

PMP4201V; PMP4201G; PMP4201Y

NPN/NPN matched double transistors

Rev. 03 — 15 September 2006

Product data sheet

1. Product profile

1.1 General description

NPN/NPN 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		NPN/NPN h_{FE1}/h_{FE2} 0.95 complement	PNP/PNP complement
	Philips	JEITA		
PMP4201V	SOT666	-	PMP4501V	PMP5201V
PMP4201G	SOT353	SC-88A	PMP4501G	PMP5201G
PMP4201Y	SOT363	SC-88	PMP4501Y	PMP5201Y

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	$V_{CE} = 5\text{ V};$ $I_C = 2\text{ mA}$	200	290	450	

Table 2. Quick reference data ...continued

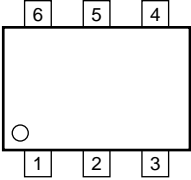
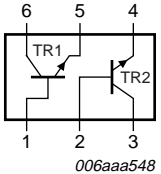
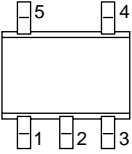
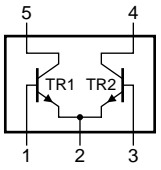
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per device						
h_{FE1}/h_{FE2}	h_{FE} matching	$V_{CE} = 5\text{ V};$ $I_C = 2\text{ mA}$	[1] 0.98	1	-	
$V_{BE1}-V_{BE2}$	V_{BE} matching	$V_{CE} = 5\text{ V};$ $I_C = 2\text{ mA}$	[2] -	-	2	mV

[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		
2	base TR2		
3	collector TR2		
4	emitter TR2		
5	emitter TR1		
6	collector TR1		
SOT353			
1	base TR1		
2	emitter TR1, TR2		
3	base TR2		
4	collector TR2		
5	collector TR1		

3. Ordering information

Table 4. Ordering information

Type number	Package		Version
	Name	Description	
PMP4201V	-	plastic surface-mounted package; 6 leads	SOT666
PMP4201G	SC-88A	plastic surface-mounted package; 5 leads	SOT353
PMP4201Y	SC-88	plastic surface-mounted package; 6 leads	SOT363

4. Marking

Table 5. Marking codes

Type number	Marking code ^[1]
PMP4201V	EA
PMP4201G	R7*
PMP4201Y	S7*

- [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	-	6	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

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per transistor						
I_{CBO}	collector-base cut-off current	$V_{CB} = 30\text{ V};$ $I_E = 0\text{ A}$	-	-	15	nA
		$V_{CB} = 30\text{ V};$ $I_E = 0\text{ A};$ $T_j = 150\text{ }^{\circ}\text{C}$	-	-	5	μA
I_{EBO}	emitter-base cut-off current	$V_{EB} = 5\text{ V};$ $I_C = 0\text{ A}$	-	-	100	nA
h_{FE}	DC current gain	$V_{CE} = 5\text{ V};$ $I_C = 10\text{ }\mu\text{A}$	-	250	-	
		$V_{CE} = 5\text{ V};$ $I_C = 2\text{ mA}$	200	290	450	
V_{CEsat}	collector-emitter saturation voltage	$I_C = 10\text{ mA};$ $I_B = 0.5\text{ mA}$	-	50	200	mV
		$I_C = 100\text{ mA};$ $I_B = 5\text{ mA}$	-	200	400	mV
V_{BEsat}	base-emitter saturation voltage	$I_C = 10\text{ mA};$ $I_B = 0.5\text{ mA}$	[1]	-	760	mV
		$I_C = 100\text{ mA};$ $I_B = 5\text{ mA}$	[1]	-	910	mV

