PBSS4420D

20 V, 4 A NPN low VCEsat transistor

30 September 2025 Product data sheet

1. General description

NPN low V_{CEsat} transistor in a small SOT457 (SC-74) Surface-Mounted Device (SMD) plastic package.

PNP complement: PBSS5420D

2. Features and benefits

- Very low collector-emitter saturation resistance
- Ultra low collector-emitter saturation voltage
- 4 A continuous collector current
- Up to 15 A peak current
- High efficiency due to less heat generation

3. Applications

- Power management functions
- Charging circuits
- DC-to-DC conversion
- MOSFET gate driving
- Power switches (e.g. motors, fans)
- Thin Film Transistor (TFT) backlight inverter

4. Quick reference data

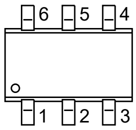
Table 1. Quick reference data

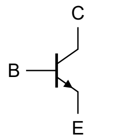
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base		-	-	20	V
I_C	collector current		[1]	-	-	4	A
I_{CM}	peak collector current	single pulse; $t_p \leq$ 1 ms		-	-	15	A
R_{CEsat}	collector-emitter saturation resistance	I_C = 4 A; I_B = 400 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		-	50	70	mΩ

[1] Device mounted on a ceramic PCB, Al_2O_3, standard footprint.

5. Pinning information

Table 2. Pinning information

<table>
<tr><th>Pin</th><th>Symbol</th><th>Description</th><th>Simplified outline</th><th>Graphic symbol</th></tr>
<tr><td>1</td><td>C</td><td>collector</td><td rowspan="6">

TSOP6 (SOT457)</td><td rowspan="6">

sym014</td></tr>
<tr><td>2</td><td>C</td><td>collector</td></tr>
<tr><td>3</td><td>B</td><td>base</td></tr>
<tr><td>4</td><td>E</td><td>emitter</td></tr>
<tr><td>5</td><td>C</td><td>collector</td></tr>
<tr><td>6</td><td>C</td><td>collector</td></tr>
</table>

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PBSS4420D	TSOP6	plastic, surface-mounted package (SC-74; TSOP6); 6 leads	SOT457

7. Marking

Table 4. Marking codes

Type number	Marking code
PBSS4420D	D4

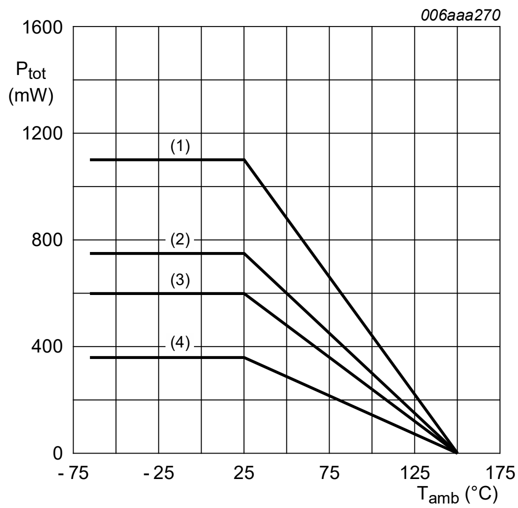
8. Limiting values

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		-	20	V
V_{CEO}	collector-emitter voltage	open base		-	20	V
V_{EBO}	emitter-base voltage	open collector		-	5	V
I_C	collector current		[1]	-	4	A
I_{CM}	peak collector current	single pulse; $t_p \leq$ 1 ms		-	15	A
I_B	base current			-	0.8	A
I_{BM}	peak base current	single pulse; $t_p \leq$ 1 ms		-	2	A
P_{tot}	total power dissipation	$T_{amb} \leq$ 25 °C	[2]	-	360	mW
			[3]	-	600	mW
			[4]	-	750	mW
			[1]	-	1.1	W
			[2] [5]	-	2.5	W
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			-65	150	°C
T_{stg}	storage temperature			-65	150	°C

[1] Device mounted on a ceramic PCB, Al_2O_3, standard footprint.
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm^2.
[4] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm^2.
[5] Operated under pulsed conditions: $\delta \leq 10$ %; $t_p \leq 10$ ms.



