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
- For Switching and AF Amplifier Applications
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The AC847BQ, AC847CQ and AC848BQ are suitable for automotive applications requiring specific change control; these parts are AEC-Q101 qualified, PPAP capable, and manufactured in IATF16949 certified facilities.**
  https://www.diodes.com/quality/product-definitions/

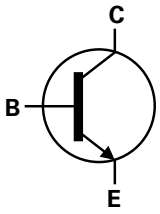
Mechanical Data

- Package: SOT23
- Package 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)

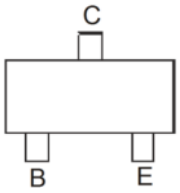
SOT23



Top View



Device Symbol



Top View
Pinout

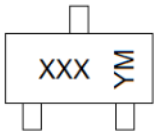
Ordering Information (Note 4)

Orderable Part Number	Package	Marking	Reel Size (inches)	Tape Width (mm)	Packing	
					Qty.	Carrier
AC847BQ-7	SOT23	2D1	7	8	3000	Reel
AC847CQ-7	SOT23	2C9	7	8	3000	Reel
AC848BQ-7	SOT23	2K9	7	8	3000	Reel
AC848BQ-13	SOT23	2K9	13	8	10000	Reel

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. For packaging details, go to our website at 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: M = 2025)
M or $\overline{M}$ = Month (ex: 9 = September)

Date Code Key

Year	2017	-	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Code	E	-	M	N	P	R	S	T	U	V	W	X

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

© 2025 Copyright Diodes Incorporated. All Rights Reserved.

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

Characteristic		Symbol	Value	Unit
Collector-Base Voltage	AC847BQ/CQ	V_{CBO}	50	V
	AC848BQ		30	
Collector-Emitter Voltage	AC847BQ/CQ	V_{CEO}	45	V
	AC848BQ		30	
Emitter-Base Voltage	AC847BQ/CQ	V_{EBO}	6.0	V
	AC848BQ		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 5)	P_D	310	mW
	(Note 6)		350	
Thermal Resistance, Junction to Ambient	(Note 5)	$R_{\theta JA}$	403	°C/W
	(Note 6)		357	
Thermal Resistance, Junction to Leads	(Note 7)	$R_{\theta JL}$	350	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-65 to +150	°C

ESD Ratings (Note 8)

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:
5. 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.
6. Same as Note 5 except the device is mounted on 15mm × 15mm 1oz copper.
7. Thermal resistance from junction to solder-point (at the end of the leads).
8. Refer to JEDEC specifications JESD22-A114 and JESD22-A115.

© 2025 Copyright Diodes Incorporated. All Rights Reserved.

