

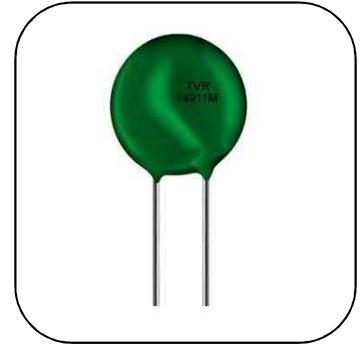
Metal Oxide Varistor: TVR-M Series

Dip Type Varistor for Automotive Applications (High Voltage Series)



■ Feature

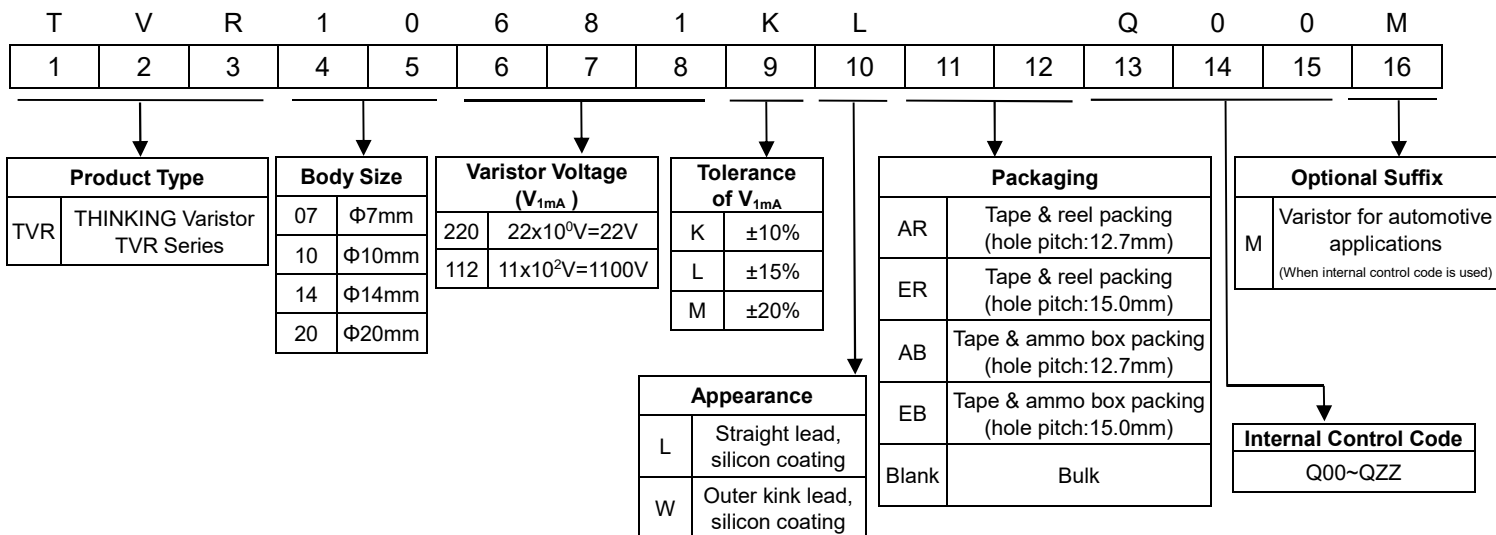
1. Designed for automotive on-board devices which might be connected to line voltage systems
2. Working Voltage: 130Vac to 680Vac
3. Superior resistance to cyclic temperature, high temperature, and high humidity stress
4. High operating temperature range up to 125 °C
5. Agency approval: UL, VDE, TUV, and CQC
6. AEC-Q 200 qualified



■ Recommended Applications

1. On board charger
2. Automotive DC-DC converter
3. Industrial power supply
4. PV Inverter

■ Part Number Code



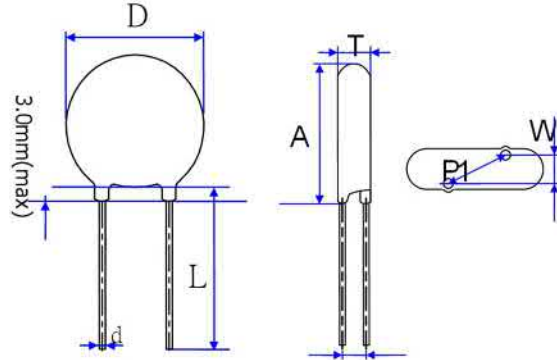
Metal Oxide Varistor: TVR-M Series

Dip Type Varistor for Automotive Applications (High Voltage Series)



■ Structure & Dimensions

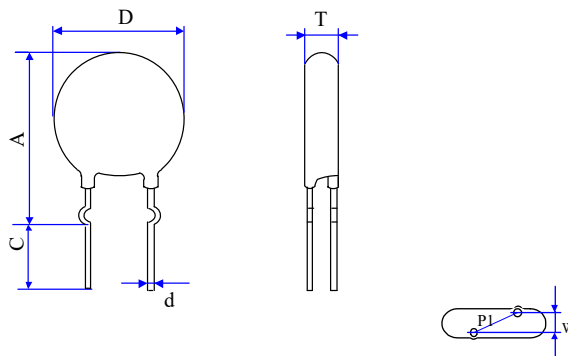
● L Type (Straight Lead)



(Unit: mm)

Series	D	A	Lmin	$\Phi d \pm 0.02$	$P1 \pm 1.0$	T & W
TVR07-M	7.5~9.6 (for TVR07201~751-M)	11.0 (for TVR07201~621-M) 11.5 (for TVR07681~751-M)	26.5	0.6	5.0	Please refer to Electrical Characteristics Table
TVR10-M	11~14.4 (for TVR10201~751-M) Dmax: 14.4 (for TVR10781~112-M)	15.0 (for TVR10201~112-M)	26.5	0.8	7.5	
TVR14-M	14.4~18.0 (for TVR14201~751-M) Dmax: 18.0 (for TVR14781~12-M)	18.5 (for TVR14201~511-M) 19.0 (for TVR14561~112-M)	26.5	0.8	7.5	
TVR20-M	20.0~24.0 (for TVR20201~751-M) Dmax: 24.0 (for TVR20781~112-M)	25.5 (for TVR20201~511-M) 26.0 (for TVR20561~112-M)	22.5	1.0	10	

● W Type (Outer Kink Lead)



(Unit: mm)

Series	D	Amax.	Cmin	$d \pm 0.02$	$P1 \pm 1.0$	T & W
TVR10-M	11~14.4 (for TVR10201~751-M) Dmax: 14.4 (for TVR10781~112-M)	20.0	20.0	0.8	7.5	Please refer to Electrical Characteristics Table
TVR14-M	14.4~18.0 (for TVR14201~751-M) Dmax: 18.0 (TVR14781~112-M)	22.5	20.0	0.8	7.5	

Note: Size of C is customized, and tolerance of cut lead product is ± 0.5 (Please refer to minimal size in the chart above if customers do not request). Popular minimal size of cut lead products is 3.5 ± 0.5 mm.

