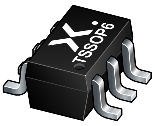

PMP3906AYS

40 V, 200 mA PNP/PNP matched double transistor

27 July 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

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_{CEO}	collector-emitter voltage	open base		-	-	-40	V
I_C	collector current			-	-	-200	mA
h_{FE}	DC current gain	V_{CE} = -1 V; I_C = -10 mA; T_{amb} = 25 °C		100	180	300	
Per device							
h_{FE1}/h_{FE2}	DC current gain matching	V_{CE} = -5 V; I_C = -2 mA; T_{amb} = 25 °C	[1]	0.95	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.

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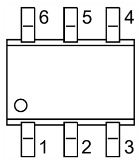
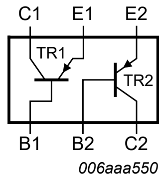
5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B1	base TR1	 TSSOP6 (SOT363)	
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	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	2G%

[1] % = placeholder for manufacturing site code

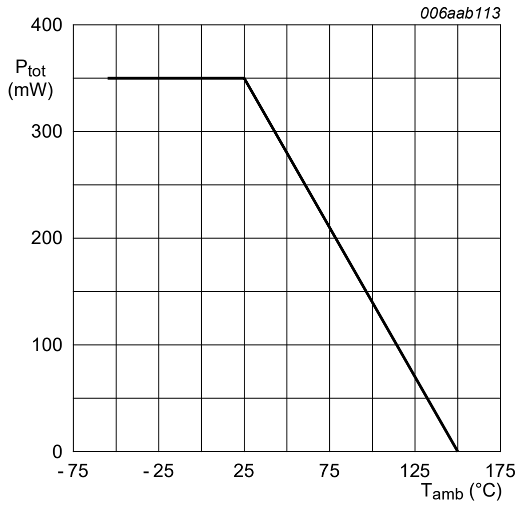
8. Limiting values

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

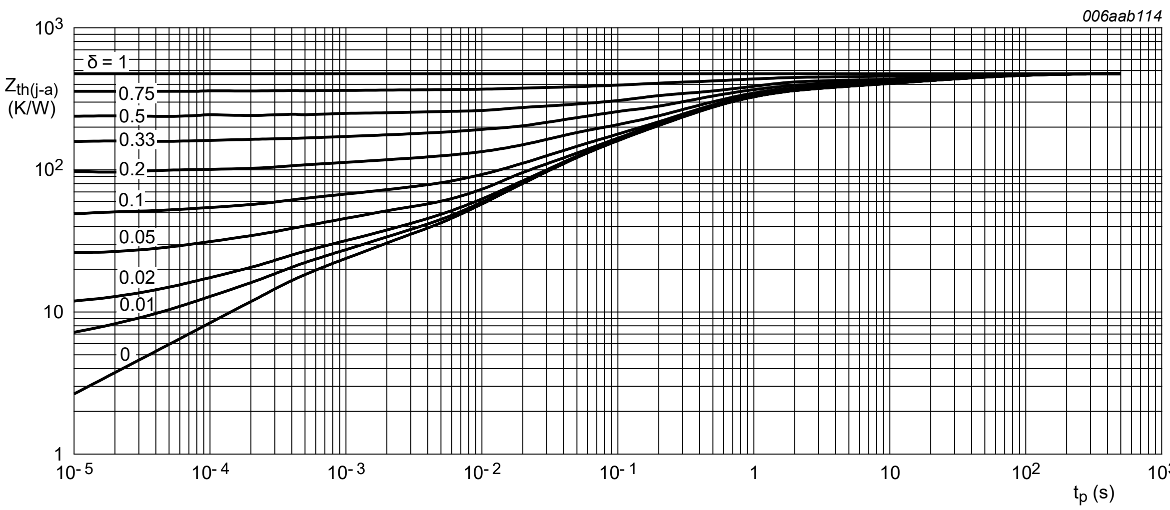
Fig. 1. Per device: Power derating curve

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

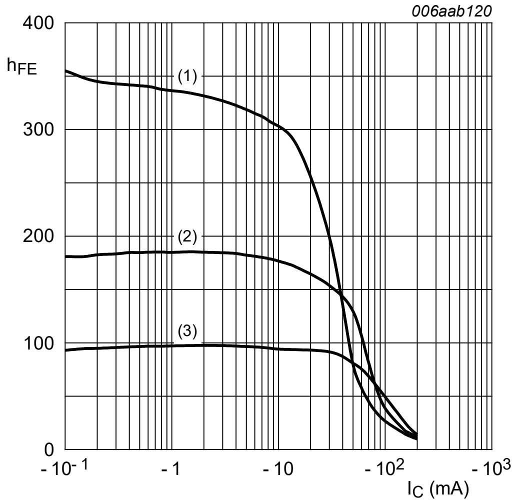
Fig. 2. Per transistor: Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics

