

## SOD-123 Schottky Barrier Diodes

The MMSD301T1, and MMSD701T1 devices are spin-offs of our popular MMBD301LT1, and MMBD701LT1 SOT-23 devices. They are designed for high-efficiency UHF and VHF detector applications. Readily available to many other fast switching RF and digital applications.

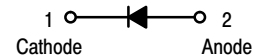
- Extremely Low Minority Carrier Lifetime
- Very Low Capacitance
- Low Reverse Leakage

### MMSD301T1 MMSD701T1

ON Semiconductor Preferred Devices



CASE 425-04, STYLE 1  
SOD-123



#### MAXIMUM RATINGS

| Rating  | Symbol                 | Value       | Unit             |     |
|---|------------------------|-------------|------------------|-----|
| Reverse Voltage                                       | MMSD301T1<br>MMSD701T1 | $V_R$       | 30<br>70         | Vdc |
| Forward Power Dissipation<br>$T_A = 25^\circ\text{C}$ | $P_F$                  | 225         | mW               |     |
| Junction Temperature                                  | $T_J$                  | -55 to +125 | $^\circ\text{C}$ |     |
| Storage Temperature Range                             | $T_{stg}$              | -55 to +150 | $^\circ\text{C}$ |     |

#### DEVICE MARKING

MMSD301T1 = XT, MMSD701T1 = XH

#### ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

| Characteristic  | Symbol                 | Min         | Typ              | Max                         | Unit                      |              |
|---|------------------------|-------------|------------------|-----------------------------|---------------------------|--------------|
| Reverse Breakdown Voltage<br>( $I_R = 10 \mu\text{A}$ )   | MMSD301T1<br>MMSD701T1 | $V_{(BR)R}$ | 30<br>70         | —<br>—                      | Volts                     |              |
| Diode Capacitance<br>( $V_R = 0$ , $f = 1.0 \text{ MHz}$ , Note 1)  | MMSD301T1<br>MMSD701T1 | $C_T$       | —<br>—           | 0.9<br>0.5                  | 1.5<br>1.0                | pF           |
| Total Capacitance<br>( $V_R = 15 \text{ Volts}$ , $f = 1.0 \text{ MHz}$ )<br>( $V_R = 20 \text{ Volts}$ , $f = 1.0 \text{ MHz}$ )         | MMSD301T1<br>MMSD701T1 | $C_T$       | —<br>—           | 0.9<br>0.5                  | 1.5<br>1.0                | pF           |
| Reverse Leakage<br>( $V_R = 25 \text{ V}$ )<br>( $V_R = 35 \text{ V}$ )   | MMSD301T1<br>MMSD701T1 | $I_R$       | —<br>—           | 13<br>9.0                   | 200<br>200                | nAdc<br>nAdc |
| Forward Voltage<br>( $I_F = 1.0 \text{ mAdc}$ )<br>( $I_F = 10 \text{ mA}$ )<br>( $I_F = 1.0 \text{ mAdc}$ )<br>( $I_F = 10 \text{ mA}$ ) | MMSD301T1<br>MMSD701T1 | $V_F$       | —<br>—<br>—<br>— | 0.38<br>0.52<br>0.42<br>0.7 | 0.45<br>0.6<br>0.5<br>1.0 | Vdc          |

Preferred devices are ON Semiconductor recommended choices for future use and best overall value.