Metal Oxide Varistor: TVR-M Series

Dip Type Varistor for Automotive Applications (High Voltage Series)



Electrical Characteristics

7mm Series

Part No.	Varistor Voltage (@ 1mA DC)	Max. Continuous Voltage		Max. Clamping Voltage (8/20 μ s)		Max. Surge Current (8/20 μ s)	Reference Capacitance @1KHZ	Rated Power	Max. Energy (10/1000 μ s)	Dimension		
	V _{1mA}	V _{ac}	V _{dc}	V _P	I _P	I _{max}	C _p	P	W _{max}	T _{min}	T _{max}	W \pm 1
	(V)	(V)	(V)	(V)	(A)	(A)	(PF)	(W)	(J)	(mm)		
TVR07201-M	200 \pm 10%	130	170	340	10	1750	140	0.25	17.5	3.2	4.6	1.5
TVR07221-M	220 \pm 10%	140	180	360	10	1750	130	0.25	19	3.28	4.8	1.5
TVR07241-M	240 \pm 10%	150	200	395	10	1750	120	0.25	21	3.44	4.9	1.6
TVR07271-M	270 \pm 10%	175	225	455	10	1750	110	0.25	24	3.52	5	1.7
TVR07301-M	300 \pm 10%	195	250	500	10	1750	105	0.25	26	3.6	5.1	1.9
TVR07331-M	330 \pm 10%	215	275	550	10	1750	100	0.25	28	3.76	5.3	2.0
TVR07361-M	360 \pm 10%	230	300	595	10	1750	95	0.25	32	3.92	5.5	2.1
TVR07391-M	390 \pm 10%	250	320	650	10	1750	85	0.25	35	4	6	2.3
TVR07431-M	430 \pm 10%	275	350	710	10	1750	80	0.25	40	4.16	6.19	2.3
TVR07471-M	470 \pm 10%	300	385	775	10	1750	70	0.25	42	4.24	6.36	2.4
TVR07511-M	510 \pm 10%	320	410	845	10	1750	65	0.25	45	4.4	6.56	2.6
TVR07561-M	560 \pm 10%	350	450	930	10	1750	60	0.25	45.5	4.56	6.8	2.8
TVR07621-M	620 \pm 10%	395	510	1020	10	1750	55	0.25	50	4.88	7.2	3.0
TVR07681-M	680 \pm 10%	420	560	1120	10	1750	50	0.25	50.5	5.04	7.4	3.2
TVR07751-M	750 \pm 10%	465	615	1235	10	1750	45	0.25	51	5.2	7.67	3.5

Metal Oxide Varistor: TVR-M Series

Dip Type Varistor for Automotive Applications (High Voltage Series)



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}	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-M	200±10%	130	170	340	25	3500	0.4	35	3.6	5	1.7
TVR10221-M	220±10%	140	180	360	25	3500	0.4	39	3.68	5.1	1.7
TVR10241-M	240±10%	150	200	395	25	3500	0.4	42	3.84	5.3	1.8
TVR10271-M	270±10%	175	225	455	25	3500	0.4	49	3.92	5.4	1.9
TVR10301-M	300±10%	195	250	500	25	3500	0.4	53	4	5.5	2.1
TVR10331-M	330±10%	215	275	550	25	3500	0.4	58	4.16	5.7	2.2
TVR10361-M	360±10%	230	300	595	25	3500	0.4	65	4.24	5.9	2.3
TVR10391-M	390±10%	250	320	650	25	3500	0.4	70	4.32	6.4	2.5
TVR10431-M	430±10%	275	350	710	25	3500	0.4	80	4.4	6.59	2.5
TVR10471-M	470±10%	300	385	775	25	3500	0.4	85	4.64	6.76	2.6
TVR10511-M	510±10%	320	410	845	25	3500	0.4	92	4.88	7	2.8
TVR10561-M	560±10%	350	450	930	25	3500	0.4	92	4.96	7.2	3.0
TVR10621-M	620±10%	395	510	1020	25	3500	0.4	92	5.20	7.6	3.2
TVR10681-M	680±10%	420	560	1120	25	3500	0.4	92	5.28	7.8	3.4
TVR10751-M	750±10%	465	615	1235	25	3500	0.4	100	5.44	8.07	3.7
TVR10781-M	780±10%	485	640	1300	25	3500	0.4	100	5.45	9.40	3.7
TVR10821-M	820±10%	510	670	1355	25	3500	0.4	110	5.50	9.80	3.8
TVR10911-M	910±10%	550	745	1500	25	3500	0.4	130	5.60	10.50	3.9
TVR10102-M	1000±10%	625	825	1650	25	3500	0.4	140	5.70	11.00	4.0
TVR10112-M	1100±10%	680	895	1815	25	3500	0.4	150	5.80	11.50	4.3

Metal Oxide Varistor: TVR-M Series

Dip Type Varistor for Automotive Applications (High Voltage 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}	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)		
TVR14201-M	200±10%	130	170	340	50	6000	0.6	70	3.6	5	1.7
TVR14221-M	220±10%	140	180	360	50	6000	0.6	78	3.68	5.1	1.7
TVR14241-M	240±10%	150	200	395	50	6000	0.6	84	3.84	5.3	1.8
TVR14271-M	270±10%	175	225	455	50	6000	0.6	99	3.92	5.4	1.9
TVR14301-M	300±10%	195	250	500	50	6000	0.6	105	4	5.5	2.1
TVR14331-M	330±10%	215	275	550	50	6000	0.6	115	4.16	5.7	2.2
TVR14361-M	360±10%	230	300	595	50	6000	0.6	130	4.24	5.9	2.3
TVR14391-M	390±10%	250	320	650	50	6000	0.6	140	4.32	6.4	2.5
TVR14431-M	430±10%	275	350	710	50	6000	0.6	155	4.4	6.59	2.5
TVR14471-M	470±10%	300	385	775	50	6000	0.6	175	4.64	6.76	2.6
TVR14511-M	510±10%	320	410	845	50	6000	0.6	190	4.88	7	2.8
TVR14561-M	560±10%	350	450	930	50	6000	0.6	190	4.96	7.2	3.0
TVR14621-M	620±10%	395	510	1020	50	6000	0.6	190	5.12	7.6	3.2
TVR14681-M	680±10%	420	560	1120	50	6000	0.6	190	5.28	7.8	3.4
TVR14751-M	750±10%	465	615	1235	50	6000	0.6	210	5.44	8.07	3.7
TVR14781-M	780±10%	485	640	1300	50	6000	0.6	230	5.45	9.40	3.7
TVR14821-M	820±10%	510	670	1355	50	6000	0.6	280	5.50	9.80	3.8
TVR14911-M	910±10%	550	745	1500	50	6000	0.6	308	5.60	10.50	3.9
TVR14102-M	1000±10%	625	825	1650	50	6000	0.6	336	5.70	11.00	4.0
TVR14112-M	1100±10%	680	895	1815	50	6000	0.6	364	5.80	11.50	4.3

Metal Oxide Varistor: TVR-M Series

Dip Type Varistor for Automotive Applications (High Voltage Series)



20mm 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}	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)		
TVR20201-M	200±10%	130	170	340	100	10000	1.0	140	3.84	5.4	1.9
TVR20221-M	220±10%	140	180	360	100	10000	1.0	155	3.92	5.5	1.9
TVR20241-M	240±10%	150	200	395	100	10000	1.0	168	4.08	5.7	2.0
TVR20271-M	270±10%	175	225	455	100	10000	1.0	190	4.16	5.8	2.1
TVR20301-M	300±10%	195	250	500	100	10000	1.0	210	4.24	5.9	2.3
TVR20331-M	330±10%	215	275	550	100	10000	1.0	228	4.32	6.1	2.4
TVR20361-M	360±10%	230	300	595	100	10000	1.0	255	4.4	6.3	2.5
TVR20391-M	390±10%	250	320	650	100	10000	1.0	275	4.48	6.72	2.7
TVR20431-M	430±10%	275	350	710	100	10000	1.0	303	4.56	6.84	2.7
TVR20471-M	470±10%	300	385	775	100	10000	1.0	350	4.88	7.2	2.8
TVR20511-M	510±10%	320	410	845	100	10000	1.0	382	5.12	7.4	3.0
TVR20561-M	560±10%	350	450	930	100	10000	1.0	382	5.2	7.6	3.2
TVR20621-M	620±10%	395	510	1020	100	10000	1.0	382	5.36	8	3.4
TVR20681-M	680±10%	420	560	1120	100	10000	1.0	382	5.52	8.2	3.6
TVR20751-M	750±10%	465	615	1235	100	10000	1.0	420	5.68	8.47	3.9
TVR20781-M	780±10%	485	640	1300	100	10000	1.0	430	5.85	9.80	3.9
TVR20821-M	820±10%	510	670	1355	100	10000	1.0	436	5.90	10.20	4.0
TVR20911-M	910±10%	550	745	1500	100	10000	1.0	452	6.00	10.90	4.1
TVR20102-M	1000±10%	625	825	1650	100	10000	1.0	494	6.10	11.40	4.2
TVR20112-M	1100±10%	680	895	1815	100	10000	1.0	548	6.20	11.90	4.5

