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Kind regards,

Team Nexperia



# PMBT4403YS

40V, 600 mA double PNP switching transistor

2 July 2015

Product data sheet

## 1. General description

Double PNP switching transistor in a very small SOT363 (TSSOP6) Surface-Mounted Device (SMD) plastic package.

Double NPN complement: PMBT4401YS

## 2. Features and benefits

- Double general-purpose switching transistor
- AEC-Q101 qualified

## 3. Applications

- Switching and linear amplification

## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per transistor</b>						
$h_{FE}$	DC current gain	$V_{CE} = -2\text{ V}$ ; $I_C = -150\text{ mA}$ ; $t_p \leq 300\text{ }\mu\text{s}$ ; $\delta \leq 0.02$ ; $T_{amb} = 25\text{ }^\circ\text{C}$	100	-	300	
<b>Per transistor</b>						
$V_{CEO}$	collector-emitter voltage	open base	-	-	-40	V
$I_C$	collector current		-	-	-600	mA

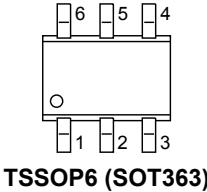
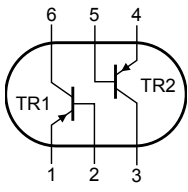


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## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	E	emitter TR1	 <p>TSSOP6 (SOT363)</p>	 <p>sym018</p>
2	B	base TR1		
3	C	collector TR2		
4	E	emitter TR2		
5	B	base TR2		
6	C	collector TR1		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMBT4403YS	TSSOP6	plastic surface-mounted package; 6 leads	SOT363

## 7. Marking

Table 4. Marking codes

Type number	Marking code
PMBT4403YS	BJ% [1]

