



PDTA143ZT

50 V, 100 mA PNP resistor-equipped transistor;
R1 = 4.7 kΩ, R2 = 47 kΩ

7 March 2024

Product data sheet

1. General description

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

NPN complement: PDTC143ZT

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

3. Applications

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

4. Quick reference data

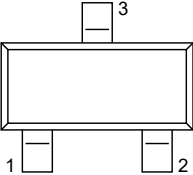
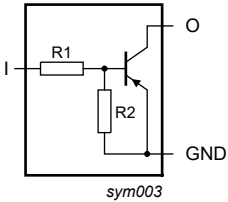
Table 1. Quick reference data

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	[1]	3.3	4.7	6.1	kΩ
R2/R1	bias resistor ratio		[1]	8	10	12	

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

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	I	input (base)	 SOT23	 sym003
2	GND	ground (emitter)		
3	O	output (collector)		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PDTA143ZT	SOT23	plastic, surface-mounted package; 3 terminals; 1.9 mm pitch; 2.9 mm x 1.3 mm x 1 mm body	SOT23

7. Marking

Table 4. Marking codes

Type number	Marking code[1]
PDTA143ZT	%19

[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			-30	5	V
I _O	output current			-	-100	mA
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[1]	-	250	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.

50 V, 100 mA PNP resistor-equipped transistor; R1 = 4.7 kΩ, R2 = 47 kΩ

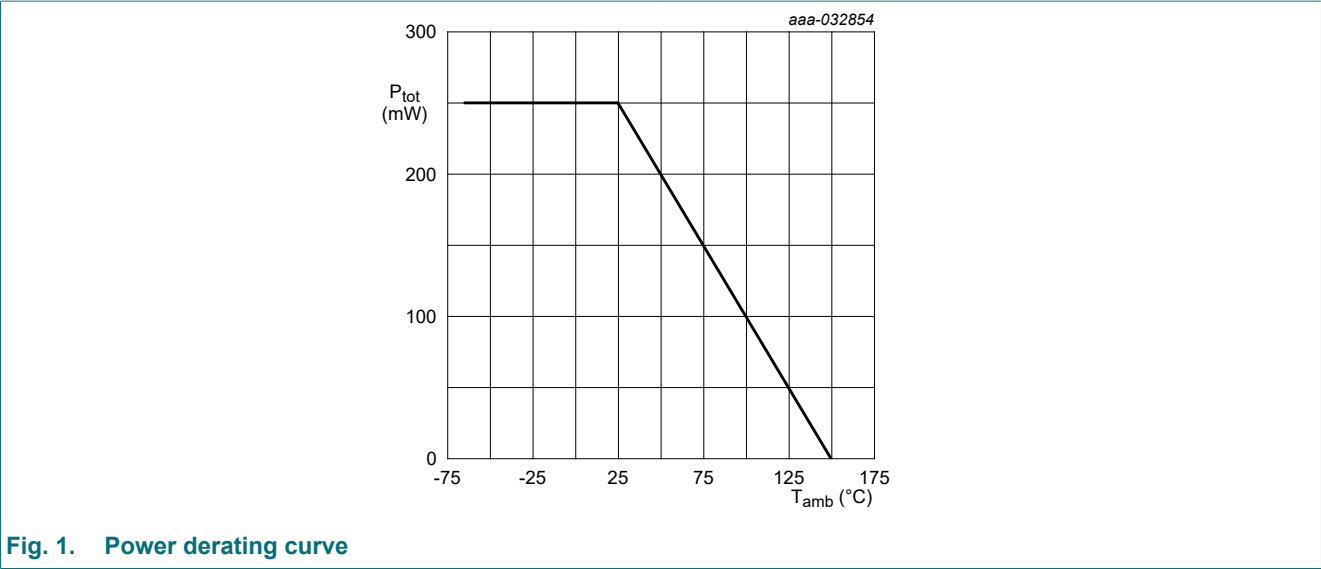


Fig. 1. Power derating curve

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient		[1]	-	-	500	K/W

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

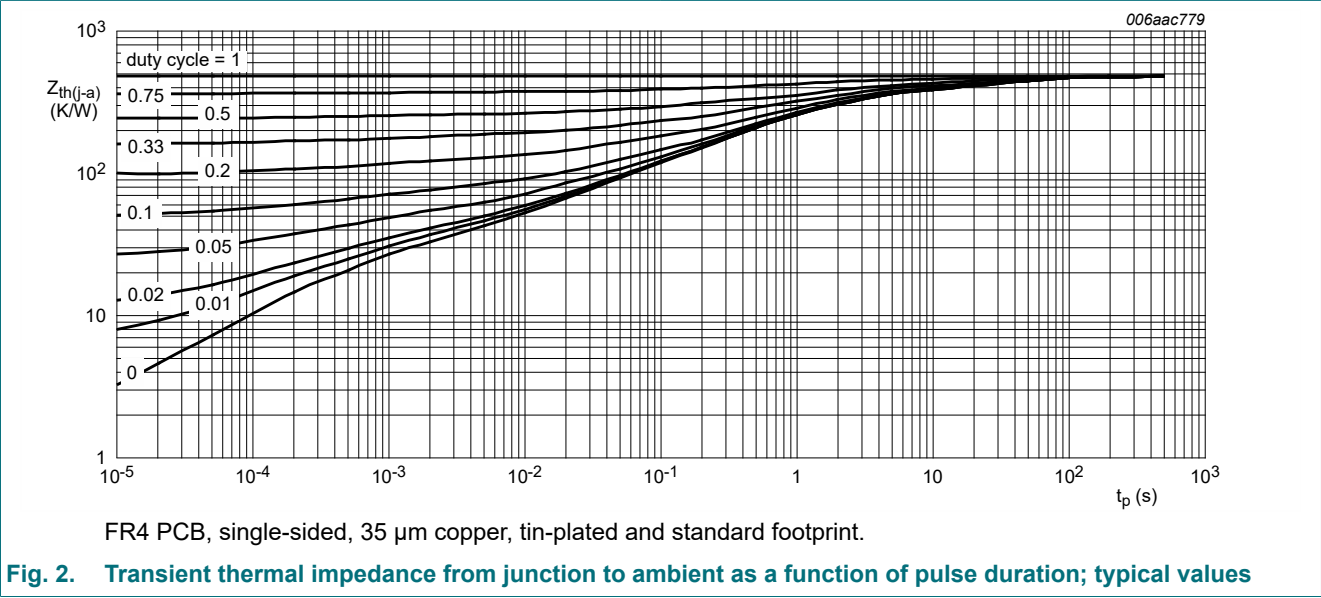


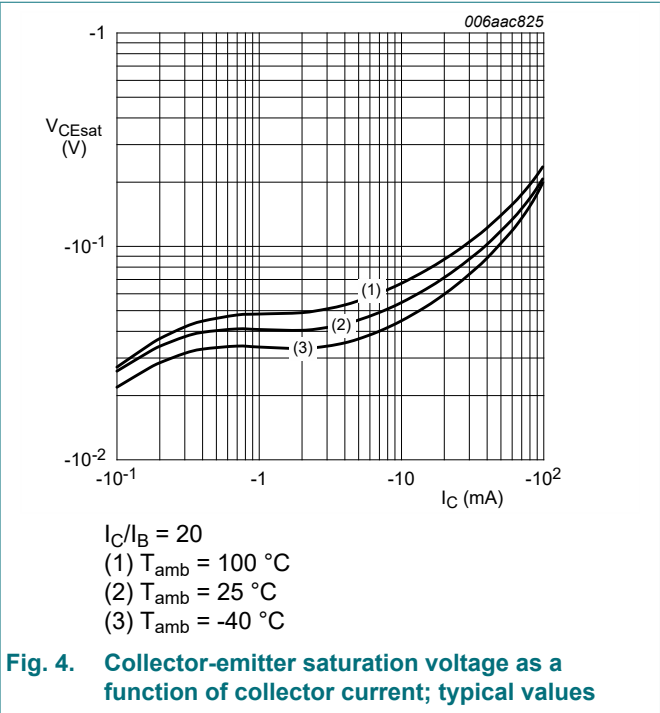
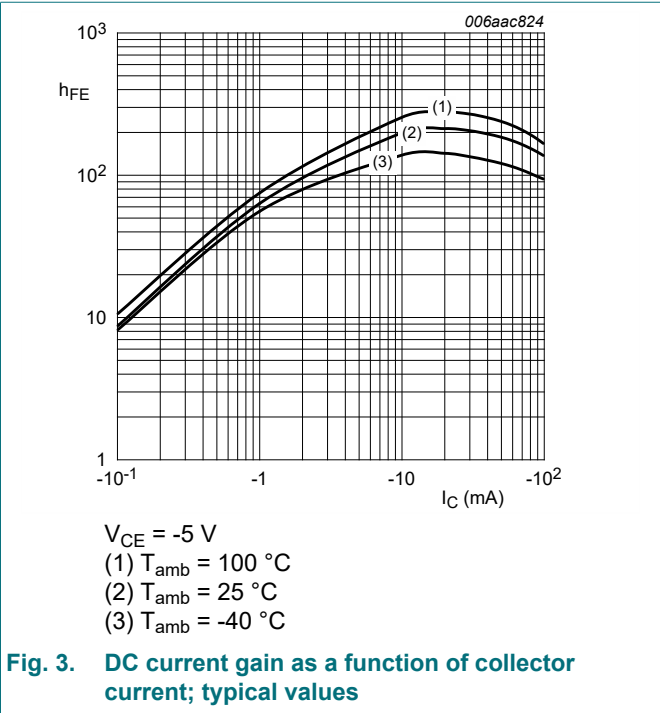
Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V _{(BR)CBO}	collector-base breakdown voltage	I _C = -100 μA; I _E = 0 A; T _{amb} = 25 °C		-50	-	-	V
V _{(BR)CEO}	collector-emitter breakdown voltage	I _C = -2 mA; I _B = 0 A; T _{amb} = 25 °C		-50	-	-	V
