

# PDTC114T series

NPN resistor-equipped transistors; R1 = 10 k $\Omega$ , R2 = open

Rev. 08 — 9 February 2006

Product data sheet

## 1. Product profile

### 1.1 General description

NPN Resistor-Equipped Transistors (RET) family.

Table 1: Product overview

Type number	Package			PNP complement
	Philips	JEITA	JEDEC	
PDTC114TE	SOT416	SC-75	-	PDTA114TE
PDTC114TK	SOT346	SC-59A	TO-236	PDTA114TK
PDTC114TM	SOT883	SC-101	-	PDTA114TM
PDTC114TS <a href="#">[1]</a>	SOT54	SC-43A	TO-92	PDTA114TS
PDTC114TT	SOT23	-	TO-236AB	PDTA114TT
PDTC114TU	SOT323	SC-70	-	PDTA114TU

[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 BC847 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)		7	10	13	k $\Omega$

**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</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
PDTC114TE	SC-75	plastic surface mounted package; 3 leads	SOT416
PDTC114TK	SC-59A	plastic surface mounted package; 3 leads	SOT346
PDTC114TM	SC-101	leadless ultra small plastic package; 3 solder lands; body 1.0 × 0.6 × 0.5 mm	SOT883
PDTC114TS <sup>[1]</sup>	SC-43A	plastic single-ended leaded (through hole) package; 3 leads	SOT54
PDTC114TT	-	plastic surface mounted package; 3 leads	SOT23
PDTC114TU	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>
PDTC114TE	24
PDTC114TK	24
PDTC114TM	DT
PDTC114TS	TC114T
PDTC114TT	*12
PDTC114TU	*24

[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	-	5	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			
	SOT416		[1] -	150	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  $\mu$ 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
	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.

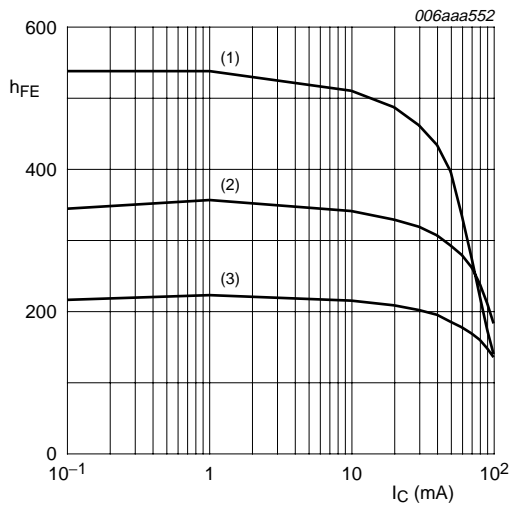
[3] Device mounted on an FR4 PCB with 60  $\mu$ m copper strip line, standard footprint.

**7. Characteristics**

**Table 8: Characteristics**

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

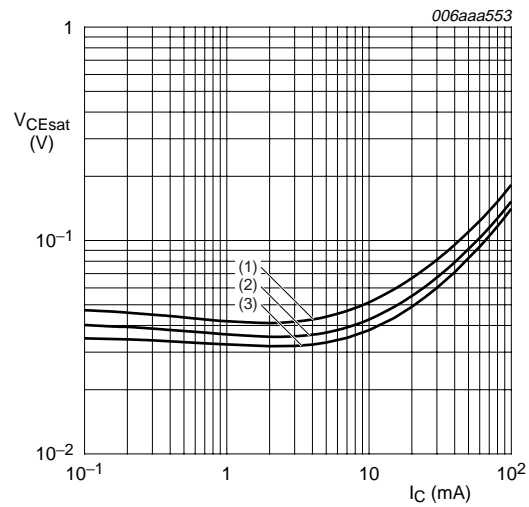
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I <sub>CBO</sub>	collector-base cut-off current	V <sub>CB</sub> = 50 V; I <sub>E</sub> = 0 A	-	-	100	nA
I <sub>CEO</sub>	collector-emitter cut-off current	V <sub>CE</sub> = 30 V; I <sub>B</sub> = 0 A	-	-	1	μA
		V <sub>CE</sub> = 30 V; I <sub>B</sub> = 0 A; 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	-	-	100	nA
h <sub>FE</sub>	DC current gain	V <sub>CE</sub> = 5 V; I <sub>C</sub> = 1 mA	200	-	-	
V <sub>CEsat</sub>	collector-emitter saturation voltage	I <sub>C</sub> = 10 mA; I <sub>B</sub> = 0.5 mA	-	-	150	mV
R1	bias resistor 1 (input)		7	10	13	kΩ
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	-	-	2.5	pF



