MOV
Metal Oxide Varistor

SFV10S Series

Description

Metal Oxide Varistor (MOV) as one nonlinear resistance element is mainly made of zinc oxide (ZnO), which has very high surge capacity and big nonlinear coefficient. Below the threshold voltage, its resistance is very high, nearly no current flows through, but above the threshold voltage, the resistance reduces sharply, huge current can be discharged. Due to this characteristic, varistor as a protection component in electronic and electrical equipment can absorb abnormal over-voltage and lightning surge.

SETsafe | SETfuse varistor is with High Surge Current Density, Low Clamping Voltage, and Good Surge Capacity. It can also be customized as required.

Features

- Epoxy Resin Coating
- Silicone Resin Coating
- Low Leakage Current
- Bidirectional and Symmetrical V/I Characteristics
- RoHS & REACH Compliant
- Operating Temperature Range

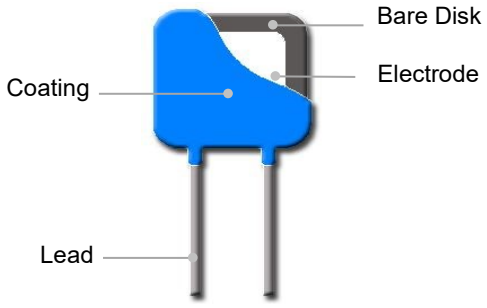
  Low Temperature: -40 °C

  High Temperature: +85 °C

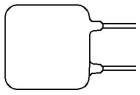
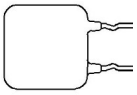
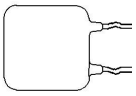
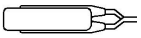
Applications

- Power Supplies
- Home Electrical Appliances
- Industrial Devices
- Surge Protectors
- Telecom Devices

Product Structure



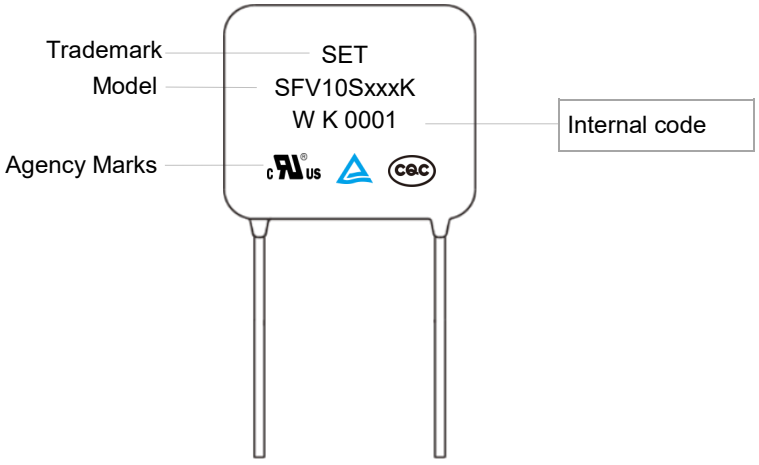
Lead Types

Lead Types		Codes
	Straight Lead	A
	Inward Crimp Lead	B
	Outward Crimp Lead	C
	Inline Crimp Lead	D

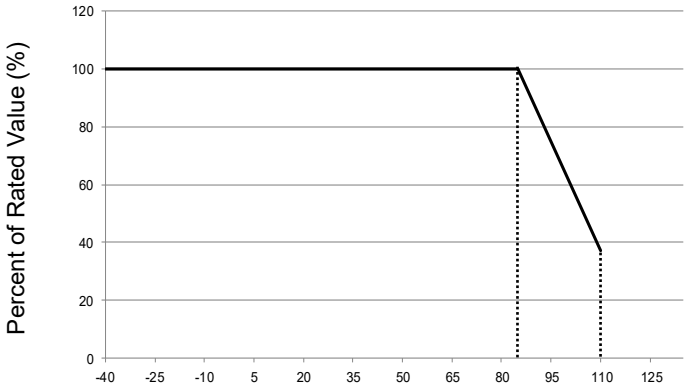
Agency Approvals

Agency	Standards	No.
	UL 1449 4th Edition	E322662
	CSA C22.2 NO.269.5-17	E322662
	EN 61051-1:2008 IEC 61051-1:2007 IEC 61051-2:1991 IEC 61051-2-2:1991	J 50218567
	GB/T 10193-1997 GB/T 10194-1997 GB 4943.1-2011 GB 8898-2011	CQC16001152821

Marking



Temp. Derating Curve



For Normal Temp. Series

Note:
When ambient Temp. exceeds 85 °C, the peak surge current and energy rating should be reduced as shown in left curve.

