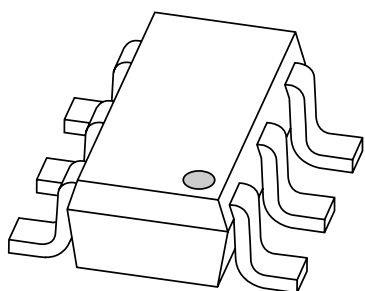


DATA SHEET



PMEM4010ND

**NPN transistor/Schottky diode
module**

Product specification

2002 Oct 28

NPN transistor/Schottky diode module

PMEM4010ND

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

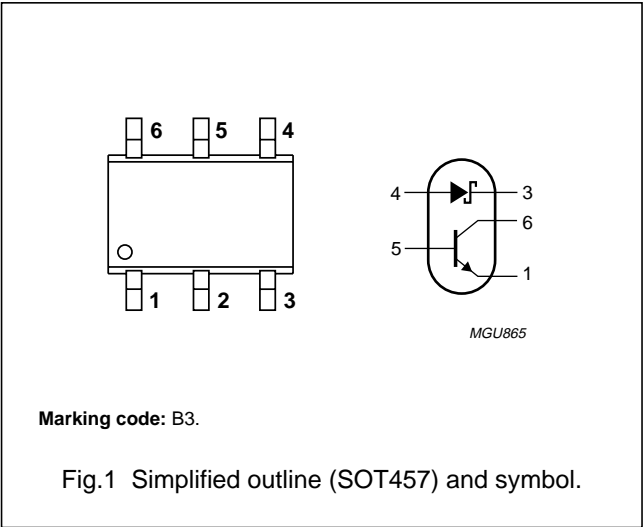
- DC/DC convertors
- Inductive load drivers
- General purpose load drivers
- Reverse polarity protection circuits.

DESCRIPTION

Combination of an NPN 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.
PNP complement: PMEM4010PD.

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.

