

# 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	$V_{CE} = 10\text{ V}$ ; $I_C = 150\text{ mA}$ ; $T_{amb} = 25\text{ °C}$ ; $\delta \leq 0.02$ ; $t_p \leq 300\text{ }\mu\text{s}$ ; 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		

## 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
PXT2222A	%1P

[1] % = placeholder for manufacturing site code

## 8. Limiting values

Table 5. Limiting values

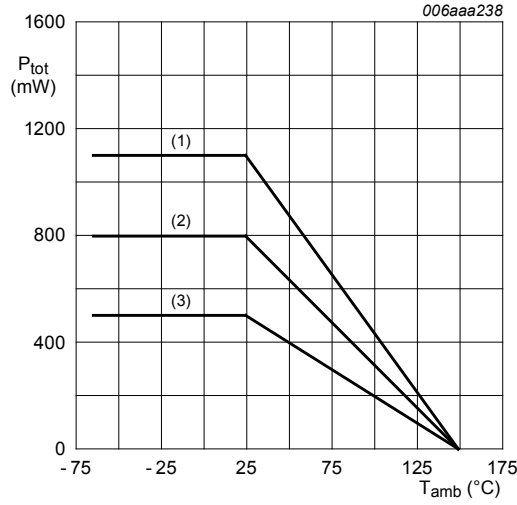
In accordance with the Absolute Maximum Rating System (IEC 60134).

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>.

