

Metal Oxide Varistor : TVA Series



Disc/Block Type Varistor for Lightning Protection

■ Features

1. RoHS compliant
2. Halogen-free series are available
3. Body size: $\Phi 25\text{mm} \sim \Phi 60\text{mm}$
4. Wide operating voltage range
5. Excellent clamping ratio
6. Bidirectional and symmetrical V/I characteristics
7. Large withstanding surge current capability
8. Excellent thermal stable ability
9. Operating temperature range: $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$
Storage temperature range : $-40^{\circ}\text{C} \sim +110^{\circ}\text{C}$
10. Agency recognition: UL/cUL
11. UL 1449 4th for SPD Type 5 application



■ Recommended Applications

1. Power distribution
2. Communication power
3. Antenna
4. New energy
5. Lighting
6. Rail traffic system
7. Industrial equipment

■ Part Number Code

$\Phi 25\text{mm} \sim \Phi 60\text{mm}$

T	V	A	3	4	6	2	1	K	Q	K	Q	E				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
↓		↓		↓		↓		↓		↓		↓		↓		
Product Type		Size		Varistor Voltage ($V_{1\text{mA}}$)		Tolerance of $V_{1\text{mA}}$		Structure		Optional Suffix						
TVA	THINKING Varistor TVA Series	25	$\Phi 25\text{mm}$	621	$62 \times 10^1 \text{V} = 620\text{V}$	K	$\pm 10\%$	AAAA~ZZZZ								
		32	$\Phi 32\text{mm}$	102	$10 \times 10^2 \text{V} = 1000\text{V}$											
		34	$34 \times 34\text{mm}$													
		40	$\Phi 40\text{mm}$													
		60	$\Phi 60\text{mm}$													

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Structures and Dimensions

TVA 25 Type

(Unit: mm)

GKGE	BKBL
QAHE	QAEE
QBSE	QCDD
QCDE	QCFE

Note 1: T is the thickness of the product.

Note 2: The specifications of thickness are available upon request.

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Structures and Dimensions

TVA 25 Type

(Unit: mm)

QCGE	QDBD
QDBE	QEPE
QGKE	QHHD
QHRE	

Note 1: T is the thickness of the product.

Note 2: The specifications of thickness are available upon request.

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Structures and Dimensions

TVA 32 Type

(Unit: mm)

GKGE	BKBL
QAFE	QBOE
QBSE	QCME
QDDD	QDDE

Note 1: T is the thickness of the product.

Note 2: The specifications of thickness are available upon request.

Metal Oxide Varistor : TVA Series

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Structures and Dimensions

TVA 32 Type

(Unit: mm)

QDSE	QDWD
QDWE	QFYE
QFZE	QKDE
QKLS	QKVE

Note 1: T is the thickness of the product.

Note 2: The specifications of thickness are available upon request.

Metal Oxide Varistor : TVA Series

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Structures and Dimensions

TVA 32 Type

(Unit: mm)

QKQE	QKUS
YKYN	

Note 1: T is the thickness of the product.

Note 2: The specifications of thickness are available upon request.

Metal Oxide Varistor : TVA Series

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Structures and Dimensions

TVA 34 Type

(Unit: mm)

YKYN	QKQE
QKDE	QKQS
QCKE	QDZE
QFQE	QBYE

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Note 2: The specifications of thickness are available upon request.

Metal Oxide Varistor : TVA Series

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Structures and Dimensions

TVA 34 Type

(Unit: mm)

QCCD	QBVD
QCCE	QBRE
QEHD	QEHE
QEXE	QFSE

Note 1: T is the thickness of the product.

Note 2: The specifications of thickness are available upon request.

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Structures and Dimensions

TVA 34 Type

(Unit: mm)

QFTE	QHJE
QHCE	QHWD
QBAE	QBAD
QDKE	QHXD

Note 1: T is the thickness of the product.

Note 2: The specifications of thickness are available upon request.

Metal Oxide Varistor : TVA Series

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Structures and Dimensions

TVA 34 Type

(Unit: mm)

QADE/QADS	QCIE
QKXE	QCLE
QFME	QGCE
QGVE	

Note 1: T is the thickness of the product.

Note 2: The specifications of thickness are available upon request.

Metal Oxide Varistor : TVA Series

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Structures and Dimensions

TVA 34 Type

(Unit: mm)

QDIE	QFIE
QGUE	QGLE
QFJE	QKUS
BKBL	

Note 1: T is the thickness of the product.

Note 2: The specifications of thickness are available upon request.

Metal Oxide Varistor : TVA Series

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Structures and Dimensions

TVA 34-T Type (T is the parallel structure of two discs)

(Unit: mm)

TKTS	TKTS
TATS	THSE
TDXD	TBYE
TDXE	THCE

Note 1: T is the thickness of the product.

Note 2: The specifications of thickness are available upon request.

Metal Oxide Varistor : TVA Series

Disc/Block Type Varistor for Lightning Protection



Structures and Dimensions

TVA 34-T Type (T is the parallel structure of two discs)

(Unit: mm)

THED	TBAE
TBAD	TCLE
TFME	TGCE
TDPE	TGYE

Note 1: T is the thickness of the product.

Note 2: The specifications of thickness are available upon request.

Metal Oxide Varistor : TVA Series

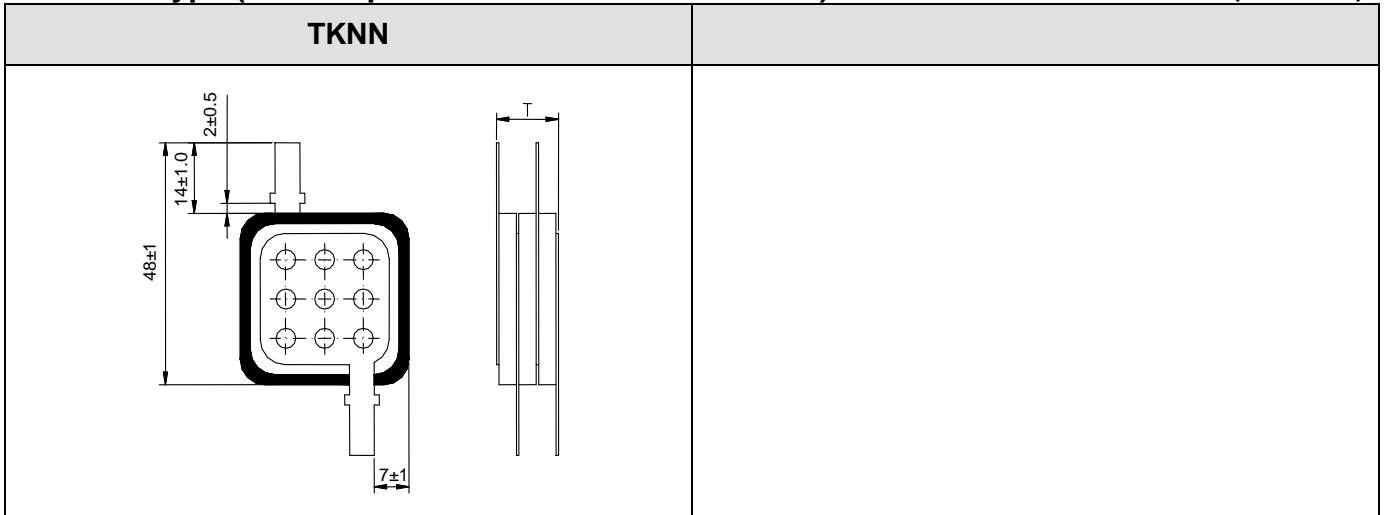
Disc/Block Type Varistor for Lightning Protection



