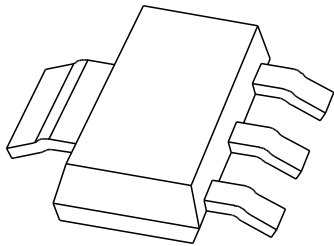


DATA SHEET



PZTM1102 PNP transistor/Schottky-diode module

Product specification
File under Discrete Semiconductors, SC01

1996 May 09

PNP transistor/Schottky-diode module

PZTM1102

FEATURES

- Low output capacitance
- Fast switching time
- Integrated Schottky protection diode.

APPLICATIONS

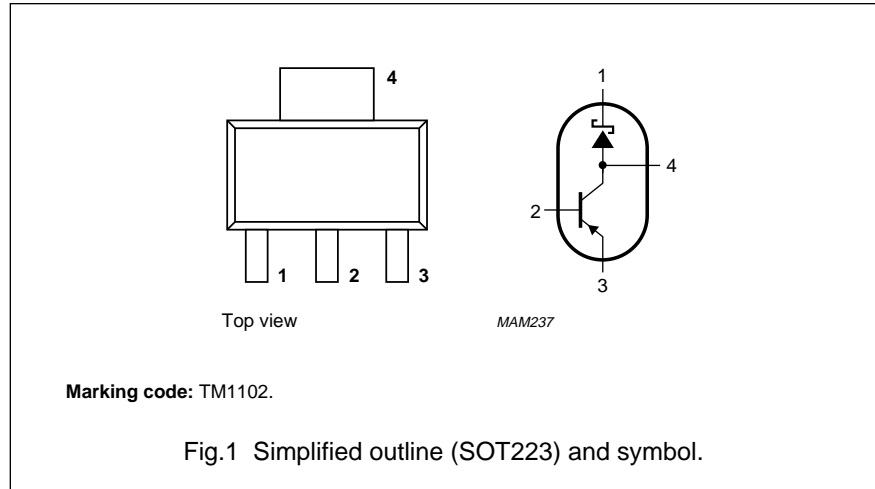
- High-speed switching for industrial applications.

PINNING

PIN	DESCRIPTION
1	cathode Schottky
2	base
3	emitter
4	collector, anode Schottky

DESCRIPTION

Combination of a PNP transistor and a Schottky barrier diode in a plastic SOT223 package. NPN complement: PZTM1101.



LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
PNP transistor					
V_{CBO}	collector-base voltage	open emitter	–	–40	V
V_{CES}	collector-emitter voltage	$V_{BE} = 0$	–	–40	V
V_{EBO}	emitter-base voltage	open collector	–	–6	V
I_C	collector current (DC)		–	–200	mA
Schottky barrier diode					
V_R	continuous reverse voltage		–	40	V
I_F	forward current (DC)		–	1	A
$I_{F(AV)}$	average forward current		–	1	A
P	power dissipation	up to $T_{amb} = 25\text{ °C}$; note 1	–	0.5	W
T_j	junction temperature	reverse current applied	–	125	°C
		forward current applied	–	150	°C
Combined device					
P_{tot}	total power dissipation	up to $T_{amb} = 25\text{ °C}$; note 2	–	1.2	W
T_{amb}	operating ambient temperature		–55	+150	°C
T_{stg}	storage temperature		–55	+150	°C
T_j	junction temperature		–	150	°C

Notes

1. An additional copper area of $>20\text{ mm}^2$ is required for pin 1, if power dissipation in the Schottky die is $>0.5\text{ W}$.
2. It is not allowed to dissipate the total power of 1.2 W in the Schottky die only.