General Technical Data

Item	Value	Unit
Operating Temperature	-40 to +85	°C
Storage Temperature	-40 to +125	°C
Voltage Proof	≥2500	V_{ac}
Insulation Resistance	≥100	MΩ

Part Numbering System

SFV 10 S 471 - K N K A BUL - 001

Other Options

***Packaging & Lead Length**
BUL: Bulk + Standard Lead Length (Normal L28)
C35: Bulk + Cut to 3.5 mm
(Range:2.5 mm to 6 mm)

Lead Types
A: Straight Lead
B: Inward Crimp Lead
C: Outward Crimp Lead
D: Inline Crimp Lead

Surge Level
K: Standard Type

Operating Temp.
N: Epoxy Coating 85 °C

Voltage Tolerance
K: ±10%
J: ±5%
S: Special Tolerance

Nominal Varistor Voltage
220: 22×10^{0} = 22 V
471: 47×10^{1} = 470 V
122: 12×10^{2} = 1200 V

Disk Shape
S: Square

Bare Disk Dimension
10: 10×10 mm

Product Category
SETfuse Varistor

MOV

*For more details refer to packaging information.

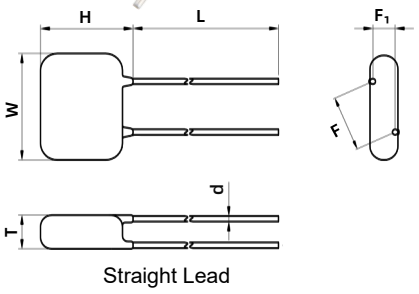
Glossary

Item	Description
V_N	**Nominal Varistor Voltage** Voltage, at specified D.C. current used as a reference point in the component characteristics.
I_L	**Leakage Current** Measuring at 75% of varistor voltage.
UCT	**Upper Category Temp.** Max. ambient temp. for which a varistor has been designed to operate continuously.
LCT	**Lower Category Temp.** Minimum ambient temp. at which a varistor has been designed to operate continuously.
Max. Peak Current	**Max. Peak Current** Max. current per pulse, which may be passed by a varistor at an ambient temp. of 25 °C, for a given number of pulses.
V_C	**Clamping Voltage** Peak voltage developed across the varistor terminations under standard atmospheric conditions, when passing an 8/20 μs class current pulse.
Voltage Proof	**Voltage Proof** Max. peak voltage, which may be applied under continuous operating conditions between the varistor terminations and any conducting mounting surface (Applicable only to insulated varistors).
C_V	**Capacitance** Capacitance across the MOV measured at a specified frequency and voltage.
V_{ac}	**Max. Continuous a.c. Voltage** Max. a.c. r.m.s. voltage of a substantially sinusoidal waveform (less than 5% total harmonic distortion) which can be applied to the component under continuous operating conditions at 25 °C.
V_{dc}	**Max. Continuous d.c. Voltage** Max. d.c. voltage (with less than 5% ripple) which can be applied to the component under continuous operating conditions at an ambient temp. of 25 °C.

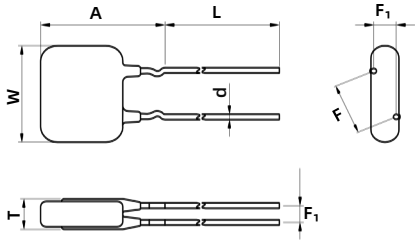
MOV

Dimensions (mm)

