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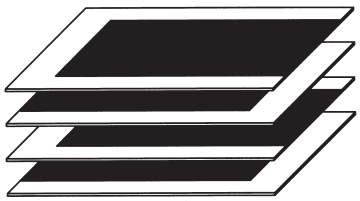
SMD Transient Voltage Suppressors

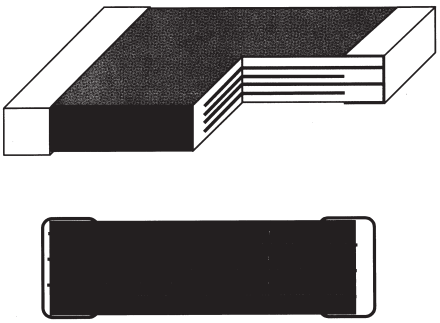
Transient Voltage Suppressor

Major Additions and Improvements

Multilayer Surface Mount Transient Voltage Suppressors (TVS) are manufactured from semiconduct ceramics by the highly advanced multilayer formation technologies, which can offer rugged protection, excellent transient energy absorption and internal heat dissipation. The devices are leadless chip form, eliminating lead inductance and guaranteeing a faster speed of response time of less than 0.5ns, which makes them fast enough to ensure reliable protection against ESD pulse and other specific transient events. These transient suppression devices are significantly smaller footprints and lower profiles than traditional zener diodes or radial MOVs,



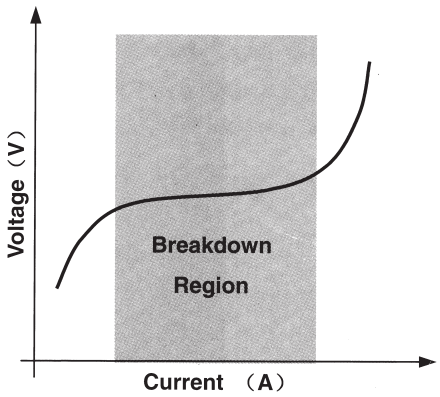
multilayer formation technologies



Section of the chip

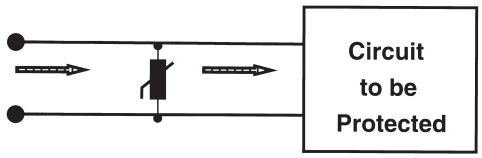
Voltage Dependent Characteristic

Transient Voltage Suppressors（varistors） are voltage-dependent electrical resistors with symmetrical V/I characteristic. Their resistance value decreases with increasing voltage, thus “short-circuiting” further rises in overvoltage.

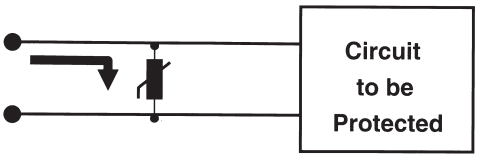


The Prevention of Overvoltage

In other words, as long as the voltage increases above the threshold of the TVS, the suppressor will draws a rapidly increasing current, and then the overvoltage is considerably attenuated away from the protected circuit, that is why the inherent protection of the equipments should be supplemented by including specific components that will raise the withstand capabilities to the required level. Varistors provide protection against all kinds of overvoltage and prevent electronic equipment from being damaged by transient events.



Normal State



Over voltage State

SMD Transient Voltage Suppressors

Information for Designer

When selecting the TVS for designing within the circuit, some characteristic parameter should be considered carefully to meet the circuit condition. The following guideline are recommended.

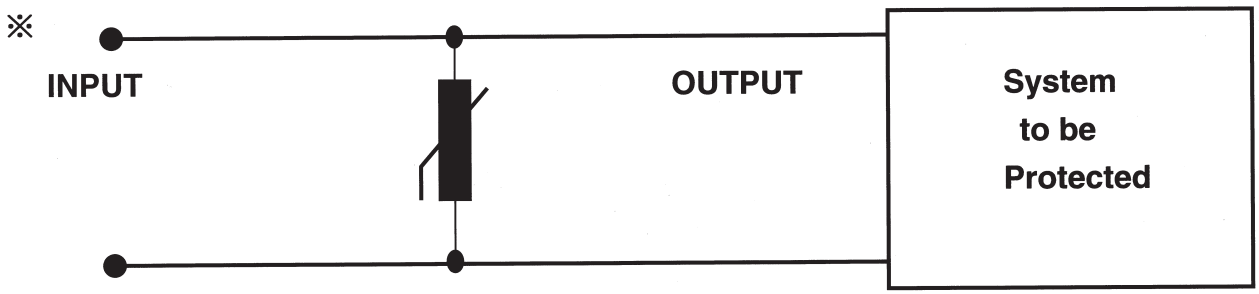
1. The surge handling ability of the selected TVS should meet the need of dissipating the expected transient surge current of the protected circuit.

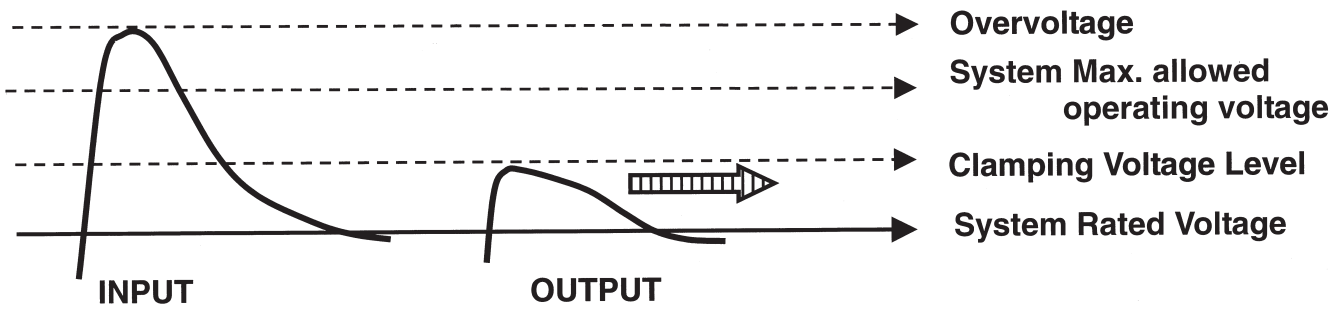
2. The clamping voltage of the selected TVS should be less than the maximum allowed
※ operating voltage of the protected circuit.

