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Kind regards,

Team Nexperia

# PDTA124X series

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

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

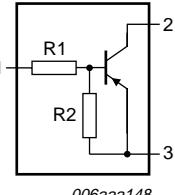
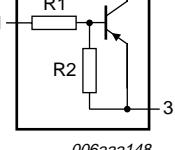
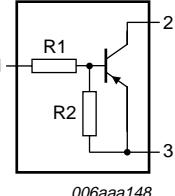
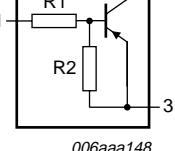
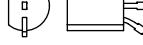
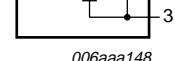
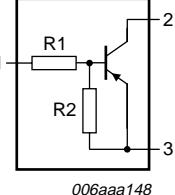
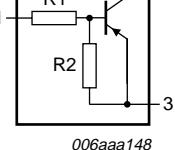
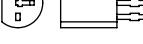
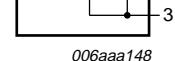
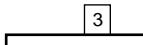
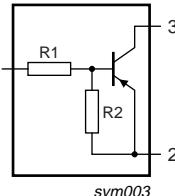
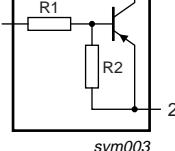
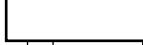
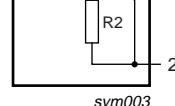
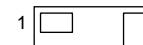
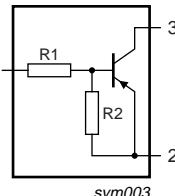
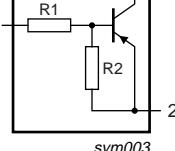
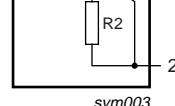
### 1.4 Quick reference data

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	$\text{k}\Omega$
$R2/R1$	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)		
2	output (collector)		
3	GND (emitter)		
<b>SOT54A</b>			
1	input (base)		
2	output (collector)		
3	GND (emitter)		
<b>SOT54 variant</b>			
1	input (base)		
2	output (collector)		
3	GND (emitter)		
<b>SOT23; SOT323; SOT346; SOT416; SOT490</b>			
1	input (base)		
2	GND (emitter)		
3	output (collector)		
<b>SOT883</b>			
1	input (base)		
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 <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
$V_{CBO}$	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	$T_{amb} \leq 25 \text{ }^{\circ}\text{C}$			
	SOT416		[1]	-	mW
	SOT490		[1][2]	-	mW
	SOT346		[1]	-	mW
	SOT883		[2][3]	-	mW
	SOT54		[1]	-	mW
	SOT23		[1]	-	mW
	SOT323		[1]	-	mW
$T_{stg}$	storage temperature		-65	+150	$^{\circ}\text{C}$
$T_j$	junction temperature		-	150	$^{\circ}\text{C}$
$T_{amb}$	ambient temperature		-65	+150	$^{\circ}\text{C}$

[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  $\mu\text{m}$  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				
	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.

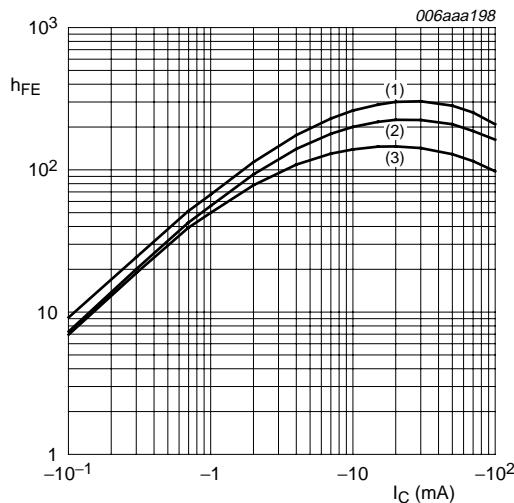
[3] Device mounted on an FR4 PCB with 60 µm copper strip line, standard footprint.

