ThermoFuse Varistor

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Series/Type:	**T14K50**
Ordering code:	**TBD**
Date:	2015-07-16
Version:	p2

Applications

- Overvoltage protection with integrated thermal fuse and warning signal
- Suitable for use in industrial and household appliance applications

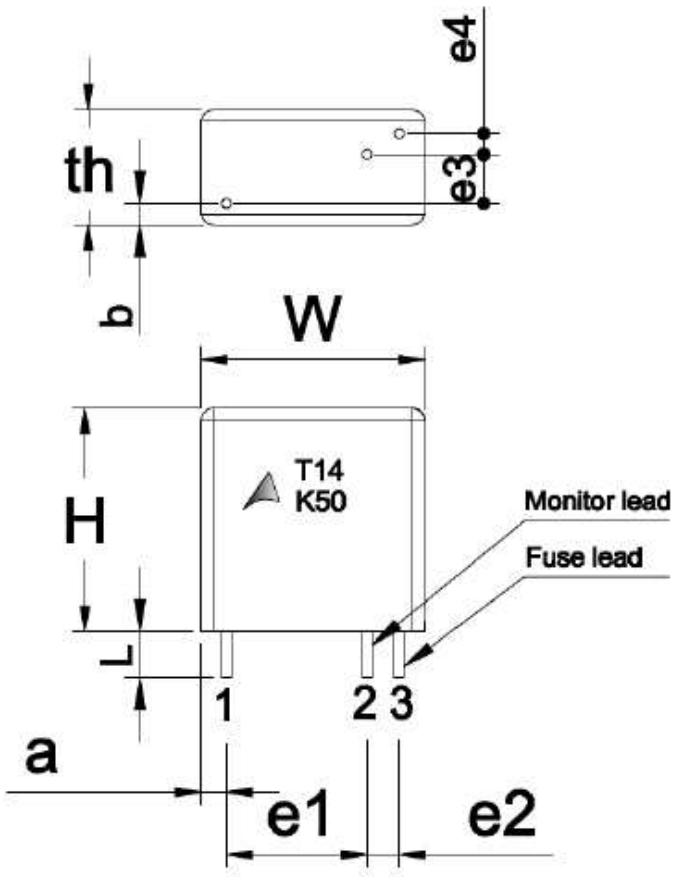
Features

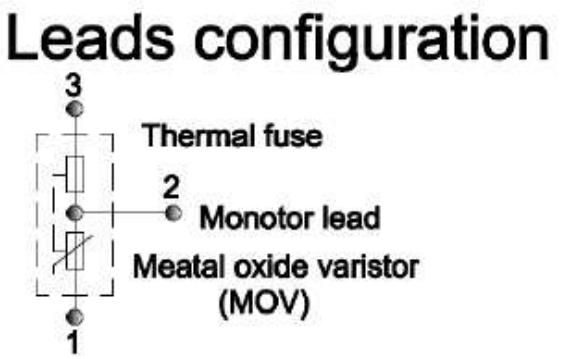
- Three-leaded version for failure indication
- Abnormal overvoltage protection under specified test conditions

Nomenclature

T	=	EPCOS ThermoFuse varistor
14	=	Rated disk diameter (mm)
K	=	Tolerance of V_V at 1 mA: ±10%
50	=	Max. AC voltage

Dimensional drawing in mm





W max	=	17,5			mm
H max	=	21,5			mm
th max	=	9,0			mm
e1	=	11,0	±	0,5	mm
e2	=	2,5	±	0,5	mm
e3	=	3,5	±	0,5	mm
e4	=	1,6	±	0,5	mm
a	=	2,0	±	0,5	mm
b	=	1,6	±	0,5	mm
Ød	=	0,8	±	0,05	mm
L	=	3,6	±	0,5	mm

Electrical data

Maximum ratings (85 ℃):

Max. operating AC voltage		V_{RMS}	=	50 V
Max. operating DC voltage		V_{DC}	=	65 V
Surge current (8/20 µs)	1 time	I_{max}	=	4500 A
Energy absorption (2 ms)	1 time	W_{max}	=	15J
Max. average power dissipation		P_{max}	=	0.6W