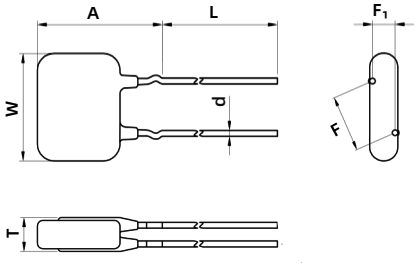
Model	L (Min.)	W (Max.)	H (Max.)	T (Max.)	d	F	F_1	A (Max.)
SFV10S220K	20	14.5	15	4.5	0.80±0.05	7.5±0.6	1.1 - 2.5	17.5
SFV10S270K	20	14.5	15	4.8	0.80±0.05	7.5±0.6	1.2 - 2.7	17.5
SFV10S330K	20	14.5	15	5.1	0.80±0.05	7.5±0.6	1.3 - 2.9	17.5
SFV10S390K	20	14.5	15	5.4	0.80±0.05	7.5±0.6	1.4 - 3.1	17.5
SFV10S470K	20	14.5	15	4.6	0.80±0.05	7.5±0.6	1.2 - 2.7	17.5
SFV10S560K	20	14.5	15	4.8	0.80±0.05	7.5±0.6	1.3 - 2.9	17.5
SFV10S680K	20	14.5	15	5.1	0.80±0.05	7.5±0.6	1.4 - 3.2	17.5
SFV10S820K	20	14.5	15	4.4	0.80±0.05	7.5±0.6	1.2 - 2.6	17.5
SFV10S101K	20	14.5	15	4.6	0.80±0.05	7.5±0.6	1.3 - 2.8	17.5
SFV10S121K	20	14.5	15	4.8	0.80±0.05	7.5±0.6	1.4 - 3.0	17.5
SFV10S151K	20	14.5	15	5.1	0.80±0.05	7.5±0.6	1.5 - 3.3	17.5
SFV10S181K	20	14.5	15	4.5	0.80±0.05	7.5±0.6	1.3 - 2.8	17.5
SFV10S201K	20	14.5	15	4.6	0.80±0.05	7.5±0.6	1.4 - 2.9	17.5
SFV10S221K	20	14.5	15	4.7	0.80±0.05	7.5±0.6	1.5 - 3.0	17.5
SFV10S241K	20	14.5	15	4.8	0.80±0.05	7.5±0.6	1.6 - 3.1	17.5
SFV10S271K	20	14.5	15	5.0	0.80±0.05	7.5±0.6	1.7 - 3.3	17.5
SFV10S301K	20	14.5	15	5.2	0.80±0.05	7.5±0.6	1.8 - 3.5	17.5
SFV10S331K	20	14.5	15	5.4	0.80±0.05	7.5±0.6	1.9 - 3.6	17.5
SFV10S361K	20	14.5	15	5.6	0.80±0.05	7.5±0.6	2.0 - 3.8	17.5
SFV10S391K	20	14.5	15	5.7	0.80±0.05	7.5±0.6	2.0 - 4.0	17.5
SFV10S431K	20	14.5	15	6.0	0.80±0.05	7.5±0.6	2.2 - 4.2	17.5
SFV10S471K	20	14.5	15	6.2	0.80±0.05	7.5±0.6	2.4 - 4.4	17.5
SFV10S511K	20	14.5	15	6.4	0.80±0.05	7.5±0.6	2.6 - 4.6	17.5
SFV10S561K	20	14.5	15	6.7	0.80±0.05	7.5±0.6	2.9 - 4.9	17.5
SFV10S621K	20	14.5	15	7.1	0.80±0.05	7.5±0.6	3.2 - 5.2	17.5
SFV10S681K	20	14.5	15	7.4	0.80±0.05	7.5±0.6	3.6 - 5.6	17.5
SFV10S751K	20	14.5	15	7.9	0.80±0.05	7.5±0.6	4.0 - 6.0	17.5
SFV10S821K	20	14.5	15	8.3	0.80±0.05	7.5±0.6	4.4 - 6.4	17.5



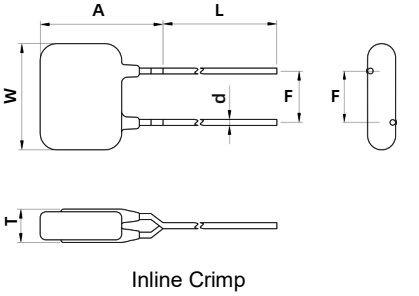
Straight Lead



Inward Crimp



Outward Crimp



Inline Crimp

Note:
The above data is for reference only.

