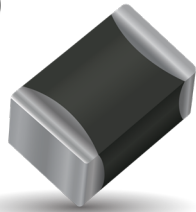


High Temp. Automotive VT Series

+150°C and 175°C Rated Varistors



GENERAL DESCRIPTION

High Temperature 150/175°C Multi-Layer Varistors are designed for underhood and other high temperature automotive or industrial applications. Parts are AEC-Q200 qualified.

They offer bi-directional overvoltage protection as well as EMI/RFI attenuation in a single SMT package. This allows designers the ability to combine the circuit protection and EMI/RFI attenuation function into a single highly reliable device.

Products have been tested, qualified, and specified to 150/175°C and they do not require any derating over specified operating temperature range.

The 48V System varistors, included in the VT Series, are designed and tested for use in motor vehicles with a 48-volt power supply. The VTAXXXX56 parts are tested against VDA-320. VDA-320 defines requirements, test conditions, and tests performed on electric, electronic and mechatronic components and systems for use in motor vehicles with a 48V on-board power supply.

GENERAL PARAMETERS

- Operating Temp.:
 - VTA3: -55 to +150°C
 - VTA7: -55 to +175°C
- Working Voltage: 14 - 56Vdc
- Case Size: 0603 - 2220
- MSL 1

FEATURES

- No temperature derating up to +175°C
- High Reliability
- AEC-Q200 Qualified
- Bi-Directional protection
- EMI/RFI attenuation
- ESD rated to 25kV (HBM ESD Level 6)
- High Flexure Stress - **FLEXITERM**

APPLICATIONS

- Under Hood
- Down Hole Drilling
- High temperature Automotive and Industrial Applications
- Electric Vehicles
- EV Charging
- Load Dump
- ESD Protection

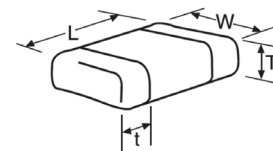
HOW TO ORDER

VT	A7	0603	18	A	400	R	P	
Varistor Temp Rated	Automotive 175°C A3 = 150°C A7 = 175°C	Case Size 0603 0805 1206 1210 1812 2220	Working Voltage 12 = 12Vdc 14 = 14Vdc 18 = 18Vdc 26 = 26Vdc 31 = 31Vdc 38 = 38Vdc 48 = 48Vdc 56 = 56Vdc	Energy Rating A = 0.1J B = 0.2J C = 0.3J E = 0.5J J = 1.6J K = 0.6J M = 1.0J U = 4.8J Y = 9.0J	Clamping Voltage 300 = 32V 350 = 35V 400 = 42V 650 = 65V 670 = 67V 101 = 100V 111 = 110V	Package D = 7" (1,000) R = 7" (4,000) T = 13" (10,000)	Termination P = Ni/Sn plated Z = FLEXITERM® (150°C)	

DIMENSIONS

mm(inches)

Size (EIA)	Length (L)	Width (W)	Max Thickness (T)	Land Length (t)
0603	1.60±0.15 (0.063±0.006)	0.80±0.15 (0.031±0.006)	0.90 (0.035)	0.35±0.15 (0.014±0.006)
0805	2.01±0.20 (0.079±0.008)	1.25±0.20 (0.049±0.008)	1.02 (0.040)	0.71 max. (0.028 max.)
1206	3.20±0.20 (0.126±0.008)	1.60±0.20 (0.063±0.008)	1.02 (0.040)	0.94 max. (0.037 max.)
1210	3.20±0.20 (0.126±0.008)	2.49±0.20 (0.098±0.008)	1.70 (0.067)	1.14 max. (0.045 max.)
1812	4.50±0.030 (1.77±0.012)	3.20±0.030 (0.126±0.012)	2.00 (0.080)	1.00 max. (0.039 max.)
2220	5.70±0.040 (0.224±0.016)	5.00±0.040 (0.197±0.016)	2.50 (0.098)	1.00 max. (0.039 max.)



