



# PMBT3906YS

40 V, 200 mA PNP/PNP general-purpose double transistor

Rev. 02 — 13 May 2009

Product data sheet

## 1. Product profile

### 1.1 General description

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

Table 1. Product overview

Type number	Package		NPN/NPN complement	NPN/PNP complement	Package configuration
	NXP	JEITA			
PMBT3906YS	SOT363	SC-88	PMBT3904YS	PMBT3946YPN	very small

### 1.2 Features

- General-purpose double transistor
- Board-space reduction
- AEC-Q101 qualified

### 1.3 Applications

- General-purpose switching and amplification

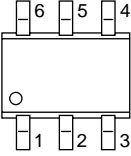
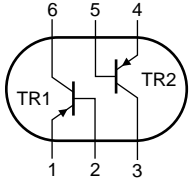
### 1.4 Quick reference data

Table 2. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per transistor</b>						
$V_{CE0}$	collector-emitter voltage	open base	-	-	-40	V
$I_C$	collector current		-	-	-200	mA
$h_{FE}$	DC current gain	$V_{CE} = -1\text{ V};$ $I_C = -10\text{ mA}$	100	180	300	

## 2. Pinning information

**Table 3. Pinning**

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

*sym018*

## 3. Ordering information

**Table 4. Ordering information**

Type number	Package		
	Name	Description	Version
PMBT3906YS	SC-88	plastic surface-mounted package; 6 leads	SOT363

## 4. Marking

**Table 5. Marking codes**

Type number	Marking code <sup>[1]</sup>
PMBT3906YS	BD*

- [1] \* = -: made in Hong Kong  
 \* = p: made in Hong Kong  
 \* = t: made in Malaysia  
 \* = W: made in China

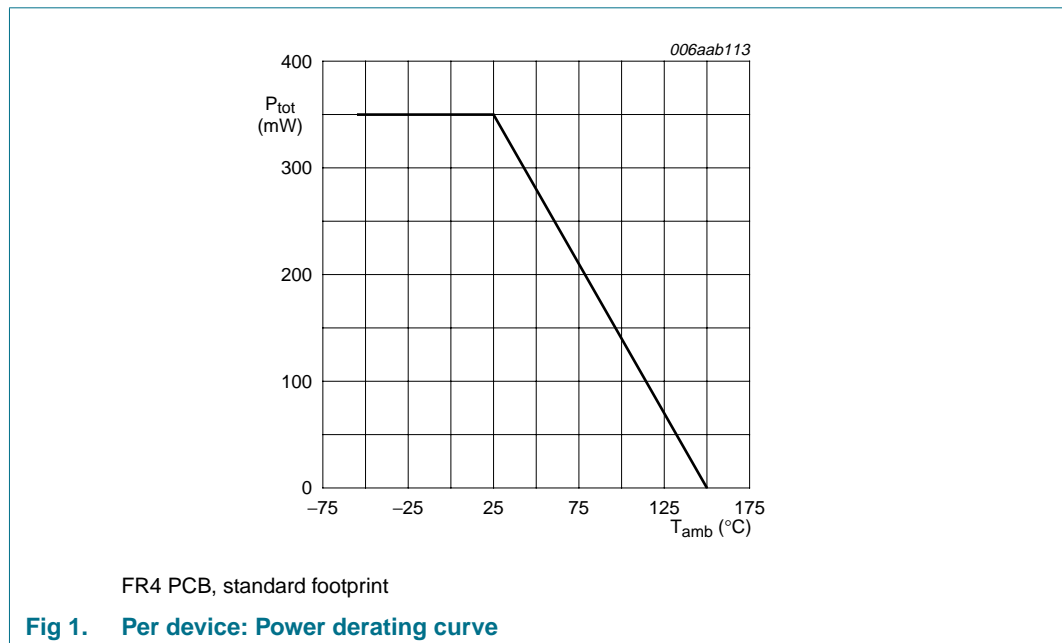
## 5. Limiting values

**Table 6. Limiting values**

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
<b>Per transistor</b>					
$V_{CBO}$	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	single pulse; $t_p \leq 1$ ms	-	-100	mA
$P_{tot}$	total power dissipation	$T_{amb} \leq 25$ °C	[1]	230	mW
<b>Per device</b>					
$P_{tot}$	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.