Thermal Characteristics and Derating Information

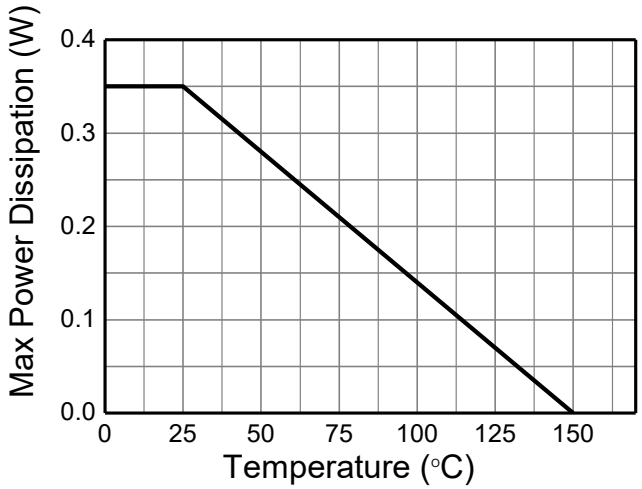


Fig.1 Derating Curve

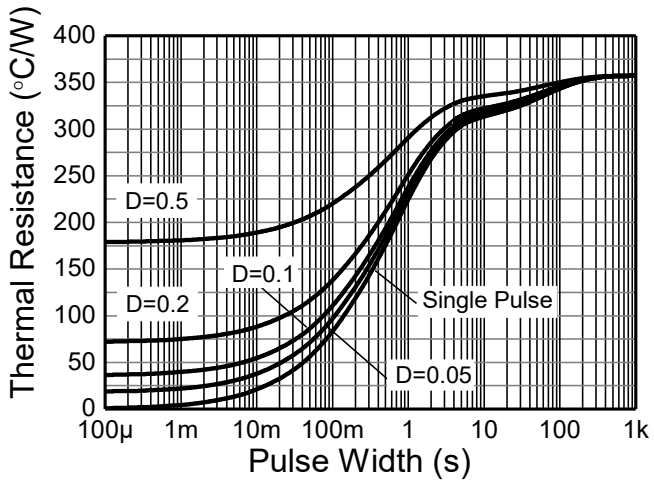


Fig.2 Transient Thermal Impedance

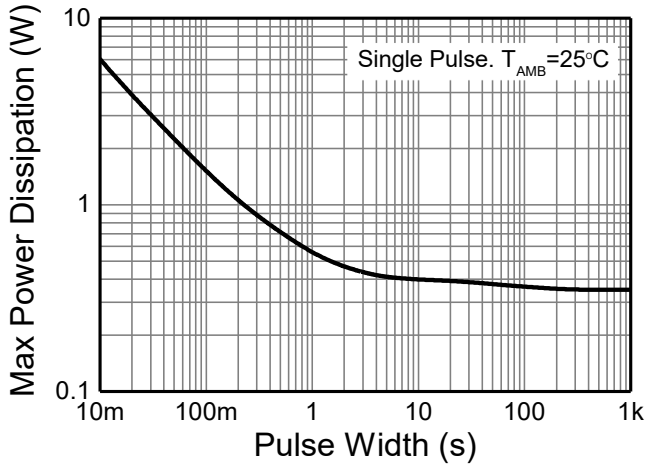


Fig.3 Pulse Power Dissipation

© 2025 Copyright Diodes Incorporated. All Rights Reserved.

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

Characteristic		Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	AC847BQ/CQ	BV_{CBO}	50	—	—	V	I_C = 10μA
	AC848BQ		30	—	—		—
Collector-Emitter Breakdown Voltage (Note 9)	AC847BQ/CQ	BV_{CEO}	45	—	—	V	I_C = 10mA
	AC848BQ		30	—	—		—
Emitter-Base Breakdown Voltage	AC847BQ/CQ	BV_{EBO}	6	—	—	V	I_E = 1μA
	AC848BQ		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 9)	AC847BQ/AC848BQ	h_{fe}	—	330	—	—	I_C = 2.0mA, V_{CE} = 5V f = 1.0kHz
	AC847CQ			600			
Input Impedance (Note 9)	AC847BQ/AC848BQ	h_{ie}	—	4.5	—	kΩ	
	AC847CQ			8.7			
Output Admittance (Note 9)	AC847BQ/AC848BQ	h_{oe}	—	30	—	μS	
	AC847CQ			60			
Reverse Voltage Transfer Ratio (Note 9)	AC847BQ/AC848BQ	h_{re}	—	$2x10^{-4}$	—	—	
	AC847CQ			$3x10^{-4}$			
DC Current Gain (Note 9)	AC847BQ/AC848BQ	h_{FE}	200	290	450	—	I_C = 2.0mA, V_{CE} = 5V
	AC847CQ		420	520	800		
Collector-Emitter Saturation Voltage (Note 9)		$V_{CE(sat)}$	—	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 9)		$V_{BE(on)}$	580	660	700	mV	I_C = 2mA, V_{CE} = 5V
			—	—	770		I_C = 10mA, V_{CE} = 5V
Base-Emitter Saturation Voltage (Note 9)		$V_{BE(sat)}$	—	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 = 1MHz
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: 9. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

© 2025 Copyright Diodes Incorporated. All Rights Reserved.

