BC817W series

45 V, 500 mA NPN general-purpose transistors

Rev. 7 — 11 June 2018 Product data sheet

1 Product profile

1.1 General description

NPN general-purpose transistors in a very small SOT323 (SC-70) Surface-Mounted Device (SMD) plastic package.

Table 1. Product overview

Type number	Package			PNP complement
	Nexperia	JEDEC	JEITA	
BC817W	SOT323	-	SC-70	BC807W
BC817-16W				BC807-16W
BC817-25W				BC807-25W
BC817-40W				BC807-40W

1.2 Features and benefits

- High current
- Three current gain selections
- AEC-Q101 qualified

1.3 Applications

- General-purpose switching and amplification

nexperia

1.4 Quick reference data

Table 2. Quick reference data

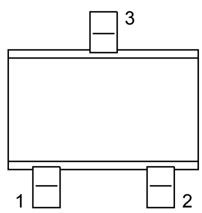
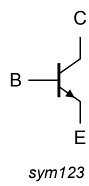
T_{amb} = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base		-	-	45	V
I_C	collector current			-	-	500	mA
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms		-	-	1	A
h_{FE}	DC current gain	V_{CE} = 1 V; I_C = 100 mA					
	BC817W		[1]	100	-	600	
	BC817-16W		[1]	100	-	250	
	BC817-25W		[1]	160	-	400	
	BC817-40W		[1]	250	-	600	

[1] pulsed; $t_p \leq 300$ μs; δ ≤ 0.02

2 Pinning information

Table 3. Pinning

Pin	Symbol	Description	Simplified outline	Graphic symbol
SOT323				
1	B	base		
2	E	emitter		
3	C	collector		

3 Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
BC817W	SC-70	Plastic surface-mounted package; 3 leads	SOT323
BC817-16W			
BC817-25W			
BC817-40W			

4 Marking

Table 5. Marking

Type number		Marking code
BC817W	[1]	6D%
BC817-16W	[1]	6A%
BC817-25W	[1]	6B%
BC817-40W	[1]	6C%

[1] % = placeholder for manufacturing site code

5 Limiting values

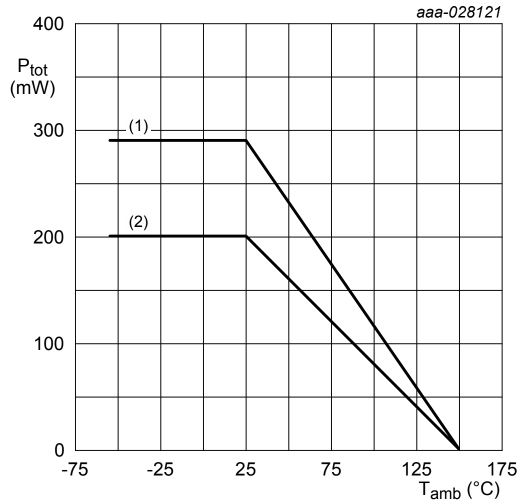
Table 6. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

T_{amb} = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions		Min	Max	Unit
V_{CBO}	collector-base voltage	open emitter		-	50	V
V_{CEO}	collector-emitter voltage	open base		-	45	V
V_{EBO}	emitter-base voltage	open collector		-	5	V
I_C	collector current			-	500	mA
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms		-	1	A
I_{BM}	peak base current	single pulse; $t_p \leq 1$ ms		-	200	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1] [2]	-	200	mW
			[3] [2]	-	290	mW
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			-65	150	°C
T_{stg}	storage temperature			-65	150	°C

[1] Device mounted on an FR4 Printed-Circuit-Board (PCB); single-sided copper; tin-plated and standard footprint.
[2] Valid for all available selection groups.
[3] Device mounted on an FR4 Printed-Circuit-Board (PCB); single-sided copper; tin-plated; mounting pad for collector 1 cm^2.



