

**PNP MEDIUM POWER TRANSISTORS IN SOT223**
**Features**

- $BV_{CEO} > -45V, -60V \text{ \& } -80V$
- $I_C = -1A$  High Continuous Collector Current
- $I_{CM} = -2A$  Peak Pulse Current
- 2W Power Dissipation
- Low Saturation Voltage  $V_{CE(sat)} < -500mV @ -0.5A$
- Gain Groups 10 and 16
- Complementary NPN types: BCP54, 55 and 56
- **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)

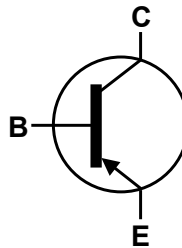
**Applications**

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

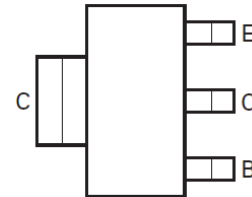
SOT223



Top View



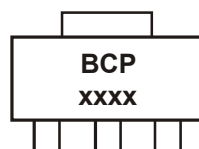
Device Symbol


 Top View  
Pin-Out

**Ordering Information** (Notes 4 & 5)

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
BCP51TA	AEC-Q101	BCP 51	7	12	1,000
BCP5110TA	AEC-Q101	BCP 5110	7	12	1,000
BCP5116TA	AEC-Q101	BCP 5116	7	12	1,000
BCP5116TC	AEC-Q101	BCP 5116	13	12	4,000
BCP52TA	AEC-Q101	BCP 52	7	12	1,000
BCP5210TA	AEC-Q101	BCP 5210	7	12	1,000
BCP5216TA	AEC-Q101	BCP 5216	7	12	1,000
BCP53TA	AEC-Q101	BCP 53	7	12	1,000
BCP53QTA	Automotive	BCP 53	7	12	1,000
BCP5310TA	AEC-Q101	BCP 5310	7	12	1,000
BCP5316TA	AEC-Q101	BCP 5316	7	12	1,000
BCP5316TC	AEC-Q101	BCP 5316	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](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.  
 xxxx = Product Type Marking Code, Line 2 as follows:

BCP51 = 51	BCP52 = 52	BCP53 = 53
BCP5110 = 5110	BCP5210 = 5210	BCP5310 = 5310
BCP5116 = 5116	BCP5216 = 5216	BCP5316 = 5316

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

Characteristic	Symbol	BCP51	BCP52	BCP53	Unit
Collector-Base Voltage	V <sub>CBO</sub>	-45	-60	-100	V
Collector-Emitter Voltage	V <sub>CEO</sub>	-45	-60	-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.)

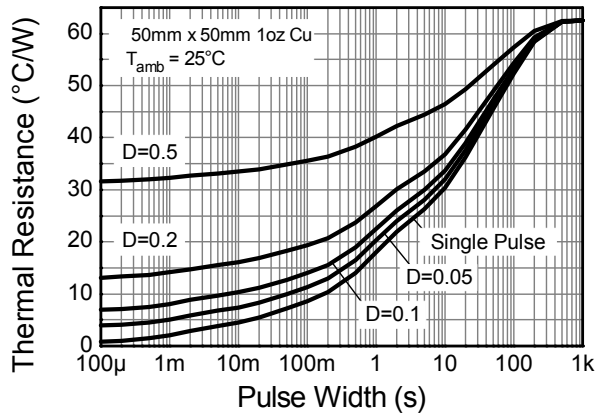
Characteristic	Symbol	Value	Unit
Power Dissipation (Note 6)	P <sub>D</sub>	2	W
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	62	°C/W
Thermal Resistance, Junction to Leads (Note 7)	R <sub>θJL</sub>	19.4	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>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

**ESD Ratings** (Note 8)

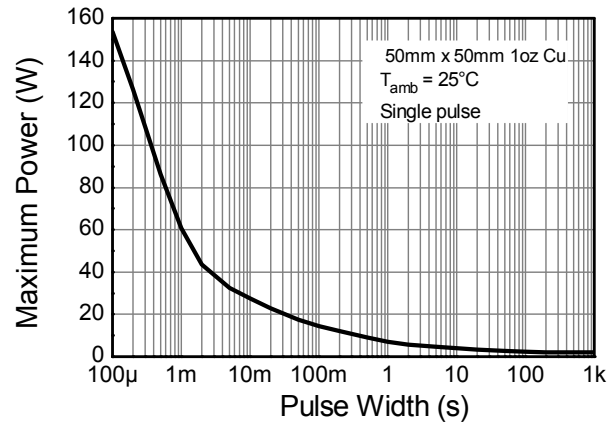
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- 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.

