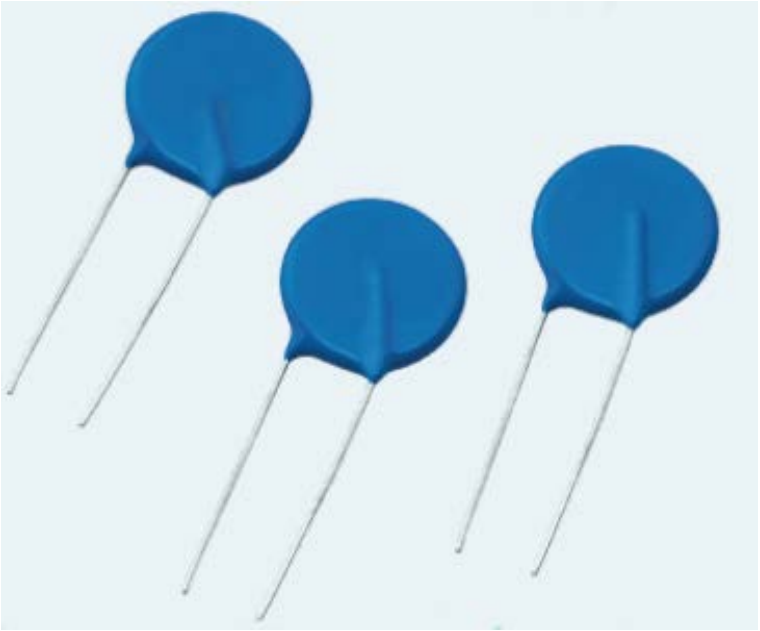
ESKA

the protection company

METALLOXID-VARISTOREN (MOV)

METAL-OXID-VARISTORS (MOV)



Ein Überspannungsschutz für Wechsel- und Gleichspannungsanwendungen ist für nahezu jedes Gerät erforderlich!

Aufgrund der unterschiedlichen Exposition gegenüber Blitz- und Schalttransienten, schlechter Netzspannungsregelung in ländlichen Gebieten und Entwicklungsgebieten sowie Unterschieden in den Stromnetzen weltweit gibt es keine anerkannte universelle Lösung. Der Schaltungsschutz ist ohne Überspannungsschutz niemals vollständig. Als etablierter Anbieter von Überstromschutz haben wir die Forderung nach einer besseren Integration der Zweikreisschutz-Designlösung erkannt.

Surge protection for AC and DC voltage applications is required for almost every device!

Varying levels of exposure to lightning and switching transients, poor line voltage regulation rural and developing areas and inconsistency among different grids around the globe means that there is no recognized single universal solution. Circuit protection is never complete without overvoltage protection, as an established provider of overcurrent protection, we realized the demand for better integration between the two-circuit protection design solution.

Die Gefahr von transienten Überspannungen:

-Externe Quellen-

Die bekannteste Quelle für Überspannungsimpulse außerhalb der Anlage ist der Blitz. Blitz-Stoßspannungen sind Energie, die durch Blitzeinschlag in das Stromnetz eingespeist wird, entweder durch magnetische Kopplung oder direkten Einschlag. Sie verursachen eine kurzzeitige Hochspannung auf den Versorgungsleitungen eines Hauses oder Betriebs. Andere externe Stoßspannungsquellen sind vom Energieversorger veranlasste Schaltvorgänge und das Schalten von Kondensatorbänken. Solche Störungen der Netzqualität treten während des normalen Betriebs auf.

The threats from transient surge:

-External Sources-

The most recognizable source of surges generated outside the facility is lightning. Lightning surge is energy induced into the power grid by lightning strike. It can be magnetic coupling or direct hit. The event causes momentary high voltage on the power lines feeding a home or business. Other external sources of surges include utility-initiated grid and capacitor bank switching. Power quality disturbances can be delivered during the normal operation of the electric power system.

-Interne Quellen-

Viele Überspannungen werden durch das Schalten elektrischer Lasten wie Induktivitäten und Kondensatoren, Schütze, Relais und Leistungsschalter verursacht. Zusätzlich können auch elektrostatische Entladungen Überspannungen verursachen und müssen berücksichtigt werden.

-Internal Sources-

Many surges are caused by switching of electrical loads like inductors and capacitors, contactors, relay and circuit breakers. Additionally, electrostatic discharges can also be cause of surges and must be consider.

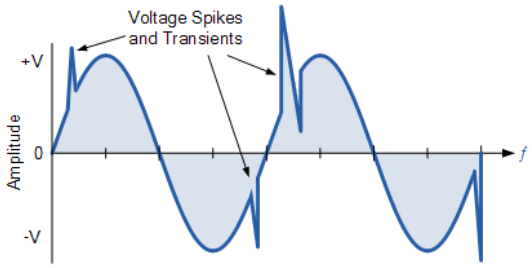
-Kurzzeitige Überspannungen-

Transiente Überspannungen sind kurze Überspannungsspitzen oder Störungen der Wellenform im Energienetz, die elektronische Geräte beschädigen oder zerstören können. Transiente Überspannungen entstehen aus einer Vielzahl von Schaltungen und Quellen, unabhängig davon, ob sie mit Wechsel- oder Gleichstrom betrieben werden, da sie häufig im Stromkreis selbst erzeugt oder von externen Quellen eingetragen werden. Transienten innerhalb eines Stromkreises können die Spannung mit einer Dauer von weniger als einem halben Zyklus der normalen Spannungswellenform auf mehrere tausend Volt erhöhen, und es sind diese Spannungsspitzen, die von empfindlichen elektronischen Schaltungen und Komponenten ferngehalten werden müssen.

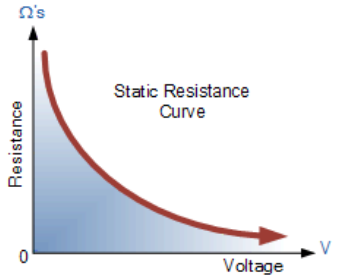
-Transient Surges-

Transient surges are brief overvoltage spikes or disturbances on a power waveform that can damage, degrade, or destroy electronic equipment. Transient surges originate from a variety of electrical circuits and sources regardless of whether they operate from an AC or DC supply as they are often generated within the circuit itself or transmitted into the circuit from external sources. Transients within a circuit can increase the voltage to several thousand volts with a duration of less than a half-cycle of the normal voltage waveform, and it is these voltage spikes which must be prevented from appearing across delicate electronic circuits and components.

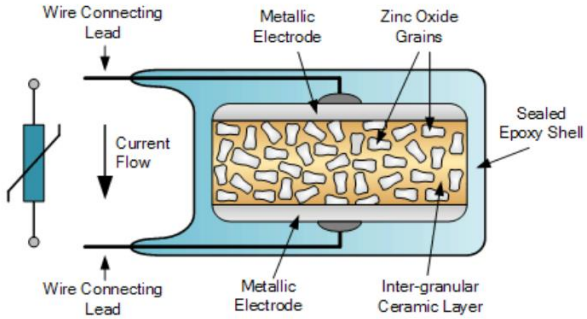
AC Waveform Transients



Varistor Static Resistance



Metal Oxide Varistor Construction



MOV Charakteristiken:

Der Metalloxid-Varistor oder MOV ist ein spannungsabhängiger Widerstand, bei dem das Widerstandsmaterial ein Metalloxid ist, hauptsächlich Zinkoxid (ZnO) als Keramikbasis, sowie andere Füllstoffe zur Bildung von Übergängen zwischen den Zinkoxidkörnern. Leitfähige ZnO-Körner, die durch Korngrenzen getrennt sind, bilden PN-Übergangshalbleiter-eigenschaften.

Im Normalbetrieb hat der Varistor einen sehr hohen Widerstand und arbeitet ähnlich einer Zenerdiode, indem Spannungen unterhalb der Schwellenspannung unberührt bleiben. Wenn jedoch die Spannung am Varistor (beide Polaritäten) den Nennwert des Varistors überschreitet, nimmt sein effektiver Widerstand stark ab, wie im Bild gezeigt. Der Varistor ändert seinen Widerstandswert automatisch mit der Spannungsänderung, was ihn zu einem spannungsabhängigen, nichtlinearen Widerstand macht. Die potenziell zerstörerische Energie des eingehenden Transienten wird vom Varistor absorbiert und als Wärme abgeführt, wodurch empfindliche Schaltungskomponenten geschützt und Systemschäden verhindert werden.

MOV Characteristics:

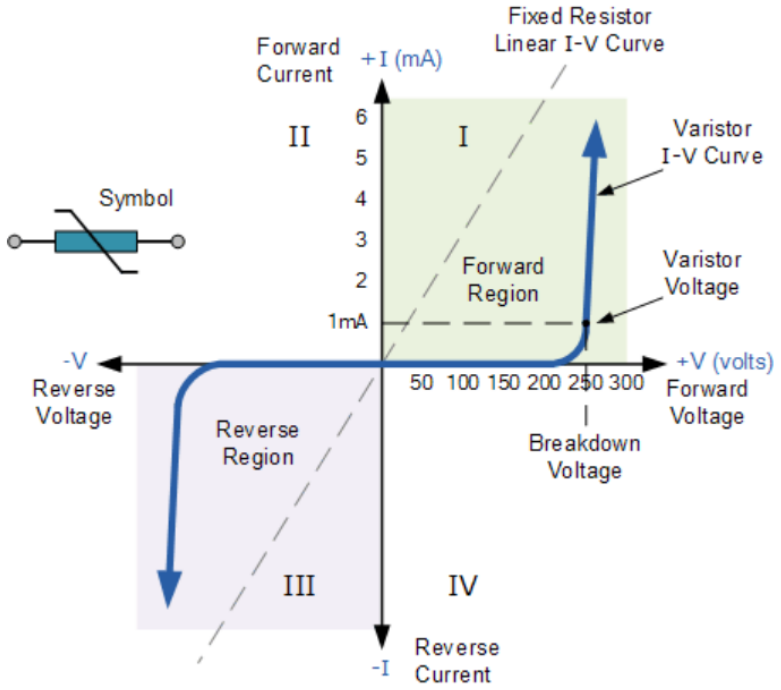
The Metal Oxide Varistor or MOV, is a voltage dependent resistor in which the resistance material is a metallic oxide, primarily zinc oxide (ZnO) as a ceramic base, plus other filler materials for the formation of junctions between the zinc oxide grains. Conductive ZnO grains separated by grain boundaries providing P–N junction semiconductor characteristics.

Under normal operation the varistor has a very high resistance, hence part of its name, operating in a similar way to the zener diode by allowing lower threshold voltages to pass unaffected.

However, when the voltage across the varistor (either polarity) exceeds the varistors rated value, its effective resistance decreases strongly with an increasing voltage as shown.

The varistor changes its resistance value automatically with the change in voltage across it making it a voltage-dependent, non-linear resistor. The potentially destructive energy of the incoming transient pulse is absorbed by the Varistor and dissipates it as heat, thereby protecting vulnerable circuit components and preventing system damage.

Varistor Characteristics Curve



Wie in der obigen Abbildung zu sehen, hat der Varistor symmetrische bidirektionale Eigenschaften, d.h. er arbeitet in beiden Richtungen (Quadrant I und III) einer sinusförmigen Wellenform und verhält sich ähnlich zweier hintereinander geschalteter Zenerdioden. Wenn nichtleitend, zeigt die U-I-Kurve eine lineare Beziehung, da der durch den Varistor fließende „Leckstrom“ bei nur wenigen Mikroampere konstant und niedrig bleibt. Sein hoher Widerstand wirkt als offener Stromkreis bleibt konstant, bis die Spannung am Varistor (beide Polaritäten) eine bestimmte „Nennspannung“ erreicht.
Diese Nenn- oder „Varistorspannung“ ist die Spannung am Varistor, die bei einem definierten Gleichstrom von 1 mA gemessen wird, d.h. der an seine Klemmen angelegte Gleichspannungspegel, der einen Strom von 1 mA durch den Varistor fließen lässt. Bei dieser Spannung beginnt der Varistor von seinem isolierenden Zustand in seinen leitenden Zustand zu wechseln.
Wenn die transiente Spannung am Varistor gleich oder größer als der Nennwert ist, wird der Widerstand des Bauteils plötzlich sehr klein, wodurch der Varistor aufgrund des Lawineneffekts seines Halbleitermaterials in einen Leiter verwandelt wird. Der kleine Leckstrom durch den Varistor steigt schnell an, aber die Spannung über ihm wird auf einen Wert knapp über der Varistorspannung begrenzt. Mit anderen Worten, der Varistor regelt die transiente Spannung über sich selbst, indem er mehr Strom durch sich fließen lässt, und aufgrund seiner steilen nichtlinearen U-I-Kurve kann er stark variierende Ströme über einen engen Spannungsbereich leiten, wodurch Spannungsspitzen abgeschnitten werden.

As seen in in the figure above, the varistor has symmetrical bi-directional characteristics that is the varistor operates in both directions (quadrant I and III) of a sinusoidal waveform behaving in a similar way to two zener diodes connected back-to-back. When not conducting, the U-I curve shows a linear relationship as the current flowing through the varistor remains constant and low at only a few micro-amperes of “leakage” current. This is due to its high resistance acting as an open circuit and remains constant until the voltage across the varistor (either polarity) reaches a particular “rated voltage”.
This rated or “varistor voltage” is the voltage across the varistor measured with the specified DC current of 1mA. That is, the DC voltage level applied across its terminals that allows a current of 1mA to flow through the varistors. At this voltage level, the varistor begins to change from its insulating state into its conducting state.
When the transient voltage across the varistor is equal to or greater than the rated value, the resistance of the device suddenly becomes very small turning the varistor into a conductor due to the avalanche effect of its semiconductor material. The small leakage current flowing through the varistor rapidly rises but the voltage across it is limited to a level just above the varistor voltage. In other words, the varistor self-regulates the transient voltage across it by allowing more current to flow through it and because of its steep non-linear U-I curve it can pass widely varying currents over a narrow voltage range clipping-off any voltage spikes.

D-Serie:
Metalloxid-Varistoren (MOV) der D-Serie sind die Standard-

D-Series:
D Series Metal Oxide Varistors (MOV) are the standard radial

produkte radial bedrahteter MOVs für kontinuierliche Wechselstromanwendungen. Die Standard-D-Serie ist in einer Vielzahl von Spannungs- und Stromwerten erhältlich und wurde für Schaltungssysteme entwickelt, die eine geringe bis mittlere Störfestigkeit erfordern.
MOV-Produkte haben eine spezifische nichtlineare und symmetrische U-I-Charakteristikkurve und eine beispiellose Spitzenstromtragfähigkeit. Sie werden zur Absorption transienter Überspannung, Unterdrückung von Impulsrauschen und Stabilisierung der Betriebsspannung verwendet.

leaded MOV products designed for continuous AC power applications. Available in wide range of voltage & current ratings, the standard D series is design for circuit systems requiring low to medium level of surge immunity. MOV products have specific nonlinear and symmetrical U-I characteristics curve and unparalleled large peak current capability are used for absorption of transient voltage, suppression of pulse noise and circuit voltage stabilization.

V-Serie:

Metalloxid-Varistoren (MOV) der V-Serie sind für Anwendungen konzipiert, die einen mittleren Überspannungsschutz erfordern. Sie sind ideal für Netzspannungsanwendungen, Schalten induktiver Lasten und Produkte, die eine Spannungsklemmung höherer transienter Stoßströme erfordern.
MOV-Produkte haben eine spezifische nichtlineare und symmetrische U-I-Charakteristikkurve und eine beispiellose Spitzenstromtragfähigkeit. Sie werden zur Absorption transienter Überspannung, Unterdrückung von Impulsrauschen und Stabilisierung der Betriebsspannung verwendet.

V-Series:

V Series Metal Oxide Varistors (MOV) are designed for applications which require medium level of surge protection. They are ideal for AC Line Voltage applications, inductive load switching and products that require voltage clamping of higher transient surge currents from power sources. MOV products have specific nonlinear and symmetrical U-I characteristics curve and unparalleled large peak current capability are used for absorption of transient voltage, suppression of pulse noise and circuit voltage stabilization.

P-Serie:

Die MOV-Produkte der P-Serie wurden speziell für Anwendungen entwickelt, die hohe Absorptionswerte für Stoßenergie und Spitzenstromfähigkeit erfordern. Der Hochenergie-MOV der P-Serie ist in 3 verschiedenen Größen erhältlich (10 mm / 14 mm / 20 mm) und bietet eine höhere Fähigkeit zur Unterdrückung von Überspannungen in kompakter Bauform.
MOV-Produkte haben eine spezifische nichtlineare und symmetrische U-I-Charakteristikkurve und eine beispiellose Spitzenstromtragfähigkeit. Sie werden zur Absorption transienter Überspannung, Unterdrückung von Impulsrauschen und Stabilisierung der Betriebsspannung verwendet.

P-Series:

P Series MOV products are specially designed for applications requiring high surge energy absorption ratings and peak current capability. Available in 3 different sizes: 10mm / 14mm / 20mm, the high energy P series MOV offers higher surge suppression ability in compact packaging. MOV products have specific nonlinear and symmetrical U-I characteristics curve and unparalleled large peak current capability are used for absorption of transient voltage, suppression of pulse noise and circuit voltage stabilization.

Legende:

U_{C_max} - maximale Dauerspannung in [V]

Die maximal zulässige Betriebsspannung ist die höchste Spannung, die ständig über dem Varistor abfallen darf. Wenn diese Spannung anliegt, ist der Strom noch vernachlässigbar (Leckstrom). Mit anderen Worten: Die Betriebsspannung ist die höchste Dauerspannung, die nicht als Überspannung gilt. Es ist der typische Kennwert, mit dem die Auswahl eines Varistors beginnt.

U_{N_DC} – Varistorspannung in [V]

Die Varistorspannung ist die Spannung, die über dem Varistor abfällt, wenn ein Strom von 1 mA hindurchfließt. Es ist ein pauschaler Kennwert für Vergleich und Auswahl von Varistoren. Wegen des – verglichen mit typischen Leckströmen – vergleichsweise starken Stromes ist die Varistorspannung höher als die Betriebsspannung.

U_{Clamp_max} – maximale Begrenzungsspannung in [V]

Die maximale Begrenzungsspannung (engl.: maximum clamping voltage) ist die höchste Spannung, die über dem Varistor abfallen

Caption:

U_{C_max} [V] – maximum continuous voltage in [V]

The maximum permissible operating voltage is the highest voltage that may drop continuously across the varistor. If this voltage is present, the current is still negligible (leakage current). In other words, the operating voltage is the highest continuous voltage that is not considered an overvoltage. It is the typical characteristic value with which the selection of a varistor begins.

U_{N_DC} – Varistor voltage in [V]

The varistor voltage is the voltage that drops across the varistor when a current of 1 mA flows through it. It is a general characteristic value for comparing and selecting varistors. Because of the comparatively strong current compared to typical leakage currents, the varistor voltage is higher than the operating voltage.

U_{Clamp_max} – maximum clamping voltage in [V]

The maximum clamping voltage is the highest voltage that may drop across the varistor if it is loaded with a standard 8 / 20µs

kann, wenn er mit einem Standard-Prüfimpuls 8/20µs belastet wird. Die U-I-Kennlinie gibt den jeweiligen maximalen Schutzpegel in Abhängigkeit vom durchfließenden Impulsstrom an. Die Höchstwerte sind an der rechten Grenze der Arbeitsbereichskurve zu finden.

E_{max} – maximale Energieaufnahme in [J]
Die maximale Energieaufnahme ist die Energie, die für einen einzelnen Impuls bei einer bestimmten Wellenform (10/1000µs) mit angelegter, kontinuierlicher Spannung abgeführt werden kann.

I_{peak_max} – maximaler Spitzenstrom in [A]
Der maximale Spitzenstrom (Ableitvermögen) ist der Strom, der einmalig in Form eines 8/20µs Stoßstroms (@U_{C_max}) über den Varistor abgeleitet werden kann, ohne dass dieser zerstört wird.

P_{rat} – Nennleistung in [W]
Die Verlustleistung (Wärmestrom) des Varistors ist die Leistung, die während des AC-Nennbetriebs (@U_{C_max}) gemessen wird.

$C_{typical}$ – Typische Kapazität in [pF]
Die typische Kapazität eines Varistors wird bei einer vordefinierten Frequenz gemessen. Wenn sich die angelegte Spannung der Varistorspannung nähert, nimmt die Kapazität geringfügig ab. Die Kapazität bleibt bei Frequenzen bis zu 100 kHz nahezu konstant (ebenso bei geringer Temperaturänderung).

test pulse. The U-I characteristic curve indicates the respective maximum protection level depending on the impulse current flowing through. The maximum values can be found on the right border of the characteristic.

E_{max} – maximum energy consumption in [J]
The maximum energy consumption is the energy that will be dissipated for a single pulse with a certain waveform (10 / 1000µs) with applied, continuous voltage.

I_{peak_max} – maximum peak current in [A]
The maximum peak current (discharge capacity) is the current that can be dissipated once in the form of an 8 / 20µs surge current (@UC_max) via the varistor without being destroyed.

P_{rat} – Rated power in [W]
The rated power (heat flow) of the varistor is the power measured during nominal AC operation (@UC_max).

$C_{typical}$ – Typical capacity in [pF]
The typical capacity of a varistor is measured at a predefined frequency. When the applied voltage of varistor voltage approaches, the capacitance slightly decreases. The capacity remains almost constant with frequency changes up to 100 kHz (also with small temperature changes).

Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV05-D
AC / DC

ESKA *the protection company*

Ø 5 mm

Radial - D-Series

RoHS Compliant

Spannung *Voltage*	**AC: 11 V - 460 V** **DC: 14 V - 615 V**	**max. Spitzenstrom** *max. Peak Current*	**100 A / 400 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**0,4 J - 18,0 J** *(@10/1000µs)*

Norm / *Standard:*	UL 1449-4
Anschluss / *Connection*:	Kupfer verzinnt / *Tin-plated copper*
Beschichtung / *Coating*:	Isolierende Beschichtung: Flammenhemmendes Epoxidharz (UL-94V-0) / *Insulating coating: Flame retardant epoxy (UL-94V-0)*
Betriebstemperatur / *Operating temperature*:	-40°C bis / to +105°C
Lötbarkeit / *Solderability*:	MIL-STD-202, Method 208E
Isolationswiderstand / *Insulation Resistance:*	>1000 MΩ
Ansprechzeit / *Response Time:*	<25 ns
Verpackungsmöglichkeiten / *Packing options*:	Siehe Verpackungsspezifikationen / *see packaging specifications*

Bemessungswerte / Ratings (@ 23°C):

Art. No.	U_{C_max} [V] AC (rms)	U_{C_max} [V] DC	$U_{N\_DC\ (@1mA)}$ [1)] [V]	U_{Clamp_max} @Test Current (@8/20µs) [V]	E_{max} (@10/1000µs) [J]	I_{peak_max} (@8/20µs) [A]	P_{rat} [W]	$C_{typical}$ (@1KHz) [pF]
EMOV05180-D	11	14	18	40 @1 A	0,4	100	0,2	1.600
EMOV05220-D	14	18	22	48 @1 A	0,5	100	0,2	1.500
EMOV05270-D	17	22	27	60 @1 A	0,6	100	0,2	1.450
EMOV05330-D	20	26	33	73 @1 A	0,8	100	0,2	1.400
EMOV05390-D	25	31	39	86 @1 A	0,9	100	0,2	700
EMOV05470-D	30	38	47	104 @1 A	1,1	100	0,2	650
EMOV05560-D	35	45	56	123 @1 A	1,3	100	0,2	600
EMOV05680-D	40	56	68	150 @1 A	1,6	100	0,2	580
EMOV05820-D	50	65	82	145 @5 A	2,5	400	0,25	310
EMOV05101-D	60	85	100	175 @5 A	3,0	400	0,25	290
EMOV05121-D	75	100	120	210 @5 A	4,0	400	0,25	270
EMOV05151-D	95	125	150	260 @5 A	4,8	400	0,25	240
EMOV05181-D	115	150	180	315 @5 A	5,9	400	0,25	140
EMOV05201-D	130	170	200	355 @5 A	6,5	400	0,25	120
EMOV05221-D	140	180	225	380 @5 A	7,0	400	0,25	110
EMOV05241-D	150	200	240	415 @5 A	8,0	400	0,25	110
EMOV05271-D	175	225	275	475 @5 A	8,5	400	0,25	100
EMOV05301-D	195	250	300	505 @5 A	9,0	400	0,25	100
EMOV05331-D	215	275	330	585 @5 A	10	400	0,25	90
EMOV05361-D	230	300	360	620 @5 A	10	400	0,25	80
EMOV05391-D	250	320	390	675 @5 A	12	400	0,25	80
EMOV05431-D	275	350	430	745 @5 A	13	400	0,25	70
EMOV05471-D	300	385	470	810 @5 A	15	400	0,25	70
EMOV05511-D	320	410	510	878 @5 A	16	400	0,25	65
EMOV05561-D	350	460	560	940 @5 A	18	400	0,25	65
EMOV05621-D	395	510	620	1050 @5 A	18	400	0,25	65
EMOV05681-D	420	560	680	1120 @5 A	18	400	0,25	60
EMOV05751-D	460	615	750	1240 @5 A	18	400	0,25	60

[1)] Toleranz: / *Tolerance:* ±10 %

Legende / Caption:

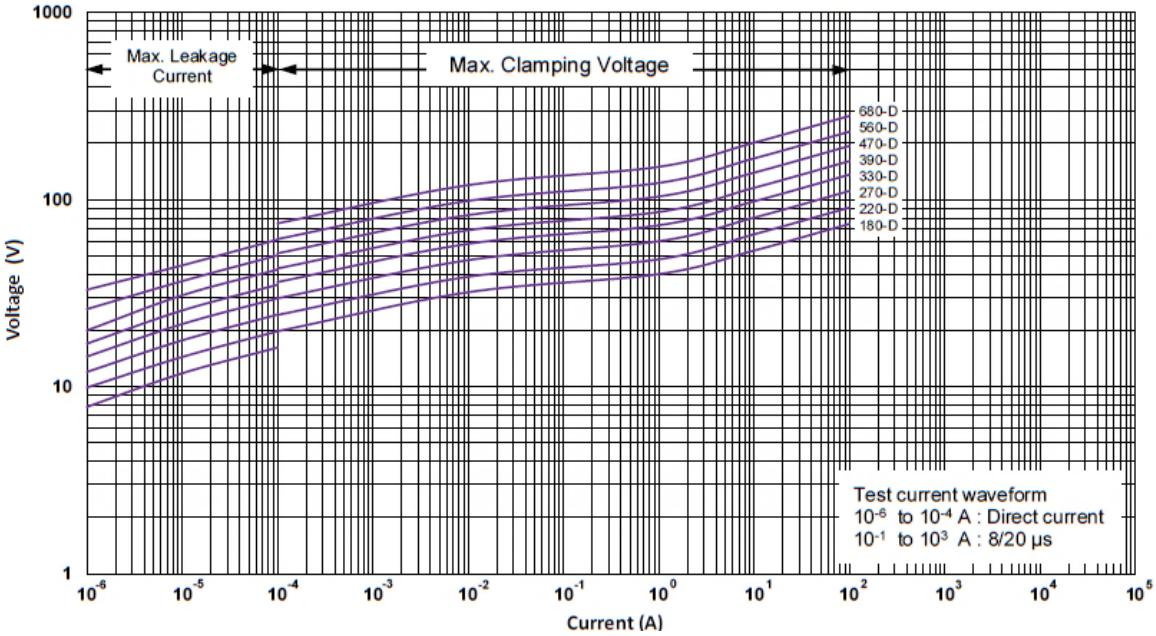
U_{C_max}	= max. Dauerspannung / *max. continuous voltage*
U_{N_DC}	= Varistorspannung / *Varistor voltage*
U_{Clamp_max}	= max. Ansprechspannung / *max. clamping voltage*
E_{max}	= max. Energie / *max. Energy*
I_{peak_max}	= max. Spitzenstrom / *max. peak current*
P_{rat}	= VerluNennleistung / *Rated power*
$C_{typical}$	= typische Kapazität / *typical capacity*

Ø 5 mm Radial - D-Series RoHS Compliant

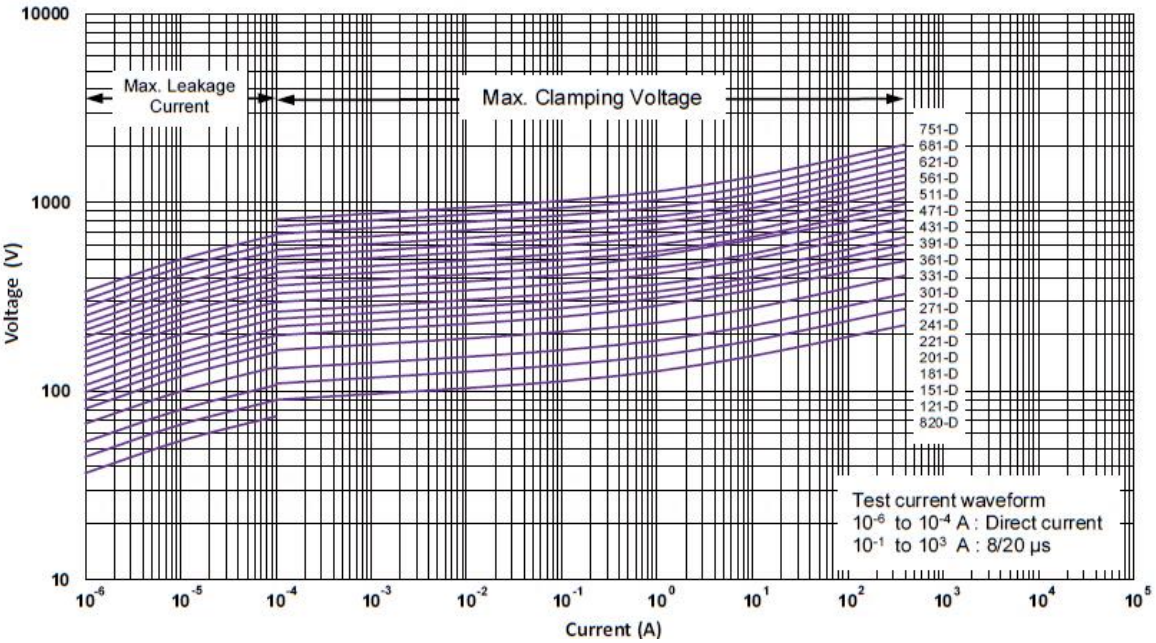
Spannung *Voltage*	**AC: 11 V - 460 V** **DC: 14 V - 615 V**	**max. Spitzenstrom** *max. Peak Current*	**100 A / 400 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**0,4 J - 18,0 J** *(@10/1000µs)*

Transient U-I Characteristic Curves:

For EMOV05180-D – EMOV05680-D:



For EMOV05820-D – EMOV05751-D:



Ø 5 mm

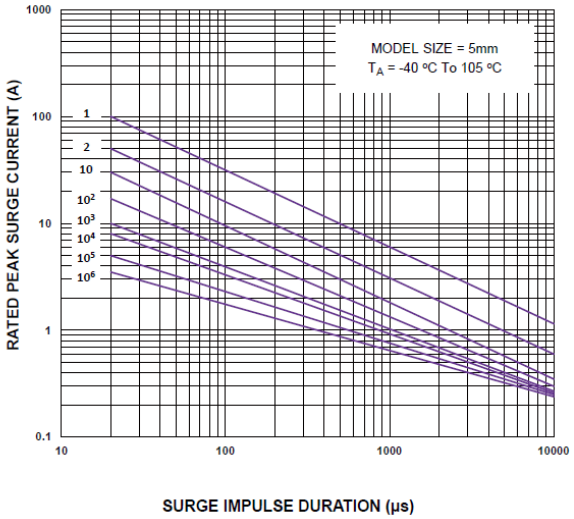
Radial - D-Series

RoHS Compliant

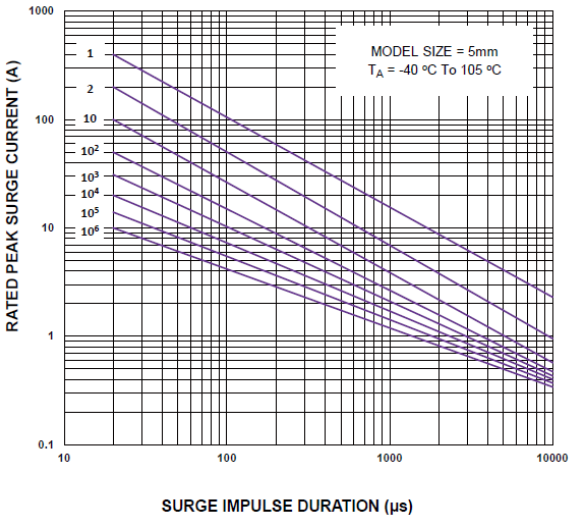
Spannung *Voltage*	**AC: 11 V - 460 V** **DC: 14 V - 615 V**	**max. Spitzenstrom** *max. Peak Current*	**100 A / 400 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**0,4 J - 18,0 J** *(@10/1000µs)*

Impulse Life Time Rating Curves:

For EMOV05180-D – EMOV05680-D:

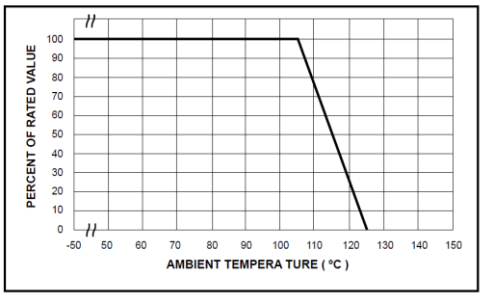


For EMOV05820-D – EMOV05751-D:

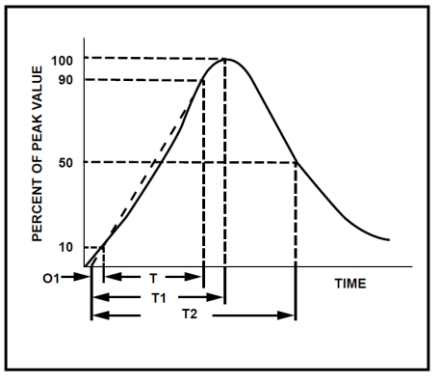


Power Derating Cuve:

Should transients occur in rapid succession, the average power dissipation is the energy (watt-seconds) per pulse times the number of pulses per second. The power so developed must be with the specifications shown on the Device Ratings and Specifications Table for the specific device. The operating values of a MOV need to be derated at high temperatures as shown above. Because varistors only dissipate a relatively small amount of average power they are not suitable for repetitive applications that involve substantial amounts of average power dissipation.



