PDTA143X series

PNP resistor-equipped transistors; R1 = 4.7 kΩ, R2 = 10 kΩ

Rev. 04 — 16 April 2007 Product data sheet

1. Product profile

1.1 General description

PNP Resistor-Equipped Transistors (RET) family in small plastic packages.

Table 1. Product overview

Type number	Package			NPN complement
	NXP	JEITA	JEDEC	
PDTA143XE	SOT416	SC-75	-	PDTC143XE
PDTA143XK	SOT346	SC-59A	TO-236	PDTC143XK
PDTA143XM	SOT883	SC-101	-	PDTC143XM
PDTA143XS[1]	SOT54	SC-43A	TO-92	PDTC143XS
PDTA143XT	SOT23	-	TO-236AB	PDTC143XT
PDTA143XU	SOT323	SC-70	-	PDTC143XU

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

1.2 Features

- 100 mA output current capability
- Built-in bias resistors
- Simplifies circuit design
- Reduces component count
- Reduces pick and place costs

1.3 Applications

- Digital applications
- Control of IC inputs
- Cost-saving alternative to BC857 series in digital applications
- Low current peripheral driver

1.4 Quick reference data

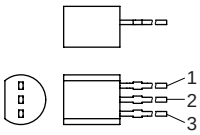
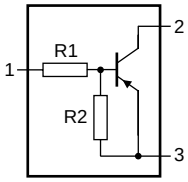
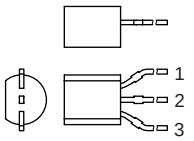
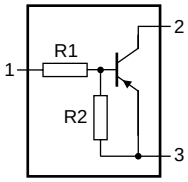
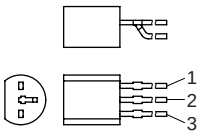
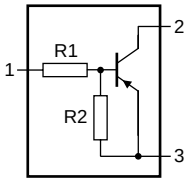
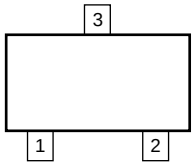
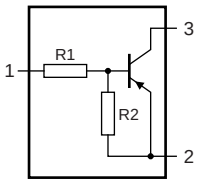
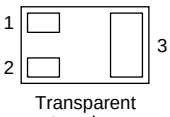
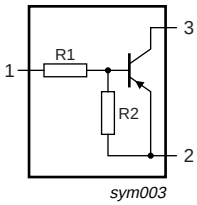
Table 2. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base	-	-	–50	V
I_O	output current		-	-	–100	mA
R1	bias resistor 1 (input)		3.3	4.7	6.1	kΩ
R2/R1	bias resistor ratio		1.7	2.1	2.6	

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2. Pinning information

Table 3. Pinning

Pin	Description	Simplified outline	Symbol
SOT54			
1	input (base)	 001aab347	 006aaa148
2	output (collector)		
3	GND (emitter)		
SOT54A			
1	input (base)	 001aab348	 006aaa148
2	output (collector)		
3	GND (emitter)		
SOT54 variant			
1	input (base)	 001aab447	 006aaa148
2	output (collector)		
3	GND (emitter)		
SOT23; SOT323; SOT346; SOT416			
1	input (base)	 006aaa144	 sym003
2	GND (emitter)		
3	output (collector)		
SOT883			
1	input (base)	 Transparent top view	 sym003
2	GND (emitter)		
3	output (collector)		

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3. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
PDTA143XE	SC-75	plastic surface-mounted package; 3 leads	SOT416
PDTA143XK	SC-59A	plastic surface-mounted package; 3 leads	SOT346
PDTA143XM	SC-101	leadless ultra small plastic package; 3 solder lands; body 1.0 × 0.6 × 0.5 mm	SOT883
PDTA143XS[1]	SC-43A	plastic single-ended leaded (through hole) package; 3 leads	SOT54
PDTA143XT	-	plastic surface-mounted package; 3 leads	SOT23
PDTA143XU	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]
PDTA143XE	35
PDTA143XK	25
PDTA143XM	DN
PDTA143XS	TA143X
PDTA143XT	*31
PDTA143XU	*46

[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		-	–20	V
I_O	output current		-	–100	mA
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms	-	–100	mA

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Table 6. Limiting values *…continued*

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C				
	PDTA143XE		[1]	-	150	mW
	PDTA143XK		[1]	-	250	mW
	PDTA143XM		[2][3]	-	250	mW
	PDTA143XS		[1]	-	500	mW
	PDTA143XT		[1]	-	250	mW
	PDTA143XU		[1]	-	200	mW
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			–65	+150	°C
T_{stg}	storage 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 µm 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					
	PDTA143XE		[1]	-	-	833	K/W
	PDTA143XK		[1]	-	-	500	K/W
	PDTA143XM		[2][3]	-	-	500	K/W
	PDTA143XS		[1]	-	-	250	K/W
	PDTA143XT		[1]	-	-	500	K/W
	PDTA143XU		[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.

