

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.

AVX VG series parts (large case size, high energy) are glass encapsulated. These parts provide the same high reliability as traditional VC series parts. The glass encapsulation provides also enhanced resistance against harsh environment or process such as acids, salts, chlorite flux.

Operating Temperature: -55°C to +125°C

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 | | | |
| VC = Varistor Chip VG = Varistor Glass Encapsulated Chip | | 0402 0603 0805 1206 1210 1812 2220 3220 | 03 = 3.3Vdc 05 = 5.6Vdc 09 = 9Vdc 12 = 12Vdc 14 = 14Vdc 16 = 16Vdc 18 = 18Vdc 22 = 22Vdc 26 = 26Vdc 30 = 30Vdc | 31 = 31Vdc 34 = 34Vdc 38 = 38Vdc 42 = 42Vdc 45 = 45Vdc 48 = 48Vdc 56 = 56Vdc 60 = 60Vdc 65 = 65Vdc 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 X = 0.05J M = 1J N = 1.1J U = 4.0-5.0J P = 2.5-3.7J Y = 6.5-12J | 140 = 14V 150 = 18V 220 = 22V 250 = 27V 300 = 32V 380 = 38V 390 = 42V 400 = 42V 440 = 44V 490 = 49V 540 = 54V | 570 = 57V 580 = 60V 620 = 67V 650 = 67V 770 = 77V 800 = 80V 900 = 90V 101 = 100V 111 = 110V 131 = 135V 151 = 150V | D = 7" (1000)* R = 7" (4000)* T = 13" (10,000)* W = 7" (10,000)** 0402 only | P = Ni/Sn plated |

*Not available for 0402
**Only available for 0402

TransGuard® Automotive Series

Multilayer Varistors for Automotive Applications

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} |
|----------------|---------------------|---------------------|----------------|----------------|-----------------|----------------|----------------|-----------------|----------------|-------|------|-------------------|------------------------|
| | Vdc | Vac | V | V | A | μA | J | J | A | pF | V | W | |
| VCAS060303A140 | 3.3 | 2.3 | 6.0±20% | 14 | 1 | 50 | 0.1 | - | 30 | 1450 | K | - | 0.002 |
| VCAS080503A140 | 3.3 | 2.3 | 6.0±20% | 14 | 1 | 50 | 0.1 | - | 40 | 1000 | K | - | 0.002 |
| VCAS080503C140 | 3.3 | 2.3 | 6.0±20% | 14 | 1 | 50 | 0.3 | - | 120 | 4500 | K | - | 0.006 |
| VCAS120603A140 | 3.3 | 2.3 | 6.0±20% | 14 | 1 | 50 | 0.1 | - | 40 | 1500 | K | - | 0.002 |
| VCAS120603D140 | 3.3 | 2.3 | 6.0±20% | 14 | 1 | 50 | 0.4 | - | 150 | 4000 | K | - | 0.009 |
| 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 | K | 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% | 38 | 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 |
| VGAS121016S390 | 16 | 14 | 24.5±10% | 40 | 2.5 | 15 | 2 | 5 | 500 | 3000 | K | 27.5 | 0.01 |
| VGAS181216P390 | 16 | 11 | 24.5±10% | 40 | 5 | 15 | 2.9 | 10 | 1000 | 7000 | K | 27.5 | 0.07 |
| VGAS222016Y390 | 16 | 11 | 24.5±10% | 40 | 10 | 15 | 10.2 | 45 | 1500 | 20000 | K | 27.5 | 0.08 |
| VGAS181216P400 | 16 | 11 | 24.5±10% | 42 | 5 | 10 | 2.9 | 10 | 1000 | 5000 | K | 27.5 | 0.070 |
| VGAS222016Y400 | 16 | 11 | 24.5±10% | 42 | 10 | 10 | 7.2 | 25 | 1500 | 13000 | K | 27.5 | 0.100 |
| 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% | 38 | 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 |
| VGAS181218P440 | 18 | 14 | 27.5±10% | 44 | 5 | 15 | 2.9 | 6 | 800 | 5000 | K | 27.5 | 0.05 |
| VGAS222022Y490 | 22 | 17 | 30±10% | 49 | 10 | 15 | 6.8 | 25 | 1200 | 12000 | K | 27.5 | 0.03 |
| 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 |
| VGAS181226P570 | 26 | 23 | 35.0±10% | 57 | 5 | 15 | 2.5 | 8 | 600 | 3000 | K | 30 | 0.015 |
| VGAS222026Y570 | 26 | 23 | 35±10% | 57 | 10 | 15 | 6.8 | 25 | 1100 | 7000 | K | 30 | 0.030 |
| VGAS322026Z570 | 26 | 23 | 35±10% | 57 | 10 | 15 | 13 | 50 | 1800 | 15000 | K | 30 | 0.04 |
| 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 | 30 | 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 |
| VGAS121031R650 | 31 | 25 | 39±10% | 65 | 2.5 | 15 | 1.7 | 4.5 | 300 | 1200 | K | 30 | 0.05 |
| VGAS181231P650 | 31 | 25 | 39.0±10% | 65 | 5 | 15 | 3.7 | 8 | 800 | 2600 | K | 30 | 0.06 |
| VGAS222031Y650 | 31 | 25 | 39±10% | 65 | 10 | 15 | 9.6 | 23 | 1200 | 6100 | K | 30 | 0.03 |
| VCAS120634N770 | 34 | 30 | 47.0±10% | 77 | 1 | 15 | 1.1 | 1.5 | 200 | 400 | K | 48 | 0.008 |
| VGAS121034S770 | 34 | 30 | 47.0±10% | 77 | 2.5 | 15 | 2 | 3.0 | 400 | 1000 | K | 48 | 0.040 |
| VGAS181234U770 | 34 | 30 | 47.0±10% | 77 | 5 | 15 | 5 | 6.1 | 800 | 1500 | K | 48 | 0.080 |
| VGAS222034Y770 | 34 | 30 | 47.0±10% | 77 | 10 | 15 | 12 | 25 | 2000 | 6300 | K | 48 | 0.240 |
| 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 | 15 | 0.8 | - | 180 | 600 | K | 48 | 0.016 |

