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Electronic Components Sourcing Information

Product Reference Information

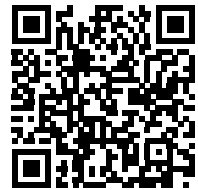
Part Number:	NHDTTC124ETR
Manufacturer:	Nexperia USA Inc.
Package:	TO-236-3, SC-59, SOT-23-3
Availability:	Please confirm with sales

Product Page:

<https://antrexco.com/product/details/nexperia-usa-inc/nhdtc124etr.html>

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Note:

This PDF includes an ANTREX product reference cover page.

The original manufacturer datasheet follows from the next page.



NHDTC114/124/144ET series

80 V, 100 mA NPN resistor-equipped transistors

Rev. 2 — 12 August 2026

Product data sheet

1. General description

NPN Resistor-Equipped Transistor (RET) family in a small SOT23 Surface-Mounted Device (SMD) plastic package.

Table 1. Product overview

Type number	R1	R2	Package	PNP complement:
	k Ω	k Ω	Nexperia	
NHDTC114ET	10	10	SOT23	NHDTA114ET
NHDTC124ET	22	22		NHDTA124ET
NHDTC144ET	47	47		NHDTA144ET

2. Features and benefits

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

3. Applications

- Digital applications
- Cost saving alternative for BC846 series in digital applications
- Controlling IC inputs
- Switching loads

4. Quick reference data

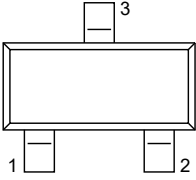
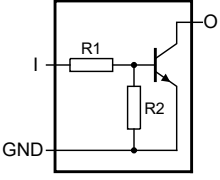
Table 2. Quick reference data

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base	-	-	80	V
I_O	output current		-	-	100	mA

5. Pinning information

Table 3. Pinning

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	I	input (base)		 aaa-019964
2	GND	GND (emitter)		
3	O	output (collector)		

6. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
NHDTTC114ET	SOT23	plastic surface-mounted package; 3 leads	SOT23
NHDTTC124ET			
NHDTTC144ET			

7. Marking

Table 5. Marking

Type number	Marking code [1]
NHDTTC114ET	QG%
NHDTTC124ET	QK%
NHDTTC144ET	QM%

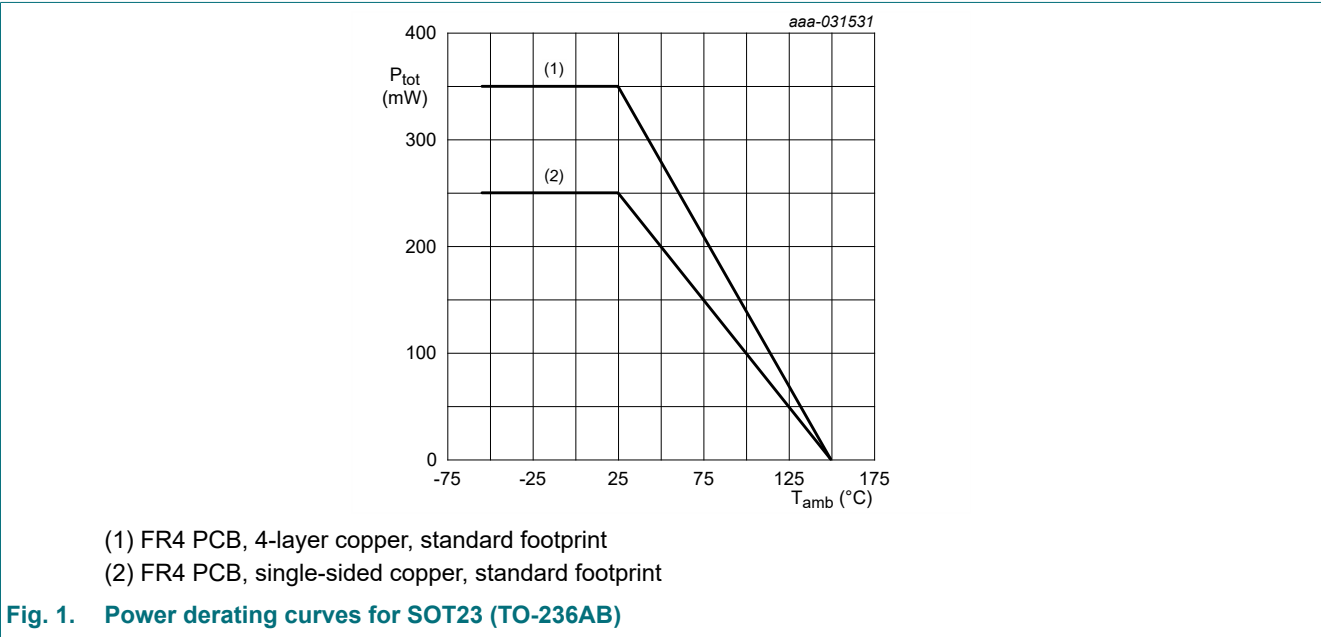
[1] % = placeholder for manufacturing site code

8. Limiting values

Table 6. Limiting values
In accordance with the Absolute Maximum Rating System (IEC 60134).
 $T_{amb} = 25\text{ °C}$ unless otherwise specified.