## 7. Characteristics

Table 8. Characteristics

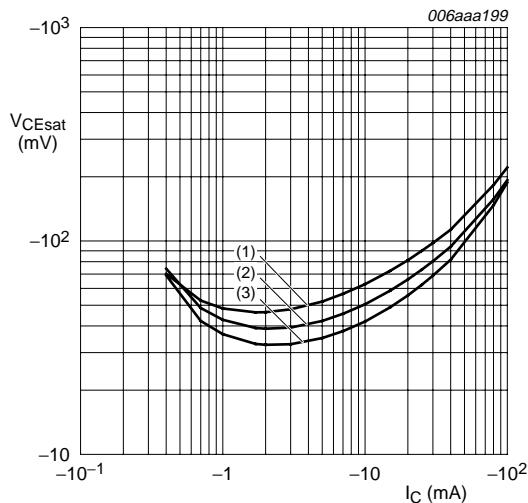
T<sub>amb</sub> = 25 °C unless otherwise specified

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	-	-	-50	µA
I <sub>EBO</sub>	emitter-base cut-off current	V <sub>EB</sub> = -5 V; I <sub>C</sub> = 0 A	-	-	-120	µA
h <sub>FE</sub>	DC current gain	V <sub>CE</sub> = -5 V; I <sub>C</sub> = -5 mA	80	-	-	
V <sub>CEsat</sub>	collector-emitter saturation voltage	I <sub>C</sub> = -10 mA; I <sub>B</sub> = -0.5 mA	-	-	-150	mV
V <sub>I(off)</sub>	off-state input voltage	V <sub>CE</sub> = -5 V; I <sub>C</sub> = -100 µA	-	-0.8	-0.5	V
V <sub>I(on)</sub>	on-state input voltage	V <sub>CE</sub> = -0.3 V; I <sub>C</sub> = -2 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 <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



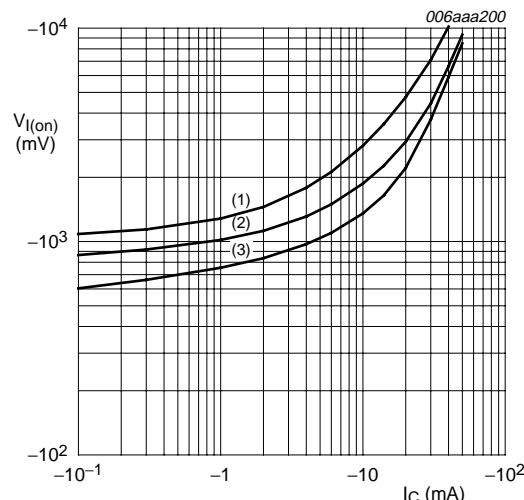
$V_{CE} = -5 \text{ V}$   
 (1)  $T_{amb} = 100 \text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25 \text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = -40 \text{ }^{\circ}\text{C}$

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



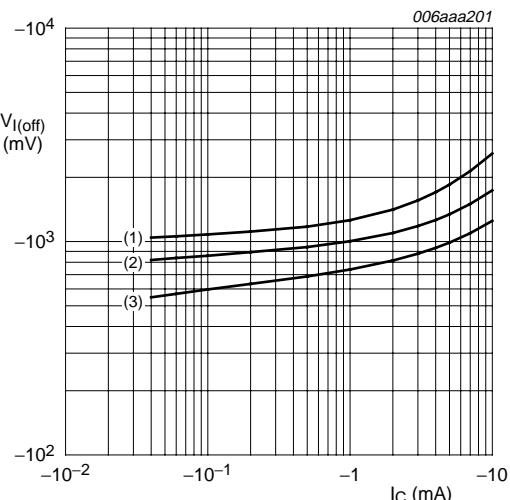
$I_C/I_B = 20$   
 (1)  $T_{amb} = 100 \text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25 \text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = -40 \text{ }^{\circ}\text{C}$

