



# PBSS4140DPN-Q

40 V low  $V_{CEsat}$  NPN/PNP transistor

9 November 2023

Product data sheet

## 1. General description

NPN/PNP low  $V_{CEsat}$  transistor pair in an SC-74 (SOT457) plastic package.

## 2. Features and benefits

- 600 mW total power dissipation
- Low collector-emitter saturation voltage
- High current capability
- Improved device reliability due to reduced heat generation
- Replaces two SOT23 packaged low  $V_{CEsat}$  transistors on same PCB area
- Reduces required PCB area
- Reduced pick and place costs
- Qualified according to AEC-Q101 and recommended for use in automotive applications

## 3. Applications

- General purpose switching and muting
- LCD backlighting
- Supply line switching circuits
- Battery driven equipment (mobile phones, video cameras and hand-held devices)

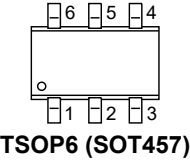
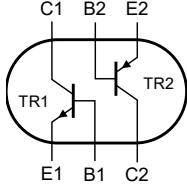
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per transistor unless otherwise specified; for the PNP transistor with negative polarity</b>						
$V_{CEO}$	collector-emitter voltage	open base	-	-	40	V
$I_C$	collector current		-	-	1	A
$I_{CM}$	peak collector current	single pulse; $t_p \leq 1$ ms	-	-	2	A
<b>TR1 (NPN)</b>						
$R_{CEsat}$	collector-emitter saturation resistance	$I_C = 500$ mA; $I_B = 50$ mA; pulsed; $t_p \leq 300$ $\mu$ s; $\delta \leq 0.02$ ; $T_{amb} = 25$ °C	-	260	500	m $\Omega$
<b>TR2 (PNP)</b>						
$R_{CEsat}$	collector-emitter saturation resistance	$I_C = -500$ mA; $I_B = -50$ mA; pulsed; $t_p \leq 300$ $\mu$ s; $\delta \leq 0.02$ ; $T_{amb} = 25$ °C	-	300	500	m $\Omega$

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	E1	emitter TR1	 TSOP6 (SOT457)	 sym139
2	B1	base TR1		
3	C2	collector TR2		
4	E2	emitter TR2		
5	B2	base TR2		
6	C1	collector TR1		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
<a href="#">PBSS4140DPN-Q</a>	TSOP6	plastic, surface-mounted package (SC-74; TSOP6); 6 leads	<a href="#">SOT457</a>

7. Marking

Table 4. Marking codes

Type number	Marking code
PBSS4140DPN-Q	M2

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 unless otherwise specified; for the PNP transistor with negative polarity						
V <sub>CBO</sub>	collector-base voltage	open emitter		-	40	V
V <sub>CEO</sub>	collector-emitter voltage	open base		-	40	V
V <sub>EBO</sub>	emitter-base voltage	open collector		-	5	V
I <sub>C</sub>	collector current			-	1	A
I <sub>CM</sub>	peak collector current	single pulse; t <sub>p</sub> ≤ 1 ms		-	2	A
I <sub>BM</sub>	peak base current			-	1	A
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C	<a href="#">[1]</a>	-	370	mW
Per device						
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C	<a href="#">[1]</a>	-	600	mW
T <sub>j</sub>	junction temperature			-	150	°C
T <sub>amb</sub>	ambient temperature			-65	150	°C
T <sub>stg</sub>	storage temperature			-65	150	°C

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm<sup>2</sup>.

## 9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
<b>Per transistor</b>							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	208	K/W

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm<sup>2</sup>.