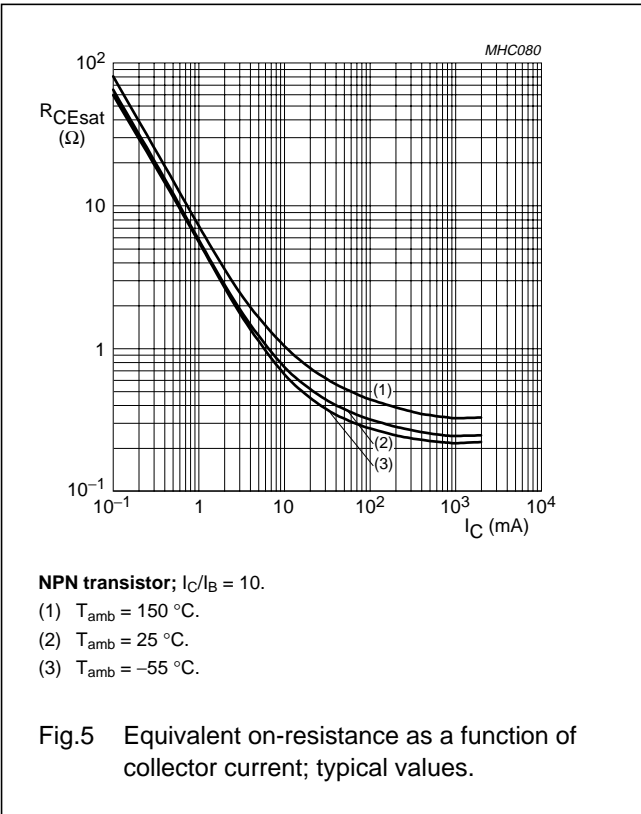
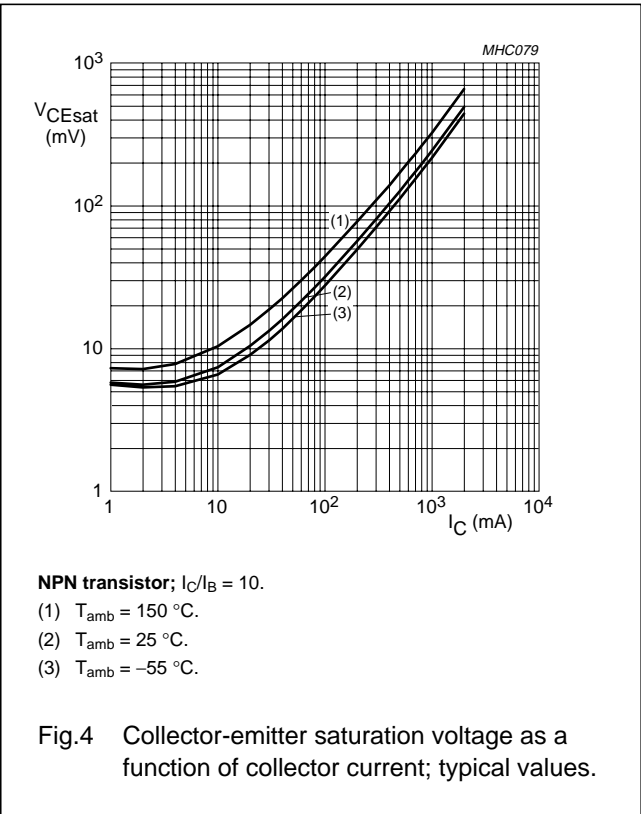
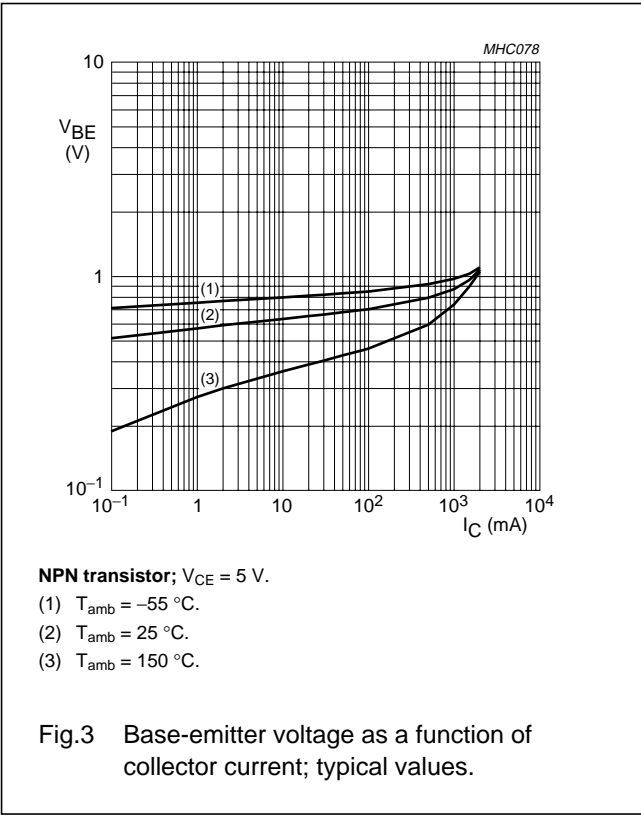
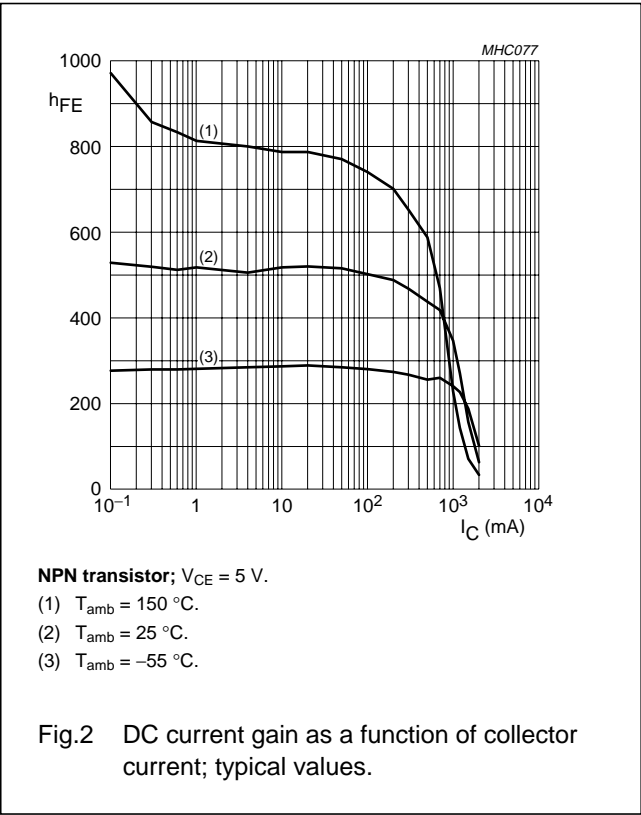
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
NPN transistor						
I_{CBO}	collector-base cut-off current	$V_{CB} = 40\text{ V}; I_E = 0$	–	–	100	nA
		$V_{CB} = 40\text{ V}; I_E = 0; T_{amb} = 150\text{ }^{\circ}\text{C}$	–	–	50	μA
I_{CEO}	collector-emitter cut-off current	$V_{CE} = 30\text{ V}; I_B = 0$	–	–	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	–	–	
		$V_{CE} = 5\text{ V}; I_C = 500\text{ mA}$	300	–	900	
		$V_{CE} = 5\text{ V}; I_C = 1\text{ A}$	200	–	–	
V_{CEsat}	collector-emitter saturation voltage	$I_C = 100\text{ mA}; I_B = 1\text{ mA}$	–	–	80	mV
		$I_C = 500\text{ mA}; I_B = 50\text{ mA}$	–	–	110	mV
		$I_C = 1\text{ A}; I_B = 100\text{ mA}$	–	–	190	mV
V_{BEsat}	base-emitter saturation voltage	$I_C = 1\text{ A}; I_B = 100\text{ mA}$	–	–	1.2	V
