

## Description

The BC817-16FSWQ, BC817-25FSWQ, and BC817-40FSWQ bipolar junction transistors (BJT) are designed to meet the stringent requirements of automotive applications.

## Features

- $BV_{CEO} > 45V$
- $I_C = 500mA$  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 BC817-16FSWQ, BC817-25FSWQ, and BC817-40FSWQ 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/>

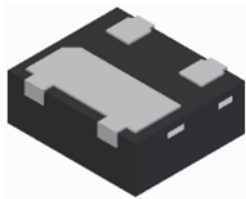
## Mechanical Data

- Package: U-DFN1412-3/SWP (Type A)
- 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: 0.0050 grams (Approximate)

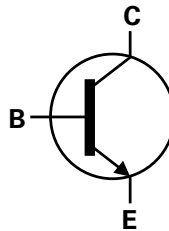
## Application

- Switching and amplification

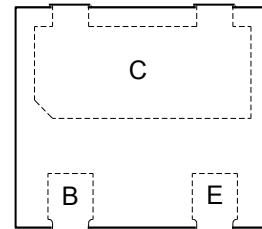
U-DFN1412-3/SWP (Type A)



Bottom View



Device Symbol



Top View  
Pin-Out

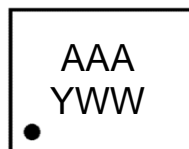
## Ordering Information (Note 4)

Orderable Part Number	Package	Marking	Reel Size (inches)	Tape Width (mm)	Packing	
					Qty.	Carrier
BC817-16FSWQ-7	U-DFN1412-3/SWP (Type A)	2W4	7	8	5,000	Reel
BC817-25FSWQ-7	U-DFN1412-3/SWP (Type A)	2W5	7	8	5,000	Reel
BC817-40FSWQ-7	U-DFN1412-3/SWP (Type A)	2W6	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-DFN1412-3/SWP (Type A)



AAA = Product type Marking Code  
 YWW = Date Code Marking  
 Y = Last Digit of Year (ex: 4 = 2024)  
 WW = Week Code 01 to 53

**Absolute Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CB0</sub>	50	V
Collector-Emitter Voltage	V <sub>CEO</sub>	45	V
Emitter-Base Voltage	V <sub>EBO</sub>	6	V
Continuous Collector Current	I <sub>C</sub>	500	mA
Peak Pulse Collector Current	I <sub>CM</sub>	1	A
Peak Base Current	I <sub>BM</sub>	200	mA

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

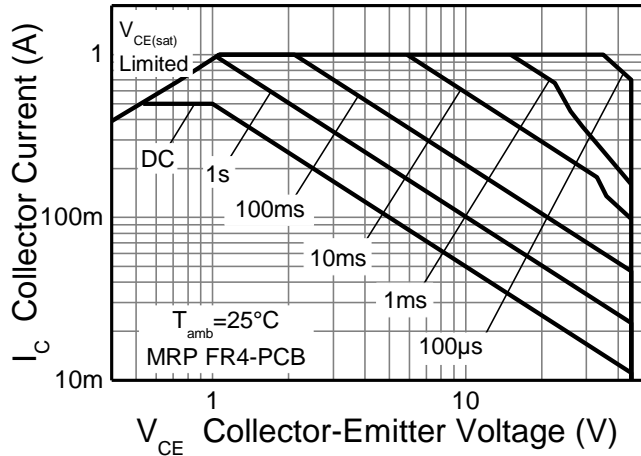
Characteristic	Symbol	Value	Unit	
Power Dissipation	P <sub>D</sub>	(Note 5)	500	mW
		(Note 6)	1.25	W
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	(Note 5)	250	°C/W
		(Note 6)	100	
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C	

