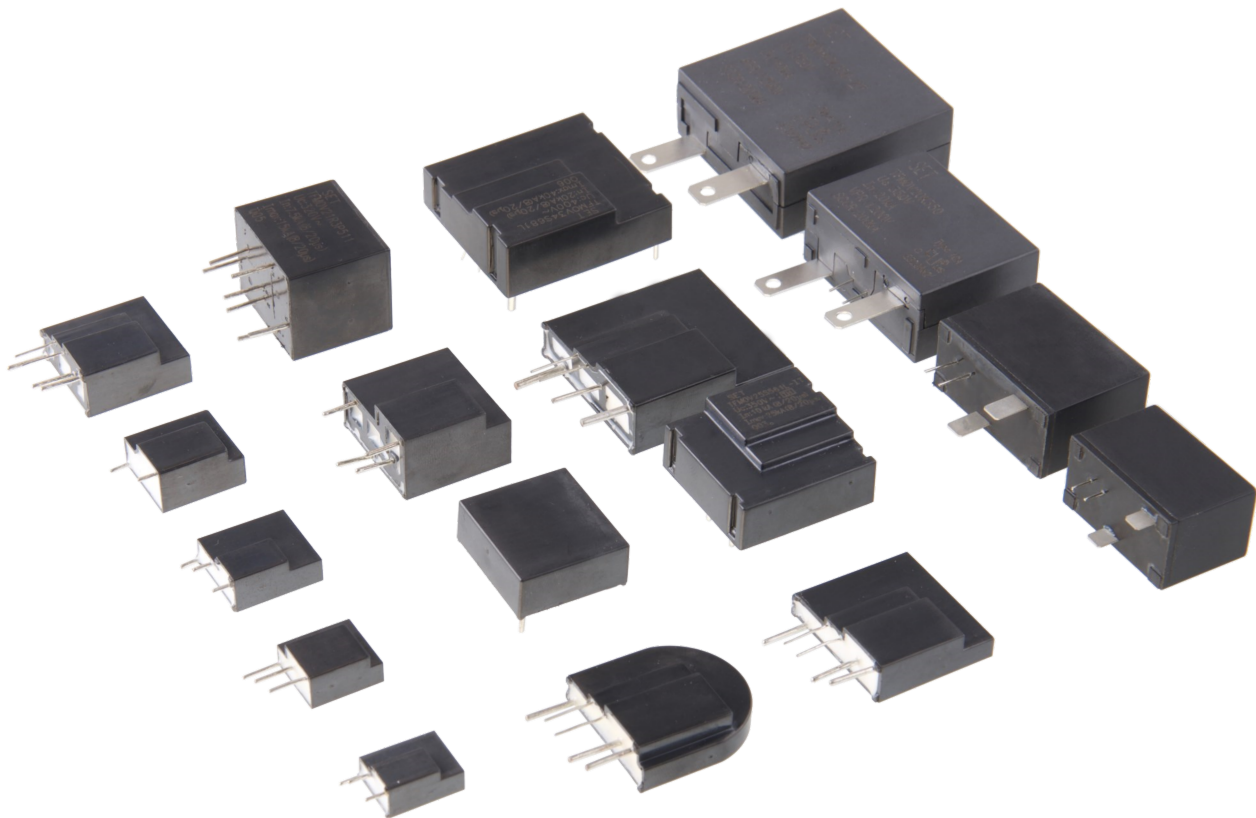


TFMOV

Thermal Fuse & MOV



Features

- Thermal Protection, High Reliability
- Small Size
- Remote Signal Contact for Failure Indication (Optional)
- High Energy Capacity
- Epoxy Sealing Material, Flame-retardant to V0 (UL 94)
- Comply with UL 1449 / IEC 61643-11

Applications

- Telecom Equipment
- String Inverter in Photovoltaic System
- AC / DC Power Supply
- Uninterruptable Power Supply (UPS)
- Surge Protective Device (SPD)
- Electric Meter
- Power Distribution Unit (PDU)

Thermal Fuse & MOV (TFMOV) Feature & Model List Overview

Rated Voltage U_n (V)										Page		Model	Maximum Continuous Operating Voltage U_n (V)
		15	20	25	39	20	30	25	30				
690V	600V	○	○	○	○	○	○	TFMOV20S122x	○	750	1000		
		○	○	○	○	○	○	TFMOV20S112x	○	680	895		
480V		○	○	○	○	○	○	TFMOV20S102x	○	625	825		
		○	○	○	○	○	○	TFMOV20S911x	○	550	745		
347V	400V	○	○	○	TFMOV10S821	TFMOV15S821	○	TFMOV20S821x	○	510	670		
		○	○	○	TFMOV10S751	TFMOV15S751	○	TFMOV20S751x	○	460	615		
	254	○	○	○	TFMOV10S681	TFMOV15S681	○	TFMOV20S681x	○	420	560		
		○	○	○	TFMOV10S621	TFMOV15S621	○	TFMOV20S621x	○	385	505		
220	277V	○	○	○	TFMOV10S561	TFMOV15S561	○	TFMOV20S561x	○	350	460		
		○	○	○	TFMOV10S511	TFMOV15S511	○	TFMOV20S511x	○	320	415		
230V	300V	○	○	○	TFMOV10S471	TFMOV15S471	○	TFMOV20S471x	○	300	385		
		○	○	○	TFMOV10S431	TFMOV15S431	○	TFMOV20S431x	○	275	350		
	120	○	○	○	TFMOV10S391	TFMOV15S391	○	TFMOV20S391x	○	250	320		
		○	○	○	TFMOV10S361	TFMOV15S361	○	TFMOV20S361x	○	230	300		
	130V	○	○	○	TFMOV10S331	TFMOV15S331	○	TFMOV20S331x	○	210	275		
		○	○	○	TFMOV10S301	TFMOV15S301	○	TFMOV20S301x	○	190	250		
		○	○	○	TFMOV10S271	TFMOV15S271	○	TFMOV20S271x	○	175	225		
		○	○	○	TFMOV10S241	TFMOV15S241	○	TFMOV20S241x	○	150	200		
110V	110V	○	○	○	TFMOV10S221	TFMOV15S221	○	TFMOV20S221x	○	140	180		
		○	○	○	TFMOV10S201	TFMOV15S201	○	TFMOV20S201x	○	130	170		
		○	○	○	TFMOV10S181	TFMOV15S181	TFMOV20S181	○	TFMOV25S181x	115	150		
		○	○	○	TFMOV10S151	TFMOV15S151	TFMOV20S151	○	TFMOV25S151x	95	125		
48V	60V	○	TFMOV10S121	TFMOV15S121	○	○	TFMOV20S121x	○	TFMOV25S121x	75	100		
		○	TFMOV10S101	TFMOV15S101	○	○	TFMOV20S101x	○	TFMOV25S101x	60	85		
	36V	○	TFMOV10S820	TFMOV15S820	○	○	TFMOV20S820x	○	TFMOV25S820x	50	65		
		TFMOV10S680	TFMOV15S680	TFMOV20S680x	TFMOV25D680x	○	TFMOV25S680x	○	○	40	56		
24V	24V	TFMOV10S560	TFMOV15S560	TFMOV20S560x	TFMOV25D560x	○	TFMOV25S560x	○	○	35	45		
		TFMOV10S470	TFMOV15S470	TFMOV20S470x	○	○	○	○	○	30	38		
		TFMOV10S390	TFMOV15S390	○	○	○	○	○	○	25	31		
		TFMOV10S330	TFMOV15S330	○	○	○	○	○	○	20	26		
12V	12V	TFMOV10S270	○	○	○	○	○	○	○	17	22		
AC	DC	1	1.5	2.5	3	5	5	7.5	8	AC	DC		
		Nominal Discharge Current I_n (kA)											

