

## Description

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

## Features

- $BV_{CEO} > 80V$
- $I_C = 1A$  High Continuous Collector Current
- $I_{CM} = 2A$  Peak Pulse Current
- 2W Power Dissipation
- Low Saturation Voltage  $V_{CE(SAT)} < 500mV @ 0.5A$
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen- and Antimony-Free. "Green" Device (Note 3)**
- **The BCP5616TQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF16949 certified facilities.**

<https://www.diodes.com/quality/product-definitions/>

## Applications

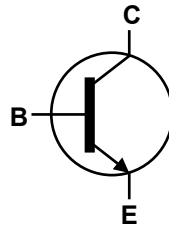
- Medium Power Switching or Amplification Applications
- AF Driver and Output Stages

## Mechanical Data

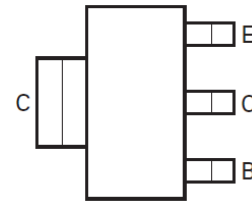
- Case: SOT223
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads. Solderable per MIL-STD-202, Method 208 Ⓔ
- Weight: 0.112 grams (Approximate)



Top View



Device Symbol



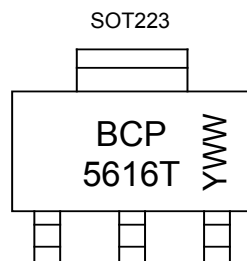
Top View  
Pin-Out

## Ordering Information (Note 4)

Product	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
BCP5616TQTA	Automotive	BCP 5616T	7	12	1,000
BCP5616TQTC	Automotive	BCP 5616T	13	12	4,000

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
  2. See <https://www.diodes.com/quality/lead-free/> 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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information



BCP 5616T = Product Type Marking Code  
 YWW = Date Code Marking  
 Y or  $\bar{Y}$  = Last Digit of Year (ex: 0 = 2020)  
 WW or  $\bar{W}W$  = Week Code (01~53)

### Absolute Maximum Ratings (@ $T_A = +25^\circ\text{C}$ , 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 (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

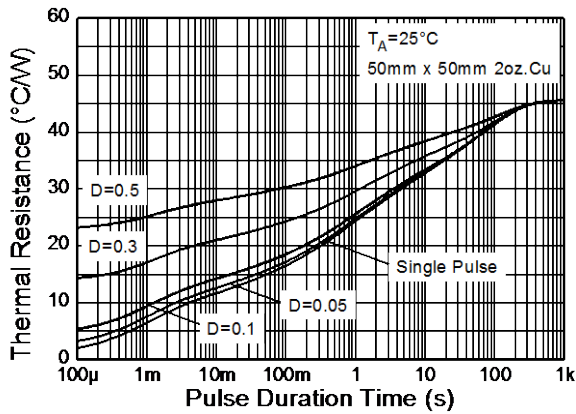
Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	$P_D$	2.5	W
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	45.6	$^\circ\text{C/W}$
Thermal Resistance, Junction to Leads (Note 6)	$R_{\theta JL}$	21.7	$^\circ\text{C/W}$
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

### ESD Ratings (Note 7)

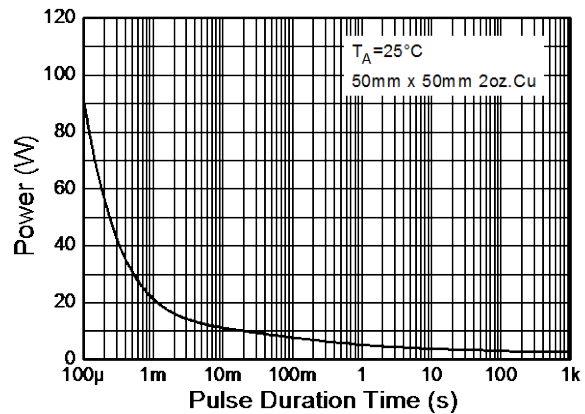
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge – Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge – Machine Model	ESD MM	400	V	C

- Notes:
5. For a device mounted with the collector lead on 50mm x 50mm 2oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in steady-state.
  6. Thermal resistance from junction to solder-point (at the end of the collector lead).
  7. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

