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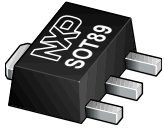
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Kind regards,

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# PXT2222A

## NPN switching transistors

2 April 2014

Product data sheet

### 1. General description

NPN switching transistor in a medium power flat lead SOT89 (SC-62/TO-243) Surface-Mounted Device (SMD) plastic package.

PNP complement: PXT2907A

### 2. Features and benefits

- High current: max. 600 mA
- Low voltage: max. 40 V

### 3. Applications

- Switching and linear amplification

### 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{CE0}$	collector-emitter voltage	open base	-	-	40	V
$I_C$	collector current		-	-	600	mA
$h_{FE}$	DC current gain	$V_{CE} = 10 \text{ V}$ ; $I_C = 150 \text{ mA}$ ; $T_{amb} = 25 \text{ }^\circ\text{C}$ ; $\delta \leq 0.02$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; pulsed	100	-	300	

### 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	E	emitter	 SOT89	 sym123
2	C	collector		
3	B	base		



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## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PXT2222A	SOT89	plastic surface-mounted package; die pad for good heat transfer; 3 leads	SOT89

## 7. Marking

Table 4. Marking codes

Type number	Marking code [1]
PXT2222A	%1P

[1] % = placeholder for manufacturing site code

## 8. Limiting values

Table 5. Limiting values

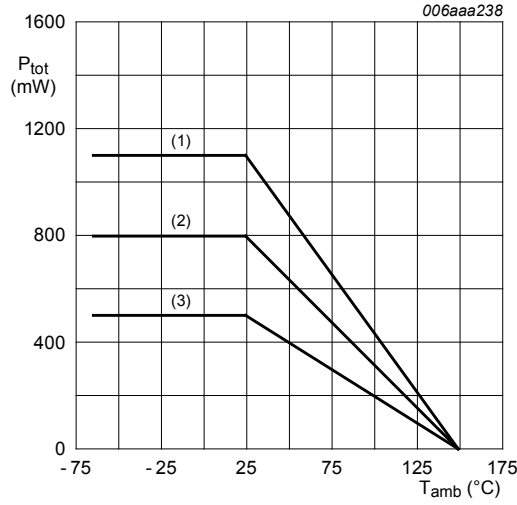
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
$V_{CBO}$	collector-base voltage	open emitter		-	60	V
$V_{CEO}$	collector-emitter voltage	open base		-	40	V
$V_{EBO}$	emitter-base voltage	open collector		-	6	V
$I_C$	collector current			-	600	mA
$I_{CM}$	peak collector current	$t_p \leq 1$ ms; single pulse		-	800	mA
$I_{BM}$	peak base current			-	200	mA
$P_{tot}$	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	0.5	W
			[2]	-	0.8	W
			[3]	-	1.1	W
$T_j$	junction temperature			-	150	°C
$T_{amb}$	ambient temperature			-65	150	°C
$T_{stg}$	storage temperature			-65	150	°C

[1] Transistor mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

[2] Transistor mounted on an FR4 PCB, single-sided copper, tin-plated and mounting pad for collector 1 cm<sup>2</sup>.

[3] Transistor mounted on an FR4 PCB, single-sided copper, tin-plated and mounting pad for collector 6 cm<sup>2</sup>.



- (1) FR4 PCB; 6 cm<sup>2</sup> mounting pad for collector.
- (2) FR4 PCB; 1 cm<sup>2</sup> mounting pad for collector.
- (3) FR4 PCB; standard footprint.

Fig. 1. Power derating curves

## 9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
R <sub>th(j-a)</sub>	thermal resistance from junction to ambient	in free air	[1]	-	-	250	K/W
			[2]	-	-	156	K/W
			[3]	-	-	113	K/W
R <sub>th(j-sp)</sub>	thermal resistance from junction to solder point			-	-	30	K/W

- [1] Transistor mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
- [2] Transistor mounted on an FR4 PCB, single-sided copper, tin-plated and mounting pad for collector 1 cm<sup>2</sup>.
- [3] Transistor mounted on an FR4 PCB, single-sided copper, tin-plated and mounting pad for collector 6 cm<sup>2</sup>.

