




**THE DATASHEET OF  
1SMB5913B-13**



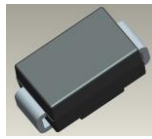
**Features**

- 3.0W Power Dissipation
- Ideally Suited for Automated Assembly
- 3.3V - 200V Nominal Zener Voltage Range
- Standard  $V_Z$  Tolerance is  $\pm 5\%$
- ESD Rating of Class 3 (>16kV) per Human Body Model
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

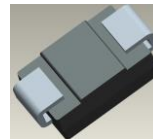
**Mechanical Data**

- Case: SMB
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Copper Alloy Leadframe with Lead-Free Plating (Matte Tin Finish). Solderable per MIL-STD-202, Method 208 
- Polarity: Cathode Band
- Weight: 0.096 grams (Approximate)

**SMB**



Top View



Bottom View

**Ordering Information** (Note 4)

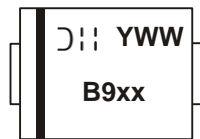
Device*	Packaging	Shipping
1SMB59xxB-13	SMB	3,000/Tape & Reel

\*x = Device Voltage, e.g., 1SMB5920B-13.

- Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
  2. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
  3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  4. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

**Marking Information**

**SMB**



B9xx = Product Type Marking Code (See Electric Characteristics Table)  
 YWW = Manufacturers' Code Marking  
 YWW = Date Code Marking  
 Y = Last Digit of Year (ex: 4 for 2014)  
 WW = Week Code (01 - 53)

**Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Forward Voltage @ I <sub>F</sub> = 200mA	V <sub>F</sub>	1.5	V
Zener Current (See Page 3)	I <sub>ZM</sub>	P <sub>D</sub> / V <sub>Z</sub>	mA

**Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Power Dissipation @T <sub>L</sub> = +75°C	P <sub>D</sub>	3.0	W
Derate Above +75°C (Note 5)		40	mW/°C
Thermal Resistance - Junction to Terminal (Note 5)	R <sub>θJT</sub>	25	°C/W
Power Dissipation @T <sub>A</sub> = +25°C	P <sub>D</sub>	550	mW
Derate Above +25°C (Note 5)		4.4	mW/°C
Thermal Resistance - Junction to Ambient (Note 5)	R <sub>θJA</sub>	226	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-65 to +150	°C

Note: 5. Device mounted on FR-4 PCB; pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com>.

