



**THE DATASHEET OF  
AC848BQ-13**



## Description

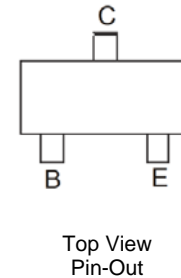
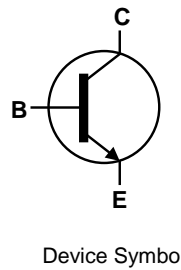
The bipolar junction transistors (BJT) are designed to meet the stringent requirements of automotive applications.

## 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)

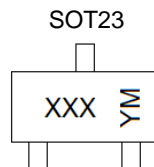


## Ordering Information (Notes 4 & 5)

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



XXX = Product Type Marking Code  
 YM = Date Code Marking  
 Y or  $\bar{Y}$  = Year (ex: G = 2019)  
 M or  $\bar{M}$  = 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<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Collector-Base Voltage	AC847	V <sub>CBO</sub>	50	V
	AC848		30	
Collector-Emitter Voltage	AC847	V <sub>CEO</sub>	45	V
	AC848		30	
Emitter-Base Voltage	AC847	V <sub>EBO</sub>	6.0	V
	AC848		5.0	
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

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

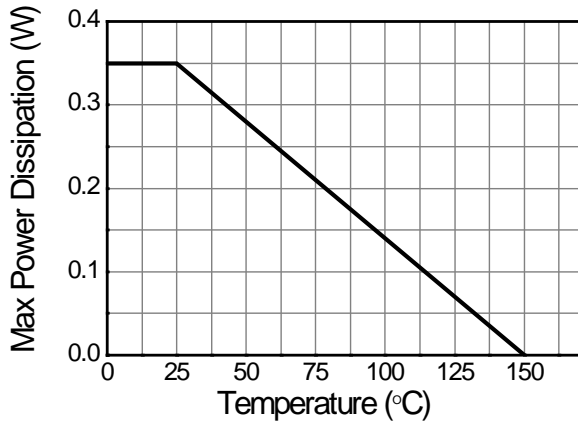
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 6)	P <sub>D</sub>	310	mW
	(Note 7)		350	
Thermal Resistance, Junction to Ambient	(Note 6)	R <sub>θJA</sub>	403	°C/W
	(Note 7)		357	
Thermal Resistance, Junction to Leads	(Note 8)	R <sub>θJL</sub>	350	°C/W
Operating and Storage Temperature Range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

**ESD Ratings** (Note 9)

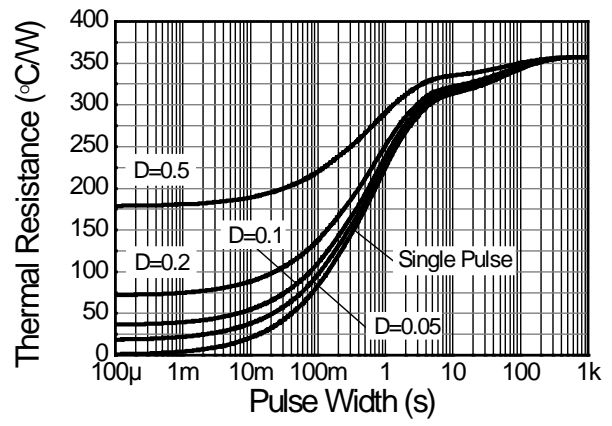
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge—Human Body Model	ESD HBM	4000	V	3A
Electrostatic Discharge—Machine Model	ESD MM	400	V	C

- 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 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.

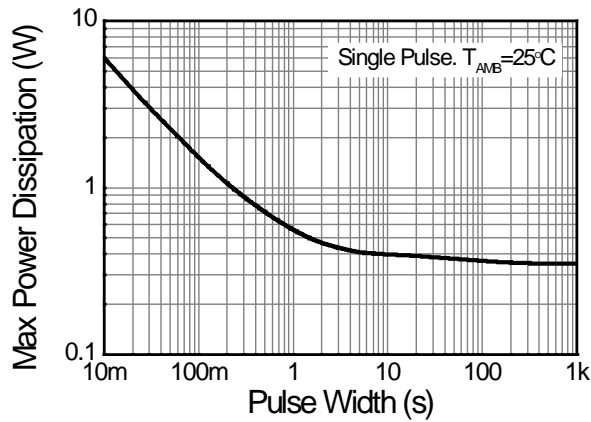
**Thermal Characteristics and Derating Information**