[1] % = placeholder for manufacturing site code

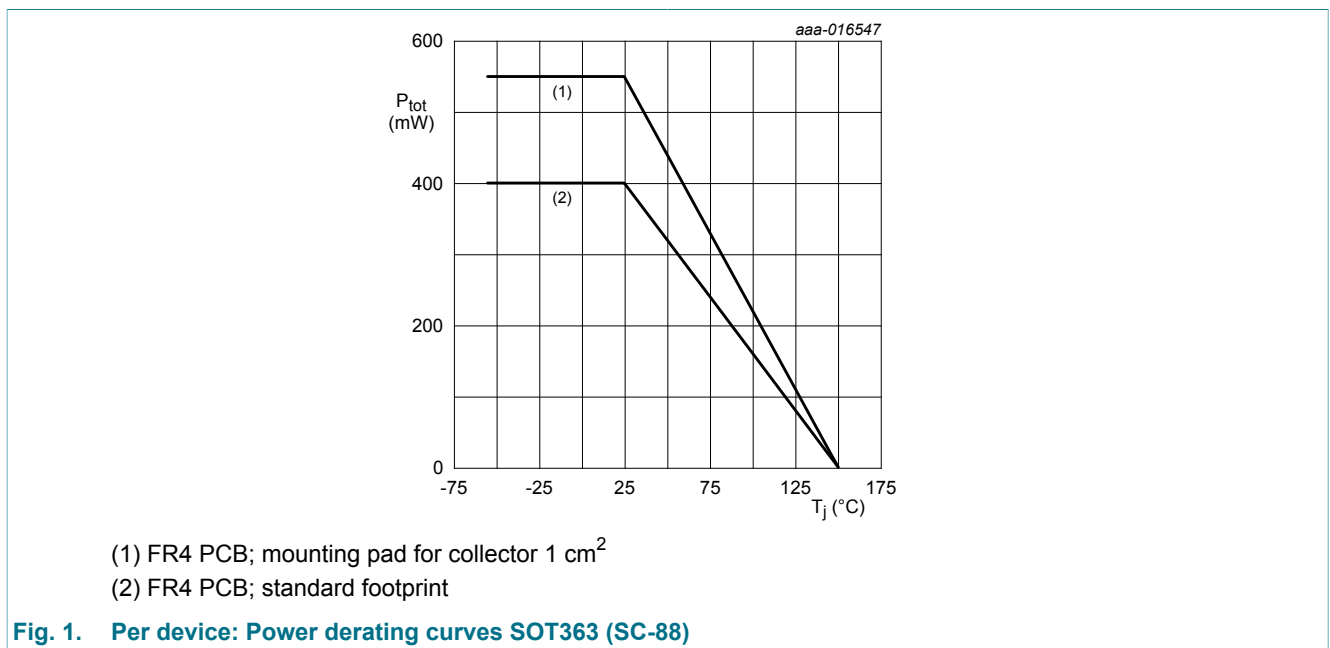
## 8. Limiting values

**Table 5. Limiting values**

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

Symbol	Parameter	Conditions		Min	Max	Unit
<b>Per transistor</b>						
V <sub>CBO</sub>	collector-base voltage	open emitter		-	-40	V
V <sub>CEO</sub>	collector-emitter voltage	open base		-	-40	V
V <sub>EBO</sub>	emitter-base voltage	open collector		-	-5	V
I <sub>C</sub>	collector current			-	-600	mA
I <sub>CM</sub>	peak collector current	single pulse; t <sub>p</sub> ≤ 1 ms		-	-800	mA
I <sub>BM</sub>	peak base current			-	-200	mA
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C	[1]	-	250	mW
			[2]	-	300	mW
<b>Per device</b>						
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C	[1]	-	400	mW
			[2]	-	550	mW
T <sub>j</sub>	junction temperature			-	150	°C
T <sub>amb</sub>	ambient temperature			-55	150	°C
T <sub>stg</sub>	storage temperature			-65	150	°C

- [1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint
- [2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for collector 1 cm<sup>2</sup>



- (1) FR4 PCB; mounting pad for collector 1 cm<sup>2</sup>
- (2) FR4 PCB; standard footprint

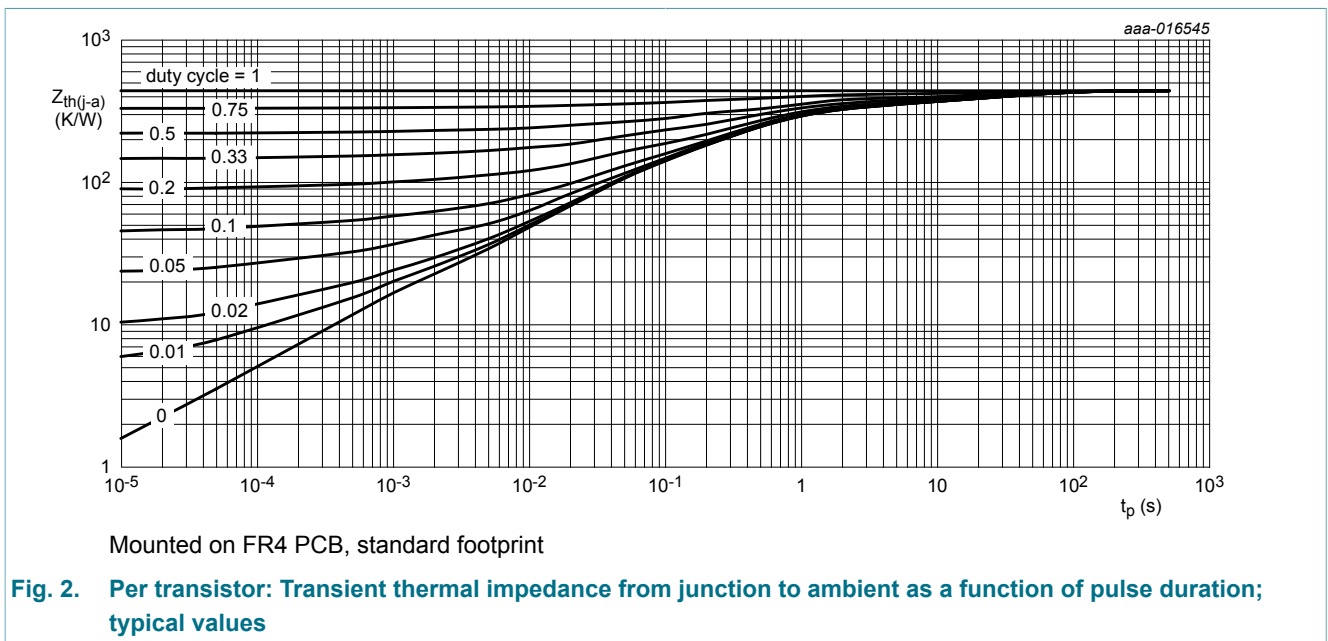
**Fig. 1. Per device: Power derating curves SOT363 (SC-88)**

