BC817; BC817W; BC337

45 V, 500 mA NPN general-purpose transistors

Rev. 06 — 17 November 2009 Product data sheet

1. Product profile

1.1 General description

NPN general-purpose transistors.

Table 1. Product overview

Type number	Package		PNP complement
	NXP	JEITA	
BC817	SOT23	-	BC807
BC817W	SOT323	SC-70	BC807W
BC337[1]	SOT54 (TO-92)	SC-43A	BC327

[1] Also available in SOT54A and SOT54 variant packages (see Section 2).

1.2 Features

- High current
- Low voltage

1.3 Applications

- General-purpose switching and amplification

1.4 Quick reference data

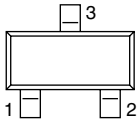
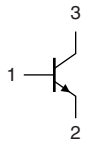
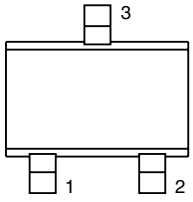
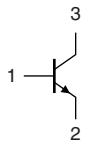
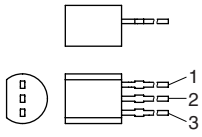
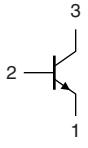
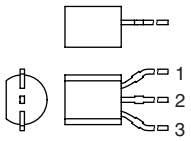
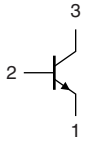
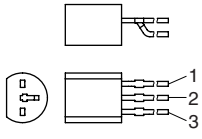
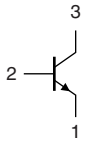
Table 2. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base; I_C = 10 mA		-	-	45	V
I_C	collector current (DC)			-	-	500	mA
I_{CM}	peak collector current			-	-	1	A
h_{FE}	DC current gain	I_C = 100 mA; V_{CE} = 1 V	[1]	-	-	-	
	BC817; BC817W; BC337			100	-	600	
	BC817-16; BC817-16W; BC337-16			100	-	250	
	BC817-25; BC817-25W; BC337-25			160	-	400	
	BC817-40; BC817-40W; BC337-40			250	-	600	

[1] Pulse test: $t_p \leq 300\ \mu s$; $\delta \leq 0.02$.

2. Pinning information

Table 3. Pinning

Pin	Description	Simplified outline	Symbol
SOT23			
1	base		
2	emitter		
3	collector		
			sym021
SOT323			
1	base		
2	emitter		
3	collector		
		sot323_so	sym021
SOT54			
1	emitter		
2	base		
3	collector		
		001aab347	sym026
SOT54A			
1	emitter		
2	base		
3	collector		
		001aab348	sym026
SOT54 variant			
1	emitter		
2	base		
3	collector		
		001aab447	sym026

3. Ordering information

Table 4. Ordering information

Type number[1]	Package		
	Name	Description	Version
BC817	-	plastic surface mounted package; 3 leads	SOT23
BC817W	SC-70	plastic surface mounted package; 3 leads	SOT323
BC337[2]	SC-43A	plastic single-ended leaded (through hole) package; 3 leads	SOT54

[1] Valid for all available selection groups.

[2] Also available in SOT54A and SOT54 variant packages (see Section 2 and Section 9).

4. Marking

Table 5. Marking codes

Type number	Marking code[1]
BC817	6D*
BC817-16	6A*
BC817-25	6B*
BC817-40	6C*
BC817W	6D*
BC817-16W	6A*
BC817-25W	6B*
BC817-40W	6C*
BC337	C337
BC337-16	C33716
BC337-25	C33725
BC337-40	C33740

[1] * = -: made in Hong Kong
* = p: made in Hong Kong
* = t: made in Malaysia
* = W: made in China

5. Limiting values

Table 6. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
V_{CBO}	collector-base voltage	open emitter		-	50	V
V_{CEO}	collector-emitter voltage	open base; I_C = 10 mA		-	45	V
V_{EBO}	emitter-base voltage	open collector		-	5	V
I_C	collector current (DC)			-	500	mA
I_{CM}	peak collector current			-	1	A
I_{BM}	peak base current			-	200	mA
P_{tot}	total power dissipation					
	BC817	$T_{amb} \leq 25$ °C	[1][2]	-	250	mW
	BC817W	$T_{amb} \leq 25$ °C	[1][2]	-	200	mW
	BC337	$T_{amb} \leq 25$ °C	[1][2]	-	625	mW
T_{stg}	storage temperature			−65	+150	°C
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			−65	+150	°C

[1] Transistor mounted on an FR4 printed-circuit board, single-sided copper, tin-plated and standard footprint.

[2] Valid for all available selection groups.

6. Thermal characteristics

Table 7. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient						
	BC817	$T_{amb} \leq 25$ °C	[1][2]	-	-	500	K/W
	BC817W	$T_{amb} \leq 25$ °C	[1][2]	-	-	625	K/W
	BC337	$T_{amb} \leq 25$ °C	[1][2]	-	-	200	K/W

[1] Transistor mounted on an FR4 printed-circuit board, single-sided copper, tin-plated and standard footprint.

