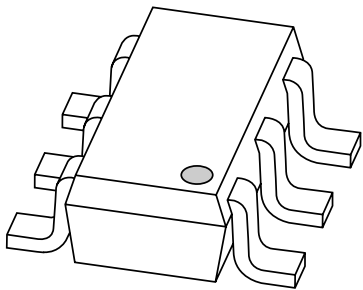


# DATA SHEET



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

Product specification  
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**

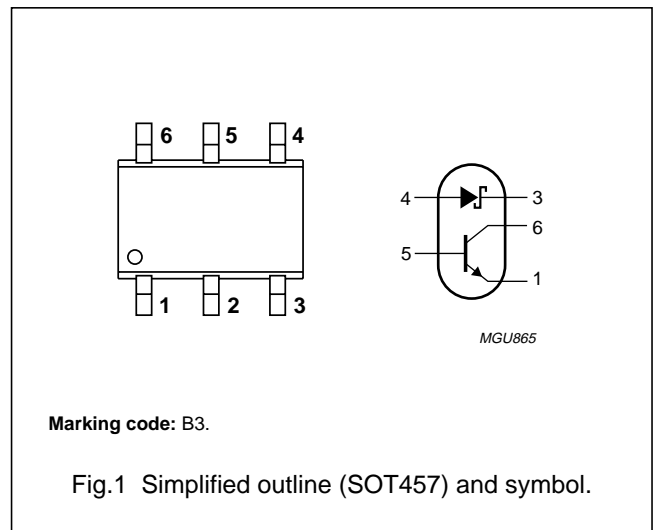
- DC/DC convertors
- Inductive load drivers
- General purpose load drivers
- Reverse polarity protection circuits.

