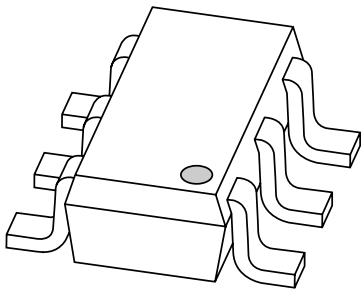


# DATA SHEET



## **PMEM4010ND** NPN transistor/Schottky diode module

Product data sheet  
Supersedes data of 2002 Oct 28

2003 Jul 04

**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**

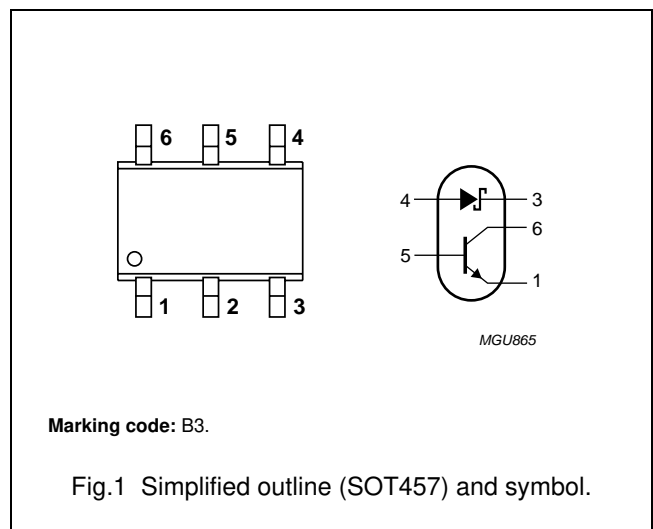
- DC/DC convertors
- Inductive load drivers
- General purpose load drivers
- Reverse polarity protection circuits.

**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



## NPN transistor/Schottky diode module

## PMEM4010ND

**LIMITING VALUES**

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
<b>NPN transistor</b>					
V <sub>CB0</sub>	collector-base voltage	open emitter	–	40	V
V <sub>CEO</sub>	collector-emitter voltage	open base	–	40	V
V <sub>EBO</sub>	emitter-base voltage	open collector	–	5	V
I <sub>C</sub>	collector current (DC)		–	1	A
I <sub>CM</sub>	peak collector current		–	2	A
I <sub>BM</sub>	peak base current		–	1	A
T <sub>j</sub>	junction temperature		–	150	°C
<b>Schottky barrier diode</b>					
V <sub>R</sub>	continuous reverse voltage		–	20	V
I <sub>F</sub>	continuous forward current		–	1	A
I <sub>FSM</sub>	non repetitive peak forward current	t = 8.3 ms half sinewave; JEDEC method	–	5	A
T <sub>j</sub>	junction temperature		–	125	°C
<b>Combined device</b>					
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C; note 1	–	600	mW
T <sub>stg</sub>	storage temperature		–65	+150	°C
T <sub>amb</sub>	operating ambient temperature	note 2	–65	+125	°C

**Notes**

1. Device mounted on a printed-circuit board; single sided copper; tinplated; mounting pad for collector 1 cm<sup>2</sup>.
2. For Schottky barrier diodes thermal run-away has to be considered, as in some applications the reverse power losses P<sub>R</sub> are significant part of the total power losses. Nomograms for determination of the reverse power losses P<sub>R</sub> and I<sub>F</sub> (AV) rating will be available on request.

**THERMAL CHARACTERISTICS**

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
R <sub>th j-a</sub>	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<sup>2</sup>.

## NPN transistor/Schottky diode module

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**ELECTRICAL CHARACTERISTICS**T<sub>amb</sub> = 25 °C unless otherwise specified.

