High Surge Current Suppression Multilayer Chip Varistor

Notice

1. In order to improve this catalog, specifications may be changed without prior notice, please consult our sales representative or product engineer before ordering;
2. Due to the limitation of length, this catalog provides only the main product information.
3. We can produce any special specifications products according to customers' requests.

Contents

1. Identification (Part Number)

QV	1206	H	180	K	T
①	②	③	④	⑤	⑥

① Type	
QV	Chip Varistor

② External Dimension L×W×T (mm)	
1206	3.20×1.60×1.60
1210	3.20×2.50×1.7.
1812	4.50×3.20×2.50
2220	5.70×5.00×2.50

③ Application Code	
H	High Surge Current Suppression

④ Maximum DC Operating Voltage	
180	18V
650	65V

⑤ Tolerance of Varistor Voltage	
K	±10%
L	±15%

⑥ Packaging	
T	Tape
B	Bulk

QV	1206	H	180	K	T	RA
①	②	③	④	⑤	⑥	⑦

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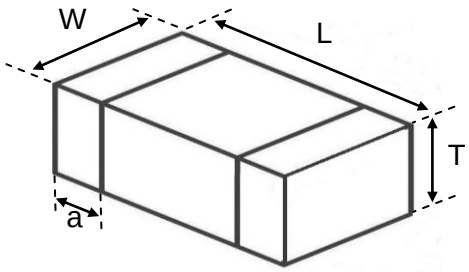
180	18V
650	65V

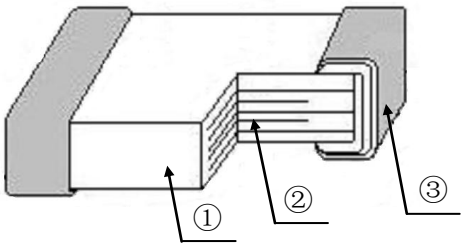
⑤ Tolerance of Varistor Voltage	
K	±10%
L	±15%

⑥ Packaging	
T	Tape
B	Bulk

⑦ Internal Code
RA, RB, RC

2. Structure and Dimensions





Type	L（mm）	W（mm）	T（mm）	a（mm）
1206	3.20±0.20	1.60±0.20	1.6 Max.	0.50±0.30
1210	3.20±0.25	2.50±0.25	1.7 Max.	0.50±0.30
1812	4.50±0.30	3.20±0.30	2.5 Max.	0.60±0.30
2220	5.70±0.40	5.00±0.40	2.5 Max.	0.60±0.30

Part	①	②	③
Component	ZnO Semiconductor Ceramics for Chip Varistor	Internal Electrode (Ag or Ag-Pd)	Terminal Electrode (Ag/Ni/Sn three layers)

3. Features

- SMD type, suitable for high density mounting
- Excellent clamping ratio and strong capability of voltage surge suppression
- Excellent solderability (Ni, Sn plating)

4. Applications

Used for security system, PLC, Automotive electronics, Industrial instrument, smart meters, Control and measurement equipment, etc

5. Electrical Characteristics

Part No.	Max. Working Voltage		Varistor Voltage @1mA DC	Max. Clamping Voltage (8/20μs)		Max. Surge Current (8/20μs)	Max. Energy (10/1000μs)	Operating ambient temperature
	V_{DC}(V)	V_{AC}(V)	V_{1mA}(V)	Vc(V)	Ic(A)	Ip(A)	Wmax (J)	℃
QV1206H090LT	9	6	13 (11～16)	22	1	200	0.4	-55～+125
QV1206H110LT	11	8	15 (13～18)	26	1	200	0.4	
QV1206H140LT	14	10	19 (16～22)	32	1	200	0.5	
QV1206H180KT	18	14	25 (22～28)	42	1	200	0.5	
QV1206H220KT	22	16	29 (26～32)	50	1	200	0.5	
QV1206H260KT	26	18	34 (31～38)	60	1	200	0.6	
QV1206H300KT	30	21	40 (36～44)	68	1	200	0.6	
QV1206H380KT	38	30	48 (43～53)	82	1	200	0.7	
QV1206H420KT	42	32	53 (48～59)	90	1	200	0.7	
QV1206H480KT	48	34	61 (55～67)	105	1	200	0.8	
QV1206H560KT	56	40	70 (63～77)	120	1	200	0.8	
QV1206H600KT	60	45	76 (69～83)	130	1	200	0.8	
QV1206H650KT	65	50	82 (74～91)	140	1	150	0.6	
QV1206H750KT	75	55	94 (85～103)	160	1	150	0.6	
QV1206H850KT	85	60	105 (95～115)	180	1	150	0.6	
QV1210H090LT	9	6	13 (11～16)	22	2.5	400	0.8	
QV1210H110LT	11	8	15 (13～18)	26	2.5	400	0.8	
QV1210H140LT	14	10	19 (16～22)	32	2.5	400	1.0	
QV1210H180KT	18	14	25 (22～28)	42	2.5	400	1.2	
QV1210H220KT	22	16	29 (26～32)	50	2.5	400	1.4	
QV1210H260KT	26	18	34 (31～38)	60	2.5	400	1.5	
QV1210H300KT	30	21	40 (36～44)	68	2.5	400	1.6	
QV1210H380KT	38	30	48 (43～53)	82	2.5	400	1.8	
QV1210H420KT	42	32	53 (48～59)	90	2.5	400	2.0	
QV1210H480KT	48	34	61 (55～67)	105	2.5	400	2.0	
QV1210H560KT	56	40	70 (63～77)	120	2.5	400	2.0	
QV1210H600KT	60	45	76 (69～83)	130	2.5	400	2.0	

