# **DISCRETE SEMICONDUCTORS**

# DATA SHEET

# **PDTC144W series** NPN resistor-equipped transistors; R1 = 47 k $\Omega$ , R2 = 22 k $\Omega$

Product data sheet Supersedes data of 2004 Mar 23 2004 Aug 17



# NPN resistor-equipped transistors; R1 = 47 k $\Omega$ , R2 = 22 k $\Omega$

### PDTC144W 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
Io	output current (DC)	_	100	mA
R1	bias resistor	47	_	kΩ
R2	bias resistor	22	_	kΩ

#### **DESCRIPTION**

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

#### **PRODUCT OVERVIEW**

TYPE NUMBER	PACE	(AGE	MARKING CODE	PNP COMPLEMENT	
ITPE NUMBER	PHILIPS	PHILIPS EIAJ		PNP COMPLEMENT	
PDTC144WE	SOT416	SC-75	42	PDTA144WE	
PDTC144WEF	SOT490	SC-89	34	PDTA144WEF	
PDTC144WK	SOT346	SC-59	41	PDTA144WK	
PDTC144WM	SOT883	SC-101	DD	PDTA144WM	
PDTC144WS	SOT54 (TO-92)	SC-43	TC144W	PDTA144WS	
PDTC144WT	SOT23	-	*20 <sup>(1)</sup>	PDTA144WT	
PDTC144WU	SOT323	SC-70	*20 <sup>(1)</sup>	PDTA144WU	

#### Note

<sup>1. \* =</sup> p: Made in Hong Kong.

<sup>\* =</sup> t: Made in Malaysia.

<sup>\* =</sup> W: Made in China.

# NPN resistor-equipped transistors; R1 = 47 k $\Omega$ , R2 = 22 k $\Omega$

# PDTC144W series

# SIMPLIFIED OUTLINE, SYMBOL AND PINNING

TYPE NUMBER	CIMPLIFIED OUTLINE AND CYMPOL		PINNING
TYPE NUMBER	SIMPLIFIED OUTLINE AND SYMBOL	PIN	DESCRIPTION
PDTC144WS	1 R1 R2 R2 R2 R2 R2 R2	1 2 3	base collector emitter
PDTC144WE PDTC144WK PDTC144WT PDTC144WU	Top view  1 R1 R2	1 2 3	base emitter collector
PDTC144WM	2 R1 R2 P2 P3	1 2 3	base emitter collector

# NPN resistor-equipped transistors; R1 = 47 k $\Omega$ , R2 = 22 k $\Omega$

# PDTC144W series

#### **ORDERING INFORMATION**

TYPE NUMBER	PACKAGE							
TYPE NUMBER	NAME	DESCRIPTION	VERSION					
PDTC144WE	_	plastic surface mounted package; 3 leads	SOT416					
PDTC144WEF	_	plastic surface mounted package; 3 leads	SOT490					
PDTC144WK	_	plastic surface mounted package; 3 leads	SOT346					
PDTC144WM	_	leadless ultra small plastic package; 3 solder lands; body $1.0 \times 0.6 \times 0.5$ mm	SOT883					
PDTC144WS	_	plastic single-ended leaded (through hole) package; 3 leads	SOT54					
PDTC144WT	_	plastic surface mounted package; 3 leads	SOT23					
PDTC144WU	_	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 <sub>CBO</sub>	collector-base voltage	open emitter	_	50	V
V <sub>CEO</sub>	collector-emitter voltage	open base	_	50	V
V <sub>EBO</sub>	emitter-base voltage	open collector	_	10	V
Vi	input voltage				
	positive		_	+40	V
	negative		_	-10	V
Io	output current (DC)		_	100	mA
I <sub>CM</sub>	peak collector current		_	100	mA
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C			
	SOT54	note 1	_	500	mW
	SOT23	note 1	_	250	mW
	SOT346	note 1	_	250	mW
	SOT323	note 1	_	200	mW
	SOT490	notes 1 and 2	_	250	mW
	SOT883	notes 2 and 3	_	250	mW
	SOT416	note 1	_	150	mW
T <sub>stg</sub>	storage temperature		-65	+150	°C
Tj	junction temperature		_	150	°C
T <sub>amb</sub>	operating ambient temperature		-65	+150	°C

