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T-62-11 NEW

General Semiconductor Industries, Inc.

HERMETIC SURFACE MOUNT TRANSZORB® TVS HSMC SERIES 1500 WATTS UNIDIRECTIONAL & BIDIRECTIONAL

FEATURES

- **1500 watts peak power**
- **Low lead inductance**
- **Voltage range: 5.0 to 170 volts**
- **Hermetic ceramic package**
- **JANTX equivalent processing available per MIL-S-19500 (consult factory)**

MAXIMUM RATINGS

- 1500 watts Peak Power dissipation (10/1000µs)
- $t_{clamping}$ (0 volts to BV min unidirectional): < 1 x 10^{-9} seconds
- Operating and Storage Temperature: -55° to +175°C

MECHANICAL CHARACTERISTICS

- Hermetic ceramic surface mountable case
- Gull-wing or J-Bend lead configurations
- Terminals: Copper with Nickel-Gold plate
- Body marked with type code (see table on next page), logo, and date code. Cathode (positive end) marked with polarity band (unidirectional only).

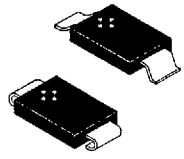
DESCRIPTION

This series of TransZorb® transient voltage suppressors, available in hermetic surface mountable packages, is designed to optimize space on printed circuit boards and ceramic substrates, to protect sensitive components from transient voltage damage. The hermetically sealed ceramic package provides high reliability under the most demanding environmental conditions. Processing to the requirements of MIL-S-19500 is available.

TransZorb® transient voltage suppressors are characterized by their high surge capability, extremely fast response time, and low on-state impedance. These silicon avalanche devices start to conduct at low currents with a minimum breakdown voltage (BV) and will limit a transient to the clamping voltage (Vc), which depends on the transient current amplitude and duration.

The HSMC series, rated for 1500 watts during a one millisecond pulse, will protect sensitive circuits against transients induced by lightning and inductive load switching from motors or relays. They are also effective against electrostatic discharge (ESD) and nuclear electromagnetic pulse (NEMP).

CASE



ABBREVIATIONS & SYMBOLS

V_R	Stand Off Voltage: Applied Reverse Voltage to assure a non-conductive condition. (See Note 1)
$BV_{(min)}$	This is the minimum Breakdown Voltage the device will exhibit and is used to assure that conduction does not occur prior to this voltage level at 25°C
V_C	Maximum Clamping Voltage. The maximum peak voltage appearing across the TransZorb® TVS when subjected to the peak pulse current in a one millisecond time interval. The peak pulse voltages are the combination of voltage rise due to both the series resistance and thermal rise.
I_{PP}	Peak Pulse Current - See Figure 2
P_P	Peak Pulse Power
I_R	Reverse Leakage

Note1:
A TransZorb® TVS is normally selected according to the reverse "Stand Off Voltage" (VR) which should be equal to or greater than the dc or continuous peak operating voltage level

FIGURE 1 — Peak Pulse Power vs Pulse Time

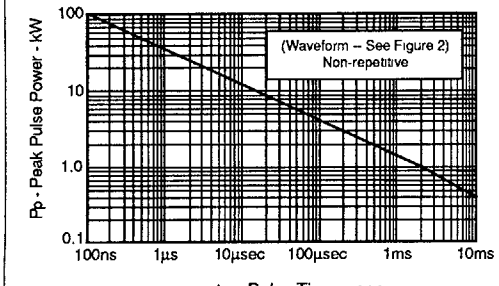
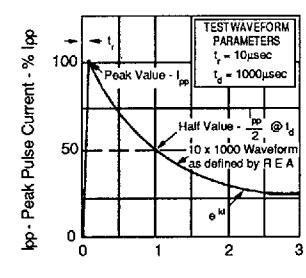


