

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

*Not available for 0402

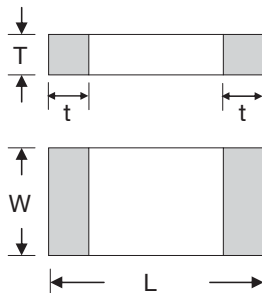
**Only available for 0402

Not RoHS Compliant



For RoHS compliant products,
please select correct termination style.

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.)

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ELECTRICAL CHARACTERISTICS

AVX PN	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}
VCAS040205X150 __	5.6	4.0	8.5±20%	18	1	35	0.05	-	20	175	M	-	0.001
VCAS060305A150 __	5.6	4.0	8.5±20%	18	1	35	0.1	-	30	750	K	-	0.001
VCAS080505A150 __	5.6	4.0	8.5±20%	18	1	35	0.1	-	40	1100	K	-	0.001
VCAS080505C150 __	5.6	4.0	8.5±20%	18	1	35	0.3	-	120	3000	K	-	0.005
VCAS120605A150 __	5.6	4.0	8.5±20%	18	1	35	0.1	-	40	1200	K	-	0.002
VCAS120605D150 __	5.6	4.0	8.5±20%	18	1	35	0.4	-	150	3000	K	-	0.008
VCAS040209X200 __	9	6.4	12.7±15%	22	1	25	0.05	-	20	175	M	-	0.001
VCAS060309A200 __	9	6.4	12.7±15%	22	1	25	0.1	-	30	550	K	-	0.002
VCAS080509A200 __	9	6.4	12.7±15%	22	1	25	0.1	-	40	750	K	-	0.002
VCAS080512A250 __	12	8.5	16±15%	27	1	25	0.1	-	40	525	K	-	0.002
VCAS040214X300 __	14	10	18.5±12%	32	1	15	0.05	-	20	85	M	16	0.001
VCAS060314A300 __	14	10	18.5±12%	32	1	15	0.1	-	30	350	K	16	0.002
VCAS080514A300 __	14	10	18.5±12%	32	1	15	0.1	-	40	325	K	16	0.002
VCAS080514C300 __	14	10	18.5±12%	32	1	15	0.3	-	120	900	K	20	0.006
VCAS120614A300 __	14	10	18.5±12%	32	1	15	0.1	-	40	600	K	20	0.002
VCAS120614D300 __	14	10	18.5±12%	32	1	15	0.4	-	150	1050	K	20	0.008
VCAS060316B400 __	16	11	25.5±10%	42	1	10	0.2	0.25	30	150	K	27.5	0.003
VCAS120616K380 __	16	11	25.5±10%	42	1	10	0.6	1.5	200	930	K	27.5	0.010
VCAS121016J390 __	16	11	25.5±10%	42	5	10	1.6	3	500	3100	K	27.5	0.030
VCAS181216P400 __	16	11	24.5±10%	42	5	10	2.9	10	1000	5000	K	27.5	0.07
VCAS040218X400 __	18	13	25.5±10%	42	1	10	0.05	0.05	20	65	M	27.5	0.001
VCAS060318A400 __	18	13	25.5±10%	42	1	10	0.1	0.25	30	150	K	27.5	0.003
VCAS080518A400 __	18	13	25.5±10%	42	1	10	0.1	0.1	30	225	K	27.5	0.002
VCAS080518C400 __	18	13	25.5±10%	42	1	10	0.3	1	120	550	K	27.5	0.007
VCAS120618A400 __	18	13	25.5±10%	42	1	10	0.1	0.5	30	350	K	27.5	0.002