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CBO}	collector-base voltage	open emitter	-	80	V
V_{CEO}	collector-emitter voltage	open base	-	80	V
V_{EBO}	emitter-base voltage	open collector	-	10	V
V_I	input voltage				
	NHDTC114ET		-10	+40	V
	NHDTC124ET		-10	+60	V
	NHDTC144ET		-10	+80	V
I_O	output current		-	100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25\text{ °C}$ [1]	-	250	mW
		[2]	-	350	mW
T_j	junction temperature		-	150	°C
T_{amb}	ambient temperature		-55	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] Device mounted on an FR4 Printed-Circuit-Board (PCB); 4-layer copper; tin-plated and standard footprint.



9. Thermal characteristics

Table 7. Thermal characteristics

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

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	500	K/W
			[2]	-	-	358	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	-	130	K/W

- [1] Device mounted on an FR4 Printed-Circuit-Board (PCB); single-sided copper; tin-plated and standard footprint.
[2] Device mounted on an FR4 Printed-Circuit Board (PCB), 4-layer copper, tin-plated and standard footprint.

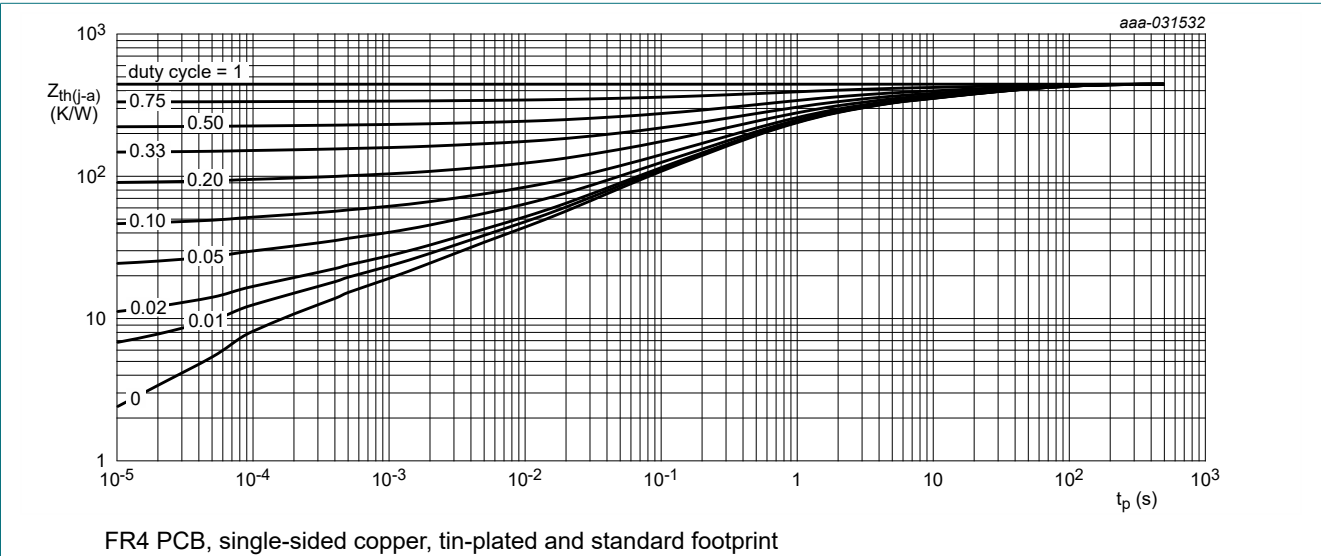


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

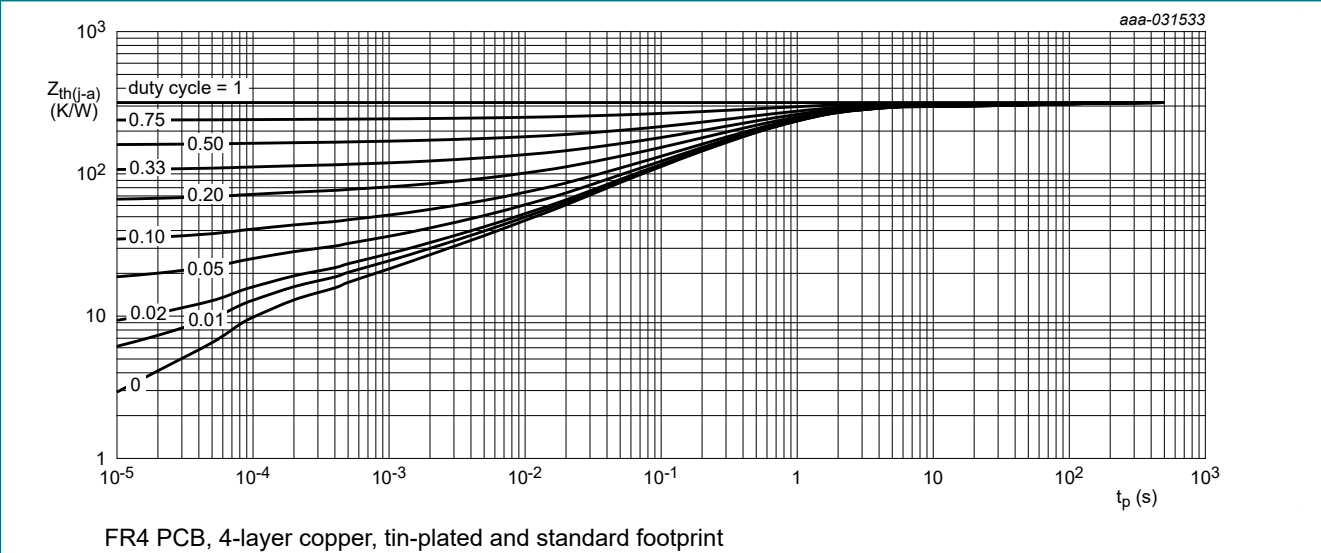


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 8. Characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
V _{(BR)CBO}	collector-base breakdown voltage	I _C = 100 μA; I _E = 0 A	80	-	-	V	
V _{(BR)CEO}	collector-emitter breakdown voltage	I _C = 2 mA; I _B = 0 A	80	-	-	V	
I _{CBO}	collector-base cut-off current	V _{CB} = 80 V; I _E = 0 A	-	-	100	nA	