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Type Number	Marking Code	Zener Voltage Range (Note 6)			Test Current	Maximum Zener Impedance (Note 7)			Maximum Reverse Current (Note 6)		I <sub>ZM</sub> Max
		V <sub>Z</sub> @ I <sub>ZT</sub>				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 (V)	Typ (V)	Max (V)	mA	Ω	Ω	mA	μA	V	
1SMB5913B	B913	3.13	3.3	3.47	113.6	10	500	1	100	1	454
1SMB5914B	B914	3.42	3.6	3.78	104.2	9	500	1	75	1	416
1SMB5915B	B915	3.7	3.9	4.1	96.1	7.5	500	1	25	1	384
1SMB5916B	B916	4.08	4.3	4.52	87.2	6	500	1	5	1	348
1SMB5917B	B917	4.46	4.7	4.94	79.8	5	500	1	5	1.5	319
1SMB5920B	B920	5.89	6.2	6.51	60.5	2	200	1	5	4	241
1SMB5921B	B921	6.46	6.8	7.14	55.1	2.5	200	1	5	5.2	220
1SMB5922B	B922	7.12	7.5	7.88	50	3	400	0.5	5	6	200
1SMB5923B	B923	7.79	8.2	8.61	45.7	3.5	400	0.5	5	6.5	182
1SMB5924B	B924	8.64	9.1	9.56	41.2	4	500	0.5	5	7	164
1SMB5925B	B925	9.5	10	10.5	37.5	4.5	500	0.25	5	8	150
1SMB5926B	B926	10.45	11	11.55	34.1	5.5	550	0.25	1	8.4	136
1SMB5927B	B927	11.4	12	12.6	31.2	6.5	550	0.25	1	9.1	125
1SMB5928B	B928	12.35	13	13.65	28.8	7	550	0.25	1	9.9	115
1SMB5929B	B929	14.25	15	15.75	25	9	600	0.25	1	11.4	100
1SMB5930B	B930	15.2	16	16.8	23.4	10	600	0.25	1	12.2	93
1SMB5931B	B931	17.1	18	18.9	20.8	12	650	0.25	1	13.7	83
1SMB5932B	B932	19	20	21	18.7	14	650	0.25	1	15.2	75
1SMB5933B	B933	20.9	22	23.1	17	17.5	650	0.25	1	16.7	68
1SMB5934B	B934	22.8	24	25.2	15.6	19	700	0.25	1	18.2	62
1SMB5935B	B935	25.65	27	28.35	13.9	23	700	0.25	1	20.6	55
1SMB5936B	B936	28.5	30	31.5	12.5	28	750	0.25	1	22.8	50
1SMB5937B	B937	31.35	33	34.65	11.4	33	800	0.25	1	25.1	45
1SMB5938B	B938	34.2	36	37.8	10.4	38	850	0.25	1	27.4	41
1SMB5939B	B939	37.05	39	40.95	9.6	45	900	0.25	1	29.7	38
1SMB5940B	B940	40.85	43	45.15	8.7	53	950	0.25	1	32.7	34
1SMB5941B	B941	44.65	47	49.35	8	67	1000	0.25	1	35.8	31
1SMB5942B	B942	48.45	51	53.55	7.3	70	1100	0.25	1	38.8	29
1SMB5943B	B943	53.2	56	58.8	6.7	86	1300	0.25	1	42.6	26
1SMB5944B	B944	58.9	62	65.1	6	100	1500	0.25	1	47.1	24
1SMB5945B	B945	64.6	68	71.4	5.5	120	1700	0.25	1	51.7	22
1SMB5946B	B946	71.25	75	78.75	5	140	2000	0.25	1	56	20
1SMB5947B	B947	77.9	82	86.1	4.6	160	2500	0.25	1	62.2	18
1SMB5948B	B948	86.45	91	95.55	4.1	200	3000	0.25	1	69.2	16
1SMB5949B	B949	95	100	105	3.7	250	3100	0.25	1	76	15
1SMB5950B	B950	104.5	110	115.5	3.4	300	4000	0.25	1	83.6	13
1SMB5951B	B951	114	120	128	3.1	380	4500	0.25	1	91.2	12
1SMB5952B	B952	123.5	130	136.5	2.9	450	5000	0.25	1	98.8	11
1SMB5953B	B953	142.5	150	157.5	2.5	600	6000	0.25	1	114	10
1SMB5954B	B954	152	160	168	2.3	700	6500	0.25	1	121.6	9
1SMB5955B	B955	171	180	189	2.1	900	7000	0.25	1	136.8	8
1SMB5956B	B956	190	200	210	1.9	1200	8000	0.25	1	152	7

Notes: 6. Short duration pulse test used to minimize self-heating effect.  
7. 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.