4

#### **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  $\mu m$  copper strip line.

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# NPN resistor-equipped transistors; R1 = 47 k $\Omega$ , R2 = 22 k $\Omega$

# PDTC144W series

#### THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
R <sub>th(j-a)</sub>	thermal resistance from junction to ambient	in free air		
	SOT54	note 1	250	K/W
	SOT23	note 1	500	K/W
	SOT346	note 1	500	K/W
	SOT323	note 1	625	K/W
	SOT490	notes 1 and 2	500	K/W
	SOT883	notes 2 and 3	500	K/W
	SOT416	note 1	833	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  $\mu m$  copper strip line.

#### **CHARACTERISTICS**

 $T_{amb}$  = 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	$V_{CE} = 30 \text{ V}; I_{B} = 0 \text{ A}$	_	_	1	μΑ
		$V_{CE} = 30 \text{ V}; I_{B} = 0 \text{ A}; T_{j} = 150 ^{\circ}\text{C}$	_	_	50	μΑ
I <sub>EBO</sub>	emitter-base cut-off current	V <sub>EB</sub> = 5 V; I <sub>C</sub> = 0 A	_	_	110	μΑ
h <sub>FE</sub>	DC current gain	$V_{CE} = 5 \text{ V}; I_{C} = 5 \text{ mA}$	60	_	_	
V <sub>CEsat</sub>	collector-emitter saturation voltage	$I_C = 10 \text{ mA}; I_B = 0.5 \text{ mA}$	_	_	150	mV
$V_{i(off)}$	input-off voltage	$I_C = 100 \mu A; V_{CE} = 5 V$	_	1.7	1.2	V
$V_{i(on)}$	input-on voltage	$I_C = 2 \text{ mA}; V_{CE} = 0.3 \text{ V}$	4	2.7	_	٧
R1	input resistor		33	47	61	kΩ
R2 R1	resistor ratio		0.37	0.47	0.57	
C <sub>c</sub>	collector capacitance	$I_E = I_e = 0 \text{ A}; V_{CB} = 10 \text{ V};$ f = 1 MHz	-	_	2.5	pF

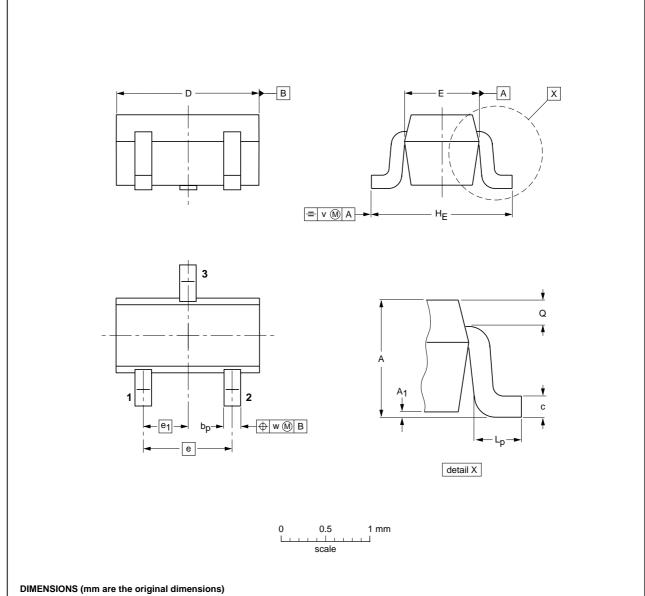
# NPN resistor-equipped transistors; $R1 = 47 \text{ k}\Omega$ , $R2 = 22 \text{ k}\Omega$

# PDTC144W series

#### **PACKAGE OUTLINES**

Plastic surface-mounted package; 3 leads

**SOT416** 



UNIT	Α	A <sub>1</sub> max	bp	С	D	E	е	e <sub>1</sub>	HE	Lp	ø	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		REFER	EUROPEAN	ISSUE DATE		
VERSION	IEC	JEDEC	JEITA		PROJECTION	ISSUE DATE
SOT416			SC-75			<del>04-11-04</del> 06-03-16

