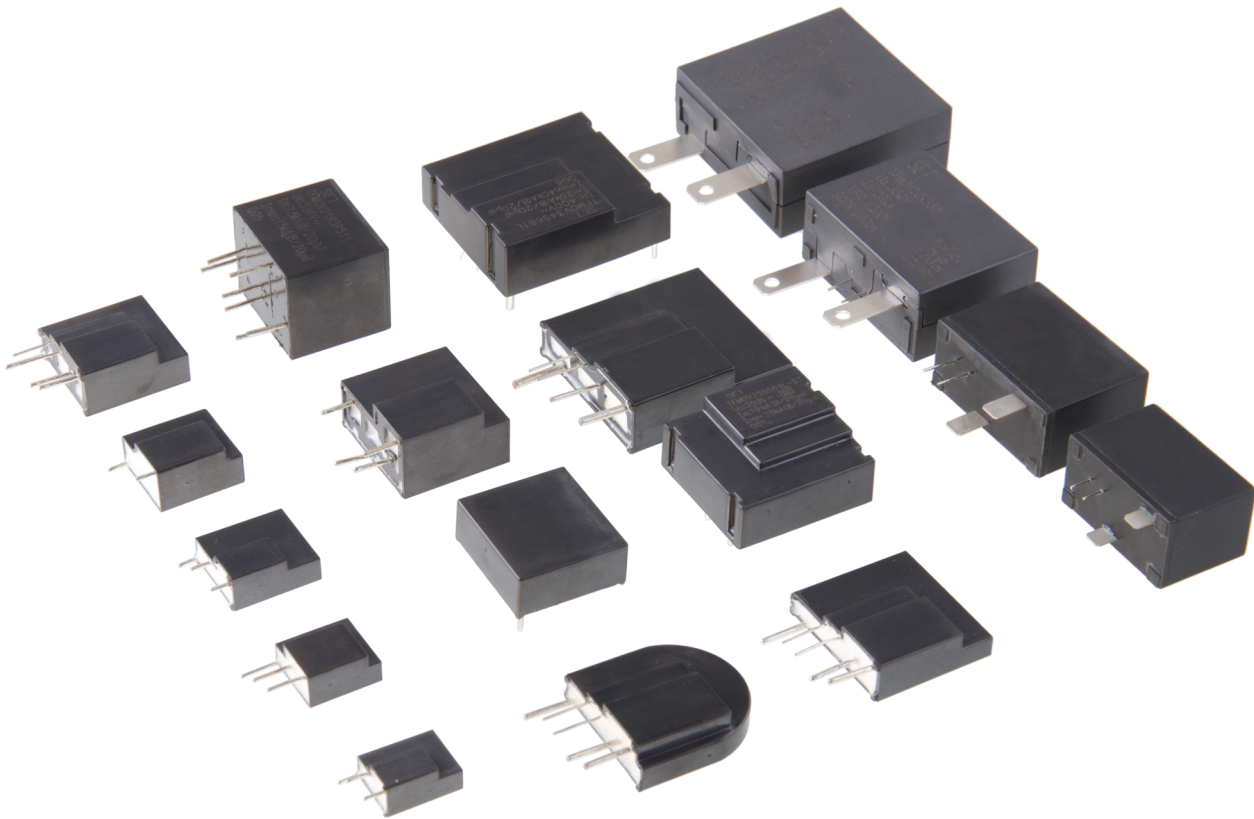


# TFMOV

Thermal Fuse & MOV



TFMOV

TFMOV

## 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)	AC	DC	Model										Maximum Continuous Operating Voltage $U_n$ (V)					
			1	1.5	2.5	3	4	5	7.5	10	15	20	AC	DC				
690V																	750	1000
600V																	680	895
480V																	625	825
400V									TFMOV10S821			TFMOV15S821					510	670
347V									TFMOV10S751			TFMOV15S751					460	615
254									TFMOV10S681			TFMOV15S681					420	560
220		277V							TFMOV10S621			TFMOV15S621					385	505
230V									TFMOV10S561			TFMOV15S561					350	460
300V									TFMOV10S511			TFMOV15S511					320	415
300V									TFMOV10S471			TFMOV15S471					300	385
300V									TFMOV10S431			TFMOV15S431					275	350
220V									TFMOV10S391			TFMOV15S391					250	320
130V									TFMOV10S361			TFMOV15S361					230	300
110V									TFMOV10S331			TFMOV15S331					210	275
110V									TFMOV10S301			TFMOV15S301					190	250
110V									TFMOV10S271			TFMOV15S271					175	225
110V									TFMOV10S241			TFMOV15S241					150	200
110V									TFMOV10S221			TFMOV15S221					140	180
110V									TFMOV10S201			TFMOV15S201					130	170
110V									TFMOV10S181		TFMOV20S181Lx	TFMOV15S181	TFMOV20S181				115	150
60V									TFMOV10S151		TFMOV20S151Lx	TFMOV15S151	TFMOV20S151				95	125
48V		60V							TFMOV10S121	TFMOV15S121	TFMOV20S560Lx						75	100
48V									TFMOV10S101	TFMOV15S101	TFMOV20S470Lx						60	85
48V		48V							TFMOV10S820	TFMOV15S820							50	65
48V												TFMOV20S820Lx					50	65
24V									TFMOV10S680	TFMOV15S680	TFMOV20S680x						40	56
24V		24V							TFMOV10S560	TFMOV15S560	TFMOV20S560x						35	45
24V									TFMOV10S470	TFMOV15S470	TFMOV20S470x						30	38
24V									TFMOV10S390	TFMOV15S390							25	31
12V		12V							TFMOV10S330	TFMOV15S330							20	26
12V									TFMOV10S270	TFMOV15S270							17	22

Nominal Discharge Current  $I_n$  (kA)

