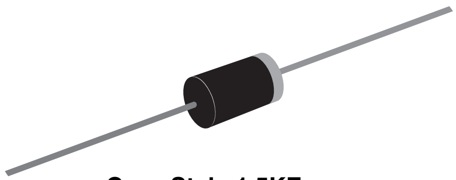
TRANSZORB® Transient Voltage Suppressors



Case Style 1.5KE

FEATURES

- Glass passivated chip junction
- Available in unidirectional and bidirectional
- 1500 W peak pulse power capability with a 10/1000 μs waveform, repetitive rate (duty cycle): 0.01 %
- Excellent clamping capability
- Very fast response time
- Low incremental surge resistance
- AEC-Q101 qualified available
- Solder dip 275 °C max. 10 s, per JESD 22-B106
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT

PRIMARY CHARACTERISTICS	
V_{BR} unidirectional	6.8 V to 540 V
V_{BR} bidirectional	6.8 V to 220 V
V_{WM} unidirectional	5.8 V to 459 V
V_{WM} bidirectional	5.8 V to 185 V
P_{PPM}	1500 W
P_D	6.5 W
I_{FSM} (unidirectional only)	200 A
T_J max.	175 °C
Polarity	Unidirectional, bidirectional
Package	1.5KE

DEVICES FOR BIDIRECTION APPLICATIONS

For bidirectional types, use CA suffix (e.g. 1.5KE220CA) Electrical characteristics apply in both directions.

TYPICAL APPLICATIONS

Use in sensitive electronics protection against voltage transients induced by inductive load switching and lighting on ICs, MOSFET, signal lines of sensor units for consumer, computer, industrial, automotive, and telecommunication.

MECHANICAL DATA

Case: molded epoxy body over passivated junction
Molding compound meets UL 94 V-0 flammability rating
Base P/N-E3 - RoHS compliant, commercial grade
Base P/NHE3_X - RoHS compliant, and AEC-Q101 qualified ("X" denotes revision code e.g. A, B, ...)

Terminals: matte tin plated leads, solderable per J-STD-002 and JESD 22-B102
E3 suffix meets JESD 201 class 1A whisker test, HE3 suffix meets JESD 201 class 2 whisker test

Note

- 1.5KE250A to 1.5KE540A are commercial grade only
- Bidirectional is available from 1.5KE6.8CA to 1.5KE220CA only

Polarity: for unidirectional types the color band denotes cathode end, no marking on bidirectional types

MAXIMUM RATINGS (T_A = 25 °C unless otherwise noted)

PARAMETER	SYMBOL	VALUE	UNIT
Peak pulse power dissipation with a 10/1000 μs waveform (1) (fig. 1)	P_{PPM}	1500	W
Peak pulse current with a 10/1000 μs waveform (1)	I_{PPM}	See next table	A
Power dissipation on infinite heatsink at T_L = 75 °C (fig. 5)	P_D	6.5	W
Peak forward surge current 8.3 ms single half sine-wave unidirectional only (2)	I_{FSM}	200	A
Maximum instantaneous forward voltage at 100 A for unidirectional only (3)	V_F	3.5/5.0	V
Operating junction and storage temperature range	T_J, T_{STG}	-55 to +175	°C

Notes

(1) Non-repetitive current pulse, per fig. 3 and derated above T_A = 25 °C per fig. 2
(2) Measured on 8.3 ms single half sine-wave or equivalent square wave, duty cycle = 4 pulses per minute maximum
(3) V_F = 3.5 V for 1.5KE220A and below; V_F = 5.0 V for 1.5KE250A and above

ELECTRICAL CHARACTERISTICS (T_A = 25 °C unless otherwise noted)