I _{CEO}	collector-emitter cut-off current	V _{CE} = 60 V; I _B = 0 A	-	-	100	nA	
		V _{CE} = 60 V; I _B = 0 A; T _j = 150 °C	-	-	5	μA	
I _{EBO}	emitter-base cut-off current						
	NHDTTC114ET	V _{EB} = 7 V; I _C = 0 A	-	-	600	μA	
	NHDTTC124ET		-	-	270	μA	
	NHDTTC144ET		-	-	130	μA	
h _{FE}	DC current gain						
	NHDTTC114ET	V _{CE} = 5 V; I _C = 10 mA	50	-	-		
	NHDTTC124ET		70	-	-		
	NHDTTC144ET		100	-	-		
V _{CEsat}	collector-emitter saturation voltage	I _C = 10 mA; I _B = 0.5 mA	-	-	100	mV	
V _{I(off)}	off-state input voltage	V _{CE} = 5 V ; I _C = 100 μA	-	1.15	0.8	V	
V _{I(on)}	on-state input voltage						
	NHDTTC114ET	V _{CE} = 0.3 V ; I _C = 10 mA	2.5	1.8	-	V	
	NHDTTC124ET		3	2.3	-	V	
	NHDTTC144ET		5	3.3	-	V	
R1	bias resistor 1 (input)		[1]				
	NHDTTC114ET		7	10	13	kΩ	
	NHDTTC124ET		15.4	22	28.6	kΩ	
	NHDTTC144ET		33	47	61	kΩ	
R2/R1	bias resitor ratio	[1]	0.8	1	1.2		
f _T	transition frequency	V _{CE} = 5 V; I _C = 10 mA; f = 100 MHz	[2]	-	170	-	MHz
C _c	collector capacitance	V _{CB} = 10 V; I _E = i _e = 0 A; f = 1 MHz	-	-	2.5	pF	

[1] See section "Test information" for resistor calculation and test conditions

[2] Characteristics of built-in transistor

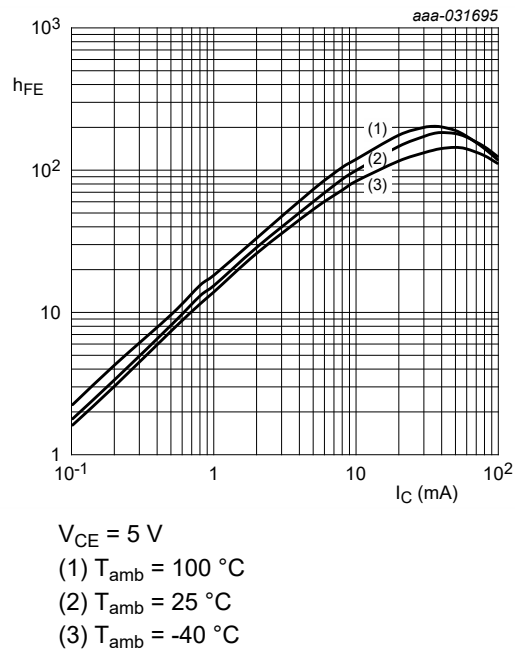


Fig. 4. NHDTC114ET: DC current gain as a function of collector current; typical values

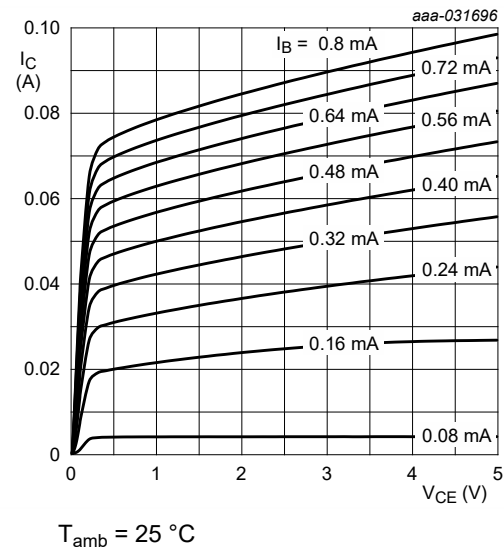


Fig. 5. NHDTC114ET: Collector current as a function of collector-emitter voltage; typical values

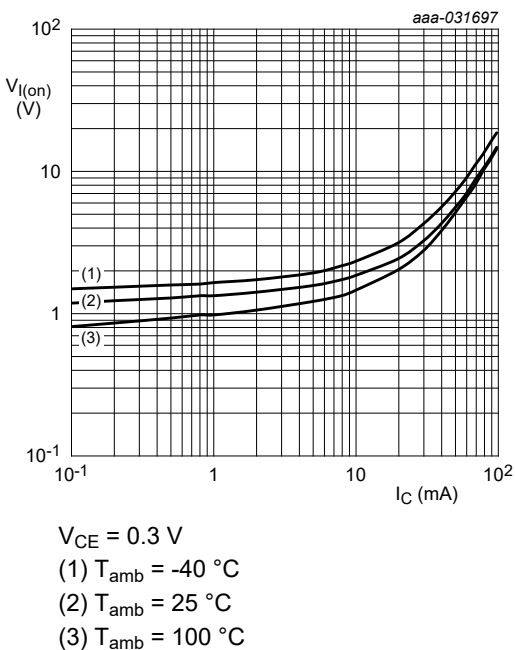


Fig. 6. NHDTC114ET: On-state input voltage as a function of collector current; typical values

