

HSMS-8101, 8202, 8207, 8209

Surface Mount Microwave Schottky Mixer Diodes



Data Sheet

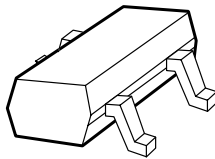


Description/Applications

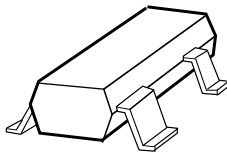
These low cost microwave Schottky diodes are specifically designed for use at X/Ku-bands and are ideal for DBS and VSAT downconverter applications. They are available in SOT-23 and SOT-143 standard package configurations.

Note that Avago's manufacturing techniques assure that dice found in pairs and quads are taken from adjacent sites on the wafer, assuring the highest degree of match.

Plastic SOT-23 Package



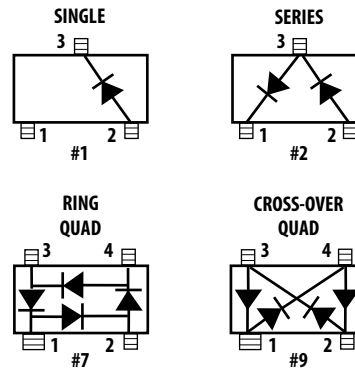
Plastic SOT-143 Package



Features

- Optimized for use at 10-14 GHz
- Low Capacitance
- Low Conversion Loss
- Low RD
- Low Cost Surface Mount Plastic Package
- Lead-free

Package Lead Code Identification (Top View)



Absolute Maximum Ratings^[1], T_A = +25°C

| Symbol | Parameter | Unit | Min. | Max. |
|------------------------------------|---|------|------|------|
| P _T | Total Device Dissipation ^[2] | mW | — | 75 |
| P _{IV} | Peak Inverse Voltage | V | — | 4 |
| T _J | Junction Temperature | °C | — | +150 |
| T _{STG} , T _{OP} | Storage and Operating Temperature | °C | -65 | +150 |

Notes:

1. Operation in excess of any one of these conditions may result in permanent damage to the device.
2. Measured in an infinite heat sink at T_{CASE} = 25°C. Derate linearly to zero at 150°C per diode.



Attention: Observe precautions for handling electrostatic sensitive devices.
 ESD Machine Model (Class A)
 ESD Human Body Model (Class 0)
 Refer to Avago Application Note A004R:
 Electrostatic Discharge Damage and Control.

DC Electrical Specifications, $T_A = 25^\circ\text{C}$

| Symbol | Parameters and Test Conditions | Units | HSMS-8101 | | HSMS-8202 | | HSMS-8207 | | HSMS-8209 | |
|----------|--|----------|-----------|------|-----------|------|-----------|------|-----------|------|
| | | | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. |
| V_{BR} | Breakdown Voltage $I_R = 10 \mu\text{A}$ | V | 4 | | 4 | | 4 | | 4 | |
| C_T | Total Capacitance $V_R = 0\text{V}, f = 1\text{MHz}$ | pF | | 0.26 | | 0.26 | | 0.26 | | 0.26 |
| DC_T | Capacitance Difference $V_R = 0\text{V}, f = 1\text{MHz}$ | pF | | — | | 0.04 | | 0.04 | | 0.04 |
| R_D | Dynamic Resistance $I_F = 5\text{mA}$ | Ω | | 14 | | 14 | | 14 | | 14 |
| DR_D | Dynamic Resistance Difference $I_F = 5\text{mA}$ | Ω | | — | | 2 | | 2 | | 2 |
| V_F | Forward Voltage $I_F = 1\text{mA}$ | mV | 250 | 350 | 250 | 350 | 250 | 350 | 250 | 350 |
| DV_F | Forward Voltage Difference $I_F = 1\text{mA}$ | mV | | — | | 20 | | 20 | | 20 |
| | Lead Code | | | 1 | | 2 | | 7 | | 9 |
| | Package Marking Code where x is date code | | | R1x | | 2Rx | | R7x | | R9x |

