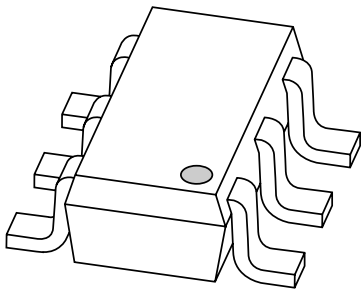


# DATA SHEET



## **PMEM4020PD** PNP transistor/Schottky-diode module

Product data sheet

2003 Nov 24

# PNP transistor/Schottky-diode module

# PMEM4020PD

### 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
- General purpose load drivers
- Reverse polarity protection circuits.

### DESCRIPTION

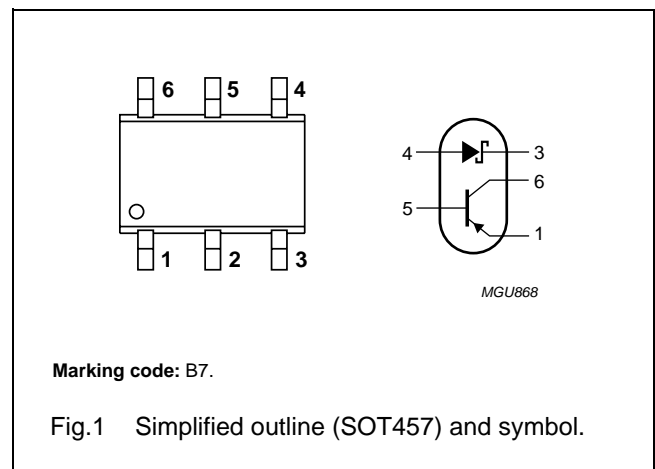
Combination of a PNP transistor with low  $V_{CEsat}$  and high current capability and a planar Schottky barrier diode with an integrated guard ring for stress protection in a SOT457 (SC-74) small plastic package.  
 NPN complement: PMEM4020ND.

### ORDERING INFORMATION

TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
PMEM4020PD	–	plastic surface mounted package; 6 leads	SOT457

### PINNING

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



## PNP transistor/Schottky-diode module

## PMEM4020PD

**LIMITING VALUES**

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
<b>PNP transistor</b>					
V <sub>CBO</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)	note 1	–	–0.75	A
		note 2	–	–1	A
		note 3	–	–1.3	A
		T <sub>s</sub> ≤ 55 °C; note 4	–	–2	A
I <sub>CM</sub>	peak collector current		–	–3	A
I <sub>BM</sub>	peak base current		–	–1	A
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C; note 1	–	295	mW
		T <sub>amb</sub> ≤ 25 °C; note 2	–	400	mW
		T <sub>amb</sub> ≤ 25 °C; note 3	–	500	mW
		T <sub>s</sub> ≤ 55 °C; note 4	–	1000	mW
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
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C; note 1	–	295	mW
		T <sub>amb</sub> ≤ 25 °C; note 2	–	400	mW
		T <sub>amb</sub> ≤ 25 °C; note 3	–	500	mW
		T <sub>s</sub> ≤ 55 °C; note 4	–	1000	mW
T <sub>j</sub>	junction temperature	note 2	–	150	°C
<b>Combined device</b>					
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> = 25 °C; note 2	–	600	mW
T <sub>stg</sub>	storage temperature		–65	+150	°C
T <sub>amb</sub>	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 cm<sup>2</sup>.
3. Mounted on a ceramic printed-circuit board; single-sided copper; tinplated; standard footprint.
4. Solder point of collector or cathode tab.

## PNP transistor/Schottky-diode module

## PMEM4020PD

**THERMAL CHARACTERISTICS**

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
<b>Single device</b>				
$R_{th(j-s)}$	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
<b>Combined device</b>				
$R_{th(j-a)}$	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 both 1 cm<sup>2</sup>.
5. Device mounted on a FR4 printed-circuit board, single-sided copper; tinplated; standard footprint for SOT457.