TransGuard® Automotive Series

Multilayer Varistors for Automotive Applications

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} |
|-------------------|---------------------|---------------------|----------------|----------------|-----------------|----------------|----------------|-----------------|----------------|------|------|-------------------|------------------------|
| | V _{dc} | V _{ac} | V | V | A | μA | J | J | A | pF | V | W | |
| VCAS120642K900 | 42 | 32 | 56±10% | 90 | 1 | 15 | 0.6 | - | 200 | 260 | K | 48 | 0.012 |
| VGAS181242U900 | 42 | 35 | 56.0±10% | 90 | 5 | 15 | 4.0 | 6 | 500 | 1200 | K | 48 | 0.015 |
| VGAS222042Y900 | 42 | 37 | 56±10% | 90 | 10 | 15 | 12 | 24 | 1000 | 5000 | K | 48 | 0.06 |
| VCAS120645K900 | 45 | 35 | 56±10% | 90 | 1 | 25 | 0.6 | - | 200 | 260 | K | 48 | 0.012N |
| 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 |
| VGAS181256U111 | 56 | 40 | 68±10% | 110 | 5 | 15 | 4.8 | - | 500 | 1100 | K | 48 | 0.04 |
| 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 |
| VGAS121065P131 | 65 | 50 | 82±10% | 135 | 2.5 | 15 | 2.7 | - | 350 | 600 | K | 48 | 0.05 |
| VGAS181265U131 | 65 | 50 | 82±10% | 135 | 5 | 15 | 4.5 | - | 400 | 800 | K | 48 | 0.03 |
| VGAS222065Y131 | 65 | 50 | 82±10% | 135 | 10 | 15 | 6.5 | - | 1100 | 3000 | K | 48 | 0.06 |
| VCAS121085S151 __ | 85 | 60 | 100.0±10% | 150 | 1 | 35 | 2 | - | 250 | 275 | K | 48 | 0.040 |
| VGAS181285U161 | 85 | 60 | 100±10% | 165 | 5 | 15 | 4.5 | - | 400 | 500 | K | 48 | 0.04 |

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_V]

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)

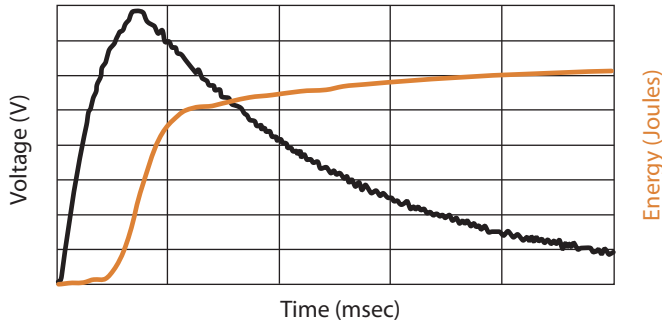
TransGuard® Automotive Series

Multilayer Varistors for Automotive Applications

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.

