



**THE DATASHEET OF  
PDTA114YU,115**



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Kind regards,

Team Nexperia

# PDTA114Y series

PNP resistor-equipped transistors;  
R1 = 10 k $\Omega$ , R2 = 47 k $\Omega$

Rev. 5 — 18 November 2011

Product data sheet

## 1. Product profile

### 1.1 General description

PNP Resistor-Equipped Transistor (RET) family in Surface-Mounted Device (SMD) plastic packages.

Table 1. Product overview

Type number	Package			NPN complement	Package configuration
	NXP	JEITA	JEDEC		
PDTA114YE	SOT416	SC-75	-	PDTC114YE	ultra small
PDTA114YM	SOT883	SC-101	-	PDTC114YM	leadless ultra small
PDTA114YT	SOT23	-	TO-236AB	PDTC114YT	small
PDTA114YU	SOT323	SC-70	-	PDTC114YU	very small

### 1.2 Features and benefits

- 100 mA output current capability
- Built-in bias resistors
- Simplifies circuit design
- Reduces component count
- Reduces pick and place costs
- AEC-Q101 qualified

### 1.3 Applications

- Digital applications in automotive and industrial segments
- Control of IC inputs
- Cost-saving alternative for BC847/857 series in digital applications
- Switching loads

### 1.4 Quick reference data

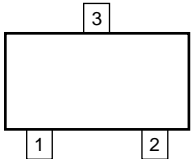
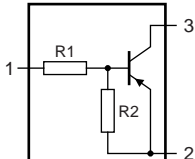
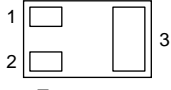
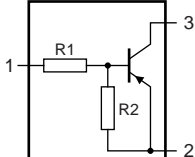
Table 2. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V <sub>CEO</sub>	collector-emitter voltage	open base	-	-	-50	V
I <sub>O</sub>	output current		-	-	-100	mA
R1	bias resistor 1 (input)		7	10	13	k $\Omega$
R2/R1	bias resistor ratio		3.7	4.7	5.7	



## 2. Pinning information

**Table 3. Pinning**

Pin	Description	Simplified outline	Graphic symbol
<b>SOT23; SOT323; SOT416</b>			
1	input (base)	 <p>006aaa144</p>	 <p>sym003</p>
2	GND (emitter)		
3	output (collector)		
<b>SOT883</b>			
1	input (base)	 <p>Transparent top view</p>	 <p>sym003</p>
2	GND (emitter)		
3	output (collector)		

## 3. Ordering information

**Table 4. Ordering information**

Type number	Package		
	Name	Description	Version
PDTA114YE	SC-75	plastic surface-mounted package; 3 leads	SOT416
PDTA114YM	SC-101	leadless ultra small plastic package; 3 solder lands; body 1.0 × 0.6 × 0.5 mm	SOT883
PDTA114YT	-	plastic surface-mounted package; 3 leads	SOT23
PDTA114YU	SC-70	plastic surface-mounted package; 3 leads	SOT323

## 4. Marking

**Table 5. Marking codes**

Type number	Marking code <sup>[1]</sup>
PDTA114YE	36
PDTA114YM	DF
PDTA114YT	*29
PDTA114YU	*55

[1] \* = placeholder for manufacturing site code

## 5. Limiting values

**Table 6. Limiting values**

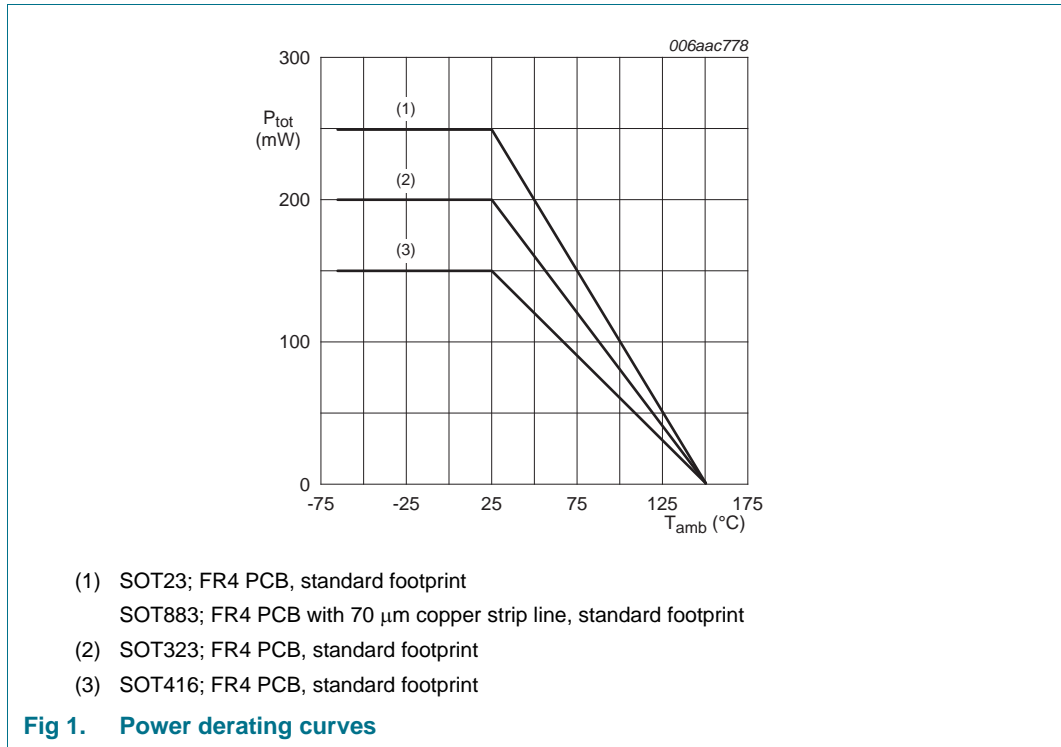
*In accordance with the Absolute Maximum Rating System (IEC 60134).*