[2] Valid for all available selection groups.

7. Characteristics

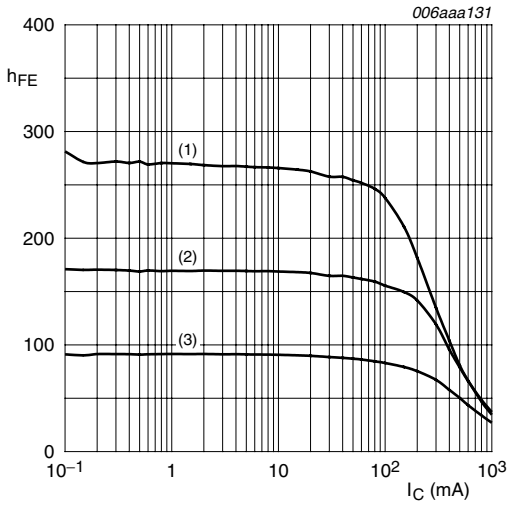
Table 8. Characteristics

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

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	I_E = 0 A; V_{CB} = 20 V		-	-	100	nA
		I_E = 0 A; V_{CB} = 20 V; T_j = 150 °C		-	-	5	μA
I_{EBO}	emitter-base cut-off current	I_C = 0 A; V_{EB} = 5 V		-	-	100	nA
h_{FE}	DC current gain	I_C = 100 mA; V_{CE} = 1 V	[1]				
	BC817; BC817W; BC337			100	-	600	
	BC817-16; BC817-16W; BC337-16			100	-	250	
	BC817-25; BC817-25W; BC337-25			160	-	400	
	BC817-40; BC817-40W; BC337-40			250	-	600	
h_{FE}	DC current gain	I_C = 500 mA; V_{CE} = 1 V	[1]	40	-	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = 500 mA; I_B = 50 mA	[1]	-	-	700	mV
V_{BE}	base-emitter voltage	I_C = 500 mA; V_{CE} = 1 V	[2]	-	-	1.2	V
C_c	collector capacitance	$I_E = i_e$ = 0 A; V_{CB} = 10 V; f = 1 MHz		-	3	-	pF
f_T	transition frequency	I_C = 10 mA; V_{CE} = 5 V; f = 100 MHz		100	-	-	MHz

[1] Pulse test: $t_p \leq 300$ μs; $\delta \leq 0.02$.

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



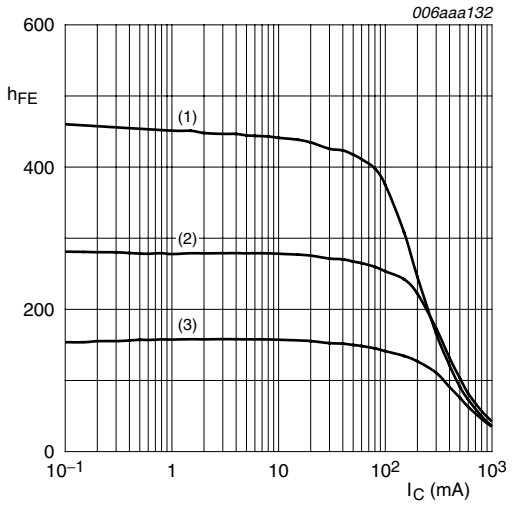
V_{CE} = 1 V

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −55 °C

Fig 1. Selection -16: DC current gain as a function of collector current; typical values



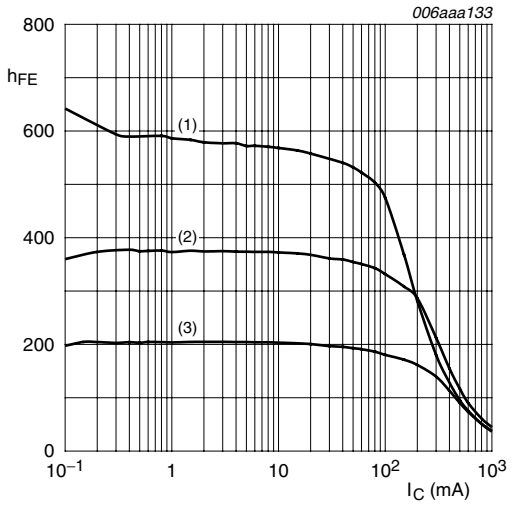
V_{CE} = 1 V

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −55 °C

Fig 2. Selection -25: DC current gain as a function of collector current; typical values



