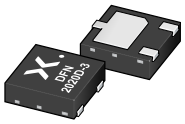


BC68PAS series

20 V, 2 A NPN medium power transistors

Rev. 1 — 19 June 2015 **Product data sheet**

1. Product profile

1.1 General description

NPN medium power transistors in an ultra thin DFN2020D-3 (SOT1061D) leadless small Surface-Mounted Device (SMD) plastic package with medium power capability and visible and solderable side pads.

PNP complement: BC69PAS series

1.2 Features and benefits

- High collector current capability I_C and I_{CM}
- Reduced Printed-Circuit Board (PCB) area requirements
- Exposed heat sink for excellent thermal and electrical conductivity
- AEC-Q101 qualified
- Two current gain selections
- Leadless very small SMD plastic package with medium power capability
- Suitable for Automatic Optical Inspection (AOI) of solder joint

1.3 Applications

- Linear voltage regulators
- Battery driven devices
- MOSFET drivers
- Low-side switches
- Power management
- Amplifiers

1.4 Quick reference data

Table 1. Quick reference data

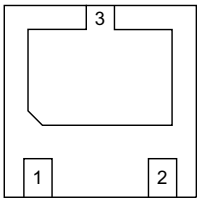
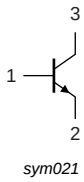
T_{amb} = 25 °C unless otherwise specified

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base		-	-	20	V
I_C	collector current			-	-	2	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms		-	-	3	A
h_{FE}	DC current gain	V_{CE} = 1 V; I_C = 500 mA	[1]	85	-	375	
	h_{FE} selection -25	V_{CE} = 1 V; I_C = 500 mA	[1]	160	-	375	

[1] Pulse test: $t_p \leq 300$ µs; $\delta \leq 0.02$.

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	base	 Transparent top view	 *sym021*
2	emitter		
3	collector		

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BC68PAS	DFN2020D-3	plastic thermal enhanced ultra thin small outline package; no leads; 3 terminals; body $2 \times 2 \times 0.65$ mm.	SOT1061D
BC68-25PAS			

4. Marking

Table 4. Marking codes

Type number	Marking code
BC68PAS	BY
BC68-25PAS	BZ

5. 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	-	32	V
V_{CEO}	collector-emitter voltage	open base	-	20	V
V_{EBO}	emitter-base voltage	open collector	-	5	V
I_C	collector current		-	2	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms	-	3	A
I_B	base current		-	0.4	A

Table 5. Limiting values *...continued*

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

Symbol	Parameter	Conditions		Min	Max	Unit
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	420	mW
			[2]	-	830	mW
			[3]	-	1.1	W
			[4]	-	810	mW
			[5]	-	1.65	W
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			–55	150	°C
T_{stg}	storage temperature			–65	150	°C

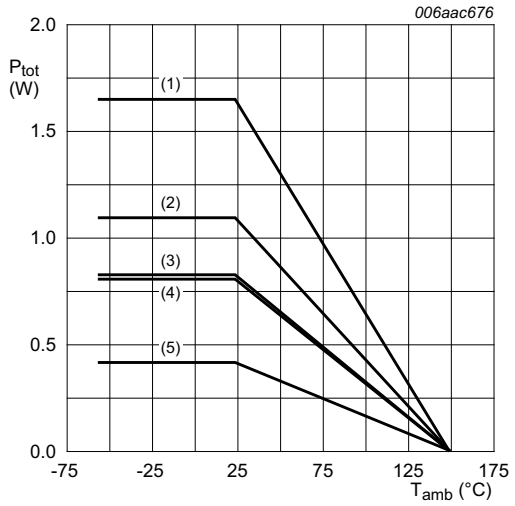
[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and mounting pad for collector 1 cm^2.

[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated and mounting pad for collector 6 cm^2.

[4] Device mounted on an FR4 PCB, 4-layer copper, tin-plated and standard footprint.

[5] Device mounted on an FR4 PCB, 4-layer copper, tin-plated and mounting pad for collector 1 cm^2.



