



PDTB123YT-Q

PNP 500 mA, 50 V resistor-equipped transistor;
R1 = 2.2 k Ω , R2 = 10 k Ω

25 February 2022

Product data sheet

1. General description

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

NPN complement: PDTD123YT-Q.

2. Features and benefits

- 500 mA output current capability
- Reduces pick and place costs
- Built-in bias resistors
- ± 10 % resistor ratio tolerance
- Simplifies circuit design
- Reduces component count
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

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

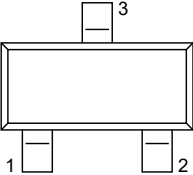
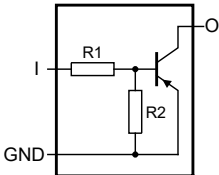
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V _{CEO}	collector-emitter voltage	open base	-	-	-50	V
I _O	output current		-	-	-500	mA
R1	bias resistor 1 (input)	T _{amb} = 25 °C	1.54	2.2	2.86	k Ω
R2/R1	bias resistor ratio		4.1	4.55	5	

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	I	input (base)	 SOT23	 aaa-019606
2	GND	ground (emitter)		
3	O	output (collector)		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PDTB123YT-Q	SOT23	plastic, surface-mounted package; 3 terminals; 1.9 mm pitch; 2.9 mm x 1.3 mm x 1 mm body	SOT23

7. Marking

Table 4. Marking codes

Type number	Marking code[1]
PDTB123YT-Q	%7Y

[1] % = placeholder for manufacturing site code

8. 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		-	-5	V
V _I	input voltage	positive		-	5	V
		negative		-	-20	V
I _O	output current			-	-500	mA
P _{tot}	total power dissipation	T _{amb} ≤ 25 °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.

9. 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 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	$V_{CB} = -40 \text{ V}$; $I_E = 0 \text{ A}$; $T_{amb} = 25 \text{ }^{\circ}\text{C}$		-	-	-100	nA
		$V_{CB} = -50 \text{ V}$; $I_E = 0 \text{ A}$; $T_{amb} = 25 \text{ }^{\circ}\text{C}$		-	-	-100	nA
I_{CEO}	collector-emitter cut-off current	$V_{CE} = -50 \text{ V}$; $I_B = 0 \text{ A}$; $T_{amb} = 25 \text{ }^{\circ}\text{C}$		-	-	-0.5	μA
I_{EBO}	emitter-base cut-off current	$V_{EB} = -5 \text{ V}$; $I_C = 0 \text{ A}$; $T_{amb} = 25 \text{ }^{\circ}\text{C}$		-	-	-0.65	mA
h_{FE}	DC current gain	$V_{CE} = -5 \text{ V}$; $I_C = -50 \text{ mA}$; $T_{amb} = 25 \text{ }^{\circ}\text{C}$		70	-	-	
V_{CEsat}	collector-emitter saturation voltage	$I_C = -50 \text{ mA}$; $I_B = -2.5 \text{ mA}$; $T_{amb} = 25 \text{ }^{\circ}\text{C}$		-	-	-300	mV
$V_{I(off)}$	off-state input voltage	$V_{CE} = -5 \text{ V}$; $I_C = -100 \text{ } \mu\text{A}$; $T_{amb} = 25 \text{ }^{\circ}\text{C}$		-0.4	-0.6	-1	V
$V_{I(on)}$	on-state input voltage	$V_{CE} = -0.3 \text{ V}$; $I_C = -20 \text{ mA}$; $T_{amb} = 25 \text{ }^{\circ}\text{C}$		-0.5	-1	-1.4	V
R1	bias resistor 1 (input)	$T_{amb} = 25 \text{ }^{\circ}\text{C}$		1.54	2.2	2.86	kΩ
R2/R1	bias resistor ratio			4.1	4.55	5	
C_c	collector capacitance	$V_{CB} = -10 \text{ V}$; $I_E = 0 \text{ A}$; $i_e = 0 \text{ A}$; $f = 100 \text{ MHz}$; $T_{amb} = 25 \text{ }^{\circ}\text{C}$		-	11	-	pF

