



PBSS4140T-Q

40 V, 1 A NPN low V_{CEsat} (BISS) transistor

15 December 2021

Product data sheet

1. General description

NPN low V_{CEsat} transistor in a small SOT23 plastic package. PNP complement: PBSS5140T-Q.

2. Features and benefits

- Low collector-emitter saturation voltage
- High current capabilities
- Improved device reliability due to reduced heat generation
- 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).

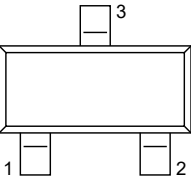
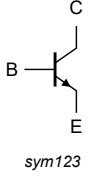
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V _{CEO}	collector-emitter voltage	open base	-	-	40	V
I _{CM}	peak collector current	single pulse; t _p ≤ 1 ms	-	-	2	A
R _{CEsat}	collector-emitter saturation resistance	I _C = 500 mA; I _B = 50 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _{amb} = 25 °C	-	260	500	mΩ

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base	 <p style="text-align: center;">SOT23</p>	 <p style="text-align: center;"><i>sym123</i></p>
2	E	emitter		
3	C	collector		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PBSS4140T-Q	SOT23	plastic, surface-mounted package; 3 terminals; 1.9 mm pitch; 2.9 mm x 1.3 mm x 1 mm body	SOT23

7. Marking

Table 4. Marking codes

Type number	Marking code ^[1]
PBSS4140T-Q	ZT%

[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		-	40	V
V_{CEO}	collector-emitter voltage	open base		-	40	V
V_{EBO}	emitter-base voltage	open collector		-	5	V
I_C	collector current			-	1	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms		-	2	A
I_{BM}	peak base current			-	1	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	300	mW
			[2]	-	450	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 PCB, single-sided, 35 μ m copper, tin-plated and standard footprint.

[2] Device mounted on an FR4 PCB, single-sided, 35 μ m copper, tin-plated, mounting pad for collector 1 cm².

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	417	K/W
			[2]	-	-	278	K/W

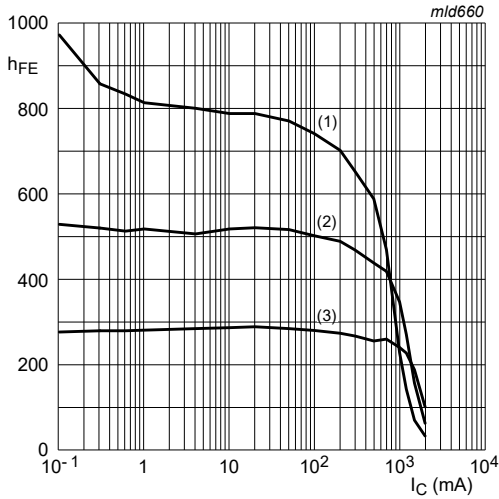
[1] Device mounted on an FR4 PCB, single-sided, 35 μ m copper, tin-plated and standard footprint.

[2] Device mounted on an FR4 PCB, single-sided, 35 μ m copper, tin-plated, mounting pad for collector 1 cm².

