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# Surface Mount RF PIN Switch Diode

## Technical Data

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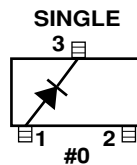
### HSMP-3880

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#### Features

- **Diodes Optimized for:  
Ultra-Low Distortion  
Switching**
- **Surface Mount SOT-23  
Package  
Tape and Reel Options  
Available**
- **Low Failure in Time (FIT)  
Rate<sup>1</sup>**
- **Lead-free Option Available**

#### Package Lead Code Identification (Top View)



#### Description/Applications

The HSMP-3880 switching diode is an ultra low distortion device optimized for higher power applications to 1.5 GHz.

A SPICE model is not available for PIN diodes as SPICE does not provide for a key PIN diode characteristic, carrier lifetime.

#### Note:

1. For more information see the Surface Mount PIN Reliability Data Sheet.
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### Absolute Maximum Ratings<sup>[1]</sup> $T_C = 25^\circ\text{C}$

Symbol	Parameter	Units	Absolute Maximum
$I_F$	Forward Current (1 ms Pulse)	Amp	1
$P_t$	Total Device Dissipation	mW <sup>[2]</sup>	250
$P_{iv}$	Peak Inverse Voltage	—	Same as $V_{BR}$
$T_j$	Junction Temperature	$^\circ\text{C}$	150
$T_{STG}$	Storage Temperature	$^\circ\text{C}$	-65 to 150

#### Notes:

1. Operation in excess of any one of these conditions may result in permanent damage to this device.
2. CW Power Dissipation at  $T_{LEAD} = 25^\circ\text{C}$ . Derate to zero at maximum rated temperature.

### Typical Parameters at $T_C = 25^\circ\text{C}$

Part Number HSMP-	Series Resistance $R_S$ ( $\Omega$ )	Carrier Lifetime $\tau$ (ns)	Reverse Recovery Time $T_{rr}$ (ns)	Total Capacitance $C_T$ (pF)
3880	3.8	2500	550	0.30 @ 50 V
Test Conditions	$I_F = 1$ mA $f = 100$ MHz	$I_F = 50$ mA $I_R = 250$ mA	$V_R = 10$ V $I_F = 20$ mA 90% Recovery	

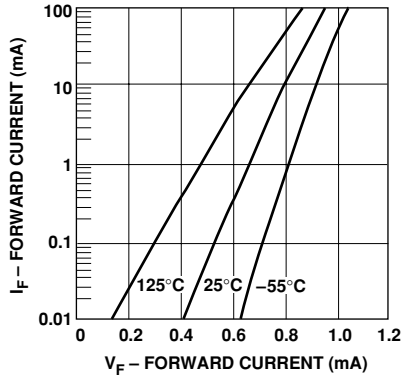
### Electrical Specifications $T_C = 25^\circ\text{C}$

Part Number HSMP-	Package Marking Code <sup>[1]</sup>	Lead Code	Configuration	Minimum Breakdown Voltage $V_{BR}$ (V)	Maximum Series Resistance $R_S$ ( $\Omega$ )	Maximum Total Capacitance $C_T$ (pF)	Maximum Shunt Mode Harmonic Distortion Hmd (dBc)
3880	S0	0	Single	100	6.5	0.40	-55
Test Conditions				$V_R = V_{BR}$ Measure $I_R \leq 10$ $\mu\text{A}$	$I_F = 5$ mA $f = 100$ MHz	$V_R = 50$ V $f = 1$ MHz	$2f_o, Z_o = 50$ W $f_o = 400$ MHz $P_{in} = +30$ dBm 0 V bias

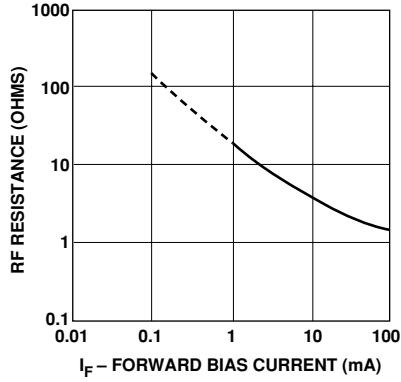
#### Note:

1. Package marking code is white.

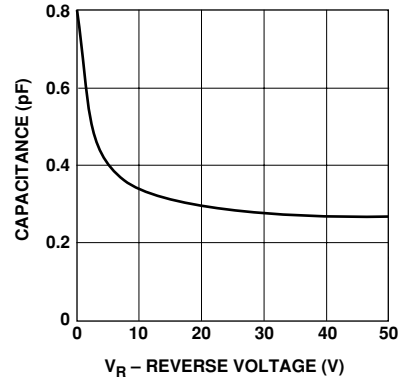
**Typical Parameters at  $T_C = 25^\circ\text{C}$  (unless otherwise noted), Single Diode**



