

# MMVL2101T1

Preferred Device

## Silicon Tuning Diode

These devices are designed in the popular Plastic Surface Mount Package for 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.

### Features

- High Q
- Controlled and Uniform Tuning Ratio
- Standard Capacitance Tolerance – 10%
- Complete Typical Design Curves
- Pb-Free Package is Available

### MAXIMUM RATINGS

| Rating                     | Symbol | Value | Unit |
|----------------------------|--------|-------|------|
| Continuous Reverse Voltage | $V_R$  | 30    | Vdc  |
| Peak Forward Current       | $I_F$  | 200   | mAdc |

### THERMAL CHARACTERISTICS

| Characteristic                                                                                               | Symbol          | Max         | Unit                       |
|--------------------------------------------------------------------------------------------------------------|-----------------|-------------|----------------------------|
| Total Device Dissipation FR-5 Board,<br>$T_A = 25^\circ\text{C}$ (Note 1)<br>Derate above $25^\circ\text{C}$ | $P_D$           | 200<br>1.57 | mW<br>mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction-to-Ambient                                                                      | $R_{\theta JA}$ | 635         | $^\circ\text{C}/\text{W}$  |
| Junction and Storage Temperature                                                                             | $T_J, T_{stg}$  | 150         | $^\circ\text{C}$           |

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.

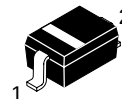
1. FR-4 Minimum Pad



ON Semiconductor®

<http://onsemi.com>

## 30 VOLTS VOLTAGE VARIABLE CAPACITANCE DIODE



PLASTIC  
SOD-323  
CASE 477  
STYLE 1

### MARKING DIAGRAM



4G = Device Code  
M = Date Code\*  
▪ = Pb-Free Package

(Note: Microdot may be in either location)  
\*Date Code orientation may vary depending upon manufacturing location.

### ORDERING INFORMATION

| Device      | Package              | Shipping†          |
|-------------|----------------------|--------------------|
| MMVL2101T1  | SOD-323              | 3000 / Tape & Reel |
| MMVL2101T1G | SOD-323<br>(Pb-Free) | 3000 / Tape & Reel |

†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.

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

# MMVL2101T1

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

| Characteristic                                                                                   | Symbol      | Min | Typ | Max | Unit                  |
|--------------------------------------------------------------------------------------------------|-------------|-----|-----|-----|-----------------------|
| Reverse Breakdown Voltage<br>( $I_R = 10\ \mu\text{A}$ )                                         | $V_{(BR)R}$ | 30  | –   | –   | Vdc                   |
| Reverse Voltage Leakage Current<br>( $V_R = 25\ \text{Vdc}$ , $T_A = 25^\circ\text{C}$ )         | $I_R$       | –   | –   | 0.1 | $\mu\text{A}$         |
| Diode Capacitance Temperature Coefficient<br>( $V_R = 4.0\ \text{Vdc}$ , $f = 1.0\ \text{MHz}$ ) | $TC_C$      | –   | 280 | –   | ppm/ $^\circ\text{C}$ |

| Device     | $C_T$ , Diode Capacitance<br>$V_R = 4.0\ \text{Vdc}$ , $f = 1.0\ \text{MHz}$<br>pF |     |     | $Q$ , Figure of Merit<br>$V_R = 4.0\ \text{Vdc}$ ,<br>$f = 50\ \text{MHz}$ | TR, Tuning Ratio<br>$C_2/C_{30}$<br>$f = 1.0\ \text{MHz}$ |     |     |
|------------|------------------------------------------------------------------------------------|-----|-----|----------------------------------------------------------------------------|-----------------------------------------------------------|-----|-----|
|            | Min                                                                                | Nom | Max | Typ                                                                        | Min                                                       | Typ | Max |
| MMVL2101T1 | 6.1                                                                                | 6.8 | 7.5 | 450                                                                        | 2.5                                                       | 2.7 | 3.2 |

## 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:

$$Q = \frac{2\pi f C}{G}$$

(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  $V_R = 4.0\ \text{Vdc}$ ,  $f = 1.0\ \text{MHz}$ ,  $T_A = -65^\circ\text{C}$  with  $C_T$  at  $V_R = 4.0\ \text{Vdc}$ ,  $f = 1.0\ \text{MHz}$ ,  $T_A = +85^\circ\text{C}$  in the following equation, which defines  $TC_C$ :

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

Accuracy limited by measurement of  $C_T$  to  $\pm 0.1\ \text{pF}$ .