Surge Current Standard Waveform



O1 = Virtual Origin of Wave
T = Time from 10% to 90% of Peak
T1 = Rise Time = 1.25 x T
T2 = Decay Time
Example - For an 8/20 µs Current Waveform :
8µs = T1 = Rise Time
20µs = T2 = Decay Time

Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV05-D
AC / DC

ESKA *the protection company*

Ø 5 mm

Radial - D-Series

RoHS Compliant

Spannung *Voltage*	**AC: 11 V - 460 V** **DC: 14 V - 615 V**	**max. Spitzenstrom** *max. Peak Current*	**100 A / 400 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**0,4 J - 18,0 J** *(@10/1000µs)*

Drawings:

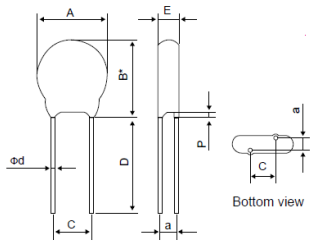


Fig 1. Straight Lead

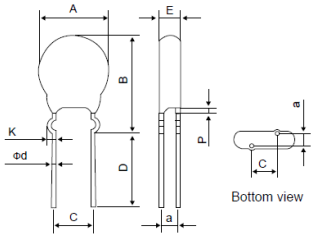


Fig 2. Outside Kink Lead

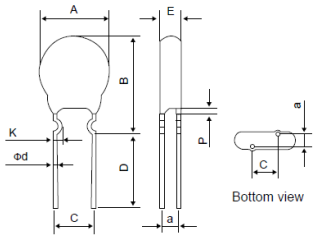


Fig 3. Inside Kink Lead

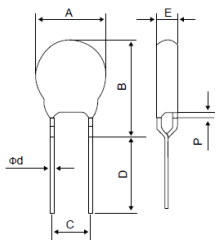


Fig 4. In Line Kink Lead

Symbol		min. [mm]	max. [mm]
A		5,5	7,5
B(max.)	180-D – 271-D	-	13,0
	> 271-D	-	13,0
B*(max.)		-	10,0
C (±1,0)		5,0	
D		25,0	
P(max.)		-	3,0
K		0,8	1,6
Φd (±0,05)		0,6	

Model	E (max.) [mm]	Model	E (max.) [mm]
05180-D	3,3	05301-D	3,9
05220-D	3,6	05331-D	4,0
05270-D	3,8	05361-D	4,1
05330-D	3,3	05391-D	4,2
05390-D	3,5	05431-D	4,4
05470-D	3,7	05471-D	4,6
05560-D	4,0	05511-D	4,8
05680-D	4,3	05561-D	5,0
05820-D	3,3	05621-D	5,3
05101-D	3,6	05681-D	5,4
05121-D	3,8	05751-D	5,6
05151-D	4,1		
05181-D	3,2		
05201-D	3,3		
05221-D	3,4		
05241-D	3,6		
05270-D	3,7		

Order Notes / Code:

1	2	3	4	5	6	7	8
EMOV	XX	XXX	-X	X	X	X	(XXX or A/B)

Pos. 1: Product family
Pos. 2: Disc diameter in [mm]
Pos. 3: Varistor voltage (two significant figures plus number of zeros that above)
Pos. 4: Standard series
Pos. 5 Tolerance of U_{N_DC} (@1mA): **K**=10% / **L**=15%
Pos. 6 Packaging: **B**=Bulk Pack / **B incl. XXX**$_{(Pos.8)}$=(Short Cut) Bulk Pack / **T**=Taped&Reeled / **A**=Flat Box Pack
Pos. 7 Lead Type: **S**=Straight (Fig.1) / **O**=Outside Kink (Fig.2) / **K**=Inside Kink (Fig.3) / **I**=In Line Kink (Fig.4)
Pos. 8 Optional: **XXX**=only for Short Cut version in [mm] (e.g. 12,5 mm) / **A** or **B**=Tape&Reel Pack Feed Hole Pitch (A=12,7 mm / B=15mm)

Example: EMOV05180-DKTSA

Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV05-D
AC / DC

ESKA *the protection company*

Ø 5 mm

Radial - D-Series

RoHS Compliant

Spannung *Voltage*	**AC: 11 V - 460 V** **DC: 14 V - 615 V**	**max. Spitzenstrom** *max. Peak Current*	**100 A / 400 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**0,4 J - 18,0 J** *(@10/1000µs)*

Tape and Reel Specifications:

(Note: Radial devices on tape are supplied with straight leads or inline kink leads)

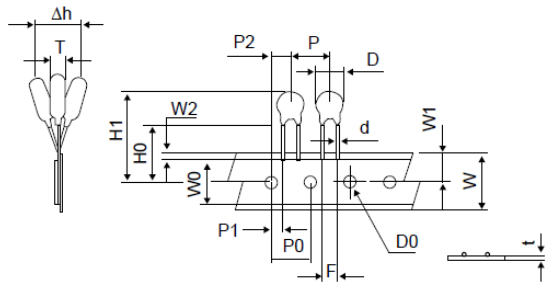


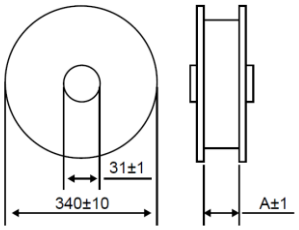
Figure : A

Symbol	Parameter	Dimensions [mm]
P	Pitch of Component	12,7 ± 1,0
P0	Feed Hole Pitch	12,7 ± 0,2
P1	Feed Hole Center Lead	3,85 ± 0,7
P2	Hole center to Component Center	6,35 ± 0,7
F	Lead to Lead Distance	5,0 ± 0,8
Δh	Component Alignment	max. 2,0
W	Tape Width	18,0 +1,0/-0,5
W0	Hold Down Fape Width	min. 5,0
W1	Hole Position	9,0 +0,75/-0,5
W2	Hold Down Tape Position	max. 3,0
H	Height from Tape Center to Component Base	18,0 +2,0/-0,0
H0	Seating Plane Height	16,0 ± 0,5
H1	Component Height	max. 29,0
D0	Feed Hole Diameter	4,0 ± 0,2
t	Total tape Thickness	0,7 ± 0,2
L	Length of Clopped Lead	max. 11,0

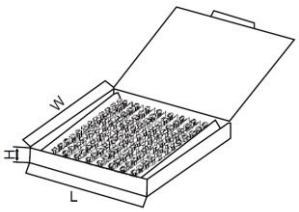
Packing Specifications:

Bulk Product Packing	**Quantity per bag**
Straight LeadType Quantity(pcs/bag)	1.000
Outside Kink LeadType Quantity(pcs/bag)	1.000
Inside Kink LeadType Quantity(pcs/bag)	1.000
In Line Kink LeadType Quantity(pcs/bag)	1.000

Tape and Reel Product Packing	**Dimension A [mm]:**	**Quatity per Reel**
EMOV05(180 ~ 391)-D	43	2.000
EMOV05(431 ~ 751)-D	43	1.500



Box Product Packing	**Dimension W-L-H [mm]:**	**Quatity per Box**
EMOV05(180 ~ 621)-D	340-245-45	1.000
EMOV05(681 ~ 751)-D	340-245-45	800



Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV05-V
AC / DC

ESKA *the protection company*

Ø 5 mm

Radial - V-Series

RoHS Compliant

Spannung *Voltage*	**AC: 130 V - 465 V** **DC: 170 V - 615 V**	**max. Spitzenstrom** *max. Peak Current*	**800 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**17,5 J - 48,0 J** *(@10/1000µs)*

Norm / *Standard:*	UL 1449-4
Anschluss / *Connection*:	Kupfer verzinnt / *Tin-plated copper*
Beschichtung / *Coating*:	Isolierende Beschichtung: Flammenhemmendes Epoxidharz (UL-94V-0) / *Insulating coating: Flame retardant epoxy (UL-94V-0)*
Betriebstemperatur / *Operating temperature*:	-40°C bis / to +105°C
Lötbarkeit / *Solderability*:	MIL-STD-202, Method 208E
Isolationswiderstand / *Insulation Resistance:*	>1000 MΩ
Ansprechzeit / *Response Time:*	<25 ns
Verpackungsmöglichkeiten / *Packing options*:	Siehe Verpackungsspezifikationen / *see packaging specifications*

Bemessungswerte / Ratings (@ 23°C):

Art. No.	U_{C_max} [V] AC (rms)	U_{C_max} [V] DC	U_{N_DC} (@1mA)[1] [V]	U_{Clamp_max} @Test Current (@8/20µs) [V]		E_{max} (@10/1000µs) [J]	I_{peak_max} (@8/20µs) [A]	P_{rat} [W]	$C_{typical}$ (@1KHz) [pF]
EMOV05201-V	130	170	200	355	@5 A	17,5	800	0,25	70
EMOV05221-V	140	180	220	380	@5 A	19	800	0,25	60
EMOV05241-V	150	200	240	415	@5 A	21	800	0,25	60
EMOV05271-V	175	225	270	475	@5 A	24	800	0,25	50
EMOV05301-V	195	250	300	505	@5 A	26	800	0,25	50
EMOV05331-V	215	275	330	585	@5 A	28	800	0,25	45
EMOV05361-V	230	300	360	620	@5 A	32	800	0,25	40
EMOV05391-V	250	320	390	675	@5 A	35	800	0,25	40
EMOV05431-V	275	350	430	745	@5 A	40	800	0,25	35
EMOV05471-V	300	385	470	810	@5 A	42	800	0,25	30
EMOV05511-V	320	410	510	878	@5 A	45	800	0,25	30
EMOV05561-V	350	460	560	940	@5 A	45	800	0,25	30
EMOV05621-V	395	510	620	1.050	@5 A	45	800	0,25	26
EMOV05681-V	420	560	680	1.120	@5 A	48	800	0,25	20
EMOV05751-V	465	615	750	1.240	@5 A	48	800	0,25	20

[1] Toleranz: / *Tolerance:* ±10 %

Legende / Caption:

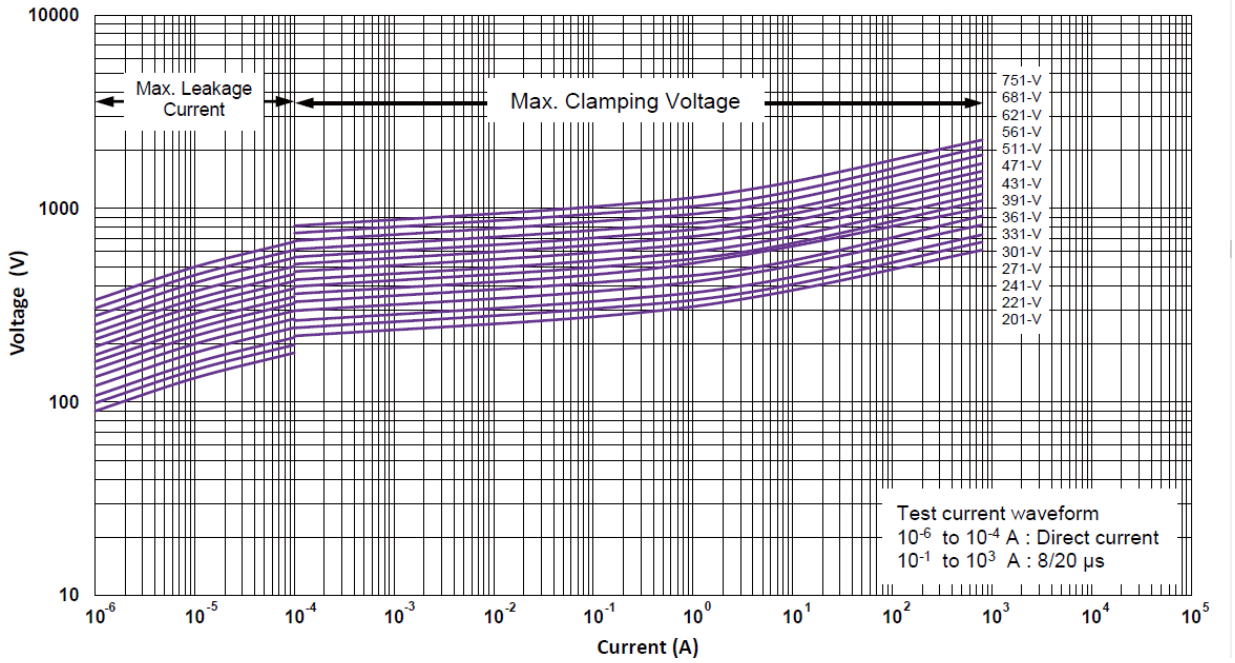
U_{C_max}	= max. Dauerspannung / *max. continuous voltage*	I_{peak_max}	= max. Spitzenstrom / *max. peak current*
U_{N_DC}	= Varistorspannung / *Varistor voltage*	P_{rat}	= Nennleistung / *Rated power*
U_{Clamp_max}	= max. Ansprechspannung / *max. clamping voltage*	$C_{typical}$	= typische Kapazität / *typical capacity*
E_{max}	= max. Energie / *max. Energy*		

Ø 5 mm Radial - V-Series RoHS Compliant

Spannung *Voltage*	**AC: 130 V - 465 V** **DC: 170 V - 615 V**	**max. Spitzenstrom** *max. Peak Current*	**800 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**17,5 J - 48,0 J** *(@10/1000µs)*

Transient U-I Characteristic Curves:

For EMOV05201-V – EMOV05751-V:



Ø 5 mm

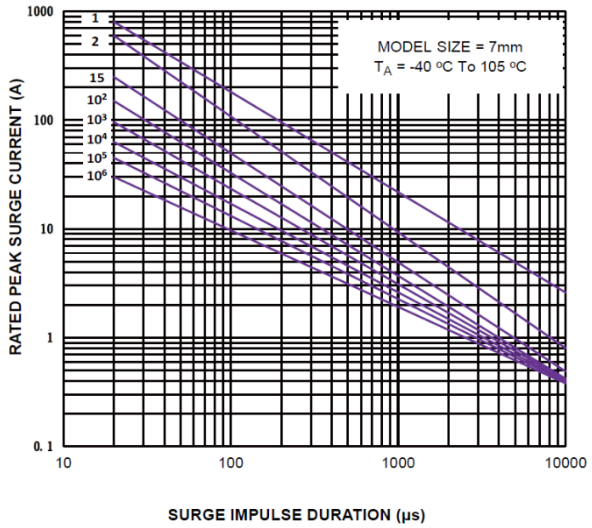
Radial - V-Series

RoHS Compliant

Spannung *Voltage*	**AC: 130 V - 465 V** **DC: 170 V - 615 V**	**max. Spitzenstrom** *max. Peak Current*	**800 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**17,5 J - 48,0 J** *(@10/1000µs)*

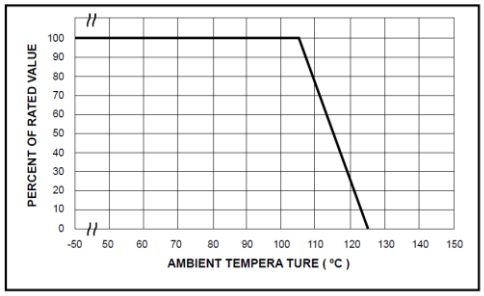
Impulse Life Time Rating Curves:

For EMOV05201-V – EMOV05751-V:

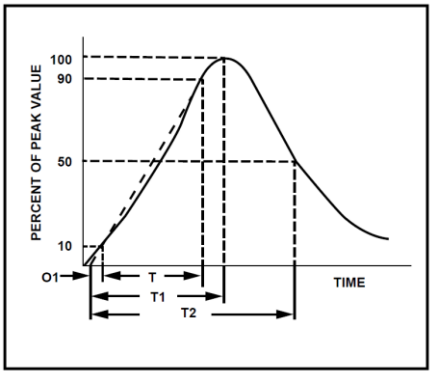


Power Derating Cuve:

Should transients occur in rapid succession, the average power dissipation is the energy (watt-seconds) per pulse times the number of pulses per second. The power so developed must be with the specifications shown on the Device Ratings and Specifications Table for the specific device. The operating values of a MOV need to be derated at high temperatures as shown above. Because varistors only dissipate a relatively small amount of average power they are not suitable for repetitive applications that involve substantial amounts of average power dissipation.



Surge Current Standard Waveform



O1 = Virtual Origin of Wave
T = Time from 10% to 90% of Peak
T1 = Rise Time = 1.25 x T
T2 = Decay Time
Example - For an 8/20 µs Current Waveform :
8µs = T1 = Rise Time
20µs = T2 = Decay Time

Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV05-V
AC / DC

ESKA the protection company

Ø 5 mm

Radial - V-Series

RoHS Compliant

Spannung *Voltage*	**AC: 130 V - 465 V** **DC: 170 V - 615 V**	**max. Spitzenstrom** *max. Peak Current*	**800 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**17,5 J - 48,0 J** *(@10/1000µs)*

Drawings:

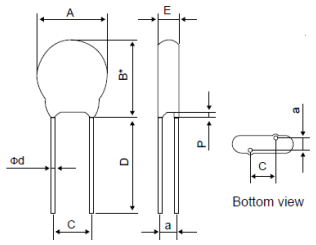


Fig 1. Straight Lead

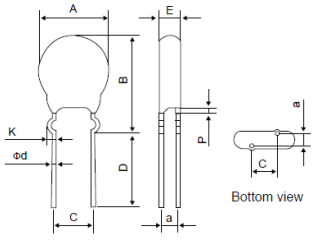


Fig 2. Outside Kink Lead

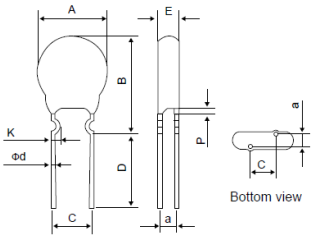


Fig 3. Inside Kink Lead

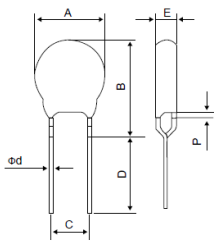


Fig 4. In Line Kink Lead

Symbol		min. [mm]	max. [mm]
A		5,5	7,5
B(max.)	180-V – 271-V	-	13,0
	> 271-V	-	13,0
B*(max.)		-	10,0
C (±1,0)		5,0	
D		25,0	
P(max.)		-	3,0
K		0,8	1,6
Φd (±0,05)		0,6	

Model	E (max.) [mm]	Model	E (max.) [mm]
EMOV05201-V	3,3	EMOV05431-V	4,4
EMOV05221-V	3,4	EMOV05471-V	4,6
EMOV05241-V	3,5	EMOV05511-V	4,8
EMOV05271-V	3,7	EMOV05561-V	5,0
EMOV05301-V	3,9	EMOV05621-V	5,3
EMOV05331-V	4,0	EMOV05681-V	5,4
EMOV05361-V	4,1	EMOV05751-V	5,6
EMOV05391-V	4,2		

Order Notes / Code:

1	2	3	4	5	6	7	8
EMOV	XX	XXX	-X	X	X	X	(XXX or A/B)

Pos. 1: Product family
Pos. 2: Disc diameter in [mm]
Pos. 3: Varistor voltage (two significant figures plus number of zeros that above)
Pos. 4: Standard series
Pos. 5 Tolerance of U_{N_DC} (@1mA): **K**=10% / **L**=15%
Pos. 6 Packaging: **B**=Bulk Pack / **B incl. XXX**(Pos.8)=(Short Cut) Bulk Pack / **T**=Taped&Reeled / **A**=Flat Box Pack
Pos. 7 Lead Type: **S**=Straight (Fig.1) / **O**=Outside Kink (Fig.2) / **K**=Inside Kink (Fig.3) / **I**=In Line Kink (Fig.4)
Pos. 8 Optional: **XXX**=only for Short Cut version in [mm] (e.g. 12,5 mm) / **A** or **B**=Tape&Reel Pack Feed Hole Pitch (A=12,7 mm / B=15mm)

Example: EMOV05201-VKTSA

Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV05-V
AC / DC

ESKA the protection company

Ø 5 mm

Radial - V-Series

RoHS Compliant

Spannung *Voltage*	**AC: 130 V - 465 V** **DC: 170 V - 615 V**	**max. Spitzenstrom** *max. Peak Current*	**800 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**17,5 J - 48,0 J** *(@10/1000µs)*

Tape and Reel Specifications:

(Note: Radial devices on tape are supplied with straight leads or inline kink leads)

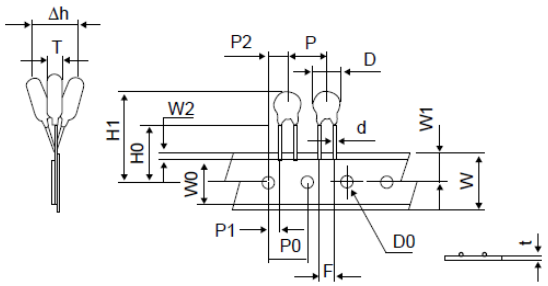


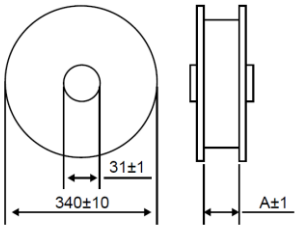
Figure : A

Symbol	Parameter	Dimensions [mm]
P	Pitch of Component	12,7 ± 1,0
P0	Feed Hole Pitch	12,7 ± 0,2
P1	Feed Hole Center Lead	3,85 ± 0,7
P2	Hole center to Component Center	6,35 ± 0,7
F	Lead to Lead Distance	5,0 ± 0,8
Δh	Component Alignment	max. 2,0
W	Tape Width	18,0 +1,0/-0,5
W0	Hold Down Fape Width	min. 5,0
W1	Hole Position	9,0 +0,75/-0,5
W2	Hold Down Tape Position	max. 3,0
H	Height from Tape Center to Component Base	18,0 +2,0/-0,0
H0	Seating Plane Height	16,0 ± 0,5
H1	Component Height	max. 32,0
D0	Feed Hole Diameter	4,0 ± 0,2
t	Total tape Thickness	0,7 ± 0,2
L	Length of Clopped Lead	max. 11,0

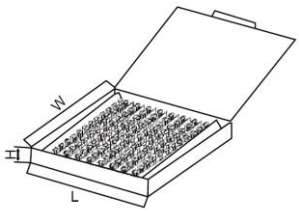
Packing Specifications:

Bulk Product Packing	**Quantity per bag**
Straight LeadType Quantity(pcs/bag)	1.000
Outside Kink LeadType Quantity(pcs/bag)	1.000
Inside Kink LeadType Quantity(pcs/bag)	1.000
In Line Kink LeadType Quantity(pcs/bag)	1.000

Tape and Reel Product Packing	**Dimension A [mm]:**	**Quatity per Reel**
EMOV05(201 ~ 391)-V-T	43	2.000
EMOV05(431 ~ 751)-V-T	43	1.500



Box Product Packing	**Dimension W-L-H [mm]:**	**Quatity per Box**
EMOV05(201 ~ 391)-V-A	340-245-45	1.000
EMOV05(431 ~ 751)-V-A	340-245-45	800



Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV07-D
AC / DC

ESKA *the protection company*

Ø 7 mm

Radial - D-Series

RoHS Compliant

Spannung *Voltage*	**AC: 11 V - 510 V** **DC: 14 V - 670 V**	**max. Spitzenstrom** *max. Peak Current*	**250 A / 1.200 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**0,9 J - 42 J** *(@10/1000µs)*

Norm / *Standard:*	UL 1449-4
Anschluss / *Connection*:	Kupfer verzinnt / *Tin-plated copper*
Beschichtung / *Coating*:	Isolierende Beschichtung: Flammenhemmendes Epoxidharz (UL-94V-0) / *Insulating coating: Flame retardant epoxy (UL-94V-0)*
Betriebstemperatur / *Operating temperature*:	-40°C bis / to +105°C
Lötbarkeit / *Solderability*:	MIL-STD-202, Method 208E
Isolationswiderstand / *Insulation Resistance:*	>1000 MΩ
Ansprechzeit / *Response Time:*	<25 ns
Verpackungsmöglichkeiten / *Packing options*:	Siehe Verpackungsspezifikationen / *see packaging specifications*

Bemessungswerte / Ratings (@ 23°C):

Art. No.	U_{C_max} [V] AC (rms)	U_{C_max} [V] DC	U_{N_DC} (@1mA)[1] [V]	U_{Clamp_max} [V]	@Test Current (@8/20µs)	E_{max} (@10/1000µs) [J]	I_{peak_max} (@8/20µs) [A]	P_{rat} [W]	$C_{typical}$ (@1KHz) [pF]
EMOV07180-D	11	14	18	36	@2,5 A	0,9	250	0,02	3.800
EMOV07220-D	14	18	22	43	@2,5 A	1,1	250	0,02	3.600
EMOV07270-D	17	22	27	53	@2,5 A	1,4	250	0,02	3.400
EMOV07330-D	20	26	33	65	@2,5 A	1,7	250	0,02	2.900
EMOV07390-D	25	31	39	77	@2,5 A	2,1	250	0,02	1.600
EMOV07470-D	30	38	47	93	@2,5 A	2,5	250	0,02	1.550
EMOV07560-D	35	45	56	110	@2,5 A	3,1	250	0,02	1.500
EMOV07680-D	40	56	68	135	@2,5 A	3,6	250	0,02	1.200
EMOV07820-D	50	65	82	135	@10 A	5,5	1.200	0,25	860
EMOV07101-D	60	85	100	165	@10 A	6,5	1.200	0,25	750
EMOV07121-D	75	100	120	200	@10 A	7,8	1.200	0,25	530
EMOV07151-D	95	125	150	250	@10 A	9,7	1.200	0,25	410
EMOV07181-D	115	150	180	300	@10 A	11,7	1.200	0,25	300
EMOV07201-D	130	170	200	340	@10 A	13	1.200	0,25	250
EMOV07221-D	140	180	225	360	@10 A	14	1.200	0,25	250
EMOV07241-D	150	200	240	395	@10 A	15	1.200	0,25	240
EMOV07271-D	175	225	275	455	@10 A	18	1.200	0,25	220
EMOV07301-D	195	250	300	500	@10 A	21	1.200	0,25	190
EMOV07331-D	215	275	330	550	@10 A	25	1.200	0,25	180
EMOV07361-D	230	300	360	595	@10 A	25	1.200	0,25	170
EMOV07391-D	250	320	390	650	@10 A	25	1.200	0,25	160
EMOV07431-D	275	350	430	710	@10 A	28	1.200	0,25	150
EMOV07471-D	300	385	470	775	@10 A	30	1.200	0,25	130
EMOV07511-D	320	410	510	845	@10 A	33	1.200	0,25	120
EMOV07561-D	350	460	560	915	@10 A	33	1.200	0,25	120
EMOV07621-D	395	510	620	1.020	@10 A	35	1.200	0,25	120
EMOV07681-D	420	560	680	1.120	@10 A	35	1.200	0,25	110
EMOV07751-D	465	615	750	1.235	@10 A	38	1.200	0,25	100
EMOV07781-D	485	640	780	1.290	@10 A	40	1.200	0,25	90
EMOV07821-D	510	670	820	1.355	@10 A	42	1.200	0,25	90

[1] Toleranz: / *Tolerance:* ±10 %

Legende / Caption:

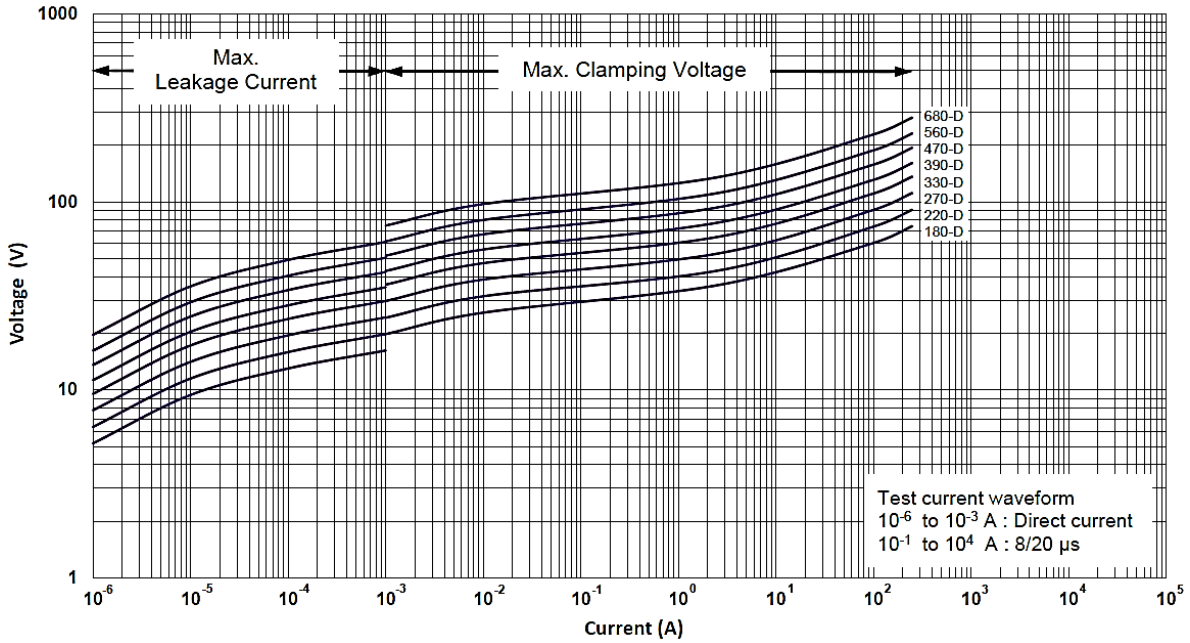
U_{C_max}	= max. Dauerspannung / *max. continuous voltage*	I_{peak_max}	= max. Spitzenstrom / *max. peak current*
U_{N_DC}	= Varistorspannung / *Varistor voltage*	P_{rat}	= Nennleistung / *Rated power*
U_{Clamp_max}	= max. Ansprechspannung / *max. clamping voltage*	$C_{typical}$	= typische Kapazität / *typical capacity*
E_{max}	= max. Energie / *max. Energy*		

Ø 7 mm Radial - D-Series

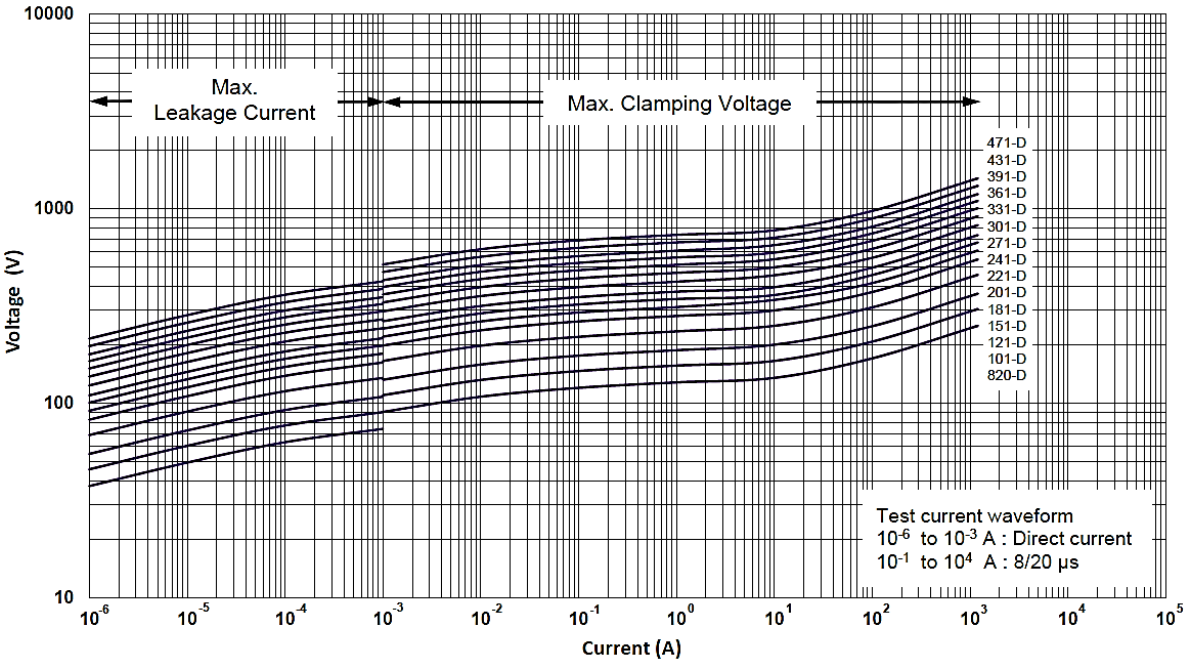
Spannung *Voltage*	**AC: 11 V - 510 V** **DC: 14 V - 670 V**	**max. Spitzenstrom** *max. Peak Current*	**250 A / 1.200 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**0,9 J - 42 J** *(@10/1000µs)*

Transient U-I Characteristic Curves:

Für / *For EMOV07180-D* bis / *to EMOV07680-D:*



Für / *For EMOV07820-D* bis / *to EMOV07471-D:*

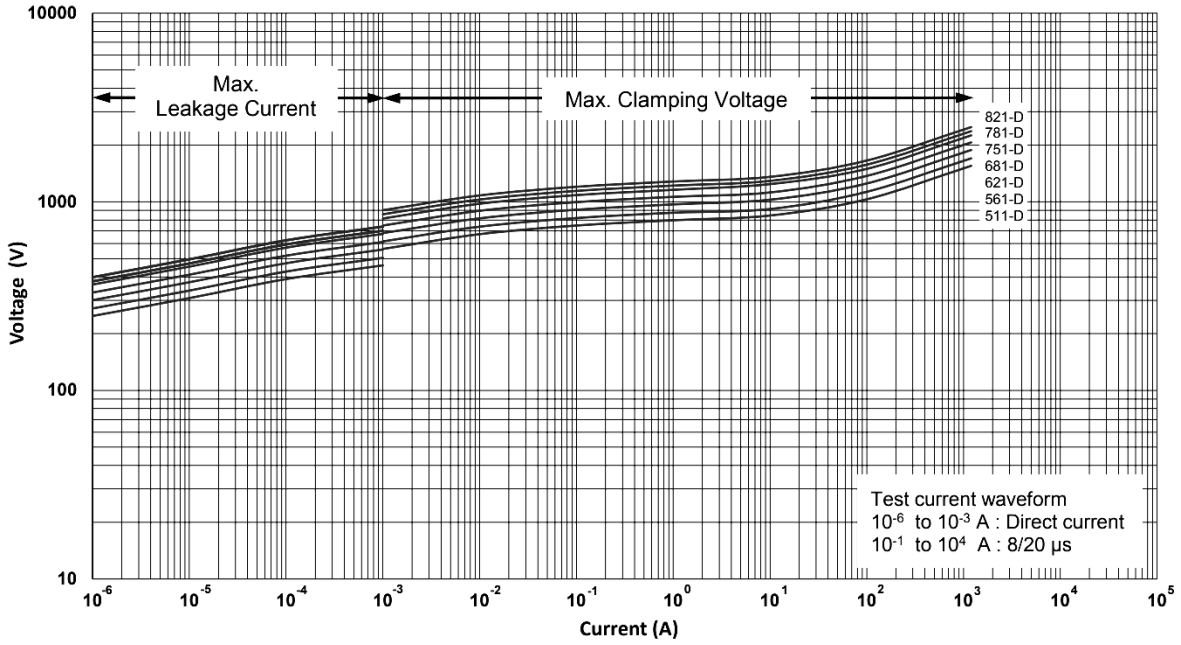


Ø 7 mm Radial - D-Series

Spannung *Voltage*	**AC: 11 V - 510 V** **DC: 14 V - 670 V**	**max. Spitzenstrom** *max. Peak Current*	**250 A / 1.200 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**0,9 J - 42 J** *(@10/1000µs)*

Transient U-I Characteristic Curves:

Für / *For EMOV07511-D* bis / *to EMOV07821-D:*



Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV07-D
AC / DC

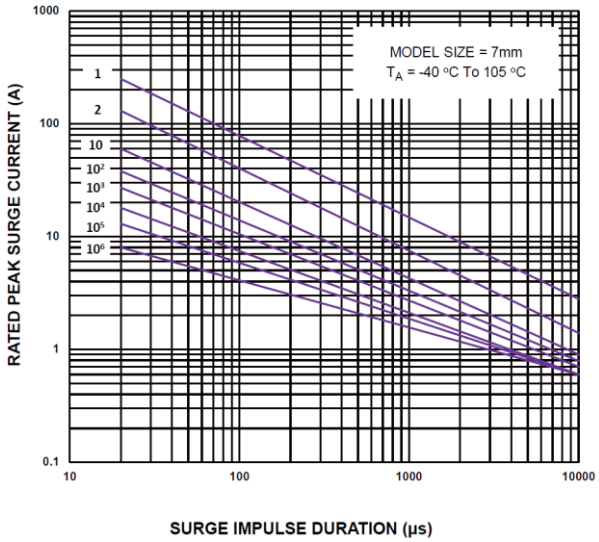
ESKA *the protection company*

Ø 7 mm Radial - D-Series

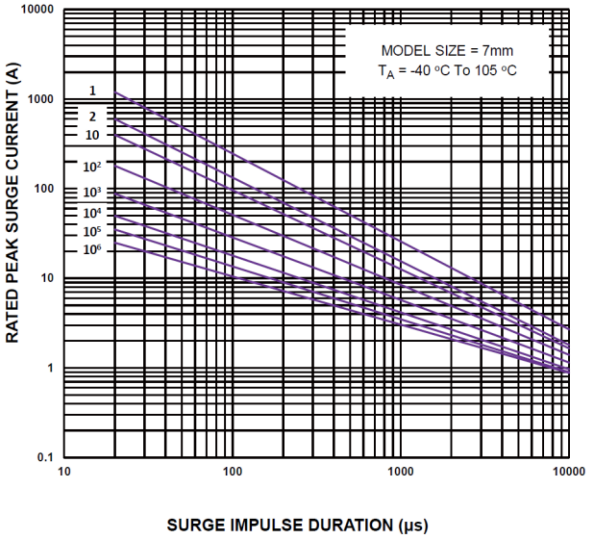
Spannung *Voltage*	**AC: 11 V - 510 V** **DC: 14 V - 670 V**	**max. Spitzenstrom** *max. Peak Current*	**250 A / 1.200 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**0,9 J - 42 J** *(@10/1000µs)*

Impulse Life Time Rating Curves:

Für / *For EMOV07180-D* bis / *to EMOV07680-D*

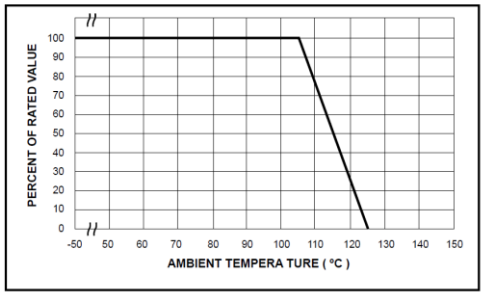


Für / *For EMOV07820-D* bis / *to EMOV07821-D*

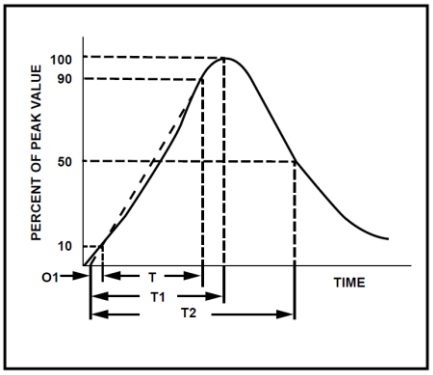


Power Derating Cuve:

Should transients occur in rapid succession, the average power dissipation is the energy (watt-seconds) per pulse times the number of pulses per second. The power so developed must be with the specifications shown on the Device Ratings and Specifications Table for the specific device. The operating values of a MOV need to be derated at high temperatures as shown above. Because varistors only dissipate a relatively small amount of average power they are not suitable for repetitive applications that involve substantial amounts of average power dissipation.