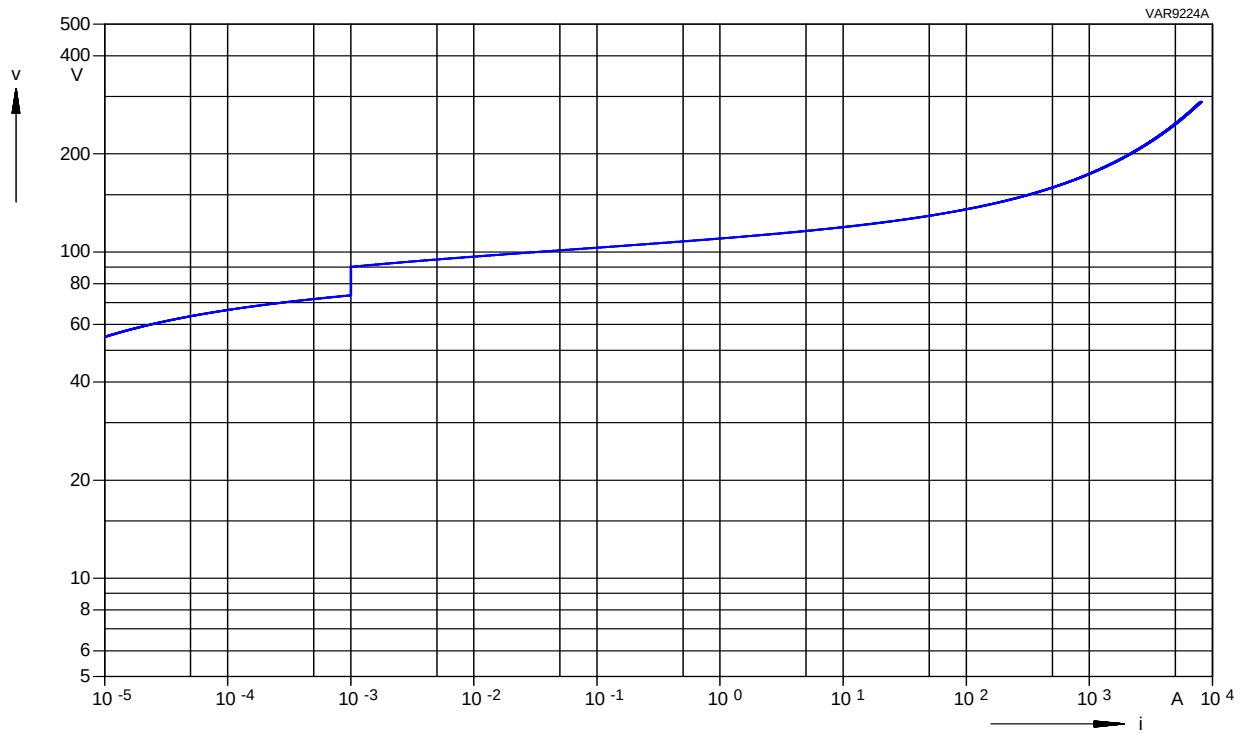
Characteristics (25 ℃)

Varistor voltage at 1 mA	V_V	=	82V	±10%
Clamping voltage at 50 A (8/20 µs)	VC, max	=	135	V
Typ. capacitance at 1 kHz	C	=	1800	pF