## 10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor unless otherwise specified; for the PNP transistor with negative polarity							
I <sub>CBO</sub>	collector-base cut-off current	V <sub>CB</sub> = 40 V; I <sub>E</sub> = 0 A; T <sub>amb</sub> = 25 °C		-	-	100	nA
		V <sub>CB</sub> = 40 V; I <sub>E</sub> = 0 A; T <sub>j</sub> = 150 °C		-	-	50	μA
I <sub>CEO</sub>	collector-emitter cut-off current (base open)	I <sub>B</sub> = 0 A; V <sub>CE</sub> = 30 V		-	-	100	nA
I <sub>EBO</sub>	emitter-base cut-off current	V <sub>EB</sub> = 5 V; I <sub>C</sub> = 0 A; T <sub>amb</sub> = 25 °C		-	-	100	nA
V <sub>CEsat</sub>	collector-emitter saturation voltage	I <sub>C</sub> = 100 mA; I <sub>B</sub> = 1 mA; T <sub>amb</sub> = 25 °C		-	-	200	mV
		I <sub>C</sub> = 500 mA; I <sub>B</sub> = 50 mA; T <sub>amb</sub> = 25 °C		-	-	250	mV
		I <sub>C</sub> = 1 A; I <sub>B</sub> = 100 mA; T <sub>amb</sub> = 25 °C		-	-	500	mV
TR1 (NPN)							
h <sub>FE</sub>	DC current gain	V <sub>CE</sub> = 5 V; I <sub>C</sub> = 1 mA; T <sub>amb</sub> = 25 °C		300	-	-	
		V <sub>CE</sub> = 5 V; I <sub>C</sub> = 500 mA; T <sub>amb</sub> = 25 °C		300	-	900	
		V <sub>CE</sub> = 5 V; I <sub>C</sub> = 1 A; T <sub>amb</sub> = 25 °C		200	-	-	
R <sub>CEsat</sub>	collector-emitter saturation resistance	I <sub>C</sub> = 500 mA; I <sub>B</sub> = 50 mA; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C		-	260	500	mΩ
V <sub>BEsat</sub>	base-emitter saturation voltage	I <sub>C</sub> = 1 A; I <sub>B</sub> = 100 mA; T <sub>amb</sub> = 25 °C		-	-	1.2	V
V <sub>BEon</sub>	base-emitter turn-on voltage	V <sub>CE</sub> = 5 V; I <sub>C</sub> = 1 A; T <sub>amb</sub> = 25 °C		-	-	1.1	V
f <sub>T</sub>	transition frequency	V <sub>CE</sub> = 10 V; I <sub>C</sub> = 50 mA; f = 100 MHz; T <sub>amb</sub> = 25 °C		150	-	-	MHz
C <sub>c</sub>	collector capacitance	V <sub>CB</sub> = 10 V; I <sub>E</sub> = 0 A; i <sub>e</sub> = 0 A; f = 1 MHz; T <sub>amb</sub> = 25 °C		-	-	10	pF
TR2 (PNP)							
h <sub>FE</sub>	DC current gain	V <sub>CE</sub> = -5 V; I <sub>C</sub> = -1 mA; T <sub>amb</sub> = 25 °C		300	-	-	
		V <sub>CE</sub> = -5 V; I <sub>C</sub> = -100 mA; T <sub>amb</sub> = 25 °C		300	-	800	
		V <sub>CE</sub> = -5 V; I <sub>C</sub> = -500 mA; T <sub>amb</sub> = 25 °C		250	-	-	
		V <sub>CE</sub> = -5 V; I <sub>C</sub> = -1 A; T <sub>amb</sub> = 25 °C		160	-	-	
R <sub>CEsat</sub>	collector-emitter saturation resistance	I <sub>C</sub> = -500 mA; I <sub>B</sub> = -50 mA; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C		-	300	500	mΩ
V <sub>BEsat</sub>	base-emitter saturation voltage	I <sub>C</sub> = -1 A; I <sub>B</sub> = -50 mA; T <sub>amb</sub> = 25 °C		-	-	-1.1	V
V <sub>BEon</sub>	base-emitter turn-on voltage	V <sub>CE</sub> = -5 V; I <sub>C</sub> = -1 A; T <sub>amb</sub> = 25 °C		-	-	-1	V

