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Kind regards,

Team Nexperia



PDTC124EMB

NPN resistor-equipped transistor; $R1 = 22 \text{ k}\Omega$, $R2 = 22 \text{ k}\Omega$

Rev. 1 — 16 May 2012

Product data sheet

1. Product profile

1.1 General description

NPN Resistor-Equipped Transistor (RET) in a leadless ultra small DFN1006B-3 (SOT883B) Surface-Mounted Device (SMD) plastic package.

PNP complement: PDTA124EMB.

1.2 Features and benefits

- 100 mA output current capability
- Reduces component count
- Built-in bias resistors
- Reduces pick and place costs
- Simplifies circuit design
- AEC-Q101 qualified
- Leadless ultra small SMD plastic package
- Low package height of 0.37 mm

1.3 Applications

- Low-current peripheral driver
- Control of IC inputs
- Replaces general-purpose transistors in digital applications
- Mobile applications

1.4 Quick reference data

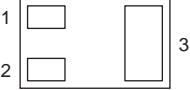
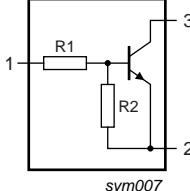
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base	-	-	50	V
I_O	output current		-	-	100	mA
$R1$	bias resistor 1 (input)	$T_{amb} = 25 \text{ }^\circ\text{C}$	15.4	22	28.6	$\text{k}\Omega$
$R2/R1$	bias resistor ratio		0.8	1	1.2	



2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	I	input (base)		
2	G	GND (emitter)		
3	O	output (collector)	 Transparent top view	 SOT883B (DFN1006B-3) sym007

3. Ordering information

Table 3. Ordering information

Type number	Package	Version
Name	Description	
PDTC124EMB	DFN1006B-3	SOT883B
	Leadless ultra small plastic package; 3 solder lands; body 1.0 x 0.6 x 0.37 mm	

4. Marking

Table 4. Marking codes

Type number	Marking code
PDTC124EMB	0011 0111

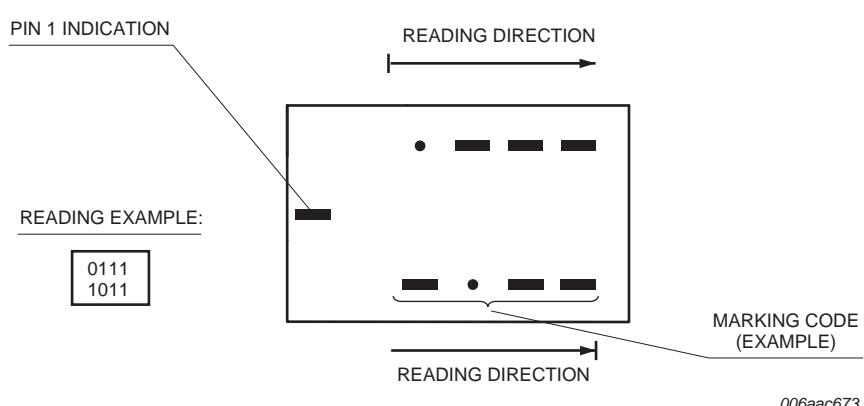


Fig 1. DFN1006B-3 (SOT883B) binary marking code description

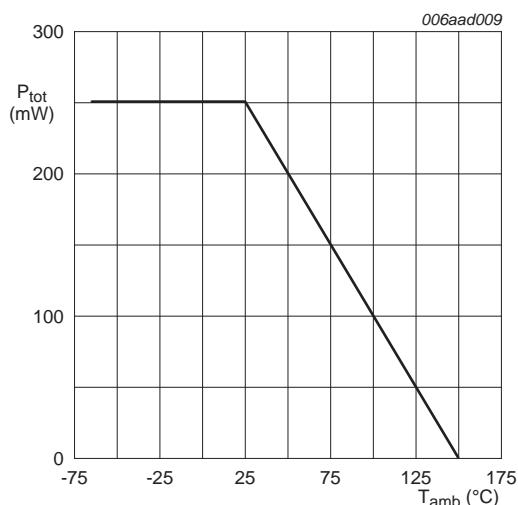
5. Limiting values

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	-	40	V
		negative	-	-10	V
I_o	output current		-	100	mA
I_{CM}	peak collector current	pulsed; $t_p \leq 1 \text{ ms}$	-	100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25 \text{ }^{\circ}\text{C}$	[1]	-	250 mW
T_j	junction temperature			-	150 $^{\circ}\text{C}$
T_{amb}	ambient temperature		-65	150	$^{\circ}\text{C}$
T_{stg}	storage temperature		-65	150	$^{\circ}\text{C}$

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



FR4 PCB, standard footprint

Fig 2. Power derating curve for DFN1006B-3 (SOT883B)

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.