LOAD DUMP LIBRARY

Typical max Vz versus Pulse duration and Ri

12V SYSTEMS

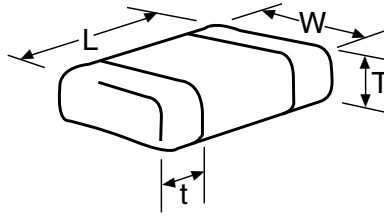
| | | | |
|-----------------------|------|----|----|
| VCAS060316B400 | 0.5Ω | 1Ω | 4Ω |
| 100ms | 37 | 38 | 42 |
| 200ms | 36 | 37 | 41 |
| 400ms | 35 | 36 | 39 |
| VCAS120616K380 | 0.5Ω | 1Ω | 4Ω |
| 100ms | 42 | 45 | 55 |
| 200ms | 40 | 43 | 50 |
| 400ms | 39 | 40 | 45 |
| VCAS121016J390 | 0.5Ω | 1Ω | 4Ω |
| 100ms | 48 | 53 | 74 |
| 200ms | 46 | 50 | 64 |
| 400ms | 43 | 46 | 56 |
| VGAS181216P400 | 0.5Ω | 1Ω | 4Ω |
| 100ms | 46 | 52 | 72 |
| 200ms | 37 | 41 | 59 |
| 400ms | 32 | 35 | 51 |
| VGAS222016Y400 | 0.5Ω | 1Ω | 4Ω |
| 100ms | 53 | 60 | 77 |
| 200ms | 50 | 55 | 73 |
| 400ms | 47 | 50 | 66 |
| VCAS040218X400 | 0.5Ω | 1Ω | 4Ω |
| 100ms | 38 | 39 | 40 |
| 200ms | 37 | 37 | 38 |
| 400ms | 34 | 35 | 36 |
| VCAS060318A400 | 0.5Ω | 1Ω | 4Ω |
| 100ms | 37 | 38 | 42 |
| 200ms | 36 | 37 | 41 |
| 400ms | 35 | 36 | 39 |
| VCAS080518A400 | 0.5Ω | 1Ω | 4Ω |
| 100ms | 37 | 39 | 40 |
| 200ms | 35 | 38 | 39 |
| 400ms | 33 | 37 | 38 |
| VCAS080518C400 | 0.5Ω | 1Ω | 4Ω |
| 100ms | 40 | 41 | 48 |
| 200ms | 39 | 40 | 45 |
| 400ms | 38 | 39 | 42 |
| VCAS120618A400 | 0.5Ω | 1Ω | 4Ω |
| 100ms | 43 | 45 | 55 |
| 200ms | 41 | 43 | 48 |
| 400ms | 40 | 41 | 45 |
| VCAS120618D400 | 0.5Ω | 1Ω | 4Ω |
| 100ms | 42 | 45 | 55 |
| 200ms | 40 | 42 | 50 |
| 400ms | 39 | 40 | 45 |
| VCAS120618E380 | 0.5Ω | 1Ω | 4Ω |
| 100ms | 42 | 45 | 55 |
| 200ms | 40 | 43 | 50 |
| 400ms | 39 | 40 | 45 |
| VCAS121018J390 | 0.5Ω | 1Ω | 4Ω |
| 100ms | 48 | 53 | 74 |
| 200ms | 46 | 50 | 64 |
| 400ms | 43 | 46 | 56 |

24V SYSTEMS

| | | | |
|-----------------------|-----|-----|-----|
| VCAS060326A580 | 1Ω | 4Ω | 8Ω |
| 100ms | 51 | 56 | 58 |
| 200ms | 50 | 54 | 56 |
| 400ms | 49 | 51 | 53 |
| VCAS080526A580 | 1Ω | 4Ω | 8Ω |
| 100ms | 51 | 53 | 59 |
| 200ms | 49 | 51 | 57 |
| 400ms | 48 | 50 | 51 |
| VCAS080526C580 | 1Ω | 4Ω | 8Ω |
| 100ms | 51 | 54 | 62 |
| 200ms | 49 | 51 | 56 |
| 400ms | 48 | 49 | 51 |
| VCAS120626D580 | 1Ω | 4Ω | 8Ω |
| 100ms | 52 | 60 | 68 |
| 200ms | 50 | 57 | 65 |
| 400ms | 47 | 54 | 61 |
| VCAS121026H560 | 1Ω | 4Ω | 8Ω |
| 100ms | 61 | 74 | 91 |
| 200ms | 59 | 69 | 82 |
| 400ms | 55 | 64 | 70 |
| VCAS060330A650 | 1Ω | 4Ω | 8Ω |
| 100ms | 57 | 59 | 63 |
| 200ms | 56 | 58 | 61 |
| 400ms | 54 | 57 | 58 |
| VCAS080530A650 | 1Ω | 4Ω | 8Ω |
| 100ms | 58 | 62 | 66 |
| 200ms | 56 | 61 | 64 |
| 400ms | 53 | 57 | 61 |
| VCAS080530C650 | 1Ω | 4Ω | 8Ω |
| 100ms | 58 | 61 | 63 |
| 200ms | 57 | 58 | 62 |
| 400ms | 55 | 56 | 59 |
| VCAS120630D650 | 1Ω | 4Ω | 8Ω |
| 100ms | 61 | 70 | 75 |
| 200ms | 57 | 66 | 69 |
| 400ms | 56 | 62 | 64 |
| VCAS121030H620 | 1Ω | 4Ω | 8Ω |
| 100ms | 70 | 77 | 98 |
| 200ms | 64 | 70 | 89 |
| 400ms | 56 | 65 | 70 |
| VGAS181234U770 | 1Ω | 4Ω | 8Ω |
| 100ms | 87 | 110 | 125 |
| 200ms | 82 | 97 | 114 |
| 400ms | 75 | 85 | 95 |
| VGAS222034Y770 | 1Ω | 4Ω | 8Ω |
| 100ms | 100 | 125 | 165 |
| 200ms | 91 | 115 | 155 |
| 400ms | 84 | 104 | 120 |