FIGURE 2 — Pulse Waveform



ECTRICAL CHARACTERISTICS @ 25°C

GSI Part Number Unidirectional Bidirectional Gull-Wing	GSI Part Number Unidirectional Bidirectional Modified J-Bend	Device Marking Code	Reverse Stand-Off Voltage (See NOTE 1) V_R volts	Breakdown Voltage BV @ I_T volts MIN.	I_T mA	Maximum Clamping Voltage @ I_{PP} V_C volts	Peak Pulse Current (See FIG. 2) I_{PP} amps	Minimum Reverse Leakage @ V_R I_R µA
◆ HSMCG5.0	HSMCJ5.0	GKD	5.0	6.40	10	9.6	156.2	1000
◆ HSMCG5.0A	HSMCJ5.0A	GKE	5.0	6.40	10	9.2	163.0	1000
◆ HSMCG6.0	HSMCJ6.0	GKH	6.0	6.67	10	11.4	131.6	1000
◆ HSMCG6.0A	HSMCJ6.0A	GKK	6.0	6.67	10	10.3	145.6	1000
◆ **HSMCG6.5C**	**HSMCJ6.5C**	**GKS**	**6.5**	**7.22**	**10**	**12.3**	**122.0**	**1000**
◆ **HSMCG6.5CA**	**HSMCJ6.5CA**	**GKT**	**6.5**	**7.22**	**10**	**11.2**	**133.9**	**1000**
HSMCG7.0	HSMCJ7.0	GKW	7.0	7.78	10	13.3	112.8	200
HSMCG7.0A	HSMCJ7.0A	GKX	7.0	7.78	10	12.0	125.0	200
◆ **HSMCG7.5C**	**HSMCJ7.5C**	**GLE**	**7.5**	**8.33**	**1**	**14.3**	**104.9**	**200**
◆ **HSMCG7.5CA**	**HSMCJ7.5CA**	**GLF**	**7.5**	**8.33**	**1**	**12.9**	**116.3**	**200**
◆ HSMCG8.0	HSMCJ8.0	GLK	8.0	8.89	1	15.0	100.0	50
◆ HSMCG8.0A	HSMCJ8.0A	GLL	8.0	8.89	1	13.6	110.3	50
◆ **HSMCG8.5C**	**HSMCJ8.5C**	**GLX**	**8.5**	**9.44**	**1**	**15.9**	**94.3**	**50**
◆ **HSMCG8.5CA**	**HSMCJ8.5CA**	**GLY**	**8.5**	**9.44**	**1**	**14.4**	**104.2**	**50**
HSMCG9.0	HSMCJ9.0	GMB	9.0	10.0	1	16.9	88.7	10
HSMCG9.0A	HSMCJ9.0A	**GMC**	9.0	10.0	1	15.4	97.4	10
HSMCG9.0C	**HSMCJ9.0C**	**GMF**	**9.0**	**10.0**	**1**	**16.9**	**88.7**	**20**
HSMCG9.0CA	**HSMCJ9.0CA**	GMG	**9.0**	**10.0**	**1**	**15.4**	**97.4**	**20**
◆ HSMCG10	HSMCJ10	GML	10	11.1	1	18.8	79.8	5
◆ HSMCG10A	HSMCJ10A	**GMM**	10	11.1	1	17.0	88.2	5
◆ **HSMCG10C**	**HSMCJ10C**	**GMR**	**10**	**11.1**	**1**	**18.8**	**79.8**	**10**
◆ **HSMCG10CA**	**HSMCJ10CA**	GMS	**10**	**11.1**	**1**	**17.0**	**88.2**	**10**
◆ HSMCG12	HSMCJ12	GMZ	12	13.3	1	22.0	68.2	5
◆ HSMCG12A	HSMCJ12A	**GNA**	12	13.3	1	19.9	75.3	5
◆ **HSMCG12C**	**HSMCJ12C**	**GNE**	**12**	**13.3**	**1**	**22.0**	**68.2**	**5**
◆ **HSMCG12CA**	**HSMCJ12CA**	**GNF**	**12**	**13.3**	**1**	**19.9**	**75.3**	**5**
◆ HSMCG13	HSMCJ13	GNK	13	14.4	1	23.8	63.0	5
◆ HSMCG13A	HSMCJ13A	GNL	13	14.4	1	21.5	69.7	5
HSMCG14	HSMCJ14	GNP	14	15.6	1	25.8	58.1	5