(1) FR4 PCB, single-sided copper; 1 cm^2

(2) FR4 PCB, single-sided copper; standard footprint

Figure 1. Power derating curves

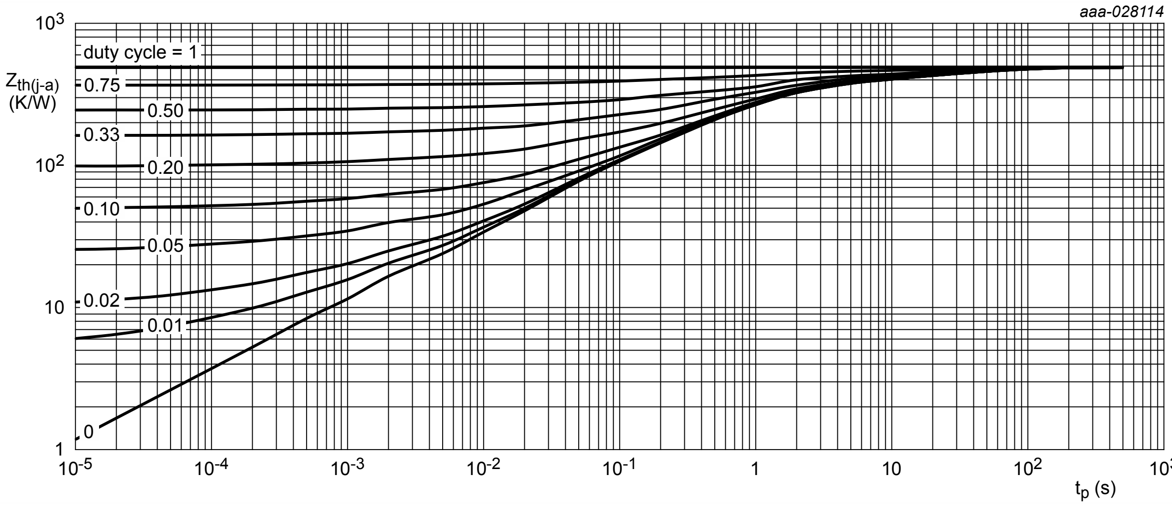
6 Thermal characteristics

Table 7. Thermal characteristics

T_{amb} = 25 °C unless otherwise specified.

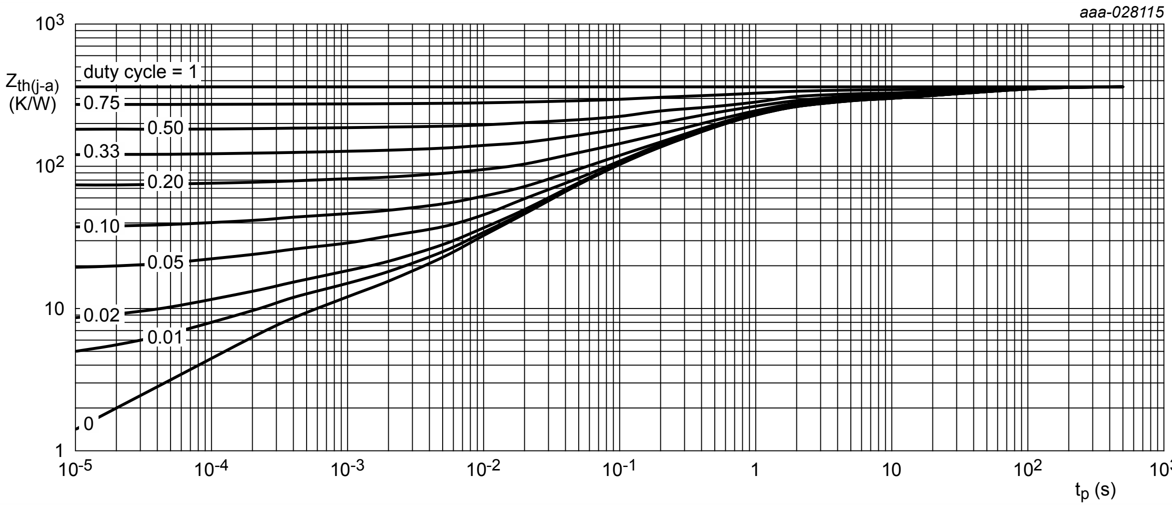
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1] [2]	-	-	625	K/W
			[3] [2]	-	-	431	K/W

[1] Device mounted on an FR4 Printed-Circuit-Board (PCB); single-sided copper; tin-plated and standard footprint.
[2] Valid for all available selection groups.
[3] Device mounted on an FR4 Printed-Circuit-Board (PCB); single-sided copper; tin-plated; mounting pad for collector 1 cm^2 .



FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 1 cm^2

Figure 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 1 cm^2

Figure 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

7 Characteristics

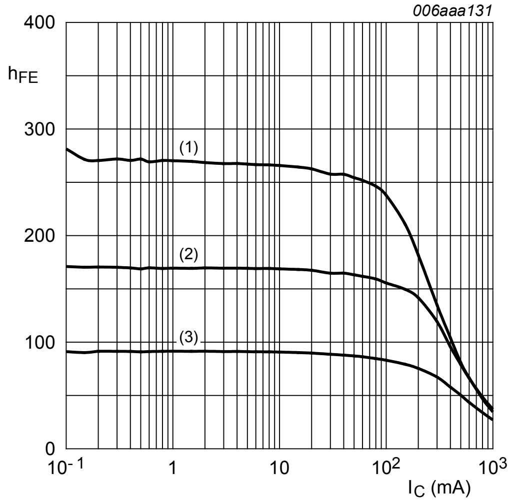
Table 8. Characteristics

T_{amb} = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 100 μA; I_E = 0 A		50	-	-	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	I_C = 10 mA; I_B = 0 A		45	-	-	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_E = 100 μA; I_C = 0 A		5	-	-	V
I_{CBO}	collector-base cut-off current	V_{CB} = 20 V; I_E = 0 A		-	-	100	nA
		V_{CB} = 20 V; I_E = 0 A; T_j = 150 °C		-	-	5	μA
I_{EBO}	emitter-base cut-off current	V_{EB} = 5 V; I_C = 0 A		-	-	100	nA
h_{FE}	DC current gain						
	BC817W	V_{CE} = 1 V; I_C = 100 mA	[1]	100	-	600	
	BC817-16W	V_{CE} = 1 V; I_C = 100 mA	[1]	100	-	250	
	BC817-25W	V_{CE} = 1 V; I_C = 100 mA	[1]	160	-	400	
	BC817-40W	V_{CE} = 1 V; I_C = 100 mA	[1]	250	-	600	
h_{FE}	DC current gain	V_{CE} = 1 V; I_C = 500 mA	[1]	40	-	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = 500 mA; I_B = 50 mA	[1]	-	-	700	mV
V_{BE}	base-emitter voltage	V_{CE} = 1 V; I_C = 500 mA	[1] [2]	-	-	1.2	V
f_T	transition frequency	V_{CE} = 5 V; I_C = 10 mA; f = 100 MHz		100	-	-	MHz
C_c	collector capacitance	V_{CB} = 10 V; I_E = i_e = 0 A; f = 1 MHz		-	3	-	pF

[1] pulsed; t_p ≤ 300 μs; δ ≤ 0.02

[2] V_{BE} decreases by approxymately 2 mV/K with increasing temperature.



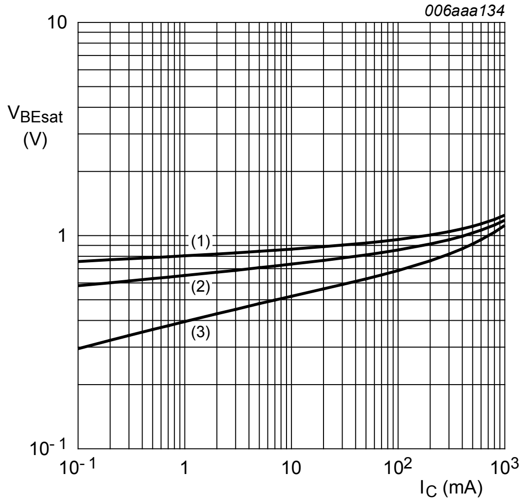
V_{CE} = 1 V

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = -55 °C

Figure 4. BC817-16W: DC current gain as a function of collector current; typical values



