

# PDTA143X series

PNP resistor-equipped transistors;  
R1 = 4.7 k $\Omega$ , R2 = 10 k $\Omega$

Rev. 5 — 9 December 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
	Nexperia	JEITA	JEDEC		
PDTA143XE	SOT416	SC-75	-	PDTC143XE	ultra small
PDTA143XM	SOT883	SC-101	-	PDTC143XM	leadless ultra small
PDTA143XT	SOT23	-	TO-236AB	PDTC143XT	small
PDTA143XU	SOT323	SC-70	-	PDTC143XU	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

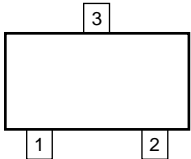
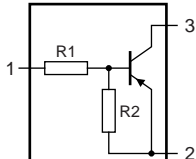

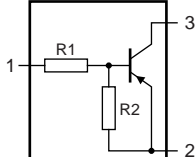
### 1.4 Quick reference data

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)		3.3	4.7	6.1	k $\Omega$
R2/R1	bias resistor ratio		1.7	2.1	2.6	

## 2. Pinning information

Table 3. Pinning

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

## 3. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
PDTA143XE	SC-75	plastic surface-mounted package; 3 leads	SOT416
PDTA143XM	SC-101	leadless ultra small plastic package; 3 solder lands; body 1.0 × 0.6 × 0.5 mm	SOT883
PDTA143XT	-	plastic surface-mounted package; 3 leads	SOT23
PDTA143XU	SC-70	plastic surface-mounted package; 3 leads	SOT323

## 4. Marking

Table 5. Marking codes

Type number	Marking code <sup>[1]</sup>
PDTA143XE	35
PDTA143XM	DN
PDTA143XT	*31
PDTA143XU	*46

[1] \* = placeholder for manufacturing site code

## 5. Limiting values

**Table 6. Limiting values**

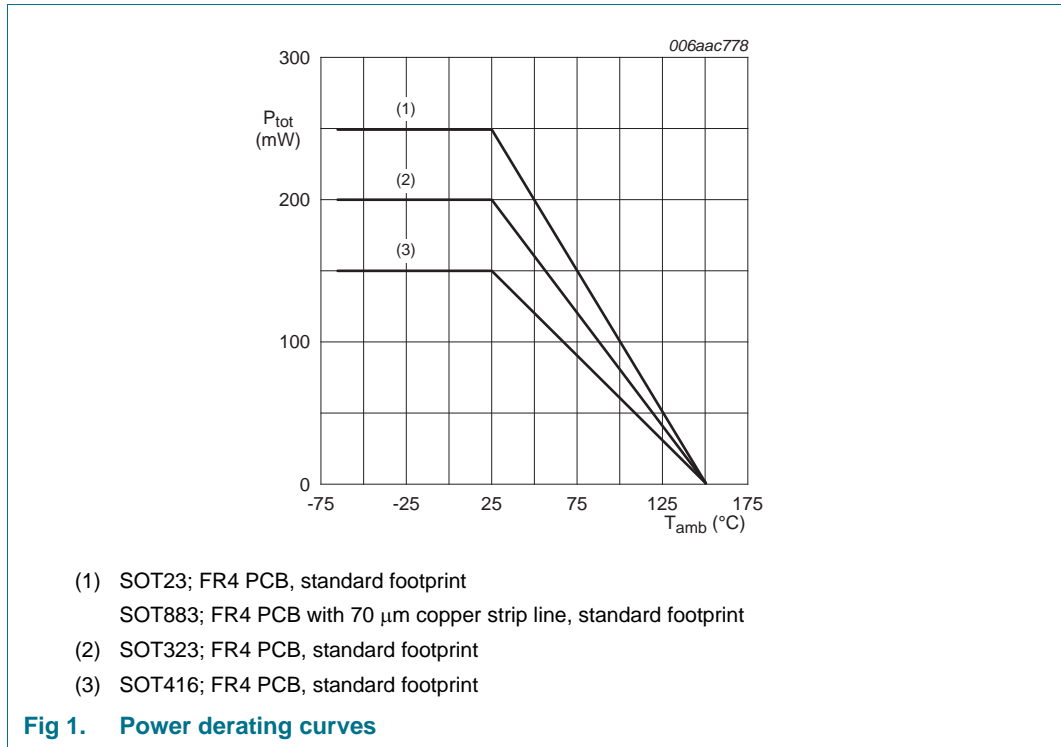
*In accordance with the Absolute Maximum Rating System (IEC 60134).*

Symbol	Parameter	Conditions	Min	Max	Unit	
$V_{CBO}$	collector-base voltage	open emitter	-	-50	V	
$V_{CEO}$	collector-emitter voltage	open base	-	-50	V	
$V_{EBO}$	emitter-base voltage	open collector	-	-7	V	
$V_I$	input voltage					
	positive		-	+7	V	
	negative		-	-20	V	
$I_O$	output current		-	-100	mA	
$I_{CM}$	peak collector current	single pulse; $t_p \leq 1$ ms	-	-100	mA	
$P_{tot}$	total power dissipation	$T_{amb} \leq 25$ °C				
	PDTA143XE (SOT416)		[1][2]	-	150	mW
	PDTA143XM (SOT883)		[2][3]	-	250	mW
	PDTA143XT (SOT23)		[1]	-	250	mW
	PDTA143XU (SOT323)		[1]	-	200	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.

