



PIMP31

50 V, 500 mA PNP/PNP Resistor-Equipped double Transistor (RET); R1 = 1 k Ω , R2 = 10 k Ω

16 February 2022

Product data sheet

1. General description

PNP/PNP Resistor-Equipped double Transistor (RET) in a small SOT457 (SC-74) Surface-Mounted Device (SMD) plastic package.

NPN/NPN complement: PIMN31

NPN/PNP complement: PIMC31

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 applications
- Cost-saving alternative to BC807 series in digital applications
- Control of IC inputs
- Switching loads

4. Quick reference data

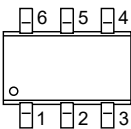
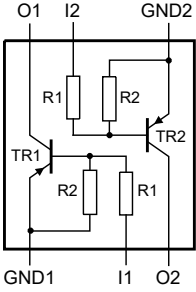
Table 1. Quick reference data

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

[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	GND1	GND (emitter) TR1	 SC-74; TSOP6 (SOT457)	 aaa-019790
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
PIMP31	SC-74; TSOP6	plastic, surface-mounted package (SC-74; TSOP6); 6 leads	SOT457

7. Marking

Table 4. Marking codes

Type number	Marking code
PIMP31	4F

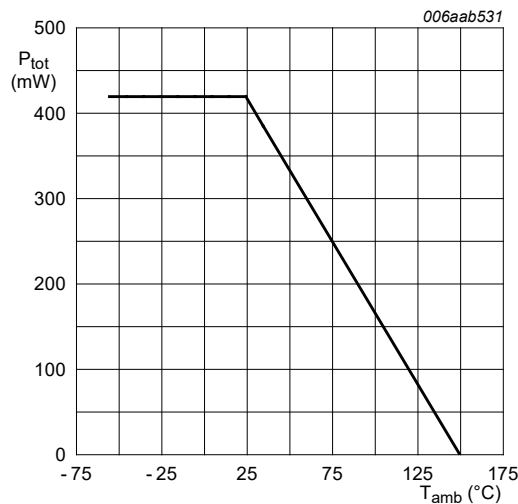
8. Limiting values

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		-	-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			-	-500	mA
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[1]	-	290	mW
Per device						
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[1]	-	420	mW
T _j	junction temperature			-	150	°C
T _{amb}	ambient temperature			-55	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.



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

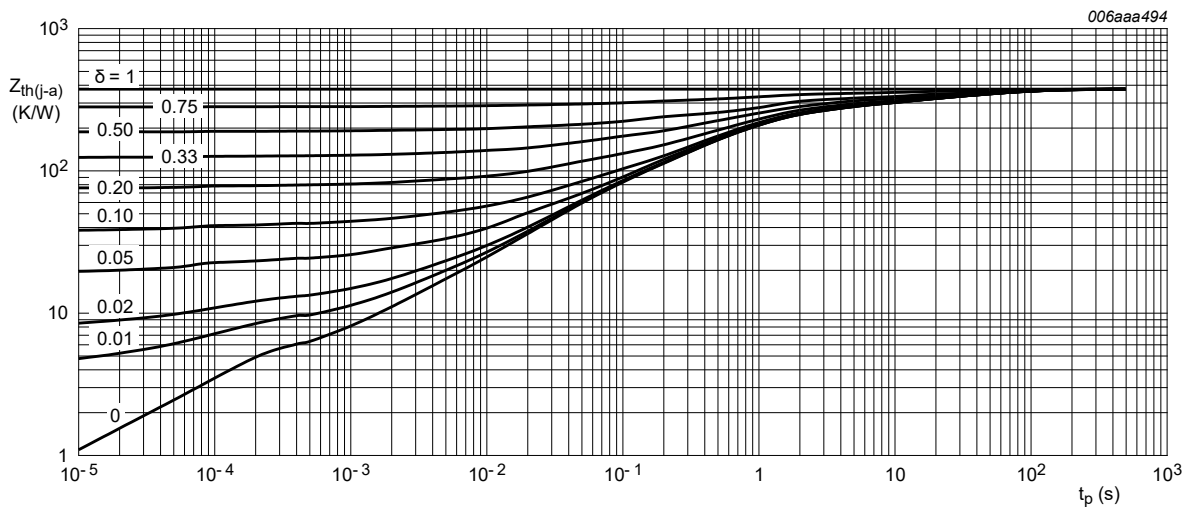
Fig. 1. Per device: Power derating curve

