

ANTREX Electronics

Electronic Components Sourcing Information

Product Reference Information

Part Number: NHUMH2X

Manufacturer: Nexperia USA Inc.

Package: 6-TSSOP, SC-88, SOT-363

Availability: Please confirm with sales

Product Page:

<https://antrexco.com/product/details/nexperia-usa-inc/nhumh2x.html>

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Note:

This PDF includes an ANTREX product reference cover page.

The original manufacturer datasheet follows from the next page.



NHUMH11/1/2 series

80 V, 100 mA NPN/NPN resistor-equipped double transistors

Rev. 1 — 22 July 2020

Product data sheet

1. General description

NPN/NPN Resistor-Equipped double Transistor (RET) family in a very small SOT363 (SC-88) Surface-Mounted Device (SMD) plastic package.

Table 1. Product overview

Type number	R1	R2	Package		PNP/PNP complement:	NPN/PNP complement:
	k Ω	k Ω	Nexperia	JEITA		
NHUMH11	10	10	SOT363	SC-88	NHUMB11	NHUMD3
NHUMH1	22	22			NHUMB1	NHUMD2
NHUMH2	47	47			NHUMB2	NHUMD12

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
- AEC-Q101 qualified

3. Applications

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

4. Quick reference data

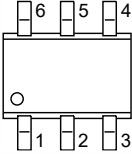
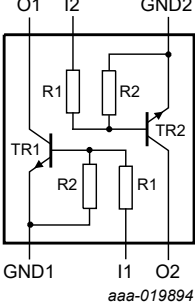
Table 2. Quick reference data

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per transistor						
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	GND1	GND (emitter) TR1		
2	I1	input (base) TR1		
3	O2	output (collector) TR2		
4	GND2	GND (emitter) TR2		
5	I2	input (base) TR2		
6	O1	output (collector) TR1		

6. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
NHUMH11	SC-88	plastic surface-mounted package; 6 leads	SOT363
NHUMH1			
NHUMH2			

7. Marking

Table 5. Marking

Type number	Marking code [1]
NHUMH11	6F%
NHUMH1	6J%
NHUMH2	6L%

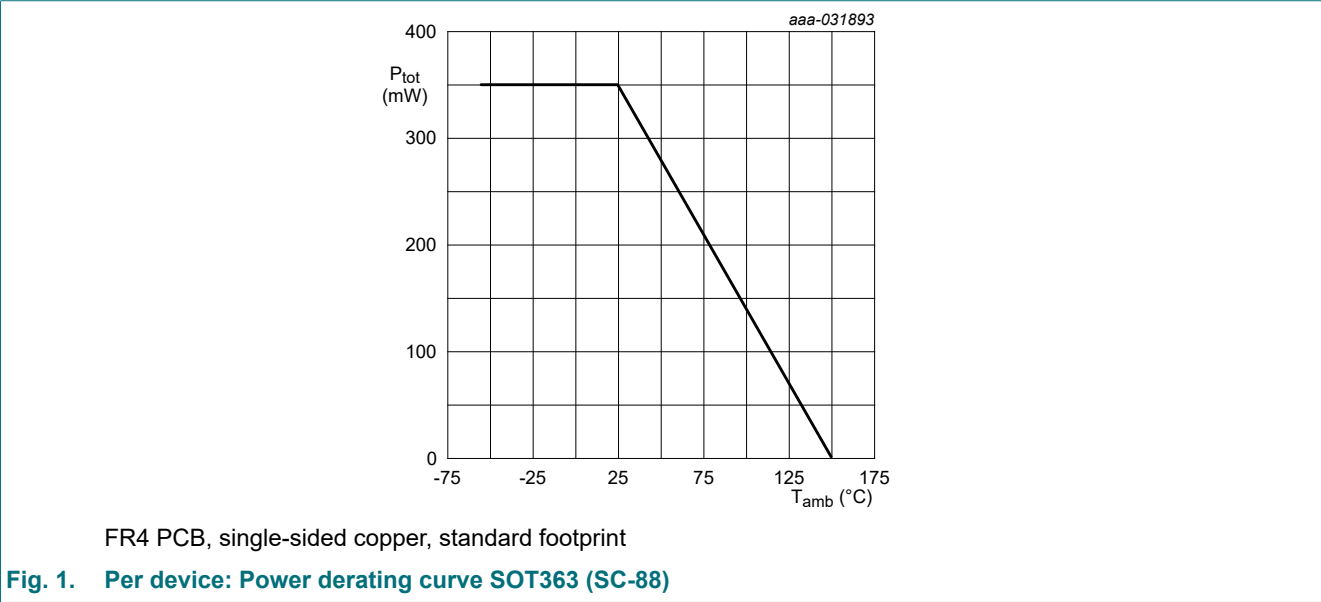
[1] % = placeholder for manufacturing site code

