

# 1SMA5913BT3 Series

## 1.5 Watt Plastic Surface Mount Zener Voltage Regulators

This complete new line of 1.5 Watt Zener Diodes offers the following advantages.

### Specification Features:

- Standard Zener Breakdown Voltage Range – 3.3 V to 68 V
- ESD Rating of Class 3 (>16 kV) per Human Body Model
- Flat Handling Surface for Accurate Placement
- Package Design for Top Slide or Bottom Circuit Board Mounting
- Low Profile Package
- Ideal Replacement for MELF Packages

### Mechanical Characteristics:

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

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

**MAXIMUM CASE TEMPERATURE FOR SOLDERING PURPOSES:** 260°C for 10 seconds

**POLARITY:** Cathode indicated by molded polarity notch or cathode band

**FLAMMABILITY RATING:** UL94 V-0

### MAXIMUM RATINGS

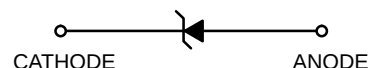
| Rating                                                                                                                      | Symbol          | Value          | Unit                          |
|-----------------------------------------------------------------------------------------------------------------------------|-----------------|----------------|-------------------------------|
| DC Power Dissipation @ $T_L = 75^\circ\text{C}$ ,<br>Measured Zero Lead Length (Note 1.)<br>Derate above $75^\circ\text{C}$ | $P_D$           | 1.5<br>20      | Watts<br>mW/ $^\circ\text{C}$ |
| Thermal Resistance –<br>Junction-to-Lead                                                                                    | $R_{\theta JL}$ | 50             | $^\circ\text{C}/\text{W}$     |
| DC Power Dissipation @ $T_A = 25^\circ\text{C}$<br>(Note 2.) Derate above $25^\circ\text{C}$                                | $P_D$           | 0.5<br>4.0     | Watts<br>mW/ $^\circ\text{C}$ |
| Thermal Resistance –<br>Junction-to-Ambient                                                                                 | $R_{\theta JA}$ | 250            | $^\circ\text{C}/\text{W}$     |
| Operating and Storage<br>Temperature Range                                                                                  | $T_J, T_{stg}$  | -65 to<br>+150 | $^\circ\text{C}$              |

1. 1" square copper pad, FR-4 board
2. FR-4 Board, using ON Semiconductor minimum recommended footprint



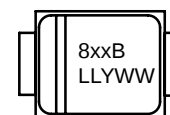
ON Semiconductor®

<http://onsemi.com>



SMA  
CASE 403D  
PLASTIC

### MARKING DIAGRAM



8xxB = Specific Device Code  
(See Table Next Page)  
LL = Assembly Location  
Y = Year  
WW = Work Week

### ORDERING INFORMATION

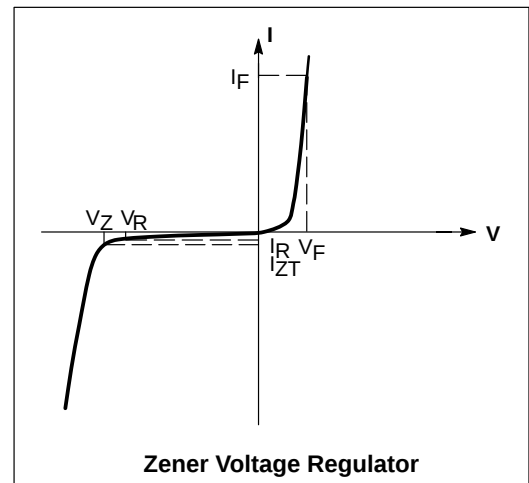
| Device †    | Package | Shipping         |
|-------------|---------|------------------|
| 1SMA59xxBT3 | SMA     | 5000/Tape & Reel |

†The "T3" suffix refers to a 13 inch reel.