[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

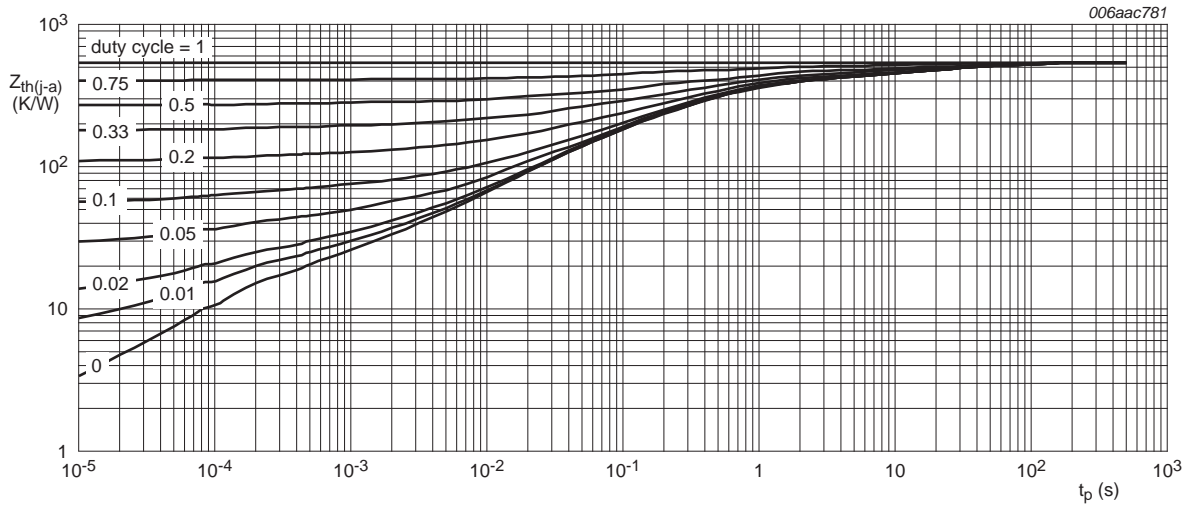
**Table 7. Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
R <sub>th(j-a)</sub>	thermal resistance from junction to ambient	in free air				
	PDTA143XE (SOT416)	[1][2]	-	-	830	K/W
	PDTA143XM (SOT883)	[2][3]	-	-	500	K/W
	PDTA143XT (SOT23)	[1]	-	-	500	K/W
	PDTA143XU (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.



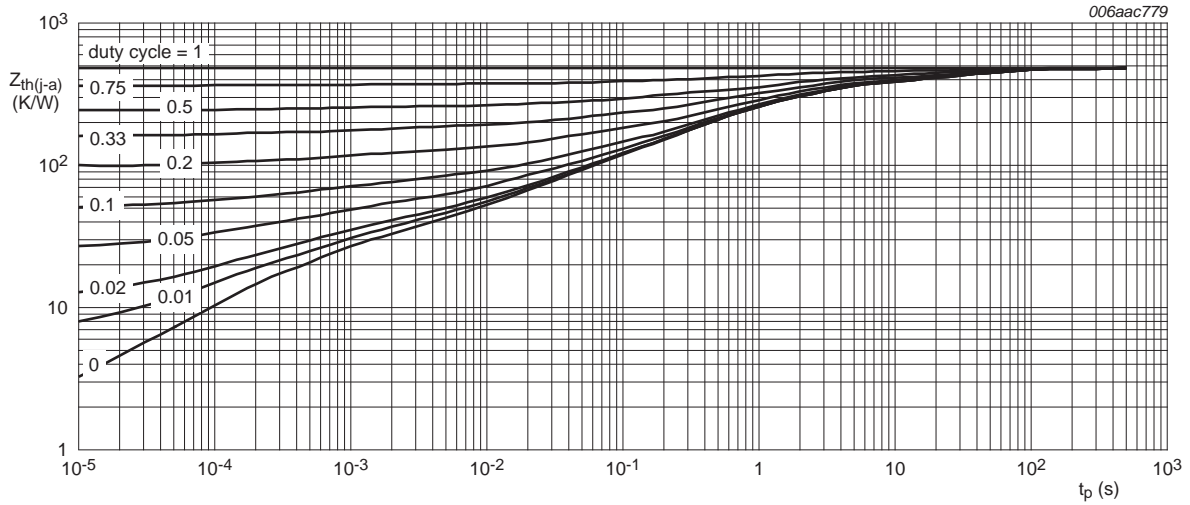
FR4 PCB, standard footprint

**Fig 2. Transient thermal impedance from junction to ambient as a function of pulse duration for PDTA143XE (SOT416); typical values**



