

PDTA124EU,135 Datasheet



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DiGi Electronics Part Number	PDTA124EU,135-DG
Manufacturer	Nexperia USA Inc.
Manufacturer Product Number	PDTA124EU,135
Description	TRANS PREBIAS PNP 50V SOT323
Detailed Description	Pre-Biased Bipolar Transistor (BJT) PNP - Pre-Biased 50 V 100 mA 200 mW Surface Mount SOT-323



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Purchase and inquiry

Manufacturer Product Number:

PDTA124EU,135

Series:

-

Transistor Type:

PNP - Pre-Biased

Voltage - Collector Emitter Breakdown (Max):

50 V

Resistor - Emitter Base (R2):

22 kOhms

Vce Saturation (Max) @ Ib, Ic:

150mV @ 500µA, 10mA

Power - Max:

200 mW

Qualification:

AEC-Q100

Package / Case:

SC-70, SOT-323

Base Product Number:

PDTA124

Manufacturer:

Nexperia USA Inc.

Product Status:

Active

Current - Collector (Ic) (Max):

100 mA

Resistor - Base (R1):

22 kOhms

DC Current Gain (hFE) (Min) @ Ic, Vce:

60 @ 5mA, 5V

Current - Collector Cutoff (Max):

100nA

Grade:

Automotive

Mounting Type:

Surface Mount

Supplier Device Package:

SOT-323

Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Unaffected

HTSUS:

8541.21.0095

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

EAR99

PDTA124E series

PNP resistor-equipped transistors;
R1 = 22 k Ω , R2 = 22 k Ω

Rev. 8 — 25 November 2011

Product data sheet

1. Product profile

1.1 General description

PNP Resistor-Equipped Transistor (RET) family in Surface-Mounted Device (SMD) plastic packages.

Table 1. Product overview

Type number	Package			NPN complement	Package configuration
	NXP	JEITA	JEDEC		
PDTA124EE	SOT416	SC-75	-	PDTC124EE	ultra small
PDTA124EM	SOT883	SC-101	-	PDTC124EM	leadless ultra small
PDTA124ET	SOT23	-	TO-236AB	PDTC124ET	small
PDTA124EU	SOT323	SC-70	-	PDTC124EU	very small

1.2 Features and benefits

- 100 mA output current capability
- Built-in bias resistors
- Simplifies circuit design
- Reduces component count
- Reduces pick and place costs
- AEC-Q101 qualified

1.3 Applications

- Digital applications in automotive and industrial segments
- Control of IC inputs
- Cost-saving alternative for BC847/857 series in digital applications
- Switching loads

1.4 Quick reference data

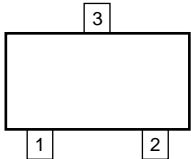
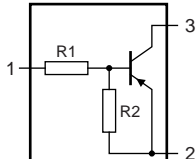
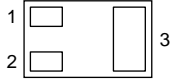
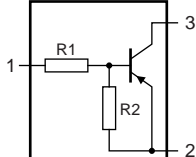
Table 2. Quick reference data

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)		15.4	22	28.6	k Ω
R2/R1	bias resistor ratio		0.8	1	1.2	



2. Pinning information

Table 3. Pinning

Pin	Description	Simplified outline	Graphic symbol
SOT23; SOT323; 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)		

3. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
PDTA124EE	SC-75	plastic surface-mounted package; 3 leads	SOT416
PDTA124EM	SC-101	leadless ultra small plastic package; 3 solder lands; body 1.0 × 0.6 × 0.5 mm	SOT883
PDTA124ET	-	plastic surface-mounted package; 3 leads	SOT23
PDTA124EU	SC-70	plastic surface-mounted package; 3 leads	SOT323

4. Marking

Table 5. Marking codes

Type number	Marking code ^[1]
PDTA124EE	05
PDTA124EM	DH
PDTA124ET	*05
PDTA124EU	*05

[1] * = placeholder for manufacturing site code

5. Limiting values

Table 6. Limiting values

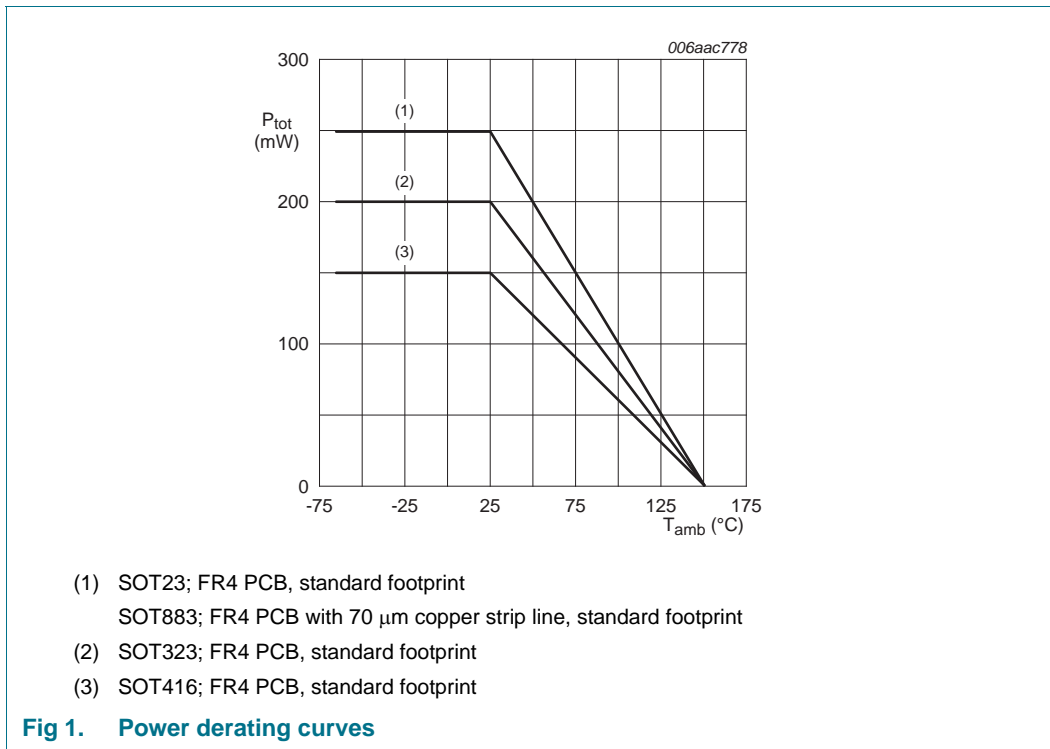
In accordance with the Absolute Maximum Rating System (IEC 60134).

