

Description

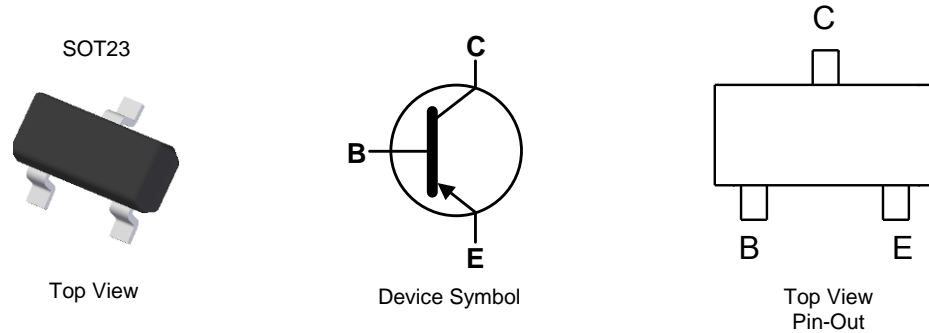
The AC857BQ-AC857CQ Bipolar Junction Transistors (BJT) are designed to meet the stringent requirements of Automotive Applications.

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 (e3)
- Weight: 0.008 grams (Approximate)

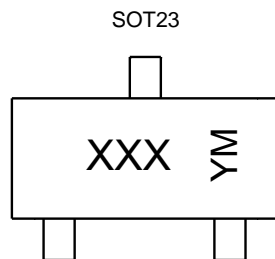


Ordering Information (Notes 4 & 5)

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V _{CBO}	-50	V
Collector-Emitter Voltage	V _{CEO}	-45	V
Emitter-Base Voltage	V _{EBO}	-5.0	V
Continuous Collector Current	I _C	-100	mA
Peak Collector Current	I _{CM}	-200	mA
Peak Emitter Current	I _{EM}	-200	mA
Peak Base Current	I _{BM}	-200	mA

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

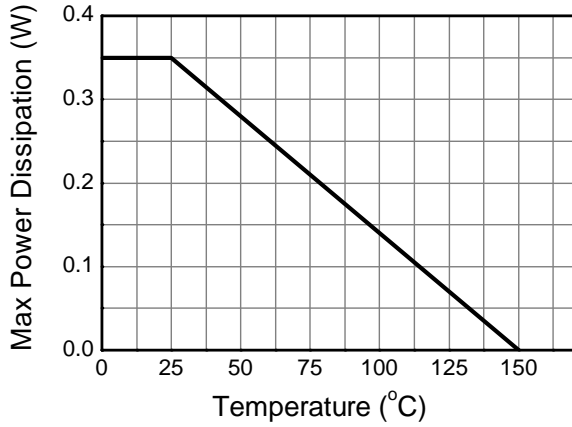
Characteristic	Symbol	Value	Unit
Power Dissipation	P _D	(Note 6)	310
		(Note 7)	350
Thermal Resistance, Junction to Ambient	R _{θJA}	(Note 6)	403
		(Note 7)	357
Thermal Resistance, Junction to Leads	R _{θJL}	350	°C/W
Operating and Storage Temperature Range	T _J , T _{STG}	-65 to +150	°C

ESD Ratings (Note 9)

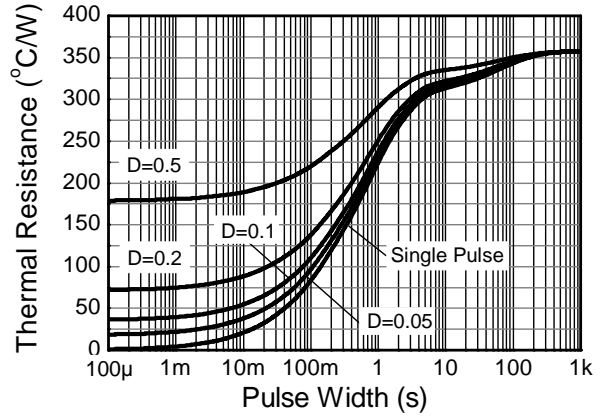
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- 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.

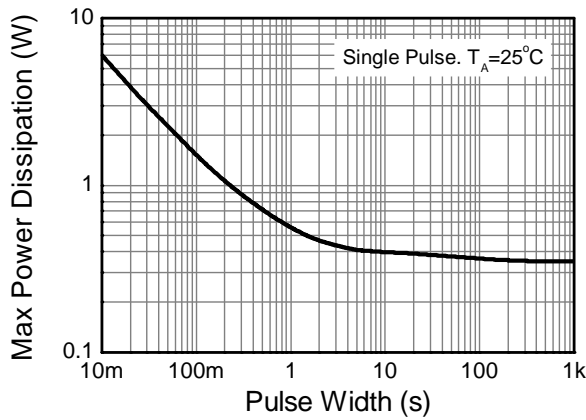
Thermal Characteristics and Derating Information



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	μA	$V_{CB} = -30\text{V}, T_J = +150^\circ\text{C}$
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 Ω	
	AC857CQ	—	8.7	—	k Ω	
Output Admittance (Note 10)	AC857BQ	—	30	—	μS	
	AC857CQ	—	60	—	μS	
Reverse Voltage Transfer Ratio (Note 10)	AC857BQ	—	2×10^{-4}	—	—	
	AC857CQ	—	3×10^{-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	mV	$I_C = -2\text{mA}, V_{CE} = -5\text{V}$
			—	—	-820	mV
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.)