HSMCG14A	HSMCJ14A	GNQ	14	15.6	1	23.2	64.7	5
HSMCG14C	**HSMCJ14C**	**GNT**	**14**	**15.6**	**1**	**25.8**	**58.1**	**5**
HSMCG14CA	**HSMCJ14CA**	**GNV**	**14**	**15.6**	**1**	**23.2**	**64.7**	**5**
◆ HSMCG15	HSMCJ15	GNY	15	16.7	1	26.9	55.8	5
◆ HSMCG15A	HSMCJ15A	GNZ	15	16.7	1	24.4	61.5	5
◆ **HSMCG15C**	**HSMCJ15C**	**GPC**	**15**	**16.7**	**1**	**26.9**	**55.8**	**5**
◆ **HSMCG15CA**	**HSMCJ15CA**	**GPD**	**15**	**16.7**	**1**	**24.4**	**61.5**	**5**
HSMCG16	HSMCJ16	GPG	16	17.8	1	28.8	52.1	5
HSMCG16A	HSMCJ16A	GPH	16	17.8	1	26.0	57.7	5
HSMCG17	HSMCJ17	GPM	17	18.9	1	30.5	49.2	5
HSMCG17A	HSMCJ17A	GPN	17	18.9	1	27.6	53.3	5
HSMCG18	HSMCJ18	GPR	18	20.0	1	32.2	46.6	5
HSMCG18A	HSMCJ18A	GPS	18	20.0	1	29.2	51.4	5
◆ **HSMCG18C**	**HSMCJ18C**	**GPV**	**18**	**20.0**	**1**	**32.2**	**46.6**	**5**
◆ **HSMCG18CA**	**HSMCJ18CA**	**GPW**	**18**	**20.0**	**1**	**29.2**	**51.4**	**5**
HSMCG20	HSMCJ20	GPZ	20	22.2	1	35.8	41.9	5
HSMCG20A	HSMCJ20A	GQA	20	22.2	1	32.4	46.3	5
HSMCG22	HSMCJ22	GQD	22	24.4	1	39.4	38.1	5
HSMCG22A	HSMCJ22A	GQE	22	24.4	1	35.5	42.2	5
HSMCG22C	**HSMCJ22C**	**GQL**	**22**	**24.4**	**1**	**39.4**	**38.1**	**5**
HSMCG22CA	**HSMCJ22CA**	**GQM**	**22**	**24.4**	**1**	**35.5**	**42.2**	**5**
◆ HSMCG24	HSMCJ24	GQS	24	26.7	1	43.0	34.9	5
◆ HSMCG24A	HSMCJ24A	GQV	24	26.7	1	38.9	38.6	5
◆ **HSMCG24C**	**HSMCJ24C**	**GQY**	**24**	**26.7**	**1**	**43.0**	**34.9**	**5**
◆ **HSMCG24CA**	**HSMCJ24CA**	**GQZ**	**24**	**26.7**	**1**	**38.9**	**38.6**	**5**
HSMCG26	HSMCJ26	GRC	26	28.9	1	46.6	32.2	5
HSMCG26A	HSMCJ26A	GRD	26	28.9	1	42.1	35.6	5
◆ **HSMCG26C**	**HSMCJ26C**	**GRG**	**26**	**28.9**	**1**	**46.6**	**32.2**	**5**
◆ **HSMCG26CA**	**HSMCJ26CA**	**GRH**	**26**	**28.9**	**1**	**42.1**	**35.6**	**5**
◆ HSMCG28	HSMCJ28	GRM	28	31.1	1	50.0	30.0	5
◆ HSMCG28A	HSMCJ28A	GRN	28	31.1	1	45.4	33.0	5
◆ HSMCG30	HSMCJ30	GRR	30	33.3	1	53.5	28.0	5
◆ HSMCG30A	HSMCJ30A	GRS	30	33.3	1	48.4	31.0	5
HSMCG30C	**HSMCJ30C**	**GRV**	**30**	**33.3**	**1**	**53.5**	**28.0**	**5**
HSMCG30CA	**HSMCJ30CA**	**GRW**	**30**	**33.3**	**1**	**48.4**	**31.0**	**5**
◆ HSMCG33	HSMCJ33	GRZ	33	36.7	1	59.0	25.2	5
◆ HSMCG33A	HSMCJ33A	GSA	33	36.7	1	53.3	28.1	5
HSMCG33C	**HSMCJ33C**	**GSD**	**33**	**36.7**	**1**	**59.0**	**25.2**	**5**
HSMCG33CA	**HSMCJ33CA**	**GSE**	**33**	**36.7**	**1**	**53.3**	**28.1**	**5**

