

## Description

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

## Features

- $BV_{CEO} > 45V$
- $I_C = 100mA$  High Collector Current
- $P_D = 435mW$  Power Dissipation
- $0.48mm^2$  Package Footprint, 16 Times Smaller than SOT23
- 0.4mm Height Package Minimizing Off-Board Profile
- Complementary PNP Type BC857BFA
- **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: X2-DFN0806-3
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – NiPdAu, Solderable per MIL-STD-202, Method 208 (e4)
- Weight: 0.0008 grams (Approximate)

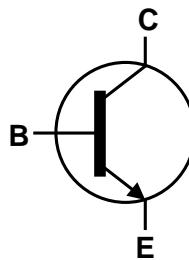
X2-DFN0806-3



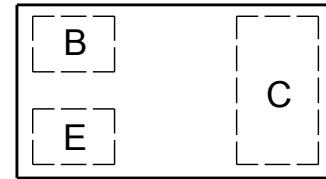
Top View



Bottom View



Device Symbol


 Top View  
 Device Schematic

## Ordering Information (Notes 4 & 5)

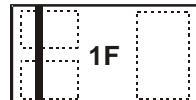
Product	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
BC847BFAQ-7B	Automotive	1F	7	8mm	10,000

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

X2-DFN0806-3



1F = Product Type Marking Code

Top View  
 Bar Denotes Base  
 and Emitter Side

**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	$V_{EBO}$	6.0	V
Continuous Collector Current	$I_C$	100	mA
Peak Pulse Collector Current	$I_{CM}$	200	mA

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

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 6)	$P_D$	435	mW
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	287	°C/W
Thermal Resistance, Junction to Lead (Note 8)	$R_{\theta JL}$	150	°C/W
Operating and Storage and Temperature Range	$T_J, T_{STG}$	-55 to +150	°C

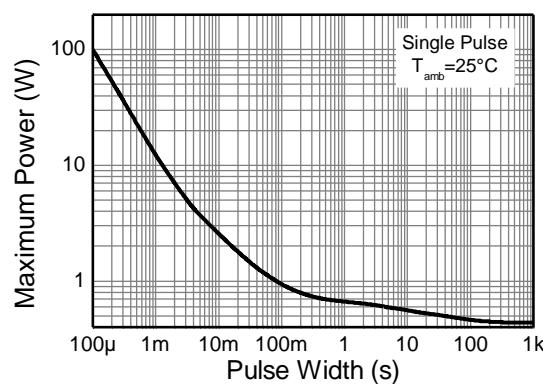
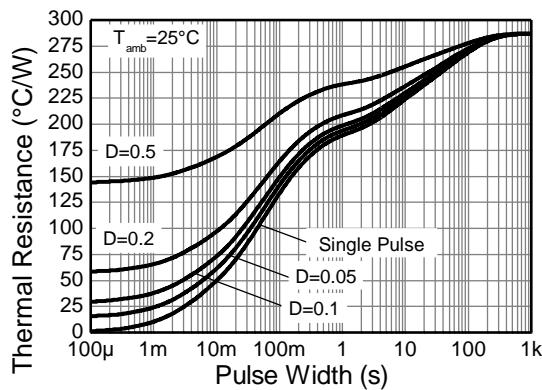
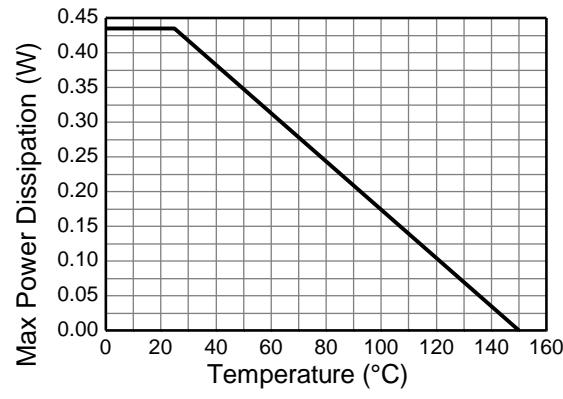
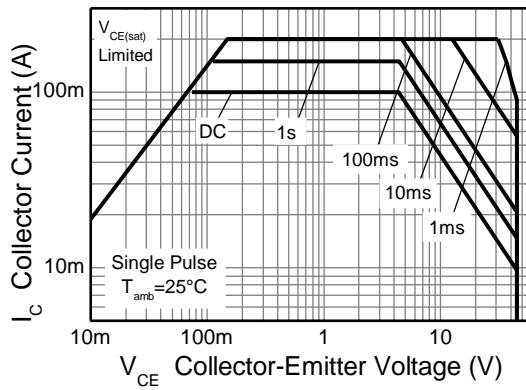
**ESD Ratings** (Note 8)

Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge – Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge – Machine Model	ESD MM	200	V	B

Notes:

- 6. For the device mounted on minimum recommended pad layout 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in steady state condition. The entire exposed collector pad is attached to the heatsink.
- 7. Thermal resistance from junction to solder-point (on the exposed collector pad).
- 8. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

## Thermal Characteristics and Derating Information



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

Characteristic	Symbol	Min	Typical	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Collector-Base Breakdown Voltage	$\text{BV}_{\text{CBO}}$	50	150	—	V	$I_C = 50\mu\text{A}, I_B = 0$
Collector-Emitter Breakdown Voltage	$\text{BV}_{\text{CES}}$	50	150	—		$I_C = 50\mu\text{A}, I_B = 0$
Collector-Emitter Breakdown Voltage (Note 9)	$\text{BV}_{\text{CEO}}$	45	65	—	V	$I_C = 1\text{mA}, I_B = 0$
Collector-Base Breakdown Voltage	$\text{BV}_{\text{EBO}}$	6.0	8.35	—	V	$I_E = 50\mu\text{A}, I_C = 0$
Collector-Base Cutoff Current	$I_{\text{CBO}}$	—	—	15	nA	$V_{\text{CB}} = 40\text{V}$
Collector-Emitter Cutoff Current	$I_{\text{CES}}$	—	—	15	nA	$V_{\text{CE}} = 40\text{V}$
<b>ON CHARACTERISTICS</b> (Note 9)						
DC Current Gain	$\text{h}_{\text{FE}}$	— 200	220 260	— 470	—	$I_C = 10\mu\text{A}, V_{\text{CE}} = 5.0\text{V}$ $I_C = 2.0\text{mA}, V_{\text{CE}} = 5.0\text{V}$
Collector-Emitter Saturation Voltage	$V_{\text{CE}(\text{SAT})}$	—	50 122	125 300	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	$V_{\text{BE}(\text{SAT})}$	—	760 880	1,000 1,100	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	$V_{\text{BE}(\text{ON})}$	580 —	650 725	750 800	mV	$I_C = 2.0\text{mA}, V_{\text{CE}} = 5\text{V}$ $I_C = 10\text{mA}, V_{\text{CE}} = 5\text{V}$
<b>SMALL SIGNAL CHARACTERISTICS</b>						
Output Capacitance	$C_{\text{OBO}}$	—	1.5	—	pF	$V_{\text{CB}} = 10.0\text{V}, f = 1.0\text{MHz}, I_E = 0$
Current Gain-Bandwidth Product	$f_T$	100	170	—	MHz	$V_{\text{CE}} = 5\text{V}, I_C = 10\text{mA}, f = 100\text{MHz}$

Note: 9. 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.)