**ESD Ratings** (Note 7)

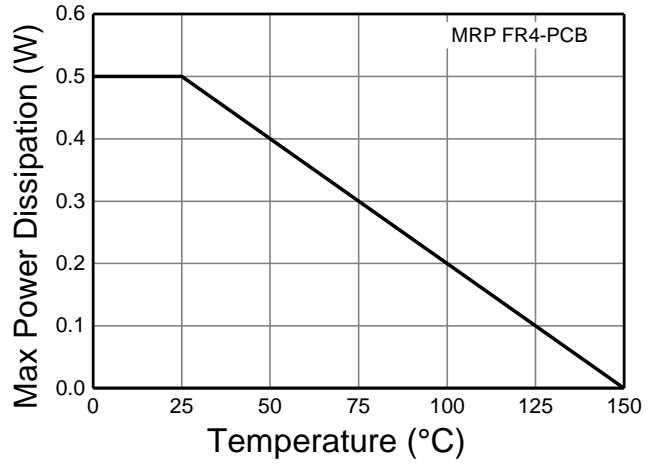
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge – Human Body Model	ESD HBM	4000	V	3A
Electrostatic Discharge – Charged Device Model	ESD CDM	1000	V	C3

- Notes:
- 5. For a device mounted with the exposed collector pads on minimum recommended pad layout that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.
  - 6. Same as Note (5), except the device is mounted with 1-inch square pad and 2oz. copper.
  - 7. Refer to JEDEC specification JESD22-A114 and JESD22-C101.

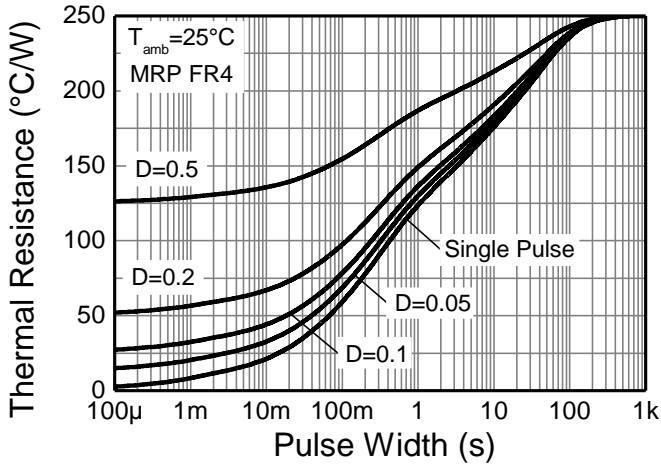
**Thermal Characteristics and Derating Information**