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]	-	-	432	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	$I_C = -100\ \mu\text{A}$; $I_E = 0\ \text{A}$; $T_{\text{amb}} = 25\ ^\circ\text{C}$	-50	-	-	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_C = -10\ \text{mA}$; $I_B = 0\ \text{A}$; $T_{\text{amb}} = 25\ ^\circ\text{C}$	-50	-	-	V
I_{CBO}	collector-base cut-off current	$V_{CB} = -50\ \text{V}$; $I_E = 0\ \text{A}$; $T_{\text{amb}} = 25\ ^\circ\text{C}$	-	-	-100	nA
I_{CEO}	collector-emitter cut-off current	$V_{CE} = -50\ \text{V}$; $I_B = 0\ \text{A}$; $T_{\text{amb}} = 25\ ^\circ\text{C}$	-	-	-0.5	μA
I_{EBO}	emitter-base cut-off current	$V_{EB} = -5\ \text{V}$; $I_C = 0\ \text{A}$; $T_{\text{amb}} = 25\ ^\circ\text{C}$	-	-	-0.72	mA
h_{FE}	DC current gain	$V_{CE} = -5\ \text{V}$; $I_C = -50\ \text{mA}$; $T_{\text{amb}} = 25\ ^\circ\text{C}$	70	-	-	
V_{CEsat}	collector-emitter saturation voltage	$I_C = -50\ \text{mA}$; $I_B = -2.5\ \text{mA}$; $T_{\text{amb}} = 25\ ^\circ\text{C}$	-	-	-100	mV
$V_{I(off)}$	off-state input voltage	$V_{CE} = -5\ \text{V}$; $I_C = -100\ \mu\text{A}$; $T_{\text{amb}} = 25\ ^\circ\text{C}$	-0.3	-0.6	-1	V
$V_{I(on)}$	on-state input voltage	$V_{CE} = -0.3\ \text{V}$; $I_C = -20\ \text{mA}$; $T_{\text{amb}} = 25\ ^\circ\text{C}$	-0.4	-0.8	-1.4	V
R1	bias resistor 1 (input)	[1]	0.7	1	1.3	kΩ
R2/R1	bias resistor ratio	[1]	9	10	11	
C_c	collector capacitance	$V_{CB} = -10\ \text{V}$; $I_E = 0\ \text{A}$; $i_e = 0\ \text{A}$; $f = 1\ \text{MHz}$; $T_{\text{amb}} = 25\ ^\circ\text{C}$	-	11	-	pF
f_T	transition frequency	$V_{CE} = -5\ \text{V}$; $I_C = -50\ \text{mA}$; $f = 100\ \text{MHz}$; $T_{\text{amb}} = 25\ ^\circ\text{C}$	[2]	140	-	MHz

