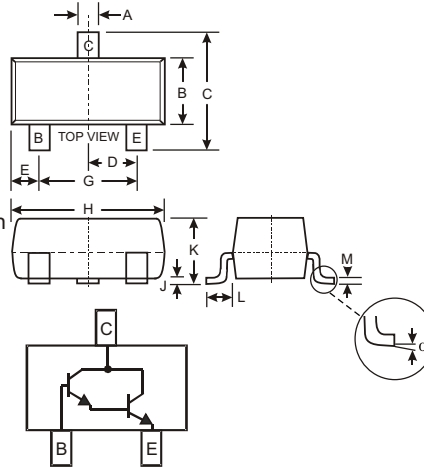


### Features

- Epitaxial Planar Die Construction
- Complementary PNP Types Available (MMBTA63 /MMBTA64)
- Ideal for Medium Power Amplification and Switching
- High Current Gain
- Lead Free/RoHS Compliant (Note 3)**
- Qualified to AEC-Q101 Standards for High Reliability**

### Mechanical Data

- Case: SOT-23
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020C
- Terminal Connections: See Diagram
- Terminals: Solderable per MIL-STD-202, Method 208
- Lead Free Plating (Matte Tin Finish annealed over Alloy 42 leadframe).
- MMBTA13 Marking (See Page 2): K2D, K3D
- MMBTA14 Marking (See Page 2): K3D
- 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 |
|                      | 0     | 8     |
| All Dimensions in mm |       |       |

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

| Characteristic                                   | Symbol                            | MMBTA13     | MMBTA14 | Unit |
|--|-----------------------------------|-------------|---------|------|
| Collector-Base Voltage                           | V <sub>CB0</sub>                  | 30          |         | V    |
| Collector-Emitter Voltage                        | V <sub>CEO</sub>                  | 30          |         | V    |
| Emitter-Base Voltage                             | V <sub>EBO</sub>                  | 10          |         | V    |
| Collector Current - Continuous (Note 1)          | I <sub>C</sub>                    | 300         |         | mA   |
| Power Dissipation (Note 1)                       | P <sub>d</sub>                    | 300         |         | mW   |
| Thermal Resistance, Junction to Ambient (Note 1) | R <sub>JA</sub>                   | 417         |         | CW   |
| Operating and Storage and 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 2)</b>  |  |                 |                                     |      |  |
| Collector-Emitter Breakdown Voltage  | V <sub>(BR)CEO</sub>                     | 30              |                                     | V    | I <sub>C</sub> = 100 μA, V <sub>BE</sub> = 0V  |
| Collector Cutoff Current             | I <sub>CBO</sub>                         |                 | 100                                 | nA   | V <sub>CB</sub> = 30V, I <sub>E</sub> = 0  |
| Emitter Cutoff Current               | I <sub>EBO</sub>                         |                 | 100                                 | nA   | V <sub>EB</sub> = 10V, I <sub>C</sub> = 0  |
| <b>ON CHARACTERISTICS (Note 2)</b>   |  |                 |                                     |      |  |
| DC Current Gain                      | MMBTA13<br>MMBTA14<br>MMBTA13<br>MMBTA14 | h <sub>FE</sub> | 5,000<br>10,000<br>10,000<br>20,000 |      | I <sub>C</sub> = 10mA, V <sub>CE</sub> = 5.0V<br>I <sub>C</sub> = 10mA, V <sub>CE</sub> = 5.0V<br>I <sub>C</sub> = 100mA, V <sub>CE</sub> = 5.0V<br>I <sub>C</sub> = 100mA, V <sub>CE</sub> = 5.0V |
| Collector-Emitter Saturation Voltage | V <sub>CE(SAT)</sub>                     |                 | 1.5                                 | V    | I <sub>C</sub> = 100mA, I <sub>B</sub> = 100 μA  |
| Base-Emitter Saturation Voltage      | V <sub>BE(SAT)</sub>                     |                 | 2.0                                 | V    | I <sub>C</sub> = 100mA, V <sub>CE</sub> = 5.0V   |
| <b>SMALL SIGNAL CHARACTERISTICS</b>  |  |                 |                                     |      |  |
| Output Capacitance                   | C <sub>obo</sub>                         | 8.0 Typical     |                                     | pF   | V <sub>CB</sub> = 10V, f = 1.0MHz, I <sub>E</sub> = 0  |
| Input Capacitance                    | C <sub>ibo</sub>                         | 15 Typical      |                                     | pF   | V <sub>EB</sub> = 0.5V, f = 1.0MHz, I <sub>C</sub> = 0   |
| Current Gain-Bandwidth Product       | f <sub>T</sub>                           | 125             |                                     | MHz  | V <sub>CE</sub> = 5.0V, I <sub>C</sub> = 10mA, f = 100MHz  |

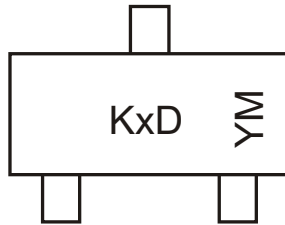
- Note: 1. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch; pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>.
2. Short duration test pulse used to minimize self-heating effect.
3. No purposefully added lead.

