



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

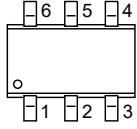
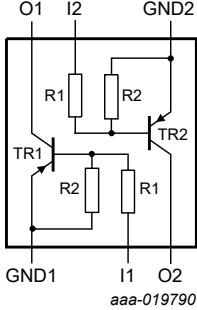
Table 1. Quick reference data

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	 <p>SC-74; TSOP6 (SOT457)</p>	 <p>aaa-019790</p>
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

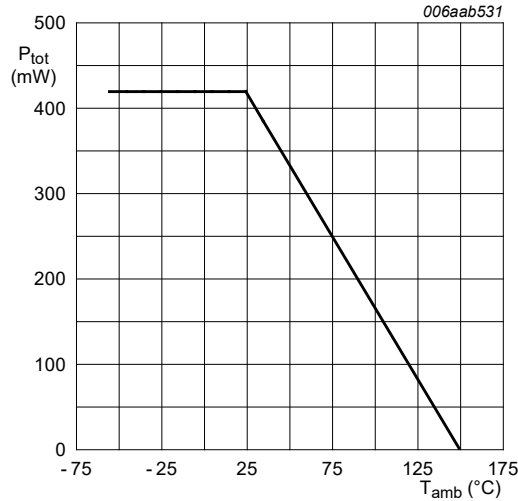
8. Limiting values

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	$T_{amb} \leq 25\text{ }^\circ\text{C}$	[1]	290	mW
Per device					
P_{tot}	total power dissipation	$T_{amb} \leq 25\text{ }^\circ\text{C}$	[1]	420	mW
T_j	junction temperature		-	150	$^\circ\text{C}$
T_{amb}	ambient temperature		-55	150	$^\circ\text{C}$
T_{stg}	storage temperature		-65	150	$^\circ\text{C}$

[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

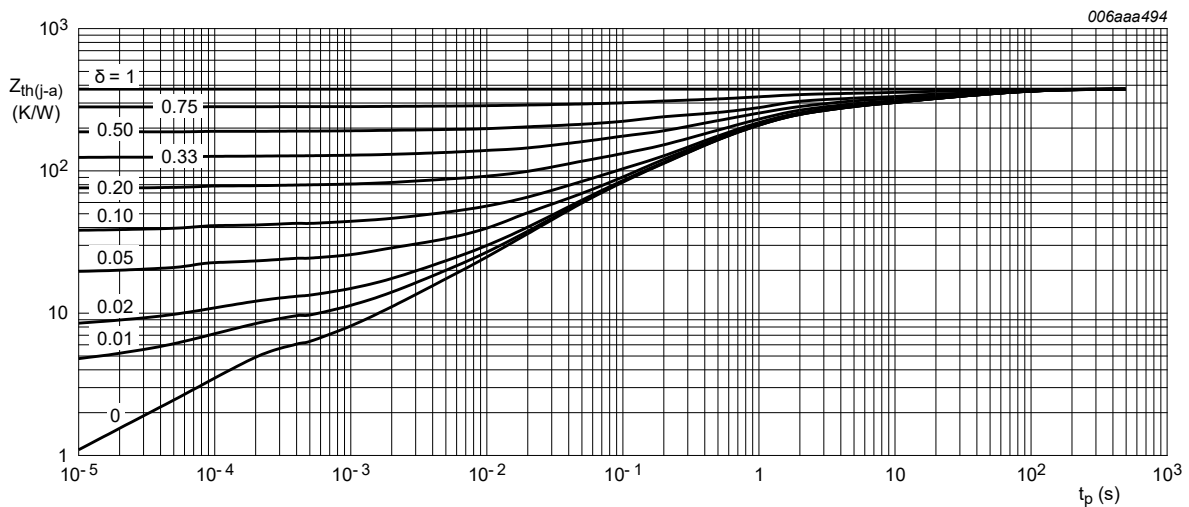
Fig. 1. Per device: Power derating curve

