HSMS-8101, 8202, 8207, 8209

Surface Mount Microwave Schottky Mixer Diodes

Data Sheet

Lead (Pb) Free
RoHS 6 fully
compliant

Description/Applications

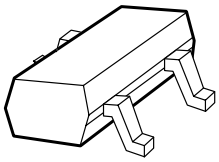
These low cost microwave Schottky diodes are specifically designed for use at X/Ku-bands and are ideal for DBS and VSAT downconverter applications. They are available in SOT-23 and SOT-143 standard package configurations.

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.

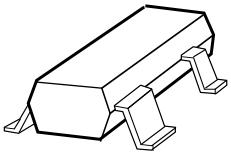
Features

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

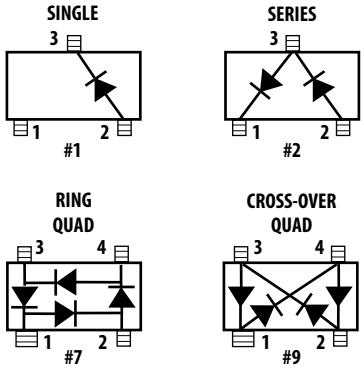
Plastic SOT-23 Package



Plastic SOT-143 Package



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, $T_A = 25°C$

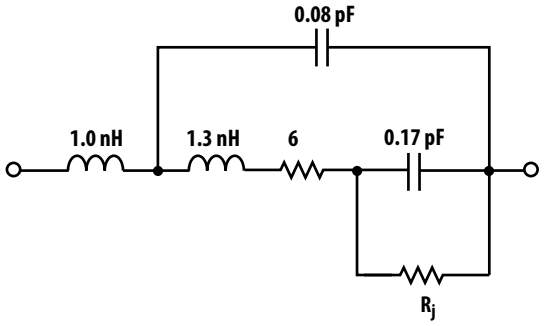
			HSMS-8101		HSMS-8202		HSMS-8207		HSMS-8209	
Symbol	**Parameters and Test Conditions**	**Units**	**Min.**	**Max.**	**Min.**	**Max.**	**Min.**	**Max.**	**Min.**	**Max.**
V_{BR}	Breakdown Voltage $I_R = 10\ \mu A$	V	4		4		4		4	
C_T	Total Capacitance $V_R = 0\ V, f = 1\ MHz$	pF		0.26		0.26		0.26		0.26
DC_T	Capacitance Difference $V_R = 0\ V, f = 1\ MHz$	pF		—		0.04		0.04		0.04
R_D	Dynamic Resistance $I_F = 5\ mA$	Ω		14		14		14		14
DR_D	Dynamic Resistance Difference $I_F = 5\ mA$	Ω		—		2		2		2
V_F	Forward Voltage $I_F = 1\ mA$	mV	250	350	250	350	250	350	250	350
DV_F	Forward Voltage Difference $I_F = 1\ mA$	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, $T_A = 25°C$

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.

Linear Equivalent Circuit



SPICE Parameters

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

Self Bias

	1 mA	2.5 mA
R_j	256	142

Typical Performance, $T_C = 25°C$

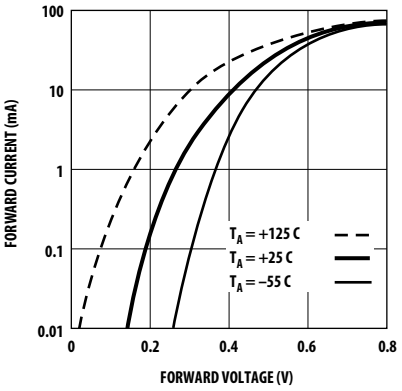


Figure 1. Typical Forward Current vs. Forward Voltage at Three Temperatures.

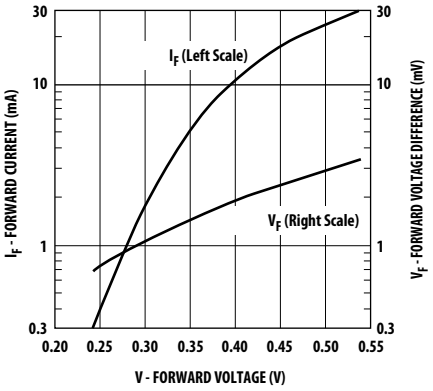


Figure 2. Typical VF Match, HSMS-820X Pairs and Quads.

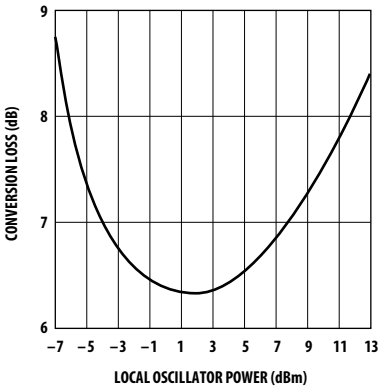


Figure 3. Typical Conversion Loss vs. Local Oscillator Power.

