

α Therm



**PROVIDING A TOTAL SOLUTION FOR
HIGH STANDARD SAFETY CIRCUIT PROTECTION**

Alpha Therm GmbH: Ihr Offizieller Vertriebskanal für SETsafe/SETfuse

Die Alpha Therm GmbH mit Sitz in Plankstadt, Deutschland, ist stolz darauf, der offizielle Vertriebskanal für SETsafe/SETfuse in Deutschland, Europa und weltweit zu sein. Unsere langjährige Partnerschaft mit SETsafe/SETfuse basiert auf einem erfolgreichen und vertrauensvollen Geschäftsmodell.

Wir repräsentieren SETsafe/SETfuse auf internationalen Messen wie der Electronica, InterSolar, ees und vielen weiteren. Von kleinen Standardsicherungen bis hin zu komplexen, kundenspezifischen Automotive-Projekten – wir haben alles erfolgreich umgesetzt. Mit unserer umfassenden Lagerhaltung in Deutschland gewährleisten wir schnelle und zuverlässige Lieferungen.

Kontaktieren Sie uns! Unser kompetentes Team berät Sie ausführlich und findet die optimale Lösung für Ihre Anforderungen. Vertrauen Sie auf Alpha Therm GmbH und SETsafe/SETfuse – Ihre Partner für innovative Sicherheitslösungen.

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Alpha Therm GmbH: Your Official Distribution Channel for SETsafe/SETfuse

Alpha Therm GmbH, based in Plankstadt, Germany, is proud to be the official distribution channel for SETsafe/SETfuse in Germany, Europe, and worldwide. Our long-standing partnership with SETsafe/SETfuse is built on a successful and trustworthy business model.

We represent SETsafe/SETfuse at international trade fairs such as Electronica, InterSolar, ees, and many more. From small standard fuses to complex, customized automotive projects, we have successfully handled it all. With our extensive warehousing in Germany, we ensure fast and reliable deliveries.

Contact us today! Our competent team will provide you with detailed advice and find the optimal solution for your requirements. Trust Alpha Therm GmbH and SETsafe/SETfuse – your partners for innovative safety solutions.

Alpha Therm GmbH
Gewerbering 7
68723 Plankstadt
Germany

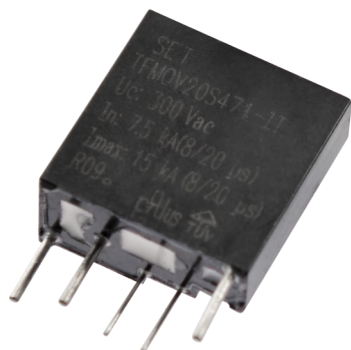
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Web: www.alpha-therm.com

TFMOV

Thermal Fuse & MOV (TFMOV)

TFMOV20S Series

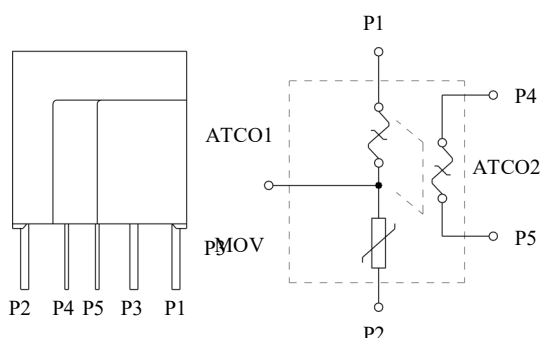
Description



Thermal Fuse & MOV (TFMOV) is a thermally protected varistor that has all the characteristics of a thermally protected varistor (MOV). TFMOV has all the characteristics of a varistor (MOV) with thermal protection, and there are two types of deterioration: natural deterioration due to long-term operation and deterioration due to an abnormal surge. When a surge occurs, the leakage current of the degraded MOV continues to increase, causing the surface temperature of the MOV to continue to rise and the possibility of fire. At this time, the thermal cutoff (fusible alloy) in the TFMOV senses the abnormal temperature and operates (blows) to disconnect the MOV from the main circuit to protect the entire circuit, and the MOV itself will not continue to heat up and catch fire.

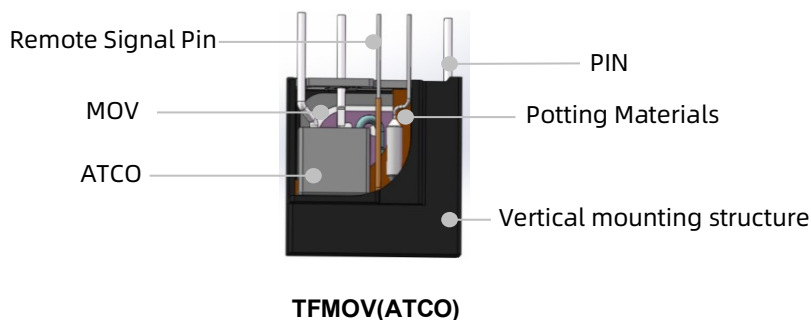
SETsafe | SETfuse Thermal Protection Varistors - Fusible Alloy TFMOV20S Series are mainly composed of Varistors (MOV), Thermal Cutoffs (Fusible Alloy) (ATCO), Flame Retardant Cases and Metal Components (Pins), Potting Materials. Vertical mounting structure; Nominal discharge current: (1.5 ~ 7.5) kA; Maximum continuous operating voltage: (17 ~ 750) VAC; Safety certificates: UL, cUL, TUV; RoHS, REACH compliant.

