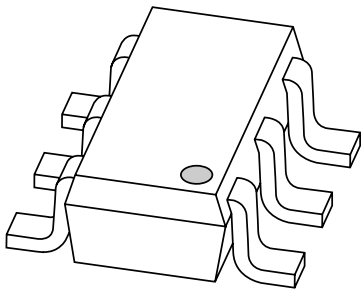


DATA SHEET



PMEM4010PD

PNP transistor/Schottky diode
module

Product data sheet

2002 Oct 28

PNP transistor/Schottky diode module

PMEM4010PD

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.

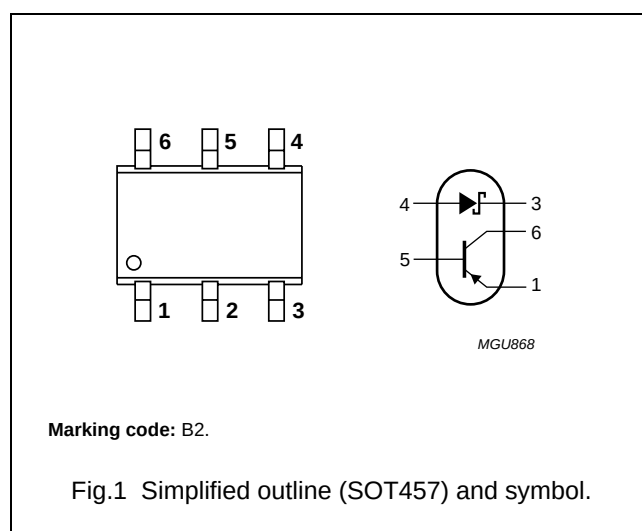
DESCRIPTION

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



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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 cm².

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j-a}$	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 cm².

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CHARACTERISTICS

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

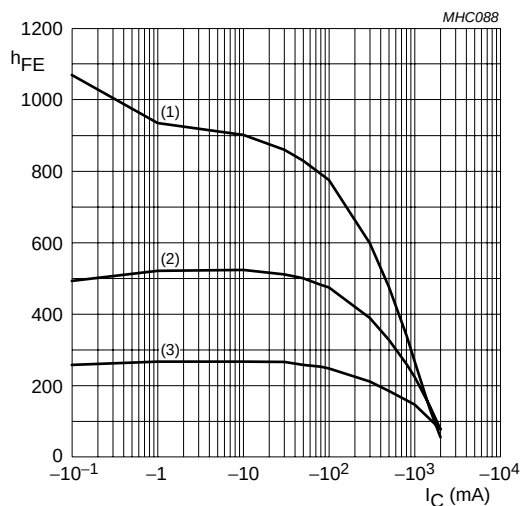
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
NPN transistor						
I_{CBO}	collector-base cut-off current	$V_{CB} = -40\text{ V}; I_E = 0$	–	–	–100	nA
		$V_{CB} = -40\text{ V}; I_E = 0;$ $T_{amb} = 150\text{ }^{\circ}\text{C}$	–	–	–50	μA
I_{CEO}	collector-emitter cut-off current	$V_{CE} = -30\text{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

Note

1. Pulse test: $t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02$.

PNP transistor/Schottky diode module

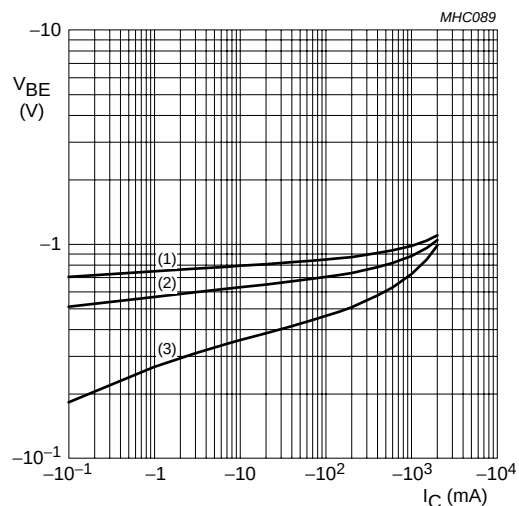
PMEM4010PD



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

- (1) $T_{amb} = 150$ °C.
- (2) $T_{amb} = 25$ °C.
- (3) $T_{amb} = -55$ °C.

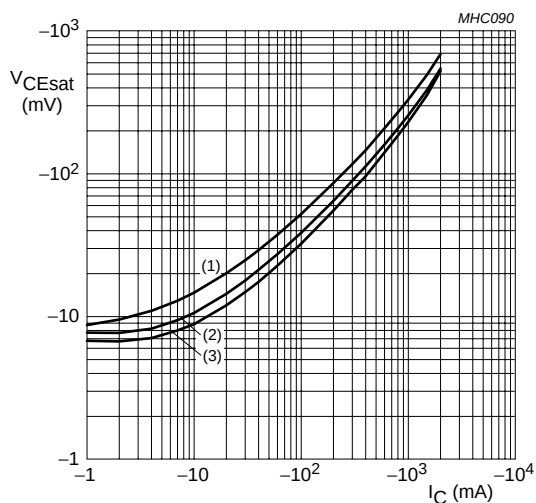
Fig.2 DC current gain as a function of collector current; typical values.



