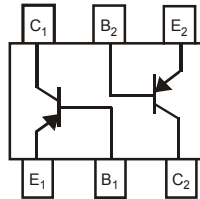
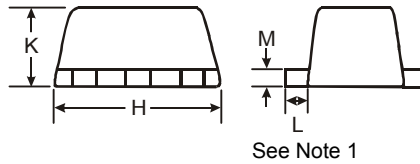
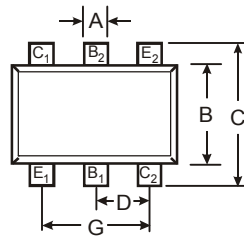


**Features**

- Epitaxial Planar Die Construction
- Ideal for Low Power Amplification and Switching
- Ultra-Small Surface Mount Package
- **Lead Free By Design/RoHS Compliant (Note 1)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **"Green" Device (Note 4 and 5)**

**Mechanical Data**

- Case: SOT-563
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020C
- Terminal Connections: See Diagram
- Terminals: Finish - Matte Tin annealed over Alloy 42 leadframe. Solderable per MIL-STD-202, Method 20
- Terminals: Lead bearing terminal plating available. See Ordering information Page 3
- Marking & Type Code Information: See Page 3
- Ordering Information: See Page 3
- Weight: 0.003 grams (approximate)



| SOT-563              |      |      |      |
|----------------------|------|------|------|
| Dim                  | Min  | Max  | Typ  |
| A                    | 0.15 | 0.30 | 0.25 |
| B                    | 1.10 | 1.25 | 1.20 |
| C                    | 1.55 | 1.70 | 1.60 |
| D                    | 0.50 |      |      |
| G                    | 0.90 | 1.10 | 1.00 |
| H                    | 1.50 | 1.70 | 1.60 |
| K                    | 0.56 | 0.60 | 0.60 |
| L                    | 0.10 | 0.30 | 0.20 |
| M                    | 0.10 | 0.18 | 0.11 |
| All Dimensions in mm |      |      |      |

**Maximum Ratings** @<sub>TA</sub> = 25°C unless otherwise specified

| Characteristic                 | Symbol           | Value | Unit |
|--------------------------------|------------------|-------|------|
| Collector-Base Voltage         | V <sub>CBO</sub> | -40   | V    |
| Collector-Emitter Voltage      | V <sub>CEO</sub> | -40   | V    |
| Emitter-Base Voltage           | V <sub>EBO</sub> | -5.0  | V    |
| Collector Current - Continuous | I <sub>C</sub>   | -200  | mA   |

**Thermal Characteristics**

| Characteristic   | Symbol                            | Value       | Unit |
|--|-----------------------------------|-------------|------|
| Power Dissipation (Note 3) @ T <sub>A</sub> = 25°C                       | P <sub>d</sub>                    | 150         | mW   |
| Thermal Resistance, Junction to Ambient (Note 3) @ T <sub>A</sub> = 25°C | R <sub>θJA</sub>                  | 833         | °C/W |
| Operating and Storage Temperature Range                                  | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C   |

- Notes:
1. No purposefully added lead.
  2. Package is non-polarized. Parts may be on reel in orientation illustrated, 180° rotated, or mixed (both ways).
  3. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch; pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>.
  4. 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).
  5. 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 @T<sub>A</sub> = 25°C unless otherwise specified