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

[2] Characteristics of built-in transistor

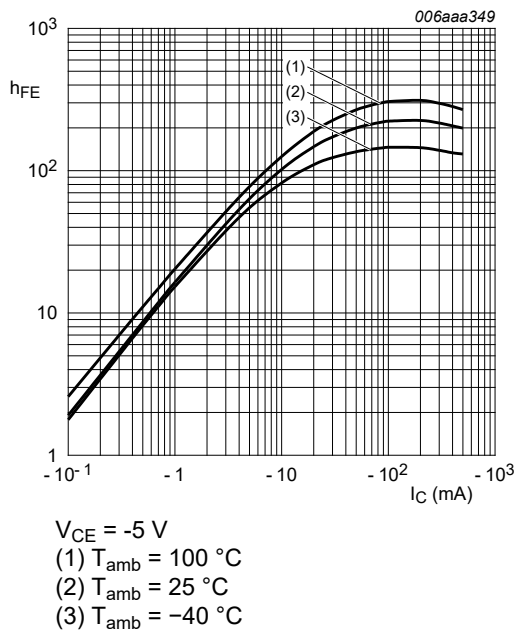


Fig. 3. DC current gain as a function of collector current; typical values

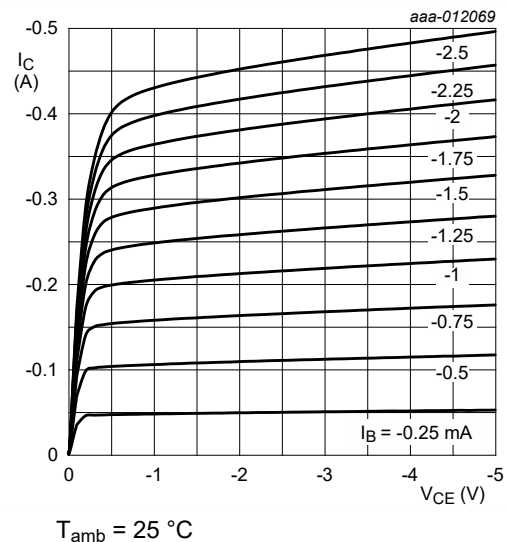


Fig. 4. Collector current as a function of collector-emitter voltage; typical values

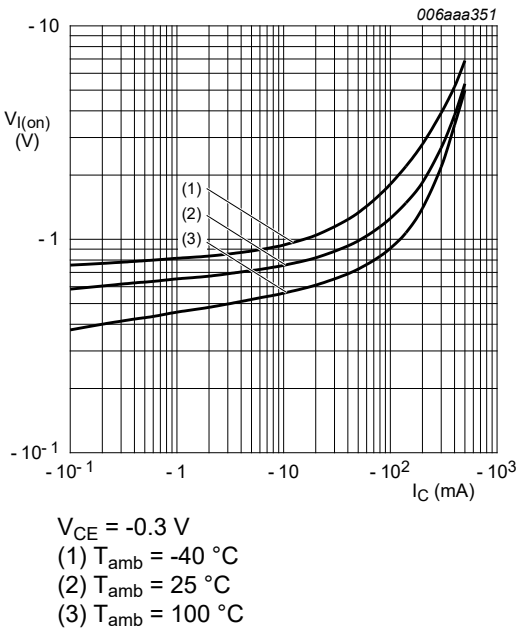


Fig. 5. On-state input voltage as a function of collector current; typical values

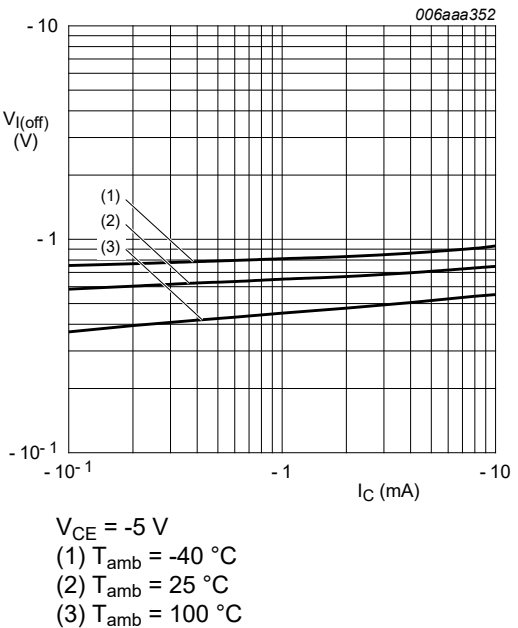


Fig. 6. Off-state input voltage as a function of collector current; typical values

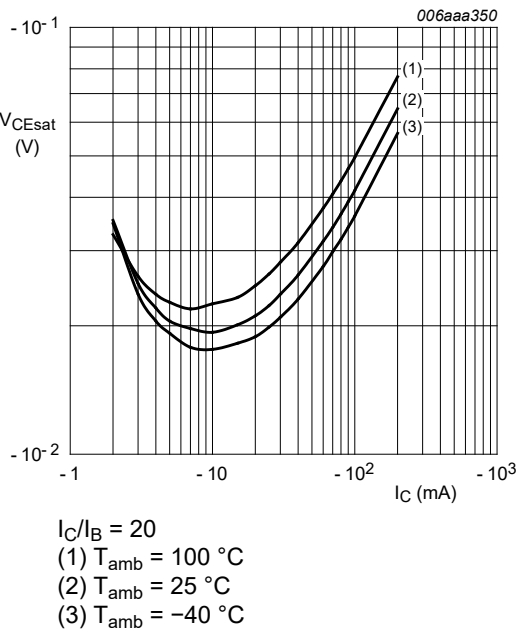


Fig. 7. Collector-emitter saturation voltage as a function of collector current; typical values

