PBSS5330PA

30 V, 3 A PNP low VCEsat (BISS) transistor

7 April 2015 — Product data sheet

1. General description

PNP low V_{CEsat} Breakthrough In Small Signal (BISS) transistor, encapsulated in an ultra thin SOT1061 leadless small Surface-Mounted Device (SMD) plastic package with medium power capability.

NPN complement: PBSS4330PA.

2. Features and benefits

- Low collector-emitter saturation voltage V_{CEsat}
- High collector current capability I_C and I_{CM}
- Smaller required Printed-Circuit Board (PCB) area than for conventional transistors
- Exposed heat sink for excellent thermal and electrical conductivity
- Leadless small SMD plastic package with medium power capability

3. Applications

- Loadswitch
- Battery-driven devices
- Power management
- Charging circuits
- Power switches (e.g. motors, fans)

4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base		-	-	-30	V
I_C	collector current			-	-	-3	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms		-	-	-5	A
R_{CEsat}	collector-emitter saturation resistance	I_C = -3 A; I_B = -300 mA; pulsed; $t_p \leq 300$ µs; $\delta \leq 0.02$; T_{amb} = 25 °C		-	75	107	mΩ

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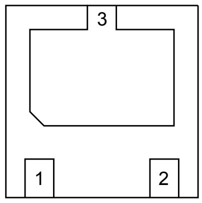
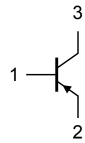
5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base	 Transparent top view **DFN2020-3 (SOT1061)**	 *sym013*
2	E	emitter		
3	C	collector		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PBSS5330PA	DFN2020-3	DFN2020-3: plastic thermal enhanced ultra thin small outline package; no leads; 3 terminals; body 2 x 2 x 0.65 mm	SOT1061

7. Marking

Table 4. Marking codes

Type number	Marking code
PBSS5330PA	AJ

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8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

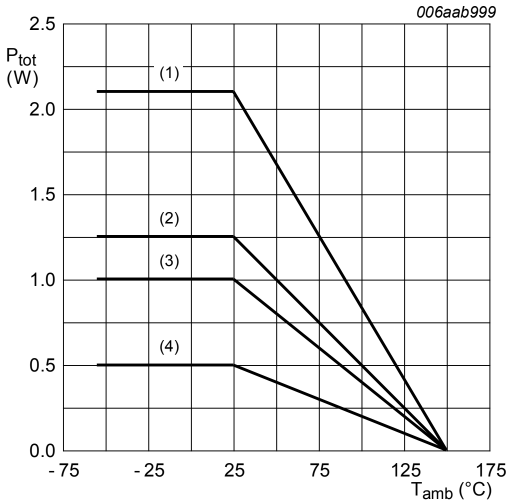
Symbol	Parameter	Conditions		Min	Max	Unit
V_{CBO}	collector-base voltage	open emitter		-	-30	V
V_{CEO}	collector-emitter voltage	open base		-	-30	V
V_{EBO}	emitter-base voltage	open collector		-	-6	V
I_C	collector current			-	-3	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms		-	-5	A
I_B	base current			-	-500	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	500	mW
			[2]	-	1	W
			[3]	-	1.25	W
			[4]	-	2.1	W
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			-55	150	°C
T_{stg}	storage temperature			-65	150	°C

[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.



