



BSR33PAS

80 V, 1 A PNP medium power transistor

9 September 2024

Product data sheet

1. General description

PNP medium power transistors in an ultra thin DFN2020D-3 (SOT1061D) leadless small Surface-Mounted Device (SMD) plastic package with medium power capability and Side-Wettable Flanks (SWF).

2. Features and benefits

- High collector current capability I_C and I_{CM}
- Reduced Printed-Circuit Board (PCB) area requirements
- Leadless small SMD plastic package with solderable side pads
- Exposed heatsink for excellent thermal and electrical conductivity
- Suitable for Automatic Optical Inspection (AOI) of solder point

3. Applications

- Linear voltage regulators
- High-side switches
- Battery-driven devices
- MOSFET drivers
- Amplifiers

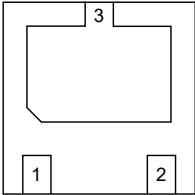
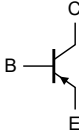
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base	-	-	-80	V
I_C	collector current		-	-	-1	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms	-	-	-2	A
h_{FE}	DC current gain	$V_{CE} = -5$ V; $I_C = -100$ mA; pulsed; $t_p \leq 300$ μ s; $\delta \leq 0.01$; $T_{amb} = 25$ °C	100	-	300	

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base	 Transparent top view DFN2020D-3 (SOT1061D)	 006aaa231
2	E	emitter		
3	C	collector		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BSR33PAS	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
BSR33PAS	G3

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		-	-90	V
V _{CEO}	collector-emitter voltage	open base		-	-80	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 ≤ 1 ms		-	-2	A
I _{BM}	peak base current			-	-200	mA
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[1]	-	0.48	W
			[2]	-	1	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 Printed-Circuit Board (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.