Specification

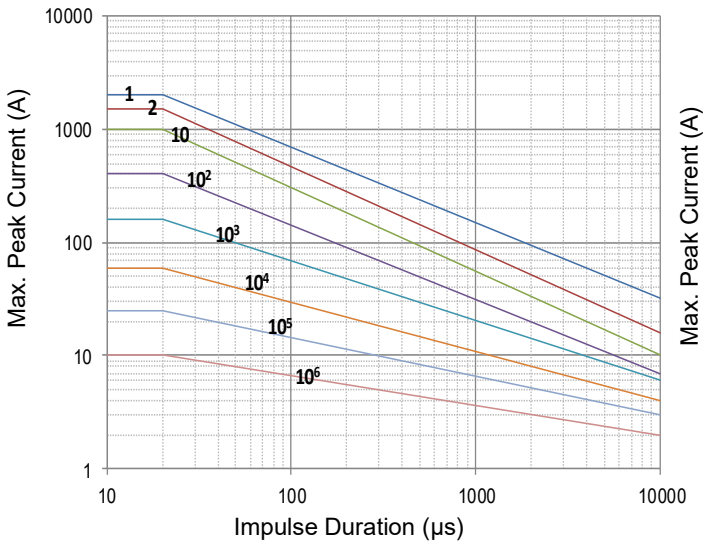
Model	Max. Continuous Operating Voltage		Varistor Voltage @1 mA DC		Clamping Voltage (Max.)		Max. Discharge Current (8/20 μs)		Max. Energy (10/1000 μs)	Typical Capacitance (For reference only) @1 kHz	Agency Approvals			
	Vac	Vdc	Min.	Max.	V_C	I_P	I_n	I_{max}	(J)	(pF)	UL	cUL	TUV	CQC
	(V)	(V)	(V)	(V)	(V)	(A)	(kA)	(kA)						
SFV10S220K	14	18	20	24	43	10	1	2	8	9100	●	●	●	○
SFV10S270K	17	22	24	31	53	10	1	2	10	7400	●	●	●	○
SFV10S330K	20	26	30	36	65	10	1	2	12	6100	●	●	●	○
SFV10S390K	25	31	35	43	77	10	1	2	13	5100	●	●	●	○
SFV10S470K	30	38	42	52	93	10	1	2	17	4300	●	●	●	○
SFV10S560K	35	45	50	62	110	10	1	2	20	3600	●	●	●	○
SFV10S680K	40	56	61	75	135	10	1	2	24	2900	●	●	●	○
SFV10S820K	50	65	74	90	135	50	1.5	3	27	2400	●	●	●	●
SFV10S101K	60	85	90	110	165	50	1.5	3	33	2000	●	●	●	●
SFV10S121K	75	100	108	132	200	50	1.5	3	40	1700	●	●	●	●
SFV10S151K	95	125	135	165	250	50	2.5	5	53	1300	●	●	●	●
SFV10S181K	115	150	162	198	300	50	2.5	5	60	1100	●	●	●	●
SFV10S201K	130	170	180	220	340	50	2.5	5	70	1000	●	●	●	●
SFV10S221K	140	180	198	242	360	50	2.5	5	78	900	●	●	●	●
SFV10S241K	150	200	216	264	395	50	2.5	5	84	830	●	●	●	●
SFV10S271K	175	225	243	297	455	50	2.5	5	99	740	●	●	●	●
SFV10S301K	190	250	270	330	500	50	2.5	5	108	670	●	●	●	●
SFV10S331K	210	275	297	363	550	50	2.5	5	115	610	●	●	●	●
SFV10S361K	230	300	324	396	595	50	2.5	5	130	560	●	●	●	●
SFV10S391K	250	320	351	429	650	50	2.5	5	140	510	●	●	●	●
SFV10S431K	275	350	387	473	710	50	2.5	5	155	460	●	●	●	●
SFV10S471K	300	385	423	517	775	50	2.5	5	175	430	●	●	●	●
SFV10S511K	320	415	459	561	845	50	2.5	5	180	390	●	●	●	●
SFV10S561K	350	460	504	616	925	50	2.5	5	185	360	●	●	●	●
SFV10S621K	385	505	558	682	1025	50	2.5	5	190	320	●	●	●	●
SFV10S681K	420	560	612	748	1120	50	2.5	5	200	290	●	●	●	●
SFV10S751K	460	615	675	825	1240	50	2.5	5	210	270	●	●	●	○
SFV10S821K	510	670	738	902	1355	50	2.5	5	220	260	●	●	●	○

●: Approved ○: Unauthorized

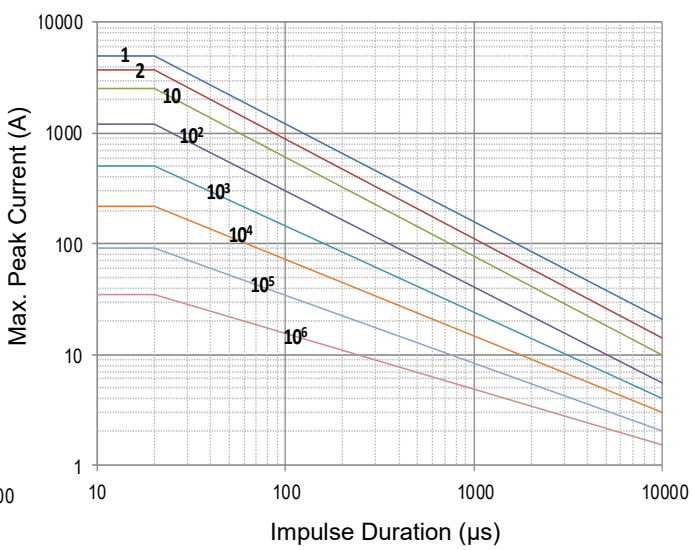
MOV

Performance Curve (For reference only)

