# PDTC114YMB

## NPN resistor-equipped transistor; R1 = 10 kΩ, R2 = 47 kΩ

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: PDTA114YMB.

### 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

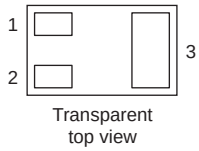
**Table 1. Quick reference data**

| 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 °C | 7 | 10 | 13 | kΩ |
| R2/R1 | bias resistor ratio | | 3.7 | 4.7 | 5.7 | |

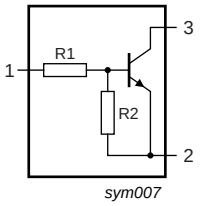
## 2. Pinning information

**Table 2. Pinning information**

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|---|---|---|---|---|
| 1 | I | input (base) | | |
| 2 | G | GND (emitter) | | |
| 3 | O | output (collector) | | |




**SOT883B (DFN1006B-3)**




## 3. Ordering information

**Table 3. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| PDTC114YMB | 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 |
|---|---|
| PDTC114YMB | 0011 0000 |

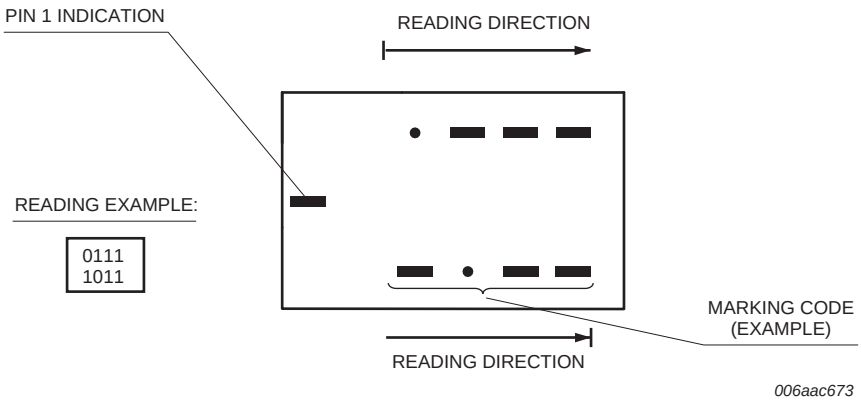



**Fig 1. DFN1006B-3 (SOT883B) binary marking code description**

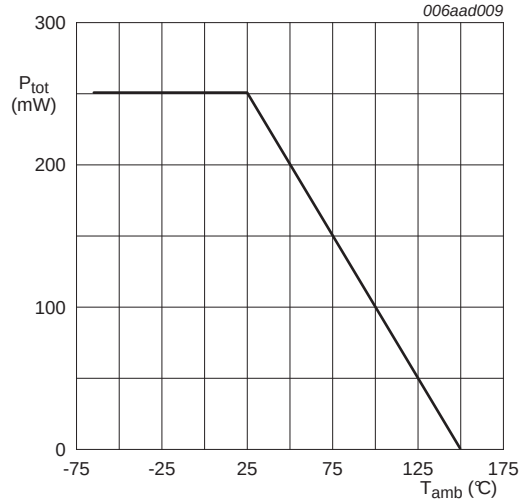
## 5. Limiting values

**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 | | - | 6 | V |
| $V_I$ | input voltage | positive | | - | 40 | V |
| | | negative | | - | -6 | V |
| $I_O$ | output current | | | - | 100 | mA |
| $I_{CM}$ | peak collector current | pulsed; $t_p \leq 1$ ms | | - | 100 | mA |
| $P_{tot}$ | total power dissipation | $T_{amb} \leq 25$ ℃ | [1] | - | 250 | mW |
| $T_j$ | junction temperature | | | - | 150 | ℃ |
| $T_{amb}$ | ambient temperature | | | -65 | 150 | ℃ |
| $T_{stg}$ | storage temperature | | | -65 | 150 | ℃ |

