MOV
Metal Oxide Varistor

SFV20S 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

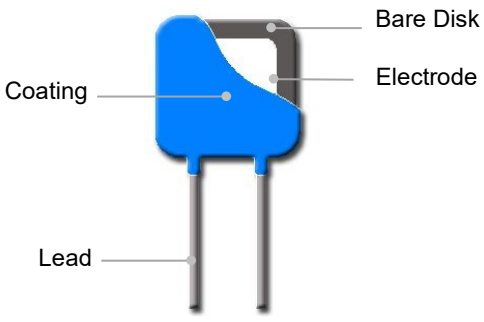
  Low Temperature: -40 °C

  High Temperature: +85 °C / +105 °C

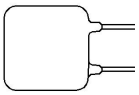
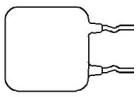
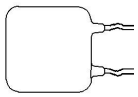
Applications

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

Product Structure



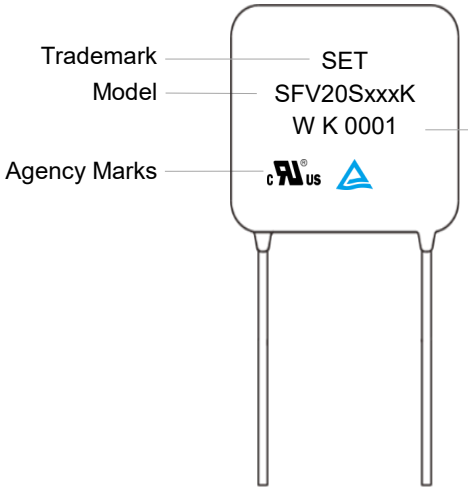
Lead Types

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

Agency Approvals

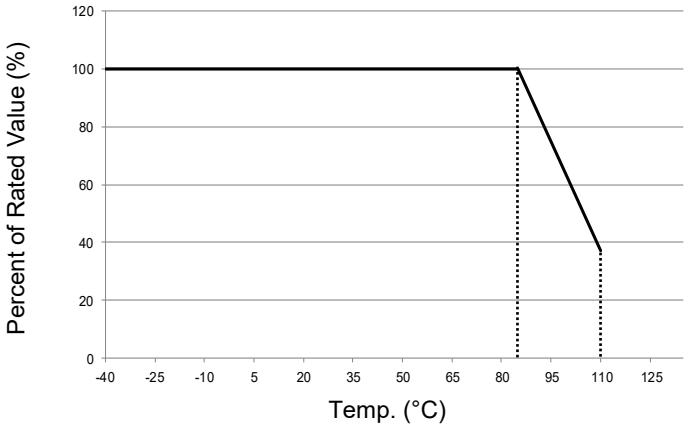
Agency	Standards	No.
	UL 1449 4th Edition	E322662
	CSA C22.2 NO.269.5-17	E322662
	EN 61051-1:2008 IEC 61051-1:2007 IEC 61051-2:1991+A1 IEC 61051-2-2:1991 Annex Q of IEC 60950-1:2005+A1+A2	J 50401611

Marking



Internal code	
Year Code	2000—A …… 2022—W
Surge Level	K: Standard Type
Serial No.	(E.G.: 0001)

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 the 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 20 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 - 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
20: 20×20 mm

Product Category
SETfuse Varistor

MOV

*For more details refer to packaging information.

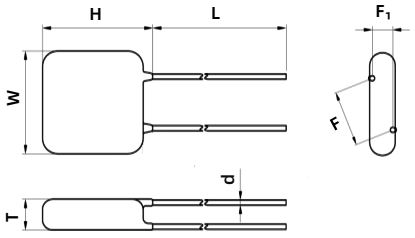
Glossary

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.

