

**NPN SMALL SIGNAL SURFACE MOUNT TRANSISTOR**
**Features**

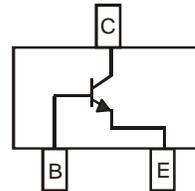
- Epitaxial Planar Die Construction
- Complementary PNP Type Available (MMST4126)
- Ideal for Medium Power Amplification and Switching
- Ultra-Small Surface Mount Package
- **Lead Free/RoHS Compliant (Note 2)**
- **"Green" Device (Notes 3 and 4)**

**Mechanical Data**

- Case: SOT-323
- Case Material: Molded Plastic, "Green" Molding Compound, Note 4. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020D
- Terminal Connections: See Diagram
- Terminals: Matte Tin Finish annealed over Alloy 42 leadframe (Lead Free Plating) Solderable per MIL-STD-202, Method 208
- Marking Information: See Page 3
- Ordering Information: See Page 3
- Weight: 0.006 grams (approximate)



Top View



Device Schematic

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

| Characteristic                          | Symbol           | Value | Unit |
|---|------------------|-------|------|
| Collector-Base Voltage                  | V <sub>CB0</sub> | 30    | V    |
| Collector-Emitter Voltage               | V <sub>CEO</sub> | 25    | V    |
| Emitter-Base Voltage                    | V <sub>EBO</sub> | 5.0   | V    |
| Collector Current - Continuous (Note 1) | I <sub>C</sub>   | 200   | mA   |

**Thermal Characteristics**

| Characteristic                                   | Symbol                            | Value       | Unit |
|--|-----------------------------------|-------------|------|
| Power Dissipation (Note 1)                       | P <sub>D</sub>                    | 200         | mW   |
| Thermal Resistance, Junction to Ambient (Note 1) | R <sub>θJA</sub>                  | 625         | °C/W |
| Operating and Storage Temperature Range          | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C   |

**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> | 30        | —        | V    | I <sub>C</sub> = 10μA, I <sub>E</sub> = 0   |
| Collector-Emitter Breakdown Voltage  | V <sub>(BR)CEO</sub> | 25        | —        | 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>CBO</sub>     | —         | 50       | nA   | V <sub>CB</sub> = 20V, I <sub>E</sub> = 0V  |
| Emitter Cutoff Current               | I <sub>EBO</sub>     | —         | 50       | nA   | V <sub>EB</sub> = 3.0V, I <sub>C</sub> = 0V   |
| <b>ON CHARACTERISTICS (Note 5)</b>   |                      |           |          |      |   |
| DC Current Gain                      | h <sub>FE</sub>      | 120<br>60 | 360<br>— | —    | I <sub>C</sub> = 2.0mA, V <sub>CE</sub> = 1.0V<br>I <sub>C</sub> = 50mA, V <sub>CE</sub> = 1.0V |
| Collector-Emitter Saturation Voltage | V <sub>CE(SAT)</sub> | —         | 0.30     | V    | I <sub>C</sub> = 50mA, I <sub>B</sub> = 5.0mA   |
| Base-Emitter Saturation Voltage      | V <sub>BE(SAT)</sub> | —         | 0.95     | V    | 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  |
| Small Signal Current Gain            | h <sub>fe</sub>      | 120       | 480      | —    | V <sub>CE</sub> = 1.0V, I <sub>C</sub> = 2.0mA,<br>f = 1.0kHz                                   |
| Current Gain-Bandwidth Product       | f <sub>T</sub>       | 300       | —        | MHz  | V <sub>CE</sub> = 20V, I <sub>C</sub> = 10mA,<br>f = 100MHz                                     |

- Notes:
1. 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>.
  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 0627 (week 27, 2006) and newer are built with Green Molding Compound. Product manufactured prior to Date Code 0627 are built with Non-Green Molding Compound and may contain Halogens or Sb2O3 Fire Retardants.
  5. Short duration pulse test used to minimize self-heating effect.