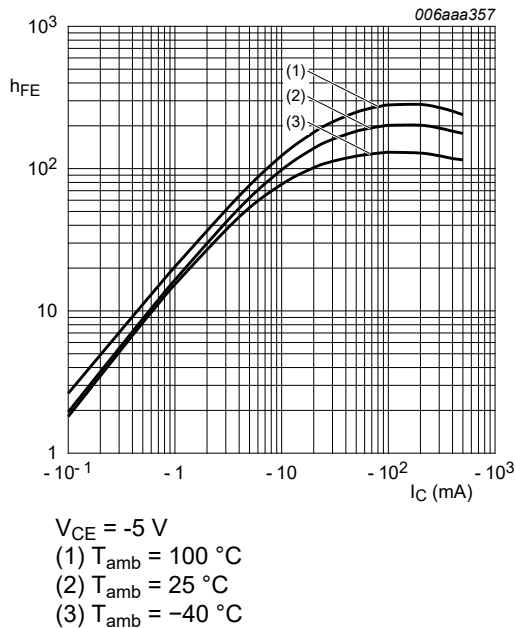


Fig. 1. DC current gain as a function of collector current; typical values

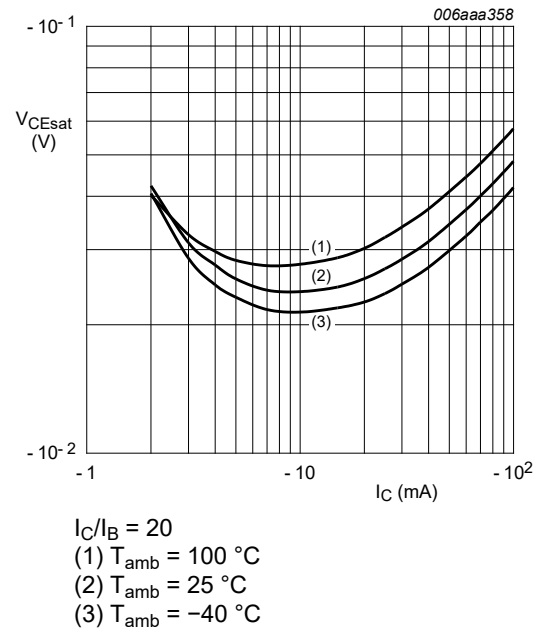


Fig. 2. Collector-emitter saturation voltage as a function of collector current; typical values

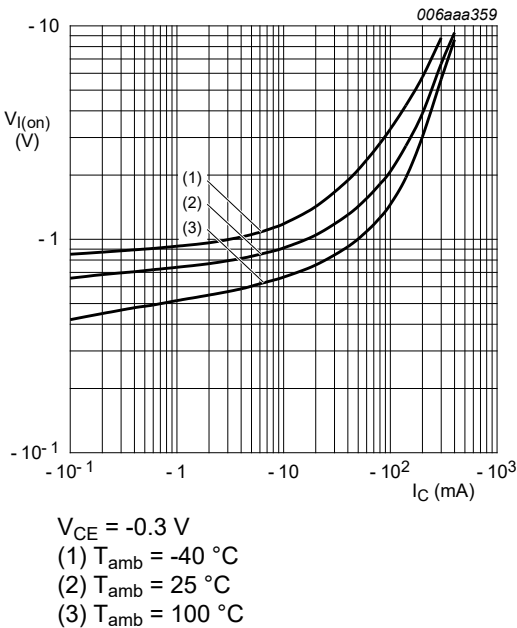


Fig. 3. On-state input voltage as a function of collector current; typical values