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

- (1) $T_{amb} = -55$ °C.
- (2) $T_{amb} = 25$ °C.
- (3) $T_{amb} = 150$ °C.

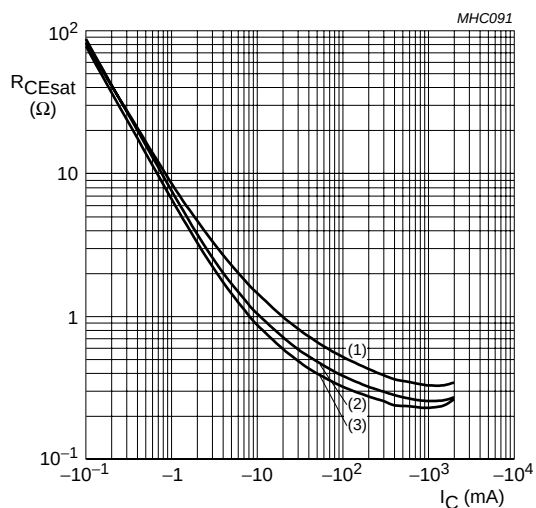
Fig.3 Base-emitter voltage as a function of collector current; typical values.



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.



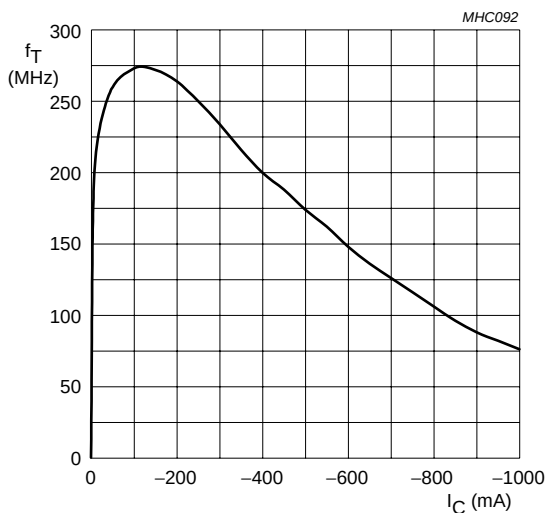
PNP transistor; $I_C/I_B = 10$.

- (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.

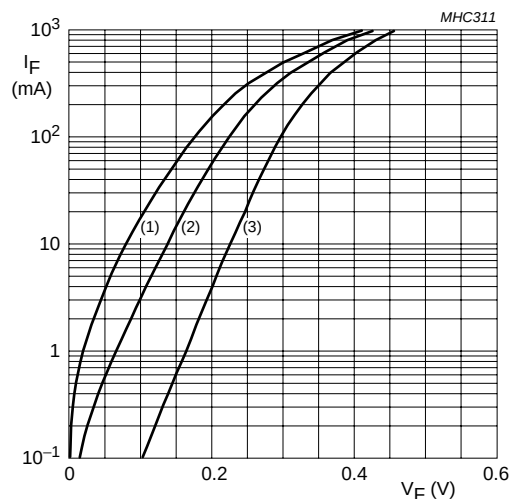
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PNP transistor; $V_{CE} = -10$ V.

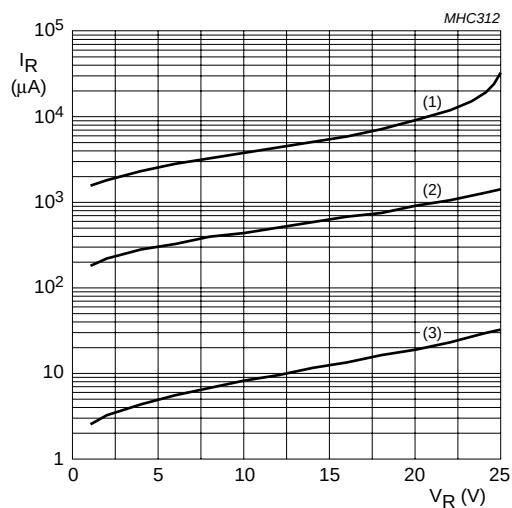
Fig.6 Transition frequency as a function of collector current.



Schottky barrier diode.

- (1) $T_{amb} = 125$ °C.
- (2) $T_{amb} = 85$ °C.
- (3) $T_{amb} = 25$ °C.

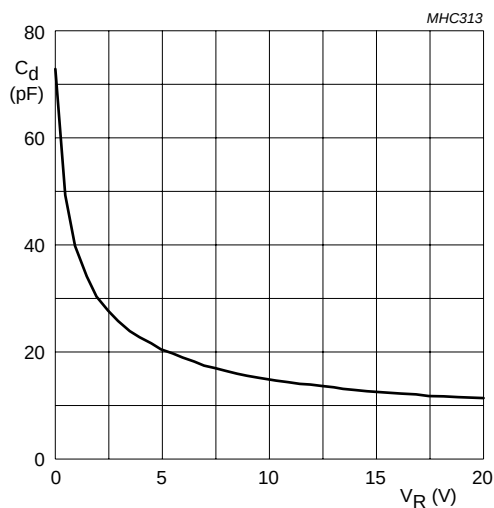
Fig.7 Forward current as a function of forward voltage; typical values.