Metal Oxide Varistor: TVR-M Series

Dip Type Varistor for Automotive Applications (High Voltage Series)



Agency Approval

Certified Model No.	Agency		
			
	UL1449 5 th & cUL	DIN/ EN/ IEC 61051-1 DIN/ EN/ IEC 61051-2 IEC 61051-2-2	GB/T10193-1997 GB/T10194-1997
	E314979	40036061	TVR07-M CQC15001128790 CQC15001128788 TVR10-M CQC13001090356 CQC13001090357
TVR07201-M	√	√	√
TVR07221-M	√	√	√
TVR07241-M	√	√	√
TVR07271-M	√	√	√
TVR07301-M	√	√	√
TVR07331-M	√	√	√
TVR07361-M	√	√	√
TVR07391-M	√	√	√
TVR07431-M	√	√	√
TVR07471-M	√	√	√
TVR07511-M	√	√	√
TVR07561-M	√	√	√
TVR07621-M	√	√	√
TVR07681-M	√	√	√
TVR07751-M	√	√	√
TVR10201-M	√	√	√
TVR10221-M	√	√	√
TVR10241-M	√	√	√
TVR10271-M	√	√	√
TVR10301-M	√	√	√
TVR10331-M	√	√	√
TVR10361-M	√	√	√
TVR10391-M	√	√	√
TVR10431-M	√	√	√
TVR10471-M	√	√	√
TVR10511-M	√	√	√
TVR10561-M	√	√	√
TVR10621-M	√	√	√
TVR10681-M	√	√	√
TVR10751-M	√	√	√
TVR10781-M	√		
TVR10821-M	√		
TVR10911-M	√		
TVR10102-M	√		
TVR10112-M	√		

Metal Oxide Varistor: TVR-M Series

Dip Type Varistor for Automotive Applications (High Voltage Series)



Agency Approval

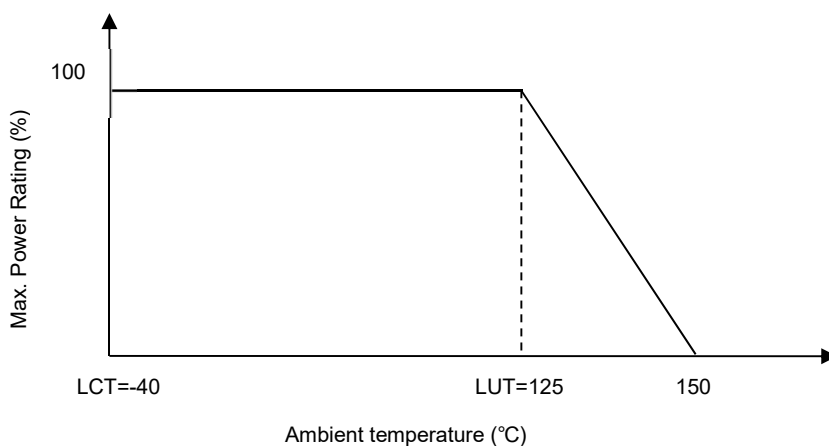
Certified Model No.	Agency				
	UL1449 5 th & cUL	EN/IEC 61051-1, IEC 61051-2, IEC 61051-2-2	IEC 60950-1 Annex Q IEC 62368-1 Annex G.8.1 IEC 62368-1 Annex G.8.2	DIN/ EN/ IEC 61051-1 DIN/ EN/ IEC 61051-2 IEC 61051-2-2	GB/T10193-1997 GB/T10194-1997
E314979	J 50259116 J 50405420		40036061	TVR14-M CQC15001128796 CQC15001128834 TVR20-M CQC15001128792 CQC15001128793	
TVR14201-M	√	√		√	√
TVR14221-M	√	√		√	√
TVR14241-M	√	√		√	√
TVR14271-M	√	√		√	√
TVR14301-M	√	√		√	√
TVR14331-M	√	√		√	√
TVR14361-M	√	√		√	√
TVR14391-M	√	√		√	√
TVR14431-M	√	√	√	√	√
TVR14471-M	√	√	√	√	√
TVR14511-M	√	√	√	√	√
TVR14561-M	√	√	√	√	√
TVR14621-M	√	√	√	√	√
TVR14681-M	√	√	√	√	√
TVR14751-M	√	√	√	√	√
TVR14781-M	√				
TVR14821-M	√	√	√		
TVR14911-M	√	√	√		
TVR14102-M	√	√	√		
TVR14112-M	√	√	√		
TVR20201-M	√		√	√	√
TVR20221-M	√		√	√	√
TVR20241-M	√		√	√	√
TVR20271-M	√		√	√	√
TVR20301-M	√		√	√	√
TVR20331-M	√		√	√	√
TVR20361-M	√		√	√	√
TVR20391-M	√		√	√	√
TVR20431-M	√		√	√	√
TVR20471-M	√		√	√	√
TVR20511-M	√		√	√	√
TVR20561-M	√		√	√	√
TVR20621-M	√		√	√	√
TVR20681-M	√		√	√	√
TVR20751-M	√		√	√	√
TVR20781-M	√				
TVR20821-M	√		√		
TVR20911-M	√		√		
TVR20102-M	√		√		
TVR20112-M	√		√		

Metal Oxide Varistor: TVR-M Series

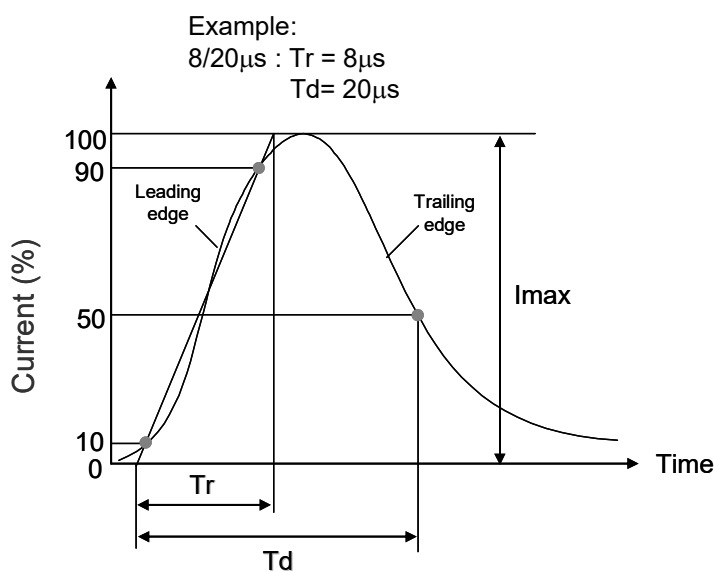
Dip Type Varistor for Automotive Applications (High Voltage Series)