Symbol	Parameter	Conditions	Min	Max	Unit	
V <sub>CBO</sub>	collector-base voltage	open emitter	-	-50	V	
V <sub>CEO</sub>	collector-emitter voltage	open base	-	-50	V	
V <sub>EBO</sub>	emitter-base voltage	open collector	-	-6	V	
V <sub>I</sub>	input voltage					
	positive		-	+6	V	
	negative		-	-40	V	
I <sub>O</sub>	output current		-	-100	mA	
I <sub>CM</sub>	peak collector current	single pulse; t <sub>p</sub> ≤ 1 ms	-	-100	mA	
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C				
	PDTA114YE (SOT416)		[1][2]	-	150	mW
	PDTA114YM (SOT883)		[2][3]	-	250	mW
	PDTA114YT (SOT23)		[1]	-	250	mW
	PDTA114YU (SOT323)		[1]	-	200	mW
T <sub>j</sub>	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.

[2] Reflow soldering is the only recommended soldering method.

[3] Device mounted on an FR4 PCB with 70  $\mu$ m copper strip line, standard footprint.



## 6. Thermal characteristics

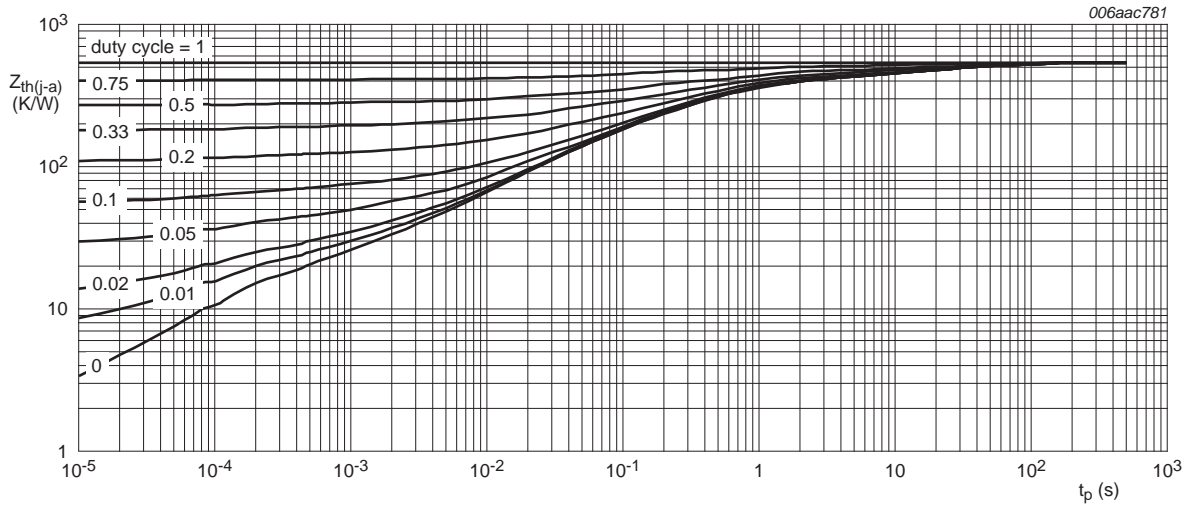
**Table 7. Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
R <sub>th(j-a)</sub>	thermal resistance from junction to ambient	in free air				
	PDTA114YE (SOT416)	[1][2]	-	-	830	K/W
	PDTA114YM (SOT883)	[2][3]	-	-	500	K/W
	PDTA114YT (SOT23)	[1]	-	-	500	K/W
	PDTA114YU (SOT323)	[1]	-	-	625	K/W

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

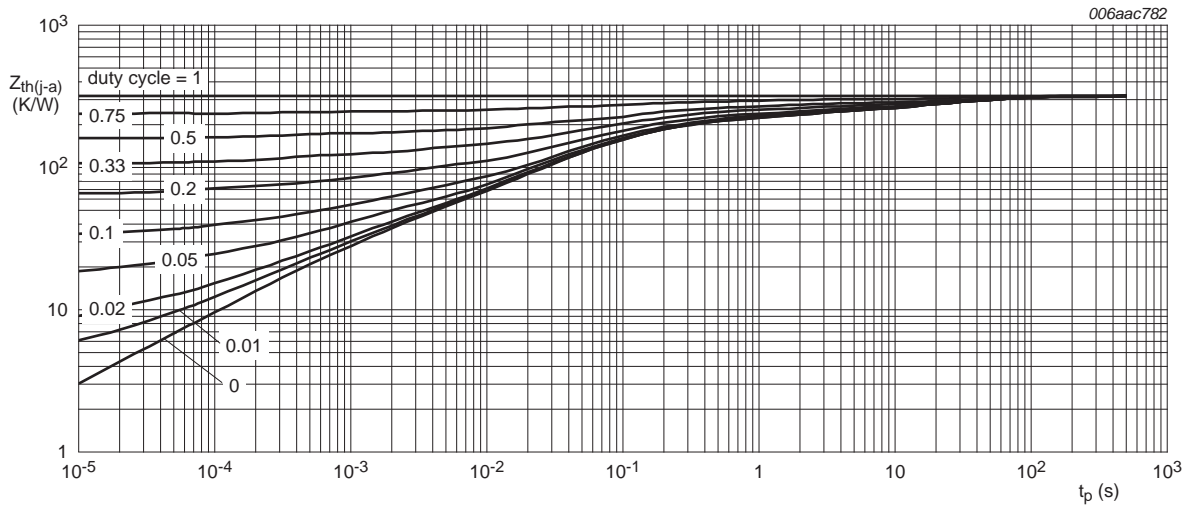
[2] Reflow soldering is the only recommended soldering method.

