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Kind regards,

Team Nexperia

# PDTA124X series

PNP resistor-equipped transistors; R1 = 22 k $\Omega$ , R2 = 47 k $\Omega$

Rev. 08 — 3 September 2009

Product data sheet

## 1. Product profile

### 1.1 General description

PNP Resistor-Equipped Transistors (RET) family.

Table 1. Product overview

Type number	Package			NPN complement
	NXP	JEITA	JEDEC	
PDTA124XE	SOT416	SC-75	-	PDTC124XE
PDTA124XEF	SOT490	SC-89	-	PDTC124XEF
PDTA124XK	SOT346	SC-59A	TO-236	PDTC124XK
PDTA124XM	SOT883	SC-101	-	PDTC124XM
PDTA124XS <sup>[1]</sup>	SOT54	SC-43A	TO-92	PDTC124XS
PDTA124XT	SOT23	-	TO-236AB	PDTC124XT
PDTA124XU	SOT323	SC-70	-	PDTC124XU

[1] Also available in SOT54A and SOT54 variant packages (see [Section 2](#))

### 1.2 Features

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

### 1.3 Applications

- Digital applications
- Controlling IC inputs
- Cost-saving alternative for BC857 series in digital applications
- Switching loads

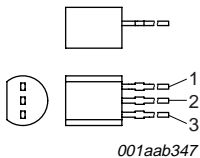
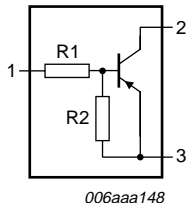
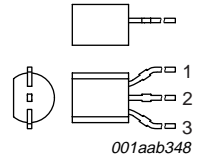
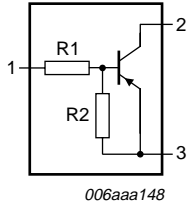
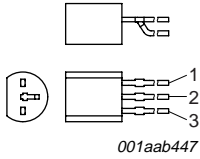
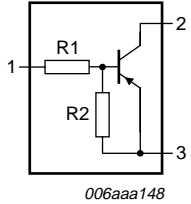
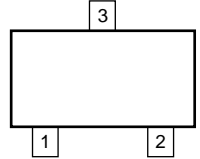
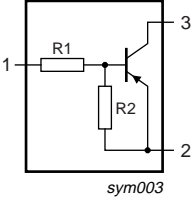
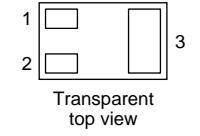
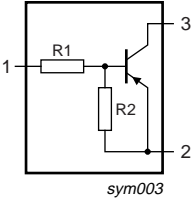
### 1.4 Quick reference data

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 (DC)		-	-	-100	mA
R1	bias resistor 1 (input)		15.4	22	28.6	k $\Omega$
R2/R1	bias resistor ratio		1.7	2.1	2.6	

**2. Pinning information**

**Table 3. Pinning**

Pin	Description	Simplified outline	Symbol
<b>SOT54</b>			
1	input (base)	 <p>001aab347</p>	 <p>006aaa148</p>
2	output (collector)		
3	GND (emitter)		
<b>SOT54A</b>			
1	input (base)	 <p>001aab348</p>	 <p>006aaa148</p>
2	output (collector)		
3	GND (emitter)		
<b>SOT54 variant</b>			
1	input (base)	 <p>001aab447</p>	 <p>006aaa148</p>
2	output (collector)		
3	GND (emitter)		
<b>SOT23; SOT323; SOT346; SOT416; SOT490</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		Version
	Name	Description	
PDTA124XE	SC-75	plastic surface mounted package; 3 leads	SOT416
PDTA124XEF	SC-89	plastic surface mounted package; 3 leads	SOT490
PDTA124XK	SC-59A	plastic surface mounted package; 3 leads	SOT346
PDTA124XM	SC-101	leadless ultra small plastic package; 3 solder lands; body 1.0 × 0.6 × 0.5 mm	SOT883
PDTA124XS <sup>[1]</sup>	SC-43A	plastic single-ended leaded (through hole) package; 3 leads	SOT54
PDTA124XT	-	plastic surface mounted package; 3 leads	SOT23
PDTA124XU	SC-70	plastic surface mounted package; 3 leads	SOT323

