nexperia

Important notice

Dear Customer,

On 7 February 2017 the former NXP Standard Product business became a new company with the tradename **Nexperia**. Nexperia is an industry leading supplier of Discrete, Logic and PowerMOS semiconductors with its focus on the automotive, industrial, computing, consumer and wearable application markets

In data sheets and application notes which still contain NXP or Philips Semiconductors references, use the references to Nexperia, as shown below.

Instead of http://www.nxp.com, http://www.philips.com/ or http://www.semiconductors.philips.com/, use **http://www.nexperia.com**

Instead of sales.addresses@www.nxp.com or sales.addresses@www.semiconductors.philips.com, use **salesaddresses@nexperia.com** (email)

Replace the copyright notice at the bottom of each page or elsewhere in the document, depending on the version, as shown below:
- © NXP N.V. (year). All rights reserved or © Koninklijke Philips Electronics N.V. (year). All rights reserved
Should be replaced with:
- **© Nexperia B.V. (year). All rights reserved**.

If you have any questions related to the data sheet, please contact our nearest sales office via e-mail or telephone (details via **salesaddresses@nexperia.com**). Thank you for your cooperation and understanding,

Kind regards,

Team Nexperia

BCM857BV; BCM857BS; BCM857DS

PNP/PNP matched double transistors

Rev. 06 — 28 August 2009　　　　　　　　　　　　　　　　　　**Product data sheet**

1. Product profile

1.1 General description

PNP/PNP matched double transistors in small Surface-Mounted Device (SMD) plastic packages. The transistors are fully isolated internally.

Table 1.　Product overview

Type number	Package		NPN/NPN complement	Matched version of
	NXP	**JEITA**		
BCM857BV	SOT666	-	BCM847BV	BC857BV
BCM857BS	SOT363	SC-88	BCM847BS	BC857BS
BCM857DS	SOT457	SC-74	BCM847DS	-

1.2 Features

■ Current gain matching
■ Base-emitter voltage matching
■ Drop-in replacement for standard double transistors

1.3 Applications

■ Current mirror
■ Differential amplifier

1.4 Quick reference data

Table 2.　Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per transistor						
V_{CEO}	collector-emitter voltage	open base	-	-	−45	V
I_C	collector current		-	-	−100	mA
h_{FE}	DC current gain	V_{CE} = −5 V; I_C = −2 mA	200	290	450	

NXP founded by Philips

Table 2. **Quick reference data** *…continued*

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per device							
h_{FE1}/h_{FE2}	h_{FE} matching	$V_{CE} = -5$ V; $I_C = -2$ mA	[1]	0.9	1	-	
$V_{BE1}-V_{BE2}$	V_{BE} matching	$V_{CE} = -5$ V; $I_C = -2$ mA	[2]	-	-	2	mV

[1] The smaller of the two values is taken as the numerator.

[2] The smaller of the two values is subtracted from the larger value.

2. Pinning information

Table 3. **Pinning**

Pin	Description	Simplified outline	Symbol
1	emitter TR1		
2	base TR1		
3	collector TR2		
4	emitter TR2		
5	base TR2		
6	collector TR1		

001aab555

sym018

3. Ordering information

Table 4. **Ordering information**

Type number	Package			Version
	Name	Description		
BCM857BV	-	plastic surface-mounted package; 6 leads		SOT666
BCM857BS	SC-88	plastic surface-mounted package; 6 leads		SOT363
BCM857DS	SC-74	plastic surface-mounted package (TSOP6); 6 leads		SOT457

4. Marking

Table 5. **Marking codes**

Type number	Marking code[1]
BCM857BV	3B
BCM857BS	A9*
BCM857DS	R8

[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
Per transistor						
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			-	−100	mA
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms		-	−200	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C				
	SOT666		[1][2] -		200	mW
	SOT363		[1] -		200	mW
	SOT457		[1] -		250	mW
Per device						
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C				
	SOT666		[1][2] -		300	mW
	SOT363		[1] -		300	mW
	SOT457		[1] -		380	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] Reflow soldering is the only recommended soldering method.

6. Thermal characteristics

Table 7.   Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air					
	SOT666		[1][2] -	-		625	K/W
	SOT363		[1] -	-		625	K/W
	SOT457		[1] -	-		500	K/W

Table 7. **Thermal characteristics** *…continued*

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per device							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air					
	SOT666		[1][2] -	-	-	416	K/W
	SOT363		[1] -	-	-	416	K/W
	SOT457		[1] -	-	-	328	K/W

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

[2] Reflow soldering is the only recommended soldering method.

