



PBSS5350PAS-Q

50 V, 3 A PNP low V_{CEsat} transistor

7 August 2024

Product data sheet

1. General description

PNP low V_{CEsat} transistor in DFN2020D-3 (SOT1061D) leadless small Surface-Mounted Device (SMD) plastic package with visible and solderable side pads.

NPN complement: PBSS4350PAS-Q

2. Features and benefits

- DFN2020D-3 (SOT1061D) package
- Low collector-emitter saturation voltage V_{CEsat}
- High collector current capability: I_C and I_{CM}
- Higher efficiency leading to less heat generation
- Reduced printed-circuit board requirements
- Leadless small SMD plastic package with solderable side pads
- Exposed heat sink for excellent thermal and electrical conductivity
- Suitable for Automatic Optical Inspection (AOI) of solder joint
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

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

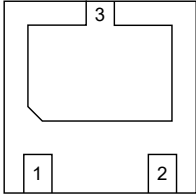
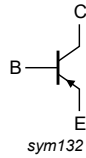
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V _{CEO}	collector-emitter voltage	open base	-	-	-50	V
I _C	collector current		-	-	-3	A
I _{CM}	peak collector current	limited by T _{j(max)}	-	-	-5	A
R _{CEsat}	collector-emitter saturation resistance	I _C = -2 A; I _B = -200 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _{amb} = 25 °C	-	90	135	mΩ

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base	 <p>Transparent top view DFN2020D-3 (SOT1061D)</p>	
2	E	emitter		
3	C	collector		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PBSS5350PAS-Q	DFN2020D-3	plastic, leadless thermal enhanced ultra thin small outline package with side-wettable flanks (SWF); no leads; 3 terminals; 1.3 mm pitch; 2 mm x 2 mm x 0.65 mm body	SOT1061D

7. Marking

Table 4. Marking codes

Type number	Marking code
PBSS5350PAS-Q	G4

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		-	-50	V
V_{CEO}	collector-emitter voltage	open base		-	-50	V
V_{EBO}	emitter-base voltage	open collector		-	-5	V
I_C	collector current			-	-3	A
I_{CM}	peak collector current	limited by $T_{j(max)}$		-	-5	A
I_B	base current			-	-0.5	A
P_{tot}	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[1]	-	0.5	W
			[2] [3]	-	1	W
			[4]	-	1.2	W
			[5] [6]	-	2	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 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 cm².
- [3] Device mounted on an FR4 PCB, 4-layer copper, tin-plated and standard footprint.
- [4] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm².
- [5] Device mounted on a ceramic PCB, Al₂O₃, standard footprint.
- [6] Device mounted on a FR4 PCB, 4-layer copper, tin-plated and mounting pad for collector 1 cm².