## PNP transistor/Schottky-diode module

## PMEM4020PD

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

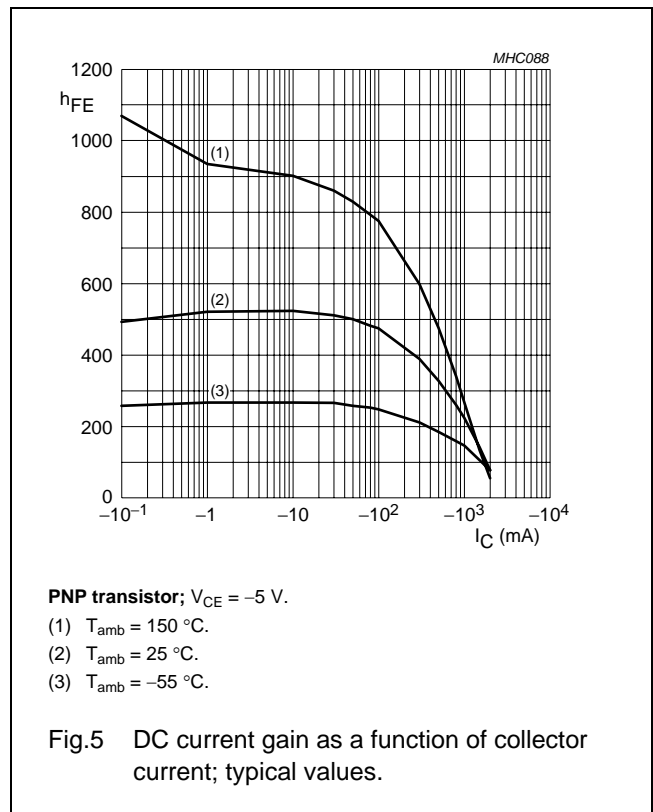
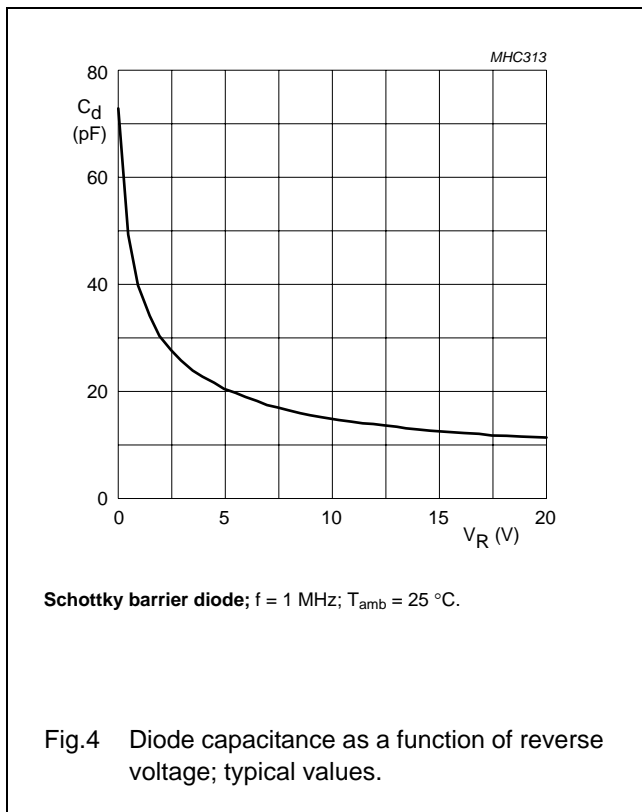
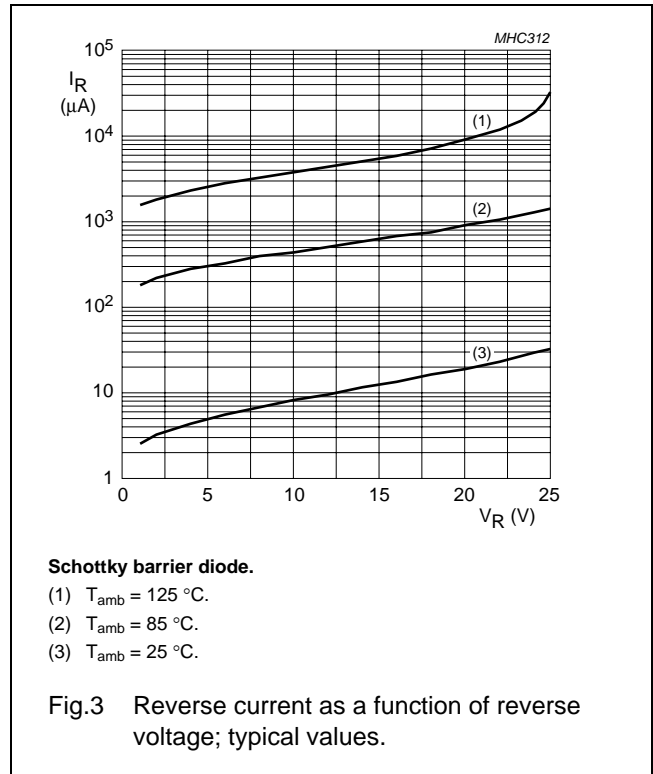
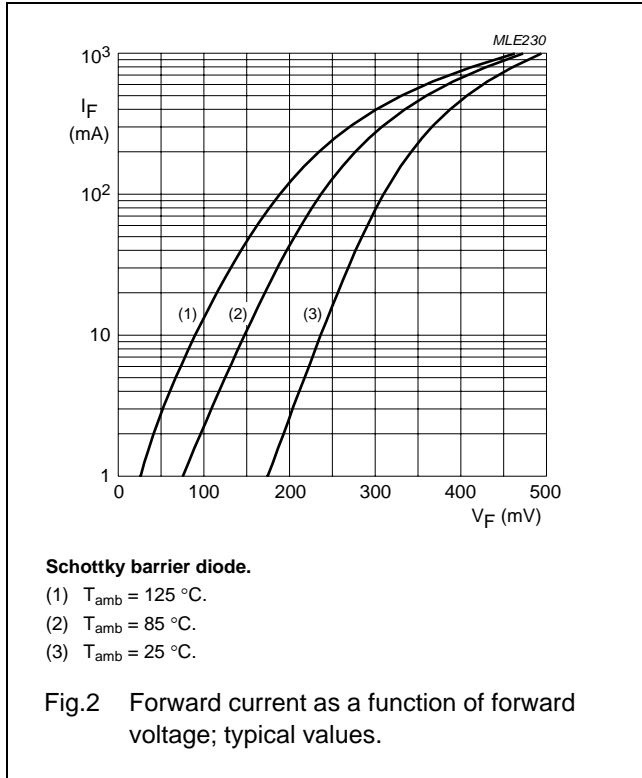
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
<b>PNP transistor</b>						
I <sub>CBO</sub>	collector-base cut-off current	V <sub>CB</sub> = -40 V; I <sub>E</sub> = 0	-	-	-100	nA
		V <sub>CB</sub> = -40 V; I <sub>E</sub> = 0; T <sub>amb</sub> = 150 °C	-	-	-50	μA
I <sub>CEO</sub>	collector-emitter cut-off 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>	current gain (DC)	V <sub>CE</sub> = -5 V; I <sub>C</sub> = -1 mA	300	-	-	
		V <sub>CE</sub> = -5 V; I <sub>C</sub> = -100 mA	300	-	800	
		V <sub>CE</sub> = -5 V; I <sub>C</sub> = -500 mA	250	-	-	
		V <sub>CE</sub> = -5 V; I <sub>C</sub> = -1 A	160	-	-	
		V <sub>CE</sub> = -5 V; I <sub>C</sub> = -2 A; note 1	50	-	-	
V <sub>CEsat</sub>	collector-emitter saturation voltage	I <sub>C</sub> = -100 mA; I <sub>B</sub> = -1 mA	-	-	-120	mV
