

DATA SHEET

PDTC144E series
NPN resistor-equipped transistors;
 $R1 = 47 \text{ k}\Omega$, $R2 = 47 \text{ k}\Omega$

Product specification
Supersedes data of 2004 Mar 23

2004 Aug 17

**NPN resistor-equipped transistors;
R1 = 47 kΩ, R2 = 47 kΩ**

PDTC144E series

FEATURES

- Built-in bias resistors
- Simplified circuit design
- Reduction of component count
- Reduced pick and place costs.

APPLICATIONS

- General purpose switching and amplification
- Inverter and interface circuits
- Circuit driver.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	TYP.	MAX.	UNIT
V_{CEO}	collector-emitter voltage	–	50	V
I_o	output current (DC)	–	100	mA
R1	bias resistor	47	–	kΩ
R2	bias resistor	47	–	kΩ

DESCRIPTION

NPN resistor-equipped transistor (see “Simplified outline, symbol and pinning” for package details).

PRODUCT OVERVIEW

TYPE NUMBER	PACKAGE		MARKING CODE	PNP COMPLEMENT
	PHILIPS	EIAJ		
PDTC144EE	SOT416	SC-75	08	PDTA144EE
PDTC144EEF	SOT490	SC-89	08	PDTA144EEF
PDTC144EK	SOT346	SC-59	08	PDTA144EK
PDTC144EM	SOT883	SC-101	E7	PDTA144EM
PDTC144ES	SOT54 (TO-92)	SC-43	TC144E	PDTA144ES
PDTC144ET	SOT23	–	*08 ⁽¹⁾	PDTA144ET
PDTC144EU	SOT323	SC-70	*08 ⁽¹⁾	PDTA144EU

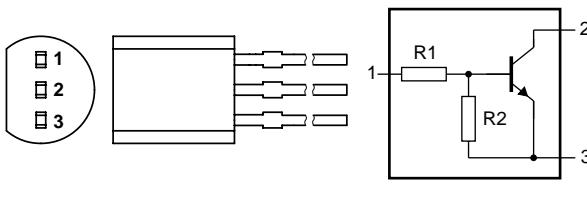
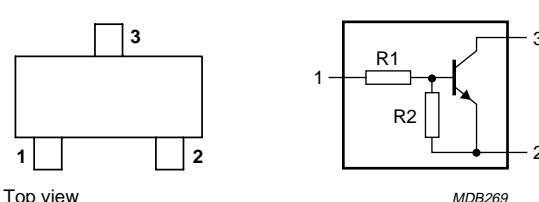
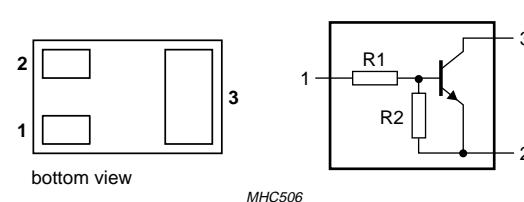
Note

1. * = p: Made in Hong Kong.
- * = t: Made in Malaysia.
- * = W: Made in China.

NPN resistor-equipped transistors;
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PDTC144E series

SIMPLIFIED OUTLINE, SYMBOL AND PINNING

TYPE NUMBER	SIMPLIFIED OUTLINE AND SYMBOL	PINNING	
		PIN	DESCRIPTION
PDTC144ES		1 2 3	base collector emitter
PDTC144EE PDTC144EEF PDTC144EK PDTC144ET PDTC144EU		1 2 3	base emitter collector
PDTC144EM		1 2 3	base emitter collector

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PDTC144E series

ORDERING INFORMATION

TYPE NUMBER	PACKAGE			VERSION
	NAME	DESCRIPTION		
PDTC144EE	–	plastic surface mounted package; 3 leads		SOT416
PDTC144EEF	–	plastic surface mounted package; 3 leads		SOT490
PDTC144EK	–	plastic surface mounted package; 3 leads		SOT346
PDTC144EM	–	leadless ultra small plastic package; 3 solder lands; body 1.0 × 0.6 × 0.5 mm		SOT883
PDTC144ES	–	plastic single-ended leaded (through hole) package; 3 leads		SOT54
PDTC144ET	–	plastic surface mounted package; 3 leads		SOT23
PDTC144EU	–	plastic surface mounted package; 3 leads		SOT323

