# 80V NPN MEDIUM POWER TRANSISTOR IN SOT223

## Description

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

## Applications

- Medium Power Switching or Amplification Applications
- AF Driver and Output Stages

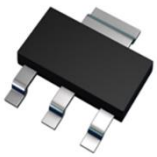
## Features

- $BV_{CEO}$ > 80V
- $I_C$ = 1A High Continuous Collector Current
- $I_{CM}$ = 2A Peak Pulse Current
- 2W Power Dissipation
- Low Saturation Voltage $V_{CE(SAT)}$ < 500mV @ 0.5A
- Complementary PNP Type: BCP5316Q
- **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)**

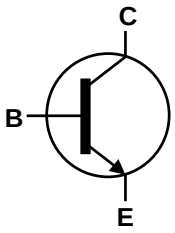
## Mechanical Data

- Case: SOT223
- 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 208 (e3)
- Weight: 0.112 grams (Approximate)

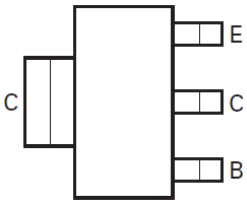
SOT223



Top View




Device Symbol




Top View
Pin-Out

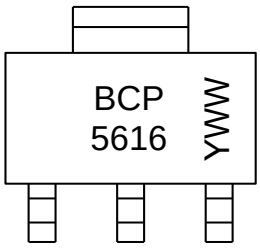
## Ordering Information (Notes 4 & 5)

| Product | Compliance | Marking | Reel Size (inches) | Tape Width (mm) | Quantity per Reel |
|---|---|---|---|---|---|
| BCP5616QTA | Automotive | BCP 5616 | 7 | 12 | 1,000 |
| BCP5616QTC | Automotive | BCP 5616 | 13 | 12 | 4,000 |

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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to 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

SOT223




BCP 5616 = Product Type Marking Code
YWW = Date Code Marking
Y or $\overline{Y}$ = Last Digit of Year (ex: 6 = 2016)
WW or $\overline{WW}$ = Week Code (01~53)

## Absolute Maximum Ratings (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Collector-Base Voltage | $V_{CBO}$ | 100 | V |
| Collector-Emitter Voltage | $V_{CEO}$ | 80 | V |
| Emitter-Base Voltage | $V_{EBO}$ | 5 | V |
| Continuous Collector Current | $I_C$ | 1 | A |
| Peak Pulse Collector Current | $I_{CM}$ | 2 | |
| Continuous Base Current | $I_B$ | 100 | mA |
| Peak Pulse Base Current | $I_{BM}$ | 200 | |

## Thermal Characteristics (@$T_A$ = +25°C, unless otherwise specified.)

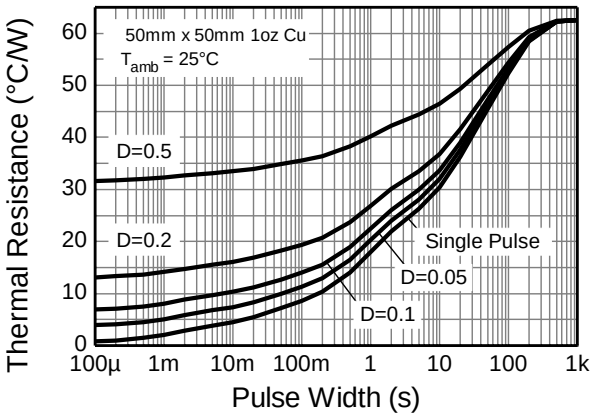
| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Power Dissipation | (Note 6) | $P_D$ | 2 | W |
| Thermal Resistance, Junction to Ambient | (Note 6) | $R_{\theta JA}$ | 62 | °C /W |
| Thermal Resistance, Junction to Leads | (Note 7) | $R_{\theta JL}$ | 19.4 | °C/W |
| Operating and Storage Temperature Range | | $T_J$, $T_{STG}$ | -65 to +150 | °C |

## ESD Ratings (Note 8)

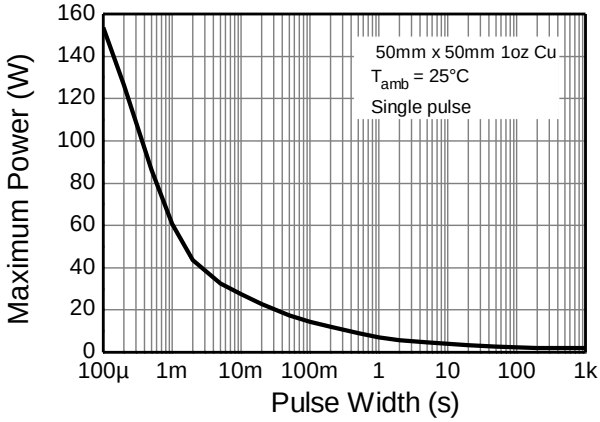
| Characteristic | Symbol | Value | Unit | JEDEC Class |
|---|---|---|---|---|
| Electrostatic Discharge – Human Body Model | ESD HBM | 4,000 | V | 3A |
| Electrostatic Discharge – Machine Model | ESD MM | 400 | V | C |

