

Features

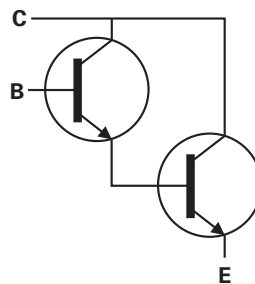
- $BV_{CES} > 80V$
- Epitaxial Planar Die Construction
- Ideal for Low Power Amplification and Switching
- High Current Gain
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

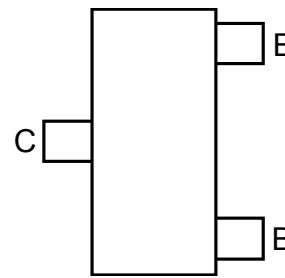
- Case: SOT23
- Case Material: molded plastic, "Green" molding compound
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208
- Weight 0.008 grams (approximate)



Top View



Device Symbol



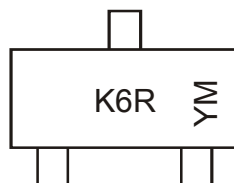
Top View
Pin-Out

Ordering Information (Note 4)

| Part Number | Compliance | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|--------------|------------|---------|--------------------|-----------------|-------------------|
| MMBTA28-7-F | AEC-Q101 | K6R | 7 | 8 | 3,000 |
| MMBTA28-13-F | AEC-Q101 | K6R | 13 | 8 | 10,000 |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 4. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information



K6R = Product Type Marking Code
YM = Date Code Marking
Y or \bar{Y} = Year (ex: B = 2014)
M or \bar{M} = Month (ex: 9 = September)

Date Code Key

| Year | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|------|------|------|------|------|------|------|------|------|
| Code | X | Y | Z | A | B | C | D | E |

| 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 |

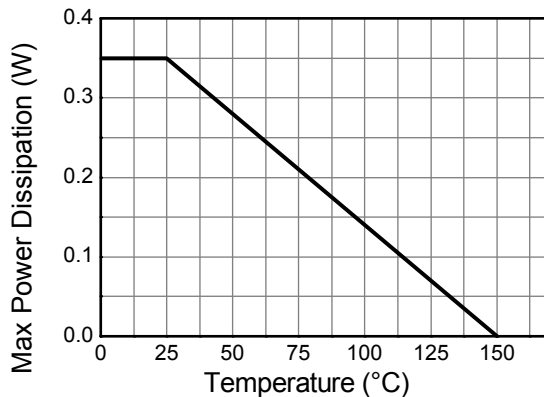
Absolute Maximum Ratings (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|------------------------------|-----------|-------|------|
| Collector-Base Voltage | V_{CBO} | 80 | V |
| Collector-Emitter Voltage | V_{CES} | 80 | V |
| Emitter-Base Voltage | V_{EBO} | 12 | V |
| Continuous Collector Current | I_C | 500 | mA |

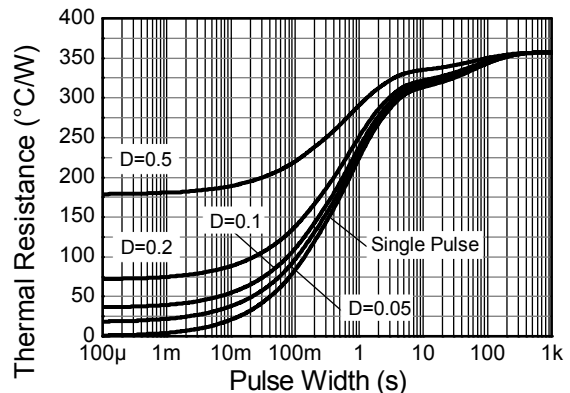
Thermal Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|---|-----------------|-------------|--------------------|
| Power Dissipation | P_D | 310 | mW |
| | | 350 | |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 403 | $^\circ\text{C/W}$ |
| | | 357 | |
| Thermal Resistance, Junction to Leads | $R_{\theta JL}$ | 350 | $^\circ\text{C/W}$ |
| Operating and Storage Temperature Range | T_J, T_{STG} | -55 to +150 | $^\circ\text{C}$ |

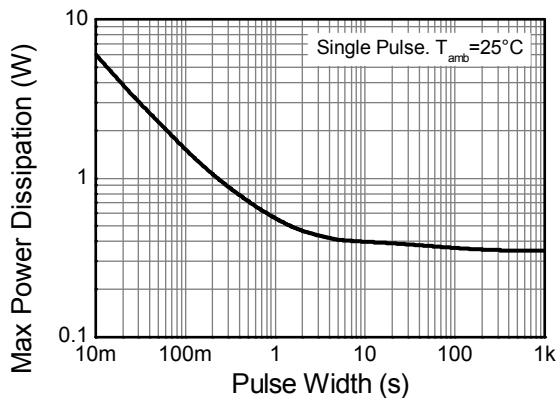
- Notes:
- For a device mounted on minimum recommended pad layout 1oz copper that is on a single-sided FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.
 - Same as note (5), except the device is mounted on 15 mm x 15mm 1oz copper.
 - Thermal resistance from junction to solder-point (at the end of the leads).



