PBSS2515YPN

15 V low VCEsat NPN/PNP transistor

1 October 2022 Product data sheet

1. General description

NPN/PNP low V_{CEsat} transistor pair in a SOT363 (SC-88) very small Surface-Mounted Device (SMD) plastic package. .

2. Features and benefits

- Low collector-emitter saturation voltage
- High current capability
- Replaces two SC-70 packaged low V_{CEsat} transistors on same PCB area
- Reduces required PCB area
- Reduced pick and place costs.

3. Applications

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

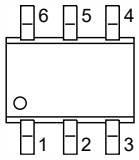
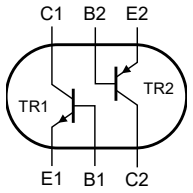
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor unless otherwise specified; for the PNP transistor with negative polarity							
V_{CEO}	collector-emitter voltage	open base		-	-	15	V
I_{CM}	peak collector current	single pulse; $t_p \leq$ 1 ms		-	-	1	A
TR1 (NPN)							
R_{CEsat}	collector-emitter saturation resistance	I_C = 500 mA; I_B = 50 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		-	300	500	mΩ
TR2 (PNP)							
R_{CEsat}	collector-emitter saturation resistance	I_C = -500 mA; I_B = -50 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		-	300	500	mΩ

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	E1	emitter TR1	 TSSOP6 (SOT363)	 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
PBSS2515YPN	TSSOP6	plastic, surface-mounted package; 6 leads; 0.65 mm pitch; 2.1 mm x 1.25 mm x 0.95 mm body	SOT363

7. Marking

Table 4. Marking codes

Type number	Marking code[1]
PBSS2515YPN	N8%

[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
Per transistor unless otherwise specified; for the PNP transistor with negative polarity						
V_{CBO}	collector-base voltage	open emitter		-	15	V
V_{CEO}	collector-emitter voltage	open base		-	15	V
V_{EBO}	emitter-base voltage	open collector		-	6	V
I_C	collector current			-	500	mA
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms		-	1	A
I_{BM}	peak base current			-	100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C		-	200	mW
Per device						
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	300	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 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]	-	-	416	K/W

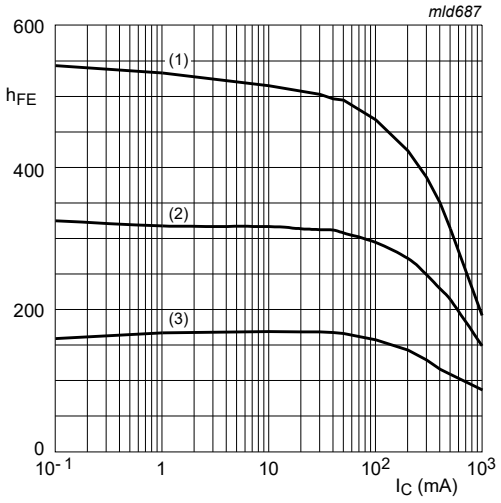
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

