NPN SURFACE MOUNT SMALL SIGNAL TRANSISTOR IN SOT23

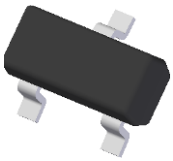
Features

- Ideally Suited for Automatic Insertion
- Complementary PNP Types Available (BC856 – BC858)
- 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)**

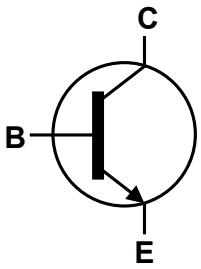
Mechanical Data

- 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 e3
- Weight: 0.008 grams (Approximate)

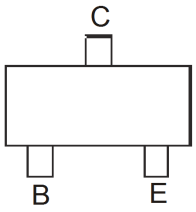
SOT23



Top View



Device Symbol



Top View
Pin-Out

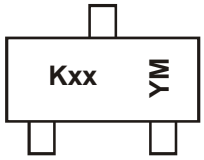
Ordering Information (Notes 4 & 5)

Product	Compliance	Marking	Reel size (inches)	Quantity per reel
BC846A-7-F	AEC-Q101	K1Q	7	3,000
BC846AQ-7-F	Automotive	K1Q	7	3,000
BC846B-7-F	AEC-Q101	K1R / C1R	7	3,000
BC846BQ-7-F	Automotive	K1R	7	3,000
BC846B-13-F	AEC-Q101	K1R / C1R	13	10,000
BC846BQ-13-F	Automotive	K1R	13	10,000
BC847A-7-F	AEC-Q101	K1Q	7	3,000
BC847AQ-7-F	Automotive	K1Q	7	3,000
BC847A-13-F	AEC-Q101	K1Q	13	10,000
BC847B-7-F	AEC-Q101	K1R / C1R	7	3,000
BC847BQ-7-F	Automotive	K1R	7	3,000

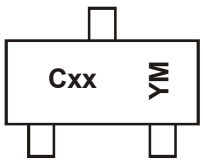
Product	Compliance	Marking	Reel size (inches)	Quantity per reel
BC847B-13-F	AEC-Q101	K1R / C1R	13	10,000
BC847C-7-F	AEC-Q101	K1M	7	3,000
BC847CQ-7-F	Automotive	K1M	7	3,000
BC847C-13-F	AEC-Q101	K1M	13	10,000
BC848A-7-F	AEC-Q101	K1Q	7	3,000
BC848B-7-F	AEC-Q101	K1R	7	3,000
BC848B-13-F	AEC-Q101	K1R	13	10,000
BC848C-7-F	AEC-Q101	K1M	7	3,000
BC848CQ-7-F	Automotive	K1M	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 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/.
5. For packaging details, go to our website at http"//www.diodes.com/products/packages.html

Marking Information



K = SAT (Shanghai Assembly / Test site)
xx = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: Y = 2011)
M = Month (ex: 9 = September)



C = CAT (Chengdu Assembly / Test site)
xx = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: Y = 2011)
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

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

Characteristic		Symbol	Value	Unit
Collector-Base Voltage	BC846	V_{CBO}	80	V
	BC847		50	
	BC848		30	
Collector-Emitter Voltage	BC846	V_{CEO}	65	V
	BC847		45	
	BC848		30	
Emitter-Base Voltage	BC846, BC847	V_{EBO}	6.0	V
	BC848		5.0	
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°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	°C/W
	(Note 7)		357	
Thermal Resistance, Junction to Leads	(Note 8)	$R_{\theta JL}$	350	°C/W
Operating and Storage Temperature Range		T_J,T_{STG}	-65 to +150	°C

ESD Ratings (Note 9)

Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	≥ 8,000	V	3B
Electrostatic Discharge - Machine Model	ESD MM	≥ 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.

