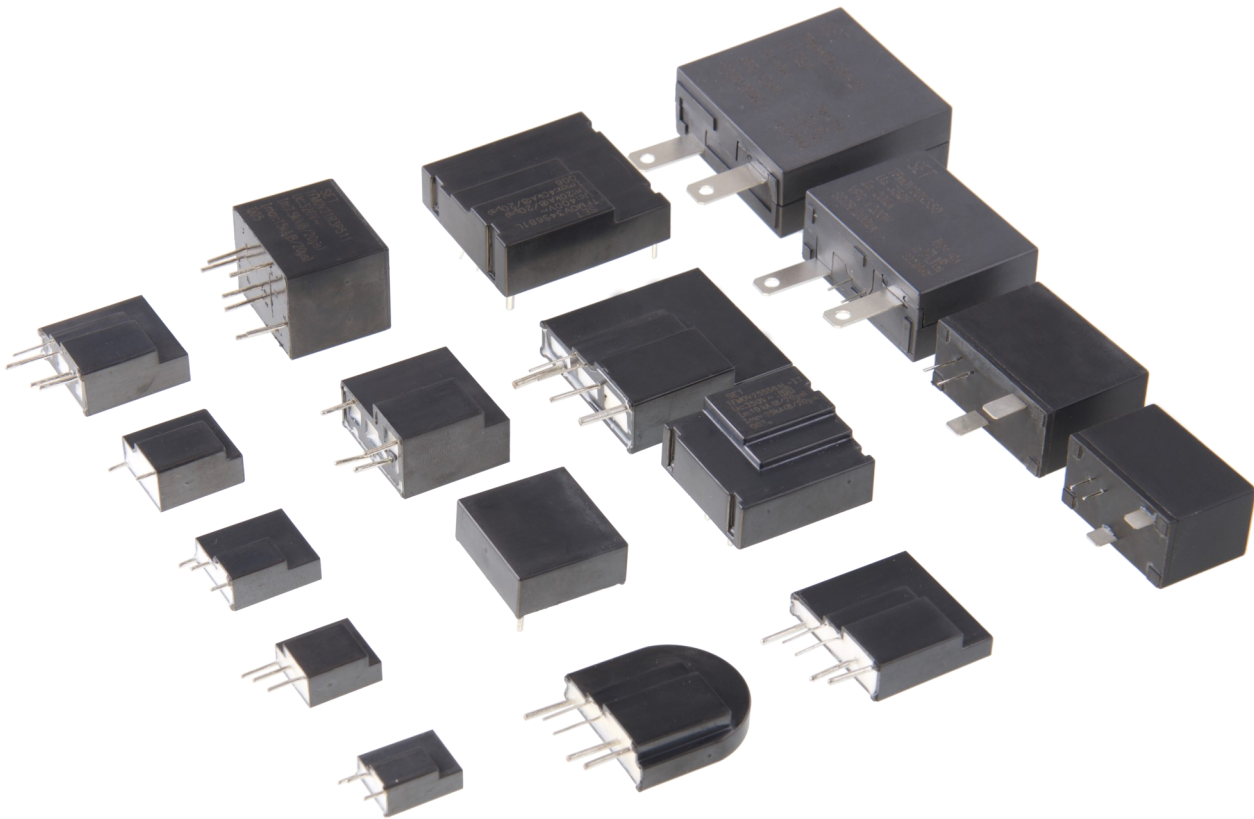


# TFMOV

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	Nominal Discharge Current $I_n$ (kA)										Maximum Continuous Operating Voltage $U_n$ (V)		Model				
			1	1.5	2.5	3	4	5	7.5	10	15	20	AC	DC					
690V	600V		○	○	○	○	○	○	○	○	○	○	○	○	○	○	750	1000	
			○	○	○	○	○	○	○	○	○	○	○	○	○	○	680	895	
480V	400V		○	○	○	○	○	○	○	○	○	○	○	○	○	○	625	825	
			○	○	○	○	○	○	○	○	○	○	○	○	○	○	550	745	
347V	254		○	○	○	○	○	○	○	○	○	○	○	○	○	○	510	670	TFMOV10S821
			○	○	○	○	○	○	○	○	○	○	○	○	○	○	460	615	
220	277V		○	○	○	○	○	○	○	○	○	○	○	○	○	○	420	560	TFMOV10S751
			○	○	○	○	○	○	○	○	○	○	○	○	○	○	385	505	
230V	300V		○	○	○	○	○	○	○	○	○	○	○	○	○	○	350	460	TFMOV10S681
			○	○	○	○	○	○	○	○	○	○	○	○	○	○	320	415	
120	130V		○	○	○	○	○	○	○	○	○	○	○	○	○	○	300	385	TFMOV10S621
			○	○	○	○	○	○	○	○	○	○	○	○	○	○	275	350	
110V	110V		○	○	○	○	○	○	○	○	○	○	○	○	○	○	250	320	TFMOV10S561
			○	○	○	○	○	○	○	○	○	○	○	○	○	○	230	300	
60V	60V		○	○	○	○	○	○	○	○	○	○	○	○	○	○	210	275	TFMOV10S511
			○	○	○	○	○	○	○	○	○	○	○	○	○	○	190	250	
48V	48V		○	○	○	○	○	○	○	○	○	○	○	○	○	○	175	225	TFMOV10S471
			○	○	○	○	○	○	○	○	○	○	○	○	○	○	150	200	
24V	24V		○	○	○	○	○	○	○	○	○	○	○	○	○	○	140	180	TFMOV10S431
			○	○	○	○	○	○	○	○	○	○	○	○	○	○	130	170	
12V	12V		○	○	○	○	○	○	○	○	○	○	○	○	○	○	115	150	TFMOV10S391
			○	○	○	○	○	○	○	○	○	○	○	○	○	○	95	125	
12V	12V		○	○	○	○	○	○	○	○	○	○	○	○	○	○	75	100	TFMOV10S361
			○	○	○	○	○	○	○	○	○	○	○	○	○	○	60	85	
12V	12V		○	○	○	○	○	○	○	○	○	○	○	○	○	○	50	65	TFMOV10S331
			○	○	○	○	○	○	○	○	○	○	○	○	○	○	40	56	
12V	12V		○	○	○	○	○	○	○	○	○	○	○	○	○	○	35	45	TFMOV10S301
			○	○	○	○	○	○	○	○	○	○	○	○	○	○	30	38	
