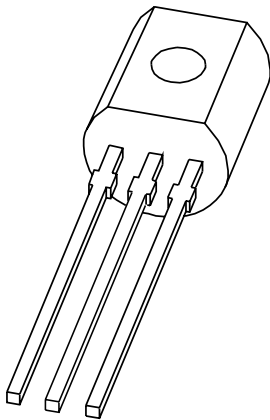


DATA SHEET



PH2369 NPN switching transistor

Product data sheet
Supersedes data of 1999 Apr 27

2004 Oct 11

NPN switching transistor

PH2369

FEATURES

- Low current (max. 200 mA)
- Low voltage (max. 15 V).

APPLICATIONS

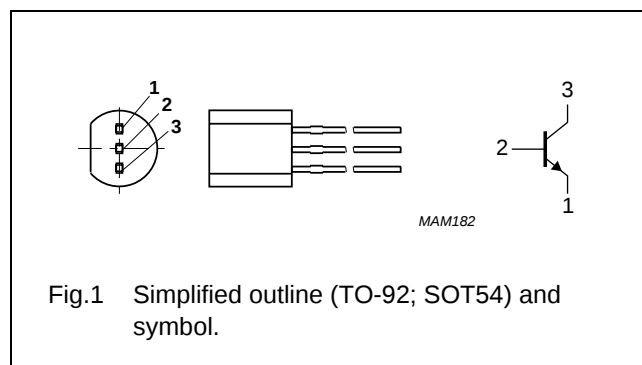
- High-speed switching.

DESCRIPTION

NPN switching transistor in a TO-92; SOT54 plastic package.

PINNING

PIN	DESCRIPTION
1	emitter
2	base
3	collector



ORDERING INFORMATION

TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
PH2369	SC-43A	plastic single-ended leaded (through hole) package; 3 leads	SOT54

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	–	40	V
V_{CEO}	collector-emitter voltage	open base	–	15	V
V_{EBO}	emitter-base voltage	open collector	–	4.5	V
I_C	collector current (DC)		–	200	mA
I_{CM}	peak collector current		–	300	mA
I_{BM}	peak base current		–	100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25\text{ °C}$	–	500	mW
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	150	°C
T_{amb}	ambient temperature		–65	+150	°C

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THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th(j-a)}$	thermal resistance from junction to ambient	note 1	250	K/W

Note

1. Transistor mounted on an FR4 printed-circuit board.

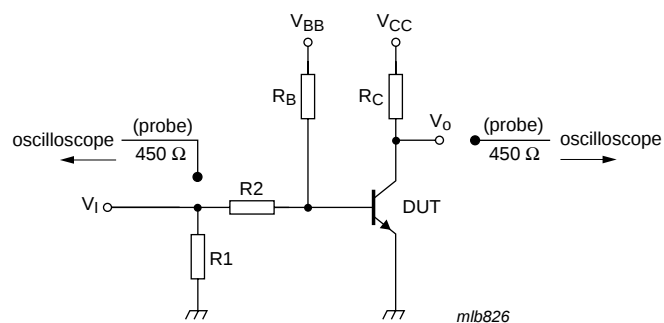
CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_{CBO}	collector-base cut-off current	$V_{CB} = 20\text{ V}; I_E = 0\text{ A}$	–	400	nA
		$V_{CB} = 20\text{ V}; I_E = 0\text{ A}; T_j = 125\text{ °C}$	–	30	μA
I_{EBO}	emitter-base cut-off current	$V_{EB} = 4\text{ V}; I_C = 0\text{ A}$	–	100	nA
h_{FE}	DC current gain	$V_{CE} = 1\text{ V}; I_C = 10\text{ mA}$	40	120	
		$V_{CE} = 1\text{ V}; I_C = 10\text{ mA}; T_{amb} = -55\text{ °C}$	20	–	
		$V_{CE} = 2\text{ V}; I_C = 100\text{ mA}$	20	–	
V_{CEsat}	collector-emitter saturation voltage	$I_C = 10\text{ mA}; I_B = 1\text{ mA}$	–	250	mV
V_{BEsat}	base-emitter saturation voltage	$I_C = 10\text{ mA}; I_B = 1\text{ mA}$	700	850	mV
C_c	collector capacitance	$V_{CB} = 5\text{ V}; I_E = I_C = 0\text{ A}; f = 1\text{ MHz}$	–	4	pF
C_e	emitter capacitance	$V_{EB} = 1\text{ V}; I_C = I_E = 0\text{ A}; f = 1\text{ MHz}$	–	4.5	pF
f_T	transition frequency	$V_{CE} = 10\text{ V}; I_C = 10\text{ mA}; f = 100\text{ MHz}$	500	–	MHz
Switching times (between 10 % and 90 % levels)					
t_{on}	turn-on time	$I_{Con} = 10\text{ mA}; I_{Bon} = 3\text{ mA}; I_{Boff} = -1.5\text{ mA};$ see Fig.2 test conditions A	–	10	ns
t_d	delay time		–	4	ns
t_r	rise time		–	6	ns
t_{off}	turn-off time		–	20	ns
t_s	storage time		–	10	ns
t_f	fall time		–	10	ns
t_{on}	turn-on time	$I_{Con} = 100\text{ mA}; I_{Bon} = 40\text{ mA}; I_{Boff} = -20\text{ mA};$ see Fig.2 test conditions B	–	13	ns
t_{off}	turn-off time		–	35	ns

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**Test conditions A.**

$V_i = 0.5$ to 4.2 V; $T = 500$ μ s; $t_p = 10$ μ s; $t_r = t_f \leq 3$ ns.