(1) Ceramic PCB, Al_2O_3, standard footprint
(2) FR4 PCB, mounting pad for collector 6 cm^2
(3) FR4 PCB, mounting pad for collector 1 cm^2
(4) FR4 PCB, standard footprint

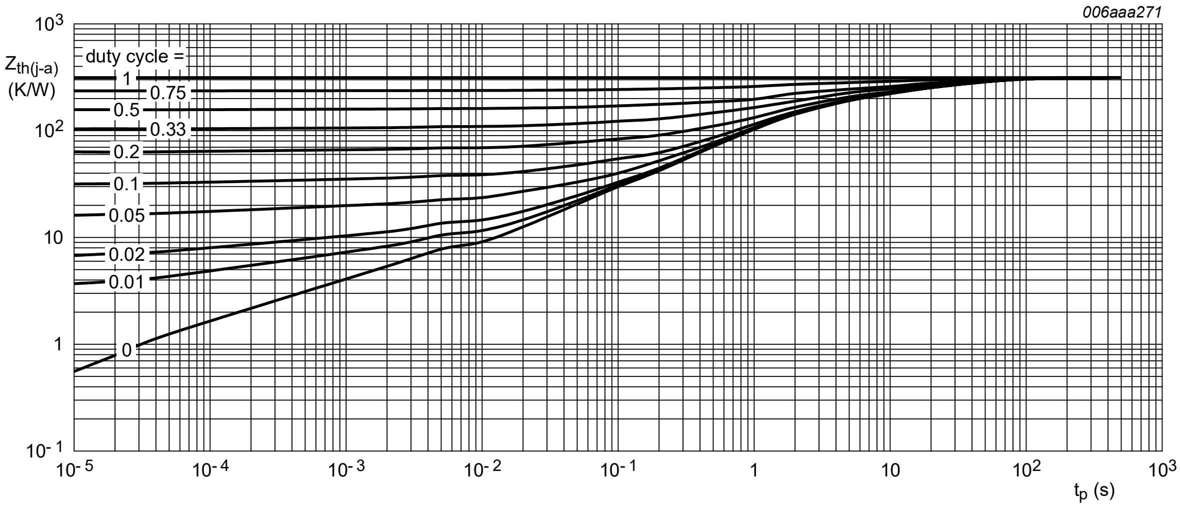
Fig. 1. Power derating curves

9. Thermal characteristics

Table 6. Thermal characteristics

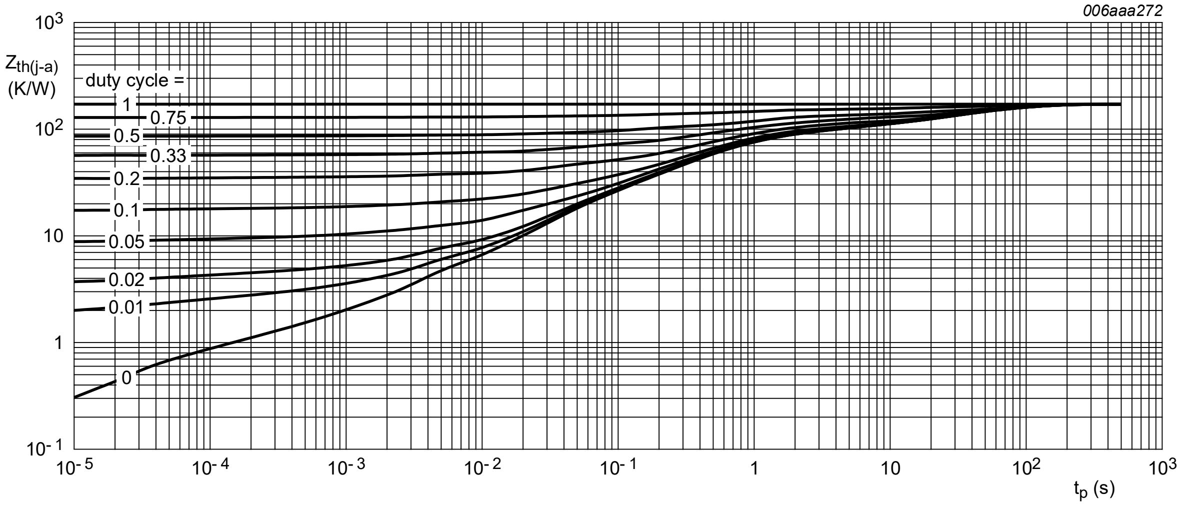
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	350	K/W
			[2]	-	-	208	K/W
			[3]	-	-	160	K/W
			[4]	-	-	113	K/W
			[1] [5]	-	-	50	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	-	45	K/W