**Fig 2. 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 3. 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 4. Off-state input voltage as a function of collector current; typical values**

## 8. Package outline

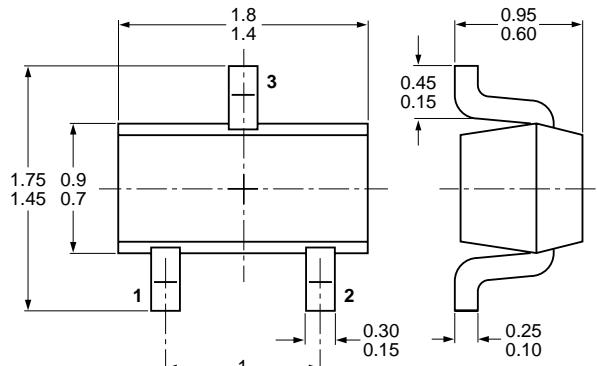


Fig 5. Package outline SOT416 (SC-75)

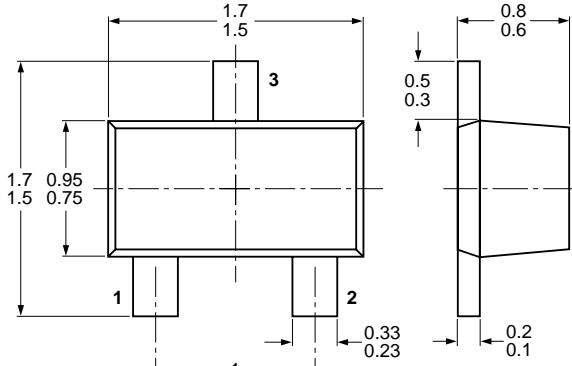


Fig 6. Package outline SOT490 (SC-89)

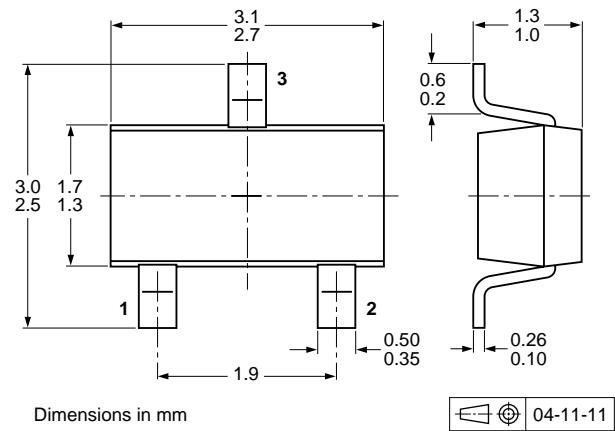


Fig 7. Package outline SOT346 (SC-59A/TO-236)

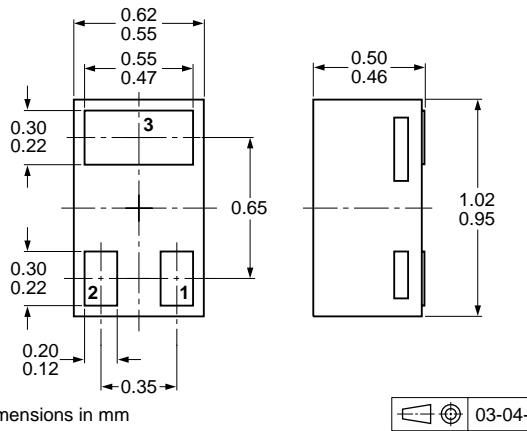


Fig 8. Package outline SOT883 (SC-101)

