

# MBD301G, MMBD301LT1G, MMBD301LT3G, SMMBD301LT3G



ON Semiconductor®

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## 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.

#### Features

- Extremely Low Minority Carrier Lifetime – 15 ps (Typ)
- Very Low Capacitance – 1.5 pF (Max) @  $V_R = 15\text{ V}$
- Low Reverse Leakage –  $I_R = 13\text{ nAdc}$  (Typ) MBD301, MMBD301
- S Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

#### MAXIMUM RATINGS

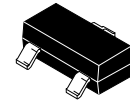
| Rating   | Symbol    | Value          | Unit                 |
|--|-----------|----------------|----------------------|
| Reverse Voltage  | $V_R$     | 30             | V                    |
| Forward Current (DC)   | $I_F$     | 200 (Max)      | mA                   |
| Total Device Dissipation<br>@ $T_A = 25^\circ\text{C}$<br>MBD301G<br>MMBD301LT1G, MMBD301LT3G,<br>SMMBD301LT3G | $P_F$     | 280<br>200     | MW                   |
| Derate above $25^\circ\text{C}$<br>MBD301G<br>MMBD301LT1G, MMBD301LT3G,<br>SMMBD301LT3G                        |           | 2.8<br>2.0     | mW/ $^\circ\text{C}$ |
| Operating Junction<br>Temperature Range  | $T_J$     | -55 to<br>+125 | $^\circ\text{C}$     |
| Storage Temperature Range  | $T_{stg}$ | -55 to<br>+150 | $^\circ\text{C}$     |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

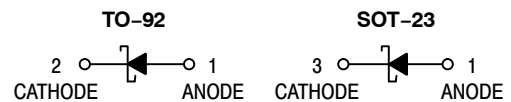
## 30 VOLTS SILICON HOT-CARRIER DETECTOR AND SWITCHING DIODES



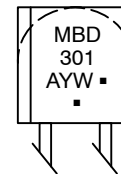
TO-92 2-Lead  
CASE 182  
STYLE 1



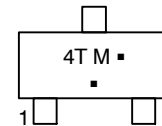
SOT-23 (TO-236)  
CASE 318  
STYLE 8



#### MARKING DIAGRAMS



TO-92



SOT-23

- A = Assembly Location
- Y = Year
- W = Work Week
- 4T = Device Code (SOT-23)
- M = Date Code\*
- = Pb-Free Package

(Note: Microdot may be in either location)

\*Date Code orientation and/or overbar may vary depending upon manufacturing location.

#### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

## MBD301G, MMBD301LT1G, MMBD301LT3G, SMMBD301LT3G

### ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

| Characteristic   | Symbol             | Min | Typ  | Max  | Unit |
|--|--------------------|-----|------|------|------|
| Reverse Breakdown Voltage<br>(I <sub>R</sub> = 10 μA)              | V <sub>(BR)R</sub> | 30  | –    | –    | V    |
| Total Capacitance<br>(V <sub>R</sub> = 15 V, f = 1.0 MHz) Figure 1 | C <sub>T</sub>     | –   | 0.9  | 1.5  | pF   |
| Reverse Leakage<br>(V <sub>R</sub> = 25 V) Figure 3                | I <sub>R</sub>     | –   | 13   | 200  | nAdc |
| Forward Voltage<br>(I <sub>F</sub> = 1.0 mAdc) Figure 4            | V <sub>F</sub>     | –   | 0.38 | 0.45 | Vdc  |
| Forward Voltage<br>(I <sub>F</sub> = 10 mAdc) Figure 4             | V <sub>F</sub>     | –   | 0.52 | 0.6  | Vdc  |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