Schematics



TFMOV(ATCO)

Structure



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)

TFMOV

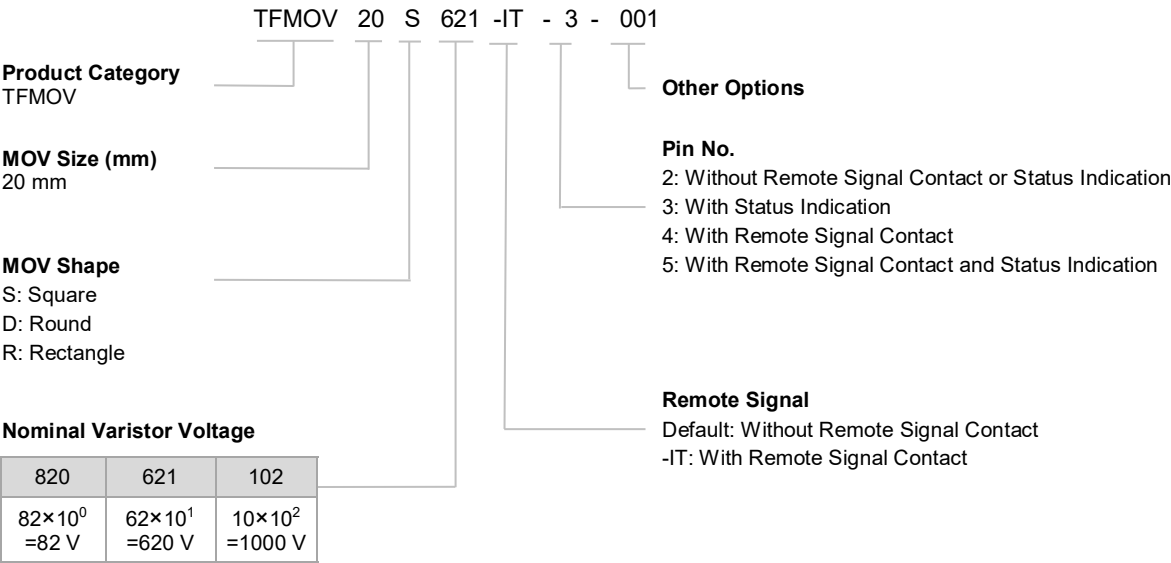
Thermal Fuse & MOV (TFMOV)

TFMOV20S Series

Agency Approvals

Agency Symbol	Standards	The File No. and certification No. obtained by SETsafe SETfuse	Category
	UL 1449	E322662	Type 4CA
	CSA C22.2 NO. 269, CSA ECN 516	E322662	Type 4CA
	IEC/EN 61643-11	J 50210179	Class II
Environment	RoHS & REACH	Compliant	

Part Numbering System

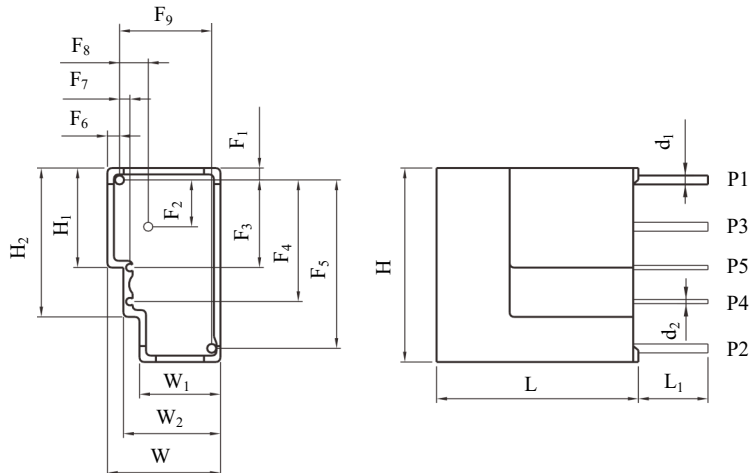
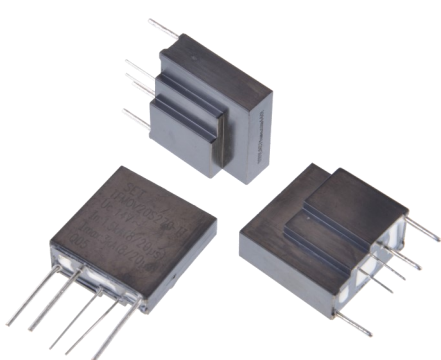


Reminder:
Part numbering system in the datasheet is only for selecting correct parameter and product features. Before placing order, please contact us for specifications and use the part number and product code in the specifications to place order to ensure the part is correct. Product code is the unique indentification.

TFMOV

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

Nominal Varistor Voltage	L (±1.0)	L ₁ (±1.0)	W (±1.0)	W ₁ (±1.0)	W ₂ (±1.0)	H (±1.0)	H ₁ (±0.5)	H ₂ (±0.5)	F ₁ (±0.5)	F ₂ (±0.5)
270 ~ 121	23.2	8.0	9.1	5.4	7.8	22.8	11.7	17.5	1.4	5.5
151 ~ 271	23.2	8.0	9.5	5.8	7.7	22.8	11.7	17.5	1.4	5.5
301 ~ 471	23.2	8.0	11.0	7.3	9.2	22.8	11.7	17.5	1.4	5.5
511 ~ 681	23.2	8.0	12.0	8.3	10.2	22.8	11.7	17.5	1.4	5.5
751 ~ 821	23.2	8.0	13.0	9.3	11.2	22.8	11.7	17.5	1.4	5.5
911 ~ 122	23.2	8.0	15.5	11.8	13.7	22.8	11.7	17.5	1.4	5.5
Nominal Varistor Voltage	F ₃ (±0.5)	F ₄ (±0.5)	F ₅ (±0.5)	F ₆ (±0.5)	F ₇ (±0.5)	F ₈ (±0.5)	F ₉ (±0.5)	d ₁ (-0.05,+0.15)	d ₂ (±0.05)	
180 ~ 121	10.3	14.3	19.8	1.4	1.2	3.3	6.7	1.05	0.50	
151 ~ 271	10.3	14.3	19.8	1.4	1.2	3.3	7.1	1.05	0.50	
301 ~ 471	10.3	14.3	19.8	1.4	1.2	3.3	8.6	1.05	0.50	
511 ~ 681	10.3	14.3	19.8	1.4	1.2	3.3	9.6	1.05	0.50	
751 ~ 821	10.3	14.3	19.8	1.4	1.2	3.3	10.6	1.05	0.50	
911 ~ 122	10.3	14.3	19.8	1.4	1.2	3.3	13.1	1.05	0.50	

