PDTA113ZU

50 V, 100 mA PNP resistor-equipped transistor; R1 = 1 kΩ, R2 = 10 kΩ

12 March 2025 Product data sheet

1. General description

PNP Resistor-Equipped Transistor (RET) in a very small SOT323 (SC-70) Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Built-in bias resistors
- Reduces component count
- Simplifies circuit design
- Reduces pick and place costs
- AEC-Q101 qualified

3. Applications

- General purpose switching and amplification
- Circuit drivers
- Inverter and interface circuits

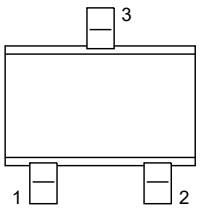
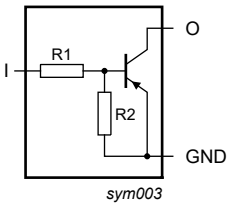
4. Quick reference data

Table 1. 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)	T_{amb} = 25 °C		0.7	1	1.3	kΩ
R2/R1	bias resistor ratio			8	10	12	

5. Pinning information

Table 2. Pinning information

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

SC-70 (SOT323)

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PDTA113ZU	SC-70	plastic, surface-mounted package; 3 leads; 1.3 mm pitch; 2 mm x 1.25 mm x 0.95 mm body	SOT323

7. Marking

Table 4. Marking codes

Type number	Marking code[1]
PDTA113ZU	%16

[1] % = placeholder for manufacturing site code

8. Limiting values

Table 5. 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		-	-5	V
V_I	input voltage			-10	5	V
I_O	output current			-	-100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[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.

9. Thermal characteristics

Table 6. Thermal characteristics

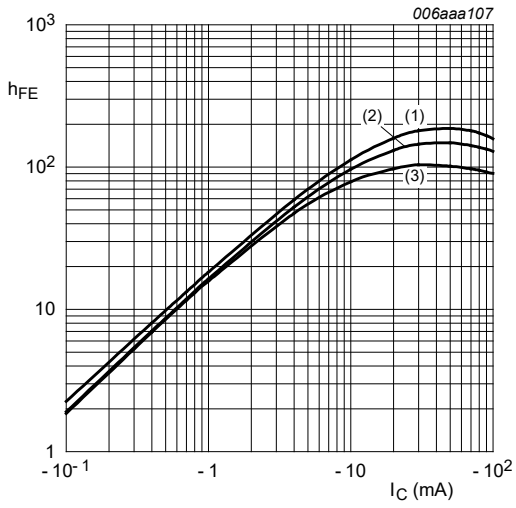
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	625	K/W

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

10. Characteristics

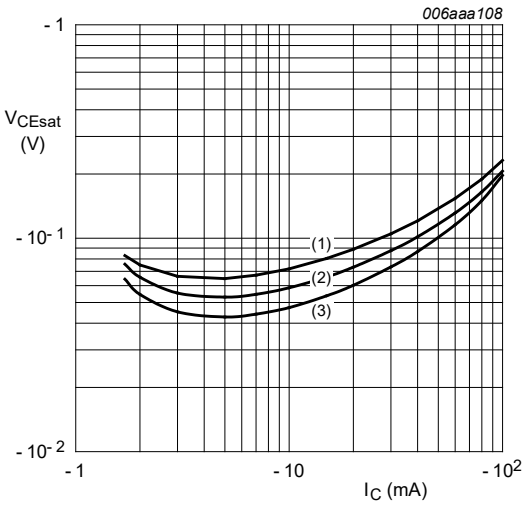
Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = -100 µA; T_{lead} = 0 °C; T_{amb} = 25 °C		-100	-	-	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	I_C = -2 mA; I_B = 0; T_{amb} = 25 °C		-100	-	-	V
I_{CBO}	collector-base cut-off current	V_{CB} = -50 V; I_E = 0 A; T_{amb} = 25 °C		-	-	-100	nA
I_{CEO}	collector-emitter cut-off current	V_{CE} = -30 V; I_B = 0 A; T_{amb} = 25 °C		-	-	-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; T_{amb} = 25 °C		-	-	-800	µA
h_{FE}	DC current gain	V_{CE} = -5 V; I_C = -5 mA; T_{amb} = 25 °C		35	-	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = -10 mA; I_B = -0.5 mA; T_{amb} = 25 °C		-	-	-150	mV
$V_{I(off)}$	off-state input voltage	V_{CE} = -5 V; I_C = -100 µA; T_{amb} = 25 °C		-	-0.65	-0.3	V
$V_{I(on)}$	on-state input voltage	V_{CE} = -300 mV; I_C = -20 mA; T_{amb} = 25 °C		-2.5	-0.95	-	V
R1	bias resistor 1 (input)	T_{amb} = 25 °C		0.7	1	1.3	kΩ
R2/R1	bias resistor ratio			8	10	12	
C_c	collector capacitance	V_{CB} = -10 V; I_E = 0 A; i_e = 0 A; f = 1 MHz; T_{amb} = 25 °C		-	-	2	pF



