

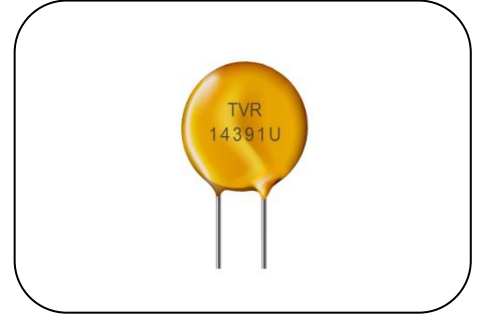
Metal Oxide Varistor: TVR-U Series

Disc Type Varistor for Surge Protection (Ultra High Surge Series)



■ Features

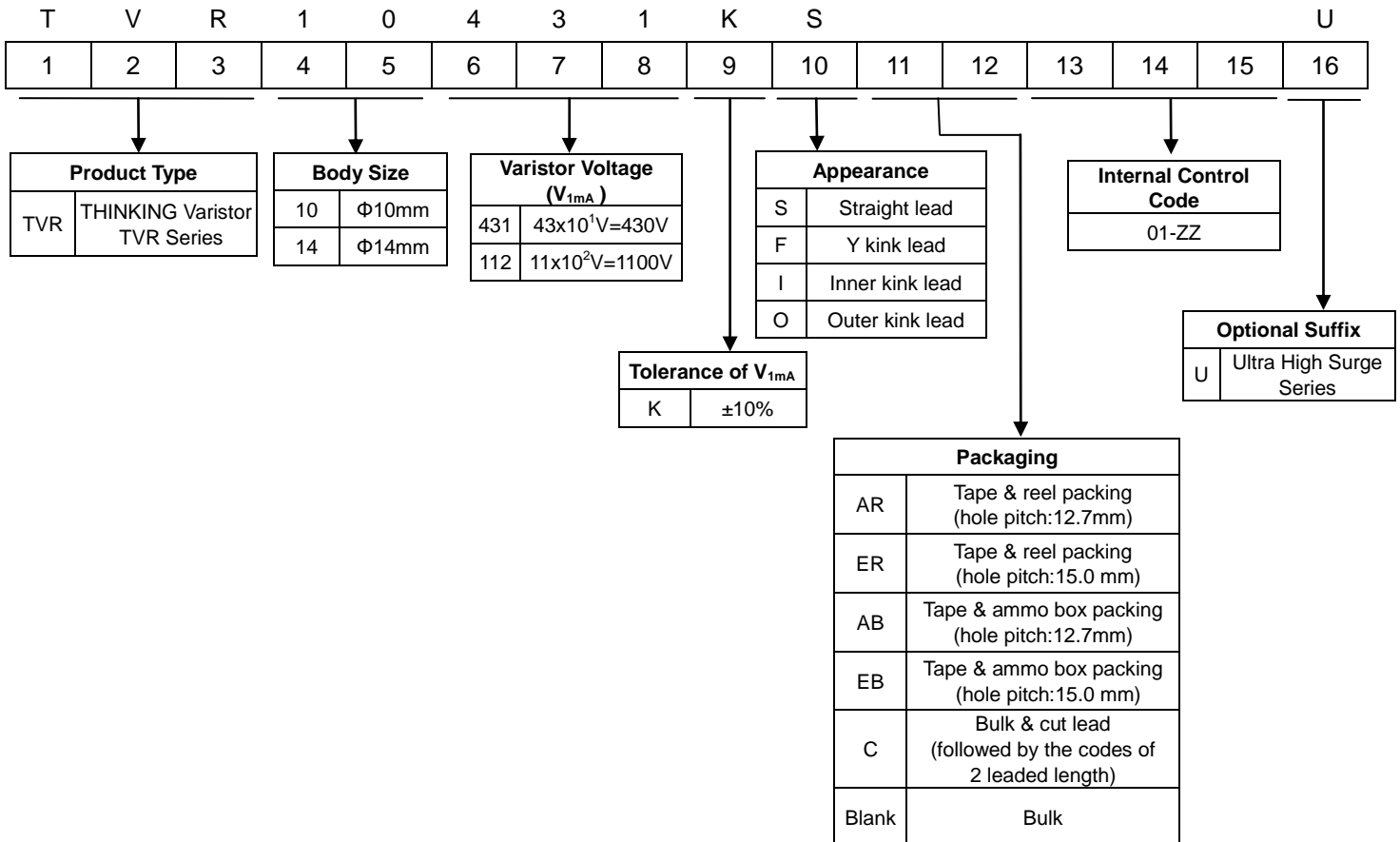
1. Body size: $\Phi 10\text{mm}$, $\Phi 14\text{mm}$
2. Compact product design saves 30% and 45% installation space when comparing with $\Phi 14\text{mm}$ and $\Phi 20\text{mm}$ varistors
3. 8/20 μs high surge current (I_{max}) of $\Phi 10\text{mm}$ and $\Phi 14\text{mm}$ products are 6,000A and 10,000A
4. Wide operating voltage range: 130Vac-680Vac
5. RoHS compliant
6. Operating temperature range: $-40^{\circ}\text{C} \sim +125^{\circ}\text{C}$
Storage temperature range: $-40^{\circ}\text{C} \sim +150^{\circ}\text{C}$
7. Agency recognition: UL/TUV/CQC



■ Recommended Applications

1. Power supply
2. Power supply for home appliance
3. Industrial equipment
4. Telecommunication system

■ Part Number Code



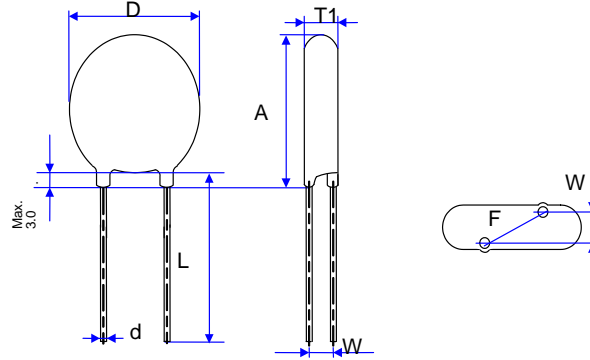
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Structures and Dimensions

