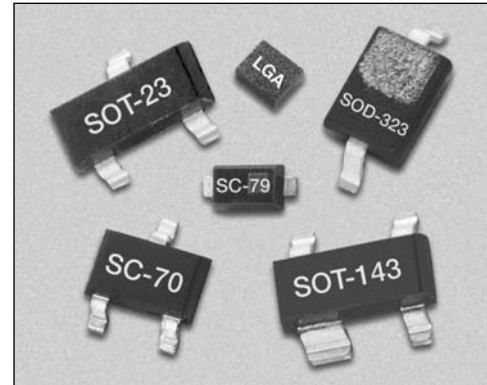


# Surface Mount Mixer and Detector Schottky Diodes



## Features

- Designed for High Volume Commercial Applications
- Available Lead (Pb)-Free MSL-1 @ 250°C per JEDEC J-STD-020
- Tight Parameter Distribution
- Available as Singles and Pairs
- Available in Tape and Reel Packaging



## Description

These low cost, surface mountable plastic packaged silicon mixer Schottky diodes are designed for RF and microwave mixers and detectors. They include low barrier diodes and zero bias detectors, combining Skyworks' advanced semiconductor technology with low cost packaging techniques. All diodes are 100% DC tested and deliver tight parameter distribution, minimizing performance variability. They are available in SC-70, SC-79, SOD-323, SOT-23, SOT-143, and LGA packages. Wiring configurations include singles, common cathode, series pairs and unconnected pairs. Applications include low noise receivers used in high sensitivity ID tags, wireless systems, radio designs and may be used at frequencies to 10 GHz. SPICE model parameters are included as a design tool.

**NEW** Lead (Pb)-Free “environmentally friendly” packaging available: Skyworks offers the SMS7630-079LF and SMS7630-517 Lead (Pb)-Free package as a green alternative.

## Absolute Maximum Ratings

Characteristic	Value
Reverse Voltage ( $V_R$ )	Rated $V_B$
Forward Current - Steady State ( $I_F$ )	50 mA
Power Dissipation ( $P_D$ )	75 mW
Storage Temperature ( $T_{ST}$ )	-65°C to +150°C
Operating Temperature ( $T_{OP}$ )	-65°C to +150°C
Junction Temperature ( $T_J$ )	150°C
Soldering Temperature	260°C for 5 Seconds

## Surface Mount Mixer and Detector Schottky Diodes

Single	Single	Single	Common Cathode	Series Pair	Reverse Series Pair	Unconnected Pair	Reverse Unconnected Pair	Unconnected Pair
SC-79	SOD-323	SOT-23		SOT-23	SOT-23	SOT-143	SOT-143	LGA
				<b>SMS1546-005</b>				
				Marking: SG2				
<b>SMS7621-079</b>	<b>SMS7621-011</b>	<b>SMS7621-001</b>		<b>SMS7621-005</b>	<b>SMS7621-006</b>	<b>SMS7621-015</b>		
<b>SMS7621-079LF</b>								
Cathode Mark	Cathode Mark	Marking: SH1		Marking: SH2	Marking: SH8	Marking: SH7		
<b>SMS7630-079</b>	<b>SMS7630-011</b>	<b>SMS7630-001</b>		<b>SMS7630-005</b>	<b>SMS7630-006</b>	$L_S = 1.5 \text{ nH}$	<b>SMS7630-020</b>	<b>SMS7630-517</b>
<b>SMS7630-079LF</b>	Cathode Mark	Marking: SD1		Marking: SD2	Marking: SD8		Marking: SD0	
<b>Anode Mark</b>								
$L_S = 0.7 \text{ nH}$	$L_S = 1.5 \text{ nH}$	$L_S = 1.5 \text{ nH}$		$L_S = 1.5 \text{ nH}$	$L_S = 1.5 \text{ nH}$		$L_S = 1.5 \text{ nH}$	$L_S = 0.6 \text{ nH}$
			SC-70	SC-70	SC-70			
			<b>SMS7621-074</b>	<b>SMS7621-075</b>	<b>SMS7621-076</b>			
			Marking: SH3	Marking: SH2	Marking: SH8			
				<b>SMS7630-075</b>	<b>SMS7630-076</b>			
				Marking: SD2	Marking: SD8			
			$L_S = 1.4 \text{ nH}$	$L_S = 1.4 \text{ nH}$	$L_S = 1.4 \text{ nH}$			

LF denotes Lead (Pb)-Free packaging.