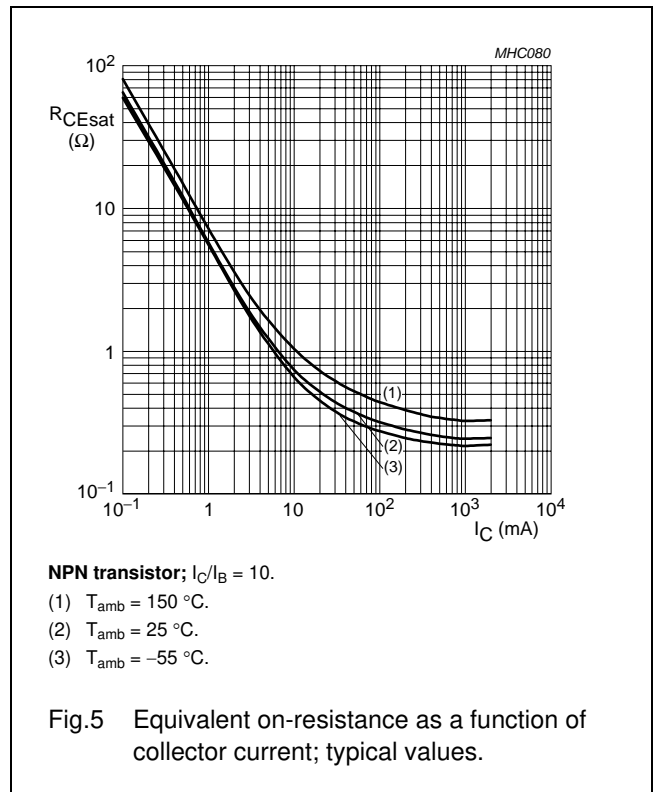
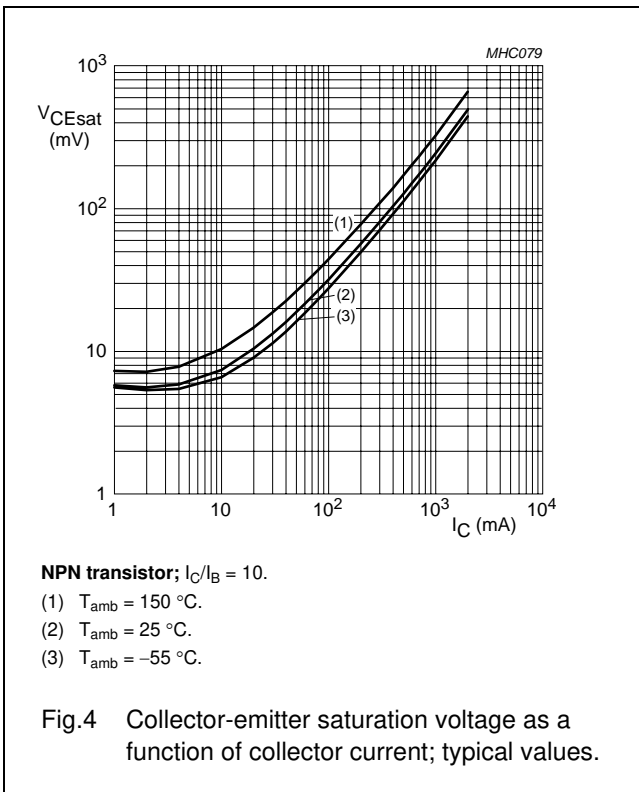
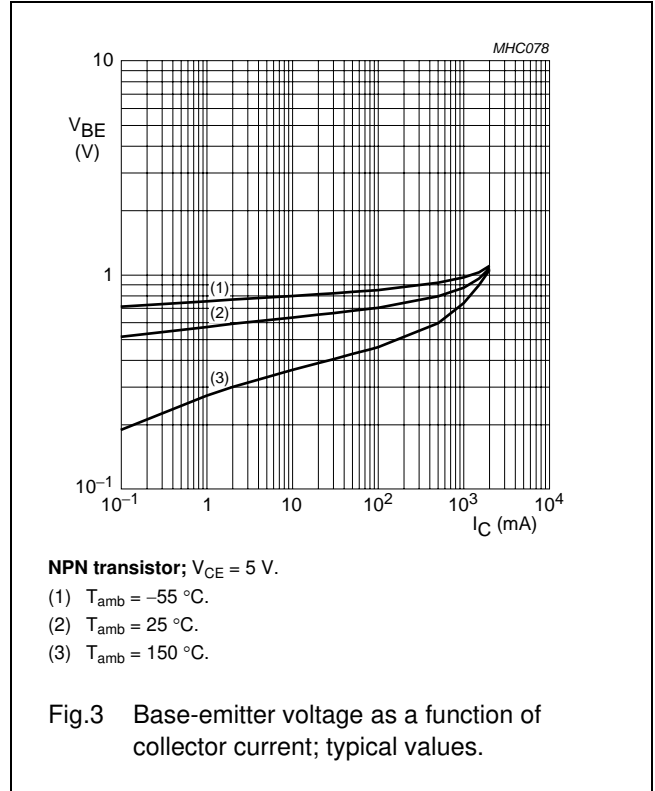
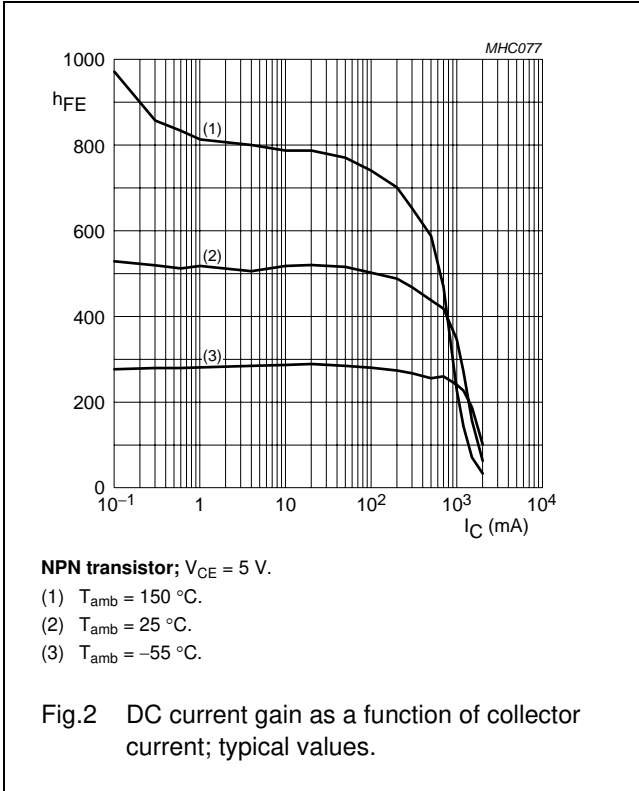
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
<b>NPN transistor</b>						
I <sub>CBO</sub>	collector-base cut-off current	V <sub>CB</sub> = 40 V; I <sub>E</sub> = 0	–	–	100	nA
		V <sub>CB</sub> = 40 V; I <sub>E</sub> = 0; T <sub>amb</sub> = 150 °C	–	–	50	μA
I <sub>CEO</sub>	collector-emitter cut-off current	V <sub>CE</sub> = 30 V; I <sub>B</sub> = 0	–	–	100	nA
I <sub>EBO</sub>	emitter-base cut-off current	V <sub>EB</sub> = 5 V; I <sub>C</sub> = 0	–	–	100	nA
h <sub>FE</sub>	DC current gain	V <sub>CE</sub> = 5 V; I <sub>C</sub> = 1 mA	300	–	–	
		V <sub>CE</sub> = 5 V; I <sub>C</sub> = 500 mA	300	–	900	
		V <sub>CE</sub> = 5 V; I <sub>C</sub> = 1 A	200	–	–	
V <sub>CEsat</sub>	collector-emitter saturation voltage	I <sub>C</sub> = 100 mA; I <sub>B</sub> = 1 mA	–	–	80	mV
		I <sub>C</sub> = 500 mA; I <sub>B</sub> = 50 mA	–	–	110	mV
		I <sub>C</sub> = 1 A; I <sub>B</sub> = 100 mA	–	–	210	mV