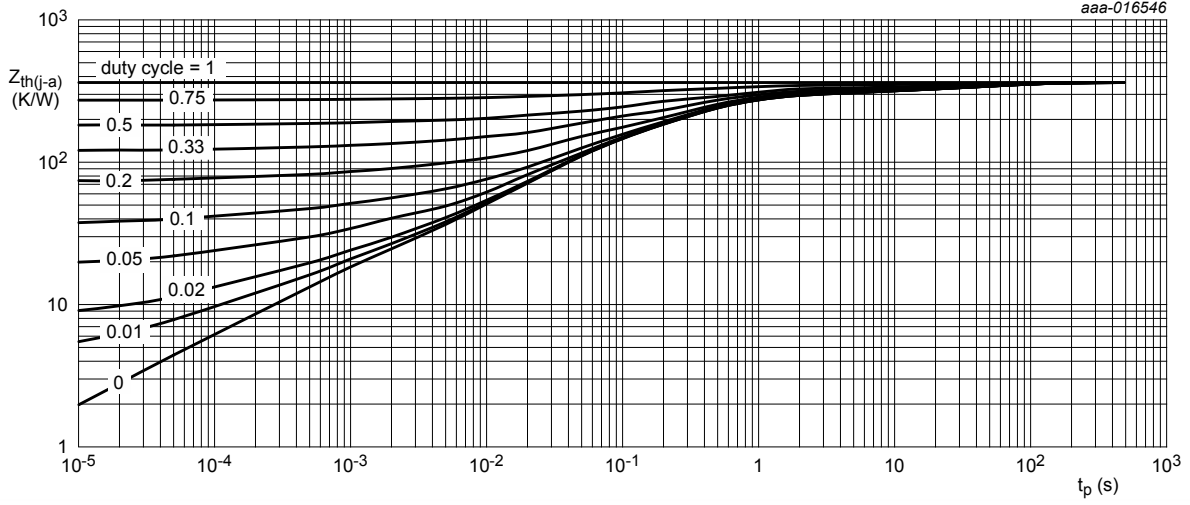
## 9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
<b>Per transistor</b>							
R <sub>th(j-a)</sub>	thermal resistance from junction to ambient	in free air	[1]	-	-	500	K/W
			[2]	-	-	417	K/W
<b>Per device</b>							
R <sub>th(j-a)</sub>	thermal resistance from junction to ambient	in free air	[1]	-	-	313	K/W
			[2]	-	-	227	K/W

- [1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint
- [2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for collector 1 cm<sup>2</sup>