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Specifications

Model	Max. Continuous Operating Voltage		Varistor Voltage @1 mA DC		Clamping Voltage (Max.)		Nominal Dis-charge Current (8/20 μ s)	Max. Dis-charge Current (8/20 μ s)	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 μ s	@1 kHz	UL 60691 E214712
	(VAC)	(VDC)	(V)		(V)	(A)	(kA)			(kA)	(J)	(pF)	
TFMOV20S270x	17	22	24	31	53	25	1.5	3	4.6	1.5	23	15600	VT Series U_T : 690 VAC I_T : 15 A/16 A
TFMOV20S330x	20	26	30	36	65	25	1.5	3	4.6	1.5	29	13800	
TFMOV20S390x	25	31	35	43	77	25	1.5	3	4.6	1.5	33.5	10200	
TFMOV20S470x	30	38	42	52	93	25	2.5	5	4.3	2.5	41	8880	
TFMOV20S560x	35	45	50	62	110	25	2.5	5	3.8	2.5	49	7800	
TFMOV20S680x	40	56	61	75	135	25	2.5	5	3.8	2.5	59	7000	
TFMOV20S820x	50	65	74	90	135	125	5	10	3.2	5	67	5880	
TFMOV20S101x	60	85	90	110	165	125	5	10	3.2	5	84	4800	
TFMOV20S121x	75	100	108	132	200	125	5	10	3.2	5	102	4000	
TFMOV20S151x	95	125	135	165	250	125	5	10	3.2	5	127	3200	
TFMOV20S181x	115	150	162	198	300	125	5	10	3.2	5	156	2650	
TFMOV20S201x	130	170	185	225	340	125	7.5	15	2.3	7.5	170	2400	
TFMOV20S221x	140	180	198	242	360	125	7.5	15	2.3	7.5	185	2160	
TFMOV20S241x	150	200	216	264	395	125	7.5	15	2.3	7.5	200	2000	
TFMOV20S271x	175	225	243	297	455	125	7.5	15	2.3	7.5	230	1800	
TFMOV20S301x	190	250	270	330	500	125	7.5	15	2.3	7.5	250	1560	
TFMOV20S331x	210	275	297	363	550	125	7.5	15	2.3	7.5	270	1440	
TFMOV20S361x	230	300	324	396	595	125	7.5	15	2.3	7.5	305	1320	
TFMOV20S391x	250	320	351	429	650	125	7.5	15	2.3	7.5	330	1200	
TFMOV20S431x	275	350	387	473	710	125	7.5	15	2.3	7.5	365	1160	
TFMOV20S471x	300	385	423	517	775	125	7.5	15	2.3	7.5	420	1020	
TFMOV20S511x	320	415	459	561	845	125	7.5	15	2.3	7.5	430	935	
TFMOV20S561x	350	460	504	616	925	125	7.5	15	2.3	7.5	455	850	
TFMOV20S621x	385	505	558	682	1025	125	7.5	15	2.3	7.5	465	780	
TFMOV20S681x	420	560	612	748	1120	125	7.5	15	2.3	7.5	480	720	
TFMOV20S751x	460	615	675	825	1240	125	7.5	15	2.3	7.5	500	635	
TFMOV20S821x	510	670	738	902	1355	125	7.5	15	2.3	7.5	520	600	
TFMOV20S911x	550	745	819	1001	1500	125	7.5	15	2.3	7.5	550	525	
TFMOV20S102x	625	825	900	1100	1650	125	7.5	15	2.3	7.5	610	480	
TFMOV20S112x	680	895	990	1210	1815	125	7.5	15	2.3	7.5	675	430	
TFMOV20S122x	750	1000	1080	1320	1980	125	7.5	15	2.3	7.5	740	380	

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Note:

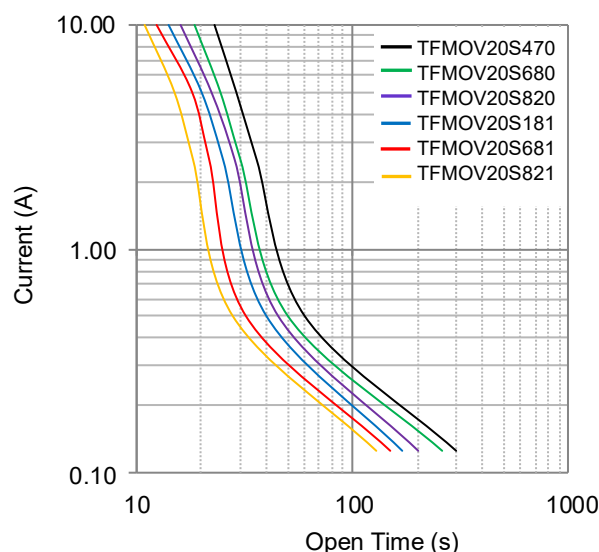
a: $R_{cl} = \frac{V_C}{V_N}$, $U_p \geq V_C$, V_C : Clamping Voltage (@ I_n), V_N : Varistor Voltage, U_p : Voltage Protection Level.

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.

