



## 30,000 Watt Transient Voltage Suppressor (TVS) Protection Device



### DESCRIPTION

This device clamps dangerous high-voltage short-term transients such as those produced by the secondary effects of lightning strikes, providing circuit protection to several class levels in the IEC61000-4-5 specification. Clamping time is virtually instantaneous. It also provides protection from transients caused by inductive load dumps, RFI, and ESD, providing protection to IEC61000-4-2 and -4-4.

**Important:** For the latest information, visit our website <http://www.microsemi.com>.

### FEATURES

- Available in both unidirectional and bidirectional configurations
- 5% voltage tolerance
- Moisture classification is Level 1 with no dry pack required per IPC/JEDEC J-STD-020B
- RoHS compliant (2002/95/EC)
- MSL level 1 (J-STD-020)
- RoHS compliant

### APPLICATIONS / BENEFITS

- Protection from transients caused by lightning strikes, switching transients, RFI, and ESD.
- Protection from the secondary effects of lightning per IEC61000-4-5
- Protection from ESD, and EFT per IEC 61000-4-2 and IEC 61000-4-4

### MAXIMUM RATINGS @ 25 °C unless otherwise noted

Parameters/Test Conditions	Symbol	Value	Unit
Junction and Storage Temperature	$T_J$ and $T_{STG}$	-55 to +175	°C
Thermal Resistance, Junction to Lead @ 3/8 inch (10 mm) lead length from body	$R_{\theta JL}$	8.0	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	77.5	°C/W
Non Repetitive Peak Forward Surge Current (8.3ms single half sine wave) <sup>(1)</sup>	$I_{FSM}$	400	A
Rated Average Power Dissipation @ $T_L = 75$ °C, (0.375 inch (9.5 mm) from body) <sup>(2)</sup>	$P_{M(AV)}$	8.0	W
Peak Pulse Power Dissipation with a 10/1000 $\mu$ s waveform (see <a href="#">Figure 1</a> )	$P_{PP}$	30,000	W
Peak Pulse Current with a 10/1000 $\mu$ s waveform <sup>(3)</sup>	$I_{PP}$	See <a href="#">Electrical Table</a>	A
Solder Temperature @ 10 s		260	°C

- Notes:**
1. Measured on 8.3ms single half sine-wave or equivalent square wave, duty cycle = 4 pulses per minute maximum
  2. Mounted as shown in [Figure 5](#)
  3. Non-repetitive current pulse, per [Figure 3](#) and derated above  $T_A = 25$  °C per [Figure 2](#)



**P600 Package**

#### MSC – Lawrence

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#### MSC – Ireland

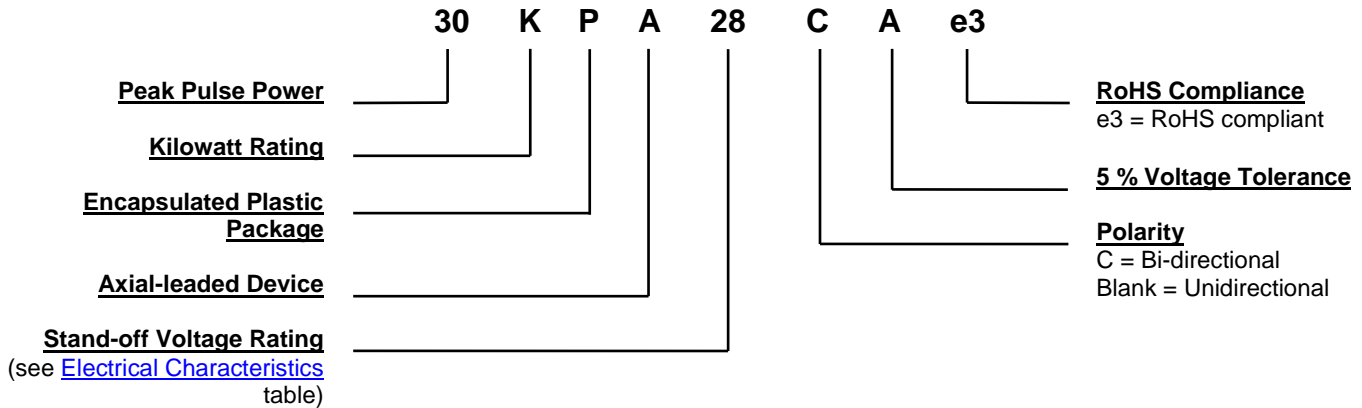
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**MECHANICAL and PACKAGING**