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

Rated Voltage $U_n$ (V)	AC	DC	Model										Maximum Continuous Operating Voltage $U_n$ (V)	
			7.5	8	10	10	10	10	10	15	15	AC	DC	
690V	600V		TFMOV20S122x	○	○	○	TFMOV25D122x	TFMOV25S122x	○	○	○	○	750	1000
			TFMOV20S112x	○	○	○	TFMOV25D112x	TFMOV25S112x	○	○	○	○	680	895
480V	400V		TFMOV20S102x	○	○	○	TFMOV25D102x	TFMOV25S102x	○	○	○	○	625	825
			TFMOV20S911x	○	○	○	TFMOV25D911x	TFMOV25S911x	○	○	○	○	550	745
347V	300V		TFMOV20S821x	○	○	○	TFMOV25D821x	TFMOV25S821x	○	○	○	○	510	670
			TFMOV20S751x	○	○	○	TFMOV25D751x	TFMOV25S751x	○	○	○	○	460	615
220 - 230V	254 - 277V		TFMOV20S681x	TFMOV20S681Lx	○	○	TFMOV25D681x	TFMOV25S681x	TFMOV25S681Lx	○	○	○	420	560
			TFMOV20S621x	TFMOV20S621Lx	○	○	TFMOV25D621x	TFMOV25S621x	TFMOV25S621Lx	○	○	○	385	505
220 - 230V	300V		TFMOV20S561x	TFMOV20S561Lx	○	○	TFMOV25D561x	TFMOV25S561x	TFMOV25S561Lx	○	○	○	350	460
			TFMOV20S511x	TFMOV20S511Lx	○	○	TFMOV25D511x	TFMOV25S511x	TFMOV25S511Lx	○	○	○	320	415
110V	110V		TFMOV20S471x	TFMOV20S471Lx	○	○	TFMOV25D471x	TFMOV25S471x	TFMOV25S471Lx	○	○	○	300	385
			TFMOV20S431x	TFMOV20S431Lx	○	○	TFMOV25D431x	TFMOV25S431x	TFMOV25S431Lx	○	○	○	275	350
110V	220V		TFMOV20S391x	TFMOV20S391Lx	○	○	TFMOV25D391x	TFMOV25S391x	TFMOV25S391Lx	○	○	○	250	320
			TFMOV20S361x	TFMOV20S361Lx	○	○	TFMOV25D361x	TFMOV25S361x	TFMOV25S361Lx	○	○	○	230	300
110V	130V		TFMOV20S331x	TFMOV20S331Lx	○	○	TFMOV25D331x	TFMOV25S331x	TFMOV25S331Lx	○	○	○	210	275
			TFMOV20S301x	TFMOV20S301Lx	○	○	TFMOV25D301x	TFMOV25S301x	TFMOV25S301Lx	○	○	○	190	250
110V	110V		TFMOV20S271x	TFMOV20S271Lx	○	○	TFMOV25D271x	TFMOV25S271x	TFMOV25S271Lx	○	○	○	175	225
			TFMOV20S241x	TFMOV20S241Lx	○	○	TFMOV25D241x	TFMOV25S241x	TFMOV25S241Lx	○	○	○	150	200
48V	60V		TFMOV20S221x	TFMOV20S221Lx	○	○	TFMOV25D221x	TFMOV25S221x	TFMOV25S221Lx	○	○	○	140	180
			TFMOV20S201x	TFMOV20S201Lx	○	○	TFMOV25D201x	TFMOV25S201x	TFMOV25S201Lx	○	○	○	130	170
48V	60V		○	○	TFMOV25S181x	TFMOV25S181Lx	○	○	○	○	TFMOV20K181x	115	150	
			○	○	TFMOV25S151x	TFMOV25S151Lx	○	○	○	○	TFMOV20K151x	95	125	
48V	48V		○	○	TFMOV25S121x	TFMOV25S121Lx	○	○	○	○	TFMOV34S121x	75	100	
			○	○	TFMOV25S101x	TFMOV25S101Lx	○	○	○	○	TFMOV34S101x	60	85	
24V	24V		○	○	TFMOV25S820x	TFMOV25S820Lx	○	○	○	○	TFMOV34S560Lx	50	65	
			○	○	○	○	TFMOV34S680x	○	○	○	TFMOV34S470Lx	40	56	
12V	12V		○	○	○	○	TFMOV34S560x	○	○	○	○	35	45	
			○	○	○	○	TFMOV34S470x	○	○	○	○	30	38	
			○	○	○	○	○	○	○	○	25	31		
			○	○	○	○	○	○	○	○	20	26		
			○	○	○	○	○	○	○	○	17	22		

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

Rated Voltage $U_n$ (V)	AC	DC	15	20 $I_{max} = 2.5I_n$		20	30	40	Maximum Continuous Operating Voltage $U_n$ (V)			
				AC	DC				750	1000		
690V	600V		○	TFMOV20K122x	○	TFMOV34S122x	○	○	TFMOV40K122x	○	750	1000
			○	TFMOV20K112x	○	TFMOV34S112x	○	○	TFMOV40K112x	○	680	895
480V	400V		○	TFMOV20K102x	○	TFMOV34S102x	○	○	TFMOV40K102x	○	625	825
			○	TFMOV20K911x	TFMOV20K550x	TFMOV34S911x	○	○	TFMOV40K911x	TFMOV40K550x	550	745
347V	300V		○	TFMOV20K821x	○	TFMOV34S821x	○	○	TFMOV40K821x	○	510	670
			○	TFMOV20K751x	TFMOV20K460x	TFMOV34S751x	○	○	TFMOV40K751x	TFMOV40K460x	460	615
220 - 230V	254		○	TFMOV20K681x	○	TFMOV34S681x	TFMOV34S681Lx	○	TFMOV40K681x	○	420	560
			○	TFMOV20K621x	○	TFMOV34S621x	TFMOV34S621Lx	○	TFMOV40K621x	○	385	505
220 - 230V	277V		○	TFMOV20K561x	TFMOV20K350x	TFMOV34S561x	TFMOV34S561Lx	○	TFMOV40K561x	TFMOV40K350x	350	460
			○	TFMOV20K511x	○	TFMOV34S511x	TFMOV34S511Lx	○	TFMOV40K511x	○	320	415
230V	300V		○	TFMOV20K471x	○	TFMOV34S471x	TFMOV34S471Lx	○	TFMOV40K471x	○	300	385
			○	TFMOV20K431x	TFMOV20K300x	TFMOV34S431x	TFMOV34S431Lx	○	TFMOV40K431x	TFMOV40K300x	275	350
120 - 130V	220V		○	TFMOV20K391x	○	TFMOV34S391x	TFMOV34S391Lx	○	TFMOV40K391x	○	250	320
			○	TFMOV20K361x	○	TFMOV34S361x	TFMOV34S361Lx	○	TFMOV40K361x	○	230	300
110V	110V		○	TFMOV20K331x	○	TFMOV34S331x	TFMOV34S331Lx	○	TFMOV40K331x	○	210	275
			○	TFMOV20K301x	○	TFMOV34S301x	TFMOV34S301Lx	○	TFMOV40K301x	○	190	250
110V	110V		○	TFMOV20K271x	○	TFMOV34S271x	TFMOV34S271Lx	○	TFMOV40K271x	○	175	225
			○	TFMOV20K241x	TFMOV20K150x	TFMOV34S241x	TFMOV34S241Lx	○	TFMOV40K241x	TFMOV40K150x	150	200
48V	60V		○	TFMOV20K221x	○	TFMOV34S221x	TFMOV34S221Lx	○	TFMOV40K221x	○	140	180
			○	TFMOV20K201x	○	TFMOV34S201x	TFMOV34S201Lx	○	TFMOV40K201x	○	130	170
48V	60V		○	○	○	TFMOV34S181x	TFMOV34S181Lx	○	TFMOV40K181x	○	115	150
			○	○	○	TFMOV34S151x	TFMOV34S151Lx	○	○	○	95	125
48V	48V		TFMOV34S121Lx	○	○	○	○	○	○	○	75	100
			TFMOV34S101Lx	○	○	○	○	TFMOV40K121x	○	○	60	85
24V	36V		TFMOV34S820Lx	○	○	○	○	TFMOV40K101x	○	○	50	65
			○	○	○	○	○	TFMOV40K820x	○	○	40	56
24V	24V		○	○	○	○	○	○	○	○	35	45
			○	○	○	○	○	○	○	○	30	38
12V	12V		○	○	○	○	○	○	○	○	25	31
			○	○	○	○	○	○	○	○	20	26
12V	12V		○	○	○	○	○	○	○	○	17	22
			○	○	○	○	○	○	○	○	17	22