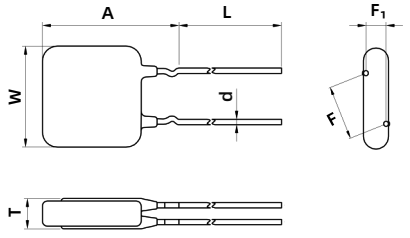
MOV

Dimensions (mm)

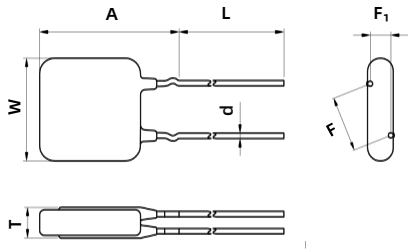
Model	L (Min.)	W (Max.)	H (Max.	T (Max.)	d	F	F_1	A (Max.)
SFV20S220K	20	22	26	5.0	1.00±0.05	10.0±0.6	1.2 - 2.8	27.5
SFV20S270K	20	22	26	5.3	1.00±0.05	10.0±0.6	1.3 - 3.0	27.5
SFV20S330K	20	22	26	5.6	1.00±0.05	10.0±0.6	1.4 - 3.2	27.5
SFV20S390K	20	22	26	5.9	1.00±0.05	10.0±0.6	1.5 - 3.4	27.5
SFV20S470K	20	22	26	5.1	1.00±0.05	10.0±0.6	1.3 - 3.0	27.5
SFV20S560K	20	22	26	5.3	1.00±0.05	10.0±0.6	1.4 - 3.2	27.5
SFV20S680K	20	22	26	5.6	1.00±0.05	10.0±0.6	1.5 - 3.4	27.5
SFV20S820K	20	22	26	4.9	1.00±0.05	10.0±0.6	1.3 - 2.9	27.5
SFV20S101K	20	22	26	5.1	1.00±0.05	10.0±0.6	1.4 - 3.1	27.5
SFV20S121K	20	22	26	5.3	1.00±0.05	10.0±0.6	1.5 - 3.3	27.5
SFV20S151K	20	22	26	5.6	1.00±0.05	10.0±0.6	1.6 - 3.6	27.5
SFV20S181K	20	22	26	5.1	1.00±0.05	10.0±0.6	1.4 - 3.1	27.5
SFV20S201K	20	22	26	5.2	1.00±0.05	10.0±0.6	1.5 - 3.2	27.5
SFV20S221K	20	22	26	5.3	1.00±0.05	10.0±0.6	1.6 - 3.3	27.5
SFV20S241K	20	22	26	5.4	1.00±0.05	10.0±0.6	1.7 - 3.5	27.5
SFV20S271K	20	22	26	5.6	1.00±0.05	10.0±0.6	1.8 - 3.6	27.5
SFV20S301K	20	22	26	5.8	1.00±0.05	10.0±0.6	1.9 - 3.8	27.5
SFV20S331K	20	22	26	6.0	1.00±0.05	10.0±0.6	2.0 - 4.0	27.5
SFV20S361K	20	22	26	6.2	1.00±0.05	10.0±0.6	2.2 - 4.2	27.5
SFV20S391K	20	22	26	6.4	1.00±0.05	10.0±0.6	2.3 - 4.3	27.5
SFV20S431K	20	22	26	6.6	1.00±0.05	10.0±0.6	2.6 - 4.6	27.5
SFV20S471K	20	22	26	6.9	1.00±0.05	10.0±0.6	2.8 - 4.8	27.5
SFV20S511K	20	22	26	7.1	1.00±0.05	10.0±0.6	3.1 - 5.1	27.5
SFV20S561K	20	22	26	7.4	1.00±0.05	10.0±0.6	3.3 - 5.3	27.5
SFV20S621K	20	22	26	7.8	1.00±0.05	10.0±0.6	3.7 - 5.7	27.5
SFV20S681K	20	22	26	8.2	1.00±0.05	10.0±0.6	4.1 - 6.1	27.5
SFV20S751K	20	22	26	8.6	1.00±0.05	10.0±0.6	4.5 - 6.5	27.5
SFV20S821K	20	22	26	9.1	1.00±0.05	10.0±0.6	4.9 - 6.9	27.5
SFV20S911K	20	22	26	9.6	1.00±0.05	10.0±0.6	5.4 - 7.4	27.5
SFV20S102K	20	22	26	10.2	1.00±0.05	10.0±0.6	5.9 - 7.9	27.5
SFV20S112K	20	22	26	10.8	1.00±0.05	10.0±0.6	6.5 - 8.5	27.5
SFV20S122K	20	22	26	11.4	1.00±0.05	10.0±0.6	7.1 - 9.1	27.5