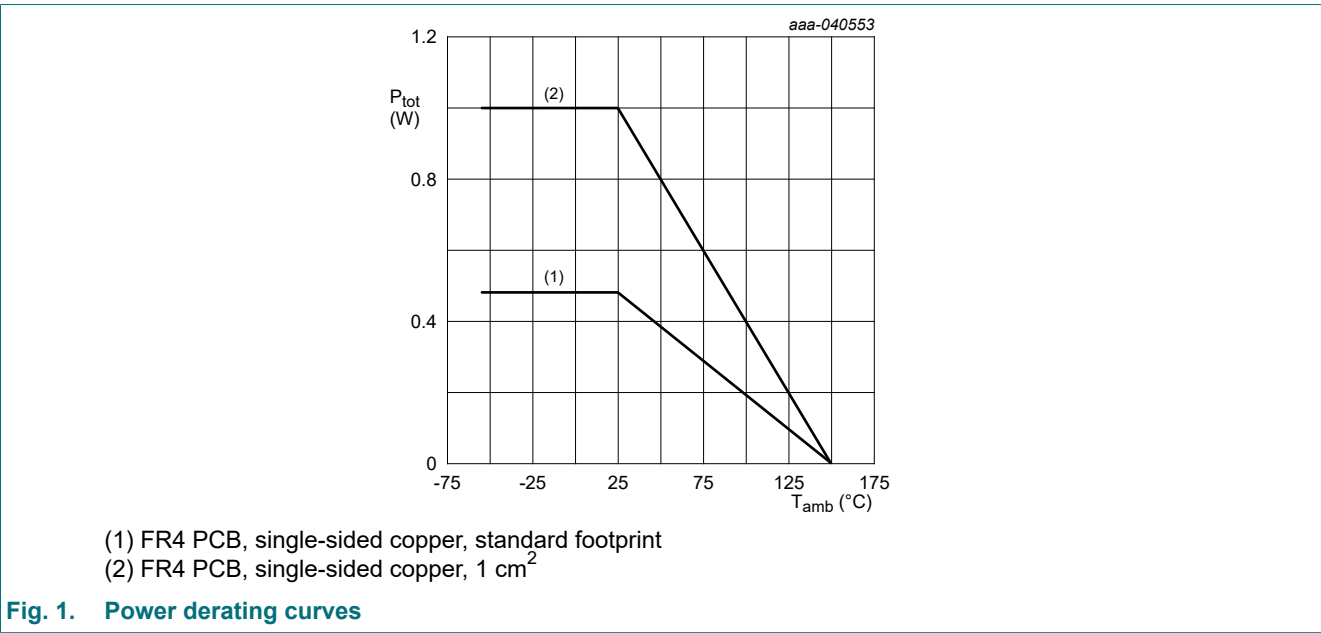


Fig. 1. Power derating curves

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]	-	-	260	K/W
			[2]	-	-	125	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	-	12	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.