V <sub>BEsat</sub>	base-emitter saturation voltage	I <sub>C</sub> = 1 A; I <sub>B</sub> = 100 mA	–	–	1.2	V
R <sub>CEsat</sub>	equivalent on-resistance	I <sub>C</sub> = 500 mA; I <sub>B</sub> = 50 mA; note 1	–	260	<220	mΩ
V <sub>BEon</sub>	base-emitter turn-on voltage	V <sub>CE</sub> = 5 V; I <sub>C</sub> = 1 A	–	–	1.1	V
f <sub>T</sub>	transition frequency	I <sub>C</sub> = 50 mA; V <sub>CE</sub> = 10 V; f = 100 MHz	150	–	–	MHz
C <sub>c</sub>	collector capacitance	V <sub>CB</sub> = 10 V; I <sub>E</sub> = I <sub>e</sub> = 0; f = 1 MHz	–	–	10	pF
<b>Schottky barrier diode</b>						
V <sub>F</sub>	continuous forward voltage	I <sub>F</sub> = 10 mA; note 1	–	240	270	mV
		I <sub>F</sub> = 100 mA; note 1	–	300	350	mV
		I <sub>F</sub> = 1000 mA; see Fig.7; note 1	–	480	550	mV
I <sub>R</sub>	reverse current	V <sub>R</sub> = 5 V; note 1	–	5	10	μA
		V <sub>R</sub> = 8 V; note 1	–	7	20	μA
		V <sub>R</sub> = 15 V; see Fig.8; note 1	–	10	50	μA
C <sub>d</sub>	diode capacitance	V <sub>R</sub> = 5 V; f = 1 MHz; see Fig.9	–	19	25	pF

