



# PDTA143ZU

50 V, 100 mA PNP resistor-equipped transistor;  
R1 = 4.7 k $\Omega$ , R2 = 47 k $\Omega$

23 January 2024

Product data sheet

## 1. General description

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

NPN complement: PDTC143ZU

## 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

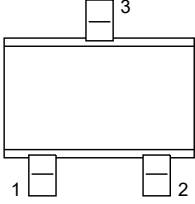
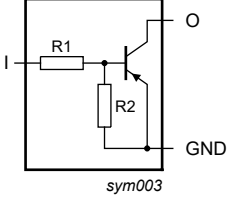
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V <sub>CEO</sub>	collector-emitter voltage	open base		-	-	-50	V
I <sub>O</sub>	output current			-	-	-100	mA
R1	bias resistor 1 (input)	T <sub>amb</sub> = 25 °C	[1]	3.3	4.7	6.1	k $\Omega$
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)	 SC-70 (SOT323)	 sym003
2	GND	ground (emitter)		
3	O	output (collector)		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
<a href="#">PDTA143ZU</a>	SC-70	plastic, surface-mounted package; 3 leads; 1.3 mm pitch; 2 mm x 1.25 mm x 0.95 mm body	<a href="#">SOT323</a>

## 7. Marking

Table 4. Marking codes

Type number	Marking code[1]
PDTA143ZU	%47

[1] % = placeholder for manufacturing site code

## 8. Limiting values

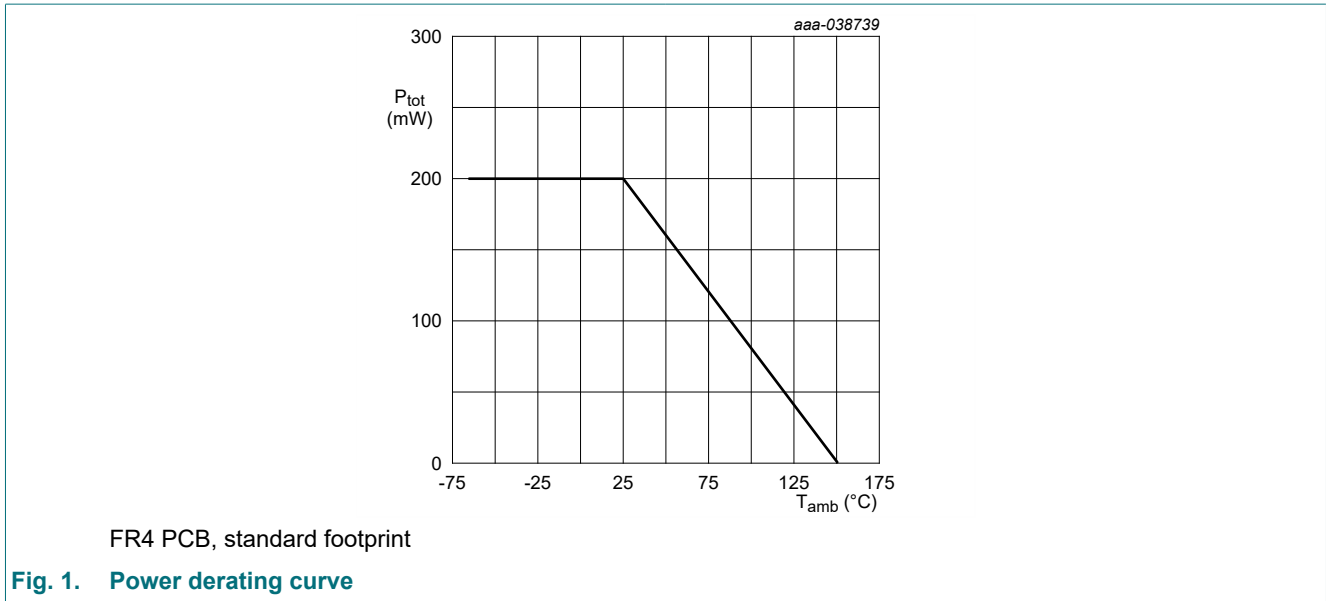
Table 5. Limiting values

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	$T_{amb} \leq 25\text{ °C}$	[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.