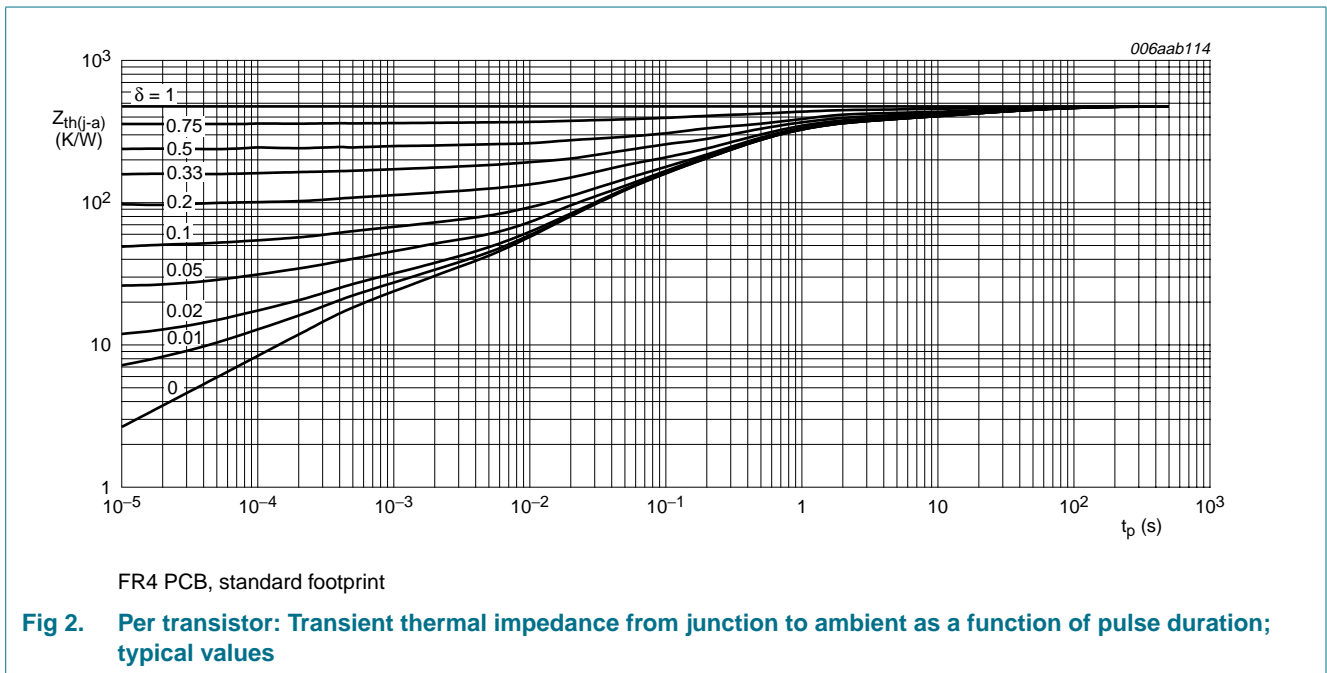
**Fig 1. Per device: Power derating curve**

## 6. Thermal characteristics

Table 7. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per transistor</b>						
$R_{th(j-a)}$	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
<b>Per device</b>						
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	357	K/W

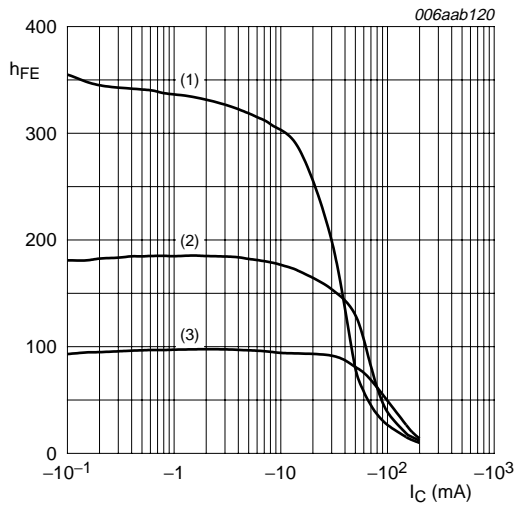
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.