High Temp. Automotive VT Series

+150°C and 175°C Rated Varistors

ELECTRICAL CHARACTERISTICS VTA3 (150°C)

Part Number	V _w (DC)	V _w (AC)	V _B	V _C	I _{VC}	I _L	E _T	E _{LD}	I _P	Cap	Freq	V _{Jump}	P _{Diss. Max}
	Vdc	Vac	V	V	A	µA	J	J	A	pF		V	W
VTA3040205X150	5.6	4	8.5±20%	18	1	10	0.05	-	20	200	K	-	0.001
VTA3080505C150	5.6	4	8.5±20%	18	1	10	0.5	-	200	3000	K	-	0.01
VTA3080512D250	12	8.5	16±15%	27	1	10	0.4	-	200	900	K	-	0.008
VTA3080514C300	14	10	18.5±12%	32	1	10	0.3	0.7	120	900	K	20	0.006
VTA3120614E300	14	10	18.5±12%	32	1	10	0.5	1.3	200	1400	K	20	0.01
VTA3121014J300	14	10	18.5±12%	32	1	10	1.6	3	500	5000	K	20	0.03
VTA3222014Y350	14	10	20.5±10%	35	5	15	7.5	35	2000	55000	K	20	0.15
VTA3040218X400	18	13	25.5±10%	42	1	10	0.05	-	20	60	K	27.5	0.001
VTA3120618K390	18	13	24.5±10%	40	1	10	0.6	1.5	200	1500	K	27.5	0.012
VTA3121018J390	18	13	25.5±10%	42	5	10	1.6	3	500	2200	K	27.5	0.03
VTA3060322C400	22	17	27±10%	44	1	10	0.3	-	30	500	K	27.5	0.011
VTA3120626F540	26	18	33±10%	54	1	10	0.7	1.5	200	600	K	27.5	0.014
VTA3121026H560	26	18	34.5±10%	60	5	10	1.2	3	2150	300	K	27.5	0.02
VTA3120631M650	31	25	39±10%	65	1	10	1	2	200	1100	K	29	0.02
VTA3121031R650	31	25	39±10%	65	2.5	10	1.7	4.5	300	1500	K	29	0.03
VTA3080538E770	38	30	47±10%	77	1	10	0.5	1	120	275	K	48	0.01
VTA3120642R800	42	32	51±10%	80	1	10	1.7	2	250	750	K	48	0.003
VTA3080556B111	56	40	68 ± 10%	110	1	10	0.2	0.25	30	80	K	48	0.004
VTA3120656K101	56	40	68 ± 10%	100	1	10	0.6	0.8	200	200	K	48	0.014
VTA3120656M101	56	40	68 ± 10%	100	1	10	1.0	2	200	500	K	48	0.018
VTA3121056S111	56	40	68 ± 10%	110	2.5	10	2.0	3	250	600	K	48	0.030
VTA3181256U111	56	40	68 ± 10%	110	5	10	4.8	5	1500	1500	K	48	0.080
VTA3222056Y111	56	40	68 ± 10%	110	10	10	9.0	14	1000	2800	K	48	0.150

ELECTRICAL CHARACTERISTICS VTA7 (175°C)

Part Number	V _w (DC)	V _w (AC)	V _B	V _C	I _{VC}	I _L	E _T	E _{LD}	I _P	Cap	Freq	V _{Jump}	P _{Diss. Max}
	Vdc	Vac	V	V	A	µA	J	J	A	pF		V	W
VTA7060314A300	14	10	18.5±12%	32	1	10	0.1	-	50	400	K	20	0.003
VTA7060314E350	14	10	20.5±10%	35	1	10	0.5	-	120	900	K	20	0.01
VTA7060318A400	18	13	23±10%	42	1	10	0.1	0.25	30	275	K	27.5	0.003
VTA7080518C400	18	13	25.5±10%	42	1	10	0.3	1	120	450	K	27.5	0.006
VTA7080526D580	26	18	34.5±10%	60	1	10	0.1	0.25	30	155	K	27.5	0.002
VTA7080526D580	26	18	34.5±10%	60	1	10	0.4	0.6	100	275	K	29	0.008
VTA7120630M650	30	21	41±10%	67	1	10	1	1	200	800	K	29	0.02
VTA7060331A670	31	25	39±10%	67	1	10	0.1	0.25	30	90	M	29	0.003
VTA7080531C650	31	25	39±10%	65	1	10	0.3	1	80	275	K	29	0.006
VTA7120648M101	48	34	62±10%	100	1	10	1.0	1.5	200	300	K	48	0.02