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm^2.
[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm^2.
[4] Device mounted on a ceramic PCB, Al_2O_3, standard footprint.
[5] Operated under pulsed conditions: δ ≤ 10 %; t_p ≤ 10 ms.



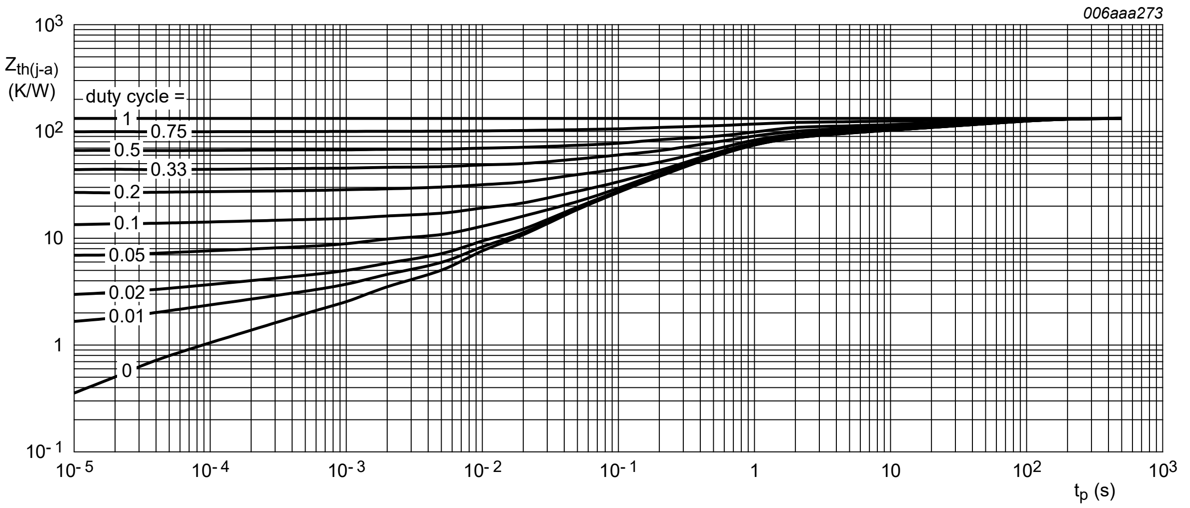
FR4 PCB, standard footprint

Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



FR4 PCB, mounting pad for collector 1 cm^2

Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



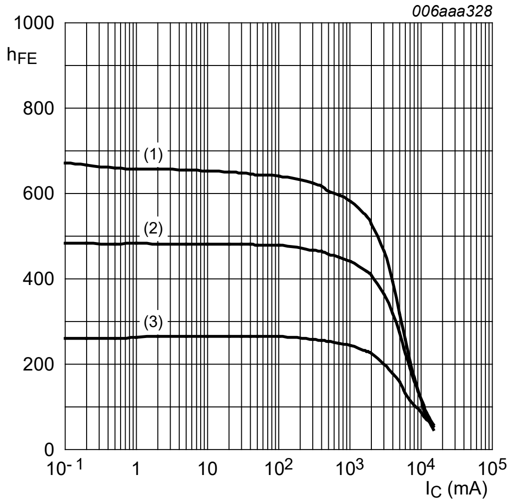
FR4 PCB, mounting pad for collector 6 cm^2

