



PIMC31

500 mA, 50 V NPN/PNP double resistor-equipped transistor;
R1 = 1 k Ω , R2 = 10 k Ω

8 October 2024

Product data sheet

1. General description

500 mA, 50 V NPN/PNP double Resistor-Equipped Transistor (RET) in a small SOT457 (SC-74) Surface-Mounted Device (SMD) plastic package.

NPN/NPN complement: PIMN31

2. Features and benefits

- 500 mA output current capability
- Built-in bias resistors
- Simplifies circuit design
- Reduces component count
- Reduces pick and place costs

3. Applications

- Digital application in automotive and industrial segments
- Switching loads

4. Quick reference data

Table 1. Quick reference data

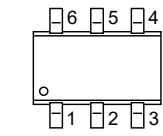
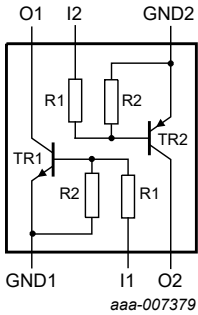
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor							
V _{CEO}	collector-emitter voltage	open base	[1]	-	-	50	V
I _O	output current		[1]	-	-	500	mA
R1	bias resistor 1 (input)		[2]	0.7	1	1.3	k Ω
R2/R1	bias resistor ratio		[2]	9	10	11	

[1] For the PNP transistor with negative polarity.

[2] 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	GND1	GND (emitter) TR1	 TSOP6 (SOT457)	 aaa-007379
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 3. Ordering information

Type number	Package		
	Name	Description	Version
PIMC31	TSOP6	plastic, surface-mounted package (SC-74; TSOP6); 6 leads	SOT457
PIMC31/A001	TSOP6	plastic, surface-mounted package (SC-74; TSOP6); 6 leads	SOT457

7. Marking

Table 4. Marking codes

Type number	Marking code
PIMC31	ZH
PIMC31/A001	ZH

8. Limiting values

Table 5. Limiting values

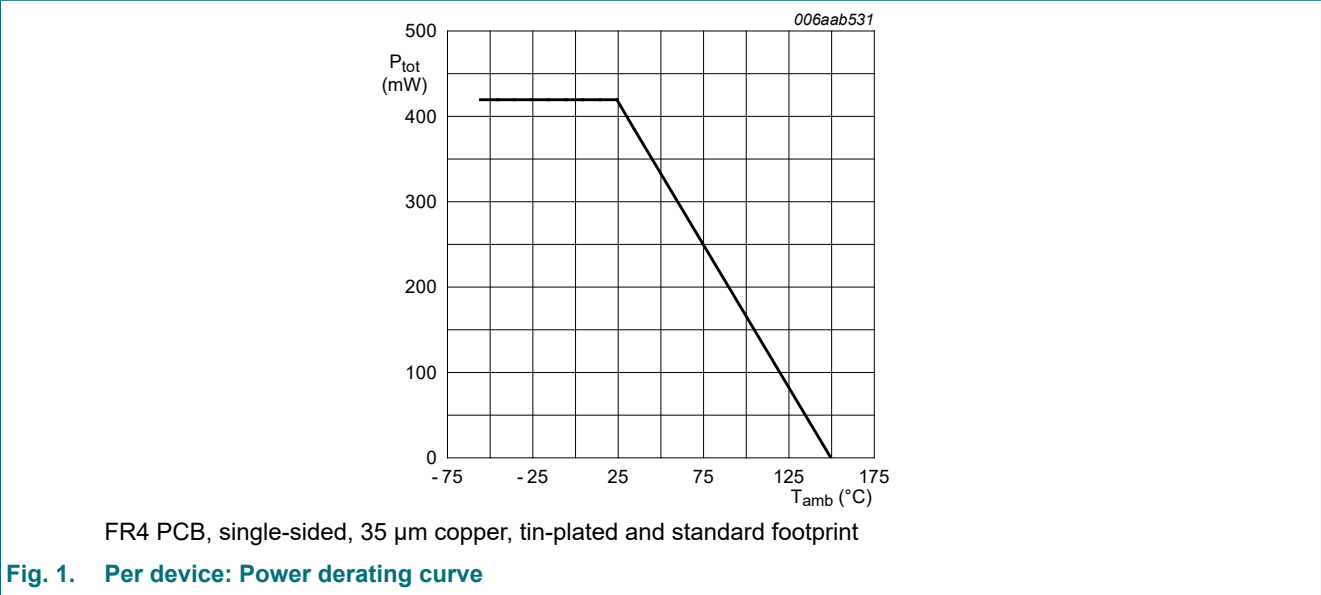
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
Per transistor						
V _{CBO}	collector-base voltage	open emitter	[1]	-	50	V
V _{CEO}	collector-emitter voltage	open base	[1]	-	50	V
V _{EBO}	emitter-base voltage	open collector	[1]	-	5	V
V _I	input voltage	TR1 (NPN)		-5	10	V
		TR2 (PNP)		-10	5	V
I _O	output current		[1]	-	500	mA
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[2]	-	290	mW
Per device						
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[2]	-	420	mW