[1] Also available in SOT54A and SOT54 variant packages (see [Section 2](#) and [Section 9](#))

### 4. Marking

Table 5. Marking codes

Type number	Marking code <sup>[1]</sup>
PDTA124XE	31
PDTA124XEF	31
PDTA124XK	44
PDTA124XM	DK
PDTA124XS	TA124X
PDTA124XT	*47
PDTA124XU	*44

[1] \* = -: made in Hong Kong  
 \* = p: made in Hong Kong  
 \* = t: made in Malaysia  
 \* = W: made in China

## 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	-	-7	V	
V <sub>I</sub>	input voltage					
	positive		-	+7	V	
	negative		-	-40	V	
I <sub>O</sub>	output current (DC)		-	-100	mA	
I <sub>CM</sub>	peak collector current		-	-100	mA	
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C				
	SOT416		[1]	-	150	mW
	SOT490		[1][2]	-	250	mW
	SOT346		[1]	-	250	mW
	SOT883		[2][3]	-	250	mW
	SOT54		[1]	-	500	mW
	SOT23		[1]	-	250	mW
	SOT323		[1]	-	200	mW
	T <sub>stg</sub>	storage temperature		-65	+150	°C
T <sub>j</sub>	junction temperature		-	150	°C	
T <sub>amb</sub>	ambient 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 60  $\mu$ m copper strip line, standard footprint.

## 6. Thermal characteristics

**Table 7. Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air				
	SOT416		[1]	-	833	K/W
	SOT490		[1][2]	-	500	K/W
	SOT346		[1]	-	500	K/W
	SOT883		[2][3]	-	500	K/W
	SOT54		[1]	-	250	K/W
	SOT23		[1]	-	500	K/W
	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.

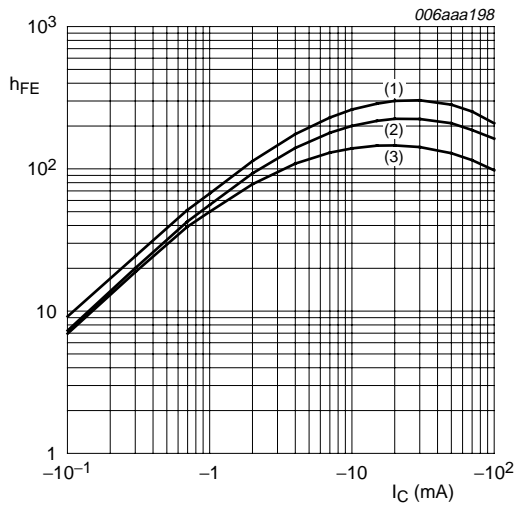
[3] Device mounted on an FR4 PCB with 60 μm copper strip line, standard footprint.

## 7. Characteristics

**Table 8. Characteristics**

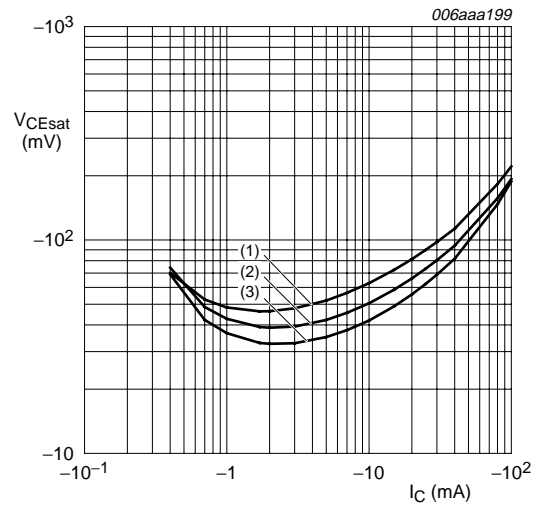
$T_{amb} = 25\text{ °C}$  unless otherwise specified