Surge Current Standard Waveform



O1 = Virtual Origin of Wave
T = Time from 10% to 90% of Peak
T1 = Rise Time = 1.25 x T
T2 = Decay Time
Example - For an 8/20 µs Current Waveform :
8µs = T1 = Rise Time
20µs = T2 = Decay Time

Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV07-D
AC / DC

ESKA the protection company

Ø 7 mm

Radial - D-Series

RoHS Compliant

Spannung *Voltage*	**AC: 11 V - 510 V** **DC: 14 V - 670 V**	**max. Spitzenstrom** *max. Peak Current*	**250 A / 1.200 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**0,9 J - 42 J** *(@10/1000µs)*

Drawings:

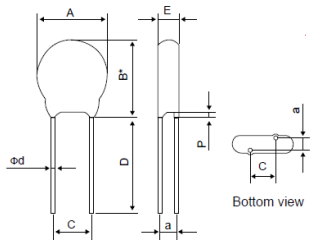


Fig 1. Straight Lead

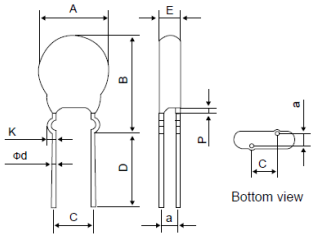


Fig 2. Outside Kink Lead

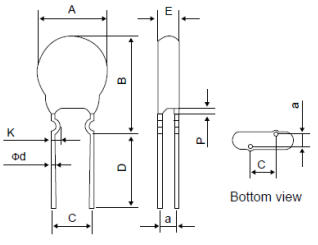


Fig 3. Inside Kink Lead

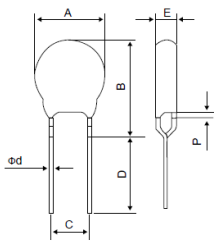


Fig 4. In Line Kink Lead

Symbol		min. [mm]	max. [mm]
A		7,5	9,0
B(max.)	180-D – 271-D	-	15,0
	> 271-D	-	15,0
B*(max.)		-	12,0
C (±1,0)		5,0	
D		25,0	
P(max.)		-	3,0
K		0,8	1,6
Φd (±0,05)		0,6	

Model	E (max.) [mm]	Model	E (max.) [mm]
07180-D	3,5	07301-D	4,1
07220-D	3,8	07331-D	4,2
07270-D	4,0	07361-D	4,3
07330-D	3,5	07391-D	4,4
07390-D	3,7	07431-D	4,6
05470-D	3,9	07471-D	4,8
07560-D	4,2	07511-D	5,0
07680-D	4,5	07561-D	5,2
05820-D	3,5	07621-D	5,5
07101-D	3,8	07681-D	5,6
07121-D	4,0	07751-D	5,8
07151-D	4,3	07778-D	6,0
07181-D	3,4	07821-D	6,3
07201-D	3,5		
07221-D	3,6		
07241-D	3,7		
07271-D	3,9		

Order Notes / Code:

1	2	3	4	5	6	7	8
EMOV	XX	XXX	-X	X	X	X	(XXX or A/B)

Pos. 1: Product family
Pos. 2: Disc diameter in [mm]
Pos. 3: Varistor voltage (two significant figures plus number of zeros that above)
Pos. 4: Standard series
Pos. 5 Tolerance of U_{N_DC} (@1mA): **K**=10% / **L**=15%
Pos. 6 Packaging: **B**=Bulk Pack / **B incl. XXX**$_{(Pos.8)}$=(Short Cut) Bulk Pack / **T**=Taped&Reeled / **A**=Flat Box Pack
Pos. 7 Lead Type: **S**=Straight (Fig.1) / **O**=Outside Kink (Fig.2) / **K**=Inside Kink (Fig.3) / **I**=In Line Kink (Fig.4)
Pos. 8 Optional: **XXX**=only for Short Cut version in [mm] (e.g. 12,5 mm) / **A** or **B**=Tape&Reel Pack Feed Hole Pitch (A=12,7 mm / B=15mm)

Example: EMOV07180-DKTSA

Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV07-D
AC / DC

ESKA the protection company

Ø 7 mm

Radial - D-Series

RoHS Compliant

Spannung *Voltage*	**AC: 11 V - 510 V** **DC: 14 V - 670 V**	**max. Spitzenstrom** *max. Peak Current*	**250 A / 1.200 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**0,9 J - 42 J** *(@10/1000µs)*

Tape and Reel Specifications:

(Note: Radial devices on tape are supplied with straight leads or inline kink leads)

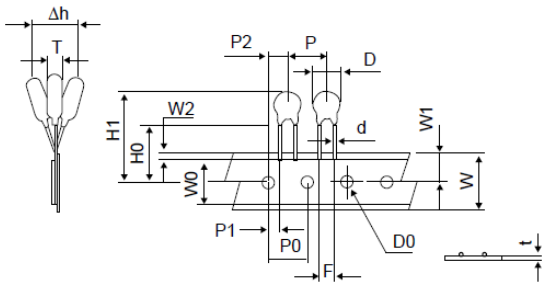


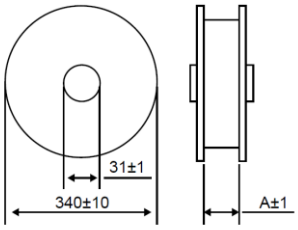
Figure : A

Symbol	Parameter	Dimensions [mm]
P	Pitch of Component	12,7 ±1,0
P0	Feed Hole Pitch	12,7 ±0,2
P1	Feed Hole Center Lead	3,85 ±0,7
P2	Hole center to Component Center	6,35 ±0,7
F	Lead to Lead Distance	5,0 ±0,8
Δh	Component Alignment	max. 2,0
W	Tape Width	18,0 +1,0/-0,5
W0	Hold Down Fape Width	min. 5,0
W1	Hole Position	9,0 +0,75/-0,5
W2	Hold Down Tape Position	max. 3,0
H	Height from Tape Center to Component Base	18,0 +2,0/-0,0
H0	Seating Plane Height	16,0 ± 0,5
H1	Component Height	max. 29,0
D0	Feed Hole Diameter	4,0 ±0,2
t	Total tape Thickness	0,7 ±0,2
L	Length of Clopped Lead	max. 11,0

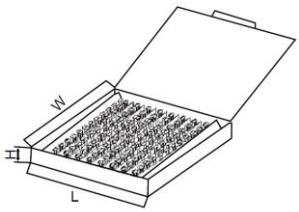
Packing Specifications:

Bulk Product Packing	**Quantity per bag**
Straight LeadType Quantity(pcs/bag)	1000
Outside Kink LeadType Quantity(pcs/bag)	1000
Inside Kink LeadType Quantity(pcs/bag)	1000
In Line Kink LeadType Quantity(pcs/bag)	1000

Tape and Reel Product Packing	**Dimension A [mm]:**	**Quatity per Reel**
EMOV05(180 ~ 391)-D	43	2000
EMOV05(431 ~ 751)-D	43	1500



Box Product Packing	**Dimension W-L-H [mm]:**	**Quatity per Box**
EMOV07(180 ~ 391)-D	340-245-45	1000
EMOV07(431 ~ 821)-D	340-245-45	800



Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV07-V
AC / DC

ESKA *the protection company*

Ø 7 mm

Radial - V-Series

RoHS Compliant

Spannung *Voltage*	**AC: 130 V - 510 V** **DC: 170 V - 670 V**	**max. Spitzenstrom** *max. Peak Current*	**1.800 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**17,5 J - 50,0 J** *(@10/1000µs)*

Norm / *Standard:*	UL 1449-4
Anschluss / *Connection*:	Kupfer verzinnt / *Tin-plated copper*
Beschichtung / *Coating*:	Isolierende Beschichtung: Flammenhemmendes Epoxidharz (UL-94V-0) / *Insulating coating: Flame retardant epoxy (UL-94V-0)*
Betriebstemperatur / *Operating temperature*:	-40°C bis / to +105°C
Lötbarkeit / *Solderability*:	MIL-STD-202, Method 208E
Isolationswiderstand / *Insulation Resistance:*	>1000 MΩ
Ansprechzeit / *Response Time:*	<25 ns
Verpackungsmöglichkeiten / *Packing options*:	Siehe Verpackungsspezifikationen / *see packaging specifications*

Bemessungswerte / Ratings (@ 23°C):

Art. No.	U_{C_max} [V] AC (rms)	U_{C_max} [V] DC	U_{N_DC} (@1mA)[1] [V]	U_{Clamp_max} @Test Current (@8/20µs) [V]		E_{max} (@10/1000µs) [J]	I_{peak_max} (@8/20µs) [A]	P_{rat} [W]	$C_{typical}$ (@1KHz) [pF]
EMOV07201-V	130	170	200	355	@10 A	17,5	1.800	0,25	200
EMOV07221-V	140	180	220	380	@10 A	19	1.800	0,25	190
EMOV07241-V	150	200	240	415	@10 A	21	1.800	0,25	170
EMOV07271-V	175	225	270	475	@10 A	24	1.800	0,25	150
EMOV07301-V	195	250	300	505	@10 A	26	1.800	0,25	140
EMOV07331-V	215	275	330	585	@10 A	28	1.800	0,25	130
EMOV07361-V	230	300	360	620	@10 A	32	1.800	0,25	130
EMOV07391-V	250	320	390	675	@10 A	35	1.800	0,25	130
EMOV07431-V	275	350	430	745	@10 A	40	1.800	0,25	120
EMOV07471-V	300	385	470	810	@10 A	42	1.800	0,25	100
EMOV07511-V	320	410	510	878	@10 A	45	1.800	0,25	90
EMOV07561-V	350	460	560	940	@10 A	45	1.800	0,25	90
EMOV07621-V	395	510	620	1.050	@10 A	45	1.800	0,25	90
EMOV07681-V	420	560	680	1.120	@10 A	48	1.800	0,25	80
EMOV07751-V	465	615	750	1.240	@10 A	48	1.800	0,25	80
EMOV07781-V	485	640	780	1.290	@10 A	50	1.800	0,25	80
EMOV07821-V	510	670	820	1.355	@10 A	50	1.800	0,25	70

[1] Toleranz: / *Tolerance:* ±10 %

Legende / Caption:

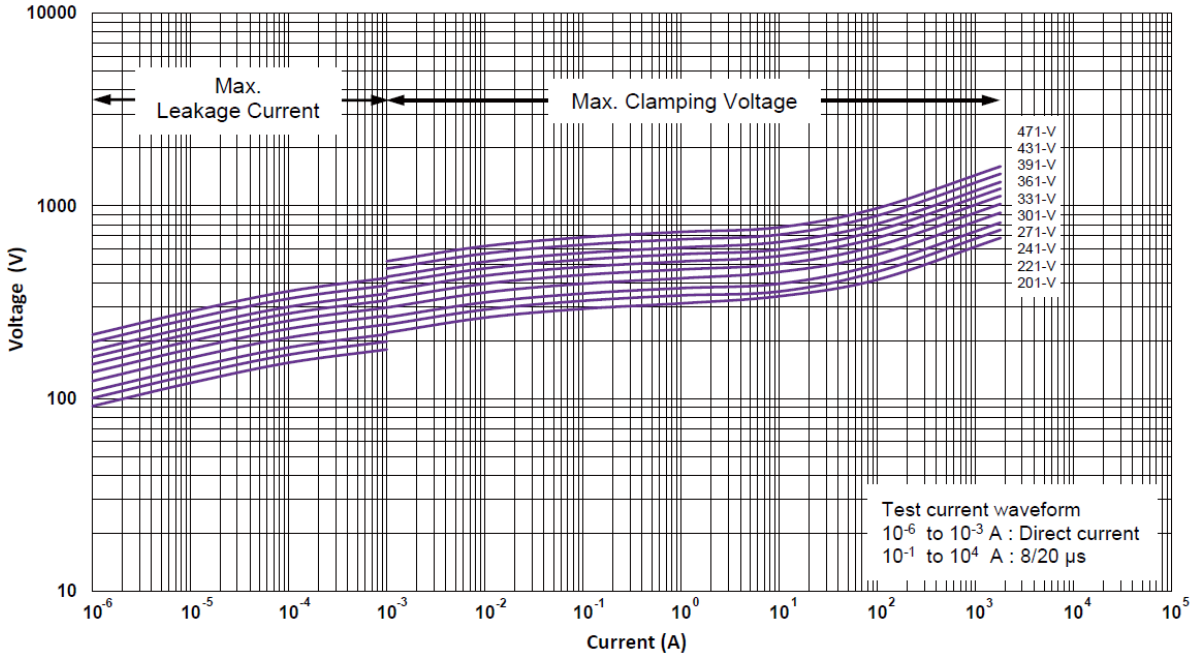
U_{C_max}	= max. Dauerspannung / *max. continuous voltage*	I_{peak_max}	= max. Spitzenstrom / *max. peak current*
U_{N_DC}	= Varistorspannung / *Varistor voltage*	P_{rat}	= Nennleistung / *Rated power*
U_{Clamp_max}	= max. Ansprechspannung / *max. clamping voltage*	$C_{typical}$	= typische Kapazität / *typical capacity*
E_{max}	= max. Energie / *max. Energy*		

Ø 7 mm Radial - V-Series RoHS Compliant

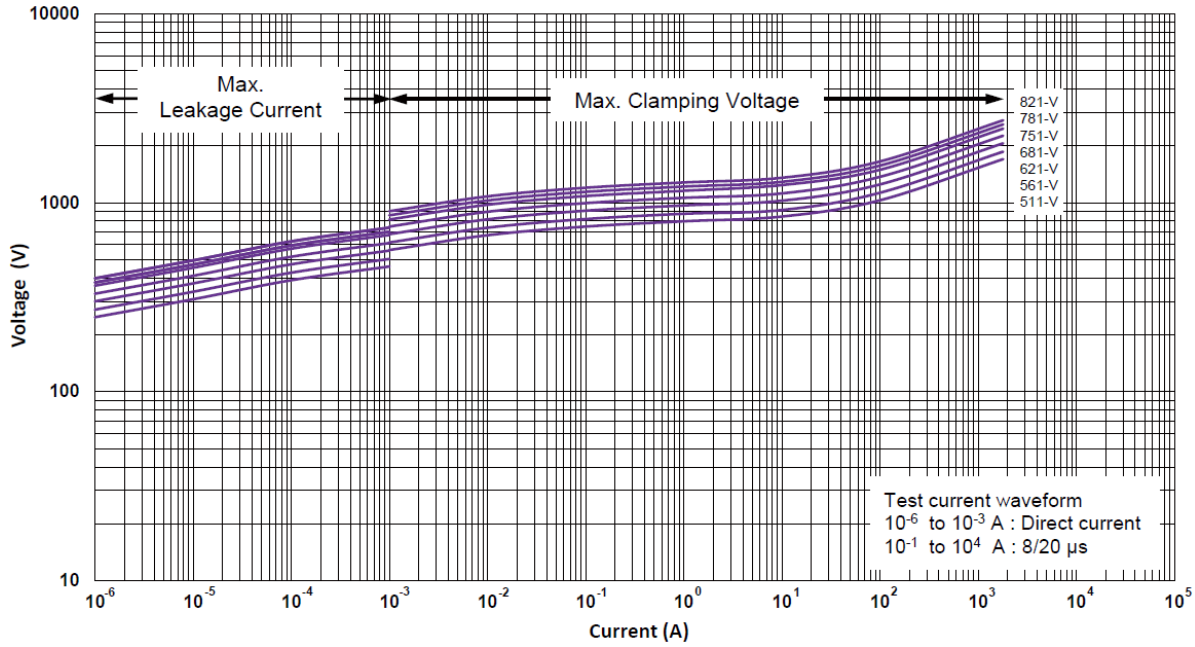
Spannung *Voltage*	**AC: 130 V - 510 V** **DC: 170 V - 670 V**	**max. Spitzenstrom** *max. Peak Current*	**1.800 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**17,5 J - 50,0 J** *(@10/1000µs)*

Transient U-I Characteristic Curves:

For EMOV07201-V – EMOV07471-V:



For EMOV07511-V – EMOV07821-V:



Ø 7 mm

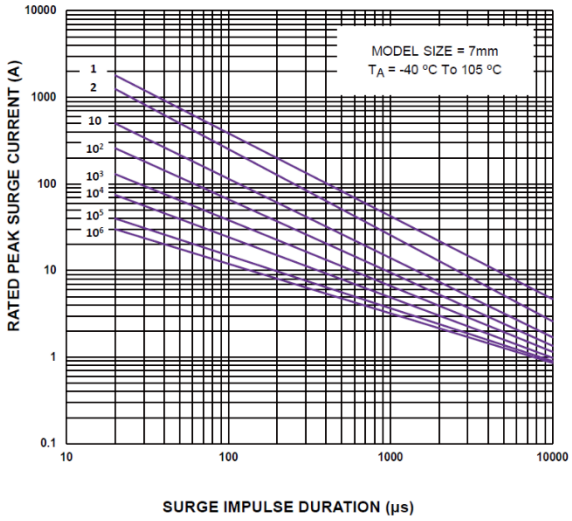
Radial - V-Series

RoHS Compliant

Spannung *Voltage*	**AC: 130 V - 510 V** **DC: 170 V - 670 V**	**max. Spitzenstrom** *max. Peak Current*	**1.800 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**17,5 J - 50,0 J** *(@10/1000µs)*

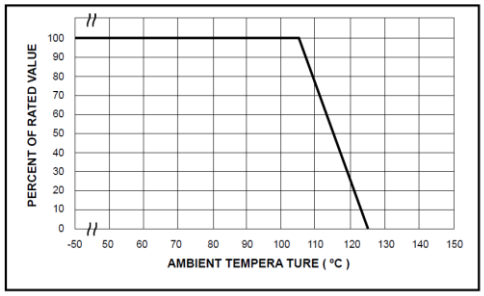
Impulse Life Time Rating Curves:

For EMOV07201-V – EMOV07821-V:

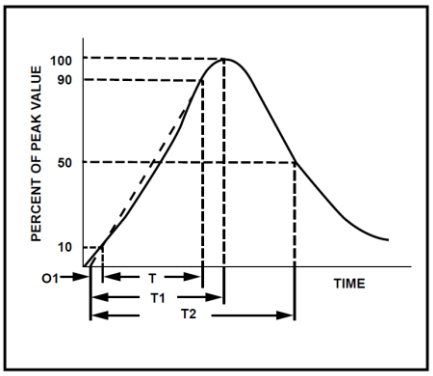


Power Derating Cuve:

Should transients occur in rapid succession, the average power dissipation is the energy (watt-seconds) per pulse times the number of pulses per second. The power so developed must be with the specifications shown on the Device Ratings and Specifications Table for the specific device. The operating values of a MOV need to be derated at high temperatures as shown above. Because varistors only dissipate a relatively small amount of average power they are not suitable for repetitive applications that involve substantial amounts of average power dissipation.



Surge Current Standard Waveform



O1 = Virtual Origin of Wave
T = Time from 10% to 90% of Peak
T1 = Rise Time = 1.25 x T
T2 = Decay Time
Example - For an 8/20 µs Current Waveform :
8µs = T1 = Rise Time
20µs = T2 = Decay Time

Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV07-V
AC / DC

ESKA the protection company

Ø 7 mm

Radial - V-Series

RoHS Compliant

Spannung *Voltage*	**AC: 130 V - 510 V** **DC: 170 V - 670 V**	**max. Spitzenstrom** *max. Peak Current*	**1.800 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**17,5 J - 50,0 J** *(@10/1000µs)*

Drawings:

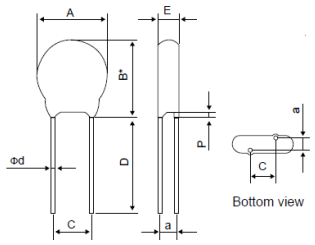


Fig 1. Straight Lead

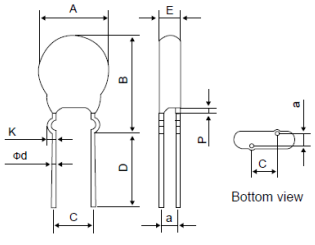


Fig 2. Outside Kink Lead

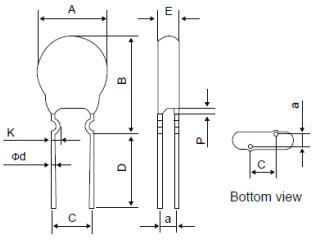


Fig 3. Inside Kink Lead

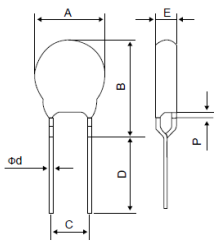


Fig 4. In Line Kink Lead

Symbol		min. [mm]	max. [mm]
A		7,5	9,0
B(max.)	180-V – 271-V	-	15,0
	> 271-V	-	15,0
B*(max.)		-	12,0
C (±1,0)		5,0	
D		25,0	
P(max.)		-	3,0
K		0,8	1,6
Φd (±0,05)		0,6	

Model	E (max.) [mm]	Model	E (max.) [mm]
EMOV07201-V	3,5	EMOV07471-V	4,8
EMOV07221-V	3,6	EMOV07511-V	5,0
EMOV07241-V	3,7	EMOV07561-V	5,2
EMOV07271-V	3,9	EMOV07621-V	5,5
EMOV07301-V	4,1	EMOV07681-V	5,6
EMOV07331-V	4,2	EMOV07751-V	5,8
EMOV07361-V	4,3	EMOV07781-V	6,0
EMOV07391-V	4,4	EMOV07821-V	6,3
EMOV07431-V	4,6		

Order Notes / Code:

1	2	3	4	5	6	7	8
EMOV	XX	XXX	-X	X	X	X	(XXX or A/B)

Pos. 1: Product family
Pos. 2: Disc diameter in [mm]
Pos. 3: Varistor voltage (two significant figures plus number of zeros that above)
Pos. 4: Standard series
Pos. 5 Tolerance of U_{N_DC} (@1mA): **K**=10% / **L**=15%
Pos. 6 Packaging: **B**=Bulk Pack / **B incl. XXX**(Pos.8)=(Short Cut) Bulk Pack / **T**=Taped&Reeled / **A**=Flat Box Pack
Pos. 7 Lead Type: **S**=Straight (Fig.1) / **O**=Outside Kink (Fig.2) / **K**=Inside Kink (Fig.3) / **I**=In Line Kink (Fig.4)
Pos. 8 Optional: **XXX**=only for Short Cut version in [mm] (e.g. 12,5 mm) / **A** or **B**=Tape&Reel Pack Feed Hole Pitch (A=12,7 mm / B=15mm)

Example: EMOV07201-VKTSA

Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV07-V
AC / DC

ESKA the protection company

Ø 7 mm

Radial - V-Series

RoHS Compliant

Spannung *Voltage*	**AC: 130 V - 510 V** **DC: 170 V - 670 V**	**max. Spitzenstrom** *max. Peak Current*	**1.800 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**17,5 J - 50,0 J** *(@10/1000µs)*

Tape and Reel Specifications:

(Note: Radial devices on tape are supplied with straight leads or inline kink leads)

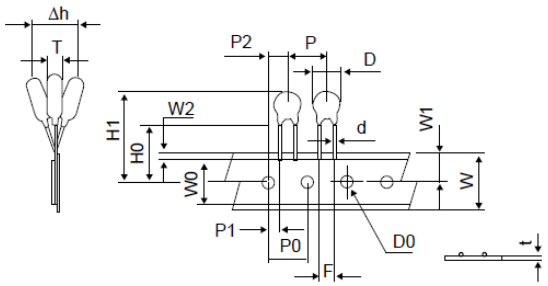


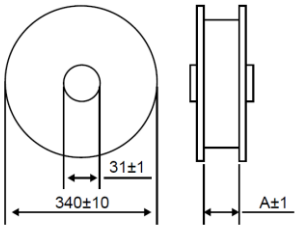
Figure : A

Symbol	Parameter	Dimensions [mm]
P	Pitch of Component	12,7 ± 1,0
P0	Feed Hole Pitch	12,7 ± 0,2
P1	Feed Hole Center Lead	3,85 ± 0,7
P2	Hole center to Component Center	6,35 ± 0,7
F	Lead to Lead Distance	5,0 ± 0,8
Δh	Component Alignment	max. 2,0
W	Tape Width	18,0 +1,0/-0,5
W0	Hold Down Fape Width	min. 5,0
W1	Hole Position	9,0 +0,75/-0,5
W2	Hold Down Tape Position	max. 3,0
H	Height from Tape Center to Component Base	18,0 +2,0/-0,0
H0	Seating Plane Height	16,0 ± 0,5
H1	Component Height	max. 32,0
D0	Feed Hole Diameter	4,0 ± 0,2
t	Total tape Thickness	0,7 ± 0,2
L	Length of Clopped Lead	max. 11,0

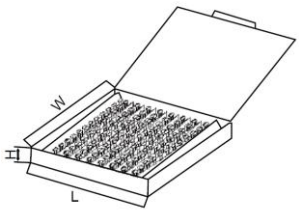
Packing Specifications:

Bulk Product Packing	**Quantity per bag**
Straight LeadType Quantity(pcs/bag)	1.000
Outside Kink LeadType Quantity(pcs/bag)	1.000
Inside Kink LeadType Quantity(pcs/bag)	1.000
In Line Kink LeadType Quantity(pcs/bag)	1.000

Tape and Reel Product Packing	**Dimension A [mm]:**	**Quatity per Reel**
EMOV07(201 ~ 391)-V-T	43	2.000
EMOV07(431 ~ 821)-V-T	43	1.500



Box Product Packing	**Dimension W-L-H [mm]:**	**Quatity per Box**
EMOV07(201 ~ 391)-V-A	340-245-45	1.000
EMOV07(431 ~ 821)-V-A	340-245-45	800



Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV10-D
AC / DC

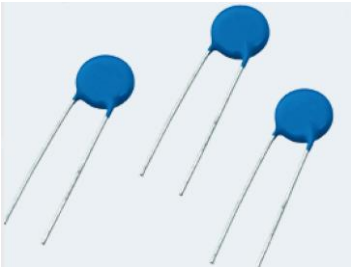
ESKA *the protection company*

Ø 10 mm

Radial - D-Series

RoHS Compliant

Spannung *Voltage*	**AC: 11 V – 1000 V** **DC: 14 V – 1465 V**	**max. Spitzenstrom** *max. Peak Current*	**500 A / 2500 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**2,1 J - 185 J** *(@10/1000µs)*



Norm / *Standard:*	UL 1449-4
Anschluss / *Connection*:	Kupfer verzinnt / *Tin-plated copper*
Beschichtung / *Coating*:	Isolierende Beschichtung: Flammenhemmendes Epoxidharz (UL-94V-0) / *Insulating coating: Flame retardant epoxy (UL-94V-0)*
Betriebstemperatur / *Operating temperature*:	-40°C bis / to +105°C
Lötbarkeit / *Solderability*:	MIL-STD-202, Method 208E
Isolationswiderstand / *Insulation Resistance:*	>1000 MΩ
Ansprechzeit / *Response Time:*	<25 ns
Verpackungsmöglichkeiten / *Packing options*:	Siehe Verpackungsspezifikationen / *see packaging specifications*

Bemessungswerte / Ratings (@ 23°C):

Art. No.	U_{C_max} [V] AC (rms)	U_{C_max} [V] DC	$U_{N\_DC\ (@1mA)}$ [1)] [V]	U_{Clamp_max} @Test Current (@8/20µs) [V]	E_{max} (@10/1000µs) [J]	I_{peak_max} (@8/20µs) [A]	P_{rat} [W]	$C_{typical}$ (@1KHz) [pF]
EMOV10180-D	11	14	18	36 @5 A	2,1	500	0,05	16.000
EMOV10220-D	14	18	22	43 @5 A	2,5	500	0,05	11.000
EMOV10270-D	17	22	27	53 @5 A	3,0	500	0,05	8.000
EMOV10330-D	20	26	33	65 @5 A	4,0	500	0,05	6.300
EMOV10390-D	25	31	39	77 @5 A	4,6	500	0,05	5.200
EMOV10470-D	30	38	47	93 @5 A	5,5	500	0,05	4.600
EMOV10560-D	35	45	56	110 @5 A	7,0	500	0,05	3.750
EMOV10680-D	40	56	68	135 @5 A	8,2	500	0,05	2.800
EMOV10820-D	50	65	82	135 @25 A	12	2.500	0,4	1.920
EMOV10101-D	60	85	100	165 @25 A	15	2.500	0,4	1.800
EMOV10121-D	75	100	120	200 @25 A	18	2.500	0,4	1.500
EMOV10151-D	95	125	150	250 @25 A	22	2.500	0,4	1.200
EMOV10181-D	115	150	180	300 @25 A	27	2.500	0,4	620
EMOV10201-D	130	170	200	340 @25 A	30	2.500	0,4	570
EMOV10221-D	140	180	225	360 @25 A	32	2.500	0,4	560
EMOV10241-D	150	200	240	395 @25 A	35	2.500	0,4	550
EMOV10271-D	175	225	275	455 @25 A	40	2.500	0,4	530
EMOV10301-D	195	250	300	500 @25 A	42	2.500	0,4	500
EMOV10331-D	215	275	330	550 @25 A	47	2.500	0,4	450
EMOV10361-D	230	300	360	595 @25 A	47	2.500	0,4	450
EMOV10391-D	250	320	390	650 @25 A	60	2.500	0,4	430
EMOV10431-D	275	350	430	710 @25 A	65	2.500	0,4	400
EMOV10471-D	300	385	470	775 @25 A	70	2.500	0,4	300
EMOV10511-D	320	410	510	845 @25 A	70	2.500	0,4	260
EMOV10561-D	350	460	560	915 @25 A	70	2.500	0,4	200
EMOV10621-D	395	510	620	1.020 @25 A	70	2.500	0,4	170
EMOV10681-D	420	560	680	1.120 @25 A	70	2.500	0,4	160
EMOV10751-D	465	615	750	1.235 @25 A	75	2.500	0,4	150
EMOV10781-D	485	640	780	1.290 @25 A	80	2.500	0,4	150
EMOV10821-D	510	670	820	1.355 @25 A	85	2.500	0,4	150
EMOV10911-D	550	745	910	1.500 @25 A	93	2.500	0,4	140
EMOV10102-D	625	825	1.000	1.650 @25 A	102	2.500	0,4	140
EMOV10112-D	680	895	1.100	1.815 @25 A	115	2.500	0,4	130
EMOV10182-D	1.000	1.465	1.800	2.950 @25 A	185	2.500	0,4	75

[1)] Toleranz: / *Tolerance:* ±10 %

Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV10-D
AC / DC

ESKA *the protection company*

Ø 10 mm

Radial - D-Series

RoHS Compliant

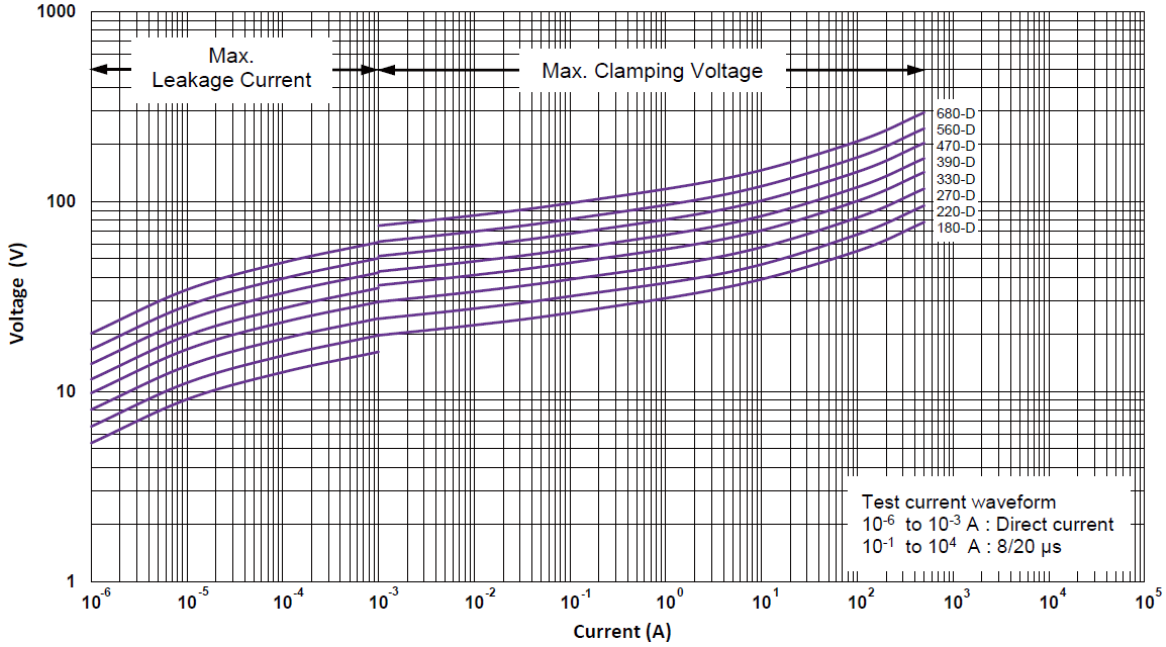
Spannung *Voltage*	**AC: 11 V – 1000 V** **DC: 14 V – 1465 V**	**max. Spitzenstrom** *max. Peak Current*	**500 A / 2500 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**2,1 J - 185 J** *(@10/1000µs)*

Legende / Caption:

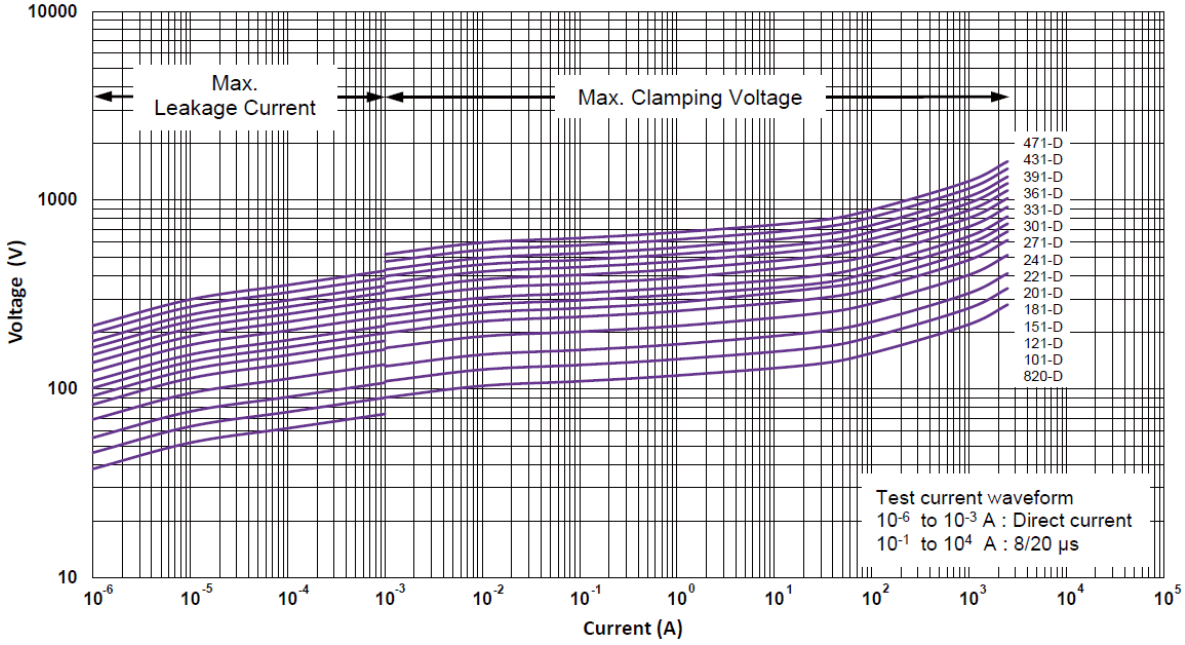
U_{C_max}	= max. Dauerspannung / *max. continuous voltage*
U_{N_DC}	= Varistorspannung / *Varistor voltage*
U_{Clamp_max}	= max. Ansprechspannung / *max. clamping voltage*
E_{max}	= max. Energie / *max. Energy*
I_{peak_max}	= max. Spitzenstrom / *max. peak current*
P_{rat}	= Nennleistung / *Rated power*
$C_{typical}$	= typische Kapazität / *typical capacity*

Transient U-I Characteristic Curves:

Für / *For EMOV10180-D* bis / *to EMOV10380-D:*



Für / *For EMOV10820-D* bis / *to EMOV10471-D:*



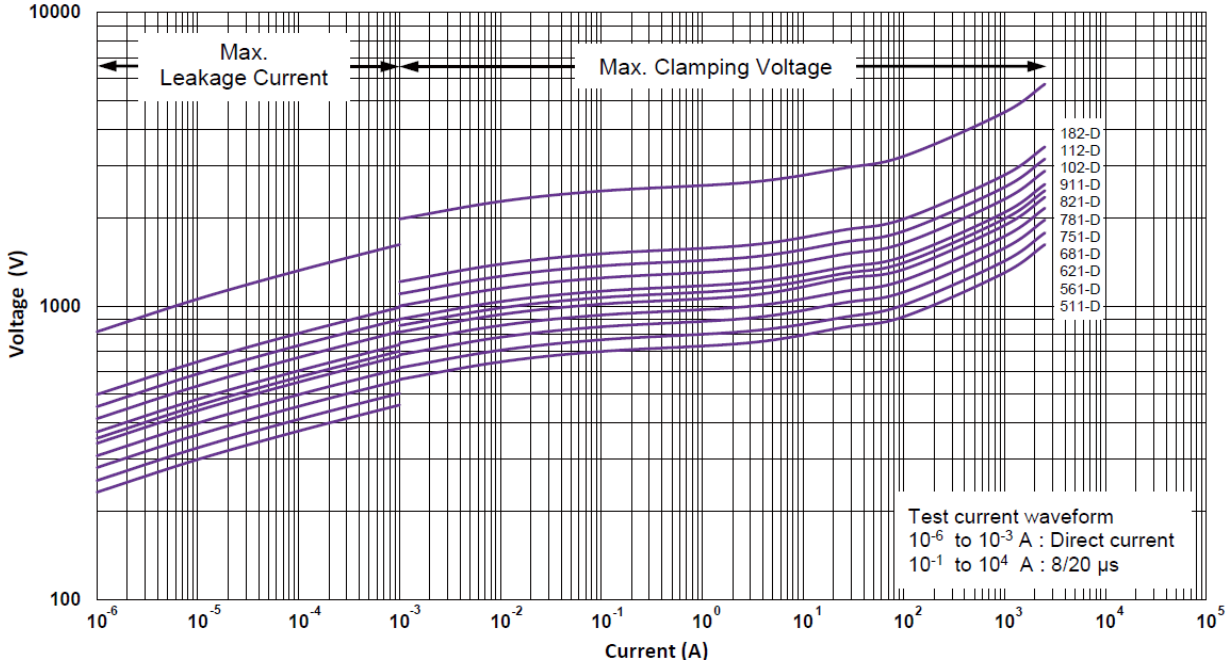
Ø 10 mm

Radial - D-Series

RoHS Compliant

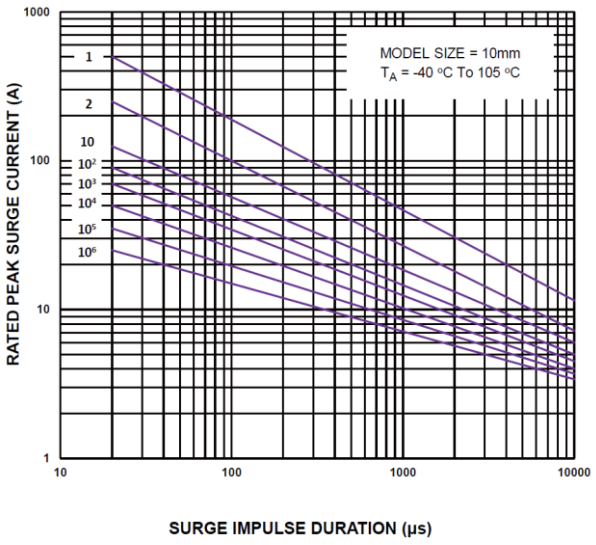
Spannung *Voltage*	**AC: 11 V – 1000 V** **DC: 14 V – 1465 V**	**max. Spitzenstrom** *max. Peak Current*	**500 A / 2500 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**2,1 J - 185 J** *(@10/1000µs)*

Für / *For EMOV10511-D* bis / *to EMOV10182-D:*

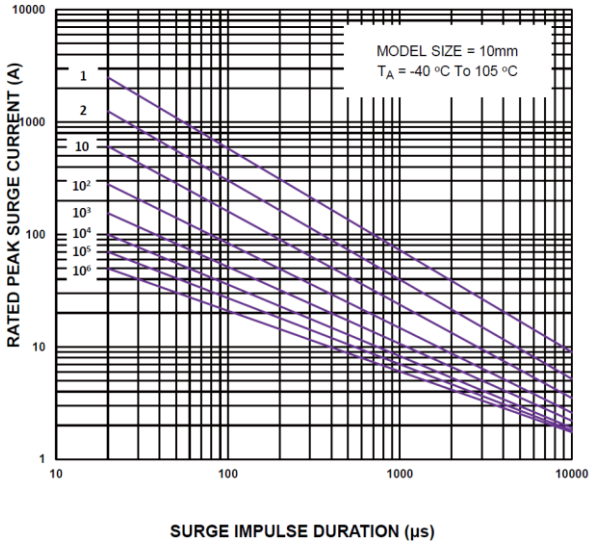


Impulse Life Time Rating Curves:

Für / *For EMOV10180-D* bis / *to EMOV10680-D:*



Für / *For EMOV10820-D* bis / *to EMOV10751-D:*



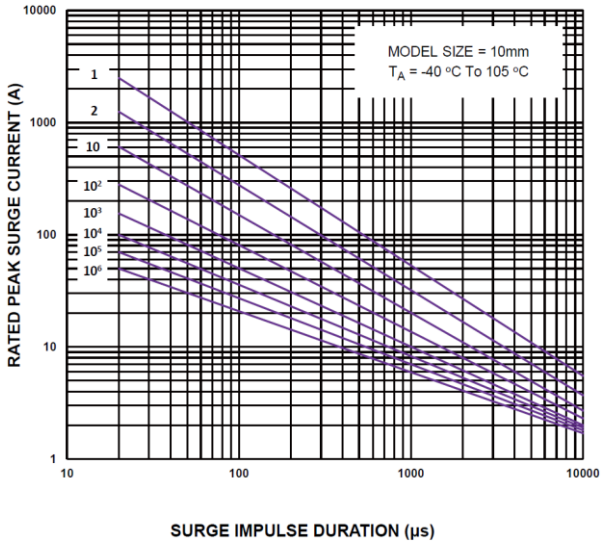
Ø 10 mm

Radial - D-Series

RoHS Compliant

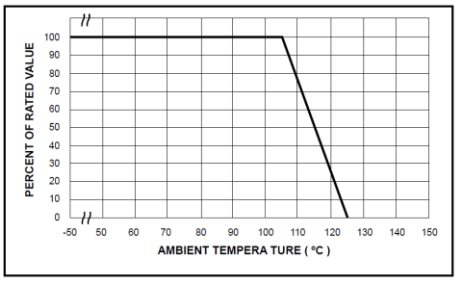
Spannung *Voltage*	**AC: 11 V – 1000 V** **DC: 14 V – 1465 V**	**max. Spitzenstrom** *max. Peak Current*	**500 A / 2500 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**2,1 J - 185 J** *(@10/1000µs)*

Für / *For EMOV10781-D* bis / *to EMOV10182-D:*

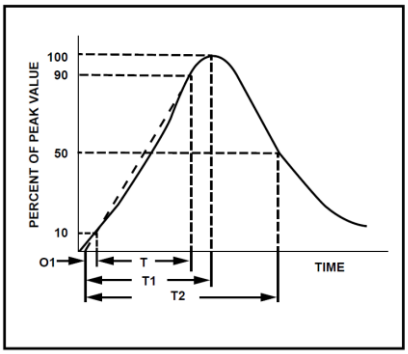


Power Derating Cuve:

Should transients occur in rapid succession, the average power dissipation is the energy (watt-seconds) per pulse times the number of pulses per second. The power so developed must be with the specifications shown on the Device Ratings and Specifications Table for the specific device. The operating values of a MOV need to be derated at high temperatures as shown above. Because varistors only dissipate a relatively small amount of average power they are not suitable for repetitive applications that involve substantial amounts of average power dissipation.



Surge Current Standard Waveform



O1 = Virtual Origin of Wave
T = Time from 10% to 90% of Peak
T1 = Rise Time = 1.25 x T
T2 = Decay Time
Example - For an 8/20 µs Current Waveform :
8µs = T1 = Rise Time
20µs = T2 = Decay Time

Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV10-D
AC / DC

ESKA the protection company

Ø 10 mm

Radial - D-Series

RoHS Compliant

Spannung *Voltage*	**AC: 11 V – 1000 V** **DC: 14 V – 1465 V**	**max. Spitzenstrom** *max. Peak Current*	**500 A / 2500 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**2,1 J - 185 J** *(@10/1000µs)*

Drawings:

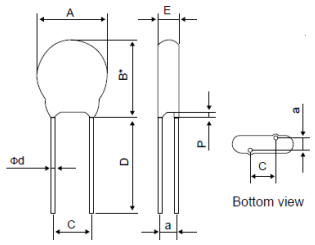


Fig 1. Straight Lead

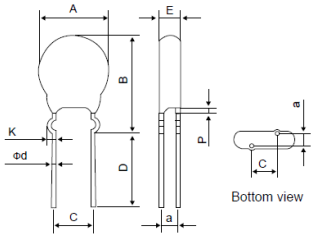


Fig 2. Outside Kink Lead

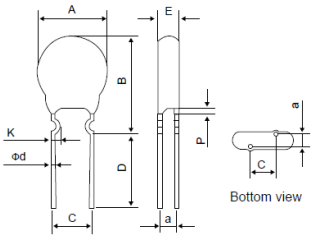


Fig 3. Inside Kink Lead

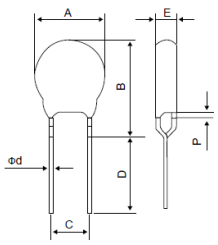


Fig 4. In Line Kink Lead

Symbol		min. [mm]	max. [mm]
A		10,5	14,0
B(max.)	180-D – 271-D	-	19,5
	> 271-D	-	20,5
B*(max.)		-	17,0
C (±1,0)		7,5	
D		25,0	
P(max.)		-	3,0
K		1,0	1,8
Φd (±0,05)		0,8	

Model	E (max.) [mm]	Model	E (max.) [mm]
10180-D	3,9	10301-D	4,3
10220-D	4,2	10331-D	4,5
10270-D	4,4	10361-D	4,7
10330-D	3,9	10391-D	4,8
10390-D	4,1	10431-D	5,0
10470-D	4,3	10471-D	5,2
10560-D	4,6	10511-D	5,3
10680-D	4,9	10561-D	5,5
10820-D	3,9	10621-D	5,7
10101-D	4,2	10681-D	5,8
10121-D	4,4	10751-D	6,0
10151-D	4,7	10778-D	6,3
10181-D	3,8	10821-D	6,5
10201-D	3,9	10911-D	6,6
10221-D	4,0	10102-D	7,0
10241-D	4,1	10112-D	7,4
10271-D	4,2	10182-D	11,3

Order Notes / Code:

1	2	3	4	5	6	7	8
EMOV	XX	XXX	-X	X	X	X	(XXX or A/B)

Pos. 1: Product family
Pos. 2: Disc diameter in [mm]
Pos. 3: Varistor voltage (two significant figures plus number of zeros that above)
Pos. 4: Standard series
Pos. 5 Tolerance of U_{N_DC} (@1mA): **K**=10% / **L**=15%
Pos. 6 Packaging: **B**=Bulk Pack / **B incl. XXX**$_{(Pos.8)}$=(Short Cut) Bulk Pack / **T**=Taped&Reeled / **A**=Flat Box Pack
Pos. 7 Lead Type: **S**=Straight (Fig.1) / **O**=Outside Kink (Fig.2) / **K**=Inside Kink (Fig.3) / **I**=In Line Kink (Fig.4)
Pos. 8 Optional: **XXX**=only for Short Cut version in [mm] (e.g. 12,5 mm) / **A** or **B**=Tape&Reel Pack Feed Hole Pitch (A=12,7 mm / B=15mm)

Example: EMOV10180-DKTSA

Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV10-D
AC / DC

ESKA the protection company

Ø 10 mm

Radial - D-Series

RoHS Compliant

Spannung *Voltage*	**AC: 11 V – 1000 V** **DC: 14 V – 1465 V**	**max. Spitzenstrom** *max. Peak Current*	**500 A / 2500 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**2,1 J - 185 J** *(@10/1000µs)*

Tape and Reel Specifications:

(Note: Radial devices on tape are supplied with straight leads or inline kink leads)

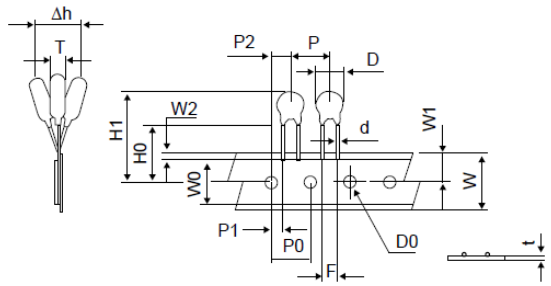


Figure : A

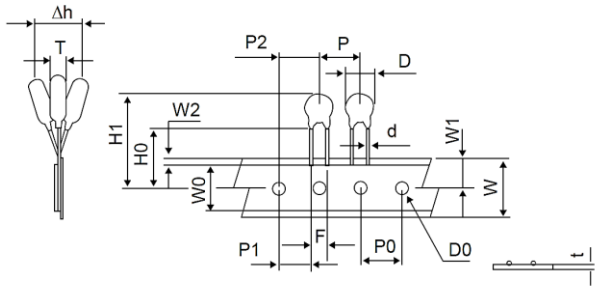


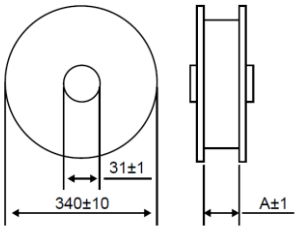
Figure : B

Symbol	Parameter	Dimensions [mm]	
P	Pitch of Component	15,0 ± 1,0	12,7 ± 1,0
P0	Feed Hole Pitch	15,0 ± 0,2	15,0 ± 1,0
P1	Feed Hole Center Lead	3,75 ± 0,7	3,85 ± 0,7
P2	Hole center to Component Center	7,5 ± 0,7	6,35 ± 0,7
F	Lead to Lead Distance	7,5 ± 0,8	7,5 ± 0,8
Δh	Component Alignment	max. 2,0	max. 2,0
W	Tape Width	18,0 +1,0/-0,5	18,0 +1,0/-0,5
W0	Hold Down Fape Width	min. 5,0	min. 5,0
W1	Hole Position	9,0 +0,75/-0,5	9,0 +0,75/-0,5
W2	Hold Down Tape Position	max. 3,0	max. 3,0
H	Height from Tape Center to Component Base	18,0 +2,0/-0,0	18,0 +2,0/-0,0
H0	Seating Plane Height	16,0 ± 0,5	16,0 ± 0,5
H1	Component Height	max. 36,0	max. 36,0
D0	Feed Hole Diameter	4,0 ±0,2	4,0 ±0,2
t	Total tape Thickness	0,7 ±0,2	0,7 ±0,2
L	Length of Clopped Lead	max. 11,0	max. 11,0
Figure		A	B

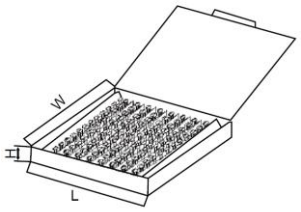
Packing Specifications:

Bulk Product Packing	**Quantity per bag**
Straight LeadType Quantity(pcs/bag)	500
Outside Kink LeadType Quantity(pcs/bag)	500
Inside Kink LeadType Quantity(pcs/bag)	500
In Line Kink LeadType Quantity(pcs/bag)	500

Tape and Reel Product Packing	**Dimension A [mm]:**	**Quatity per Reel**
EMOV10(180 ~ 621)-D	43	1.000
EMOV10(681 ~ 112)-D	43	800



Box Product Packing	**Dimension W-L-H [mm]:**	**Quatity per Box**
EMOV10(180 ~ 621)-D	340-245-50	1.000
EMOV10(681 ~ 112)-D	340-245-50	800



Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV10-P
AC / DC

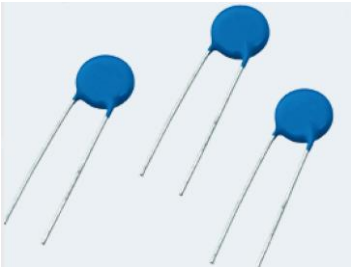
ESKA *the protection company*

Ø 10 mm

Radial - P-Series

RoHS Compliant

Spannung *Voltage*	**AC: 11 V - 680 V** **DC: 14 V - 895 V**	**max. Spitzenstrom** *max. Peak Current*	**1.500 A – 4.000 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**4 J - 180 J** *(@10/1000µs)*



Norm / *Standard:*	UL 1449-4
Anschluss / *Connection*:	Kupfer verzinnt / *Tin-plated copper*
Beschichtung / *Coating*:	Isolierende Beschichtung: Flammenhemmendes Epoxidharz (UL-94V-0) / *Insulating coating: Flame retardant epoxy (UL-94V-0)*
Betriebstemperatur / *Operating temperature*:	-40°C bis / to +105°C
Lötbarkeit / *Solderability*:	MIL-STD-202, Method 208E
Isolationswiderstand / *Insulation Resistance:*	>1000 MΩ
Ansprechzeit / *Response Time:*	<25 ns
Verpackungsmöglichkeiten / *Packing options*:	Siehe Verpackungsspezifikationen / *see packaging specifications*

Bemessungswerte / Ratings (@ 23°C):

Art. No.	U_{C_max} [V] AC (rms)	U_{C_max} [V] DC	U_{N_DC} (@1mA)[1] [V]	U_{Clamp_max} @Test Current (@8/20µs) [V]		E_{max} (@10/1000µs) [J]	I_{peak_max} (@8/20µs) [A]	P_{rat} [W]	$C_{typical}$ (@1KHz) [pF]
EMOV10180-P	11	14	18	36	@5 A	4	1.500	0,08	8.000
EMOV10220-P	14	18	22	43	@5 A	5	1.500	0,08	7.000
EMOV10270-P	17	22	27	53	@5 A	6	1.500	0,08	5.500
EMOV10330-P	20	26	33	65	@5 A	7,5	1.500	0,08	4.100
EMOV10390-P	25	31	39	77	@5 A	8,6	1.500	0,08	3.900
EMOV10470-P	30	38	47	93	@5 A	10	1.500	0,08	3.300
EMOV10560-P	35	45	56	110	@5 A	11	1.500	0,08	2.800
EMOV10680-P	40	56	68	135	@5 A	14	1.500	0,08	2.300
EMOV10201-P	130	170	200	340	@25 A	52	4.000	0,4	625
EMOV10221-P	140	180	220	360	@25 A	58	4.000	0,4	570
EMOV10241-P	150	200	240	395	@25 A	64	4.000	0,4	525
EMOV10271-P	175	225	270	455	@25 A	67	4.000	0,4	470
EMOV10301-P	195	250	300	500	@25 A	70	4.000	0,4	415
EMOV10331-P	215	275	330	550	@25 A	72	4.000	0,4	350
EMOV10361-P	230	300	360	595	@25 A	76	4.000	0,4	350
EMOV10391-P	250	320	390	650	@25 A	82	4.000	0,4	325
EMOV10431-P	275	350	430	710	@25 A	93	4.000	0,4	290
EMOV10471-P	300	385	470	775	@25 A	99	4.000	0,4	260
EMOV10511-P	320	410	510	845	@25 A	107	4.000	0,4	240
EMOV10561-P	350	460	560	915	@25 A	113	4.000	0,4	220
EMOV10621-P	395	510	620	1.020	@25 A	125	4.000	0,4	200
EMOV10681-P	420	560	680	1.120	@25 A	128	4.000	0,4	190
EMOV10751-P	465	615	750	1.235	@25 A	134	4.000	0,4	175
EMOV10781-P	485	640	780	1.290	@25 A	140	4.000	0,4	170
EMOV10821-P	510	670	820	1.355	@25 A	146	4.000	0,4	160
EMOV10911-P	550	745	910	1.500	@25 A	152	4.000	0,4	140
EMOV10102-P	625	825	1.000	1.650	@25 A	170	4.000	0,4	132
EMOV10112-P	680	895	1.100	1.815	@25 A	180	4.000	0,4	120

[1] Toleranz: / *Tolerance:* ±10 %

Legende / Caption:

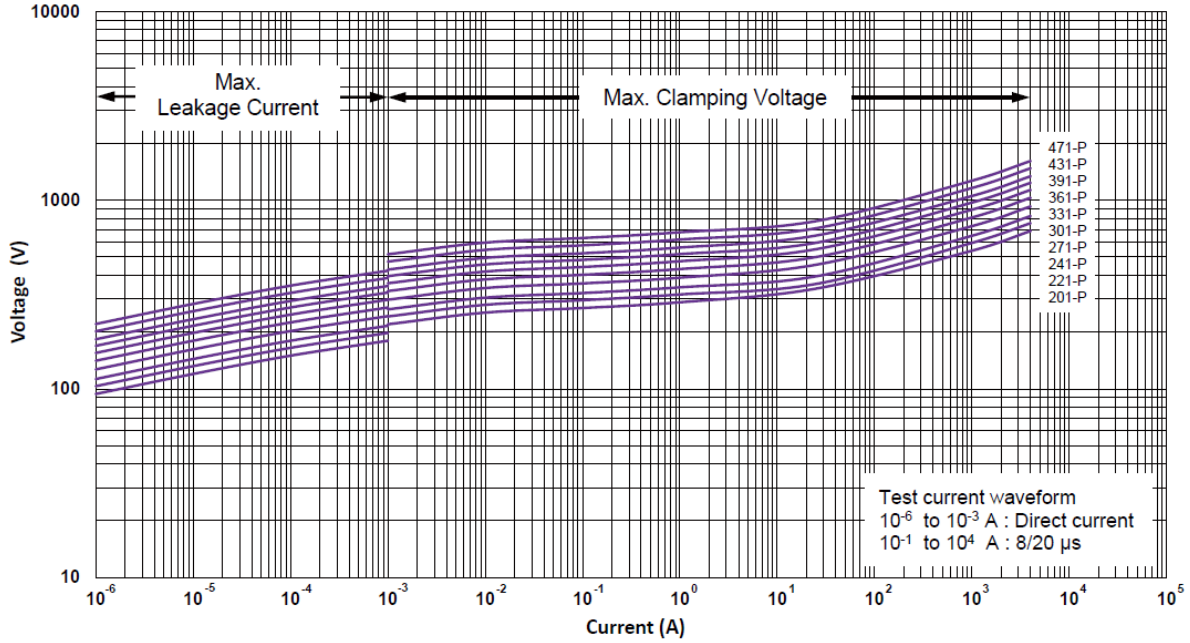
U_{C_max}	= max. Dauerspannung / *max. continuous voltage*	I_{peak_max}	= max. Spitzenstrom / *max. peak current*
U_{N_DC}	= Varistorspannung / *Varistor voltage*	P_{rat}	= Nennleistung / *Rated power*
U_{Clamp_max}	= max. Ansprechspannung / *max. clamping voltage*	$C_{typical}$	= typische Kapazität / *typical capacity*
E_{max}	= max. Energie / *max. Energy*		

Ø 10 mm Radial - P-Series RoHS Compliant

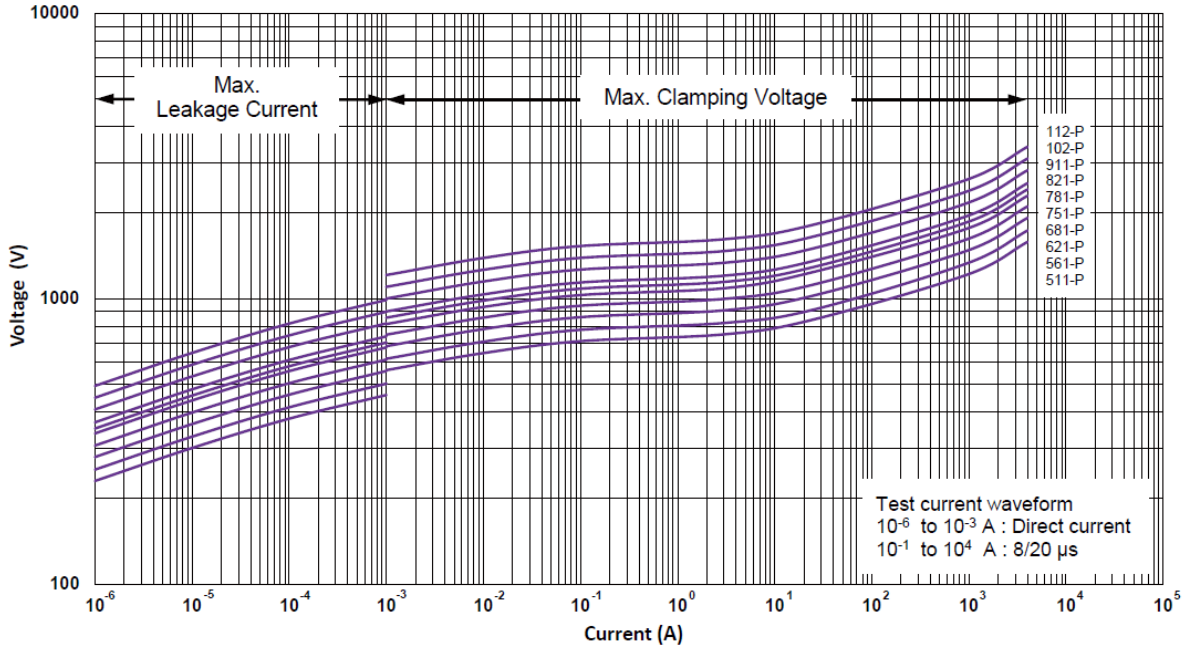
Spannung *Voltage*	**AC: 11 V - 680 V** **DC: 14 V - 895 V**	**max. Spitzenstrom** *max. Peak Current*	**1.500 A – 4.000 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**4 J - 180 J** *(@10/1000µs)*

Transient U-I Characteristic Curves:

For EMOV10201-P – EMOV10471-P:



For EMOV10511-P – EMOV10112-P:



Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV10-P
AC / DC

ESKA the protection company

Ø 10 mm

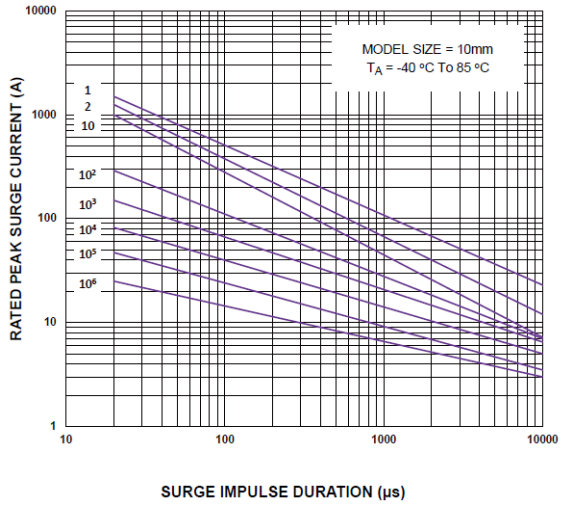
Radial - P-Series

RoHS Compliant

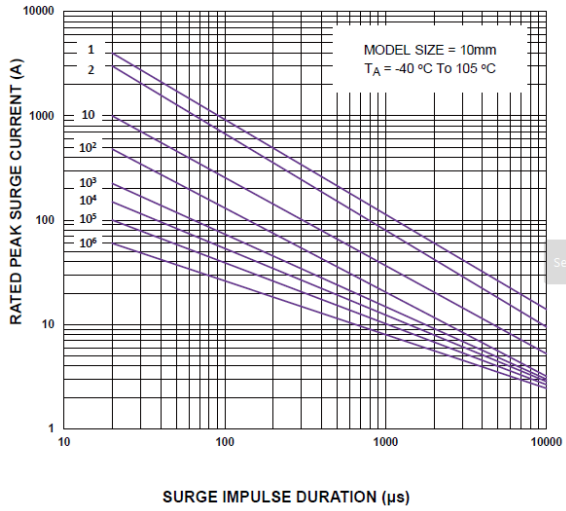
Spannung *Voltage*	**AC: 11 V - 680 V** **DC: 14 V - 895 V**	**max. Spitzenstrom** *max. Peak Current*	**1.500 A – 4.000 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**4 J - 180 J** *(@10/1000µs)*

Impulse Life Time Rating Curves:

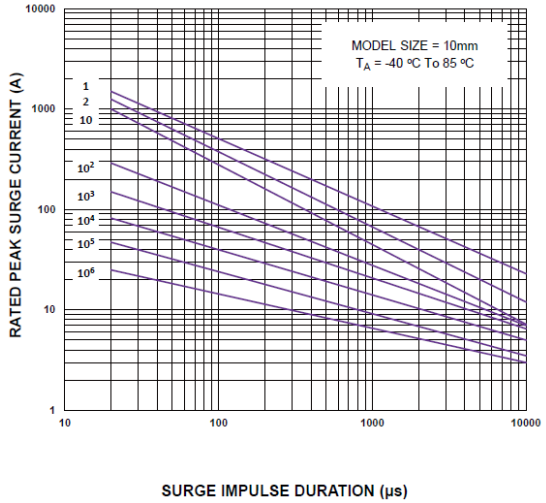
For EMOV10180-P – EMOV10680-P:



For EMOV10201-P – EMOV10751-P:

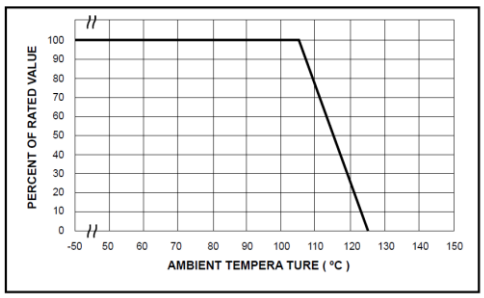


For EMOV10781-P – EMOV10112-P:

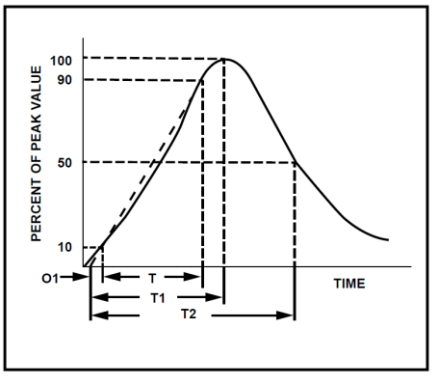


Power Derating Cuve:

Should transients occur in rapid succession, the average power dissipation is the energy (watt-seconds) per pulse times the number of pulses per second. The power so developed must be with the specifications shown on the Device Ratings and Specifications Table for the specific device. The operating values of a MOV need to be derated at high temperatures as shown above. Because varistors only dissipate a relatively small amount of average power they are not suitable for repetitive applications that involve substantial amounts of average power dissipation.



Surge Current Standard Waveform



O1 = Virtual Origin of Wave
T = Time from 10% to 90% of Peak
T1 = Rise Time = 1.25 x T
T2 = Decay Time
Example - For an 8/20 µs Current Waveform :
8µs = T1 = Rise Time
20µs = T2 = Decay Time

Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV10-P
AC / DC

ESKA *the protection company*

Ø 10 mm

Radial - P-Series

RoHS Compliant

Spannung *Voltage*	**AC: 11 V - 680 V** **DC: 14 V - 895 V**	**max. Spitzenstrom** *max. Peak Current*	**1.500 A – 4.000 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**4 J - 180 J** *(@10/1000µs)*

Drawings:

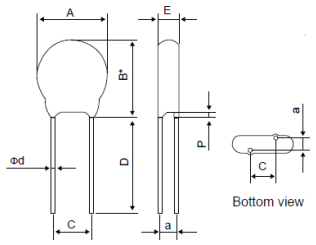


Fig 1. Straight Lead

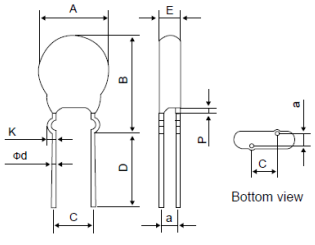


Fig 2. Outside Kink Lead

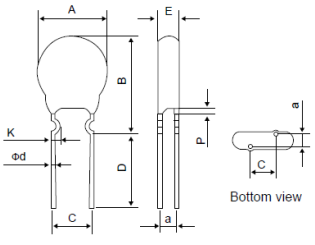


Fig 3. Inside Kink Lead

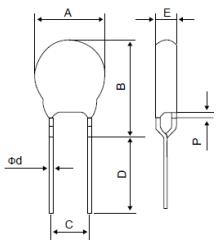


Fig 4. In Line Kink Lead

Symbol		min. [mm]	max. [mm]
A		10,5	14,0
B(max.)	201-P – 271-P	-	19,5
	> 271-P	-	20,5
B*(max.)		-	17
C (±1,0)		7,5	
D		25,0	
P(max.)		-	3,0
K		1,0	1,8
Φd (±0,05)		0,8	

Model	E (max.) [mm]	Model	E (max.) [mm]
EMOV10180-P	3,9	EMOV10361-P	5,4
EMOV10220-P	4,2	EMOV10391-P	5,5
EMOV10270-P	4,4	EMOV10431-P	5,7
EMOV10330-P	3,9	EMOV10471-P	5,9
EMOV10390-P	4,1	EMOV10511-P	6,1
EMOV10470-P	4,3	EMOV10561-P	6,3
EMOV10560-P	4,6	EMOV10621-P	6,5
EMOV10680-P	4,9	EMOV10581-P	6,6
EMOV10201-P	4,5	EMOV10751-P	6,8
EMOV10221-P	4,6	EMOV10781-P	7,2
EMOV10241-P	4,7	EMOV10821-P	7,4
EMOV10271-P	4,8	EMOV10911-P	7,5
EMOV10301-P	4,9	EMOV10102-P	8,0
EMOV10331-P	5,1	EMOV10112-P	8,9

Order Notes / Code:

1	2	3	4	5	6	7	8
EMOV	XX	XXX	-X	X	X	X	(XXX or A/B)

Pos. 1: Product family
Pos. 2: Disc diameter in [mm]
Pos. 3: Varistor voltage (two significant figures plus number of zeros that above)
Pos. 4: Standard series
Pos. 5 Tolerance of U_{N_DC} (@1mA): **K**=10% / **L**=15%
Pos. 6 Packaging: **B**=Bulk Pack / **B incl. XXX**$_{(Pos.8)}$=(Short Cut) Bulk Pack / **T**=Taped&Reeled / **A**=Flat Box Pack
Pos. 7 Lead Type: **S**=Straight (Fig.1) / **O**=Outside Kink (Fig.2) / **K**=Inside Kink (Fig.3) / **I**=In Line Kink (Fig.4)
Pos. 8 Optional: **XXX**=only for Short Cut version in [mm] (e.g. 12,5 mm) / **A** or **B**=Tape&Reel Pack Feed Hole Pitch (A=12,7 mm / B=15mm)

Example: EMOV10220-PKTSA

Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV10-P
AC / DC

ESKA the protection company

Ø 10 mm

Radial - P-Series

RoHS Compliant

Spannung *Voltage*	**AC: 11 V - 680 V** **DC: 14 V - 895 V**	**max. Spitzenstrom** *max. Peak Current*	**1.500 A – 4.000 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**4 J - 180 J** *(@10/1000µs)*

Tape and Reel Specifications:

(Note: Radial devices on tape are supplied with straight leads or inline kink leads)

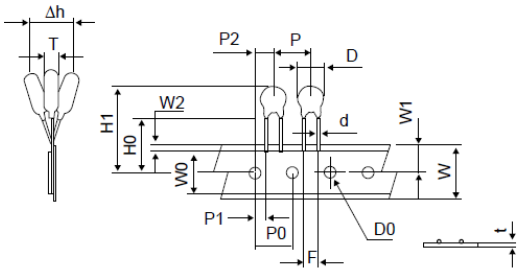


Figure : A

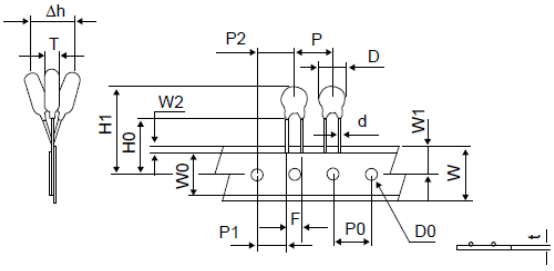


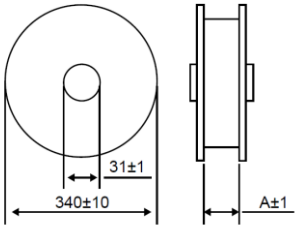
Figure : B

Symbol	Parameter	Dimensions [mm]	
P	Pitch of Component	15,0 ± 1,0	12,7 ± 1,0
P0	Feed Hole Pitch	15,0 ± 0,2	12,7 ± 0,2
P1	Feed Hole Center Lead	3,75 ± 0,7	3,85 ± 0,7
P2	Hole center to Component Center	7,5 ± 0,7	7,5 ± 0,7
F	Lead to Lead Distance	7,5 ± 0,8	6,35 ± 0,8
Δh	Component Alignment	max. 2,0	max. 2,0
W	Tape Width	18,0 +1,0/-0,5	18,0 +1,0/-0,5
W0	Hold Down Fape Width	min. 5,0	min. 5,0
W1	Hole Position	9,0 +0,75/-0,5	9,0 +0,75/-0,5
W2	Hold Down Tape Position	max. 3,0	max. 3,0
H	Height from Tape Center to Component Base	18,0 +2,0/-0,0	18,0 +2,0/-0,0
H0	Seating Plane Height	16,0 ± 0,5	16,0 ± 0,5
H1	Component Height	max. 36,0	max. 36,0
D0	Feed Hole Diameter	4,0 ± 0,2	4,0 ± 0,2
t	Total tape Thickness	0,7 ± 0,2	0,7 ± 0,2
L	Length of Clopped Lead	max. 11,0	max. 11,0
Figure		A	B

