

# PDTA124E series

PNP resistor-equipped transistors;  
R1 = 22 k $\Omega$ , R2 = 22 k $\Omega$

Rev. 8 — 25 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		
PDTA124EE	SOT416	SC-75	-	PDTC124EE	ultra small
PDTA124EM	SOT883	SC-101	-	PDTC124EM	leadless ultra small
PDTA124ET	SOT23	-	TO-236AB	PDTC124ET	small
PDTA124EU	SOT323	SC-70	-	PDTC124EU	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

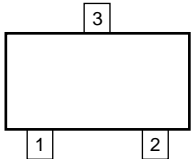
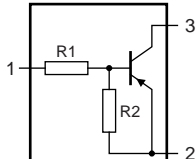
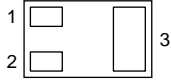
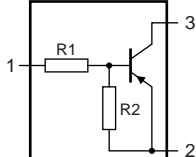
Table 2. Quick reference data

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)		15.4	22	28.6	k $\Omega$
R2/R1	bias resistor ratio		0.8	1	1.2	



## 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
PDTA124EE	SC-75	plastic surface-mounted package; 3 leads	SOT416
PDTA124EM	SC-101	leadless ultra small plastic package; 3 solder lands; body 1.0 × 0.6 × 0.5 mm	SOT883
PDTA124ET	-	plastic surface-mounted package; 3 leads	SOT23
PDTA124EU	SC-70	plastic surface-mounted package; 3 leads	SOT323

## 4. Marking

**Table 5. Marking codes**

Type number	Marking code <sup>[1]</sup>
PDTA124EE	05
PDTA124EM	DH
PDTA124ET	*05
PDTA124EU	*05

[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	-	-10	V	
V <sub>I</sub>	input voltage					
	positive		-	+10	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				
	PDTA124EE (SOT416)		[1][2]	-	150	mW
	PDTA124EM (SOT883)		[2][3]	-	250	mW
	PDTA124ET (SOT23)		[1]	-	250	mW
	PDTA124EU (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

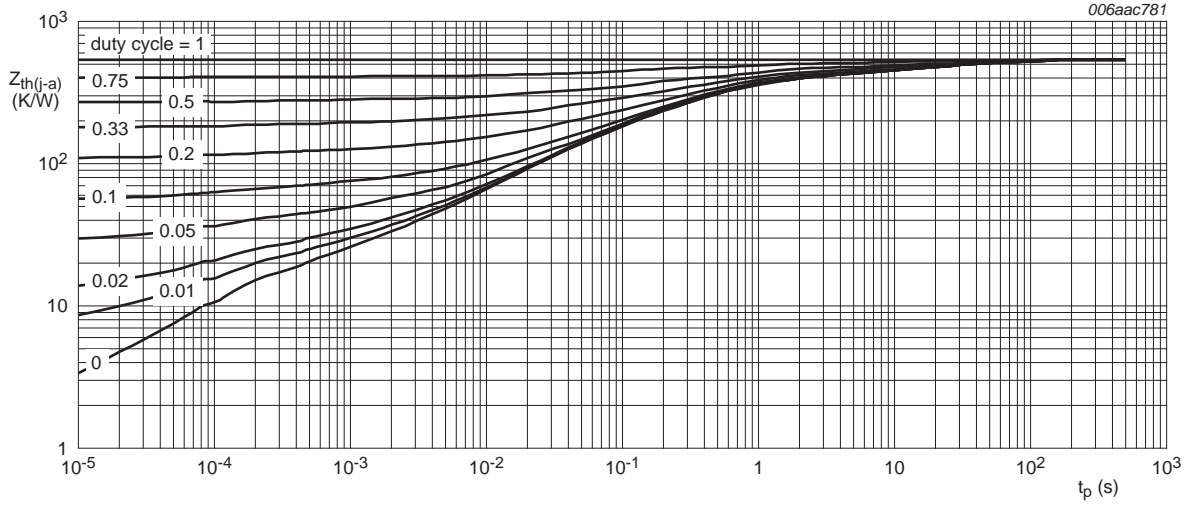
**Table 7. Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
R <sub>th(j-a)</sub>	thermal resistance from junction to ambient	in free air				
	PDTA124EE (SOT416)	[1][2]	-	-	830	K/W
	PDTA124EM (SOT883)	[2][3]	-	-	500	K/W
	PDTA124ET (SOT23)	[1]	-	-	500	K/W
	PDTA124EU (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 PDTA124EE (SOT416); typical values**



