



PMP3906AYS-Q

40 V, 200 mA PNP/PNP matched double transistor

3 August 2022

Product data sheet

1. General description

PNP/PNP matched double transistor in a SOT363 (SC-88) very small Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Current gain matching
- Base-emitter voltage matching
- Application-optimized pinout
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

- Current mirror
- Differential amplifier

4. Quick reference data

Table 1. Quick reference data

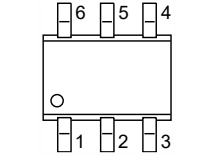
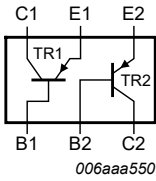
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per transistor						
V_{CE0}	collector-emitter voltage	open base	-	-	-40	V
I_C	collector current		-	-	-200	mA
h_{FE}	DC current gain	$V_{CE} = -1\text{ V}; I_C = -10\text{ mA}; T_{amb} = 25\text{ °C}$	100	180	300	
Per device						
h_{FE1}/h_{FE2}	DC current gain matching	$V_{CE} = -5\text{ V}; I_C = -2\text{ mA}; T_{amb} = 25\text{ °C}$	[1]	0.98	1	-
$V_{BE1}-V_{BE2}$	base-emitter voltage matching		[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.

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B1	base TR1	 <p>TSSOP6 (SOT363)</p>	 <p>006aaa550</p>
2	B2	base TR2		
3	C2	collector TR2		
4	E2	emitter TR2		
5	E1	emitter TR1		
6	C1	collector TR1		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMP3906AYS-Q	TSSOP6	plastic, surface-mounted package; 6 leads; 0.65 mm pitch; 2.1 mm x 1.25 mm x 0.95 mm body	SOT363

7. Marking

Table 4. Marking codes

Type number	Marking code ^[1]
PMP3906AYS-Q	Q2%

[1] % = placeholder for manufacturing site code

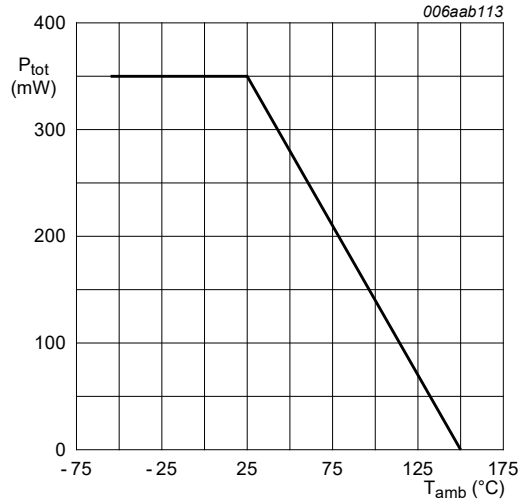
8. Limiting values

Table 5. 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	-	-40	V
V_{CEO}	collector-emitter voltage	open base	-	-40	V
V_{EBO}	emitter-base voltage	open collector	-	-6	V
I_C	collector current		-	-200	mA
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms	-	-200	mA
I_{BM}	peak base current		-	-100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	230	mW
Per device					
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	350	mW
T_j	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.



