BCP52; BCX52

60 V, 1 A PNP medium power transistors

Rev. 08 — 25 February 2008 Product data sheet

1. Product profile

1.1 General description

PNP medium power transistor series.

Table 1. Product overview

Type number[1]	Package			NPN complement
	NXP	JEITA	JEDEC	
BCP52	SOT223	SC-73	-	BCP55
BCX52	SOT89	SC-62	TO-243	BCX55

[1] Valid for all available selection groups.

1.2 Features

- High current
- Two current gain selections
- High power dissipation capability

1.3 Applications

- Linear voltage regulators
- High-side switches
- MOSFET drivers
- Amplifiers

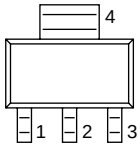
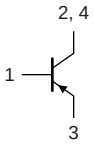
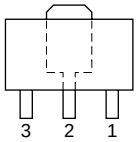
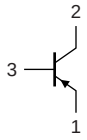
1.4 Quick reference data

Table 2. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base	-	-	–60	V
I_C	collector current		-	-	–1	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms	-	-	–1.5	A
h_{FE}	DC current gain	V_{CE} = –2 V; I_C = –150 mA	63	-	250	
	h_{FE} selection -10	V_{CE} = –2 V; I_C = –150 mA	63	-	160	
	h_{FE} selection -16	V_{CE} = –2 V; I_C = –150 mA	100	-	250	

2. Pinning information

Table 3. Pinning

Pin	Description	Simplified outline	Symbol
SOT223			
1	base		 sym028
2	collector		
3	emitter		
4	collector		
SOT89			
1	emitter		 006aaa231
2	collector		
3	base		

3. Ordering information

Table 4. Ordering information

Type number[1]	Package		
	Name	Description	Version
BCP52	SC-73	plastic surface-mounted package with increased heatsink; 4 leads	SOT223
BCX52	SC-62	plastic surface-mounted package; collector pad for good heat transfer; 3 leads	SOT89

[1] Valid for all available selection groups.

4. Marking

Table 5. Marking codes

Type number	Marking code
BCP52	BCP52
BCP52-10	BCP52/10
BCP52-16	BCP52/16
BCX52	AE
BCX52-10	AG
BCX52-16	AM

5. Limiting values

Table 6. Limiting values

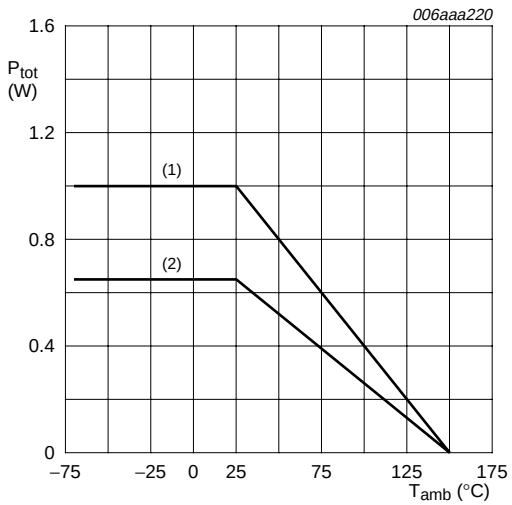
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
V_{CBO}	collector-base voltage	open emitter		-	–60	V
V_{CEO}	collector-emitter voltage	open base		-	–60	V
V_{EBO}	emitter-base voltage	open collector		-	–5	V
I_C	collector current			-	–1	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms		-	–1.5	A
I_{BM}	peak base current	single pulse; $t_p \leq 1$ ms		-	–0.2	A
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C				
	BCP52		[1]	-	0.65	W
			[2]	-	1	W
	BCX52		[1]	-	0.5	W
			[2]	-	0.9	W
			[3]	-	1.3	W
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] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm^2.