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ELECTRICAL CHARACTERISTICS $T_{amb} = 25\text{ °C}$ unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
NPN transistor					
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; $I_C = -10\text{ }\mu\text{A}$; $I_E = 0$; $T_{amb} = -55\text{ to }+150\text{ °C}$; note 1	-40	-	V
$V_{(BR)CES}$	collector-emitter breakdown voltage	open base; $I_C = -1\text{ mA}$; $V_{BE} = 0$; $T_{amb} = -55\text{ to }+150\text{ °C}$; note 1	-40	-	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; $I_E = -10\text{ }\mu\text{A}$; $I_C = 0$; $T_{amb} = -55\text{ to }+150\text{ °C}$; note 1	-6	-	V
I_{CES}	collector-emitter cut-off current	$V_{CE} = -20\text{ V}$; $V_{BE} = 0$	-	100	nA
		$V_{CE} = -20\text{ V}$; $V_{BE} = 0$; $T_{amb} = -55\text{ to }+150\text{ °C}$	-	50	μA
I_{EBO}	emitter-base cut-off current	$V_{EB} = -6\text{ V}$; $I_C = 0$	-	50	nA
		$V_{EB} = -6\text{ V}$; $I_C = 0$; $T_{amb} = -55\text{ to }+150\text{ °C}$	-	10	μA
V_{CEsat}	collector-emitter saturation voltage	note 1	-	-	-
		$I_C = -10\text{ mA}$; $I_B = -1\text{ mA}$ $I_C = -50\text{ mA}$; $I_B = -3.2\text{ mA}$	-	-200 -300	mV mV
V_{CEsat}	collector-emitter saturation voltage	$T_{amb} = -55\text{ to }+150\text{ °C}$; note 1	-	-	-
		$I_C = -10\text{ mA}$; $I_B = -1\text{ mA}$ $I_C = -50\text{ mA}$; $I_B = -3.2\text{ mA}$	-	-250 -350	mV mV
V_{BEsat}	base-emitter saturation voltage	note 1	-	-	-
		$I_C = -10\text{ mA}$; $I_B = -1\text{ mA}$ $I_C = -50\text{ mA}$; $I_B = -5\text{ mA}$	-	-850 -950	mV mV
V_{BEsat}	base-emitter saturation voltage	$T_{amb} = -55\text{ to }+150\text{ °C}$; note 1	-	-	-
		$I_C = -10\text{ mA}$; $I_B = -1\text{ mA}$ $I_C = -50\text{ mA}$; $I_B = -5\text{ mA}$	-	-1.0 -1.1	V V
C_{ob}	output capacitance	$I_E = i_e = 0$; $V_{CB} = -5\text{ V}$; $f = 1\text{ MHz}$	-	4.5	pF
C_{ib}	input capacitance	$I_C = i_c = 0$; $V_{EB} = -0.5\text{ V}$; $f = 1\text{ MHz}$	-	10	pF
f_T	transition frequency	$I_C = -10\text{ mA}$; $V_{CE} = -20\text{ V}$; $f = 100\text{ MHz}$	250	-	MHz
h_{FE}	DC current gain	$V_{CE} = -1\text{ V}$; note 1	-	-	-
		$I_C = -0.1\text{ mA}$	40	-	-
		$I_C = -1\text{ mA}$	70	-	-
		$I_C = -10\text{ mA}$	100	300	-
h_{FE}	DC current gain	$V_{CE} = -1\text{ V}$; $T_{amb} = -55\text{ to }+150\text{ °C}$; note 1	-	-	-
		$I_C = -10\text{ mA}$	60	500	-
		$I_C = -100\text{ mA}$	15	-	-
SWITCHING TIMES (see Figs 2 and 3)					
t_d	delay time	$V_{CC} = 5\text{ V}$	3	7	ns
t_r	rise time	$I_C = 50\text{ mA}$	13	23	ns
t_s	storage time	$V_i = 0\text{ to }5\text{ V}$	200	380	ns
t_f	fall time		50	80	ns

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SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
Schottky barrier diode					
V _F	forward voltage	I _F = 100 mA; note 1	–	330	mV
		I _F = 100 mA; T _{amb} = –55 to +150 °C; note 1	–	400	mV
		I _F = 1 A; note 1	–	500	mV
		I _F = 1 A; T _{amb} = –55 to +150 °C; note 1	–	560	mV
I _R	reverse current	V _R = 40 V; note 1	–	300	μA
		V _R = 40 V; T _j = 125 °C; T _{amb} = –55 to +150 °C; note 1	–	35 ⁽²⁾	mA
I _R	reverse current	V _R = 10 V; note 1	–	40	μA
		V _R = 10 V; T _j = 125 °C; T _{amb} = –55 to +150 °C; note 1	–	15 ⁽²⁾	mA
C _j	junction capacitance	V _R = 0 V; f = 1 MHz	–	250	pF

Notes

1. Measured under pulsed conditions: t_p ≤ 300 μs; δ ≤ 0.01.
2. Limiting value for T_j = 125 °C; T_j = 150 °C with reverse current applied is not allowed as this may cause thermal runaway leading to thermal destruction of the diode. A peak junction temperature of T_j = 150 °C is only allowed with forward voltage applied.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
R _{th j-a}	thermal resistance from junction to ambient (for the transistor)	note 1	100	K/W
R _{th j-a}	thermal resistance from junction to ambient (for the Schottky diode)	note 1	250	K/W