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$f_T$	transition frequency	$V_{CE} = -10\text{ V}$ ; $I_C = -50\text{ mA}$ ; $f = 100\text{ MHz}$ ; $T_{amb} = 25\text{ }^{\circ}\text{C}$	150	-	-	MHz
$C_c$	collector capacitance	$V_{CB} = -10\text{ V}$ ; $I_E = 0\text{ A}$ ; $i_e = 0\text{ A}$ ; $f = 1\text{ MHz}$ ; $T_{amb} = 25\text{ }^{\circ}\text{C}$	-	-	12	pF

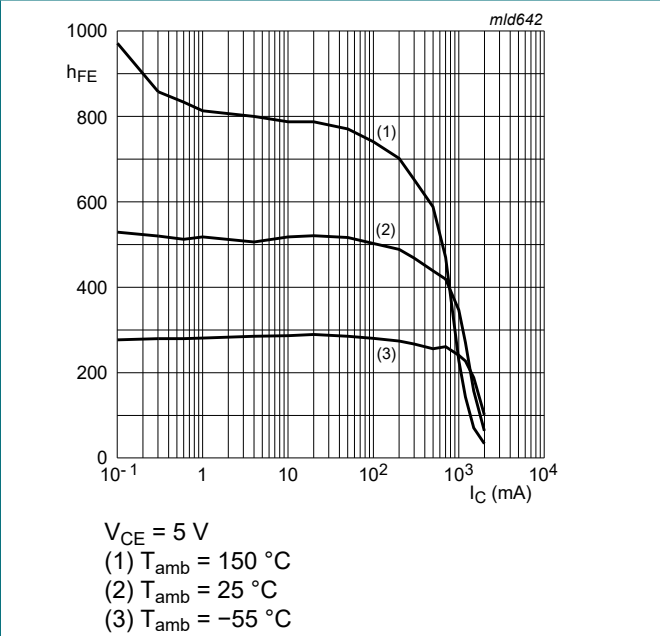


Fig. 1. TR1 (NPN): DC current gain as a function of collector current; typical values

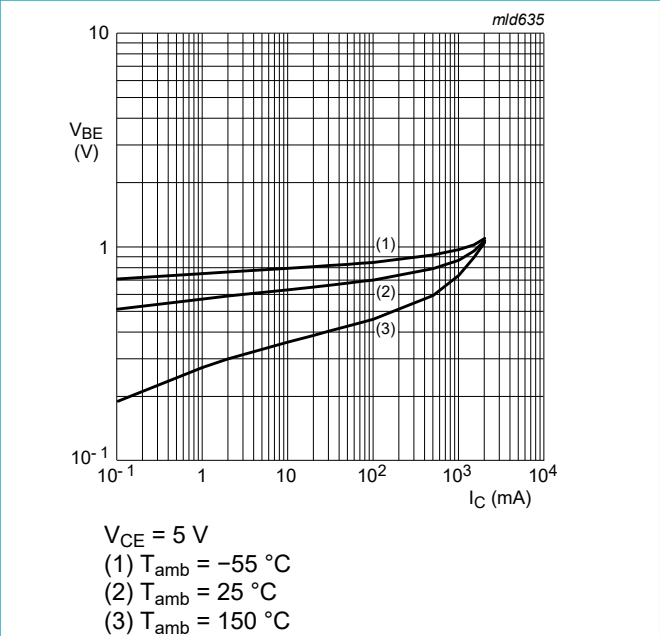


Fig. 2. TR1 (NPN): Base-emitter voltage as a function of collector current; typical values