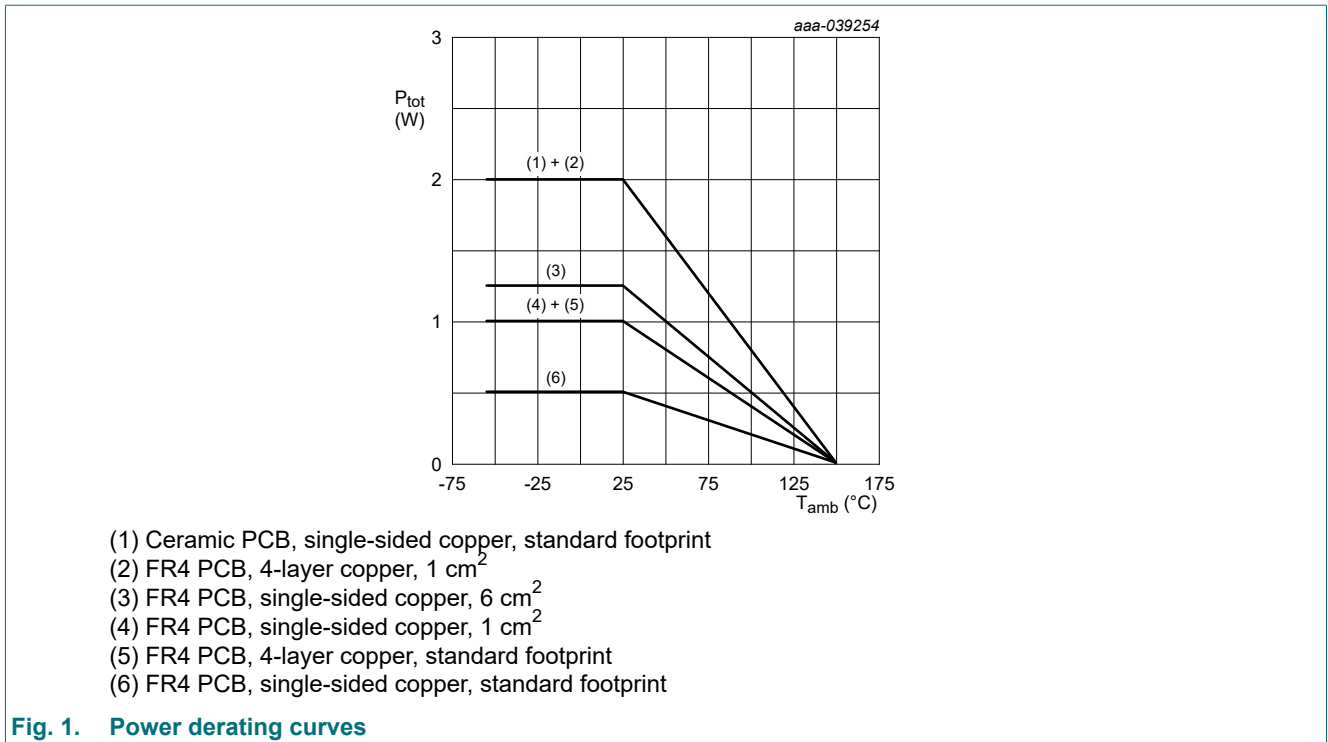


Fig. 1. Power derating curves

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]	-	-	250	K/W
			[2] [3]	-	-	125	K/W
			[4]	-	-	100	K/W
			[5] [6]	-	-	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 cm².
- [3] Device mounted on an FR4 PCB, 4-layer copper, tin-plated and standard footprint.
- [4] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm².
- [5] Device mounted on a ceramic PCB, Al₂O₃, standard footprint.
- [6] Device mounted on a FR4 PCB, 4-layer copper, tin-plated and mounting pad for collector 1 cm².