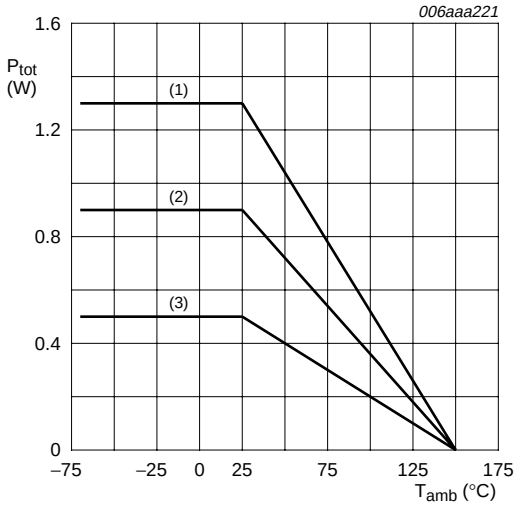
[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm^2.



(1) FR4 PCB, mounting pad for collector 1 cm^2

(2) FR4 PCB, standard footprint

Fig 1. Power derating curves SOT223



(1) FR4 PCB, mounting pad for collector 6 cm^2

(2) FR4 PCB, mounting pad for collector 1 cm^2

(3) FR4 PCB, standard footprint

Fig 2. Power derating curves SOT89

6. Thermal characteristics

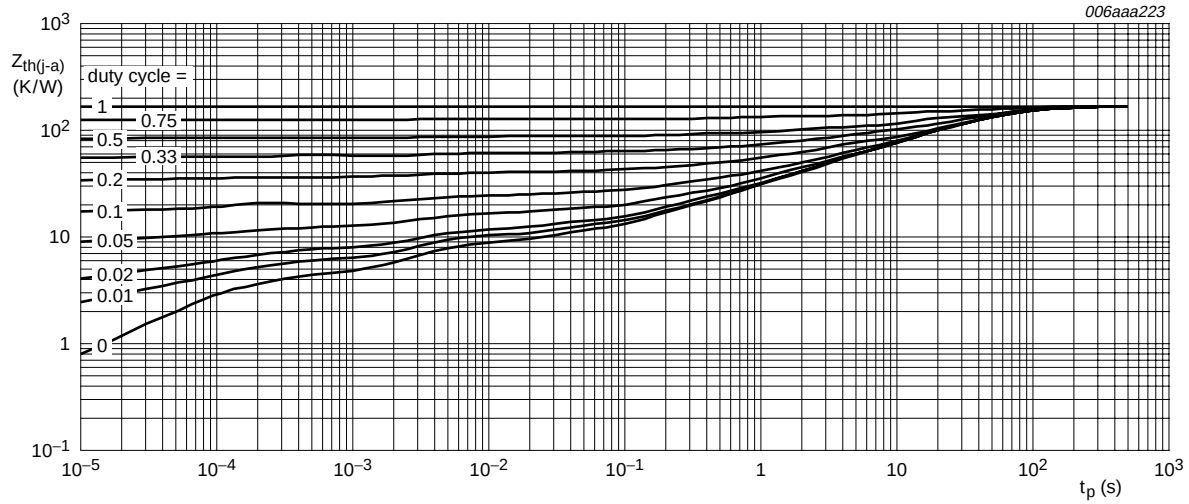
Table 7. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air					
	BCP52		[1]	-	-	190	K/W
			[2]	-	-	125	K/W
	BCX52		[1]	-	-	230	K/W
			[2]	-	-	135	K/W
			[3]	-	-	95	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point						
	BCP52			-	-	17	K/W
	BCX52			-	-	20	K/W

