



# PdTc115EMB

NPN resistor-equipped transistor; R1 = 100 k $\Omega$ , R2 = 100 k $\Omega$

Rev. 1 — 1 June 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: PDTA115EMB.

### 1.2 Features and benefits

- 20 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

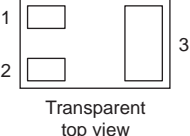
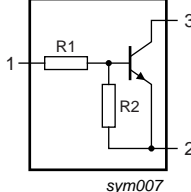
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V <sub>CEO</sub>	collector-emitter voltage	open base	-	-	50	V
I <sub>O</sub>	output current		-	-	20	mA
R1	bias resistor 1 (input)	T <sub>amb</sub> = 25 °C	70	100	130	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)	 <p>SOT883B (DFN1006B-3)</p>	
2	G	GND (emitter)		
3	O	output (collector)		

## 3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PDTC115EMB	DFN1006B-3	Leadless ultra small plastic package; 3 solder lands; body 1.0 x 0.6 x 0.37 mm	SOT883B

## 4. Marking

Table 4. Marking codes

Type number	Marking code
PDTC115EMB	0011 0001

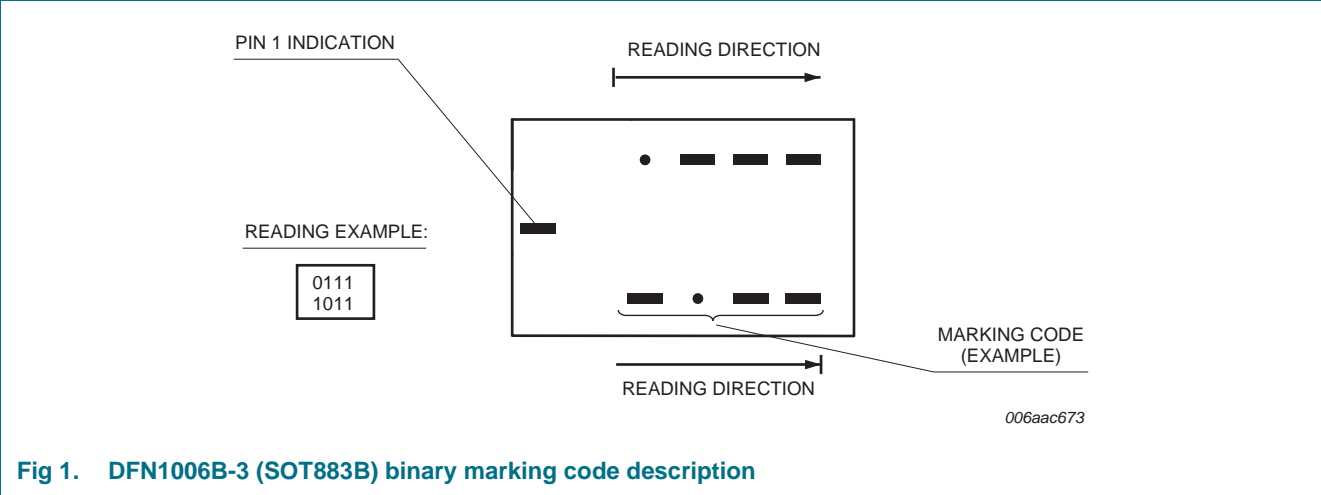


Fig 1. DFN1006B-3 (SOT883B) binary marking code description

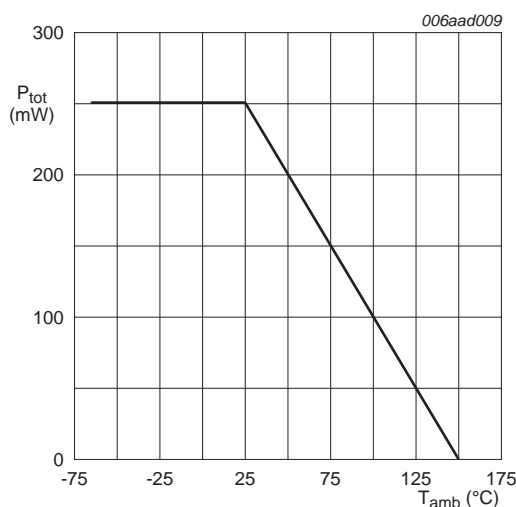
## 5. Limiting values

**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		-	20	mA
$I_{CM}$	peak collector current	pulsed; $t_p \leq 1$ ms	-	100	mA
$P_{tot}$	total power dissipation	$T_{amb} \leq 25$ °C <a href="#">[1]</a>	-	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.