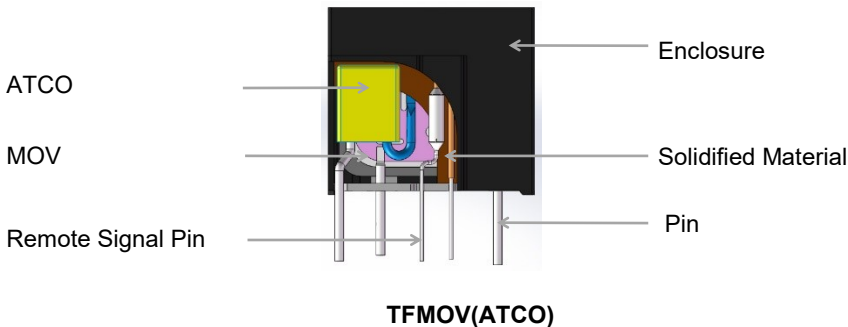
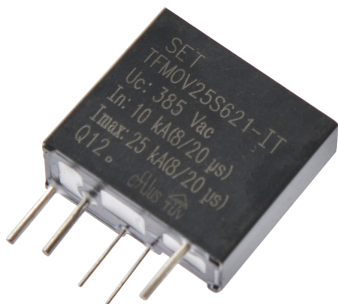
**Thermal Fuse & MOV (TFMOV) Feature & Model List Overview**

Rated Voltage $U_n$ (V)	AC	DC	Nominal Discharge Current $I_n$ (kA)						Maximum Continuous Operating Voltage $U_n$ (V)		Model		
			2.5x2	5x2	7.5x2	2.5x3	5x3	7.5x3	AC	DC			
690V		600V									750	1000	
											680	895	
480V											625	825	
		400V									550	745	
347V											510	670	
											460	615	
		254									420	560	
220		277V									385	505	
											350	460	
230V		300V			TFMOV21R2P511					TFMOV21R3P511	320	415	
					TFMOV21R2P471					TFMOV21R3P471	300	385	
					TFMOV21R2P431					TFMOV21R3P431	275	350	
					TFMOV21R2P391					TFMOV21R3P391	250	320	
		120			TFMOV21R2P361					TFMOV21R3P361	230	300	
		130V			TFMOV21R2P331					TFMOV21R3P331	210	275	
					TFMOV21R2P301					TFMOV21R3P301	190	250	
					TFMOV21R2P271					TFMOV21R3P271	175	225	
		110V			TFMOV21R2P241					TFMOV21R3P241	150	200	
110V					TFMOV21R2P221					TFMOV21R3P221	140	180	
					TFMOV21R2P201					TFMOV21R3P201	130	170	
					TFMOV21R2P181					TFMOV21R3P181	115	150	
		60V			TFMOV21R2P151					TFMOV21R3P151	95	125	
48V					TFMOV21R2P121					TFMOV21R3P121	75	100	
		48V			TFMOV21R2P101					TFMOV21R3P101	60	85	
		36V			TFMOV21R2P820					TFMOV21R3P820	50	65	
					TFMOV21R2P680					TFMOV21R3P680	40	56	
24V		24V			TFMOV21R2P560					TFMOV21R3P560	35	45	
					TFMOV21R2P470					TFMOV21R3P470	30	38	
											25	31	
12V		12V									20	26	
											17	22	

