PMP5501V; PMP5501G; PMP5501Y

PNP/PNP matched double transistors

Rev. 02 — 19 September 2006 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 in the SOT666 and SOT363 (SC-88) packages are fully isolated internally.

Table 1. Product overview

Type number	Package		PNP/PNP h_{FE1}/h_{FE2} 0.98 complement	NPN/NPN complement
	Philips	JEITA		
PMP5501V	SOT666	-	PMP5201V	PMP4501V
PMP5501G	SOT353	SC-88A	PMP5201G	PMP4501G
PMP5501Y	SOT363	SC-88	PMP5201Y	PMP4501Y

1.2 Features

- Current gain matching
- Base-emitter voltage matching
- Common emitter configuration for SOT353 types
- Application-optimized pinout

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	

PHILIPS

Table 2. Quick reference data *…continued*

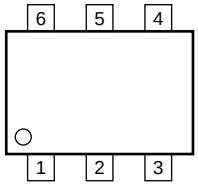
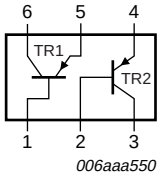
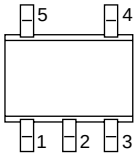
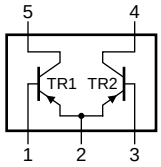
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per device							
h_{FE1}/h_{FE2}	h_{FE} matching	V_{CE} = –5 V; I_C = –2 mA	[1]	0.95	1	-	
$V_{BE1}–V_{BE2}$	V_{BE} matching	V_{CE} = –5 V; I_C = –2 mA	[2]	-	-	2	mV

[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
SOT666; SOT363			
1	base TR1	 001aab555	 006aaa550
2	base TR2		
3	collector TR2		
4	emitter TR2		
5	emitter TR1		
6	collector TR1		
SOT353			
1	base TR1		 006aaa551
2	emitter TR1, TR2		
3	base TR2		
4	collector TR2		
5	collector TR1		

3. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
PMP5501V	-	plastic surface-mounted package; 6 leads	SOT666
PMP5501G	SC-88A	plastic surface-mounted package; 5 leads	SOT353
PMP5501Y	SC-88	plastic surface-mounted package; 6 leads	SOT363

4. Marking

Table 5. Marking codes

Type number	Marking code[1]
PMP5501V	ED
PMP5501G	R4*
PMP5501Y	S6*

[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
	SOT353		[1]	-	200	mW
	SOT363		[1]	-	200	mW
Per device						
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C				
	SOT666		[1][2]	-	300	mW
	SOT353		[1]	-	300	mW
	SOT363		[1]	-	300	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
	SOT353		[1]	-	-	625	K/W
	SOT363		[1]	-	-	625	K/W
Per device							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air					
	SOT666		[1][2]	-	-	416	K/W
	SOT353		[1]	-	-	416	K/W
	SOT363		[1]	-	-	416	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

Table 8. Characteristics *...continued*

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

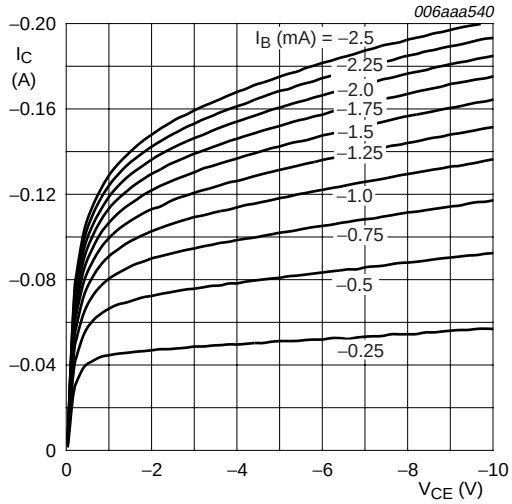
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{BE}	base-emitter voltage	V_{CE} = –5 V; I_C = –2 mA	[2]	–600	–650	–700	mV
		V_{CE} = –5 V; I_C = –10 mA	[2]	-	-	–760	mV
C_c	collector capacitance	V_{CB} = –10 V; $I_E = i_e$ = 0 A; f = 1 MHz		-	-	2.2	pF
C_e	emitter capacitance	V_{EB} = –0.5 V; $I_C = i_c$ = 0 A; f = 1 MHz		-	10	-	pF
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]	0.95	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.