ELECTRICAL CHARACTERISTICS @ 25°C

	GSI Part Number Unidirectional Bidirectional Gull-Wing	Modified J-Bend	Device Marking Code	Reverse Stand-Off Voltage (See NOTE 1) V_R volts	Breakdown Voltage BV @ I_T volts MIN.	I_T mA	Maximum Clamping Voltage @ I_{PP} V_C volts	Peak Pulse Current (See FIG. 2) I_{PP} amps	Minimum Reverse Leakage @ V_R I_R µA
	HSMCG36	HSMCJ36	GSH	36	40 0	1	64.3	23.3	5
◆	HSMCG36A	HSMCJ36A	GSK	36	40 0	1	58.1	25.8	5
	HSMCG36C	**HSMCJ36C**	**GSN**	**36**	**40.0**	**1**	**64.3**	**23.3**	**5**
	HSMCG36CA	**HSMCJ36CA**	**GSP**	**36**	**40.0**	**1**	**58.1**	**25.8**	**5**
	HSMCG40	HSMCJ40	GSS	40	44.4	1	71.4	21.0	5
◆	HSMCG40A	HSMCJ40A	GST	40	44.4	1	64.5	23.2	5
	HSMCG40C	**HSMCJ40C**	**GSX**	**40**	**44.4**	**1**	**71.4**	**21.0**	**5**
	HSMCG40CA	**HSMCJ40CA**	**GSY**	**40**	**44.4**	**1**	**64.5**	**23.2**	**5**
	HSMCG43	HSMCJ43	GTB	43	47.8	1	76.7	19.6	5
	HSMCG43A	HSMCJ43A	GTC	43	47 8	1	69.4	21.6	5
◆	**HSMCG43C**	**HSMCJ43C**	**GTG**	**43**	**47.8**	**1**	**76.7**	**19.6**	**5**
◆	**HSMCG43CA**	**HSMCJ43CA**	**GTH**	**43**	**47.8**	**1**	**69.4**	**21.6**	**5**
	HSMCG48	HSMCJ48	GTM	48	53 3	1	85 5	17.5	5
	HSMCG48A	HSMCJ48A	GTN	48	53.3	1	77.4	19.4	5
	HSMCG51	HSMCJ51	GTV	51	56 7	1	91.1	18.5	5
	HSMCG51A	HSMCJ51A	GTW	51	56 7	1	82.4	18.2	5
	HSMCG58	HSMCJ58	GTZ	58	64 4	1	103	14.6	5
	HSMCG58A	HSMCJ58A	GUA	58	64.4	1	93.6	16.0	5
	HSMCG64	HSMCJ64	GUH	64	71.1	1	114	13.2	5
	HSMCG64A	HSMCJ64A	GUK	64	71 1	1	103	14.6	5
	HSMCG70	HSMCJ70	GUV	70	77 8	1	125	12.0	5
	HSMCG70A	HSMCJ70A	GUW	70	77 8	1	113	13.3	5
	HSMCG78	HSMCJ78	GVA	78	86 7	1	139	10.8	5
	HSMCG78A	HSMCJ78A	GVF	78	86.7	1	126	11.4	5
	HSMCG90	HSMCJ90	GVK	90	100	1	160	9.4	5
	HSMCG90A	HSMCJ90A	GVQ	90	100	1	145	10.3	5
	HSMCG100	HSMCJ100	GVT	100	111	1	179	8.4	5
	HSMCG100A	HSMCJ100A	GVU	100	111	1	162	9.3	5
	HSMCG100CA	**HSMCJ100CA**	**GVX**	**100**	**114**	**1**	**168**	**8.8**	**5**
	HSMCG110	HSMCJ110	GWA	110	122	1	196	7.7	5
	HSMCG110A	HSMCJ110A	GWB	110	122	1	177	8.4	5
	HSMCG120	HSMCJ120	GWE	120	133	1	214	7.0	5
	HSMCG120A	HSMCJ120A	GWF	120	133	1	193	7.8	5
	HSMCG130	HSMCJ130	GWK	130	144	1	231	6.5	5
	HSMCG130A	HSMCJ130A	GWL	130	144	1	209	7.2	5
	HSMCG150	HSMCJ150	GWP	150	167	1	268	5.6	5
	HSMCG150A	HSMCJ150A	GWQ	150	167	1	243	6.2	5
	HSMCG160	HSMCJ160	GWT	160	178	1	287	5.2	5
	HSMCG160A	HSMCJ160A	GWU	160	178	1	259	5.8	5
	HSMCG170	HSMCJ170	GWX	170	189	1	304	4.9	5
	HSMCG170A	HSMCJ170A	GWY	170	189	1	275	5.5	5
	HSMCG170CA	**HSMCJ170CA**	**GXB**	**170**	**189**	**1**	**294**	**5.0**	**5**