Table 8. Characteristics ...continued $T_{amb} = 25^{\circ}\text{C}$ unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{BE}	base-emitter voltage	$V_{CE} = 5\text{ V};$ $I_C = 2\text{ mA}$	[2] 610	660	710	mV
		$V_{CE} = 5\text{ V};$ $I_C = 10\text{ mA}$	[2] -	-	770	mV
C_c	collector capacitance	$V_{CB} = 10\text{ V};$ $I_E = i_e = 0\text{ A};$ $f = 1\text{ MHz}$	-	-	1.5	pF
C_e	emitter capacitance	$V_{EB} = 0.5\text{ V};$ $I_C = i_c = 0\text{ A};$ $f = 1\text{ MHz}$	-	11	-	pF
f_T	transition frequency	$V_{CE} = 5\text{ V};$ $I_C = 10\text{ mA};$ $f = 100\text{ MHz}$	100	250	-	MHz
NF	noise figure	$V_{CE} = 5\text{ V};$ $I_C = 0.2\text{ mA};$ $R_S = 2\text{ k}\Omega;$ $f = 10\text{ Hz to}$ 15.7 kHz	-	2.8	-	dB
		$V_{CE} = 5\text{ V};$ $I_C = 0.2\text{ mA};$ $R_S = 2\text{ k}\Omega;$ $f = 1\text{ kHz};$ $B = 200\text{ Hz}$	-	3.3	-	dB
Per device						
h_{FE1}/h_{FE2}	h_{FE} matching	$V_{CE} = 5\text{ V};$ $I_C = 2\text{ mA}$	[3] 0.98	1	-	
$V_{BE1}-V_{BE2}$	V_{BE} matching	$V_{CE} = 5\text{ V};$ $I_C = 2\text{ mA}$	[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.

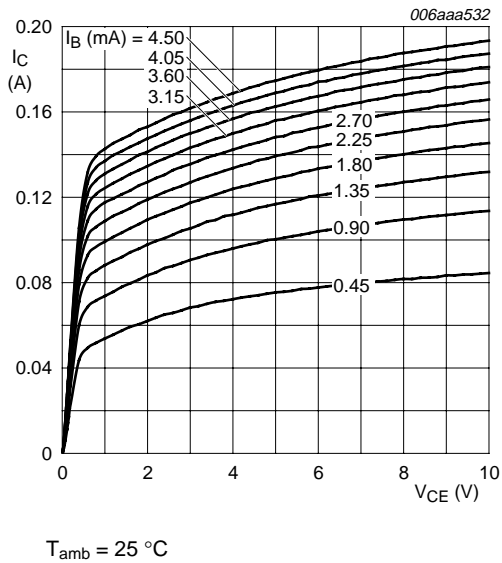


Fig 1. Collector current as a function of collector-emitter voltage; typical values

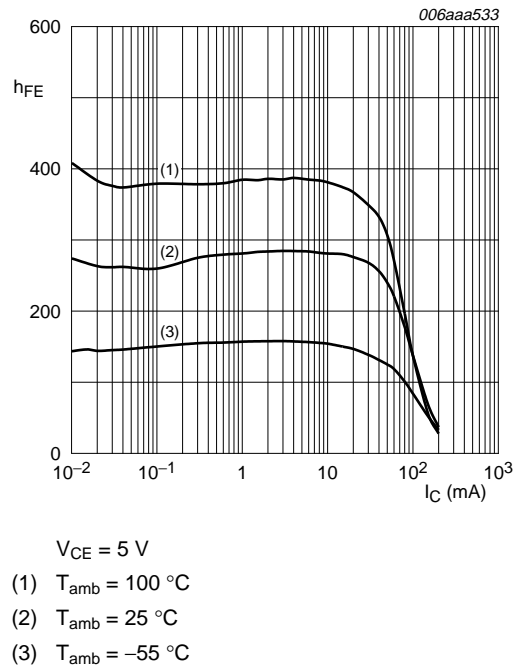


Fig 2. DC current gain as a function of collector current; typical values

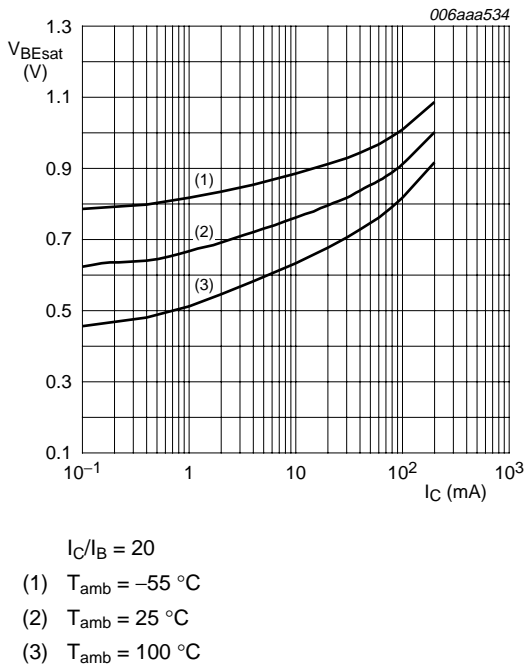


Fig 3. Base-emitter saturation voltage as a function of collector current; typical values

