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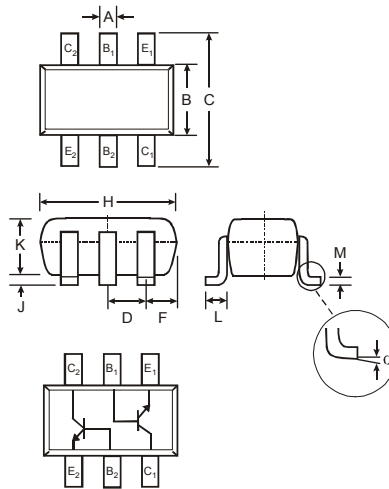
Jameco Part Number 1591025

**Features**

- Epitaxial Planar Die Construction
- Ideal for Low Power Amplification and Switching
- Ultra-Small Surface Mount Package
- **Lead Free/RoHS Compliant (Note 2)**
- **"Green" Device (Note 3 and 4)**

**Mechanical Data**

- Case: SOT-363
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020C
- Terminals: Solderable per MIL-STD-202, Method 208
- Lead Free Plating (Matte Tin Finish annealed over Alloy 42 leadframe).
- Terminal Connections: See Diagram
- Marking Information: See Page 4
- Ordering Information: See Page 4
- Weight: 0.006 grams (approximate)



| SOT-363              |              |      |
|----------------------|--------------|------|
| Dim                  | Min          | Max  |
| A                    | 0.10         | 0.30 |
| B                    | 1.15         | 1.35 |
| C                    | 2.00         | 2.20 |
| D                    | 0.65 Nominal |      |
| F                    | 0.30         | 0.40 |
| H                    | 1.80         | 2.20 |
| J                    | —            | 0.10 |
| K                    | 0.90         | 1.00 |
| L                    | 0.25         | 0.40 |
| M                    | 0.10         | 0.25 |
| $\alpha$             | 0°           | 8°   |
| All Dimensions in mm |              |      |

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

| Characteristic                          | Symbol          | Value       | Unit               |
|---|-----------------|-------------|--------------------|
| Collector-Base Voltage                  | $V_{CBO}$       | 60          | V                  |
| Collector-Emitter Voltage               | $V_{CEO}$       | 40          | V                  |
| Emitter-Base Voltage                    | $V_{EBO}$       | 6.0         | V                  |
| Collector Current - Continuous          | $I_C$           | 200         | mA                 |
| Power Dissipation (Note 1)              | $P_d$           | 200         | mW                 |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 625         | $^\circ\text{C/W}$ |
| Operating and Storage Temperature Range | $T_j, T_{STG}$  | -55 to +150 | $^\circ\text{C}$   |

- Notes:
1. Device mounted on FR-4 PCB; pad layout as shown on Diodes Inc. suggested pad layout documents APO2001, which can be found on our website 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 @T<sub>A</sub> = 25°C unless otherwise specified

| Characteristic                       | Symbol               | Min                         | Max                     | Unit               | Test Condition   |
|--------------------------------------|----------------------|-----------------------------|-------------------------|--------------------|--|
| <b>OFF CHARACTERISTICS (Note 5)</b>  |                      |                             |                         |                    |  |
| Collector-Base Breakdown Voltage     | V <sub>(BR)CBO</sub> | 60                          | —                       | 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 5)</b>   |                      |                             |                         |                    |  |
| DC Current Gain                      | h <sub>FE</sub>      | 40<br>70<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> | —                           | 0.20<br>0.30            | 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<br>—                   | 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>     | —                           | 4.0                     | pF                 | V <sub>CB</sub> = 5.0V, f = 1.0MHz, I <sub>E</sub> = 0   |
| Input Capacitance                    | C <sub>ibo</sub>     | —                           | 8.0                     | pF                 | V <sub>EB</sub> = 0.5V, f = 1.0MHz, I <sub>C</sub> = 0   |
| Input Impedance                      | h <sub>ie</sub>      | 1.0                         | 10                      | kΩ                 | V <sub>CE</sub> = 10V, I <sub>C</sub> = 1.0mA,<br>f = 1.0kHz   |
| Voltage Feedback Ratio               | h <sub>re</sub>      | 0.5                         | 8.0                     | x 10 <sup>-4</sup> |  |
| Small Signal Current Gain            | h <sub>fe</sub>      | 100                         | 400                     | —                  |  |
| Output Admittance                    | h <sub>oe</sub>      | 1.0                         | 40                      | μS                 |  |
| Current Gain-Bandwidth Product       | f <sub>T</sub>       | 300                         | —                       | MHz                | V <sub>CE</sub> = 20V, I <sub>C</sub> = 10mA,<br>f = 100MHz  |
| Noise Figure                         | NF                   | —                           | 5.0                     | 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>       | —                           | 200                     | 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>       | —                           | 50                      | ns                 |  |

Notes: 5. Short duration pulse test used to minimize self-heating.