FR4 PCB, mounting pad for collector 1 cm<sup>2</sup>

**Fig. 3. 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
<b>Per transistor</b>						
I <sub>CBO</sub>	collector-base cut-off current	V <sub>CB</sub> = -40 V; I <sub>E</sub> = 0 A; T <sub>amb</sub> = 25 °C	-	-	-50	nA
		V <sub>CB</sub> = -40 V; I <sub>E</sub> = 0 A; T <sub>j</sub> = 125 °C	-	-	-10	μA
I <sub>EBO</sub>	emitter-base cut-off current	V <sub>EB</sub> = -5 V; I <sub>C</sub> = 0 A; T <sub>amb</sub> = 25 °C	-	-	-50	nA
h <sub>FE</sub>	DC current gain	V <sub>CE</sub> = -1 V; I <sub>C</sub> = -0.1 mA; T <sub>amb</sub> = 25 °C	30	-	-	
		V <sub>CE</sub> = -1 V; I <sub>C</sub> = -1 mA; T <sub>amb</sub> = 25 °C	60	-	-	
		V <sub>CE</sub> = -1 V; I <sub>C</sub> = -10 mA; T <sub>amb</sub> = 25 °C	100	-	-	
		V <sub>CE</sub> = -2 V; I <sub>C</sub> = -150 mA; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C	100	-	300	
		V <sub>CE</sub> = -2 V; I <sub>C</sub> = -500 mA; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C	20	-	-	
V <sub>CEsat</sub>	collector-emitter saturation voltage	I <sub>C</sub> = -150 mA; I <sub>B</sub> = -15 mA; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C	-	-	-400	mV
		I <sub>C</sub> = -500 mA; I <sub>B</sub> = -50 mA; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C	-	-	-750	mV
V <sub>BEsat</sub>	base-emitter saturation voltage	I <sub>C</sub> = -150 mA; I <sub>B</sub> = -15 mA; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C	-	-	-950	mV
		I <sub>C</sub> = -500 mA; I <sub>B</sub> = -50 mA; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C	-	-	-1.3	V
t <sub>d</sub>	delay time	I <sub>C</sub> = -150 mA; I <sub>Bon</sub> = -15 mA; I <sub>Boff</sub> = 15 mA; T <sub>amb</sub> = 25 °C	-	-	15	ns
t <sub>r</sub>	rise time		-	-	30	ns
t <sub>on</sub>	turn-on time		-	-	40	ns
t <sub>s</sub>	storage time		-	-	300	ns
t <sub>f</sub>	fall time		-	-	50	ns
t <sub>off</sub>	turn-off time		-	-	350	ns
C <sub>C</sub>	collector capacitance		V <sub>CB</sub> = -10 V; I <sub>E</sub> = 0 A; i <sub>e</sub> = 0 A; f = 1 MHz; T <sub>amb</sub> = 25 °C	-	-	8.5
C <sub>E</sub>	emitter capacitance	V <sub>EB</sub> = -500 mV; I <sub>C</sub> = 0 A; i <sub>c</sub> = 0 A; f = 1 MHz; T <sub>amb</sub> = 25 °C	-	-	35	pF
f <sub>T</sub>	transition frequency	V <sub>CE</sub> = -10 V; I <sub>C</sub> = -20 mA; f = 100 MHz; T <sub>amb</sub> = 25 °C	200	-	-	MHz

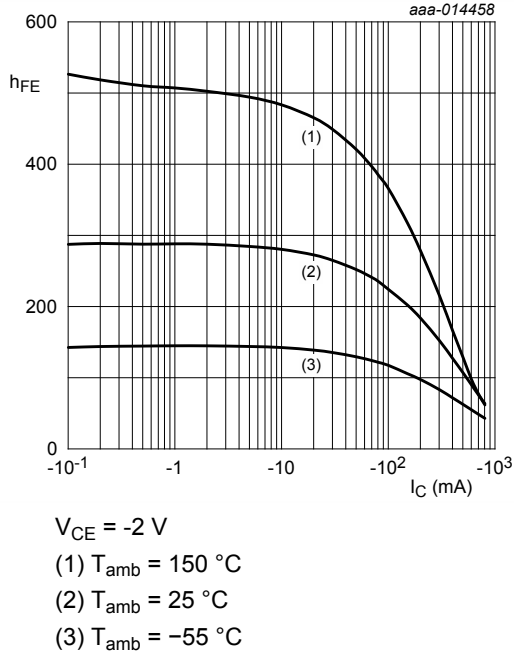


Fig. 4. DC current gain as a function of collector current; typical values

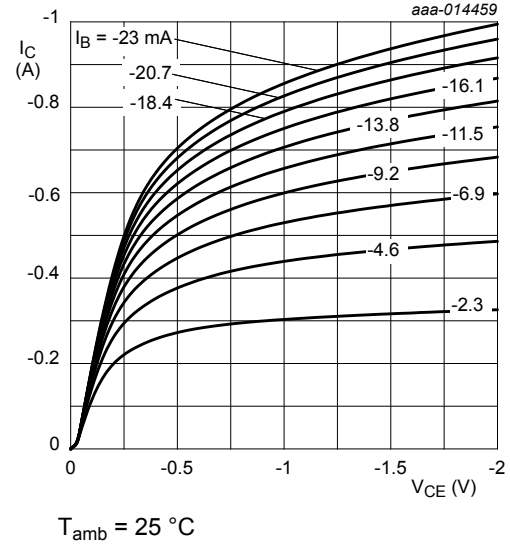


Fig. 5. Collector current as a function of collector-emitter voltage; typical values

