

# Transient Voltage Suppressor Diode

## **1.5KA22**

(1.5KA6.8 thru 1.5KA43A Series)

Breakdown-Voltage 6.8 to 43V

Peak Pulse Power 1500W

Automotive Applications

# DATASHEET

OEM – General Semiconductor

Source: General Semiconductor Databook 1998

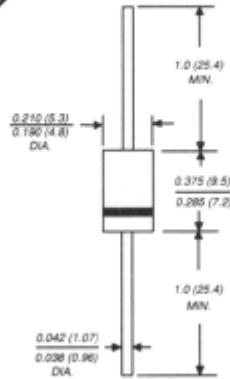
# 1.5KA6.8 THRU 1.5KA43A

## AUTOMOTIVE TRANSIENT VOLTAGE SUPPRESSOR

Breakdown Voltage - 6.8 to 43 Volts Peak Pulse Power - 1500 Watts

Case Style 1.5KA

**PATENTED \***



Dimensions in inches and (millimeters)

\* Patent #'s 4,980,315  
5,166,769  
5,278,094

**Available in unidirectional only**

### FEATURES

- ◆ Designed for under the hood applications
- ◆ Plastic package has Underwriters Laboratory Flammability Classification 94V-0
- ◆ 1500W peak pulse power surge capability with a 10/1000µs waveform, repetition rate (duty cycle): 0.01%
- ◆ Exclusive G.I. patented Passivated Anisotropic Rectifier (PAR) chip construction
- ◆ Excellent clamping capability
- ◆ Low incremental surge resistance
- ◆ Fast response time: typically less than 1.0 ps from 0 Volts to  $V_{(BR)}$  for unidirectional
- ◆ For devices with  $V_{(BR)} \geq 10V$   $I_D$  are typically less than 1.0µA at  $T_A = 150^\circ C$
- ◆ High temperature soldering guaranteed: 300°C/10 seconds, 0.375" (9.5mm) lead length, 5lbs. (2.3 kg) tension

### MECHANICAL DATA

**Case:** Molded plastic over passivated junction  
**Terminals:** Solder plated axial leads, solderable per MIL-STD-750, Method 2026  
**Polarity:** Color band denotes positive end (cathode)  
**Mounting Position:** Any  
**Weight:** 0.045 ounce, 1.2 grams

### MAXIMUM RATINGS AND CHARACTERISTICS

Ratings at 25°C ambient temperature unless otherwise specified.

	SYMBOL	VALUE	UNITS
Peak pulse power dissipation with a 10/1000µs waveform (NOTE 1, FIG. 1)	PPPM	Minimum 1500	Watts
Peak pulse current at $T_A = 25^\circ C$ with a 10/1000µs waveform (NOTE 1, FIG. 3)	IPPM	SEE TABLE 1	Amps
Steady state power dissipation at $T_L = 75^\circ C$ lead lengths 0.375" (9.5mm) (NOTE 2)	$P_{M(AV)}$	5.0	Watts
Peak forward surge current, 8.3ms single half Sine-wave superimposed on rated load (JEDEC Method) (NOTE 3)	$I_{FSM}$	200	Amps
Maximum instantaneous forward voltage at 100A (NOTE 3)	$V_F$	3.5	Volts
Operating junction and storage temperature range	$T_J, T_{STG}$	-65 to +185	°C

**NOTES:**

- (1) Non-repetitive current pulse, per Fig. 3 and derated above  $T_A = 25^\circ C$  per Fig. 2
- (2) Mounted on copper pad area of 0.8 x 0.8" (20 x 20mm) per Fig. 5
- (3) 8.3ms single half sine-wave or equivalent square wave, duty cycle=4 pulses per minutes maximum