VCAS120618D400 __	18	13	25.5±10%	42	1	10	0.4	1.5	150	900	K	27.5	0.008
VCAS120618E380 __	18	13	25.5±10%	42	1	10	0.5	1.5	200	930	K	27.5	0.010
VCAS121018J390 __	18	13	25.5±10%	42	5	10	1.6	3	500	3100	K	27.5	0.030
VCAS060326A580 __	26	18	34.5±10%	60	1	10	0.1	0.1	30	155	K	27.5	0.002
VCAS080526A580 __	26	18	34.5±10%	60	1	10	0.1	0.15	30	120	K	27.5	0.002
VCAS080526C580 __	26	18	34.5±10%	60	1	10	0.3	0.5	100	250	K	27.5	0.006
VCAS120626D580 __	26	18	34.5±10%	60	1	10	0.4	1	120	500	K	27.5	0.008
VCAS120626F540 __	26	18	33.0±10%	54	1	15	0.7	1.5	200	600	K	27.5	0.008
VCAS121026H560 __	26	18	34.5±10%	60	5	10	1.2	3	300	2150	K	27.5	0.018
VCAS060330A650 __	30	21	41.0±10%	67	1	10	0.1	0.15	30	125	K	29	0.002
VCAS080530A650 __	30	21	41.0±10%	67	1	10	0.1	0.15	30	90	M	29	0.002
VCAS080530C650 __	30	21	41.0±10%	67	1	10	0.3	0.5	80	250	K	29	0.005
VCAS120630D650 __	30	21	41.0±10%	67	1	10	0.4	1	120	400	K	29	0.008
VCAS121030H620 __	30	21	41.0±10%	67	5	10	1.2	3	280	1850	K	29	0.018
VCAS121030S620 __	30	21	41.0±10%	67	5	10	1.9	3	300	1500	K	29	0.038
VCAS080531C650 __	31	25	39.0±10%	65	1	10	0.3	0.5	80	250	K	29	0.005
VCAS120631M650 __	31	25	39.0±10%	65	1	15	1	1.5	200	500	K	29	0.008
VCAS120634N770 __	34	30	47.0±10%	77	1	15	1.1	1.5	200	400	K	48	0.008
VCAS121034S770 __	34	30	47.0±10%	77	2.5	15	2	3.5	400	1500	K	48	0.04
VCAS181234U770 __	34	30	47.0±10%	77	5	15	5	6.1	800	1500	K	48	0.08
VCAS080538C770 __	38	30	47.0±10%	77	1	10	0.3	-	80	200	K	48	0.006
VCAS120642L800 __	42	32	51.0±10%	80	1	35	0.8	-	180	600	K	48	0.016
VCAS120642K900 __	42	32	56±10%	90	1	15	0.6	-	200	260	K	48	0.012
VCAS120645K900 __	45	35	56±10%	90	1	25	0.6	-	200	260	K	48	0.012
VCAS120648D101 __	48	34	62.0±10%	100	1	10	0.4	-	100	225	K	48	0.008
VCAS121048H101 __	48	34	62.0±10%	100	1	10	1.2	-	250	500	K	48	0.022
VCAS120656F111 __	56	40	68.0±10%	110	1	15	0.7	-	100	180	K	48	0.014
VCAS120660M131 __	60	50	82.0±10%	135	1	15	1	-	150	250	K	48	0.008
VCAS121060J121 __	60	42	76±10%	120	5	10	1.5	-	250	400	K	48	0.03
VCAS121065P131 __	65	50	82±10%	135	2.5	15	2.7	-	350	600	K	48	0.05
VCAS121085S151 __	85	60	100.0±10%	150	1	35	2	-	250	275	K	48	0.040