Power Derating Curve



Surge Current Standard Waveform



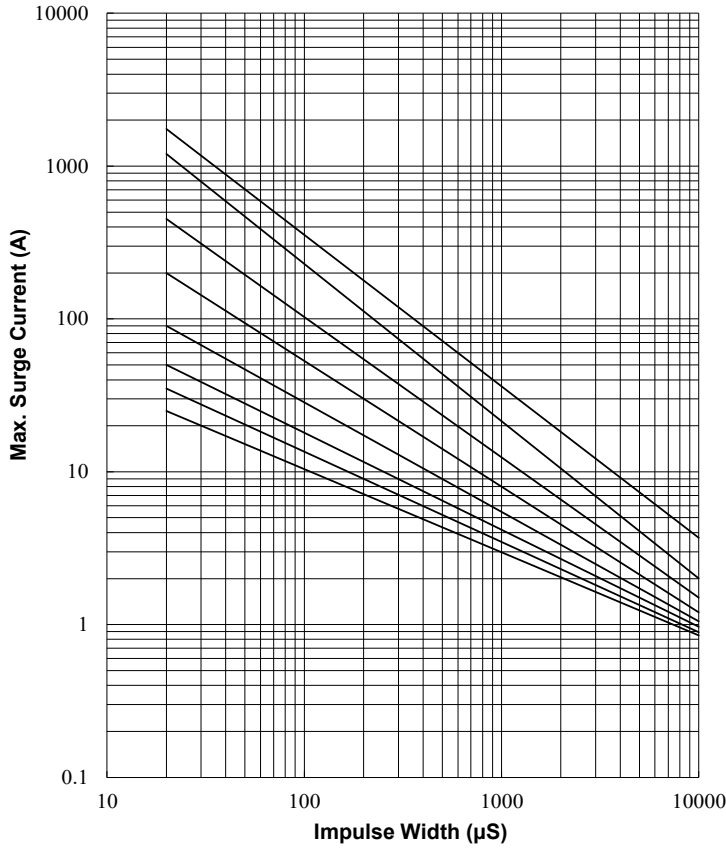
Metal Oxide Varistor: TVR-M Series

Dip Type Varistor for Automotive Applications (High Voltage Series)

