

# HSMS-286Y

## Microwave Schottky Detector Diodes In Surface Mount SOD-523 Package



### Data Sheet

#### Description/Applications

The HSMS-286Y of Avago Technologies is a DC biased detector Diode that designed and optimized for use from 915MHz to 5.8GHz. They are ideal for RF/ID and RF Tag applications as well as large signal detection, modulation, RF to DC conversion or voltage doubling.

The device is housed in a miniature low cost surface mount SOD-523 package. This miniature package is particularly useful in the application where board space is the major concern.

**Table 1. Absolute Maximum Ratings [1] at Tc = +25°C**

| Symbol           | Parameter                         | Unit | Max Rating |
|------------------|-----------------------------------|------|------------|
| P <sub>IV</sub>  | Peak Inverse Voltage              | V    | 4          |
| T <sub>J</sub>   | Junction Temperature              | °C   | 150        |
| T <sub>STG</sub> | Storage Temperature               | °C   | -65 to 150 |
| T <sub>OP</sub>  | Storage Temperature               | °C   | -65 to 150 |
| θ <sub>jb</sub>  | Thermal Resistance <sup>[2]</sup> | °C/W | 175        |

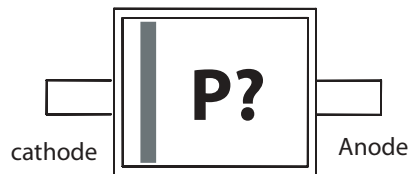
Notes:

1. Operation in excess of any one of these conditions may result in permanent damage to the device.
2. Thermal Resistance is measured from junction to board using IR method.

#### Features

- Space saving SOD-523 package
- High Detection Sensitivity
  - Up to 50 mW/uW at 915 MHz
  - Up to 35 mW/uW at 2.45 GHz
  - Up to 25 mW/uW at 5.80 GHz
- Tape and Reel Options Available
- MSL 1 & Lead Free

#### Package Marking and Pin Connections



Note: Package marking provides orientation and identification

"P" = Device Code

"?" = Month code indicates the month of manufacture



**Attention:** Observe precautions for handling electrostatic sensitive devices.

ESD Machine Model <30V

ESD Human Body Model =50 V

Refer to Avago Technologies Application Note A004R: *Electrostatic Discharge, Damage and Control*.

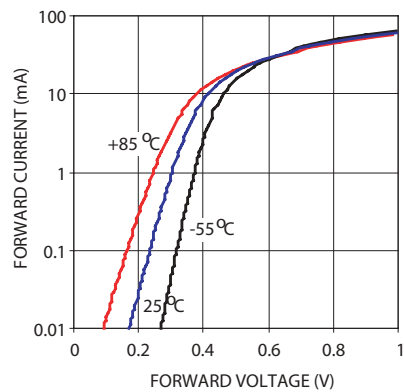
**Table 2. Electrical Specifications at Tc = +25°C**

|                 | Forward Voltage V <sub>F</sub> (mV) |                         | Typical Capacitance C <sub>T</sub> (pF) |
|-----------------|-------------------------------------|-------------------------|---|
|                 |                                     | 250 Min                 | 350 Max                                 |
| Test Conditions | I <sub>F</sub> = 1.0 mA             | I <sub>F</sub> = 1.0 mA | V <sub>R</sub> = 0V , f = 1MHz          |

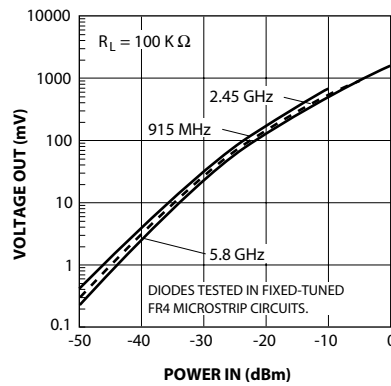
**Table 3. RF Electrical Specifications, Tc = +25°C**

|                 | Typical Tangential Sensitivity<br>TSS (dBm) @ f = |          |         | Typical Voltage Sensitivity<br>(mV/μW) @ f =                         |          |         | Typical Video<br>Resistance R <sub>V</sub> (KΩ) |
|-----------------|---|----------|---------|--|----------|---------|---|
|                 | 915 MHz   | 2.45 GHz | 5.8 GHz | 915 MHz  | 2.45 GHz | 5.8 GHz |   |
|                 | -57   | -56      | -55     | 50   | 35       | 25      | 5.0   |
| Test Conditions | Video Bandwidth = 2 MHz<br>I <sub>b</sub> = 5 μA  |          |         | Power in = -40 dBm<br>R <sub>L</sub> = 100 KΩ, I <sub>b</sub> = 5 μA |          |         | I <sub>b</sub> = 5 μA                           |