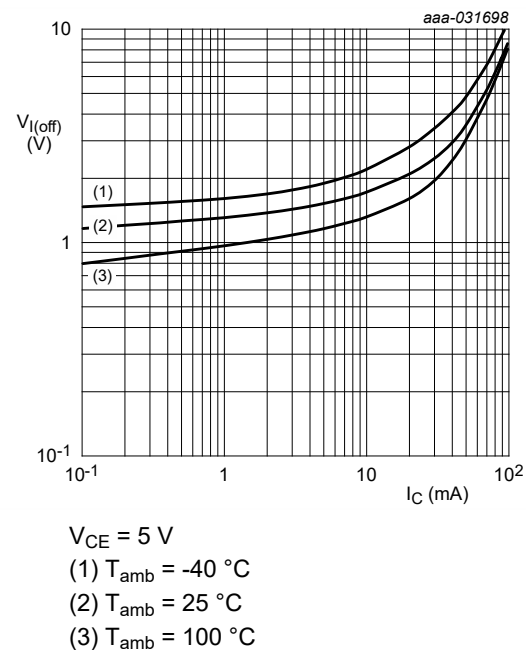
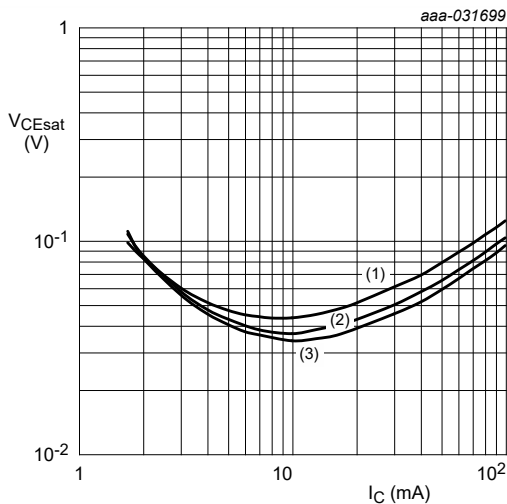
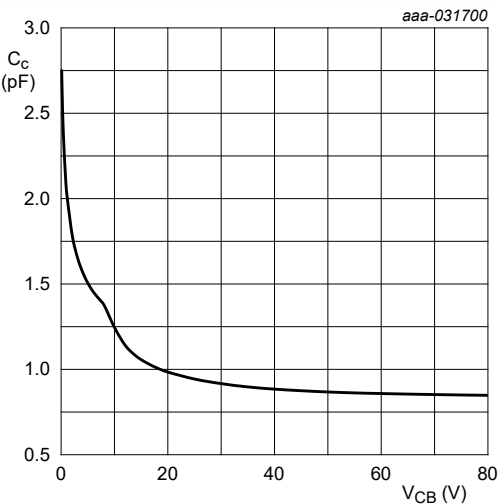


Fig. 7. NHDTC114ET: Off-state input voltage as a function of collector current; typical values



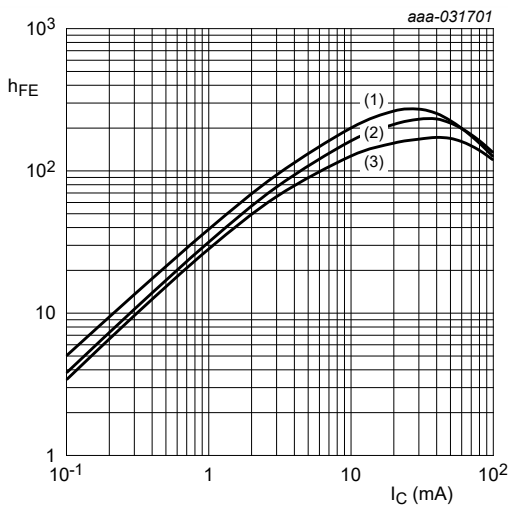
$I_C/I_B = 20$
(1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
(2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
(3) $T_{amb} = -40\text{ }^{\circ}\text{C}$

Fig. 8. NHDTC114ET: Collector-emitter saturation voltage as a function of collector current; typical values



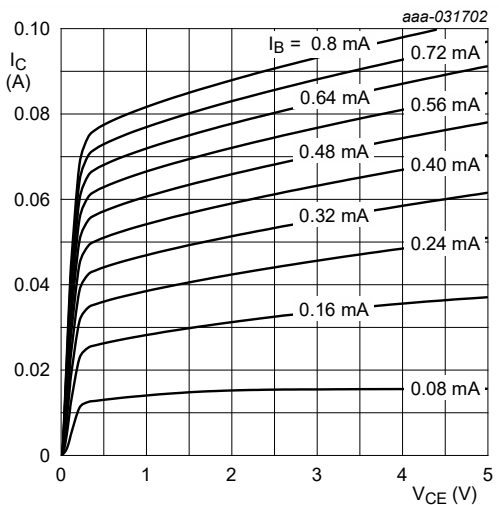
$f = 1\text{ MHz}$
 $T_{amb} = 25\text{ }^{\circ}\text{C}$