FR4 PCB, standard footprint

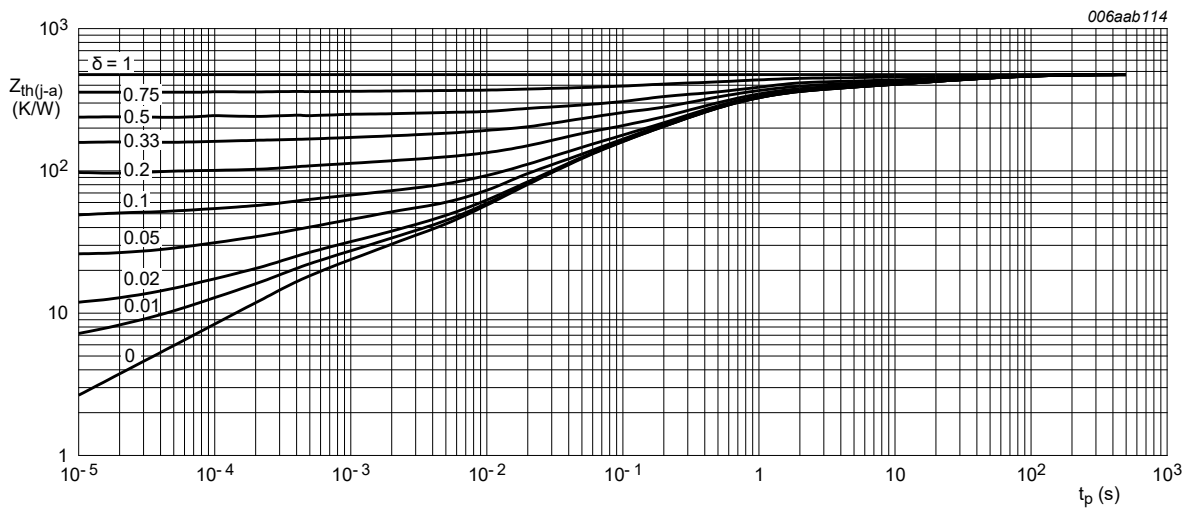
Fig. 1. Per device: Power derating curve

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor							
R _{th(j-a)}	thermal resistance from junction to ambient	in free air	[1]	-	-	543	K/W
R _{th(j-sp)}	thermal resistance from junction to solder point			-	-	290	K/W
Per device							
R _{th(j-a)}	thermal resistance from junction to ambient	in free air	[1]	-	-	357	K/W

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



FR4 PCB, standard footprint

Fig. 2. Per transistor: Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per transistor						
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = -100 \mu\text{A}$; $I_E = 0 \text{ A}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-40	-	-	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	$I_C = 0 \text{ A}$; $I_E = -100 \mu\text{A}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-6	-	-	V
I_{CBO}	collector-base cut-off current	$V_{CB} = -32 \text{ V}$; $I_E = 0 \text{ A}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	-50	nA
I_{EBO}	emitter-base cut-off current	$V_{EB} = -6 \text{ V}$; $I_C = 0 \text{ A}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	-50	nA
h_{FE}	DC current gain	$V_{CE} = -1 \text{ V}$; $I_C = -100 \mu\text{A}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	60	180	-	
		$V_{CE} = -1 \text{ V}$; $I_C = -1 \text{ mA}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	80	180	-	
		$V_{CE} = -1 \text{ V}$; $I_C = -10 \text{ mA}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	100	180	300	
		$V_{CE} = -1 \text{ V}$; $I_C = -50 \text{ mA}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	60	130	-	
		$V_{CE} = -1 \text{ V}$; $I_C = -100 \text{ mA}$; pulsed; $t_p \leq 300 \mu\text{s}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	30	50	-	
V_{CEsat}	collector-emitter saturation voltage	$I_C = -10 \text{ mA}$; $I_B = -1 \text{ mA}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	-250	mV
		$I_C = -50 \text{ mA}$; $I_B = -5 \text{ mA}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	-400	mV
V_{BEsat}	base-emitter saturation voltage	$I_C = -10 \text{ mA}$; $I_B = -1 \text{ mA}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	-850	mV
		$I_C = -50 \text{ mA}$; $I_B = -5 \text{ mA}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	-950	mV
t_d	delay time	$I_C = -10 \text{ mA}$; $I_{B\text{on}} = -1 \text{ mA}$; $I_{B\text{off}} = 1 \text{ mA}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	35	ns
t_r	rise time		-	-	35	ns
t_{on}	turn-on time		-	-	70	ns
t_s	storage time		-	-	225	ns
t_f	fall time		-	-	75	ns
t_{off}	turn-off time		-	-	300	ns
C_c	collector capacitance		$V_{CB} = -5 \text{ V}$; $I_E = 0 \text{ A}$; $i_e = 0 \text{ A}$; $f = 1 \text{ MHz}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	4.5
C_e	emitter capacitance	$V_{EB} = -0.5 \text{ V}$; $I_C = 0 \text{ A}$; $i_c = 0 \text{ A}$; $f = 1 \text{ MHz}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	10	pF
f_T	transition frequency	$V_{CE} = -20 \text{ V}$; $I_C = -10 \text{ mA}$; $f = 100 \text{ MHz}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	250	-	-	MHz
NF	noise figure	$V_{CE} = -5 \text{ V}$; $I_C = -100 \mu\text{A}$; $R_S = 1 \text{ k}\Omega$; $f = 1 \text{ kHz}$; $B = 10 \text{ to } 15700 \text{ Hz}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	4	dB
Per device						
h_{FE1}/h_{FE2}	DC current gain matching	$V_{CE} = -5 \text{ V}$; $I_C = -2 \text{ mA}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	[1]	0.98	1	-
$V_{BE1}-V_{BE2}$	base-emitter voltage matching		[2]	-	-	2