R_{CEsat}	equivalent on-resistance	$I_C = 500\text{ mA}; I_B = 50\text{ mA}; \text{note 1}$	–	260	<220	m Ω
V_{BEon}	base-emitter turn-on voltage	$V_{CE} = 5\text{ V}; I_C = 1\text{ A}$	–	–	1.1	V
f_T	transition frequency	$I_C = 50\text{ mA}; V_{CE} = 10\text{ V};$ $f = 100\text{ MHz}$	150	–	–	MHz
C_c	collector capacitance	$V_{CB} = 10\text{ V}; I_E = I_e = 0; f = 1\text{ MHz}$	–	–	10	pF
Schottky barrier diode						
V_F	continuous forward voltage	$I_F = 10\text{ mA}; \text{note 1}$	–	240	270	mV
		$I_F = 100\text{ mA}; \text{note 1}$	–	300	350	mV
		$I_F = 1000\text{ mA}; \text{see Fig.7; note 1}$	–	480	550	mV
I_R	reverse current	$V_R = 5\text{ V}; \text{note 1}$	–	5	10	μA
		$V_R = 8\text{ V}; \text{note 1}$	–	7	20	μA
		$V_R = 15\text{ V}; \text{see Fig.8; note 1}$	–	10	50	μA
C_d	diode capacitance	$V_R = 5\text{ V}; f = 1\text{ MHz}; \text{see Fig.9}$	–	19	25	pF