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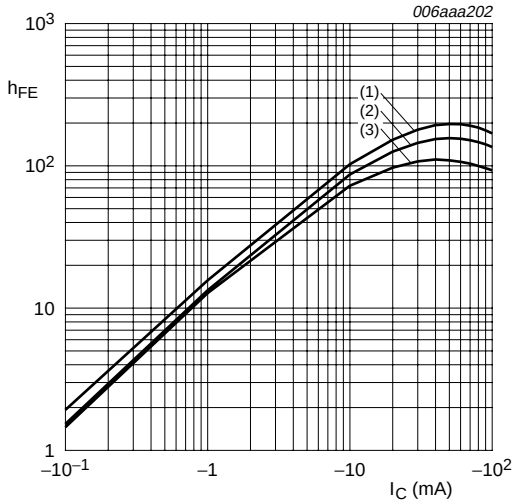
7. Characteristics

Table 8. 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	-	-	–600	µA
h_{FE}	DC current gain	V_{CE} = –5 V; I_C = –10 mA	50	-	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = –10 mA; I_B = –0.5 mA	-	-	–150	mV
$V_{I(off)}$	off-state input voltage	V_{CE} = –5 V; I_C = –100 µA	-	–0.9	–0.3	V
$V_{I(on)}$	on-state input voltage	V_{CE} = –0.3 V; I_C = –20 mA	–2.5	–1.5	-	V
R1	bias resistor 1 (input)		3.3	4.7	6.1	kΩ
R2/R1	bias resistor ratio		1.7	2.1	2.6	
C_c	collector capacitance	V_{CB} = –10 V; I_E = i_e = 0 A; f = 1 MHz	-	-	3	pF

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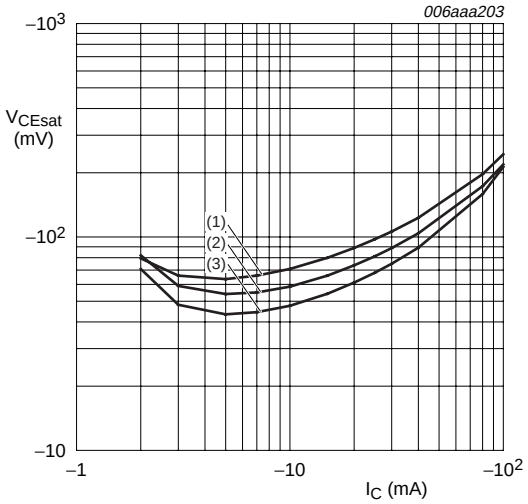
V_{CE} = −5 V