Fig. 4. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

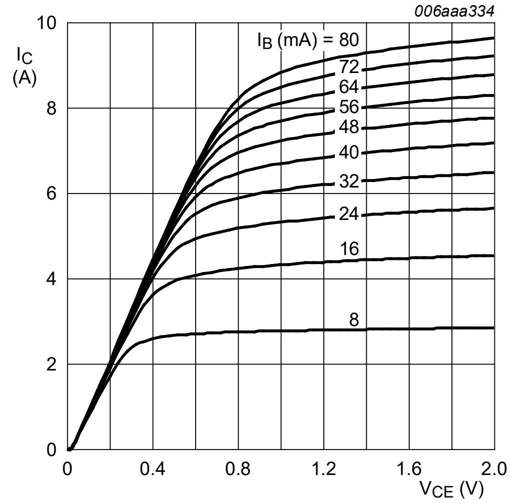
Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	V_{CB} = 20 V; I_E = 0 A; T_{amb} = 25 °C		-	-	100	nA
		V_{CB} = 20 V; I_E = 0 A; T_j = 150 °C		-	-	50	μA
I_{CES}	collector-emitter cut-off current	V_{CE} = 20 V; V_{BE} = 0 V; T_{amb} = 25 °C		-	-	100	nA
I_{EBO}	emitter-base cut-off current	V_{EB} = 5 V; I_C = 0 A; T_{amb} = 25 °C		-	-	100	nA
h_{FE}	DC current gain	V_{CE} = 2 V; I_C = 0.5 A; T_{amb} = 25 °C		300	450	-	
		V_{CE} = 2 V; I_C = 1 A; pulsed; t_p ≤ 300 μs; δ ≤ 0.02; T_{amb} = 25 °C		300	430	-	
		V_{CE} = 2 V; I_C = 2 A; pulsed; t_p ≤ 300 μs; δ ≤ 0.02; T_{amb} = 25 °C		250	400	-	
		V_{CE} = 2 V; I_C = 4 A; pulsed; t_p ≤ 300 μs; δ ≤ 0.02; T_{amb} = 25 °C		200	310	-	
		V_{CE} = 2 V; I_C = 6 A; pulsed; t_p ≤ 300 μs; δ ≤ 0.02; T_{amb} = 25 °C		100	230	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = 0.5 A; I_B = 50 mA; T_{amb} = 25 °C		-	30	50	mV
		I_C = 1 A; I_B = 50 mA; T_{amb} = 25 °C		-	60	90	mV
		I_C = 2 A; I_B = 200 mA; T_{amb} = 25 °C		-	110	150	mV
		I_C = 4 A; I_B = 400 mA; pulsed; t_p ≤ 300 μs; δ ≤ 0.02; T_{amb} = 25 °C		-	200	280	mV
		I_C = 6 A; I_B = 600 mA; pulsed; t_p ≤ 300 μs; δ ≤ 0.02; T_{amb} = 25 °C		-	300	420	mV
R_{CEsat}	collector-emitter saturation resistance	I_C = 4 A; I_B = 400 mA; pulsed; t_p ≤ 300 μs; δ ≤ 0.02; T_{amb} = 25 °C		-	50	70	mΩ
V_{BEsat}	base-emitter saturation voltage	I_C = 0.5 A; I_B = 50 mA; T_{amb} = 25 °C		-	0.79	0.85	V
		I_C = 1 A; I_B = 50 mA; T_{amb} = 25 °C		-	0.81	0.9	V
		I_C = 1 A; I_B = 100 mA; pulsed; t_p ≤ 300 μs; δ ≤ 0.02; T_{amb} = 25 °C		-	0.83	1	V
		I_C = 4 A; I_B = 400 mA; pulsed; t_p ≤ 300 μs; δ ≤ 0.02; T_{amb} = 25 °C		-	1	1.1	V
V_{BEon}	base-emitter turn-on voltage	V_{CE} = 2 V; I_C = 2 A; T_{amb} = 25 °C		-	0.79	1	V
t_d	delay time	V_{CC} = 12.5 V; I_C = 3 A; I_{Bon} = 0.15 A; I_{Boff} = -0.15 A; T_{amb} = 25 °C		-	12	-	ns
t_r	rise time			-	36	-	ns
t_{on}	turn-on time			-	48	-	ns
t_s	storage time			-	230	-	ns
t_f	fall time			-	50	-	ns
t_{off}	turn-off time			-	280	-	ns
f_T	transition frequency	V_{CE} = 10 V; I_C = 0.1 A; f = 100 MHz; T_{amb} = 25 °C		-	100	-	MHz
C_c	collector capacitance	V_{CB} = 10 V; I_E = 0 A; i_e = 0 A; f = 1 MHz; T_{amb} = 25 °C		-	60	-	pF



