TransGuard Automotive Series
Multilayer Varistors for Automotive Applications

GENERAL DESCRIPTION

The TransGuard Automotive Series are zinc oxide (ZnO) based ceramic semiconductor devices with non-linear, bi-directional voltage-current characteristics.

They have the advantage of offering bi-directional overvoltage protection as well as EMI/RFI attenuation in a single SMT package. The Automotive Series high current and high energy handling capability make them well suited for protection against automotive related transients.

FEATURES

- High Reliability
- High Energy Absorption (Load Dump)
- High Current Handling
- AEC Q200 Qualified
- Bi-Directional protection
- EMI/RFI attenuation
- Multi-strike capability
- Sub 1nS response to ESD strike

APPLICATIONS

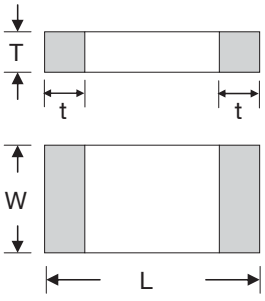
- Internal Combustion Engine (ICE) Vehicles
- Hybrid Electric Vehicles (HEV)
- Plug-in Hybrid Electric Vehicles (PHEV)
- Commercial Vehicles
  - CAN, LIN, FLEXRAY based modules
  - Sensors
  - Module load dump protection
  - Motor/inductive load transient suppression

HOW TO ORDER

VC	AS	1206	18	D	400	R	P
Varistor Chip	**Automotive Series**	**Case Size**	**Working Voltage**	**Energy Rating**	**Clamping Voltage**	**Package**	**Termination**
		0402 0603 0805 1206 1210	16 = 16Vdc 18 = 18Vdc 26 = 26Vdc 30 = 30Vdc 38 = 38Vdc 42 = 42Vdc 48 = 48Vdc 56 = 56Vdc 85 = 85Vdc	A = 0.1J B = 0.2J C = 0.3J D = 0.4J E = 0.5J F = 0.7J H = 1.2J J = 1.5J K = 0.6J L = 0.8J S = 1.9-2.0J	380 = 38V 390 = 42V 400 = 42V 580 = 60V 620 = 67V 650 = 67V 770 = 77V 800 = 80V 101 = 100V 111 = 110V 151 = 150V	D = 7" (1000) R = 7" (4000) T = 13" (10,000)* W = 13" (10,000)** 0402 only	P = Ni/Sn plated

*Not available for 0402
**Only available packaging option for 0402

PHYSICAL DIMENSIONS: mm (inches)



Size (EIA)	Length (L)	Width (W)	Max Thickness (T)	Land Length (t)
0402	1.00±0.10 (0.040±0.004)	0.50±0.10 (0.020±0.004)	0.60 (0.024)	0.25±0.15 (0.010±0.006)
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)	0.14 max. (0.045 max.)