V _{(BR)EBO}	emitter-base breakdown voltage	I _C = 0 A; I _E = 100 μA; T _{amb} = 25 °C		-5	-	-	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		-	-	-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; T _{amb} = 25 °C		-	-	-170	μA
h _{FE}	DC current gain	V _{CE} = -5 V; I _C = -10 mA; T _{amb} = 25 °C		100	-	-	
V _{CEsat}	collector-emitter saturation voltage	I _C = -5 mA; I _B = -0.25 mA; T _{amb} = 25 °C		-	-	-100	mV
V _{I(off)}	off-state input voltage	V _{CE} = -5 V; I _C = -100 μA; T _{amb} = 25 °C		-	-0.6	-0.5	V
V _{I(on)}	on-state input voltage	V _{CE} = -0.3 V; I _C = -5 mA; T _{amb} = 25 °C		-1.3	-0.9	-	V
R1	bias resistor 1 (input)	T _{amb} = 25 °C	[1]	3.3	4.7	6.1	kΩ
R2/R1	bias resistor ratio		[1]	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		-	-	3	pF
f _T	transition frequency	V _{CE} = -5 V; I _C = -10 mA; f = 100 MHz; T _{amb} = 25 °C	[2]	-	180	-	MHz

[1] See section "Test information" for resistor calculation and test conditions
[2] Characteristics of built-in transistor