Performance Curve for Reference

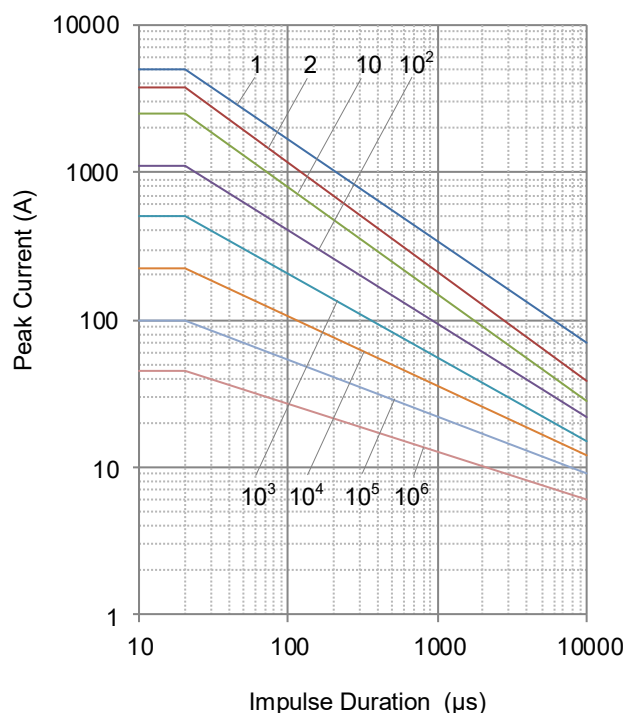
Limited Current Test Curve (UL 1449 clause 44.4)



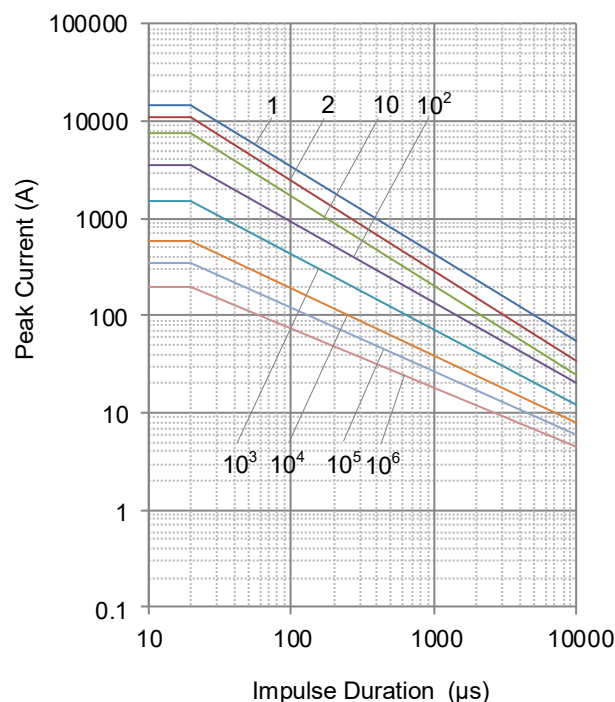
Note: The limited current test curve is for reference only.

