



# PDTA114ET-Q

50 V, 100 mA PNP resistor-equipped transistor;  
R1 = 10 k $\Omega$ , R2 = 10 k $\Omega$

7 February 2023

Product data sheet

## 1. General description

PNP Resistor-Equipped Transistor (RET) in a small SOT23 (TO-236AB) Surface-Mounted Device (SMD) plastic package.

NPN complement: PDTC114ET-Q

## 2. Features and benefits

- 100 mA output current capability
- Built-in bias resistors
- Simplifies circuit design
- Reduces component count
- Reduces pick and place costs
- Qualified according to AEC-Q101 and recommended for use in automotive applications

## 3. Applications

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

## 4. Quick reference data

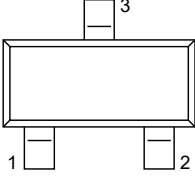
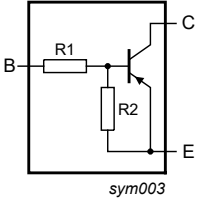
Table 1. Quick reference data

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)	[1]	7	10	13	k $\Omega$
R2/R1	bias resistor ratio	[1]	0.8	1	1.2	

[1] See "Section 11: 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)	 <p style="text-align: center;">SOT23</p>	 <p style="text-align: center;">sym003</p>
2	GND	ground (emitter)		
3	O	output (collector)		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
<a href="#">PDTA114ET-Q</a>	SOT23	plastic, surface-mounted package; 3 terminals; 1.9 mm pitch; 2.9 mm x 1.3 mm x 1 mm body	<a href="#">SOT23</a>

## 7. Marking

Table 4. Marking codes

Type number	Marking code <sup>[1]</sup>
PDTA114ET-Q	%03

[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	-	-10	V
$V_i$	input voltage		-40	10	V
$I_O$	output current		-	-100	mA
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[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, 35 μm copper, tin-plated and standard footprint.