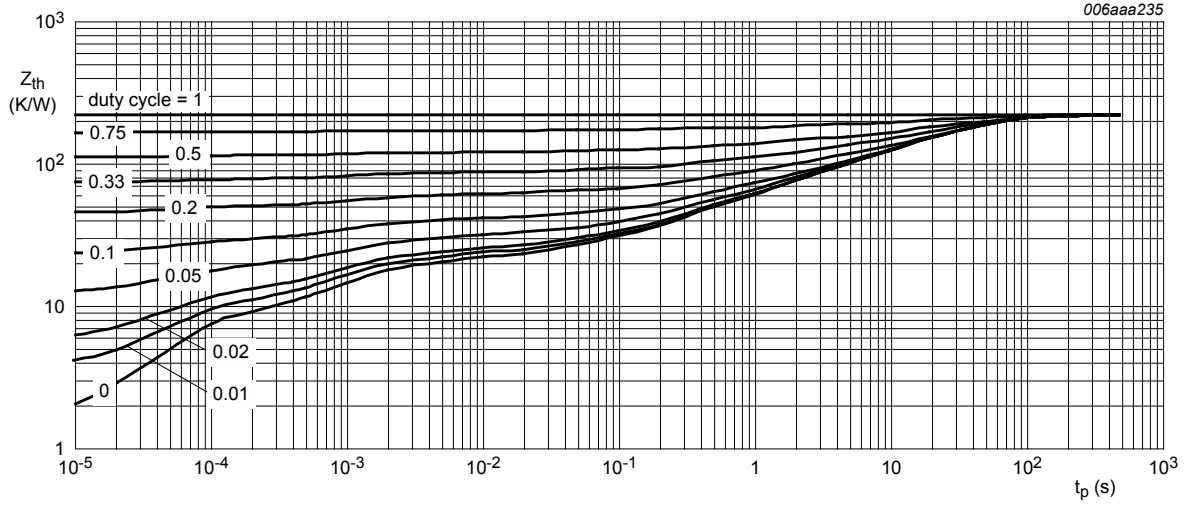


Fig. 2. Transient thermal impedance as a function of pulse