# MMSD301T1 MMSD701T1

## TYPICAL CHARACTERISTICS MMSD301T1

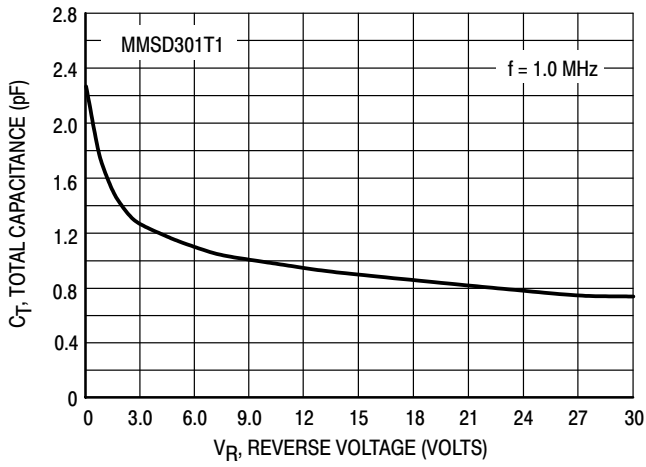


Figure 1. Total Capacitance

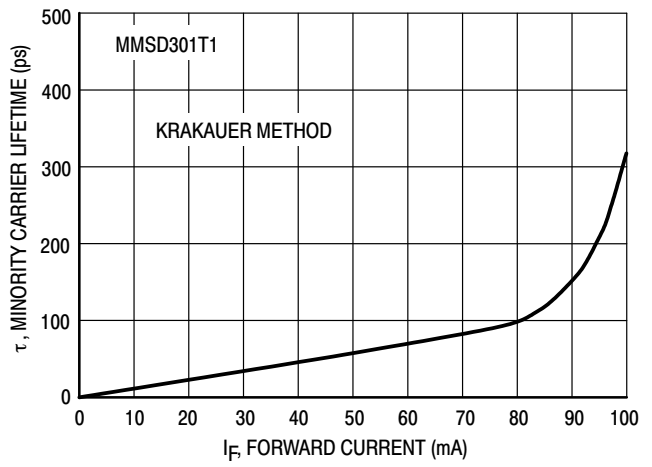


Figure 2. Minority Carrier Lifetime

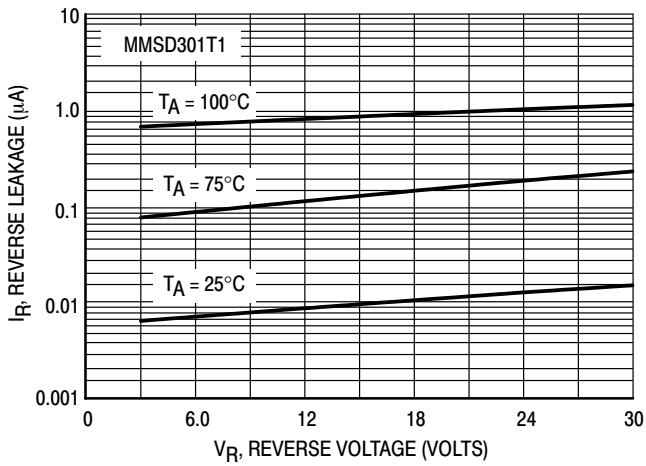


Figure 3. Reverse Leakage

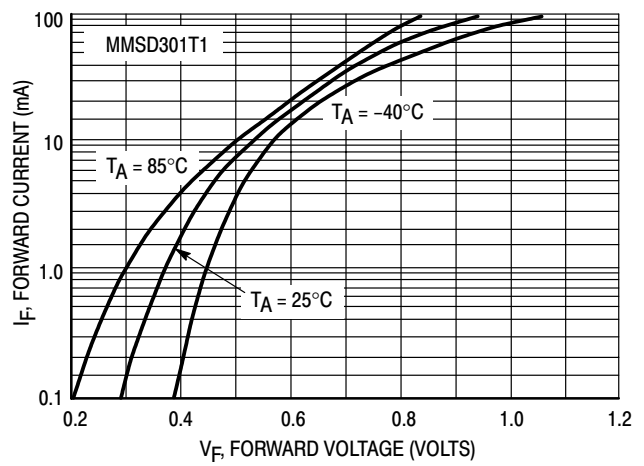


Figure 4. Forward Voltage

# MMSD301T1 MMSD701T1

## TYPICAL CHARACTERISTICS MMSD701T1

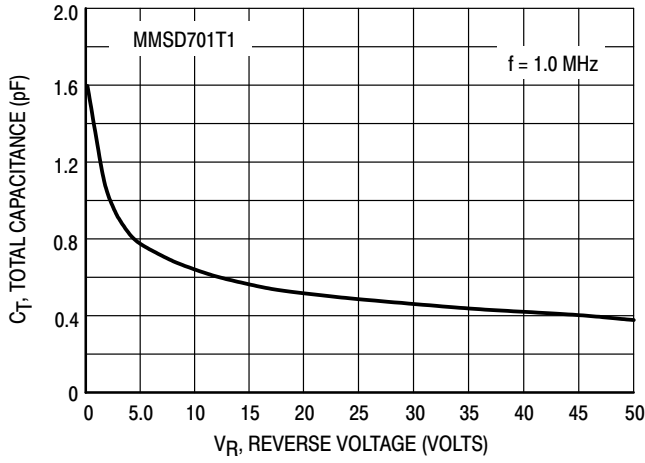


Figure 5. Total Capacitance

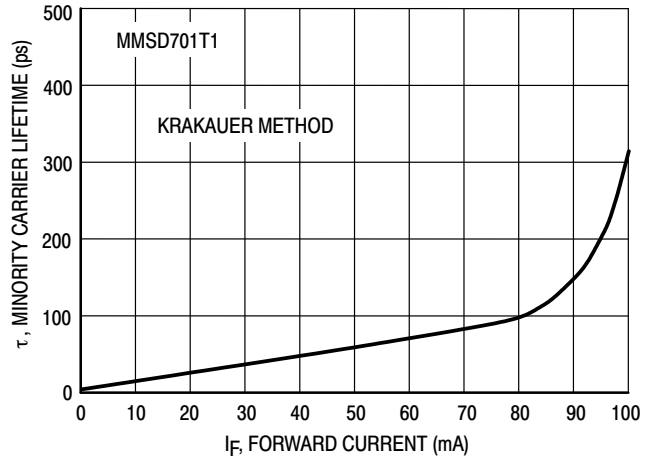


Figure 6. Minority Carrier Lifetime

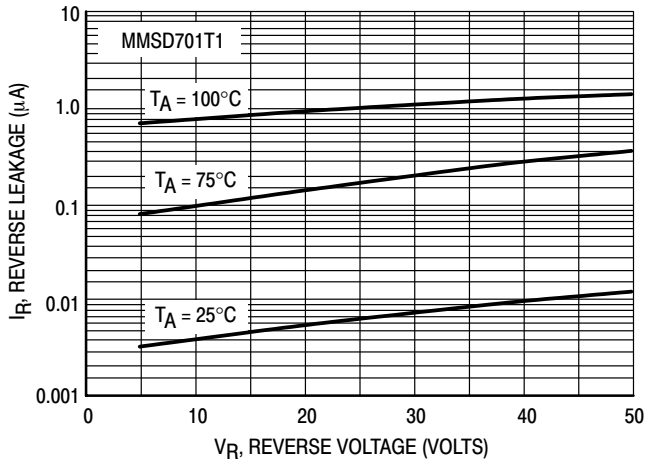