## Electrical Specifications at 25°C (Per Junction)

### Low Barrier Mixer and Detectors

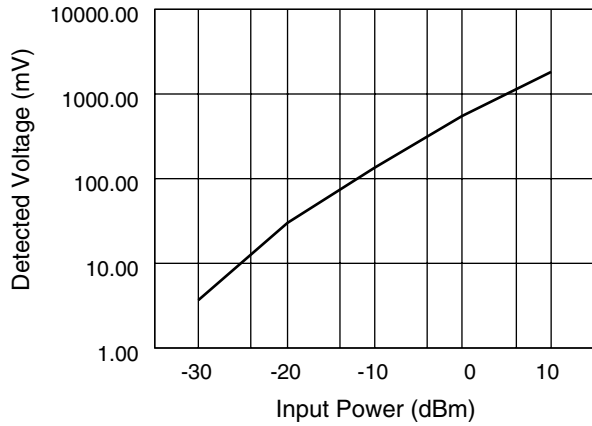
Part Number	Barrier	$V_B @ 10 \mu\text{A} \text{ (V)}$	$C_T @ 0 \text{ V} \text{ (pF)}$	$V_F @ 1 \text{ mA} \text{ (mV)}$	Pair Configuration (b) $V_F @ 1 \text{ mA} \text{ (mV)}$	$R_T^* @ 10 \text{ mA} \text{ (}\Omega\text{)}$
		Min.	Typ.		Max.	Max.
SMS1546 Series	Low	2	0.50	200–270	10	8
SMS7621 Series	Low	2	0.25	260–320	10	18

\* $R_T$  is the slope resistance.

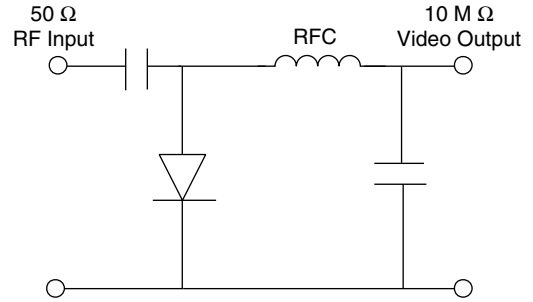
### Zero Bias Detectors

Part Number	$V_B @ 100 \mu\text{A} \text{ (V)}$	$C_T @ 0.15 \text{ V} \text{ (pF)}$	$V_F @ 0.1 \text{ mA} \text{ (mV)}$	$V_F @ 1 \text{ mA} \text{ (mV)}$	Pair Configuration (b) $V_F @ 1 \text{ mA} \text{ (mV)}$	$R_V \text{ (}\Omega\text{)}$
	Min.	Typ.			Max.	Typ.
SMS7630 Series	1.0	0.30	60–120	135–240	10	5000