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 <a href="#">[1]</a>	-	-	500	K/W

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

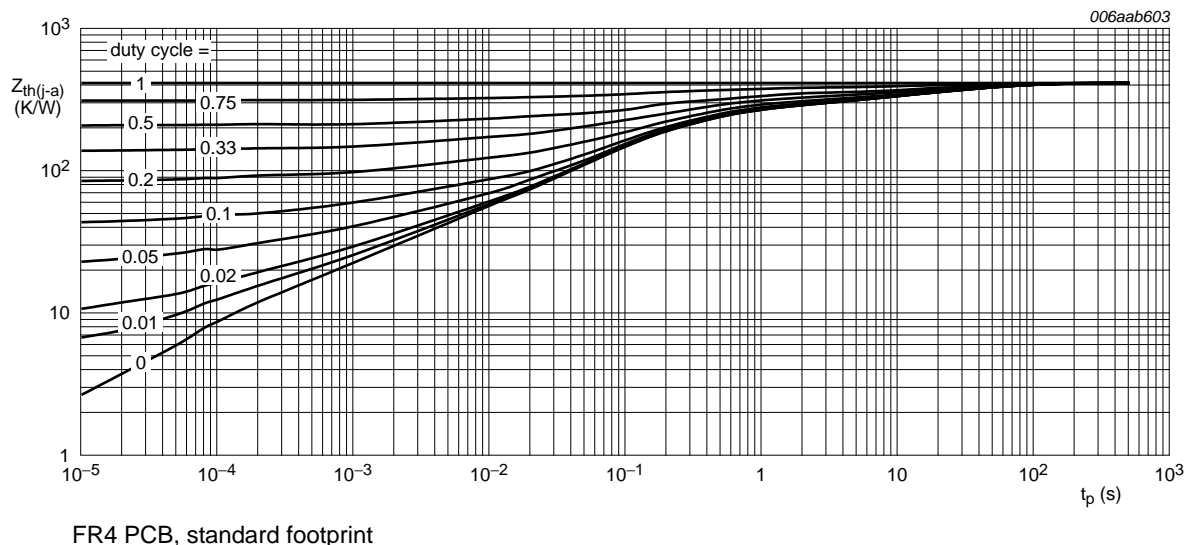


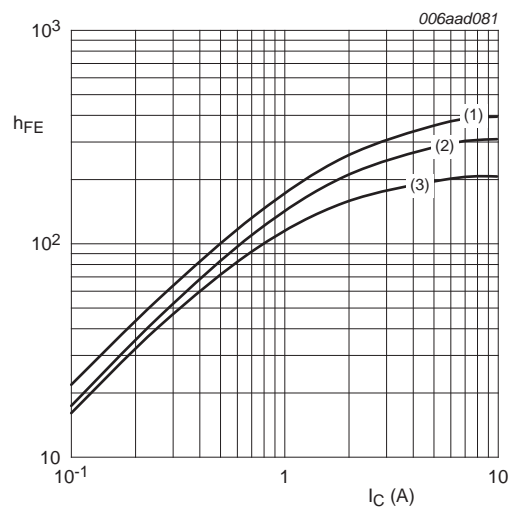
Fig 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

