NPN SMALL-SIGNAL TRANSISTOR IN U-DFN1110-3

Description

The BC846BFHWQ, BC847BFHWQ, and BC847CFHWQ bipolar junction transistors (BJT) are designed to meet the stringent requirements of automotive applications.

Features

- BV_{CEO} > 65V (BC846)
- BV_{CEO} > 45V (BC847)
- I_C = 100mA High Continuous Collector Current
- Low-Profile, 0.6mm-High Package for Thin Applications
- Sidewall Tin Plating for Wettable Flanks in AOI
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The BC846BFHWQ, BC847BFHWQ, and BC847CFHWQ are suitable for automotive applications requiring specific change control; these parts are AEC-Q101 qualified, PPAP capable, and manufactured in IATF16949 certified facilities.** https://www.diodes.com/quality/product-definitions/

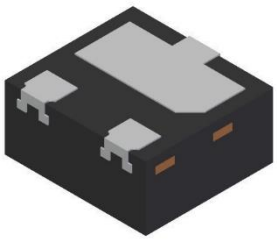
Mechanical Data

- Package: U-DFN1110-3
- 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: 0.001714 grams (Approximate)

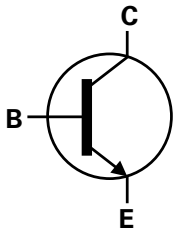
Application

- Switching and amplification

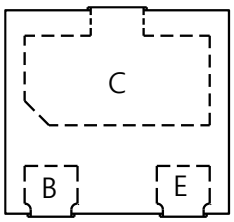
U-DFN1110-3/SWP (Type A)



Bottom View



Device Symbol



Top View
Pin-Out

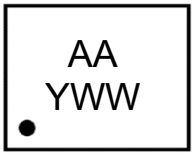
Ordering Information (Note 4)

Orderable Part Number	Package	Marking	Reel Size (inches)	Tape Width (mm)	Packing	
					Qty.	Carrier
BC846BFHWQ-7	U-DFN1110-3/SWP (Type A)	4L	7	8	5,000	Reel
BC847BFHWQ-7	U-DFN1110-3/SWP (Type A)	4W	7	8	5,000	Reel
BC847CFHWQ-7	U-DFN1110-3/SWP (Type A)	4X	7	8	5,000	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

U-DFN1110-3/SWP (Type A)



AA = Product Type Marking Code
YWW = Date Code Marking
Y = Last Digit of Year (ex: 5 = 2025)
WW = Week Code 01 to 53

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Absolute Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Collector-Base Voltage	BC846	V_{CBO}	80	V
	BC847		50	
Collector-Emitter Voltage	BC846	V_{CEO}	65	V
	BC847		45	
Emitter-Base Voltage		V_{EBO}	6	V
Continuous Collector Current		I_C	100	mA
Peak Pulse Collector Current		I_{CM}	200	mA
Peak Base Current		I_{BM}	100	mA

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

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	P_D	420	mW
Thermal Resistance, Junction to Ambient	(Note 5)	$R_{\theta JA}$	298	°C/W
Thermal Resistance, Junction to Case	(Note 6)	$R_{\theta JC}$	109	°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	4000	V	3A
Electrostatic Discharge – Charged Device Model	ESD CDM	1000	V	C3

Notes:
5. For a device mounted with the exposed collector pads on minimum recommended pad layout and 2oz. copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in a steady state.
6. Thermal resistance from junction to the top of the case.
7. Refer to JEDEC specifications JS-001 and JS-002.