(1) FR4 PCB, 4-layer copper, 1 cm^2

(2) FR4 PCB, single-sided copper, 6 cm^2

(3) FR4 PCB, single-sided copper, 1 cm^2

(4) FR4 PCB, 4-layer copper, standard footprint

(5) FR4 PCB, single-sided copper, standard footprint

Fig 1. Power derating curves

6. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	298	K/W
			[2]	151	K/W
			[3]	114	K/W
			[4]	154	K/W
			[5]	76	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point	in free air		20	K/W

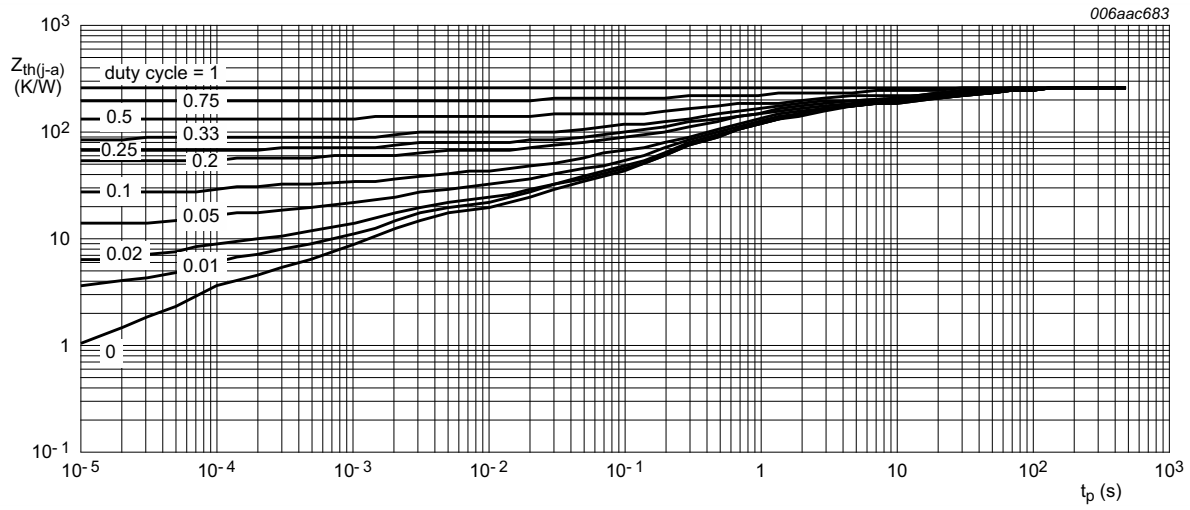
[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and mounting pad for collector 1 cm^2.

[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated and mounting pad for collector 6 cm^2.

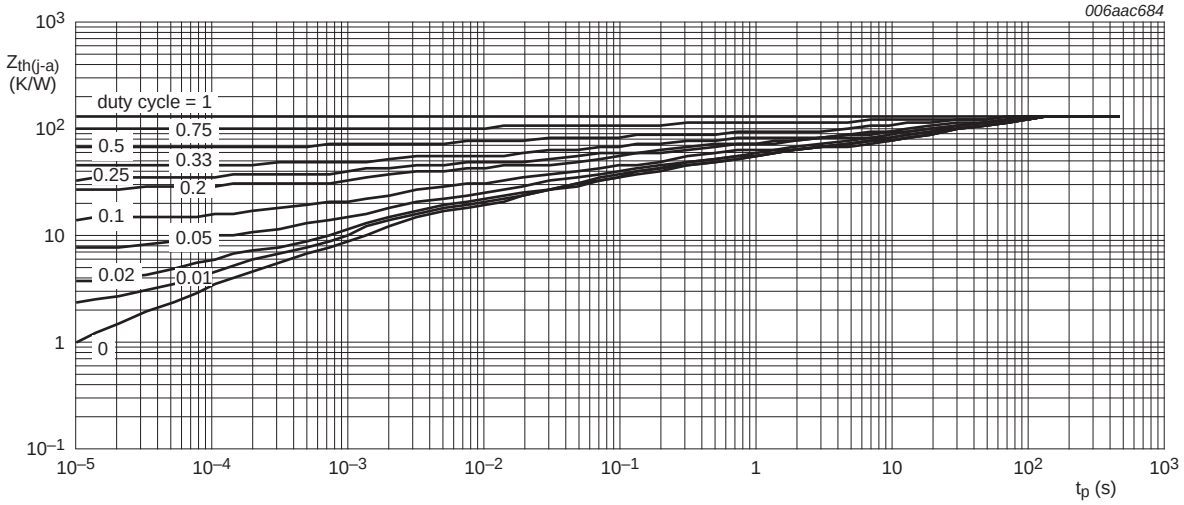
[4] Device mounted on an FR4 PCB, 4-layer copper, tin-plated and standard footprint.