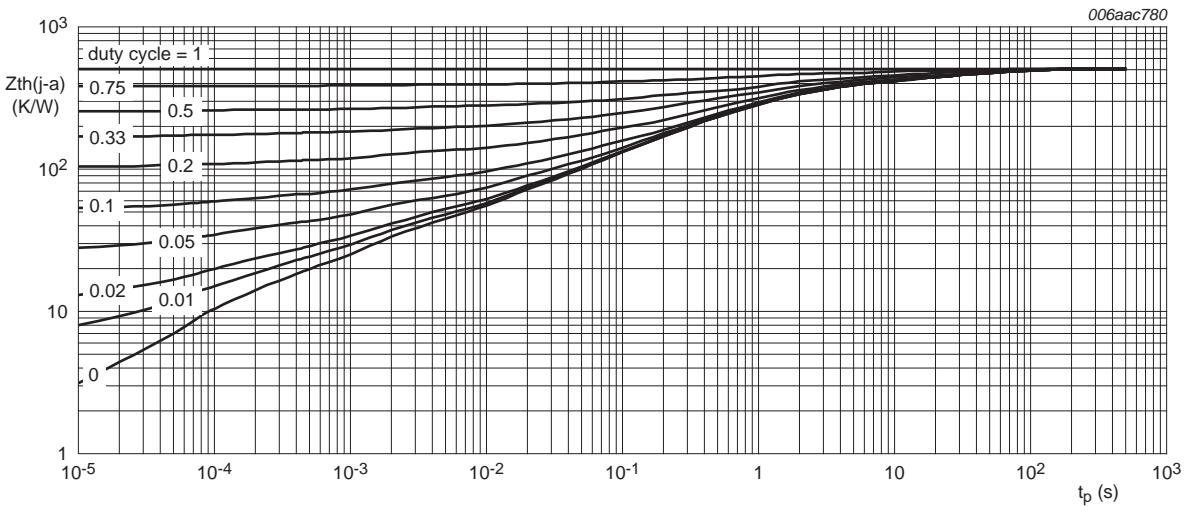
FR4 PCB, 70 μm copper strip line

**Fig 3. Transient thermal impedance from junction to ambient as a function of pulse duration for PDTA124EM (SOT883); typical values**



FR4 PCB, standard footprint

**Fig 4. Transient thermal impedance from junction to ambient as a function of pulse duration for PDTA124ET (SOT23); typical values**



FR4 PCB, standard footprint

**Fig 5. Transient thermal impedance from junction to ambient as a function of pulse duration for PDTA124EU (SOT323); typical values**

