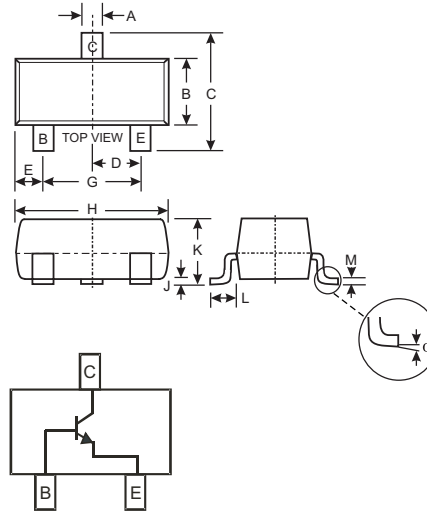


**Features**

- Epitaxial Planar Die Construction
- Ideal for Medium Power Amplification and Switching
- High Collector Current Rating
- Suitable as a low voltage high current driver
- **Lead Free/RoHS Compliant (Note 2)**

**Mechanical Data**

- Case: SOT-23
- 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 (See Page 2): K6D
- Ordering & Date Code Information: See Page 2
- Weight: 0.008 grams (approximate)



| SOT-23               |       |       |
|----------------------|-------|-------|
| Dim                  | Min   | Max   |
| A                    | 0.37  | 0.51  |
| B                    | 1.20  | 1.40  |
| C                    | 2.30  | 2.50  |
| D                    | 0.89  | 1.03  |
| E                    | 0.45  | 0.60  |
| G                    | 1.78  | 2.05  |
| H                    | 2.80  | 3.00  |
| J                    | 0.013 | 0.10  |
| K                    | 0.903 | 1.10  |
| L                    | 0.45  | 0.61  |
| M                    | 0.085 | 0.180 |
| $\alpha$             | 0°    | 8°    |
| All Dimensions in mm |       |       |

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

| Characteristic                                   | Symbol                            | MMBT123S    | Unit |
|--|-----------------------------------|-------------|------|
| Collector-Base Voltage                           | V <sub>CB0</sub>                  | 45          | V    |
| Collector-Emitter Voltage                        | V <sub>CEO</sub>                  | 18          | V    |
| Emitter-Base Voltage                             | V <sub>EBO</sub>                  | 5           | V    |
| Collector Current - Continuous                   | I <sub>C</sub>                    | 1           | A    |
| Power Dissipation (Note 1)                       | P <sub>d</sub>                    | 300         | mW   |
| Thermal Resistance, Junction to Ambient (Note 1) | R <sub>θJA</sub>                  | 417         | °C/W |
| Operating and Storage and Temperature Range      | T <sub>j</sub> , T <sub>STG</sub> | -55 to +150 | °C   |

- 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.

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

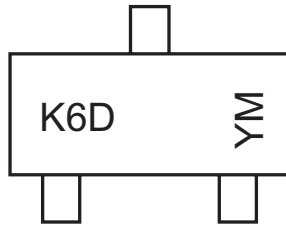
| Characteristic                       | Symbol        | Min | Max | Unit          | Test Condition  |
|--------------------------------------|---------------|-----|-----|---------------|---|
| <b>OFF CHARACTERISTICS (Note 3)</b>  |               |     |     |               |   |
| Collector-Base Breakdown Voltage     | $V_{(BR)CBO}$ | 45  | —   | V             | $I_C = 100\mu\text{A}, I_E = 0$                             |
| Collector-Emitter Breakdown Voltage  | $V_{(BR)CEO}$ | 18  | —   | V             | $I_C = 1\text{mA}, I_B = 0$                                 |
| Emitter-Base Breakdown Voltage       | $V_{(BR)EBO}$ | 5   | —   | V             | $I_E = 100\mu\text{A}, I_C = 0$                             |
| Collector Cutoff Current             | $I_{CBO}$     | —   | 1   | $\mu\text{A}$ | $V_{CB} = 40\text{V}, I_E = 0$                              |
| Emitter Cutoff Current               | $I_{EBO}$     | —   | 1   | $\mu\text{A}$ | $V_{EB} = 4\text{V}, I_C = 0$                               |
| <b>ON CHARACTERISTICS (Note 3)</b>   |               |     |     |               |   |
| DC Current Gain                      | $h_{FE}$      | 150 | 800 | —             | $I_C = 100\text{mA}, V_{CE} = 1\text{V}$                    |
| Collector-Emitter Saturation Voltage | $V_{CE(SAT)}$ | —   | 0.5 | V             | $I_C = 300\text{mA}, I_B = 30\text{mA}$                     |
| <b>SMALL SIGNAL CHARACTERISTICS</b>  |               |     |     |               |   |
| Output Capacitance                   | $C_{obo}$     | —   | 8   | pF            | $V_{CB} = 10\text{V}, f = 1.0\text{MHz}, I_E = 0$           |
| Current Gain-Bandwidth Product       | $f_T$         | 100 | —   | MHz           | $V_{CB} = 10\text{V}, I_E = 50\text{mA}, f = 100\text{MHz}$ |

Notes: 3. Short duration pulse test used to minimize self-heating effect.

