

## Features

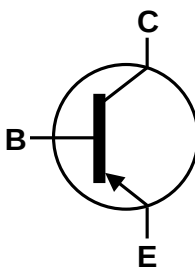
- Epitaxial Planar Die Construction
- Ideal for Low Power Amplification and Switching
- Complementary NPN Type: MMBTA05 / MMBTA06
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

## Mechanical Data

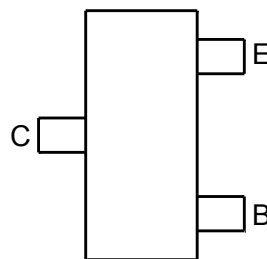
- Case: SOT-23
- Case Material: Molded Plastic, "Green" Molding Compound;  
UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish-Matte Tin Plated Leads.  
Solderable per MIL-STD-202, Method 208 @3
- Weight: 0.008 grams (Approximate)



Top View



Device Symbol

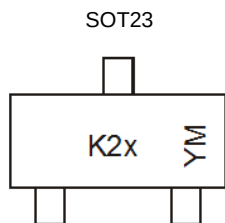

 Top View  
Pin-Out

## Ordering Information (Notes 4 & 5)

| Part Number   | Compliance | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|---------------|------------|---------|--------------------|-----------------|-------------------|
| MMBTA55-7-F   | AEC-Q101   | K2H     | 7                  | 8               | 3,000             |
| MMBTA56-7-F   | AEC-Q101   | K2G     | 7                  | 8               | 3,000             |
| MMBTA56Q-7-F  | Automotive | K2G     | 7                  | 8               | 3,000             |
| MMBTA56Q-13-F | Automotive | K2G     | 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](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. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified.
  5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



K2x = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: C = 2015)  
 M = Month (ex: 9 = September)

### Date Code Key

| Year | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 |
|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Code | C    | D    | E    | F    | G    | H    | I    | J    | K    | L    | M    | N    |

| 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           | MMBTA55 | MMBTA56 | Unit |
|--------------------------------|------------------|---------|---------|------|
| Collector-Base Voltage         | V <sub>CBO</sub> | -60     | -80     | V    |
| Collector-Emitter Voltage      | V <sub>CEO</sub> | -60     | -80     | V    |
| Emitter-Base Voltage           | V <sub>EBO</sub> | -4.0    |         | V    |
| Collector Current - Continuous | I <sub>C</sub>   | -500    |         | mA   |

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

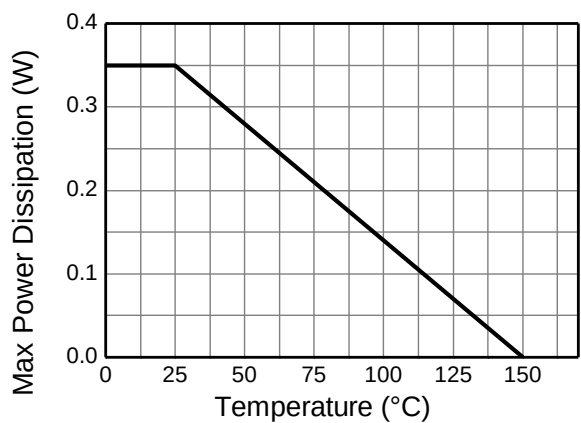
| Characteristic                          | Symbol                            | Value       | Unit |
|-----------------------------------------|-----------------------------------|-------------|------|
| Power Dissipation                       | P <sub>D</sub>                    | 310         | mW   |
|                                         |                                   | 350         |      |
| Thermal Resistance, Junction to Ambient | R <sub>θJA</sub>                  | 403         | °C/W |
|                                         |                                   | 357         |      |
| Thermal Resistance, Junction to Leads   | R <sub>θJL</sub>                  | 350         | °C/W |
| Operating and Storage Temperature Range | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C   |

**ESD Ratings** (Note 9)

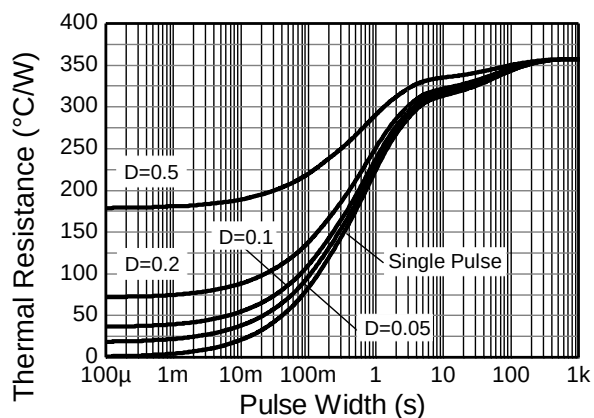
| Characteristic                             | Symbol  | Value | Unit | JEDEC Class |
|--------------------------------------------|---------|-------|------|-------------|
| Electrostatic Discharge - Human Body Model | ESD HBM | 4,000 | V    | 3A          |
| Electrostatic Discharge - Machine Model 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