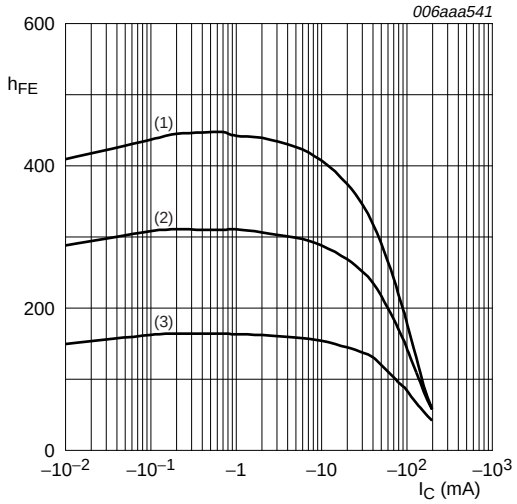
[3] The smaller of the two values is taken as the numerator.

[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



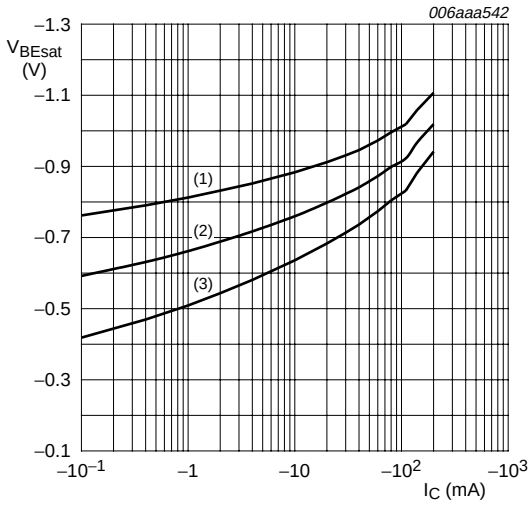
V_{CE} = −5 V

(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



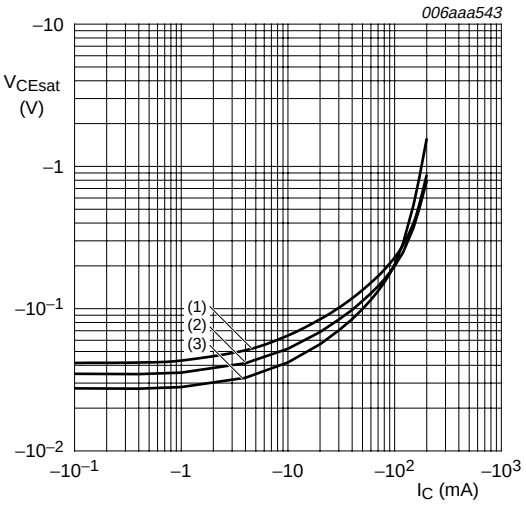
I_C/I_B = 20

(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



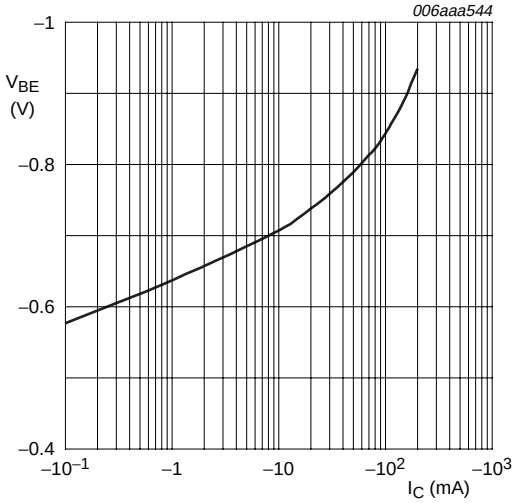
I_C/I_B = 20

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

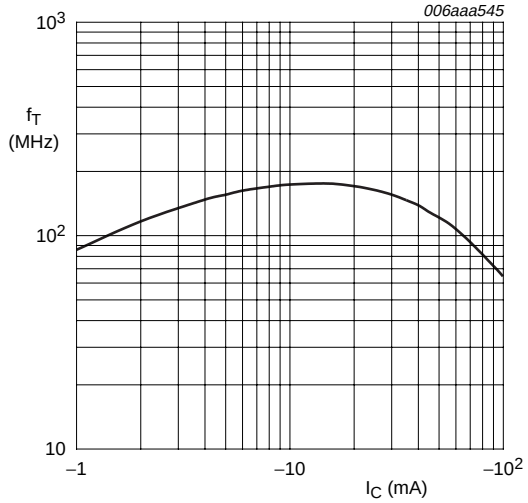
(3) T_{amb} = −55 °C

Fig 4. Collector-emitter saturation voltage as a function of collector current; typical values