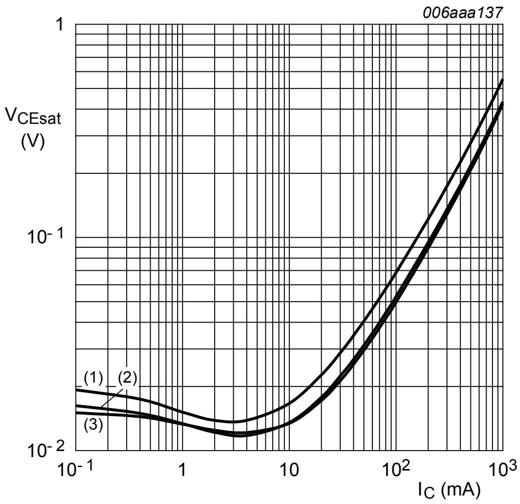
I_C/I_B = 10

(1) T_{amb} = -55 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 150 °C

Figure 5. BC817-16W: Base-emitter saturation voltage as a function of collector current; typical values



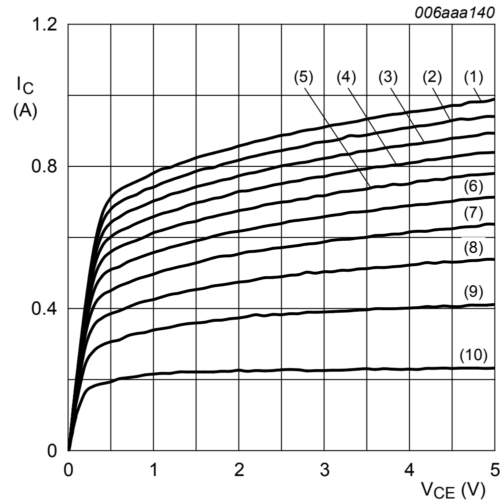
I_C/I_B = 10

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = -55 °C

Figure 6. BC817-16W: Collector-emitter saturation voltage as a function of collector current; typical values