Thermal Fuse & MOV (TFMOV) Feature & Model List Overview

Rated Voltage U_n (V)										Page		Model	Maximum Continuous Operating Voltage U_n (V)
			39	30	52	65	65	52	70				
690V	600V		TFMOV25D122x	TFMOV25S122x	○	TFMOV20K122x	○	TFMOV34S122x	○	750	1000		
			TFMOV25D112x	TFMOV25S112x	○	TFMOV20K112x	○	TFMOV34S112x	○	680	895		
480V			TFMOV25D102x	TFMOV25S102x	○	TFMOV20K102x	○	TFMOV34S102x	○	625	825		
			TFMOV25D911x	TFMOV25S911x	○	TFMOV20K911x	TFMOV20K550x	TFMOV34S911x	○	550	745		
347V	400V		TFMOV25D821x	TFMOV25S821x	○	TFMOV20K821x	○	TFMOV34S821x	○	510	670		
			TFMOV25D751x	TFMOV25S751x	○	TFMOV20K751x	TFMOV20K460x	TFMOV34S751x	○	460	615		
	254 - 277V		TFMOV25D681x	TFMOV25S681x	○	TFMOV20K681x	○	TFMOV34S681x	○	420	560		
			TFMOV25D621x	TFMOV25S621x	○	TFMOV20K621x	○	TFMOV34S621x	○	385	505		
220 - 230V	300V		TFMOV25D561x	TFMOV25S561x	○	TFMOV20K561x	TFMOV20K350x	TFMOV34S561x	○	350	460		
			TFMOV25D511x	TFMOV25S511x	○	TFMOV20K511x	○	TFMOV34S511x	○	320	415		
			TFMOV25D471x	TFMOV25S471x	○	TFMOV20K471x	○	TFMOV34S471x	○	300	385		
			TFMOV25D431x	TFMOV25S431x	○	TFMOV20K431x	TFMOV20K300x	TFMOV34S431x	○	275	350		
	120 - 130V		TFMOV25D391x	TFMOV25S391x	○	TFMOV20K391x	○	TFMOV34S391x	○	250	320		
			TFMOV25D361x	TFMOV25S361x	○	TFMOV20K361x	○	TFMOV34S361x	○	230	300		
			TFMOV25D331x	TFMOV25S331x	○	TFMOV20K331x	○	TFMOV34S331x	○	210	275		
			TFMOV25D301x	TFMOV25S301x	○	TFMOV20K301x	○	TFMOV34S301x	○	190	250		
110V	110V		TFMOV25D271x	TFMOV25S271x	○	TFMOV20K271x	○	TFMOV34S271x	○	175	225		
			TFMOV25D241x	TFMOV25S241x	○	TFMOV20K241x	TFMOV20K150x	TFMOV34S241x	○	150	200		
			TFMOV25D221x	TFMOV25S221x	○	TFMOV20K221x	○	TFMOV34S221x	○	140	180		
			TFMOV25D201x	TFMOV25S201x	○	TFMOV20K201x	○	TFMOV34S201x	○	130	170		
			○	○	○	TFMOV20K181x	○	TFMOV34S181x	○	115	150		
			○	○	○	TFMOV20K151x	○	TFMOV34S151x	○	95	125		
48V	60V		○	○	TFMOV34S121x	○	○	○	○	75	100		
			○	○	TFMOV34S101x	○	○	○	TFMOV40K121x	60	85		
	48V		○	○	TFMOV34S820x	○	○	○	TFMOV40K101x	50	65		
			○	○		○	○	○	TFMOV40K820x	40	56		
24V	24V		TFMOV34S680x	○	○	○	○	○	○	35	45		
			TFMOV34S560x	○	○	○	○	○	○	30	38		
			TFMOV34S470x	○	○	○	○	○	○	25	31		
			○	○	○	○	○	○	○	20	26		
12V	12V		○	○	○	○	○	○	○	17	22		
			○	○	○	○	○	○	○				
AC		DC	10	10 $I_{max} = 2.5/I_n$	15	20 $I_{max} = 2.5/I_n$	20 $I_{max} = 2.5/I_n$	20	30	AC	DC		
Nominal Discharge Current I_n (kA)													

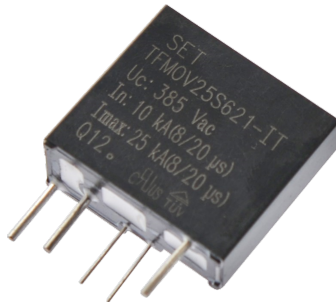
Thermal Fuse & MOV (TFMOV) Feature & Model List Overview

										Page		Model
		70	70	57	57	57	61	61	61			
Rated Voltage U_n (V)												Maximum Continuous Operating Voltage U_n (V)
690V	600V		TFMOV40K122x	○	○	○	○	○	○	750	1000	
			TFMOV40K112x	○	○	○	○	○	○	680	895	
480V			TFMOV40K102x	○	○	○	○	○	○	625	825	
			TFMOV40K911x	TFMOV40K550x	○	○	○	○	○	550	745	
347V	400V		TFMOV40K821x	○	○	○	○	○	○	510	670	
			TFMOV40K751x	TFMOV40K460x	○	○	○	○	○	460	615	
			TFMOV40K681x	○	○	○	○	○	○	420	560	
			TFMOV40K621x	○	○	○	○	○	○	385	505	
220V	277V		TFMOV40K561x	TFMOV40K350x	○	○	○	○	○	350	460	
			TFMOV40K511x	○	○	TFMOV21R2P511	○	○	TFMOV21R3P511	320	415	
230V	300V		TFMOV40K471x	○	○	TFMOV21R2P471	○	○	TFMOV21R3P471	300	385	
			TFMOV40K431x	TFMOV40K300x	○	TFMOV21R2P431	○	○	TFMOV21R3P431	275	350	
			TFMOV40K391x	○	○	TFMOV21R2P391	○	○	TFMOV21R3P391	250	320	
			TFMOV40K361x	○	○	TFMOV21R2P361	○	○	TFMOV21R3P361	230	300	
	120V	130V	TFMOV40K331x	○	○	TFMOV21R2P331	○	○	TFMOV21R3P331	210	275	
			TFMOV40K301x	○	○	TFMOV21R2P301	○	○	TFMOV21R3P301	190	250	
			TFMOV40K271x	○	○	TFMOV21R2P271	○	○	TFMOV21R3P271	175	225	
			TFMOV40K241x	TFMOV40K150x	○	TFMOV21R2P241	○	○	TFMOV21R3P241	150	200	
110V	110V		TFMOV40K221x	○	○	TFMOV21R2P221	○	○	TFMOV21R3P221	140	180	
			TFMOV40K201x	○	○	TFMOV21R2P201	○	○	TFMOV21R3P201	130	170	
			TFMOV40K181x	○	○	TFMOV21R2P181	○	TFMOV21R3P181	○	115	150	
			○	○	TFMOV21R2P151	○	TFMOV21R3P151	○	○	95	125	
48V	60V	60V	○	○	TFMOV21R2P121	○	TFMOV21R3P121	○	○	75	100	
			○	○	TFMOV21R2P101	○	TFMOV21R3P101	○	○	60	85	
	36V	48V	○	○	TFMOV21R2P820	○	TFMOV21R3P820	○	○	50	65	
			○	○	TFMOV21R2P680	○	TFMOV21R3P680	○	○	40	56	
24V	24V		○	○	TFMOV21R2P560	○	TFMOV21R3P560	○	○	35	45	
			○	○	TFMOV21R2P470	○	TFMOV21R3P470	○	○	30	38	
			○	○	○	○	○	○	○	25	31	
			○	○	○	○	○	○	○	20	26	
12V	12V		○	○	○	○	○	○	○	17	22	
AC	DC		40	40	2.5 x 2	5 x 2	7.5 x 2	2.5 x 3	5 x 3	7.5 x 3	AC	DC
Nominal Discharge Current I_n (kA)												