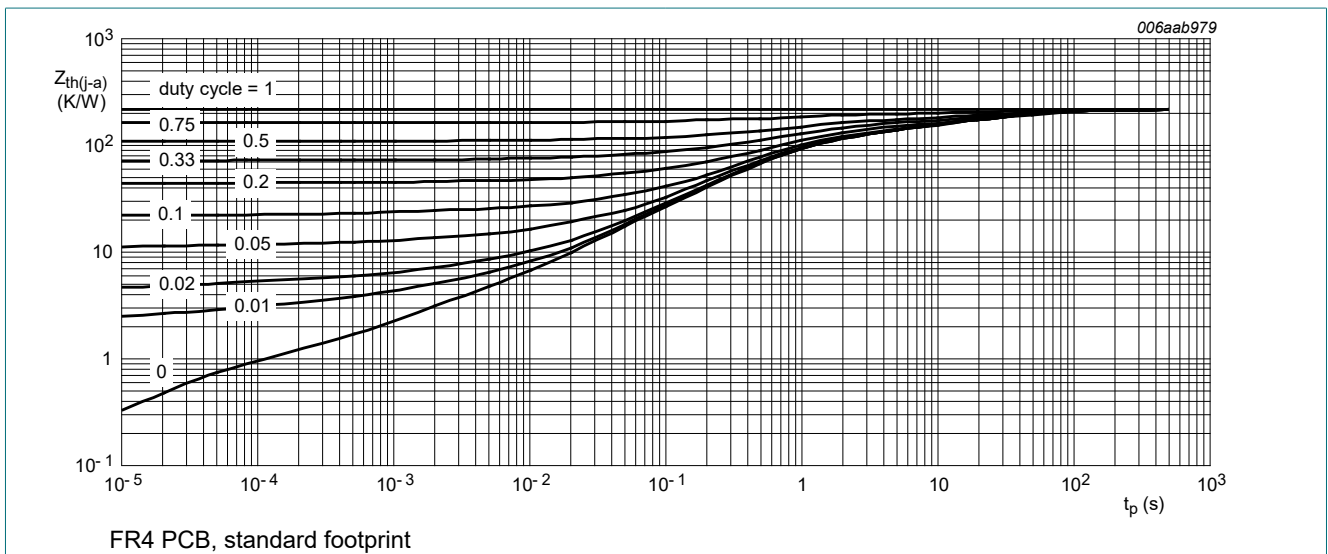


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

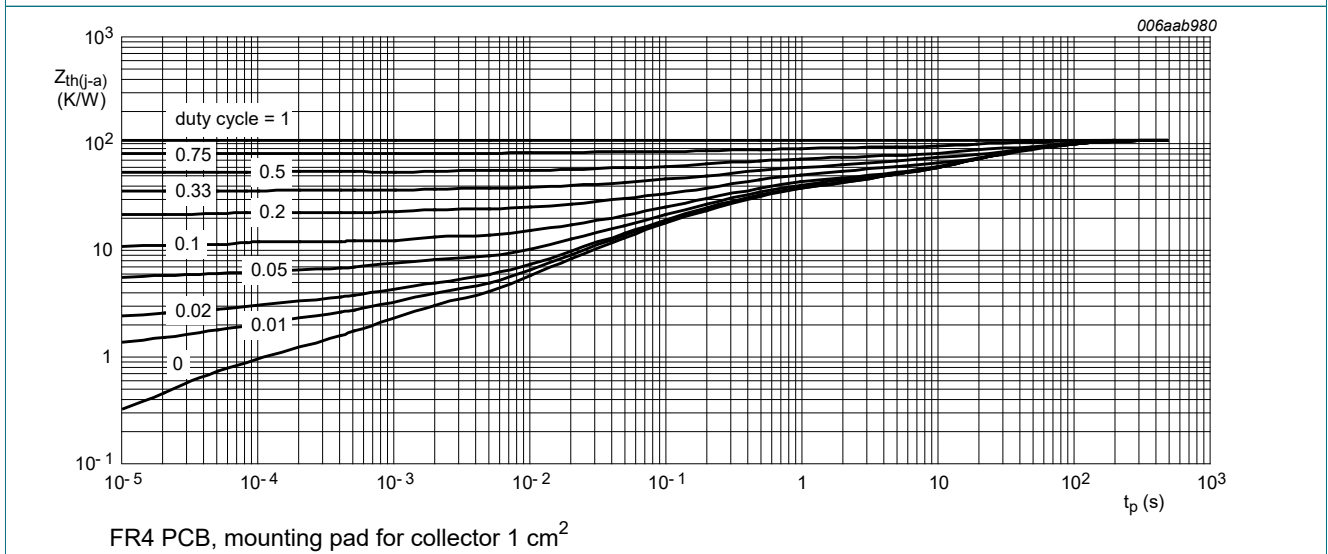


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

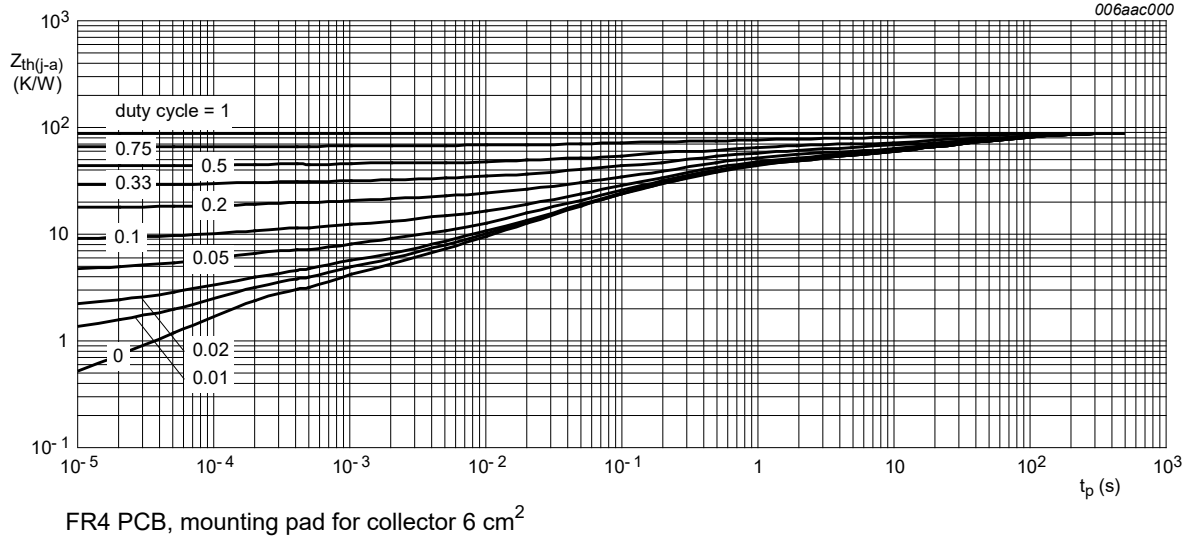