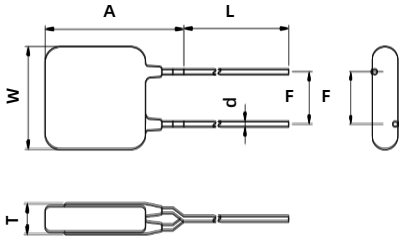
Straight Lead



Inward Crimp



Outward Crimp



Inline Crimp

Note:
The above data is for reference only.

Specification

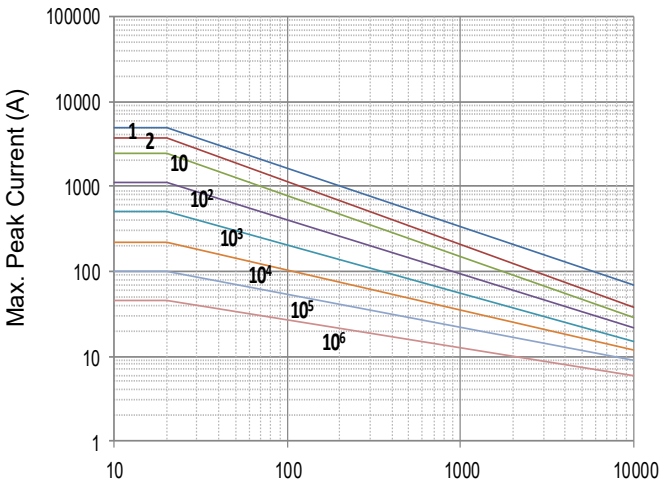
Model	Max. Continuous Operating Voltage		Varistor Voltage @1 mA DC		Clamping Voltage (Max.)		Max. Discharge Current (8/20 μs)		Max. Energy (10/1000 μs)	Typical Capacitance (For reference only) @1 kHz	Agency Approvals			
	Vac	Vdc	Min.	Max.	V_C	I_P	I_n	I_{max}	(J)	(pF)				
	(V)	(V)	(V)	(V)	(V)	(A)	(kA)	(kA)			UL	cUL	TUV	CQC
SFV20S220K	14	18	20	24	43	25	1.5	3	19.1	22200	●	●	○	○
SFV20S270K	17	22	24	31	53	25	1.5	3	23	15600	●	●	●	○
SFV20S330K	20	26	30	36	65	25	1.5	3	29	13800	●	●	●	○
SFV20S390K	25	31	35	43	77	25	1.5	3	33.5	10200	●	●	●	○
SFV20S470K	30	38	42	52	93	25	2.5	5	41	8880	●	●	●	○
SFV20S560K	35	45	50	62	110	25	2.5	5	49	7800	●	●	●	○
SFV20S680K	40	56	61	75	135	25	2.5	5	59	7000	●	●	●	○
SFV20S820K	50	65	74	90	135	125	8	15	67	5880	●	●	●	○
SFV20S101K	60	85	90	110	165	125	8	15	84	4800	●	●	●	○
SFV20S121K	75	100	108	132	200	125	8	15	102	4000	●	●	●	○
SFV20S151K	95	125	135	165	250	125	8	15	127	3200	●	●	●	○
SFV20S181K	115	150	162	198	300	125	8	15	156	2650	●	●	●	○
SFV20S201K	130	170	180	220	340	125	8	15	170	2400	●	●	●	○
SFV20S221K	140	180	198	242	360	125	8	15	185	2160	●	●	●	○
SFV20S241K	150	200	216	264	395	125	8	15	200	2000	●	●	●	○
SFV20S271K	175	225	243	297	455	125	8	15	230	1800	●	●	●	○
SFV20S301K	190	250	270	330	500	125	8	15	250	1560	●	●	●	○
SFV20S331K	210	275	297	363	550	125	8	15	270	1440	●	●	●	○
SFV20S361K	230	300	324	396	595	125	8	15	305	1320	●	●	●	○
SFV20S391K	250	320	351	429	650	125	8	15	330	1200	●	●	●	○
SFV20S431K	275	350	387	473	710	125	8	15	365	1160	●	●	●	○
SFV20S471K	300	385	423	517	775	125	8	15	420	1020	●	●	●	○
SFV20S511K	320	415	459	561	845	125	8	15	430	935	●	●	●	○
SFV20S561K	350	460	504	616	925	125	8	15	455	850	●	●	●	○
SFV20S621K	385	505	558	682	1025	125	8	15	465	780	●	●	●	○
SFV20S681K	420	560	612	748	1120	125	8	15	480	720	●	●	●	○
SFV20S751K	460	615	675	825	1240	125	8	15	500	635	●	●	●	○
SFV20S821K	510	670	738	902	1355	125	8	15	520	600	●	●	●	○
SFV20S911K	550	745	819	1001	1500	125	8	15	550	525	●	●	●	○
SFV20S102K	625	825	900	1100	1650	125	8	15	610	480	●	●	●	○
SFV20S112K	680	895	990	1210	1815	125	8	15	675	430	●	●	●	○
SFV20S122K	750	1000	1080	1320	1980	125	8	15	740	380	●	●	●	○