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	$V_{CE} = -30\text{ V}$ ; $I_B = 0\text{ A}$	-	-	-1	μA
		$V_{CE} = -30\text{ V}$ ; $I_B = 0\text{ A}$ ; $T_j = 150\text{ °C}$	-	-	-50	μA
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = -5\text{ V}$ ; $I_C = 0\text{ A}$	-	-	-120	μA
$h_{FE}$	DC current gain	$V_{CE} = -5\text{ V}$ ; $I_C = -5\text{ mA}$	80	-	-	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = -10\text{ mA}$ ; $I_B = -0.5\text{ mA}$	-	-	-150	mV
$V_{I(off)}$	off-state input voltage	$V_{CE} = -5\text{ V}$ ; $I_C = -100\text{ μA}$	-	-0.8	-0.5	V
$V_{I(on)}$	on-state input voltage	$V_{CE} = -0.3\text{ V}$ ; $I_C = -2\text{ mA}$	-2	-1.1	-	V
R1	bias resistor 1 (input)		15.4	22	28.6	kΩ
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



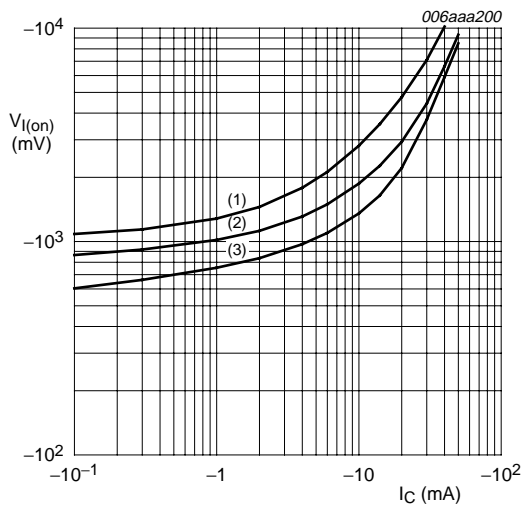
$V_{CE} = -5\text{ V}$   
 (1)  $T_{amb} = 100\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -40\text{ °C}$

**Fig 1. DC current gain as a function of collector current; typical values**



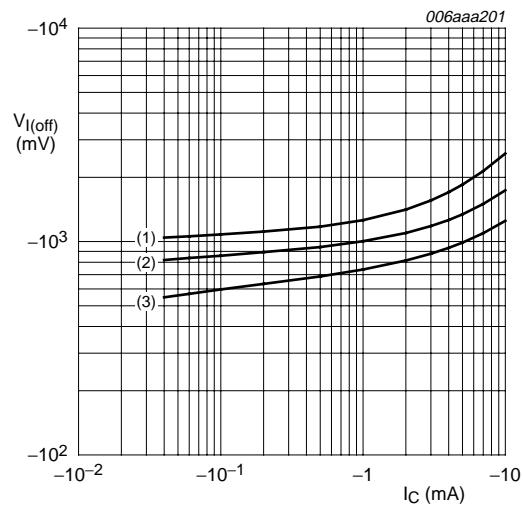
$I_C/I_B = 20$   
 (1)  $T_{amb} = 100\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -40\text{ °C}$

**Fig 2. Collector-emitter saturation voltage as a function of collector current; typical values**



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

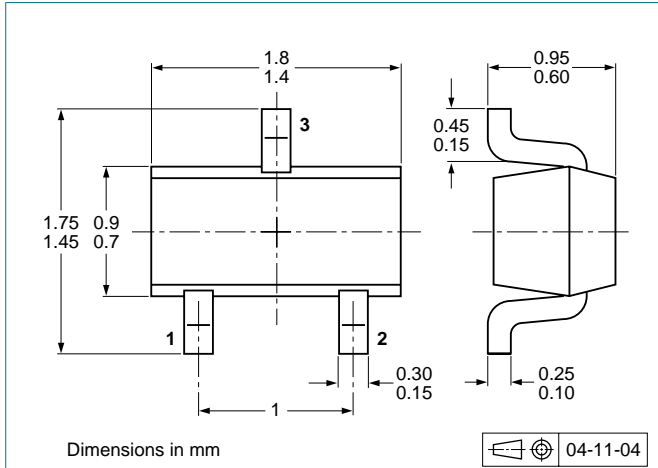
**Fig 3. On-state input voltage as a function of collector current; typical values**