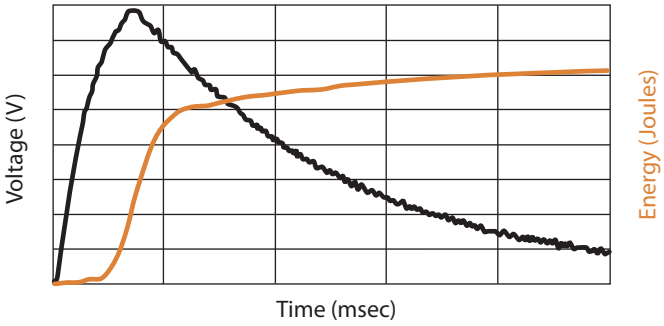
ELECTRICAL CHARACTERISTICS

AVX Part Number	Working Voltage (DC)	Working Voltage (AC)	V_B	V_C	Test Current for V_C	Maximum I_L	E_T	I_P	Typical Cap	Freq	V_{Jump}	$P_{Diss.\ Max}$
VCAS060316B400 _ _	16	11	25.5±10%	42	1	10	0.2	30	150	K	24.5	0.003
VCAS120616K380 _ _	16	11	22.0±10%	38	1	15	0.6	200	930	K	27.5	0.010
VCAS121016J390 _ _	16	11	25.5±10%	42	5	10	1.5	500	3100	K	27.5	0.030
VCAS040218X400 _ _	18	13	25.5±10%	42	1	10	0.05	20	65	M	24.5	0.001
VCAS060318A400 _ _	18	13	25.5±10%	42	1	10	0.1	30	150	K	24.5	0.003
VCAS080518A400 _ _	18	13	25.5±10%	42	1	10	0.1	30	225	K	27.5	0.002
VCAS080518C400 _ _	18	13	25.5±10%	42	1	10	0.3	120	550	K	27.5	0.007
VCAS120618A400 _ _	18	13	25.5±10%	42	1	10	0.1	30	350	K	27.5	0.002
VCAS120618D400 _ _	18	13	25.5±10%	42	1	10	0.4	150	900	K	27.5	0.008
VCAS120618E380 _ _	18	13	22.0±10%	38	1	15	0.5	200	930	K	27.5	0.010
VCAS121018J390 _ _	18	13	25.5±10%	42	5	10	1.5	500	3100	K	27.5	0.030
VCAS060326A580 _ _	26	18	34.5±10%	60	1	10	0.1	30	155	K	27.5	0.002
VCAS080526A580 _ _	26	18	34.5±10%	60	1	10	0.1	30	120	K	27.5	0.002
VCAS080526C580 _ _	26	18	34.5±10%	60	1	10	0.3	100	250	K	27.5	0.006
VCAS120626D580 _ _	26	18	34.5±10%	60	1	10	0.4	120	500	K	27.5	0.008
VCAS121026H560 _ _	26	18	34.5±10%	60	5	10	1.2	300	2150	K	27.5	0.018
VCAS060330A650 _ _	30	21	41.0±10%	67	1	10	0.1	30	125	K	29.0	0.002
VCAS080530A650 _ _	30	21	41.0±10%	67	1	10	0.1	30	90	M	29.0	0.002
VCAS080530C650 _ _	30	21	41.0±10%	67	1	10	0.3	30	250	K	29.0	0.005
VCAS120630D650 _ _	30	21	41.0±10%	67	1	10	0.4	120	400	K	29.0	0.008
VCAS121030H620 _ _	30	21	41.0±10%	67	5	10	1.2	280	1850	K	29.0	0.018
VCAS080538C770 _ _	38	30	47.0±10%	77	1	10	0.3	80	200	K	45.0	0.006
VCAS120642L800 _ _	42	32	51.0±10%	80	1	100	0.8	180	600	K	48.0	0.016
VCAS120648D101 _ _	48	34	62.0±10%	100	1	10	0.4	100	225	K	48.0	0.008
VCAS121048H101 _ _	48	34	62.0±10%	100	1	10	1.2	250	500	K	48.0	0.022
VCAS120656F111 _ _	56	40	68.0±10%	110	1	15	0.7	100	180	K	48.0	0.014
VCAS121085S151 _ _	85	60	100.0±10%	150	1	35	2.0	250	275	K	48.0	0.040

V_W(DC) DC Working Voltage [V]
V_W(AC) AC Working Voltage [V]
V_B Typical Breakdown Votage [V @ $1mA_{DC}$]
V_C Clamping Voltage [V @ I_M]
I_{VC} Test Current for V_C
I_L Maximum leakage current at the working voltage [µA]
E_t Transient Energy Rating [J, 10x1000µS]
I_P Peak Current Rating [A, 8x20µS]
Cap Typical capacitance [pF] @ frequency specified and $0.5V_{RMS}$
V_{Jump} Jump Start (V)
P_{DISS} Power Dissipation (W)

AUTOMOTIVE SERIES – LOAD DUMP TEST
According to ISO DP7637 rev 2 Pulse 5

Automotive Load Dump Pulse (According to ISO 7637 Pulse 5)



When using the test method indicated below, the amount of Energy dissipated by the varistor must not exceed the Load Dump Energy value specified in the product table.