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

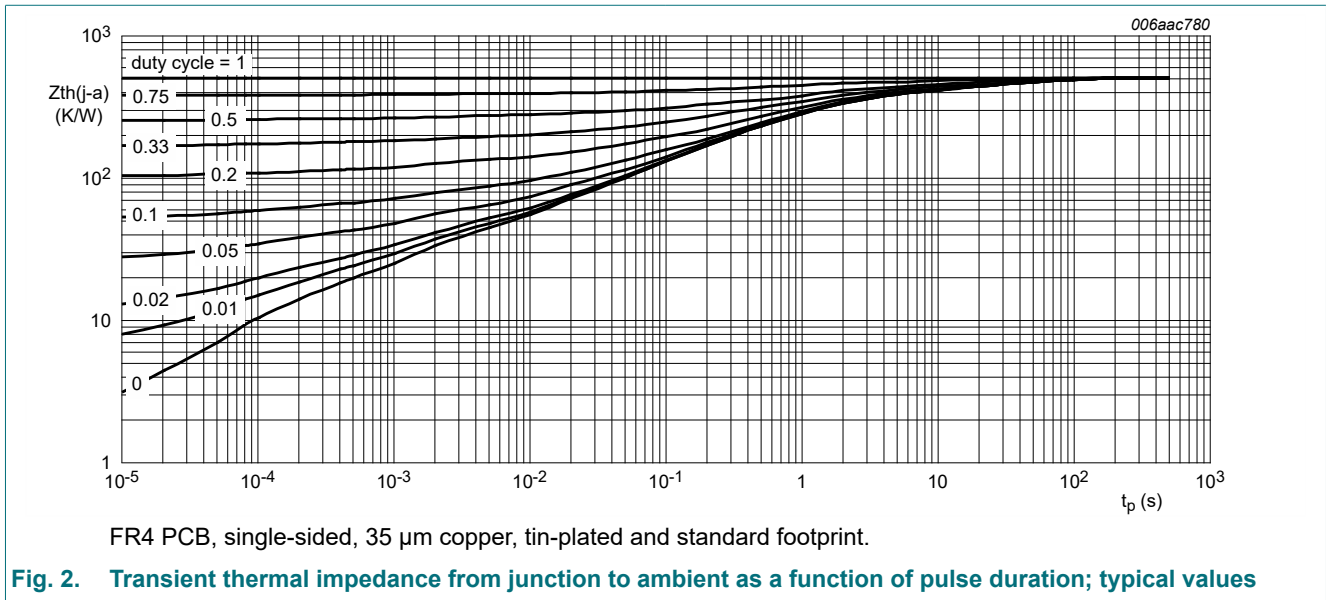


## 9. Thermal characteristics

Table 6. Thermal characteristics

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

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

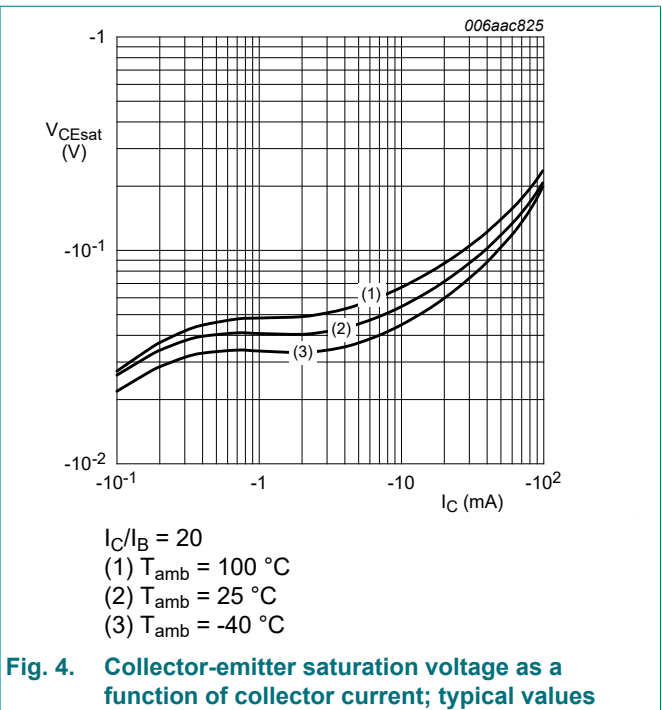
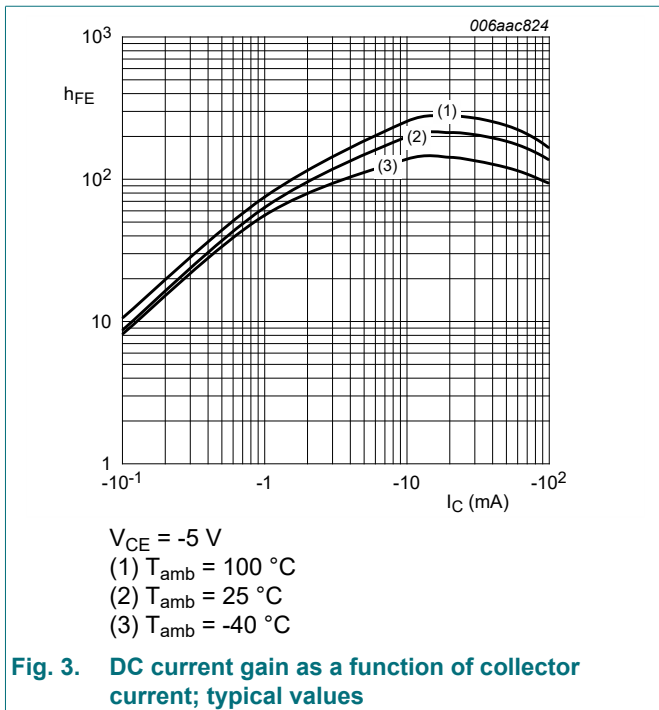


