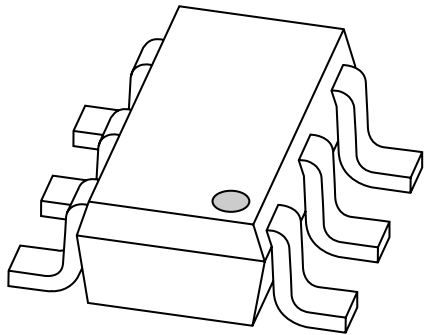


DATA SHEET



PMEM4020ND NPN transistor/Schottky-diode module

Product data sheet

2003 Nov 10

NPN transistor/Schottky-diode module

PMEM4020ND

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

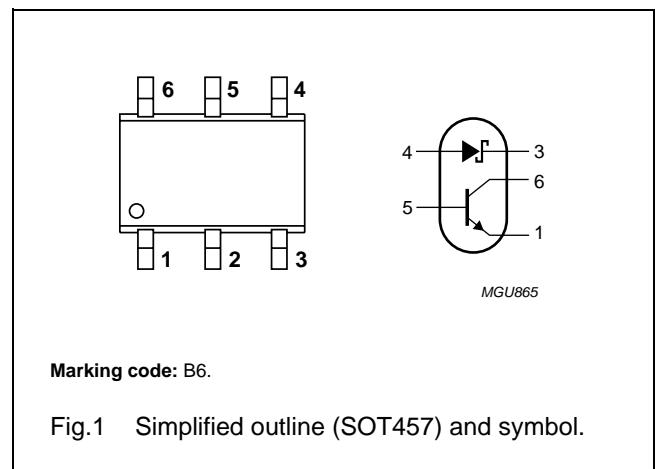
- DC-to-DC converters
- Inductive load drivers
- MOSFET drivers.

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: PMEM4020PD.

PINNING

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



ORDERING INFORMATION

TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
PMEM4020ND	–	plastic surface mounted package; 6 leads	SOT457

NPN transistor/Schottky-diode module

PMEM4020ND

LIMITING VALUES

In accordance with the Absolute Maximum 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)	note 1	–	0.95	A
		note 2	–	1.30	A
		note 3	–	1.65	A
		T _s ≤ 55 °C; note 4	–	2.0	A
I _{CM}	peak collector current		–	3	A
I _{BM}	peak base current		–	1	A
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C; note 1	–	295	mW
		T _{amb} ≤ 25 °C; note 2	–	400	mW
		T _{amb} ≤ 25 °C; note 3	–	500	mW
		T _s ≤ 55 °C; note 4	–	1000	mW
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 square wave	–	5	A
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C; note 1	–	295	mW
		T _{amb} ≤ 25 °C; note 2	–	400	mW
		T _{amb} ≤ 25 °C; note 3	–	500	mW
		T _s ≤ 55 °C; note 4	–	1000	mW
T _j	junction temperature	note 2	–	150	°C
Combined device					
P _{tot}	total power dissipation	T _{amb} = 25 °C; note 2	–	600	mW
T _{stg}	storage temperature		–65	+150	°C
T _{amb}	operating ambient temperature	note 2	–65	+150	°C

Notes

1. Device mounted on a FR4 printed-circuit board; single-sided copper; tinplated; standard footprint for SOT457.
2. Device mounted on a FR4 printed-circuit board; single-sided copper; tinplated; mounting pads for collector and cathode both 1 cm².
3. Device mounted on a ceramic printed-circuit board, single-sided copper; tinplated; standard footprint.
4. Solder point of collector or cathode tab.