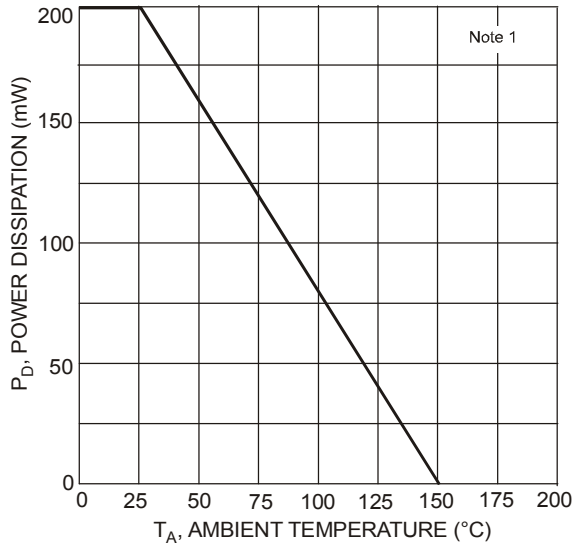


Fig. 1, Max Power Dissipation vs. Ambient Temperature (Total Device)

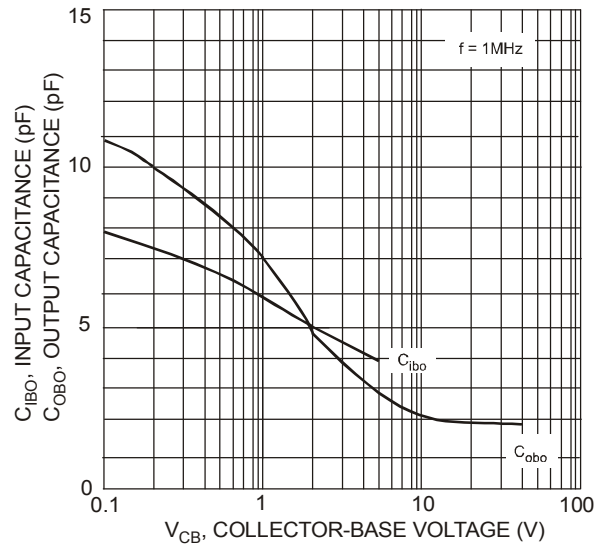


Fig. 2, Input and Output Capacitance vs. Collector-Base Voltage

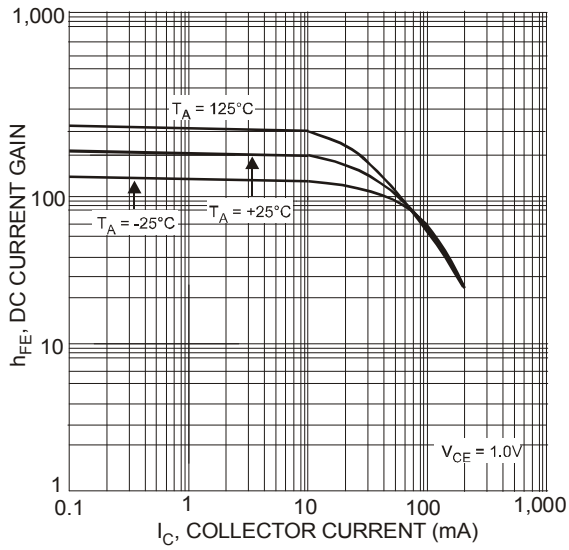


Fig. 3, Typical DC Current Gain vs. Collector Current

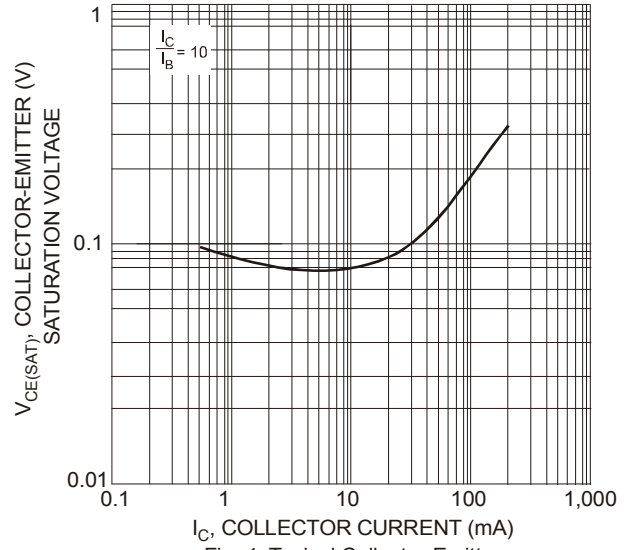


Fig. 4, Typical Collector-Emitter Saturation Voltage vs. Collector Current

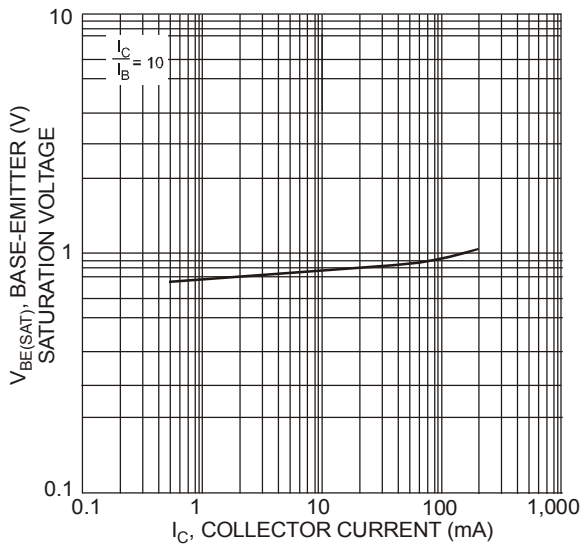


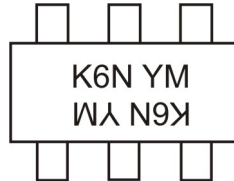
Fig. 5, Typical Base-Emitter Saturation Voltage vs. Collector Current

## Ordering Information (Note 6)

| Device       | Packaging | Shipping         |
|--------------|-----------|------------------|
| MMDT3904-7-F | SOT-363   | 3000/Tape & Reel |

Notes: 6. For packaging details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

## Marking Information



K6N = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year ex: N = 2002  
 M = Month ex: 9 = September

### Date Code Key

| Year | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Code | J    | K    | L    | M    | N    | P    | R    | 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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