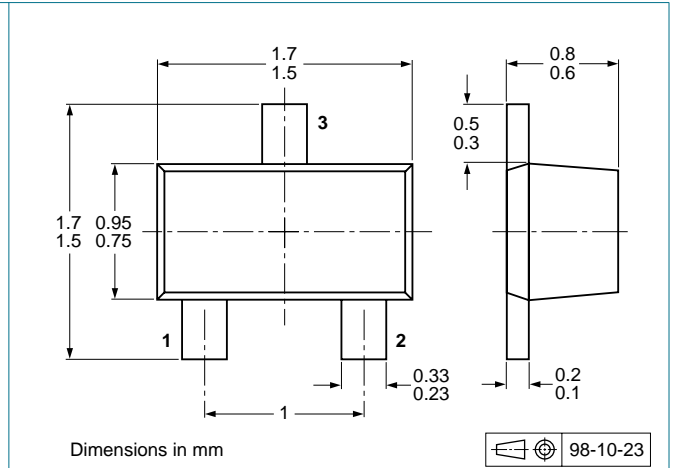
$V_{CE} = -5\text{ V}$   
 (1)  $T_{amb} = -40\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 100\text{ °C}$

**Fig 4. Off-state input voltage as a function of collector current; typical values**

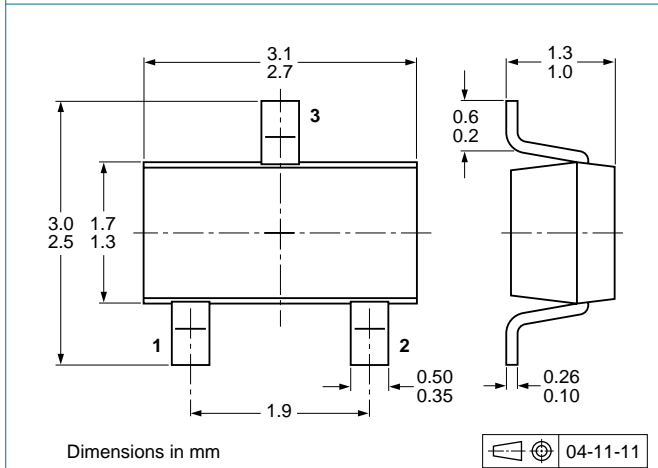
**8. Package outline**



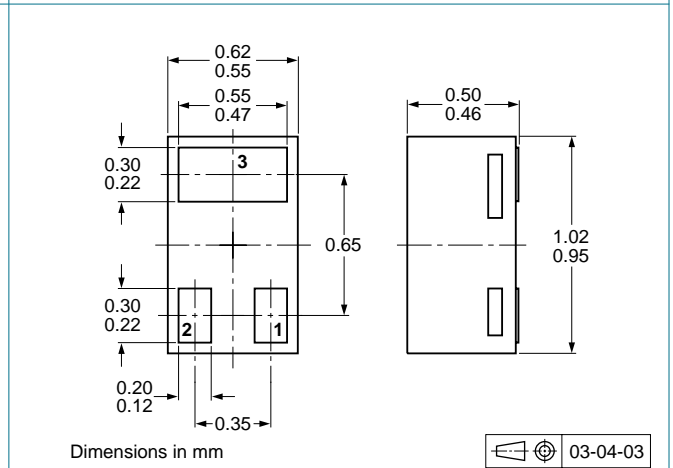
**Fig 5. Package outline SOT416 (SC-75)**



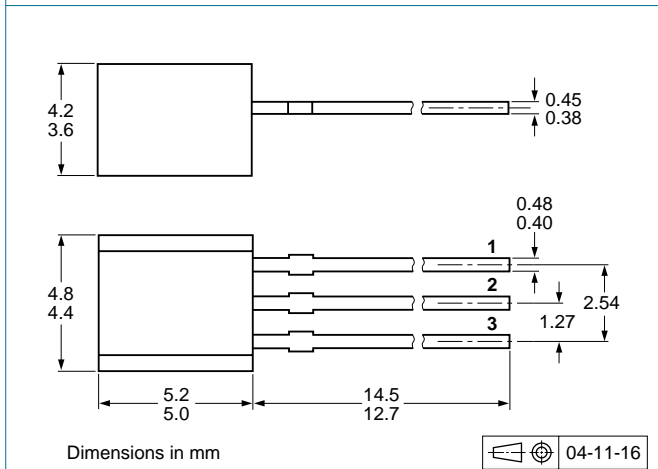
**Fig 6. Package outline SOT490 (SC-89)**