TransGuard® Automotive Series

Multilayer Varistors for Automotive Applications

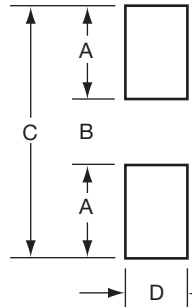


DIMENSIONS: mm (inches)

| AVX Style | | 0402 | 0603 | 0805 | 1206 | 1210 | 1812 | 2220 | 3220 |
|-------------------|-------------|----------------------------|----------------------------|----------------------------|--|----------------------------|----------------------------|----------------------------|----------------------------|
| (L) Length | mm (in.) | 1.00±0.10 (0.040±0.004) | 1.60±0.15 (0.063±0.006) | 2.01±0.20 (0.079±0.008) | 3.20±0.20 (0.126±0.008) | 3.20±0.20 (0.126±0.008) | 4.50±0.30 (0.177±0.012) | 5.70±0.40 (0.224±0.016) | 8.20±0.40 (0.323±0.016) |
| (W) Width | mm (in.) | 0.50±0.10 (0.020±0.004) | 0.80±0.15 (0.031±0.006) | 1.25±0.20 (0.049±0.008) | 1.60±0.20 (0.063±0.008) | 2.49±0.20 (0.098±0.008) | 3.20±0.30 (0.126±0.012) | 5.00±0.40 (0.197±0.016) | 5.00±0.40 (0.197±0.016) |
| (T) Max Thickness | mm (in.) | 0.6 (0.024) | 0.9 (0.035) | 1.02 (0.040) | 1.02 (0.040) 1.27 (0.050) ¹⁾ 1.70 (0.067) ²⁾ | 1.70 (0.067) | 2.00 (0.080) | 2.50 (0.098) | 2.50 max. (0.098 max.) |
| (t) Land Length | mm (in.) | 0.25±0.15 (0.010±0.006) | 0.35±0.15 (0.014±0.006) | 0.71 max. (0.028 max.) | 0.94 max. (0.037 max.) | 1.14 max. (0.045 max.) | 1.00 max. (0.039 max.) | 1.00 max. (0.039 max.) | 1.30 max. (0.051 max.) |

1) Applicable for: VCAS120618E380

2) Applicable for: VCAS120626F540, VCAS120631M650, VCAS120638N770, VCAS120642L800, VCAS120645K900, VCAS120656F111, VCAS120660M131



SOLDERING PAD: mm (inches)

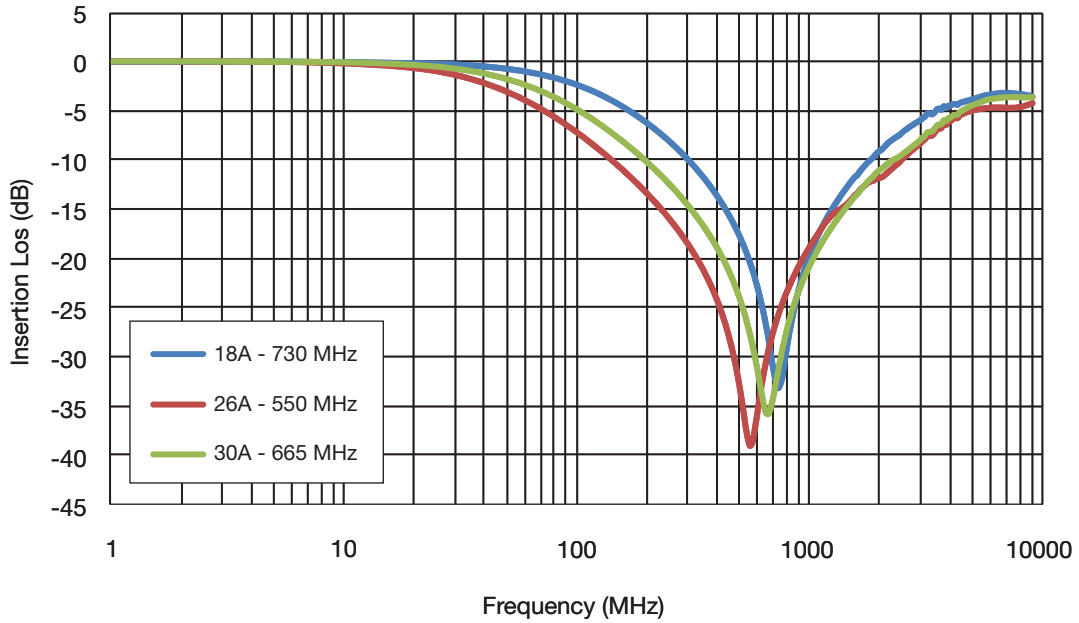
| Pad Layout | 0402 | 0603 | 0805 | 1206 | 1210 | 1812 | 2220 | 3220 |
|------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|
| A | 1.61 (0.024) | 0.89 (0.035) | 1.02 (0.040) | 1.02 (0.040) | 1.02 (0.040) | 1.00 (0.039) | 1.00 (0.039) | 2.21 (0.087) |
| B | 1.51 (0.020) | 0.76 (0.030) | 1.02 (0.040) | 2.03 (0.080) | 2.03 (0.080) | 3.60 (0.142) | 4.60 (0.18) | 5.79 (0.228) |
| C | 1.70 (0.067) | 2.54 (0.100) | 3.05 (0.120) | 4.06 (0.160) | 4.06 (0.160) | 5.60 (0.220) | 6.60 (0.26) | 10.21 (0.402) |
| D | 1.51 (0.020) | 0.76 (0.030) | 1.27 (0.050) | 1.65 (0.065) | 2.54 (0.100) | 3.00 (0.118) | 5.00 (0.20) | 5.50 (0.217) |