12V	12V		○	○	○	○	○	○	○	○	○	○	○	○	○	○	25	31	TFMOV10S271
			○	○	○	○	○	○	○	○	○	○	○	○	○	○	20	26	
12V	12V		○	○	○	○	○	○	○	○	○	○	○	○	○	○	17	22	TFMOV10S241
			○	○	○	○	○	○	○	○	○	○	○	○	○	○			
12V	12V		○	○	○	○	○	○	○	○	○	○	○	○	○	○			TFMOV10S221
			○	○	○	○	○	○	○	○	○	○	○	○	○	○			
12V	12V		○	○	○	○	○	○	○	○	○	○	○	○	○	○			TFMOV10S201
			○	○	○	○	○	○	○	○	○	○	○	○	○	○			
12V	12V		○	○	○	○	○	○	○	○	○	○	○	○	○	○			TFMOV10S181
			○	○	○	○	○	○	○	○	○	○	○	○	○	○			
12V	12V		○	○	○	○	○	○	○	○	○	○	○	○	○	○			TFMOV10S151
			○	○	○	○	○	○	○	○	○	○	○	○	○	○			
12V	12V		○	○	○	○	○	○	○	○	○	○	○	○	○	○			TFMOV10S121
			○	○	○	○	○	○	○	○	○	○	○	○	○	○			
12V	12V		○	○	○	○	○	○	○	○	○	○	○	○	○	○			TFMOV10S101
			○	○	○	○	○	○	○	○	○	○	○	○	○	○			
12V	12V		○	○	○	○	○	○	○	○	○	○	○	○	○	○			TFMOV10S820
			○	○	○	○	○	○	○	○	○	○	○	○	○	○			
12V	12V		○	○	○	○	○	○	○	○	○	○	○	○	○	○			TFMOV10S680
			○	○	○	○	○	○	○	○	○	○	○	○	○	○			
12V	12V		○	○	○	○	○	○	○	○	○	○	○	○	○	○			TFMOV10S560
			○	○	○	○	○	○	○	○	○	○	○	○	○	○			
12V	12V		○	○	○	○	○	○	○	○	○	○	○	○	○	○			TFMOV10S470
			○	○	○	○	○	○	○	○	○	○	○	○	○	○			
12V	12V		○	○	○	○	○	○	○	○	○	○	○	○	○	○			TFMOV10S390
			○	○	○	○	○	○	○	○	○	○	○	○	○	○			
12V	12V		○	○	○	○	○	○	○	○	○	○	○	○	○	○			TFMOV10S330
			○	○	○	○	○	○	○	○	○	○	○	○	○	○			
12V	12V		○	○	○	○	○	○	○	○	○	○	○	○	○	○			TFMOV10S270
			○	○	○	○	○	○	○	○	○	○	○	○	○	○			

**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	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
110V	110V		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	○	○	○	TFMOV34S680Lx	TFMOV34S101x	60	85	
24V	24V		○	○	TFMOV25S820x	TFMOV25S820Lx	○	○	○	TFMOV34S560Lx	TFMOV34S820x	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**