## 7. Characteristics

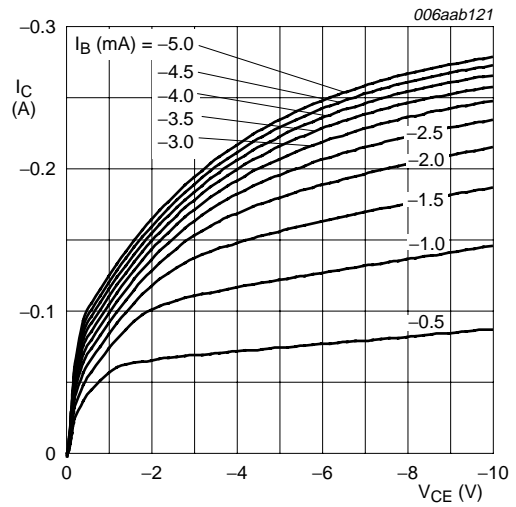
**Table 8. Characteristics**
*T<sub>amb</sub> = 25 °C unless otherwise specified.*

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per transistor</b>						
I <sub>CBO</sub>	collector-base cut-off current	V <sub>CB</sub> = -30 V; I <sub>E</sub> = 0 A	-	-	-50	nA
I <sub>EBO</sub>	emitter-base cut-off current	V <sub>EB</sub> = -6 V; I <sub>C</sub> = 0 A	-	-	-50	nA
h <sub>FE</sub>	DC current gain	V <sub>CE</sub> = -1 V				
		I <sub>C</sub> = -0.1 mA	60	180	-	
		I <sub>C</sub> = -1 mA	80	180	-	
		I <sub>C</sub> = -10 mA	100	180	300	
		I <sub>C</sub> = -50 mA	60	130	-	
V <sub>CEsat</sub>	collector-emitter saturation voltage	I <sub>C</sub> = -10 mA; I <sub>B</sub> = -1 mA	-	-100	-250	mV
		I <sub>C</sub> = -50 mA; I <sub>B</sub> = -5 mA	-	-165	-400	mV
V <sub>BESat</sub>	base-emitter saturation voltage	I <sub>C</sub> = -10 mA; I <sub>B</sub> = -1 mA	-	-750	-850	mV
		I <sub>C</sub> = -50 mA; I <sub>B</sub> = -5 mA	-	-850	-950	mV
f <sub>T</sub>	transition frequency	V <sub>CE</sub> = -20 V; I <sub>C</sub> = -10 mA; f = 100 MHz	250	-	-	MHz
C <sub>c</sub>	collector capacitance	V <sub>CB</sub> = -5 V; I <sub>E</sub> = i <sub>e</sub> = 0 A; f = 1 MHz	-	-	4.5	pF
C <sub>e</sub>	emitter capacitance	V <sub>BE</sub> = -0.5 V; I <sub>C</sub> = i <sub>c</sub> = 0 A; f = 1 MHz	-	-	10	pF
NF	noise figure	V <sub>CE</sub> = -5 V; I <sub>C</sub> = -100 μA; R <sub>S</sub> = 1 kΩ; f = 10 Hz to 15.7 kHz	-	-	4	dB
t <sub>d</sub>	delay time	V <sub>CC</sub> = -3 V;	-	-	35	ns
t <sub>r</sub>	rise time	I <sub>C</sub> = -10 mA;	-	-	35	ns
t <sub>on</sub>	turn-on time	I <sub>Bon</sub> = -1 mA;	-	-	70	ns
t <sub>s</sub>	storage time	I <sub>Boff</sub> = 1 mA	-	-	225	ns
t <sub>f</sub>	fall time		-	-	75	ns
t <sub>off</sub>	turn-off time		-	-	300	ns



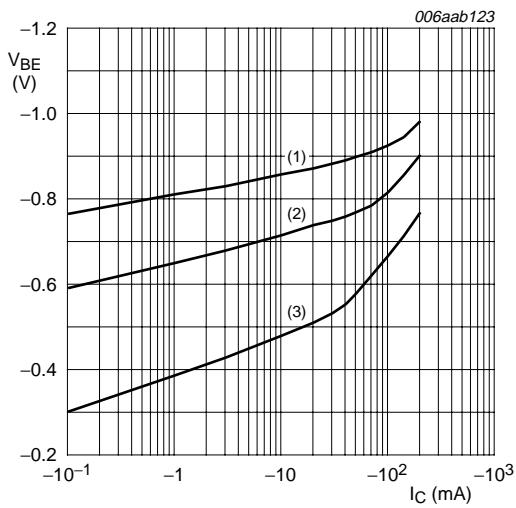
$V_{CE} = -1 V$   
 (1)  $T_{amb} = 150^\circ C$   
 (2)  $T_{amb} = 25^\circ C$   
 (3)  $T_{amb} = -55^\circ C$