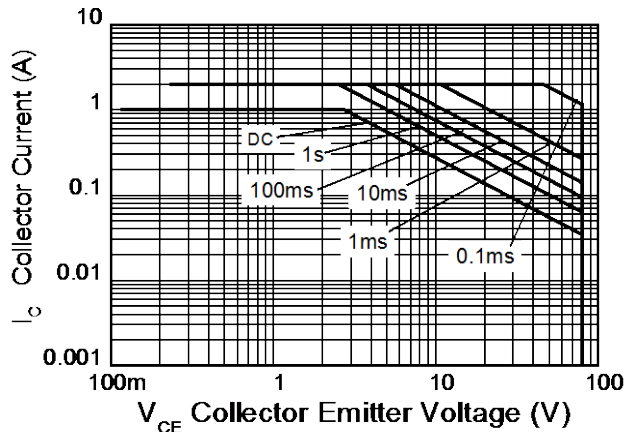
**Thermal Characteristics and Derating Information**



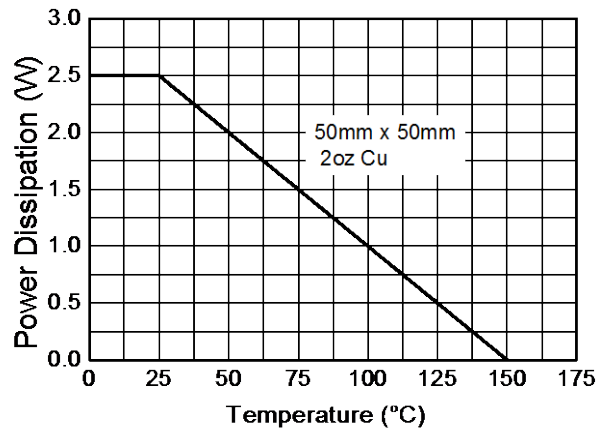
**Transient Thermal Impedance**



**Pulse Power Dissipation**



**SOA, Safe Operating Area**



**Derating Curve**

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	$BV_{CBO}$	100	—	—	V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage (Note 8)	$BV_{CEO}$	80	—	—	V	$I_C = 10\text{mA}$
Emitter-Base Breakdown Voltage	$BV_{EBO}$	7	—	—	V	$I_E = 10\mu\text{A}$
Collector Cut-Off Current	$I_{CBO}$	—	—	0.1 20	$\mu\text{A}$	$V_{CB} = 30\text{V}$ $V_{CB} = 30\text{V}, T_A = +150^\circ\text{C}$
Emitter Cut-Off Current	$I_{EBO}$	—	—	20	nA	$V_{EB} = 6\text{V}$
Static Forward Current Transfer Ratio (Note 8)	$h_{FE}$	63 100 40	—	250	—	$I_C = 5\text{mA}, V_{CE} = 2\text{V}$ $I_C = 150\text{mA}, V_{CE} = 2\text{V}$ $I_C = 500\text{mA}, V_{CE} = 2\text{V}$
Collector-Emitter Saturation Voltage (Note 8)	$V_{CE(sat)}$	—	—	0.5	V	$I_C = 500\text{mA}, I_B = 50\text{mA}$
Base-Emitter Turn-On Voltage (Note 8)	$V_{BE(on)}$	—	—	1.0	V	$I_C = 500\text{mA}, V_{CE} = 2\text{V}$
Transition Frequency	$f_r$	100	150	—	MHz	$I_C = 50\text{mA}, V_{CE} = 10\text{V}$ $f = 100\text{MHz}$
Output Capacitance	$C_{OBO}$	—	—	25	pF	$V_{CB} = 10\text{V}, f = 1\text{MHz}$

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.)