$R_1 = 56$ Ω ; $R_2 = 1$ k Ω ; $R_B = 1$ k Ω ; $R_C = 270$ Ω .

$V_{BB} = 0.2$ V; $V_{CC} = 2.7$ V.

Oscilloscope: input impedance $Z_i = 50$ Ω .

Test conditions B.

$V_i = 0.5$ to 4.52 V; $T = 200$ μ s; $t_p = 10$ μ s; $t_r = t_f \leq 3$ ns.

$R_1 = 100$ Ω ; $R_2 = 68$ Ω ; $R_B = 390$ Ω ; $R_C = 47$ Ω .

$V_{BB} = -3$ V; $V_{CC} = 4.6$ V.

Oscilloscope: input impedance $Z_i = 50$ Ω .

Fig.2 Test circuit for switching times.

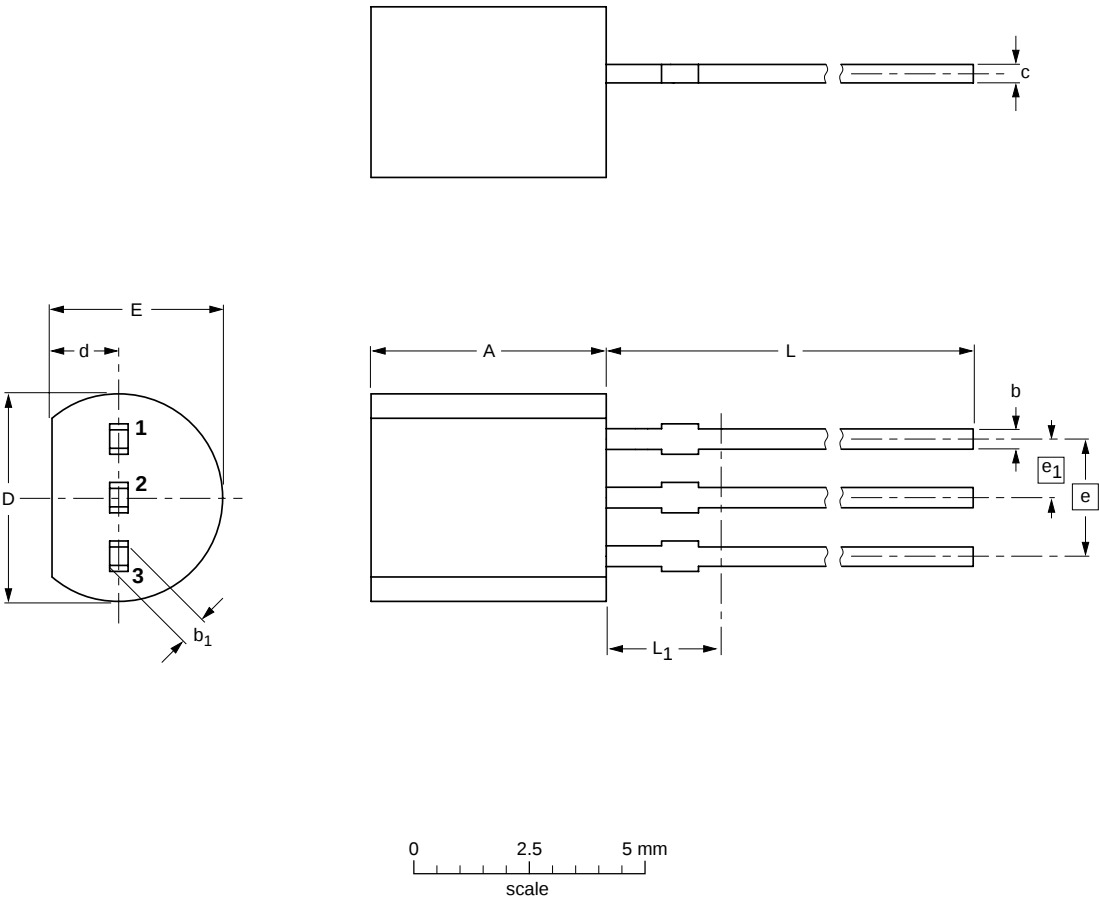
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PACKAGE OUTLINE

Plastic single-ended leaded (through hole) package; 3 leads

SOT54



DIMENSIONS (mm are the original dimensions)

UNIT	A	b	b ₁	c	D	d	E	e	e ₁	L	L ₁ ⁽¹⁾ max.
mm	5.2 5.0	0.48 0.40	0.66 0.55	0.45 0.38	4.8 4.4	1.7 1.4	4.2 3.6	2.54	1.27	14.5 12.7	2.5

Note

1. Terminal dimensions within this zone are uncontrolled to allow for flow of plastic and terminal irregularities.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT54		TO-92	SC-43A			04-06-28 04-11-16

NPN switching transistor

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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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Customer notification

This data sheet was changed to reflect the new company name NXP Semiconductors, including new legal definitions and disclaimers. No changes were made to the technical content, except for package outline drawings which were updated to the latest version.

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