



**THE DATASHEET OF  
BC857A-7-F**



**PNP SMALL SIGNAL TRANSISTOR IN SOT23**

**Features**

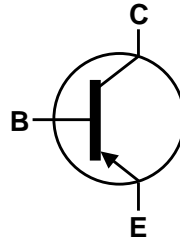
- Ideally Suited for Automatic Insertion
- Complementary NPN Types: BC846 – BC848
- For Switching and AF Amplifier Applications
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**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

**Mechanical Data**

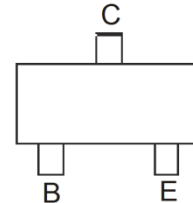
- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound  
UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per  
MIL-STD-202, Method 208 (Ⓐ)
- Weight: 0.008 grams (Approximate)



Top View



Device Symbol



Top View  
Pin-Out

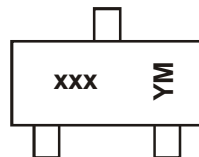
**Ordering Information** (Notes 4 & 5)

Product	Compliance	Marking	Reel Size (inches)	Quantity per Reel
BC856A-7-F	AEC-Q101	K3A	7	3,000
BC856AQ-7-F	Automotive	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

Product	Compliance	Marking	Reel Size (inches)	Quantity per Reel
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
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 or  $\bar{Y}$  = Year (ex: A = 2013)  
M or  $\bar{M}$  = 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

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

Characteristic		Symbol	Value	Unit
Collector-Base Voltage	BC856	V <sub>CBO</sub>	-80	V
	BC857		-50	
	BC858		-30	
Collector-Emitter Voltage	BC856	V <sub>CEO</sub>	-65	V
	BC857		-45	
	BC858		-30	
Emitter-Base Voltage		V <sub>EBO</sub>	-5.0	V
Continuous Collector Current		I <sub>C</sub>	-100	mA
Peak Collector Current		I <sub>CM</sub>	-200	mA
Peak Emitter Current		I <sub>EM</sub>	-200	mA
Peak Base Current		I <sub>BM</sub>	-200	mA

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

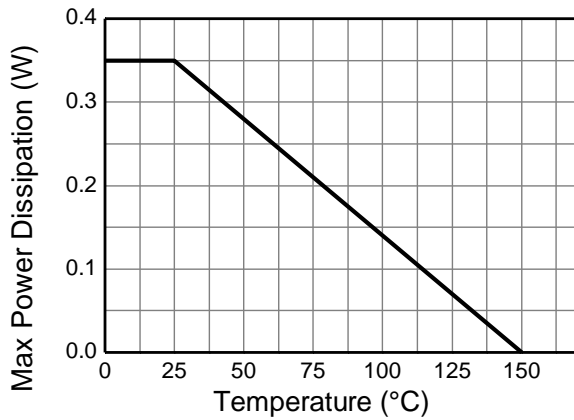
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 6)	P <sub>D</sub>	310	mW
	(Note 7)		350	
Thermal Resistance, Junction to Ambient	(Note 6)	R <sub>θJA</sub>	403	°C/W
	(Note 7)		357	
Thermal Resistance, Junction to Leads	(Note 8)	R <sub>θJL</sub>	350	°C/W
Operating and Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	-65 to +150	°C

**ESD Ratings** (Note 9)

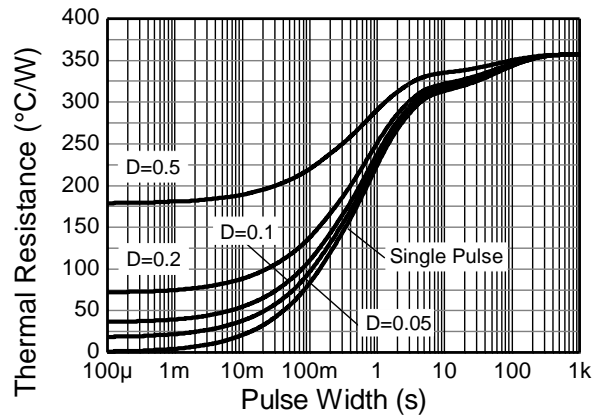
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- Notes:
6. For a device mounted on minimum recommended pad layout 1oz copper that is on a single-sided FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.
  7. Same as Note 6, except the device is mounted on 15 mm x 15mm 1oz copper.
  8. Thermal resistance from junction to solder-point (at the end of the leads).
  9. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