(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

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9. Thermal characteristics

Table 6. Thermal characteristics

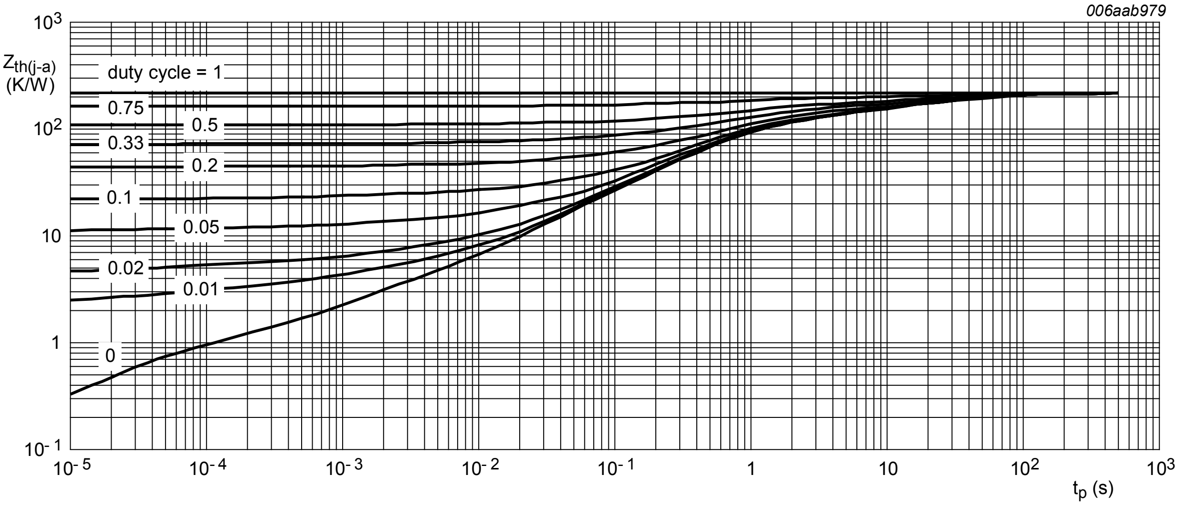
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	250	K/W
			[2]	-	-	125	K/W
			[3]	-	-	100	K/W
			[4]	-	-	60	K/W

[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.



FR4 PCB, standard footprint

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

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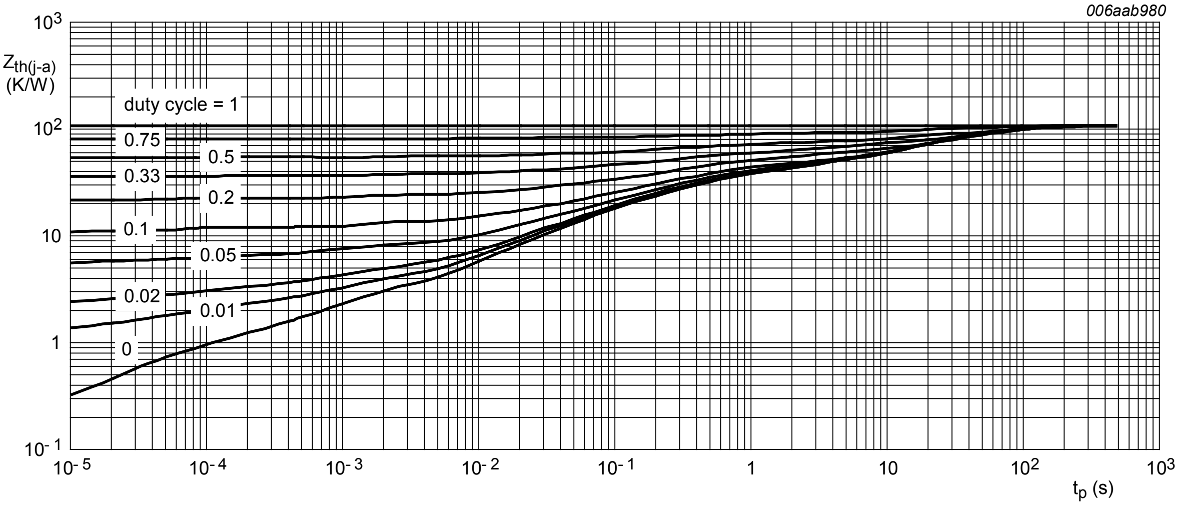
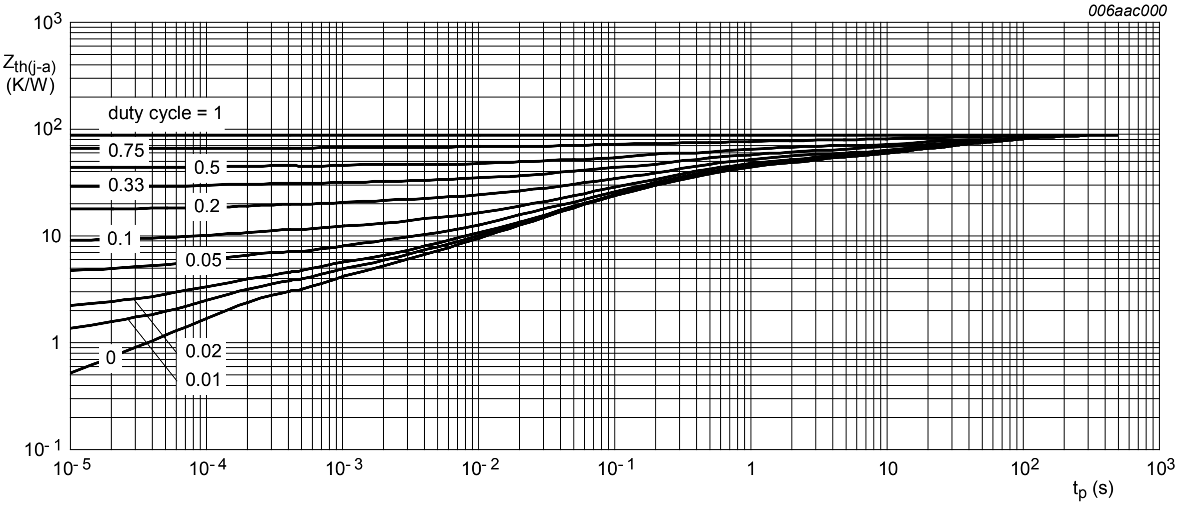