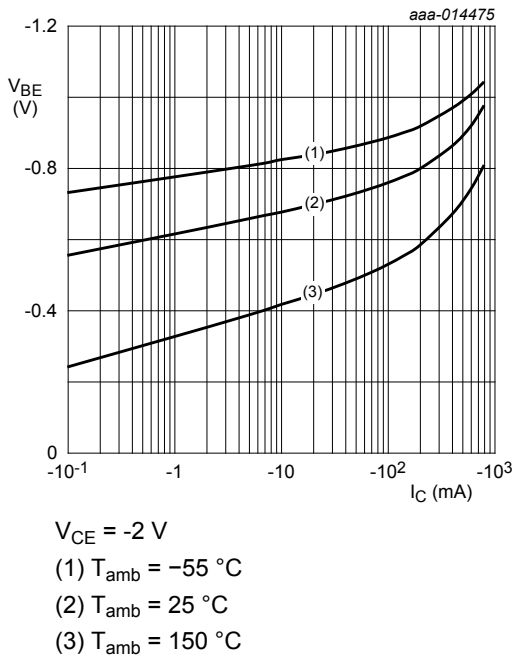


Fig. 6. Base-emitter voltage as a function of collector current; typical values

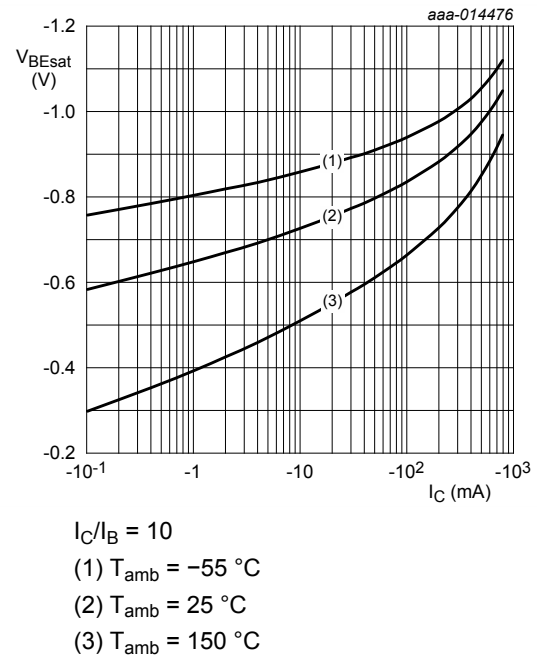
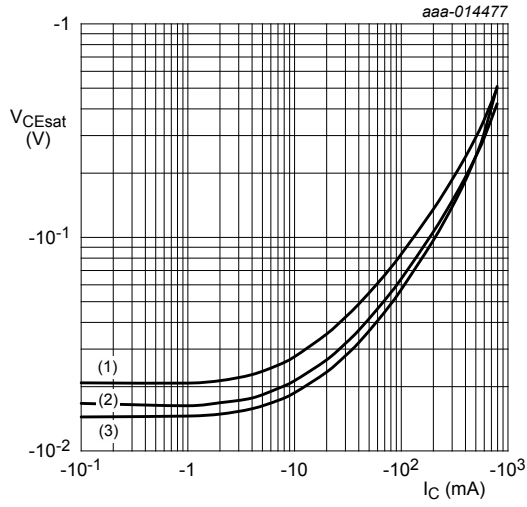


Fig. 7. Base-emitter saturation voltage as a function of collector current; typical values