TransGuard® Automotive Series

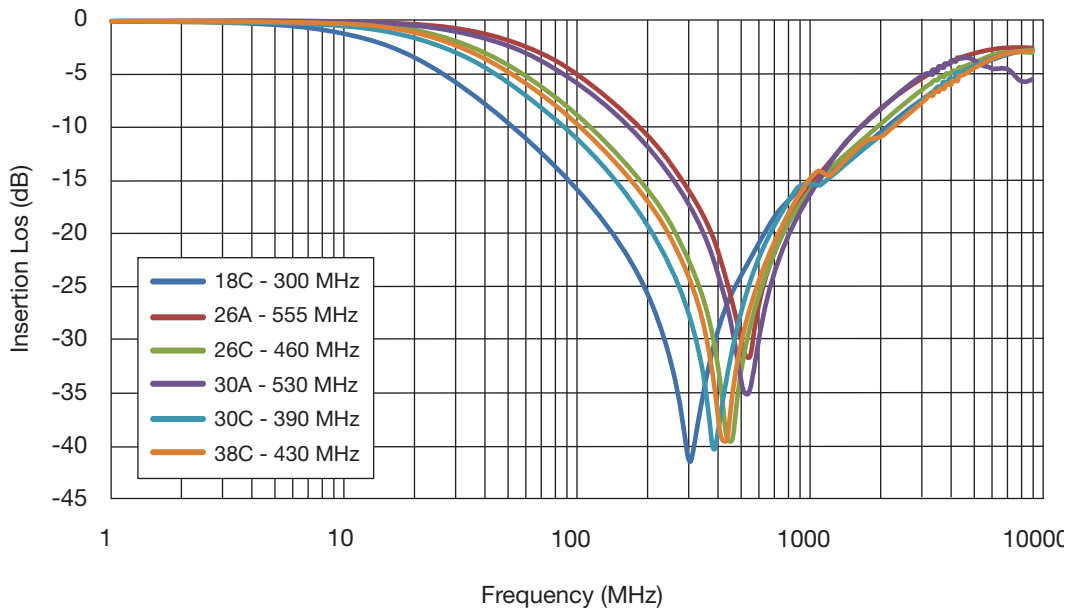
Multilayer Varistors for Automotive Applications

FORWARD TRANSMISSION CHARACTERISTICS (S21)