[3] Device mounted on an FR4 PCB with 70 μm copper strip line, standard footprint.



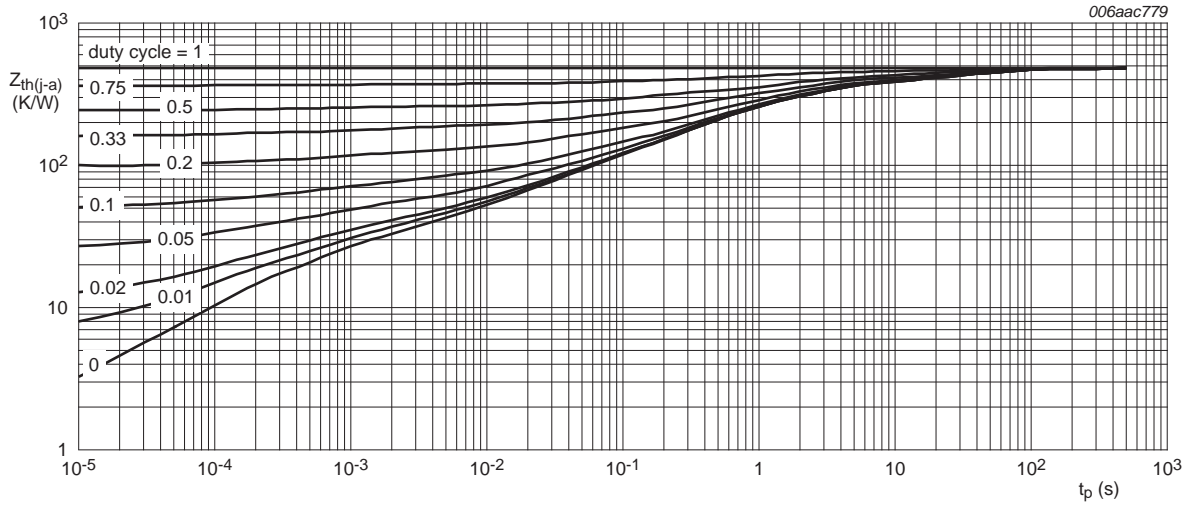
FR4 PCB, standard footprint

**Fig 2. Transient thermal impedance from junction to ambient as a function of pulse duration for PDTA114YE (SOT416); typical values**



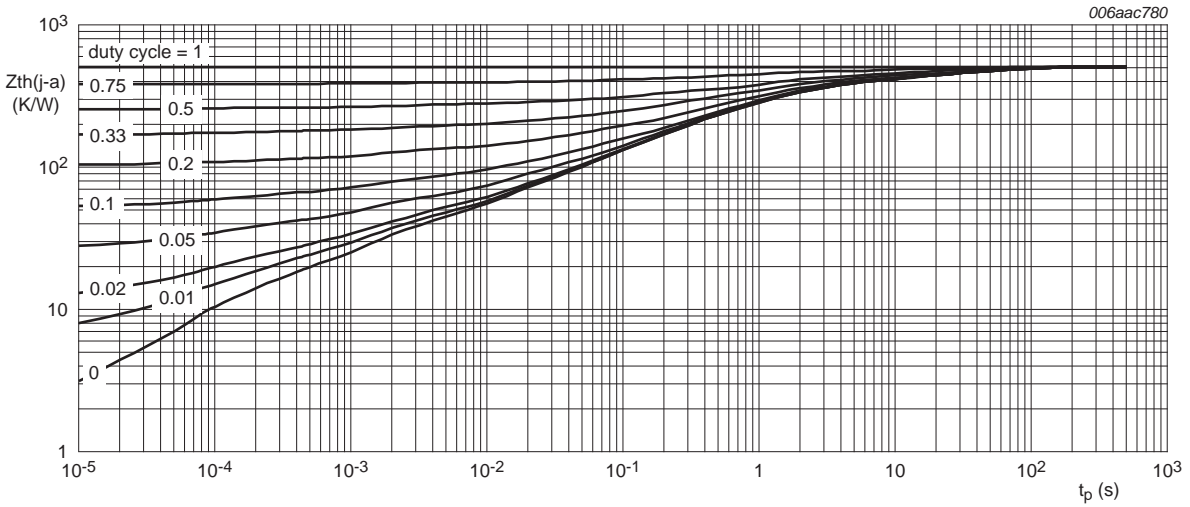
FR4 PCB, 70 μm copper strip line

**Fig 3. Transient thermal impedance from junction to ambient as a function of pulse duration for PDTA114YM (SOT883); typical values**



FR4 PCB, standard footprint

**Fig 4. Transient thermal impedance from junction to ambient as a function of pulse duration for PDTA114YT (SOT23); typical values**



FR4 PCB, standard footprint

**Fig 5. Transient thermal impedance from junction to ambient as a function of pulse duration for PDTA114YU (SOT323); typical values**

