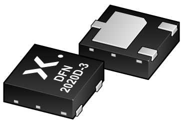


BC53PAST-Q series

80 V, 1 A PNP medium power transistors

Rev. 1 — 23 August 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).

Table 1. Product overview

Type number	Package	NPN complement
	Nexperia	
BC53PAST-Q	DFN2020D-3 (SOT1061D)	BC56PAST-Q
BC53-10PAST-Q		BC56-10PAST-Q
BC53-16PAST-Q		BC56-16PAST-Q

2. Features and benefits

- High collector current capability I_C and I_{CM}
- Three current gain selections
- Reduced Printed-Circuit Board (PCB) area 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 point
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

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

4. Quick reference data

Table 2. Quick reference data

T_{amb} = 25 °C unless otherwise specified.

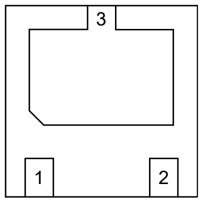
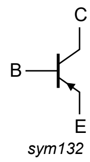
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base		-	-	-80	V
I_C	collector current			-	-	-1	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms		-	-	-2	A

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
h_{FE}	DC current gain						
	BC53PAST-Q	V_{CE} = -2 V; I_C = -150 mA	[1]	63	-	250	
	BC53-10PAST-Q		[1]	63	-	160	
	BC53-16PAST-Q		[1]	100	-	250	

[1] pulsed; t_p ≤ 300 μs; δ ≤ 0.02

5. Pinning information

Table 3. Pinning

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base	 Transparent top view	
2	E	emitter		
3	C	collector		

6. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
BP53PAST-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
BC53-10PAST-Q			
BC53-16PAST-Q			

7. Marking

Table 5. Marking

Type number	Marking code
BC53PAST-Q	G2
BC53-10PAST-Q	F9
BC53-16PAST-Q	F8

8. Limiting values

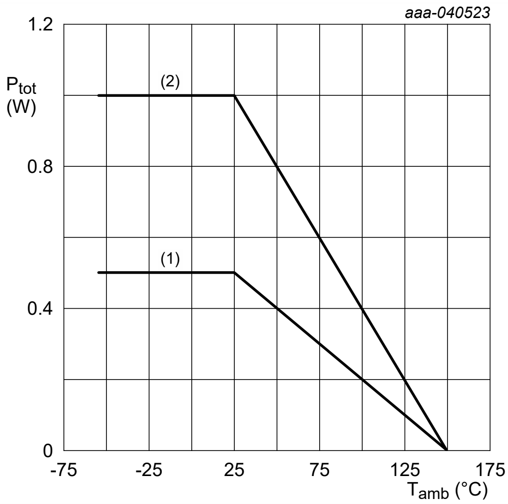
Table 6. Limiting values

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

T_{amb} = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions		Min	Max	Unit
V_{CBO}	collector-base voltage	open emitter		-	-100	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_B	base current			-	-0.2	A
I_{BM}	peak base current	single pulse; t_p ≤ 1 ms		-	-0.3	A
P_{tot}	total power dissipation	T_{amb} ≤ 25 °C	[1]	-	0.5	W
			[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 Printed-Circuit-Board (PCB); single-sided copper; tin-plated and standard footprint.
[2] Device mounted on an FR4 Printed-Circuit-Board (PCB); single-sided copper; tin-plated; mounting pad for collector 1 cm^2.



(1) FR4 PCB; single-sided copper; standard footprint
(2) FR4 PCB; single-sided copper; 1 cm^2

