AC847BQ-AC847CQ-AC848BQ

NPN SMALL SIGNAL TRANSISTOR IN SOT23

Description

The bipolar junction transistors (BJT) are designed to meet the stringent requirements of automotive applications.

Features

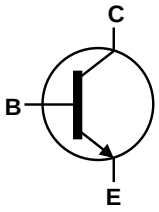
- Ideally Suited for Automatic Insertion
- Complementary PNP Types: AC857BQ – AC857CQ – AC858BQ
- For Switching and AF Amplifier Applications
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

Mechanical Data

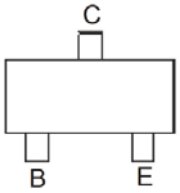
- Case: SOT23
- Case Material: Molded Plastic, “Green” Molding Compound UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish—Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 (e3)
- Weight: 0.008 grams (Approximate)

SOT23

Top View



Device Symbol



Top View
Pin-Out

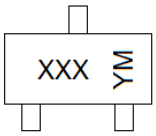
Ordering Information (Notes 4 & 5)

Product	Compliance	Marking	Reel Size (inches)	Quantity per Reel
AC847BQ-7	Automotive	2D1	7	3000
AC847CQ-7	Automotive	2C9	7	3000
AC848BQ-7	Automotive	2K9	7	3000
AC848BQ-13	Automotive	2K9	13	10,000

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant
2. See https://www.diodes.com/quality/lead-free/ 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. Refer to https://www.diodes.com/quality/.
5. For packaging details, see https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information

SOT23



XXX = Product Type Marking Code
YM = Date Code Marking
Y or $\overline{Y}$ = Year (ex: G = 2019)
M or $\overline{M}$ = Month (ex: 9 = September)

Date Code Key

Year	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Code	E	F	G	H	I	J	K	L	M	N	O	P

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_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Collector-Base Voltage	AC847	V_{CBO}	50	V
	AC848		30	
Collector-Emitter Voltage	AC847	V_{CEO}	45	V
	AC848		30	
Emitter-Base Voltage	AC847	V_{EBO}	6.0	V
	AC848		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.)

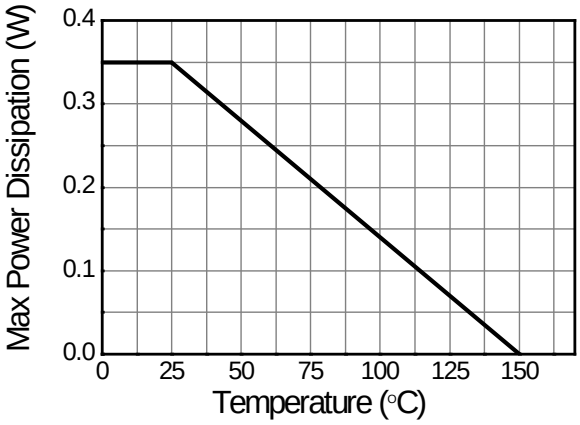
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 6)	P_D	310	mW
	(Note 7)		350	
Thermal Resistance, Junction to Ambient	(Note 6)	$R_{\Theta JA}$	403	°C/W
	(Note 7)		357	
Thermal Resistance, Junction to Leads	(Note 8)	$R_{\Theta JL}$	350	°C/W
Operating and Storage Temperature Range		T_J,T_{STG}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

ESD Ratings (Note 9)

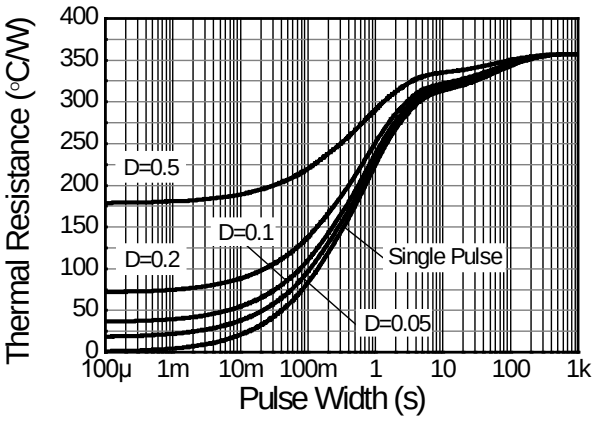
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge—Human Body Model	ESD HBM	4000	V	3A
Electrostatic Discharge—Machine Model	ESD MM	400	V	C

Notes:
6. For a device mounted on minimum recommended pad layout 1oz copper that is on a single-sided FR-4 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 15mm × 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.