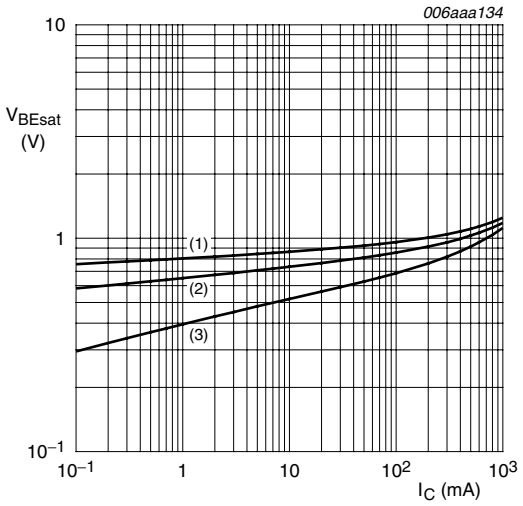
V_{CE} = 1 V

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −55 °C

Fig 3. Selection -40: DC current gain as a function of collector current; typical values



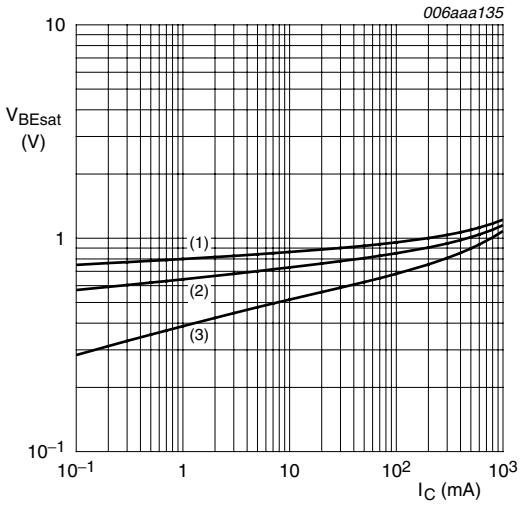
I_C/I_B = 10

(1) T_{amb} = −55 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 150 °C

Fig 4. Selection -16: Base-emitter saturation voltage as a function of collector current; typical values



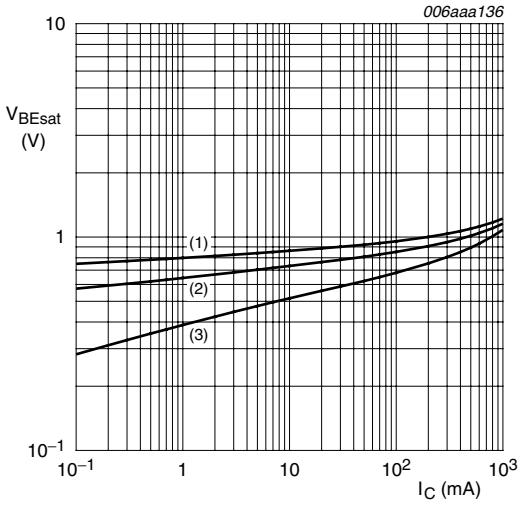
I_C/I_B = 10

(1) T_{amb} = −55 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 150 °C

Fig 5. Selection -25: Base-emitter saturation voltage as a function of collector current; typical values



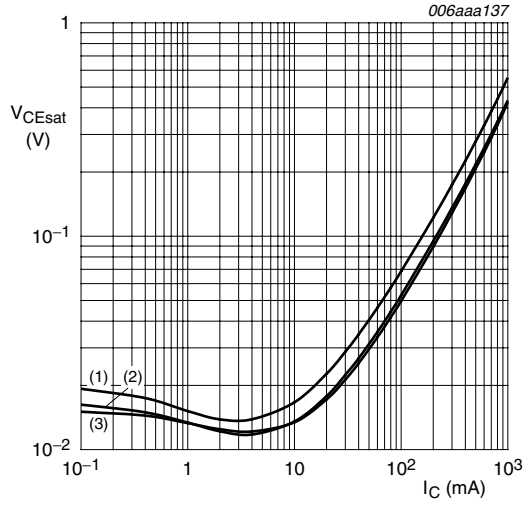
I_C/I_B = 10

(1) T_{amb} = −55 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 150 °C

Fig 6. Selection -40: Base-emitter saturation voltage as a function of collector current; typical values



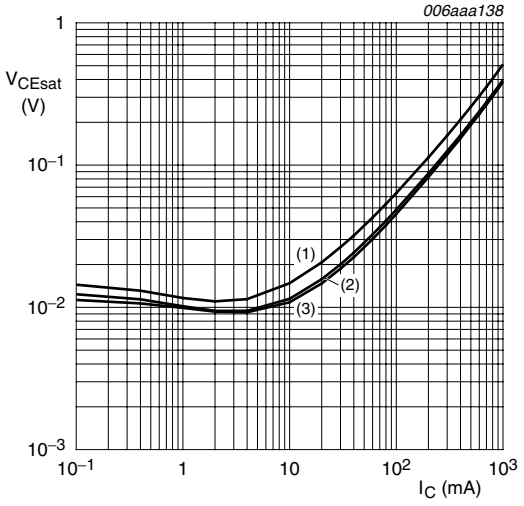
I_C/I_B = 10

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −55 °C

Fig 7. Selection -16: Collector-emitter saturation voltage as a function of collector current; typical values