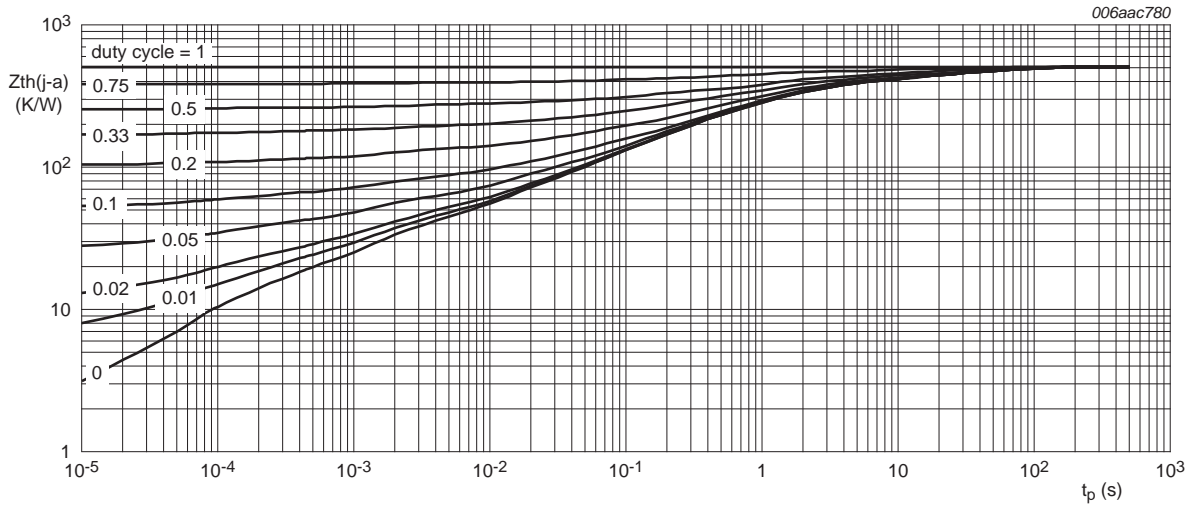
FR4 PCB, 70 μm copper strip line

**Fig 3. Transient thermal impedance from junction to ambient as a function of pulse duration for PDTA143XM (SOT883); typical values**



FR4 PCB, standard footprint

**Fig 4. Transient thermal impedance from junction to ambient as a function of pulse duration for PDTA143XT (SOT23); typical values**



FR4 PCB, standard footprint

**Fig 5. Transient thermal impedance from junction to ambient as a function of pulse duration for PDTA143XU (SOT323); typical values**

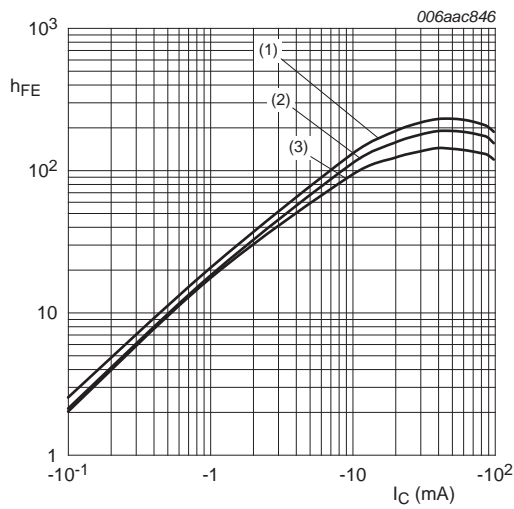
## 7. Characteristics

**Table 8. Characteristics**

$T_{amb} = 25\text{ }^{\circ}\text{C}$  unless otherwise specified.

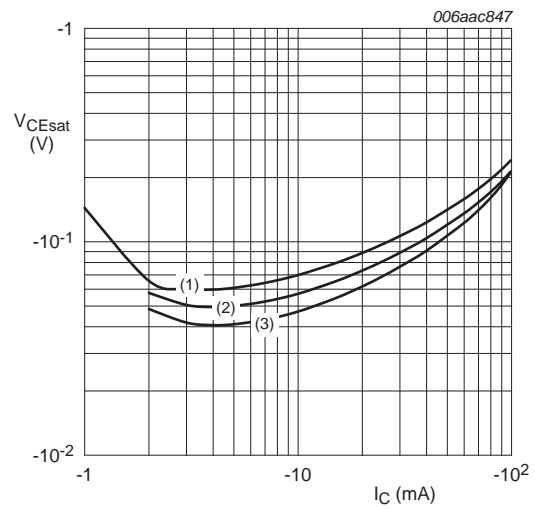
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{CBO}$	collector-base cut-off current	$V_{CB} = -50\text{ V}$ ; $I_E = 0\text{ A}$	-	-	-100	nA
$I_{CEO}$	collector-emitter cut-off current	$V_{CE} = -30\text{ V}$ ; $I_B = 0\text{ A}$	-	-	-1	$\mu\text{A}$
		$V_{CE} = -30\text{ V}$ ; $I_B = 0\text{ A}$ ; $T_j = 150\text{ }^{\circ}\text{C}$	-	-	-5	$\mu\text{A}$
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = -5\text{ V}$ ; $I_C = 0\text{ A}$	-	-	-600	$\mu\text{A}$
$h_{FE}$	DC current gain	$V_{CE} = -5\text{ V}$ ; $I_C = -10\text{ mA}$	50	-	-	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = -10\text{ mA}$ ; $I_B = -0.5\text{ mA}$	-	-	-100	mV
$V_{I(off)}$	off-state input voltage	$V_{CE} = -5\text{ V}$ ; $I_C = -100\text{ }\mu\text{A}$	-	-0.9	-0.3	V
$V_{I(on)}$	on-state input voltage	$V_{CE} = -0.3\text{ V}$ ; $I_C = -20\text{ mA}$	-2.5	-1.5	-	V
R1	bias resistor 1 (input)		3.3	4.7	6.1	k $\Omega$
R2/R1	bias resistor ratio		1.7	2.1	2.6	
$C_c$	collector capacitance	$V_{CB} = -10\text{ V}$ ; $I_E = i_e = 0\text{ A}$ ; $f = 1\text{ MHz}$	-	-	3	pF
$f_T$	transition frequency	$V_{CE} = -5\text{ V}$ ; $I_C = -10\text{ mA}$ ; <a href="#">[1]</a> $f = 100\text{ MHz}$	-	180	-	MHz