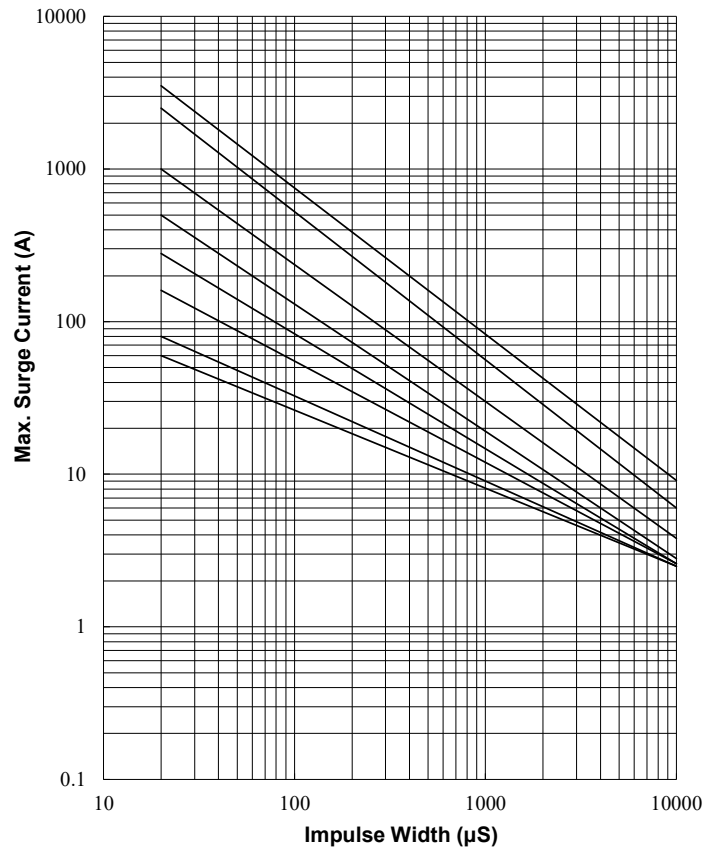


Max. Surge Current Derating Curves

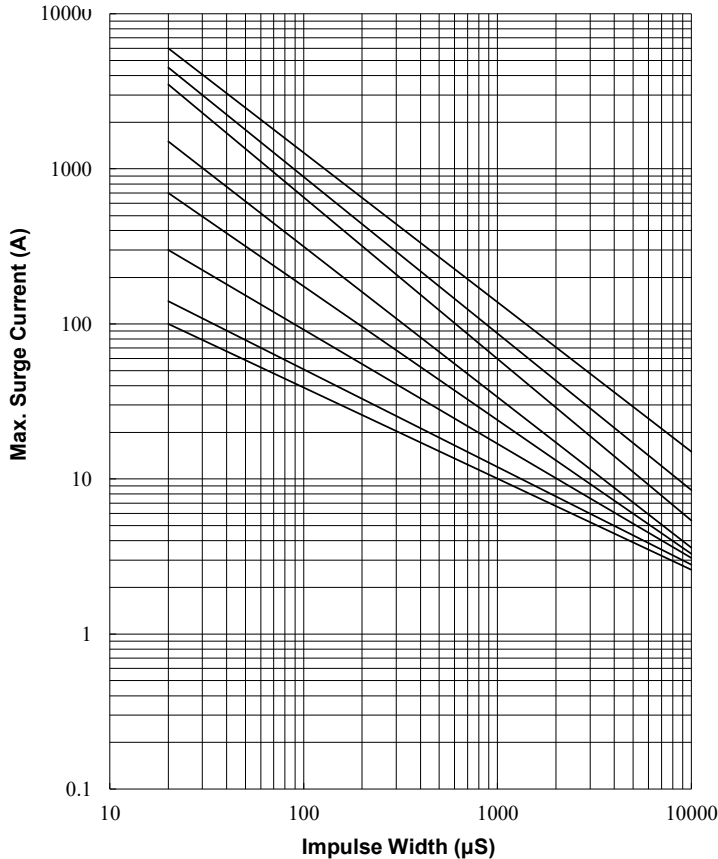
TVR07201M to TVR07751M



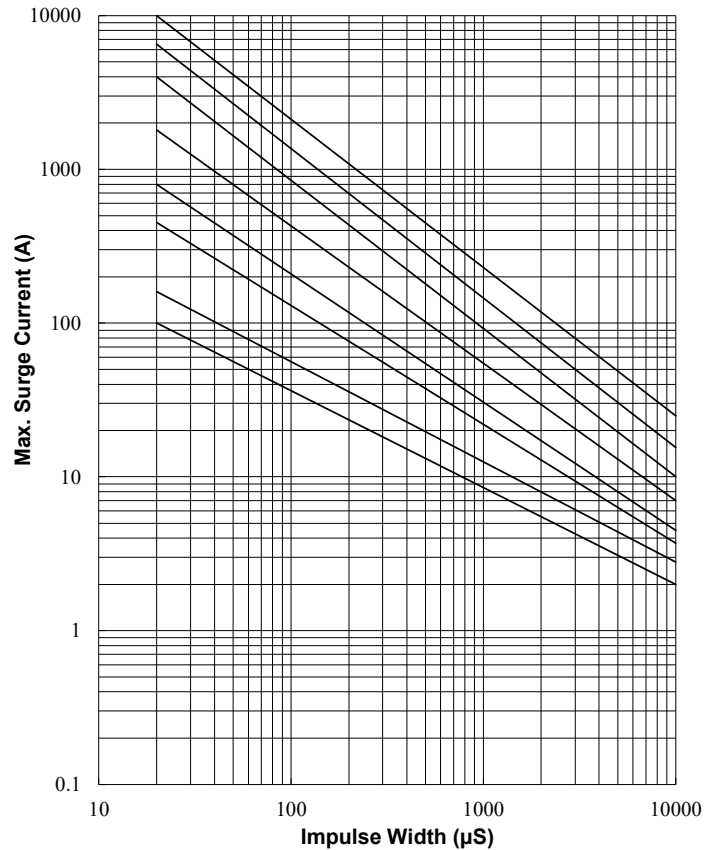
TVR10201M to TVR10112M



TVR14201M to TVR14112M



TVR20201M to TVR20112M



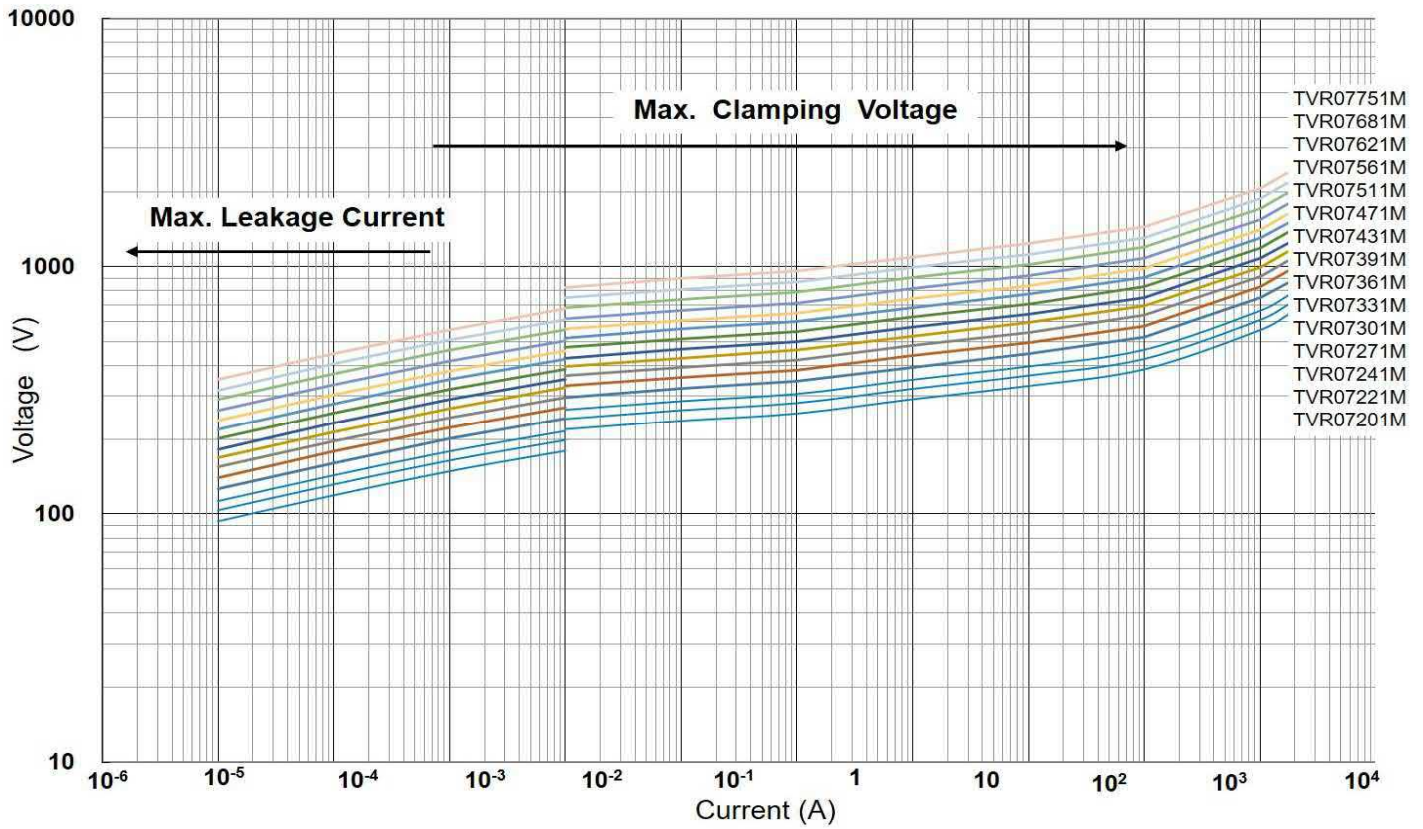
Metal Oxide Varistor: TVR-M Series

Dip Type Varistor for Automotive Applications (High Voltage Series)

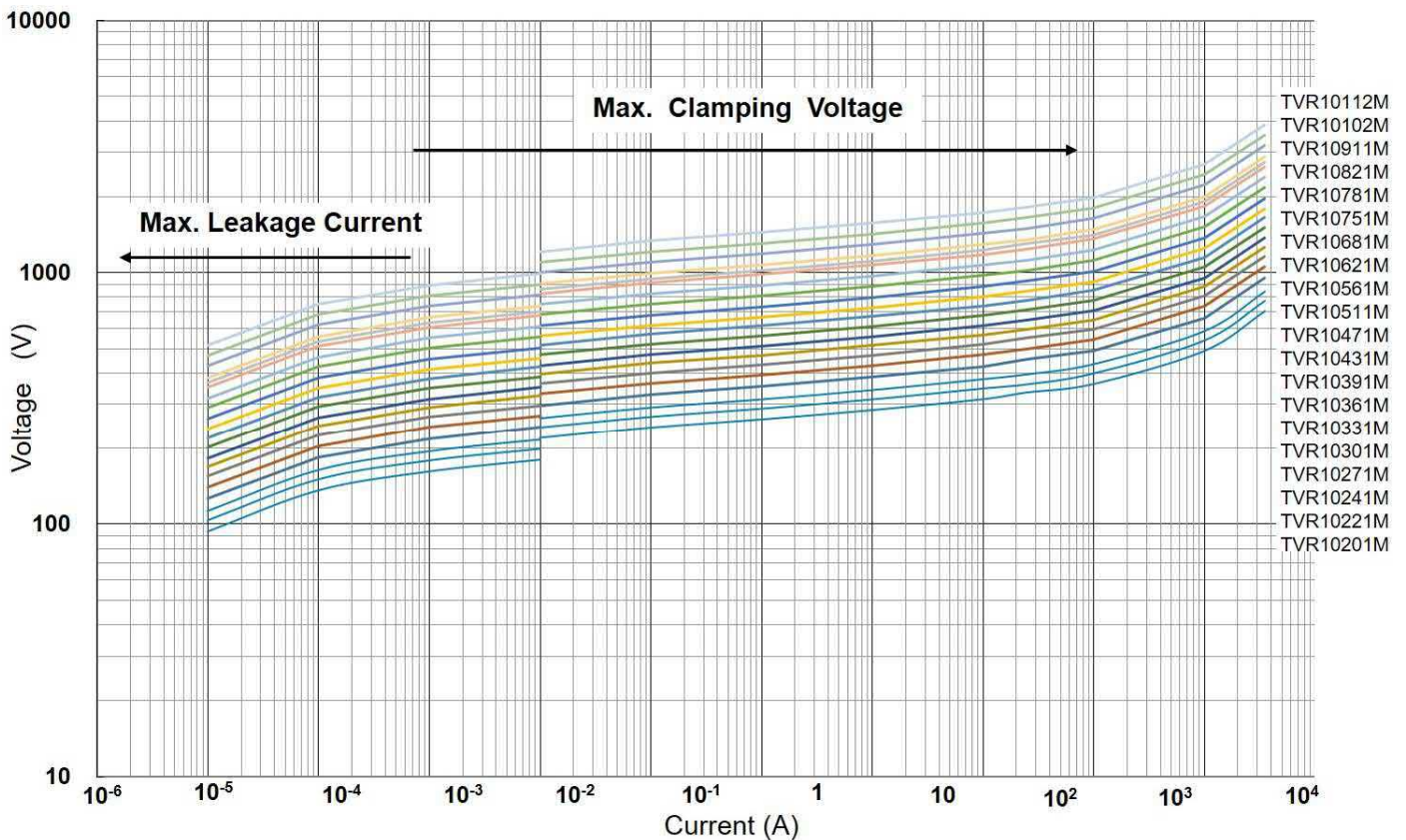


Max. Leakage Current and Max. Clamping Voltage Curves

Max. Leakage Current and Max. Clamping Voltage Curves (TVR107201M to TVR7751M)



Max. Leakage Current and Max. Clamping Voltage Curves (TVR10201M to TVR10112M)

