

PDTC144V series

NPN resistor-equipped transistors; R1 = 47 k Ω , R2 = 10 k Ω

Rev. 04 — 16 November 2009

Product data sheet

1. Product profile

1.1 General description

NPN resistor-equipped transistors.

Table 1. Product overview

Type number	Package		PNP complement
	NXP	JEITA	
PDTC144VE	SOT416	SC-75	PDTA144VE
PDTC144VK	SOT346	SC-59A	PDTA144VK
PDTC144VM	SOT883	SC-101	PDTA144VM
PDTC144VS ^[1]	SOT54 (TO-92)	SC-43A	PDTA144VS
PDTC144VT	SOT23	-	PDTA144VT
PDTC144VU	SOT323	SC-70	PDTA144VU

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

1.2 Features

- Built-in bias resistors
- Reduces component count
- Simplifies circuit design
- Reduces pick and place costs

1.3 Applications

- General-purpose switching and amplification
- Circuit drivers
- Inverter and interface circuits

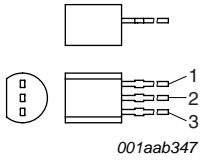
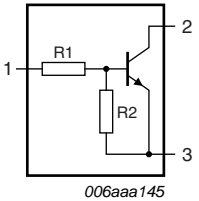
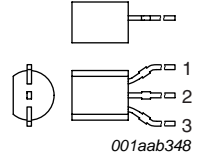
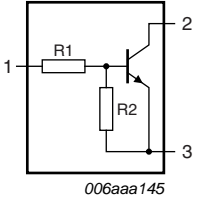
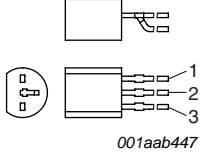
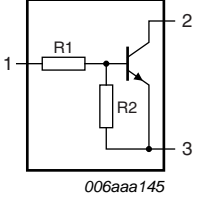
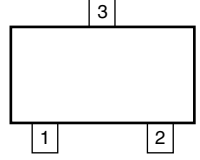
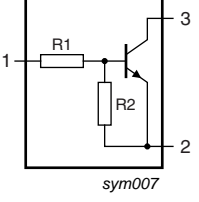
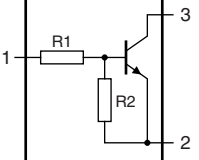
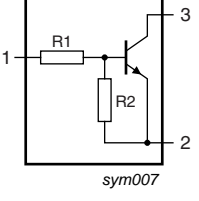
1.4 Quick reference data

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)		33	47	61	k Ω
R2/R1	bias resistor ratio		0.17	0.21	0.26	

2. Pinning information

Table 3. Pinning

Pin	Description	Simplified outline	Symbol
SOT54			
1	input (base)	 <p>001aab347</p>	 <p>006aaa145</p>
2	output (collector)		
3	GND (emitter)		
SOT54A			
1	input (base)	 <p>001aab348</p>	 <p>006aaa145</p>
2	output (collector)		
3	GND (emitter)		
SOT54 variant			
1	input (base)	 <p>001aab447</p>	 <p>006aaa145</p>
2	output (collector)		
3	GND (emitter)		
SOT23, SOT323, SOT346, SOT416			
1	input (base)	 <p>006aaa144</p>	 <p>sym007</p>
2	GND (emitter)		
3	output (collector)		
SOT883			
1	input (base)	 <p>sym007</p>	 <p>sym007</p>
2	GND (emitter)		
3	output (collector)		

3. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
PDTC144VE	SC-75	plastic surface mounted package; 3 leads	SOT416
PDTC144VK	SC-59A	plastic surface mounted package; 3 leads	SOT346
PDTC144VM	SC-101	leadless ultra small plastic package; 3 solder lands; body 1.0 × 0.6 × 0.5 mm	SOT883
PDTC144VS ^[1]	SC-43A	plastic single-ended leaded (through hole) package; 3 leads	SOT54
PDTC144VT	-	plastic surface mounted package; 3 leads	SOT23
PDTC144VU	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]
PDTC144VE	18
PDTC144VK	29
PDTC144VM	G6
PDTC144VS	TC144V
PDTC144VT	*AA
PDTC144VU	*18