Fig. 4. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

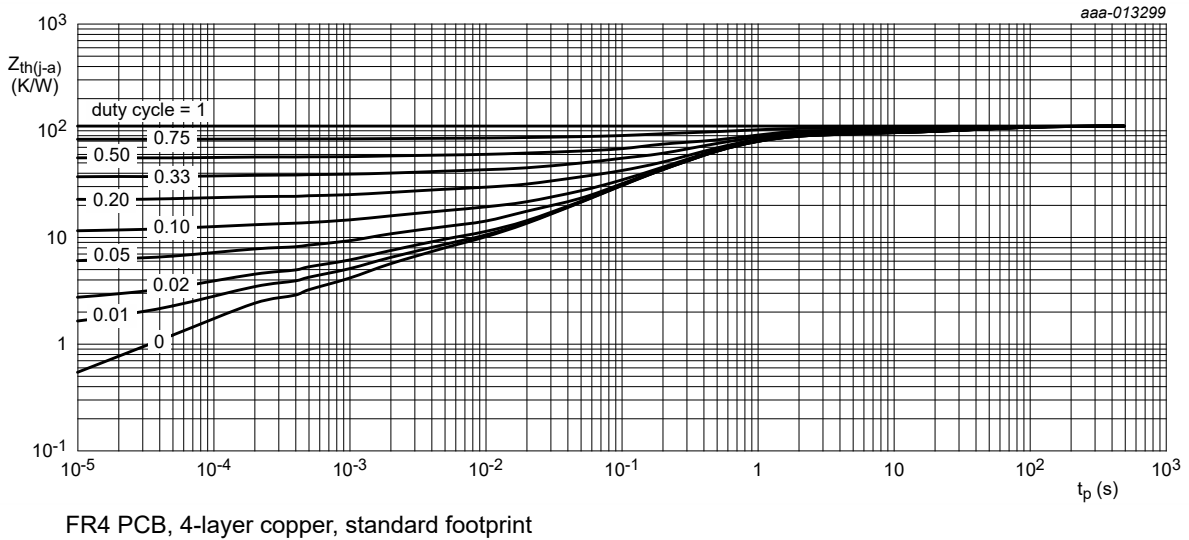


Fig. 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

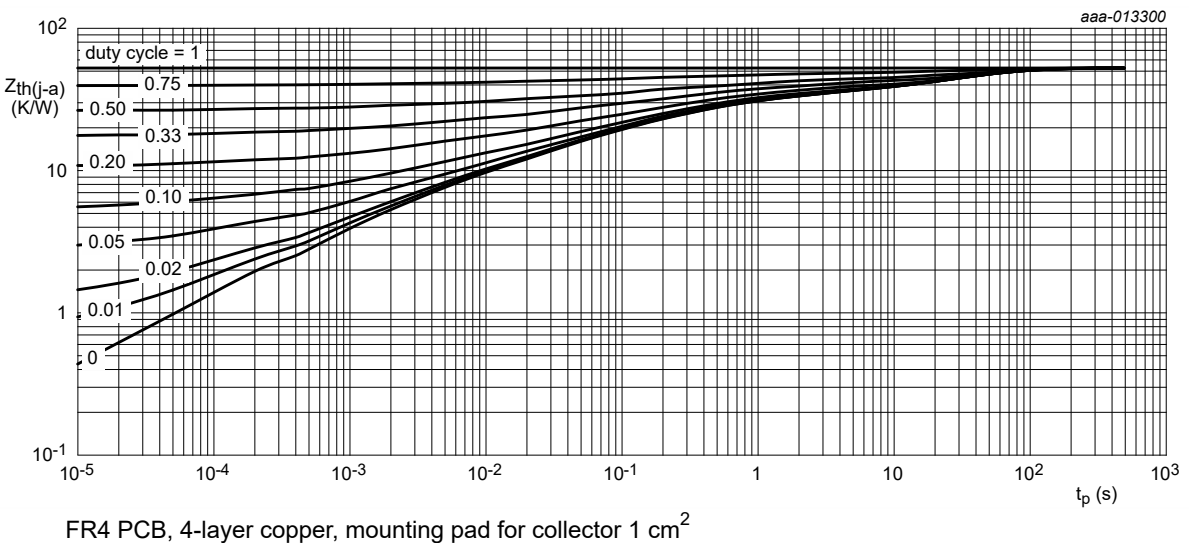
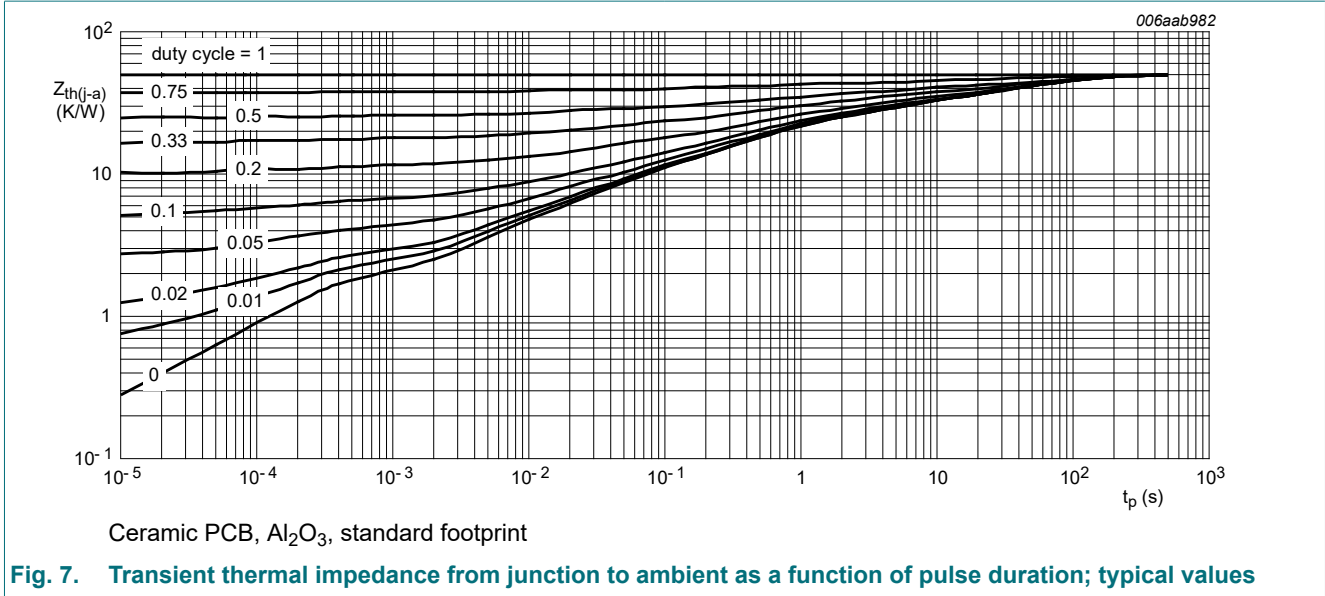