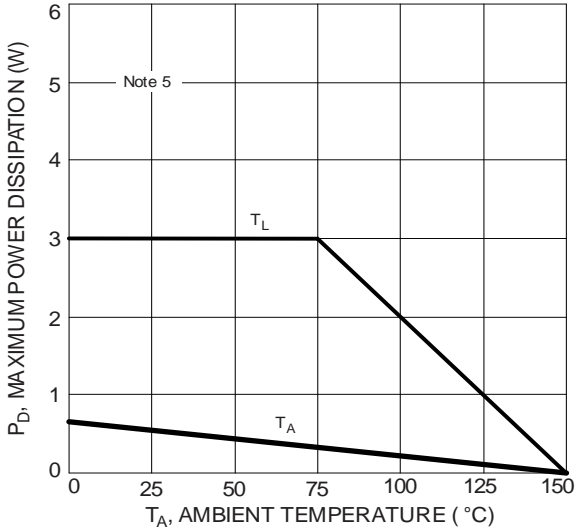


Figure Power Dissipation vs. Ambient Temperature

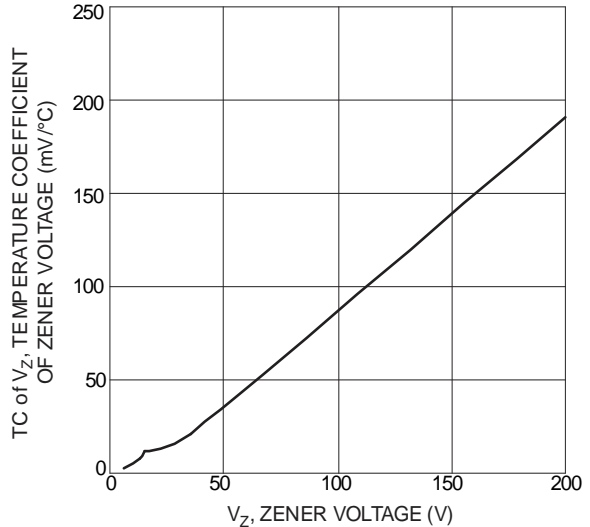


Figure 2 Typical Temperature Coefficient of Zener Voltage vs. Zener Voltage

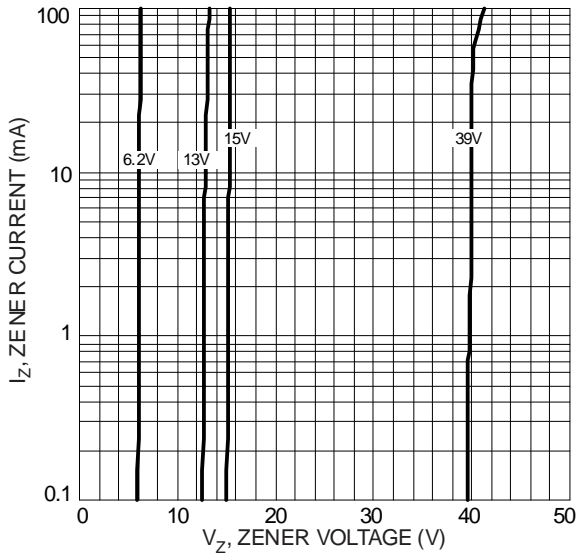


Figure 3 Typical Zener Breakdown Characteristics

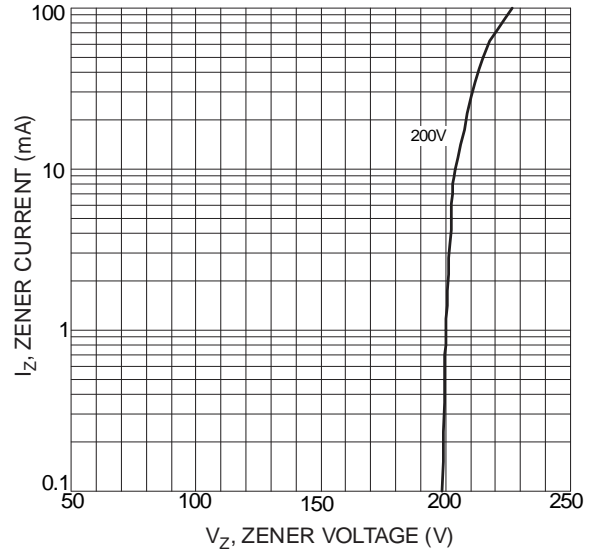


Figure 4 Typical Zener Breakdown Characteristics

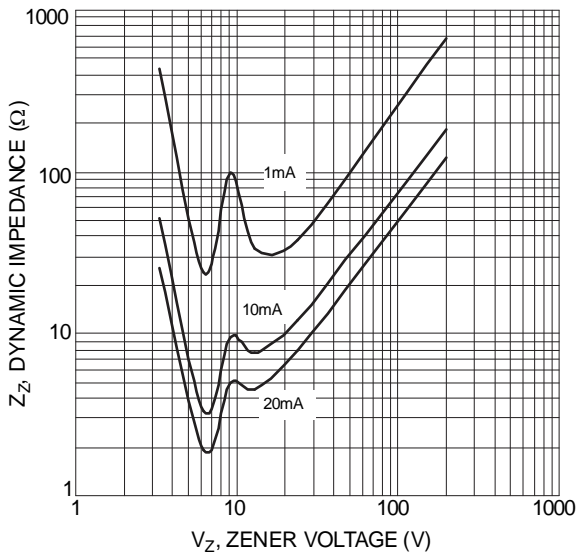


Figure 5 Effect of Zener Voltage