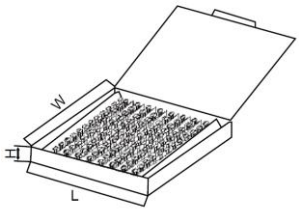
Packing Specifications:

Bulk Product Packing		**Quantity per bag**
Straight LeadType Quantity(pcs/bag)		500
Outside Kink LeadType Quantity(pcs/bag)		500
Inside Kink LeadType Quantity(pcs/bag)		500
In Line Kink LeadType Quantity(pcs/bag)		500

Tape and Reel Product Packing	**Dimension A [mm]:**	**Quatity per Reel**
EMOV10(180 ~ 391)-P-T	43	800
EMOV10(431 ~ 621)-P-T	43	700
EMOV10(681 ~ 112)-P-T	43	600



Box Product Packing	**Dimension W-L-H [mm]:**	**Quatity per Box**
EMOV10(180 ~ 391)-P-A	340-245-45	500
EMOV10(431 ~ 621)-P-A	340-245-45	500
EMOV10(681 ~ 112)-P-A	340-245-45	400



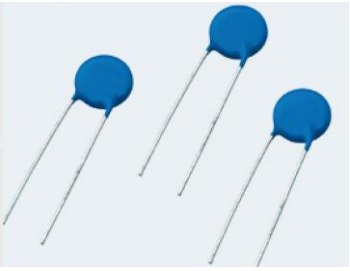
Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV10-V
AC / DC

ESKA *the protection company*

Ø 10 mm Radial - V-Series

Spannung *Voltage*	**AC: 130 V - 680 V** **DC: 170 V - 895 V**	**max. Spitzenstrom** *max. Peak Current*	**3.500 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**35 J - 155 J** *(@10/1000µs)*



Norm / *Standard:*	UL 1449-4
Anschluss / *Connection*:	Kupfer verzinnt / *Tin-plated copper*
Beschichtung / *Coating*:	Isolierende Beschichtung: Flammenhemmendes Epoxidharz (UL-94V-0) / *Insulating coating: Flame retardant epoxy (UL-94V-0)*
Betriebstemperatur / *Operating temperature*:	-40°C bis / to +105°C
Lötbarkeit / *Solderability*:	MIL-STD-202, Method 208E
Isolationswiderstand / *Insulation Resistance:*	>1000 MΩ
Ansprechzeit / *Response Time:*	<25 ns
Verpackungsmöglichkeiten / *Packing options*:	Siehe Verpackungsspezifikationen / *see packaging specifications*

Bemessungswerte / Ratings (@ 23°C):

Art. No.	U_{C_max} [V] AC (rms)	U_{C_max} [V] DC	$U_{N\_DC\ (@1mA)}$ [1)] [V]	U_{Clamp_max} @Test Current (@8/20µs) [V]		E_{max} (@10/1000µs) [J]	I_{peak_max} (@8/20µs) [A]	P_{rat} [W]	$C_{typical}$ (@1KHz) [pF]
EMOV10201-V	130	170	200	340	@10 A	35	3.500	0,4	430
EMOV10221-V	140	180	220	360	@10 A	39	3.500	0,4	410
EMOV10241-V	150	200	240	395	@10 A	42	3.500	0,4	380
EMOV10271-V	175	225	270	455	@10 A	49	3.500	0,4	350
EMOV10301-V	195	250	300	500	@10 A	55	3.500	0,4	330
EMOV10331-V	215	275	330	550	@10 A	58	3.500	0,4	300
EMOV10361-V	230	300	360	595	@10 A	65	3.500	0,4	300
EMOV10391-V	250	320	390	650	@10 A	70	3.500	0,4	300
EMOV10431-V	275	350	430	710	@10 A	80	3.500	0,4	270
EMOV10471-V	300	385	470	775	@10 A	85	3.500	0,4	230
EMOV10511-V	320	410	510	845	@10 A	92	3.500	0,4	210
EMOV10561-V	350	460	560	915	@10 A	92	3.500	0,4	200
EMOV10621-V	395	510	620	1.020	@10 A	95	3.500	0,4	180
EMOV10681-V	420	560	680	1.120	@10 A	98	3.500	0,4	150
EMOV10751-V	465	615	750	1.235	@10 A	100	3.500	0,4	140
EMOV10781-V	485	640	780	1.290	@10 A	100	3.500	0,4	140
EMOV10821-V	510	670	820	1.355	@10 A	110	3.500	0,4	140
EMOV10911-V	550	745	910	1.500	@10 A	130	3.500	0,4	130
EMOV10102-V	625	825	1.000	1.650	@10 A	140	3.500	0,4	130
EMOV10112-V	680	895	1.100	1.815	@10 A	155	3.500	0,4	120

[1)] Toleranz: / *Tolerance:* ±10 %

Legende / Caption:

U_{C_max}	= max. Dauerspannung / *max. continuous voltage*	I_{peak_max}	= max. Spitzenstrom / *max. peak current*
U_{N_DC}	= Varistorspannung / *Varistor voltage*	P_{rat}	= Nennleistung / *Rated power*
U_{Clamp_max}	= max. Ansprechspannung / *max. clamping voltage*	$C_{typical}$	= typische Kapazität / *typical capacity*
E_{max}	= max. Energie / *max. Energy*		

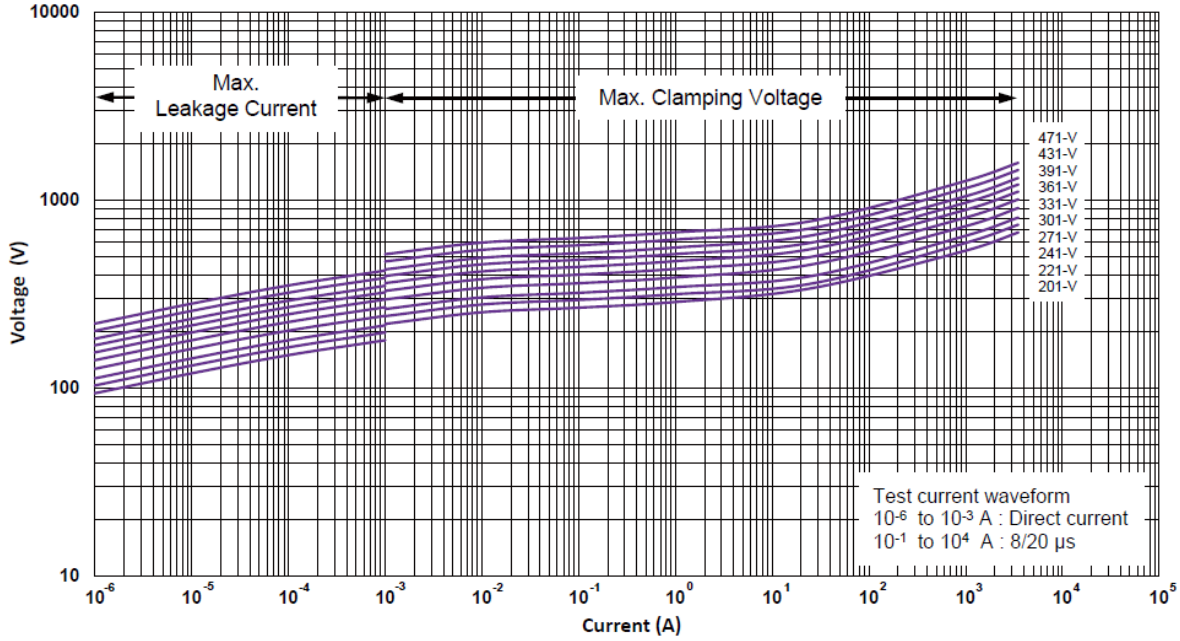
Ø 10 mm

Radial - V-Series

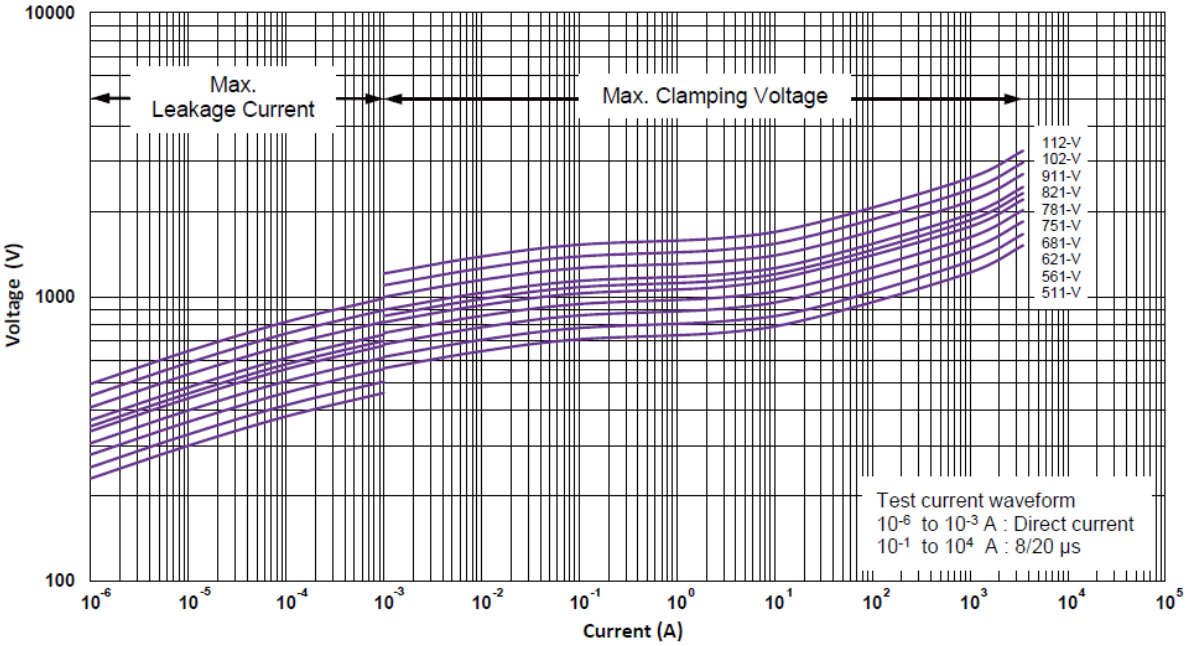
Spannung *Voltage*	**AC: 130 V - 680 V** **DC: 170 V - 895 V**	**max. Spitzenstrom** *max. Peak Current*	**3.500 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**35 J - 155 J** *(@10/1000µs)*

Transient U-I Characteristic Curves:

For EMOV10201-V – EMOV10471-V:



For EMOV10511-V – EMOV10112-V:



Ø 10 mm

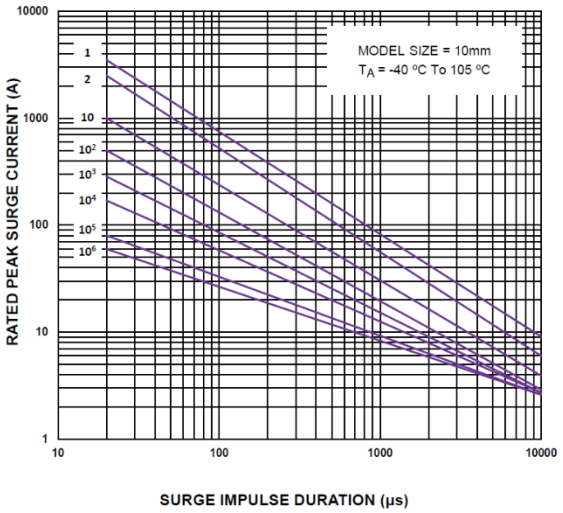
Radial - V-Series

RoHS Compliant

Spannung *Voltage*	**AC: 130 V - 680 V** **DC: 170 V - 895 V**	**max. Spitzenstrom** *max. Peak Current*	**3.500 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**35 J - 155 J** *(@10/1000µs)*

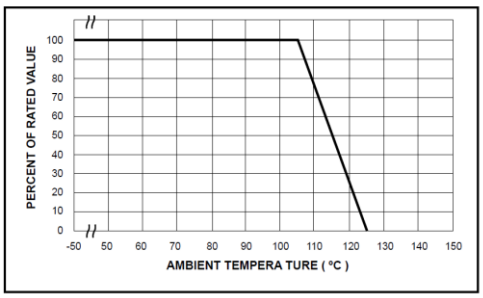
Impulse Life Time Rating Curves:

For EMOV10201-V – EMOV10121-V:

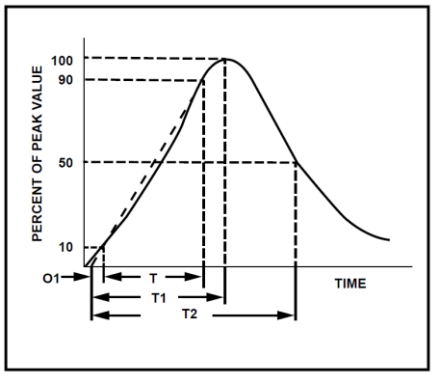


Power Derating Cuve:

Should transients occur in rapid succession, the average power dissipation is the energy (watt-seconds) per pulse times the number of pulses per second. The power so developed must be with the specifications shown on the Device Ratings and Specifications Table for the specific device. The operating values of a MOV need to be derated at high temperatures as shown above. Because varistors only dissipate a relatively small amount of average power they are not suitable for repetitive applications that involve substantial amounts of average power dissipation.



Surge Current Standard Waveform



O1 = Virtual Origin of Wave
T = Time from 10% to 90% of Peak
T1 = Rise Time = 1.25 x T
T2 = Decay Time
Example - For an 8/20 µs Current Waveform :
8µs = T1 = Rise Time
20µs = T2 = Decay Time

Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV10-V
AC / DC

ESKA *the protection company*

Ø 10 mm

Radial - V-Series

RoHS Compliant

Spannung *Voltage*	**AC: 130 V - 680 V** **DC: 170 V - 895 V**	**max. Spitzenstrom** *max. Peak Current*	**3.500 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**35 J - 155 J** *(@10/1000µs)*

Drawings:

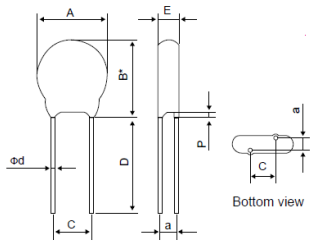


Fig 1. Straight Lead

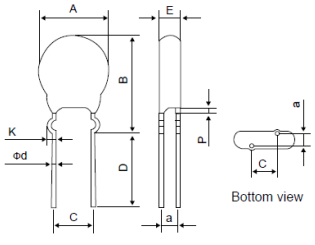


Fig 2. Outside Kink Lead

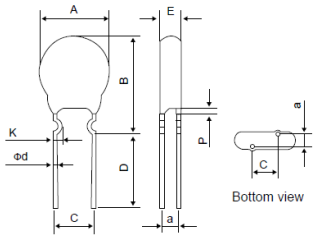


Fig 3. Inside Kink Lead

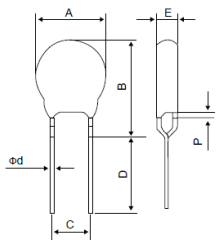


Fig 4. In Line Kink Lead

Symbol		min. [mm]	max. [mm]
A		10,5	14,0
B(max.)	180-V – 271-V	-	19,5
	> 271-V	-	20,5
B*(max.)		-	17,0
C (±1,0)		7,5	
D		25,0	
P(max.)		-	3,0
K		0,8	1,6
Φd (±0,05)		0,8	

Model	E (max.) [mm]	Model	E (max.) [mm]
EMOV10201-V	3,9	EMOV10511-V	5,3
EMOV10221-V	4,0	EMOV10561-V	5,5
EMOV10241-V	4,1	EMOV10621-V	5,7
EMOV10271-V	4,2	EMOV10681-V	5,8
EMOV10301-V	4,3	EMOV10751-V	6,0
EMOV10331-V	4,5	EMOV10781-V	6,3
EMOV10361-V	4,7	EMOV10821-V	6,5
EMOV10391-V	4,8	EMOV10911-V	6,6
EMOV10431-V	5,0	EMOV10102-V	7,0
EMOV10471-V	5,2	EMOV10112-V	7,4

Order Notes / Code:

1	2	3	4	5	6	7	8
EMOV	XX	XXX	-X	X	X	X	(XXX or A/B)

Pos. 1: Product family
Pos. 2: Disc diameter in [mm]
Pos. 3: Varistor voltage (two significant figures plus number of zeros that above)
Pos. 4: Standard series
Pos. 5 Tolerance of U_{N_DC} (@1mA): **K**=10% / **L**=15%
Pos. 6 Packaging: **B**=Bulk Pack / **B incl. XXX**(Pos.8)=(Short Cut) Bulk Pack / **T**=Taped&Reeled / **A**=Flat Box Pack
Pos. 7 Lead Type: **S**=Straight (Fig.1) / **O**=Outside Kink (Fig.2) / **K**=Inside Kink (Fig.3) / **I**=In Line Kink (Fig.4)
Pos. 8 Optional: **XXX**=only for Short Cut version in [mm] (e.g. 12,5 mm) / **A** or **B**=Tape&Reel Pack Feed Hole Pitch (A=12,7 mm / B=15mm)

Example: EMOV10201-VKTSA

Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV10-V
AC / DC

ESKA the protection company

Ø 10 mm

Radial - V-Series

RoHS Compliant

Spannung *Voltage*	**AC: 130 V - 680 V** **DC: 170 V - 895 V**	**max. Spitzenstrom** *max. Peak Current*	**3.500 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**35 J - 155 J** *(@10/1000µs)*

Tape and Reel Specifications:

(Note: Radial devices on tape are supplied with straight leads or inline kink leads)

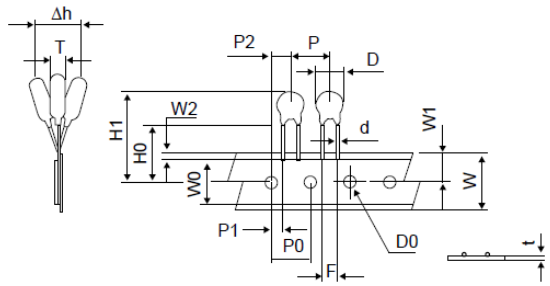


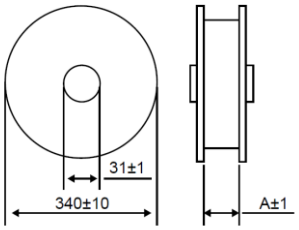
Figure : A

Symbol	Parameter	Dimensions [mm]	
P	Pitch of Component	12,7 ± 1,0	15 ± 1,0
P0	Feed Hole Pitch	12,7 ± 0,2	15 ± 0,2
P1	Feed Hole Center Lead	3,85 ± 0,7	3,75 ± 0,7
P2	Hole center to Component Center	6,35 ± 0,7	7,5 ± 0,7
F	Lead to Lead Distance	7,5 ± 0,8	7,5 ± 0,8
Δh	Component Alignment	max. 2,0	max. 2,0
W	Tape Width	18,0 +1,0/-0,5	18,0 +1,0/-0,5
W0	Hold Down Fape Width	min. 5,0	min. 5,0
W1	Hole Position	9,0 +0,75/-0,5	9,0 +0,75/-0,5
W2	Hold Down Tape Position	max. 3,0	max. 3,0
H	Height from Tape Center to Component Base	18,0 +2,0/-0,0	18,0 +2,0/-0,0
H0	Seating Plane Height	16,0 ± 0,5	16,0 ± 0,5
H1	Component Height	max. 36,0	max. 36,0
D0	Feed Hole Diameter	4,0 ± 0,2	4,0 ± 0,2
t	Total tape Thickness	0,7 ± 0,2	0,7 ± 0,2
L	Length of Clopped Lead	max. 11,0	max. 11,0

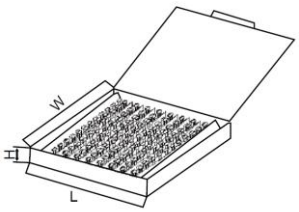
Packing Specifications:

Bulk Product Packing	**Quantity per bag**
Straight LeadType Quantity(pcs/bag)	500
Outside Kink LeadType Quantity(pcs/bag)	500
Inside Kink LeadType Quantity(pcs/bag)	500
In Line Kink LeadType Quantity(pcs/bag)	500

Tape and Reel Product Packing	**Dimension A [mm]:**	**Quatity per Reel**
EMOV10(201 ~ 621)-V-T	43	1.000
EMOV10(681 ~ 112)-V-T	43	800



Box Product Packing	**Dimension W-L-H [mm]:**	**Quatity per Box**
EMOV10(201 ~ 621)-V-A	340-245-50	1.000
EMOV10(681 ~ 112)-V-A	340-245-50	800



Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV14-D
AC / DC

ESKA *the protection company*

Ø 14 mm

Radial - D-Series

RoHS Compliant

Spannung *Voltage*	**AC: 11 V – 1000 V** **DC: 14 V – 1465 V**	**max. Spitzenstrom** *max. Peak Current*	**1000 A / 4500 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**4 J - 354 J** *(@10/1000µs)*

Norm / *Standard:*	UL 1449-4
Anschluss / *Connection*:	Kupfer verzinnt / *Tin-plated copper*
Beschichtung / *Coating*:	Isolierende Beschichtung: Flammenhemmendes Epoxidharz (UL-94V-0) / *Insulating coating: Flame retardant epoxy (UL-94V-0)*
Betriebstemperatur / *Operating temperature*:	-40°C bis / to +105°C
Lötbarkeit / *Solderability*:	MIL-STD-202, Method 208E
Isolationswiderstand / *Insulation Resistance:*	>1000 MΩ
Ansprechzeit / *Response Time:*	<25 ns
Verpackungsmöglichkeiten / *Packing options*:	Siehe Verpackungsspezifikationen / *see packaging specifications*

Bemessungswerte / Ratings (@ 23°C):

Art. No.	U_{C_max} [V] AC (rms)	U_{C_max} [V] DC	$U_{N\_DC\ (@1mA)}$ [1)] [V]	U_{Clamp_max} @Test Current (@8/20µs) [V]		E_{max} (@10/1000µs) [J]	I_{peak_max} (@8/20µs) [A]	P_{rat} [W]	$C_{typical}$ (@1KHz) [pF]
EMOV14180-D	11	14	18	36	@10 A	4,0	1.000	0,1	25.000
EMOV14220-D	14	18	22	43	@10 A	5,0	1.000	0,1	20.000
EMOV14270-D	17	22	27	53	@10 A	6,0	1.000	0,1	16.000
EMOV14330-D	20	26	33	65	@10 A	7,5	1.000	0,1	12.200
EMOV14390-D	25	31	39	77	@10 A	8,6	1.000	0,1	7.000
EMOV14470-D	30	38	47	93	@10 A	10	1.000	0,1	6.750
EMOV14560-D	35	45	56	110	@10 A	11	1.000	0,1	6.500
EMOV14680-D	40	56	68	135	@10 A	14	1.000	0,1	5.500
EMOV14820-D	50	65	82	135	@50 A	22	4.500	0,6	4.300
EMOV14141-D	60	85	100	165	@50 A	28	4.500	0,6	3.500
EMOV14121-D	75	100	120	200	@50 A	32	4.500	0,6	2.500
EMOV14151-D	95	125	150	250	@50 A	40	4.500	0,6	2.100
EMOV14181-D	115	150	180	300	@50 A	52	4.500	0,6	1.250
EMOV14201-D	130	170	200	340	@50 A	57	4.500	0,6	1.150
EMOV14221-D	140	180	225	360	@50 A	60	4.500	0,6	1.100
EMOV14241-D	150	200	240	395	@50 A	63	4.500	0,6	1.050
EMOV14271-D	175	225	275	455	@50 A	70	4.500	0,6	1.000
EMOV14301-D	195	250	300	500	@50 A	78	4.500	0,6	900
EMOV14331-D	215	275	330	550	@50 A	93	4.500	0,6	850
EMOV14361-D	230	300	360	595	@50 A	93	4.500	0,6	800
EMOV14391-D	250	320	390	650	@50 A	100	4.500	0,6	800
EMOV14431-D	275	350	430	710	@50 A	115	4.500	0,6	650
EMOV14471-D	300	385	470	775	@50 A	125	4.500	0,6	550
EMOV14511-D	320	410	510	845	@50 A	125	4.500	0,6	450
EMOV14561-D	350	460	560	915	@50 A	125	4.500	0,6	400
EMOV14621-D	395	510	620	1.020	@50 A	125	4.500	0,6	350
EMOV14681-D	420	560	680	1.120	@50 A	130	4.500	0,6	350
EMOV14751-D	465	615	750	1.235	@50 A	143	4.500	0,6	330
EMOV14781-D	485	640	780	1.290	@50 A	148	4.500	0,6	330
EMOV14821-D	510	670	820	1.355	@50 A	157	4.500	0,6	330
EMOV14911-D	550	745	910	1.500	@50 A	175	4.500	0,6	300
EMOV14142-D	625	825	1.000	1.650	@50 A	190	4.500	0,6	300
EMOV14112-D	680	895	1.100	1.815	@50 A	213	4.500	0,6	200
EMOV14182-D	1.000	1.465	1.800	2.950	@50 A	354	4.500	0,6	150

[1)] Toleranz: / *Tolerance:* ±10 %

Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV14-D
AC / DC

ESKA *the protection company*

Ø 14 mm

Radial - D-Series

RoHS Compliant

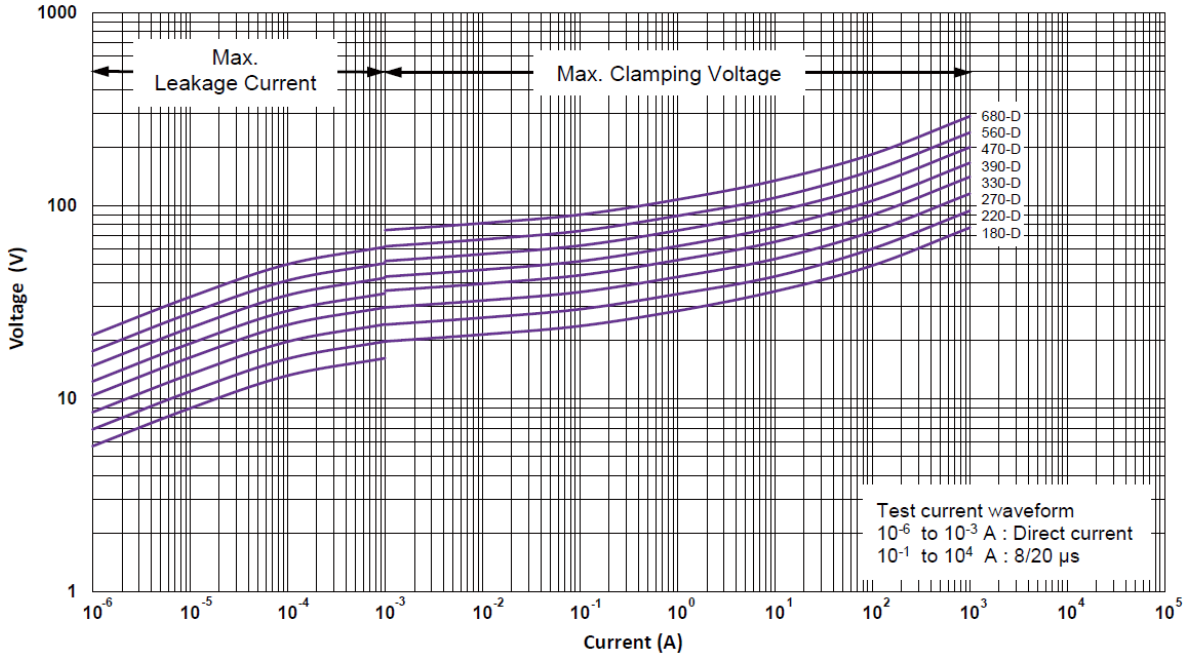
Spannung *Voltage*	**AC: 11 V – 1000 V** **DC: 14 V – 1465 V**	**max. Spitzenstrom** *max. Peak Current*	**1000 A / 4500 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**4 J - 354 J** *(@10/1000µs)*

Legende / Caption:

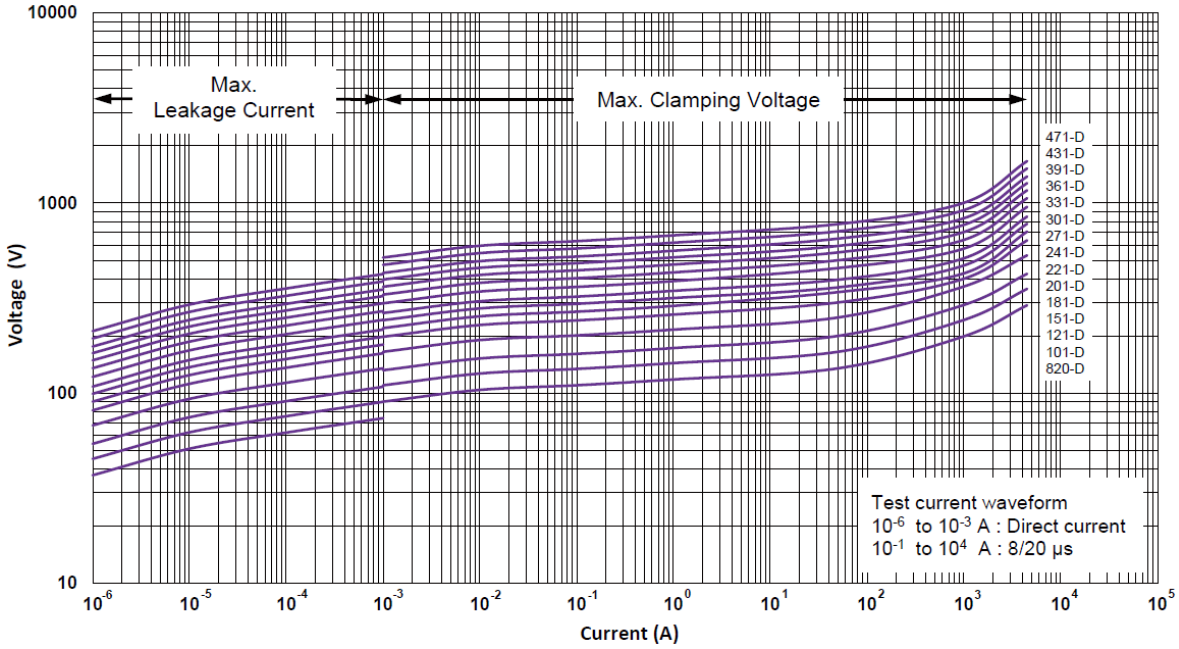
U_{C_max}	= max. Dauerspannung / *max. continuous voltage*
U_{N_DC}	= Varistorspannung / *Varistor voltage*
U_{Clamp_max}	= max. Ansprechspannung / *max. clamping voltage*
E_{max}	= max. Energie / *max. Energy*
I_{peak_max}	= max. Spitzenstrom / *max. peak current*
P_{rat}	= Nennleistung / *Rated power*
$C_{typical}$	= typische Kapazität / *typical capacity*

Transient U-I Characteristic Curves:

Für / *For EMOV14180-D* bis / *to EMOV14680-D:*



Für / *For EMOV14820-D* bis / *to EMOV14471-D:*



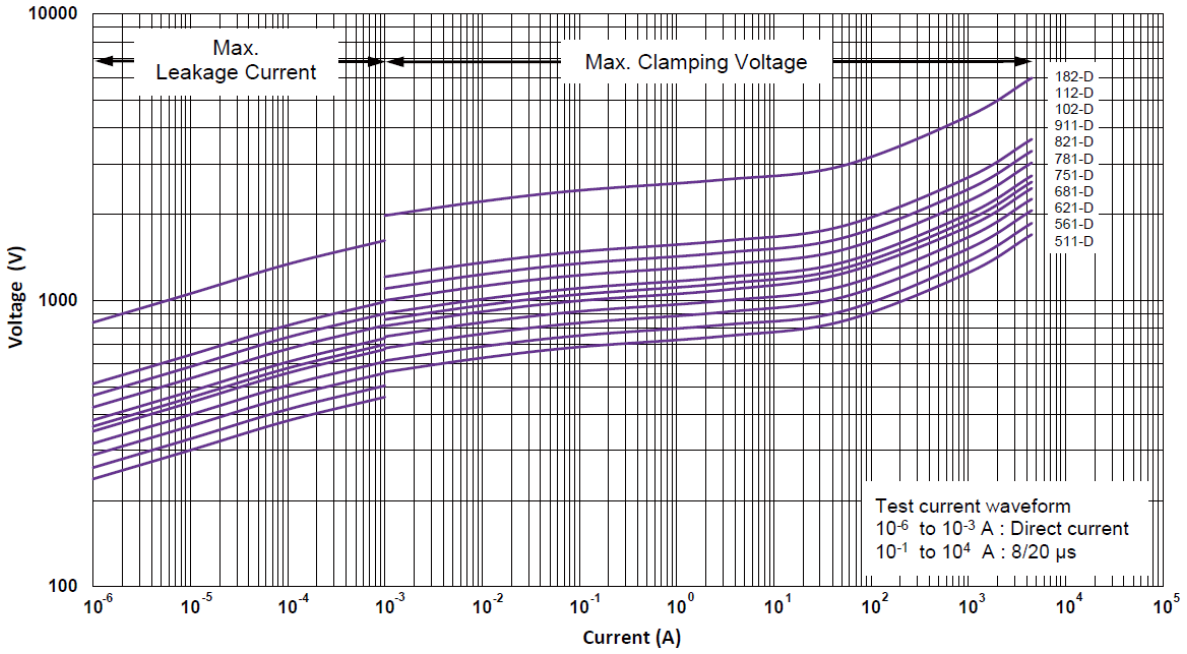
Ø 14 mm

Radial - D-Series

RoHS Compliant

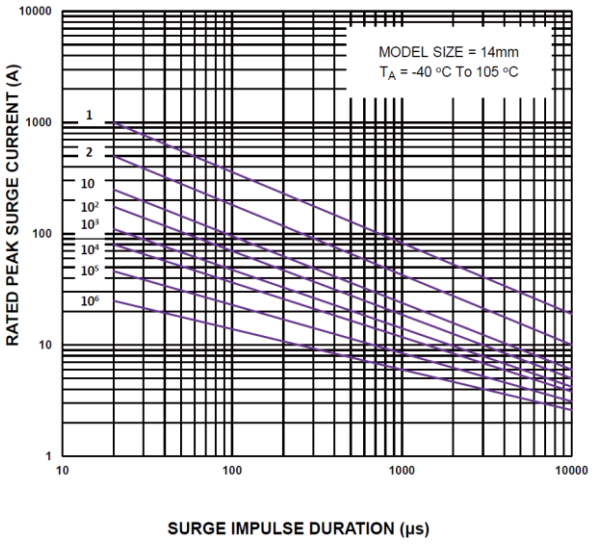
Spannung *Voltage*	**AC: 11 V – 1000 V** **DC: 14 V – 1465 V**	**max. Spitzenstrom** *max. Peak Current*	**1000 A / 4500 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**4 J - 354 J** *(@10/1000µs)*

Für / *For EMOV14511-D* bis / *to EMOV14182-D:*

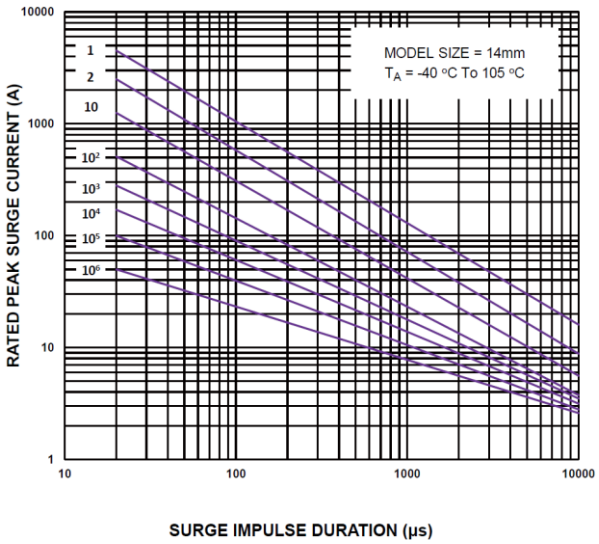


Impulse Life Time Rating Curves:

Für / *For EMOV14180-D* bis / *to EMOV14680-D:*



Für / *For EMOV14820-D* bis / *to EMOV14751-D:*



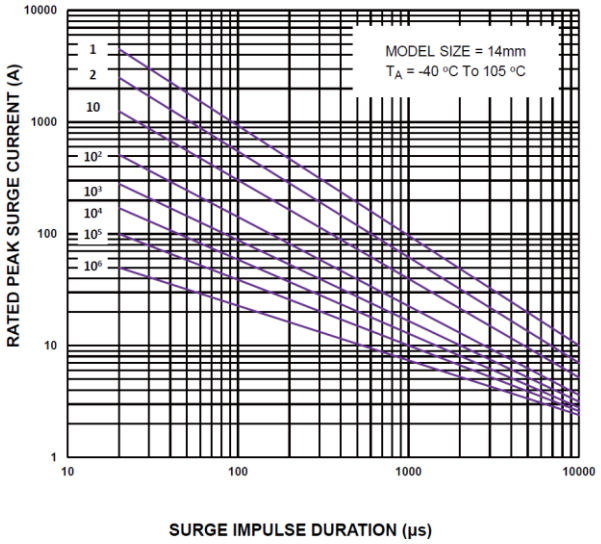
Ø 14 mm

Radial - D-Series

RoHS Compliant

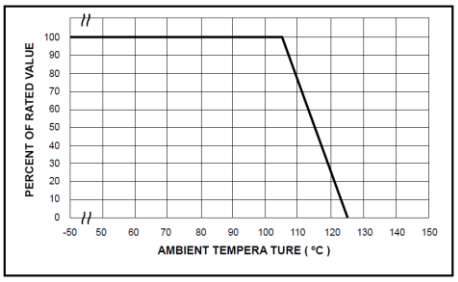
Spannung *Voltage*	**AC: 11 V – 1000 V** **DC: 14 V – 1465 V**	**max. Spitzenstrom** *max. Peak Current*	**1000 A / 4500 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**4 J - 354 J** *(@10/1000µs)*

Für / *For EMOV14781-D* bis / *to EMOV14182-D:*

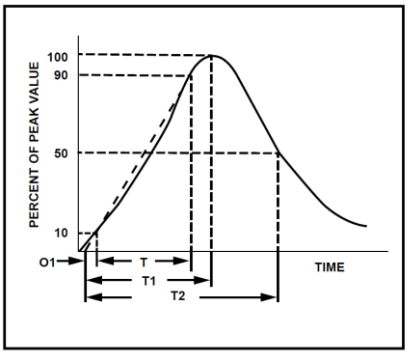


Power Derating Cuve:

Should transients occur in rapid succession, the average power dissipation is the energy (watt-seconds) per pulse times the number of pulses per second. The power so developed must be with the specifications shown on the Device Ratings and Specifications Table for the specific device. The operating values of a MOV need to be derated at high temperatures as shown above. Because varistors only dissipate a relatively small amount of average power they are not suitable for repetitive applications that involve substantial amounts of average power dissipation.