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Thermal Characteristics and Derating Information

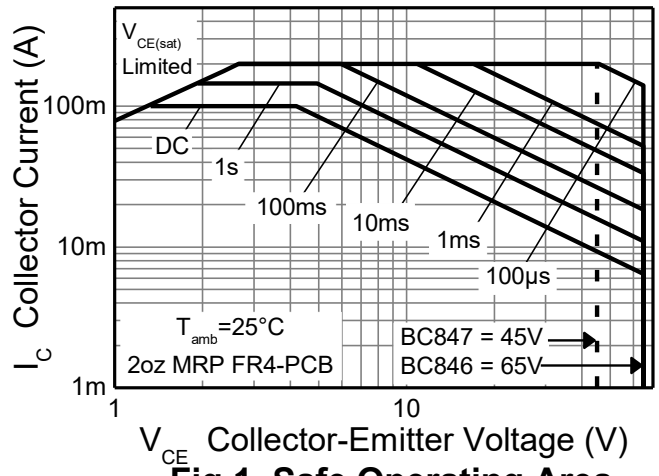


Fig.1 Safe Operating Area

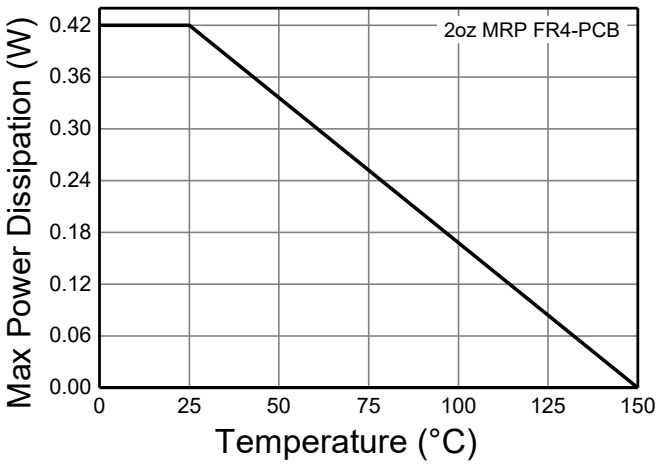


Fig.2 Derating Curve

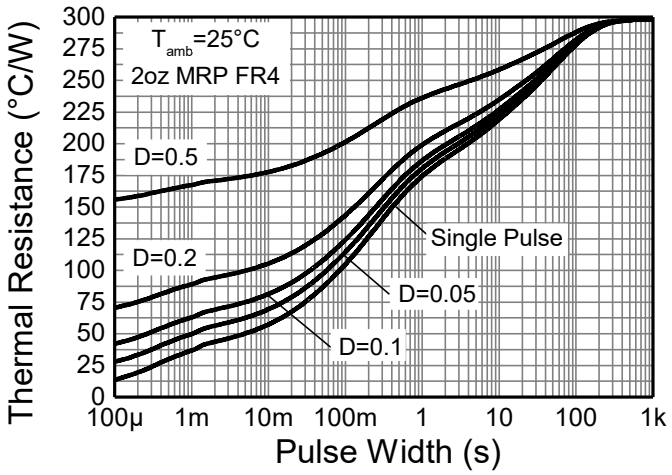


Fig.3 Transient Thermal Impedance

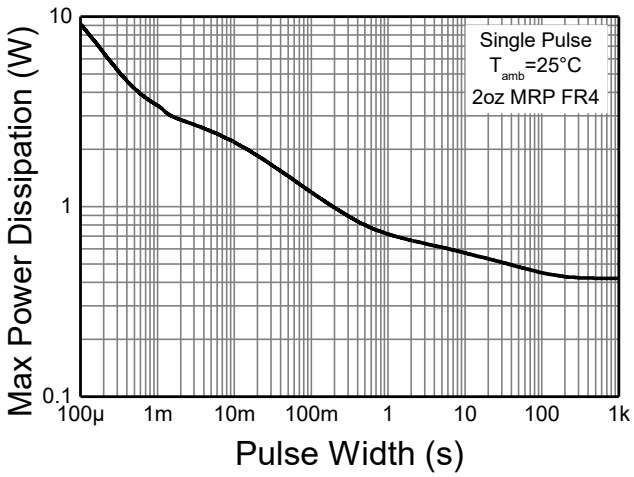


Fig.4 Pulse Power Dissipation

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

Characteristic		Symbol	Min	Typ	Max	Unit	Test Conditions
Collector-Base Breakdown Voltage	BC846	BV_{CBO}	80	—	—	V	I_C = 100µA
	BC847		50				
Collector-Emitter Breakdown Voltage (Note 8)	BC846	BV_{CEO}	65	—	—	V	I_C = 10mA
	BC847		45				
Emitter-Base Breakdown Voltage		BV_{EBO}	6	—	—	V	I_E = 100µA
Collector-Base Cutoff Current		I_{CBO}	—	—	15	nA	V_{CB} = 30V, I_E = 0
			—	—	5	µA	V_{CB} = 30V, I_E = 0, T_A = +150°C
Emitter-Base Cutoff Current		I_{EBO}	—	—	100	nA	V_{EB} = 5.6V, I_C = 0