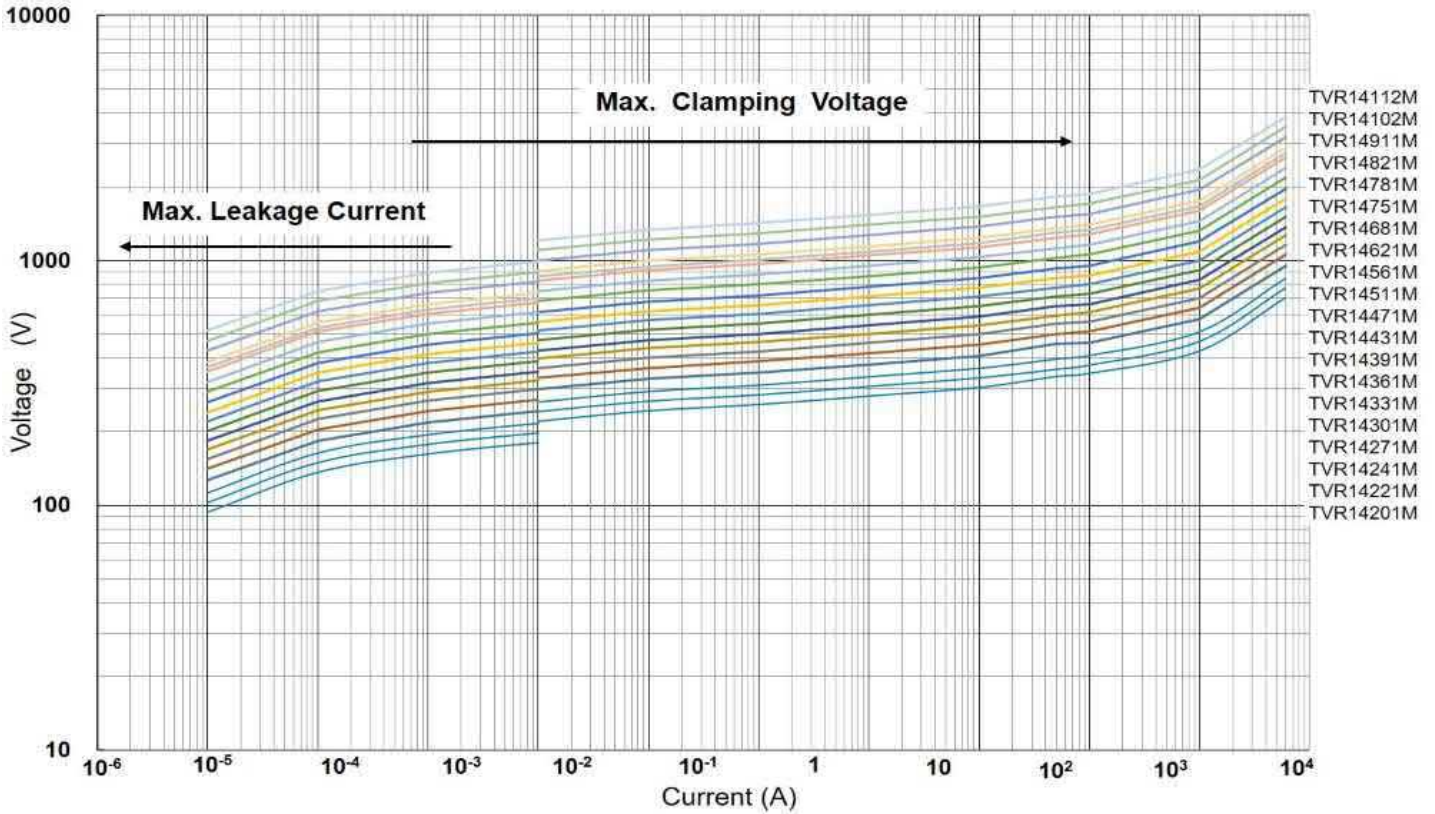


Metal Oxide Varistor: TVR-M Series

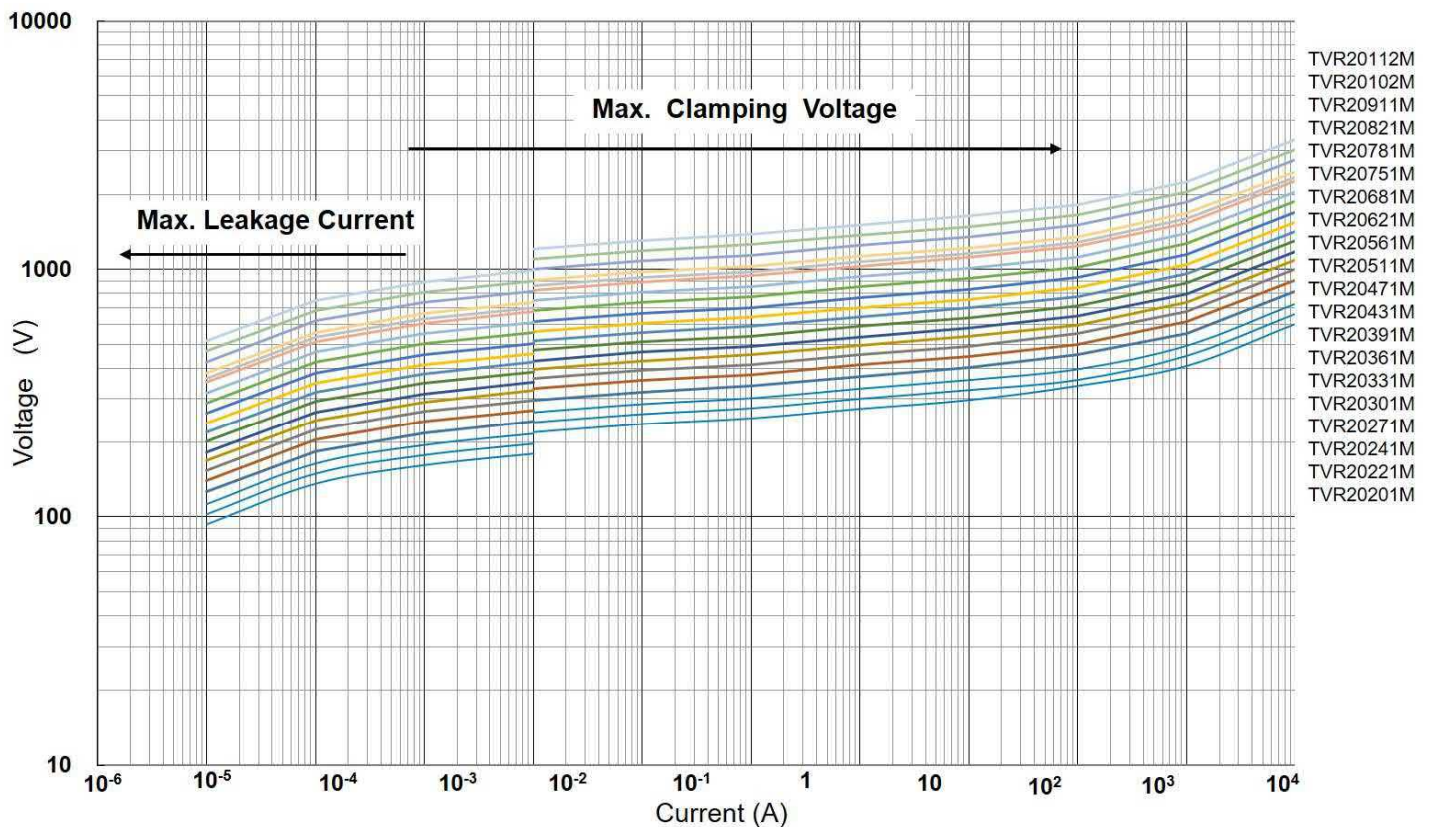
Dip Type Varistor for Automotive Applications (High Voltage Series)



Max. Leakage Current and Max. Clamping Voltage Curves (TVR14201M to TVR14112M)



Max. Leakage Current and Max. Clamping Voltage Curves (TVR20201M to TVR20112M)