7. Characteristics

Table 8. **Characteristics**

T_{amb} = 25 °C unless otherwise specified

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor							
I_{CBO}	collector-base cut-off current	V_{CB} = −30 V; I_E = 0 A		-	-	−15	nA
		V_{CB} = −30 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	V_{CE} = −5 V; I_C = −10 µA		-	250	-	
		V_{CE} = −5 V; I_C = −2 mA		200	290	450	
V_{CEsat}	collector-emitter saturation voltage	I_C = −10 mA; I_B = −0.5 mA		-	−50	−200	mV
		I_C = −100 mA; I_B = −5 mA		-	−200	−400	mV
V_{BEsat}	base-emitter saturation voltage	I_C = −10 mA; I_B = −0.5 mA	[1] -		−760	-	mV
		I_C = −100 mA; I_B = −5 mA	[1] -		−920	-	mV
V_{BE}	base-emitter voltage	V_{CE} = −5 V; I_C = −2 mA	[2] −600		−650	−700	mV
		V_{CE} = −5 V; I_C = −10 mA	[2] -		-	−760	mV
C_c	collector capacitance	V_{CB} = −10 V; I_E = i_e = 0 A; f = 1 MHz		-	-	2.2	pF
C_e	emitter capacitance	V_{EB} = −0.5 V; I_C = i_c = 0 A; f = 1 MHz		-	10	-	pF

Table 8. **Characteristics** *…continued*

$T_{amb} = 25\,°C$ *unless otherwise specified*

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
f_T	transition frequency	$V_{CE} = -5$ V; $I_C = -10$ mA; $f = 100$ MHz	100	175	-	MHz
NF	noise figure	$V_{CE} = -5$ V; $I_C = -0.2$ mA; $R_S = 2$ kΩ; $f = 10$ Hz to 15.7 kHz	-	1.6	-	dB
		$V_{CE} = -5$ V; $I_C = -0.2$ mA; $R_S = 2$ kΩ; $f = 1$ kHz; $B = 200$ Hz	-	3.1	-	dB
Per device						
h_{FE1}/h_{FE2}	h_{FE} matching	$V_{CE} = -5$ V; $I_C = -2$ mA	[3] 0.9	1	-	
$V_{BE1} - V_{BE2}$	V_{BE} matching	$V_{CE} = -5$ V; $I_C = -2$ mA	[4] -	-	2	mV

[1] V_{BEsat} decreases by about 1.7 mV/K with increasing temperature.

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

[3] The smaller of the two values is taken as the numerator.

[4] The smaller of the two values is subtracted from the larger value.

$T_{amb} = 25\ °C$
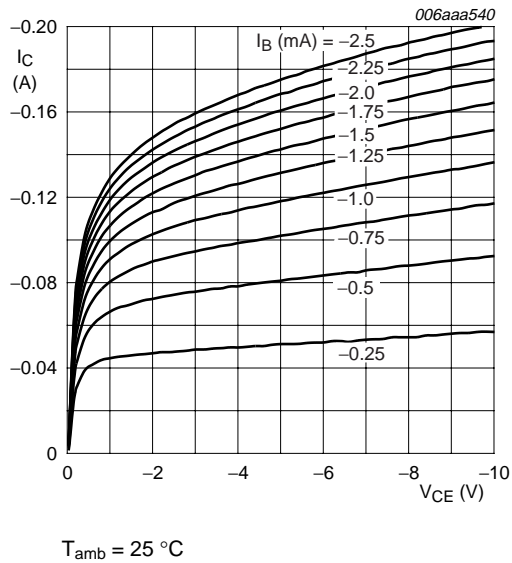
Fig 1. Collector current as a function of collector-emitter voltage; typical values