TFMOV

Thermal Fuse & MOV

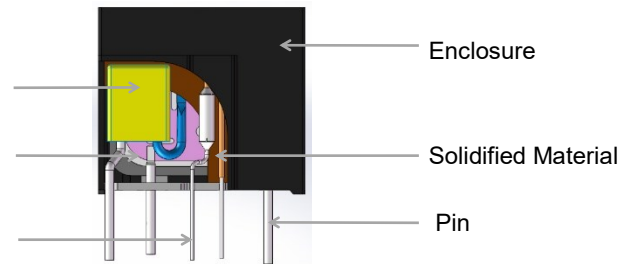
Description



ATCO

MOV

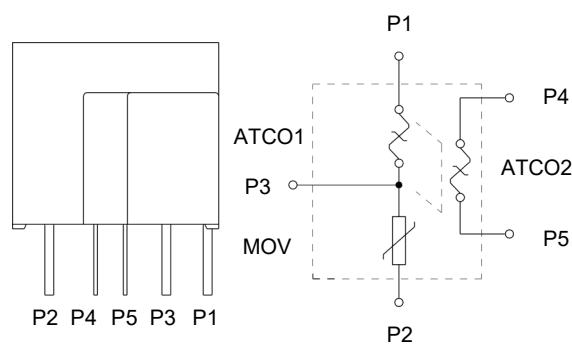
Remote Signal Pin



TFMOV(ATCO)

TFMOV is a combination of varistors (MOV) and thermal protection component. Since varistor has the characteristics of aging or degrading; TFMOV can separate the varistor from the main circuitry by opening the thermal protection component when the varistor (MOV) degrades or fails. It is often used in which requires high reliability and weather withstanding, such as photovoltaic inverters, communication equipment, and power supplies in data centers, etc.

Schematics

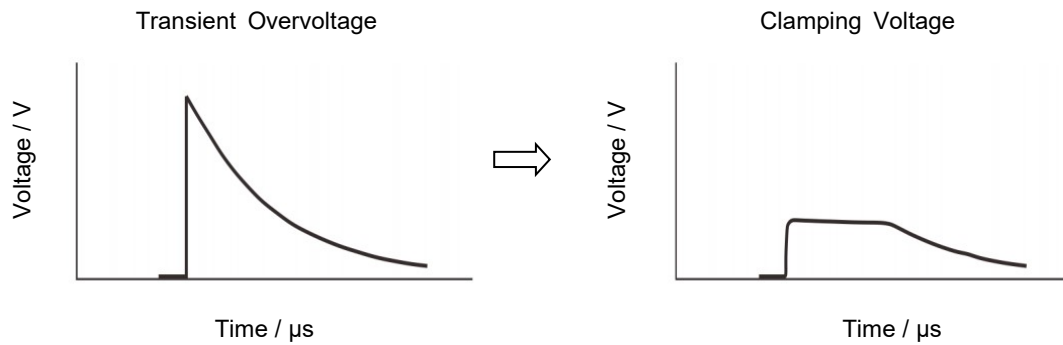


TFMOV(ATCO)

TFMOV

Thermal Fuse & MOV

MOV Operation Principle



MOV Thermal Protection

Figure a is a surge protection circuit commonly used in power supplies. MOV is used to suppress the surge voltage and protect the subsequent circuit. There is a risk of burning when the varistor degrades or fails. In the high-reliability surge protection circuit of Figure b, in order to improve the safety of the circuit, a thermal protection varistor TFMOV is used as the surge voltage protection element. TFMOV is a combination of varistors (MOV) and thermal protection component. When the temperature of the MOV is abnormally exceeded, the thermal fuse will be opened first, so that the failure mode of the MOV appears to be open-circuit failure.

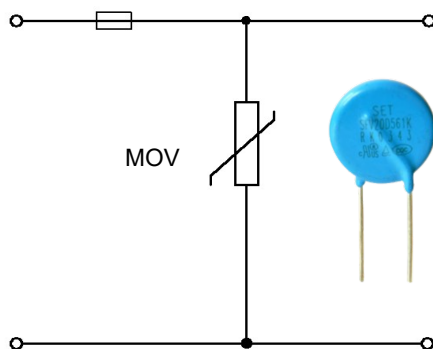


Figure a Typical surge protection circuit

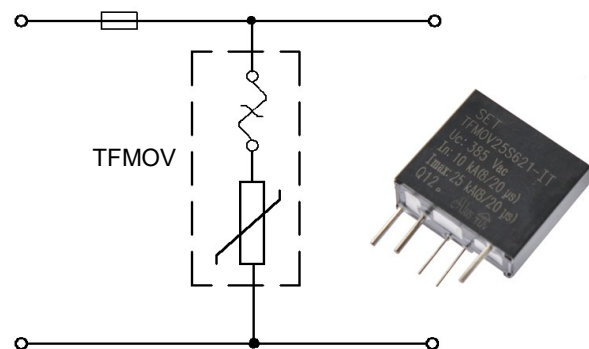
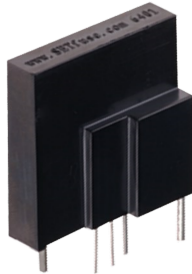


Figure b: High reliability surge protection circuit

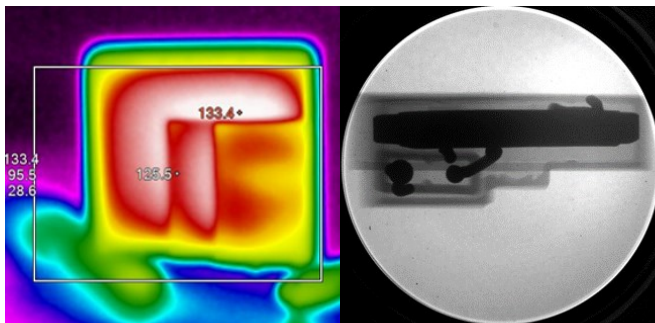
TFMOV

Thermal Fuse & MOV

Benefits



Safety

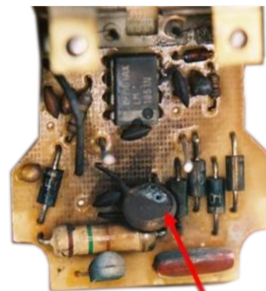


TFMOV Failure Simulation

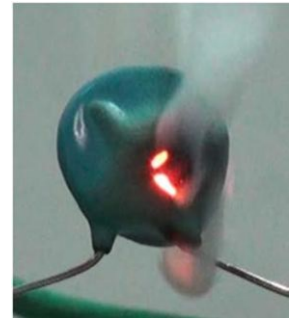
During the electrical performance degrading of varistor, the inbuilt ATCO will open the circuit when the leakage current of varistor increases to tens of micro Amperes. As shown in the figure above, this is a safe open circuit failure.



