



BC56xPAS series

80 V, 1 A NPN medium power transistors

2 May 2023

Product data sheet

1. General description

NPN medium power transistor series encapsulated 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.

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
- Two current gain selections
- Leadless very small SMD plastic package with medium power capability
- Suitable for Automatic Optical Inspection (AOI) of solder joint
- AEC-Q101 qualified

3. Applications

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

4. Quick reference data

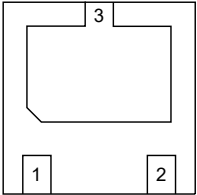
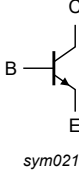
Table 1. Quick reference data

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						
	BC56PAS	$V_{CE} = 2$ V; $I_C = 150$ mA; $T_{amb} = 25$ °C	[1]	63	-	250	
	BC56-10PAS		[1]	63	-	160	
	BC56-16PAS		[1]	100	-	250	

[1] pulsed; $t_p \leq 300$ μ s; $\delta \leq 0.02$

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base	 Transparent top view DFN2020D-3 (SOT1061D)	 sym021
2	E	emitter		
3	C	collector		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BC56PAS	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
BC56-10PAS			
BC56-16PAS			

7. Marking

Table 4. Marking codes

Type number	Marking code
BC56PAS	CK
BC56-10PAS	CL
BC56-16PAS	CM

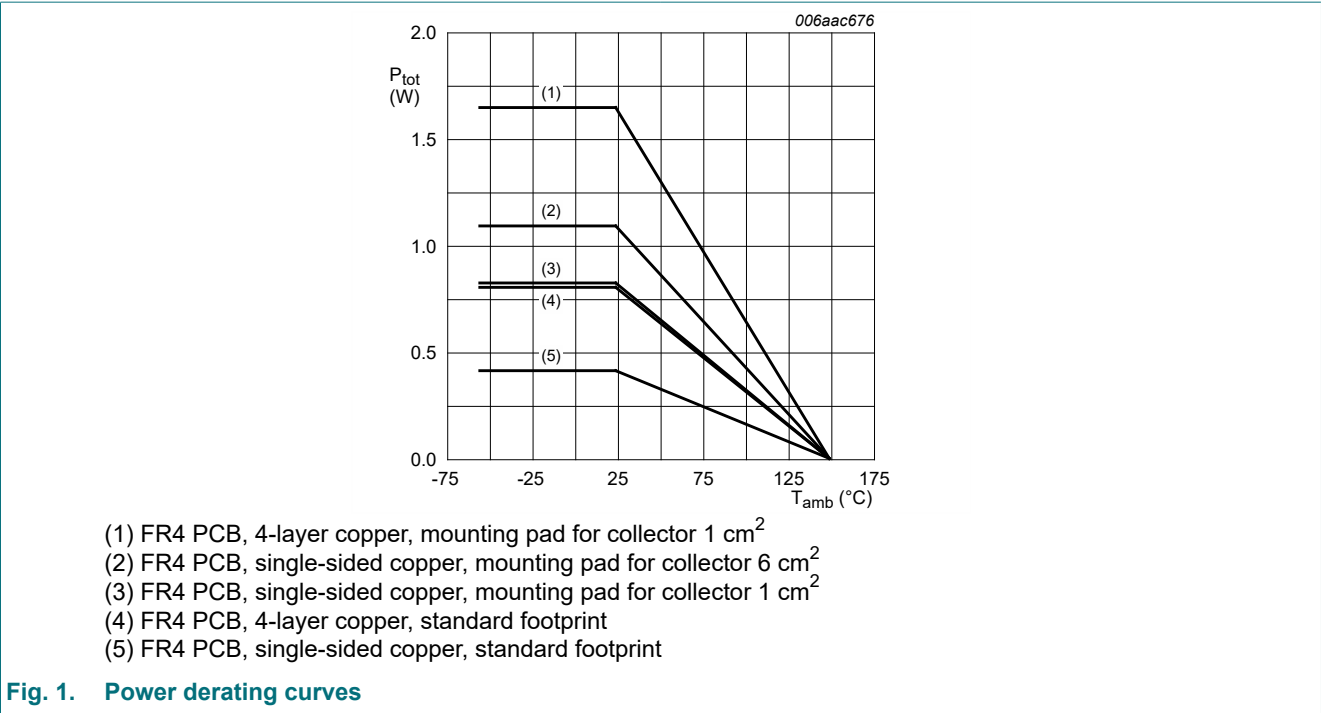
8. Limiting values

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		-	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			-	0.3	A
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[1]	-	0.42	W
			[2]	-	0.81	W
			[3]	-	0.83	W
			[4]	-	1.10	W
			[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, 4-layer copper, tin-plated and standard footprint.
- [3] Device mounted on an FR4 PCB, single-sided copper, tin-plated and mounting pad for collector 1 cm².
- [4] Device mounted on an FR4 PCB, single-sided copper, tin-plated and mounting pad for collector 6 cm².
- [5] Device mounted on an FR4 PCB, 4-layer copper, tin-plated and mounting pad for collector 1 cm².