- Max. Peak Current Derating Curves



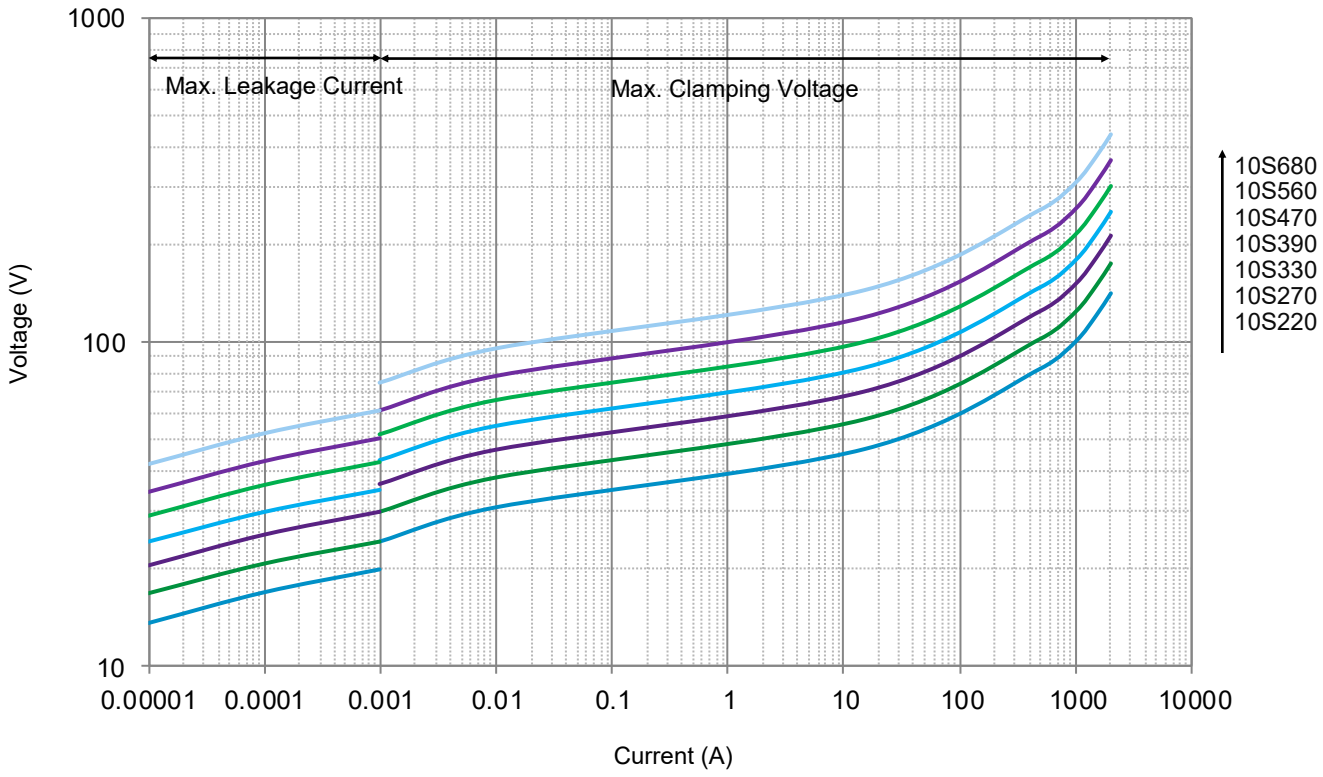
SFV10S220K to SFV10S680K



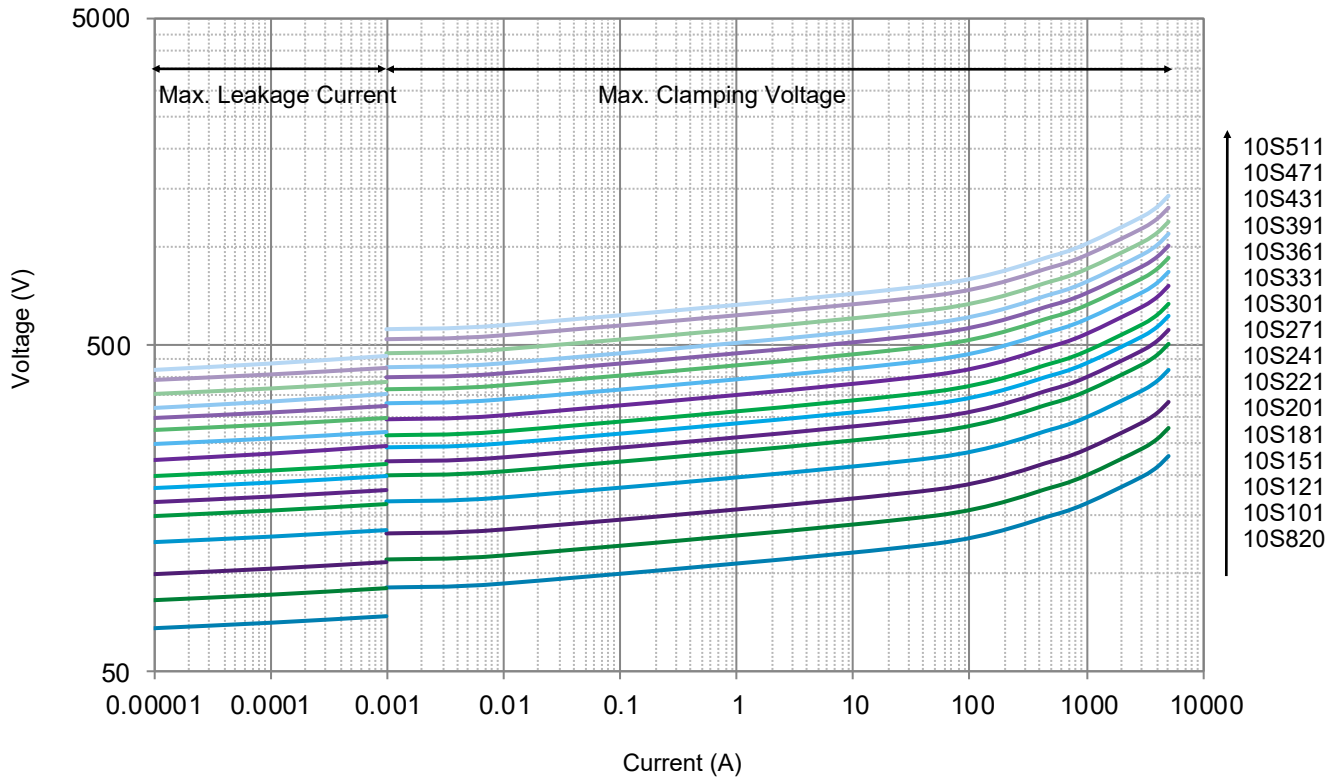
