BCP53; BCX53; BC53PA

80 V, 1 A PNP medium power transistors Rev. 9 — 19 October 2011

Product data sheet

1. **Product profile**

1.1 General description

PNP medium power transistor series in Surface-Mounted Device (SMD) plastic packages.

Product overview Table 1.

Type number 11	Package	Package		
	NXP	JEITA	JEDEC	
BCP53	SOT223	SC-73	-	BCP56
BCX53	SOT89	SC-62	TO-243	BCX56
BC53PA	SOT1061	-	-	BC56PA

^[1] Valid for all available selection groups.

1.2 Features and benefits

- High current
- Three current gain selections
- High power dissipation capability
- Exposed heatsink for excellent thermal and electrical conductivity (SOT89, SOT1061)
- Leadless very small SMD plastic package with medium power capability (SOT1061)
- AEC-Q101 qualified

1.3 Applications

- Linear voltage regulators
- High-side switches
- Battery-driven devices
- Power management
- MOSFET drivers
- Amplifiers

1.4 Quick reference data

Table 2. Quick reference data

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
V_{CEO}	collector-emitter voltage	open base	-	-	-80	V
I _C	collector current		-	-	-1	Α
I _{CM}	peak collector current	single pulse; t _p ≤ 1 ms	-	-	-2	Α



Table 2. Quick reference data ...continued

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
h _{FE}	DC current gain	$V_{CE} = -2 \text{ V};$ $I_{C} = -150 \text{ mA}$	63	-	250	
	h _{FE} selection -10	$V_{CE} = -2 \text{ V};$ $I_C = -150 \text{ mA}$	63	-	160	
	h _{FE} selection -16	$V_{CE} = -2 \text{ V};$ $I_{C} = -150 \text{ mA}$	100	-	250	

2. Pinning information

Table 3. Pinning

Table 3.	Pinning		
Pin	Description	Simplified outline	Graphic symbol
SOT223			
1	base		2.4
2	collector	4	2, 4
3	emitter		1—
4	collector	1 2 3	3 sym028
SOT89			GymoLo
1	emitter		2
2	collector		Ĵ
3	base		3 ————————————————————————————————————
SOT1061			
1	base		_
2	emitter	3	3
3	collector	Transparent top view	1

3. Ordering information

Table 4. Ordering information

Type number[1]	Package						
	Name	Description	Version				
BCP53	SC-73	plastic surface-mounted package with increased heatsink; 4 leads	SOT223				
BCX53	SC-62	plastic surface-mounted package; exposed die pad for good heat transfer; 3 leads	SOT89				
BC53PA	HUSON3	plastic thermal enhanced ultra thin small outline package; no leads; 3 terminals; body 2 \times 2 \times 0.65 mm	SOT1061				

^[1] Valid for all available selection groups.

4. Marking

Table 5. Marking codes

Type number	Marking code
• •	
BCP53	BCP53
BCP53-10	BCP53/10
BCP53-16	BCP53/16
BCX53	AH
BCX53-10	AK
BCX53-16	AL
BC53PA	BV
BC53-10PA	BW
BC53-16PA	BX

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	-	-100	V
V_{CEO}	collector-emitter voltage	open base	-	-80	V
V_{EBO}	emitter-base voltage	open collector	-	-5	V
Ic	collector current		-	-1	Α
I _{CM}	peak collector current	single pulse; $t_p \le 1 \text{ ms}$	-	-2	Α
I _B	base current		-	-0.3	Α
I _{BM}	peak base current	single pulse; $t_p \le 1 \text{ ms}$	-	-0.3	Α
P _{tot}	total power dissipation	$T_{amb} \le 25 ^{\circ}C$			
	BCP53		<u>[1]</u> _	0.65	W
			[2] _	1.00	W
			[3]	1.35	W
	BCX53		<u>[1]</u> _	0.50	W
			[2]	0.95	W
			[3]	1.35	W
	BC53PA		<u>[1]</u> _	0.42	W
			[2]	0.83	W
			[3]	1.10	W
			<u>[4]</u> _	0.81	W
			[5]	1.65	W
Tj	junction temperature		-	150	°C
T _{amb}	ambient temperature		-55	+150	°C
T _{stg}	storage temperature		-65	+150	°C

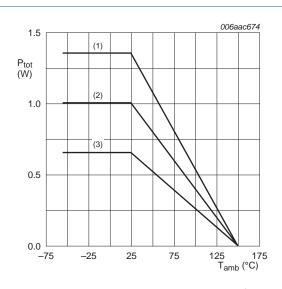
^[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

^[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm².