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −40 °C

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



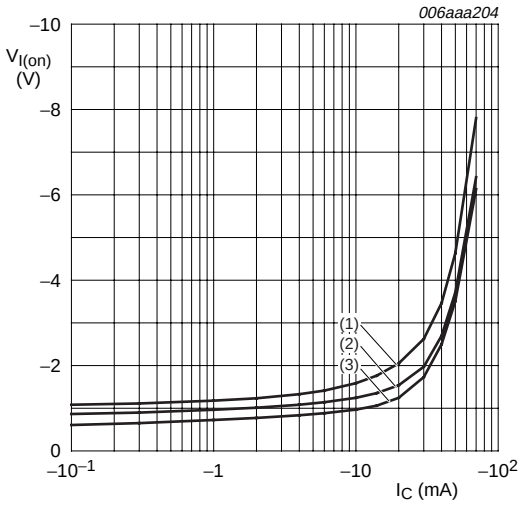
I_C/I_B = 20

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −40 °C

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



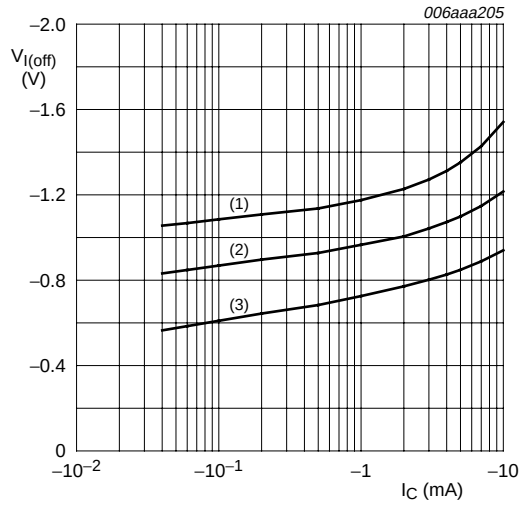
V_{CE} = −0.3 V

(1) T_{amb} = −40 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 100 °C

Fig 3. On-state input voltage as a function of collector current; typical values



V_{CE} = −5 V

(1) T_{amb} = −40 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 100 °C

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

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8. Package outline

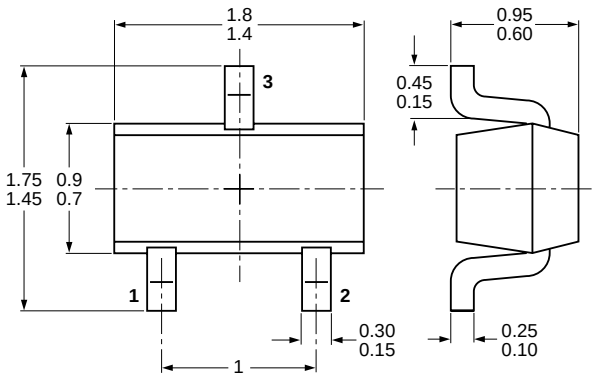


Fig 5. Package outline SOT416 (SC-75)

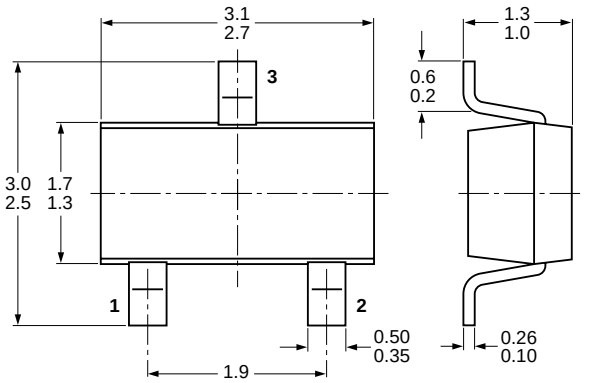


Fig 6. Package outline SOT346 (SC-59A/TO-236)

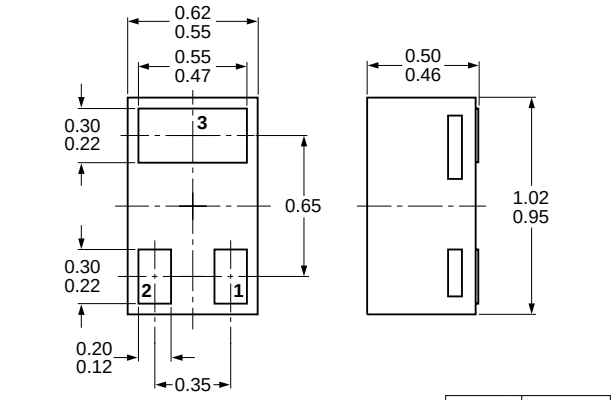


Fig 7. Package outline SOT883 (SC-101)

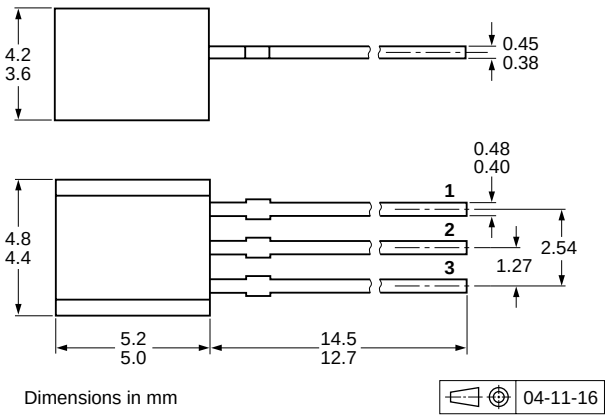


Fig 8. Package outline SOT54 (SC-43A/TO-92)

