1.5KE6.8CA Series

1500 Watt Mosorb™ Zener Transient Voltage Suppressors

Bidirectional*

Mosorb devices are designed to protect voltage sensitive components from high voltage, high–energy transients. They have excellent clamping capability, high surge capability, low zener impedance and fast response time. These devices are ON Semiconductor's exclusive, cost-effective, highly reliable Surmetic axial leaded package and are ideally-suited for use in communication systems, numerical controls, process controls, medical equipment, business machines, power supplies and many other industrial/ consumer applications, to protect CMOS, MOS and Bipolar integrated circuits.

Specification Features:

- Working Peak Reverse Voltage Range – 5.8 V to 214 V
- Peak Power – 1500 Watts @ 1 ms
- ESD Rating of Class 3 (>16 KV) per Human Body Model
- Maximum Clamp Voltage @ Peak Pulse Current
- Low Leakage < 5 µA above 10 V
- UL 497B for Isolated Loop Circuit Protection
- Response Time is typically < 1 ns

Mechanical Characteristics:

CASE: Void-free, transfer-molded, thermosetting plastic

FINISH: All external surfaces are corrosion resistant and leads are readily solderable

MAXIMUM LEAD TEMPERATURE FOR SOLDERING PURPOSES: 230°C, 1/16″ from the case for 10 seconds

POLARITY: Cathode band does not imply polarity

MOUNTING POSITION: Any

MAXIMUM RATINGS

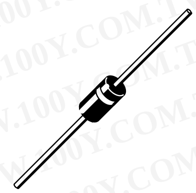
Rating	Symbol	Value	Unit
Peak Power Dissipation (Note 1.) @ $T_L \leq 25°C$	P_{PK}	1500	Watts
Steady State Power Dissipation @ $T_L \leq 75°C$, Lead Length = 3/8″ Derated above $T_L = 75°C$	P_D	5.0 20	Watts mW/°C
Thermal Resistance, Junction–to–Lead	$R_{\theta JL}$	20	°C/W
Operating and Storage Temperature Range	T_J, T_{stg}	– 65 to +175	°C

1. Nonrepetitive current pulse per Figure 4 and derated above $T_A = 25°C$ per Figure 2.

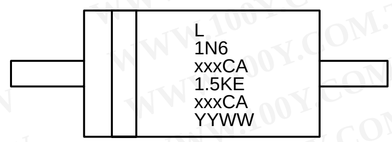
*Please see 1N6267A to 1N6306A (1.5KE6.8A – 1.5KE250A) for Unidirectional Devices

ON Semiconductor™

http://onsemi.com



AXIAL LEAD
CASE 41A
PLASTIC



L = Assembly Location
1N6xxxCA = JEDEC Device Code
1.5KExxxCA = ON Device Code
YY = Year
WW = Work Week

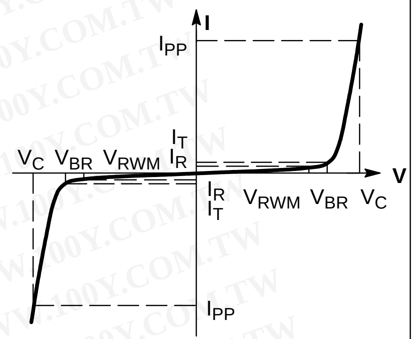
ORDERING INFORMATION

Device	Packaging	Shipping
1.5KExxCA	Axial Lead	500 Units/Box
1.5KExxCARL4	Axial Lead	1500/Tape & Reel

ELECTRICAL CHARACTERISTICS

(T_A = 25°C unless otherwise noted)

Symbol	Parameter
I_{PP}	Maximum Reverse Peak Pulse Current
V_C	Clamping Voltage @ I_{PP}
V_{RWM}	Working Peak Reverse Voltage
I_R	Maximum Reverse Leakage Current @ V_{RWM}
V_{BR}	Breakdown Voltage @ I_T
I_T	Test Current
ΘV_{BR}	Maximum Temperature Coefficient of V_{BR}