## Surface Mount Mixer and Detector Schottky Diodes



**Typical Detector  
Characteristics @ 1.8 GHz**



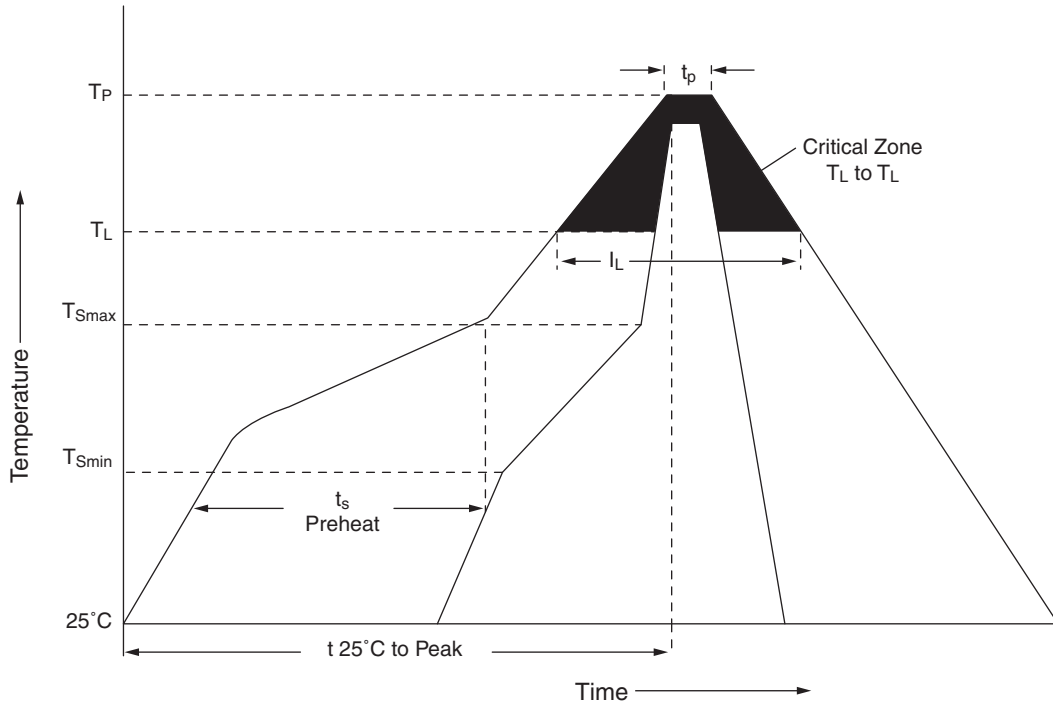
### SPICE Model Parameters (Per Junction)

Parameter	Unit	SMS1546	SMS7621	SMS7630
IS	A	3E-7	4E-8	5E-06
RS	Ω	4	12	20
N		1.04	1.05	1.05
TT	S	1E-11	1E-11	1E-11
CJ0	pF	0.38	0.10	0.14
M		0.36	0.35	0.40
EG	eV	0.69	0.69	0.69
XTI		2	2	2
FC		0.5	0.5	0.5
BV	V	3	3	2
IBV	A	1E-5	1E-5	1E-4
VJ	V	0.51	0.51	0.34

### Recommended Solder Reflow Profiles

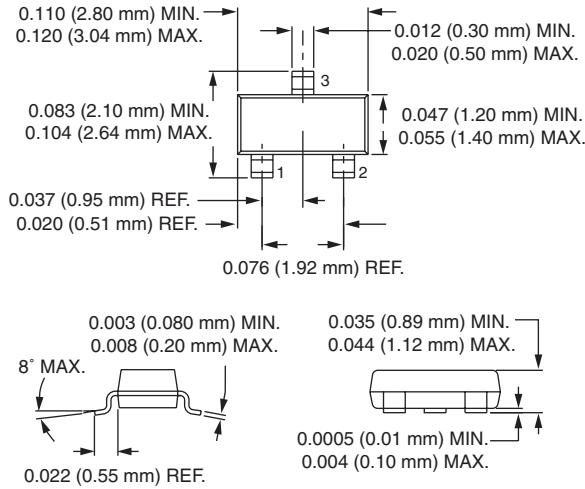
Profile Feature	SnPb Eutectic Assembly	Lead (Pb)-Free Assembly 100% Sn
Average Ramp-Up Rate ( $T_L$ to $T_P$ )	3°C/Second Max.	3°C/Second Max.
Preheat Temperature Min. ( $T_{Smin}$ ) Temperature Max. ( $T_{Smax}$ ) Time (Min. to Max.) ( $t_s$ )	100°C 150°C 60–120 Seconds	150°C 200°C 60–80 Seconds
$T_{Smax}$ to $T_L$ Ramp-up Rate	—	3°C/Second Max.
Time Maintained Above: Temperature ( $T_L$ ) Time ( $t_L$ )	183°C 60–150 Seconds	217°C 60–150 Seconds
Peak Temperature ( $T_P$ )	240 +0/-5°C	250 +0/-5°C
Time Within 5°C of Actual Peak Temperature ( $t_p$ )	10–30 Seconds	20–40 Seconds
Ramp-Down Rate	6°C/Second Max.	6°C/Second Max.
Time 25°C to Peak Temperature	6 Minutes Max.	8 Minutes Max.