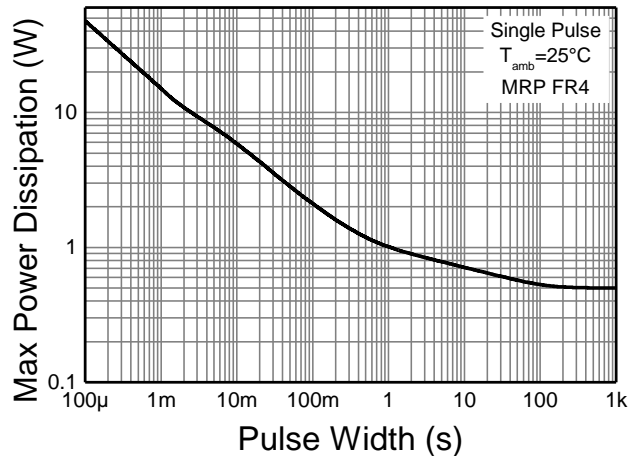
**Fig.1 Safe Operating Area**



**Fig.2 Derating Curve**



**Fig.3. Transient Thermal Impedance**



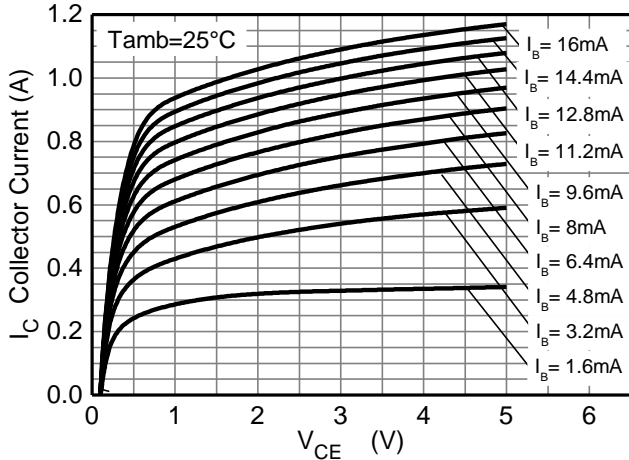
**Fig.4 Pulse Power Dissipation**

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

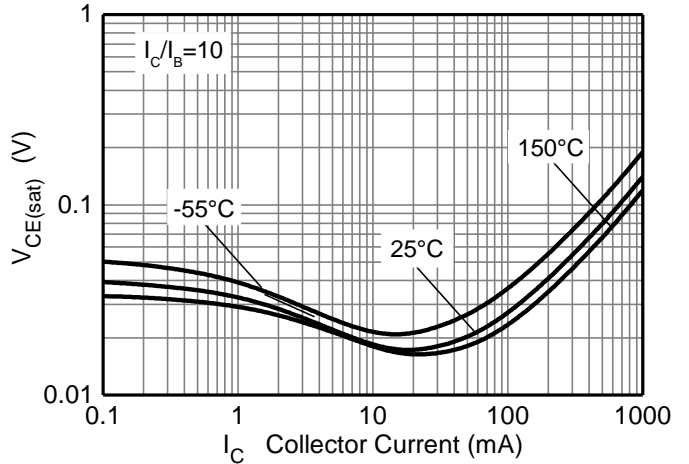
Characteristic		Symbol	Min	Typ	Max	Unit	Test Conditions
Collector-Base Breakdown Voltage		BV <sub>CBO</sub>	50	—	—	V	I <sub>C</sub> = 100μA
Collector-Emitter Breakdown Voltage (Note 8)		BV <sub>CEO</sub>	45	—	—	V	I <sub>C</sub> = 10mA
Emitter-Base Breakdown Voltage		BV <sub>EBO</sub>	7	—	—	V	I <sub>E</sub> = 100μA
Collector-Base Cutoff Current		I <sub>CBO</sub>	—	—	100	nA	V <sub>CB</sub> = 36V, I <sub>E</sub> = 0
			—	—	5	μA	V <sub>CB</sub> = 36V, I <sub>E</sub> = 0, T <sub>A</sub> = +150°C
Emitter-Base Cutoff Current		I <sub>EBO</sub>	—	—	100	nA	V <sub>EB</sub> = 5.6V, I <sub>C</sub> = 0
DC Current Gain (Note 8)	BC817-16FSWQ	h <sub>FE</sub>	100	—	250	—	V <sub>CE</sub> = 1V, I <sub>C</sub> = 100mA
	BC817-25FSWQ		160	—	400		V <sub>CE</sub> = 1V, I <sub>C</sub> = 100mA
	BC817-40FSWQ		250	—	600		V <sub>CE</sub> = 1V, I <sub>C</sub> = 100mA
	All variants		40	—	—		V <sub>CE</sub> = 1V, I <sub>C</sub> = 500mA
Collector-Emitter Saturation Voltage (Note 8)		V <sub>CE(sat)</sub>	—	—	700	mV	I <sub>C</sub> = 500mA, I <sub>B</sub> = 50mA
Base-Emitter Turn-on Voltage (Note 8)		V <sub>BE(on)</sub>	—	—	1.2	V	V <sub>CE</sub> = 1V, I <sub>C</sub> = 500mA
Transition Frequency		f <sub>T</sub>	100	—	—	MHz	V <sub>CE</sub> = 5V, I <sub>C</sub> = 10mA, f = 100MHz
Collector-Base Capacitance		C <sub>cb0</sub>	—	—	12	pF	V <sub>CB</sub> = 10V, f = 1MHz

