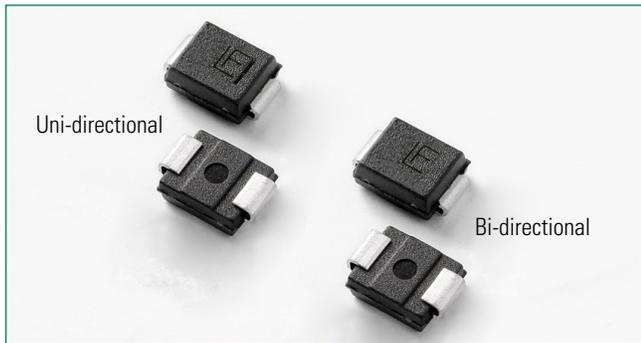


### 1KSMB Series



#### Agency Approvals

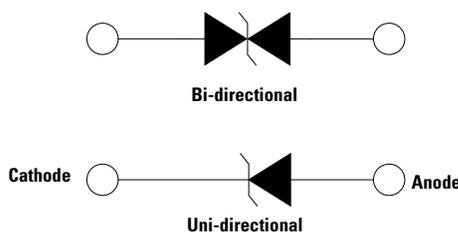
Agency	Agency File Number
	E230531

#### Maximum Ratings and Thermal Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation at T <sub>A</sub> =25°C by 10/1000µs Waveform (Fig.2)(Note 1), (Note 2)	P <sub>PPM</sub>	1000	W
Power Dissipation on Infinite Heat Sink at T <sub>L</sub> =50°C	P <sub>D</sub>	5.0	W
Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 3)	I <sub>FSM</sub>	120	A
Maximum Instantaneous Forward Voltage at 50A for Unidirectional Only	V <sub>F</sub>	3.5	V
Operating Temperature Range	T <sub>J</sub>	-65 to 150	°C
Storage Temperature Range	T <sub>STG</sub>	-65 to 175	°C
Typical Thermal Resistance Junction to Lead	R <sub>θJL</sub>	20	°C/W
Typical Thermal Resistance Junction to Ambient	R <sub>θJA</sub>	100	°C/W

**Notes:**  
 1. Non-repetitive current pulse, per Fig. 4 and derated above T<sub>J</sub> (initial) =25°C per Fig. 3.  
 2. Mounted on copper pad area of 0.2x0.2" (5.0 x 5.0mm) to each terminal.  
 3. Measured on 8.3ms single half sine wave or equivalent square wave for unidirectional device only, duty cycle=4 per minute maximum.

#### Functional Diagram



#### Description

The 1KSMB series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

#### Features

- 1000W peak pulse power capability at 10/1000µs waveform, repetition rate (duty cycles):0.01 %
- For surface mounted applications to optimize board space
- Low profile package
- Typical failure mode is short from over-specified voltage or current
- Whisker test is conducted based on JEDEC JESD201A per its table 4a and 4c
- IEC-61000-4-2 ESD 30kV(Air), 30kV (Contact)
- ESD protection of data lines in accordance with IEC 61000-4-2
- EFT protection of data lines in accordance with IEC 61000-4-4
- Built-in strain relief
- V<sub>BR</sub> @ T<sub>J</sub> = V<sub>BR</sub> @25°C x (1+αT x (T<sub>J</sub> - 25)) (αT: Temperature Coefficient, typical value is 0.1 %)
- Glass passivated chip junction
- Fast response time: typically less than 1.0ps from 0V to BV min
- Excellent clamping capability
- Low incremental surge resistance
- Typical I<sub>R</sub> less than 1µA when V<sub>BR</sub> max>12V
- High temperature to reflow soldering guaranteed: 260°C/40sec
- Plastic package is flammability rated V-0 per Underwriters Laboratories
- Meet MSL level1, per J-STD-020, LF maximum peak of 260°C
- Matte tin lead-free Plated
- Available in breakdown Voltage from 6.8V to 180V specially designed for automotive applications
- Offers high-surge rating in compact package: bridges the gap between 600W and 1.5KW
- Halogen free and RoHS compliant
- Pb-free E3 means 2nd level interconnect is Pb-free and the terminal finish material is tin(Sn) (IPC/JEDEC J-STD-609A.01)

#### Applications

TVS devices are ideal for the protection of I/O Interfaces, V<sub>CC</sub> bus and other vulnerable circuits used in Telecom, Computer, Industrial and Consumer electronic applications.