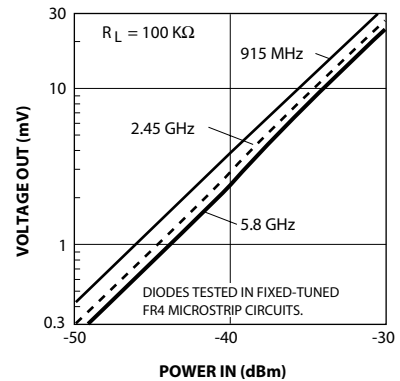
**Typical Performance Curves at Tc = +25°C**



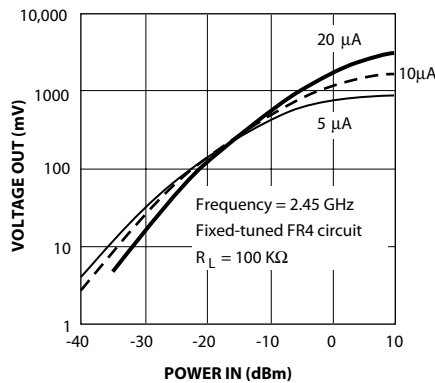
**Figure 1. Forward Current vs. Forward Voltage at Temperature**



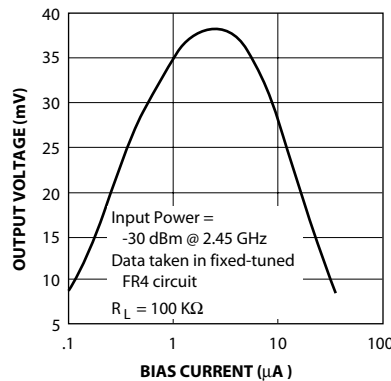
**Figure 2. +25°C Output Voltage vs. Input Power, 3uA Bias**



**Figure 3. +25°C Expanded Output Voltage vs. Input Power.**

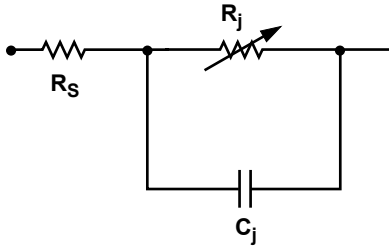


**Figure 4. Dynamic Transfer Characteristic as a function of DC Bias**



**Figure 5. Voltage Sensitivity as a Function of DC Bias Current**

**Equivalent Linear Circuit Model,  
Diode chip**



$R_S$  = series resistance (see Table of SPICE parameters)

$C_j$  = junction capacitance (see Table of SPICE parameters)

$$R_j = \frac{8.33 \times 10^{-5} nT}{I_b + I_s}$$

where

$I_b$  = externally applied bias current in amps

$I_s$  = saturation current (see table of SPICE parameters)

$T$  = temperature, K

$n$  = ideality factor (see table of SPICE parameters)

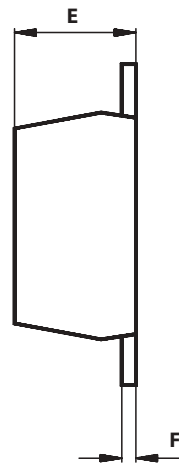
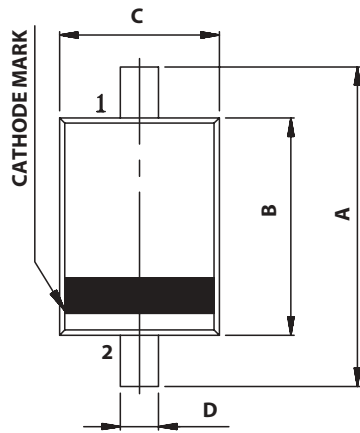
Note:

To effectively model the packaged HSMS-286x product, please refer to Application Note AN1124.

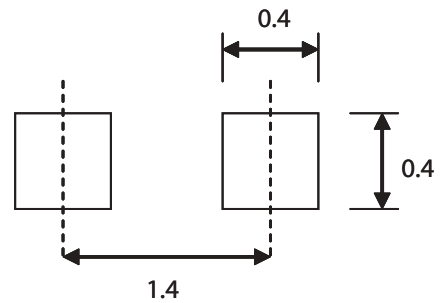
**SPICE Parameters**

| Parameter   | Units    | Value  |
|-------------|----------|--------|
| $B_V$       | V        | 7.0    |
| $C_{J0}$    | pF       | 0.18   |
| $E_G$       | eV       | 0.69   |
| $I_{BV}$    | A        | 1E - 5 |
| $I_S$       | A        | 5E - 8 |
| $N$         |          | 1.08   |
| $R_S$       | $\Omega$ | 6.0    |
| $P_B$ (VJ)  | V        | 0.65   |
| $P_T$ (XTI) |          | 2      |
| $M$         |          | 0.5    |