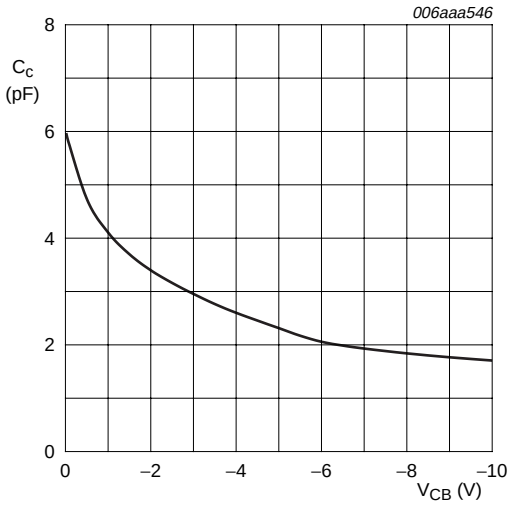
V_{CE} = −5 V; T_{amb} = 25 °C

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



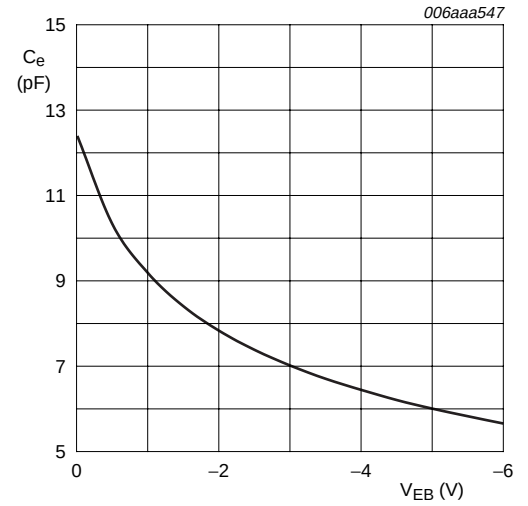
V_{CE} = −5 V; T_{amb} = 25 °C

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

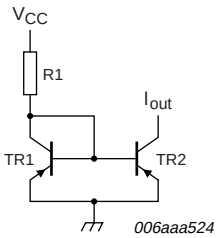


Fig 9. Current mirror

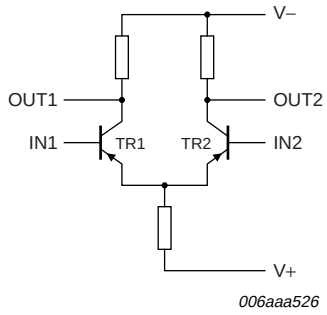


Fig 10. Differential amplifier

9. Package outline

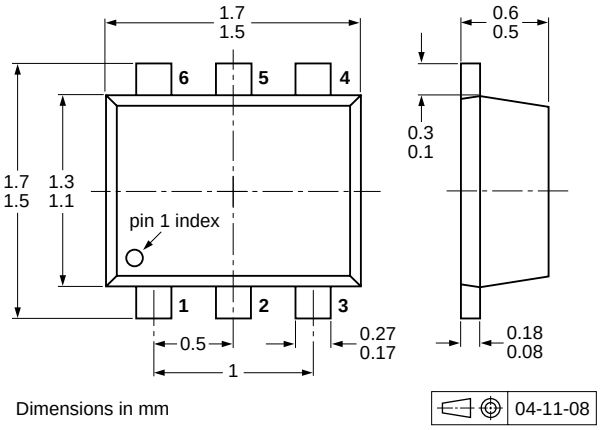


Fig 11. Package outline SOT666

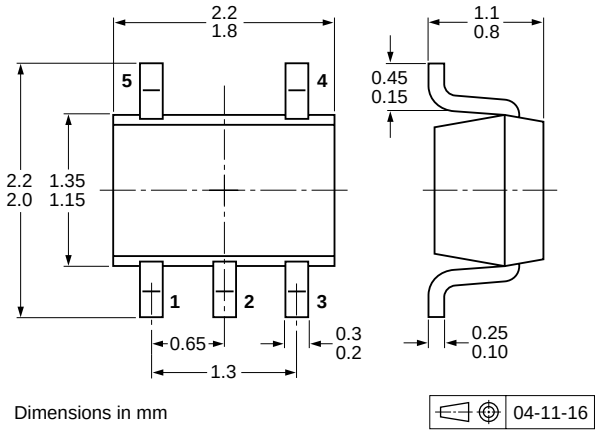


Fig 12. Package outline SOT353 (SC-88A)

