Description

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

Applications

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

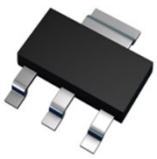
Features

- BV_{CEO} > 45V & 80V
- I_C = 1A 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)**
- **The BCP5416Q and BCP5616Q are suitable for automotive applications requiring specific change control; these parts are AEC-Q101 qualified, PPAP capable, and manufactured in IATF16949 certified facilities.**
  https://www.diodes.com/quality/product-definitions/

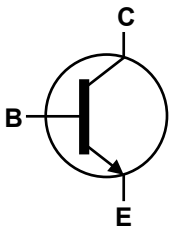
Mechanical Data

- 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)

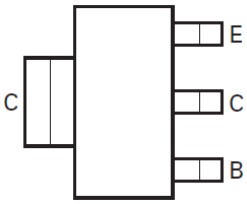
SOT223



Top View



Device Symbol



Top View
Pin-Out

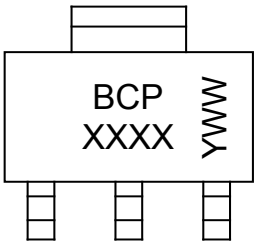
Ordering Information (Note 4)

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
BCP5416QTA	Automotive	BCP 5416	7	12	1,000

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

SOT223



BCP = Product Type Marking Code, Line 1
XXXX = Product Type Marking Code, Line 2 as follows:

BCP5416 = 5416
BCP5616 = 5616

YWW = Date Code Marking
$\overline{Y}$ or Y = Last Digit of Year (ex: 0= 2020)
WW or $\overline{WW}$ = Week Code (01~53)

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

Characteristic	Symbol	BCP5416	BCP5616	Unit
Collector-Base Voltage	V_{CBO}	45	100	V
Collector-Emitter Voltage	V_{CEO}	45	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.)

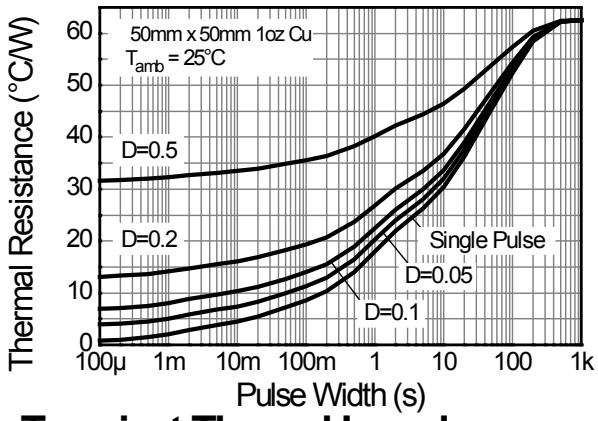
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	P_D	2	W
Thermal Resistance, Junction to Ambient	(Note 5)	$R_{\theta JA}$	62	°C /W
Thermal Resistance, Junction to Leads	(Note 6)	$R_{\theta JL}$	19.4	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

ESD Ratings (Note 7)

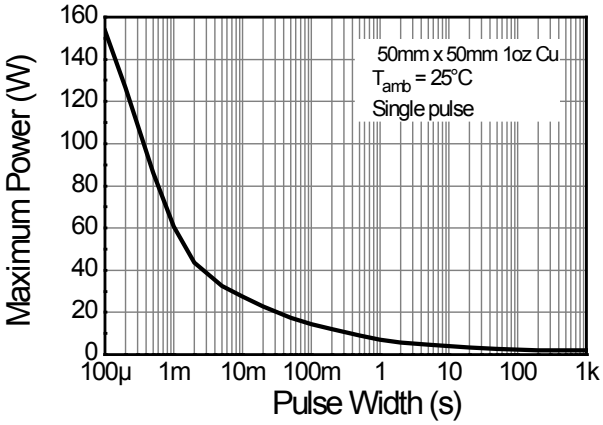
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge – Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge – Machine Model	ESD MM	400	V	C

Notes:
5. 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.
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.