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	–	10	V
V_I	input voltage				
	positive		–	+40	V
	negative		–	–10	V
I_O	output current (DC)		–	100	mA
I_{CM}	peak collector current		–	100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25^\circ\text{C}$			
	SOT54	note 1	–	500	mW
	SOT23	note 1	–	250	mW
	SOT346	note 1	–	250	mW
	SOT323	note 1	–	200	mW
	SOT416	note 1	–	150	mW
	SOT490	notes 1 and 2	–	250	mW
	SOT883	notes 2 and 3	–	250	mW
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	150	°C
T_{amb}	operating ambient temperature		–65	+150	°C

Notes

1. Refer to standard mounting conditions.
2. Reflow soldering is the only recommended soldering method.
3. Refer to SOT883 standard mounting conditions; FR4 with 60 µm copper strip line.

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THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th(j-a)}$	thermal resistance from junction to ambient SOT54 SOT23 SOT346 SOT323 SOT416 SOT490 SOT883	in free air		
		note 1	250	K/W
		note 1	500	K/W
		note 1	500	K/W
		note 1	625	K/W
		note 1	833	K/W
		notes 1 and 2	500	K/W
		notes 2 and 3	500	K/W

Notes

1. Refer to standard mounting conditions.
2. Reflow soldering is the only recommended soldering method.
3. Refer to SOT883 standard mounting conditions; FR4 with 60 µm copper strip line.

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector-base cut-off current	$V_{CB} = 50$ V; $I_E = 0$ A	–	–	100	nA
I_{CEO}	collector-emitter cut-off current	$V_{CE} = 30$ V; $I_B = 0$ A	–	–	1	µA
		$V_{CE} = 30$ V; $I_B = 0$ A; $T_j = 150$ °C	–	–	50	µA
I_{EBO}	emitter-base cut-off current	$V_{EB} = 5$ V; $I_C = 0$ A	–	–	90	µA
h_{FE}	DC current gain	$V_{CE} = 5$ V; $I_C = 5$ mA	80	–	–	
V_{CEsat}	collector-emitter saturation voltage	$I_C = 10$ mA; $I_B = 0.5$ mA	–	–	150	mV
$V_{i(off)}$	input-off voltage	$I_C = 100$ µA; $V_{CE} = 5$ V	–	1.2	0.8	V
$V_{i(on)}$	input-on voltage	$I_C = 2$ mA; $V_{CE} = 0.3$ V	3	1.6	–	V
$R1$	input resistor		33	47	61	kΩ
$\frac{R2}{R1}$	resistor ratio		0.8	1	1.2	
C_c	collector capacitance	$I_E = i_e = 0$ A; $V_{CB} = 10$ V; $f = 1$ MHz	–	–	2.5	pF