10. Characteristics

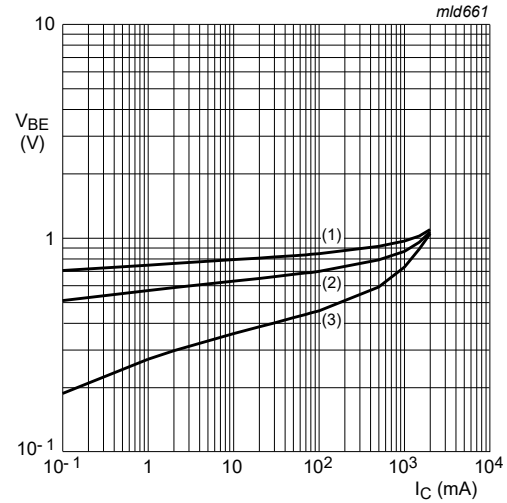
Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = 100 \mu\text{A}; I_E = 0 \text{ A}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	40	-	-	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_C = 2 \text{ mA}; I_B = 0 \text{ A}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	40	-	-	V
$V_{(BR)EBO}$	emitter-base breakdown voltage (collector open)	$I_E = 100 \mu\text{A}; I_C = 0 \text{ A}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	5	-	-	V
I_{CBO}	collector-base cut-off current	$V_{CB} = 40 \text{ V}; I_E = 0 \text{ A}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	100	nA
		$V_{CB} = 40 \text{ V}; I_E = 0 \text{ A}; T_{\text{amb}} = 150 \text{ }^\circ\text{C}$	-	-	50	μA
I_{CES}	collector-emitter cut-off current	$V_{CE} = 30 \text{ V}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	100	nA
I_{EBO}	emitter-base cut-off current	$V_{EB} = 5 \text{ V}; I_C = 0 \text{ A}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	100	nA
h_{FE}	DC current gain	$V_{CE} = 5 \text{ V}; I_C = 1 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	300	-	-	
		$V_{CE} = 5 \text{ V}; I_C = 500 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	300	-	900	
		$V_{CE} = 5 \text{ V}; I_C = 1 \text{ A}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	200	-	-	
V_{CEsat}	collector-emitter saturation voltage	$I_C = 100 \text{ mA}; I_B = 1 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	200	mV
		$I_C = 500 \text{ mA}; I_B = 50 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	250	mV
		$I_C = 1 \text{ A}; I_B = 100 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	500	mV
R_{CEsat}	collector-emitter saturation resistance	$I_C = 500 \text{ mA}; I_B = 50 \text{ mA}; \text{pulsed}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	260	500	m Ω
V_{BEsat}	base-emitter saturation voltage	$I_C = 1 \text{ A}; I_B = 100 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	1.2	V
V_{BEon}	base-emitter turn-on voltage	$V_{CE} = 5 \text{ V}; I_C = 1 \text{ A}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	1.1	V
f_T	transition frequency	$V_{CE} = 10 \text{ V}; I_C = 50 \text{ mA}; f = 100 \text{ MHz}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	150	-	-	MHz
C_c	collector capacitance	$V_{CB} = 10 \text{ V}; I_E = 0 \text{ A}; i_e = 0 \text{ A}; f = 1 \text{ MHz}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	10	pF



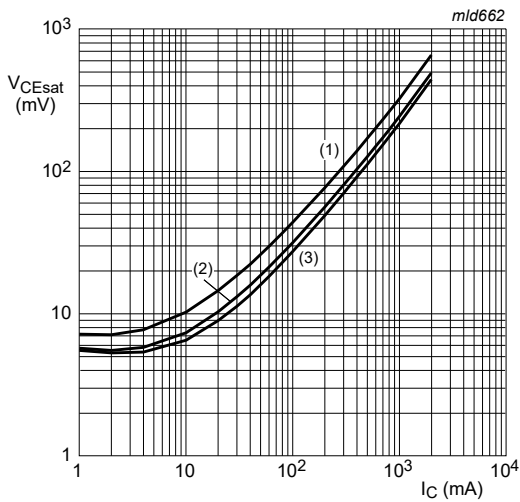
$V_{CE} = 5\text{ V}$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

Fig. 1. DC current gain as a function of collector current; typical values



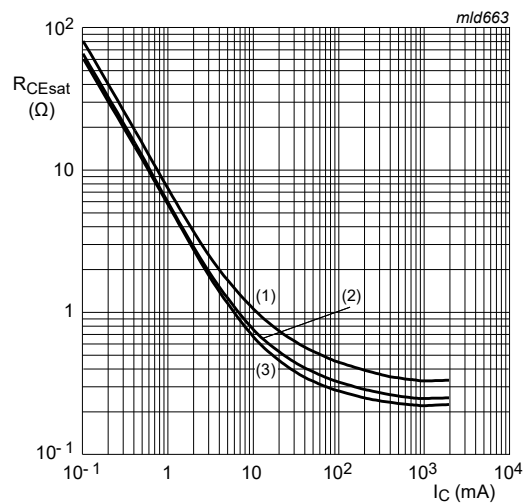
$V_{CE} = 5\text{ V}$
 (1) $T_{amb} = -55\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 150\text{ °C}$