FR4 PCB, mounting pad for collector 1 cm²

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



FR4 PCB, mounting pad for collector 6 cm²

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

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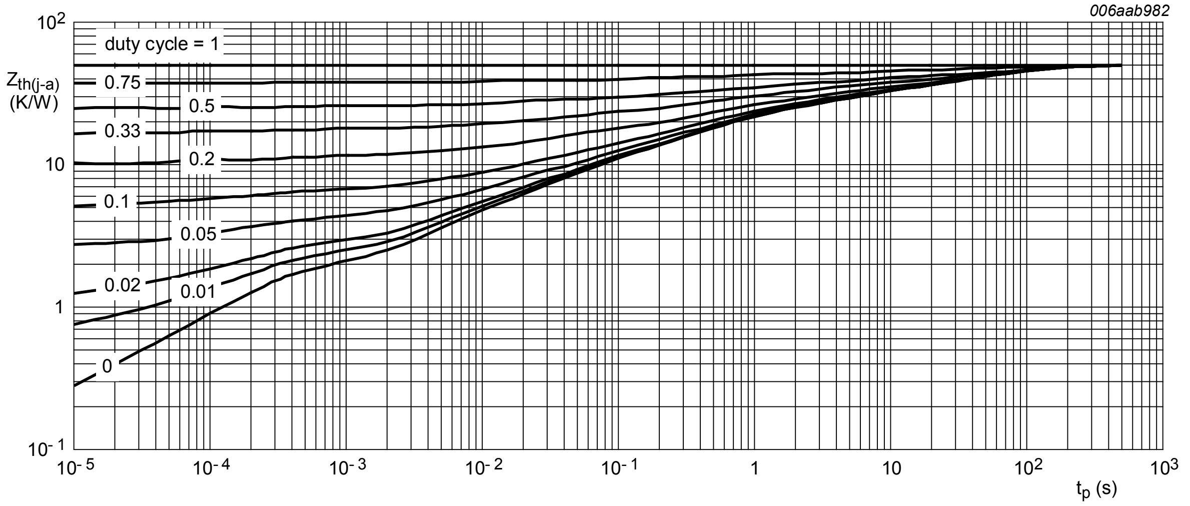