500 mA, 50 V NPN/PNP double resistor-equipped transistor; R1 = 1 kΩ, R2 = 10 kΩ

Symbol	Parameter	Conditions		Min	Max	Unit
T _j	junction temperature			-	150	°C
T _{amb}	ambient temperature			-55	150	°C
T _{stg}	storage temperature			-65	150	°C

- [1] For the PNP transistor with negative polarity.
- [2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided, 35 μm copper, tin-plated and standard footprint.

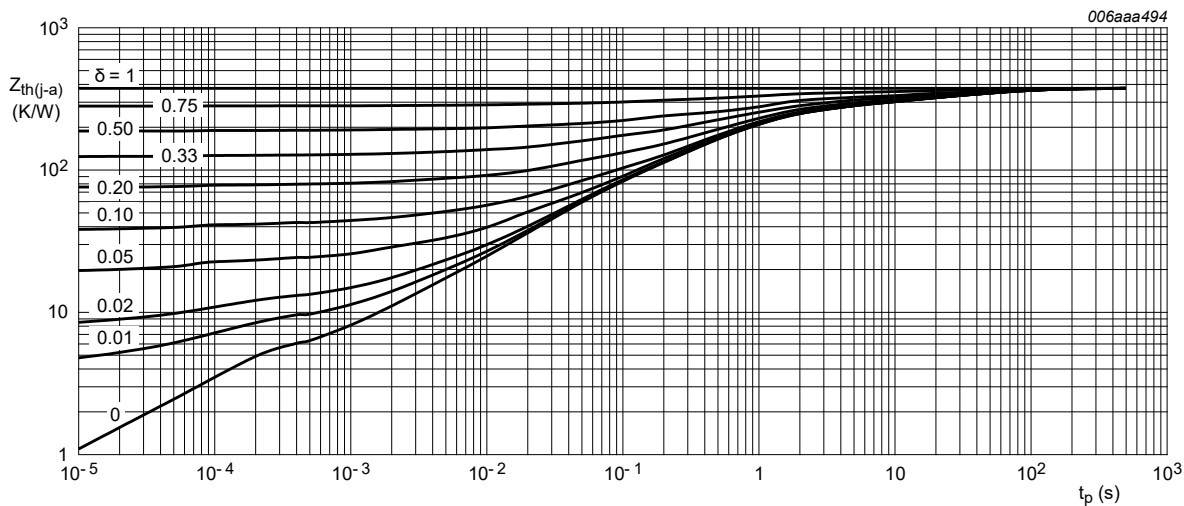


9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor							
R _{th(j-a)}	thermal resistance from junction to ambient	in free air	[1]	-	-	431	K/W
R _{th(j-sp)}	thermal resistance from junction to solder point			-	-	105	K/W
Per device							
R _{th(j-a)}	thermal resistance from junction to ambient	in free air	[1]	-	-	298	K/W