CONSUMER VEHICLE TESTING (12V Network)

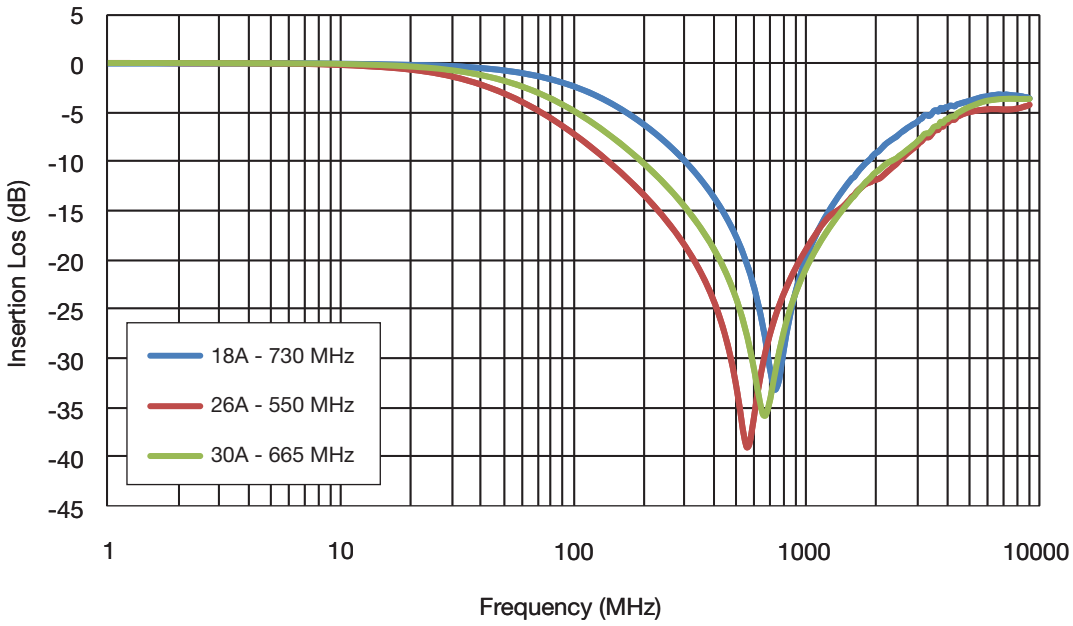
AVX Part Number	Working Voltage (DC)	Working Voltage (AC)	Transient Energy 10 x 1000 us (Joules)	Load Dump Energy (x10) Joules	Typical Vz Max Versus Pulse Duration and Rs	
					0.5 Ohm 100 mS	4 Ohm 100 mS
VCAS060316B400 _ _	16	11	0.2	0.25	35	40
VCAS120616K380 _ _	16	11	0.6	1.5	40	55
VCAS121016J390 _ _	16	11	1.5	3	45	65
VCSA040218X400 _ _	18	13	0.05	0.05	30	35
VCAS060318A400 _ _	18	13	0.1	0.1	35	40
VCAS080518A400 _ _	18	13	0.1	0.1	35	40
VCAS080518C400 _ _	18	13	0.3	1	35	45
VCAS120618A400 _ _	18	13	0.1	0.1	40	50
VCAS120618D400 _ _	18	13	0.4	1.5	40	55
VCAS120618E380 _ _	18	13	0.5	1.5	40	55
VCAS121018J390 _ _	18	13	1.5	3	45	65

COMMERCIAL VEHICLE TESTING (24V Network)