0603 Case Size



0805 Case Size

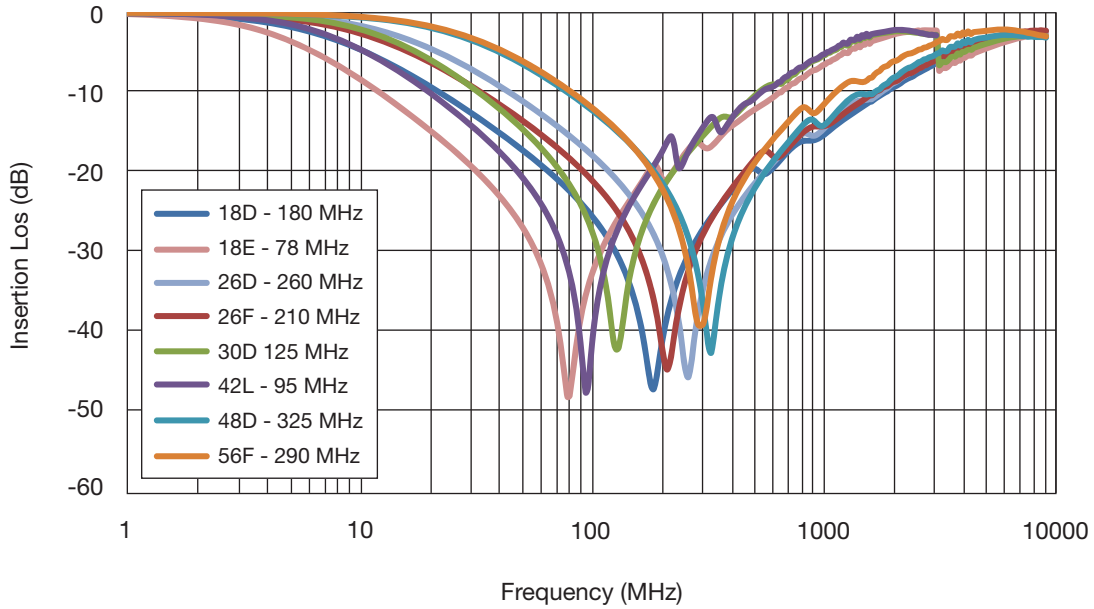


TransGuard® Automotive Series

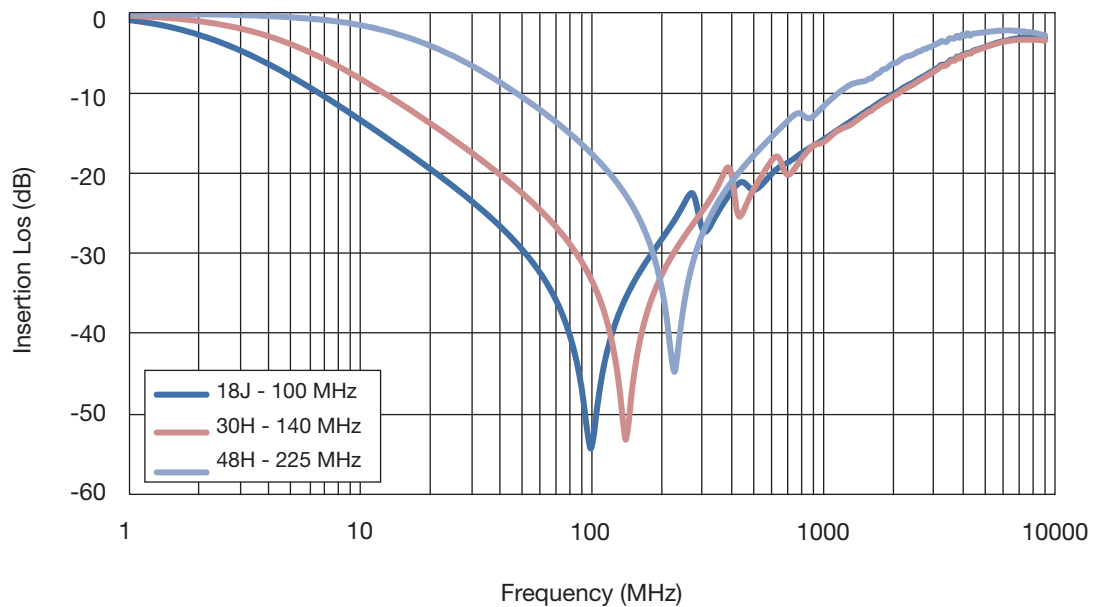
Multilayer Varistors for Automotive Applications

FORWARD TRANSMISSION CHARACTERISTICS (S21)