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



FR4 PCB, single-sided, 35µm copper, tin-plated and standard footprint

Fig. 2. Per transistor: 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
Per transistor							
V _{(BR)CBO}	collector-base breakdown voltage	I _C = 100 µA; I _E = 0 A; T _{amb} = 25 °C	[1]	50	-	-	V
V _{(BR)CEO}	collector-emitter breakdown voltage	I _C = 2 mA; I _B = 0 A; T _{amb} = 25 °C	[1]	50	-	-	V
I _{CBO}	collector-base cut-off current	V _{CB} = 50 V; I _E = 0 A; T _{amb} = 25 °C	[1]	-	-	100	nA
I _{CEO}	collector-emitter cut-off current	V _{CE} = 50 V; I _B = 0 A; T _{amb} = 25 °C	[1]	-	-	0.5	µA
I _{EBO}	emitter-base cut-off current	V _{EB} = 5 V; I _C = 0 A; T _{amb} = 25 °C	[1]	-	-	0.72	mA
h _{FE}	DC current gain	V _{CE} = 5 V; I _C = 50 mA; T _{amb} = 25 °C	[1]	70	-	-	
V _{CEsat}	collector-emitter saturation voltage	I _C = 50 mA; I _B = 2.5 mA; T _{amb} = 25 °C	[1]	-	-	300	mV
V _{I(off)}	off-state input voltage	V _{CE} = 5 V; I _C = 100 µA	[1]	0.3	0.6	1	V
V _{I(on)}	on-state input voltage	V _{CE} = 0.3 V; I _C = 20 mA; T _{amb} = 25 °C	[1]	0.4	0.8	1.4	V
R1	bias resistor 1 (input)		[2]	0.7	1	1.3	kΩ
R2/R1	bias resistor ratio		[2]	9	10	11	
TR1 (NPN)							
C _c	collector capacitance	V _{CB} = 10 V; I _E = 0 A; i _e = 0 A; f = 1 MHz; T _{amb} = 25 °C		-	7	-	pF
TR2 (PNP)							
C _c	collector capacitance	V _{CB} = -10 V; I _E = 0 A; i _e = 0 A; f = 1 MHz; T _{amb} = 25 °C		-	11	-	pF

[1] For the PNP transistor with negative polarity.
[2] See section "Test information" for resistor calculation and test conditions.

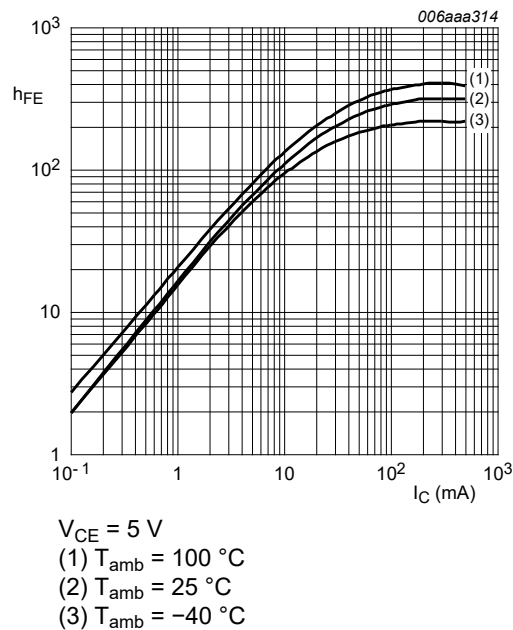


Fig. 3. TR1 (NPN): DC current gain as a function of collector current; typical values

