

# Silicon Hot-Carrier Diodes

## Schottky Barrier Diodes

These devices are designed primarily for high-efficiency UHF and VHF detector applications. They are readily adaptable to many other fast switching RF and digital applications. They are supplied in an inexpensive plastic package for low-cost, high-volume consumer and industrial/commercial requirements. They are also available in a Surface Mount package.

- Extremely Low Minority Carrier Lifetime – 15 ps (Typ)
- Very Low Capacitance – 1.5 pF (Max) @  $V_R = 15$  V
- Low Reverse Leakage –  $I_R = 13$  nAdc (Typ) MBD301, MMBD301

### MAXIMUM RATINGS ( $T_J = 125^\circ\text{C}$ unless otherwise noted)

|                                                                                            |           | MBD301      | MMBD301LT1 |                            |
|--------------------------------------------------------------------------------------------|-----------|-------------|------------|----------------------------|
| Rating                                                                                     | Symbol    | Value       |            | Unit                       |
| Reverse Voltage                                                                            | $V_R$     | 30          |            | Volts                      |
| Forward Power Dissipation<br>@ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_F$     | 280<br>2.8  | 200<br>2.0 | mW<br>mW/ $^\circ\text{C}$ |
| Operating Junction<br>Temperature Range                                                    | $T_J$     | -55 to +125 |            | $^\circ\text{C}$           |
| Storage Temperature Range                                                                  | $T_{stg}$ | -55 to +150 |            | $^\circ\text{C}$           |

### DEVICE MARKING

MMBD301LT1 = 4T

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

| Characteristic                                            | Symbol      | Min | Typ  | Max  | Unit  |
|-----------------------------------------------------------|-------------|-----|------|------|-------|
| Reverse Breakdown Voltage ( $I_R = 10$ $\mu\text{A}$ )    | $V_{(BR)R}$ | 30  | —    | —    | Volts |
| Total Capacitance ( $V_R = 15$ V, $f = 1.0$ MHz) Figure 1 | $C_T$       | —   | 0.9  | 1.5  | pF    |
| Reverse Leakage ( $V_R = 25$ V) Figure 3                  | $I_R$       | —   | 13   | 200  | nAdc  |
| Forward Voltage ( $I_F = 1.0$ mAdc) Figure 4              | $V_F$       | —   | 0.38 | 0.45 | Vdc   |
| Forward Voltage ( $I_F = 10$ mAdc) Figure 4               | $V_F$       | —   | 0.52 | 0.6  | Vdc   |

NOTE: MMBD301LT1 is also available in bulk packaging. Use MMBD301L as the device title to order this device in bulk.

Thermal Clad is a registered trademark of the Berquist Company.

