

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

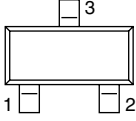
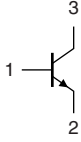
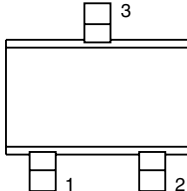
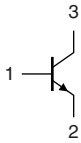
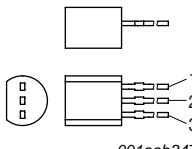
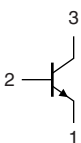
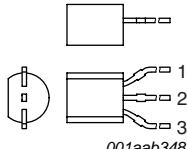
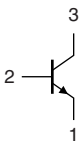
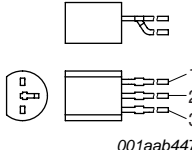
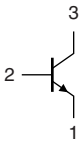
Table 2. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base; $I_C = 10 \text{ mA}$	-	-	45	V
I_C	collector current (DC)		-	-	500	mA
I_{CM}	peak collector current		-	-	1	A
h_{FE}	DC current gain	$I_C = 100 \text{ mA};$ $V_{CE} = 1 \text{ V}$	^[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: $t_p \leq 300 \mu\text{s}$; $\delta \leq 0.02$.

2. Pinning information

Table 3. Pinning

Pin	Description	Simplified outline	Symbol
SOT23			
1	base		 sym021
2	emitter		
3	collector		
SOT323			
1	base		 sym021
2	emitter		
3	collector		
SOT54			
1	emitter		 sym026
2	base		
3	collector		
SOT54A			
1	emitter		 sym026
2	base		
3	collector		
SOT54 variant			
1	emitter		 sym026
2	base		
3	collector		

3. Ordering information

Table 4. Ordering information

Type number ^[1]	Package		Version
	Name	Description	
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; $I_C = 10 \text{ mA}$	-	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	$T_{amb} \leq 25 \text{ °C}$	[1][2]	-	250	mW
	BC817W	$T_{amb} \leq 25 \text{ °C}$	[1][2]	-	200	mW
	BC337	$T_{amb} \leq 25 \text{ °C}$	[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	$T_{amb} \leq 25 \text{ °C}$	[1][2]	-	-	500	K/W
	BC817W	$T_{amb} \leq 25 \text{ °C}$	[1][2]	-	-	625	K/W
	BC337	$T_{amb} \leq 25 \text{ °C}$	[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

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

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

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

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



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

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



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

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



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

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



- $I_C/I_B = 10$
- (1) $T_{amb} = -55\text{ }^\circ\text{C}$
 - (2) $T_{amb} = 25\text{ }^\circ\text{C}$
 - (3) $T_{amb} = 150\text{ }^\circ\text{C}$

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



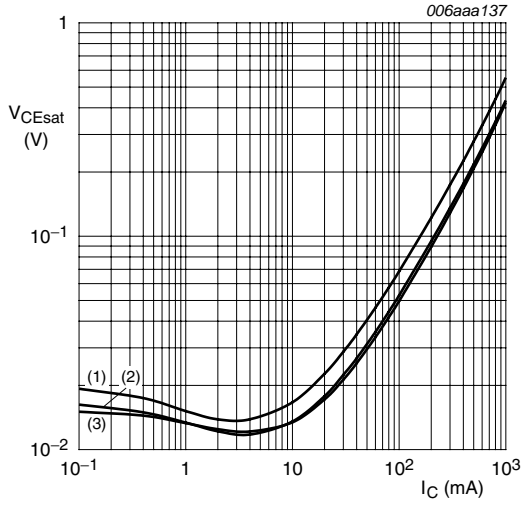
- $I_C/I_B = 10$
- (1) $T_{amb} = -55\text{ }^\circ\text{C}$
 - (2) $T_{amb} = 25\text{ }^\circ\text{C}$
 - (3) $T_{amb} = 150\text{ }^\circ\text{C}$