3. In high speed data transmission situation. the capacitance of the selected TVS should be considered.

4. The special requests of the TVS's capacitance such as ESD prevention are available, please contact with us.

5. While choosing the TVS, the working voltage of the TVS should be greater than or equal to the normal operating voltage of the circuit.





SMD Transient Voltage Suppressors

M0V 240 ST 1206 C

Series Code

Where: A = Operating voltage from $8.0V_{RMS}$ ($11.0V_{DC}$) to $35.0V_{RMS}$ ($45.0V_{DC}$), High surge absorption, low clamping voltage.

C = Operating voltage from $2.5V_{RMS}$ ($3.3V_{DC}$) to $95.0V_{RMS}$ ($127.0V_{DC}$), Wide range application.

Area of element

SIZE	LENGTH	WIDTH
0402	1.0 ± 0.1mm	0.50 ± 0.10mm
0603	1.6 ± 0.15mm	0.80 ± 0.15mm
0805	2.0 ± 0.2mm	1.25 ± 0.15mm
1206	3.2 ± 0.2mm	1.60 ± 0.15mm
1210	3.2 ± 0.2mm	2.50 ± 0.20mm
1812	4.5 ± 0.2mm	3.20 ± 0.20mm
2220	5.7 ± 0.2mm	5.00 ± 0.20mm

Application Code

Where: ST = Multilayer SMD TVS

Varistor Voltage

Where: 240 = 24×10^0 V = 24 V

241 = 24×10^1 V = 240 V

Company Code

Vincenc Group

SMD Transient Voltage Suppressors

The Introduction of Mitilayer Surface Varistor

ST-Series include two types of TVS, illustrate as below：

◎ **ST-A Series:** High energy and surge and specially specification, multilayer SMD formation Transient Voltage Suppressors (TVS).

◎ **ST-C Series:** Wide range applications, multilayer SMD formation Transient Voltage Suppressors (TVS).

@ **CH series: :** High voltage suppressor, the working voltage could be up to 385Vdc

Characteristics	***ST Series***
Surge current（8/20μs）up to	1200A
Energy absorption up to	12.0J
Average power dissipation up to	0.04W
Response time	＜0.5ns
Storage temperature	(0402…0603) −55 ℃ ~ +125 ℃ (0805…2220) −55 ℃ ~ +150 ℃
Operating temperature（full load）	(0402…0603) −55 ℃ ~ +85 ℃ (0805…2220) −55 ℃ ~ +125 ℃
Max. relative humidity (Without condensation)	<75% annual average, <95% on max. 30days per annu.

GENERAL FEATURE:

◎Chip size ： from 0402 to 3220

◎Working Voltage rating is from 2.5 to 300 $V_{RMS;}$ 3.3 to 385 Vdc

◎Leadless SMD formation surface mount design

◎Surge current up to 1200A

◎Bidirectional clamping, high energy rating up 12.0 Joules

◎Low inductance, fast response

◎Suitable for ESD Protection

◎Excellent temperature coefficient

◎Very low leakage current

◎Good solderability

◎Available in tape and reel for use with automatic pick & place equipment

◎Compatible with most surface-mounting assembly equipment and mounting techniques

SMD Transient Voltage Suppressors

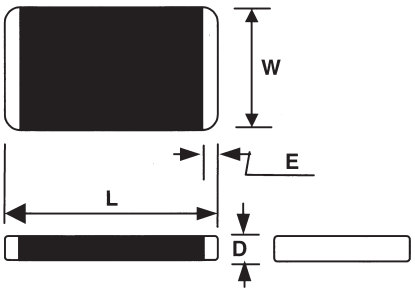
High surge protection varistor A-series

Vincenc Model Number	Working Voltage (MAX)		Breakdown Voltage	Peak Current (MAX)	Clamping Voltage (MAX)		Energy Absorption (MAX)	Typical Capacitance ※
Unit Condition	AC (V_{RMS})	DC (V)	1mA (V)	8/20μs (A)	(A)	(V)	10/1000 (J)	1KHz (pF)
MOV150ST1206A	8.0	11.0	15(12.75~17.25)	200	1	25	0.4	1700
MOV180ST1206A	11.0	14.0	18(15.3~20.7)	200	1	30	0.5	1500
MOV220ST1206A	12.0	16.5	22(19.8~24.2)	200	1	36	0.5	1280
MOV240ST1206A	14.0	18.0	24(21.6~27)	200	1	39	0.5	1160
MOV270ST1206A	17.0	22.0	27(24.3~29.8)	200	1	44	0.6	1080
MOV330ST1206A	20.0	26.0	33(29.7~36.3)	200	1	54	0.7	680
MOV390ST1206A	25.0	30.0	39(35.1~42.9)	200	1	65	1.0	620
MOV470ST1206A	30.0	38.0	47(42.3~51.7)	200	1	77	1.1	550
MOV560ST1206A	35.0	45.0	56(50.4~61.6)	200	1	90	0.8	400
MOV150ST1210A	8.0	11.0	15(12.75~17.25)	400	2.5	25	1.0	4050
MOV180ST1210A	11.0	14.0	18（15.3~20.7）	400	2.5	30	1.2	3860
MOV220ST1210A	12.0	16.5	22（19.8~24.2）	400	2.5	36	1.4	2600
MOV240ST1210A	14.0	18.0	24（21.6~27）	400	2.5	39	1.4	2380
MOV270ST1210A	17.0	22.0	27（24.3~29.8）	400	2.5	44	1.7	2100
MOV330ST1210A	20.0	26.0	33(29.7~36.3)	400	2.5	54	1.9	1400
MOV390ST1210A	25.0	30.0	39(35.1~42.9)	400	2.5	65	1.7	1180
MOV470ST1210A	30.0	38.0	47(42.3~51.7)	400	2.5	77	2.0	1000
MOV560ST1210A	35.0	45.0	56(50.4~61.6)	400	2.5	90	2.0	660
MOV150ST1812A	8.0	11.0	15(12.75~17.25)	800	5	25	1.8	8450
MOV180ST1812A	11.0	14.0	18（15.3~20.7）	800	5	30	1.9	7030
MOV220ST1812A	12.0	16.5	22（19.8~24.2）	800	5	36	2.3	5080
MOV240ST1812A	14.0	18.0	24（21.6~27）	800	5	38	2.3	4650
MOV270ST1812A	17.0	22.0	27(24.3~29.8)	800	5	44	2.7	4150
MOV330ST1812A	20.0	26.0	33(29.7~36.3)	800	5	54	3.0	3400
MOV390ST1812A	25.0	30.0	39(35.1~42.9)	800	5	65	3.7	2950
MOV470ST1812A	30.0	38.0	47(42.3~51.7)	800	5	77	4.2	2550
MOV560ST1812A	35.0	45.0	56(50.4~61.6)	800	5	90	4.2	2400