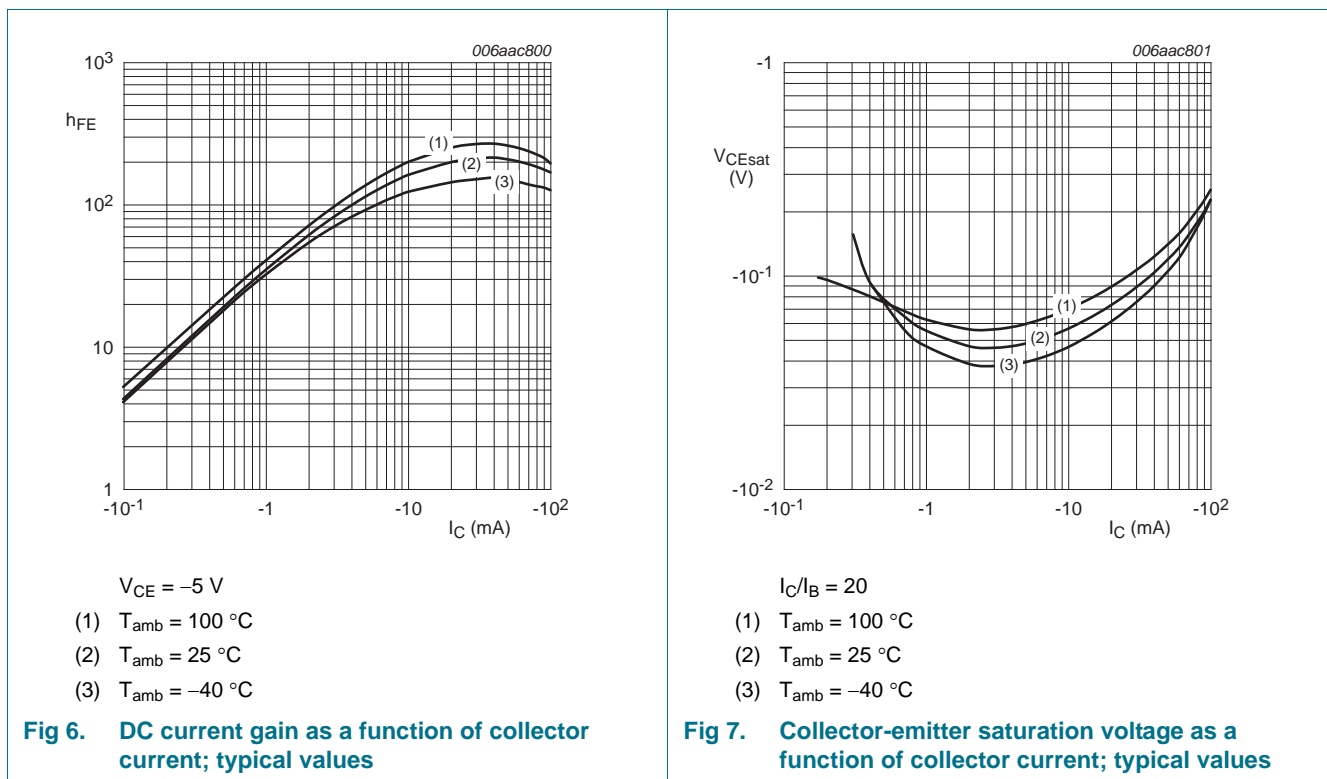
## 7. Characteristics

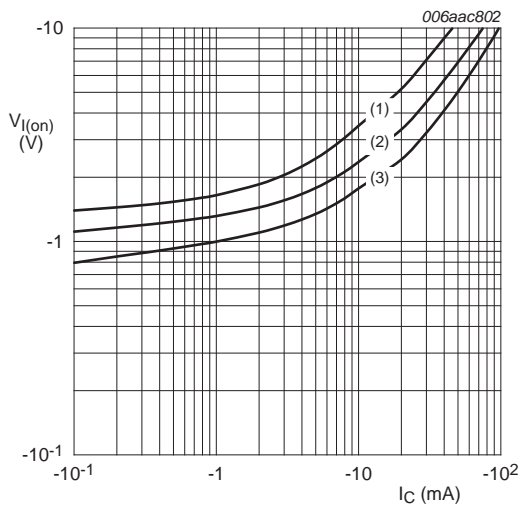
**Table 8. Characteristics**

$T_{amb} = 25\text{ °C}$  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	$V_{CE} = -30\text{ V}; I_B = 0\text{ A}$	-	-	-100	nA
		$V_{CE} = -30\text{ V}; I_B = 0\text{ A}; T_j = 150\text{ °C}$	-	-	-5	μA
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = -5\text{ V}; I_C = 0\text{ A}$	-	-	-180	μA
$h_{FE}$	DC current gain	$V_{CE} = -5\text{ V}; I_C = -5\text{ mA}$	60	-	-	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = -10\text{ mA}; I_B = -0.5\text{ mA}$	-	-	-150	mV
$V_{I(off)}$	off-state input voltage	$V_{CE} = -5\text{ V}; I_C = -100\text{ μA}$	-	-1.1	-0.8	V
$V_{I(on)}$	on-state input voltage	$V_{CE} = -0.3\text{ V}; I_C = -5\text{ mA}$	-2.5	-1.7	-	V
R1	bias resistor 1 (input)		15.4	22	28.6	kΩ
