45V NPN SMALL SIGNAL TRANSISTOR IN SOT523

Features

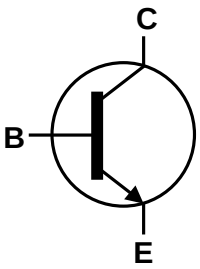
- BV_{CEO} > 45V
- I_C = 100mA Collector Current
- Epitaxial Planar Die Construction
- Ultra-Small Surface-Mount Package
- Complementary PNP Type: MMBT3906T
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **An automotive-compliant part is available under separate datasheet (BC847BTQ)**

Mechanical Data

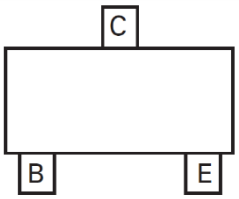
- Package: SOT523
- Package Material: Molded Plastic. "Green" Molding Compound. UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.002 grams (Approximate)

SOT523

Top View



Device Symbol



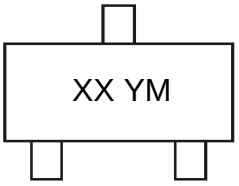
Pin-Out Top View

Ordering Information (Note 4)

Part Number	Package	Marking Code	Reel Size (inches)	Tape Width (mm)	Packing	
					Qty.	Carrier
BC847AT-7-F	SOT523	1E	7	8	3,000	Reel
BC847BT-7-F	SOT523	1F	7	8	3,000	Reel
BC847CT-7-F	SOT523	1M	7	8	3,000	Reel

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. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information



XX = Product Type Marking Code
YM = Date Code Marking
Y or $\overline{Y}$ = Year (ex: K = 2023)
M or $\overline{M}$ = Month (ex: 9 = September)

Date Code Key

Year	2015	-	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Code	C	-	K	L	M	N	P	R	S	T	U	V

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}	6.0	V
Collector Current	I_C	100	mA

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

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P_D	150	mW
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	833	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

ESD Ratings (Note 6)

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: 5. 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.
6. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

Thermal Characteristics and Derating Information

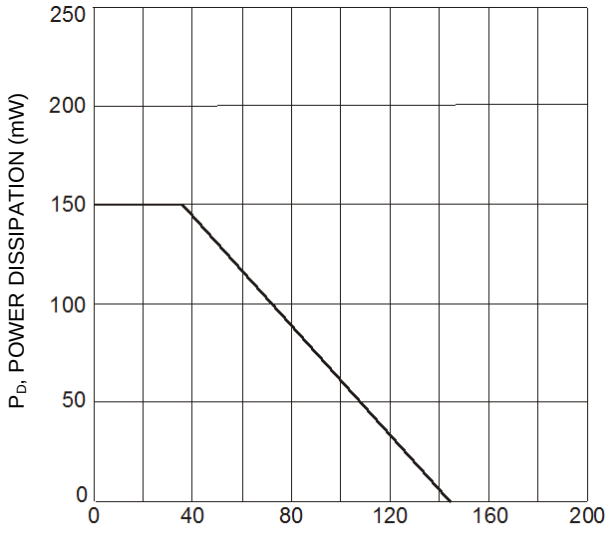


Fig. 1, Power Derating Curve

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

Characteristic		Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)							
Collector-Base Breakdown Voltage		BV_{CBO}	50	—	—	V	I_C = 10μA, I_E = 0
Collector-Emitter Breakdown Voltage		BV_{CEO}	45	—	—	V	I_C = 1mA, I_B = 0
Emitter-Base Breakdown Voltage		BV_{EBO}	6	—	—	V	I_E = 10μA, I_C = 0
ON CHARACTERISTICS (Note 7)							
DC Current Gain	Current Gain A B C	h_{FE}	110 200 420	— 290 520	220 450 800	—	V_{CE} = 5V, I_C = 2mA
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$	—	—	250 600	mV	I_C = 10mA, I_B = 0.5mA I_C = 100mA, I_B = 5mA
Base-Emitter Saturation Voltage		$V_{BE(sat)}$	—	700 900	—	mV	I_C = 10mA, I_B = 0.5mA I_C = 100mA, I_B = 5mA
Base-Emitter Voltage		V_{BE}	580 —	660 —	700 770	mV	V_{CE} = 5V, I_C = 2mA V_{CE} = 5V, I_C = 10mA
Collector-Emitter Cutoff Current		I_{CBO}	—	—	15 5	nA μA	V_{CB} = 30V V_{CB} = 30V, T_A = +150°C
SMALL SIGNAL CHARACTERISTICS							
Output Capacitance		C_{obo}	—	—	4.5	pF	V_{CB} = 10V, f = 1.0MHz
Current Gain-Bandwidth Product		f_T	100	—	—	MHz	V_{CE} = 5V, I_C = 10mA, f = 100MHz
Noise Figure	BC847BT BC847CT	NF	—	—	1 4	dB	V_{CE} = 5V, R_S = 2kΩ, f = 1MHz, BW = 200Hz