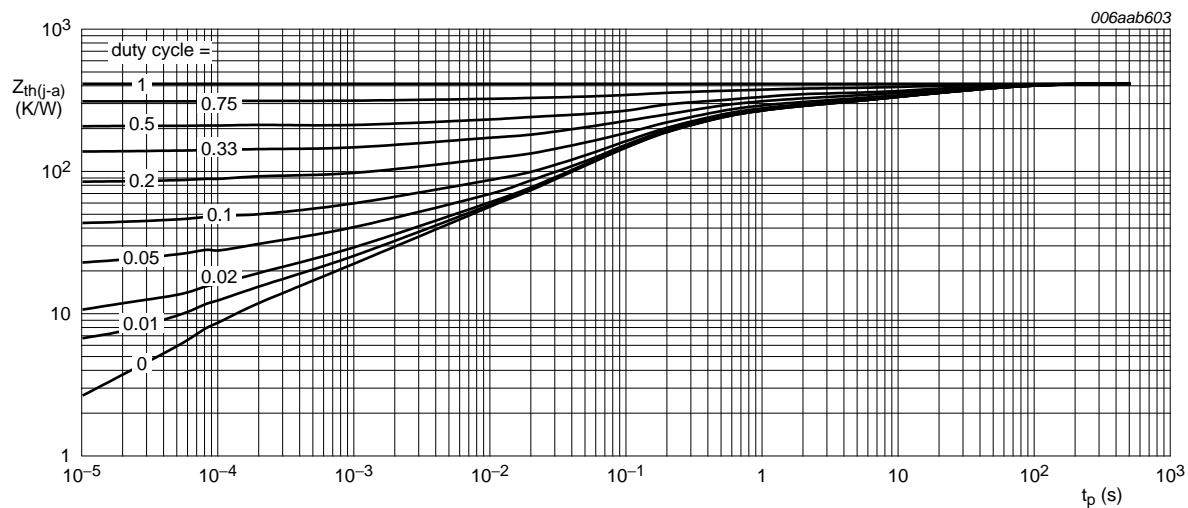


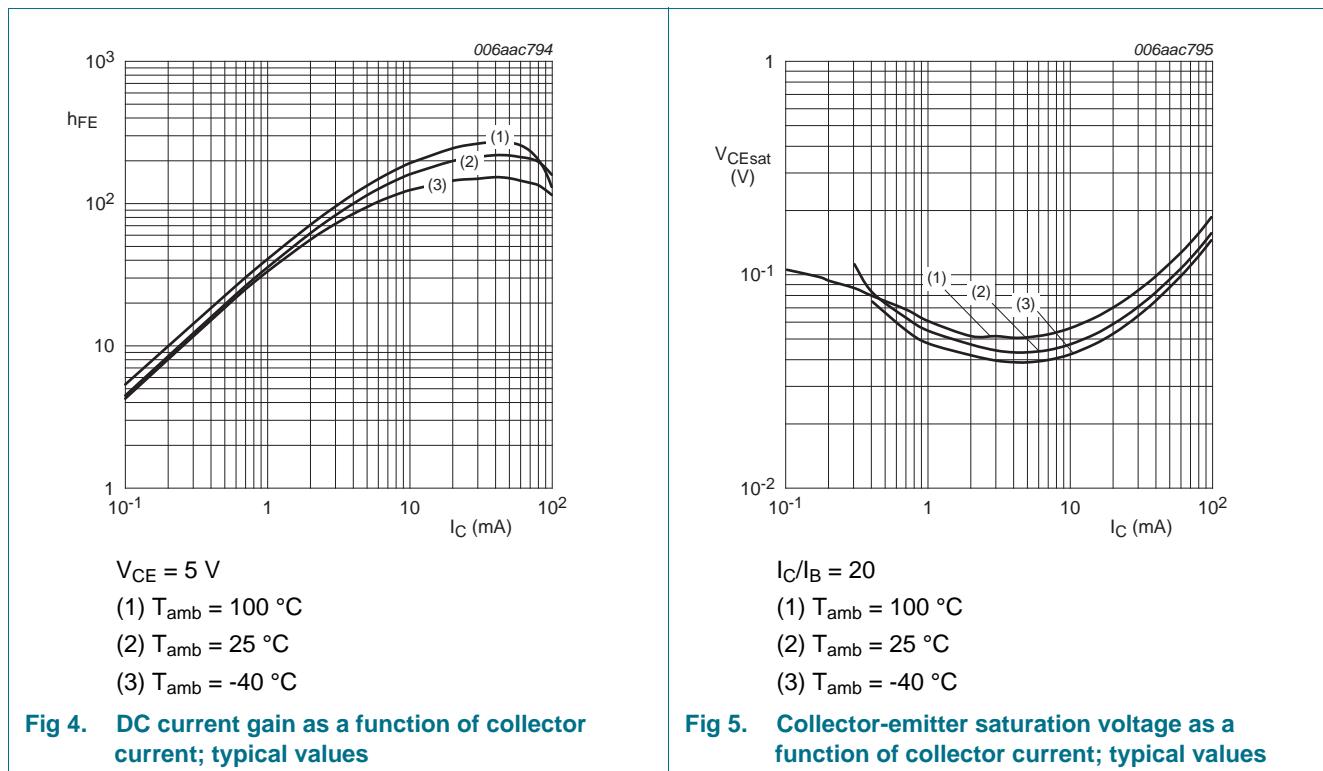
Fig 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