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

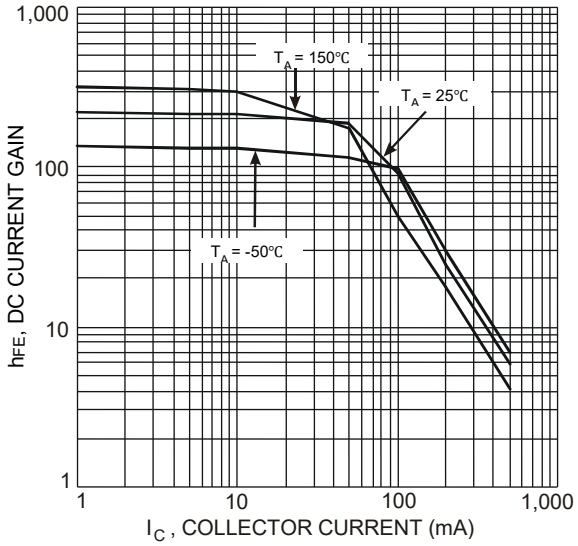


Fig.4 Typical DC Current Gain vs. Collector Current

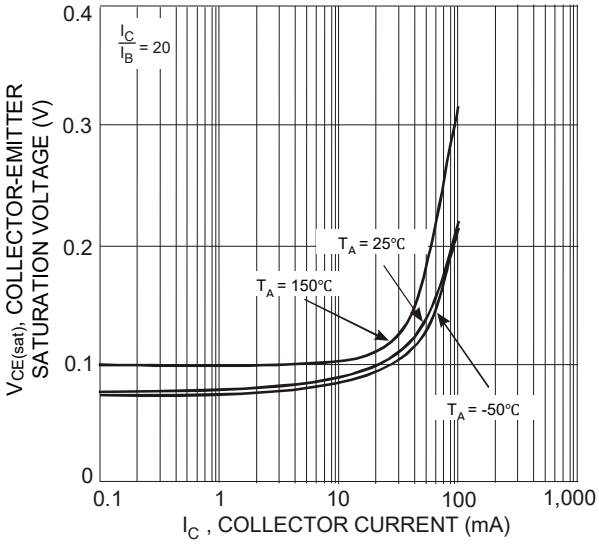


Fig.5 Typical Collector-Emitter Saturation Voltage vs. Collector Current

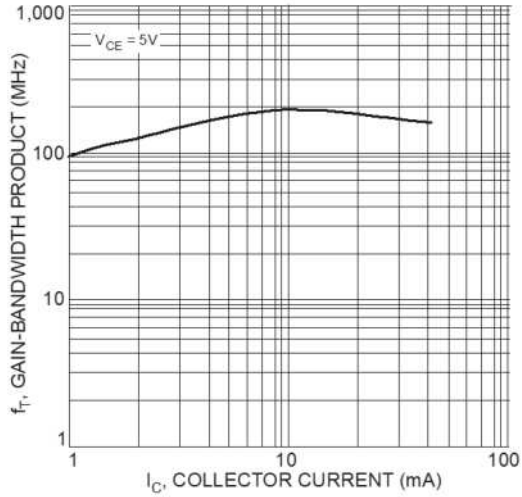


Fig.6 Typical Gain-Bandwidth Product vs. Collector Current

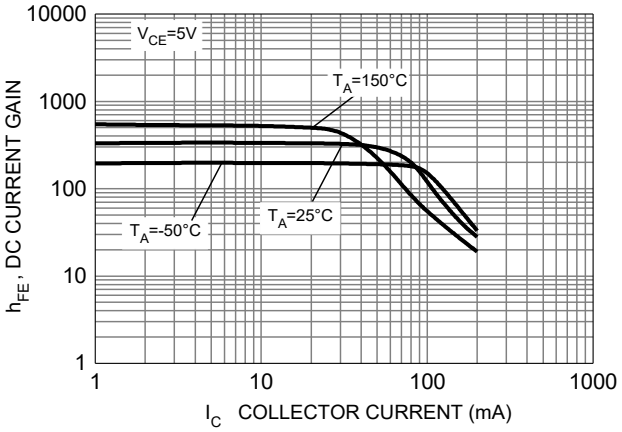


Fig.7 Typical DC Current Gain vs. Collector Current (Band B Group Gain)

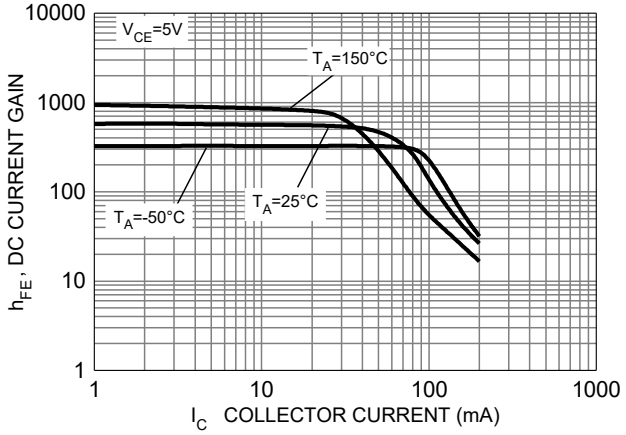


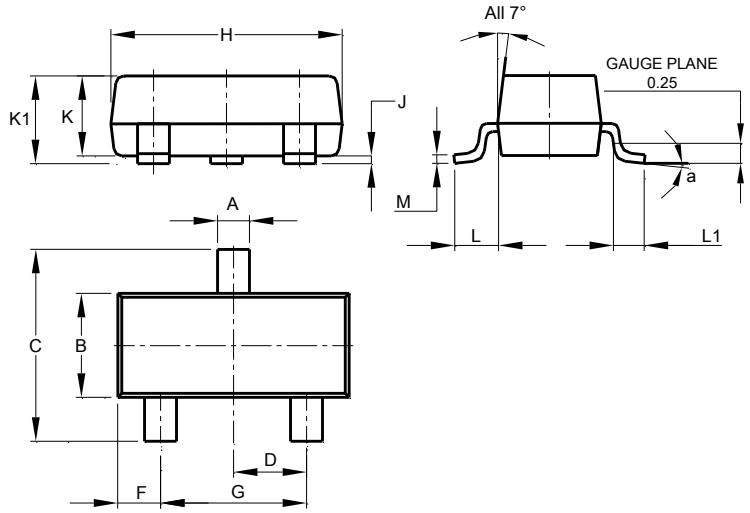
Fig.8 Typical DC Current Gain vs. Collector Current (Band C Group Gain)