Notes:
6. For a device mounted with the collector lead on 50mm x 50mm 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in steady-state.
7. Thermal resistance from junction to solder-point (at the end of the collector lead).
8. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

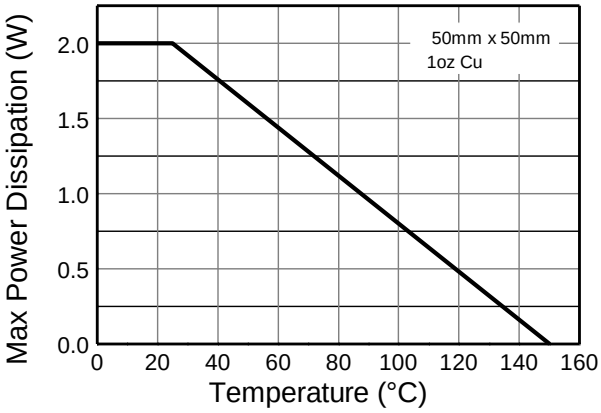
## Thermal Characteristics and Derating Information




**Transient Thermal Impedance**




**Pulse Power Dissipation**




**Derating Curve**

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

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| Collector-Base Breakdown Voltage | $BV_{CBO}$ | 100 | — | — | V | $I_C$ = 100µA |
| Collector-Emitter Breakdown Voltage (Note 9) | $BV_{CEO}$ | 80 | — | — | V | $I_C$ = 10mA |
| Emitter-Base Breakdown Voltage | $BV_{EBO}$ | 5 | — | — | V | $I_E$ = 10µA |
| Collector Cut-Off Current | $I_{CBO}$ | — | — | 0.1<br>20 | µA | $V_{CB}$ = 30V<br>$V_{CB}$ = 30V, $T_A$ = +150°C |
| Emitter Cut-Off Current | $I_{EBO}$ | — | — | 20 | nA | $V_{EB}$ = 4V |
| Static Forward Current Transfer Ratio (Note 9) | $h_{FE}$ | 25<br>100<br>25 | — | 250 | — | $I_C$ = 5mA, $V_{CE}$ = 2V<br>$I_C$ = 150mA, $V_{CE}$ = 2V<br>$I_C$ = 500mA, $V_{CE}$ = 2V |
| Collector-Emitter Saturation Voltage (Note 9) | $V_{CE(SAT)}$ | — | — | 0.5 | V | $I_C$ = 500mA, $I_B$ = 50mA |
| Base-Emitter Turn-On Voltage (Note 9) | $V_{BE(ON)}$ | — | — | 1.0 | V | $I_C$ = 500mA, $V_{CE}$ = 2V |
| Transition Frequency | $f_T$ | 100 | 150 | — | MHz | $I_C$ = 50mA, $V_{CE}$ = 10V<br>f = 100MHz |
| Output Capacitance | $C_{OBO}$ | — | — | 25 | pF | $V_{CB}$ = 10V, f = 1MHz |

Note: 9. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%.