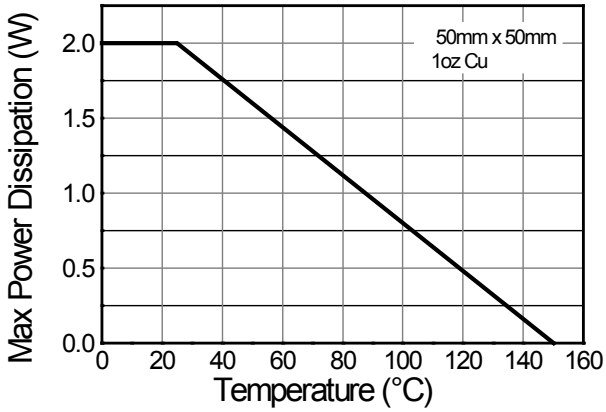
Thermal Characteristics and Derating Information



Transient Thermal Impedance



Pulse Power Dissipation



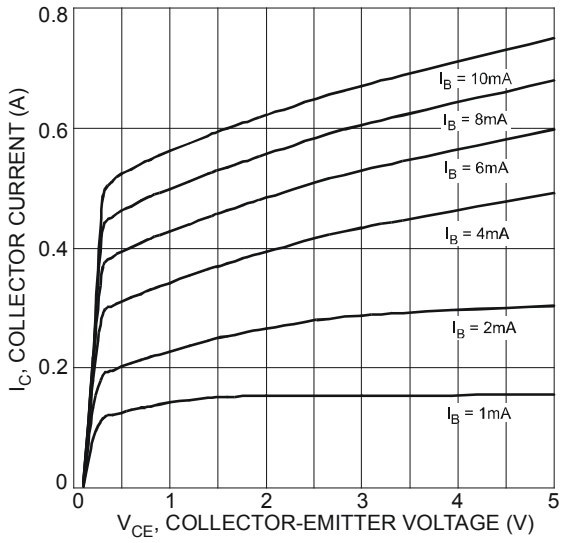
Derating Curve

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

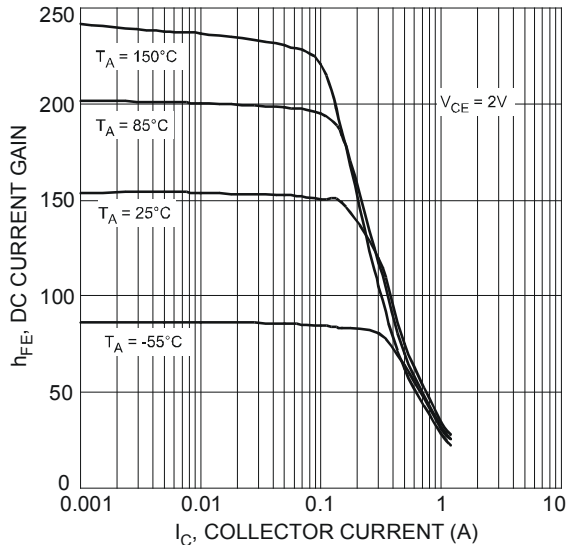
Characteristic		Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BCP5416	BV_{CBO}	45	—	—	V	I_C = 100µA
	BCP5616		100				
Collector-Emitter Breakdown Voltage (Note 8)	BCP5416	BV_{CEO}	45	—	—	V	I_C = 10mA
	BCP5616		80				
Emitter-Base Breakdown Voltage		BV_{EBO}	5	—	—	V	I_E = 100µA
Collector Cut-Off Current		I_{CBO}	—	—	0.1 20	µA	V_{CB} = 30V V_{CB} = 30V, T_A = +150°C
Emitter Cut-Off Current		I_{EBO}	—	—	20	nA	V_{EB} = 4V
DC Current Gain (Note 8)		h_{FE}	25 100 25	—	— 250 —	—	I_C = 5mA, V_{CE} = 2V I_C = 150mA, V_{CE} = 2V I_C = 500mA, V_{CE} = 2V
Collector-Emitter Saturation Voltage (Note 8)		$V_{CE(sat)}$	—	—	0.5	V	I_C = 500mA, I_B = 50mA
Base-Emitter Turn-On Voltage (Note 8)		$V_{BE(on)}$	—	—	1.0	V	I_C = 500mA, V_{CE} = 2V
Transition frequency		f_T	100	150	—	MHz	I_C = 50mA, V_{CE} = 10V f = 100MHz
Output Capacitance		C_{obo}	—	—	25	pF	V_{CB} = 10V, f = 1MHz

Note: 8. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%.