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

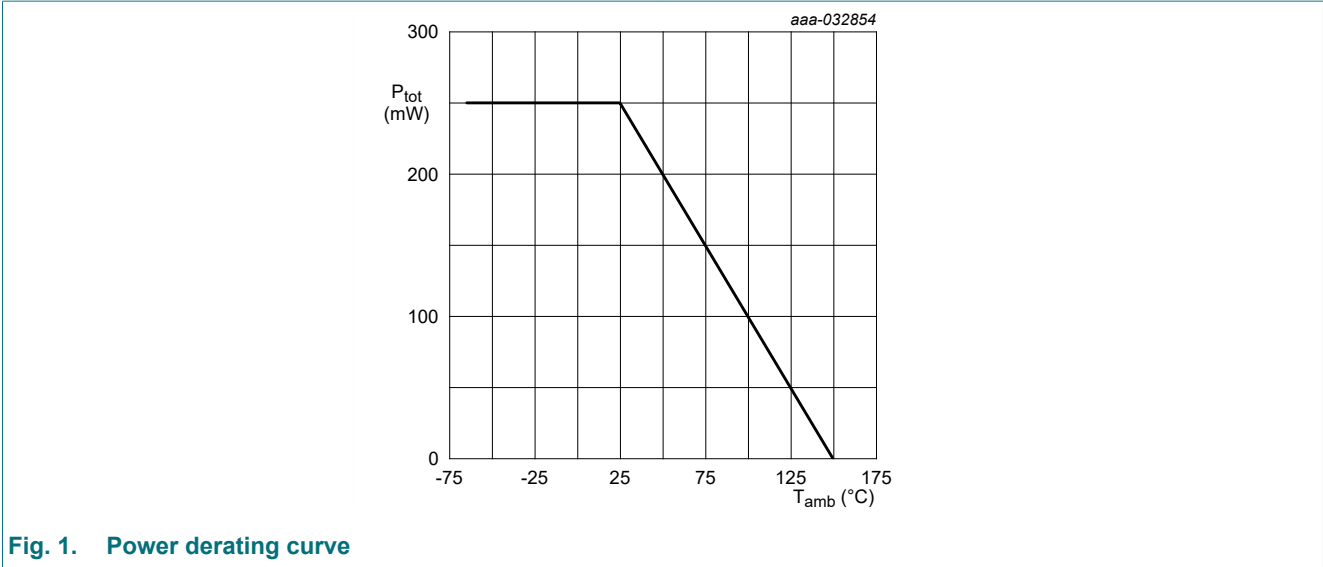


Fig. 1. Power derating curve

## 9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
R <sub>th(j-a)</sub>	thermal resistance from junction to ambient	in free air	[1]	-	-	500	K/W

[1] Device mounted on an FR4 PCB, single-sided, 35 μm copper, tin-plated and standard footprint.