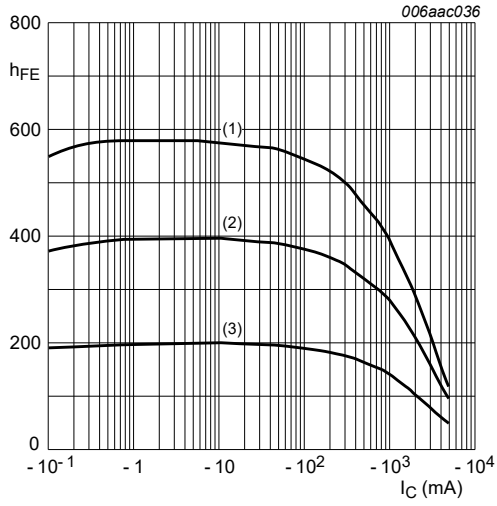
Fig. 6. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



10. Characteristics

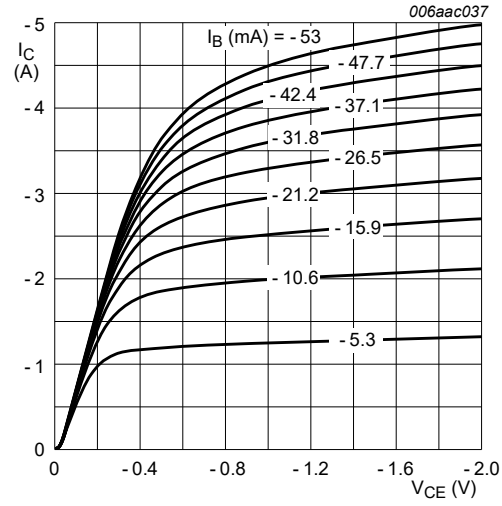
Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = -100 \mu\text{A}$; $I_E = 0 \text{ A}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-50	-	-	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_C = -10 \text{ mA}$; $I_B = 0 \text{ A}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-50	-	-	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	$I_E = -100 \mu\text{A}$; $I_C = 0 \text{ A}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-5	-	-	V
I_{CBO}	collector-base cut-off current	$V_{CB} = -50 \text{ V}$; $I_E = 0 \text{ A}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	-100	nA
		$V_{CB} = -50 \text{ V}$; $I_E = 0 \text{ A}$; $T_j = 150 \text{ }^\circ\text{C}$	-	-	-50	μA
I_{CES}	collector-emitter cut-off current	$V_{CE} = -50 \text{ V}$; $V_{BE} = 0 \text{ V}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	-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	$V_{CE} = -2 \text{ V}$; $I_C = 0.1 \text{ A}$; single pulse; $t_p \leq 300 \mu\text{s}$; $\delta \leq 0.02$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	200	-	-	
		$V_{CE} = -2 \text{ V}$; $I_C = -0.5 \text{ A}$; pulsed; $t_p \leq 300 \mu\text{s}$; $\delta \leq 0.02$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	200	-	-	
		$V_{CE} = -2 \text{ V}$; $I_C = -1 \text{ A}$; pulsed; $t_p \leq 300 \mu\text{s}$; $\delta \leq 0.02$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	200	-	450	
		$V_{CE} = -2 \text{ V}$; $I_C = -2 \text{ A}$; pulsed; $t_p \leq 300 \mu\text{s}$; $\delta \leq 0.02$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	130	-	-	
		$V_{CE} = -2 \text{ V}$; $I_C = -3 \text{ A}$; pulsed; $t_p \leq 300 \mu\text{s}$; $\delta \leq 0.02$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	80	-	-	
V_{CEsat}	collector-emitter saturation voltage	$I_C = -0.5 \text{ A}$; $I_B = -50 \text{ mA}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	-90	mV
		$I_C = -1 \text{ A}$; $I_B = -50 \text{ mA}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	-180	mV
		$I_C = -2 \text{ A}$; $I_B = -100 \text{ mA}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	-320	mV
		$I_C = -2 \text{ A}$; $I_B = -200 \text{ mA}$; pulsed; $t_p \leq 300 \mu\text{s}$; $\delta \leq 0.02$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	-270	mV
		$I_C = -3 \text{ A}$; $I_B = -300 \text{ mA}$; pulsed; $t_p \leq 300 \mu\text{s}$; $\delta \leq 0.02$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	-390	mV
R_{CEsat}	collector-emitter saturation resistance	$I_C = -2 \text{ A}$; $I_B = -200 \text{ mA}$; pulsed; $t_p \leq 300 \mu\text{s}$; $\delta \leq 0.02$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	90	135	m Ω
V_{BEsat}	base-emitter saturation voltage	$I_C = -2 \text{ A}$; $I_B = -100 \text{ mA}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	-1.1	V
		$I_C = -3 \text{ A}$; $I_B = -300 \text{ mA}$; pulsed; $t_p \leq 300 \mu\text{s}$; $\delta \leq 0.02$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	-1.2	V
V_{BE}	base-emitter voltage	$V_{CE} = -2 \text{ V}$; $I_C = -1 \text{ A}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	-1.1	V
f_T	transition frequency	$V_{CE} = -5 \text{ V}$; $I_C = -100 \text{ mA}$; $f = 100 \text{ MHz}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	100	-	-	MHz
C_c	collector capacitance	$V_{CB} = -10 \text{ V}$; $I_E = 0 \text{ A}$; $i_e = 0 \text{ A}$; $f = 1 \text{ MHz}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	35	pF