## 7. Characteristics

Table 7. Characteristics

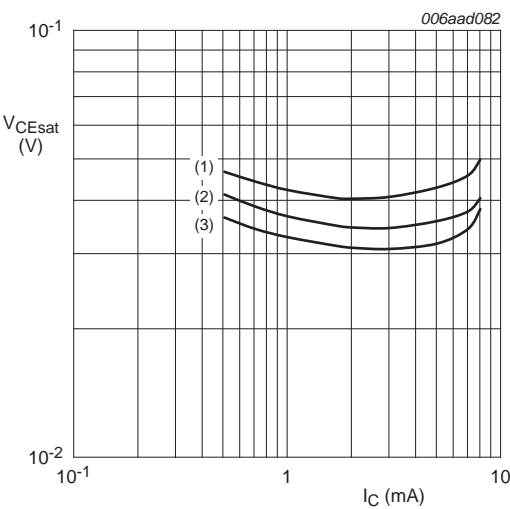
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{CBO}$	collector-base cut-off current	$V_{CB} = 50\text{ V}$ ; $I_E = 0\text{ A}$ ; $T_{amb} = 25\text{ °C}$	-	-	100	nA
$I_{CEO}$	collector-emitter cut-off current	$V_{CE} = 30\text{ V}$ ; $I_B = 0\text{ A}$ ; $T_{amb} = 25\text{ °C}$	-	-	1	μA
		$V_{CE} = 30\text{ V}$ ; $I_B = 0\text{ A}$ ; $T_j = 150\text{ °C}$	-	-	5	μA
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = 5\text{ V}$ ; $I_C = 0\text{ A}$ ; $T_{amb} = 25\text{ °C}$	-	-	50	μA
$h_{FE}$	DC current gain	$V_{CE} = 5\text{ V}$ ; $I_C = 5\text{ mA}$ ; $T_{amb} = 25\text{ °C}$	80	-	-	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = 5\text{ mA}$ ; $I_B = 0.25\text{ mA}$ ; $T_{amb} = 25\text{ °C}$	-	-	150	mV
$V_{I(off)}$	off-state input voltage	$V_{CE} = 5\text{ V}$ ; $I_C = 100\text{ μA}$ ; $T_{amb} = 25\text{ °C}$	-	1.1	0.5	V
$V_{I(on)}$	on-state input voltage	$V_{CE} = 0.3\text{ V}$ ; $I_C = 1\text{ mA}$ ; $T_{amb} = 25\text{ °C}$	3	1.5	-	V
R1	bias resistor 1 (input)	$T_{amb} = 25\text{ °C}$	70	100	130	kΩ
R2/R1	bias resistor ratio		0.8	1	1.2	
$C_C$	collector capacitance	$V_{CB} = 10\text{ V}$ ; $I_E = 0\text{ A}$ ; $i_e = 0\text{ A}$ ; $f = 1\text{ MHz}$ ; $T_{amb} = 25\text{ °C}$	-	-	2.5	pF
$f_T$	transition frequency	$V_{CE} = 5\text{ V}$ ; $I_C = 10\text{ mA}$ ; $f = 100\text{ MHz}$ ; $T_{amb} = 25\text{ °C}$	[1]	230	-	MHz

[1] Characteristics of built-in transistor.



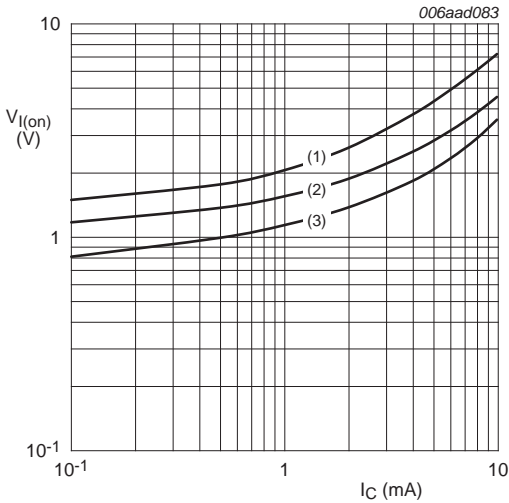
$V_{CE} = 5\text{ V}$   
(1)  $T_{amb} = 100\text{ }^{\circ}\text{C}$   
(2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
(3)  $T_{amb} = -40\text{ }^{\circ}\text{C}$