Fig. 9. NHDTC114ET: Collector capacitance as a function of collector-base voltage; typical values



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

Fig. 10. NHDTC124ET: DC current gain as a function of collector current; typical values



$T_{amb} = 25\text{ }^{\circ}\text{C}$

Fig. 11. NHDTC124ET: Collector current as a function of collector-emitter voltage; typical values

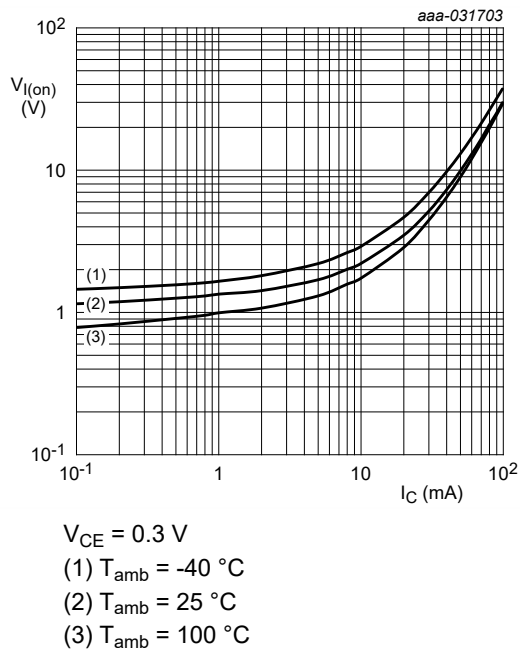


Fig. 12. NHDTC124ET: On-state input voltage as a function of collector current; typical values

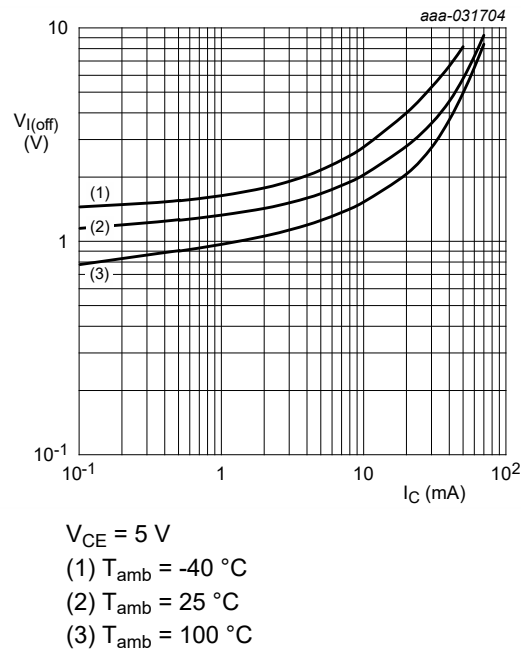


Fig. 13. NHDTC124ET: Off-state input voltage as a function of collector current; typical values

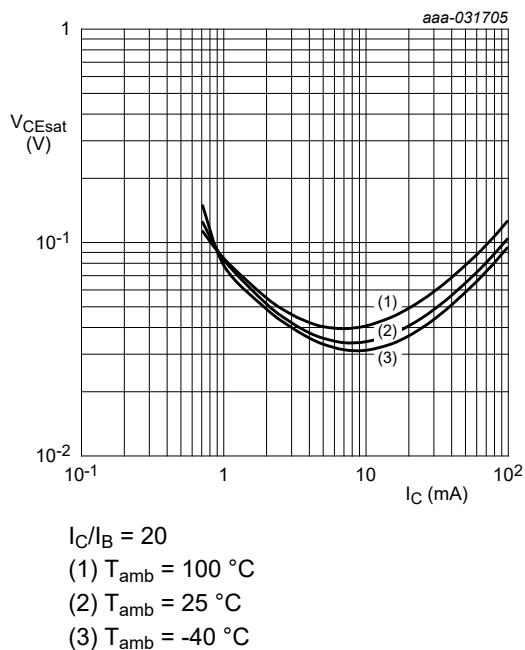


Fig. 14. NHDTC124ET: Collector-emitter saturation voltage as a function of collector current; typical values

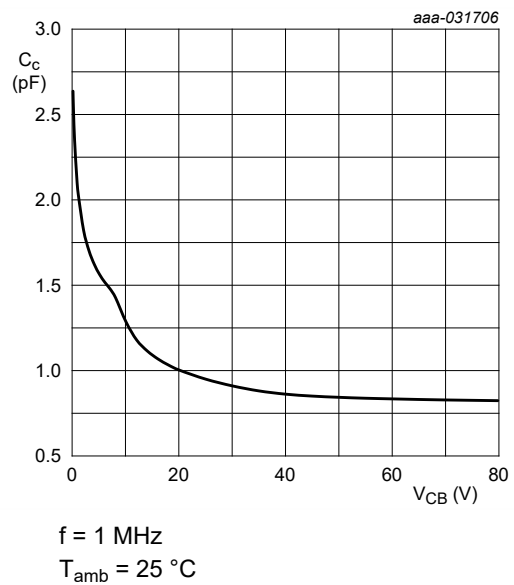


Fig. 15. NHDTC124ET: Collector capacitance as a function of collector-base voltage; typical values