**Ordering Information** (Note 4)

| Device       | Packaging | Shipping         |
|--------------|-----------|------------------|
| MMBT123S-7-F | SOT-23    | 3000/Tape & Reel |

 Notes: 4. For Packaging Details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

**Marking Information**


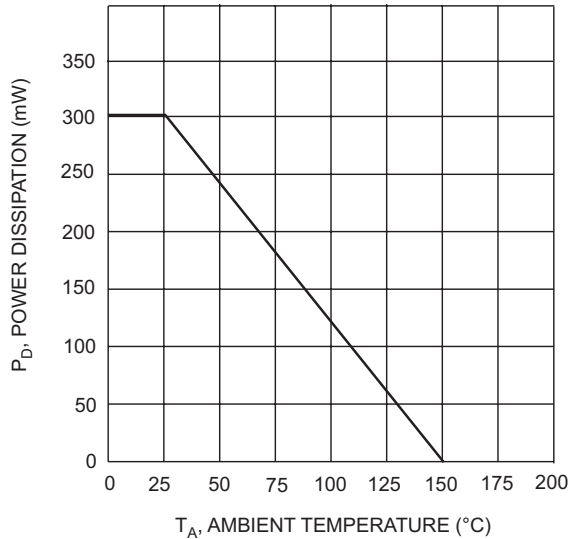
K6D = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year ex: N = 2002  
 M = Month ex: 9 = September

Date Code Key

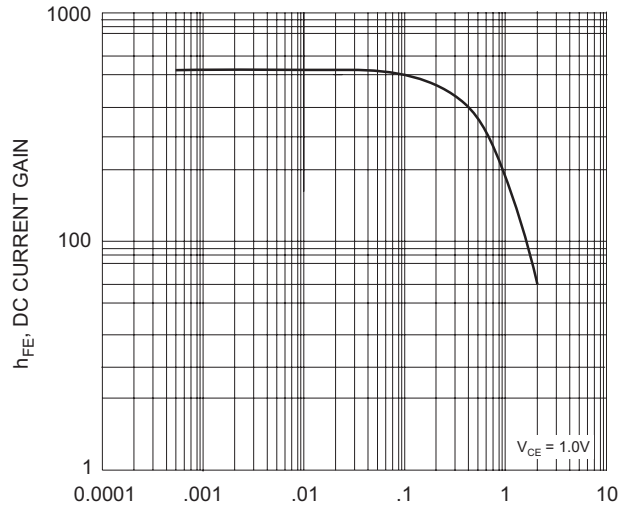
| Year | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|------|------|------|------|------|------|------|------|------|
| Code | N    | P    | R    | S    | T    | U    | V    | W    |

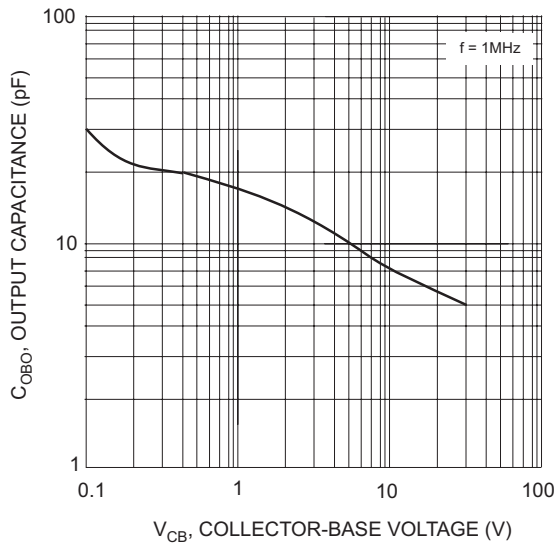
| Month | Jan | Feb | March | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-------|-----|-----|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Code  | 1   | 2   | 3     | 4   | 5   | 6   | 7   | 8   | 9   | O   | N   | D   |



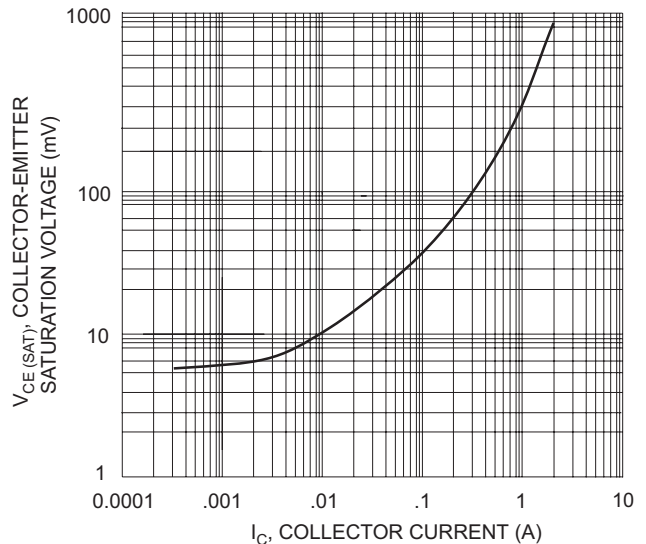
T<sub>A</sub>, AMBIENT TEMPERATURE (°C)  
Fig. 1, Max Power Dissipation vs Ambient Temperature



I<sub>C</sub>, COLLECTOR CURRENT (A)  
Fig. 2, Typical DC Current Gain vs Collector Current



V<sub>CB</sub>, COLLECTOR-BASE VOLTAGE (V)  
Fig. 3, Output Capacitance vs. Collector-Base Voltage



I<sub>C</sub>, COLLECTOR CURRENT (A)  
Fig. 4, Collector Saturation Voltage vs Collector Current

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