## 1SMA5913BT3 Series

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted,  $V_F = 1.5\text{ V Max.}$  @  $I_F = 200\text{ mA}$  for all types)

| Symbol   | Parameter                          |
|----------|------------------------------------|
| $V_Z$    | Reverse Zener Voltage @ $I_{ZT}$   |
| $I_{ZT}$ | Reverse Current                    |
| $Z_{ZT}$ | Maximum Zener Impedance @ $I_{ZT}$ |
| $I_{ZK}$ | Reverse Current                    |
| $Z_{ZK}$ | Maximum Zener Impedance @ $I_{ZK}$ |
| $I_R$    | Reverse Leakage Current @ $V_R$    |
| $V_R$    | Reverse Voltage                    |
| $I_F$    | Forward Current                    |
| $V_F$    | Forward Voltage @ $I_F$            |
| $I_{ZM}$ | Maximum DC Zener Current           |



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| Device (Note 1) | Device Marking | Zener Voltage (Note 2) |     |       |                   | Zener Impedance                   |                                   |      | Leakage Current                 |       | I <sub>ZM</sub> |
|-----------------|----------------|------------------------|-----|-------|-------------------|-----------------------------------|-----------------------------------|------|---------------------------------|-------|-----------------|
|                 |                | 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 |                 |
| 1SMA5913BT3     | 813B           | 3.13                   | 3.3 | 3.47  | 113.6             | 10                                | 500                               | 1.0  | 50                              | 1.0   | 455             |
| 1SMA5914BT3     | 814B           | 3.42                   | 3.6 | 3.78  | 104.2             | 9.0                               | 500                               | 1.0  | 35.5                            | 1.0   | 417             |
| 1SMA5915BT3     | 815B           | 3.70                   | 3.9 | 4.10  | 96.1              | 7.5                               | 500                               | 1.0  | 12.5                            | 1.0   | 385             |
| 1SMA5916BT3     | 816B           | 4.08                   | 4.3 | 4.52  | 87.2              | 6.0                               | 500                               | 1.0  | 2.5                             | 1.0   | 349             |
| 1SMA5917BT3     | 817B           | 4.46                   | 4.7 | 4.94  | 79.8              | 5.0                               | 500                               | 1.0  | 2.5                             | 1.5   | 319             |
| 1SMA5918BT3     | 818B           | 4.84                   | 5.1 | 5.36  | 73.5              | 4.0                               | 350                               | 1.0  | 2.5                             | 2.0   | 294             |
| 1SMA5919BT3     | 819B           | 5.32                   | 5.6 | 5.88  | 66.9              | 2.0                               | 250                               | 1.0  | 2.5                             | 3.0   | 268             |
| 1SMA5920BT3     | 820B           | 5.89                   | 6.2 | 6.51  | 60.5              | 2.0                               | 200                               | 1.0  | 2.5                             | 4.0   | 242             |
| 1SMA5921BT3     | 821B           | 6.46                   | 6.8 | 7.14  | 55.1              | 2.5                               | 200                               | 1.0  | 2.5                             | 5.2   | 221             |
| 1SMA5922BT3     | 822B           | 7.12                   | 7.5 | 7.88  | 50                | 3.0                               | 400                               | 0.5  | 2.5                             | 6.0   | 200             |
| 1SMA5923BT3     | 823B           | 7.79                   | 8.2 | 8.61  | 45.7              | 3.5                               | 400                               | 0.5  | 2.5                             | 6.5   | 183             |
| 1SMA5924BT3     | 824B           | 8.64                   | 9.1 | 9.56  | 41.2              | 4.0                               | 500                               | 0.5  | 2.5                             | 7.0   | 165             |
| 1SMA5925BT3     | 825B           | 9.5                    | 10  | 10.5  | 37.5              | 4.5                               | 500                               | 0.25 | 2.5                             | 8.0   | 150             |
| 1SMA5926BT3     | 826B           | 10.45                  | 11  | 11.55 | 34.1              | 5.5                               | 550                               | 0.25 | 0.5                             | 8.4   | 136             |