$V_{CE} = -5\ V$

(1) $T_{amb} = 100\ °C$

(2) $T_{amb} = 25\ °C$

(3) $T_{amb} = -55\ °C$
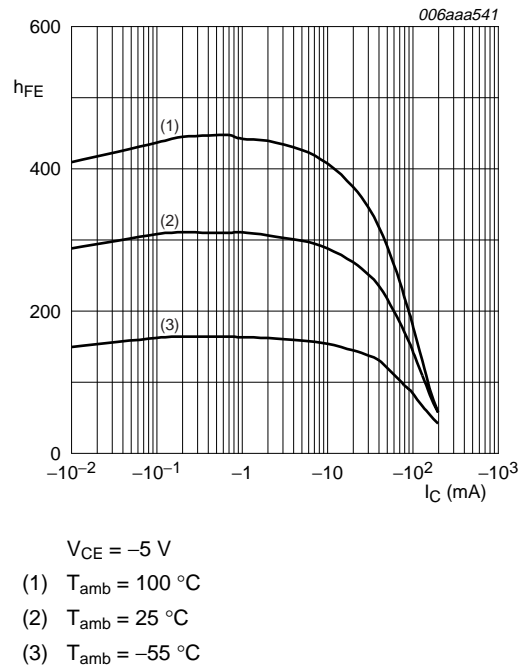
Fig 2. DC current gain as a function of collector current; typical values
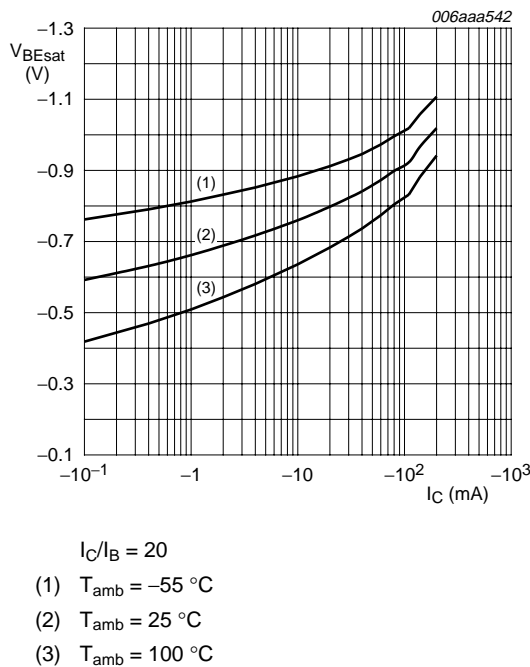
$I_C/I_B = 20$

(1) $T_{amb} = -55\ °C$

(2) $T_{amb} = 25\ °C$

(3) $T_{amb} = 100\ °C$

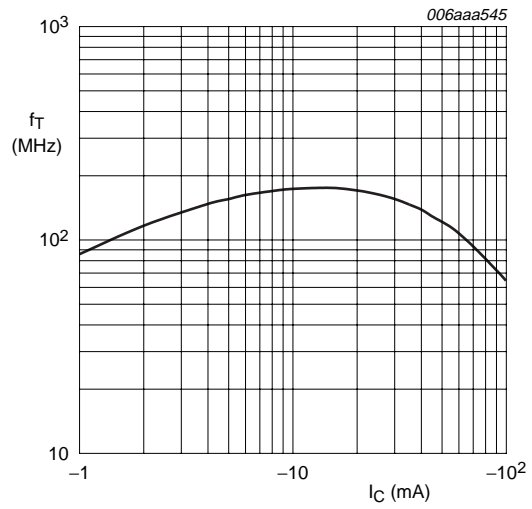**Fig 3.** Base-emitter saturation voltage as a function of collector current; typical values

$I_C/I_B = 20$

(1) $T_{amb} = 100\ °C$

(2) $T_{amb} = 25\ °C$

(3) $T_{amb} = -55\ °C$
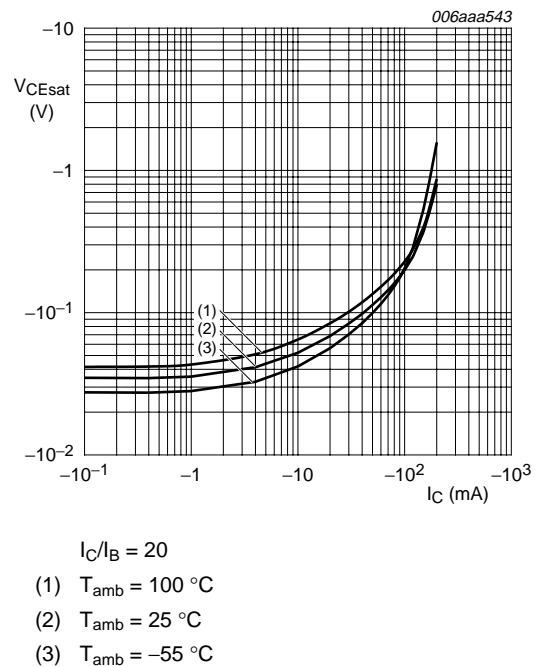
Fig 4. Collector-emitter saturation voltage as a function of collector current; typical values
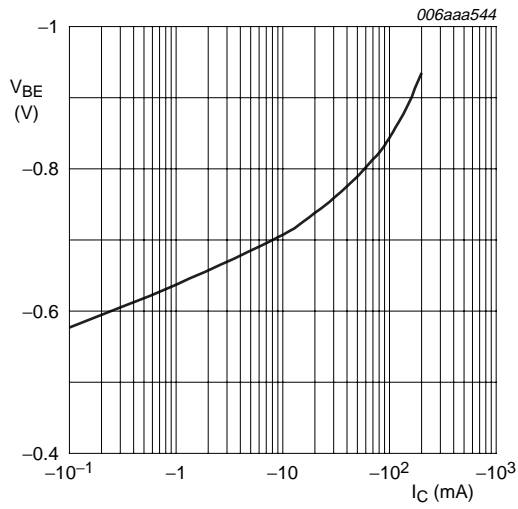
V_{CE} = −5 V; T_{amb} = 25 °C