#### Additional Information



Datasheet



Resources



Samples

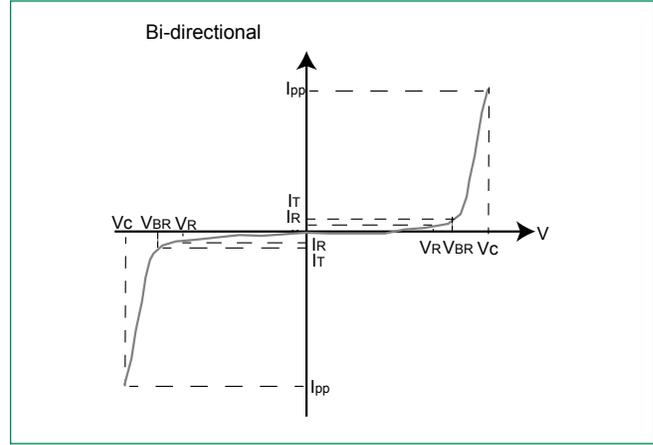
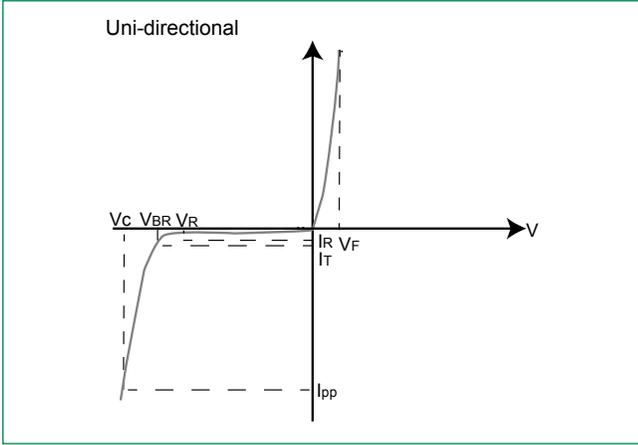
### Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