Hidden Danger



Hole in Varistor



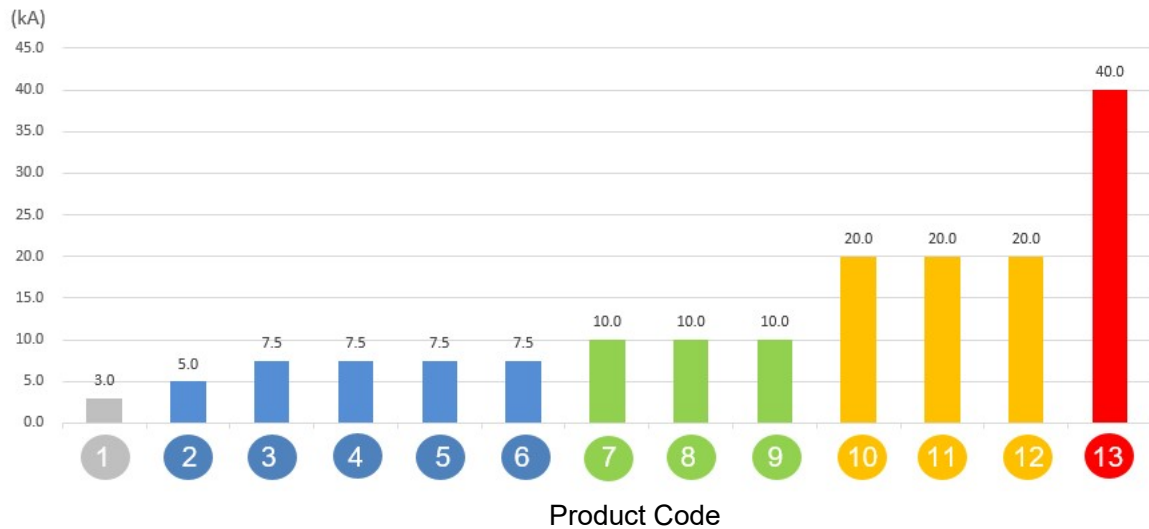
MOV Failure Simulation

The electrical performance of varistor degrades with operating, mostly the varistor voltage drops, and leakage current increases. The heat accumulation can cause the temperature increase sharply and varistor results in thermal breakdown to short circuit status. It's very dangerous.

TFMOV

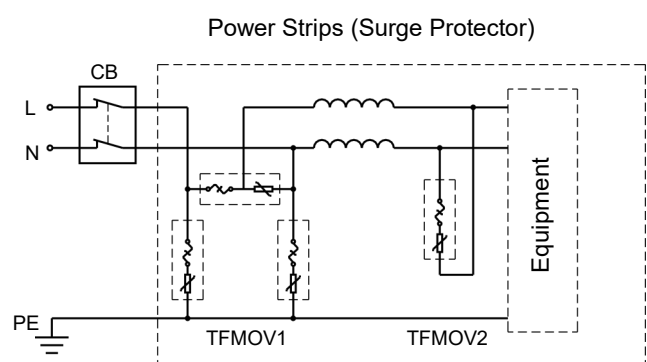
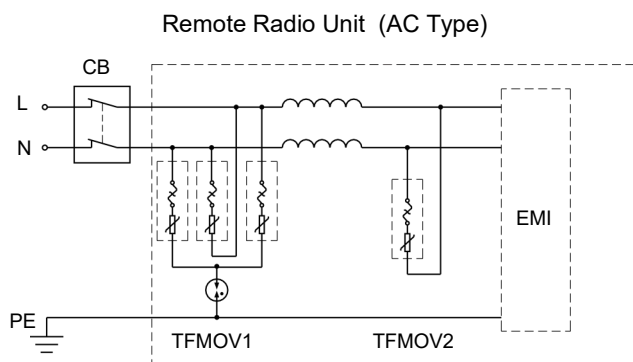
Thermal Fuse & MOV

Nominal Discharge Current



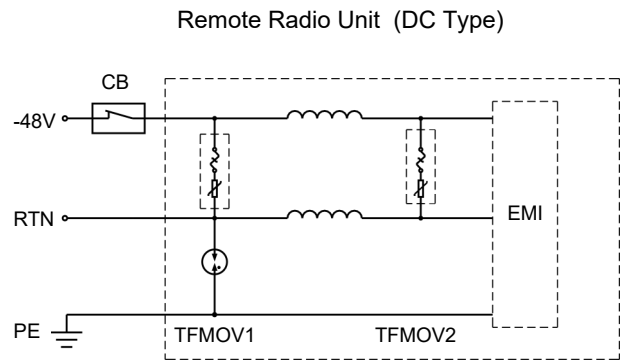
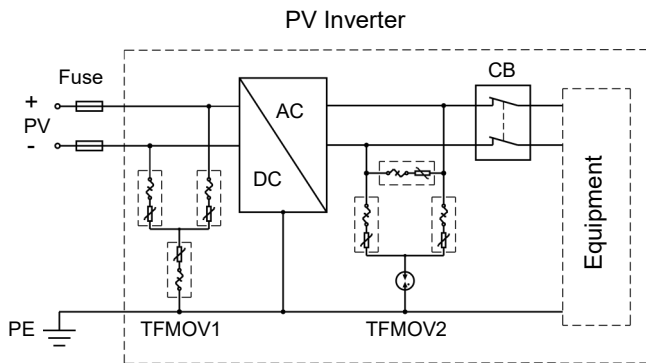
- | | | |
|---------------------|------------------------|-----------------------|
| 1 TFMOV10S Series | | |
| 2 TFMOV15S Series | 3 TFMOV20S Series | 4 TFMOV20SxxxL Series |
| 5 TFMOV21R2P Series | 6 TFMOV21R3P Series | |
| 7 TFMOV25S Series | 8 TFMOV25SxxxL Series | 9 TFMOV25D Series |
| 10 TFMOV34S Series | 11 TFMOV34SxxxL Series | 12 TFMOV20K Series |
| 13 TFMOV40K Series | | |

Application Options



TFMOV

Thermal Fuse & MOV



Design

When a single TFMOV surge capacity can't meet the requirement of customers, paralleling more TFMOVs is recommended. Due to its nonlinear current-voltage characteristics, please pay attention to below tips:

1. Use the TFMOV from the same manufacturer with same model to parallel.
2. Control the varistor voltage; Typically, the varistor voltage deviation should be less than 1% in the same group (between the Max and Min), and meet the next tip at the same time.
3. Calculate the average surge capacity for each TFMOV and keep a margin at least 10%.
4. Design the layout like Figure.2. to make sure the surge capacity is divided averagely.