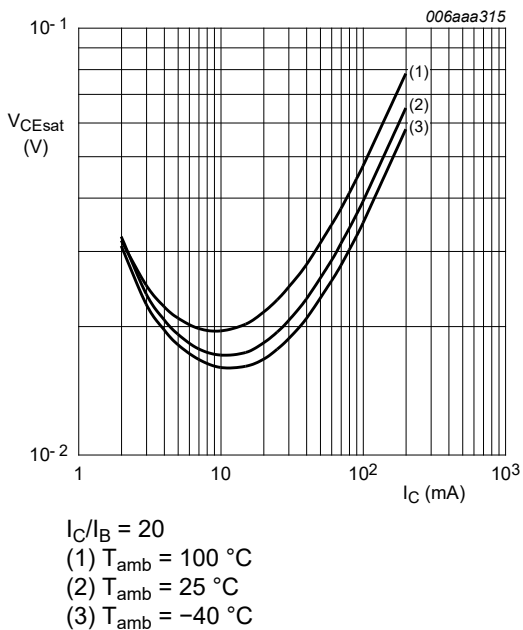


Fig. 4. TR1 (NPN): Collector-emitter saturation voltage as a function of collector current; typical values

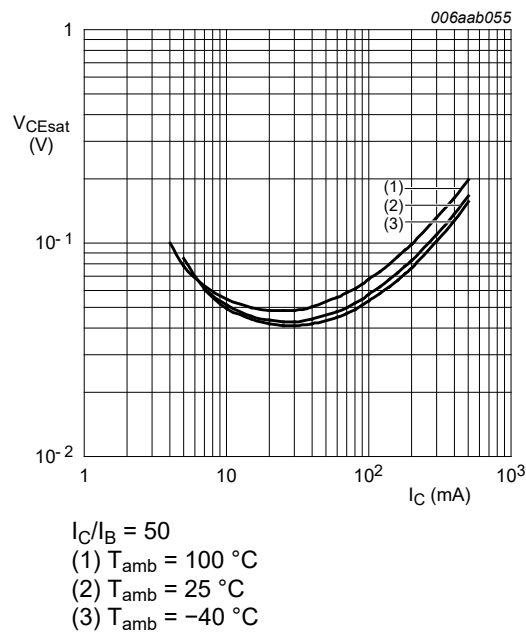


Fig. 5. TR1 (NPN): Collector-emitter saturation voltage as a function of collector current; typical values

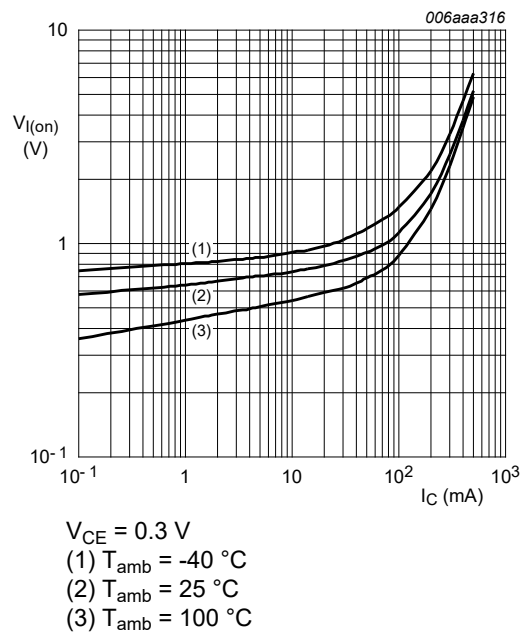


Fig. 6. TR1 (NPN): On-state input voltage as a function of collector current; typical values