© 2025 Copyright Diodes Incorporated. All Rights Reserved.

Package Outline Dimensions

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

SOT23

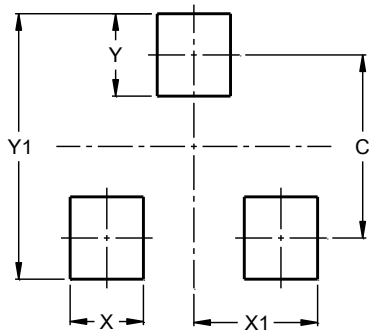


SOT23			
Dim	**Min**	**Max**	**Typ**
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

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

© 2025 Copyright Diodes Incorporated. All Rights Reserved.

IMPORTANT NOTICE

1. DIODES INCORPORATED (Diodes) AND ITS SUBSIDIARIES MAKE NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO ANY INFORMATION CONTAINED IN THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).

2. The Information contained herein is for informational purpose only and is provided only to illustrate the operation of Diodes' products described herein and application examples. Diodes does not assume any liability arising out of the application or use of this document or any product described herein. This document is intended for skilled and technically trained engineering customers and users who design with Diodes' products. Diodes' products may be used to facilitate safety-related applications; however, in all instances customers and users are responsible for (a) selecting the appropriate Diodes products for their applications, (b) evaluating the suitability of Diodes' products for their intended applications, (c) ensuring their applications, which incorporate Diodes' products, comply the applicable legal and regulatory requirements as well as safety and functional-safety related standards, and (d) ensuring they design with appropriate safeguards (including testing, validation, quality control techniques, redundancy, malfunction prevention, and appropriate treatment for aging degradation) to minimize the risks associated with their applications.

3. Diodes assumes no liability for any application-related information, support, assistance or feedback that may be provided by Diodes from time to time. Any customer or user of this document or products described herein will assume all risks and liabilities associated with such use, and will hold Diodes and all companies whose products are represented herein or on Diodes' websites, harmless against all damages and liabilities.

4. Products described herein may be covered by one or more United States, international or foreign patents and pending patent applications. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks and trademark applications. Diodes does not convey any license under any of its intellectual property rights or the rights of any third parties (including third parties whose products and services may be described in this document or on Diodes' website) under this document.

5. Diodes' products are provided subject to Diodes' Standard Terms and Conditions of Sale (https://www.diodes.com/about/company/terms-and-conditions/terms-and-conditions-of-sales/) or other applicable terms. This document does not alter or expand the applicable warranties provided by Diodes. Diodes does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel.

6. Diodes' products and technology may not be used for or incorporated into any products or systems whose manufacture, use or sale is prohibited under any applicable laws and regulations. Should customers or users use Diodes' products in contravention of any applicable laws or regulations, or for any unintended or unauthorized application, customers and users will (a) be solely responsible for any damages, losses or penalties arising in connection therewith or as a result thereof, and (b) indemnify and hold Diodes and its representatives and agents harmless against any and all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim relating to any noncompliance with the applicable laws and regulations, as well as any unintended or unauthorized application.

7. While efforts have been made to ensure the information contained in this document is accurate, complete and current, it may contain technical inaccuracies, omissions and typographical errors. Diodes does not warrant that information contained in this document is error-free and Diodes is under no obligation to update or otherwise correct this information. Notwithstanding the foregoing, Diodes reserves the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. 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.

8. Any unauthorized copying, modification, distribution, transmission, display or other use of this document (or any portion hereof) is prohibited. Diodes assumes no responsibility for any losses incurred by the customers or users or any third parties arising from any such unauthorized use.

9. This Notice may be periodically updated with the most recent version available at https://www.diodes.com/about/company/terms-and-conditions/important-notice

The Diodes logo is a registered trademark of Diodes Incorporated in the United States and other countries.
All other trademarks are the property of their respective owners.
© 2025 Diodes Incorporated. All Rights Reserved.

www.diodes.com

© 2025 Copyright Diodes Incorporated. All Rights Reserved.