R2/R1	bias resistor ratio		0.8	1	1.2	
$C_c$	collector capacitance	$V_{CB} = -10\text{ V}; I_E = i_e = 0\text{ A}; f = 1\text{ MHz}$	-	-	3	pF
$f_T$	transition frequency	$V_{CE} = -5\text{ V}; I_C = -10\text{ mA}; [1]$	-	180	-	MHz
		$f = 100\text{ MHz}$				

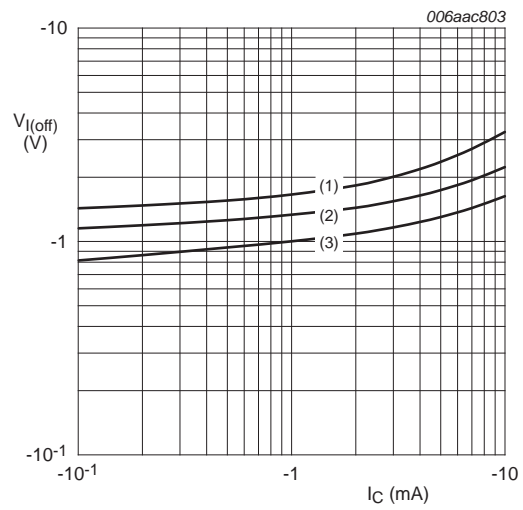
[1] Characteristics of built-in transistor





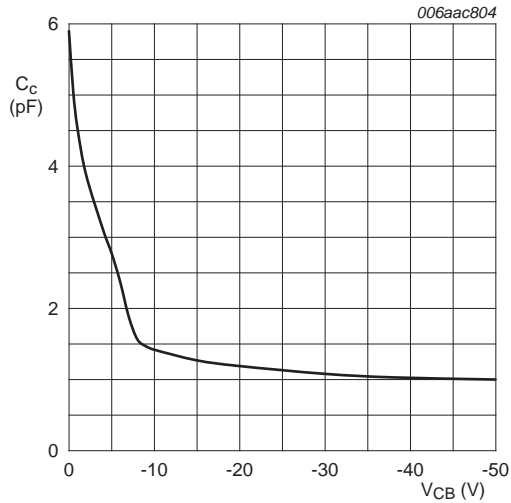
$V_{CE} = -0.3 \text{ V}$   
 (1)  $T_{amb} = -40 \text{ }^\circ\text{C}$   
 (2)  $T_{amb} = 25 \text{ }^\circ\text{C}$   
 (3)  $T_{amb} = 100 \text{ }^\circ\text{C}$

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



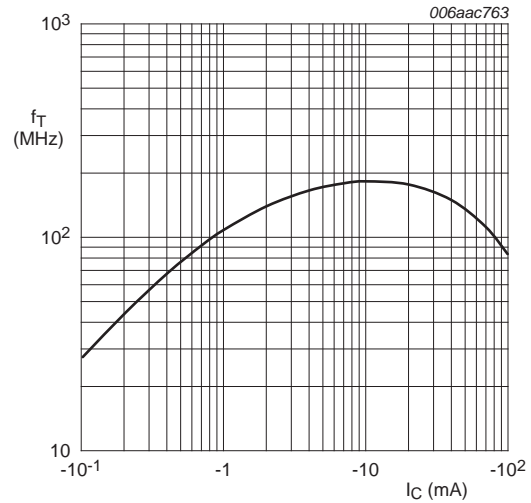
$V_{CE} = -5 \text{ V}$   
 (1)  $T_{amb} = -40 \text{ }^\circ\text{C}$   
 (2)  $T_{amb} = 25 \text{ }^\circ\text{C}$   
 (3)  $T_{amb} = 100 \text{ }^\circ\text{C}$