V<sub>CE</sub> = 5 V

- (1) T<sub>amb</sub> = 150 °C
- (2) T<sub>amb</sub> = 25 °C
- (3) T<sub>amb</sub> = -40 °C

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

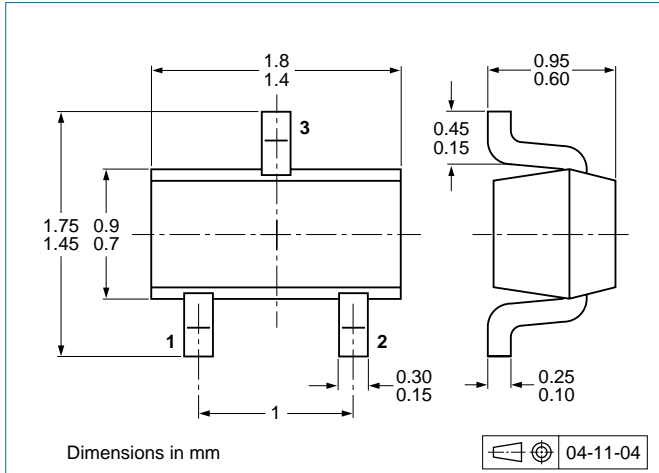


I<sub>C</sub>/I<sub>B</sub> = 20

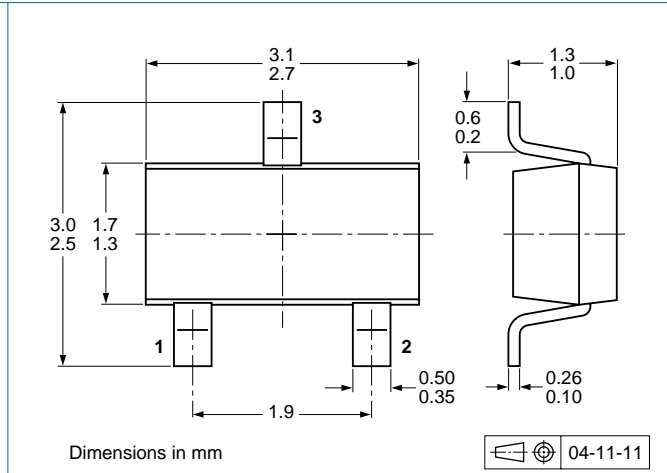
- (1) T<sub>amb</sub> = 100 °C
- (2) T<sub>amb</sub> = 25 °C
- (3) T<sub>amb</sub> = -40 °C

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

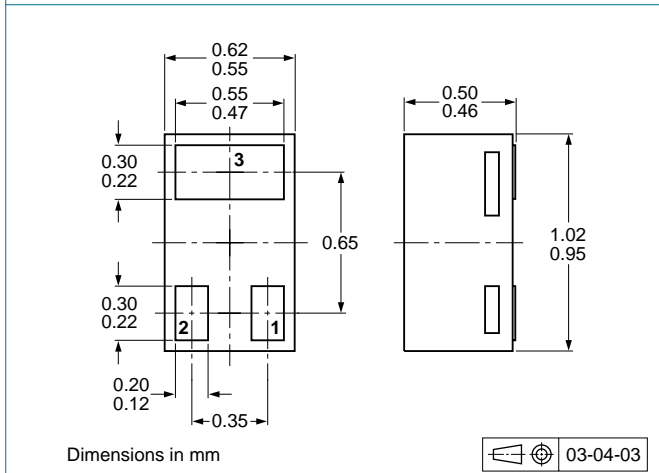
**8. Package outline**



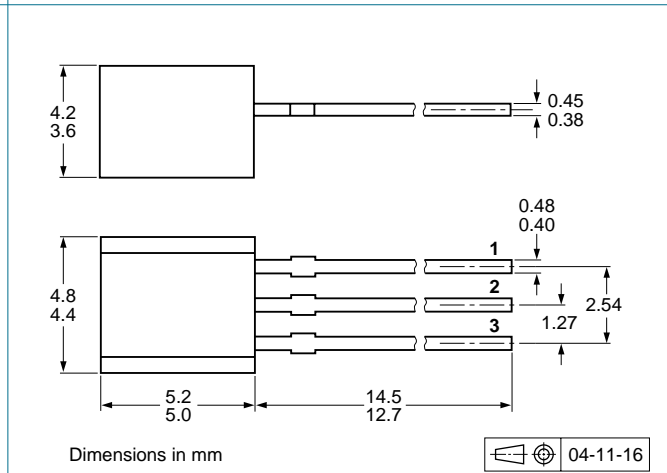
**Fig 3. Package outline SOT416 (SC-75)**