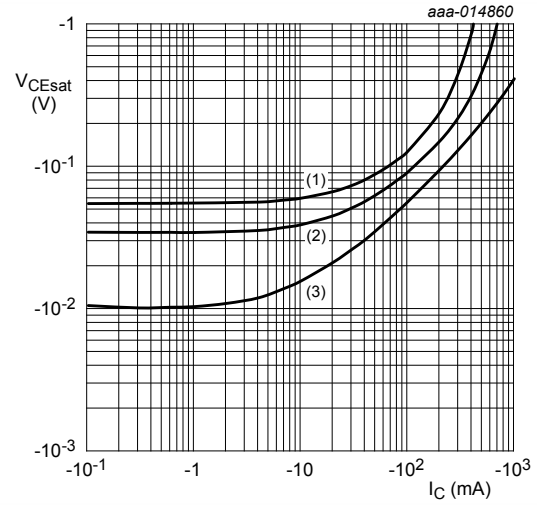




$I_C/I_B = 20$

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

**Fig. 8. Collector-emitter saturation voltage as a function of collector current; typical values**



$T_{amb} = 25\text{ °C}$

- (1)  $I_C/I_B = 100$
- (2)  $I_C/I_B = 50$
- (3)  $I_C/I_B = 10$

**Fig. 9. Collector-emitter saturation voltage as a function of collector current; typical