^[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm².

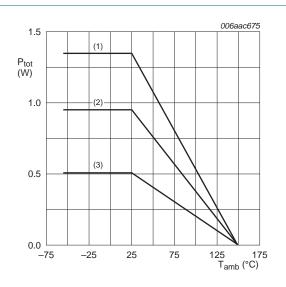
^[4] Device mounted on an FR4 PCB, 4-layer copper, tin-plated and standard footprint.

^[5] Device mounted on an FR4 PCB, 4-layer copper, tin-plated, mounting pad for collector 1 cm².



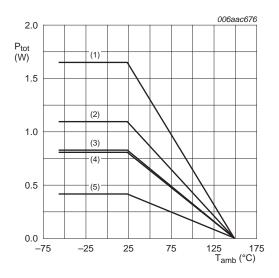
- (1) FR4 PCB, mounting pad for collector 6 cm²
- (2) FR4 PCB, mounting pad for collector 1 cm²
- (3) FR4 PCB, standard footprint

Fig 1. Power derating curves SOT223



- (1) FR4 PCB, mounting pad for collector 6 cm²
- (2) FR4 PCB, mounting pad for collector 1 cm²
- (3) FR4 PCB, standard footprint

Fig 2. Power derating curves SOT89



- (1) FR4 PCB, 4-layer copper, mounting pad for collector 1 cm²
- (2) FR4 PCB, single-sided copper, mounting pad for collector 6 cm²
- (3) FR4 PCB, single-sided copper, mounting pad for collector 1 cm²
- (4) FR4 PCB, 4-layer copper, standard footprint
- (5) FR4 PCB, single-sided copper, standard footprint

Fig 3. Power derating curves SOT1061

6. Thermal characteristics

Table 7. Thermal characteristics

Table 7.	i nermai characteristics					
Symbol	Parameter	Conditions	Min	Тур	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air				
	BCP53		<u>[1]</u> _	-	192	K/W
			[2] _	-	125	K/W
			[3] _	-	93	K/W
	BCX53	BCX53		-	250	K/W
			[2] _	-	132	K/W
			[3] _	-	93	K/W
	BC53PA		<u>[1]</u> _	-	298	K/W
			[2] _	-	151	K/W
			[3] _	-	114	K/W
			<u>[4]</u> _	-	154	K/W
			<u>[5]</u> _	-	76	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point					
	BCP53		-	-	16	K/W
	BCX53		-	-	16	K/W
	BC53PA		-	-	20	K/W

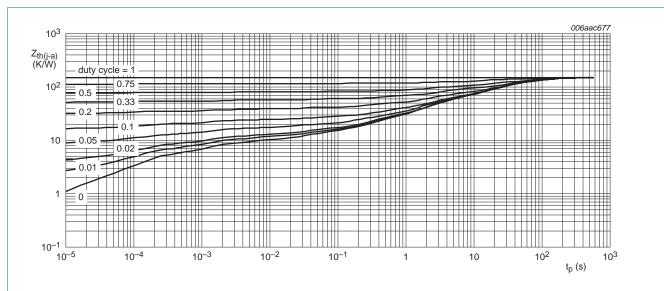
^[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

^[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm².

^[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm².