8. Limiting values

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

Symbol	Parameter	Conditions	Min	Max	Unit
Per transistor					
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				
	NHUMH11		-10	+40	V
	NHUMH1		-10	+60	V
	NHUMH2		-10	+80	V
I_O	output current		-	100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25\text{ }^{\circ}\text{C}$ [1]	-	235	mW
Per device					
P_{tot}	total power dissipation	$T_{amb} \leq 25\text{ }^{\circ}\text{C}$ [1]	-	350	mW
T_j	junction temperature		-	150	$^{\circ}\text{C}$
T_{amb}	ambient temperature		-55	150	$^{\circ}\text{C}$
T_{stg}	storage temperature		-65	150	$^{\circ}\text{C}$

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



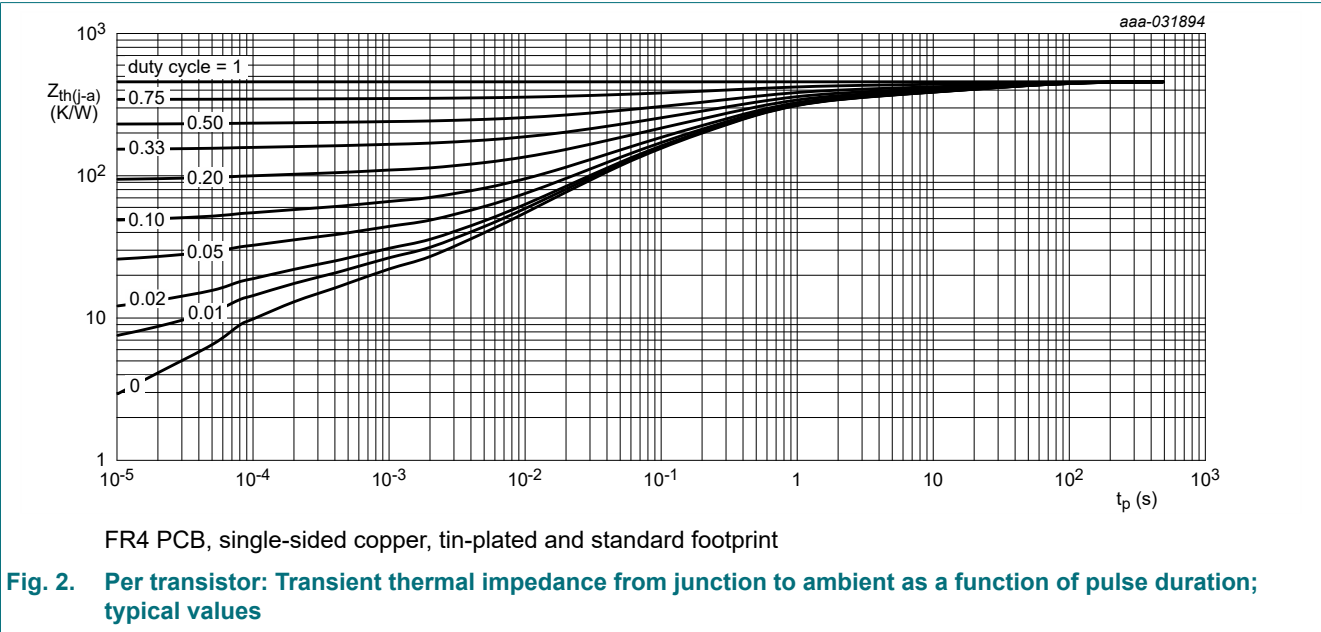
9. Thermal characteristics

Table 7. Thermal characteristics

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

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	532	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	-	150	K/W
Per device							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	358	K/W

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



10. Characteristics

Table 8. Characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
Per transistor							
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						
	NHUMH11	V _{EB} = 7 V; I _C = 0 A	-	-	600	μA	
	NHUMH1		-	-	270	μA	
	NHUMH2		-	-	130	μA	
h _{FE}	DC current gain						
	NHUMH11	V _{CE} = 5 V; I _C = 10 mA	50	-	-		
	NHUMH1		70	-	-		
	NHUMH2		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						
	NHUMH11	V _{CE} = 0.3 V ; I _C = 10 mA	2.5	1.8	-	V	
	NHUMH1		3	2.3	-	V	
	NHUMH2		5	3.3	-	V	
R1	bias resistor 1 (input)		[1]				
	NHUMH11		7	10	13	kΩ	
	NHUMH1		15.4	22	28.6	kΩ	
	NHUMH2		33	47	61	kΩ	
R2/R1	bias resistor 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

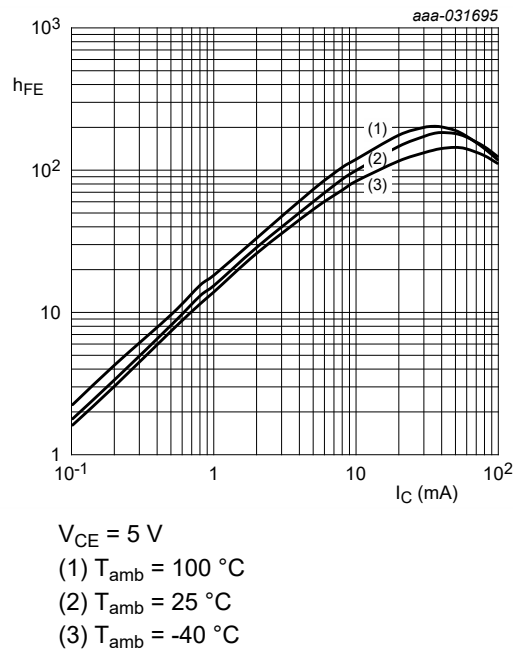


Fig. 3. NHUMH11: DC current gain as a function of collector current; typical values

