

## Description

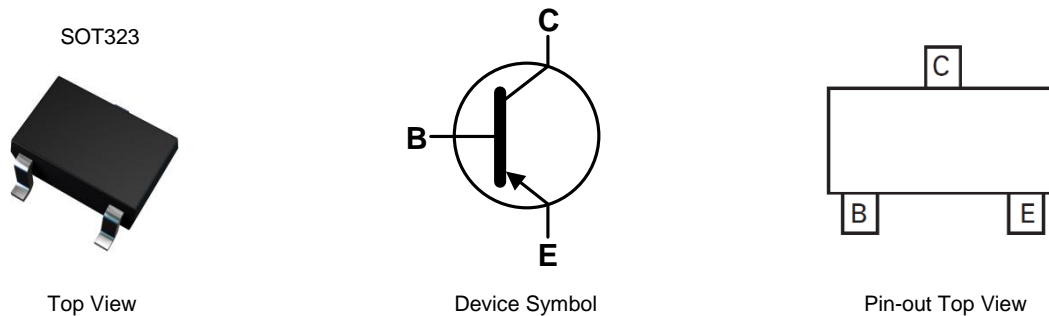
This Bipolar Junction Transistor (BJT) is designed to meet the stringent requirements of Automotive Applications.

## Features

- $BV_{CEO} > -80V$
- $I_C = -500mA$  Collector Current
- Epitaxial Planar Die Construction
- Ultra-Small Surface Mount Package
- Complementary NPN Type: MMSTA06Q
- **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: SOT323
- Case Material: Molded Plastic. "Green" Molding Compound. UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads. Solderable per MIL-STD-202, Method 208③
- Weight: 0.006 grams (Approximate)

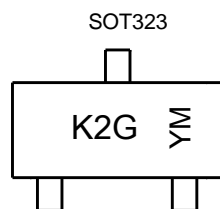


## Ordering Information (Notes 4 & 5)

| Product      | Compliance | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|--------------|------------|---------|--------------------|-----------------|-------------------|
| MMSTA56Q-7-F | Automotive | K2G     | 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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to [http://www.diodes.com/quality/product\\_compliance\\_definitions/](http://www.diodes.com/quality/product_compliance_definitions/).
  5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



K2G = Product Type Marking Code  
 YM = Date Code Marking  
 Y or  $\bar{Y}$  = Year (ex: C = 2015)  
 M or  $\bar{M}$  = Month (ex: 9 = September)

### Date Code Key

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

| 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> | -80   | V    |
| Collector-Emitter Voltage | V <sub>CEO</sub> | -80   | V    |
| Emitter-Base Voltage      | V <sub>EBO</sub> | -4    | V    |
| Collector Current         | I <sub>C</sub>   | -500  | mA   |

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

| Characteristic                                   | Symbol                            | Value       | Unit |
|--|-----------------------------------|-------------|------|
| Power Dissipation (Note 6)                       | P <sub>D</sub>                    | 200         | mW   |
| Thermal Resistance, Junction to Ambient (Note 6) | R <sub>θJA</sub>                  | 625         | °C/W |
| Operating and Storage Temperature Range          | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C   |

**ESD Ratings** (Note 7)

| 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 with the collector lead on minimum recommended pad layout 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.  
7. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

