MMBV2101LT1 Series, MV2105, MV2101, MV2109, LV2209

Preferred Device

Silicon Tuning Diodes

These devices are designed in popular plastic packages for the high volume requirements of FM Radio and TV tuning and AFC, general frequency control and tuning applications. They provide solid−state reliability in replacement of mechanical tuning methods. Also available in a Surface Mount Package up to 33 pF.

Features

- High Q
- Controlled and Uniform Tuning Ratio
- Standard Capacitance Tolerance − 10%
- Complete Typical Design Curves
- Pb−Free Packages are Available

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Reverse Voltage	V_R	30	Vdc
Forward Current	I_F	200	mAdc
Forward Power Dissipation @ T_A = 25°C MMBV21xx Derate above 25°C @ T_A = 25°C MV21xx Derate above 25°C LV2209	P_D	 225 1.8 280 2.8	 mW mW/°C mW mW/°C
Junction Temperature	T_J	+150	°C
Storage Temperature Range	T_{stg}	−55 to +150	°C

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

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

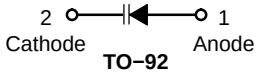
Characteristic	Symbol	Min	Typ	Max	Unit
Reverse Breakdown Voltage (I_R = 10 μAdc) MMBV21xx, MV21xx LV2209	$V_{(BR)R}$	 30 25	 − −	 − −	Vdc
Reverse Voltage Leakage Current (V_R = 25 Vdc, T_A = 25°C)	I_R	−	−	0.1	μAdc
Diode Capacitance Temperature Coefficient (V_R = 4.0 Vdc, f = 1.0 MHz)	TC_C	−	280	−	ppm/°C

ON Semiconductor®

http://onsemi.com

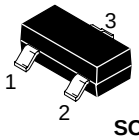
6.8−100 pF, 30 VOLTS VOLTAGE VARIABLE CAPACITANCE DIODES

SOT−23

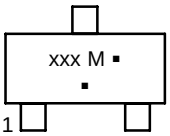


TO−92

MARKING DIAGRAMS

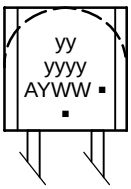


SOT−23 (TO−236)
CASE 318−08
STYLE 8



xxx = Specific Device Code
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.

TO−92 (TO−226AC)
CASE 182
STYLE 1



yyyyyy = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
▪ = Pb−Free Package
(Note: Microdot may be in either location)

ORDERING INFORMATION

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

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

Device	Marking	Package	Shipping†	C_T, Diode Capacitance V_R = 4.0 Vdc, f = 1.0 MHz pF			Q, Figure of Merit V_R = 4.0 Vdc, f = 50 MHz	TR, Tuning Ratio C_2/C_{30} f = 1.0 MHz		
				Min	Nom	Max	Typ	Min	Typ	Max
MMBV2101LT1	M4G	SOT−23	3,000 / Tape & Reel	6.1	6.8	7.5	450	2.5	2.7	3.2
MMBV2101LT1G	M4G	SOT−23 (Pb−Free)	3,000 / Tape & Reel	6.1	6.8	7.5	450	2.5	2.7	3.2
MMBV2101L	M4G	SOT−23	Bulk (Note 1)	6.1	6.8	7.5	450	2.5	2.7	3.2
MV2101	MV2101	TO−92	1,000 per Box	6.1	6.8	7.5	450	2.5	2.7	3.2
MV2101G	MV2101	TO−92 (Pb−Free)	1,000 per Box	6.1	6.8	7.5	450	2.5	2.7	3.2
MMBV2103LT1	4H	SOT−23	3,000 / Tape & Reel	9.0	10	11	400	2.5	2.9	3.2
MMBV2105LT1	4U	SOT−23	3,000 / Tape & Reel	13.5	15	16.5	400	2.5	2.9	3.2
MMBV2105LT1G	4U	SOT−23 (Pb−Free)	3,000 / Tape & Reel	13.5	15	16.5	400	2.5	2.9	3.2
MMBV2105L	4U	SOT−23	Bulk (Note 1)	13.5	15	16.5	400	2.5	2.9	3.2
MV2105	MV2105	TO−92	1,000 per Box	13.5	15	16.5	400	2.5	2.9	3.2
MV2105G	MV2105	TO−92 (Pb−Free)	1,000 per Box	13.5	15	16.5	400	2.5	2.9	3.2
MMBV2107LT1	4W	SOT−23	3,000 / Tape & Reel	19.8	22	24.2	350	2.5	2.9	3.2
MMBV2107LT1G	4W	SOT−23 (Pb−Free)	3,000 / Tape & Reel	19.8	22	24.2	350	2.5	2.9	3.2
MMBV2107L	4W	SOT−23	Bulk (Note 1)	19.8	22	24.2	350	2.5	2.9	3.2
MMBV2108LT1	4X	SOT−23	3,000 / Tape & Reel	24.3	27	29.7	300	2.5	3.0	3.2
MMBV2108LT1G	4X	SOT−23 (Pb−Free)	3,000 / Tape & Reel	24.3	27	29.7	300	2.5	3.0	3.2
LV2209	LV2209	TO−92	1,000 per Box	29.7	33	36.3	200	2.5	3.0	3.2
MMBV2109LT1	4J	SOT−23	3,000 / Tape & Reel	29.7	33	36.3	200	2.5	3.0	3.2
MMBV2109LT1G	4J	SOT−23 (Pb−Free)	3,000 / Tape & Reel	29.7	33	36.3	200	2.5	3.0	3.2
MMBV2109L	4J	SOT−23	Bulk (Note 1)	29.7	33	36.3	200	2.5	3.0	3.2
MV2109	MV2109	TO−92	1,000 per Box	29.7	33	36.3	200	2.5	3.0	3.2
MV2109G	MV2109	TO−92 (Pb−Free)	1,000 per Box	29.7	33	36.3	200	2.5	3.0	3.2