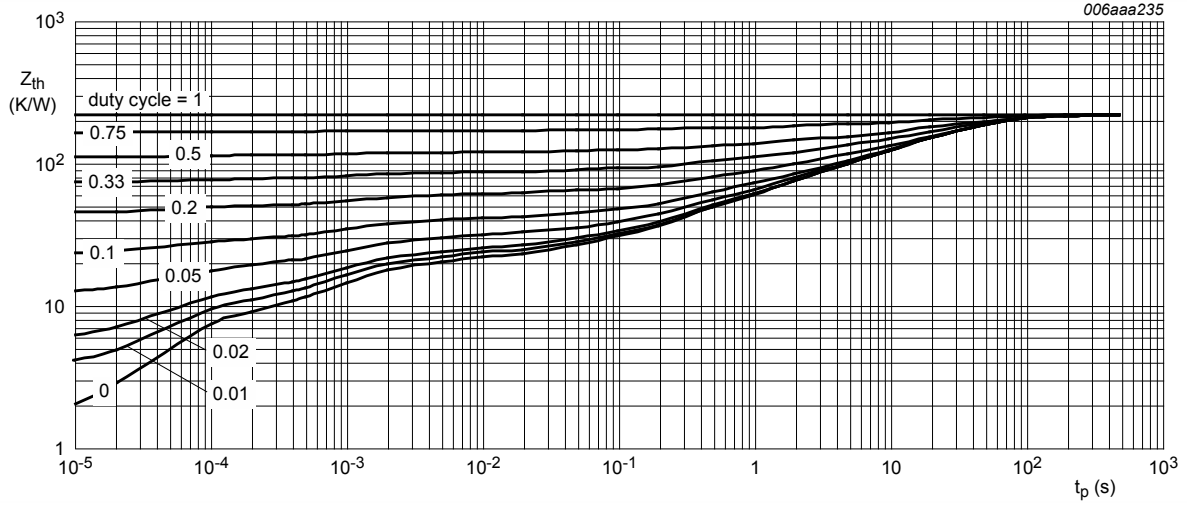


Fig. 2. Transient thermal impedance as a function of pulse time; typical values

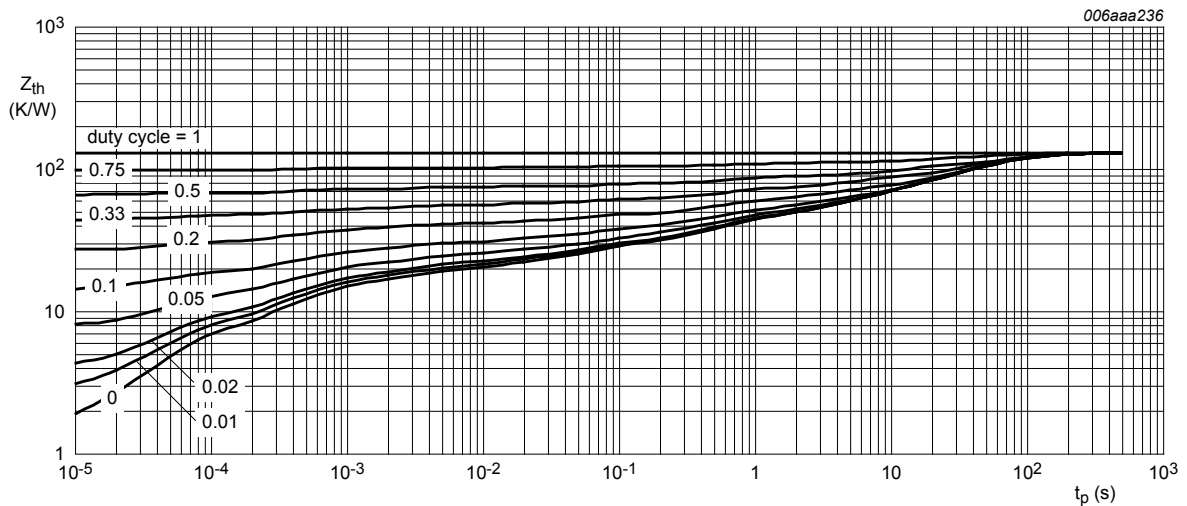
