



**THE DATASHEET OF
PDTA124XK,115**



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Kind regards,

Team Nexperia

PDTA124X series

PNP resistor-equipped transistors; R1 = 22 k Ω , R2 = 47 k Ω

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 ^[1]	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

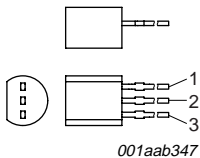
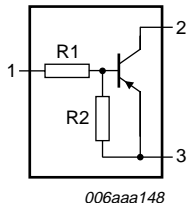
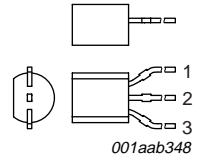
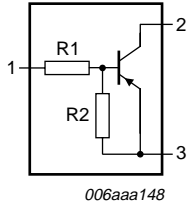
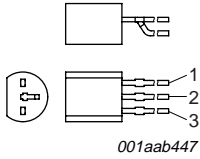
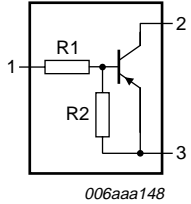
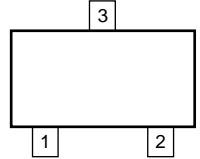
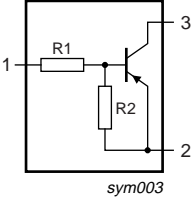
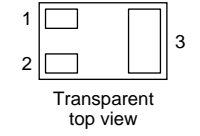
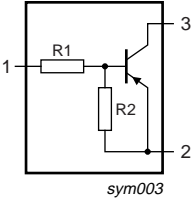
1.4 Quick reference data

Table 2. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V _{CEO}	collector-emitter voltage	open base	-	-	-50	V
I _O	output current (DC)		-	-	-100	mA
R1	bias resistor 1 (input)		15.4	22	28.6	k Ω
R2/R1	bias resistor ratio		1.7	2.1	2.6	

2. Pinning information

Table 3. Pinning

Pin	Description	Simplified outline	Symbol
SOT54			
1	input (base)	 <p>001aab347</p>	 <p>006aaa148</p>
2	output (collector)		
3	GND (emitter)		
SOT54A			
1	input (base)	 <p>001aab348</p>	 <p>006aaa148</p>
2	output (collector)		
3	GND (emitter)		
SOT54 variant			
1	input (base)	 <p>001aab447</p>	 <p>006aaa148</p>
2	output (collector)		
3	GND (emitter)		
SOT23; SOT323; SOT346; SOT416; SOT490			
1	input (base)	 <p>006aaa144</p>	 <p>sym003</p>
2	GND (emitter)		
3	output (collector)		
SOT883			
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
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 ^[1]	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 ^[1]
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 _{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		-	-40	V	
I _O	output current (DC)		-	-100	mA	
I _{CM}	peak collector current		-	-100	mA	
P _{tot}	total power dissipation	T _{amb} ≤ 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 _{stg}	storage temperature		-65	+150	°C
T _j	junction temperature		-	150	°C	
T _{amb}	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 μ 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.

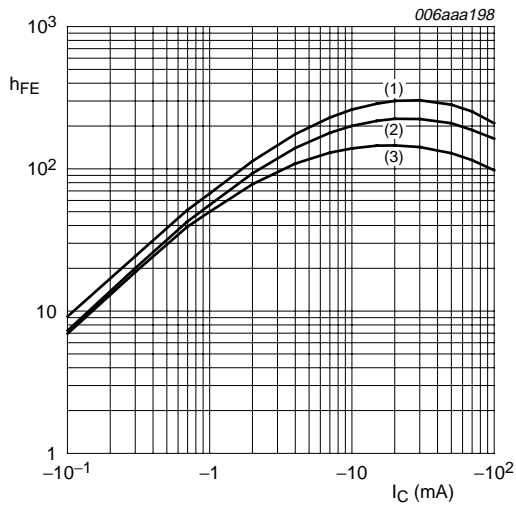
[3] Device mounted on an FR4 PCB with 60 μ m copper strip line, standard footprint.