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	-	-10	V	
V_I	input voltage					
	positive		-	+10	V	
	negative		-	-40	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				
	PDTA124EE (SOT416)		[1][2]	-	150	mW
	PDTA124EM (SOT883)		[2][3]	-	250	mW
	PDTA124ET (SOT23)		[1]	-	250	mW
	PDTA124EU (SOT323)		[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 70 μ m copper strip line, standard footprint.



6. Thermal characteristics

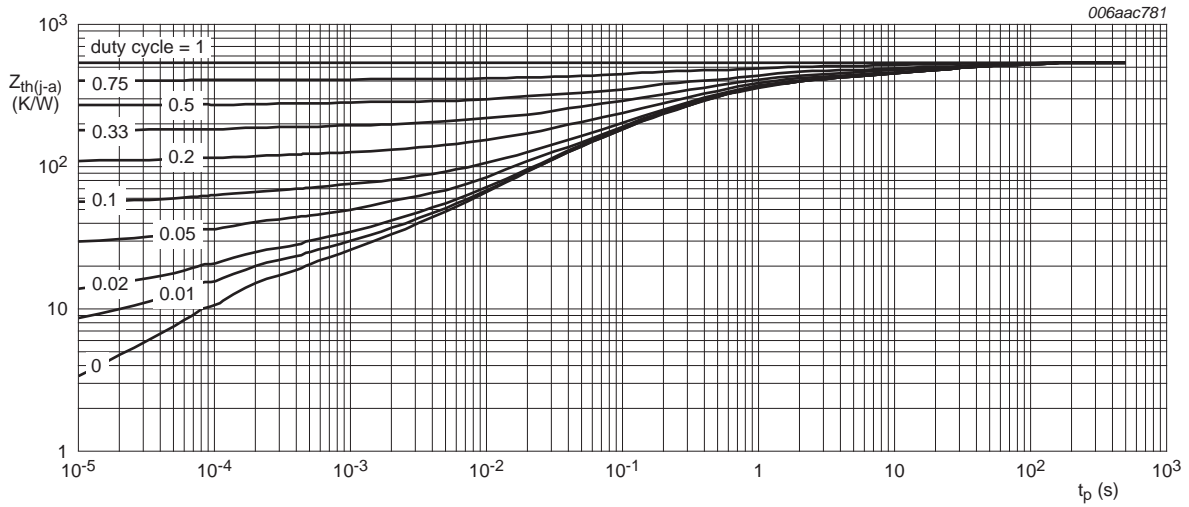
Table 7. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
R _{th(j-a)}	thermal resistance from junction to ambient	in free air				
	PDTA124EE (SOT416)	[1][2]	-	-	830	K/W
	PDTA124EM (SOT883)	[2][3]	-	-	500	K/W
	PDTA124ET (SOT23)	[1]	-	-	500	K/W
	PDTA124EU (SOT323)	[1]	-	-	625	K/W

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

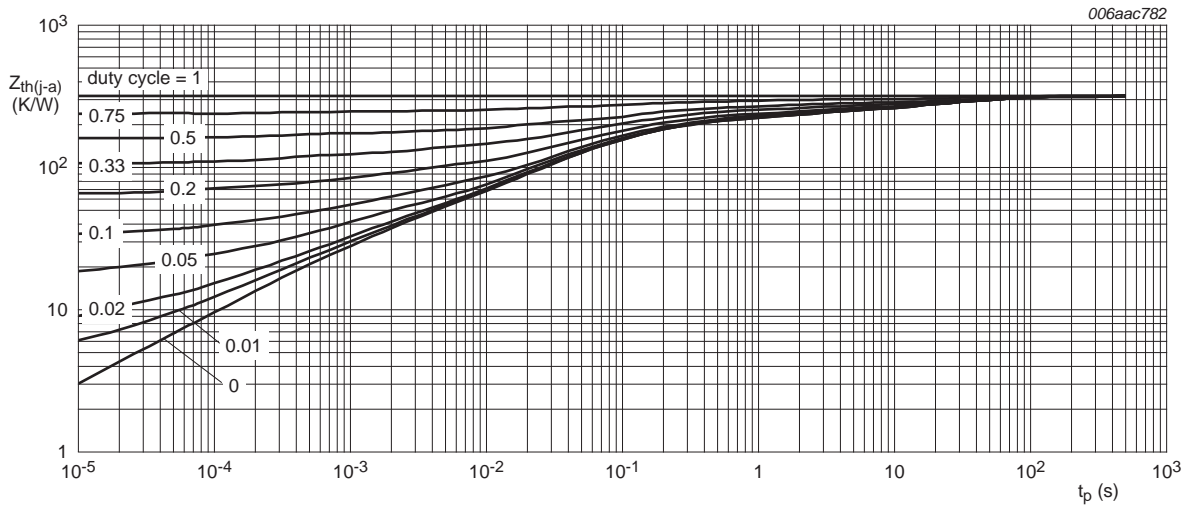
[2] Reflow soldering is the only recommended soldering method.