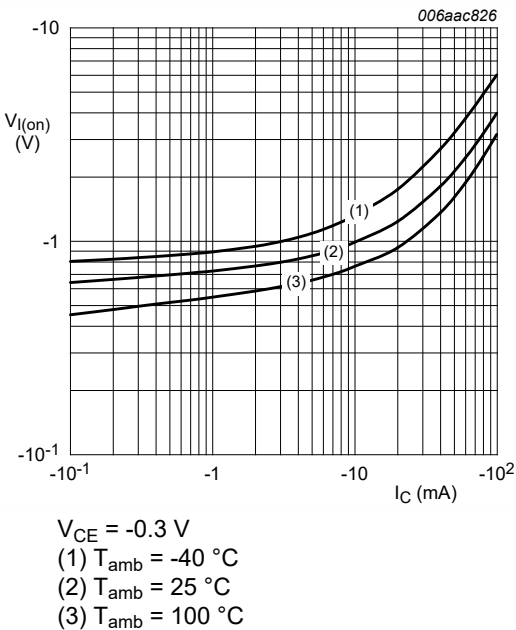


Fig. 5. On-state input voltage as a function of collector current; typical values

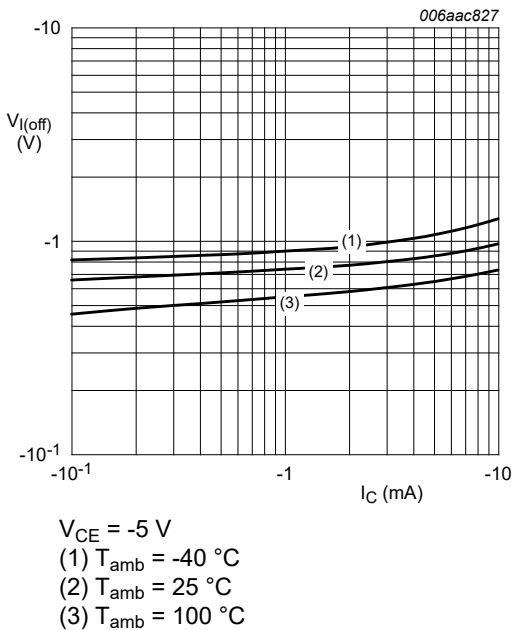


Fig. 6. Off-state input voltage as a function of collector current; typical values

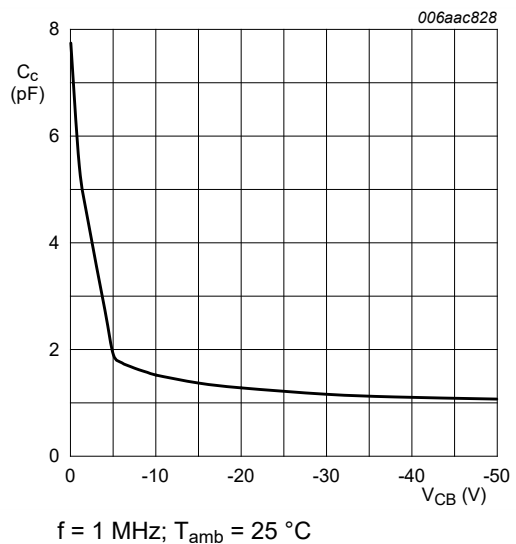


Fig. 7. Collector capacitance as a function of collector-base voltage; typical values

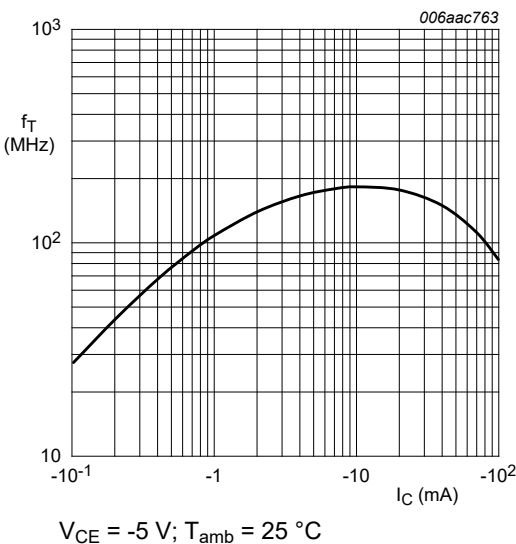


Fig. 8. Transition frequency as a function of collector current; typical values of built-in transistor