**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**

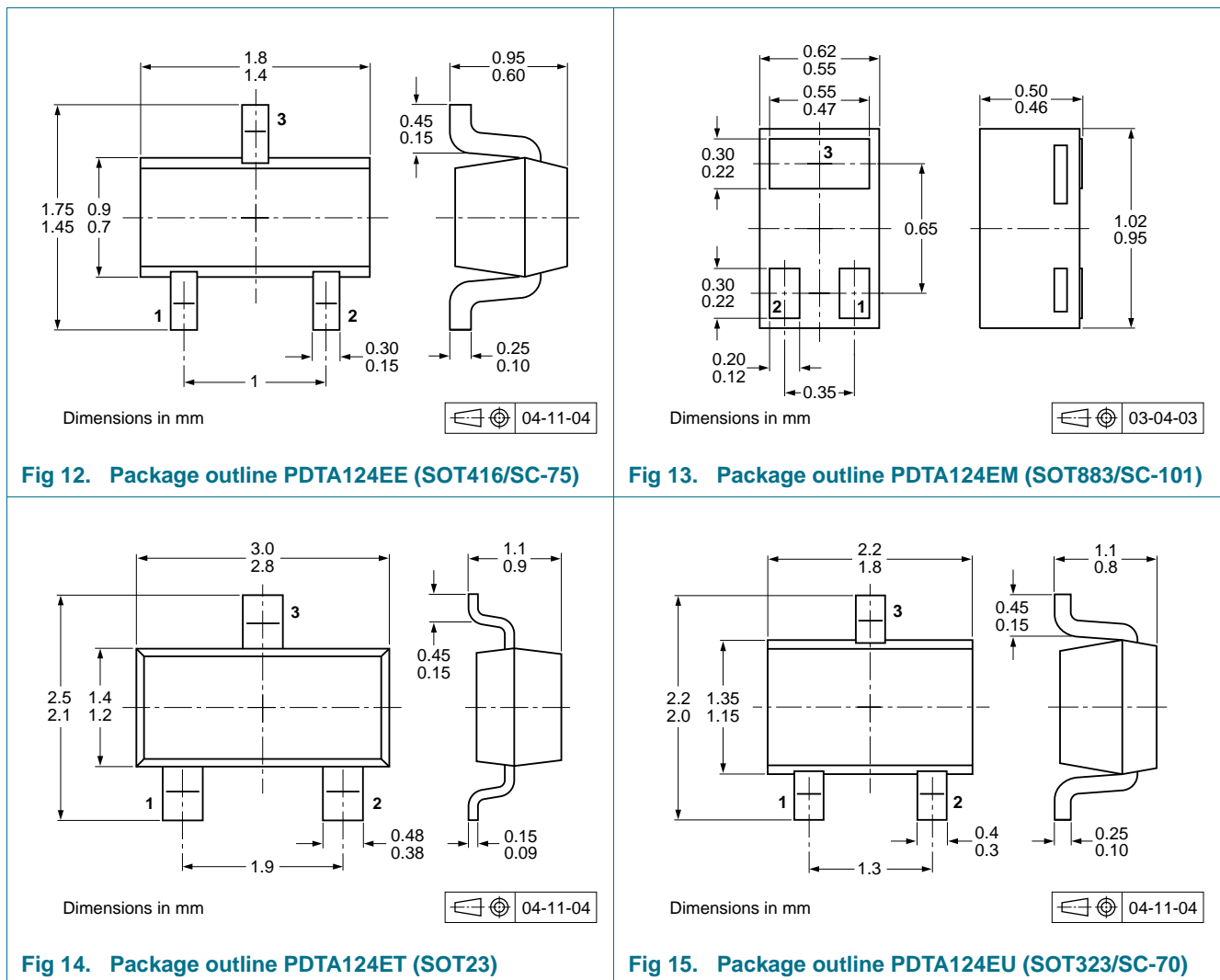


## 8. Test information

### 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