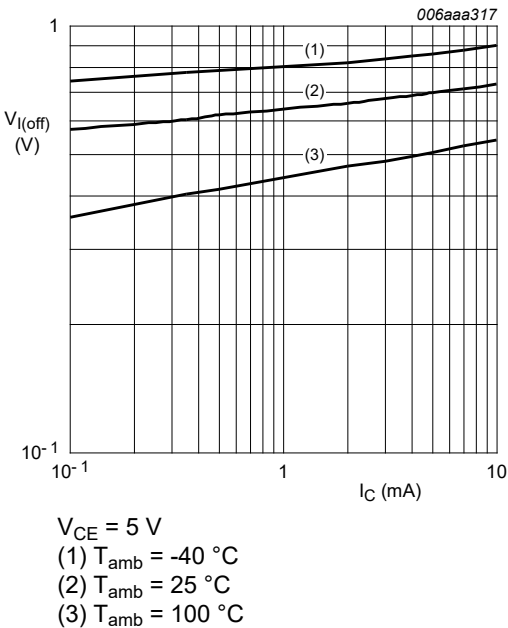


Fig. 7. TR1 (NPN): Off-state input voltage as a function of collector current; typical values

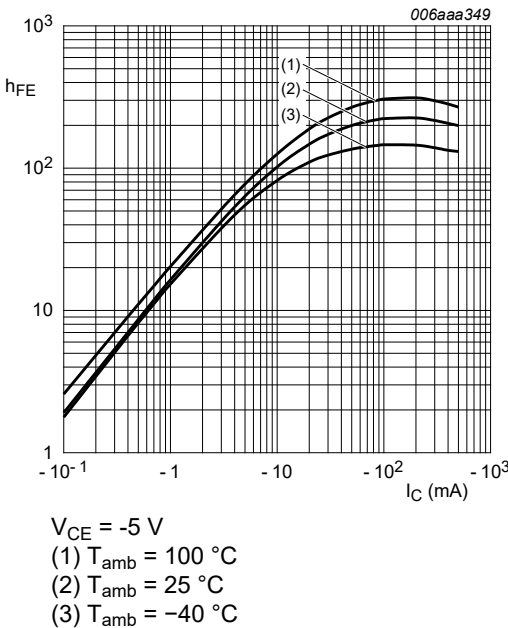


Fig. 8. TR2 (PNP): DC current gain as a function of collector current; typical values

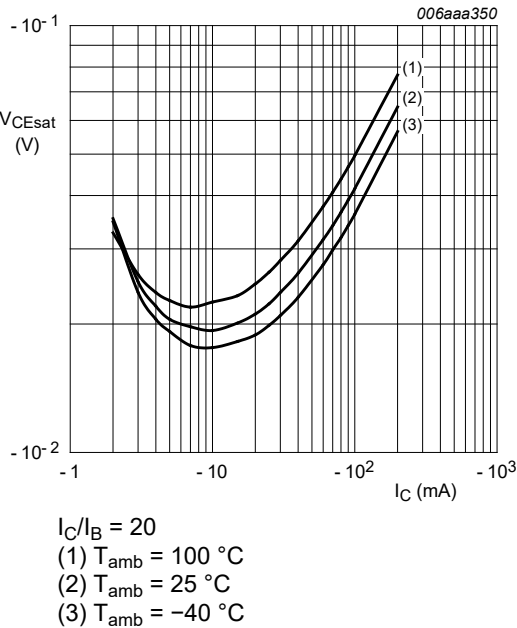


Fig. 9. TR2 (PNP): Collector-emitter saturation voltage as a function of collector current; typical values

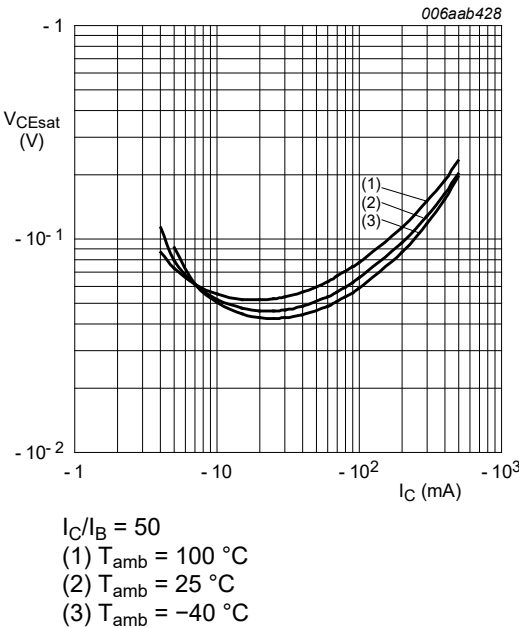


Fig. 10. TR2 (PNP): Collector-emitter saturation voltage as a function of collector current; typical values