# TFMOV

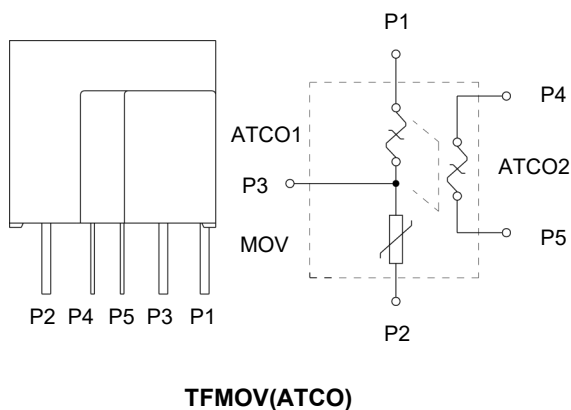
Thermal Fuse & MOV

## Description



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



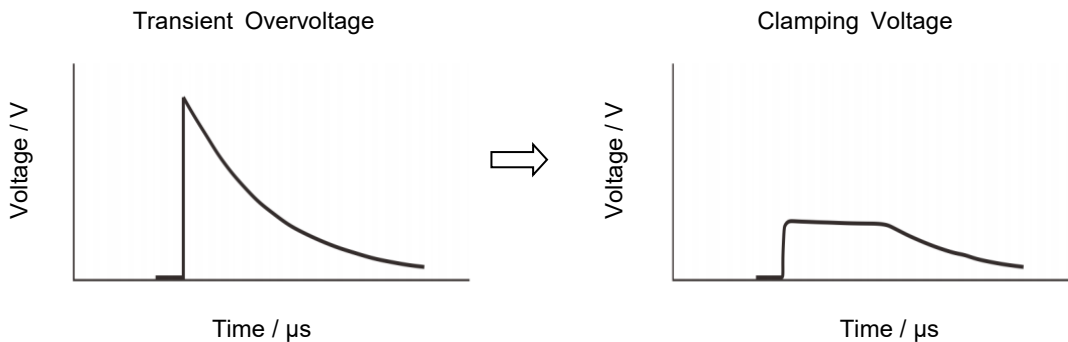
TFMOV

TFMOV

# 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.

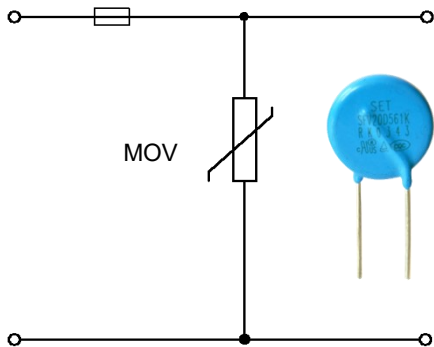


Figure a Typical surge protection circuit

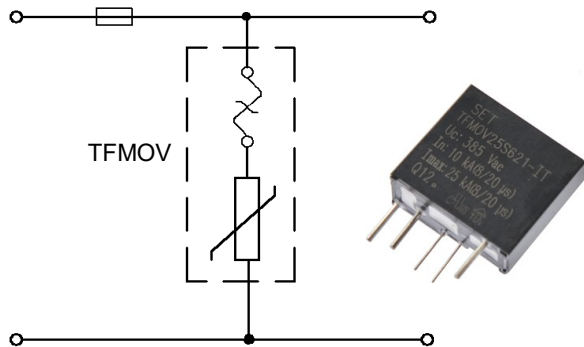


Figure b: High reliability surge protection circuit

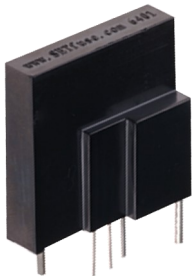
TFMOV

TFMOV

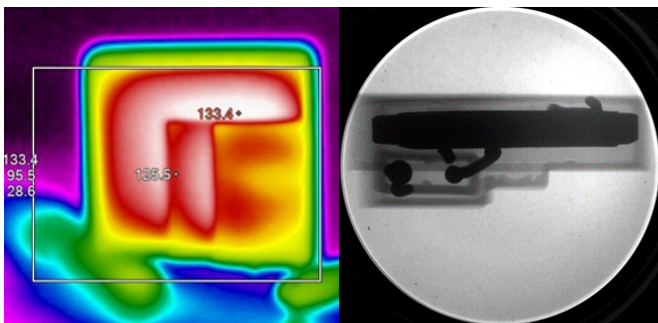
# TFMOV

Thermal Fuse & MOV

## Benefits



**Safety**

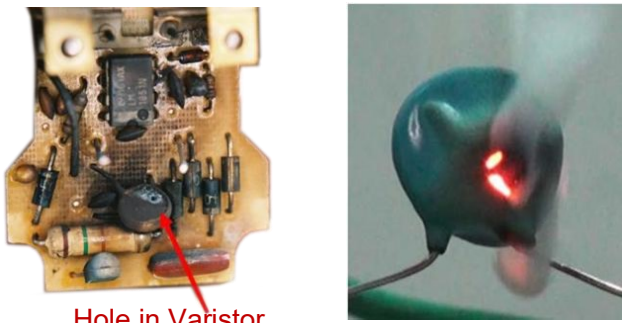


### TFMOV Failure Simulation

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**



### 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

TFMOV



# TFMOV

Thermal Fuse & MOV

## Part Numbering System

TFMOV 20 K 621 L -IT - 3 - 001

**Product Category**

**Nominal Discharge Current (8/20 μs)**  
20 kA

**MOV Shape**

- S: Square
- D: Round
- R: Rectangle
- K: 2 Pcs MOV Kilo

**Nominal Varistor Voltage**

820	621	102
$82 \times 10^0$ =82 V	$62 \times 10^1$ =620 V	$10 \times 10^2$ =1000 V

**Other Options**

**Pin No**

- 2: Without Remote Signal Contact or Failure Indication
- 3: With Failure Indication
- 4: With Remote Signal Contact
- 5: With Remote Signal Contact and Failure Indication

**Remote Signal**

- Default: Without Remote Signal Contact
- IT: With Remote Signal Contact

**Installation mode**

- Default: Vertical type
- L: Horizontal type (Low height)

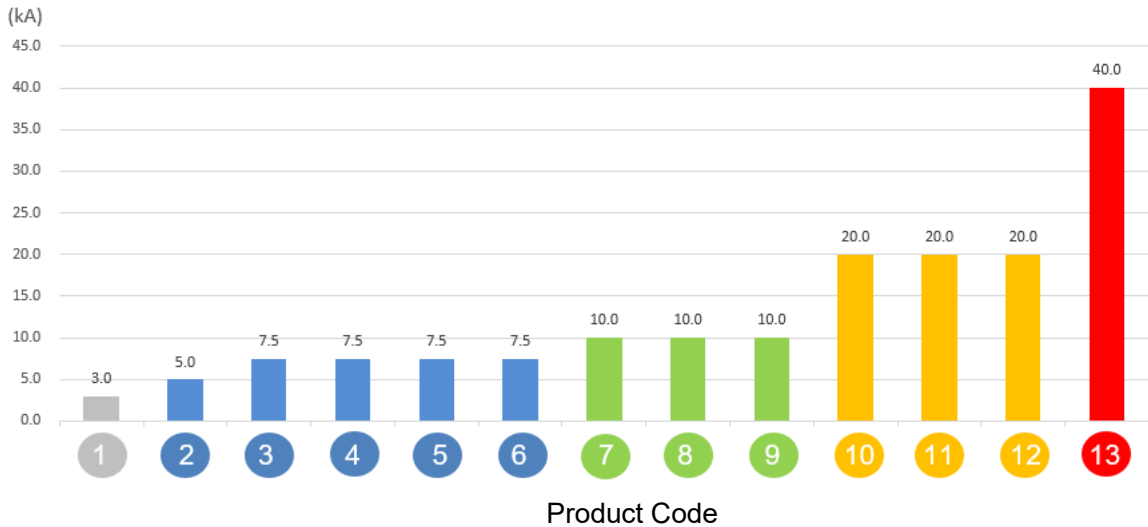
TFMOV

TFMOV

# 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

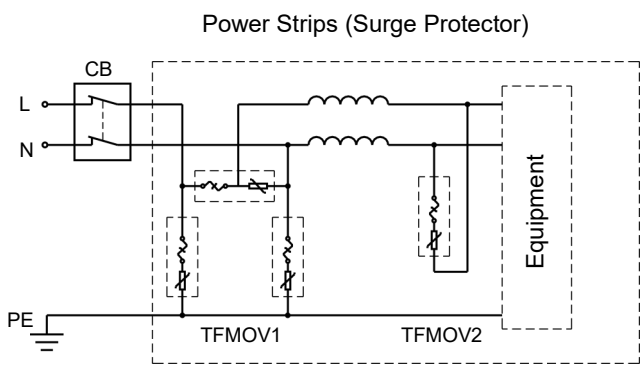
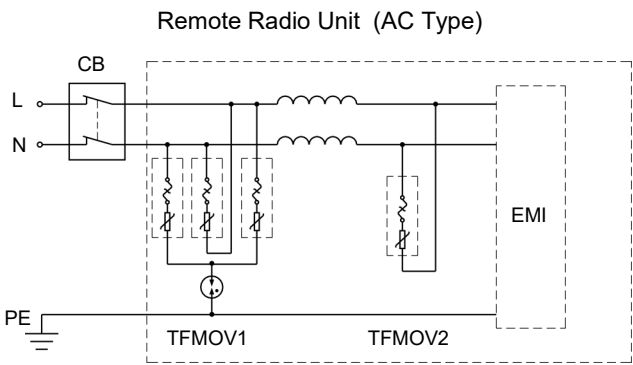
---

- 10 TFMOV34S Series      11 TFMOV34SxxxL Series      12 TFMOV20K Series

---

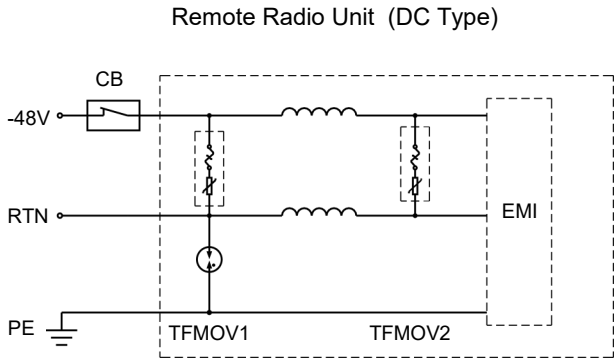
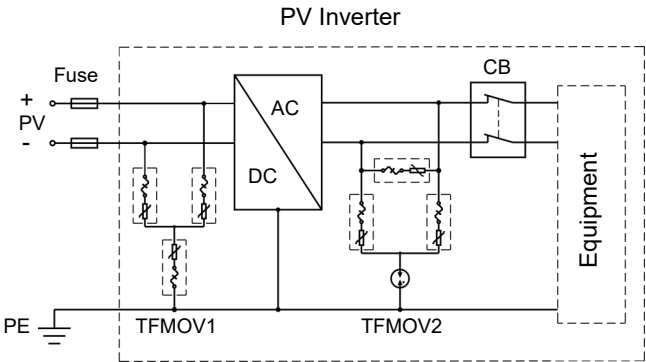
- 13 TFMOV40K Series