SMD Transient Voltage Suppressors

High Surge protection Varistors A Series

Vincenc Model Number	Working Voltage (MAX)		Breakdown Voltage	Peak Current (MAX)	Clamping Voltage (MAX)		Energy Absorption (MAX)	Typical Capacitance ※
Unit Condition	AC (V_{RMS})	DC (V)	1mA (V)	8/20μs (A)	(A)	(V)	10/1000 (J)	1KHz (pF)
MOV150ST2220A	8	11	15(12.75~17.25)	1200	10	25	4.2	21200
MOV180ST2220A	11	14	18(15.3~20.7)	1200	10	30	5.4	17700
MOV220ST2220A	12	16.5	22(19.8~24.2)	1200	10	36	5.8	14500
MOV240ST2220A	14	18	24(21.6~27)	1200	10	39	5.8	13600
MOV270ST2220A	17	22	27(24.3~29.8)	1200	10	44	7.2	12000
MOV330ST2220A	20	26	33(29.7~36.3)	1200	10	54	7.8	10500
MOV390ST2220A	25	30	39(35.1~42.9)	1200	10	65	9.6	8900
MOV470ST2220A	30	38	47(42.3~51.7)	1200	10	77	12.0	5700
MOV560ST2220A	35	45	56(50.4~61.6)	1200	10	90	7.7	4800



Type	L mm	W Mm	D mm	E mm
MOV 1206 ST	3.2 ± 0.20	1.6 ± 0.15	1.5 max.	0.5 +0.2/-0.2
MOV 1210 ST	3.2 ± 0.20	2.5 ± 0.20	1.5 max.	0.5 +0.2/-0.2
MOV 1812 ST	4.5 ± 0.20	3.2± 0.20	2.0 max.	0.5 +0.3/-0.1
MOV 2220 ST	5.7 ± 0.20	5.0 ± 0.20	2.5 max.	0.5 +0.3/-0.1

NOTES :

1. **Tolerance of breakdown Voltage : 15~18V＝±15％, 22~56V＝±10％**
2. **Capacitance value just for reference**
3. **Typical leakage at 25℃< 50 μA, maximum leakage 200 μA.**
4. **If there is any change without notice , it depends on approval sheet.**

※can be designed during manufacturing according to the request, please contact our sales department if needed.

Vincenc SFI Model Number	Working Voltage (MAX)		Breakdown Voltage	Peak Current (MAX)	Clamping Voltage (MAX)		Energy Absorption (MAX)	Typical Capacitance ※
Unit Condition	AC (V_{RMS})	DC (V)	1mA (V)	8/20μs (A)	(A)	(V)	10/1000μs (J)	1KHz (pF)
MOV050ST0402C	2.5	3.3	5(4.0~6.0)	20	1	10	0.05	390
MOV080ST0402C	4	5.5	8(6.4~9.6)	20	1	16	0.05	295
MOV120ST0402C	6	9	12(9.6~14.4)	20	1	20	0.05	190
MOV150ST0402C	8	11	15(12.75~17.25)	20	1	25	0.05	160
MOV180ST0402C	11	14	18(15.3~20.7)	20	1	30	0.05	135
MOV220ST0402C	12	16.5	22(19.8~24.2)	20	1	36	0.05	105
MOV240ST0402C	14	18	24(21.6~27)	20	1	40	0.05	93
MOV270ST0402C	17	22	27(24.3~29.8)	20	1	45	0.05	75
MOV330ST0402C	20	26	33(29.7~36.3)	20	1	54	0.05	54
MOV390ST0402C	25	30	39(35.1~42.9)	20	1	65	0.05	45
MOV470ST0402C	30	38	47(42.3~51.7)	20	1	77	0.05	27

MOV050ST0603C	2.5	3.3	5(4.0~6.0)	30	1	10	0.1	1250
MOV080ST0603C	4	5.5	8(6.4~9.6)	30	1	16	0.1	800
MOV120ST0603C	6	9	12(9.6~14.4)	30	1	20	0.1	680
MOV150ST0603C	8	11	15(12.75~17.25)	30	1	25	0.1	460
MOV180ST0603C	11	14	18(15.3~20.7)	30	1	30	0.1	350
MOV220ST0603C	12	16.5	22(19.8~24.2)	30	1	36	0.1	300
MOV240ST0603C	14	18	24(21.6~27)	30	1	39	0.1	270
MOV270ST0603C	17	22	27(24.3~29.8)	30	1	44	0.1	235
MOV330ST0603C	20	26	33(29.7~36.3)	30	1	54	0.1	200
MOV390ST0603C	25	30	39(35.1~42.9)	30	1	65	0.1	120
MOV470ST0603C	30	38	47(42.3~51.7)	30	1	77	0.1	100
MOV560ST0603C	35	45	56(50.4~61.6)	30	1	90	0.1	80