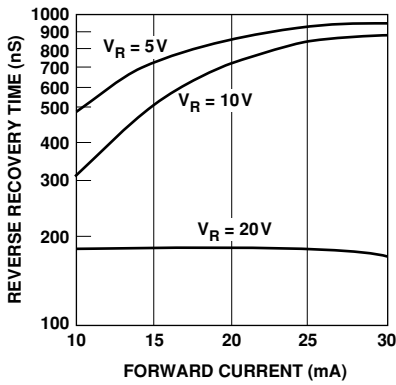
**Figure 1. Forward Current vs. Forward Voltage.**



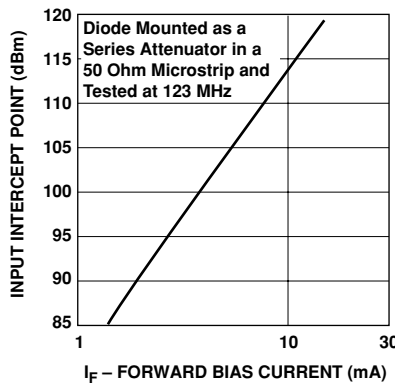
**Figure 2. RF Resistance at  $25^\circ\text{C}$  vs. Forward Bias Current.**



**Figure 3. Capacitance vs. Reverse Voltage.**

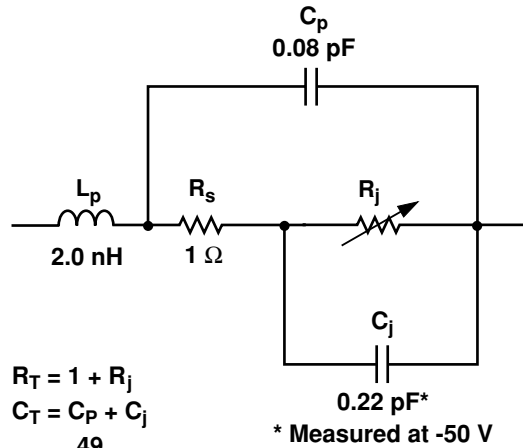


**Figure 4. Typical Reverse Recovery Time vs. Reverse Voltage.**



**Figure 5. 2nd Harmonic Input Intercept Point vs. Forward Bias Current.**

**Equivalent Circuit Model  
HSMP-3880**



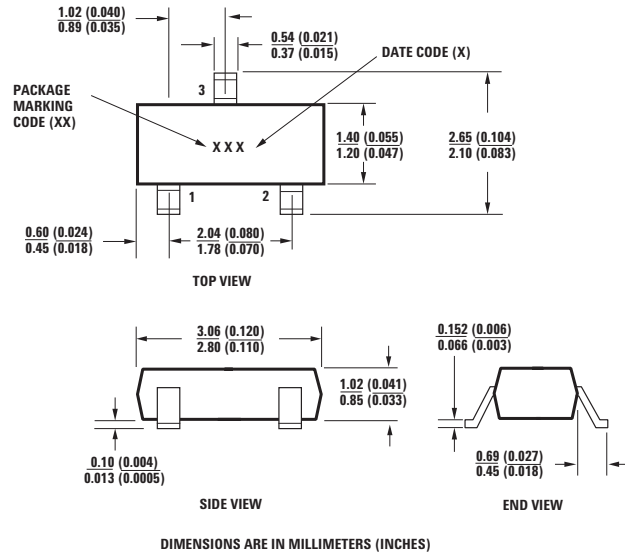
$$R_T = 1 + R_j$$

$$C_T = C_p + C_j$$

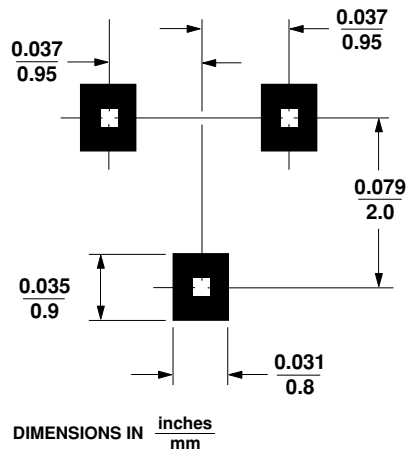
$$R_j = \frac{49}{I^{0.9}} \Omega$$

I = Forward Bias Current in mA

## Package Dimensions Outline 23 (SOT-23)



## PC Board Footprints SOT-23



## 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)

## Profile Option Descriptions

-BLK = Bulk

-TR1 = 3K pc. Tape and Reel, Device Orientation; See Figure 6

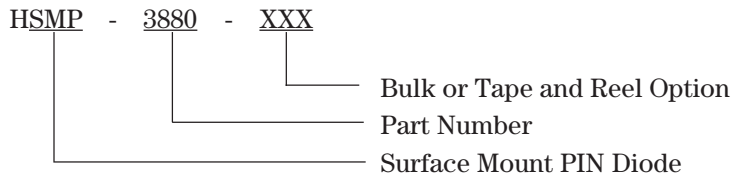
-TR2 = 10K pc. Tape and Reel, Device Orientation; See Figure 6