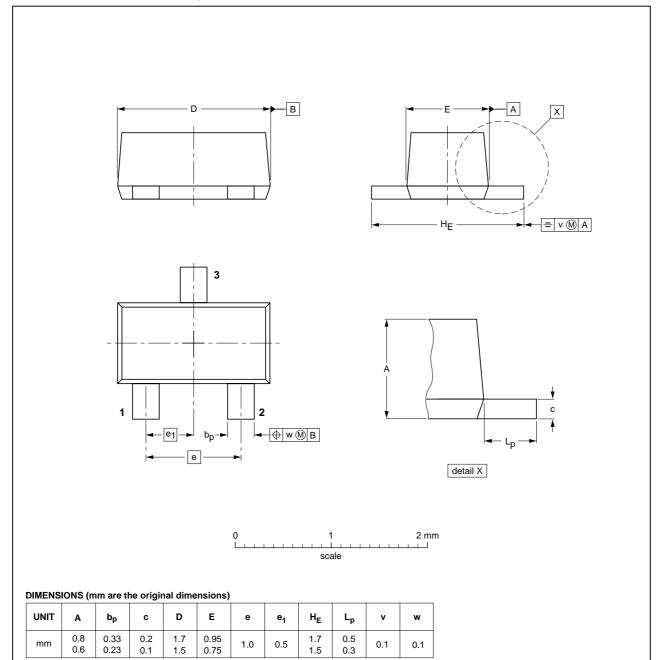
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# NPN resistor-equipped transistors; R1 = 47 k $\Omega$ , R2 = 22 k $\Omega$

# PDTC144W series

#### Plastic surface-mounted package; 3 leads

SOT490



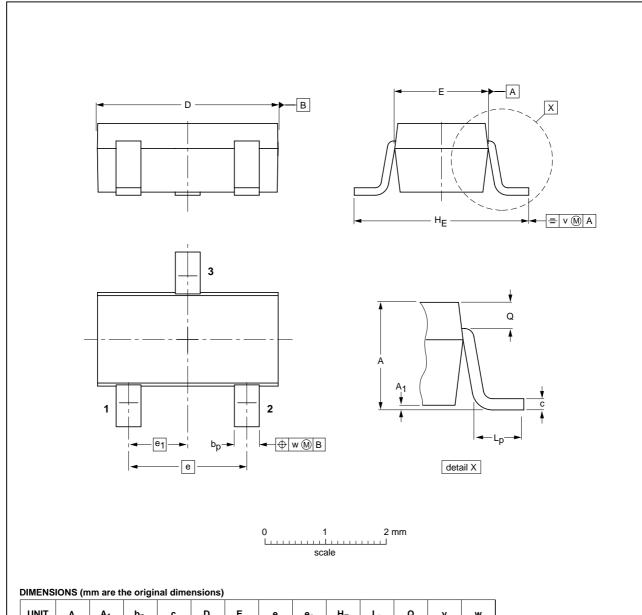
OUTLINE		REFER	EUROPEAN	ISSUE DATE			
VERSION	IEC	JEDEC	JEITA		PROJECTION	1920E DATE	
SOT490			SC-89			<del>05-07-28</del> 06-03-16	

# NPN resistor-equipped transistors; R1 = 47 k $\Omega$ , R2 = 22 k $\Omega$

# PDTC144W series

#### Plastic surface-mounted package; 3 leads

**SOT346** 



UNII	Α	A <sub>1</sub>	ор	С	ט	E	е	e <sub>1</sub>	HE	Lp	Q	<b>'</b>	w
mm	1.3 1.0	0.1 0.013	0.50 0.35	0.26 0.10	3.1 2.7	1.7 1.3	1.9	0.95	3.0 2.5	0.6 0.2	0.33 0.23	0.2	0.2