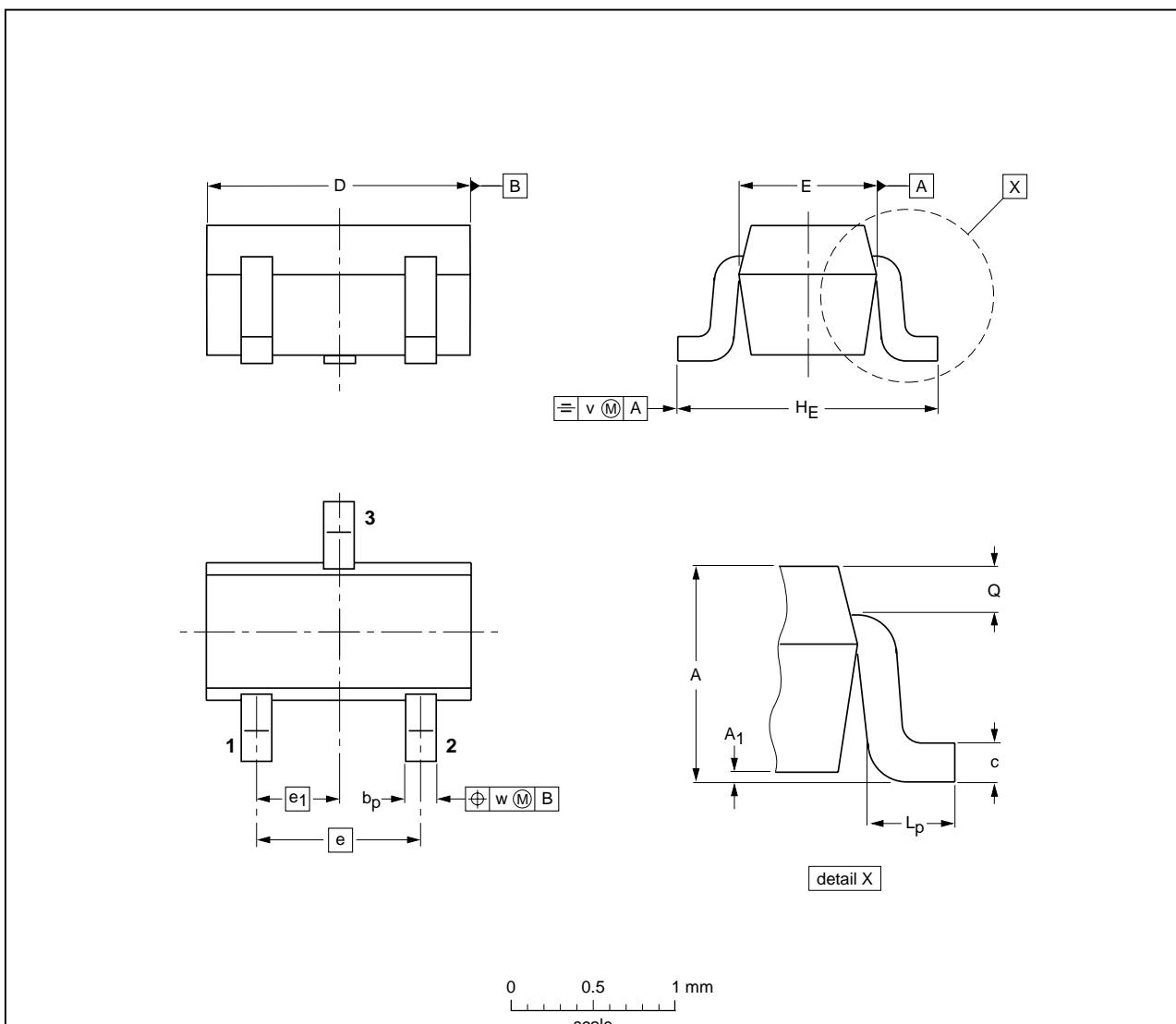
NPN resistor-equipped transistors;
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PDTC144E series

PACKAGE OUTLINES

Plastic surface mounted package; 3 leads

SOT416



DIMENSIONS (mm are the original dimensions)

UNIT	A	A ₁ max	b _p	c	D	E	e	e ₁	H _E	L _p	Q	v	w
mm	0.95 0.60	0.1	0.30 0.15	0.25 0.10	1.8 1.4	0.9 0.7	1	0.5	1.75 1.45	0.45 0.15	0.23 0.13	0.2	0.2