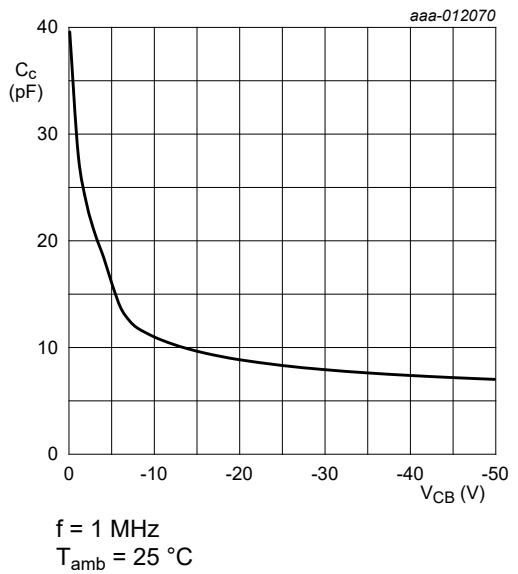
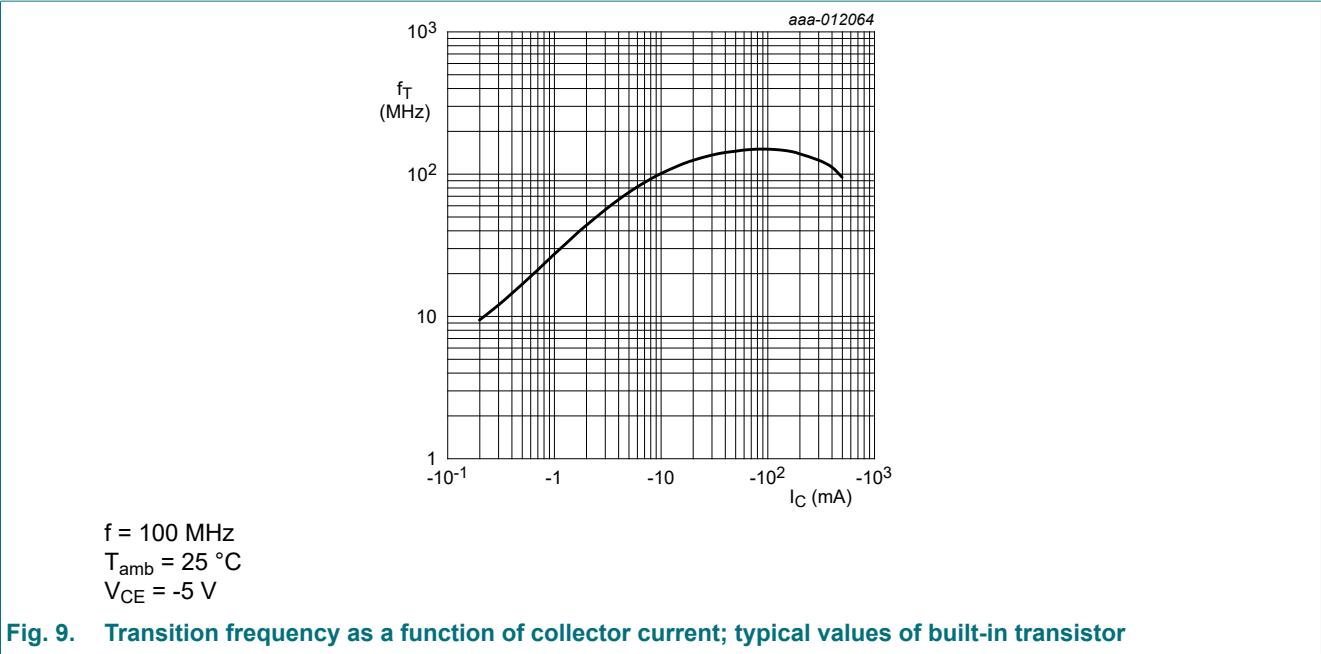


Fig. 8. Collector capacitance as a function of collector-base voltage; typical values