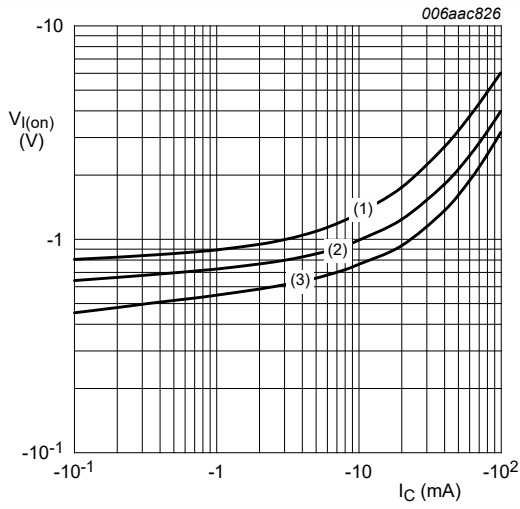
## 10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = -100 \mu A; I_E = 0 A; T_{amb} = 25 \text{ }^\circ C$	-50	-	-	V	
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_C = -2 \text{ mA}; I_B = 0 A; T_{amb} = 25 \text{ }^\circ C$	-50	-	-	V	
$V_{(BR)EBO}$	emitter-base breakdown voltage	$I_C = 0 A; I_E = 100 \mu A; T_{amb} = 25 \text{ }^\circ C$	-5	-	-	V	
$I_{CBO}$	collector-base cut-off current	$V_{CB} = -50 \text{ V}; I_E = 0 A; T_{amb} = 25 \text{ }^\circ C$	-	-	-100	nA	
$I_{CEO}$	collector-emitter cut-off current	$V_{CE} = -30 \text{ V}; I_B = 0 A; T_{amb} = 25 \text{ }^\circ C$	-	-	-1	$\mu A$	
		$V_{CE} = -30 \text{ V}; I_B = 0 A; T_j = 150 \text{ }^\circ C$	-	-	-5	$\mu A$	
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = -5 \text{ V}; I_C = 0 A; T_{amb} = 25 \text{ }^\circ C$	-	-	-170	$\mu A$	
$h_{FE}$	DC current gain	$V_{CE} = -5 \text{ V}; I_C = -10 \text{ mA}; T_{amb} = 25 \text{ }^\circ C$	100	-	-		
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = -5 \text{ mA}; I_B = -0.25 \text{ mA}; T_{amb} = 25 \text{ }^\circ C$	-	-	-100	mV	
$V_{I(off)}$	off-state input voltage	$V_{CE} = -5 \text{ V}; I_C = -100 \mu A; T_{amb} = 25 \text{ }^\circ C$	-	-0.6	-0.5	V	
$V_{I(on)}$	on-state input voltage	$V_{CE} = -0.3 \text{ V}; I_C = -5 \text{ mA}; T_{amb} = 25 \text{ }^\circ C$	-1.3	-0.9	-	V	
R1	bias resistor 1 (input)	$T_{amb} = 25 \text{ }^\circ C$	[1]	3.3	4.7	6.1	kΩ
R2/R1	bias resistor ratio		[1]	8	10	12	
$C_c$	collector capacitance	$V_{CB} = -10 \text{ V}; I_E = 0 A; i_e = 0 A; f = 1 \text{ MHz}; T_{amb} = 25 \text{ }^\circ C$	-	-	3	pF	
$f_T$	transition frequency	$V_{CE} = -5 \text{ V}; I_C = -10 \text{ mA}; f = 100 \text{ MHz}; T_{amb} = 25 \text{ }^\circ C$	[2]	-	180	-	MHz