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

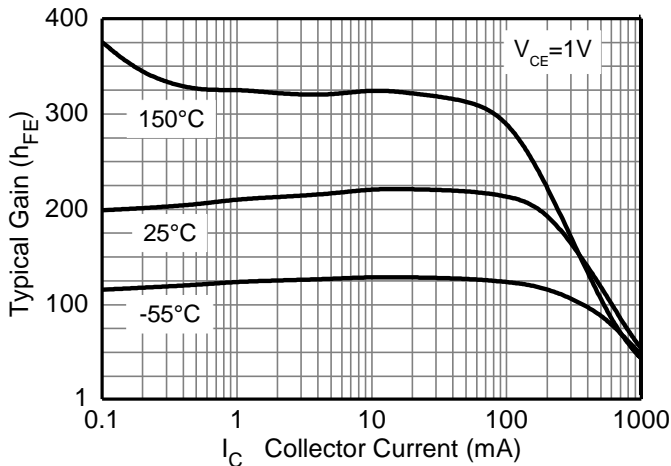
**Typical Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)



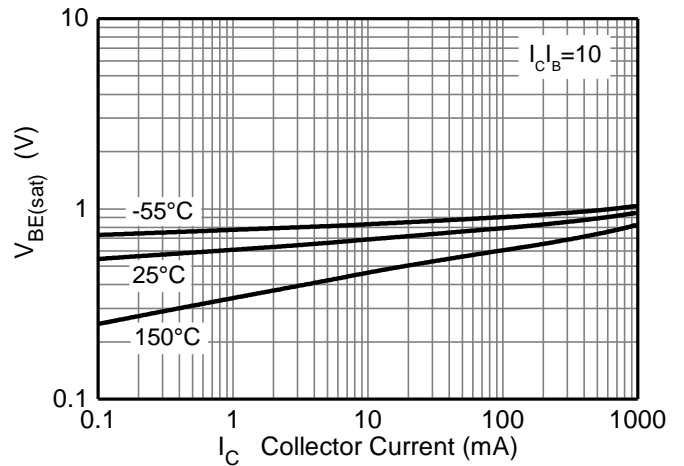
**Fig.5**  $I_C$  v  $V_{CE}$  (BC817-16FSWQ)



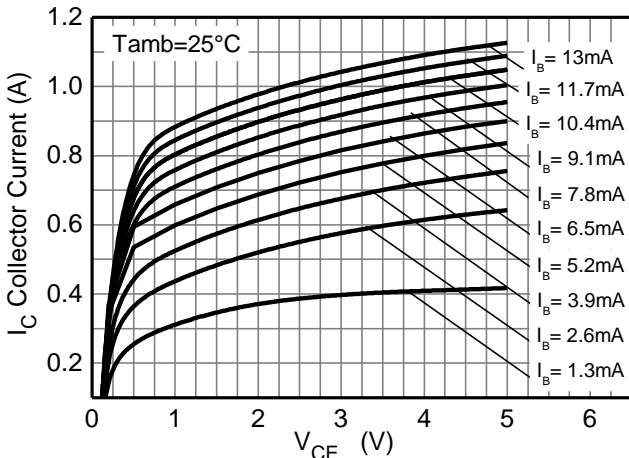
**Fig.6**  $V_{CE(sat)}$  v  $I_C$  (BC817-16FSWQ)