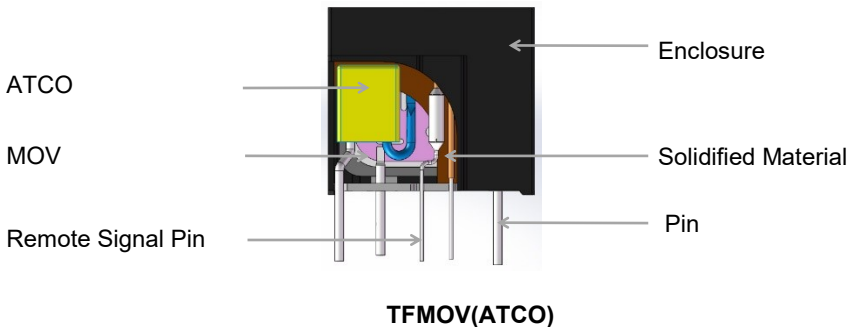
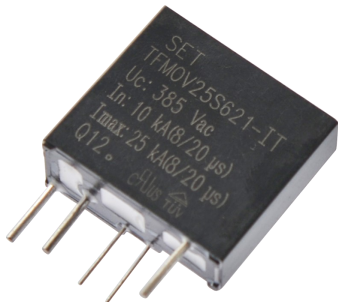
Rated Voltage $U_n$ (V)	AC	DC	15	20 $I_{max} = 2.5I_n$	20	30	40	750	1000	Model	Maximum Continuous Operating Voltage $U_n$ (V)				
												AC	DC		
690V	600V		○		○			○	○	TFMOV20K122x	TFMOV34S122x	TFMOV40K122x			
			○		○			○	○	TFMOV20K112x	TFMOV34S112x	TFMOV40K112x			
480V	400V		○		○			○	○	TFMOV20K102x	TFMOV34S102x	TFMOV40K102x			
			○		○			○	○	TFMOV20K911x	TFMOV20K550x	TFMOV34S911x	TFMOV40K911x	TFMOV40K550x	
347V	300V		○		○			○	○	TFMOV20K821x	TFMOV34S821x	TFMOV40K821x			
			○		○			○	○	TFMOV20K751x	TFMOV20K460x	TFMOV34S751x	TFMOV40K751x	TFMOV40K460x	
220 - 230V	254 - 277V		○		○			○	○	TFMOV20K681x	TFMOV34S681x	TFMOV34S681Lx	TFMOV40K681x		
			○		○			○	○	TFMOV20K621x	TFMOV34S621x	TFMOV34S621Lx	TFMOV40K621x		
220 - 230V	300V		○		○			○	○	TFMOV20K561x	TFMOV20K350x	TFMOV34S561x	TFMOV34S561Lx	TFMOV40K561x	TFMOV40K350x
			○		○			○	○	TFMOV20K511x		TFMOV34S511x	TFMOV34S511Lx	TFMOV40K511x	
110V	120 - 130V		○		○			○	○	TFMOV20K471x	TFMOV34S471x	TFMOV34S471Lx	TFMOV40K471x		
			○		○			○	○	TFMOV20K431x	TFMOV20K300x	TFMOV34S431x	TFMOV34S431Lx	TFMOV40K431x	TFMOV40K300x
110V	110V		○		○			○	○	TFMOV20K391x	TFMOV34S391x	TFMOV34S391Lx	TFMOV40K391x		
			○		○			○	○	TFMOV20K361x	TFMOV34S361x	TFMOV34S361Lx	TFMOV40K361x		
110V	110V		○		○			○	○	TFMOV20K331x	TFMOV34S331x	TFMOV34S331Lx	TFMOV40K331x		
			○		○			○	○	TFMOV20K301x	TFMOV34S301x	TFMOV34S301Lx	TFMOV40K301x		
110V	110V		○		○			○	○	TFMOV20K271x	TFMOV34S271x	TFMOV34S271Lx	TFMOV40K271x		
			○		○			○	○	TFMOV20K241x	TFMOV20K150x	TFMOV34S241x	TFMOV34S241Lx	TFMOV40K241x	TFMOV40K150x
110V	110V		○		○			○	○	TFMOV20K221x	TFMOV34S221x	TFMOV34S221Lx	TFMOV40K221x		
			○		○			○	○	TFMOV20K201x	TFMOV34S201x	TFMOV34S201Lx	TFMOV40K201x		
60V	60V		○		○			○	○	TFMOV34S181x	TFMOV34S181Lx	TFMOV40K181x			
			○		○			○	○	TFMOV34S151x	TFMOV34S151Lx				
48V	60V		○		○			○	○	TFMOV34S121Lx					
			○		○			○	○	TFMOV34S101Lx		TFMOV40K121x			
48V	48V		○		○			○	○	TFMOV34S820Lx		TFMOV40K101x			
			○		○			○	○			TFMOV40K820x			
24V	24V		○		○			○	○						
			○		○			○	○						
12V	12V		○		○			○	○						
			○		○			○	○						