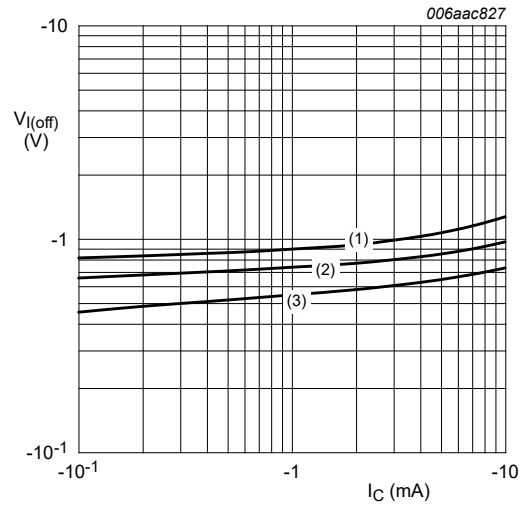
- [1] See section "Test information" for resistor calculation and test conditions
- [2] Characteristics of built-in transistor





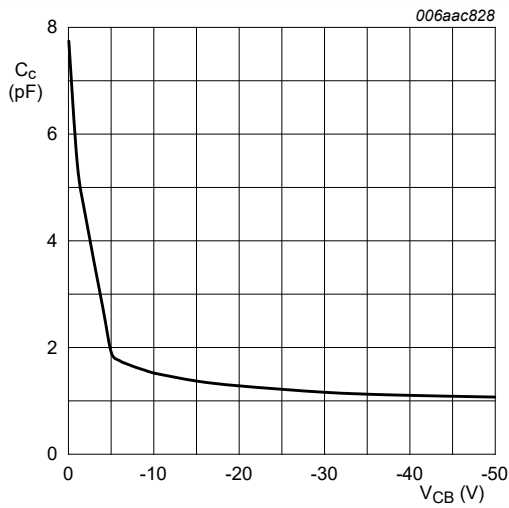
$V_{CE} = -0.3\text{ V}$   
 (1)  $T_{amb} = -40\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 100\text{ °C}$

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



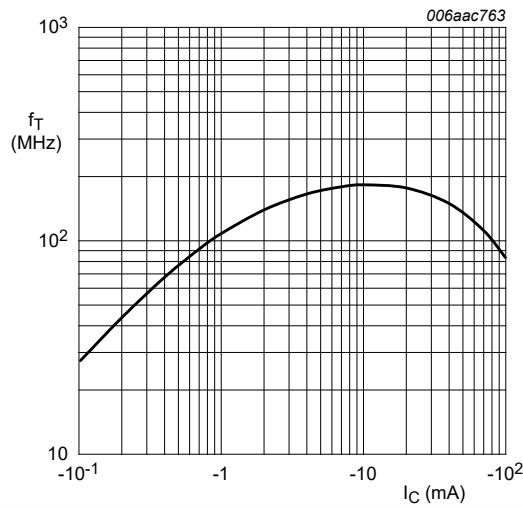
$V_{CE} = -5\text{ V}$   
 (1)  $T_{amb} = -40\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 100\text{ °C}$