Part Number (Uni)	Part Number (Bi)	Marking		Reverse Stand off Voltage V <sub>R</sub> (Volts)	Breakdown Voltage V <sub>BR</sub> (Volts) @ I <sub>T</sub>		Test Current I <sub>T</sub> (mA)	Maximum Clamping Voltage V <sub>C</sub> @ I <sub>PP</sub> (V)	Maximum Peak Pulse Current I <sub>PP</sub> (A)	Maximum Reverse Leakage I <sub>R</sub> @ V <sub>R</sub> (μA)	Agency Approval 
		Uni	Bi		Min.	Max.					
1KSMB6.8A	1KSMB6.8CA	A10A	N10A	5.80	6.45	7.14	10	10.5	95.2	900	x
1KSMB7.5A	1KSMB7.5CA	A10B	N10B	6.40	7.13	7.88	10	11.3	88.5	400	x
1KSMB8.2A	1KSMB8.2CA	A10C	N10C	7.02	7.79	8.61	10	12.1	82.6	180	x
1KSMB9.1A	1KSMB9.1CA	A10D	N10D	7.78	8.65	9.55	1	13.4	74.6	45	x
1KSMB10A	1KSMB10CA	A10E	N10E	8.55	9.50	10.50	1	14.5	69.0	8	x
1KSMB11A	1KSMB11CA	A10F	N10F	9.40	10.50	11.60	1	15.6	64.1	4	x
1KSMB12A	1KSMB12CA	A10G	N10G	10.20	11.40	12.60	1	16.7	59.9	1	x
1KSMB13A	1KSMB13CA	A10H	N10H	11.10	12.40	13.70	1	18.2	54.9	1	x
1KSMB15A	1KSMB15CA	A10I	N10I	12.80	14.30	15.80	1	21.2	47.2	1	x
1KSMB16A	1KSMB16CA	A10J	N10J	13.60	15.20	16.80	1	22.5	44.4	1	x
1KSMB18A	1KSMB18CA	A10K	N10K	15.30	17.10	18.90	1	25.5	39.2	1	x
1KSMB20A	1KSMB20CA	A10L	N10L	17.10	19.00	21.00	1	27.7	36.1	1	x
1KSMB22A	1KSMB22CA	A10M	N10M	18.80	20.90	23.10	1	30.6	32.7	1	x
1KSMB24A	1KSMB24CA	A10N	N10N	20.50	22.80	25.20	1	33.2	30.1	1	x
1KSMB27A	1KSMB27CA	A10O	N10O	23.10	25.70	28.40	1	37.5	26.7	1	x
1KSMB30A	1KSMB30CA	A10P	N10P	25.60	28.50	31.50	1	41.4	24.2	1	x
1KSMB33A	1KSMB33CA	A10Q	N10Q	28.20	31.40	34.70	1	45.7	21.9	1	x
1KSMB36A	1KSMB36CA	A10R	N10R	30.80	34.20	37.80	1	49.9	20.0	1	x
1KSMB39A	1KSMB39CA	A10S	N10S	33.30	37.10	41.00	1	53.9	18.6	1	x
1KSMB43A	1KSMB43CA	A10T	N10T	36.80	40.90	45.20	1	59.3	16.9	1	x
1KSMB47A	1KSMB47CA	A10U	N10U	40.20	44.70	49.40	1	64.8	15.4	1	x
1KSMB51A	1KSMB51CA	A10V	N10V	43.60	48.50	53.60	1	70.1	14.3	1	x
1KSMB56A	1KSMB56CA	A10W	N10W	47.80	53.20	58.80	1	77.0	13.0	1	x
1KSMB62A	1KSMB62CA	A10X	N10X	53.00	58.90	65.10	1	85.0	11.8	1	x
1KSMB68A	1KSMB68CA	A10Y	N10Y	58.10	64.60	71.40	1	92.0	10.9	1	x
1KSMB75A	1KSMB75CA	A10Z	N10Z	64.10	71.30	78.80	1	103.0	9.7	1	x
1KSMB82A	1KSMB82CA	B10A	O10A	70.10	77.90	86.10	1	113.0	8.8	1	x
1KSMB91A	1KSMB91CA	B10B	O10B	77.80	86.50	95.50	1	125.0	8.0	1	x
1KSMB100A	1KSMB100CA	B10C	O10C	85.50	95.00	105.00	1	137.0	7.3	1	x
1KSMB110A	1KSMB110CA	B10D	O10D	94.00	105.00	116.00	1	152.0	6.6	1	x
1KSMB120A	1KSMB120CA	B10E	O10E	102.00	114.00	126.00	1	165.0	6.1	1	x
1KSMB130A	1KSMB130CA	B10F	O10F	111.00	124.00	137.00	1	179.0	5.6	1	x
1KSMB150A	1KSMB150CA	B10G	O10G	128.00	143.00	158.00	1	207.0	4.8	1	x
1KSMB160A	1KSMB160CA	B10H	O10H	136.00	152.00	168.00	1	219.0	4.6	1	x
1KSMB170A	1KSMB170CA	B10I	O10I	144.50	162.00	179.00	1	234.0	4.3	1	x
1KSMB180A	1KSMB180CA	B10J	O10J	153.00	171.00	189.00	1	246.0	4.1	1	x

For bidirectional type having V<sub>s</sub> of 10 volts and less, the I<sub>s</sub> limit is double.