SMD Transient Voltage Suppressors

Surface Mount Multi layer 0805, 1206 C Series

Vincenc Model Number	Working Voltage (MAX)		Breakdown Voltage	Peak Current (MAX)	Clamping Voltage (MAX)		Energy Absorption (MAX)	Typical Capacitance ※
Unit Condition	AC (V_{RMS})	DC (V)	1mA (V)	8/20μs (A)	(A)	(V)	10/1000μs (J)	1KHz (pF)
MOV050ST0805C	2.5	3.3	5(4.0~6.0)	40	1	10	0.1	2450
MOV080ST0805C	4	5.5	8(6.4~9.6)	80	1	16	0.1	1600
MOV120ST0805C	6	9	12(9.6~14.4)	80	1	20	0.1	1180
MOV150ST0805C	8	11	15(12.75~17.25)	100	1	25	0.1	1050
MOV180ST0805C	11	14	18(15.3~20.7)	100	1	30	0.1	750
MOV220ST0805C	12	16.5	22(19.8~24.2)	100	1	36	0.2	680
MOV240ST0805C	14	18	24(21.6~27)	100	1	39	0.2	550
MOV270ST0805C	17	22	27(24.3~29.8)	100	1	44	0.2	400
MOV330ST0805C	20	26	33(29.7~36.3)	100	1	54	0.3	350
MOV390ST0805C	25	30	39(35.1~42.9)	100	1	65	0.3	310
MOV470ST0805C	30	38	47(42.3~51.7)	100	1	77	0.3	280
MOV560ST0805C	35	45	56(50.4~61.6)	80	1	90	0.3	195
MOV680ST0805C	40	56	68(61.2~74.8)	80	1	110	0.3	145
MOV820ST0805C	50	65	82(73.8~90.2)	60	1	135	0.3	85

MOV050ST1206C	2.5	3.3	5(4.0~6.0)	60	1	10	0.1	3850
MOV080ST1206C	4	5.5	8(6.4~9.6)	100	1	16	0.2	3200
MOV120ST1206C	6	9	12(9.6~14.4)	100	1	20	0.2	2200
MOV150ST1206C	8	11	15(12.75~17.25)	100	1	25	0.2	1300
MOV180ST1206C	11	14	18(15.3~20.7)	100	1	30	0.3	1150
MOV220ST1206C	12	16.5	22(19.8~24.2)	100	1	36	0.3	1000
MOV240ST1206C	14	18	24(21.6~27)	100	1	38	0.3	900
MOV270ST1206C	17	22	27(24.3~29.8)	100	1	44	0.4	840
MOV330ST1206C	20	26	33(29.7~36.3)	100	1	54	0.5	490
MOV390ST1206C	25	30	39(35.1~42.9)	100	1	65	0.6	440
MOV470ST1206C	30	38	47(42.3~51.7)	100	1	77	0.7	400
MOV560ST1206C	35	45	56(50.4~61.6)	100	1	90	0.8	310
MOV680ST1206C	40	56	68(61.2~74.8)	100	1	110	1.0	280
MOV820ST1206C	50	65	82(73.8~90.2)	100	1	135	0.5	240
MOV101ST1206C	60	85	100(90~110)	100	1	165	0.6	160
MOV111ST1206C	70	90	110(99~121)	100	1	180	0.6	120

SMD Transient Voltage Suppressors

Surface Mount Multi layer 1210,1812 C Series

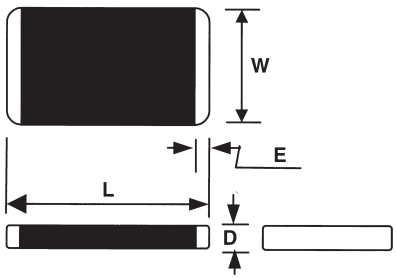
Vincenc SFI Model Number	Working Voltage (MAX)		Breakdown Voltage	Peak Current (MAX)	Clamping Voltage (MAX)		Energy Absorption (MAX)	Typical Capacitance ※
Unit Condition	AC (V_{RMS})	DC (V)	1mA (V)	8/20μs (A)	(A)	(V)	10/1000μs (J)	1KHz (pF)
MOV080ST1210C	4	5.5	8(6.4~9.6)	250	2.5	16	0.4	6200
MOV120ST1210C	6	9	12(9.6~14.4)	250	2.5	20	0.5	4400
MOV150ST1210C	8	11	15(12.75~17.25)	250	2.5	25	0.6	3520
MOV180ST1210C	11	14	18(15.3~20.7)	250	2.5	30	0.7	3260
MOV220ST1210C	12	16.5	22(19.8~24.2)	250	2.5	36	0.8	2100
MOV240ST1210C	14	18	24(21.6~27)	250	2.5	38	0.8	1950
MOV270ST1210C	17	22	27(24.3~29.8)	250	2.5	44	1.0	1720
MOV330ST1210C	20	26	33(29.7~36.3)	250	2.5	54	1.2	1090
MOV390ST1210C	25	30	39(35.1~42.9)	250	2.5	65	1.4	920
MOV470ST1210C	30	38	47(42.3~51.7)	250	2.5	77	1.6	780
MOV560ST1210C	35	45	56(50.4~61.6)	250	2.5	90	2.0	470
MOV680ST1210C	40	56	68(61.2~74.8)	250	2.5	110	2.3	390
MOV820ST1210C	50	65	82(73.8~90.2)	250	2.5	135	1.2	320
MOV101ST1210C	60	85	100(90~110)	200	2.5	165	1.4	220
MOV111ST1210C	70	90	110(99~121)	200	2.5	180	1.4	200

