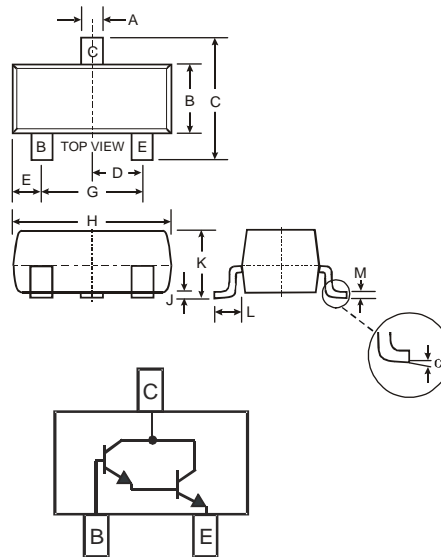


Features

- Epitaxial Planar Die Construction
- Complementary PNP Types Available (MMBTA63 /MMBTA64)
- Ideal for Medium Power Amplification and Switching
- High Current Gain
- **Lead, Halogen and Antimony Free, RoHS Compliant "Green" Device (Notes 3 and 4)**
- **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-020D
- 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 3): K2D, K3D
- MMBTA14 Marking (See Page 3): K3D
- Ordering & Date Code Information: See Page 3
- 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 |
| α | 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_{CB0} | 30 | V |
| Collector-Emitter Voltage | V_{CEO} | 30 | V |
| Emitter-Base Voltage | V_{EBO} | 10 | V |
| Collector Current - Continuous | I_C | 300 | mA |
| Power Dissipation (Note 1) | P_D | 300 | mW |
| Thermal Resistance, Junction to Ambient (Note 1) | $R_{\theta JA}$ | 417 | $^\circ\text{C/W}$ |
| Operating and Storage and Temperature Range | T_J, T_{STG} | -55 to +150 | $^\circ\text{C}$ |

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

| Characteristic | Symbol | Min | Max | Unit | Test Condition |
|--------------------------------------|--|-------------|-------------------------------------|------|--|
| OFF CHARACTERISTICS (Note 2) | | | | | |
| Collector-Emitter Breakdown Voltage | $V_{(BR)CEO}$ | 30 | — | V | $I_C = 100\mu\text{A}, V_{BE} = 0\text{V}$ |
| Collector Cutoff Current | I_{CBO} | — | 100 | nA | $V_{CB} = 30\text{V}, I_E = 0$ |
| Emitter Cutoff Current | I_{EBO} | — | 100 | nA | $V_{EB} = 10\text{V}, I_C = 0$ |
| ON CHARACTERISTICS (Note 2) | | | | | |
| DC Current Gain | MMBTA13 MMBTA14 MMBTA13 MMBTA14 | h_{FE} | 5,000 10,000 10,000 20,000 | — | $I_C = 10\text{mA}, V_{CE} = 5.0\text{V}$ $I_C = 10\text{mA}, V_{CE} = 5.0\text{V}$ $I_C = 100\text{mA}, V_{CE} = 5.0\text{V}$ $I_C = 100\text{mA}, V_{CE} = 5.0\text{V}$ |
| Collector-Emitter Saturation Voltage | $V_{CE(SAT)}$ | — | 1.5 | V | $I_C = 100\text{mA}, I_B = 100\mu\text{A}$ |
| Base-Emitter Saturation Voltage | $V_{BE(SAT)}$ | — | 2.0 | V | $I_C = 100\text{mA}, V_{CE} = 5.0\text{V}$ |
| SMALL SIGNAL CHARACTERISTICS | | | | | |
| Output Capacitance | C_{obo} | 8.0 Typical | — | pF | $V_{CB} = 10\text{V}, f = 1.0\text{MHz}, I_E = 0$ |
| Input Capacitance | C_{ibo} | 15 Typical | — | pF | $V_{EB} = 0.5\text{V}, f = 1.0\text{MHz}, I_C = 0$ |
| Current Gain-Bandwidth Product | f_T | 125 | — | MHz | $V_{CE} = 5.0\text{V}, I_C = 10\text{mA}, f = 100\text{MHz}$ |

- 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. Short duration pulse test used to minimize self-heating effect.
 3. No purposefully added lead. Halogen and Antimony Free.
 4. Product manufactured with Data Code V9 (week 33, 2008) and newer are built with Green Molding Compound. Product manufactured prior to Date Code V9 are built with Non-Green Molding Compound and may contain Halogens or Sb_2O_3 Fire Retardants.

