



# THE DATASHEET OF MMBD301LT1



# 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

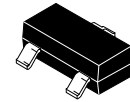
Rating	Symbol	Value	Unit
Reverse Voltage	$V_R$	30	V
Forward Current (DC)	$I_F$	200 (Max)	mA
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ MBD301G MMBD301LT1G, MMBD301LT3G, SMMBD301LT3G	$P_F$	280 200	MW
Derate above $25^\circ\text{C}$ MBD301G MMBD301LT1G, MMBD301LT3G, SMMBD301LT3G		2.8 2.0	mW/ $^\circ\text{C}$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

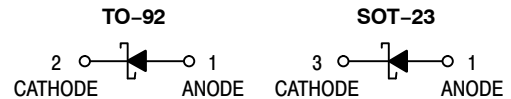
## 30 VOLTS SILICON HOT-CARRIER DETECTOR AND SWITCHING DIODES



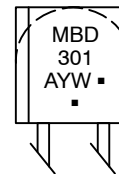
TO-92 2-Lead  
CASE 182  
STYLE 1



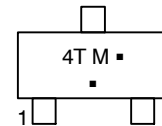
SOT-23 (TO-236)  
CASE 318  
STYLE 8



#### 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 (I <sub>R</sub> = 10 μA)	V <sub>(BR)R</sub>	30	–	–	V
Total Capacitance (V <sub>R</sub> = 15 V, f = 1.0 MHz) Figure 1	C <sub>T</sub>	–	0.9	1.5	pF
Reverse Leakage (V <sub>R</sub> = 25 V) Figure 3	I <sub>R</sub>	–	13	200	nAdc
Forward Voltage (I <sub>F</sub> = 1.0 mAdc) Figure 4	V <sub>F</sub>	–	0.38	0.45	Vdc
Forward Voltage (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 (Pb-Free)	5,000 Units / Bulk
MMBD301LT1G	SOT-23 (Pb-Free)	3,000 / Tape & Reel
MMBD301LT3G	SOT-23 (Pb-Free)	10,000 / Tape & Reel
SMMBD301LT3G	SOT-23 (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