time; typical values

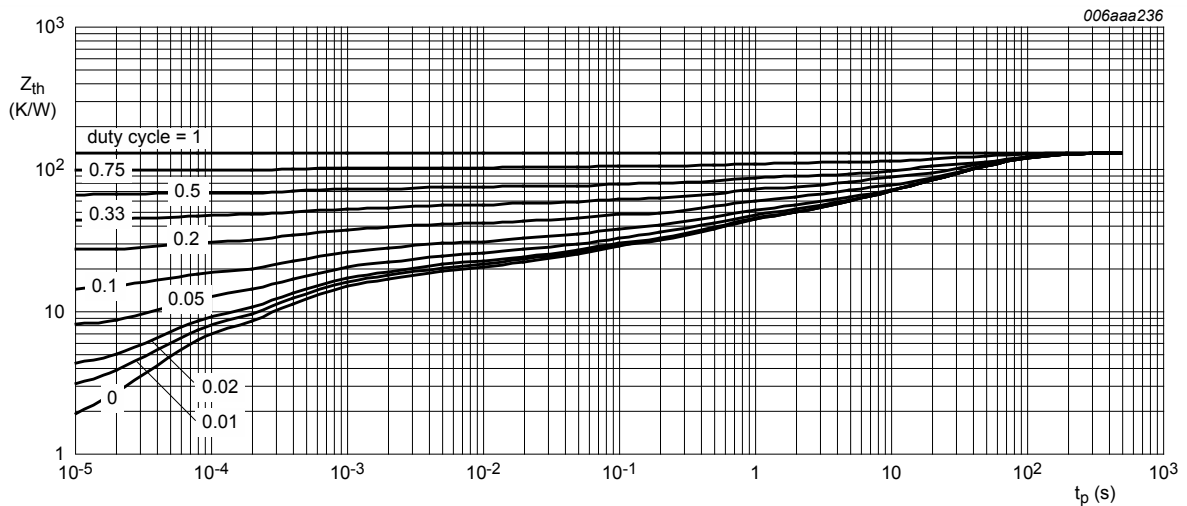
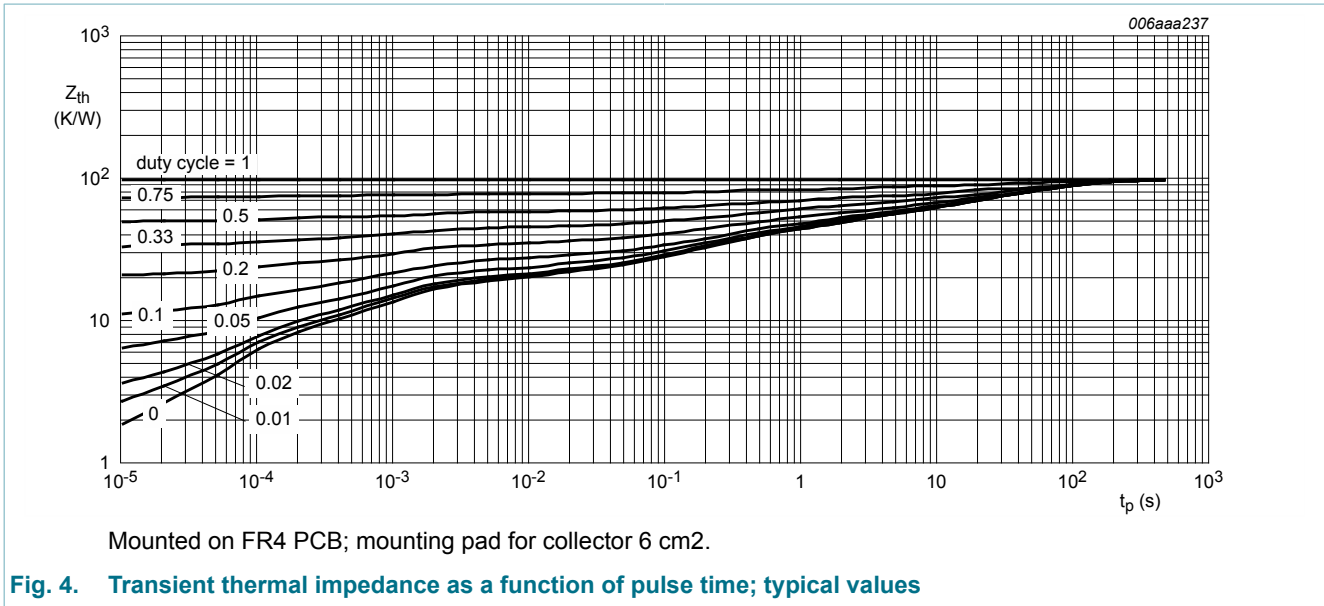