RF Electrical Parameters, $T_A = 25^\circ\text{C}$

| Symbol | Parameter | Units | Typical |
|----------|---------------------------|----------|---------|
| L_c | Conversion Loss at 12 GHz | dB | 6.3 |
| Z_{IF} | IF Impedance | Ω | 150 |
| SWR | SWR at 12 GHz | | 1.2 |

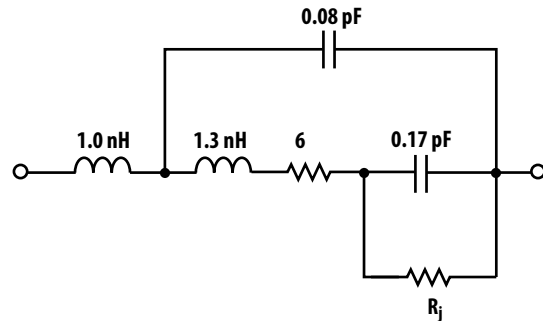
Note:

DC Load Resistance = 0 Ω ; LO Power = 1 mW.

SPICE Parameters

| | | |
|-------------------------|----------------------------|--------|
| $I_S = 4.6\text{E-}8$ | $E_G = 0.69$ | TT = 0 |
| $R_S = 6$ | $C_{JO} = 0.18\text{E-}12$ | |
| N = 1.09 | $P_B (V_J) = 0.5$ | |
| $B_V = 7.3$ | M = 0.5 | |
| $I_{BV} = 10\text{E-}5$ | FC = 0.5 | |

Linear Equivalent Circuit



Self Bias

| | | |
|-------|------|--------|
| | 1 mA | 2.5 mA |
| R_j | 256 | 142 |

Typical Performance, $T_c = 25^\circ\text{C}$

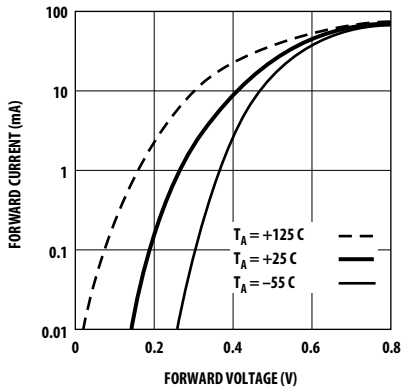


Figure 1. Typical Forward Current vs. Forward Voltage at Three Temperatures.

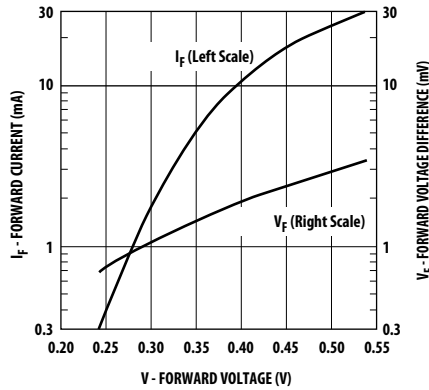


Figure 2. Typical VF Match, HSMS-820X Pairs and Quads.

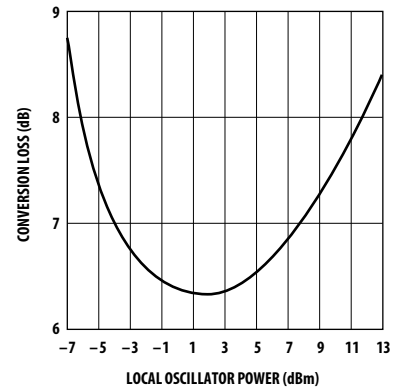
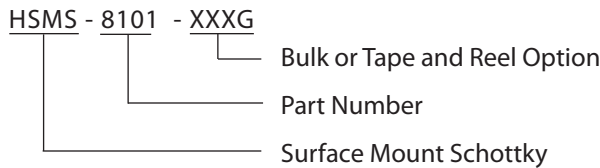


Figure 3. Typical Conversion Loss vs. Local Oscillator Power.