For parts without A V<sub>min</sub> is ± 10% and V<sub>C</sub> is 5% higher than with A parts, the parts without A are currently available, but not recommended for new designs. The parts with A are preferred.

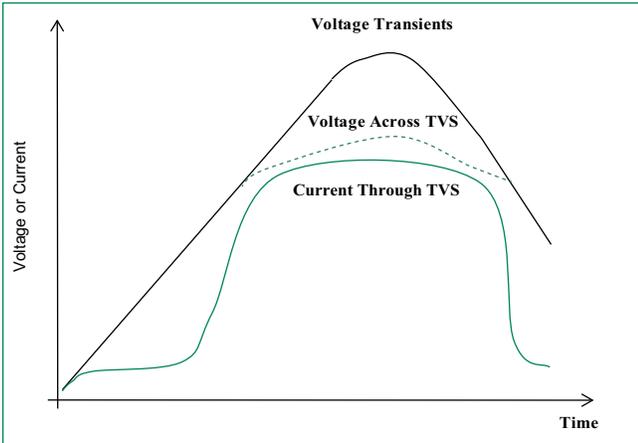
**I-V Curve Characteristics**



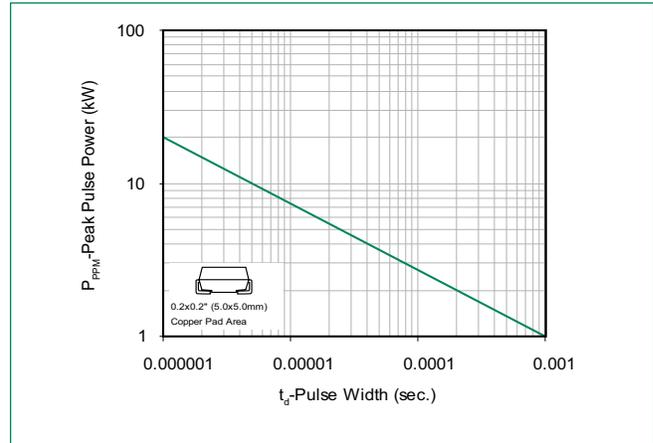
- $P_{PPM}$  Peak Pulse Power Dissipation** – Max power dissipation
- $V_R$  Stand-off Voltage** – Maximum voltage that can be applied to the TVS without operation
- $V_{BR}$  Breakdown Voltage** – Maximum voltage that flows through the TVS at a specified test current ( $I_T$ )
- $V_C$  Clamping Voltage** – Peak voltage measured across the TVS at a specified  $I_{ppm}$  (peak impulse current)
- $I_R$  Reverse Leakage Current** – Current measured at  $V_R$
- $V_F$  Forward Voltage Drop for Uni-directional**

