

# MSKSEMI 美森科

SEMICONDUCTOR



ESD



TVS



TSS



MOV



GDT



PLED

**1SMB59XXBT3G-MS**

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**Product specification**

**Features**

- Zener Voltage Range – 3.3 V to 200 V
- ESD Rating of Class 3 (> 16 kV) per Human Body Model
- Flat Handling Surface for Accurate Placement
- Package Design for Top Side or Bottom Circuit Board Mounting

**Mechanical Characteristics:**

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

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

**MAXIMUM CASE TEMPERATURE FOR SOLDERING PURPOSES:**

260°C for 10 seconds

**LEADS:** Modified L-Bend providing more contact area to bond pads

**POLARITY:** Cathode indicated by polarity band

**FLAMMABILITY RATING:** UL 94 V-0


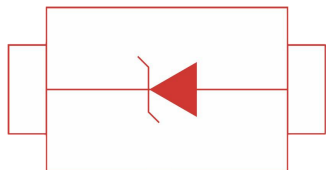
**MAXIMUM RATINGS**

Rating	Symbol	Value	Unit
Maximum Steady State Power Dissipation @ TL = 75°C Measured at Zero Lead Length Derate Above 75°C	PD	3.0	W
Thermal Resistance from Junction-to-Lead	RθJL	40 25	mW/°C °C/W
Maximum Steady State Power Dissipation @ TA = 25°C (Note ) Derate Above 25°C	PD	550	mW
Thermal Resistance from Junction-to-Ambient	RθJA	4.4 226	mW/°C °C/W
Operating and Storage Temperature Range	TJ, Tstg	-65 to +150	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. FR-4 board, using recommended footprint.

**Reference News**

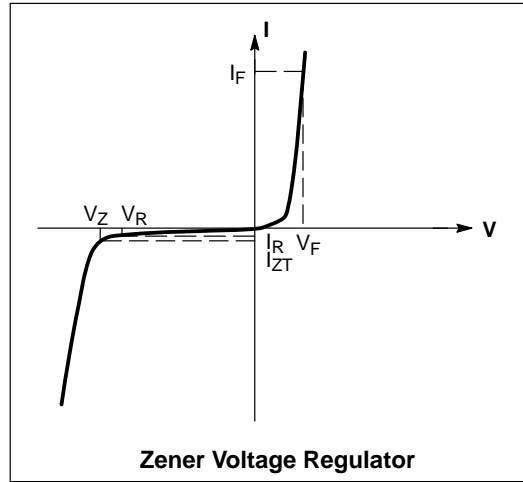
PACKAGE OUTLINE	PIN CONFIGURATION
	
SMB(DO-214AA)	

**ELECTRICAL CHARACTERISTICS**

(TL = 30°C unless otherwise noted,

VF = 1.5 V Max. @ IF = 200 mA(dc) for all types)

Symbol	Parameter
VZ	Reverse Zener Voltage @ IZT
IZT	Reverse Current
ZZT	Maximum Zener Impedance @ IZT
IZK	Reverse Current
ZZK	Maximum Zener Impedance @ IZK
IR	Reverse Leakage Current @ VR
VR	Reverse Voltage
IF	Forward Current
VF	Forward Voltage @ IF
IZM	Maximum DC Zener Current



**ELECTRICAL CHARACTERISTICS** ( $T_L = 30$ . C unless otherwise noted,  $V_F = 1.5$  V Max. @  $I_F = 200$  mA(dc) for all types) (Devices listed in **bold, italic** are ON Semiconductor Preferred devices.)