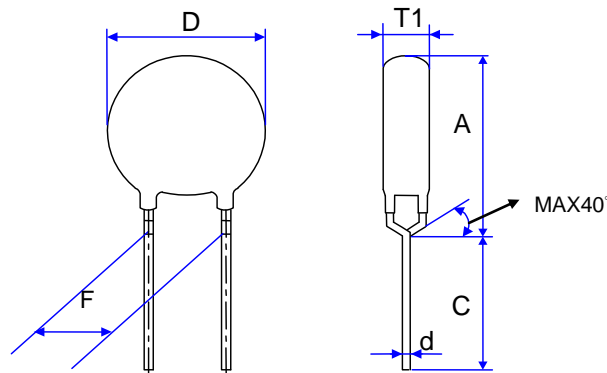
S Type (Straight lead)



(Unit:mm)

Series	D _{max.}	L _{min.}	d	F	A _{max.}	T1	W
TVR10-U	14	15	0.8±0.05	7.5±0.5 (for TVR10201-U-TV10561-U) 7.5±1.0 (for TVR10621-U-TV10112-U)	17	Please refer to Electrical Characteristics Table	
TVR14-U	18	15	0.8±0.05	7.5±0.5 (for TVR14201-U-TV14561-U) 7.5±1.0 (for TVR14621-U-TV14112-U)	21.5		

F Type (Y kink lead)



(Unit: mm)

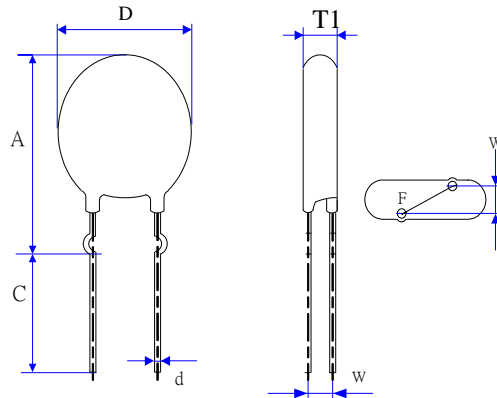
Series	D _{max.}	C _{min.}	d	F	A _{max.}	T1	W
TVR10-U	14	15	0.8±0.05	7.5±0.5 (for TVR10201-U-TV10561-U) 7.5±1.0 (for TVR10621-U-TV10112-U)	17	Please refer to Electrical Characteristics Table	
TVR14-U	18	15	0.8±0.05	7.5±0.5 (for TVR14201-U-TV14561-U) 7.5±1.0 (for TVR10621-U-TV10112-U)	22		

Metal Oxide Varistor: TVR-U Series

Disc Type Varistor for Surge Protection (Ultra High Surge Series)



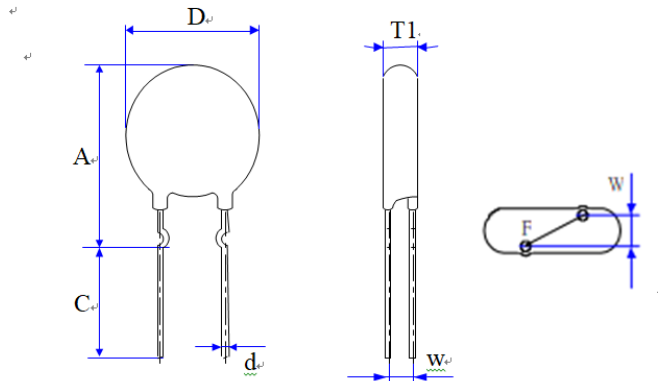
■ O Type (Outer kink lead)



(Unit: mm)

Series	D _{max.}	C _{min.}	d	F	A _{max.}	T1	W
TVR10-U	14	15	0.8±0.05	7.5±0.5 (for TVR10201-U-TV10561-U) 7.5±1.0 (for TVR10621-U-TV10112-U)	22	Please refer to Electrical Characteristics Table	
TVR14-U	18	15	0.8±0.05	7.5±0.5 (for TVR14201-U-TV14561-U) 7.5±1.0 (for TVR10621-U-TV10112-U)	24.5		

■ I Type (Inner kink lead)



(Unit: mm)

Series	D _{max.}	C _{min.}	d	F	A _{max.}	T1	W
TVR10-U	14	15	0.8±0.05	7.5±0.5 (for TVR10201-U-TV10561-U) 7.5±1.0 (for TVR10621-U-TV10112-U)	22	Please refer to Electrical Characteristics Table	
TVR14-U	18	15	0.8±0.05	7.5±0.5 (for TVR14201-U-TV14561-U) 7.5±1.0 (for TVR10621-U-TV10112-U)	24.5		

Metal Oxide Varistor: TVR-U Series

Disc Type Varistor for Surge Protection (Ultra High Surge Series)