[1] Characteristics of built-in transistor



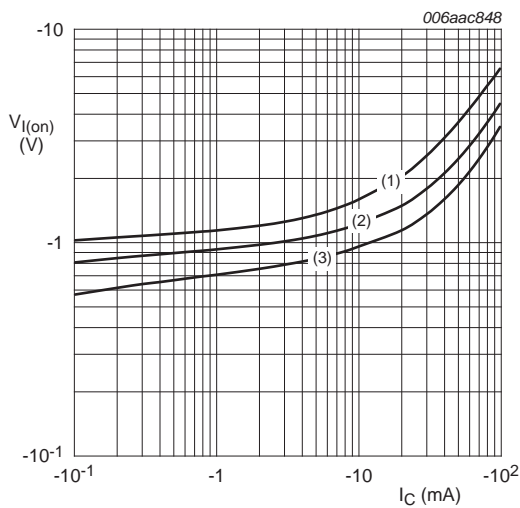
$V_{CE} = -5 \text{ V}$   
 (1)  $T_{amb} = 100 \text{ }^\circ\text{C}$   
 (2)  $T_{amb} = 25 \text{ }^\circ\text{C}$   
 (3)  $T_{amb} = -40 \text{ }^\circ\text{C}$

**Fig 6. DC current gain as a function of collector current; typical values**



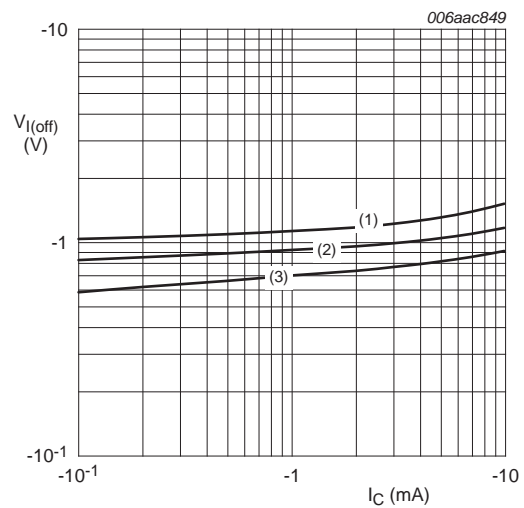
$I_C/I_B = 20$   
 (1)  $T_{amb} = 100 \text{ }^\circ\text{C}$   
 (2)  $T_{amb} = 25 \text{ }^\circ\text{C}$   
 (3)  $T_{amb} = -40 \text{ }^\circ\text{C}$

**Fig 7. 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)  $T_{amb} = 100 \text{ }^\circ\text{C}$

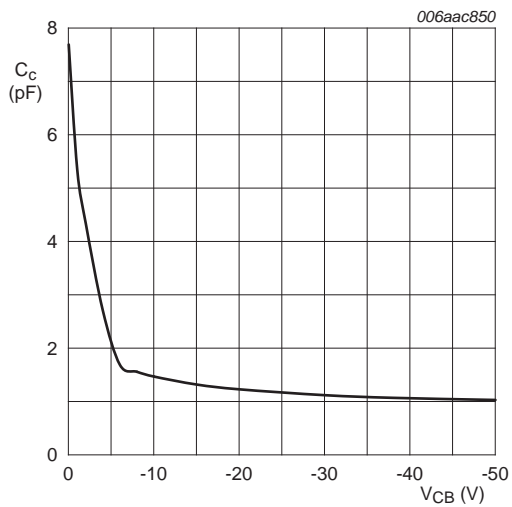
**Fig 8. On-state input voltage as a function of collector current; typical values**



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

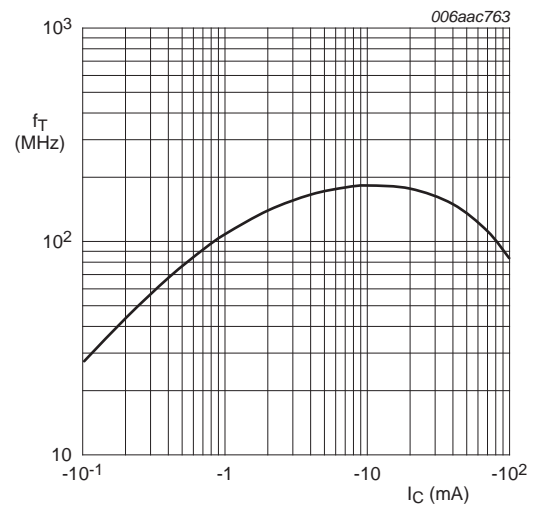
**Fig 9. Off-state input voltage as a function of collector current; typical values**