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)

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

- Calculation of bias resistor ratio (R2/R1)

$$\frac{R_2}{R_1} = \frac{V(I_4) - V(I_3)}{R_1 \cdot (I_4 - I_3)} - 1$$

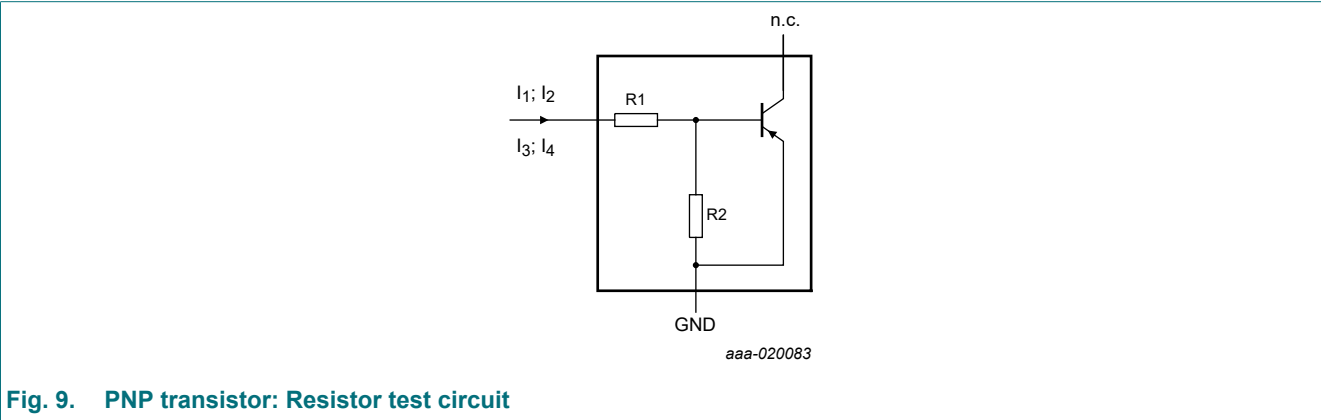


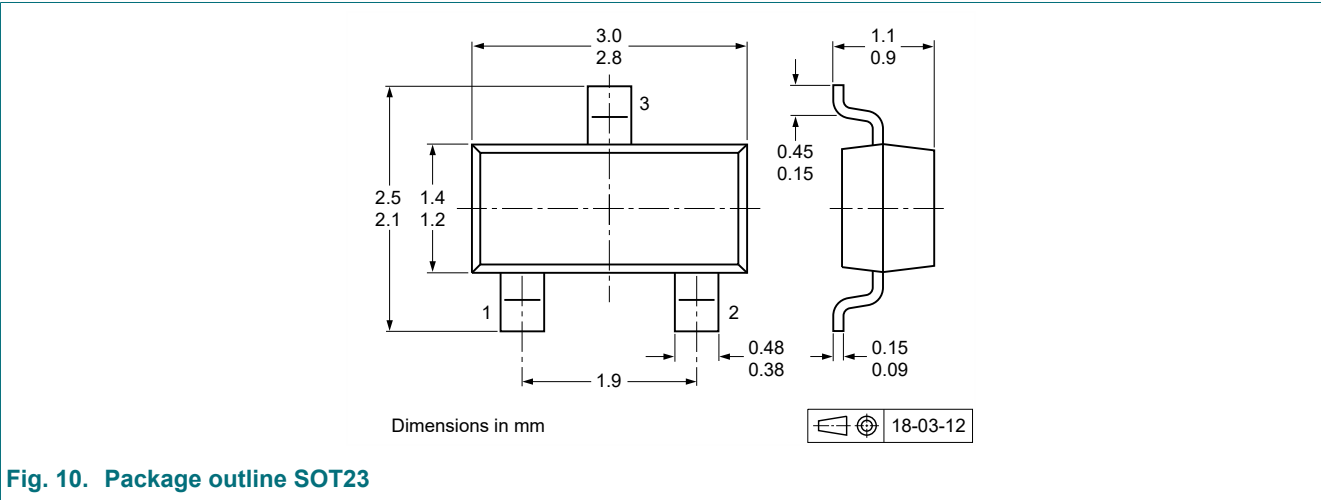
Fig. 9. PNP transistor: Resistor test circuit