JEDEC® TYPE NUMBER	GENERAL SEMICONDUCTOR PART NUMBER	BREAKDOWN VOLTAGE V_{BR} AT I_T (1) (V)		TEST CURRENT I_T (mA)	STAND-OFF VOLTAGE V_{WM} (V)	MAXIMUM REVERSE LEAKAGE AT V_{WM} I_D (4) (μA)	MAXIMUM PEAK PULSE CURRENT I_{PPM} (2) (A)	MAXIMUM CLAMPING VOLTAGE AT I_{PPM} V_C (V)	MAXIMUM TEMPERATURE COEFFICIENT OF V_{BR} (%/°C)
		MIN.	MAX.						
1N6267A	(+)1.5KE6.8A	6.45	7.14	10	5.80	1000	143	10.5	0.057
1N6268A	(+)1.5KE7.5A	7.13	7.88	10	6.40	500	133	11.3	0.061
1N6269A	(+)1.5KE8.2A	7.79	8.61	10	7.02	200	124	12.1	0.065
1N6270A	(+)1.5KE9.1A	8.65	9.55	1.0	7.78	50	112	13.4	0.068
1N6271A	(+)1.5KE10A	9.50	10.5	1.0	8.55	10	103	14.5	0.073
1N6272A	(+)1.5KE11A	10.5	11.6	1.0	9.40	5.0	96.2	15.6	0.075
1N6273A	(+)1.5KE12A	11.4	12.6	1.0	10.2	5.0	89.8	16.7	0.078
1N6274A	(+)1.5KE13A	12.4	13.7	1.0	11.1	5.0	82.4	18.2	0.081
1N6275A	(+)1.5KE15A	14.3	15.8	1.0	12.8	1.0	70.8	21.2	0.084
1N6276A	(+)1.5KE16A	15.2	16.8	1.0	13.6	1.0	66.7	22.5	0.086
1N6277A	(+)1.5KE18A	17.1	18.9	1.0	15.3	1.0	59.5	25.2	0.089
1N6278A	(+)1.5KE20A	19.0	21.0	1.0	17.1	1.0	54.2	27.7	0.090
1N6279A	(+)1.5KE22A	20.9	23.1	1.0	18.8	1.0	49.0	30.6	0.092
1N6280A	(+)1.5KE24A	22.8	25.2	1.0	20.5	1.0	45.2	33.2	0.094
1N6281A	(+)1.5KE27A	25.7	28.4	1.0	23.1	1.0	40.0	37.5	0.096
1N6282A	(+)1.5KE30A	28.5	31.5	1.0	25.6	1.0	36.2	41.4	0.097
1N6283A	(+)1.5KE33A	31.4	34.7	1.0	28.2	1.0	32.8	45.7	0.098
1N6284A	(+)1.5KE36A	34.2	37.8	1.0	30.8	1.0	30.1	49.9	0.099
1N6285A	(+)1.5KE39A	37.1	41.0	1.0	33.3	1.0	27.8	53.9	0.100
1N6286A	(+)1.5KE43A	40.9	45.2	1.0	36.8	1.0	25.3	59.3	0.101
1N6287A	(+)1.5KE47A	44.7	49.4	1.0	40.2	1.0	23.1	64.8	0.101
1N6288A	(+)1.5KE51A	48.5	53.6	1.0	43.6	1.0	21.4	70.1	0.102
1N6289A	(+)1.5KE56A	53.2	58.8	1.0	47.8	1.0	19.5	77.0	0.103
1N6290A	(+)1.5KE62A	58.9	65.1	1.0	53.0	1.0	17.6	85.0	0.104
1N6291A	(+)1.5KE68A	64.6	71.4	1.0	58.1	1.0	16.3	92.0	0.104
1N6292A	(+)1.5KE75A	71.3	78.8	1.0	64.1	1.0	14.6	104	0.105
1N6293A	(+)1.5KE82A	77.9	86.1	1.0	70.1	1.0	13.3	113	0.105
1N6294A	(+)1.5KE91A	86.5	95.5	1.0	77.8	1.0	12.0	125	0.106
1N6295A	(+)1.5KE100A	95.0	105	1.0	85.5	1.0	10.9	137	0.106
1N6296A	(+)1.5KE110A	105	116	1.0	94.0	1.0	9.9	152	0.107
1N6297A	(+)1.5KE120A	114	126	1.0	102	1.0	9.1	165	0.107
1N6298A	(+)1.5KE130A	124	137	1.0	111	1.0	8.4	179	0.107
1N6299A	(+)1.5KE150A	143	158	1.0	128	1.0	7.2	207	0.106
1N6300A	(+)1.5KE160A	152	168	1.0	136	1.0	6.8	219	0.108
1N6301A	(+)1.5KE170A	162	179	1.0	145	1.0	6.4	234	0.108
1N6302A	(+)1.5KE180A	171	189	1.0	154	1.0	6.1	246	0.108
1N6303A	(+)1.5KE200A	190	210	1.0	171	1.0	5.5	274	0.108
-	(+)1.5KE220A	209	231	1.0	185	1.0	4.6	328	0.108
-	1.5KE250A	237	263	1.0	214	1.0	4.4	344	0.110
-	1.5KE300A	285	315	1.0	256	1.0	3.6	414	0.110
-	1.5KE350A	333	368	1.0	300	1.0	3.1	482	0.110
-	1.5KE400A	380	420	1.0	342	1.0	2.7	548	0.110
-	1.5KE440A	418	462	1.0	376	1.0	2.5	602	0.110
-	1.5KE480A	456	504	1.0	408	1.0	2.28	658	0.110
-	1.5KE510A	485	535	1.0	434	1.0	2.15	698	0.110
-	1.5KE540A	513	567	1.0	459	1.0	2.03	740	0.110