DC Current Gain	BC846B BC847B	h_{FE}	200	—	450	—	V_{CE} = 5V, I_C = 2mA
	BC847C		420	—	800		V_{CE} = 5V, I_C = 2mA
Collector-Emitter Saturation Voltage (Note 8)		$V_{CE(sat)}$	—	—	200	mV	I_C = 10mA, I_B = 0.5mA
			—	—	400		I_C = 100mA, I_B = 5mA
Base-Emitter Turn-On Voltage (Note 8)		$V_{BE(on)}$	580	—	700	mV	V_{CE} = 5V, I_C = 2mA
			—	—	770		V_{CE} = 5V, I_C = 10mA
Base-Emitter Saturation Voltage (Note 8)		$V_{BE(sat)}$	—	760	—	V	I_C = 10mA, I_B = 0.5mA
			—	900	—		I_C = 100mA, I_B = 5mA
Transition Frequency		f_T	100	—	—	MHz	V_{CE} = 5V, I_C = 10mA, f = 100MHz
Output (Collector) Capacitance		C_{obc}	—	—	3	pF	V_{CB} = 10V, f = 1MHz
Output (Emitter) Capacitance		C_{oec}	—	11	—	pF	V_{EB} = 0.5V, f = 1MHz
Noise Figure		NF	—	—	10	dB	V_{CE} = 5V, I_C = 200µA, R_S = 2kΩ, f = 1kHz, B_W = 200Hz

Note: 8. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%.

