

# PDTB123ET

PNP 500 mA, 50 V resistor-equipped transistor;  
R1 = 2.2 kΩ, R2 = 2.2 kΩ

Rev. 3 — 22 September 2010

Product data sheet

## 1. Product profile

### 1.1 General description

500 mA PNP Resistor-Equipped Transistor (RET) in a small SOT23 (TO-236AB) Surface-Mounted Device (SMD) plastic package.

NPN complement: PDTD123ET.

### 1.2 Features and benefits

- 500 mA output current capability
- Built-in bias resistors
- Simplifies circuit design
- Reduces component count
- Reduces pick and place costs
- ±10 % resistor ratio tolerance
- AEC-Q101 qualified

### 1.3 Applications

- Digital application in automotive and industrial segments
- Control of IC inputs
- Cost-saving alternative for BC807 series in digital applications
- Switching loads

### 1.4 Quick reference data

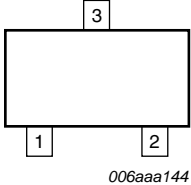
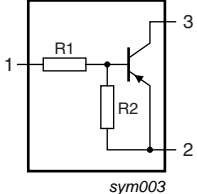
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V <sub>CEO</sub>	collector-emitter voltage	open base	-	-	-50	V
I <sub>O</sub>	output current		-	-	-500	mA
R1	bias resistor 1 (input)		1.54	2.2	2.86	kΩ
R2/R1	bias resistor ratio		0.9	1.0	1.1	



## 2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	input (base)	 <p>006aaa144</p>	 <p>sym003</p>
2	GND (emitter)		
3	output (collector)		

## 3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PDTB123ET	-	plastic surface-mounted package; 3 leads	SOT23

## 4. Marking

Table 4. Marking codes

Type number	Marking code <sup>[1]</sup>
PDTB123ET	*7S

- [1] \* = -: made in Hong Kong  
 \* = 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
$V_{CBO}$	collector-base voltage	open emitter	-	-50	V
$V_{CEO}$	collector-emitter voltage	open base	-	-50	V
$V_{EBO}$	emitter-base voltage	open collector	-	-10	V
$V_I$	input voltage				
	positive		-	+10	V
	negative		-	-12	V
$I_O$	output current		-	-500	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	$T_{amb} \leq 25\text{ °C}$	[1] -	250	mW
$T_j$	junction temperature		-	150	°C
$T_{amb}$	ambient temperature		-65	+150	°C
$T_{stg}$	storage temperature		-65	+150	°C

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

## 6. Thermal characteristics

**Table 6. Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1] -	-	500	K/W

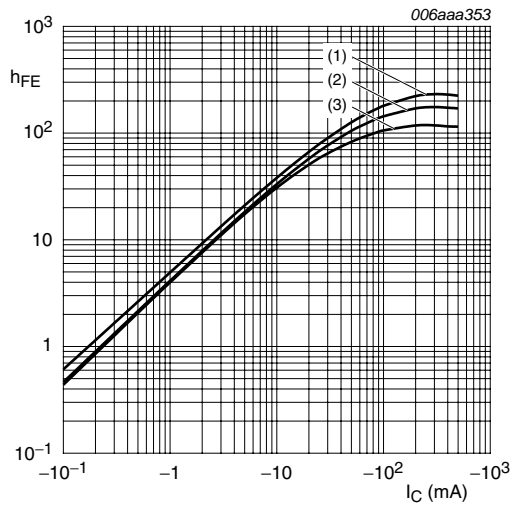
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

