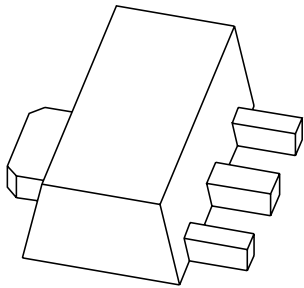


DATA SHEET



PXT4401 NPN switching transistor

Product data sheet
Supersedes data of 1999 Apr 14

2004 Nov 22

NPN switching transistor

PXT4401

FEATURES

- High current (max. 600 mA)
- Low voltage (max. 40 V).

APPLICATIONS

- Switching and linear amplification in industrial and consumer applications.

DESCRIPTION

NPN switching transistor in a SOT89 plastic package.
PNP complement: PXT4403.

MARKING

TYPE NUMBER	MARKING CODE ⁽¹⁾
PXT4401	*2X

Note

- * = p: Made in Hong Kong.
* = t: Made in Malaysia.
* = W: Made in China.

PINNING

PIN	DESCRIPTION
1	emitter
2	collector
3	base

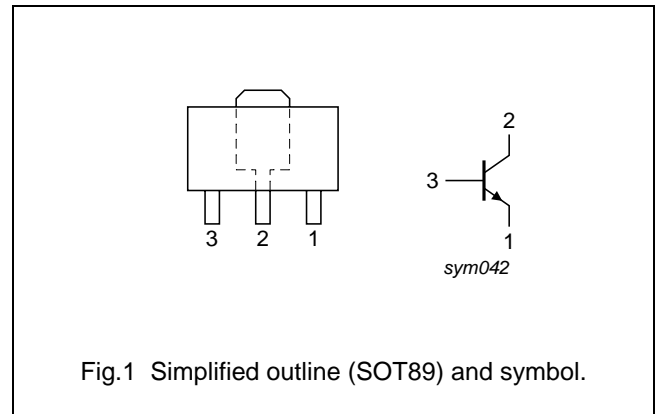


Fig.1 Simplified outline (SOT89) and symbol.

ORDERING INFORMATION

TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
PXT4401	SC-62	plastic surface mounted package; collector pad for good heat transfer; 3 leads	SOT89

NPN switching transistor

PXT4401

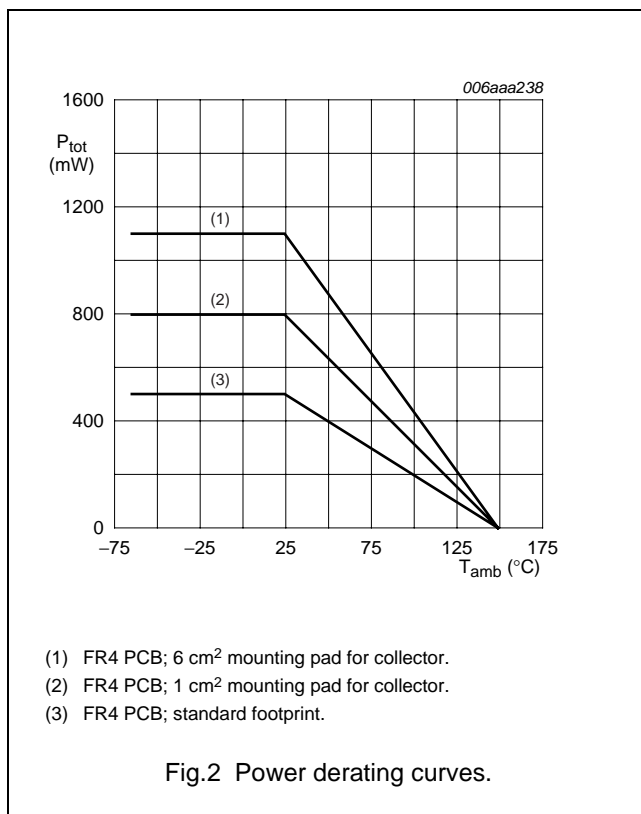
LIMITING VALUES

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	–	5	V
I_C	collector current (DC)		–	600	mA
I_{CM}	peak collector current		–	800	mA
I_{BM}	peak base current		–	200	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25\text{ °C}$	–	0.5	W
		note 1	–	0.8	W
		note 2	–	1.1	W
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	150	°C
T_{amb}	ambient temperature		–65	+150	°C