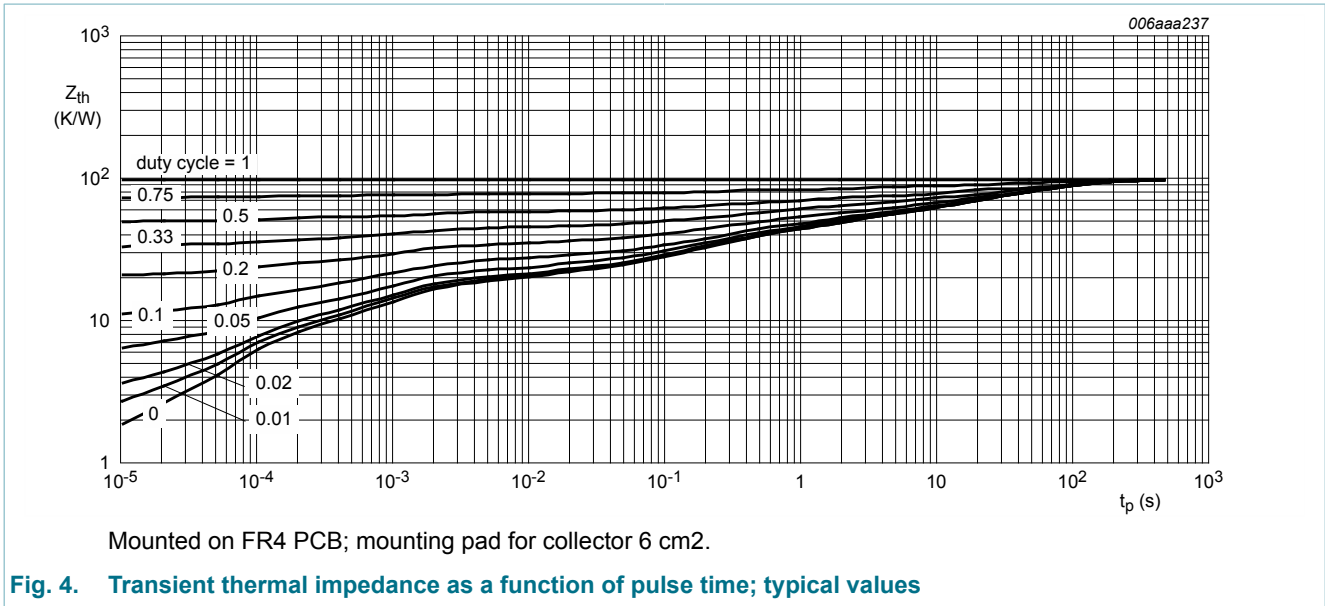


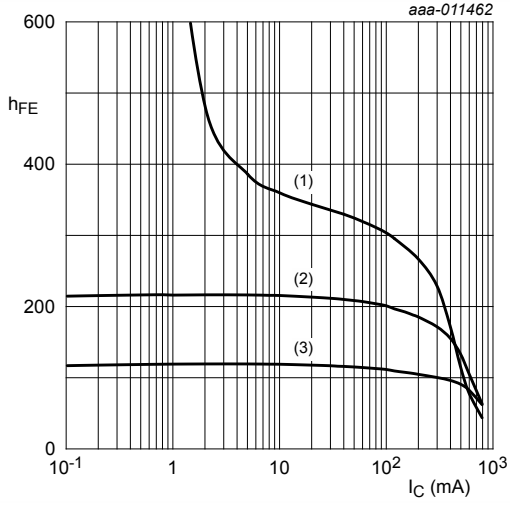
Fig. 3. Transient thermal impedance as a function of pulse time; typical values