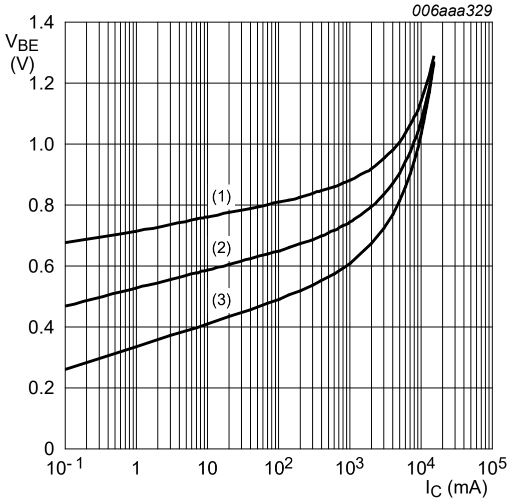
V_{CE} = 2 V
(1) T_{amb} = 100 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

Fig. 5. DC current gain as a function of collector current; typical values



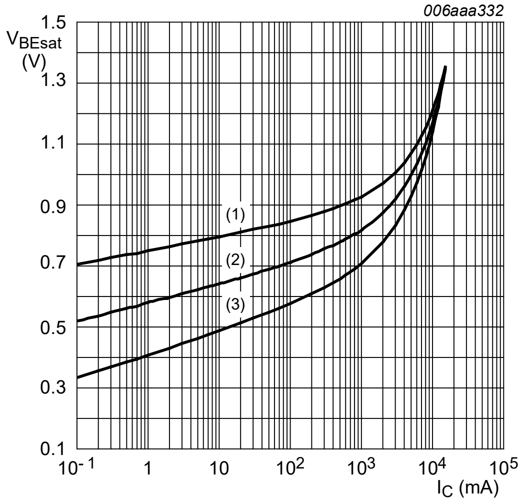
T_{amb} = 25 °C

Fig. 6. Collector current as a function of collector-emitter voltage; typical values



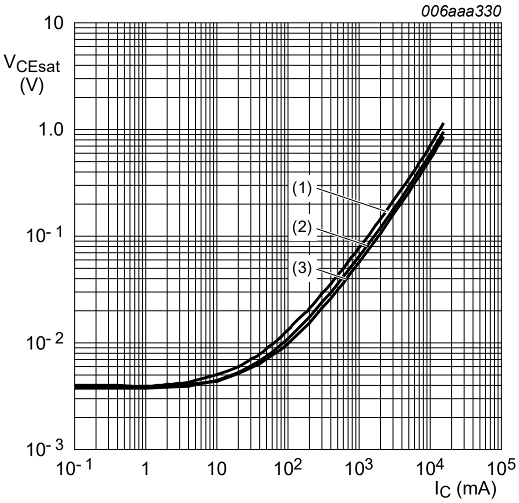
V_{CE} = 2 V
(1) T_{amb} = -55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 100 °C