Surge Current Standard Waveform



O1 = Virtual Origin of Wave
T = Time from 10% to 90% of Peak
T1 = Rise Time = 1.25 x T
T2 = Decay Time
Example - For an 8/20 µs Current Waveform :
8µs = T1 = Rise Time
20µs = T2 = Decay Time

Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV14-D
AC / DC

ESKA *the protection company*

Ø 14 mm

Radial - D-Series

RoHS Compliant

Spannung *Voltage*	**AC: 11 V – 1000 V** **DC: 14 V – 1465 V**	**max. Spitzenstrom** *max. Peak Current*	**1000 A / 4500 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**4 J - 354 J** *(@10/1000µs)*

Drawings:

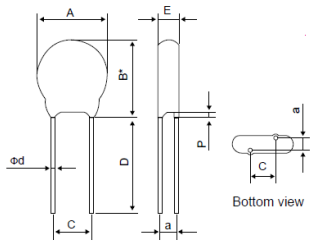


Fig 1. Straight Lead

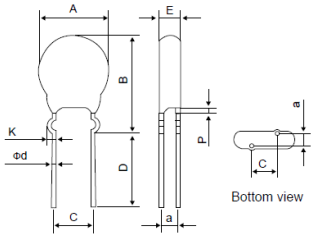


Fig 2. Outside Kink Lead

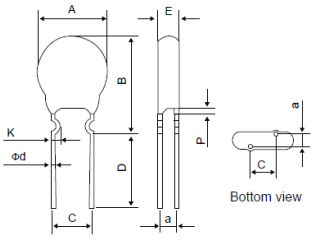


Fig 3. Inside Kink Lead

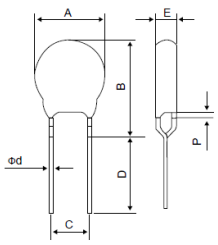


Fig 4. In Line Kink Lead

Symbol		min. [mm]	max. [mm]
A		13,5	17,5
B(max.)	180-D – 271-D	-	22,5
	> 271-D	-	22,5
B*(max.)		-	20,5
C (±1,0)		7,5	
D		25,0	
P(max.)		-	3,0
K		1,0	1,8
Φd (±0,05)		0,8	

Model	E (max.) [mm]	Model	E (max.) [mm]
14180-D	4,0	**14301-D**	4,4
14220-D	4,3	**14331-D**	4,6
14270-D	4,5	**14361-D**	4,8
14330-D	4,0	**14391-D**	4,9
14390-D	4,2	**14431-D**	5,1
14470-D	4,4	**14471-D**	5,3
14560-D	4,7	**14511-D**	5,4
14680-D	5,0	**14561-D**	5,6
14820-D	4,0	**14621-D**	5,8
14141-D	4,3	**14681-D**	5,9
14121-D	4,5	**14751-D**	6,1
14151-D	4,8	**14778-D**	6,4
14181-D	3,9	**14821-D**	6,6
14201-D	4,0	**14911-D**	6,7
14221-D	4,1	**14142-D**	7,1
14241-D	4,2	**14112-D**	7,5
14271-D	4,3	**14182-D**	11,5

Order Notes / Code:

1	2	3	4	5	6	7	8
EMOV	XX	XXX	-X	X	X	X	(XXX or A/B)

Pos. 1: Product family
Pos. 2: Disc diameter in [mm]
Pos. 3: Varistor voltage (two significant figures plus number of zeros that above)
Pos. 4: Standard series
Pos. 5 Tolerance of U_{N_DC} (@1mA): **K**=10% / **L**=15%
Pos. 6 Packaging: **B**=Bulk Pack / **B incl. XXX**$_{(Pos.8)}$=(Short Cut) Bulk Pack / **T**=Taped&Reeled / **A**=Flat Box Pack
Pos. 7 Lead Type: **S**=Straight (Fig.1) / **O**=Outside Kink (Fig.2) / **K**=Inside Kink (Fig.3) / **I**=In Line Kink (Fig.4)
Pos. 8 Optional: **XXX**=only for Short Cut version in [mm] (e.g. 12,5 mm) / **A** or **B**=Tape&Reel Pack Feed Hole Pitch (A=12,7 mm / B=15mm)

Example: EMOV14180-DKTSA

Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV14-D
AC / DC

ESKA the protection company

Ø 14 mm

Radial - D-Series

RoHS Compliant

Spannung *Voltage*	**AC: 11 V – 1000 V** **DC: 14 V – 1465 V**	**max. Spitzenstrom** *max. Peak Current*	**1000 A / 4500 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**4 J - 354 J** *(@10/1000µs)*

Tape and Reel Specifications:

(Note: Radial devices on tape are supplied with straight leads or inline kink leads)

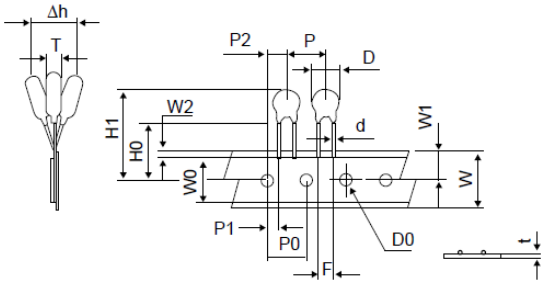


Figure : A

Symbol	Parameter	Dimensions [mm]	
P	Pitch of Component	25,4 ± 1,0	30,0 ± 1,0
P0	Feed Hole Pitch	12,7 ± 0,2	15,0 ± 0,2
P1	Feed Hole Center Lead	8,95 ± 0,7	3,75 ± 0,7
P2	Hole center to Component Center	12,7 ± 0,7	7,5 ± 0,7
F	Lead to Lead Distance	7,5 ± 0,8	7,5 ± 0,8
Δh	Component Alignment	max. 2,0	max. 2,0
W	Tape Width	18,0 +1,0/-0,5	18,0 +1,0/-0,5
W0	Hold Down Fape Width	min. 5,0	min. 5,0
W1	Hole Position	9,0 +0,75/-0,5	9,0 +0,75/-0,5
W2	Hold Down Tape Position	max. 3,0	max. 3,0
H	Height from Tape Center to Component Base	18,0 +2,0/-0,0	18,0 +2,0/-0,0
H0	Seating Plane Height	16,0 ± 0,5	16,0 ± 0,5
H1	Component Height	max. 40,0	max. 40,0
D0	Feed Hole Diameter	4,0 ±0,2	4,0 ±0,2
t	Total tape Thickness	0,7 ±0,2	0,7 ±0,2
L	Length of Clopped Lead	max. 11,0	max. 11,0
Figure		C[1)]	D[1)]

[1)] Maße ähnlich zu Zeichnung A, jedoch Lochabstand variiert /
Dimensions similar to figure A, but the hole distance varies

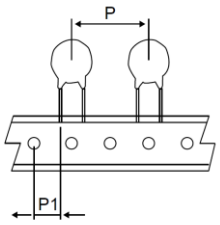


Figure : C

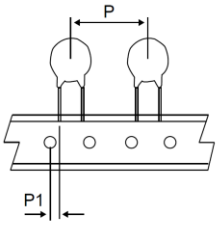
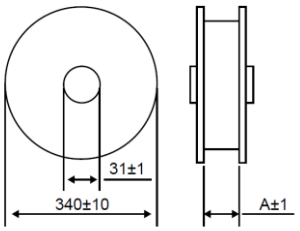


Figure : D

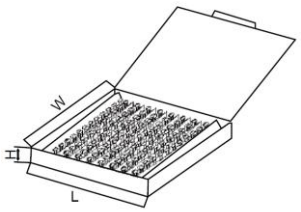
Packing Specifications:

Bulk Product Packing		**Quantity per bag**
Straight LeadType Quantity(pcs/bag)		500
Outside Kink LeadType Quantity(pcs/bag)		500
Inside Kink LeadType Quantity(pcs/bag)		500
In Line Kink LeadType Quantity(pcs/bag)		500

Tape and Reel Product Packing	**Dimension A [mm]:**	**Quatity per Reel**
EMOV14(180 ~ 391)-D	56	800
EMOV14(431 ~ 621)-D	56	700
EMOV14(681 ~ 112)-D	56	600



Box Product Packing	**Dimension W-L-H [mm]:**	**Quatity per Box**
EMOV14(180 ~ 621)-D	340-245-50	500
EMOV14(681 ~ 112)-D	340-245-50	400



Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV14-P
AC / DC

ESKA *the protection company*

Ø 14 mm

Radial - P-Series

RoHS Compliant

Spannung *Voltage*	**AC: 11 V - 680 V** **DC: 14 V - 895 V**	**max. Spitzenstrom** *max. Peak Current*	**3.000 A – 8.000 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**11 J - 360 J** *(@10/1000µs)*

Norm / *Standard:*	UL 1449-4
Anschluss / *Connection*:	Kupfer verzinnt / *Tin-plated copper*
Beschichtung / *Coating*:	Isolierende Beschichtung: Flammenhemmendes Epoxidharz (UL-94V-0) / *Insulating coating: Flame retardant epoxy (UL-94V-0)*
Betriebstemperatur / *Operating temperature*:	-40°C bis / to +105°C
Lötbarkeit / *Solderability*:	MIL-STD-202, Method 208E
Isolationswiderstand / *Insulation Resistance:*	>1000 MΩ
Ansprechzeit / *Response Time:*	<25 ns
Verpackungsmöglichkeiten / *Packing options*:	Siehe Verpackungsspezifikationen / *see packaging specifications*

Bemessungswerte / Ratings (@ 23°C):

Art. No.	U_{C_max} [V] AC (rms)	U_{C_max} [V] DC	U_{N_DC} (@1mA)[1] [V]	U_{Clamp_max} @Test Current (@8/20µs) [V]		E_{max} (@10/1000µs) [J]	I_{peak_max} (@8/20µs) [A]	P_{rat} [W]	$C_{typical}$ (@1KHz) [pF]
EMOV14180-P	11	14	18	36	@10 A	11	3.000	0,15	18.500
EMOV14220-P	14	18	22	43	@10 A	14	3.000	0,15	16.400
EMOV14270-P	17	22	27	53	@10 A	18	3.000	0,15	13.000
EMOV14330-P	20	26	33	65	@10 A	23	3.000	0,15	9.500
EMOV14390-P	25	31	39	77	@10 A	26	3.000	0,15	8.800
EMOV14470-P	30	38	47	93	@10 A	33	3.000	0,15	7.700
EMOV14560-P	35	45	56	110	@10 A	41	3.000	0,15	6.400
EMOV14680-P	40	56	68	135	@10 A	46	3.000	0,15	5.600
EMOV14201-P	130	170	200	340	@50 A	96	8.000	0,6	770
EMOV14221-P	140	180	220	360	@50 A	104	8.000	0,6	740
EMOV14241-P	150	200	240	395	@50 A	112	8.000	0,6	700
EMOV14271-P	175	225	270	455	@50 A	120	8.000	0,6	640
EMOV14301-P	195	250	300	500	@50 A	136	8.000	0,6	600
EMOV14331-P	215	275	330	550	@50 A	152	8.000	0,6	580
EMOV14361-P	230	300	360	595	@50 A	164	8.000	0,6	540
EMOV14391-P	250	320	390	650	@50 A	176	8.000	0,6	500
EMOV14431-P	275	350	430	710	@50 A	200	8.000	0,6	450
EMOV14471-P	300	385	470	775	@50 A	220	8.000	0,6	400
EMOV14511-P	320	410	510	845	@50 A	240	8.000	0,6	350
EMOV14561-P	350	460	560	915	@50 A	240	8.000	0,6	350
EMOV14621-P	395	510	620	1.020	@50 A	250	8.000	0,6	330
EMOV14681-P	420	560	680	1.120	@50 A	260	8.000	0,6	320
EMOV14751-P	465	615	750	1.235	@50 A	270	8.000	0,6	300
EMOV14781-P	485	640	780	1.290	@50 A	275	8.000	0,6	300
EMOV14821-P	510	670	820	1.355	@50 A	280	8.000	0,6	270
EMOV14911-P	550	745	910	1.500	@50 A	295	8.000	0,6	260
EMOV14102-P	625	825	1.000	1.650	@50 A	335	8.000	0,6	250
EMOV14112-P	680	895	1.100	1.815	@50 A	360	8.000	0,6	240

[1] Toleranz: / *Tolerance:* ±10 %

Legende / Caption:

U_{C_max}	= max. Dauerspannung / *max. continuous voltage*
U_{N_DC}	= Varistorspannung / *Varistor voltage*
U_{Clamp_max}	= max. Ansprechspannung / *max. clamping voltage*
E_{max}	= max. Energie / *max. Energy*
I_{peak_max}	= max. Spitzenstrom / *max. peak current*
P_{rat}	= Nennleistung / *Rated power*
$C_{typical}$	= typische Kapazität / *typical capacity*

Ø 14 mm

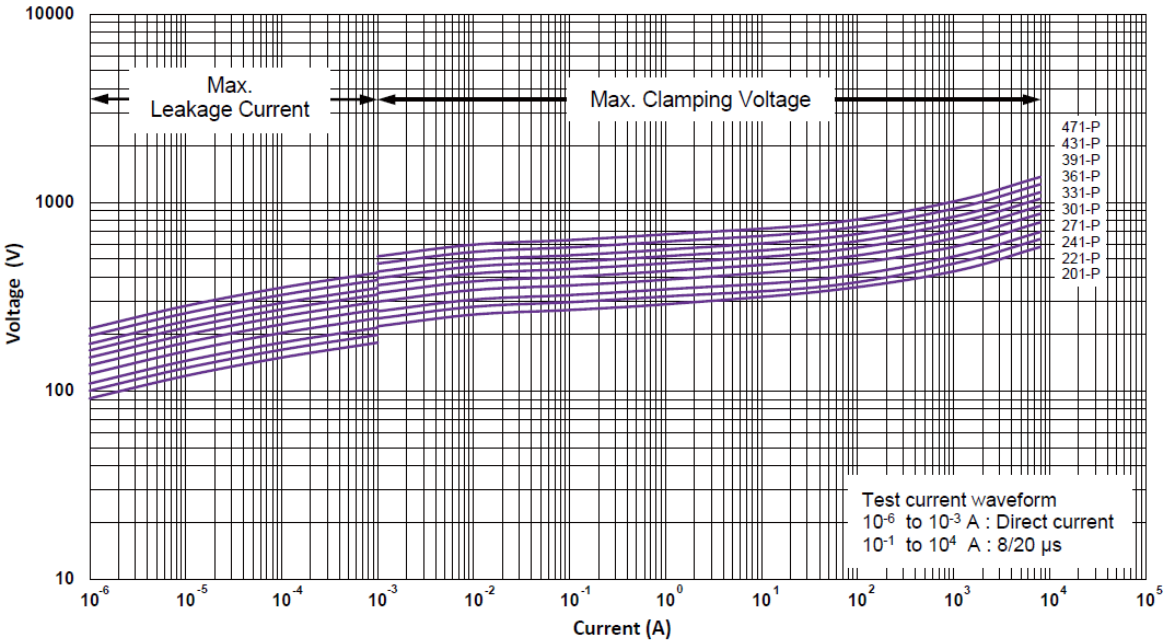
Radial - P-Series

RoHS Compliant

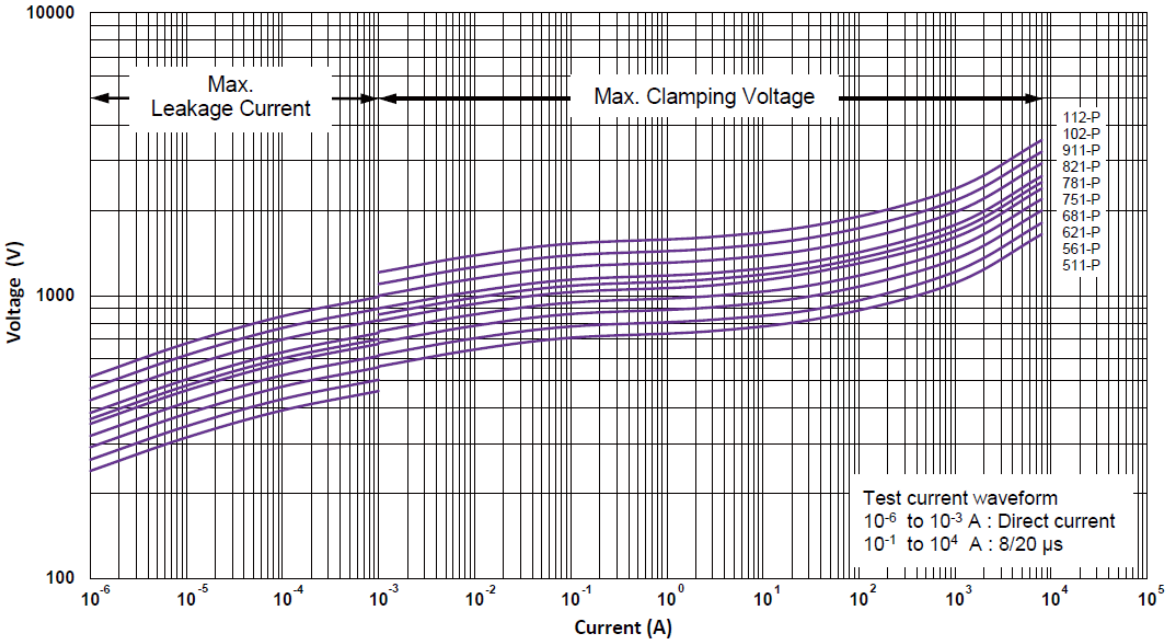
Spannung *Voltage*	**AC: 11 V - 680 V** **DC: 14 V - 895 V**	**max. Spitzenstrom** *max. Peak Current*	**3.000 A – 8.000 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**11 J - 360 J** *(@10/1000µs)*

Transient U-I Characteristic Curves:

For EMOV14201-P – EMOV14471-P:



For EMOV14511-P – EMOV14112-P:



Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV14-P
AC / DC

ESKA the protection company

Ø 14 mm

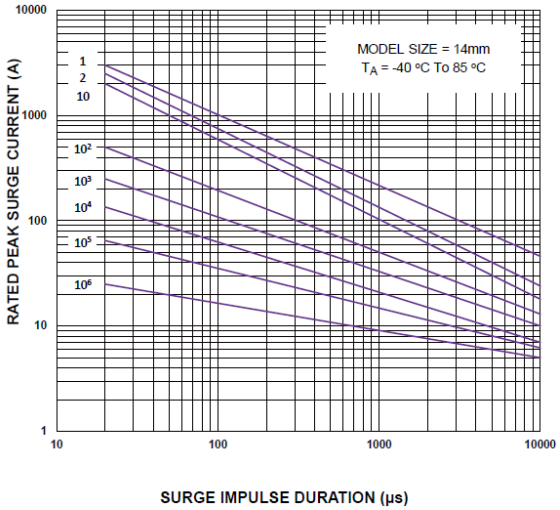
Radial - P-Series

RoHS Compliant

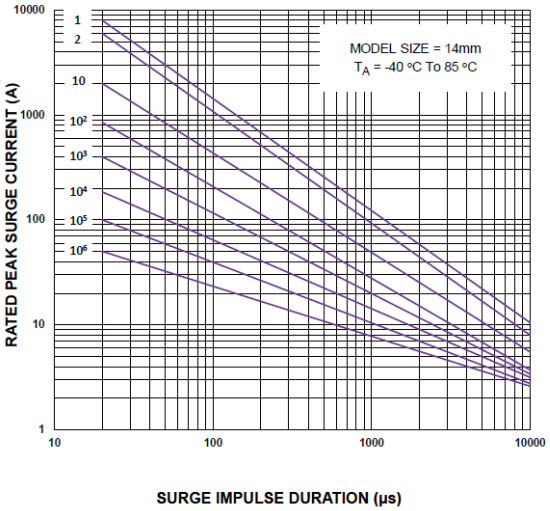
Spannung *Voltage*	**AC: 11 V - 680 V** **DC: 14 V - 895 V**	**max. Spitzenstrom** *max. Peak Current*	**3.000 A – 8.000 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**11 J - 360 J** *(@10/1000µs)*

Impulse Life Time Rating Curves:

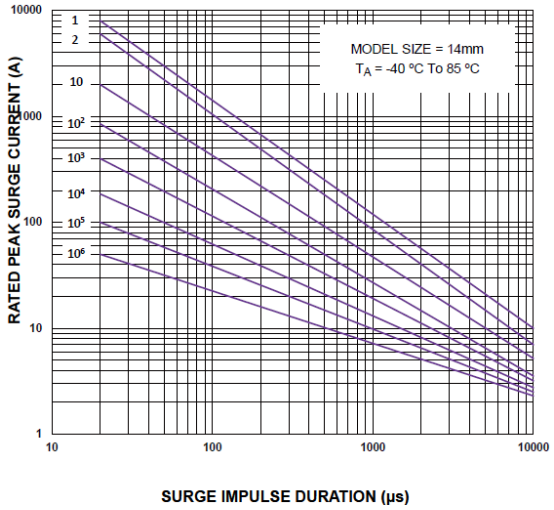
For EMOV14180-P – EMOV14680-P:



For EMOV14201-P – EMOV14751-P:

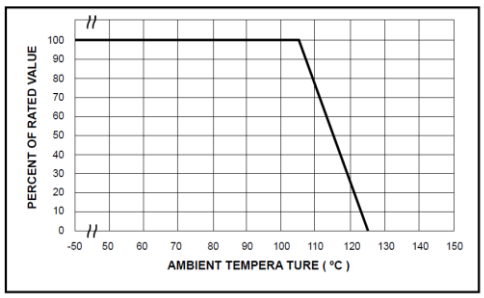


For EMOV14781-P – EMOV14112-P:

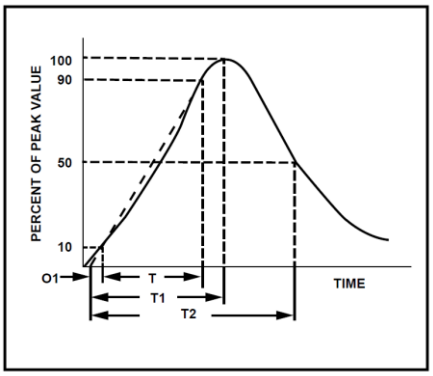


Power Derating Cuve:

Should transients occur in rapid succession, the average power dissipation is the energy (watt-seconds) per pulse times the number of pulses per second. The power so developed must be with the specifications shown on the Device Ratings and Specifications Table for the specific device. The operating values of a MOV need to be derated at high temperatures as shown above. Because varistors only dissipate a relatively small amount of average power they are not suitable for repetitive applications that involve substantial amounts of average power dissipation.



Surge Current Standard Waveform



O1 = Virtual Origin of Wave
T = Time from 10% to 90% of Peak
T1 = Rise Time = 1.25 x T
T2 = Decay Time
Example - For an 8/20 µs Current Waveform :
8µs = T1 = Rise Time
20µs = T2 = Decay Time

Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV14-P
AC / DC

ESKA the protection company

Ø 14 mm

Radial - P-Series

RoHS Compliant

Spannung *Voltage*	**AC: 11 V - 680 V** **DC: 14 V - 895 V**	**max. Spitzenstrom** *max. Peak Current*	**3.000 A – 8.000 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**11 J - 360 J** *(@10/1000µs)*

Drawings:

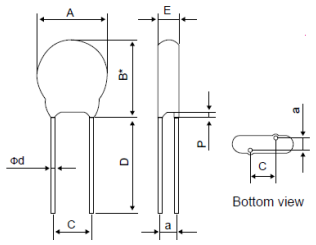


Fig 1. Straight Lead

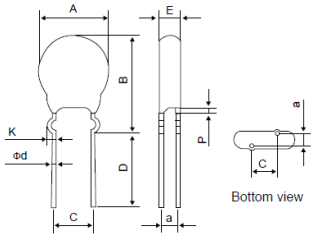


Fig 2. Outside Kink Lead

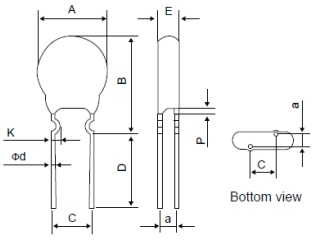


Fig 3. Inside Kink Lead

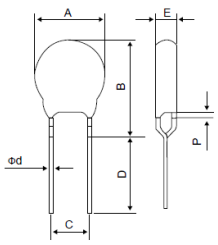


Fig 4. In Line Kink Lead

Symbol		min. [mm]	max. [mm]
A		13,5	17,5
B(max.)	201-P – 271-P	-	22,5
	> 271-P	-	23,5
B*(max.)		-	20,5
C (±1,0)		7,5	
D		25,0	
P(max.)		-	3,0
K		1,0	1,8
Φd (±0,05)		0,8	

Model	E (max.) [mm]	Model	E (max.) [mm]
EMOV14180-P	4,0	EMOV14361-P	5,5
EMOV14220-P	4,3	EMOV14391-P	5,6
EMOV14270-P	4,5	EMOV14431-P	5,8
EMOV14330-P	4,0	EMOV14471-P	6,0
EMOV14390-P	4,2	EMOV14511-P	6,2
EMOV14470-P	4,4	EMOV14561-P	6,4
EMOV14560-P	4,7	EMOV14621-P	6,6
EMOV14680-P	5,0	EMOV14581-P	6,7
EMOV14201-P	4,6	EMOV14751-P	6,9
EMOV14221-P	4,7	EMOV14781-P	7,3
EMOV14241-P	4,8	EMOV14821-P	7,5
EMOV14271-P	4,9	EMOV14911-P	7,6
EMOV14301-P	5,0	EMOV14102-P	8,1
EMOV14331-P	5,2	EMOV14112-P	9,0

Order Notes / Code:

1	2	3	4	5	6	7	8
EMOV	XX	XXX	-X	X	X	X	(XXX or A/B)

Pos. 1: Product family
Pos. 2: Disc diameter in [mm]
Pos. 3: Varistor voltage (two significant figures plus number of zeros that above)
Pos. 4: Standard series
Pos. 5 Tolerance of U_{N_DC} (@1mA): **K**=10% / **L**=15%
Pos. 6 Packaging: **B**=Bulk Pack / **B incl. XXX**$_{(Pos.8)}$=(Short Cut) Bulk Pack / **T**=Taped&Reeled / **A**=Flat Box Pack
Pos. 7 Lead Type: **S**=Straight (Fig.1) / **O**=Outside Kink (Fig.2) / **K**=Inside Kink (Fig.3) / **I**=In Line Kink (Fig.4)
Pos. 8 Optional: **XXX**=only for Short Cut version in [mm] (e.g. 12,5 mm) / **A** or **B**=Tape&Reel Pack Feed Hole Pitch (A=12,7 mm / B=15mm)

Example: EMOV14220-PKTSA

Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV14-P
AC / DC

ESKA the protection company

Ø 14 mm

Radial - P-Series

RoHS Compliant

Spannung *Voltage*	**AC: 11 V - 680 V** **DC: 14 V - 895 V**	**max. Spitzenstrom** *max. Peak Current*	**3.000 A – 8.000 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**11 J - 360 J** *(@10/1000µs)*

Tape and Reel Specifications:

(Note: Radial devices on tape are supplied with straight leads or inline kink leads)

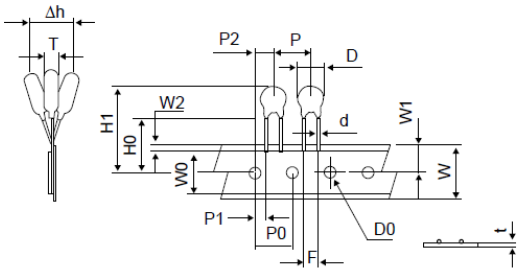


Figure : A

Symbol	Parameter	Dimensions [mm]	
P	Pitch of Component	25,4 ± 1,0	30,0 ± 1,0
P0	Feed Hole Pitch	12,7 ± 0,2	15,0 ± 0,2
P1	Feed Hole Center Lead	8,95 ± 0,7	3,75 ± 0,7
P2	Hole center to Component Center	7,5 ± 0,7	7,5 ± 0,7
F	Lead to Lead Distance	7,5 ± 0,8	7,5 ± 0,8
Δh	Component Alignment	max. 2,0	max. 2,0
W	Tape Width	18,0 +1,0/-0,5	18,0 +1,0/-0,5
W0	Hold Down Fape Width	min. 5,0	min. 5,0
W1	Hole Position	9,0 +0,75/-0,5	9,0 +0,75/-0,5
W2	Hold Down Tape Position	max. 3,0	max. 3,0
H	Height from Tape Center to Component Base	18,0 +2,0/-0,0	18,0 +2,0/-0,0
H0	Seating Plane Height	16,0 ± 0,5	16,0 ± 0,5
H1	Component Height	max. 40,0	max. 40,0
D0	Feed Hole Diameter	4,0 ± 0,2	4,0 ± 0,2
t	Total tape Thickness	0,7 ± 0,2	0,7 ± 0,2
L	Length of Clopped Lead	max. 11,0	max. 11,0
Figure[2)]		C	D

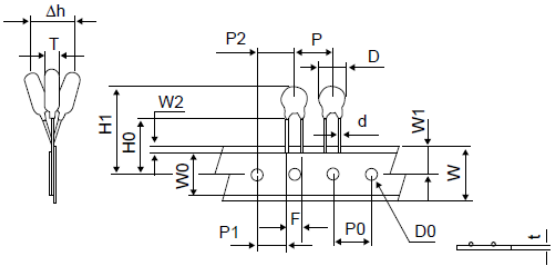


Figure : B

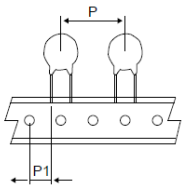


Figure : C

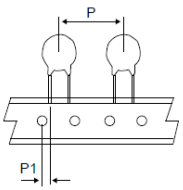


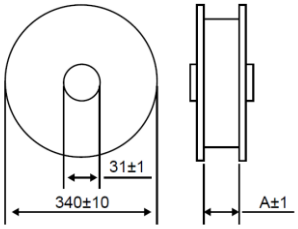
Figure : D

[2)] Bild C / Bild D sind jeweils, mit Ausnahme der dargestellten Parameter, identisch zu B / A. / *Drawing C / D are, with the exception of the parameters that belong, identical to to B / A.*

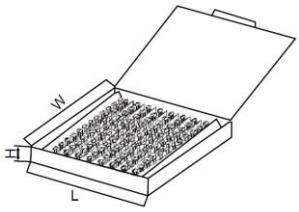
Packing Specifications:

Bulk Product Packing	**Quantity per bag**
Straight LeadType Quantity(pcs/bag)	500
Outside Kink LeadType Quantity(pcs/bag)	500
Inside Kink LeadType Quantity(pcs/bag)	500
In Line Kink LeadType Quantity(pcs/bag)	500

Tape and Reel Product Packing	**Dimension A [mm]:**	**Quatity per Reel**
EMOV14(180 ~ 391)-P-T	56	800
EMOV14(431 ~ 621)-P-T	56	700
EMOV14(681 ~ 112)-P-T	56	600



Box Product Packing	**Dimension W-L-H [mm]:**	**Quatity per Box**
EMOV14(180 ~ 391)-P-A	340-245-50	500
EMOV14(431 ~ 621)-P-A	340-245-50	500
EMOV14(681 ~ 112)-P-A	340-245-50	400



Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV14-V
AC / DC

ESKA *the protection company*

Ø 14 mm

Radial - V-Series

RoHS Compliant

Spannung *Voltage*	**AC: 130 V - 680 V** **DC: 170 V - 895 V**	**max. Spitzenstrom** *max. Peak Current*	**6.000 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**84 J - 364 J** *(@10/1000µs)*

Norm / *Standard:*	UL 1449-4
Anschluss / *Connection*:	Kupfer verzinnt / *Tin-plated copper*
Beschichtung / *Coating*:	Isolierende Beschichtung: Flammenhemmendes Epoxidharz (UL-94V-0) / *Insulating coating: Flame retardant epoxy (UL-94V-0)*
Betriebstemperatur / *Operating temperature*:	-40°C bis / to +105°C
Lötbarkeit / *Solderability*:	MIL-STD-202, Method 208E
Isolationswiderstand / *Insulation Resistance:*	>1000 MΩ
Ansprechzeit / *Response Time:*	<25 ns
Verpackungsmöglichkeiten / *Packing options*:	Siehe Verpackungsspezifikationen / *see packaging specifications*

Bemessungswerte / Ratings (@ 23°C):

Art. No.	U_{C_max} [V] AC (rms)	U_{C_max} [V] DC	U_{N_DC} (@1mA)[1] [V]	U_{Clamp_max} @Test Current (@8/20µs) [V]		E_{max} (@10/1000µs) [J]	I_{peak_max} (@8/20µs) [A]	P_{rat} [W]	$C_{typical}$ (@1KHz) [pF]
EMOV14201-V	130	170	200	340	@50 A	84	6.000	0,6	770
EMOV14221-V	140	180	220	360	@50 A	91	6.000	0,6	740
EMOV14241-V	150	200	240	395	@50 A	98	6.000	0,6	700
EMOV14271-V	175	225	270	455	@50 A	112	6.000	0,6	640
EMOV14301-V	195	250	300	500	@50 A	123	6.000	0,6	400
EMOV14331-V	215	275	330	550	@50 A	133	6.000	0,6	580
EMOV14361-V	230	300	360	595	@50 A	147	6.000	0,6	540
EMOV14391-V	250	320	390	650	@50 A	161	6.000	0,6	500
EMOV14431-V	275	350	430	710	@50 A	182	6.000	0,6	450
EMOV14471-V	300	385	470	775	@50 A	196	6.000	0,6	400
EMOV14511-V	320	410	510	845	@50 A	210	6.000	0,6	350
EMOV14561-V	350	460	560	915	@50 A	231	6.000	0,6	350
EMOV14621-V	395	510	620	1.020	@50 A	252	6.000	0,6	330
EMOV14681-V	420	560	680	1.120	@50 A	266	6.000	0,6	310
EMOV14751-V	465	615	750	1.235	@50 A	280	6.000	0,6	300
EMOV14781-V	485	640	780	1.290	@50 A	280	6.000	0,6	300
EMOV14821-V	510	670	820	1.355	@50 A	280	6.000	0,6	270
EMOV14911-V	550	745	910	1.500	@50 A	308	6.000	0,6	260
EMOV14102-V	625	825	1.000	1.650	@50 A	336	6.000	0,6	250
EMOV14112-V	680	895	1.100	1.815	@50 A	364	6.000	0,6	240

