



**THE DATASHEET OF  
MMBZ5241BT-7-F**



## Features

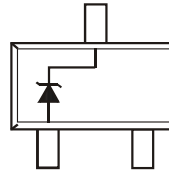
- Ultra-Small Surface Mount Package
- Planar Die Construction
- General Purpose
- Ideally Suited for Automated Assembly Processes
- **Lead Free/RoHS Compliant (Note 2)**
- **"Green" Device (Note 3 and 4)**

## Mechanical Data

- Case: SOT-523
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020D
- Terminals: Solderable per MIL-STD-202, Method 208
- Lead Free Plating (Matte Tin Finish annealed over Alloy 42 leadframe).
- Polarity: See Diagram
- Marking Information: See Page 4
- Ordering Information: See Page 4
- Weight: 0.002 grams (approximate)



Top View



Device Schematic

## Maximum Ratings @ $T_A = 25^\circ\text{C}$ unless otherwise specified

| Characteristic                        | Symbol | Value | Unit |
|---------------------------------------|--------|-------|------|
| Zener Current (See Table on page 2)   | —      | —     | —    |
| Forward Voltage @ $I_F = 10\text{mA}$ | $V_F$  | 0.9   | V    |

## Thermal Characteristics

| Characteristic                                   | Symbol          | Value       | Unit               |
|--|-----------------|-------------|--------------------|
| Power Dissipation (Note 1)                       | $P_D$           | 150         | mW                 |
| Thermal Resistance, Junction to Ambient (Note 1) | $R_{\theta JA}$ | 833         | $^\circ\text{C/W}$ |
| Operating and Storage Temperature Range          | $T_J, T_{STG}$  | -65 to +150 | $^\circ\text{C}$   |

- Notes:
1. Device mounted on FR-4 PC board with recommended pad layout at <http://www.diodes.com/datasheets/ap02001.pdf>.
  2. No purposefully added lead.
  3. Diodes Inc.'s "Green" policy can be found on our website at [http://www.diodes.com/products/lead\\_free/index.php](http://www.diodes.com/products/lead_free/index.php).
  4. Product manufactured with Date Code UO (week 40, 2007) and newer are built with Green Molding Compound. Product manufactured prior to Date Code UO are built with Non-Green Molding Compound and may contain Halogens or Sb2O3 Fire Retardants.