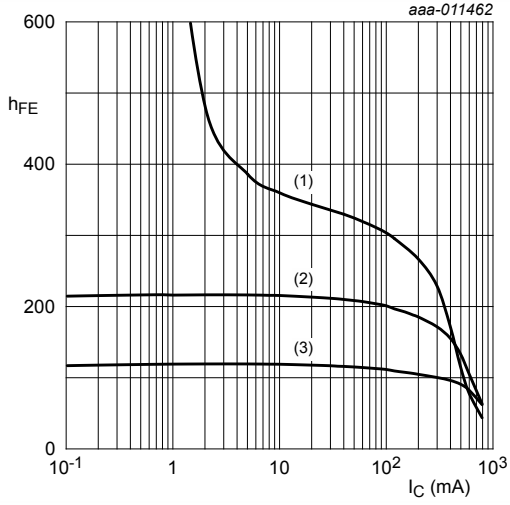
Fig. 3. Transient thermal impedance as a function of pulse time; typical values



## 10. Characteristics

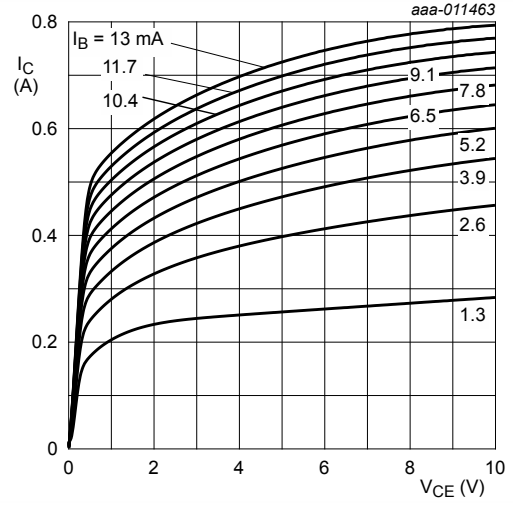
Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{CBO}$	collector-base cut-off current	$V_{CB} = 60\text{ V}; I_E = 0\text{ A}; T_{amb} = 25\text{ }^\circ\text{C}$	-	-	10	nA
		$V_{CB} = 60\text{ V}; I_E = 0\text{ A}; T_j = 125\text{ }^\circ\text{C}$	-	-	10	$\mu\text{A}$
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = 5\text{ V}; I_C = 0\text{ A}; T_{amb} = 25\text{ }^\circ\text{C}$	-	-	10	nA
$h_{FE}$	DC current gain	$V_{CE} = 10\text{ V}; I_C = 0.1\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$	35	-	-	
		$V_{CE} = 10\text{ V}; I_C = 1\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$	50	-	-	
		$V_{CE} = 10\text{ V}; I_C = 10\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$	75	-	-	
		$V_{CE} = 10\text{ V}; I_C = 10\text{ mA}; T_j = -55\text{ }^\circ\text{C}$	35	-	-	
		$V_{CE} = 1\text{ V}; I_C = 150\text{ mA}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02; T_{amb} = 25\text{ }^\circ\text{C}; \text{pulsed}$	50	-	-	
		$V_{CE} = 10\text{ V}; I_C = 150\text{ mA}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02; T_{amb} = 25\text{ }^\circ\text{C}; \text{pulsed}$	100	-	300	
		$V_{CE} = 10\text{ V}; I_C = 500\text{ mA}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02; T_{amb} = 25\text{ }^\circ\text{C}; \text{pulsed}$	40	-	-	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = 150\text{ mA}; I_B = 15\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$	-	-	300	mV
		$I_C = 500\text{ mA}; I_B = 50\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$	-	-	1	V
$V_{BEsat}$	base-emitter saturation voltage	$I_C = 150\text{ mA}; I_B = 15\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$	0.6	-	1.2	V
		$I_C = 500\text{ mA}; I_B = 50\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$	-	-	2	V
$t_d$	delay time	$I_C = 150\text{ mA}; I_{Bon} = 15\text{ mA}; I_{Boff} = -15\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$	-	-	15	ns
$t_r$	rise time		-	-	20	ns
$t_{on}$	turn-on time		-	-	35	ns
$t_s$	storage time		-	-	200	ns
$t_f$	fall time		-	-	60	ns
$t_{off}$	turn-off time		-	-	250	ns
$C_C$	collector capacitance		$V_{CB} = 10\text{ V}; I_E = 0\text{ A}; i_e = 0\text{ A}; f = 1\text{ MHz}; T_{amb} = 25\text{ }^\circ\text{C}$	-	-	8
$C_E$	emitter capacitance	$V_{EB} = 500\text{ mV}; I_C = 0\text{ A}; i_c = 0\text{ A}; f = 1\text{ MHz}; T_{amb} = 25\text{ }^\circ\text{C}$	-	-	25	pF
$f_T$	transition frequency	$V_{CE} = 10\text{ V}; I_C = 20\text{ mA}; f = 100\text{ MHz}; T_{amb} = 25\text{ }^\circ\text{C}$	300	-	-	MHz
NF	noise figure	$V_{CE} = 5\text{ V}; I_C = 200\text{ }\mu\text{A}; R_S = 2\text{ k}\Omega; f = 1\text{ kHz}; B = 200\text{ Hz}; T_{amb} = 25\text{ }^\circ\text{C}$	-	-	4	dB