MOV120ST1812C	6	9	12(9.6~14.4)	500	5	20	0.9	9150
MOV150ST1812C	8	11	15(12.75~17.25)	500	5	25	1.2	7320
MOV180ST1812C	11	14	18(15.3~20.7)	500	5	30	1.4	6100
MOV220ST1812C	12	16.5	22(19.8~24.2)	500	5	36	1.6	4300
MOV240ST1812C	14	18	24(21.6~27)	500	5	38	1.7	3930
MOV270ST1812C	17	22	27(24.3~29.8)	500	5	44	2.0	3500
MOV330ST1812C	20	26	33(29.7~36.3)	500	5	54	2.5	2900
MOV390ST1812C	25	30	39(35.1~42.9)	500	5	65	2.9	2500
MOV470ST1812C	30	38	47(42.3~51.7)	500	5	77	3.5	2200
MOV560ST1812C	35	45	56(50.4~61.6)	500	5	90	4.2	1950
MOV680ST1812C	40	56	68(61.2~74.8)	500	5	110	4.8	1650
MOV820ST1812C	50	65	82(73.8~90.2)	400	5	135	4.5	1060
MOV101ST1812C	60	85	100(90~110)	400	5	165	5.8	870
MOV111ST1812C	70	90	110(99~121)	400	5	180	5.8	790
MOV151ST1812C	95	127	150(135~165)	300	5	248	5.8	420

SMD Transient Voltage Suppressors

Surface Mount Multi Layer 2220 C Series

Vincenc Model Number	Working Voltage (MAX)		Breakdown Voltage	Peak Current (MAX)	Clamping Voltage (MAX)		Energy Absorption (MAX)	Typical Capacitance
Unit Condition	AC (V_{RMS})	DC (V)	1mA (V)	8/20μs (A)	(A)	(V)	10/1000μs (J)	1KHz (pF)
MOV120ST2220C	6	9	12(9.6~14.4)	1000	10	20	1.9	36500
MOV150ST2220C	8	11	15(12.75~17.25)	1000	10	25	2.3	18400
MOV180ST2220C	11	14	18(15.3~20.7)	1000	10	30	2.7	15300
MOV220ST2220C	12	16.5	22(19.8~24.2)	1000	10	36	2.9	12500
MOV240ST2220C	14	18	24(21.6~27)	1000	10	38	3.1	11800
MOV270ST2220C	17	22	27(24.3~29.8)	1000	10	44	3.8	10400
MOV330ST2220C	20	26	33(29.7~36.3)	1000	10	54	4.3	8900
MOV390ST2220C	25	30	39(35.1~42.9)	1000	10	65	5.5	7500
MOV470ST2220C	30	38	47(42.3~51.7)	1000	10	77	6.3	4600
MOV560ST2220C	35	45	56(50.4~61.6)	1000	10	90	7.7	4000
MOV680ST2220C	40	56	68(61.2~74.8)	1000	10	110	8.8	3500
MOV820ST2220C	50	65	82(73.8~90.2)	800	10	135	5.6	2850
MOV101ST2220C	60	85	100(90~110)	800	10	165	6.8	1800
MOV111ST2220C	70	90	110(99~121)	800	10	180	6.8	1500



Type	L mm	W mm	D mm	E mm
0402	1.0 ± 0.10	0.5 ± 0.10	0.6 max	0.25+0.1/-0.1
0603	1.6 ± 0.15	0.8 ± 0.10	0.9 max	0.3+0.1/-0.1
0805	2.0± 0.20	1.25 ± 0.15	1.2max	0.3+0.1/-0.1
1206	3.2 ± 0.20	1.6 ± 0.15	1.5 max.	0.5 +0.2/-0.2
1210	3.2 ± 0.20	2.5 ± 0.20	1.5 max.	0.5 +0.2/-0.2
1812	4.5 ± 0.20	3.2± 0.20	2.0 max.	0.5 +0.3/-0.1
2220	5.7 ± 0.20	5.0 ± 0.20	2.5 max.	0.5 +0.3/-0.1

NOTES :

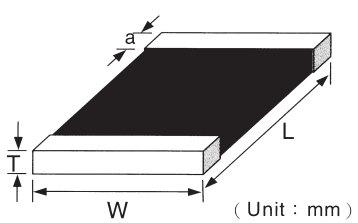
1. **Tolerance of breakdown Voltage : 5~8V＝±20％, 12~15V＝±15％, 18~110V＝±10％**
2. **Capacitance value just for reference**
3. **Typical leakage at 25℃< 50 μA, maximum leakage 200 μA.**
4. **If there is any change without notice , it depends on approval sheet.**

※can be designed during manufacturing according to the request, please contact our sales department if needed.

SMD Transient Voltage Suppressors

The Introductions of CH-Series

MODEL NUMBER	MAXIMUM RATING(TA=125℃)				CHARACTERISTICS(TA=25℃)				
Vincenc Model Number	MAX. WORKING VOLTAGE		SURGE CURRENT	ENERGY ABSORPTION (10/1000μs)	MAX. CLAMPING VOLTAGE		VARISTOR VOLTAGE	TYPICAL CAPACITANCE	Thickness T± 1
Unit Condition	AC(V_{RMS})	DC(V)	8/20μs(A)	(J)	(A)	(V)	(V)	PF(MHz)	(mm)
180KCH08	11	14	250	0.8	5	40	18(16~20)	3300	1.5
220KCH08	14	18	250	1.0	5	46	22(20~24)	1750	1.5
270KCH08	17	22	250	1.0	5	56	27(24~30)	1500	1.5
330KCH08	20	26	250	1.2	5	67	33(30~36)	1200	1.5
390KCH08	25	31	250	1.5	5	76	39(35~43)	820	1.5
470KCH08	30	38	250	1.8	5	90	47(42~52)	660	1.5
560KCH08	35	45	250	2.3	5	106	56(50~62)	530	2.0
680KCH08	40	56	250	3.0	5	124	68(62~74)	360	2.0
820KCH08	50	65	500	4.0	10	135	82(74~90)	250	1.5
101KCH08	65	85	500	5.0	10	165	100(90~110)	225	1.5
121KCH08	75	102	500	6.0	10	198	120(108~132)	200	1.5
151KCH08	95	127	500	8.0	10	248	150(135~165)	150	1.5
181KCH08	115	153	500	10.0	10	292	180(162~198)	110	1.5
201KCH08	130	175	500	11.0	10	340	200(180~220)	100	1.5
221KCH08	140	180	500	12.0	10	356	220(198~242)	94	1.5
241KCH08	150	200	500	13.0	10	390	240(216~264)	86	1.5
271KCH08	175	225	500	14.0	10	450	270(243-297)	76	1.5
301KCH08	190	250	500	15.0	10	495	300(270~330)	64	1.5
331KCH08	210	275	500	16.0	10	545	330(297~363)	52	1.5
361KCH08	230	300	500	20.0	10	593	360(324~396)	45	2.0
391KCH08	250	330	500	21.0	10	647	390(351~429)	42	2.0
431KCH08	275	369	500	23.0	10	705	430(387~473)	39	2.5
471KCH08	300	385	500	25.0	10	775	470(423-517)	35	2.5