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



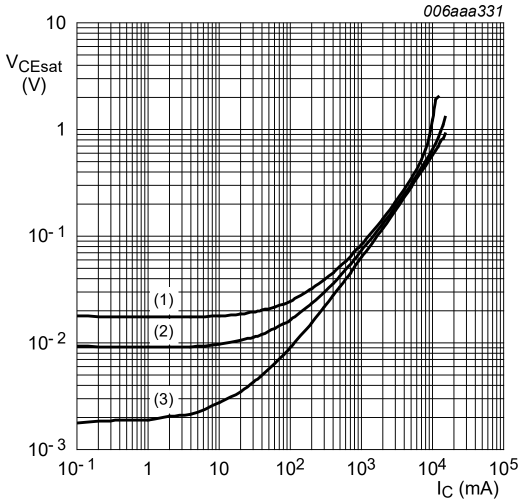
I_C/I_B = 20
(1) T_{amb} = -55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 100 °C

Fig. 8. Base-emitter saturation voltage as a function of collector current; typical values



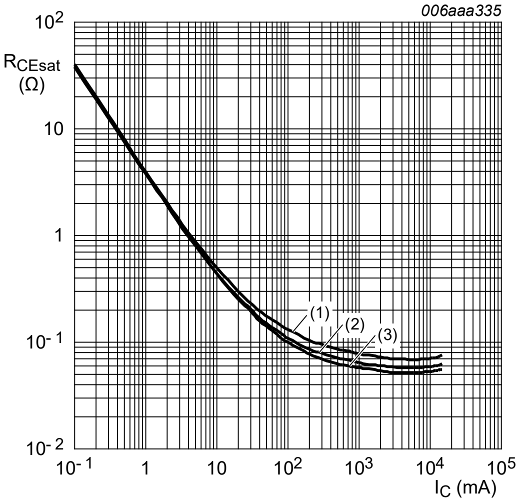
$I_C/I_B = 20$
(1) T_{amb} = 100 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

Fig. 9. Collector-emitter saturation voltage as a function of collector current; typical values



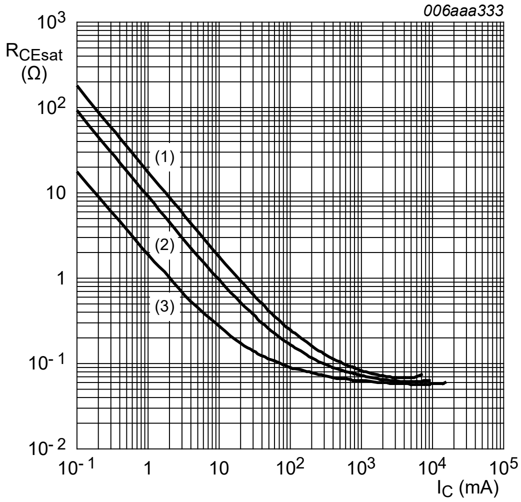
T_{amb} = 25 °C
(1) $I_C/I_B = 100$
(2) $I_C/I_B = 50$
(3) $I_C/I_B = 10$

Fig. 10. Collector-emitter saturation voltage as a function of collector current; typical values



$I_C/I_B = 20$
(1) T_{amb} = 100 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

Fig. 11. Collector-emitter saturation resistance as a function of collector current; typical values



T_{amb} = 25 °C
(1) $I_C/I_B = 100$
(2) $I_C/I_B = 50$
(3) $I_C/I_B = 10$

Fig. 12. Collector-emitter saturation resistance as a function of collector current; typical values