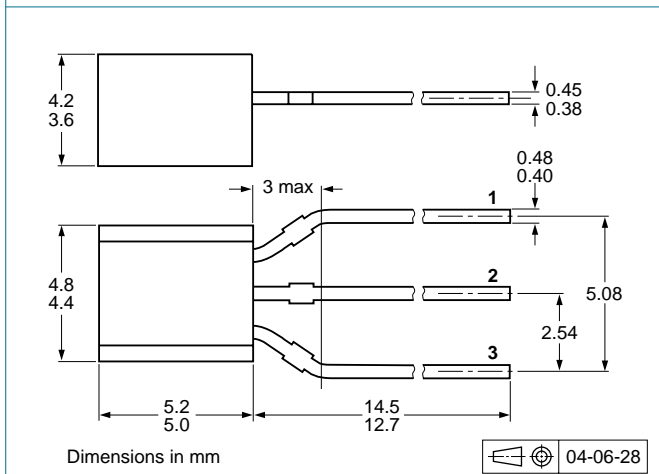
**Fig 4. Package outline SOT346 (SC-59A/TO-236)**



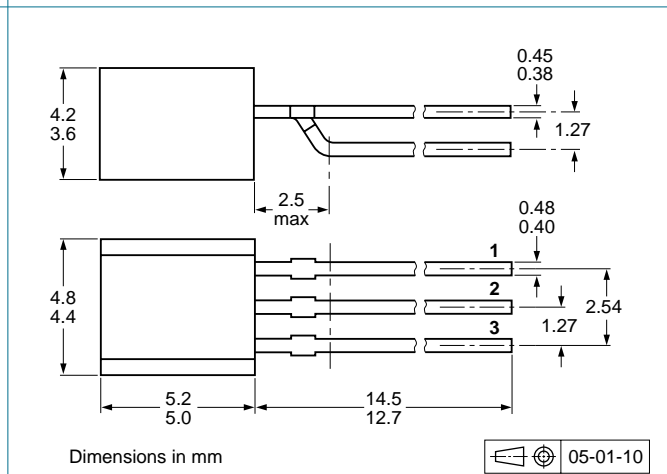
**Fig 5. Package outline SOT883 (SC-101)**



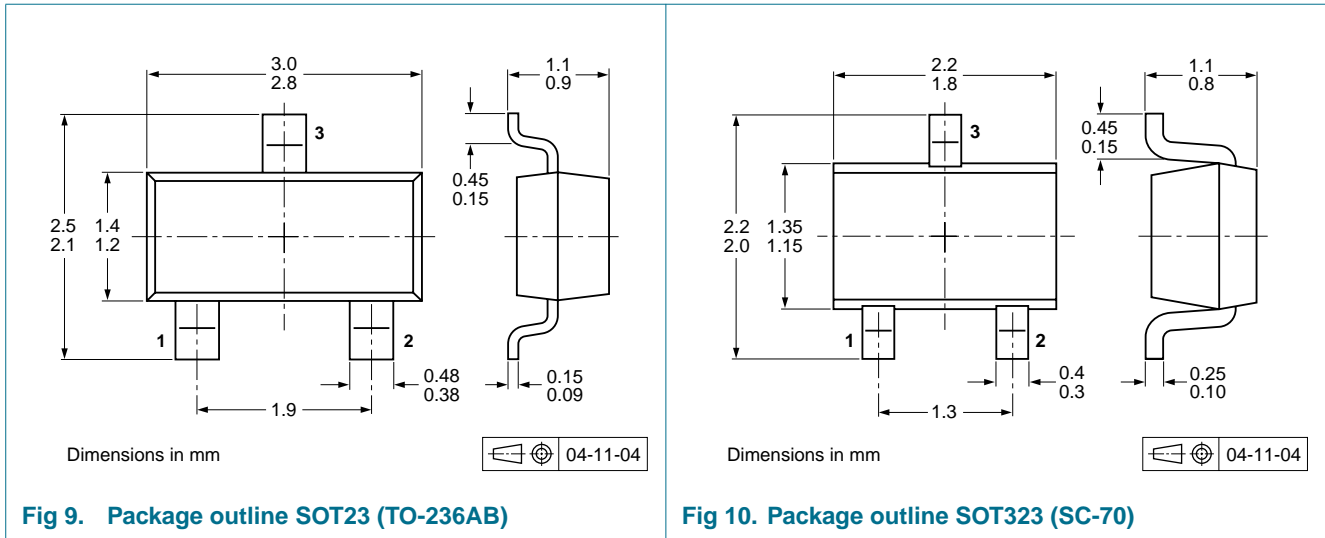
**Fig 6. Package outline SOT54 (SC-43A/TO-92)**