●: Approved ○: Unauthorized

MOV

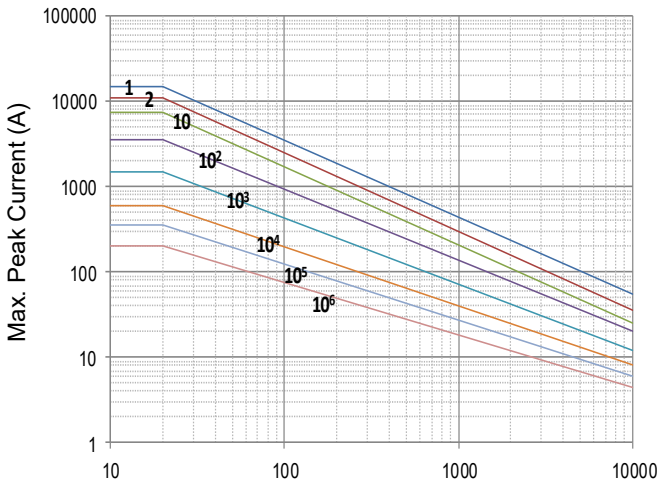
Performance Curve (For reference only)

- Max. Peak Current Derating Curves



Impulse Duration (μs)

SFV20S220K to SFV20S680K

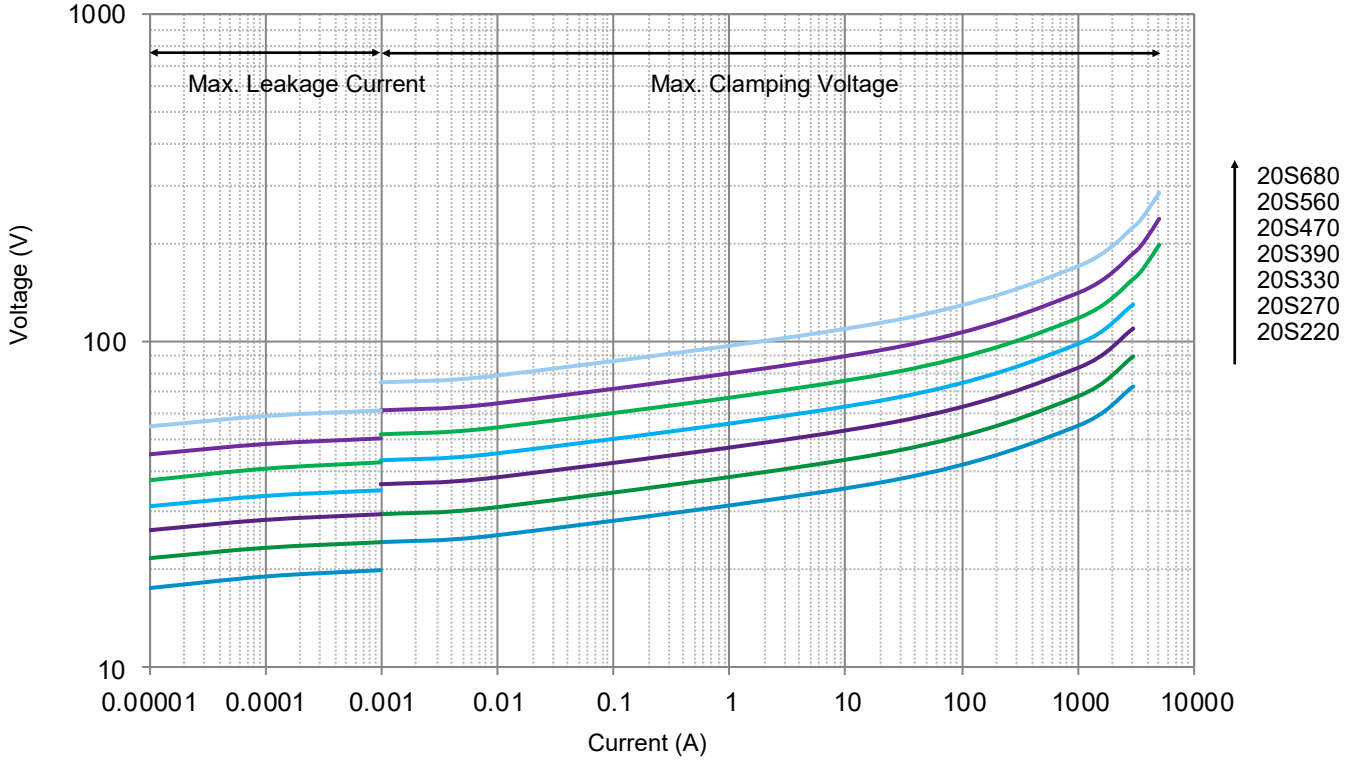


Impulse Duration (μs)