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

1. **MMBV2101LT1, MMBV2105LT1, MMBV2107LT1 thru MMBV2109LT1,** are also available in bulk. Use the device title and drop the "T1" suffix when ordering any of these devices in bulk.

PARAMETER TEST METHODS

1. C_T, DIODE CAPACITANCE

($C_T = C_C + C_J$). C_T is measured at 1.0 MHz using a capacitance bridge (Boonton Electronics Model 75A or equivalent).

2. TR, TUNING RATIO

TR is the ratio of C_T measured at 2.0 Vdc divided by C_T measured at 30 Vdc.

3. Q, FIGURE OF MERIT

Q is calculated by taking the G and C readings of an admittance bridge at the specified frequency and substituting in the following equations:

$$Q = \frac{2\pi fC}{G}$$

(Boonton Electronics Model 33AS8 or equivalent). Use Lead Length $\approx$ 1/16″.

4. TC_C, DIODE CAPACITANCE TEMPERATURE COEFFICIENT

TC_C is guaranteed by comparing C_T at V_R = 4.0 Vdc, f = 1.0 MHz, T_A = −65°C with C_T at V_R = 4.0 Vdc, f = 1.0 MHz, T_A = +85°C in the following equation, which defines TC_C:

$$TC_C = \left|\frac{C_T(+85°C) - C_T(-65°C)}{85 + 65}\right| \cdot \frac{10^6}{C_T(25°C)}$$

Accuracy limited by measurement of C_T to ±0.1 pF.