**Thermal Characteristics and Derating Information**

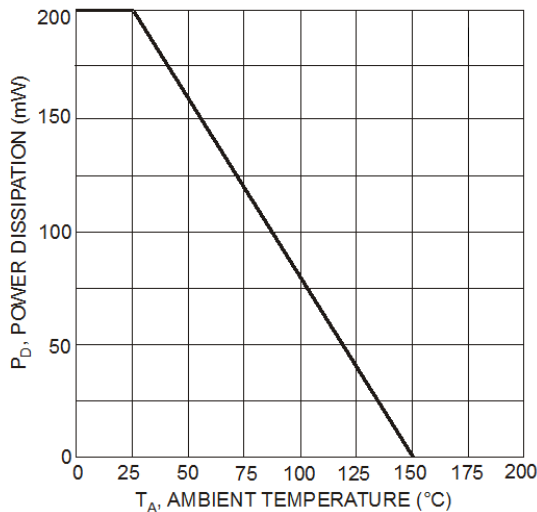


Fig. 1 Max Power Dissipation vs. Ambient Temperature

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

| Characteristic                       | Symbol        | Min | Max   | Unit | Test Condition  |
|--------------------------------------|---------------|-----|-------|------|---|
| <b>OFF CHARACTERISTICS (Note 8)</b>  |               |     |       |      |   |
| Collector-Base Breakdown Voltage     | $BV_{CBO}$    | -80 | —     | V    | $I_C = -100\mu\text{A}$   |
| Collector-Emitter Breakdown Voltage  | $BV_{CEO}$    | -80 | —     | V    | $I_C = -1\text{mA}$   |
| Emitter-Base Breakdown Voltage       | $BV_{EBO}$    | -4  | —     | V    | $I_E = -100\mu\text{A}$   |
| Collector Base Cutoff Current        | $I_{CBO}$     | —   | -100  | nA   | $V_{CB} = -80\text{V}, T_A = +125^\circ\text{C}$  |
| Collector Cutoff Current             | $I_{CEX}$     | —   | -100  | nA   | $V_{CE} = -80\text{V}$  |
| <b>ON CHARACTERISTICS (Note 8)</b>   |               |     |       |      |   |
| DC Current Gain                      | $h_{FE}$      | 100 | —     | —    | $I_C = -10\text{mA}, V_{CE} = -1.0\text{V}$<br>$I_C = -100\text{mA}, V_{CE} = -1.0\text{V}$ |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | —   | -0.25 | V    | $I_C = -100\text{mA}, I_B = -10\text{mA}$   |
| Base-Emitter Saturation Voltage      | $V_{BE(sat)}$ | —   | -1.2  | V    | $I_C = -100\text{mA}, V_{CE} = -1.0\text{V}$  |
| <b>SMALL SIGNAL CHARACTERISTICS</b>  |               |     |       |      |   |
| Current Gain-Bandwidth Product       | $f_T$         | 50  | —     | MHz  | $V_{CE} = -1.0\text{V}, I_C = -100\text{mA}, f = 100\text{MHz}$                             |

