

**PNP SURFACE MOUNT SMALL SIGNAL TRANSISTOR IN SOT23**

**Features**

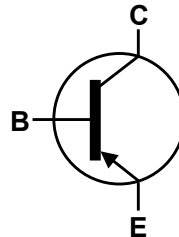
- Ideally Suited for Automatic Insertion
- Complementary NPN Types Available (BC846 – BC848)
- For switching and AF Amplifier Applications
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP capable (Note 4)**

**Mechanical Data**

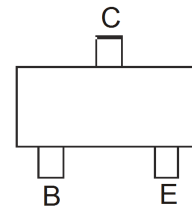
- Case: SOT23
- Case material: molded plastic, "Green" molding compound
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 Ⓔ3
- Weight: 0.008 grams (Approximate)



Top View



Device Symbol



Top View  
Pin-Out

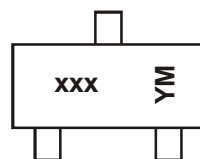
**Ordering Information** (Notes 4 & 5)

Product	Compliance	Marking	Reel size (inches)	Quantity per reel
BC856A-7-F	AEC-Q101	K3A	7	3,000
BC856B-7-F	AEC-Q101	K3B	7	3,000
BC856BQ-7-F	Automotive	K3B	7	3,000
BC856B-13-F	AEC-Q101	K3B	13	10,000
BC856BQ-13-F	Automotive	K3B	13	10,000
BC857A-7-F	AEC-Q101	K3A	7	3,000
BC857B-7-F	AEC-Q101	K3B	7	3,000
BC857BQ-7-F	Automotive	K3B	7	3,000
BC857B-13-F	AEC-Q101	K3B	13	10,000

Product	Compliance	Marking	Reel size (inches)	Quantity per reel
BC857C-7-F	AEC-Q101	K3G	7	3,000
BC857C-13-F	AEC-Q101	K3G	13	10,000
BC858A-7-F	AEC-Q101	K3A	7	3,000
BC858B-7-F	AEC-Q101	K3B	7	3,000
BC858C-7-F	AEC-Q101	K3G	7	3,000

- 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. Tape width is 8mm. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>

**Marking Information**



xxx = Product Type Marking Code  
(Please see Ordering Information)  
YM = Date Code Marking  
Y = Year ex: X = 2010  
M = Month ex: 9 = September

Date Code Key

Year	2010	2011	2012	2013	2014	2015	2016	2017
Code	X	Y	Z	A	B	C	D	E

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

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

Characteristic		Symbol	Value	Unit
Collector-Base Voltage	BC856	$V_{CB0}$	-80	V
	BC857		-50	
	BC858		-30	
Collector-Emitter Voltage	BC856	$V_{CEO}$	-65	V
	BC857		-45	
	BC858		-30	
Emitter-Base Voltage		$V_{EBO}$	-5.0	V
Continuous Collector Current		$I_C$	-100	mA
Peak Collector Current		$I_{CM}$	-200	mA
Peak Emitter Current		$I_{EM}$	-200	mA

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

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 6)	$P_D$	310	mW
	(Note 7)		350	
Thermal Resistance, Junction to Ambient	(Note 6)	$R_{\theta JA}$	403	$^\circ\text{C}/\text{W}$
	(Note 7)		357	
Thermal Resistance, Junction to Leads	(Note 8)	$R_{\theta JL}$	350	$^\circ\text{C}/\text{W}$
Operating and Storage Temperature Range		$T_J, T_{STG}$	-65 to +150	$^\circ\text{C}$