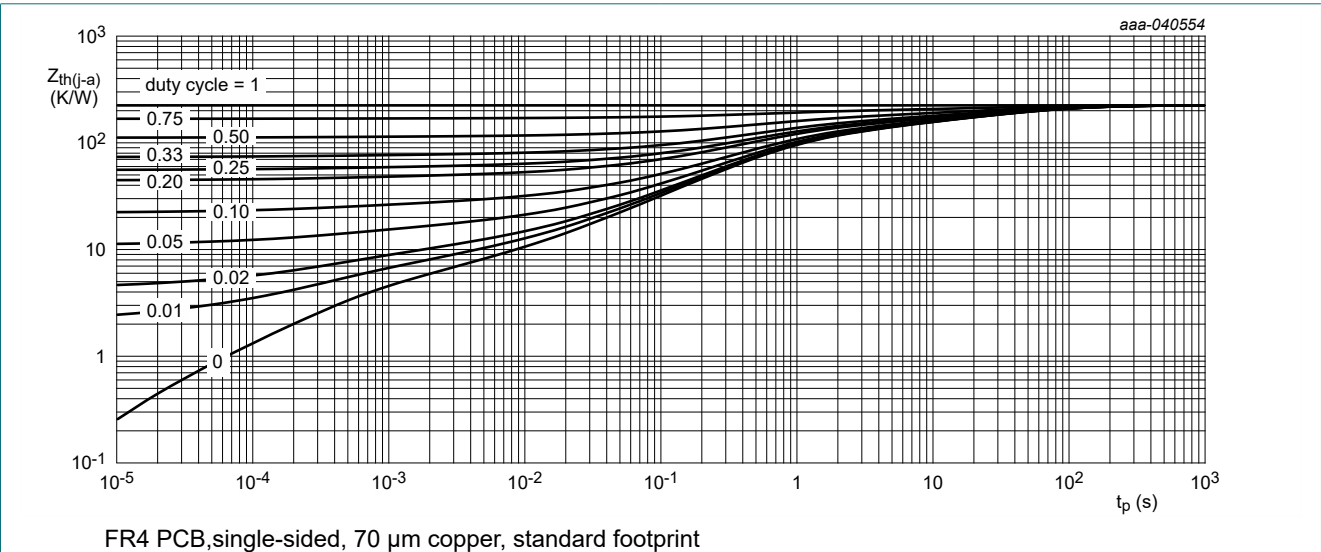


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

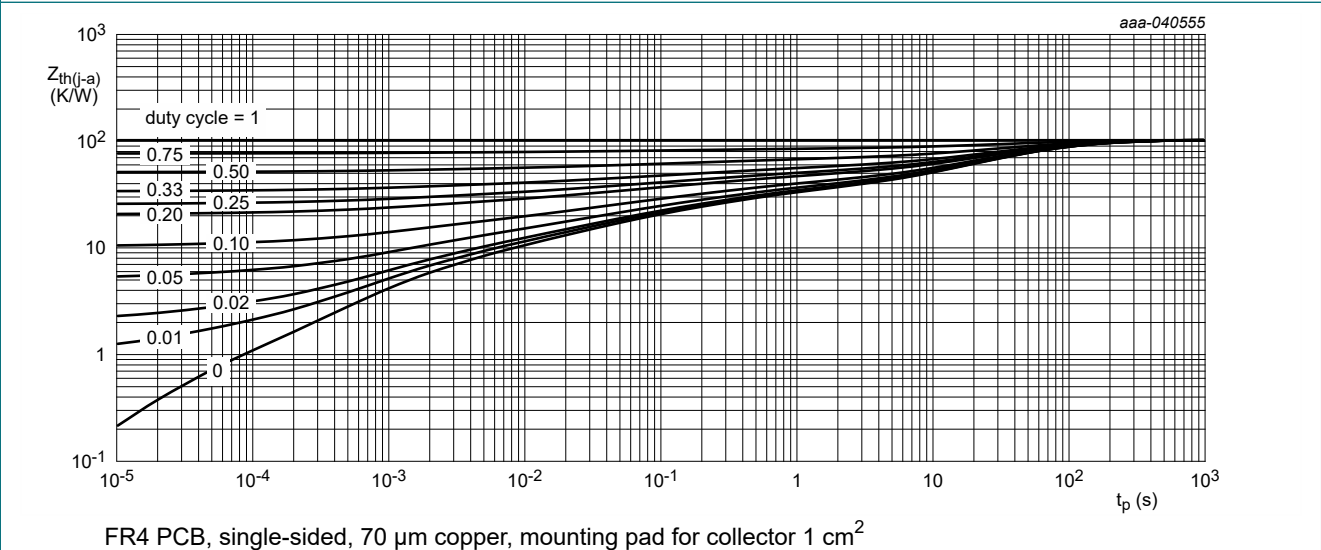
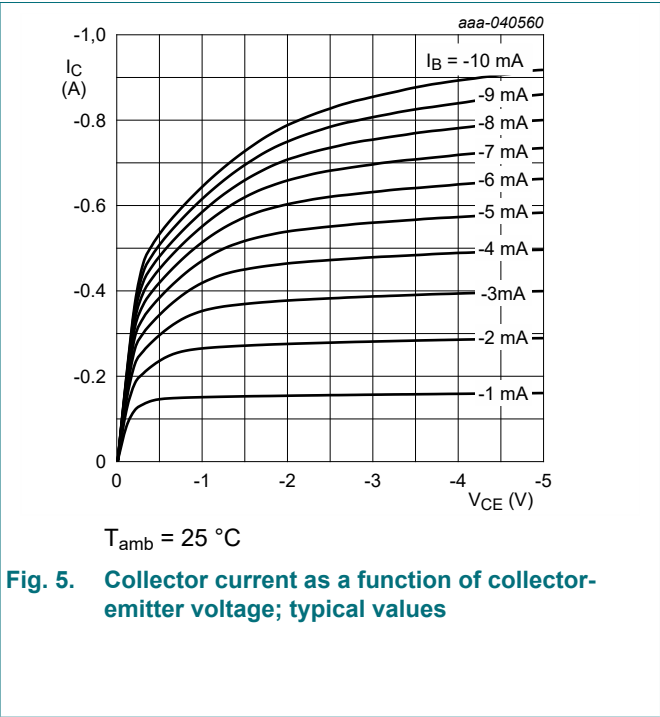
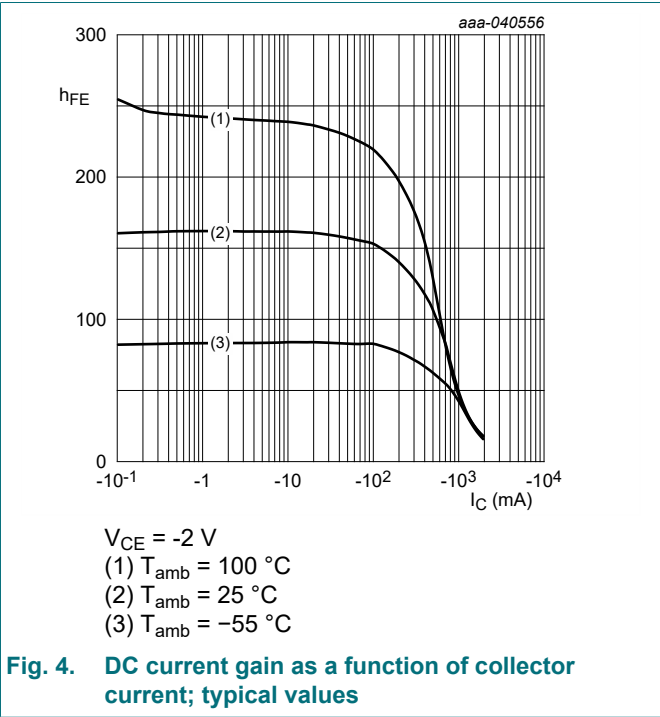