## 7. Characteristics

**Table 7. Characteristics**

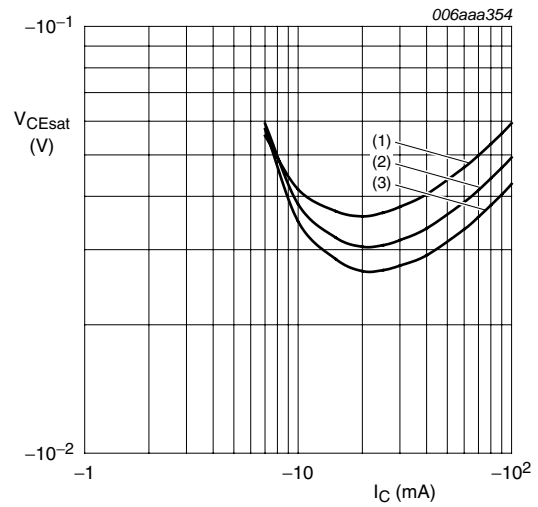
$T_{amb} = 25\text{ °C}$  unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{CBO}$	collector-base cut-off current	$V_{CB} = -40\text{ V}; I_E = 0\text{ A}$	-	-	-100	nA
		$V_{CB} = -50\text{ V}; I_E = 0\text{ A}$	-	-	-100	nA
$I_{CEO}$	collector-emitter cut-off current	$V_{CE} = -50\text{ V}; I_B = 0\text{ A}$	-	-	-0.5	μA
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = -5\text{ V}; I_C = 0\text{ A}$	-	-	-2.0	mA
$h_{FE}$	DC current gain	$V_{CE} = -5\text{ V}; I_C = -50\text{ mA}$	40	-	-	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = -50\text{ mA}; I_B = -2.5\text{ mA}$	-	-	-0.3	V
$V_{I(off)}$	off-state input voltage	$V_{CE} = -5\text{ V}; I_C = -100\text{ μA}$	-0.6	-1.1	-1.8	V
$V_{I(on)}$	on-state input voltage	$V_{CE} = -0.3\text{ V}; I_C = -20\text{ mA}$	-1.0	-1.5	-2.0	V
R1	bias resistor 1 (input)		1.54	2.2	2.86	kΩ
R2/R1	bias resistor ratio		0.9	1.0	1.1	
$C_c$	collector capacitance	$V_{CB} = -10\text{ V}; I_E = i_e = 0\text{ A}; f = 100\text{ MHz}$	-	11	-	pF



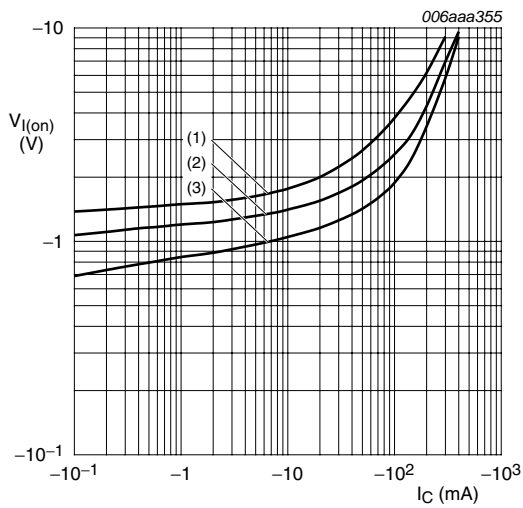
$V_{CE} = -5\text{ V}$   
 (1)  $T_{amb} = 100\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -40\text{ °C}$

**Fig 1. DC current gain as a function of collector current; typical values**



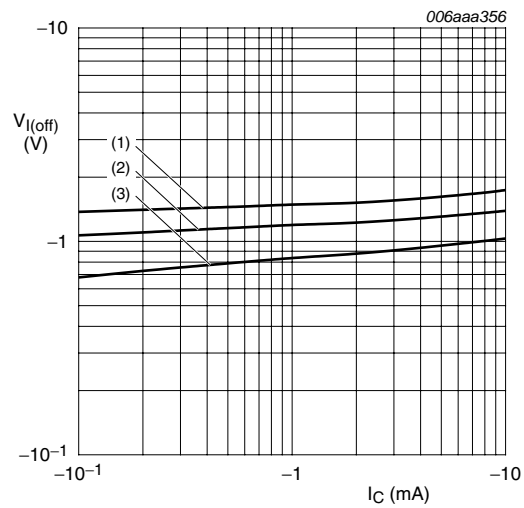
$I_C/I_B = 20$   
 (1)  $T_{amb} = 100\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -40\text{ °C}$

**Fig 2. Collector-emitter saturation voltage as a function of collector current; typical values**



$V_{CE} = -0.3\text{ V}$   
 (1)  $T_{amb} = -40\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 100\text{ °C}$

**Fig 3. On-state input voltage as a function of collector current; typical values**



$V_{CE} = -5\text{ V}$   
 (1)  $T_{amb} = -40\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 100\text{ °C}$