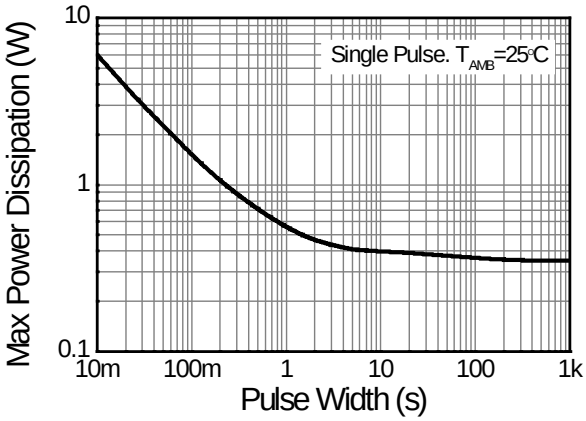
Thermal Characteristics and Derating Information



Derating Curve



Transient Thermal Impedance



Pulse Power Dissipation

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

Characteristic		Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	AC847	BV_{CBO}	50	—	—	V	I_C = 10µA
	AC848		30	—	—	—	—
Collector-Emitter Breakdown Voltage (Note 10)	AC847	BV_{CEO}	45	—	—	V	I_C = 10mA
	AC848		30	—	—	—	—
Emitter-Base Breakdown Voltage	AC847	BV_{EBO}	6	—	—	V	I_E = 1µA
	AC848		5	—	—	—	—
Collector Cutoff Current		I_{CBO}	—	—	15	nA	V_{CB} = 30V
					5	µA	V_{CB} = 30V, T_J = +150°C
Collector Emitter Cutoff Current		I_{CES}	—	—	15	nA	V_{CE}= 50V
Emitter Base Cutoff Current		I_{EBO}	—	—	100	nA	V_{EB}= 5V
Small Signal Current Gain (Note 10)	AC847BQ/AC848BQ	h_{fe}	—	330	—	—	I_C = 2.0mA, V_{CE} = 5V f=1.0kHz
	AC847CQ			600			
Input Impedance (Note 10)	AC847BQ/AC848BQ	h_{ie}	—	4.5	—	kΩ	
	AC847CQ			8.7			
Output Admittance (Note 10)	AC847BQ/AC848BQ	h_{oe}	—	30	—	µs	
	AC847CQ			60			
Reverse Voltage Transfer Ratio (Note 10)	AC847BQ/AC848BQ	h_{re}	—	$2x10^{-4}$	—	—	
	AC847CQ			$3x10^{-4}$			
DC Current Gain (Note 10)	AC847BQ/AC848BQ	h_{FE}	200	290	450	—	I_C = 2.0mA, V_{CE} = 5V
	AC847CQ		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%.

