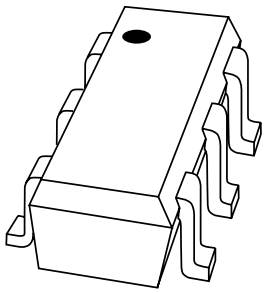
DATA SHEET



PUMD48
NPN/PNP resistor-equipped transistors

Product Specification

1999 Apr 22

Philips
Semiconductors

PHILIPS

NPN/PNP resistor-equipped transistors PUMD48

FEATURES

- Transistors with different polarity and built-in bias resistors R1 (typ. 47 and 47 kΩ) and R2 (typ. 2.2 and 47 kΩ)
- No mutual interference between the transistors
- Simplification of circuit design
- Reduces number of components and board space.

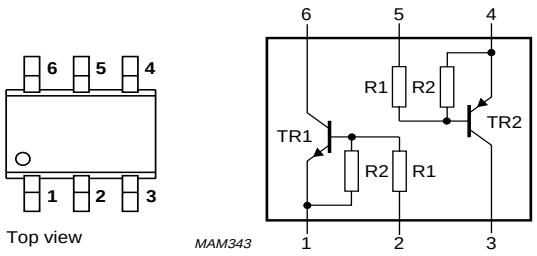


Fig.1 Simplified outline (SC-88) and symbol.

APPLICATIONS

- Especially suitable for space reduction in interface and driver circuits
- Inverter circuit configurations without use of external resistors.

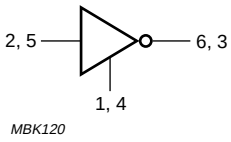


Fig.2 Equivalent inverter symbol.

DESCRIPTION

NPN/PNP resistor-equipped transistors in an SC-88 plastic package.

PINNING

PIN	DESCRIPTION	
1, 4	emitter	TR1; TR2
2, 5	base	TR1; TR2
6, 3	collector	TR1; TR2

MARKING

TYPE NUMBER	MARKING CODE
PUMD48	4t8

LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
Per transistor; for the PNP transistor with negative polarity					
V_{CBO}	collector-base voltage	open emitter	–	50	V
V_{CEO}	collector-emitter voltage	open base	–	50	V
V_{EBO}	emitter-base voltage	open collector	–	10	V
V_I	input voltage TR1				
	positive		–	+40	V
	negative		–	–10	V
	input voltage TR2				
	positive		–	+5	V
	negative		–	–12	V
I_O	output current (DC)		–	100	mA
I_{CM}	peak collector current		–	100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C; note 1	–	200	mW
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	150	°C
T_{amb}	operating ambient temperature		–65	+150	°C
Per device					
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	–	300	mW

Notes

1. Refer to SC-88 standard mounting conditions.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}a}$	thermal resistance from junction to ambient	note 1	416	K/W