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_{VC}]

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 Power Dissipation (W)

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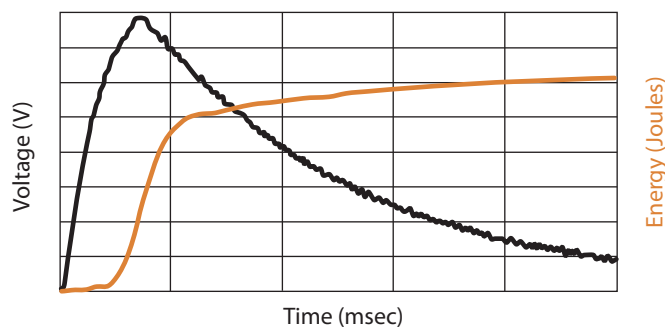
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AUTOMOTIVE SERIES – LOAD DUMP TEST

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	0.25	35	40
VCAS080518A400 __	18	13	0.1	0.1	35	40
VCAS080518C400 __	18	13	0.3	1	35	45
VCAS120618A400 __	18	13	0.1	0.5	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

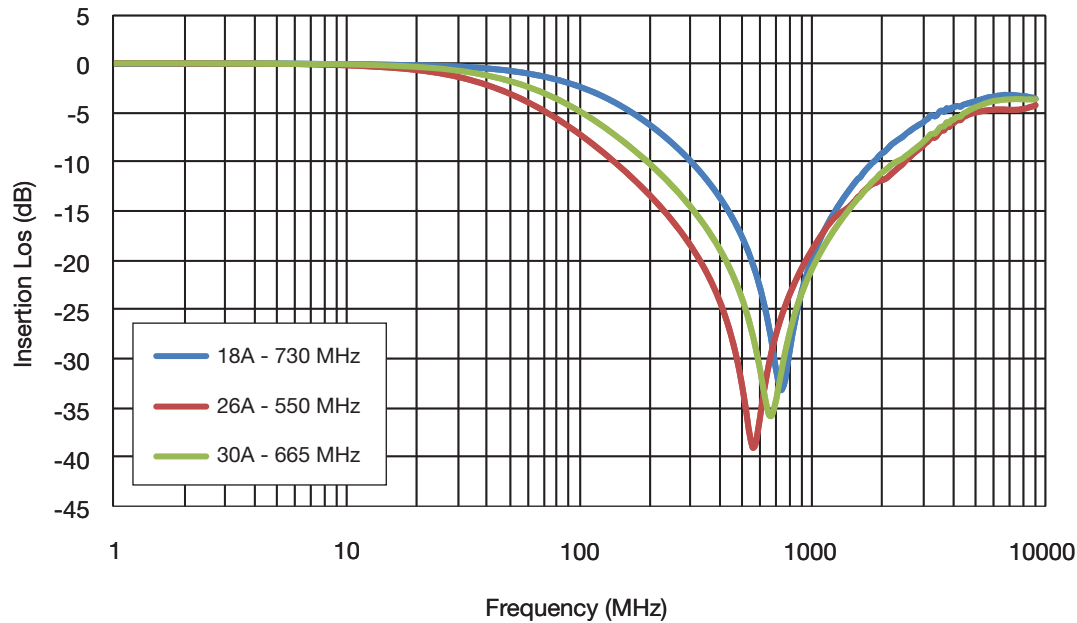
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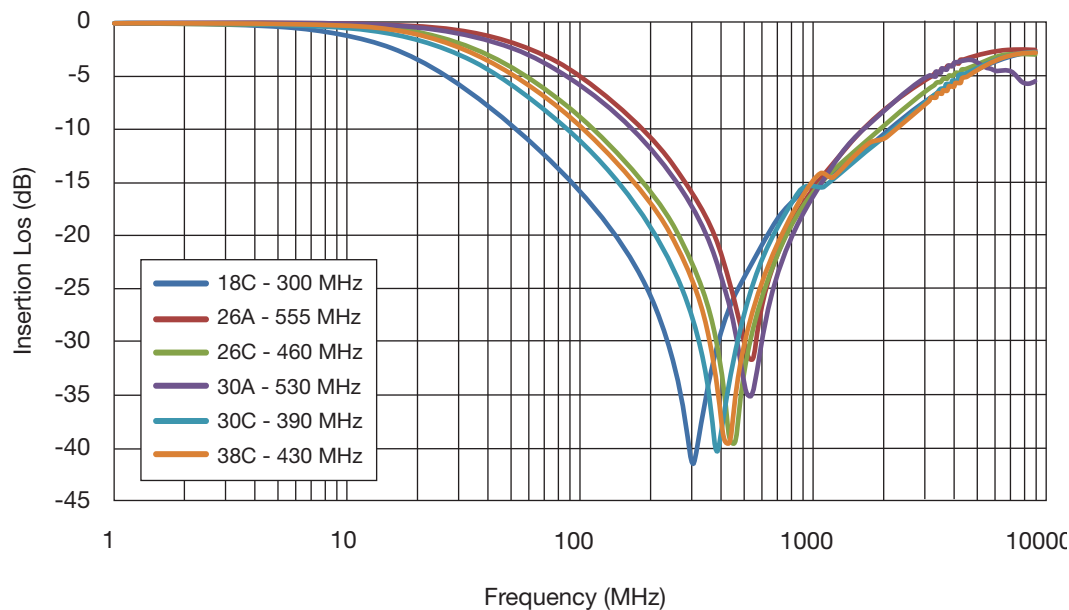


