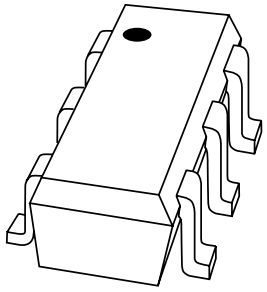
DATA SHEET



PUMD13
NPN/PNP resistor-equipped transistors

Product specification

2001 Feb 27

Philips
Semiconductors

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NPN/PNP resistor-equipped transistors PUMD13

FEATURES

- Transistors with different polarity and built-in bias resistors R1 and R2 (4.7 and 47 kΩ respectively)
- No mutual interference between the transistors
- Simplification of circuit design
- Reduced number of components and board space.

APPLICATION

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

DESCRIPTION

NPN/PNP resistor-equipped transistors in an SC-88 (SOT363) plastic package.

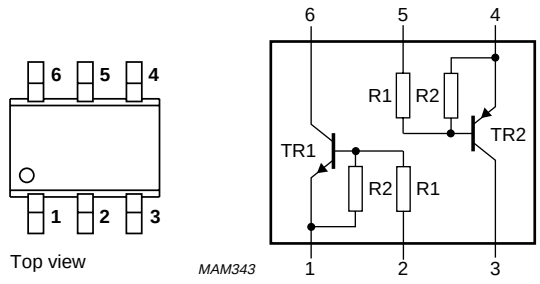


Fig.1 Simplified outline (SC-88) and symbol.

PINNING

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

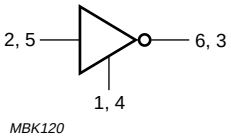


Fig.2 Equivalent inverter symbol.

MARKING

TYPE NUMBER	MARKING CODE
PUMD13	3t1

LIMITING VALUES

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

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		–	+30	V
	negative		–	–5	V
	input voltage TR2				
	positive		–	+5	V
	negative		–	–30	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	–	300	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	–	200	mW

Note

1. Refer to SC88 standard mounting conditions.

THERMAL CHARACTERISTICS

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

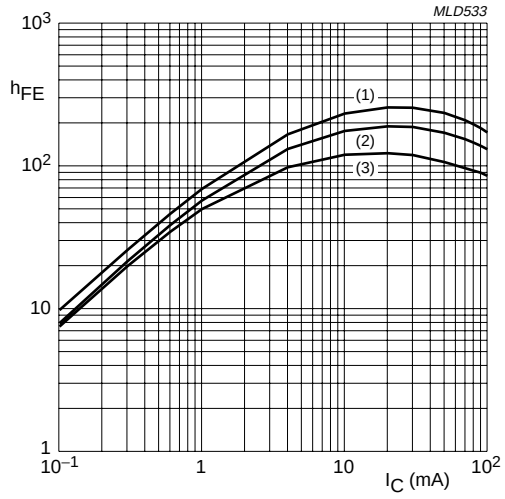
Note

1. See standard mounting conditions SC88.

CHARACTERISTICS

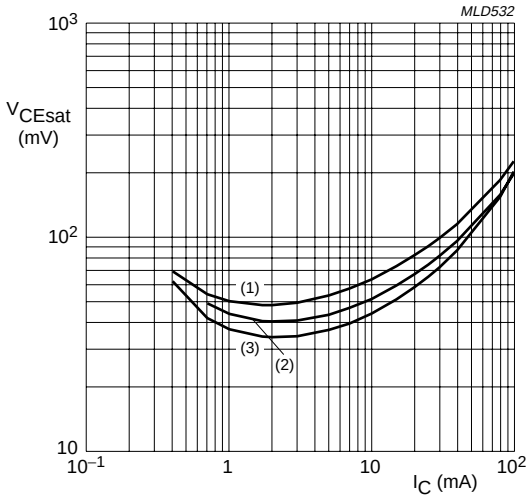
T_{amb} = 25 °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Per transistor for the PNP transistor with negative polarity						
I_{CBO}	collector-base cut-off current	V_{CB} = 50 V; I_E = 0	–	–	100	nA
I_{CEO}	collector-emitter cut-off current	V_{CE} = 30 V; I_B = 0	–	–	1	µA
		V_{CE} = 30 V; I_B = 0; T_j = 150 °C	–	–	50	µA
I_{EBO}	emitter-base cut-off current	V_{EB} = 5 V; I_C = 0	–	–	170	µA
h_{FE}	DC current gain	V_{CE} = 5 V; I_C = 10 mA	100	–	–	
V_{CEsat}	saturation voltage	I_C = 5 mA; I_B = 0.25 mA	–	–	100	mV
$V_{i(off)}$	input off voltage	V_{CE} = 5 V; I_C = 100 µA	–	0.6	0.5	V
$V_{i(on)}$	input on voltage	V_{CE} = 0.3 V; I_C = 5 mA	1.3	0.9	–	V
R_1	input resistor		3.3	4.7	6.1	kΩ
$\frac{R2}{R1}$	resistor ratio		8	10	12	
C_c	collector capacitance	$I_E = i_e$ = 0; V_{CB} = 10 V; f = 1 MHz				
	TR1 (NPN)		–	–	2.5	pF
	TR2 (PNP)		–	–	3	pF