- CASE: Epoxy body meets UL94V-0
- TERMINALS: Matte-tin plating, fully RoHS compliant. Solderable per MIL-STD-750, method 2026.
- MARKING: Manufacturer ID, date code and part number
- POLARITY: For unidirectional types the color band denotes the cathode, which is positive with respect to the anode under normal TVS operation.
- TAPE & REEL option: Standard per EIA-296 (add "TR" suffix to part number). Consult factory for quantities.
- WEIGHT: Approximately 0.07 ounce (2.0 grams)
- See [Package Dimensions](#) on last page.

**PART NOMENCLATURE**

**SYMBOLS & DEFINITIONS**

Symbol	Definition
$\alpha_{V(BR)}$	Temperature Coefficient of Breakdown Voltage: The change in breakdown voltage divided by the change in temperature that caused it expressed in %/°C or mV/°C.
$I_D$	Standby Current: The current through the device at rated stand-off voltage.
$I_{PP}$	Peak Impulse Current: The maximum rated random recurring peak impulse current or nonrepetitive peak impulse current that may be applied to a device. A random recurring or nonrepetitive transient current is usually due to an external cause, and it is assumed that its effect will have completely disappeared before the next transient arrives.
$P_{PP}$	Peak Pulse Power. The rated random recurring peak impulse power or rated nonrepetitive peak impulse power. The impulse power is the maximum-rated value of the product of $I_{PP}$ and $V_C$ .
$V_{(BR)}$	Breakdown Voltage: The voltage across the device at a specified current $I_{(BR)}$ in the breakdown region.
$V_C$	Clamping Voltage: The voltage across the device in a region of low differential resistance during the application of an impulse current ( $I_{PP}$ ) for a specified waveform.
$V_{WM}$	Working Standoff Voltage: The maximum-rated value of dc or repetitive peak positive cathode-to-anode voltage that may be continuously applied over the standard operating temperature.