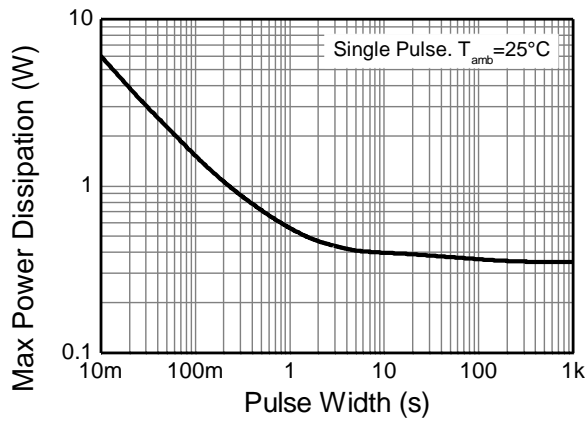
**Thermal Characteristics and Derating Information**



**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>CB0</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	nA	V <sub>CB</sub> = -30V
					-4	μA	V <sub>CB</sub> = -30V, T <sub>J</sub> = +150°C
Collector Emitter Cutoff Current	BC856	I <sub>CES</sub>	—	—	-15	nA	V <sub>CE</sub> = -80V
	BC857				-15		V <sub>CE</sub> = -50V
	BC858				-15		V <sub>CE</sub> = -30V
Emitter-Base Cutoff Current		I <sub>EBO</sub>	—	—	-100	nA	V <sub>EB</sub> = -5V
Small Signal Current Gain (Note 10)	BC856A / BC857A / BC858A	h <sub>fe</sub>	—	—	200	—	—
	BC856B / BC857B / BC858B				330		
	BC857C / BC858C				600		
Input Impedance (Note 10)	BC856A / BC857A / BC858A	h <sub>ie</sub>	—	—	2.7	kΩ	I <sub>C</sub> = -2.0mA, V <sub>CE</sub> = -5V f = 1.0kHz
	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	180	250	—	I <sub>C</sub> = -2.0mA, V <sub>CE</sub> = -5V
	BC856B / BC857B / BC858B		220	290	475		
	BC857C / BC858C		420	520	800		
Collector-Emitter Saturation Voltage (Note 10)		V <sub>CE(sat)</sub>	—	-75	-300	mV	I <sub>C</sub> = -10mA, I <sub>B</sub> = -0.5mA
					-250		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
			—	—	-820		I <sub>C</sub> = -10mA, V <sub>CE</sub> = -5V
Base-Emitter Saturation Voltage (Note 10)		V <sub>BE(sat)</sub>	—	-700	—	mV	I <sub>C</sub> = -10mA, I <sub>B</sub> = -0.5mA
					-850		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