7. Characteristics

Table 8. Characteristics

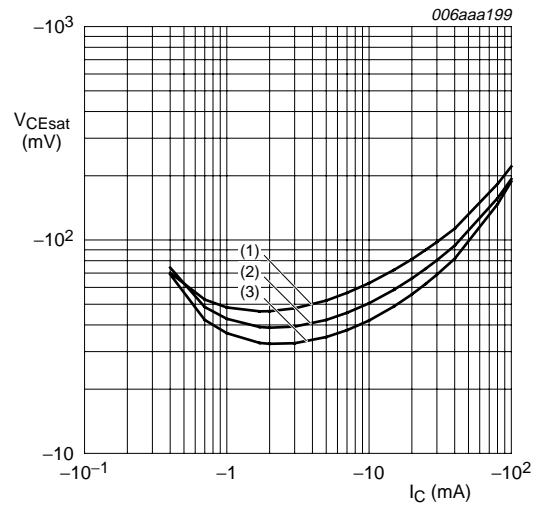
$T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified

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	μ A
		$V_{CE} = -30\text{ V}$; $I_B = 0\text{ A}$; $T_j = 150\text{ }^{\circ}\text{C}$	-	-	-50	μ A
I_{EBO}	emitter-base cut-off current	$V_{EB} = -5\text{ V}$; $I_C = 0\text{ A}$	-	-	-120	μ A
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	$V_{CE} = -5\text{ V}$; $I_C = -100\text{ }\mu\text{A}$	-	-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	k Ω
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



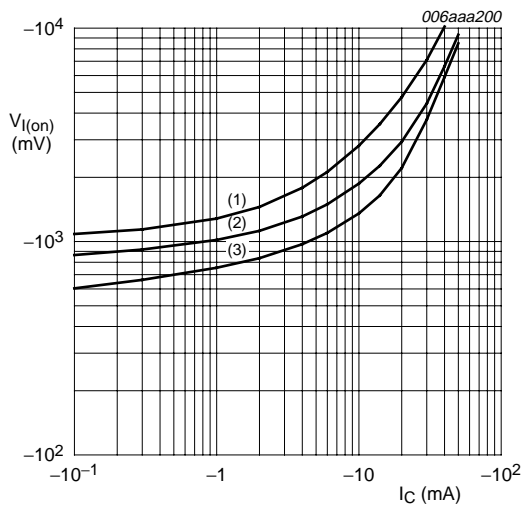
$V_{CE} = -5\text{ V}$
 (1) $T_{amb} = 100\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -40\text{ °C}$

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



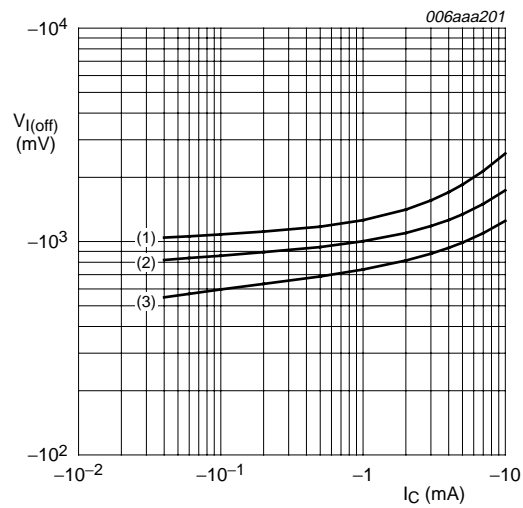
$I_C/I_B = 20$
 (1) $T_{amb} = 100\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -40\text{ °C}$

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

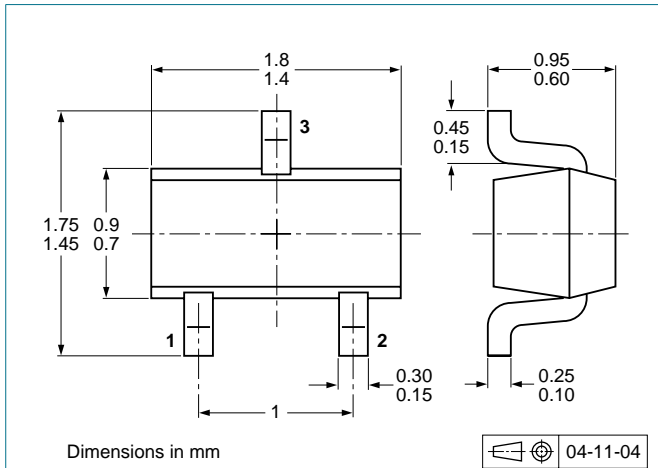


Fig 5. Package outline SOT416 (SC-75)

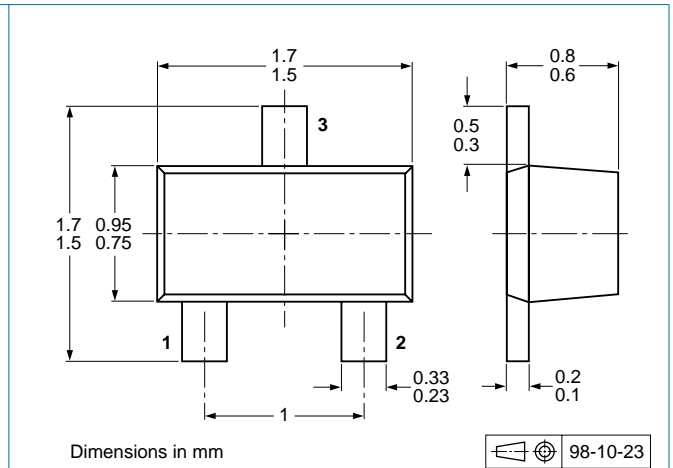


Fig 6. Package outline SOT490 (SC-89)