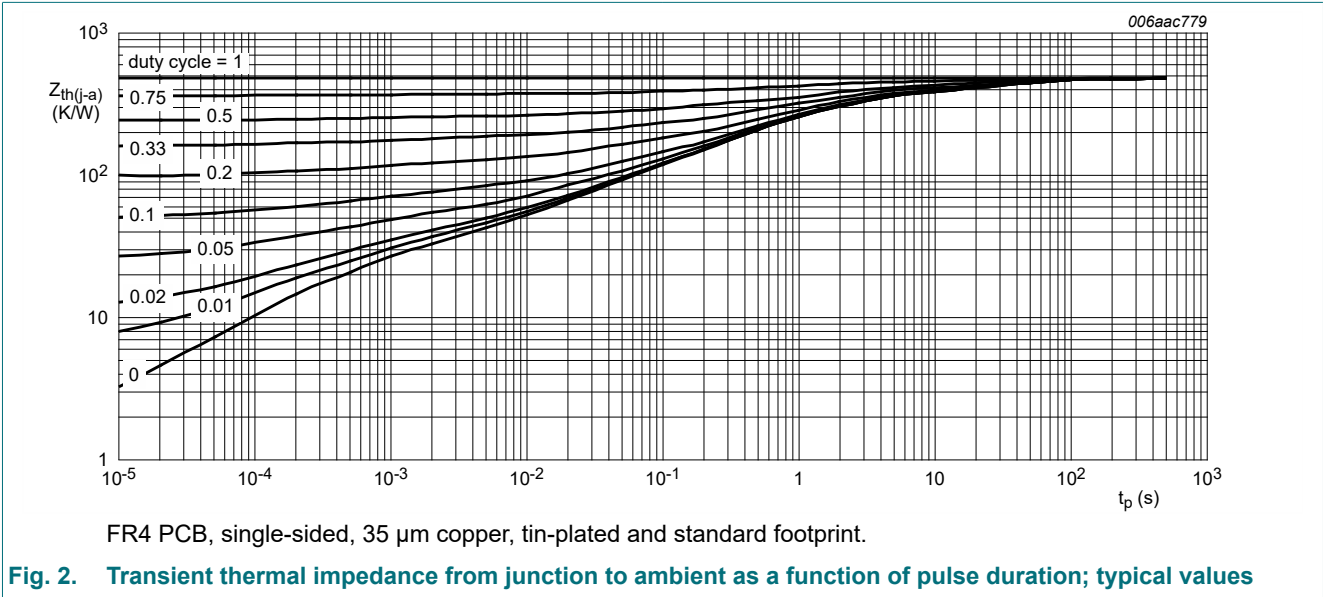


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

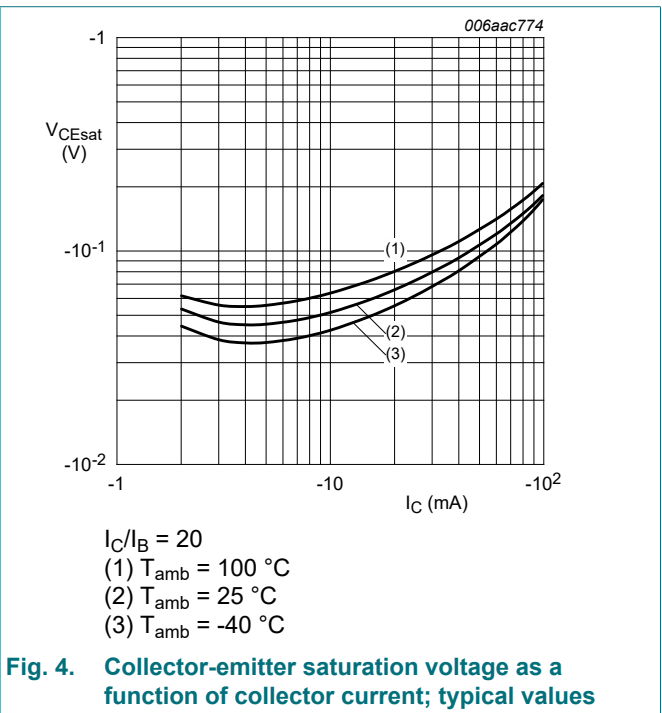
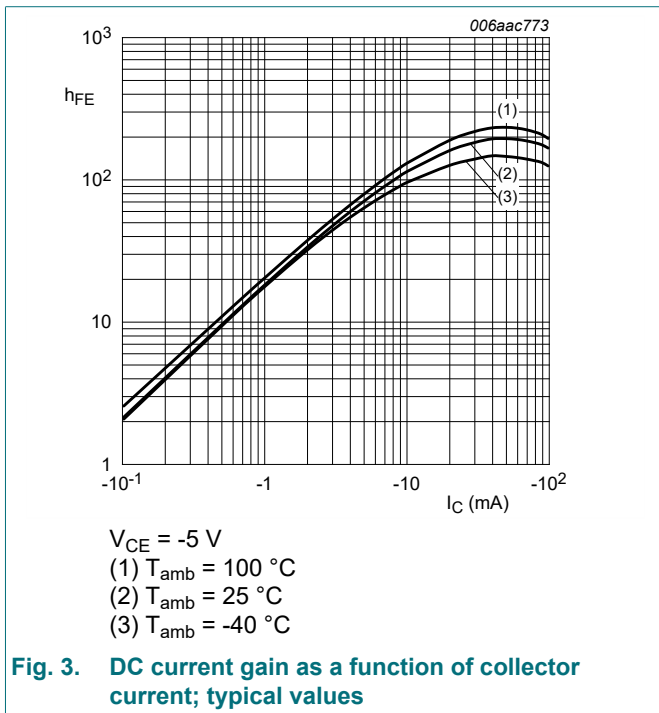
## 10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = -100 \mu A; I_E = 0 A; T_{amb} = 25 \text{ }^\circ C$	-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	
$I_{CBO}$	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	$V_{EB} = -5 \text{ V}; I_C = 0 A; T_{amb} = 25 \text{ }^\circ C$	-	-	-400	$\mu A$	
$h_{FE}$	DC current gain	$V_{CE} = -5 \text{ V}; I_C = -5 \text{ mA}; T_{amb} = 25 \text{ }^\circ C$	30	-	-		
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = -10 \text{ mA}; I_B = -0.5 \text{ mA}; T_{amb} = 25 \text{ }^\circ C$	-	-	-150	mV	
$V_{I(off)}$	off-state input voltage	$V_{CE} = -5 \text{ V}; I_C = -100 \mu A; T_{amb} = 25 \text{ }^\circ C$	-	-1.1	-0.8	V	
$V_{I(on)}$	on-state input voltage	$V_{CE} = -0.3 \text{ V}; I_C = -10 \text{ mA}; T_{amb} = 25 \text{ }^\circ C$	-2.5	-1.8	-	V	
R1	bias resistor 1 (input)		[1]	7	10	13	kΩ
R2/R1	bias resistor ratio		[1]	0.8	1	1.2	
$C_c$	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 11: Test information" for resistor calculation and test conditions.