1206 Case Size



1210 Case Size

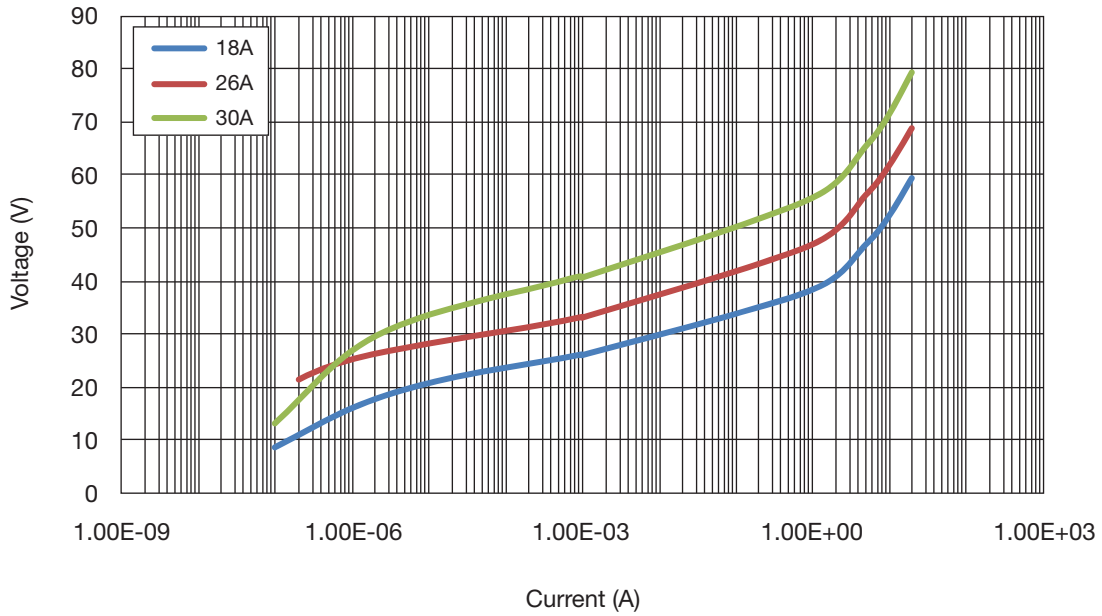


TransGuard® Automotive Series

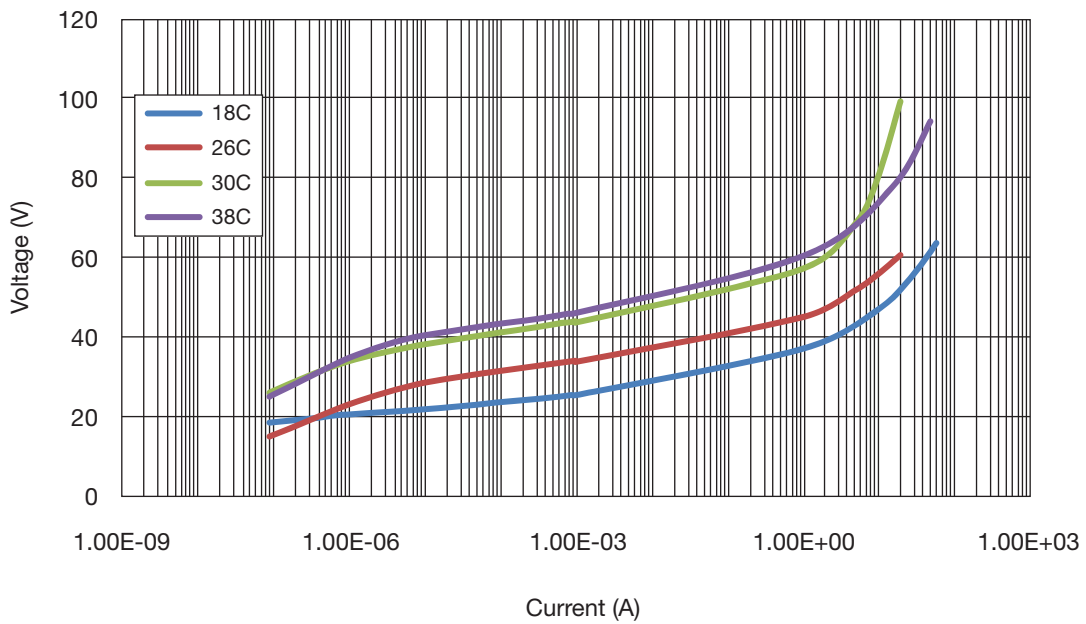
Multilayer Varistors for Automotive Applications

