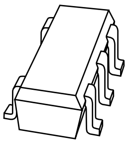


PMEM1505PG

PNP transistor/Schottky rectifier module

Rev. 02 — 31 August 2009 **Product data sheet**

1. Product profile

1.1 General description

Combination of an PNP transistor with low V_{CEsat} and high current capability and a planar Schottky barrier rectifier with an integrated guard ring for stress protection in a SOT353 (SC-88A) small plastic package. NPN complement: PMEM1505NG

1.2 Features

- 300 mW total power dissipation
- Current capability up to 0.5 A
- Reduces printed-circuit board area required
- Reduces 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

1.3 Applications

- DC-to-DC converters
- General purpose load drivers
- MOSFET drivers
- Inductive load drivers
- Reverse polarity protection circuits

1.4 Quick reference data

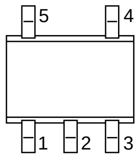
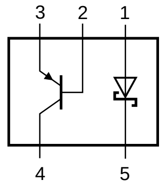
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
PNP transistor							
V_{CEO}	collector-emitter voltage	open base		-	-	–15	V
I_C	collector current (DC)	continuous	[1]	-	-	–0.5	A
Schottky barrier rectifier							
V_R	continuous reverse voltage			-	-	20	V
I_F	continuous forward current			-	-	0.5	A

[1] Mounted on a FR4 printed-circuit board, single-sided copper, tin-plated, standard footprint for SOT353.

2. Pinning information

Table 2. Discrete pinning

Pin	Description	Simplified outline	Symbol
1	anode		 sym024
5	cathode		
4	collector		
2	base		
3	emitter		

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMEM1505PG	-	plastic surface mounted package; 5 leads	SOT353

4. Marking

Table 4. Marking

Type number	Marking code[1]
PMEM1505PG	L6*

[1] * = p: made in Hong Kong
* = t: made in Malaysia
* = W: made in China

5. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions	Min	Max	Unit
PNP transistor					
V_{CBO}	collector-base voltage	open emitter	-	–15	V
V_{CEO}	collector-emitter voltage	open base	-	–15	V
V_{EBO}	emitter-base voltage	open collector	-	–6	V
I_C	collector current (DC)	continuous [1]	-	–0.5	A
		continuous [2]	-	–0.6	A
		continuous; $T_s \leq 55$ °C [3]	-	–1	A
I_{CM}	peak collector current		-	–1	A
I_{BM}	peak base current		-	–100	mA

Table 5. Limiting values *...continued*

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

Symbol	Parameter	Conditions		Min	Max	Unit
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	200	mW
		$T_{amb} \leq 25$ °C	[2]	-	250	mW
		$T_s \leq 55$ °C	[3]	-	800	mW
T_j	junction temperature			-	150	°C
Schottky barrier rectifier						
V_R	continuous reverse voltage			-	20	V
I_F	continuous forward current			-	0.5	A
I_{FSM}	non-repetitive peak forward current	t = 8.3 ms square wave		-	5	A
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	200	mW
		$T_{amb} \leq 25$ °C	[2]	-	250	mW
		$T_s \leq 55$ °C	[3]	-	800	mW
T_j	junction temperature		[2]	-	125	°C
Combined device						
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[2]	-	300	mW
T_{stg}	storage temperature			–65	+150	°C
T_{amb}	operating ambient temperature		[2]	–65	+150	°C

[1] Mounted on a FR4 printed-circuit board, single-sided copper, tin-plated, standard footprint for SOT353.

[2] Device mounted on a printed-circuit board, single-sided copper, tin-plated, 1cm^2 mounting pad for both collector and cathode.

[3] Solder point of collector or cathode tab.

6. Thermal characteristics

Table 6. Thermal characteristics[1]

Symbol	Parameter	Conditions		Typ	Unit
Single device					
$R_{th(j-s)}$	from junction to solder point	in free air	[2]	120	K/W
$R_{th(j-a)}$	from junction to ambient	in free air	[3]	395	K/W
			[4]	495	K/W
Combined device					
$R_{th(j-a)}$	from junction to ambient	in free air	[5]	410	K/W

[1] For Schottky barrier rectifiers 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 determining 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 printed-circuit board, single-sided copper, tin-plated, 1cm^2 mounting pad for both collector and cathode.

[4] Mounted on a FR4 printed-circuit board, single-sided copper, tin-plated, standard footprint for SOT353.

[5] Mounted on a ceramic printed-circuit board, single-sided copper, tin-plated, standard footprint.