Bi–Directional TVS

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

	V_{RWM} (Note 1)	I_R @ V_{RWM}	Breakdown Voltage				V_C @ I_{PP} (Note 3)		
			V_{BR} (Note 2) **(Volts)**			@ I_T	V_C	I_{PP}	ΘV_{BR}
Device	**(Volts)**	**(μA)**	**Min**	**Nom**	**Max**	**(mA)**	**(Volts)**	**(A)**	**(%/°C)**
1.5KE6.8CA	5.8	1000	6.45	6.8	7.14	10	10.5	143	0.057
1.5KE7.5CA	6.4	500	7.13	7.5	7.88	10	11.3	132	0.061
1.5KE8.2CA	7.02	200	7.79	8.2	8.61	10	12.1	124	0.065
1.5KE9.1CA	7.78	50	8.65	9.1	9.55	1	13.4	112	0.068
1.5KE10CA	8.55	10	9.5	10	10.5	1	14.5	103	0.073
1.5KE11CA	9.4	5	10.5	11	11.6	1	15.6	96	0.075
1.5KE12CA	10.2	5	11.4	12	12.6	1	16.7	90	0.078
1.5KE13CA	11.1	5	12.4	13	13.7	1	18.2	82	0.081
1.5KE15CA	12.8	5	14.3	15	15.8	1	21.2	71	0.084
1.5KE16CA	13.6	5	15.2	16	16.8	1	22.5	67	0.086
1.5KE18CA	15.3	5	17.1	18	18.9	1	25.2	59.5	0.088
1.5KE20CA	17.1	5	19	20	21	1	27.7	54	0.09
1.5KE22CA	18.8	5	20.9	22	23.1	1	30.6	49	0.092
1.5KE24CA	20.5	5	22.8	24	25.2	1	33.2	45	0.094
1.5KE27CA	23.1	5	25.7	27	28.4	1	37.5	40	0.096
1.5KE30CA	25.6	5	28.5	30	31.5	1	41.4	36	0.097
1.5KE33CA	28.2	5	31.4	33	34.7	1	45.7	33	0.098
1.5KE36CA	30.8	5	34.2	36	37.8	1	49.9	30	0.099
1.5KE39CA	33.3	5	37.1	39	41	1	53.9	28	0.1
1.5KE43CA	36.8	5	40.9	43	45.2	1	59.3	25.3	0.101
1.5KE47CA	40.2	5	44.7	47	49.4	1	64.8	23.2	0.101
1.5KE51CA	43.6	5	48.5	51	53.6	1	70.1	21.4	0.102
1.5KE56CA	47.8	5	53.2	56	58.8	1	77	19.5	0.103
1.5KE62CA	53	5	58.9	62	65.1	1	85	17.7	0.104
1.5KE68CA	58.1	5	64.6	68	71.4	1	92	16.3	0.104
1.5KE75CA	64.1	5	71.3	75	78.8	1	103	14.6	0.105
1.5KE82CA	70.1	5	77.9	82	86.1	1	113	13.3	0.105
1.5KE91CA	77.8	5	86.5	91	95.5	1	125	12	0.106
1.5KE100CA	85.5	5	95	100	105	1	137	11	0.106
1.5KE110CA	94	5	105	110	116	1	152	9.9	0.107
1.5KE120CA	102	5	114	120	126	1	165	9.1	0.107
1.5KE130CA	111	5	124	130	137	1	179	8.4	0.107
1.5KE150CA	128	5	143	150	158	1	207	7.2	0.108
1.5KE160CA	136	5	152	160	168	1	219	6.8	0.108
1.5KE170CA	145	5	162	170	179	1	234	6.4	0.108
1.5KE180CA	154	5	171	180	189	1	246	6.1	0.108
1.5KE200CA	171	5	190	200	210	1	274	5.5	0.108
1.5KE220CA	185	5	209	220	231	1	328	4.6	0.109
1.5KE250CA	214	5	237	250	263	1	344	5	0.109

1. A transient suppressor is normally selected according to the maximum working peak reverse voltage (V_{RWM}), which should be equal to or greater than the dc or continuous peak operating voltage level.
2. V_{BR} measured at pulse test current I_T at an ambient temperature of 25°C.
3. Surge current waveform per Figure 4 and derate per Figures 1 and 2.