Derating Curve



Transient Thermal Impedance



Pulse Power Dissipation

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|----------------------|------------------|------|------------|------|--|
| OFF CHARACTERISTICS | | | | | | |
| Collector-Base Breakdown Voltage | BV _{CBO} | 80 | — | — | V | I _C = 100μA, I _E = 0 |
| Collector-Emitter Breakdown Voltage (Note 8) | BV _{CES} | 80 | — | — | V | I _C = 100μA, V _{BE} = 0 |
| Emitter-Base Breakdown Voltage | BV _{EBO} | 12 | — | — | V | I _E = 100μA, I _C = 0 |
| Collector cut-off current | I _{CBO} | — | — | 100 | nA | V _{CB} = 60V, I _E = 0 |
| | I _{CES} | — | — | 500 | nA | V _{CE} = 60V, V _{BE} = 0 |
| Emitter-base Cut-off Current | I _{EBO} | — | — | 100 | nA | V _{EB} = 10V, I _C = 0 |
| ON CHARACTERISTICS (Note 8) | | | | | | |
| Static Forward Current Transfer Ratio | h _{FE} | 10,000 10,000 | — | — | — | I _C = 10mA, V _{CE} = 5V I _C = 100mA, V _{CE} = 5V |
| Collector-Emitter Saturation Voltage | V _{CE(sat)} | — | — | 1.2 1.5 | V | I _C = 10mA, I _B = 10μA I _C = 100mA, I _B = 100μA |
| Base-Emitter Turn-On Voltage | V _{BE(on)} | — | — | 2.0 | V | I _C = 100mA, V _{CE} = 5V |
| SMALL SIGNAL CHARACTERISTICS (Note 8) | | | | | | |
| Current Gain-Bandwidth Product | f _T | 125 | — | — | MHz | I _C = 10mA, V _{CE} = 5V, f = 100MHz |
| Output Capacitance | C _{obo} | — | 8.0 | — | pF | V _{CB} = 10V, f = 1MHz, I _E = 0 |
| Input Capacitance | C _{ibo} | — | 15.0 | — | pF | V _{EB} = 0.5V, f = 1MHz, I _C = 0 |