Electrical Characteristics

10mm Series

Part No.	Varistor Voltage (@ 1mA DC)	Max. Continuous Voltage		Max. Clamping Voltage (8/20μs)		Max. Surge Current (8/20μs)	Rated Power	Max. Energy (10/1000μs)	Dimension		
	V _{1mA}	V _{AC(rms)}	V _{DC}	V _P	I _P	I _{max}	P	W _{max}	T _{min}	T _{max}	W ±1.0
	(V)	(V)	(V)	(V)	(A)	(A)	(W)	(J)	(mm)		
TVR10201-U	205 (184.5-225.5)	130	--	340	50	6000	0.6	84	2.9	4.4	1.3
TVR10221-U	220 (198-242)	140	--	360				91	3.0	4.5	1.4
TVR10241-U	240 (216-264)	150	200	395				98	3.1	4.7	1.5
TVR10271-U	270 (243-297)	175	225	455				112	3.3	4.9	1.8
TVR10301-U	300 (270-330)	195	250	500				123	3.4	5.1	1.9
TVR10331-U	330 (297-363)	215	275	550				133	3.5	5.3	2.1
TVR10361-U	360 (324-396)	230	300	595				147	3.6	5.5	2.3
TVR10391-U	390 (351-429)	250	320	650				161	3.7	5.6	2.4
TVR10431-U	430 (387-473)	275	350	710				182	3.8	5.9	2.5
TVR10471-U	470 (423-517)	300	385	775				196	3.9	6.2	2.6
TVR10511-U	510 (459-561)	320	420	845				210	4.1	6.5	2.7
TVR10561-U	560 (504-616)	350	460	930				231	4.2	7.0	2.8
TVR10621-U	620 (558-682)	395	510	1020				252	4.5	7.4	3.0
TVR10681-U	680 (612-748)	420	560	1120				266	4.7	8.1	3.0
TVR10751-U	750 (675-825)	465	615	1235				280	5.0	8.6	3.1
TVR10781-U	780 (702-858)	485	640	1300				280	5.1	9.0	3.3
TVR10821-U	820 (738-902)	510	670	1355				280	5.2	9.2	3.4
TVR10911-U	910 (819-1001)	550	745	1500				308	5.6	9.9	3.7
TVR10102-U	1000 (900-1100)	625	825	1650				336	5.9	10.4	4.0
TVR10112-U	1100 (990-1210)	680	895	1815				364	6.3	11.1	4.4

Metal Oxide Varistor: TVR-U Series

Disc Type Varistor for Surge Protection (Ultra High Surge Series)



14mm Series




Part No.	Varistor Voltage (@ 1mA DC)	Max. Continuous Voltage		Max. Clamping Voltage (8/20μs)		Max. Surge Current (8/20μs)	Rated Power	Max. Energy (10/1000μs)	Dimension		
	V _{1mA}	V _{AC(rms)}	V _{DC}	V _P	I _P	I _{max}	P	W _{max}	T _{min}	T _{max}	W ±1.0
	(V)	(V)	(V)	(V)	(A)	(A)	(W)	(J)	(mm)		
TVR14241-U	240 (216-264)	150	200	395	100	10000	1.0	168	3.1	5.1	1.5
TVR14271-U	270 (243-297)	175	225	455				190	3.3	5.3	1.8
TVR14301-U	300 (270-330)	195	250	500				210	3.4	5.5	1.9
TVR14331-U	330 (297-363)	215	275	550				228	3.5	5.7	2.1
TVR14361-U	360 (324-396)	230	300	595				255	3.6	5.9	2.3
TVR14391-U	390 (351-429)	250	320	650				275	3.7	6	2.4
TVR14431-U	430 (387-473)	275	350	710				303	3.8	6.1	2.5
TVR14471-U	470 (423-517)	300	385	775				350	3.9	6.3	2.6
TVR14511-U	510 (459-561)	320	420	845				382	4.1	6.5	2.7
TVR14561-U	560 (504-616)	350	450	930				382	4.2	7.0	2.8
TVR14621-U	620 (558-682)	395	510	1020				382	4.5	7.4	3.0
TVR14681-U	680 (612-748)	420	560	1120				382	4.7	8.1	3.0
TVR14751-U	750 (675-825)	465	615	1235				420	5.0	8.6	3.0
TVR14781-U	780 (702-858)	485	640	1300				440	5.1	9.0	3.3
TVR14821-U	820 (738-902)	510	670	1355				460	5.2	9.2	3.4
TVR14911-U	910 (819-1001)	550	745	1500				510	5.6	9.9	3.7
TVR14102-U	1000 (900-1100)	625	825	1650				565	5.9	10.0	4.0
TVR14112-U	1100 (990-1210)	680	895	1815	620	6.3	11.1	4.4			

Metal Oxide Varistor: TVR-U Series

Disc Type Varistor for Surge Protection (Ultra High Surge Series)



■ Safety Approvals




Certified Model No.	Agency				
					
	UL1449 5 th & cUL	EN/IEC 61051-1, IEC 61051-2, IEC 61051-2-2	IEC62368-1 Annex G.8.1	GB/T10193-1997 GB/T10194-1997	GB8898-2011 GB4943.1-2011
	E314979	J50531421		Pending	
TVR10201-U	√				
TVR10221-U	√				
TVR10241-U	√	√	√	√	√
TVR10271-U	√	√	√	√	√
TVR10301-U	√	√	√	√	√
TVR10331-U	√	√	√	√	√
TVR10361-U	√	√	√	√	√
TVR10391-U	√	√	√	√	√
TVR10431-U	√	√	√	√	√
TVR10471-U	√	√	√	√	√
TVR10511-U	√	√	√	√	√
TVR10561-U	√	√	√	√	√
TVR10621-U	√	√	√	√	√
TVR10681-U	√	√	√	√	√
TVR10751-U	√	√	√	√	√
TVR10781-U	√	√	√	√	√
TVR10821-U	√	√	√	√	√
TVR10911-U	√	√	√	√	√
TVR10102-U	√	√	√	√	√
TVR10112-U	√	√	√	√	√

Metal Oxide Varistor: TVR-U Series

Disc Type Varistor for Surge Protection (Ultra High Surge Series)