NPN transistor/Schottky-diode module

PMEM4020ND

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
Single device				
$R_{th\ j-s}$	thermal resistance from junction to solder point	in free air; notes 1 and 2	95	K/W
$R_{th\ j-a}$	thermal resistance from junction to ambient	in free air; notes 1 and 3	250	K/W
		in free air; notes 1 and 4	315	K/W
		in free air; notes 1 and 5	425	K/W
Combined device				
$R_{th\ j-a}$	thermal resistance from junction to ambient	in free air; notes 1 and 3	208	K/W

Notes

1. For Schottky barrier diodes thermal run-away has to be considered, as in some applications the reverse power losses P_R are a significant part of the total power losses. Nomograms for determination of the reverse power losses P_R and I_F (AV) rating will be available on request.
2. Solder point of collector or cathode tab.
3. Device mounted on a ceramic printed-circuit board; single-sided copper; tinplated; standard footprint.
4. Device mounted on a FR4 printed-circuit board, single-sided copper; tinplated; mounting pad for collector and cathode 1 cm²/each.
5. Device mounted on a FR4 printed-circuit board; single-sided copper; tinplated; standard footprint for SOT457.

NPN transistor/Schottky-diode module

PMEM4020ND

ELECTRICAL CHARACTERISTICST_{amb} = 25 °C unless otherwise specified.