### ORDERING INFORMATION

| Device       | Package             | Shipping <sup>†</sup> |
|--------------|---------------------|-----------------------|
| MBD301G      | TO-92<br>(Pb-Free)  | 5,000 Units / Bulk    |
| MMBD301LT1G  | SOT-23<br>(Pb-Free) | 3,000 / Tape & Reel   |
| MMBD301LT3G  | SOT-23<br>(Pb-Free) | 10,000 / Tape & Reel  |
| SMMBD301LT3G | SOT-23<br>(Pb-Free) | 10,000 / Tape & Reel  |

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

TYPICAL ELECTRICAL CHARACTERISTICS

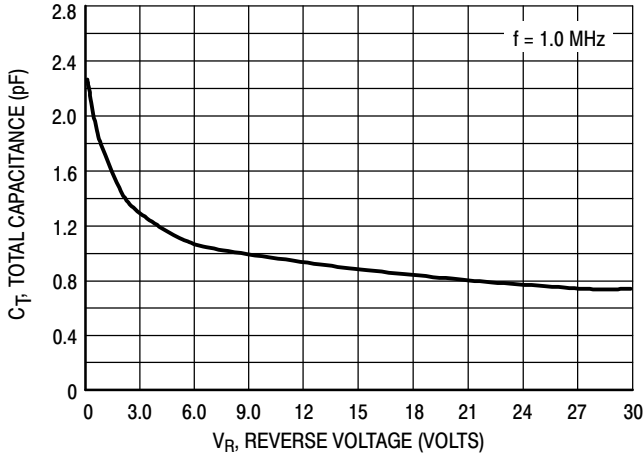


Figure 1. Total Capacitance

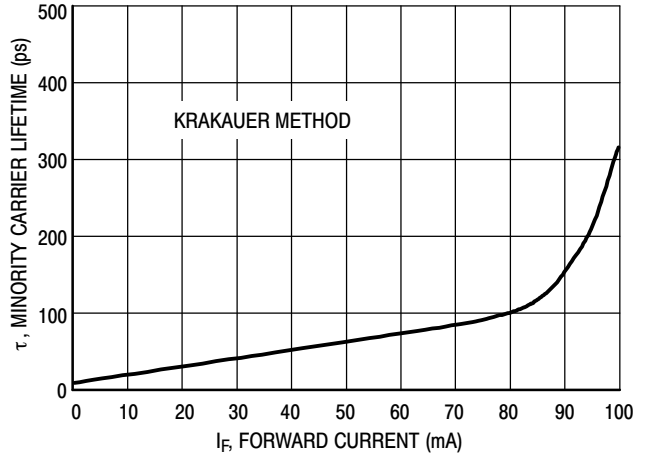


Figure 2. Minority Carrier Lifetime

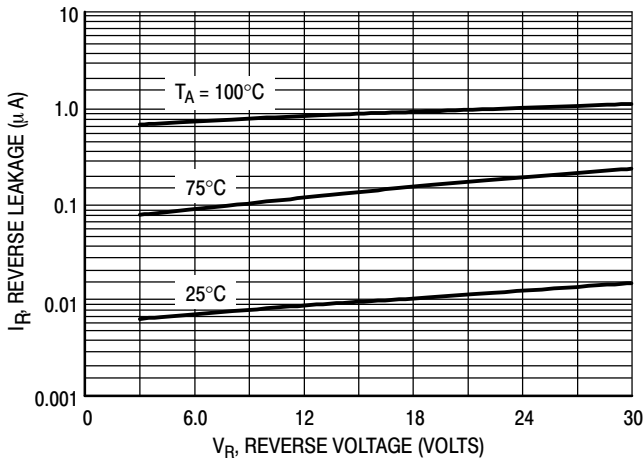


Figure 3. Reverse Leakage

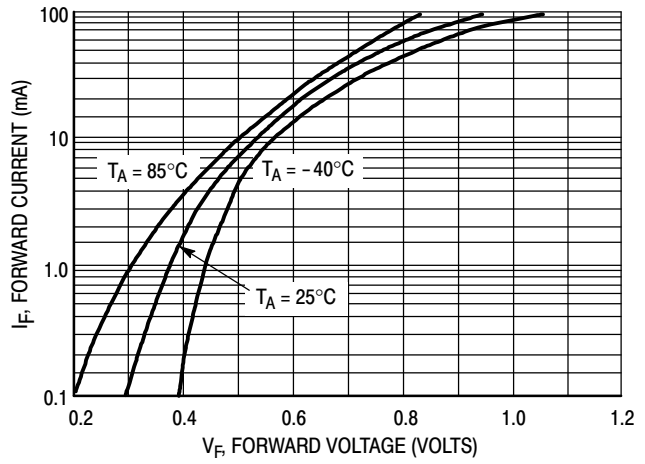


Figure 4. Forward Voltage

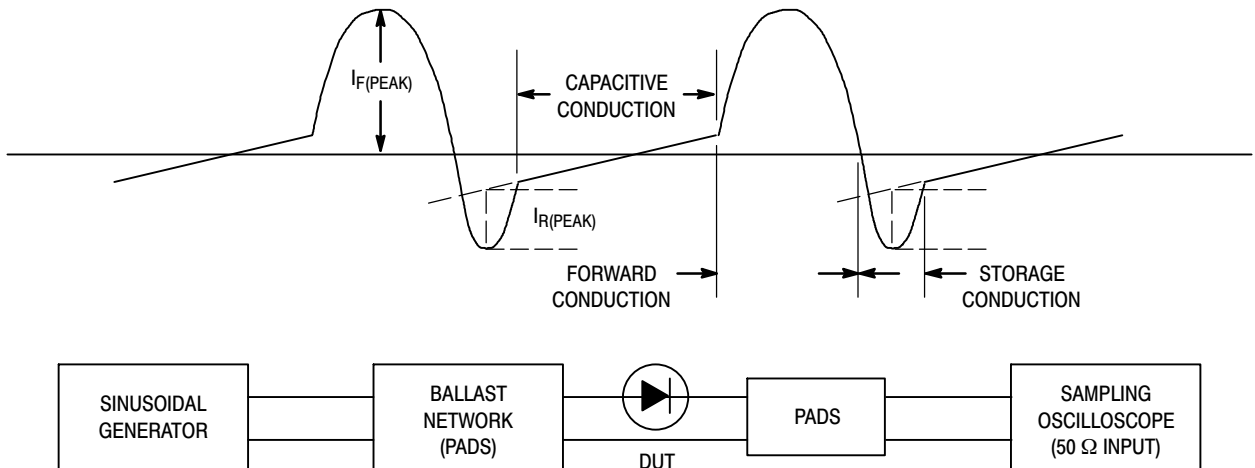


Figure 5. Krakauer Method of Measuring Lifetime