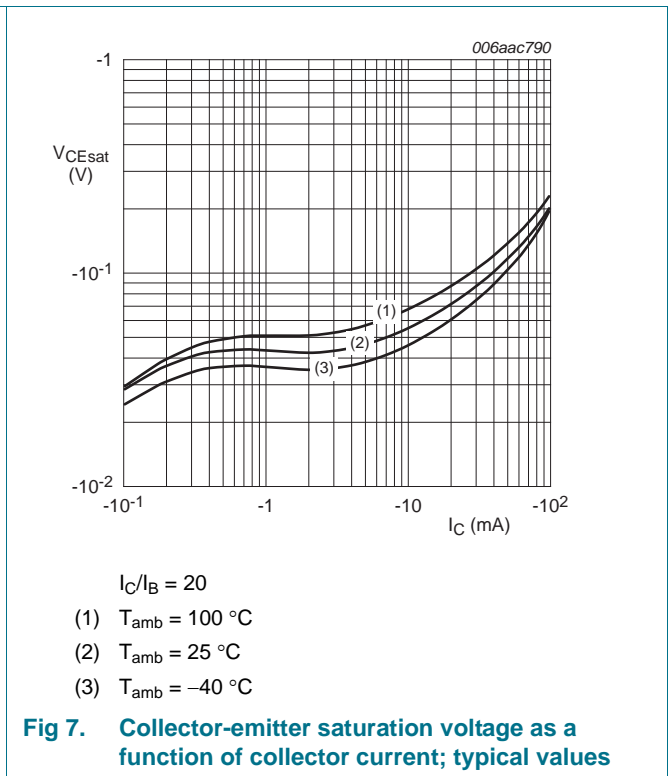
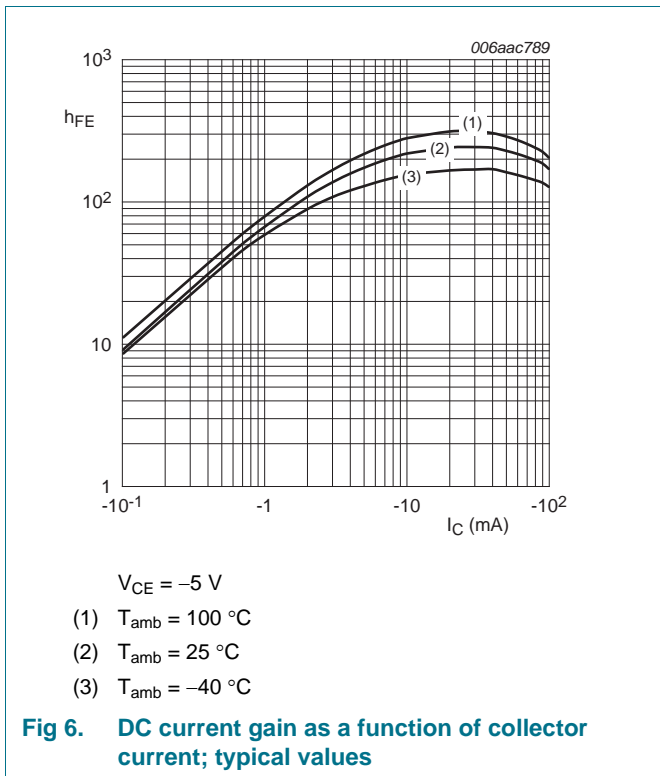
**7. Characteristics**

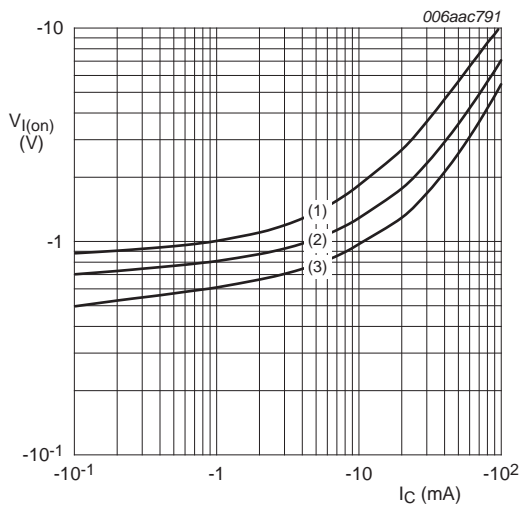
**Table 8. Characteristics**

*T<sub>amb</sub> = 25 °C unless otherwise specified.*

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I <sub>CBO</sub>	collector-base cut-off current	V <sub>CB</sub> = -50 V; I <sub>E</sub> = 0 A	-	-	-100	nA
I <sub>CEO</sub>	collector-emitter cut-off current	V <sub>CE</sub> = -30 V; I <sub>B</sub> = 0 A	-	-	-1	μA
		V <sub>CE</sub> = -30 V; I <sub>B</sub> = 0 A; T <sub>j</sub> = 150 °C	-	-	-5	μA
I <sub>EBO</sub>	emitter-base cut-off current	V <sub>EB</sub> = -5 V; I <sub>C</sub> = 0 A	-	-	-150	μA
h <sub>FE</sub>	DC current gain	V <sub>CE</sub> = -5 V; I <sub>C</sub> = -5 mA	100	-	-	
V <sub>CEsat</sub>	collector-emitter saturation voltage	I <sub>C</sub> = -5 mA; I <sub>B</sub> = -0.25 mA	-	-	-100	mV
V <sub>I(off)</sub>	off-state input voltage	V <sub>CE</sub> = -5 V; I <sub>C</sub> = -100 μA	-	-0.7	-0.5	V
V <sub>I(on)</sub>	on-state input voltage	V <sub>CE</sub> = -0.3 V; I <sub>C</sub> = -1 mA	-1.4	-0.8	-	V
R1	bias resistor 1 (input)		7	10	13	kΩ
R2/R1	bias resistor ratio		3.7	4.7	5.7	
C <sub>c</sub>	collector capacitance	V <sub>CB</sub> = -10 V; I <sub>E</sub> = i <sub>e</sub> = 0 A; f = 1 MHz	-	-	3	pF
f <sub>T</sub>	transition frequency	V <sub>CE</sub> = -5 V; I <sub>C</sub> = -10 mA; [1]	-	180	-	MHz
		f = 100 MHz				