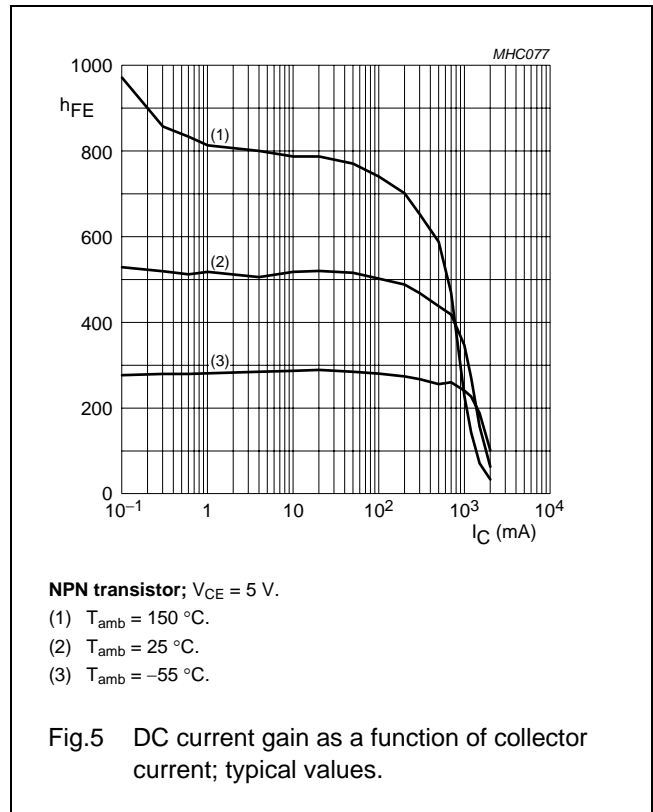
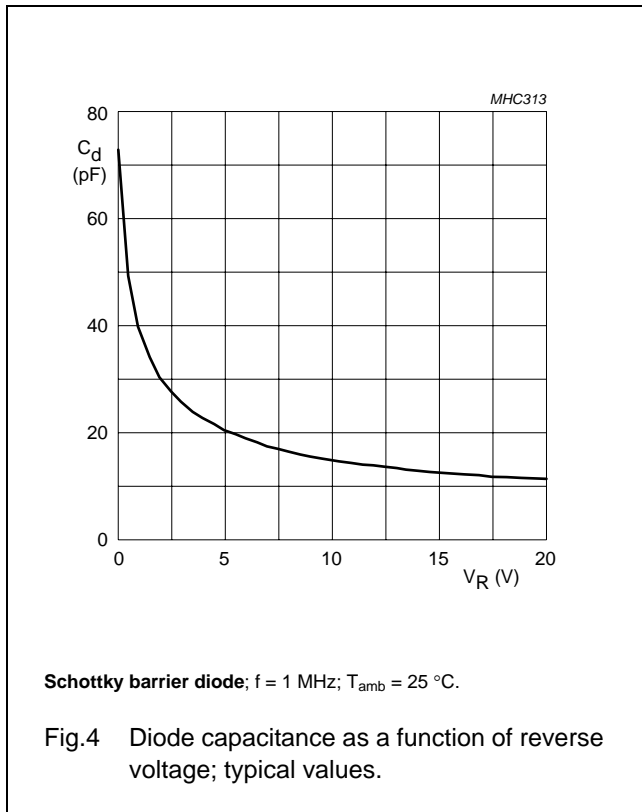
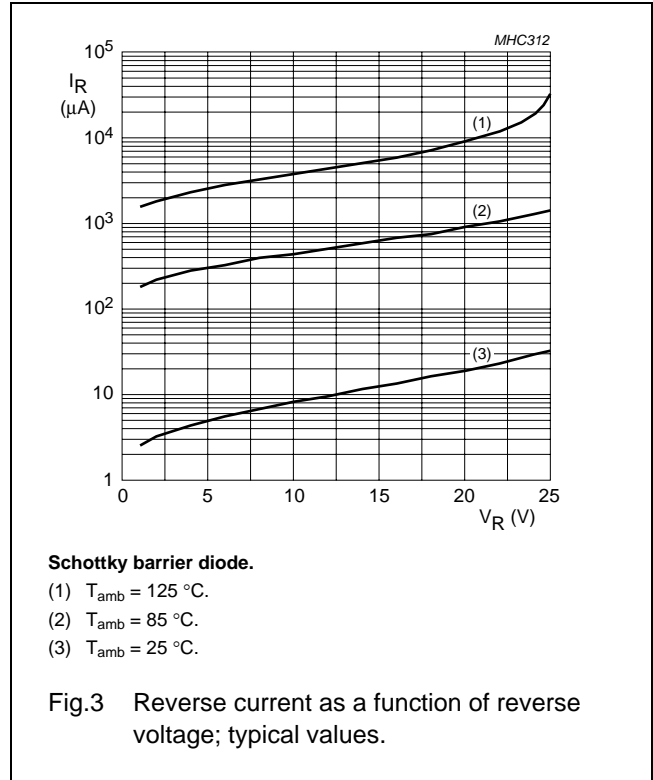
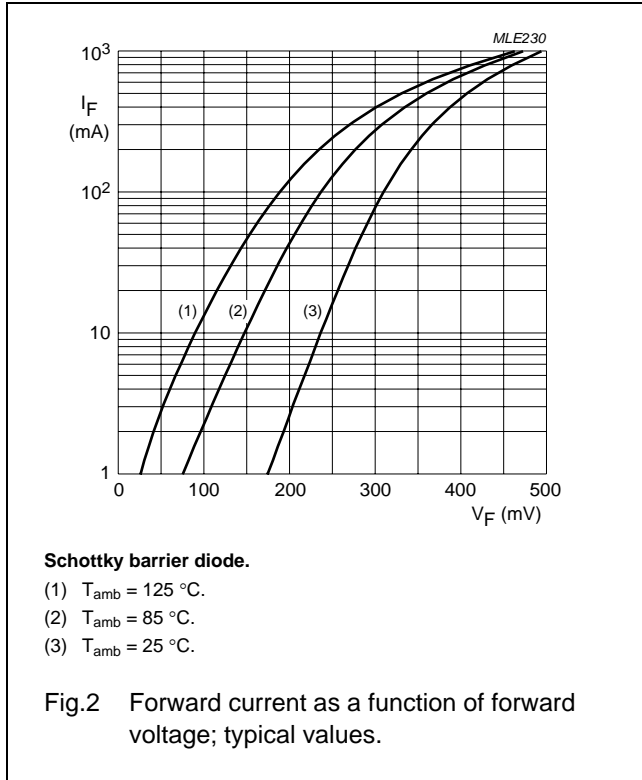
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
NPN transistor						
I _{CBO}	collector-base cut-off current	V _{CB} = 40 V; I _E = 0	–	–	100	nA
		V _{CB} = 40 V; I _E = 0; T _{amb} = 150 °C	–	–	50	μA
I _{CEO}	collector-emitter cut-off current	V _{CE} = 30 V; I _B = 0	–	–	100	nA
I _{EBO}	emitter-base cut-off current	V _{EB} = 5 V; I _C = 0	–	–	100	nA
h _{FE}	current gain (DC)	V _{CE} = 5 V; I _C = 1 mA	300	–	–	
		V _{CE} = 5 V; I _C = 500 mA	300	–	900	
		V _{CE} = 5 V; I _C = 1 A	200	–	–	
		V _{CE} = 5 V; I _C = 2 A; note 1	75	–	–	
V _{CEsat}	collector-emitter saturation voltage	I _C = 100 mA; I _B = 1 mA	–	–	75	mV
		I _C = 500 mA; I _B = 50 mA	–	–	100	mV