**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>.

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## PMEM4010ND

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

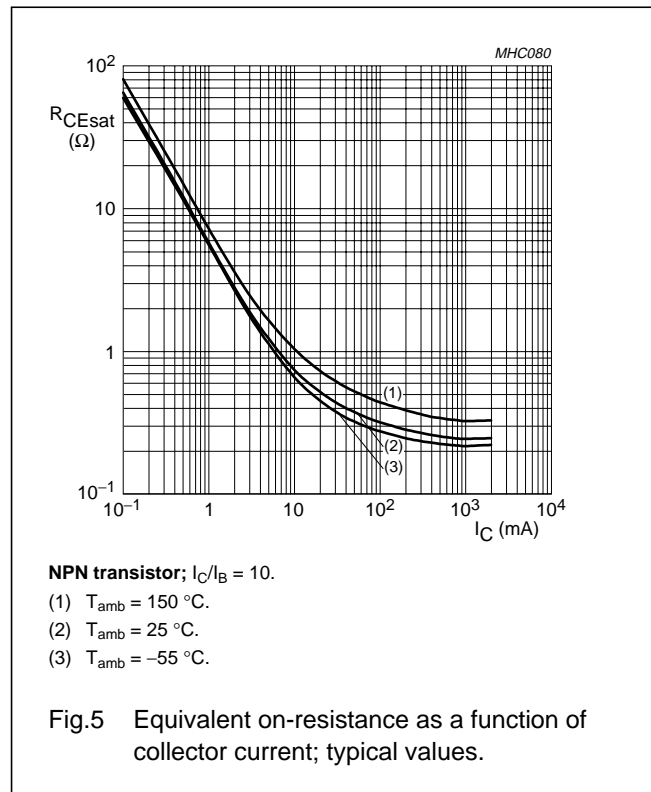
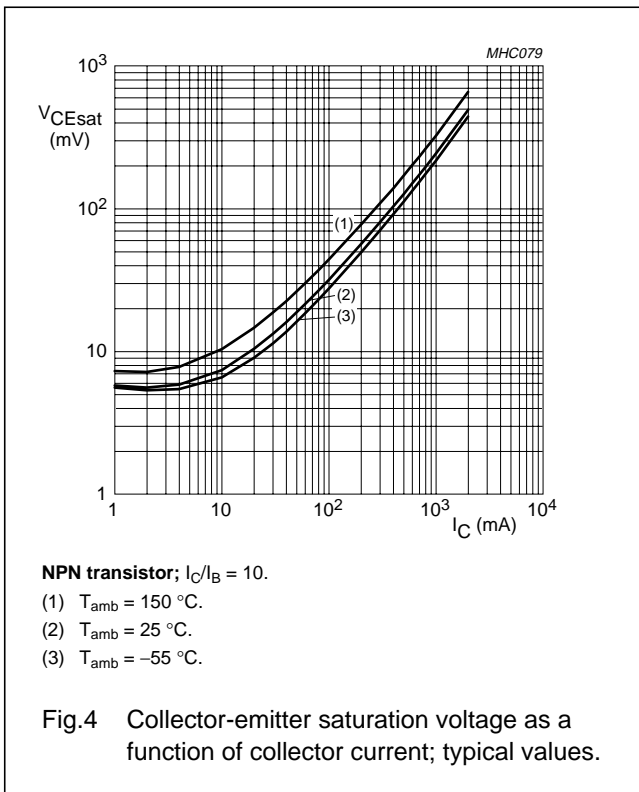
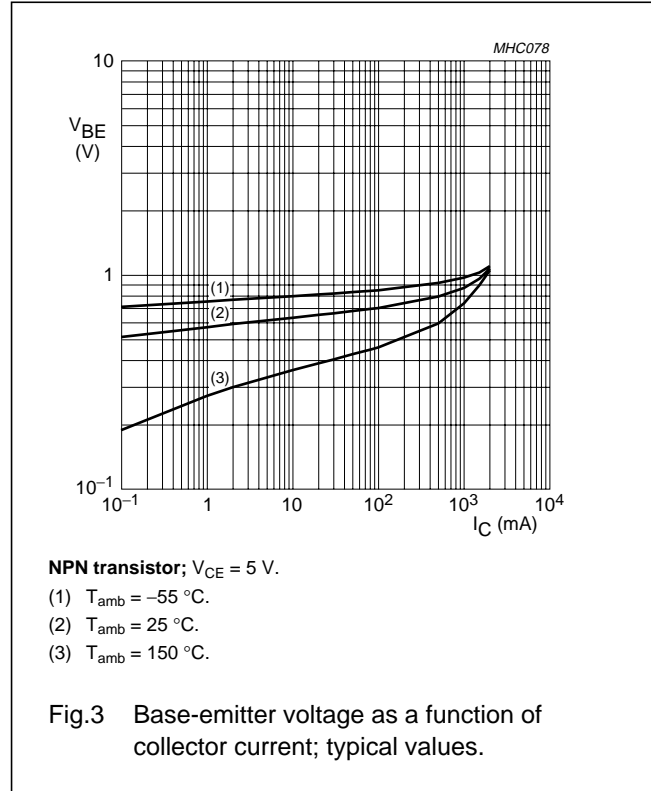
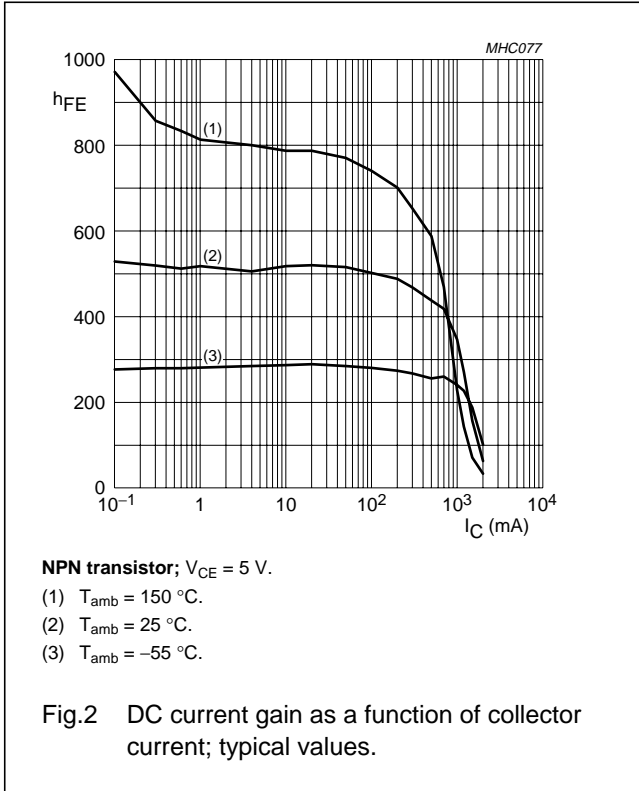
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
<b>NPN transistor</b>						
I <sub>CBO</sub>	collector-base cut-off current	V <sub>CB</sub> = 40 V; I <sub>E</sub> = 0	–	–	100	nA
		V <sub>CB</sub> = 40 V; I <sub>E</sub> = 0; T <sub>amb</sub> = 150 °C	–	–	50	μA
I <sub>CEO</sub>	collector-emitter cut-off 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