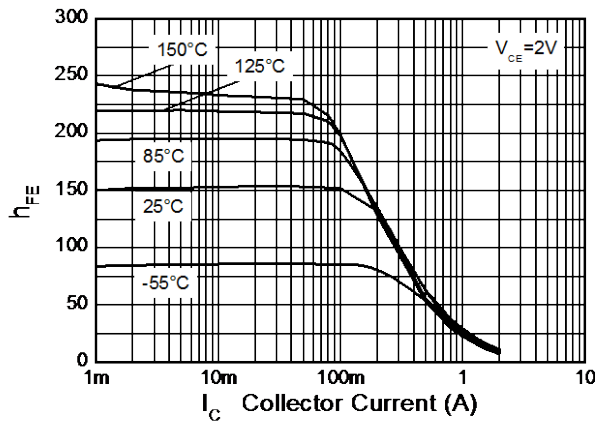


Fig. 1 : Typical DC Current Gain vs Collector Current

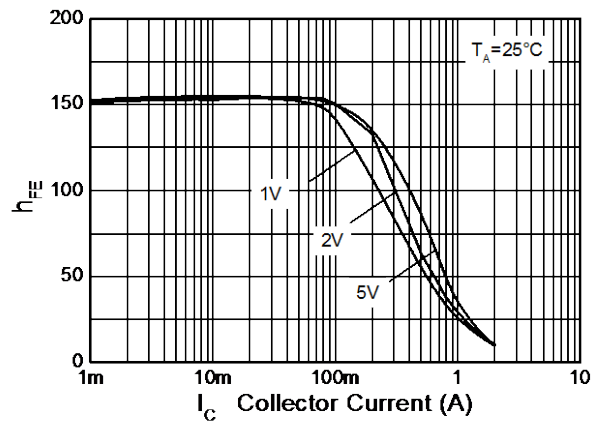


Fig. 2 : Typical DC Current Gain vs Collector Current

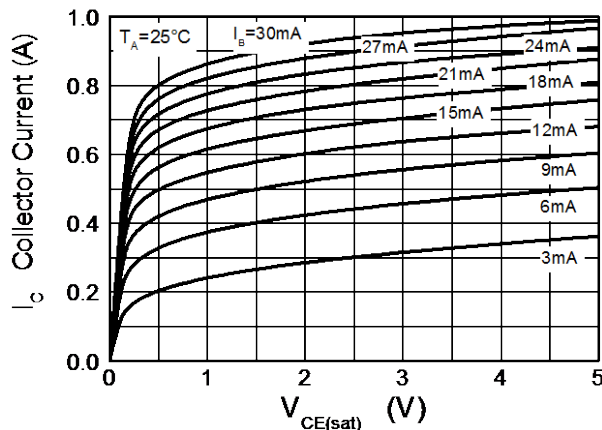


Fig. 3 : Typical Collector Current vs Collector-Emitter Saturation Voltage

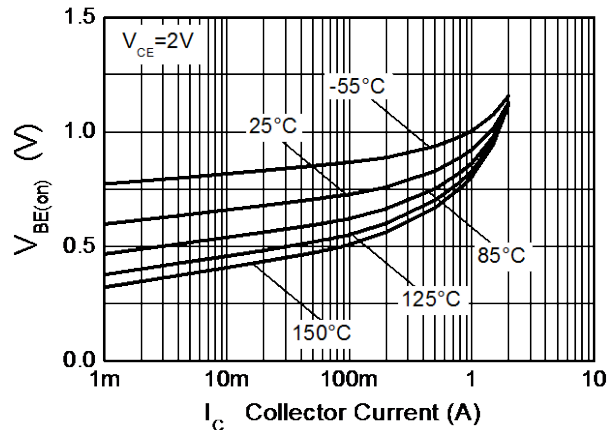


Fig. 4 : Typical Base-Emitter Turn-On Voltage vs Collector Current

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

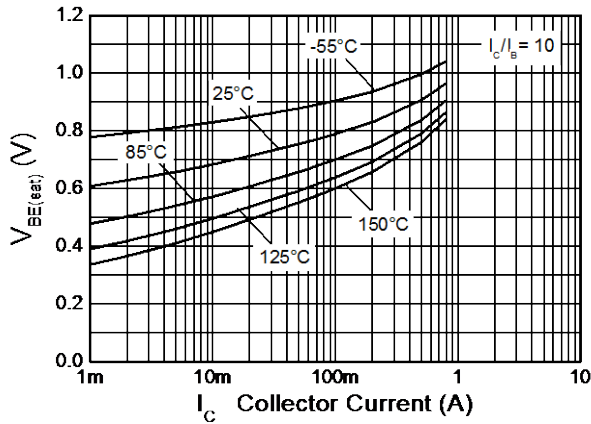


Fig 5: Typical Base-Emitter Saturation Voltage vs Collector Current

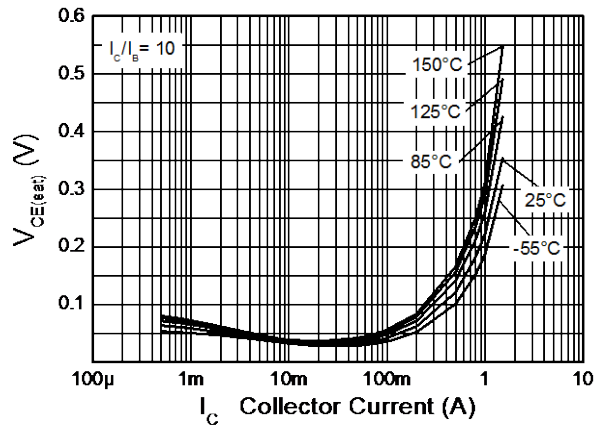


Fig 6: Typical Collector-Emitter Saturation Voltage vs Collector Current