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

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



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

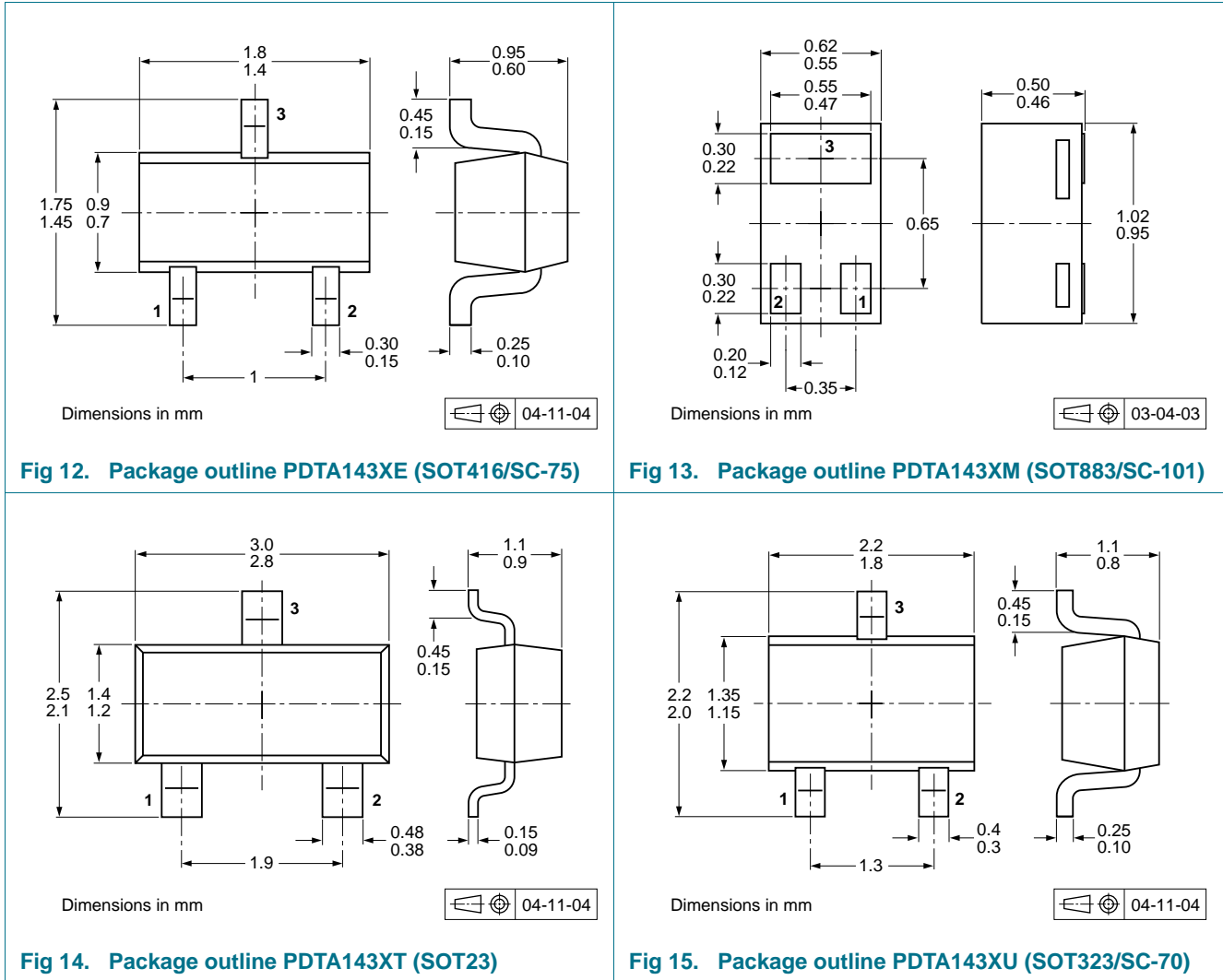
**Fig 11.** Transition frequency as a function of collector current; typical values of built-in transistor

