

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



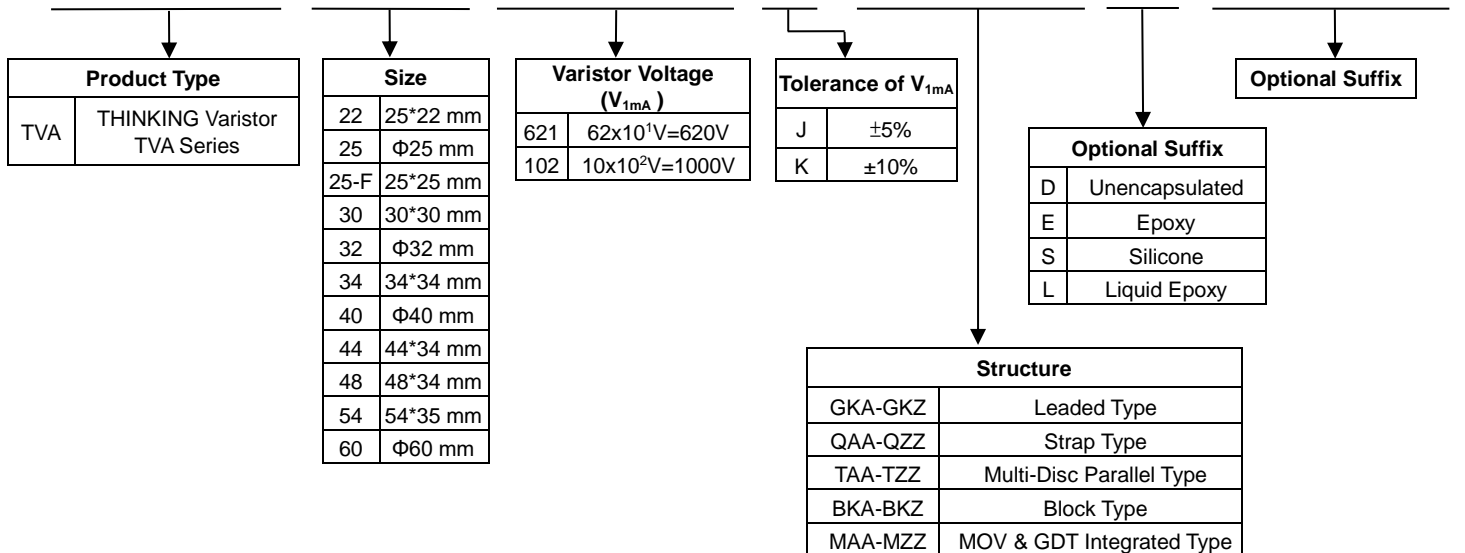
■ Recommended Applications

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	5	0	0
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16



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Structures and Dimensions

Leaded Type

(Unit: mm)

GKGE	GKOE
GKFE	GKGS
GKGE (Tube Type)	GKGE (Teflon Wire Type)

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Structures and Dimensions

- Strap Type

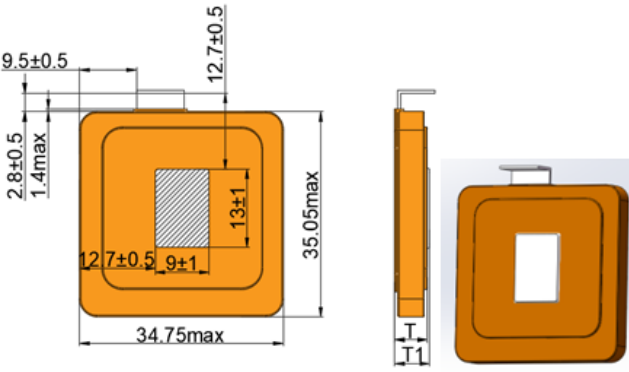
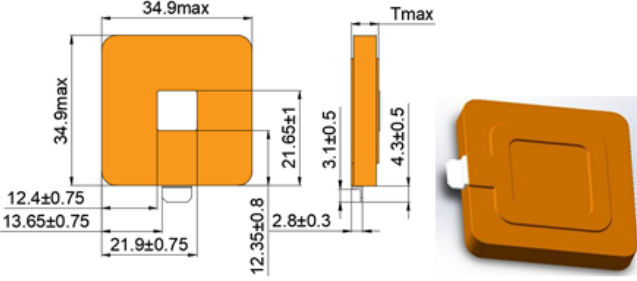
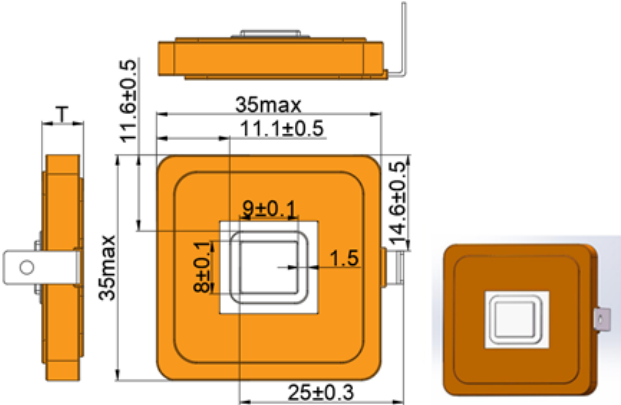
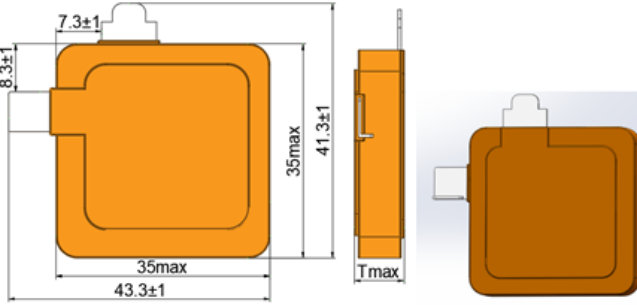
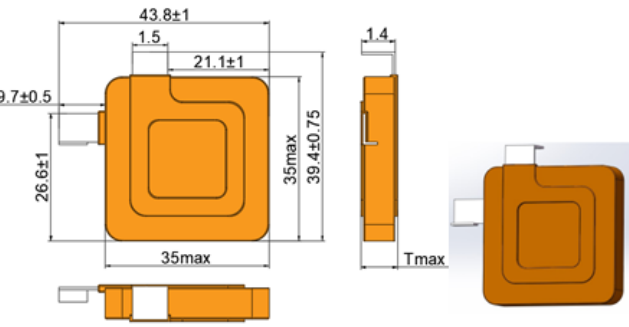
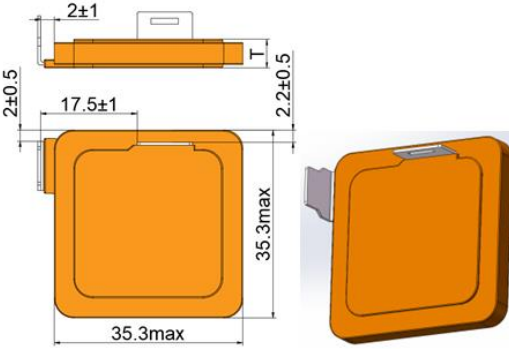
(Unit: mm)