Fig. 1. Power derating curves

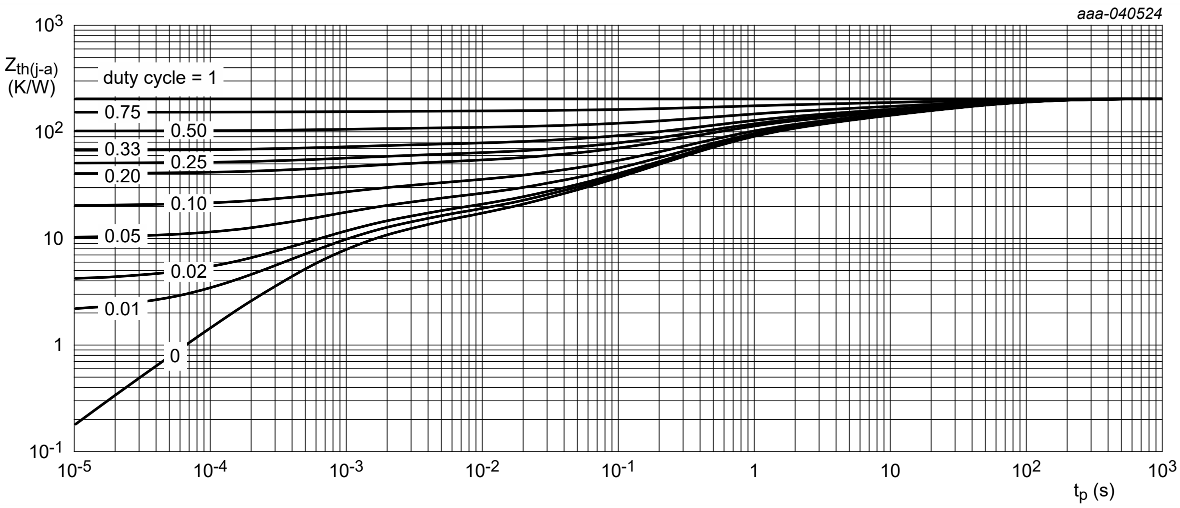
9. Thermal characteristics

Table 7. Thermal characteristics

T_{amb} = 25 °C unless otherwise specified.

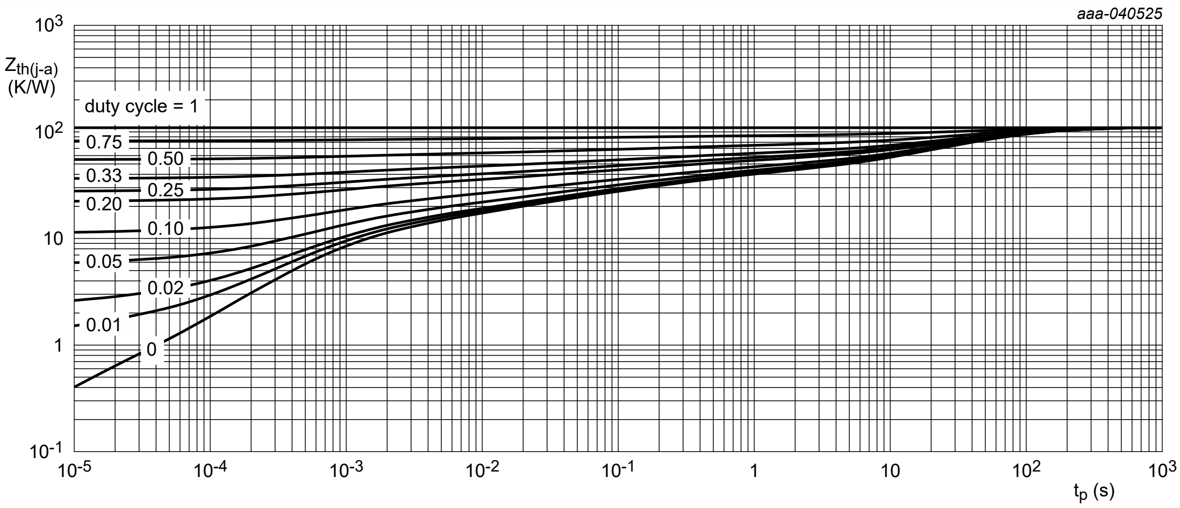
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	235	K/W
			[2]	-	-	124	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	-	15	K/W

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



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

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

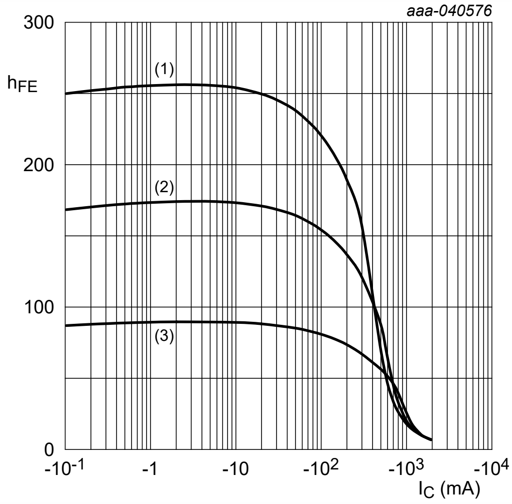
10. Characteristics

Table 8. Characteristics

T_{amb} = 25 °C unless otherwise specified.

