

## Description

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

## Features

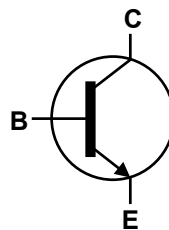
- $BV_{CE0} > 80V$
- $I_C = 1A$  High Continuous Collector Current
- $I_{CM} = 2A$  Peak Pulse Current
- 2W Power Dissipation
- Low Saturation Voltage  $V_{CE(sat)} < 500mV @ 0.5A$
- Complementary PNP Type: BCP5316Q
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

## Applications

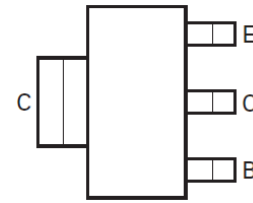
- Medium Power Switching or Amplification Applications
- AF Driver and Output Stages

## 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<sup>(3)</sup>
- Weight: 0.112 grams (approximate)



Device Symbol



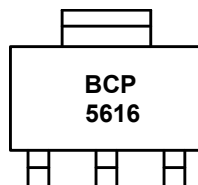
Top View  
Pin-Out

## 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

- 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. For more information, please 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



BCP = Product Type Marking Code, Line 1  
5616 = Product Type Marking Code, Line 2

### Absolute Maximum Ratings (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CB0</sub>	100	V
Collector-Emitter Voltage	V <sub>CEO</sub>	80	V
Emitter-Base Voltage	V <sub>EBO</sub>	5	V
Continuous Collector Current	I <sub>C</sub>	1	A
Peak Pulse Collector Current	I <sub>CM</sub>	2	
Continuous Base Current	I <sub>B</sub>	100	mA
Peak Pulse Base Current	I <sub>BM</sub>	200	

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

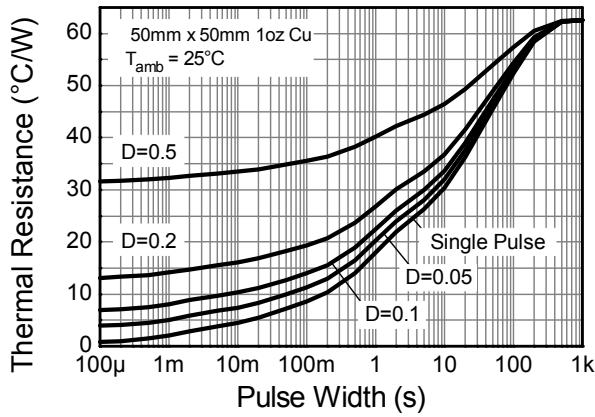
Characteristic	Symbol	Value	Unit
Power Dissipation (Note 6)	P <sub>D</sub>	2	W
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	62	°C/W
Thermal Resistance, Junction to Leads (Note 7)	R <sub>θJL</sub>	19.4	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-65 to +150	°C

### ESD Ratings (Note 8)

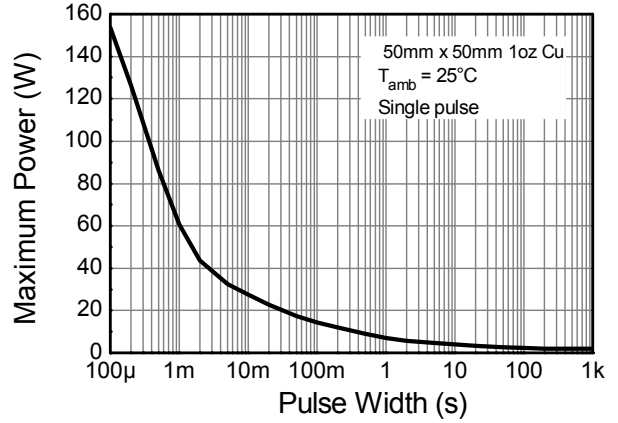
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- 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.