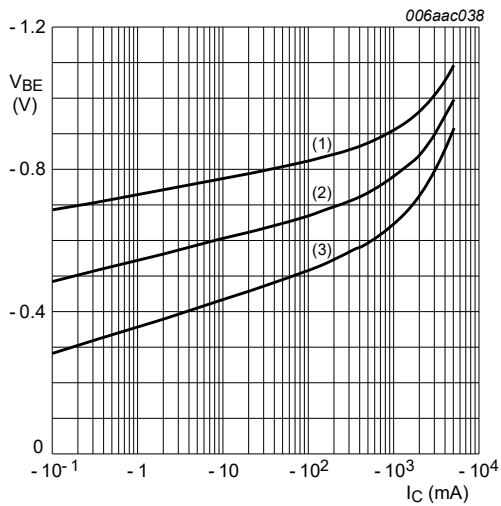
$V_{CE} = -2$ V
 (1) $T_{amb} = 100$ °C
 (2) $T_{amb} = 25$ °C
 (3) $T_{amb} = -55$ °C

Fig. 8. DC current gain as a function of collector current; typical values



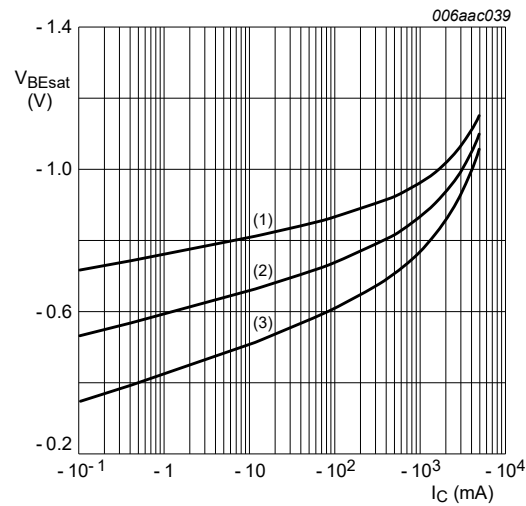
$T_{amb} = 25$ °C

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



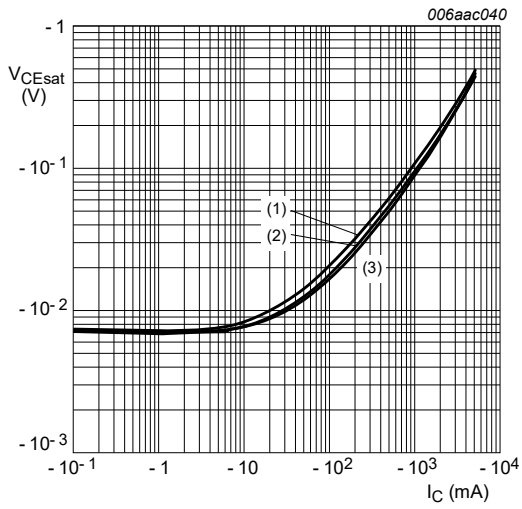
$V_{CE} = -2$ V
 (1) $T_{amb} = -55$ °C
 (2) $T_{amb} = 25$ °C
 (3) $T_{amb} = 100$ °C