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




FR4 PCB, standard footprint

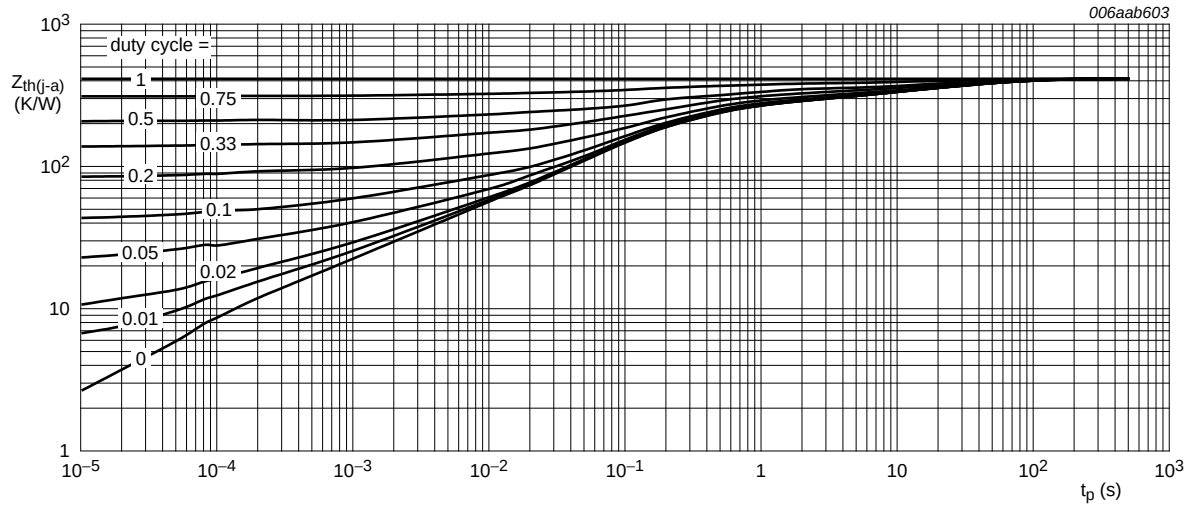
**Fig 2. Power derating curve for DFN1006B-3 (SOT883B)**

## 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.




FR4 PCB, standard footprint

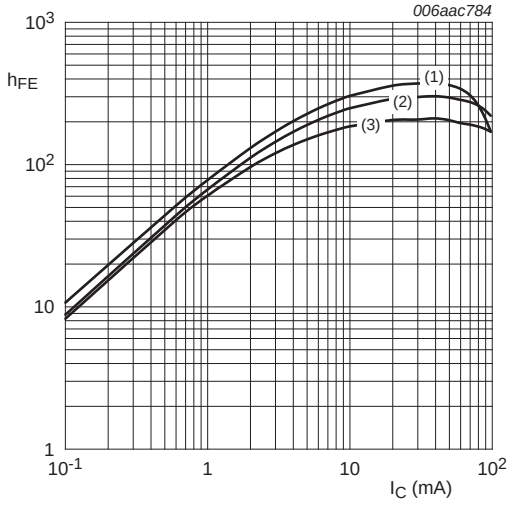
**Fig 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values**

# 7. Characteristics

**Table 7. Characteristics**

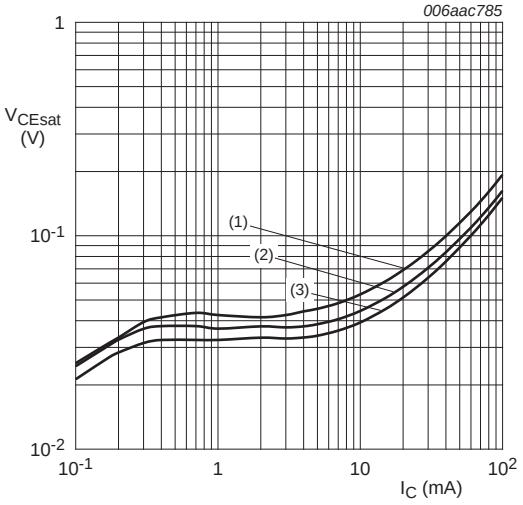
| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $I_{CBO}$ | collector-base cut-off current | $V_{CB}$ = 50 V; $I_E$ = 0 A; $T_{amb}$ = 25 °C | | - | - | 100 | nA |
| $I_{CEO}$ | collector-emitter cut-off current | $V_{CE}$ = 30 V; $I_B$ = 0 A; $T_{amb}$ = 25 °C | | - | - | 1 | µA |
| | | $V_{CE}$ = 30 V; $I_B$ = 0 A; $T_j$ = 150 °C | | - | - | 5 | µA |
| $I_{EBO}$ | emitter-base cut-off current | $V_{EB}$ = 5 V; $I_C$ = 0 A; $T_{amb}$ = 25 °C | | - | - | 150 | µA |
| $h_{FE}$ | DC current gain | $V_{CE}$ = 5 V; $I_C$ = 5 mA; $T_{amb}$ = 25 °C | | 100 | - | - | |
| $V_{CEsat}$ | collector-emitter saturation voltage | $I_C$ = 5 mA; $I_B$ = 0.25 mA; $T_{amb}$ = 25 °C | | - | - | 100 | mV |
| $V_{I(off)}$ | off-state input voltage | $V_{CE}$ = 5 V; $I_C$ = 100 µA; $T_{amb}$ = 25 °C | | - | 0.7 | 0.5 | V |
| $V_{I(on)}$ | on-state input voltage | $V_{CE}$ = 0.3 V; $I_C$ = 1 mA; $T_{amb}$ = 25 °C | | 1.4 | 0.8 | - | V |
| R1 | bias resistor 1 (input) | $T_{amb}$ = 25 °C | | 7 | 10 | 13 | kΩ |
| R2/R1 | bias resistor ratio | | | 3.7 | 4.7 | 5.7 | |
| $C_C$ | collector capacitance | $V_{CB}$ = 10 V; $I_E$ = 0 A; $i_e$ = 0 A; f = 1 MHz; $T_{amb}$ = 25 °C | | - | - | 2.5 | pF |
| $f_T$ | transition frequency | $V_{CE}$ = 5 V; $I_C$ = 10 mA; f = 100 MHz; $T_{amb}$ = 25 °C | [1] | - | 230 | - | MHz |

[1] Characteristics of built-in transistor.