SFV20S820K to SFV20S122K

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

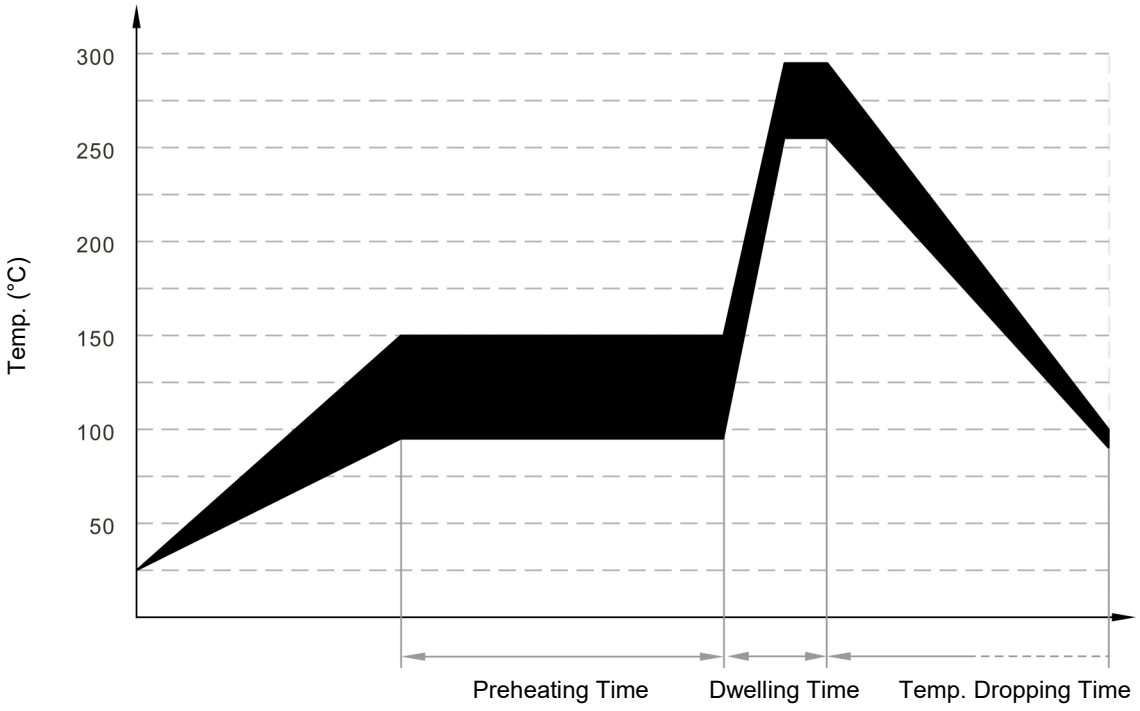
- Voltage-Current Characteristic Curves