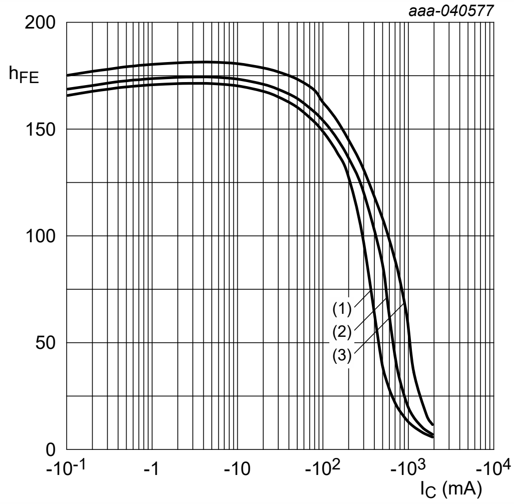
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = -100 µA; I_E = 0 A		-100	-		V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	I_C = -2 mA; I_E = 0 A		-80	-		V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_E = -100 µA; I_C = 0 A		-5	-		V
I_{CBO}	collector-base cut-off current	V_{CB} = -30 V; I_E = 0 A		-	-	-100	nA
		V_{CB} = -30 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						
	BC53PAST-Q	V_{CE} = -2 V; I_C = -5 mA		63	-	-	
		V_{CE} = -2 V; I_C = -150 mA	[1]	63	-	250	
		V_{CE} = -2 V; I_C = -500 mA	[1]	40	-	-	
	BC53-10PAST-Q	V_{CE} = -2 V; I_C = -5 mA		63	-	-	
		V_{CE} = -2 V; I_C = -150 mA	[1]	63	-	160	
		V_{CE} = -2 V; I_C = -500 mA	[1]	40	-	-	
	BC53-16PAST-Q	V_{CE} = -2 V; I_C = -5 mA		63	-	-	
		V_{CE} = -2 V; I_C = -150 mA	[1]	100	-	250	
		V_{CE} = -2 V; I_C = -500 mA	[1]	40	-	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = -500 mA; I_B = -50 mA	[1]	-	-	-500	mV
V_{BE}	base-emitter voltage	V_{CE} = -2 V; I_C = -500 mA	[1]	-	-	-1	V
f_T	transition frequency	V_{CE} = -5 V; I_C = -50 mA; f = 100 MHz		100	-	-	MHz
C_c	collector capacitance	V_{CB} = -10 V; I_E = i_e = 0 A; f = 1 MHz		-	7	-	pF

[1] pulsed; t_p ≤ 300 µs; δ ≤ 0.02



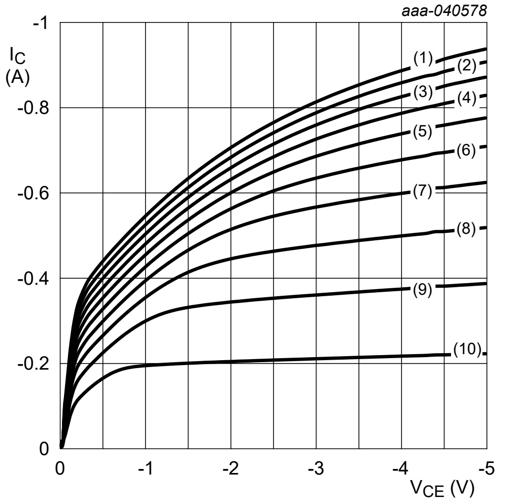
V_{CE} = -2 V
(1) T_{amb} = 100 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