## 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

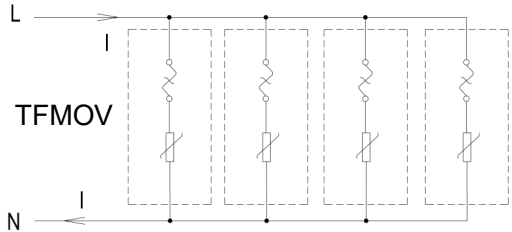


Figure .1

The Design Recommended

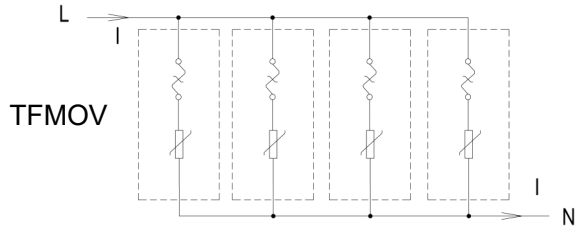


Figure .2





TFMOV

TFMOV

# 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	See the different models for details	N/A
	CQC	GB 4943.1-2011, GB 8898-2011; GB/T 10193-1997, GB/T 10194-1997	See the different models for details	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
$V_N$	<b>Nominal Varistor Voltage</b> Voltage, at specified d.c. current used as a reference point in the component characteristic.
8/20 $\mu$ s	<b>8/20 Current Impulse</b> Current impulse with a nominal virtual front time of 8 $\mu$ s and a nominal time to half-value of 20 $\mu$ s. — (IEC 61643-11)
1.2/50 $\mu$ s	<b>1.2/50 Voltage Impulse</b> Voltage impulse with a nominal virtual front time of 1.2 $\mu$ s and a nominal time to half-value of 50 $\mu$ s. — (IEC 61643-11)
$U_c$	<b>Maximum Continuous Operating Voltage</b> Maximum r.m.s. voltage, which may be continuously applied to the SPD's mode of protection. — (IEC 61643-11)
$I_n$	<b>Nominal Discharge Current</b> Crest value of the current through the SPD having a current waveshape of 8/20 $\mu$ s. — (IEC 61643-11)
$I_{imp}$	<b>Impulse Discharge Current for Class I Test</b> 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)
$I_{max}$	<b>Maximum Discharge Current</b> Crest value of a current through the SPD having an 8/20 $\mu$ s waveshape and magnitude according to the manufacturers specification. $I_{max}$ is equal to or greater than $I_n$ . — (IEC 61643-11)
$V_c$	<b>Clamping Voltage</b> Peak voltage developed across the varistor terminations under standard atmospheric conditions, when passing an 8/20 $\mu$ s class current pulse.
$C_v$	<b>Capacitance</b> Capacitance across the MOV measured at a specified frequency and voltage.
<b>Modes of protection</b>	<b>Modes of protection</b> 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)
$U_p$	<b>Voltage Protection Level</b> 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)
<b>TCO</b>	<b>Thermal-Link</b> 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.
<b>ATCO</b>	<b>Alloy Thermal-Link</b> 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.

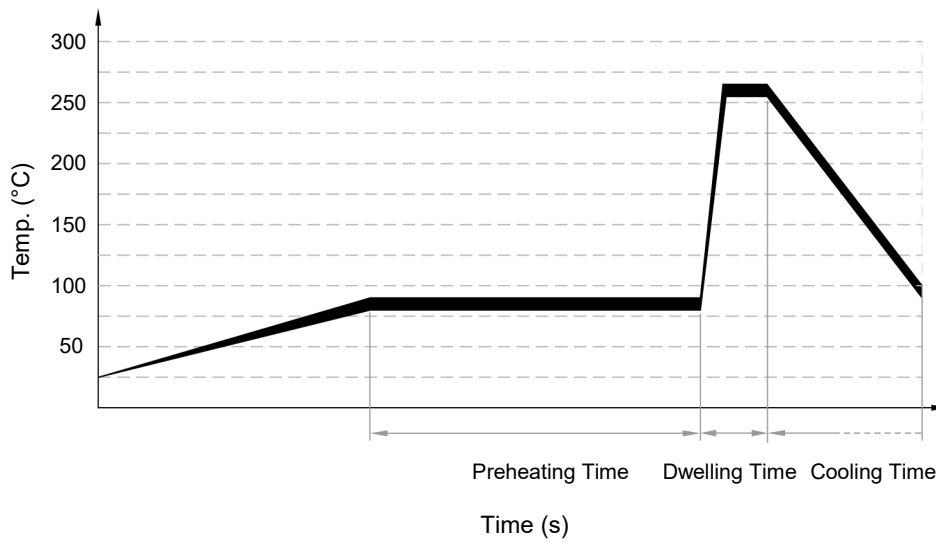
### Mechanical Stress

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

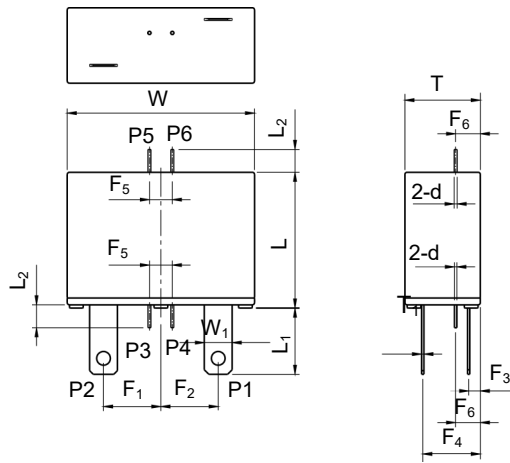
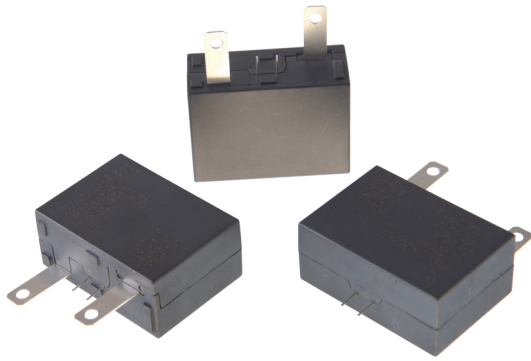
## Recommended Hand-Soldering Parameters

