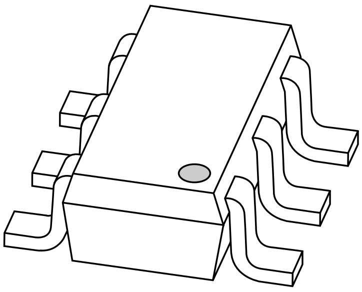
DATA SHEET



PMEM4010PD
PNP transistor/Schottky diode module

Product specification 2002 Oct 28

Philips Semiconductors

FEATURES

- 600 mW total power dissipation
- High current capability
- Reduces required PCB area
- Reduced pick and place costs
- Small plastic SMD package.

Transistor:

- Low collector-emitter saturation voltage.

Diode:

- Ultra high-speed switching
- Very low forward voltage
- Guard ring protected.

APPLICATIONS

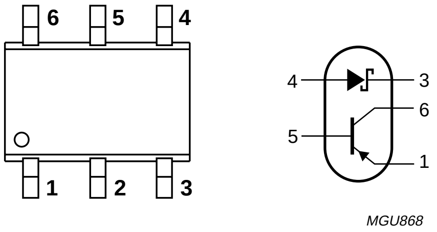
- DC/DC convertors
- Inductive load drivers
- General purpose load drivers
- Reverse polarity protection circuits.

DESCRIPTION

Combination of a PNP transistor with low V_{CEsat} and high current capability and a planar Schottky barrier diode with an integrated guard ring for stress protection in a SOT457 (SC-74) small plastic package.
NPN complement: PMEM4010ND.

PINNING

PIN	DESCRIPTION
1	emitter
2	not connected
3	cathode
4	anode
5	base
6	collector



Marking code: B2.

Fig.1 Simplified outline (SOT457) and symbol.

LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
NPN transistor					
V_{CBO}	collector-base voltage	open emitter	–	–40	V
V_{CEO}	collector-emitter voltage	open base	–	–40	V
V_{EBO}	emitter-base voltage	open collector	–	–5	V
I_C	collector current (DC)		–	–1	A
I_{CM}	peak collector current		–	–2	A
I_{BM}	peak base current		–	–1	A
T_j	junction temperature		–	150	°C
Schottky barrier diode					
V_R	continuous reverse voltage		–	20	V
I_F	continuous forward current		–	1	A
I_{FSM}	non repetitive peak forward current	t = 8.3 ms half sinewave; JEDEC method	–	5	A
T_j	junction temperature		–	125	°C
Combined device					
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C; note 1	–	600	mW
T_{stg}	storage temperature		–65	+150	°C
T_{amb}	operating ambient temperature		–65	+125	°C

Note

1. Device mounted on a printed-circuit board; single sided copper; tinplated; mounting pad for collector 1 cm^2.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}a}$	thermal resistance from junction to ambient	in free air; note 1	208	K/W