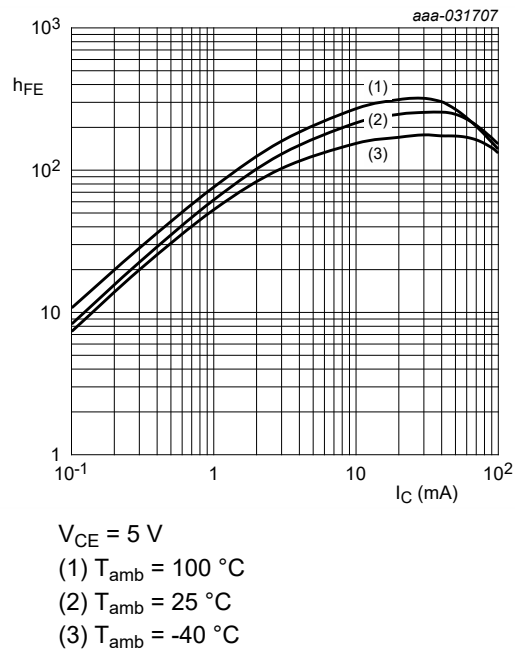


Fig. 16. NHDTC144ET: DC current gain as a function of collector current; typical values

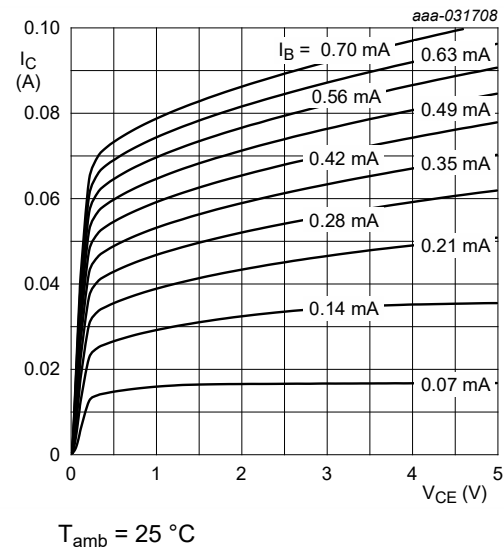


Fig. 17. NHDTC144ET: Collector current as a function of collector-emitter voltage; typical values

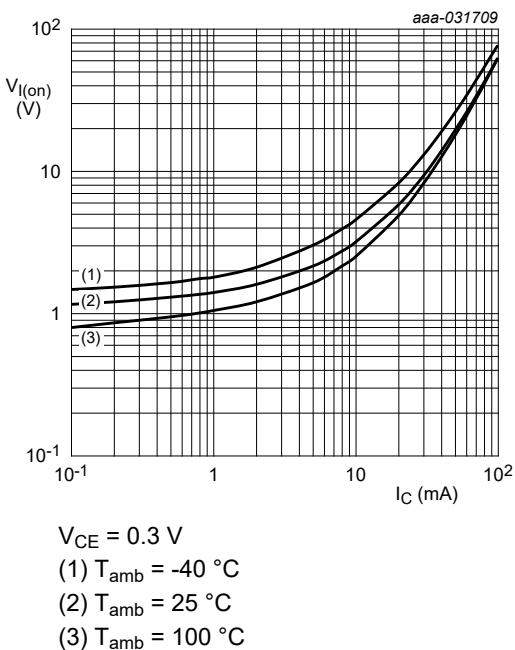


Fig. 18. NHDTC144ET: On-state input voltage as a function of collector current; typical values

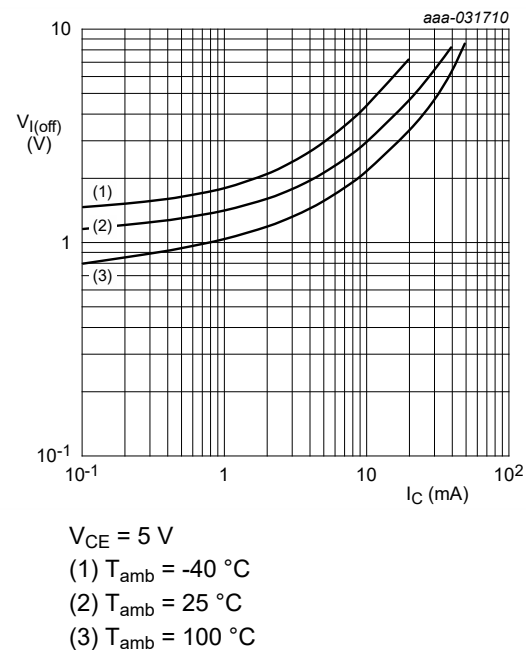
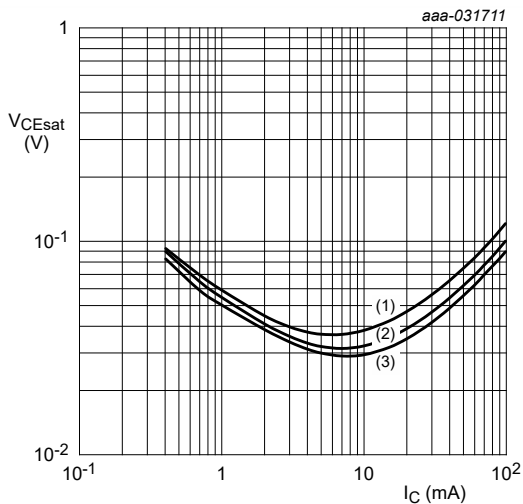
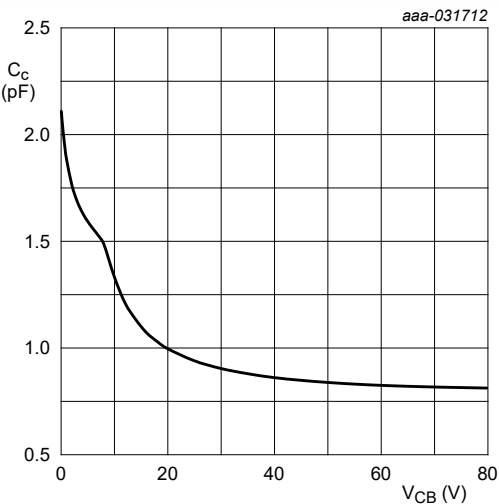