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



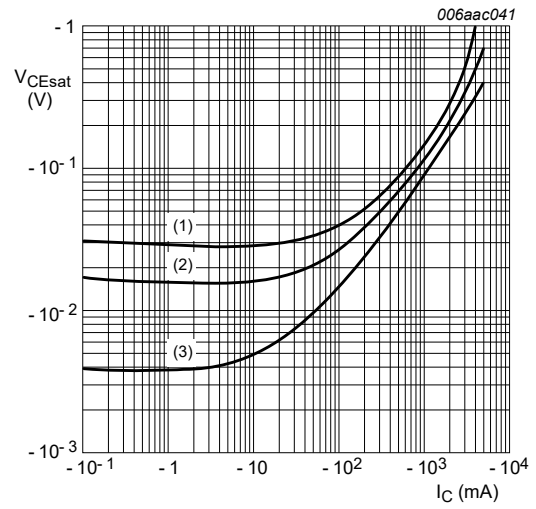
$I_C/I_B = 20$
 (1) $T_{amb} = -55$ °C
 (2) $T_{amb} = 25$ °C
 (3) $T_{amb} = 100$ °C

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



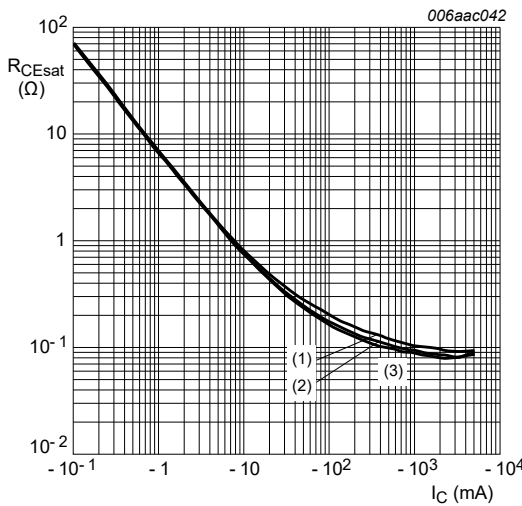
$I_C/I_B = 20$
 (1) $T_{amb} = 100\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

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



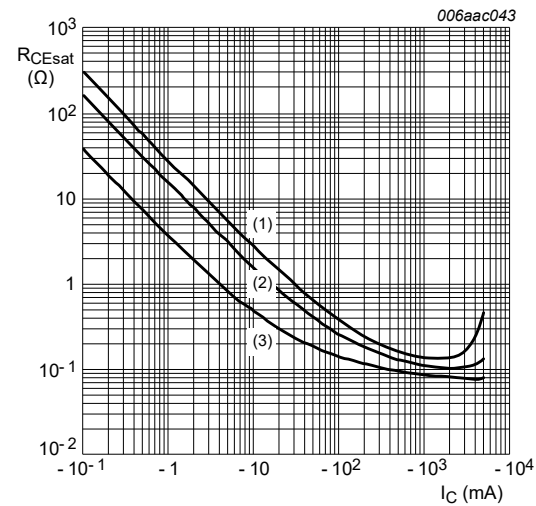
$T_{amb} = 25\text{ °C}$
 (1) $I_C/I_B = 100$
 (2) $I_C/I_B = 50$
 (3) $I_C/I_B = 10$

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



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

Fig. 14. Collector-emitter saturation resistance as a function of collector current; typical values



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

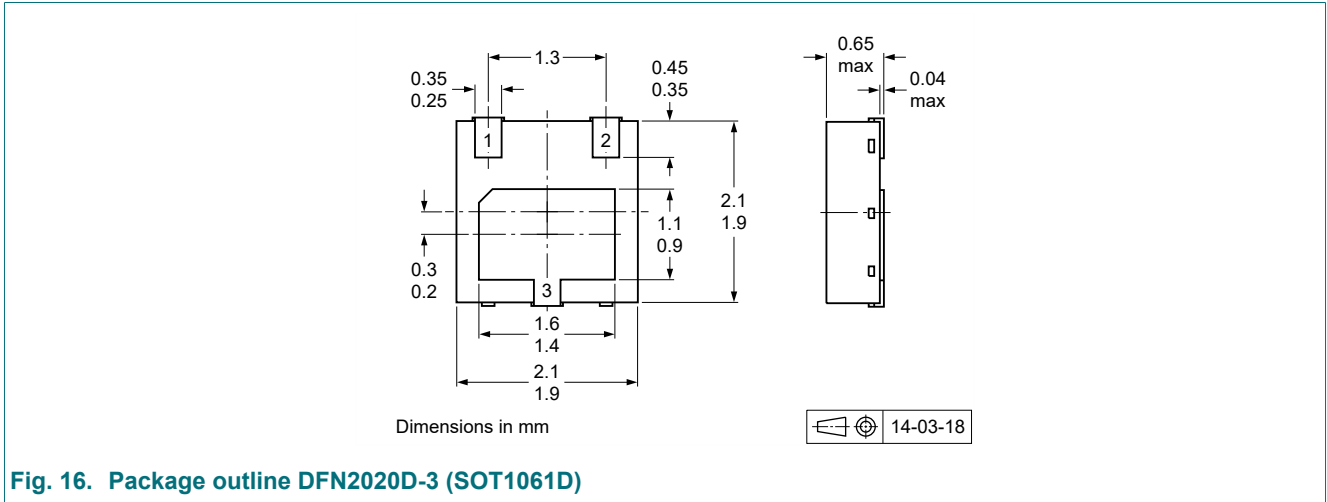
Fig. 15. Collector-emitter saturation resistance as a function of collector current; typical values

