

MMVL409T1

Preferred Device

Silicon Tuning Diode

These devices are designed for general frequency control and tuning applications. They provide solid-state reliability in replacement of mechanical tuning methods.

Features

- High Q with Guaranteed Minimum Values at VHF Frequencies
- Controlled and Uniform Tuning Ratio
- Surface Mount Package
- Pb-Free Package is Available

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|----------------------------|--------|-------|------------------|
| Continuous Reverse Voltage | V_R | 20 | Vdc |
| Peak Forward Current | I_F | 200 | mA _{dc} |

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|--|-----------------|-------------|----------------------------|
| Total Device Dissipation FR-5 Board, $T_A = 25^\circ\text{C}$ (Note 1) Derate above 25°C | P_D | 200 1.57 | mW 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.

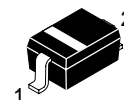
1. FR-4 Minimum Pad



ON Semiconductor®

<http://onsemi.com>

VOLTAGE VARIABLE CAPACITANCE DIODE



PLASTIC
SOD-323
CASE 477
STYLE 1

MARKING DIAGRAM



X5 = 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† |
|------------|----------------------|--------------------|
| MMVL409T1 | SOD-323 | 3000 / Tape & Reel |
| MMVL409T1G | SOD-323 (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.

MMVL409T1

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

| Characteristic | Symbol | Min | Typ | Max | Unit |
|--|-------------|-----|-----|-----|-----------------------|
| Reverse Breakdown Voltage ($I_R = 10 \mu\text{A}$) | $V_{(BR)R}$ | 20 | – | – | Vdc |
| Reverse Voltage Leakage Current ($V_R = 15 \text{Vdc}$) | I_R | – | – | 0.1 | μA |
| Diode Capacitance Temperature Coefficient ($V_R = 3.0 \text{Vdc}$, $f = 1.0 \text{MHz}$) | TC_C | – | 300 | – | ppm/ $^\circ\text{C}$ |

| Device | C_T , Diode Capacitance $V_R = 3.0 \text{Vdc}$, $f = 1.0 \text{MHz}$ μF | | | Q , Figure of Merit $V_R = 3.0 \text{Vdc}$ $f = 50 \text{MHz}$ | C_R , Capacitance Ratio C_3/C_8 (Note 2) $f = 1.0 \text{MHz}$ | |
|-----------|---|-----|-----|--|---|-----|
| | Min | Nom | Max | Min | Min | Max |
| MMVL409T1 | 26 | 29 | 32 | 200 | 1.5 | 1.9 |