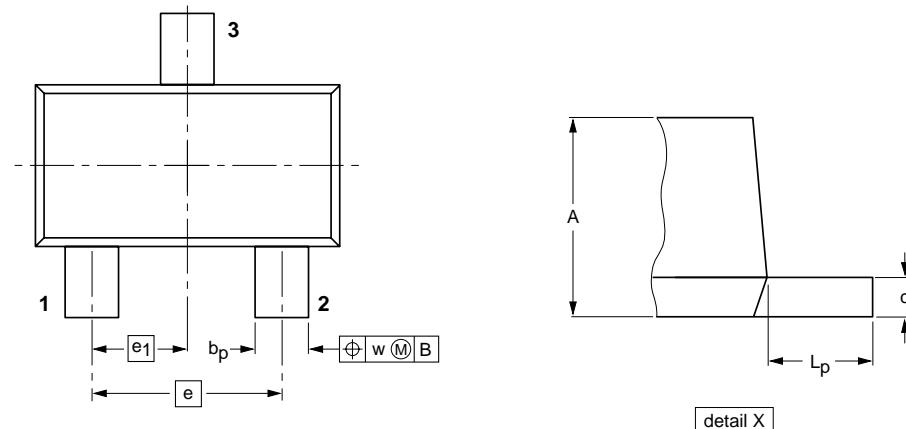
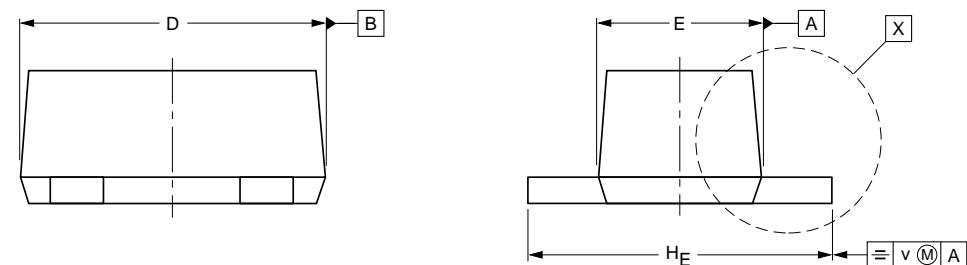
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT416			SC-75			97-02-28

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

PDTC144E series

Plastic surface mounted package; 3 leads

SOT490



0 1 2 mm
 scale

DIMENSIONS (mm are the original dimensions)

UNIT	A	b_p	c	D	E	e	e_1	H_E	l_p	v	w
mm	0.8 0.6	0.33 0.23	0.2 0.1	1.7 1.5	0.95 0.75	1.0	0.5	1.7 1.5	0.5 0.3	0.1	0.1