Note: 7. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

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

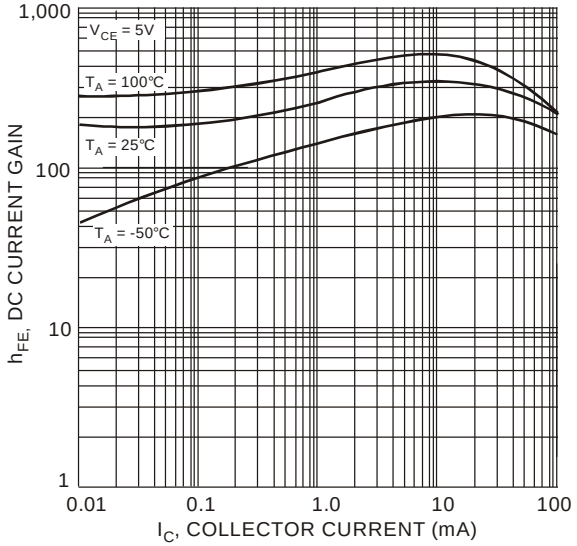


Fig. 2, DC Current Gain vs Collector Current

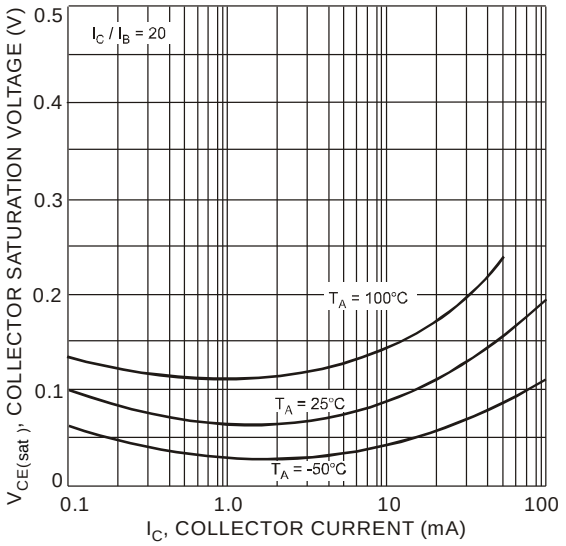


Fig. 3, Collector Saturation Voltage vs Collector Current

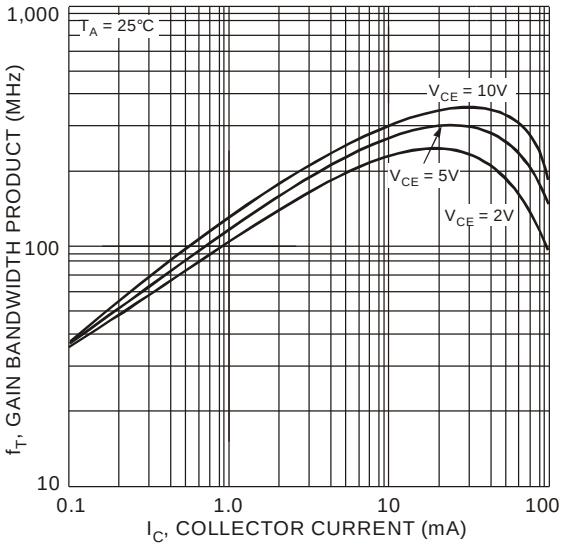
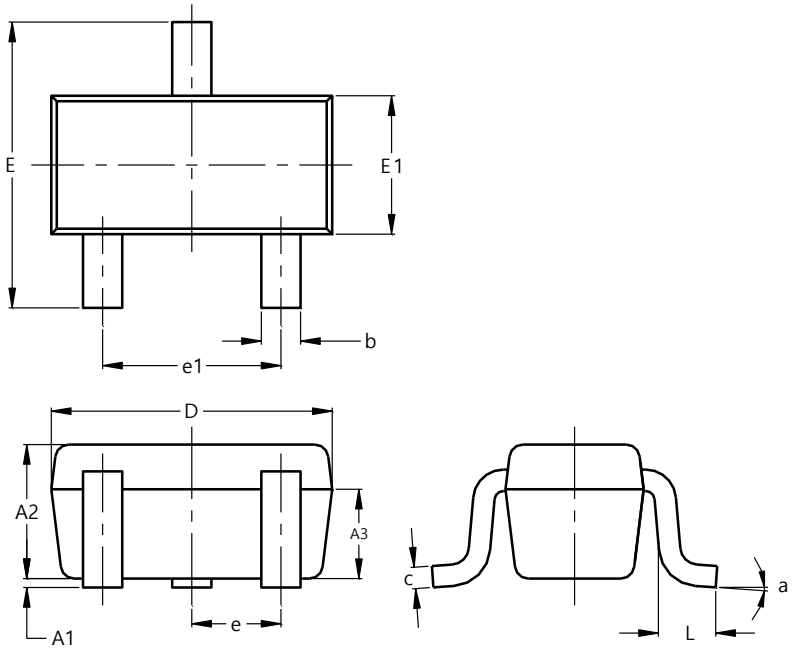


Fig. 4, Gain Bandwidth Product vs Collector Current

Package Outline Dimensions

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

SOT523

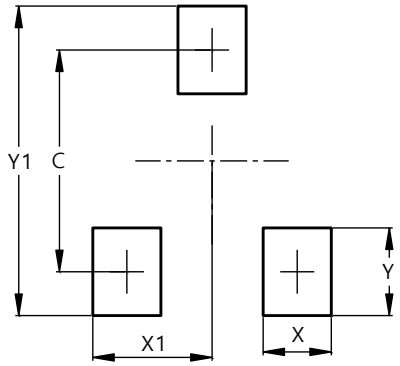


SOT523			
Dim	**Min**	**Max**	**Typ**
A1	0.00	0.10	0.05
A2	0.60	0.80	0.75
A3	0.45	0.65	0.50
b	0.15	0.30	0.22
c	0.10	0.20	0.12
D	1.50	1.70	1.60
E	1.45	1.75	1.60
E1	0.75	0.85	0.80
e	0.50 BSC		
e1	0.90	1.10	1.00
L	0.20	0.40	0.33
a	0°	--	8°
All Dimensions in mm			

Suggested Pad Layout

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

SOT523



Dimensions	Value (in mm)
C	1.29
X	0.40
X1	0.70
Y	0.51
Y1	1.80

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