Note

1. Device mounted on a printed-circuit board; single sided copper; tinplated; mounting pad for collector 1 cm^2.

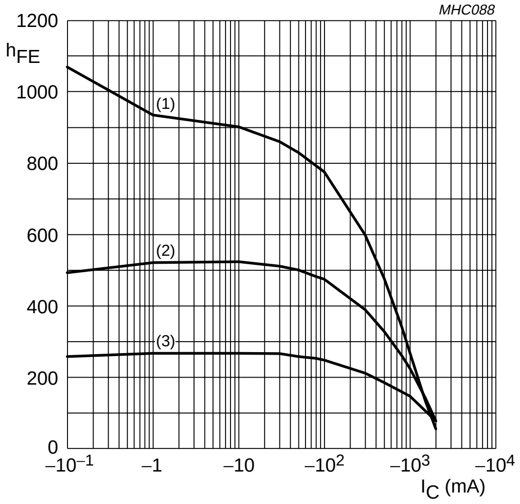
CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
NPN transistor						
I_{CBO}	collector-base cut-off current	V_{CB} = –40 V; I_E = 0	–	–	–100	nA
		V_{CB} = –40 V; I_E = 0; T_{amb} = 150 °C	–	–	–50	µA
I_{CEO}	collector-emitter cut-off current	V_{CE} = –30 V; I_B = 0	–	–	–100	nA
I_{EBO}	emitter-base cut-off current	V_{EB} = –5 V; I_C = 0	–	–	–100	nA
h_{FE}	DC current gain	V_{CE} = –5 V; I_C = –1 mA	300	–	–	
		V_{CE} = –5 V; I_C = –100 mA	300	–	800	
		V_{CE} = –5 V; I_C = –500 mA	250	–	–	
		V_{CE} = –5 V; I_C = –1 A	160	–	–	
V_{CEsat}	collector-emitter saturation voltage	I_C = –100 mA; I_B = –1 mA	–	–	–140	mV
		I_C = –500 mA; I_B = –50 mA	–	–	–170	mV
		I_C = –1 A; I_B = –100 mA	–	–	–310	mV
V_{BEsat}	base-emitter saturation voltage	I_C = –1 A; I_B = –50 mA	–	–	–1.1	V
R_{CEsat}	equivalent on-resistance	I_C = –500 mA; I_B = –50 mA; note 1	–	300	<340	mΩ
V_{BEon}	base-emitter turn-on voltage	V_{CE} = –5 V; I_C = –1 A	–	–	–1	V
f_T	transition frequency	I_C = –50 mA; V_{CE} = –10 V; f = 100 MHz	150	–	–	MHz
Schottky barrier diode						
V_F	continuous forward voltage	I_F = 10 mA; note 1	–	240	270	mV
		I_F = 100 mA; note 1	–	300	350	mV
		I_F = 1000 mA; see Fig.7; note 1	–	480	550	mV
I_R	reverse current	V_R = 5 V; note 1	–	5	10	µA
		V_R = 8 V; note 1	–	7	20	µA
		V_R = 15 V; see Fig.8; note 1	–	10	50	µA
C_d	diode capacitance	V_R = 5 V; f = 1 MHz; see Fig.9	–	19	25	pF

Note

1. Pulse test: $t_p \leq 300$ µs; $\delta \leq 0.02$.



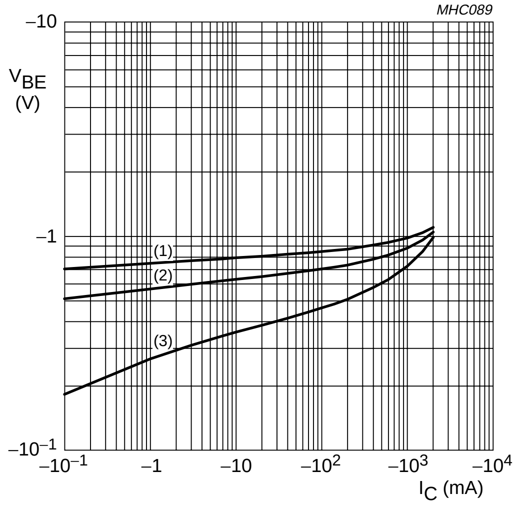
PNP transistor; $V_{CE} = -5$ V.

(1) $T_{amb} = 150$ °C.

(2) $T_{amb} = 25$ °C.

(3) $T_{amb} = -55$ °C.

Fig.2 DC current gain as a function of collector current; typical values.