Notes

1. Device mounted on a printed-circuit board, single-sided copper, tin-plated and standard footprint.
2. Device mounted on a printed-circuit board, single-sided copper, tin-plated and mounting pad for collector 1 cm².
3. Device mounted on a printed-circuit board, single-sided copper, tin-plated and mounting pad for collector 6 cm².



NPN switching transistor

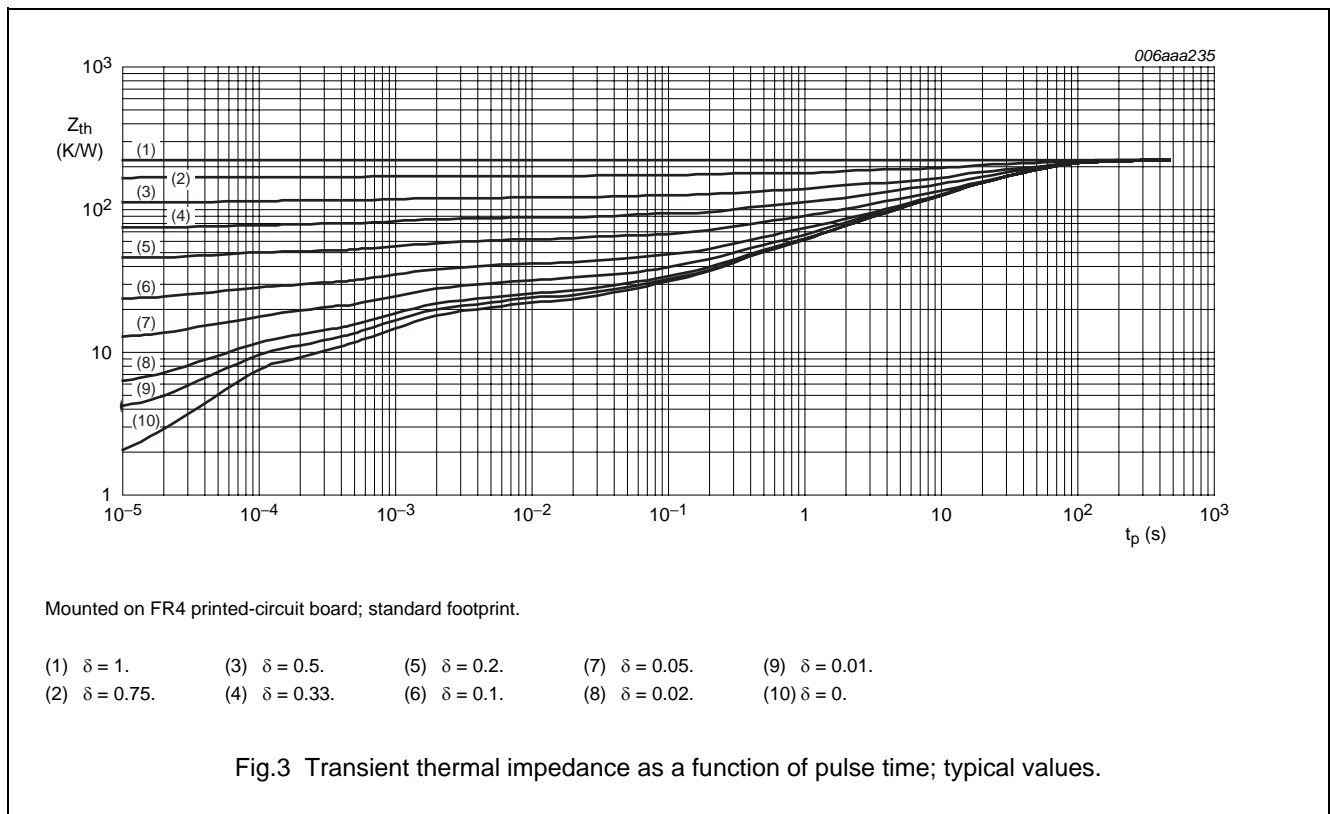
PXT4401

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
R _{th(j-a)}	thermal resistance from junction to ambient	in free air		
		note 1	250	K/W
		note 2	156	K/W
		note 3	113	K/W
R _{th(j-s)}	thermal resistance from junction to soldering point		30	K/W