		I <sub>C</sub> = -500 mA; I <sub>B</sub> = -50 mA	-	-	-145	mV
		I <sub>C</sub> = -1 A; I <sub>B</sub> = -100 mA	-	-	-260	mV
		I <sub>C</sub> = -2 A; I <sub>B</sub> = -200 mA	-	-	-530	mV
V <sub>BEsat</sub>	base-emitter saturation voltage	I <sub>C</sub> = -1 A; I <sub>B</sub> = -50 mA	-	-	-1.1	V
R <sub>CEsat</sub>	equivalent on-resistance	I <sub>C</sub> = -1 A; I <sub>B</sub> = -100 mA; note 1	-	180	280	mΩ
V <sub>BEon</sub>	base-emitter turn-on voltage	V <sub>CE</sub> = -5 V; I <sub>C</sub> = -1 A	-	-	-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
<b>Schottky barrier diode</b>						
V <sub>F</sub>	continuous forward voltage	see Fig.2; note 1				
		I <sub>F</sub> = 10 mA	-	240	270	mV
		I <sub>F</sub> = 100 mA	-	300	350	mV
		I <sub>F</sub> = 1000 mA	-	480	550	mV
I <sub>R</sub>	reverse current	see Fig.3; note 1				
		V <sub>R</sub> = 5 V	-	5	10	μA
		V <sub>R</sub> = 8 V	-	7	20	μA
		V <sub>R</sub> = 15 V	-	10	50	μA
C <sub>d</sub>	diode capacitance	V <sub>R</sub> = 5 V; f = 1 MHz; see Fig.4	-	19	25	pF