Notes

(1) Pulse test: $t_p \leq 50$ ms
(2) Surge current waveform per fig. 3 and derate per fig. 2
(3) All terms and symbols are consistent with ANSI/IEEE CA62.35
(4) For bidirectional types with V_R 10 V and less the I_D limit is doubled
(+) Underwriters laboratory recognition for the classification of protectors (QVGQ2) under the UL standard for safety 497B and file number E136766 for both unidirectional and bidirectional devices

THERMAL CHARACTERISTICS (T_A = 25 °C unless otherwise noted)			
PARAMETER	**SYMBOL**	**VALUE**	**UNIT**
Typical thermal resistance, junction to ambient	$R_{\theta JA}$	75	°C/ W
Typical thermal resistance, junction to lead	$R_{\theta JL}$	15.4	

ORDERING INFORMATION (Example)				
PREFERRED PIN	**UNIT WEIGHT (g)**	**PREFERRED PACKAGE CODE**	**BASE QUANTITY**	**DELIVERY MODE**
1.5KE6.8A-E3/54	0.968	54	1400	13" diameter paper tape and reel
1.5KE6.8AHE3_B/C [(1)(2)]	0.968	C	1400	13" diameter paper tape and reel

Notes

[(1)] AEC-Q101 qualified

[(2)] Applied for 1.5KE6.8AHE3_B to 1.5KE220AHE3_B, and 1.5KE6.8CAHE3_B to 1.5KE220CAHE3_B

RATINGS AND CHARACTERISTICS CURVES (T_A = 25 °C unless otherwise noted)