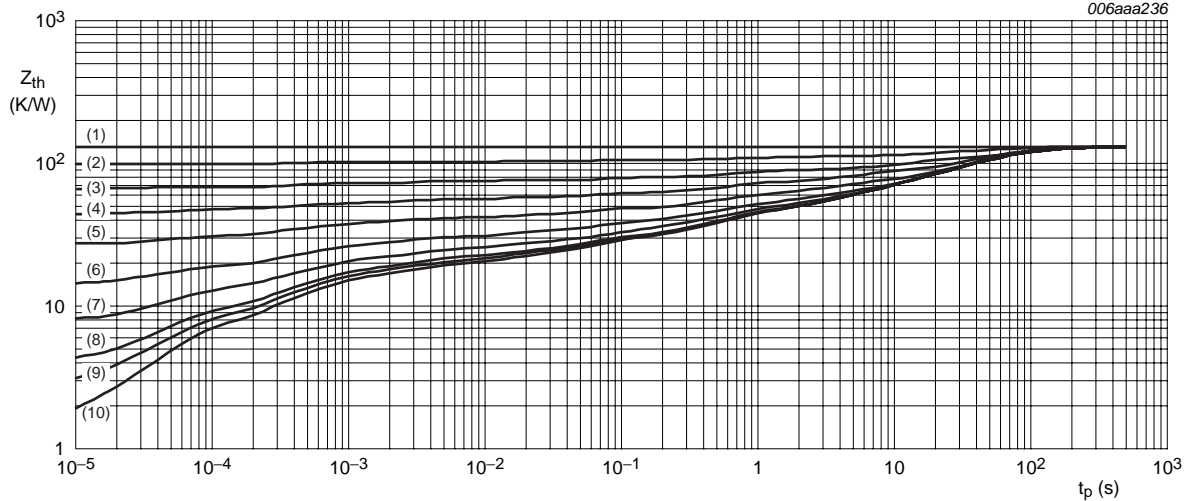
Notes

1. Device mounted on a printed-circuit board, single-sided copper, tin-plated and standard footprint.
2. Device mounted on a printed-circuit board, single-sided copper, tin-plated and mounting pad for collector 1 cm².
3. Device mounted on a printed-circuit board, single-sided copper, tin-plated and mounting pad for collector 6 cm².