[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.

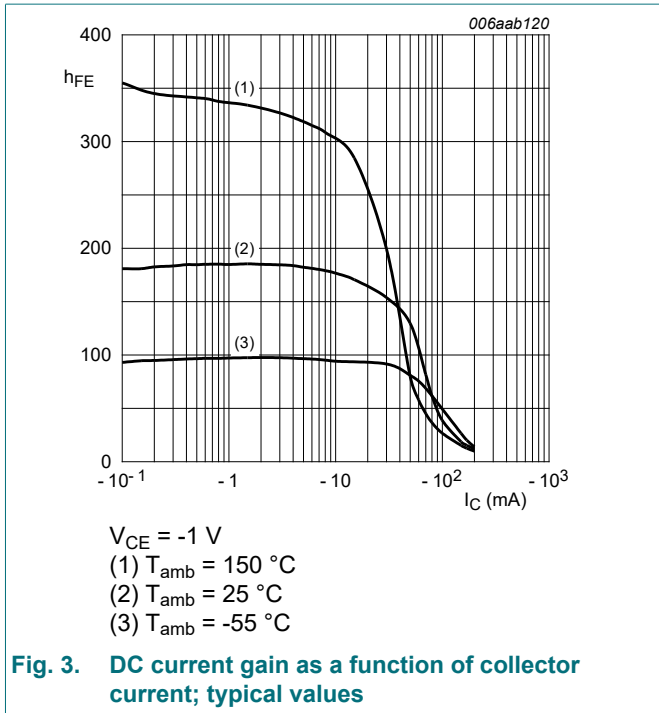


Fig. 3. DC current gain as a function of collector current; typical values

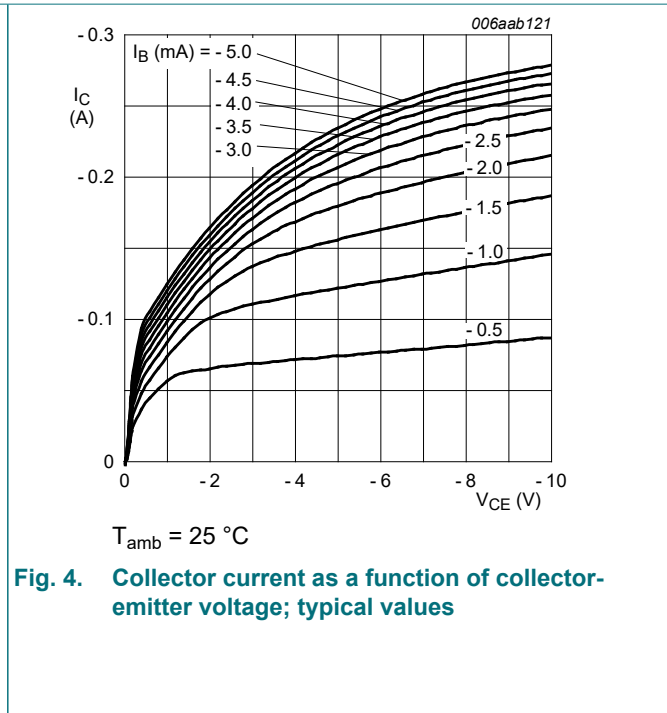


Fig. 4. Collector current as a function of collector-emitter voltage; typical values