Ceramic PCB, Al_2O_3, standard footprint

Fig. 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

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10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	V_{CB} = -30 V; I_E = 0 A; T_{amb} = 25 °C		-	-	-100	nA
		V_{CB} = -30 V; I_E = 0 A; T_j = 150 °C		-	-	-50	μA
I_{CES}	collector-emitter cut-off current	V_{CE} = -24 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; pulsed; t_p ≤ 300 μs; δ ≤ 0.02 ; T_{amb} = 25 °C		200	320	-	
		V_{CE} = -2 V; I_C = -1 A; pulsed; t_p ≤ 300 μs; δ ≤ 0.02 ; T_{amb} = 25 °C		175	280	450	
		V_{CE} = -2 V; I_C = -2 A; pulsed; t_p ≤ 300 μs; δ ≤ 0.02 ; T_{amb} = 25 °C		140	210	-	
		V_{CE} = -2 V; I_C = -3 A; pulsed; t_p ≤ 300 μs; δ ≤ 0.02 ; T_{amb} = 25 °C		100	160	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = -0.5 A; I_B = -50 mA; pulsed; t_p ≤ 300 μs; δ ≤ 0.02 ; T_{amb} = 25 °C		-	-45	-70	mV
		I_C = -1 A; I_B = -50 mA; pulsed; t_p ≤ 300 μs; δ ≤ 0.02 ; T_{amb} = 25 °C		-	-90	-130	mV
		I_C = -2 A; I_B = -100 mA; pulsed; t_p ≤ 300 μs; δ ≤ 0.02 ; T_{amb} = 25 °C		-	-170	-240	mV
		I_C = -3 A; I_B = -300 mA; pulsed; t_p ≤ 300 μs; δ ≤ 0.02 ; T_{amb} = 25 °C		-	-230	-320	mV
R_{CEsat}	collector-emitter saturation resistance			-	75	107	mΩ
V_{BEsat}	base-emitter saturation voltage	I_C = -2 A; I_B = -100 mA; pulsed; t_p ≤ 300 μs; δ ≤ 0.02 ; T_{amb} = 25 °C		-	-0.89	-1.1	V
		I_C = -3 A; I_B = -300 mA; pulsed; t_p ≤ 300 μs; δ ≤ 0.02 ; T_{amb} = 25 °C		-	-0.97	-1.2	V
V_{BEon}	base-emitter turn-on voltage	V_{CE} = -2 V; I_C = -1 A; pulsed; t_p ≤ 300 μs; δ ≤ 0.02 ; T_{amb} = 25 °C		-	-0.75	-1	V
t_d	delay time	V_{CC} = -9 V; I_C = -2 A; I_{Bon} = -0.1 A; I_{Boff} = 0.1 A; T_{amb} = 25 °C		-	11	-	ns
t_r	rise time			-	59	-	ns
t_{on}	turn-on time			-	70	-	ns
t_s	storage time			-	165	-	ns
t_f	fall time			-	35	-	ns
t_{off}	turn-off time			-	200	-	ns

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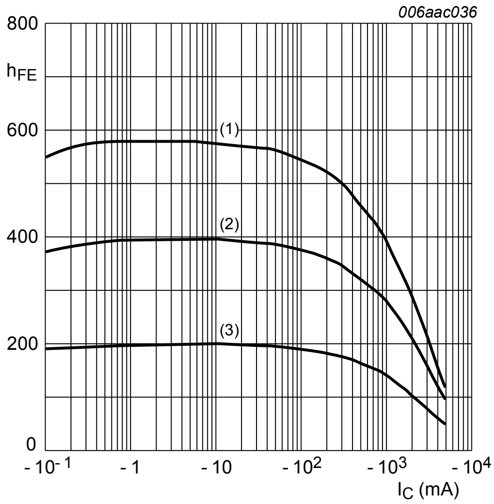
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
f_T	transition frequency	V_{CE} = -5 V; I_C = -100 mA; f = 100 MHz; T_{amb} = 25 °C		100	165	-	MHz
C_c	collector capacitance	V_{CB} = -10 V; I_E = 0 A; i_e = 0 A; f = 1 MHz; T_{amb} = 25 °C		-	38	45	pF