**Note**1. Pulse test: t<sub>p</sub> ≤ 300 μs; δ ≤ 0.02.

NPN transistor/Schottky diode module

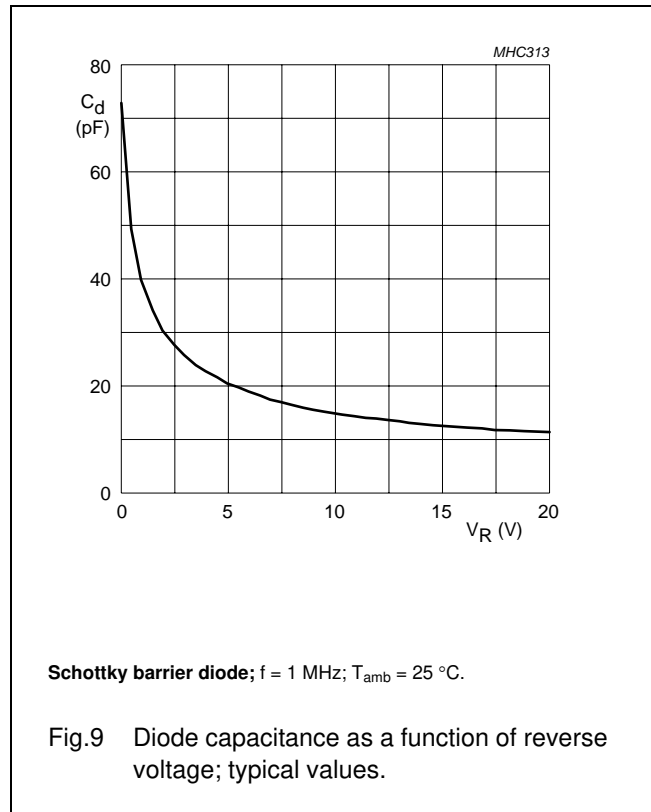
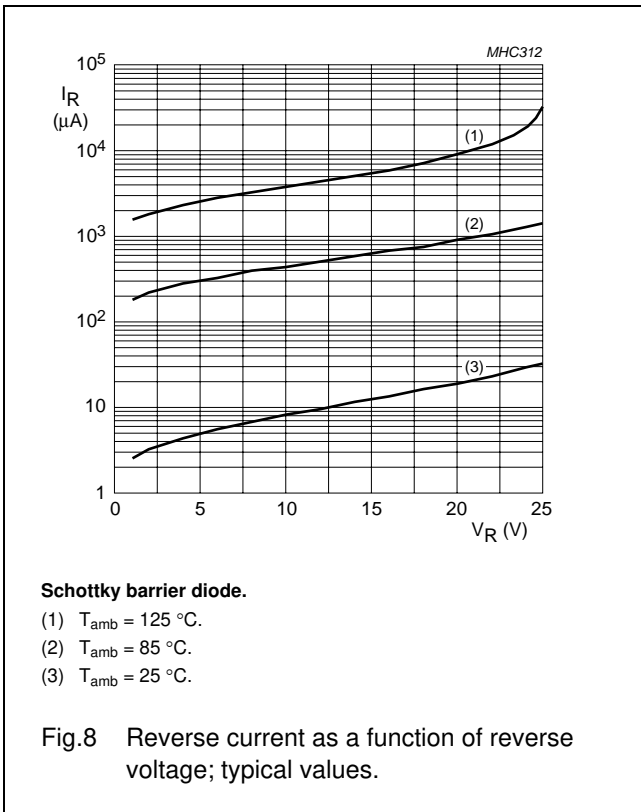