Max. Peak Current Derating Curve

TFMOV20S270 to TFMOV20S680



TFMOV20S820 to TFMOV20S122



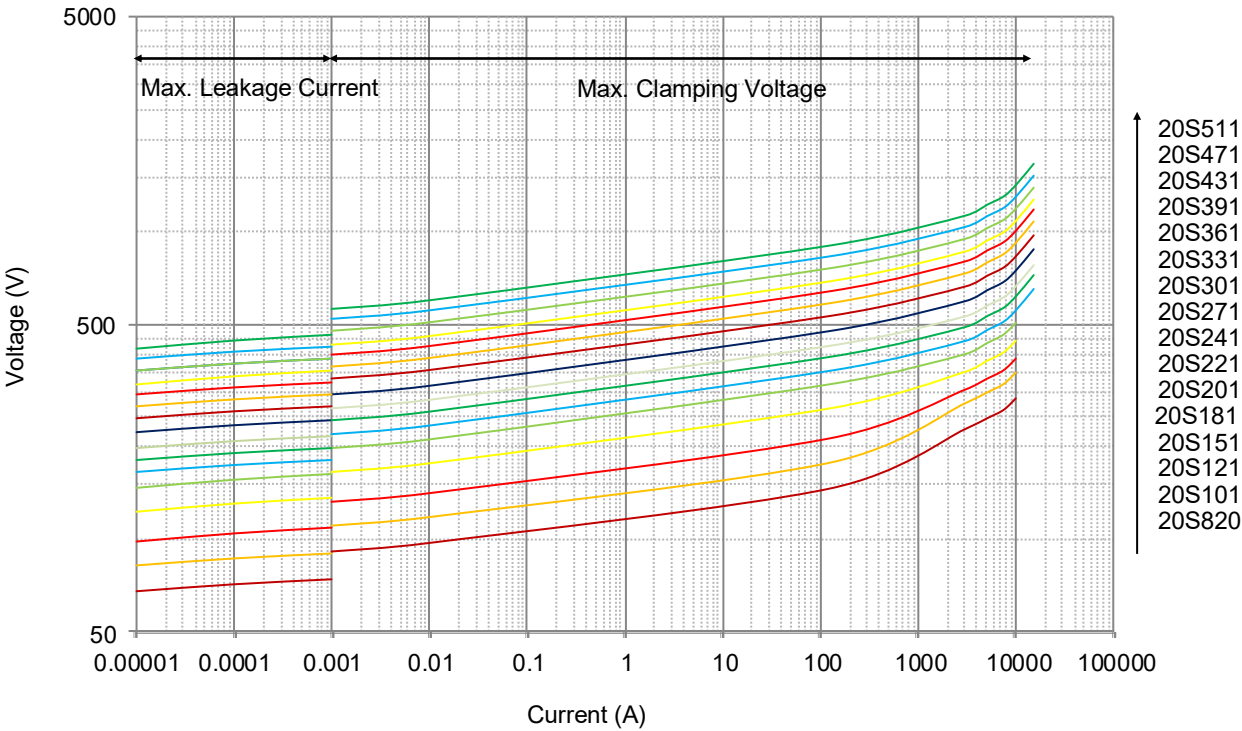
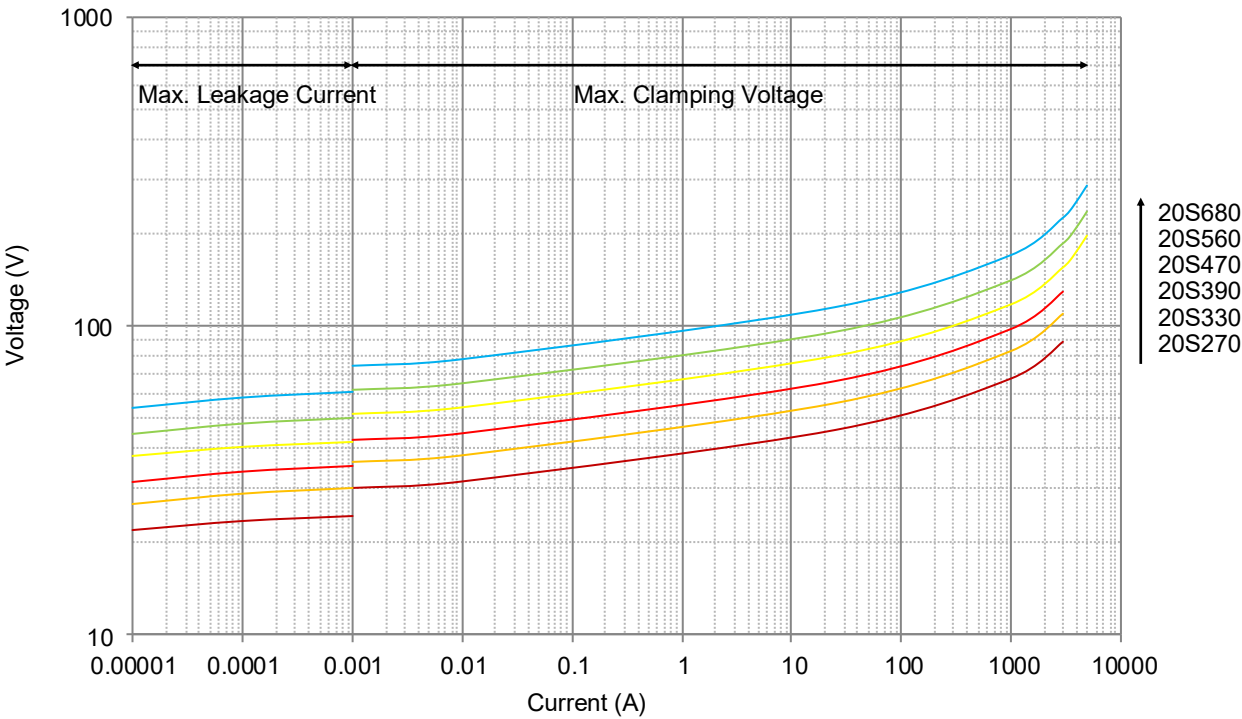
Note: 1, 2, 10, 10², 10³, 10⁴, 10⁵, 10⁶ Stand for number of repetitions.

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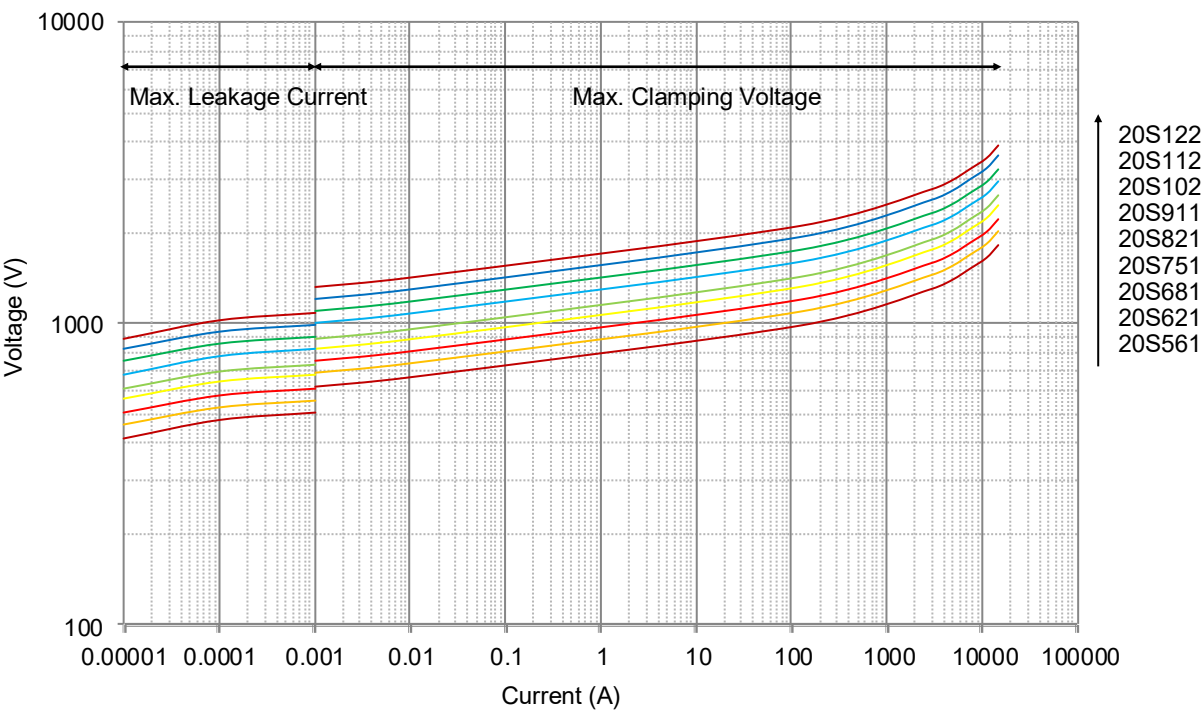
Voltage-Current Characteristic Curves