		I _C = 1 A; I _B = 100 mA	–	–	190	mV
		I _C = 2 A; I _B = 200 mA	–	–	400	mV
V _{BEsat}	base-emitter saturation voltage	I _C = 1 A; I _B = 100 mA	–	–	1.2	V
R _{CEsat}	equivalent on-resistance	I _C = 1 A; I _B = 100 mA; note 1	–	150	190	mΩ
V _{BEon}	base-emitter turn-on voltage	V _{CE} = 5 V; I _C = 1 A	–	–	1.1	V
f _T	transition frequency	I _C = 50 mA; V _{CE} = 10 V; f = 100 MHz	150	–	–	MHz
C _c	collector capacitance	V _{CB} = 10 V; I _E = 0; i _e = 0; f = 1 MHz	–	–	10	pF
Schottky barrier diode						
V _F	continuous forward voltage	see Fig.2; note 1	–	–	–	–
		I _F = 10 mA	–	240	270	mV
		I _F = 100 mA	–	300	350	mV
I _R	reverse current	see Fig.3; note 1	–	–	–	–
		V _R = 5 V	–	5	10	μA
		V _R = 8 V	–	7	20	μA
C _d	diode capacitance	V _R = 15 V	–	10	50	μA
		V _R = 5 V; f = 1 MHz; see Fig.4	–	19	25	pF