V_w(DC) DC Working Voltage [V]

V_w(AC) AC Working Voltage [V]

V_B Typical Breakdown Voltage [V @ 1mA_{DC}]

V_C Clamping Voltage [V @I_L]

I_{VC} Test Current for V_C

I_L Maximum leakage current at the working voltage, 25°C [µA]

E_T Transient Energy Rating [J, 10x1000µs]

E_{LD} Load Dump Energy (x10)

I_P Peak Current Rating [A, 8x20µs]

Cap Typical capacitance [pF] @ frequency specified and 0.5V_{RMS}, 25°C

V_{Jump} Jump Start (V)

P_{Diss. Max} Power Dissipation (W)

The following series are available with industry proven KYOCERA AVX flexible termination system **FLEXITERM**® :

VTA3/VTA7: 0603, 0805, 1206, 1210

All VTA7 Varistors with Flexiterm are rated up to 150°C Max Operating Temperature

FLEXITERM® is designed to enhance the mechanical flexure and temperature cycling performance provides up to 5mm of flexure without internal cracks.



FLEXITERM®

High Temp. Automotive VT Series

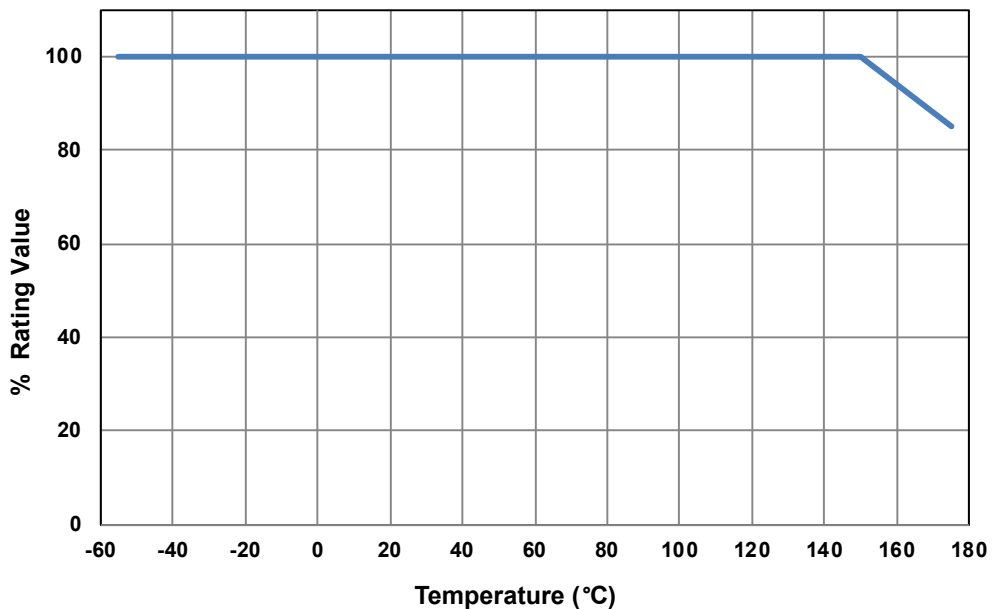
+150°C and 175°C Rated Varistors



ESD RATING

Part Number	IEC 61000-4-2	ISO 10605		AEC-Q200 (Lvl.6)
	150 pF / 330 Ω Contact Discharge	330 pF / 330 Ω Contact Discharge	330 pF / 2000 Ω Contact Discharge	150 pF / 2000 Ω Air Discharge
VTA3 (150°C)				
VTA3080514C300	30kV	30kV	30kV	25kV
VTA3120614E300	30kV	30kV	30kV	25kV
VTA3121014J300	30kV	30kV	30kV	25kV
VTA3121031R650	30kV	30kV	30kV	25kV
VTA7 (175°C)				
VTA7060318A400	25 kV	30 kV	30 kV	25 kV
VTA7080518C400	30 kV	30 kV	30 kV	25 kV
VTA7060331A670	30 kV	30 kV	30 kV	25 kV
VTA7080531C650	30 kV	30 kV	30 kV	25 kV

VTA3 (+150°C): POWER DERATING CURVE (CURRENT, ENERGY, POWER)