**Ratings and Characteristic Curves ( $T_A=25^\circ\text{C}$  unless otherwise noted)**

**Figure 1 - TVS Transients Clamping Waveform**

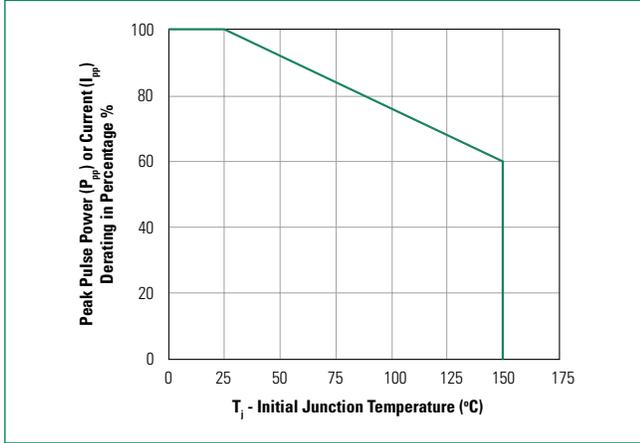


**Figure 2 - Peak Pulse Power Rating Curve**

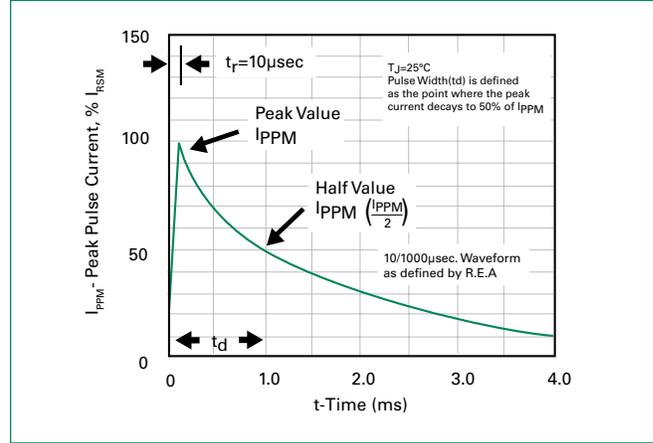


**Ratings and Characteristic Curves** ( $T_A=25^\circ\text{C}$  unless otherwise noted) (Continued)

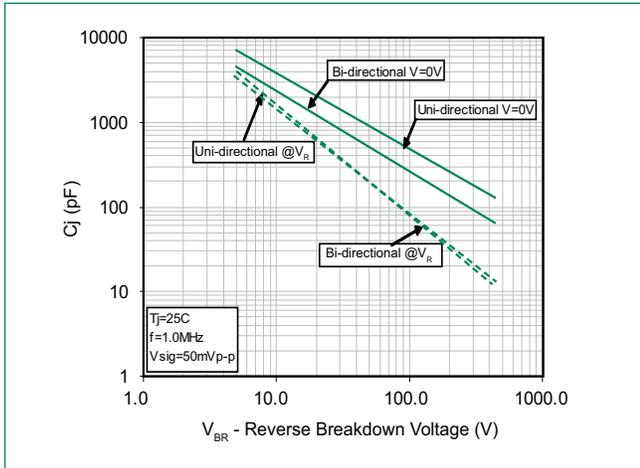
**Figure 3 - Peak Pulse Power Derating Curve**



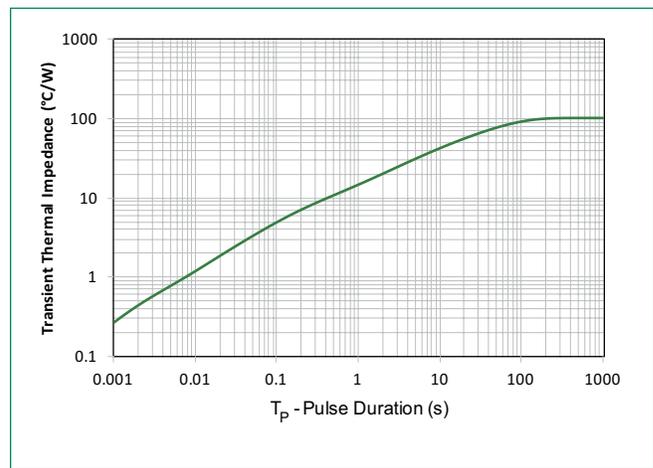
**Figure 4 - Pulse Waveform**



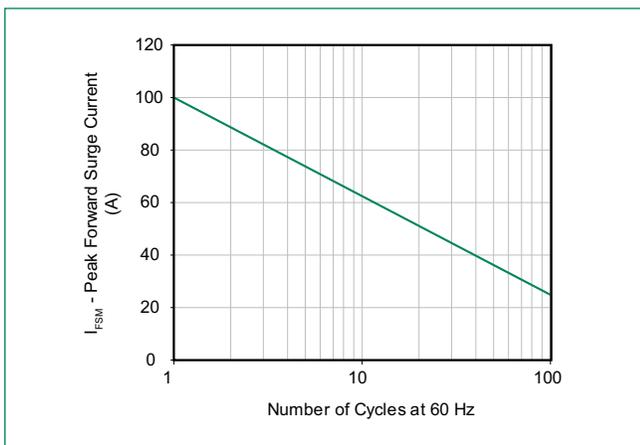
**Figure 5 - Typical Junction Capacitance**