MIL PROCESSING High reliability to the requirements of MIL-S-19500 is available

- To specify devices with screening equivalent to JANTX level, add suffix -H1 to the part number
  For example, HSMCG36A-H1 = 36V unidirectional suppressor with JANTX equivalent screening.

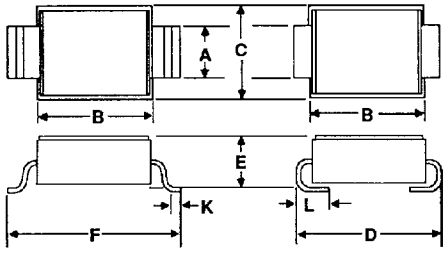
- To specify devices with Group B equivalent sample tests in addition to JANTX equivalent screening, add suffix -H2 to the part number
  For example, HSMC36A-H2 = 36V unidirectional suppressor with JANTX equivalent screening AND Group B processing.

◆Preferred voltage: Popular design choices which allow shorter lead times and greater scheduling flexibility

Other voltages available upon request. Consult factory

CASE OUTLINE

"GULL-WING" "C"BEND (MODIFIED J-BEND)



DIMENSIONS IN INCHES								
	A	B	C	D	E	F	K	L
MIN	.108	.260	.225	.330	.087	.380	.024	.018
MAX	.128	.280	.245	.350	.105	.400	.032	.038
DIMENSIONS IN MILLIMETERS								
MIN	2.74	6.60	5.72	9.64	2.21	9.64	.610	.457
MAX	3.25	7.11	6.22	10.16	2.67	10.16	.810	.965

Typical Standoff Height: 0.004" - 0.012" (0.1mm - 0.3mm)

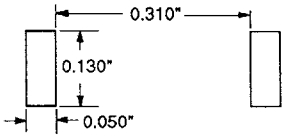
APPLICATIONS

General Semiconductor Industries' surface mountable packages are designed specifically for transient voltage suppression. The wide leads assure a large surface contact for good heat dissipation, and a low resistance path for surge current flow to ground. These high speed transient voltage suppressors can be used to effectively protect sensitive components such as integrated circuits and MOS devices.

A 1500W (HSMC) device is normally selected when the transient threat is from induced lightning conducted via external leads or I/O lines. It is also used to protect against switching transients induced by large coils or industrial motors. A system's inherent impedance at the component level is usually high enough to limit transient current to within the peak pulse current (Ipp) rating of this series. In an overstress condition, the failure mode is a short circuit.

RECOMMENDED PAD SIZES

GULL-WING
(Pad distances equal layout for SO-28.)



MODIFIED J-BEND

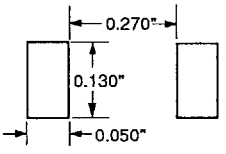


FIGURE 3 – Derating Curve