Fig. 19. NHDTC144ET: Off-state input voltage as a function of collector current; typical values



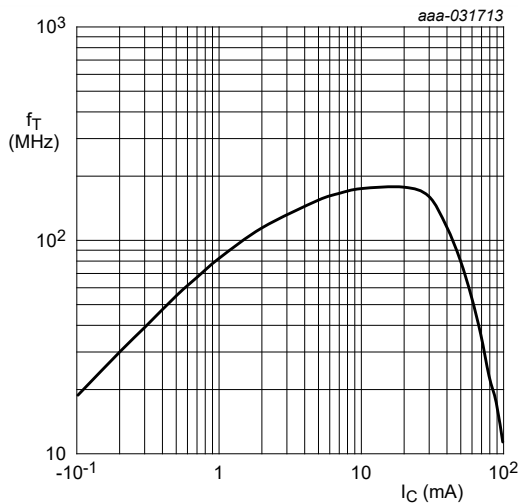
$I_C/I_B = 20$
(1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
(2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
(3) $T_{amb} = -40\text{ }^{\circ}\text{C}$

Fig. 20. NHDT C144ET: Collector-emitter saturation voltage as a function of collector current; typical values



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

Fig. 21. NHDT C144ET: Collector capacitance as a function of collector-base voltage; typical values



$f = 100\text{ MHz}$
 $V_{CE} = 5\text{ V}$
 $T_{amb} = 25\text{ }^{\circ}\text{C}$

Fig. 22. Transition frequency as a function of collector current; typical values of built-in transistor

11. Test information

Resistor calculation

- Calculation of bias resistor 1 (R1)

$$R_I = \frac{V(I_2) - V(I_1)}{I_2 - I_1}$$

- Calculation of bias resistor ratio (R_2/R_1)

$$\frac{R2}{R1} = \frac{V(I4) - V(I3)}{R1 \cdot (I4 - I3)} - 1$$

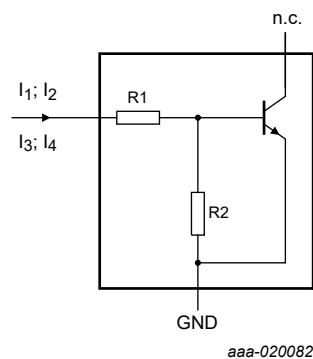


Fig. 23. NPN transistor: Resistor test circuit

Resistor test conditions

Table 9. Resistor test conditions

Type number	R1 (kΩ)	R2 (kΩ)	Test conditions			
			I ₁	I ₂	I ₃	I ₄
NHDTC114ET-Q	10	10	800 μA	1.1 mA	-350 μA	-450 μA
NHDTC124ET-Q	22	22	550 μA	750 μA	-150 μA	-230 μA
NHDTC144ET-Q	47	47	250 μA	350 μA	-55 μA	-105 μA