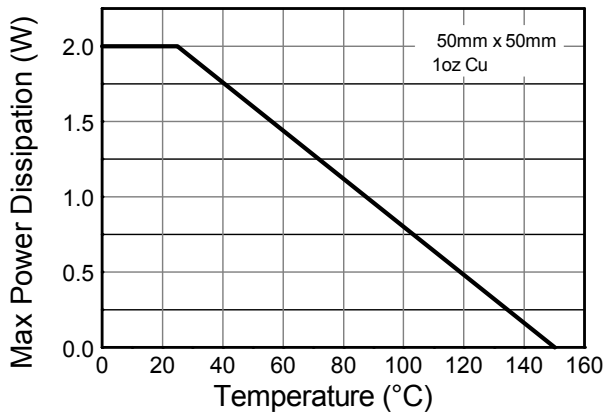
**Thermal Characteristics and Derating Information**



**Transient Thermal Impedance**



**Pulse Power Dissipation**



**Derating Curve**

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV <sub>CB0</sub>	100	-	-	V	I <sub>C</sub> = 100μA
Collector-Emitter Breakdown Voltage (Note 9)	BV <sub>CEO</sub>	80	-	-	V	I <sub>C</sub> = 10mA
Emitter-Base Breakdown Voltage	BV <sub>EB0</sub>	5	-	-	V	I <sub>E</sub> = 10μA
Collector Cut-off Current	I <sub>CB0</sub>	-	-	0.1 20	μA	V <sub>CB</sub> = 30V V <sub>CB</sub> = 30V, T <sub>A</sub> = +150°C
Emitter Cut-off Current	I <sub>EBO</sub>	-	-	20	nA	V <sub>EB</sub> = 4V
Static Forward Current Transfer Ratio (Note 9)	h <sub>FE</sub>	25 100 25	- - -	- 250 -	-	I <sub>C</sub> = 5mA, V <sub>CE</sub> = 2V I <sub>C</sub> = 150mA, V <sub>CE</sub> = 2V I <sub>C</sub> = 500mA, V <sub>CE</sub> = 2V
Collector-Emitter Saturation Voltage (Note 9)	V <sub>CE(sat)</sub>	-	-	0.5	V	I <sub>C</sub> = 500mA, I <sub>B</sub> = 50mA
Base-Emitter Turn-On Voltage (Note 9)	V <sub>BE(on)</sub>	-	-	1.0	V	I <sub>C</sub> = 50mA, V <sub>CE</sub> = 2V
Transition Frequency	f <sub>T</sub>	150	-	-	MHz	I <sub>C</sub> = 50mA, V <sub>CE</sub> = 10V f = 100MHz
Output Capacitance	C <sub>obo</sub>	-	-	25	pF	V <sub>CB</sub> = 10V, f = 1MHz