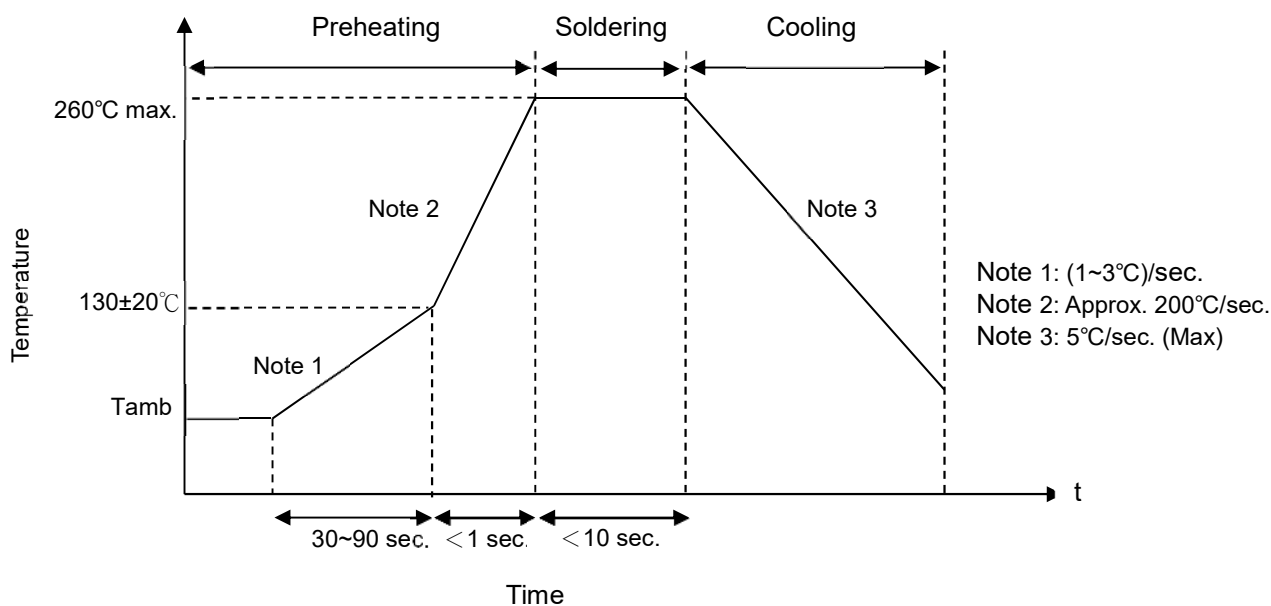
Metal Oxide Varistor: TVR-M Series

Dip Type Varistor for Automotive Applications (High Voltage 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	2 mm (min.)

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■ Reliability (based on AEC-Q200 Rev-D)

Item	Standard	Test conditions / Methods	Specifications
Varistor voltage	Specification Standard	The voltage between two terminals with the specified measuring current applied is called V_v	To meet the specified value
Clamping voltage	Specification Standard	The maximum voltage between two terminals with the specified standard impulse current (8/20 μ s) applied	To meet the specified value
High Temperature Exposure (Storage)	MIL-STD-202 Method 108	Test temp.: 150 +3/-0°C Duration: 1000 h Unpowered Measurement at 24±2 hours after test conclusion.	No visible damage $\Delta V_{1mA}/V_{1mA}$ ≤ 10% $\Delta V_{clamp}/V_{clamp}$ ≤ 10%
Resistance to Soldering Heat	MIL-STD-202 Method 210	No pre-heat of samples. Temperature 260 ±5°C, Time 10 ±1 s Immersion and emersion rate 25mm/s ±6 mm/s Number of heat cycles 1	No visible damage $\Delta V_{1mA}/V_{1mA}$ ≤ 10% $\Delta V_{clamp}/V_{clamp}$ ≤ 10%
Vibration	MIL-STD-202 Method 204	Acceleration 5 g's Sweep time: 20 min Frequency range: 10 to 2000 Hz 3×12 cycles	No visible damage $\Delta V_{1mA}/V_{1mA}$ ≤ 10% $\Delta V_{clamp}/V_{clamp}$ ≤ 10%
Solderability	J-STD-002	Steam aging 8hr@93±3°C, 245±5°C 5 +0/-0.5sec	At least 95% of terminal electrode is covered by new solder
Terminal Strength	MIL-STD-202 Method 211	1. Pull test (2.27 kg) 2. Wire-lead bend test (227 g) Duration of the applied forces: 10 ±1sec	No visible damage $\Delta V_{1mA}/V_{1mA}$ ≤ 10% $\Delta V_{clamp}/V_{clamp}$ ≤ 10%
Biased Humidity	MIL-STD-202 Method 103	Test temp.: 125°C Rel. humidity of air: 85% Duration: 1000 h Test Power Bias at 85%(+5%/-0%) of rated varistor voltage=230Vdc Measurement at 24±2 hours after test conclusion	No visible damage $\Delta V_{1mA}/V_{1mA}$ ≤ 10% $\Delta V_{clamp}/V_{clamp}$ ≤ 10%
Operational Life	MIL-STD-202 Method 108	Test temp.: 125 +3/-0°C Duration: 1000 h Test Power: Bias at 85%(+5%/-0%) of rated Varistor voltage	No visible damage $\Delta V_{1mA}/V_{1mA}$ ≤ 10% $\Delta V_{clamp}/V_{clamp}$ ≤ 10%
Temperature Cycling	JESD22 Method JA-104	Lower test temp. : -40 +0/-10°C Upper test temp. : 125 +15/-0°C Soak time at lower or upper temp. : 15 min Transfer time: 5 mins Cycle time: 2 Cycles/hr Number of cycles: 1000 Measurement at 24±2 hours after test conclusion.	No visible damage $\Delta V_{1mA}/V_{1mA}$ ≤ 10% $\Delta V_{clamp}/V_{clamp}$ ≤ 10%
Mechanical Shock	MIL-STD-202, Method 213	Peak value 100g's Half sine Waveform Normal duration (D): 6ms In 3 directions perpendicularly intersecting each other (total 18 times)	No visible damage $\Delta V_{1mA}/V_{1mA}$ ≤ 10% $\Delta V_{clamp}/V_{clamp}$ ≤ 10%
Resistance to solvents	MIL-STD-202 Method 215	Add aqueous wash chemical- OKEM Clean or equivalent. Do not use banned solvents	No visible damage
Thermal Shock	Specification Standard	Lower test temp. : -55 +0/-3°C Upper test temp. : 125 +3/-0°C Maximum transfer time: 20 seconds. Dwell time: 15 minutes. Air-Air. Number of cycles: 300	No visible damage $\Delta V_{1mA}/V_{1mA}$ ≤ 10% $\Delta V_{clamp}/V_{clamp}$ ≤ 10%
8/20 μ s Surge Current Derating	IEC 61051-1	8/20 μ s waveform, 10 surge currents, unipolar, interval 30 secs	$\Delta V_{1mA}/V_{1mA}$ ≤ 10% No visible damage

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Package

Taping Specification

S Type (Straight Lead)