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

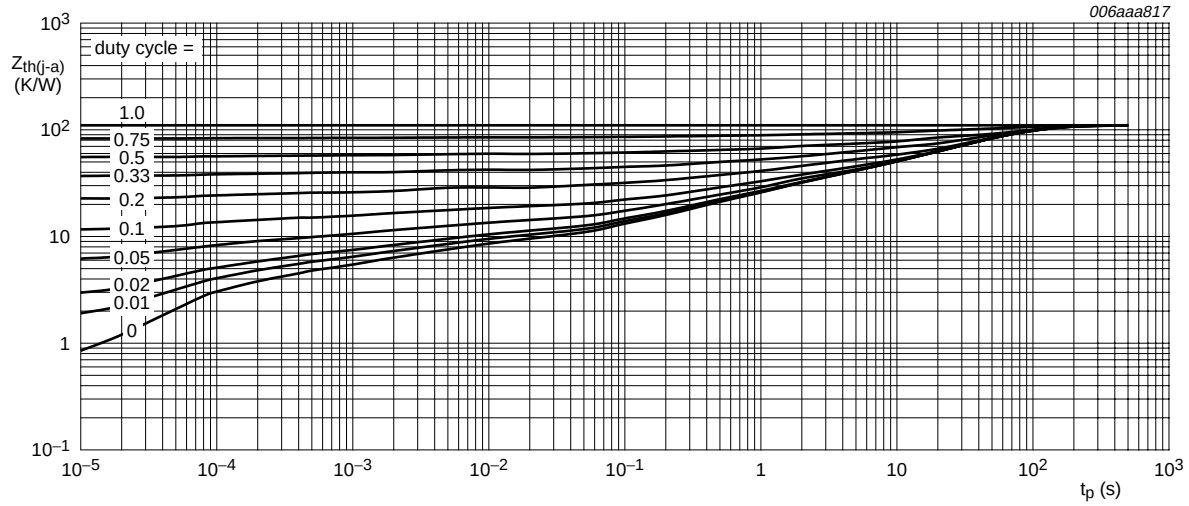
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm^2.

[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm^2.