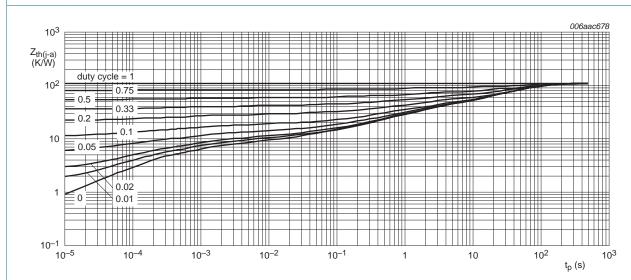
^[4] Device mounted on an FR4 PCB, 4-layer copper, tin-plated and standard footprint.

^[5] Device mounted on an FR4 PCB, 4-layer copper, tin-plated, mounting pad for collector 1 cm².



FR4 PCB, standard footprint

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



FR4 PCB, mounting pad for collector 1 cm²

Fig 5. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT223; typical values

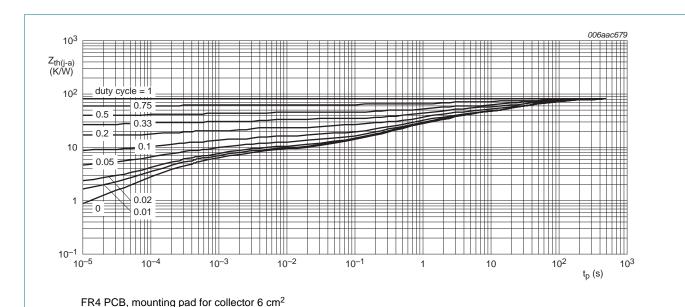
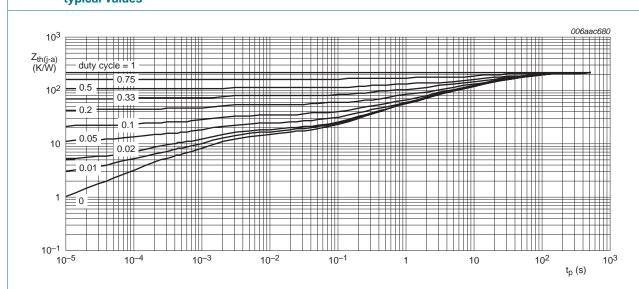
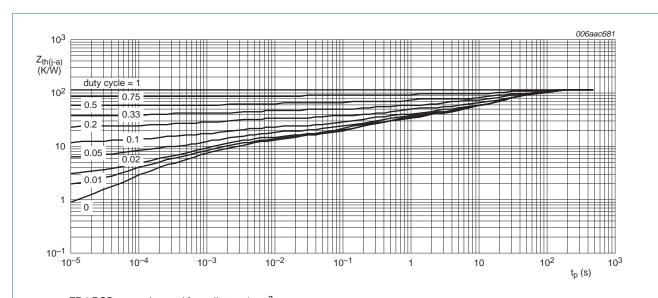


Fig 6. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT223; typical values



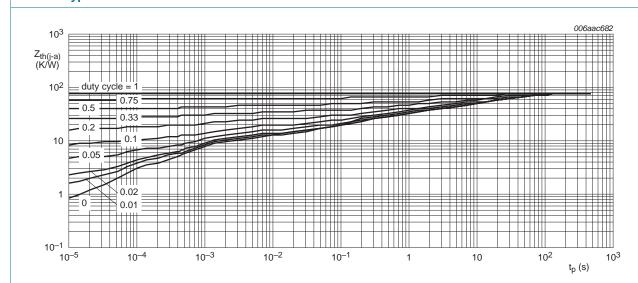
FR4 PCB, standard footprint

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



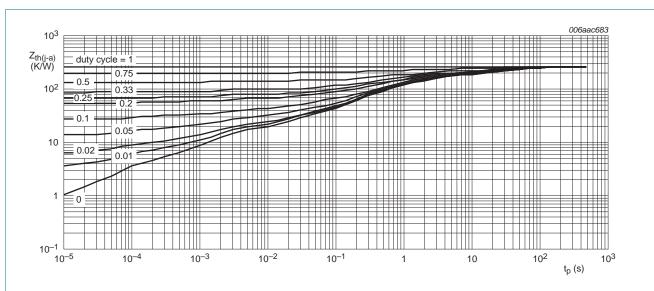
FR4 PCB, mounting pad for collector 1 cm²