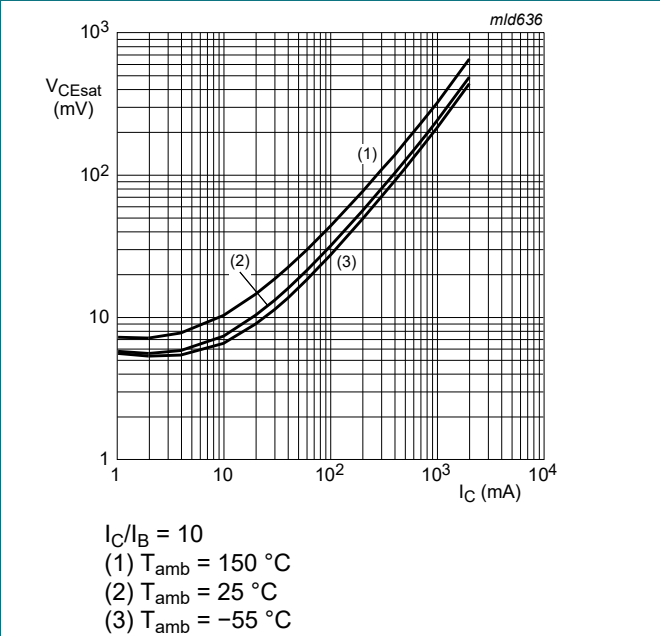


Fig. 3. TR1 (NPN): Collector-emitter saturation voltage as a function of collector current; typical values

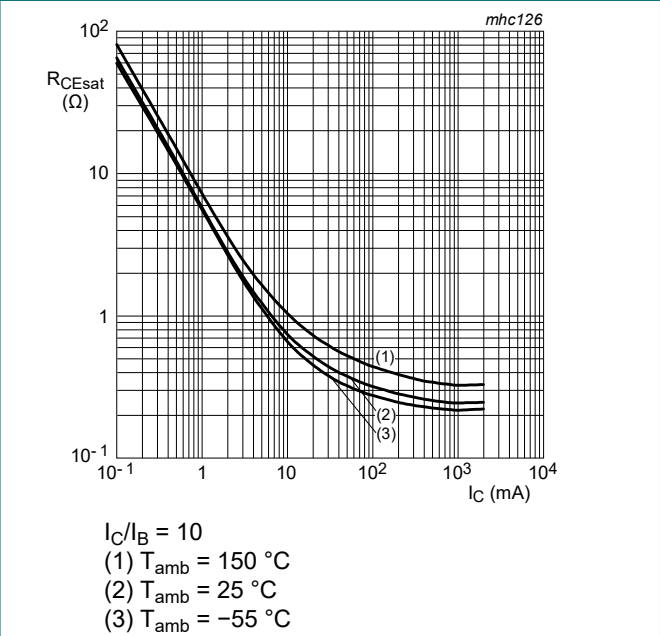


Fig. 4. TR1 (NPN): Equivalent on-resistance as a function of collector current; typical values

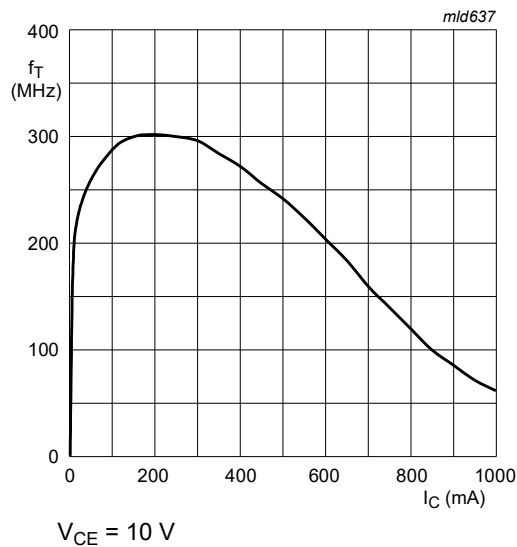


Fig. 5. TR1 (NPN): Transition frequency as a function of collector current; typical values