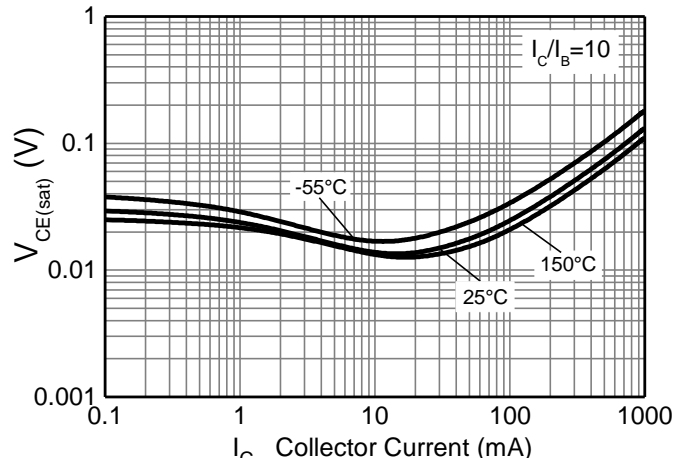
**Fig.7**  $h_{FE}$  v  $I_C$  (BC817-16FSWQ)



**Fig.8**  $V_{BE(sat)}$  v  $I_C$  (BC817-16FSWQ)

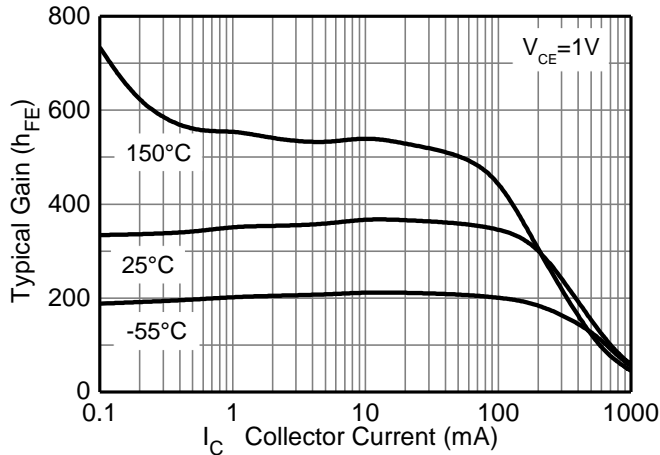


**Fig.9**  $I_C$  v  $V_{CE}$  (BC817-25FSWQ)

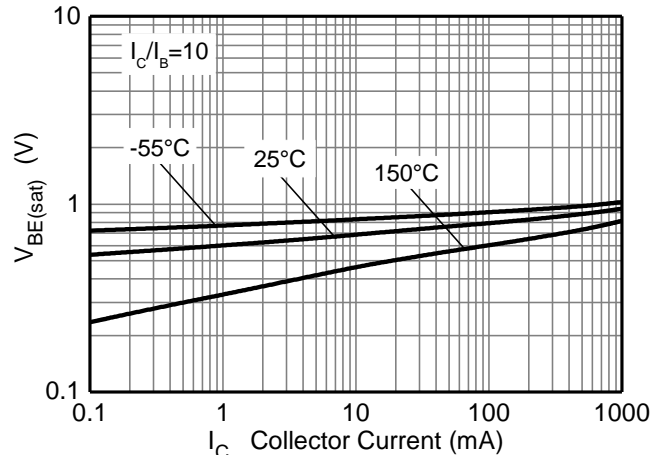


**Fig.10**  $V_{CE(sat)}$  v  $I_C$  (BC817-25FSWQ)

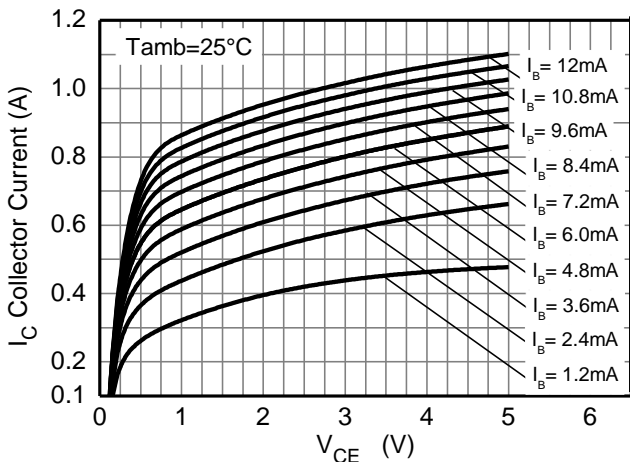
**Typical Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)