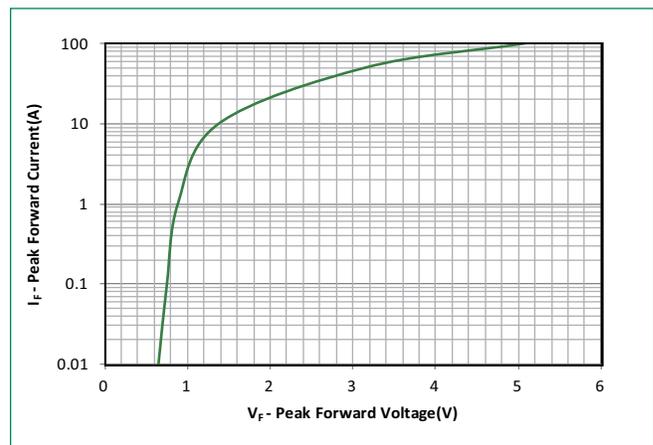
**Figure 6 - Typical Transient Thermal Impedance**



**Figure 7 - Maximum Non-Repetitive Peak Forward Surge Current Uni-Directional Only**

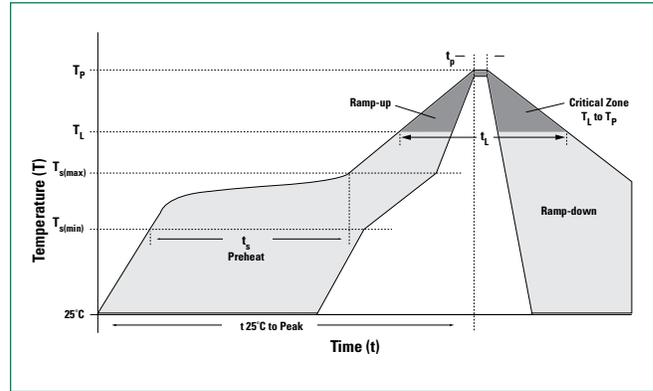


**Figure 8 - Peak Forward Voltage Drop vs Peak Forward Current (Typical Values)**



### Soldering Parameters

<b>Reflow Condition</b>		Lead-free assembly
<b>Pre Heat</b>	- Temperature Min ( $T_{s(min)}$ )	150°C
	- Temperature Max ( $T_{s(max)}$ )	200°C
	- Time (min to max) ( $t_s$ )	60 – 180 secs
<b>Average ramp up rate (Liquidus Temp (<math>T_A</math>) to peak)</b>		3°C/second max
<b><math>T_{s(max)}</math> to <math>T_A</math> - Ramp-up Rate</b>		3°C/second max
<b>Reflow</b>	- Temperature ( $T_A$ ) (Liquidus)	217°C
	- Time (min to max) ( $t_s$ )	60 – 150 seconds
<b>Peak Temperature (<math>T_p</math>)</b>		260 <sup>+0/-5</sup> °C
<b>Time within 5°C of actual peak Temperature (<math>t_p</math>)</b>		20 – 40 seconds
<b>Ramp-down Rate</b>		6°C/second max
<b>Time 25°C to peak Temperature (<math>T_p</math>)</b>		8 minutes Max.
<b>Do not exceed</b>		260°C