QMHD	QDWD
QAPE	QFEE
QEHE	QPWE

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QHUE	QGUE
 <p>Dimensions for QHUE: 9.5±0.5, 2.8±0.5, 1.4max, 12.7±0.5, 13±1, 35.05max, 34.75max, 12.7±0.5, 9±1, T, T1.</p>	 <p>Dimensions for QGUE: 34.9max, 34.9max, 12.4±0.75, 13.65±0.75, 21.9±0.75, 21.65±1, 12.35±0.8, 2.8±0.3, 3.1±0.5, 4.3±0.5, Tmax.</p>
QHNE	QDKE
 <p>Dimensions for QHNE: 11.6±0.5, 35max, 11.1±0.5, 9±0.1, 8±0.1, 1.5, 14.6±0.5, 35max, 25±0.3, T.</p>	 <p>Dimensions for QDKE: 7.3±1, 8.3±1, 35max, 41.3±1, 35max, 43.3±1, Tmax.</p>
QGCE	QBAE
 <p>Dimensions for QGCE: 43.8±1, 1.5, 21.1±1, 9.7±0.5, 26.6±1, 35max, 39.4±0.75, 1.4, Tmax.</p>	 <p>Dimensions for QBAE: 2±1, 2±0.5, 17.5±1, 35.3max, 35.3max, 2.2±0.5, T.</p>

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QKQE	QHKS
QHBS	TGQE
TDKE	TLNE

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- Structures and Dimensions
 - Block Type

(Unit: mm)

BKBL	BKCL

Metal Oxide Varistor : TVA Series

Disc/Block Type Varistor for Lightning Protection



Electrical Characteristics

T2-25*22mm Series

Part No.	Varistor Voltage (@ 1mA DC)		Max. Continuous Voltage		Vp@In (8/20μs)	Surge Operating Duty Test		Max. Energy (2ms)
	V ^{1mA} (V)	ΔVv (1 mA) %	V _{AC(rms)} (V)	V _{DC} (V)	V _{P(typical)} (V)	I _n (KA)	I _{max} (KA)	W _{max} (J)
TVA22470	47	±10	30	38	215	5	10	35
TVA22560	56	±10	35	45	255	5	10	45
TVA22680	68	±10	40	56	310	5	10	55
TVA22820	82	±10	50	65	290	10	20	70
TVA22101	100	±10	60	85	350	10	20	95
TVA22121	120	±10	75	100	420	10	20	110
TVA22151	150	±10	95	125	450	10	20	130
TVA22181	180	±10	115	150	490	10	20	175
TVA22201	200	±10	130	170	500	10	20	190
TVA22221	220	±10	140	180	550	10	20	205
TVA22241	240	±10	150	200	600	10	20	245
TVA22271	270	±10	180	225	675	10	20	265
TVA22301	300	±10	190	250	750	10	20	280
TVA22331	330	±10	210	275	810	10	20	295
TVA22361	360	±10	230	300	890	10	20	330
TVA22391	390	±10	250	320	960	10	20	370
TVA22431	430	±10	275	350	1050	10	20	410
TVA22471	470	±10	300	385	1130	10	20	445
TVA22511	510	±10	320	415	1250	10	20	480
TVA22561	560	±10	350	450	1350	10	20	520
TVA22621	620	±10	385	505	1500	10	20	560
TVA22681	680	±10	420	560	1650	10	20	565
TVA22711	710	±10	440	585	1720	10	20	640
TVA22751	750	±10	460	615	1820	10	20	660
TVA22781	780	±10	485	640	1900	10	20	690
TVA22821	820	±10	510	670	1980	10	20	730
TVA22911	910	±10	550	745	2010	10	20	770
TVA22951	950	±10	575	780	2090	10	20	830
TVA22102	1000	±10	625	825	2200	10	20	890
TVA22112	1100	±10	680	895	2420	10	20	920
TVA22122	1200	±10	750	980	2640	10	20	960
TVA22142	1400	±10	850	1120	3010	10	15	970
TVA22152	1500	±10	900	1200	3330	10	15	980
TVA22162	1600	±10	1000	1320	3440	10	15	990
TVA22182	1800	±10	1100	1485	3870	10	15	1000

Note: If you have specific electrical requirements, please contact us.

Metal Oxide Varistor : TVA Series

Disc/Block Type Varistor for Lightning Protection



T2-25mm Disc Series

Part No.	Varistor Voltage (@ 1mA DC)		Max. Continuous Voltage		Vp@In (8/20μs)	Surge Operating Duty Test		Max. Energy (2ms)
	V _{1mA} (V)	ΔVv (1 mA) %	V _{AC(rms)} (V)	V _{DC} (V)	VP(typical) (V)	In (KA)	I _{max} (KA)	W _{max} (J)
TVA25470	47	±10	30	38	220	5	10	30
TVA25560	56	±10	35	45	260	5	10	40
TVA25680	68	±10	40	56	320	5	10	45
TVA25820	82	±10	50	65	300	10	20	60
TVA25101	100	±10	60	85	360	10	20	85
TVA25121	120	±10	75	100	435	10	20	95
TVA25151	150	±10	95	125	450	10	20	110
TVA25181	180	±10	115	150	490	10	20	150
TVA25201	200	±10	130	170	520	10	20	165
TVA25221	220	±10	140	180	580	10	20	175
TVA25241	240	±10	150	200	630	10	20	215
TVA25271	270	±10	180	225	720	10	20	230
TVA25301	300	±10	190	250	800	10	20	245
TVA25331	330	±10	210	275	890	10	20	255
TVA25361	360	±10	230	300	950	10	20	285
TVA25391	390	±10	250	320	1020	10	20	325
TVA25431	430	±10	275	350	1120	10	20	360
TVA25471	470	±10	300	385	1200	10	20	400
TVA25511	510	±10	320	415	1300	10	20	430
TVA25561	560	±10	350	450	1450	10	20	460
TVA25621	620	±10	385	505	1600	10	20	500
TVA25681	680	±10	420	560	1750	10	20	505
TVA25711	710	±10	440	585	1820	10	20	525
TVA25751	750	±10	460	615	1915	10	20	580
TVA25781	780	±10	485	640	1990	10	20	610
TVA25821	820	±10	510	670	2050	10	20	645
TVA25911	910	±10	550	745	2150	10	20	690
TVA25951	950	±10	575	780	2235	10	20	735
TVA25102	1000	±10	625	825	2350	10	20	795
TVA25112	1100	±10	680	895	2600	10	20	820
TVA25122	1200	±10	750	980	2850	10	20	860
TVA25142	1400	±10	850	1120	3100	10	15	870
TVA25152	1500	±10	900	1200	3350	10	15	880
TVA25162	1600	±10	1000	1320	3550	10	15	890
TVA25182	1800	±10	1100	1485	3960	10	15	900

Note: If you have specific electrical requirements, please contact us.