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

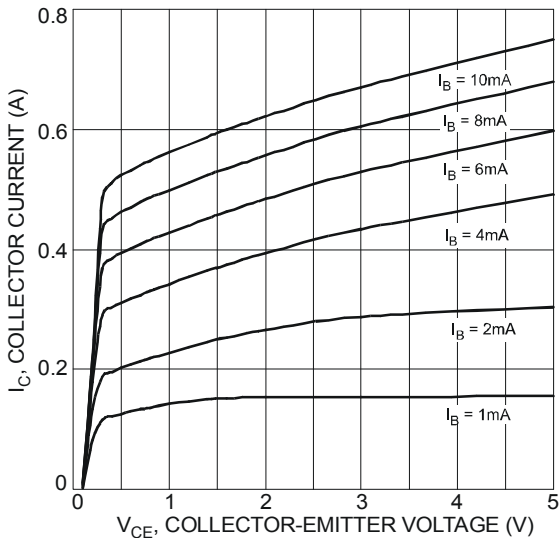


Fig. 1 Typical Collector Current vs. Collector-Emitter Voltage

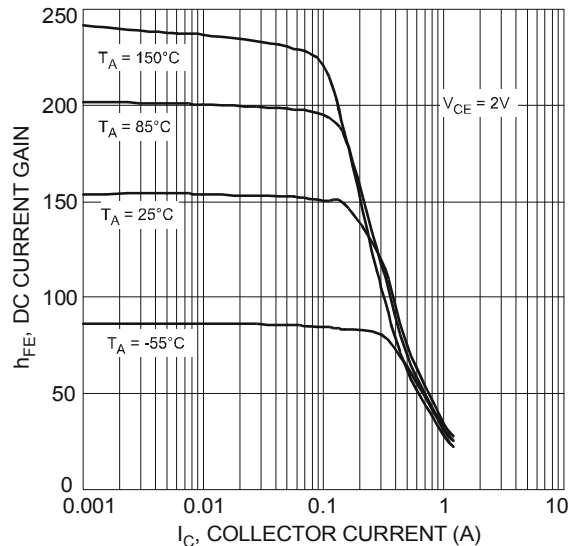


Fig. 2 Typical DC Current Gain vs. Collector Current

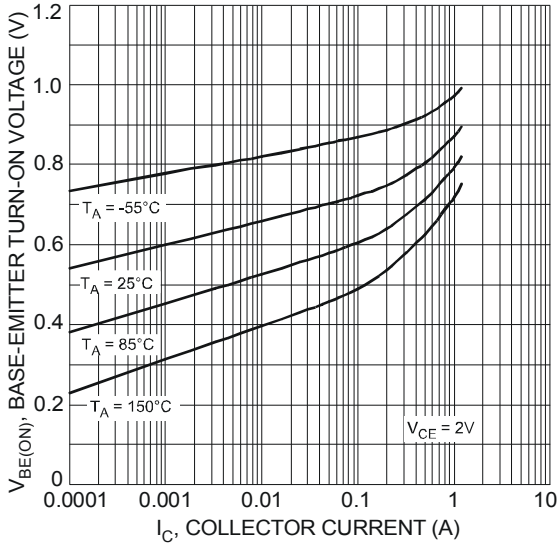


Fig. 3 Typical Base-Emitter Turn-On Voltage vs. Collector Current

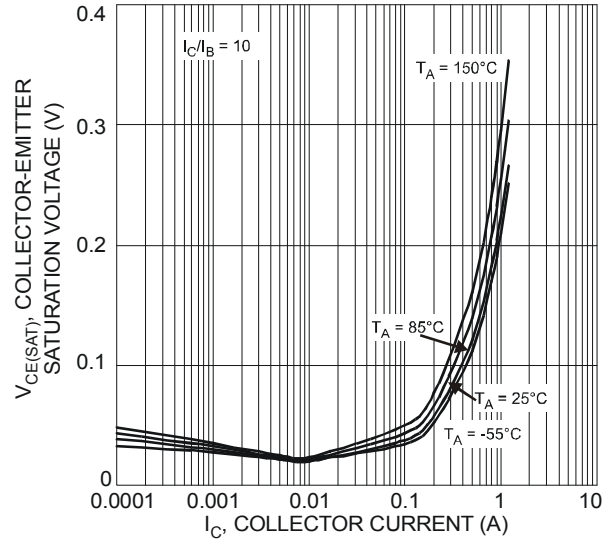


Fig. 4 Typical Collector-Emitter Saturation Voltage vs. Collector Current

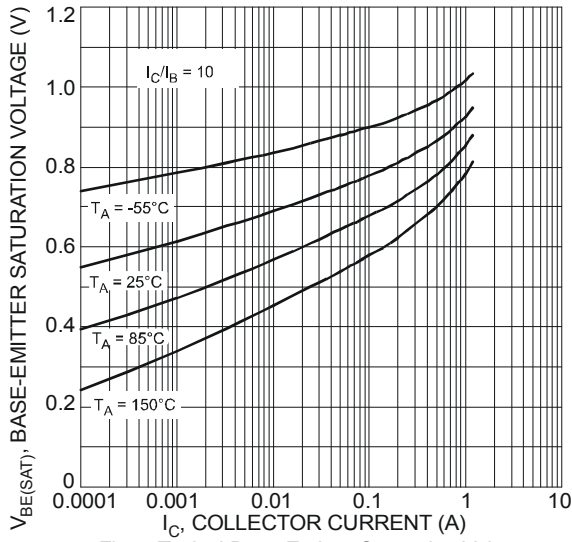


Fig. 5 Typical Base-Emitter Saturation Voltage vs. Collector Current