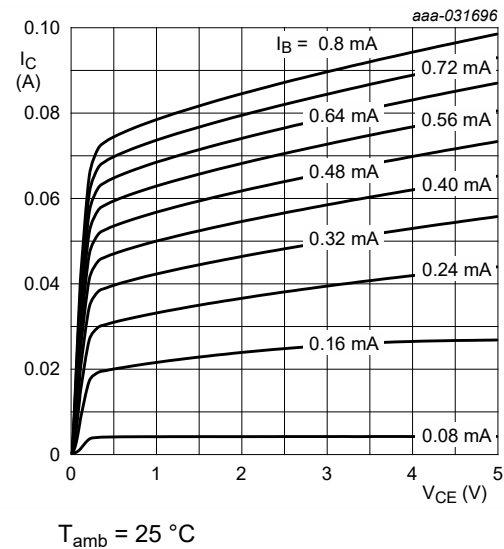


Fig. 4. NHUMH11: Collector current as a function of collector-emitter voltage; typical values

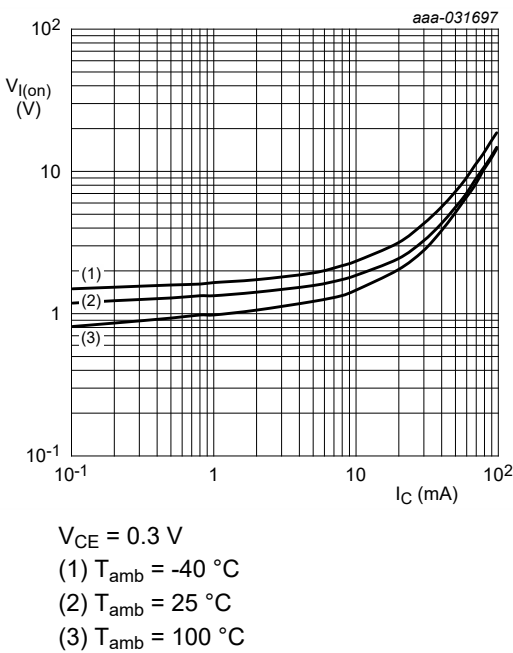


Fig. 5. NHUMH11: On-state input voltage as a function of collector current; typical values

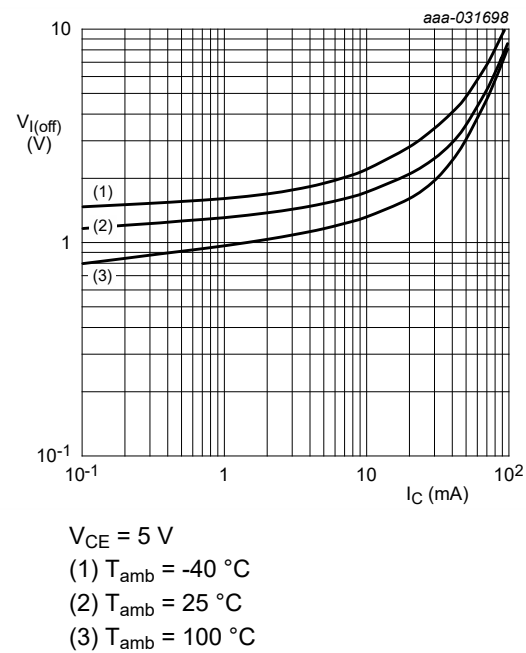


Fig. 6. NHUMH11: Off-state input voltage as a function of collector current; typical values

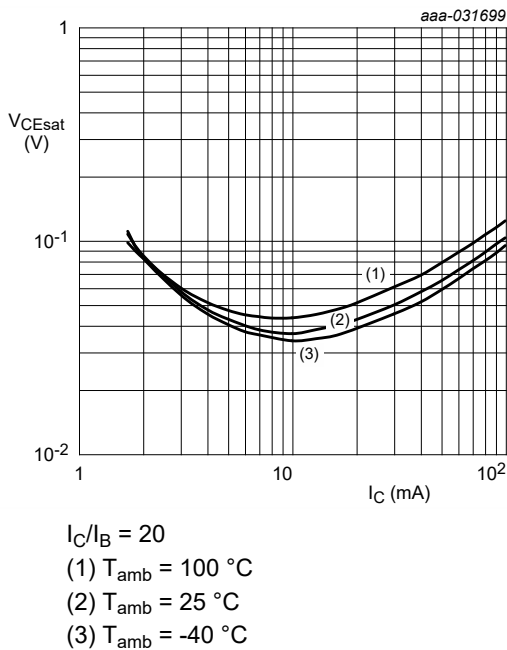


Fig. 7. NHUMH11: Collector-emitter saturation voltage as a function of collector current; typical values