**ESD Ratings** (Note 9)

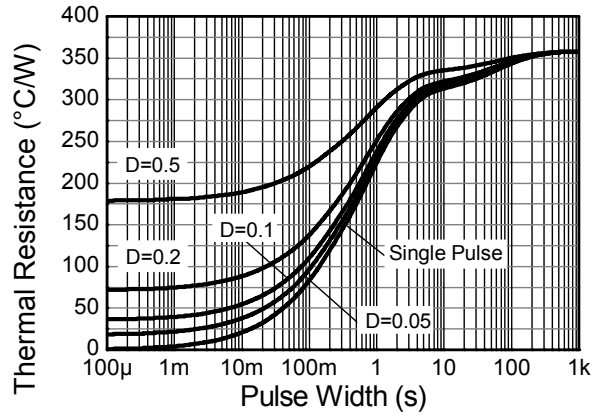
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	$\geq 8,000$	V	3B
Electrostatic Discharge - Machine Model	ESD MM	$\geq 400$	V	C

- Notes:
6. For the device mounted on minimum recommended pad layout FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.
  7. For the device mounted on 15mm x 15mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.
  8. Thermal resistance from junction to solder-point (at the end of the leads).
  9. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

**Thermal Characteristics and Derating Information**



**Derating Curve**



**Transient Thermal Impedance**



**Pulse Power Dissipation**

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

Characteristic		Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BC856	BV <sub>CBO</sub>	-80	—	—	V	I <sub>C</sub> = -10μA
	BC857		-50				
	BC858		-30				
Collector-Emitter Breakdown Voltage (Note 10)	BC856	BV <sub>CEO</sub>	-65	—	—	V	I <sub>C</sub> = -10mA
	BC857		-45				
	BC858		-30				
Emitter-Base Breakdown Voltage		BV <sub>EBO</sub>	-5	—	—	V	I <sub>E</sub> = -1μA
Collector Cutoff Current		I <sub>CBO</sub>	—	—	-15 -4	μA	V <sub>CB</sub> = -30V V <sub>CB</sub> = -30V, T <sub>A</sub> = +150°C
Collector Emitter Cutoff Current	BC856	I <sub>CES</sub>	—	—	-15	nA	V <sub>CE</sub> = -80V V <sub>CE</sub> = -50V V <sub>CE</sub> = -30V
	BC857				-15		
	BC858				-15		
Small Signal Current Gain (Note 10)	BC856A / BC857A / BC858A	h <sub>re</sub>	—	—	200	—	I <sub>C</sub> = -2.0mA, V <sub>CE</sub> = -5V f = 1.0kHz
	BC856B / BC857B / BC858B				330		
	BC857C / BC858C				600		
Input Impedance (Note 10)	BC856A / BC857A / BC858A	h <sub>ie</sub>	—	—	2.7	kΩ	
	BC856B / BC857B / BC858B				4.5		
	BC857C / BC858C				8.7		
Output Admittance (Note 10)	BC856A / BC857A / BC858A	h <sub>oe</sub>	—	—	18	μS	
	BC856B / BC857B / BC858B				30		
	BC857C / BC858C				60		
Reverse Voltage Transfer Ratio (Note 10)	BC856A / BC857A / BC858A	h <sub>re</sub>	—	—	1.5x10 <sup>-4</sup>	—	
	BC856B / BC857B / BC858B				2x10 <sup>-4</sup>		
	BC857C / BC858C				3x10 <sup>-4</sup>		
DC Current Gain (Note 10)	BC856A / BC857A / BC858A	h <sub>FE</sub>	—	—	125	—	I <sub>C</sub> = -2.0mA, V <sub>CE</sub> = -5V
	BC856B / BC857B / BC858B				220		
	BC857C / BC858C				420		
Collector-Emitter Saturation Voltage (Note 10)		V <sub>CE(sat)</sub>	—	-75 -250	-300 -650	mV	I <sub>C</sub> = -10mA, I <sub>B</sub> = -0.5mA I <sub>C</sub> = -100mA, I <sub>B</sub> = -5.0mA
Base-Emitter Turn-On Voltage (Note 10)		V <sub>BE(on)</sub>	-600	-650	-750	mV	I <sub>C</sub> = -2mA, V <sub>CE</sub> = -5V I <sub>C</sub> = -10mA, V <sub>CE</sub> = -5V
Base-Emitter Saturation Voltage (Note 10)		V <sub>BE(sat)</sub>	—	-700 -850	—	mV	I <sub>C</sub> = -10mA, I <sub>B</sub> = -0.5mA I <sub>C</sub> = -100mA, I <sub>B</sub> = -5mA
Output Capacitance		C <sub>obo</sub>	—	3	—	pF	V <sub>CB</sub> = -10V, f = 1.0MHz
Transition Frequency		f <sub>T</sub>	100	200	—	MHz	V <sub>CE</sub> = -5V, I <sub>C</sub> = -10mA, f = 100MHz
Noise Figure		NF	—	2	10	dB	V <sub>CE</sub> = -5V, I <sub>C</sub> = -200μA R <sub>S</sub> = 2kΩ, f = 1kHz Δf = 200Hz