T_{amb} = 25 °C

(1) I_B = 16.0 mA

(2) I_B = 14.4 mA

(3) I_B = 12.8 mA

(4) I_B = 11.2 mA

(5) I_B = 9.6 mA

(6) I_B = 8.0 mA

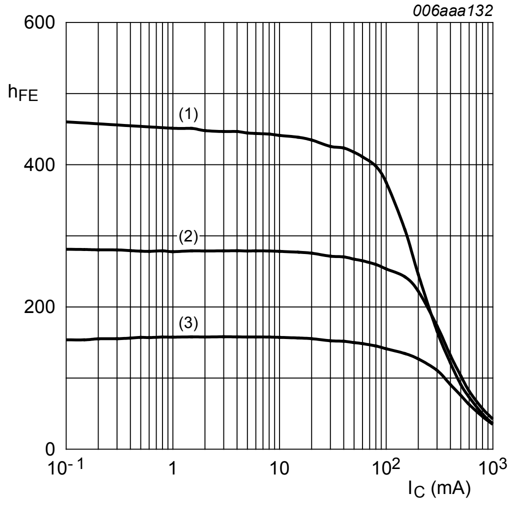
(7) I_B = 6.4 mA

(8) I_B = 4.8 mA

(9) I_B = 3.2 mA

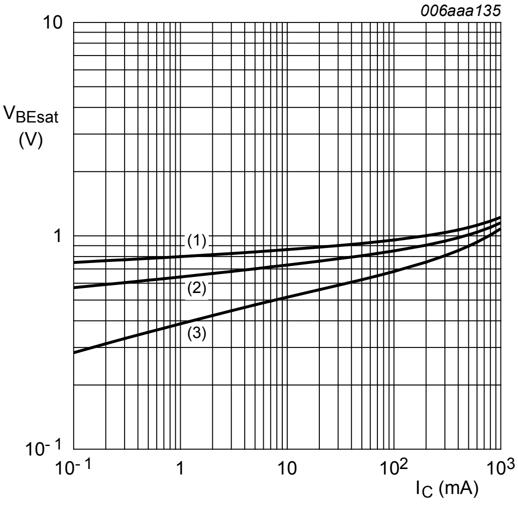
(10) I_B = 1.6 mA

Figure 7. BC817-16W: Collector current as a function of collector-emitter voltage; typical values



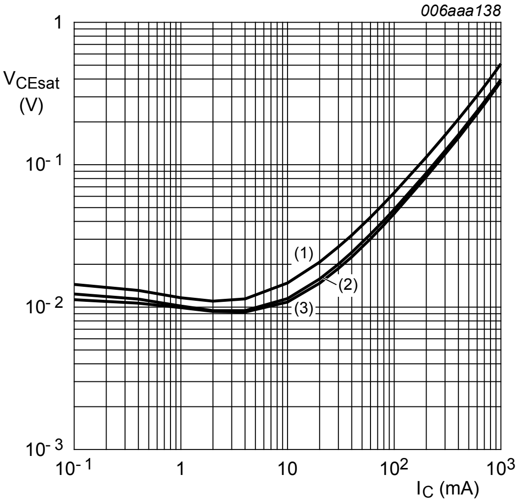
V_{CE} = 1 V
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

Figure 8. BC817-25W: DC current gain as a function of collector current; typical values



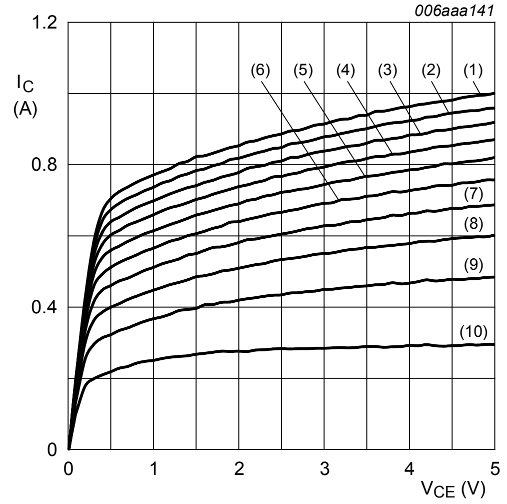
I_C/I_B = 10
(1) T_{amb} = -55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 150 °C

Figure 9. BC817-25W: Base-emitter saturation voltage as a function of collector current; typical values



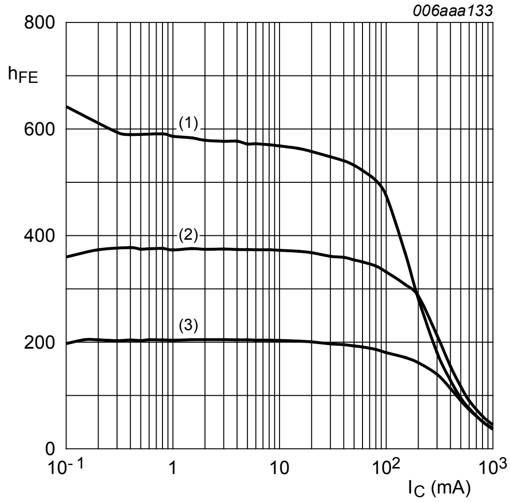
I_C/I_B = 10
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

Figure 10. BC817-25W: Collector-emitter saturation voltage as a function of collector current; typical values