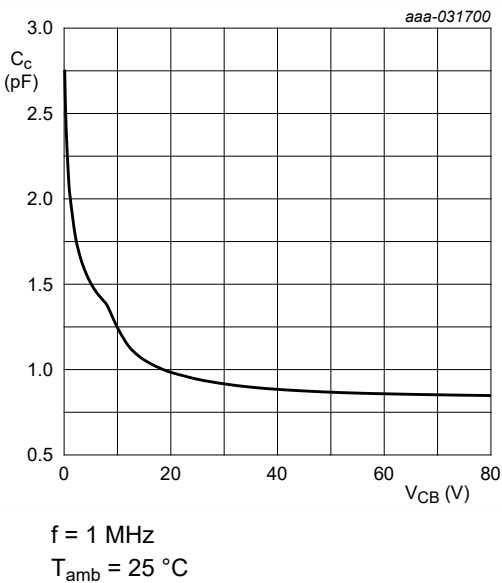


Fig. 8. NHUMH11: Collector capacitance as a function of collector-base voltage; typical values

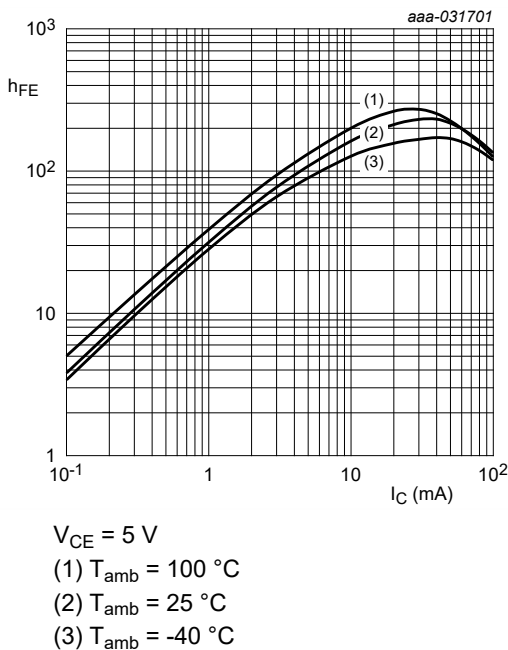


Fig. 9. NHUMH11: DC current gain as a function of collector current; typical values

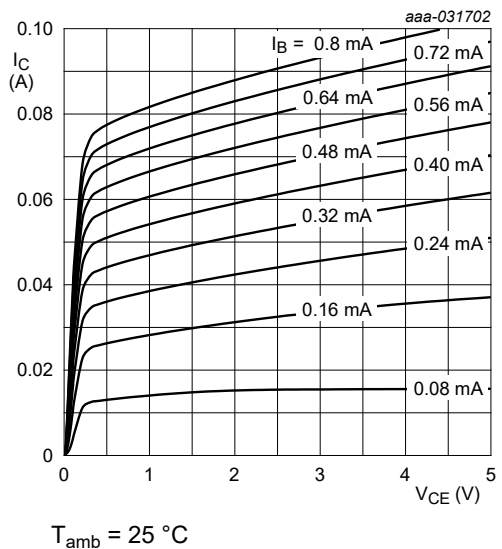


Fig. 10. NHUMH11: Collector current as a function of collector-emitter voltage; typical values

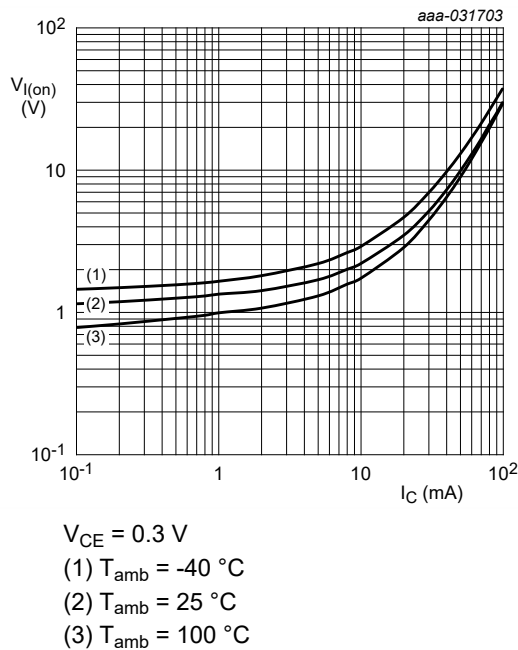


Fig. 11. NHUMH1: On-state input voltage as a function of collector current; typical values

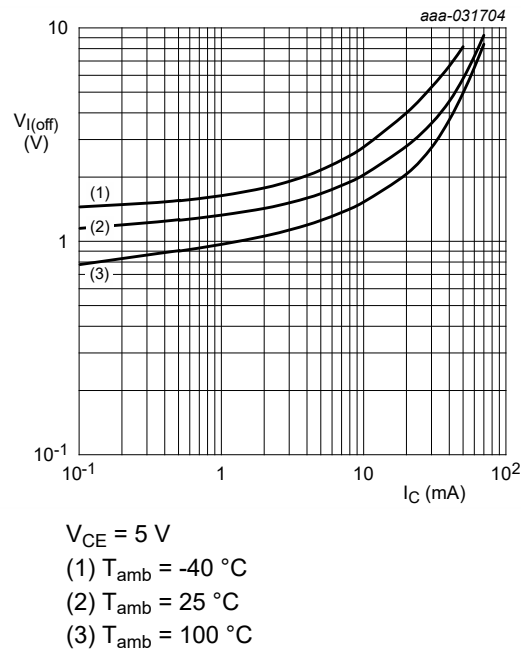


Fig. 12. NHUMH1: Off-state input voltage as a function of collector current; typical values