values**

### 11. Test information

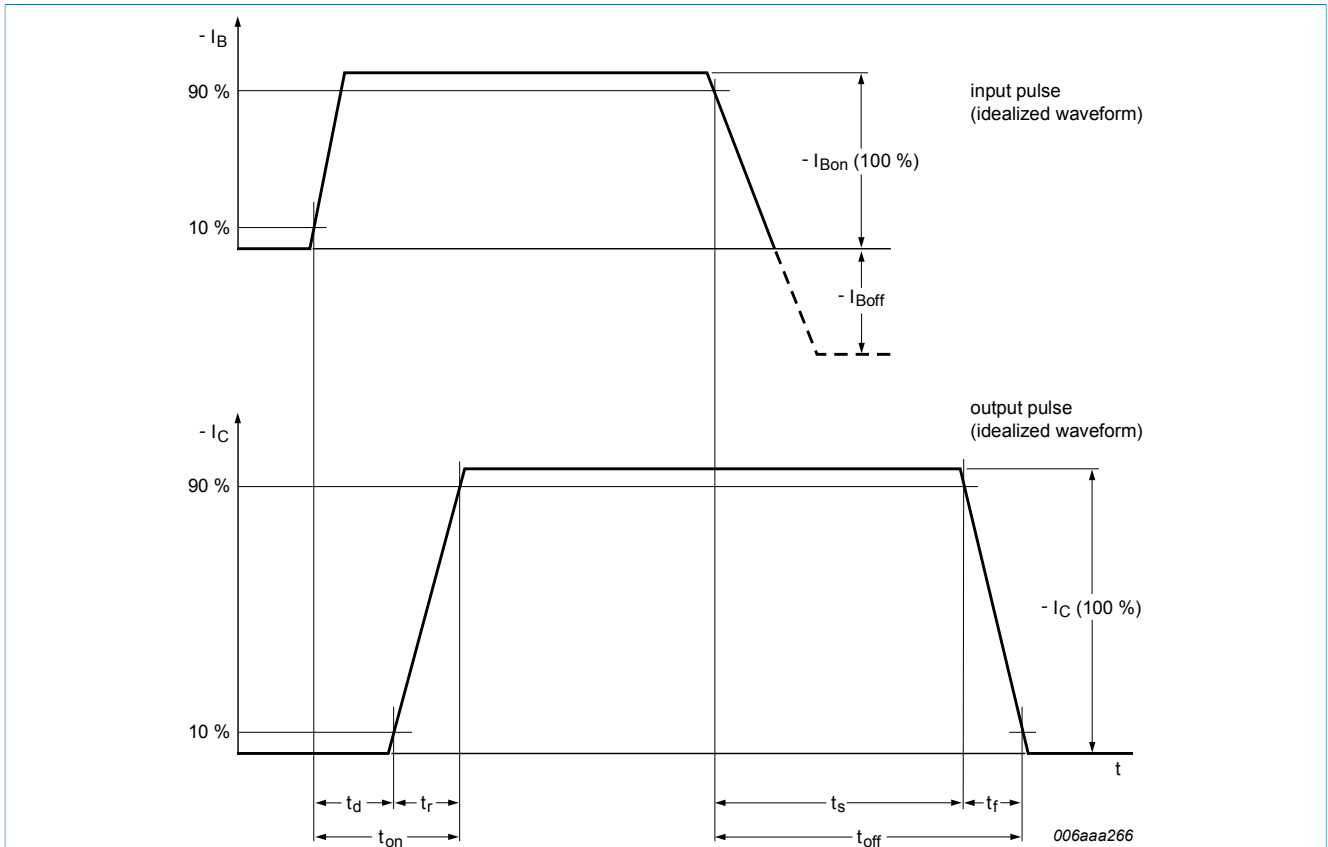


Fig. 10. BISS transistor switching time definition

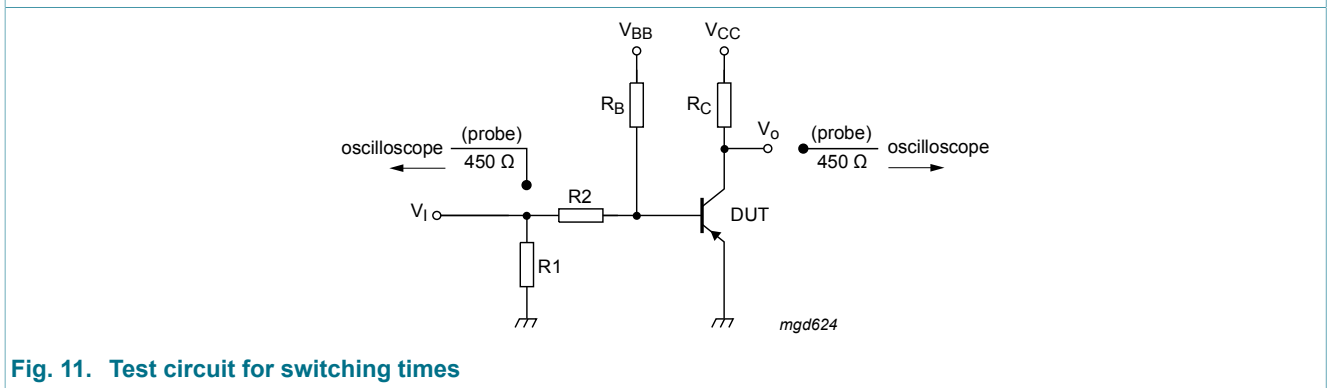


Fig. 11. Test circuit for switching times

#### 11.1 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.

## 12. Package outline

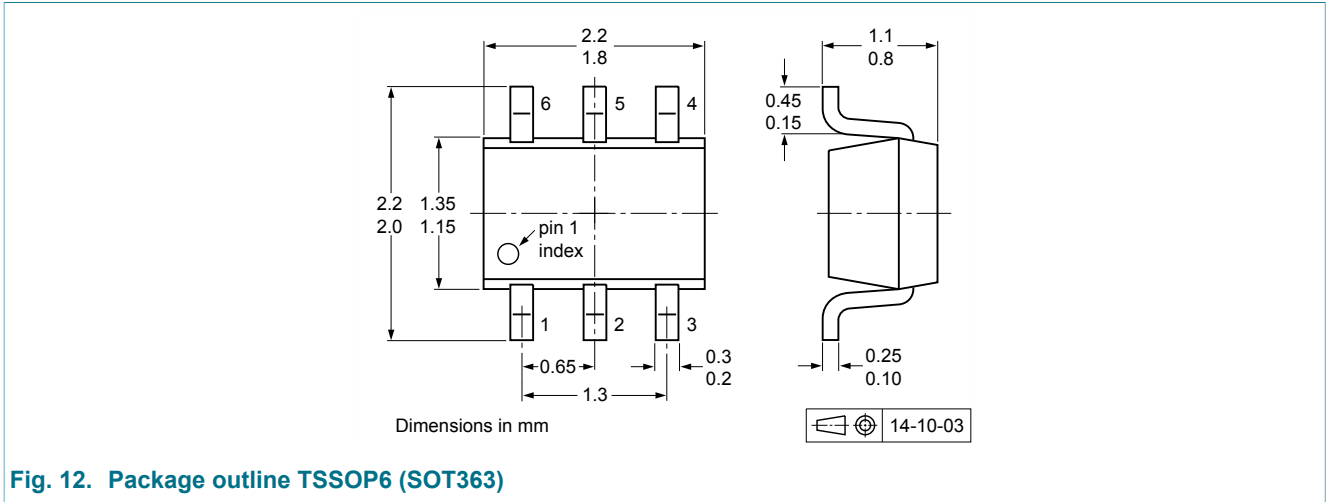


Fig. 12. Package outline TSSOP6 (SOT363)