| 1SMA5927BT3     | 827B           | 11.4                   | 12  | 12.6  | 31.2              | 6.5                               | 550                               | 0.25 | 0.5                             | 9.1   | 125             |
| 1SMA5928BT3     | 828B           | 12.35                  | 13  | 13.65 | 28.8              | 7.0                               | 550                               | 0.25 | 0.5                             | 9.9   | 115             |
| 1SMA5929BT3     | 829B           | 14.25                  | 15  | 15.75 | 25                | 9.0                               | 600                               | 0.25 | 0.5                             | 11.4  | 100             |
| 1SMA5930BT3     | 830B           | 15.2                   | 16  | 16.8  | 23.4              | 10                                | 600                               | 0.25 | 0.5                             | 12.2  | 94              |
| 1SMA5931BT3     | 831B           | 17.1                   | 18  | 18.9  | 20.8              | 12                                | 650                               | 0.25 | 0.5                             | 13.7  | 83              |
| 1SMA5932BT3     | 832B           | 19                     | 20  | 21    | 18.7              | 14                                | 650                               | 0.25 | 0.5                             | 15.2  | 75              |
| 1SMA5933BT3     | 833B           | 20.9                   | 22  | 23.1  | 17                | 17.5                              | 650                               | 0.25 | 0.5                             | 16.7  | 68              |
| 1SMA5934BT3     | 834B           | 22.8                   | 24  | 25.2  | 15.6              | 19                                | 700                               | 0.25 | 0.5                             | 18.2  | 63              |
| 1SMA5935BT3     | 835B           | 25.65                  | 27  | 28.35 | 13.9              | 23                                | 700                               | 0.25 | 0.5                             | 20.6  | 56              |
| 1SMA5936BT3     | 836B           | 28.5                   | 30  | 31.5  | 12.5              | 26                                | 750                               | 0.25 | 0.5                             | 22.8  | 50              |
| 1SMA5937BT3     | 837B           | 31.35                  | 33  | 34.65 | 11.4              | 33                                | 800                               | 0.25 | 0.5                             | 25.1  | 45              |
| 1SMA5938BT3     | 838B           | 34.2                   | 36  | 37.8  | 10.4              | 38                                | 850                               | 0.25 | 0.5                             | 27.4  | 42              |
| 1SMA5939BT3     | 839B           | 37.05                  | 39  | 40.95 | 9.6               | 45                                | 900                               | 0.25 | 0.5                             | 29.7  | 38              |
| 1SMA5940BT3     | 840B           | 40.85                  | 43  | 45.15 | 8.7               | 53                                | 950                               | 0.25 | 0.5                             | 32.7  | 35              |
| 1SMA5941BT3     | 841B           | 44.65                  | 47  | 49.35 | 8.0               | 67                                | 1000                              | 0.25 | 0.5                             | 35.8  | 32              |
| 1SMA5942BT3     | 842B           | 48.45                  | 51  | 53.55 | 7.3               | 70                                | 1100                              | 0.25 | 0.5                             | 38.8  | 29              |
| 1SMA5943BT3     | 843B           | 53.2                   | 56  | 58.8  | 6.7               | 86                                | 1300                              | 0.25 | 0.5                             | 42.6  | 27              |
| 1SMA5944BT3     | 844B           | 58.9                   | 62  | 65.1  | 6.0               | 100                               | 1500                              | 0.25 | 0.5                             | 47.1  | 24              |
| 1SMA5945BT3     | 845B           | 64.6                   | 68  | 71.4  | 5.5               | 120                               | 1700                              | 0.25 | 0.5                             | 51.7  | 22              |