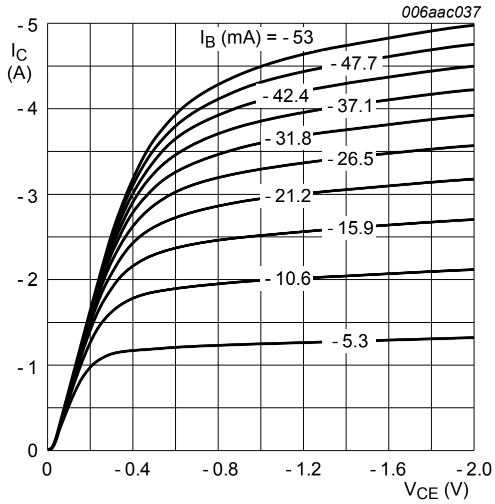
V_{CE} = −2 V

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −55 °C

Fig. 6. DC current gain as a function of collector current; typical values



T_{amb} = 25 °C

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

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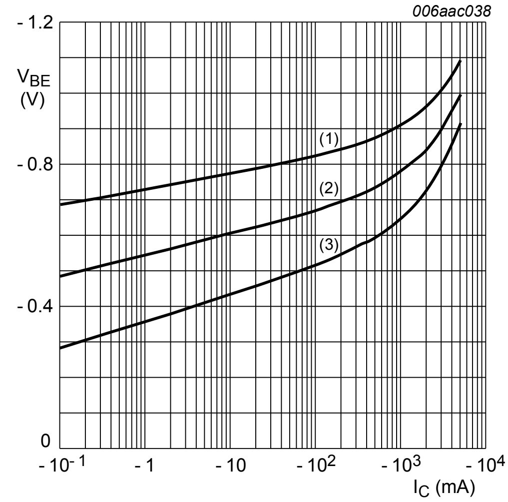
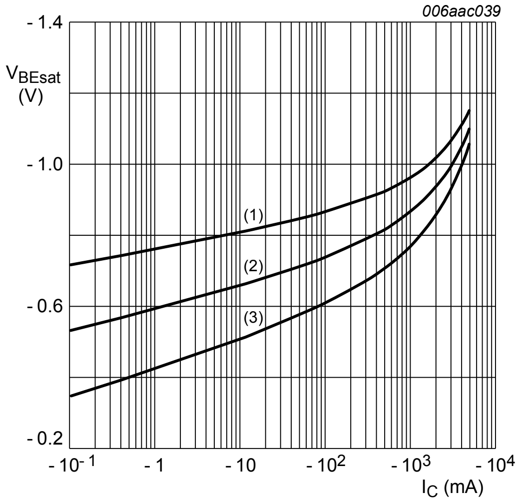


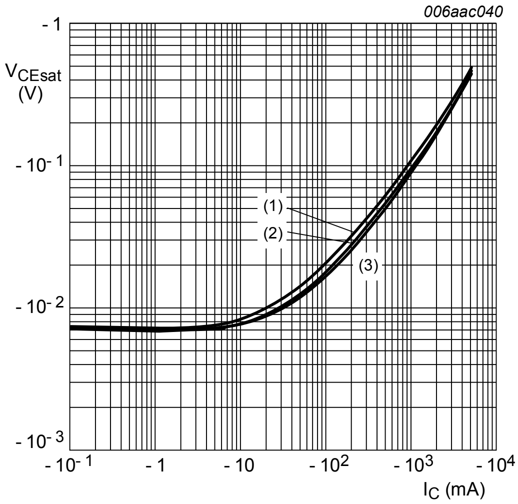
V_{CE} = −2 V
(1) T_{amb} = −55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 100 °C