# TFMOV

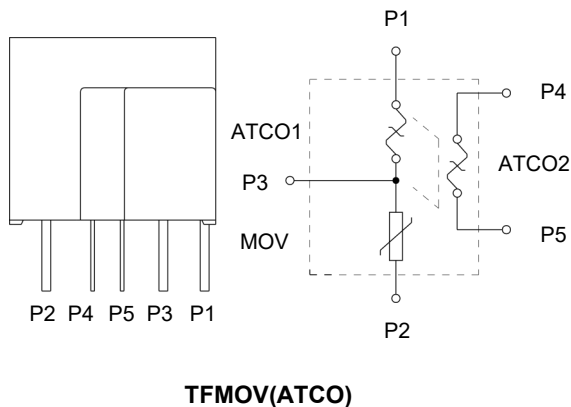
Thermal Fuse & MOV

## 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.

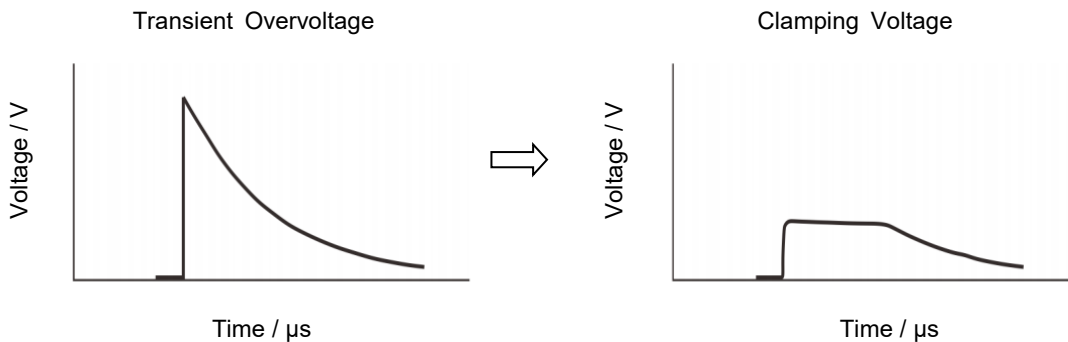
## Schematics



# TFMOV

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.