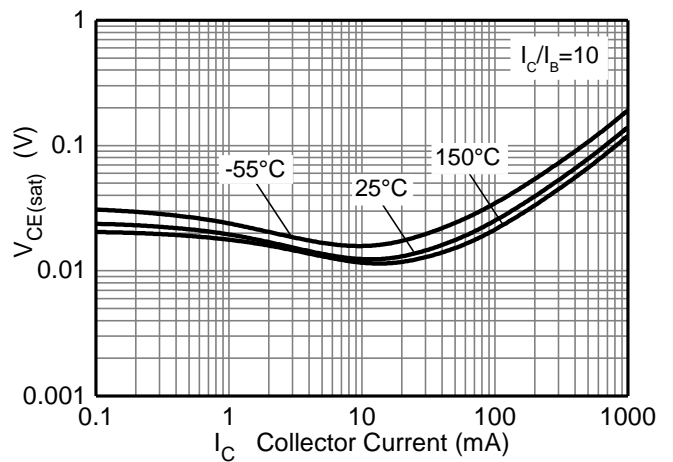
**Fig.11  $h_{FE}$  v  $I_C$  (BC817-25FSWQ)**



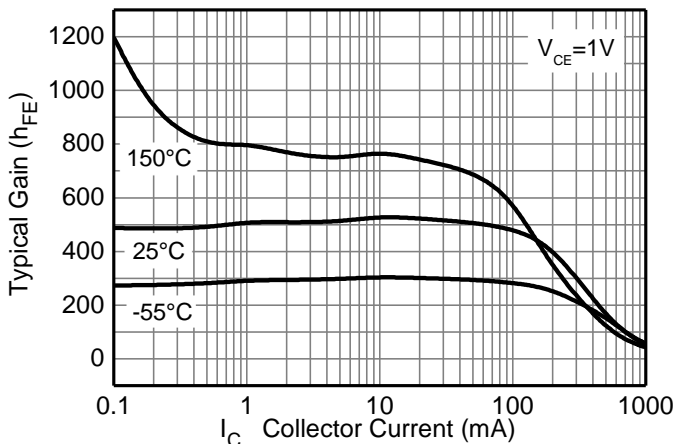
**Fig.12  $V_{BE(sat)}$  v  $I_C$  (BC817-25FSWQ)**



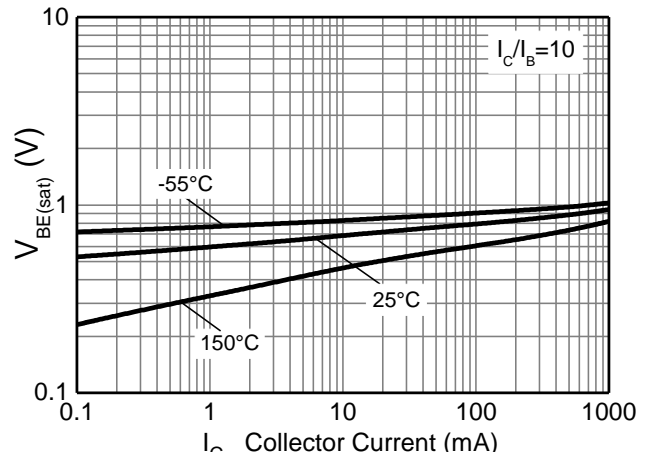
**Fig.13  $I_C$  v  $V_{CE}$  (BC817-40FSWQ)**