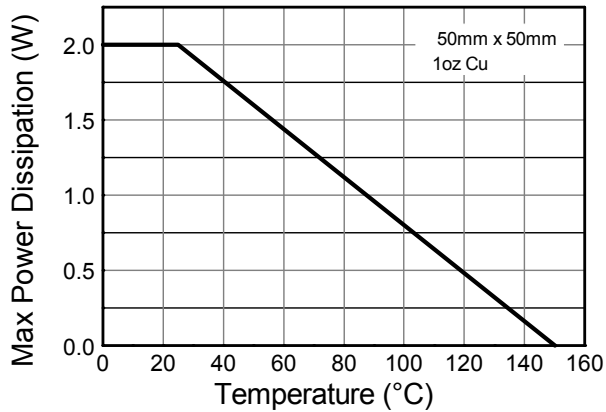
## Thermal Characteristics and Derating Information



**Transient Thermal Impedance**



**Pulse Power Dissipation**



**Derating Curve**

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

Characteristic		Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BCP51	$BV_{CBO}$	-45	—	—	V	$I_C = -100\mu\text{A}$
	BCP52		-60				
	BCP53		-100				
Collector-Emitter Breakdown Voltage (Note 9)	BCP51	$BV_{CEO}$	-45	—	—	V	$I_C = -10\text{mA}$
	BCP52		-60				
	BCP53		-80				
Emitter-Base Breakdown Voltage		$BV_{EBO}$	-5	—	—	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	$V_{EB} = -4\text{V}$
Static Forward Current Transfer Ratio (Note 9)	All versions	$h_{FE}$	25 40 25	— — —	— 250 —	—	$I_C = -5\text{mA}, V_{CE} = -2\text{V}$ $I_C = -150\text{mA}, V_{CE} = -2\text{V}$ $I_C = -500\text{mA}, V_{CE} = -2\text{V}$
	10 gain grp		63	—	160		$I_C = -150\text{mA}, V_{CE} = -2\text{V}$
	16 gain grp		100	—	250		$I_C = -150\text{mA}, V_{CE} = -2\text{V}$
Collector-Emitter Saturation Voltage (Note 9)		$V_{CE(sat)}$	—	—	-0.5	V	$I_C = -500\text{mA}, I_B = -50\text{mA}$
Base-Emitter Turn-On Voltage (Note 9)		$V_{BE(on)}$	—	—	-1.0	V	$I_C = -500\text{mA}, V_{CE} = -2\text{V}$
Transition Frequency		$f_T$	150	—	—	MHz	$I_C = -50\text{mA}, V_{CE} = -10\text{V}$ $f = 100\text{MHz}$
Output Capacitance		$C_{obo}$	—	—	25	pF	$V_{CB} = -10\text{V}, f = 1\text{MHz}$