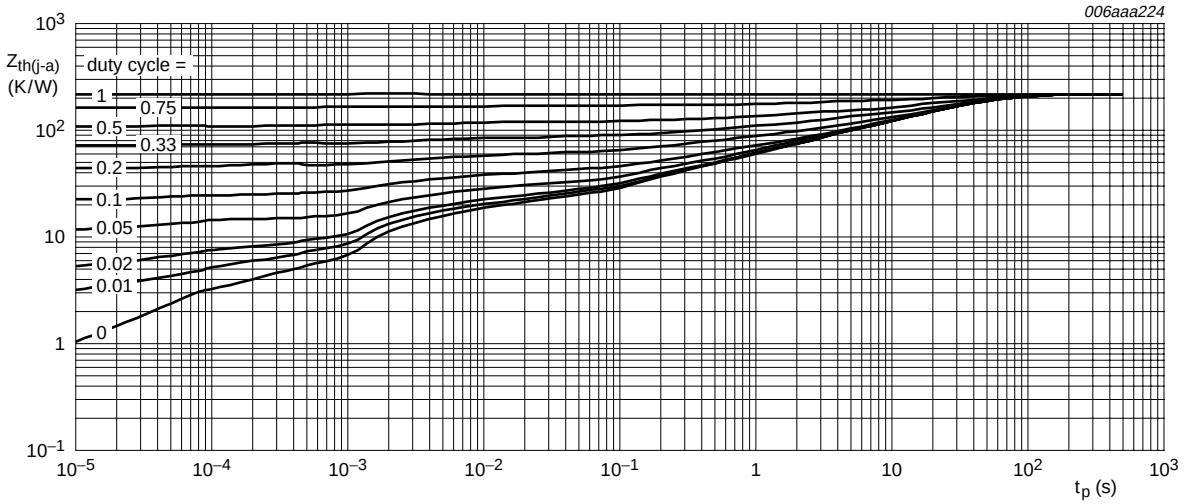
FR4 PCB, standard footprint

Fig 3. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT223; typical values



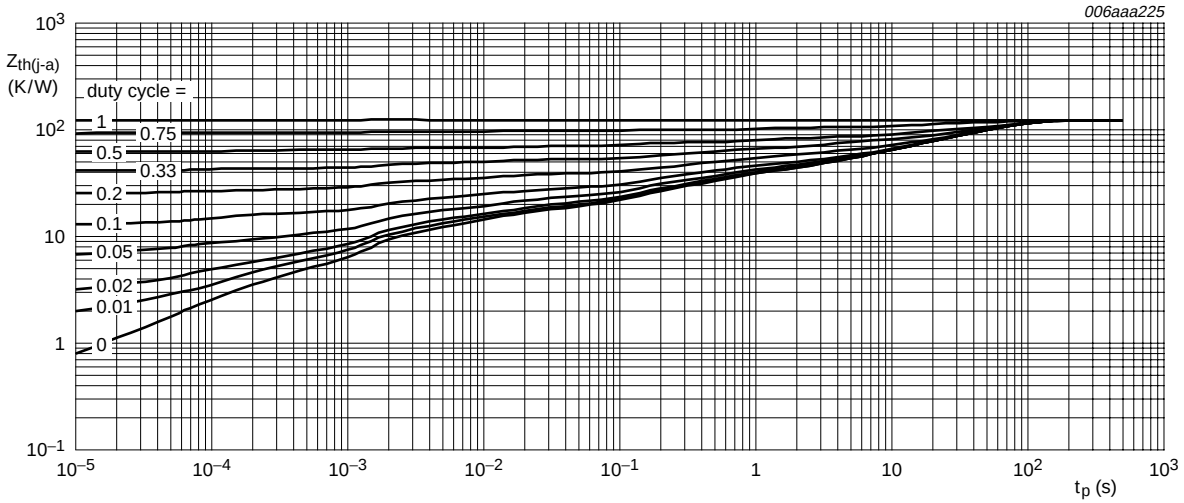
FR4 PCB, mounting pad for collector 1 cm^2