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



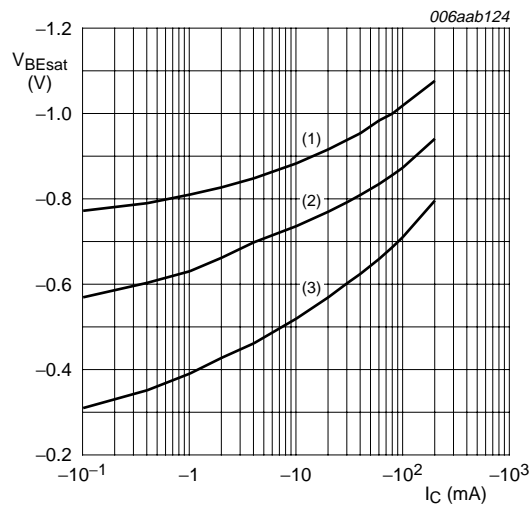
$T_{amb} = 25^\circ C$

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



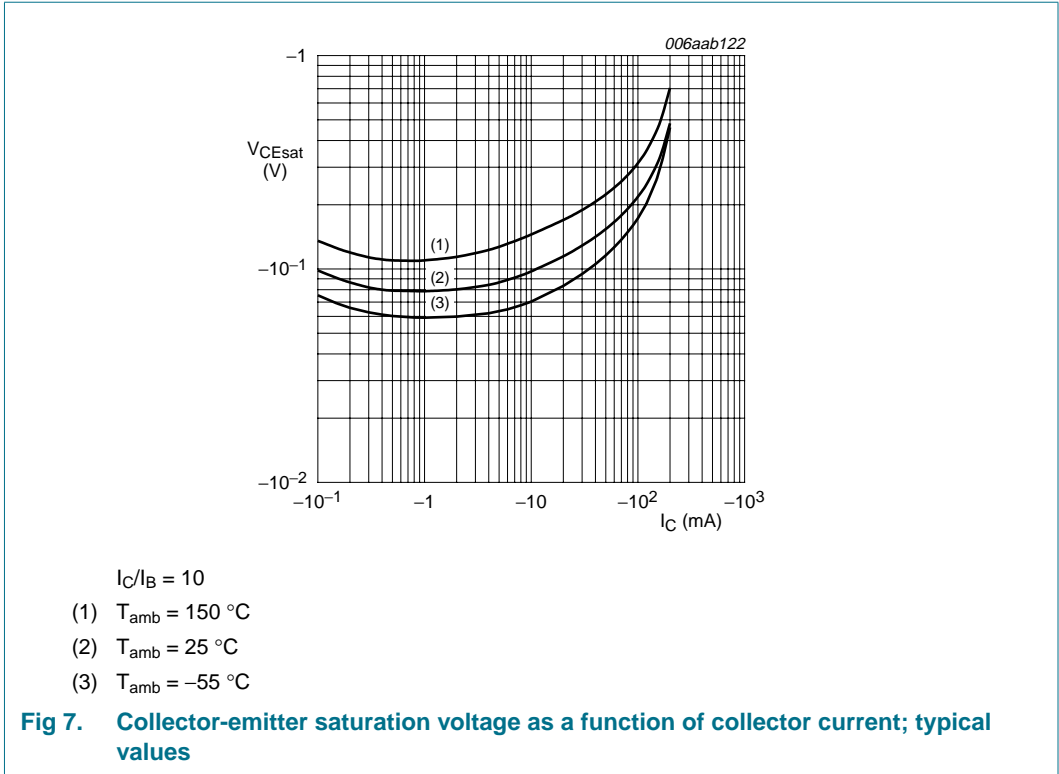
$V_{CE} = -1 V$   
 (1)  $T_{amb} = -55^\circ C$   
 (2)  $T_{amb} = 25^\circ C$   
 (3)  $T_{amb} = 150^\circ C$