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

V_{CE} = −5 V; T_{amb} = 25 °C

Fig 6. Transition frequency as a function of collector current; typical values
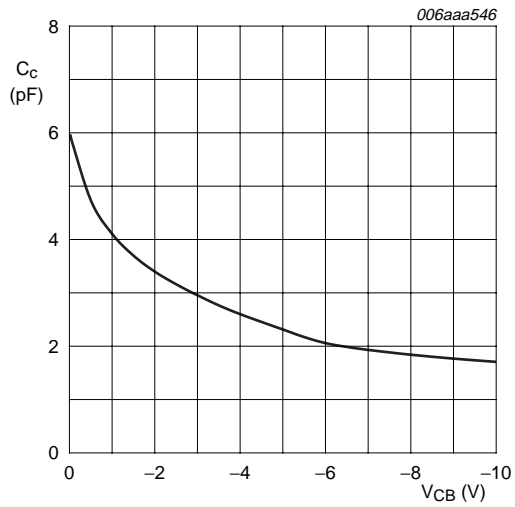
f = 1 MHz; T_{amb} = 25 °C

Fig 7. Collector capacitance as a function of collector-base voltage; typical values
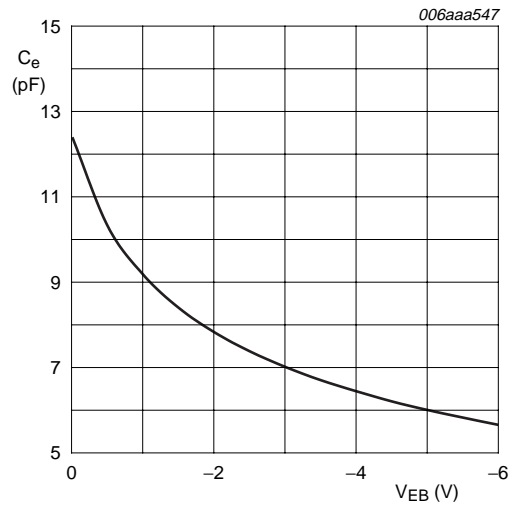
f = 1 MHz; T_{amb} = 25 °C