Structures and Dimensions

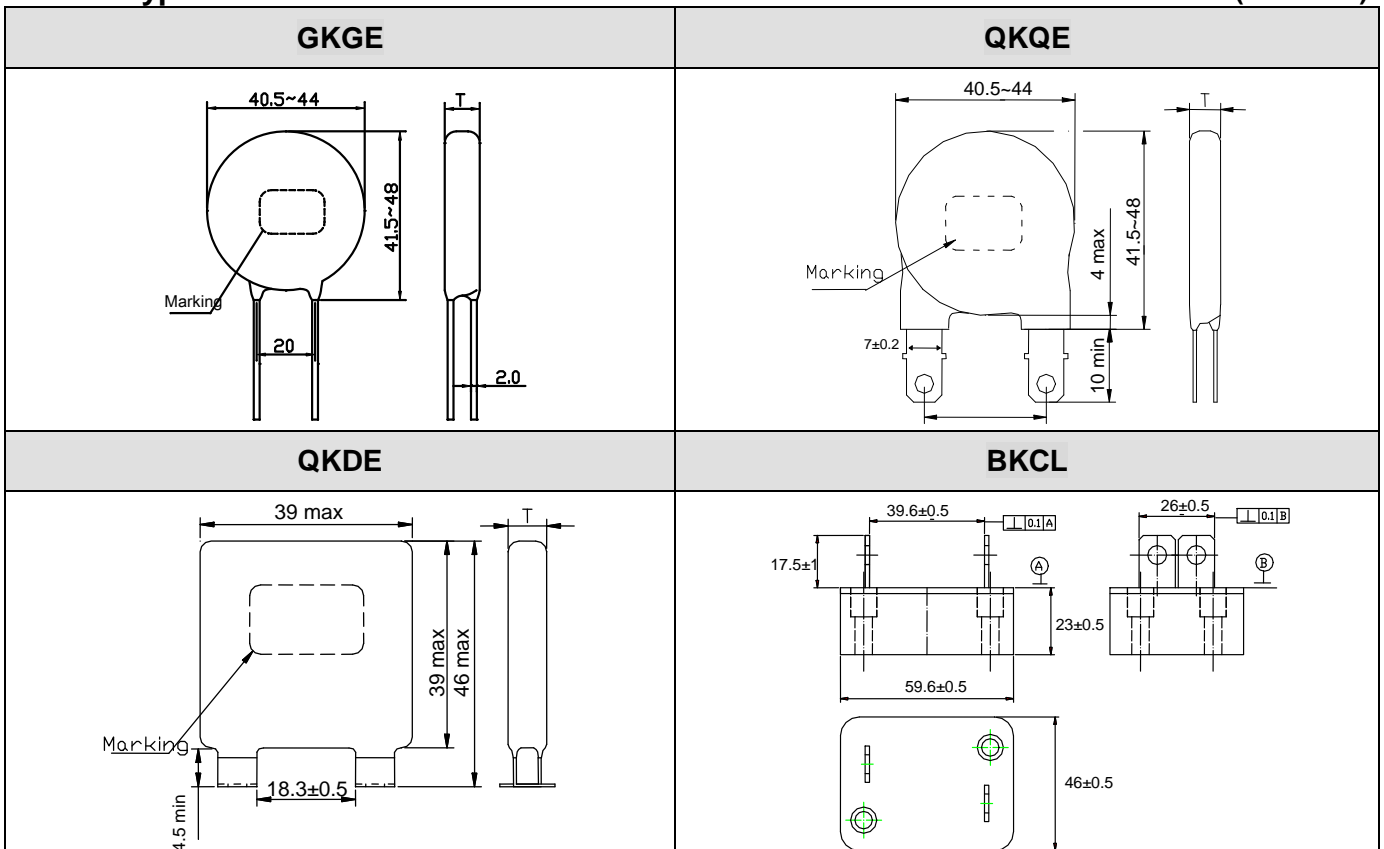
TVA 34-T Type (T is the parallel structure of two discs)

(Unit: mm)



TVA 40 Type

(Unit: mm)



Note 1: T is the thickness of the product.

Note 2: The specifications of thickness are available upon request.

Metal Oxide Varistor : TVA Series

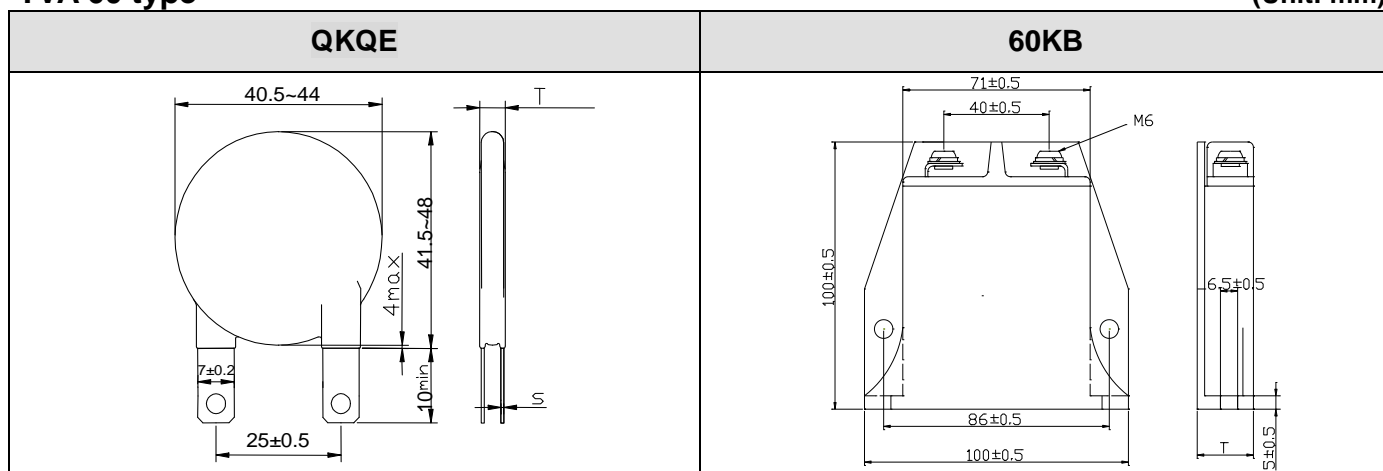
Disc/Block Type Varistor for Lightning Protection



Structures and Dimensions

TVA 60 type

(Unit: mm)



Note 1: T is the thickness of the product.

Note 2: The specifications of thickness are available upon request.

Metal Oxide Varistor : TVA Series

Disc/Block Type Varistor for Lightning Protection



■ Electrical Characteristics

25mm Series

Part No.	Varistor Voltage (@ 1mA DC)	Max. Continuous Voltage		Max. Clamping Voltage (8/20μs)		Max. Surge Current* ¹ (8/20μs)	Surge Operating Duty Test IEC 61643-11, (8/20μs)		Max. Energy (2ms)	Rated Power	Safety Approvals
	V _{1mA} (V)	V _{AC(rms)} (V)	V _{DC} (V)	V _P (V)	I _P (A)	I _{max} (KA)	I _{max} (KA)	I _n (KA)	W _{max} (J)	P (W)	UL 1449 &cUL
TVA25201K□□□□	200(180~220)	130	170	340	150	25	20	10	128	1.0	√
TVA25221K□□□□	220(198~242)	140	180	365	150	25	20	10	135	1.0	√
TVA25241K□□□□	240(216~264)	150	200	395	150	25	20	10	146	1.0	√
TVA25271K□□□□	270(243~297)	175	225	455	150	25	20	10	170	1.0	√
TVA25361K□□□□	360(324~396)	230	300	595	150	25	20	10	190	1.0	√
TVA25391K□□□□	390(351~429)	250	320	650	150	25	20	10	210	1.0	√
TVA25431K□□□□	430(387~473)	275	350	710	150	25	20	10	220	1.0	√
TVA25471K□□□□	470(423~517)	300	385	775	150	25	20	10	225	1.0	√
TVA25511K□□□□	510(459~561)	320	415	845	150	25	20	10	230	1.0	√
TVA25561K□□□□	560(504~616)	350	450	930	150	25	20	10	235	1.0	√
TVA25621K□□□□	620(558~682)	385	505	1025	150	25	20	10	240	1.0	√
TVA25681K□□□□	680(612~748)	420	560	1120	150	25	20	10	250	1.0	√
TVA25751K□□□□	750(675~825)	460	615	1240	150	25	20	10	275	1.0	√
TVA25781K□□□□	780(702~858)	485	640	1290	150	25	20	10	290	1.0	√
TVA25821K□□□□	820(738~902)	510	670	1355	150	25	20	10	300	1.0	√
TVA25911K□□□□	910(819~1001)	550	745	1500	150	25	20	10	340	1.0	√
TVA25951K□□□□	950(855~1045)	575	765	1570	150	25	20	10	355	1.0	√
TVA25102K□□□□	1000(900~1100)	625	825	1650	150	25	20	10	375	1.0	√
TVA25112K□□□□	1100(990~1210)	680	895	1815	150	25	20	10	390	1.0	√
TVA25122K□□□□	1200(1080~1320)	750	980	2000	150	25	20	10	420	1.0	√

Note: □□□□ is structure code and please refers to the dimensions.