Fig. 4. DC current gain as a function of collector current; typical values



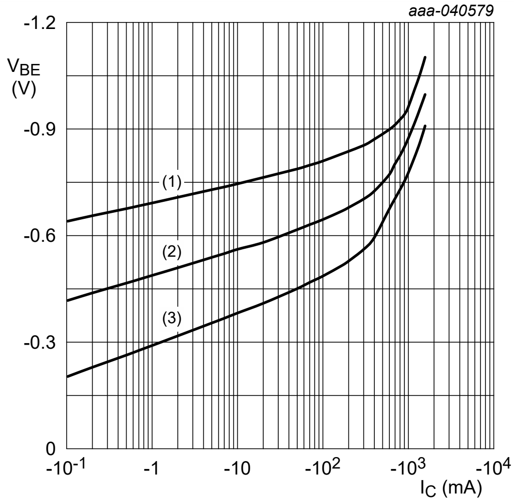
T_{amb} = 25 °C
(1) V_{CE} = -1 V
(2) V_{CE} = -2 V
(3) V_{CE} = -5 V

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



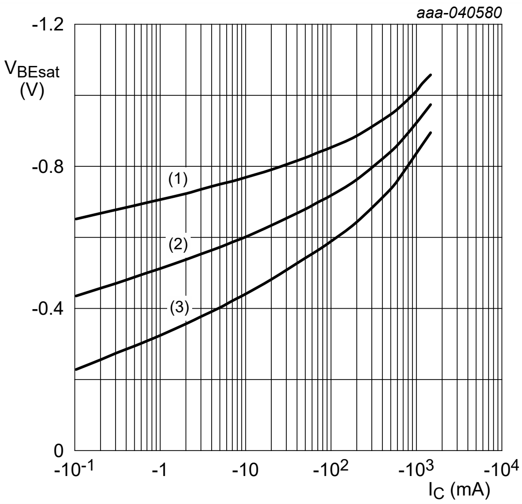
T_{amb} = 25 °C
(1) I_B = -15.0 mA
(2) I_B = -13.5 mA
(3) I_B = -12.0 mA
(4) I_B = -10.5 mA
(5) I_B = -9.0 mA
(6) I_B = -7.5 mA
(7) I_B = -6.0 mA
(8) I_B = -4.5 mA
(9) I_B = -3.0 mA
(10) I_B = -1.5 mA

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



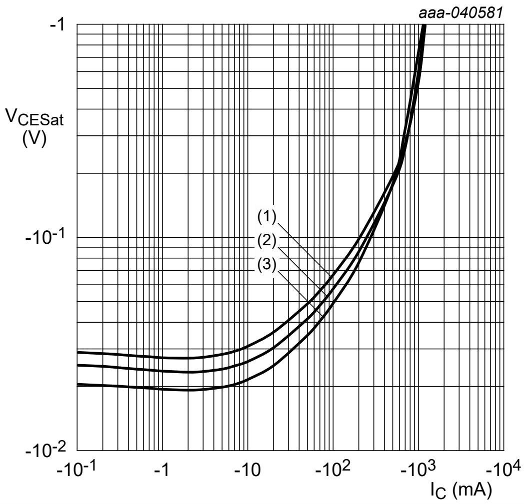
V_{CE} = -2 V
(1) T_{amb} = -55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 100 °C

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



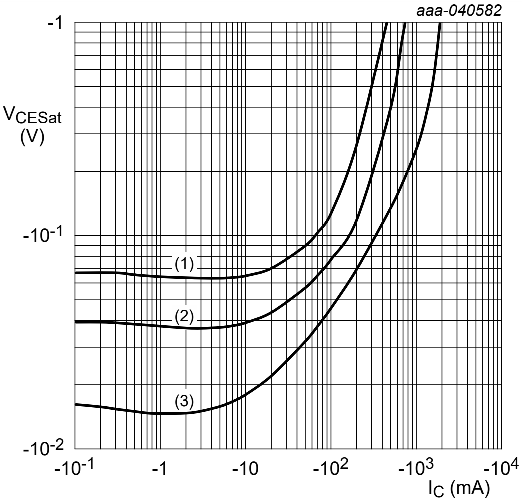
$I_C/I_B = 10$
(1) T_{amb} = -55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 100 °C