[3] Device mounted on an FR4 PCB with 70 μm copper strip line, standard footprint.



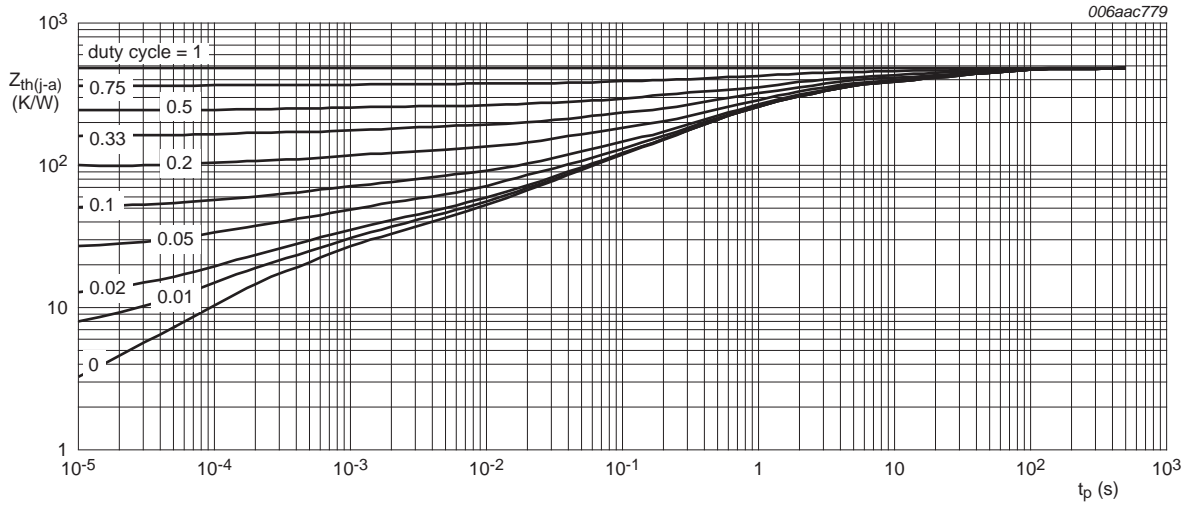
FR4 PCB, standard footprint

Fig 2. Transient thermal impedance from junction to ambient as a function of pulse duration for PDTA124EE (SOT416); typical values



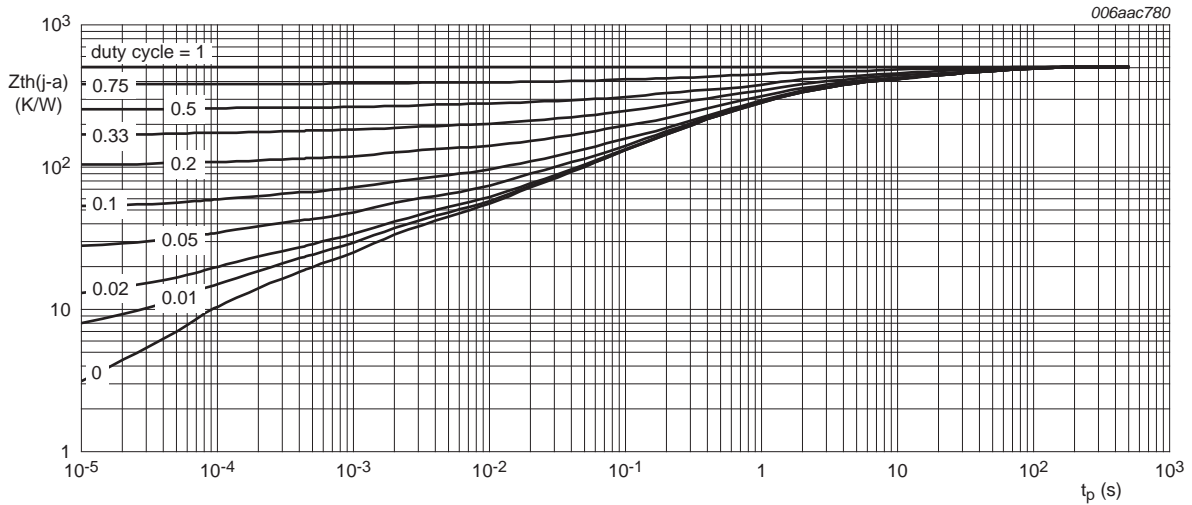
FR4 PCB, 70 μm copper strip line

Fig 3. Transient thermal impedance from junction to ambient as a function of pulse duration for PDTA124EM (SOT883); typical values



FR4 PCB, standard footprint

Fig 4. Transient thermal impedance from junction to ambient as a function of pulse duration for PDTA124ET (SOT23); typical values



FR4 PCB, standard footprint

Fig 5. Transient thermal impedance from junction to ambient as a function of pulse duration for PDTA124EU (SOT323); typical values