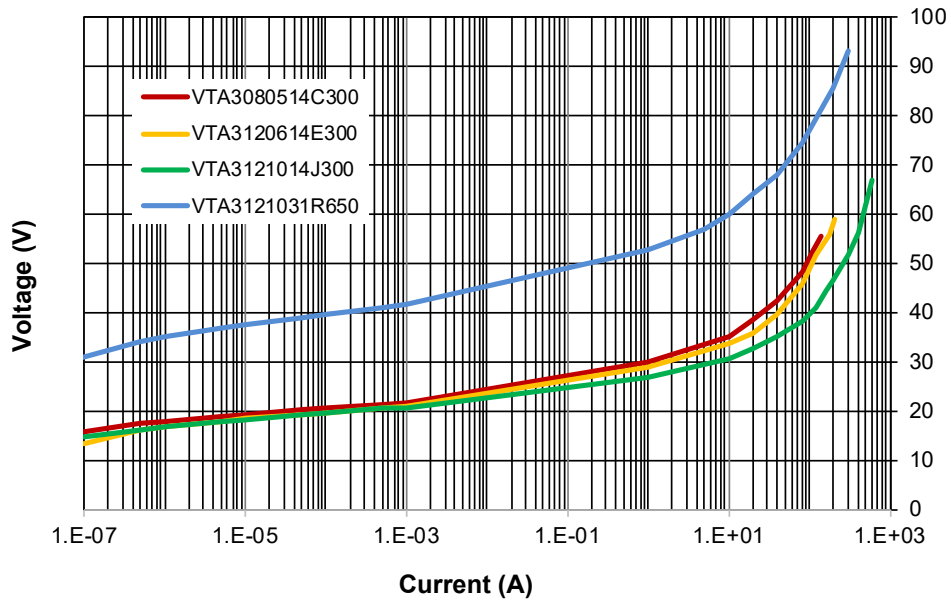


High Temp. Automotive VT Series

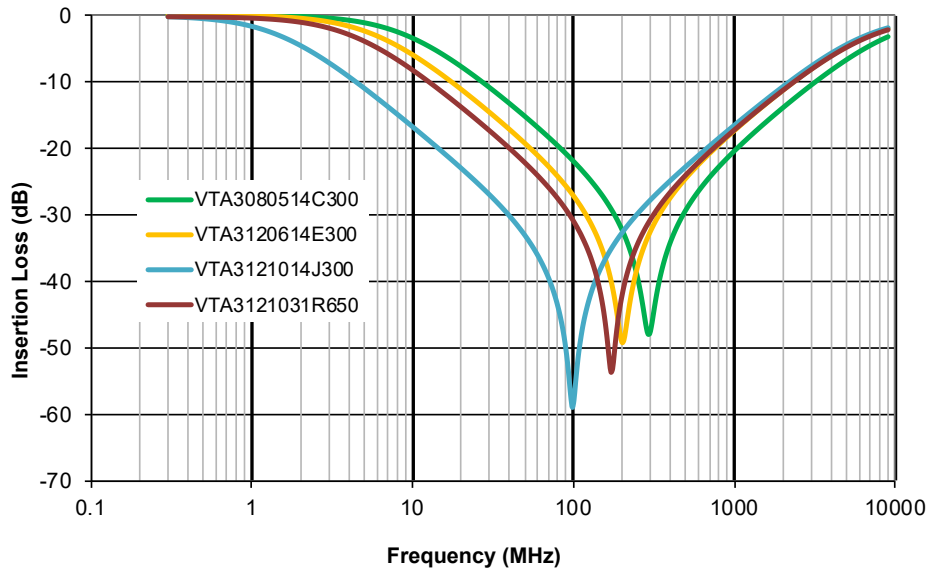
+150°C and 175°C Rated Varistors



VTA3 (+150°C): V-I CHARACTERISTICS



VTA3 (+150°C): FORWARD TRANSMISSION CHARACTERISTICS (S21)