**ELECTRICAL CHARACTERISTICS @ 25 °C**

DEVICE	BREAKDOWN VOLTAGE <sup>(2)</sup> V <sub>(BR)</sub> @ I <sub>(BR)</sub> (Volts)		TEST CURRENT I <sub>(BR)</sub> (mA)	STAND-OFF VOLTAGE V <sub>WM</sub> (Volts)	MAXIMUM STANDBY CURRENT <sup>(4)</sup> I <sub>D</sub> @ V <sub>WM</sub> (µA)	MAXIMUM PEAK PULSE CURRENT <sup>(3)</sup> I <sub>PP</sub> (A)	MAXIMUM CLAMPING VOLTAGE V <sub>C</sub> @ I <sub>PP</sub> (Volts)	MAXIMUM TEMPERATURE COEFFICIENT α <sub>V(BR)</sub> (%/°C)
	Min	Max						
30KPA28Ae3 / 30KPA28CAe3	31.28	34.2	50	28	5000	606.0	50.0	0.1
30KPA30Ae3 / 30KPA30CAe3	33.51	36.7	50	30	5000	548.9	55.2	0.1
30KPA33Ae3 / 30KPA33CAe3	36.90	40.4	50	33	5000	517.9	58.5	0.1
30KPA36Ae3 / 30KPA36CAe3	40.20	44.0	50	36	5000	490.3	61.8	0.1
30KPA39Ae3 / 30KPA39CAe3	43.60	47.7	20	39	2000	450.9	67.2	0.1
30KPA42Ae3 / 30KPA42CAe3	46.90	51.3	10	42	1000	420.8	72.0	0.1
30KPA43Ae3 / 30KPA43CAe3	48.00	52.6	10	43	1000	415.1	73.0	0.1
30KPA45Ae3 / 30KPA45CAe3	50.30	55.0	5	45	250	391.5	77.4	0.1
30KPA48Ae3 / 30KPA48CAe3	53.60	58.7	5	48	150	371.3	81.6	0.1
30KPA51Ae3 / 30KPA51CAe3	57.00	62.4	5	51	50	350.7	86.4	0.1
30KPA54Ae3 / 30KPA54CAe3	60.30	66.0	5	54	20	331.5	91.4	0.1
30KPA58Ae3 / 30KPA58CAe3	64.80	70.9	5	58	20	327.9	92.4	0.1
30KPA60Ae3 / 30KPA60CAe3	67.00	73.4	5	60	15	297.1	102	0.1
30KPA64Ae3 / 30KPA64CAe3	71.50	78.3	5	64	10	291.3	104	0.1
30KPA66Ae3 / 30KPA66CAe3	73.70	80.7	5	66	2	283.2	107	0.1
30KPA70Ae3 / 30KPA70CAe3	78.20	85.6	5	70	2	278.0	109	0.1
30KPA71Ae3 / 30KPA71CAe3	79.3	86.8	5	71	2	271.1	111.5	0.1
30KPA72Ae3 / 30KPA72CAe3	80.4	88.0	5	72	2	265.8	114.0	0.1
30KPA75Ae3 / 30KPA75CAe3	83.8	91.7	5	75	2	253.8	119.4	0.1
30KPA78Ae3 / 30KPA78CAe3	87.1	95.4	5	78	2	234.9	129.0	0.1
30KPA84Ae3 / 30KPA84CAe3	93.8	102.7	5	84	2	217.7	139.2	0.1
30KPA90Ae3 / 30KPA90CAe3	100.5	110.1	5	90	2	207.0	146.4	0.1
30KPA96Ae3 / 30KPA96CAe3	107.2	117.4	5	96	2	194.2	156.0	0.1
30KPA102Ae3 / 30KPA102CAe3	113.9	124.7	5	102	2	183.0	165.6	0.1
30KPA108Ae3 / 30KPA108CAe3	120.6	132.0	5	108	2	172.9	175.2	0.1
30KPA120Ae3 / 30KPA120CAe3	134.0	146.8	5	120	2	155.9	194.4	0.1
30KPA132Ae3 / 30KPA132CAe3	147.4	161.4	5	132	2	142.3	213.0	0.1
30KPA144Ae3 / 30KPA144CAe3	160.8	176.1	5	144	2	135.8	223.2	0.1
30KPA150Ae3 / 30KPA150CAe3	167.6	183.5	5	150	2	129.8	233.4	0.1
30KPA156Ae3 / 30KPA156CAe3	174.3	190.8	5	156	2	123.7	245.0	0.1
30KPA160Ae3 / 30KPA160CAe3	178.7	195.7	5	160	2	120.0	252.6	0.1
30KPA168Ae3 / 30KPA168CAe3	187.7	205.5	5	168	2	111.2	272.4	0.1
30KPA170Ae3 / 30KPA170CAe3	189.9	207.9	5	170	2	110.2	275.0	0.1
30KPA180Ae3 / 30KPA180CAe3	201.1	220.1	5	180	2	104.3	290.4	0.1
30KPA198Ae3 / 30KPA198CAe3	221.2	242.2	5	198	2	94.7	319.8	0.1
30KPA216Ae3 / 30KPA216CAe3	241.3	264.2	5	216	2	86.9	348.6	0.1
30KPA240Ae3 / 30KPA240CAe3	268.1	293.5	5	240	2	78.3	387.0	0.1
30KPA258Ae3 / 30KPA258CAe3	288.2	315.6	5	258	2	72.8	416.4	0.1
30KPA260Ae3 / 30KPA260CAe3	290.4	318.0	5	260	2	72.8	416.0	0.1
30KPA270Ae3 / 30KPA270CAe3	301.6	330.2	5	270	2	69.5	436.2	0.1

Continued on next page.