Metal Oxide Varistor : TVA Series

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T2-25*25mm Series

Part No.	Varistor Voltage (@ 1mA DC)		Max. Continuous Voltage		Vp@In (8/20μs)	Surge Operating Duty Test		Max. Energy (2ms)
	V _{1mA} (V)	ΔVv (1 mA) %	V _{AC(rms)} (V)	V _{DC} (V)	VP(typical) (V)	In (KA)	I _{max} (KA)	W _{max} (J)
TVA25470-F	47	±10	30	38	215	5	10	40
TVA25560-F	56	±10	35	45	255	5	10	50
TVA25680-F	68	±10	40	56	310	5	10	60
TVA25820-F	82	±10	50	65	280	10	20	80
TVA25101-F	100	±10	60	85	330	10	20	105
TVA25121-F	120	±10	75	100	400	10	20	120
TVA25151-F	150	±10	95	125	450	10	20	140
TVA25181-F	180	±10	115	150	480	10	20	190
TVA25201-F	200	±10	130	170	490	10	22	210
TVA25221-F	220	±10	140	180	540	10	22	225
TVA25241-F	240	±10	150	200	590	10	22	270
TVA25271-F	270	±10	180	225	660	10	22	290
TVA25301-F	300	±10	190	250	740	10	22	305
TVA25331-F	330	±10	210	275	800	10	22	325
TVA25361-F	360	±10	230	300	880	10	22	360
TVA25391-F	390	±10	250	320	950	10	22	405
TVA25431-F	430	±10	275	350	1000	10	22	450
TVA25471-F	470	±10	300	385	1120	10	22	490
TVA25511-F	510	±10	320	415	1240	10	22	525
TVA25561-F	560	±10	350	450	1340	10	22	570
TVA25621-F	620	±10	385	505	1490	10	22	615
TVA25681-F	680	±10	420	560	1640	10	22	620
TVA25711-F	710	±10	440	585	1710	10	22	700
TVA25751-F	750	±10	460	615	1810	10	22	725
TVA25781-F	780	±10	485	640	1890	10	22	755
TVA25821-F	820	±10	510	670	1970	10	22	800
TVA25911-F	910	±10	550	745	2000	10	22	845
TVA25951-F	950	±10	575	780	2080	10	22	910
TVA25102-F	1000	±10	625	825	2190	10	22	975
TVA25112-F	1100	±10	680	895	2430	10	22	1005
TVA25122-F	1200	±10	750	980	2620	10	20	1055
TVA25142-F	1400	±10	850	1120	3000	10	20	1065
TVA25152-F	1500	±10	900	1200	3320	10	20	1075
TVA25162-F	1600	±10	1000	1320	3430	10	20	1090
TVA25182-F	1800	±10	1100	1485	3860	10	20	1100

Note: If you have specific electrical requirements, please contact us.

Metal Oxide Varistor : TVA Series

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T2-30*30mm Series

Part No.	Varistor Voltage (@ 1mA DC)		Max. Continuous Voltage		Vp@In (8/20μs)	Surge Operating Duty Test		Max. Energy (2ms)
	V _{1mA} (V)	ΔVv (1 mA) %	V _{AC(rms)} (V)	V _{DC} (V)	VP(typical) (V)	In (KA)	I _{max} (KA)	W _{max} (J)
TVA30431	430	±10	275	350	1100	20	40	540
TVA30471	470	±10	300	385	1200	20	40	580
TVA30511	510	±10	320	415	1300	20	40	630
TVA30561	560	±10	350	450	1400	20	40	685
TVA30621	620	±10	385	505	1550	20	40	740
TVA30681	680	±10	420	560	1700	20	40	745
TVA30711	710	±10	440	585	1750	20	40	840
TVA30751	750	±10	460	615	1800	20	40	870
TVA30781	780	±10	485	640	1950	20	40	905
TVA30821	820	±10	510	670	2000	20	40	960
TVA30911	910	±10	550	745	2100	20	40	1015
TVA30951	950	±10	575	780	2250	20	40	1100
TVA30102	1000	±10	625	825	2300	20	40	1170
TVA30112	1100	±10	680	895	2500	20	40	1200
TVA30122	1200	±10	750	980	2700	20	40	1265
TVA30142	1400	±10	850	1120	3150	15	30	1280
TVA30152	1500	±10	900	1200	3400	15	30	1290
TVA30162	1600	±10	1000	1320	3600	15	30	1310

Note: If you have specific electrical requirements, please contact us.

Metal Oxide Varistor : TVA Series

Disc/Block Type Varistor for Lightning Protection



T2-32mm Series

Part No.	Varistor Voltage (@ 1mA DC)		Max. Continuous Voltage		Vp@In (8/20μs)	Surge Operating Duty Test		Max. Energy (2ms)
	V _{1mA} (V)	ΔVv (1 mA) %	V _{AC(rms)} (V)	V _{DC} (V)	VP(typical) (V)	In (KA)	I _{max} (KA)	W _{max} (J)
TVA32201	200	±10	130	170	600	15	30	225
TVA32221	220	±10	140	180	660	15	30	245
TVA32241	240	±10	150	200	720	15	30	290
TVA32271	270	±10	180	225	705	15	30	315
TVA32301	300	±10	190	250	780	15	30	335
TVA32331	330	±10	210	275	860	15	30	355
TVA32361	360	±10	230	300	900	15	30	395
TVA32391	390	±10	250	320	975	15	30	445
TVA32431	430	±10	275	350	1035	15	30	490
TVA32471	470	±10	300	385	1130	15	30	530
TVA32511	510	±10	320	415	1225	15	30	575
TVA32561	560	±10	350	450	1350	15	30	625
TVA32621	620	±10	385	505	1490	15	30	670
TVA32681	680	±10	420	560	1650	15	30	680
TVA32711	710	±10	440	585	1710	15	30	760
TVA32751	750	±10	460	615	1800	15	30	790
TVA32781	780	±10	485	640	1880	15	30	830
TVA32821	820	±10	510	670	1970	15	30	875
TVA32911	910	±10	550	745	2050	15	30	925
TVA32951	950	±10	575	780	2140	15	30	1000
TVA32102	1000	±10	625	825	2250	15	30	1070
TVA32112	1100	±10	680	895	2480	15	30	1105
TVA32122	1200	±10	750	980	2700	15	30	1155
TVA32142	1400	±10	850	1120	3010	15	25	1165
TVA32152	1500	±10	900	1200	3225	15	25	1180
TVA32162	1600	±10	1000	1320	3440	15	25	1190
TVA32182	1800	±10	1100	1485	3870	15	25	1200

Note: If you have specific electrical requirements, please contact us.