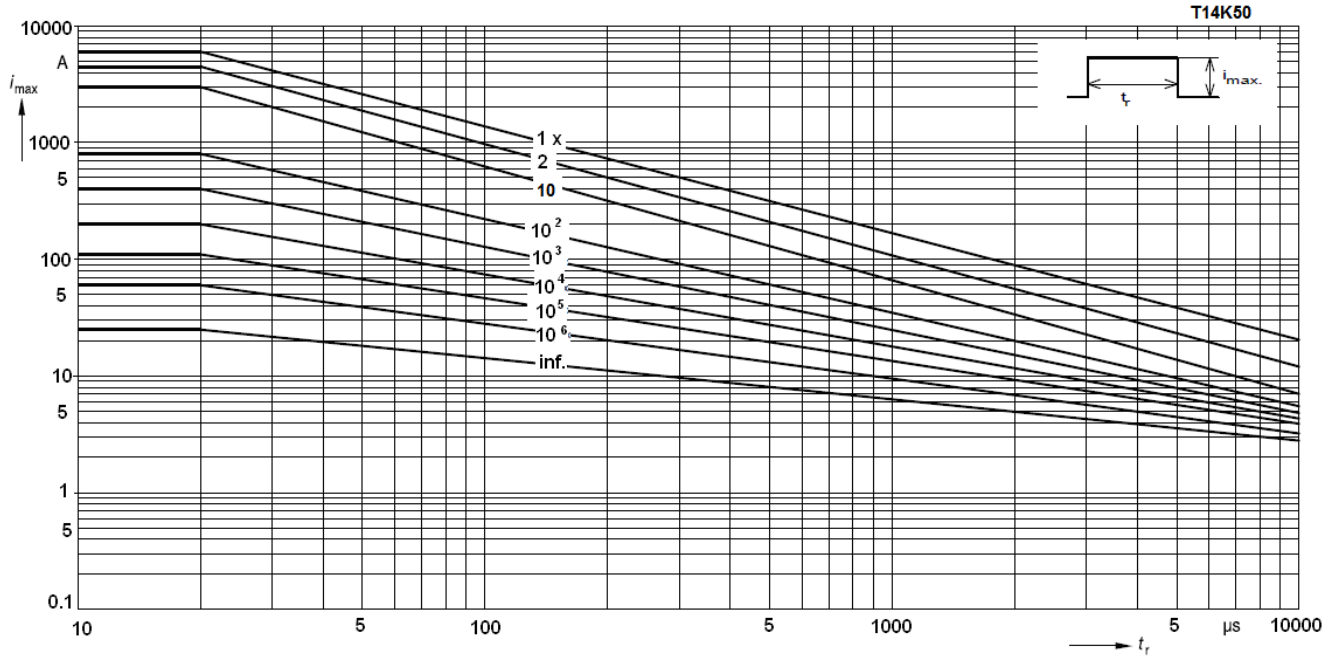
General technical data

Climatic category	to IEC 60068-1	40/85/56
Operating temperature	to CECC 42 000	-40…+85 ℃
Storage temperature		-40…+85 ℃
Electric strength	to CECC 42 000	≥2.5 kV_{RMS}
Response time		<25 ns