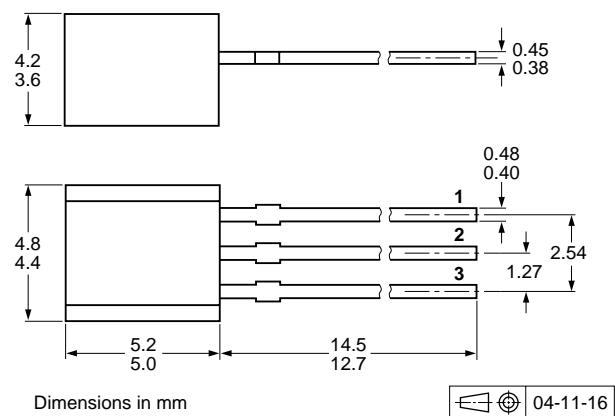


Fig 9. Package outline SOT54 (SC-43A/TO-92)

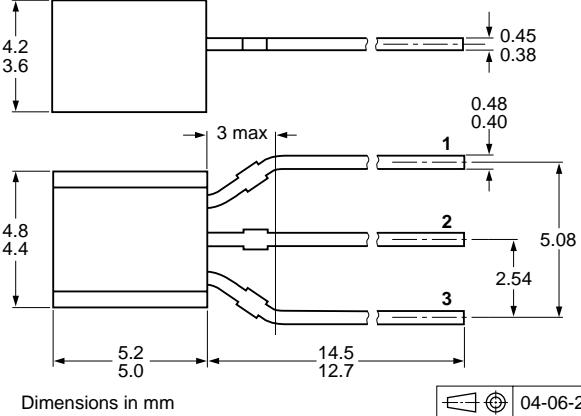
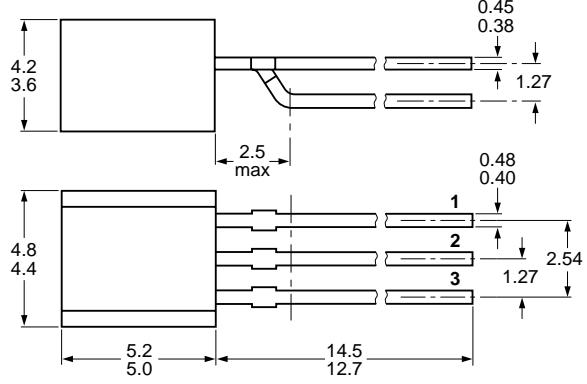


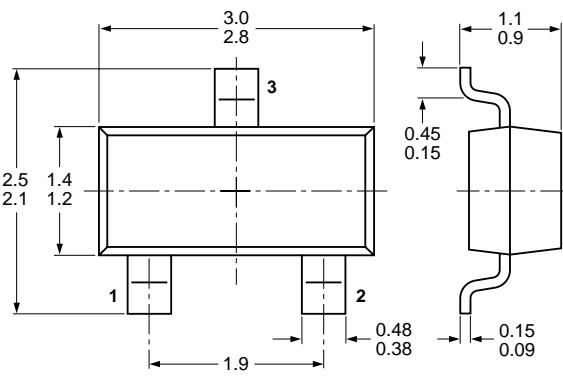
Fig 10. Package outline SOT54A



Dimensions in mm

05-01-10

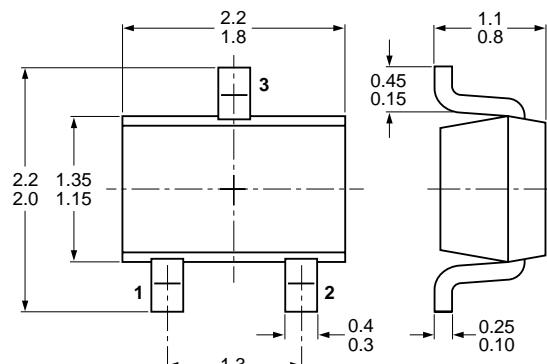
Fig 11. Package outline SOT54 variant



Dimensions in mm

04-11-04

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



Dimensions in mm

04-11-04

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 ammopack, 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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nxp.com>.

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## 13. Contents

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