| Characteristic                       | Symbol               | Min                         | Max                     | Unit               | Test Condition   |
|--------------------------------------|----------------------|-----------------------------|-------------------------|--------------------|--|
| <b>OFF CHARACTERISTICS (Note 6)</b>  |                      |                             |                         |                    |  |
| Collector-Base Breakdown Voltage     | V <sub>(BR)CBO</sub> | -40                         | —                       | V                  | I <sub>C</sub> = -10μA, I <sub>E</sub> = 0   |
| Collector-Emitter Breakdown Voltage  | V <sub>(BR)CEO</sub> | -40                         | —                       | V                  | I <sub>C</sub> = -1.0mA, I <sub>B</sub> = 0  |
| Emitter-Base Breakdown Voltage       | V <sub>(BR)EBO</sub> | -5.0                        | —                       | V                  | I <sub>E</sub> = -10μA, I <sub>C</sub> = 0   |
| Collector Cutoff Current             | I <sub>CEX</sub>     | —                           | -50                     | nA                 | V <sub>CE</sub> = -30V, V <sub>EB(OFF)</sub> = -3.0V   |
| Base Cutoff Current                  | I <sub>BL</sub>      | —                           | -50                     | nA                 | V <sub>CE</sub> = -30V, V <sub>EB(OFF)</sub> = -3.0V   |
| <b>ON CHARACTERISTICS (Note 6)</b>   |                      |                             |                         |                    |  |
| DC Current Gain                      | h <sub>FE</sub>      | 60<br>80<br>100<br>60<br>30 | —<br>—<br>300<br>—<br>— | —                  | I <sub>C</sub> = -100μA, V <sub>CE</sub> = -1.0V<br>I <sub>C</sub> = -1.0mA, V <sub>CE</sub> = -1.0V<br>I <sub>C</sub> = -10mA, V <sub>CE</sub> = -1.0V<br>I <sub>C</sub> = -50mA, V <sub>CE</sub> = -1.0V<br>I <sub>C</sub> = -100mA, V <sub>CE</sub> = -1.0V |
| Collector-Emitter Saturation Voltage | V <sub>CE(SAT)</sub> | —                           | -0.25<br>-0.40          | V                  | I <sub>C</sub> = -10mA, I <sub>B</sub> = -1.0mA<br>I <sub>C</sub> = -50mA, I <sub>B</sub> = -5.0mA   |
| Base-Emitter Saturation Voltage      | V <sub>BE(SAT)</sub> | -0.65                       | -0.85<br>-0.95          | V                  | I <sub>C</sub> = -10mA, I <sub>B</sub> = -1.0mA<br>I <sub>C</sub> = -50mA, I <sub>B</sub> = -5.0mA   |
| <b>SMALL SIGNAL CHARACTERISTICS</b>  |                      |                             |                         |                    |  |
| Output Capacitance                   | C <sub>obo</sub>     | —                           | 4.5                     | pF                 | V <sub>CB</sub> = -5.0V, f = 1.0MHz, I <sub>E</sub> = 0  |
| Input Capacitance                    | C <sub>ibo</sub>     | —                           | 10                      | pF                 | V <sub>EB</sub> = -0.5V, f = 1.0MHz, I <sub>C</sub> = 0  |
| Input Impedance                      | h <sub>ie</sub>      | 2.0                         | 12                      | kΩ                 | V <sub>CE</sub> = 10V, I <sub>C</sub> = 1.0mA,<br>f = 1.0kHz   |
| Voltage Feedback Ratio               | h <sub>re</sub>      | 0.1                         | 10                      | x 10 <sup>-4</sup> |  |
| Small Signal Current Gain            | h <sub>fe</sub>      | 100                         | 400                     | —                  |  |
| Output Admittance                    | h <sub>oe</sub>      | 3.0                         | 60                      | μS                 |  |
| Current Gain-Bandwidth Product       | f <sub>T</sub>       | 250                         | —                       | MHz                | V <sub>CE</sub> = -20V, I <sub>C</sub> = -10mA,<br>f = 100MHz  |
| Noise Figure                         | NF                   | —                           | 4.0                     | dB                 | V <sub>CE</sub> = -5.0V, I <sub>C</sub> = -100μA,<br>R <sub>S</sub> = 1.0kΩ, f = 1.0kHz  |
| <b>SWITCHING CHARACTERISTICS</b>     |                      |                             |                         |                    |  |
| Delay Time                           | t <sub>d</sub>       | —                           | 35                      | ns                 | V <sub>CC</sub> = -3.0V, I <sub>C</sub> = -10mA,<br>V <sub>BE(off)</sub> = 0.5V, I <sub>B1</sub> = -1.0mA  |
| Rise Time                            | t <sub>r</sub>       | —                           | 35                      | ns                 |  |
| Storage Time                         | t <sub>s</sub>       | —                           | 225                     | ns                 | V <sub>CC</sub> = -3.0V, I <sub>C</sub> = -10mA,<br>I <sub>B1</sub> = I <sub>B2</sub> = -1.0mA   |
| Fall Time                            | t <sub>f</sub>       | —                           | 75                      | ns                 |  |

Notes: 6. Short duration pulse test used to minimize self-heating effect.