11. Test information

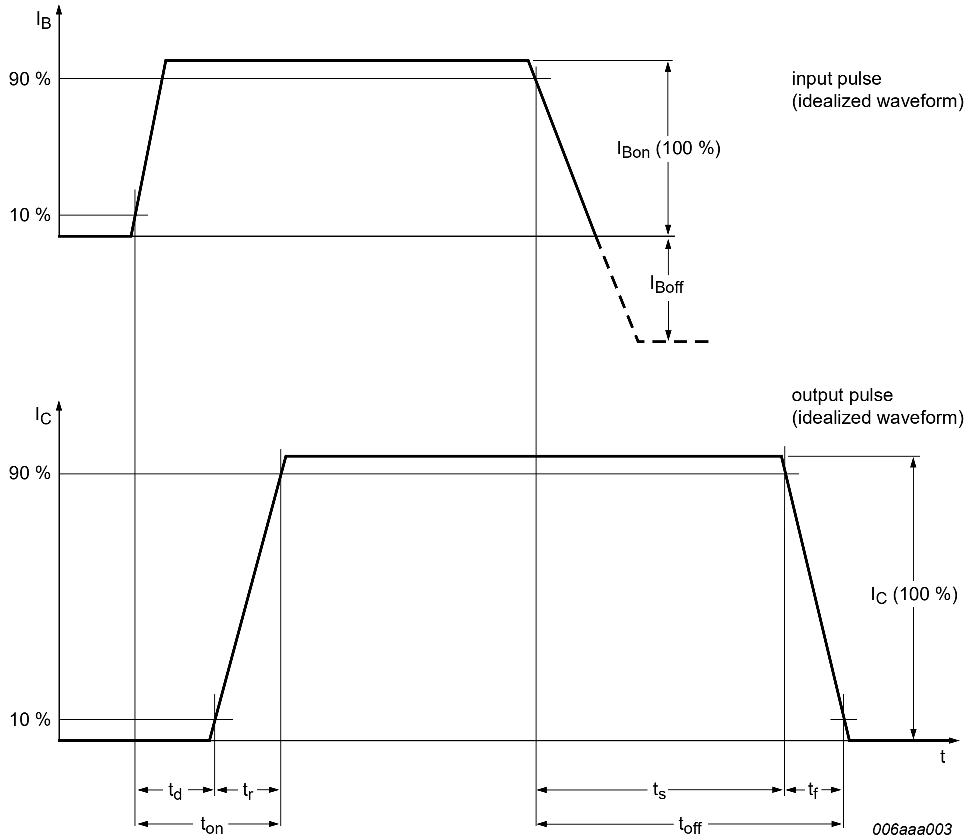


Fig. 13. Switching time definition

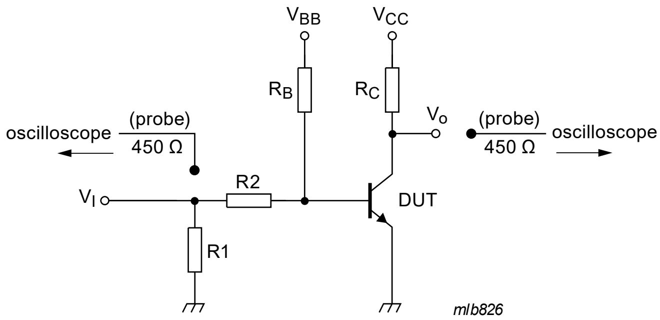


Fig. 14. Test circuit for switching times

V_{CC} = 12.5 V; I_C = 3 A; I_{Bon} = 0.15 A; I_{Boff} = -0.15 A

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12. Package outline

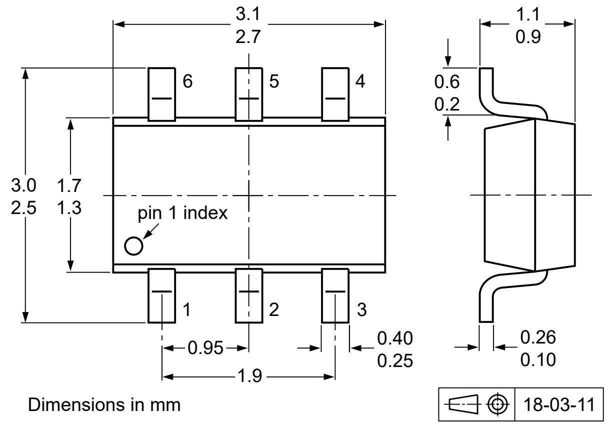

Fig. 15. Package outline TSOP6 (SOT457)