Device* (Note 2)	Device Marking	Zener Voltage (Note 3)				Zener Impedance (Note 4)			Leakage Current		I <sub>ZM</sub> mA(dc)
		V <sub>Z</sub> (Volts)			@ I <sub>ZT</sub>	Z <sub>ZT</sub> @ I <sub>ZT</sub>	Z <sub>ZK</sub> @ I <sub>ZK</sub>		I <sub>R</sub> @ V <sub>R</sub>		
		Min	Nom	Max	mA	Ω	Ω	mA	μA	Volts	
1SMB5913BT3G-MS	MSKSEMI 913B	3.13	3.3	3.47	113.6	10	500	1	100	1	454
1SMB5914BT3G-MS	MSKSEMI 914B	3.42	3.6	3.78	104.2	9	500	1	75	1	416
<b>1SMB5915BT3G-MS</b>	<b>MSKSEMI 915B</b>	<b>3.70</b>	<b>3.9</b>	<b>4.10</b>	<b>96.1</b>	<b>7.5</b>	<b>500</b>	<b>1</b>	<b>25</b>	<b>1</b>	<b>384</b>
<b>1SMB5916BT3G-MS</b>	<b>MSKSEMI 916B</b>	<b>4.08</b>	<b>4.3</b>	<b>4.52</b>	<b>87.2</b>	<b>6</b>	<b>500</b>	<b>1</b>	<b>5</b>	<b>1</b>	<b>348</b>
<b>1SMB5917BT3G-MS</b>	<b>MSKSEMI 917B</b>	<b>4.46</b>	<b>4.7</b>	<b>4.94</b>	<b>79.8</b>	<b>5</b>	<b>500</b>	<b>1</b>	<b>5</b>	<b>1.5</b>	<b>319</b>
<b>1SMB5918BT3G-MS</b>	<b>MSKSEMI 918B</b>	<b>4.84</b>	<b>5.1</b>	<b>5.36</b>	<b>73.5</b>	<b>4</b>	<b>350</b>	<b>1</b>	<b>5</b>	<b>2</b>	<b>294</b>
<b>1SMB5919BT3G-MS</b>	<b>MSKSEMI 919B</b>	<b>5.32</b>	<b>5.6</b>	<b>5.88</b>	<b>66.9</b>	<b>2</b>	<b>250</b>	<b>1</b>	<b>5</b>	<b>3</b>	<b>267</b>
<b>1SMB5920BT3G-MS</b>	<b>MSKSEMI 920B</b>	<b>5.89</b>	<b>6.2</b>	<b>6.51</b>	<b>60.5</b>	<b>2</b>	<b>200</b>	<b>1</b>	<b>5</b>	<b>4</b>	<b>241</b>
1SMB5921BT3G-MS	MSKSEMI 921B	6.46	6.8	7.14	55.1	2.5	200	1	5	5.2	220
1SMB5922BT3G-MS	MSKSEMI 922B	7.12	7.5	7.88	50	3	400	0.5	5	6	200
<b>1SMB5923BT3G-MS</b>	<b>MSKSEMI 923B</b>	<b>7.79</b>	<b>8.2</b>	<b>8.61</b>	<b>45.7</b>	<b>3.5</b>	<b>400</b>	<b>0.5</b>	<b>5</b>	<b>6.5</b>	<b>182</b>
1SMB5924BT3G-MS	MSKSEMI 924B	8.64	9.1	9.56	41.2	4	500	0.5	5	7	164
<b>1SMB5925BT3G-MS</b>	<b>MSKSEMI 925B</b>	<b>9.5</b>	<b>10</b>	<b>10.5</b>	<b>37.5</b>	<b>4.5</b>	<b>500</b>	<b>0.25</b>	<b>5</b>	<b>8</b>	<b>150</b>
<b>1SMB5926BT3G-MS</b>	<b>MSKSEMI 926B</b>	<b>10.45</b>	<b>11</b>	<b>11.55</b>	<b>34.1</b>	<b>5.5</b>	<b>550</b>	<b>0.25</b>	<b>1</b>	<b>8.4</b>	<b>136</b>
<b>1SMB5927BT3G-MS</b>	<b>MSKSEMI 927B</b>	<b>11.4</b>	<b>12</b>	<b>12.6</b>	<b>31.2</b>	<b>6.5</b>	<b>550</b>	<b>0.25</b>	<b>1</b>	<b>9.1</b>	<b>125</b>
1SMB5928BT3G-MS	MSKSEMI 928B	12.35	13	13.65	28.8	7	550	0.25	1	9.9	115
<b>1SMB5929BT3G-MS</b>	<b>MSKSEMI 929B</b>	<b>14.25</b>	<b>15</b>	<b>15.75</b>	<b>25</b>	<b>9</b>	<b>600</b>	<b>0.25</b>	<b>1</b>	<b>11.4</b>	<b>100</b>