Notes: 9. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

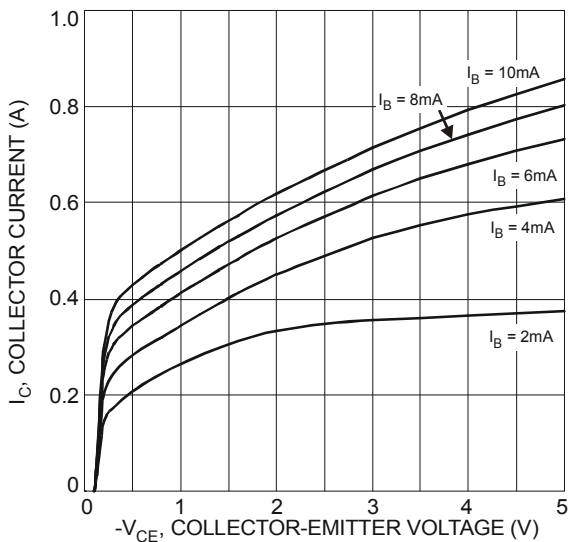


Fig. 1 Typical Collector Current vs. Collector-Emitter Voltage

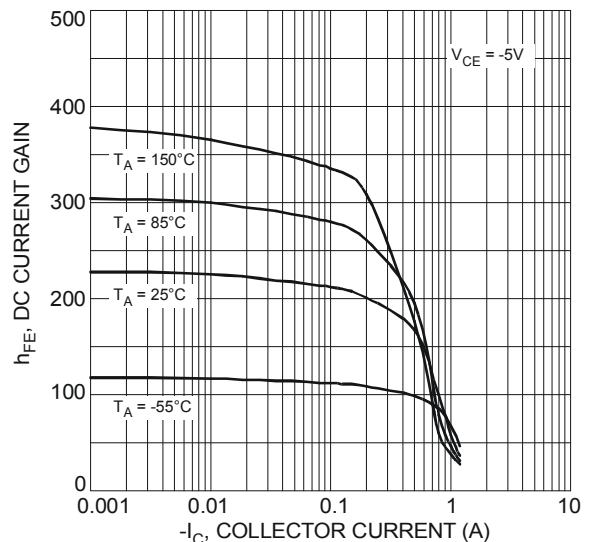
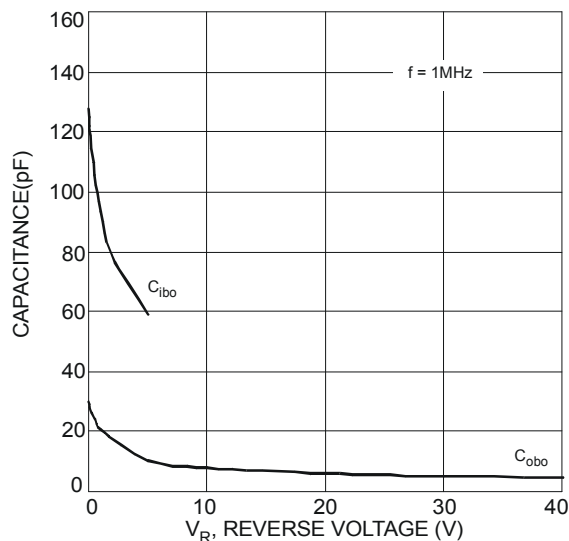
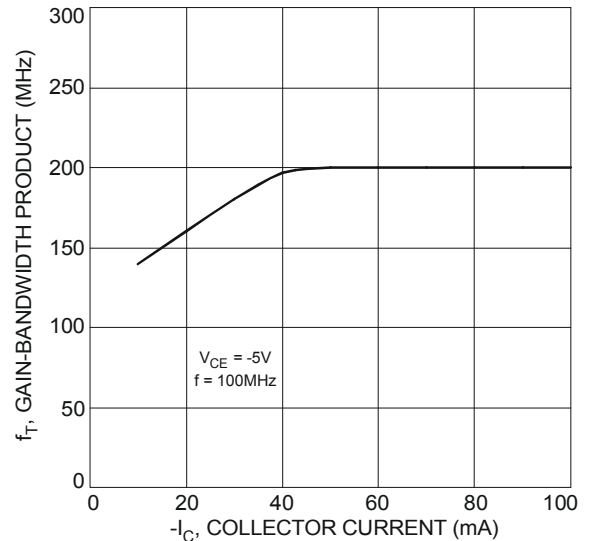
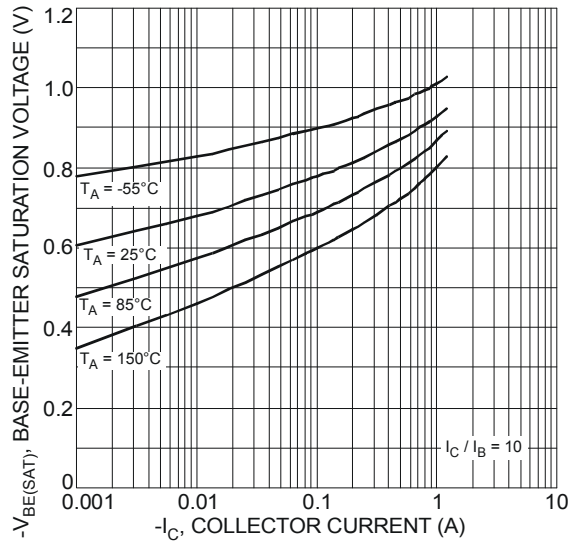
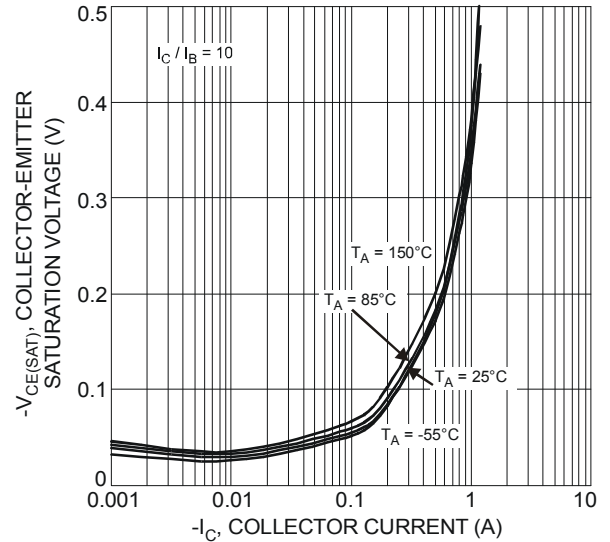
