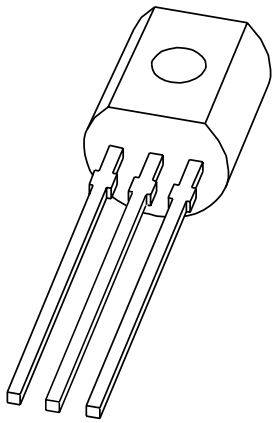
DATA SHEET



PH2369
NPN switching transistor

Product specification
Supersedes data of 1997 May 27

1999 Apr 27

Philips
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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

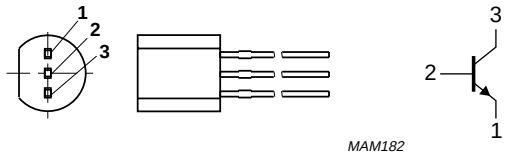


Fig.1 Simplified outline (TO-92; SOT54) and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

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	$T_{amb} \leq 25$ °C	–	500	mW
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	150	°C
T_{amb}	operating ambient temperature		–65	+150	°C

THERMAL CHARACTERISTICS

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

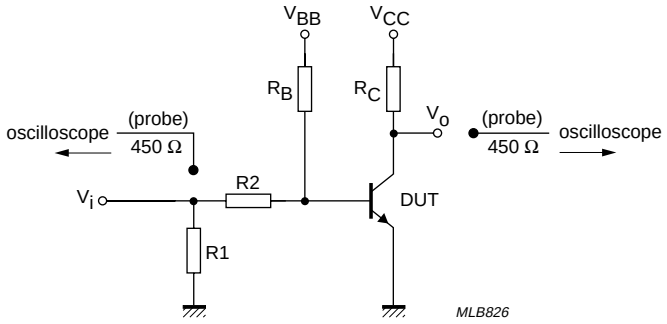
Note

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

CHARACTERISTICS

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

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



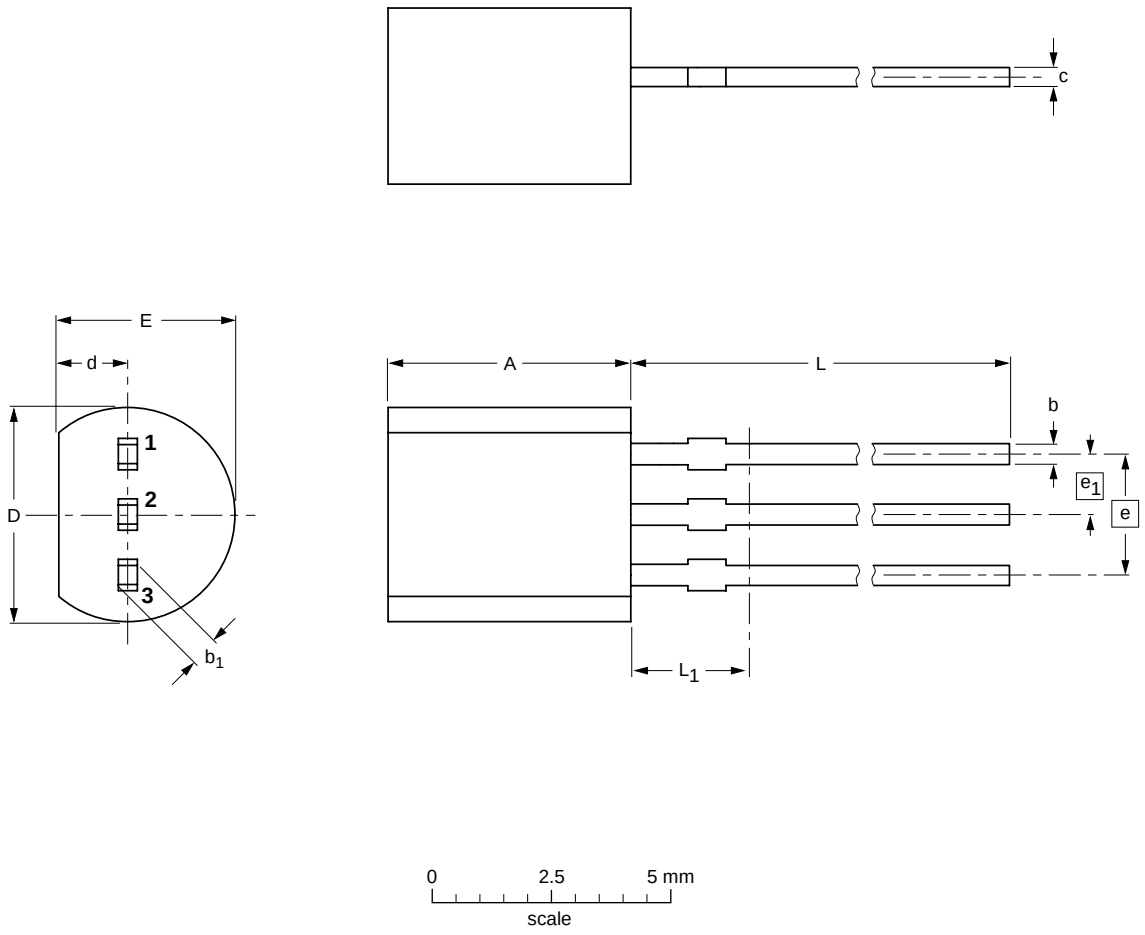
Test conditions A.
V_i = 0.5 to 4.2 V; T = 500 μs; t_p = 10 μs; $t_r = t_f \leq 3$ ns.
R1 = 56 Ω; R2 = 1 kΩ; R_B = 1 kΩ; R_C = 270 Ω.
V_{BB} = 0.2 V; V_{CC} = 2.7 V.
Oscilloscope: input impedance Z_i = 50 Ω.

Test conditions B.
V_i = 0.5 to 4.52 V; T = 200 μs; t_p = 10 μs; $t_r = t_f \leq 3$ ns.
R1 = 100 Ω; R2 = 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.

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)
mm	5.2 5.0	0.48 0.40	0.66 0.56	0.45 0.40	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	EIAJ			
SOT54		TO-92	SC-43			97-02-28

DEFINITIONS

Data sheet status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

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