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

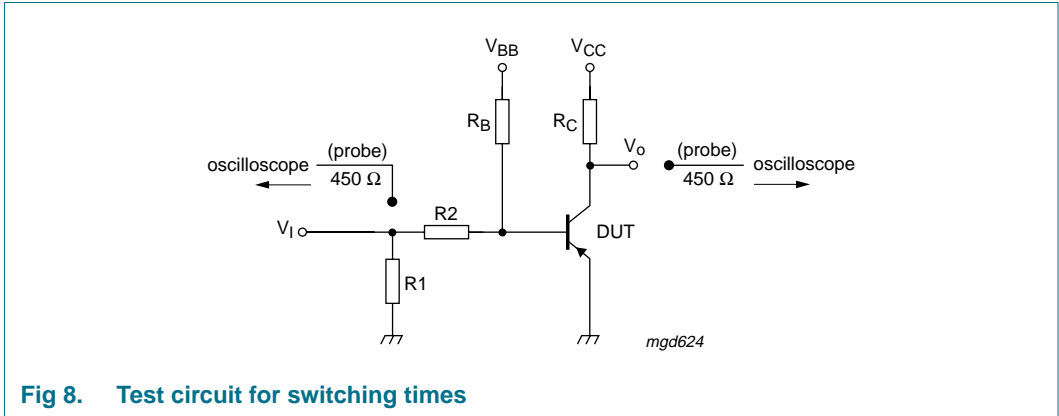


$I_C/I_B = 10$   
 (1)  $T_{amb} = -55^\circ C$   
 (2)  $T_{amb} = 25^\circ C$   
 (3)  $T_{amb} = 150^\circ C$

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



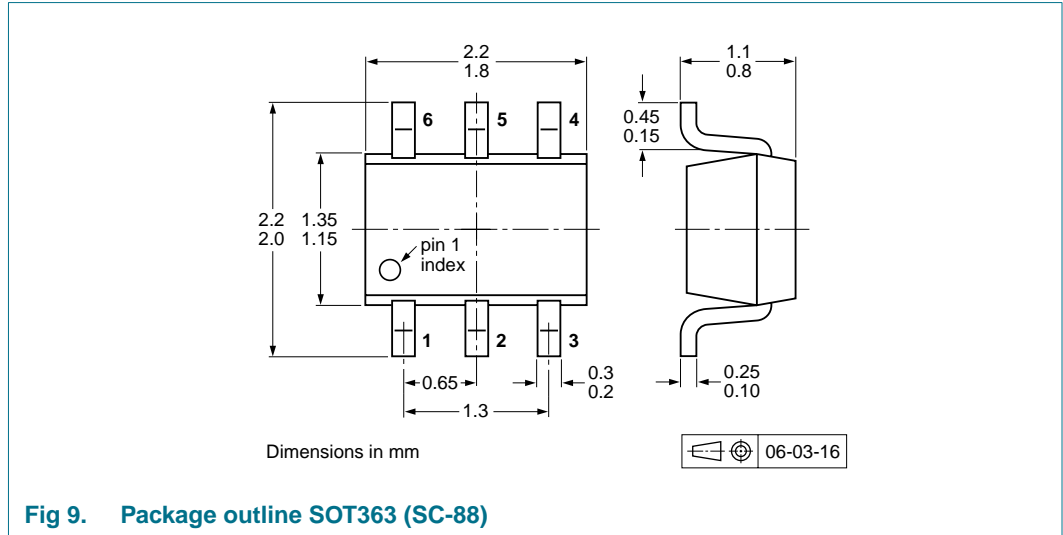
## 8. Test information



### 8.1 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.

9. Package outline



10. Packing information

**Table 9. Packing methods**

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

Type number	Package	Description	Packing quantity	
			3000	10000
PMBT3906YS	SOT363	4 mm pitch, 8 mm tape and reel; T1	<sup>[2]</sup> -115	-135
		4 mm pitch, 8 mm tape and reel; T2	<sup>[3]</sup> -125	-165

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

[2] T1: normal taping

[3] T2: reverse taping





## 12. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMBT3906YS_2	20090513	Product data sheet	-	PMBT3906YS_1
Modifications:	• <a href="#">Figure 4</a> : amended			
PMBT3906YS_1	20080306	Product data sheet	-	-

## 13. Legal information

### 13.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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>.

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