Ordering Information

Specify part number followed by option. For example:

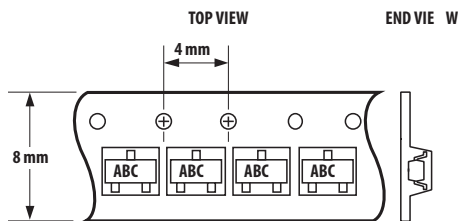
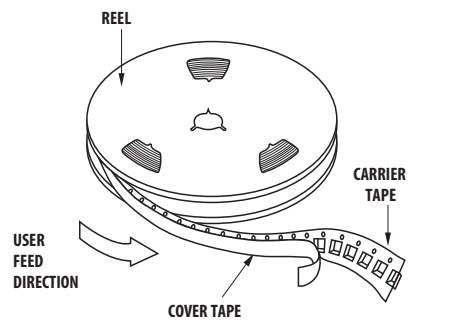


Profile Option Descriptions

- BLKG = Bulk
- TR1G = 3K pc. Tape and Reel, Device Orientation Figures 4, 5
- TR2G = 10K pc. Tape and Reel, Device Orientation Figures 4, 5

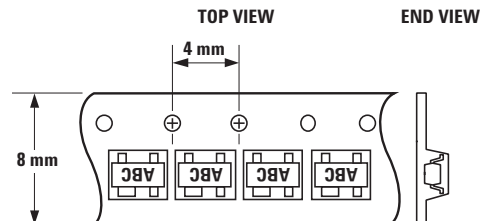
Tape and Reeling conforms to Electronic Industries RS-481, "Taping of Surface Mounted Components for Automated Placement."

Device Orientation



Note: "AB" represents package marking code.
"C" represents date code.

Figure 4. Option -TR1G/-TR2G for SOT-23 Packages.



Note: "AB" represents package marking code.
"C" represents date code.

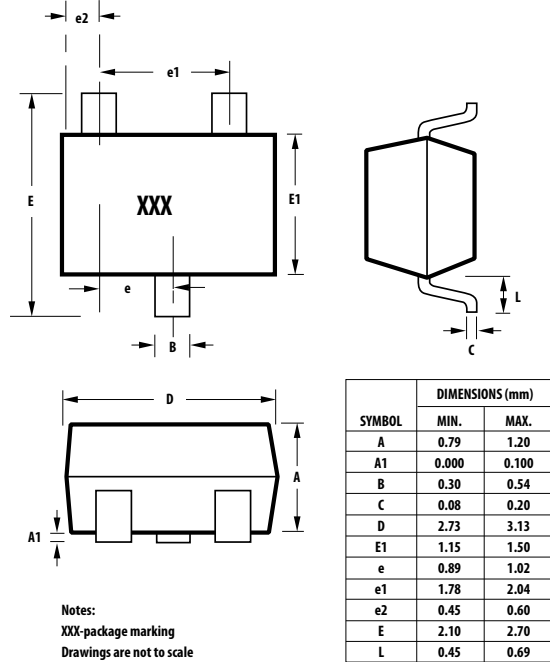
Figure 5. Option -TR1G/-TR2G for SOT-143 Packages.

Package Characteristics

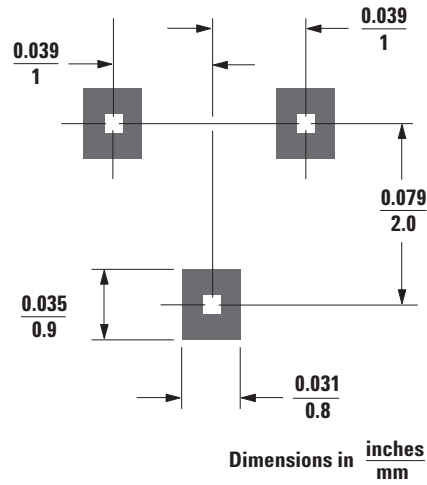
| | |
|-------------------------------|-----------------------------|
| Lead Material | Alloy 42 |
| Lead Finish | Tin 100% (Lead-free option) |
| Maximum Soldering Temperature | 260°C for 5 seconds |
| Minimum Lead Strength | 2 pounds pull |
| Typical Package Inductance | 2 nH |
| Typical Package Capacitance | 0.08 pF (opposite leads) |