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current (emitter open)	$V_{CB} = -60\text{ V}; I_E = 0\text{ A}; T_{amb} = 25\text{ }^{\circ}\text{C}$	-	-	-100	nA
		$V_{CB} = -60\text{ V}; I_E = 0\text{ A}; T_j = 150\text{ }^{\circ}\text{C}$	-	-	-50	μA
I_{EBO}	emitter-base cut-off current (collector open)	$V_{EB} = -5\text{ V}; I_C = 0\text{ A}; T_{amb} = 25\text{ }^{\circ}\text{C}$	-	-	-100	nA
h_{FE}	DC current gain	$V_{CE} = -5\text{ V}; I_C = -100\text{ }\mu\text{A}; \text{pulsed}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.01; T_{amb} = 25\text{ }^{\circ}\text{C}$	30	-	-	
		$V_{CE} = -5\text{ V}; I_C = -100\text{ mA}; \text{pulsed}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.01; T_{amb} = 25\text{ }^{\circ}\text{C}$	100	-	300	
		$V_{CE} = -5\text{ V}; I_C = -500\text{ mA}; \text{pulsed}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.01; T_{amb} = 25\text{ }^{\circ}\text{C}$	50	-	-	
V_{CEsat}	collector-emitter saturation voltage	$I_C = -150\text{ mA}; I_B = -15\text{ mA}; \text{pulsed}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.01; T_{amb} = 25\text{ }^{\circ}\text{C}$	-	-	-0.25	V
		$I_C = -500\text{ mA}; I_B = -50\text{ mA}; \text{pulsed}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.01; T_{amb} = 25\text{ }^{\circ}\text{C}$	-	-	-0.5	V
V_{BEsat}	base-emitter saturation voltage	$I_C = -150\text{ mA}; I_B = -15\text{ mA}; \text{pulsed}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.01; T_{amb} = 25\text{ }^{\circ}\text{C}$	-	-	-1	V
		$I_C = -500\text{ mA}; I_B = -50\text{ mA}; \text{pulsed}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.01; T_{amb} = 25\text{ }^{\circ}\text{C}$	-	-	-1.2	V
f_T	transition frequency	$V_{CE} = -10\text{ V}; I_C = -50\text{ mA}; f = 100\text{ MHz}; T_{amb} = 25\text{ }^{\circ}\text{C}$	100	-	-	MHz