[2] Characteristics of built-in transistor.



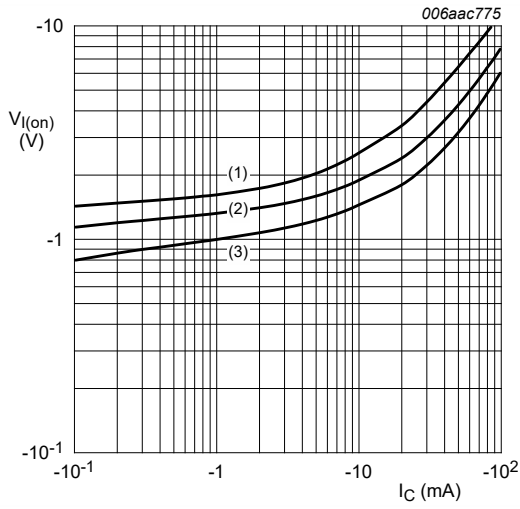


Fig. 5. On-state input voltage as a function of collector current; typical values

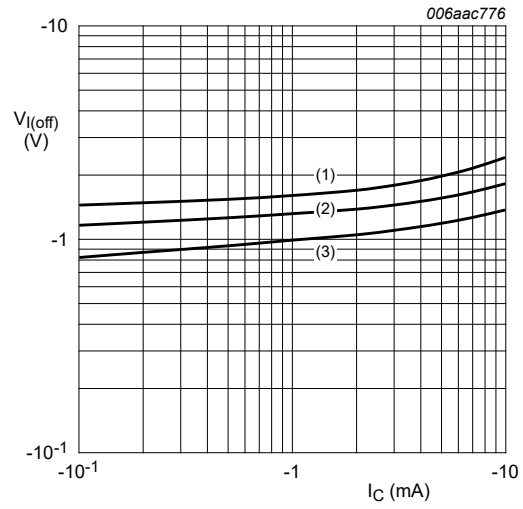


Fig. 6. Off-state input voltage as a function of collector current; typical values

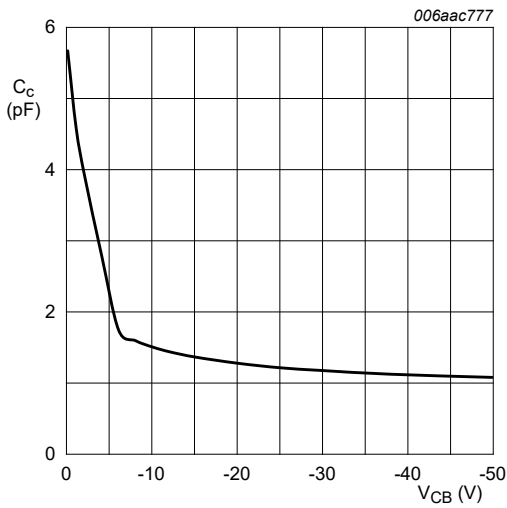


Fig. 7. Collector capacitance as a function of collector-base voltage; typical values

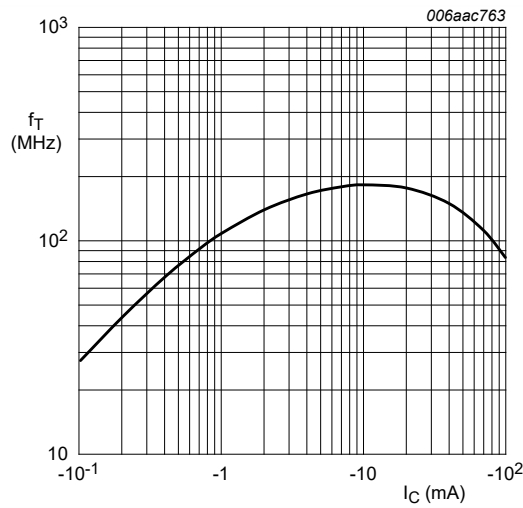


Fig. 8. Transition frequency as a function of collector current; typical values of built-in transistor