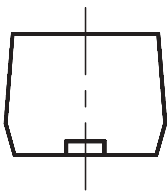
**Package Outline and Dimension**



**PCB Footprint**

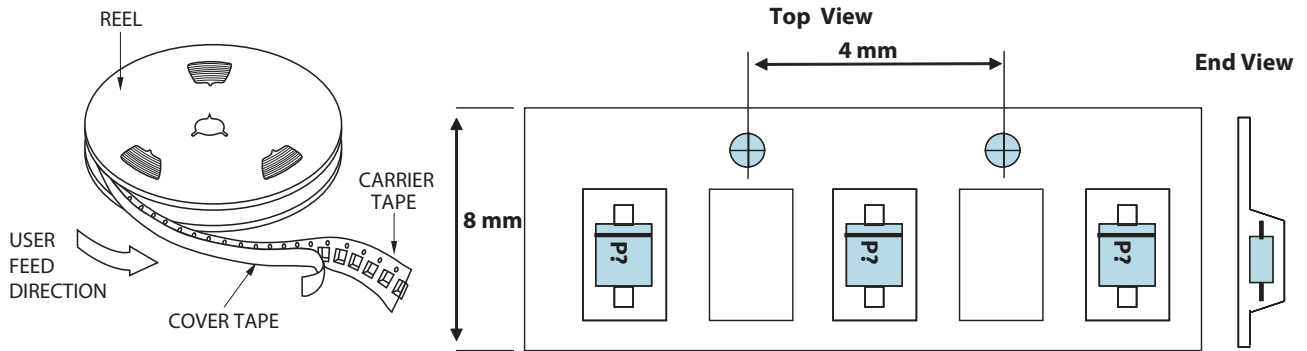


Unit : mm

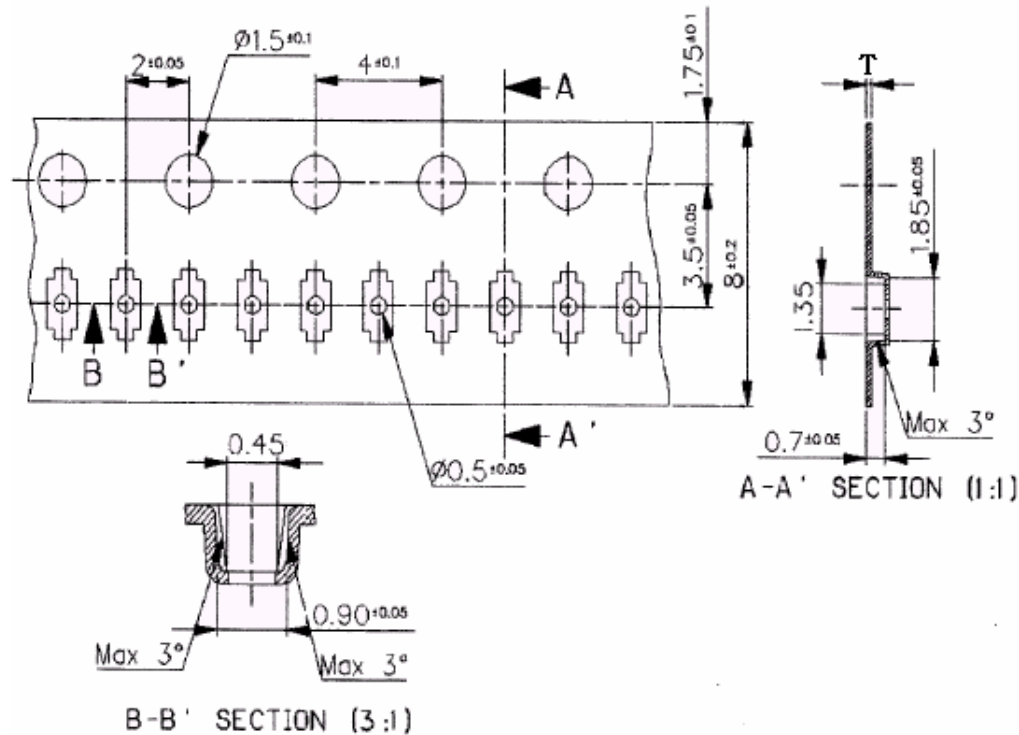


| DIM | MILLIMETERS |
|-----|-------------|
| A   | 1.60 ± 0.10 |
| B   | 1.20 ± 0.10 |
| C   | 0.80 ± 0.10 |
| D   | 0.30 ± 0.05 |
| E   | 0.60 ± 0.10 |
| F   | 0.13 ± 0.05 |

## Device Orientation



## Tape Dimension



Specification < Unit : mm >

hole pitch : 50 Pitch Tolerance :  $200 \pm 0.3$

General Tolerance :  $\pm 0.1$

Surface resistance :  $104 \sim 108 \text{ W/cm}^3$

## Part Number Ordering Information

| Part number    | No. of Units | Container       |
|----------------|--------------|-----------------|
| HSMS-286Y-BLKG | 100          | Anti-static bag |
| HSMS-286Y-TR1G | 3000         | 7" reel         |

For product information and a complete list of distributors, please go to our web site: [www.avagotech.com](http://www.avagotech.com)

Avago, Avago Technologies, and the A logo are trademarks of Avago Technologies, Limited in the United States and other countries. Data subject to change. Copyright © 2006 Avago Technologies Limited. All rights reserved. Obsoletes AV01-0201EN AV01-0691EN - December 21, 2006

**AVAGO**  
TECHNOLOGIES