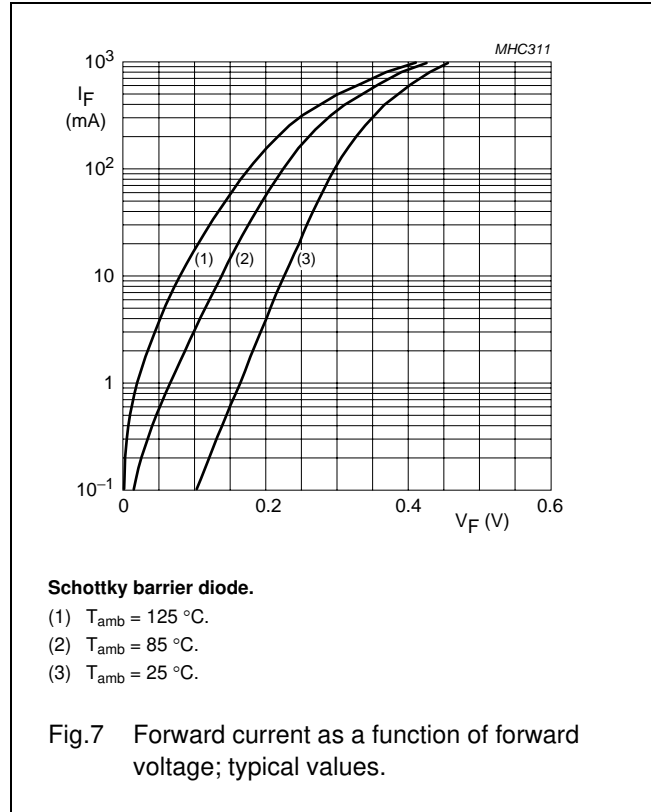
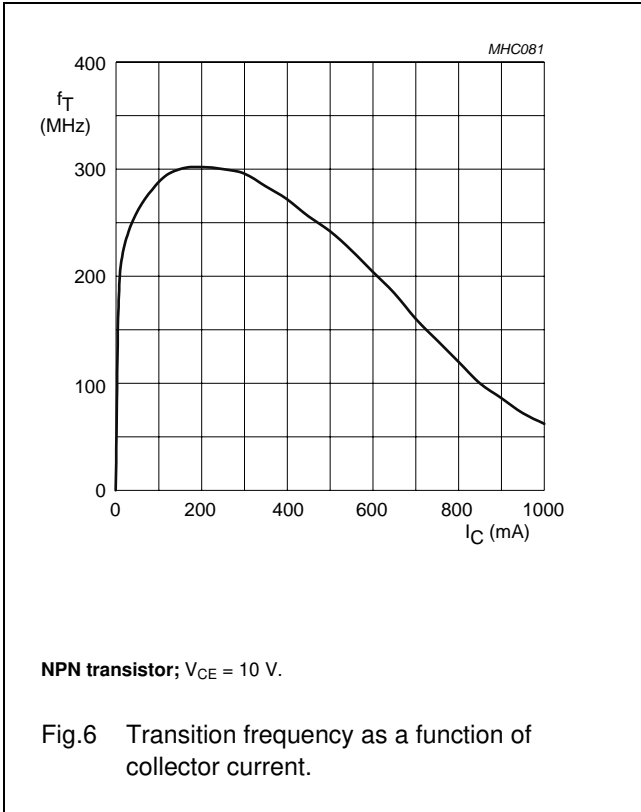
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GRAPHICAL DATA