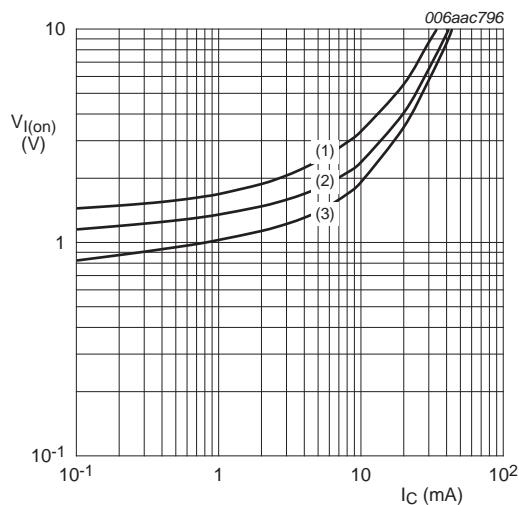
7. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
I_{CBO}	collector-base cut-off current	$V_{CB} = 50 \text{ V}$; $I_E = 0 \text{ A}$; $T_{amb} = 25 \text{ }^\circ\text{C}$	-	-	100	nA	
I_{CEO}	collector-emitter cut-off current	$V_{CE} = 30 \text{ V}$; $I_B = 0 \text{ A}$; $T_{amb} = 25 \text{ }^\circ\text{C}$	-	-	100	nA	
		$V_{CE} = 30 \text{ V}$; $I_B = 0 \text{ A}$; $T_j = 150 \text{ }^\circ\text{C}$	-	-	5	μA	
I_{EBO}	emitter-base cut-off current	$V_{EB} = 5 \text{ V}$; $I_C = 0 \text{ A}$; $T_{amb} = 25 \text{ }^\circ\text{C}$	-	-	180	μA	
h_{FE}	DC current gain	$V_{CE} = 5 \text{ V}$; $I_C = 5 \text{ mA}$; $T_{amb} = 25 \text{ }^\circ\text{C}$	60	-	-		
V_{CEsat}	collector-emitter saturation voltage	$I_C = 10 \text{ mA}$; $I_B = 0.5 \text{ mA}$; $T_{amb} = 25 \text{ }^\circ\text{C}$	-	-	150	mV	
$V_{I(off)}$	off-state input voltage	$V_{CE} = 5 \text{ V}$; $I_C = 100 \mu\text{A}$; $T_{amb} = 25 \text{ }^\circ\text{C}$	-	1.1	0.8	V	
$V_{I(on)}$	on-state input voltage	$V_{CE} = 0.3 \text{ V}$; $I_C = 5 \text{ mA}$; $T_{amb} = 25 \text{ }^\circ\text{C}$	2.5	1.7	-	V	
$R1$	bias resistor 1 (input)	$T_{amb} = 25 \text{ }^\circ\text{C}$	15.4	22	28.6	$\text{k}\Omega$	
$R2/R1$	bias resistor ratio		0.8	1	1.2		
C_C	collector capacitance	$V_{CB} = 10 \text{ V}$; $I_E = 0 \text{ A}$; $i_e = 0 \text{ A}$; $f = 1 \text{ MHz}$; $T_{amb} = 25 \text{ }^\circ\text{C}$	-	-	2.5	pF	
f_T	transition frequency	$V_{CE} = 5 \text{ V}$; $I_C = 10 \text{ mA}$; $f = 100 \text{ MHz}$; $T_{amb} = 25 \text{ }^\circ\text{C}$	[1]	-	230	-	MHz

[1] Characteristics of built-in transistor.