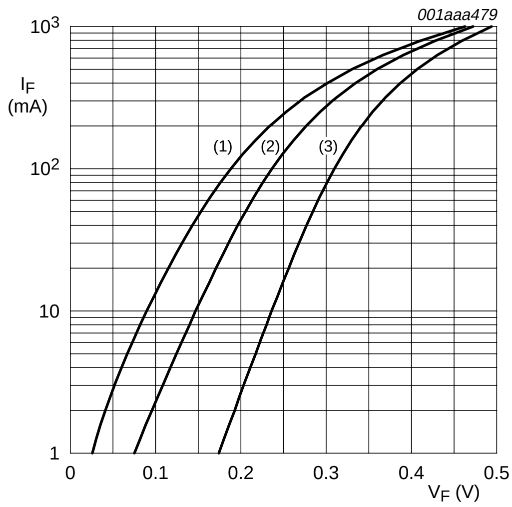
7. Characteristics

Table 7. Characteristics

T_{amb} = 25 °C unless otherwise specified

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
PNP transistor							
I_{CBO}	collector-base cut-off current	V_{CB} = –15 V; I_E = 0 A		-	-	–100	nA
		V_{CB} = –15 V; I_E = 0 A; T_j = 150 °C		-	-	–50	µA
I_{EBO}	emitter-base cut-off current	V_{EB} = –5 V; I_C = 0 A		-	-	–100	nA
h_{FE}	DC current gain	V_{CE} = –2 V; I_C = –10 mA		200	-	-	
		V_{CE} = –2 V; I_C = –100 mA		150	-	-	
		V_{CE} = –2 V; I_C = –500 mA		90	-	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = –10 mA; I_B = –0.5 mA	[1]	-	-	–25	mV
		I_C = –200 mA; I_B = –10 mA		-	-	–150	mV
		I_C = –500 mA; I_B = –50 mA		-	-	–250	mV
R_{CEsat}	equivalent on-resistance	I_C = –500 mA; I_B = –50 mA	[1]	-	300	< 500	mΩ
V_{BEsat}	base-emitter saturation voltage	I_C = –500 mA; I_B = –50 mA	[1]	-	-	–1.1	V
V_{BEon}	base-emitter turn-on voltage	V_{CE} = –2 V; I_C = –100 mA	[1]	-	-	–0.9	V
f_T	transition frequency	V_{CE} = –10 V; I_C = –50 mA; f = 100 MHz	[1]	100	280	-	MHz
C_c	collector capacitance	V_{CB} = –10 V; I_E = I_e = 0 A; f = 1 MHz		-	4.4	10	pF
Schottky barrier rectifier							
V_F	continuous forward voltage	see Figure 1					
		I_F = 10 mA	[1]	-	240	270	mV
		I_F = 100 mA	[1]	-	300	350	mV
		I_F = 500 mA	[1]	-	400	460	mV
		I_F = 1000 mA	[1]	-	480	550	mV
I_R	reverse current	see Figure 2					
		V_R = 5 V	[1]	-	5	10	µA
		V_R = 8 V	[1]	-	7	20	µA
		V_R = 15 V	[1]	-	10	50	µA
C_d	diode capacitance	V_R = 5 V; f = 1 MHz; see Figure 3		-	19	25	pF