Note1. Pulse test: t_p ≤ 300 μs; δ ≤ 0.02.

NPN transistor/Schottky-diode module

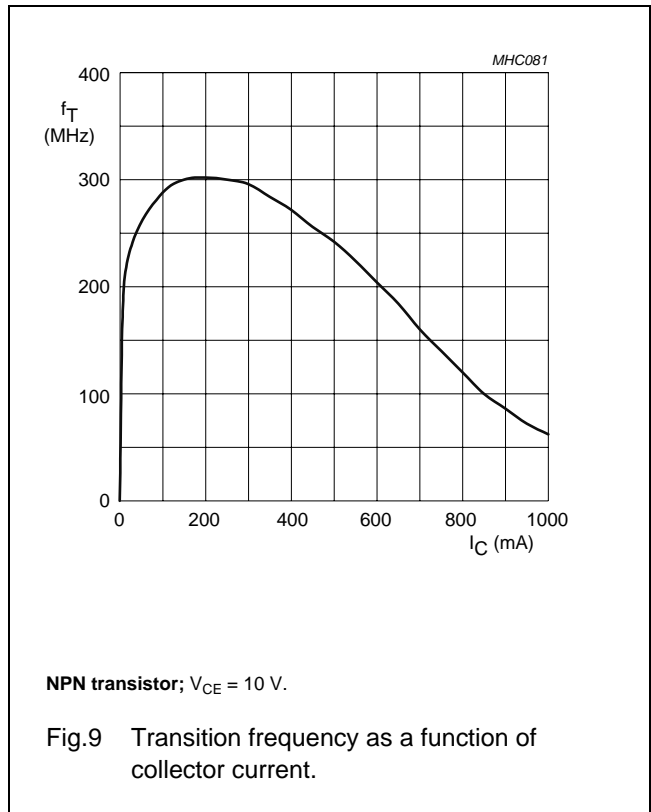
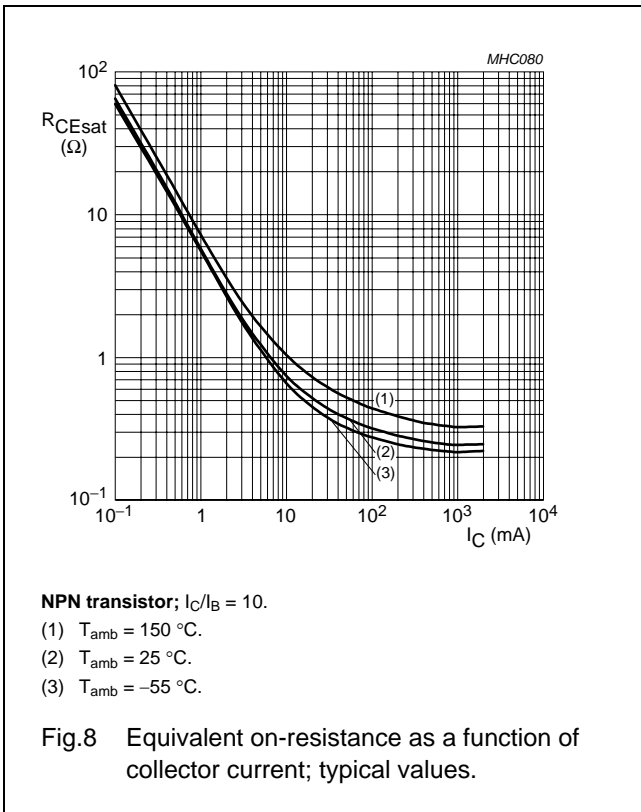
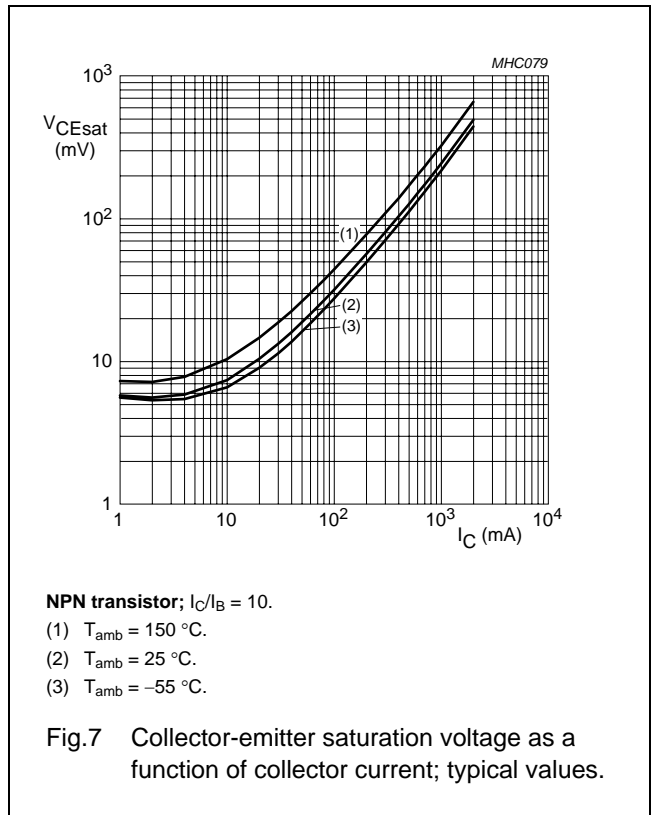
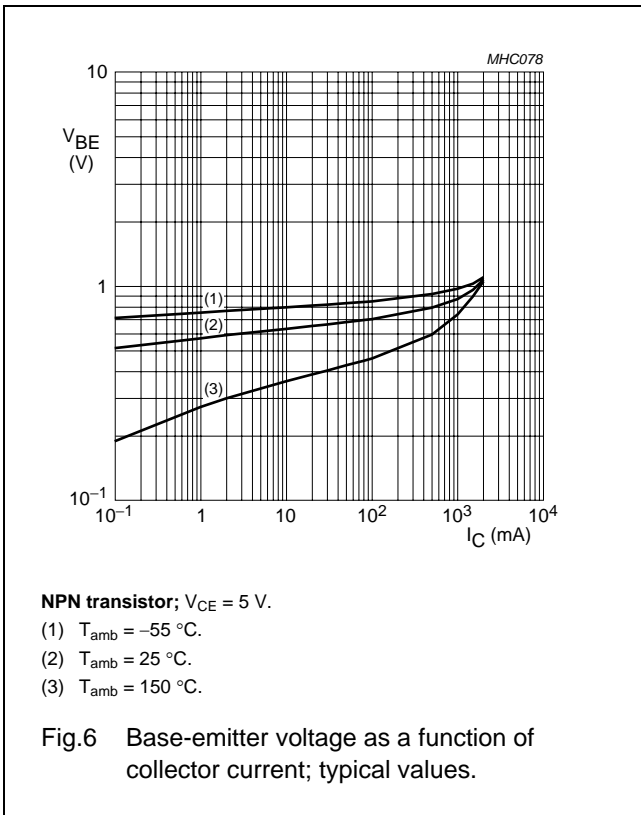
PMEM4020ND