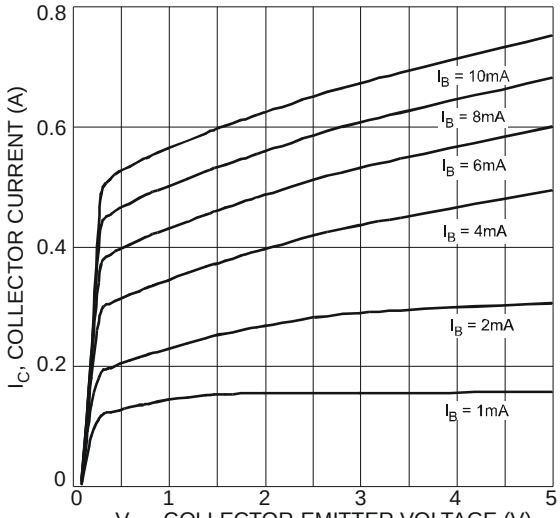



Fig. 1 Typical Collector Current vs. Collector-Emitter Voltage

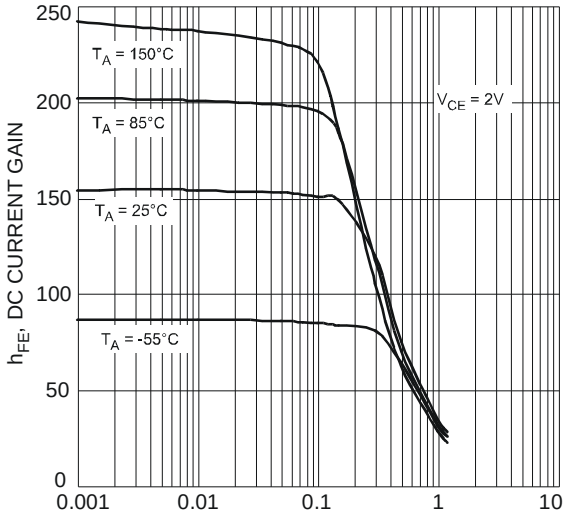



Fig. 2 Typical DC Current Gain vs. Collector Current

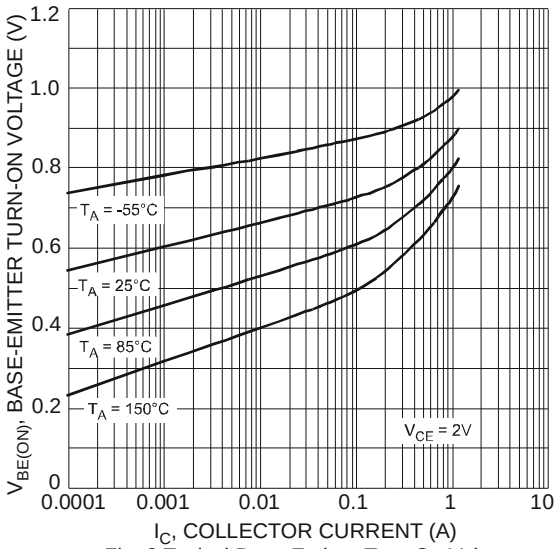



Fig. 3 Typical Base-Emitter Turn-On Voltage vs. Collector Current

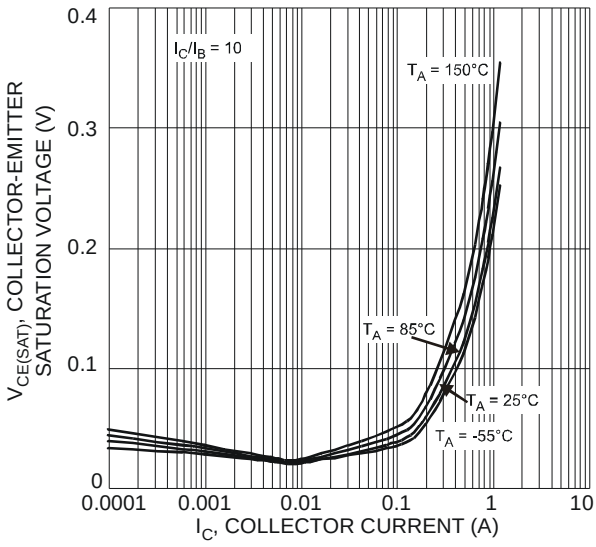



Fig. 4 Typical Collector-Emitter Saturation Voltage vs. Collector Current

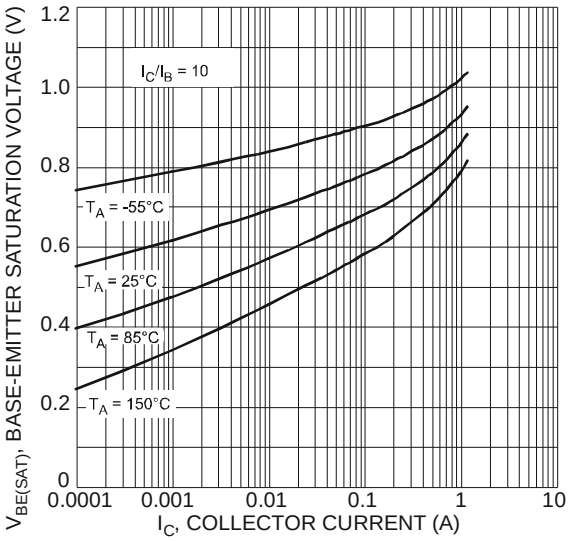



Fig. 5 Typical Base-Emitter Saturation Voltage vs. Collector Current

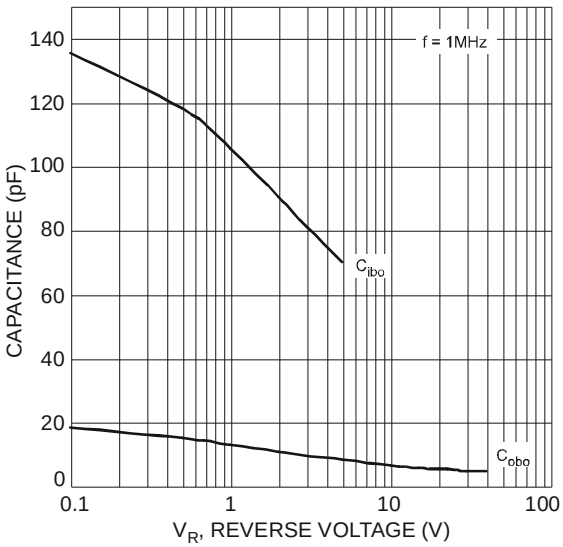



Fig. 6 Typical Capacitance Characteristics

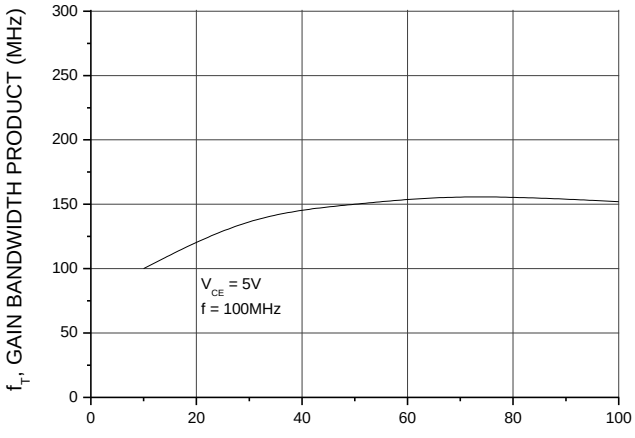
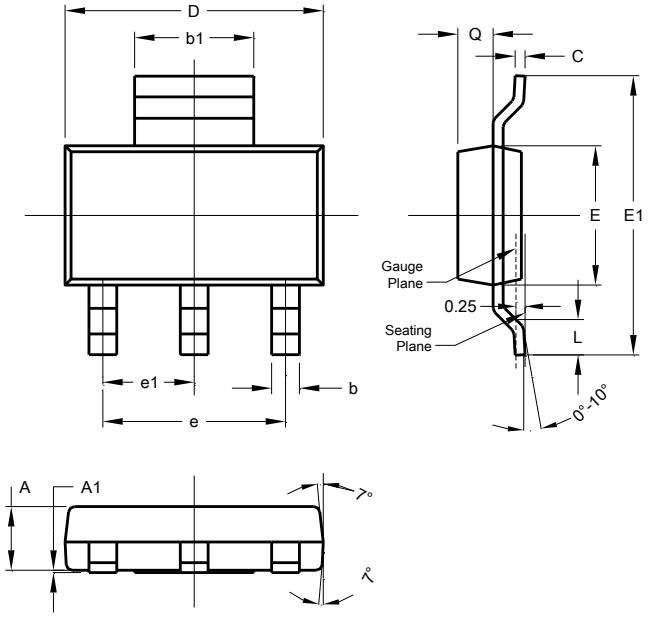



Fig. 7 Typical Gain-bandwidth Product vs. Collector Current

## Package Outline Dimensions

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