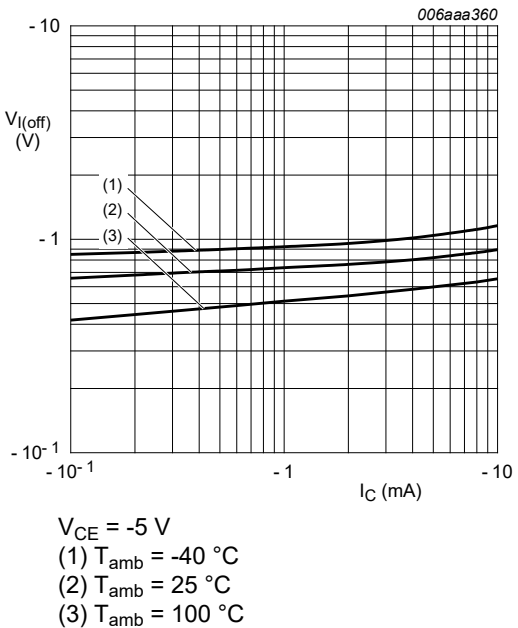


Fig. 4. Off-state input voltage as a function of collector current; typical values

11. Test information

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.

Resistor calculation

- Calculation of bias resistor 1 (R1)

$$R1 = \frac{V(I12) - V(I11)}{I12 - I11}$$

- Calculation of bias resistor ratio (R2/R1)

$$\frac{R2}{R1} = \frac{V(I14) - V(I13)}{R1 \cdot (I14 - I13)} - 1$$

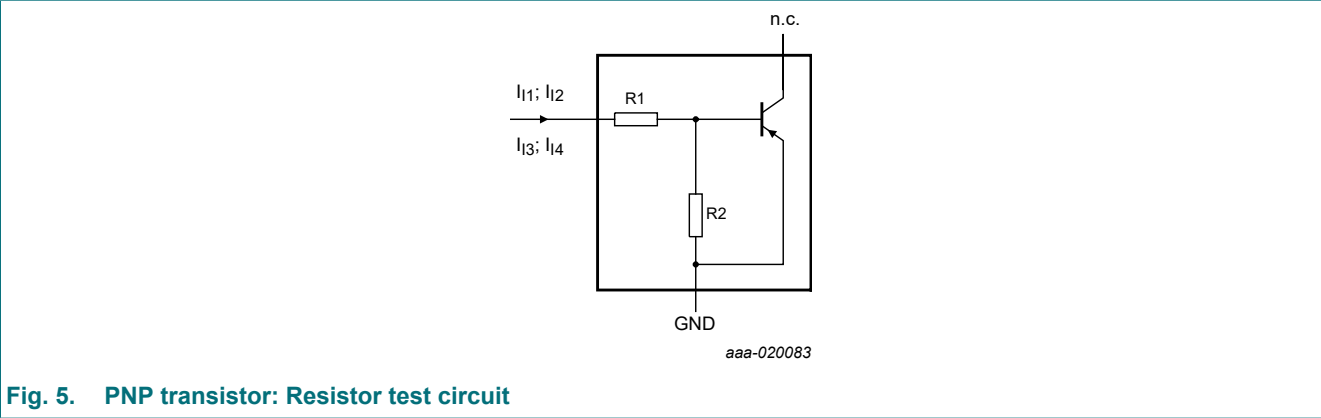


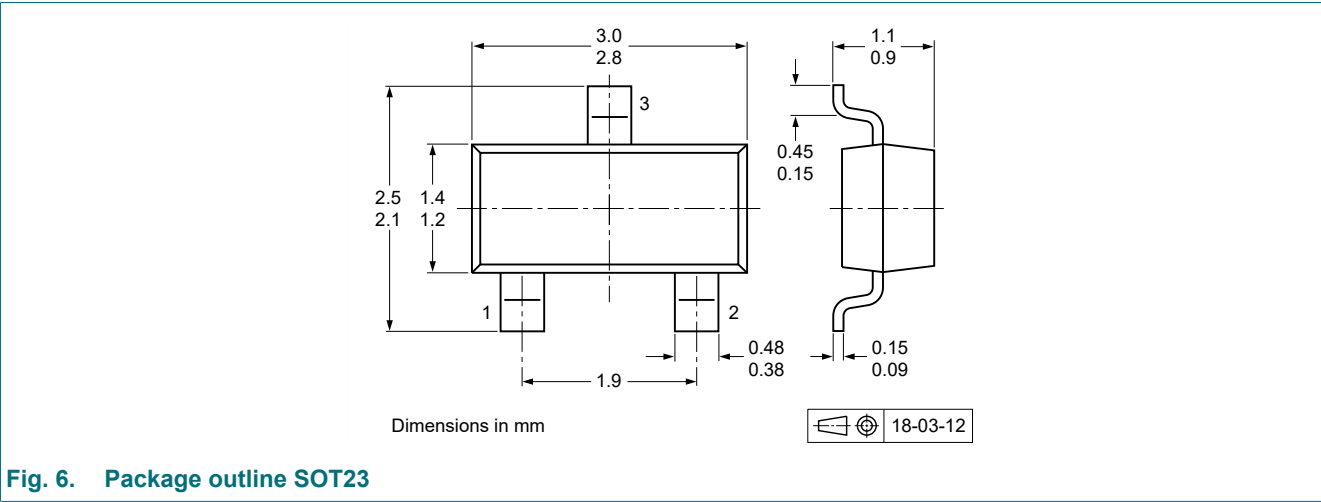
Fig. 5. PNP transistor: Resistor test circuit