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

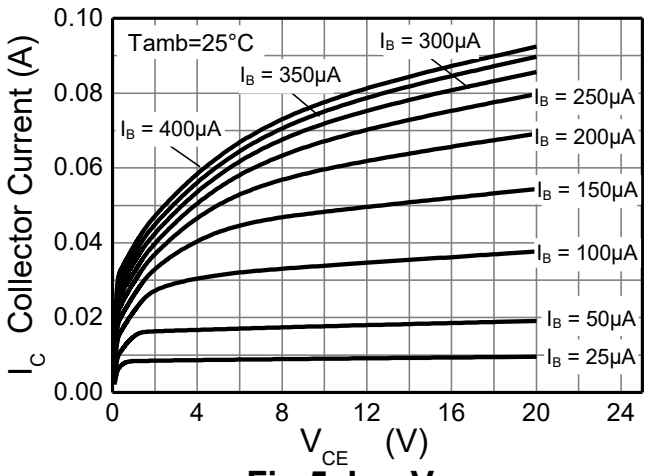


Fig.5 I_C v V_{CE}

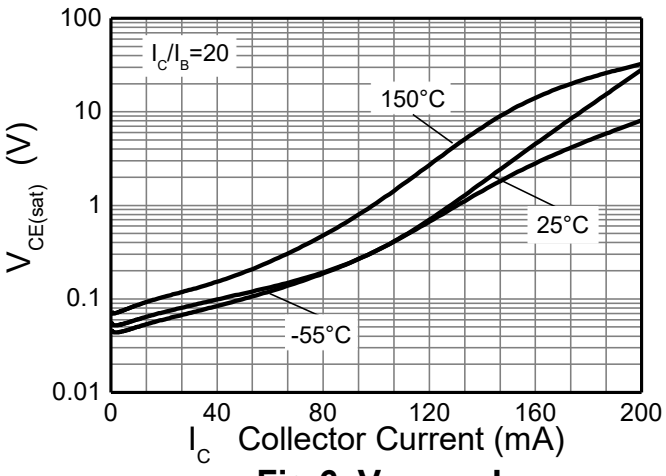


Fig.6 $V_{CE(sat)}$ v I_C

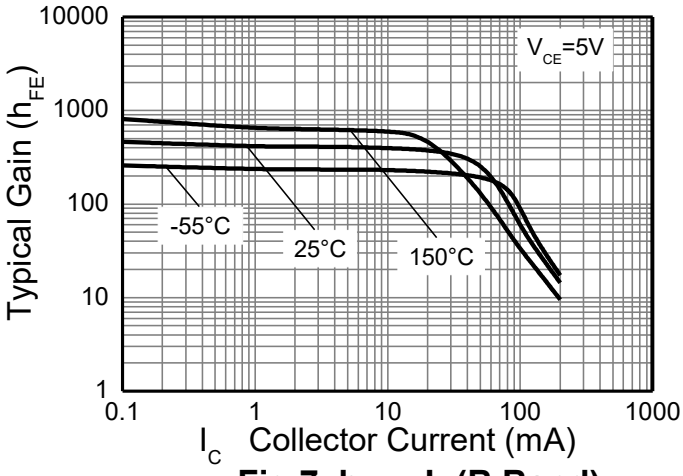


Fig.7 h_{FE} v I_C (B Band)

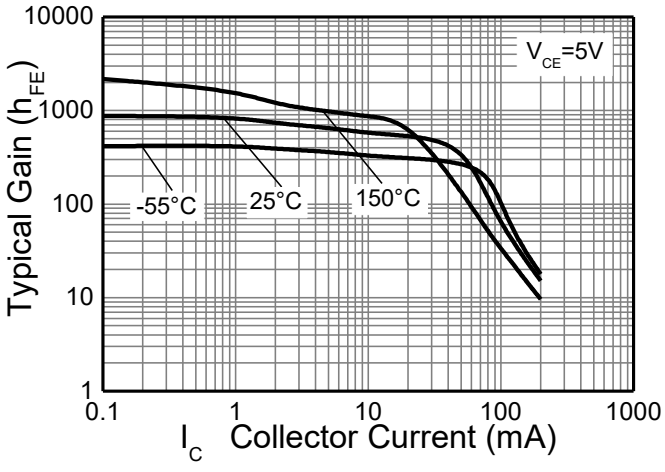


Fig.8 h_{FE} v I_C (C Band)