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

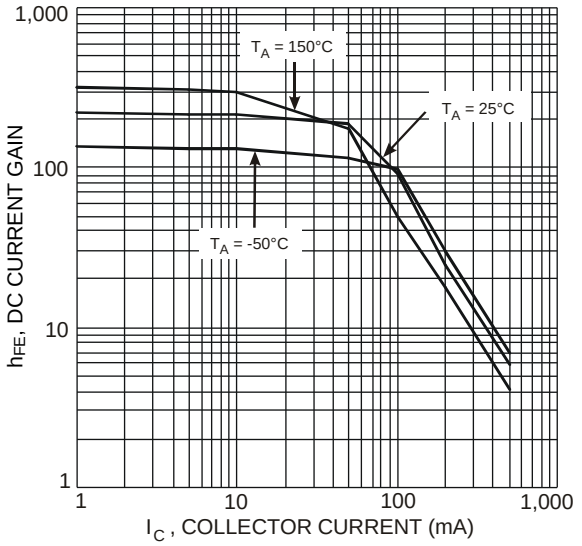


Figure 1 Typical DC Current Gain vs. Collector Current

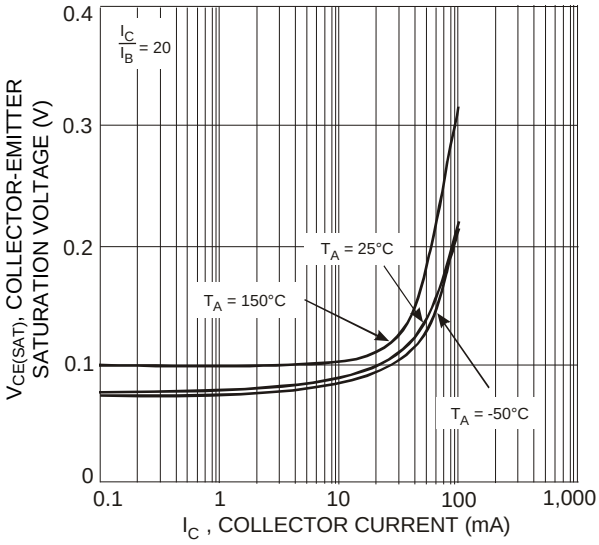


Figure 2 Typical Collector-Emitter Saturation Voltage vs. Collector Current

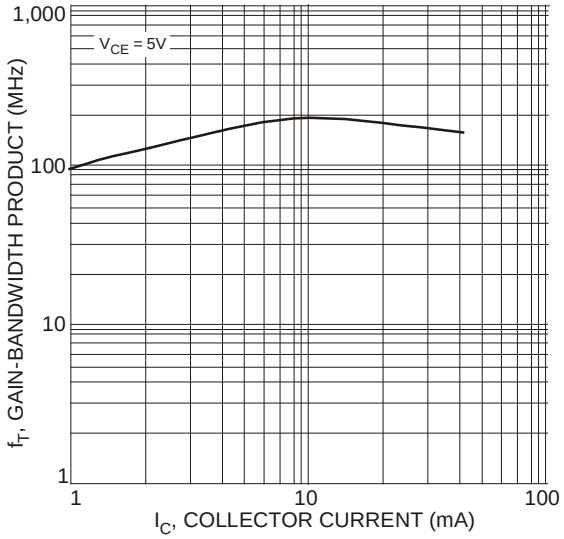


Figure 3 Typical Gain-Bandwidth Product vs. Collector Current

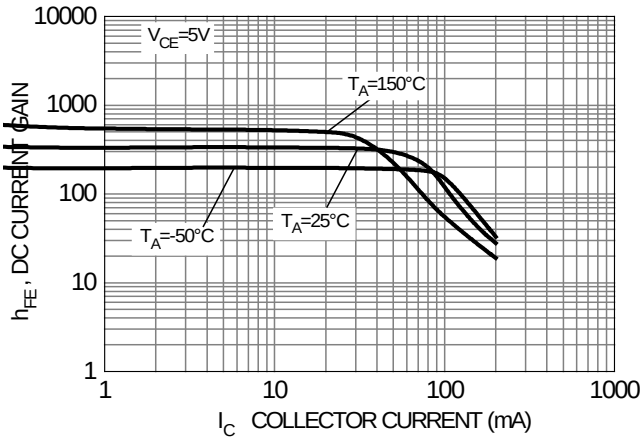


Figure 4 Typical DC Current Gain vs. Collector Current (Band B Group Gain)

