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

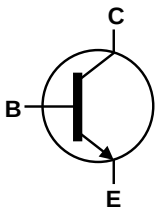
- Ideally Suited for Automatic Insertion
- Complementary PNP Types: AC857BQ – AC857CQ – AC858BQ
- For Switching and AF Amplifier Applications
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High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

Mechanical Data

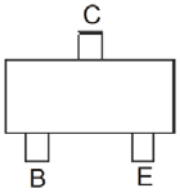
- Case: SOT23
- Case Material: Molded Plastic, “Green” Molding Compound UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish—Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 (e3)
- Weight: 0.008 grams (Approximate)

SOT23

Top View



Device Symbol



Top View
Pin-Out

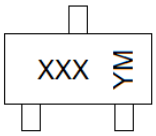
Ordering Information (Notes 4 & 5)

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.)

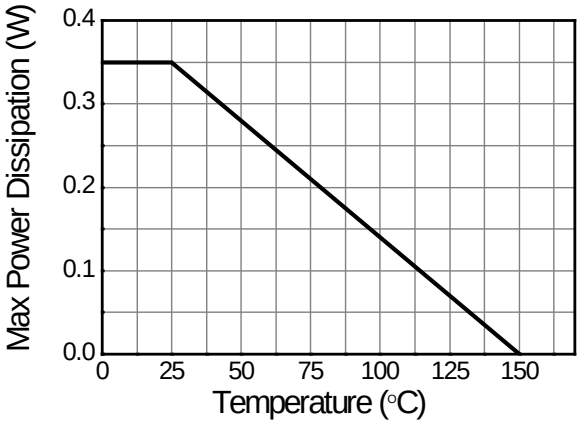
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 6)	P_D	310	mW
	(Note 7)		350	
Thermal Resistance, Junction to Ambient	(Note 6)	$R_{\Theta JA}$	403	°C/W
	(Note 7)		357	
Thermal Resistance, Junction to Leads	(Note 8)	$R_{\Theta JL}$	350	°C/W
Operating and Storage Temperature Range		T_J,T_{STG}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

ESD Ratings (Note 9)

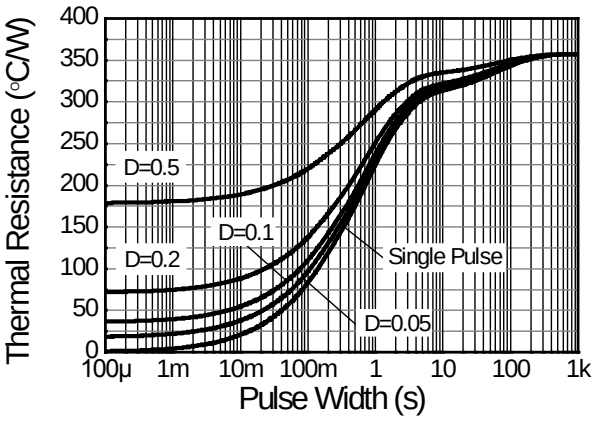
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge—Human Body Model	ESD HBM	4000	V	3A
Electrostatic Discharge—Machine Model	ESD MM	400	V	C

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.

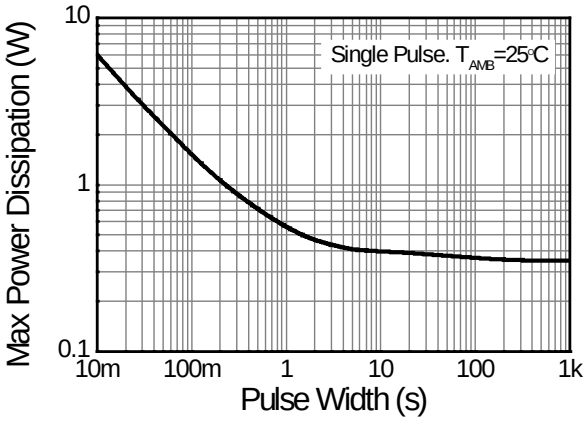
Thermal Characteristics and Derating Information



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.)