All temperatures refer to the topside of the package, measured on the package body surface.  
Reference JEDEC J-STD-020B.

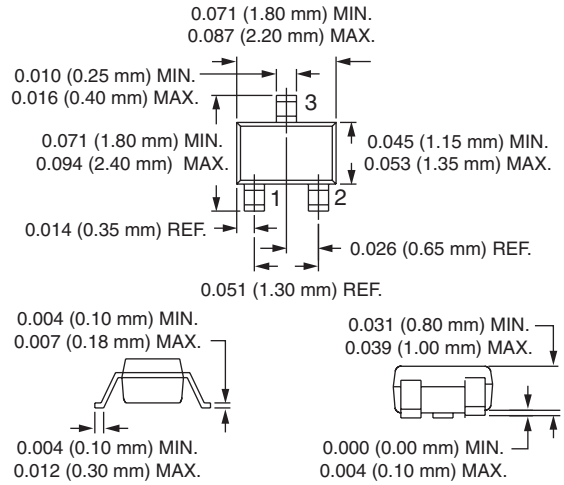


Reference JEDEC J-STD-020

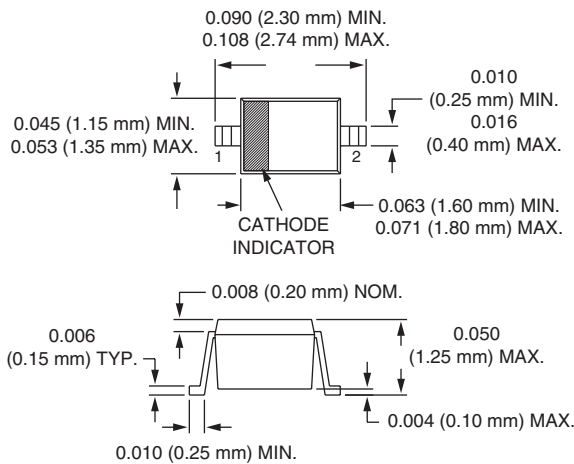
**SOT-23**



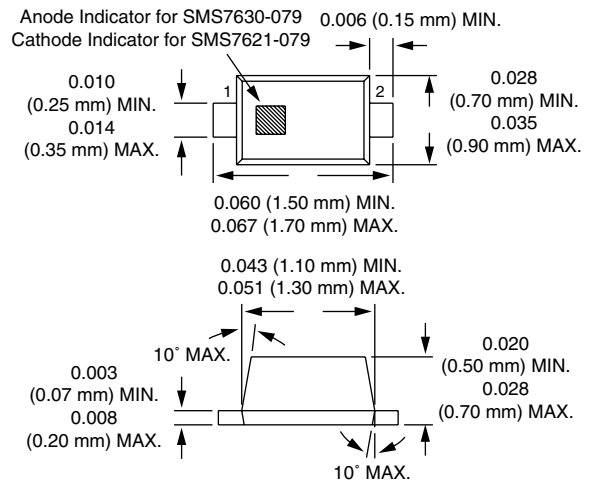
**SC-70**



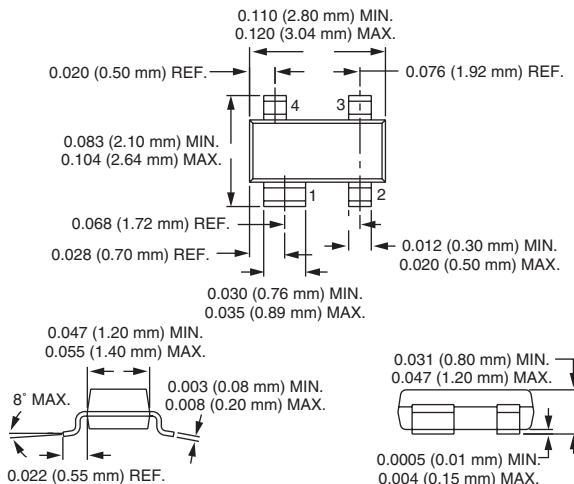
**SOD-323**



**SC-79**



**SOT-143**



**LGA (-517)**