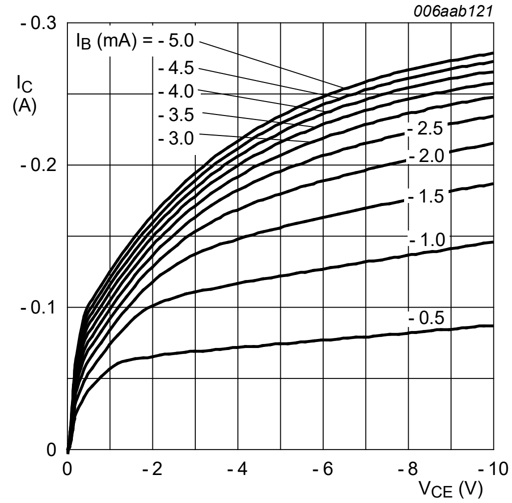
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor							
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = -100 µA; I_E = 0 A; T_{amb} = 25 °C		-40	-	-	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_C = 0 A; I_E = -100 µA; T_{amb} = 25 °C		-6	-	-	V
I_{CBO}	collector-base cut-off current	V_{CB} = -32 V; I_E = 0 A; T_{amb} = 25 °C		-	-	-50	nA
I_{EBO}	emitter-base cut-off current	V_{EB} = -6 V; I_C = 0 A; T_{amb} = 25 °C		-	-	-50	nA
h_{FE}	DC current gain	V_{CE} = -1 V; I_C = -100 µA; T_{amb} = 25 °C		60	180	-	
		V_{CE} = -1 V; I_C = -1 mA; T_{amb} = 25 °C		80	180	-	
		V_{CE} = -1 V; I_C = -10 mA; T_{amb} = 25 °C		100	180	300	
		V_{CE} = -1 V; I_C = -50 mA; T_{amb} = 25 °C		60	130	-	
		V_{CE} = -1 V; I_C = -100 mA; pulsed; t_p ≤ 300 µs; T_{amb} = 25 °C		30	50	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = -10 mA; I_B = -1 mA; T_{amb} = 25 °C		-	-	-250	mV
		I_C = -50 mA; I_B = -5 mA; T_{amb} = 25 °C		-	-	-400	mV
V_{BEsat}	base-emitter saturation voltage	I_C = -10 mA; I_B = -1 mA; T_{amb} = 25 °C		-	-	-850	mV
		I_C = -50 mA; I_B = -5 mA; T_{amb} = 25 °C		-	-	-950	mV
t_d	delay time	I_C = -10 mA; I_{Bon} = -1 mA; I_{Boff} = 1 mA; T_{amb} = 25 °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 V; I_E = 0 A; i_e = 0 A; f = 1 MHz; T_{amb} = 25 °C		-	-	4.5	pF
C_e	emitter capacitance	V_{EB} = -0.5 V; I_C = 0 A; i_c = 0 A; f = 1 MHz; T_{amb} = 25 °C		-	-	10	pF
f_T	transition frequency	V_{CE} = -20 V; I_C = -10 mA; f = 100 MHz; T_{amb} = 25 °C		250	-	-	MHz
NF	noise figure	V_{CE} = -5 V; I_C = -100 µA; R_S = 1 kΩ; f = 1 kHz; B = 10 to 15700 Hz; T_{amb} = 25 °C		-	-	4	dB
Per device							
h_{FE1}/h_{FE2}	DC current gain matching	V_{CE} = -5 V; I_C = -2 mA; T_{amb} = 25 °C	[1]	0.95	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.



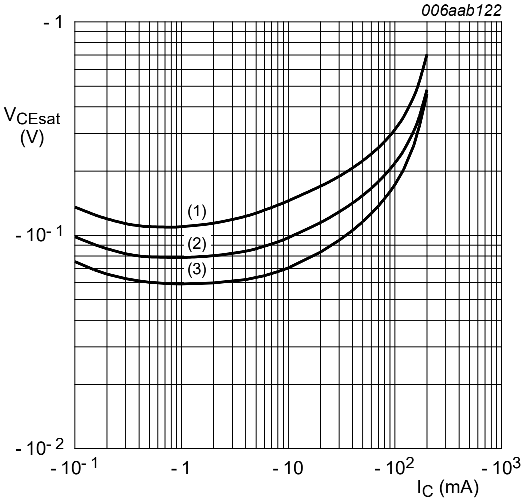
V_{CE} = -1 V
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