**ELECTRICAL CHARACTERISTICS @ 25 °C (continued)**

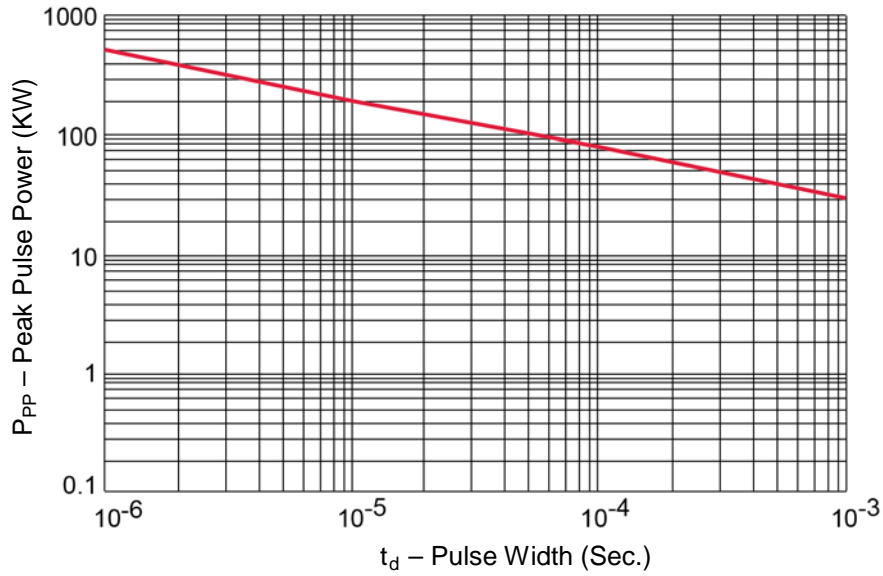
DEVICE	BREAKDOWN VOLTAGE <sup>(2)</sup> V <sub>(BR)</sub> @ I <sub>(BR)</sub> (Volts)		TEST CURRENT I <sub>(BR)</sub> (mA)	STAND-OFF VOLTAGE V <sub>WM</sub> (Volts)	MAXIMUM STANDBY CURRENT <sup>(4)</sup> I <sub>D</sub> @ V <sub>WM</sub> (μA)	MAXIMUM PEAK PULSE CURRENT <sup>(3)</sup> I <sub>PP</sub> (A)	MAXIMUM CLAMPING VOLTAGE V <sub>C</sub> @ I <sub>PP</sub> (Volts)	MAXIMUM TEMPERATURE COEFFICIENT α <sub>V(BR)</sub> (%/ °C)
	Min	Max						
30KPA280Ae3 / 30KPA280CAe3	312.8	342.4	5	280	2	65.3	464.0	0.1
30KPA288Ae3 / 30KPA288CAe3	321.7	352.2	5	288	2	64.5	469.9	0.1

Consult factory for higher voltages.

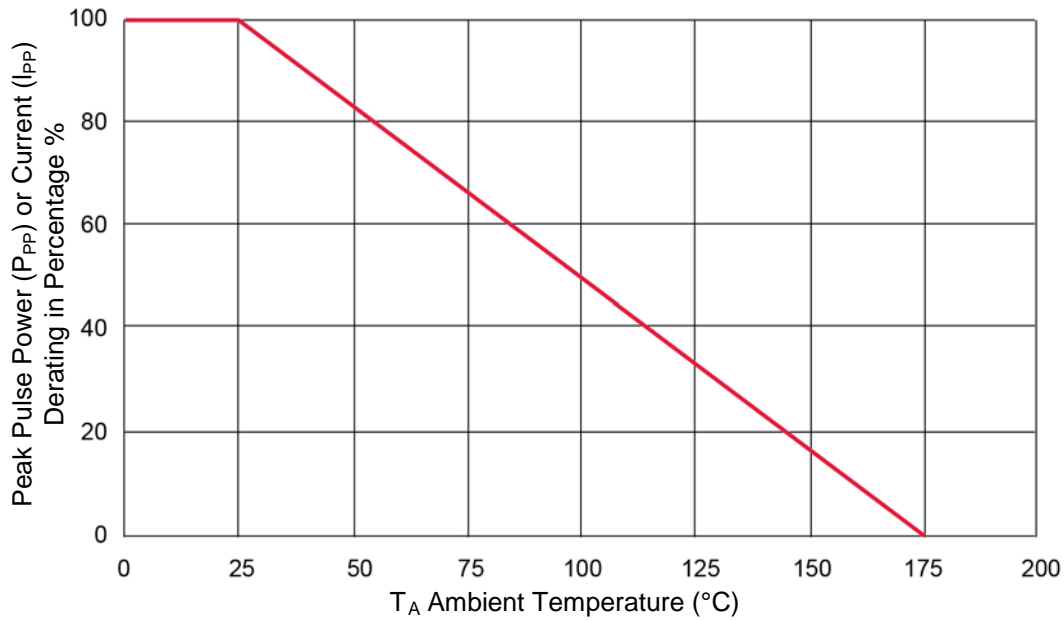
**NOTES:**

- (1) All ratings at 25 °C unless specified otherwise.
- (2) V<sub>(BR)</sub> measured after I<sub>(BR)</sub> applied for 300 μs, I<sub>(BR)</sub> = square wave pulse or equivalent.
- (3) Surge current waveform per [Figure 3](#) and derated per [Figure 2](#).
- (4) For bidirectional types with V<sub>WM</sub> of 30 volts and less, the I<sub>D</sub> limit is doubled.