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, e.g., TR2G for a 10K pc lead-free reel.

## Ordering Information

Specify part number followed by option under. For example:



## Device Orientation For Outline SOT-23

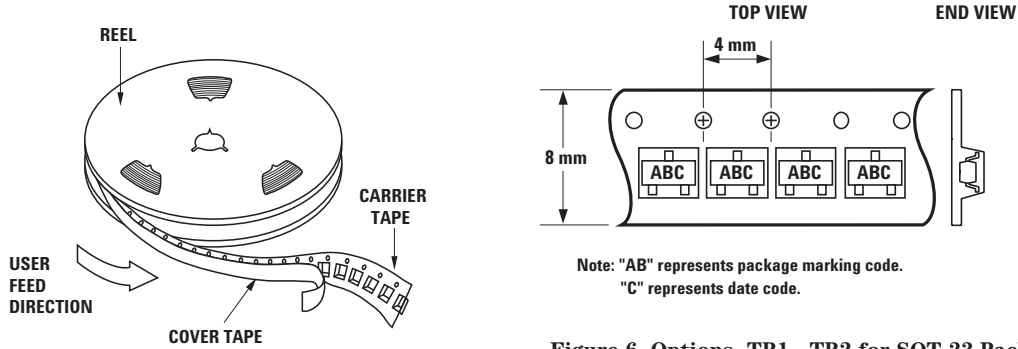
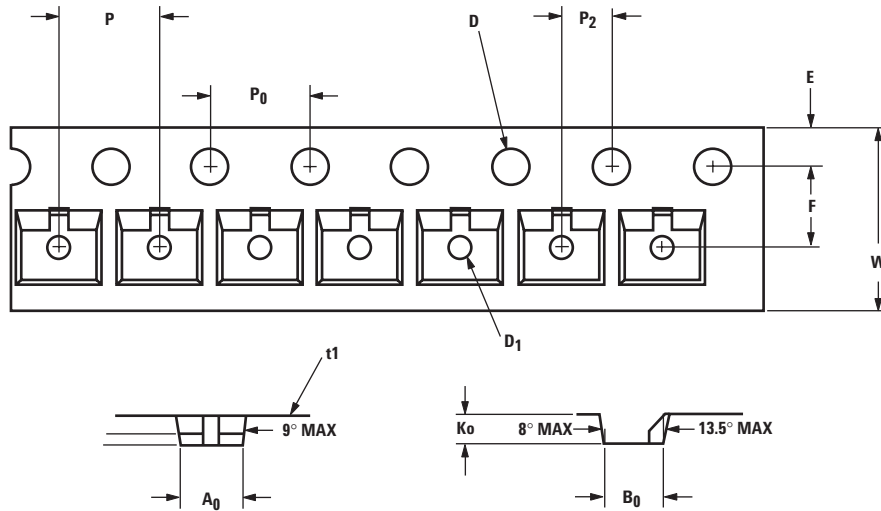


Figure 6. Options -TR1, -TR2 for SOT-23 Package.

## Tape Dimensions and Product Orientation For Outline SOT-23



DESCRIPTION		SYMBOL	SIZE (mm)	SIZE (INCHES)
CAVITY	LENGTH	A <sub>0</sub>	3.15 ± 0.10	0.124 ± 0.004
	WIDTH	B <sub>0</sub>	2.77 ± 0.10	0.109 ± 0.004
	DEPTH	K <sub>0</sub>	1.22 ± 0.10	0.048 ± 0.004
	PITCH	P	4.00 ± 0.10	0.157 ± 0.004
	BOTTOM HOLE DIAMETER	D <sub>1</sub>	1.00 + 0.05	0.039 ± 0.002
PERFORATION	DIAMETER	D	1.50 + 0.10	0.059 + 0.004
	PITCH	P <sub>0</sub>	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 <sub>1</sub>	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 <sub>2</sub>	2.00 ± 0.05	0.079 ± 0.002

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