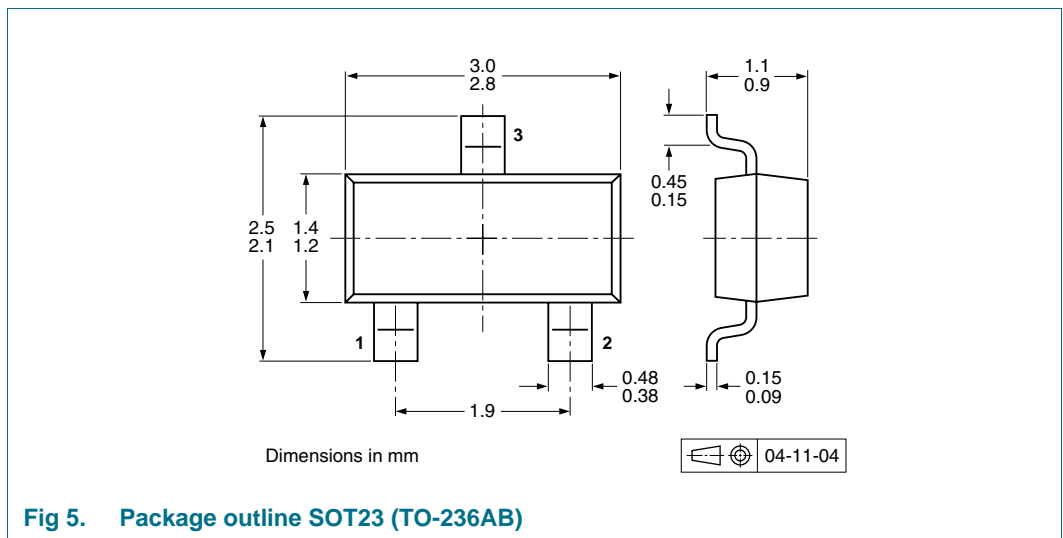
**Fig 4. Off-state input voltage as a function of collector current; typical values**

## 8. Test information

### 8.1 Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - *Stress test qualification for discrete semiconductors*, and is suitable for use in automotive applications.

## 9. Package outline



## 10. Packing information

**Table 8. Packing methods**

The indicated -xxx are the last three digits of the 12NC ordering code.<sup>[1]</sup>

Type number	Package	Description	Packing quantity	
			3000	10000
PDTB123ET	SOT23	4 mm pitch, 8 mm tape and reel	-215	-235

[1] For further information and the availability of packing methods, see [Section 14](#).

### 11. Soldering

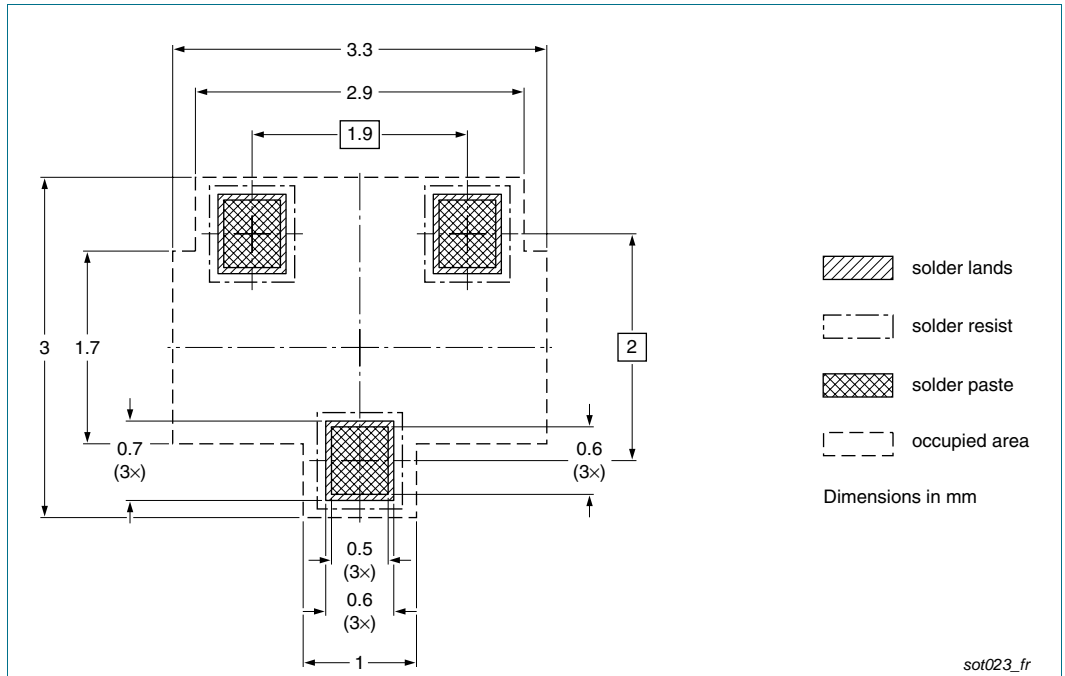


Fig 6. Reflow soldering footprint SOT23 (TO-236AB)