TYPICAL DEVICE CHARACTERISTICS

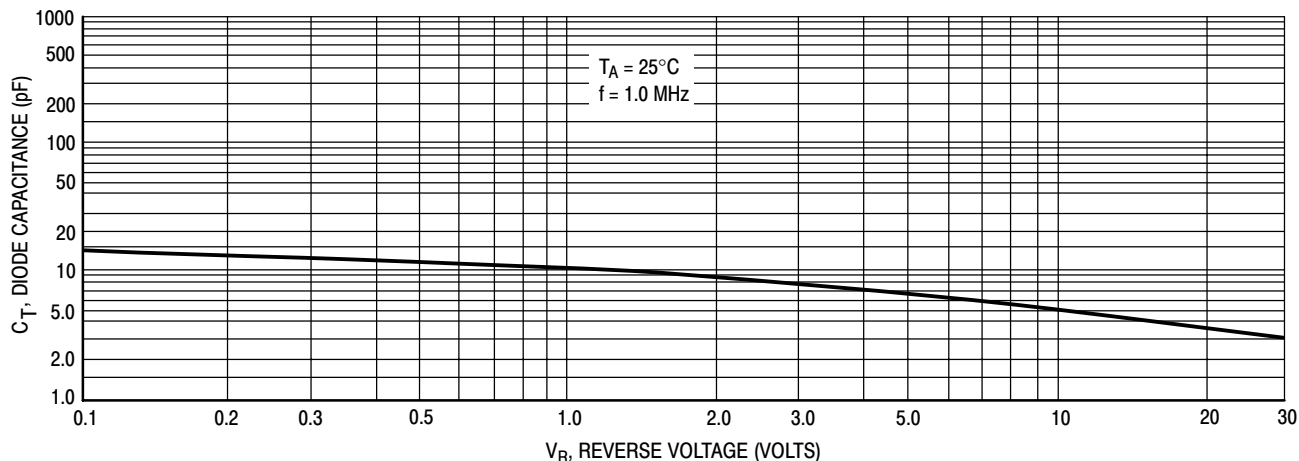


Figure 1. Diode Capacitance versus Reverse Voltage

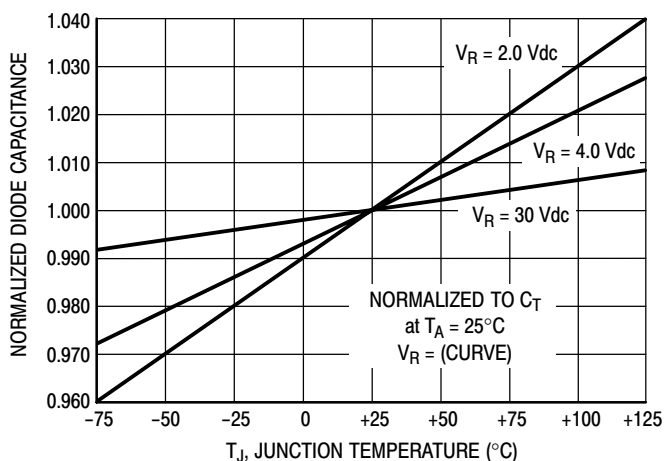


Figure 2. Normalized Diode Capacitance versus Junction Temperature

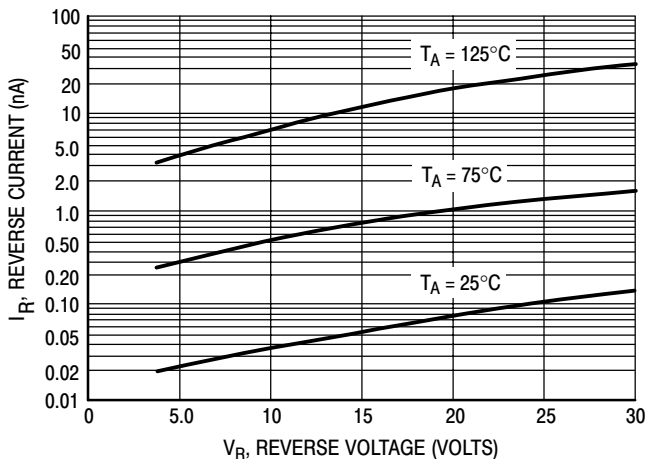


Figure 3. Reverse Current versus Reverse Bias Voltage

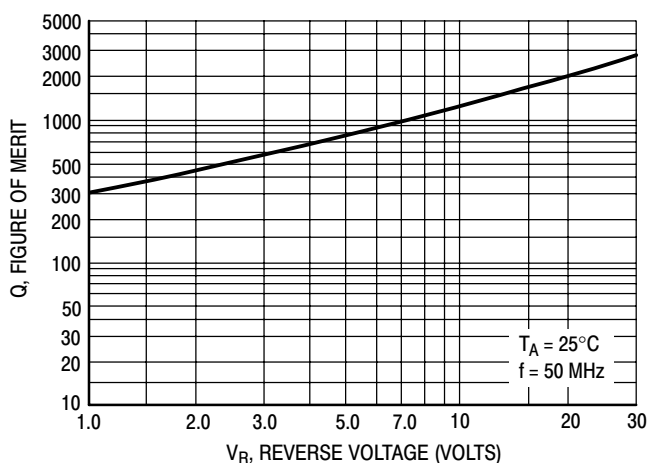


Figure 4. Figure of Merit versus Reverse Voltage

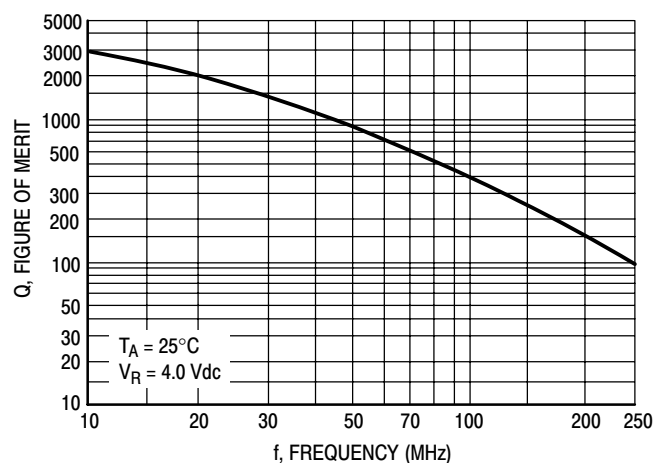
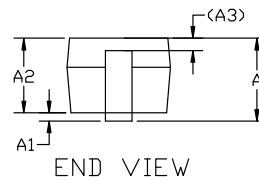


Figure 5. Figure of Merit versus Frequency


**SOD-323 1.70x1.25x0.85**  
**CASE 477**  
**ISSUE K**

DATE 11 MAR 2024



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

## NOTES:

1. DIMENSIONING AND TOLERANCING AS PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. LEAD THICKNESS SPECIFIED PER L/F DRAWING WITH SOLDER PLATING.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.
5. DIMENSION L IS MEASURE FROM END OF RADIUS.

| DIM | MILLIMETERS |      |      |
|-----|-------------|------|------|
|     | MIN.        | NOM. | MAX. |
| A   | 0.80        | 0.90 | 1.00 |
| A1  | 0.00        | 0.05 | 0.10 |
| A2  | 0.75        | 0.85 | 0.95 |
| A3  | 0.15 (REF)  |      |      |
| b   | 0.25        | 0.32 | 0.4  |
| c   | 0.09        | 0.12 | 0.18 |
| D   | 1.60        | 1.70 | 1.80 |
| E   | 1.15        | 1.25 | 1.35 |
| H   | 2.30        | 2.50 | 2.70 |
| L   | 0.08        | ---  | ---  |
| L1  | 0.40 (REF)  |      |      |

**GENERIC MARKING DIAGRAM\***


XX = Specific Device Code  
M = Date Code

\*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.

STYLE 1:  
PIN 1: CATHODE (POLARITY BAND)  
2: ANODE

STYLE 2:  
NO POLARITY

|                         |                               |                                                                                                                                                                                  |
|-------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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| <b>DESCRIPTION:</b>     | <b>SOD-323 1.70x1.25x0.85</b> | <b>PAGE 1 OF 1</b>                                                                                                                                                               |

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