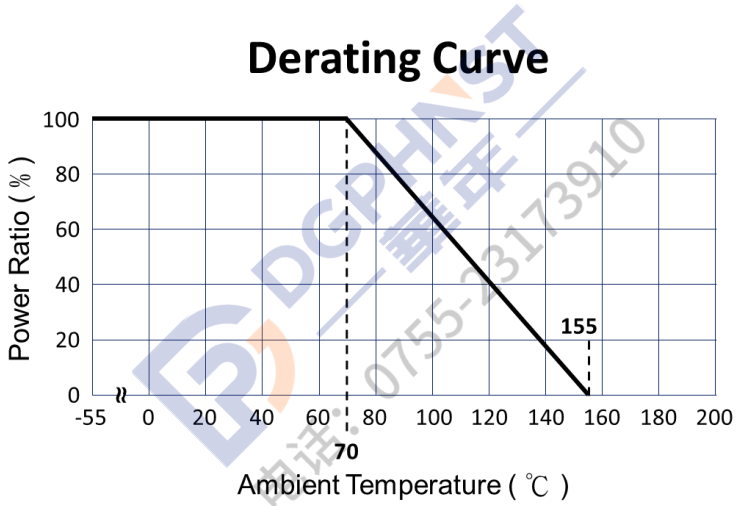
Unit : mm

TYPE	L	W	H	l_1	l_2
TQV1206	3.10 ± 0.15	1.60 ± 0.15	0.55 ± 0.10	0.45 ± 0.20	0.50 ± 0.20
TQV1210	3.10 ± 0.15	2.50 ± 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℃. For operation at ambient temperature in excess of 70℃, the load should be derated in accordance with figure of derating Curve.



Rated Voltage

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:

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

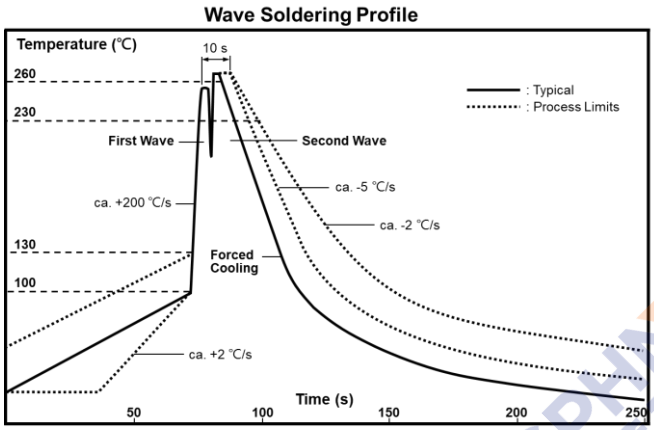
V = Rated voltage (V)
P = Rated power (W)
R = Nominal resistance (Ω)

■ Reliability Tests and Requirements

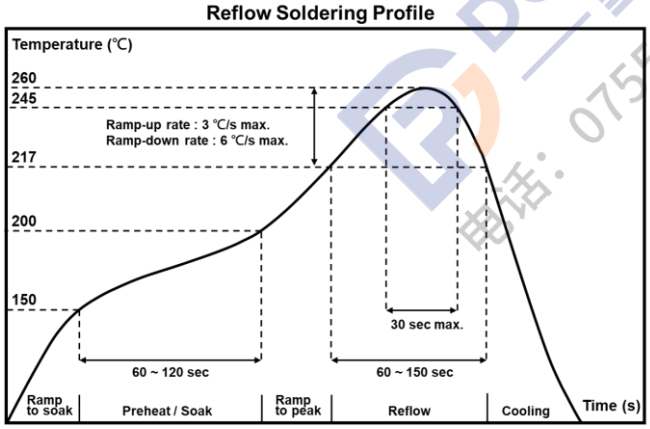
Test Item	Test Method	Procedure	Requirements
Temperature Coefficient of Resistance (T.C.R)	JIS-C-5201-1 4.8 IEC-60115-1 4.8	At 25 / -55℃ and 25℃ /+125℃, 25℃ is the reference temperature.	Refer to Standard Electrical Specifications
Short Time Overload	JIS-C-5201-1 4.13 IEC-60115-1 4.13	2.5 times RCWV or Max. Overload voltage whichever is less for 5 seconds.	±0.1% No Visual damage
Leaching	JIS-C-5201-1 4.18 IEC-60068-2-58 8.2.1	260±5℃ 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℃ for 10 seconds.	±0.1% 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% No Visual damage
Resistance to Solvent	MIL-STD-202 Method 215	Add Aqueous wash chemical - OKEM Clean or equivalent.	±0.1% 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%
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%
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%
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%
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%
ESD	AEC-Q200- 002 or ISO/DIS 10605	Human body model 1206 / 1210：4000 V	±0.5%
Solderability	J-STD-002	(1) 4 hrs 155℃ dry heat. (2) 245±5℃ 3 sec.	>95% Coverage No Visual damage
Terminal Strength (SMD)	AEC Q200-006	Pressurizing force for 60 seconds 1206 / 1210：17.7N	No broken
Board Flex	AEC Q200-005	Beading once for 60 seconds 1206 / 1210 : 3mm	±0.1%
Sulfur Test (FoS)	ASTM B809-95 ANSI/EIA-977	105±2℃, no power rating for 1000 hrs.	±1.0%