Fig 8. Emitter capacitance as a function of emitter-base voltage; typical values

8. Application information
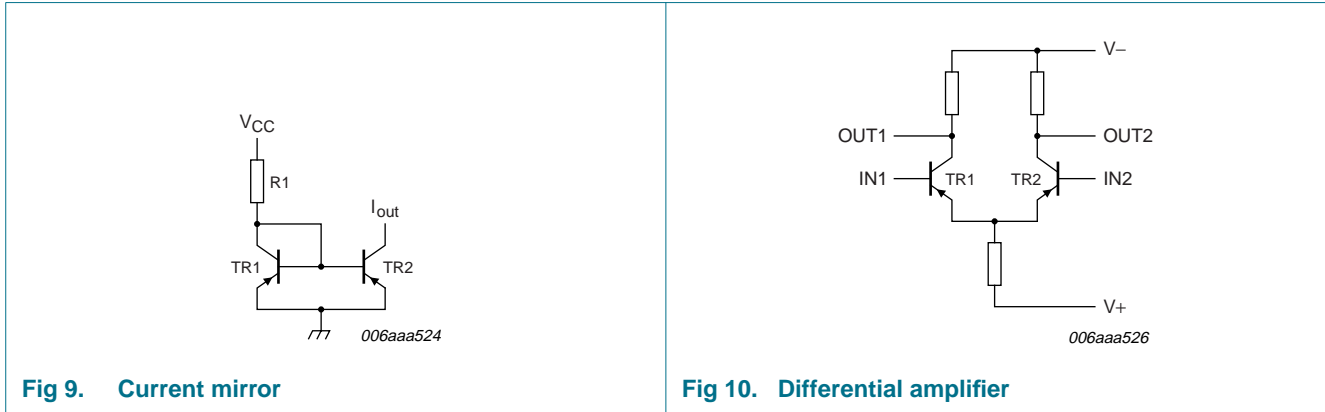
Fig 9. **Current mirror**

Fig 10. **Differential amplifier**

9. Package outline

Dimensions in mm
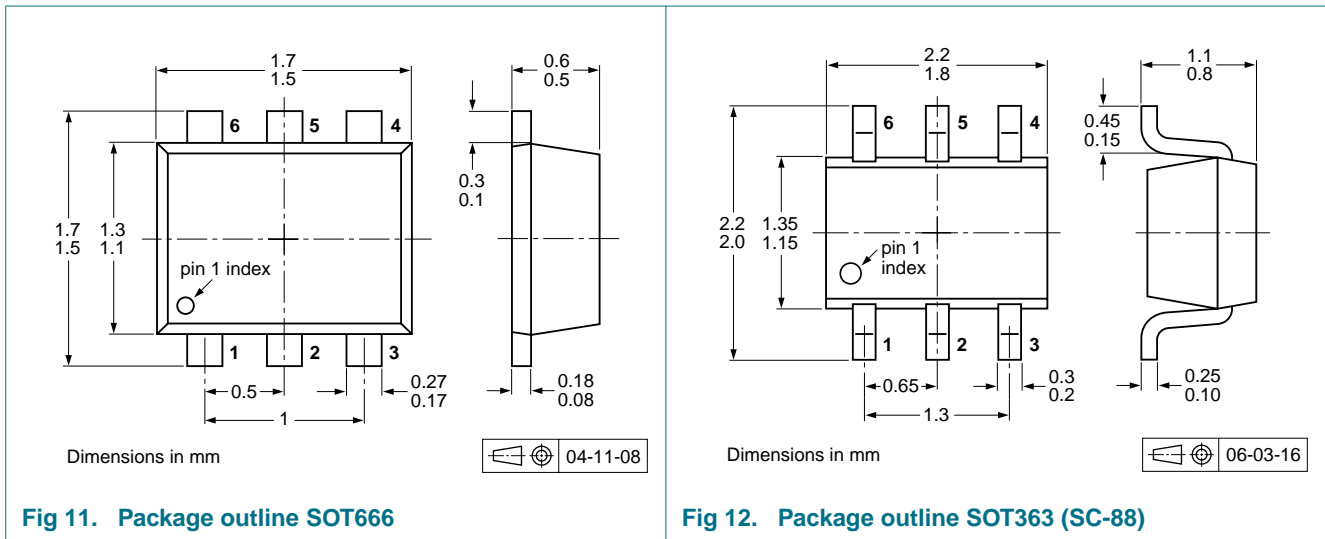
Fig 11. **Package outline SOT666**

Dimensions in mm

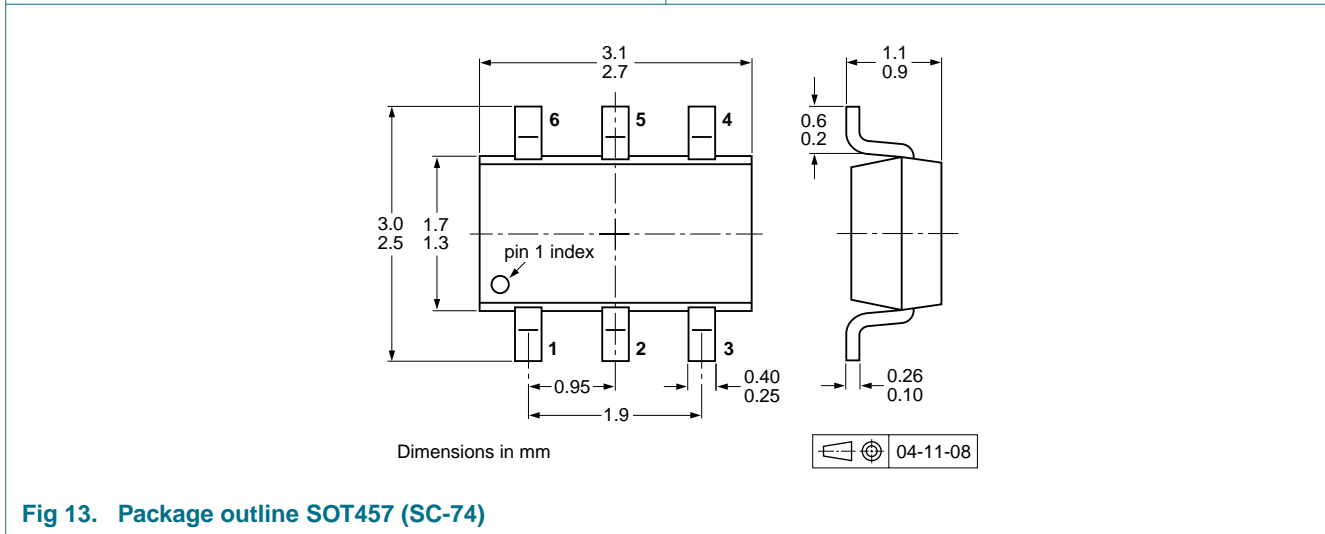**Fig 12.** **Package outline SOT363 (SC-88)**