Part No.	Max. Working Voltage		Varistor Voltage @1mA DC	Max. Clamping Voltage (8/20μs)		Max. Surge Current (8/20μs)	Max. Energy (10/1000μs)	Operating ambient temperature
	V_{DC}(V)	V_{AC}(V)	V_{1mA}(V)	Vc(V)	Ic(A)	Ip(A)	Wmax (J)	℃
QV1210H650KT	65	50	82 (74～91)	140	2.5	300	1.6	
QV1210H750KT	75	55	94 (85～103)	160	2.5	300	1.6	-55～+125
QV1210H850KT	85	60	105 (95～115)	180	2.5	300	1.6	
QV1812H090LT	9	6	13 (11～16)	22	5	800	1.2	
QV1812H110LT	11	8	15 (13～18)	26	5	800	1.4	
QV1812H140LT	14	10	19 (16～22)	32	5	800	1.8	
QV1812H180KT	18	14	25 (22～28)	42	5	800	2.2	
QV1812H220KT	22	16	29 (26～32)	50	5	800	2.5	
QV1812H260KT	26	18	34 (31～38)	60	5	800	3.0	
QV1812H300KT	30	21	40 (36～44)	68	5	800	3.5	
QV1812H380KT	38	30	48 (43～53)	82	5	800	3.8	
QV1812H420KT	42	32	53 (48～59)	90	5	800	3.8	
QV1812H480KT	48	34	61 (55～67)	105	5	800	4.0	
QV1812H560KT	56	40	70 (63～77)	120	5	800	4.0	
QV1812H600KT	60	45	76 (69～83)	130	5	800	4.0	
QV1812H650KT	65	50	82 (74～91)	140	5	600	3.6	
QV1812H750KT	75	55	94 (85～103)	160	5	600	3.6	
QV1812H850KT	85	60	105 (95～115)	180	5	600	3.6	
QV2220H090LT	9	6	13 (11～16)	22	10	1200	2.6	
QV2220H110LT	11	8	15 (13～18)	26	10	1200	3.0	
QV2220H140LT	14	10	19 (16～22)	32	10	1200	5.0	
QV2220H180KT	18	14	25 (22～28)	42	10	1200	5.5	
QV2220H220KT	22	16	29 (26～32)	50	10	1200	6.0	
QV2220H260KT	26	18	34 (31～38)	60	10	1200	7.0	
QV2220H300KT	30	21	40 (36～44)	68	10	1200	7.0	
QV2220H380KT	38	30	48 (43～53)	82	10	1200	7.5	
QV2220H420KT	42	32	53 (48～59)	90	10	1200	7.5	
QV2220H480KT	48	34	61 (55～67)	105	10	1200	8.0	
QV2220H560KT	56	40	70 (63～77)	120	10	1200	8.0	