Note

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

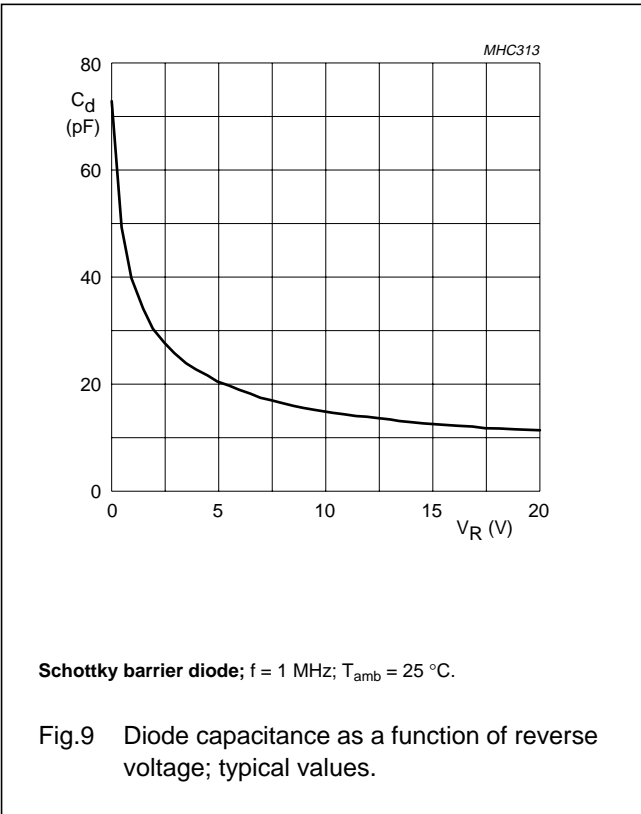
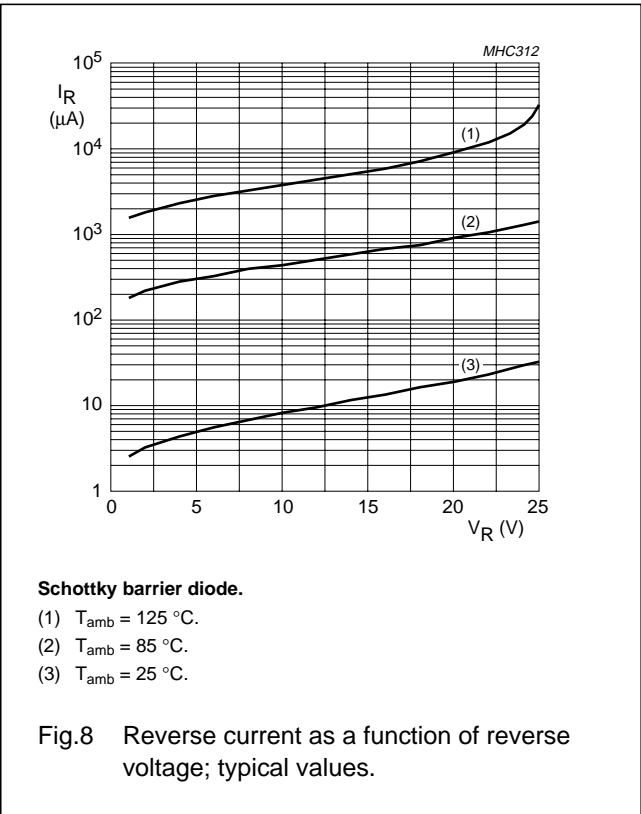