Dimensions in mm

Fig 13. **Package outline SOT457 (SC-74)**

10. 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	**4000**	**8000**	**10000**
BCM857BV	SOT666	2 mm pitch, 8 mm tape and reel		-	-	-315	-
		4 mm pitch, 8 mm tape and reel		-	-115	-	-
BCM857BS	SOT363	4 mm pitch, 8 mm tape and reel; T1	[2]	-115	-	-	-135
		4 mm pitch, 8 mm tape and reel; T2	[3]	-125	-	-	-165
BCM857DS	SOT457	4 mm pitch, 8 mm tape and reel; T1	[2]	-115	-	-	-135
		4 mm pitch, 8 mm tape and reel; T2	[3]	-125	-	-	-165

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

[2]   T1: normal taping

[3]   T2: reverse taping

11. Soldering
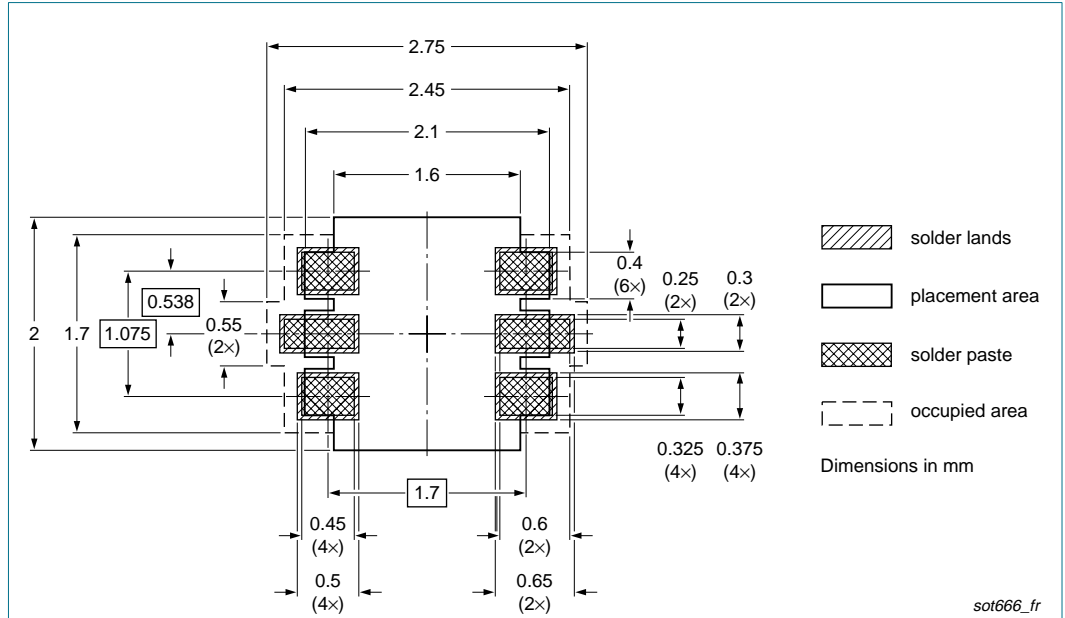
Reflow soldering is the only recommended soldering method.
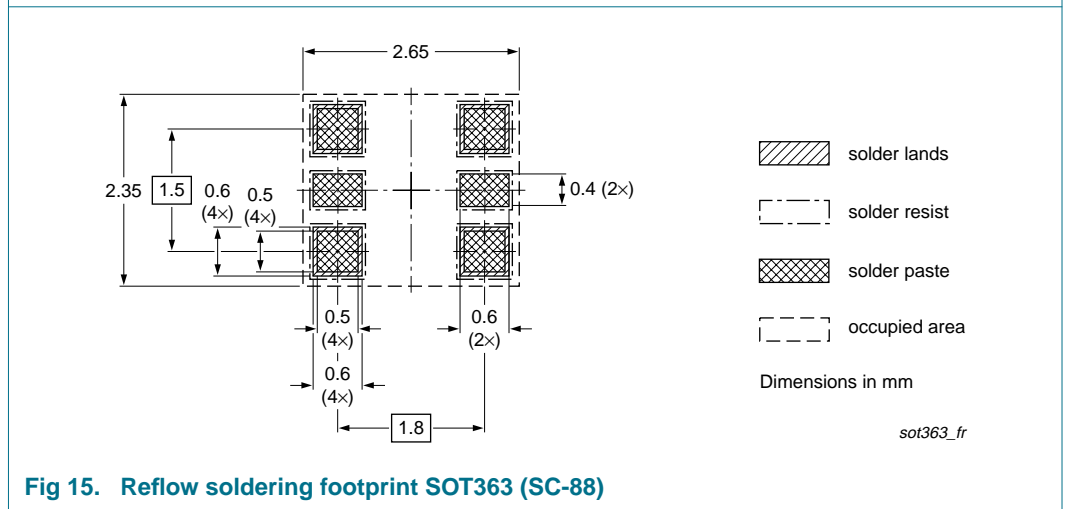
Fig 14.   Reflow soldering footprint SOT666
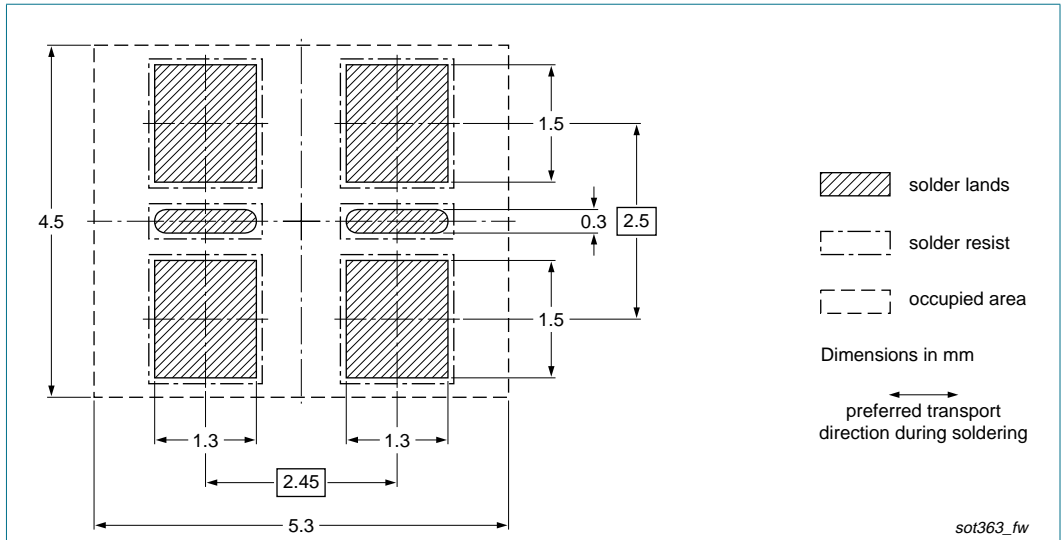
Fig 15.   Reflow soldering footprint SOT363 (SC-88)
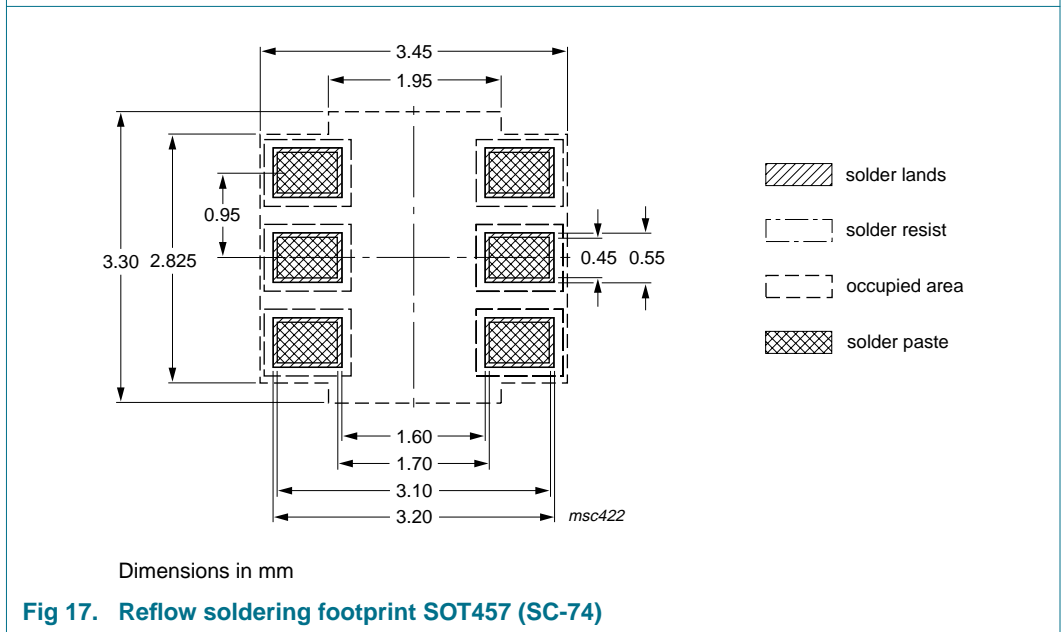
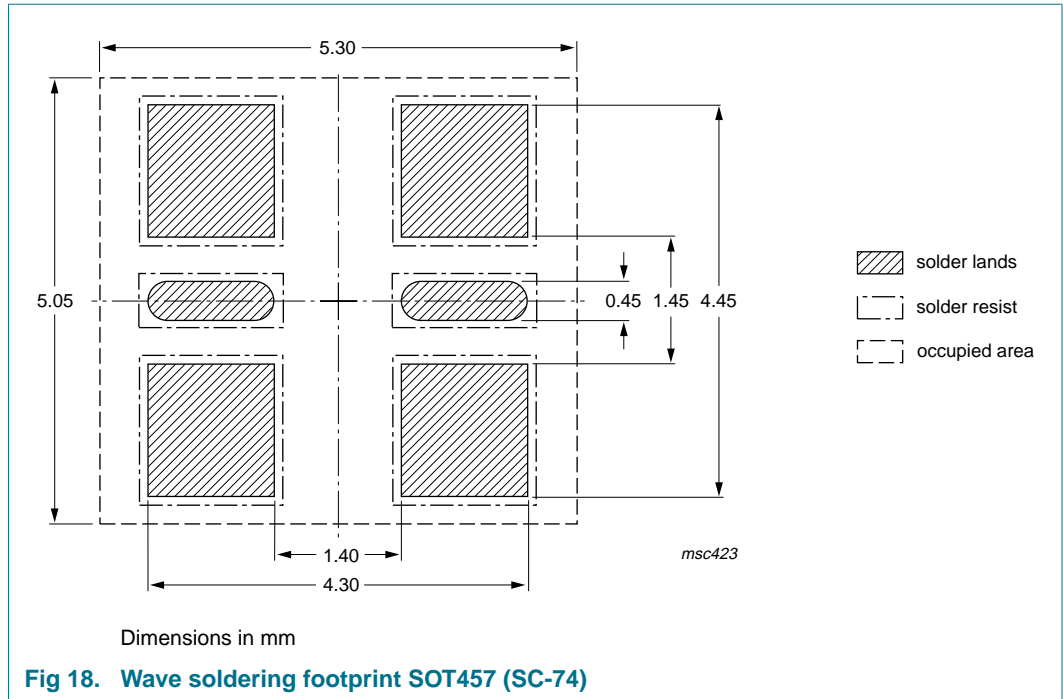**Fig 16. Wave soldering footprint SOT363 (SC-88)**