Fig 4. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT223; typical values



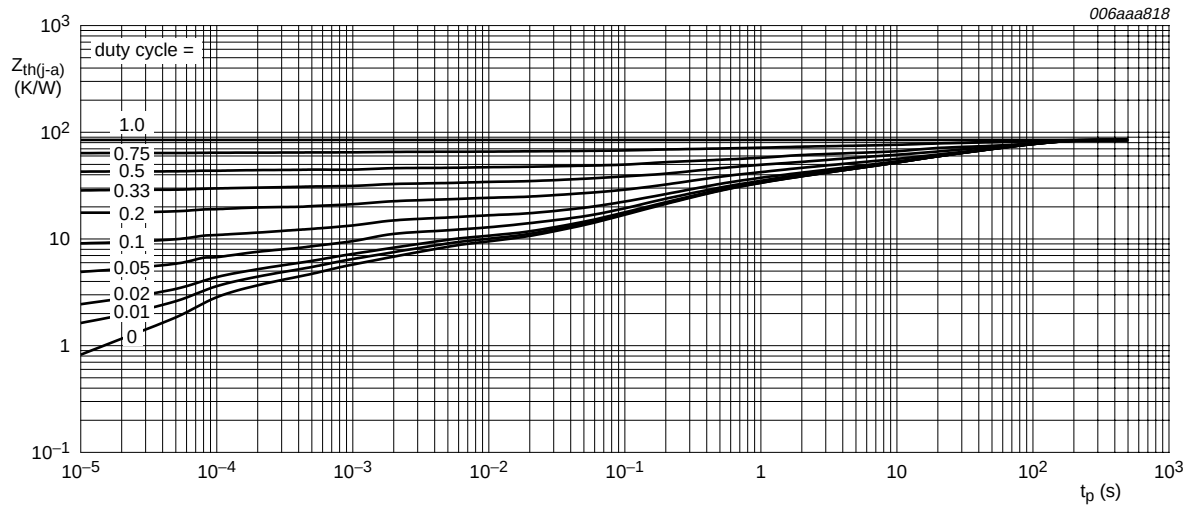
FR4 PCB, standard footprint

Fig 5. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT89; typical values



FR4 PCB, mounting pad for collector 1 cm^2

Fig 6. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT89; typical values



FR4 PCB, mounting pad for collector 6 cm^2

Fig 7. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT89; typical values

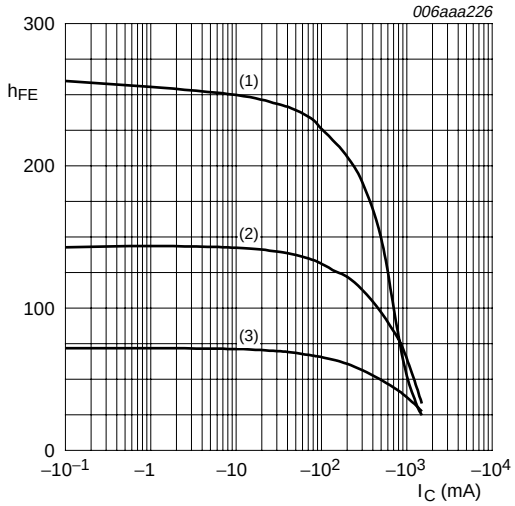
7. Characteristics

Table 8. Characteristics

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

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	V_{CB} = –30 V; I_E = 0 A;		-	-	–100	nA
		V_{CB} = –30 V; I_E = 0 A; T_j = 150 °C		-	-	–10	µA
I_{EBO}	emitter-base cut-off current	V_{EB} = –5 V; I_C = 0 A		-	-	–100	nA
h_{FE}	DC current gain	V_{CE} = –2 V					
		I_C = –5 mA		63	-	-	
		I_C = –150 mA		63	-	250	
		I_C = –500 mA	[1]	40	-	-	
	DC current gain	V_{CE} = –2 V					
	h_{FE} selection -10	I_C = –150 mA		63	-	160	
	h_{FE} selection -16	I_C = –150 mA		100	-	250	
V_{CEsat}	collector-emitter saturation voltage	I_C = –500 mA; I_B = –50 mA	[1]	-	-	–0.5	V
V_{BE}	base-emitter voltage	V_{CE} = –2 V; I_C = –500 mA	[1]	-	-	–1	V
C_c	collector capacitance	V_{CB} = –10 V; I_E = i_e = 0 A; f = 1 MHz		-	15	-	pF
f_T	transition frequency	V_{CE} = –5 V; I_C = –50 mA; f = 100 MHz		-	145	-	MHz