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

## TFMOV20K Series



Note:  
Pin P3 & P4 or P5 & P6 is optional.  
Unit: mm

Nominal Varistor Voltage	L (±1.0)	L <sub>1</sub> (±0.5)	L <sub>2</sub> (±1.0)	W (±1.0)	W <sub>1</sub> (±0.2)	T (±1.0)	T <sub>1</sub> (±0.2)
20K820-201	29.7	14.5	5.0	41.0	6.0	12.4	0.5
20K221-471	29.7	14.5	5.0	41.0	6.0	14.0	0.5
20K511-621	29.7	14.5	5.0	41.0	6.0	16.5	0.5
20K681-821	29.7	14.5	5.0	41.0	6.0	18.5	0.5
20K911-122	29.7	14.5	5.0	41.0	6.0	22.4	0.5
Nominal Varistor Voltage	d (±0.05)	F <sub>1</sub> (±0.3)	F <sub>2</sub> (±0.3)	F <sub>3</sub> (±0.5)	F <sub>4</sub> (±0.5)	F <sub>5</sub> (±0.5)	F <sub>6</sub> (±0.5)
20K820-201	0.50	12.5	12.5	2.3	10.2	5.0	5.5
20K221-471	0.50	12.5	12.5	2.3	11.0	5.0	5.5
20K511-621	0.50	12.5	12.5	2.3	12.2	5.0	5.5
20K681-821	0.50	12.5	12.5	2.3	13.5	5.0	5.5
20K911-122	0.50	12.5	12.5	2.3	20.0	5.0	5.5
Model	L (±1.0)	L <sub>1</sub> (±0.5)	L <sub>2</sub> (±1.0)	W (±1.0)	W <sub>1</sub> (±0.2)	T (±1.0)	T <sub>1</sub> (±0.2)
TFMOV20K150x	29.7	14.5	5.0	41.0	6.0	14.0	0.5
TFMOV20K300x	29.7	14.5	5.0	41.0	6.0	14.0	0.5
TFMOV20K350x	29.7	14.5	5.0	41.0	6.0	16.5	0.5
TFMOV20K460x	29.7	14.5	5.0	41.0	6.0	18.5	0.5
TFMOV20K550x	29.7	14.5	5.0	41.0	6.0	18.5	0.5
Model	d (±0.05)	F <sub>1</sub> (±0.3)	F <sub>2</sub> (±0.3)	F <sub>3</sub> (±0.5)	F <sub>4</sub> (±0.5)	F <sub>5</sub> (±0.5)	F <sub>6</sub> (±0.5)
TFMOV20K150x	0.50	12.5	12.5	2.3	11.0	5.0	5.5
TFMOV20K300x	0.50	12.5	12.5	2.3	11.0	5.0	5.5
TFMOV20K350x	0.50	12.5	12.5	2.3	12.2	5.0	5.5
TFMOV20K460x	0.50	12.5	12.5	2.3	13.5	5.0	5.5
TFMOV20K550x	0.50	12.5	12.5	2.3	13.5	5.0	5.5

TFMOV

TFMOV



**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 <sup>a</sup>		Max. Energy (Joule)	Typical Capacitance (Reference)	UL SPD Type
	U <sub>c</sub>		Min.	Max.	V <sub>C</sub>	I <sub>P</sub>	I <sub>n</sub>	I <sub>max</sub>	R <sub>cl</sub>	I <sub>n</sub>	10/1000 μs	@1 kHz	UL 1449
	(VAC)	(VDC)	(V)		(V)	(A)	(kA)			(kA)	(J)	(pF)	
TFMOV20K820x*	50	65	74	90	135	150	15	30	3.2	15	196	17600	Type 4CA
TFMOV20K101x*	60	85	90	110	165	150	15	30	3.2	15	244	14400	Type 4CA
TFMOV20K121x*	75	100	108	132	200	150	15	30	3.2	15	292	12000	Type 4CA
TFMOV20K151x*	95	125	135	165	250	150	15	30	3.2	15	370	8800	Type 4CA
TFMOV20K181x*	115	150	162	198	300	150	15	30	2.3	15	436	7300	Type 4CA
TFMOV20K201x*	130	170	185	225	340	150	20	50	2.3	20	504	6600	Type 4CA
TFMOV20K221x*	140	180	198	242	360	150	20	50	2.3	20	560	6000	Type 4CA
TFMOV20K241x*	150	200	216	264	395	150	20	50	2.3	20	604	5600	Type 4CA
TFMOV20K271x*	175	225	243	297	455	150	20	50	2.3	20	680	4900	Type 4CA
TFMOV20K301x*	190	250	270	330	500	150	20	50	2.3	20	750	4400	Type 4CA
TFMOV20K331x*	210	275	297	363	550	150	20	50	2.3	20	820	4100	Type 4CA
TFMOV20K361x*	230	300	324	396	595	150	20	50	2.3	20	930	3700	Type 4CA
TFMOV20K391x*	250	320	351	429	650	150	20	50	2.3	20	1040	3400	Type 4CA
TFMOV20K431x*	275	350	387	473	710	150	20	50	2.3	20	1150	3200	Type 4CA
TFMOV20K471x*	300	385	423	517	775	150	20	50	2.3	20	1260	2900	Type 4CA
TFMOV20K511x*	320	415	459	561	845	150	20	50	2.3	20	1330	2600	Type 4CA
TFMOV20K561x*	350	460	504	616	925	150	20	50	2.3	20	1440	2400	Type 4CA
TFMOV20K621x*	385	505	558	682	1025	150	20	50	2.3	20	1580	2200	Type 4CA
TFMOV20K681x*	420	560	612	748	1120	150	20	50	2.3	20	1580	2000	Type 4CA
TFMOV20K751x*	460	615	675	825	1240	150	20	50	2.3	20	1650	1800	Type 4CA
TFMOV20K821x*	510	670	738	902	1355	150	20	50	2.3	20	1680	1600	Type 4CA
TFMOV20K911x*	550	745	819	1001	1500	150	20	50	2.3	20	1800	1400	Type 4CA
TFMOV20K102x*	625	825	900	1100	1650	150	20	50	2.3	20	1900	1320	Type 4CA
TFMOV20K112x*	680	895	990	1210	1815	150	20	50	2.3	20	2080	1230	Type 4CA
TFMOV20K122x*	750	1000	1080	1320	1980	150	20	50	2.3	20	2340	1100	Type 4CA

Notes:

a:  $R_{cl} = \frac{V_c}{V_N}$ ,  $U_p \geq V_c$ ,  $V_c$ : 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.

\*: Optional direction of the Remote Signal, Default: with one downward Remote Signal P3 & P4, -IT: with one upward Remote Signal P5 & P6.