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

PNP transistor/Schottky-diode module

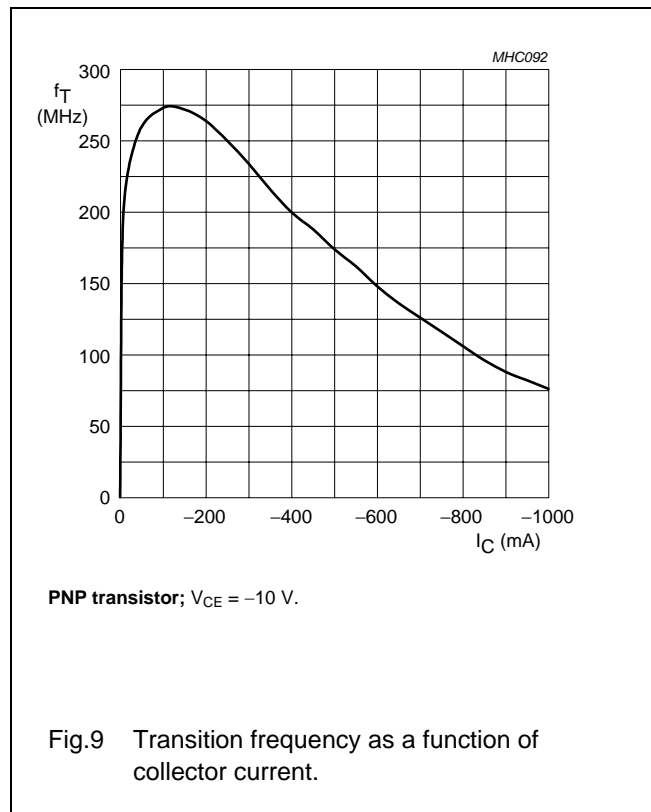
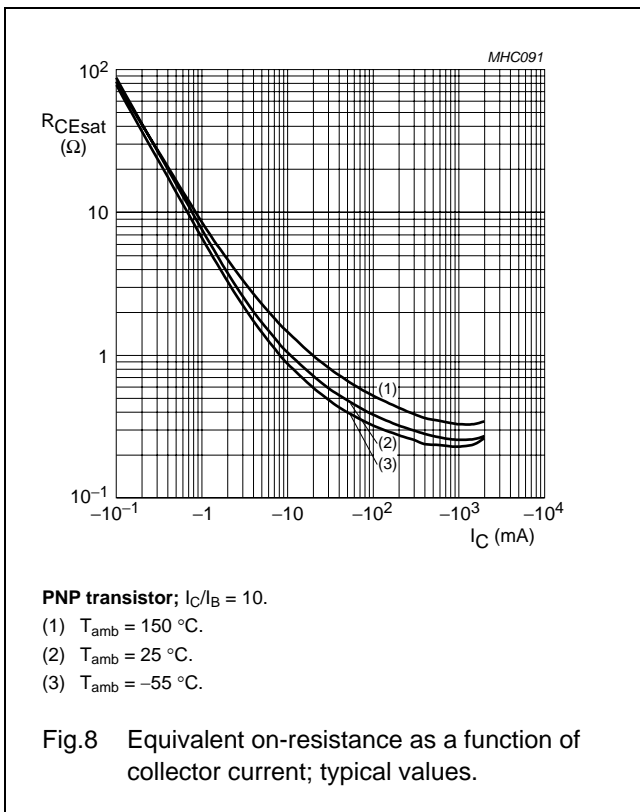