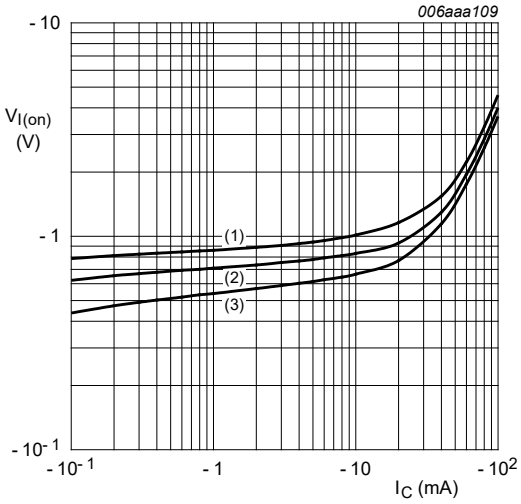
V_{CE} = -5 V
(1) T_{amb} = 100 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -40 °C

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



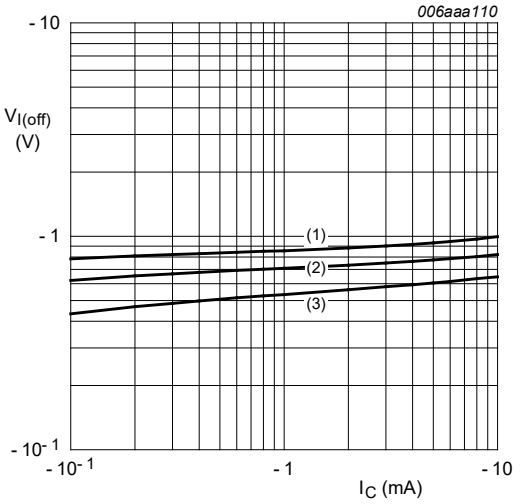
I_C/I_B = 20
(1) T_{amb} = 100 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -40 °C

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

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)

$$R_1 = \frac{V(I_2) - V(I_1)}{I_2 - I_1}$$

- Calculation of bias resistor ratio (R2/R1)

$$\frac{R2}{R1} = \frac{V(I_4) - V(I_3)}{R1 \cdot (I_4 - I_3)} - 1$$

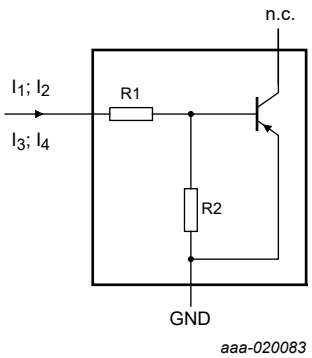


Fig. 5. PNP transistor: Resistor test circuit

Resistor test conditions

Table 8. Resistor test conditions

Type number	R1 (kΩ)	R2 (kΩ)	Test conditions			
			I_1	I_2	I_3	I_4
PDTA113ZU	1	10	-700 µA	-800 µA	450 µA	550 µA

12. Package outline

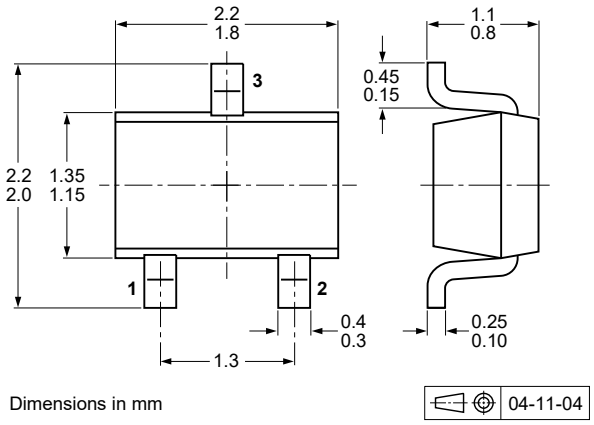


Fig. 6. Package outline SC-70 (SOT323)