## 10. Characteristics

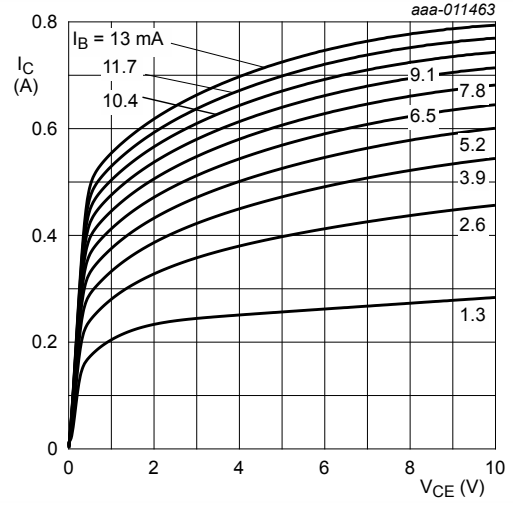
Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I <sub>CBO</sub>	collector-base cut-off current	V <sub>CB</sub> = 60 V; I <sub>E</sub> = 0 A; T <sub>amb</sub> = 25 °C	-	-	10	nA
		V <sub>CB</sub> = 60 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	-	-	10	nA
h <sub>FE</sub>	DC current gain	V <sub>CE</sub> = 10 V; I <sub>C</sub> = 0.1 mA; T <sub>amb</sub> = 25 °C	35	-	-	
		V <sub>CE</sub> = 10 V; I <sub>C</sub> = 1 mA; T <sub>amb</sub> = 25 °C	50	-	-	
		V <sub>CE</sub> = 10 V; I <sub>C</sub> = 10 mA; T <sub>amb</sub> = 25 °C	75	-	-	
		V <sub>CE</sub> = 10 V; I <sub>C</sub> = 10 mA; T <sub>j</sub> = -55 °C	35	-	-	
		V <sub>CE</sub> = 1 V; I <sub>C</sub> = 150 mA; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C; pulsed	50	-	-	
		V <sub>CE</sub> = 10 V; I <sub>C</sub> = 150 mA; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C; pulsed	100	-	300	
		V <sub>CE</sub> = 10 V; I <sub>C</sub> = 500 mA; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C; pulsed	40	-	-	
V <sub>CEsat</sub>	collector-emitter saturation voltage	I <sub>C</sub> = 150 mA; I <sub>B</sub> = 15 mA; T <sub>amb</sub> = 25 °C	-	-	300	mV
		I <sub>C</sub> = 500 mA; I <sub>B</sub> = 50 mA; T <sub>amb</sub> = 25 °C	-	-	1	V
V <sub>BEsat</sub>	base-emitter saturation voltage	I <sub>C</sub> = 150 mA; I <sub>B</sub> = 15 mA; T <sub>amb</sub> = 25 °C	0.6	-	1.2	V
		I <sub>C</sub> = 500 mA; I <sub>B</sub> = 50 mA; T <sub>amb</sub> = 25 °C	-	-	2	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		-	-	20	ns
t <sub>on</sub>	turn-on time		-	-	35	ns
t <sub>s</sub>	storage time		-	-	200	ns
t <sub>f</sub>	fall time		-	-	60	ns
t <sub>off</sub>	turn-off time		-	-	250	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
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	-	-	25	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	300	-	-	MHz
NF	noise figure	V <sub>CE</sub> = 5 V; I <sub>C</sub> = 200 μA; R <sub>S</sub> = 2 kΩ; f = 1 kHz; B = 200 Hz; T <sub>amb</sub> = 25 °C	-	-	4	dB



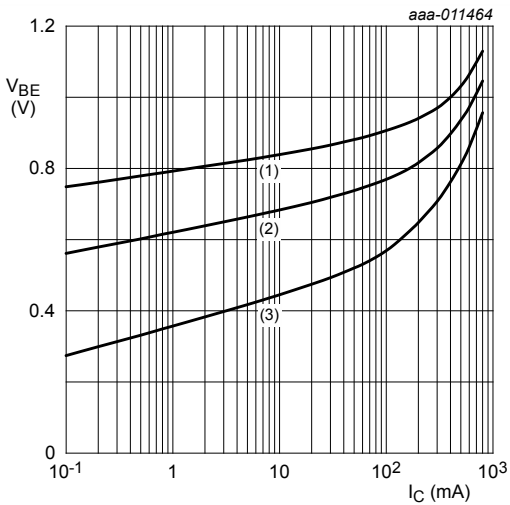
$V_{CE} = 10\text{ V}$   
 (1)  $T_{amb} = 150^\circ\text{C}$   
 (2)  $T_{amb} = 25^\circ\text{C}$   
 (3)  $T_{amb} = -55^\circ\text{C}$