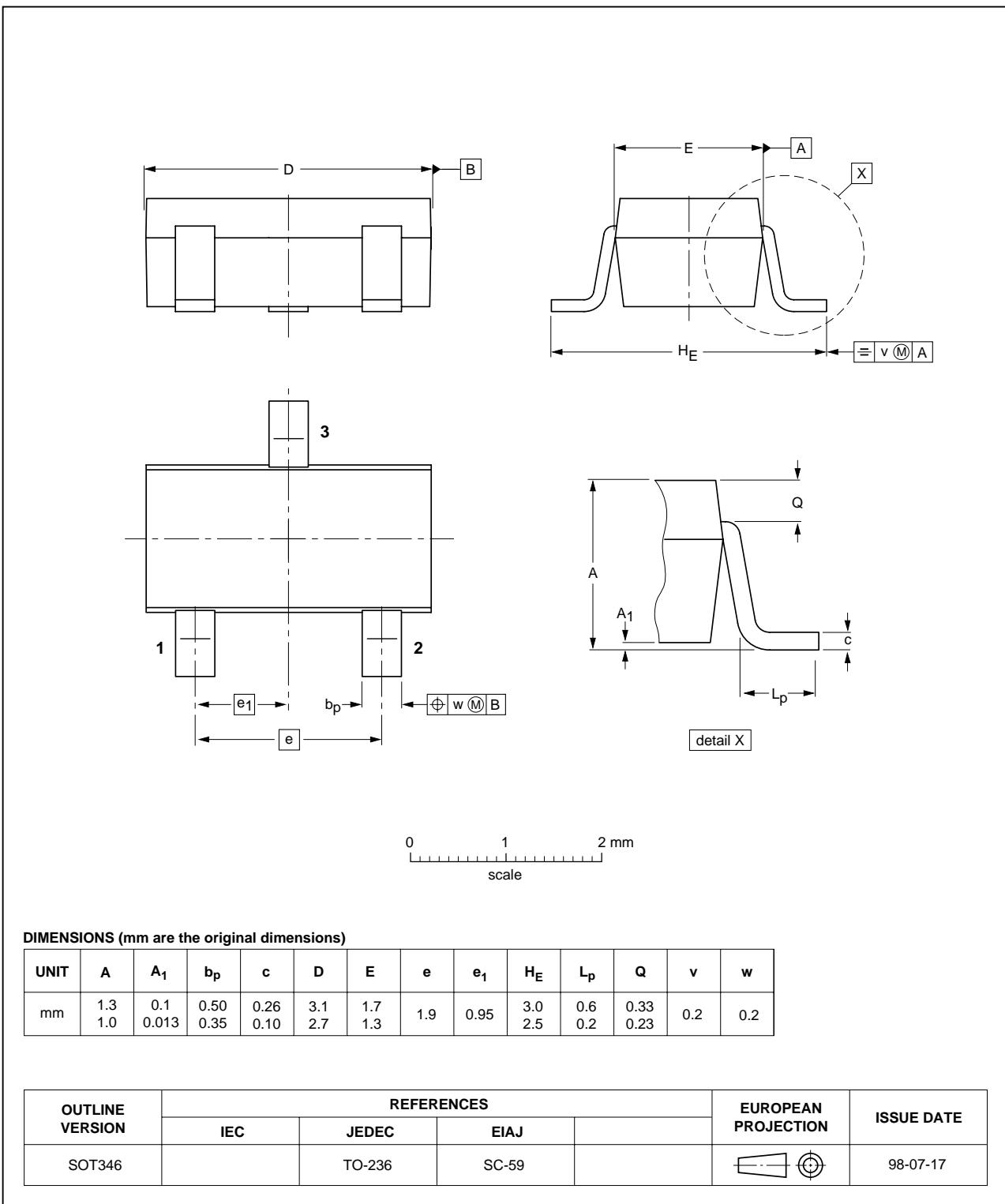
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ	SC-89		
SOT490						98-10-23