GRAPHS

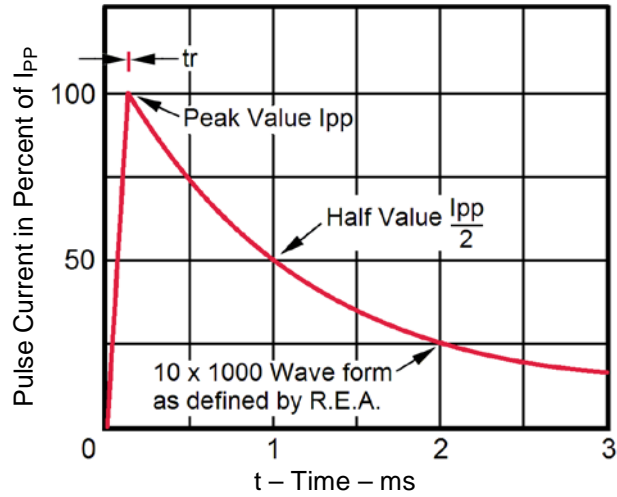


**FIGURE 1**  
Peak Pulse Power Rating Curve



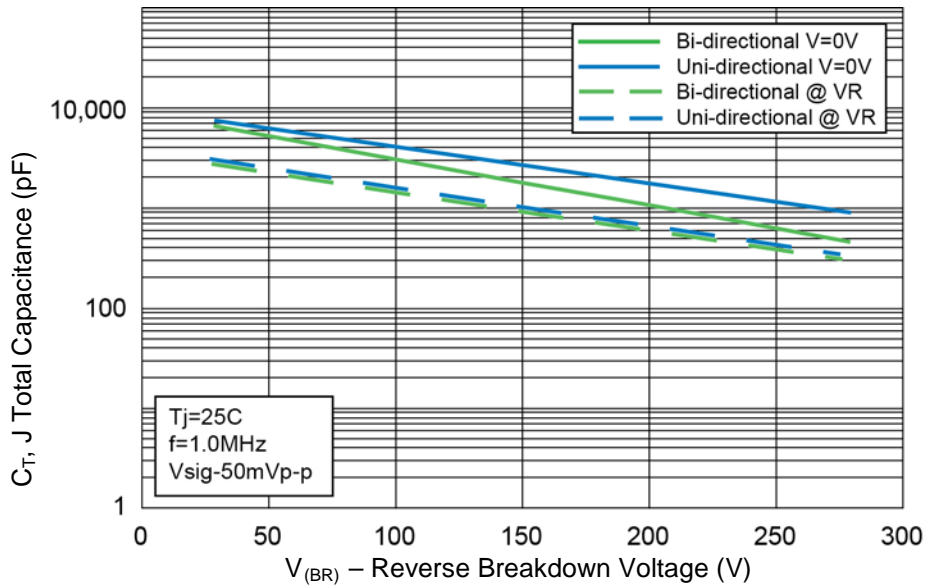
**FIGURE 2**  
Pulse Derating Curve

GRAPHS (continued)