NPN switching transistor

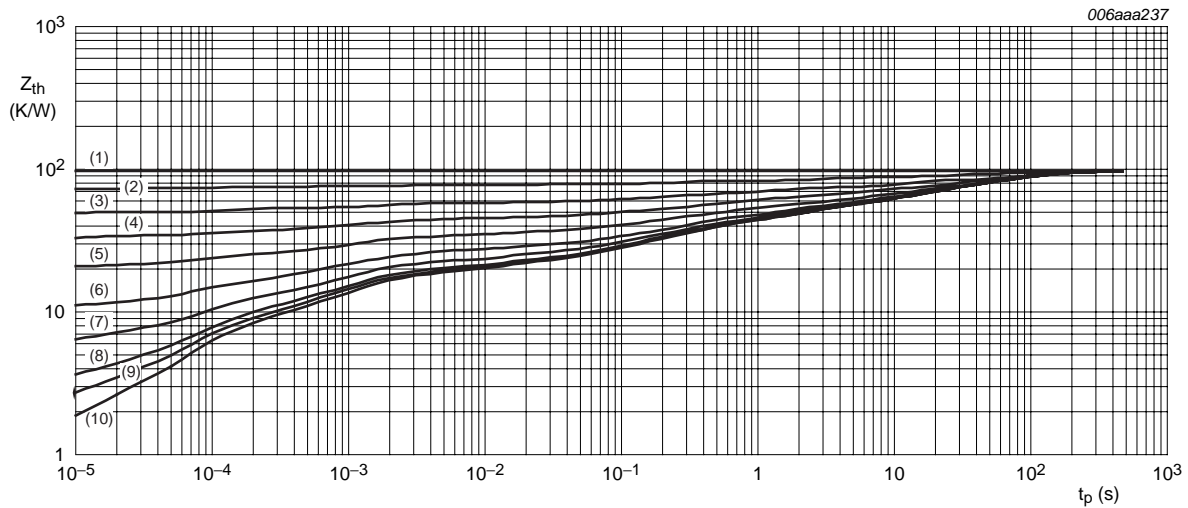
PXT4401



Mounted on FR4 printed-circuit board; mounting pad for collector 1 cm².

- | | | | | |
|----------------------|----------------------|---------------------|----------------------|----------------------|
| (1) $\delta = 1.$ | (3) $\delta = 0.5.$ | (5) $\delta = 0.2.$ | (7) $\delta = 0.05.$ | (9) $\delta = 0.01.$ |
| (2) $\delta = 0.75.$ | (4) $\delta = 0.33.$ | (6) $\delta = 0.1.$ | (8) $\delta = 0.02.$ | (10) $\delta = 0.$ |

Fig.4 Transient thermal impedance as a function of pulse time; typical values.



Mounted on FR4 printed-circuit board; mounting pad for collector 6 cm².

- | | | | | |
|----------------------|----------------------|---------------------|----------------------|----------------------|
| (1) $\delta = 1.$ | (3) $\delta = 0.5.$ | (5) $\delta = 0.2.$ | (7) $\delta = 0.05.$ | (9) $\delta = 0.01.$ |
| (2) $\delta = 0.75.$ | (4) $\delta = 0.33.$ | (6) $\delta = 0.1.$ | (8) $\delta = 0.02.$ | (10) $\delta = 0.$ |

Fig.5 Transient thermal impedance as a function of pulse time; typical values.

NPN switching transistor

PXT4401

CHARACTERISTICS

 $T_{amb} = 25\text{ °C}$ unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_{CBO}	collector-base cut-off current	$I_E = 0\text{ A}$; $V_{CB} = 60\text{ V}$	–	50	nA
I_{EBO}	emitter-base cut-off current	$I_C = 0\text{ A}$; $V_{EB} = 6\text{ V}$	–	50	nA
h_{FE}	DC current gain	$V_{CE} = 1\text{ V}$; (see Fig.6)	20	–	
		$I_C = 0.1\text{ mA}$	20	–	
		$I_C = 1\text{ mA}$	40	–	
		$I_C = 10\text{ mA}$	80	–	
		$I_C = 150\text{ mA}$; note 1	100	300	
V_{CEsat}	collector-emitter saturation voltage	$I_C = 150\text{ mA}$; $I_B = 15\text{ mA}$; note 1	–	400	mV
		$I_C = 500\text{ mA}$; $I_B = 50\text{ mA}$; note 1	–	750	mV
V_{BEsat}	base-emitter saturation voltage	$I_C = 150\text{ mA}$; $I_B = 15\text{ mA}$; note 1	–	950	mV
		$I_C = 500\text{ mA}$; $I_B = 50\text{ mA}$; note 1	–	1.2	V
C_c	collector capacitance	$I_E = i_e = 0\text{ A}$; $V_{CB} = 5\text{ V}$; $f = 1\text{ MHz}$	–	8	pF
C_e	emitter capacitance	$I_C = i_c = 0\text{ A}$; $V_{EB} = 500\text{ mV}$; $f = 1\text{ MHz}$	–	30	pF
f_T	transition frequency	$I_C = 20\text{ mA}$; $V_{CE} = 10\text{ V}$; $f = 100\text{ MHz}$	250	–	MHz
Switching times (between 10% and 90% levels); (see Fig.7)					
t_{on}	turn-on time	$I_{Con} = 150\text{ mA}$; $I_{Bon} = 15\text{ mA}$; $I_{Boff} = -15\text{ mA}$	–	35	ns
t_d	delay time		–	15	ns
t_r	rise time		–	20	ns
t_{off}	turn-off time		–	250	ns
t_s	storage time		–	200	ns
t_f	fall time		–	60	ns