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

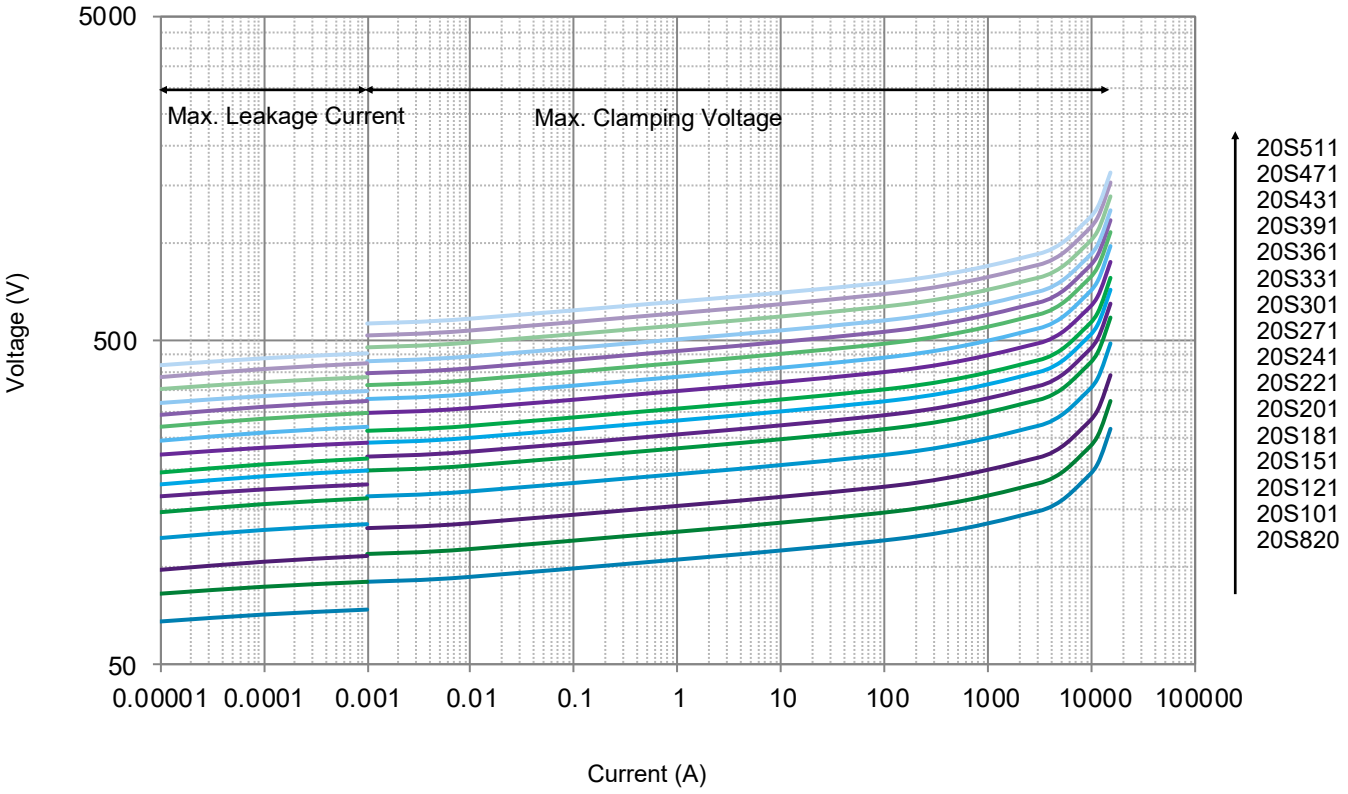
Item	Temp. (°C)	Time (s)
Preheating	90 to 150	<150
Dwelling	255 to 290	3 to 10