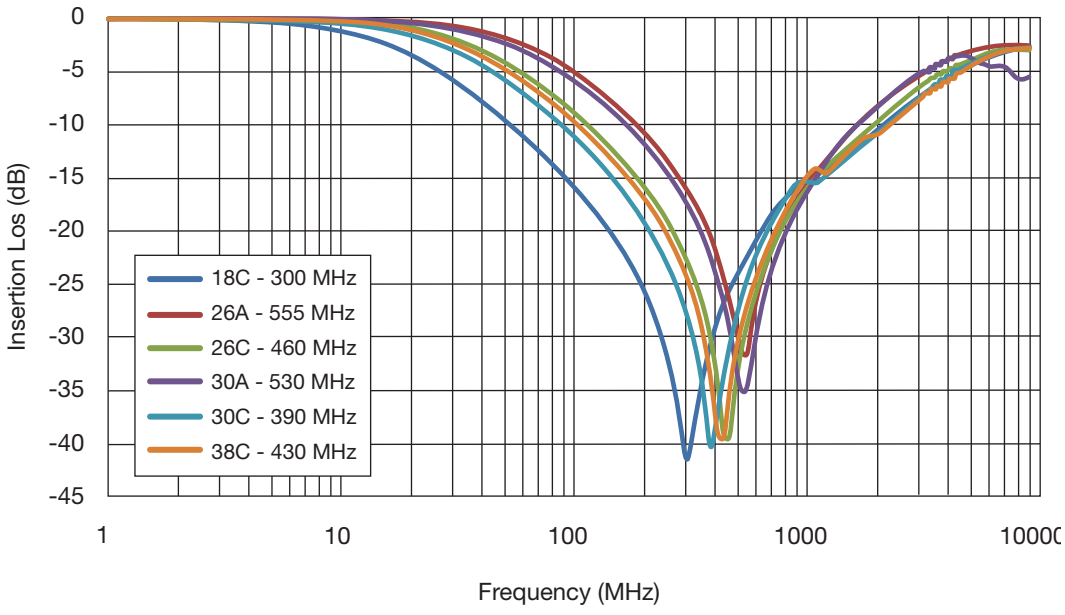
AVX Part Number	Working Voltage (DC)	Working Voltage (AC)	Transient Energy 10 x 1000 us (Joules)	Load Dump Energy (x10) Joules	Typical Vz Max Versus Pulse Duration and Rs	
					1 Ohm 100 mS	8 Ohm 100 mS
VCAS060326A580 _ _	26	18	0.1	0.1	45	50
VCAS080526A580 _ _	26	18	0.1	0.15	50	55
VCAS080526C580 _ _	26	18	0.3	0.5	50	60
VCAS120626D580 _ _	26	18	0.4	1	50	60
VCAS121026H560 _ _	26	18	1.2	3	55	80
VCAS060330A650 _ _	30	21	0.1	0.15	50	60
VCAS080530A650 _ _	30	21	0.1	0.15	50	60
VCAS080530C650 _ _	30	21	0.3	0.5	55	65
VCAS120630D650 _ _	30	21	0.4	1	60	70
VCAS121030H620 _ _	30	21	1.2	3	60	90

FORWARD TRANSMISSION CHARACTERISTICS (S21)