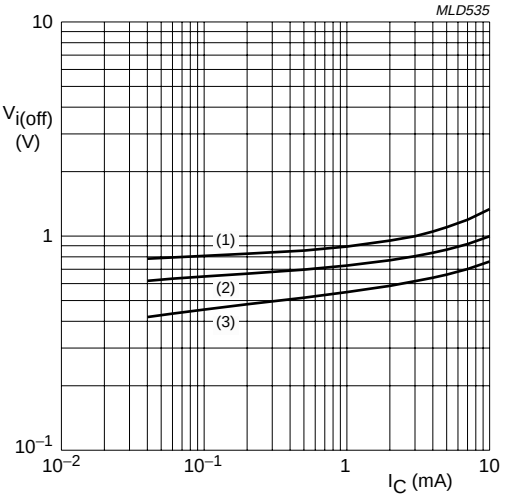
TR1 (NPN); V_{CE} = 5 V.
(1) T_{amb} = 150 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = –40 °C.

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



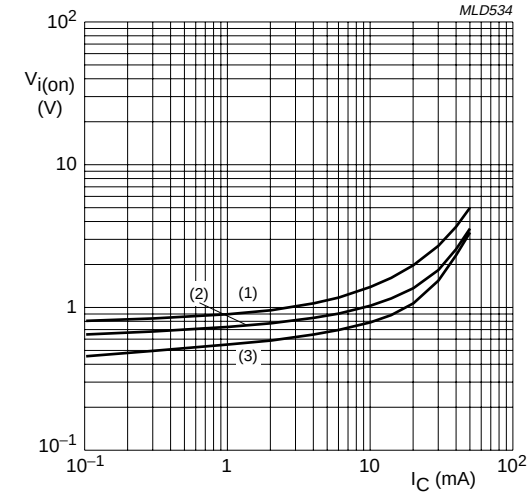
TR1 (NPN); I_C/I_B = 20.
(1) T_{amb} = 100 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = –40 °C.

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



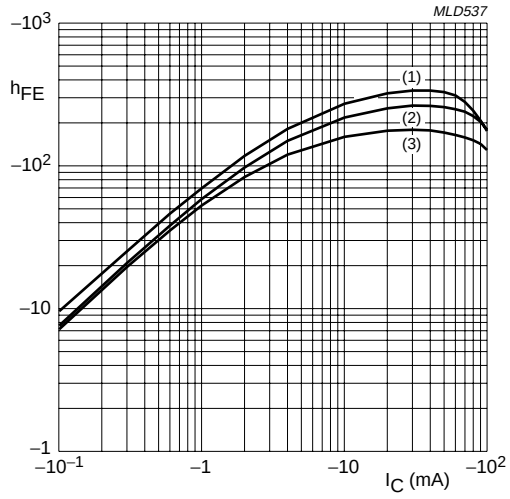
TR1 (NPN); V_{CE} = 5 V.
(1) T_{amb} = –40 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = 100 °C.

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



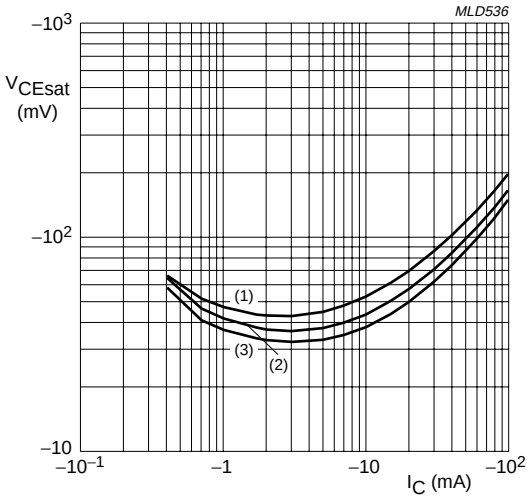
TR1 (NPN); V_{CE} = 0.3 V.
(1) T_{amb} = –40 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = 100 °C.

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



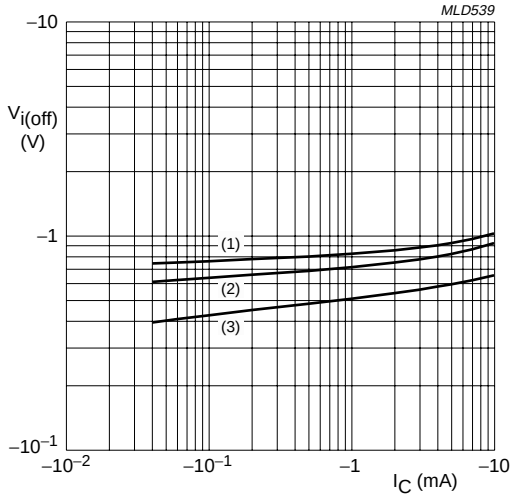
TR2 (PNP); V_{CE} = −5 V.
(1) T_{amb} = 150 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = −40 °C.

