MULTILAYER CHIP VARISTORS

1 Electrical Characteristics

1.1 Technical Data	Symbol	Value	Unit
Maximum allowable continuous AC voltage	VRMS	48.0	V
Maximum allowable continuous DC voltage	VDC	60.0	V
Varistor voltage Measured	VB	76(68.4-83.6)	V
Typical capacitance value measured	C	1300	pF
Typical capacitance value tolerance		±40	%
Maximum clamping voltage measured	VC	130	V
Rated peak single pulse transient current at	I P	800	A

1.2 Reference Data	Symbol	Value	Unit
Maximum Energy Absorption 10/1000μs	E	2.0	J
Response time	T_{rise}	<5	ns
Leakage current at V_{DC} (At initial state)	I_L	<50	μA
Leakage current at V_{DC} (After reliability Test)	I_{LA}	<100	μA
Operating ambient temperature		-40~+125	℃
Max Reflow temperature profile(Recommend)		260	℃

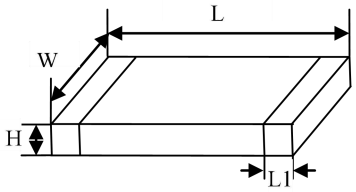
2 Type Code Designation

KMVR	1210	—	760H	Q-V
①	②		③	④

① KMVR : Series name
② 1210 : Chip size – 1210 (3.2 x 2.5mm) size
③ 760 : Varistor voltage(Breakdown voltage) -76Vdc
④ Q-V : Automotive Electronics AEC-Q200

3 Dimensional Drawings

Type	Length（L）	Width（W）	High（H）	Termination（L1）
1210	3.20±0.20	2.50±0.20	2.50(max)	0.40±0.20



4 Other Data

Body	ZnO
End Termination	Ag/Ni/Sn
Packaging	Bulk/Tape
Complies with Standard	IEC61000-4-5

4.1 Test record

*1 The breakdown voltage was measured at 1 mA current.
*2 The Clamping voltage was measured at 8*20 us standard current, 1210(2A)
*3 The surge current was tested at 8/20 μs waveform.
*4 Typical capacitance value measured at 1KHz

*5 The components shall be employed within 1 year

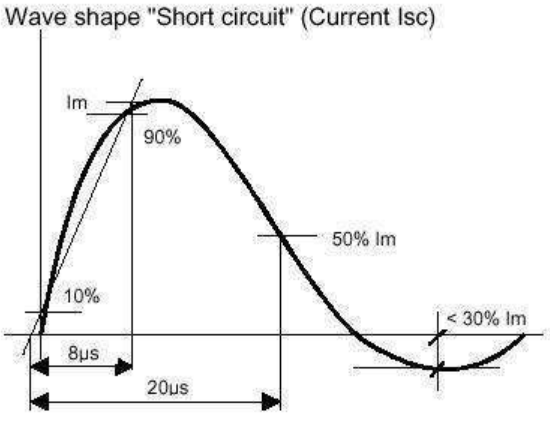
4.2 Storage Condition

- As far as possible, the components should be employed within 24 months after delivery from .
- They should be left in their original packing to avoid soldering problems due to oxidized contacts.
- Storage temperature: − 25 up to + 45°C.
- Relative humidity: < 75 % annual average, < 95 % on max. 30 days in a year.

4.3 Enviromental Reliability Test

Characteristic	Test method and description			
High Temperature Storage	The specimen shall be subjected to 125℃ for 1000 hours in a thermostatic bath without load and then stored at room temperature and humidity for 1 to 2 hours. The change of varistor voltage shall be within 10%.			
Temperature Cycle	The temperature cycle of specified temperature shall be repeated five times and then stored at room temperature and humidity for one two hours. The change of varistor voltage shall be within 10%and mechanical damage shall be examined.	Step	Temperature	Period
		1	-40±3℃	30min±3
		2	Room Temperature	1~2hours
		3	125±2℃	30min±3
		4	Room Temperature	1~2hours
High Temperature Load	After being continuously applied the maximum allowable voltage at 125℃ for 1000hours, the specimen shall be stored at room temperature and humidity for one or hours, the change of varistor voltage shall be within 10%.			
Damp Heat Load/ Humidity Load	The specimen should be subjected to 40℃,90 to 95%RH environment, and the maximum allowable voltage applied for 1000 hours, then stored at room temperature and humidity for one or two hours. The change of varistor voltage shall be within 10%.			
Low Temperature Storage	The specimen should be subjected to -40℃, without load for 1000 hours and then stored at room temperature for one two hours. The change of varistor voltage shall be within 10%.			