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

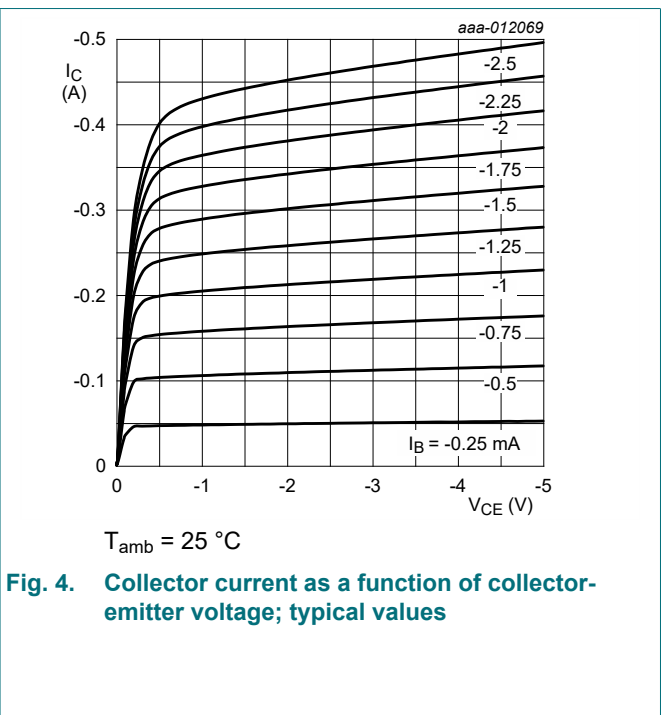
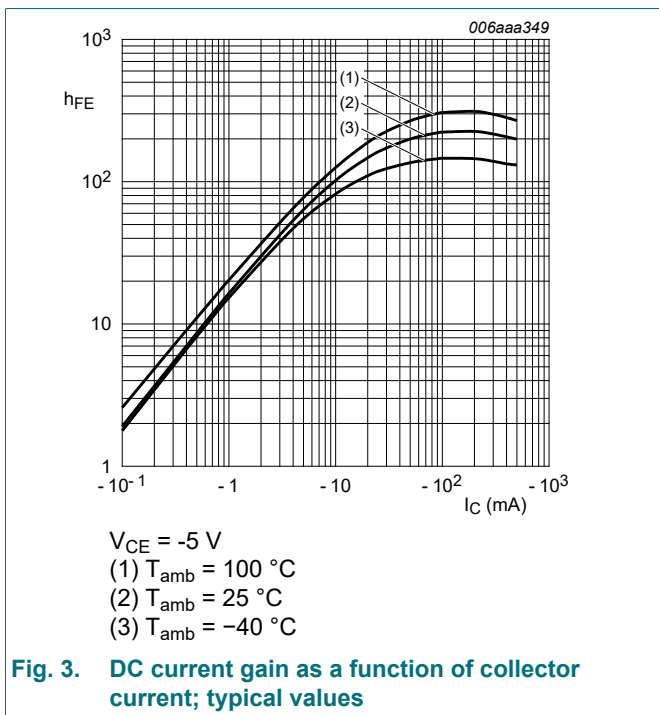
10. Characteristics