## 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)

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

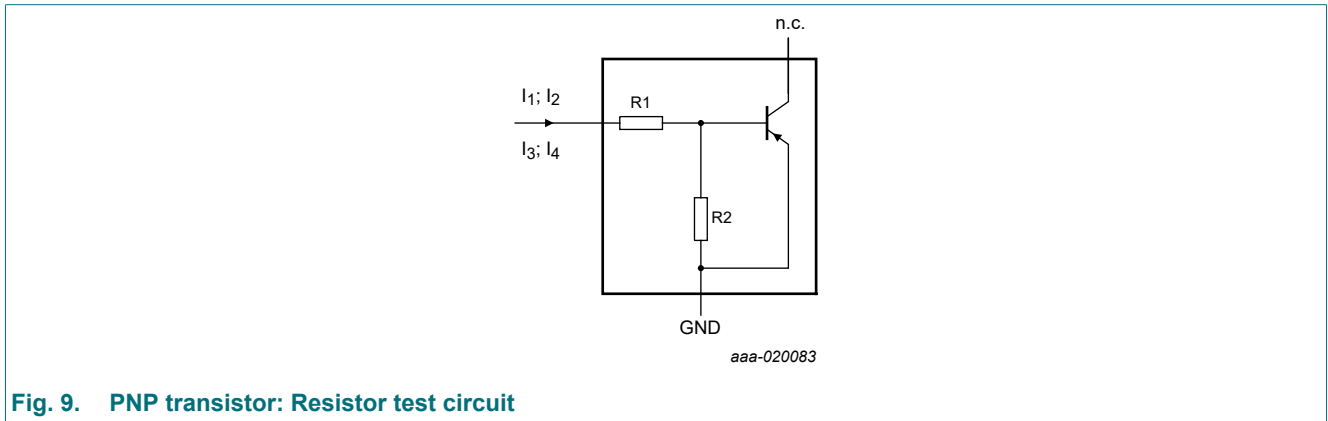


Fig. 9. PNP transistor: Resistor test circuit

### Resistor test conditions

Table 8. Resistor test conditions

Type number	R1 (kΩ)	R2 (kΩ)	Test conditions			
			I <sub>1</sub>	I <sub>2</sub>	I <sub>3</sub>	I <sub>4</sub>
PDTA114ET-Q	10	10	-350 μA	-450 μA	350 μA	450 μA