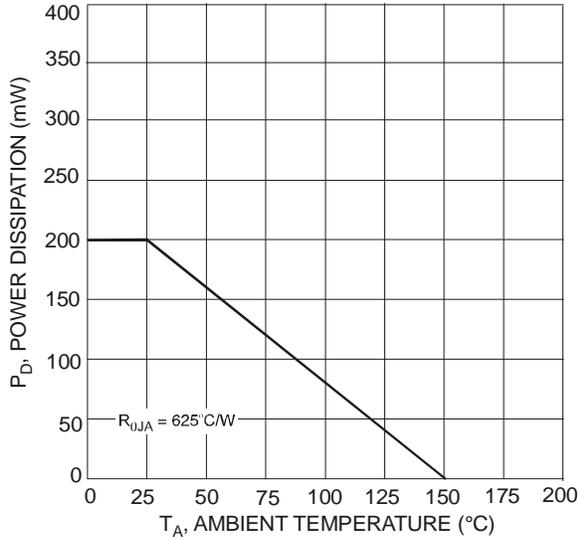


Fig. 1 Power Dissipation vs. Ambient Temperature (Note 1)

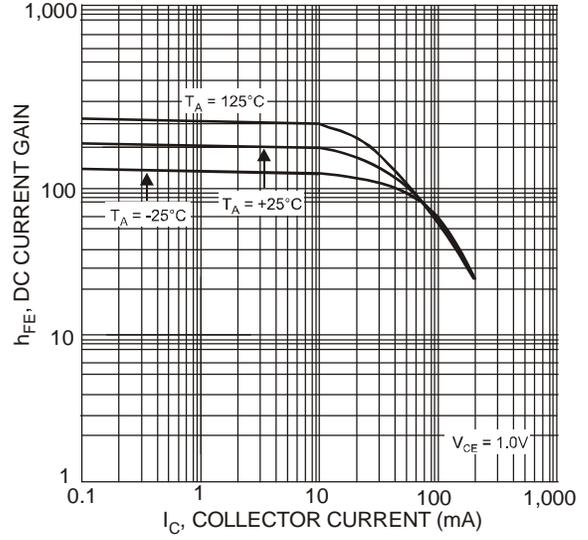


Fig. 2 Typical DC Current Gain vs. Collector Current

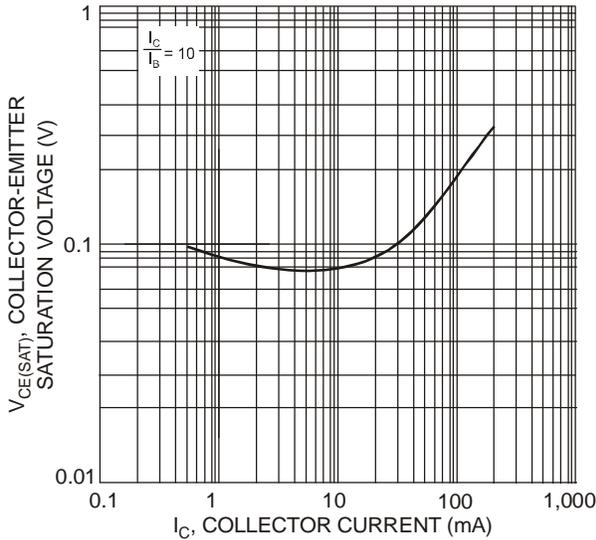


Fig. 3 Typical Collector-Emitter Saturation Voltage vs. Collector Current

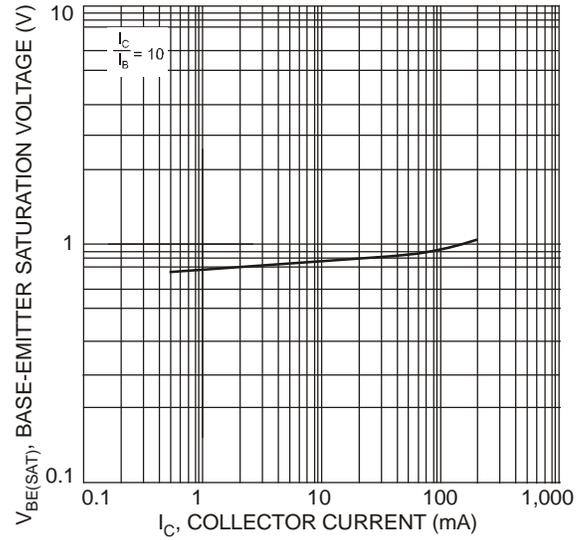


Fig. 4 Typical Base-Emitter Saturation Voltage vs. Collector Current

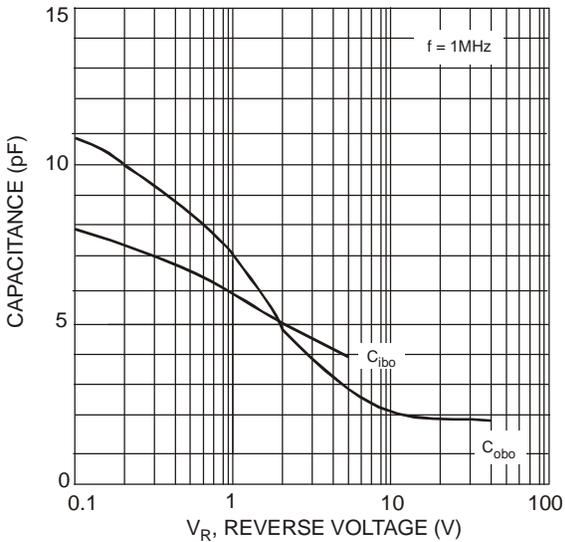


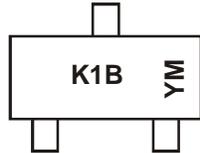
Fig. 5 Typical Capacitance Characteristics

### Ordering Information (Notes 4 and 6)

| Part Number  | Case    | Packaging        |
|--------------|---------|------------------|
| MMST4124-7-F | SOT-323 | 3000/Tape & Reel |

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

### Marking Information

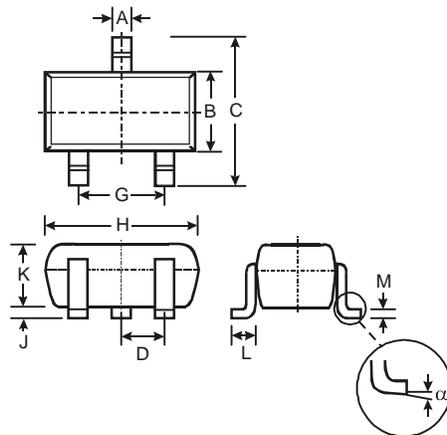


K1B = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: N = 2002)  
 M = Month (ex: 9 = September)

Date Code Key

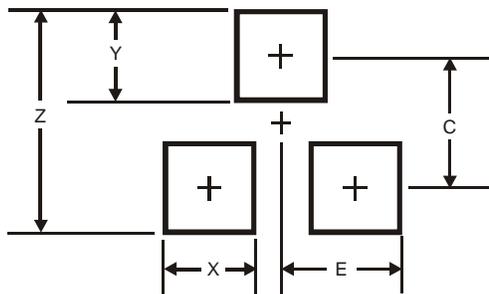
| Year  | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Code  | J    | K    | L    | M    | 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-323                     |      |      |      |
|-----------------------------|------|------|------|
| Dim                         | Min  | Max  | Typ  |
| A                           | 0.25 | 0.40 | 0.30 |
| B                           | 1.15 | 1.35 | 1.30 |
| C                           | 2.00 | 2.20 | 2.10 |
| D                           | -    | -    | 0.65 |
| G                           | 1.20 | 1.40 | 1.30 |
| H                           | 1.80 | 2.20 | 2.15 |
| J                           | 0.0  | 0.10 | 0.05 |
| K                           | 0.90 | 1.00 | 1.00 |
| L                           | 0.25 | 0.40 | 0.30 |
| M                           | 0.10 | 0.18 | 0.11 |
| $\alpha$                    | 0°   | 8°   | -    |
| <b>All Dimensions in mm</b> |      |      |      |

### Suggested Pad Layout



| Dimensions | Value (in mm) |
|------------|---------------|
| Z          | 2.8           |
| X          | 0.7           |
| Y          | 0.9           |
| C          | 1.9           |
| E          | 1.0           |

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