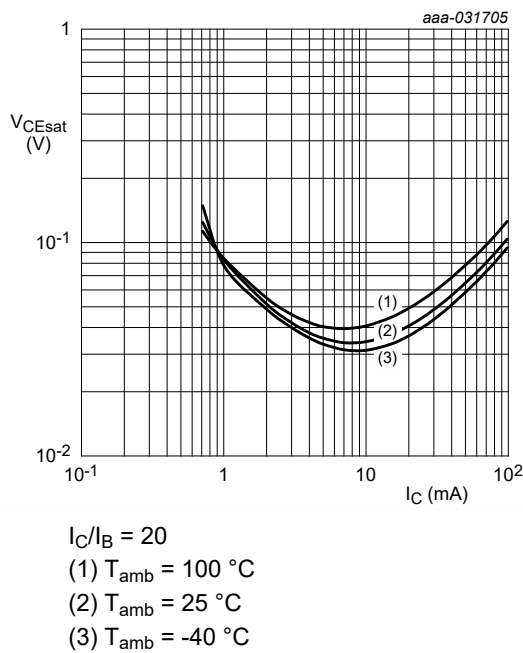


Fig. 13. NHUMH1: Collector-emitter saturation voltage as a function of collector current; typical values

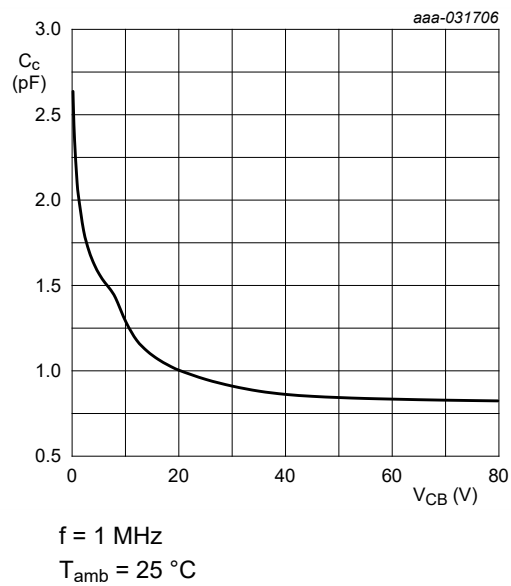


Fig. 14. NHUMH1: Collector capacitance as a function of collector-base voltage; typical values

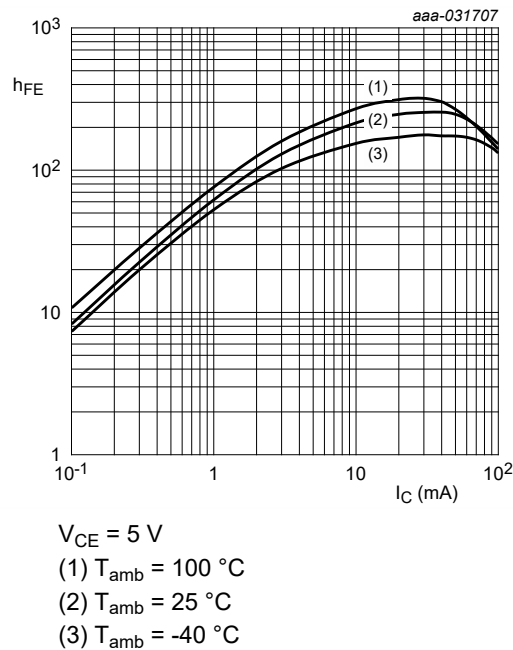


Fig. 15. NHUMH2: DC current gain as a function of collector current; typical values

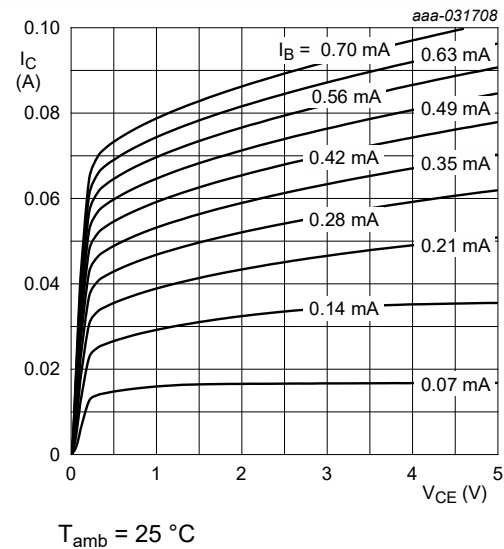


Fig. 16. NHUMH2: Collector current as a function of collector-emitter voltage; typical values