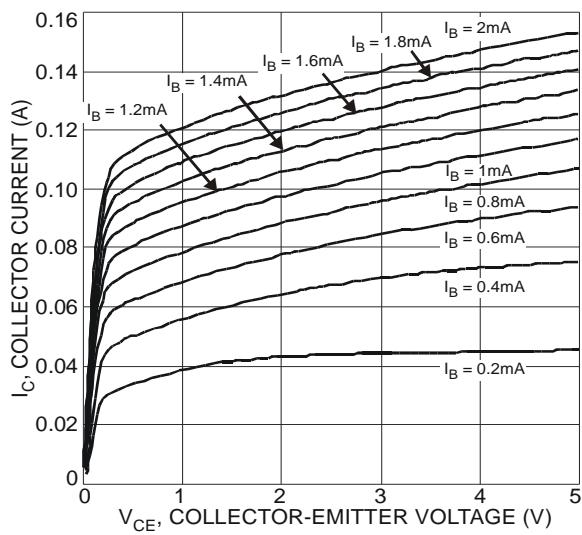


Fig. 4 Typical Collector Current vs. Collector-Emitter Voltage

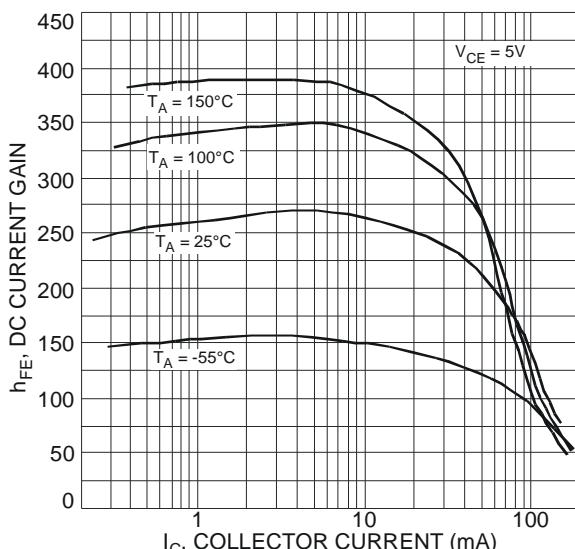


Fig. 5 Typical DC Current Gain vs. Collector Current

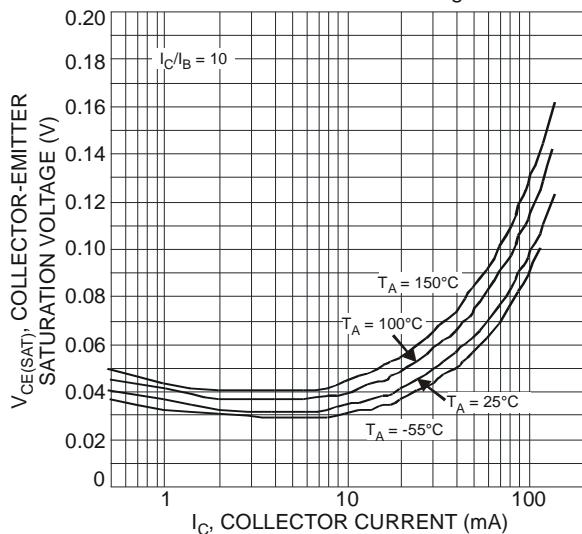


Fig. 6 Typical Collector-Emitter Saturation Voltage vs. Collector Current

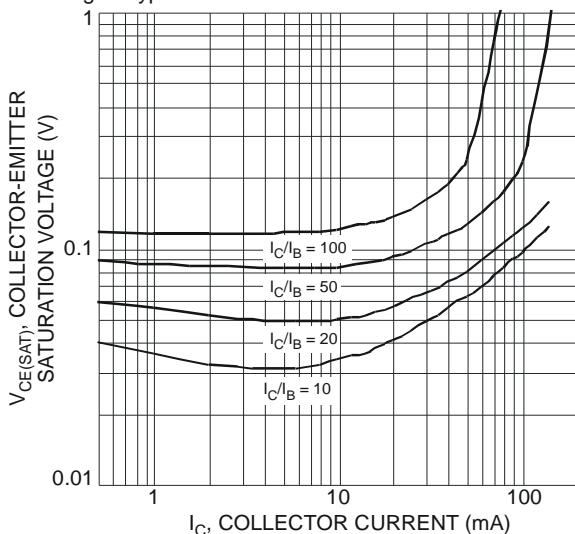


Fig. 7 Typical Collector-Emitter Saturation Voltage vs. Collector Current

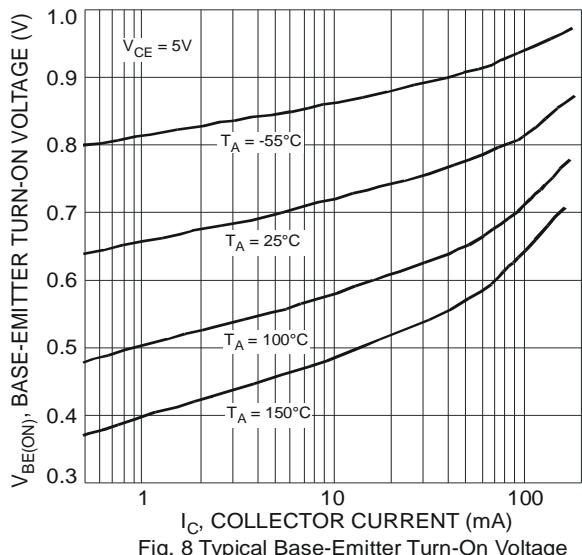


Fig. 8 Typical Base-Emitter Turn-On Voltage vs. Collector Current

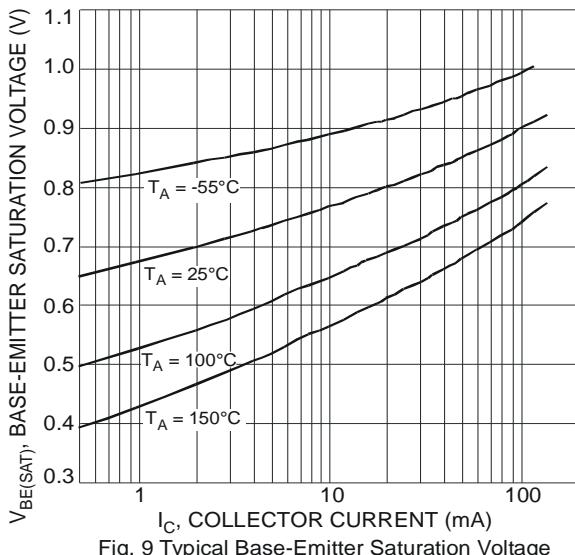
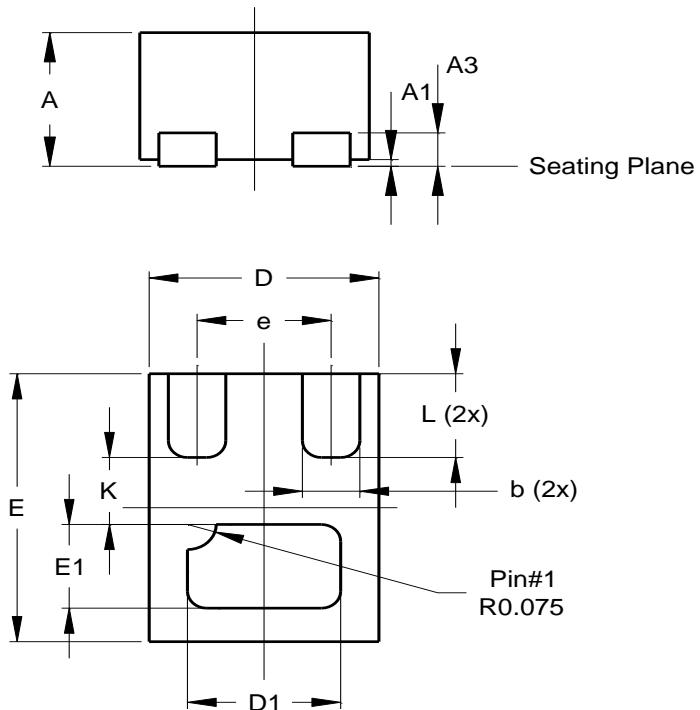