1SMB5930BT3G-MS	MSKSEMI 930B	15.2	16	16.8	23.4	10	600	0.25	1	12.2	93
<b>1SMB5931BT3G-MS</b>	<b>MSKSEMI 931B</b>	<b>17.1</b>	<b>18</b>	<b>18.9</b>	<b>20.8</b>	<b>12</b>	<b>650</b>	<b>0.25</b>	<b>1</b>	<b>13.7</b>	<b>83</b>
1SMB5932BT3G-MS	MSKSEMI 932B	19	20	21	18.7	14	650	0.25	1	15.2	75
1SMB5933BT3G-MS	MSKSEMI 933B	20.9	22	23.1	17	17.5	650	0.25	1	16.7	68
<b>1SMB5934BT3G-MS</b>	<b>MSKSEMI 934B</b>	<b>22.8</b>	<b>24</b>	<b>25.2</b>	<b>15.6</b>	<b>19</b>	<b>700</b>	<b>0.25</b>	<b>1</b>	<b>18.2</b>	<b>62</b>
<b>1SMB5935BT3G-MS</b>	<b>MSKSEMI 935B</b>	<b>25.65</b>	<b>27</b>	<b>28.35</b>	<b>13.9</b>	<b>23</b>	<b>700</b>	<b>0.25</b>	<b>1</b>	<b>20.6</b>	<b>55</b>
<b>1SMB5936BT3G-MS</b>	<b>MSKSEMI 936B</b>	<b>28.5</b>	<b>30</b>	<b>31.5</b>	<b>12.5</b>	<b>28</b>	<b>750</b>	<b>0.25</b>	<b>1</b>	<b>22.8</b>	<b>50</b>
1SMB5937BT3G-MS	MSKSEMI 937B	31.35	33	34.65	11.4	33	800	0.25	1	25.1	45
<b>1SMB5938BT3G-MS</b>	<b>MSKSEMI 938B</b>	<b>34.2</b>	<b>36</b>	<b>37.8</b>	<b>10.4</b>	<b>38</b>	<b>850</b>	<b>0.25</b>	<b>1</b>	<b>27.4</b>	<b>41</b>
1SMB5939BT3G-MS	MSKSEMI 939B	37.05	39	40.95	9.6	45	900	0.25	1	29.7	38
1SMB5940BT3G-MS	MSKSEMI 940B	40.85	43	45.15	8.7	53	950	0.25	1	32.7	34
1SMB5941BT3G-MS	MSKSEMI 941B	44.65	47	49.35	8	67	1000	0.25	1	35.8	31
1SMB5942BT3G-MS	MSKSEMI 942B	48.45	51	53.55	7.3	70	1100	0.25	1	38.8	29
1SMB5943BT3G-MS	MSKSEMI 943B	53.2	56	58.8	6.7	86	1300	0.25	1	42.6	26
1SMB5944BT3G-MS	MSKSEMI 944B	58.9	62	65.1	6	100	1500	0.25	1	47.1	24
1SMB5945BT3G-MS	MSKSEMI 945B	64.6	68	71.4	5.5	120	1700	0.25	1	51.7	22
1SMB5946BT3G-MS	MSKSEMI 946B	71.25	75	78.75	5	140	2000	0.25	1	56	20
1SMB5947BT3G-MS	MSKSEMI 947B	77.9	82	86.1	4.6	160	2500	0.25	1	62.2	18
1SMB5948BT3G-MS	MSKSEMI 948B	86.45	91	95.55	4.1	200	3000	0.25	1	69.2	16
<b>1SMB5949BT3G-MS</b>	<b>MSKSEMI 949B</b>	<b>95</b>	<b>100</b>	<b>105</b>	<b>3.7</b>	<b>250</b>	<b>3100</b>	<b>0.25</b>	<b>1</b>	<b>76</b>	<b>15</b>
1SMB5951BT3G-MS	MSKSEMI 951B	114	120	126	3.1	380	4500	0.25	1	91.2	12
1SMB5952BT3G-MS	MSKSEMI 952B	123.5	130	136.5	2.9	450	5000	0.25	1	98.8	11
1SMB5953BT3G-MS	MSKSEMI 953B	142.5	150	157.5	2.5	600	6000	0.25	1	114	10
1SMB5954BT3G-MS	MSKSEMI 954B	152	160	168	2.3	700	6500	0.25	1	121.6	9
1SMB5955BT3G-MS	MSKSEMI 955B	171	180	189	2.1	900	7000	0.25	1	136.8	8
1SMB5956BT3G-MS	MSKSEMI 956B	190	200	210	1.9	1200	8000	0.25	1	152	7