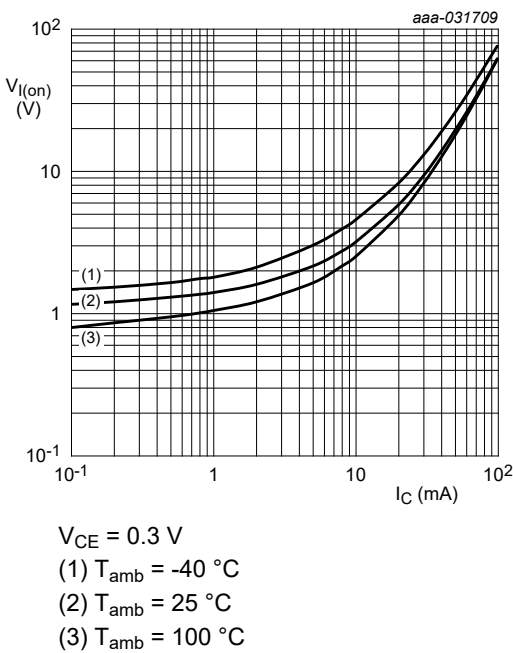


Fig. 17. NHUMH2: On-state input voltage as a function of collector current; typical values

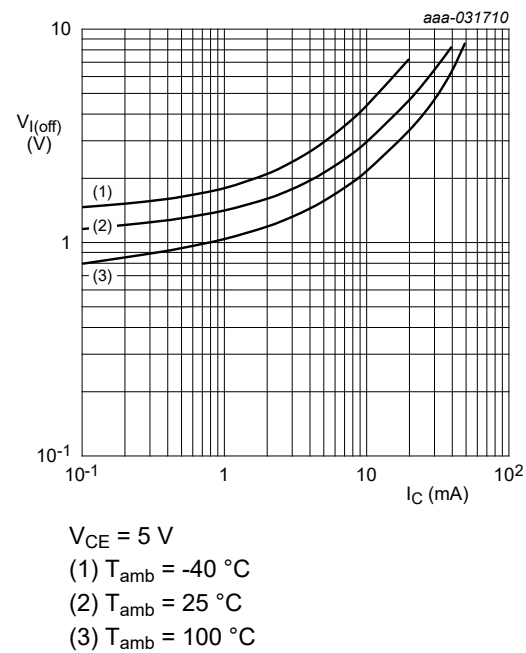


Fig. 18. NHUMH2: Off-state input voltage as a function of collector current; typical values

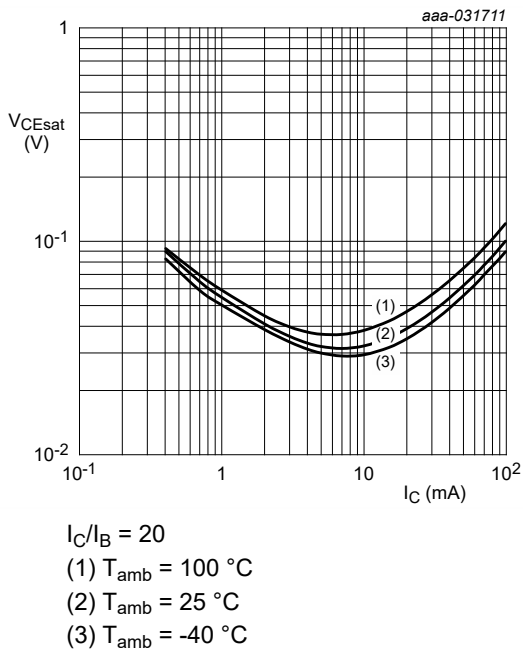


Fig. 19. NHUMH2: Collector-emitter saturation voltage as a function of collector current; typical values

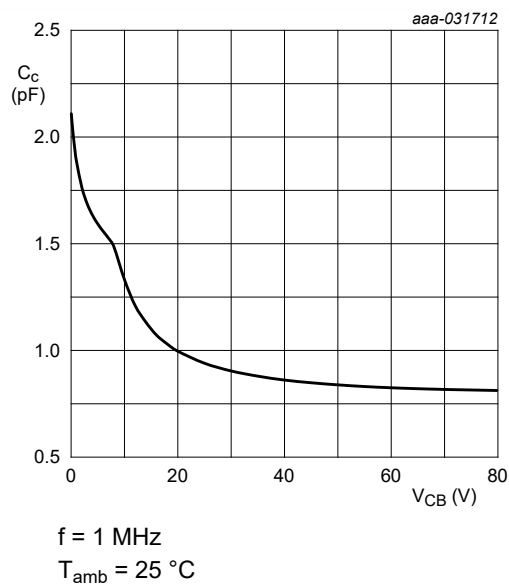


Fig. 20. NHUMH2: Collector capacitance as a function of collector-base voltage; typical values of built-in transistor