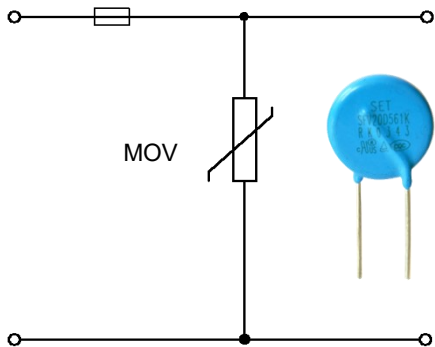


Figure a Typical surge protection circuit

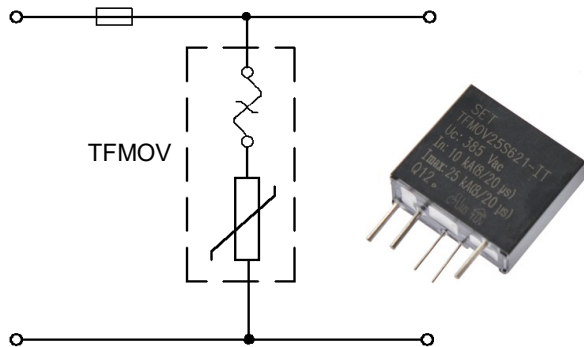


Figure b: High reliability surge protection circuit

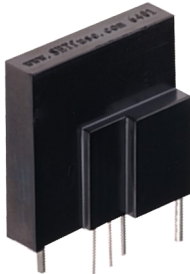
TFMOV

TFMOV

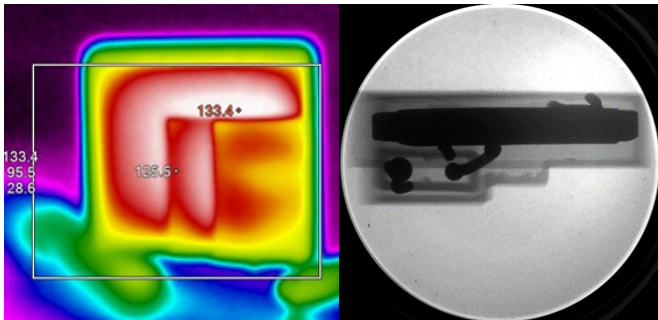
# TFMOV

Thermal Fuse & MOV

## Benefits



**Safety**

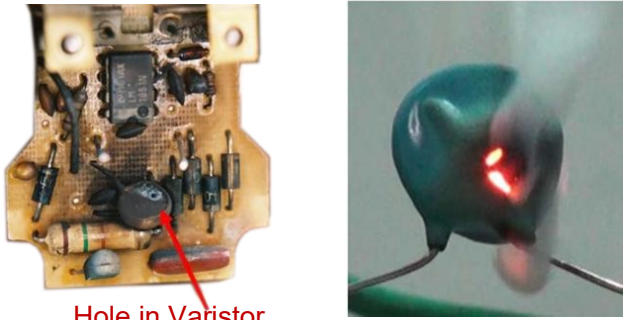


### TFMOV Failure Simulation

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

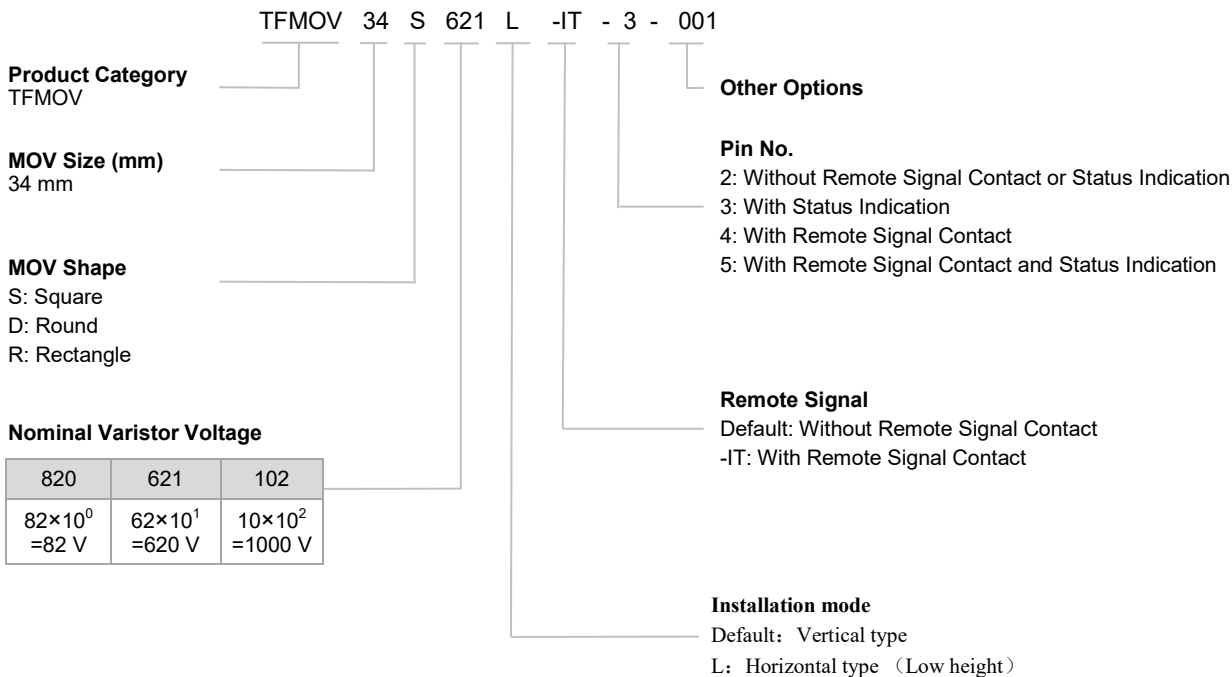
TFMOV



# TFMOV

Thermal Fuse & MOV

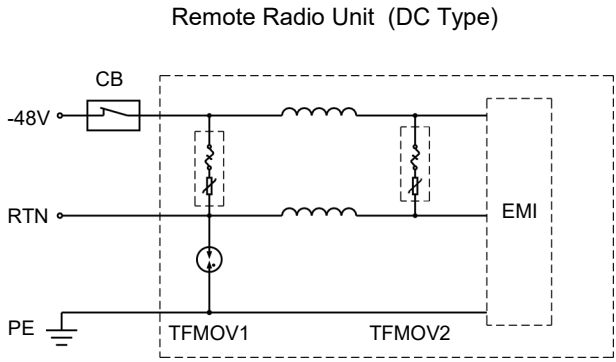
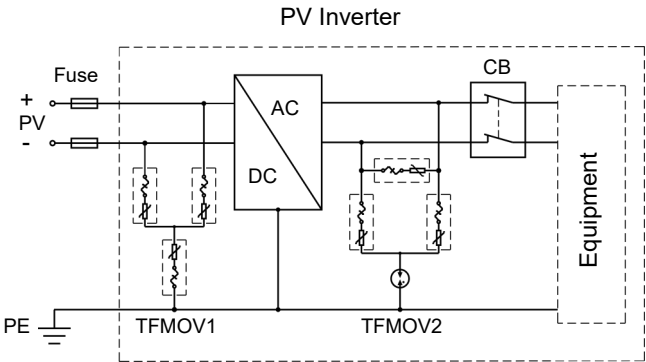
## Part Numbering System





# TFMOV

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

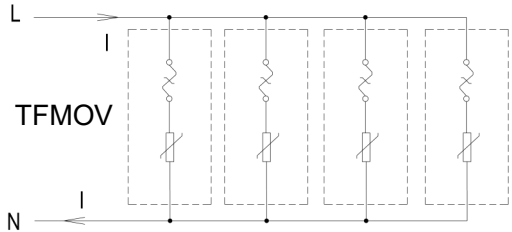


Figure .1

The Design Recommended

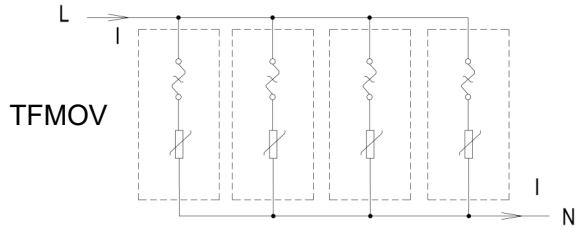


Figure .2





TFMOV

TFMOV

# TFMOV

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## 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

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## 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

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## 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.

