

PDTB123T series

PNP 500 mA, 50 V resistor-equipped transistors;
R1 = 2.2 k Ω , R2 = open

Rev. 03 — 16 November 2009

Product data sheet

1. Product profile

1.1 General description

PNP Resistor-Equipped Transistors (RET) family.

Table 1. Product overview

Type number	Package			NPN complement
	NXP	JEITA	JEDEC	
PDTB123TK	SOT346	SC-59A	TO-236	PDTD123TK
PDTB123TS ^[1]	SOT54	SC-43A	TO-92	PDTD123TS
PDTB123TT	SOT23	-	TO-236AB	PDTD123TT

[1] Also available in SOT54A and SOT54 variant packages (see [Section 2](#)).

1.2 Features

- Built-in bias resistors
- Simplifies circuit design
- 500 mA output current capability
- Reduces component count
- Reduces pick and place costs

1.3 Applications

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

1.4 Quick reference data

Table 2. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V _{CEO}	collector-emitter voltage	open base	-	-	-50	V
I _O	output current (DC)		-	-	-500	mA
R1	bias resistor 1 (input)		1.54	2.2	2.86	k Ω

2. Pinning information

Table 3. Pinning

Pin	Description	Simplified outline	Symbol
SOT54			
1	input (base)		
2	output (collector)		
3	GND (emitter)		
SOT54A			
1	input (base)		
2	output (collector)		
3	GND (emitter)		
SOT54 variant			
1	input (base)		
2	output (collector)		
3	GND (emitter)		
SOT23; SOT346			
1	input (base)		
2	GND (emitter)		
3	output (collector)		

3. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
PDTB123TK	SC-59A	plastic surface mounted package; 3 leads	SOT346
PDTB123TS ^[1]	SC-43A	plastic single-ended leaded (through hole) package; 3 leads	SOT54
PDTB123TT	-	plastic surface mounted package; 3 leads	SOT23

[1] Also available in SOT54A and SOT54 variant packages (see [Section 2](#) and [Section 9](#)).

4. Marking

Table 5. Marking codes

Type number	Marking code ^[1]
PDTB123TK	F1
PDTB123TS	TB123TS
PDTB123TT	*1U

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

5. Limiting values

Table 6. 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	-	-5	V		
V_I	input voltage	positive	-	+5	V		
		negative	-	-12	V		
I_O	output current (DC)		-	-500	mA		
P_{tot}	total power dissipation	$T_{amb} \leq 25\text{ }^\circ\text{C}$	[1]				
				SOT346	-	250	mW
				SOT54	-	500	mW
				SOT23	-	250	mW
T_{stg}	storage temperature		-65	+150	$^\circ\text{C}$		
T_j	junction temperature		-	150	$^\circ\text{C}$		
T_{amb}	ambient temperature		-65	+150	$^\circ\text{C}$		

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

6. Thermal characteristics

Table 7. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]			
	SOT346		-	-	500	K/W
	SOT54		-	-	250	K/W
	SOT23		-	-	500	K/W

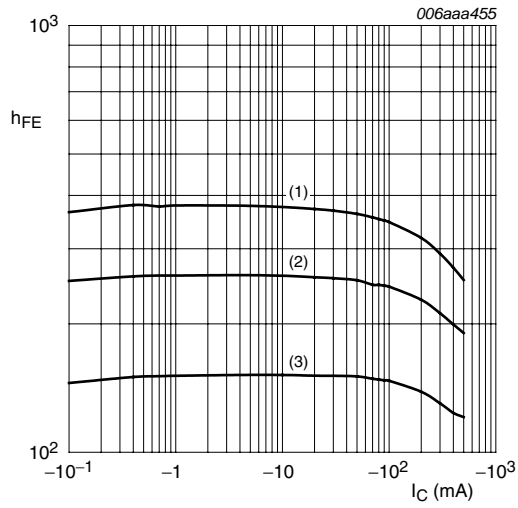
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

7. Characteristics

Table 8. Characteristics

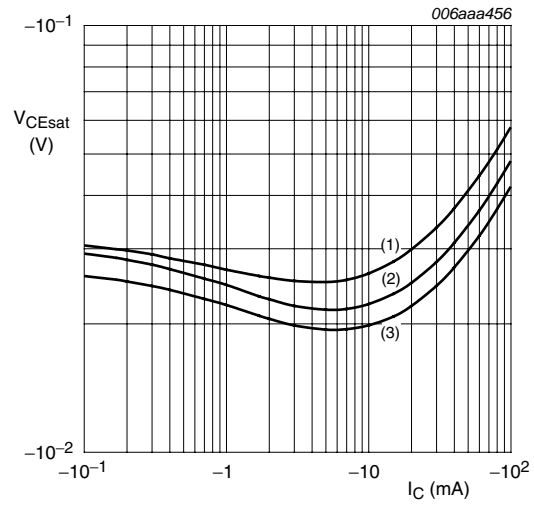
$T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified.