The Design not Recommended

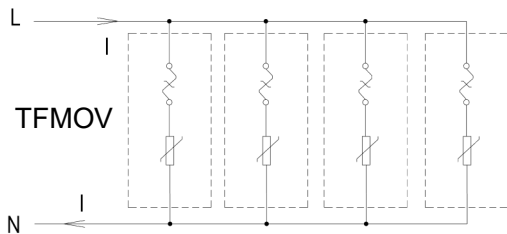


Figure .1

The Design Recommended

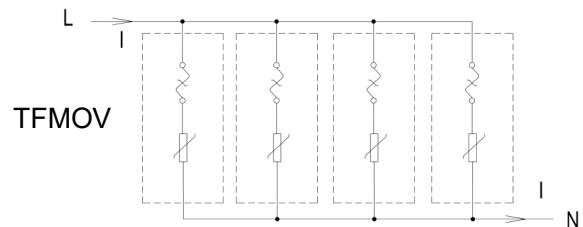


Figure .2

TFMOV

Thermal Fuse & MOV

Agency Information

Agency Information		Standards	NO.	Category
	UL	UL 1449 4th Edition	E322662	VZCA2
	CUL	CSA C22.2 NO. 269, CSA ECN 516	E322662	VZCA8
	TUV	IEC/EN 61643-11, IEC/EN 61643-31	-	N/A
	CQC	GB 4943.1-2011, GB 8898-2011; GB/T 10193-1997, GB/T 10194-1997	-	N/A
	CE	IEC/EN 61643-11, IEC/EN 61643-31	-	N/A

Patents

Name	Region	Category	Patent NO.
Varistor with In-built Alloy-Type Thermal Fuse	China	Patent for Invention	ZL 200510044661.5
A Protection Pluggable Module with Over Current、Over Voltage、and Over Temperature Protection Function	China	Utility Model	ZL 201020244488.X
A Varistor with Double Protection Function	China	Utility Model	ZL 201020255481.8
Surge Protection Module Applicable for Power Strip	China	Utility Model	ZL 201120107173.5
A Surge Protection Module Applicable for Power Strip	China	Patent for Invention	ZL 201110092261.7
A New Type of Varistor and Surge Protective Device with Thermal Protection	China	Utility Mode	ZL 201420306127.1
A Surge Protective Device	China	Utility Modeel	ZL 201420415059.2
A Varistor and Thermal Protection Component Combination	China	Utility Mode	ZL 201520376567.9
合金型温度ヒューズ付のバリスタ	Japan	Utility Mode	3142835
Varistor with an Alloy-Type Temperature Fuse	Australia	Utility Mode	2007100456
Varistor with an Alloy-Type Temperature Fuse	Taiwan	Utility Model	M 300855
Varistor with an Alloy-type Temperature Fuse	Canada	Patent for Invention	2588819
Metal Oxide Varistor with Built-in Alloy-Type Temperature Fuse	USA	Patent for Invention	US 8780521
Varistor with In-built Alloy Type Thermal Fuse (with Housing)	USA	Patent for Invention	US 9355763

TFMOV

Thermal Fuse & MOV

Glossary

Item	Description
V_N	Nominal Varistor Voltage Voltage, at specified d.c. current used as a reference point in the component characteristic.
$8/20 \mu s$	8/20 Current Impulse Current impulse with a nominal virtual front time of 8 μs and a nominal time to half-value of 20 μs . — (IEC 61643-11)
$1.2/50 \mu s$	1.2/50 Voltage Impulse Voltage impulse with a nominal virtual front time of 1.2 μs and a nominal time to half-value of 50 μs . — (IEC 61643-11)
U_c	Maximum Continuous Operating Voltage Maximum r.m.s. voltage, which may be continuously applied to the SPD's mode of protection. — (IEC 61643-11)
I_n	Nominal Discharge Current Crest value of the current through the SPD having a current waveshape of 8/20 μs . — (IEC 61643-11)
I_{imp}	Impulse Discharge Current for Class I Test Crest value of a discharge current through the SPD with specified charge transfer Q and specified energy W/R in the specified time. — (IEC 61643-11)
I_{max}	Maximum Discharge Current Crest value of a current through the SPD having an 8/20 μs waveshape and magnitude according to the manufacturers specification. I_{max} is equal to or greater than I_n . — (IEC 61643-11)
V_c	Clamping Voltage Peak voltage developed across the varistor terminations under standard atmospheric conditions, when passing an 8/20 μs class current pulse.
C_v	Capacitance Capacitance across the MOV measured at a specified frequency and voltage.
Modes of protection	Modes of protection An intended current path, between terminals that contains protective components, e.g. line-to-line, line-to-earth, line-to-neutral, neutral-to-earth. — (IEC 61643-11)
U_p	Voltage Protection Level Maximum voltage to be expected at the SPD terminals due to an impulse stress with defined voltage steepness and an impulse stress with a discharge current with given amplitude and wave shape. — (IEC 61643-11)
TCO	Thermal-Link A non-resettable device incorporating a THERMAL ELEMENT which will open a circuit once only when exposed for a sufficient length of time to a temperature in excess of that for which it has been designed.
ATCO	Alloy Thermal-Link Alloy Type Thermal-Link, Alloy is the thermal element.

TFMOV

Thermal Fuse & MOV



ATTENTION

Usage

1. Frequency range is from 47 Hz to 63 Hz.
2. The voltage applied continuously to the TFMOV can not exceed its maximum continuous operating voltage U_c .
3. When atmosphere press is from 80 kPa to 106 kPa, the related altitude shall be from 2000 meters to- 500 meters.
4. Do not touch the product body or pins directly when power is on, to avoid electric shock.
5. Do not clean the TFMOV with strong polar solvent such as ketone, esters, benzene, halogenated hydrocarbon, to avoid damaging the enclosure.
6. It should have a reliable grounding when using these products.

Replacement

TFMOV is a non-repairable product. For safety sake, please use equivalent TFMOV for replacement.

Storage

Do not store TFMOV at high temperature, high humidity or corrosive gas environment. To avoid reducing the solderability of the pins, please use them up within 1 year after receiving the goods.

Installation Position

Do not install the TFMOV on a place that may often suffer severe continuous vibration.

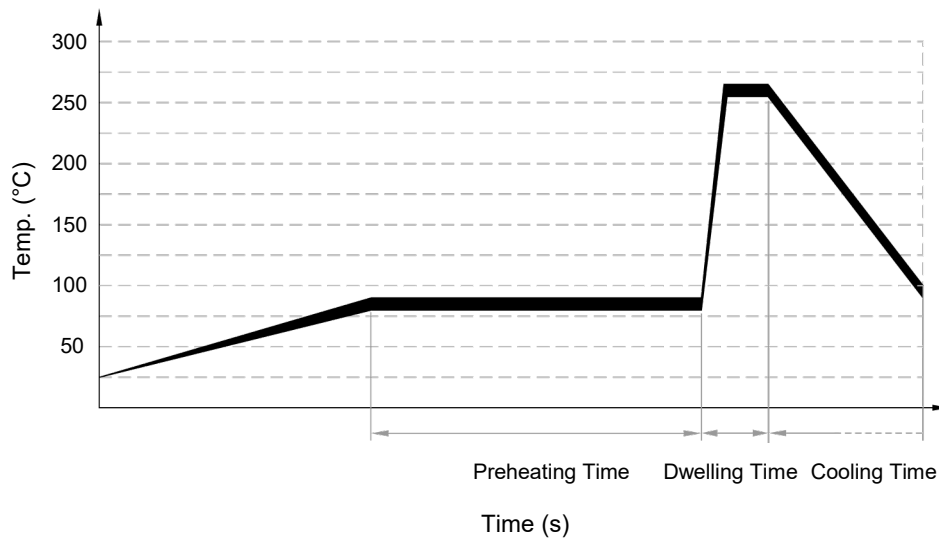
Mechanical Stress

Do not take violent action such as knocking when assembling to avoid mechanical damage.