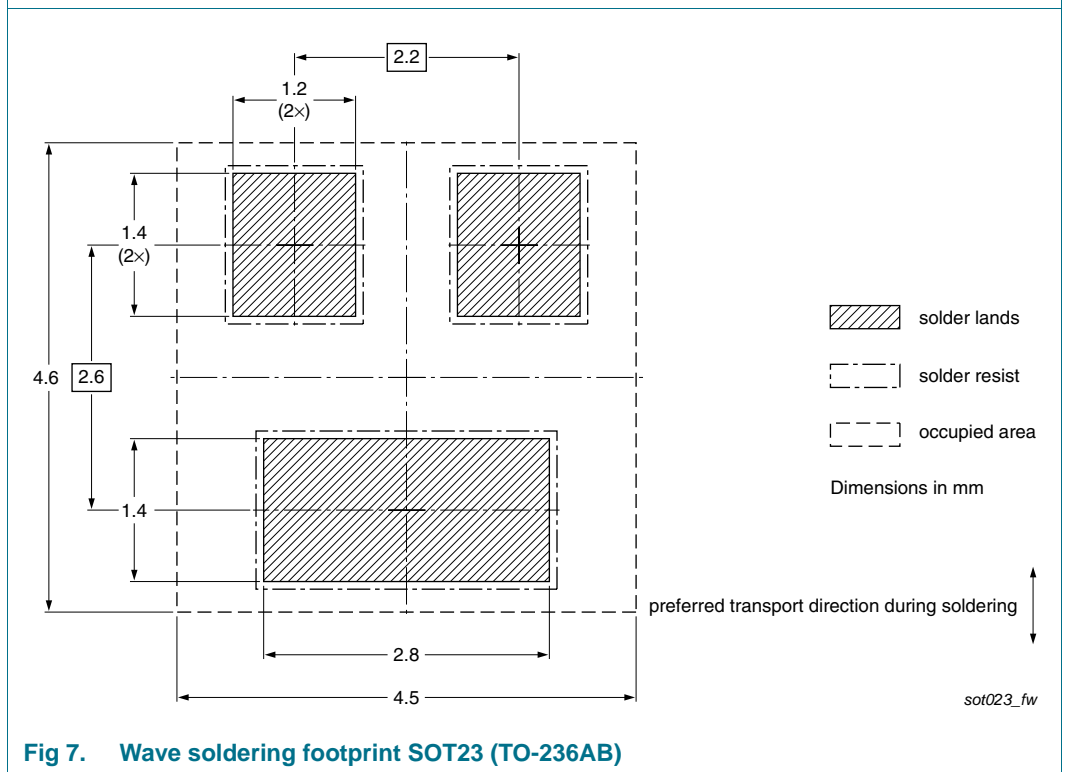


Fig 7. Wave soldering footprint SOT23 (TO-236AB)

## 12. Revision history

**Table 9. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
PDTB123ET v.3	20100922	Product data sheet	-	PDTB123E_SER_2
Modifications:	<ul style="list-style-type: none"> <li>• Type numbers PDTB123EK and PDTB123ES deleted.</li> <li>• <a href="#">Table 7 “Characteristics”</a>: unit for <math>V_{CEsat}</math> changed from mV to V.</li> <li>• <a href="#">Section 8 “Test information”</a>: added.</li> <li>• <a href="#">Section 11 “Soldering”</a>: added.</li> <li>• <a href="#">Section 13 “Legal information”</a>: updated.</li> </ul>			
PDTB123E_SER_2	20091116	Product data sheet	-	PDTB123E_SER_1
PDTB123E_SER_1	20050427	Product data sheet	-	-

## 13. Legal information

### 13.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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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PNP 500 mA resistor-equipped transistor; R1 = 2.2 k $\Omega$ , R2 = 2.2 k $\Omega$

**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.

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