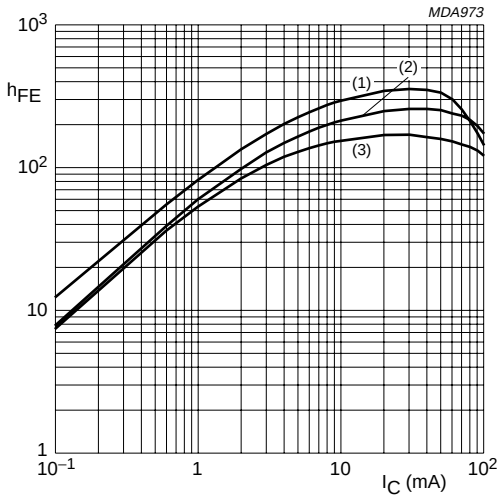
Note

1. Refer to SC-88 standard mounting conditions.

CHARACTERISTICS

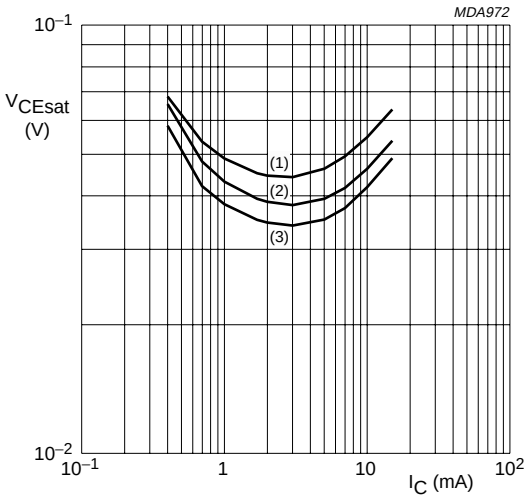
T_{amb} = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Per transistor; for the PNP transistor with negative polarity						
I_{CBO}	collector cut-off current	I_E = 0; V_{CB} = 50 V	–	–	100	nA
I_{CEO}	collector cut-off current	I_B = 0; V_{CE} = 30 V	–	–	1	µA
		I_B = 0; V_{CE} = 30 V; T_j = 150 °C	–	–	50	µA
Transistor TR1 (NPN)						
I_{EBO}	emitter cut-off current	I_C = 0; V_{EB} = 5 V	–	–	90	µA
h_{FE}	DC current gain	I_C = 5 mA; V_{CE} = 5 V	80	–	–	
V_{CEsat}	collector-emitter saturation voltage	I_C = 10 mA; I_B = 0.5 mA	–	–	150	mV
$V_{i(off)}$	input-off voltage	I_C = 100 µA; V_{CE} = 5 V	–	1.2	0.8	V
$V_{i(on)}$	input-on voltage	I_C = 2 mA; V_{CE} = 0.3 V	3	1.6	–	V
R1	input resistor		33	47	61	kΩ
$\frac{R2}{R1}$	resistor ratio		0.8	1	1.2	
C_c	collector capacitance	$I_E = i_e$ = 0; V_{CB} = 10 V; f = 1 MHz	–	–	2.5	pF
Transistor TR2 (PNP)						
I_{EBO}	emitter cut-off current	I_C = 0; V_{EB} = –5 V	–	–	180	µA
h_{FE}	DC current gain	I_C = –10 mA; V_{CE} = –5 V	100	–	–	
V_{CEsat}	collector-emitter saturation voltage	I_C = –5 mA; I_B = –0.25 mA	–	–	–100	mV
$V_{i(off)}$	input-off voltage	I_C = –100 µA; V_{CE} = –5 V	–	–0.6	–0.5	V
$V_{i(on)}$	input-on voltage	I_C = –5 mA; V_{CE} = –0.3 V	–1.1	–0.75	–	V
R1	input resistor		1.54	2.2	2.86	kΩ
$\frac{R2}{R1}$	resistor ratio		17	21	26	
C_c	collector capacitance	$I_E = i_e$ = 0; V_{CB} = –10 V; f = 1 MHz	–	–	3	pF



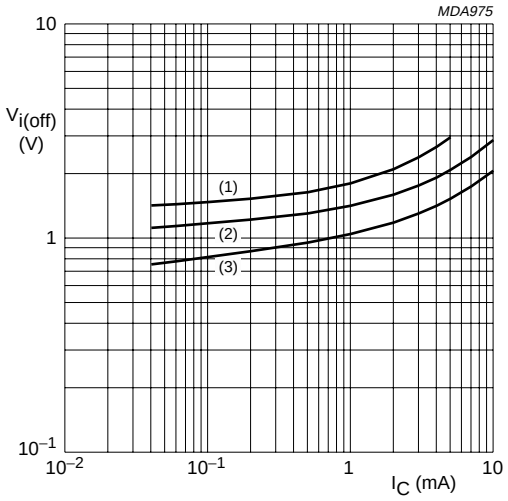
TR1 (NPN); V_{CE} = 5 V.
(1) T_{amb} = 150 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = –40 °C.

Fig.3 DC current gain as a function of collector current; typical values.



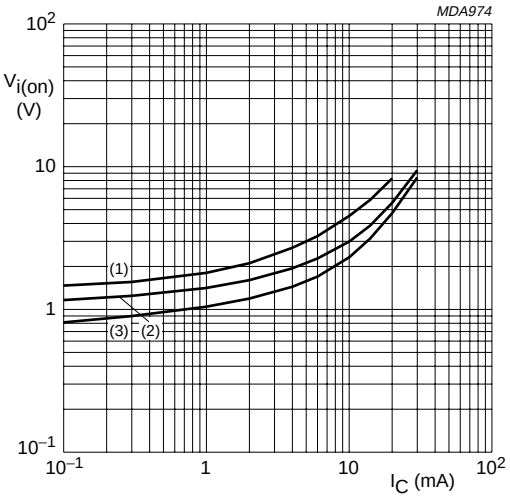
TR1 (NPN); I_C/I_B = 20.
(1) T_{amb} = 100 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = –40 °C.