Ordering Information

Specify part number followed by option. For example:

HSMS - 8101 - XXXG

- XXXG: Bulk or Tape and Reel Option
- 8101: Part Number
- HSMS: Surface Mount Schottky

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

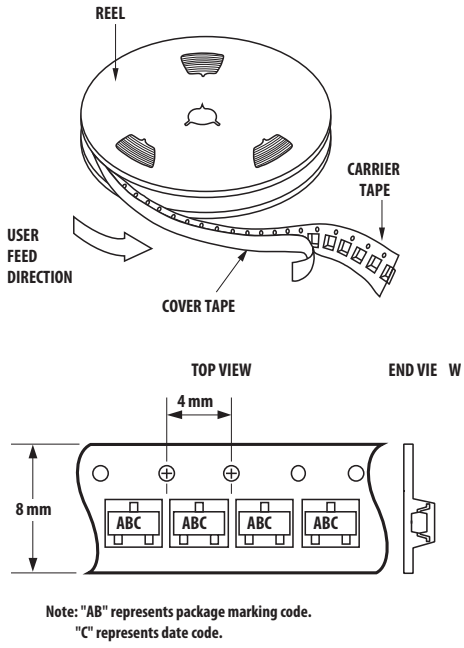


Figure 4. Option -TR1G/-TR2G for SOT-23 Packages.

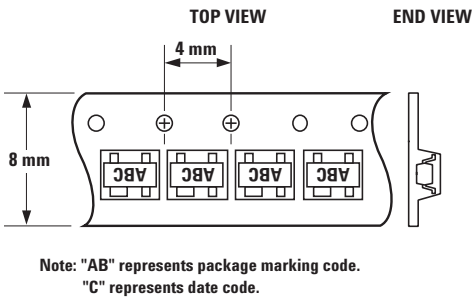


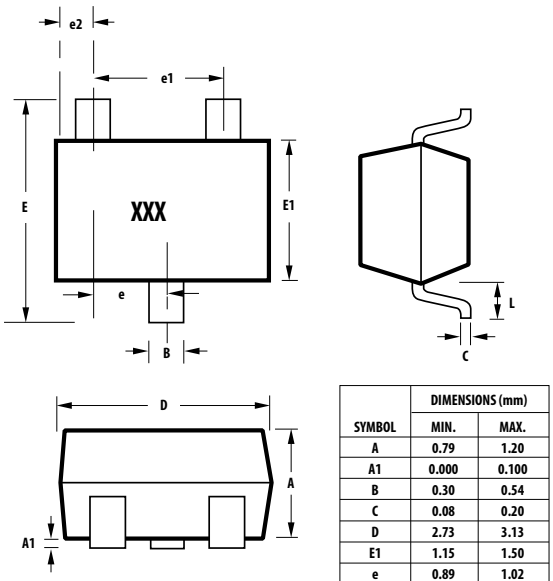
Figure 5. Option -TR1G/-TR2G for SOT-143 Packages.

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

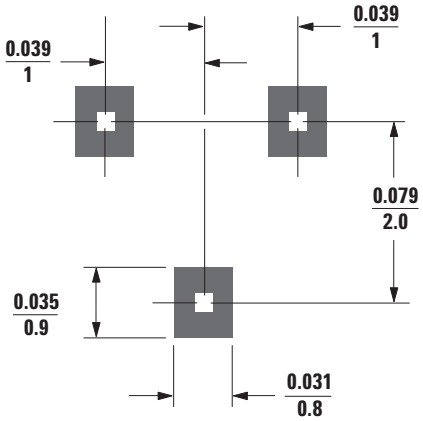
Outline 23 (SOT-23)



SYMBOL	DIMENSIONS (mm) MIN.	MAX.
A	0.79	1.20
A1	0.000	0.100
B	0.30	0.54
C	0.08	0.20
D	2.73	3.13
E1	1.15	1.50
e	0.89	1.02
e1	1.78	2.04
e2	0.45	0.60
E	2.10	2.70
L	0.45	0.69