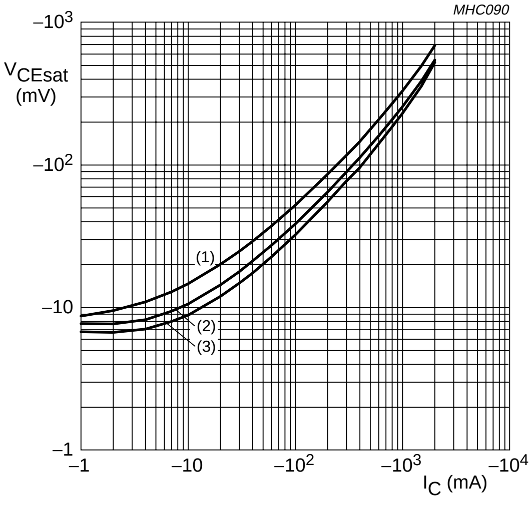
PNP transistor; $V_{CE} = -5$ V.

(1) $T_{amb} = -55$ °C.

(2) $T_{amb} = 25$ °C.

(3) $T_{amb} = 150$ °C.

Fig.3 Base-emitter voltage as a function of collector current; typical values.



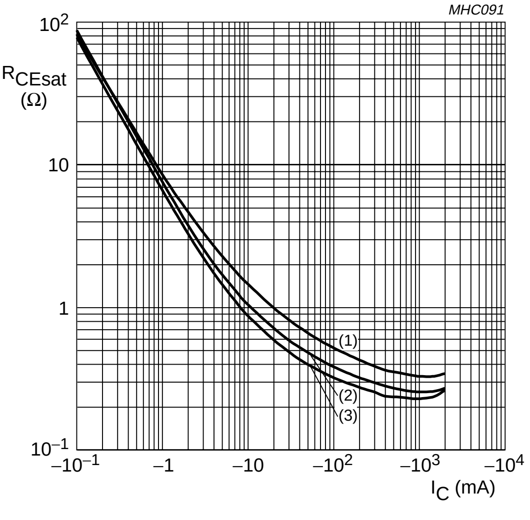
PNP transistor; $I_C/I_B = 10$.

(1) $T_{amb} = 150$ °C.

(2) $T_{amb} = 25$ °C.

(3) $T_{amb} = -55$ °C.

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



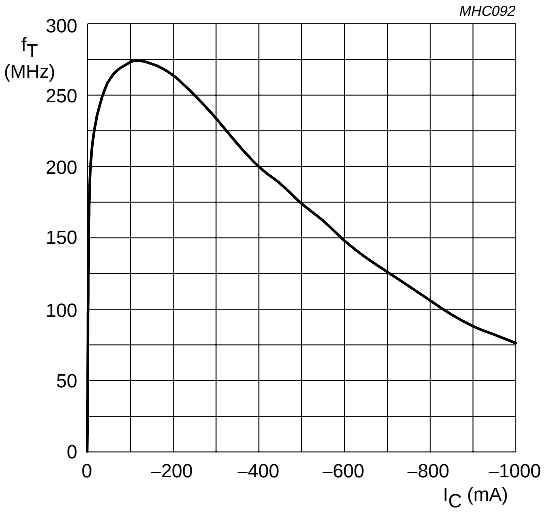
PNP transistor; $I_C/I_B = 10$.

(1) $T_{amb} = 150$ °C.

(2) $T_{amb} = 25$ °C.

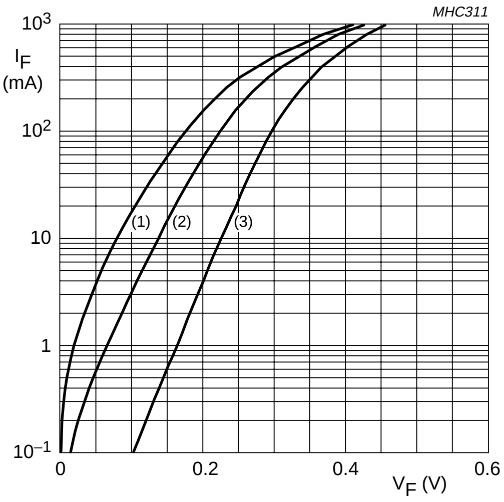
(3) $T_{amb} = -55$ °C.

Fig.5 Equivalent on-resistance as a function of collector current; typical values.



