

## Description

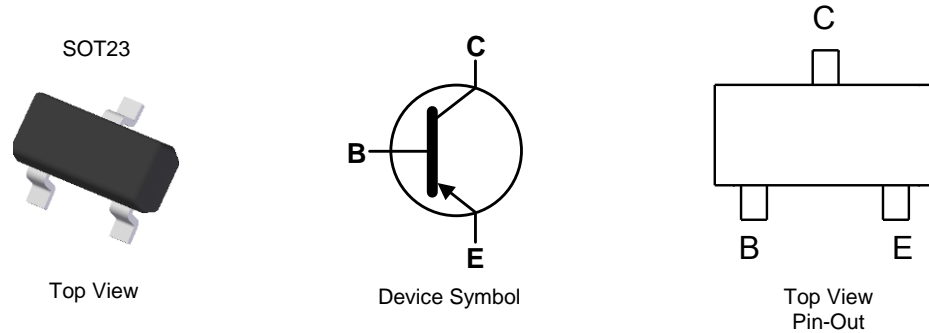
The AC857BQ-AC857CQ Bipolar Junction Transistors (BJT) are designed to meet the stringent requirements of Automotive Applications.

## Features

- Ideally Suited for Automatic Insertion
- Complementary NPN Types: AC847BQ-AC847CQ
- 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 @3
- Weight: 0.008 grams (Approximate)

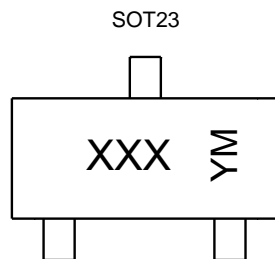


## Ordering Information (Notes 4 & 5)

Product	Compliance	Marking	Reel Size (inches)	Quantity per Reel
AC857BQ-7	Automotive	2C6	7	3,000
AC857CQ-7	Automotive	2C7	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](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. Refer to [http://www.diodes.com/product\\_compliance\\_definitions.html](http://www.diodes.com/product_compliance_definitions.html).
  5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



XXX = Product Type Marking Code  
 YM = Date Code Marking  
 Y or  $\bar{Y}$  = Year (ex: E = 2017)  
 M or  $\bar{M}$  = Month (ex: 9 = September)

### Date Code Key

Year	2016	2017	2018	2019	2020	2021	2022	2023
Code	D	E	F	G	H	I	J	K

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	V <sub>CBO</sub>	-50	V
Collector-Emitter Voltage	V <sub>CEO</sub>	-45	V
Emitter-Base Voltage	V <sub>EBO</sub>	-5.0	V
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
Peak Base Current	I <sub>BM</sub>	-200	mA

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

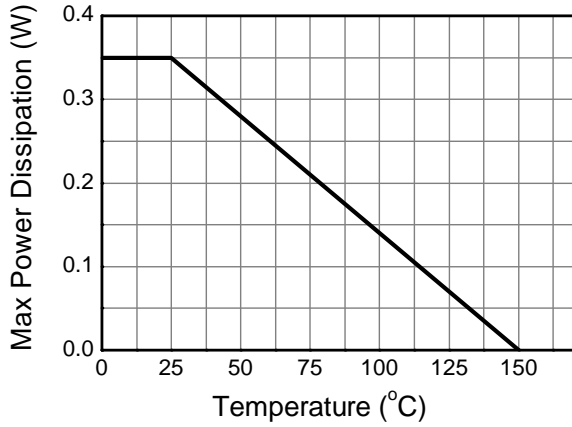
Characteristic	Symbol	Value	Unit
Power Dissipation	P <sub>D</sub>	(Note 6)	310
		(Note 7)	350
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	(Note 6)	403
		(Note 7)	357
Thermal Resistance, Junction to Leads	R <sub>θJL</sub>	350	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T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

**ESD Ratings** (Note 9)

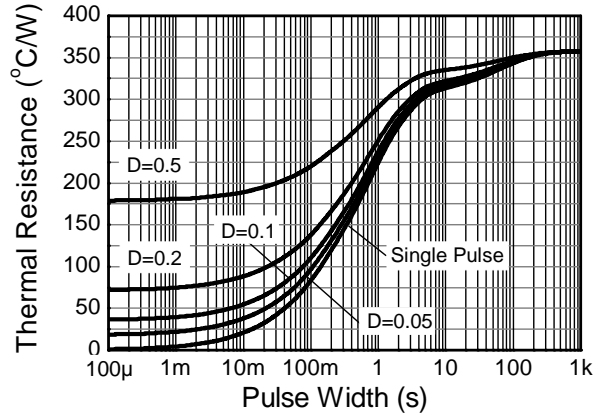
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- 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.