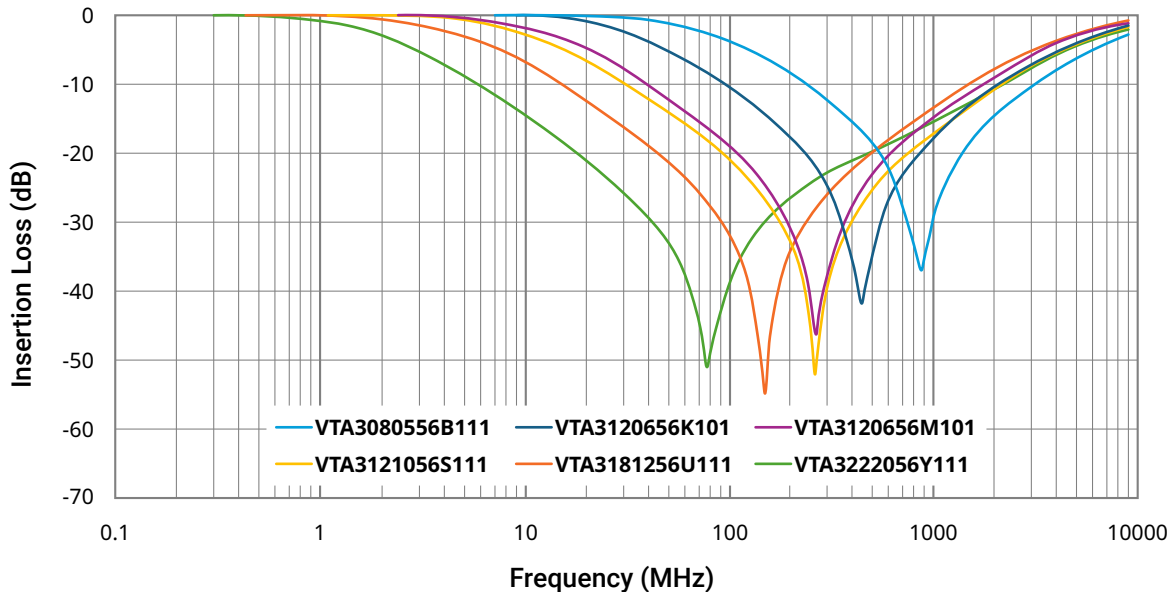
High Temp. Automotive VT Series

+150°C and 175°C Rated Varistors



48V SYSTEM VARISTORS FORWARD TRANSMISSION CHARACTERISTICS S21 (VTA3 +150°C)

48V System Varistors - Typical S21



48V SYSTEM VARISTORS VDA-320 TESTING (VTA3 +150°C)

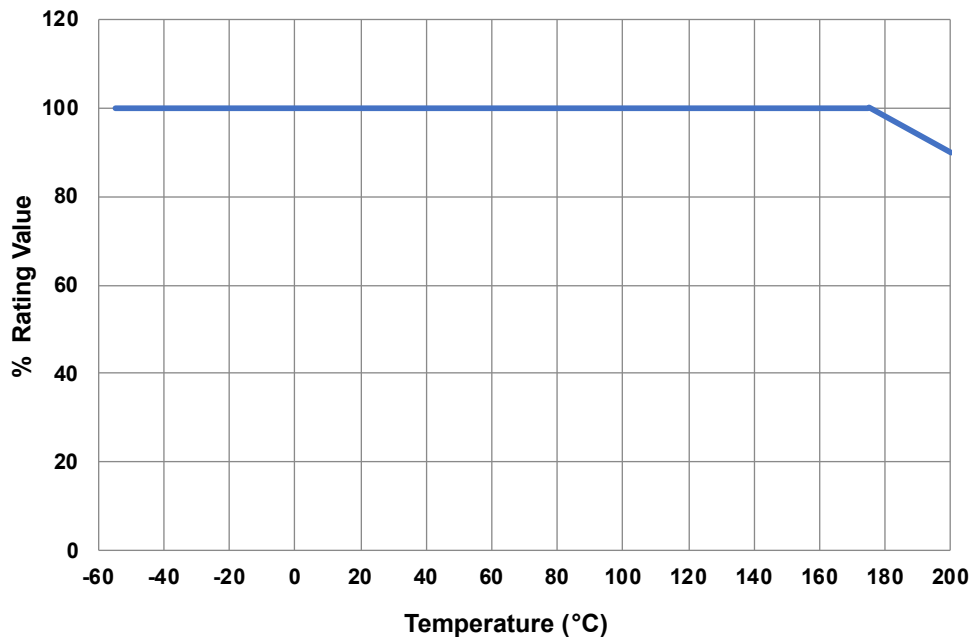
Test Pulse	Name	Results
E48-01a	Long-Term Overvoltage	PASS
E48-01b	Overvoltage with Components that Return Electrical Energy	PASS
E48-02	Transient Overvoltage	PASS
E48-03	Transient Event in Lower Limited Operation Range	PASS
E48-04	Recuperation	PASS
E48-05a	Superimposed Alternating Voltage, Part 1	PASS
E48-05b	Superimposed Alternating Voltage, Part 2	PASS
E48-06a	Slow Decrease and Increase of the Supply Voltage	PASS
E48-06b	Operation with Storage, Part 1	PASS
E48-06c	Operation with Storage, Part 2	PASS
E48-07	Slow Decrease and Abrupt Increase of the Supply Voltage	PASS
E48-08	Reset Behaviour	PASS
E48-09	Brief Interruptions	PASS
E48-10	Starting Pulses	PASS
E48-14	Standby Current	PASS
E48-15	Operation in Unlimited Operation Range	PASS
E48-16	Operation in Upper Limited Operation Range	PASS
E48-17	Operation in Lower Limited Operation Range	PASS
E48-18	Overvoltage Range	PASS
E48-19	Undervoltage Range	PASS

