NichTek®

ITEM : CHIP MULTILAYER VARISTORS

ESTABLISHMENT	2013.05.03	APPROVED	
REVISION	2013.11.25	Series NO:PVSA130503003	

APPROVAL SHEET

CHIP MULTILAYER VARIATORS

CUSTOMER :

DATE :

You can reapprove only the changed quality request recorded in spec sheet.
And, We can decide other changed parts

NichTek®

ITEM : CHIP MULTILAYER VARISTORS

Features

RoHS compliant

SMD type Body size 3216 ~5750

Meet IEC61000-4-5 / K21 Standard

Bidirectional and symmetrical V/I characteristics

Large withstanding surge current capability

Excellent low leakage current

Operating temperature range -55 ~ +125℃

Multi-Layers construction provides higher power dissipation

Ordering Information

PVSA 3216 09 422 T

(1) (2) (3) (4) (5)

(1) Series

PVSA : High Surge Current series

(2) Dimensions

The first two digits : length (mm)

The last two digits : width (mm)

(3) DC Voltage

Code	DC Voltage	Code	DC Voltage
09	9	45	45
18	18	60	60
38	38	85	85

(4) Capacitance

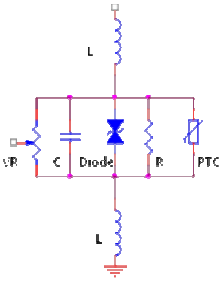
The first two digits are significant.

The last digit is the number of zeros following.

(5) Packaging

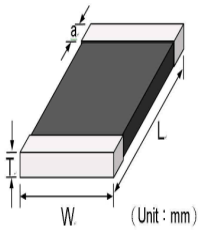
T:Tape & Reel.

Equivalent Circuit



☆L Body Inductance
☆C Device Capacitance
☆VR Voltage Variable Resistor
☆R Insulation Resistor
☆Diode Voltage clamped
☆PTC For low leakage current

Dimensions



Model	3216	3225	4532	5750
Length(L)	3.2+0.6/-0.2mm	3.2+0.6/-0.2mm	4.5+0.6/-0.2mm	6.0+0.7/-0.3mm
Width(W)	1.6+0.4/-0.2mm	2.5+0.4/-0.2mm	3.2+0.5/-0.2mm	5.3+0.5/-0.3mm
Thickness(T)	1.9mmMax	2.60mmMax	3.50mmMax	3.6 mm Max
Termination(a)	0.50±0.2mm	0.50±0.25mm	0.50±0.35/-0.1mm	0.5+0.35/-0.1 mm

Specifications

Part Number	Working Voltage		Breakdown Voltage (＊1)	Clamping Voltage (＊2)	Surge Curre(8/20 μs) (＊3)
	AC	DC	V（1mA）	V	A
PVSA321609422T	6	9	12(12~20)	<25	500
PVSA321618102T	14	18	24(±10%)	＜45	500
PVSA321638801T	30	38	47(±10%)	＜85	500
PVSA321660801T	48	60	75(±10%)	＜100	500
PVSA322518382T	14	18	24(±10%)	＜45	1000
PVSA322538202T	30	38	47(±10%)	＜85	1000
PVSA322560202T	48	60	75(±10%)	＜100	1000
PVSA453218282T	14	18	24(±10%)	＜45	2000
PVSA453238142T	30	38	47(±10%)	＜85	2000
PVSA453260212T	48	60	75(±10%)	＜100	2000
PVSA575018842T	14	18	24(±10%)	＜45	3000
PVSA575038492T	30	38	47(±10%)	＜85	3000
PVSA575045352T	35	45	56(±10%)	<90	3000
PVSA575060342T	48	60	75(±10%)	＜100	3000
PVSA575065202T	50	65	82(±10%)	＜135	3000

＊ 1 The breakdown voltage was measured at 1 mA current.

＊ 2 The clamping voltage was measured at standard current, 3216(1A), 3225(2.5A), 4532(5A) and 5750(10A).