GRAPHICAL DATA



NPN transistor/Schottky-diode module

PMEM4020ND



NPN transistor/Schottky-diode module

PMEM4020ND

APPLICATION INFORMATION

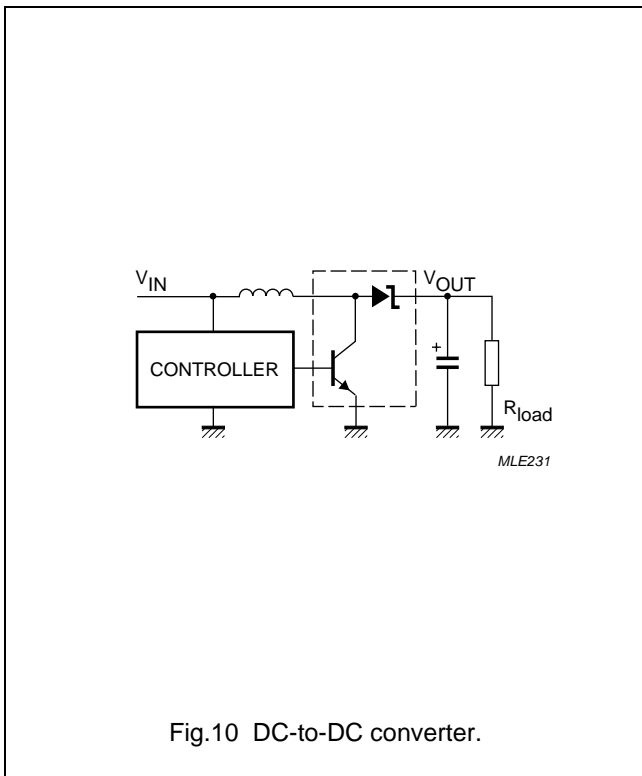


Fig.10 DC-to-DC converter.