12. Package outline

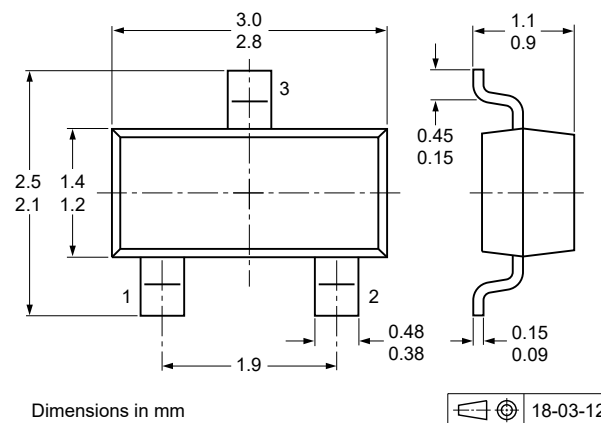


Fig. 24. Package outline SOT23

13. Soldering

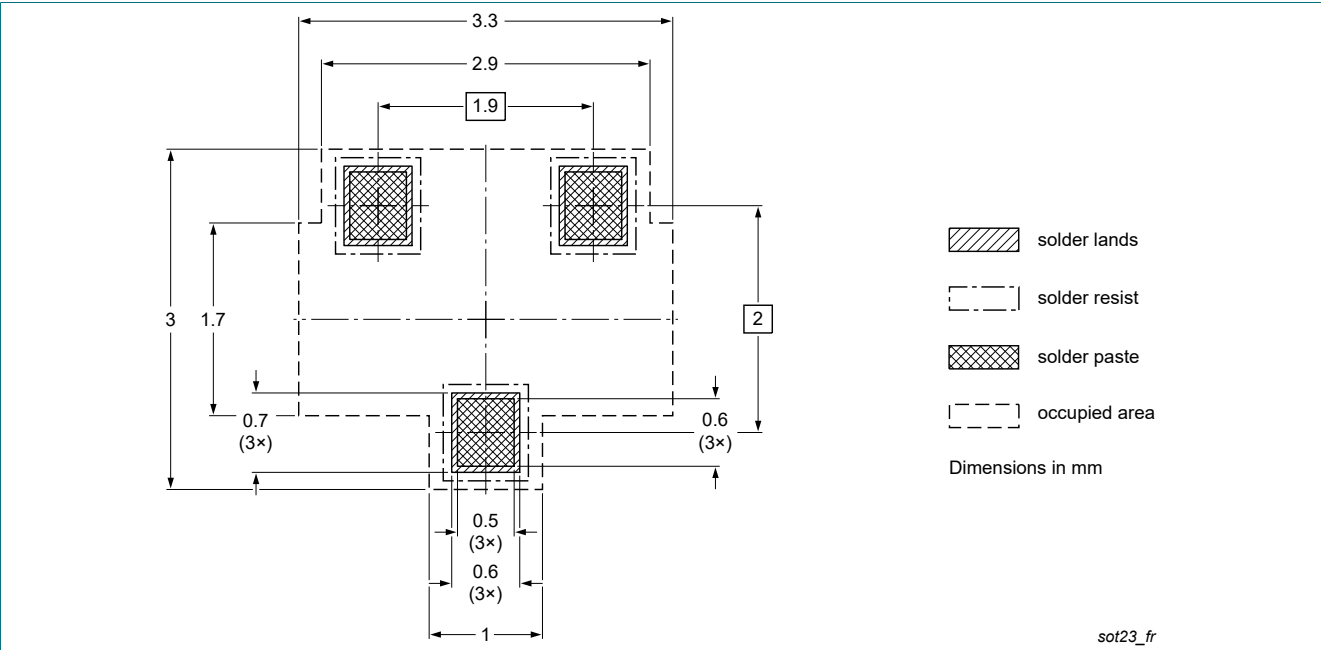


Fig. 25. Reflow soldering footprint for SOT23

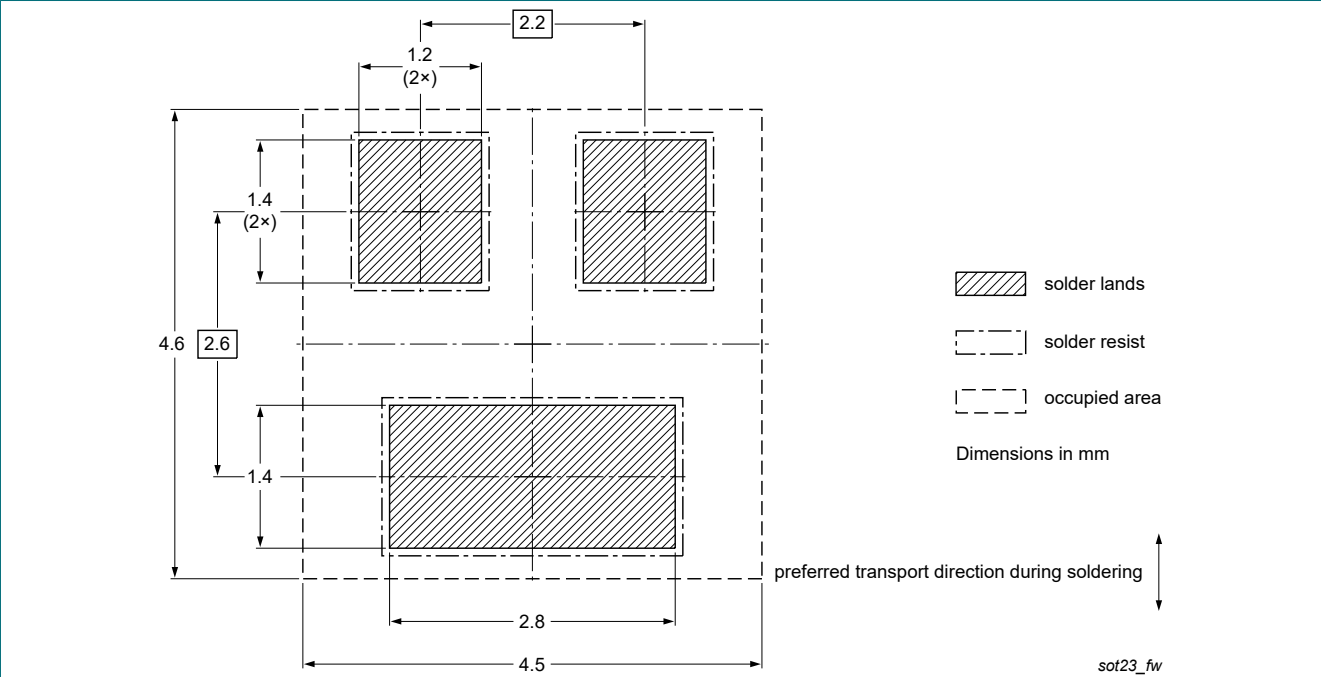


Fig. 26. Wave soldering footprint for SOT23

14. Revision history

Table 10. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
NHDTC114_124_144ET_SER v.2	20260812	Product data sheet	-	NHDTC114_124_144ET_SER v.1
Modification:	Product(s) changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s).			
NHDTC114_124_144ET_SER v.1	20200626	Product data sheet	-	-

15. Legal information

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 <https://www.nexperia.com>.

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