■ Safety Approvals

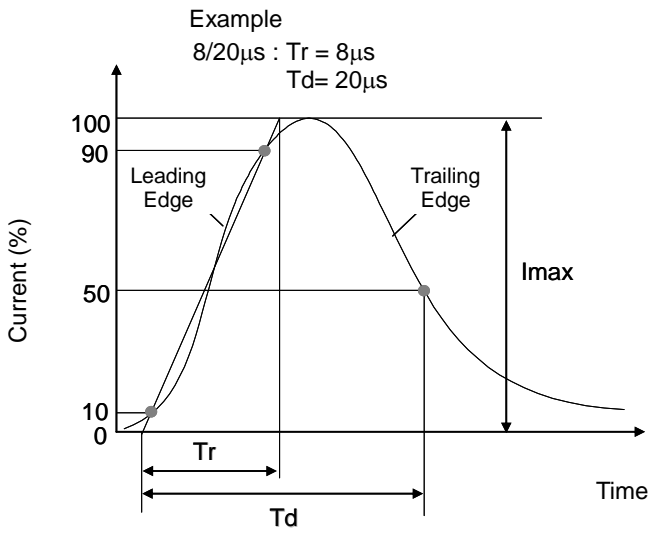
Certified Model No.	Agency				
					
	UL1449 5 th & cUL	EN/IEC 61051-1, IEC 61051-2, IEC 61051-2-2	IEC62368-1 Annex G.8.1	GB/T10193-1997 GB/T10194-1997	GB8898-2011 GB4943.1-2011
	E314979	J50531421		Pending	
TVR14241-U	√	√	√	√	√
TVR14271- U	√	√	√	√	√
TVR14301- U	√	√	√	√	√
TVR14331- U	√	√	√	√	√
TVR14361- U	√	√	√	√	√
TVR14391- U	√	√	√	√	√
TVR14431- U	√	√	√	√	√
TVR14471- U	√	√	√	√	√
TVR14511- U	√	√	√	√	√
TVR14561- U	√	√	√	√	√
TVR14621- U	√	√	√	√	√
TVR14681- U	√	√	√	√	√
TVR14751- U	√	√	√	√	√
TVR14781- U	√	√	√	√	√
TVR14821- U	√	√	√	√	√
TVR14911- U	√	√	√	√	√
TVR14102- U	√	√	√	√	√
TVR14112- U	√	√	√	√	√

Metal Oxide Varistor: TVR-U Series

Disc Type Varistor for Surge Protection (Ultra High Surge Series)