0603 Case Size

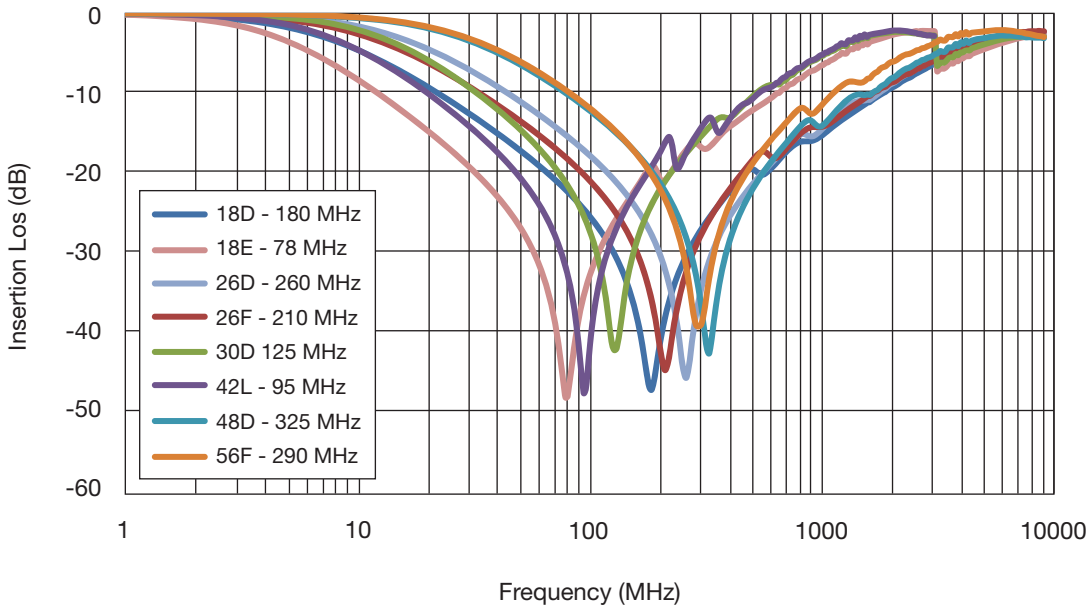


0805 Case Size

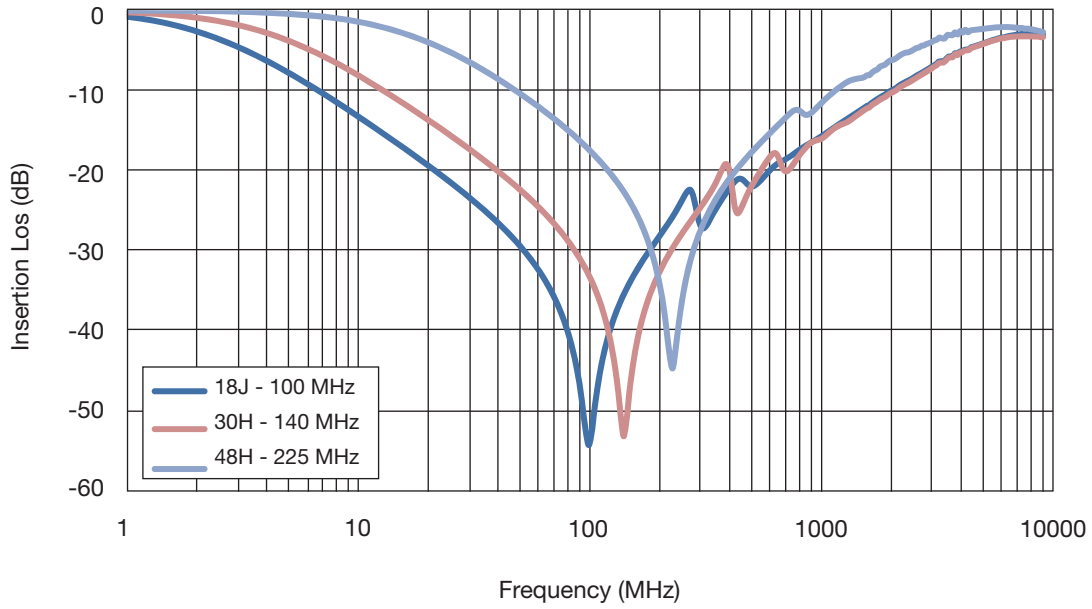


FORWARD TRANSMISSION CHARACTERISTICS (S21)