[5] Device mounted on an FR4 PCB, 4-layer copper, tin-plated and mounting pad for collector 1 cm^2



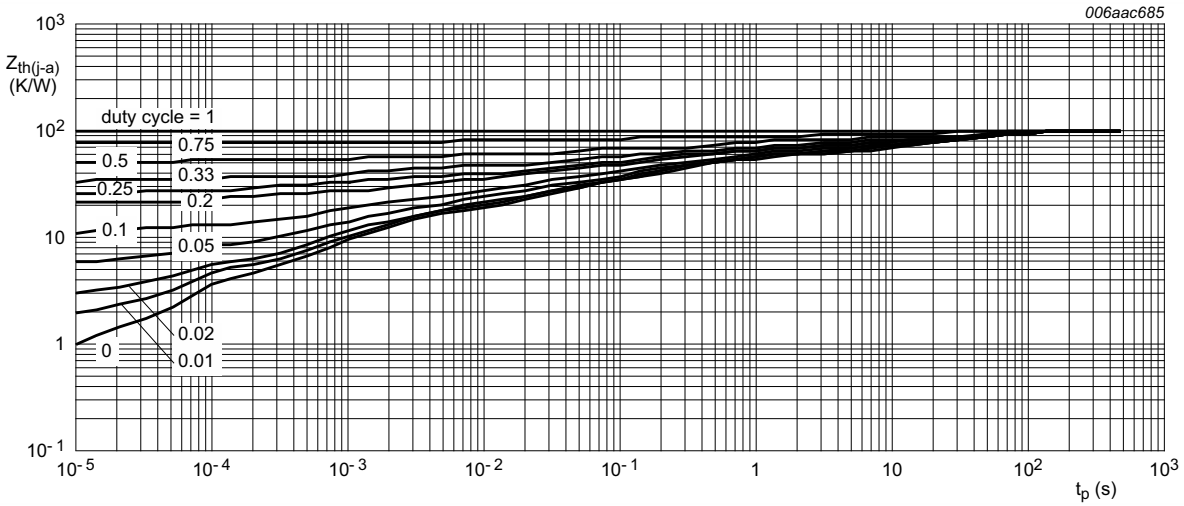
FR4 PCB, single-sided copper, tin-plated and standard footprint

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



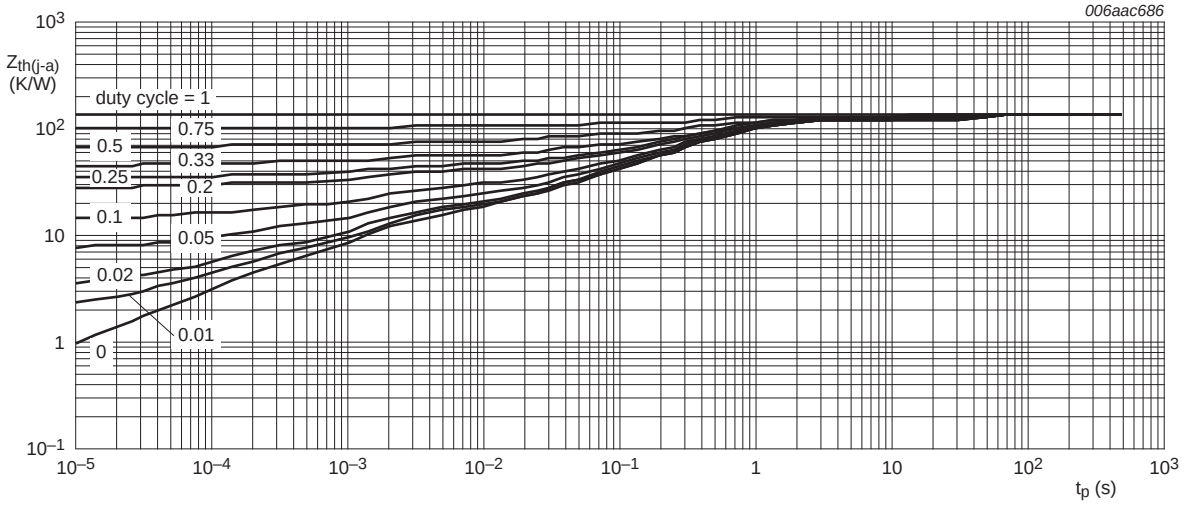
FR4 PCB, single-sided copper, tin-plated and mounting pad for collector 1 cm^2