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



13. Soldering

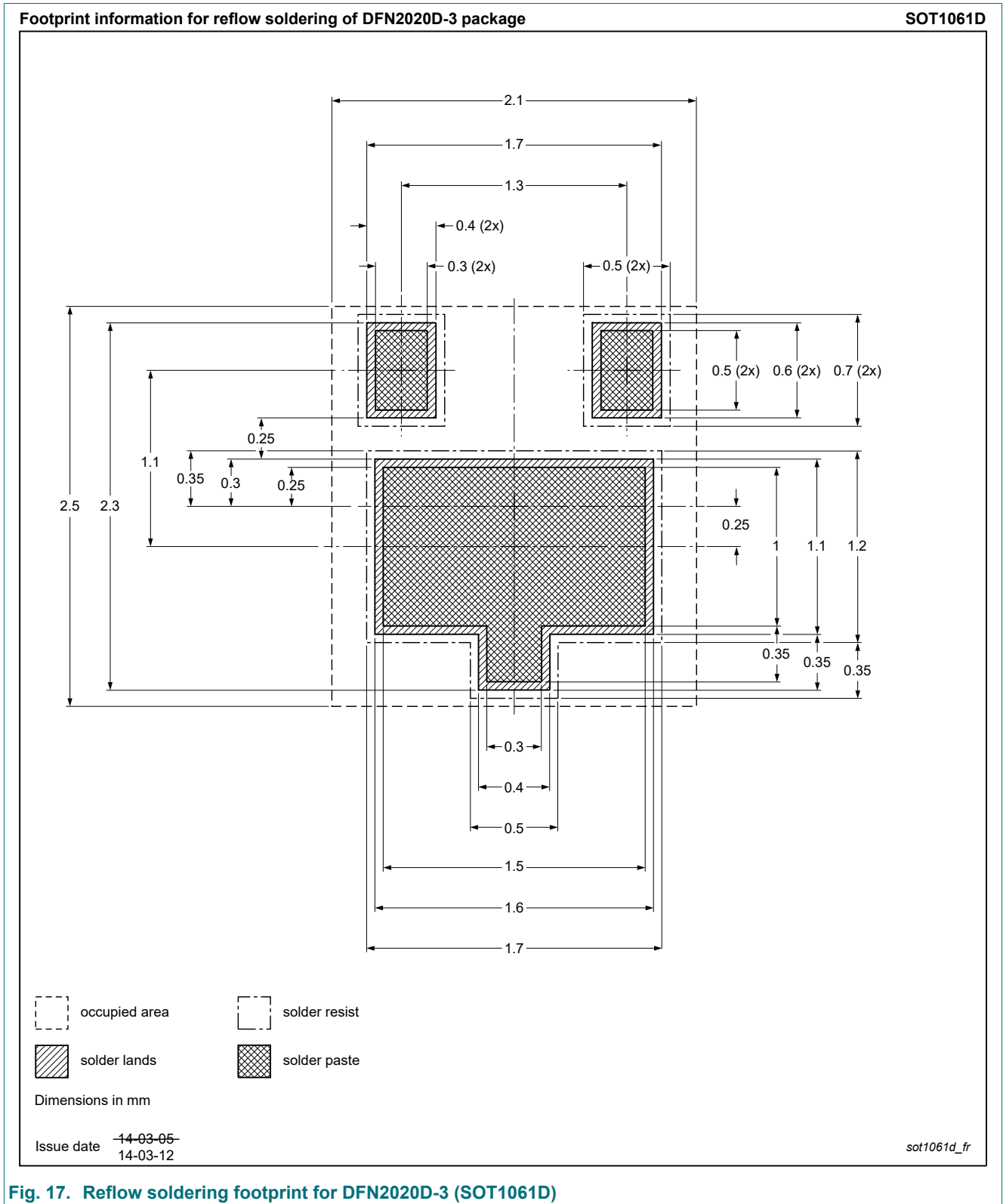


Fig. 17. Reflow soldering footprint for DFN2020D-3 (SOT1061D)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PBSS5350PAS-Q v.2	20240807	Product data sheet	-	PBSS5350PAS-Q v.1
Modifications:	<ul style="list-style-type: none">Graphic symbol corrected.Characteristics graphs are changed.			
PBSS5350PAS-Q v.1	20240516	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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