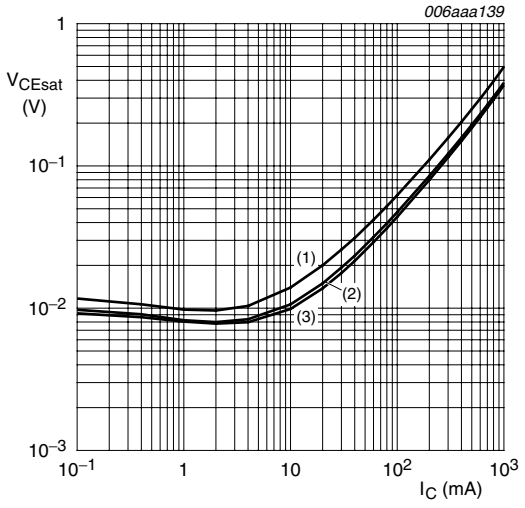
I_C/I_B = 10

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −55 °C

Fig 8. Selection -25: Collector-emitter saturation voltage as a function of collector current; typical values



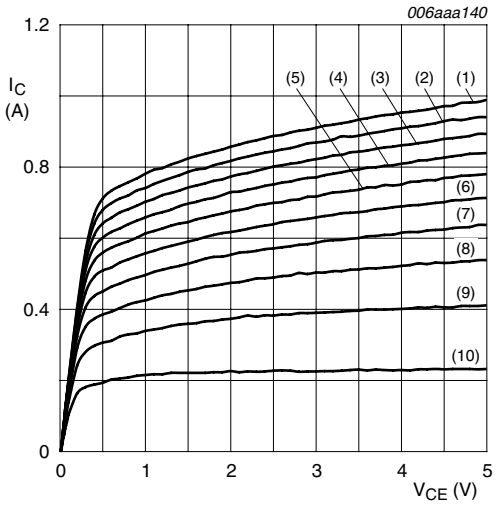
I_C/I_B = 10

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −55 °C

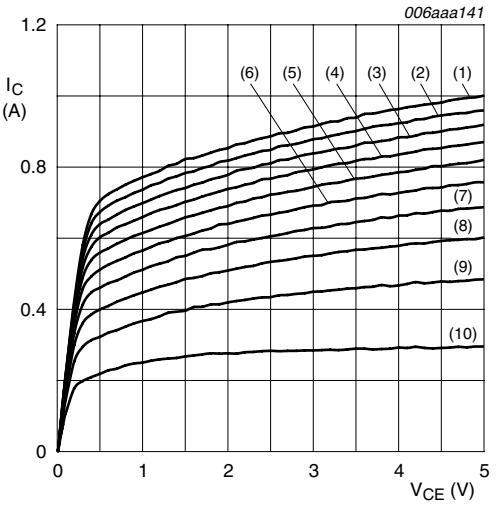
Fig 9. Selection -40: Collector-emitter saturation voltage as a function of collector current; typical values



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

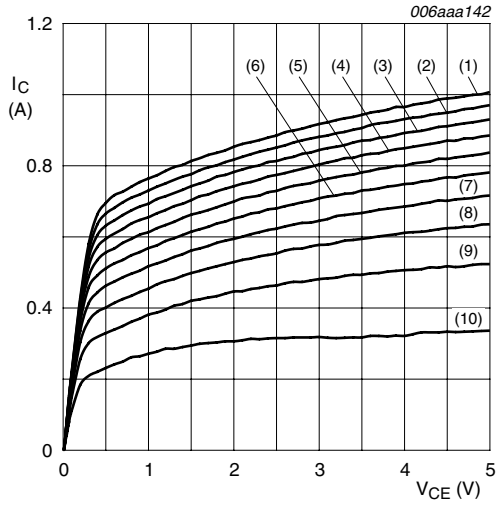
Fig 10. Selection -16: Collector current as a function of collector-emitter voltage; typical values



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

Fig 11. Selection -25: Collector current as a function of collector-emitter voltage; 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