FORWARD TRANSMISSION CHARACTERISTICS (S21)

0603 Case Size



0805 Case Size

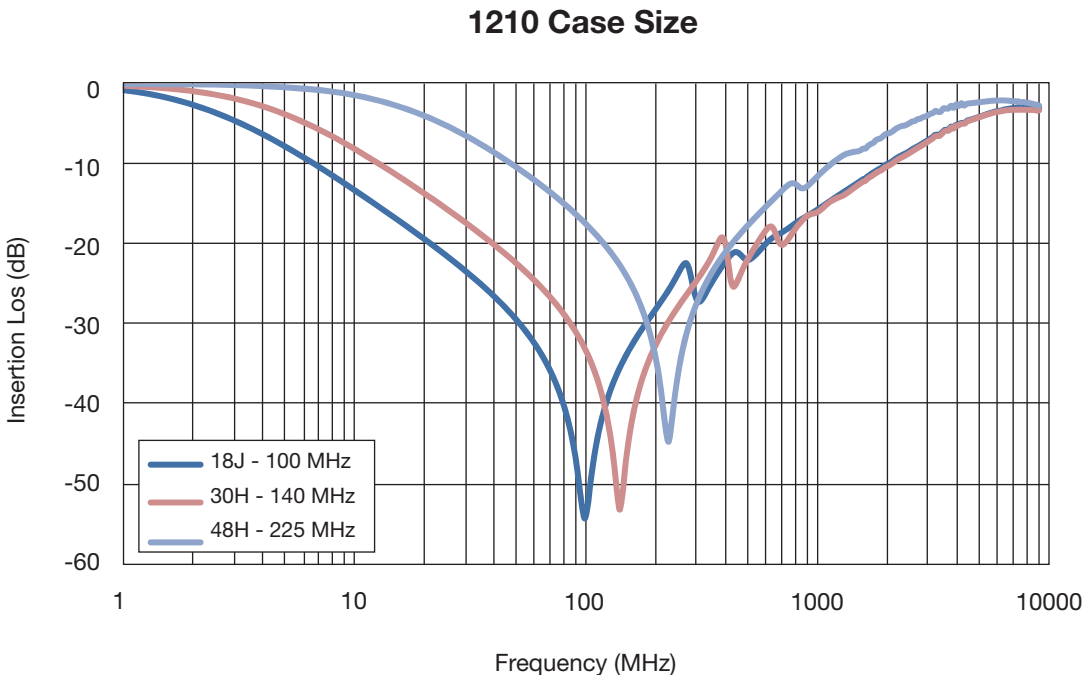
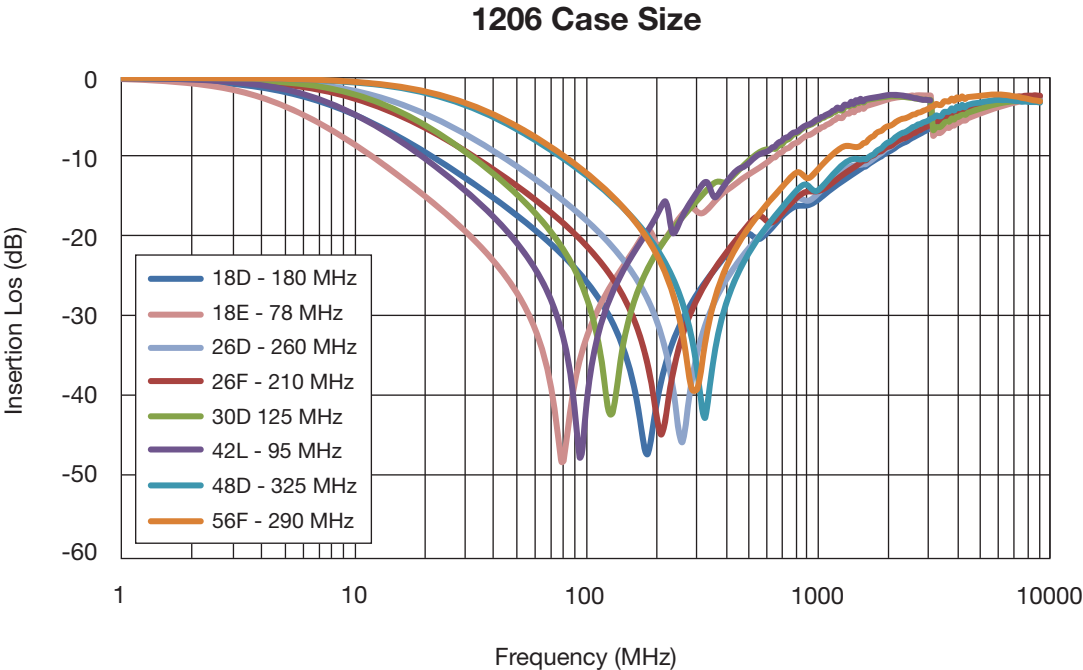