Resistor test conditions

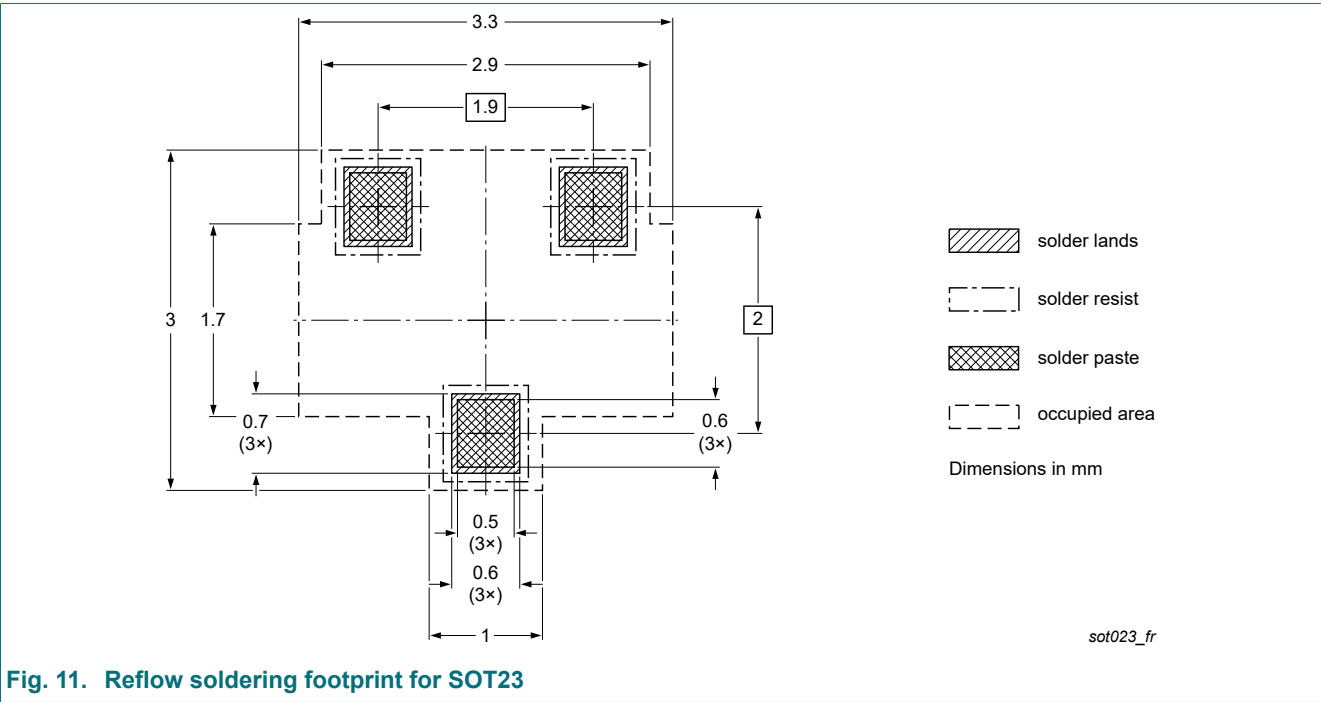
Table 8. Resistor test conditions

Type number	R1 (kΩ)	R2 (kΩ)	Test conditions			
			I ₁	I ₂	I ₃	I ₄
PDTA143ZT	4.7	47	-90 μA	-140 μA	55 μA	105 μA