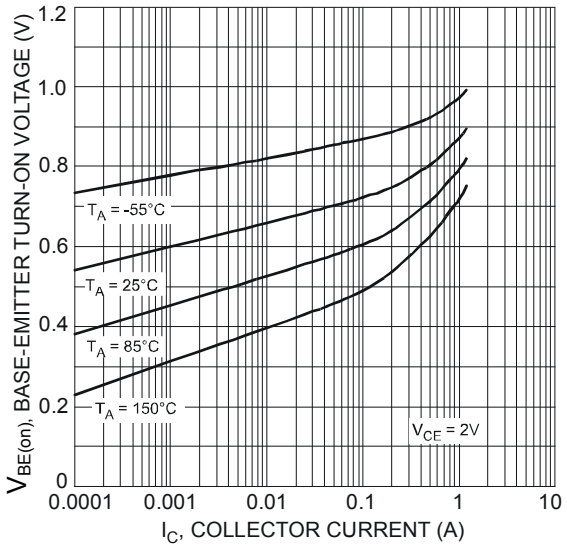
Typical Electrical Characteristics (@ T_A = +25°C, unless otherwise specified.)



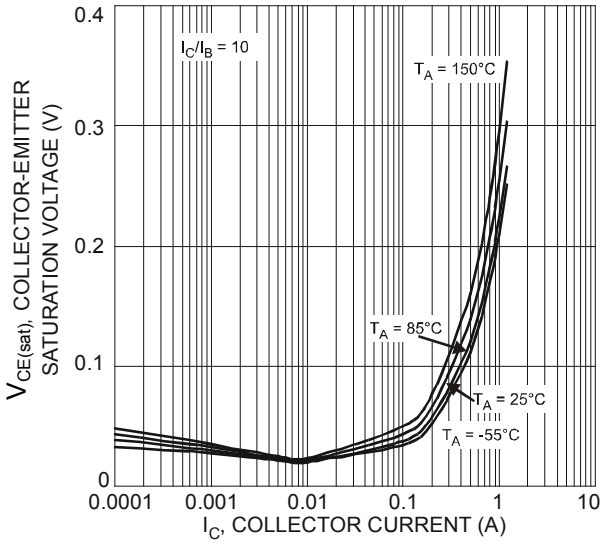
I_C v V_{CE}



h_{FE} v I_C

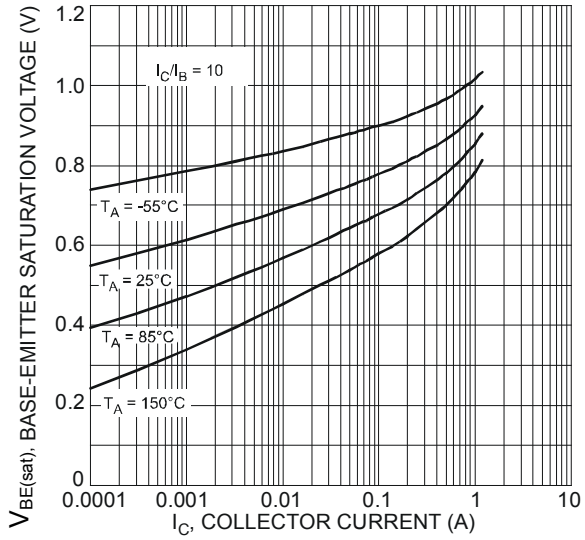


$V_{BE(on)}$ v I_C

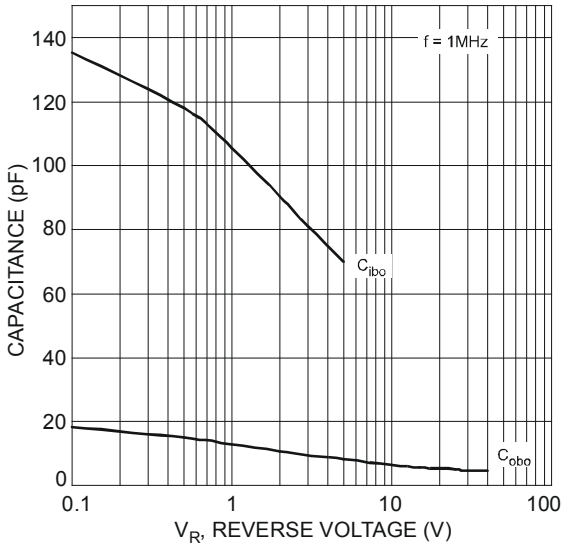


$V_{CE(sat)}$ v I_C

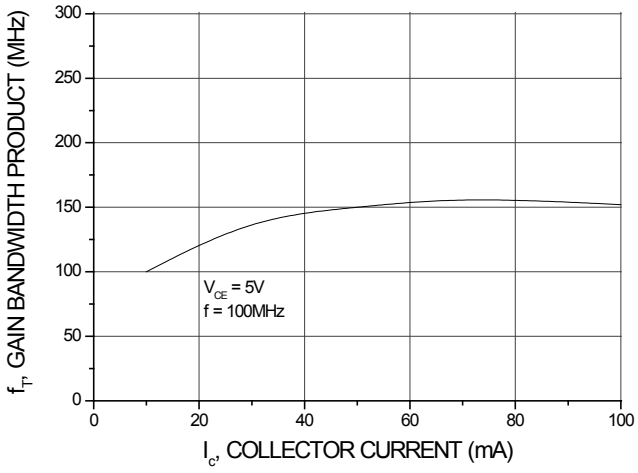
Typical Electrical Characteristics (@ T_A = +25°C, unless otherwise specified.)



$V_{BE(sat)}$ v I_C



C v V_R



f_T v I_C

Package Outline Dimensions