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



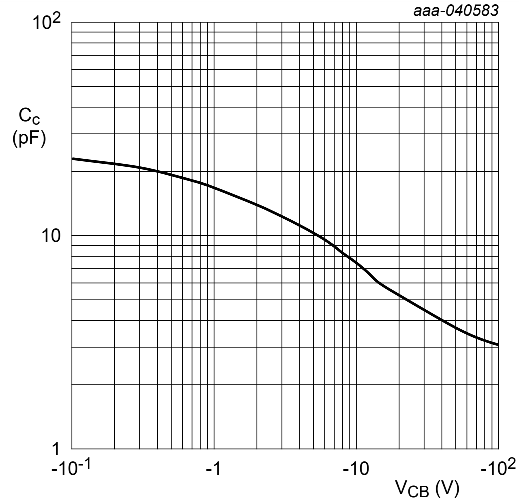
$I_C/I_B = 10$
(1) T_{amb} = 100 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

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



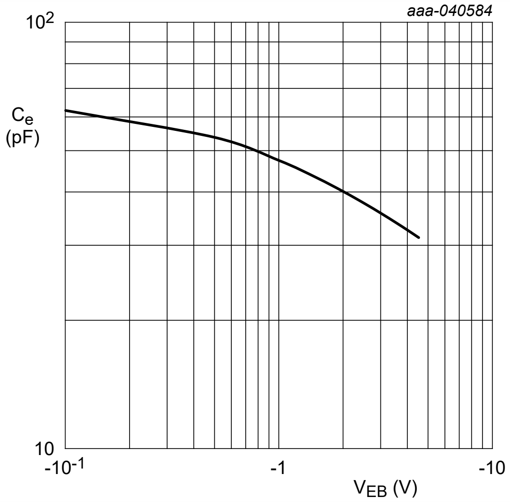
T_{amb} = 25 °C
(1) $I_C/I_B = 50$
(2) $I_C/I_B = 20$
(3) $I_C/I_B = 5$

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



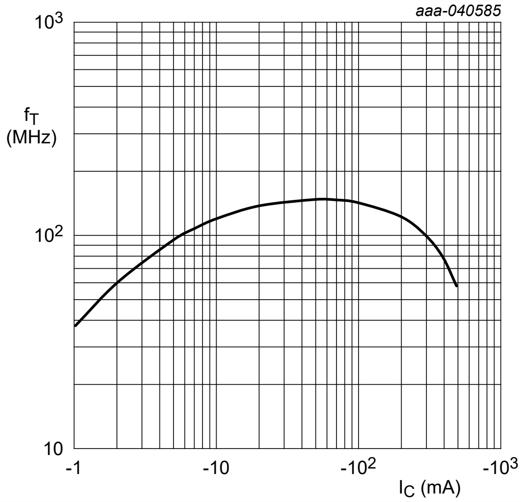
f = 1 MHz; T_{amb} = 25 °C

Fig. 11. Collector capacitance as a function of collector-base voltage; typical values



f = 1 MHz; T_{amb} = 25 °C

Fig. 12. Emitter capacitance as a function of emitter-base voltage; typical values



V_{CE} = -5 V
f = 100 MHz; T_{amb} = 25 °C

Fig. 13. Transition frequency as a function of collector current; typical values

11. Test information

11.1. 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.

12. Package outline

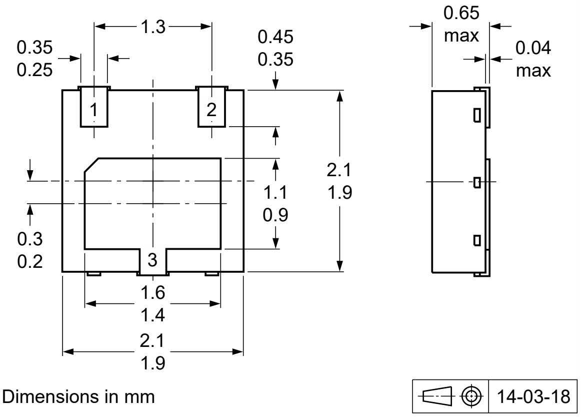


Fig. 14. Package outline DFN2020D-3 (SOT1061D)