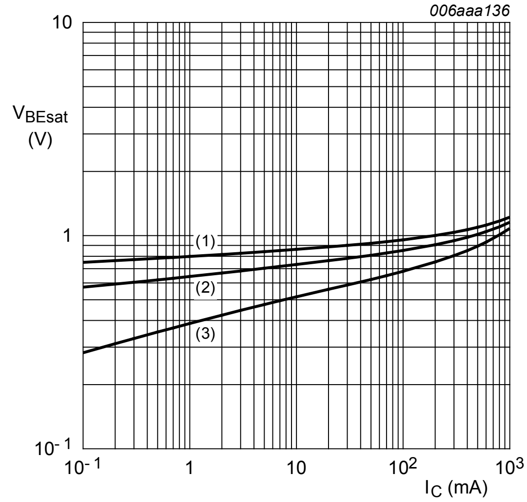
T_{amb} = 25 °C
(1) I_B = 13.0 mA
(2) I_B = 11.7 mA
(3) I_B = 10.4 mA
(4) I_B = 9.1 mA
(5) I_B = 7.8 mA
(6) I_B = 6.5 mA
(7) I_B = 5.2 mA
(8) I_B = 3.9 mA
(9) I_B = 2.6 mA
(10) I_B = 1.3 mA

Figure 11. BC817-25W: Collector current as a function of collector-emitter voltage; typical values



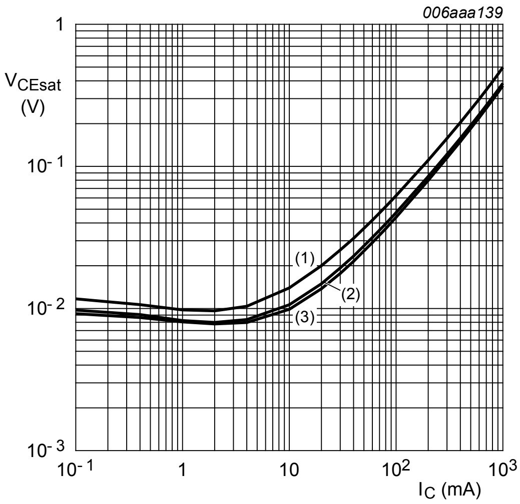
V_{CE} = 1 V
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

Figure 12. BC817-40W: DC current gain as a function of collector current; typical values



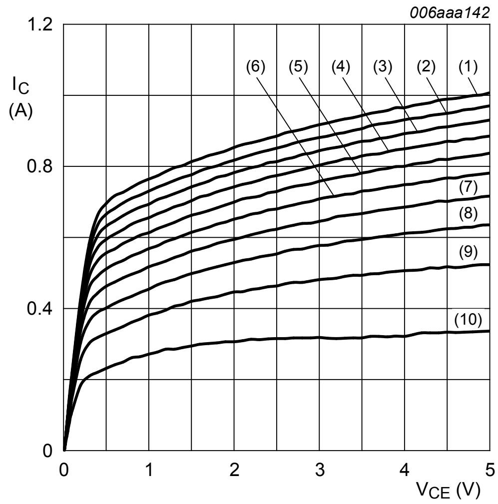
I_C/I_B = 10
(1) T_{amb} = -55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 150 °C

Figure 13. BC817-40W: Base-emitter saturation voltage as a function of collector current; typical values



I_C/I_B = 10
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

Figure 14. BC817-40W: Collector-emitter saturation voltage as a function of collector current; typical values



T_{amb} = 25 °C
(1) I_B = 12.0 mA
(2) I_B = 10.8 mA
(3) I_B = 9.6 mA
(4) I_B = 8.4 mA
(5) I_B = 7.2 mA
(6) I_B = 6.0 mA
(7) I_B = 4.8 mA
(8) I_B = 3.6 mA
(9) I_B = 2.4 mA
(10) I_B = 1.2 mA

Figure 15. BC817-40W: Collector current as a function of collector-emitter voltage; typical values