Fig 8. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT89; typical values



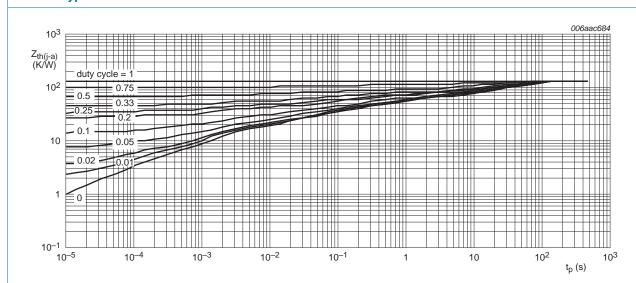
FR4 PCB, mounting pad for collector 6 cm²

Fig 9. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT89; typical values



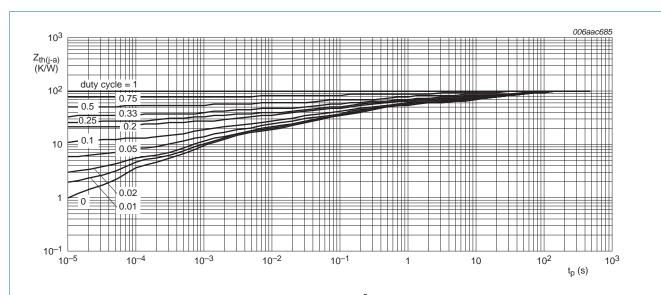
FR4 PCB, single-sided copper, standard footprint

Fig 10. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT1061; typical values



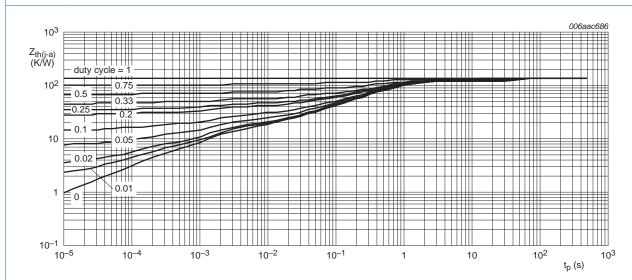
FR4 PCB, single-sided copper, mounting pad for collector 1 cm²

Fig 11. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT1061; typical values



FR4 PCB, single-sided copper, mounting pad for collector 6 cm²

Fig 12. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT1061; typical values



FR4 PCB, 4-layer copper, standard footprint

Fig 13. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT1061; typical values

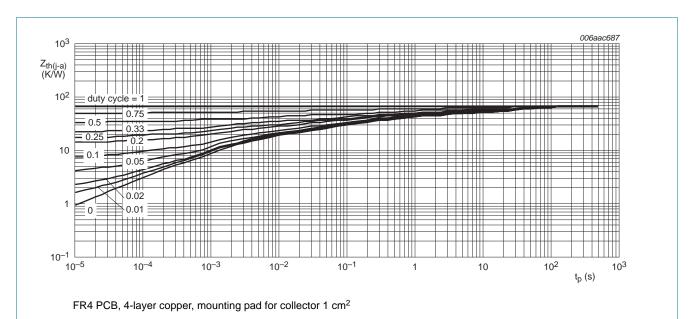


Fig 14. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT1061; typical values

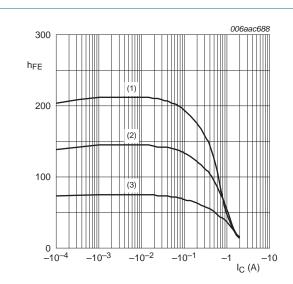
7. Characteristics

Table 8. Characteristics

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

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

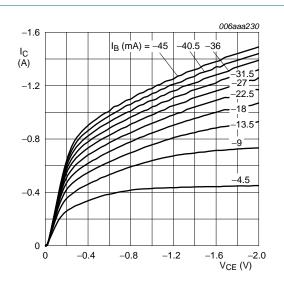
^[1] Pulse test: $t_p \le 300 \ \mu s; \ \delta = 0.02.$



$$V_{CE} = -2 V$$

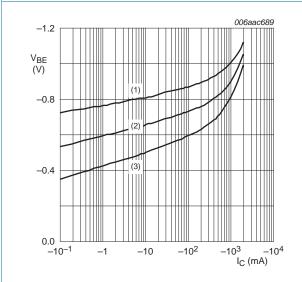
- (1) $T_{amb} = 100 \, ^{\circ}C$
- (2) $T_{amb} = 25 \, ^{\circ}C$
- (3) $T_{amb} = -55 \, ^{\circ}C$