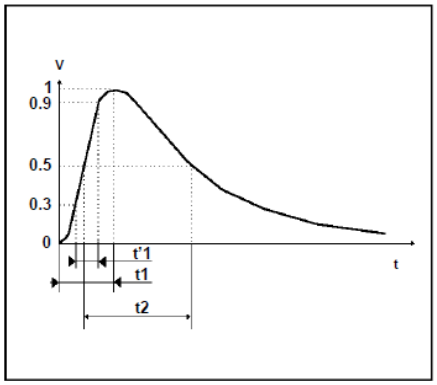
＊ 3 The surge current was tested at 8/20 μs waveform.

Part Number	Non-linear Coefficient	Leakage current		Capacitance (＊4)	Response Time	Operation Ambient Temperature	Storage Temperat
		before Surge Test	After Surge Test				
	α	μA	μA	PF(at 1 KHz)	Trise	℃	℃
PVSA321609422T	20	10	80	3500	<1ns	-55~+125	-55~+150
PVSA321618102T	20	10	80	2300			
PVSA321638801T	30	10	80	690			
PVSA321660801T	.30	10	80	300			
PVSA322518382T	20	15	80	2300			
PVSA322538202T	30	10	80	1550			
PVSA322560202T	30	10	80	930			
PVSA453218282T	20	15	80	4500			
PVSA453238142T	30	15	80	2100			
PVSA453260212T	30	15	80	1650			
PVSA575018842T	20	15	80	5500			
PVSA575038492T	35	15	80	8000			
PVSA575045352T	35	15	80	3500			
PVSA575060342T	40	15	80	2000			
PVSA575065202T	40	15	80	2000			

＊ 4 The capacitance value only for customer reference, it's not formal specification.

＊ 5 The components shall be employed within 1 year, in the nitrogen condition.

Electrical Characteristicse



8/20 μs waveform current

IEC61000-4-5 Standards

SEVERITY LEVEL	t1 (=1.67t'1)	t2
1	8 μs	20 μs

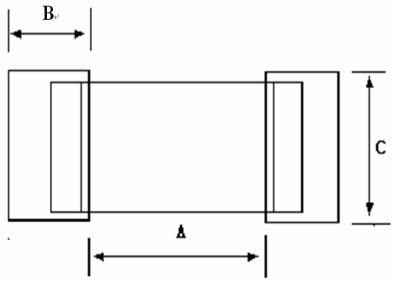
Reliability And Test Conditions

Item	Requirement	Test condition
High Temperature Storage	1.Breakdown voltage change : within ±10% 2.No mechanical damage	1.Temperature : 150±2℃ 2.Time : 1000±2 hours 3.Test after placing in ambient temperature for 24 hours.
Low Temperature Storage	1.Breakdown voltage change : within ±10% 2.No mechanical damage	1.Temperature : -40±2℃ 2.Time : 1000±2 hours 3.Test after placing in ambient temperature for 24 hours.
Temperature Cycle	1.Breakdown voltage change : within ±10% 2.No mechanical damage	1.Step 1 : -40±3℃; time : 30±3min 2.Step 2 : 25℃; time : 1 hour 3.Step 3 : 125±3℃; time : 30±3min 4.Step 4 : 25℃; time : 1 hour 5.Number of cycle : 5 times 6.Test after placing in ambient temperature for 24 hours.
High Temperature Load	1.Breakdown voltage change : within ±10% 2.No mechanical damage	1.Temperature : 125±2℃ 2.Rated working voltage applied 3.Time : 1000±2 hours 4.Test after placing in ambient temperature for 24 hours.
Damp Heat Load/ Humidity Load	1.Breakdown voltage change : within ±10% 2.No mechanical damage	1.Temperature : 40±2℃ 2.Humidity : 90~95% RH 3.Rated working voltage applied 4.Time : 500±2 hours 5.Test after placing in ambient temperature for 24 hours.