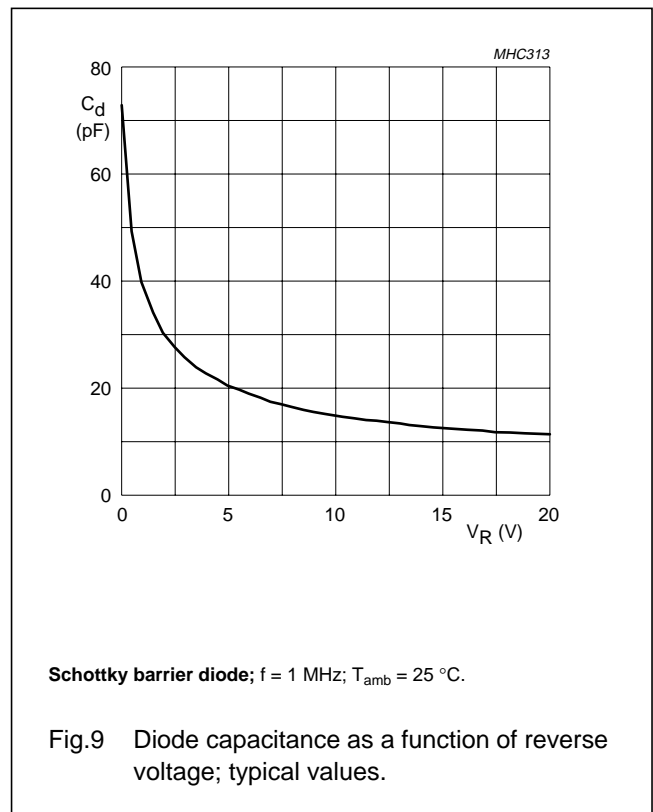
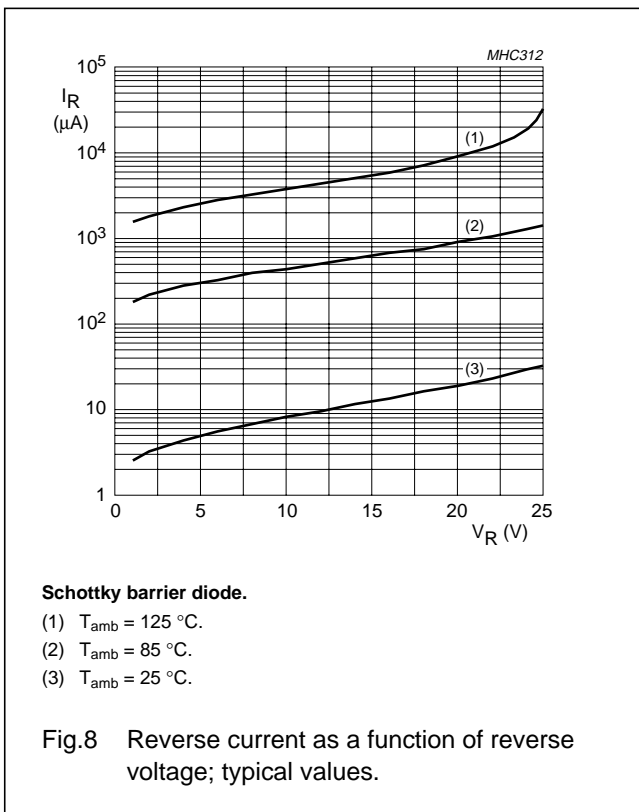
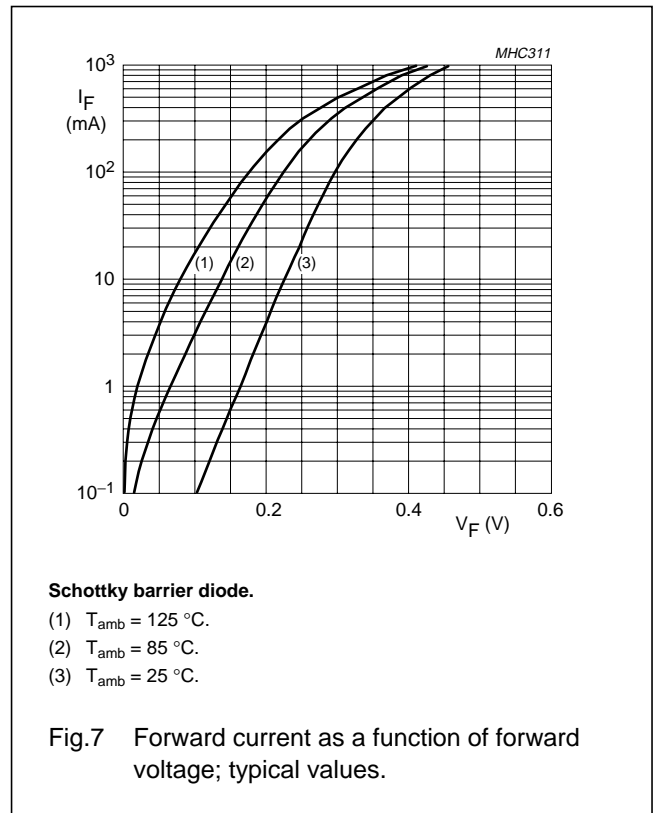
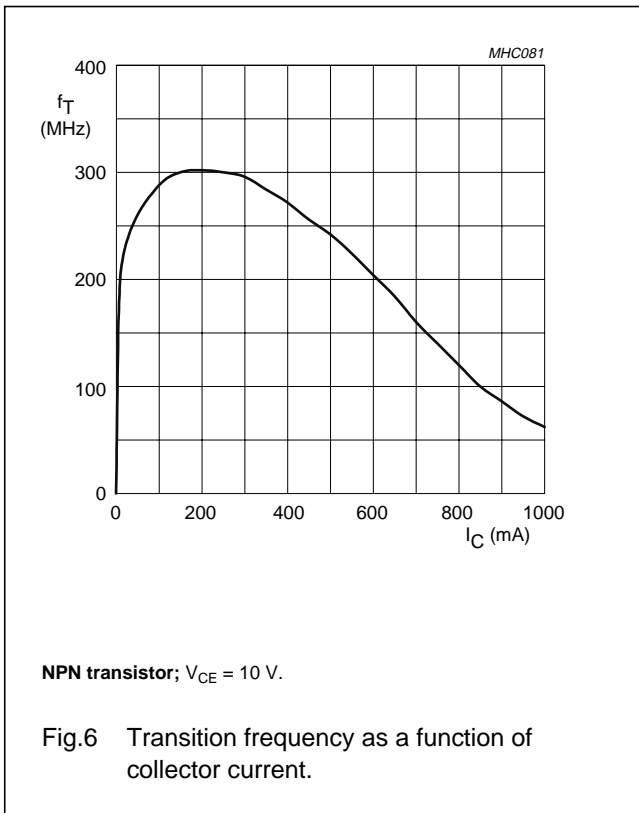
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GRAPHICAL DATA