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



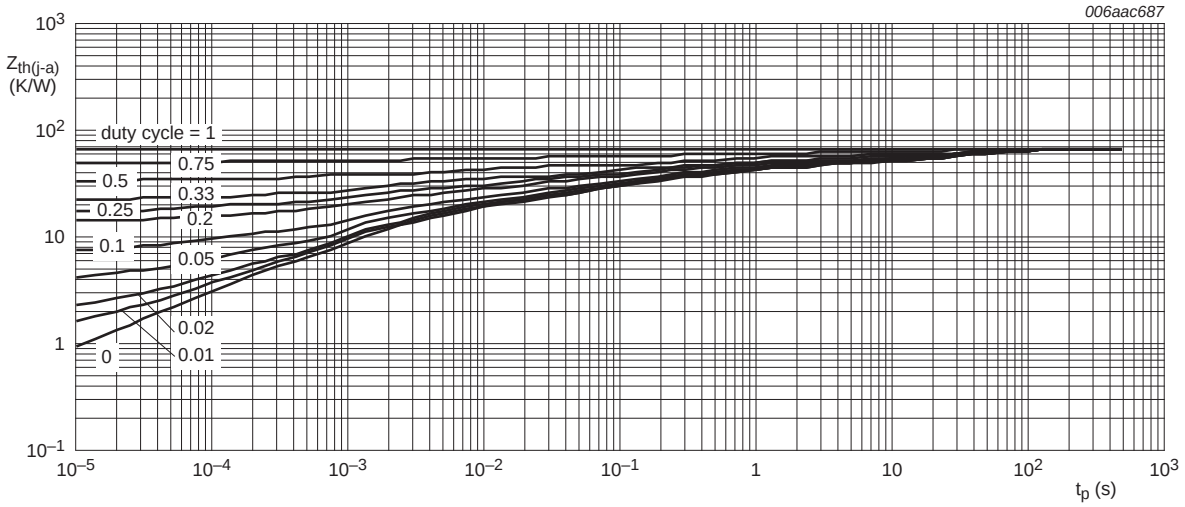
FR4 PCB, single-sided copper, tin-plated and mounting pad for collector 6 cm^2

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



FR4 PCB, 4-layer copper, tin-plated and standard footprint

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



FR4 PCB, 4-layer copper, tin-plated and mounting pad for collector 1 cm^2

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

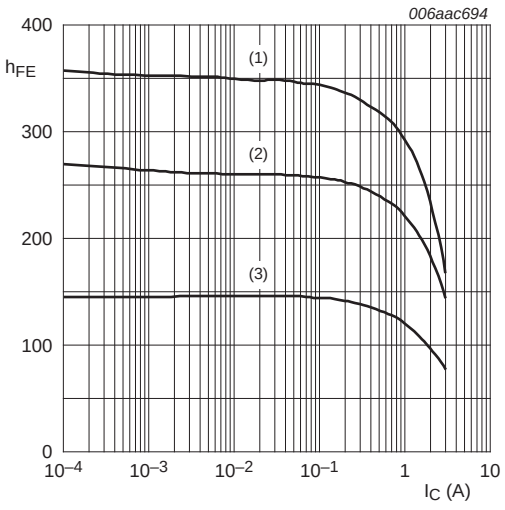
7. Characteristics

Table 7. Characteristics

T_{amb} = 25 °C unless otherwise specified

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	V_{CB} = 25 V; I_E = 0 A		-	-	100	nA
		V_{CB} = 25 V; I_E = 0 A; T_j = 150 °C		-	-	10	µA
I_{EBO}	emitter-base cut-off current	V_{EB} = 5 V; I_C = 0 A		-	-	100	nA
h_{FE}	DC current gain	V_{CE} = 10 V; I_C = 5 mA		50	-	-	
		V_{CE} = 1 V; I_C = 500 mA	[1]	85	-	375	
		V_{CE} = 1 V; I_C = 1 A	[1]	60	-	-	
		V_{CE} = 1 V; I_C = 2 A	[1]	40	-	-	
	h_{FE} selection -25	V_{CE} = 1 V; I_C = 500 mA	[1]	160	-	375	
V_{CEsat}	collector-emitter saturation voltage	I_C = 1 A; I_B = 100 mA	[1]	-	-	0.5	V
		I_C = 2 A; I_B = 200 mA	[1]	-	-	0.6	V
V_{BE}	base-emitter voltage	I_C = 5 mA; V_{CE} = 10 V	[1]	-	-	0.7	V
		I_C = 1 A; V_{CE} = 1 V	[1]	-	-	1	V
f_T	transition frequency	V_{CE} = 5 V; I_C = 50 mA; f = 100 MHz		40	170	-	MHz
C_c	collector capacitance	V_{CB} = 10 V; I_E = i_e = 0 A; f = 1 MHz		-	22	-	pF

[1] Pulse test: $t_p \leq 300$ µs; $\delta \leq 0.02$.



