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# Glass Encapsulated TransGuard® Automotive Series



## Multilayer Varistors for Automotive Applications



### GENERAL DESCRIPTION

The Glass Encapsulated 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.

These large case size parts extend TransGuard range into high energy applications. In addition the glass encapsulation provides enhanced resistance against harsh environment or process such as acidic environment, salts or chlorite flux.

### GENERAL CHARACTERISTICS

- Operating Temperature: -55°C to 125°C
- Case Size: 1206-2200
- Working Voltage: 16-65Vdc
- Energy: 07-12J
- Peak Current: 200-2000A

### FEATURES

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

### APPLICATIONS

- Various Automotive Applications
- Internal Combustion Engine (ICE) Vehicles
- Hybrid Electric Vehicles (HEV)
- Plug-in Hybrid Electric Vehicles (PHEV)
- Commercial Vehicles
- Sensors
- LIN BUS
- ECU
- DC Motor
- Relays
- and more
- Applications where Glass Encapsulation is needed for Harsh Environment/Acid-Resistance

### HOW TO ORDER

<b>V</b> ↓ Varistor	<b>G</b> ↓ Glass Encapsulate Chip	<b>AS</b> ↓ Automotive Series	<b>1812</b> ↓ Chip Size 1206 1210 1812 2220	<b>16</b> ↓ Working Voltage 16 = 16Vdc 18 = 18Vdc 26 = 26Vdc 30 = 30Vdc 31 = 31Vdc 34 = 34Vdc 42 = 42Vdc 48 = 48Vdc 60 = 60Vdc 65 = 65Vdc	<b>P</b> ↓ Energy Rating F = 0.7J H = 1.2J J = 1.6J S = 2.0J P = 2.5-3.7J U = 4.0-5.0J Y = 6.5-12J	<b>400</b> ↓ Clamping Voltage 390 = 40V 400 = 42V 440 = 44V 540 = 54V 560 = 60V 570 = 57V 650 = 65V 770 = 77V 900 = 90V 101 = 100V 121 = 120V 131 = 135V	<b>R</b> ↓ Package D = 7" reel R = 7" reel T = 13" reel	<b>P</b> ↓ Termination P = Ni/Sn plated
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### PHYSICAL DIMENSIONS: mm (inches)

Size (EIA)	Length (L)	Width (W)	Max Thickness (T)	Land Length (t)
1206	3.20±0.20 (0.126±0.008)	1.60±0.20 (0.063±0.008)	1.70 (0.067)	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.)
1812	4.50±0.30 (0.177±0.012)	3.20±0.30 (0.126±0.012)	2.00 (0.079)	1.00 max. (0.040 max.)
2220	5.70±0.40 (0.224±0.016)	5.00±0.40 (0.197±0.016)	2.50 (0.098)	1.00 max. (0.040 max.)