Note

1. Pulse test: $t_p \leq 300\text{ }\mu\text{s}$; $\delta \leq 0.02$.

NPN switching transistor

PXT4401

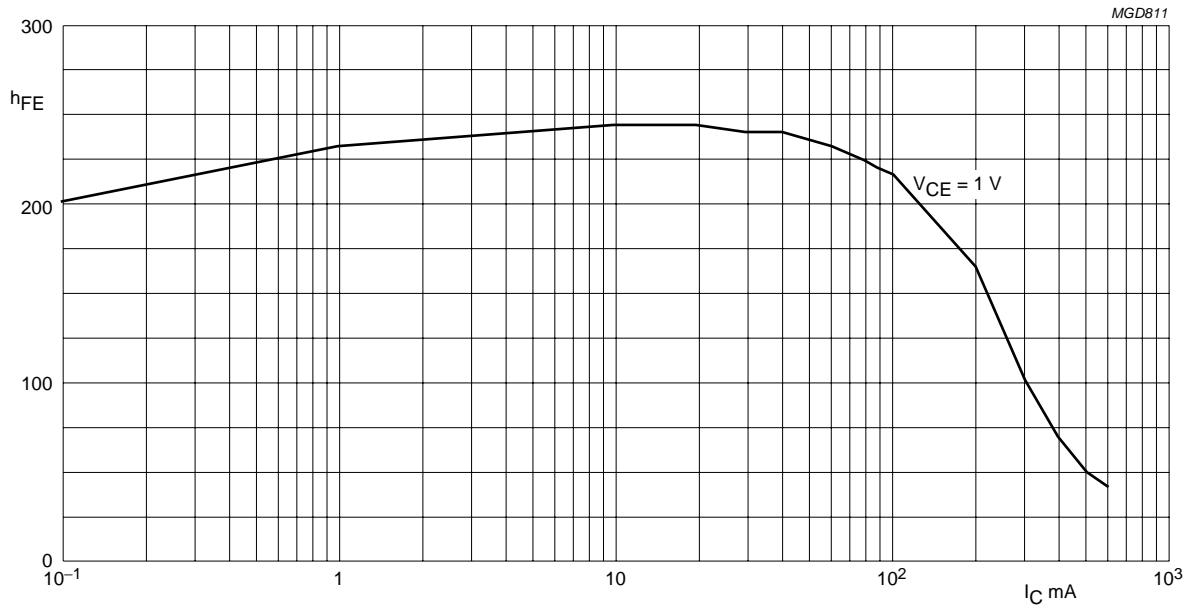
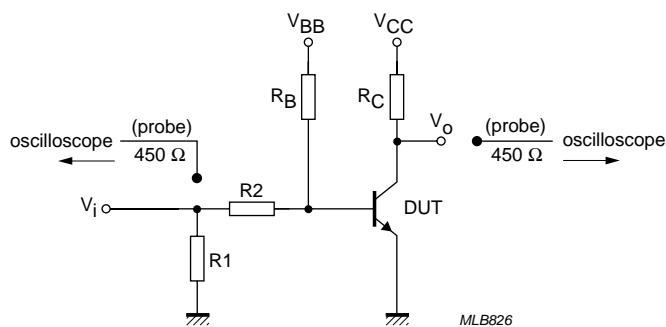


Fig.6 DC current gain; typical values.