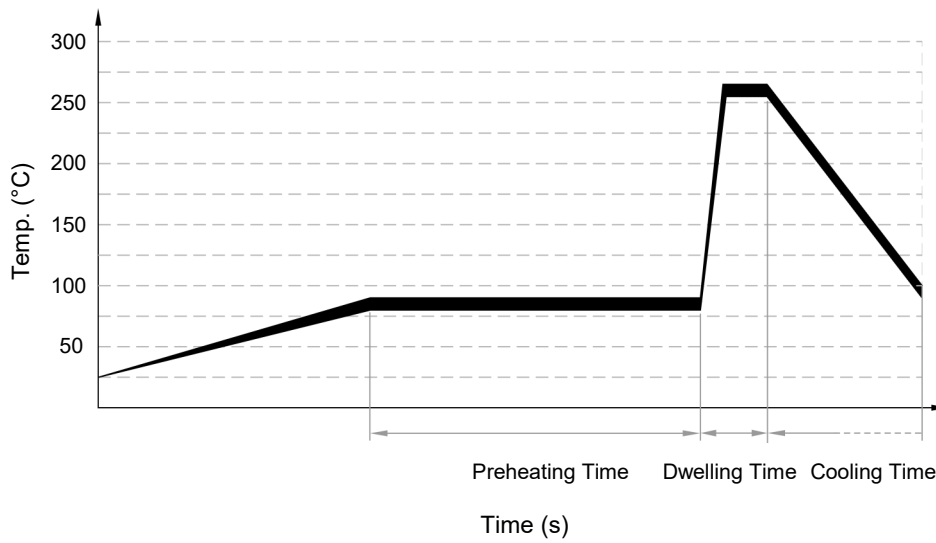
### Mechanical Stress

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

# TFMOV

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## Wave Soldering Parameters (Reference)



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

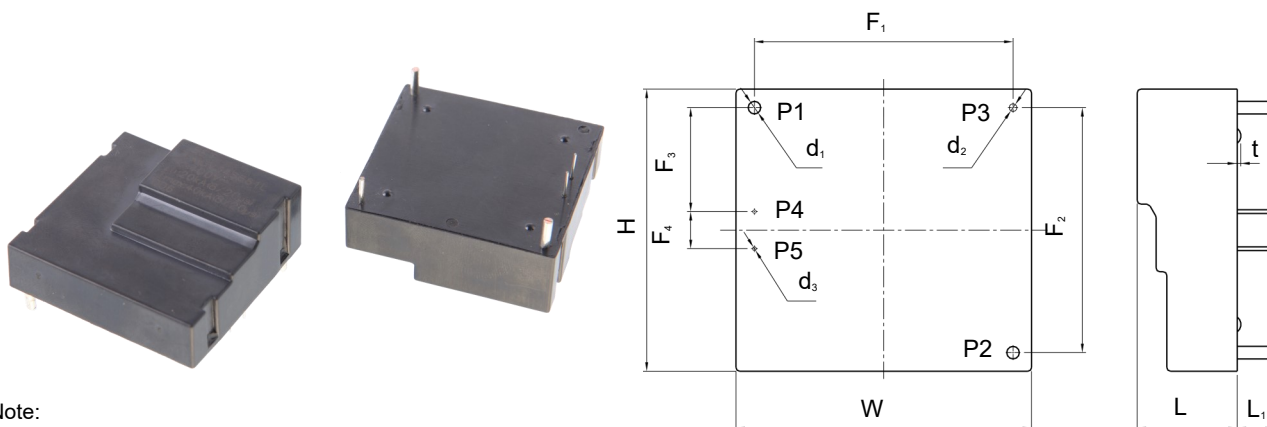
## Recommended Hand-Soldering Parameters

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

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## TFMOV34SxxxL Series



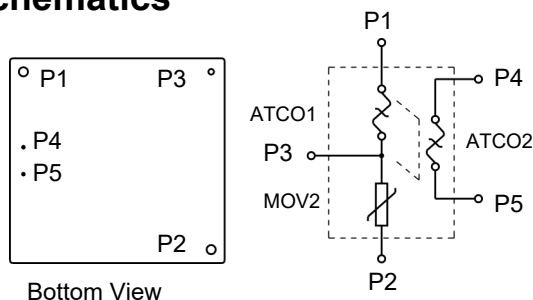
Note:  
Pin P3 / P4 / P5 is Optional  
Unit: mm