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



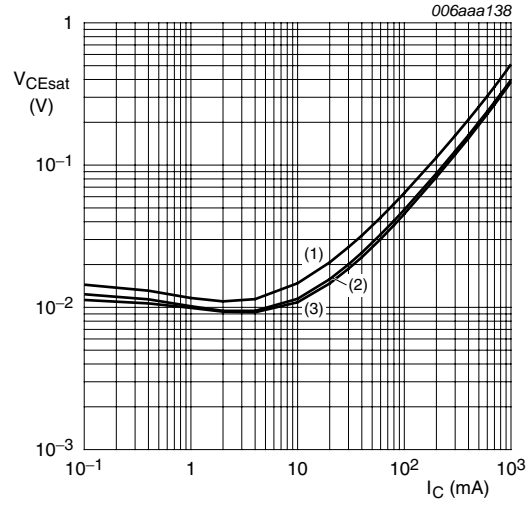
- $I_C/I_B = 10$
- (1) $T_{amb} = -55\text{ }^\circ\text{C}$
 - (2) $T_{amb} = 25\text{ }^\circ\text{C}$
 - (3) $T_{amb} = 150\text{ }^\circ\text{C}$

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



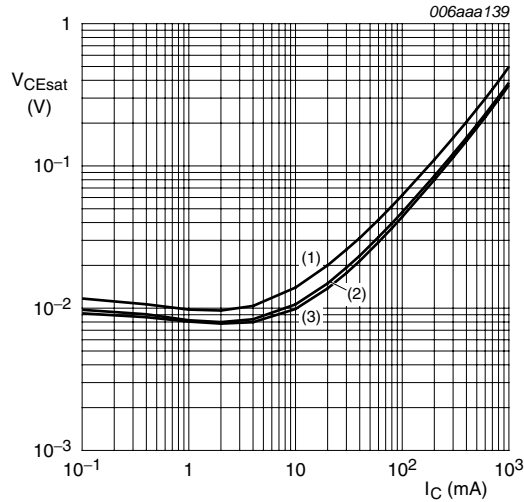
- $I_C/I_B = 10$
- (1) $T_{amb} = 150\text{ °C}$
 - (2) $T_{amb} = 25\text{ °C}$
 - (3) $T_{amb} = -55\text{ °C}$

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



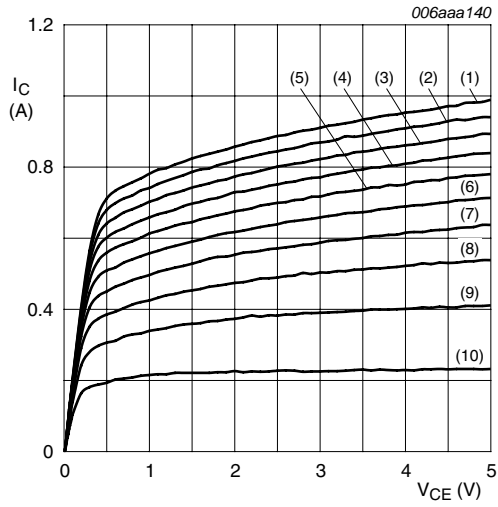
- $I_C/I_B = 10$
- (1) $T_{amb} = 150\text{ °C}$
 - (2) $T_{amb} = 25\text{ °C}$
 - (3) $T_{amb} = -55\text{ °C}$

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



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

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



- $T_{amb} = 25\text{ }^\circ\text{C}$
- (1) $I_B = 16.0\text{ mA}$
 - (2) $I_B = 14.4\text{ mA}$
 - (3) $I_B = 12.8\text{ mA}$
 - (4) $I_B = 11.2\text{ mA}$
 - (5) $I_B = 9.6\text{ mA}$
 - (6) $I_B = 8.0\text{ mA}$
 - (7) $I_B = 6.4\text{ mA}$
 - (8) $I_B = 4.8\text{ mA}$
 - (9) $I_B = 3.2\text{ mA}$
 - (10) $I_B = 1.6\text{ mA}$

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



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

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



$T_{amb} = 25\text{ }^{\circ}\text{C}$

- (1) $I_B = 12.0\text{ mA}$
- (2) $I_B = 10.8\text{ mA}$
- (3) $I_B = 9.6\text{ mA}$
- (4) $I_B = 8.4\text{ mA}$
- (5) $I_B = 7.2\text{ mA}$
- (6) $I_B = 6.0\text{ mA}$
- (7) $I_B = 4.8\text{ mA}$
- (8) $I_B = 3.6\text{ mA}$
- (9) $I_B = 2.4\text{ mA}$
- (10) $I_B = 1.2\text{ mA}$

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



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

Plastic surface-mounted package; 3 leads

SOT323



Fig 14. Package outline SOT323 (SC-70)

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

SOT54



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

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

SOT54A



Fig 16. Package outline SOT54A

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

SOT54 variant



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:		<ul style="list-style-type: none"> 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".

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