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

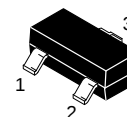
## MBD301 MMBD301LT1

Motorola Preferred Devices

**30 VOLTS  
SILICON HOT-CARRIER  
DETECTOR AND SWITCHING  
DIODES**



**CASE 182-02, STYLE 1  
(TO-226AC)**



**CASE 318-08, STYLE 8  
SOT-23 (TO-236AB)**



## TYPICAL ELECTRICAL CHARACTERISTICS

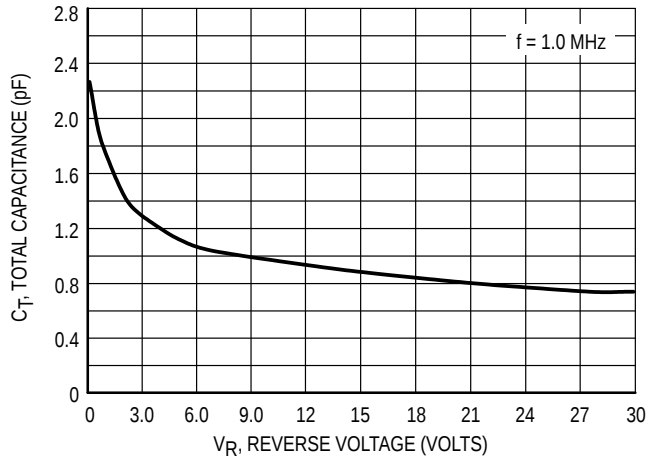


Figure 1. Total Capacitance

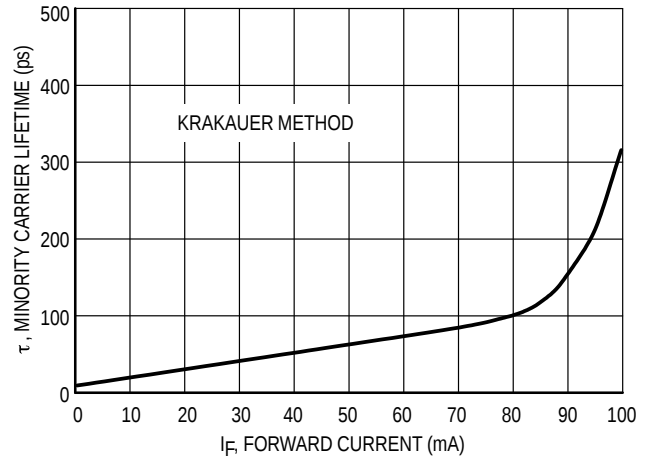


Figure 2. Minority Carrier Lifetime

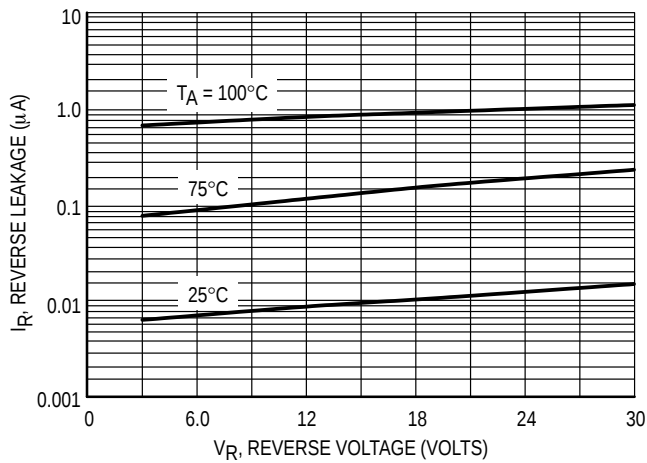


Figure 3. Reverse Leakage

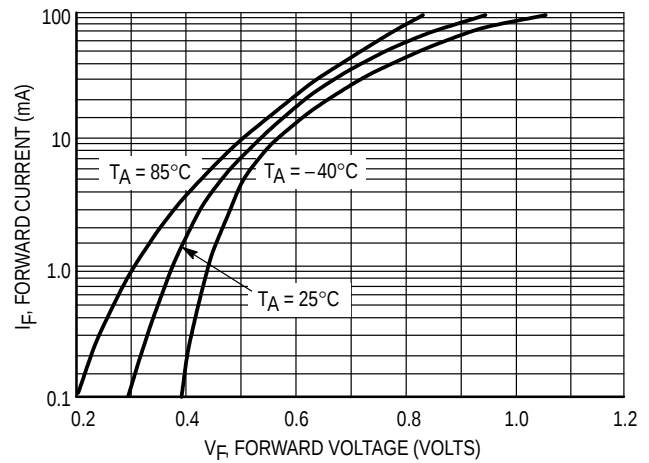


Figure 4. Forward Voltage

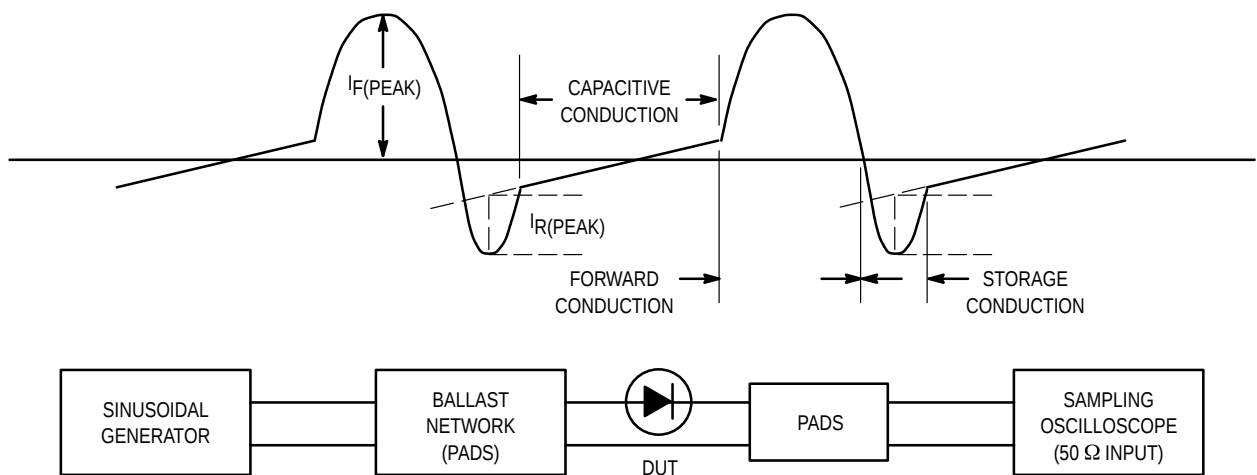
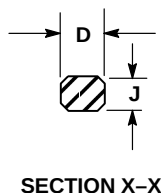
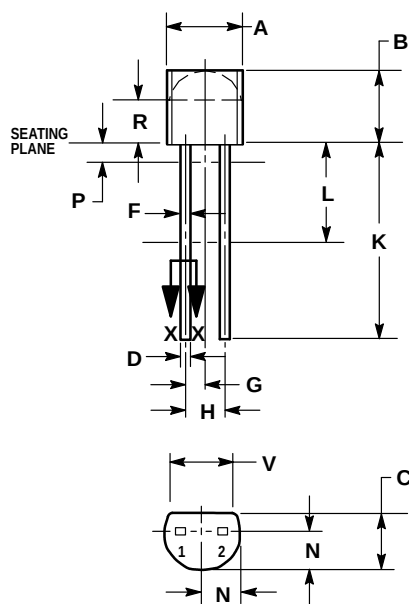