1) For "GKGE structure: Max. Surge Current (8/20μs) test condition is 15KA*1 time.

2) UL 1449 4th / cUL File No. E314979.

Metal Oxide Varistor : TVA Series

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32mm Series

Part No.	Varistor Voltage (@ 1mA DC)	Max. Continuous Voltage		Max. Clamping Voltage (8/20μs)		Max. Surge Current ¹ (8/20μs)	Surge Operating Duty Test IEC 61643-11, (8/20μs)		Max. Energy (2ms)	Rated Power	Safety Approvals
	V _{1mA} (V)	V _{AC(rms)} (V)	V _{DC} (V)	V _P (V)	I _P (A)	I _{max} (KA)	I _{max} (KA)	I _n (KA)	W _{max} (J)	P (W)	UL 1449 &cUL
TVA32201K□□□□	200(180~220)	130	170	340	200	30	30	15	210	1.2	√
TVA32221K□□□□	220(198~242)	140	180	365	200	30	30	15	225	1.2	√
TVA32241K□□□□	240(216~264)	150	200	395	200	30	30	15	240	1.2	√
TVA32271K□□□□	270(243~297)	175	225	455	200	30	30	15	250	1.2	√
TVA32361K□□□□	360(324~396)	230	300	595	200	30	30	15	300	1.2	√
TVA32391K□□□□	390(351~429)	250	320	650	200	30	30	15	330	1.2	√
TVA32431K□□□□	430(387~473)	275	350	710	200	30	30	15	360	1.2	√
TVA32471K□□□□	470(423~517)	300	385	775	200	30	30	15	405	1.2	√
TVA32511K□□□□	510(459~561)	320	415	845	200	30	30	15	430	1.2	√
TVA32561K□□□□	560(504~616)	350	450	930	200	30	30	15	470	1.2	√
TVA32621K□□□□	620(558~682)	385	505	1025	200	30	30	15	550	1.2	√
TVA32681K□□□□	680(612~748)	420	560	1120	200	30	30	15	600	1.2	√
TVA32751K□□□□	750(675~825)	460	615	1240	200	30	30	15	660	1.2	√
TVA32781K□□□□	780(702~858)	485	640	1290	200	30	30	15	680	1.2	√
TVA32821K□□□□	820(738~902)	510	670	1355	200	30	30	15	550	1.2	√
TVA32911K□□□□	910(819~1001)	550	745	1500	200	30	30	15	620	1.2	√
TVA32951K□□□□	950(855~1045)	575	765	1570	200	30	30	15	660	1.2	√
TVA32102K□□□□	1000(900~1100)	625	825	1650	200	30	30	15	690	1.2	√
TVA32112K□□□□	1100(990~1210)	680	895	1815	200	30	30	15	760	1.2	√
TVA32122K□□□□	1200(1080~1320)	750	980	2000	200	30	30	15	800	1.2	√
TVA32182K□□□□	1800(1620~1980)	1000	1465	2970	200	25	25	12.5	1200	1.2	

Note: □□□□ is structure code and please refers to the dimensions.

1) For "GKGE" structure: Max. Surge Current (8/20μs) test condition is 25KA*1time.

2) UL 1449 4th / cUL File No. E314979

Metal Oxide Varistor : TVA Series



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34*34mm Series

Part No.	Varistor Voltage (@ 1mA DC)	Max. Continuous Voltage		Max. Clamping Voltage (8/20μs)		Max. Surge Current (8/20μs)	Surge Operating Duty Test IEC 61643-11, (8/20μs)		Max. Energy (2ms)	Rated Power	Safety Approvals	
	V _{1mA} (V)	V _{AC(rms)} (V)	V _{DC} (V)	V _P (V)	I _P (A)	I _{max} (KA)	I _{max} (KA)	I _n (KA)	W _{max} (J)	P (W)	UL 1449 &cUL	TUV
TVA34201K□□□□	200(180~220)	130	170	340	300	50	40	20	310	1.4	√	√
TVA34221K□□□□	220(198~242)	140	180	365	300	50	40	20	340	1.4	√	√
TVA34241K□□□□	240(216~264)	150	200	395	300	50	40	20	360	1.4	√	√
TVA34271K□□□□	270(243~297)	175	225	455	300	50	40	20	400	1.4	√	√
TVA34361K□□□□	360(324~396)	230	300	595	300	50	40	20	460	1.4	√	√
TVA34391K□□□□	390(351~429)	250	320	650	300	50	40	20	490	1.4	√	√
TVA34431K□□□□	430(387~473)	275	350	710	300	50	40	20	550	1.4	√	√
TVA34471K□□□□	470(423~517)	300	385	775	300	50	40	20	595	1.4	√	√
TVA34511K□□□□	510(459~561)	320	415	845	300	50	40	20	640	1.4	√	√
TVA34561K□□□□	560(504~616)	350	450	930	300	50	40	20	710	1.4	√	√
TVA34621K□□□□	620(558~682)	385	505	1025	300	50	40	20	800	1.4	√	√
TVA34681K□□□□	680(612~748)	420	560	1120	300	50	40	20	910	1.4	√	√
TVA34751K□□□□	750(675~825)	460	615	1240	300	50	40	20	1000	1.4	√	√
TVA34781K□□□□	780(702~858)	485	640	1290	300	50	40	20	1030	1.4	√	√
TVA34821K□□□□	820(738~902)	510	670	1355	300	50	40	20	860	1.4	√	√
TVA34911K□□□□	910(819~1001)	550	745	1500	300	50	40	20	960	1.4	√	√
TVA34951K□□□□	950(855~1045)	575	765	1570	300	50	40	20	1000	1.4	√	√
TVA34102K□□□□	1000(900~1100)	625	825	1650	300	50	40	20	1050	1.4	√	√
TVA34112K□□□□	1100(990~1210)	680	895	1815	300	50	40	20	1200	1.4	√	√
TVA34122K□□□□	1200(1080~1320)	750	980	2000	300	50	40	20	1310	1.4	√	√
TVA34182K□□□□	1800(1620~1980)	1000	1465	2970	300	40	30	15	1800	1.4		√

Note: □□□□ is structure code and please refers to the dimensions.

UL 1449 4th / cUL File No. E314979 , TUV File No. J 50182629.