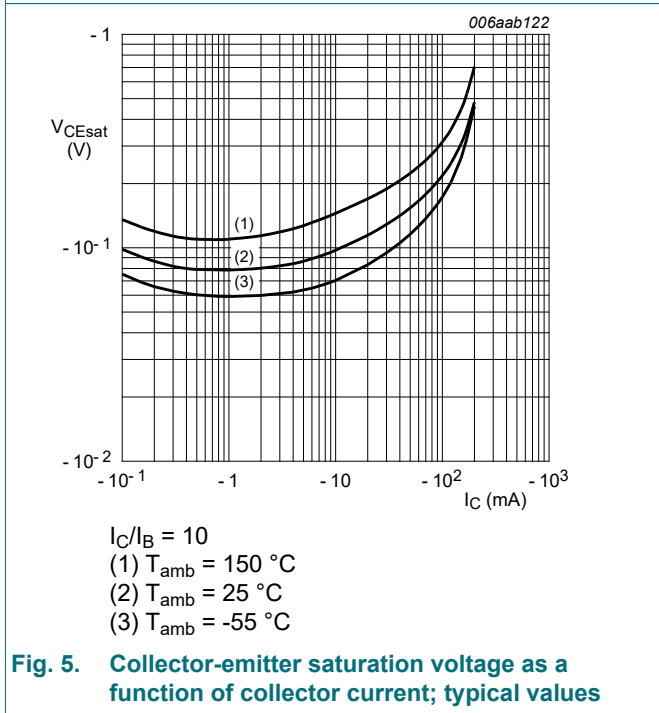


Fig. 5. Collector-emitter saturation voltage as a function of collector current; typical values

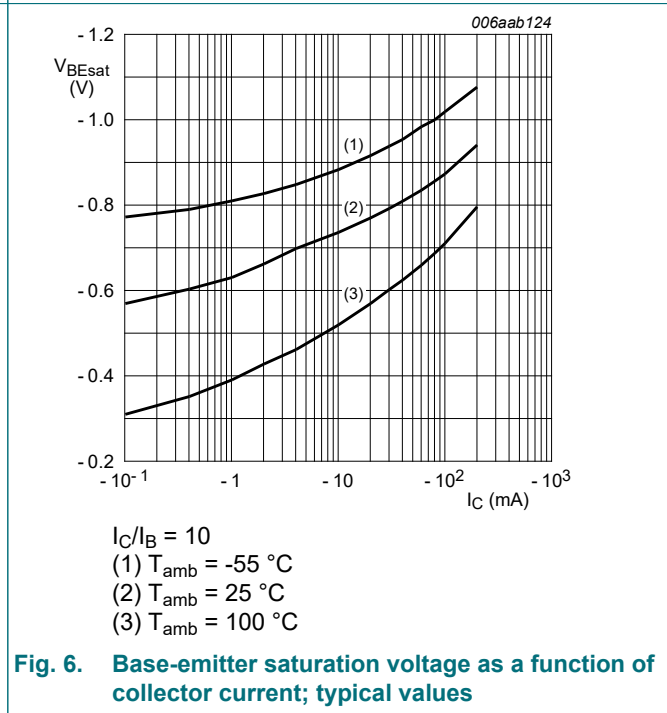
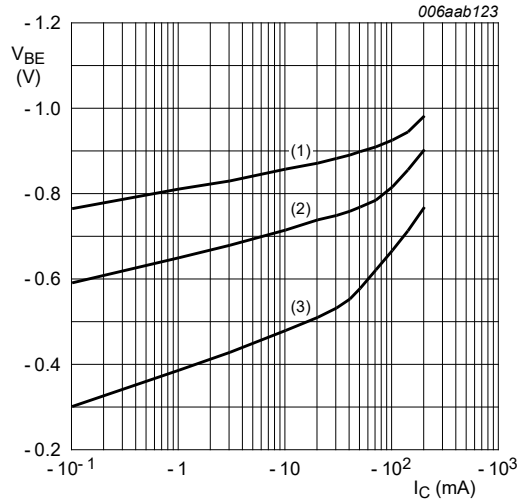