NPN transistor/Schottky diode module

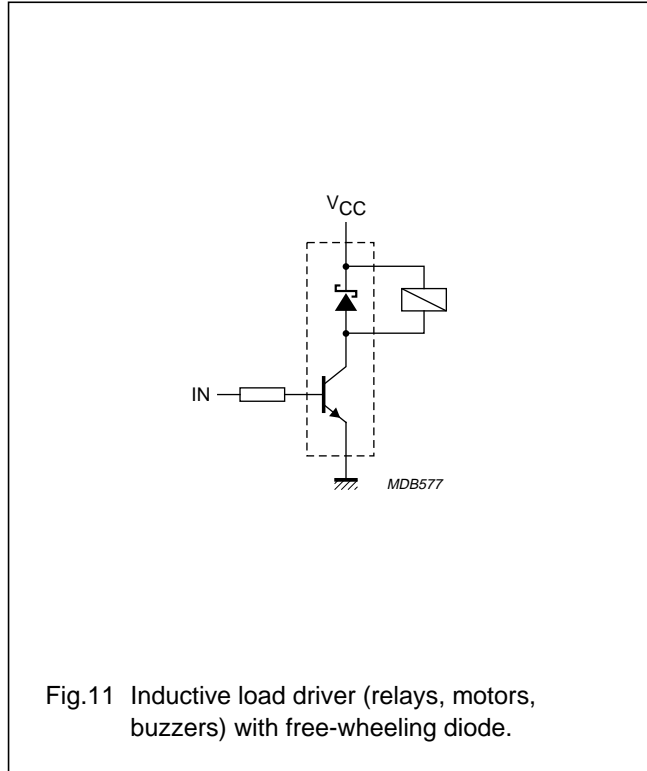
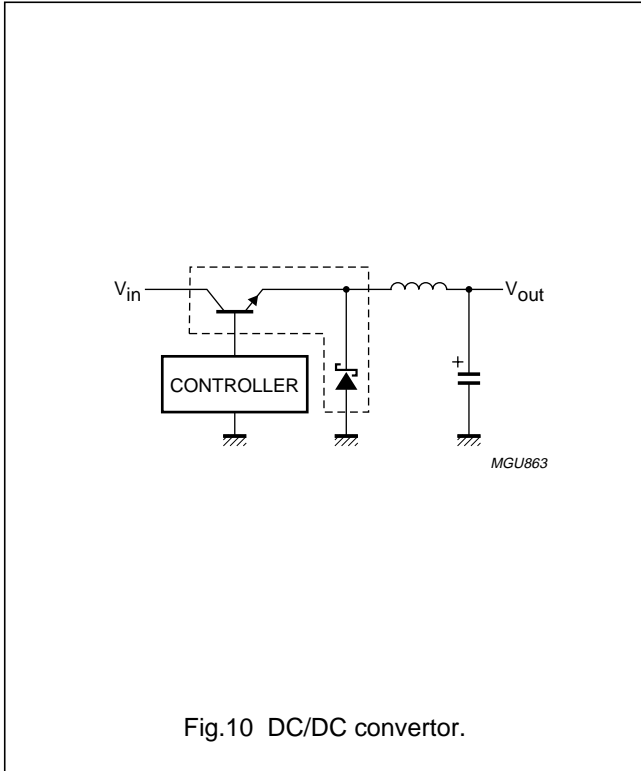
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NPN transistor/Schottky diode module