Land Pattern Design

Unit:mm

	A	B	C
3216	1.8~2.5	1.2~1.8	1.5~2.0
3225	1.8~2.5	1.3~2.0	2.2~3.0
4532	2.5~3.3	1.3~2.2	2.8~3.6
5750	3.8~4.6	1.3~2.2	4.8~5.5



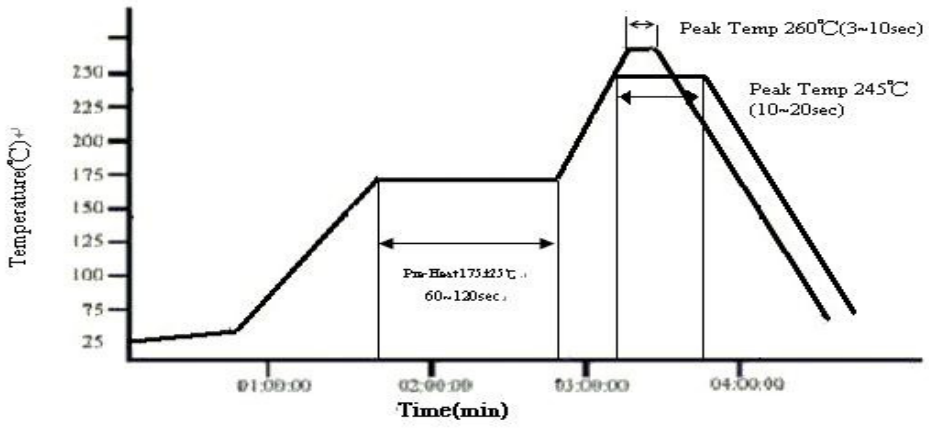
The SIR test of the solder paste shall be done（Based on JIS-Z-3284）

Steel plate and foot distance printing

The IR Reflow and Temperature of Soldering for Pb Free

Foot distance printing (mm)	Steel Plate thickness (mm)
> 0.65mm	0.18mm
0.65mm~0.5mm	0.15mm
0.50mm~0.40mm	0.12mm
<=0.40 mm	0.10mm

Soldering Profile



IR reflow Pb Free Process suggestion profile

(1) The solder recommend is Sn96.5/Ag 3.5 of 120 to 150μm

(2) Ramp-up rate (217℃ to Peak) + 3℃/second max

(3) Temp. maintain at 175 +/-25℃ 180 seconds max

(4) Temp. maintain above 217 ℃ 60-150 seconds

(5) Peak temperature range 245℃ +20℃/ -10 ℃ time within 5 ℃ of actually peak temperature10~20 seconds

(6) Ramp down rate +6 ℃/second max.

※Perform adequate test in advance as the reflow temperature profile will vary according to the conditions of the manufacturing process, and the specification of the reflow furnace.

Resistance to Soldering Heat-High Temperature Resistance:260,10sec- 3 times.

Hand Soldering

In hand soldering of the PVSA devices. Large temperature gradient between preheated the PVSA devices and the tip of soldering iron may cause electrical failures and mechanical damages such as crackings or breakings of the devices. The soldering shall be carefully controlled and carried out so that the temperature gradient is kept minimum with following recommended conditions for hand soldering.

Recommended Soldering Condition 1

（1） Solder ：
0.12~0.18mm Thread solder (Sn96.5:Ag3.5) with soldering flux in the core.
Rosin-based and non-activated flux is recommended.

（2） Preheating
The PVSA devices shall be preheated so that Temperature Gradient between the devices and the tip of soldering iron is 150℃ or below.

（3）Soldering Iron
Rated Power of 20w max with 3mm soldering tip in diameter.
Temperature of soldering iron tip 380℃max, 3-5sec (The required amount of solder shall be melted in advance on the soldering tip.)

（4）Cooling
After soldering. The PVSA devices shall be cooled gradually at room ambient temperature.

Recommended Soldering Condition 2（Without preheating）

（1）Solder iron tip shall not directly touch to ceramic dielectrics.
（2）Solder iron tip shall be fully preheated before soldering while soldering iron tip to the external electrode of the PVSA devices.

Recommended using IR Reflow Process. The Wave Soldering Process and Immersion Tin Process can't to be Adopted for this Product.