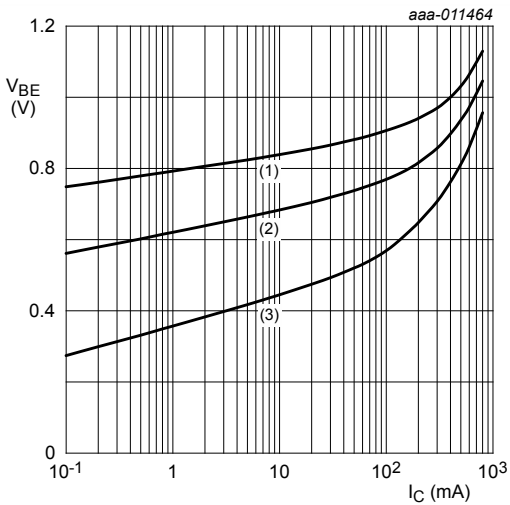
$V_{CE} = 10\text{ V}$   
 (1)  $T_{amb} = 150\text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = -55\text{ }^{\circ}\text{C}$

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



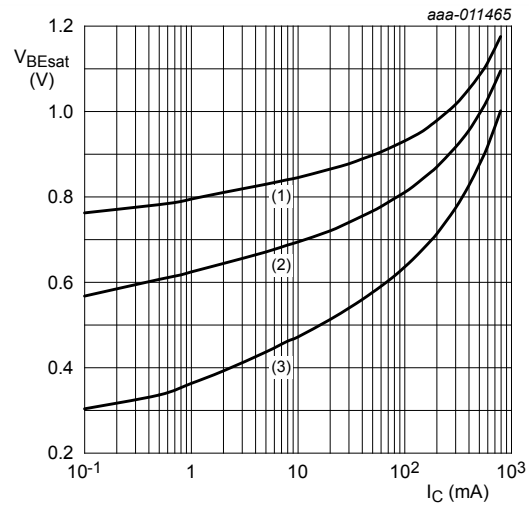
$T_{amb} = 25\text{ }^{\circ}\text{C}$

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



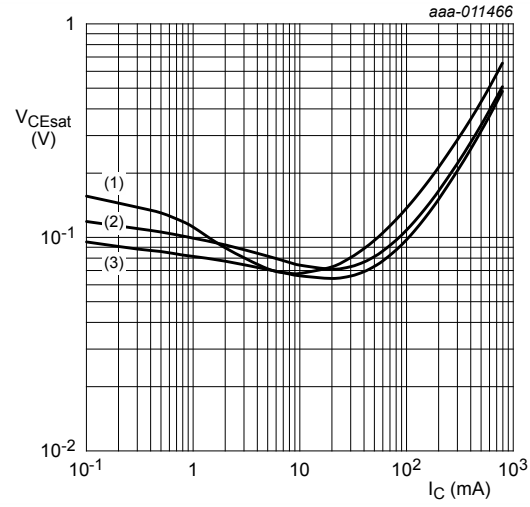
$V_{CE} = 1\text{ V}$   
 (1)  $T_{amb} = -55\text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = 150\text{ }^{\circ}\text{C}$

