

## Features

- $BV_{CEO} > 160V$
- Ideal for Low Power Amplification and Switching
- Complementary PNP Type Available (MMBT5401)
- **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**

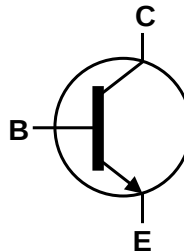
## Mechanical Data

- Case: SOT-23
- 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)

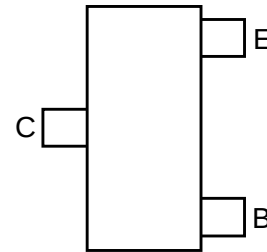
SOT23



Top View



Device Symbol

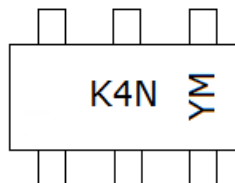

 Top View  
Pin-Out

## Ordering Information (Note 4)

| Part Number  | Compliance | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|--------------|------------|---------|--------------------|-----------------|-------------------|
| MMBT5551-7-F | AEC-Q101   | K4N     | 7                  | 8               | 3,000             |

- 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](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



K4N = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: B = 2014)  
 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<sub>A</sub> = +25°C unless otherwise specified)

| Characteristic                          | Symbol           | Value | Unit |
|-----------------------------------------|------------------|-------|------|
| Collector-Base Voltage                  | V <sub>CBO</sub> | 180   | V    |
| Collector-Emitter Voltage               | V <sub>CEO</sub> | 160   | V    |
| Emitter-Base Voltage                    | V <sub>EBO</sub> | 6.0   | V    |
| Collector Current - Continuous (Note 1) | I <sub>C</sub>   | 600   | mA   |

**Thermal Characteristics** (@T<sub>A</sub> = +25°C unless otherwise specified)

| Characteristic                                   | Symbol                            | Value       | Unit |
|--------------------------------------------------|-----------------------------------|-------------|------|
| Power Dissipation (Note 5)                       | P <sub>D</sub>                    | 300         | mW   |
| Thermal Resistance, Junction to Ambient (Note 5) | R <sub>θJA</sub>                  | 417         | °C/W |
| Operating and Storage Temperature Range          | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C   |

**ESD Ratings** (Note 6)

| Characteristic                             | Symbol  | Value | Unit | JEDEC Class |
|--------------------------------------------|---------|-------|------|-------------|
| Electrostatic Discharge - Human Body Model | ESD HBM | 4,000 | V    | 3A          |
| Electrostatic Discharge - Machine Model    | ESD MM  | 400   | V    | C           |

- Notes:
5. 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.
  6. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