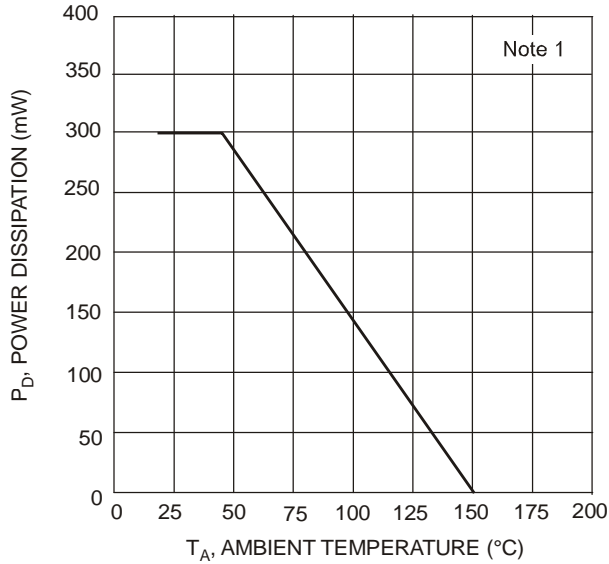


Fig. 1, Max Power Dissipation vs Ambient Temperature

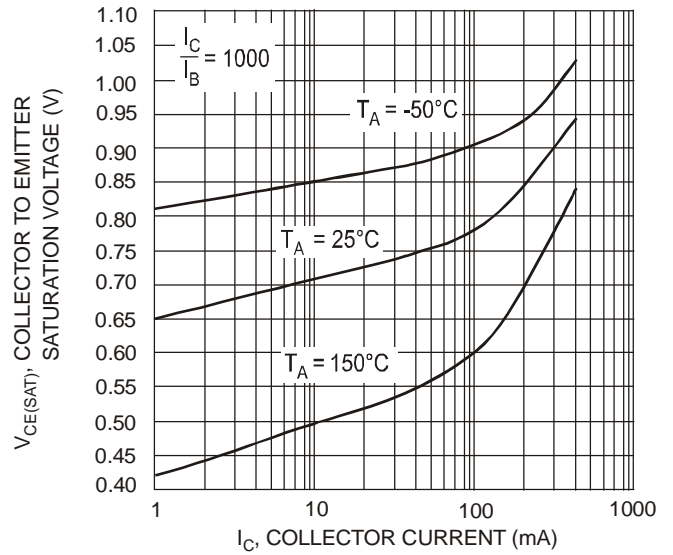


Fig. 2, Collector Emitter Saturation Voltage vs. Collector Current

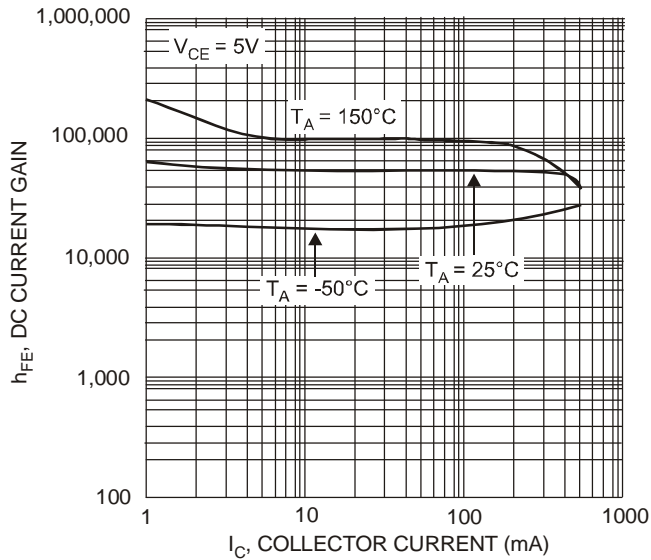


Fig. 3, DC Current Gain vs Collector Current

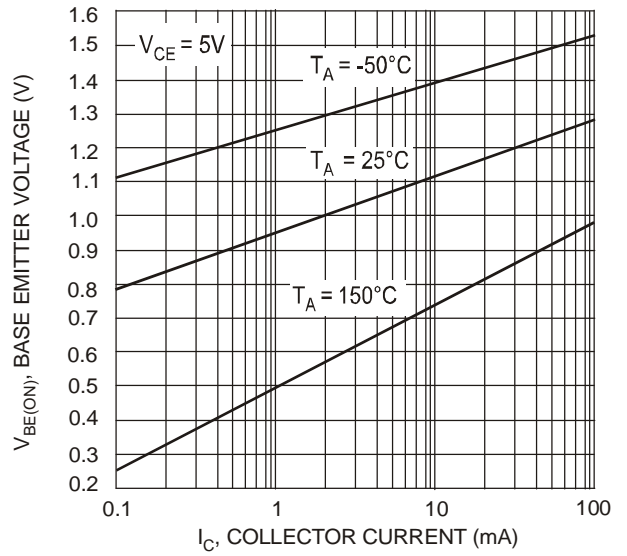


Fig. 4, Base Emitter Voltage vs. Collector Current

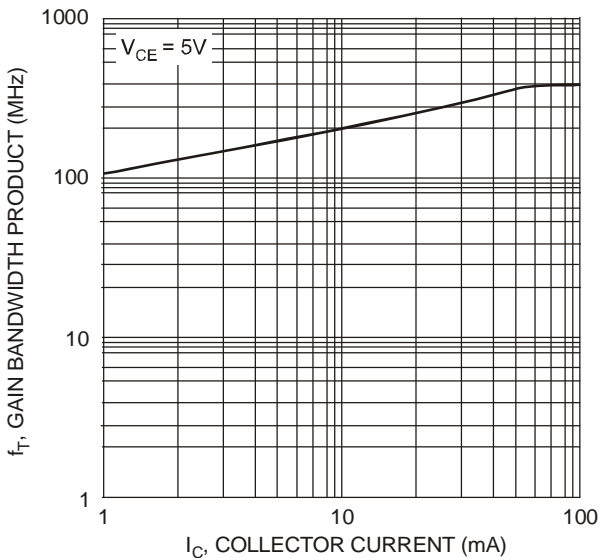


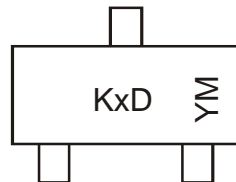
Fig. 5, Gain Bandwidth Product vs Collector Current

Ordering Information (Note 5)

| Device | Packaging | Shipping |
|-------------|-----------|------------------|
| MMBTA13-7-F | SOT-23 | 3000/Tape & Reel |
| MMBTA14-7-F | SOT-23 | 3000/Tape & Reel |

Notes: 5. 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 | 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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