Fig. 9 Typical Base-Emitter Saturation Voltage vs. Collector Current

## Package Outline Dimensions

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

X2-DFN0806-3

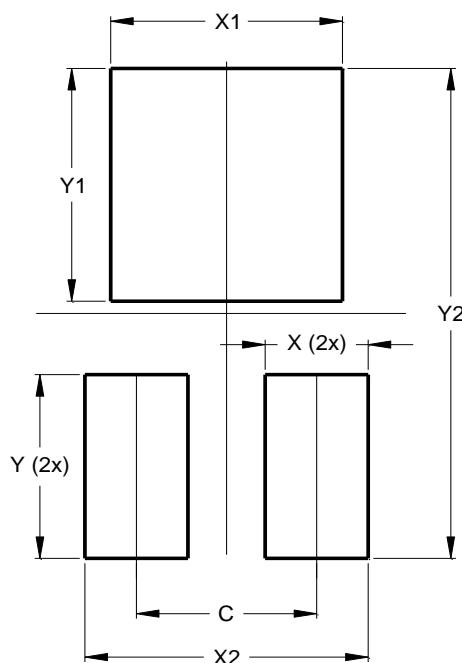


X2-DFN0806-3			
Dim	Min	Max	Typ
A	0.375	0.40	0.39
A1	0	0.05	0.02
A3	—	—	0.10
b	0.10	0.20	0.15
D	0.55	0.65	0.60
D1	0.35	0.45	0.40
E	0.75	0.85	0.80
E1	0.20	0.30	0.25
e	—	—	0.35
K	—	—	0.20
L	0.20	0.30	0.25
All Dimensions in mm			

## Suggested Pad Layout

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

X2-DFN0806-3



Dimensions	Value (in mm)
C	0.350
X	0.200
X1	0.450
X2	0.550
Y	0.375
Y1	0.475
Y2	1.000

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