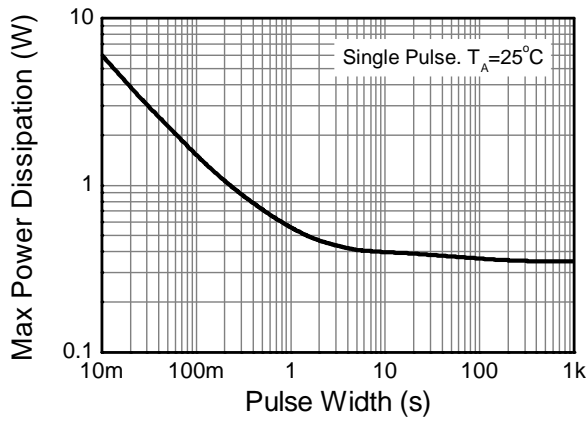
**Thermal Characteristics and Derating Information**



**Derating Curve**



**Transient Thermal Impedance**



**Pulse Power Dissipation**

**Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	$BV_{CBO}$	-50	—	—	V	$I_C = -10\mu\text{A}$
Collector-Emitter Breakdown Voltage (Note 10)	$BV_{CEO}$	-45	—	—	V	$I_C = -10\text{mA}$
Emitter-Base Breakdown Voltage	$BV_{EBO}$	-5	—	—	V	$I_E = -1\mu\text{A}$
Collector Cutoff Current	$I_{CBO}$	—	—	-15	nA	$V_{CB} = -30\text{V}$
				-4	$\mu\text{A}$	$V_{CB} = -30\text{V}, T_J = +150^\circ\text{C}$
Collector Emitter Cutoff Current	$I_{CES}$	—	—	-15	nA	$V_{CE} = -50\text{V}$
Emitter-Base Cutoff Current	$I_{EBO}$	—	—	-100	nA	$V_{EB} = -5\text{V}$
Small Signal Current Gain (Note 10)	AC857BQ	—	330	—	—	$I_C = -2.0\text{mA}, V_{CE} = -5\text{V}$ $f = 1.0\text{kHz}$
	AC857CQ	—	600	—	—	
Input Impedance (Note 10)	AC857BQ	—	4.5	—	k $\Omega$	
	AC857CQ	—	8.7	—	k $\Omega$	
Output Admittance (Note 10)	AC857BQ	—	30	—	$\mu\text{S}$	
	AC857CQ	—	60	—	$\mu\text{S}$	
Reverse Voltage Transfer Ratio (Note 10)	AC857BQ	—	$2 \times 10^{-4}$	—	—	
	AC857CQ	—	$3 \times 10^{-4}$	—	—	
DC Current Gain (Note 10)	AC857BQ	220	290	475	—	
	AC857CQ	420	520	800	—	
Collector-Emitter Saturation Voltage (Note 10)	$V_{CE(SAT)}$	—	-75	-300	mV	$I_C = -10\text{mA}, I_B = -0.5\text{mA}$
			-250	-650	mV	$I_C = -100\text{mA}, I_B = -5.0\text{mA}$
Base-Emitter Turn-On Voltage (Note 10)	$V_{BE(ON)}$	-600	-650	-750	mV	$I_C = -2\text{mA}, V_{CE} = -5\text{V}$
			—	-820	mV	$I_C = -10\text{mA}, V_{CE} = -5\text{V}$
Base-Emitter Saturation Voltage (Note 10)	$V_{BE(SAT)}$	—	-700	—	mV	$I_C = -10\text{mA}, I_B = -0.5\text{mA}$
			-850	-1100	mV	$I_C = -100\text{mA}, I_B = -5\text{mA}$
Output Capacitance	$C_{obo}$	—	3	—	pF	$V_{CB} = -10\text{V}, f = 1.0\text{MHz}$
Transition Frequency	$f_T$	100	200	—	MHz	$V_{CE} = -5\text{V}, I_C = -10\text{mA}, f = 100\text{MHz}$
Noise Figure	NF	—	2	10	dB	$V_{CE} = -5\text{V}, I_C = -200\mu\text{A}$ $R_S = 2\text{k}\Omega, f = 1\text{kHz}$ $\Delta f = 200\text{Hz}$