**Fig.14  $V_{CE(sat)}$  v  $I_C$  (BC817-40FSWQ)**



**Fig.15  $h_{FE}$  v  $I_C$  (BC817-40FSWQ)**

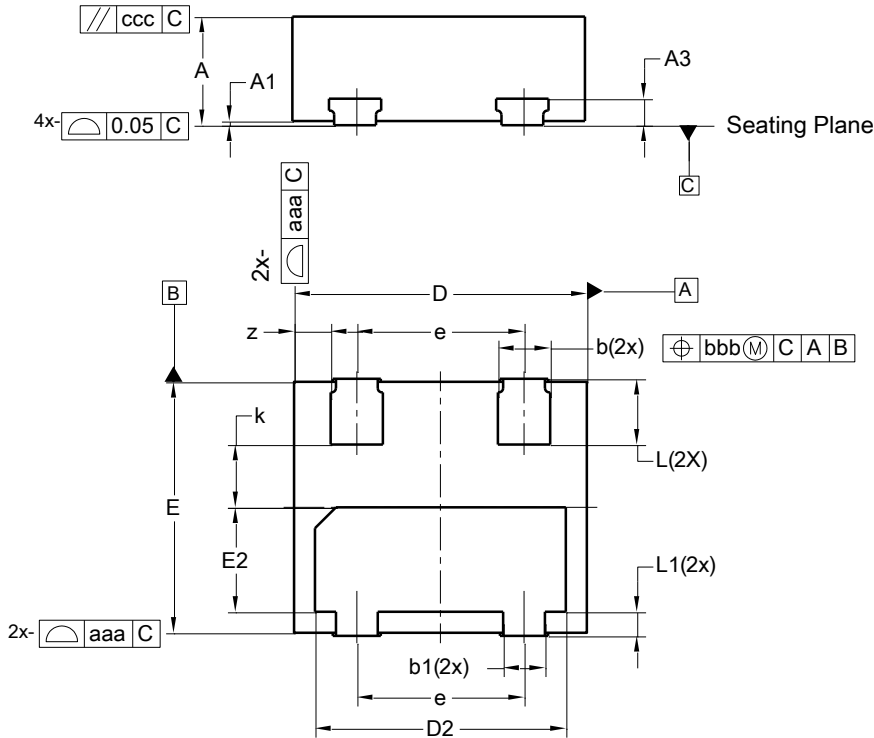


**Fig.16  $V_{BE(sat)}$  v  $I_C$  (BC817-40FSWQ)**

**Package Outline Dimensions**

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

**U-DFN1412-3/SWP (Type A)**



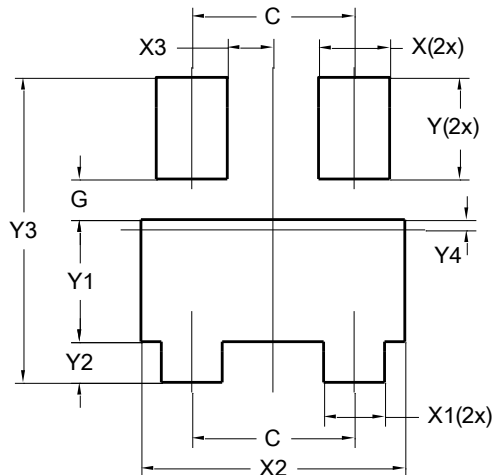
U-DFN1412-3/SWP (Type A)			
Dim	Min	Max	Typ
A	0.47	0.57	0.52
A1	0.00	0.05	0.03
A3	-	-	0.127
b	0.20	0.30	0.25
b1	0.15	0.25	0.20
D	1.35	1.45	1.40
D2	1.10	1.30	1.20
e	0.80 BSC		
E	1.15	1.25	1.20
E2	0.40	0.60	0.50
k	-	-	0.30
L	0.265	0.365	0.315
L1	0.065	0.165	0.115
z	-	-	0.175
aaa	0.25		
bbb	0.10		
ccc	0.10		
All Dimensions in mm			

Note: 9. 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-DFN1412-3/SWP (Type A)**



Dimensions	Value (in mm)
C	0.800
G	0.200
X	0.350
X1	0.300
X2	1.300
X3	0.225
Y	0.500
Y1	0.600
Y2	0.200
Y3	1.500

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