# PDTC144EMB



NPN resistor-equipped transistor; R1 = 47 k $\Omega$ , R2 = 47 k $\Omega$ Rev. 1 — 11 June 2012 Product data s

**Product data sheet** 

# **Product profile**

### 1.1 General description

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

PNP complement: PDTA144EMB.

#### 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	Тур	Max	Unit
$V_{CEO}$	collector-emitter voltage	open base	-	-	50	V
Io	output current		-	-	100	mA
R1	bias resistor 1 (input)	T <sub>amb</sub> = 25 °C	33	47	61	kΩ
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)	1	3
3	0	output (collector)	2 3	1 R1
	Transparent top view			
			SOT883B (DFN1006B-3)	sym007

# 3. Ordering information

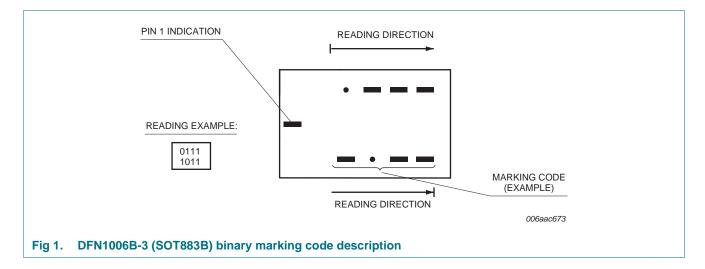
Table 3. Ordering information

Type number	Package				
	Name	Description	Version		
PDTC144EMB	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
PDTC144EMB	0011 1100



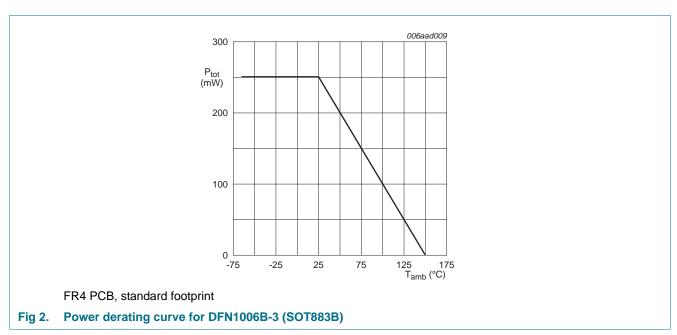
# 5. Limiting values

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
VI	input voltage	positive		-	40	V
		negative		-	-10	V
I <sub>O</sub>	output current			-	100	mA
I <sub>CM</sub>	peak collector current	pulsed; t <sub>p</sub> ≤ 1 ms		-	100	mA
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C	<u>[1]</u>	-	250	mW
Tj	junction temperature			-	150	°C
T <sub>amb</sub>	ambient temperature			-65	150	°C
T <sub>stg</sub>	storage temperature			-65	150	°C

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



# 6. Thermal characteristics

Table 6. Thermal characteristics

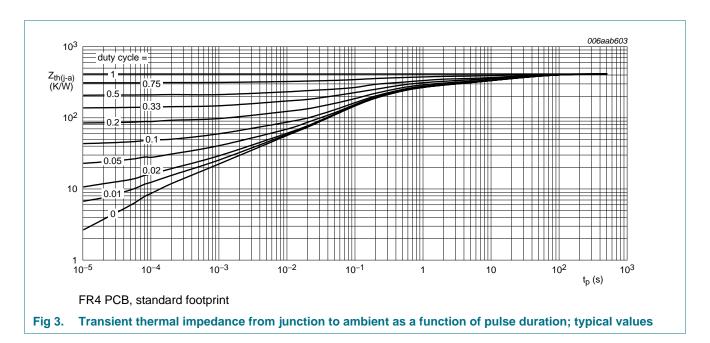
Symbol	Parameter	Conditions		Min	Тур	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	<u>[1]</u>	-	-	500	K/W

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

PDTC144EMB

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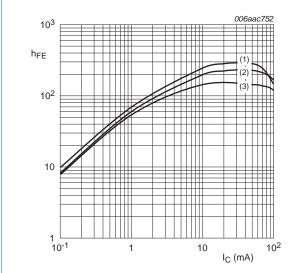


# 7. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Тур	Max	Unit
Cyllibol				141111	тур		
I <sub>CBO</sub>	collector-base cut-off current	$V_{CB} = 50 \text{ V}; I_{E} = 0 \text{ A}; T_{amb} = 25 ^{\circ}\text{C}$		-	-	100	nA
I <sub>CEO</sub>	collector-emitter cut-off current	$V_{CE} = 30 \text{ V}; I_{B} = 0 \text{ A}; T_{amb} = 25 \text{ °C}$		-	-	1	μΑ
		$V_{CE} = 30 \text{ V}; I_B = 0 \text{ A}; T_j = 150 ^{\circ}\text{C}$		-	-	5	μΑ
I <sub>EBO</sub>	emitter-base cut-off current	$V_{EB} = 5 \text{ V}; I_{C} = 0 \text{ A}; T_{amb} = 25 \text{ °C}$		-	-	90	μΑ
h <sub>FE</sub>	DC current gain	$V_{CE}$ = 5 V; $I_{C}$ = 5 mA; $T_{amb}$ = 25 °C		80	-	-	
V <sub>CEsat</sub>	collector-emitter saturation voltage	$I_C = 10 \text{ mA}; I_B = 0.5 \text{ mA}; T_{amb} = 25 \text{ °C}$		-	-	150	mV
V <sub>I(off)</sub>	off-state input voltage	$V_{CE}$ = 5 V; $I_{C}$ = 100 $\mu$ A; $T_{amb}$ = 25 °C		-	1.2	0.8	V
V <sub>I(on)</sub>	on-state input voltage	$V_{CE}$ = 0.3 V; $I_{C}$ = 2 mA; $T_{amb}$ = 25 °C		3	1.6	-	V
R1	bias resistor 1 (input)	T <sub>amb</sub> = 25 °C		33	47	61	kΩ
R2/R1	bias resistor ratio			0.8	1	1.2	
C <sub>C</sub>	collector capacitance	$V_{CB} = 10 \text{ V}; I_E = 0 \text{ A}; i_e = 0 \text{ A};$ f = 1 MHz; $T_{amb} = 25 \text{ °C}$		-	-	2.5	pF
f <sub>T</sub>	transition frequency	$V_{CE}$ = 5 V; $I_{C}$ = 10 mA; f = 100 MHz; $T_{amb}$ = 25 °C	<u>[1]</u>	-	230	-	MHz