5 Surge Wave Form



IEC61000-4-5 Standards

SEVERITY LEVEL	T1	T2
1	8 uS	20 uS
2	10 uS	1000 uS

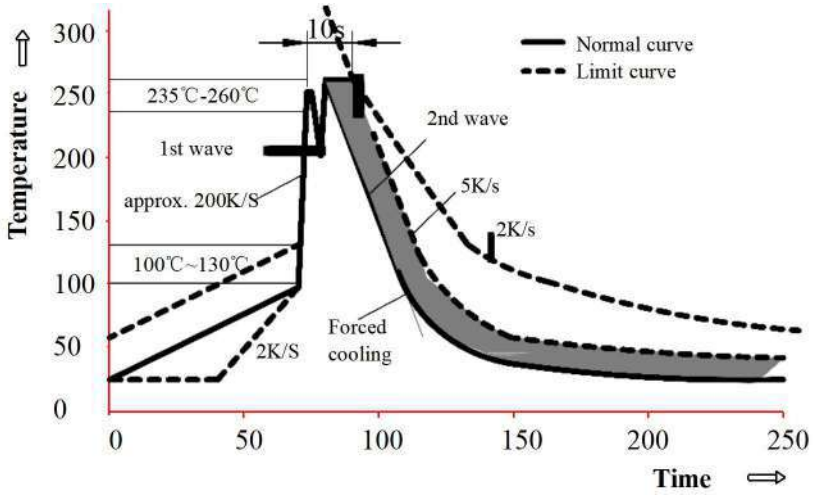
8/20μs waveform current

6 Soldering guidelines

The usage of mild, non-activated fluxes for soldering is recommended, as well as proper cleaning of the PCB.

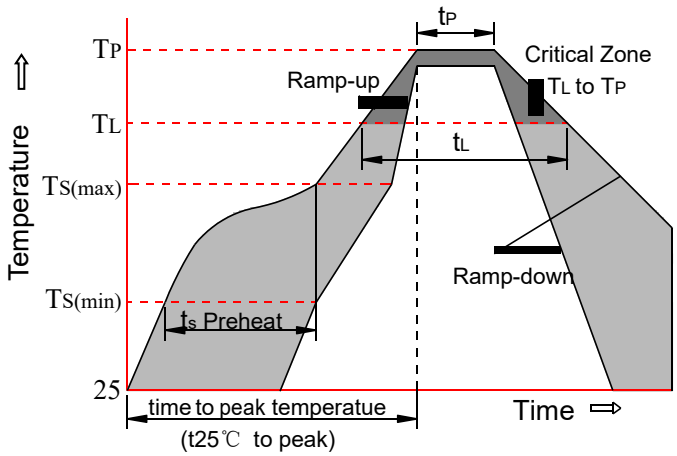
The components are suitable for reflow soldering per JEDEC J-STD-020C