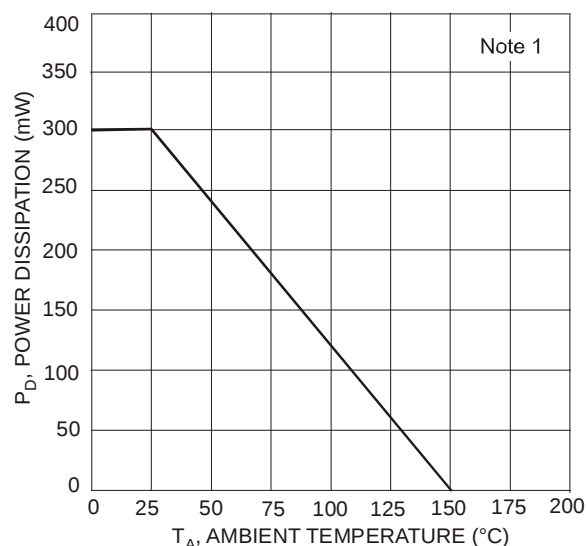


Fig. 1 Power Dissipation vs. Ambient Temperature

# Electrical Characteristics @T<sub>A</sub> = 25°C unless otherwise specified

| Characteristic                       | Symbol               | Min            | Max           | Unit     | Test Condition                                                                                                                                   |
|--------------------------------------|----------------------|----------------|---------------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>OFF CHARACTERISTICS (Note 7)</b>  |                      |                |               |          |                                                                                                                                                  |
| Collector-Base Breakdown Voltage     | V <sub>(BR)CBO</sub> | 180            | —             | V        | I <sub>C</sub> = 100μA, I <sub>E</sub> = 0                                                                                                       |
| Collector-Emitter Breakdown Voltage  | V <sub>(BR)CEO</sub> | 160            | —             | V        | I <sub>C</sub> = 1.0mA, I <sub>B</sub> = 0                                                                                                       |
| Emitter-Base Breakdown Voltage       | V <sub>(BR)EBO</sub> | 6.0            | —             | V        | I <sub>E</sub> = 10μA, I <sub>C</sub> = 0                                                                                                        |
| Collector Cutoff Current             | I <sub>CBO</sub>     | —              | 50            | nA<br>μA | V <sub>CB</sub> = 120V, I <sub>E</sub> = 0<br>V <sub>CB</sub> = 120V, I <sub>E</sub> = 0, T <sub>A</sub> = 100°C                                 |
| Emitter Cutoff Current               | I <sub>EBO</sub>     | —              | 50            | nA       | V <sub>EB</sub> = 4.0V, I <sub>C</sub> = 0                                                                                                       |
| <b>ON CHARACTERISTICS (Note 7)</b>   |                      |                |               |          |                                                                                                                                                  |
| DC Current Gain                      | h <sub>FE</sub>      | 80<br>80<br>30 | —<br>250<br>— | —        | I <sub>C</sub> = 1.0mA, V <sub>CE</sub> = 5.0V<br>I <sub>C</sub> = 10mA, V <sub>CE</sub> = 5.0V<br>I <sub>C</sub> = 50mA, V <sub>CE</sub> = 5.0V |
| Collector-Emitter Saturation Voltage | V <sub>CE(SAT)</sub> | —              | 0.15<br>0.20  | V        | I <sub>C</sub> = 10mA, I <sub>B</sub> = 1.0mA<br>I <sub>C</sub> = 50mA, I <sub>B</sub> = 5.0mA                                                   |
| Base-Emitter Saturation Voltage      | V <sub>BE(SAT)</sub> | —              | 1.0           | V        | I <sub>C</sub> = 10mA, I <sub>B</sub> = 1.0mA<br>I <sub>C</sub> = 50mA, I <sub>B</sub> = 5.0mA                                                   |
| <b>SMALL SIGNAL CHARACTERISTICS</b>  |                      |                |               |          |                                                                                                                                                  |
| Output Capacitance                   | C <sub>obo</sub>     | —              | 6.0           | pF       | V <sub>CB</sub> = 10V, f = 1.0MHz, I <sub>E</sub> = 0                                                                                            |
| Small Signal Current Gain            | h <sub>fe</sub>      | 50             | 250           | —        | V <sub>CE</sub> = 10V, I <sub>C</sub> = 1.0mA,<br>f = 1.0kHz                                                                                     |
| Current Gain-Bandwidth Product       | f <sub>T</sub>       | 100            | 300           | MHz      | V <sub>CE</sub> = 10V, I <sub>C</sub> = 10mA,<br>f = 100MHz                                                                                      |
| Noise Figure                         | nF                   | —              | 8.0           | dB       | V <sub>CE</sub> = 5.0V, I <sub>C</sub> = 200μA,<br>R <sub>S</sub> = 1.0kΩ, f = 1.0kHz                                                            |