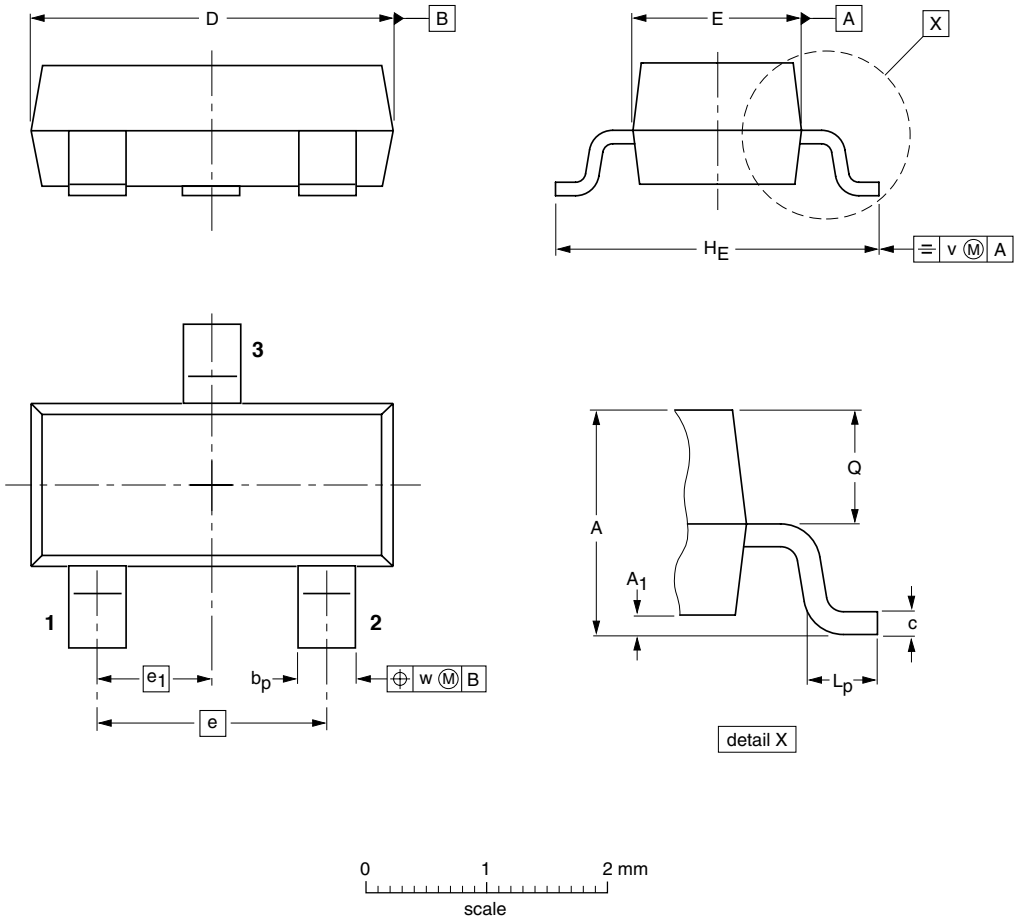
(9) I_B = 2.4 mA

(10) I_B = 1.2 mA

Fig 12. Selection -40: Collector current as a function of collector-emitter voltage; typical values

8. Package outline

Plastic surface-mounted package; 3 leads **SOT23**



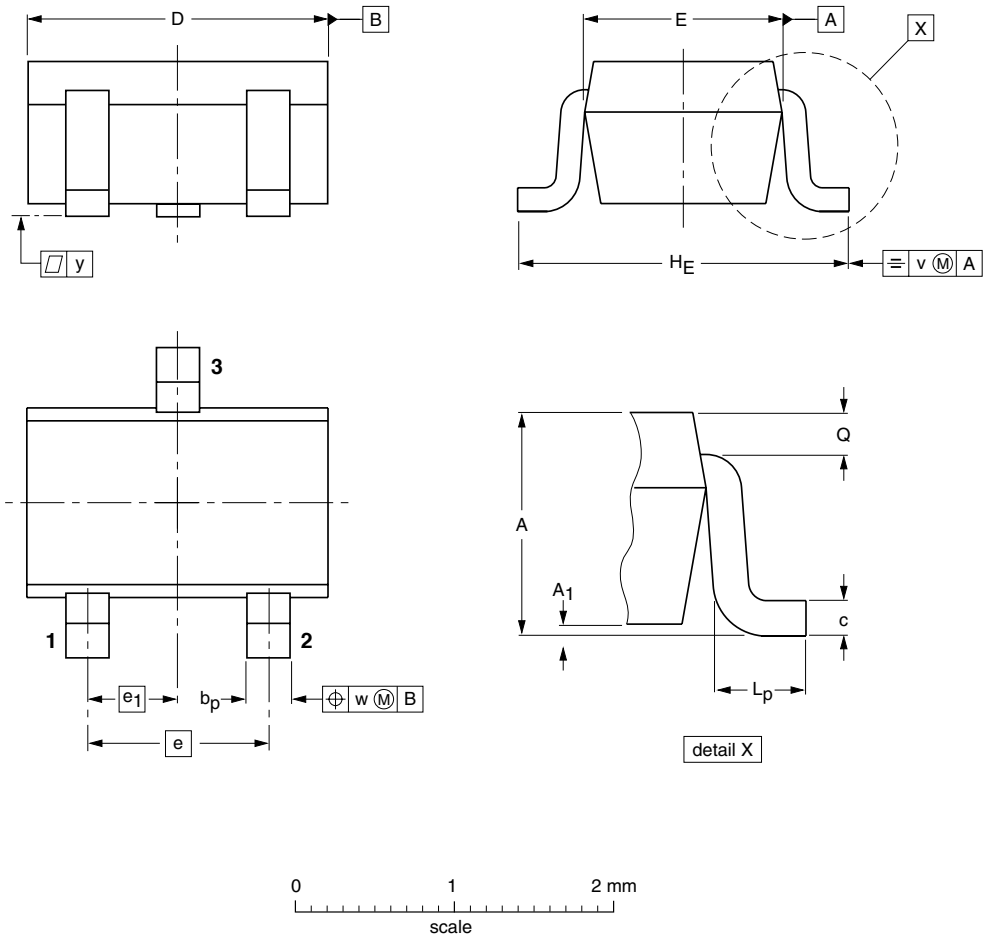
DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1 max.	b_p	c	D	E	e	e_1	H_E	L_p	Q	v	w
mm	1.1 0.9	0.1	0.48 0.38	0.15 0.09	3.0 2.8	1.4 1.2	1.9	0.95	2.5 2.1	0.45 0.15	0.55 0.45	0.2	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT23		TO-236AB				~~04-11-04~~ 06-03-16