[1] Toleranz: / *Tolerance:* ±10 %

Legende / Caption:

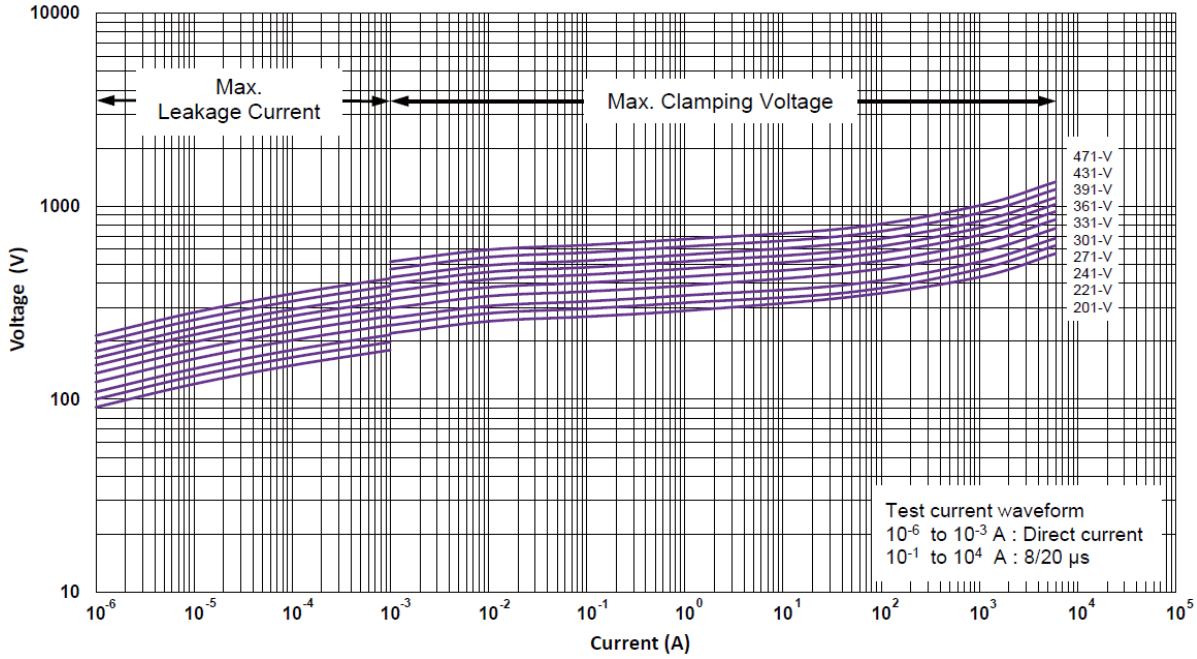
U_{C_max}	= max. Dauerspannung / *max. continuous voltage*	I_{peak_max}	= max. Spitzenstrom / *max. peak current*
U_{N_DC}	= Varistorspannung / *Varistor voltage*	P_{rat}	= Nennleistung / *Rated power*
U_{Clamp_max}	= max. Ansprechspannung / *max. clamping voltage*	$C_{typical}$	= typische Kapazität / *typical capacity*
E_{max}	= max. Energie / *max. Energy*		

Ø 14 mm Radial - V-Series RoHS Compliant

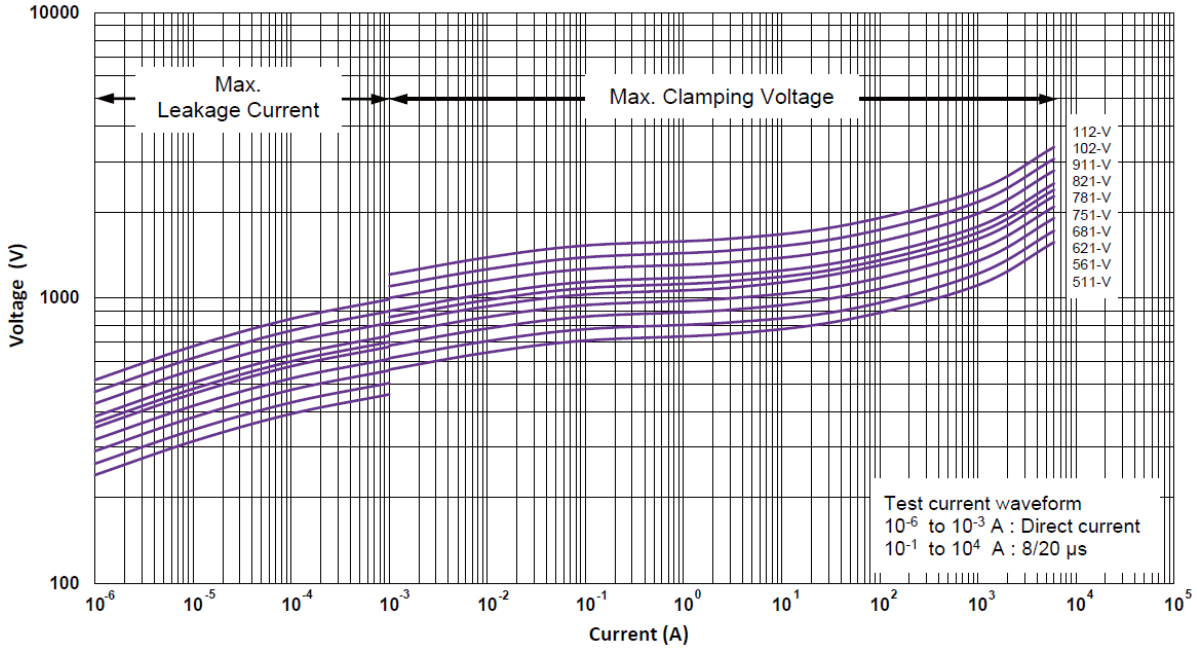
Spannung *Voltage*	**AC: 130 V - 680 V** **DC: 170 V - 895 V**	**max. Spitzenstrom** *max. Peak Current*	**6.000 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**84 J - 364 J** *(@10/1000µs)*

Transient U-I Characteristic Curves:

For EMOV14201-V – EMOV14471-V:



For EMOV14511-V – EMOV14112-V:



Ø 14 mm

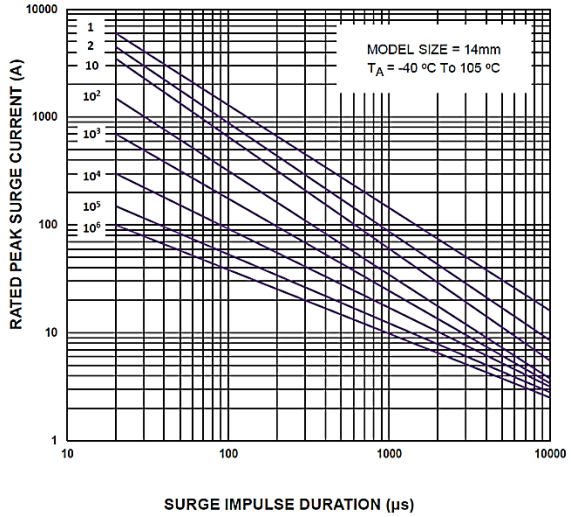
Radial - V-Series

RoHS Compliant

Spannung *Voltage*	**AC: 130 V - 680 V** **DC: 170 V - 895 V**	**max. Spitzenstrom** *max. Peak Current*	**6.000 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**84 J - 364 J** *(@10/1000µs)*

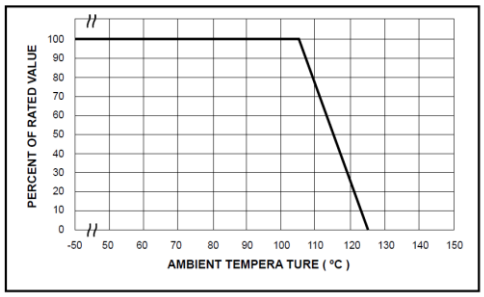
Impulse Life Time Rating Curves:

For EMOV14201-V – EMOV14112-V:

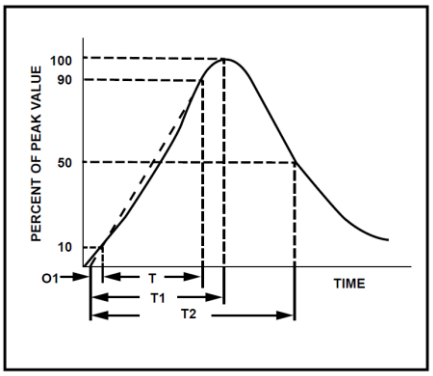


Power Derating Cuve:

Should transients occur in rapid succession, the average power dissipation is the energy (watt-seconds) per pulse times the number of pulses per second. The power so developed must be with the specifications shown on the Device Ratings and Specifications Table for the specific device. The operating values of a MOV need to be derated at high temperatures as shown above. Because varistors only dissipate a relatively small amount of average power they are not suitable for repetitive applications that involve substantial amounts of average power dissipation.



Surge Current Standard Waveform



O1 = Virtual Origin of Wave
T = Time from 10% to 90% of Peak
T1 = Rise Time = 1.25 x T
T2 = Decay Time
Example - For an 8/20 µs Current Waveform :
8µs = T1 = Rise Time
20µs = T2 = Decay Time

Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV14-V
AC / DC

ESKA the protection company

Ø 14 mm

Radial - V-Series

RoHS Compliant

Spannung *Voltage*	**AC: 130 V - 680 V** **DC: 170 V - 895 V**	**max. Spitzenstrom** *max. Peak Current*	**6.000 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**84 J - 364 J** *(@10/1000µs)*

Drawings:

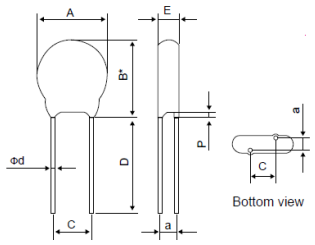


Fig 1. Straight Lead

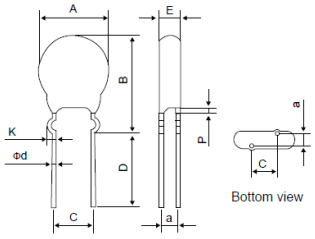


Fig 2. Outside Kink Lead

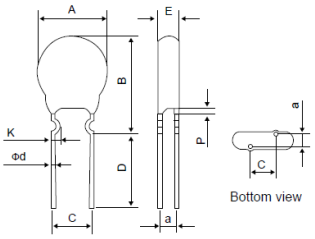


Fig 3. Inside Kink Lead

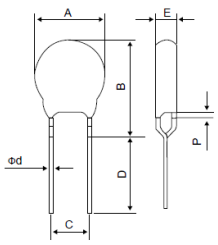


Fig 4. In Line Kink Lead

Symbol		min. [mm]	max. [mm]
A		13,5	17,5
B(max.)	180-V – 271-V	-	22,5
	> 271-V	-	23,5
B*(max.)		-	20,5
C (±1,0)		7,5	
D		25,0	
P(max.)		-	3,0
K		0,8	1,6
Φd (±0,05)		0,8	

Model	E (max.) [mm]	Model	E (max.) [mm]
EMOV14201-V	4,0	EMOV14511-V	5,4
EMOV14221-V	4,1	EMOV14561-V	5,6
EMOV14241-V	4,2	EMOV14621-V	5,8
EMOV14271-V	4,3	EMOV14681-V	5,9
EMOV14301-V	4,4	EMOV14751-V	6,1
EMOV14331-V	4,6	EMOV14781-V	6,4
EMOV14361-V	4,8	EMOV14821-V	6,6
EMOV14391-V	4,9	EMOV14911-V	6,7
EMOV14431-V	5,1	EMOV14102-V	7,1
EMOV14471-V	5,3	EMOV14112-V	7,5

Order Notes / Code:

1	2	3	4	5	6	7	8
EMOV	XX	XXX	-X	X	X	X	(XXX or A/B)

Pos. 1: Product family
Pos. 2: Disc diameter in [mm]
Pos. 3: Varistor voltage (two significant figures plus number of zeros that above)
Pos. 4: Standard series
Pos. 5 Tolerance of U_{N_DC} (@1mA): **K**=10% / **L**=15%
Pos. 6 Packaging: **B**=Bulk Pack / **B incl. XXX**$_{(Pos.8)}$=(Short Cut) Bulk Pack / **T**=Taped&Reeled / **A**=Flat Box Pack
Pos. 7 Lead Type: **S**=Straight (Fig.1) / **O**=Outside Kink (Fig.2) / **K**=Inside Kink (Fig.3) / **I**=In Line Kink (Fig.4)
Pos. 8 Optional: **XXX**=only for Short Cut version in [mm] (e.g. 12,5 mm) / **A** or **B**=Tape&Reel Pack Feed Hole Pitch (A=12,7 mm / B=15mm)

Example: EMOV14201-VKTSA

Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV14-V
AC / DC

ESKA the protection company

Ø 14 mm

Radial - V-Series

RoHS Compliant

Spannung *Voltage*	**AC: 130 V - 680 V** **DC: 170 V - 895 V**	**max. Spitzenstrom** *max. Peak Current*	**6.000 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**84 J - 364 J** *(@10/1000µs)*

Tape and Reel Specifications:

(Note: Radial devices on tape are supplied with straight leads or inline kink leads)

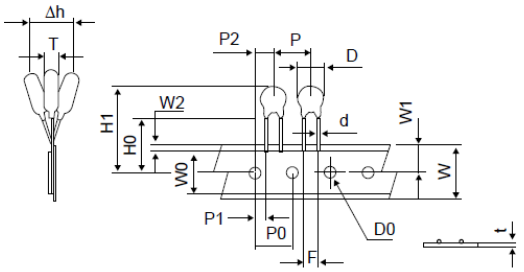


Figure : A

Symbol	Parameter	Dimensions [mm]	
P	Pitch of Component	25,4 ± 1,0	30 ± 1,0
P0	Feed Hole Pitch	12,7 ± 0,2	15 ± 0,2
P1	Feed Hole Center Lead	8,95 ± 0,7	3,75 ± 0,7
P2	Hole center to Component Center	12,7 ± 0,7	7,5 ± 0,7
F	Lead to Lead Distance	7,5 ± 0,8	7,5 ± 0,8
Δh	Component Alignment	max. 2,0	max. 2,0
W	Tape Width	18,0 +1,0/-0,5	18,0 +1,0/-0,5
W0	Hold Down Fape Width	min. 5,0	min. 5,0
W1	Hole Position	9,0 +0,75/-0,5	9,0 +0,75/-0,5
W2	Hold Down Tape Position	max. 3,0	max. 3,0
H	Height from Tape Center to Component Base	18,0 +2,0/-0,0	18,0 +2,0/-0,0
H0	Seating Plane Height	16,0 ± 0,5	16,0 ± 0,5
H1	Component Height	max. 40,0	max. 40,0
D0	Feed Hole Diameter	4,0 ± 0,2	4,0 ± 0,2
t	Total tape Thickness	0,7 ± 0,2	0,7 ± 0,2
L	Length of Clopped Lead	max. 11,0	max. 11,0
Figure[2)]		C	D

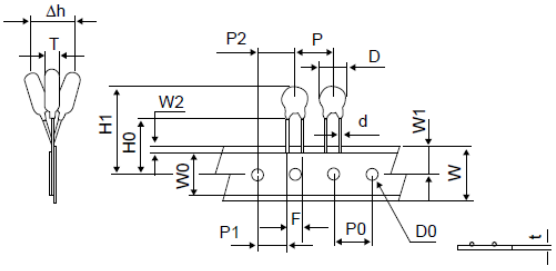


Figure : B

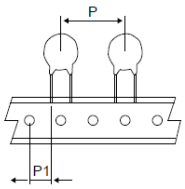


Figure : C

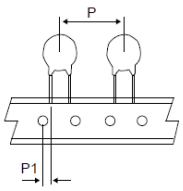


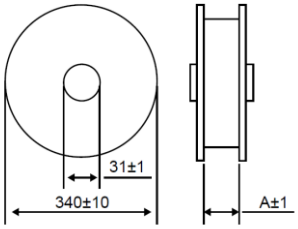
Figure : D

[2)] Bild C / Bild D sind jeweils, mit Ausnahme der dargestellten Parameter, identisch zu B / A. / *Drawing C / D are, with the exception of the parameters that belong, identical to to B / A.*

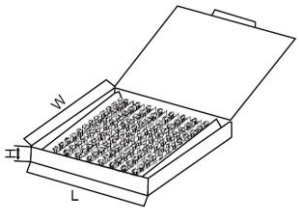
Packing Specifications:

Bulk Product Packing	**Quantity per bag**
Straight LeadType Quantity(pcs/bag)	500
Outside Kink LeadType Quantity(pcs/bag)	500
Inside Kink LeadType Quantity(pcs/bag)	500
In Line Kink LeadType Quantity(pcs/bag)	500

Tape and Reel Product Packing	**Dimension A [mm]:**	**Quatity per Reel**
EMOV14(201 ~ 391)-V-T	56	800
EMOV14(431 ~ 621)-V-T	56	700
EMOV14(681 ~ 112)-V-T	56	600



Box Product Packing	**Dimension W-L-H [mm]:**	**Quatity per Box**
EMOV14(201 ~ 621)-V-A	340-245-50	500
EMOV14(681 ~ 112)-V-A	340-245-50	400



Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV20-D
AC / DC

ESKA *the protection company*

Ø 20 mm

Radial - D-Series

RoHS Compliant

Spannung *Voltage*	**AC: 11 V – 1000 V** **DC: 14 V – 1465 V**	**max. Spitzenstrom** *max. Peak Current*	**2000 A / 6500 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**11 J - 620 J** *(@10/1000µs)*

Norm / *Standard:*	UL 1449-4
Anschluss / *Connection*:	Kupfer verzinnt / *Tin-plated copper*
Beschichtung / *Coating*:	Isolierende Beschichtung: Flammenhemmendes Epoxidharz (UL-94V-0) / *Insulating coating: Flame retardant epoxy (UL-94V-0)*
Betriebstemperatur / *Operating temperature*:	-40°C bis / to +105°C
Lötbarkeit / *Solderability*:	MIL-STD-202, Method 208E
Isolationswiderstand / *Insulation Resistance:*	>1000 MΩ
Ansprechzeit / *Response Time:*	<25 ns
Verpackungsmöglichkeiten / *Packing options*:	Siehe Verpackungsspezifikationen / *see packaging specifications*

Bemessungswerte / Ratings (@ 23°C):

Art. No.	U_{C_max} [V] AC (rms)	U_{C_max} [V] DC	$U_{N\_DC\ (@1mA)}$ [1)] [V]	U_{Clamp_max} @Test Current (@8/20µs) [V]		E_{max} (@10/1000µs) [J]	I_{peak_max} (@8/20µs) [A]	P_{rat} [W]	$C_{typical}$ (@1KHz) [pF]
EMOV20180-D	11	14	18	36	@20 A	11	2.000	0,2	40.000
EMOV20220-D	14	18	22	43	@20 A	14	2.000	0,2	30.000
EMOV20270-D	17	22	27	53	@20 A	18	2.000	0,2	24.500
EMOV20330-D	20	26	33	65	@20 A	23	2.000	0,2	20.000
EMOV20390-D	25	31	39	77	@20 A	26	2.000	0,2	13.800
EMOV20470-D	30	38	47	93	@20 A	33	2.000	0,2	13.500
EMOV20560-D	35	45	56	110	@20 A	41	2.000	0,2	12.200
EMOV20680-D	40	56	68	135	@20 A	46	2.000	0,2	11.500
EMOV20820-D	50	65	82	135	@100 A	48	6.500	1	8.200
EMOV20141-D	60	85	100	165	@100 A	51	6.500	1	8.000
EMOV20121-D	75	100	120	200	@100 A	55	6.500	1	5.500
EMOV20151-D	95	125	150	250	@100 A	70	6.500	1	4.200
EMOV20181-D	115	150	180	300	@100 A	85	6.500	1	2.500
EMOV20201-D	130	170	200	340	@100 A	95	6.500	1	2.300
EMOV20221-D	140	180	225	360	@100 A	100	6.500	1	2.200
EMOV20241-D	150	200	240	395	@100 A	108	6.500	1	2.200
EMOV20271-D	175	225	275	455	@100 A	127	6.500	1	2.100
EMOV20301-D	195	250	300	500	@100 A	150	6.500	1	1.800
EMOV20331-D	215	275	330	550	@100 A	163	6.500	1	1.750
EMOV20361-D	230	300	360	595	@100 A	163	6.500	1	1.700
EMOV20391-D	250	320	390	650	@100 A	180	6.500	1	1.400
EMOV20431-D	275	350	430	710	@100 A	190	6.500	1	1.350
EMOV20471-D	300	385	470	775	@100 A	220	6.500	1	1.200
EMOV20511-D	320	410	510	845	@100 A	220	6.500	1	1.050
EMOV20561-D	350	460	560	915	@100 A	220	6.500	1	850
EMOV20621-D	395	510	620	1.020	@100 A	220	6.500	1	570
EMOV20681-D	420	560	680	1.120	@100 A	230	6.500	1	550
EMOV20751-D	465	615	750	1.235	@100 A	255	6.500	1	530
EMOV20781-D	485	640	780	1.290	@100 A	265	6.500	1	500
EMOV20821-D	510	670	820	1.355	@100 A	282	6.500	1	500
EMOV20911-D	550	745	910	1.500	@100 A	310	6.500	1	480
EMOV20142-D	625	825	1.000	1.650	@100 A	342	6.500	1	460
EMOV20112-D	680	895	1.100	1.815	@100 A	383	6.500	1	400
EMOV20182-D	1.000	1.465	1.800	2.950	@100 A	620	6.500	1	300

[1)] Toleranz: / *Tolerance:* ±10 %

Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV20-D
AC / DC

ESKA *the protection company*

Ø 20 mm

Radial - D-Series

RoHS Compliant

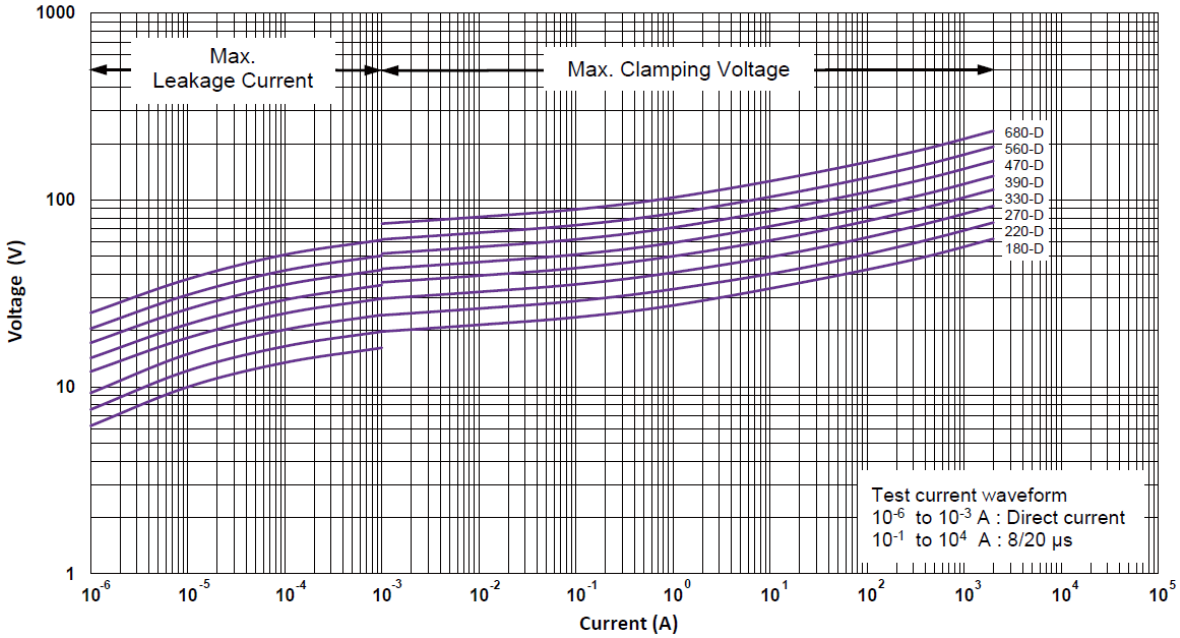
Spannung *Voltage*	**AC: 11 V – 1000 V** **DC: 14 V – 1465 V**	**max. Spitzenstrom** *max. Peak Current*	**2000 A / 6500 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**11 J - 620 J** *(@10/1000µs)*

Legende / Caption:

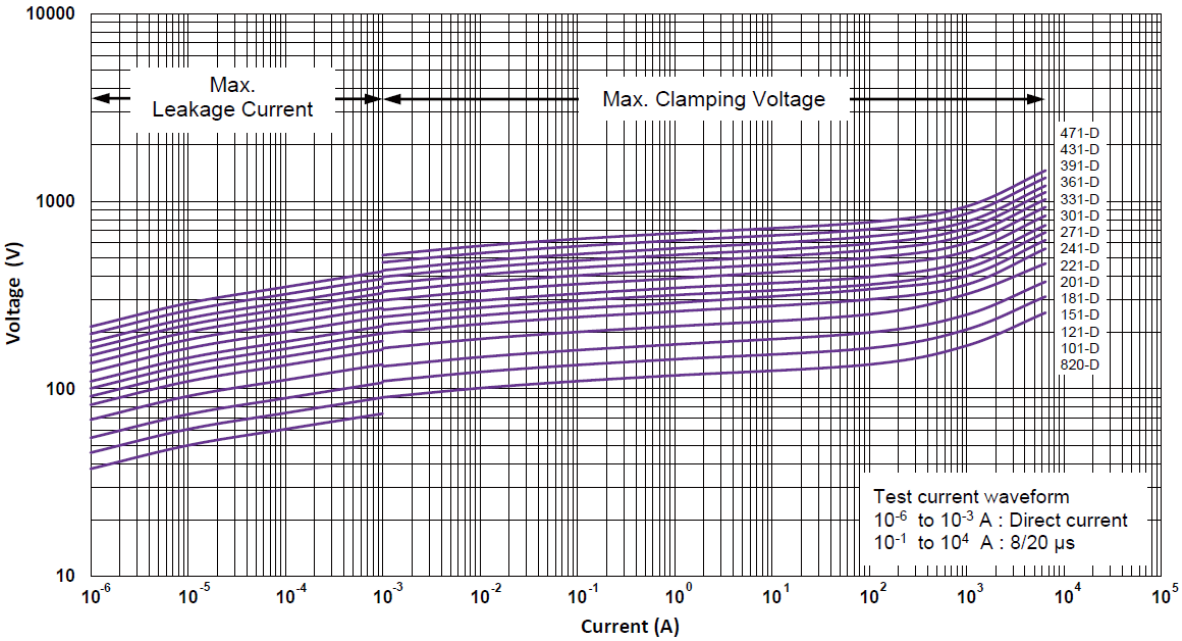
U_{C_max}	= max. Dauerspannung / *max. continuous voltage*
U_{N_DC}	= Varistorspannung / *Varistor voltage*
U_{Clamp_max}	= max. Ansprechspannung / *max. clamping voltage*
E_{max}	= max. Energie / *max. Energy*
I_{peak_max}	= max. Spitzenstrom / *max. peak current*
P_{rat}	= Nennleistung / *Rated power*
$C_{typical}$	= typische Kapazität / *typical capacity*

Transient U-I Characteristic Curves:

Für / *For EMOV20180-D* bis / *to EMOV20680-D:*



Für / *For EMOV20820-D* bis / *to EMOV20471-D:*



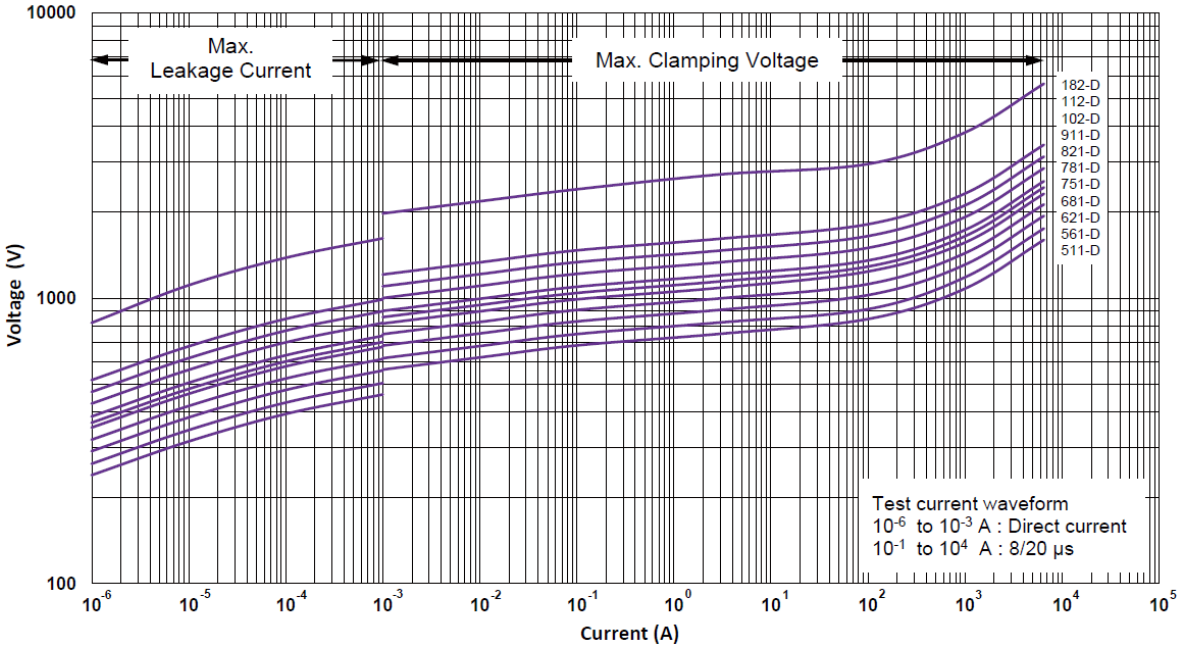
Ø 20 mm

Radial - D-Series

RoHS Compliant

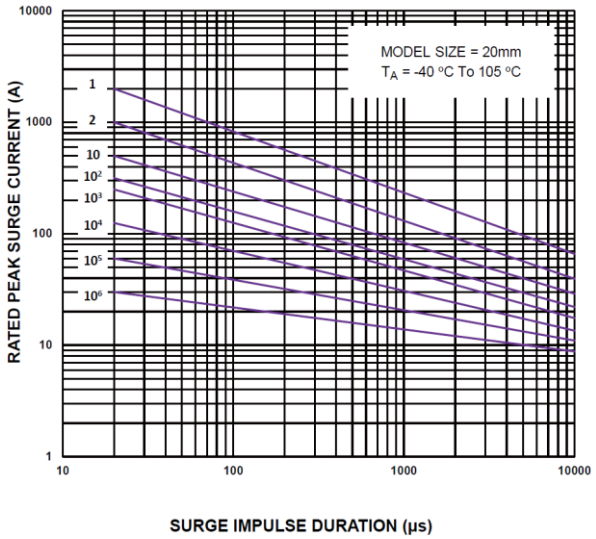
Spannung *Voltage*	**AC: 11 V – 1000 V** **DC: 14 V – 1465 V**	**max. Spitzenstrom** *max. Peak Current*	**2000 A / 6500 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**11 J - 620 J** *(@10/1000µs)*

Für / *For EMOV20511-D* bis / *to EMOV20182-D:*

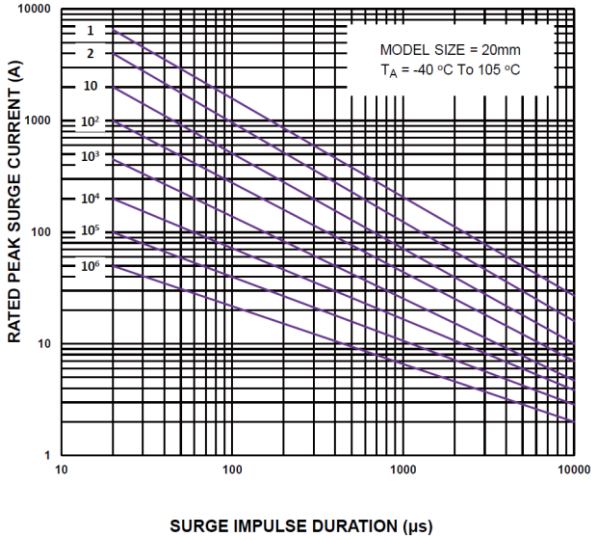


Impulse Life Time Rating Curves:

Für / *For EMOV20180-D* bis / *to EMOV20680-D:*



Für / *For EMOV20820-D* bis / *to EMOV20751-D:*



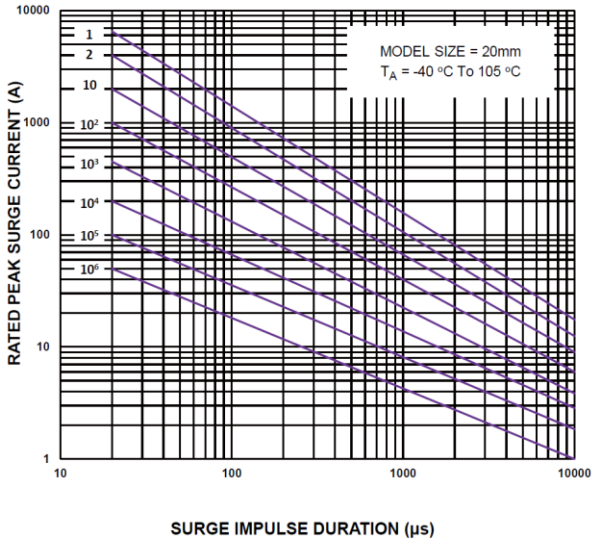
Ø 20 mm

Radial - D-Series

RoHS Compliant

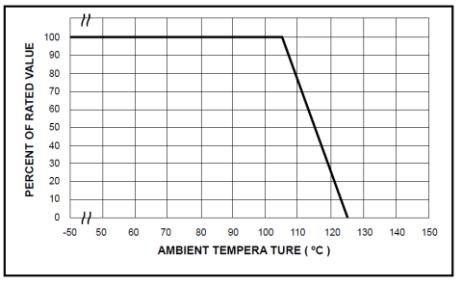
Spannung *Voltage*	**AC: 11 V – 1000 V** **DC: 14 V – 1465 V**	**max. Spitzenstrom** *max. Peak Current*	**2000 A / 6500 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**11 J - 620 J** *(@10/1000µs)*

Für / *For EMOV20781-D* bis / *to EMOV20182-D:*

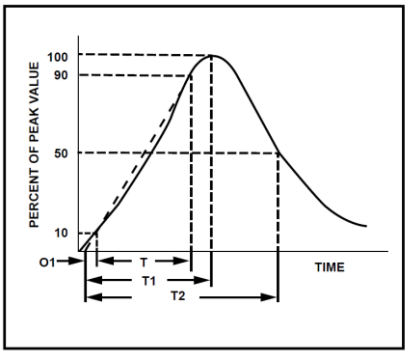


Power Derating Cuve:

Should transients occur in rapid succession, the average power dissipation is the energy (watt-seconds) per pulse times the number of pulses per second. The power so developed must be with the specifications shown on the Device Ratings and Specifications Table for the specific device. The operating values of a MOV need to be derated at high temperatures as shown above. Because varistors only dissipate a relatively small amount of average power they are not suitable for repetitive applications that involve substantial amounts of average power dissipation.