**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	AC847	BV <sub>CBO</sub>	50	—	—	V	I <sub>C</sub> = 10μA	
	AC848		30	—	—	—	—	
Collector-Emitter Breakdown Voltage (Note 10)	AC847	BV <sub>CEO</sub>	45	—	—	V	I <sub>C</sub> = 10mA	
	AC848		30	—	—	—	—	
Emitter-Base Breakdown Voltage	AC847	BV <sub>EBO</sub>	6	—	—	V	I <sub>E</sub> = 1μA	
	AC848		5	—	—	—	—	
Collector Cutoff Current		I <sub>CBO</sub>	—	—	15	nA	V <sub>CB</sub> = 30V	
					5	μA	V <sub>CB</sub> = 30V, T <sub>J</sub> = +150°C	
Collector Emitter Cutoff Current		I <sub>CES</sub>	—	—	15	nA	V <sub>CE</sub> = 50V	
Emitter Base Cutoff Current		I <sub>EBO</sub>	—	—	100	nA	V <sub>EB</sub> = 5V	
Small Signal Current Gain (Note 10)	AC847BQ/AC848BQ	h <sub>re</sub>	—	330	—	—	I <sub>C</sub> = 2.0mA, V <sub>CE</sub> = 5V f = 1.0kHz	
	AC847CQ			600				
Input Impedance (Note 10)	AC847BQ/AC848BQ	h <sub>ie</sub>	—	4.5	—	kΩ		
	AC847CQ			8.7				
Output Admittance (Note 10)	AC847BQ/AC848BQ	h <sub>oe</sub>	—	30	—	μs		
	AC847CQ			60				
Reverse Voltage Transfer Ratio (Note 10)	AC847BQ/AC848BQ	h <sub>re</sub>	—	2x10 <sup>-4</sup>	—	—		
	AC847CQ			3x10 <sup>-4</sup>				
DC Current Gain (Note 10)	AC847BQ/AC848BQ	h <sub>FE</sub>	200	290	450	—		I <sub>C</sub> = 2.0mA, V <sub>CE</sub> = 5V
	AC847CQ		420	520	800			
Collector-Emitter Saturation Voltage (Note 10)		V <sub>CE(SAT)</sub>	—	90	250	mV	I <sub>C</sub> = 10mA, I <sub>B</sub> = 0.5mA	
				200	600		I <sub>C</sub> = 100mA, I <sub>B</sub> = 5.0mA	
Base-Emitter Turn-On Voltage (Note 10)		V <sub>BE(ON)</sub>	—	580	660	mV	I <sub>C</sub> = 2mA, V <sub>CE</sub> = 5V	
				—	—		770	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	
				900			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	300	—	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.)