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FORWARD TRANSMISSION CHARACTERISTICS (S21)



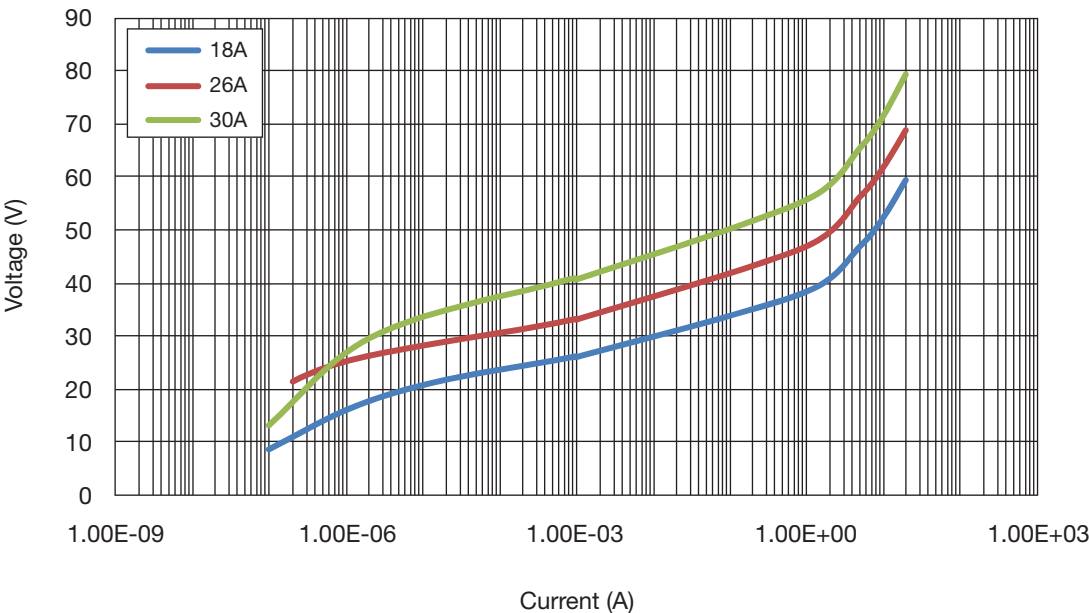
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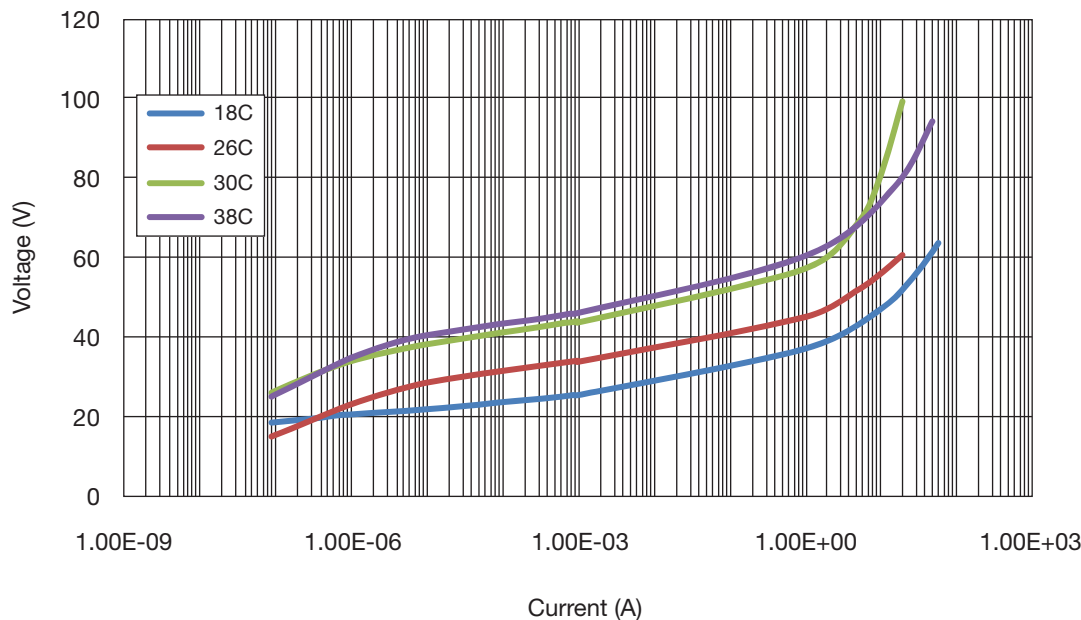