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



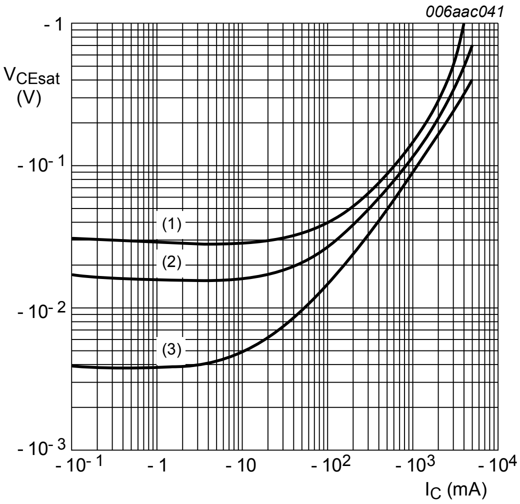
I_C/I_B = 20
(1) T_{amb} = −55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 100 °C

Fig. 9. 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. 10. 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. 11. Collector-emitter saturation voltage as a function of collector current; typical values

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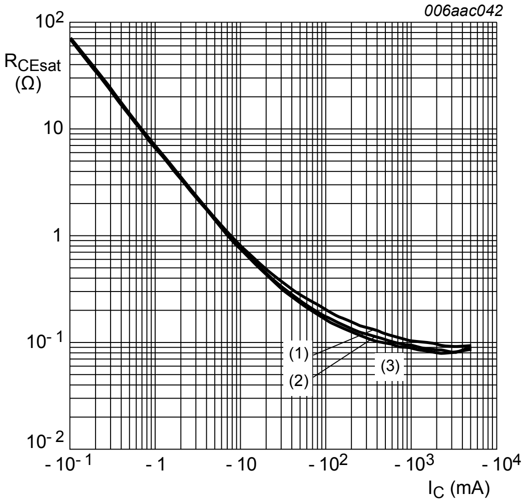


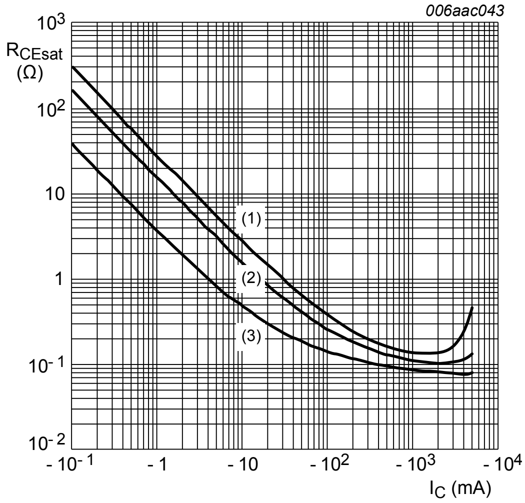
$I_C/I_B = 20$

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −55 °C

Fig. 12. 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. 13. Collector-emitter saturation resistance as a function of collector current; typical values