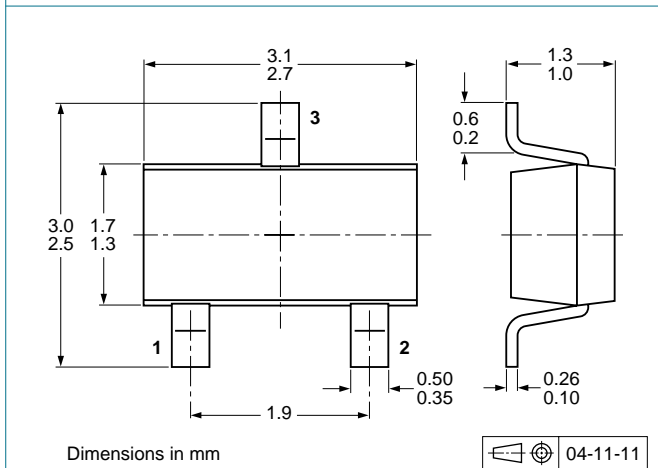


Fig 7. Package outline SOT346 (SC-59A/TO-236)

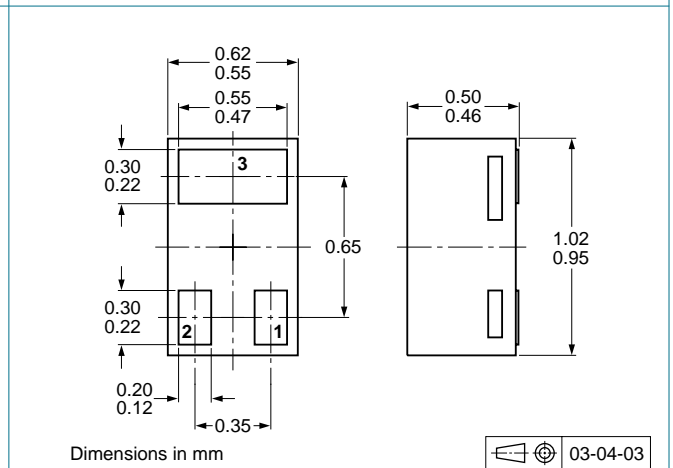


Fig 8. Package outline SOT883 (SC-101)

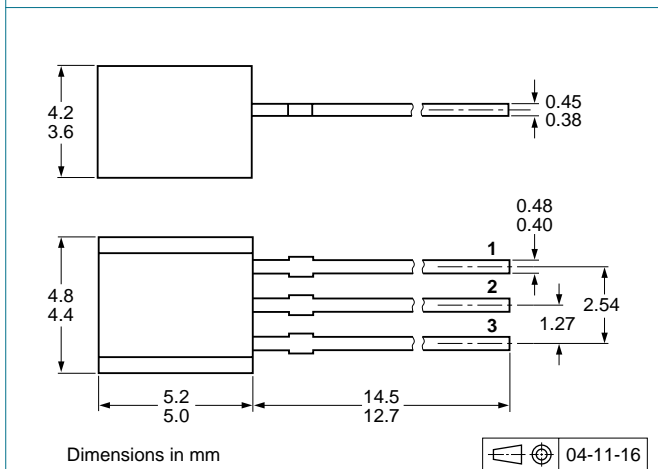


Fig 9. Package outline SOT54 (SC-43A/TO-92)