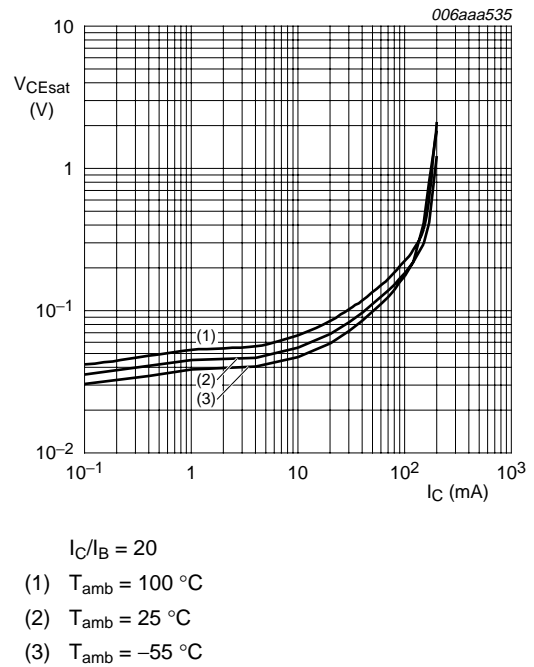
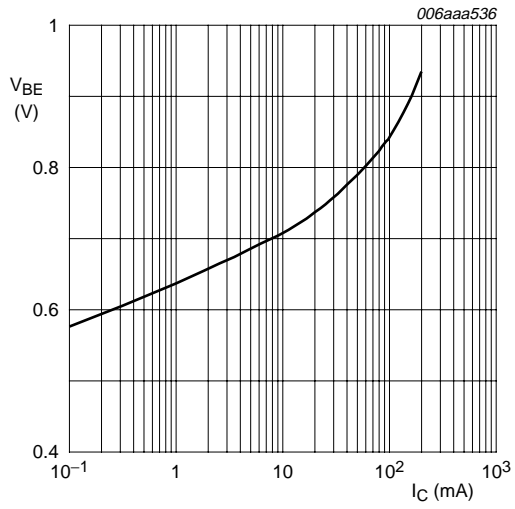
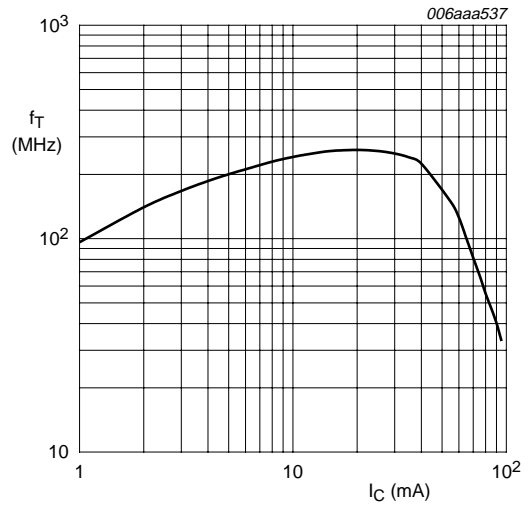


Fig 4. Collector-emitter saturation voltage as a function of collector current; typical values