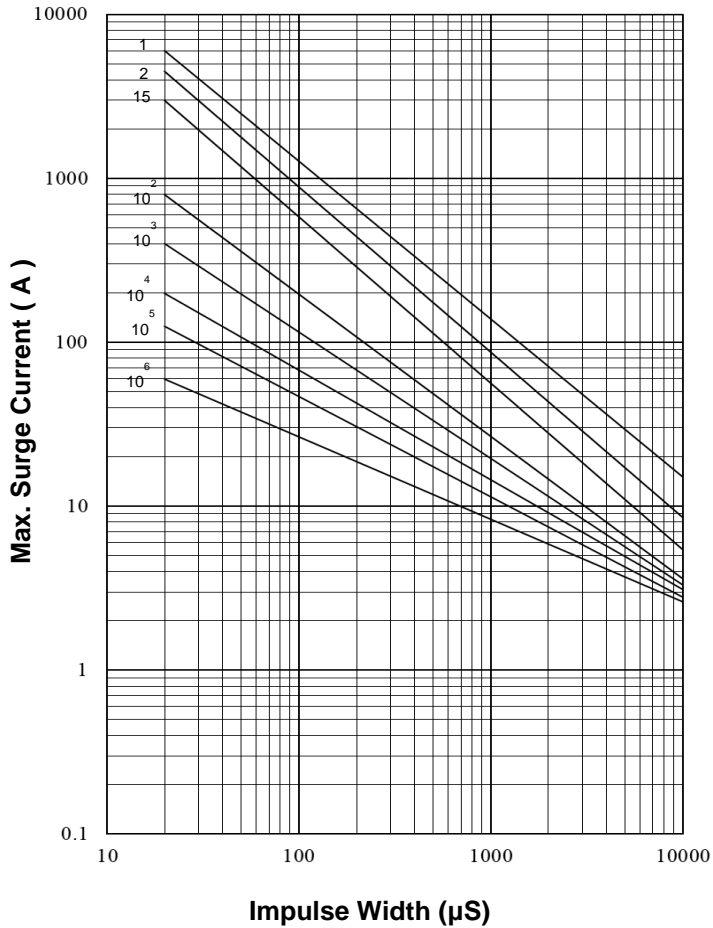


Surge Current Standard Waveform

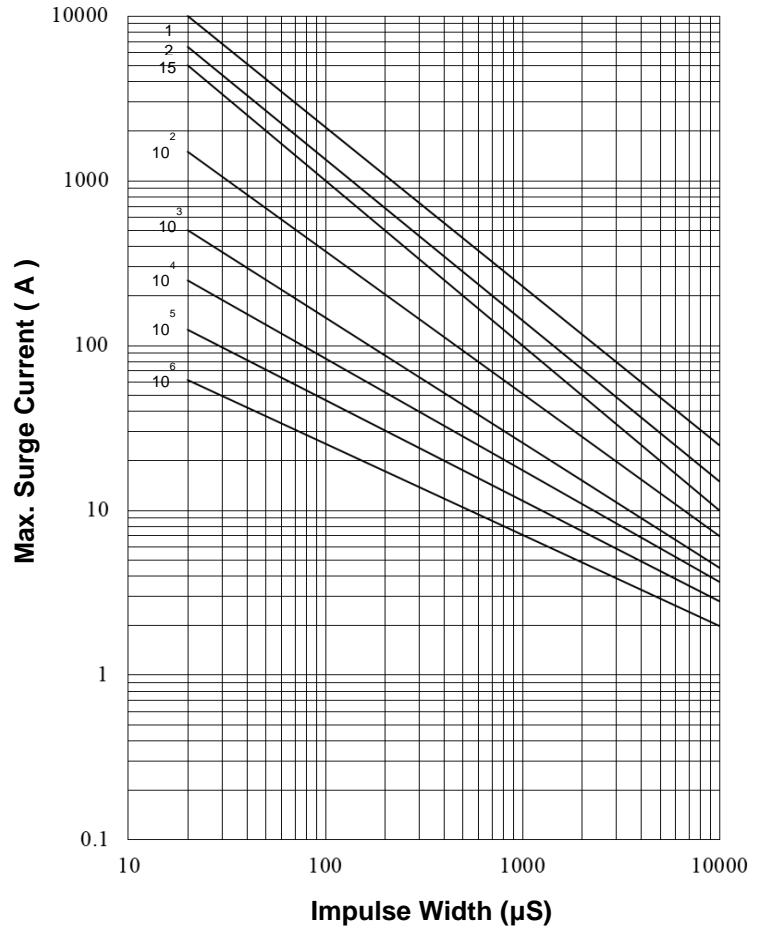


Max. Surge Current Derating Curves

TVR10201-U to TVR10112-U



TVR14241-U to TVR14112-U

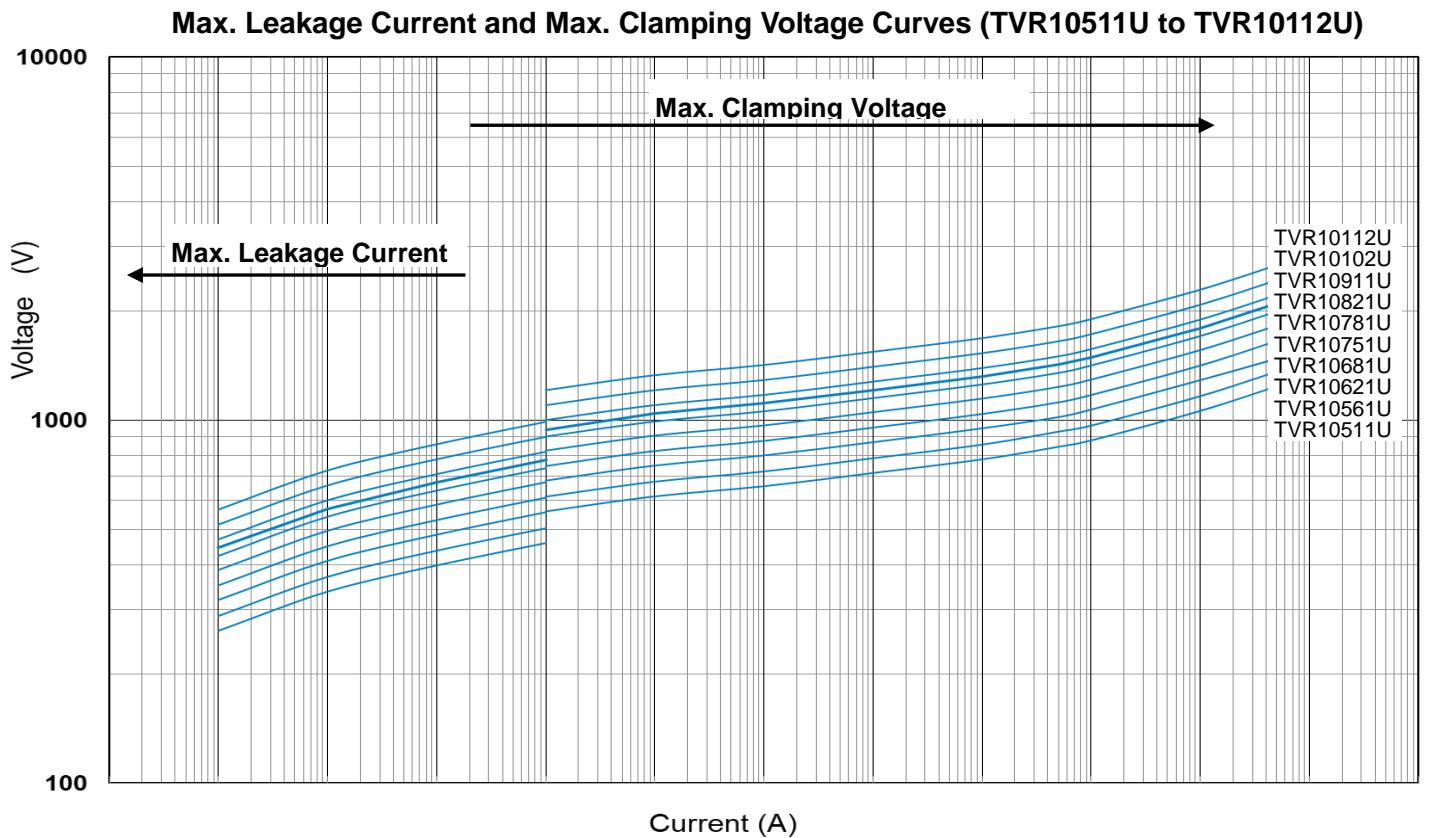
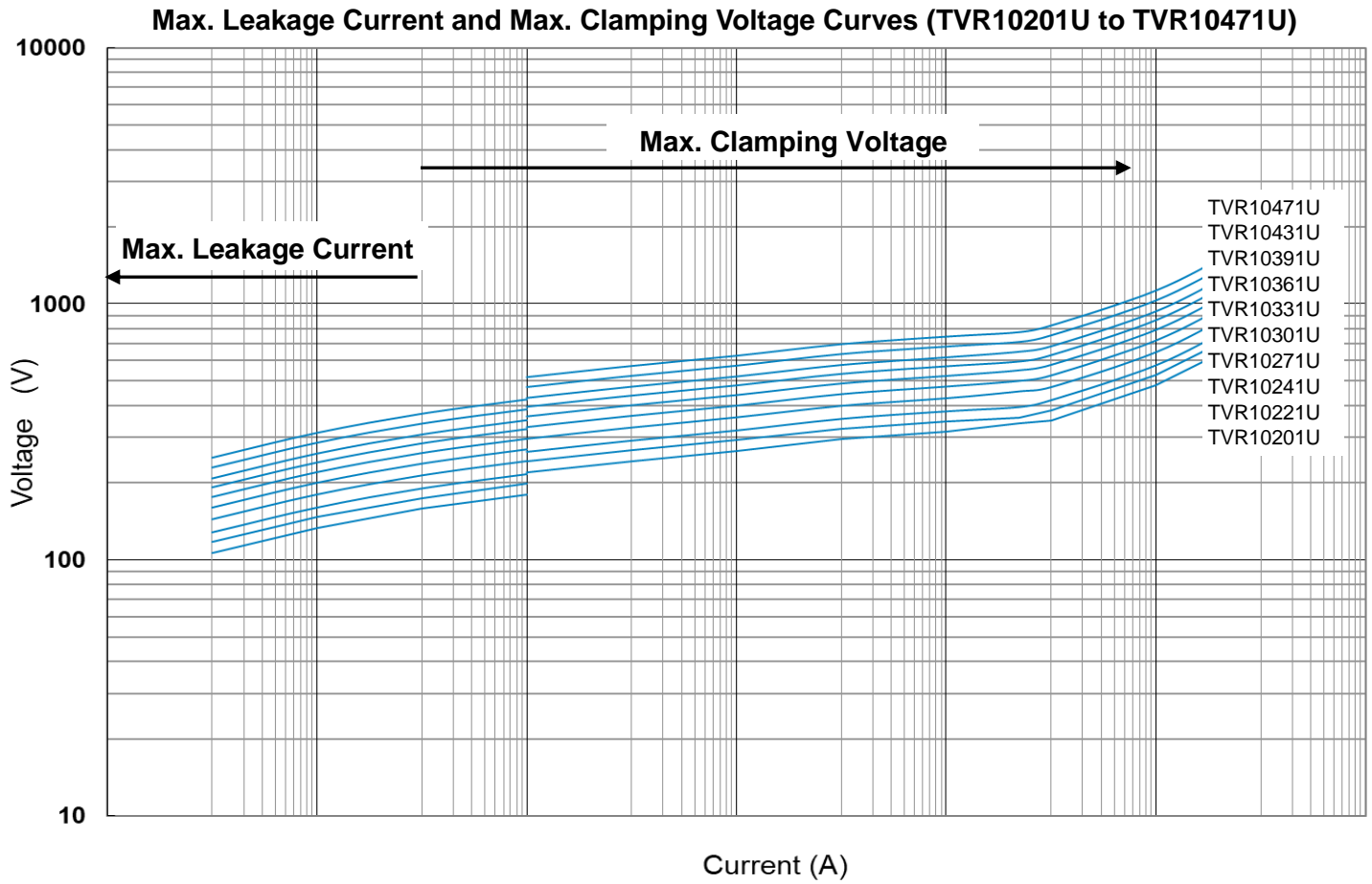