13. Soldering

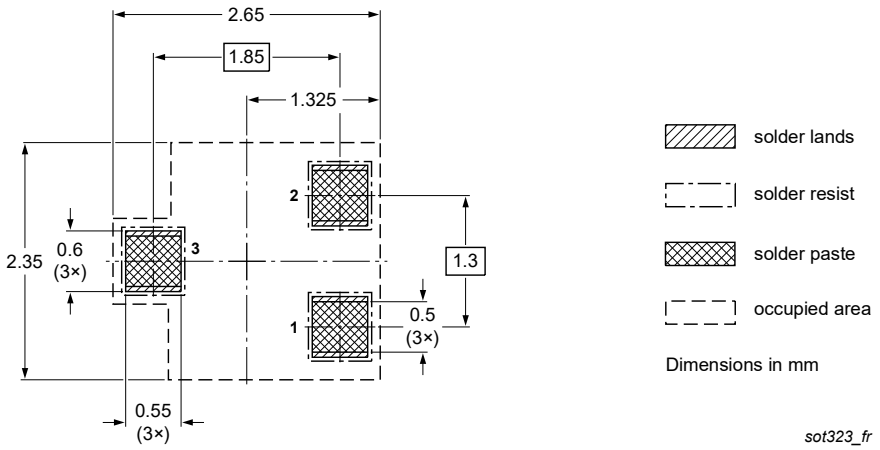


Fig. 7. Reflow soldering footprint for SC-70 (SOT323)

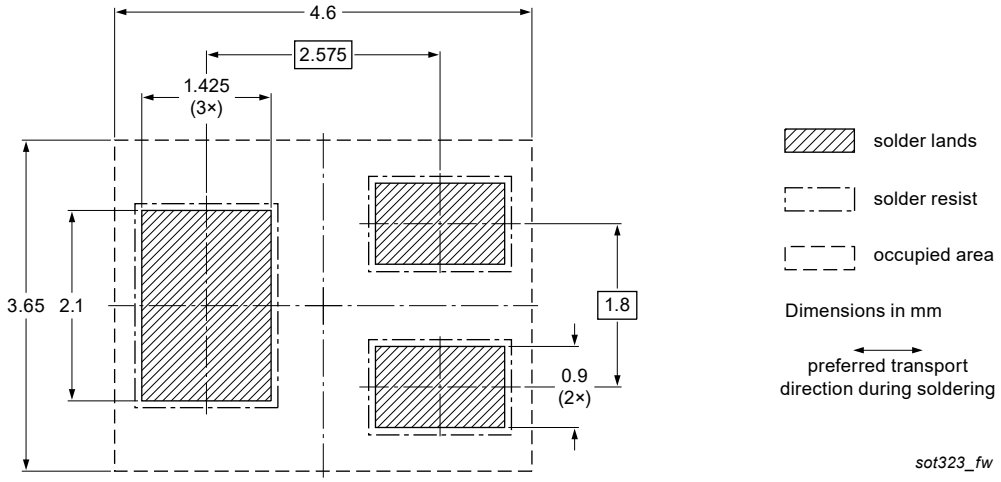


Fig. 8. Wave soldering footprint for SC-70 (SOT323)

14. Revision history

Table 9. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PDTA113ZU v.5	20250312	Product data sheet	-	PDTA113Z_SER_4
Modifications:	• The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. • Legal texts have been adapted to the new company name where appropriate. • Section "Packing information" removed. • Family data sheet splitted to single type data sheets for the active products.			
PDTA113Z_SER_4	20090902	Product data sheet	-	PDTA113Z_SER_3
PDTA113Z_SER_3	20050407	Product data sheet	-	PDTA113ZT_2
PDTA113ZT_2	20040518	Objective data sheet	-	PDTA113ZT_1
PDTA113ZT_1	20040325	Objective 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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