Fig. 2. Base-emitter voltage as a function of collector current; typical values



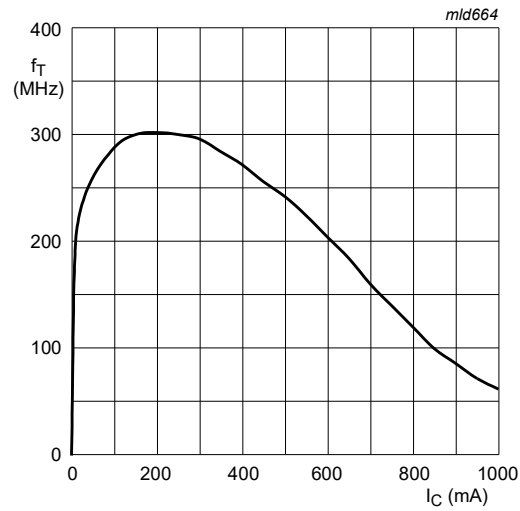
$I_C/I_B = 10$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

Fig. 3. Collector-emitter saturation voltage as a function of collector current; typical values



$I_C/I_B = 10$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

Fig. 4. Equivalent on-resistance as a function of collector current; typical values



$V_{CE} = 10\text{ V}$

Fig. 5. Transition frequency as a function of collector current

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

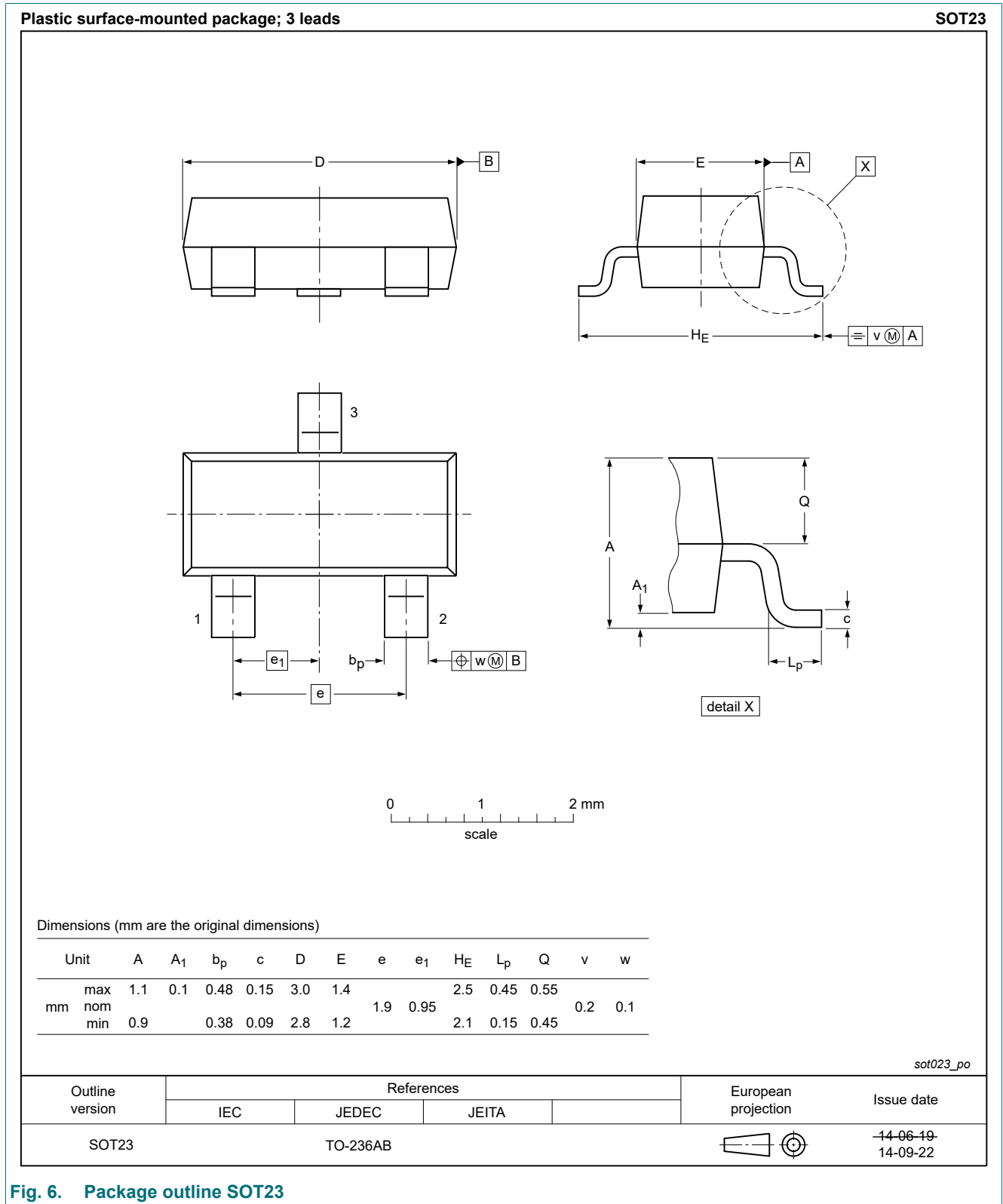


Fig. 6. Package outline SOT23

13. Soldering