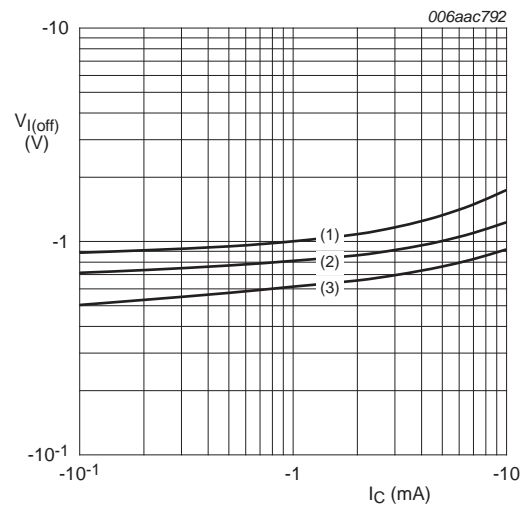
[1] Characteristics of built-in transistor





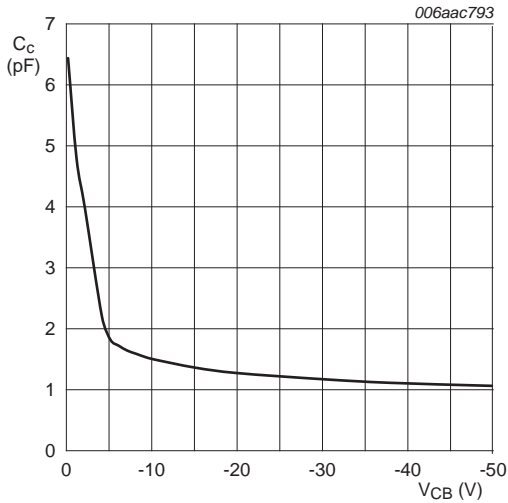
$V_{CE} = -0.3 \text{ V}$   
 (1)  $T_{amb} = -40 \text{ }^\circ\text{C}$   
 (2)  $T_{amb} = 25 \text{ }^\circ\text{C}$   
 (3)  $T_{amb} = 100 \text{ }^\circ\text{C}$

**Fig 8. On-state input voltage as a function of collector current; typical values**



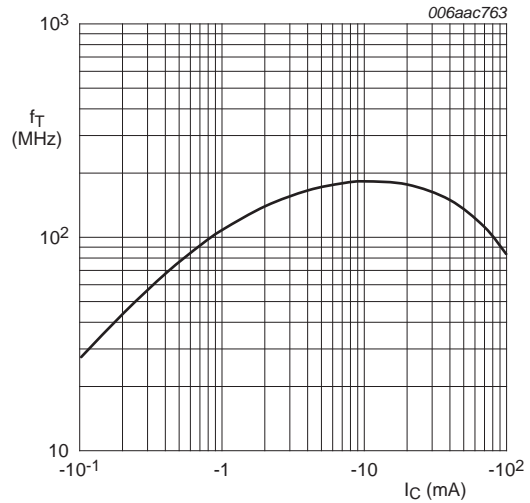
$V_{CE} = -5 \text{ V}$   
 (1)  $T_{amb} = -40 \text{ }^\circ\text{C}$   
 (2)  $T_{amb} = 25 \text{ }^\circ\text{C}$   
 (3)  $T_{amb} = 100 \text{ }^\circ\text{C}$

**Fig 9. Off-state input voltage as a function of collector current; typical values**



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

**Fig 10. Collector capacitance as a function of collector-base voltage; typical values**



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

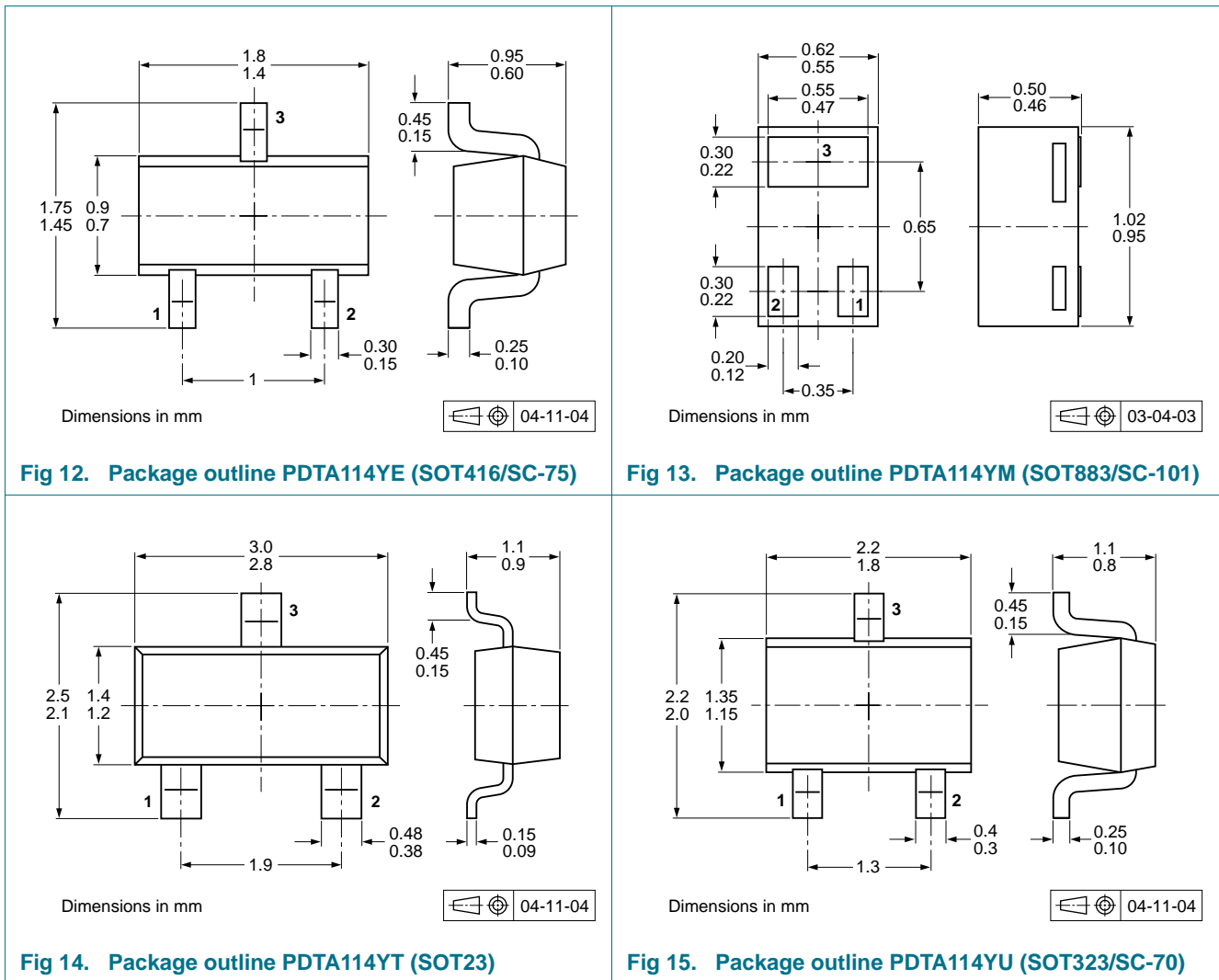
**Fig 11. Transition frequency as a function of collector current; typical values of built-in transistor**