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



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

**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

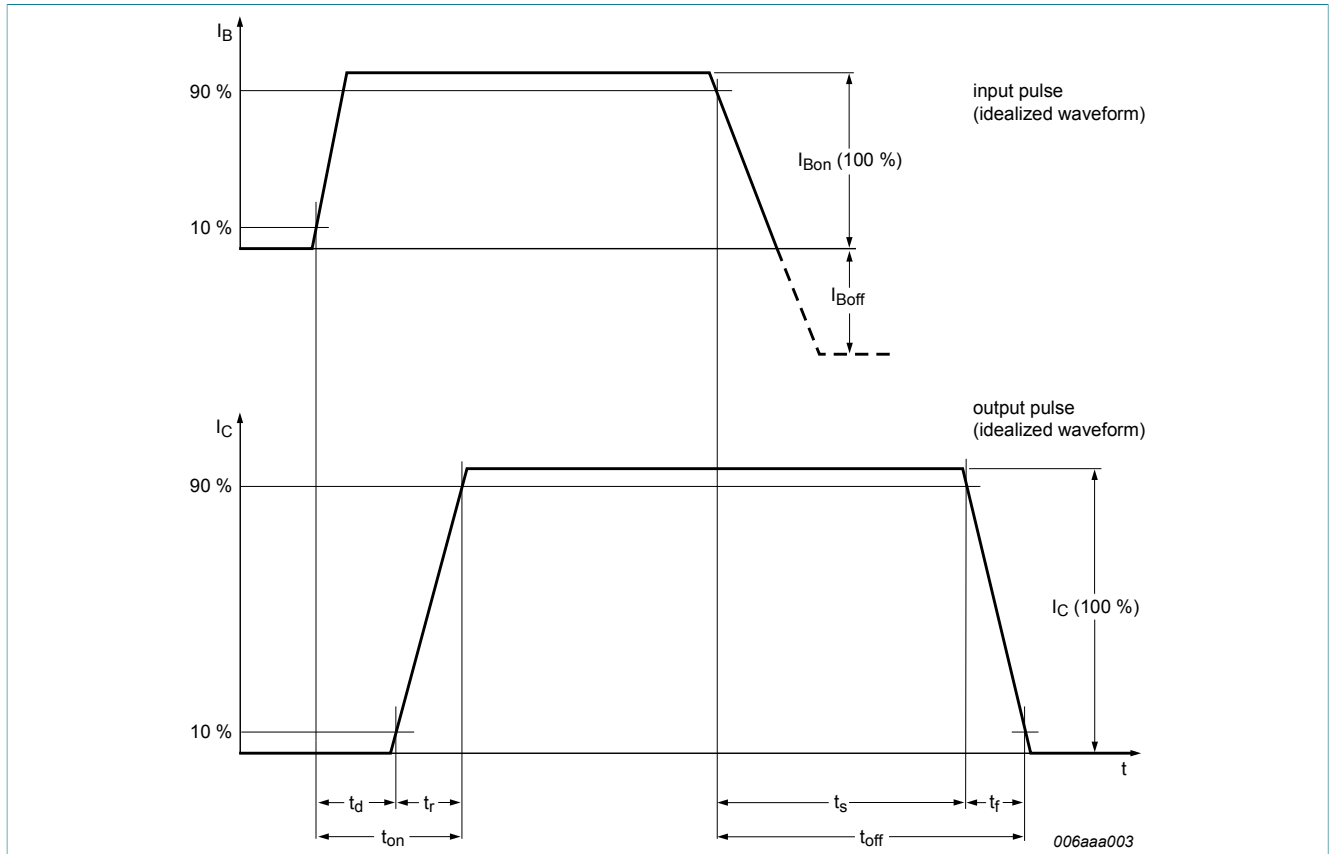


Fig. 10. BISS transistor switching time definition