Surge Current Standard Waveform



O1 = Virtual Origin of Wave
T = Time from 10% to 90% of Peak
T1 = Rise Time = 1.25 x T
T2 = Decay Time
Example - For an 8/20 µs Current Waveform :
8µs = T1 = Rise Time
20µs = T2 = Decay Time

Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV20-D
AC / DC

ESKA *the protection company*

Ø 20 mm

Radial - D-Series

RoHS Compliant

Spannung *Voltage*	**AC: 11 V – 1000 V** **DC: 14 V – 1465 V**	**max. Spitzenstrom** *max. Peak Current*	**2000 A / 6500 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**11 J - 620 J** *(@10/1000µs)*

Drawings:

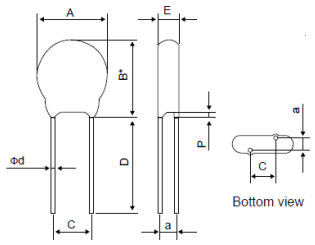


Fig 1. Straight Lead

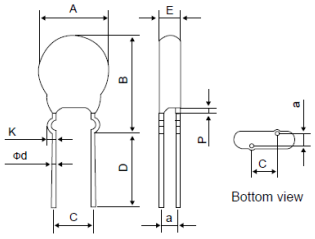


Fig 2. Outside Kink Lead

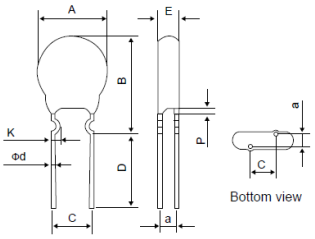


Fig 3. Inside Kink Lead

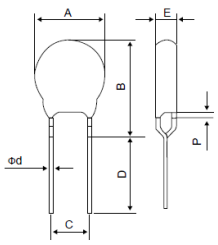


Fig 4. In Line Kink Lead

Symbol		min. [mm]	max. [mm]
A		19,2	25,0
B(max.)	180-D – 271-D	-	30,0
	> 271-D	-	31,0
B*(max.)		-	28,0
C (±1,0)		10,0	
D		25,0	
P(max.)		-	3,0
K		1,0	1,8
Φd (±0,05)		1,0	

Model	E (max.) [mm]	Model	E (max.) [mm]
20180-D	4,4	20301-D	4,7
20220-D	4,6	20331-D	4,9
20270-D	4,8	20361-D	5,1
20330-D	4,9	20391-D	5,2
20390-D	5,1	20431-D	5,4
20470-D	5,3	20471-D	5,6
20560-D	5,4	20511-D	5,7
20680-D	5,6	20561-D	5,9
20820-D	5,8	20621-D	6,1
20141-D	5,9	20681-D	6,2
20121-D	6,1	20751-D	6,4
20151-D	6,4	20778-D	6,7
20181-D	6,6	20821-D	6,9
20201-D	6,7	20911-D	7,0
20221-D	7,1	20102-D	7,4
20241-D	7,5	20112-D	7,9
20271-D	11,5	20182-D	11,9

Order Notes / Code:

1	2	3	4	5	6	7	8
EMOV	XX	XXX	-X	X	X	X	(XXX or A/B)

Pos. 1: Product family
Pos. 2: Disc diameter in [mm]
Pos. 3: Varistor voltage (two significant figures plus number of zeros that above)
Pos. 4: Standard series
Pos. 5 Tolerance of U_{N_DC} (@1mA): **K**=10% / **L**=15%
Pos. 6 Packaging: **B**=Bulk Pack / **B incl. XXX**$_{(Pos.8)}$=(Short Cut) Bulk Pack / **T**=Taped&Reeled / **A**=Flat Box Pack
Pos. 7 Lead Type: **S**=Straight (Fig.1) / **O**=Outside Kink (Fig.2) / **K**=Inside Kink (Fig.3) / **I**=In Line Kink (Fig.4)
Pos. 8 Optional: **XXX**=only for Short Cut version in [mm] (e.g. 12,5 mm) / **A** or **B**=Tape&Reel Pack Feed Hole Pitch (A=12,7 mm / B=15mm)

Example: EMOV20180-DKTSA

Packing Specifications:

Bulk Product Packing	**Quantity per bag**
Straight LeadType Quantity(pcs/bag)	250
Outside Kink LeadType Quantity(pcs/bag)	250
Inside Kink LeadType Quantity(pcs/bag)	250
In Line Kink LeadType Quantity(pcs/bag)	250

Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV20-P
AC / DC

ESKA *the protection company*

Ø 20 mm

Radial - P-Series

RoHS Compliant

Spannung *Voltage*	**AC: 11 V - 680 V** **DC: 14 V - 895 V**	**max. Spitzenstrom** *max. Peak Current*	**6.000 A – 15.000 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**20 J - 720 J** *(@10/1000µs)*

Norm / *Standard:*	UL 1449-4
Anschluss / *Connection*:	Kupfer verzinnt / *Tin-plated copper*
Beschichtung / *Coating*:	Isolierende Beschichtung: Flammenhemmendes Epoxidharz (UL-94V-0) / *Insulating coating: Flame retardant epoxy (UL-94V-0)*
Betriebstemperatur / *Operating temperature*:	-40°C bis / to +105°C
Lötbarkeit / *Solderability*:	MIL-STD-202, Method 208E
Isolationswiderstand / *Insulation Resistance:*	>1000 MΩ
Ansprechzeit / *Response Time:*	<25 ns
Verpackungsmöglichkeiten / *Packing options*:	Siehe Verpackungsspezifikationen / *see packaging specifications*

Bemessungswerte / Ratings (@ 23°C):

Art. No.	U_{C_max} [V] AC (rms)	U_{C_max} [V] DC	U_{N_DC} (@1mA)[1] [V]	U_{Clamp_max} @Test Current (@8/20µs) [V]		E_{max} (@10/1000µs) [J]	I_{peak_max} (@8/20µs) [A]	P_{rat} [W]	$C_{typical}$ (@1KHz) [pF]
EMOV20180-P	11	14	18	36	@20 A	20	6.000	0,3	42.000
EMOV20220-P	14	18	22	43	@20 A	26	6.000	0,3	37.000
EMOV20270-P	17	22	27	53	@20 A	31	6.000	0,3	29.200
EMOV20330-P	20	26	33	65	@20 A	39	6.000	0,3	21.400
EMOV20390-P	25	31	39	77	@20 A	44	6.000	0,3	19.800
EMOV20470-P	30	38	47	93	@20 A	52	6.000	0,3	17.300
EMOV20560-P	35	45	56	110	@20 A	57	6.000	0,3	14.400
EMOV20680-P	40	56	68	135	@20 A	72	6.000	0,3	12.600
EMOV20201-P	130	170	200	340	@100 A	175	15.000	1	1.700
EMOV20221-P	140	180	220	360	@100 A	185	15.000	1	1.600
EMOV20241-P	150	200	240	395	@100 A	198	15.000	1	1.500
EMOV20271-P	175	225	270	455	@100 A	220	15.000	1	1.300
EMOV20301-P	195	250	300	500	@100 A	245	15.000	1	1.200
EMOV20331-P	215	275	330	550	@100 A	268	15.000	1	1.100
EMOV20361-P	230	300	360	595	@100 A	315	15.000	1	1.100
EMOV20391-P	250	320	390	650	@100 A	350	15.000	1	1.100
EMOV20431-P	275	350	430	710	@100 A	380	15.000	1	1.000
EMOV20471-P	300	385	470	775	@100 A	405	15.000	1	900
EMOV20511-P	320	410	510	845	@100 A	445	15.000	1	800
EMOV20561-P	350	460	560	915	@100 A	475	15.000	1	750
EMOV20621-P	395	510	620	1.020	@100 A	490	15.000	1	570
EMOV20681-P	420	560	680	1.120	@100 A	500	15.000	1	550
EMOV20751-P	465	615	750	1.235	@100 A	525	15.000	1	530
EMOV20781-P	485	640	780	1.290	@100 A	535	15.000	1	500
EMOV20821-P	510	670	820	1.355	@100 A	545	15.000	1	500
EMOV20911-P	550	745	910	1.500	@100 A	595	15.000	1	480
EMOV20102-P	625	825	1.000	1.650	@100 A	650	15.000	1	460
EMOV20112-P	680	895	1.100	1.815	@100 A	720	15.000	1	400

[1] Toleranz: / *Tolerance:* ±10 %

Legende / Caption:

U_{C_max}	= max. Dauerspannung / *max. continuous voltage*
U_{N_DC}	= Varistorspannung / *Varistor voltage*
U_{Clamp_max}	= max. Ansprechspannung / *max. clamping voltage*
E_{max}	= max. Energie / *max. Energy*
I_{peak_max}	= max. Spitzenstrom / *max. peak current*
P_{rat}	= Nennleistung / *Rated power*
$C_{typical}$	= typische Kapazität / *typical capacity*

Ø 20 mm

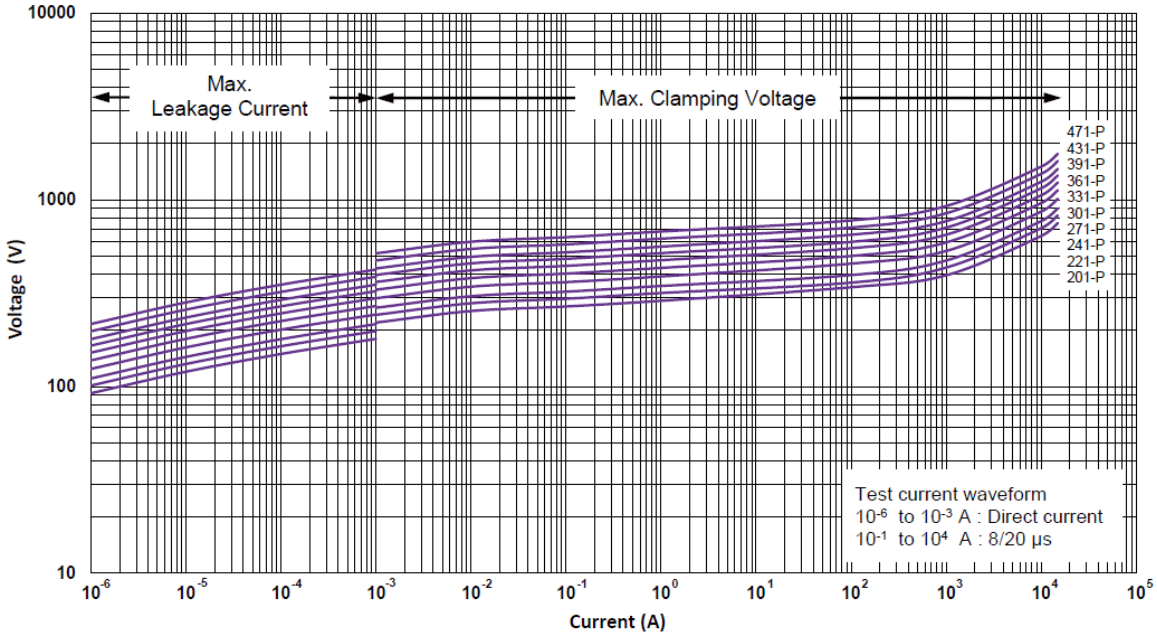
Radial - P-Series

RoHS Compliant

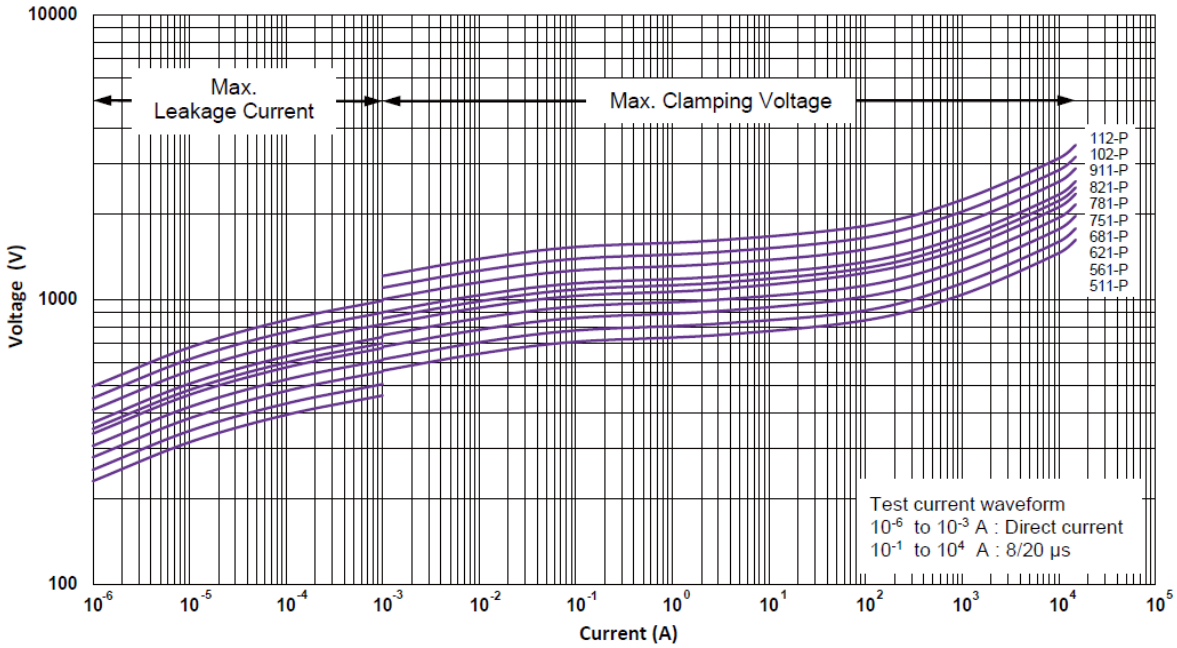
Spannung *Voltage*	**AC: 11 V - 680 V** **DC: 14 V - 895 V**	**max. Spitzenstrom** *max. Peak Current*	**6.000 A – 15.000 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**20 J - 720 J** *(@10/1000µs)*

Transient U-I Characteristic Curves:

For EMOV20201-P – EMOV20471-P:



For EMOV20511-P – EMOV20112-P:



Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV20-P
AC / DC

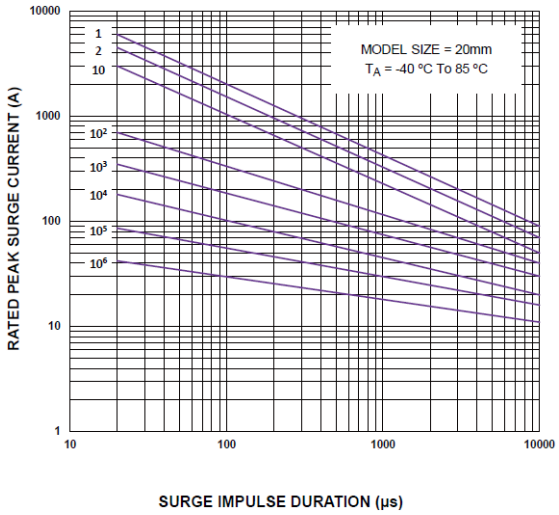
ESKA the protection company

Ø 20 mm Radial - P-Series

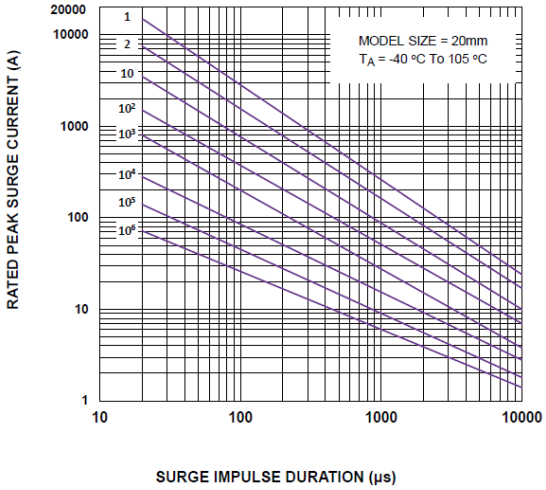
Spannung *Voltage*	**AC: 11 V - 680 V** **DC: 14 V - 895 V**	**max. Spitzenstrom** *max. Peak Current*	**6.000 A – 15.000 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**20 J - 720 J** *(@10/1000µs)*

Impulse Life Time Rating Curves:

For EMOV20180-P – EMOV20680-P:

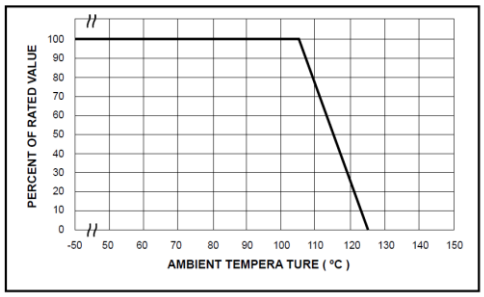


For EMOV20201-P – EMOV20112-P:

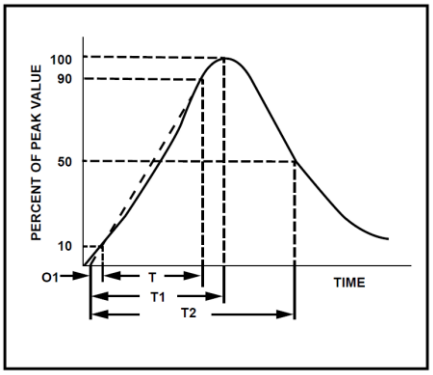


Power Derating Cuve:

Should transients occur in rapid succession, the average power dissipation is the energy (watt-seconds) per pulse times the number of pulses per second. The power so developed must be with the specifications shown on the Device Ratings and Specifications Table for the specific device. The operating values of a MOV need to be derated at high temperatures as shown above. Because varistors only dissipate a relatively small amount of average power they are not suitable for repetitive applications that involve substantial amounts of average power dissipation.



Surge Current Standard Waveform



O1 = Virtual Origin of Wave
T = Time from 10% to 90% of Peak
T1 = Rise Time = 1.25 x T
T2 = Decay Time
Example - For an 8/20 µs Current Waveform :
8µs = T1 = Rise Time
20µs = T2 = Decay Time

Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV20-P
AC / DC

ESKA the protection company

Ø 20 mm

Radial - P-Series

RoHS Compliant

Spannung *Voltage*	**AC: 11 V - 680 V** **DC: 14 V - 895 V**	**max. Spitzenstrom** *max. Peak Current*	**6.000 A – 15.000 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**20 J - 720 J** *(@10/1000µs)*

Drawings:

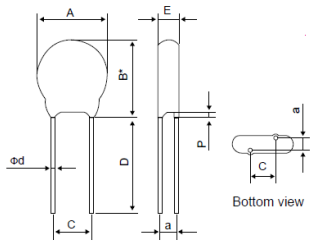


Fig 1. Straight Lead

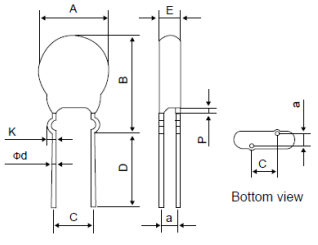


Fig 2. Outside Kink Lead

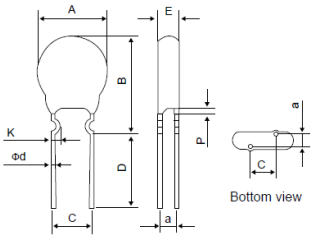


Fig 3. Inside Kink Lead

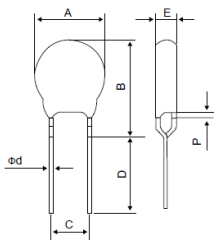


Fig 4. In Line Kink Lead

Symbol		min. [mm]	max. [mm]
A		19,2	25,0
B(max.)	201-P – 271-P	-	30,0
	> 271-P	-	31,0
B*(max.)		-	28,0
C (±1,0)		10,0	
D		25,0	
P(max.)		-	3,0
K		1,0	1,8
Φd (±0,05)		1,0	

Model	E (max.) [mm]	Model	E (max.) [mm]
EMOV20180-P	4,2	EMOV20361-P	6,0
EMOV20220-P	4,6	EMOV20391-P	6,1
EMOV20270-P	4,8	EMOV20431-P	6,4
EMOV20330-P	4,3	EMOV20471-P	6,6
EMOV20390-P	4,5	EMOV20511-P	6,7
EMOV20470-P	4,7	EMOV20561-P	6,9
EMOV20560-P	5,0	EMOV20621-P	7,2
EMOV20680-P	5,3	EMOV20581-P	7,3
EMOV20201-P	5,1	EMOV20751-P	7,5
EMOV20221-P	5,2	EMOV20781-P	7,9
EMOV20241-P	5,3	EMOV20821-P	8,1
EMOV20271-P	5,4	EMOV20911-P	8,2
EMOV20301-P	5,5	EMOV20102-P	8,7
EMOV20331-P	5,8	EMOV20112-P	9,3

Order Notes / Code:

1	2	3	4	5	6	7	8
EMOV	XX	XXX	-X	X	X	X	(XXX or A/B)

Pos. 1: Product family
Pos. 2: Disc diameter in [mm]
Pos. 3: Varistor voltage (two significant figures plus number of zeros that above)
Pos. 4: Standard series
Pos. 5 Tolerance of U_{N_DC} (@1mA): **K**=10% / **L**=15%
Pos. 6 Packaging: **B**=Bulk Pack / **B incl. XXX**$_{(Pos.8)}$=(Short Cut) Bulk Pack / **T**=Taped&Reeled / **A**=Flat Box Pack
Pos. 7 Lead Type: **S**=Straight (Fig.1) / **O**=Outside Kink (Fig.2) / **K**=Inside Kink (Fig.3) / **I**=In Line Kink (Fig.4)
Pos. 8 Optional: **XXX**=only for Short Cut version in [mm] (e.g. 12,5 mm) / **A** or **B**=Tape&Reel Pack Feed Hole Pitch (A=12,7 mm / B=15mm)

Example: EMOV20220-PKTSA

Packing Specifications:

Bulk Product Packing	**Quantity per bag**
Straight LeadType Quantity(pcs/bag)	250
Outside Kink LeadType Quantity(pcs/bag)	250
Inside Kink LeadType Quantity(pcs/bag)	250
In Line Kink LeadType Quantity(pcs/bag)	250

Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV20-V
AC / DC

ESKA *the protection company*

Ø 20 mm

Radial - V-Series

RoHS Compliant

Spannung *Voltage*	**AC: 130 V - 680 V** **DC: 170 V - 895 V**	**max. Spitzenstrom** *max. Peak Current*	**10.000 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**140 J - 620 J** *(@10/1000µs)*

Norm / *Standard:*	UL 1449-4
Anschluss / *Connection*:	Kupfer verzinnt / *Tin-plated copper*
Beschichtung / *Coating*:	Isolierende Beschichtung: Flammenhemmendes Epoxidharz (UL-94V-0) / *Insulating coating: Flame retardant epoxy (UL-94V-0)*
Betriebstemperatur / *Operating temperature*:	-40°C bis / to +105°C
Lötbarkeit / *Solderability*:	MIL-STD-202, Method 208E
Isolationswiderstand / *Insulation Resistance:*	>1000 MΩ
Ansprechzeit / *Response Time:*	<25 ns
Verpackungsmöglichkeiten / *Packing options*:	Siehe Verpackungsspezifikationen / *see packaging specifications*

Bemessungswerte / Ratings (@ 23°C):

Art. No.	U_{C_max} [V] AC (rms)	U_{C_max} [V] DC	U_{N_DC} (@1mA)[1] [V]	U_{Clamp_max} @Test Current (@8/20µs) [V]		E_{max} (@10/1000µs) [J]	I_{peak_max} (@8/20µs) [A]	P_{rat} [W]	$C_{typical}$ (@1KHz) [pF]
EMOV20201-V	130	170	200	340	@100 A	140	10.000	1	1.700
EMOV20221-V	140	180	220	360	@100 A	155	10.000	1	1.600
EMOV20241-V	150	200	240	395	@100 A	170	10.000	1	1.500
EMOV20271-V	175	225	270	455	@100 A	190	10.000	1	1.300
EMOV20301-V	195	250	300	500	@100 A	215	10.000	1	1.200
EMOV20331-V	215	275	330	550	@100 A	228	10.000	1	1.100
EMOV20361-V	230	300	360	595	@100 A	255	10.000	1	1.100
EMOV20391-V	250	320	390	650	@100 A	275	10.000	1	1.100
EMOV20431-V	275	350	430	710	@100 A	303	10.000	1	1.000
EMOV20471-V	300	385	470	775	@100 A	350	10.000	1	900
EMOV20511-V	320	410	510	845	@100 A	382	10.000	1	800
EMOV20561-V	350	460	560	915	@100 A	382	10.000	1	750
EMOV20621-V	395	510	620	1.020	@100 A	400	10.000	1	570
EMOV20681-V	420	560	680	1.120	@100 A	420	10.000	1	550
EMOV20751-V	465	615	750	1.235	@100 A	420	10.000	1	530
EMOV20781-V	485	640	780	1.290	@100 A	440	10.000	1	500
EMOV20821-V	510	670	820	1.355	@100 A	460	10.000	1	500
EMOV20911-V	550	745	910	1.500	@100 A	510	10.000	1	480
EMOV20102-V	625	825	1.000	1.650	@100 A	565	10.000	1	460
EMOV20112-V	680	895	1.100	1.815	@100 A	620	10.000	1	400

[1] Toleranz: / *Tolerance:* ±10 %

Legende / Caption:

U_{C_max}	= max. Dauerspannung / *max. continuous voltage*	I_{peak_max}	= max. Spitzenstrom / *max. peak current*
U_{N_DC}	= Varistorspannung / *Varistor voltage*	P_{rat}	= Nennleistung / *Rated power*
U_{Clamp_max}	= max. Ansprechspannung / *max. clamping voltage*	$C_{typical}$	= typische Kapazität / *typical capacity*
E_{max}	= max. Energie / *max. Energy*		

Ø 20 mm

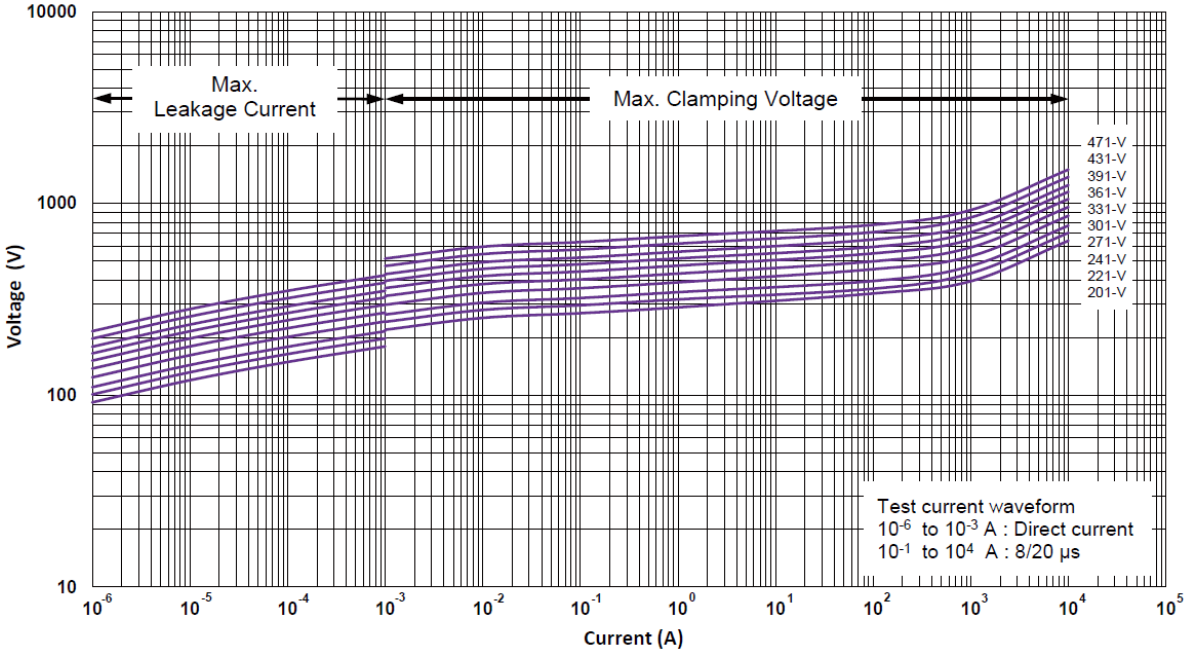
Radial - V-Series

RoHS Compliant

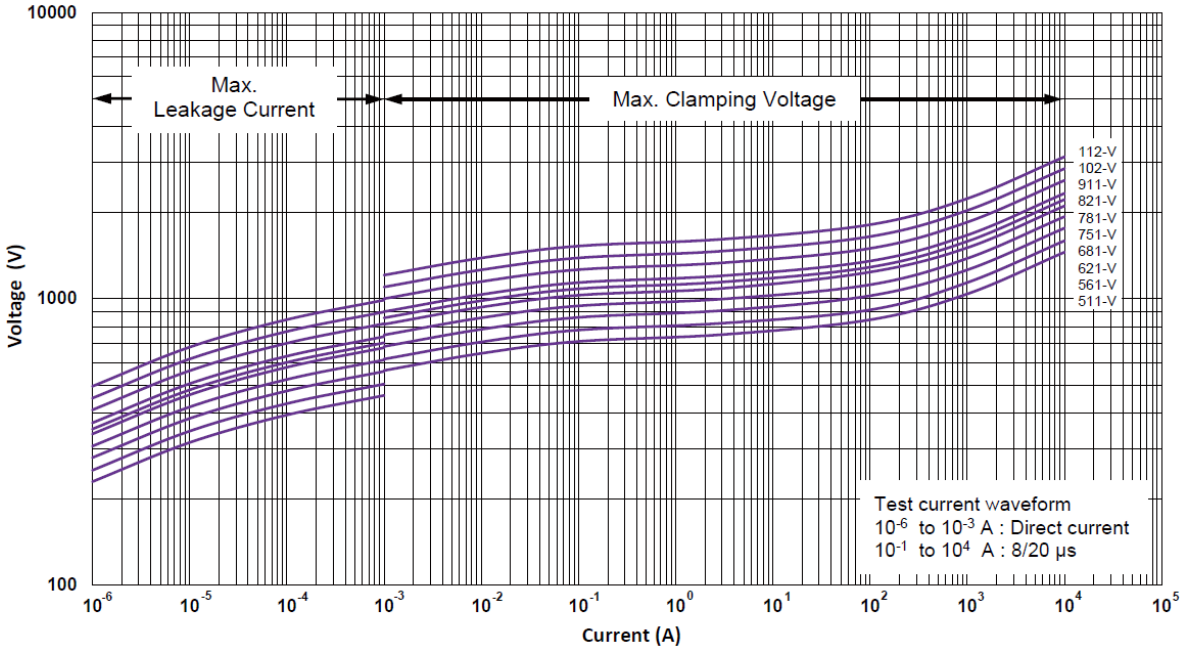
Spannung *Voltage*	**AC: 130 V - 680 V** **DC: 170 V - 895 V**	**max. Spitzenstrom** *max. Peak Current*	**10.000 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**140 J - 620 J** *(@10/1000µs)*

Transient U-I Characteristic Curves:

For EMOV20201-V – EMOV20471-V:



For EMOV20511-V – EMOV20112-V:



Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV20-V
AC / DC

ESKA the protection company

Ø 20 mm

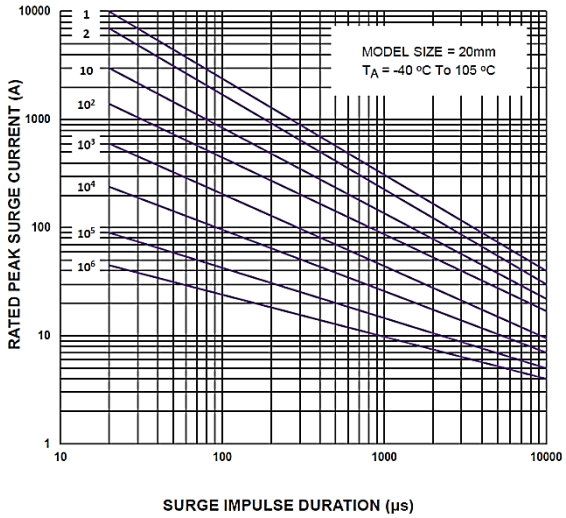
Radial - V-Series

RoHS Compliant

Spannung *Voltage*	**AC: 130 V - 680 V** **DC: 170 V - 895 V**	**max. Spitzenstrom** *max. Peak Current*	**10.000 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**140 J - 620 J** *(@10/1000µs)*

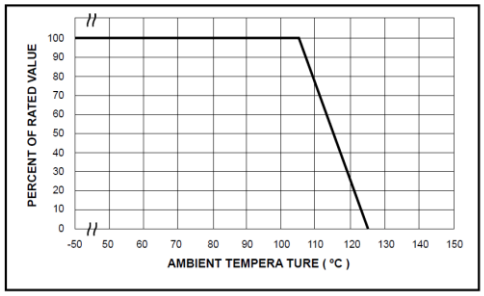
Impulse Life Time Rating Curves:

For EMOV14201-V – EMOV14112-V:

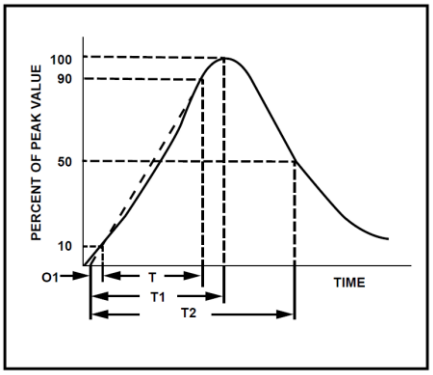


Power Derating Cuve:

Should transients occur in rapid succession, the average power dissipation is the energy (watt-seconds) per pulse times the number of pulses per second. The power so developed must be with the specifications shown on the Device Ratings and Specifications Table for the specific device. The operating values of a MOV need to be derated at high temperatures as shown above. Because varistors only dissipate a relatively small amount of average power they are not suitable for repetitive applications that involve substantial amounts of average power dissipation.



Surge Current Standard Waveform



O1 = Virtual Origin of Wave
T = Time from 10% to 90% of Peak
T1 = Rise Time = 1.25 x T
T2 = Decay Time
Example - For an 8/20 µs Current Waveform :
8µs = T1 = Rise Time
20µs = T2 = Decay Time

Metalloxid-Varistoren
Metal-oxide-Varistors

EMOV20-V
AC / DC

ESKA the protection company

Ø 20 mm

Radial - V-Series

RoHS Compliant

Spannung *Voltage*	**AC: 130 V - 680 V** **DC: 170 V - 895 V**	**max. Spitzenstrom** *max. Peak Current*	**10.000 A** *(@8/20µs)*	**max. Energie** *max. Energy*	**140 J - 620 J** *(@10/1000µs)*

Drawings:

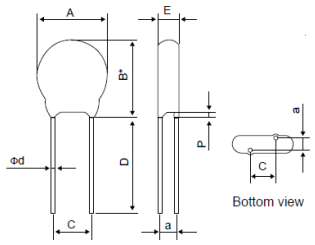


Fig 1. Straight Lead

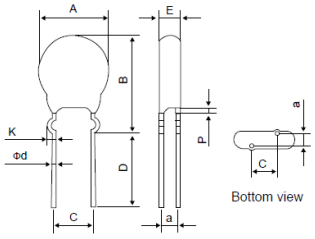


Fig 2. Outside Kink Lead

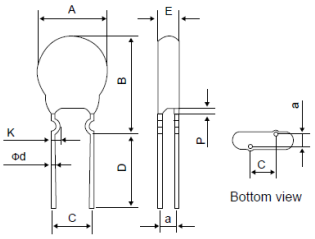


Fig 3. Inside Kink Lead

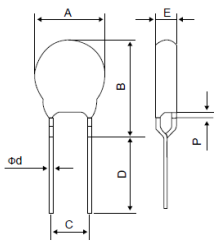


Fig 4. In Line Kink Lead

Symbol		min. [mm]	max. [mm]
A		19,5	25,0
B(max.)	180-V – 271-V	-	30,0
	> 271-V	-	31,0
B*(max.)		-	28,0
C (±1,0)		10,0	
D		25,0	
P(max.)		-	3,0
K		0,8	1,6
Φd (±0,05)		1,0	

Model	E (max.) [mm]	Model	E (max.) [mm]
EMOV20201-V	4,3	EMOV20511-V	5,7
EMOV20221-V	4,4	EMOV20561-V	5,9
EMOV20241-V	4,5	EMOV20621-V	6,1
EMOV20271-V	4,6	EMOV20681-V	6,2
EMOV20301-V	4,7	EMOV20751-V	6,4
EMOV20331-V	4,9	EMOV20781-V	6,7
EMOV20361-V	5,1	EMOV20821-V	6,9
EMOV20391-V	5,2	EMOV20911-V	7,0
EMOV20431-V	5,4	EMOV20102-V	7,4
EMOV20471-V	5,6	EMOV20112-V	7,9

Order Notes / Code:

1	2	3	4	5	6	7	8
EMOV	XX	XXX	-X	X	X	X	(XXX or A/B)

Pos. 1: Product family
Pos. 2: Disc diameter in [mm]
Pos. 3: Varistor voltage (two significant figures plus number of zeros that above)
Pos. 4: Standard series
Pos. 5 Tolerance of U_{N_DC} (@1mA): **K**=10% / **L**=15%
Pos. 6 Packaging: **B**=Bulk Pack / **B incl. XXX**$_{(Pos.8)}$=(Short Cut) Bulk Pack / **T**=Taped&Reeled / **A**=Flat Box Pack
Pos. 7 Lead Type: **S**=Straight (Fig.1) / **O**=Outside Kink (Fig.2) / **K**=Inside Kink (Fig.3) / **I**=In Line Kink (Fig.4)
Pos. 8 Optional: **XXX**=only for Short Cut version in [mm] (e.g. 12,5 mm) / **A** or **B**=Tape&Reel Pack Feed Hole Pitch (A=12,7 mm / B=15mm)

Example: EMOV20201-VKTSA

Packing Specifications:

Bulk Product Packing	**Quantity per bag**
Straight LeadType Quantity(pcs/bag)	250
Outside Kink LeadType Quantity(pcs/bag)	250
Inside Kink LeadType Quantity(pcs/bag)	250
In Line Kink LeadType Quantity(pcs/bag)	250