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



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

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



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

**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)

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

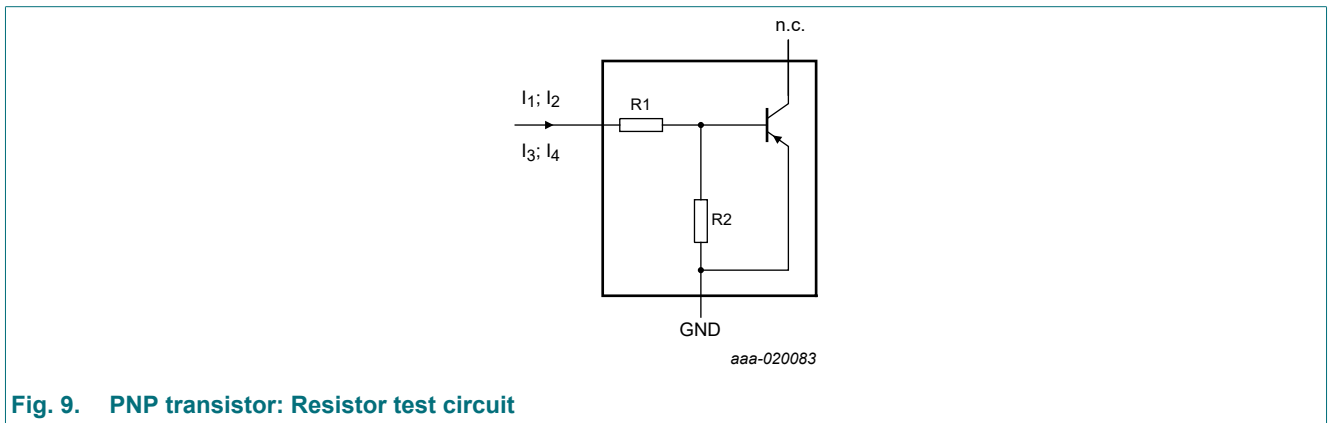


Fig. 9. PNP transistor: Resistor test circuit

### Resistor test conditions

Table 8. Resistor test conditions

Type number	R1 (kΩ)	R2 (kΩ)	Test conditions			
			I <sub>1</sub>	I <sub>2</sub>	I <sub>3</sub>	I <sub>4</sub>
PDTA143ZU	4.7	47	-90 μA	-140 μA	55 μA	105 μA

## 12. Package outline

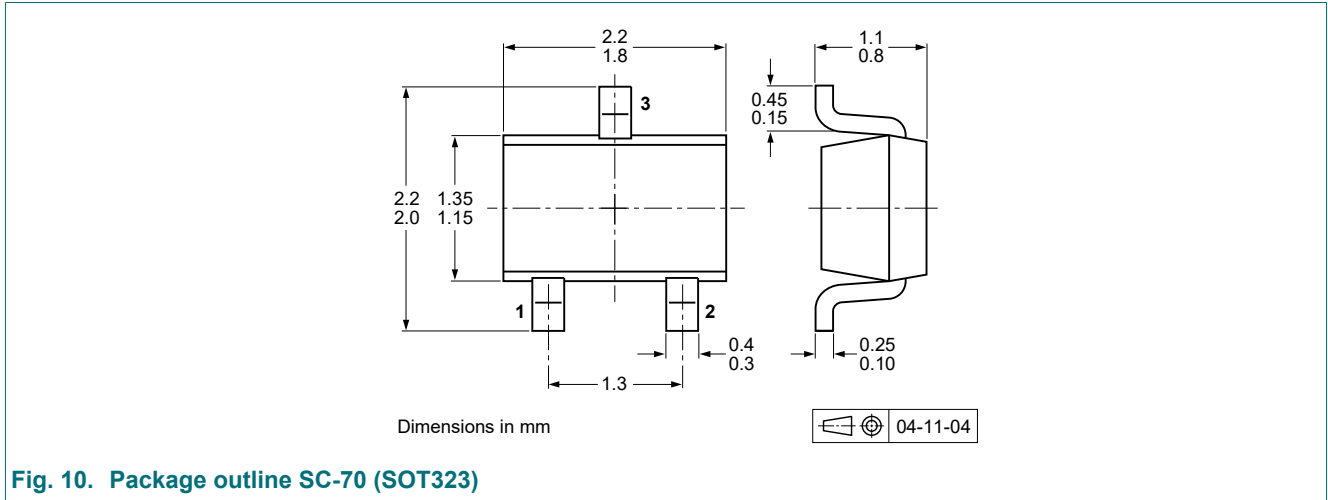


Fig. 10. Package outline SC-70 (SOT323)