[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	-	15	V
V _I	input voltage				
	positive		-	+40	V
	negative		-	-15	V
I _O	output current (DC)		-	100	mA
I _{CM}	peak collector current		-	100	mA
P _{tot}	total power dissipation				
	SOT416	T _{amb} ≤ 25 °C	[1] -	150	mW
	SOT346	T _{amb} ≤ 25 °C	[1] -	250	mW
	SOT883	T _{amb} ≤ 25 °C	[2][3] -	250	mW
	SOT54	T _{amb} ≤ 25 °C	[1] -	500	mW
	SOT23	T _{amb} ≤ 25 °C	[1] -	250	mW
	SOT323	T _{amb} ≤ 25 °C	[1] -	200	mW
	T _{stg}	storage temperature		-65	+150
T _j	junction temperature		-	150	°C
T _{amb}	ambient temperature		-65	+150	°C

[1] Refer to standard mounting conditions.

[2] Reflow soldering is the only recommended soldering method.

[3] Refer to SOT883 standard mounting conditions; FR4 printed-circuit board with 60 μ m copper strip line.

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] Refer to standard mounting conditions.

[2] Reflow soldering is the only recommended soldering method.

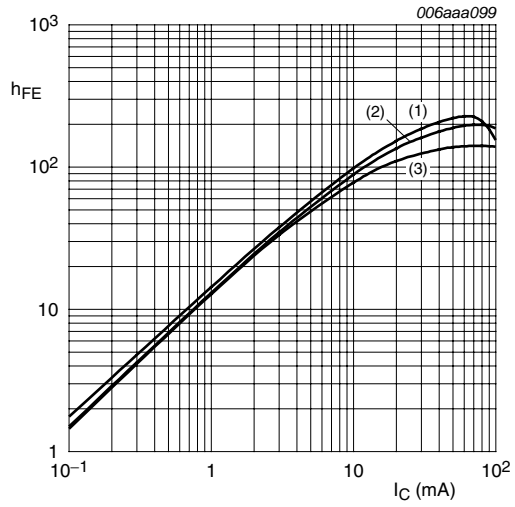
[3] Refer to SOT883 standard mounting conditions; FR4 printed-circuit board with 60 μ m copper strip line.

7. Characteristics

Table 8. Characteristics

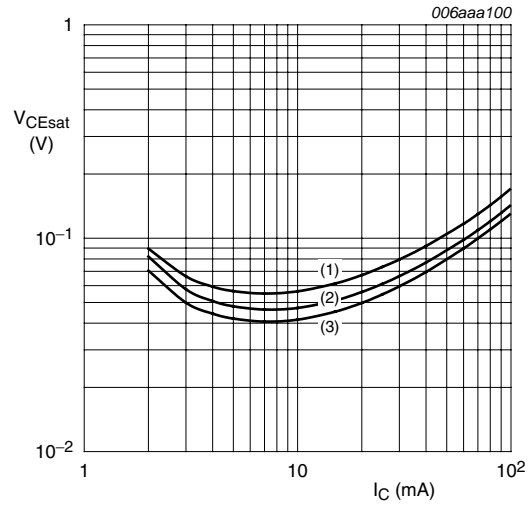
$T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified.

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	μA
		$V_{CE} = 30\text{ V}; I_B = 0\text{ A}; T_j = 150\text{ }^{\circ}\text{C}$	-	-	50	μA
I_{EBO}	emitter-base cut-off current	$V_{EB} = 5\text{ V}; I_C = 0\text{ A}$	-	-	150	μA
h_{FE}	DC current gain	$V_{CE} = 5\text{ V}; I_C = 5\text{ mA}$	40	-	-	
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	$V_{CE} = 5\text{ V}; I_C = 100\text{ }\mu\text{A}$	-	3.1	1	V
$V_{I(on)}$	on-state input voltage	$V_{CE} = 300\text{ mV}; I_C = 2\text{ mA}$	6	3.8	-	V
R1	bias resistor 1 (input)		33	47	61	k Ω
R2/R1	bias resistor ratio		0.17	0.21	0.26	
C_c	collector capacitance	$V_{CB} = 10\text{ V}; I_E = i_e = 0\text{ A}; f = 1\text{ MHz}$	-	-	2	pF