TYPICAL DEVICE CHARACTERISTICS

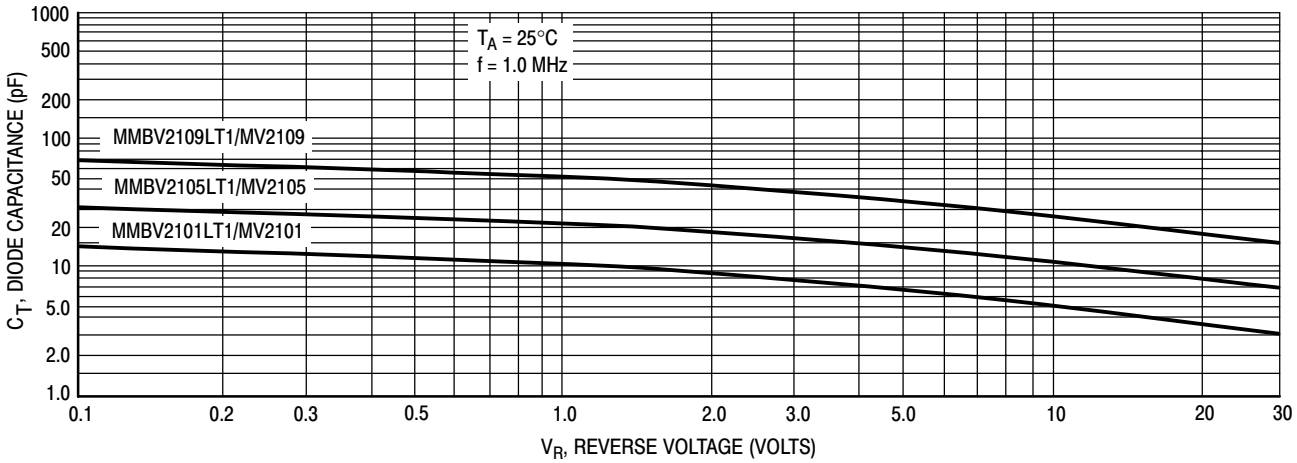


Figure 1. Diode Capacitance versus Reverse Voltage

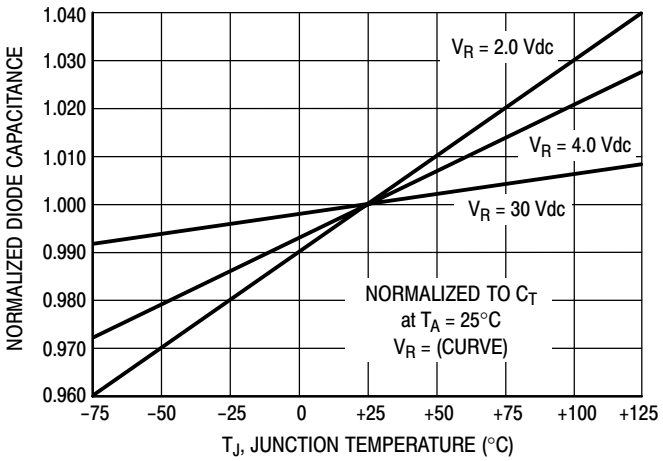


Figure 2. Normalized Diode Capacitance versus Junction Temperature

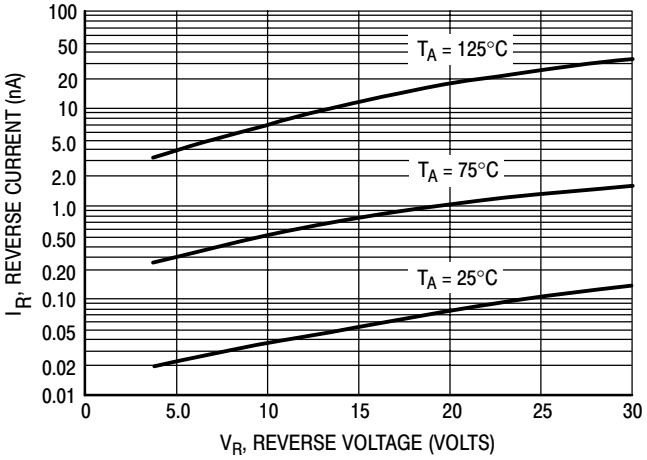


Figure 3. Reverse Current versus Reverse Bias Voltage

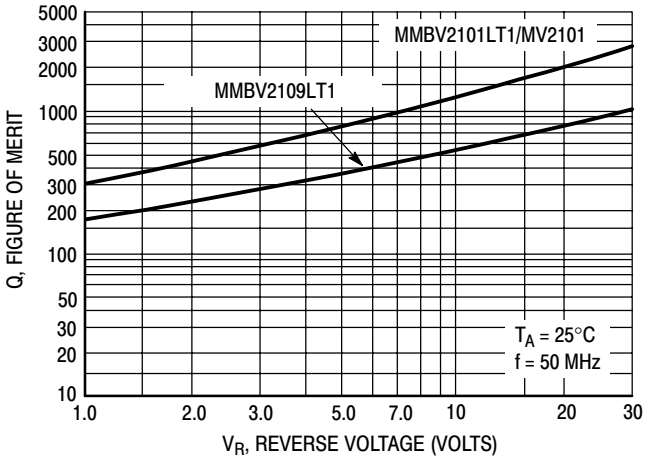


Figure 4. Figure of Merit versus Reverse Voltage

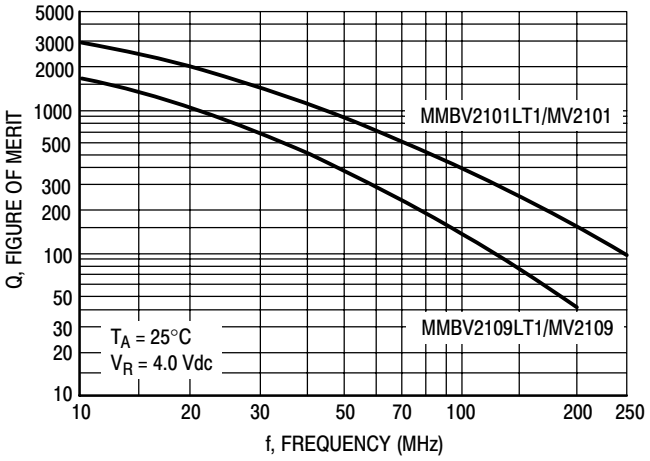


Figure 5. Figure of Merit versus Frequency

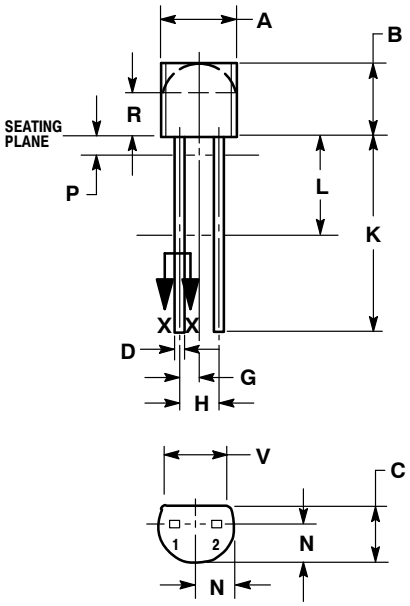
MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

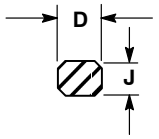
ON Semiconductor®

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.

	INCHES		MILLIMETERS	
DIM	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

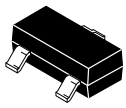
DOCUMENT NUMBER:	**98ASB42118B**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.	
DESCRIPTION:	**TO−92 (TO−226)**		**PAGE 1 OF 1**

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

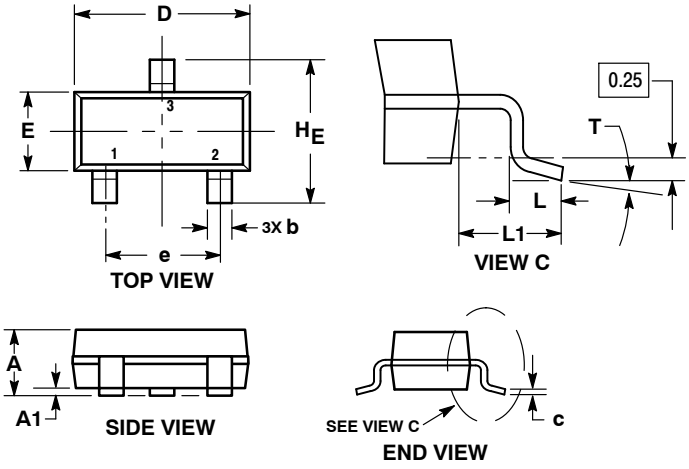
ON Semiconductor®

SOT−23 (TO−236)
CASE 318−08
ISSUE AS

DATE 30 JAN 2018



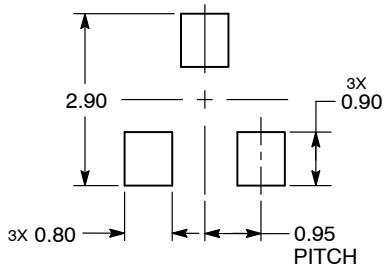