10. Characteristics

Table 7. Characteristics

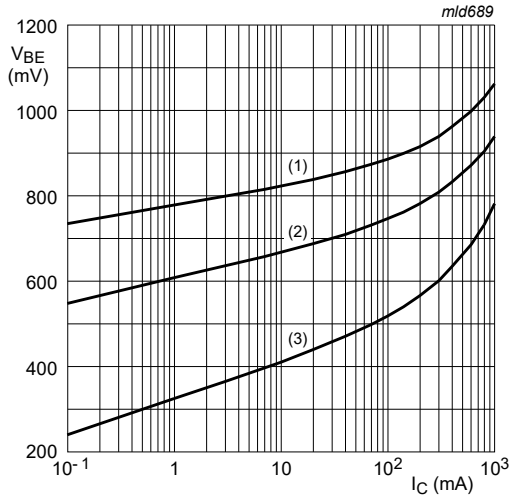
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor unless otherwise specified; for the PNP transistor with negative polarity							
I_{CBO}	collector-base cut-off current	V_{CB} = 15 V; I_E = 0 A; T_{amb} = 25 °C		-	-	100	nA
		V_{CB} = 15 V; I_E = 0 A; T_j = 150 °C		-	-	50	µA
I_{EBO}	emitter-base cut-off current	V_{EB} = 5 V; I_C = 0 A; T_{amb} = 25 °C		-	-	100	nA
TR1 (NPN)							
h_{FE}	DC current gain	V_{CE} = 2 V; I_C = 10 mA; T_{amb} = 25 °C		200	-	-	
		V_{CE} = 2 V; I_C = 100 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		150	-	-	
		V_{CE} = 2 V; I_C = 500 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		90	-	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = 10 mA; I_B = 0.5 mA; T_{amb} = 25 °C		-	-	25	mV
		I_C = 200 mA; I_B = 10 mA; T_{amb} = 25 °C		-	-	150	mV
		I_C = 500 mA; I_B = 50 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		-	-	250	mV
R_{CEsat}	collector-emitter saturation resistance			-	300	500	mΩ
V_{BEsat}	base-emitter saturation voltage			-	-	1.1	V
V_{BEon}	base-emitter turn-on voltage	V_{CE} = 2 V; I_C = 100 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		-	-	0.9	V
f_T	transition frequency	V_{CE} = 5 V; I_C = 100 mA; f = 100 MHz; T_{amb} = 25 °C		250	420	-	MHz
C_c	collector capacitance	V_{CB} = 10 V; I_E = 0 A; i_e = 0 A; f = 1 MHz; T_{amb} = 25 °C		-	4.4	6	pF
TR2 (PNP)							
h_{FE}	DC current gain	V_{CE} = -2 V; I_C = -10 mA; T_{amb} = 25 °C		200	-	-	
		V_{CE} = -2 V; I_C = -100 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		150	-	-	
		V_{CE} = -2 V; I_C = -500 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		90	-	-	

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CEsat}	collector-emitter saturation voltage	I_C = -10 mA; I_B = -0.5 mA; T_{amb} = 25 °C		-	-	-25	mV
		I_C = -200 mA; I_B = -10 mA; T_{amb} = 25 °C		-	-	-150	mV
		I_C = -500 mA; I_B = -50 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		-	-	-250	mV
R_{CEsat}	collector-emitter saturation resistance			-	300	500	mΩ
V_{BEsat}	base-emitter saturation voltage			-	-	-1.1	V
V_{BEon}	base-emitter turn-on voltage	V_{CE} = -2 V; I_C = -100 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		-	-	-0.9	V
f_T	transition frequency	V_{CE} = -5 V; I_C = -100 mA; f = 100 MHz; T_{amb} = 25 °C		100	280	-	MHz
C_c	collector capacitance	V_{CB} = -10 V; I_E = 0 A; i_e = 0 A; f = 1 MHz; T_{amb} = 25 °C		-	-	10	pF



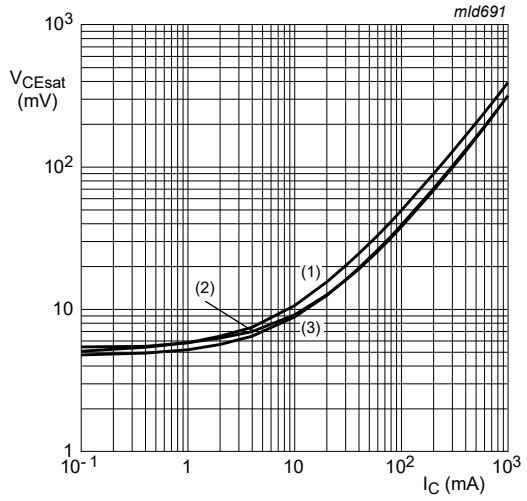
V_{CE} = 2 V
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

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



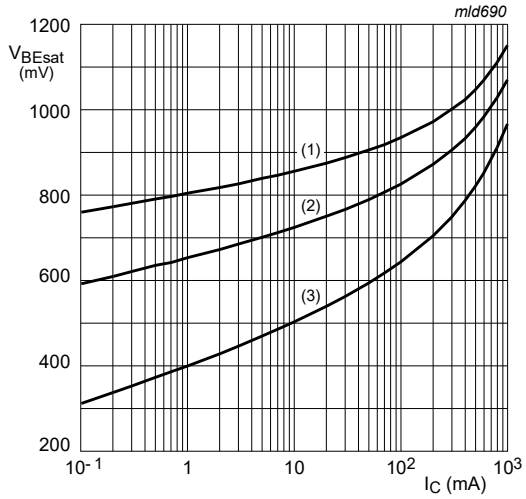
V_{CE} = 2 V
(1) T_{amb} = −55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 150 °C