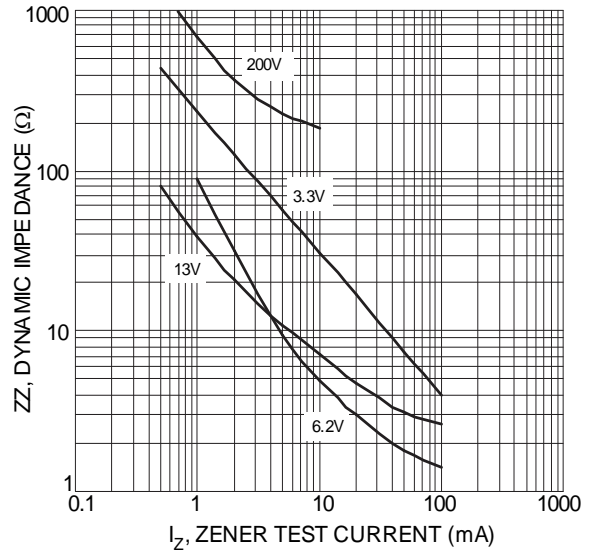


Figure 6 Effect of Zener Current

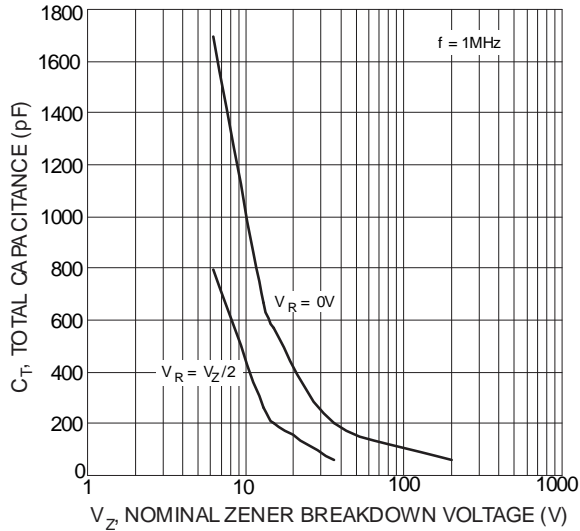


Figure 7 Typical Total Capacitance vs. Nominal Zener Breakdown Voltage

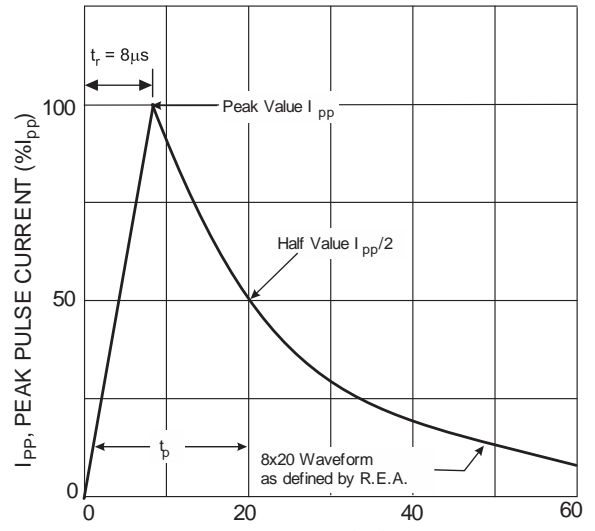


Figure 8 Pulse Waveform

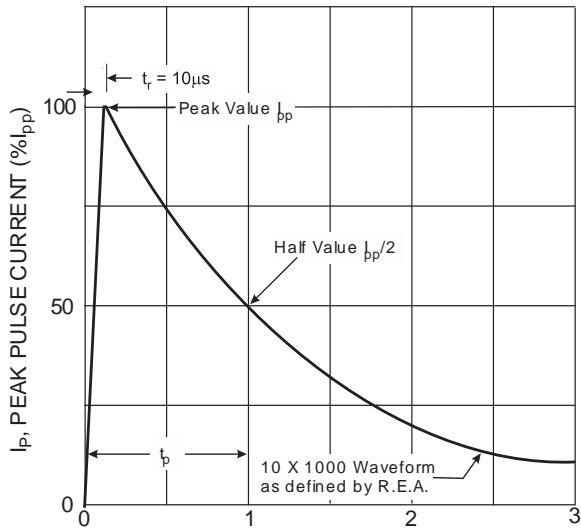


Figure 9 Pulse Waveform

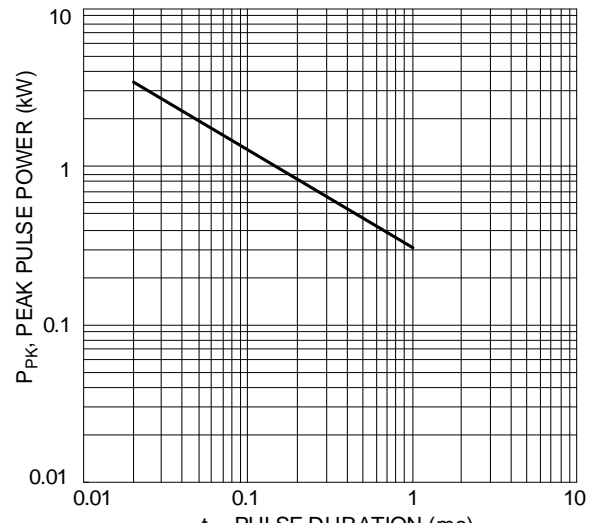
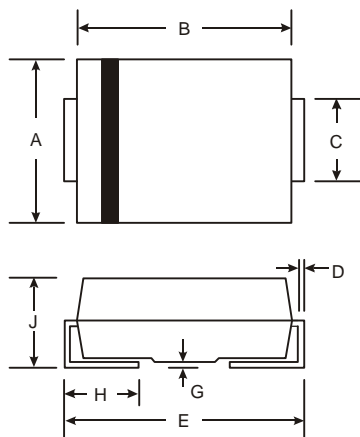


Figure 10 Max. Peak Pulse Power vs. Pulse Duration

**Package Outline Dimensions**

Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.

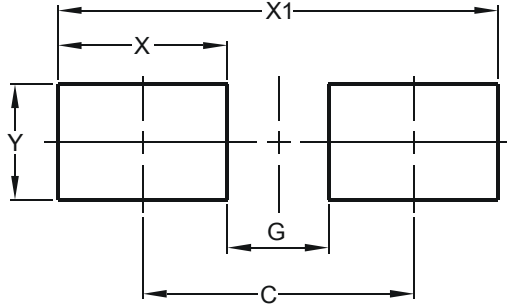


SMB		
Dim	Min	Max
A	3.30	3.94
B	4.06	4.57
C	1.96	2.21
D	0.15	0.31
E	5.00	5.59
G	0.05	0.20
H	0.76	1.52
J	2.00	2.50

All Dimensions in mm

## Suggested Pad Layout

Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



Dimensions	Value (in mm)
C	4.30
G	1.80
X	2.50
X1	6.80
Y	2.30

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