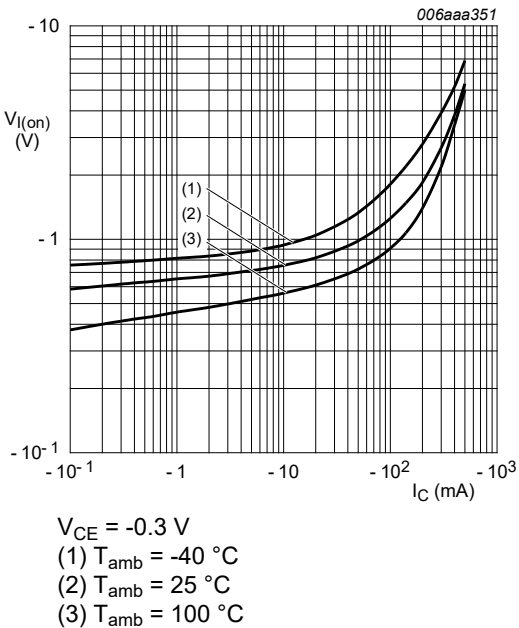


Fig. 11. TR2 (PNP): On-state input voltage as a function of collector current; typical values

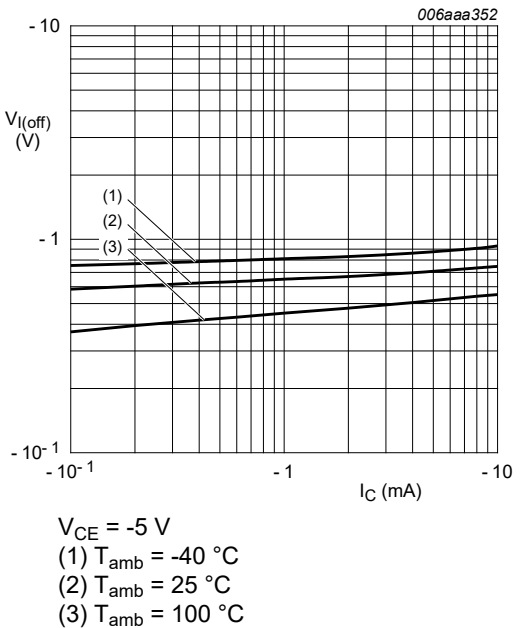


Fig. 12. TR2 (PNP): Off-state input voltage as a function of collector current; typical values