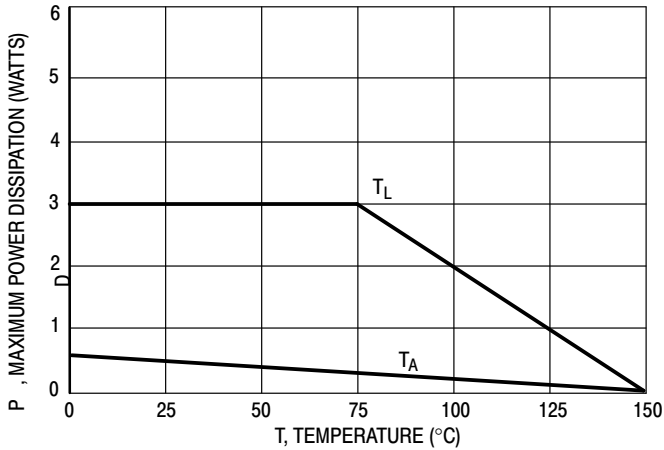
2. **TOLERANCE AND TYPE NUMBER DESIGNATION** The type numbers listed indicate a tolerance of ±5%.

3. **ZENER VOLTAGE (V<sub>Z</sub>) MEASUREMENT**

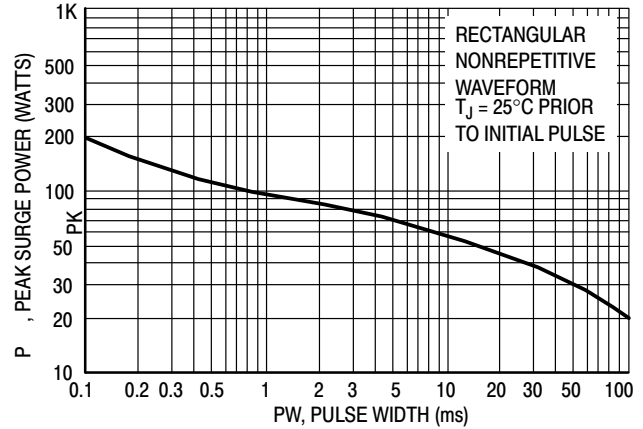
Nominal Zener voltage is measured with the device junction in thermal equilibrium with ambient temperature at 25. C.

4. **ZENER IMPEDANCE (Z<sub>Z</sub>) DERIVATION** Z<sub>ZT</sub> and Z<sub>ZK</sub> are measured by dividing the ac voltage drop across the device by the ac current applied.

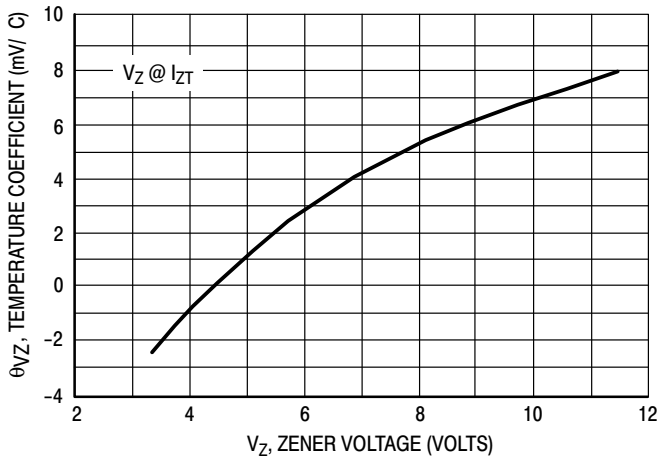
The specified limits are for I<sub>Z(ac)</sub> = 0.1 I<sub>Z(dc)</sub> with the ac frequency = 60 Hz.