Fig 13. Package outline SOT23 (TO-236AB)

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



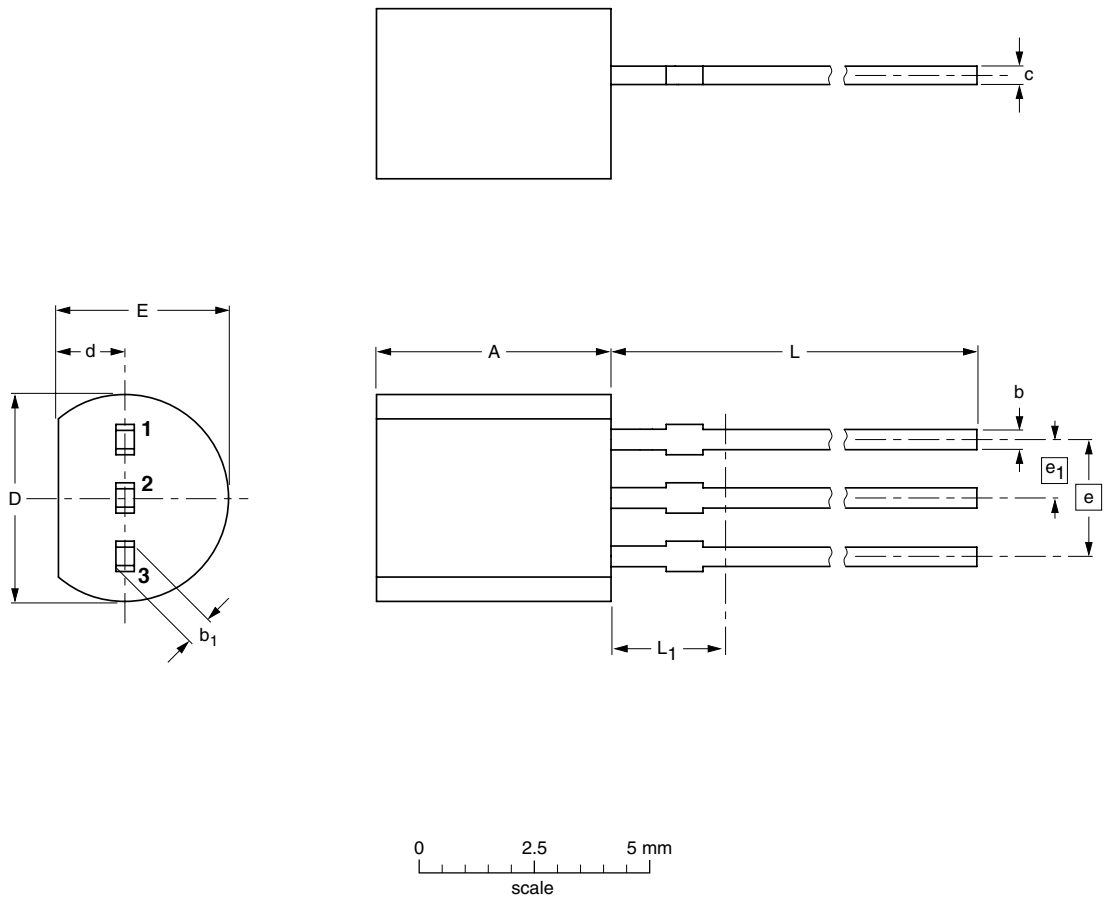
DIMENSIONS (mm are the original dimensions)

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

Fig 14. Package outline SOT323 (SC-70)

Plastic single-ended leaded (through hole) package; 3 leads **SOT54**



DIMENSIONS (mm are the original dimensions)

UNIT	A	b	b_1	c	D	d	E	e	e_1	L	L_1(1) max.
mm	5.2 5.0	0.48 0.40	0.66 0.55	0.45 0.38	4.8 4.4	1.7 1.4	4.2 3.6	2.54	1.27	14.5 12.7	2.5