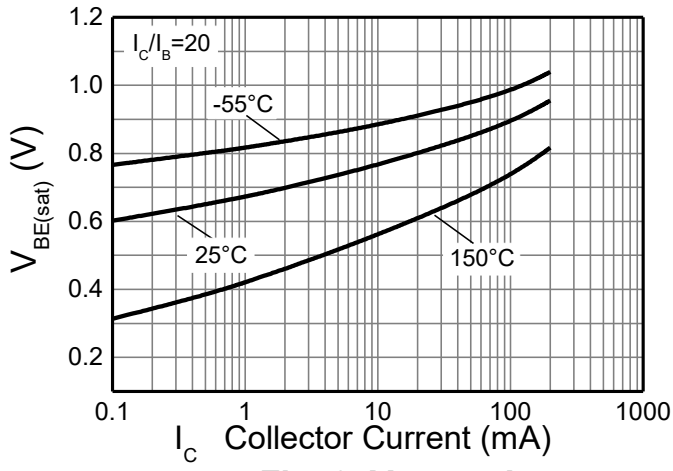


Fig. 9 $V_{BE(sat)}$ v I_C

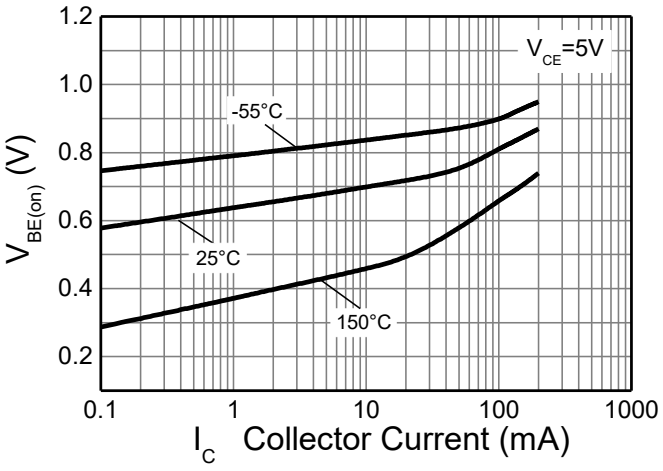


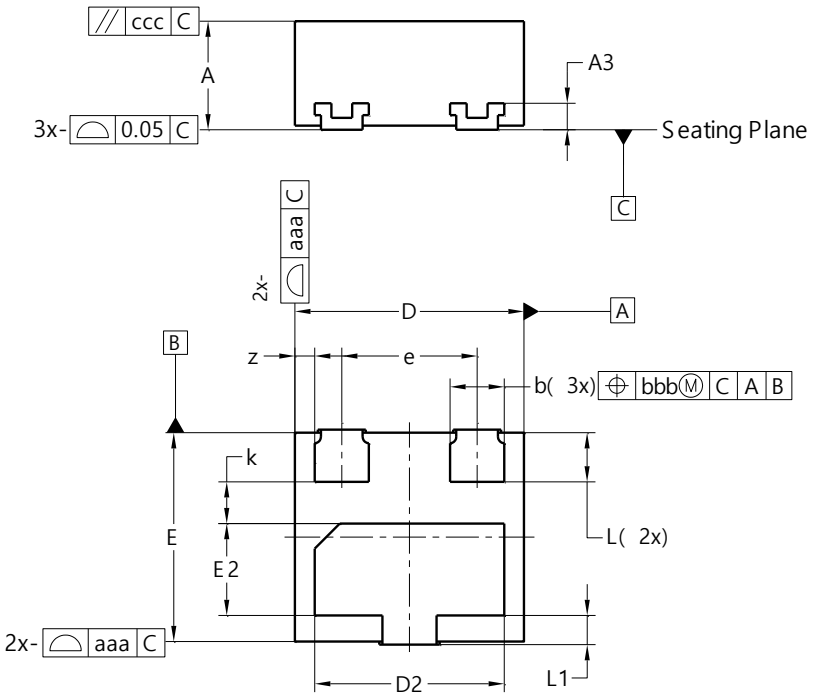
Fig. 10 $V_{BE(on)}$ v I_C

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Package Outline Dimensions

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

U-DFN1110-3/SWP (Type A)



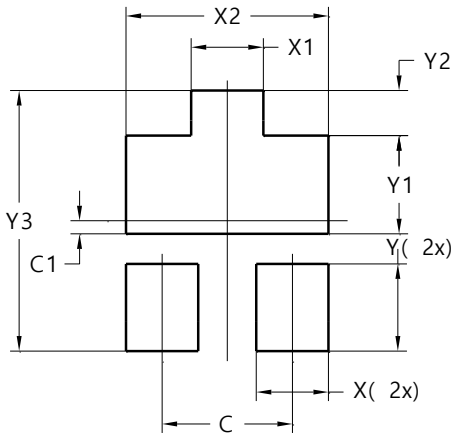
U-DFN1110-3/SWP (Type A)			
Dim	**Min**	**Max**	**Typ**
A	0.47	0.57	0.52
A1	0.00	0.05	0.03
A3	–	–	0.127
b	0.22	0.30	0.26
D	1.05	1.15	1.10
D2	0.87	0.95	0.91
e	0.65 BSC		
E	0.95	1.05	1.00
E2	0.40	0.48	0.44
k	–	–	0.20
L	0.20	0.27	0.23
L1	0.09	0.19	0.14
z	–	–	0.095
aaa	0.25		
bbb	0.10		
ccc	0.10		
All Dimensions in mm			

Note: Side wall tin plated package for wettable flanks in AOI.

Suggested Pad Layout

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

U-DFN1110-3/SWP (Type A)



Dimensions	Value (in mm)
C	0.650
C1	0.065
X	0.360
X1	0.360
X2	1.010
Y	0.435
Y1	0.490
Y2	0.225
Y3	1.300

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