### Physical Specifications

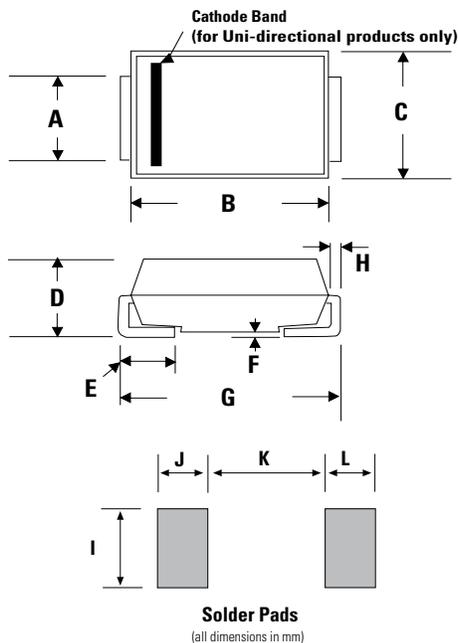
<b>Weight</b>	0.003 ounce, 0.093 grams
<b>Case</b>	JEDEC DO214AA. Molded plastic body over glass passivated junction
<b>Polarity</b>	Color band denotes cathode except Bidirectional.
<b>Terminal</b>	Matte Tin-plated leads, Solderable per JESD22-B102

### Environmental Specifications

<b>High Temp. Storage</b>	JESD22-A103
<b>HTRB</b>	JESD22-A108
<b>Temperature Cycling</b>	JESD22-A104
<b>MSL</b>	JEDEC-J-STD-020, Level 1
<b>H3TRB</b>	JESD22-A101
<b>RSH</b>	JESD22-A111

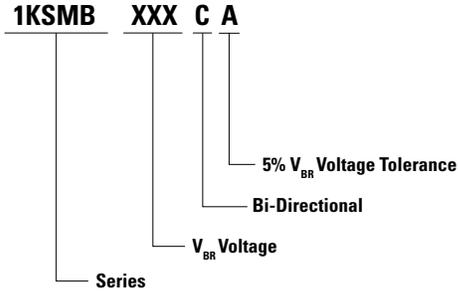
### Dimensions

#### DO-214AA (SMB J-Bend)

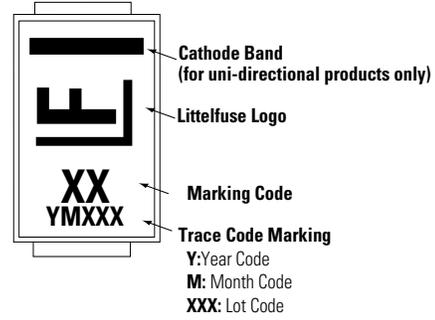


Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	0.077	0.086	1.950	2.200
B	0.160	0.180	4.060	4.570
C	0.130	0.155	3.300	3.940
D	0.084	0.096	2.130	2.440
E	0.030	0.060	0.760	1.520
F	-	0.008	-	0.203
G	0.205	0.220	5.210	5.590
H	0.006	0.012	0.152	0.305
I	0.089	-	2.260	-
J	0.085	-	2.160	-
K	-	0.107	-	2.740
L	0.085	-	2.160	-