NPN transistor/Schottky diode module

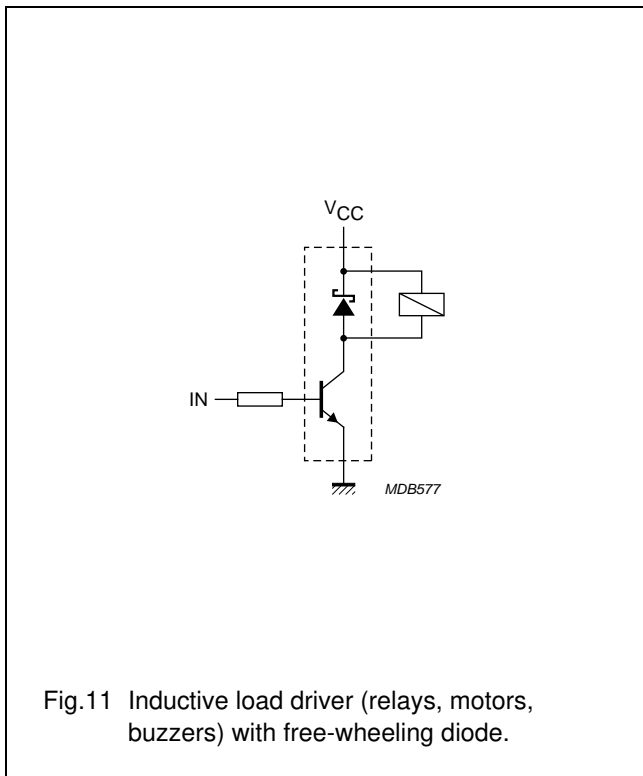
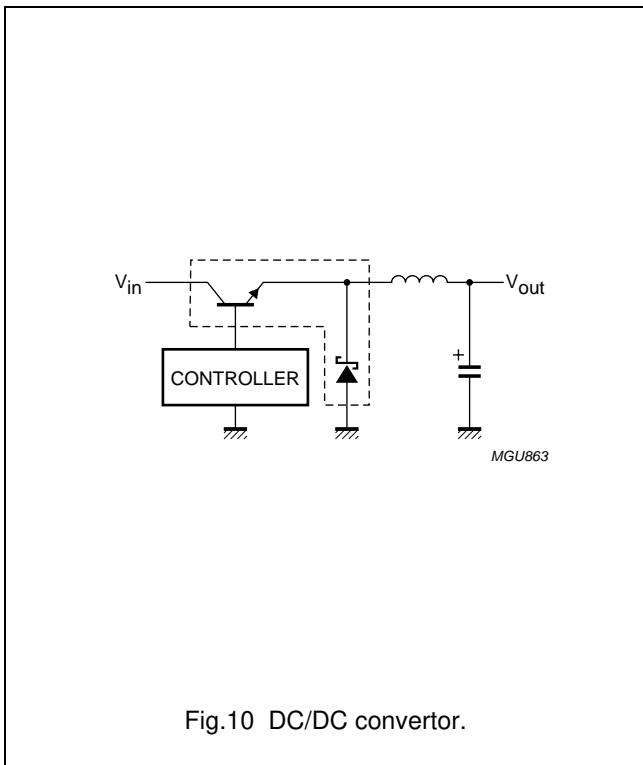
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# NPN transistor/Schottky diode module