Nominal Varistor Voltage	L (±1.0)	L <sub>1</sub> (±1.0)	H (±1.0)	W (±1.0)	d <sub>1</sub> (-0.05,+0.20)	d <sub>2</sub> (-0.05,+0.15)	d <sub>3</sub> (±0.05)	F <sub>1</sub> (±0.5)	F <sub>2</sub> (±0.5)	F <sub>3</sub> (±0.5)	F <sub>4</sub> (±0.5)	t (±0.1)
34S470L - 151L	11.5	5.0	38.0	40.0	1.70	1.05	0.50	34.9	33.0	14.0	5.0	0.5
34S181L - 561L	13.0	5.0	38.0	40.0	1.70	1.05	0.50	34.9	33.0	14.0	5.0	0.5
34S621L - 681L	13.5	5.0	38.0	40.0	1.70	1.05	0.50	34.9	33.0	14.0	5.0	0.5

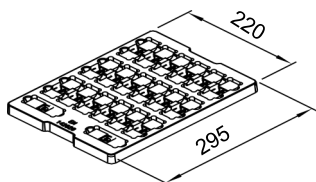
### Agency Approvals

Agency	Standards	No.
UL	UL1449	E322662
Environment	RoHS & REACH	Compliant

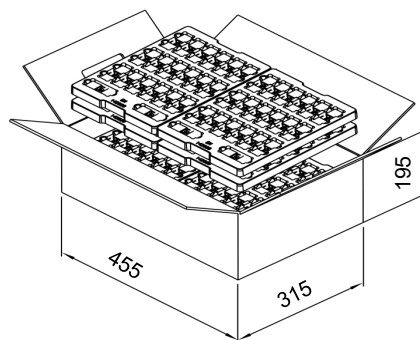
### Schematics



### Packaging Information



12 Trays



Unit: mm  
Please contact us if you have special packaging requirements.

Item	Nominal Varistor Voltage	Tray	Carton
Dimensions (mm)	N/A	295 × 220	455 × 315 × 195
Quantity (PCS)	470 - 681	12	240



# TFMOV

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## TFMOV34SxxxL 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 <sup>a</sup>		Max. Energy (Joule)	Typical Capacitance (Reference)	Thermal Fuse
	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 60691 E214712
	(VAC)	(VDC)	(V)		(V)	(A)	(kA)			(kA)	(J)	(pF)	
TFMOV34S470Lx	30	38	42	52	93	60	10	20	4.3	10	96	35000	VQ Series U <sub>r</sub> : 690 VAC I <sub>r</sub> : 25 A
TFMOV34S560Lx	35	45	50	62	110	60	10	20	3.8	10	115	29500	
TFMOV34S680Lx	40	56	61	75	135	60	10	20	3.8	10	136	24200	
TFMOV34S820Lx	50	65	74	90	135	300	15	30	3.2	15	156	17950	
TFMOV34S101Lx	60	85	90	110	165	300	15	30	3.2	15	195	15000	
TFMOV34S121Lx	75	100	108	132	200	300	15	30	3.2	15	235	12200	
TFMOV34S151Lx	95	125	135	165	250	300	20	40	3.2	20	296	10000	
TFMOV34S181Lx	115	150	162	198	300	300	20	40	2.3	20	350	8250	
TFMOV34S201Lx	130	170	185	225	340	300	20	40	2.3	20	400	6750	
TFMOV34S221Lx	140	180	198	242	360	300	20	40	2.3	20	450	6400	
TFMOV34S241Lx	150	200	216	264	395	300	20	40	2.3	20	480	5650	
TFMOV34S271Lx	175	225	243	297	455	300	20	40	2.3	20	540	5100	
TFMOV34S301Lx	190	250	270	330	500	300	20	40	2.3	20	600	4510	
TFMOV34S331Lx	210	275	297	363	550	300	20	40	2.3	20	656	4150	
TFMOV34S361Lx	230	300	324	396	595	300	20	40	2.3	20	745	3750	
TFMOV34S391Lx	250	320	351	429	650	300	20	40	2.3	20	830	3500	
TFMOV34S431Lx	275	350	387	473	710	300	20	40	2.3	20	920	2950	
TFMOV34S471Lx	300	385	423	517	775	300	20	40	2.3	20	1000	2880	
TFMOV34S511Lx	320	415	459	561	845	300	20	40	2.3	20	1060	2650	
TFMOV34S561Lx	350	460	504	616	925	300	20	40	2.3	20	1150	2450	
TFMOV34S621Lx	385	505	558	682	1025	300	20	40	2.3	20	1250	2200	
TFMOV34S681Lx	420	560	612	748	1120	300	20	40	2.3	20	1250	2000	

Note:

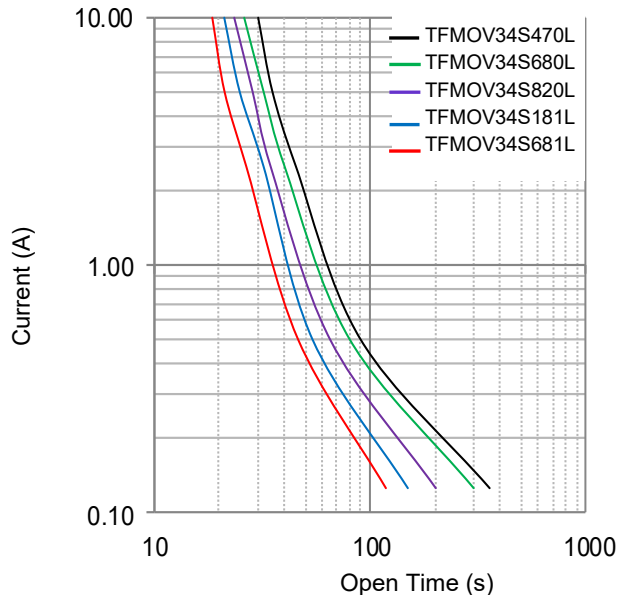
a:  $R_{cl} = \frac{V_c}{I_n}$ ,  $U_p \geq V_c$ , V<sub>c</sub>: Clamping Voltage (@ I<sub>n</sub>), V<sub>N</sub>: Varistor Voltage, U<sub>p</sub>: Voltage Protection Level.

The Value of Voltage Protection Level (U<sub>p</sub>) 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.

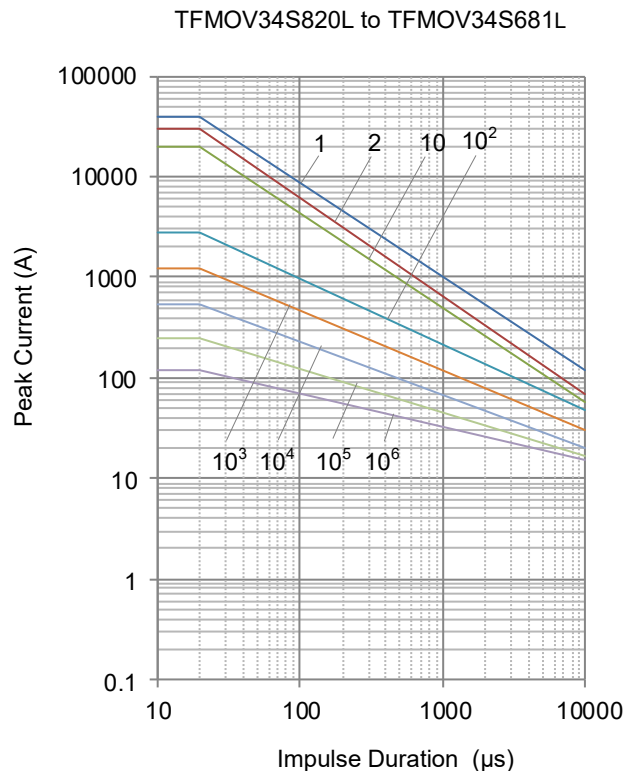
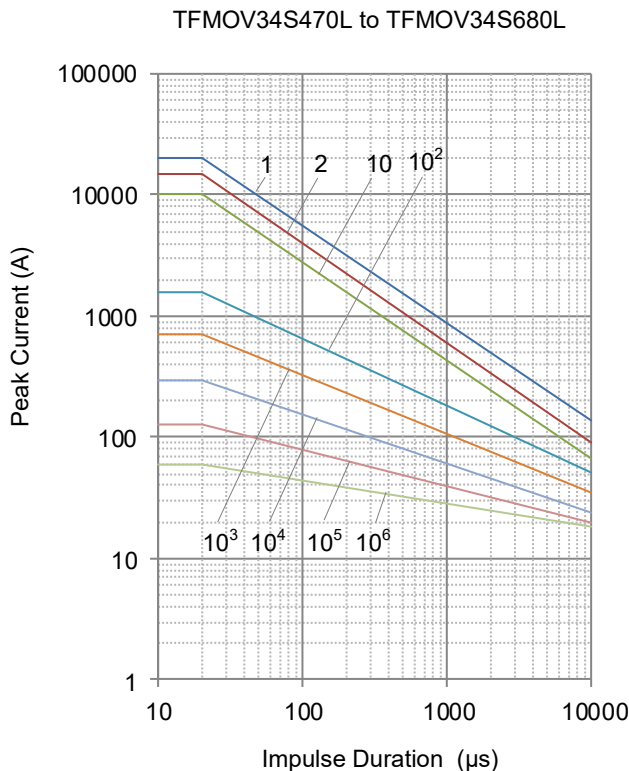
## Performance Curve for Reference

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



Note: The limited current curve is for reference only.

Max. Peak Current Derating Curve



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 repetitions.

**Voltage-Current Characteristic Curves**