PNP transistor; $V_{CE} = -10$ V.

Fig.6 Transition frequency as a function of collector current.



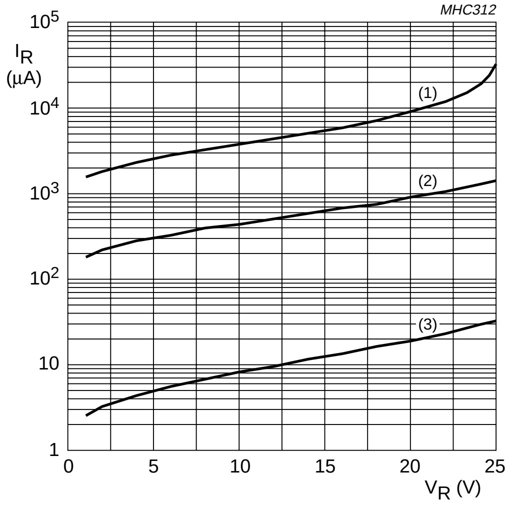
Schottky barrier diode.

(1) $T_{amb} = 125$ °C.

(2) $T_{amb} = 85$ °C.

(3) $T_{amb} = 25$ °C.

Fig.7 Forward current as a function of forward voltage; typical values.



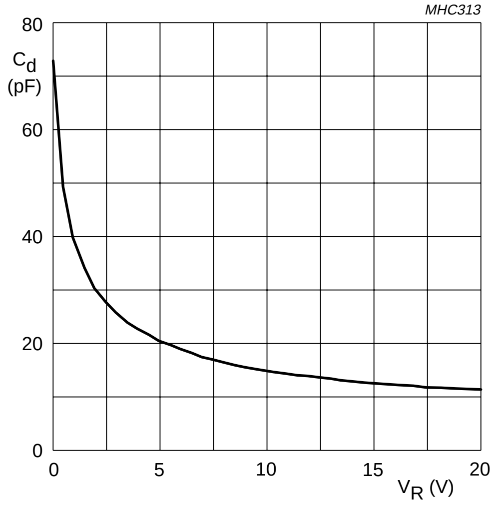
Schottky barrier diode.

(1) $T_{amb} = 125$ °C.

(2) $T_{amb} = 85$ °C.

(3) $T_{amb} = 25$ °C.

Fig.8 Reverse current as a function of reverse voltage; typical values.



Schottky barrier diode; f = 1 MHz; $T_{amb} = 25$ °C.

Fig.9 Diode capacitance as a function of reverse voltage; typical values.

APPLICATION INFORMATION

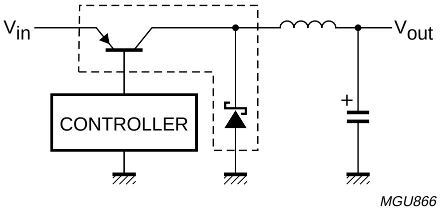


Fig.10 DC/DC convertor.