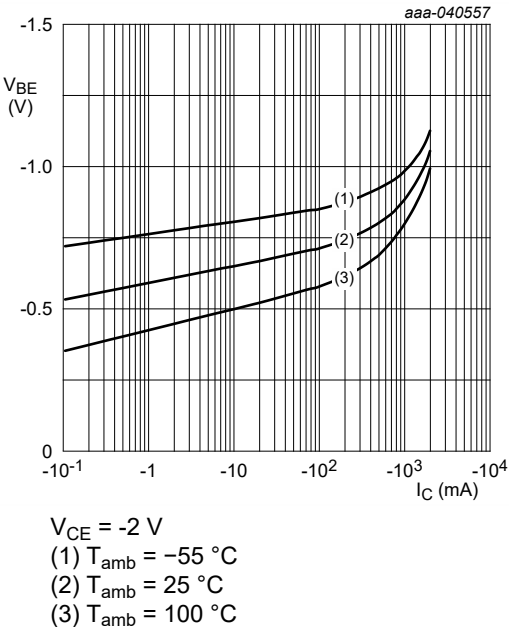


Fig. 6. Base-emitter voltage as a function of collector current; typical values

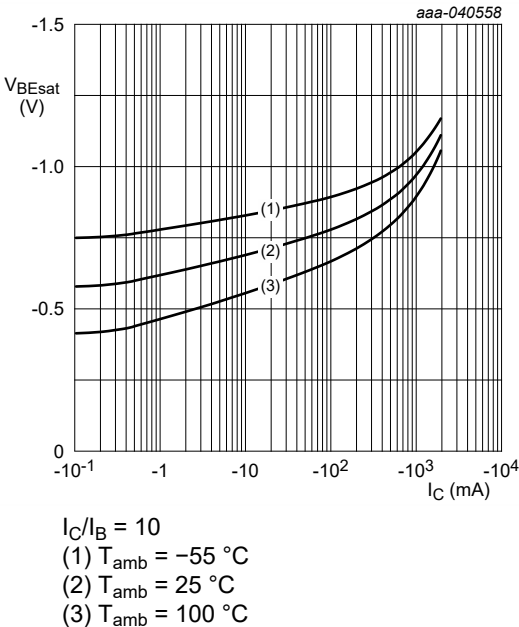


Fig. 7. Base-emitter saturation voltage as a function of collector current; typical values

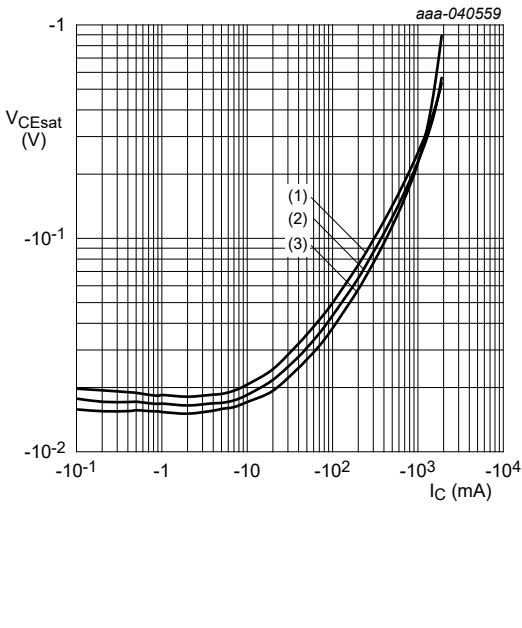


Fig. 8. Collector-emitter saturation voltage as a function of collector current; typical values

