MOTOROLA
SEMICONDUCTOR TECHNICAL DATA

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by MMSD301T1/D

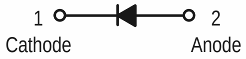
SOD-123 Schottky Barrier Diodes

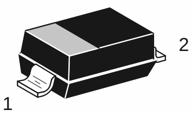
MMSD301T1
MMSD701T1

Motorola Preferred Devices

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





CASE 425–04, STYLE 1
SOD–123

MAXIMUM RATINGS

Rating		Symbol	Value	Unit
Reverse Voltage	MMSD301T1 MMSD701T1	V_R	30 70	Vdc
Forward Power Dissipation T_A = 25°C		P_F	225	mW
Junction Temperature		T_J	–55 to +125	°C
Storage Temperature Range		T_{stg}	–55 to +150	°C

DEVICE MARKING

MMSD301T1 = XT, MMSD701T1 = XH

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

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

Thermal Clad is a trademark of the Bergquist Company.

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

TYPICAL CHARACTERISTICS
MMSD301T1

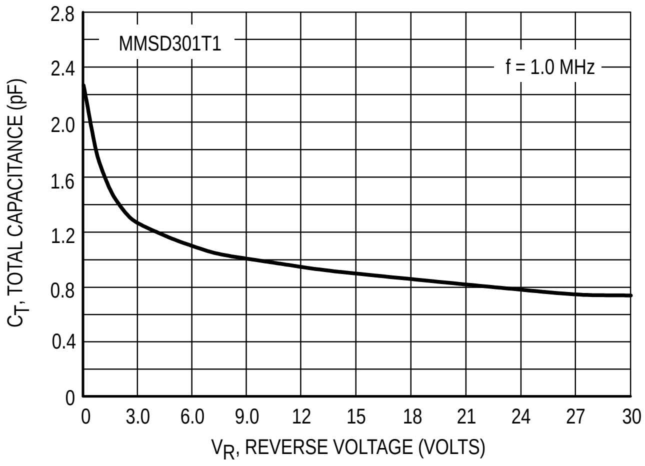


Figure 1. Total Capacitance

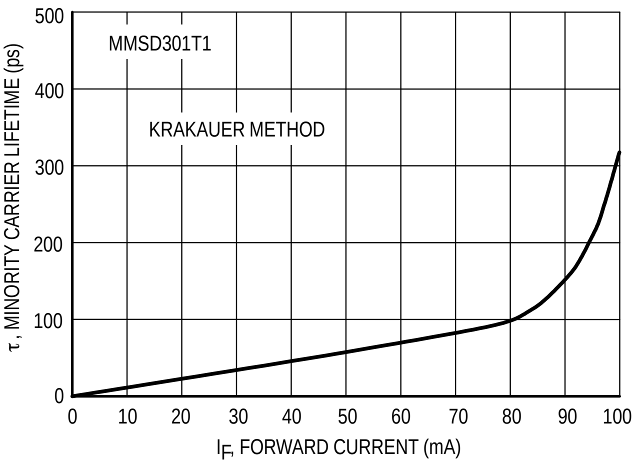


Figure 2. Minority Carrier Lifetime

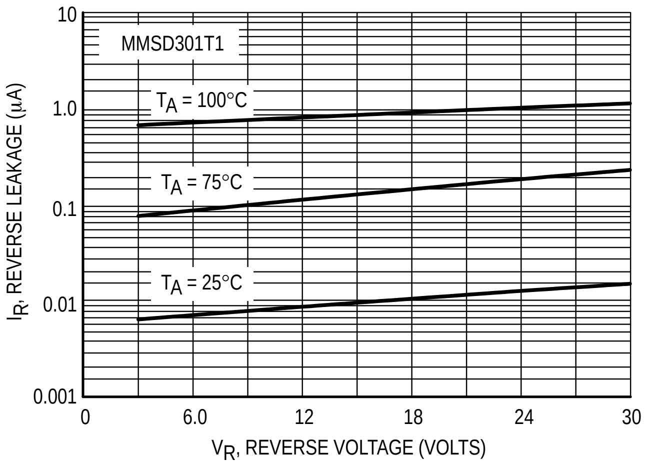