**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**



## 10. Packing information

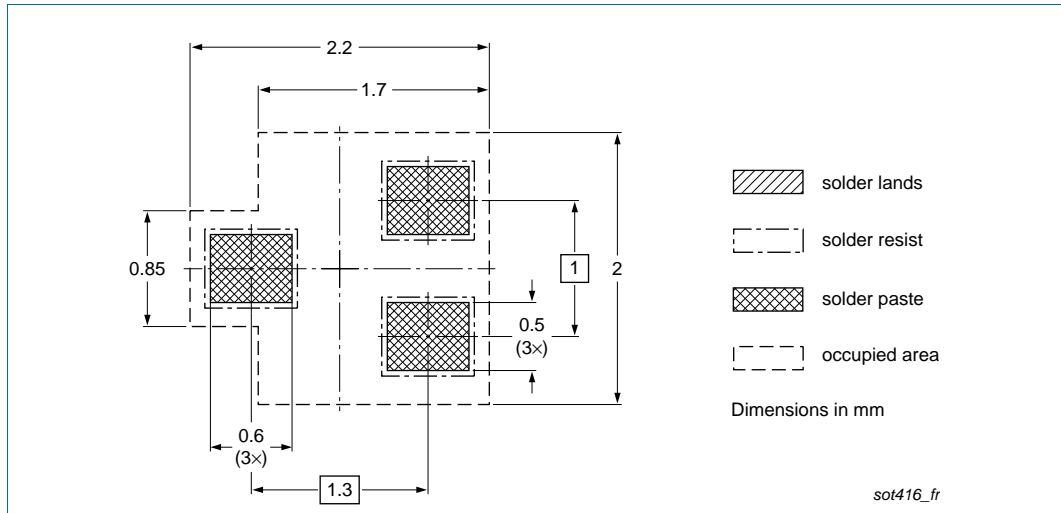
**Table 9. Packing methods**

The indicated -xxx are the last three digits of the 12NC ordering code.<sup>[1]</sup>

Type number	Package	Description	Packing quantity		
			3000	5000	10000
PDTA114YE	SOT416	4 mm pitch, 8 mm tape and reel	-115	-	-135
PDTA114YM	SOT883	2 mm pitch, 8 mm tape and reel	-	-	-315
PDTA114YT	SOT23	4 mm pitch, 8 mm tape and reel	-215	-	-235
PDTA114YU	SOT323	4 mm pitch, 8 mm tape and reel	-115	-	-135

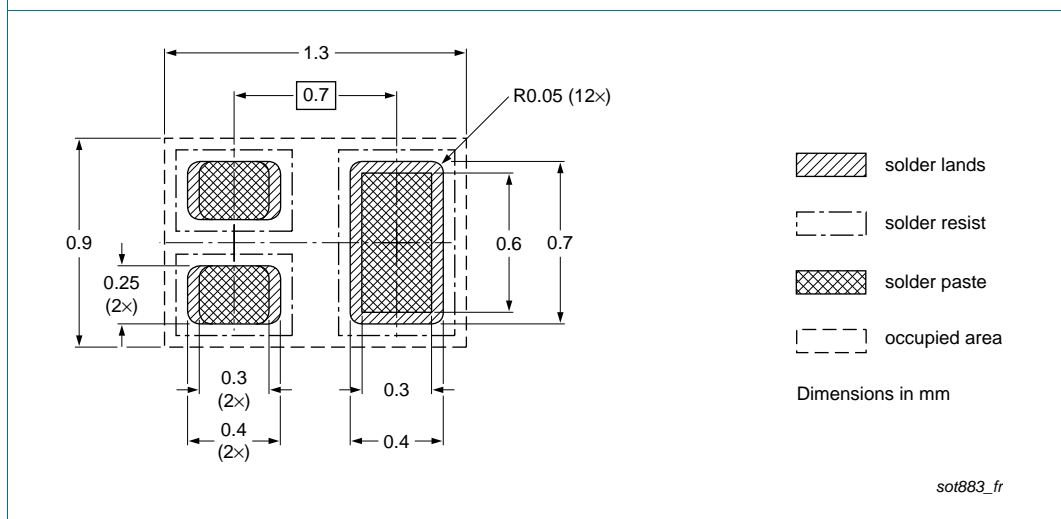
[1] For further information and the availability of packing methods, see [Section 14](#).