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34-T mm Series (T is the parallel structure of two discs)

Part No.	Varistor Voltage (@ 1mA DC)	Max. Continuous Voltage		Max. Clamping Voltage (8/20 μ s)		Max. Surge Current ⁻¹ (8/20 μ s)	Surge Operating Duty Test IEC 61643-11, (8/20 μ s)		Max. Energy (2ms)	Rated Power	Safety Approvals
	V _{1mA} (V)	V _{AC(rms)} (V)	V _{DC} (V)	V _P (V)	I _P (A)	I _{max} (KA)	I _{max} (KA)	I _n (KA)	W _{max} (J)	P (W)	UL 1449 &cUL
TVA34201KT□□□	200(180~220)	130	170	340	500	80	70	40	410	1.6	√
TVA34221KT□□□	220(198~242)	140	180	365	500	80	70	40	451	1.6	√
TVA34241KT□□□	240(216~264)	150	200	395	500	80	70	40	490	1.6	√
TVA34271KT□□□	270(243~297)	175	225	455	500	80	70	40	550	1.6	√
TVA34361KT□□□	360(324~396)	230	300	595	500	80	70	40	730	1.6	√
TVA34391KT□□□	390(351~429)	250	320	650	500	80	70	40	800	1.6	√
TVA34431KT□□□	430(387~473)	275	350	710	500	80	70	40	860	1.6	√
TVA34471KT□□□	470(423~517)	300	385	775	500	80	70	40	950	1.6	√
TVA34511KT□□□	510(459~561)	320	415	845	500	80	70	40	1000	1.6	√
TVA34561KT□□□	560(504~616)	350	450	930	500	80	70	40	1100	1.6	√
TVA34621KT□□□	620(558~682)	385	505	1025	500	80	70	40	1200	1.6	√
TVA34681KT□□□	680(612~748)	420	560	1120	500	80	70	40	1500	1.6	√
TVA34751KT□□□	750(675~825)	460	615	1240	500	80	70	40	1650	1.6	√
TVA34781KT□□□	780(702~858)	485	640	1290	500	80	70	40	1700	1.6	√
TVA34821KT□□□	820(738~902)	510	670	1355	500	80	70	40	1350	1.6	√
TVA34911KT□□□	910(819~1001)	550	745	1500	500	80	70	40	1500	1.6	√
TVA34951KT□□□	950(855~1045)	575	765	1570	500	80	70	40	1560	1.6	√
TVA34102KT□□□	1000(900~1100)	625	825	1650	500	80	70	40	1650	1.6	√
TVA34112KT□□□	1100(990~1210)	680	895	1815	500	80	70	40	1800	1.6	√
TVA34122KT□□□	1200(1080~1320)	750	980	2000	500	80	70	40	2000	1.6	√

Note: □□□□ is structure code and please refers to the dimensions.

UL 1449 4th / cUL File No. E314979

Metal Oxide Varistor : TVA Series

Disc/Block Type Varistor for Lightning Protection



40mm Series

Part No.	Varistor Voltage (@ 1mA DC)	Max. Continuous Voltage		Max. Clamping Voltage (8/20μs)		Max. Surge Current* ¹ (8/20μs)	Surge Operating Duty Test IEC 61643-11, (8/20μs)		Max. Energy (2ms)	Rated Power	Safety Approvals
	V _{1mA} (V)	V _{AC(rms)} (V)	V _{DC} (V)	V _P (V)	I _P (A)	I _{max} (KA)	I _{max} (KA)	I _n (KA)	W _{max} (J)	P (W)	UL 1449 &cUL
TVA40201K□□□□	200(180~220)	130	170	340	300	50	40	20	310	1.4	√
TVA40221K□□□□	220(198~242)	140	180	365	300	50	40	20	340	1.4	√
TVA40241K□□□□	240(216~264)	150	200	395	300	50	40	20	360	1.4	√
TVA40271K□□□□	270(243~297)	175	225	455	300	50	40	20	400	1.4	√
TVA40361K□□□□	360(324~396)	230	300	595	300	50	40	20	460	1.4	√
TVA40391K□□□□	390(351~429)	250	320	650	300	50	40	20	490	1.4	√
TVA40431K□□□□	430(387~473)	275	350	710	300	50	40	20	550	1.4	√
TVA40471K□□□□	470(423~517)	300	385	775	300	50	40	20	595	1.4	√
TVA40511K□□□□	510(459~561)	320	415	845	300	50	40	20	640	1.4	√
TVA40561K□□□□	560(504~616)	350	450	930	300	50	40	20	710	1.4	√
TVA40621K□□□□	620(558~682)	385	505	1025	300	50	40	20	800	1.4	√
TVA40681K□□□□	680(612~748)	420	560	1120	300	50	40	20	910	1.4	√
TVA40751K□□□□	750(675~825)	460	615	1240	300	50	40	20	1000	1.4	√
TVA40781K□□□□	780(702~858)	485	640	1290	300	50	40	20	1030	1.4	√
TVA40821K□□□□	820(738~902)	510	670	1355	300	50	40	20	860	1.4	√
TVA40911K□□□□	910(819~1001)	550	745	1500	300	50	40	20	960	1.4	√
TVA40951K□□□□	950(855~1045)	575	765	1570	300	50	40	20	1000	1.4	√
TVA40102K□□□□	1000(900~1100)	625	825	1650	300	50	40	20	1050	1.4	√
TVA40112K□□□□	1100(990~1210)	680	895	1815	300	50	40	20	1200	1.4	√
TVA40122K□□□□	1200(1080~1320)	750	980	2000	300	50	40	20	1310	1.4	√
TVA40182K□□□□	1800(1620~1980)	1000	1465	2970	300	40	30	15	1800	1.4	

Note: □□□□ is structure code and please refers to the dimensions.

1) For "GKGE" structure: Max. Surge Current (8/20μs) test condition is 40KA*1time.

2) UL 1449 4th / cUL File No. E314979

Metal Oxide Varistor : TVA Series

Disc/Block Type Varistor for Lightning Protection



60mm Series

Part No.	Varistor Voltage (@ 1mA DC)	Max. Continuous Voltage		Max. Clamping Voltage (8/20μs)		Max. Surge Current*1 (8/20μs)	Surge Operating Duty Test IEC 61643-11, (8/20μs)		Max. Energy (2ms)	Rated Power	Safety Approvals
	V _{1mA} (V)	V _{AC(rms)} (V)	V _{DC} (V)	V _P (V)	I _P (A)	I _{max} (KA)	I _{max} (KA)	I _n (KA)	W _{max} (J)	P (W)	UL 1449 &cUL
TVA60431K□□□□	430(387~473)	275	350	710	500	80	70	35	860	1.6	√
TVA60471K□□□□	470(423~517)	300	385	775	500	80	70	35	950	1.6	√
TVA60511K□□□□	510(459~561)	320	415	845	500	80	70	35	1000	1.6	√
TVA60561K□□□□	560(504~616)	350	450	930	500	80	70	35	1100	1.6	√
TVA60621K□□□□	620(558~682)	385	505	1025	500	80	70	35	1200	1.6	√
TVA60681K□□□□	680(612~748)	420	560	1120	500	80	70	35	1500	1.6	√
TVA60751K□□□□	750(675~825)	460	615	1240	500	80	70	35	1650	1.6	√
TVA60781K□□□□	780(702~858)	485	640	1290	500	80	70	35	1700	1.6	√
TVA60821K□□□□	820(738~902)	510	670	1355	500	80	70	35	1350	1.6	√
TVA60911K□□□□	910(819~1001)	550	745	1500	500	80	70	35	1500	1.6	√
TVA60951K□□□□	950(855~1045)	575	765	1570	500	80	70	35	1560	1.6	√
TVA60102K□□□□	1000(900~1100)	625	825	1650	500	80	70	35	1650	1.6	√
TVA60112K□□□□	1100(990~1210)	680	895	1815	500	80	70	35	1800	1.6	√
TVA60122K□□□□	1200(1080~1320)	750	980	2000	500	80	70	35	2000	1.6	√
TVA60182K□□□□	1800(1620~1980)	1000	1465	2970	500	70	60	30	3000	1.6	√

Note: □□□□ is structure code and please refers to the dimensions.