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

PDTC144E series

Plastic surface mounted package; 3 leads

SOT346

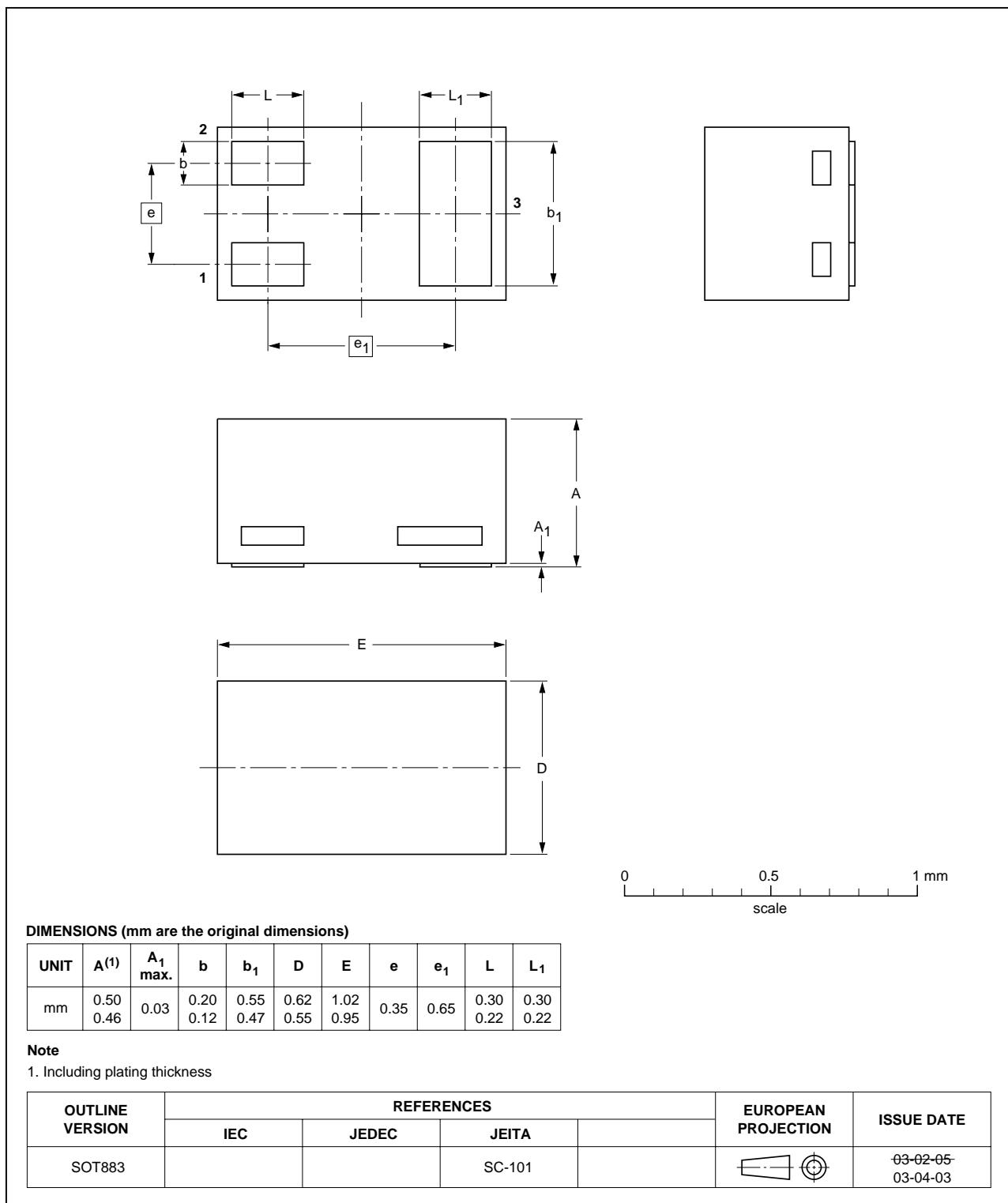


NPN resistor-equipped transistors;
 R1 = 47 k Ω , R2 = 47 k Ω

PDTC144E series

Leadless ultra small plastic package; 3 solder lands; body 1.0 x 0.6 x 0.5 mm

SOT883

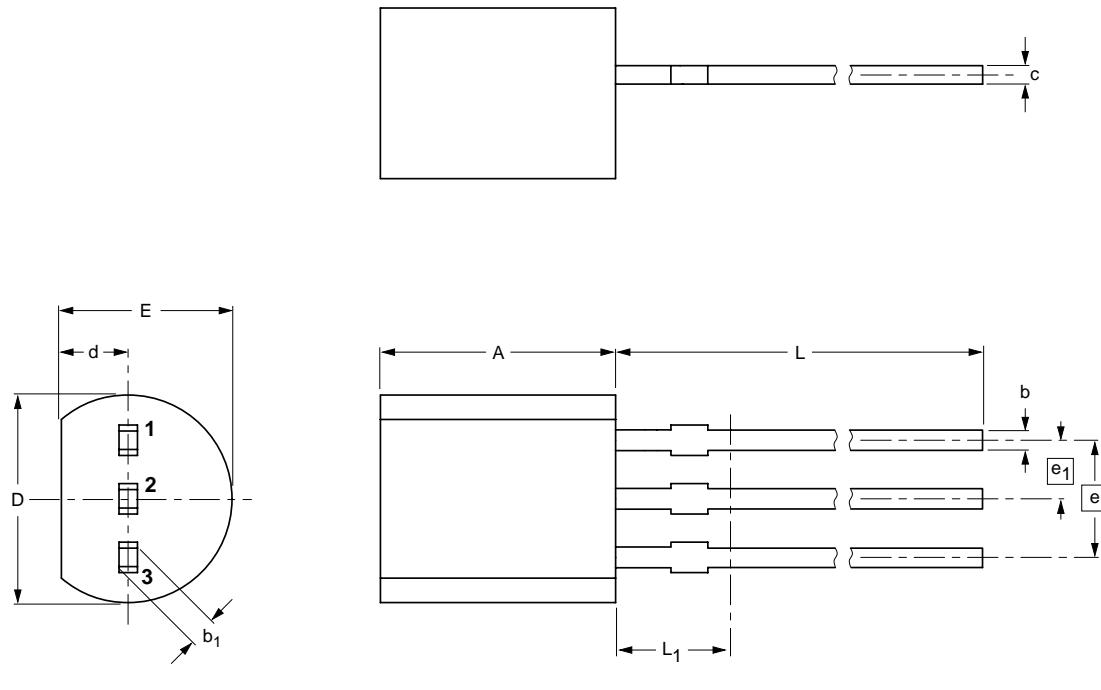


NPN resistor-equipped transistors;
 R1 = 47 kΩ, R2 = 47 kΩ

PDTC144E series

Plastic single-ended leaded (through hole) package; 3 leads