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



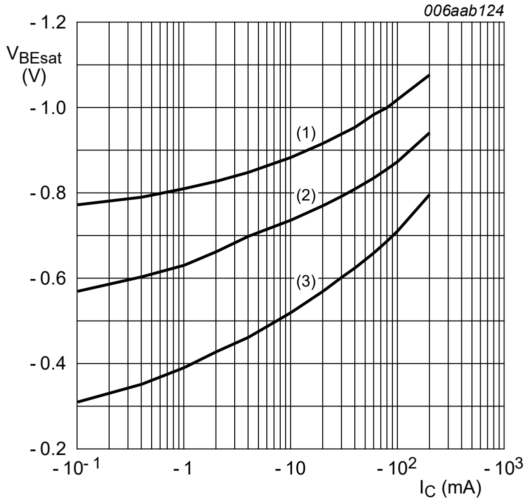
T_{amb} = 25 °C

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



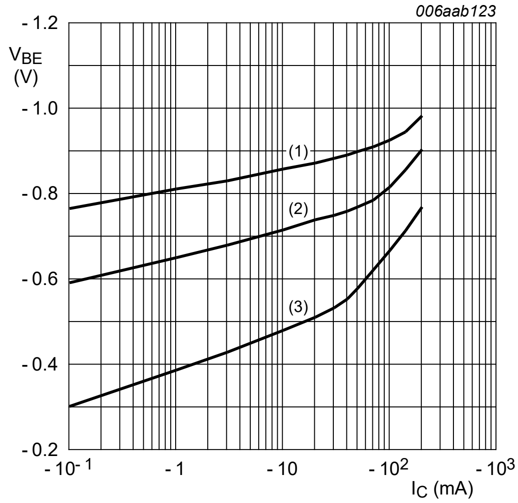
I_C/I_B = 10
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

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



I_C/I_B = 10
(1) T_{amb} = -55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 100 °C