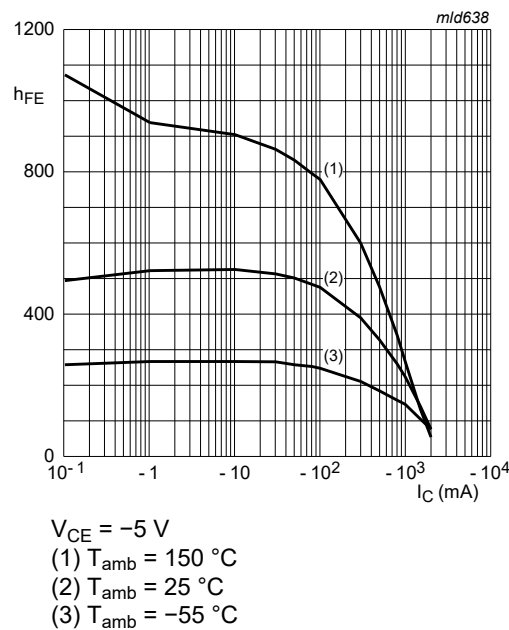


Fig. 6. TR2 (PNP): DC current gain as a function of collector current; typical values

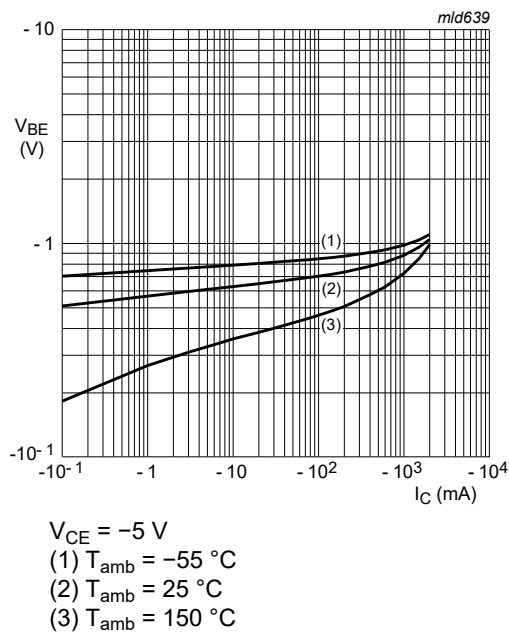


Fig. 7. TR2 (PNP): Base-emitter voltage as a function of collector current; typical values

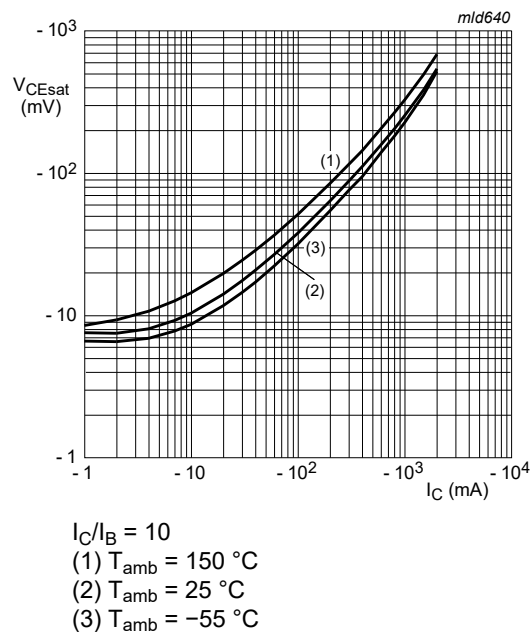


Fig. 8. TR2 (PNP): Collector-emitter saturation voltage as a function of collector current; typical values

