

## Description

This Bipolar Junction Transistor (BJT) is designed to meet the stringent requirements of Automotive applications.

## Features

- $BV_{CEO} > -45V$
- $I_C = -100mA$  Collector Current
- Epitaxial Planar Die Construction
- Ultra-Small Surface Mount Package
- Complementary NPN Type: BC847BTQ
- **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)

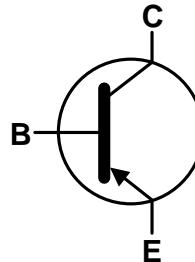
## Mechanical Data

- Case: SOT523
- Case Material: Molded Plastic. "Green" Molding Compound. UL Flammability 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: 0.002 grams (Approximate)

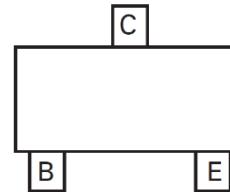
SOT523



Top View



Device Symbol



Pin-Out Top View

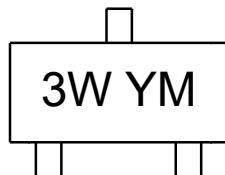
## Ordering Information (Notes 4 and 5)

Part Number	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
BC857BTQ-7	Automotive	3W	7	8	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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information

SOT523



3W = 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	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	
Code	E	F	G	H	I	J	K	L	M	N	O	
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** (@ $T_A = +25^\circ\text{C}$ , 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
Collector Current	$I_C$	-100	mA

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

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 6)	$P_D$	150	mW
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	833	°C/W
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	°C

**ESD Ratings** (Note 7)

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 with the collector lead on minimum recommended pad layout 1oz copper that is on a single-sided 1.6mm FR-4 PCB; device is measured under still air conditions whilst operating in a steady-state.
- 7. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

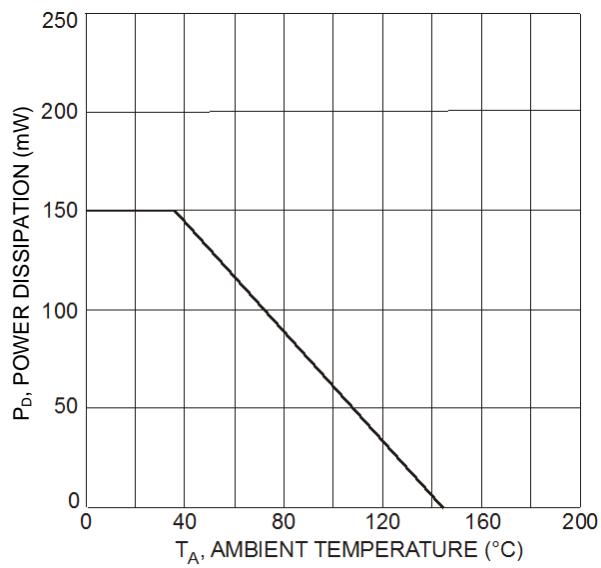
**Thermal Characteristics and Derating Information**