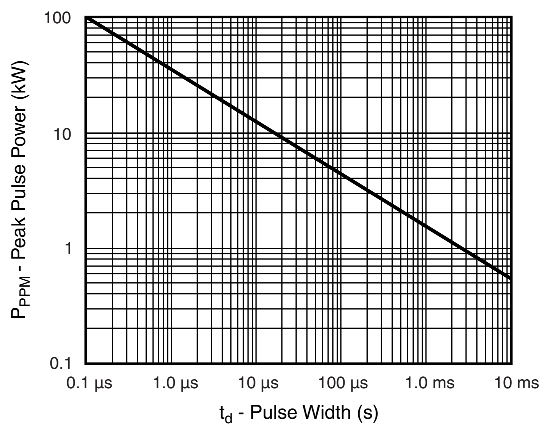


Fig. 1 - Peak Pulse Power Rating Curve

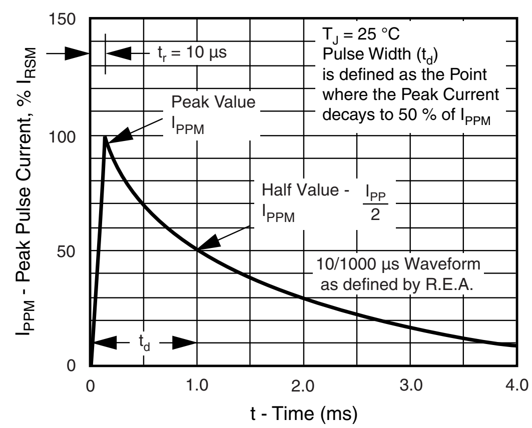


Fig. 3 - Pulse Waveform

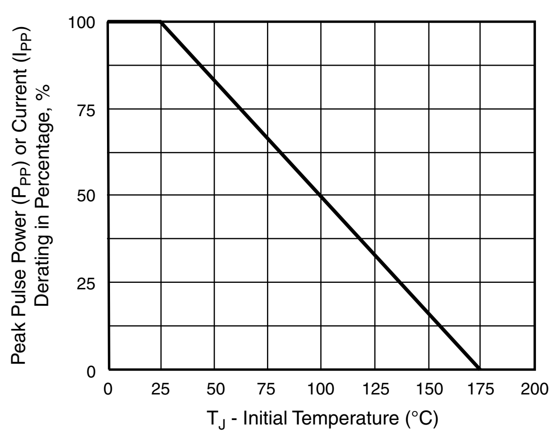


Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature

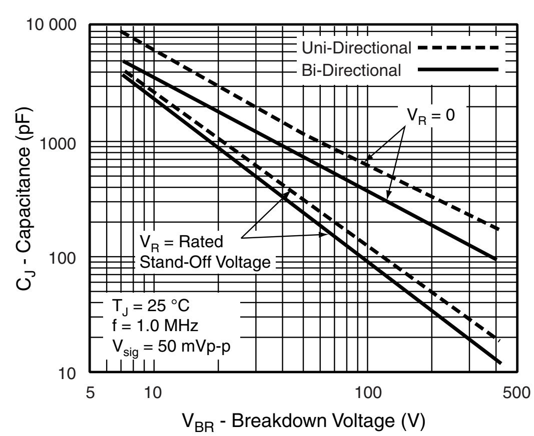


Fig. 4 - Typical Junction Capacitance

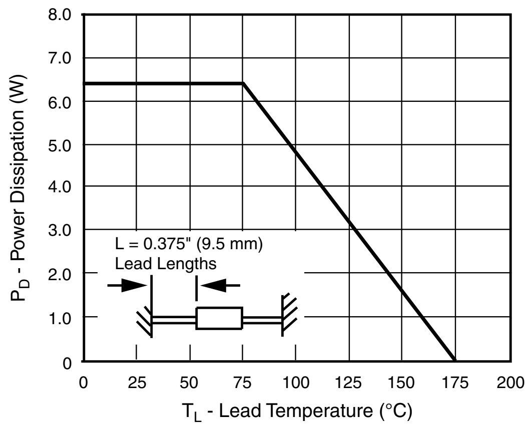


Fig. 5 - Power Derating Curve

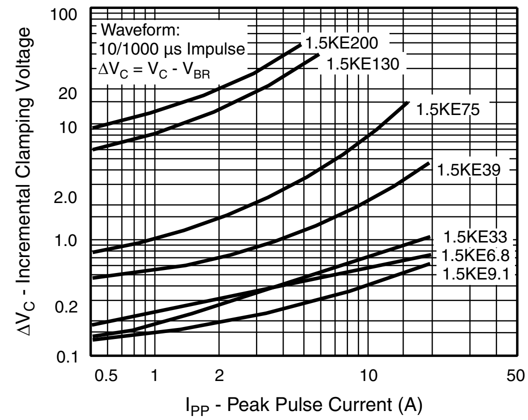


Fig. 8 - Incremental Clamping Voltage Curve (Unidirectional)

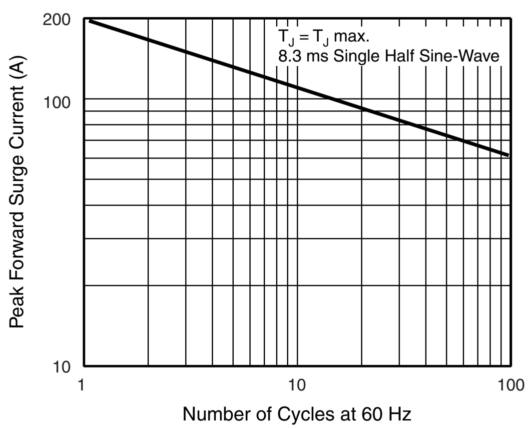


Fig. 6 - Maximum Non-Repetitive Forward Surge Current
Unidirectional only

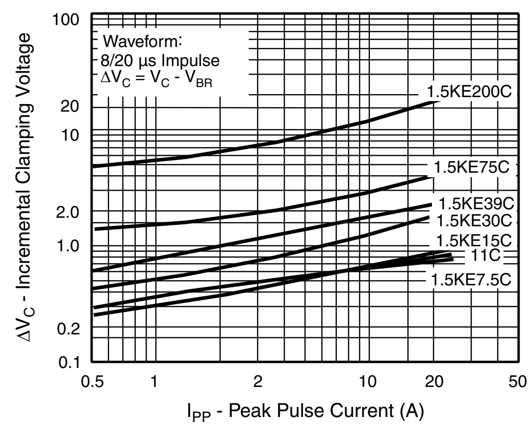


Fig. 9 - Incremental Clamping Voltage Curve (Bidirectional)

