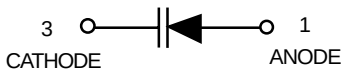
# Silicon Tuning Diode

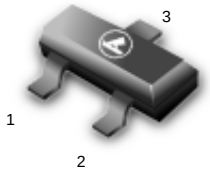
**MMBV2101LT1**
**MMBV2103LT1**
**MMBV2105LT1**
**MMBV2107LT1**
**MMBV2108LT1**
**MMBV2109LT1**
**MV2101 MV2104**
**MV2106 MV2108**
**MV2109 MV2111**
**MV2115**

These devices are designed in the popular PLASTIC PACKAGE for high volumerequirements of FM Radio and TV tuning and AFC, general frequency control andtuning applications.They provide solid–state reliability in replacement of mechanical tuning methods. Also available in Surface Mount Package up to 33pF.

- High Q
- Controlled and Uniform Tuning Ratio
- Standard Capacitance Tolerance —10%
- Complete Typical Design Curves




**6.8-100p**
**30 VOLTS**
**VOLTAGE VARIABLE**
**CAPACITANCE DIODES**




**CASE 318–08, STYLE 8**
**SOT– 23 (TO–236AB)**

**MAXIMUM RATINGS(EACH DIODE)**

| Rating | Symbol | MV21XX | MMBV21XXLT1 | Unit |
|---|---|---|---|---|
| Reverse Voltage | $V_R$ | 30 | | Vdc |
| Forward Current | $I_F$ | 200 | | mAdc |
| Forward power Dissipation @$T_A$ = 25°C | $P_D$ | 280 | 225 | mW |
| Derate above 25°C | | 2.8 | 1.8 | mW/°C |
| Junction Temperature | $T_J$ | +150 | | ℃ |
| Storage Temperature Range | $T_{stg}$ | –55 to +150 | | ℃ |

**DEVICE MARKING**

| | |
|---|---|
| MMBV2101LT1=M4G | MMBV2107LT1=4W |
| MMBV2103LT1=4H | MMBV2108LT1=4X |
| MMBV2105LT1=4U | MMBV2109LT1=4J |

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

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

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**MV2101 MV2104 MV2105 MV2108 MV2109**
**MV2111 MV2115**

| Device | $C_T$, Diode Capacitance $V_R$ = 4.0 Vdc, f = 1.0 MHz pF | | | Q, Figure of Merit $V_R$ = 4.0 Vdc, f = 50 MHz | $T_R$, Tuning Ratio $C_2/C_{30}$ f = 1.0 MHz | | |
|---|---|---|---|---|---|---|---|
| | Min | Nom | Max | Typ | Min | Typ | Max |
| MMBV2101LT1/MV2101 | 6.1 | 6.8 | 7.5 | 450 | 2.5 | 2.7 | 3.2 |
| MMBV2103LT1 | 9.0 | 10 | 11 | 400 | 2.5 | 2.9 | 3.2 |
| MV2104 | 10.8 | 12 | 13.2 | 400 | 2.5 | 2.9 | 3.2 |
| MMBV2105LT1/MV2105 | 13.5 | 15 | 16.5 | 400 | 2.5 | 2.9 | 3.2 |
| MMBV2107LT1 | 19.8 | 22 | 24.2 | 350 | 2.5 | 2.9 | 3.2 |
| MMBV2108LT1/MV2108 | 24.3 | 27 | 29.7 | 300 | 2.5 | 3.0 | 3.2 |
| MMBV2109LT1/MV2109 | 29.7 | 33 | 36.3 | 200 | 2.5 | 3.0 | 3.2 |
| MV2111 | 42.3 | 47 | 51.7 | 150 | 2.5 | 3.0 | 3.2 |
| MV2115 | 90 | 100 | 110 | 100 | 2.6 | 3.0 | 3.3 |

**MMBV2101LT1, MMBV2103LT1, 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 ca-pacitance bridge (Boonton Electronics Model 75A or equivalent).

### 2. $T_R$, TUNING RATIO

$T_R$ 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 ad-mittance bridge at the specified frequency and substitut-ing in the following equations:

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

(Booton Electronics Model 33As8 or equivalent).Use Lead Length ≃1/16".

### 4.$TC_C$,DIODE CAPACITANCE TEMPERATURE COEFFICIENT

$TC_C$ is guaranteed by comparing $C_T$ at $V_R$=4.0Vdc,f=1.0MHz, $T_A$= – 65°C with $C_T$ at $V_R$=4.0Vdc,f=1.0MHz,$T_A$= +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±0.1pF.

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## TYPICAL DEVICE CHARACTERISTICS