V-I CHARACTERISTICS

0603 Case Size



0805 Case Size



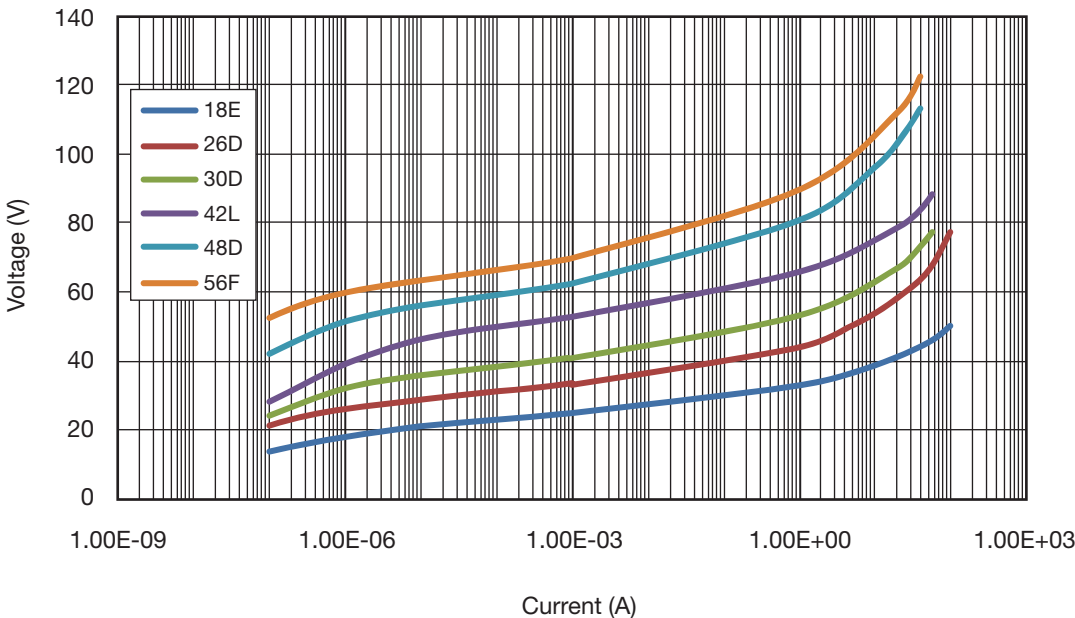
TransGuard® Automotive Series



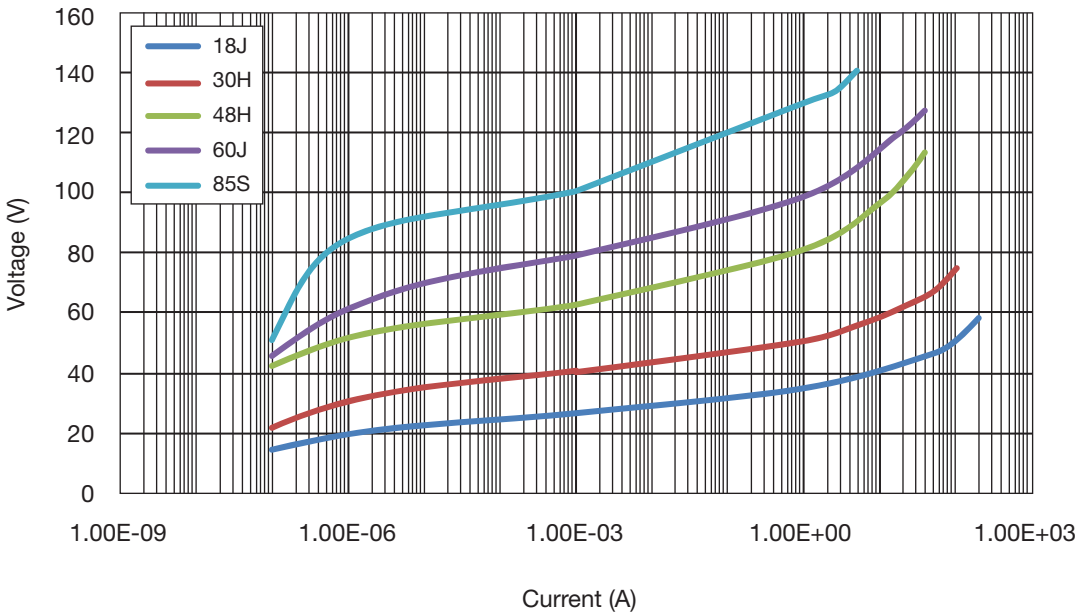
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V-I CHARACTERISTICS

1206 Case Size



1210 Case Size