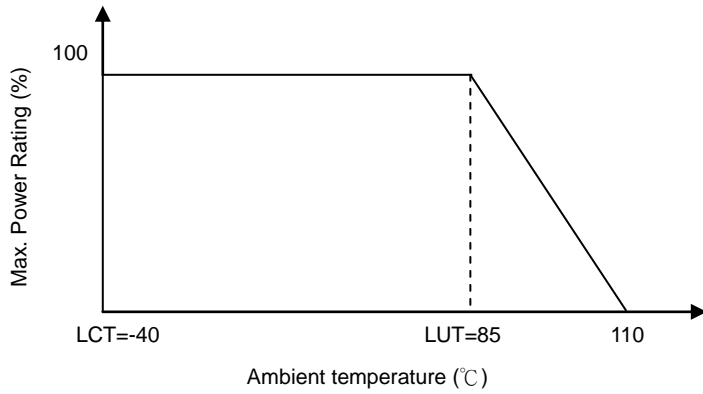
UL 1449 4th / cUL File No. E314979

Metal Oxide Varistor : TVA Series

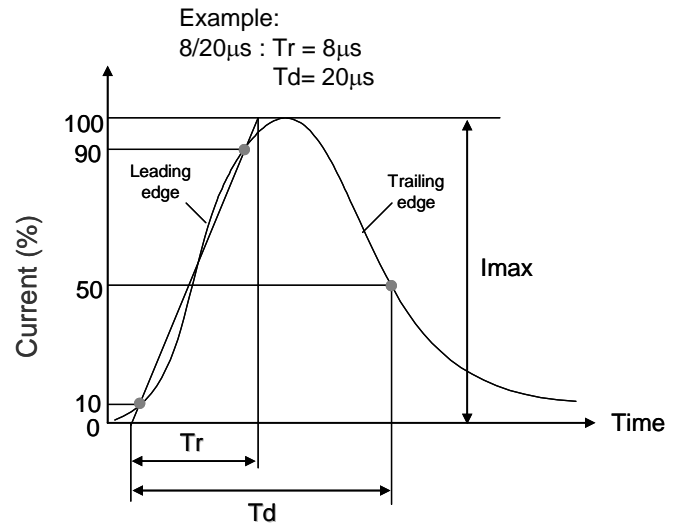
Disc/Block Type Varistor for Lightning Protection



Power Derating Curve

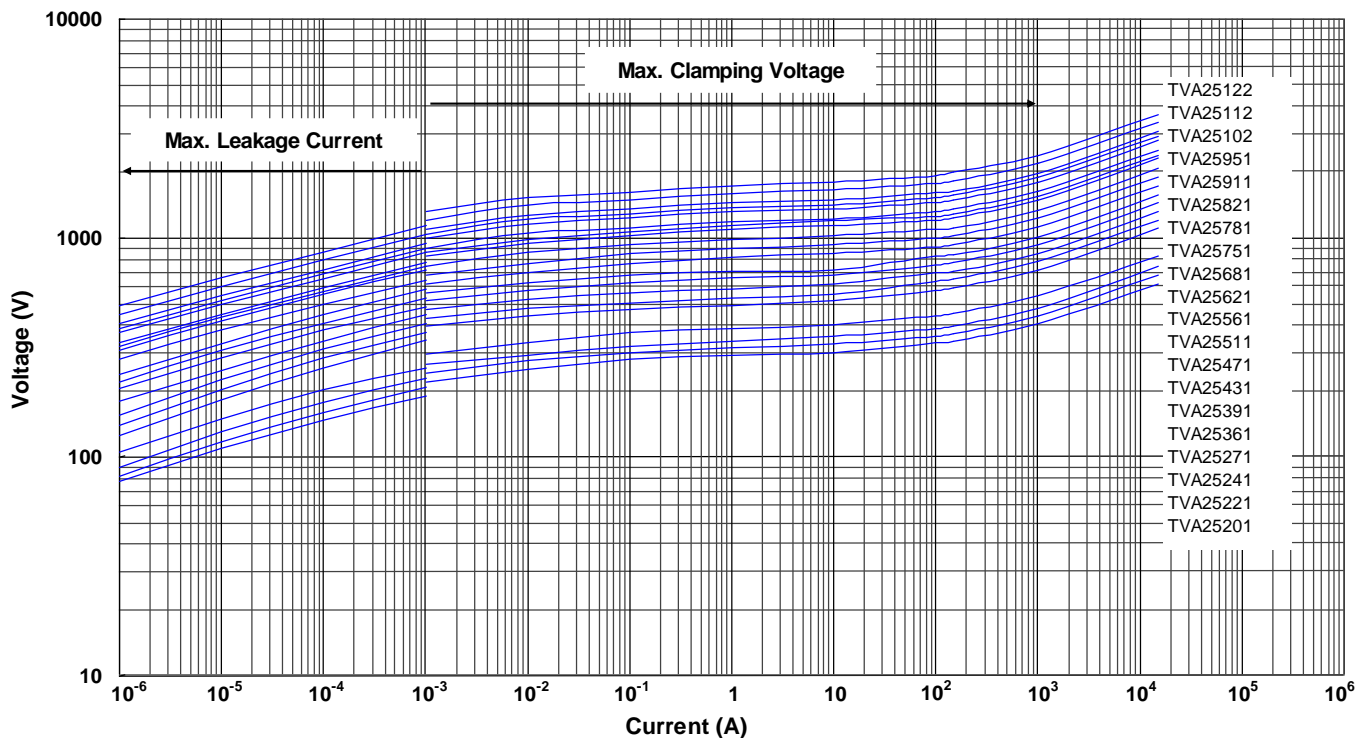


Surge Current Standard Waveform



Max. Leakage Current and Max. Clamping Voltage Curves

Max. Leakage Current and Max. Clamping Voltage Curves (TVA25201 ~ TVT25122)