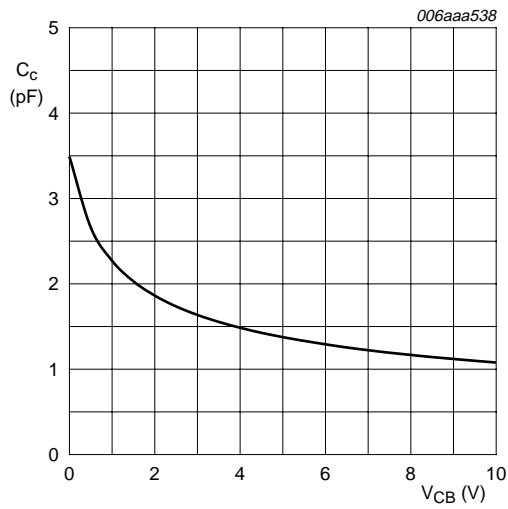
$V_{CE} = 5$ V; $T_{amb} = 25$ °C

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



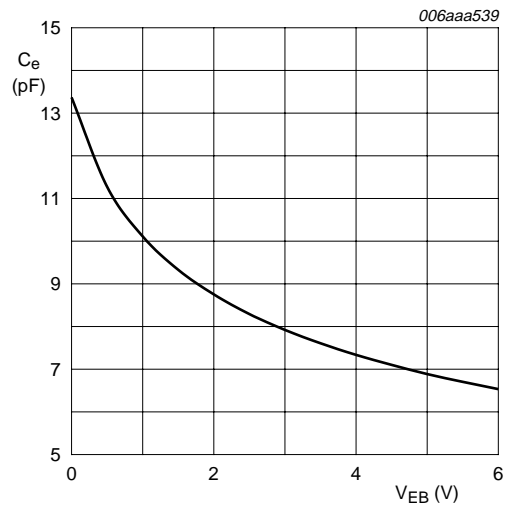
$V_{CE} = 5$ V; $T_{amb} = 25$ °C

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

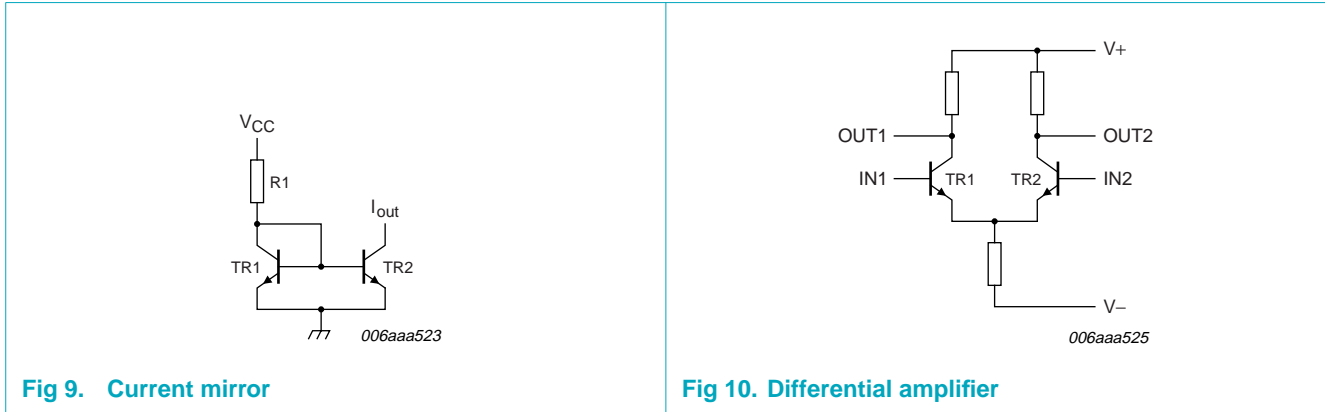