Note: 8. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%

Typical Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

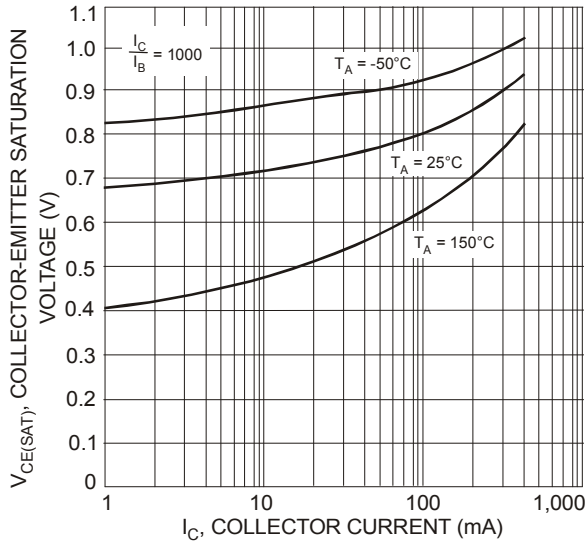


Fig. 2 Typical Collector-Emitter Saturation Voltage vs. Collector Current

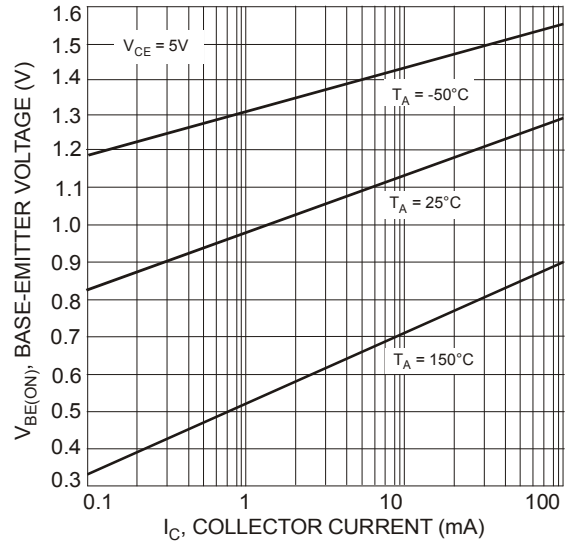


Fig. 3 Typical Base-Emitter Voltage vs. Collector Current

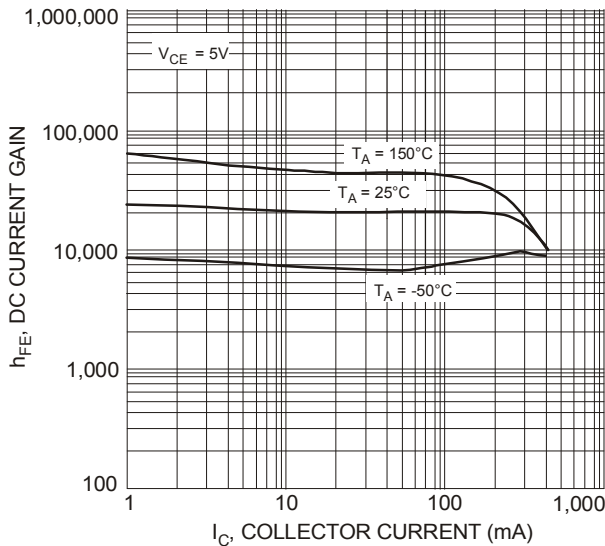


Fig. 4 Typical DC Current Gain vs. Collector Current

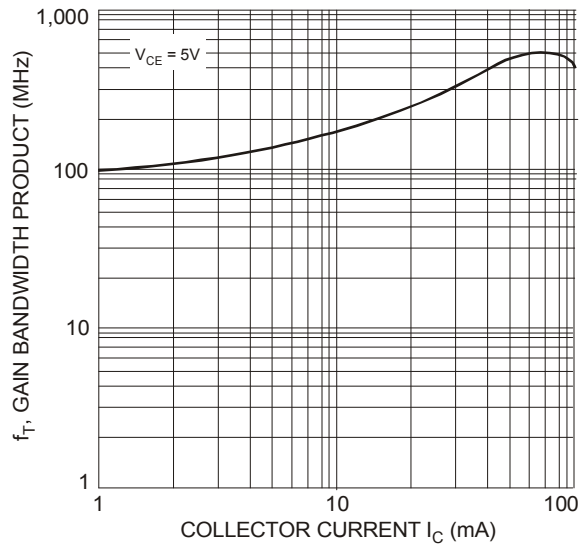
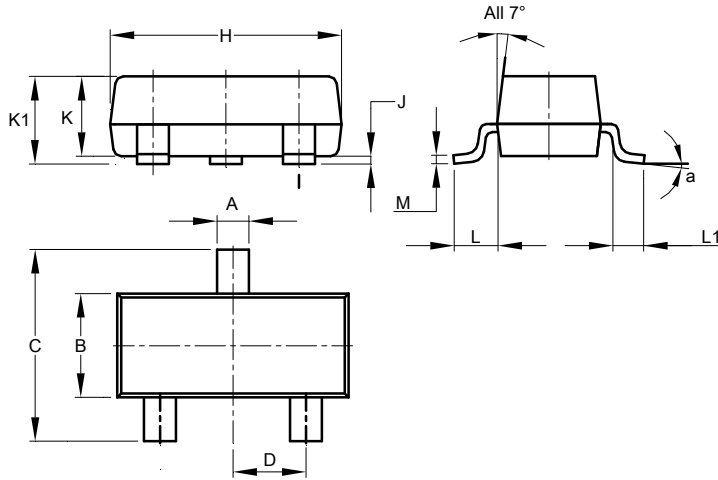


Fig. 5 Typical Gain Bandwidth Product vs. Collector Current

Package Outline Dimensions

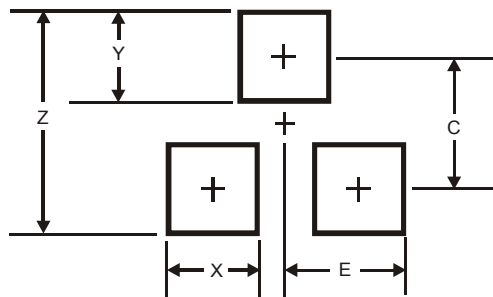
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



| SOT23 | | | |
|----------------------|-------|-------|-------|
| Dim | Min | Max | Typ |
| A | 0.37 | 0.51 | 0.40 |
| B | 1.20 | 1.40 | 1.30 |
| C | 2.30 | 2.50 | 2.40 |
| D | 0.89 | 1.03 | 0.915 |
| F | 0.45 | 0.60 | 0.535 |
| G | 1.78 | 2.05 | 1.83 |
| H | 2.80 | 3.00 | 2.90 |
| J | 0.013 | 0.10 | 0.05 |
| K | 0.890 | 1.00 | 0.975 |
| K1 | 0.903 | 1.10 | 1.025 |
| L | 0.45 | 0.61 | 0.55 |
| L1 | 0.25 | 0.55 | 0.40 |
| M | 0.085 | 0.150 | 0.110 |
| a | 8° | | |
| All Dimensions in mm | | | |

Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



| Dimensions | Value (in mm) |
|------------|---------------|
| Z | 2.9 |
| X | 0.8 |
| Y | 0.9 |
| C | 2.0 |
| E | 1.35 |

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