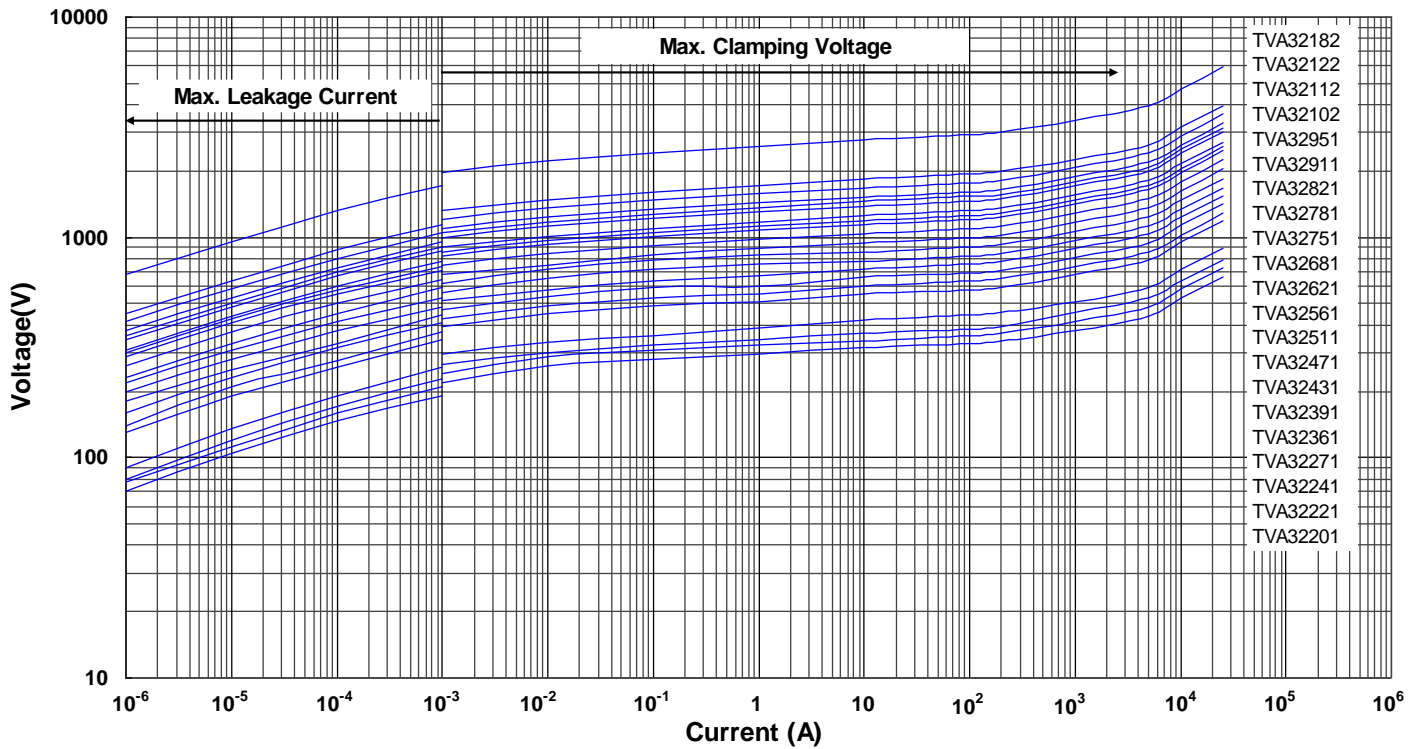
Metal Oxide Varistor : TVA Series

Disc/Block Type Varistor for Lightning Protection

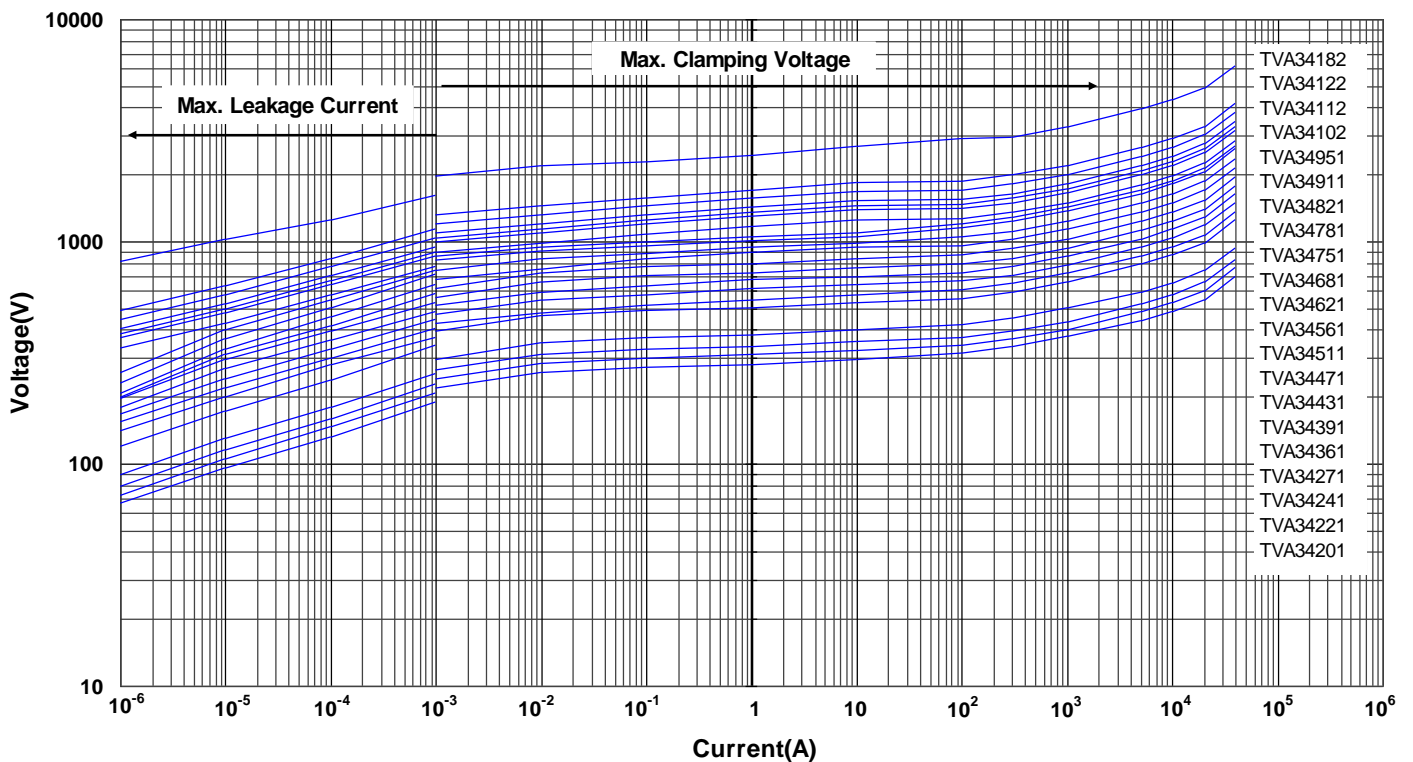


■ Max. Leakage Current and Max. Clamping Voltage Curves

Max. Leakage Current and Max. Clamping Voltage Curves (TVA32201 ~ TVT32182)



Max. Leakage Current and Max. Clamping Voltage Curves (TVA34201 ~ TVT34182)