Table 7. Characteristics

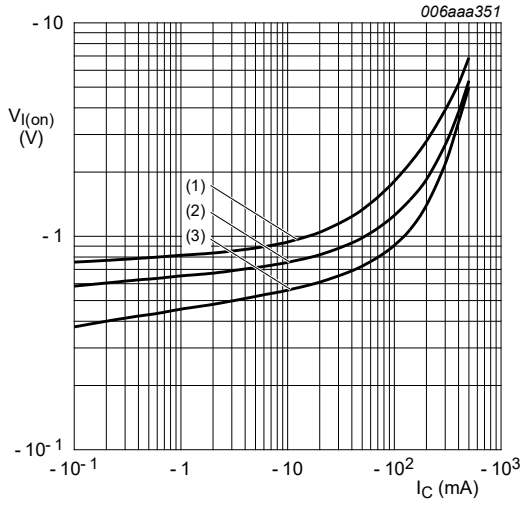
Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
Per transistor							
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = -100 \mu A; I_E = 0 A; T_{amb} = 25 \text{ }^\circ C$	-50	-	-	V	
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_C = -10 \text{ mA}; I_B = 0 A; T_{amb} = 25 \text{ }^\circ C$	-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	$V_{CE} = -50 \text{ V}; I_B = 0 A; T_{amb} = 25 \text{ }^\circ C$	-	-	-0.5	μA	
I_{EBO}	emitter-base cut-off current	$V_{EB} = -5 \text{ V}; I_C = 0 A; T_{amb} = 25 \text{ }^\circ C$	-	-	-0.72	mA	
h_{FE}	DC current gain	$V_{CE} = -5 \text{ V}; I_C = -50 \text{ mA}; T_{amb} = 25 \text{ }^\circ C$	70	-	-		
V_{CEsat}	collector-emitter saturation voltage	$I_C = -50 \text{ mA}; I_B = -2.5 \text{ mA}; T_{amb} = 25 \text{ }^\circ C$	-	-	-100	mV	
$V_{I(off)}$	off-state input voltage	$V_{CE} = -5 \text{ V}; I_C = -100 \mu A; T_{amb} = 25 \text{ }^\circ C$	-0.3	-0.6	-1	V	
$V_{I(on)}$	on-state input voltage	$V_{CE} = -0.3 \text{ V}; I_C = -20 \text{ mA}; T_{amb} = 25 \text{ }^\circ C$	-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	$V_{CB} = -10 \text{ V}; I_E = 0 A; i_e = 0 A; f = 1 \text{ MHz}; T_{amb} = 25 \text{ }^\circ C$	-	11	-	pF	
f_T	transition frequency	$V_{CE} = -5 \text{ V}; I_C = -50 \text{ mA}; f = 100 \text{ MHz}; T_{amb} = 25 \text{ }^\circ C$	[2]	-	140	-	MHz

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

[2] Characteristics of built-in transistor

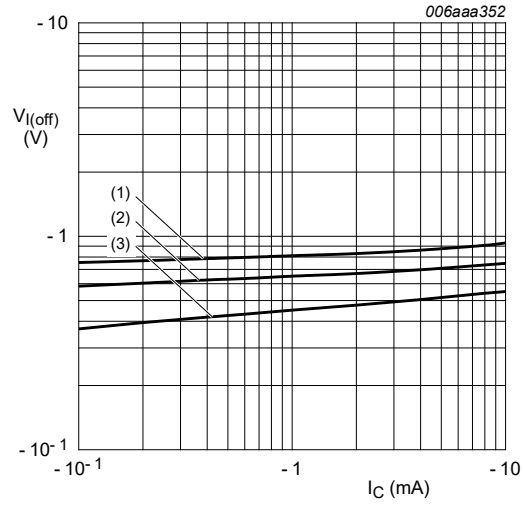


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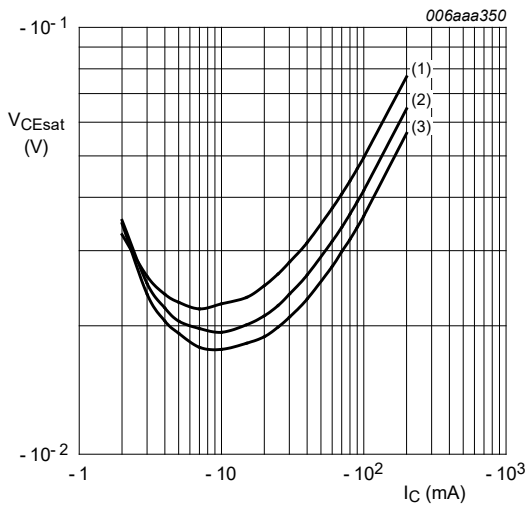
$V_{CE} = -0.3\text{ V}$
 (1) $T_{amb} = -40\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 100\text{ °C}$

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



$I_C/I_B = 20$
 (1) $T_{amb} = 100\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -40\text{ °C}$