# Glass Encapsulated TransGuard® Automotive Series



## Multilayer Varistors for Automotive Applications

### ELECTRIAL CHARACTERISTICS

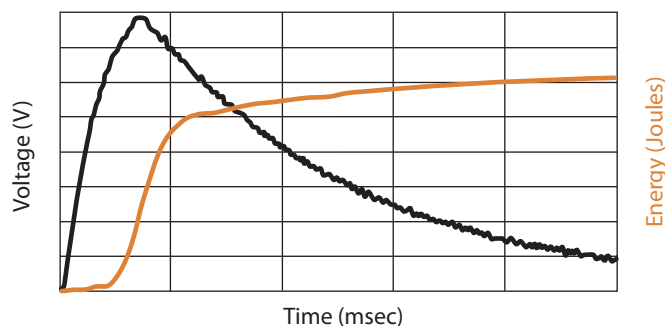
AVX PN	V <sub>W</sub> (DC)	V <sub>W</sub> (AC)	V <sub>B</sub>	V <sub>C</sub>	I <sub>Vc</sub>	I <sub>L</sub>	E <sub>T</sub>	E <sub>LD</sub>	I <sub>P</sub>	Cap	Freq	V <sub>Jump</sub>	P <sub>Diss, MAX</sub>
VGAS120616K390	16	11	24.5±10%	40	1	15	0.6	1.5	200	1100	K	27.5	0.01
VGAS120616N390	16	11	24.5±10%	40	1	15	1.1	2	200	1300	K	27.5	0.01
VGAS121016J400	16	13	25.5±10%	42	5	15	1.6	3	500	2300	K	27.5	0.03
VGAS181216P390	16	11	24.5±10%	40	5	15	2.9	10	1000	7000	K	27.5	0.07
VGAS181216P400	16	11	24.5±10%	42	5	10	2.9	10	1000	5000	K	27.5	0.07
VGAS222016Y400	16	11	24.5±10%	42	10	10	7.2	25	1500	13000	K	25.5	0.10
VGAS120618D400	18	13	25.5±10%	42	1	15	0.4	1.5	150	1200	K	27.5	0.008
VGAS181218P440	18	14	27.5±10%	44	5	15	2.9	6	800	5000	K	27.5	0.05
VGAS120626F540	26	18	33.0±10%	54	1	15	0.7	1.5	200	600	K	27.5	0.008
VGAS121026H560	26	18	34.5±10%	60	5	15	1.2	3	300	1200	K	27.5	0.018
VGAS181226P570	26	23	35.0±10%	57	5	15	3.0	8	600	3000	K	30	0.015
VGAS222026Y570	26	23	35±10%	57	10	15	6.8	20	1100	7000	K	30	0.03
VGAS121030H620	30	21	41.0±10%	67	5	15	1.2	3	280	1000	K	30	0.018
VGAS181231P650	31	25	39.0±10%	65	5	15	3.7	8	800	2600	K	30	0.06
VGAS121034S770	34	30	47.0±10%	77	2.5	15	2	3	400	1000	K	48	0.04
VGAS181234U770	34	30	47.0±10%	77	5	15	5	6.1	800	1500	K	48	0.08
VGAS222034Y770	34	30	47.0±10%	77	10	15	12	25	2000	6300	K	48	0.24
VGAS181242U900	42	35	56.0±10%	90	5	15	4.0	6	500	1800	K	48	0.015
VGAS121048H101	48	34	62.0±10%	100	5	15	1.2	-	250	500	K	48	0.022
VGAS121060J121	60	42	76.0±10%	120	5	15	1.5	-	250	400	K	48	0.03
VGAS121065P131	65	50	82.0±10%	135	2.5	15	2.7	-	350	600	K	48	0.05

V <sub>W</sub> (DC)	DC Working Voltage [V]	E <sub>T</sub>	Transient Energy Rating [J, 10x1000µS]
V <sub>W</sub> (AC)	AC Working Voltage [V]	E <sub>LD</sub>	Load Dump Energy (x10) [J]
V <sub>B</sub>	Typical Breakdown Voltage [V @ 1mA <sub>Vc</sub> , 25°C]	I <sub>P</sub>	Peak Current Rating [A, 8x20µS]
V <sub>C</sub>	Clamping Voltage [V @ I <sub>Vc</sub> ]	Cap	Typical capacitance [pF] @ frequency specified and 0.5V <sub>max</sub> , 25°C, M = 1MHz, K = 1kHz
I <sub>Vc</sub>	Test Current for V <sub>C</sub> [A, 8x20µs]	V <sub>Jump</sub>	Jump Start [V, 5 min]
I <sub>L</sub>	Maximum leakage current at the working voltage, 25°C [µA]	P <sub>Diss</sub>	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.

#### 12V SYSTEMS

<b>VGAS181216P400</b>	0.5Ω	1Ω	4Ω
100ms	46	52	72
200ms	37	41	59
400ms	32	35	51
<b>VGAS222016Y400</b>	0.5Ω	1Ω	4Ω
100ms	53	60	77
200ms	50	55	73
400ms	47	50	66