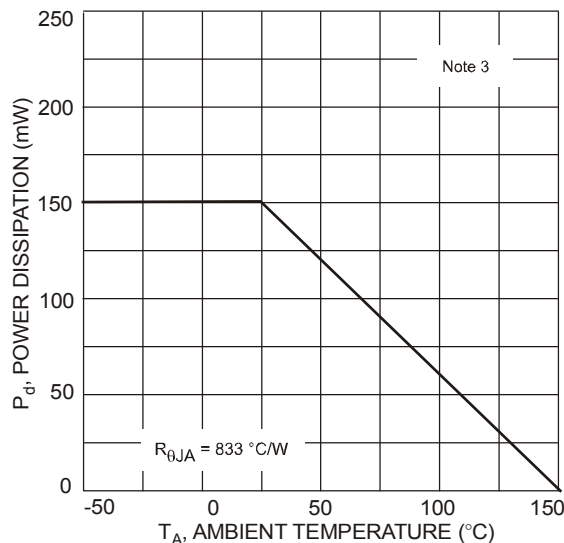


Fig. 1, Derating Curve - Total Device

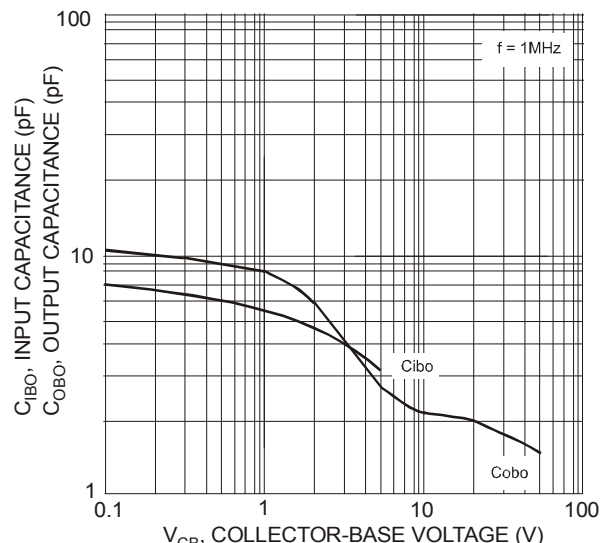


Fig. 2, Input and Output Capacitance vs. Collector-Base Voltage

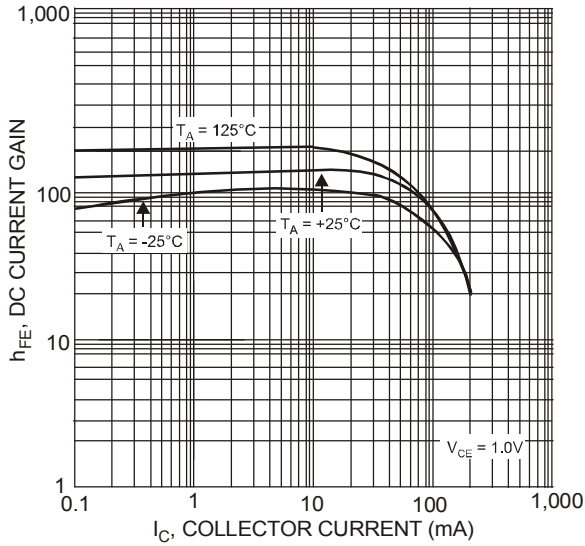


Fig. 3, Typical DC Current Gain vs. Collector Current

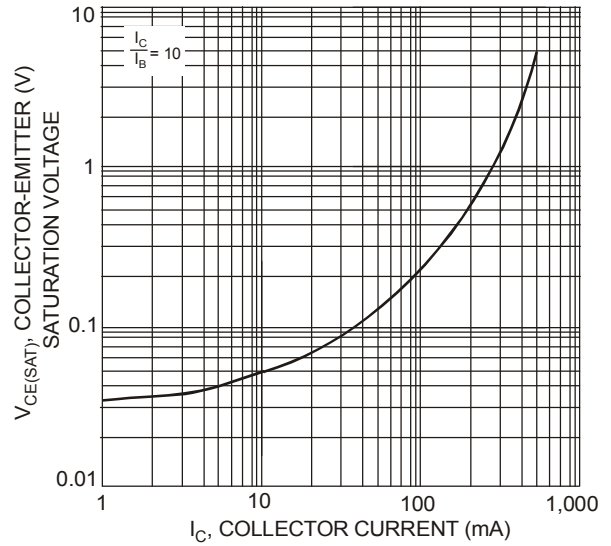


Fig. 4, Typical Collector-Emitter Saturation Voltage vs. Collector Current

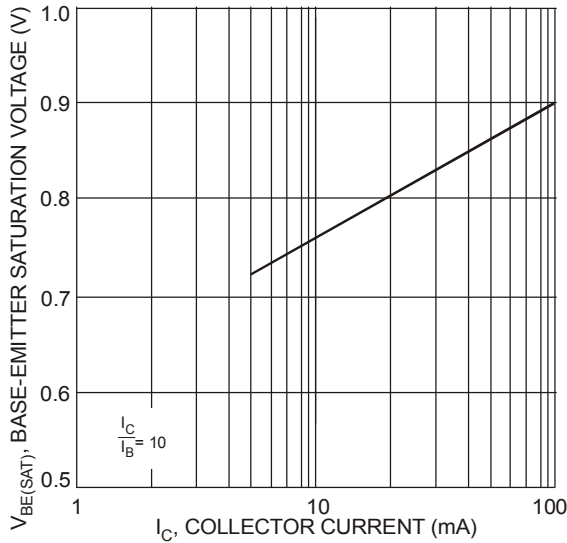


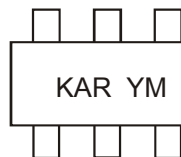
Fig. 5, Typical Base-Emitter Saturation Voltage vs. Collector Current

## Ordering Information (Note 7)

| Device      | Packaging | Shipping         |
|-------------|-----------|------------------|
| MMDT3906V-7 | SOT-563   | 3000/Tape & Reel |

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

## Marking Information



KAR = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: T = 2006)  
 M = Month (ex: 9 = September)

### Date Code Key

| Year | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|------|------|------|------|------|------|------|------|------|
| Code | S    | T    | U    | V    | W    | X    | Y    | Z    |

| 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   |

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