Post Soldering Cleaning

Residues of corrosive soldering fluxes on the PC board after cleaning may greatly have influences on the electrical characteristic and the reliability (such as humidity resistance)of the PVSA devices which have been mounted on the board. It shall be confirmed that the characteristic and the reliability of the devices are not affected by the applied cleaning conditions.

When an ultrasonic cleaning is applied to the mounted PVSA devices on PC Boards. Following conditions are recommended for preventing failures or damages of the devices due to the large vibration energy and the resonance caused by the ultrasonic waves.

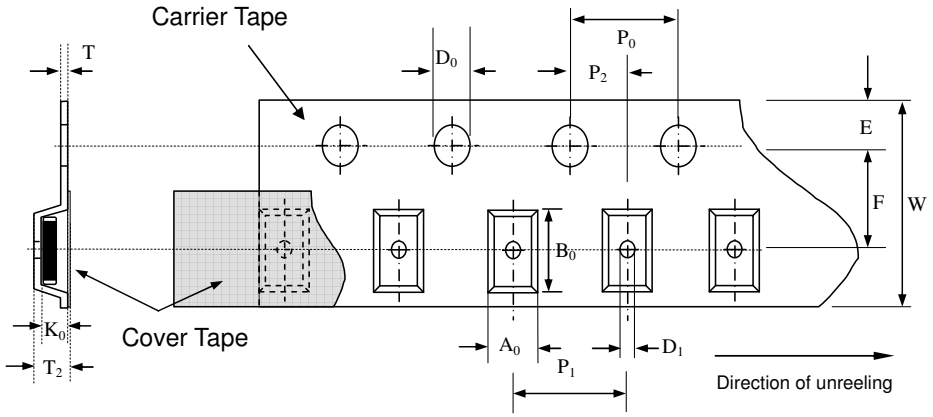
（1）Frequency 29MHz max
（2）Radiated Power 20w/lithr max
（3）Period 5minuets max

Packaging

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

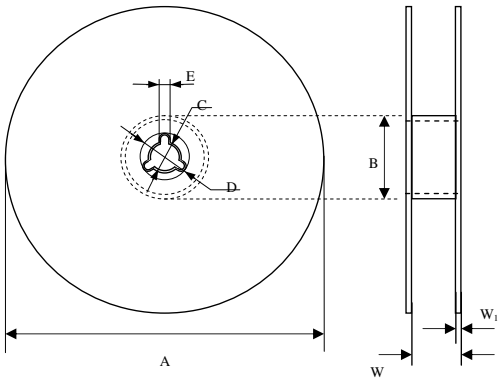
The adhesion of the heat-sealed cover tape shall be 40 + 20/ − 15grams.

Both the head and the end portion of the 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 to handle.



Symbol	A0 ±0.10	B0 ±0.10	K0 ±0.10	T ±0.05	T2 ±0.05	D0 +0.10 -0.00	D1 ±0.05	P1 ±0.10	P2 ±0.05	P0 ±0.05	W ±0.20	E ±0.10	F ±0.05
3216	2.10	3.90	2.10	0.22	2.32	1.50	1.00	4.00	2.00	4.00	8.00	1.75	3.50
3225	3.00	3.90	2.70	0.22	2.87	1.50	1.00	4.00	2.00	4.00	8.00	1.75	3.50
4532	3.80	5.25	3.60	0.25	3.40	1.50	1.50	8.00	2.00	4.00	12.00	1.75	5.50
5750	5.90	6.80	3.75	0.25	3.90	1.50	1.50	8.00	2.00	4.00	12.00	1.75	5.50

Reel Dimension



Symbol	A	B	C	D	E	W	W1
3216	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
3225	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
4532	178.0±1.0	60.2±0.5	13.0±0.5	21.0±0.2	2.5±0.5	13.6±0.2	1.5±0.15
5750	178.0±1.0	60.2±0.5	13.0±0.5	21.0±0.2	2.5±0.5	13.6±0.2	1.5±0.15

Standard Packaging

Size	3216	3225	4532	5750
Pcs	2000	1500	500	500