2. C_R is the ratio of C_T measured at 3 Vdc divided by C_T measured at 8 Vdc.

TYPICAL CHARACTERISTICS

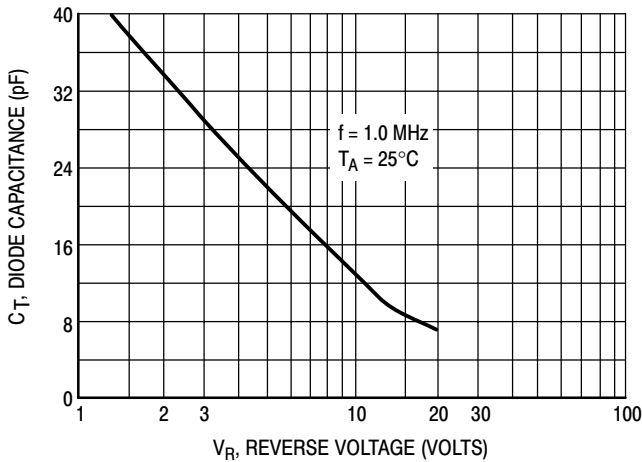


Figure 1. Diode Capacitance

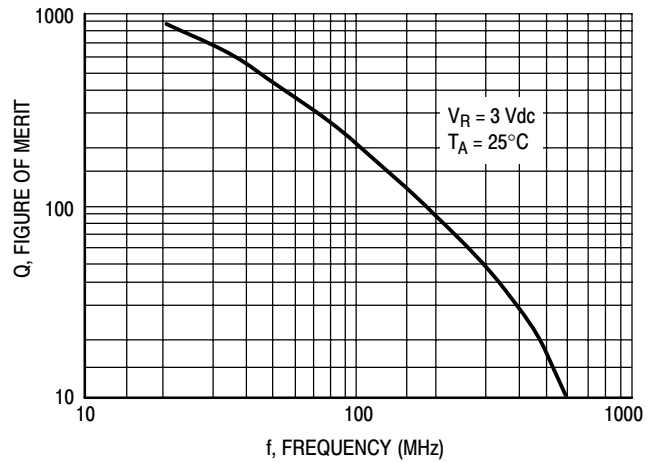


Figure 2. Figure of Merit

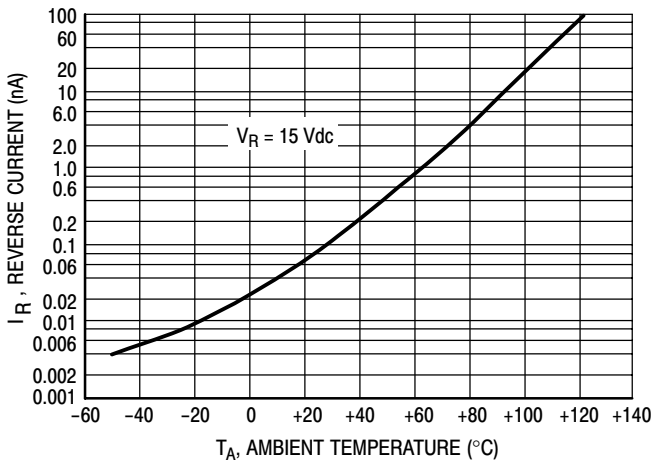


Figure 3. Leakage Current

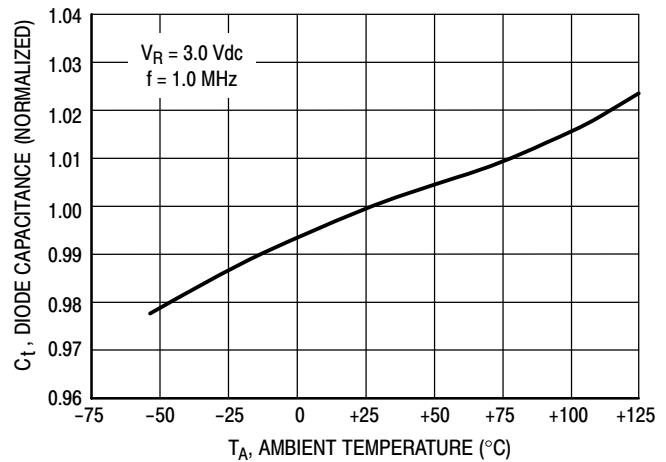
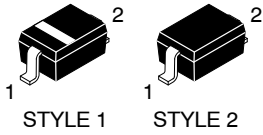


Figure 4. Diode Capacitance

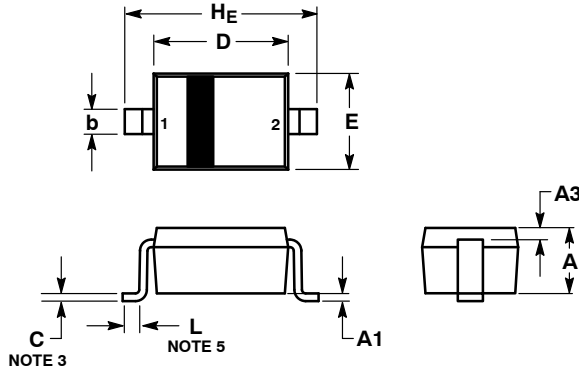
MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



SCALE 4:1

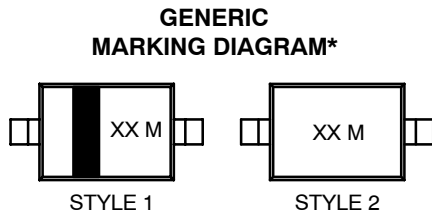
SOD-323
CASE 477-02
ISSUE H

DATE 13 MAR 2007



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

STYLE 2:
NO POLARITY



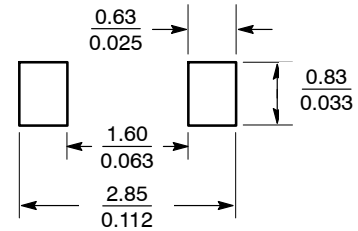
XX = Specific Device Code
M = Date Code

*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.

- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 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 MEASURED FROM END OF RADIUS.

| DIM | MILLIMETERS | | | INCHES | | |
|-----|-------------|------|-------|-----------|-------|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.80 | 0.90 | 1.00 | 0.031 | 0.035 | 0.040 |
| A1 | 0.00 | 0.05 | 0.10 | 0.000 | 0.002 | 0.004 |
| A3 | 0.15 REF | | | 0.006 REF | | |
| b | 0.25 | 0.32 | 0.4 | 0.010 | 0.012 | 0.016 |
| C | 0.089 | 0.12 | 0.177 | 0.003 | 0.005 | 0.007 |
| D | 1.60 | 1.70 | 1.80 | 0.062 | 0.066 | 0.070 |
| E | 1.15 | 1.25 | 1.35 | 0.045 | 0.049 | 0.053 |
| L | 0.08 | | | 0.003 | | |
| HE | 2.30 | 2.50 | 2.70 | 0.090 | 0.098 | 0.105 |

RECOMMENDED SOLDERING FOOTPRINT*



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

| | | |
|------------------|-------------|--|
| DOCUMENT NUMBER: | 98ASB17533C | Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red. |
| DESCRIPTION: | SOD-323 | PAGE 1 OF 1 |

onsemi and ONSEMI are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi 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 special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

onsemi, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** 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 special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** 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. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** 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 **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

Technical Library: www.onsemi.com/design/resources/technical-documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

For additional information, please contact your local Sales Representative at www.onsemi.com/support/sales