Figure 3. Reverse Leakage

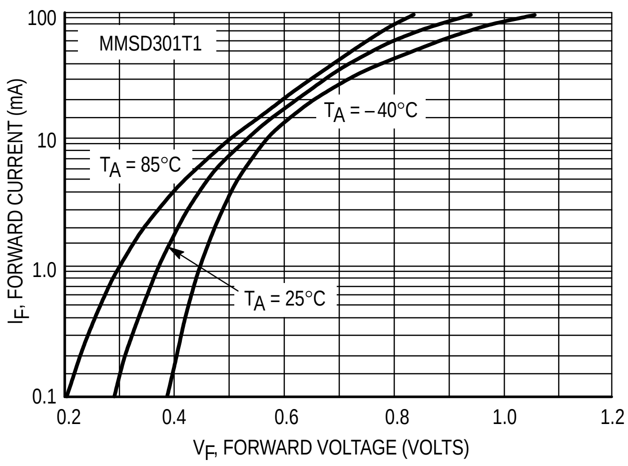


Figure 4. Forward Voltage

TYPICAL CHARACTERISTICS
MMSD701T1

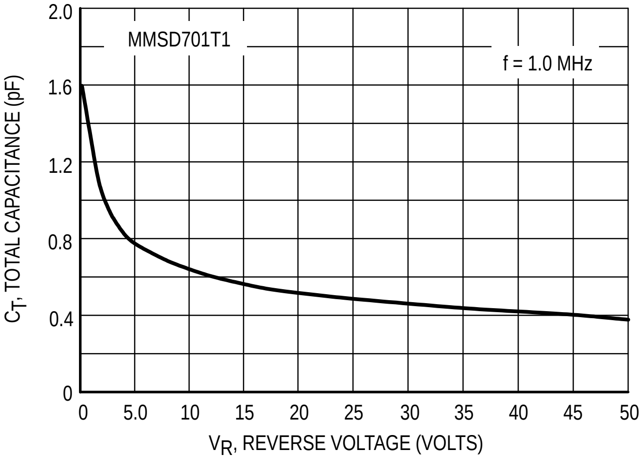


Figure 5. Total Capacitance

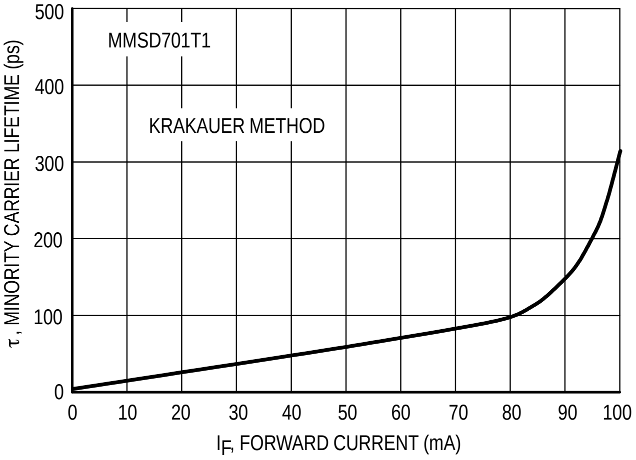


Figure 6. Minority Carrier Lifetime

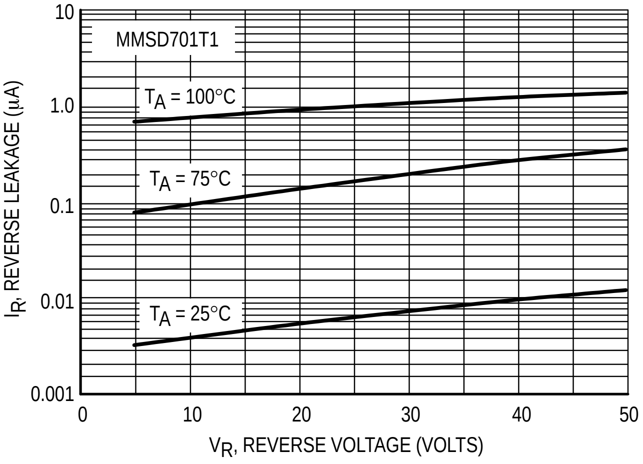


Figure 7. Reverse Leakage

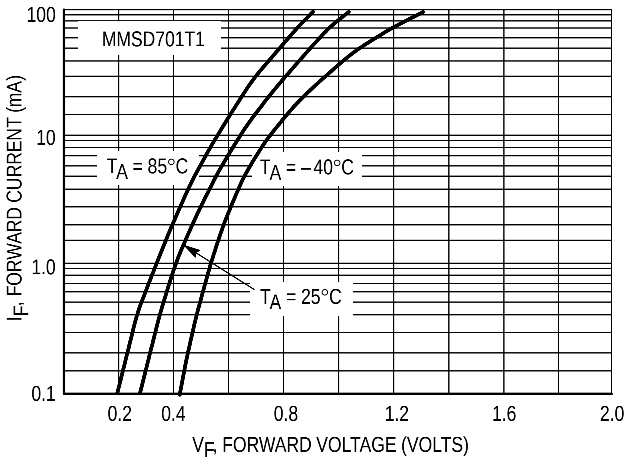


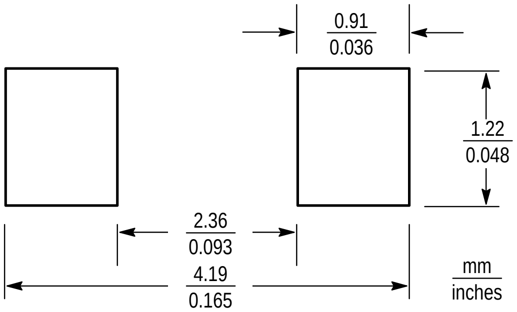
Figure 8. Forward Voltage

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.

$$P_D = \frac{125°C - 25°C}{444°C/W} = 225 \text{ milliwatts}$$

The 444°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.

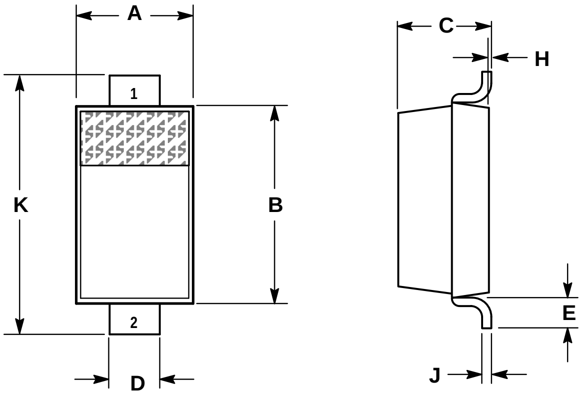
SOLDERING PRECAUTIONS

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.

PACKAGE DIMENSIONS



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

	INCHES		MILLIMETERS	
DIM	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	0.004	——	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

CASE 425–04
ISSUE C

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