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	$V_{EB} = -5\text{ V}; I_C = 0\text{ A}$	-	-	-100	nA
h_{FE}	DC current gain	$V_{CE} = -5\text{ V}; I_C = -50\text{ mA}$	100	250	-	
V_{CEsat}	collector-emitter saturation voltage	$I_C = -50\text{ mA}; I_B = -2.5\text{ mA}$	-	-	-0.3	mV
R1	bias resistor 1 (input)		1.54	2.2	2.86	k Ω
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) $T_{amb} = -40\text{ °C}$

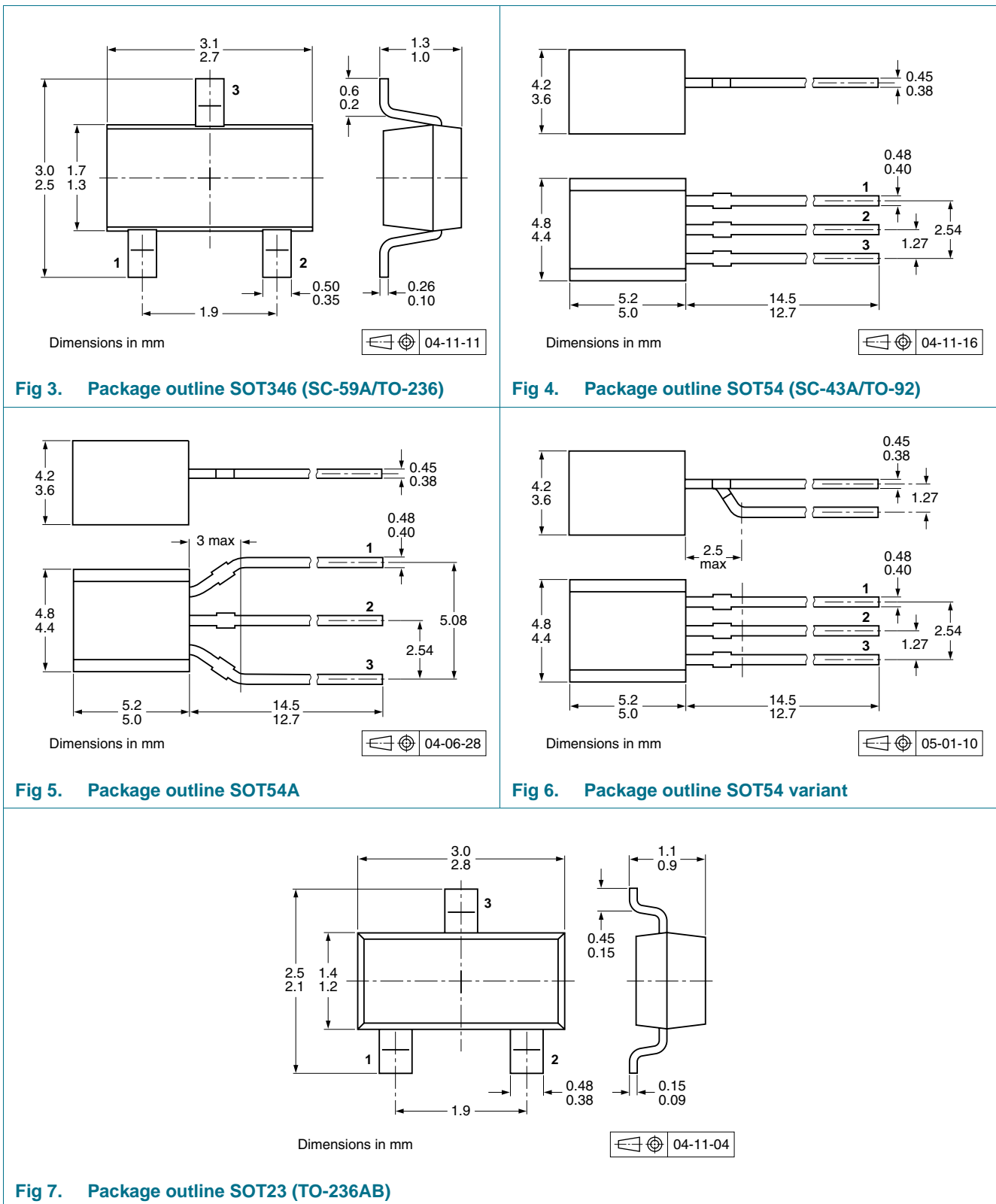
Fig 1. DC current gain as a function of collector current; typical values



$I_C/I_B = 20$
 (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

8. Package outline



9. Packing information

Table 9. Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code.^[1]

Type number	Package	Description	Packing quantity		
			3000	5000	10000
PDTB123TK	SOT346	4 mm pitch, 8 mm tape and reel	-115	-	-135
PDTB123TS	SOT54	bulk, straight leads	-	-412	-
	SOT54A	tape and reel, wide pitch	-	-	-116
		tape ammopack, wide pitch	-	-	-126
	SOT54 variant	bulk, delta pinning	-	-112	-
PDTB123TT	SOT23	4 mm pitch, 8 mm tape and reel	-215	-	-235

[1] For further information and the availability of packing methods, see [Section 12](#).

10. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PDTB123T_SER_3	20091116	Product data sheet	-	PDTB123T_SER_2
Modifications:	<ul style="list-style-type: none">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.			
PDTB123T_SER_2	20050804	Product data sheet	-	PDTB123TK_1
PDTB123TK_1	20050519	Product data sheet	-	-

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

1	Product profile	1
1.1	General description	1
1.2	Features	1
1.3	Applications	1
1.4	Quick reference data	1
2	Pinning information	2
3	Ordering information	3
4	Marking	3
5	Limiting values	3
6	Thermal characteristics	4
7	Characteristics	4
8	Package outline	6
9	Packing information	7
10	Revision history	8
11	Legal information	9
11.1	Data sheet status	9
11.2	Definitions	9
11.3	Disclaimers	9
11.4	Trademarks	9
12	Contact information	9
13	Contents	10

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