Figure 7. Reverse Leakage

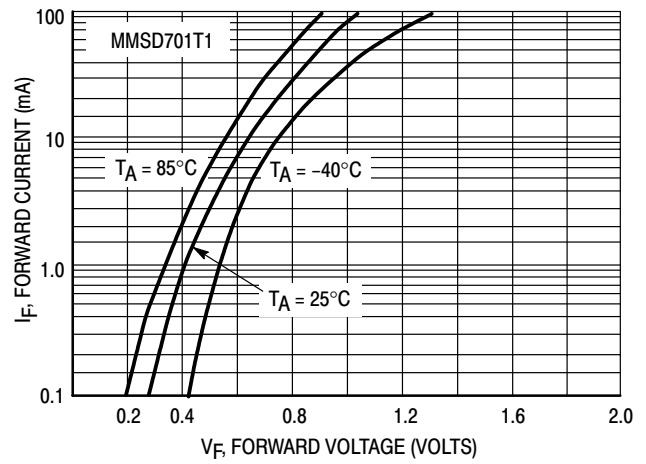
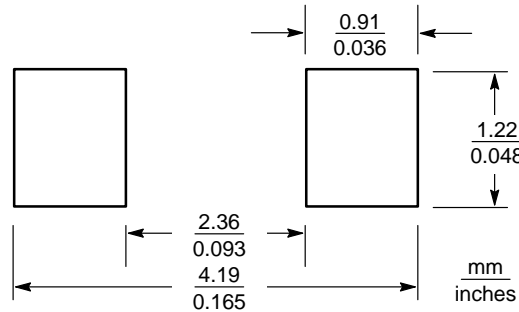


Figure 8. Forward Voltage

**INFORMATION FOR USING THE SOD-123 SURFACE MOUNT PACKAGE**  
**MINIMUM RECOMMENDED FOOTPRINT FOR SURFACE MOUNTED APPLICATIONS**

Surface mount board layout is a critical portion of the total design. The footprint for the semiconductor packages must be the correct size to insure proper solder connection

interface between the board and the package. With the correct pad geometry, the packages will self align when subjected to a solder reflow process.