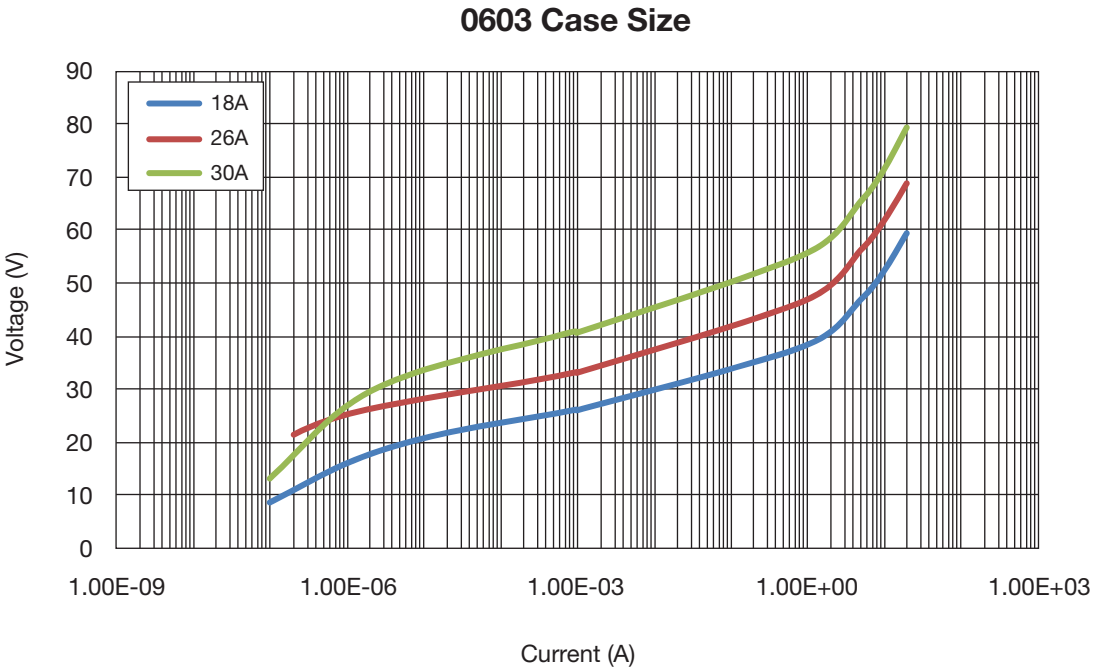
1206 Case Size

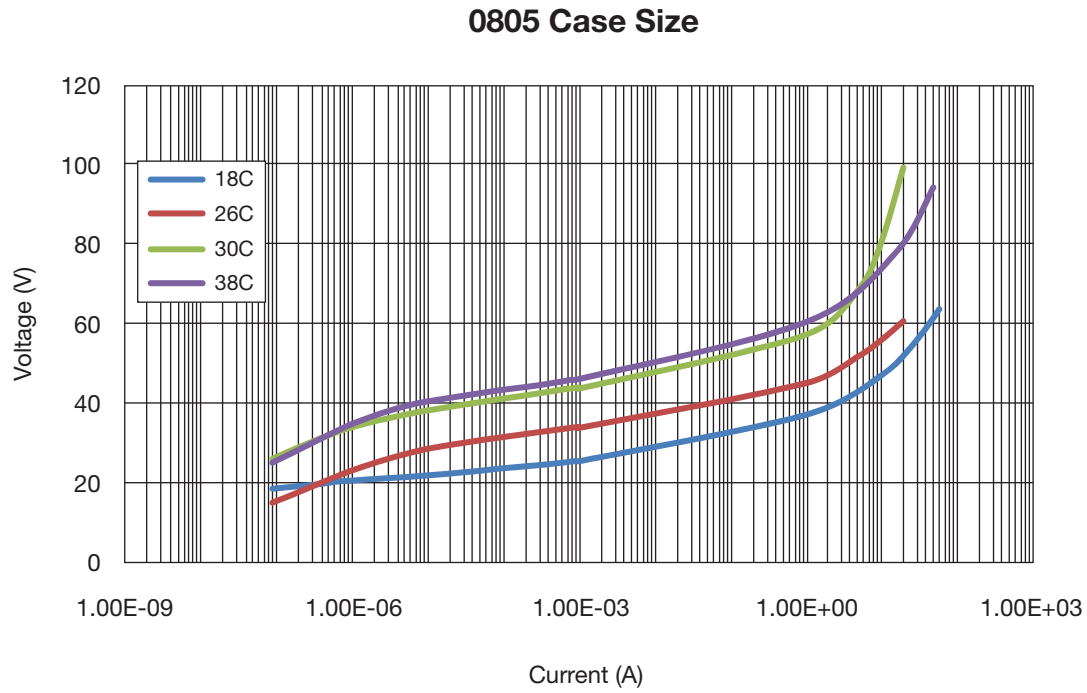


1210 Case Size



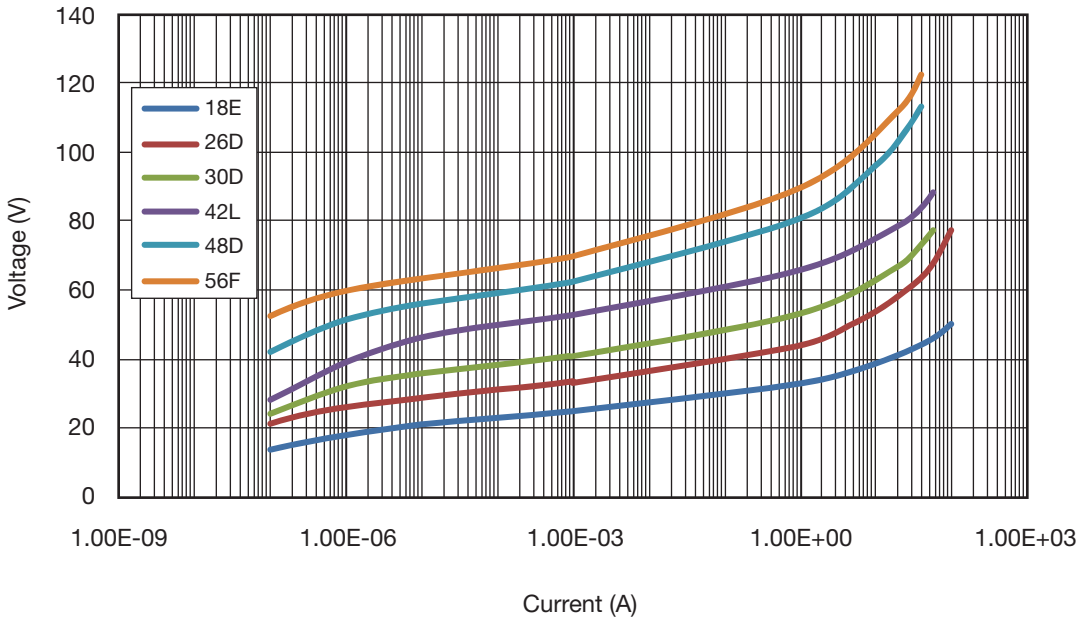
V-I CHARACTERISTICS



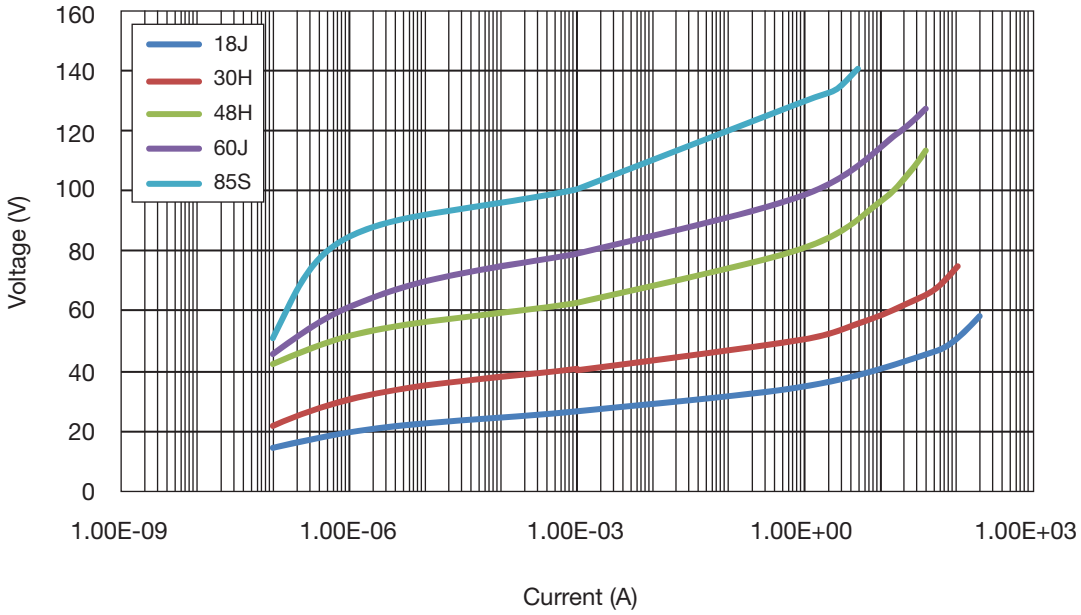