**11. Soldering**



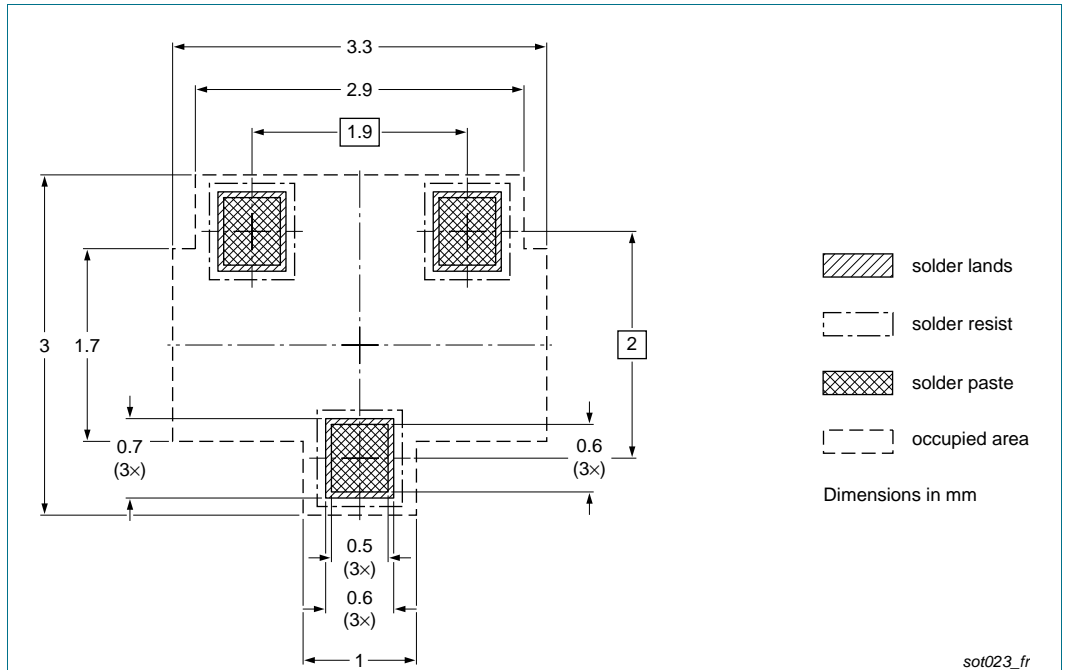
Reflow soldering is the only recommended soldering method.

**Fig 16. Reflow soldering footprint PDTA114YE (SOT416/SC-75)**

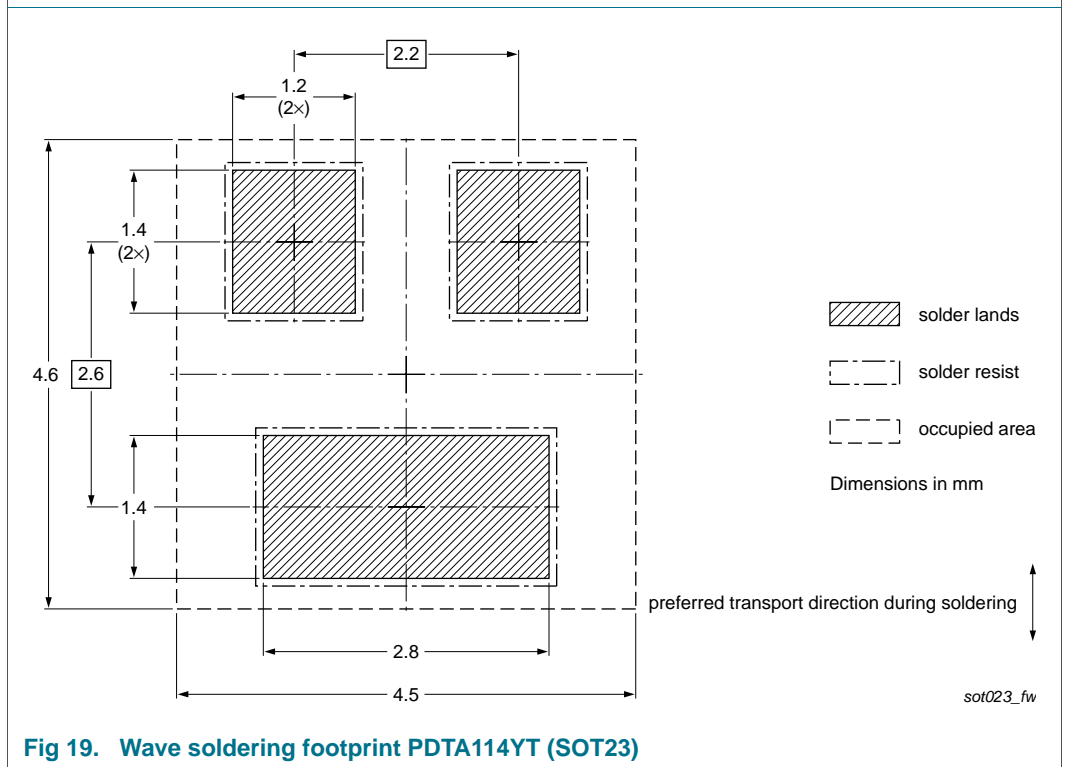


Reflow soldering is the only recommended soldering method.