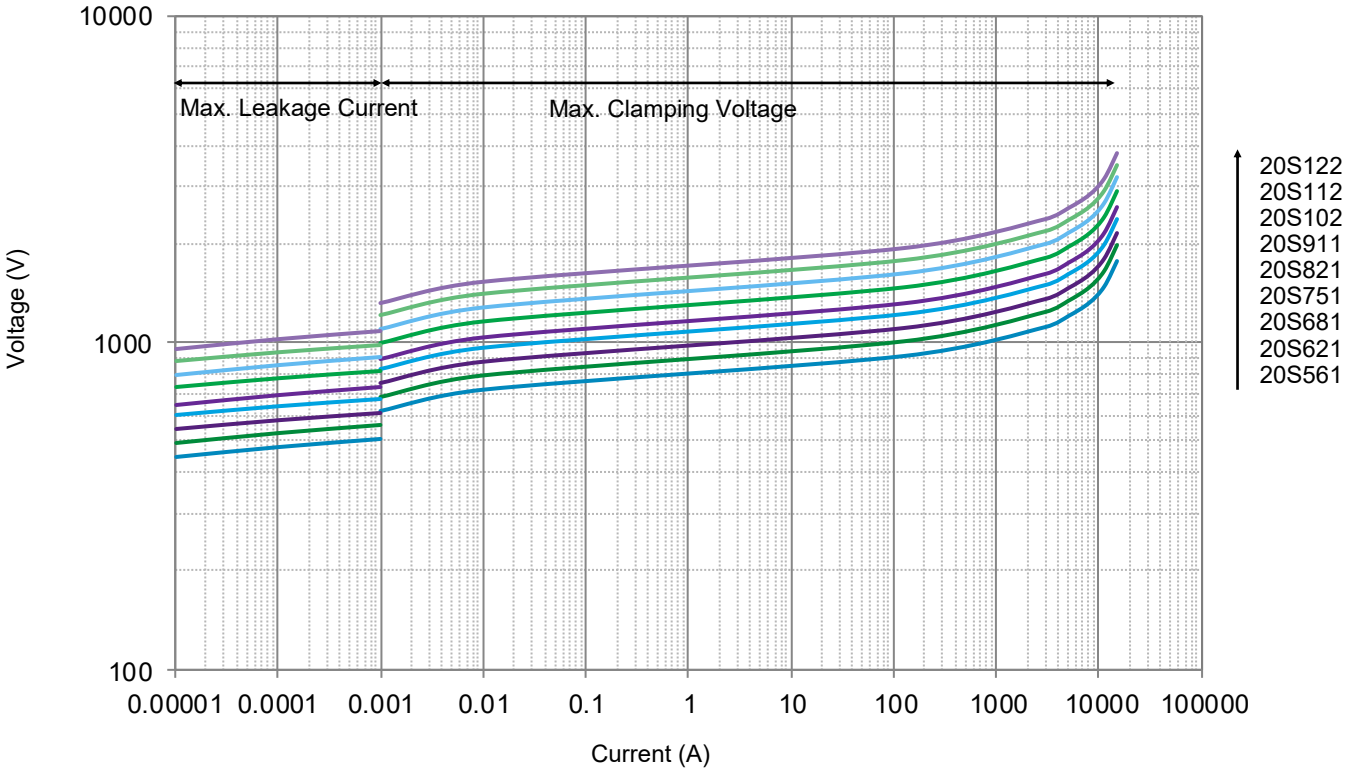
Recommended Hand-Soldering Parameters

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

MOV

- Voltage-Current Characteristic Curves





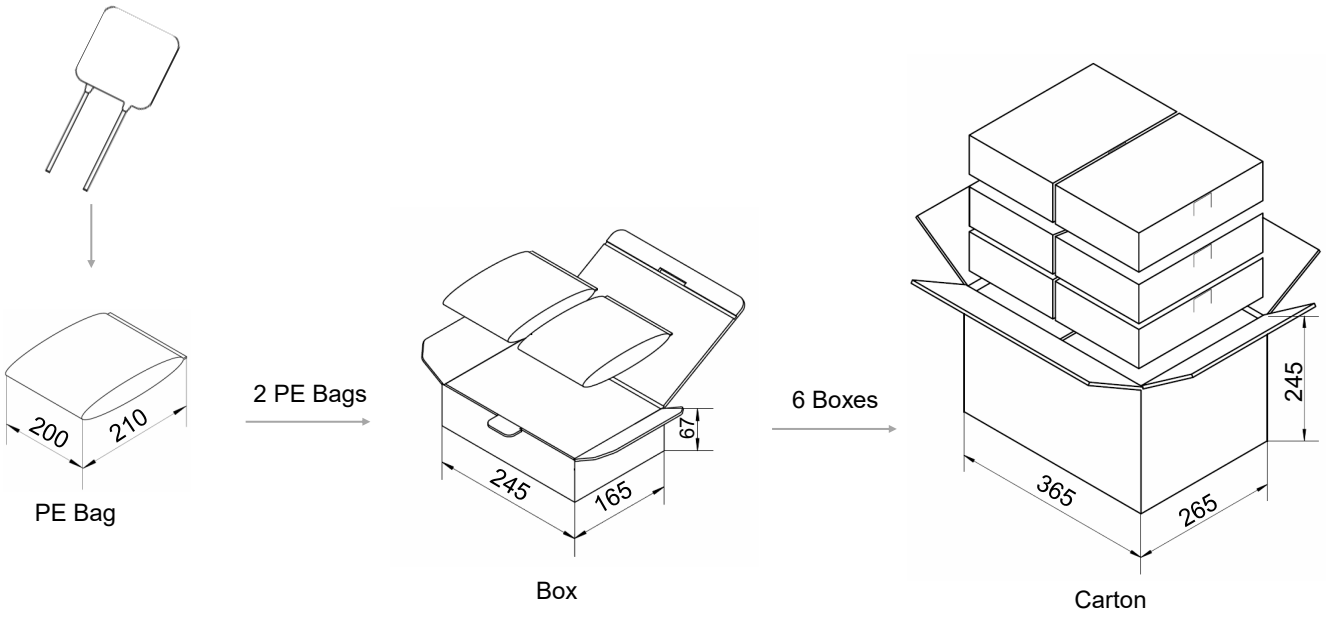
Packaging Information

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

Series	Nominal Varistor Voltage	PE Bag	Box	Carton	G. W / Carton (365 × 265× 245)
	(V)	(PCS)	(PCS)	(PCS)	(kg)±10%
20S	220 - 391	100	200	1200	6 - 10
	431 - 122	80	160	960	9 - 20

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

All Dimensions in mm



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ATTENTION

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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.

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