**SOD-123**

**SOD-123 POWER DISSIPATION**

The power dissipation of the SOD-123 is a function of the pad size. This can vary from the minimum pad size for soldering to a pad size given for maximum power dissipation. Power dissipation for a surface mount device is determined by  $T_{J(max)}$ , the maximum rated junction temperature of the die,  $R_{\theta JA}$ , the thermal resistance from the device junction to ambient, and the operating temperature,  $T_A$ . Using the values provided on the data sheet for the SOD-123 package,  $P_D$  can be calculated as follows:

$$P_D = \frac{T_{J(max)} - T_A}{R_{\theta JA}}$$

The values for the equation are found in the maximum ratings table on the data sheet. Substituting these values into the equation for an ambient temperature  $T_A$  of 25°C, one can calculate the power dissipation of the device which in this case is 225 milliwatts.

$$P_D = \frac{150^\circ\text{C} - 25^\circ\text{C}}{556^\circ\text{C/W}} = 225 \text{ milliwatts}$$

The 556°C/W for the SOD-123 package assumes the use of the recommended footprint on a glass epoxy printed circuit board to achieve a power dissipation of 225 milliwatts. There are other alternatives to achieving higher power dissipation from the SOD-123 package. Another alternative would be to use a ceramic substrate or an aluminum core board such as Thermal Clad™. Using a board material such as Thermal Clad, an aluminum core board, the power dissipation can be doubled using the same footprint.

**SOLDERING PRECAUTIONS**

The melting temperature of solder is higher than the rated temperature of the device. When the entire device is heated to a high temperature, failure to complete soldering within a short time could result in device failure. Therefore, the following items should always be observed in order to minimize the thermal stress to which the devices are subjected.

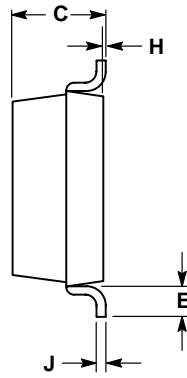
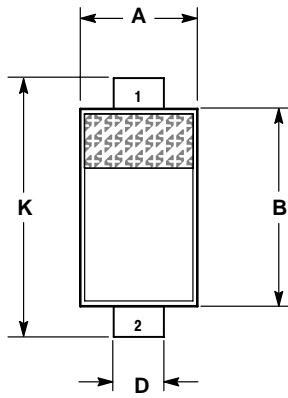
- Always preheat the device.
- The delta temperature between the preheat and soldering should be 100°C or less.\*
- When preheating and soldering, the temperature of the leads and the case must not exceed the maximum temperature ratings as shown on the data sheet. When using infrared heating with the reflow soldering method, the difference shall be a maximum of 10°C.
- The soldering temperature and time shall not exceed 260°C for more than 10 seconds.
- When shifting from preheating to soldering, the maximum temperature gradient shall be 5°C or less.
- After soldering has been completed, the device should be allowed to cool naturally for at least three minutes. Gradual cooling should be used as the use of forced cooling will increase the temperature gradient and result in latent failure due to mechanical stress.
- Mechanical stress or shock should not be applied during cooling.

\* Soldering a device without preheating can cause excessive thermal shock and stress which can result in damage to the device.

# MMSD301T1 MMSD701T1

## PACKAGE DIMENSIONS

SOD-123  
CASE 425-04  
ISSUE C



- NOTES:  
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.  
2. CONTROLLING DIMENSION: INCH.

| DIM | INCHES |       | MILLIMETERS |      |
|-----|--------|-------|-------------|------|
|     | MIN    | MAX   | MIN         | MAX  |
| A   | 0.055  | 0.071 | 1.40        | 1.80 |
| B   | 0.100  | 0.112 | 2.55        | 2.85 |
| C   | 0.037  | 0.053 | 0.95        | 1.35 |
| D   | 0.020  | 0.028 | 0.50        | 0.70 |
| E   | 0.01   | ---   | 0.25        | ---  |
| H   | 0.000  | 0.004 | 0.00        | 0.10 |
| J   | ---    | 0.006 | ---         | 0.15 |
| K   | 0.140  | 0.152 | 3.55        | 3.85 |


STYLE 1:  
PIN 1. CATHODE  
2. ANODE

## Notes

## Notes

# MMSD301T1 MMSD701T1

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