TFMOV

Thermal Fuse & MOV

Wave Soldering Parameters (Reference)



Item	Temp. (°C)	Time (s)
Preheating	80 to 90	60 to 150
Dwelling	250 to 260	2 to 4

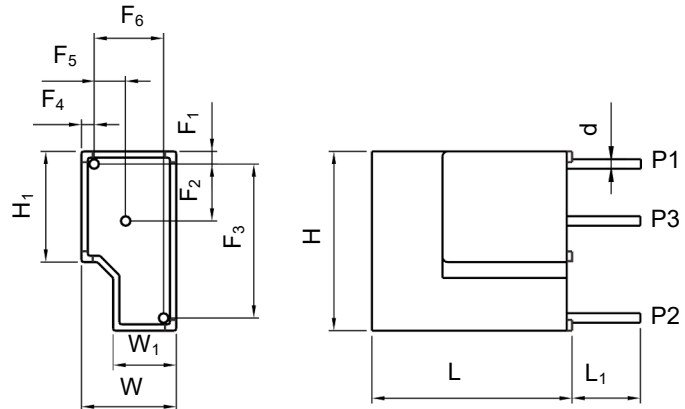
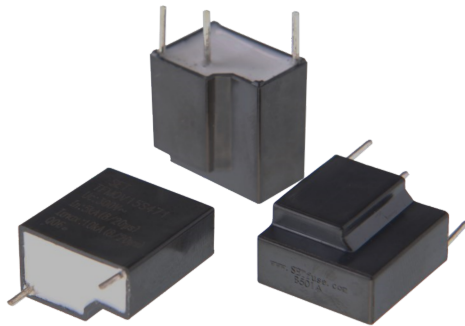
Recommended Hand-Soldering Parameters

Item	Condition
Iron Temperature	350 °C (Max.)
Soldering Time	4 seconds (Max.)
Distance between Soldering Point and the Bottom of Product	2 mm (Min.)

TFMOV

Thermal Fuse & MOV

TFMOV15S Series



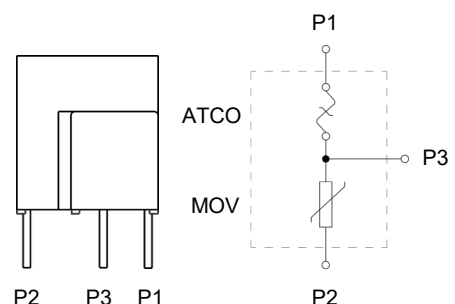
Note:
Pin P3 is Optional
Unit: mm

Nominal Varistor Voltage	L (±1.0)	L ₁ (±1.0)	W (±1.0)	W ₁ (±1.0)	H (±1.0)	H ₁ (±0.5)	d (-0.05,+0.10)
15S270 - 121	18.5	7.0	8.0	5.0	17.0	10.5	0.90
15S151 - 271	18.5	7.0	9.0	6.0	17.0	10.5	0.90
15S301 - 471	18.5	7.0	10.2	7.2	17.0	10.5	0.90
15S511 - 621	18.5	7.0	11.4	8.4	17.0	10.5	0.90
15S681 - 821	18.5	7.0	12.6	9.6	17.0	10.5	0.90
Nominal Varistor Voltage	F ₁ (±0.5)	F ₂ (±0.5)	F ₃ (±0.5)	F ₄ (±0.5)	F ₅ (±0.5)	F ₆ (±0.5)	
15S180 - 121	1.2	5.4	14.6	1.2	3.0	5.6	
15S151 - 271	1.2	5.4	14.6	1.2	3.0	6.6	
15S301 - 471	1.2	5.4	14.6	1.2	3.0	7.8	
15S511 - 621	1.2	5.4	14.6	1.2	3.0	9.0	
15S681 - 821	1.2	5.4	14.6	1.2	3.0	10.2	

Agency Approvals

Agency	Standards	File No.
 US	UL1449	E322662
	EN 61643-11	J 50285666
	GB 4943.1-2011 GB 8898-2011	CQC15001125792
Environment	RoHS & REACH	Compliant

Schematics



TFMOV

Thermal Fuse & MOV

TFMOV15S Series

Specifications

Model	Max. Continuous Operating Voltage		Varistor Voltage @1 mA DC		Clamping Voltage (Max.)		Nominal Discharge Current (8/20 μs)	Max. Discharge Current (8/20 μs)	Voltage Clamping Ratio ^a		Max. Energy (Joule)	Typical Capacitance (Reference)	Thermal Fuse
	U _c		Min.	Max.	V _C	I _P	I _n	I _{max}	R _{cl}	I _n	10/1000 μs	@1 kHz	UL 60691 E214712
	(VAC)	(VDC)	(V)		(V)	(A)	(kA)			(kA)	(J)	(pF)	
TFMOV15S270	17	22	24	31	53	15	1.5	3	4.6	1.5	16	10500	VS Series U _i :690 VAC I _t :10 A
TFMOV15S330	20	26	30	36	65	15	1.5	3	4.6	1.5	19	9300	
TFMOV15S390	25	31	35	43	77	15	1.5	3	4.6	1.5	21	7000	
TFMOV15S470	30	38	42	52	93	15	1.5	3	4.3	1.5	27	6000	
TFMOV15S560	35	45	50	62	110	15	1.5	3	3.8	1.5	32	5300	
TFMOV15S680	40	56	61	75	135	15	1.5	3	3.8	1.5	41	4700	
TFMOV15S820	50	65	74	90	135	75	2.5	5	3.2	2.5	43	4000	
TFMOV15S101	60	85	90	110	165	75	2.5	5	3.2	2.5	53	3200	
TFMOV15S121	75	100	108	132	200	75	2.5	5	3.2	2.5	64	2700	
TFMOV15S151	95	125	135	165	250	75	5	10	3.2	5	85	2200	
TFMOV15S181	115	150	162	198	300	75	5	10	2.3	5	96	1800	
TFMOV15S201	130	170	185	225	340	75	5	10	2.3	5	102	1600	
TFMOV15S221	140	180	198	242	360	75	5	10	2.3	5	125	1450	
TFMOV15S241	150	200	216	264	395	75	5	10	2.3	5	134	1350	
TFMOV15S271	175	225	243	297	455	75	5	10	2.3	5	158	1200	
TFMOV15S301	190	250	270	330	500	75	5	10	2.3	5	173	1050	
TFMOV15S331	210	275	297	363	550	75	5	10	2.3	5	185	1000	
TFMOV15S361	230	300	324	396	595	75	5	10	2.3	5	208	900	
TFMOV15S391	250	320	351	429	650	75	5	10	2.3	5	224	800	
TFMOV15S431	275	350	387	473	710	75	5	10	2.3	5	248	750	
TFMOV15S471	300	385	423	517	775	75	5	10	2.3	5	280	680	
TFMOV15S511	320	415	459	561	845	75	5	10	2.3	5	300	630	
TFMOV15S561	350	460	504	616	925	75	5	10	2.3	5	310	580	
TFMOV15S621	385	505	558	682	1025	75	5	10	2.3	5	310	530	
TFMOV15S681	420	560	612	748	1120	75	5	10	2.3	5	320	500	
TFMOV15S751	460	615	675	825	1240	75	5	10	2.3	5	335	430	
TFMOV15S821	510	670	738	902	1355	75	5	10	2.3	5	350	400	

Note:

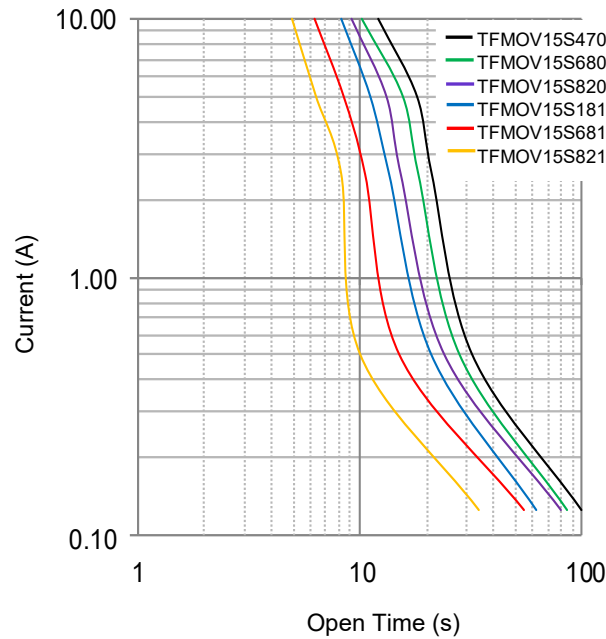
a: $R_{cl} = \frac{V_C}{I_n}$, $U_p \geq V_C$, V_C : Clamping Voltage (@ I_n), V_N : Varistor Voltage, U_p : Voltage Protection Level.