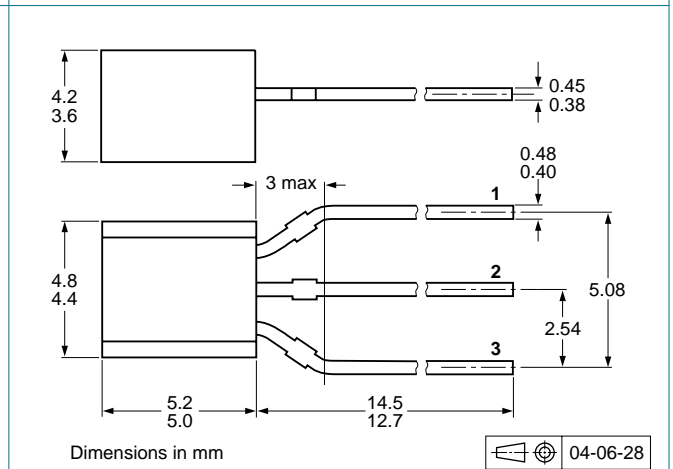
**Fig 7. Package outline SOT346 (SC-59A/TO-236)**



**Fig 8. Package outline SOT883 (SC-101)**



**Fig 9. Package outline SOT54 (SC-43A/TO-92)**



**Fig 10. Package outline SOT54A**



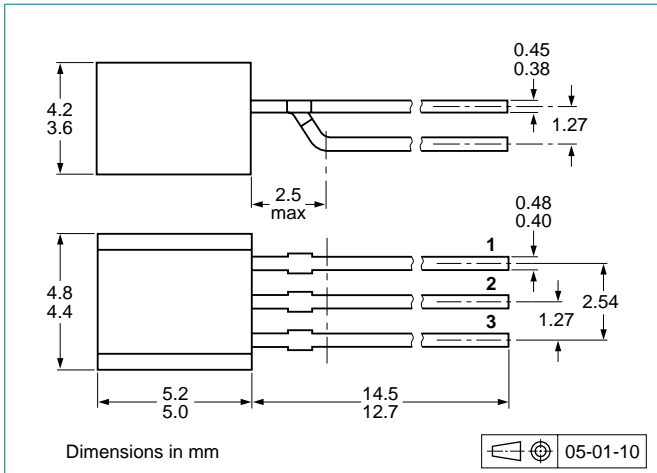


Fig 11. Package outline SOT54 variant

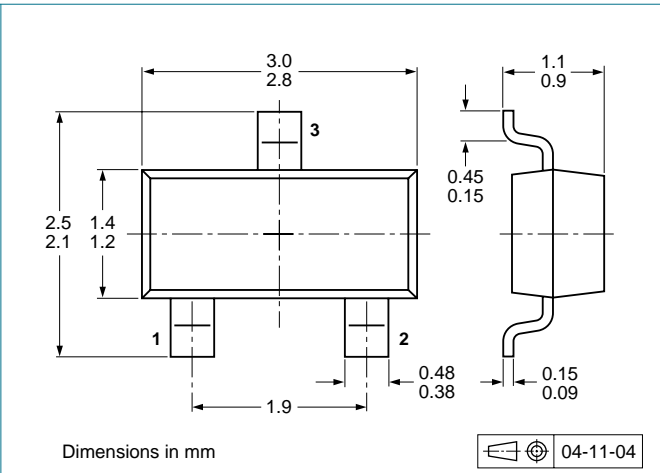


Fig 12. Package outline SOT23 (TO-236AB)