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



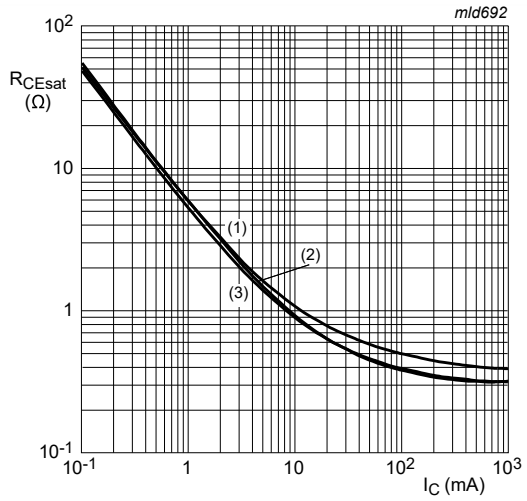
I_C/I_B = 20
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

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



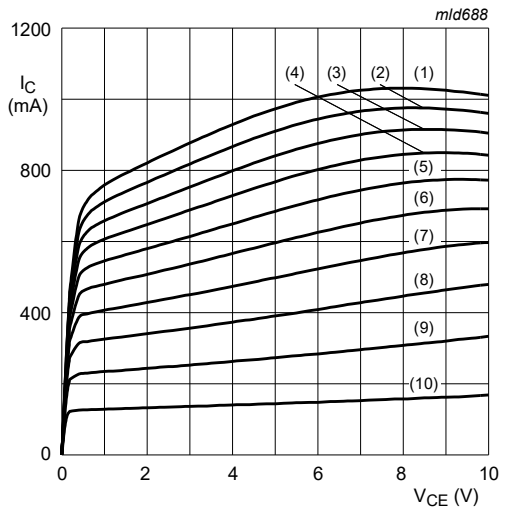
I_C/I_B = 20
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

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



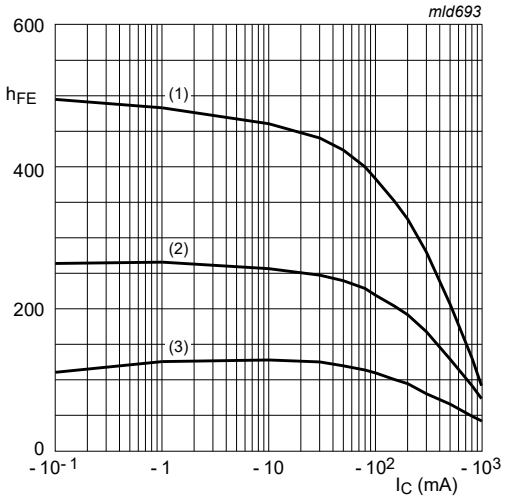
I_C/I_B = 20
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

Fig. 5. TR1 (NPN): Equivalent on-resistance as a function of collector current; typical values



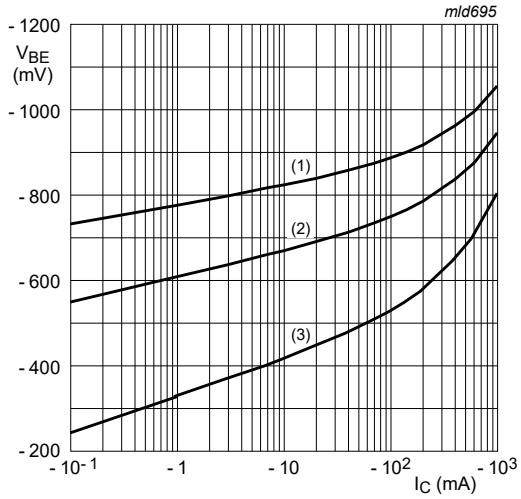
T_{amb} = 25 °C
(1) I_B = 4.6 mA
(2) I_B = 4.14 mA
(3) I_B = 3.68 mA
(4) I_B = 3.22 mA
(5) I_B = 2.76 mA
(6) I_B = 2.3 mA
(7) I_B = 1.84 mA
(8) I_B = 1.38 mA
(9) I_B = 0.92 mA
(10) I_B = 0.46 mA

Fig. 6. TR1 (NPN): Collector current as a function of collector-emitter voltage; typical values