Fig. 6. Base-emitter saturation voltage as a function of collector current; typical values



$V_{CE} = -1\text{ V}$
 (1) $T_{amb} = -55\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 150\text{ °C}$

Fig. 7. Base-emitter voltage as a function of collector current; typical values

11. Test information

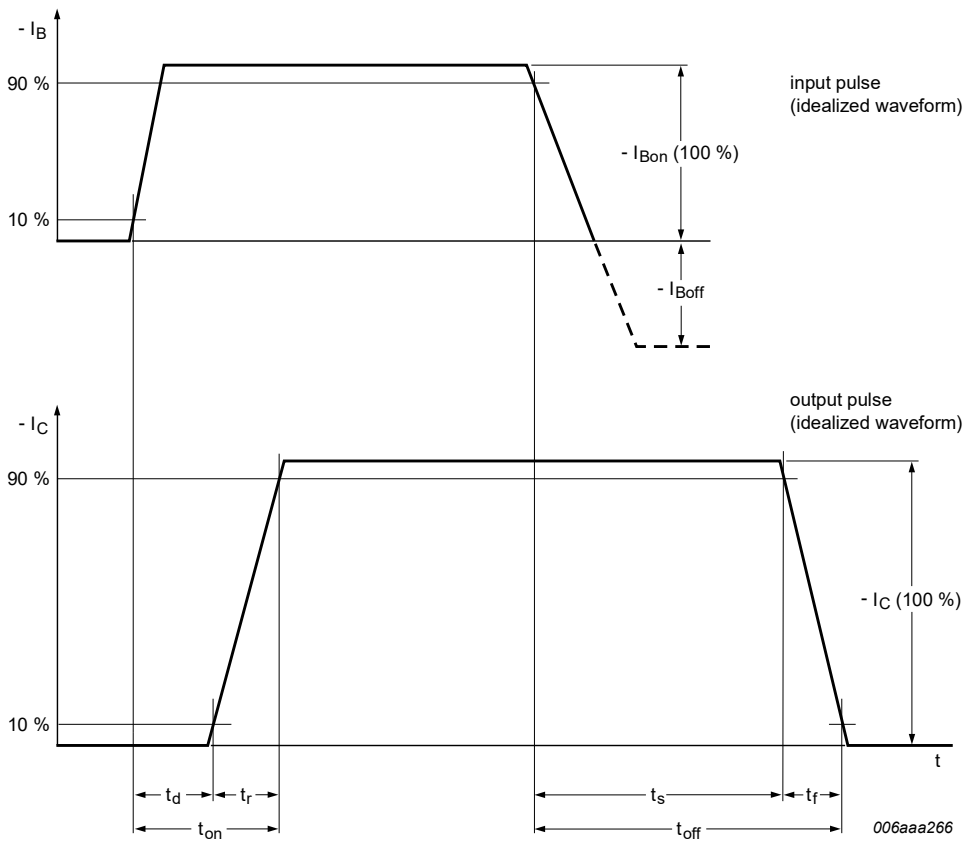


Fig. 8. Transistor switching time definition

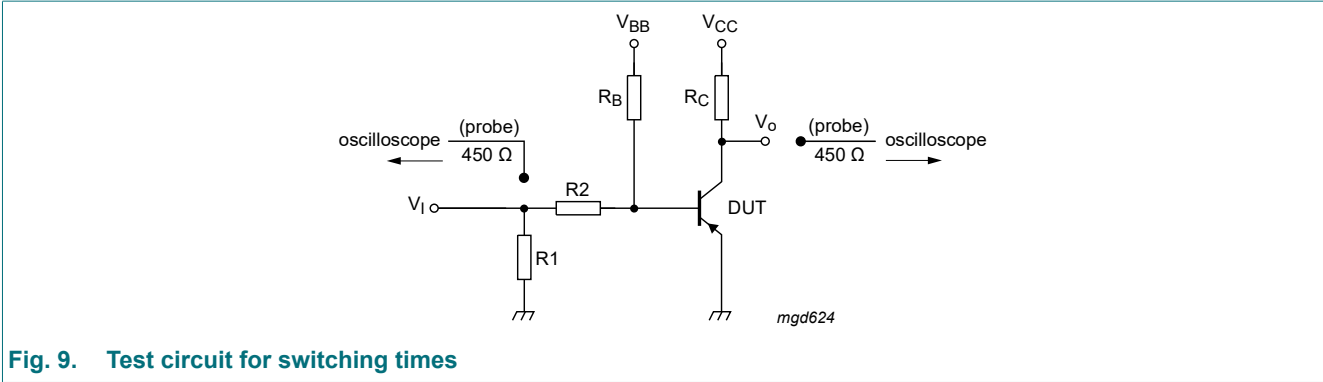


Fig. 9. Test circuit for switching times

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.

12. Package outline

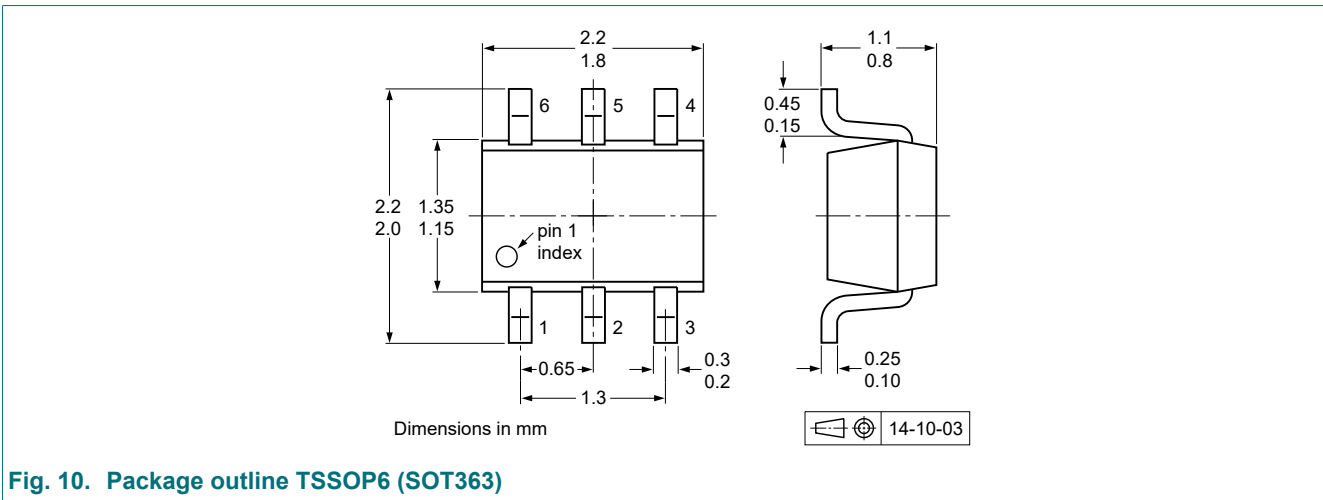


Fig. 10. Package outline TSSOP6 (SOT363)