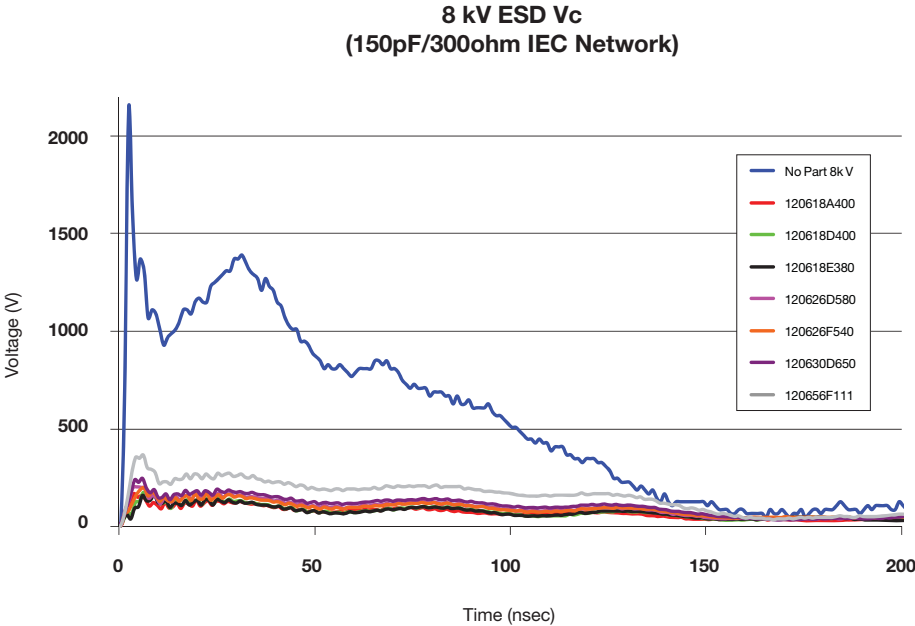


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ESD V-I CHARACTERISTICS



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
120626F540	201	159	84
120630D650	249	177	106
120656F111	366	262	169

ESD 8 kV IEC 61000-4-2 150pF / 330Ω Resistor
VC060318A400