[1] Pulse test: $t_p \leq 300$ µs; $\delta \leq 0.02$



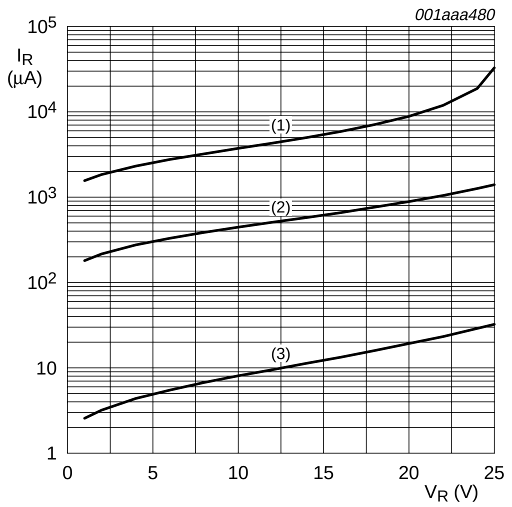
Schottky barrier rectifier

(1) T_{amb} = 125 °C

(2) T_{amb} = 85 °C

(3) T_{amb} = 25 °C

Fig 1. Forward current as a function of forward voltage; typical values



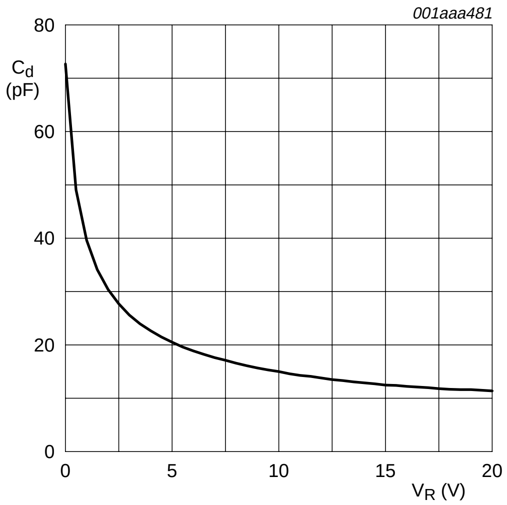
Schottky barrier rectifier

(1) T_{amb} = 125 °C

(2) T_{amb} = 85 °C

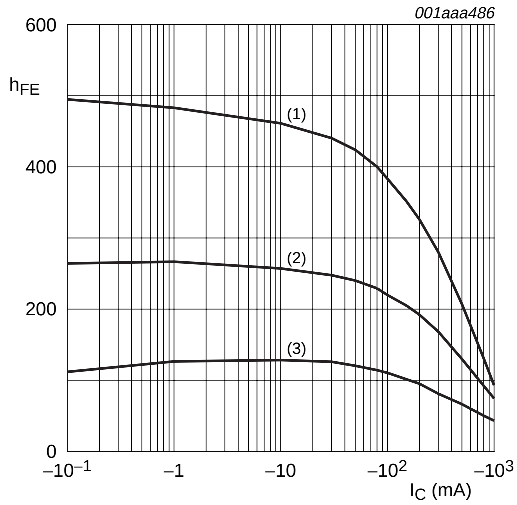
(3) T_{amb} = 25 °C

Fig 2. Reverse current as a function of reverse voltage; typical values



Schottky barrier rectifier; f = 1 MHz; T_{amb} = 25 °C

Fig 3. Diode capacitance as a function of reverse voltage; typical values



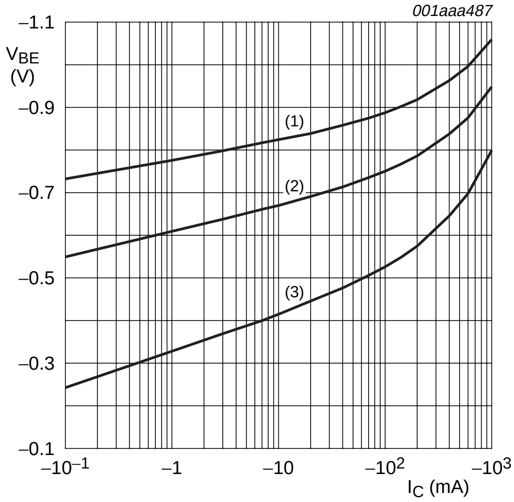
PNP transistor; V_{CE} = −2 V

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −55 °C

Fig 4. DC current gain as a function of collector current; typical values



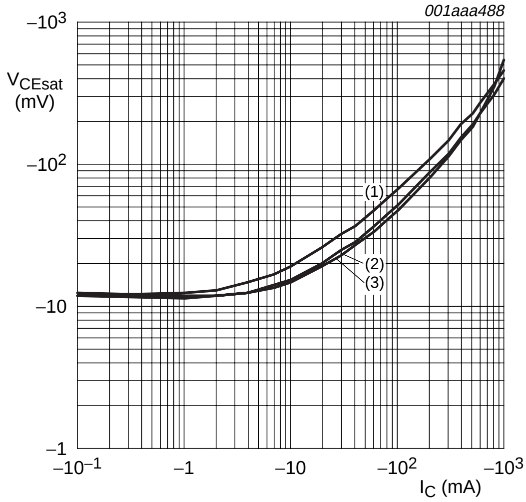
PNP transistor; V_{CE} = −2 V

(1) T_{amb} = −55 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 150 °C

Fig 5. Base-emitter voltage as a function of collector current; typical values



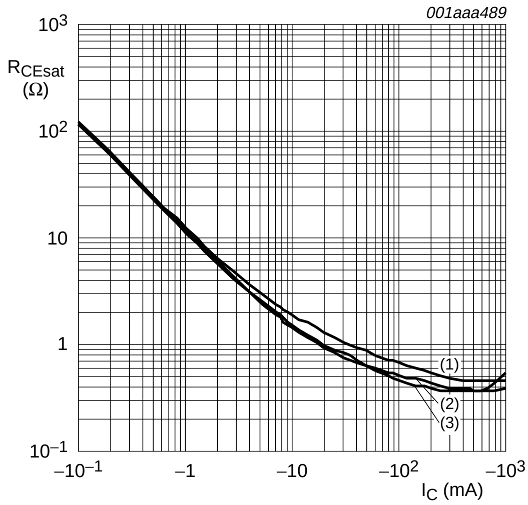
PNP transistor; I_C/I_B = 20

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −55 °C

Fig 6. Collector-emitter saturation voltage as a function of collector current; typical values



PNP transistor; V_{CE} = −2 V

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −55 °C

Fig 7. Equivalent on-resistance as a function of collector current; typical values