Fig 9. Current mirror

Fig 10. Differential amplifier

9. Package outline

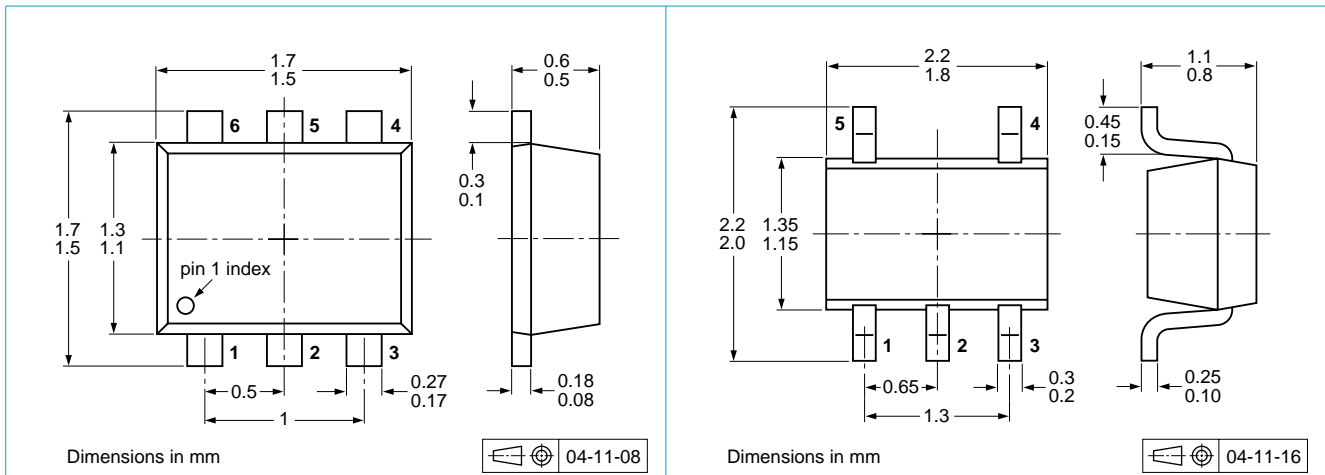


Fig 11. Package outline SOT666

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

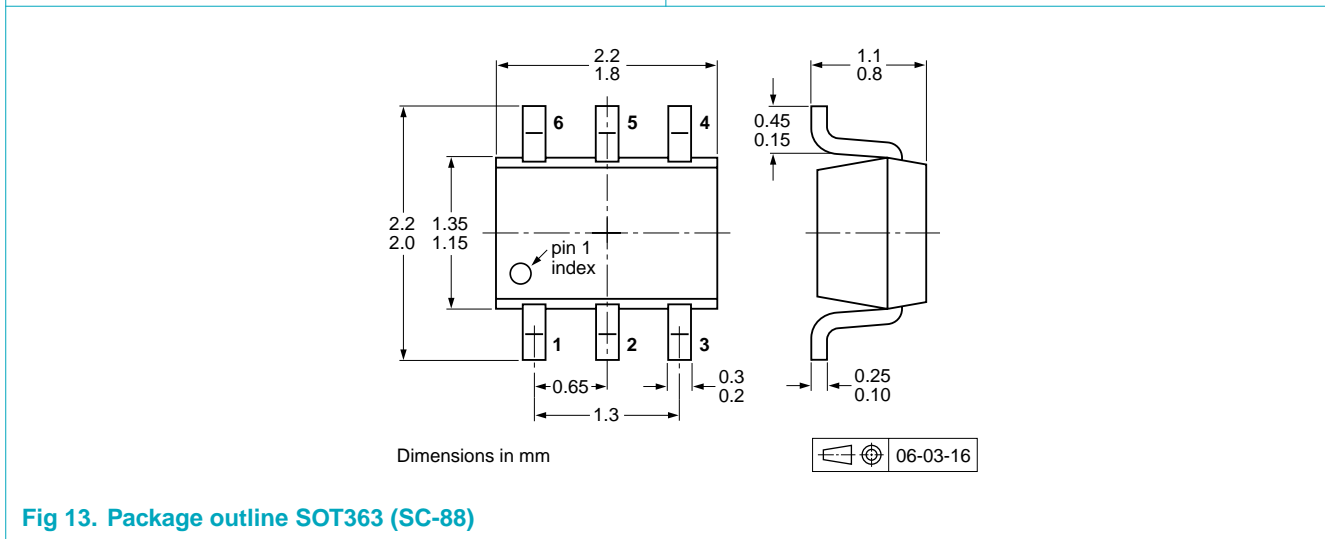


Fig 13. Package outline SOT363 (SC-88)