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



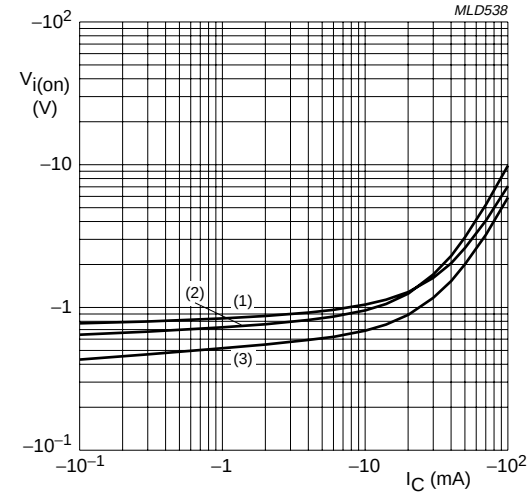
TR2 (PNP); I_C/I_B = 20.
(1) T_{amb} = 100 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = −40 °C.

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.

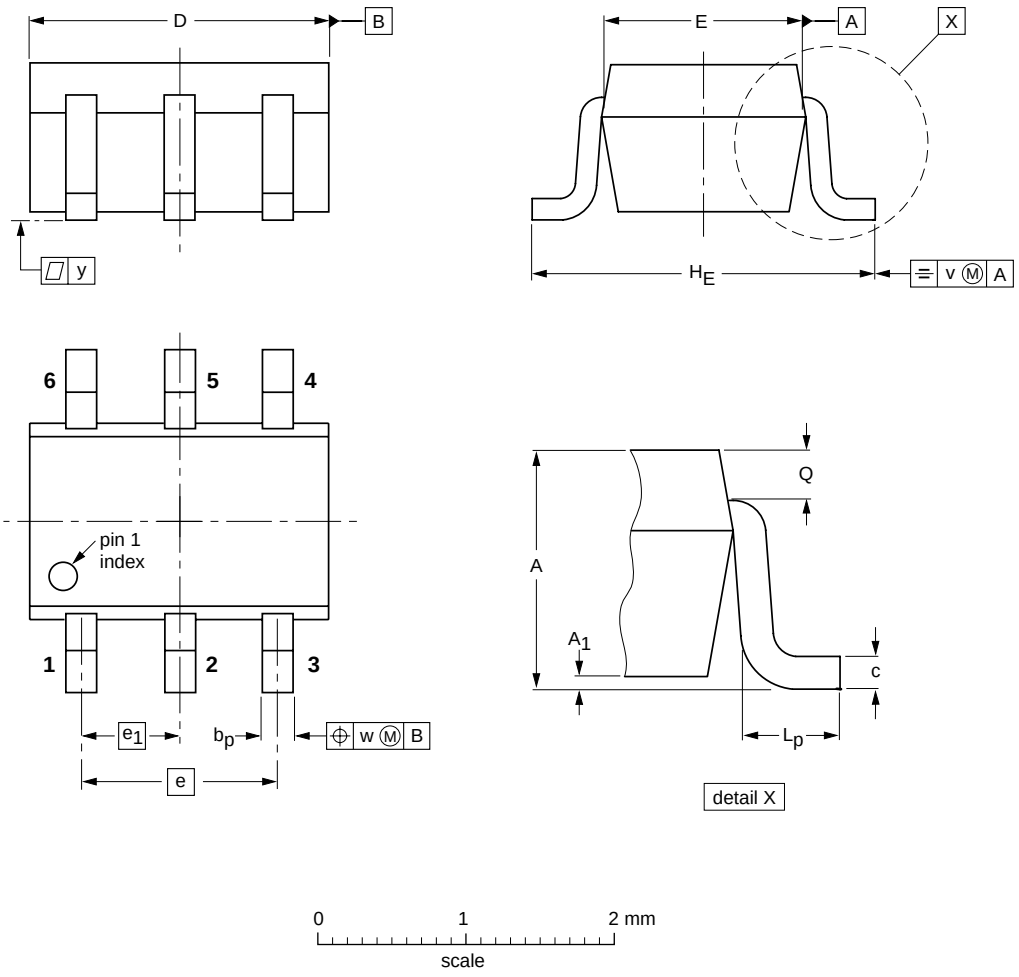


TR2 (PNP); V_{CE} = −0.3 V.
(1) T_{amb} = −40 °C.
(2) T_{amb} = 25 °C.
(3) T_{amb} = 100 °C.

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

DATA SHEET STATUS

DATA SHEET STATUS	PRODUCT STATUS	DEFINITIONS (1)
Objective specification	Development	This data sheet contains the design target or goal specifications for product development. Specification may change in any manner without notice.
Preliminary specification	Qualification	This data sheet contains preliminary data, and supplementary data will be published at a later date. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.
Product specification	Production	This data sheet contains final specifications. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.

Note

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Short-form specification — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). 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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Printed in The Netherlands 613514/01/pp12 Date of release: 2001 Feb 27 Document order number: 9397 750 07876

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