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

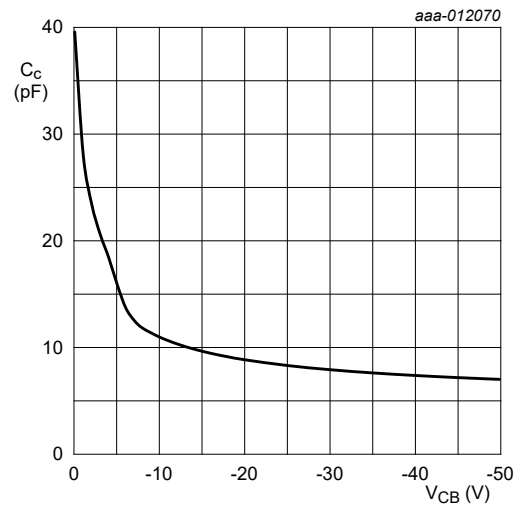
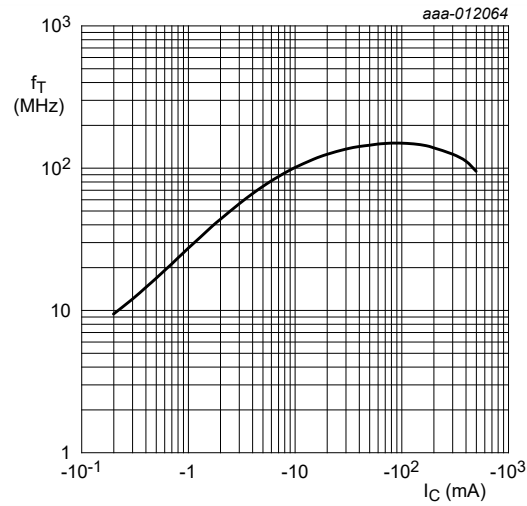


Fig. 8. Collector capacitance as a function of collector-base voltage; typical values



f = 100 MHz
 $T_{amb} = 25\text{ }^\circ\text{C}$
 $V_{CE} = -5\text{ V}$

Fig. 9. Transition frequency as a function of collector current; typical values of built-in transistor

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)

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

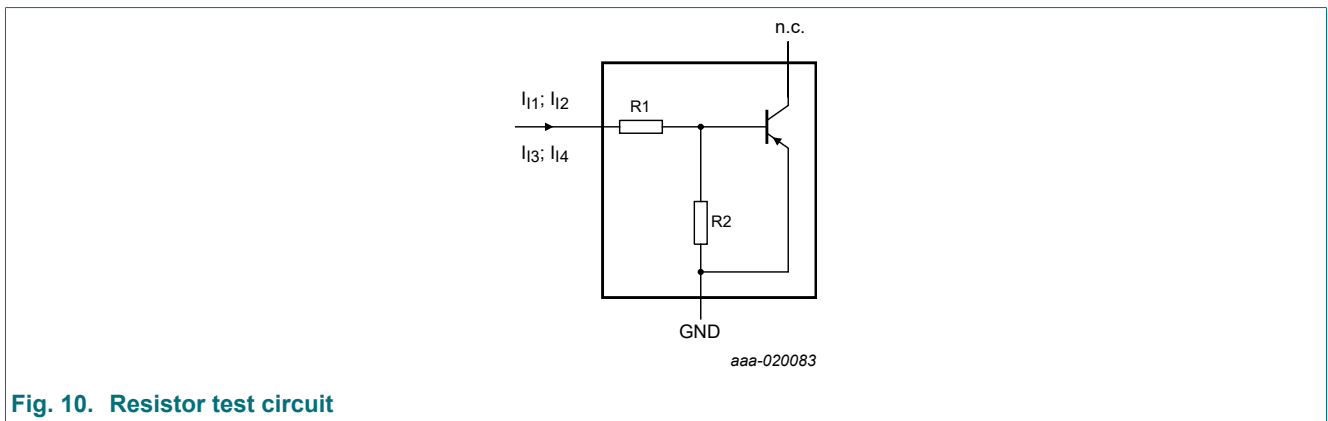


Fig. 10. Resistor test circuit

Resistor test conditions

Table 8. Resistor test conditions

R1 (kΩ)	R2 (kΩ)	Test conditions			
		I ₁₁	I ₁₂	I ₁₃	I ₁₄
1	10	-0.7 mA	-0.8 mA	0.45 mA	0.55 mA