1. Tolerance and Voltage Regulation Designation – The type number listed indicates a tolerance of  $\pm 5\%$ .
2.  $V_Z$  limits are to be guaranteed at thermal equilibrium.

# 1SMA5913BT3 Series

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

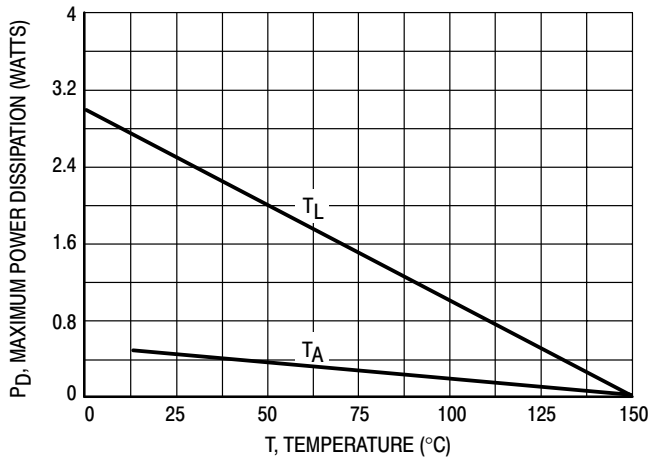


Figure 1. Steady State Power Derating

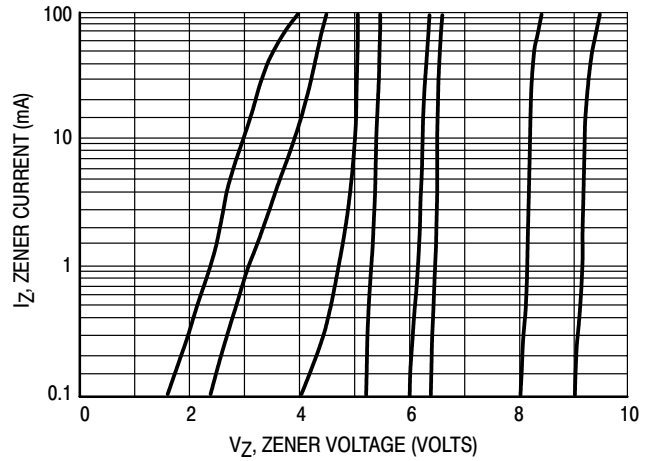


Figure 2.  $V_Z$  - 3.3 thru 10 Volts

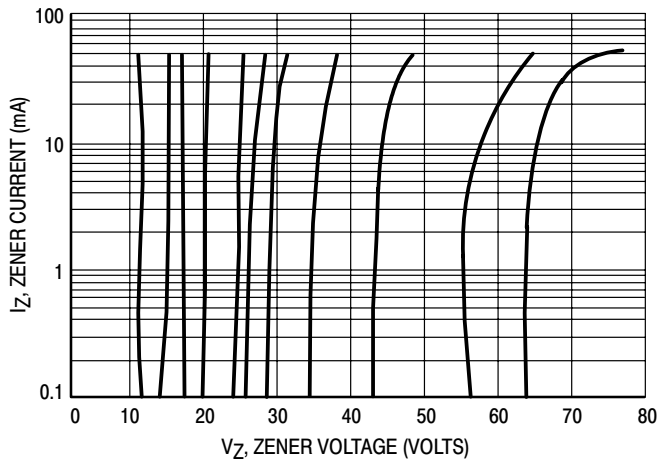


Figure 3.  $V_Z = 12$  thru 68 Volts

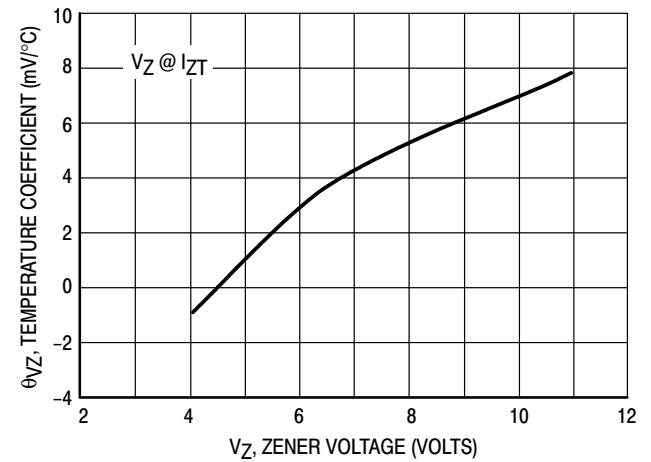


Figure 4. Zener Voltage - 3.3 to 12 Volts

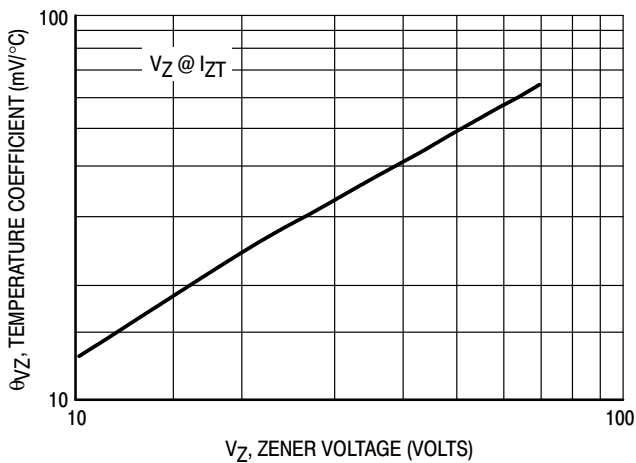


Figure 5. Zener Voltage - 14 to 68 Volts