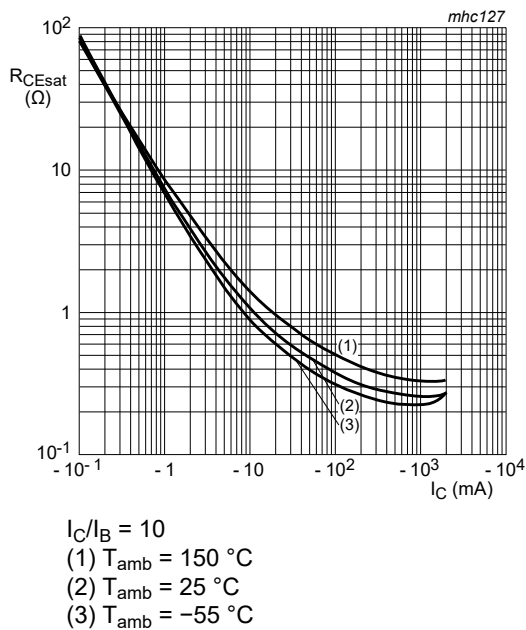


Fig. 9. TR2 (PNP): Equivalent on-resistance as a function of collector current; typical values

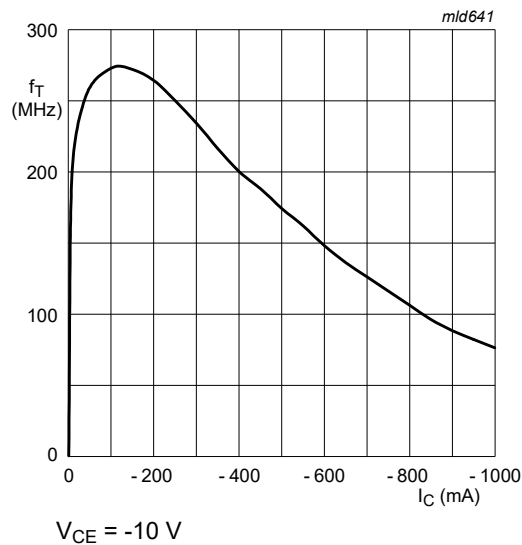


Fig. 10. TR2 (PNP): Transition frequency as a function of collector current; typical values

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.

12. Package outline

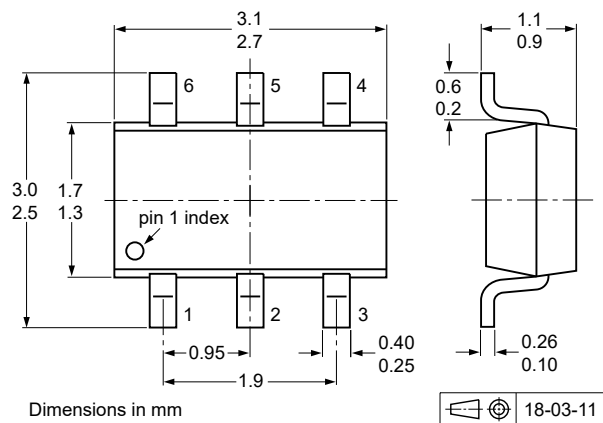


Fig. 11. Package outline TSOP6 (SOT457)