v/i characteristics

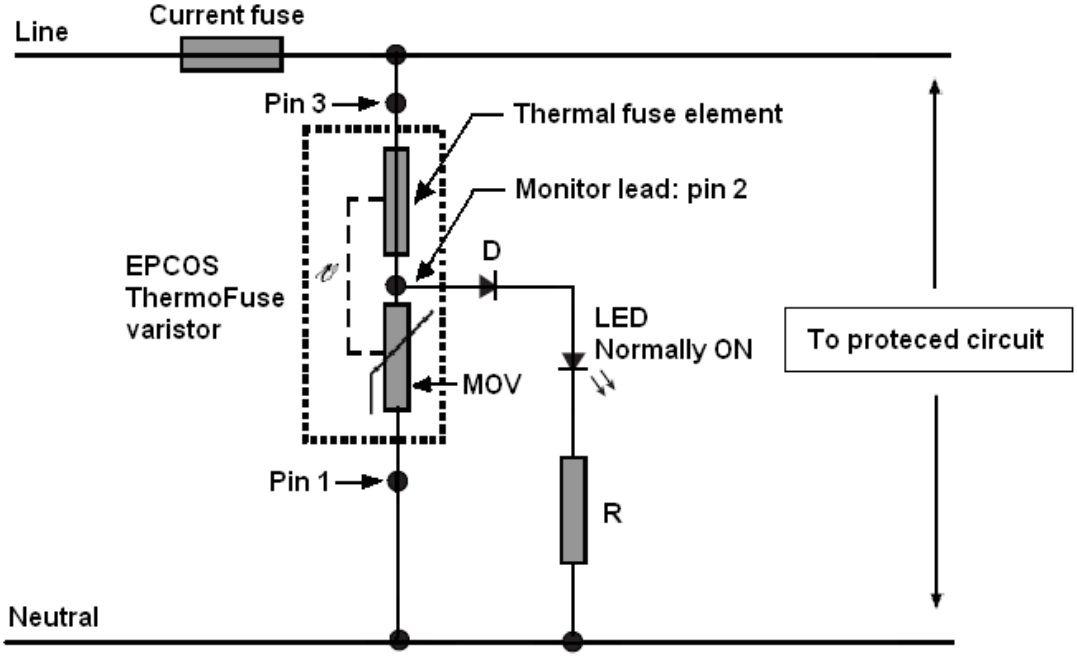


Derating curves



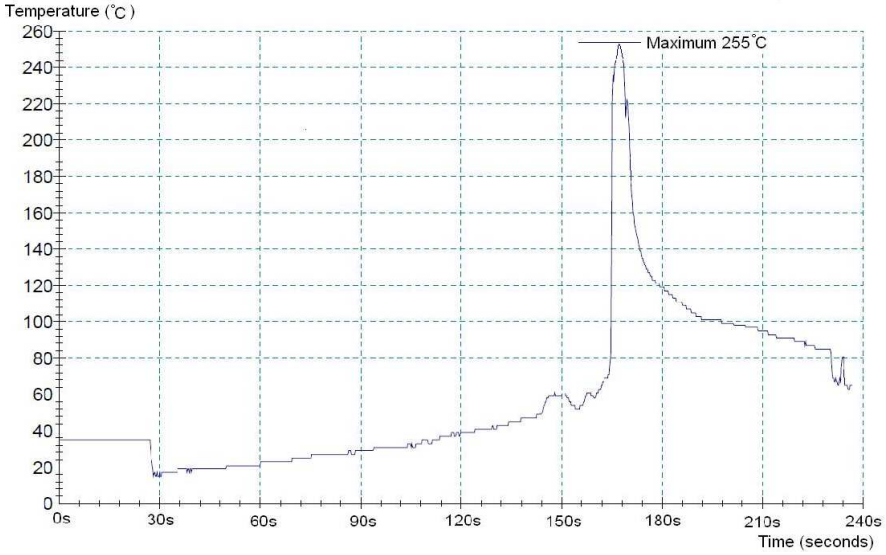
Typical application

The typical application below shows how the monitor lead on the device can be used to indicate that the thermal fuse has been opened. This denotes that the circuit will be no longer protected from surge currents by the MOV after the thermal fuse forms open circuit.



Typical wave soldering curve

Care must be taken when soldering the device into place because it contains a thermal fuse element. Two soldering methods are possible: (1) Manual soldering under max. 350℃ / 3s: it is recommended to heat-sink the leads of the device. (2) Wave soldering: it is very important that the temperatures of all preheat stages and the solder bath should be strictly controlled.



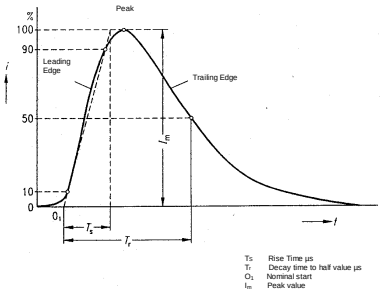
Test condition for disconnection characteristic

Characteristics	Test Methods/Description	Specifications
Abnormal over voltage	This device is designed to form open circuit in the event of overheating due to the limited current abnormal over voltage conditions as outlined in section 39.4 of UL1449 3rd edition. The device (P1 & P3) is to be connected to a power supply having an open circuit voltage equal to the test voltage specified below. The power supply is to incorporate a series variable resistor that can be adjusted to obtain the short-circuit current (Isc). The variable resistor is to be adjusted such that Isc equals 10A, 5A, 2.5A, 0.5A or 0.125A respectively (measured without the device in the circuit). The device will be energized for 7 hours, or until the device becomes disconnected from the power supply, or until current to, or temperature within the device attains equilibrium [1]. The test result will be visually inspected. Detailed test voltages applied onto the devices are as below:	Any of below phenomena shall not be observed, otherwise this device will be judged as failed part: 1. Emission of flame, molten metal, glowing or flaming particles through any openings (pre-existed or created as a result of the test) in the device. 2. Charring, glowing, or flaming of the supporting surface, or cheesecloth draped on the device. 3. Ignition of the enclosure. 4. Creation of any openings in the enclosure that result in accessibility of live parts.