**ELECTRICAL CHARACTERISTICS at (TA=25°C unless otherwise noted)**

Device Type	Breakdown Voltage V <sub>(BR)</sub> Volts (NOTE 1)		Test Current at I <sub>r</sub> (mA)	Stand-off Voltage V <sub>WM</sub> (Volts)	Maximum Reverse Leakage at V <sub>WM</sub> I <sub>o</sub> (µA)	T <sub>J</sub> =150°C Maximum Reverse Leakage at V <sub>WM</sub> I <sub>o</sub> (µA)	Peak Pulse Current I <sub>PPM</sub> (NOTE 2) (Amps)	Maximum Clamping Voltage at I <sub>PPM</sub> V <sub>c</sub> (Volts)	Maximum Temperature Coefficient of V <sub>(BR)</sub> (% / °C)
	MIN	MAX							
1.5KA6.8	6.12	7.48	10	5.50	500	2000	139	10.8	0.057
1.5KA6.8A	6.45	7.14	10	5.80	500	2000	143	10.5	0.057
1.5KA7.5	6.75	8.25	10	6.05	250	1000	128	11.7	0.061
1.5KA7.5A	7.13	7.88	10	6.40	250	1000	133	11.3	0.061
1.5KA8.2	7.38	9.02	10	6.63	100	400	120	12.5	0.065
1.5KA8.2A	7.79	8.61	10	7.02	100	400	124	12.1	0.065
1.5KA9.1	8.19	10.0	1.0	7.37	25.0	100	109	13.8	0.068
1.5KA9.1A	8.65	9.55	1.0	7.78	25.0	100	112	13.4	0.068
1.5KA10	9.00	11.0	1.0	8.10	10.0	50.0	100	15.0	0.073
1.5KA10A	9.50	10.5	1.0	8.55	10.0	50.0	103	14.5	0.073
1.5KA11	9.90	12.1	1.0	8.92	5.0	20.0	92.6	16.2	0.075
1.5KA11A	10.5	11.6	1.0	9.40	5.0	20.0	96.2	15.6	0.076
1.5KA12	10.8	13.2	1.0	9.72	2.0	10.0	86.7	17.3	0.076
1.5KA12A	11.4	12.6	1.0	10.2	2.0	10.0	89.8	19.0	0.078
1.5KA13	11.7	14.3	1.0	10.5	2.0	10.0	78.9	18.2	0.081
1.5KA13A	12.4	13.7	1.0	11.1	2.0	10.0	82.4	22.0	0.081
1.5KA15	13.5	16.3	1.0	12.1	2.0	10.0	68.2	21.2	0.084
1.5KA15A	14.3	15.8	1.0	12.8	2.0	10.0	70.8	23.5	0.084
1.5KA16	14.4	17.6	1.0	12.9	2.0	10.0	63.8	23.5	0.086
1.5KA16A	15.2	16.8	1.0	13.6	2.0	10.0	66.7	22.5	0.086
1.5KA18	16.2	19.8	1.0	14.5	2.0	10.0	56.6	26.5	0.088

**ELECTRICAL CHARACTERISTICS at (T<sub>A</sub>=25°C unless otherwise noted)**

Device Type	Breakdown Voltage V <sub>(BR)</sub> Volts (NOTE 1)		Test Current at I <sub>T</sub> (mA)	Stand-off Voltage V <sub>WM</sub> (Volts)	Maximum Reverse Leakage at V <sub>WM</sub> I <sub>o</sub> (µA)	T <sub>J</sub> =150°C Maximum Reverse Leakage at V <sub>WM</sub> I <sub>o</sub> (µA)	Peak Pulse Current I <sub>PPM</sub> (NOTE 2) (Amps)	Maximum Clamping Voltage at I <sub>PPM</sub> V <sub>C</sub> (Volts)	Maximum Temperature Coefficient of V <sub>(BR)</sub> (% / °C)
	MIN	MAX							
1.5KA18A	17.1	18.9	1.0	15.3	2.0	10.0	59.5	25.2	0.088
1.5KA20	18.0	22.0	1.0	16.2	2.0	10.0	51.5	29.1	0.090
1.5KA20A	19.0	21.0	1.0	17.1	2.0	10.0	54.2	27.7	0.090
1.5KA22	19.8	24.2	1.0	17.8	2.0	10.0	47.0	31.9	0.092
1.5KA22A	20.9	23.1	1.0	18.8	2.0	10.0	49.0	30.6	0.092
1.5KA24	21.6	26.4	1.0	19.4	2.0	10.0	43.2	34.7	0.094
1.5KA24A	22.8	25.2	1.0	20.5	2.0	10.0	45.2	33.2	0.094
1.5KA27	24.3	29.7	1.0	21.8	2.0	10.0	38.4	39.1	0.096
1.5KA27A	25.7	28.4	1.0	23.1	2.0	10.0	40.0	37.5	0.096
1.5KA30	27.0	33.0	1.0	24.3	2.0	10.0	34.5	43.5	0.097
1.5KA30A	28.5	31.5	1.0	25.6	2.0	10.0	36.2	41.4	0.097
1.5KA33	29.7	36.3	1.0	26.8	2.0	10.0	31.4	47.7	0.098
1.5KA33A	31.4	34.7	1.0	28.2	2.0	10.0	32.8	45.7	0.098
1.5KA36	32.4	39.6	1.0	29.1	2.0	10.0	28.8	52.0	0.099
1.5KA36A	34.2	37.8	1.0	30.8	2.0	10.0	30.1	49.9	0.099
1.5KA39	35.1	42.9	1.0	31.6	2.0	10.0	26.6	56.4	0.100
1.5KA39A	37.1	41.0	1.0	33.3	2.0	10.0	27.8	53.9	0.100
1.5KA43	38.7	47.3	1.0	34.8	2.0	10.0	24.2	61.9	0.101
1.5KA43A	40.9	45.2	1.0	36.8	2.0	10.0	25.3	59.3	0.101