V-I CHARACTERISTICS

0603 Case Size



0805 Case Size

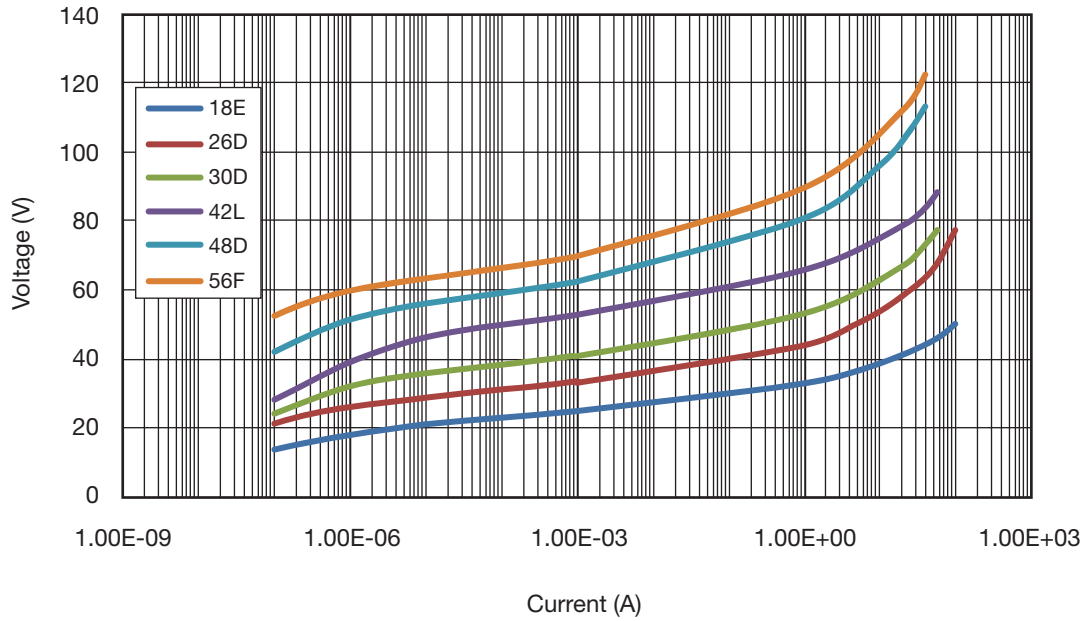


TransGuard® Automotive Series

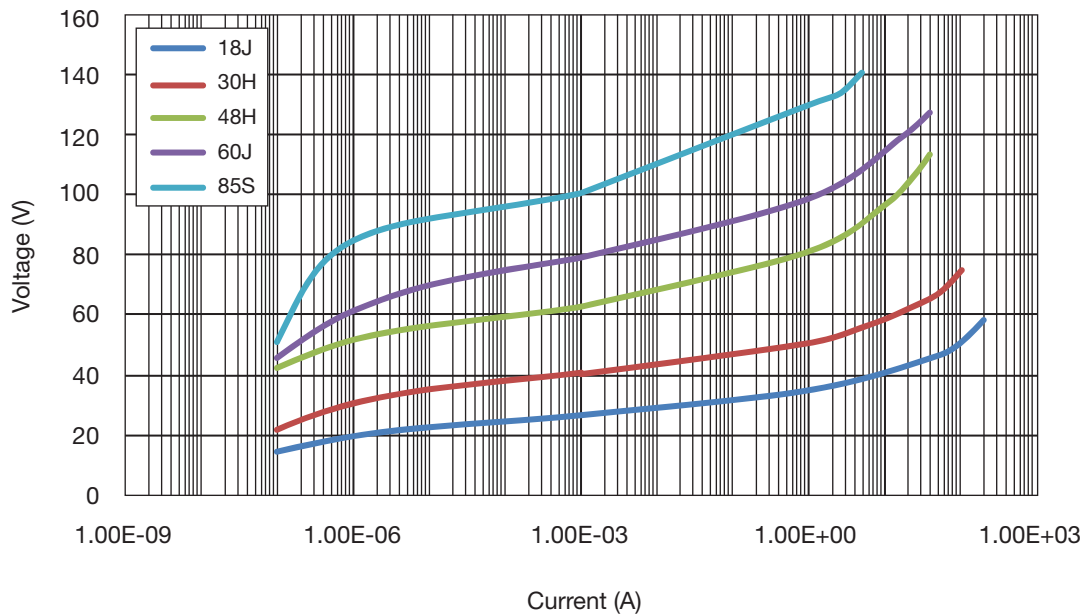
Multilayer Varistors for Automotive Applications

V-I CHARACTERISTICS

1206 Case Size



1210 Case Size

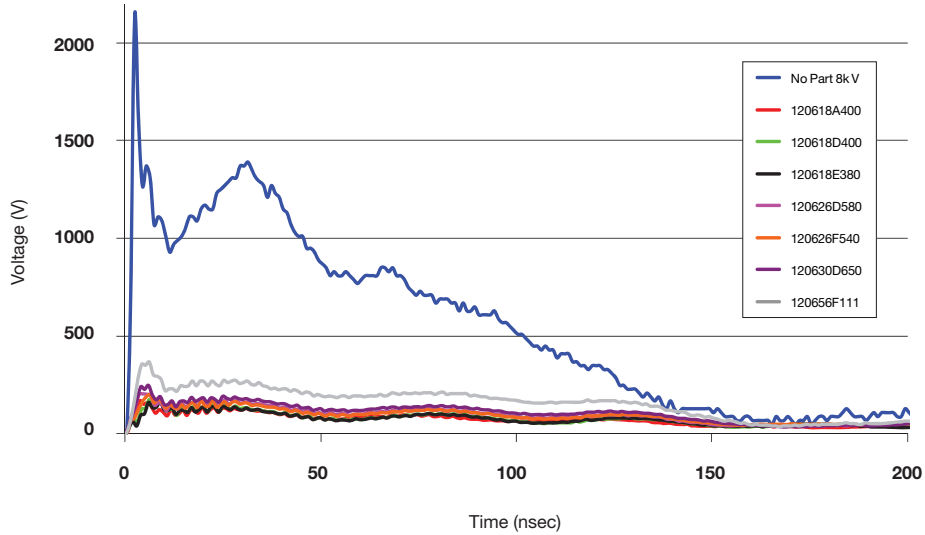


TransGuard® Automotive Series

Multilayer Varistors for Automotive Applications

ESD V-I CHARACTERISTICS

8 kV ESD Vc
(150pF/300ohm IEC Network)



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 |

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