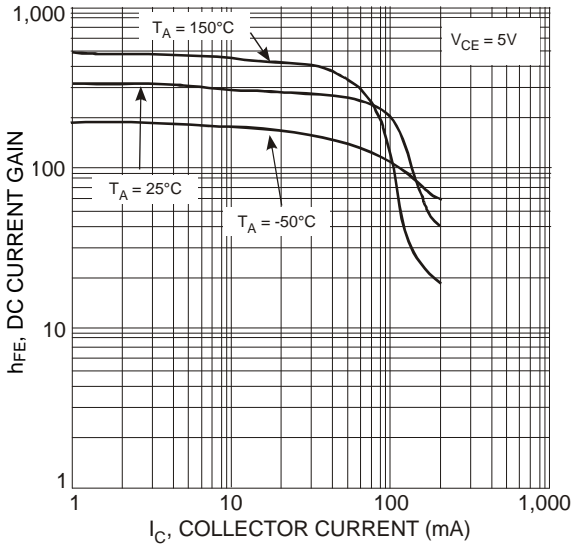


Figure 1 Typical DC Current Gain vs. Collector Current

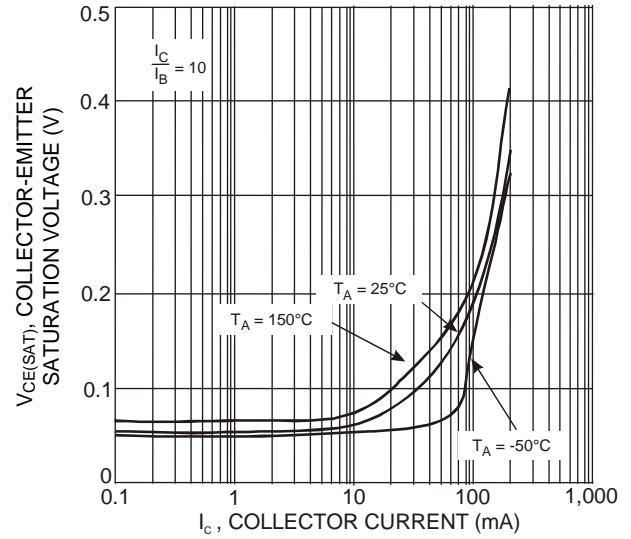


Figure 2 Typical Collector-Emitter Saturation Voltage vs. Collector Current

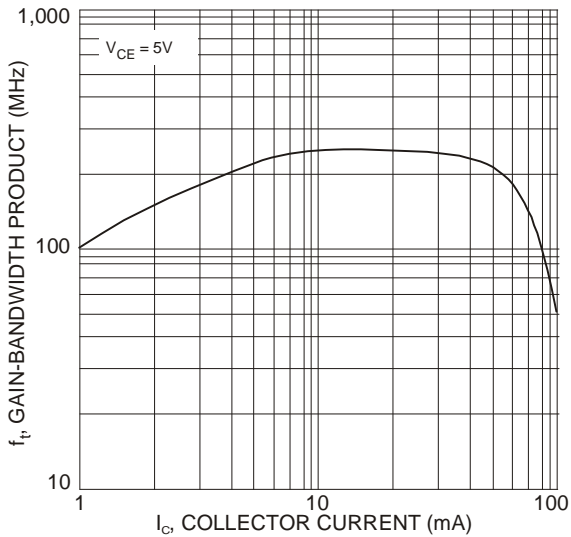
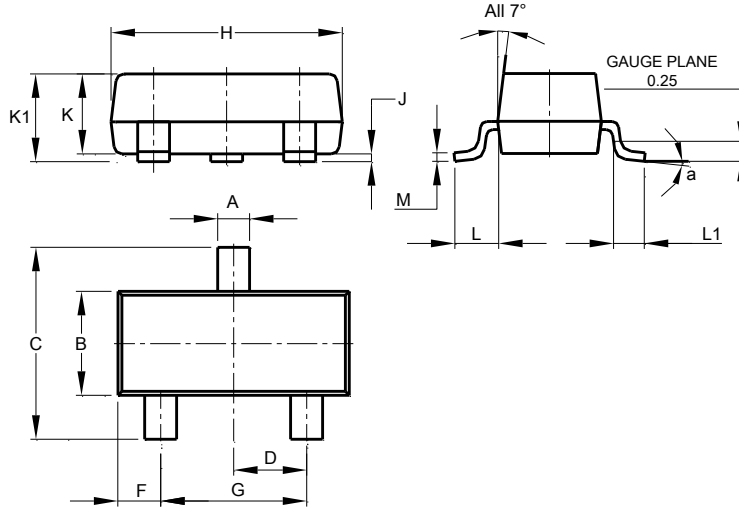


Figure 3 Gain-Bandwidth Product vs. Collector Current

Package Outline Dimensions

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

SOT23

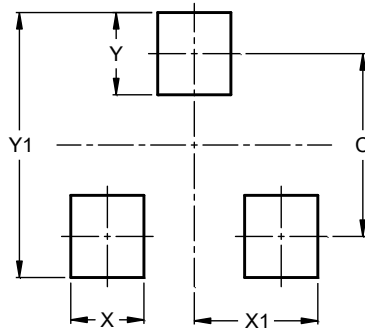


SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

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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