SFV10S820K to SFV10S821K

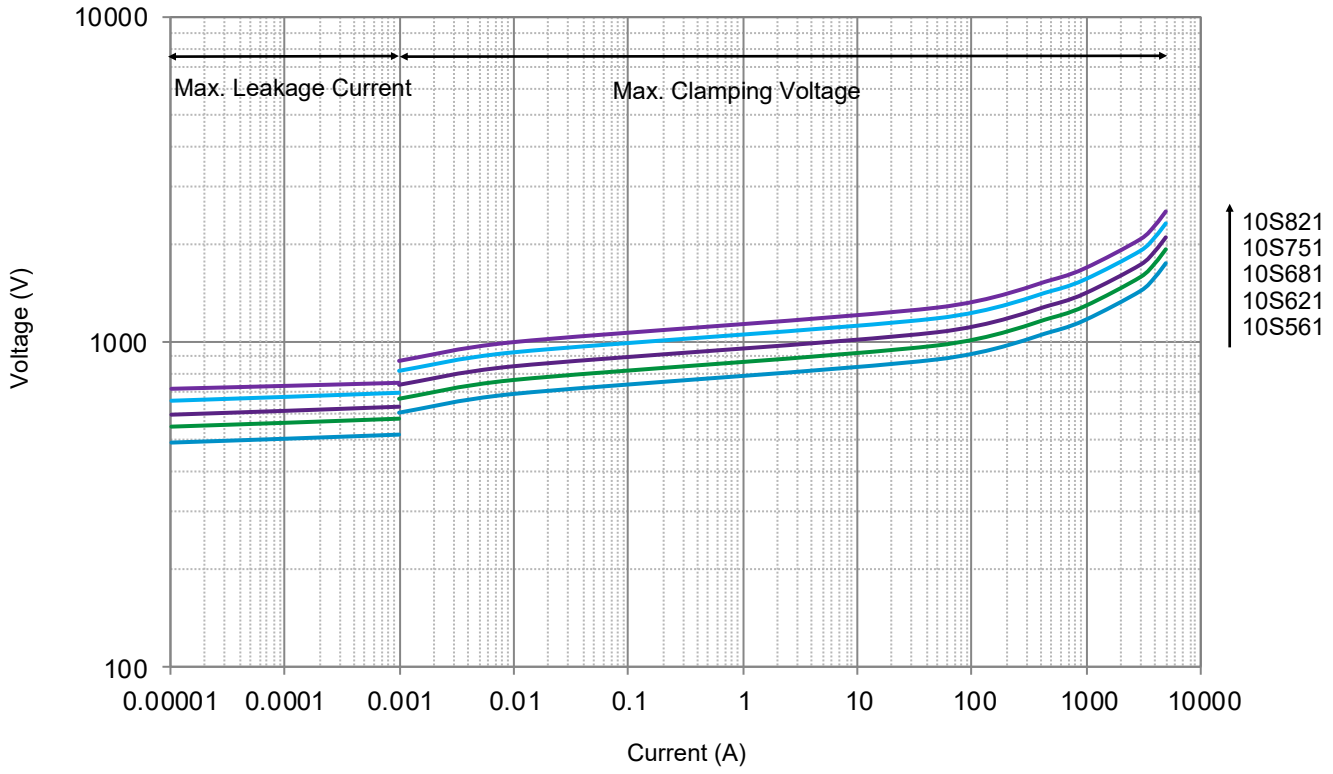
Note: 1, 2, 10, 10^2, 10^3, 10^4, 10^5, 10^6 Stand for Repetitions.