# TFMOV

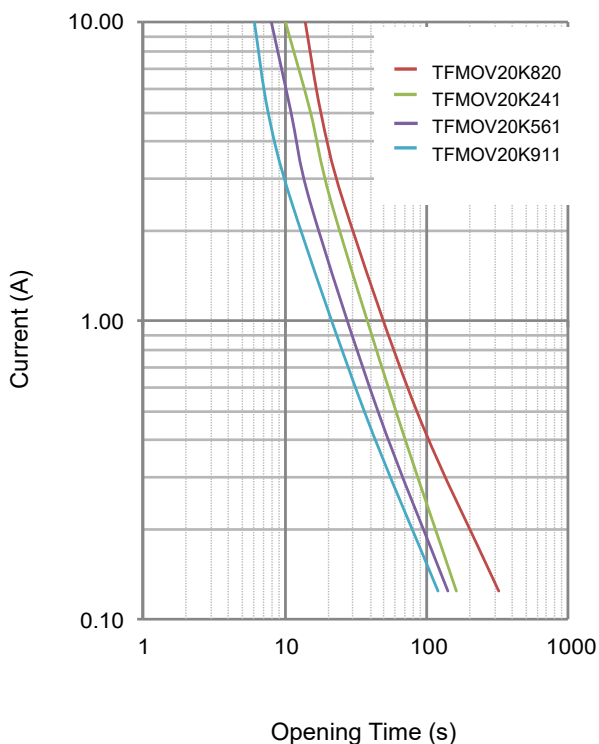
Thermal Fuse & MOV

## TFMOV20K Series

Model	Nominal System Voltage	Max. Continuous Operating Voltage	Nominal Discharge Current (8/20 μs)	Max. Discharge Current (8/20 μs)	Voltage Protection Rating	SCCR	UL SPD Type
	$U_n$	$U_C$	$I_n$	$I_{max}$	VPR (@6 kV/3 kA)		
	( VAC )	( VAC )	( kA )		( V )		
TFMOV20K150x	120	150	20	50	600	200	Type 1CA
TFMOV20K300x	220	300	20	50	900	200	Type 1CA
TFMOV20K350x	277	350	20	50	1200	200	Type 1CA
TFMOV20K460x	347	460	20	50	1500	200	Type 1CA
TFMOV20K550x	480	550	20	50	1500	200	Type 1CA

### Performance Curve for Reference

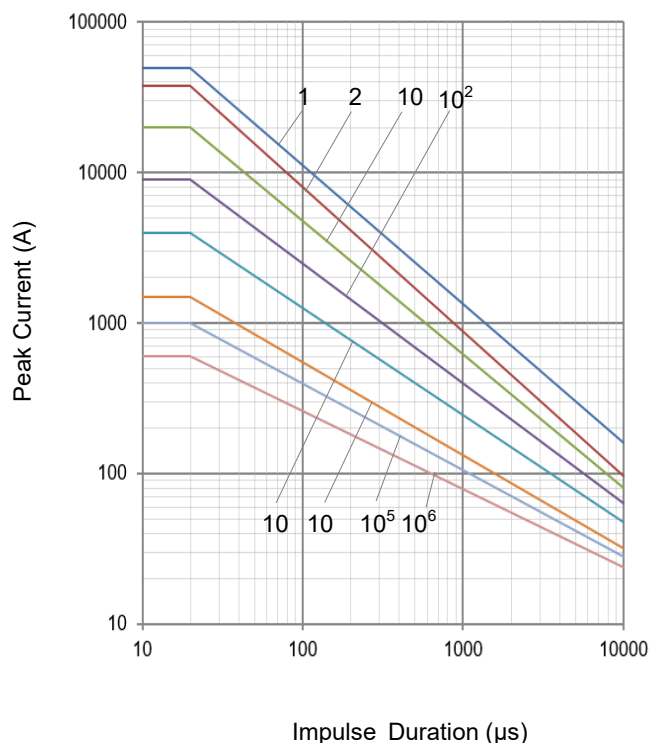
Limited Current Test Curve (UL 1449 4th clause 44.4)



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

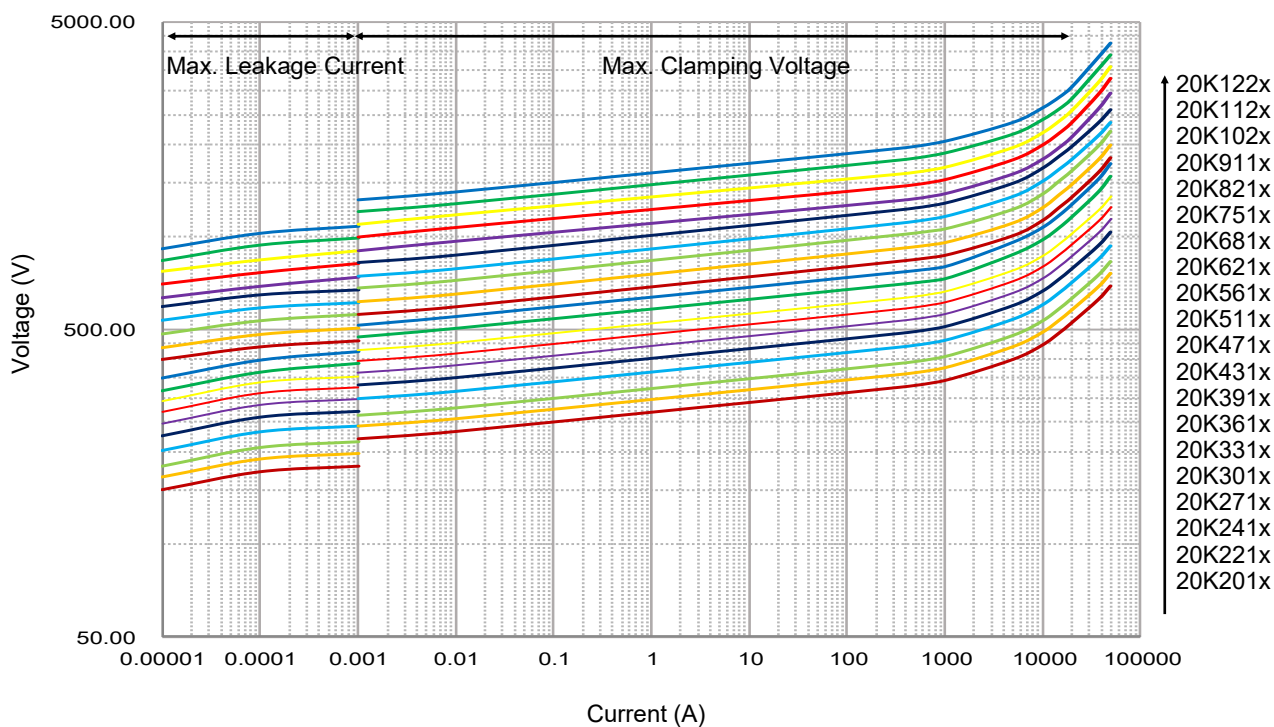
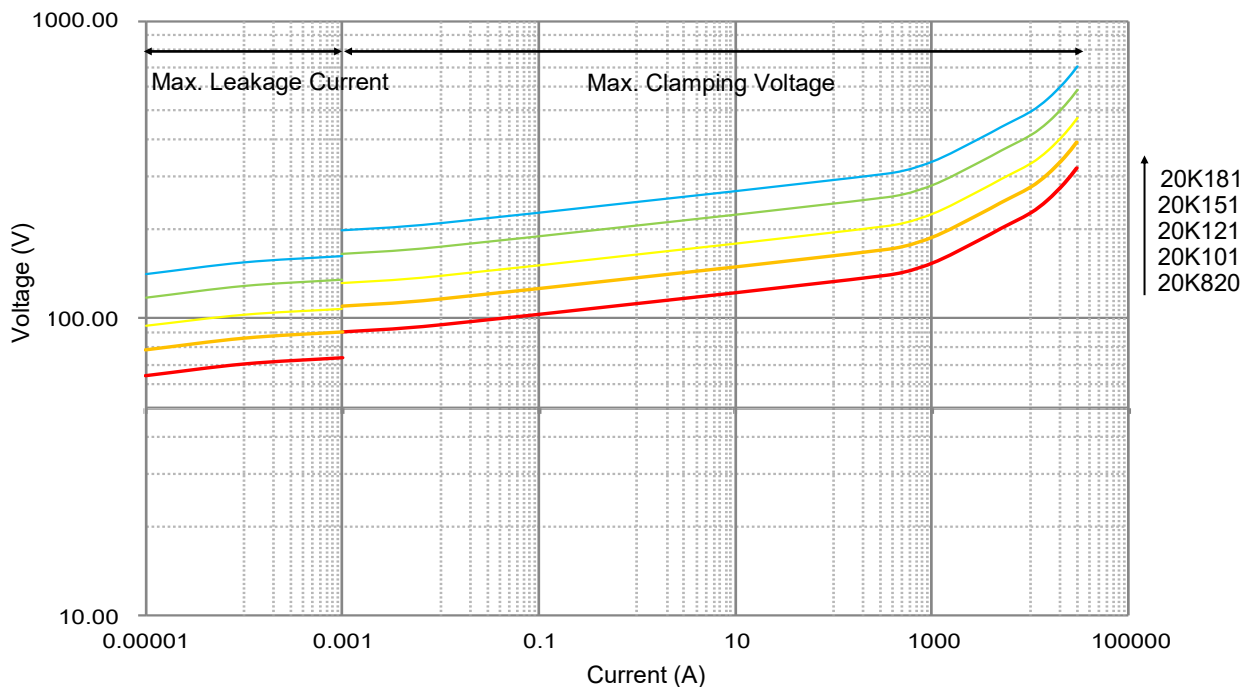
Max. Peak Current Derating Curve