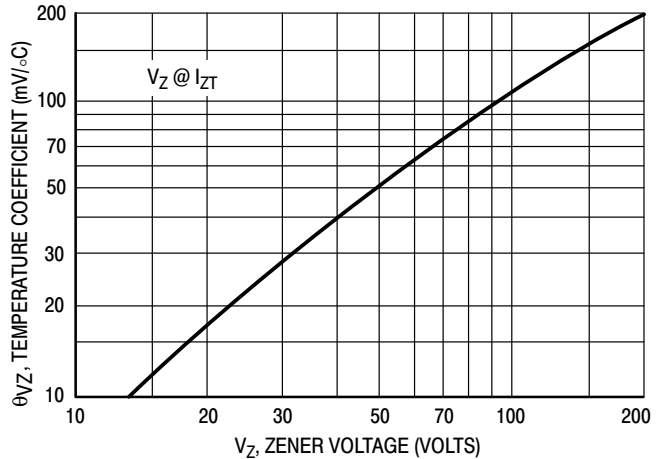
**Figure 1. Steady State Power Derating**



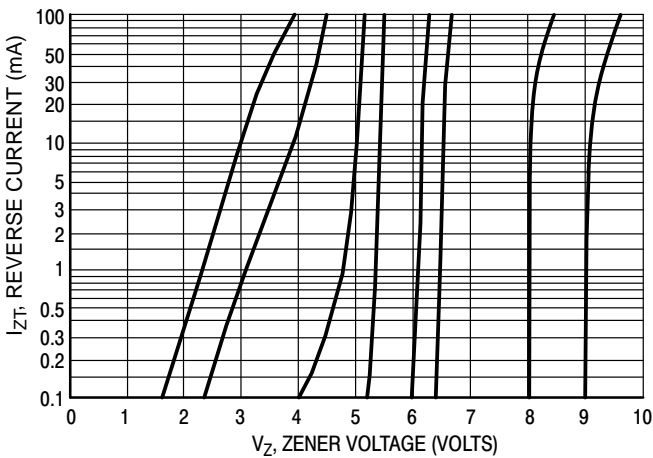
**Figure 2. Maximum Surge Power**



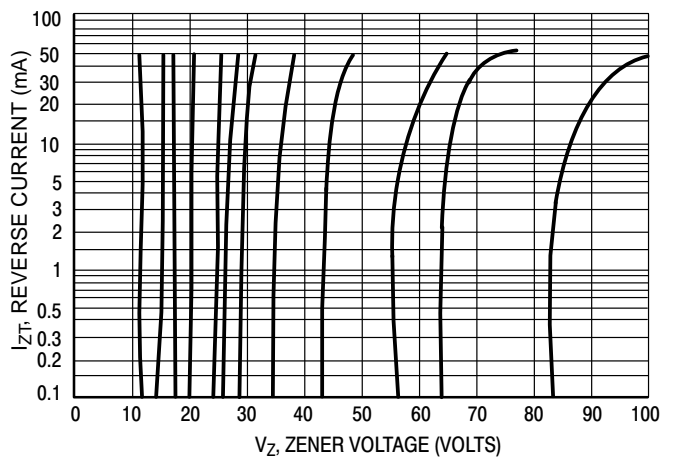
**Figure 3. Zener Voltage - To 12 Volts**