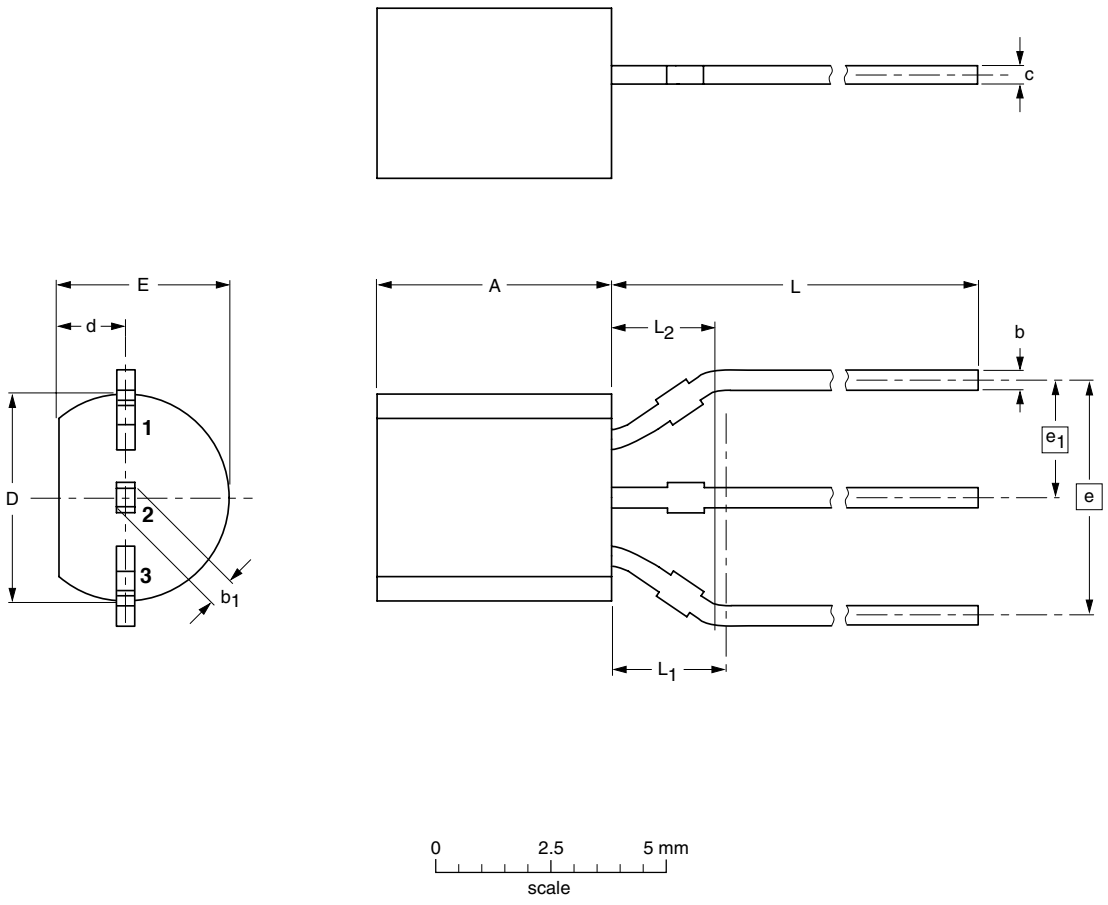
Note

1. Terminal dimensions within this zone are uncontrolled to allow for flow of plastic and terminal irregularities.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT54		TO-92	SC-43A			~~04-06-28~~ 04-11-16

Fig 15. Package outline SOT54 (SC-43A/TO-92)

Plastic single-ended leaded (through hole) package; 3 leads (wide pitch) **SOT54A**



DIMENSIONS (mm are the original dimensions)

UNIT	A	b	b_1	c	D	d	E	e	e_1	L	L_1 (1) max.	L_2
mm	5.2 5.0	0.48 0.40	0.66 0.55	0.45 0.38	4.8 4.4	1.7 1.4	4.2 3.6	5.08	2.54	14.5 12.7	3	3 2