## 13. Soldering

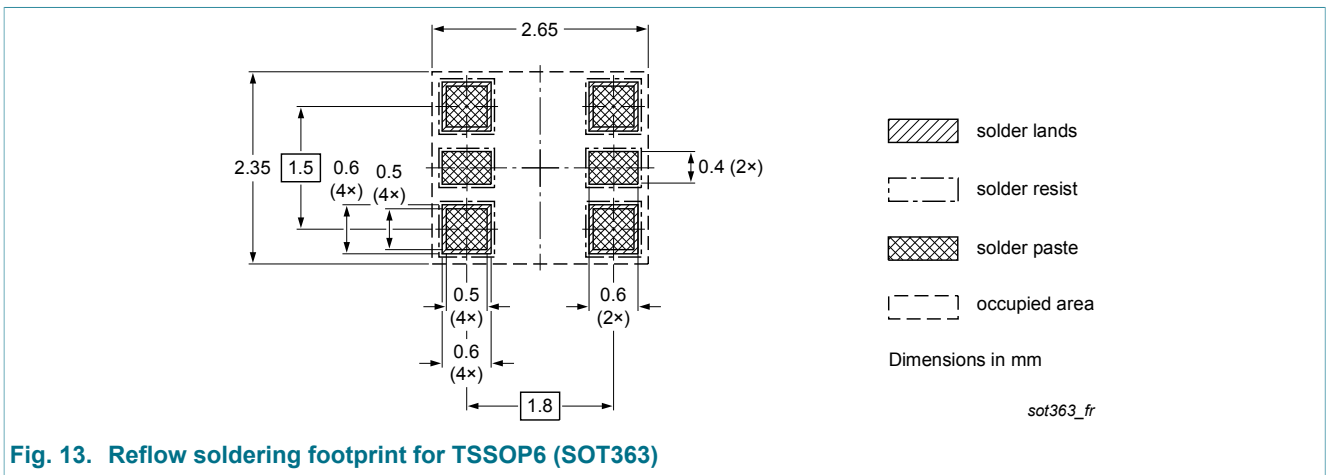


Fig. 13. Reflow soldering footprint for TSSOP6 (SOT363)

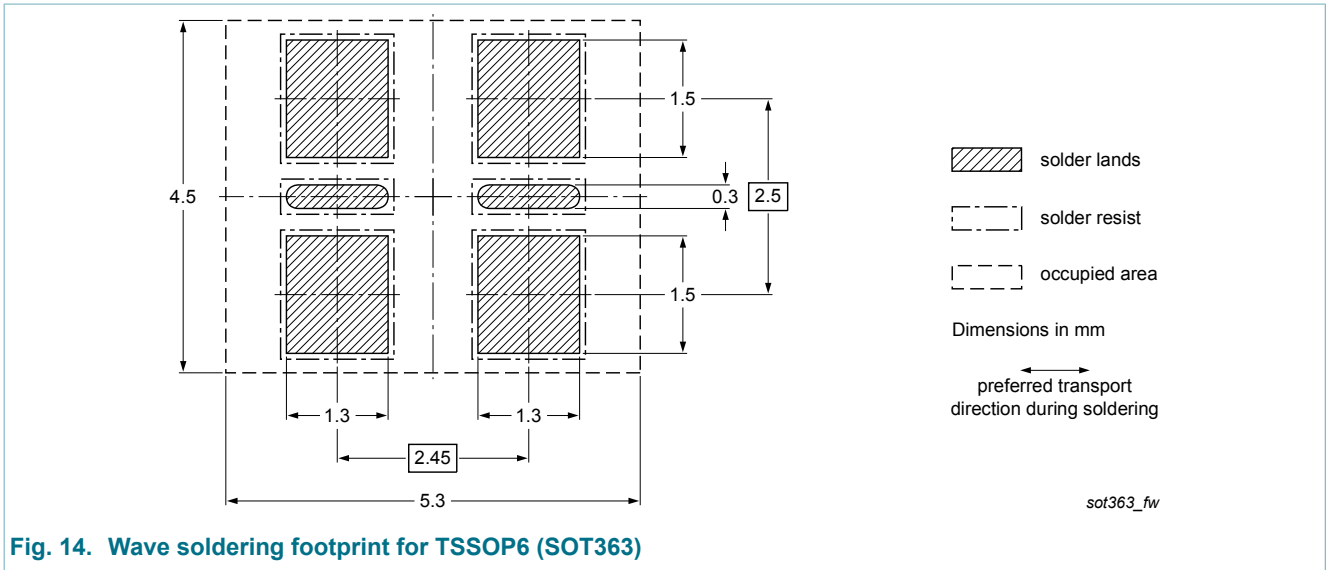


Fig. 14. Wave soldering footprint for TSSOP6 (SOT363)

## 14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMBT4403YS v.1	20150702	Product data sheet	-	-

## 15. Legal information

### 15.1 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.

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