**Figure 4. Zener Voltage - 14 To 200 Volts**



**Figure 5.  $V_Z = 3.3$  thru 10 Volts**



**Figure 6.  $V_Z = 12$  thru 82 Volts**

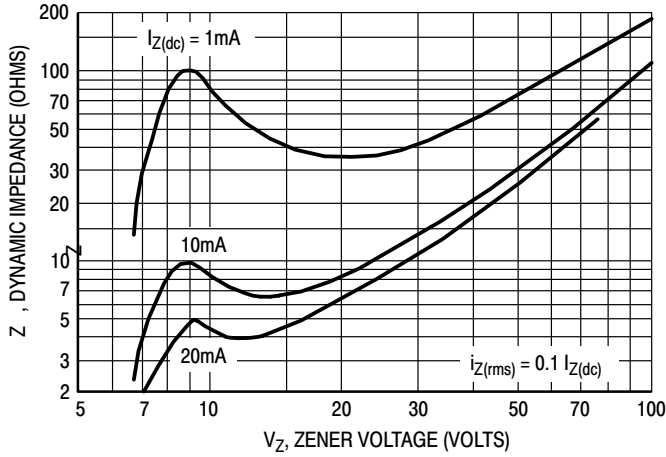


Figure 7. Effect of Zener Voltage

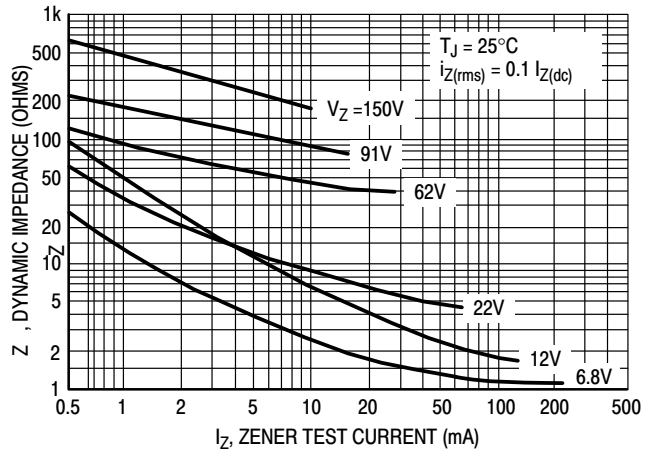


Figure 8. Effect of Zener Current

**Rating and Typical Characteristic Curves ( $T_A = 25^\circ\text{C}$ )**

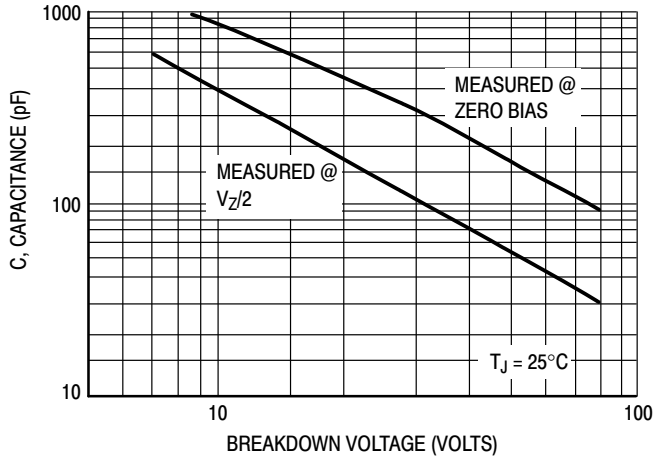


Figure 9. Capacitance Curve

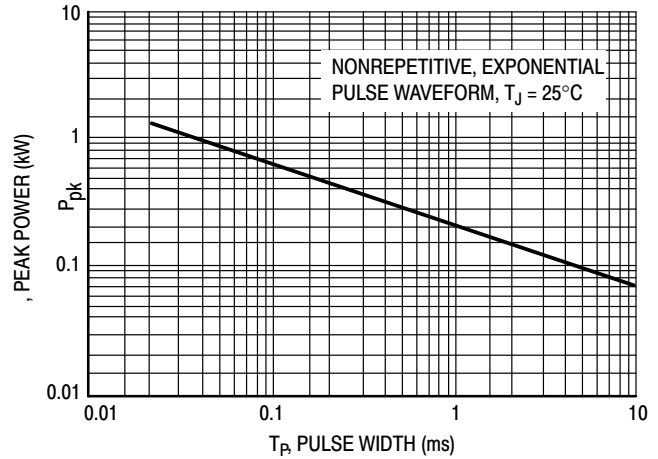


Figure 10. Typical Pulse Rating Curve

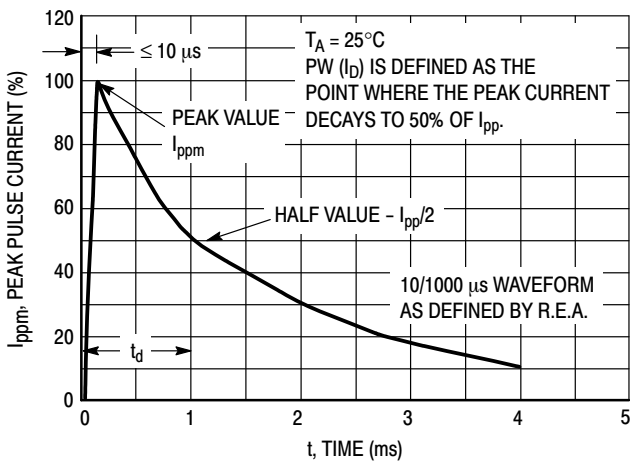