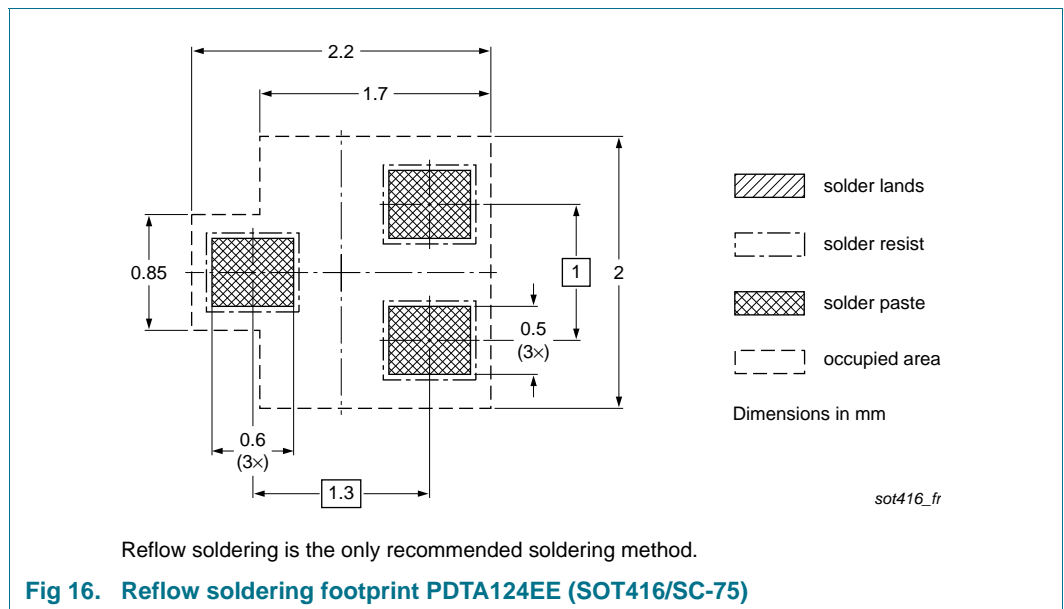
**Table 9. Packing methods**

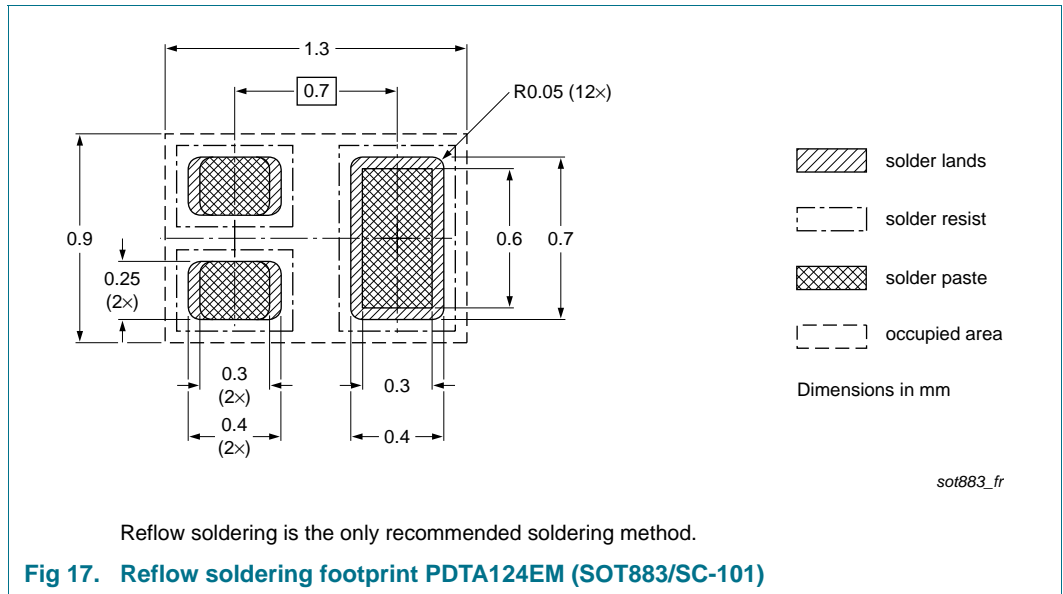
The indicated -xxx are the last three digits of the 12NC ordering code.<sup>[1]</sup>