High Temp. Automotive VT Series

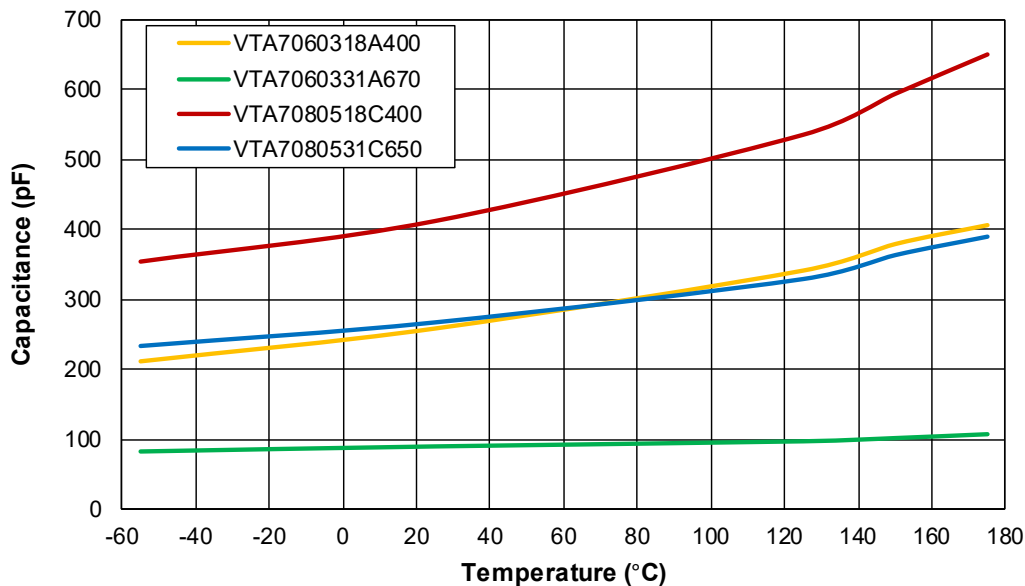
+150°C and 175°C Rated Varistors



VTA7 (+175°C): POWER DERATING CURVE (CURRENT, ENERGY, POWER)