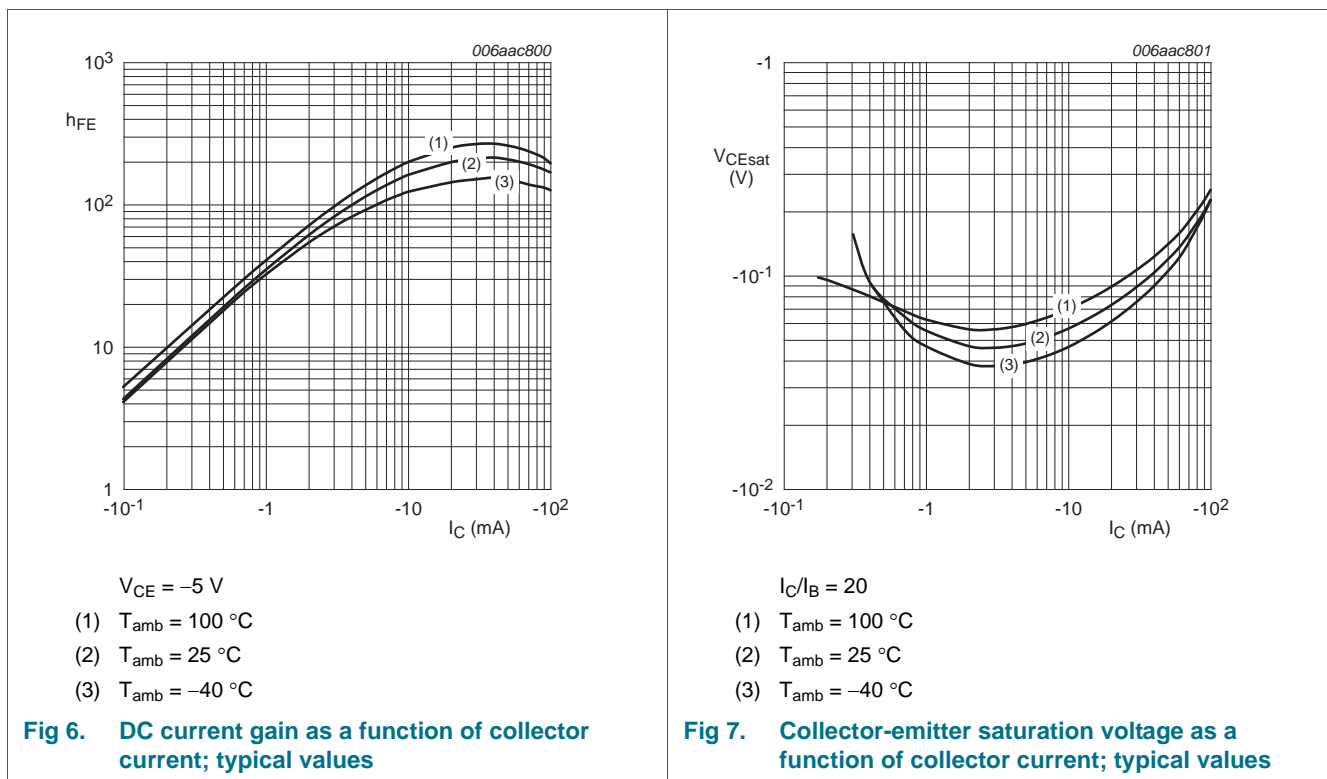
7. Characteristics

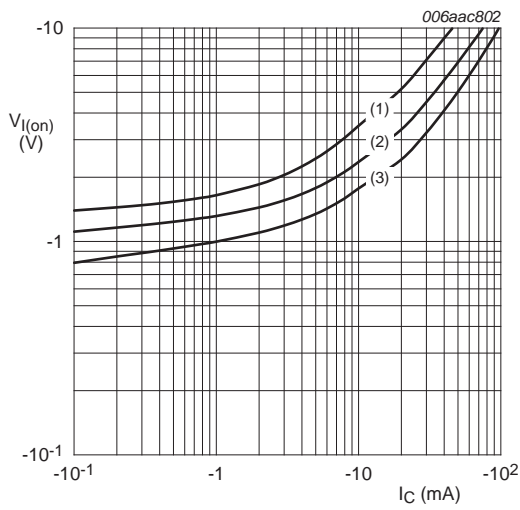
Table 8. Characteristics

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	-	-	-100	nA
		V _{CE} = -30 V; I _B = 0 A; T _j = 150 °C	-	-	-5	μA
I _{EBO}	emitter-base cut-off current	V _{EB} = -5 V; I _C = 0 A	-	-	-180	μA
h _{FE}	DC current gain	V _{CE} = -5 V; I _C = -5 mA	60	-	-	
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	-	-1.1	-0.8	V
V _{I(on)}	on-state input voltage	V _{CE} = -0.3 V; I _C = -5 mA	-2.5	-1.7	-	V
R1	bias resistor 1 (input)		15.4	22	28.6	kΩ
R2/R1	bias resistor ratio		0.8	1	1.2	
C _c	collector capacitance	V _{CB} = -10 V; I _E = i _e = 0 A; f = 1 MHz	-	-	3	pF
f _T	transition frequency	V _{CE} = -5 V; I _C = -10 mA; [1]	-	180	-	MHz

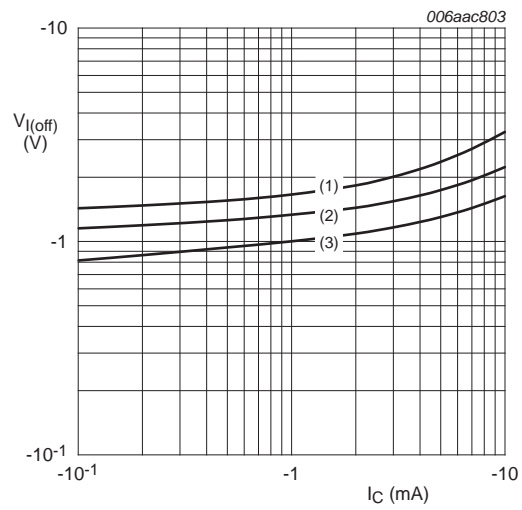
[1] Characteristics of built-in transistor