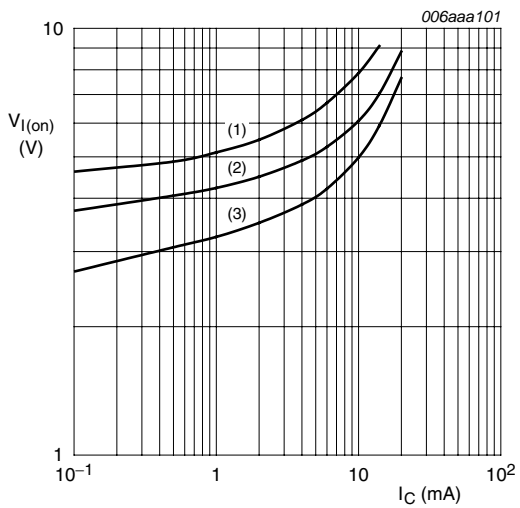
- $V_{CE} = 5\text{ V}$
- (1) $T_{amb} = 100\text{ °C}$
 - (2) $T_{amb} = 25\text{ °C}$
 - (3) $T_{amb} = -40\text{ °C}$

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



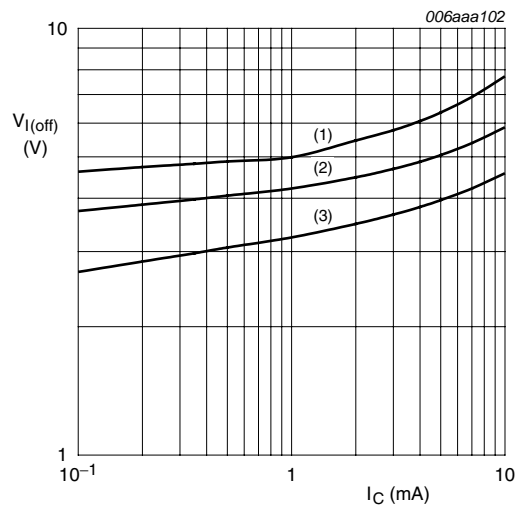
- $I_C/I_B = 20$
- (1) $T_{amb} = 100\text{ °C}$
 - (2) $T_{amb} = 25\text{ °C}$
 - (3) $T_{amb} = -40\text{ °C}$

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

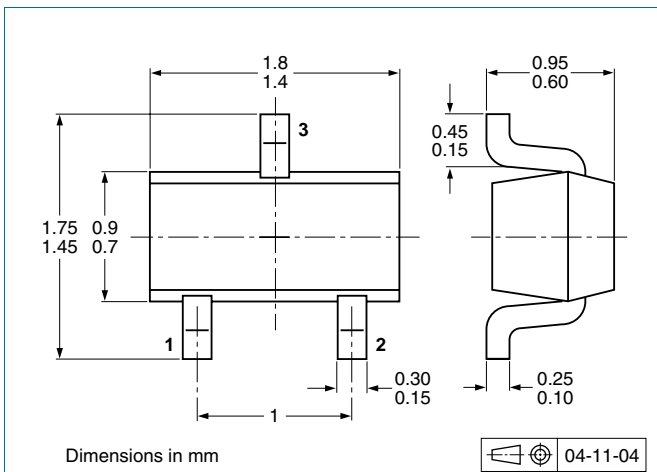


Fig 5. Package outline SOT416 (SC-75)

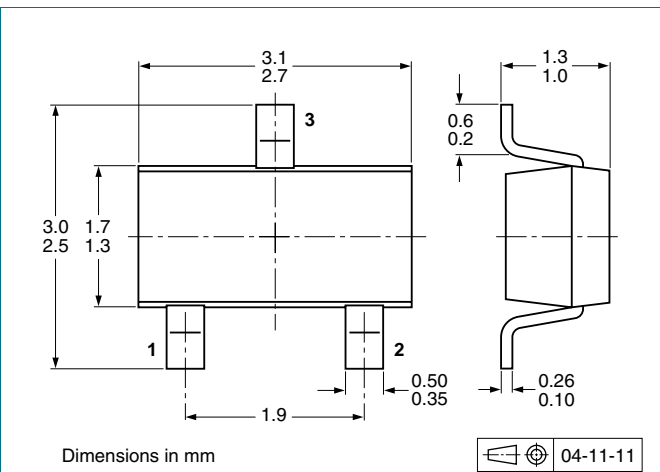


Fig 6. Package outline SOT346 (SC-59A/TO-236)