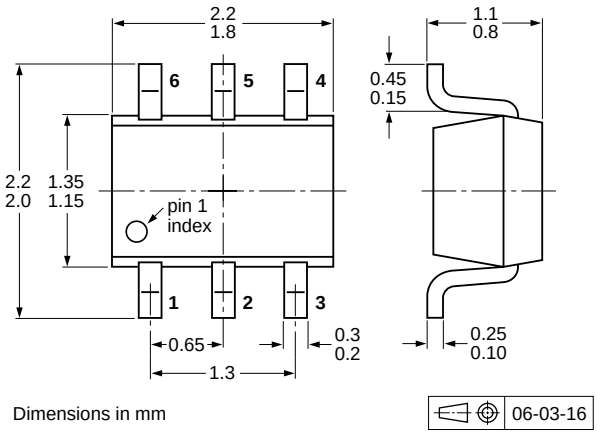


Fig 13. Package outline SOT363 (SC-88)

10. Packing information

Table 9. Packing methods

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

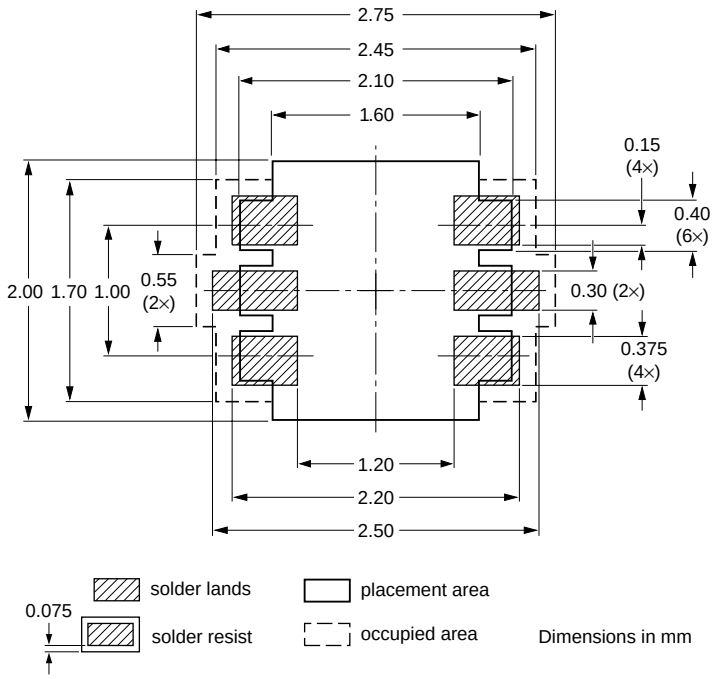
Type number	Package	Description	Packing quantity			
			3000	4000	8000	10000
PMP5501V	SOT666	2 mm pitch, 8 mm tape and reel	-	-	-315	-
		4 mm pitch, 8 mm tape and reel	-	-115	-	-
PMP5501G	SOT353	4 mm pitch, 8 mm tape and reel	-115	-	-	-135
PMP5501Y	SOT363	4 mm pitch, 8 mm tape and reel; T1 [2]	-115	-	-	-135
		4 mm pitch, 8 mm tape and reel; T2 [3]	-125	-	-	-165