10. Packing information

Table 9. Packing methods

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

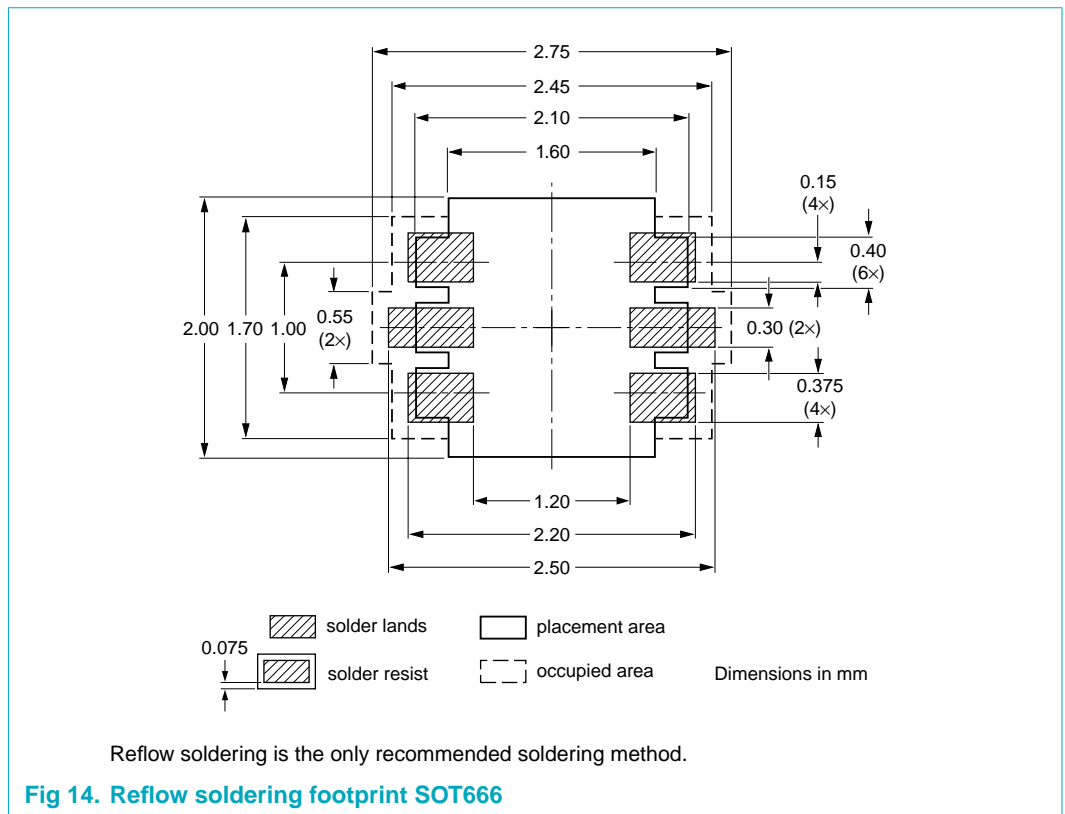
Type number	Package	Description	Packing quantity			
			3000	4000	8000	10000
PMP4201V	SOT666	2 mm pitch, 8 mm tape and reel	-	-	-315	-
		4 mm pitch, 8 mm tape and reel	-	-115	-	-
PMP4201G	SOT353	4 mm pitch, 8 mm tape and reel	-115	-	-	-135
PMP4201Y	SOT363	4 mm pitch, 8 mm tape and reel; T1 ^[2]	-115	-	-	-135
		4 mm pitch, 8 mm tape and reel; T2 ^[3]	-125	-	-	-165

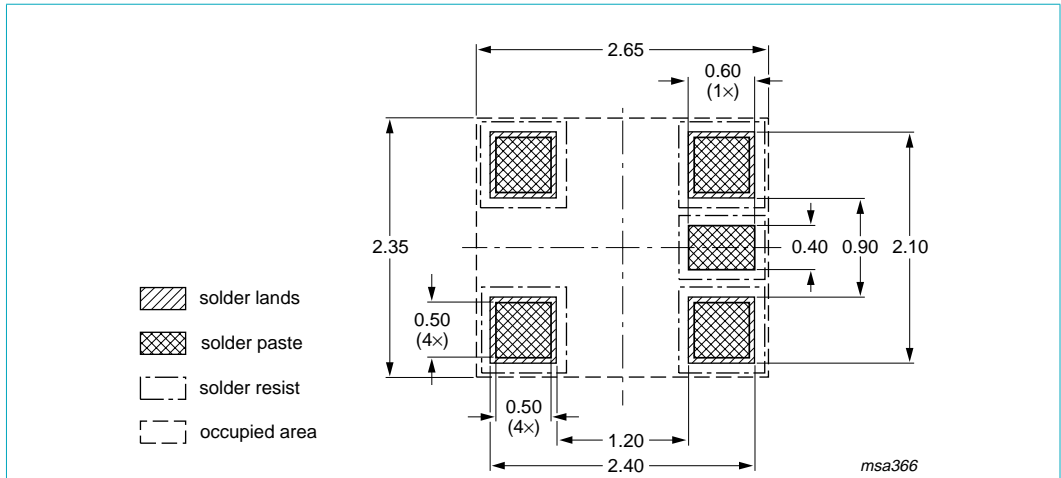
[1] For further information and the availability of packing methods, see [Section 14](#).