Notes: 7. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

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

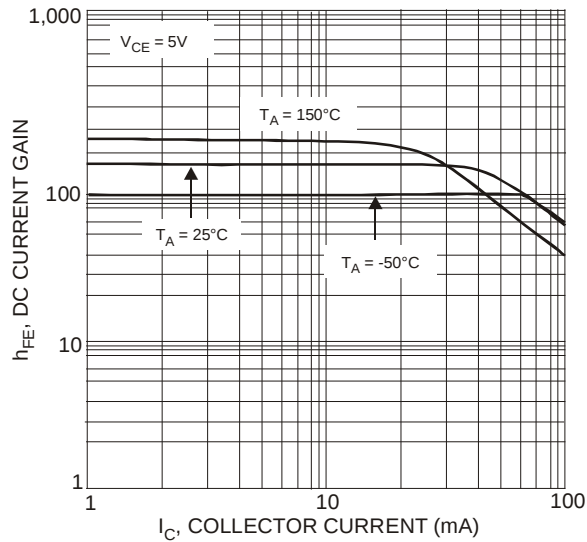


Fig. 2 Typical DC Current Gain vs. Collector Current

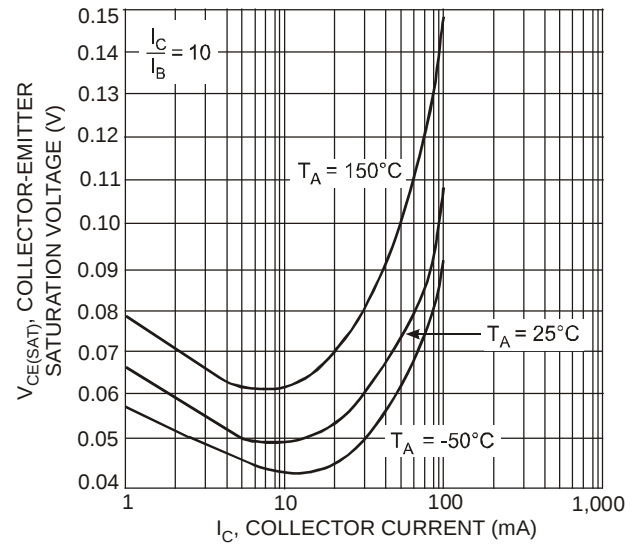


Fig. 3 Typical Collector-Emitter Saturation Voltage vs. Collector Current

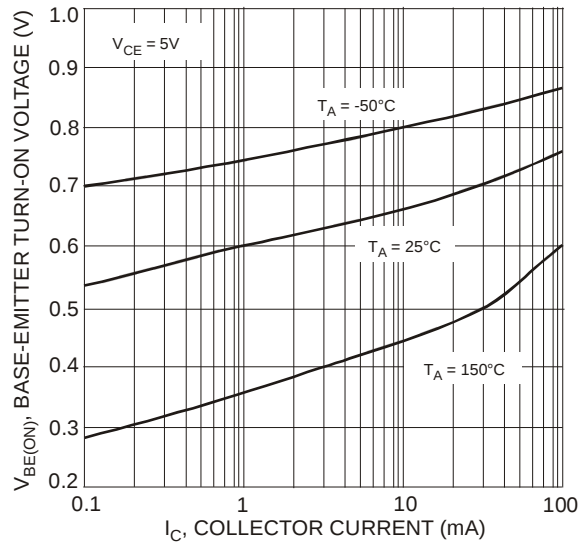


Fig. 4 Typical Base-Emitter Turn-On Voltage vs. Collector Current

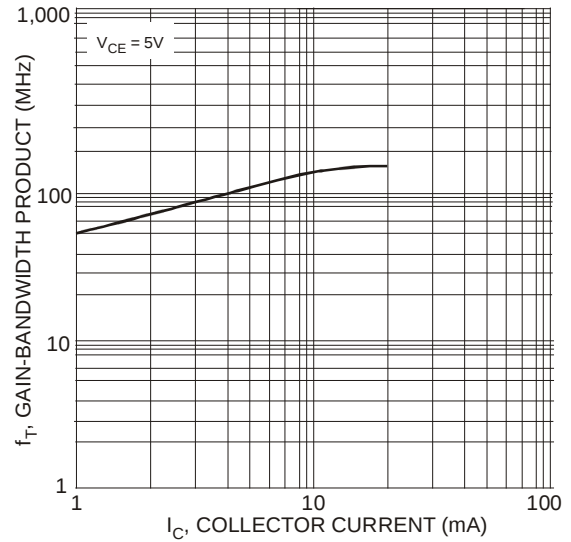
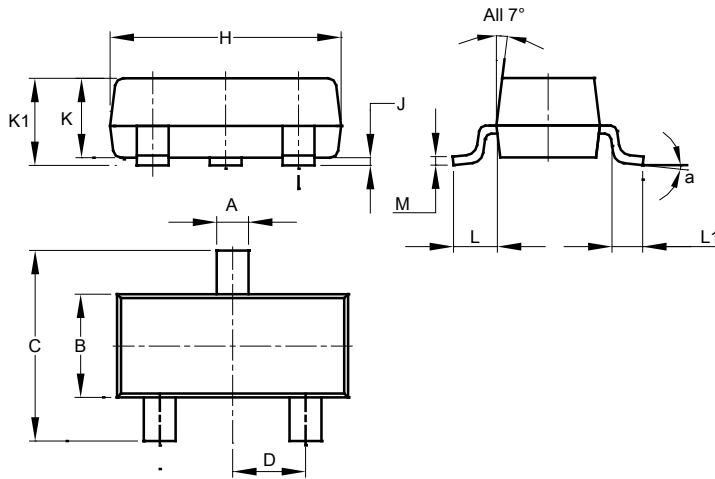


Fig. 5 Typical Gain-Bandwidth Product vs. Collector Current

## Package Outline Dimensions

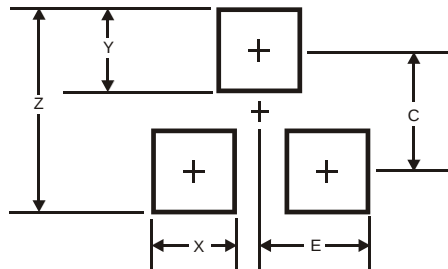
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



| 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 AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for 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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