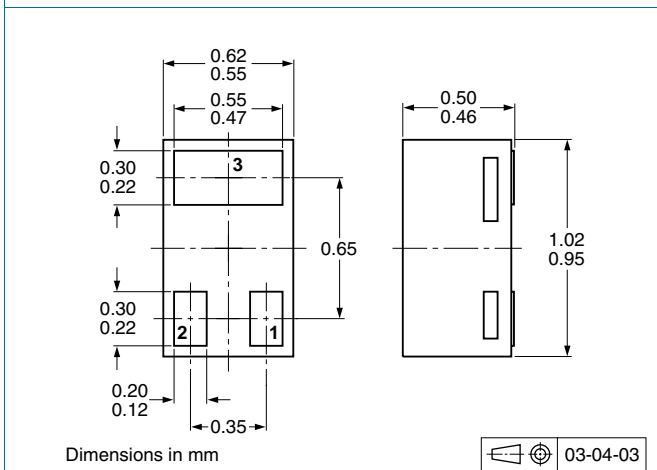


Fig 7. Package outline SOT883 (SC-101)

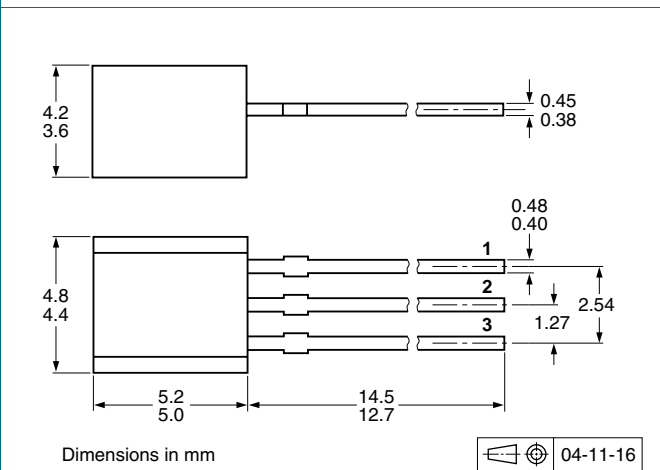


Fig 8. Package outline SOT54 (SC-43A/TO-92)