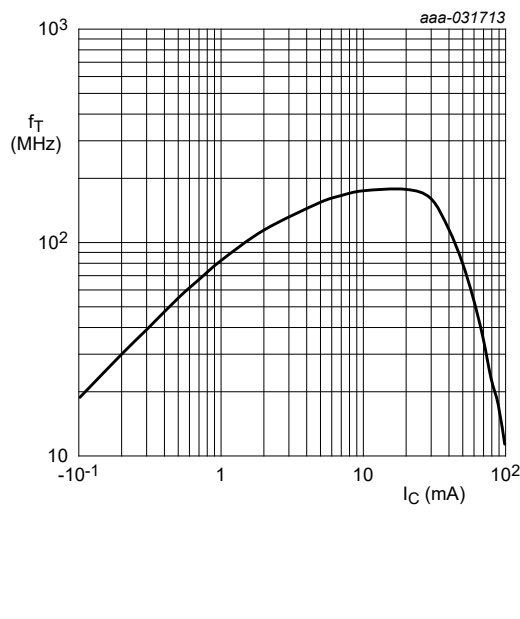


Fig. 21. Transition frequency as a function of collector current; typical values of built-in transistor

11. Test information

Quality information

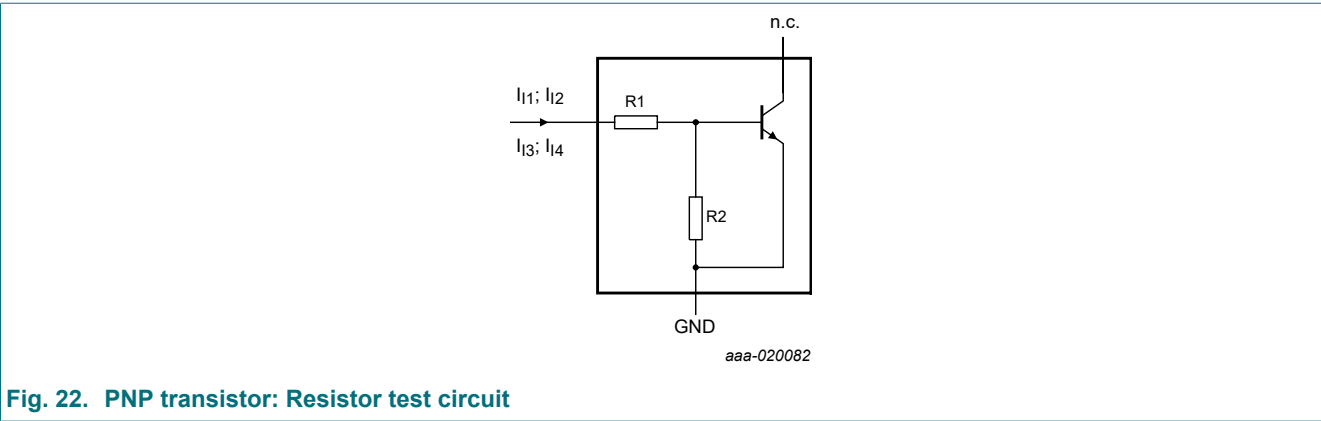
This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - Stress test qualification for discrete semiconductors, and is suitable for use in automotive applications.

Resistor calculation

- Calculation of bias resistor 1 (R1)

$$R_I = \frac{V(I_{I2}) - V(I_{I1})}{I_{I2} - I_{I1}}$$
- Calculation of bias resistor ratio (R2/R1)

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



Resistor test conditions

Table 9. Resistor test conditions

Type number	R1 (kΩ)	R2 (kΩ)	Test conditions			
			I _{I1}	I _{I2}	I _{I3}	I _{I4}
Per transistor						
NHUMH11	10	10	800 μA	1.1 mA	-350 μA	-450 μA
NHUMH1	22	22	550 μA	750 μA	-150 μA	-230 μA
NHUMH2	47	47	250 μA	350 μA	-55 μA	-105 μA

12. Package outline

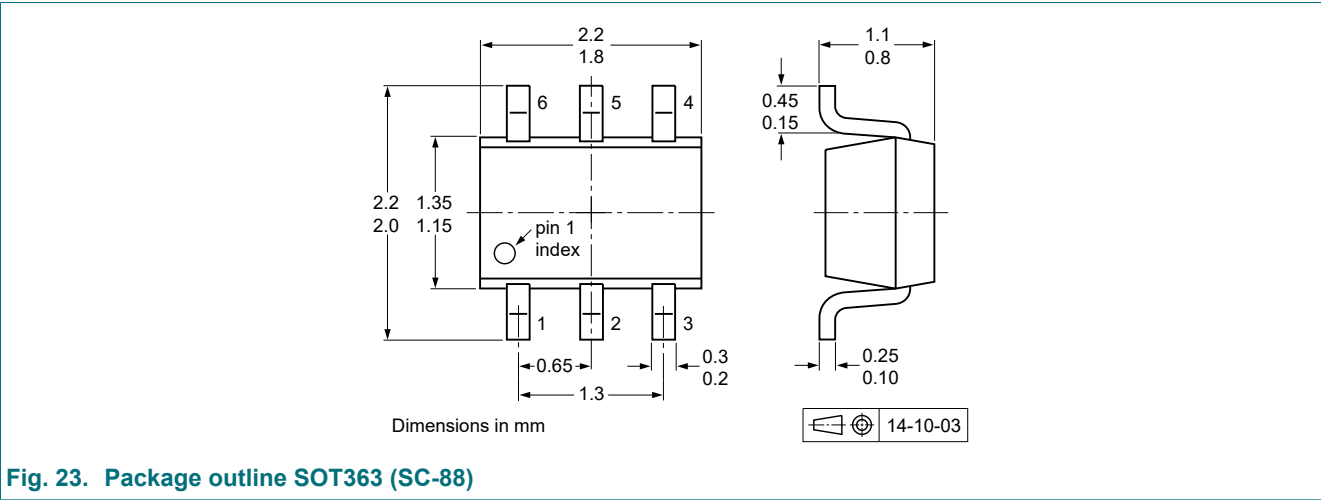


Fig. 23. Package outline SOT363 (SC-88)