12. Package outline



13. Soldering



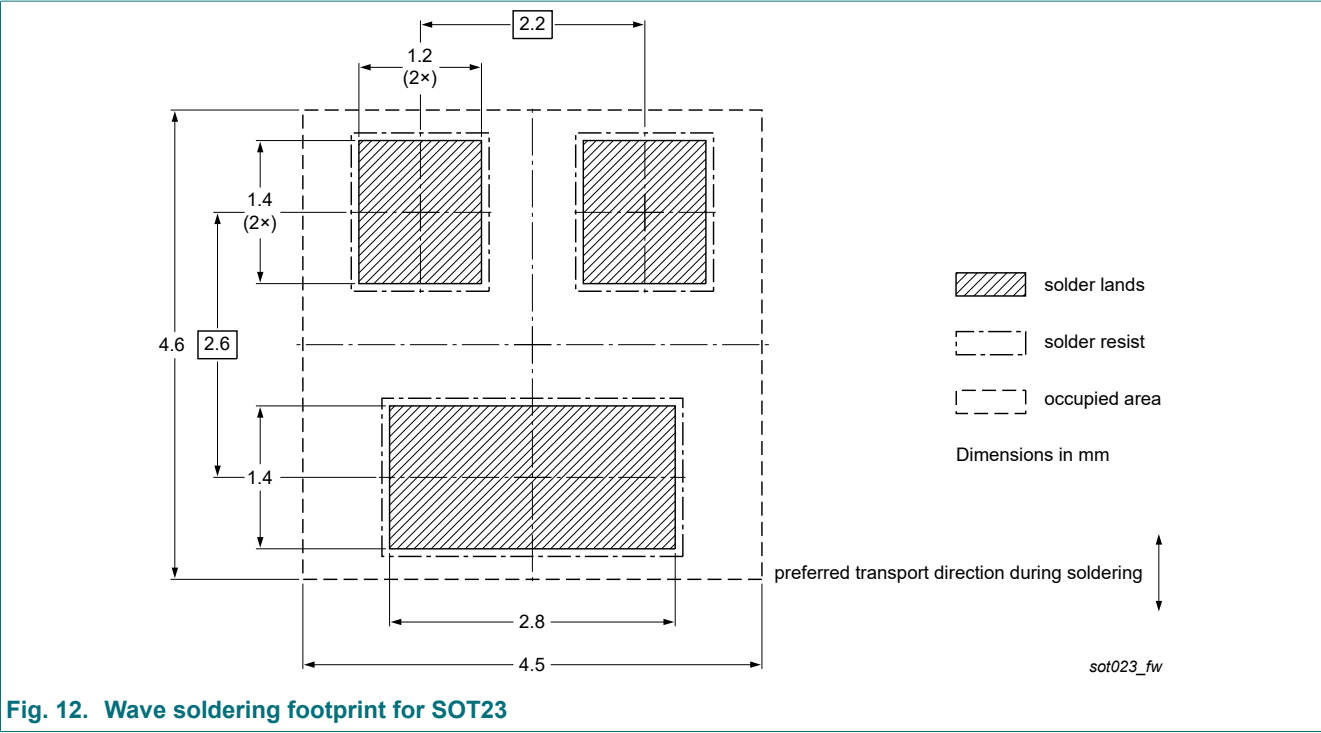


Fig. 12. Wave soldering footprint for SOT23

14. Revision history

Table 9. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PDTA143ZT v.9	20240307	Product data sheet	-	PDTA143Z_SER v.8
Modification:	• Characteristics: Value of I _{CEO} @ 25 °C adapted to -100 nA			
PDTA143ZT v.8	20240123	Product data sheet	-	PDTA143Z_SER v.7
PDTA143Z_SER v.7	20111205	Product data sheet	-	PDTA143Z_SERIES v.6
PDTA143Z_SERIES v.6	20040805	Product data sheet	-	PDTA143Z_SERIES v.5
PDTA143Z_SERIES v.5	20030908	Product specification	-	PDTA143Z_SERIES v.4
PDTA143Z_SERIES v.4	20030410	Product specification	-	-

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".
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