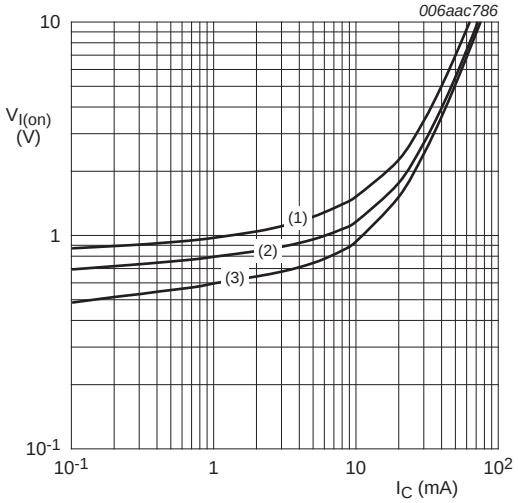

$V_{CE}$ = 5 V
(1) $T_{amb}$ = 100 °C
(2) $T_{amb}$ = 25 °C
(3) $T_{amb}$ = -40 °C

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




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

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



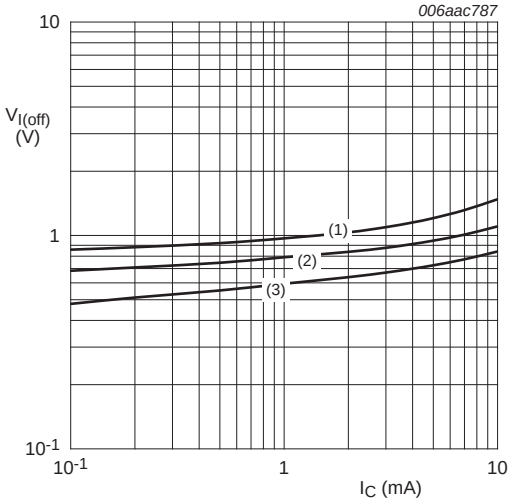

$V_{CE}$ = 0.3 V

(1) $T_{amb}$ = -40 °C

(2) $T_{amb}$ = 25 °C

(3) $T_{amb}$ = 100 °C

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



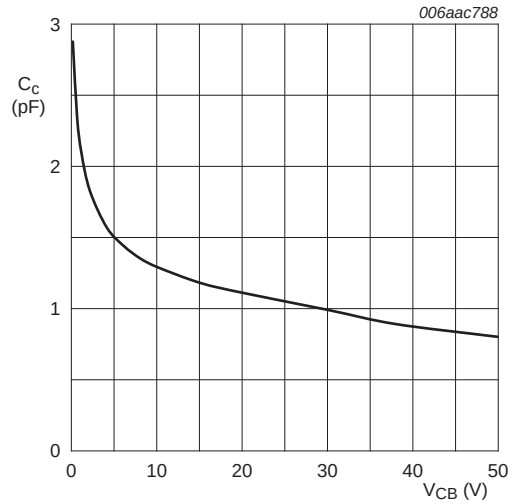

$V_{CE}$ = 5 V

(1) $T_{amb}$ = -40 °C

(2) $T_{amb}$ = 25 °C

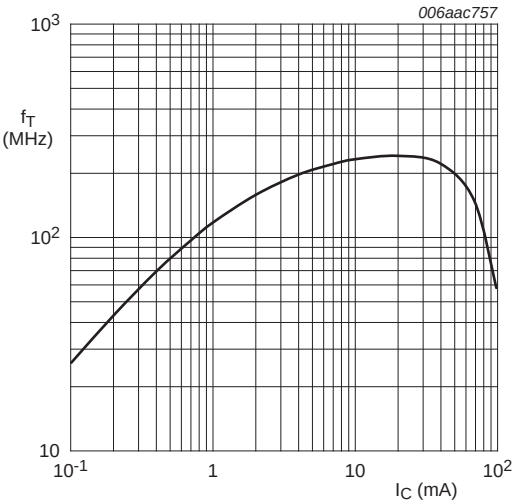
(3) $T_{amb}$ = 100 °C

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




f = 1 MHz; $T_{amb}$ = 25 °C

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




$V_{CE}$ = 5 V; $T_{amb}$ = 25 °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