Metal Oxide Varistor: TVR-U Series

Disc Type Varistor for Surge Protection (Ultra High Surge Series)



Max. Leakage Current and Max. Clamping Voltage Curves



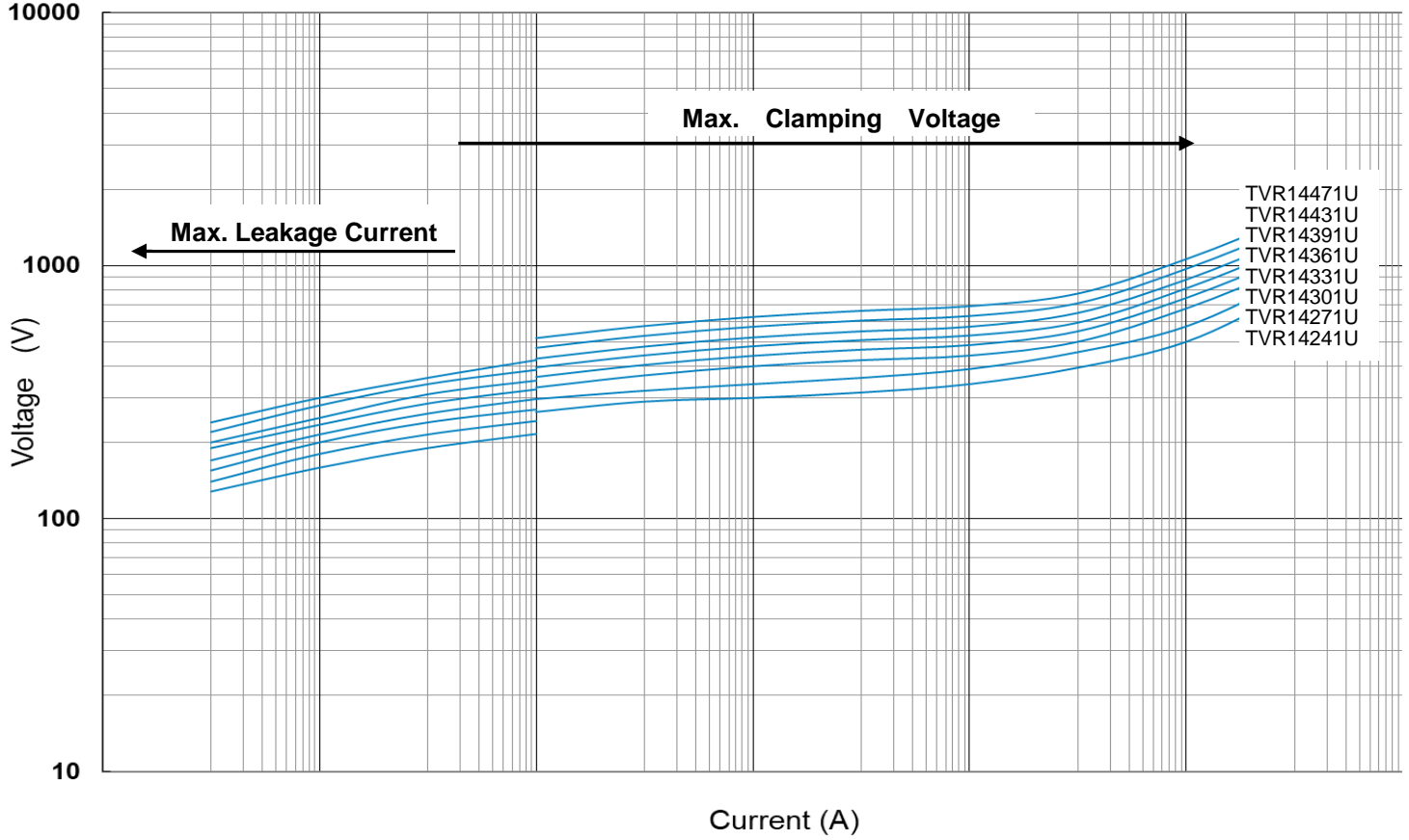
Metal Oxide Varistor: TVR-U Series

Disc Type Varistor for Surge Protection (Ultra High Surge Series)