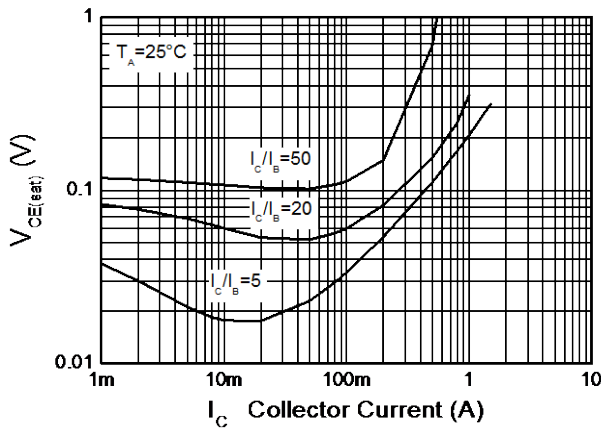


Fig 7: Typical Collector-Emitter Saturation Voltage vs Collector Current

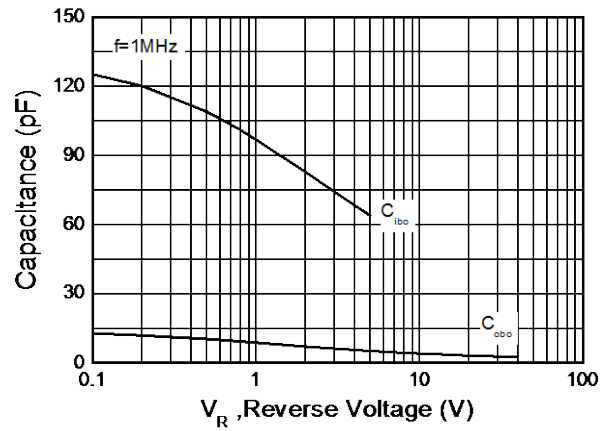
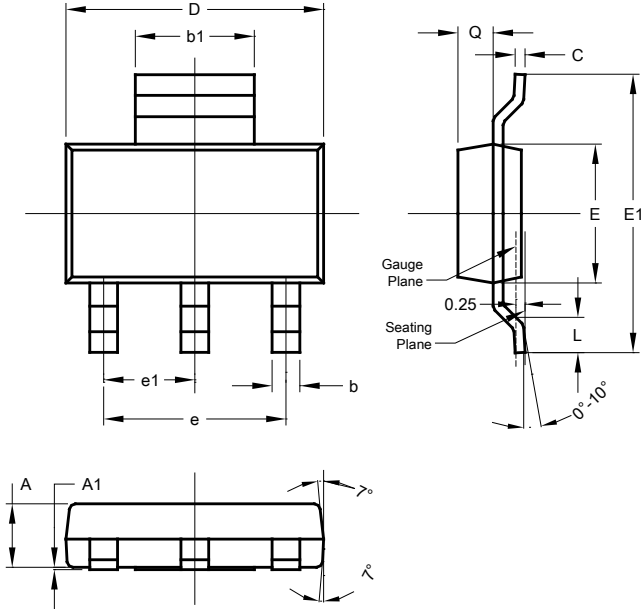


Fig 8: Typical Capacitance Characteristics

**Package Outline Dimensions**

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

**SOT223**

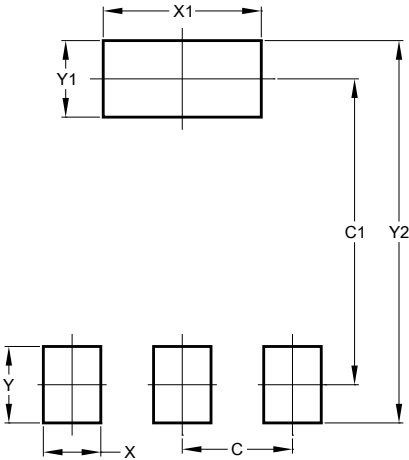


SOT223			
Dim	Min	Max	Typ
A	1.55	1.65	1.60
A1	0.010	0.15	0.05
b	0.60	0.80	0.70
b1	2.90	3.10	3.00
C	0.20	0.30	0.25
D	6.45	6.55	6.50
E	3.45	3.55	3.50
E1	6.90	7.10	7.00
e	-	-	4.60
e1	-	-	2.30
L	0.85	1.05	0.95
Q	0.84	0.94	0.89
All Dimensions in mm			

**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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