12. Package outline

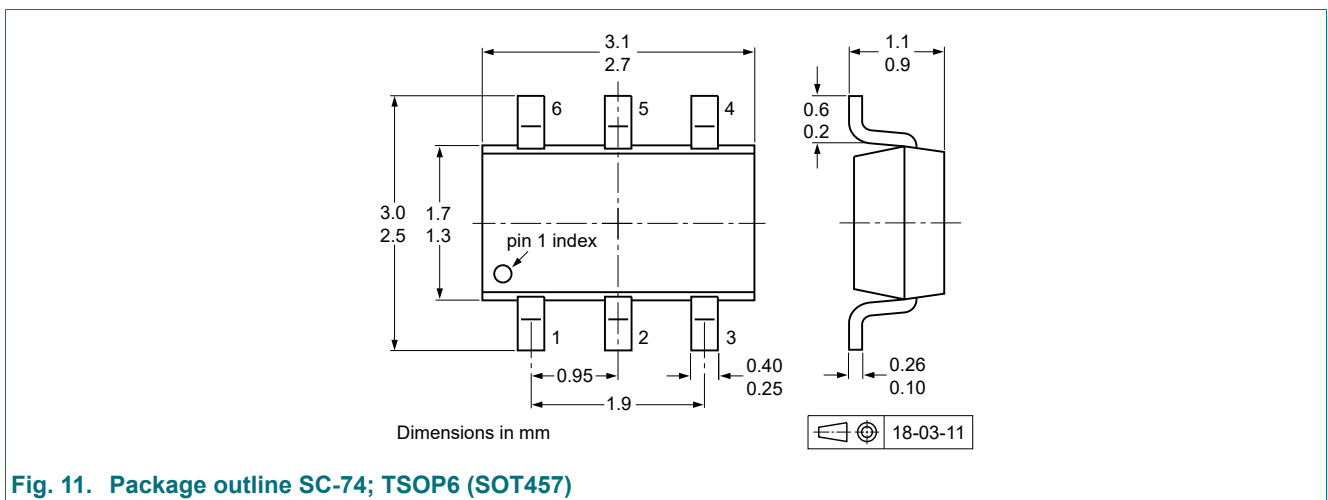


Fig. 11. Package outline SC-74; TSOP6 (SOT457)