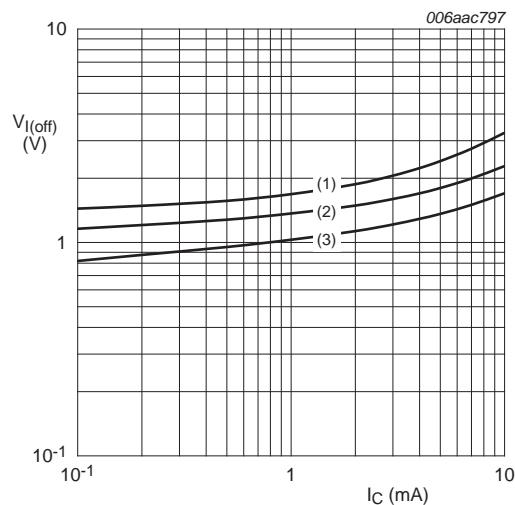
$V_{CE} = 0.3 \text{ V}$

(1) $T_{amb} = -40 \text{ }^{\circ}\text{C}$

(2) $T_{amb} = 25 \text{ }^{\circ}\text{C}$

(3) $T_{amb} = 100 \text{ }^{\circ}\text{C}$

Fig 6. On-state input voltage as a function of collector current; typical values



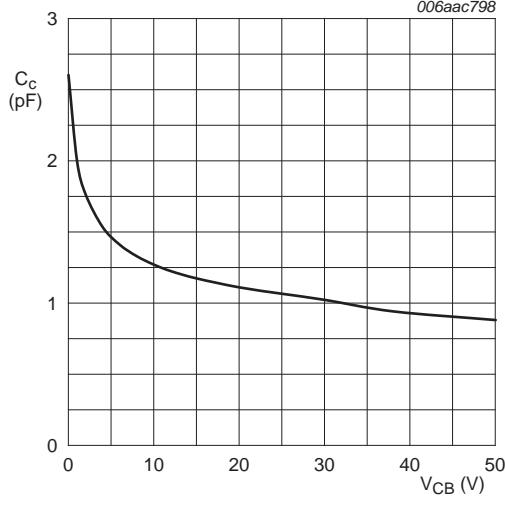
$V_{CE} = 5 \text{ V}$

(1) $T_{amb} = -40 \text{ }^{\circ}\text{C}$

(2) $T_{amb} = 25 \text{ }^{\circ}\text{C}$

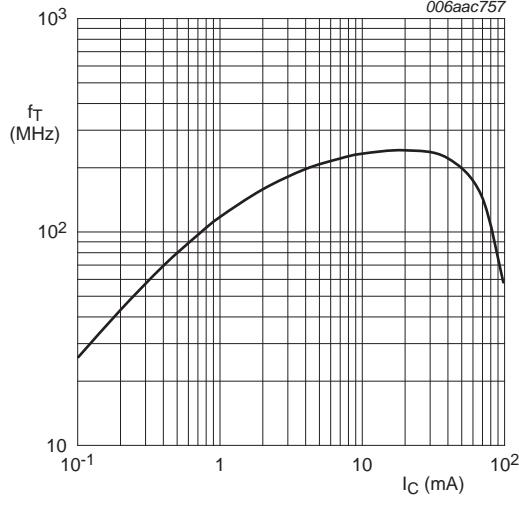
(3) $T_{amb} = 100 \text{ }^{\circ}\text{C}$

Fig 7. Off-state input voltage as a function of collector current; typical values



$f = 1 \text{ MHz}; T_{amb} = 25 \text{ }^{\circ}\text{C}$

Fig 8. Collector capacitance as a function of collector-base voltage; typical values



$V_{CE} = 5 \text{ V}; T_{amb} = 25 \text{ }^{\circ}\text{C}$

Fig 9. Transition frequency as a function of collector current; typical values of built-in transistor

