



# BC856A - BC858C

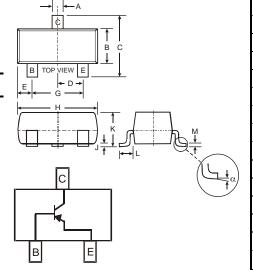
#### PNP SURFACE MOUNT SMALL SIGNAL TRANSISTOR

## **Features**

- Ideally Suited for Automatic Insertion
- Complementary NPN Types Available (BC846-BC848)
- For Switching and AF Amplifier Applications
- Qualified to AEC-Q101 Standards for High Reliability
- Lead, Halogen and Antimony Free, RoHS Compliant "Green" Device (Notes 3 and 4)

## **Mechanical Data**

- Case: SOT-23
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020C
- Terminals: Solderable per MIL-STD-202, Method 208
- Lead Free Plating (Matte Tin Finish annealed over Alloy 42 leadframe).
- Pin Connections: See Diagram
- Marking Codes: See Table Below & Diagram on Page 4
- Ordering & Date Code Information: See Page 4
- Weight: 0.008 grams (approximate)



	SOT-23									
Dim	Min	Max								
Α	0.37	0.51								
В	1.20	1.40								
C	2.30	2.50								
D	0.89	1.03								
E	0.45	0.60								
G	1.78	2.05								
Н	2.80	3.00								
J	0.013	0.10								
K	0.903	1.10								
L	0.45	0.61								
М	0.085	0.180								
α	0°	8°								
All Dimensions in mm										

Marking Code (Note 2)										
Туре	Marking	Туре	Marking							
BC856A	3A, K3A	BC857C	3G, K3G							
BC856B	3B, K3B	BC858A	3J, K3J, K3A, K3V							
BC857A	3E, K3V, K3A	BC858B	3K, K3K, K3B, K3W							
BC857B	3F, K3W, K3B	BC858C	3L, K3L, K3G							

# **Maximum Ratings** @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic		Symbol	Value	Unit
Collector-Base Voltage	BC856 BC857 BC858	V <sub>CBO</sub>	-80 -50 -30	V
Collector-Emitter Voltage	BC856 BC857 BC858	V <sub>CEO</sub>	-65 -45 -30	V
Emitter-Base Voltage		$V_{EBO}$	-5.0	V
Collector Current		Ic	-100	mA
Peak Collector Current		I <sub>CM</sub>	-200	mA
Peak Emitter Current		I <sub>EM</sub>	-200	mA
Power Dissipation (Note 1)		$P_d$	300	mW
Thermal Resistance, Junction to Ambient (Note 1)		$R_{\theta JA}$	417	°C/W
Operating and Storage Temperature Range		$T_{j}, T_{STG}$	-65 to +150	°C

Notes:

- Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch; pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at http://www.diodes.com/datasheets/ap02001.pdf.
- Current gain subgroup "C" is not available for BC856.
- No purposefully added lead. Halogen and Antimony Free.
- Product manufactured with Data Code V9 (week 33, 2008) and newer are built with Green Molding Compound. Product manufactured prior to Date Code V9 are built with Non-Green Molding Compound and may contain Halogens or Sb<sub>2</sub>O<sub>3</sub> Fire Retardants.