Note

1. Refer to SOT223 standard mounting conditions.

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GRAPHICAL DATA

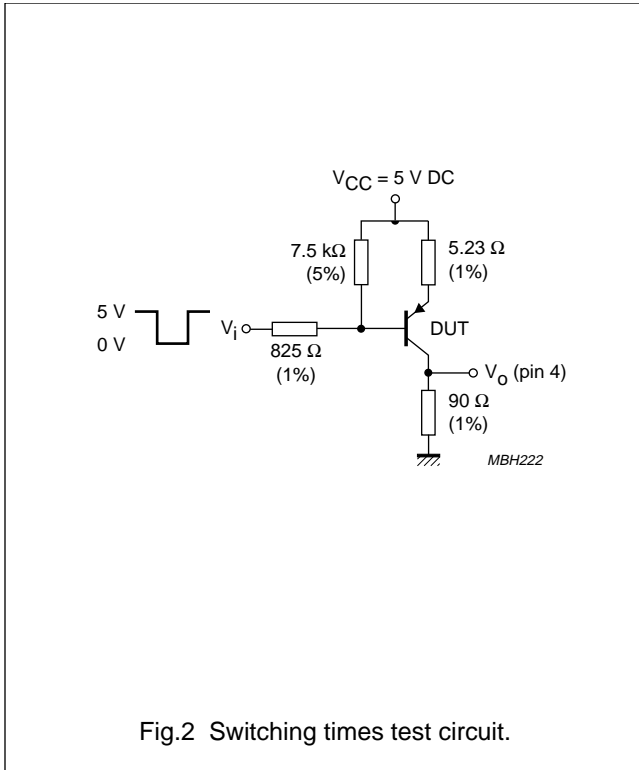


Fig.2 Switching times test circuit.

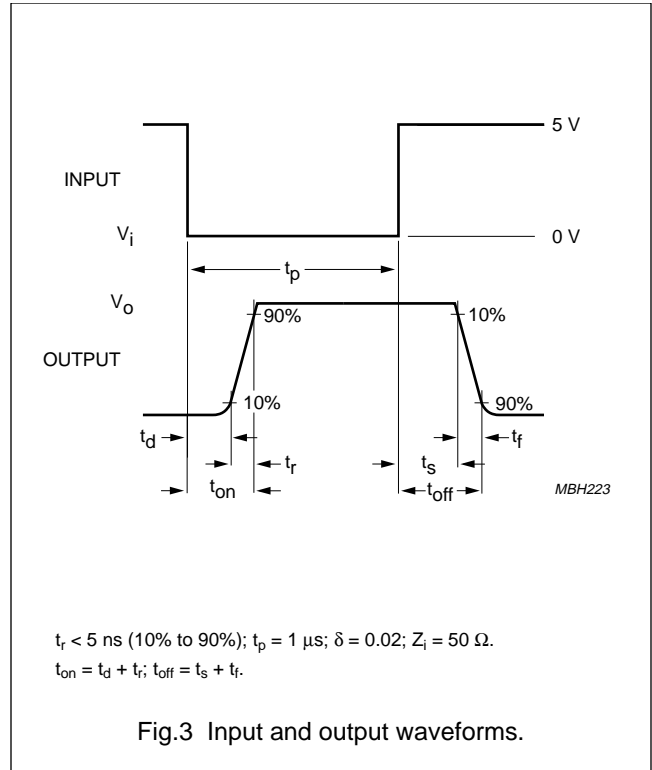
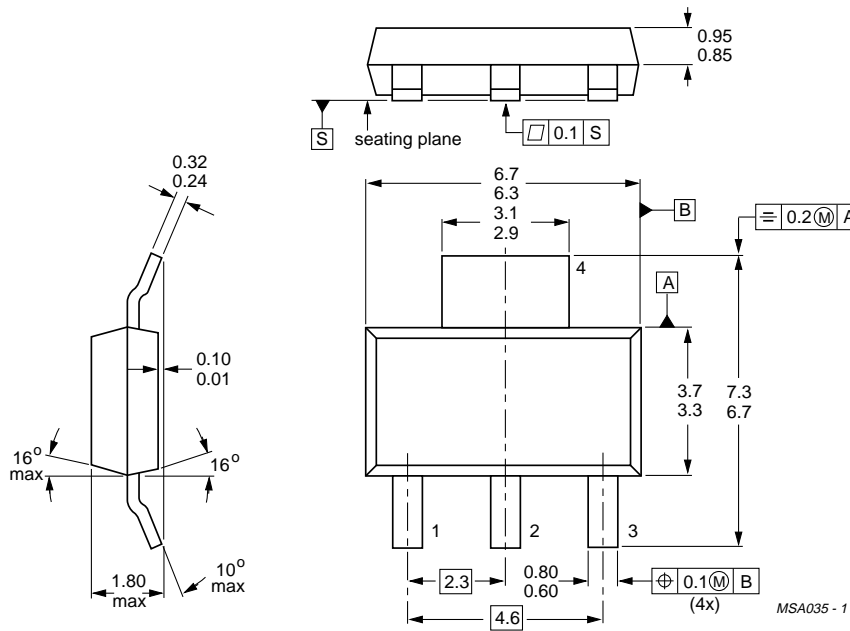


Fig.3 Input and output waveforms.

PNP transistor/Schottky-diode module

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PACKAGE OUTLINE



Dimensions in mm.

Fig.4 SOT223.

PNP transistor/Schottky-diode module

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DEFINITIONS

Data sheet status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

LIFE SUPPORT APPLICATIONS

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