13. Soldering

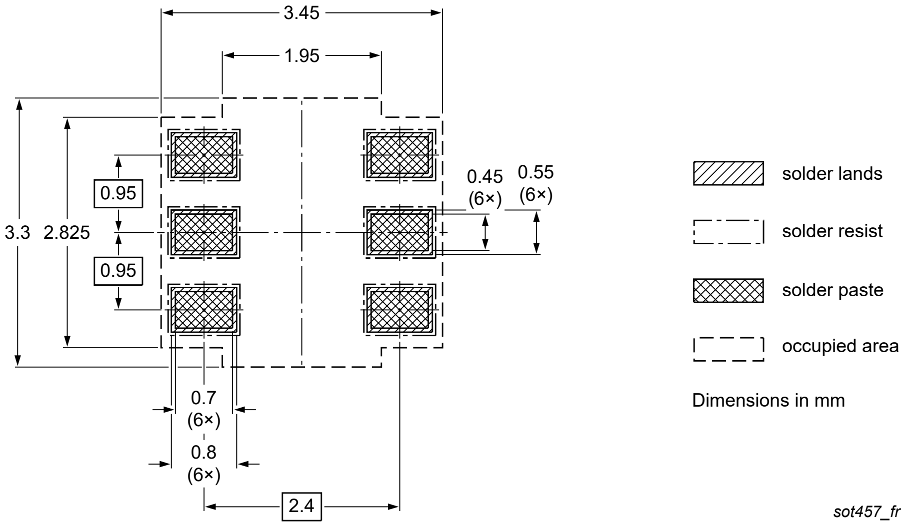

Fig. 16. Reflow soldering footprint for TSOP6 (SOT457)

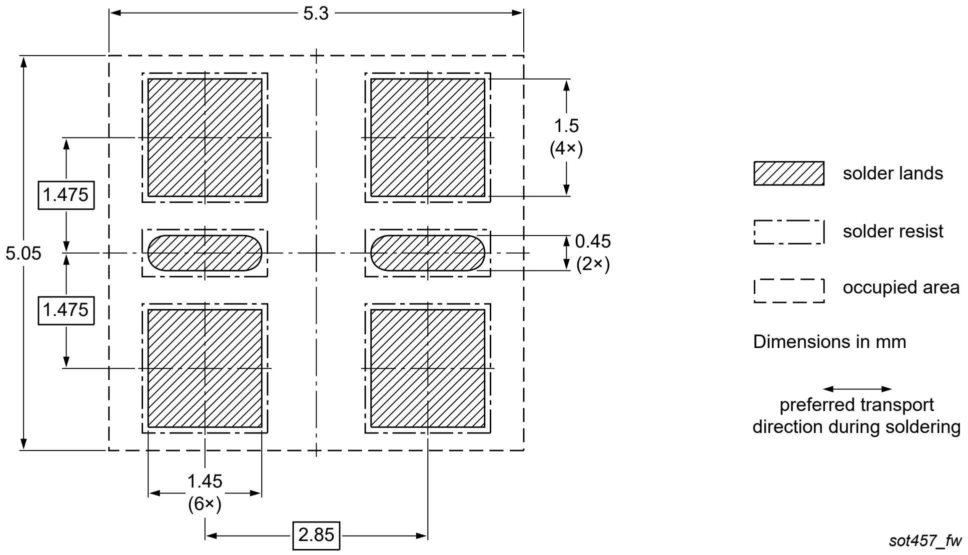

Fig. 17. Wave soldering footprint for TSOP6 (SOT457)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PBSS4420D v.3	20250930	Product data sheet	-	PBSS4420D_2
Modifications:	• Product(s) changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s).			
PBSS4420D_2	20080924	Product data sheet	-	PBSS4420D_1
PBSS4420D_1	20050421	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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Date of release: 30 September 2025