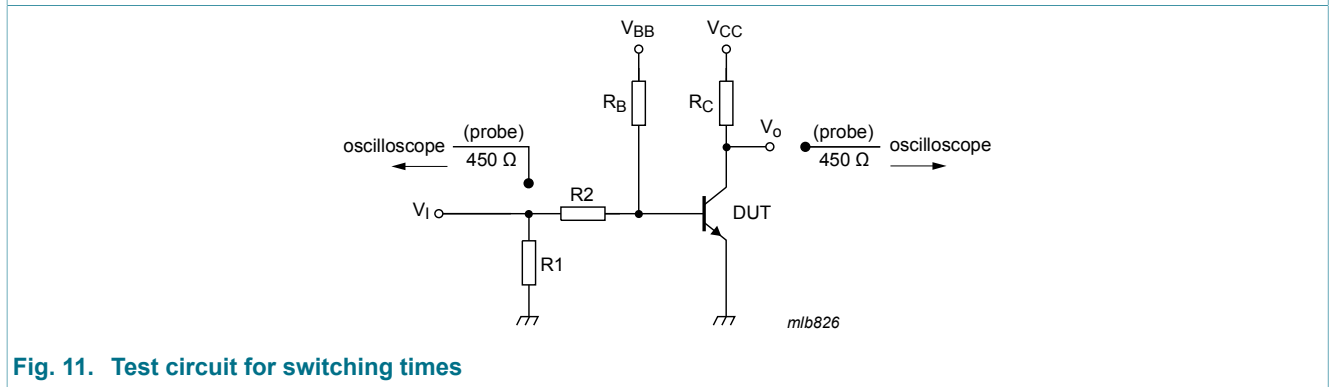


Fig. 11. Test circuit for switching times

## 12. Package outline

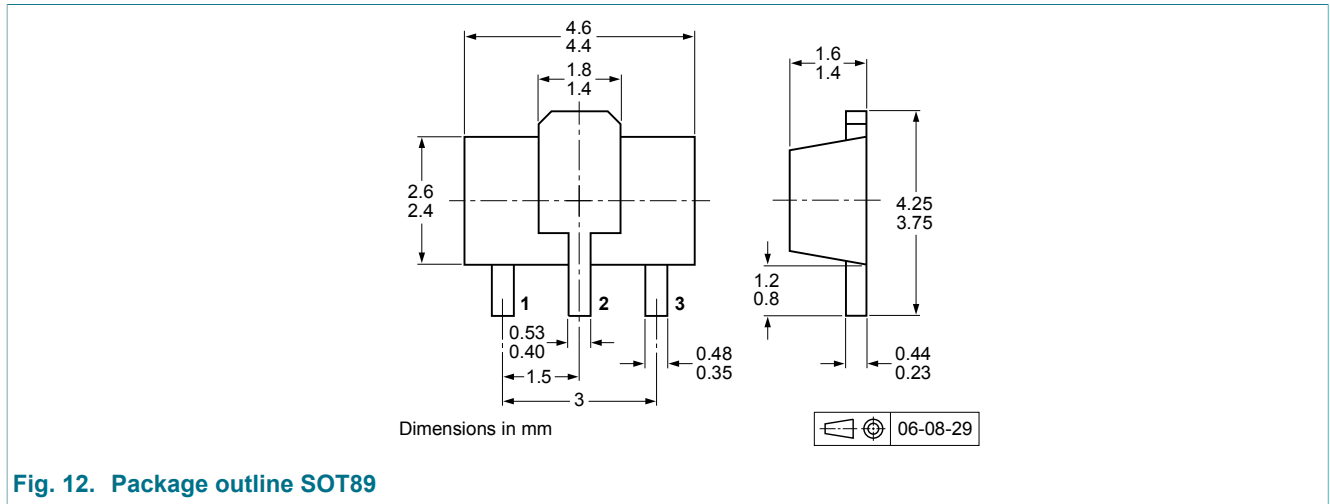


Fig. 12. Package outline SOT89

## 13. Soldering

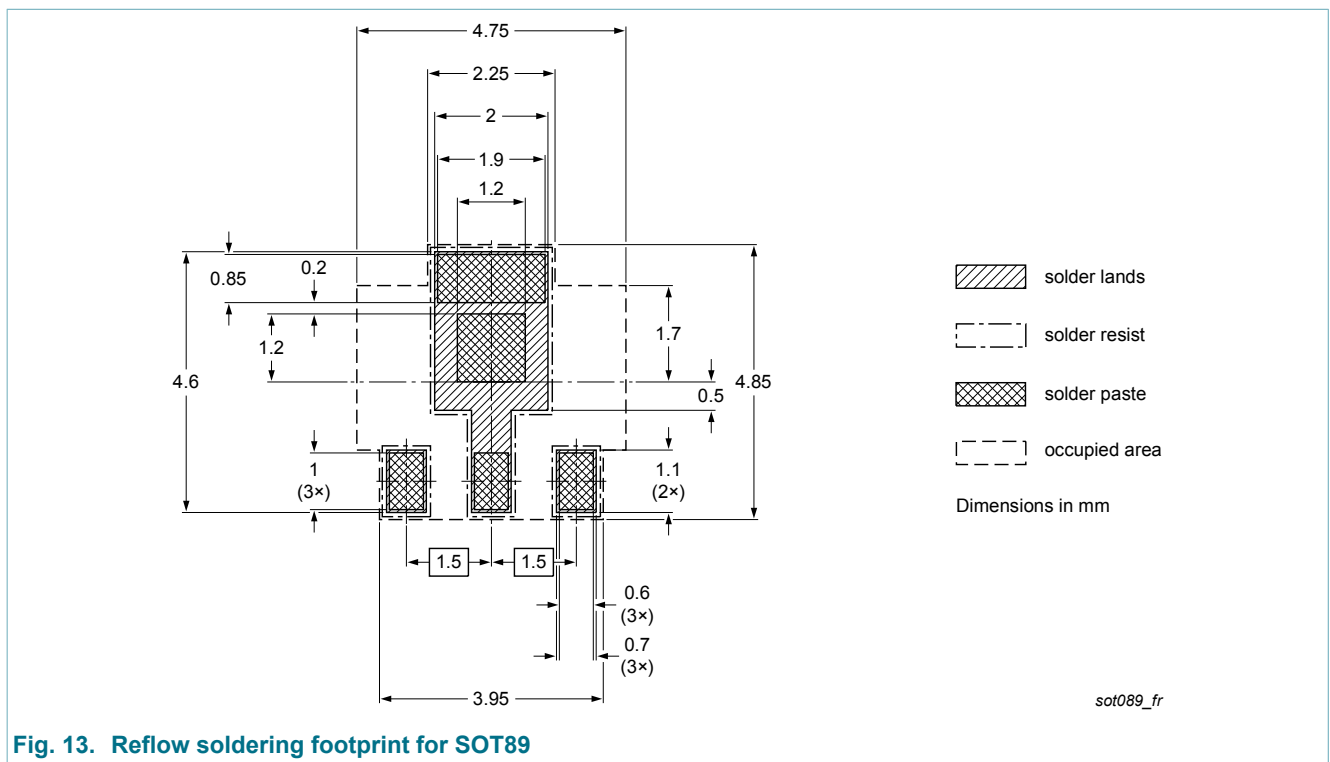


Fig. 13. Reflow soldering footprint for SOT89