Part No.	Max. Working Voltage		Varistor Voltage @1mA DC	Max. Clamping Voltage (8/20μs)		Max. Surge Current (8/20μs)	Max. Energy (10/1000μs)	Operating ambient temperature
	V_{DC}(V)	V_{AC}(V)	V_{1mA}(V)	Vc(V)	Ic(A)	Ip(A)	Wmax (J)	℃
QV2220H600KT	60	45	76 (69～83)	130	10	1200	8.0	
QV2220H650KT	65	50	82 (74～91)	140	10	1000	6.0	-55～+125
QV2220H750KT	75	55	94 (85～103)	160	10	1000	6.0	
QV2220H850KT	85	60	105 (95～115)	180	10	1000	6.0	
QV1206H090LTRA	9	6	13 (11～16)	24	1	120	0.2	
QV1206H110LTRA	11	8	15 (13～18)	29	1	120	0.2	
QV1206H140LTRA	14	10	19 (16～22)	35	1	120	0.3	
QV1206H180KTRA	18	14	25 (22～28)	46	1	120	0.3	
QV1206H220KTRA	22	16	29 (26～32)	55	1	120	0.3	
QV1206H260KTRA	26	18	34 (31～38)	66	1	120	0.4	
QV1206H300KTRA	30	21	40 (36～44)	75	1	120	0.4	
QV1206H380KTRA	38	30	48 (43～53)	90	1	120	0.5	
QV1206H420KTRA	42	32	53 (48～59)	99	1	120	0.5	
QV1206H480KTRA	48	34	61 (55～67)	115	1	120	0.6	
QV1206H560KTRA	56	40	70 (63～77)	132	1	120	0.6	
QV1206H600KTRA	60	45	76 (69～83)	143	1	120	0.6	
QV1206H650KTRA	65	50	82 (74～91)	154	1	100	0.4	
QV1206H750KTRA	75	55	94 (85～103)	176	1	100	0.4	
QV1206H850KTRA	85	60	105 (95～115)	198	1	100	0.4	
QV1210H090LTRA	9	6	13 (11～16)	24	2.5	280	0.5	
QV1210H110LTRA	11	8	15 (13～18)	29	2.5	280	0.6	
QV1210H140LTRA	14	10	19 (16～22)	35	2.5	280	0.7	
QV1210H180KTRA	18	14	25 (22～28)	46	2.5	280	0.8	
QV1210H220KTRA	22	16	29 (26～32)	55	2.5	280	1.0	
QV1210H260KTRA	26	18	34 (31～38)	66	2.5	280	1.2	
QV1210H300KTRA	30	21	40 (36～44)	75	2.5	280	1.4	
QV1210H380KTRA	38	30	48 (43～53)	90	2.5	280	1.5	
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QV1210H560KTRA	56	40	70 (63～77)	132	2.5	280	1.6	
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QV1210H650KTRA	65	50	82 (74～91)	154	2.5	250	1.4	
QV1210H750KTRA	75	55	94 (85～103)	176	2.5	250	1.4	
QV1210H850KTRA	85	60	105 (95～115)	198	2.5	250	1.4	
QV1812H090LTRA	9	6	13 (11～16)	24	5.0	500	0.9	
QV1812H110LTRA	11	8	15 (13～18)	29	5.0	500	1.2	
QV1812H140LTRA	14	10	19 (16～22)	35	5.0	500	1.4	
QV1812H180KTRA	18	14	25 (22～28)	46	5.0	500	1.7	
QV1812H220KTRA	22	16	29 (26～32)	55	5.0	500	2.0	
QV1812H260KTRA	26	18	34 (31～38)	66	5.0	500	2.5	
QV1812H300KTRA	30	21	40 (36～44)	75	5.0	500	2.8	
QV1812H380KTRA	38	30	48 (43～53)	90	5.0	500	3.0	
QV1812H420KTRA	42	32	53 (48～59)	99	5.0	500	3.0	
QV1812H480KTRA	48	34	61 (55～67)	115	5.0	500	3.2	
QV1812H560KTRA	56	40	70 (63～77)	132	5.0	500	3.2	
QV1812H600KTRA	60	45	76 (69～83)	143	5.0	500	3.2	
QV1812H650KTRA	65	50	82 (74～91)	154	5.0	400	2.8	
QV1812H750KTRA	75	55	94 (85～103)	176	5.0	400	2.8	
QV1812H850KTRA	85	60	105 (95～115)	198	5.0	400	2.8	
QV2220H090LTRA	9	6	13 (11～16)	24	10.0	1000	1.9	
QV2220H110LTRA	11	8	15 (13～18)	29	10.0	1000	2.3	
QV2220H140LTRA	14	10	19 (16～22)	35	10.0	1000	2.7	
QV2220H180KTRA	18	14	25 (22～28)	46	10.0	1000	3.0	
QV2220H220KTRA	22	16	29 (26～32)	55	10.0	1000	3.6	
QV2220H260KTRA	26	18	34 (31～38)	66	10.0	1000	4.0	
QV2220H300KTRA	30	21	40 (36～44)	75	10.0	1000	5.0	
QV2220H380KTRA	38	30	48 (43～53)	90	10.0	1000	6.0	
QV2220H420KTRA	42	32	53 (48～59)	99	10.0	1000	6.0	