(Unit : mm)

Type	Length L	Width W	Electrode A
CH08 (mm)	8.0± 0.30	5.0± 0.30	0.8+0.5/-0.1
3220 (inches)	0.315± 0.118	0.196 ± 0.118	0.0315+0.196/-0.039

SMD Transient Voltage Suppressors

SMD Transient Voltage Suppressors ESD Series

Part Number Identification

MOV 220 – 050 E 0402 N P

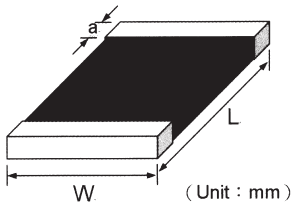
Company Logo

Size : Unit mm

Model	0402 Series	0603 Series
Length(L)	1.0 ±0.15	1.60 ±0.15
Width(W)	0.50 ±0.15	0.80 ±0.15
Thickness(T)	0.6 Max	0.9 Max
Termination(a)	0.25 ±0.1	0.3 ±0.1

MAX Working Voltage :

Mark	Voltage
050	5V
120	12V
240	24V



Package :

Mark	Type
P	Taping
C	normal

Cap. Tolerance :

Mark	Range
N	+-30%
P	+80%-20%

Exception under 5PF

Cap. Value :

Where 220=22× 10^0= 22(PF)

Where 2R5=2.5× 10^0= 2.5(PF)

Series :

ESD Protect Solution

ESD Series

Mark		101	820	560	330	220	100	050	2R5
Capacitance		100PF	82PF	56PF	33PF	22PF	10PF	4~8PF	2~4PF
Working Voltage (Max)	5V	◎	◎	◎	◎	◎	◎	◎	-
	12V	◎	◎	◎	◎	◎	◎	◎	-
	24V	-	-	-	-	◎	◎	◎	◎

If it get any change , without notice

Recommend Application

Item	Device Description	Data Rate &Frequency	Rise time	General Location	Capacitance
1	USB 2.0 Data Port	480 M bps	0.5~0.6 nS	I/O port, Data, Signal	<4PF
2	USB1.1 Data Port	12 M bps	4~20 nS	I/O port, Data, Signal	5~56PF
3	Keyboard or Wireless device	1.5 M bps	75~300 nS	I/O port, Data, Signal	5~56PF
4	RS232、IrDA1.0	115.2 K Hz	1uS~8 uS	I/O port, Data, Signal	10~100PF
5	Audio (Microphone/Speaker)	20~20K Hz	0.05mS~50 mS	I/O port, Data, Signal	10~100PF

SMD Transient Voltage Suppressors

MOV DISC Varistor series

Vincenc can also supply the following disc varistor.

Vincenc Model Number	Element Size (mm)					Working Voltage (MAX)		Breakdown Voltage
	D05	D07	D10	D14	D20	AC	DC	1mA(V)
180K	◎	◎	◎	◎	◎	11	14	18 (16~20)
220K	◎	◎	◎	◎	◎	14	18	22 (20~24)
270K	◎	◎	◎	◎	◎	17	22	27 (24~30)
330K	◎	◎	◎	◎	◎	20	26	33 (30~36)
390K	◎	◎	◎	◎	◎	25	31	39 (35~43)
470K	◎	◎	◎	◎	◎	30	38	47 (42~52)
560K	◎	◎	◎	◎	◎	35	45	56 (50~62)
680K	◎	◎	◎	◎	◎	40	56	68 (61~75)
820K	◎	◎	◎	◎	◎	50	65	82 (74~90)
101K	◎	◎	◎	◎	◎	60	85	100 (90~110)
121K	◎	◎	◎	◎	◎	75	100	120 (108~132)
151K	◎	◎	◎	◎	◎	95	125	150 (135~165)
181K	◎	◎	◎	◎	◎	115	150	180 (162~198)
201K	◎	◎	◎	◎	◎	130	170	200 (185~225)
221K	◎	◎	◎	◎	◎	140	180	220 (198~242)
241K	◎	◎	◎	◎	◎	150	200	240 (216~264)
271K	◎	◎	◎	◎	◎	175	225	270 (247~303)
301K	◎	◎	◎	◎	◎	195	250	300 (270~330)
331K	◎	◎	◎	◎	◎	210	270	330 (297~363)
361K	◎	◎	◎	◎	◎	230	300	360 (324~396)
391K	◎	◎	◎	◎	◎	250	320	390 (351~429)
431K	◎	◎	◎	◎	◎	275	350	430 (387~473)
471K	◎	◎	◎	◎	◎	300	385	470 (423~517)
511K	◎	◎	◎	◎	◎	320	418	510 (459~561)
561K	◎	◎	◎	◎	◎	350	460	560 (504~616)
621K		◎	◎	◎	◎	385	505	620 (558~682)
681K		◎	◎	◎	◎	420	560	680 (612~748)
751K			◎	◎	◎	460	615	750 (685~825)
781K			◎	◎	◎	485	640	780 (702~858)
821K			◎	◎	◎	510	670	820 (738~902)
911K			◎	◎	◎	550	745	910 (819~1001)
102K			◎	◎	◎	625	825	1000 (900~1100)
112K			◎	◎	◎	680	895	1100 (990~1210)
182K				◎	◎	1000	1465	1800 (1620~1980)