Fig 4. DC current gain as a function of collector current; typical values



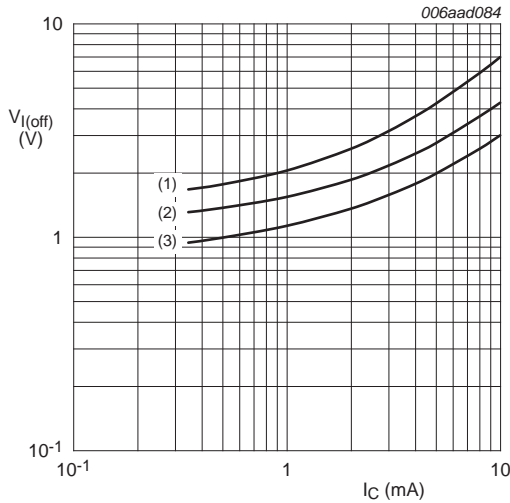
$I_C/I_B = 20$   
(1)  $T_{amb} = 100\text{ }^{\circ}\text{C}$   
(2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
(3)  $T_{amb} = -40\text{ }^{\circ}\text{C}$

Fig 5. Collector-emitter saturation voltage as a function of collector current; typical values



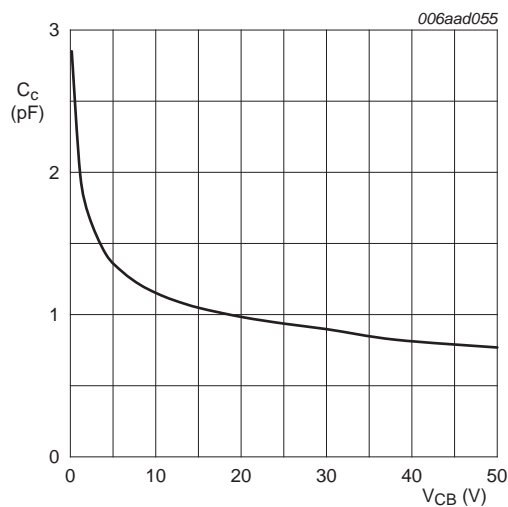
$V_{CE} = 0.3\text{ V}$   
(1)  $T_{amb} = -40\text{ }^{\circ}\text{C}$   
(2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
(3)  $T_{amb} = 100\text{ }^{\circ}\text{C}$

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



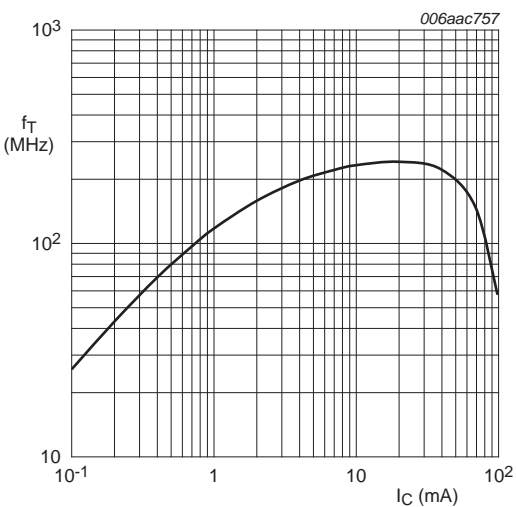
$V_{CE} = 5\text{ V}$   
(1)  $T_{amb} = -40\text{ }^{\circ}\text{C}$   
(2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
(3)  $T_{amb} = 100\text{ }^{\circ}\text{C}$