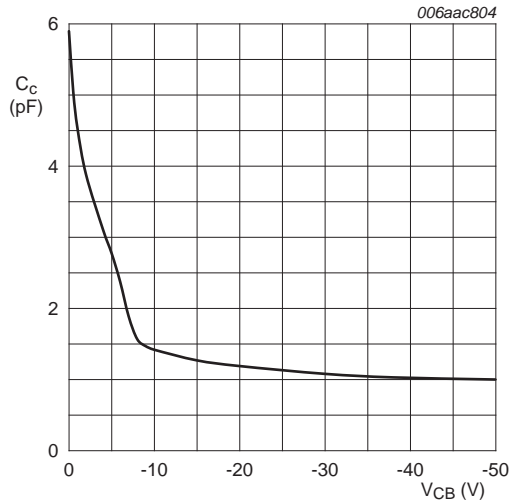
$V_{CE} = -0.3 \text{ V}$
 (1) $T_{amb} = -40 \text{ }^\circ\text{C}$
 (2) $T_{amb} = 25 \text{ }^\circ\text{C}$
 (3) $T_{amb} = 100 \text{ }^\circ\text{C}$

Fig 8. On-state input voltage as a function of collector current; typical values



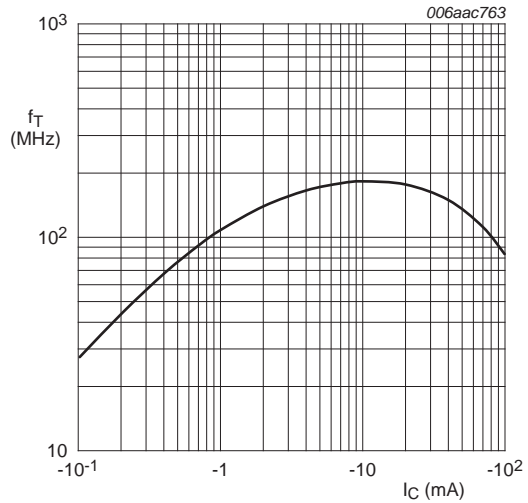
$V_{CE} = -5 \text{ V}$
 (1) $T_{amb} = -40 \text{ }^\circ\text{C}$
 (2) $T_{amb} = 25 \text{ }^\circ\text{C}$
 (3) $T_{amb} = 100 \text{ }^\circ\text{C}$

Fig 9. Off-state input voltage as a function of collector current; typical values



$f = 1 \text{ MHz}; T_{amb} = 25 \text{ }^\circ\text{C}$

Fig 10. Collector capacitance as a function of collector-base voltage; typical values



$V_{CE} = -5 \text{ V}; T_{amb} = 25 \text{ }^\circ\text{C}$

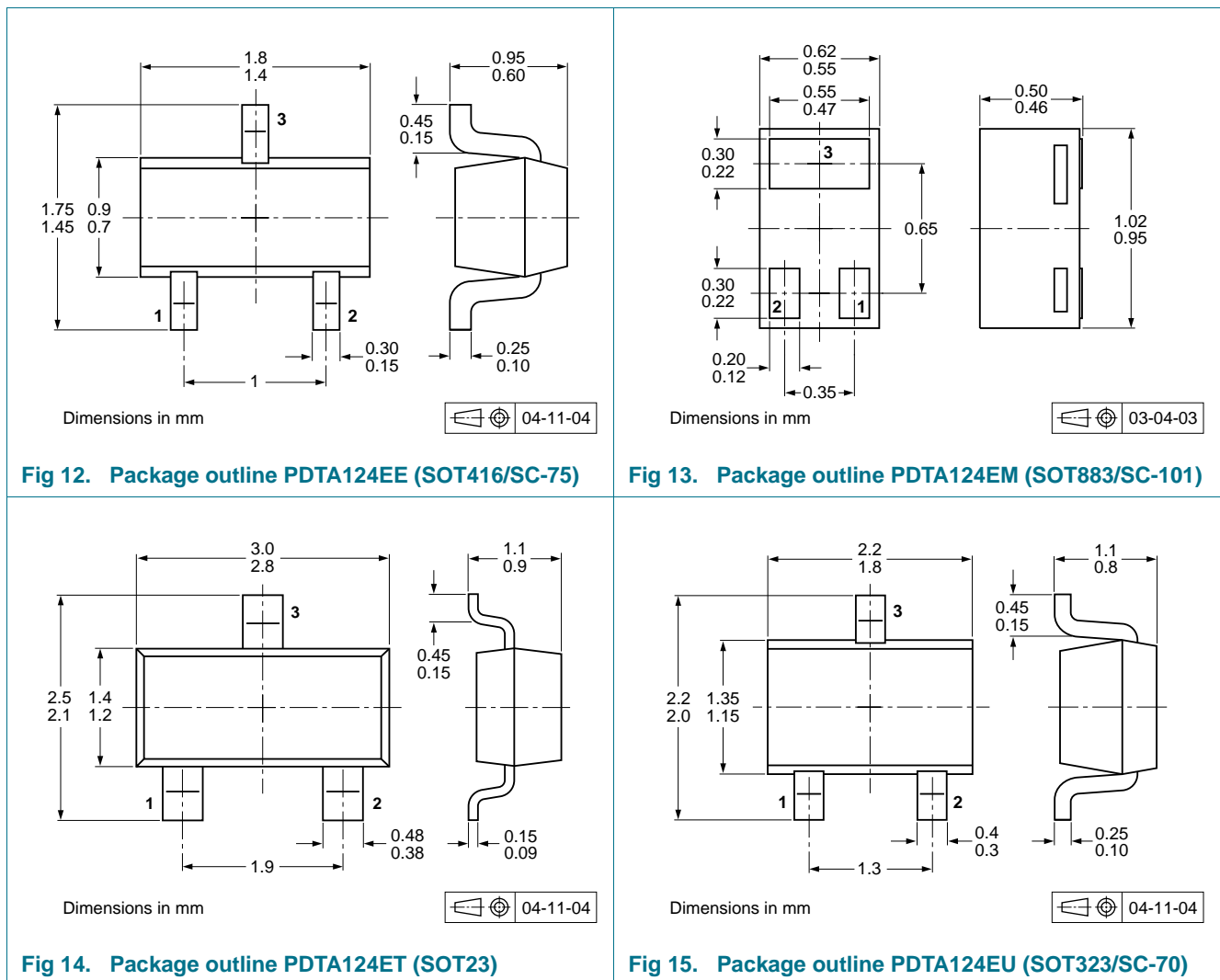
Fig 11. Transition frequency as a function of collector current; typical values of built-in transistor