Note: 10. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

**Typical Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

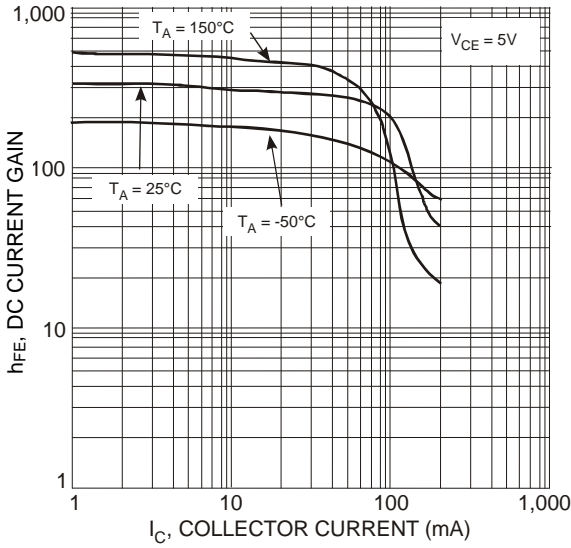


Figure 1 Typical DC Current Gain vs. Collector Current

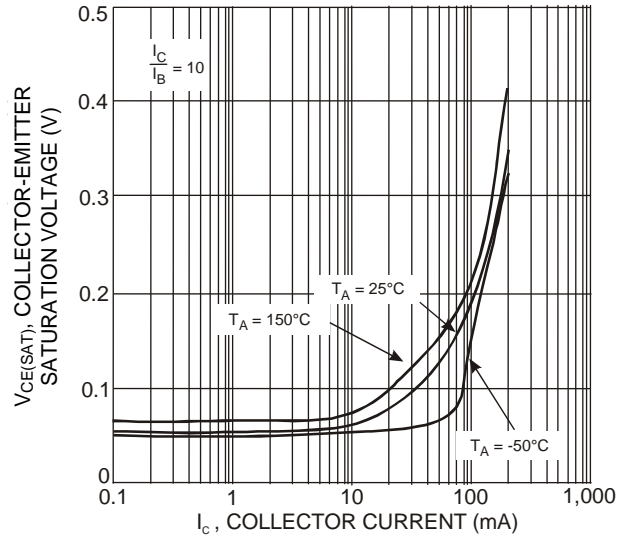


Figure 2 Typical Collector-Emitter Saturation Voltage vs. Collector Current

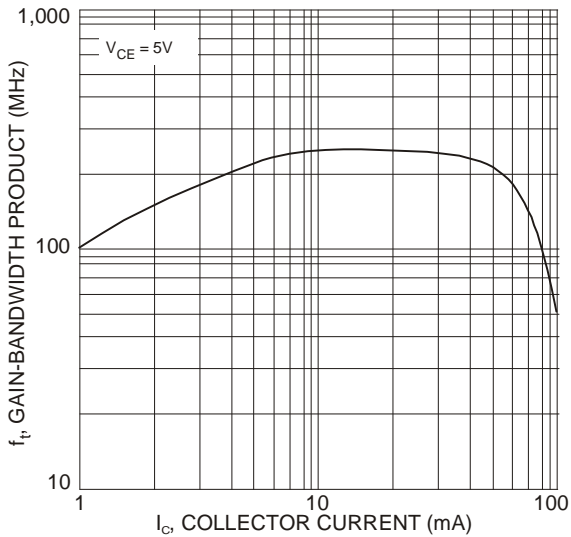
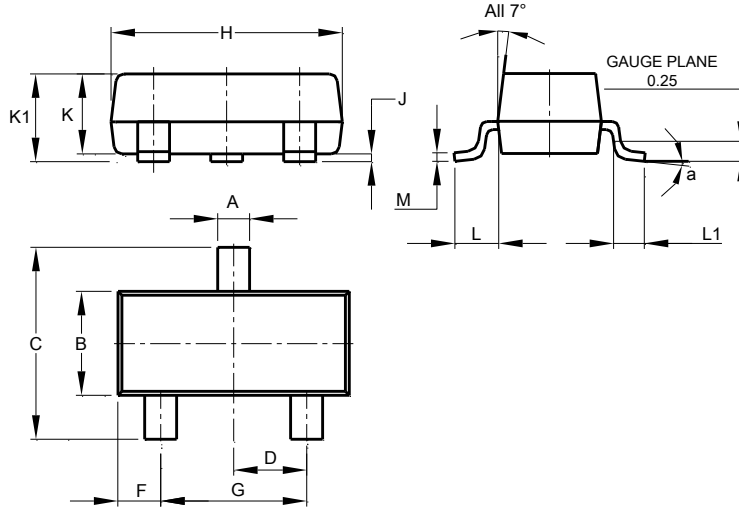


Figure 3 Gain-Bandwidth Product vs Collector Current

**Package Outline Dimensions**

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

SOT23

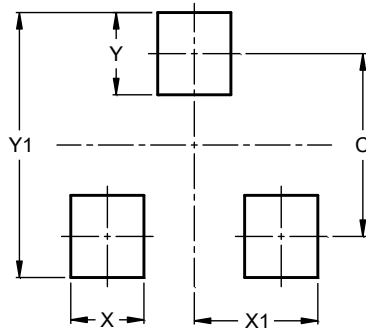


SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

**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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Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: [ocean@oceanchips.ru](mailto:ocean@oceanchips.ru)

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А