Fig.4 Collector-emitter saturation voltage as a function of collector current; typical values.



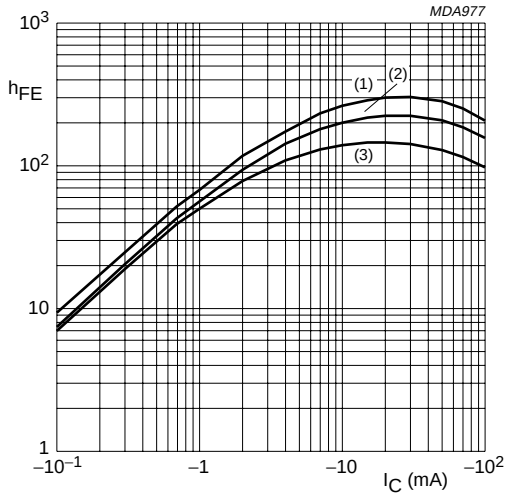
TR1 (NPN); V_{CE} = 5 V.
(1) T_{amb} = –40 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = 100 °C.

Fig.5 Input-off voltage as a function of collector current; typical values.



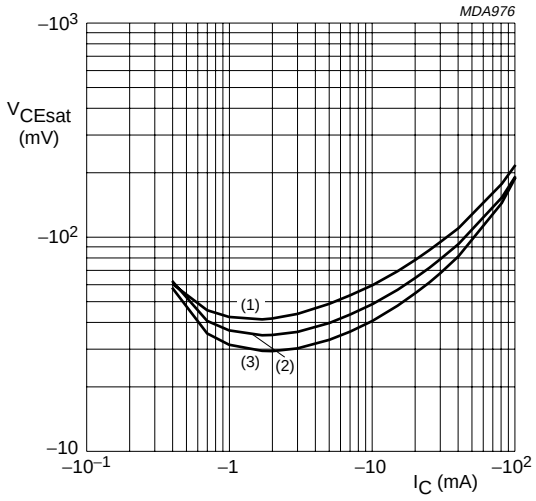
TR1 (NPN); V_{CE} = 0.3 V.
(1) T_{amb} = –40 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = 100 °C.

Fig.6 Input-on voltage as a function of collector current; typical values.



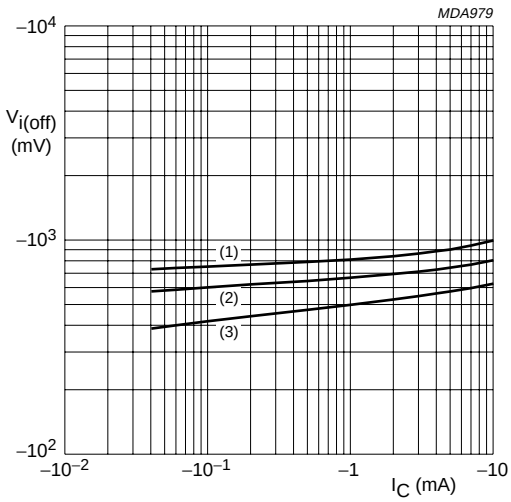
TR2 (PNP); V_{CE} = –5 V.
(1) T_{amb} = 100 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = –40 °C.

Fig.7 DC current gain as a function of collector current; typical values.



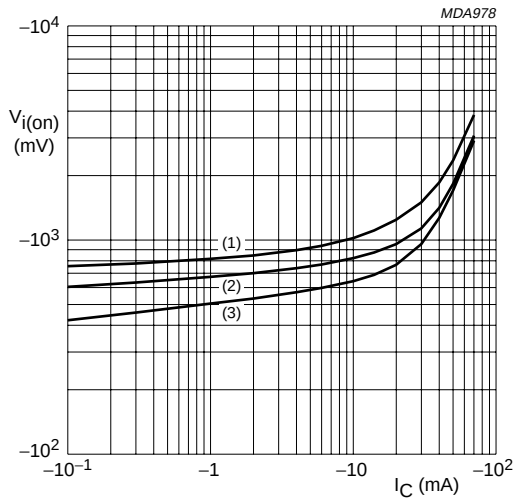
TR2 (PNP); I_C/I_B = 20.
(1) T_{amb} = 100 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = –40 °C.