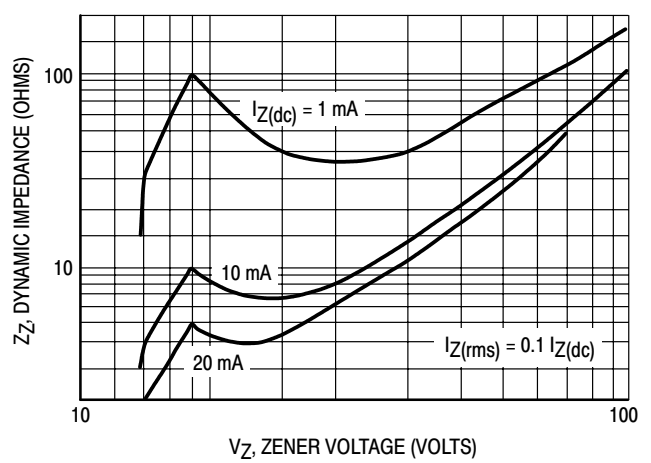


Figure 6. Effect of Zener Voltage

# 1SMA5913BT3 Series

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

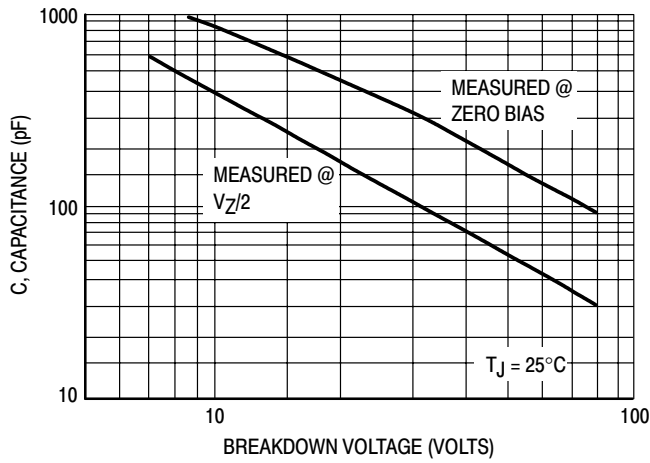


Figure 7. Capacitance Curve

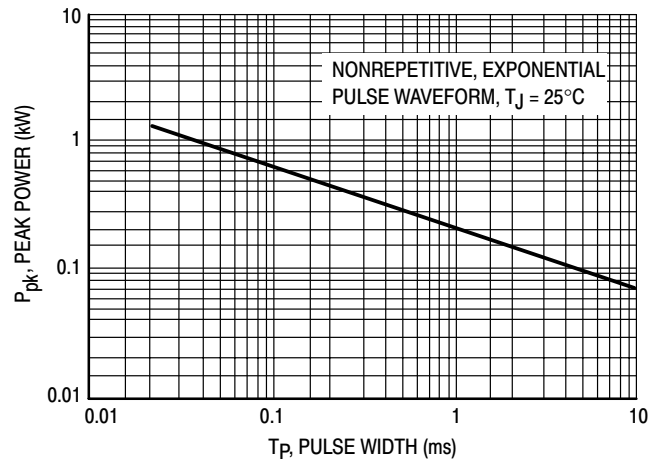


Figure 8. Typical Pulse Rating Curve

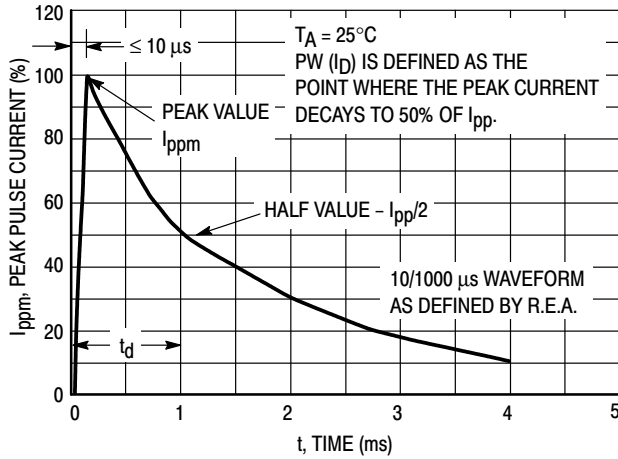


Figure 9. Pulse Waveform

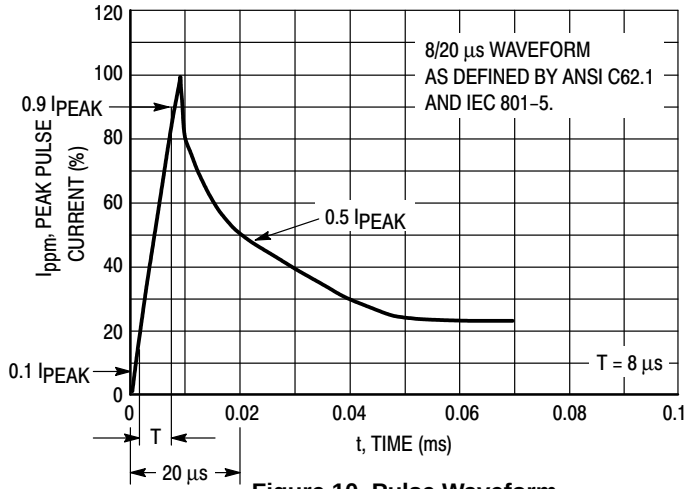
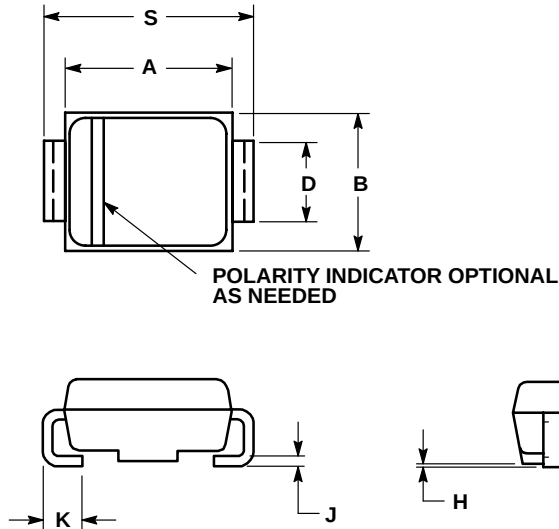


Figure 10. Pulse Waveform

# Zener Voltage Regulator Diodes – Surface Mount

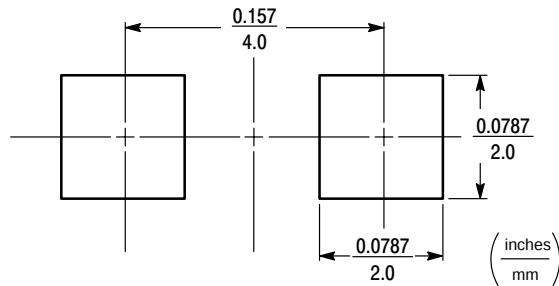
## 1.5 Watts DC Power

SMA  
CASE 403D-02  
ISSUE A



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. 403D-01 OBSOLETE, NEW STANDARD IS 403D-02.

| DIM | INCHES |       | MILLIMETERS |      |
|-----|--------|-------|-------------|------|
|     | MIN    | MAX   | MIN         | MAX  |
| A   | 0.160  | 0.180 | 4.06        | 4.57 |
| B   | 0.090  | 0.115 | 2.29        | 2.92 |
| C   | 0.075  | 0.095 | 1.91        | 2.41 |
| D   | 0.050  | 0.064 | 1.27        | 1.63 |
| H   | 0.002  | 0.006 | 0.05        | 0.15 |
| J   | 0.006  | 0.016 | 0.15        | 0.41 |
| K   | 0.030  | 0.060 | 0.76        | 1.52 |
| S   | 0.190  | 0.220 | 4.83        | 5.59 |



SMA FOOTPRINT

## **Notes**

# 1SMA5913BT3 Series

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