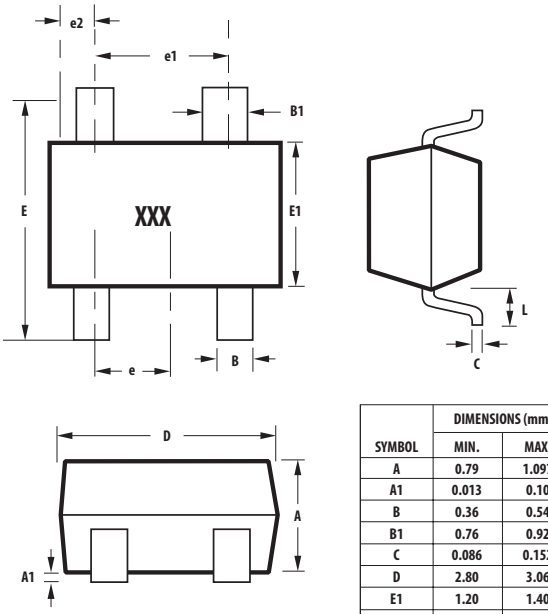
Notes:
XXX-package marking
Drawings are not to scale

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



Dimensions in inches / mm

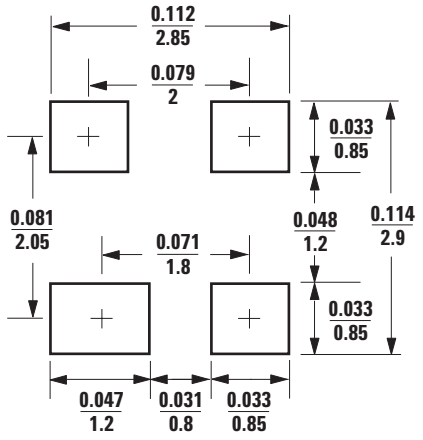
Outline 143 (SOT-143)



SYMBOL	DIMENSIONS (mm) MIN.	MAX.
A	0.79	1.097
A1	0.013	0.10
B	0.36	0.54
B1	0.76	0.92
C	0.086	0.152
D	2.80	3.06
E1	1.20	1.40
e	0.89	1.02
e1	1.78	2.04
e2	0.45	0.60
E	2.10	2.65
L	0.45	0.69

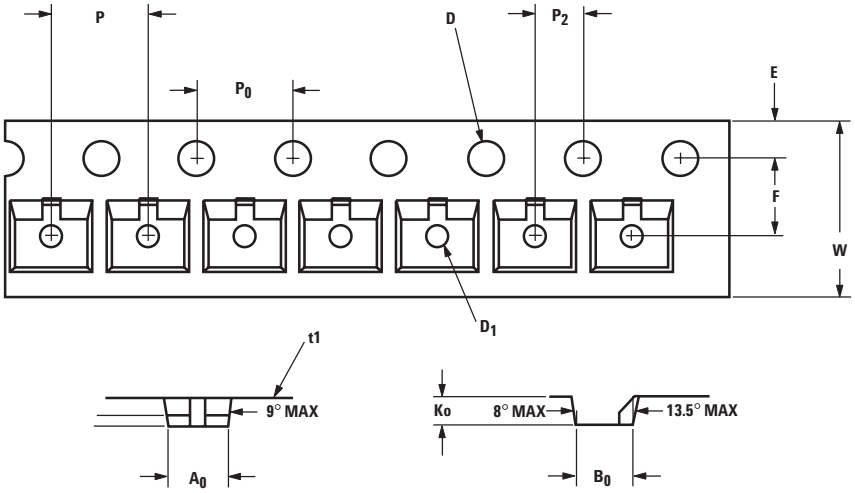
Notes:
XXX-package marking
Drawings are not to scale

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



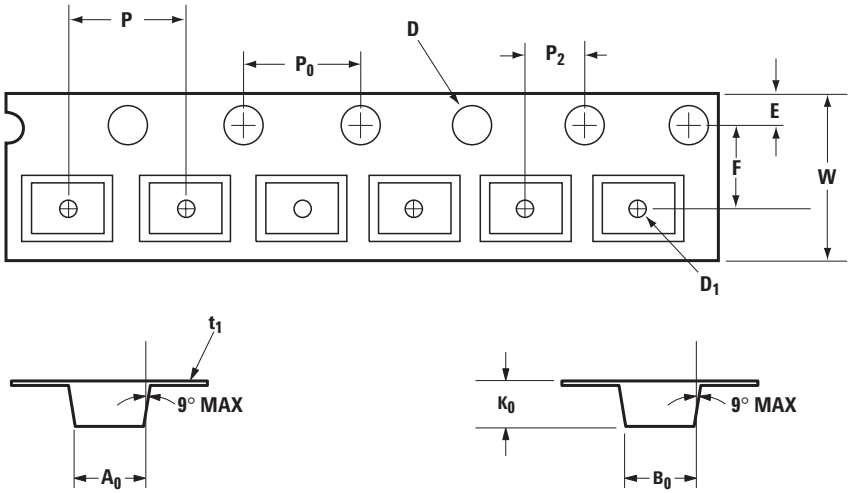
Dimensions in inches / mm

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	t1	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	t1	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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