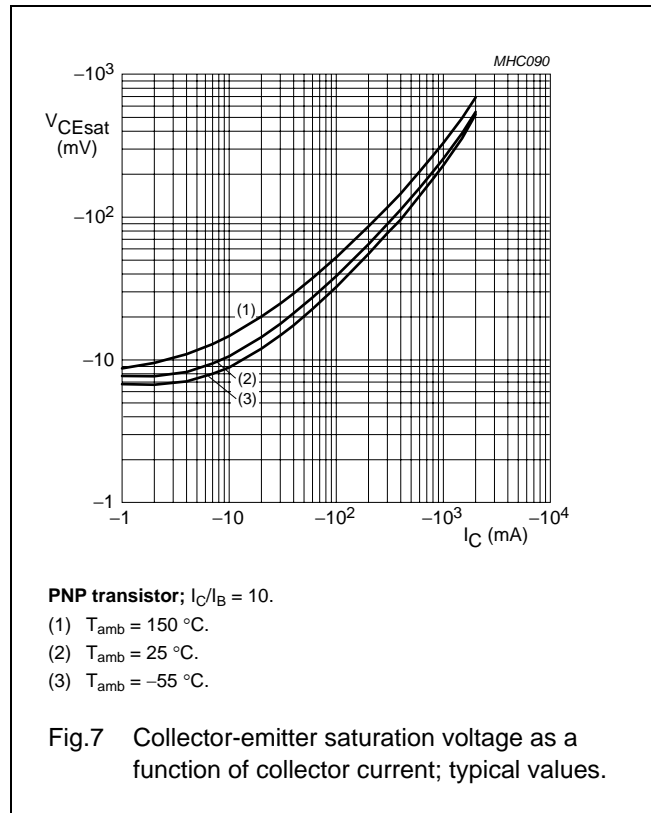
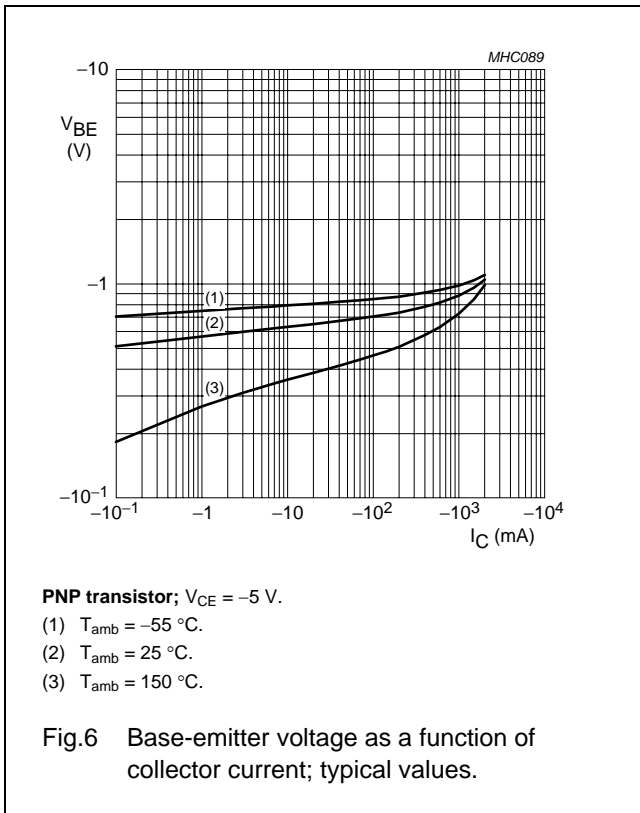
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GRAPHICAL DATA