11. Package outline

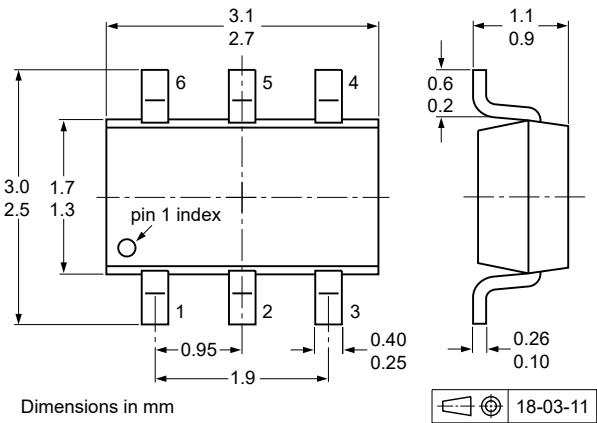
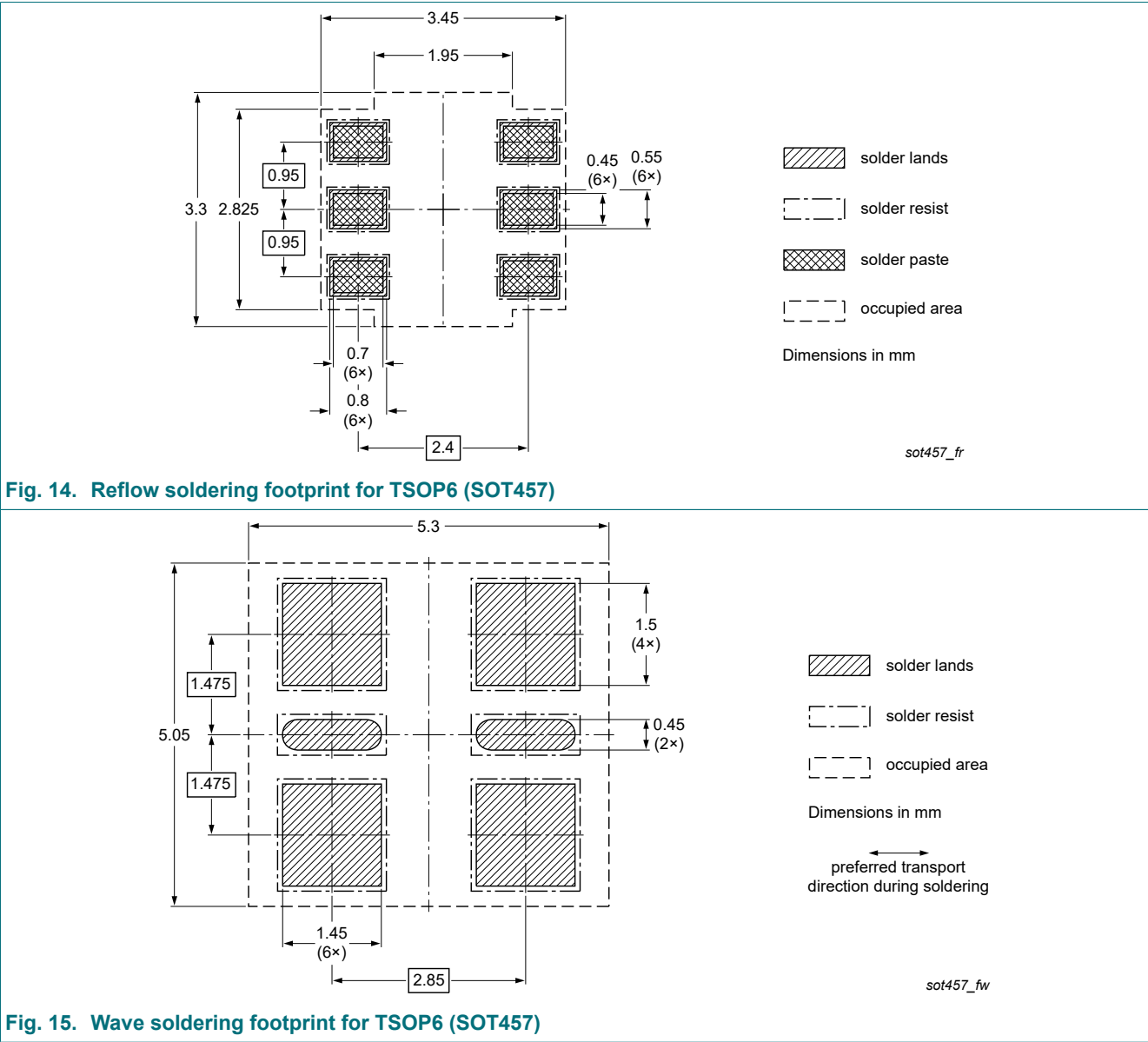


Fig. 13. Package outline TSOP6 (SOT457)

12. Soldering



13. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PIMC31 v.2	20241008	Product data sheet	-	PIMC31 v.1
Modifications:	- Product(s) changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s). - 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.			
PIMC31 v.1	20090324	Product data sheet	-	-

14. 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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