Type number	Package	Description	Packing quantity		
			3000	5000	10000
PDTA124EE	SOT416	4 mm pitch, 8 mm tape and reel	-115	-	-135
PDTA124EM	SOT883	2 mm pitch, 8 mm tape and reel	-	-	-315
PDTA124ET	SOT23	4 mm pitch, 8 mm tape and reel	-215	-	-235
PDTA124EU	SOT323	4 mm pitch, 8 mm tape and reel	-115	-	-135

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

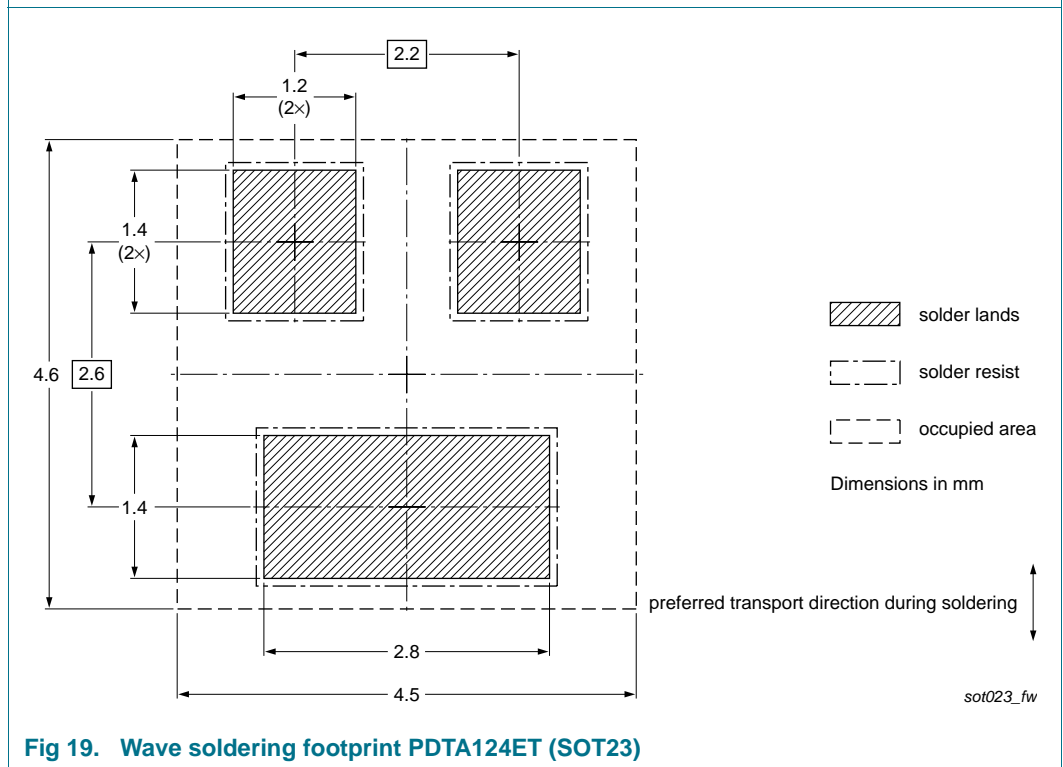
## 11. Soldering







**Fig 18. Reflow soldering footprint PDTA124ET (SOT23)**



**Fig 19. Wave soldering footprint PDTA124ET (SOT23)**