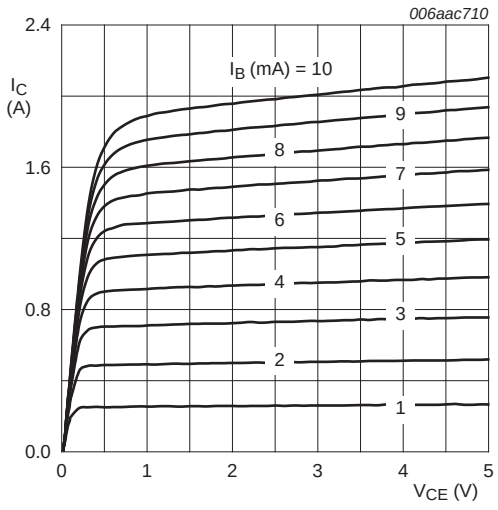
V_{CE} = 1 V

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

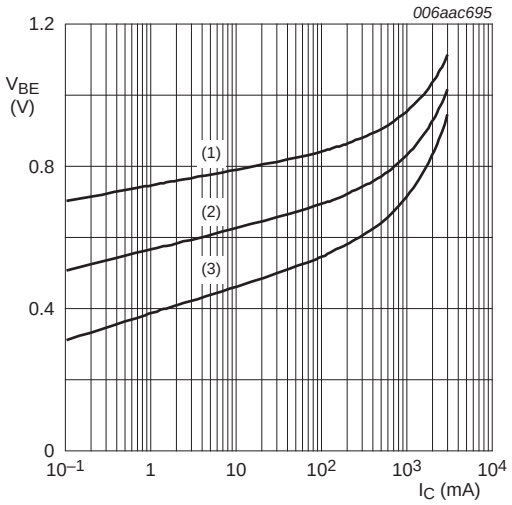
(3) T_{amb} = −55 °C

Fig 7. DC current gain as a function of collector current; typical values



T_{amb} = 25 °C

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



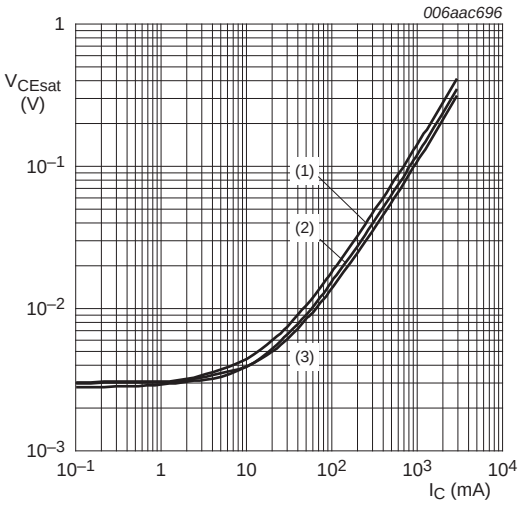
V_{CE} = 1 V

(1) T_{amb} = −55 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 100 °C

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



I_C/I_B = 10

(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

8. Test information

8.1 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.

9. Package outline

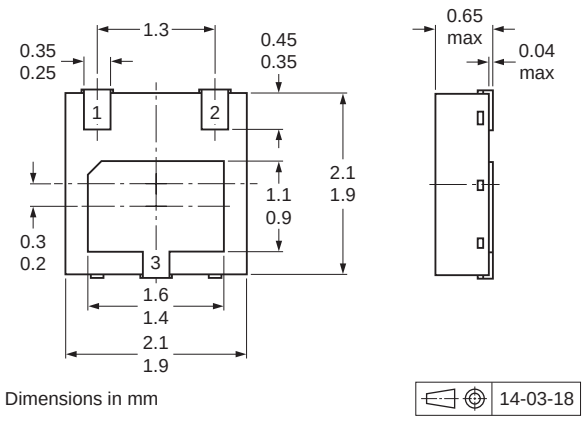


Fig 11. Package outline DFN2020D-3 (SOT1061D)