Fig 15. DC current gain as a function of collector current; typical values



T_{amb} = 25 °C

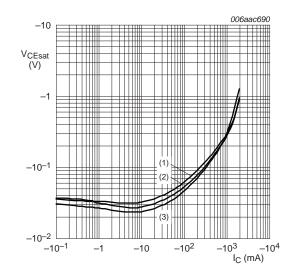
Fig 16. Collector current as a function of collector-emitter voltage; typical values





- (1) $T_{amb} = -55 \, ^{\circ}C$
- (2) $T_{amb} = 25 \, ^{\circ}C$
- (3) T_{amb} = 100 °C

Fig 17. Base-emitter voltage as a function of collector current; typical values



$$I_{\rm C}/I_{\rm B} = 10$$

- (1) $T_{amb} = 100 \, ^{\circ}C$
- (2) $T_{amb} = 25 \, ^{\circ}C$
- (3) $T_{amb} = -55 \, ^{\circ}C$

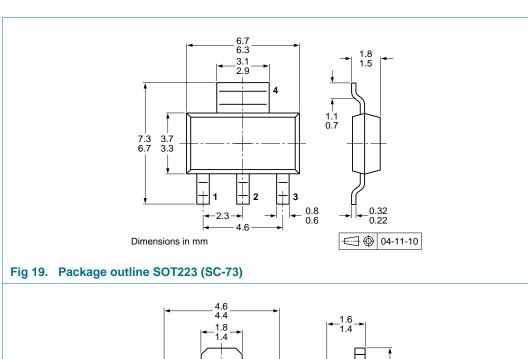
Fig 18. Collector-emitter saturation voltage as a function of collector current; typical values

8. Test information

8.1 Quality information

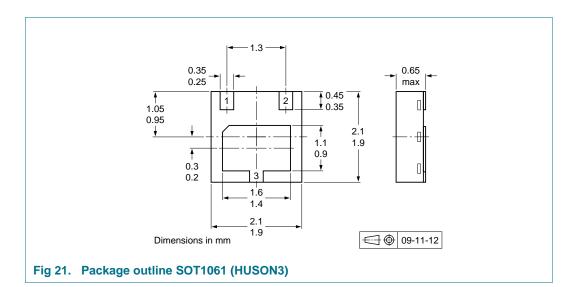
This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard *Q101 - Stress test qualification for discrete semiconductors*, and is suitable for use in automotive applications.

9. Package outline



2.6 2.4 1.2 3 0.8 1.2 0.40 0.40 0.23 Dimensions in mm

Fig 20. Package outline SOT89 (SC-62/TO-243)



10. Packing information

Table 9. Packing methods

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

Туре	Package	Description		Packing quantity		
number[2]				1000	3000	4000
BCP53	SOT223	8 mm pitch, 12 mm tape and reel		-115	-	-135
BCX53 SOT89		8 mm pitch, 12 mm tape and reel; T1	[3]	-115	-	-135
		8 mm pitch, 12 mm tape and reel; T3	[4]	-146	-	-
BC53PA	SOT1061	4 mm pitch, 8 mm tape and reel		-	-115	-