# PMEM4010ND

## APPLICATION INFORMATION



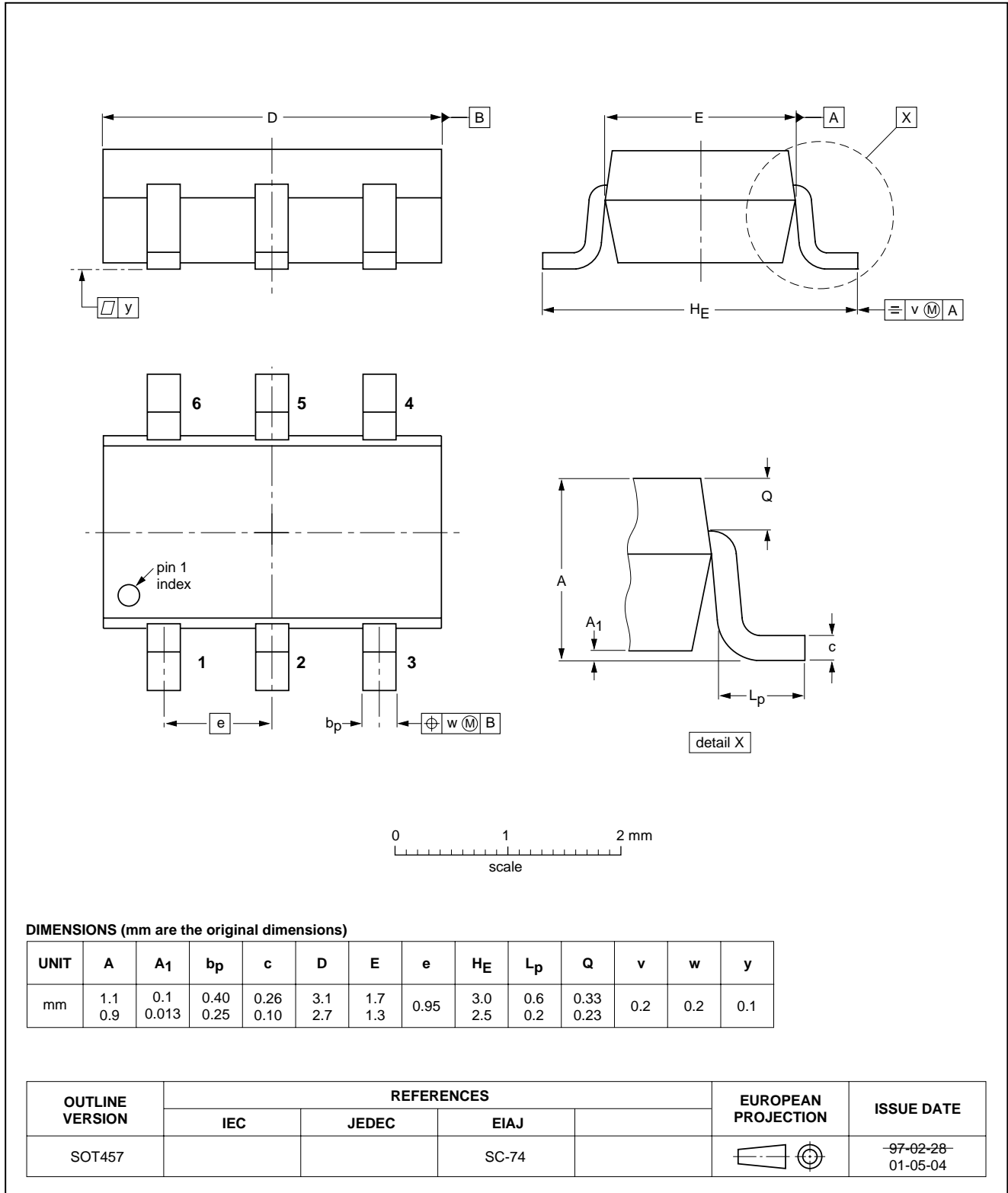
NPN transistor/Schottky diode module

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PACKAGE OUTLINE

Plastic surface mounted package; 6 leads

SOT457





## NPN transistor/Schottky diode module

## PMEM4010ND

## DATA SHEET STATUS

DOCUMENT STATUS <sup>(1)</sup>	PRODUCT STATUS <sup>(2)</sup>	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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Printed in The Netherlands

613514/02/pp10

Date of release: 2003 Jul 04

Document order number: 9397 750 11317