- Notes:
6. 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.
  7. Same as Note 6, except the device is mounted on 15 mm x 15mm 1oz copper.
  8. Thermal resistance from junction to solder-point (at the end of the leads).
  9. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

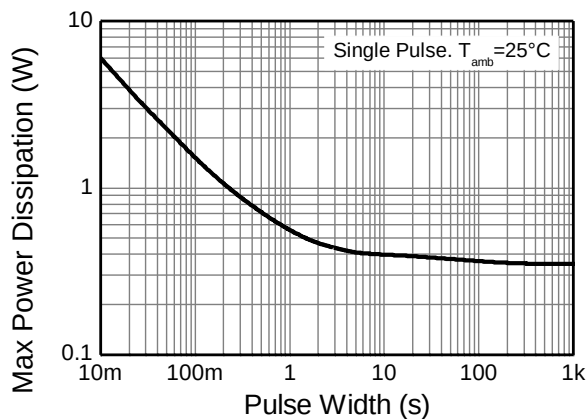
## Thermal Characteristics and Derating Information



**Derating Curve**



**Transient Thermal Impedance**



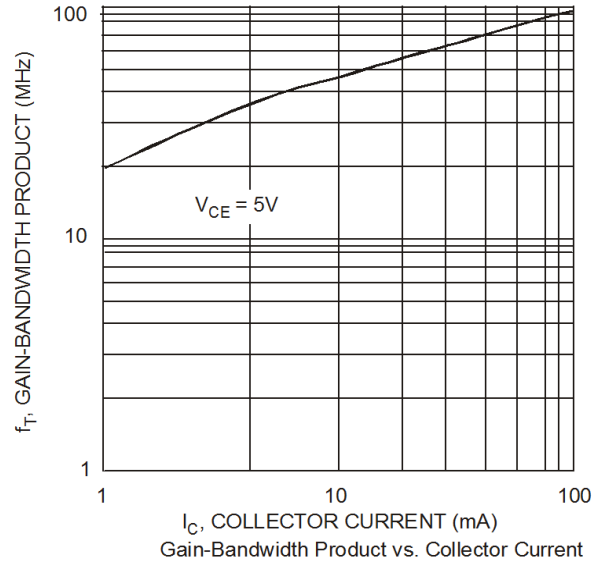
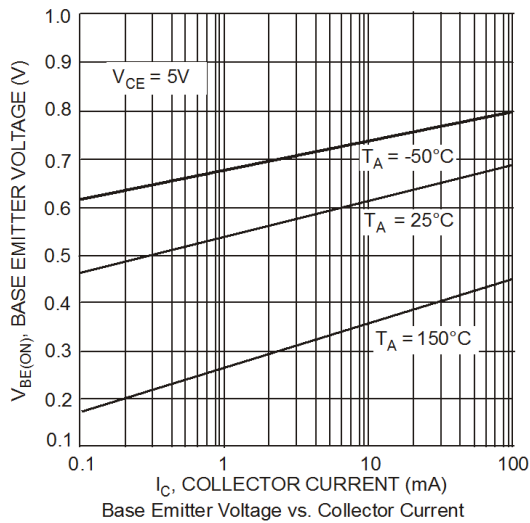
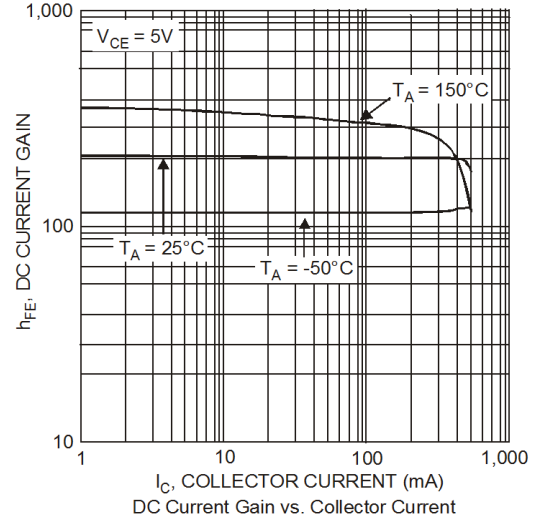
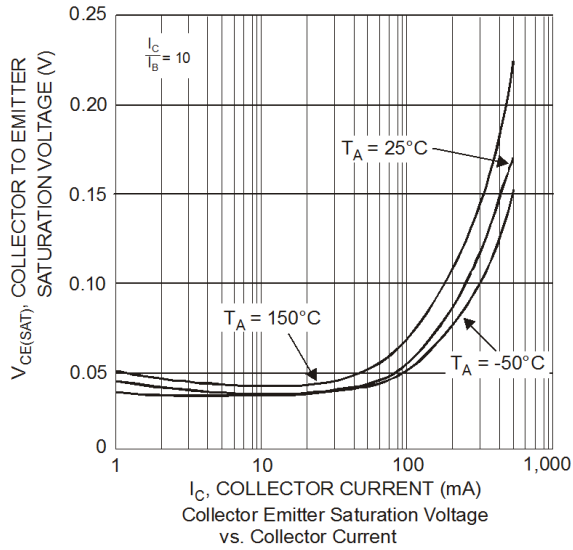
**Pulse Power Dissipation**