Type	Device rating (V dc)	Test voltage (V dc)
T14K50	50	100

1) Thermal fuse may not form open circuit under low current [e.g. 0.125A] due to less heat generated by MOV, however the device will reach thermal equilibrium within 30 minutes under a low temperature which will not be able to cause any damage to the device.

Reliability data, electrical

Characteristics	Test methods / Description	Specifications
Varistor voltage	The voltage between two terminals with the specified measuring current applied is called V_v (1 mA_{DC} @ 0.2 … 2 s).	To meet the specified value.
Clamping voltage	The maximum voltage between two terminals with the specified standard impulse current (8/20 µs) illustrated below applied.  	To meet the specified value.
Surge current derating, 8/20 µs	CECC 42 000, test C 2.1 100 surge currents (8/20 µs), unipolar, interval 30 s, amplitude corresponding to derating curve for 20 µs	| △V/V (1 mA) | ≤ 10% (measured in direction of surge current) No visible damage
Surge current derating, 2 ms	CECC 42 000, test C 2.1 100 surge currents (2 ms), unipolar, interval 120 s, amplitude corresponding to derating curve for 2 ms	| △V/V (1 mA) | ≤ 10% (measured in direction of surge current) No visible damage

Cautions and warnings

General

1. EPCOS metal oxide varistors (SIOVs) are designed for specific applications and should not be used for purposes not identified in our specifications, application notes and data books unless otherwise agreed with EPCOS during the design-in-phase.

2. Ensure suitability of SIOVs through reliability testing during the design-in phase. The SIOVs should be evaluated taking into consideration worst-case conditions.

3. For applications of SIOVs in line-to ground circuits based on various international and local standards there are restrictions existing or additional safety measures required.

Storage

1. Store SIOVs only in original packaging. Do not open the package before storage.

2. Storage conditions in original packaging:

Storage temperature:	-25 ℃ … +45 ℃
Relative humidity:	<75% annual average, <95% on maximum 30 days a year.
Dew precipitation:	Is to be avoided.

3. Avoid contamination of SIOVs surface during storage, handling and processing.

4. Avoid storage of SIOVs in harmful environments which can affect the function during long-term operation (examples given under operation precautions).

5. The SIOV type series should be soldered within the time specified.

SIOV-S, -Q, -LS	24 month
T, ETFV and SFS types	12 month.

Handling

1. SIOVs must not be dropped.

2. Components must not be touched with bare hands. Gloves are recommended.

3. Avoid contamination of the surface of SIOV electrodes during handling, be careful of the sharp edge of SIOV electrodes.

Soldering (where applicable)

1. Use rosin-type flux or non-activated flux.

2. Insufficient preheating may cause ceramic cracks.

3. Rapid cooling by dipping in solvent is not recommended.

4. Complete removal of flux is recommended.

Mounting

1. Potting, sealing or adhesive compounds can produce chemical reactions in the SIOV ceramic that will degrade the component's electrical characteristics.

2. Overloading SIOVs may result in ruptured packages and expulsion of hot materials. For this reason the SIOVs should be physically shielded from adjacent components.

Operation

1. Use SIOVs only within the specified temperature operating range

2. Use SIOVs only within the specified voltage and current ranges.

3. Environmental conditions must not harm the SIOVs. Use SIOVs only in normal atmospheric conditions. Avoid use in the presence of deoxidizing gases (chlorine gas, hydrogen sulfide gas, ammonia gas, sulfuric acid gas, etc), corrosive agents, humid or salty conditions, Avoid contact with any liquids and solvents.

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