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.

PNP transistor/Schottky diode module

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APPLICATION INFORMATION

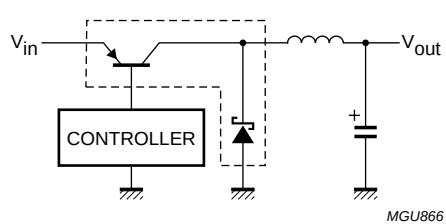


Fig.10 DC/DC convertor.

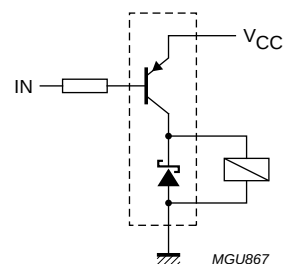


Fig.11 Inductive load driver (relays, motors, buzzers) with free-wheeling diode.

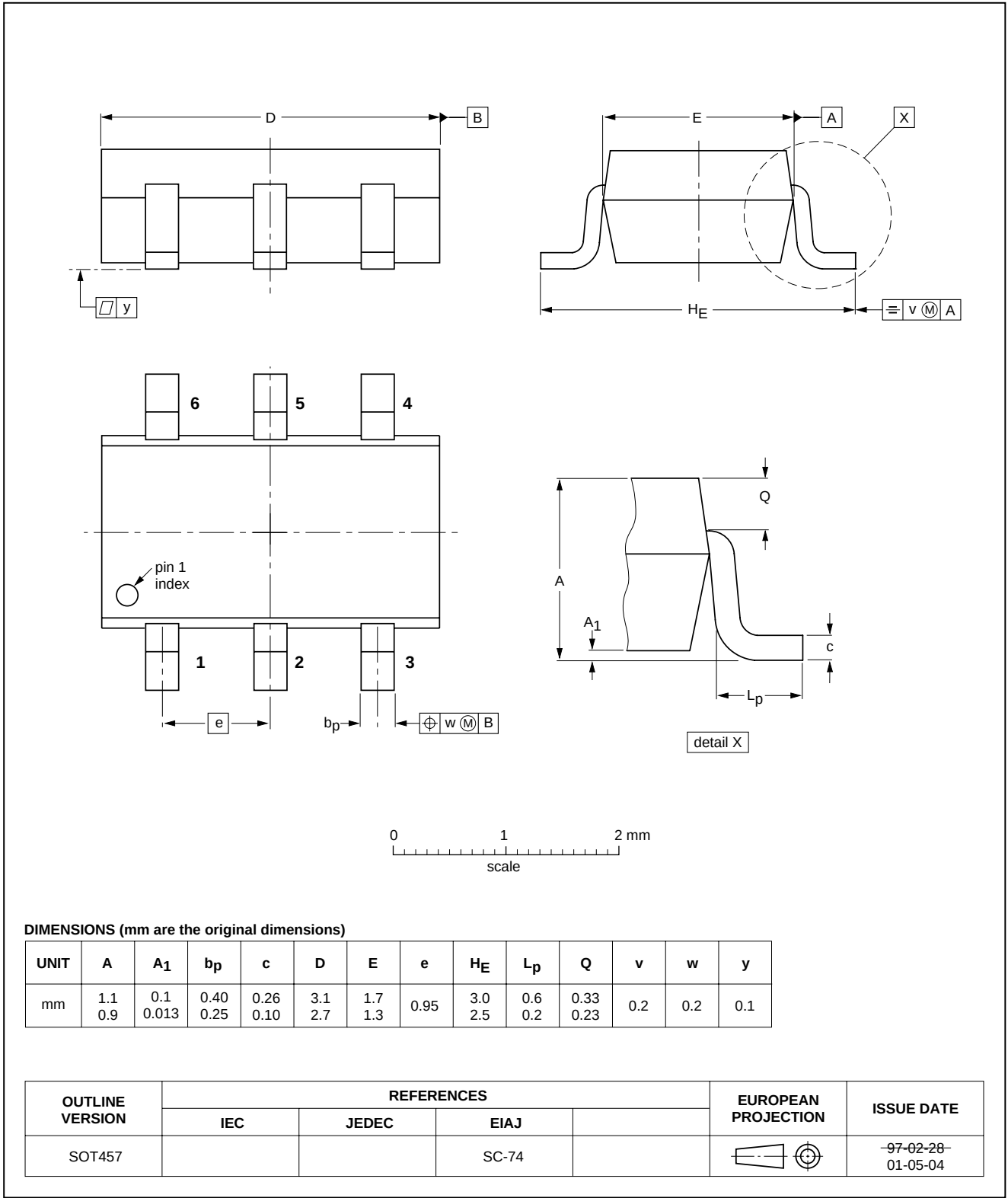
PNP transistor/Schottky diode module

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PACKAGE OUTLINE

Plastic surface mounted package; 6 leads

SOT457



PNP transistor/Schottky diode module

PMEM4010PD

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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