8. Application information

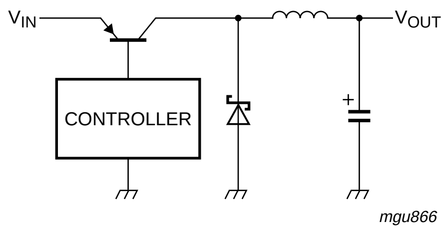


Fig 8. DC-to-DC converter

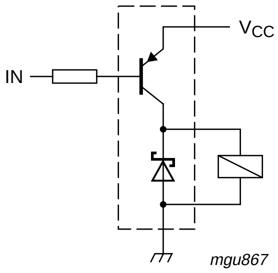
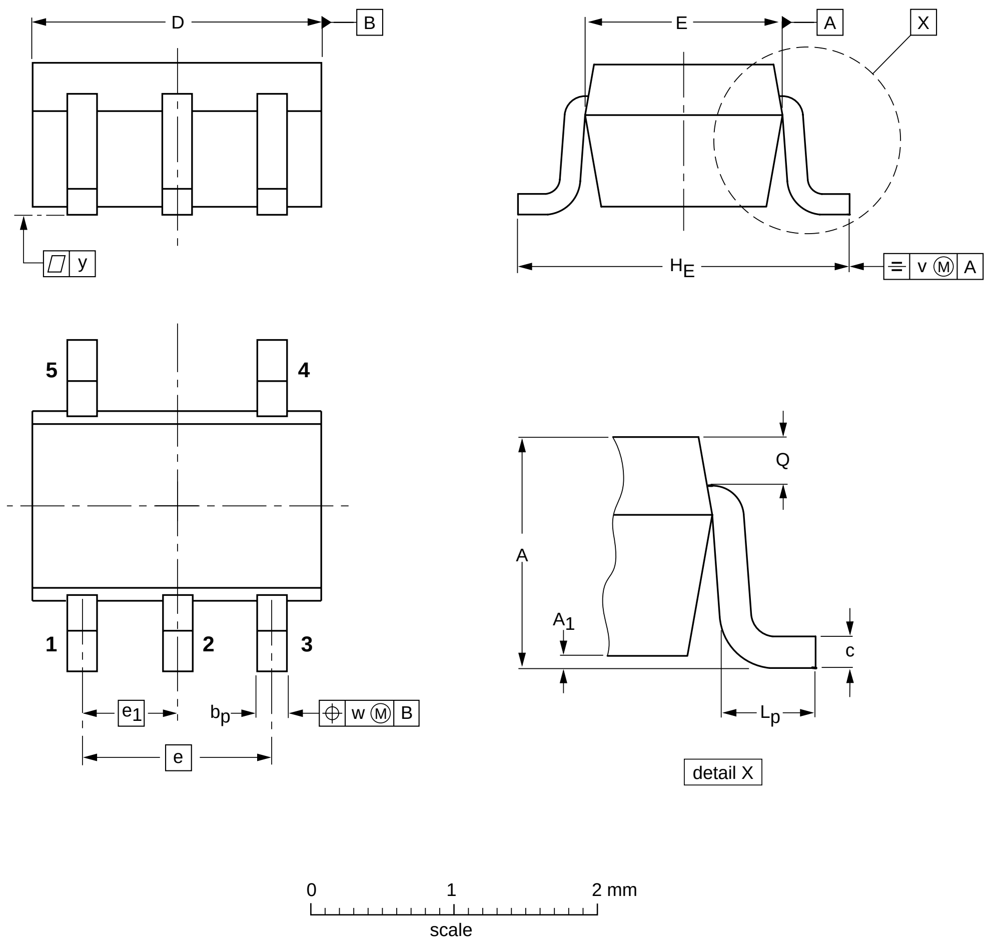


Fig 9. Inductive load driver (relays, motors and buzzers) with free-wheeling diode

9. Package outline

Plastic surface-mounted package; 5 leads **SOT353**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1 max	b_p	c	D	E [(2)]	e	e_1	H_E	L_p	Q	v	w	y
mm	1.1 0.8	0.1	0.3 0.2	0.25 0.10	2.2 1.8	1.35 1.15	1.3	0.65	2.2 2.0	0.45 0.15	0.25 0.15	0.2	0.2	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT353			SC-88A			~~04-11-16~~ 06-03-16

Fig 10. Package outline

10. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMEM1505PG_2	20090831	Product data	-	PMEM1505PG_1
Modifications:	• This data sheet was changed to reflect the new company name NXP Semiconductors, including new legal definitions and disclaimers. No changes were made to the technical content. • Table 2 "Discrete pinning": amended • Figure 10 "Package outline": updated			
PMEM1505PG_1	20040526	Product data	-	-

11. Legal information

11.1 Data sheet status

Document status[1][2]	Product status[3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

[3] 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.

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13. Contents

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