**Electrical Characteristics** @<sub>T<sub>A</sub></sub> = 25°C unless otherwise specified

| Type Number | Marking Code | Zener Voltage Range (Note 5)     |         |         | Test Current | Maximum Zener Impedance (Note 6) |                                   | Maximum Reverse Leakage Current (Note 5)      |                |
|-------------|--------------|----------------------------------|---------|---------|--------------|----------------------------------|-----------------------------------|---|----------------|
|             |              | V <sub>Z</sub> @ I <sub>ZT</sub> |         |         |              | I <sub>ZT</sub>                  | Z <sub>ZT</sub> @ I <sub>ZT</sub> | Z <sub>ZK</sub> @ I <sub>ZK</sub><br>= 0.25mA | I <sub>R</sub> |
|             |              | Nom (V)                          | Min (V) | Max (V) | mA           |                                  |                                   |   |                |
| MMBZ5221BT  | KC1          | 2.4                              | 2.28    | 2.52    | 20           | 30                               | 1200                              | 100   | 1.0            |
| MMBZ5223BT  | KC3          | 2.7                              | 2.57    | 2.84    | 20           | 30                               | 1300                              | 75  | 1.0            |
| MMBZ5225BT  | KC5          | 3.0                              | 2.85    | 3.15    | 20           | 30                               | 1600                              | 50  | 1.0            |
| MMBZ5226BT  | KG1          | 3.3                              | 3.14    | 3.47    | 20           | 28                               | 1600                              | 25  | 1.0            |
| MMBZ5227BT  | KG2          | 3.6                              | 3.42    | 3.78    | 20           | 24                               | 1700                              | 15  | 1.0            |
| MMBZ5228BT  | KG3          | 3.9                              | 3.71    | 4.10    | 20           | 23                               | 1900                              | 10  | 1.0            |
| MMBZ5229BT  | KG4          | 4.3                              | 4.09    | 4.52    | 20           | 22                               | 2000                              | 5.0   | 1.0            |
| MMBZ5230BT  | KG5          | 4.7                              | 4.47    | 4.94    | 20           | 19                               | 1900                              | 5.0   | 2.0            |
| MMBZ5231BT  | KE1          | 5.1                              | 4.85    | 5.36    | 20           | 17                               | 1600                              | 5.0   | 2.0            |
| MMBZ5232BT  | KE2          | 5.6                              | 5.32    | 5.88    | 20           | 11                               | 1600                              | 5.0   | 3.0            |
| MMBZ5234BT  | KE4          | 6.2                              | 5.89    | 6.51    | 20           | 7.0                              | 1000                              | 5.0   | 4.0            |
| MMBZ5235BT  | KE5          | 6.8                              | 6.46    | 7.14    | 20           | 5.0                              | 750                               | 3.0   | 5.0            |
| MMBZ5236BT  | KF1          | 7.5                              | 7.13    | 7.88    | 20           | 6.0                              | 500                               | 3.0   | 6.0            |
| MMBZ5237BT  | KF2          | 8.2                              | 7.79    | 8.61    | 20           | 8.0                              | 500                               | 3.0   | 6.5            |
| MMBZ5239BT  | KF4          | 9.1                              | 8.65    | 9.56    | 20           | 10                               | 600                               | 3.0   | 7.0            |
| MMBZ5240BT  | KF5          | 10                               | 9.50    | 10.50   | 20           | 17                               | 600                               | 3.0   | 8.0            |
| MMBZ5241BT  | KH1          | 11                               | 10.45   | 11.55   | 20           | 22                               | 600                               | 2.0   | 8.4            |
| MMBZ5242BT  | KH2          | 12                               | 11.40   | 12.60   | 20           | 30                               | 600                               | 1.0   | 9.1            |
| MMBZ5243BT  | KH3          | 13                               | 12.35   | 13.65   | 9.5          | 13                               | 600                               | 0.5   | 9.9            |
| MMBZ5245BT  | KH5          | 15                               | 14.25   | 15.75   | 8.5          | 16                               | 600                               | 0.1   | 11             |
| MMBZ5246BT  | KJ1          | 16                               | 15.20   | 16.80   | 7.8          | 17                               | 600                               | 0.1   | 12             |
| MMBZ5248BT  | KJ3          | 18                               | 17.10   | 18.90   | 7.0          | 21                               | 600                               | 0.1   | 14             |
| MMBZ5250BT  | KJ5          | 20                               | 19.00   | 21.00   | 6.2          | 25                               | 600                               | 0.1   | 15             |
| MMBZ5251BT  | KK1          | 22                               | 20.90   | 23.10   | 5.6          | 29                               | 600                               | 0.1   | 17             |
| MMBZ5252BT  | KK2          | 24                               | 22.80   | 25.20   | 5.2          | 33                               | 600                               | 0.1   | 18             |
| MMBZ5254BT  | KK4          | 27                               | 25.65   | 28.35   | 5.0          | 41                               | 600                               | 0.1   | 21             |
| MMBZ5255BT  | KK5          | 28                               | 26.60   | 29.40   | 4.5          | 44                               | 600                               | 0.1   | 21             |
| MMBZ5256BT  | KM1          | 30                               | 28.50   | 31.50   | 4.2          | 49                               | 600                               | 0.1   | 23             |
| MMBZ5257BT  | KM2          | 33                               | 31.35   | 34.65   | 3.8          | 58                               | 700                               | 0.1   | 25             |
| MMBZ5258BT  | KM3          | 36                               | 34.20   | 37.80   | 3.4          | 70                               | 700                               | 0.1   | 27             |
| MMBZ5259BT  | KM4          | 39                               | 37.05   | 40.95   | 3.2          | 80                               | 800                               | 0.1   | 30             |

Notes: 5. Short duration pulse test used to minimize self-heating effect.  
6. f = 1KHz.