**Fig. 5. DC current gain as a function of collector current; typical values**



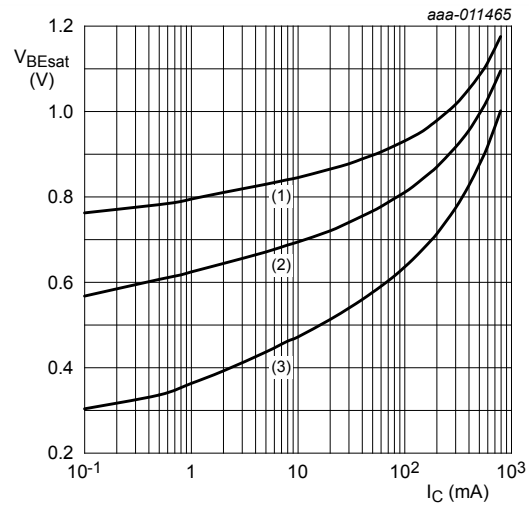
$T_{amb} = 25^\circ\text{C}$

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



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

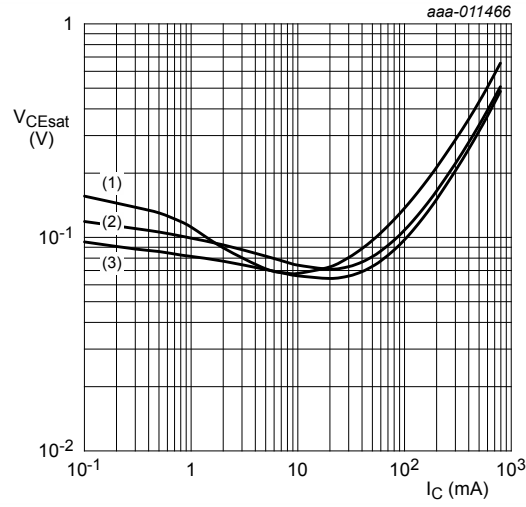
**Fig. 7. Base-emitter voltage as a function of collector current; typical values**