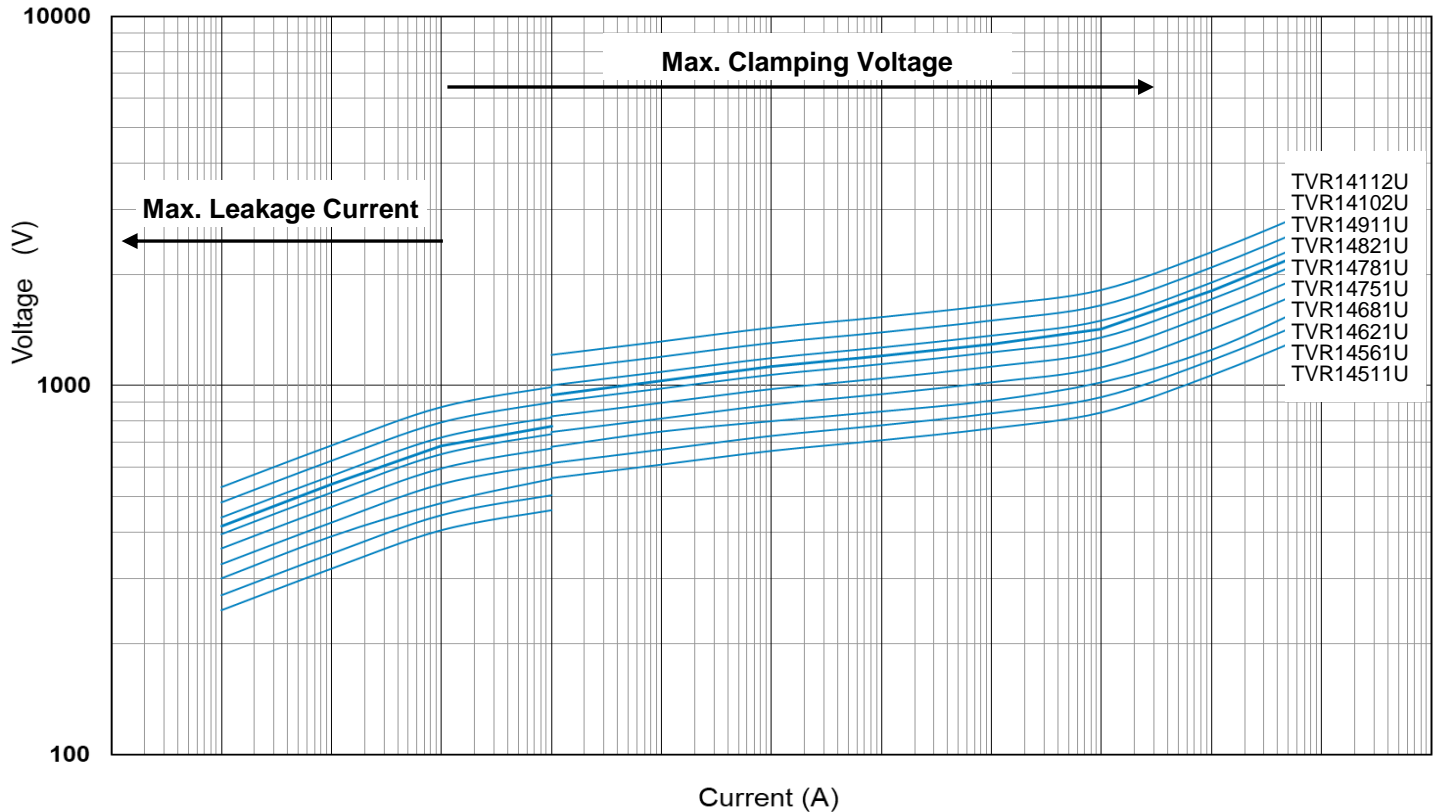


Max. Leakage Current and Max. Clamping Voltage Curves

Max. Leakage Current and Max. Clamping Voltage Curves (TVR14241U to TVR14471U)



Max. Leakage Current and Max. Clamping Voltage Curves (TVR14511U to TVR14112U)



