

Surface Mount Microwave Schottky Mixer Diodes

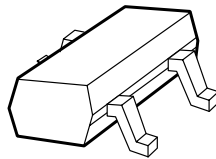
Technical Data

HSMS-8101 Single
HSMS-8202 Series Pair
HSMS-8207 Ring Quad
HSMS-8209 Crossover Quad

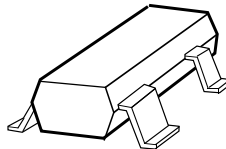
Features

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

Plastic SOT-23 Package



Plastic SOT-143 Package

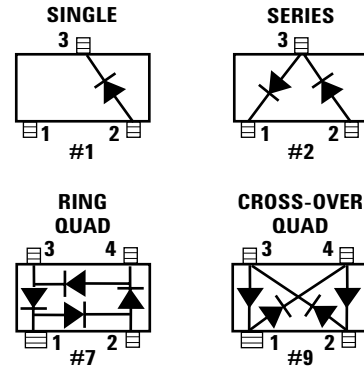


Description/Applications

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 Agilent'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.

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 |

ESD WARNING:

Handling Precautions Should Be Taken To Avoid Static Discharge.

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.

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

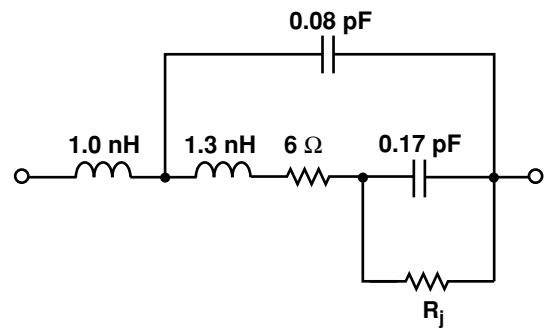
| Symbol | Parameters and Test Conditions | Units | HSMS-8101 | | HSMS-8202 | | HSMS-8207 | | HSMS-8209 | |
|---|--|----------|-----------|------|-----------|------|-----------|------|-----------|------|
| | | | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. |
| V_{BR} | Breakdown Voltage $I_R = 10 \mu\text{A}$ | 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 |
| ΔC_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 |
| ΔR_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 |
| ΔV_F | Forward Voltage Difference $I_F = 1 \text{ mA}$ | mV | | — | | 20 | | 20 | | 20 |
| Lead Code | | | 1 | | 2 | | 7 | | 9 | |
| Package Marking Code in White 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 | 263 | 142 |

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

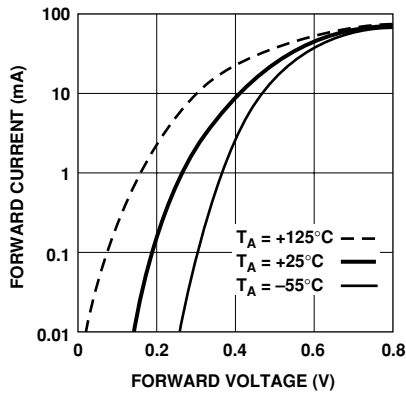


Figure 1. Typical Forward Current vs. Forward Voltage at Three Temperatures.

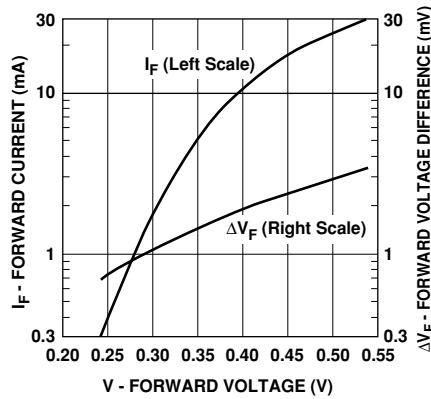


Figure 2. Typical VF Match, HSMS-820X Pairs and Quads.

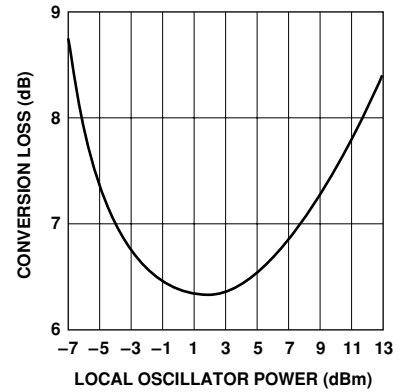
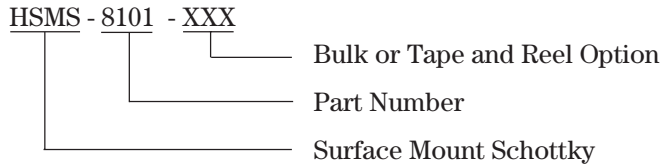


Figure 3. Typical Conversion Loss vs. Local Oscillator Power.

Ordering Information

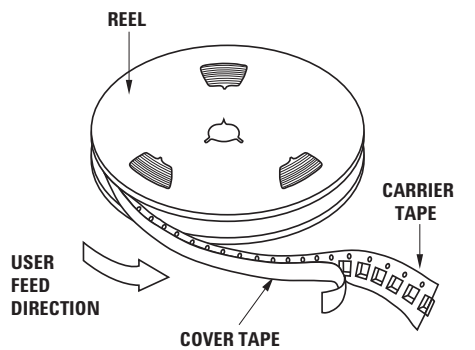
Specify part number followed by option. For example:



Profile Option Descriptions

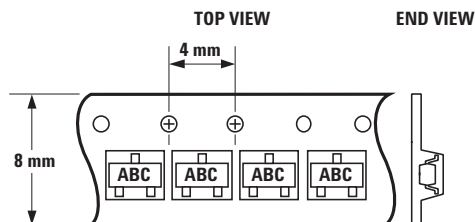
- BLK = Bulk
- TR1 = 3K pc. Tape and Reel, Device Orientation Figures 4, 5
- TR2 = 10K pc. Tape and Reel, Device Orientation Figures 4, 5

Device Orientation



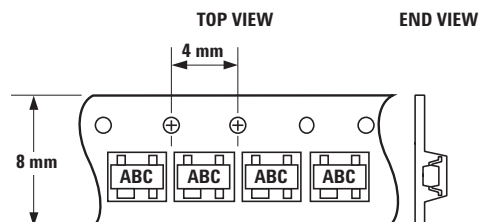
Tape and Reeling conforms to Electronic Industries RS-481, "Taping of Surface Mounted Components for Automated Placement."