- Voltage-Current Characteristic Curves



- Voltage-Current Characteristic Curves

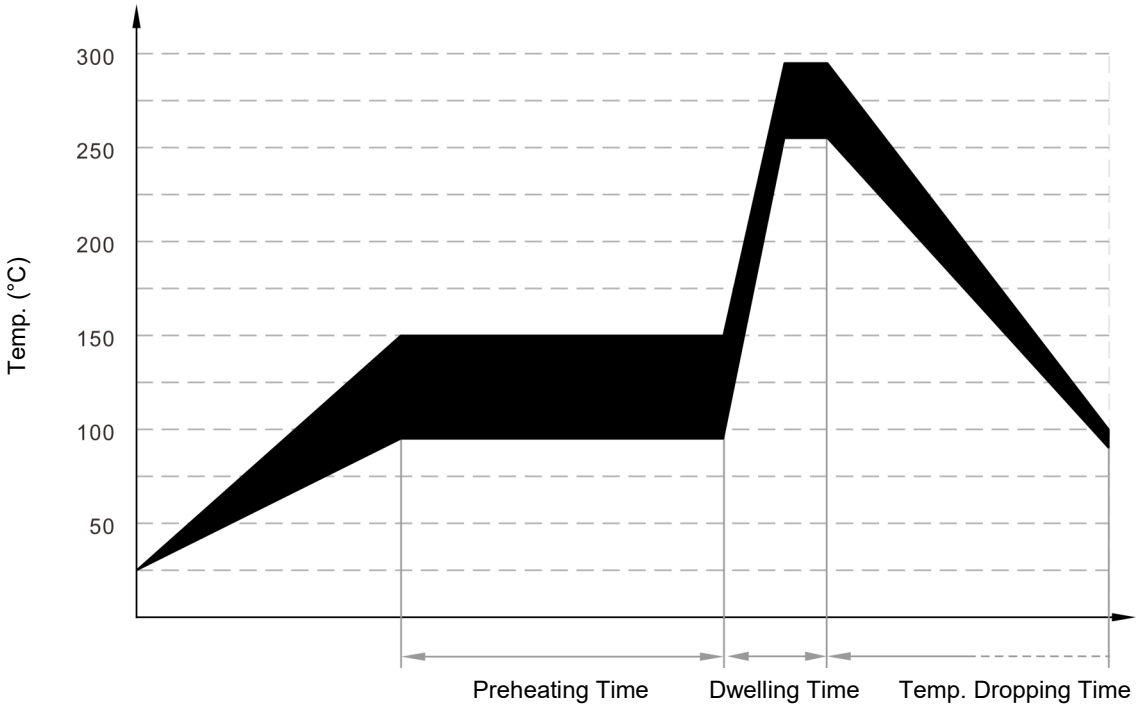




Soldering Parameters

Wave Soldering Parameters

The wave soldering parameters are for reference only. When MOV is for practice use, some related validation is recommended.