PNP transistor/Schottky-diode module

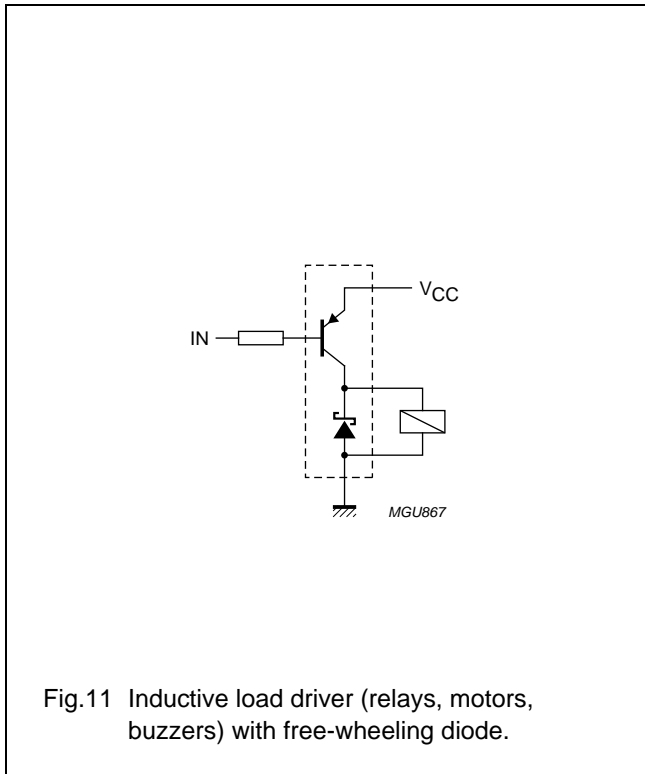
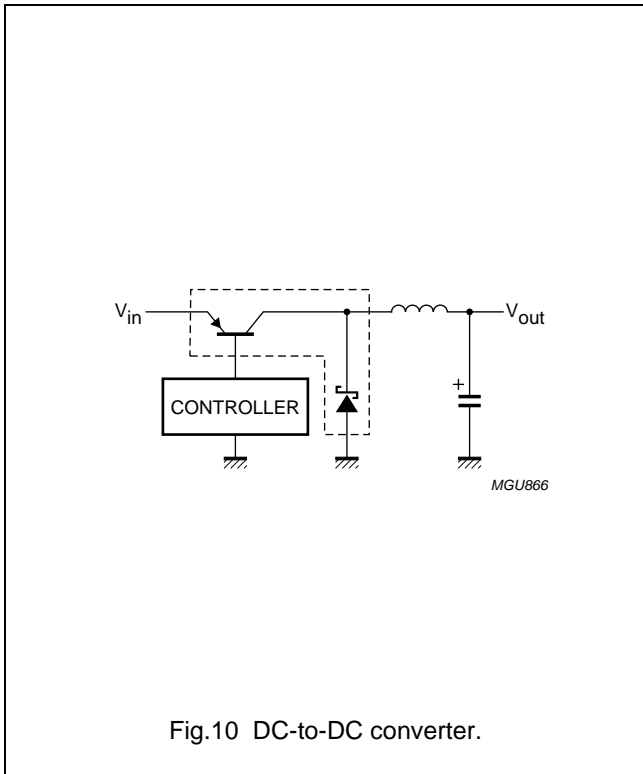
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PNP transistor/Schottky-diode module