For lead-free option, the part number will have the character "G" at the end, eg. -TR2G for a 10K pc lead-free reel.



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

Figure 4. Option -TR1/-TR2 for SOT-23 Packages.



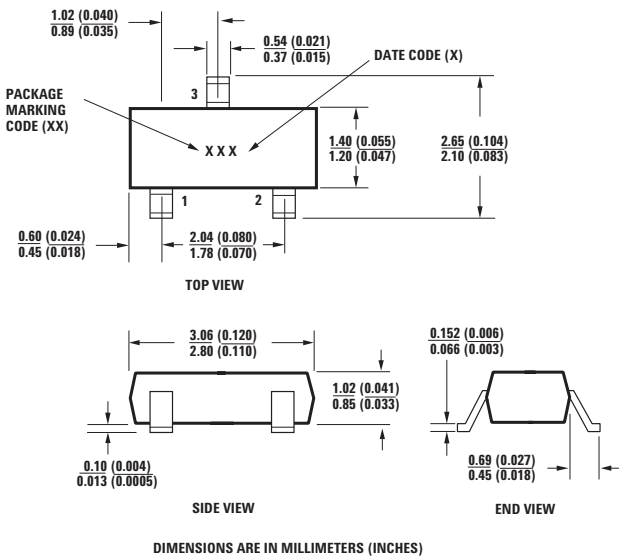
Note: "AB" represents package marking code.
"C" represents date code.

Figure 5. Option -TR1/-TR2 for SOT-143 Packages.

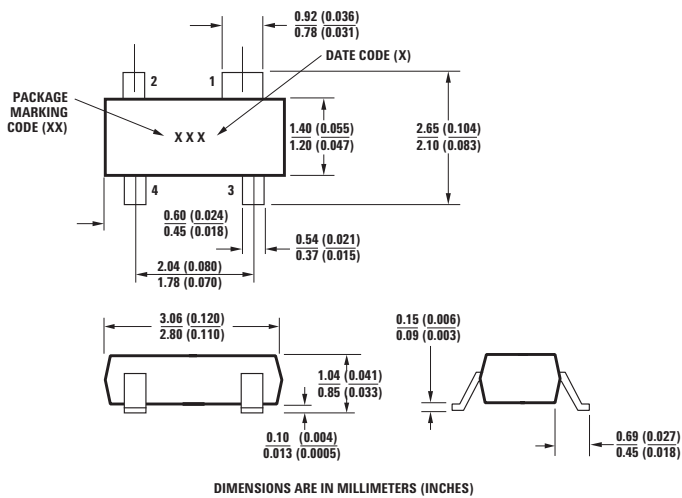
Package Characteristics

Lead Material Alloy 42
 Lead Finish Tin-Lead 85-15%
 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)

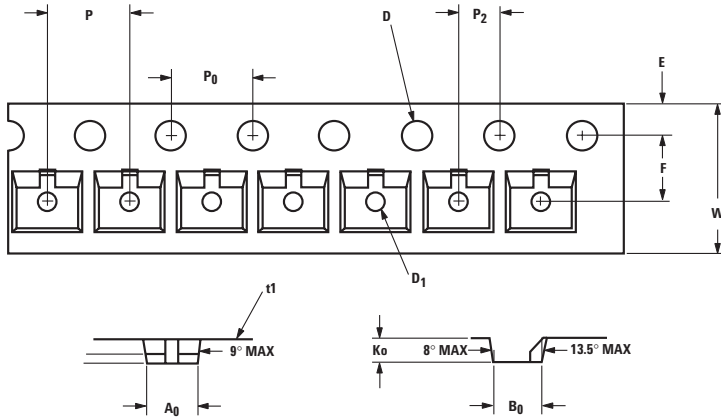
Package Dimensions Outline 23 (SOT-23)



Outline 143 (SOT-143)

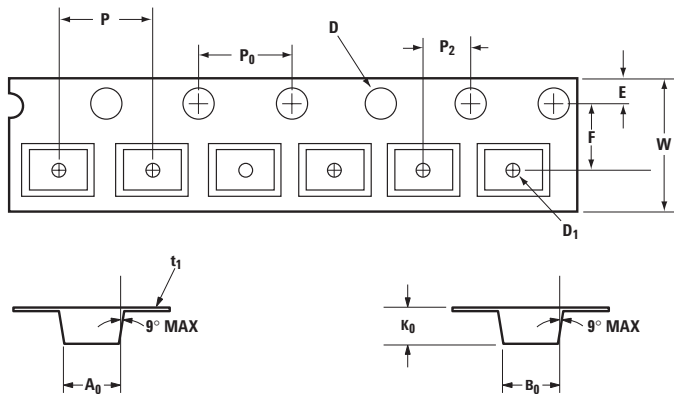


Tape Dimensions and Product Orientation For Outline SOT-23



| 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 |

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 |

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Obsoletes 5988-3328EN

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