8 Test information

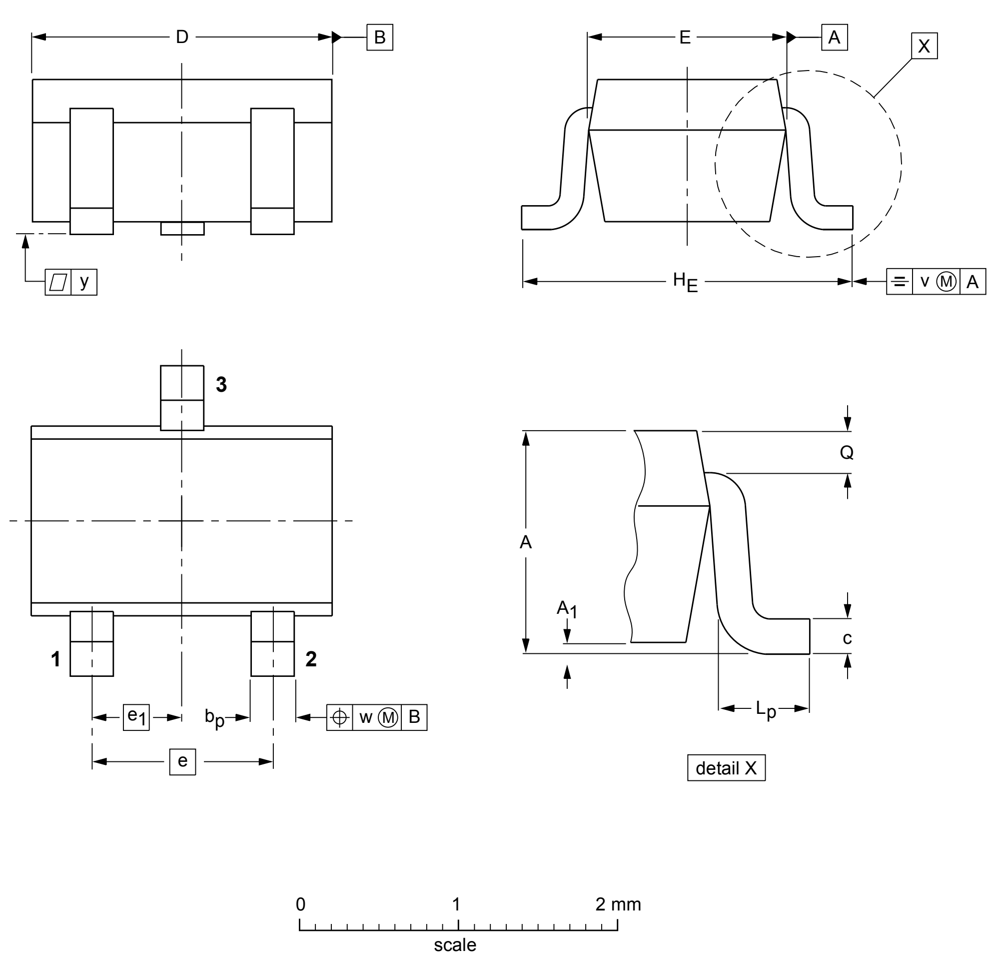
8.1 Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - Stress test qualification for discrete semiconductors, and is suitable for use in automotive applications.

9 Package outline

Table 9. Package outline

Plastic surface-mounted package; 3 leads **SOT323**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1 max	b_p	c	D	E	e	e_1	H_E	L_p	Q	v	w
mm	1.1 0.8	0.1	0.4 0.3	0.25 0.10	2.2 1.8	1.35 1.15	1.3	0.65	2.2 2.0	0.45 0.15	0.23 0.13	0.2	0.2

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT323			SC-70			~~04-11-04~~ 06-03-16

Figure 16. Package outline SOT323 (SC70)