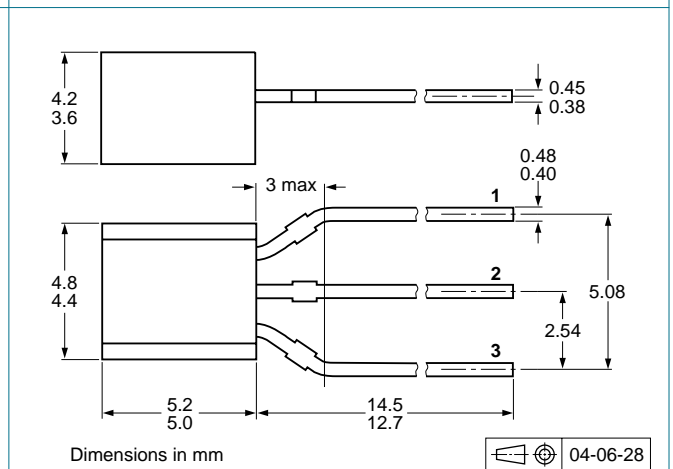


Fig 10. Package outline SOT54A

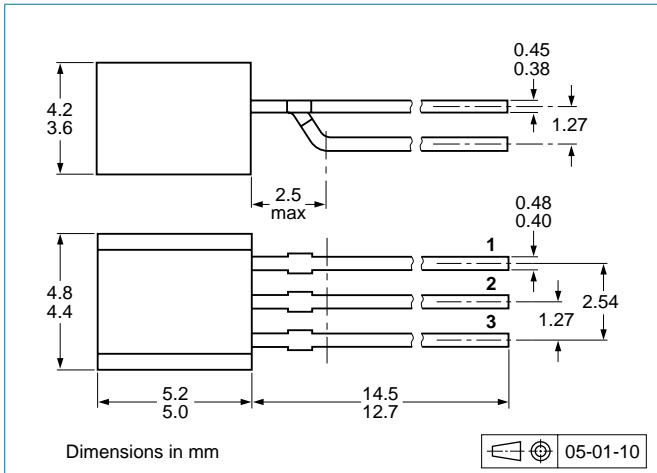


Fig 11. Package outline SOT54 variant

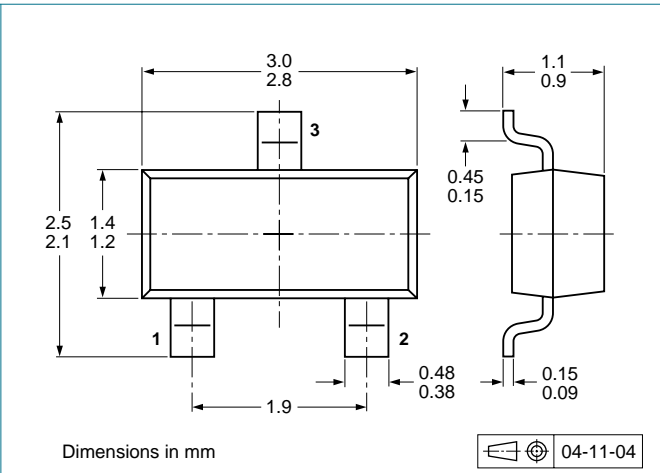


Fig 12. Package outline SOT23 (TO-236AB)

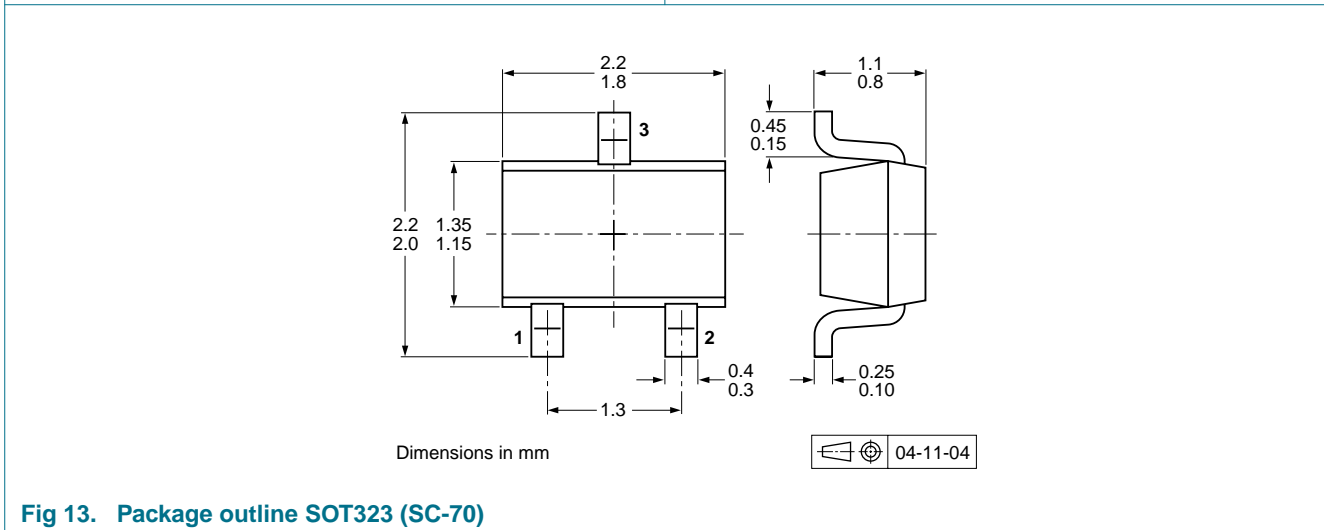


Fig 13. Package outline SOT323 (SC-70)

9. Packing information

Table 9. Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code.^[1]

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"> 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 			
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 ^{[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.

[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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