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



TR2 (PNP); V_{CE} = –5 V.
(1) T_{amb} = –40 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = 100 °C.

Fig.9 Input-off voltage as a function of collector current; typical values.

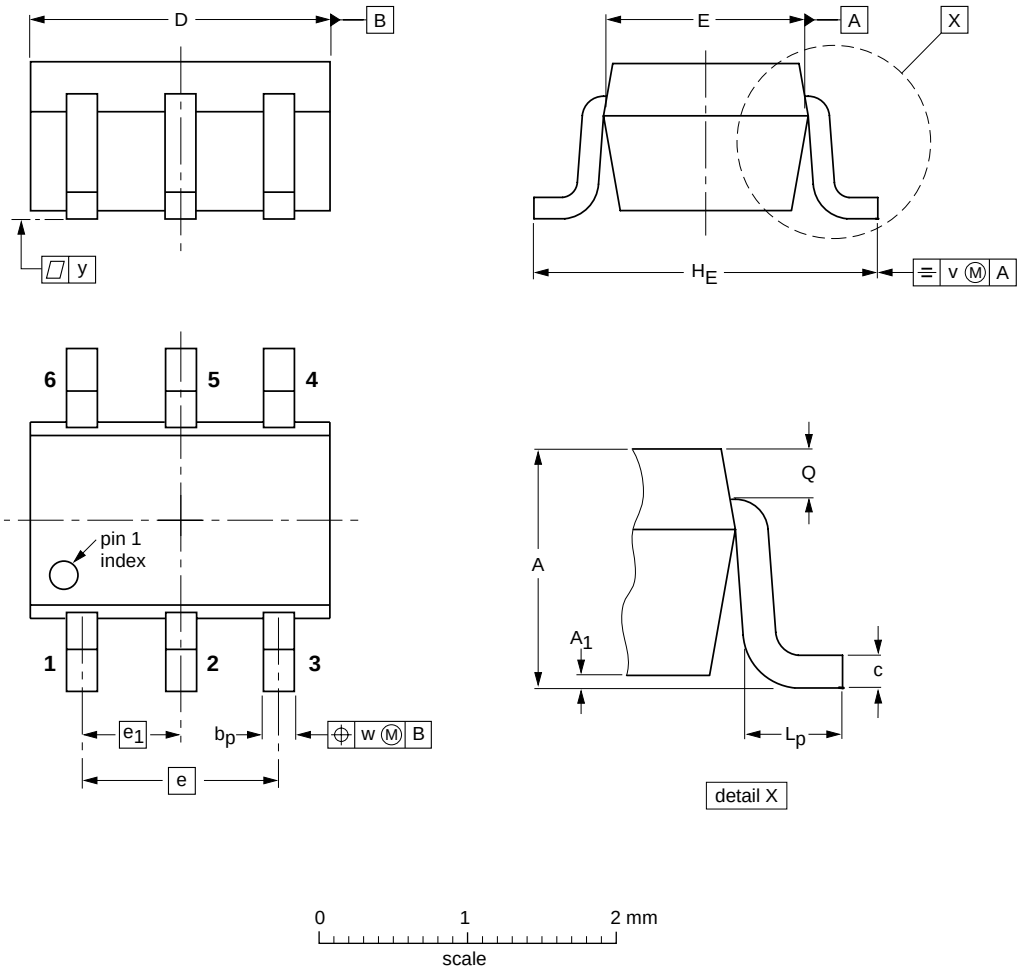


TR2 (PNP); V_{CE} = –0.3 V.
(1) T_{amb} = –40 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = 100 °C.

Fig.10 Input-on voltage as a function of collector current; typical values.

PACKAGE OUTLINE

Plastic surface mounted package; 6 leads **SOT363**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1 max	b_p	c	D	E	e	e_1	H_E	L_p	Q	v	w	y
mm	1.1 0.8	0.1	0.30 0.20	0.25 0.10	2.2 1.8	1.35 1.15	1.3	0.65	2.2 2.0	0.45 0.15	0.25 0.15	0.2	0.2	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT363			SC-88			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.	
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Where application information is given, it is advisory and does not form part of the specification.	

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