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APPLICATION INFORMATION



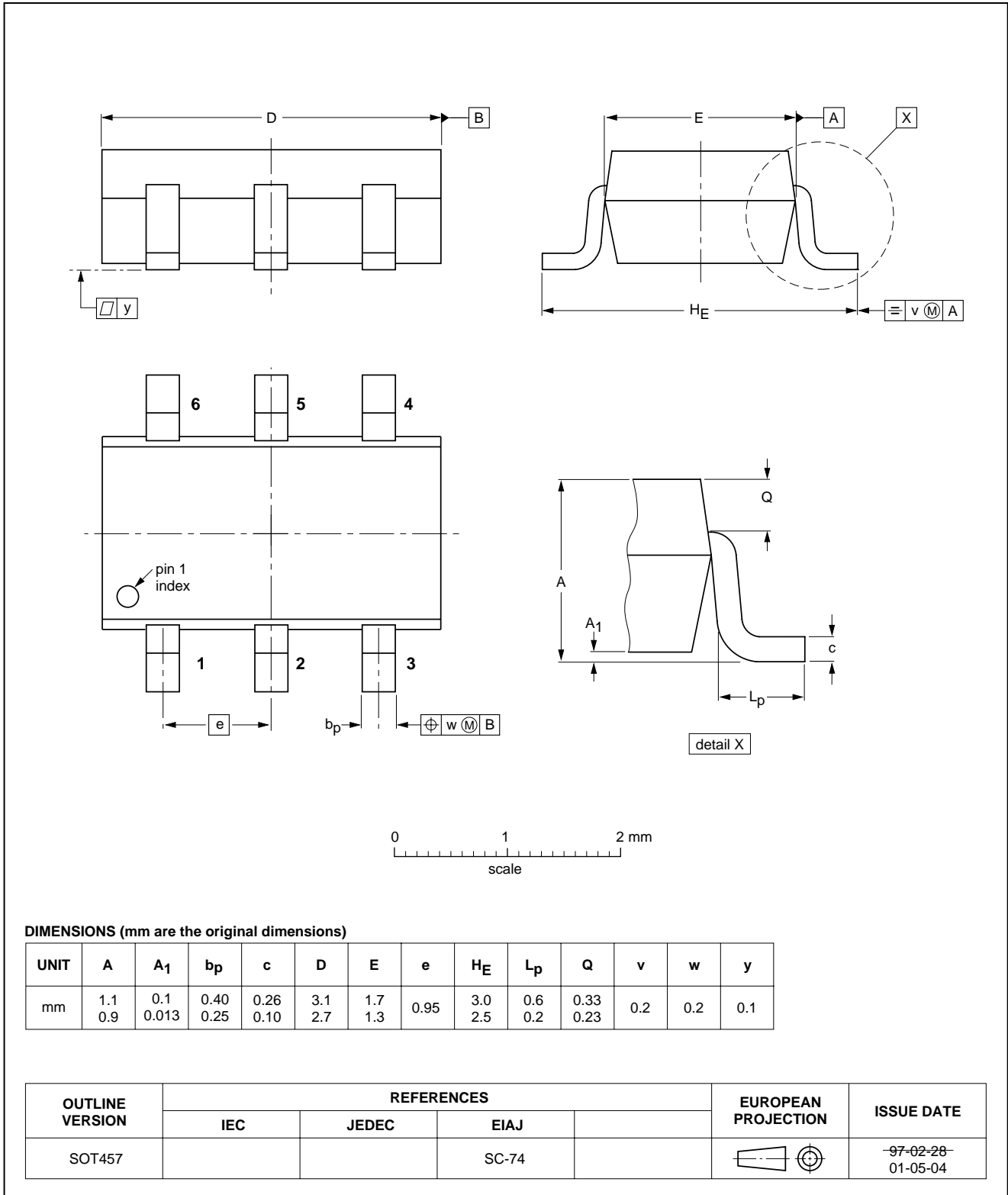
NPN transistor/Schottky diode module

PMEM4010ND

PACKAGE OUTLINE

Plastic surface mounted package; 6 leads

SOT457





## NPN transistor/Schottky diode module

## PMEM4010ND

## DATA SHEET STATUS

LEVEL	DATA SHEET STATUS <sup>(1)</sup>	PRODUCT STATUS <sup>(2)(3)</sup>	DEFINITION
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