**Ordering Information** (Note 4)

| Device                     | Packaging | Shipping         |
|----------------------------|-----------|------------------|
| MMBTA13-7-F<br>MMBTA14-7-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**



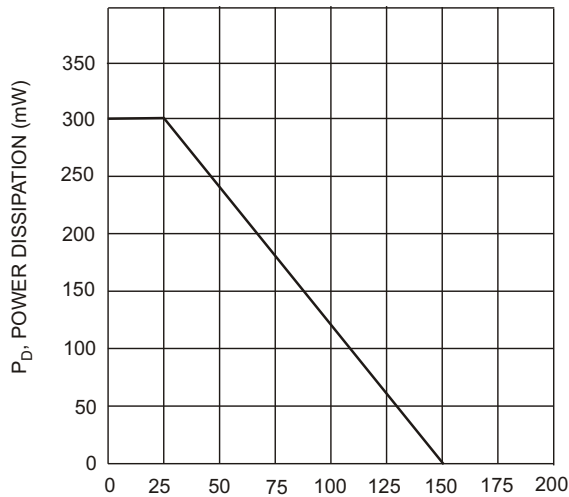
KxD = Product Type Marking Code, ex: K2D = MMBTA13  
 YM = Date Code Marking  
 Y = Year ex: N = 2002  
 M = Month ex: 9 = September

Date Code Key

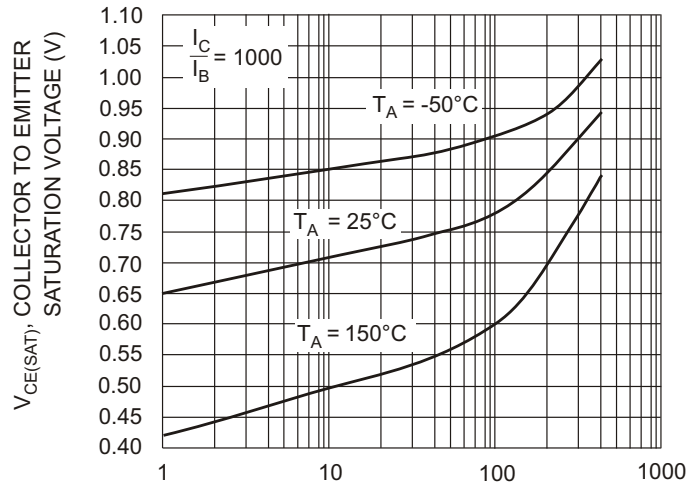
| Year | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Code | J    | K    | L    | M    | N    | P    | R    | S    | T    | U    | V    | W    |

| 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 (mA)  
 Fig. 2, Collector Emitter Saturation Voltage vs. Collector Current

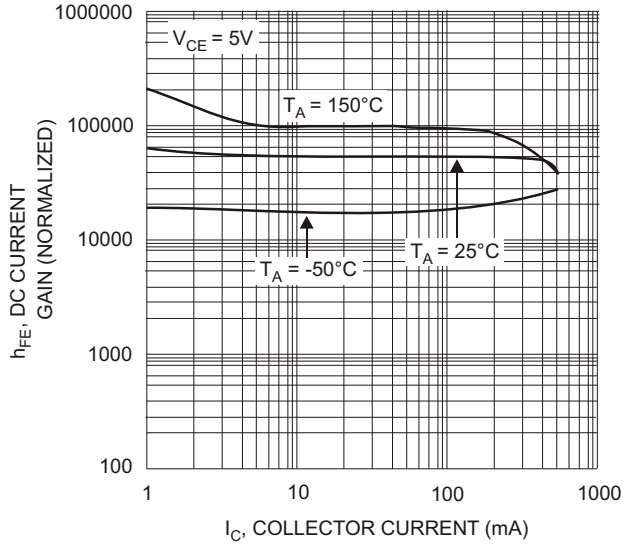


Fig. 3, DC Current Gain vs Collector Current

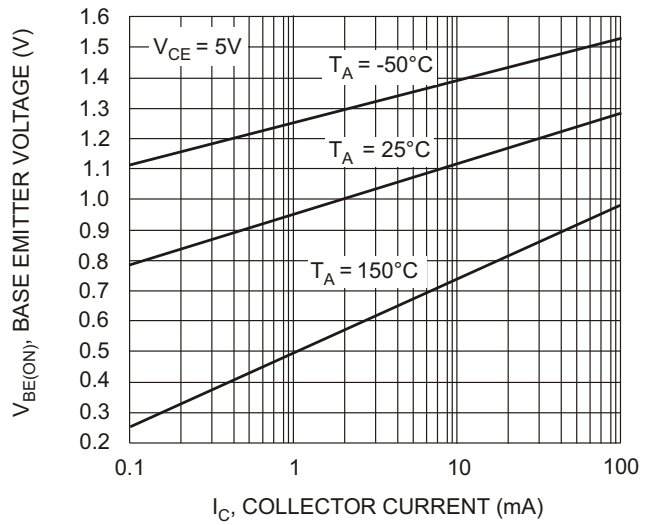


Fig. 4, Base Emitter Voltage vs. Collector Current

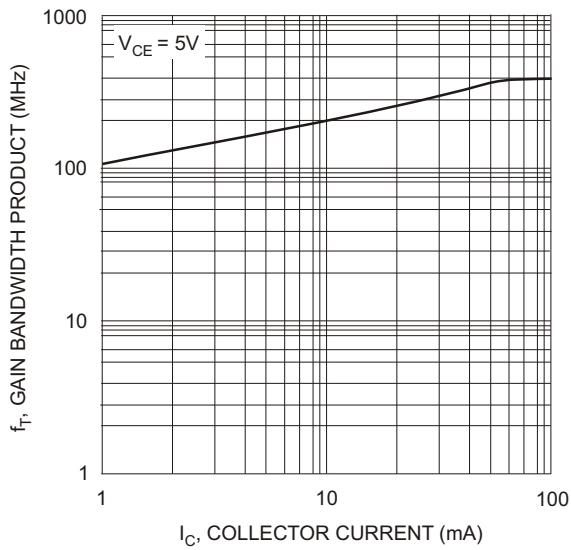


Fig. 5, Gain Bandwidth Product vs Collector Current

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