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

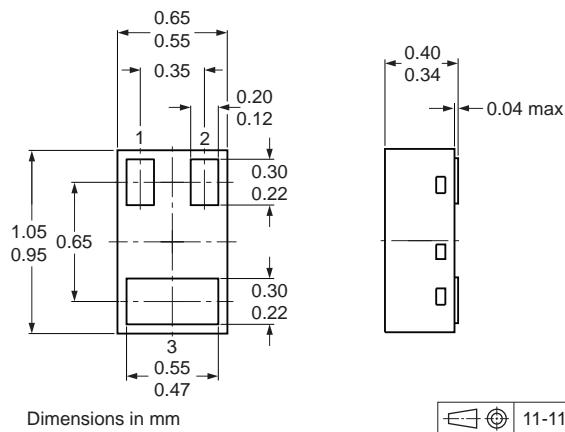


Fig 10. Package outline SOT883B (DFN1006B-3)

10. Soldering

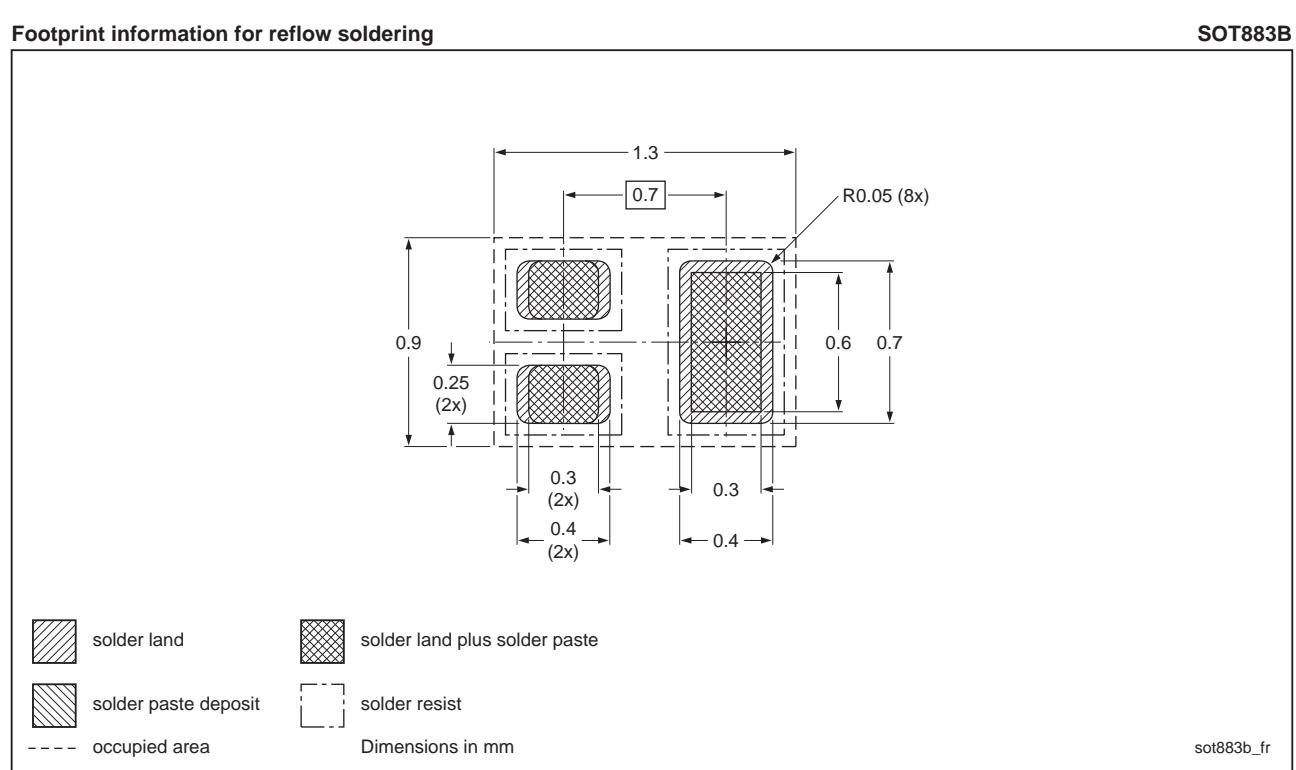


Fig 11. Reflow soldering footprint for SOT883B (DFN1006B-3)

11. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PDTC124EMB v.1	20120516	Product data sheet	-	-

12. Legal information

12.1 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".

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