## 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**

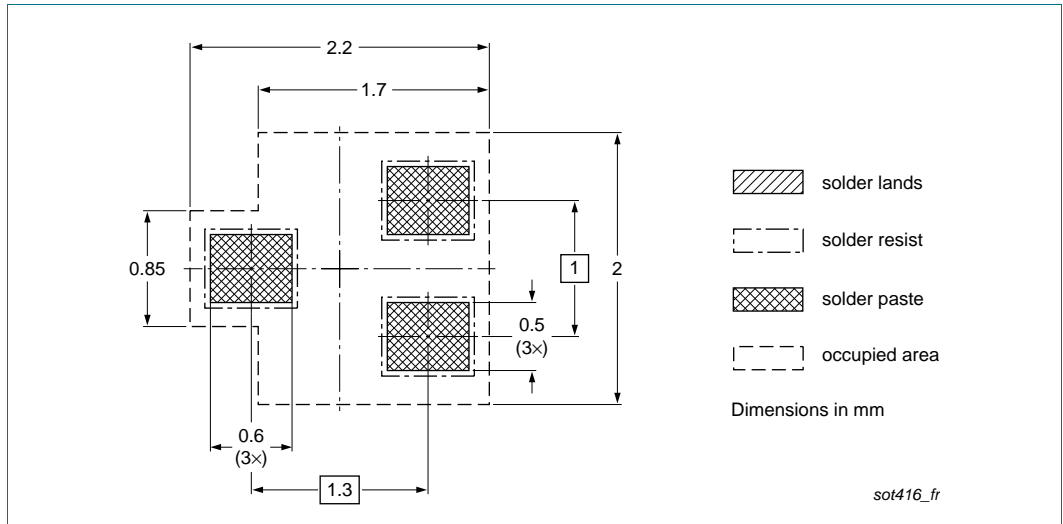
**Table 9. Packing methods**

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
PDTA143XE	SOT416	4 mm pitch, 8 mm tape and reel	-115	-	-135
PDTA143XM	SOT883	2 mm pitch, 8 mm tape and reel	-	-	-315
PDTA143XT	SOT23	4 mm pitch, 8 mm tape and reel	-215	-	-235
PDTA143XU	SOT323	4 mm pitch, 8 mm tape and reel	-115	-	-135

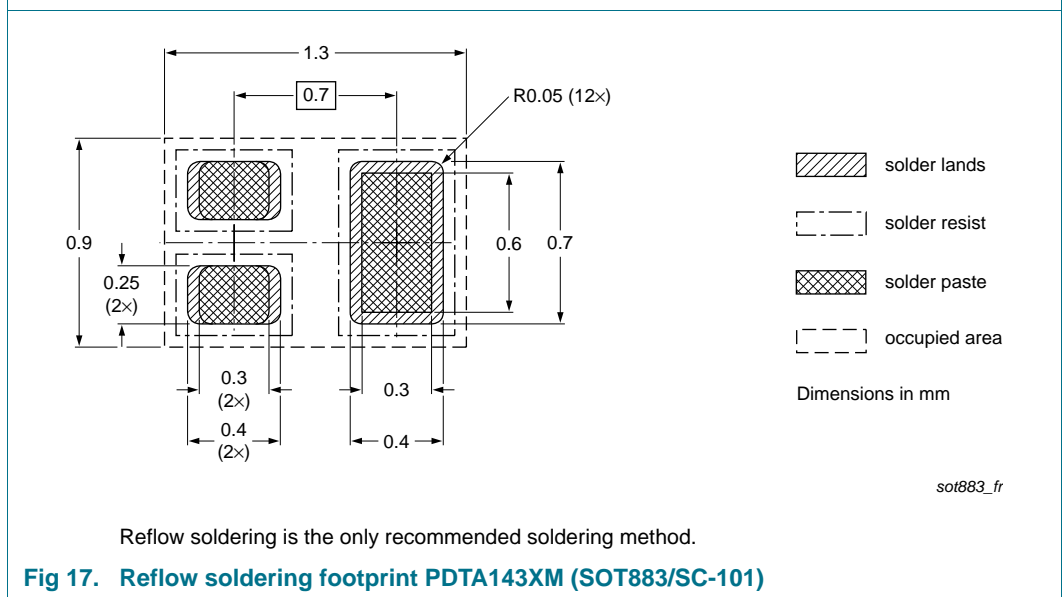
[1] For further information and the availability of packing methods, see [Section 14](#).

**11. Soldering**



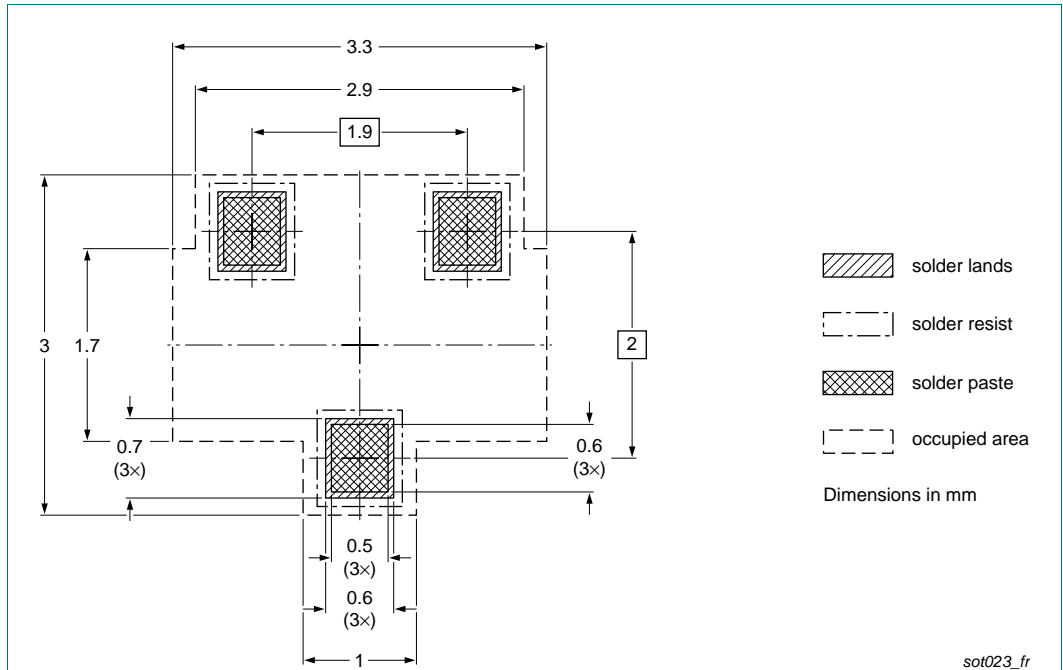
Reflow soldering is the only recommended soldering method.