**SOT223**

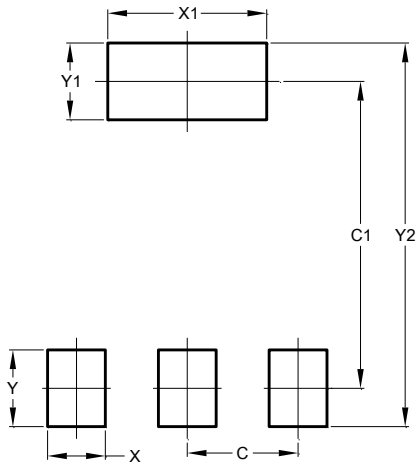



| SOT223 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | 1.55 | 1.65 | 1.60 |
| **A1** | 0.010 | 0.15 | 0.05 |
| **b** | 0.60 | 0.80 | 0.70 |
| **b1** | 2.90 | 3.10 | 3.00 |
| **C** | 0.20 | 0.30 | 0.25 |
| **D** | 6.45 | 6.55 | 6.50 |
| **E** | 3.45 | 3.55 | 3.50 |
| **E1** | 6.90 | 7.10 | 7.00 |
| **e** | – | – | 4.60 |
| **e1** | – | – | 2.30 |
| **L** | 0.85 | 1.05 | 0.95 |
| **Q** | 0.84 | 0.94 | 0.89 |
| **All Dimensions in mm** | | | |

## Suggested Pad Layout

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

**SOT223**




| Dimensions | Value (in mm) |
|---|---|
| **C** | 2.30 |
| **C1** | 6.40 |
| **X** | 1.20 |
| **X1** | 3.30 |
| **Y** | 1.60 |
| **Y1** | 1.60 |
| **Y2** | 8.00 |

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