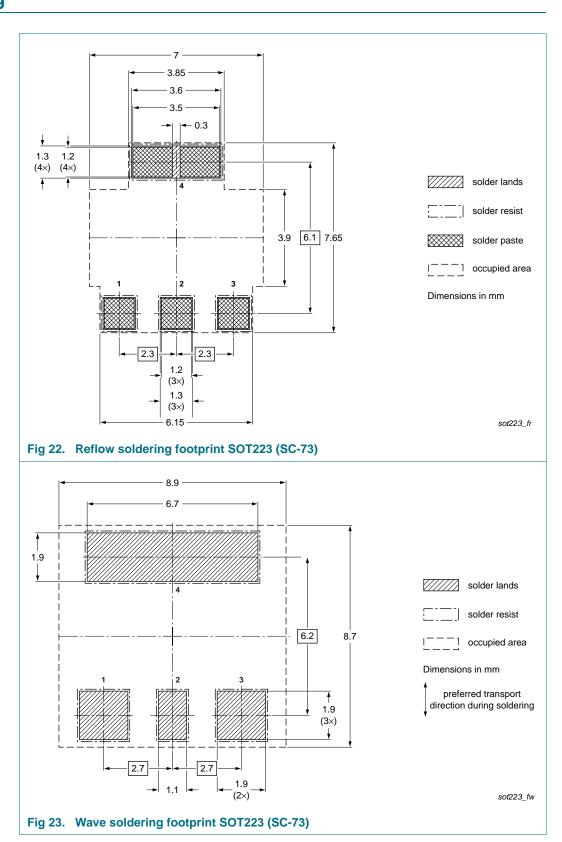
^[1] For further information and the availability of packing methods, see Section 14.

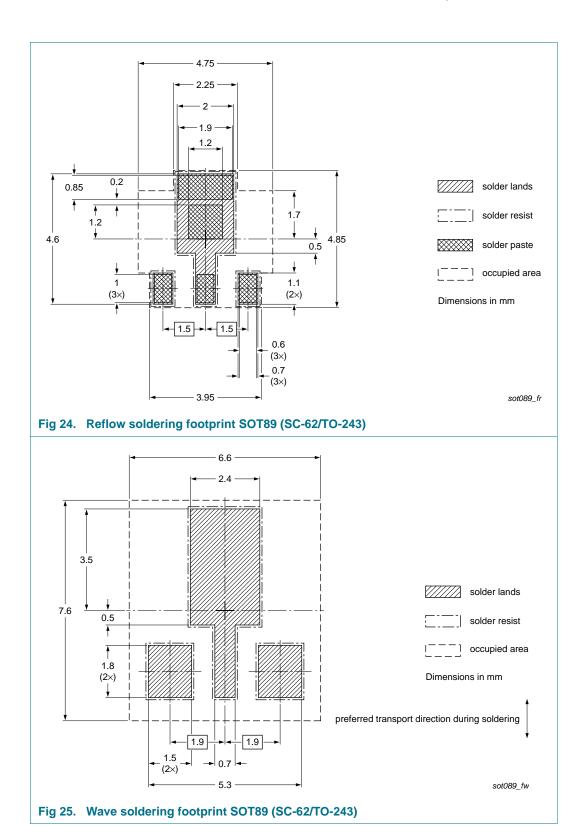
^[2] Valid for all available selection groups.