NOTES : 180 K = 18×10^0 V = 18V, 181 K = 18×10^1 V = 180V, 182 K = 18×10^2 V = 1800V

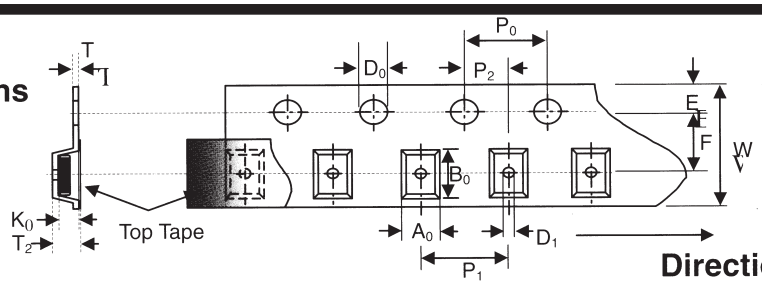
K : Tolerance 10%

Vincenc

SMD Transient Voltage Suppressors

Packaging

Tape Dimensions

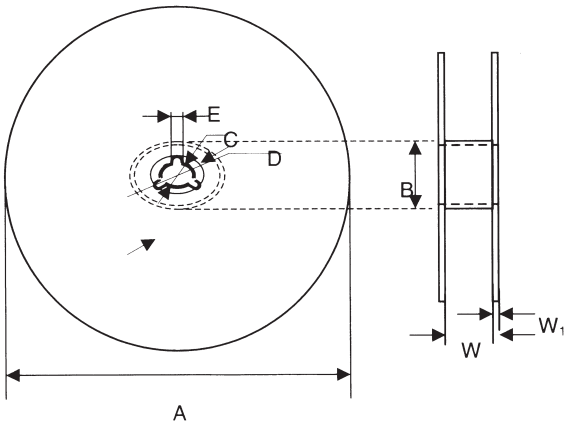


Direction of unreeling

Symbol	A_0 ±0.10	B_0 ±0.10	K_0 ±0.10	T ±0.05	T_2 ±0.05	D_0 +0.10 -0.00	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	0.10	1.50	1.00	4.00	2.00	4.00	8.00	1.75	3.50
0603	1.08	1.88	1.04	0.22	0.10	1.50	1.00	4.00	2.00	4.00	8.00	1.75	3.50
0805	1.42	2.30	1.04	0.22	0.10	1.50	1.00	4.00	2.00	4.00	8.00	1.75	3.50
1206	1.88	3.50	1.27	0.2	0.10	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	0.10	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	0.10	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	0.10	1.50	1.50	8.00	2.00	4.00	12.00	1.75	5.50

Unit：mm

Reel Dimensions



Symbol	A	B	C	D	E	W	W_1
0402	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
0603	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
0805	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
1206	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
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	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
2220	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

Pieces packaged per reel Unit mm

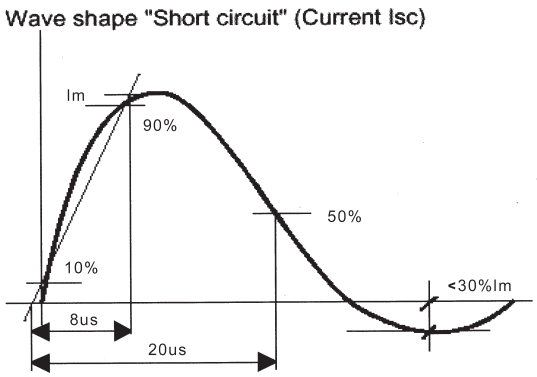
Type	0402	0603	0805	1206	1210	1812	2220
Pcs/reel	10000	4000	3000	3000	2000	1000	1000
Pcs/kg	850000	168000	66000	31500	18500	7600	4200

◎ Definition

Characteristics	Test Method or Description
Max. Working Voltage	Maximum steady-state DC operating voltage the device can maintain and typical leakage current at 25℃ not exceed 50 μA.
Varistor Voltage（BDV）	With the specified measuring current of 1mA DC applied.
Max. Clamping Voltage	Maximum peak voltage across the TVS measured at a specified pulse current（A）and waveform 8/20 μs.
Surge Current	Maximum peak current may be applied with the specified waveform 8/20 μs without device failure.
Surge Shift △V/V	The shift of Varistor voltage after suffering the specified surge current.
Energy Absorption	Maximum energy may be dissipated with a specified waveform 10/1000 μs without device failure.
Typical Capacitance	Device Capacitance measured with zero voltage bias $0.5V_{RMS}$ $1KH_Z$/ $1MH_Z$
Nonlinear exponent α	$\alpha = [\log(V_{1mA}/V_{0.1mA}) / \log(I_{V1mA}/I_{V0.1mA})]$
Leakage Current	Typical leakage current at 25℃ ＜50 μA

※Standard Test Condition：Environmental condition under which every measuring is done without doubt on the measuring results. Unless specially specified, temperature, relative humidity are 5 to 35℃, 45 to 85% RH.

※ 8/20 μs waveform current（A）



"Specification for combinations surge waveforms" with effective impedance 12 and 2 W.

The definition and test method of Varistor's main characteristics are illustrated below：