VTA7 (+175°C): CAPACITANCE VS TEMPERATURE



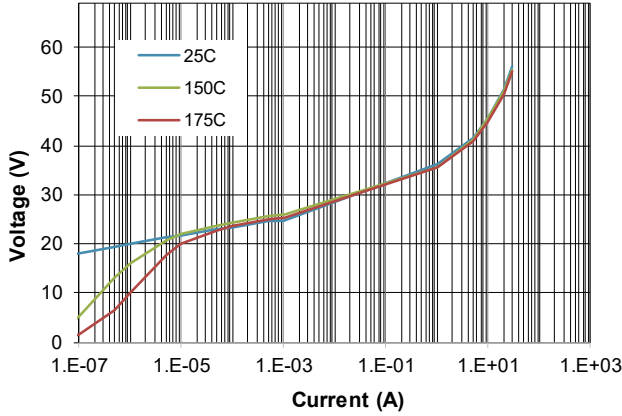
High Temp. Automotive VT Series

+150°C and 175°C Rated Varistors

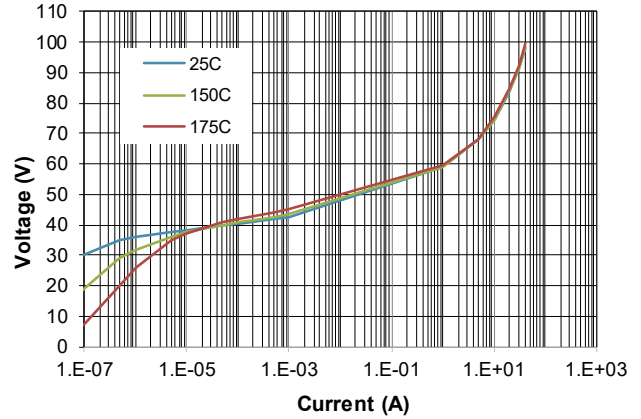


VTA7 (+175°C): V-I CHARACTERISTICS

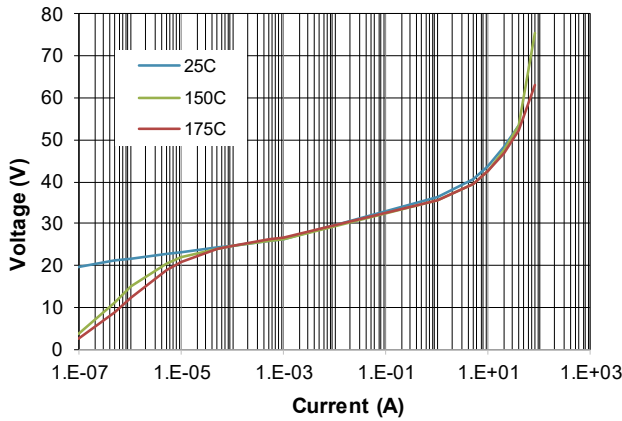
VTA7060318A400



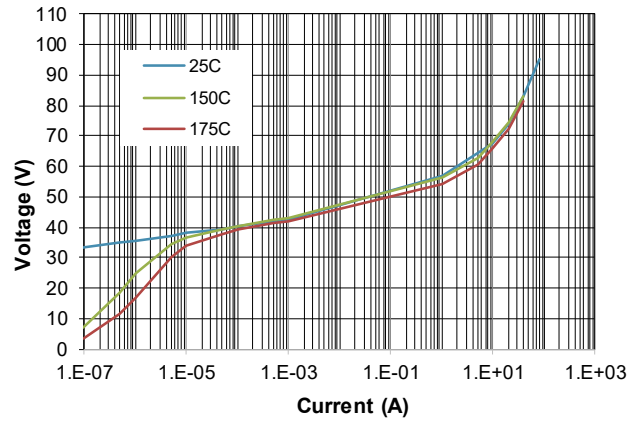
VTA7060331A650



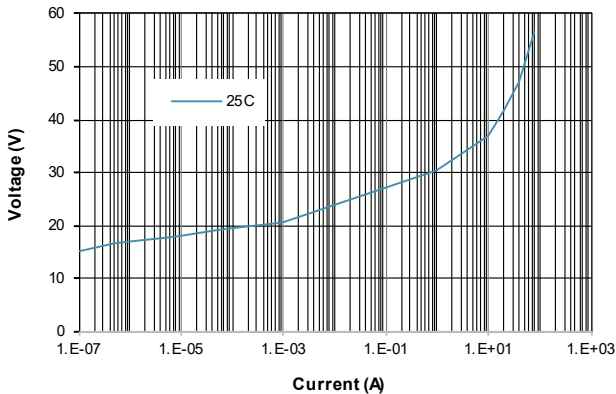
VTA7080518C400



VTA7080531C650



VTA7060314A300



High Temp. Automotive VT Series

+150°C and 175°C Rated Varistors



VTA7 (+175°C): FORWARD TRANSMISSION CHARACTERISTICS (S21)