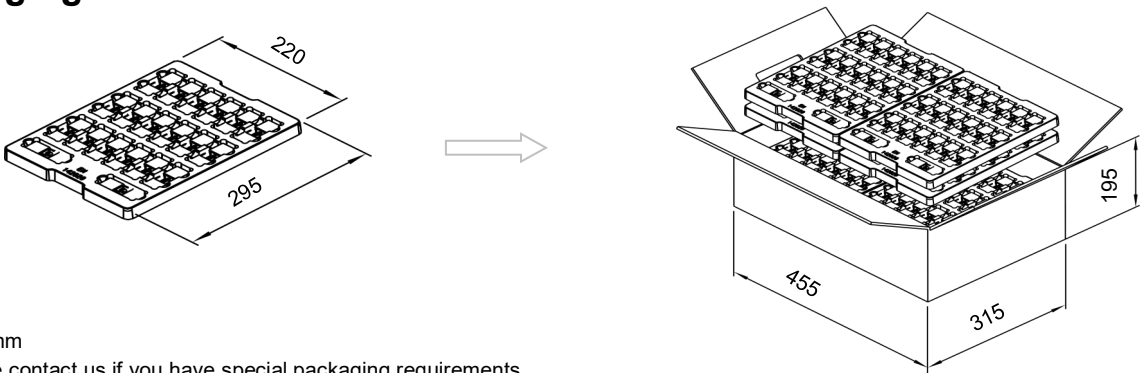
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TFMOV20S Series



Packaging Information



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

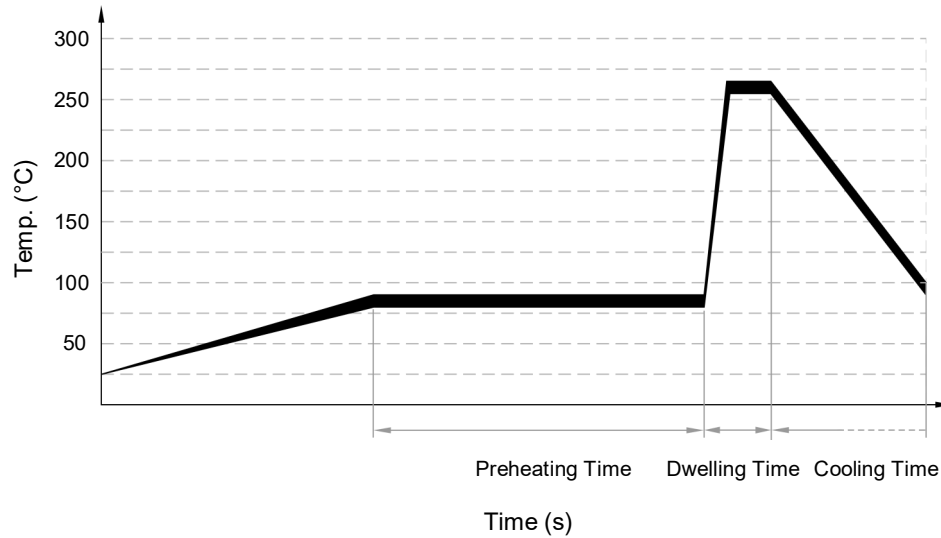
Item	Nominal Varistor Voltage	Tray	Carton
Dimensions (mm)	N/A	295 × 220	455 × 315 × 195
Quantity (PCS)	270 ~ 271	40	960
	301 ~ 681	40	800
	751 ~ 122	40	640

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Wave Soldering Parameters (Reference)

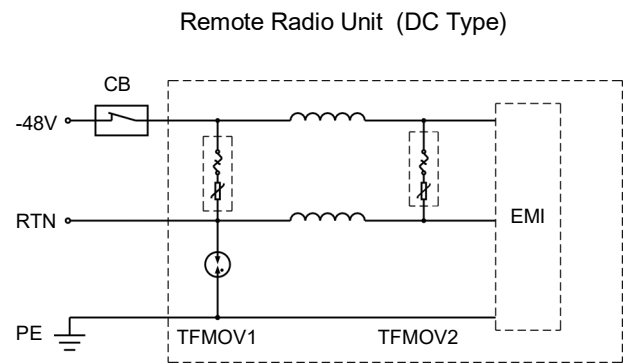
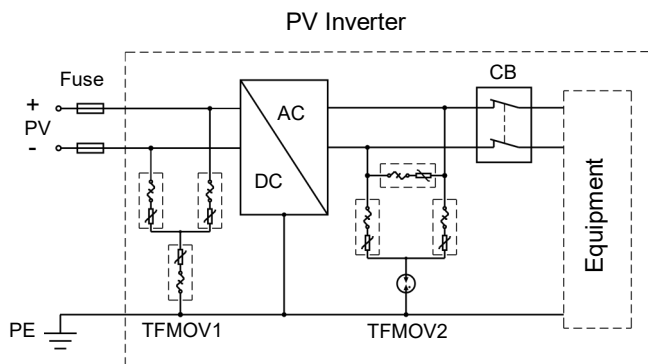
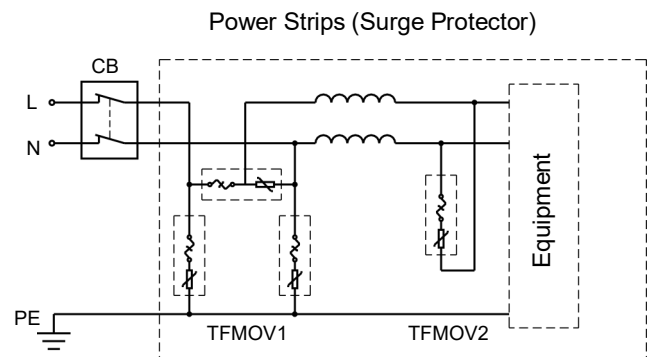
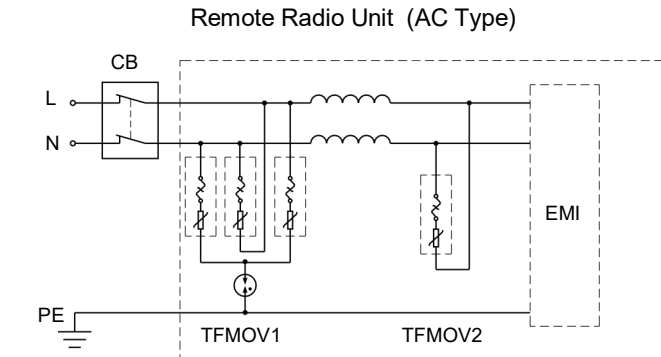