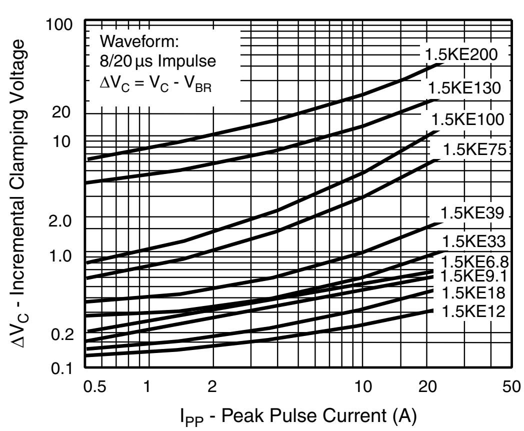


Fig. 7 - Incremental Clamping Voltage Curve (Unidirectional)

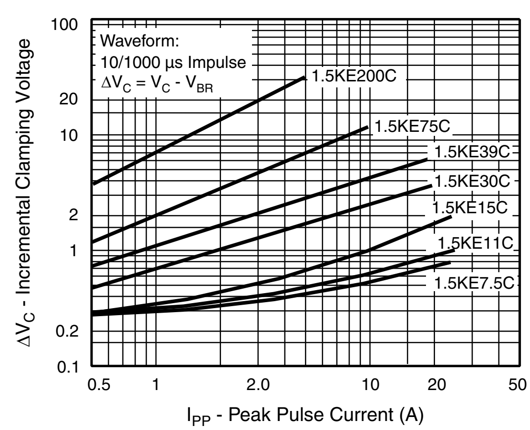


Fig. 10 - Incremental Clamping Voltage Curve (Bidirectional)

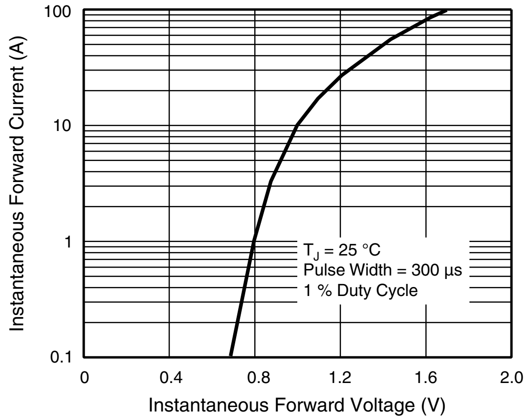


Fig. 11 - Instantaneous Forward Voltage Characteristics Curve

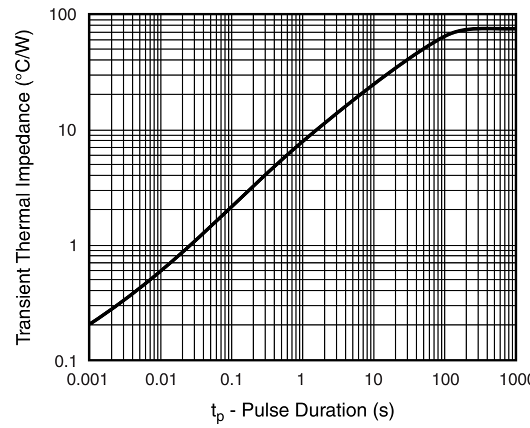
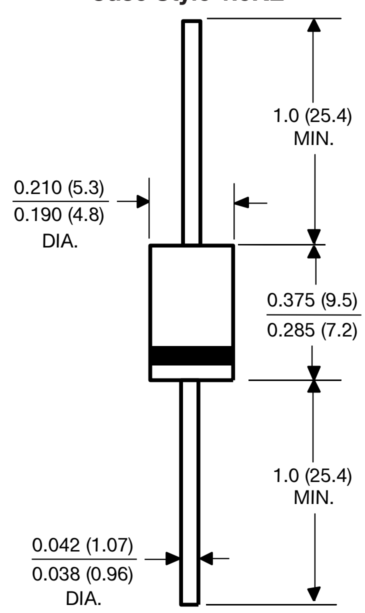


Fig. 12 - Typical Transient Thermal Impedance

PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

Case Style 1.5KE



APPLICATION NOTES

- This series of Silicon Transient Suppressors is used in applications where large voltage transients can permanently damage voltage-sensitive components.
- The TVS diode can be used in applications where induced lightning on rural or remote transmission lines presents a hazard to electronic circuitry (ref: R.E.A. specification P.E. 60).
- This Transient Voltage Suppressor diode has a pulse power rating of 1500 W for 1 ms. The response time of TVS diode clamping action is effectively instantaneous (1 x 10^{-9} s bi-directional); therefore, they can protect integrated circuits, MOS devices, hybrids, and other voltage sensitive semiconductors and components. TVS diodes can also be used in series or parallel to increase the peak power ratings.

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