■ Recommended Customer Soldering Parameters

■ Wave solder Temperature condition



■ Solder reflow Temperature condition



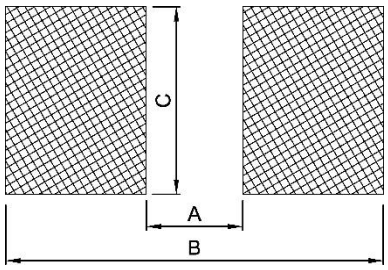
■ Rework temperature（hot air equipment）: 350℃, 3~5seconds

■ 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



Item \ Type	1206	1210
A	2.20	2.00
B	4.20	4.40
C	1.70	2.70

Marking

1206 / 1210 : 4-digit code

4-digit code for type 1206、1210

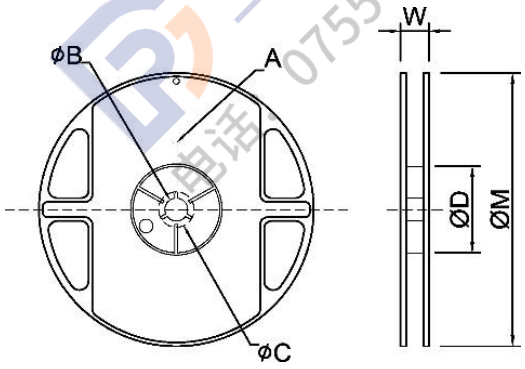
First 3 digits are the significant figures, the 4th digit is the multiplier. "R"= decimal point.

Examples:

Resistance	332KΩ	1MΩ
4 digits code	3323	1004

Packaging Information

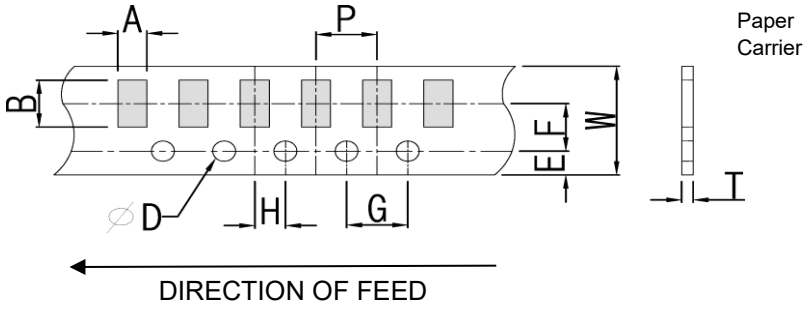
Reel Dimensions



Unit: mm t

TYPE	SIZE		A	ΦB	ΦC	ΦD	W	ΦM
1206/1210	7”	5K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	11.5±2.0	178±2.0

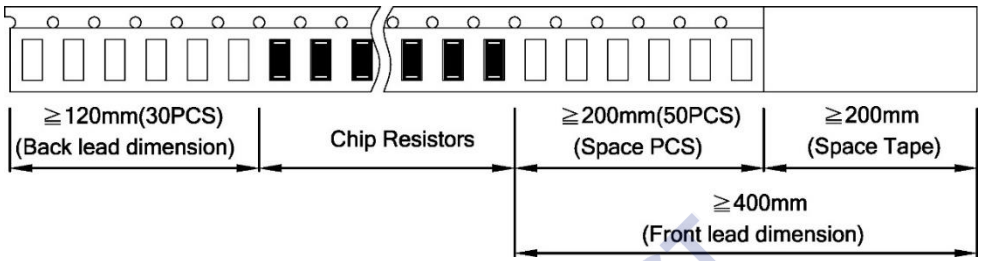
Paper Tape Dimensions



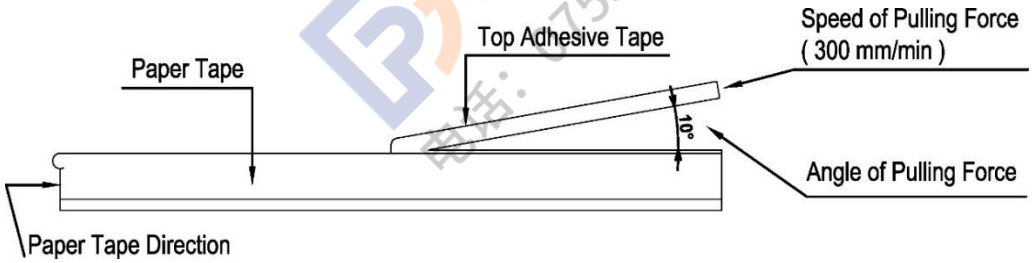
Unit: mm

Type	A	B	W	E	F	G	H	T	ΦD	P
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	$1.50^{+0.10}_{-0}$	4.0±0.10
1210	2.85±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

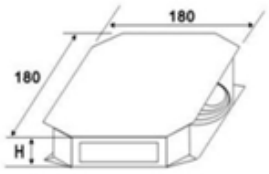


■ Top Adhesive Peel Off Strength：10~70g

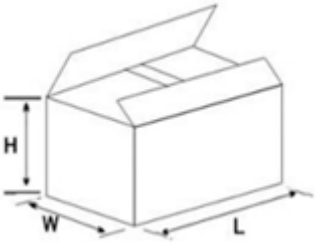


■ Package

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℃& humidity: 60±20% is valid for one year from the date of delivery.