Wave Soldering Curve

Item	Temp. (°C)	Time (s)
Preheating	90 to 150	<150
Dwelling	255 to 290	3 to 10

Recommended Hand-Soldering Parameters

Item	Condition
Temp. of Solder Head	350 °C (max.)
Soldering Time	4 seconds (max.)

MOV

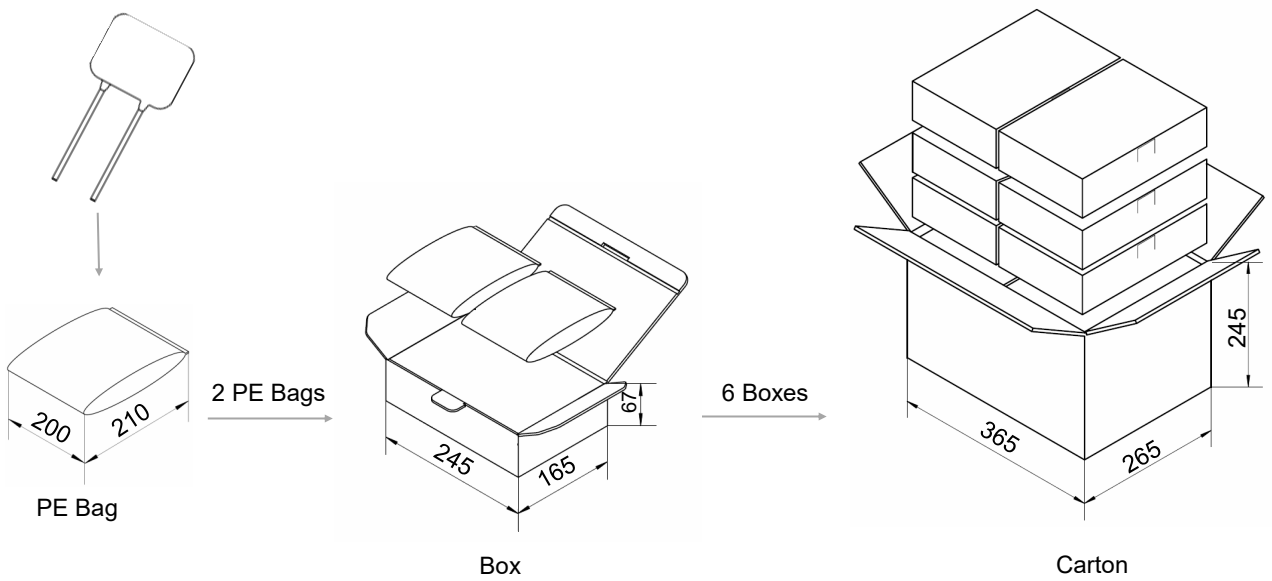
Packaging Information

- Bulk Packaging (Code: BUL)
- Bulk Packaging Quantity & Weight.

Series	Nominal Varistor Voltage	PE Bag	Box	Carton	G. W / Carton (365 × 265× 245)
10S	(V)	(PCS)	(PCS)	(PCS)	(kg)±10%
	220 - 621	400	800	4800	5 - 15
	681 - 821	300	600	3600	12 - 15

Note:
Other lead length packaging information, please contact SETsafe | SETfuse.

All Dimensions in mm



PE Bag

Box

Carton

ATTENTION

MOV

Usage

1. Varistor must operated in the specified ambient temp.
2. Do not clean the varistor with strong polar solvent such as ketone, esters, benzene and halogenated hydrocarbon.
3. Please do not apply severe vibration, shock or pressure to MOV.
4. Please fix lead wires when bending or cutting. The distance between the bending point and the sealing of MOV shall be greater than 2 mm.

Replacement

If varistor is visually damaged,please replace it.

Storage

1. Storage Temp. Range: (-40 to +125) °C
2. Relative Humidity : ≤75% RH
3. Altitude: <2000 m
4. Do not store the MOV at the high temp., high humidity or corrosive gas environment, to avoid influencing the solder-ability of the lead wires, the product shall be used up within 1 year after receiving the goods.

Environmental Conditions

1. Varistor should neither be exposed to the open air, nor direct sunshine.
2. Varistor should avoid rain, water vapor or other condition of high temp. and high humidity.
3. Varistor should avoid sand dust, salt spray, or other harmful gases.

Max. Typical Capacitance of Varistor

The typical capacitance of varistor is listed in the specifications. Designers may refer to it when designing MOV in high frequency circuit.

Installation

Mechanical Stress

Do not knock MOV when installing, to avoid mechanical damage.

MOV