The Value of Voltage Protection Level (U_p) is determined according to IEC 61643-11:2011 clause 6.4.

Preferred values of voltage protection level (kV): 0.08, 0.09, 0.10, 0.12, 0.15, 0.22, 0.33, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.2, 1.5, 1.8, 2.0, 2.5, 3.0, 4.0, 5.0, 6.0, 8.0, 10.

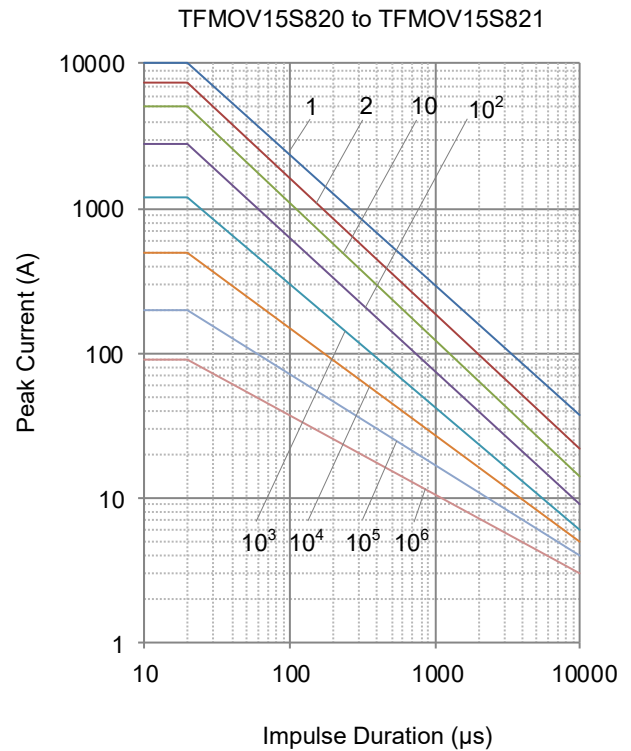
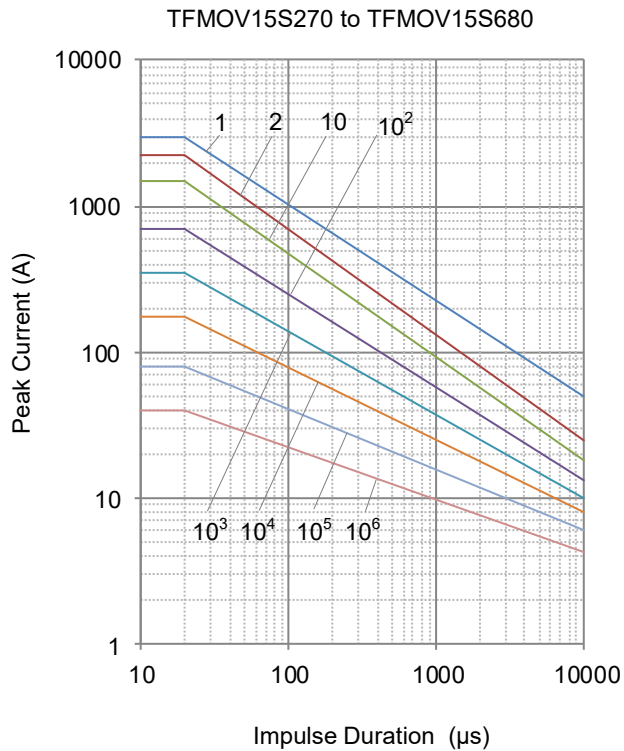
Performance Curve for Reference

Limited Current Test Curve (UL 1449 4th clause 44.4)



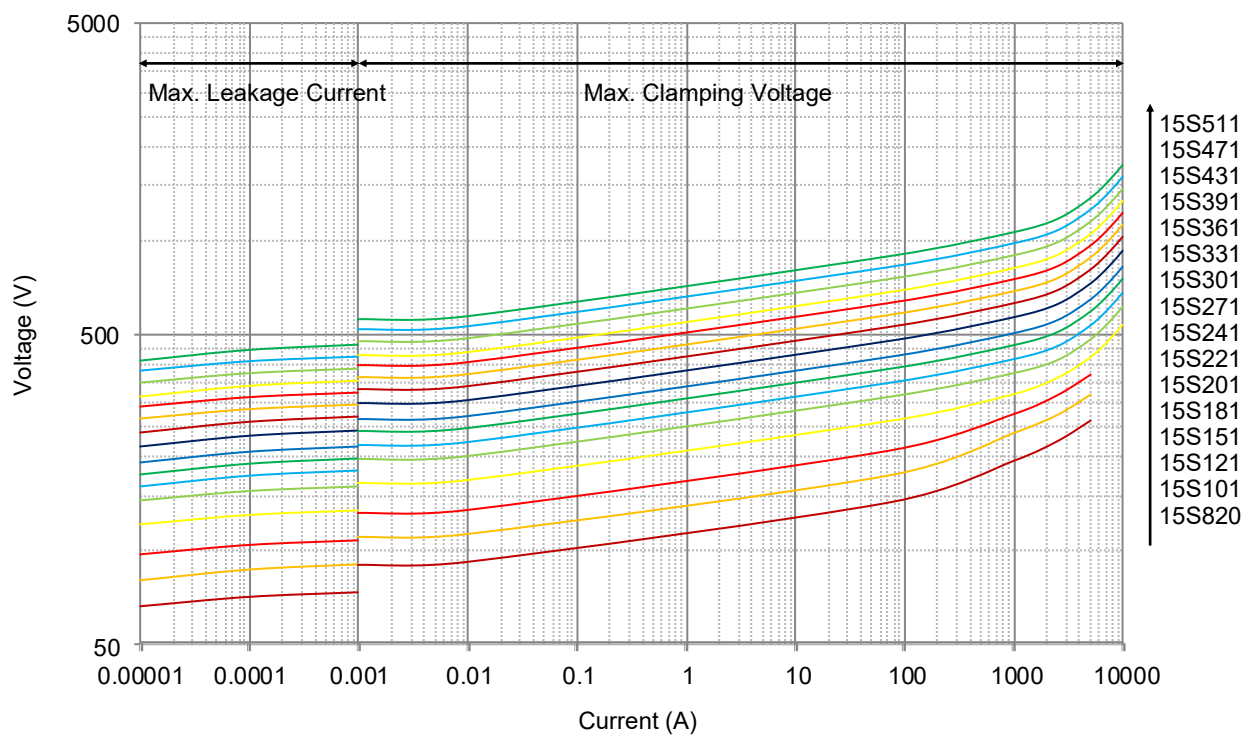
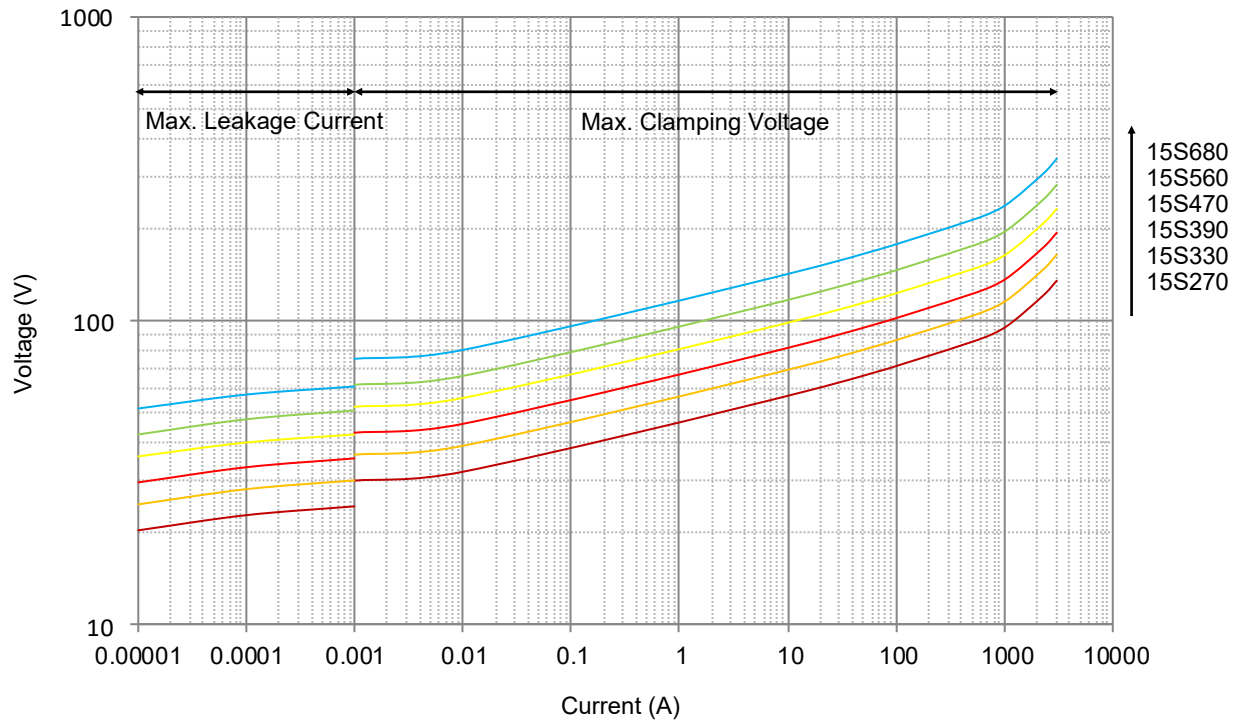
Note: The limited current test curve is for reference only.