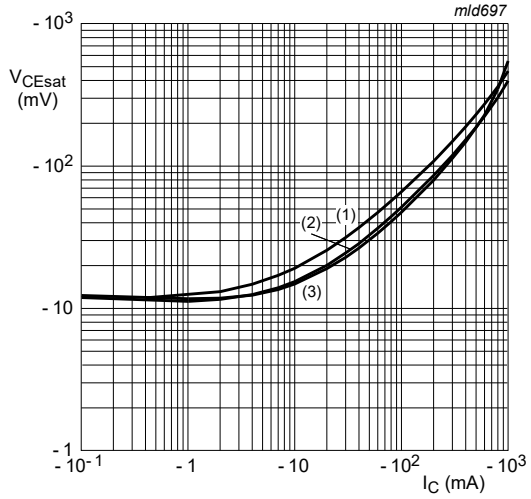
V_{CE} = −2 V
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

Fig. 7. TR2 (PNP): DC current gain as a function of collector current; typical values



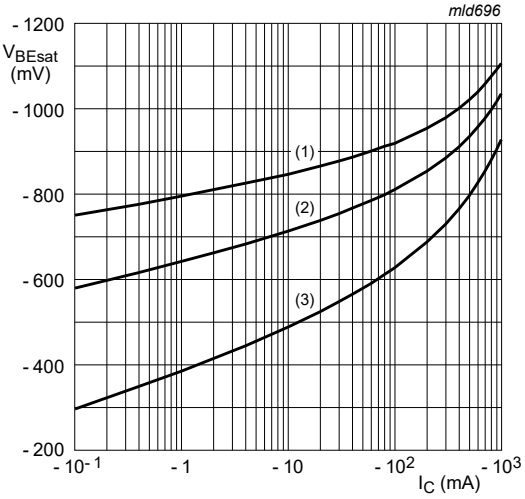
V_{CE} = −2 V
(1) T_{amb} = −55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 150 °C

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



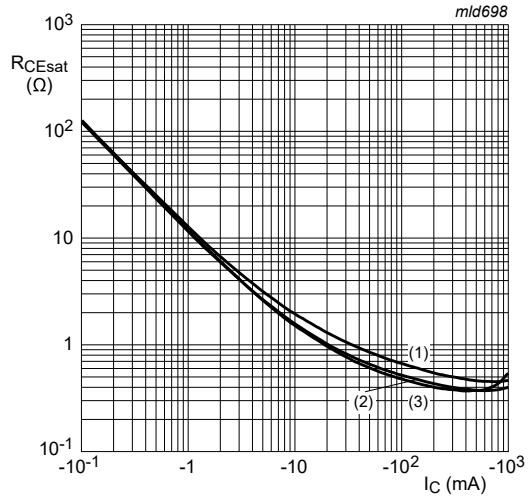
I_C/I_B = 20
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

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



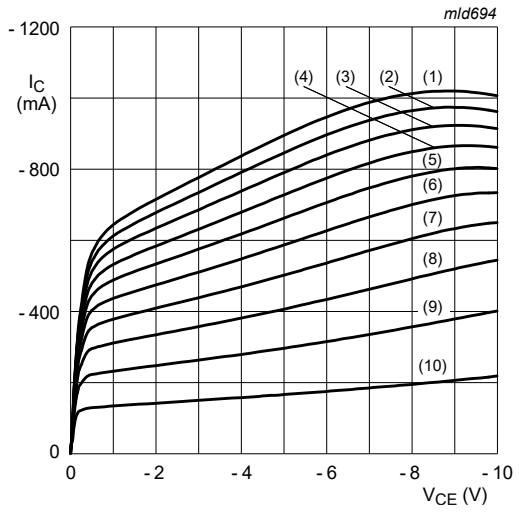
I_C/I_B = 20
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

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



I_C/I_B = 20
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

Fig. 11. TR2 (PNP): Equivalent on-resistance as a function of collector current; typical values



T_{amb} = 25 °C
(1) I_B = −7 mA
(2) I_B = −6.3 mA
(3) I_B = −5.6 mA
(4) I_B = −4.9 mA
(5) I_B = −4.2 mA
(6) I_B = −3.5 mA
(7) I_B = −2.8 mA
(8) I_B = −2.1 mA
(9) I_B = −1.4 mA
(10) I_B = −0.7 mA

Fig. 12. TR2 (PNP): Collector current as a function of collector-emitter voltage; typical values