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11. Test information

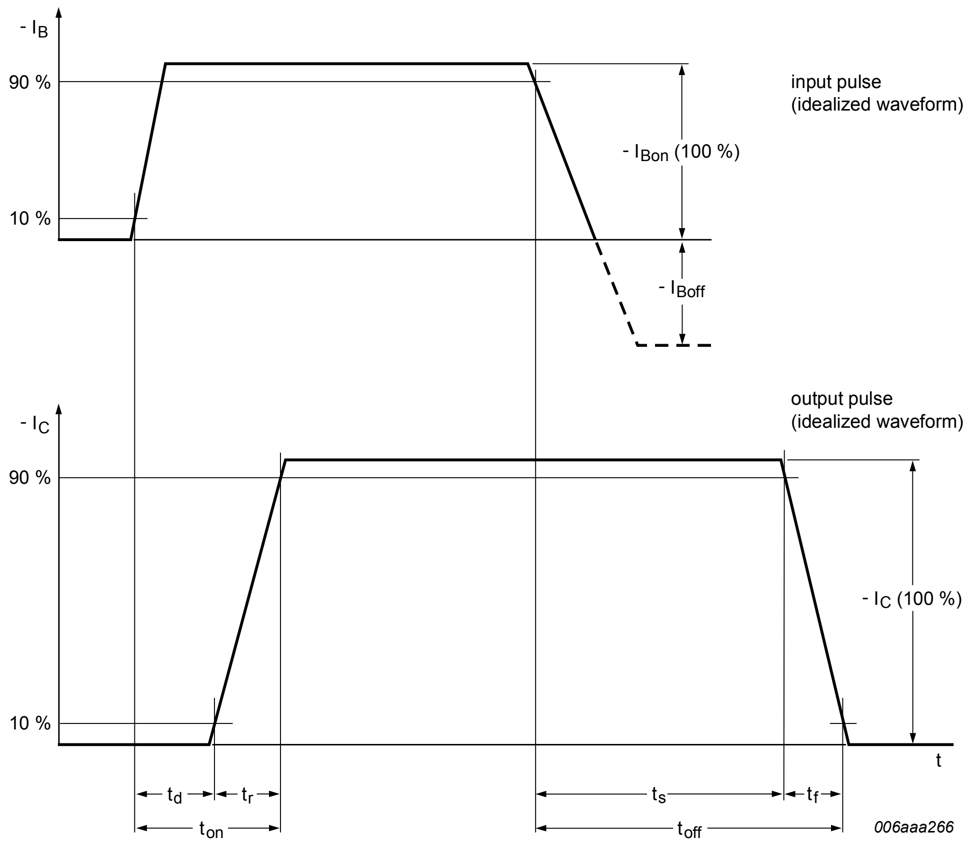

Fig. 14. BISS transistor switching time definition

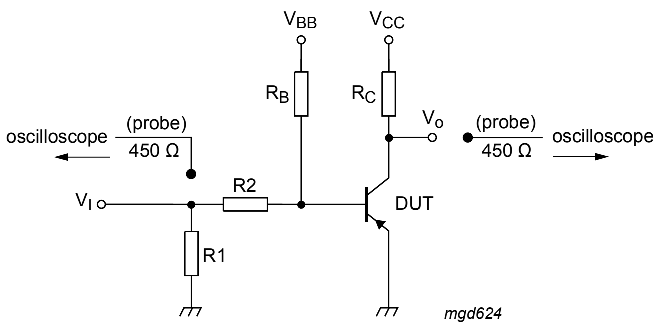

Fig. 15. Test circuit for switching times

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12. Package outline

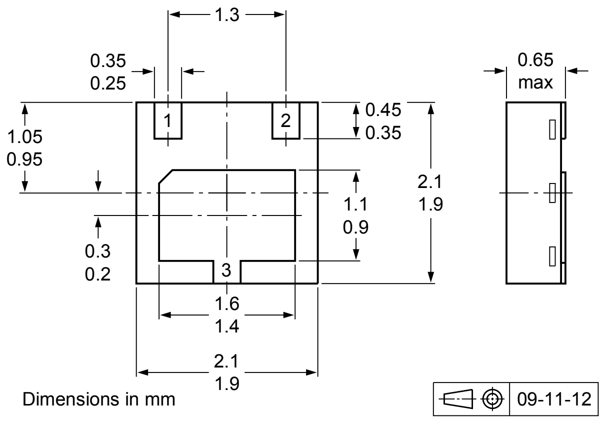

Fig. 16. Package outline DFN2020-3 (SOT1061)