10. Soldering

Footprint information for reflow soldering of DFN2020D-3 package **SOT1061D**

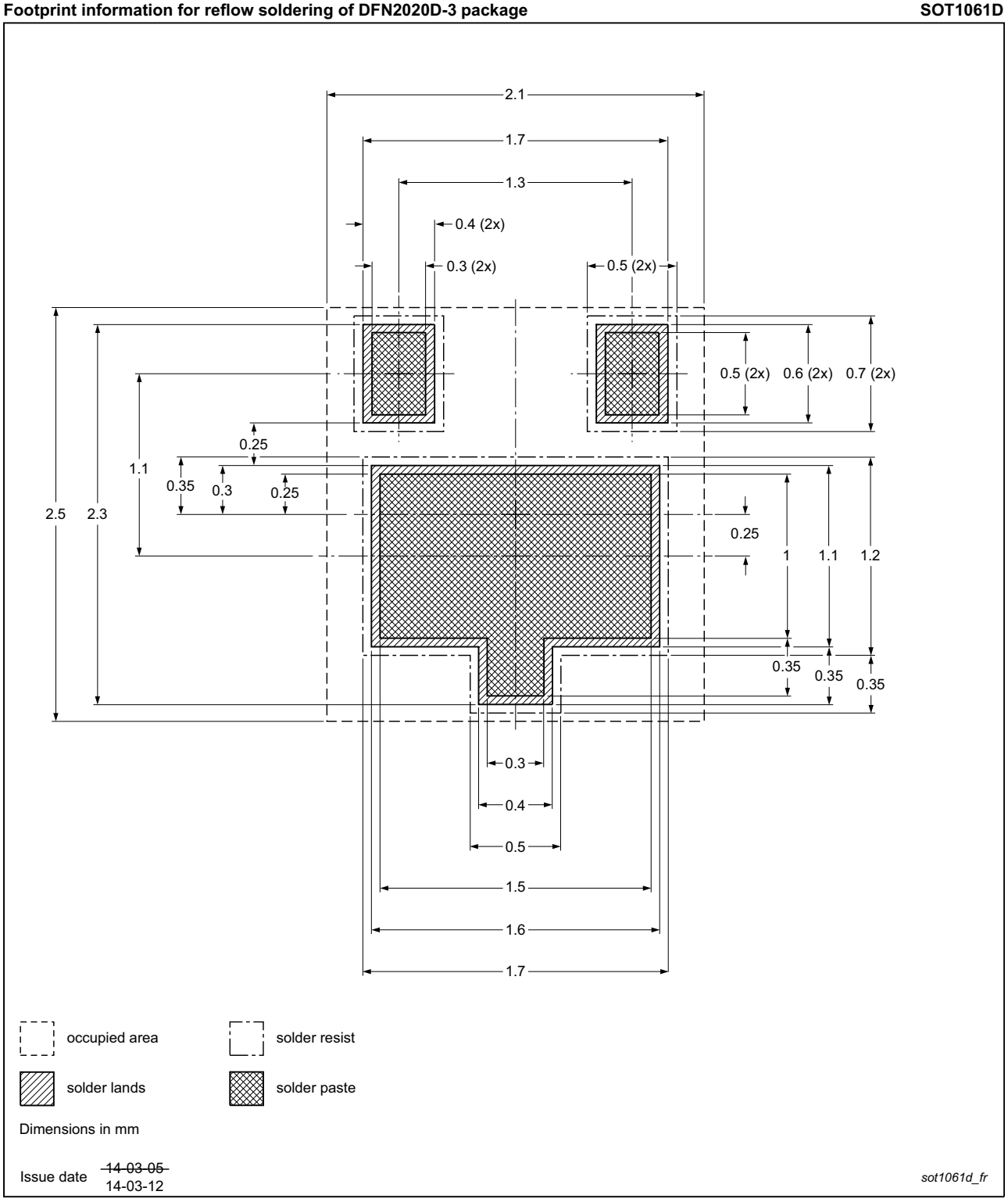


Fig 12. Reflow soldering footprint DFN2020D-3 (SOT1061D)

11. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BC68PAS_SER v.1	20150619	Product data sheet	-	-

12. Legal information

12.1 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.

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

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13. Contents

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Document identifier: BC68PAS_SER

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