8. Test information

8.1 Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard *Q101 - Stress test qualification for discrete semiconductors*, and is suitable for use in automotive applications.

9. Package outline



10. Packing information

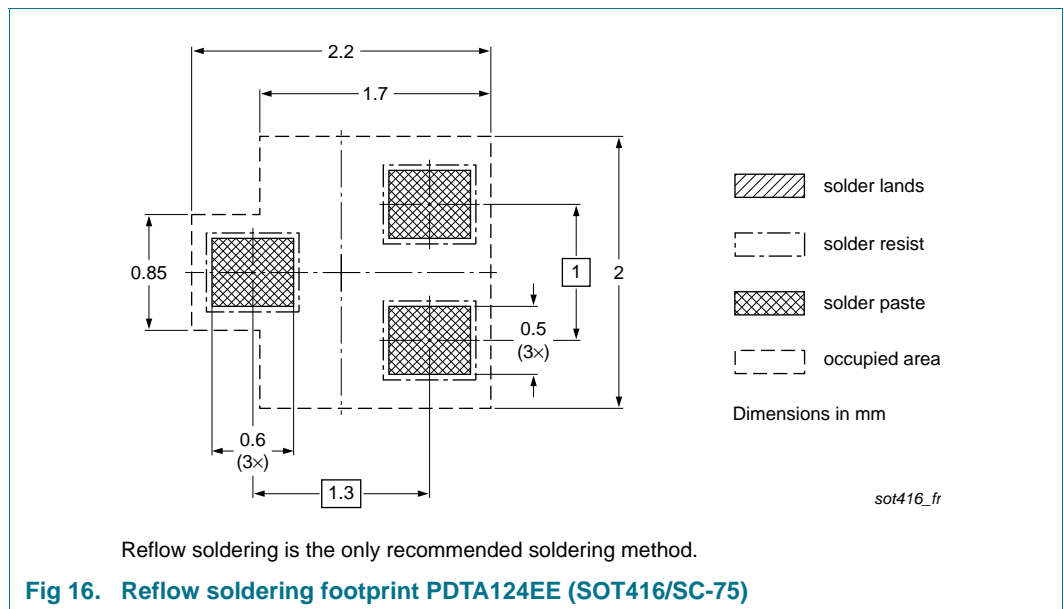
Table 9. Packing methods

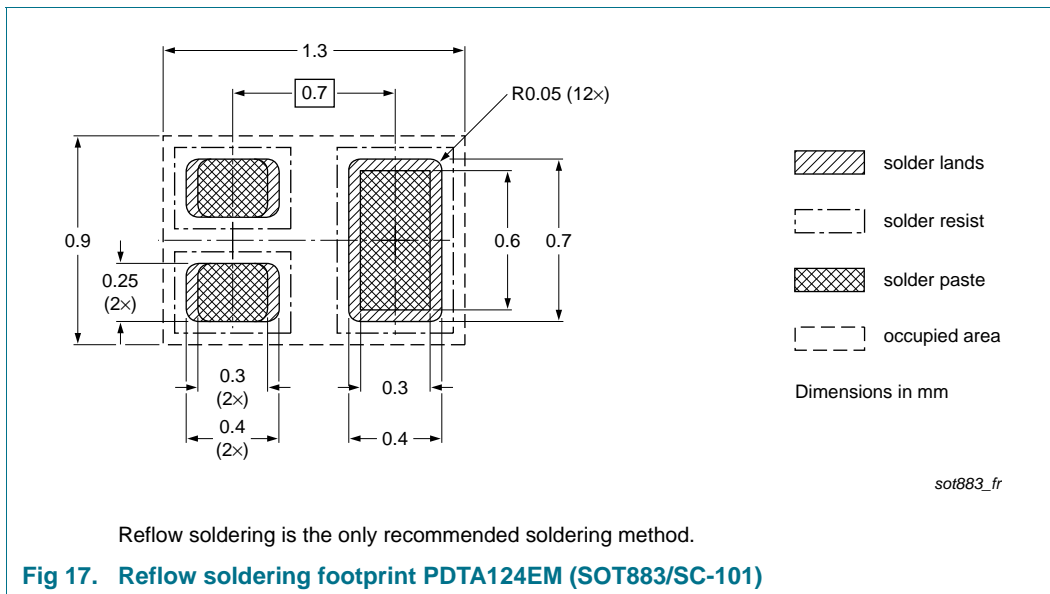
The indicated -xxx are the last three digits of the 12NC ordering code.^[1]