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

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





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

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

### 11. Test information

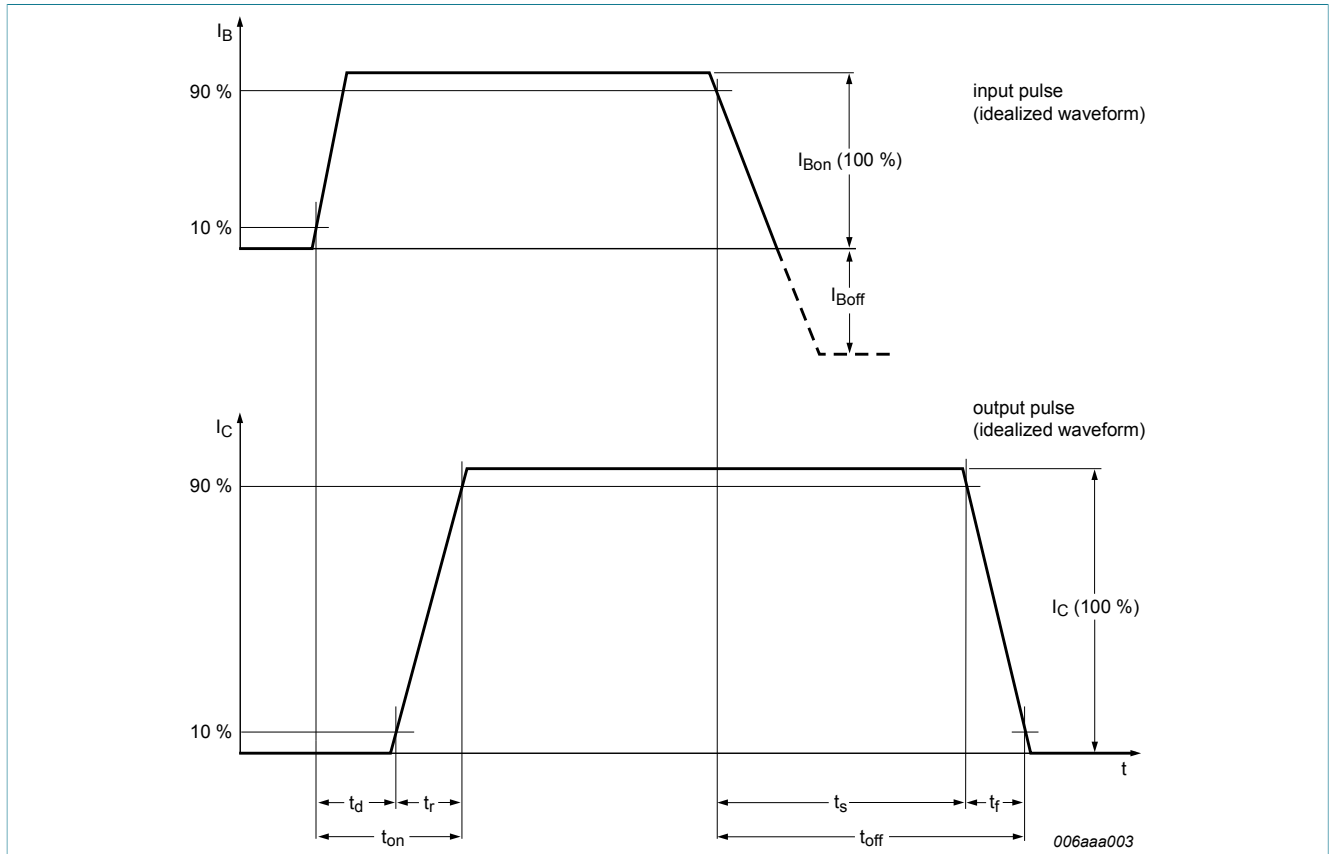


Fig. 10. BISS transistor switching time definition

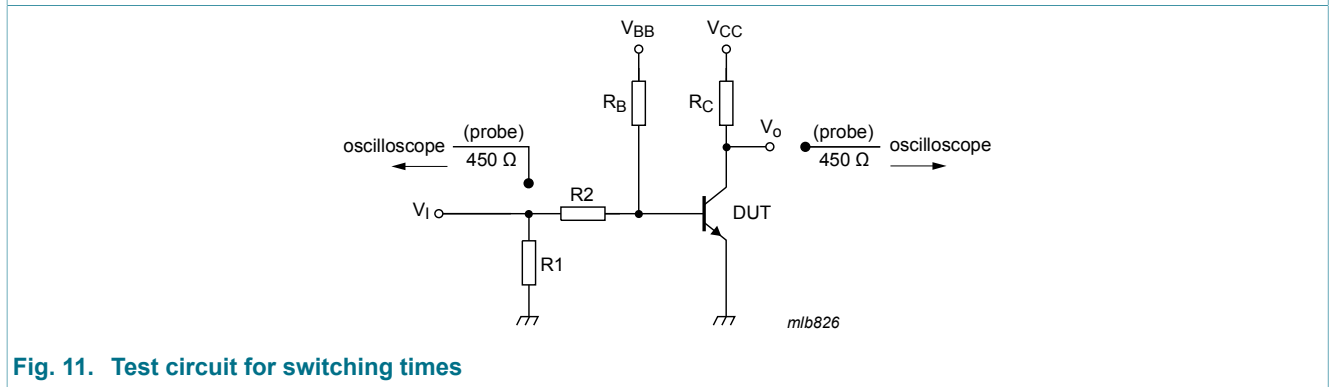


Fig. 11. Test circuit for switching times

## 12. Package outline

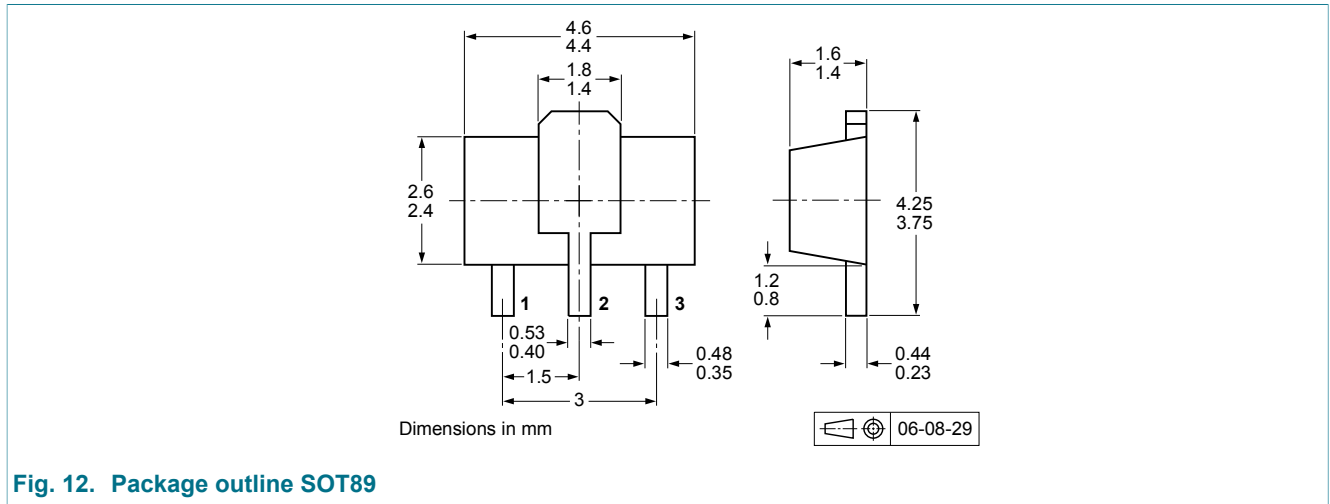


Fig. 12. Package outline SOT89

## 13. Soldering

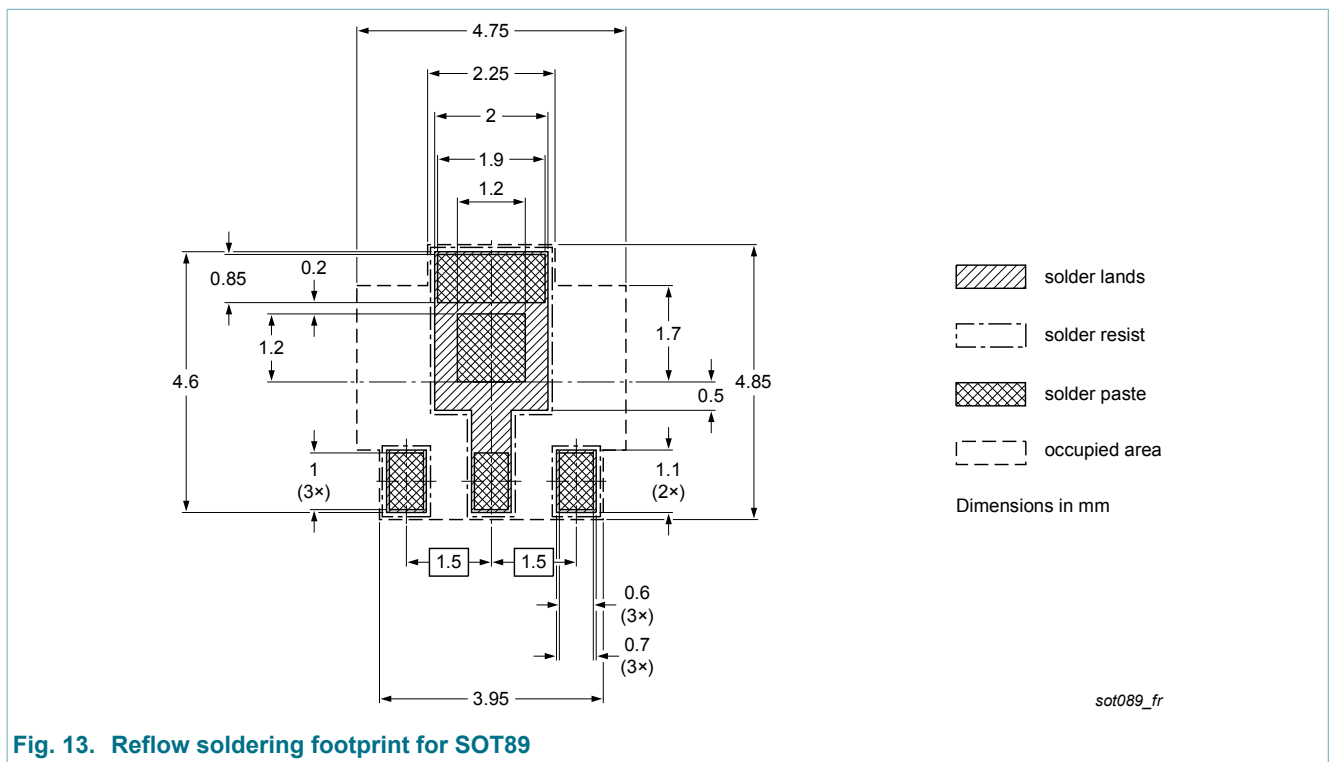