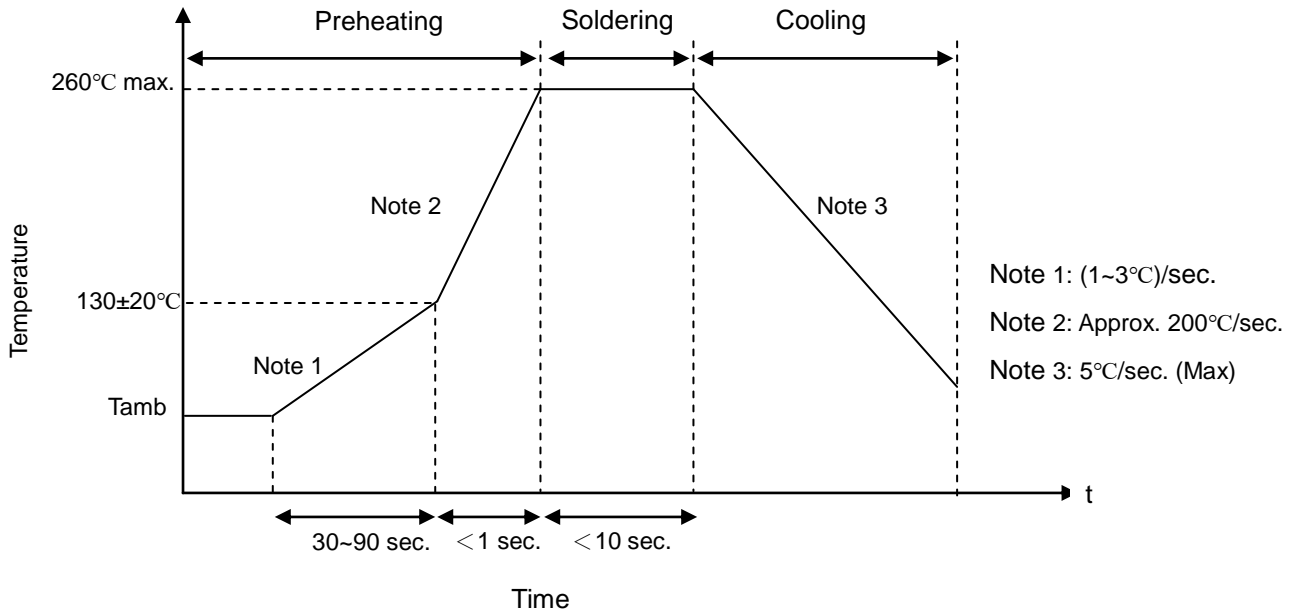
Metal Oxide Varistor: TVR-U Series

Disc Type Varistor for Surge Protection (Ultra High Surge Series)



■ Soldering Recommendation

● IR-reflow Soldering Profile



● Recommended Reworking Conditions with Soldering Iron

Item	Conditions
Temperature of Soldering Iron-tip	360°C (max.)
Soldering Time	3 sec (max.)
Diameter of Soldering Iron-tip	Φ3 mm (max.)

Metal Oxide Varistor: TVR-U Series

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■ Reliability

Item	Standard	Test conditions / Methods	Specifications															
Vibration	IEC 60068-2-6	Frequency range: 10Hz→55Hz→55Hz, 1 min Amplitude: 0.75mm, 6hrs	$ \Delta V_{1mA} / V_{1mA} \leq \pm 5\%$ No visible damage															
Solderability	IEC 60068-2-20	245±3°C, 3±0.3 sec.	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 \pm 5\%$ No visible damage															
High Temperature Storage	IEC 60068-2-2	150°C, 1000 hrs	$ \Delta V_{1mA} / V_{1mA} \leq \pm 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 \pm 5\%$ No visible damage															
Rapid Change of Temperature	IEC 60068-2-14	The conditions shown below shall be repeated 5 cycles <table border="1" style="margin-left: auto; margin-right: auto;"> <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>5±3</td> </tr> <tr> <td>3</td> <td>125±2</td> <td>30±3</td> </tr> <tr> <td>4</td> <td>Room temperature</td> <td>5±3</td> </tr> </tbody> </table>	Step	Temperature (°C)	Period (minutes)	1	-40±3	30±3	2	Room temperature	5±3	3	125±2	30±3	4	Room temperature	5±3	$ \Delta V_{1mA} / V_{1mA} \leq \pm 5\%$ No visible damage
Step	Temperature (°C)	Period (minutes)																
1	-40±3	30±3																
2	Room temperature	5±3																
3	125±2	30±3																
4	Room temperature	5±3																
High Temp. Load	MIL-STD-202 Method 108	125°C, 1000±24 hrs at V_{rms} (Max. Continuous Voltage)	$ \Delta V_{1mA} / V_{1mA} \leq \pm 10\%$ No visible damage															
Voltage Proof	IEC 61051-1	Metal balls method, 2500 V _{ac} 1 min	No visible damage															
Varistor Voltage Temp. Coefficient	Specification Standard	Varistor voltage is measured at -40°C, +125°C, and +25°C	$-0.05 \leq T_C \leq 0.05$ (%/°C)															

Metal Oxide Varistor: TVR-U Series

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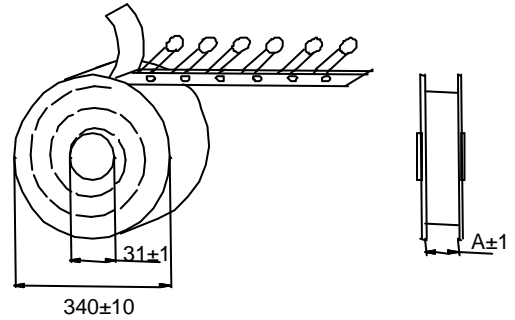
Quantity

Bulk Packing

Series	Quantity (pcs/bag)
TVR10-U (201~751)	200
TVR10-U (781~112) TVR14-U (241~112)	100

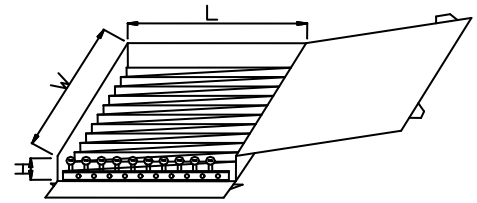
Reel Packing

Series	A (mm)	Quantity (pcs/reel)
TVR10-U (201~391)	55	1,000
TVR10-U (431~561)		600
TVR10-U (621~112)		500
TVR14-U (241~331)		750
TVR14-U (361~112)		500



Ammo Packing

Series	Quantity (pcs/reel) P0=12.7mm	Quantity (pcs/reel) P0=15mm
TVR10-U (201~361)	700	850
TVR10-U (391~621)	550	750
TVR10-U (681~112)	400	650
TVR14-U (241~271)	650	550
TVR14-U (301~561)	450	400
TVR14-U (621~112)	350	300



(Unit: mm)

Series	W±5	L±5	H±5
TVR10-U & TVR14-U	275	345	55

Warehouse Storage Conditions of Products

Storage Conditions:

1. Storage Temperature: -10°C ~+40°C
2. Relative Humidity: ≤ 75%RH
3. Keep away from corrosive atmosphere and sunlight.

Period of Storage: 1 year