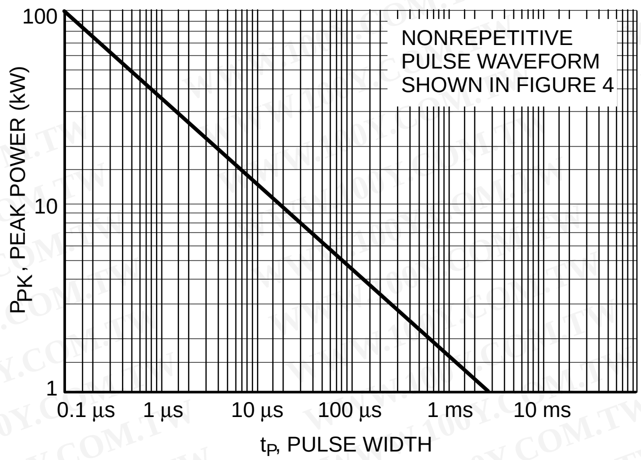


Figure 1. Pulse Rating Curve

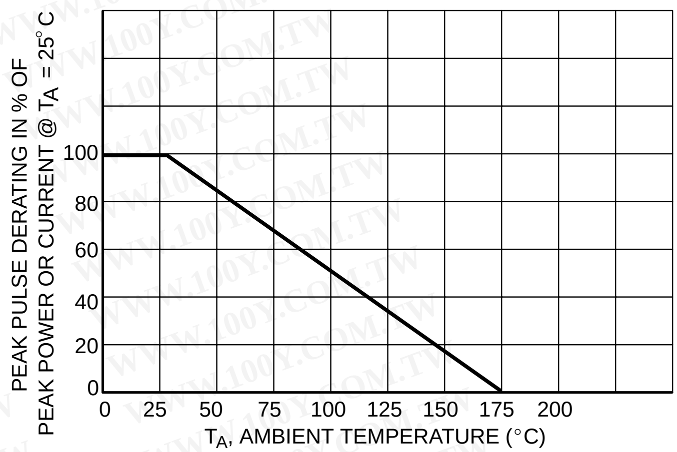


Figure 2. Pulse Derating Curve

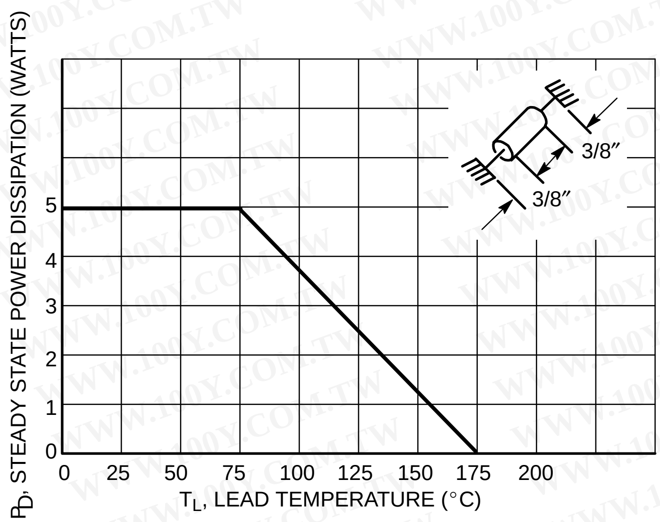


Figure 3. Steady State Power Derating

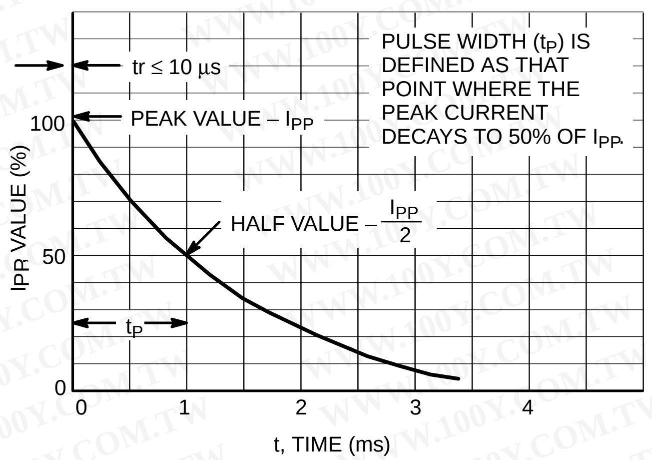


Figure 4. Pulse Waveform

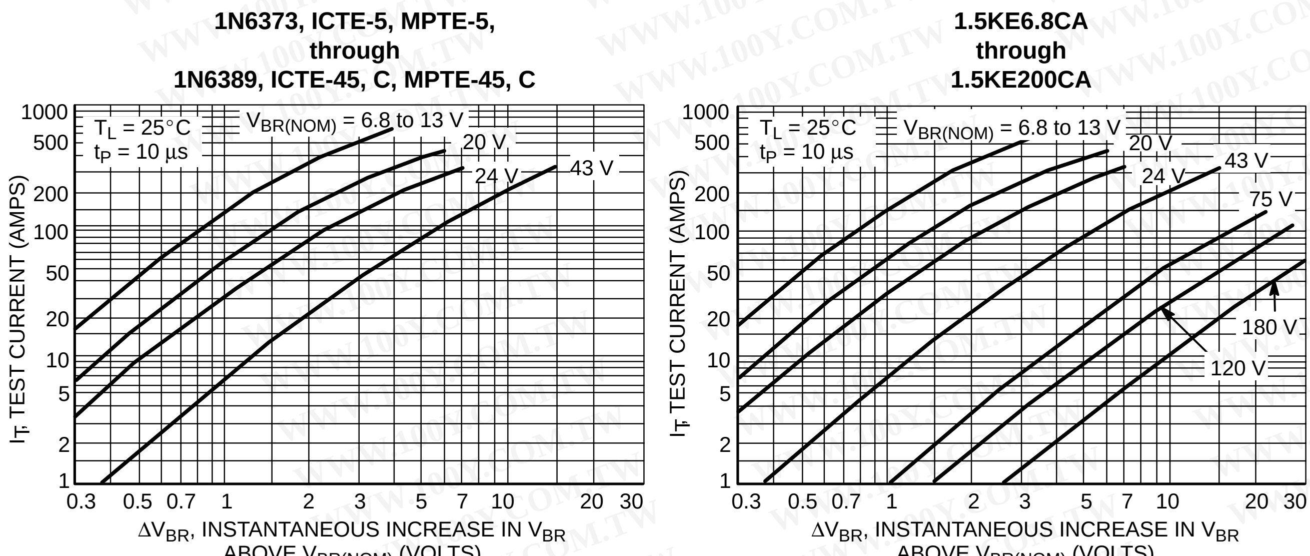


Figure 5. Dynamic Impedance

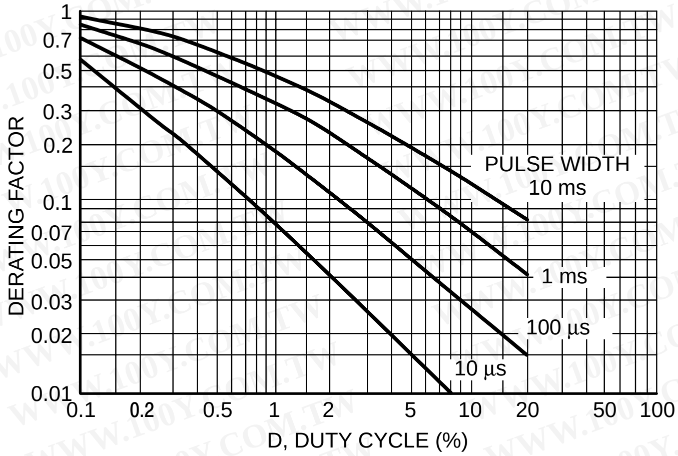


Figure 6. Typical Derating Factor for Duty Cycle

APPLICATION NOTES

RESPONSE TIME

In most applications, the transient suppressor device is placed in parallel with the equipment or component to be protected. In this situation, there is a time delay associated with the capacitance of the device and an overshoot condition associated with the inductance of the device and the inductance of the connection method. The capacitance effect is of minor importance in the parallel protection scheme because it only produces a time delay in the transition from the operating voltage to the clamp voltage as shown in Figure 7.

The inductive effects in the device are due to actual turn-on time (time required for the device to go from zero current to full current) and lead inductance. This inductive effect produces an overshoot