Item	Temp. (°C)	Time (s)
Preheating	80 to 90	60 to 150
Dwelling	250 to 260	2 to 4

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.)

Application Options



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

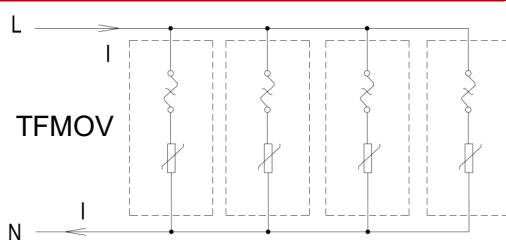


Figure .1

The Design Recommended

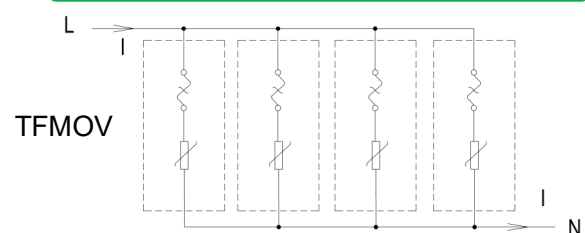
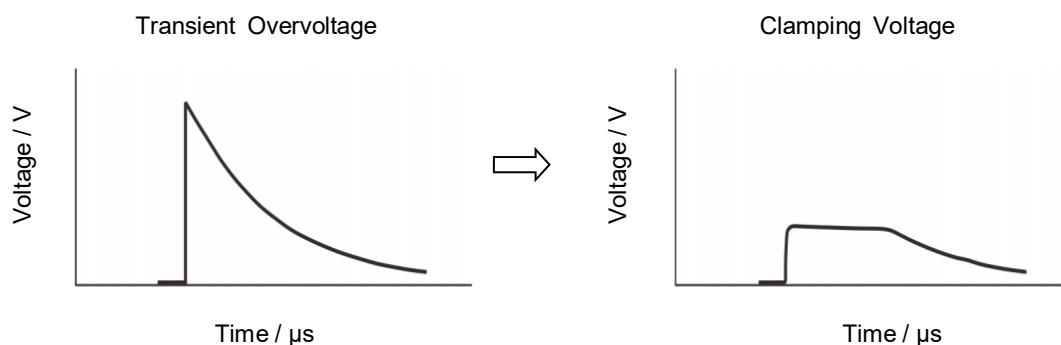


Figure .2

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.

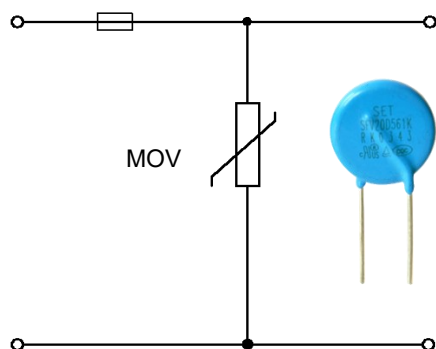


Figure a Typical surge protection circuit

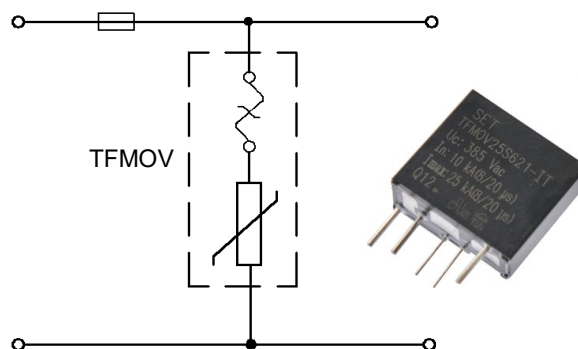


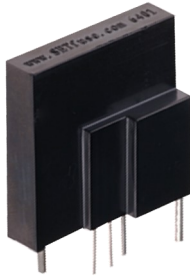
Figure b: High reliability surge protection circuit

TFMOV

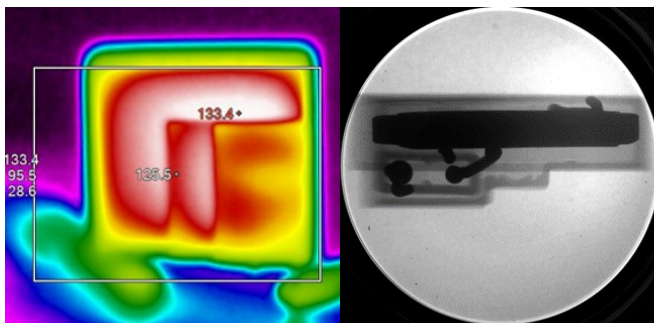
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Benefits