## 12. Package outline

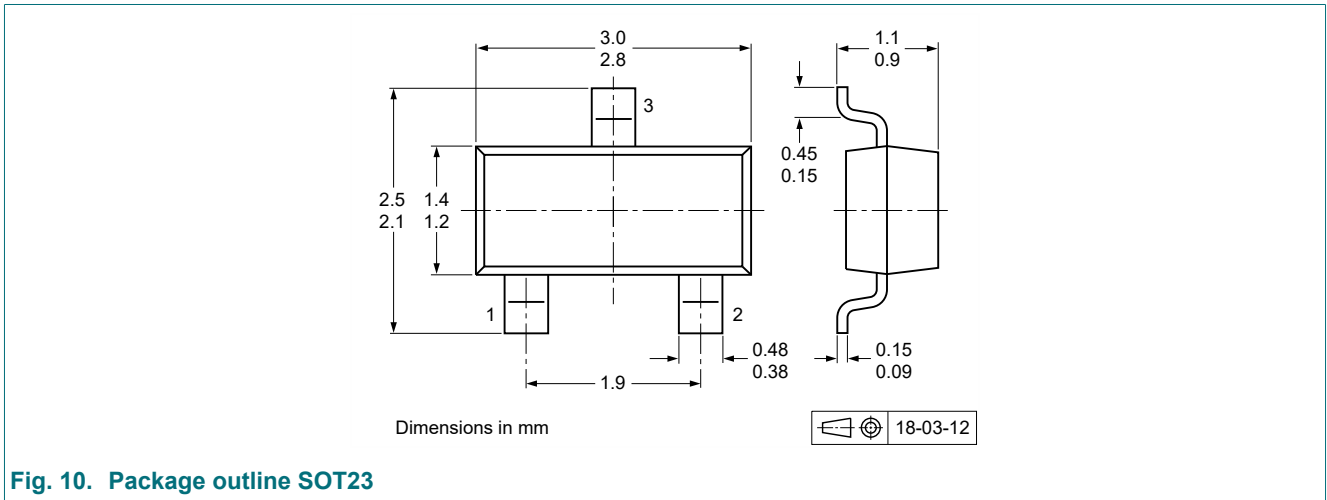


Fig. 10. Package outline SOT23

## 13. Soldering

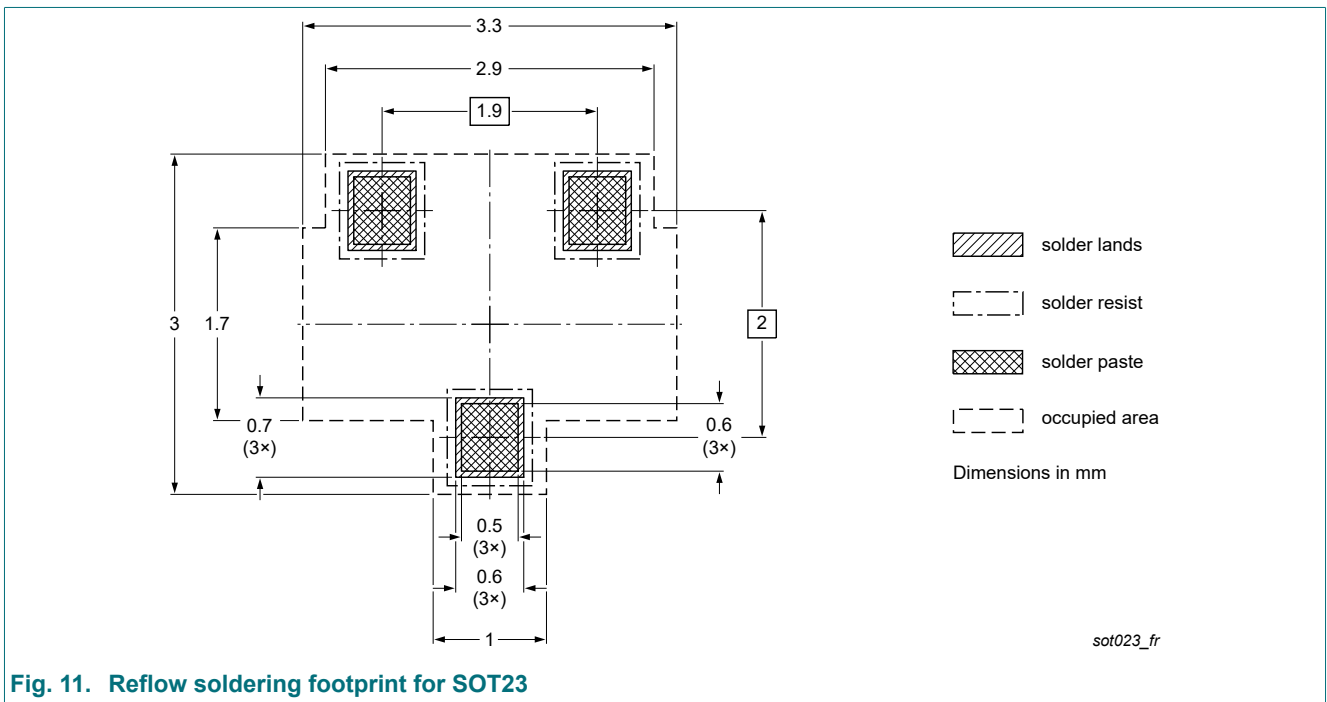


Fig. 11. Reflow soldering footprint for SOT23

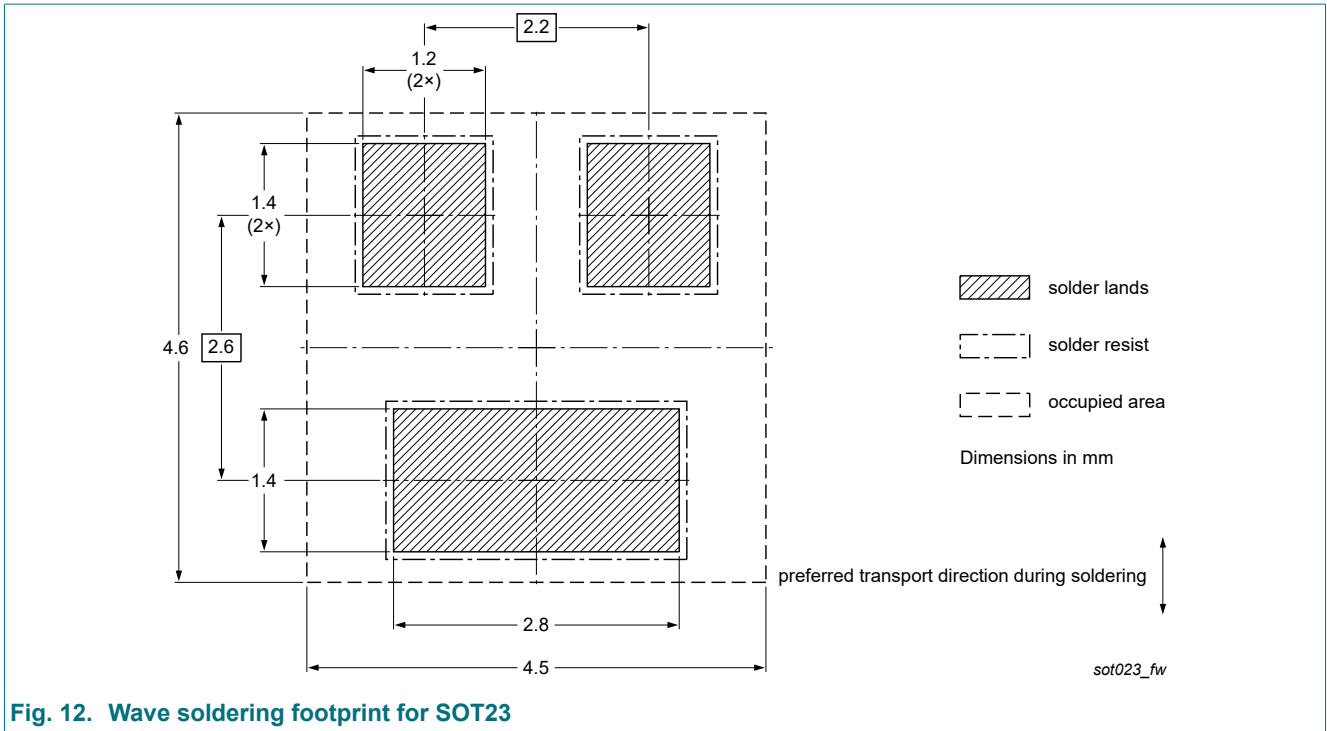


Fig. 12. Wave soldering footprint for SOT23



## 14. Revision history

**Table 9. Revision history**

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PDTA114ET-Q v.2	20230207	Product data sheet	-	-
Modifications:	• Limiting values: Values for Input voltage corrected			
PDTA114ET-Q v.1	20220225	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".
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