in the voltage across the equipment or component being protected as shown in Figure 8. Minimizing this overshoot is very important in the application, since the main purpose for adding a transient suppressor is to clamp voltage spikes. These devices have excellent response time, typically in the picosecond range and negligible inductance. However, external inductive effects could produce unacceptable overshoot. Proper circuit layout, minimum lead lengths and placing the suppressor device as close as possible to the equipment or components to be protected will minimize this overshoot.

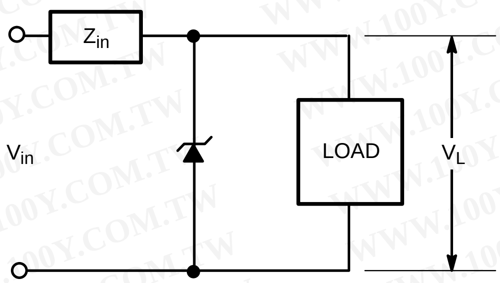
Some input impedance represented by Z_{in} is essential to prevent overstress of the protection device. This impedance should be as high as possible, without restricting the circuit operation.

DUTY CYCLE DERATING

The data of Figure 1 applies for non-repetitive conditions and at a lead temperature of 25°C. If the duty cycle increases, the peak power must be reduced as indicated by the curves of Figure 6. Average power must be derated as the lead or ambient temperature rises above 25°C. The average power derating curve normally given on data sheets may be normalized and used for this purpose.