13. Soldering

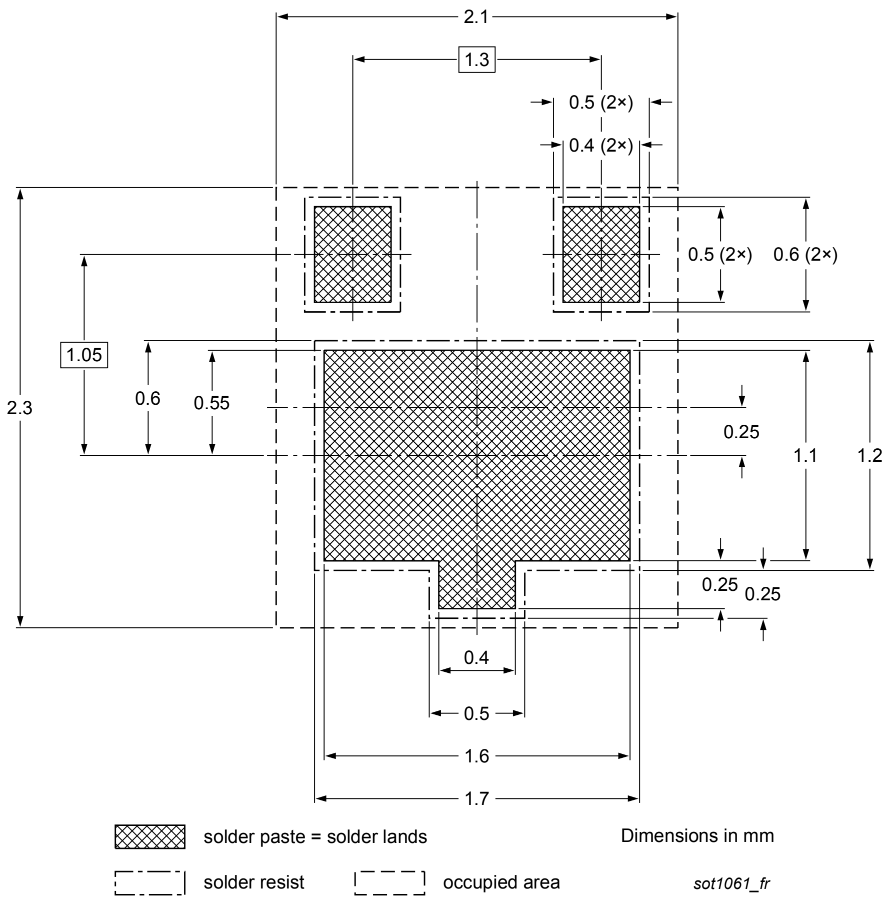

Fig. 17. Reflow soldering footprint for DFN2020-3 (SOT1061)

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14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PBSS5330PA v.2	20150407	Product data sheet	-	PBSS5330PA v.1
Modifications:	• Condition V_{CE} changed for parameter I_{CES} in Table 7, Characteristics			
PBSS5330PA v.1	20100419	Product data sheet	-	-

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15. Legal information

15.1 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.
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16. Contents

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Date of release: 07 April 2015

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- *Формирование склада под заказчика.*

- *Сертификаты соответствия на поставляемую продукцию (по желанию клиента).*
- *Тестирование поставляемой продукции.*
- *Поставку компонентов, требующих военную и космическую приемку.*
- *Входной контроль качества.*
- *Наличие сертификата ISO.*

В составе нашей компании организован Конструкторский отдел, призванный помогать разработчикам, и инженерам.

Конструкторский отдел помогает осуществить:

- *Регистрацию проекта у производителя компонентов.*
- *Техническую поддержку проекта.*
- *Защиту от снятия компонента с производства.*
- *Оценку стоимости проекта по компонентам.*
- *Изготовление тестовой платы монтаж и пусконаладочные работы.*

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