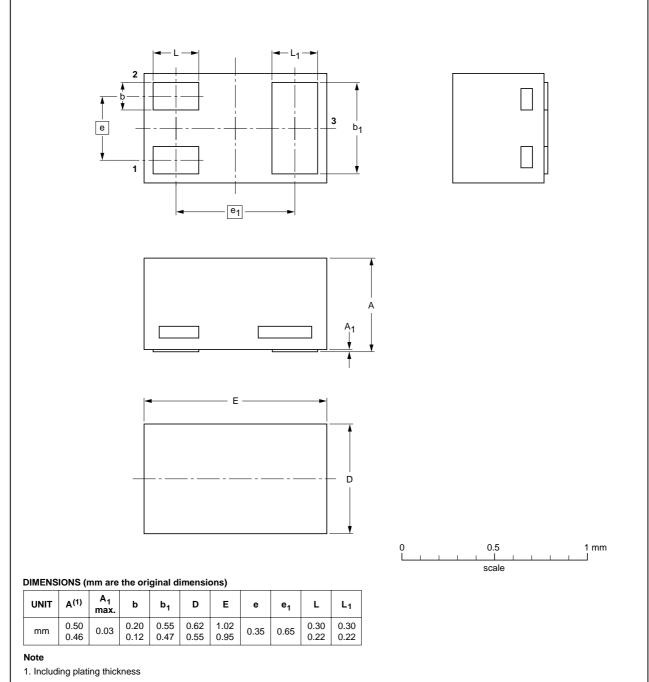
OUTLINE		REFER	EUROPEAN	ICCUE DATE			
VERSION	IEC	JEDEC	JEITA		PROJECTION	ISSUE DATE	
SOT346		TO-236	SC-59A			<del>-04-11-11</del> 06-03-16	

# NPN resistor-equipped transistors; R1 = 47 k $\Omega$ , R2 = 22 k $\Omega$

# PDTC144W series

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

**SOT883** 



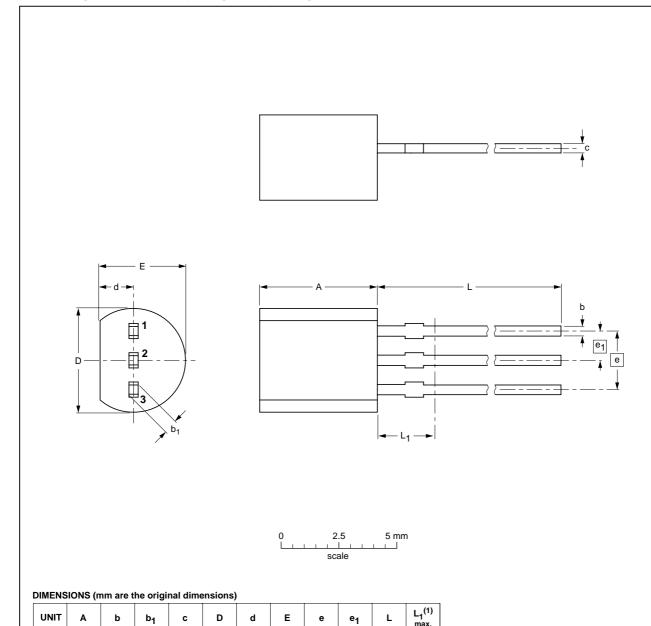
OUTLINE	REFERENCES				EUROPEAN	ISSUE DATE
VERSION	IEC	JEDEC	JEITA	JEITA PROJECTION	PROJECTION	ISSUE DATE
SOT883			SC-101			<del>03-02-05</del> 03-04-03

# NPN resistor-equipped transistors; R1 = 47 k $\Omega$ , R2 = 22 k $\Omega$

# PDTC144W series

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

SOT54



### mm

0.48

0.40

5.0

0.66

0.55

0.45

0.38

4.8

4.4

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

1.7

1.4

4.2

3.6

OUTLINE		REFER	EUROPEAN	ISSUE DATE		
VERSION	IEC	JEDEC	JEITA		PROJECTION	ISSUE DATE
SOT54		TO-92	SC-43A			<del>04-06-28</del> 04-11-16