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



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

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

11. Test information

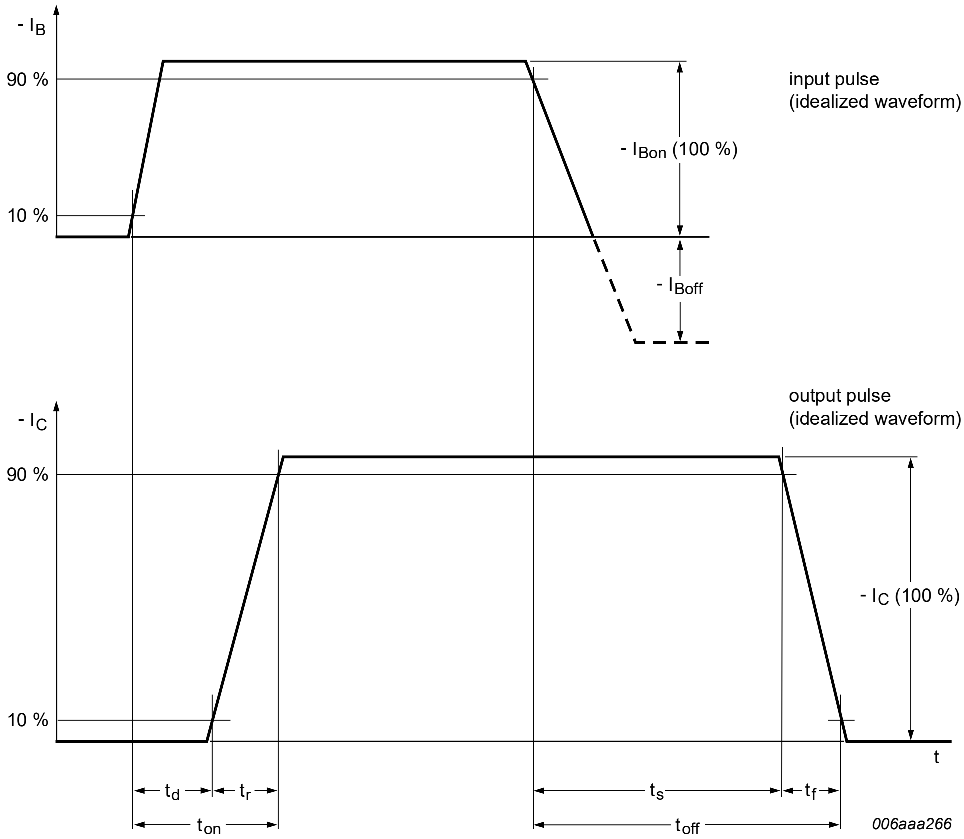


Fig. 8. BISS transistor switching time definition

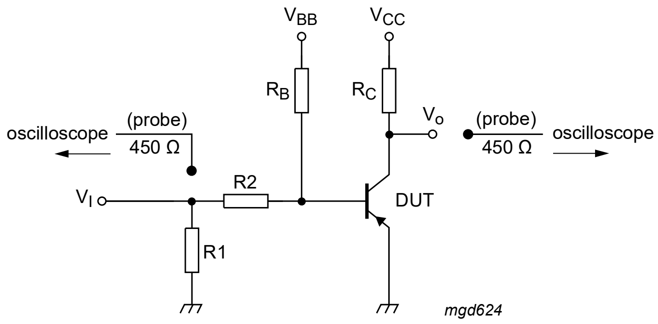


Fig. 9. Test circuit for switching times

12. Package outline

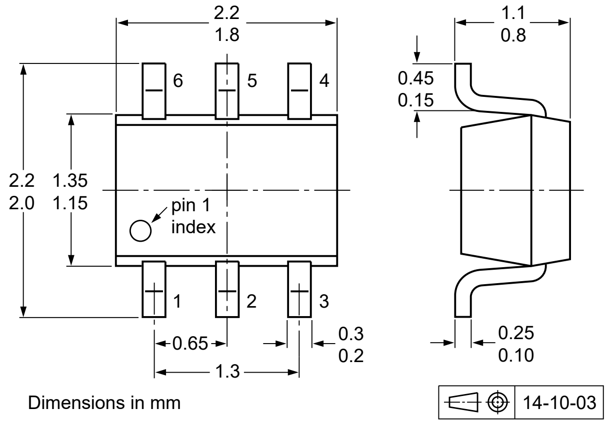


Fig. 10. Package outline TSSOP6 (SOT363)

13. Soldering

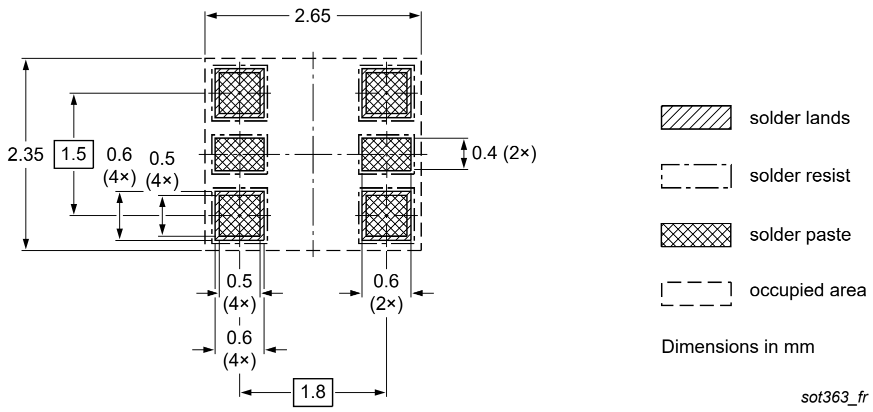


Fig. 11. Reflow soldering footprint for TSSOP6 (SOT363)

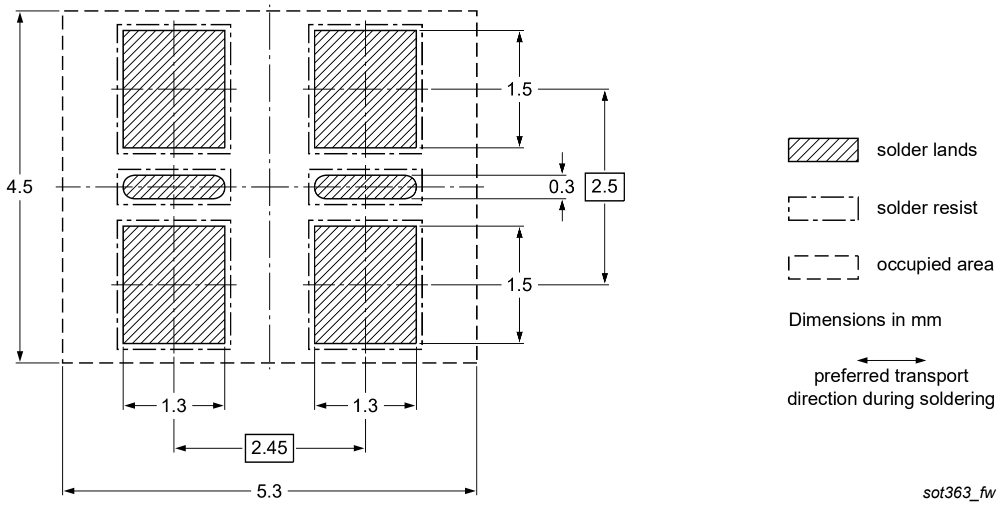


Fig. 12. Wave soldering footprint for TSSOP6 (SOT363)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMP3906AYS v.1	20220727	Product 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.

[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 https://www.nexperia.com.

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