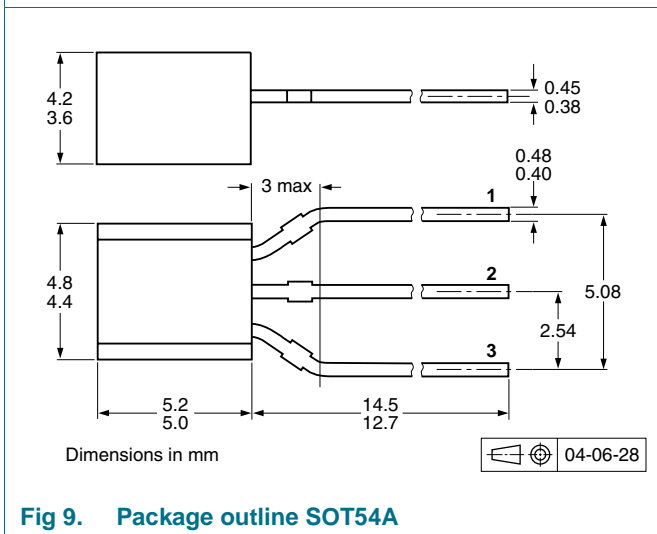


Fig 9. Package outline SOT54A

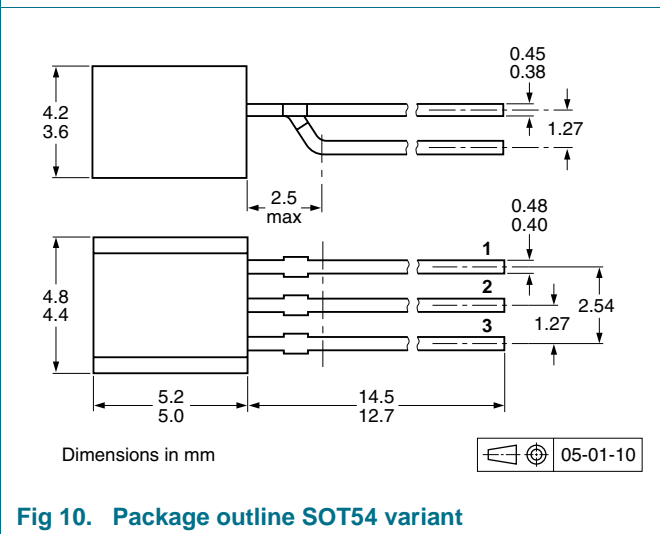
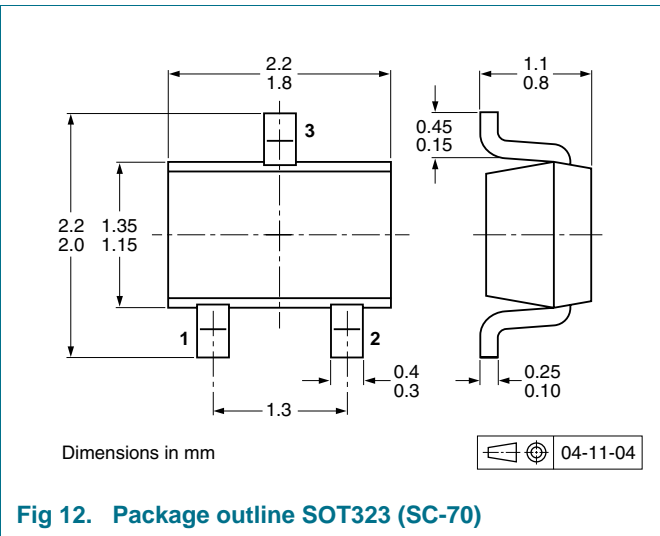
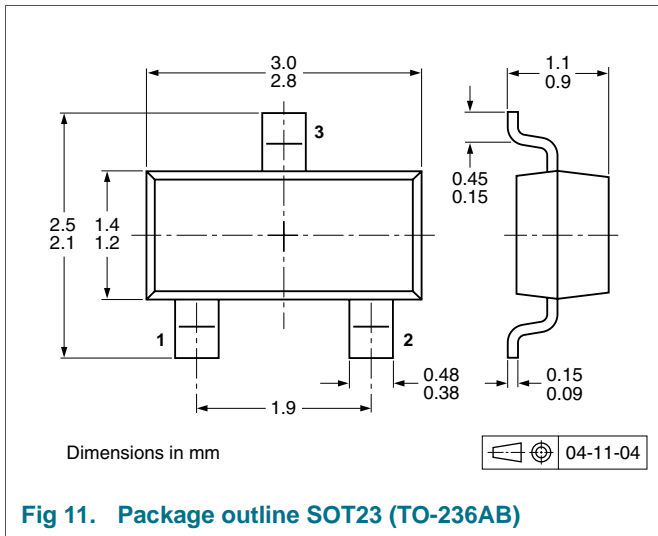


Fig 10. Package outline SOT54 variant



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
PDTC144VE	SOT416	4 mm pitch, 8 mm tape and reel	-115	-	-135
PDTC144VK	SOT346	4 mm pitch, 8 mm tape and reel	-115	-	-135
PDTC144VM	SOT883	2 mm pitch, 8 mm tape and reel	-	-	-315
PDTC144VS	SOT54	bulk, straight leads	-	-412	-
	SOT54A	tape and reel, wide pitch	-	-	-116
		tape ammopack, wide pitch	-	-	-126
	SOT54 variant	bulk, delta pinning	-	-112	-
PDTC144VT	SOT23	4 mm pitch, 8 mm tape and reel	-215	-	-235
PDTC144VU	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
PDTC144V_SER_4	20091116	Product data sheet	-	PDTC144V_SER_3
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.			
PDTC144V_SER_3	20050215	Product data sheet	-	PDTC144VT_2
PDTC144VT_2	20040511	Objective data sheet	-	PDTC144VT_1
PDTC144VT_1	20040305	Objective data sheet	-	-

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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Date of release: 16 November 2009

Document identifier: PDTC144V_SER_4