11. Package outline

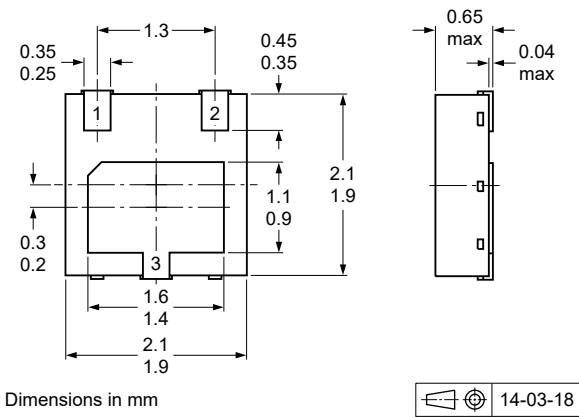
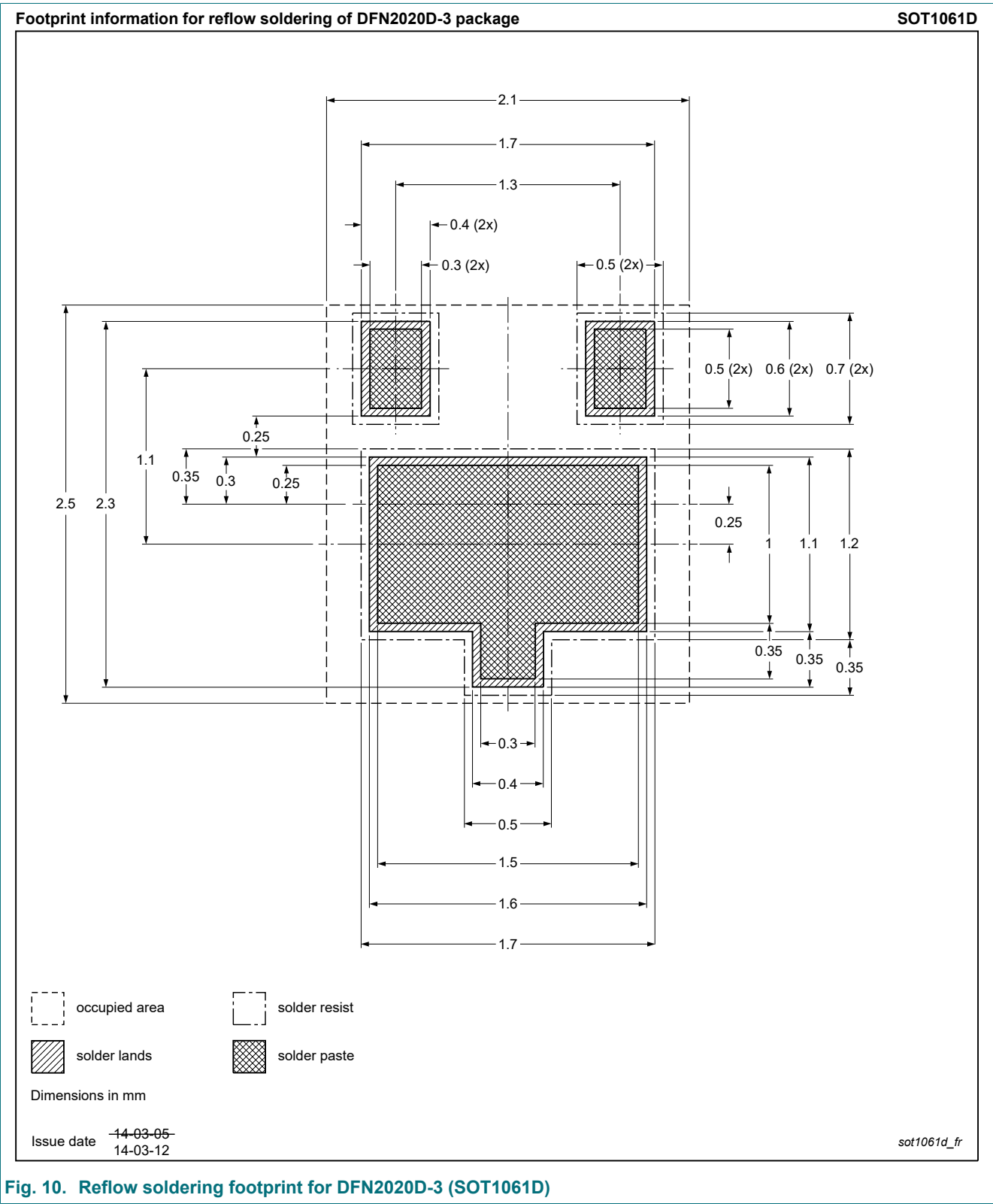


Fig. 9. Package outline DFN2020D-3 (SOT1061D)

12. Soldering



13. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BSR33PAS v.1	20240909	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.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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Contents

1. General description..... 1

2. Features and benefits..... 1

3. Applications..... 1

4. Quick reference data..... 1

5. Pinning information.....2

6. Ordering information.....2

7. Marking.....2

8. Limiting values..... 3

9. Thermal characteristics..... 4

10. Characteristics..... 5

11. Package outline..... 7

12. Soldering..... 8

13. Revision history.....9

14. Legal information.....10

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