Note: 8. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

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

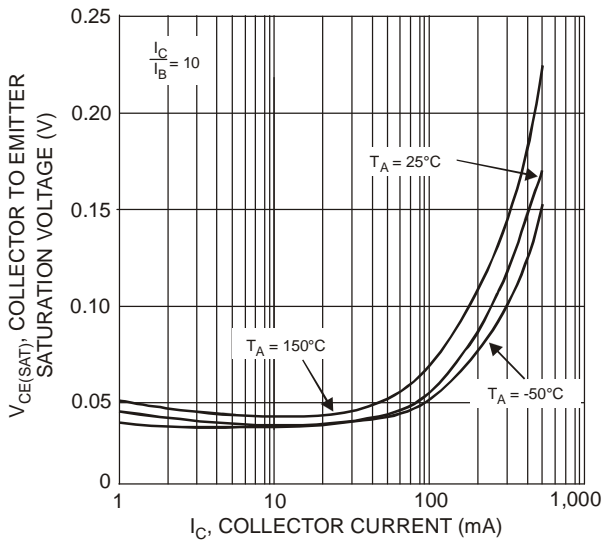


Fig. 2, Collector Emitter Saturation Voltage vs. Collector Current

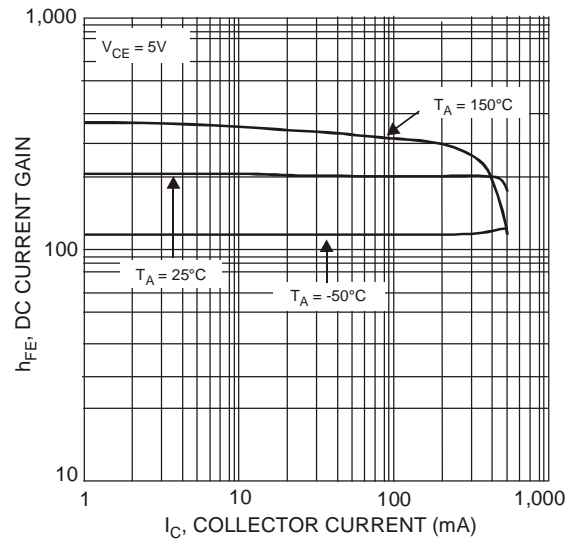


Fig. 3, DC Current Gain vs. Collector Current

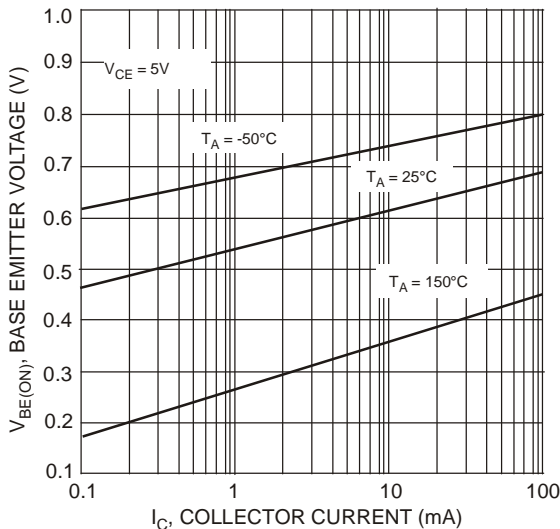


Fig. 4 Base Emitter Voltage vs. Collector Current

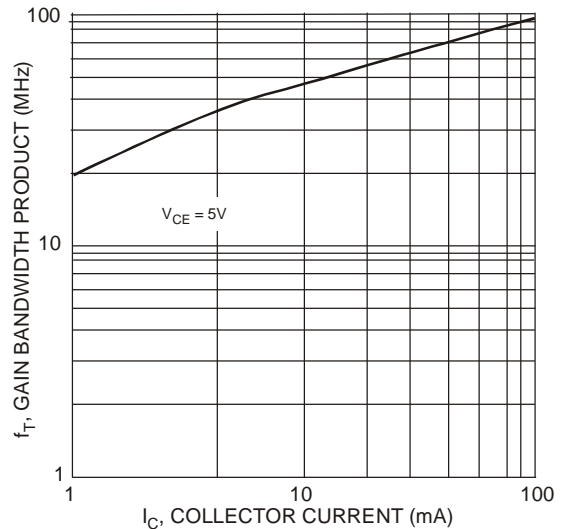
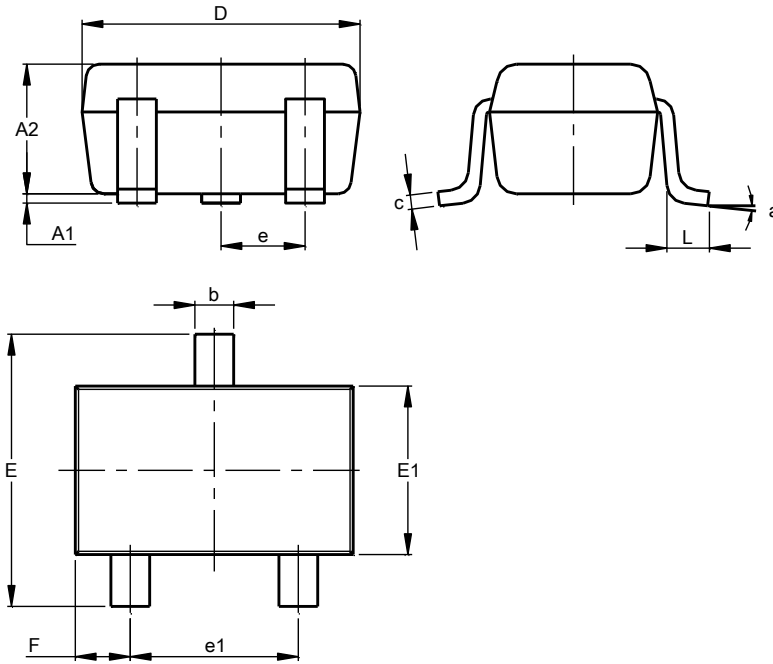


Fig. 5 Gain Bandwidth Product vs. Collector Current

**Package Outline Dimensions**

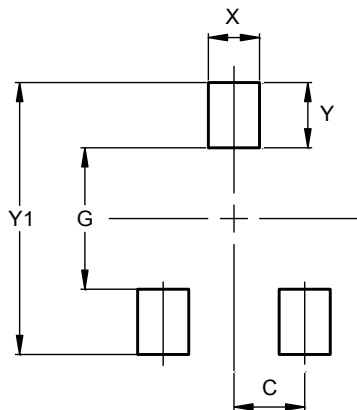
Please see <http://www.diodes.com/package-outlines.html> for the latest version.



| SOT323                      |           |       |       |
|-----------------------------|-----------|-------|-------|
| Dim                         | Min       | Max   | Typ   |
| A1                          | 0.00      | 0.10  | 0.05  |
| A2                          | 0.90      | 1.00  | 0.95  |
| b                           | 0.25      | 0.40  | 0.30  |
| c                           | 0.10      | 0.18  | 0.11  |
| D                           | 1.80      | 2.20  | 2.15  |
| E                           | 2.00      | 2.20  | 2.10  |
| E1                          | 1.15      | 1.35  | 1.30  |
| e                           | 0.650 BSC |       |       |
| e1                          | 1.20      | 1.40  | 1.30  |
| F                           | 0.375     | 0.475 | 0.425 |
| L                           | 0.25      | 0.40  | 0.30  |
| a                           | 0°        | 8°    | --    |
| <b>All Dimensions in mm</b> |           |       |       |

**Suggested Pad Layout**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.



| Dimensions | Value (in mm) |
|------------|---------------|
| C          | 0.650         |
| G          | 1.300         |
| X          | 0.470         |
| Y          | 0.600         |
| Y1         | 2.500         |

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