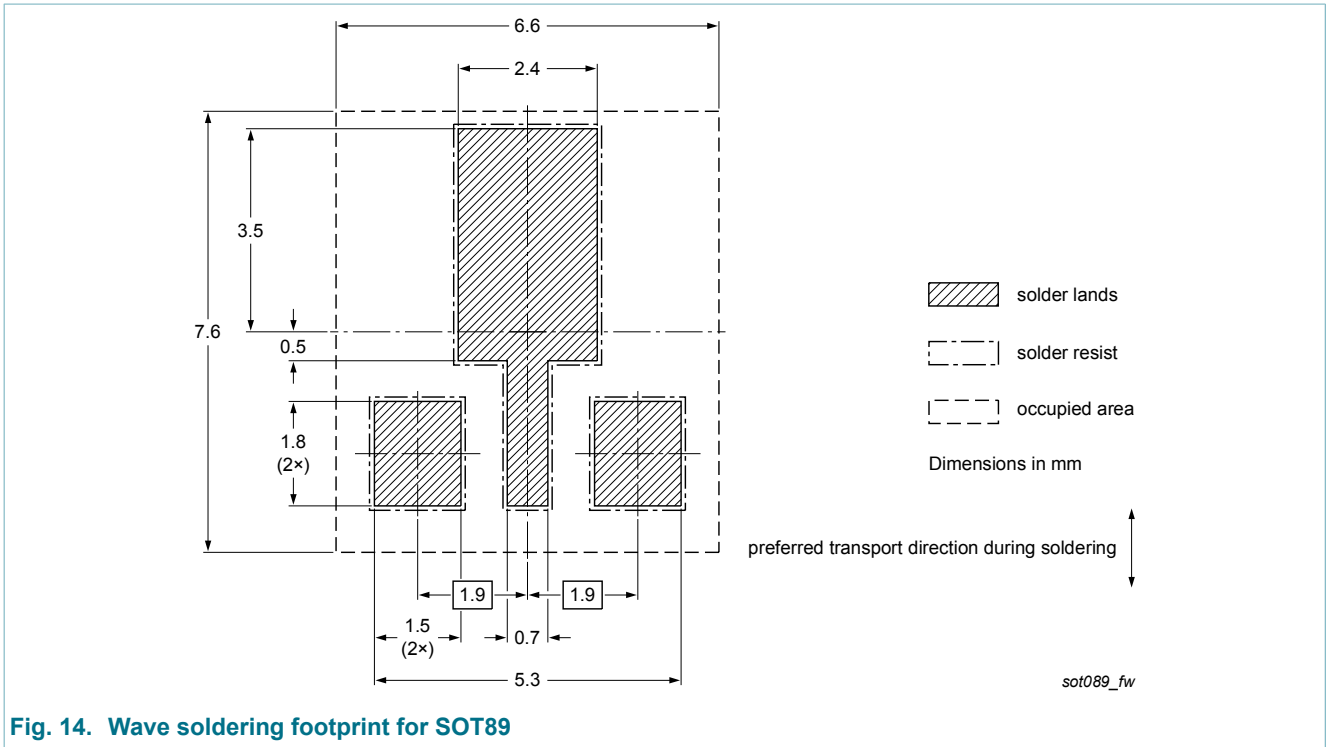


Fig. 14. Wave soldering footprint for SOT89

## 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	-	-

## 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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