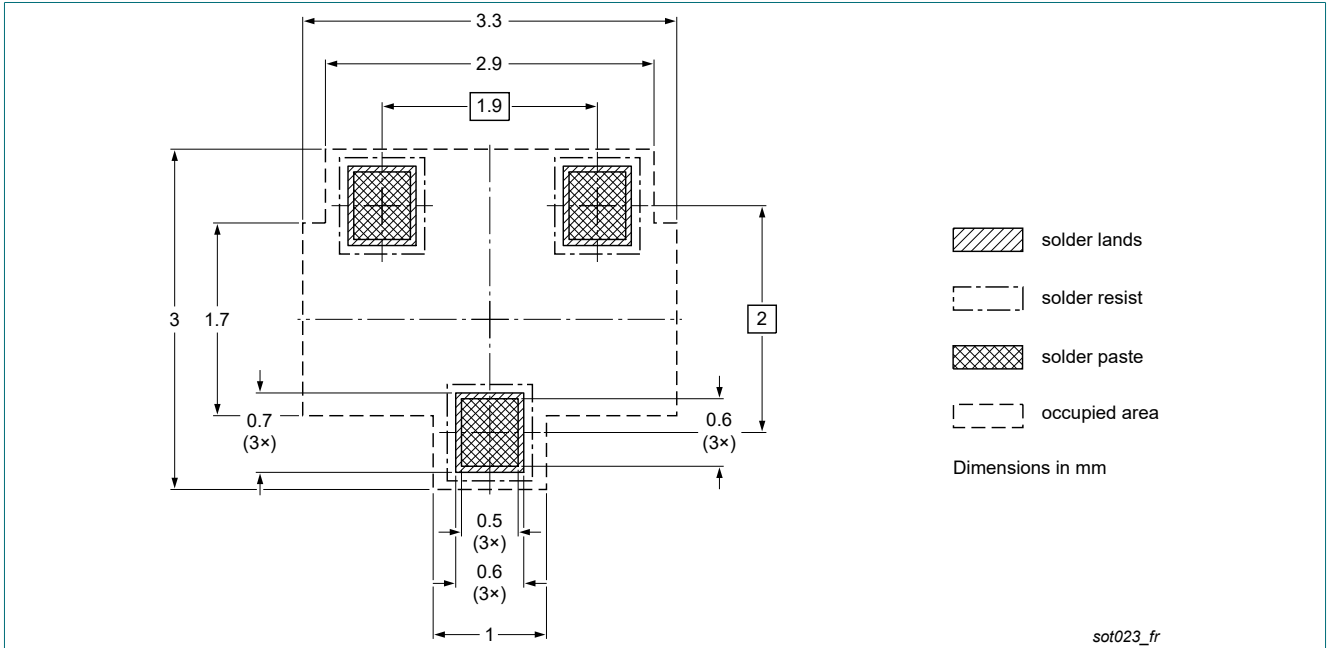


Fig. 7. Reflow soldering footprint for SOT23

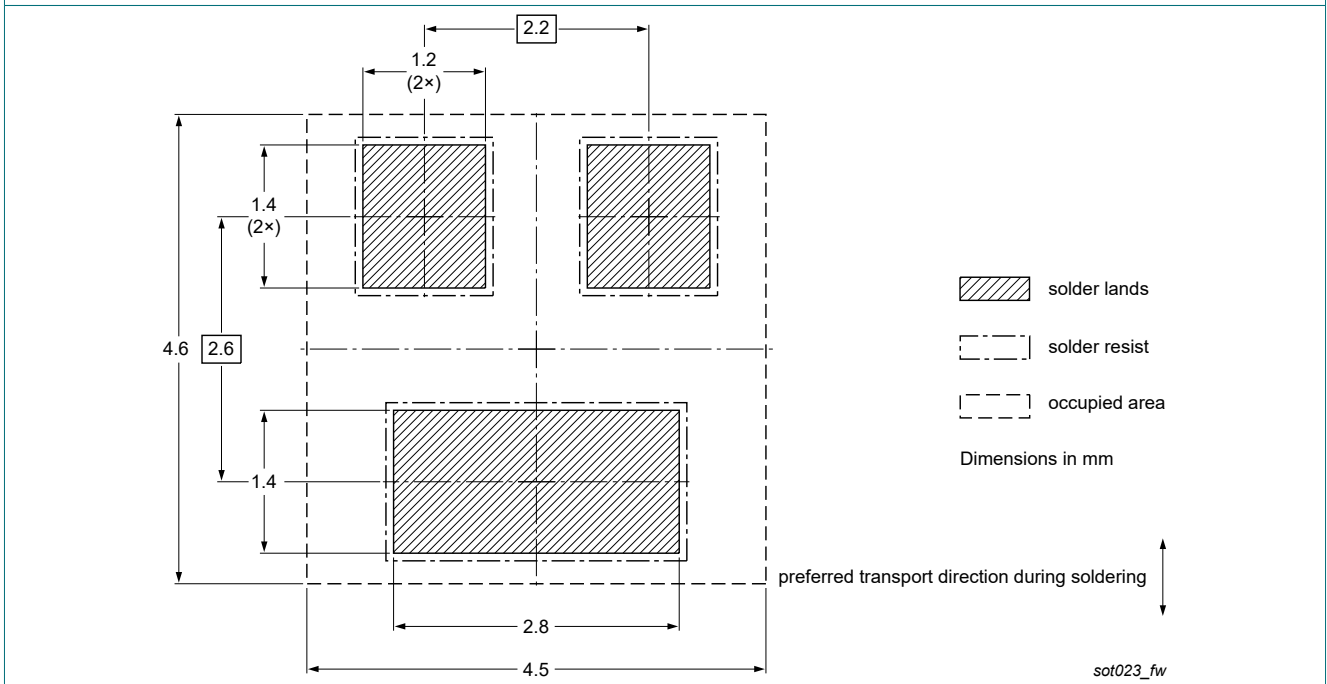


Fig. 8. Wave soldering footprint for SOT23

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PBSS4140T-Q v.1	20211215	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".
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