Resistor test conditions

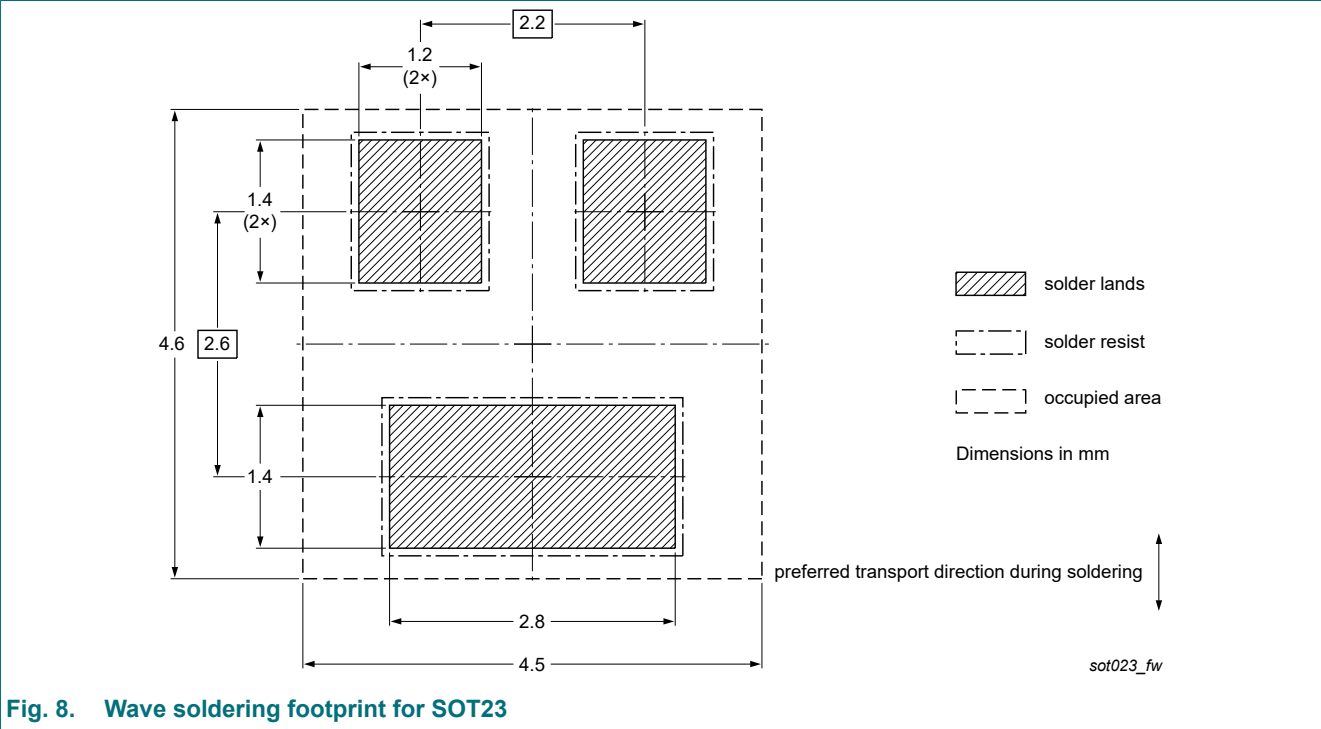
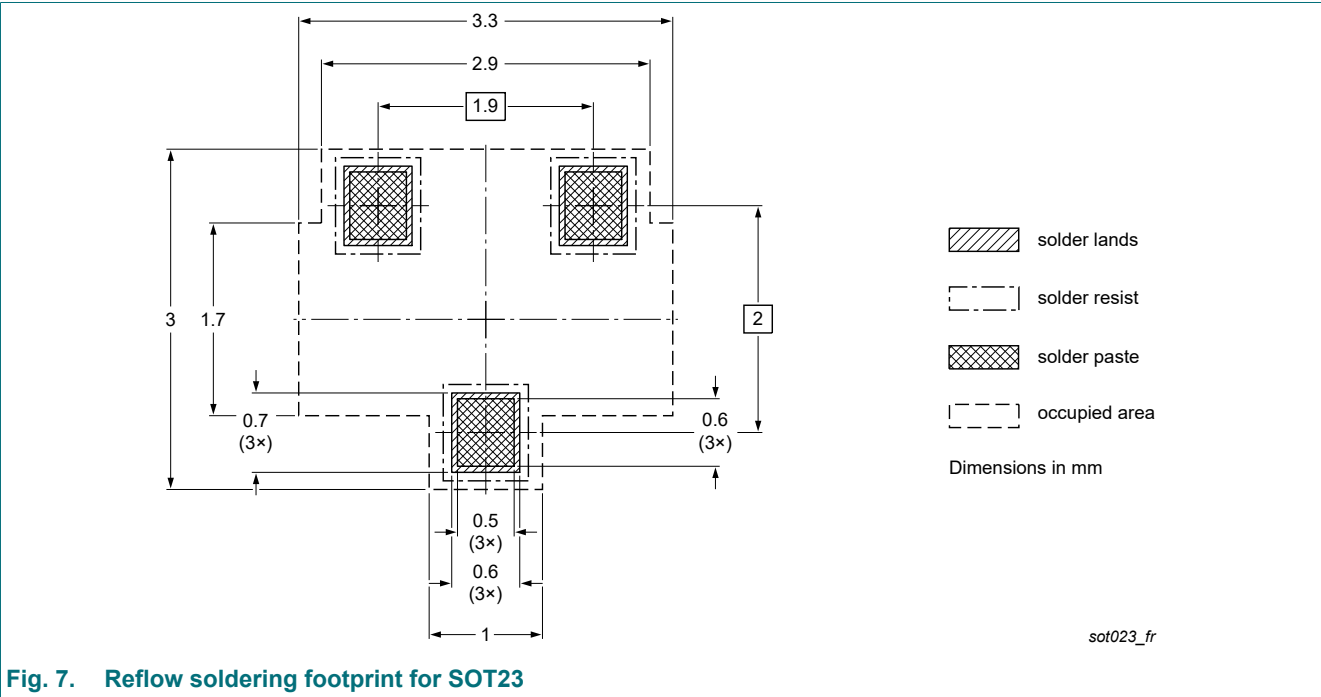
Table 8. Resistor test conditions

Type number	R1 (kΩ)	R2 (kΩ)	Test conditions			
			I11	I12	I13	I14
PDTB123YT-Q	2.2	10	-0.7 mA	-0.8 mA	0.45 mA	0.55 mA

12. Package outline



13. Soldering



14. Revision history

Table 9. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PDTB123YT-Q v.1	20220225	Product data sheet	-	-

15. Legal information

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.

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

1. General description..... 1

2. Features and benefits..... 1

3. Applications..... 1

4. Quick reference data..... 1

5. Pinning information.....2

6. Ordering information.....2

7. Marking.....2

8. Limiting values..... 2

9. Thermal characteristics..... 3

10. Characteristics..... 3

11. Test information..... 5

12. Package outline..... 6

13. Soldering..... 7

14. Revision history.....8

15. Legal information.....9

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