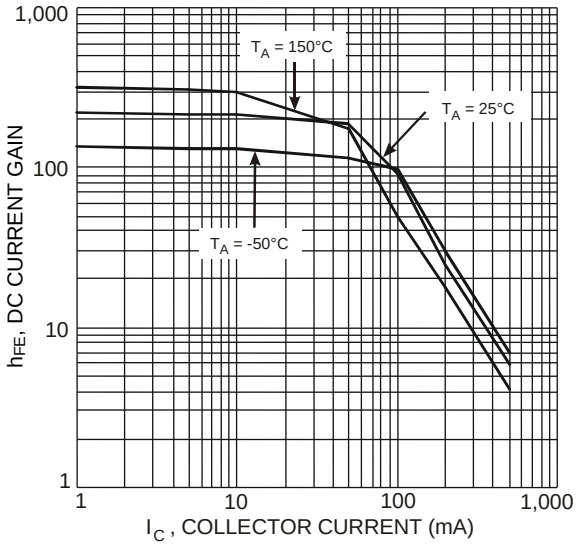


Figure 1 Typical DC Current Gain vs. Collector Current

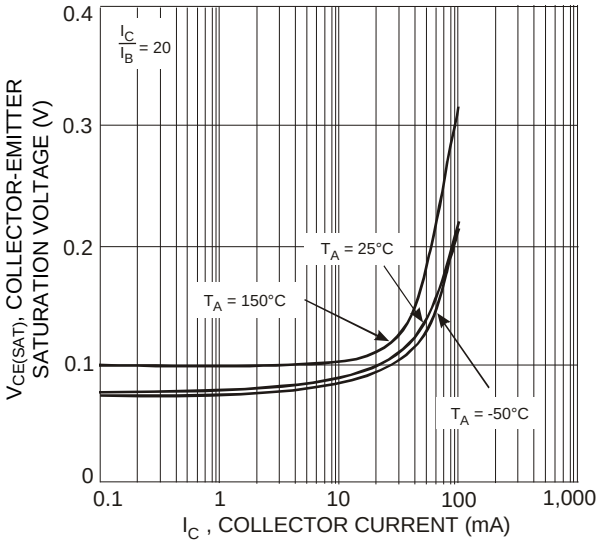


Figure 2 Typical Collector-Emitter Saturation Voltage vs. Collector Current

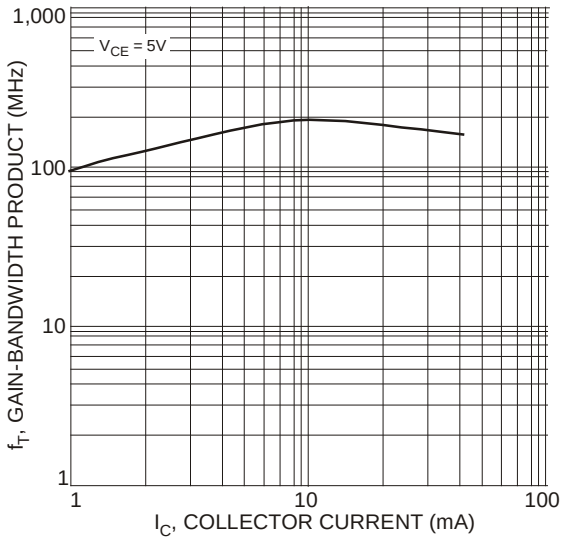


Figure 3 Typical Gain-Bandwidth Product vs. Collector Current

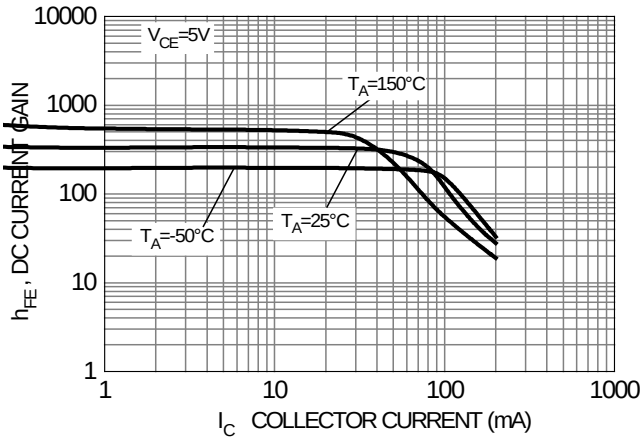


Figure 4 Typical DC Current Gain vs. Collector Current (Band B Group Gain)

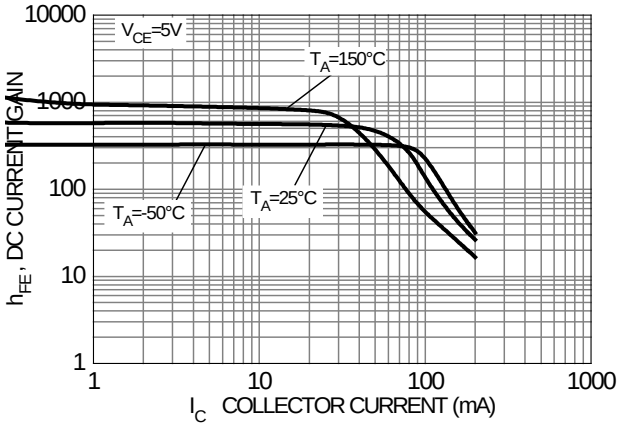


Figure 5 Typical DC Current Gain vs. Collector Current (Band C Group Gain)

Package Outline Dimensions

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

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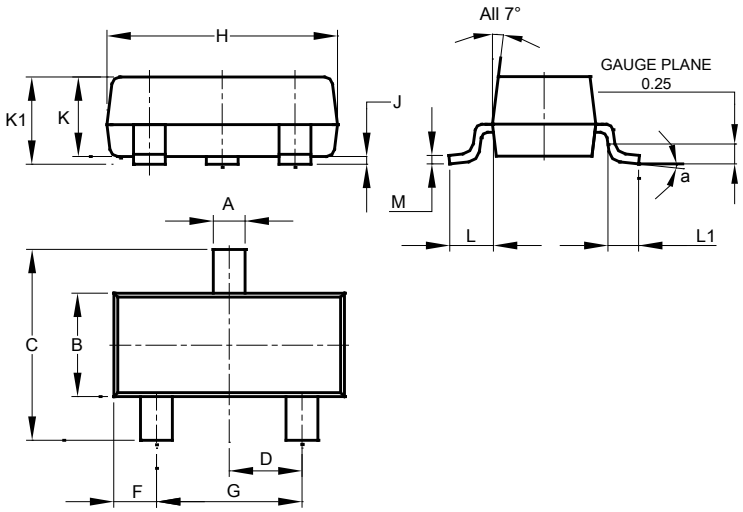
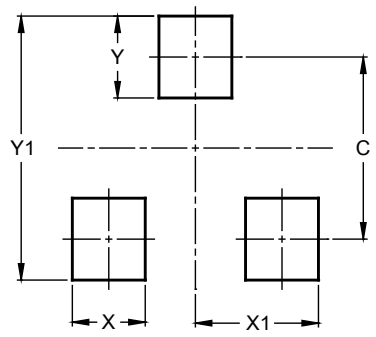


SOT23			
Dim	**Min**	**Max**	**Typ**
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

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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