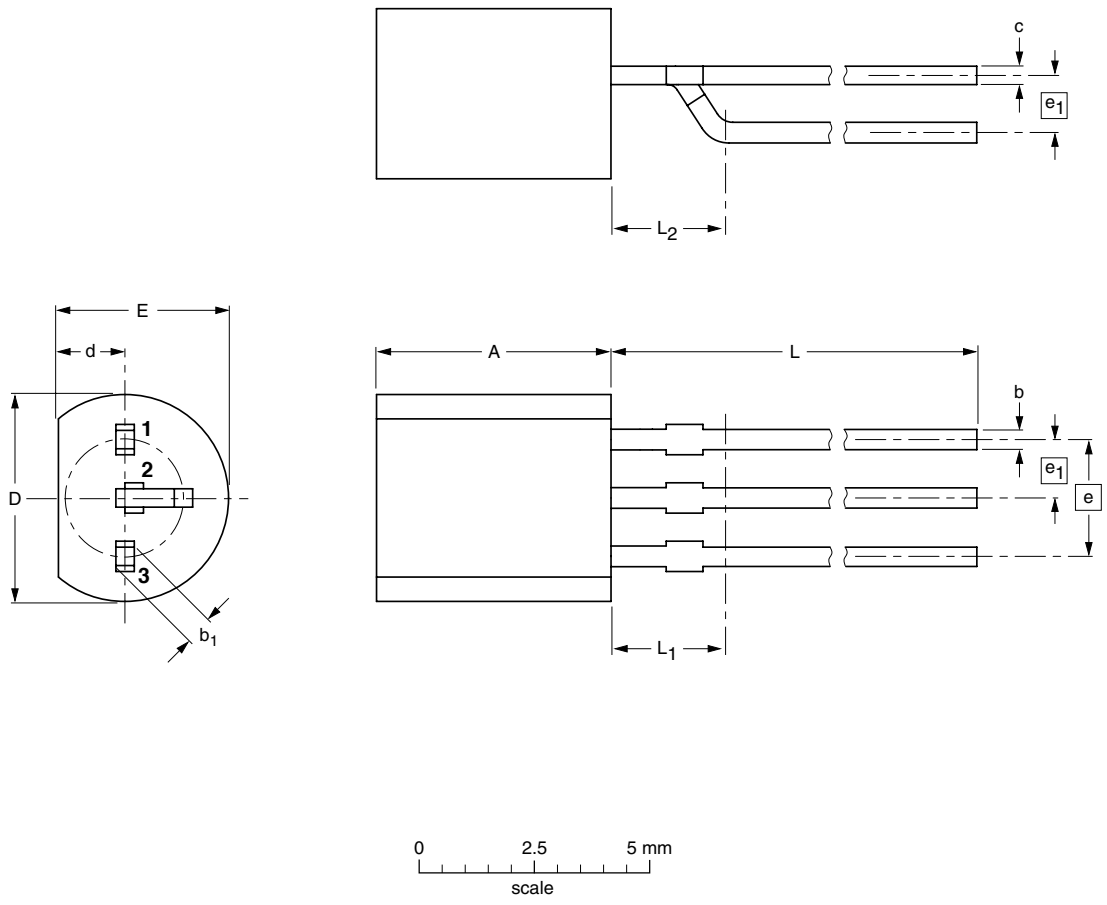
Note

1. Terminal dimensions within this zone are uncontrolled to allow for flow of plastic and terminal irregularities.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT54A						~~97-05-13~~ 04-06-28

Fig 16. Package outline SOT54A

Plastic single-ended leaded (through hole) package; 3 leads (on-circle) **SOT54 variant**



DIMENSIONS (mm are the original dimensions)

UNIT	A	b	b_1	c	D	d	E	e	e_1	L	L_1 (1) max	L_2 max
mm	5.2 5.0	0.48 0.40	0.66 0.55	0.45 0.38	4.8 4.4	1.7 1.4	4.2 3.6	2.54	1.27	14.5 12.7	2.5	2.5

Note

1. Terminal dimensions within this zone are uncontrolled to allow for flow of plastic and terminal irregularities.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT54 variant						~~04-06-28~~ 05-01-10

Fig 17. Package outline SOT54 variant

9. Packing information

Table 9. Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code.[1]

Type number	Package	Description	Packing quantity		
			3000	5000	10000
BC817	SOT23	4 mm pitch, 8 mm tape and reel	-215	-	-235
BC817W	SOT323	4 mm pitch, 8 mm tape and reel	-115	-	-135
BC337	SOT54	bulk, straight leads	-	-412	-
BC337	SOT54A	tape and reel, wide pitch	-	-	-116
BC337	SOT54A	tape ammopack, wide pitch	-	-	-126
BC337	SOT 54 variant	bulk, delta pinning (on-circle)	-	-112	-

[1] For further information and the availability of packing methods, see Section 12.

10. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BC817_BC817W_BC337_6	20091117	Product data sheet	-	BC817_BC817W_BC337_5
Modifications:	• This data sheet was changed to reflect the new company name NXP Semiconductors, including new legal definitions and disclaimers. No changes were made to the technical content. • Table 3 “Pinning”: updated • Figure 13 “Package outline SOT23 (TO-236AB)”: updated • Figure 14 “Package outline SOT323 (SC-70)”: updated			
BC817_BC817W_BC337_5	20050121	Product data sheet	CPCN200302007F1	BC817_4; BC817W_SER_4; BC337_3
BC817_4	20040105	Product specification	-	BC817_3
BC817W_SER_4	20040225	Product specification	-	BC817W_SER_3
BC337_3	19990415	Product specification	-	BC337_338_CNV_2

11. Legal information

11.1 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.nxp.com.

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12. Contact information

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13. Contents

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