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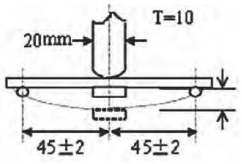
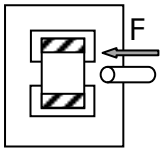
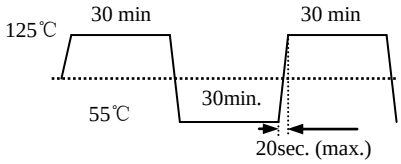
	V_{DC}(V)	V_{AC}(V)	V_{1mA}(V)	Vc(V)	Ic(A)	Ip(A)	Wmax (J)	℃
QV2220H480KTRA	48	34	61 (55～67)	115	10.0	1000	6.5	
QV2220H560KTRA	56	40	70 (63～77)	132	10.0	1000	6.5	
QV2220H600KTRA	60	45	76 (69～83)	143	10.0	1000	6.5	
QV2220H650KTRA	65	50	82 (74～91)	154	10.0	800	5.0	-55～+125
QV2220H750KTRA	75	55	94 (85～103)	176	10.0	800	5.0	
QV2220H850KTRA	85	60	105 (95～115)	198	10.0	800	5.0	

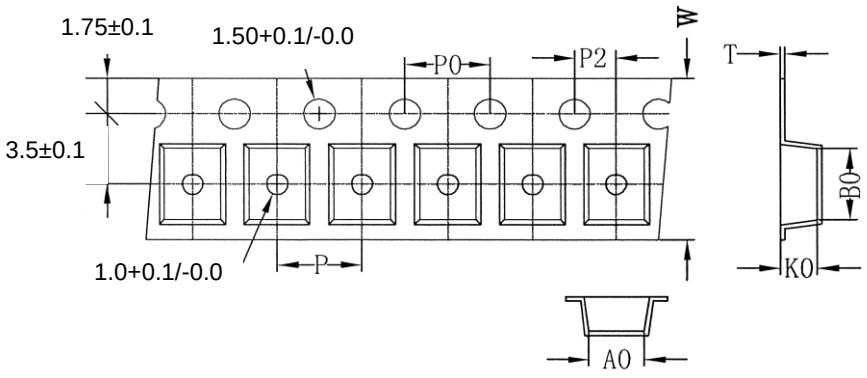
6. Reliability Test

No	Items	Test conditions / Methods	Requirements
1	Bending Resistance	Warp: 2mm Speed<0.5mm/s Duration: 10s 	① No visible mechanical damage. ② ｜ΔV1mA /V1mA｜≦5%.
2	Terminal Strength	Speed＜0.5mm/s Apply force: 10N Duration: 10±1s 	No removal or split of the termination
3	Solderability	Solder temperature：240±5℃； Dipping Duration：3±0.3s；	① No visible mechanical damage. ② Wetting coverage≧90%.
4	Resistance to Soldering Heat	Solder temperature：260±5℃； Dipping Duration：5±1s；	
5	Thermal Shock	High and low temperatures Transform for 100 Cycles. 	
6	Damp Heat	Temperature: 60±2℃ Humidity: 90% ～ 95% RH. Duration: 1000+24 h.	
7	High Temp. Storage	Temperature: 125±2℃ Duration: 1000±24 h.	

8	High Temp. Load	Temperature: 125±2℃ Loading Voltage: V_{DC}. Duration: 1000±24 h.	① No visible mechanical damage. ② |ΔV1mA /V1mA| ≦10%.
9	Damp Heat Load	Temperature: 60±2℃ Humidity: 90% ～ 95% RH. Loading Voltage: V_{DC}. Duration: 1000±24 h.	
10	Maximum Surge Current	Pulse waveform: 8/20 us Number of hit: each 1 time of +/- polarity Applied current: maximum surge current (Ip)	
11	Maximum Surge Energy	Pulse waveform: 10/1000 us Number of hit: each 1 time of +/- polarity Applied current: maximum surge energy(Wmax)	