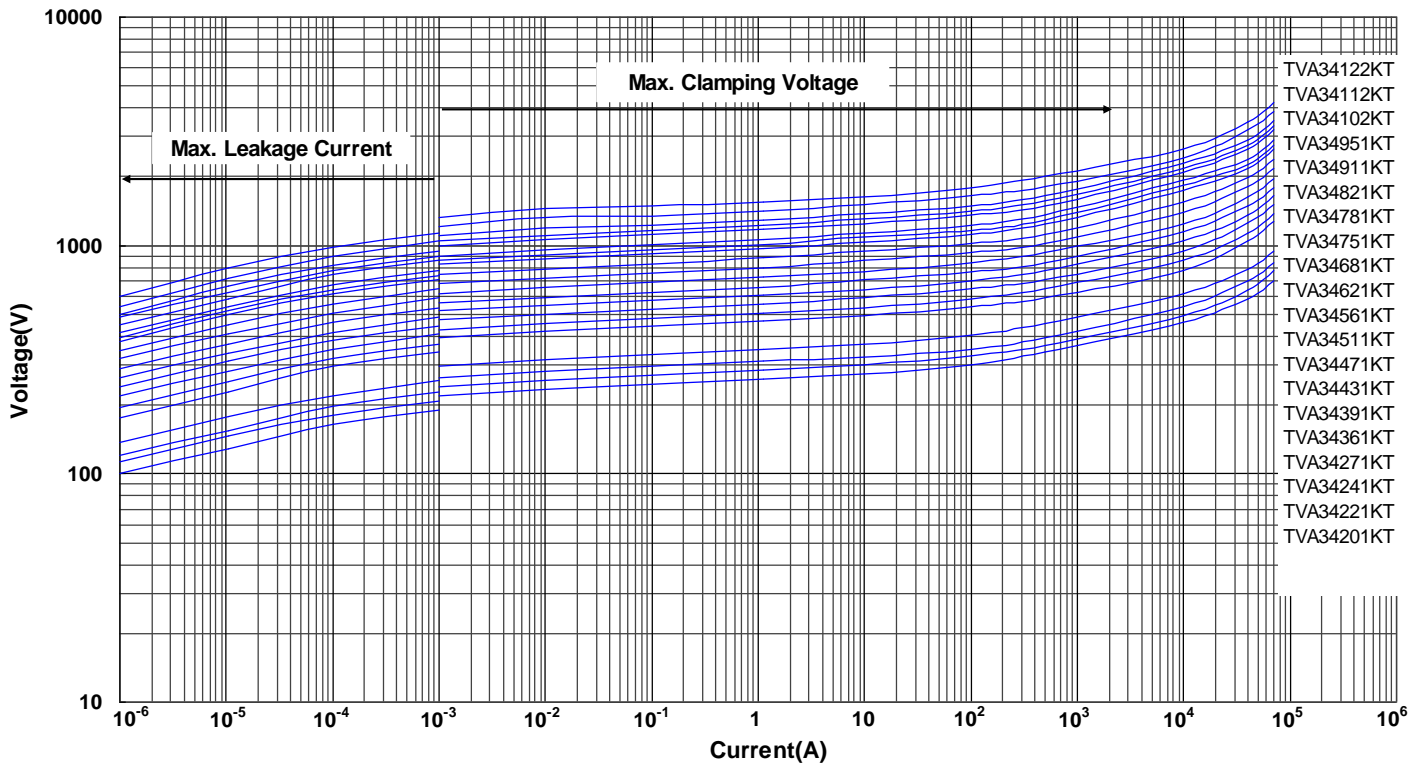
Metal Oxide Varistor : TVA Series

Disc/Block Type Varistor for Lightning Protection

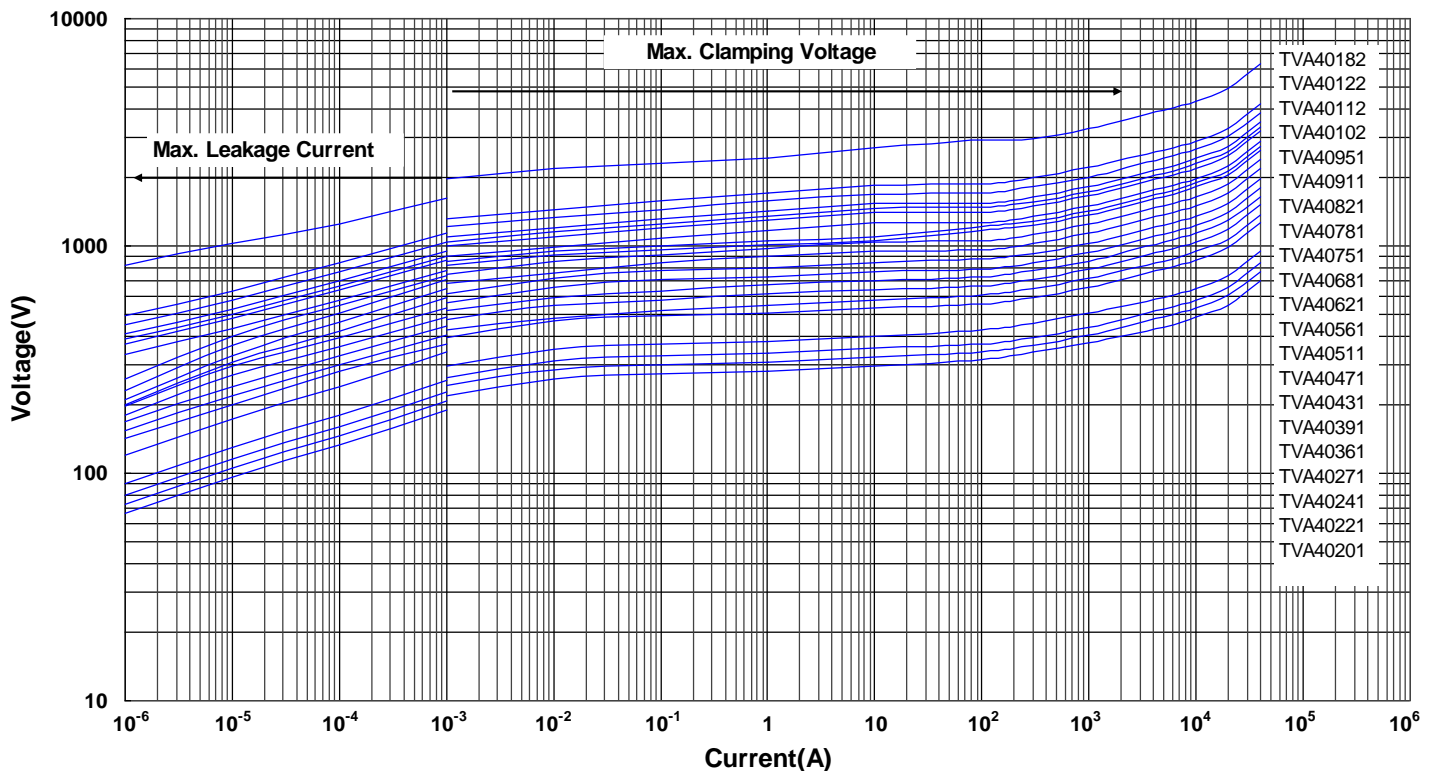


Max. Leakage Current and Max. Clamping Voltage Curves

Max. Leakage Current and Max. Clamping Voltage Curves (TVA34201KT ~ TVT34122KT)



Max. Leakage Current and Max. Clamping Voltage Curves (TVA40201 ~ TVT40182)



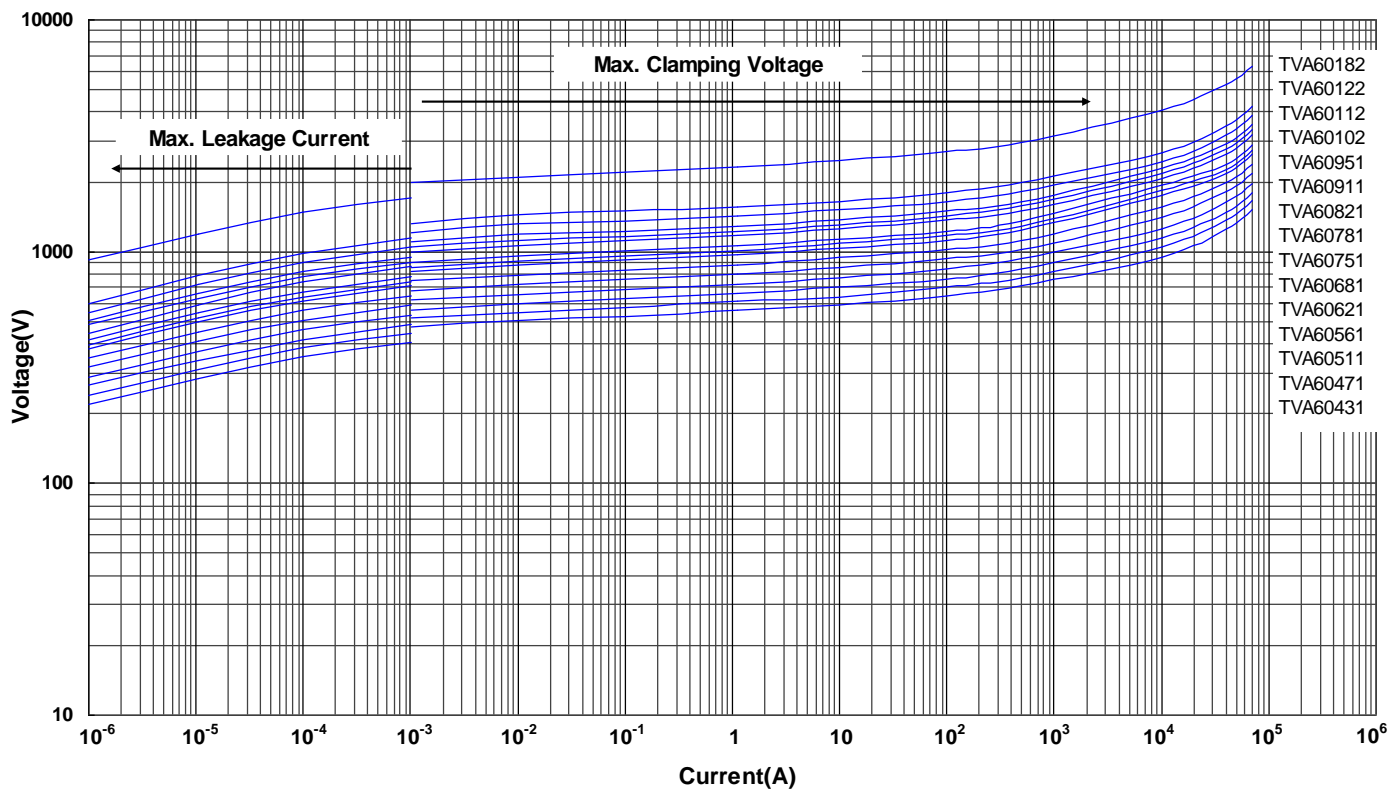
Metal Oxide Varistor : TVA Series

Disc/Block Type Varistor for Lightning Protection



■ Max. Leakage Current and Max. Clamping Voltage Curves

Max. Leakage Current and Max. Clamping Voltage Curves (TVA60431 ~ TVT60182)