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

[2] T1: normal taping

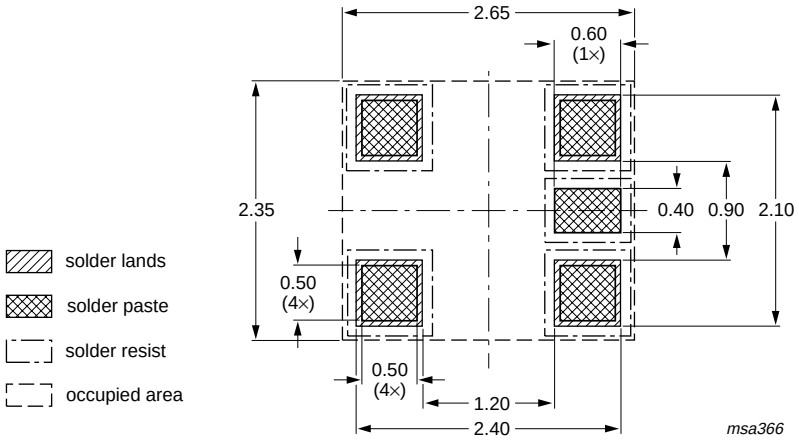
[3] T2: reverse taping

11. Soldering



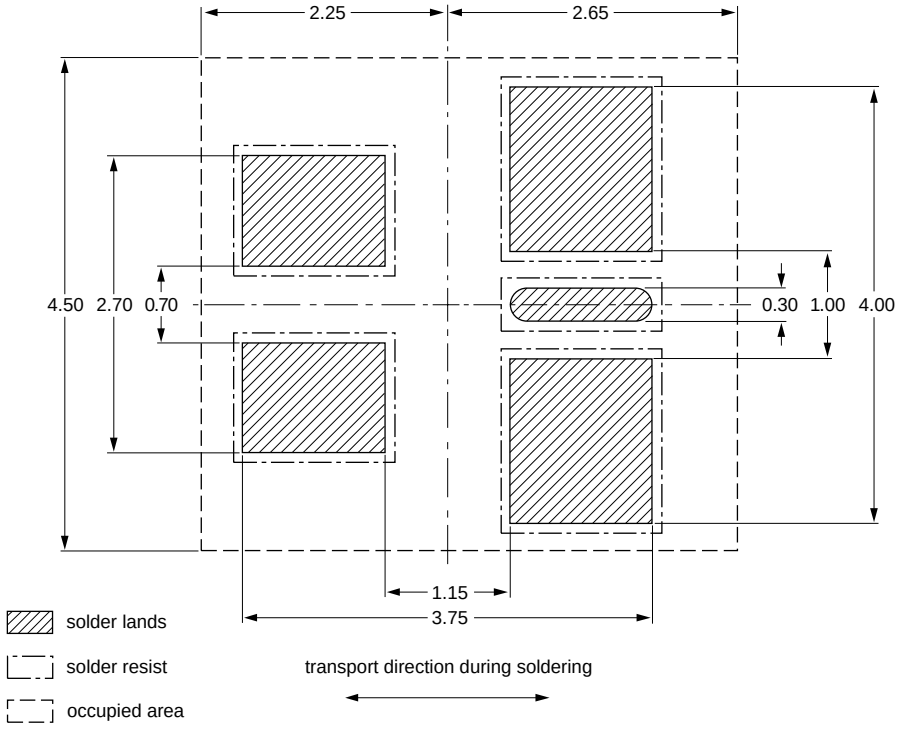
Reflow soldering is the only recommended soldering method.