Package Dimensions

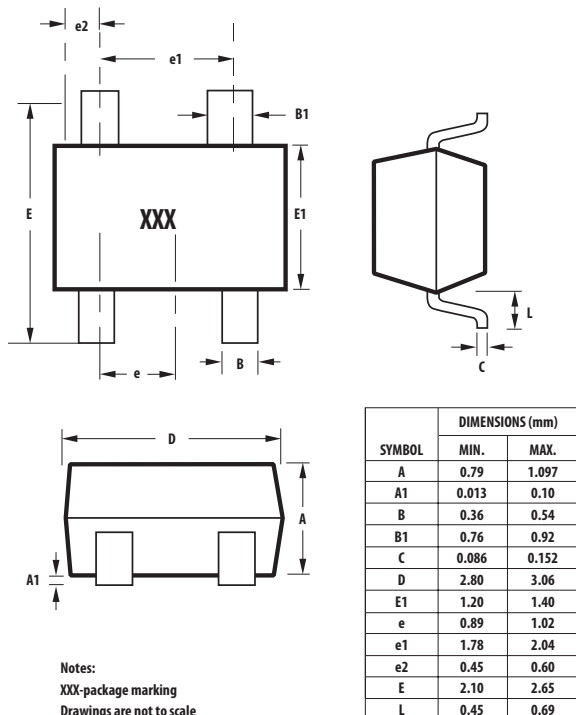
Outline 23 (SOT-23)



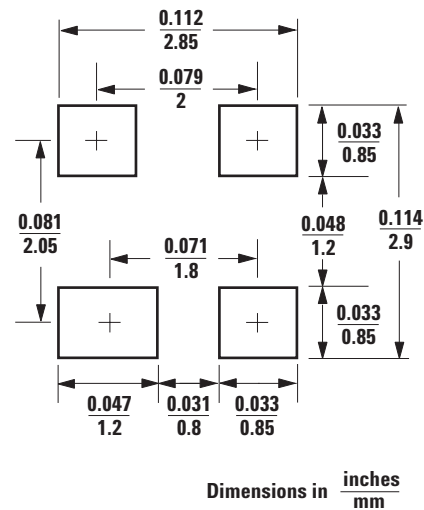
Recommended PCB Pad Layout for Avago's SOT-23 Products



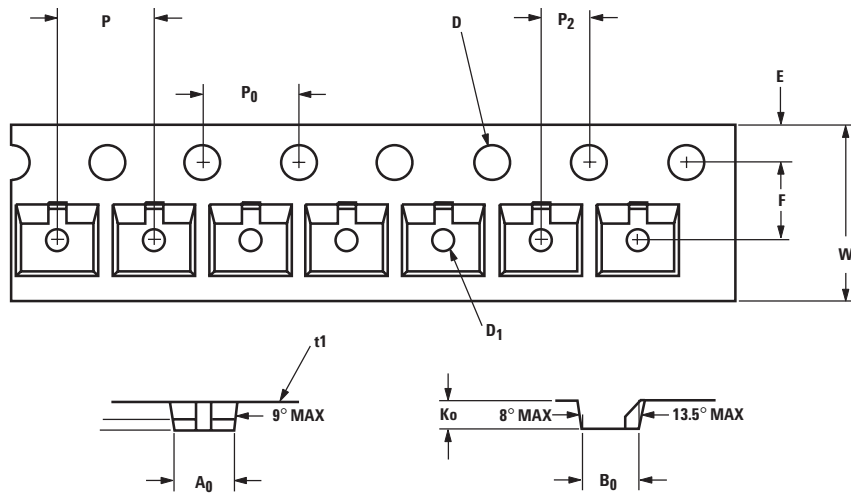
Outline 143 (SOT-143)