Notes: 10. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%

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



Figure 1 Typical DC Current Gain vs. Collector Current



Figure 2 Typical Collector-Emitter Saturation Voltage vs. Collector Current

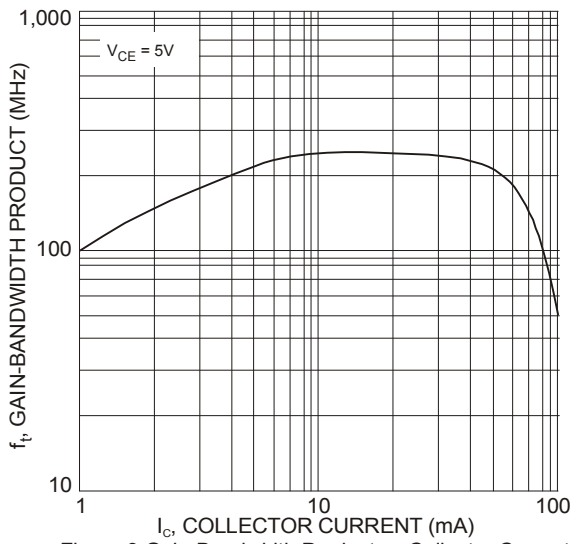
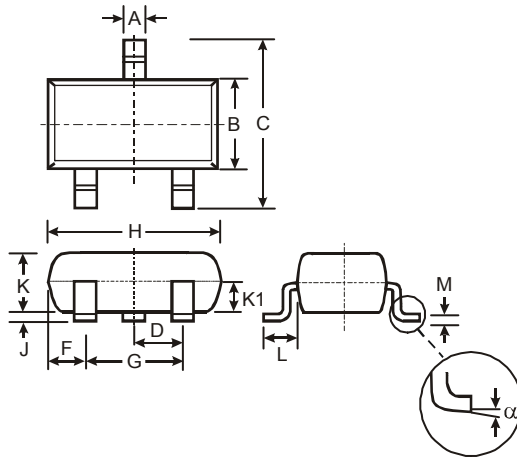


Figure 3 Gain-Bandwidth Product vs Collector Current

**Package Outline Dimensions**

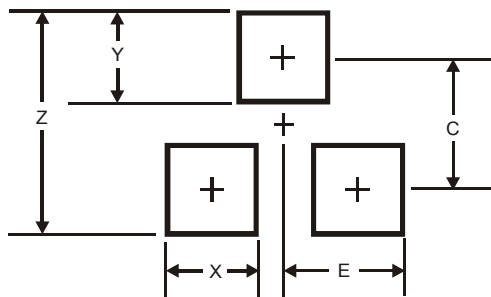
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.903	1.10	1.00
K1	-	-	0.400
L	0.45	0.61	0.55
M	0.085	0.18	0.11
α	0°	8°	-
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)
Z	2.9
X	0.8
Y	0.9
C	2.0
E	1.35

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