Metal Oxide Varistor : TVA Series

Disc/Block Type Varistor for Lightning Protection



T2-34*34mm Series

Part No.	Varistor Voltage (@ 1mA DC)		Max. Continuous Voltage		Vp@In (8/20μs)	Surge Operating Duty Test		Max. Energy (2ms)
	V _{1mA} (V)	ΔVv (1 mA) %	V _{AC(rms)} (V)	V _{DC} (V)	V _P (V)	I _n (KA)	I _{max} (KA)	W _{max} (J)
TVA34470	47	±10	30	38	215	10	20	65
TVA34560	56	±10	35	45	255	10	20	80
TVA34680	68	±10	40	56	310	10	20	100
TVA34820	82	±10	50	65	290	20	40	130
TVA34101	100	±10	60	85	350	20	40	170
TVA34121	120	±10	75	100	420	20	40	195
TVA34151	150	±10	95	125	450	20	40	225
TVA34181	180	±10	115	150	490	20	40	305
TVA34201	200	±10	130	170	520	20	40	340
TVA34221	220	±10	140	180	565	20	40	360
TVA34241	240	±10	150	200	615	20	40	435
TVA34271	270	±10	180	225	690	20	40	465
TVA34301	300	±10	190	250	735	20	40	490
TVA34331	330	±10	210	275	810	20	40	520
TVA34361	360	±10	230	300	885	20	40	580
TVA34391	390	±10	250	320	960	20	40	645
TVA34431	430	±10	275	350	1060	20	40	720
TVA34471	470	±10	300	385	1130	20	40	785
TVA34511	510	±10	320	415	1225	20	40	840
TVA34561	560	±10	350	450	1345	20	40	915
TVA34621	620	±10	385	505	1490	20	40	985
TVA34681	680	±10	420	560	1635	20	40	995
TVA34711	710	±10	440	585	1705	20	40	1120
TVA34751	750	±10	460	615	1800	20	40	1160
TVA34781	780	±10	485	640	1875	20	40	1210
TVA34821	820	±10	510	670	1970	20	40	1280
TVA34911	910	±10	550	745	2140	20	40	1355
TVA34951	950	±10	575	780	2235	20	40	1455
TVA34102	1000	±10	625	825	2350	20	40	1560
TVA34112	1100	±10	680	895	2585	20	40	1610
TVA34122	1200	±10	750	980	2820	20	40	1690
TVA34142	1400	±10	850	1120	3150	20	30	1705
TVA34152	1500	±10	900	1200	3375	20	30	1720
TVA34162	1600	±10	1000	1320	3600	20	30	1750
TVA34182	1800	±10	1100	1485	4050	20	30	1760

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T2-34*34mm High Surge Series

Part No.	Varistor Voltage (@ 1mA DC)		Max. Continuous Voltage		Vp@In (8/20μs)	Surge Operating Duty Test		Max. Energy (2ms)
	V _{1mA} (V)	ΔVv (1 mA) %	V _{AC(rms)} (V)	V _{DC} (V)	VP(typical) (V)	In (KA)	I _{max} (KA)	W _{max} (J)
TVA34241	240	±10	150	200	615	20	50	480
TVA34271	270	±10	180	225	690	20	50	510
TVA34301	300	±10	190	250	735	20	50	540
TVA34331	330	±10	210	275	810	20	50	570
TVA34361	360	±10	230	300	885	20	50	640
TVA34391	390	±10	250	320	960	20	50	710
TVA34431	430	±10	275	350	1060	20	50	790
TVA34471	470	±10	300	385	1130	20	50	865
TVA34511	510	±10	320	415	1225	20	50	920
TVA34561	560	±10	350	450	1345	20	50	1000
TVA34621	620	±10	385	505	1490	20	50	1085
TVA34681	680	±10	420	560	1635	20	50	1100
TVA34711	710	±10	440	585	1705	20	50	1230
TVA34751	750	±10	460	615	1800	20	50	1275
TVA34781	780	±10	485	640	1875	20	50	1330
TVA34821	820	±10	510	670	1970	20	50	1400

Note: If you have specific electrical requirements, please contact us.

Metal Oxide Varistor : TVA Series

Disc/Block Type Varistor for Lightning Protection



T2-34*34mm Multi-Chip Parallel Series

Part No.	Varistor Voltage (@ 1mA DC)		Max. Continuous Voltage		Vp@In (8/20μs)	Surge Operating Duty Test		Max. Energy (2ms)
	V _{1mA} (V)	ΔVv (1 mA) %	V _{AC(rms)} (V)	V _{DC} (V)	VP(typical) (V)	In (KA)	I _{max} (KA)	W _{max} (J)
TVA34201-T	200	±10	130	170	520	40	80	545
TVA34221-T	220	±10	140	180	565	40	80	575
TVA34241-T	240	±10	150	200	615	40	80	695
TVA34271-T	270	±10	180	225	690	40	80	745
TVA34301-T	300	±10	190	250	735	40	80	785
TVA34331-T	330	±10	210	275	810	40	80	835
TVA34361-T	360	±10	230	300	885	40	80	925
TVA34391-T	390	±10	250	320	960	40	80	1035
TVA34431-T	430	±10	275	350	1060	40	80	1155
TVA34471-T	470	±10	300	385	1130	40	80	1255
TVA34511-T	510	±10	320	415	1225	40	80	1345
TVA34561-T	560	±10	350	450	1345	40	80	1465
TVA34621-T	620	±10	385	505	1490	40	80	1575
TVA34681-T	680	±10	420	560	1635	40	80	1600
TVA34711-T	710	±10	440	585	1705	40	80	1795
TVA34751-T	750	±10	460	615	1800	40	80	1855
TVA34781-T	780	±10	485	640	1875	40	80	1935
TVA34821-T	820	±10	510	670	1970	40	80	2050
TVA34911-T	910	±10	550	745	2140	40	80	2170
TVA34951-T	950	±10	575	780	2235	40	80	2330
TVA34102-T	1000	±10	625	825	2350	40	80	2500
TVA34112-T	1100	±10	680	895	2585	40	80	2780
TVA34122-T	1200	±10	750	980	2820	40	80	2700
TVA34142-T	1400	±10	850	1120	3150	40	70	2730
TVA34152-T	1500	±10	900	1200	3375	40	70	2750
TVA34162-T	1600	±10	1000	1320	3600	40	70	2800
TVA34182-T	1800	±10	1100	1485	4050	40	70	2820

Note: If you have specific electrical requirements, please contact us.