10 Soldering

Table 10. Soldering

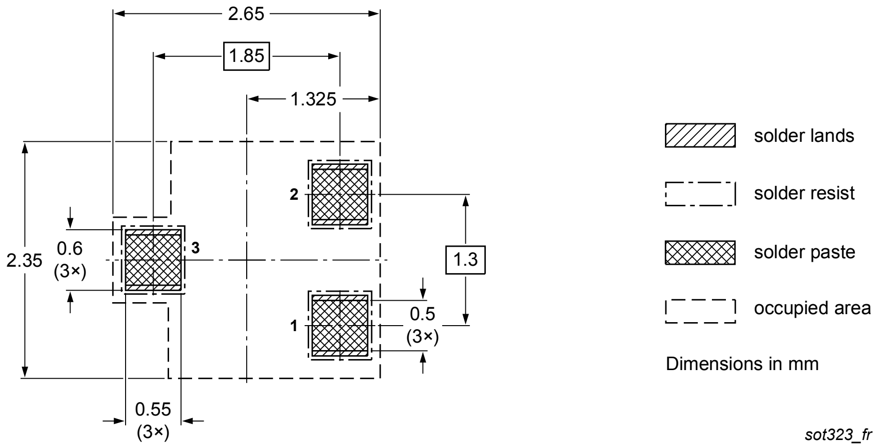


Figure 17. Reflow soldering footprint for SOT323 (SC-70)

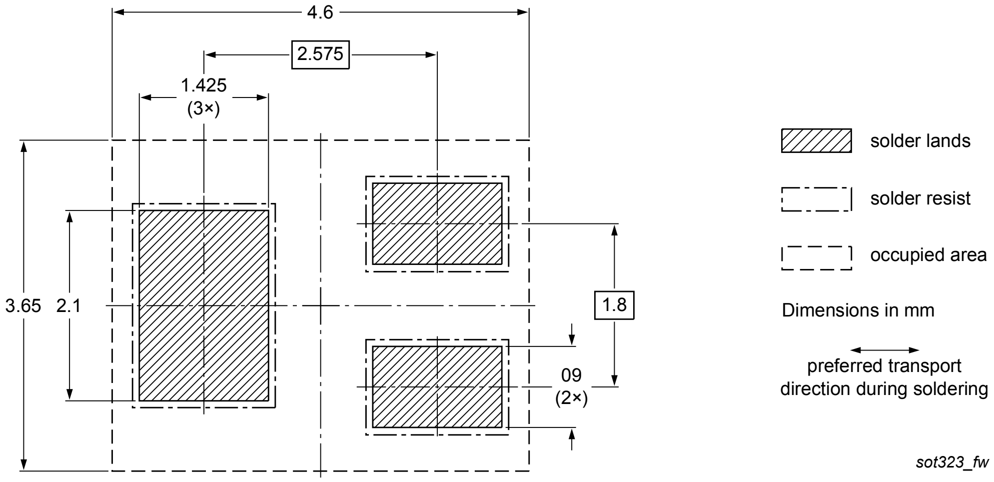


Figure 18. Wave soldering footprint for SOT323 (SC-70)

11 Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BC817W_SER v.7	20180611	Product data sheet	-	BC817_BC817W_BC337 v.6
Modifications:	• The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. • Legal texts have been adapted to the new company name where appropriate. • Removed basic types: BC327 and BC807W (separate data sheet). • Added Fig 1. Power derating curves in section "Limiting values" and the thermal graphs as Fig 2. and Fig 3. in section "Thermal characteristics". • Graphs in section "Characteristics" are sorted in new order. • Added sections 8 "Test information" and 9 "Soldering". • Removed Section "Packing information" • AEC-Q101 qualified			
BC817_BC817W_BC337 v.6	20091117	Product data sheet	-	BC817_BC817W_BC337 v.5
BC817_BC817W_BC337 v.5	20050221	Product data sheet	CPCN200302007F CPCN200405006F	BC817 v.4; BC817W_SER v.4; BC337 v.3
BC817 v.4	20040116	Product Specification	-	BC817 v.3
BC817W_SER v.4	20040225	Product Specification	-	BC817W_SER v.3
BC337 v.3	19990415	Product Specification	-	BC337_338_CNV v.2

12 Legal information

12.1 Data sheet status

Document status[1][2]	Product status[3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.
[2] The term 'short data sheet' is explained in section "Definitions".
[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.nexperia.com.

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Translations — A non-English (translated) version of a document is for reference only. The English version shall prevail in case of any discrepancy between the translated and English versions.

12.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

Contents

Date of release: 11 June 2018
Document identifier: BC817W_SER