[2] T1: normal taping

[3] T2: reverse taping

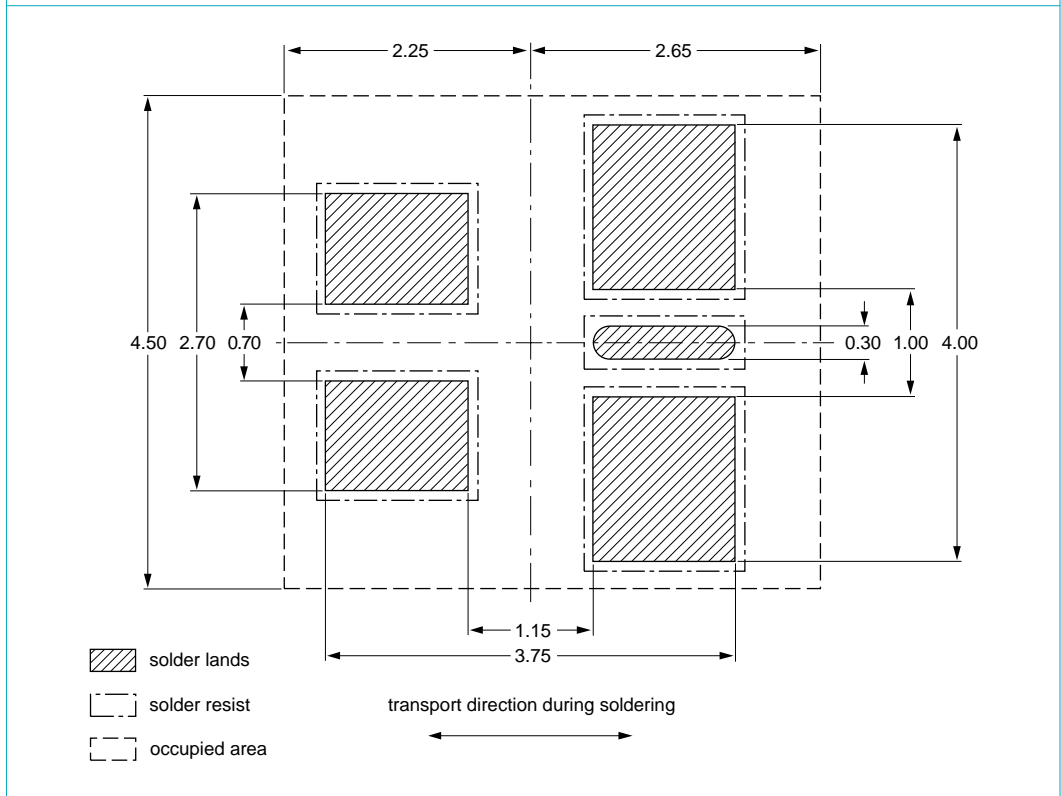
11. Soldering





Dimensions in mm

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



Dimensions in mm

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

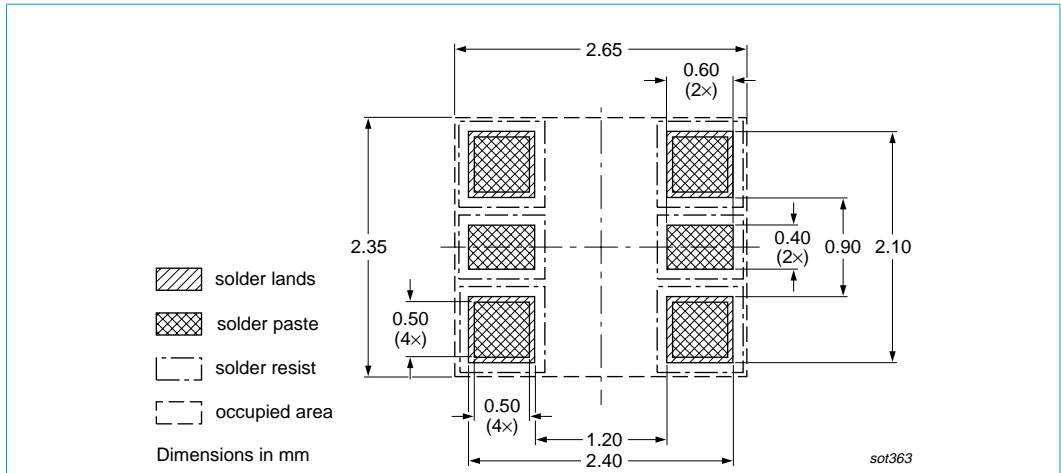


Fig 17. Reflow soldering footprint SOT363 (SC-88)

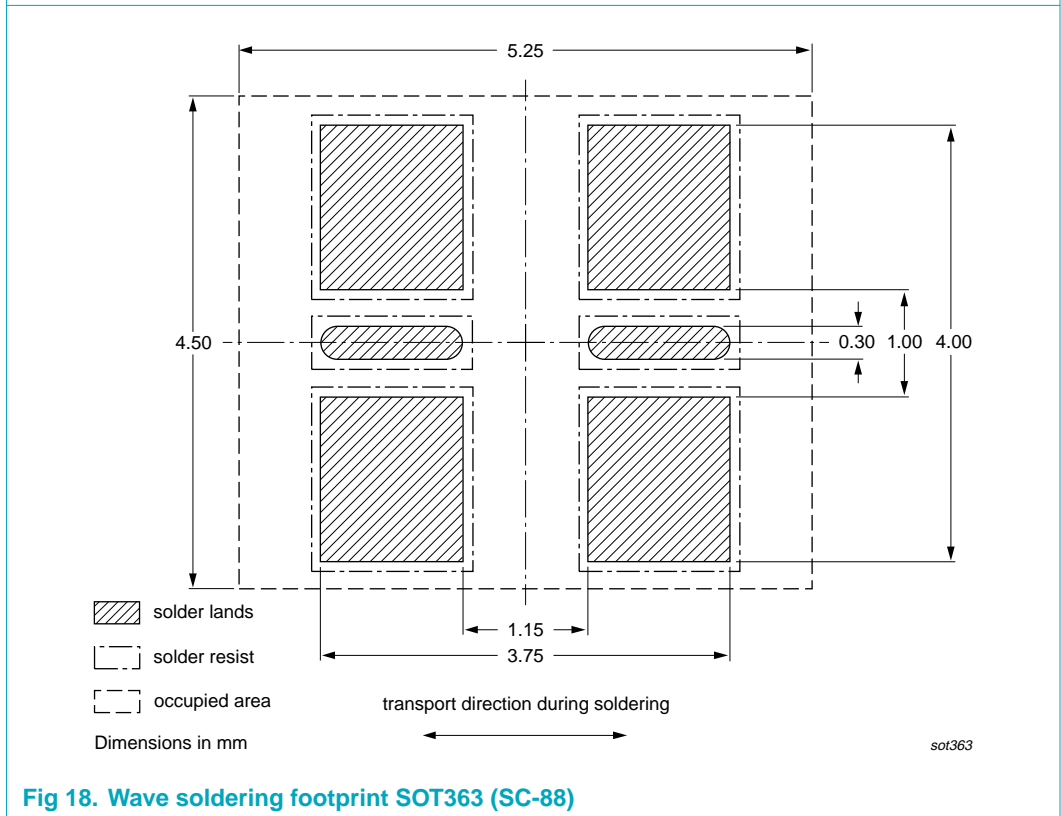


Fig 18. Wave soldering footprint SOT363 (SC-88)

12. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMP4201V_G_Y_3	20060915	Product data sheet	-	PMP4201G_Y_2
Modifications:	<ul style="list-style-type: none">Type number PMP4201V addedSection 13 "Legal information": updated			
PMP4201G_Y_2	20060214	Product data sheet	-	PMP4201G_Y_1
PMP4201G_Y_1	20060131	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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