7. Packaging

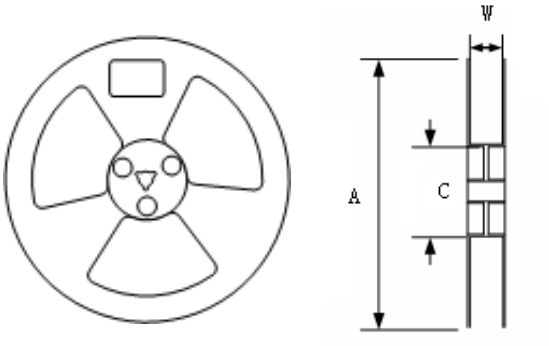
7.1 Carrier tape dimensions



Unit: mm

Type	A0 (±0.2)	B0 (±0.2)	K0Max.	T Max.	W (±0.3)	P0 (±0.2)	P (±0.2)	P2 (±0.2)
1206	1.9	3.5	2.0	0.30	8.0	4.0	4.0	2.0
1210	2.8	3.5	2.0	0.30	8.0	4.0	4.0	2.0
1812	3.5	4.8	2.8	0.30	12.0	4.0	8.0	2.0
2220	5.1	6.0	3.0	0.30	12.0	4.0	8.0	2.0

7.2 Taping reel dimensions



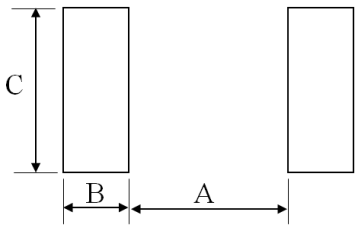
Type	Spec.	Dimensions(mm)		
		A	W	C
1206	7"	178±2	8.4+2.0/-0.0	58±2
1210	7"	178±2	8.4+2.0/-0.0	58±2
1812	13"	330±2	12.4+2.0/-0.0	100±2
2220	13"	330±2	12.4+2.0/-0.0	100±2

7.3 Packaging quantity

Type	Tape	Quantity (pcs/reel)
1206	Embossed Tape	3K
1210		2K
1812		4K
2220		3K

8. Soldering Recommendation

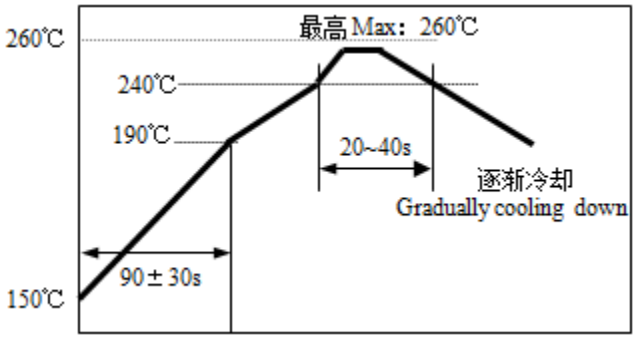
8.1 Recommended Land pattern



Type	A（mm）	B（mm）	C（mm）
1206	1.8~2.5	1.0~1.5	1.2~2.0
1210	1.9~2.1	1.2~1.5	2.6~2.8
1812	2.8~3.0	1.5~1.8	3.3~3.6
2220	4.0~4.2	1.8~2.0	5.2~5.5

8.2 Recommended Soldering Profile

- Pb Free Solder Paste: Sn/Ag/Cu (96.5/3.0/0.5).
- Max time at max temp: 10sec.
- Allowed Reflow time: 2x Max



9. Notes & Warnings

9.1 Storage

1.Storage temperature in original packaging: -10~+40℃.

2. Relative Humidity: ≤70%RH.

3. Keep away from corrosive atmosphere and sunlight.

4. Period of Storage: 12 Months.

5. Shall not be operated and stored under the following environmental condition:

(1) Corrosive or deoxidized atmospheres(such as chlorine, sulfureted hydrogen, ammonia, sulfuric acid, nitric oxide and so on)

(2) Volatile or inflammable atmospheres

(3) Dusty condition

(4) Excessive high or low pressure condition

(5) Humid site

(6) Places with brine, oil, chemical liquid or organic solvent

(7) Intense vibration

(8) Places with analogously deleterious

9.2 Usage

1. The ceramic body of the QV series varistors is fragile, no excessive pressure or impact shall be exerted on it.

2. The QV series varistors shall not be operated beyond the specified “Operating ambient temperature” range.