Fig. 1, Power Derating Curve

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 8)</b>						
Collector-Base Breakdown Voltage	$\text{BV}_{\text{CBO}}$	-50	—	—	V	$I_C = -10\mu\text{A}$
Collector-Emitter Breakdown Voltage	$\text{BV}_{\text{CEO}}$	-45	—	—	V	$I_C = -10\text{mA}$
Emitter-Base Breakdown Voltage	$\text{BV}_{\text{EBO}}$	-5	—	—	V	$I_E = -10\mu\text{A}$
<b>ON CHARACTERISTICS (Note 8)</b>						
DC Current Gain	$\text{h}_{\text{FE}}$	220	290	475	—	$V_{\text{CE}} = -5.0\text{V}$ , $I_C = -2.0\text{mA}$
Collector-Emitter Saturation Voltage	$V_{\text{CE}(\text{SAT})}$	—	—	-300 -650	mV	$I_C = -10\text{mA}$ , $I_B = -0.5\text{mA}$ $I_C = -100\text{mA}$ , $I_B = -5.0\text{mA}$
Base-Emitter Saturation Voltage	$V_{\text{BE}(\text{SAT})}$	—	-700 -900	—	mV	$I_C = -10\text{mA}$ , $I_B = -0.5\text{mA}$ $I_C = -100\text{mA}$ , $I_B = -5.0\text{mA}$
Base-Emitter Voltage	$V_{\text{BE}(\text{ON})}$	-600 —	—	-750 -820	mV	$V_{\text{CE}} = -5.0\text{V}$ , $I_C = -2.0\text{mA}$ $V_{\text{CE}} = -5.0\text{V}$ , $I_C = -10\text{mA}$
Collector-Emitter Cutoff Current	$I_{\text{CBO}}$	—	—	-15 -4.0	nA $\mu\text{A}$	$V_{\text{CB}} = -30\text{V}$ $V_{\text{CB}} = -30\text{V}$ , $T_A = +150^\circ\text{C}$
<b>SMALL SIGNAL CHARACTERISTICS</b>						
Output Capacitance	$C_{\text{OBO}}$	—	—	4.5	pF	$V_{\text{CB}} = -10\text{V}$ , $f = 1.0\text{MHz}$
Current Gain-Bandwidth Product	$f_T$	100	—	—	MHz	$V_{\text{CE}} = -5.0\text{V}$ , $I_C = -10\text{mA}$ , $f = 100\text{MHz}$
Noise Figure	$N_F$	—	—	10	dB	$I_C = -0.2\text{mA}$ , $V_{\text{CE}} = -5.0\text{V}$ , $R_S = 2.0\text{k}\Omega$ , $f = 1.0\text{KHz}$ , $BW = 200\text{Hz}$

Note: 8. 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.)