Fig 14. Reflow soldering footprint SOT666



Dimensions in mm

Fig 15. Reflow soldering footprint SOT353 (SC-88A)



Dimensions in mm

Fig 16. Wave soldering footprint SOT353 (SC-88A)

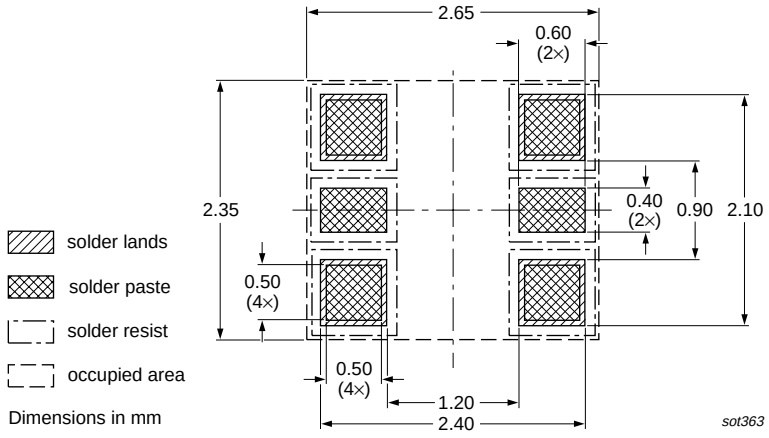


Fig 17. Reflow soldering footprint SOT363 (SC-88)

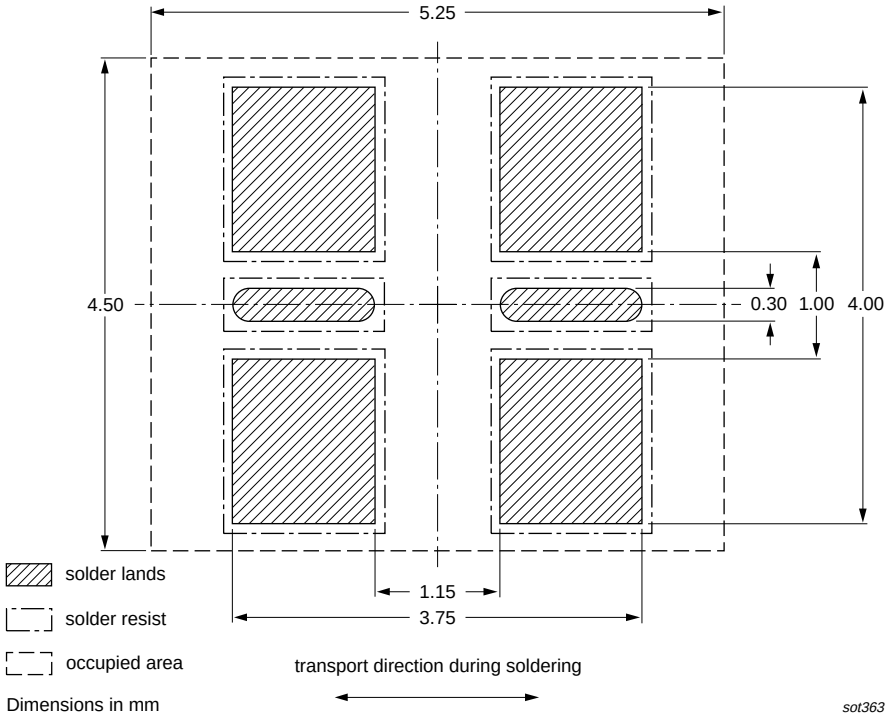


Fig 18. Wave soldering footprint SOT363 (SC-88)

12. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMP5501V_G_Y_2	20060919	Product data sheet	-	PMP5501G_Y_1
Modifications:	• Type number PMP5501V added • Section 13 “Legal information”: updated			
PMP5501G_Y_1	20060221	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.semiconductors.philips.com.

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15. Contents

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