Dimensions in mm

Fig 17. Reflow soldering footprint SOT457 (SC-74)

solder lands

solder resist

occupied area

5.30

5.05

4.45

1.45

0.45

1.40

4.30

msc423

Dimensions in mm

Fig 18. Wave soldering footprint SOT457 (SC-74)

12. Revision history

Table 10.   Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BCM857BV_BS_DS_6	20090828	Product data sheet	-	BCM857BV_BS_DS_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. • Figure 12 "Package outline SOT363 (SC-88)": updated • Figure 14 "Reflow soldering footprint SOT666": updated • Figure 15 "Reflow soldering footprint SOT363 (SC-88)": updated • Figure 16 "Wave soldering footprint SOT363 (SC-88)": updated • Figure 18 "Wave soldering footprint SOT457 (SC-74)": updated			
BCM857BV_BS_DS_5	20060627	Product data sheet	-	BCM857BS_DS_4
BCM857BS_DS_4	20060216	Product data sheet	-	BCM857BS_DS_3
BCM857BS_DS_3	20060130	Product data sheet	-	BCM857BS_2
BCM857BS_2	20050411	Product data sheet	-	BCM857BS_1
BCM857BS_1	20040914	Product data sheet	-	-

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.

13.2 Definitions

Draft — The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. NXP Semiconductors does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

Short data sheet — A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local NXP Semiconductors sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

13.3 Disclaimers

General — Information in this document is believed to be accurate and reliable. However, NXP Semiconductors does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information.

Right to make changes — NXP Semiconductors reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

Suitability for use — NXP Semiconductors products are not designed, authorized or warranted to be suitable for use in medical, military, aircraft, space or life support equipment, nor in applications where failure or malfunction of an NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental damage. NXP Semiconductors accepts no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

Applications — Applications that are described herein for any of these products are for illustrative purposes only. NXP Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Limiting values — Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) may cause permanent damage to the device. Limiting values are stress ratings only and operation of the device at these or any other conditions above those given in the Characteristics sections of this document is not implied. Exposure to limiting values for extended periods may affect device reliability.

Terms and conditions of sale — NXP Semiconductors products are sold subject to the general terms and conditions of commercial sale, as published at http://www.nxp.com/profile/terms, including those pertaining to warranty, intellectual property rights infringement and limitation of liability, unless explicitly otherwise agreed to in writing by NXP Semiconductors. In case of any inconsistency or conflict between information in this document and such terms and conditions, the latter will prevail.

No offer to sell or license — Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

Export control — This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from national authorities.

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

Date of release: 28 August 2009
Document identifier: BCM857BV_BS_DS_6

founded by

PHILIPS

单击下面可查看定价，库存，交付和生命周期等信息

>>Nexperia(安世)