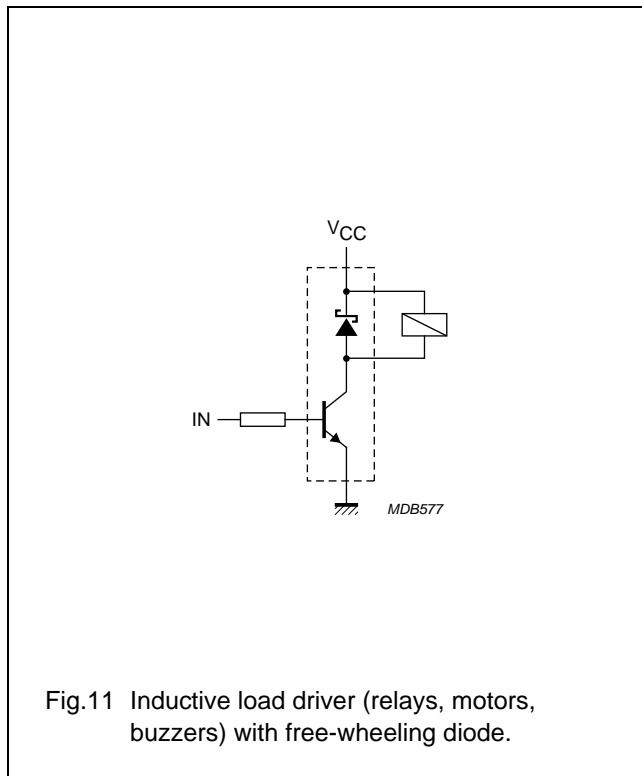


Fig.11 Inductive load driver (relays, motors, buzzers) with free-wheeling diode.

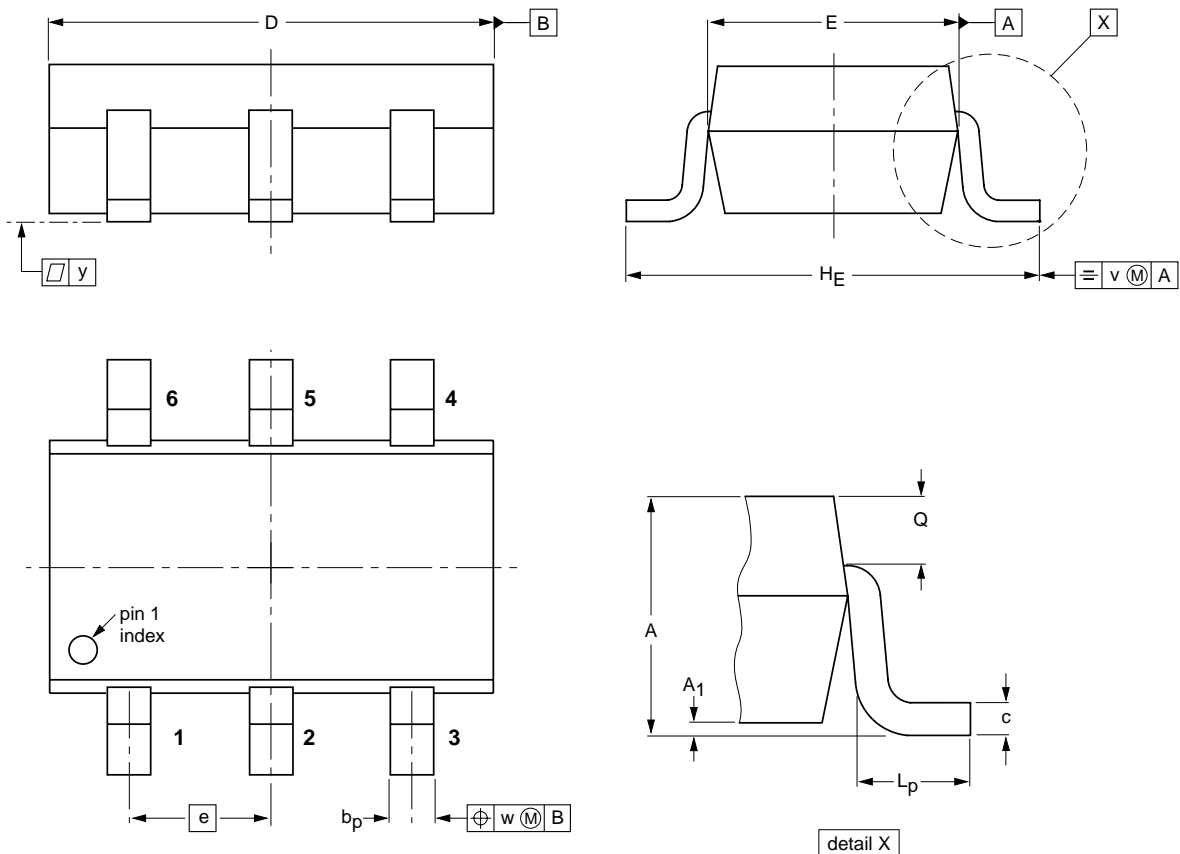
NPN transistor/Schottky-diode module

PMEM4020ND

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

NPN transistor/Schottky-diode module

PMEM4020ND

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.