Metal Oxide Varistor : TVA Series

Disc/Block Type Varistor for Lightning Protection



T2-40mm Series

Part No.	Varistor Voltage (@ 1mA DC)		Max. Continuous Voltage		Vp@In (8/20μs)	Surge Operating Duty Test		Max. Energy (2ms)
	V _{1mA} (V)	ΔVv (1 mA) %	V _{AC(rms)} (V)	V _{DC} (V)	VP(typical) (V)	In (KA)	I _{max} (KA)	W _{max} (J)
TVA40201	200	±10	130	170	520	20	40	360
TVA40221	220	±10	140	180	565	20	40	380
TVA40241	240	±10	150	200	615	20	40	460
TVA40271	270	±10	180	225	690	20	40	490
TVA40301	300	±10	190	250	735	20	40	515
TVA40331	330	±10	210	275	810	20	40	550
TVA40361	360	±10	230	300	885	20	40	610
TVA40391	390	±10	250	320	960	20	40	675
TVA40431	430	±10	275	350	1060	20	40	755
TVA40471	470	±10	300	385	1130	20	40	825
TVA40511	510	±10	320	415	1225	20	40	885
TVA40561	560	±10	350	450	1345	20	40	960
TVA40621	620	±10	385	505	1490	20	40	1035
TVA40681	680	±10	420	560	1635	20	40	1045
TVA40711	710	±10	440	585	1705	20	40	1175
TVA40751	750	±10	460	615	1800	20	40	1220
TVA40781	780	±10	485	640	1875	20	40	1270
TVA40821	820	±10	510	670	1970	20	40	1345
TVA40911	910	±10	550	745	2140	20	40	1425
TVA40951	950	±10	575	780	2235	20	40	1530
TVA40102	1000	±10	625	825	2350	20	40	1640
TVA40112	1100	±10	680	895	2585	20	40	1690
TVA40122	1200	±10	750	980	2820	20	40	1775
TVA40142	1400	±10	850	1120	3150	20	30	1790
TVA40152	1500	±10	900	1200	3375	20	30	1810
TVA40162	1600	±10	1000	1320	3600	20	30	1840
TVA40182	1800	±10	1100	1485	4050	20	30	1850

Note: If you have specific electrical requirements, please contact us.

Metal Oxide Varistor : TVA Series

Disc/Block Type Varistor for Lightning Protection



T2-48*34mm Series

Part No.	Varistor Voltage (@ 1mA DC)		Max. Continuous Voltage		Vp@In (8/20μs)	Surge Operating Duty Test		Max. Energy (2ms)
	V _{1mA} (V)	ΔVv (1 mA) %	V _{AC(rms)} (V)	V _{DC} (V)	V _P (typical) (V)	I _n (KA)	I _{max} (KA)	W _{max} (J)
TVA48431	430	±10	275	350	955	30	60	865
TVA48471	470	±10	300	385	1015	30	60	940
TVA48511	510	±10	320	415	1100	30	60	1015
TVA48561	560	±10	350	450	1210	30	60	1100
TVA48621	620	±10	385	505	1340	30	60	1190
TVA48681	680	±10	420	560	1470	30	60	1200
TVA48711	710	±10	440	585	1535	30	60	1350
TVA48751	750	±10	460	615	1620	30	60	1400
TVA48781	780	±10	485	640	1680	30	60	1460
TVA48821	820	±10	510	670	1770	30	60	1545
TVA48911	910	±10	550	745	1930	30	60	1635
TVA48951	950	±10	575	780	2010	30	60	1760
TVA48102	1000	±10	625	825	2115	30	60	1885
TVA48112	1100	±10	680	895	2325	30	60	1945
TVA48122	1200	±10	750	980	2535	30	60	2040
TVA48142	1400	±10	850	1120	2835	25	50	2060
TVA48152	1500	±10	900	1200	3035	25	50	2080
TVA48162	1600	±10	1000	1320	3250	25	50	2110
TVA48182	1800	±10	1100	1485	3780	25	50	1850

Note: If you have specific electrical requirements, please contact us.

Metal Oxide Varistor : TVA Series

Disc/Block Type Varistor for Lightning Protection



T2-60mm Series

Part No.	Varistor Voltage (@ 1mA DC)		Max. Continuous Voltage		Vp@In (8/20μs)	Surge Operating Duty Test		Max. Energy (2ms)
	V _{1mA} (V)	ΔVv (1 mA) %	V _{AC(rms)} (V)	V _{DC} (V)	V _P (V)	I _n (KA)	I _{max} (KA)	W _{max} (J)
TVA60241	240	±10	150	200	585	35	70	830
TVA60271	270	±10	180	225	660	35	70	880
TVA60301	300	±10	190	250	705	35	70	930
TVA60331	330	±10	210	275	775	35	70	990
TVA60361	360	±10	230	300	845	35	70	1100
TVA60391	390	±10	250	320	915	35	70	1215
TVA60431	430	±10	275	350	1055	35	70	1360
TVA60471	470	±10	300	385	1080	35	70	1485
TVA60511	510	±10	320	415	1175	35	70	1595
TVA60561	560	±10	350	450	1285	35	70	1725
TVA60621	620	±10	385	505	1425	35	70	1860
TVA60681	680	±10	420	560	1565	35	70	1880
TVA60711	710	±10	440	585	1635	35	70	2115
TVA60751	750	±10	460	615	1725	35	70	2200
TVA60781	780	±10	485	640	1795	35	70	2280
TVA60821	820	±10	510	670	1885	35	70	2420
TVA60911	910	±10	550	745	2050	35	70	2565
TVA60951	950	±10	575	780	2140	35	70	2755
TVA60102	1000	±10	625	825	2250	35	70	2955
TVA60112	1100	±10	680	895	2475	35	70	3045
TVA60122	1200	±10	750	980	2700	35	70	3175
TVA60142	1400	±10	850	1120	3010	35	60	3220
TVA60152	1500	±10	900	1200	3225	30	60	3260
TVA60162	1600	±10	1000	1320	3440	30	60	3315
TVA60182	1800	±10	1100	1485	3870	30	60	3330

Note: If you have specific electrical requirements, please contact us.