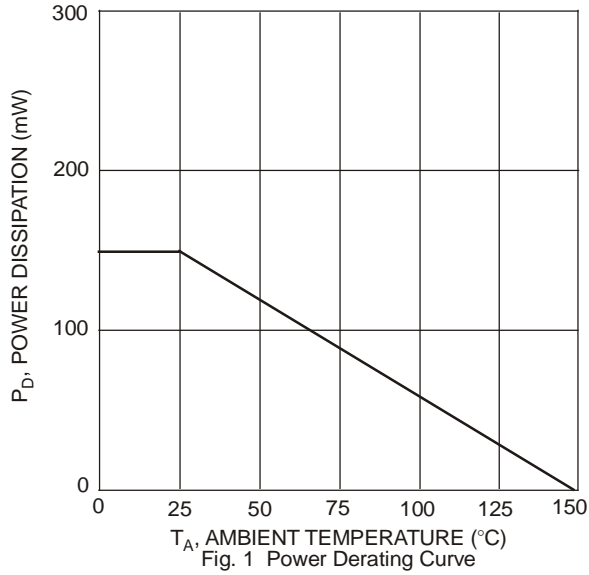


Fig. 1 Power Derating Curve

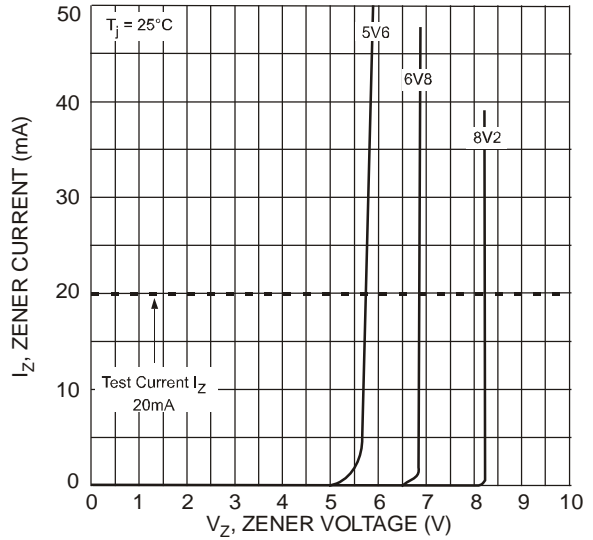


Fig. 2 Typical Zener Breakdown Characteristics

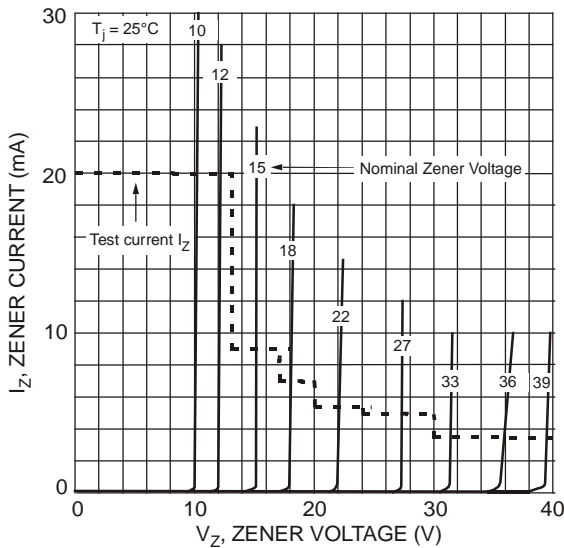


Fig. 3 Typical Zener Breakdown Characteristics

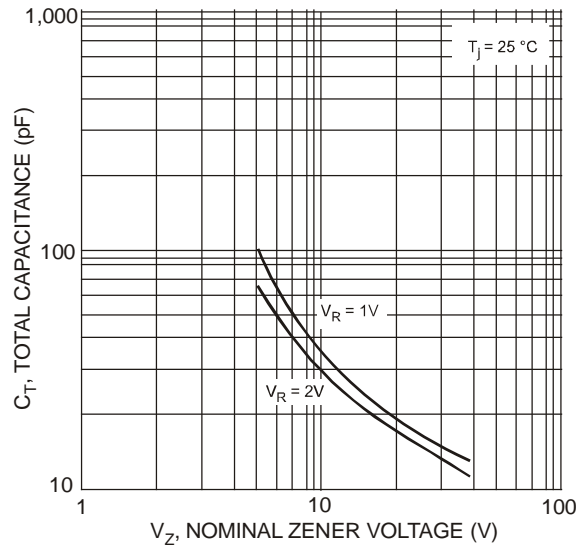


Fig. 4 Typical Total Capacitance vs. Nominal Zener Voltage

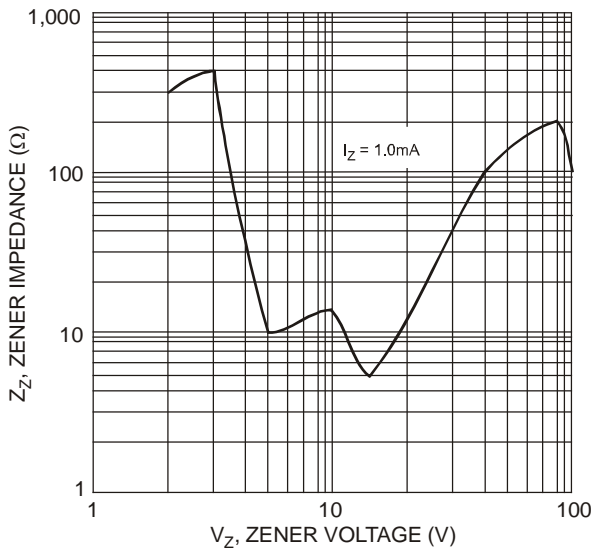


Fig. 5 Typical Zener Impedance Characteristics

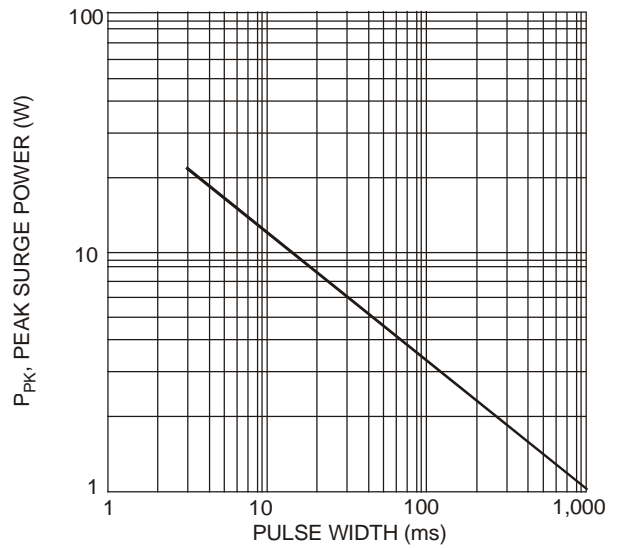


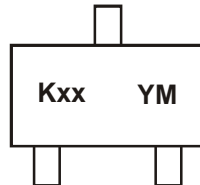
Fig. 6 Maximum Non-repetitive Surge Power

**Ordering Information** (Note 7)

| Device            | Packaging | Shipping         |
|-------------------|-----------|------------------|
| (Type Number)-7-F | SOT-523   | 3000/Tape & Reel |

\* Add "-7-F" to the appropriate type number in from Electrical Characteristics Table, example: 6.2V Zener = MMBZ5234BTS-7-F.

Notes: 7. For packaging details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

**Marking Information**


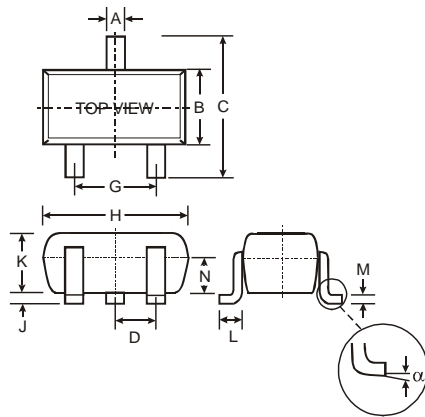
Kxx = Product Type Marking Code  
(See Electrical Characteristics Table)  
YM = Date Code Marking  
Y = Year (ex: N = 2002)  
M = Month (ex: 9 = September)

## Date Code Key

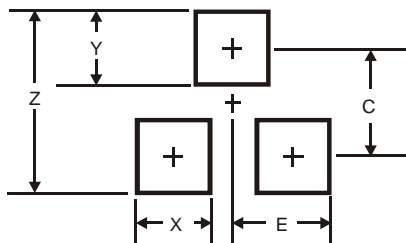