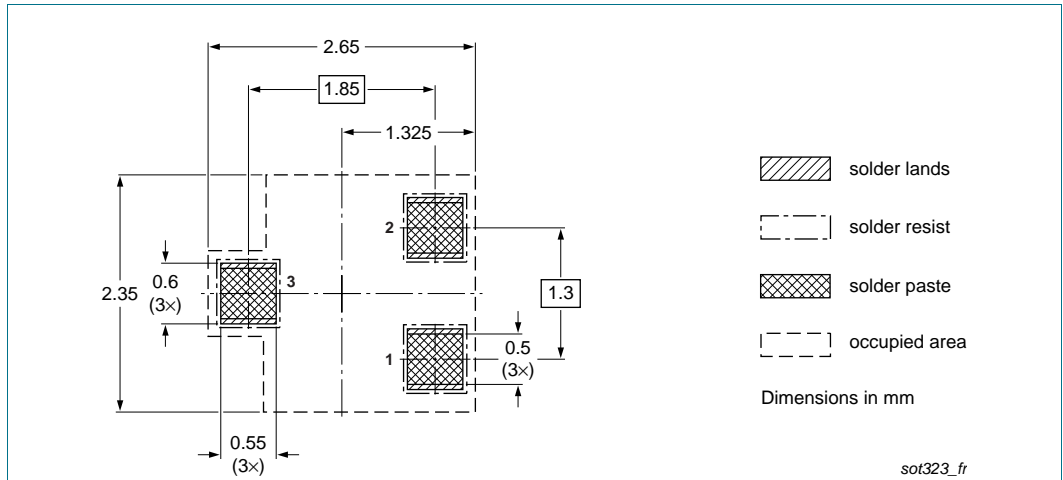
**Fig 17. Reflow soldering footprint PDTA114YM (SOT883/SC-101)**



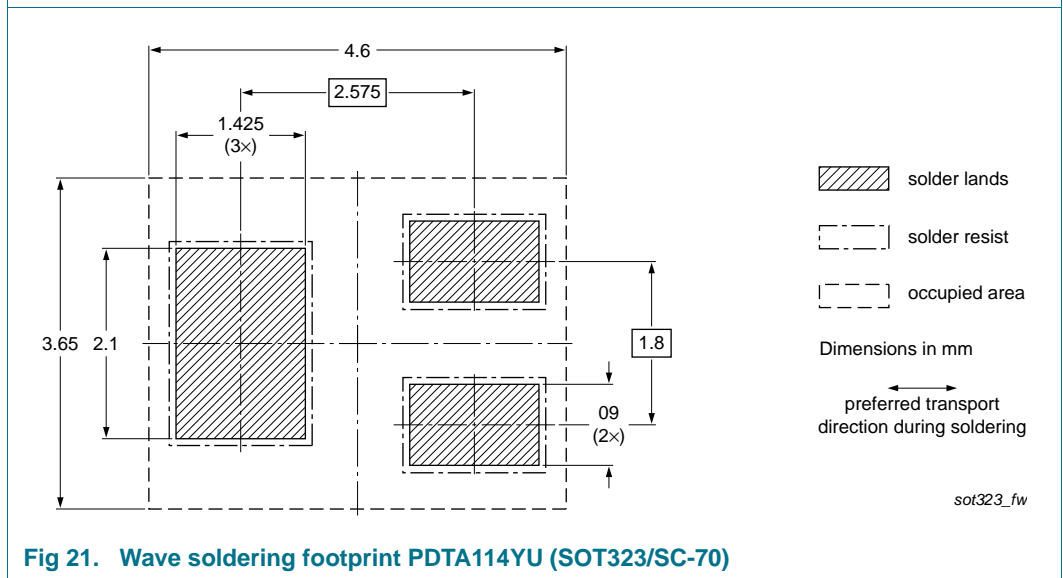
**Fig 18. Reflow soldering footprint PDTA114YT (SOT23)**



**Fig 19. Wave soldering footprint PDTA114YT (SOT23)**



**Fig 20. Reflow soldering footprint PDTA114YU (SOT323/SC-70)**



**Fig 21. Wave soldering footprint PDTA114YU (SOT323/SC-70)**

## 12. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PDTA114Y_SER v.5	20111118	Product data sheet	-	PDTA114Y_SERIES v.4
Modifications:	<ul style="list-style-type: none"> <li>• The format of this document has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li> <li>• Legal texts have been adapted to the new company name where appropriate.</li> <li>• Type numbers PDTA114YEF, PDTA114YK and PDTA114YS removed.</li> <li>• <a href="#">Section 1 "Product profile"</a>: updated</li> <li>• <a href="#">Section 3 "Ordering information"</a>: added</li> <li>• <a href="#">Section 4 "Marking"</a>: updated</li> <li>• <a href="#">Figure 1</a> to <a href="#">11</a>: added</li> <li>• <a href="#">Section 5 "Limiting values"</a>: updated</li> <li>• <a href="#">Section 6 "Thermal characteristics"</a>: updated</li> <li>• <a href="#">Table 8 "Characteristics"</a>: <math>V_{i(on)}</math> redefined to <math>V_{I(on)}</math> on-state input voltage, <math>V_{i(off)}</math> redefined to <math>V_{I(off)}</math> off-state input voltage, <math>I_{CEO}</math> updated, <math>f_T</math> added</li> <li>• <a href="#">Section 8 "Test information"</a>: added</li> <li>• <a href="#">Section 9 "Package outline"</a>: superseded by minimized package outline drawings</li> <li>• <a href="#">Section 10 "Packing information"</a>: added</li> <li>• <a href="#">Section 11 "Soldering"</a>: added</li> <li>• <a href="#">Section 13 "Legal information"</a>: updated</li> </ul>			
PDTA114Y_SERIES v.4	20040802	Product data sheet	-	PDTA114Y_SERIES v.3
PDTA114Y_SERIES v.3	20030909	Product specification	-	PDTA114Y_SERIES v.2
PDTA114Y_SERIES v.2	20030411	Product specification	-	PDTA114YEF v.1
PDTA114YEF v.1	20020515	Product specification	-	-

## 13. Legal information

### 13.1 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.

[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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Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.

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