TFMOV20K201x to TFMOV20K122x



Note:  
1, 2, 10, 10<sup>2</sup>, 10<sup>3</sup>, 10<sup>4</sup>, 10<sup>5</sup>, 10<sup>6</sup> Stand for number of repetitions.

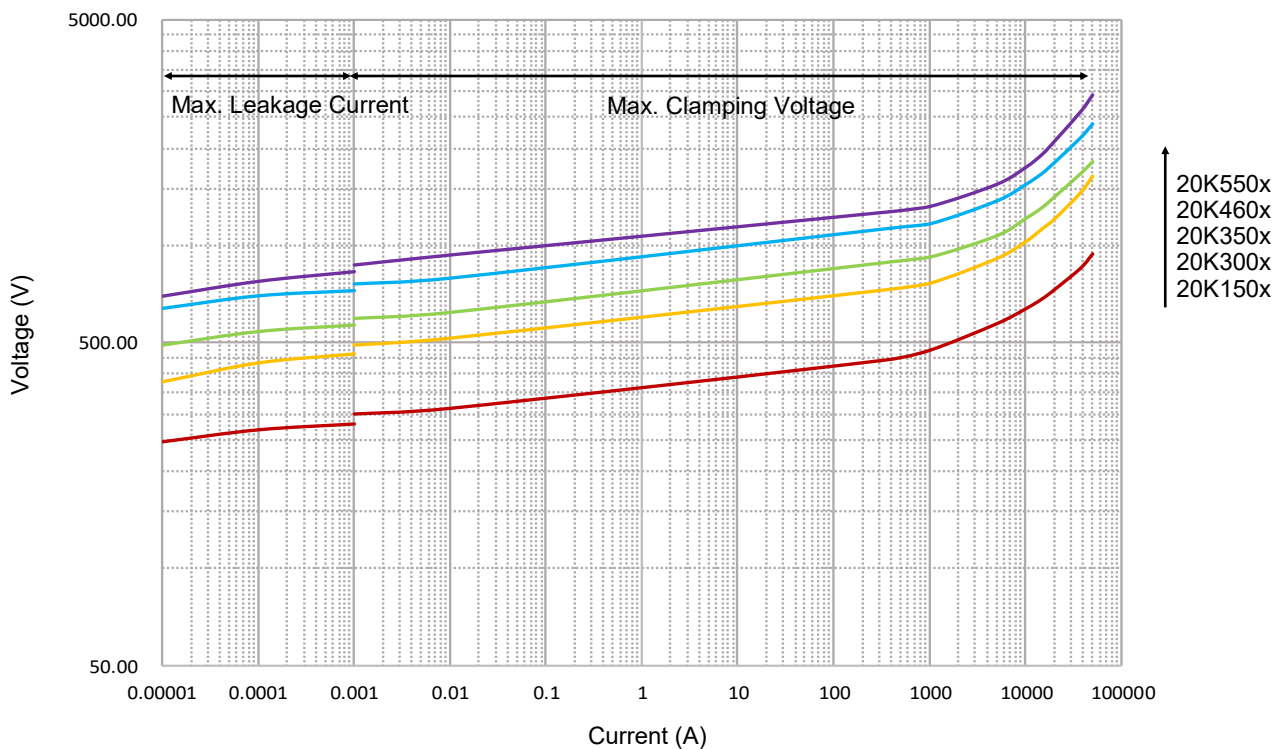
Voltage-Current Characteristic Curves



# TFMOV

Thermal Fuse & MOV

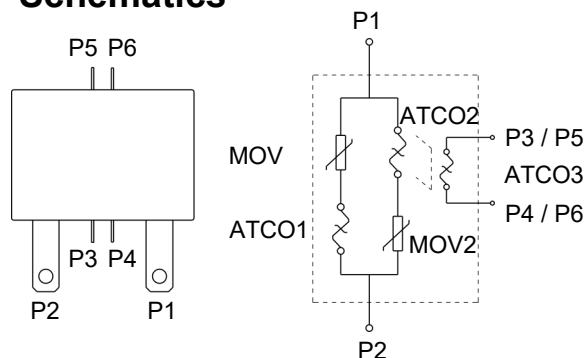
TFMOV20K Series



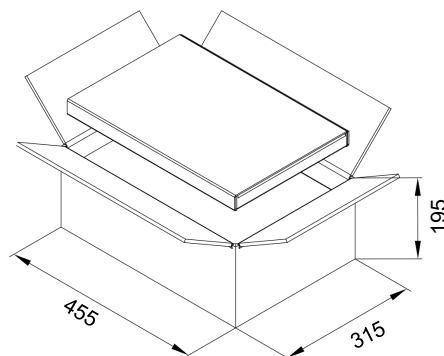
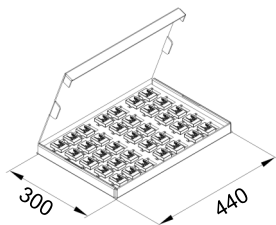
## Agency Approvals

Agency	Standards	No.
<b>UL</b> c <b>us</b>	UL1449	E322662
Environment	RoHS & REACH	Compliant

## Schematics



## Packaging Information



Unit: mm

Please contact us if you have special packaging requirements.

Item	Nominal Varistor Voltage	Box	Carton
Dimensions (mm)	N/A	440 × 300	455 × 315 × 195
Quantity (PCS)	820 - 201	60	240
	221 - 821	60	180
	911 - 122	30	120