At first glance the derating curves of Figure 6 appear to be in error as the 10 ms pulse has a higher derating factor than the 10 µs pulse. However, when the derating factor for a given pulse of Figure 6 is multiplied by the peak power value of Figure 1 for the same pulse, the results follow the expected trend.

TYPICAL PROTECTION CIRCUIT



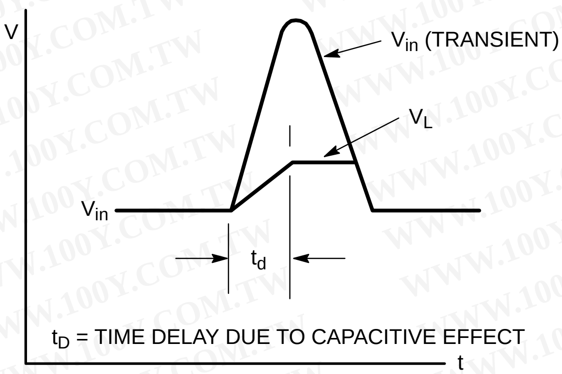


Figure 7.

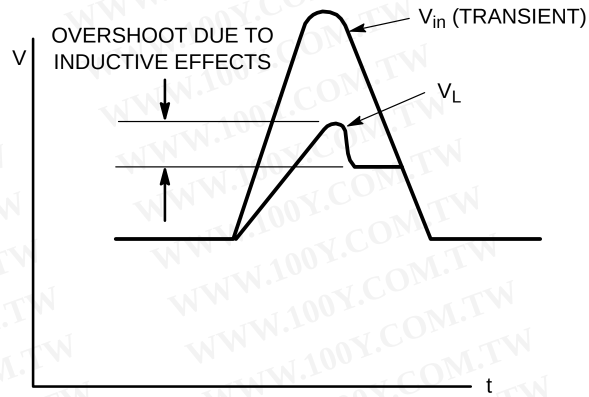


Figure 8.

UL RECOGNITION*

The entire series has *Underwriters Laboratory Recognition* for the classification of protectors (QVGV2) under the UL standard for safety 497B and File #116110. Many competitors only have one or two devices recognized or have recognition in a non-protective category. Some competitors have no recognition at all. With the UL497B recognition, our parts successfully passed several tests including Strike Voltage Breakdown test, Endurance Conditioning, Temperature test, Dielectric Voltage-Withstand test, Discharge test and several more.

Whereas, some competitors have only passed a flammability test for the package material, we have been recognized for much more to be included in their Protector category.

*Applies to 1.5KE6.8CA – 1.5KE250CA

CLIPPER BIDIRECTIONAL DEVICES

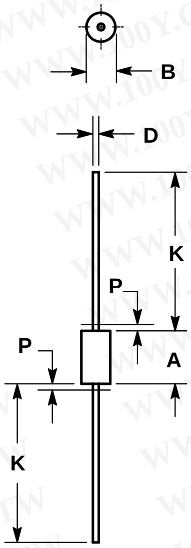
1. Clipper-bidirectional devices are available in the 1.5KEXXA series and are designated with a “CA” suffix; for example, 1.5KE18CA. Contact your nearest ON Semiconductor representative.
2. Clipper-bidirectional part numbers are tested in both directions to electrical parameters in preceeding table (except for V_F which does not apply).
3. The 1N6267A through 1N6303A series are JEDEC registered devices and the registration does not include a “CA” suffix. To order clipper-bidirectional devices one must add CA to the 1.5KE device title.

OUTLINE DIMENSIONS

Transient Voltage Suppressors – Axial Leaded

1500 Watt Mosorb™

MOSORB
CASE 41A–04
ISSUE D



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. LEAD FINISH AND DIAMETER UNCONTROLLED IN DIMENSION P.
4. 041A–01 THRU 041A–03 OBSOLETE, NEW STANDARD 041A–04.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.335	0.374	8.50	9.50
B	0.189	0.209	4.80	5.30
D	0.038	0.042	0.96	1.06
K	1.000	---	25.40	---
P	---	0.050	---	1.27

Mosorb is a trademark of Semiconductor Components Industries, LLC.

PUBLICATION ORDERING INFORMATION

Literature Fulfillment:
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Fax: 303–675–2176 or 800–344–3867 Toll Free USA/Canada
Email: ONlit@hibbertco.com

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ON Semiconductor Website: http://onsemi.com

For additional information, please contact your local Sales Representative.