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



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

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



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

**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

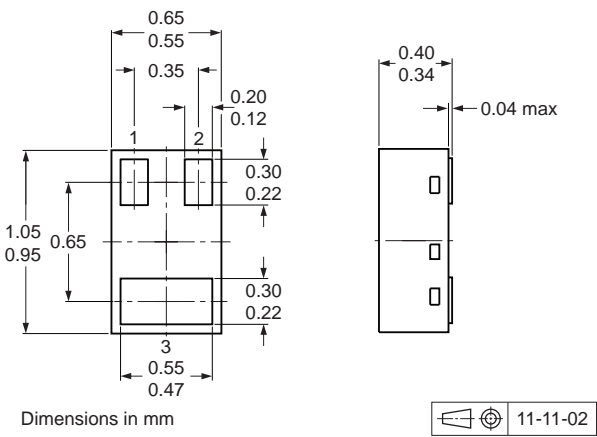


Fig 10. Package outline SOT883B (DFN1006B-3)

10. Soldering

Footprint information for reflow soldering

SOT883B

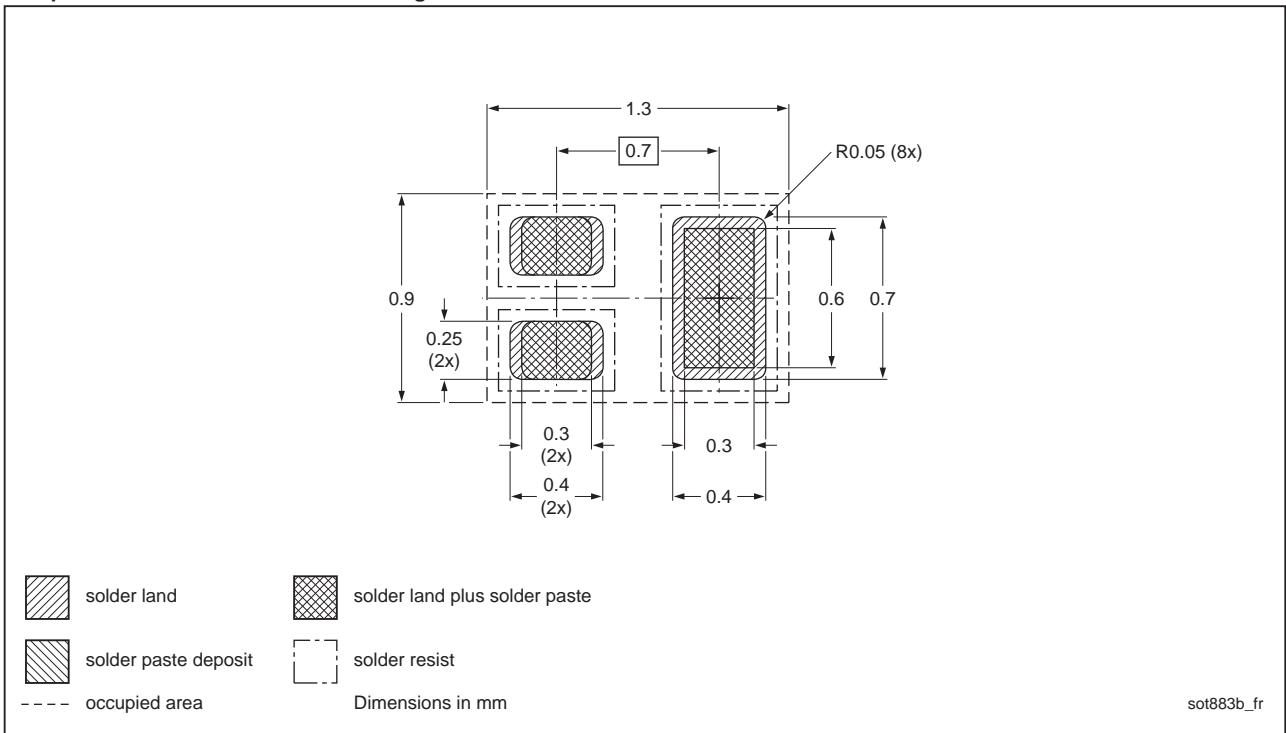


Fig 11. Reflow soldering footprint for SOT883B (DFN1006B-3)

## 11. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PDTC115EMB v.1	20120601	Product data sheet	-	-



## 12. Legal information

### 12.1 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.

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

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