$V_i = 9.5 \text{ V}$; $T = 500 \text{ } \mu\text{s}$; $t_p = 10 \text{ } \mu\text{s}$; $t_r = t_f \leq 3 \text{ ns}$.
 $R_1 = 68 \text{ } \Omega$; $R_2 = 325 \text{ } \Omega$; $R_B = 325 \text{ } \Omega$; $R_C = 160 \text{ } \Omega$.
 $V_{BB} = -3.5 \text{ V}$; $V_{CC} = 29.5 \text{ V}$.
 Oscilloscope: input impedance $Z_i = 50 \text{ } \Omega$.

Fig.7 Test circuit for switching times.

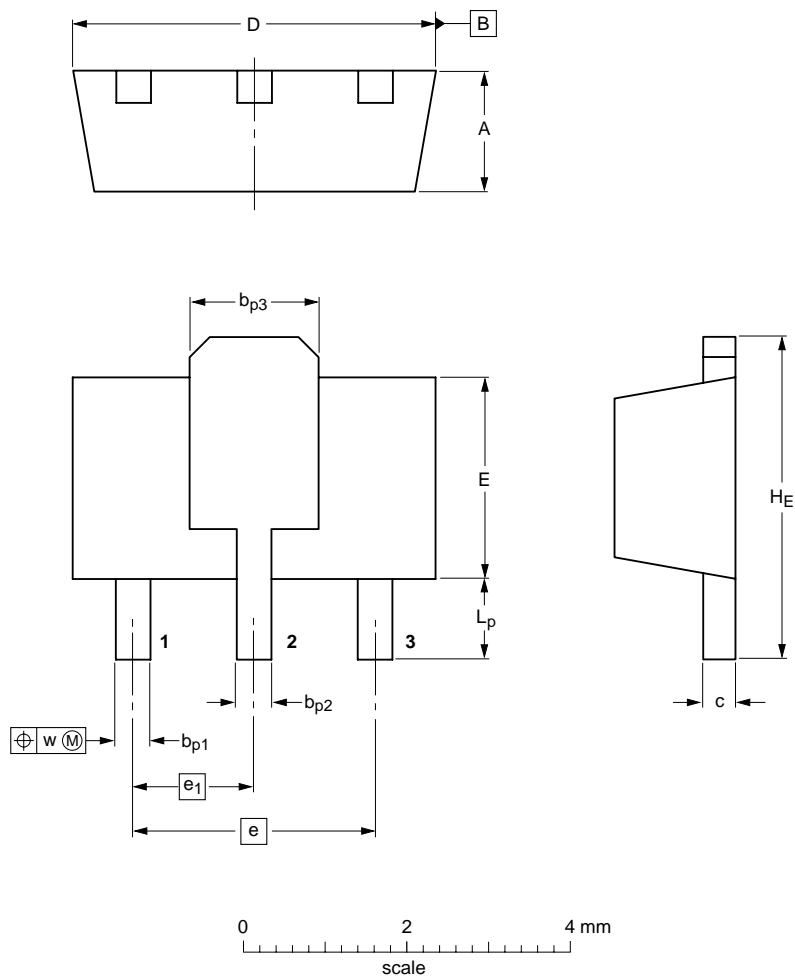
NPN switching transistor

PXT4401

PACKAGE OUTLINE

Plastic surface-mounted package; collector pad for good heat transfer; 3 leads

SOT89



DIMENSIONS (mm are the original dimensions)

UNIT	A	b _{p1}	b _{p2}	b _{p3}	c	D	E	e	e ₁	H _E	L _p	w
mm	1.6 1.4	0.48 0.35	0.53 0.40	1.8 1.4	0.44 0.23	4.6 4.4	2.6 2.4	3.0	1.5	4.25 3.75	1.2 0.8	0.13

OUTLINE VERSION	REFERENCES			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
SOT89		TO-243	SC-62		04-08-03 06-03-16

NPN switching transistor

PXT4401

DATA SHEET STATUS

DOCUMENT STATUS ⁽¹⁾	PRODUCT STATUS ⁽²⁾	DEFINITION
Objective data sheet	Development	This document contains data from the objective specification for product development.
Preliminary data sheet	Qualification	This document contains data from the preliminary specification.
Product data sheet	Production	This document contains the product specification.

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