Type number	Package	Description	Packing quantity		
			3000	5000	10000
PDTA124EE	SOT416	4 mm pitch, 8 mm tape and reel	-115	-	-135
PDTA124EM	SOT883	2 mm pitch, 8 mm tape and reel	-	-	-315
PDTA124ET	SOT23	4 mm pitch, 8 mm tape and reel	-215	-	-235
PDTA124EU	SOT323	4 mm pitch, 8 mm tape and reel	-115	-	-135

[1] For further information and the availability of packing methods, see [Section 14](#).

11. Soldering





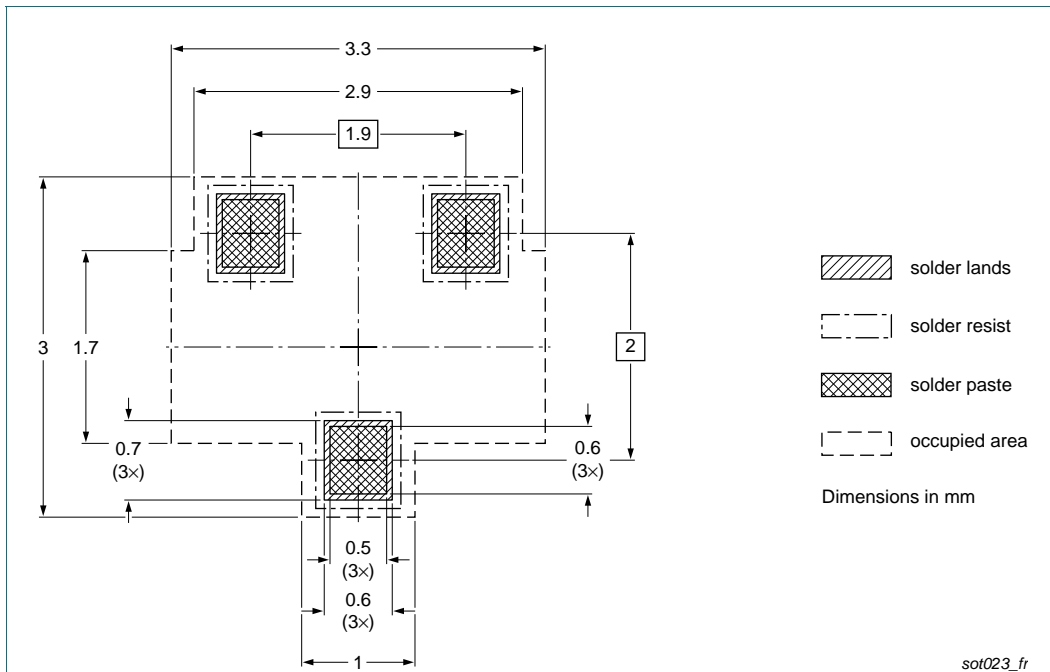


Fig 18. Reflow soldering footprint PDTA124ET (SOT23)

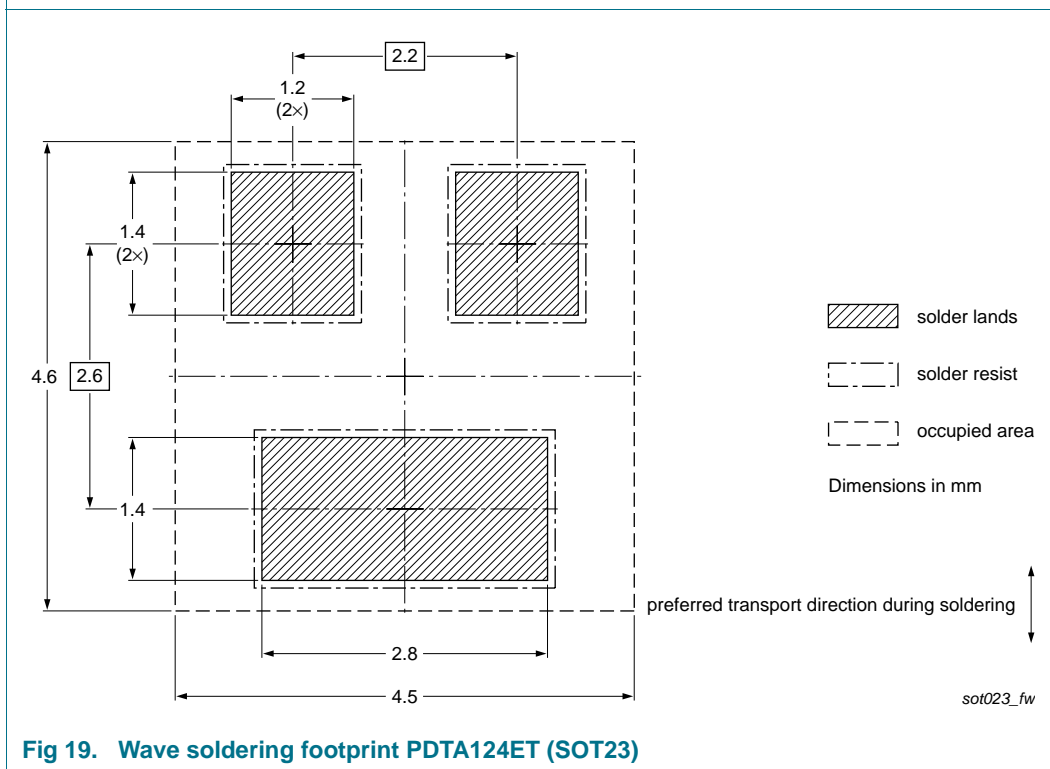


Fig 19. Wave soldering footprint PDTA124ET (SOT23)