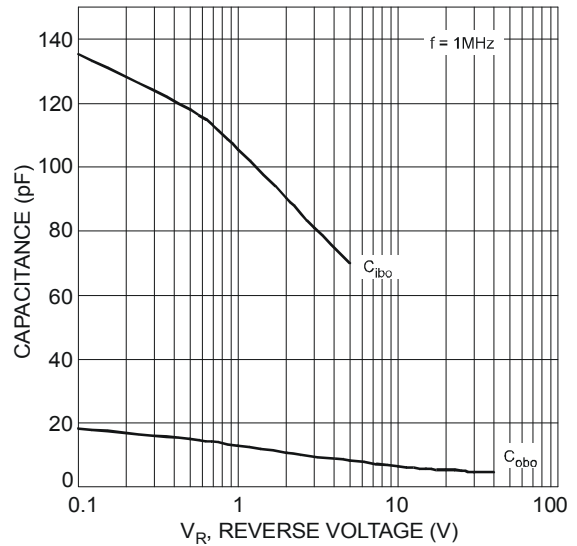


Fig. 6 Typical Capacitance Characteristics

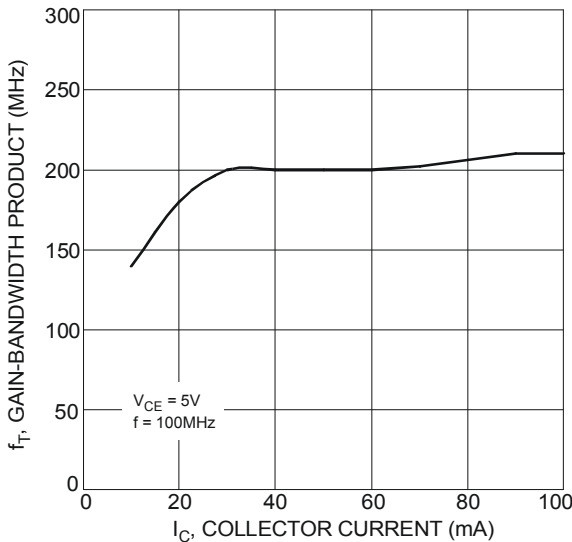
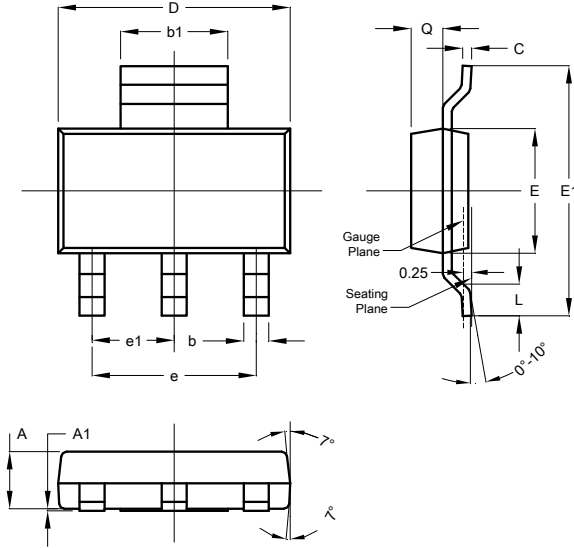


Fig. 7 Typical Gain-Bandwidth Product vs. Collector Current

**Package Outline Dimensions**

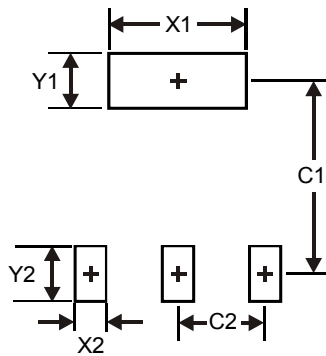
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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



Dimensions	Value (in mm)
X1	3.3
X2	1.2
Y1	1.6
Y2	1.6
C1	6.4
C2	2.3

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