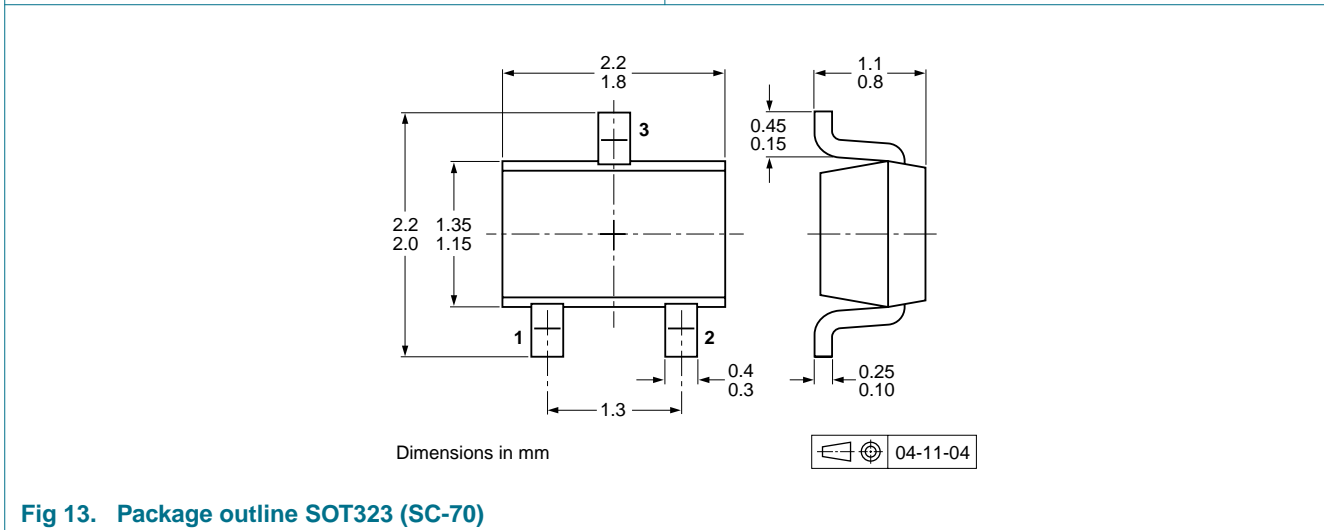


Fig 13. Package outline SOT323 (SC-70)

## 9. 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	4000	5000	10000
PDTA124XE	SOT416	4 mm pitch, 8 mm tape and reel	-115	-	-	-135
PDTA124XEF	SOT490	4 mm pitch, 8 mm tape and reel	-	-115	-	-
PDTA124XK	SOT346	4 mm pitch, 8 mm tape and reel	-115	-	-	-135
PDTA124XM	SOT883	2 mm pitch, 8 mm tape and reel	-	-	-	-315
PDTA124XS	SOT54	bulk, straight leads	-	-	-412	-
	SOT54A	tape and reel, wide pitch	-	-	-	-116
		tape ammpack, wide pitch	-	-	-	-126
	SOT54 variant	bulk, delta pinning	-	-	-112	-
PDTA124XT	SOT23	4 mm pitch, 8 mm tape and reel	-215	-	-	-235
PDTA124XU	SOT323	4 mm pitch, 8 mm tape and reel	-115	-	-	-135

[1] For further information and the availability of packing methods, see [Section 12](#).

## 10. Revision history

**Table 10. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
PDTA124X_SER_8	20090903	Product data sheet	-	PDTA124X_SER_7
Modifications:	<ul style="list-style-type: none"> <li>This data sheet was changed to reflect the new company name NXP Semiconductors, including new legal definitions and disclaimers. No changes were made to the technical content</li> </ul>			
PDTA124X_SER_7	20050811	Product data sheet	-	PDTA124X_SERIES_6
PDTA124X_SERIES_6	20040804	Product specification	-	PDTA124X_SERIES_5
PDTA124X_SERIES_5	20040407	Product specification	-	PDTA124X_SERIES_4
PDTA124X_SERIES_4	20030414	Product specification	-	PDTA124XE_3 PDTA124XEF_2
PDTA124XE_3	19990521	Product specification	-	PDTA124XE_2
PDTA124XE_2	19981125	Product specification	-	PDTA124XE_1
PDTA124XE_1	19971215	Product specification	-	-
PDTA124XEF_2	19990525	Preliminary specification	-	PDTA124XEF_1
PDTA124XEF_1	19981116	Preliminary specification	-	-

## 11. Legal information

### 11.1 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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