**MOTOROLA**

MECHANICAL OUTLINES  
DICTIONARY

98ASB42118B

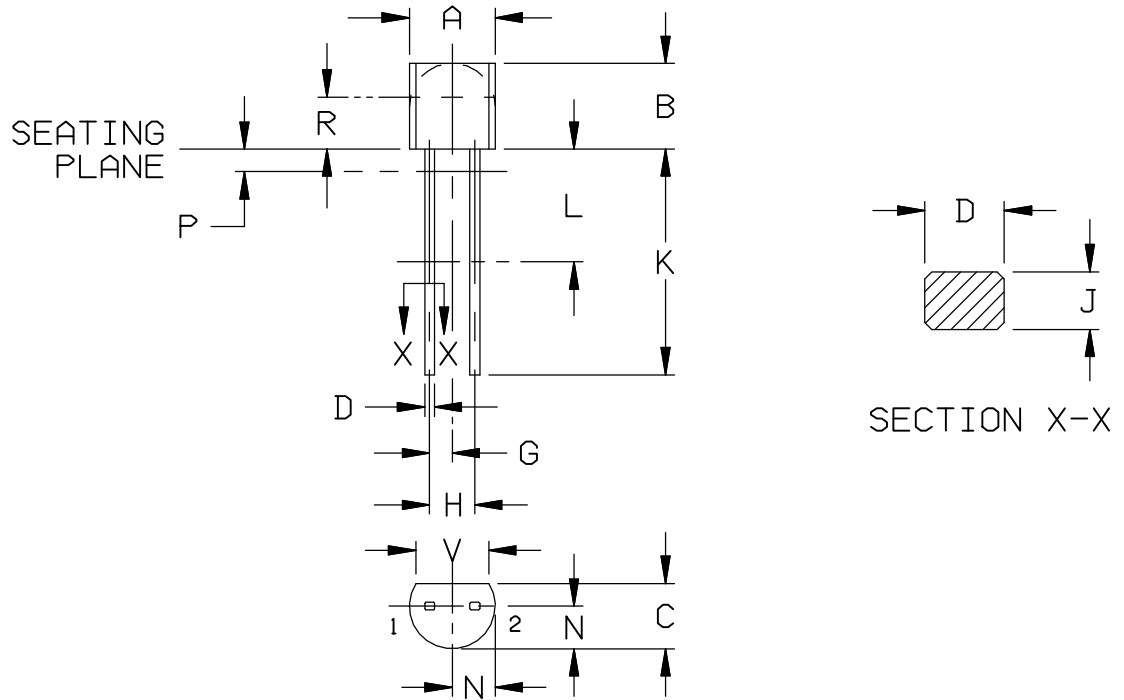
PAGE 182

DO NOT SCALE THIS DWG

ALL APPROVAL SIGNATURES ON FILE  
IN DOCUMENT CENTRAL

ISSUE L

SHEET 1 OF 2



| DIM | MILLIMETERS |       | INCHES |       |
|-----|-------------|-------|--------|-------|
|     | MIN         | MAX   | MIN    | MAX   |
| A   | 4.45        | 5.21  | 0.175  | 0.205 |
| B   | 4.32        | 5.33  | 0.170  | 0.210 |
| C   | 3.18        | 4.19  | 0.125  | 0.165 |
| D   | 0.407       | 0.533 | 0.016  | 0.021 |
| G   | 1.27        | BSC   | 0.050  | BSC   |
| H   | 2.54        | BSC   | 0.100  | BSC   |
| J   | 0.36        | 0.41  | 0.014  | 0.016 |
| K   | 12.70       | ---   | 0.500  | ---   |
| L   | 6.35        | ---   | 0.250  | ---   |
| N   | 2.03        | 2.66  | 0.080  | 0.105 |
| P   | ---         | 1.27  | ---    | 0.050 |