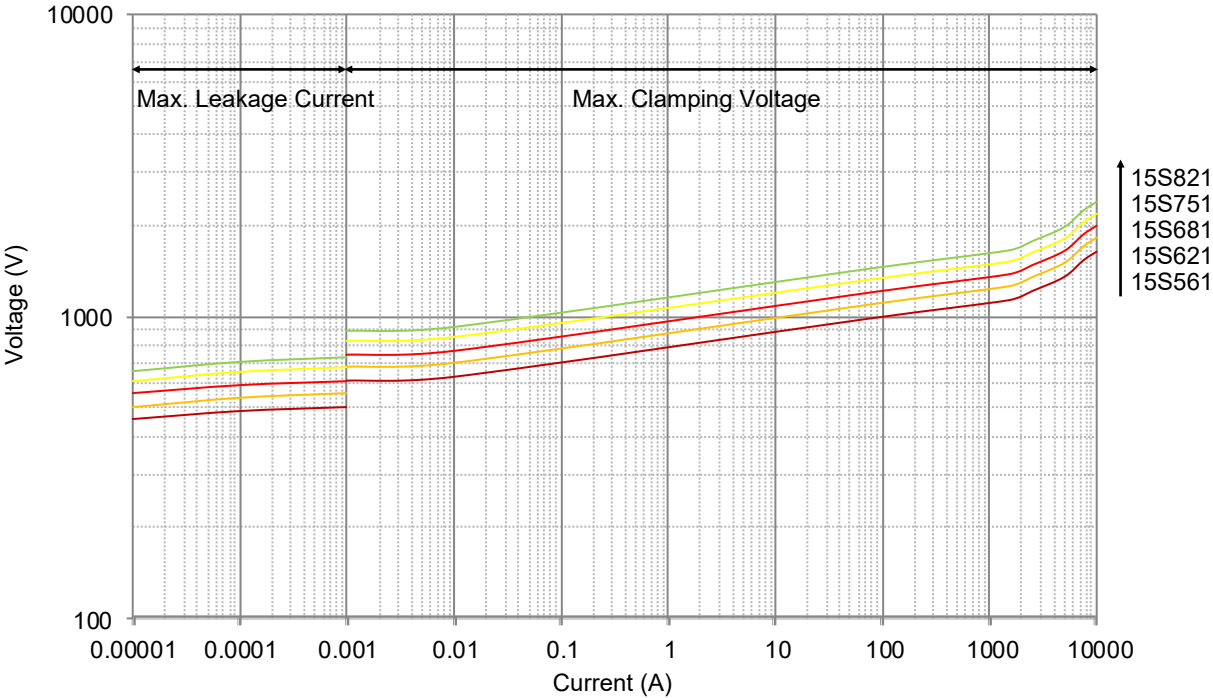
Max. Peak Current Derating Curve



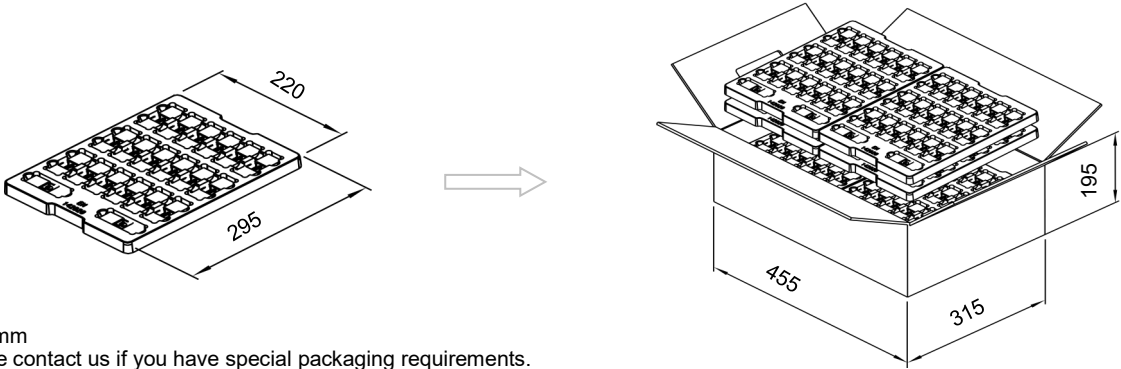
Note: 1, 2, 10, 10², 10³, 10⁴, 10⁵, 10⁶ Stand for number of repetitions.

Voltage-Current Characteristic Curves





Packaging Information



Item	Nominal Varistor Voltage	Tray	Carton
Dimensions (mm)	N/A	295 × 220	455 × 315 × 195
Quantity (PCS)	270 - 621	60	1200
	681 - 821	60	960