## 13. Soldering

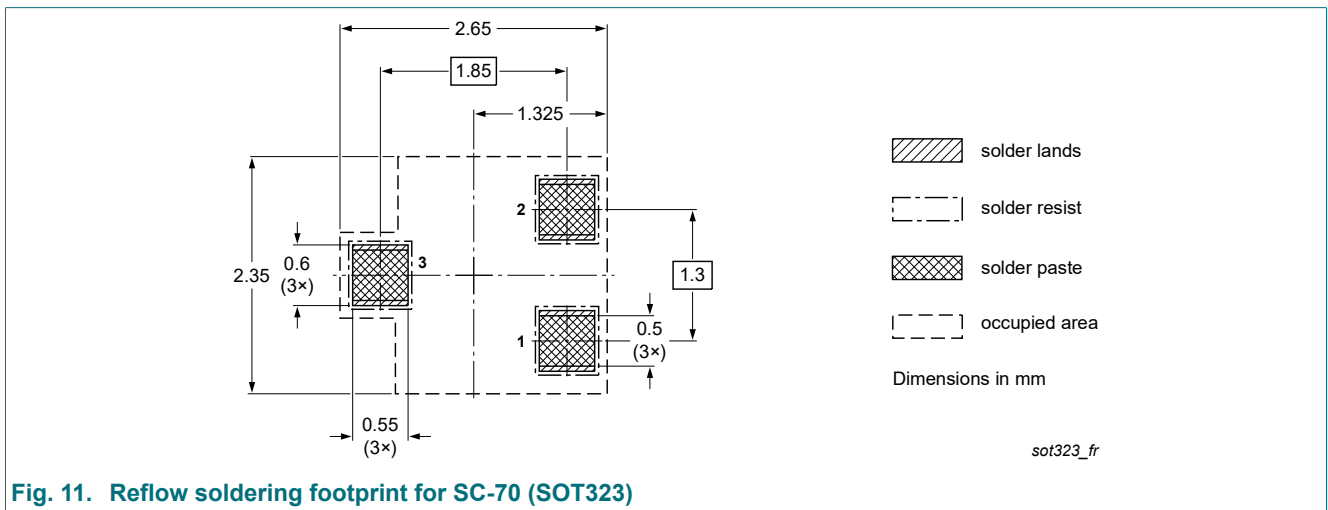


Fig. 11. Reflow soldering footprint for SC-70 (SOT323)

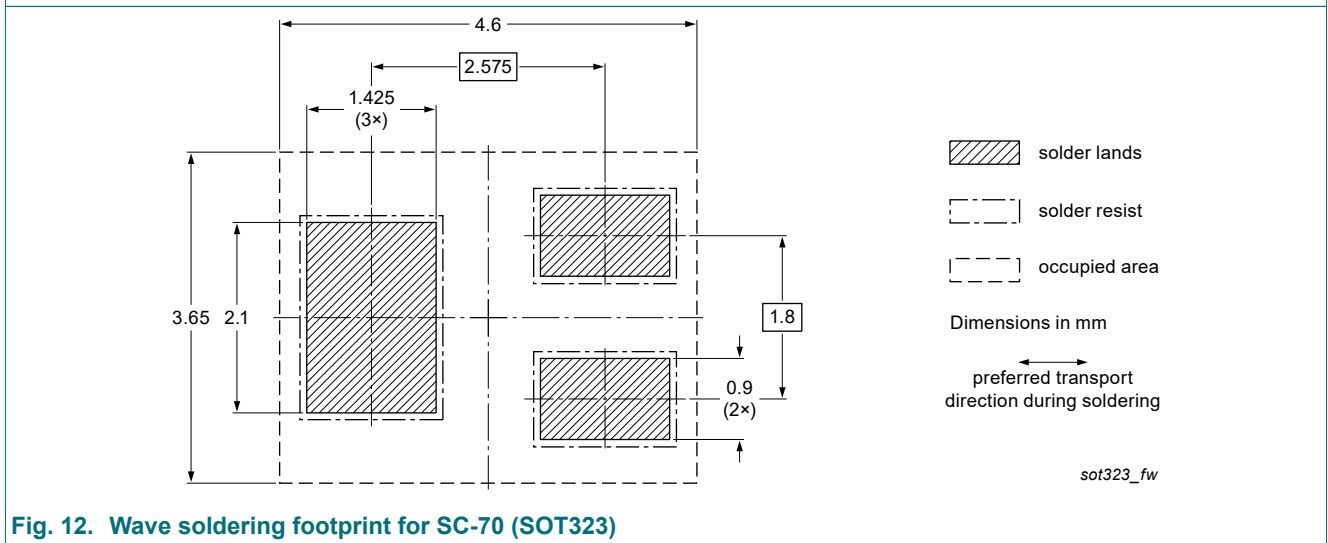


Fig. 12. Wave soldering footprint for SC-70 (SOT323)

## 14. Revision history

**Table 9. Revision history**

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PDTA143ZU v.8	20240123	Product data sheet	-	PDTA143Z_SER v.7
Modification:	<ul style="list-style-type: none"><li>Family data sheet reduced to single type data sheet.</li><li>Packing information removed.</li></ul>			
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.

- [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".
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