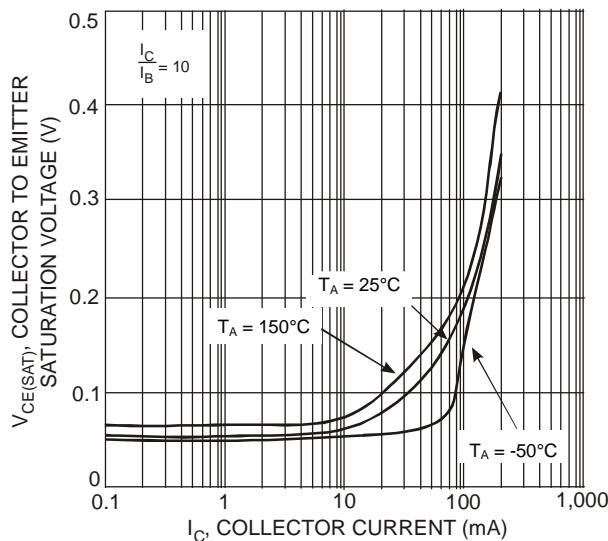


Fig. 2, Collector Emitter Saturation Voltage vs. Collector Current

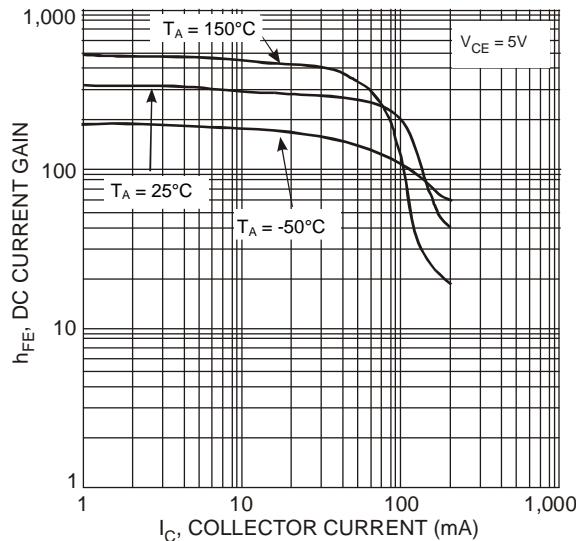


Fig. 3, DC Current Gain vs. Collector Current

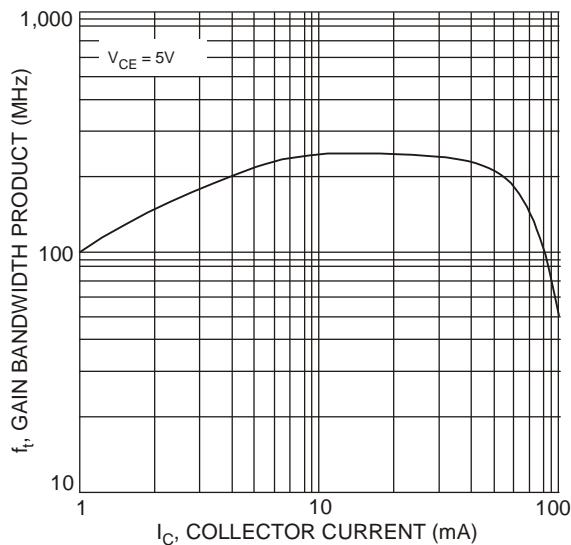
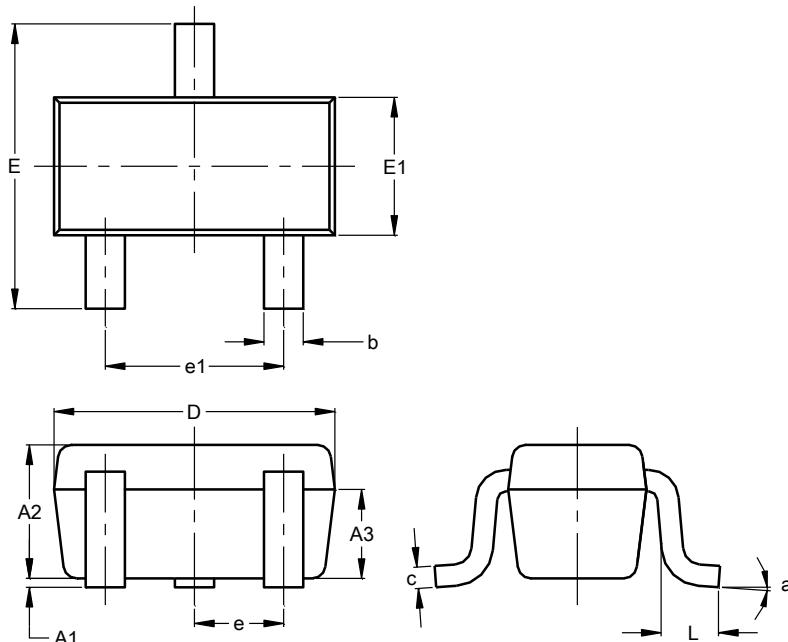


Fig. 4, Gain Bandwidth Product vs. Collector Current

## Package Outline Dimensions

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

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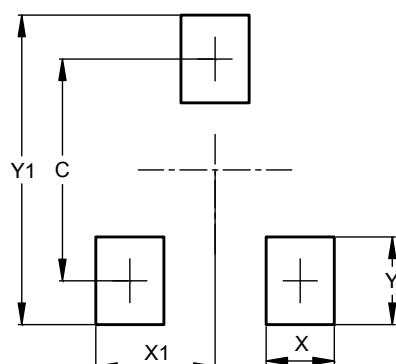


SOT523			
Dim	Min	Max	Typ
A1	0.00	0.10	0.05
A2	0.60	0.80	0.75
A3	0.45	0.65	0.50
b	0.15	0.30	0.22
c	0.10	0.20	0.12
D	1.50	1.70	1.60
E	1.45	1.75	1.60
E1	0.75	0.85	0.80
e	0.50 BSC		
e1	0.90	1.10	1.00
L	0.20	0.40	0.33
a	0°	--	8°
All Dimensions in mm			

## Suggested Pad Layout

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

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Dimensions	Value
C	1.29
X	0.40
X1	0.70
Y	0.51
Y1	1.80

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