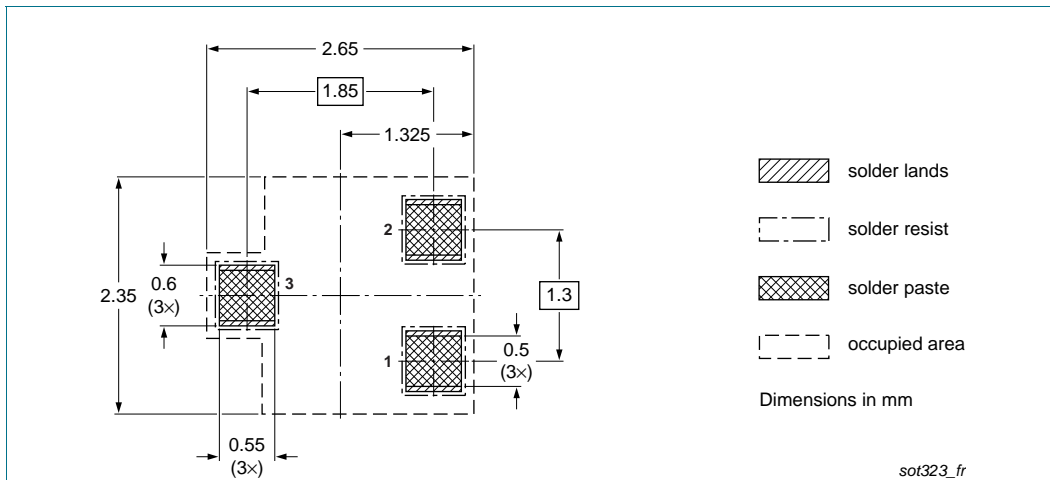


Fig 20. Reflow soldering footprint PDTA124EU (SOT323/SC-70)

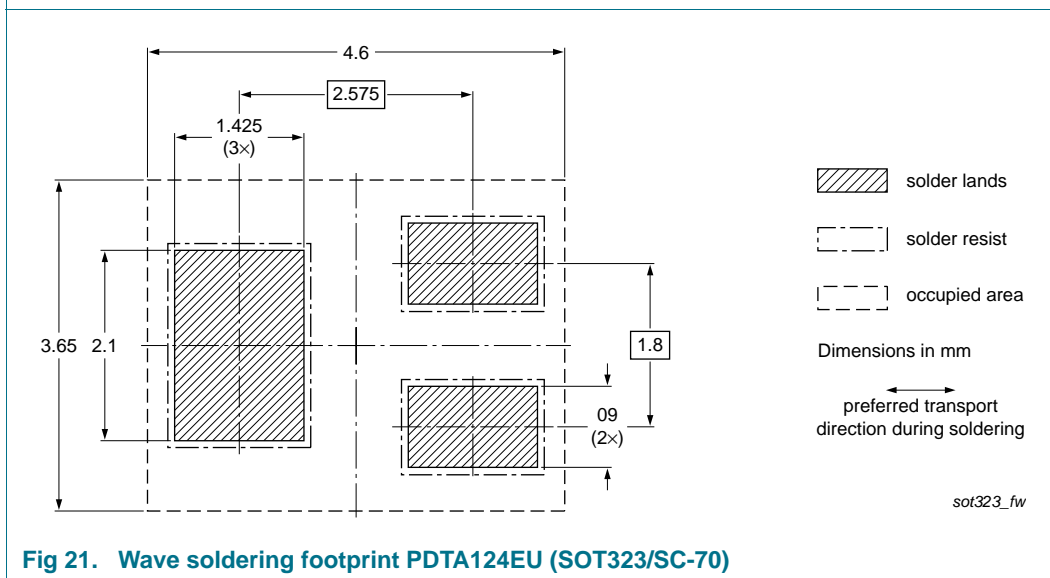


Fig 21. Wave soldering footprint PDTA124EU (SOT323/SC-70)

12. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PDTA124E_SER v.8	20111125	Product data sheet	-	PDTA124E_SERIES v.7
Modifications:	<ul style="list-style-type: none"> • The format of this document 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 numbers PDTA124EEF, PDTA124EK and PDTA124ES removed. • Section 1 "Product profile": updated • Section 3 "Ordering information": added • Section 4 "Marking": updated • Figure 1 to 11: added • Section 6 "Thermal characteristics": updated • Table 8 "Characteristics": $V_{i(on)}$ redefined to $V_{I(on)}$ on-state input voltage, $V_{i(off)}$ redefined to $V_{I(off)}$ off-state input voltage, I_{CEO} updated, f_T added • Section 8 "Test information": added • Section 9 "Package outline": superseded by minimized package outline drawings • Section 10 "Packing information": added • Section 11 "Soldering": added • Section 13 "Legal information": updated 			
PDTA124E_SERIES v.7	20040805	Product data sheet	-	PDTA124E_SERIES v.6
PDTA124E_SERIES v.6	20030414	Product specification	-	-

13. Legal information

13.1 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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