13. Soldering

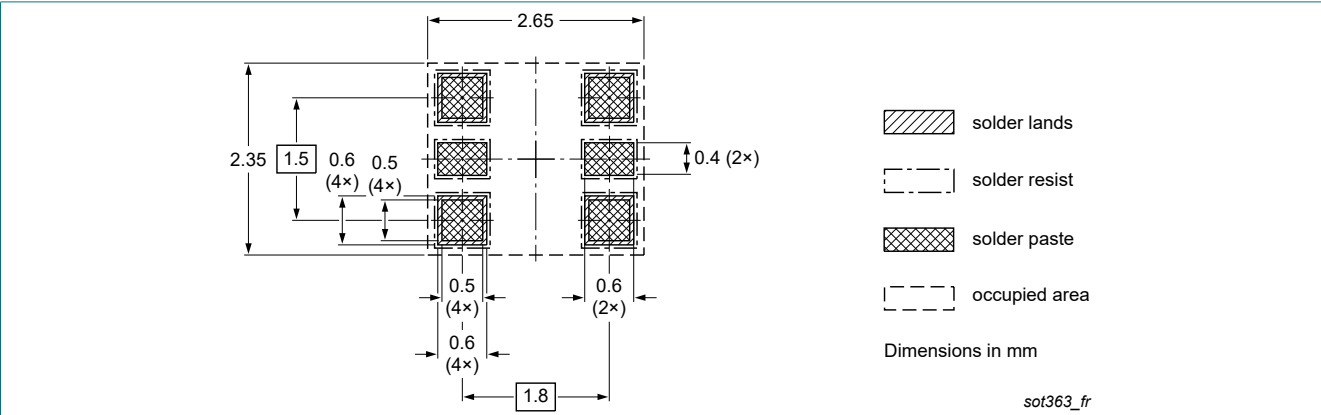


Fig. 24. Reflow soldering footprint for SOT363 (SC-88)

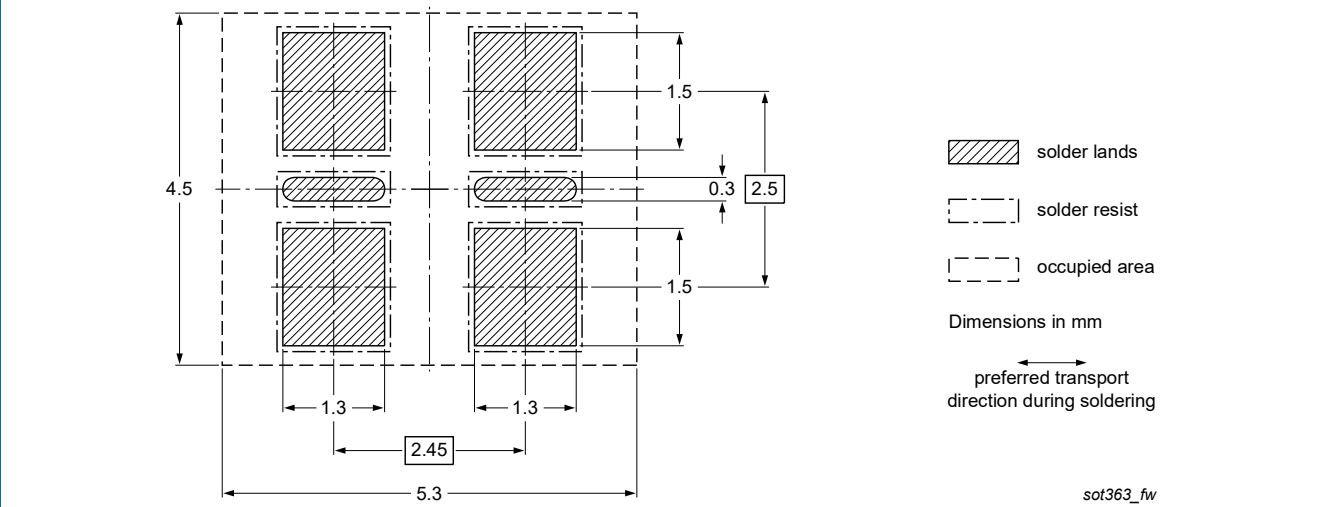


Fig. 25. Wave soldering footprint for SOT363 (SC-88)

14. Revision history

Table 10. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
NHUMH11_1_2_SER v.1	20200722	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.

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- [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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