13. Soldering

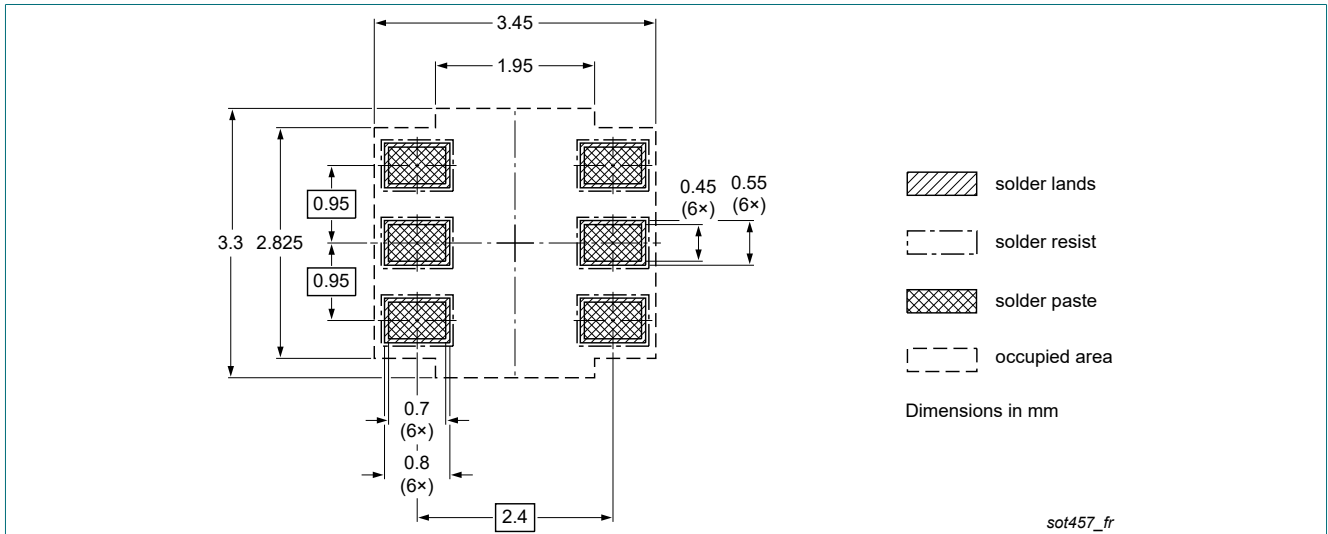


Fig. 12. Reflow soldering footprint for SC-74; TSOP6 (SOT457)

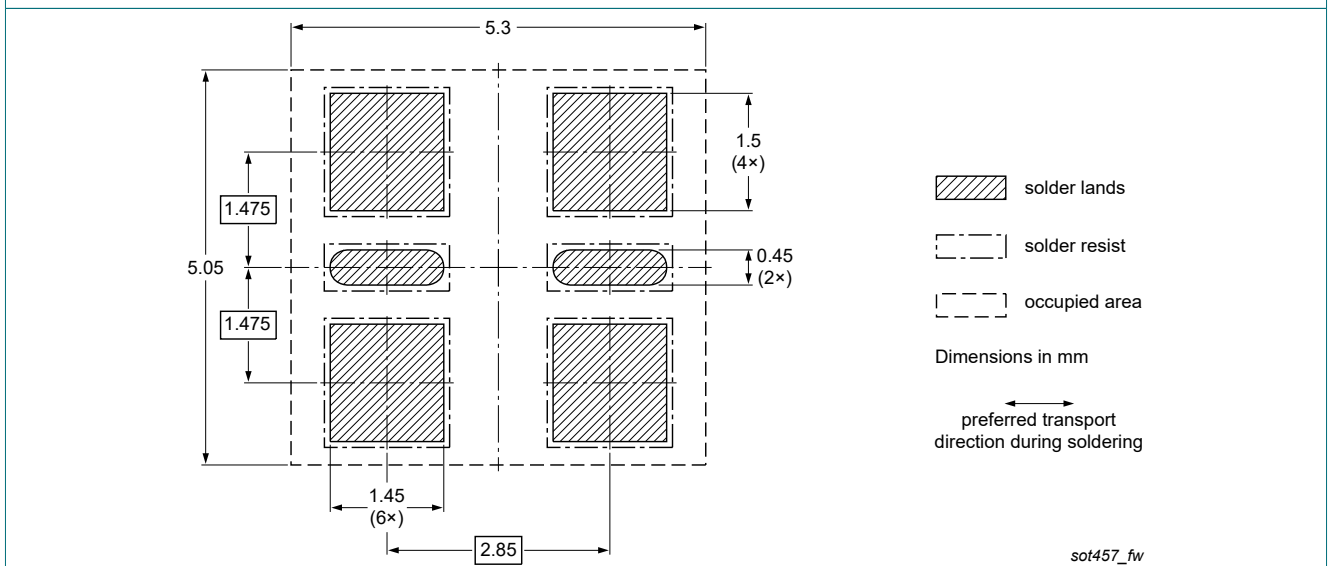


Fig. 13. Wave soldering footprint for SC-74; TSOP6 (SOT457)

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.

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- [2] The term 'short data sheet' is explained in section "Definitions".
- [3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the internet at <https://www.nexperia.com>.

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