SMD Transient Voltage Suppressors

Reliability Experiment

<table>
<tr><th>Experiment</th><th colspan="4">Test Method and Description</th></tr>
<tr><td>High Temperature Storage/ Dry Heat</td><td colspan="4">The specimen shall be subjected to 150 ± 2℃ for 1000 ± 12 hours in a thermostatic bath without load and then stored at room temperature and humidity for 1 to 2 hours. Therefore, the change of varistor voltage shall be measured.</td></tr>
<tr><td>Temperature Cycle</td><td colspan="2">The temperature cycle of specified temper -ature shall be repeated five times and then stored at room temperature and humidity for one or two hours. the change of varistor voltage and mechanical damage shall be examined.</td><td>Step
1
2
3
4</td><td>Temperature
-40±3
Room Temperature
125±2
Room Temperature</td><td>Period
30Min±3
1~2 hours
30Min±3
1~2 hours</td></tr>
<tr><td>High Temperature Load/ Dry Heat Load</td><td colspan="4">After being continuously applied the maximum allowable voltage at 125 ± 2℃ for 1000± 2 hours, the specimen shall be stored at room temperature and humidity for one or two hours, Therefore the change of varistor voltage should be measured.</td></tr>
<tr><td>Damp Heat Load/ Humidity Load</td><td colspan="4">The specimen should be subjected to 40 ± 2℃, 90 to 95% RH and the maximum allowable voltage for 1000 hours and then stored at room temperature and humidity for one or two hours. Therefore the change of varistor voltage should be measured.</td></tr>
<tr><td>Low Temperature Storage/ Cold</td><td colspan="4">The specimen should be subjected to 40 ± 2℃, without load for 1000 hours and then stored at room temperature for one or two hours. Therefore the change of varistor voltage should be measured.</td></tr>
<tr><td>Direct contact electrostatic discharge</td><td colspan="4">1.Discharge: contact electrostatic discharge; 2.Voltage：8KV（Level4）
3.Polarity：+,- ; 4.Number: 10 times ; 5.Interval time：1sec</td></tr>
<tr><td>Direct air electrostatic discharge</td><td colspan="4">1.Discharge: air electrostatic discharge; 2.Voltage：15KV（Level4）
3.Polarity：+,-; 4.Number: 10 times; 5.Interval time：1~ 3sec</td></tr>
</table>

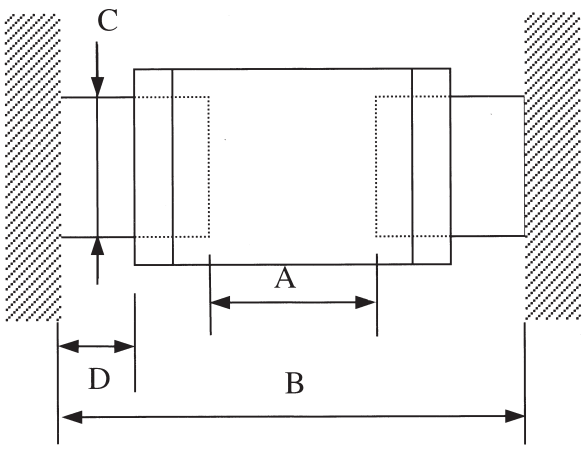
Due to the unpredictable nature of transients, a transient voltage suppressor may be overloaded, although it was carefully selected. Overload may result in package rupture expulsion of hot material. For this reason the TVS should be physically shielded from adjacent components. The TVS can be additionally protected by a thermal fuse which is connected to the TVS body.

For further test,plese contact us.

Recommended solder pad layout

Type	Solder pad layout			
	A	B	C	D
0402	0.4~0.6	1.6~1.8	0.5~0.52	0.2~0.4
0603	0.8~1.2	2.5~3.0	0.6~1.0	0.3~0.6
0805	1.0~1.5	3.2~3.8	1.2~1.4	0.3~0.6
1206	1.8~2.5	4.2~5.8	1.2~1.6	0.4~0.8
1210	1.8~2.5	4.2~5.8	1.8~2.5	0.5~1.0
1812	2.5~3.5	5.5~6.1	2.3~3.2	0.6~1.1
2220	3.5~4.6	6.0~7.2	4.8~5.5	1.2~2.3

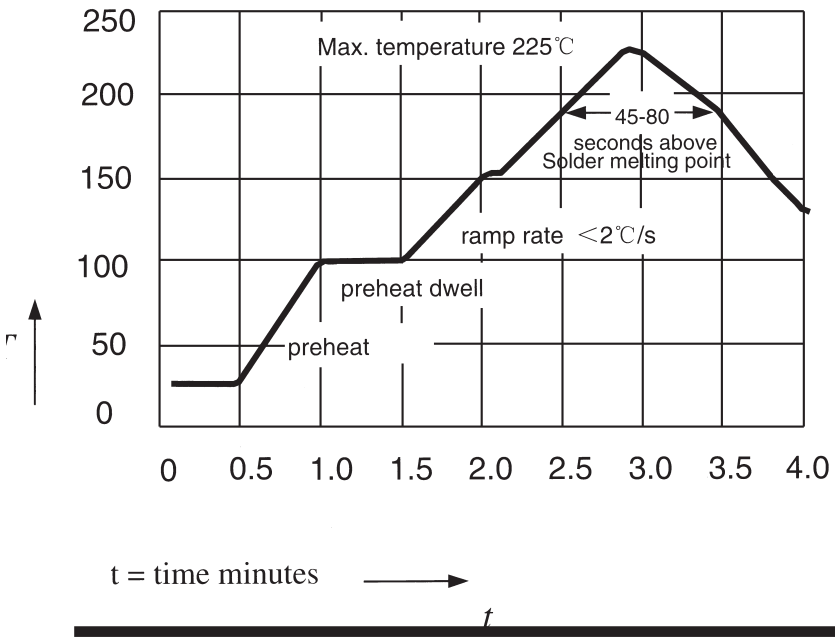
（Unit：mm）



Soldering Recommendations：

Material	62/36/2 Sn/Pb/Ag or equivalent
Temperature	235℃, 5 seconds max
Flux	Non Activated.

Reflow Solder Profile



IR Soldering has the highest yields due to controlled heating rates and solder liquidus times. Make sure that the element is not subjected to a thermal gradient steeper than 4 degrees per second. 2 degrees per second is the ideal gradient. During the soldering process, preheating to within 100 degrees of the solders peak temperature is essential to minimize thermal shock.

Recommendation for Soldering

Hand Soldering

In hand soldering of the Varistors. Large temperature gradient between preheated the Varistors 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 ：

1mm Thread solder (sn63:pb37) with soldering flux in the core.

Rosin-based and non-activated flux is recommended.

（2）Preheating

The Varistors shall be preheated so that Temperature Gradient between the devices and the tip of soldering iron is 150C or below.

（3）Soldering Iron

Rated Power of 20w max with 3mm soldering tip in diameter.

Temperature of soldering iron tip 300C max (The required amount of solder shall be melted in advance on the soldering tip.)

（4）Cooling

After soldering. The Varistors 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 Varistors.

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 Varistors 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 Varistors 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