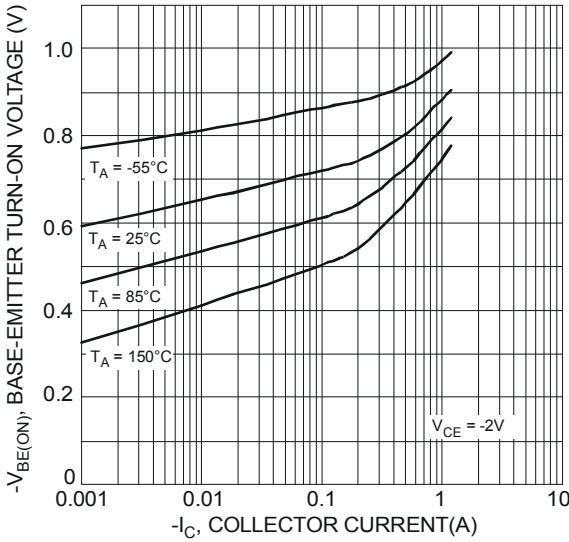
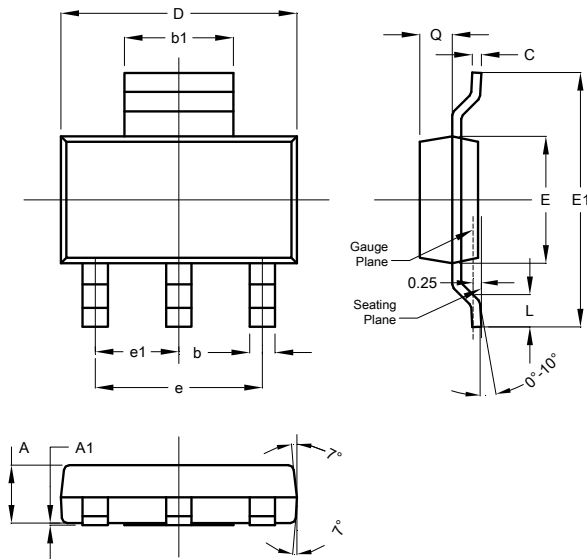


Fig. 2 Typical DC Current Gain vs. Collector Current



## Package Outline Dimensions

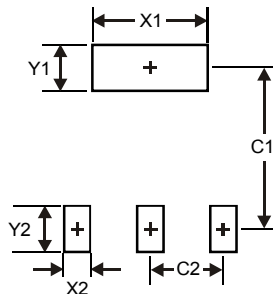
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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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