SOT54



0 2.5 5 mm
 scale

DIMENSIONS (mm are the original dimensions)

UNIT	A	b	b ₁	c	D	d	E	e	e ₁	L	L ₁₍₁₎ max.
mm	5.2 5.0	0.48 0.40	0.66 0.55	0.45 0.38	4.8 4.4	1.7 1.4	4.2 3.6	2.54	1.27	14.5 12.7	2.5

Note

1. Terminal dimensions within this zone are uncontrolled to allow for flow of plastic and terminal irregularities.

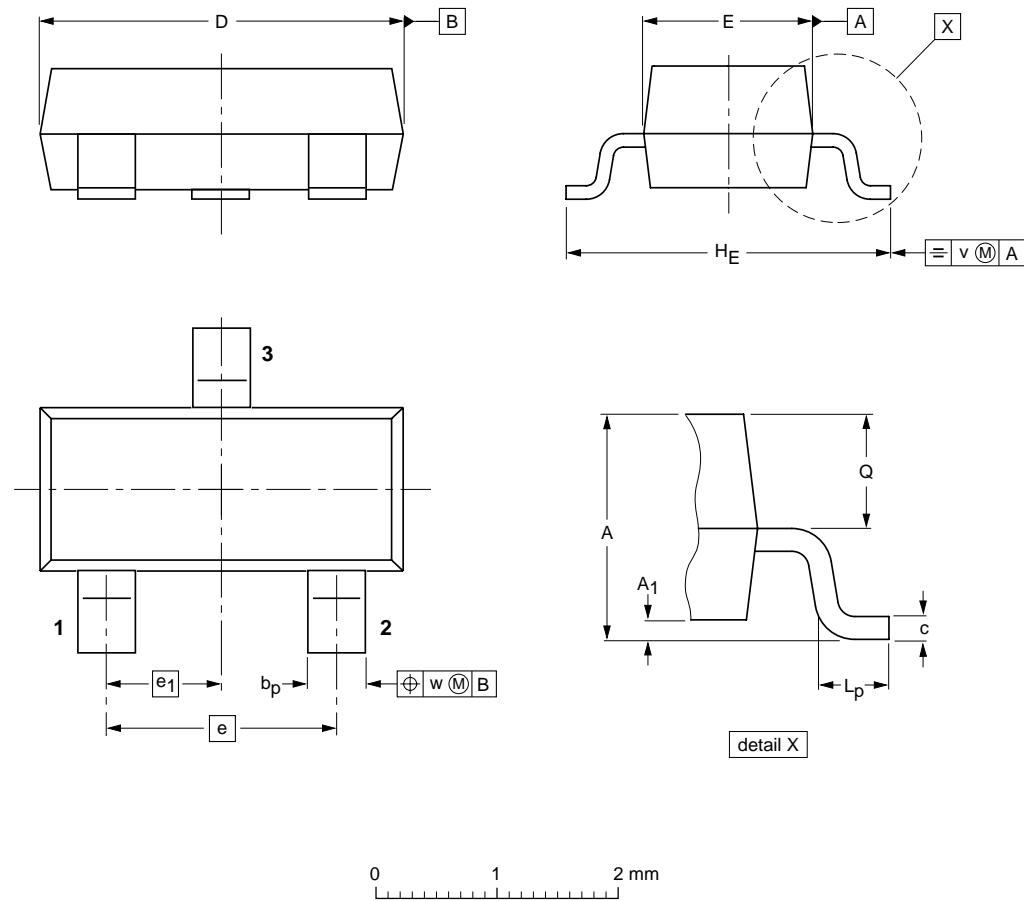
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT54		TO-92	SC-43A			-97-02-28 04-06-28