| R   | 2.93        | ---   | 0.115  | ---   |
| V   | 3.43        | ---   | 0.135  | ---   |

NOTES:

- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- CONTROLLING DIMENSION: INCH.
- CONTOUR OF PACKAGE BEYOND ZONE R IS UNCONTROLLED.
- LEAD DIM IS UNCONTROLLED IN P AND BEYOND DIM K MINIMUM.
- 182-01 THRU -04 OBSOLETE, NEW STANDARD 182-06.

STYLE 1:

- PIN 1. ANODE
- CATHODE

STYLE 2:

- PIN 1. CATHODE
- ANODE

STYLE 3:

- PIN 1. MAIN TERM 1
- MAIN TERM 2

STYLE 4: OBSOLETE

STYLE 5:

- PIN 1. INPUT
- OUTPUT

|          |                |
|----------|----------------|
| CASE NO. | 182-06         |
| STATUS   | TO-226AC       |
| NEW STD  |                |
| USED ON  | VL225 THRU 289 |

ELECTRONIC VERSIONS ARE UNCONTROLLED, EXCEPT WHEN ACCESSED DIRECTLY FROM WWC. PRINTED VERSIONS ARE UNCONTROLLED, EXCEPT WHEN STAMPED "CONTROLLED COPY" IN RED.