1.27

2.54

14.5

12.7

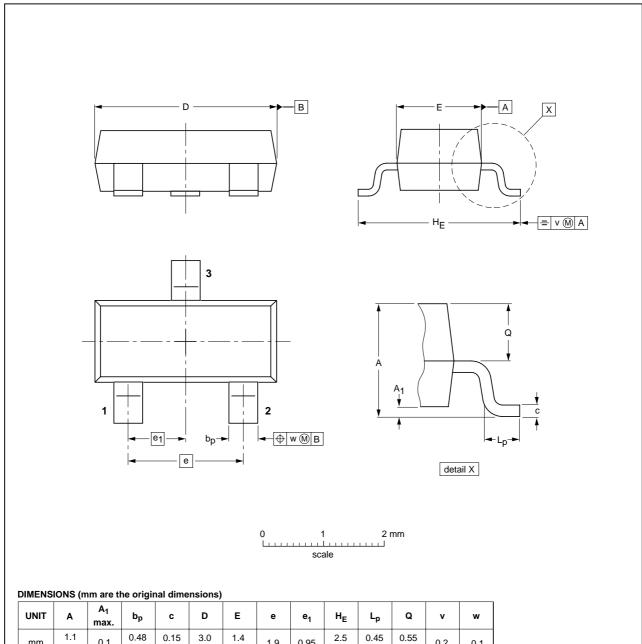
2.5

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

# PDTC144W series

#### Plastic surface-mounted package; 3 leads

SOT23



OUTLINE	OUTLINE REFERENCES				EUROPEAN	ISSUE DATE
VERSION	IEC	JEDEC	JEITA		PROJECTION	ISSUE DATE
SOT23		TO-236AB				<del>-04-11-04</del> 06-03-16

0.2

0.1

1.9

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0.38

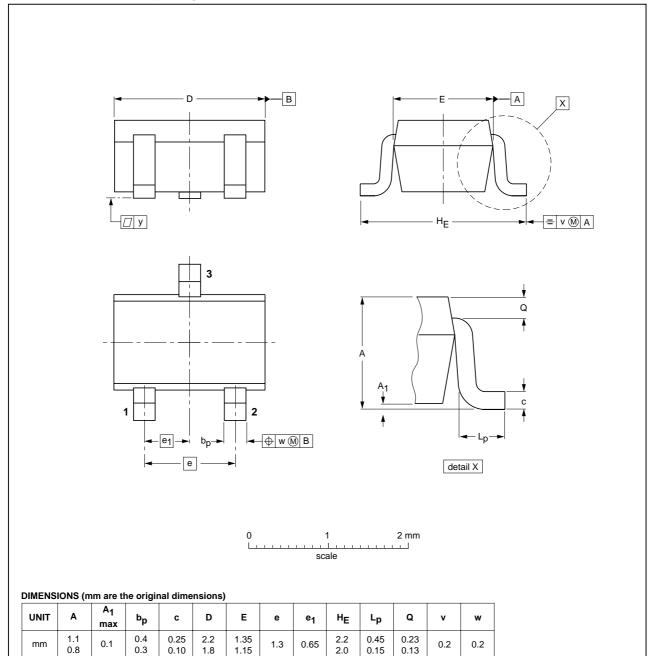
0.9

# NPN resistor-equipped transistors; R1 = 47 k $\Omega$ , R2 = 22 k $\Omega$

# PDTC144W series

#### Plastic surface-mounted package; 3 leads

**SOT323** 



OUTLINE	REFERENCES				EUROPEAN	ISSUE DATE
VERSION	IEC	JEDEC	JEITA		PROJECTION	ISSUE DATE
SOT323			SC-70			<del>04-11-04</del> 06-03-16

# NPN resistor-equipped transistors; R1 = 47 k $\Omega$ , R2 = 22 k $\Omega$

#### PDTC144W series

#### **DATA SHEET STATUS**

DOCUMENT STATUS <sup>(1)</sup>	PRODUCT STATUS <sup>(2)</sup>	DEFINITION
Objective data sheet	Development	This document contains data from the objective specification for product development.
Preliminary data sheet	Qualification	This document contains data from the preliminary specification.
Product data sheet	Production	This document contains the product specification.

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- 2. 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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# **NXP Semiconductors**

#### **Customer notification**

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, except for package outline drawings which were updated to the latest version.

#### **Contact information**

For additional information please visit: http://www.nxp.com
For sales offices addresses send e-mail to: salesaddresses@nxp.com

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