# **Electrical Characteristics** @T<sub>A</sub> = 25°C unless otherwise specified

Character	Symbol	Min	Тур	Max	Unit	Test Condition	
Collector-Base Breakdown Voltage	V <sub>(BR)CBO</sub>	-80 -50 -30	_ _ _	_ _ _	V	$I_C = 10 \mu A, I_B = 0$	
Collector-Emitter Breakdown Volta	ge (Note 5) BC856 BC857 BC858	$V_{(BR)CEO}$	-65 -45 -30	_ _ _		V	$I_{C} = 10$ mA, $I_{B} = 0$
Emitter-Base Breakdown Voltage	(Note 5)	$V_{(BR)EBO}$	-5	_	_	V	$I_E = 1 \mu A, I_C = 0$
H-Parameters Small Signal Current Gain Input Impedance	Current Gain Group A B C Current Gain Group A	h <sub>fe</sub> h <sub>fe</sub> h <sub>fe</sub> h <sub>ie</sub>		200 330 600 2.7		   kΩ	
Output Admittance	B C Current Gain Group A B C	h <sub>ie</sub> h <sub>ie</sub> h <sub>oe</sub> h <sub>oe</sub>	_ _ _ _	4.5 8.7 18 30 60	_ _ _ _	kΩ kΩ μS μS μS	$V_{CE} = -5.0V$ , $I_{C} = -2.0$ mA, $f = 1.0$ kHz
Reverse Voltage Transfer Ratio	Current Gain Group A B C	h <sub>re</sub> h <sub>re</sub> h <sub>re</sub>		1.5x10 <sup>-4</sup> 2x10 <sup>-4</sup> 3x10 <sup>-4</sup>		_ _ _	
DC Current Gain (Note 5)	Current Gain Group A B C	h <sub>FE</sub>	125 220 420	180 290 520	250 475 800	_	$V_{CE} = -5.0V, I_{C} = -2.0mA$
Collector-Emitter Saturation Voltag	V <sub>CE(SAT)</sub>	_	-75 -250	-300 -650	mV	$I_C = -10$ mA, $I_B = -0.5$ mA $I_C = -100$ mA, $I_B = -5.0$ mA	
Base-Emitter Saturation Voltage (N	$V_{BE(SAT)}$	_	-700 -850	_	mV	$I_C = -10$ mA, $I_B = -0.5$ mA $I_C = -100$ mA, $I_B = -5.0$ mA	
Base-Emitter Voltage (Note 5)	$V_{BE(ON)}$	-600 —	-650 —	-750 -820	mV	$V_{CE} = -5.0V, I_{C} = -2.0mA$ $V_{CE} = -5.0V, I_{C} = -10mA$	
Collector-Cutoff Current (Note 5)	BC856 BC857 BC858	I <sub>CES</sub> I <sub>CES</sub> I <sub>CES</sub> I <sub>CBO</sub> I <sub>CBO</sub>	_ _ _ _	_ _ _ _	-15 -15 -15 -15 -4.0	nA nA nA nA µA	$V_{CE} = -80V$ $V_{CE} = -50V$ $V_{CE} = -30V$ $V_{CB} = -30V$ $V_{CB} = -30V$ , $T_{A} = 150^{\circ}C$
Gain Bandwidth Product		f⊤	100	200	_	MHz	$V_{CE} = -5.0V, I_{C} = -10mA,$ f = 100MHz
Collector-Base Capacitance	C <sub>CBO</sub>	_	3	_	pF	V <sub>CB</sub> = -10V, f = 1.0MHz	
Noise Figure		NF	_	2	10	dB	$\begin{aligned} V_{CE} &= \text{-}5.0\text{V}, \ I_{C} = 200\mu\text{A}, \\ R_{S} &= 2k\Omega, \ f = 1\text{kHz}, \ \Delta f = 200\text{Hz} \end{aligned}$

Notes: 5. Short duration pulse test used to minimize self-heating effect.



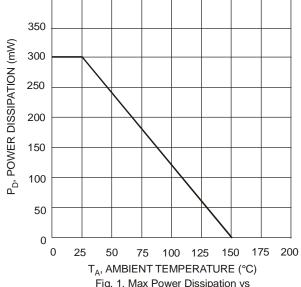
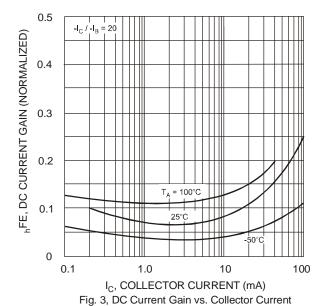


Fig. 1, Max Power Dissipation vs Ambient Temperature



0.5 V<sub>CE(SAT)</sub>, COLLECTOR TO EMITTER SATURATION VOLTAGE (V) 0.4 0.3 0.2  $T_A = 150^{\circ}C$ 0.1 0 1000 0.1 100 10

I<sub>c</sub>, COLLECTOR CURRENT (mA) Fig. 2 Collector Emitter Saturation Voltage vs. Collector Current

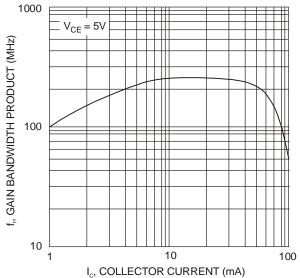


Fig. 4, Gain Bandwidth Product vs Collector Current



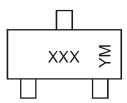
#### Ordering Information (Note 6)

Device*	Packaging	Shipping				
BC85xx-7-F	SOT-23	3000/Tape & Reel				

xx = device type, e.g. BC856A-7-F.

Notes: 6. For packaging details, go to our website at http://www.diodes.com/datasheets/ap02007.pdf.

## **Marking Information**



XXX = Product Type Marking Code (See Page 1), e.g. K3A = BC856A

YM = Date Code Marking Y = Year ex: T = 2006 M = Month ex: 9 = September

#### Date Code Key

Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Code	J	K	L	М	N	Р	R	S	Т	U	V	W	Χ	Υ	Z
Month	Jan	Fe	b I	Mar	Apr	May	Ju	n	Jul	Aug	Sep	Oc	t	Nov	Dec
Code	1	2		3	4	5	6		7	8	9	0		N	D

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