13. Soldering

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

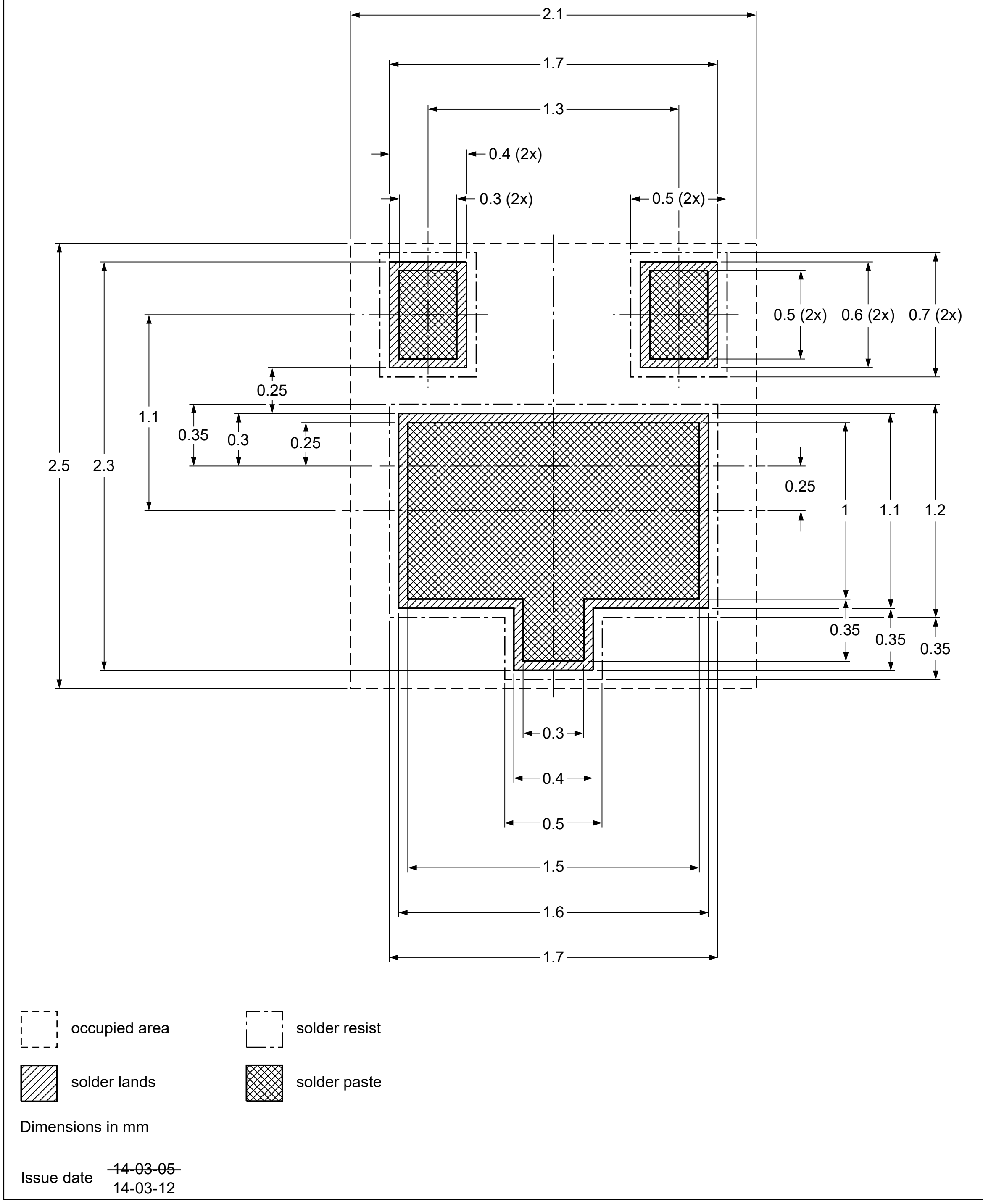


Fig. 15. Reflow soldering footprint for DFN2020D-3 (SOT1061D

14. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BC53PAST-Q_SER v.1	20240823	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".
[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the internet at https://www.nexperia.com.

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