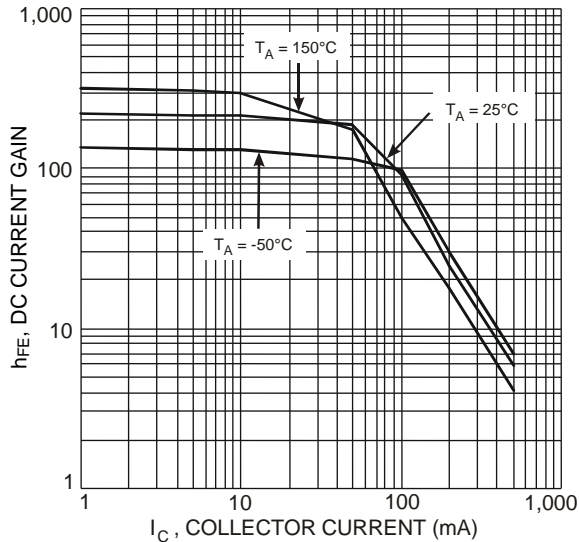


Figure 1 Typical DC Current Gain vs. Collector Current

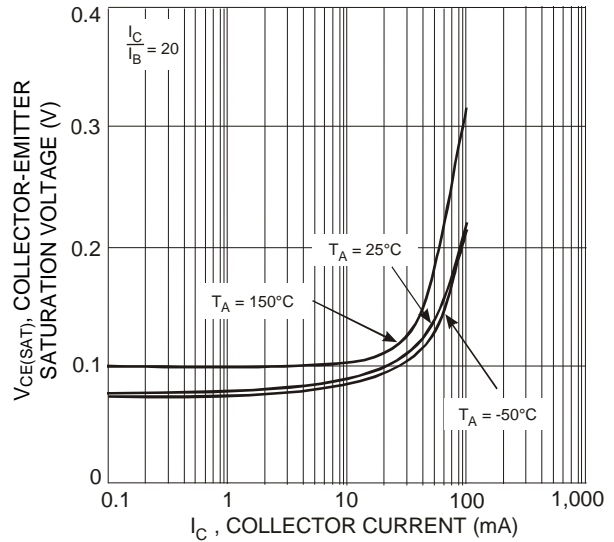


Figure 2 Typical Collector-Emitter Saturation Voltage vs. Collector Current

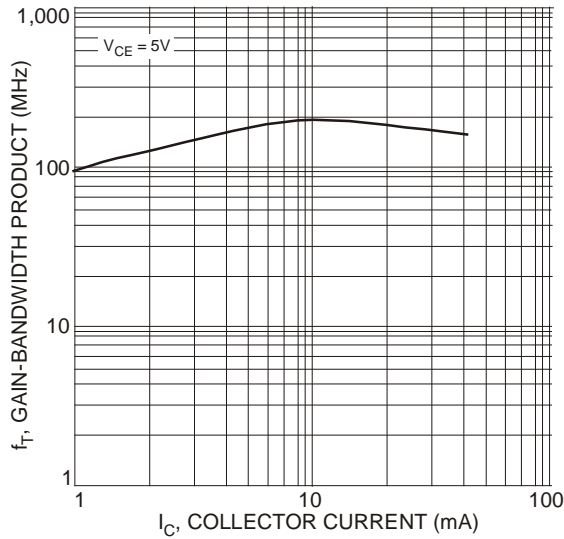


Figure 3 Typical Gain-Bandwidth Product vs. Collector Current

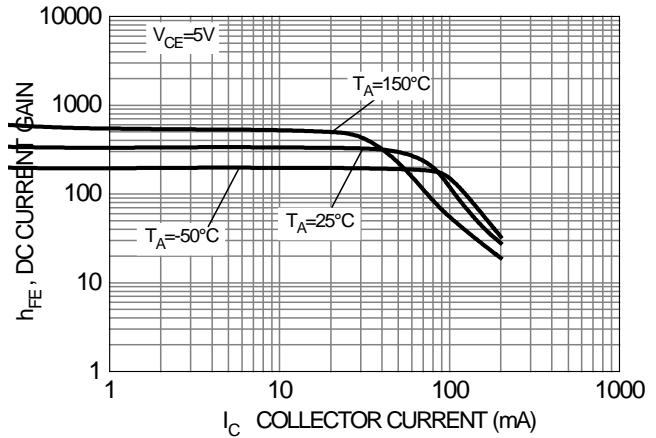


Figure 4 Typical DC Current Gain vs. Collector Current (Band B Group Gain)

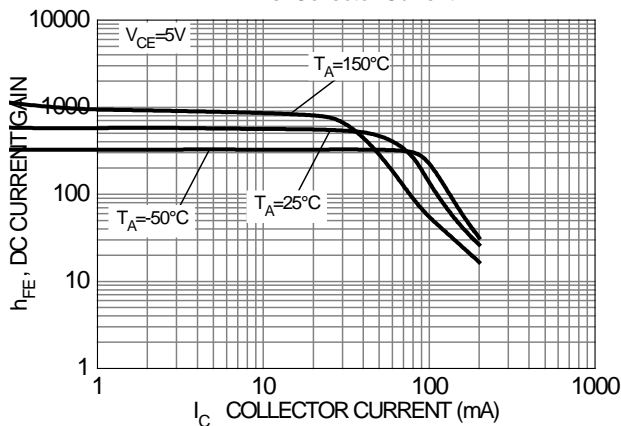
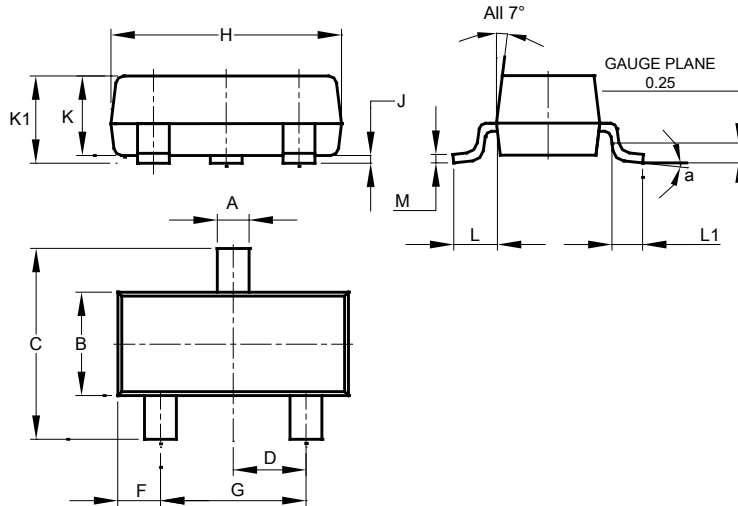


Figure 5 Typical DC Current Gain vs. Collector Current (Band C Group Gain)

**Package Outline Dimensions**

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

**SOT23**

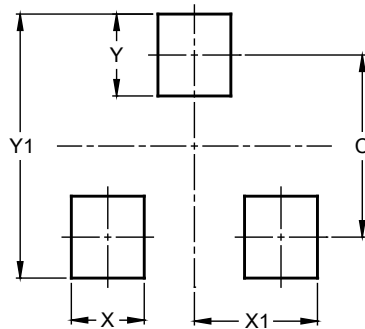


SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

**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

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