Figure 5. Krakauer Method of Measuring Lifetime



# PACKAGE DIMENSIONS



**CASE 182-02  
(TO-226AC)  
ISSUE H**

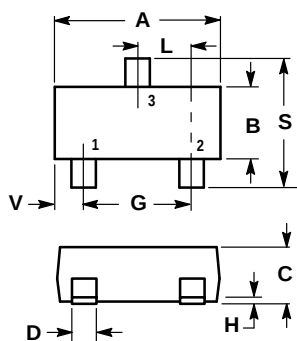
## NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND ZONE R IS UNCONTROLLED.
4. DIMENSION F APPLIES BETWEEN P AND L. DIMENSIONS D AND J APPLY BETWEEN L AND K MINIMUM. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIM K MINIMUM.

| DIM | INCHES    |       | MILLIMETERS |       |
|-----|-----------|-------|-------------|-------|
|     | MIN       | MAX   | MIN         | MAX   |
| A   | 0.175     | 0.205 | 4.45        | 5.21  |
| B   | 0.170     | 0.210 | 4.32        | 5.33  |
| C   | 0.125     | 0.165 | 3.18        | 4.49  |
| D   | 0.016     | 0.022 | 0.41        | 0.56  |
| F   | 0.016     | 0.019 | 0.407       | 0.482 |
| G   | 0.050 BSC |       | 1.27 BSC    |       |
| H   | 0.100 BSC |       | 3.54 BSC    |       |
| J   | 0.014     | 0.016 | 0.36        | 0.41  |
| K   | 0.500     | —     | 12.70       | —     |
| L   | 0.250     | —     | 6.35        | —     |
| N   | 0.080     | 0.105 | 2.03        | 2.66  |
| P   | —         | 0.050 | —           | 1.27  |
| R   | 0.115     | —     | 2.93        | —     |
| V   | 0.135     | —     | 3.43        | —     |

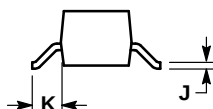
## STYLE 1:

- PIN 1: ANODE
- CATHODE



## STYLE 8:

- PIN 1: ANODE
- NO CONNECTION
- CATHODE



**CASE 318-08  
ISSUE AF  
SOT-23 (TO-236AB)**

## NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.

| DIM | INCHES |        | MILLIMETERS |       |
|-----|--------|--------|-------------|-------|
|     | MIN    | MAX    | MIN         | MAX   |
| A   | 0.1102 | 0.1197 | 2.80        | 3.04  |
| B   | 0.0472 | 0.0551 | 1.20        | 1.40  |
| C   | 0.0350 | 0.0440 | 0.89        | 1.11  |
| D   | 0.0150 | 0.0200 | 0.37        | 0.50  |
| G   | 0.0701 | 0.0807 | 1.78        | 2.04  |
| H   | 0.0005 | 0.0040 | 0.013       | 0.100 |
| J   | 0.0034 | 0.0070 | 0.085       | 0.177 |
| K   | 0.0140 | 0.0285 | 0.35        | 0.69  |
| L   | 0.0350 | 0.0401 | 0.89        | 1.02  |
| S   | 0.0830 | 0.1039 | 2.10        | 2.64  |
| V   | 0.0177 | 0.0236 | 0.45        | 0.60  |

Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters which may be provided in Motorola data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and  are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

Mfax is a trademark of Motorola, Inc.

## How to reach us:

**USA/EUROPE/Locations Not Listed:** Motorola Literature Distribution;  
P.O. Box 5405, Denver, Colorado 80217. 303-675-2140 or 1-800-441-2447

**JAPAN:** Nippon Motorola Ltd.; Tatsumi-SPD-JLDC, 6F Seibu-Butsuryu-Center,  
3-14-2 Tatsumi Koto-Ku, Tokyo 135, Japan. 81-3-3521-8315

**Mfax™:** RMFAX0@email.sps.mot.com – TOUCHTONE 602-244-6609  
– US & Canada ONLY 1-800-774-1848

**ASIA/PACIFIC:** Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,  
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298

**INTERNET:** <http://motorola.com/sps>



**MOTOROLA**