**Fig 7. Package outline SOT54A**



**Fig 8. Package outline SOT54 variant**



## 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	5000	10000
PDTC114TE	SOT416	4 mm pitch, 8 mm tape and reel	-115	-	-135
PDTC114TK	SOT346	4 mm pitch, 8 mm tape and reel	-115	-	-135
PDTC114TM	SOT883	2 mm pitch, 8 mm tape and reel	-	-	-315
PDTC114TS	SOT54	bulk, straight leads	-	-412	-
	SOT54A	tape and reel, wide pitch	-	-	-116
		tape ammpack, wide pitch	-	-	-126
	SOT54 variant	bulk, delta pinning	-	-112	-
PDTC114TT	SOT23	4 mm pitch, 8 mm tape and reel	-215	-	-235
PDTC114TU	SOT323	4 mm pitch, 8 mm tape and reel	-115	-	-135

[1] For further information and the availability of packing methods, see [Section 15](#).

## 10. Revision history

Table 10: Revision history

Document ID	Release date	Data sheet status	Change notice	Doc. number	Supersedes
PDTC114T_SER_8	20060209	Product data sheet	-	-	PDTC114T_SER_7
Modifications:		<ul style="list-style-type: none"> <li>The format of this data sheet has been redesigned to comply with the new presentation and information standard of Philips Semiconductors.</li> <li>Type number PDTC114TEF removed</li> <li><a href="#">Table 1 "Product overview"</a>: EIAJ in table header amended to JEITA</li> <li><a href="#">Section 1.2 "Features"</a>: amended</li> <li><a href="#">Section 1.3 "Applications"</a>: amended</li> <li><a href="#">Figure 1, 2, 7 and 8</a>: added</li> <li><a href="#">Figure 3, 4, 5, 6, 9 and 10</a>: superseded by minimized package outline drawings</li> <li><a href="#">Section 9 "Packing information"</a>: added</li> <li><a href="#">Section 14 "Trademarks"</a>: added</li> </ul>			
PDTC114T_SER_7	20041011	Product specification	-	9397 750 14186	PDTC114T_SERIES_6
PDTC114T_SERIES_6	20040817	Product specification	-	9397 750 13664	PDTC114T_SERIES_5
PDTC114T_SERIES_5	20040119	Product specification	-	9397 750 11731	PDTC114T_SERIES_4
PDTC114T_SERIES_4	20030414	Product specification	-	9397 750 11011	PDTC114TE_2 PDTC114TK_2 PDTC114TS_2 PDTC114TT_3 PDTC114TU_3
PDTC114TU_3	19990416	Preliminary specification	-	9397 750 05599	PDTC114TU_2
PDTC114TU_2	19980519	Preliminary specification	-	9397 750 03908	PDTC114TU_1
PDTC114TU_1	19970716	Preliminary specification	-	9397 750 01149	-
PDTC114TT_3	19990416	Objective specification	-	9397 750 05598	PDTC114TT_2
PDTC114TT_2	19980519	Objective specification	-	9397 750 03912	PDTC114TT_1
PDTC114TT_1	19970714	Objective specification	-	9397 750 01371	-
PDTC114TS_2	19980518	Product specification	-	9397 750 03891	PDTC114TS_1
PDTC114TS_1	19970703	Product specification	-	9397 750 02297	-
PDTC114TK_2	19980519	Product specification	-	9397 750 03899	PDTC114TK_1



Table 10: Revision history ...continued

Document ID	Release date	Data sheet status	Change notice	Doc. number	Supersedes
PDTC114TK_1	19970528	Product specification	-	9397 750 01367	-
PDTC114TE_2	19980803	Product specification	-	9397 750 04123	PDTC114TE_1
PDTC114TE_1	19970711	Product specification	-	9397 750 02628	-

## 11. Data sheet status

Level	Data sheet status <sup>[1]</sup>	Product status <sup>[2] [3]</sup>	Definition
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[2] The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL <http://www.semiconductors.philips.com>.

[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.