Figure 11. Pulse Waveform

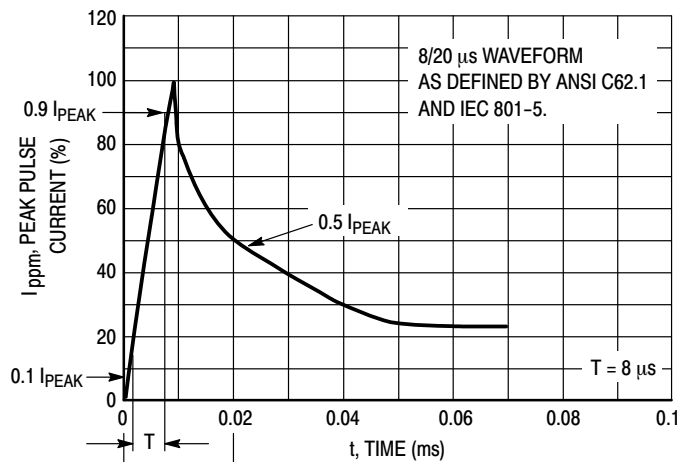
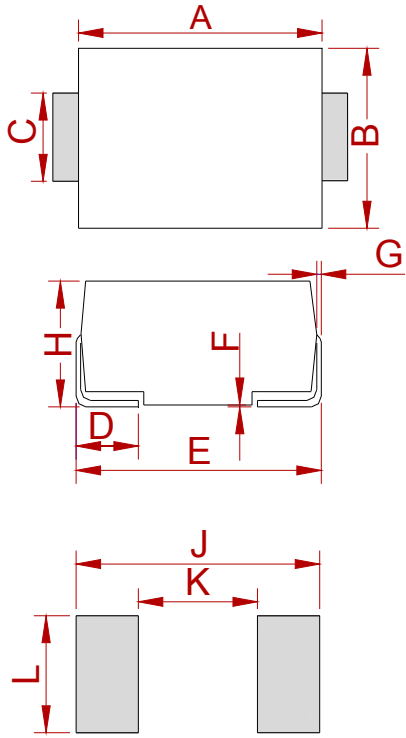


Figure 12. Pulse Waveform

**PACKAGE MECHANICAL DATA**



DO-214AA (SMB)

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.25	4.75	0.167	0.187
B	3.30	3.94	0.130	0.155
C	1.85	2.21	0.073	0.087
D	0.76	1.52	0.030	0.060
E	5.08	5.59	0.200	0.220
F	0.051	0.203	0.002	0.008
G	0.15	0.31	0.006	0.012
H	2.11	2.44	0.083	0.096
J	6.80		0.270	
K		2.60		0.100
L	2.40		0.090	

**REEL SPECIFICATION**

P/N	PKG	QTY
1SMB59XXBT3G-MS	SMB	2500

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