<sup>[1]</sup> Characteristics of built-in transistor.



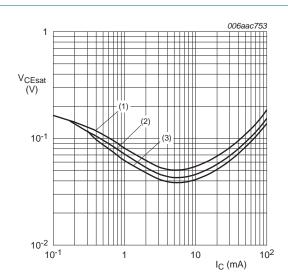
$$V_{CE} = 5 V$$

(1) 
$$T_{amb} = 100 \, ^{\circ}C$$

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

(3) 
$$T_{amb} = -40 \, ^{\circ}C$$

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



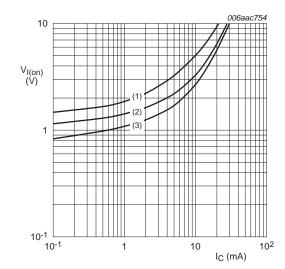
$$I_{\rm C}/I_{\rm B} = 20$$

(1) 
$$T_{amb} = 100 \, ^{\circ}C$$

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

(3) 
$$T_{amb} = -40 \, ^{\circ}C$$

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



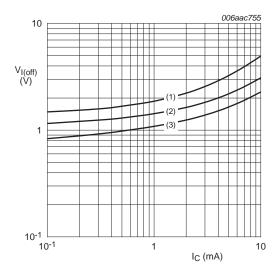
 $V_{CE} = 0.3 \text{ V}$ 

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

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

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

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



$$V_{CE} = 5 V$$

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

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

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

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

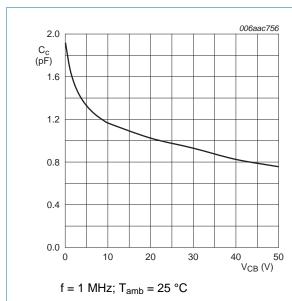


Fig 8. Collector capacitance as a function of collector-base voltage; typical values

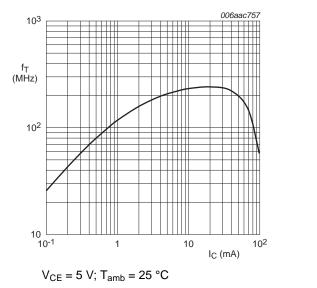


Fig 9. Transition frequency as a function of collector current; typical values of built-in transistor

### 8. Test information

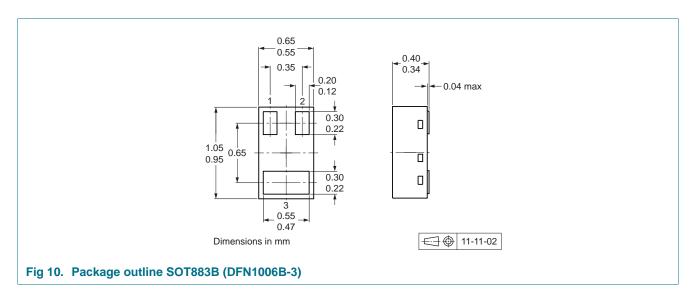
# 8.1 Quality information

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.

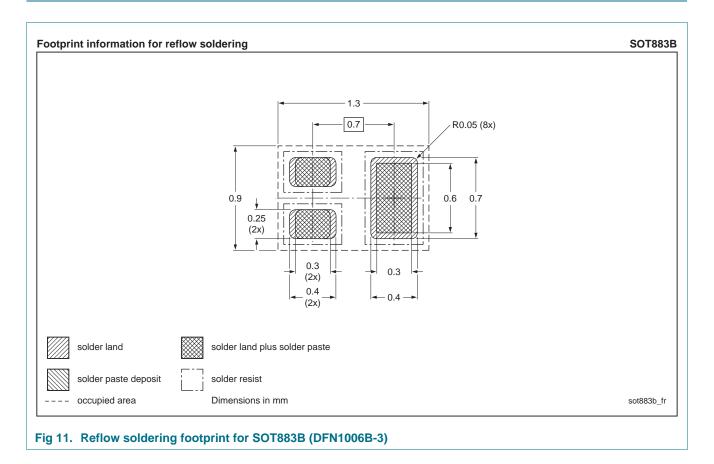
PDTC144EMB

NPN resistor-equipped transistor; R1 = 47 k $\Omega$ , R2 = 47 k $\Omega$ 

# 9. Package outline



# 10. Soldering





# 11. Revision history

### Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PDTC144EMB v.1	20120611	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.

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