**Fig 16. Reflow soldering footprint PDTA143XE (SOT416/SC-75)**

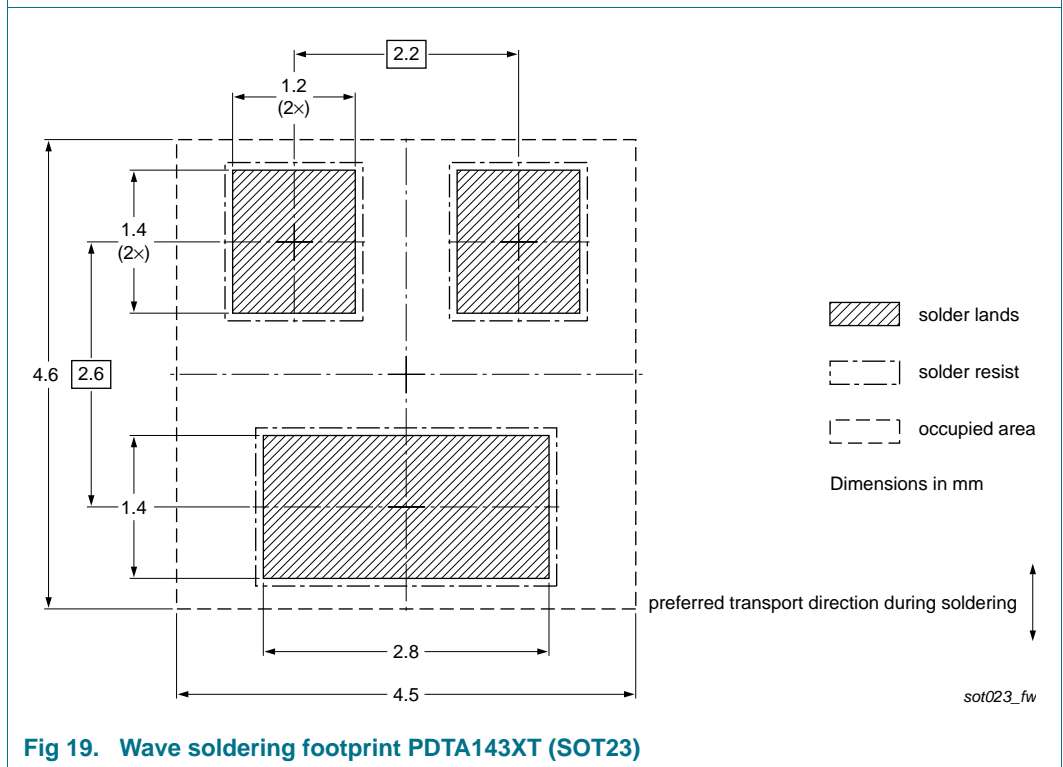


Reflow soldering is the only recommended soldering method.

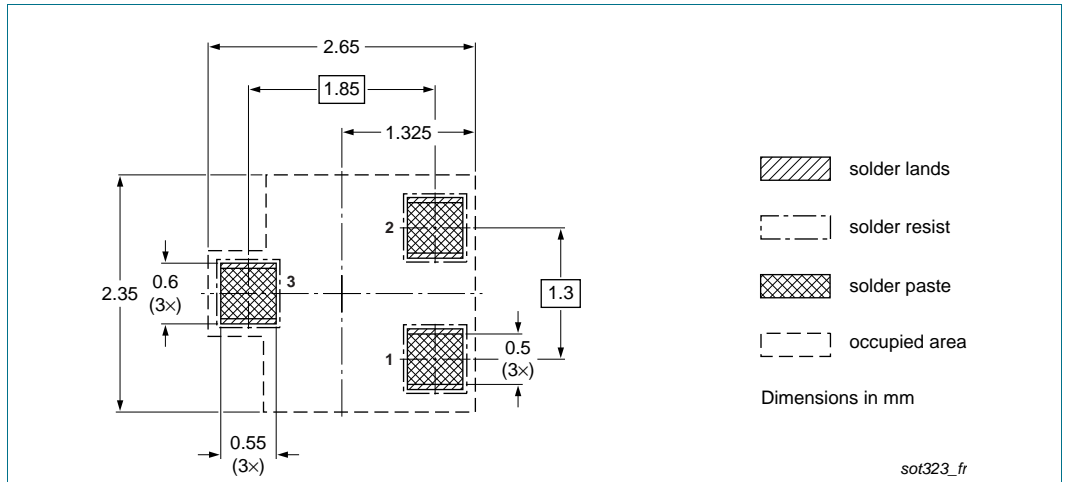
**Fig 17. Reflow soldering footprint PDTA143XM (SOT883/SC-101)**