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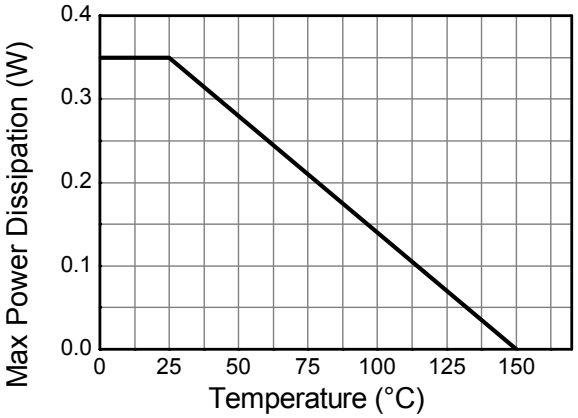
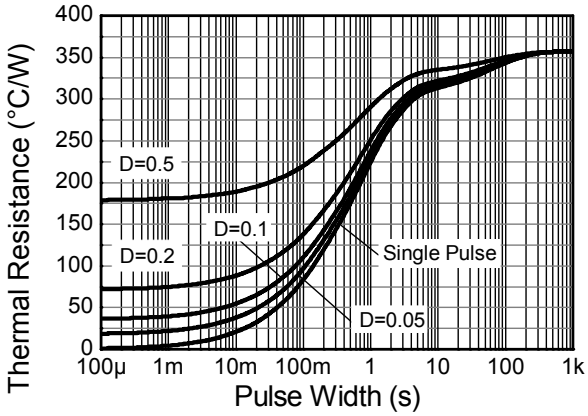
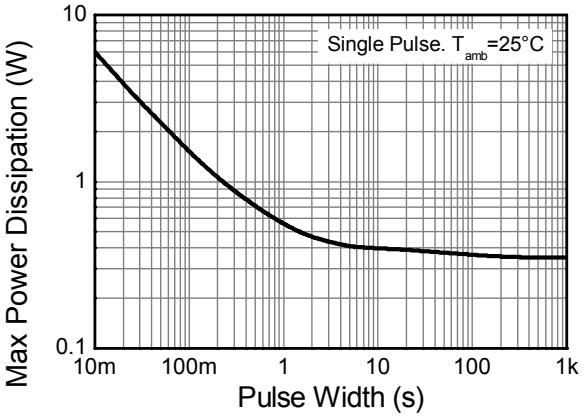
Thermal Characteristics and Derating Information



Derating Curve



Transient Thermal Impedance



Pulse Power Dissipation

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

Characteristic		Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BC846	BV_{CBO}	80	—	—	V	I_C = 10μA
	BC847		50				
	BC848		30				
Collector-Emitter Breakdown Voltage (Note 10)	BC846	BV_{CEO}	65	—	—	V	I_C = 10mA
	BC847		45				
	BC848		30				
Emitter-Base Breakdown Voltage	BC846 / BC847	BV_{EBO}	6	—	—	V	I_E = 1μA
	BC848		5				
Collector Cutoff Current		I_{CBO}	—	—	—	μA	V_{CB} = 40V
					—		V_{CB} = 30V, T_A = +150°C
Collector Emitter Cutoff Current	BC846	I_{CES}	—	—	15	nA	V_{CE}= 80V
	BC847				15		V_{CE}= 50V
	BC848				15		V_{CE}= 30V
Small Signal Current Gain (Note 10)	BC846A / BC847A / BC848A	h_{fe}	—	200	—	—	I_C = 2.0mA, V_{CE} = 5V f=1.0kHz
	BC846B / BC847B / BC848B			330			
	BC847C / BC848C			600			
Input Impedance (Note 10)	BC846A / BC847A / BC848A	h_{ie}	—	2.7	—	kΩ	
	BC846B / BC847B / BC848B			4.5			
	BC847C / BC848C			8.7			
Output Admittance (Note 10)	BC846A / BC847A / BC848A	h_{oe}	—	18	—	μS	
	BC846B / BC847B / BC848B			30			
	BC847C / BC848C			60			
Reverse Voltage Transfer Ratio (Note 10)	BC846A / BC847A / BC848A	h_{re}	—	$1.5x10^{-4}$	—	—	
	BC846B / BC847B / BC848B			$2x10^{-4}$			
	BC847C / BC848C			$3x10^{-4}$			
DC Current Gain (Note 10)	BC846A / BC847A / BC848A	h_{FE}	110	180	220	—	I_C = 2.0mA, V_{CE} = 5V
	BC846B / BC847B / BC848B		200	290	450		
	BC847C / BC848C		420	520	800		
Collector-Emitter Saturation Voltage (Note 10)		$V_{CE(sat)}$	—	90	250	mV	I_C = 10mA, I_B = 0.5mA
				200	600		I_C = 100mA, I_B = 5.0mA
Base-Emitter Turn-On Voltage(Note 10)		$V_{BE(on)}$	580	660	700	mV	I_C = 2mA, V_{CE} = 5V
			-	—	770		I_C = 10mA, V_{CE} = 5V
Base-Emitter Saturation Voltage(Note 10)		$V_{BE(sat)}$	—	700	—	mV	I_C = 10mA, I_B = 0.5mA
				900			I_C = 100mA, I_B = 5mA
Output Capacitance		C_{obo}	—	3	—	pF	V_{CB} = 10V, f = 1.0MHz
Transition Frequency		f_T	100	300	—	MHz	V_{CE} = 5V, I_C = 10mA, f = 100MHz
Noise Figure		NF	—	2	10	dB	V_{CE}=5V, I_C =200μA R_S =2kΩ, f=1kHz Δf=200Hz