| ISSUE | REVISION  | COORD/<br>DATE    |
|-------|---|-------------------|
| J     | SH 1: DIM "F" WAS ..407-.482, .016-.019. REQ BY T. GRINTER.     | FB<br>27 JAN1998  |
| K     | SH 1 : DIMENSIONS "D", "F" WERE 0.56, 0.022. REQ BY T. GRINTER. | FB<br>10 FEB 1998 |
| L     | DELETED DIM "F" AND REVISED NOTE 4. REQ BY T. GRINTER.          | FB<br>14 APR 1998 |

# MECHANICAL CASE OUTLINE

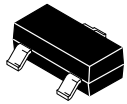
## PACKAGE DIMENSIONS

ON Semiconductor®

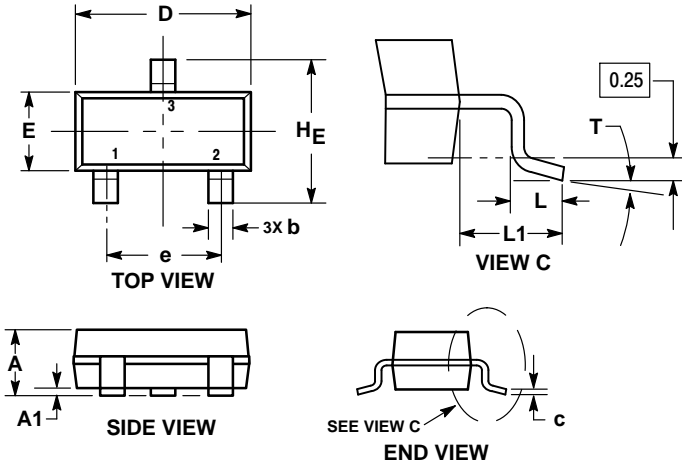


### SOT-23 (TO-236) CASE 318-08 ISSUE AS

DATE 30 JAN 2018



SCALE 4:1

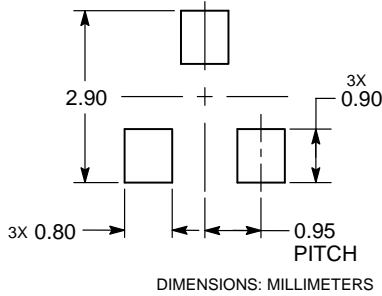


NOTES:

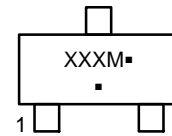
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

| DIM | MILLIMETERS |      |      | INCHES |       |       |
|-----|-------------|------|------|--------|-------|-------|
|     | MIN         | NOM  | MAX  | MIN    | NOM   | MAX   |
| A   | 0.89        | 1.00 | 1.11 | 0.035  | 0.039 | 0.044 |
| A1  | 0.01        | 0.06 | 0.10 | 0.000  | 0.002 | 0.004 |
| b   | 0.37        | 0.44 | 0.50 | 0.015  | 0.017 | 0.020 |
| c   | 0.08        | 0.14 | 0.20 | 0.003  | 0.006 | 0.008 |
| D   | 2.80        | 2.90 | 3.04 | 0.110  | 0.114 | 0.120 |
| E   | 1.20        | 1.30 | 1.40 | 0.047  | 0.051 | 0.055 |
| e   | 1.78        | 1.90 | 2.04 | 0.070  | 0.075 | 0.080 |
| L   | 0.30        | 0.43 | 0.55 | 0.012  | 0.017 | 0.022 |
| L1  | 0.35        | 0.54 | 0.69 | 0.014  | 0.021 | 0.027 |
| HE  | 2.10        | 2.40 | 2.64 | 0.083  | 0.094 | 0.104 |
| T   | 0°          | ---  | 10°  | 0°     | ---   | 10°   |

### RECOMMENDED SOLDERING FOOTPRINT



### GENERIC MARKING DIAGRAM\*



XXX = Specific Device Code  
M = Date Code  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present.