13. Soldering

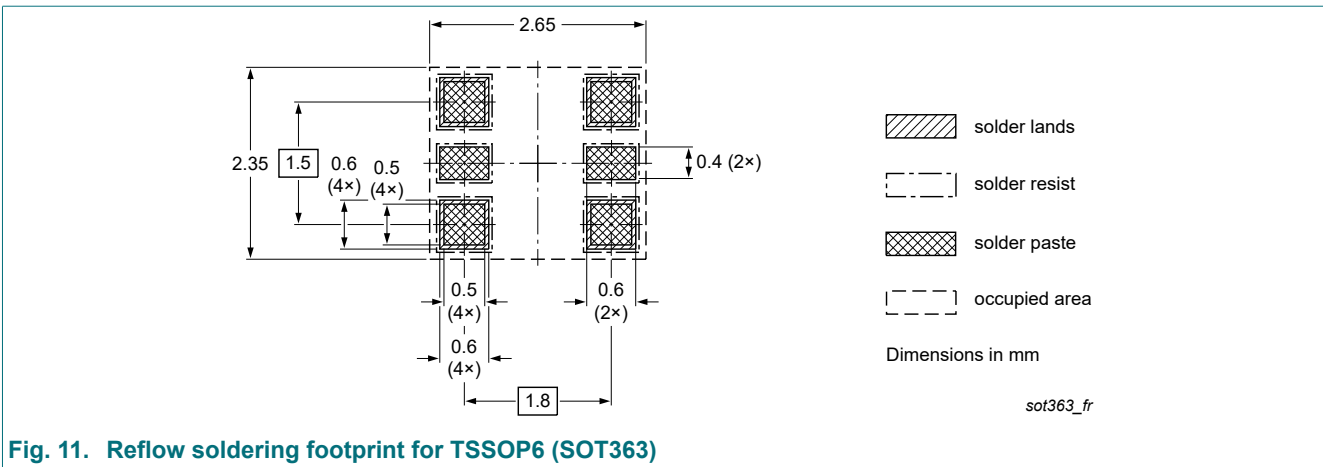


Fig. 11. Reflow soldering footprint for TSSOP6 (SOT363)

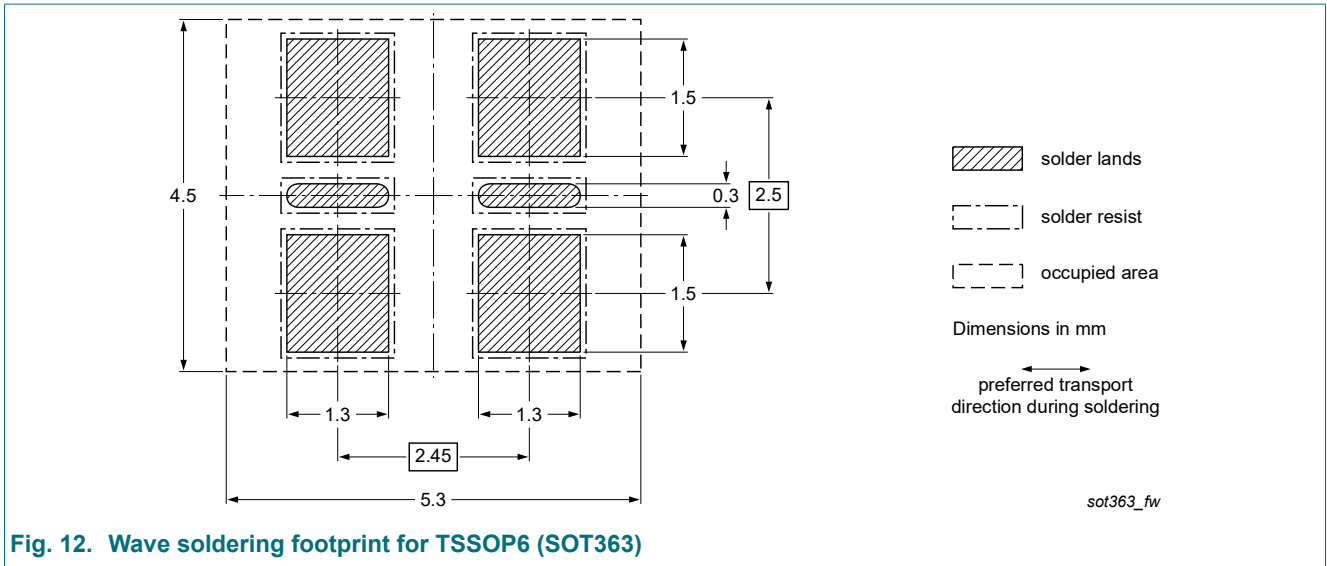


Fig. 12. Wave soldering footprint for TSSOP6 (SOT363)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMP3906AYS-Q v.2	20220803	Product data sheet	-	PMP3906AYS-Q v.1
Modifications:	• Product status changed			
PMP3906AYS-Q v.1	20220525	Objective data sheet	-	-

15. Legal information

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.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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