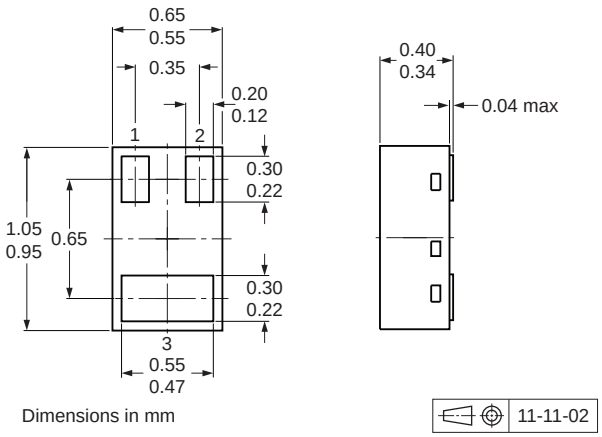



**Fig 10. Package outline SOT883B (DFN1006B-3)**

## 10. Soldering

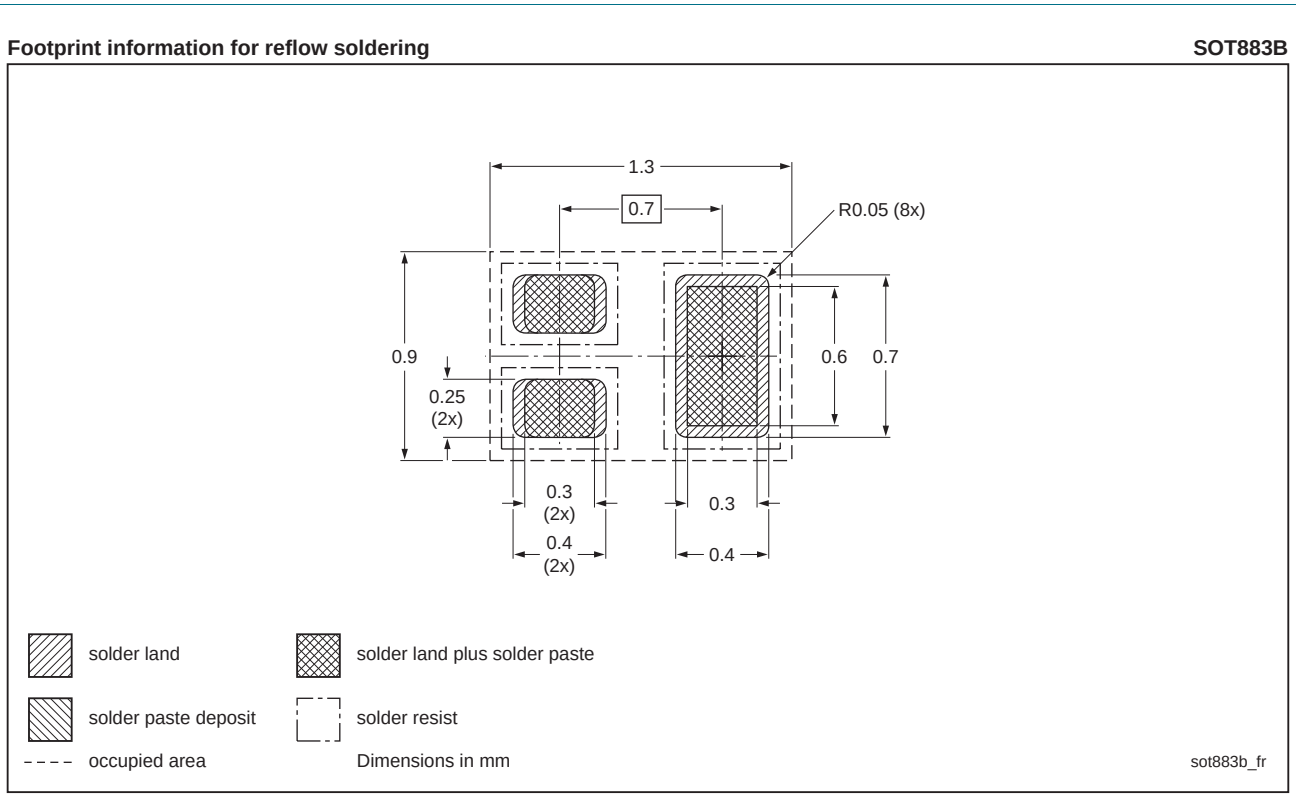



**Fig 11. Reflow soldering footprint for SOT883B (DFN1006B-3)**

## 11. Revision history

**Table 8. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| PDTC114YMB v.1 | 20120516 | Product data sheet | - | - |

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| 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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**Date of release: 16 May 2012**
**Document identifier: PDTC114YMB**