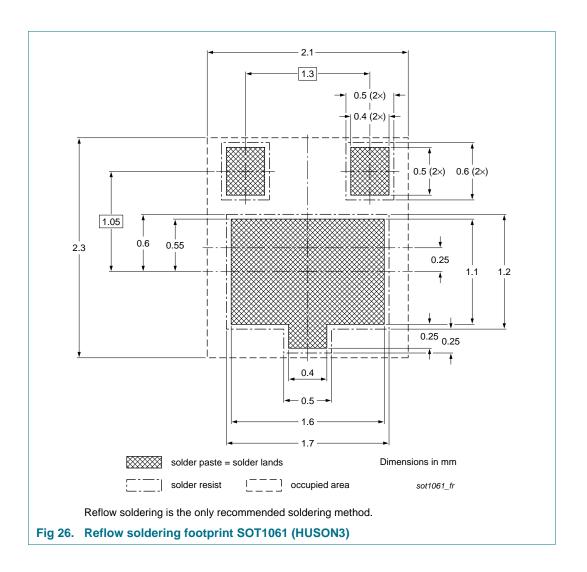
^[3] T1: normal taping

^[4] T3: 90° rotated taping

11. Soldering







12. Revision history

Table 10. Revision history

Release date	Data sheet status	Change notice	Supersedes			
20111019	Product data sheet	-	BCP640_BCX53_BCX53 v.8			
 Type number 	er removed: BC640					
 Type number 	 Type numbers added: BC53PA, BC53-10PA and BC53-16PA 					
 <u>Section 1 "Product profile"</u>: updated 						
 Table 6, 7 and 8: updated according to latest measurements 						
 Figure 1, 2, 4, 5, 7, 8, 9, 15, 17 and 18: updated 						
• Figure 3, 6,	10 to 14: added					
 Section 8 "T 	est information": added					
 Section 10 ' 	'Packing information": upda	ated				
Section 11 "	Soldering": added					
 Section 13 ^c 	<u>'Legal information"</u> : update	ed				
20080222	Product data sheet	-	BC640_BCP53_BCX53 v.7			
20070627	Product data sheet	-	BC640_BCP53_BCX53 v.6			
20060313	Product data sheet	-	BC636_638_640 v.5			
			BCP51_52_53 v.5			
			BCX51_52_53 v.4			
20041011	Product specification	-	BC636_638_640 v.4			
20030206	Product specification	-	BCP51_52_53 v.4			
20011010	Product specification	-	BCX51_52_53 v.3			
	20111019 Type number Type number Section 1 "F Table 6, 7 a Figure 1, 2, Figure 3, 6, Section 8 "T Section 10 " Section 11 " Section 13 " 20080222 20070627 20060313	 Type number removed: BC640 Type numbers added: BC53PA, BC53 Section 1 "Product profile": updated Table 6, 7 and 8: updated according to Figure 1, 2, 4, 5, 7, 8, 9, 15, 17 and 18 Figure 3, 6, 10 to 14: added Section 8 "Test information": added Section 10 "Packing information": updated Section 11 "Soldering": added Section 13 "Legal information": updated Product data sheet 20070627 Product data sheet Product data sheet Product specification Product specification Product specification 	Type number removed: BC640 Type numbers added: BC53PA, BC53-10PA and BC53-2 Section 1 "Product profile": updated Table 6, 7 and 8: updated according to latest measurements Figure 1, 2, 4, 5, 7, 8, 9, 15, 17 and 18: updated Figure 3, 6, 10 to 14: added Section 8 "Test information": added Section 10 "Packing information": updated Section 11 "Soldering": added Section 13 "Legal information": updated 20080222 Product data sheet - 20070627 Product data sheet - 20060313 Product specification -			

13. Legal information

13.1 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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BCP53_BCX53_BC53PA

BCP53; BCX53; BC53PA

80 V, 1 A PNP medium power transistors

Quick reference data — The Quick reference data is an extract of the product data given in the Limiting values and Characteristics sections of this document, and as such is not complete, exhaustive or legally binding.

13.4 Trademarks

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

14. Contact information

For more information, please visit: http://www.nxp.com

For sales office addresses, please send an email to: salesaddresses@nxp.com

15. Contents

1	Product profile
1.1	General description
1.2	Features and benefits
1.3	Applications
1.4	Quick reference data
2	Pinning information
3	Ordering information
4	Marking
5	Limiting values
6	Thermal characteristics
7	Characteristics
8	Test information
8.1	Quality information
9	Package outline
10	Packing information 15
11	Soldering 10
12	Revision history19
13	Legal information
13.1	Data sheet status
13.2	Definitions
13.3	Disclaimers
13.4	Trademarks
14	Contact information 2
15	Contents 2

Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.

ПОСТАВКА ЭЛЕКТРОННЫХ КОМПОНЕНТОВ

многоканальный

Общество с ограниченной ответственностью «МосЧип» ИНН 7719860671 / КПП 771901001 Адрес: 105318, г.Москва, ул.Щербаковская д.3, офис 1107

Данный компонент на территории Российской Федерации Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

http://moschip.ru/get-element

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

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