50 V, 500 mA PNP/PNP Resistor-Equipped double Transistor (RET); R1 = 1 kΩ, R2 = 10 kΩ



11. Test information

Resistor calculation

- Calculation of bias resistor 1 (R1)

$$R1 = \frac{V(I12) - V(I11)}{I12 - I11}$$

- Calculation of bias resistor ratio (R2/R1)

$$\frac{R2}{R1} = \frac{V(I14) - V(I13)}{R1 \cdot (I14 - I13)} - 1$$

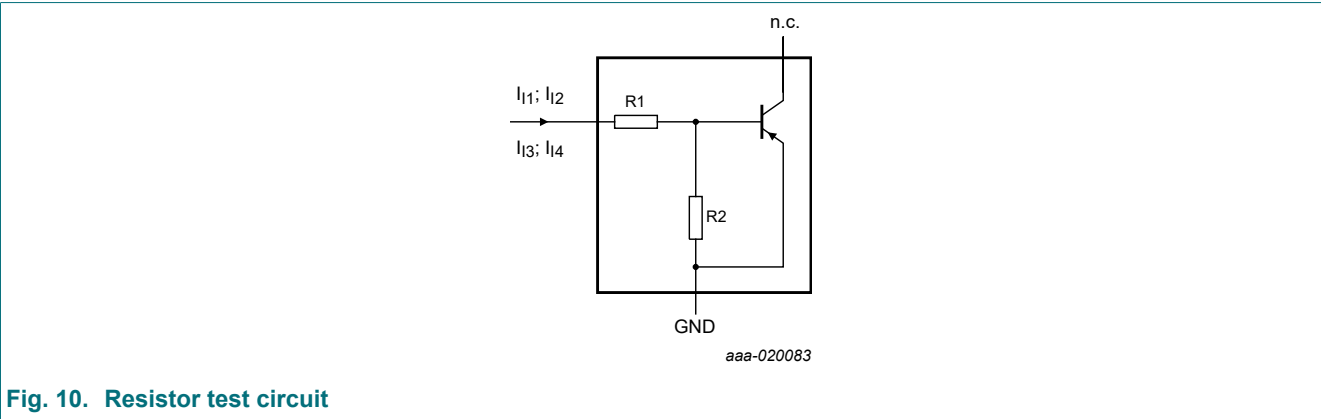


Fig. 10. Resistor test circuit

Resistor test conditions

Table 8. Resistor test conditions

R1 (kΩ)	R2 (kΩ)	Test conditions			
		I11	I12	I13	I14
1	10	-0.7 mA	-0.8 mA	0.45 mA	0.55 mA