**NOTES:**

- (1) V<sub>(BR)</sub> measured after I<sub>T</sub> applied for 300µs = square wave pulse or equivalent  
(2) Surge current waveform per Fig. 3 and derate per Fig. 2  
(3) All terms and symbols are consistent with ANSI/IEEE C62.35

**RATINGS AND CHARACTERISTIC CURVES 1.5KA6.8 THRU 1.5KA43A**

FIG. 1 - PEAK PULSE POWER RATING CURVE

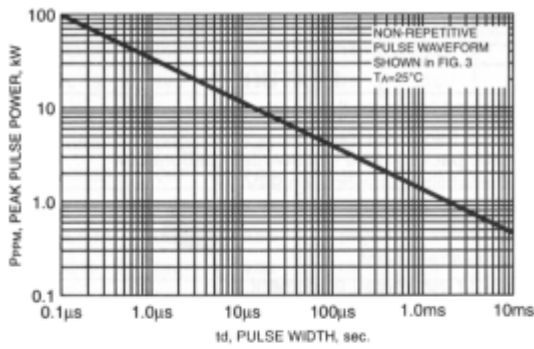


FIG. 2 - PULSE DERATING CURVE

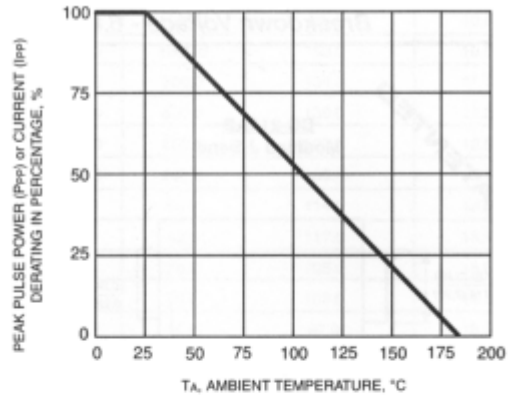


FIG. 3 - PULSE WAVEFORM

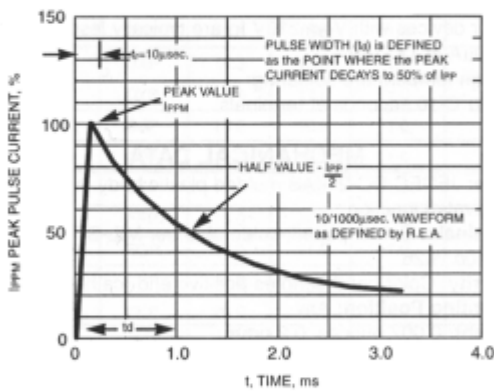


FIG. 4 - TYPICAL JUNCTION CAPACITANCE UNIDIRECTIONAL

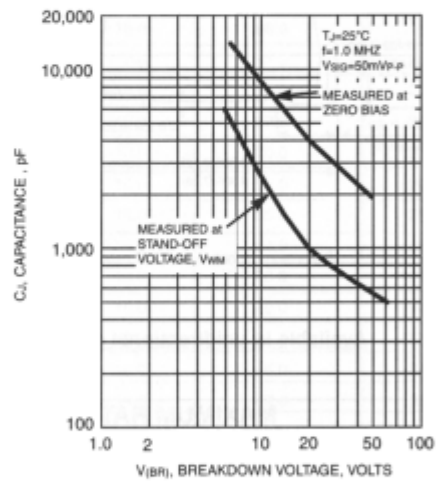


FIG. 5 - STEADY STATE POWER DERATING CURVE

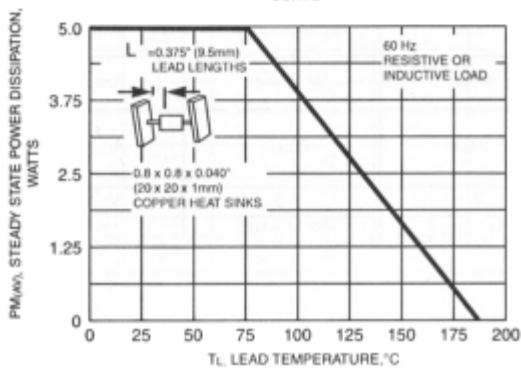


FIG. 6 - MAXIMUM NON-REPETITIVE FORWARD SURGE CURRENT