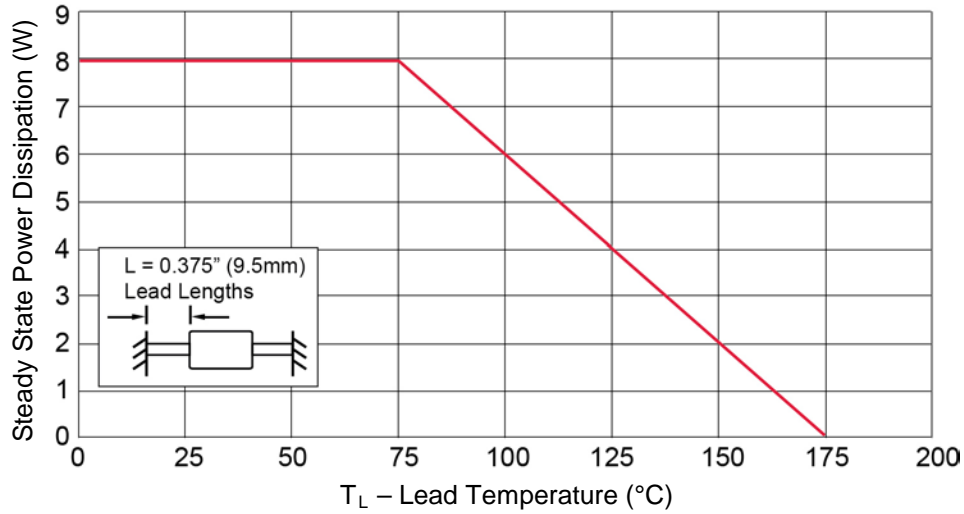
Test waveform parameters:  $t_r=10\ \mu s$ ,  $t_p=1000\ \mu s$

**FIGURE 3**  
Pulse Waveform for 10/1000 Exponential Surge

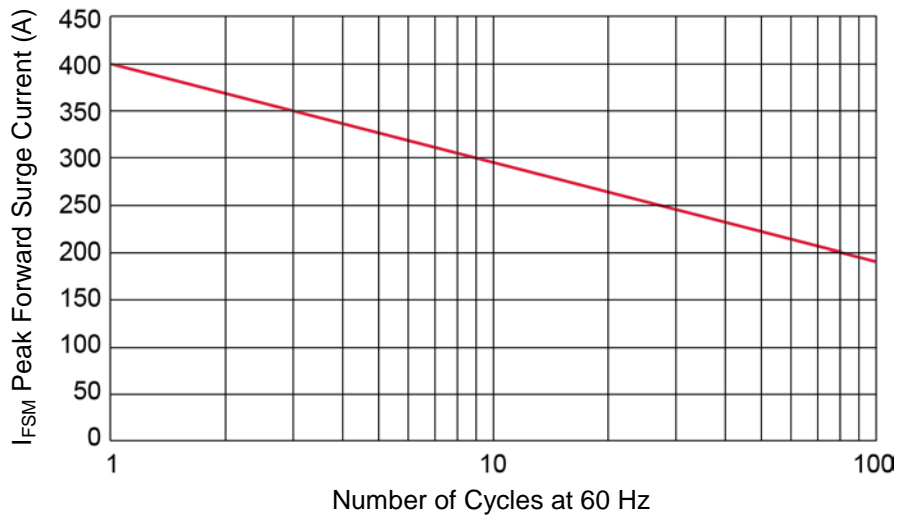


**FIGURE 4**  
Typical Junction Capacitance

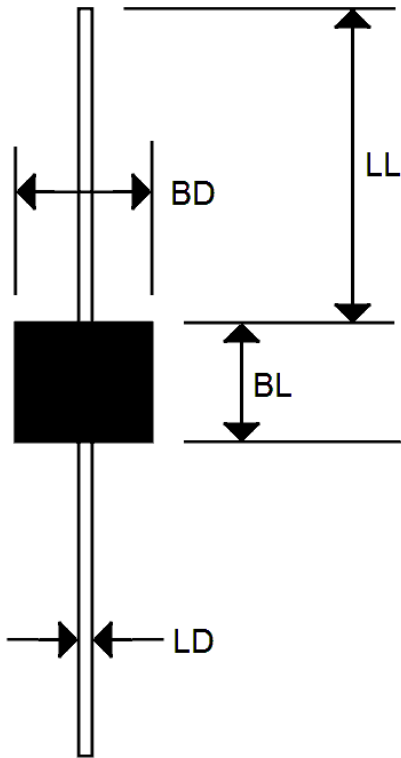
GRAPHS (continued)



**FIGURE 5**  
Steady State Power Derating Curve



**FIGURE 6**  
Maximum Non-repetitive Forward Surge Current

**PACKAGE DIMENSIONS**


Dim	Dimensions			
	Inch		Millimeters	
	Min	Max	Min	Max
<b>LL</b>	0.750	-	19.05	-
<b>BL</b>	0.340	0.360	8.645	9.135
<b>BD</b>	0.340	0.360	8.645	9.135
<b>LD</b>	0.047	0.053	1.194	1.346