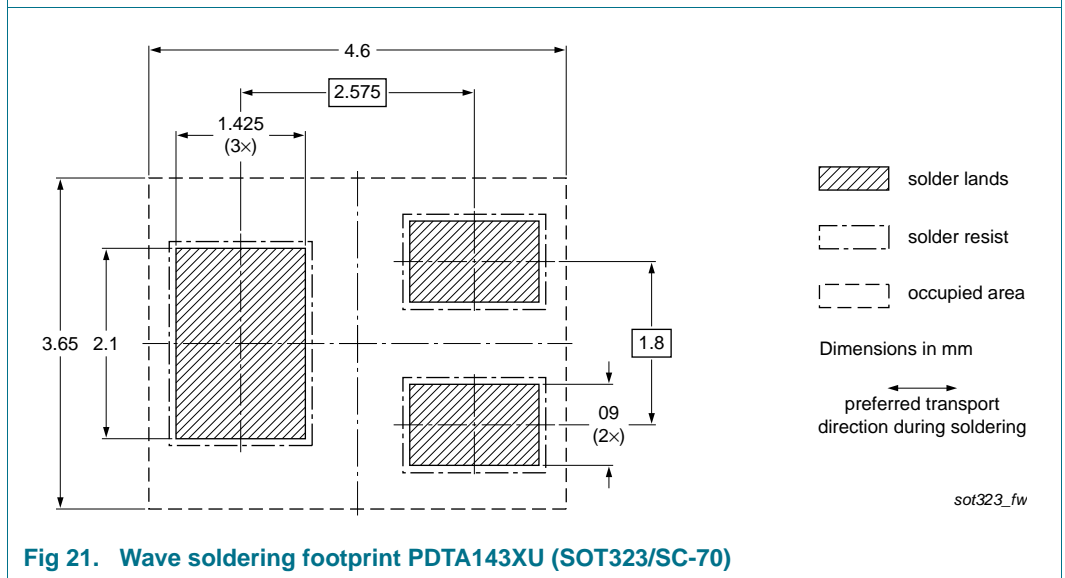
**Fig 18. Reflow soldering footprint PDTA143XT (SOT23)**



**Fig 19. Wave soldering footprint PDTA143XT (SOT23)**



**Fig 20. Reflow soldering footprint PDTA143XU (SOT323/SC-70)**



**Fig 21. Wave soldering footprint PDTA143XU (SOT323/SC-70)**

## 12. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PDTA143X_SER v.5	20111209	Product data sheet	-	PDTA143X_SERIES v.4
Modifications:	<ul style="list-style-type: none"> <li>• Type numbers PDTA143XK and PDTA143XS removed.</li> <li>• <a href="#">Section 1 “Product profile”</a>: updated</li> <li>• <a href="#">Section 4 “Marking”</a>: updated</li> <li>• <a href="#">Figure 1</a> to <a href="#">5</a>, <a href="#">10</a> and <a href="#">11</a>: added</li> <li>• <a href="#">Section 6 “Thermal characteristics”</a>: updated</li> <li>• <a href="#">Figure 6</a> to <a href="#">9</a>: updated</li> <li>• <a href="#">Table 8 “Characteristics”</a>: I<sub>CEO</sub> updated, f<sub>T</sub> added</li> <li>• <a href="#">Section 8 “Test information”</a>: added</li> <li>• <a href="#">Section 11 “Soldering”</a>: added</li> <li>• <a href="#">Section 13 “Legal information”</a>: updated</li> </ul>			
PDTA143X_SERIES v.4	20070416	Product data sheet	-	PDTA143X_SERIES v.3
PDTA143X_SERIES v.3	20040804	Product specification	-	PDTA143X_SERIES v.2
PDTA143X_SERIES v.2	20030410	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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## 14. Contact information

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[TP](#) [NSBA144EF3T5G](#) [NSVDTA114EET1G](#) [2SC2223-T1B-A](#) [2SC3912-TB-E](#) [SMUN5237DW1T1G](#) [SMUN5213DW1T1G](#)  
[SMUN5114DW1T1G](#) [SMUN2111T1G](#) [NSVDTC144EM3T5G](#) [DTC124ECA-TP](#) [DTC123TM3T5G](#) [DTA114ECA-TP](#) [DTA113EM3T5G](#)  
[DCX115EK-7-F](#) [DTC113EM3T5G](#) [NSVMUN5135DW1T1G](#) [NSVMUN2237T1G](#) [SMUN5335DW1T2G](#) [SMUN5216DW1T1G](#)  
[NSVMUN5316DW1T1G](#) [NSVMUN5312DW1T2G](#) [NSVMUN5215DW1T1G](#) [NSVMUN5213DW1T3G](#)