STYLE 1 THRU 5:  
CANCELLED

STYLE 6:  
PIN 1. BASE  
2. EMITTER  
3. COLLECTOR

STYLE 7:  
PIN 1. EMITTER  
2. BASE  
3. COLLECTOR

STYLE 8:  
PIN 1. ANODE  
2. NO CONNECTION  
3. CATHODE

STYLE 9:  
PIN 1. ANODE  
2. ANODE  
3. CATHODE

STYLE 10:  
PIN 1. DRAIN  
2. SOURCE  
3. GATE

STYLE 11:  
PIN 1. ANODE  
2. CATHODE  
3. CATHODE-ANODE

STYLE 12:  
PIN 1. CATHODE  
2. CATHODE  
3. ANODE

STYLE 13:  
PIN 1. SOURCE  
2. DRAIN  
3. GATE

STYLE 14:  
PIN 1. CATHODE  
2. GATE  
3. ANODE

STYLE 15:  
PIN 1. GATE  
2. CATHODE  
3. ANODE

STYLE 16:  
PIN 1. ANODE  
2. CATHODE  
3. CATHODE

STYLE 17:  
PIN 1. NO CONNECTION  
2. ANODE  
3. CATHODE

STYLE 18:  
PIN 1. NO CONNECTION  
2. CATHODE  
3. ANODE

STYLE 19:  
PIN 1. CATHODE  
2. ANODE  
3. CATHODE-ANODE

STYLE 20:  
PIN 1. CATHODE  
2. ANODE  
3. GATE

STYLE 21:  
PIN 1. GATE  
2. SOURCE  
3. DRAIN

STYLE 22:  
PIN 1. RETURN  
2. OUTPUT  
3. INPUT

STYLE 23:  
PIN 1. ANODE  
2. ANODE  
3. CATHODE

STYLE 24:  
PIN 1. GATE  
2. DRAIN  
3. SOURCE

STYLE 25:  
PIN 1. ANODE  
2. CATHODE  
3. GATE

STYLE 26:  
PIN 1. CATHODE  
2. ANODE  
3. NO CONNECTION

STYLE 27:  
PIN 1. CATHODE  
2. CATHODE  
3. CATHODE

STYLE 28:  
PIN 1. ANODE  
2. ANODE  
3. ANODE

|                  |                           |  |
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| STATUS:          | ON SEMICONDUCTOR STANDARD |  |
| NEW STANDARD:    |                           |  |
| DESCRIPTION:     | SOT-23 (TO-236)           | PAGE 1 OF 2  |



| ISSUE | REVISION   | DATE        |
|-------|--|-------------|
| AJ    | ADDED STYLE 27. REQ. BY P. LEM.  | 07 JUL 2004 |
| AK    | OBSOLETED -09 VERSION. REQ. BY D. TRUHITTE.                                  | 14 SEP 2004 |
| AL    | ADDED NOMINAL VALUES AND UPDATED GENERIC MARKING DIAGRAM. REQ. BY HONG XIAO. | 27 MAY 2005 |
| AM    | REDREW LEAD SIDE VIEW. REQ BY DARRELL TRUHITTE.                              | 26 AUG 2005 |
| AN    | REINTRODUCED LABELS FOR DIMENSION C. REQ. BY D. TRUHITTE.                    | 14 OCT 2005 |
| AP    | ADDED THETA DEGREE VALUES TO DIMENSION TABLE. REQ. BY D. TRUHITTE.           | 17 NOV 2009 |
| AR    | MODIFIED DIMENSIONS C AND L. REQ. BY M. YOU.                                 | 10 OCT 2016 |
| AS    | ADDED STYLE 28. REQ. BY E. ESTILLER.   | 30 JAN 2018 |
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