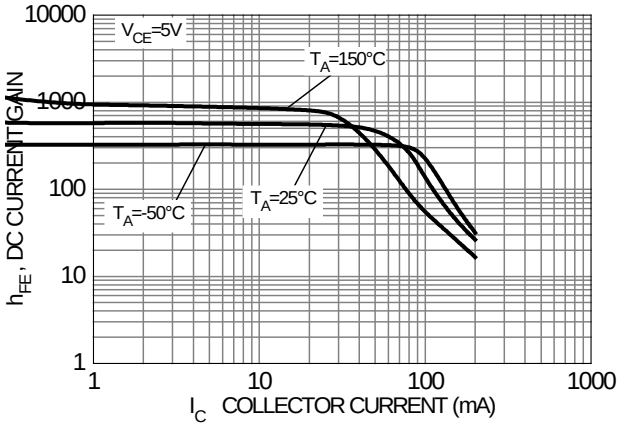
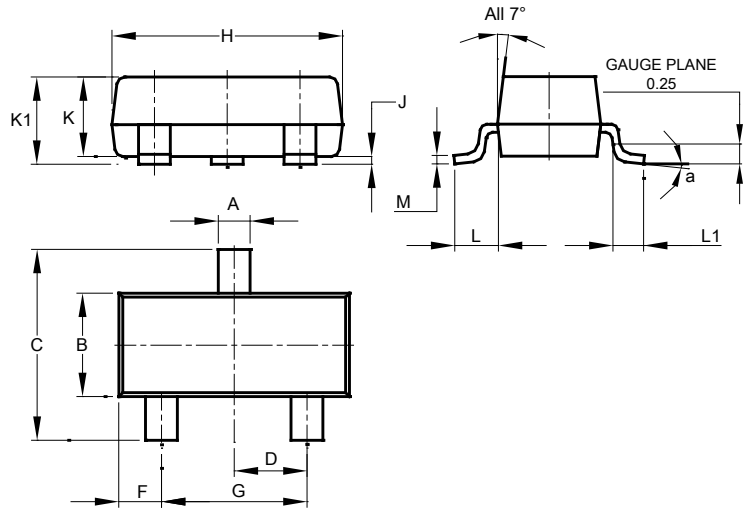


Figure 5 Typical DC Current Gain vs. Collector Current (Band C Group Gain)

Package Outline Dimensions

Please see http://www.diodes.com/package-outlines.html for the latest version.

SOT23

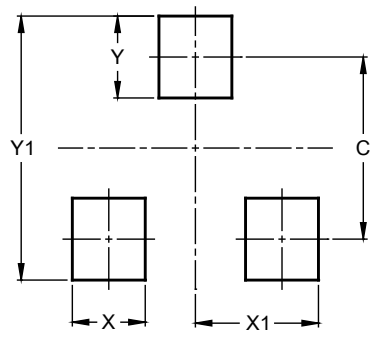


SOT23			
Dim	**Min**	**Max**	**Typ**
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

SOT23



Dimensions	Value (in mm)
C	2.0
X	0.8
X1	1.35
Y	0.9
Y1	2.9

IMPORTANT NOTICE

DIODES INCORPORATED MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).

Diodes Incorporated and its subsidiaries reserve the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. Diodes Incorporated does not assume any liability arising out of the application or use of this document or any product described herein; neither does Diodes Incorporated convey any license under its patent or trademark rights, nor the rights of others. Any Customer or user of this document or products described herein in such applications shall assume all risks of such use and will agree to hold Diodes Incorporated and all the companies whose products are represented on Diodes Incorporated website, harmless against all damages.

Diodes Incorporated does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel. Should Customers purchase or use Diodes Incorporated products for any unintended or unauthorized application, Customers shall indemnify and hold Diodes Incorporated and its representatives harmless against all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized application.

Products described herein may be covered by one or more United States, international or foreign patents pending. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks.

This document is written in English but may be translated into multiple languages for reference. Only the English version of this document is the final and determinative format released by Diodes Incorporated.

LIFE SUPPORT

Diodes Incorporated products are specifically not authorized for use as critical components in life support devices or systems without the express written approval of the Chief Executive Officer of Diodes Incorporated. As used herein:

A. Life support devices or systems are devices or systems which:

1. are intended to implant into the body, or

2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

Customers represent that they have all necessary expertise in the safety and regulatory ramifications of their life support devices or systems, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of Diodes Incorporated products in such safety-critical, life support devices or systems, notwithstanding any devices- or systems-related information or support that may be provided by Diodes Incorporated. Further, Customers must fully indemnify Diodes Incorporated and its representatives against any damages arising out of the use of Diodes Incorporated products in such safety-critical, life support devices or systems.

www.diodes.com

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Diodes Incorporated:

AC847CQ-7 AC847BQ-7