Fig. 13. Reflow soldering footprint for SOT89

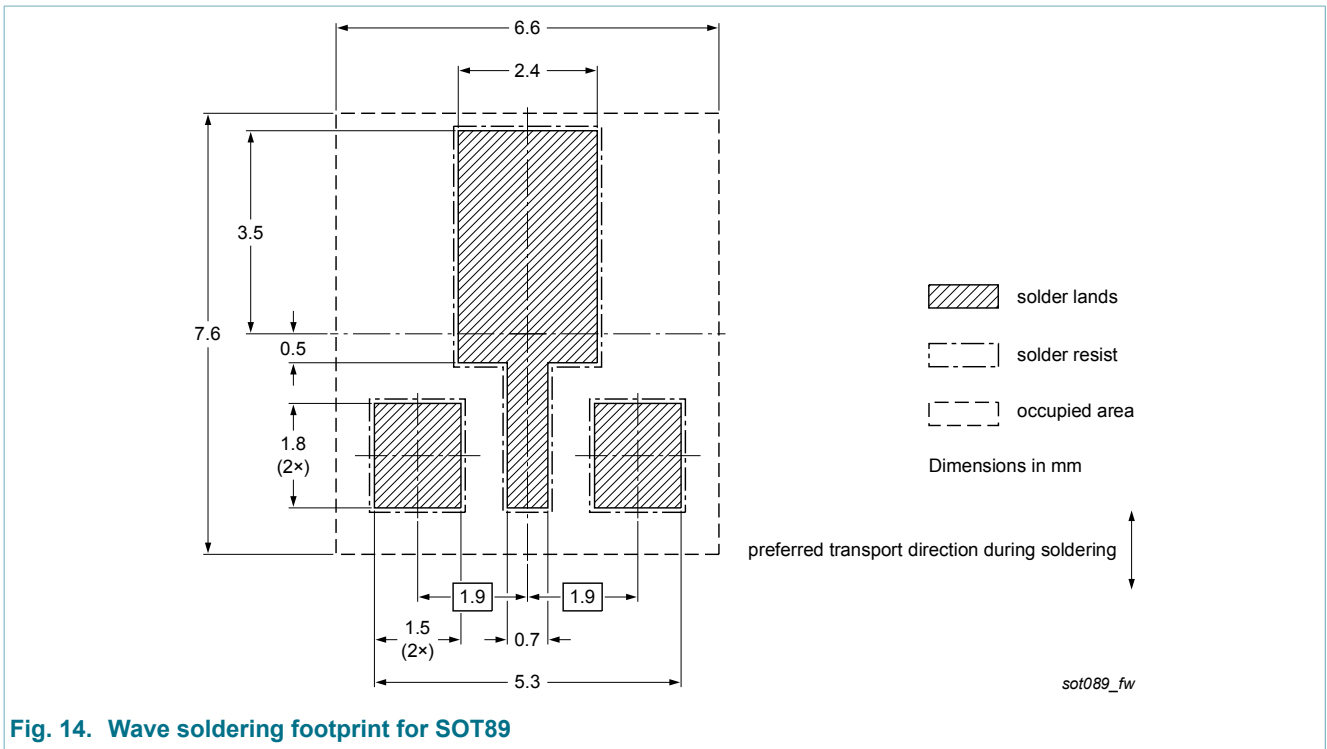


Fig. 14. Wave soldering footprint for SOT89

## 14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PXT2222A v.5	20140402	Product data sheet	-	PXT2222A v.4
Modifications:	<ul style="list-style-type: none"> <li>• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li> <li>• Legal texts have been adapted to the new company name where appropriate.</li> <li>• General description: updated.</li> <li>• Quick reference data: added.</li> <li>• Thermal characteristics: Figure 2 to 4 updated.</li> <li>• Limiting values: values of <math>I_C</math>, <math>I_{CM}</math> and <math>I_{BM}</math> parameters corrected.</li> <li>• Characteristics: Figures 5 to 9 added.</li> <li>• Soldering information: added.</li> <li>• Legal information: updated.</li> </ul>			
PXT2222A v.4	20041122	Product specification	-	PXT2222A v.3
PXT2222A v.3	19990414	Product specification	-	PXT2222A v.2
PXT2222A v.2	19970505	Product specification	-	PXT2222A v.1
PXT2222A v.1	19940901	Product specification	-	-

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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".
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