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



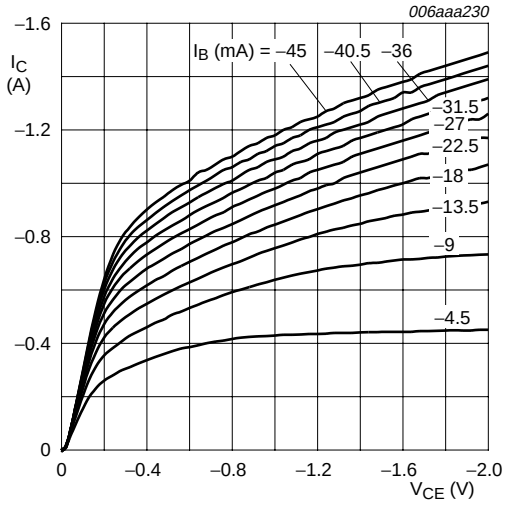
V_{CE} = −2 V

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

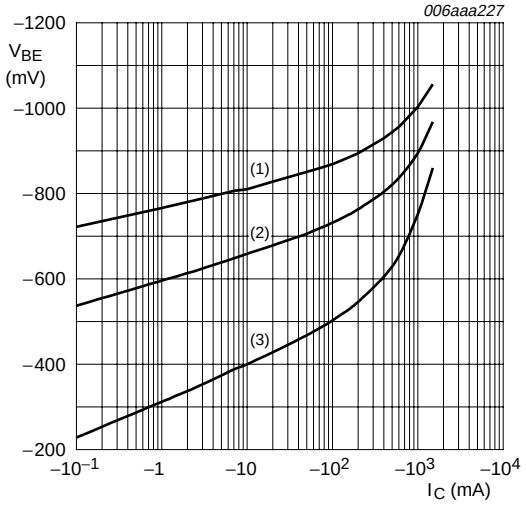
(3) T_{amb} = −55 °C

Fig 8. DC current gain as a function of collector current; typical values



T_{amb} = 25 °C

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



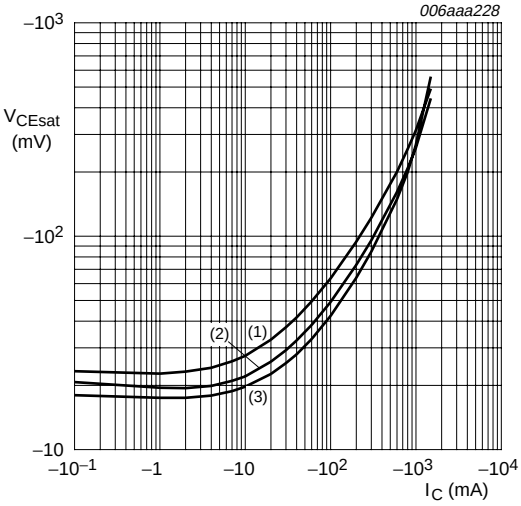
V_{CE} = −2 V

(1) T_{amb} = −55 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 150 °C

Fig 10. Base-emitter 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 11. Collector-emitter saturation voltage as a function of collector current; typical values

8. Package outline

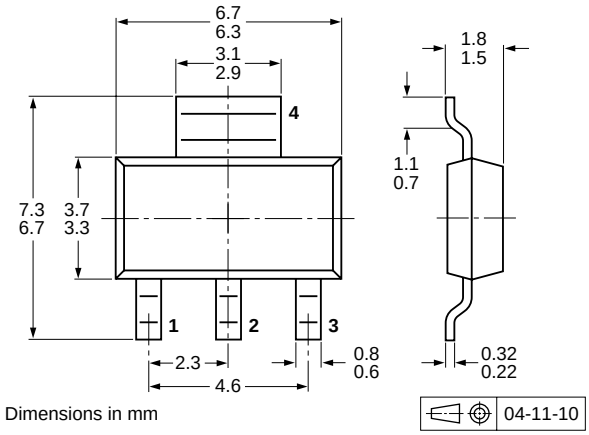


Fig 12. Package outline SOT223 (SC-73)

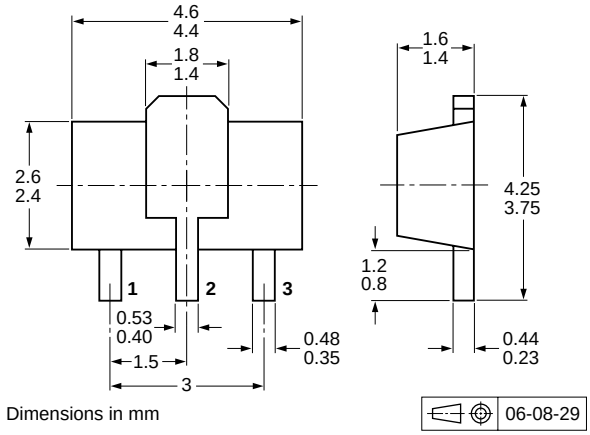


Fig 13. Package outline SOT89 (SC-62/TO-243)

9. Packing information

Table 9. Packing methods

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

Type number[2]	Package	Description	Packing quantity	
			1000	4000
BCP52	SOT223	8 mm pitch, 12 mm tape and reel	-115	-135
BCX52	SOT89	8 mm pitch, 12 mm tape and reel; T1 [3]	-115	-135
		8 mm pitch, 12 mm tape and reel; T3 [4]	-120	-

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

[2] Valid for all available selection groups.

[3] T1: normal taping

[4] T3: 90° rotated taping

10. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BCP52_BCX52_8	20080225	Product data sheet	-	BC638_BCP52_BCX52_7
Modifications:	• Type numbers BC638 and BC638-16 have been removed • Figure 9: amended			
BC638_BCP52_BCX52_7	20070626	Product data sheet	-	BC638_BCP52_BCX52_6
BC638_BCP52_BCX52_6	20060329	Product data sheet	-	BC636_638_640_5 BCP51_52_53_5 BCX51_52_53_4
BC636_638_640_5	20041011	Product specification	-	BC636_638_640_4
BCP51_52_53_5	20030206	Product specification	-	BCP51_52_53_4
BCX51_52_53_4	20011010	Product specification	-	BCX51_52_53_3

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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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13. Contents

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