| Year | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Code | N    | P    | R    | S    | T    | U    | V    | W    | X    | Y    | Z    | A    | B    | C    |

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Code  | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | O   | N   | D   |

**Package Outline Dimensions**


| SOT-523              |      |      |      |
|----------------------|------|------|------|
| Dim                  | Min  | Max  | Typ  |
| A                    | 0.15 | 0.30 | 0.22 |
| B                    | 0.75 | 0.85 | 0.80 |
| C                    | 1.45 | 1.75 | 1.60 |
| D                    | —    | —    | 0.50 |
| G                    | 0.90 | 1.10 | 1.00 |
| H                    | 1.50 | 1.70 | 1.60 |
| J                    | 0.00 | 0.10 | 0.05 |
| K                    | 0.60 | 0.80 | 0.75 |
| L                    | 0.10 | 0.30 | 0.22 |
| M                    | 0.10 | 0.20 | 0.12 |
| N                    | 0.45 | 0.65 | 0.50 |
| $\alpha$             | 0°   | 8°   | —    |
| All Dimensions in mm |      |      |      |

**Suggested Pad Layout**


| Dimensions | Value (in mm) |
|------------|---------------|
| Z          | 1.8           |
| X          | 0.4           |
| Y          | 0.51          |
| C          | 1.3           |
| E          | 0.7           |

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