Recommended PCB Pad Layout for Avago's SOT-143 Products

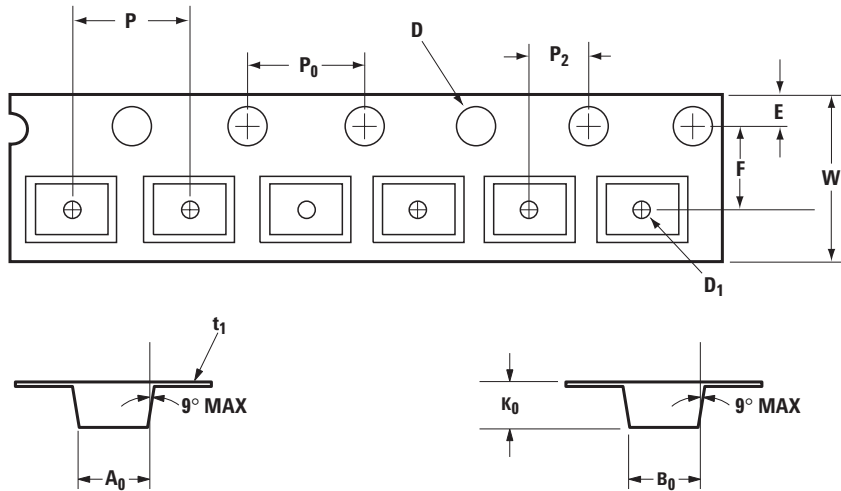


Tape Dimensions and Product Orientation For Outline SOT-23



| DESCRIPTION | | SYMBOL | SIZE (mm) | SIZE (INCHES) |
|-----------------------------|--|----------------|--------------------|-----------------------|
| CAVITY | LENGTH | A ₀ | 3.15 ± 0.10 | 0.124 ± 0.004 |
| | WIDTH | B ₀ | 2.77 ± 0.10 | 0.109 ± 0.004 |
| | DEPTH | K ₀ | 1.22 ± 0.10 | 0.048 ± 0.004 |
| | PITCH | P | 4.00 ± 0.10 | 0.157 ± 0.004 |
| | BOTTOM HOLE DIAMETER | D ₁ | 1.00 + 0.05 | 0.039 ± 0.002 |
| PERFORATION | DIAMETER | D | 1.50 + 0.10 | 0.059 + 0.004 |
| | PITCH | P ₀ | 4.00 ± 0.10 | 0.157 ± 0.004 |
| | POSITION | E | 1.75 ± 0.10 | 0.069 ± 0.004 |
| CARRIER TAPE | WIDTH | W | 8.00 + 0.30 - 0.10 | 0.315 + 0.012 - 0.004 |
| | THICKNESS | t ₁ | 0.229 ± 0.013 | 0.009 0.0005 |
| DISTANCE BETWEEN CENTERLINE | CAVITY TO PERFORATION (WIDTH DIRECTION) | F | 3.50 ± 0.05 | 0.138 ± 0.002 |
| | CAVITY TO PERFORATION (LENGTH DIRECTION) | P ₂ | 2.00 ± 0.05 | 0.079 ± 0.002 |

**Tape Dimensions and Product Orientation
For Outline SOT-143**



| DESCRIPTION | | SYMBOL | SIZE (mm) | SIZE (INCHES) |
|--------------|---|--------|----------------------|-------------------------|
| CAVITY | LENGTH | A_0 | 3.19 ± 0.10 | 0.126 ± 0.004 |
| | WIDTH | B_0 | 2.80 ± 0.10 | 0.110 ± 0.004 |
| | DEPTH | K_0 | 1.31 ± 0.10 | 0.052 ± 0.004 |
| | PITCH | P | 4.00 ± 0.10 | 0.157 ± 0.004 |
| | BOTTOM HOLE DIAMETER | D_1 | $1.00 + 0.25$ | $0.039 + 0.010$ |
| PERFORATION | DIAMETER | D | $1.50 + 0.10$ | $0.059 + 0.004$ |
| | PITCH | P_0 | 4.00 ± 0.10 | 0.157 ± 0.004 |
| | POSITION | E | 1.75 ± 0.10 | 0.069 ± 0.004 |
| CARRIER TAPE | WIDTH | W | $8.00 + 0.30 - 0.10$ | $0.315 + 0.012 - 0.004$ |
| | THICKNESS | t_1 | 0.254 ± 0.013 | 0.0100 ± 0.0005 |
| DISTANCE | CAVITY TO PERFORATION (WIDTH DIRECTION) | F | 3.50 ± 0.05 | 0.138 ± 0.002 |
| | CAVITY TO PERFORATION (LENGTH DIRECTION) | P_2 | 2.00 ± 0.05 | 0.079 ± 0.002 |

For product information and a complete list of distributors, please go to our web site: www.avagotech.com

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