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

| Characteristic                       |                    | Symbol               | Min        | Max   | Unit | Test Condition                                                                                      |
|--------------------------------------|--------------------|----------------------|------------|-------|------|-----------------------------------------------------------------------------------------------------|
| <b>OFF CHARACTERISTICS (Note 10)</b> |                    |                      |            |       |      |                                                                                                     |
| Collector-Base Breakdown Voltage     | MMBTA55<br>MMBTA56 | BV <sub>CBO</sub>    | -60<br>-80 | —     | V    | I <sub>C</sub> = -100μA, I <sub>E</sub> = 0                                                         |
| Collector-Emitter Breakdown Voltage  | MMBTA55<br>MMBTA56 | BV <sub>CEO</sub>    | -60<br>-80 | —     | V    | I <sub>C</sub> = -1.0mA, I <sub>B</sub> = 0                                                         |
| Emitter-Base Breakdown Voltage       |                    | BV <sub>EBO</sub>    | -5.0       | -4.0  | —    | I <sub>E</sub> = -100μA, I <sub>C</sub> = 0                                                         |
| Collector Cut-Off Current            | MMBTA55<br>MMBTA56 | I <sub>CBO</sub>     | —          | -100  | nA   | V <sub>CB</sub> = -60V, I <sub>E</sub> = 0<br>V <sub>CB</sub> = -80V, I <sub>E</sub> = 0            |
| Collector Cut-Off Current            |                    | I <sub>CEX</sub>     | —          | -100  | nA   | V <sub>CE</sub> = -60V, I <sub>BO</sub> = 0V<br>V <sub>CE</sub> = -80V, I <sub>BO</sub> = 0V        |
| <b>ON CHARACTERISTICS (Note 10)</b>  |                    |                      |            |       |      |                                                                                                     |
| DC Current Gain                      |                    | h <sub>FE</sub>      | 100        | —     | —    | I <sub>C</sub> = -10mA, V <sub>CE</sub> = -1.0V<br>I <sub>C</sub> = -100mA, V <sub>CE</sub> = -1.0V |
| Collector-Emitter Saturation Voltage |                    | V <sub>CE(SAT)</sub> | —          | -0.25 | V    | I <sub>C</sub> = -100mA, I <sub>B</sub> = -10mA                                                     |
| Base-Emitter Saturation Voltage      |                    | V <sub>BE(SAT)</sub> | —          | -1.2  | V    | I <sub>C</sub> = -100mA, V <sub>CE</sub> = -1.0V                                                    |
| <b>SMALL SIGNAL CHARACTERISTICS</b>  |                    |                      |            |       |      |                                                                                                     |
| Current Gain-Bandwidth Product       |                    | f <sub>T</sub>       | 50         | —     | MHz  | V <sub>CE</sub> = -1.0V, I <sub>C</sub> = -100mA,<br>f = 100MHz                                     |

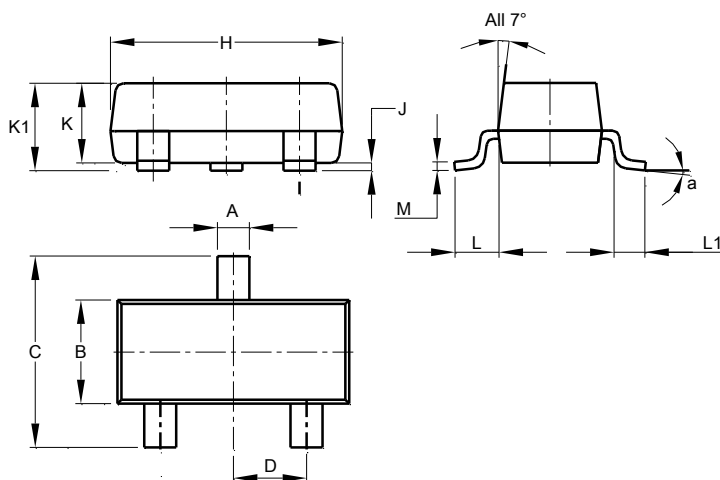
Note: 10. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

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



## Package Outline Dimensions

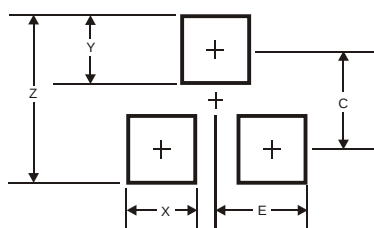
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



| 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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