V-I CHARACTERISTICS

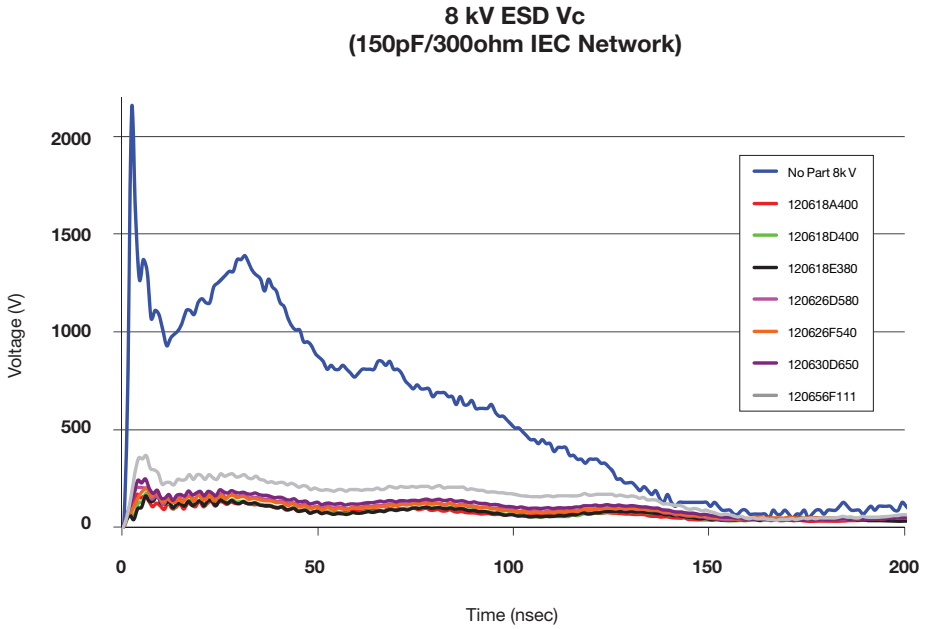
1206 Case Size

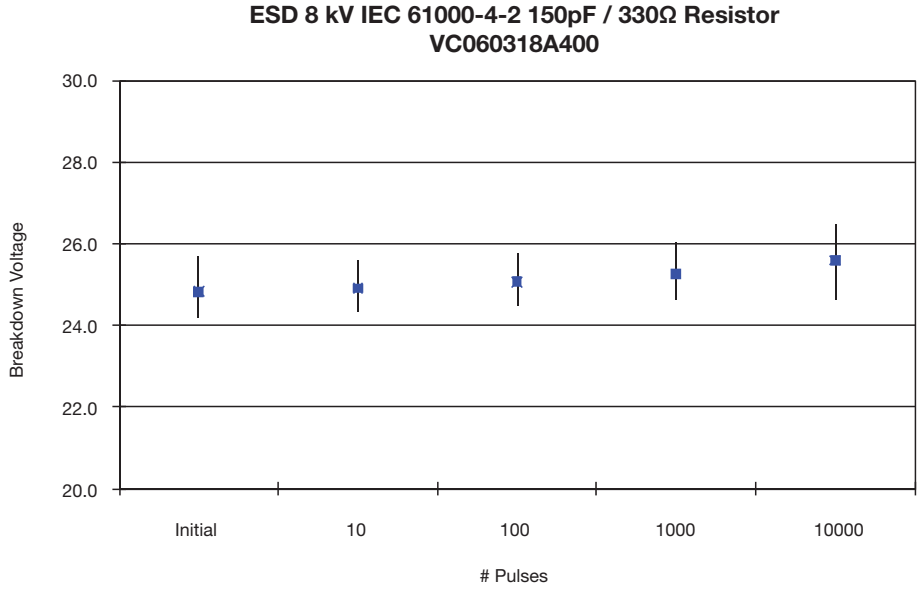


1210 Case Size



ESD V-I CHARACTERISTICS



TYPICAL VOLTAGE AT 8 KV PULSE

8kV Pulse	Peak Voltage (V)	30ns Voltage (V)	100ns Voltage (V)
No Part (No Suppression)	2130	1370	517
120618A400	171	123	65
120618D400	177	133	66
120618E380	161	121	63
120626D580	203	155	88
102626F540	201	159	84
120630D650	249	177	106
120656F111	366	262	169