Metal Oxide Varistor : TVA Series

Disc/Block Type Varistor for Lightning Protection



T1-30*30mm Series

Part No.	Varistor Voltage (@ 1mA DC)		Max. Continuous Voltage		Vp@In (8/20μs)	Surge Operating Duty Test			Max. Energy (2ms)
	V _{1mA} (V)	ΔV _v (1 mA) %	V _{AC(rms)} (V)	V _{DC} (V)	V _P (typical) (V)	In (KA)	I _{max} (KA)	I _{imp} (KA)	W _{max} (J)
TVA30431	430	±10	275	350	1200	20	40	4	540
TVA30471	470	±10	300	385	1300	20	40	4	580
TVA30511	510	±10	320	415	1450	20	40	3.5	630
TVA30561	560	±10	350	450	1580	20	40	3.5	685
TVA30621	620	±10	385	505	1750	20	40	3.5	740
TVA30681	680	±10	420	560	1900	20	40	3	745
TVA30711	710	±10	440	585	2000	20	40	3	840
TVA30751	750	±10	460	615	2100	20	40	3	870
TVA30781	780	±10	485	640	2200	20	40	2.5	905
TVA30821	820	±10	510	670	2300	20	40	2.5	960
TVA30911	910	±10	550	745	2550	20	40	2.5	1015
TVA30951	950	±10	575	780	2660	20	40	2	1100
TVA30102	1000	±10	625	825	2800	20	40	2	1170
TVA30112	1100	±10	680	895	3080	20	40	2	1200

Note: If you have specific electrical requirements, please contact us.

Metal Oxide Varistor : TVA Series

Disc/Block Type Varistor for Lightning Protection



T1-34*34mm Series

Part No.	Varistor Voltage (@ 1mA DC)		Max. Continuous Voltage		Vp@In (8/20μs)	Surge Operating Duty Test			Max. Energy (2ms)
	V _{1mA} (V)	ΔVv (1 mA) %	V _{AC(rms)} (V)	V _{DC} (V)	VP(typical) (V)	In (KA)	I _{max} (KA)	I _{imp} (KA)	W _{max} (J)
TVA34101	100	±10	60	85	350	20	40	8	170
TVA34121	120	±10	75	100	420	20	40	8	195
TVA34151	150	±10	95	125	450	20	40	8	225
TVA34181	180	±10	115	150	540	20	40	8	305
TVA34201	200	±10	130	170	580	20	40	8	340
TVA34221	220	±10	140	180	650	20	40	8	360
TVA34241	240	±10	150	200	700	20	40	8	435
TVA34271	270	±10	180	225	780	20	40	8	465
TVA34301	300	±10	190	250	870	20	40	8	490
TVA34331	330	±10	210	275	920	20	40	8	520
TVA34361	360	±10	230	300	1010	20	40	8	580
TVA34391	390	±10	250	320	1095	20	40	8	645
TVA34431	430	±10	275	350	1205	20	40	8	720
TVA34471	470	±10	300	385	1320	20	40	8	785
TVA34511	510	±10	320	415	1430	20	40	7	840
TVA34561	560	±10	350	450	1570	20	40	7	915
TVA34621	620	±10	385	505	1740	20	40	7	985
TVA34681	680	±10	420	560	1905	20	40	6.5	995
TVA34711	710	±10	440	585	1990	20	40	6.5	1120
TVA34751	750	±10	460	615	2100	20	40	6.5	1160
TVA34781	780	±10	485	640	2185	20	40	5	1210
TVA34821	820	±10	510	670	2295	20	40	5	1280
TVA34911	910	±10	550	745	2550	20	40	5	1355
TVA34951	950	±10	575	780	2660	20	40	3.5	1455
TVA34102	1000	±10	625	825	2800	20	40	3.5	1560
TVA34112	1100	±10	680	895	3080	20	40	3.5	1610

Note: If you have specific electrical requirements, please contact us.

Metal Oxide Varistor : TVA Series

Disc/Block Type Varistor for Lightning Protection



T1-43*29mm Series

Part No.	Varistor Voltage (@ 1mA DC)		Max. Continuous Voltage		Vp@In (8/20μs)	Surge Operating Duty Test			Max. Energy (2ms)
	V _{1mA} (V)	ΔVv (1 mA) %	V _{AC(rms)} (V)	V _{DC} (V)		VP(typical) (V)	In (KA)	I _{max} (KA)	
TVA44431	430	±10	275	350	1300	25	50	8.5	795
TVA44471	470	±10	300	385	1420	25	50	8.5	865
TVA44511	510	±10	320	415	1550	25	50	7.5	930
TVA44561	560	±10	350	450	1680	25	50	7.5	1000
TVA44621	620	±10	385	505	1860	25	50	7.5	1050
TVA44681	680	±10	420	560	2040	25	50	7	1100
TVA44711	710	±10	440	585	2130	25	50	7	1230
TVA44751	750	±10	460	615	2250	25	50	7	1280
TVA44781	780	±10	485	640	2340	25	50	5.5	1330
TVA44821	820	±10	510	670	2460	25	50	5.5	1400
TVA44911	910	±10	550	745	2730	25	50	5.5	1500
TVA44951	950	±10	575	780	2850	25	50	4	1610
TVA44102	1000	±10	625	825	3000	25	50	4	1720
TVA44112	1100	±10	680	895	3300	25	50	4	1775

Note: If you have specific electrical requirements, please contact us.

T1-48*34mm Series

Part No.	Varistor Voltage (@ 1mA DC)		Max. Continuous Voltage		Vp@In (8/20μs)	Surge Operating Duty Test			Max. Energy (2ms)
	V _{1mA} (V)	ΔVv (1 mA) %	V _{AC(rms)} (V)	V _{DC} (V)		VP(typical) (V)	In (KA)	I _{max} (KA)	
TVA48431	430	±10	275	350	1300	30	60	12	865
TVA48471	470	±10	300	385	1420	30	60	12	940
TVA48511	510	±10	320	415	1550	30	60	12	1015
TVA48561	560	±10	350	450	1680	30	60	12	1100
TVA48621	620	±10	385	505	1860	30	60	11.5	1190
TVA48681	680	±10	420	560	2040	30	60	11.5	1200
TVA48711	710	±10	440	585	2130	30	60	11.5	1350
TVA48751	750	±10	460	615	2250	30	60	10	1400
TVA48781	780	±10	485	640	2340	30	60	9.5	1460
TVA48821	820	±10	510	670	2460	30	60	9.5	1545
TVA48911	910	±10	550	745	2730	30	60	9.5	1635
TVA48951	950	±10	575	780	2850	30	60	6	1760
TVA48102	1000	±10	625	825	3000	30	60	6	1885
TVA48112	1100	±10	680	895	3300	30	60	6	1945

Note: If you have specific electrical requirements, please contact us.