Safety

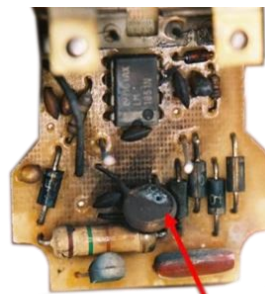


TFMOV Failure Simulation

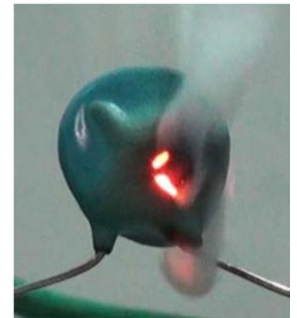
During the electrical performance degrading of varistor, the inbuilt ATCO will open the circuit when the leakage current of varistor increases to tens of micro Amperes. As shown in the figure above, this is a safe open circuit failure.



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.

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 μ s	8/20 Current Impulse Current impulse with a nominal virtual front time of 8 μ s and a nominal time to half-value of 20 μ s. — (IEC 61643-11)
1.2/50 μ s	1.2/50 Voltage Impulse Voltage impulse with a nominal virtual front time of 1.2 μ s and a nominal time to half-value of 50 μ s. — (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 μ s. — (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 μ s 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 μ s 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.
MOV	Varistors A resistive device with nonlinear voltammetry characteristics

TFMOV

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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



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 pressure 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.

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

Rated Voltage U_n (V)													Maximum Continuous Operating Voltage U_n (V)		Model
			AC	DC	1	1.5	2.5	3	4	5			AC	DC	
690V 480V 347V 220 - 230V 110V	600V		○	○	○	○	○	○	○	○	○	○	750	1000	Maximum Continuous Operating Voltage U_n (V)
			○	○	○	○	○	○	○	○	○	○	680	895	
			○	○	○	○	○	○	○	○	○	○	625	825	
			○	○	○	○	○	○	○	○	○	○	550	745	
	400V		○	○	○	○	TFMOV10S821	○	○	TFMOV15S821	○	○	510	670	
			○	○	○	○	TFMOV10S751	○	○	TFMOV15S751	○	○	460	615	
	254 - 277V		○	○	○	○	TFMOV10S681	○	○	TFMOV15S681	○	○	420	560	
			○	○	○	○	TFMOV10S621	○	○	TFMOV15S621	○	○	385	505	
	300V		○	○	○	○	TFMOV10S561	○	○	TFMOV15S561	○	○	350	460	
			○	○	○	○	TFMOV10S511	○	○	TFMOV15S511	○	○	320	415	
120 - 130V 60V 48V 36V 24V 12V	220V		○	○	○	○	TFMOV10S471	○	○	TFMOV15S471	○	○	300	385	
			○	○	○	○	TFMOV10S431	○	○	TFMOV15S431	○	○	275	350	
			○	○	○	○	TFMOV10S391	○	○	TFMOV15S391	○	○	250	320	
			○	○	○	○	TFMOV10S361	○	○	TFMOV15S361	○	○	230	300	
	110V		○	○	○	○	TFMOV10S331	○	○	TFMOV15S331	○	○	210	275	
			○	○	○	○	TFMOV10S301	○	○	TFMOV15S301	○	○	190	250	
			○	○	○	○	TFMOV10S271	○	○	TFMOV15S271	○	○	175	225	
			○	○	○	○	TFMOV10S241	○	○	TFMOV15S241	○	○	150	200	
	60V		○	○	○	○	TFMOV10S221	○	○	TFMOV15S221	○	○	140	180	
			○	○	○	○	TFMOV10S201	○	○	TFMOV15S201	○	○	130	170	
48V 36V 24V 12V	60V		○	○	○	TFMOV10S181	○	TFMOV20S181Lx	TFMOV15S181	TFMOV20S181	○	115	150		
			○	TFMOV10S121	TFMOV15S121	TFMOV20S560Lx	○	○	TFMOV20S151Lx	TFMOV15S151	TFMOV20S151	○	95	125	
	48V		○	TFMOV10S101	TFMOV15S101	TFMOV20S470Lx	○	○	TFMOV20S121Lx	○	TFMOV20S121x	○	75	100	
			○	TFMOV10S820	TFMOV15S820	○	○	○	TFMOV20S101Lx	○	TFMOV20S101x	○	60	85	
	36V			TFMOV10S680	TFMOV15S680	TFMOV20S680x	○	TFMOV25D680x	○	○	TFMOV20S820x	○	50	65	
				TFMOV10S560	TFMOV15S560	TFMOV20S560x	○	TFMOV25D560x	○	○	TFMOV25S680x	TFMOV25S680Lx	40	56	
	24V			TFMOV10S470	TFMOV15S470	TFMOV20S470x	○	○	TFMOV20S820Lx	○	TFMOV25S560x	TFMOV25S560Lx	35	45	
				TFMOV10S390	TFMOV15S390	○	○	TFMOV25S470Lx	○	○	○	○	30	38	
	12V			TFMOV10S330	TFMOV15S330	○	○	○	○	○	○	○	25	31	
				TFMOV10S270	TFMOV15S270	○	○	○	○	○	○	○	20	26	
												17	22		

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

[illegible]

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

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

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

Rated Voltage U_n (V)								Maximum Continuous Operating Voltage U_n (V)		Model
								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	60V	○	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	
AC	DC	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)								