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

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

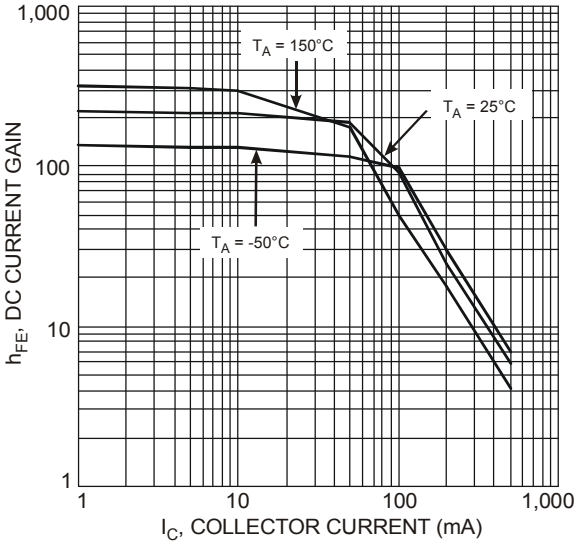

Figure 1 Typical DC Current Gain vs. Collector Current

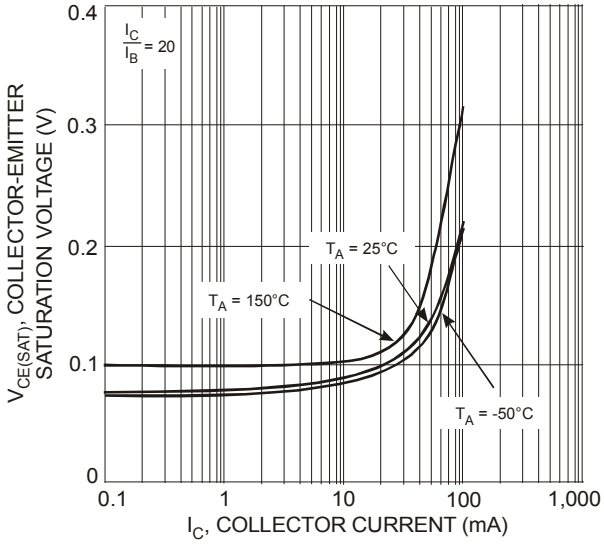

Figure 2 Typical Collector-Emitter Saturation Voltage vs. Collector Current

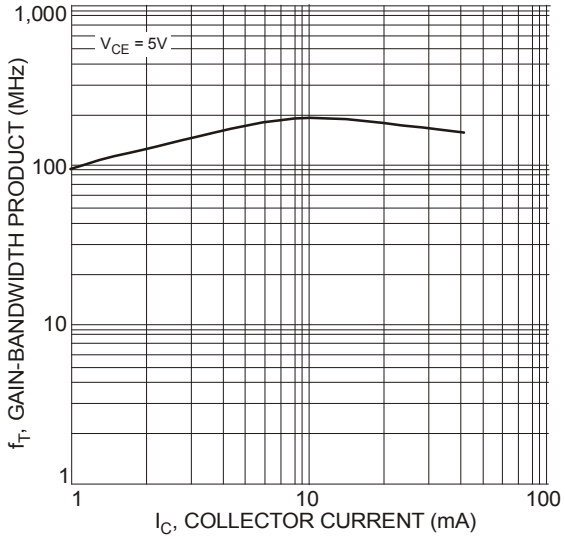

Figure 3 Typical Gain-Bandwidth Product vs. Collector Current

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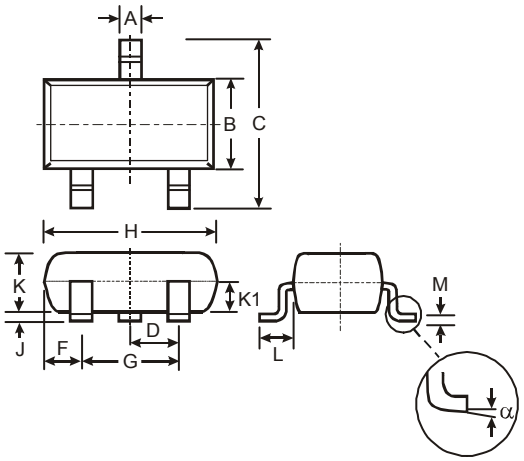
Package Outline Dimensions

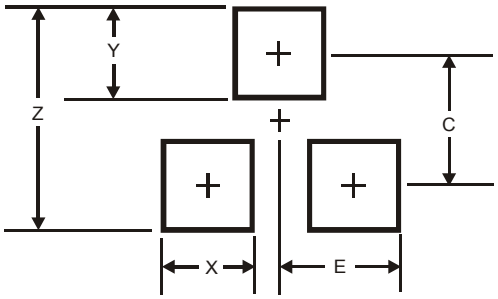
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



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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Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:
moschip.ru
moschip.ru_4
moschip.ru_6
moschip.ru_9