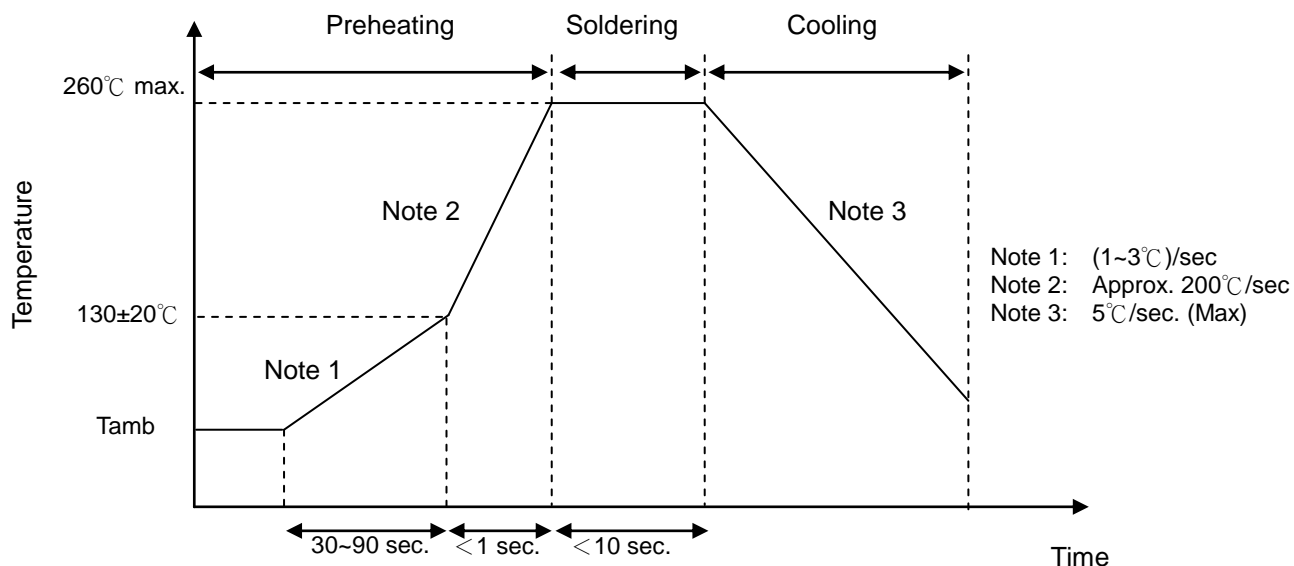
Metal Oxide Varistor : TVA Series

Disc/Block Type Varistor for Lightning Protection



■ Soldering Recommendation

● Wave Soldering Profile



● Recommended Reworking Conditions with Soldering Iron

Item	Conditions
Temperature of Soldering Iron-tip	360°C (max.)
Soldering Time	3 sec (max.)
Distance from Varistor	2 mm (min.)

Metal Oxide Varistor : TVA Series

Disc/Block Type Varistor for Lightning Protection



■ Reliability

Item	Standard	Test conditions / Methods	Specifications															
Tensile Strength of Terminals	IEC 60068-2-21	<p>Gradually apply the specified force and keep the unit fixed for 10±1 sec.</p> <table border="1"> <thead> <tr> <th>Terminal cross-sectional area (mm²)</th> <th>Terminal diameter (mm)</th> <th>Force (Kg)</th> </tr> </thead> <tbody> <tr> <td>0.5<S≤1.2</td> <td>0.8<d≤1.25</td> <td>2.0</td> </tr> <tr> <td>1.2<S</td> <td>1.25<d</td> <td>4.0</td> </tr> </tbody> </table>	Terminal cross-sectional area (mm ²)	Terminal diameter (mm)	Force (Kg)	0.5<S≤1.2	0.8<d≤1.25	2.0	1.2<S	1.25<d	4.0	$ \Delta V_{1mA} / V_{1mA} \leq 5\%$ No visible damage						
Terminal cross-sectional area (mm ²)	Terminal diameter (mm)	Force (Kg)																
0.5<S≤1.2	0.8<d≤1.25	2.0																
1.2<S	1.25<d	4.0																
Vibration (Optional)	IEC 60068-2-6	Frequency range: 10~55Hz Amplitude: 0.75mm or 98m/s ² Direction: 3 mutually perpendicular directions, 2 hrs each.	$ \Delta V_{1mA} / V_{1mA} \leq 5\%$ No visible damage															
Solderability	IEC 60068-2-20	245±3°C, 3±0.3 sec (For Lead wire structure)	At least 95% of terminal electrode is covered by new solder															
Resistance to Soldering Heat	IEC 60068-2-20	260±3°C, 10±1 sec	$ \Delta V_{1mA} / V_{1mA} \leq 5\%$ No visible damage															
High Temperature Storage	IEC 60068-2-2	110±5°C x 1000±24 hrs	$ \Delta V_{1mA} / V_{1mA} \leq 5\%$ No visible damage															
Damp Heat, Steady State	IEC 60068-2-78	a. 40±2°C, 90 ~ 95 % RH, 1344 hrs b. 40±2°C, 90 ~ 95 % RH, at 10%Vdc,1344 hrs	$ \Delta V_{1mA} / V_{1mA} \leq 5\%$ No visible damage Insulation Resistance ≥ 100MΩ															
Rapid Change of Temperature (optional)	IEC 60068-2-14	The conditions shown below shall be repeated 5 cycles <table border="1"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Period (minutes)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-40±3</td> <td>30±3</td> </tr> <tr> <td>2</td> <td>Room temperature</td> <td>15±3</td> </tr> <tr> <td>3</td> <td>85±2</td> <td>30±3</td> </tr> <tr> <td>4</td> <td>Room temperature</td> <td>15±3</td> </tr> </tbody> </table>	Step	Temperature (°C)	Period (minutes)	1	-40±3	30±3	2	Room temperature	15±3	3	85±2	30±3	4	Room temperature	15±3	$ \Delta V_{1mA} / V_{1mA} \leq 5\%$ No visible damage
Step	Temperature (°C)	Period (minutes)																
1	-40±3	30±3																
2	Room temperature	15±3																
3	85±2	30±3																
4	Room temperature	15±3																
High Temp. Load	MIL-STD-202 Method 108	85±2°C, 1000±24 hrs at V _{DC} or V _{rms} (Max. Continuous Voltage)	$ \Delta V_{1mA} / V_{1mA} \leq 10\%$ No visible damage															
8/20μs Surge Operating Duty Test	IEC 61643-11	a. Measured limiting voltage @ 0.1In, 0.2In, 0.5In, 1.0In, I _{max} b. Operating duty test: In*15 times	$ \Delta V_{1mA} / V_{1mA} \leq 10\%$ No visible damage															
Climatic Sequence	IEC 61051-1	a. dry heat at 85°C,16hrs b. damp heat ,1st cycle: 55°C, 95RH, 24hrs (IEC60068-2-30) c. cold, -40°C, 2 hrs d. damp heat, additional 5 cycles,120 hrs	$ \Delta V_{1mA} / V_{1mA} \leq 10\%$ No visible damage Insulation Resistance ≥ 100MΩ															
Voltage Proof	IEC 61051-1	Metal balls method, 2500 V _{ac} 1 min	No visible damage															

Metal Oxide Varistor : TVA Series

Disc/Block Type Varistor for Lightning Protection



■ Packaging

Note: Packaging quantity varies with product structure. Please contact THINKING sales rep for detailed information.

● Bulk Packing (For Lead Wire Structure)

Series	Part No.	Quantity (pcs/bag)
TVA25,	TVA25201~122(except 821)	50
	TVA25821	25
TVA32,	TVA32201~182	25
TVA40	TVA40201~182	10
TVA60	TVA60431~182	

● Box Packing (For Plastic Housing Structure)

Structure	Code	Quantity (pcs/box)
Plastic Housing	KB	60
	KC	30

■ Warehouse Storage Conditions of Products

- Storage Conditions:
 1. Storage Temperature: $-10^{\circ}\text{C} \sim +40^{\circ}\text{C}$
 2. Relative Humidity: $\leq 75\% \text{RH}$
 3. Keep away from corrosive atmosphere and sunlight.
- Period of Storage: 1 year