SCALE 4:1



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.

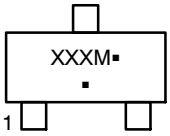
	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
A	0.89	1.00	1.11	0.035	0.039	0.044
A1	0.01	0.06	0.10	0.000	0.002	0.004
b	0.37	0.44	0.50	0.015	0.017	0.020
c	0.08	0.14	0.20	0.003	0.006	0.008
D	2.80	2.90	3.04	0.110	0.114	0.120
E	1.20	1.30	1.40	0.047	0.051	0.055
e	1.78	1.90	2.04	0.070	0.075	0.080
L	0.30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

RECOMMENDED SOLDERING FOOTPRINT



DIMENSIONS: MILLIMETERS

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.

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

DOCUMENT NUMBER:	**98ASB42226B**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped “CONTROLLED COPY” in red.
DESCRIPTION:	**SOT−23 (TO−236)**	**PAGE 1 OF 1**

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Email Requests to: orderlit@onsemi.com

onsemi Website: www.onsemi.com

TECHNICAL SUPPORT
North American Technical Support:
Voice Mail: 1 800−282−9855 Toll Free USA/Canada
Phone: 011 421 33 790 2910

Europe, Middle East and Africa Technical Support:
Phone: 00421 33 790 2910
For additional information, please contact your local Sales Representative

◊