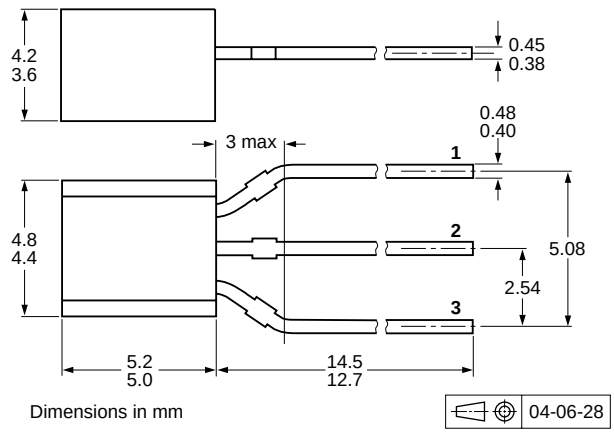


Fig 9. Package outline SOT54A

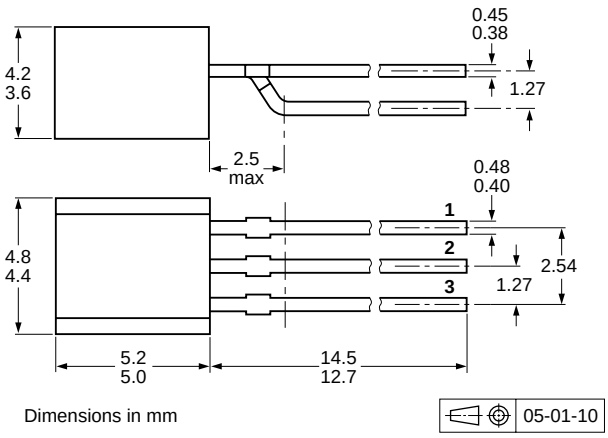


Fig 10. Package outline SOT54 variant

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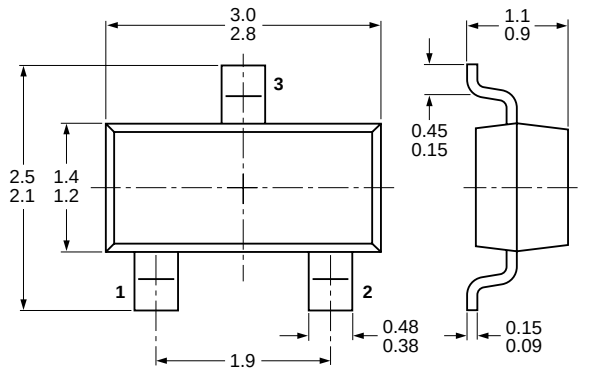


Fig 11. Package outline SOT23 (TO-236AB)

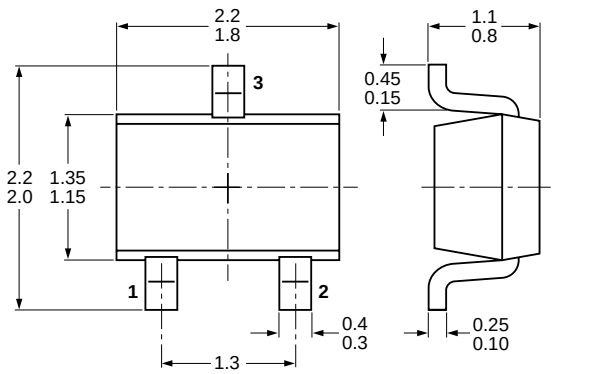


Fig 12. Package outline SOT323 (SC-70)

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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
PDTA143XE	SOT416	4 mm pitch, 8 mm tape and reel	-115	-	-135
PDTA143XK	SOT346	4 mm pitch, 8 mm tape and reel	-115	-	-135
PDTA143XM	SOT883	2 mm pitch, 8 mm tape and reel	-	-	-315
PDTA143XS	SOT54	bulk, straight leads	-	-412	-
	SOT54A	tape and reel, wide pitch	-	-	-116
		tape ammopack, wide pitch	-	-	-126
	SOT54 variant	bulk, delta pinning	-	-112	-
PDTA143XT	SOT23	4 mm pitch, 8 mm tape and reel	-215	-	-235
PDTA143XU	SOT323	4 mm pitch, 8 mm tape and reel	-115	-	-135

[1] For further information and the availability of packing methods, see Section 12.

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10. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PDTA143X_SER_4	20070416	Product data sheet	-	PDTA143X_SERIES_3
Modifications:	• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. • Legal texts have been adapted to the new company name where appropriate. • Type number PDTA143XEF removed • Section 1.2 “Features”: amended • Section 1.3 “Applications”: amended • Table 4 “Ordering information”: added • Table 5 “Marking codes”: enhanced table note section • Table 6 “Limiting values”: typing error for value V_{EBO} emitter-base voltage corrected • Table 6 “Limiting values”: I_{CM} peak collector current conditions added • Table 8 “Characteristics”: $V_{i(on)}$ redefined to $V_{I(on)}$ on-state input voltage • Table 8 “Characteristics”: $V_{i(off)}$ redefined to $V_{I(off)}$ off-state input voltage • Figure 1, 2, 3, 4, 9 and 10: added • Figure 5, 6, 7, 8, 11 and 12: superseded by minimized package outline drawings • Section 9 “Packing information”: added • Section 11 “Legal information”: updated			
PDTA143X_SERIES_3	20040804	Product specification	-	PDTA143X_SERIES_2
PDTA143X_SERIES_2	20030410	Product specification	-	PDTA143XEF_1 PDTA143XK_1 PDTA143XE_1 PDTA143XT_1
PDTA143XEF_1	20020314	Product specification	-	-
PDTA143XK_1	20020115	Product specification	-	-
PDTA143XE_1	19990420	Product specification	-	-
PDTA143XT_1	19990420	Product specification	-	-

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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".

[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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