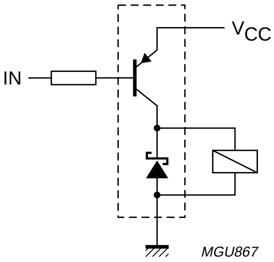
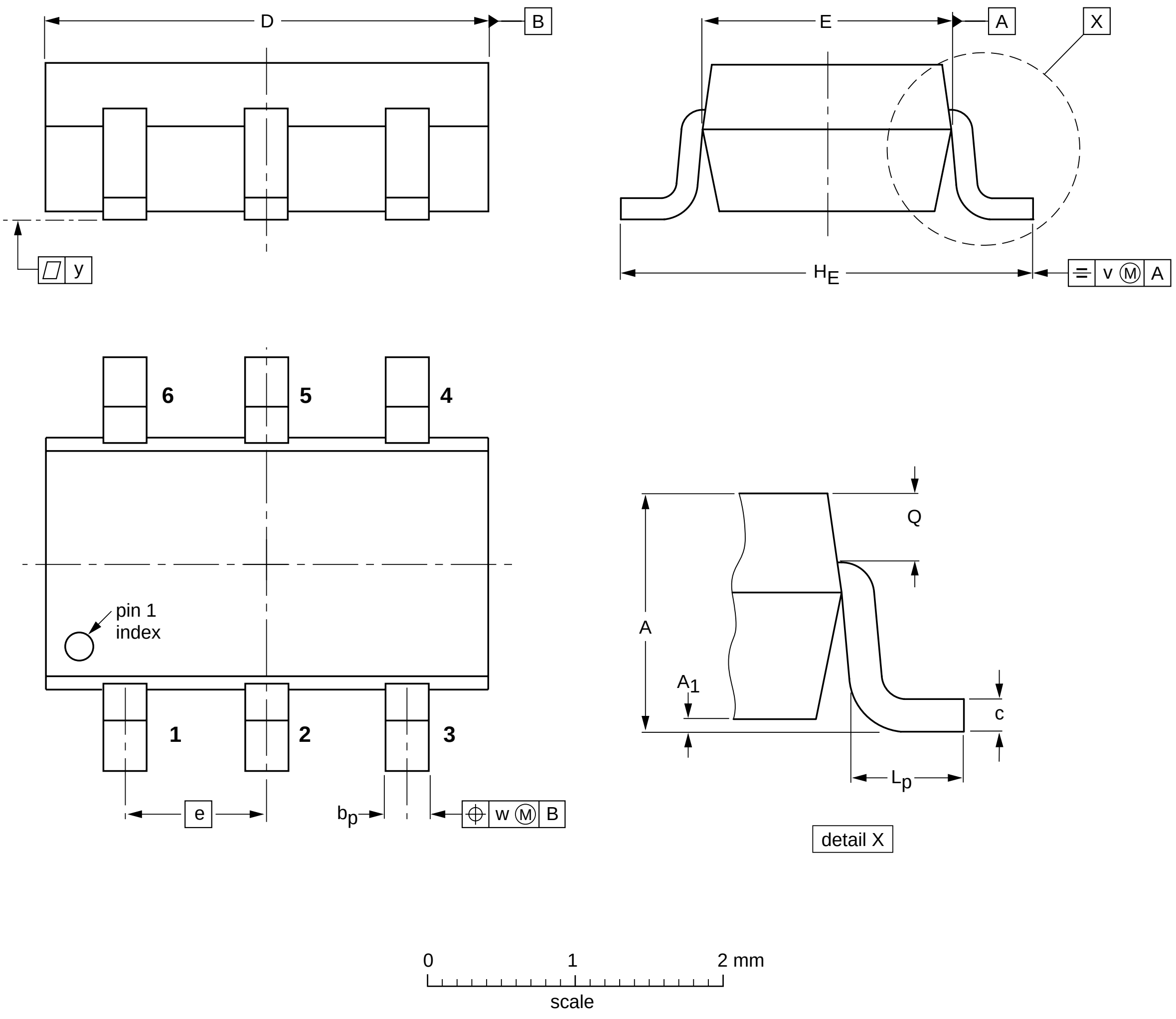


Fig.11 Inductive load driver (relays, motors, buzzers) with free-wheeling diode.

PACKAGE OUTLINE

Plastic surface mounted package; 6 leads **SOT457**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b_p	c	D	E	e	H_E	L_p	Q	v	w	y
mm	1.1 0.9	0.1 0.013	0.40 0.25	0.26 0.10	3.1 2.7	1.7 1.3	0.95	3.0 2.5	0.6 0.2	0.33 0.23	0.2	0.2	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT457			SC-74			~~97-02-28~~ 01-05-04

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LEVEL	DATA SHEET STATUS[1]	PRODUCT STATUS[2][3]	DEFINITION
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