NPN resistor-equipped transistors;
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PDTC144E series

Plastic surface mounted package; 3 leads

SOT23



DIMENSIONS (mm are the original dimensions)

DIMENSIONS (mm are the original dimensions)													
UNIT	A	A ₁ max.	b _p	c	D	E	e	e ₁	H _E	l _p	Q	v	w
mm	1.1 0.9	0.1	0.48 0.38	0.15 0.09	3.0 2.8	1.4 1.2	1.9	0.95	2.5 2.1	0.45 0.15	0.55 0.45	0.2	0.1

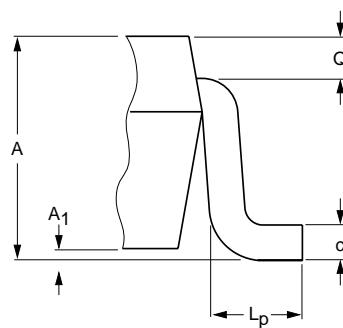
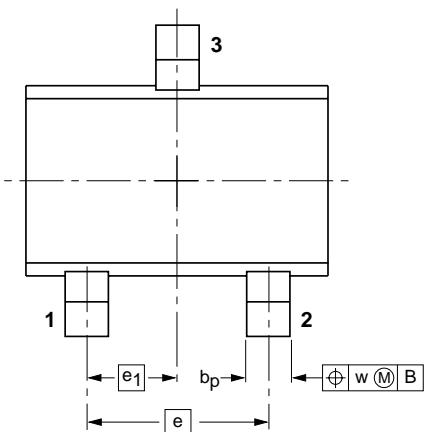
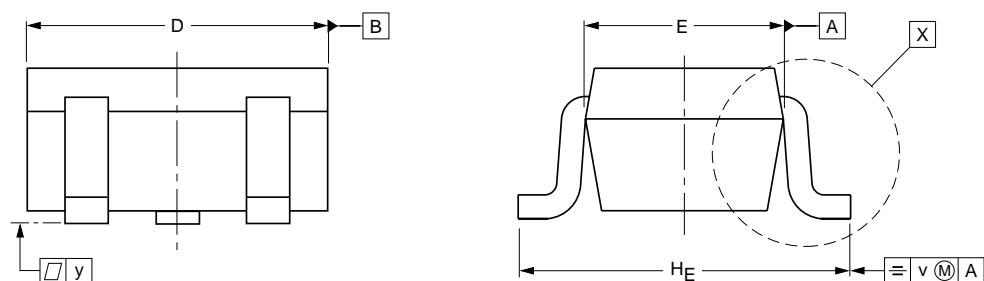
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	IEC	JEDEC	EIAJ			
SOT23		TO-236AB			 	-97-02-28 99-09-13

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

PDTC144E series

Plastic surface mounted package; 3 leads

SOT323



0 1 2 mm
scale

DIMENSIONS (mm are the original dimensions)

UNIT	A	A ₁ max	b _p	c	D	E	e	e ₁	H _E	L _p	Q	v	w
mm	1.1 0.8	0.1	0.4 0.3	0.25 0.10	2.2 1.8	1.35 1.15	1.3	0.65	2.2 2.0	0.45 0.15	0.23 0.13	0.2	0.2

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT323			SC-70			97-02-28

NPN resistor-equipped transistors;
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PDTC144E series

DATA SHEET STATUS

LEVEL	DATA SHEET STATUS ⁽¹⁾	PRODUCT STATUS ⁽²⁾⁽³⁾	DEFINITION
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
II	Preliminary data	Qualification	This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.
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3. For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

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