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APPLICATION INFORMATION





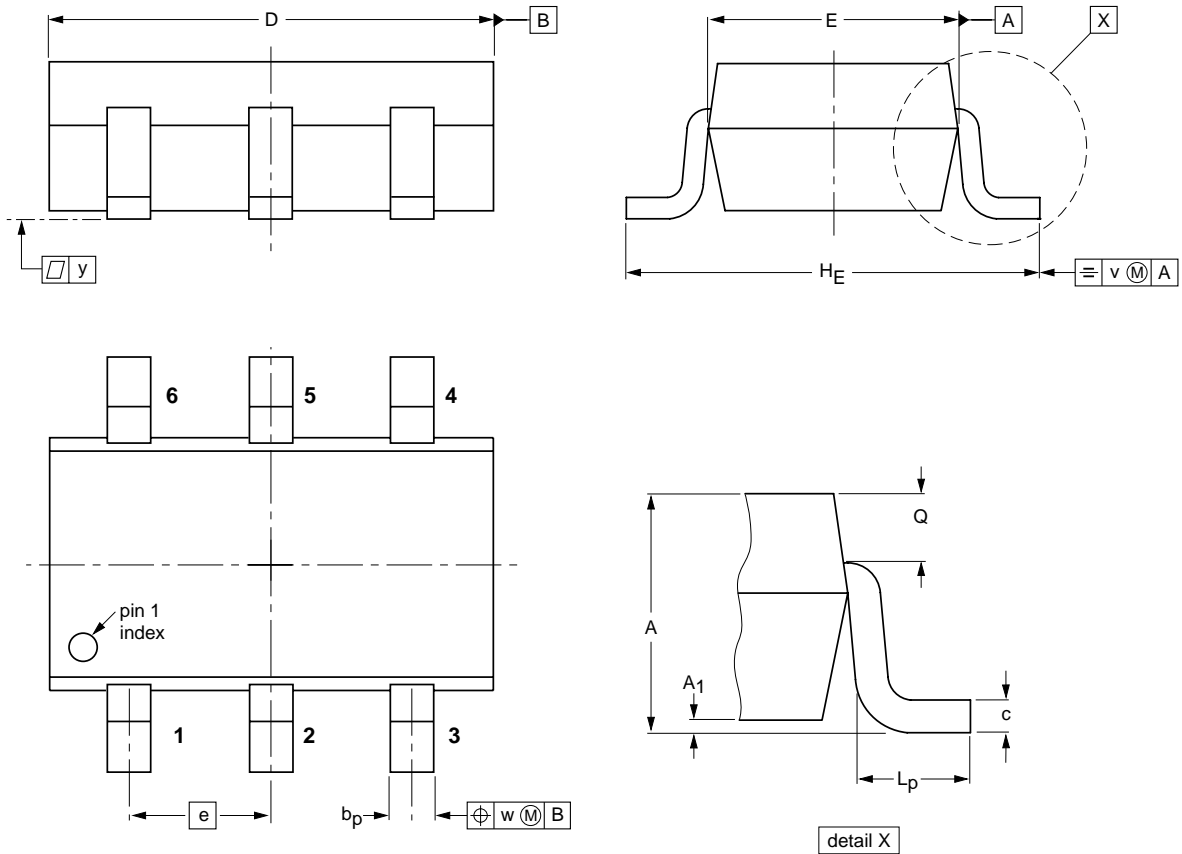
PNP transistor/Schottky-diode module

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PACKAGE OUTLINE

Plastic surface mounted package; 6 leads

SOT457



DIMENSIONS (mm are the original dimensions)

UNIT	A	A <sub>1</sub>	b <sub>p</sub>	c	D	E	e	H <sub>E</sub>	L <sub>p</sub>	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

PNP transistor/Schottky-diode module

PMEM4020PD

**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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