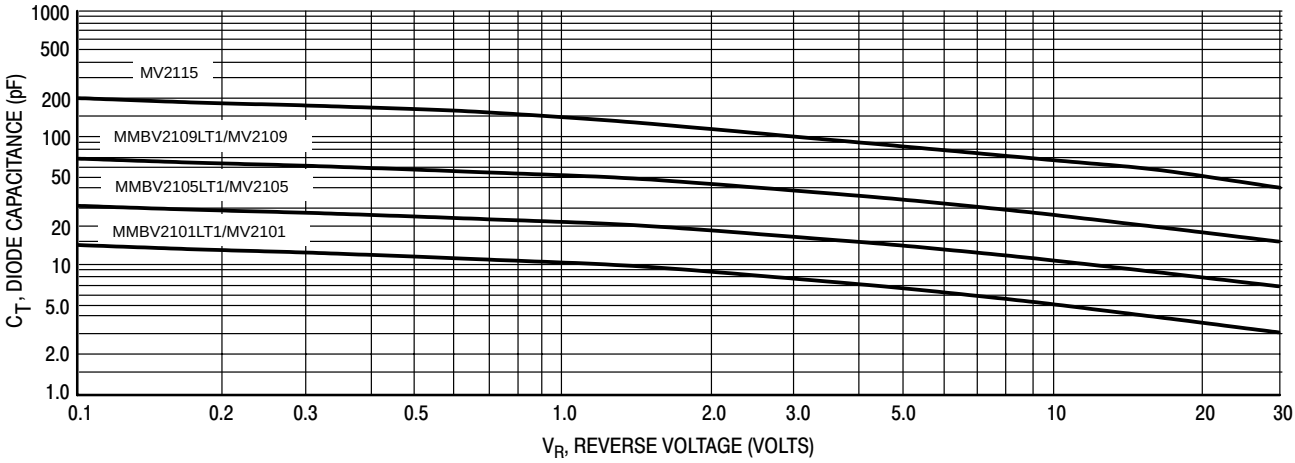


**Figure 1. Diode Capacitance versus Reverse Voltage**

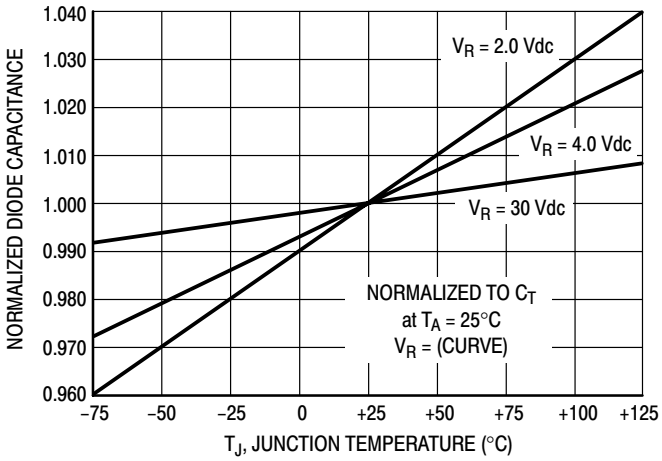


**Figure 2. Normalized Diode Capacitance versus Junction Temperature**

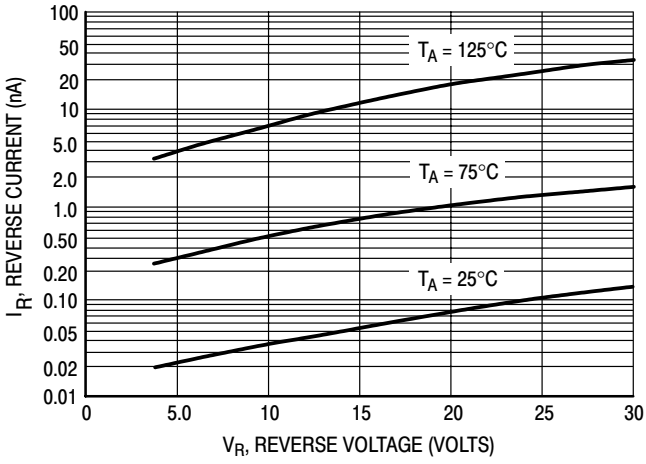


**Figure 3. Reverse Current versus Reverse Bias Voltage**

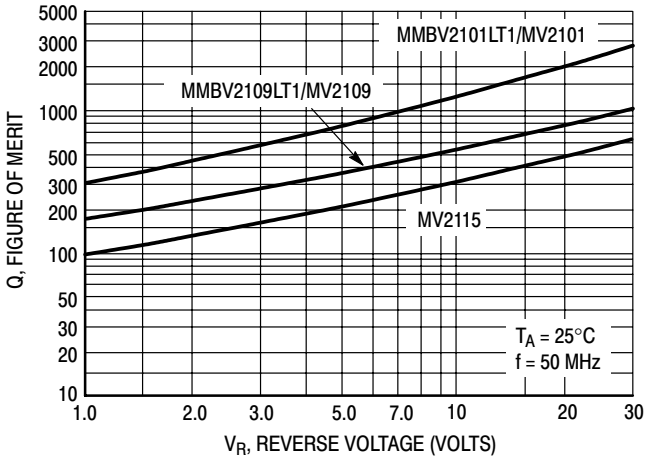


**Figure 4. Figure of Merit versus Reverse Voltage**

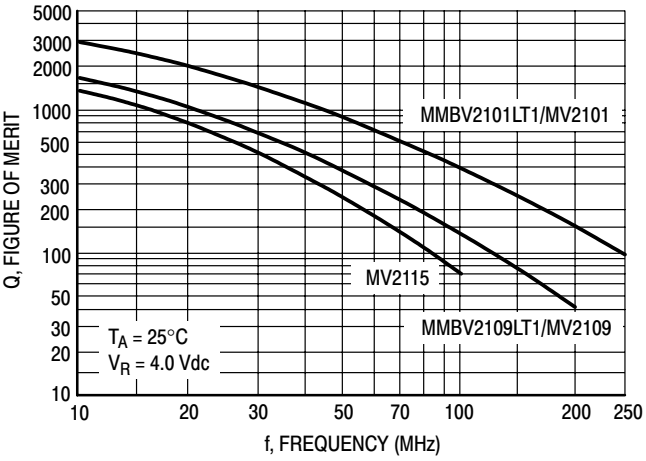


**Figure 5. Figure of Merit versus Frequency**