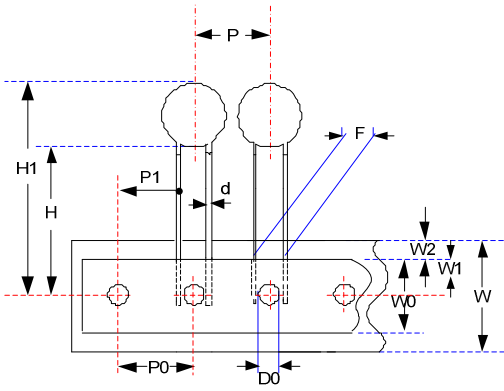


Figure A

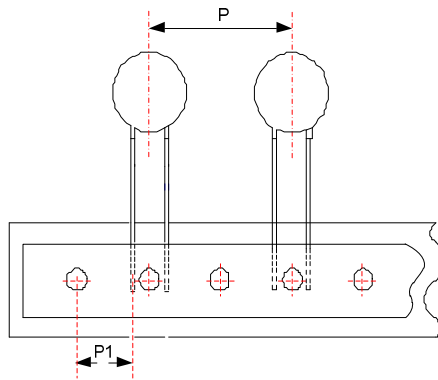


Figure B

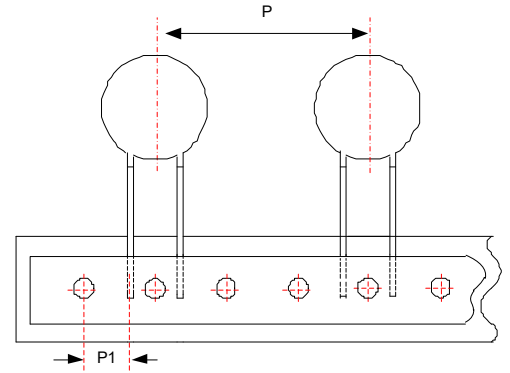


Figure C

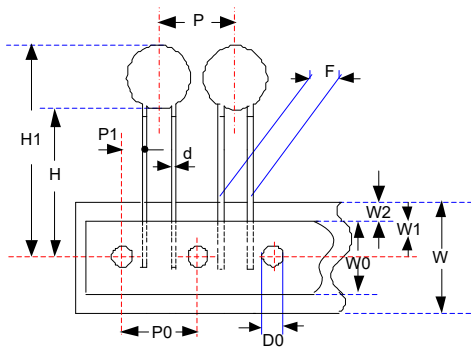


Figure D

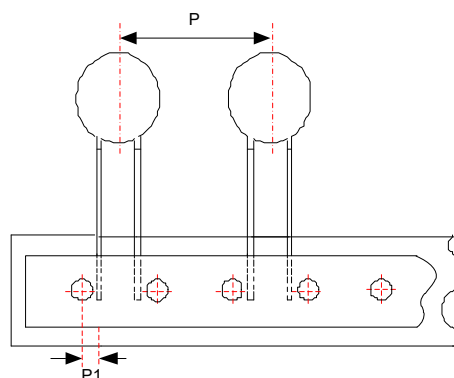
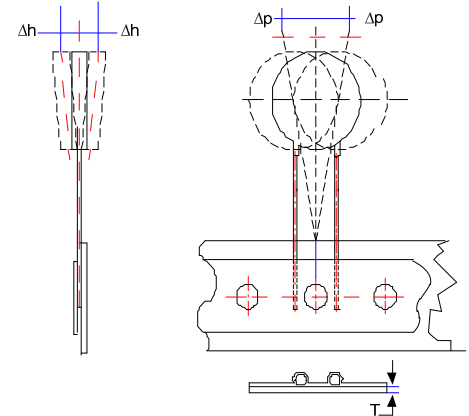


Figure E



(Unit: mm)

Taping Code	Body Size	P ₀	F	P	P ₁	H	H ₁	d	W ₀	W ₁	W ₂	W	Δ P	Δ h	D ₀	T	Figure
		±0.3	±1	±1	±1	+2/-0	Max.	±0.02	±1	+0.75/-0.5	Max	+1/-0.5	Max.	Max.	±0.2	±0.2	
A (P ₀ :12.7)	07-M	12.7	5.0	12.7	3.55	18	31	0.6	12	9	3	18	1	2	4	0.6	D
	10-M	12.7	7.5	12.7	8.55	18	33.5	0.8	12	9	3	18	1	2	4	0.6	A
	14-M	12.7	7.5	25.4	8.55	18	38	0.8	12	9	3	18	1	2	4	0.6	B
	20-M	12.7	10.0	38.1	7.20	18	40.5	1.0	12	9	3	18	1	2	4	0.6	C
E (P ₀ :15.0)	07-M	15	5.0	15.0	4.70	18	31	0.6	12	9	3	18	1	2	4	0.6	D
	10-M	15	7.5	15.0	3.35	18	33.5	0.8	12	9	3	18	1	2	4	0.6	D
	14-M	15	7.5	30.0	3.35	18	38	0.8	12	9	3	18	1	2	4	0.6	E
	20-M	15	10.0	30.0	9.50	18	40.5	1.0	12	9	3	18	1	2	4	0.6	B

Metal Oxide Varistor: TVR-M Series

Dip Type Varistor for Automotive Applications (High Voltage Series)



Quantity

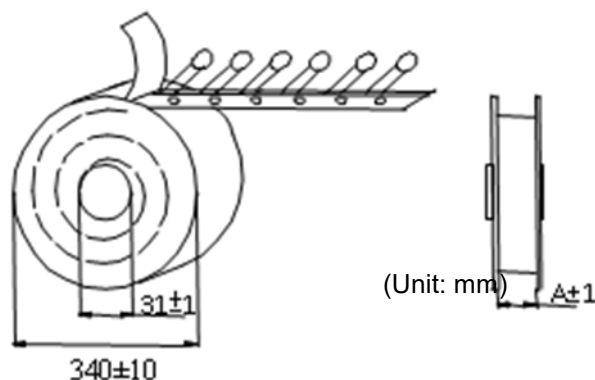
Bulk Packing

Series	Quantity of Straight Lead Type (pcs/bag)	Quantity of Cut Lead Type (pcs/bag)	Quantity of Kink Lead Type (pcs/bag)
TVR07-M	250	250	200
TVR10(201~751)-M	200	200	200
TVR10(821~112)-M	100	100	100
TVR14(201~112)-M	100	100	100
TVR20-M	Box Packing: 201~471: 600pcs 511~621: 525pcs 681~821: 450pcs 911~112: 400pcs	50	50

Reel Packing

First Reel Packing

Series	A (mm)	Quantity (pcs/reel)
TVR07(201~361)-M	46	1,500
TVR07(391)-M		1,200
TVR07(431~751)-M		1,000
TVR10(201~471)-M	55	750
TVR10(511~112)-M		500
TVR14(201~391)-M		750
TVR14(431~112)-M		500
TVR20(201~221)-M		500
TVR20(241~431)-M		400
TVR20(471~681)-M		250
TVR20(751~112)-M		200



Second Reel Packing

Series	A (mm)	Quantity (pcs/reel)	
		P0=12.7mm	P0=15mm
TVR07(201~361)-M	46	1,500	1,500
TVR07(391)-M		1,200	1,200
TVR07(431~751)-M		1,000	1,000
TVR10(201~431)-M		1,000	1,000
TVR10(471)-M		1,000	850
TVR10(511~821)-M		750	750
TVR10(911~112)-M	500	500	
TVR14(201~391)-M	55	750	750
TVR14(431~112)-M		500	500
TVR20(201~221)-M		500	500
TVR20(241~431)-M		400	400
TVR20(471~681)-M		250	250
TVR20(751~112)-M		200	200

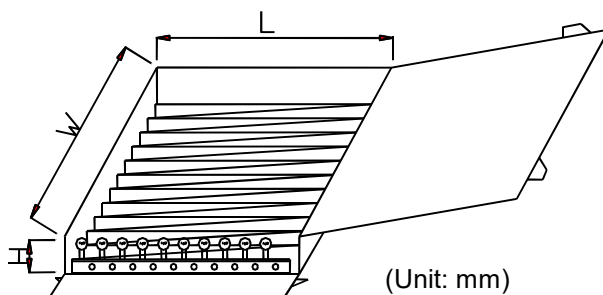
Ammo Packing

Metal Oxide Varistor: TVR-M Series

Dip Type Varistor for Automotive Applications (High Voltage Series)



Series	Quantity (pcs/box) P0=12.7mm	Quantity (pcs/box) P0=15.0mm
TVR07(201~361)-M	1,200	1,100
TVR07(391~751)-M	1,000	1,000
TVR10(201~361)-M	900	800
TVR10(391~561)-M	800	700
TVR10(621~751)-M	650	500
TVR10(781~112)-M	500	400
TVR14(201~271)-M	500	450
TVR14(301~561)-M	450	350
TVR14(621~821)-M	300	300
TVR14(911~112)-M	250	250
TVR20(201~271)-M	350	300
TVR20(301~751)-M	250	250
TVR20(781~112)-M	200	200



Series	W±5	L±5	H±5
TVR05 ~ TVR20-M	345	275	55

■ 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. Thermistors must be kept away from sunlight and stored in a non-corrosive atmosphere.
- Period of Storage: 1 year