12. Package outline

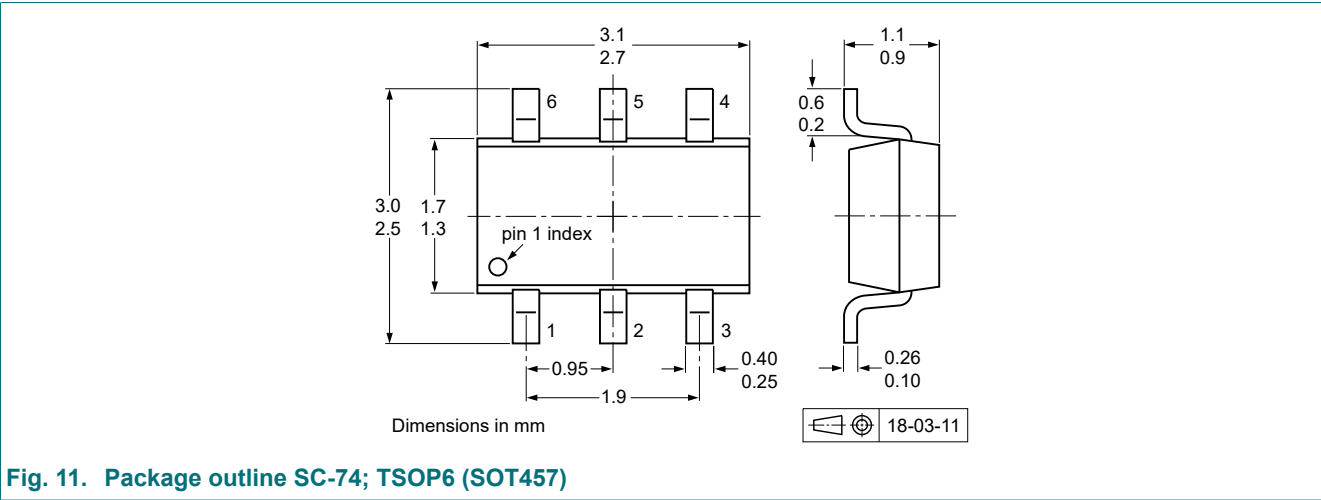
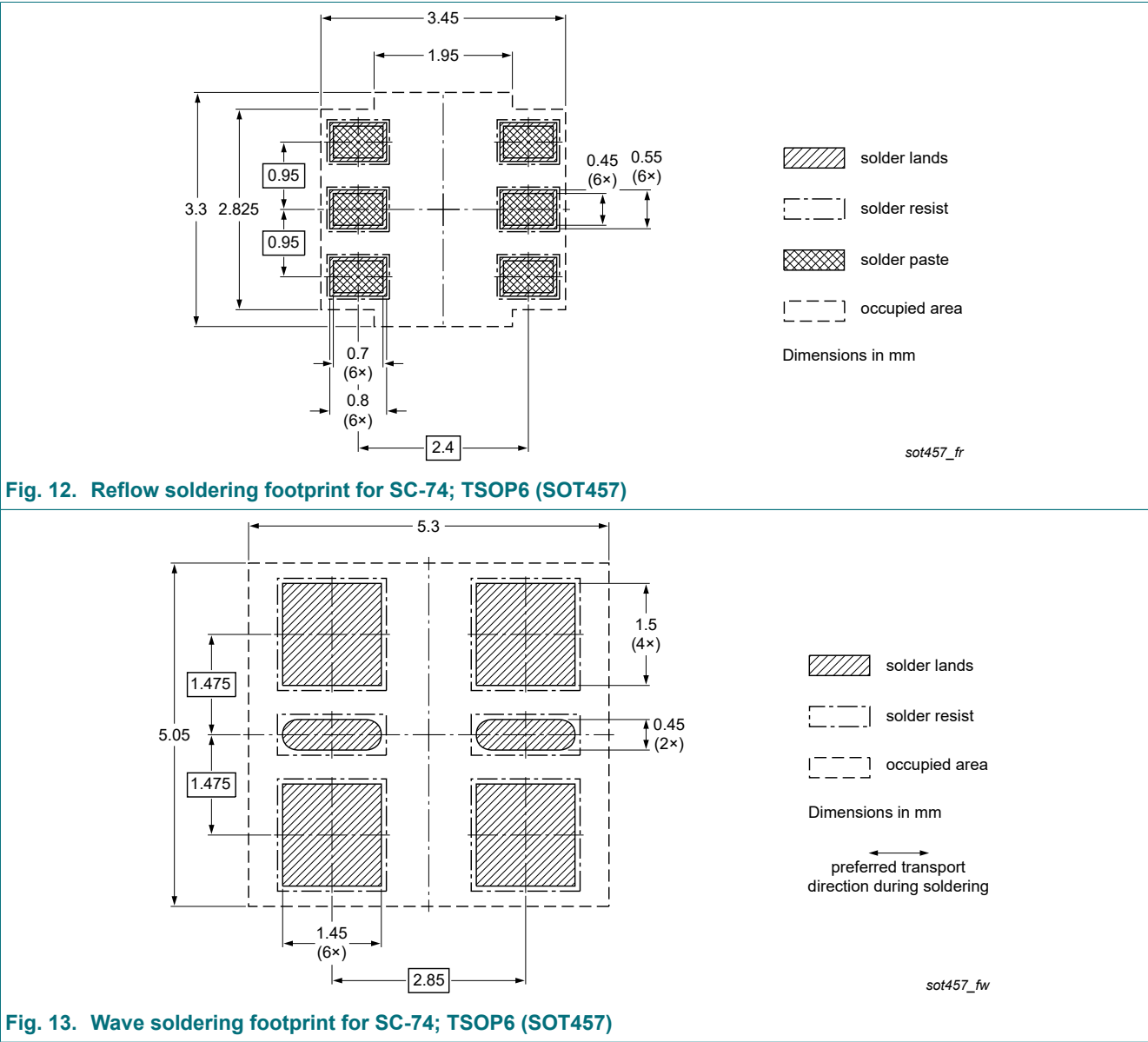


Fig. 11. Package outline SC-74; TSOP6 (SOT457)

13. Soldering



14. Revision history

Table 9. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PIMP31 v.1	20220216	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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