11. Package outline

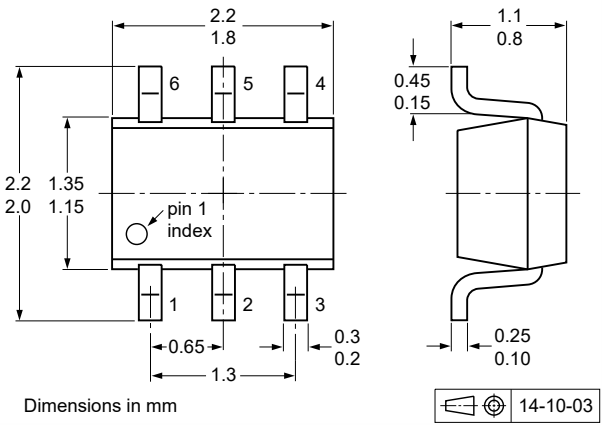


Fig. 13. Package outline TSSOP6 (SOT363)

12. Soldering

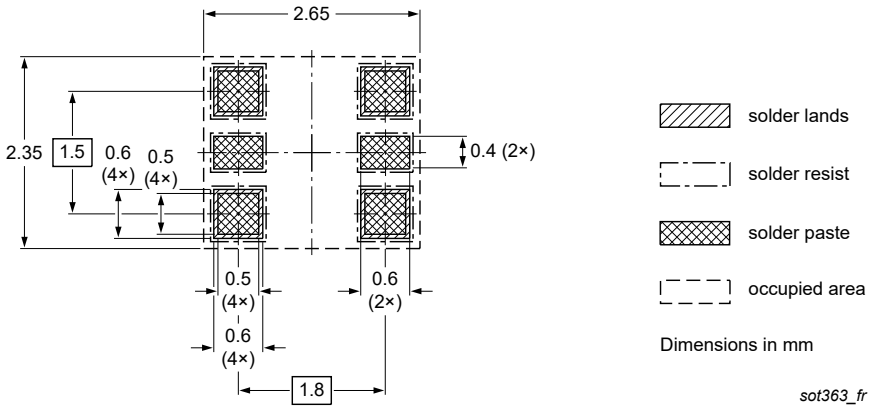


Fig. 14. Reflow soldering footprint for TSSOP6 (SOT363)

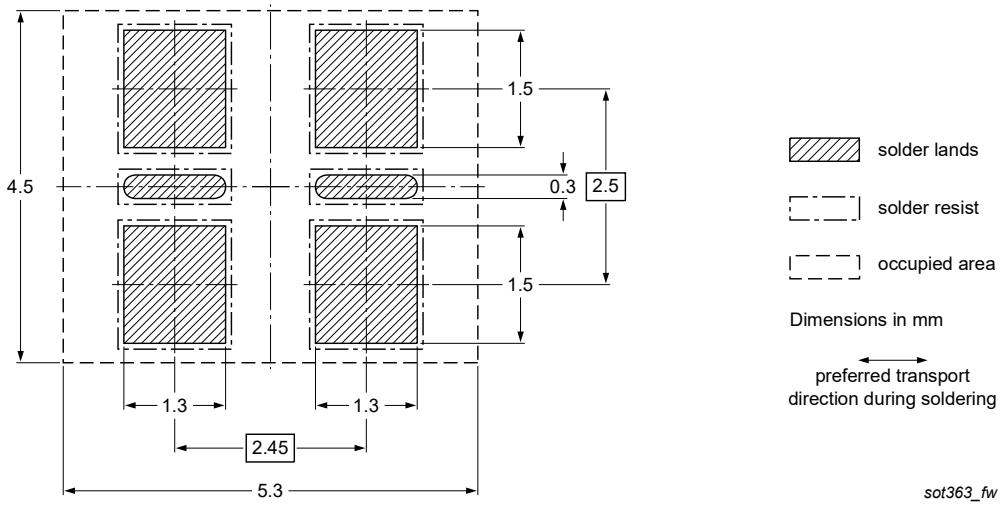


Fig. 15. Wave soldering footprint for TSSOP6 (SOT363)

13. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PBSS2515YPN v.3	20221001	Product data sheet	-	PBSS2515YPN v.2
Modifications:	• 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. • Product(s) changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q).			
PBSS2515YPN v.2	20050111	Product data sheet	-	PBSS2515YPN v.1
PBSS2515YPN v.1	20020508	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".
[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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For sales office addresses, please send an email to: salesaddresses@nexperia.com
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