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

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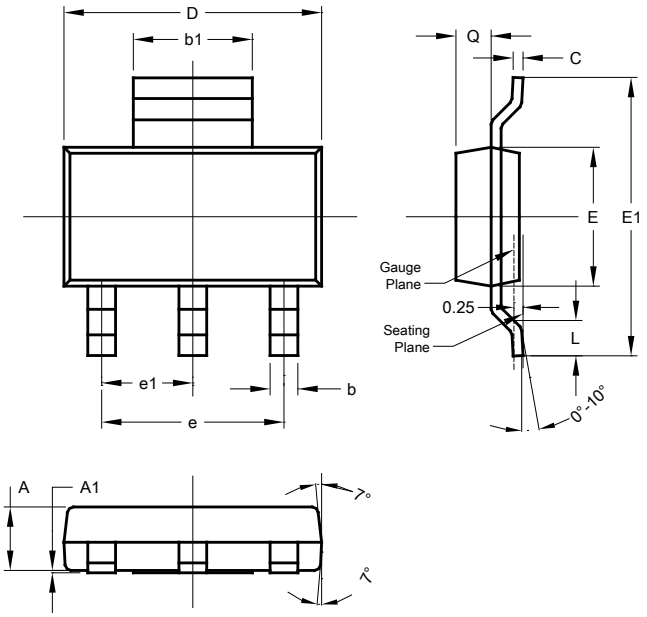
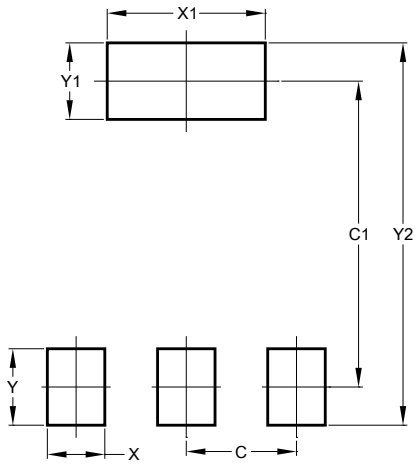


SOT223			
Dim	**Min**	**Max**	**Typ**
A	1.55	1.65	1.60
A1	0.010	0.15	0.05
b	0.60	0.80	0.70
b1	2.90	3.10	3.00
C	0.20	0.30	0.25
D	6.45	6.55	6.50
E	3.45	3.55	3.50
E1	6.90	7.10	7.00
e	–	–	4.60
e1	–	–	2.30
L	0.85	1.05	0.95
Q	0.84	0.94	0.89
All Dimensions in mm			

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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