Notes

1. Please consult the most recently issued document before initiating or completing a design.
2. The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nxp.com>.

DISCLAIMERS

General — Information in this document is believed to be accurate and reliable. However, NXP Semiconductors does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information.

Right to make changes — NXP Semiconductors reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

Suitability for use — NXP Semiconductors products are not designed, authorized or warranted to be suitable for use in medical, military, aircraft, space or life support equipment, nor in applications where failure or malfunction of an NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental damage. NXP Semiconductors accepts no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

Applications — Applications that are described herein for any of these products are for illustrative purposes only. NXP Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Limiting values — Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) may cause permanent damage to

the device. Limiting values are stress ratings only and operation of the device at these or any other conditions above those given in the Characteristics sections of this document is not implied. Exposure to limiting values for extended periods may affect device reliability.

Terms and conditions of sale — NXP Semiconductors products are sold subject to the general terms and conditions of commercial sale, as published at <http://www.nxp.com/profile/terms>, including those pertaining to warranty, intellectual property rights infringement and limitation of liability, unless explicitly otherwise agreed to in writing by NXP Semiconductors. In case of any inconsistency or conflict between information in this document and such terms and conditions, the latter will prevail.

No offer to sell or license — Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

Export control — This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from national authorities.

Quick reference data — The Quick reference data is an extract of the product data given in the Limiting values and Characteristics sections of this document, and as such is not complete, exhaustive or legally binding.

NXP Semiconductors

Customer notification

This data sheet was changed to reflect the new company name NXP Semiconductors. No changes were made to the content, except for the legal definitions and disclaimers.

Contact information

For additional information please visit: **<http://www.nxp.com>**

For sales offices addresses send e-mail to: **salesaddresses@nxp.com**

© NXP B.V. 2009

All rights are reserved. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner.

The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice. No liability will be accepted by the publisher for any consequence of its use. Publication thereof does not convey nor imply any license under patent- or other industrial or intellectual property rights.

Printed in The Netherlands

R76/01/pp11

Date of release: 2003 Nov 10

Document order number: 9397 750 11906



X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for [Schottky Diodes & Rectifiers](#) category:

Click to view products by [NXP](#) manufacturer:

Other Similar products are found below :

[CUS06\(TE85L,Q,M\)](#) [MA4E2039](#) [D1FH3-5063](#) [MBR0530L-TP](#) [MBR10100CT-BP](#) [MBR30H100MFST1G](#) [MMBD301M3T5G](#) [PMAD1103-LF](#) [PMAD1108-LF](#) [RB160M-50TR](#) [RB520S-30](#) [RB551V-30](#) [DD350N18K](#) [DZ435N40K](#) [DZ600N16K](#) [BAS16E6433HTMA1](#) [BAS 3010S-02LRH E6327](#) [BAT 54-02LRH E6327](#) [IDL02G65C5XUMA1](#) [NSR05F40QNXT5G](#) [NSVR05F40NXT5G](#) [JANS1N6640](#) [SB07-03C-TB-H](#) [SB1003M3-TL-W](#) [SBAT54CWT1G](#) [SBM30-03-TR-E](#) [SBS818-TL-E](#) [SK32A-LTP](#) [SK33A-TP](#) [SK34A-TP](#) [SK34B-TP](#) [SMD1200PL-TP](#) [ACDBN160-HF](#) [SS3003CH-TL-E](#) [STPS30S45CW](#) [PDS3100Q-7](#) [GA01SHT18](#) [CRS10I30A\(TE85L,QM\)](#) [MBR1240MFST1G](#) [MBRB30H30CT-1G](#) [BAS28E6433HTMA1](#) [BAS 70-02L E6327](#) [HSB123JTR-E](#) [JANTX1N5712-1](#) [VS-STPS40L45CW-N3](#) [DD350N12K](#) [SB007-03C-TB-E](#) [SB10015M-TL-E](#) [SB1003M3-TL-E](#) [SK110-LTP](#)