Metal Oxide Varistor : TVA Series

Disc/Block Type Varistor for Lightning Protection



T1-52*33mm Series

Part No.	Varistor Voltage (@ 1mA DC)		Max. Continuous Voltage		Vp@In (8/20μs)	Surge Operating Duty Test			Max. Energy (2ms)
	V _{1mA} (V)	ΔVv (1 mA) %	V _{AC(rms)} (V)	V _{DC} (V)	VP(typical) (V)	In (KA)	I _{max} (KA)	I _{imp} (KA)	W _{max} (J)
TVA54431	430	±10	275	350	1300	35	70	12.5	865
TVA54471	470	±10	300	385	1420	35	70	12.5	940
TVA54511	510	±10	320	415	1550	35	70	12.5	1015
TVA54561	560	±10	350	450	1680	35	70	12.5	1100
TVA54621	620	±10	385	505	1860	35	70	12	1190
TVA54681	680	±10	420	560	2040	35	70	12	1200
TVA54711	710	±10	440	585	2130	35	70	12	1350
TVA54751	750	±10	460	615	2250	35	70	11	1400
TVA54781	780	±10	485	640	2340	35	70	10	1460
TVA54821	820	±10	510	670	2460	35	70	10	1545
TVA54911	910	±10	550	745	2730	35	70	10	1635
TVA54951	950	±10	575	780	2850	35	70	6.5	1760
TVA54102	1000	±10	625	825	3000	35	70	6.5	1885
TVA54112	1100	±10	680	895	3300	35	70	6.5	1945

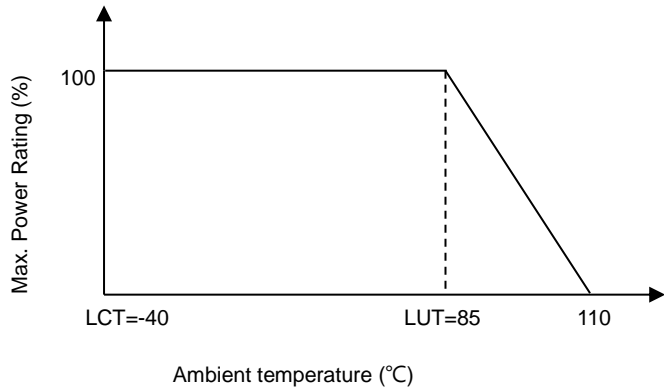
Note: If you have specific electrical requirements, please contact us.

Metal Oxide Varistor : TVA Series

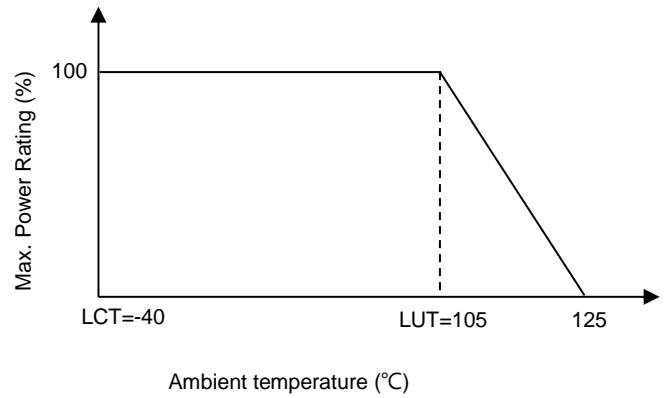
Disc/Block Type Varistor for Lightning Protection



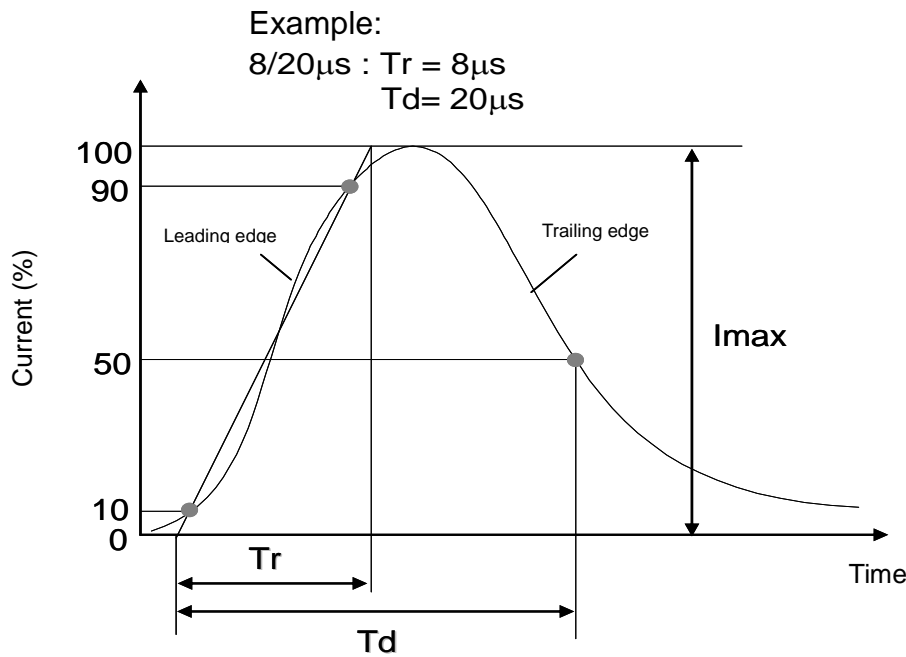
■ Power Derating Curve (85°C)



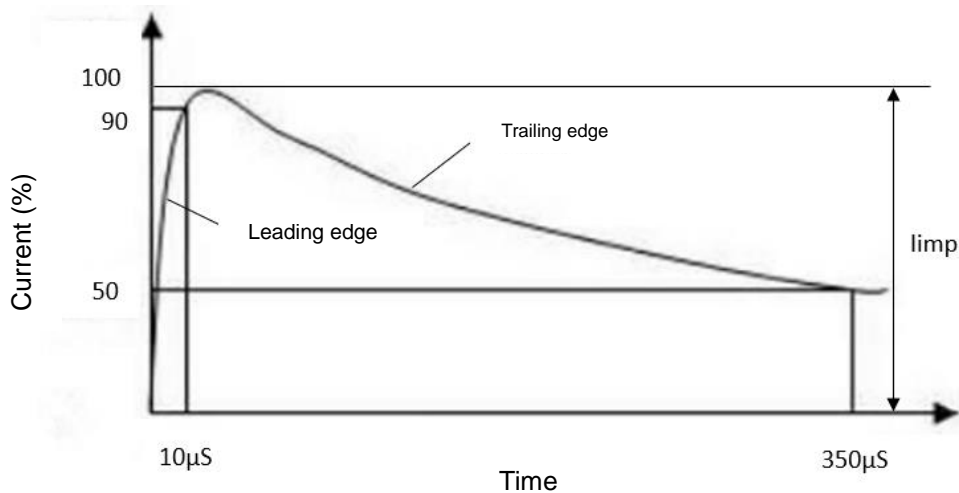
■ Power Derating Curve (105°C)