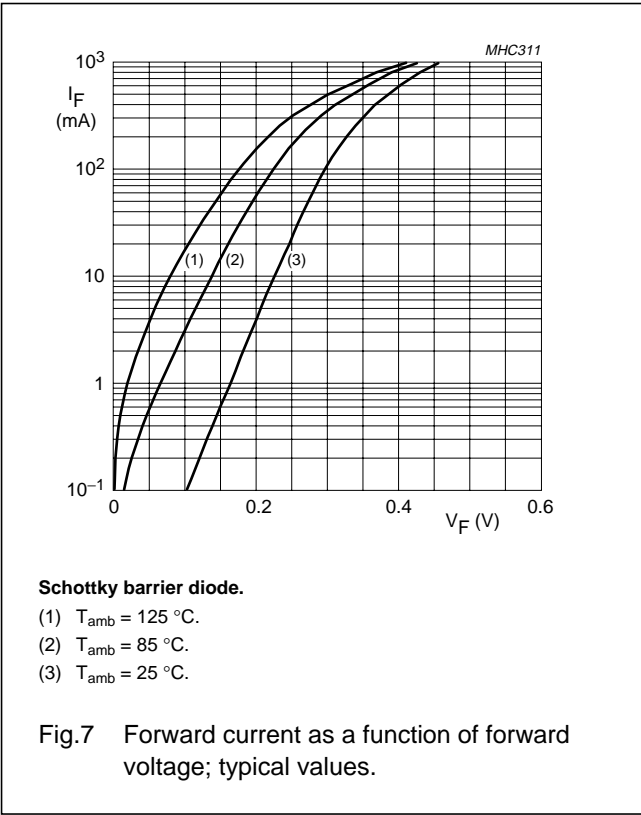
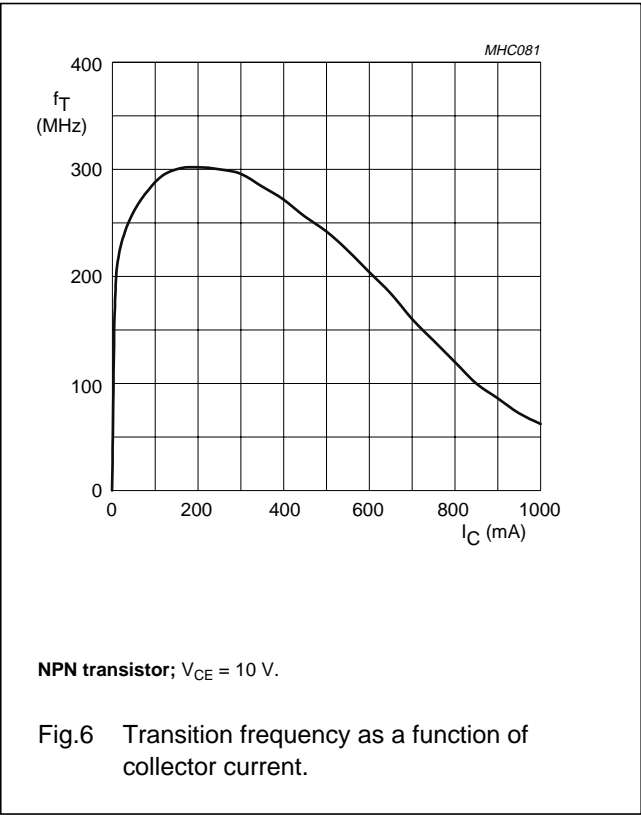
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APPLICATION INFORMATION