**Part Numbering System**



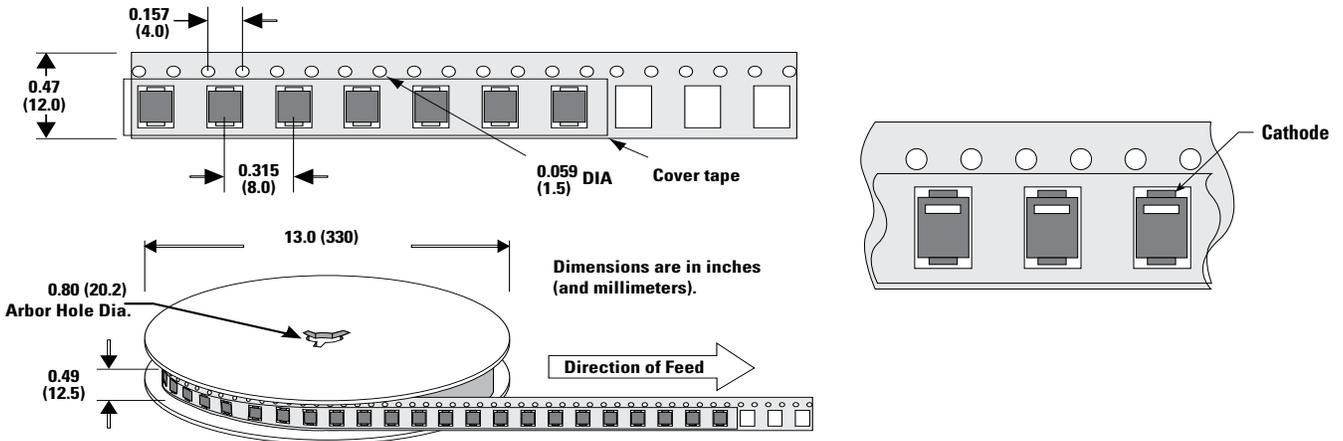
**Part Marking System**



**Packaging**

Part number	Component Package	Quantity	Packaging Option	Packaging Specification
1KSMBxxxXX	DO-214AA	3000	Tape & Reel - 12mm tape/13" reel	EIA STD RS-481

**Tape and Reel Specification**



# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

## Littelfuse:

[1KSMB170A](#) [1KSMB82A](#) [1KSMB51CA](#) [1KSMB160A](#) [1KSMB100A](#) [1KSMB62A](#) [1KSMB27A](#) [1KSMB43A](#)  
[1KSMB20CA](#) [1KSMB11CA](#) [1KSMB8.2A](#) [1KSMB150CA](#) [1KSMB9.1A](#) [1KSMB12CA](#) [1KSMB7.5CA](#) [1KSMB110CA](#)  
[1KSMB33CA](#) [1KSMB68A](#) [1KSMB170CA](#) [1KSMB91CA](#) [1KSMB47A](#) [1KSMB22CA](#) [1KSMB180A](#) [1KSMB10A](#)  
[1KSMB9.1CA](#) [1KSMB16A](#) [1KSMB15CA](#) [1KSMB91A](#) [1KSMB27CA](#) [1KSMB180CA](#) [1KSMB10CA](#) [1KSMB11A](#)  
[1KSMB16CA](#) [1KSMB56CA](#) [1KSMB110A](#) [1KSMB75CA](#) [1KSMB18A](#) [1KSMB7.5A](#) [1KSMB51A](#) [1KSMB13A](#)  
[1KSMB30A](#) [1KSMB24CA](#) [1KSMB120A](#) [1KSMB39A](#) [1KSMB18CA](#) [1KSMB36CA](#) [1KSMB22A](#) [1KSMB130CA](#)  
[1KSMB6.8A](#) [1KSMB13CA](#) [1KSMB30CA](#) [1KSMB15A](#) [1KSMB75A](#) [1KSMB56A](#) [1KSMB160CA](#) [1KSMB6.8CA](#)  
[1KSMB33A](#) [1KSMB36A](#) [1KSMB8.2CA](#) [1KSMB39CA](#) [1KSMB120CA](#) [1KSMB20A](#) [1KSMB68CA](#) [1KSMB12A](#)  
[1KSMB47CA](#) [1KSMB24A](#) [1KSMB150A](#) [1KSMB100CA](#) [1KSMB62CA](#) [1KSMB82CA](#) [1KSMB43CA](#) [1KSMB22C](#)  
[1KSMB15C](#) [1KSMB47C](#) [1KSMB10](#) [1KSMB18C](#) [1KSMB33C](#) [1KSMB20C](#) [1KSMB33](#) [1KSMB20](#) [1KSMB15](#)  
[1KSMB30](#) [1KSMB47](#) [1KSMB18](#) [1KSMB68](#) [1KSMB36](#) [1KSMB56](#) [1KSMB22](#) [1KSMB51](#) [1KSMB24](#) [1KSMB16](#)  
[1KSMB62](#) [1KSMB43](#) [1KSMB27](#) [1KSMB11C](#) [1KSMB130A](#)