■ Surge Current Standard Waveform (8/20μS)



■ Surge Current Standard Waveform (10/350 μS)



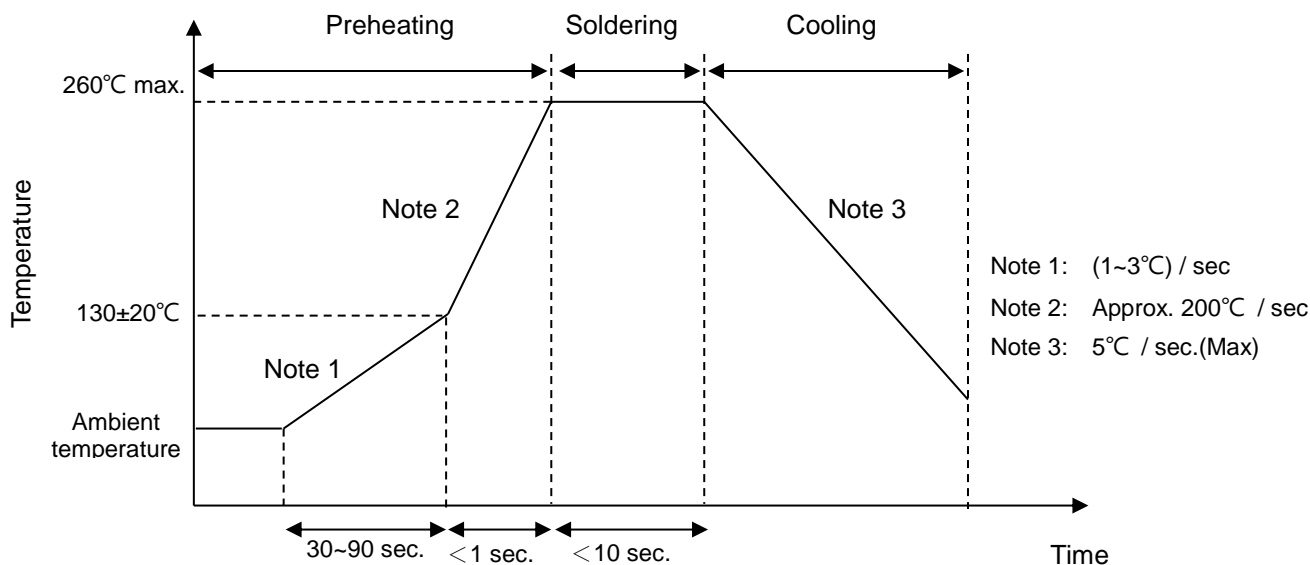
Metal Oxide Varistor : TVA Series

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	420°C (max.)
Soldering Time	4 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	Gradually apply the specified force and keep the unit fixed for 10±1 sec. 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															
Vibration (Optional)	IEC 60068-2-6	Frequency range: 10~55Hz Amplitude: 0.75mm or 98m/s ² Duration: 6 hrs (3 x 2 hrs)	$ \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	105/125±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>≤3</td> </tr> <tr> <td>3</td> <td>85/105°C±2</td> <td>30±3</td> </tr> <tr> <td>4</td> <td>Room temperature</td> <td>≤3</td> </tr> </tbody> </table>	Step	Temperature (°C)	Period (minutes)	1	-40±3	30±3	2	Room temperature	≤3	3	85/105°C±2	30±3	4	Room temperature	≤3	$ \Delta V_{1mA} / V_{1mA} \leq 5\%$ No visible damage
Step	Temperature (°C)	Period (minutes)																
1	-40±3	30±3																
2	Room temperature	≤3																
3	85/105°C±2	30±3																
4	Room temperature	≤3																
High Temp. Load	MIL-STD-202 Method 108	For TVA 25 / TVA25S / TVA34 (except for 152/162/182): 105°C, 1000±24 hrs at V _{DC} or V _{rms} (Max. Continuous Voltage) For the rest of the specifications: 85°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	T2: <u>Testing under 8/20μs waveform:</u> 1. Test ±VP @In and record the waveform. 2. Preprocessing for operating duty test: Couple to the maximum operating voltage and apply In*15 times, in 3 groups, with 5 surges per group, with a 1-minute interval between surges and a 30-minute interval between groups. 3. Test ±VP @In and record the waveform. 4. In Step 3, select the polarity with the higher VP for surge testing at 0.5, 0.75, and 1.0 I _{max} , with each level tested once and a 30-minute interval between tests. T1: <u>Testing under 8/20μs waveform:</u> 1. Test ±VP @Iimp and record the waveform. 2. Preprocessing for operating duty test: Couple to the maximum operating	$ \Delta V_{1mA} / V_{1mA} \leq 10\%$ No visible damage															

Metal Oxide Varistor : TVA Series

Disc/Block Type Varistor for Lightning Protection



		voltage and apply limp*15 times, in 3 groups, with a 1-minute interval between surges and a 30-minute interval between groups.		
		3. Test $\pm VP$ @ limp and record the waveform.		
		4. Testing under 10/350 μ s waveform: In Step 3, select the polarity with the higher VP for surge testing at 0.1, 0.25, 0.5, 0.75, and 1.0 limp, with each level tested once and a 30-minute interval between tests.		
Climatic Sequence	IEC 61051-1	a. dry heat at 85/105°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 $\geq 100M\Omega$
Voltage Proof	IEC 61051-1	Epoxy	Metal balls method, 2500 Vac 1 min	No visible damage
		Silicone	Metal balls method, 1000 Vac 1 min	

■ Warehouse Storage Conditions of Products

- Storage Conditions:
 1. Storage Temperature: -10°C~+40°C
 2. Relative Humidity: $\leq 75\%RH$
 3. Keep away from corrosive atmosphere and sunlight.
- Period of Storage: 1 year

Metal Oxide Varistor : TVA Series

Disc/Block Type Varistor for Lightning Protection