6.1 Wave soldering



Temperature characteristics at component terminal with dual-wave soldering

6.2 Reflow soldering

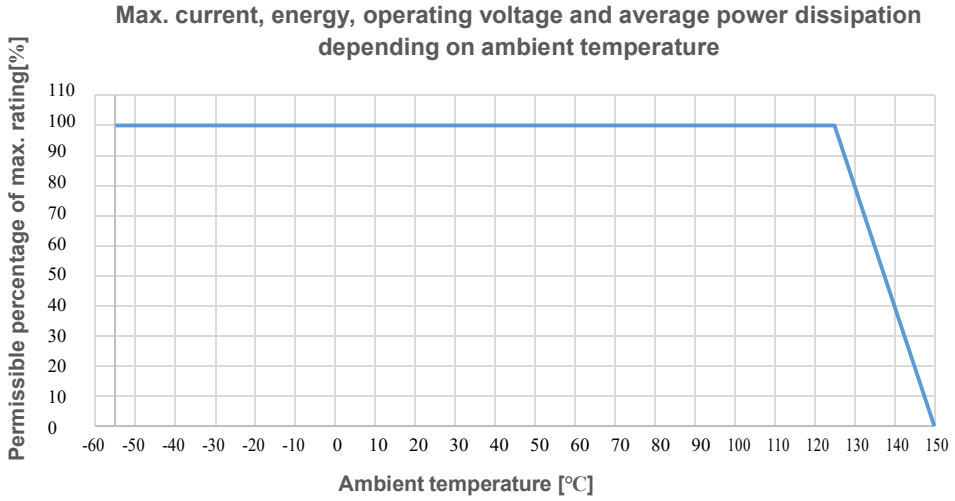


Profile feature		Sn-Pb assembly	Pb-Free assembly
Average ramp-up rate (T_{Smax} to T_p)		3℃/sec. Max	3℃/sec. Max
Preheat	-Temperature min. ($T_{s(min)}$)	+100℃	+150℃
	-Temperature max.($T_{s(max)}$)	+150℃	+200℃
	-Time (t_{Smin} to t_{Smax})	60-120 secs.	60-180 secs.
$T_{s(max)}$ to T_L - Ramp-up Rate		3℃/sec. Max	3℃/sec. Max
Time maintained above	-Temperature min. (T_L)	+183℃	+217℃
	-Time (t_L)	60-150 secs.	60-150 secs.
Peak classification temperature (T_p)		+220℃ to +240℃	+240℃ to +260℃
Time within 5℃of actual peak temperature (t_p)		10 secs. to 30 secs.	20 secs. to 40 secs.
Ramp-down rate		6℃/sec. max.	6℃/sec. max.
Time 25℃ to peak temperature		6 min. max.	8 min. max.

Notes: All temperature refer to topside of the package, measured on the package body surface

Maximum number of reflow cycles

7 Temperature derating curve

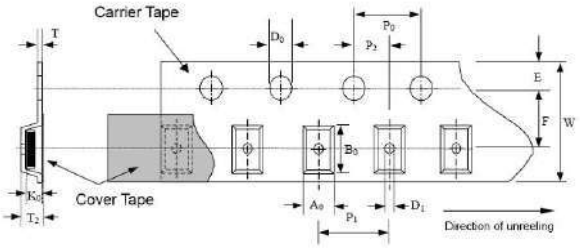


8 Packaging Specification

8.1 Carrier tape transparent cover tape should be heat-sealed to carry the products, and the reel should be used to reel the carrier tape.

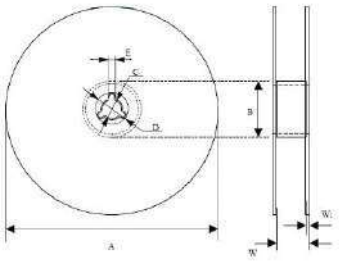
8.2 The adhesion of the heat-sealed cover tape shall be 40 + 20/ - 15 grams.

8.3 Both the head and the end portion of taping shall be empty for reel package and SMT auto-pickup machine. And a normal paper tape shall be connected in the head of taping for the operator handle.



Type	A_0 ±0.10	B_0 ±0.10	K_0 ±0.10	T ±0.05	T_2 ±0.05	D_0 +0.10	D_1 ±0.05	P_1 ±0.10	P_2 ±0.05	P_0 ±0.05	W ±0.20	E ±0.10	F ±0.05
0402	1. 08	1. 88	1. 04	0. 22	0. 87	1. 50	1. 00	4. 00	2. 00	4. 00	8. 00	1. 75	3. 50
0604	1. 08	1. 88	1. 04	0. 22	1. 17	1. 50	1. 00	4. 00	2. 00	4. 00	8. 00	1. 75	3. 50
0806	1. 42	2. 30	1. 165	0. 22	1. 87	1. 50	1. 00	4. 00	2. 00	4. 00	8. 00	1. 75	3. 50
1206	1. 88	3. 50	1. 27	0. 20	1. 49	1. 50	1. 00	4. 00	2. 00	4. 00	8. 00	1. 75	3. 50
1210	2. 18	3. 46	1. 45	0. 22	1. 77	1. 50	1. 00	4. 00	2. 00	4. 00	8. 00	1. 75	3. 50
1812	3. 66	4. 95	1. 74	0. 25	1. 99	1. 50	1. 50	8. 00	2. 00	4. 00	12. 00	1. 75	5. 50
2220	5. 10	5. 97	2. 80	0. 25	3. 05	1. 50	1. 50	8. 00	2. 00	4. 00	12. 00	1. 75	5. 50
3220	5. 50	8. 50	2. 80	0. 30	3. 50	1. 50	1. 50	8. 00	2. 00	4. 00	16. 00	1. 75	7. 50

9 Reel dimension



type	A	B	C	D	E	W	W_1
0402-1210	178.0±1.0	60.0±0.5	13.0±0.2	21.0±0.2	2.0±0.5	9.0±0.50	1.5±0.15
1812-3220	178.0±1.0	60.0±0.5	13.5±0.1	21.0±0.2	2.0±0.5	13.6±0.2	1.5±0.15

type		0603	0805		0806	1206	1210	1812	2220	3220
quantity	paper	4000	4000	-	-	-	-	-	-	
	plastic	-	-	3000	2000	3000	2000/3000	1000	500/1000	1000

Quantity of taping packing(pcs) : 2000/3000