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

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

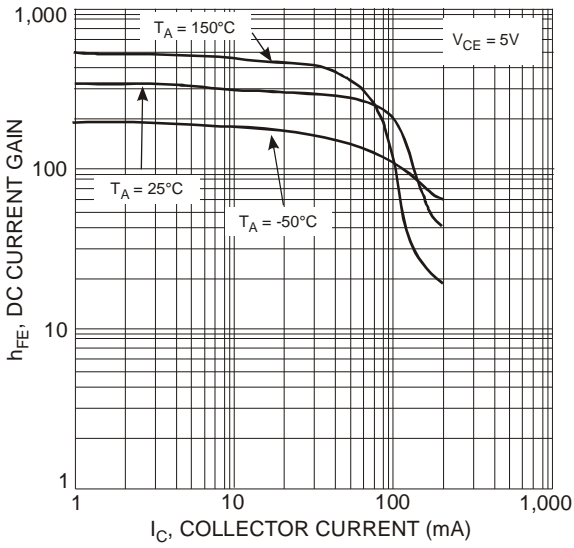


Figure 1 Typical DC Current Gain vs. Collector Current

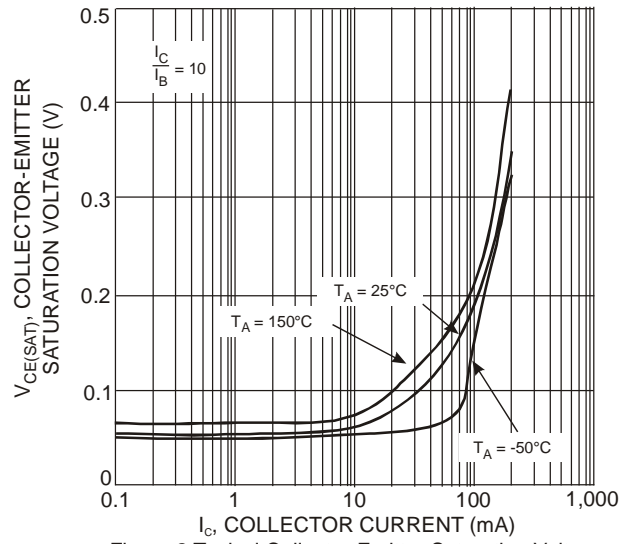


Figure 2 Typical Collector-Emitter Saturation Voltage vs. Collector Current

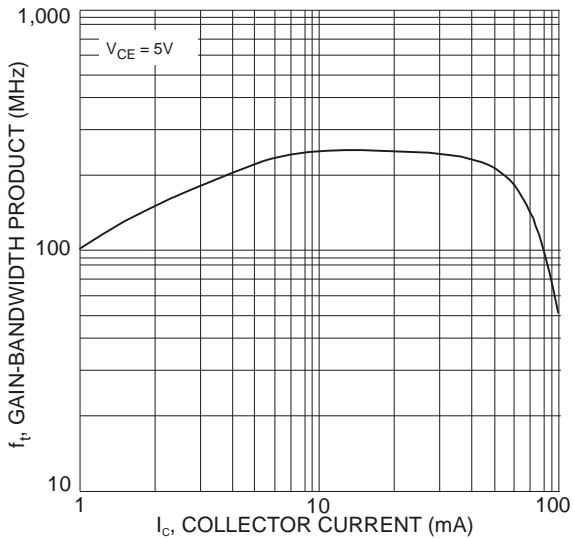
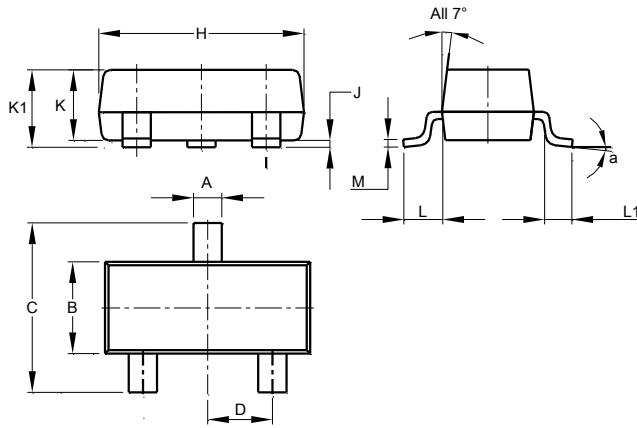


Figure 3 Gain-Bandwidth Product vs Collector Current

**Package Outline Dimensions**

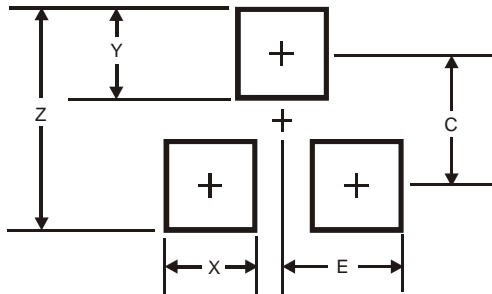
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



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	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	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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