13. Soldering

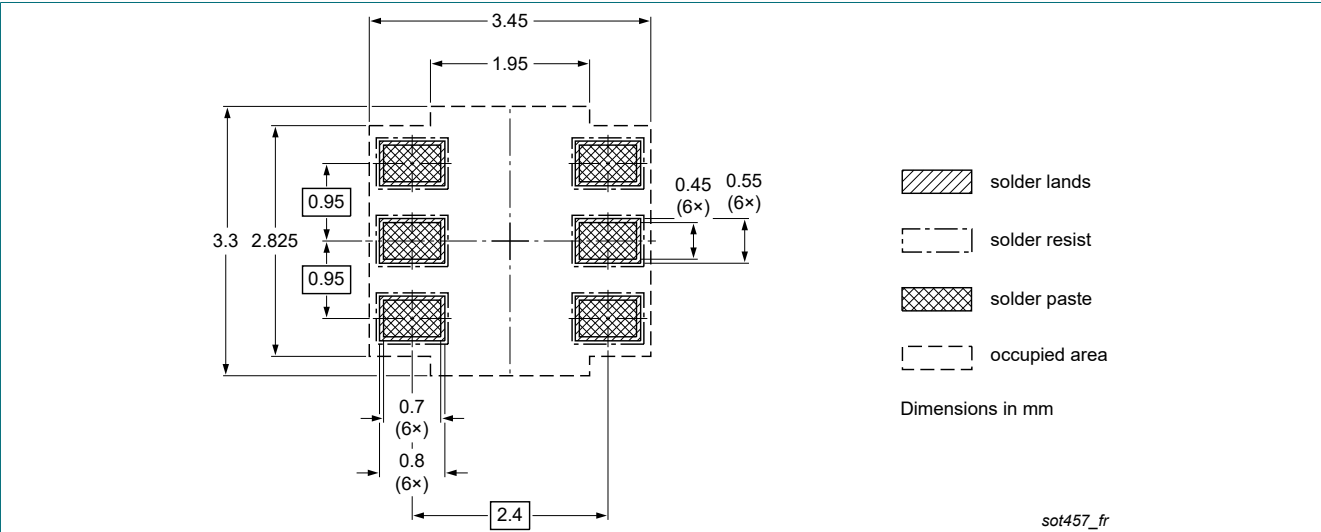


Fig. 12. Reflow soldering footprint for TSOP6 (SOT457)

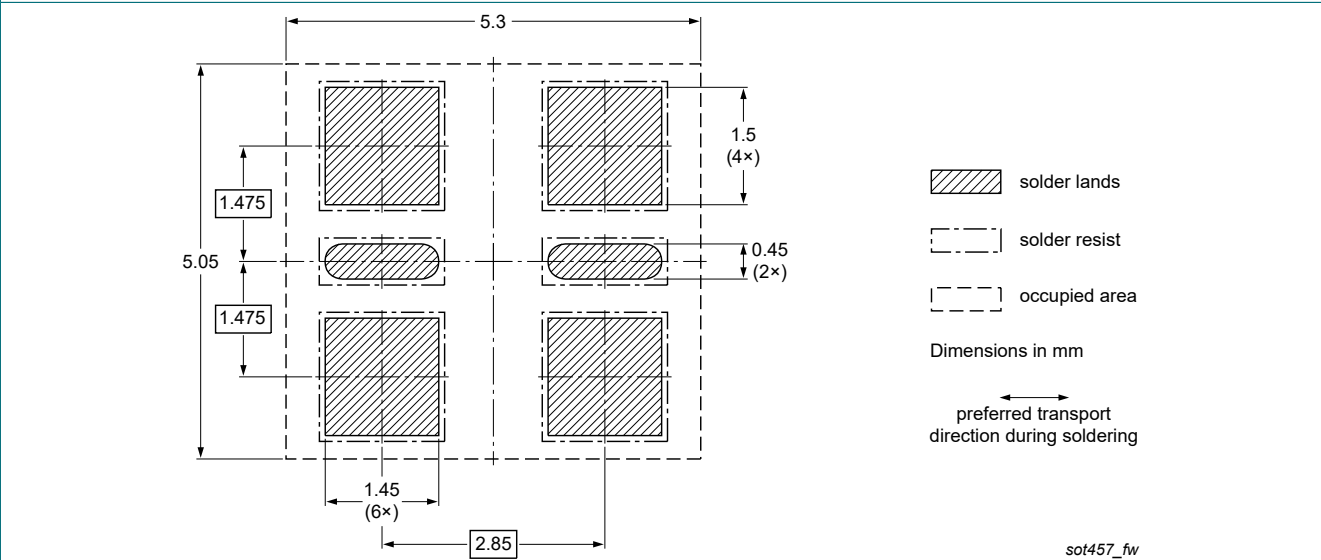


Fig. 13. Wave soldering footprint for TSOP6 (SOT457)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PBSS4140DPN-Q v.1	20231109	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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