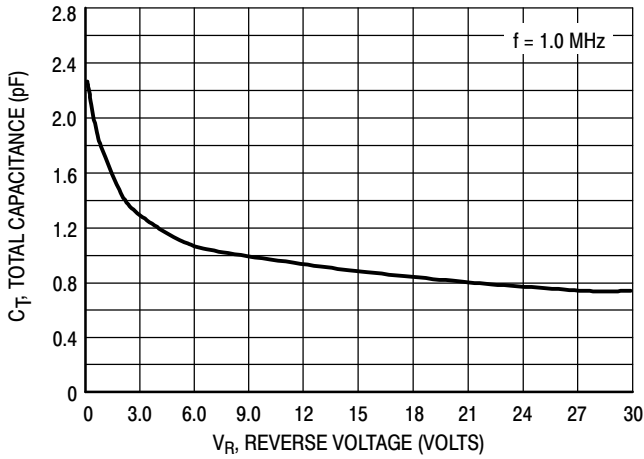


Figure 1. Total Capacitance

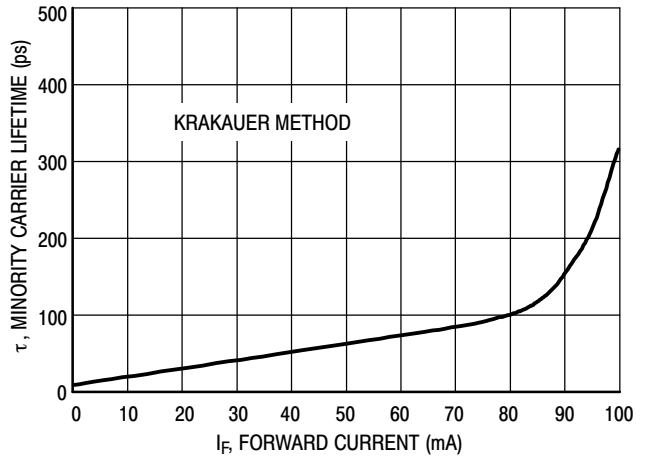


Figure 2. Minority Carrier Lifetime

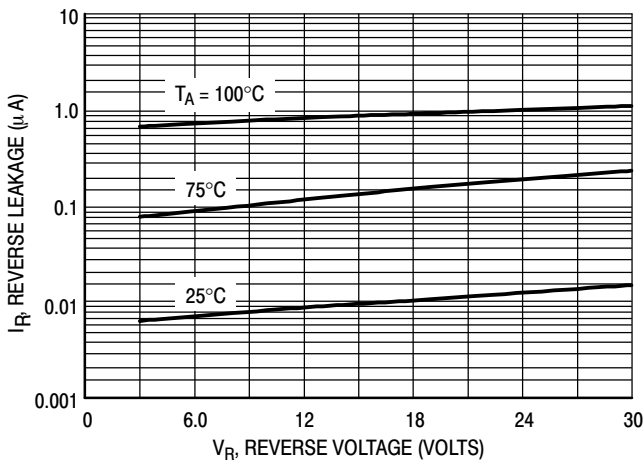


Figure 3. Reverse Leakage

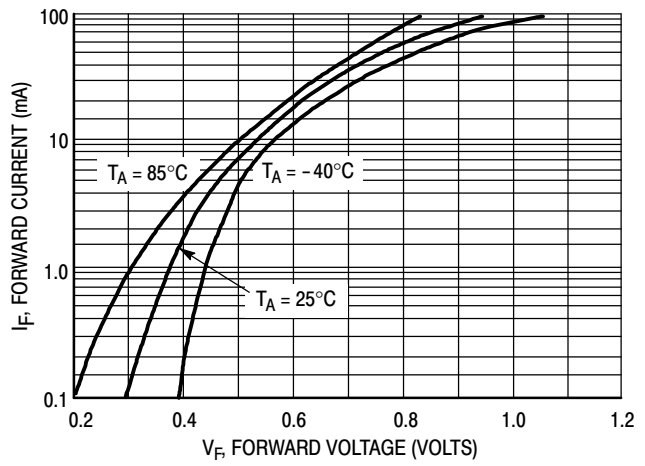


Figure 4. Forward Voltage

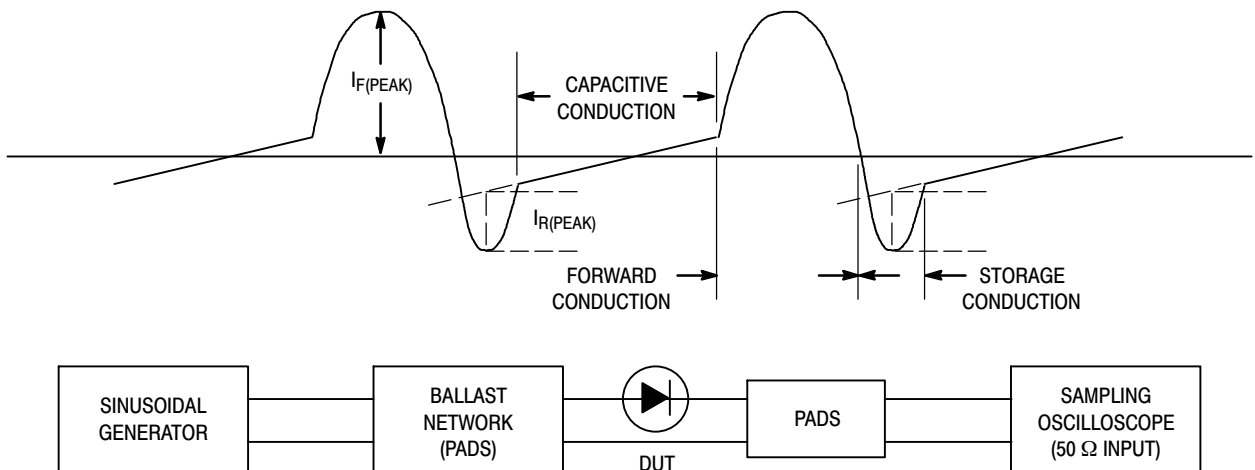


Figure 5. Krakauer Method of Measuring Lifetime

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

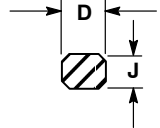
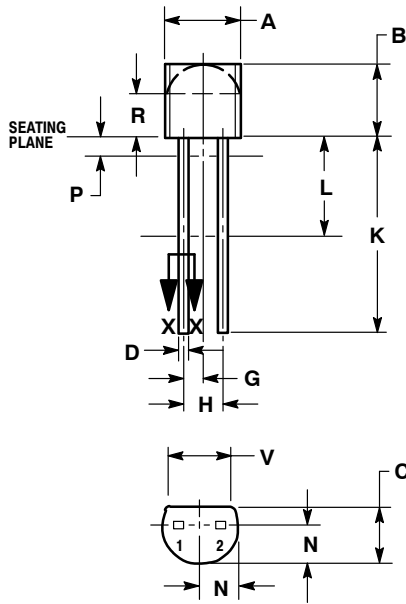
ON Semiconductor®



TO-92 (TO-226)  
CASE 182-06  
ISSUE L

DATE 04/18/1998

SCALE 1:1



SECTION X-X

NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND ZONE R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION 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	4.19
D	0.016	0.021	0.407	0.533
G	0.050 BSC		1.27 BSC	
H	0.100 BSC		2.54 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
- 2. CATHODE

STYLE 2:

- PIN 1. CATHODE
- 2. ANODE

STYLE 3:

- PIN 1. MAIN TERMINAL 1
- 2. MAIN TERMINAL 2

STYLE 4:

CANCELLED

STYLE 5:

- PIN 1. INPUT
- 2. OUTPUT

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# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



**SOT-23 (TO-236)**  
CASE 318  
ISSUE AT

DATE 01 MAR 2023

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.

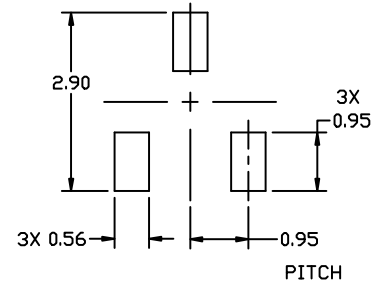
DIM	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.89	1.00	1.11	0.035	0.039	0.044
A1	0.01	0.06	0.10	0.000	0.002	0.004
b	0.37	0.44	0.50	0.015	0.017	0.020
c	0.08	0.14	0.20	0.003	0.006	0.008
D	2.80	2.90	3.04	0.110	0.114	0.120
E	1.20	1.30	1.40	0.047	0.051	0.055
e	1.78	1.90	2.04	0.070	0.075	0.080
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
H <sub>E</sub>	2.10	2.40	2.64	0.083	0.094	0.104
T	0°	---	10°	0°	---	10°

**GENERIC MARKING DIAGRAM\***



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

\*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. Some products may not follow the Generic Marking.



**RECOMMENDED MOUNTING FOOTPRINT**

\* For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

**STYLES ON PAGE 2**

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# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS



### SOT-23 (TO-236) CASE 318 ISSUE AT

DATE 01 MAR 2023

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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