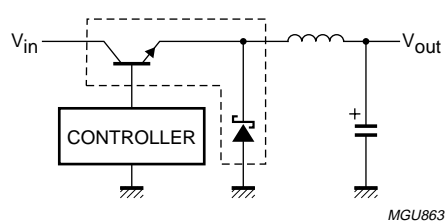


Fig.10 DC/DC convertor.

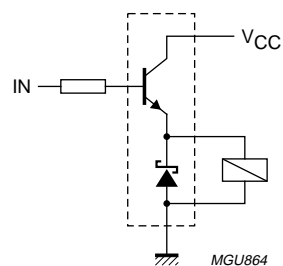


Fig.11 Inductive load driver (relays, motors, buzzers) with free-wheeling diode.

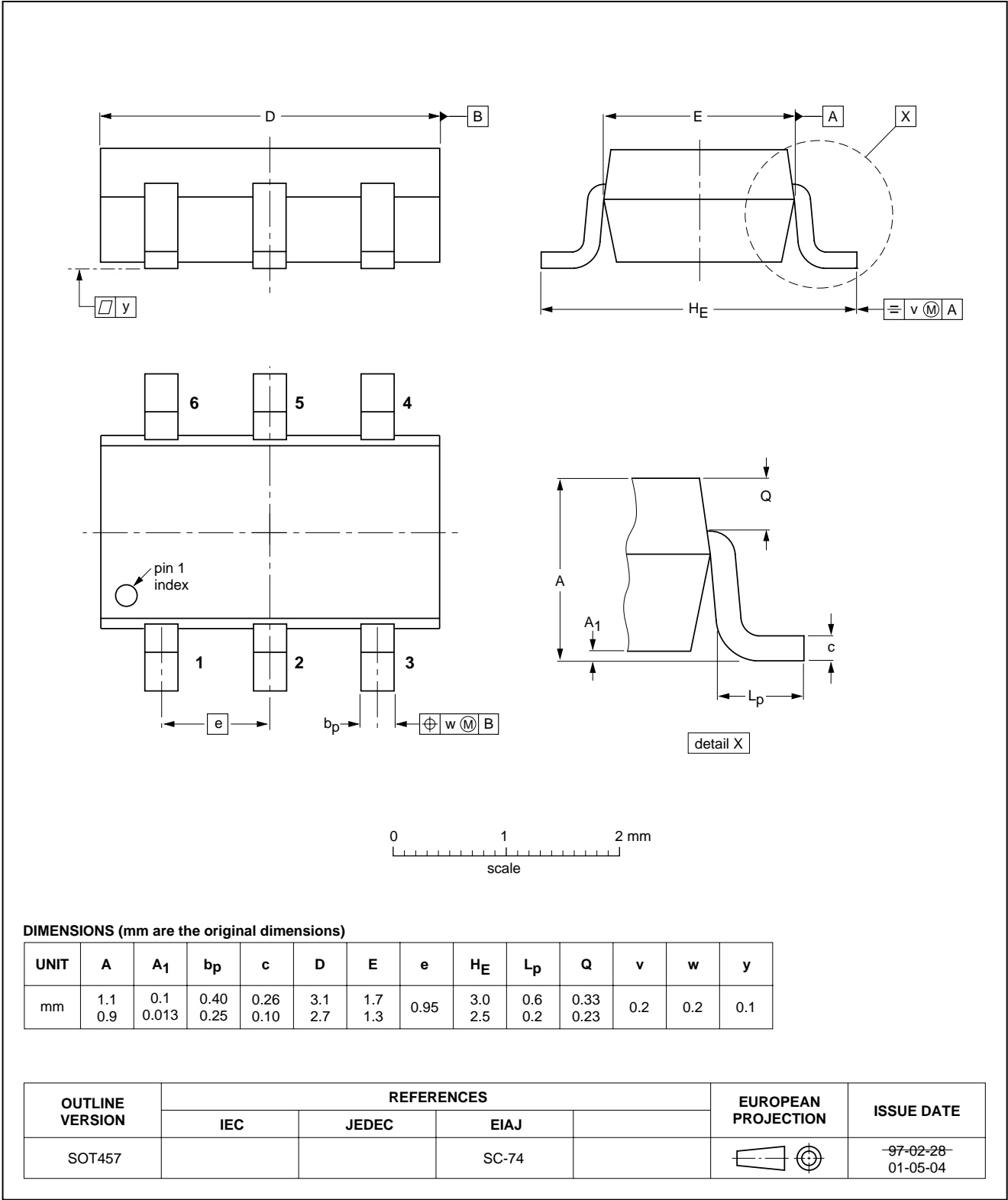
NPN transistor/Schottky diode module

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PACKAGE OUTLINE

Plastic surface mounted package; 6 leads

SOT457



NPN transistor/Schottky diode module

PMEM4010ND

DATA SHEET STATUS

LEVEL	DATA SHEET STATUS ⁽¹⁾	PRODUCT STATUS ⁽²⁾⁽³⁾	DEFINITION
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
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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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NOTES

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NOTES

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Contact information

For additional information please visit **<http://www.semiconductors.philips.com>**. Fax: **+31 40 27 24825**

For sales offices addresses send e-mail to: **sales.addresses@www.semiconductors.philips.com**.

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