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]	-	-	298	K/W
			[2]	-	-	154	K/W
			[3]	-	-	151	K/W
			[4]	-	-	114	K/W
			[5]	-	-	76	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	-	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, 4-layer copper, tin-plated and standard footprint.
[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated and mounting pad for collector 1 cm².
[4] Device mounted on an FR4 PCB, single-sided copper, tin-plated and mounting pad for collector 6 cm².
[5] Device mounted on an FR4 PCB, 4-layer copper, tin-plated and mounting pad for collector 1 cm².

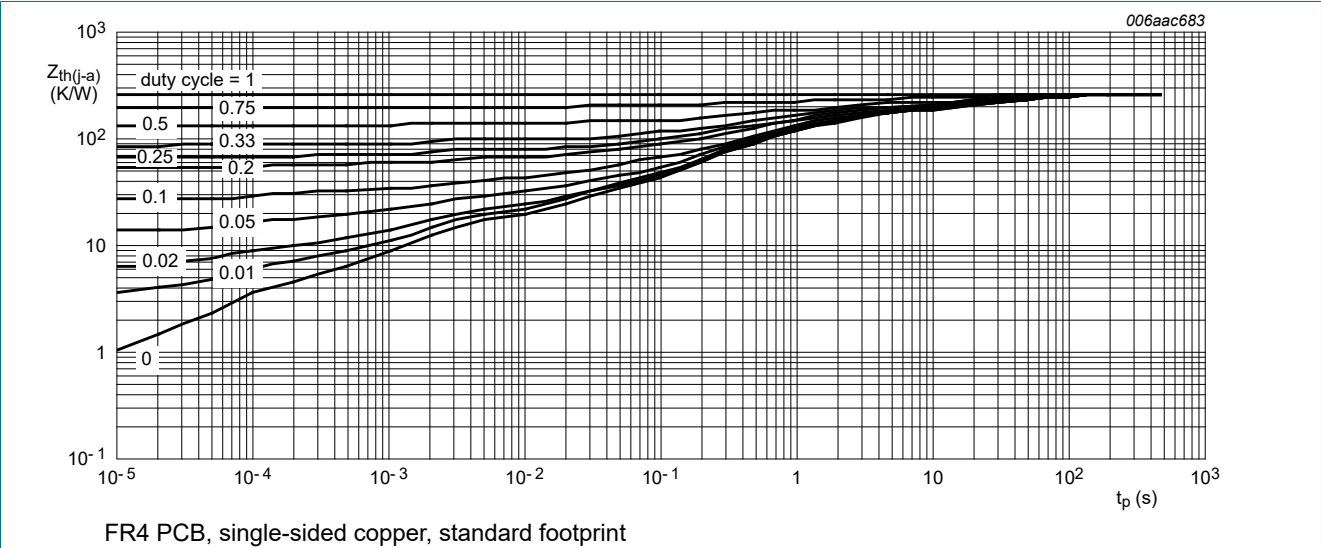


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

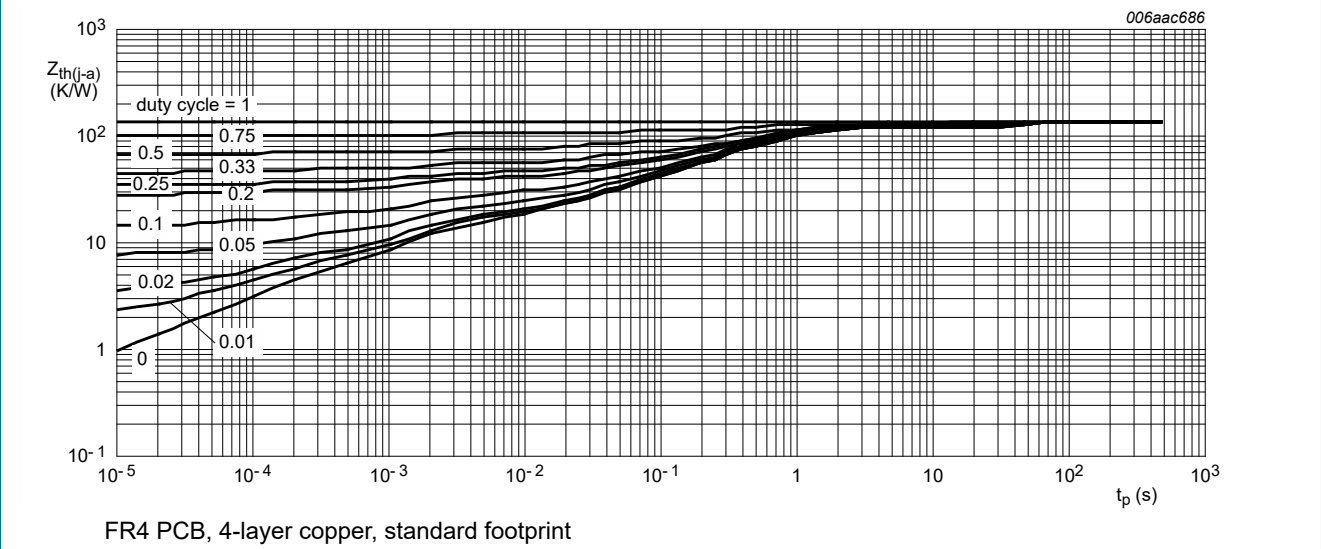
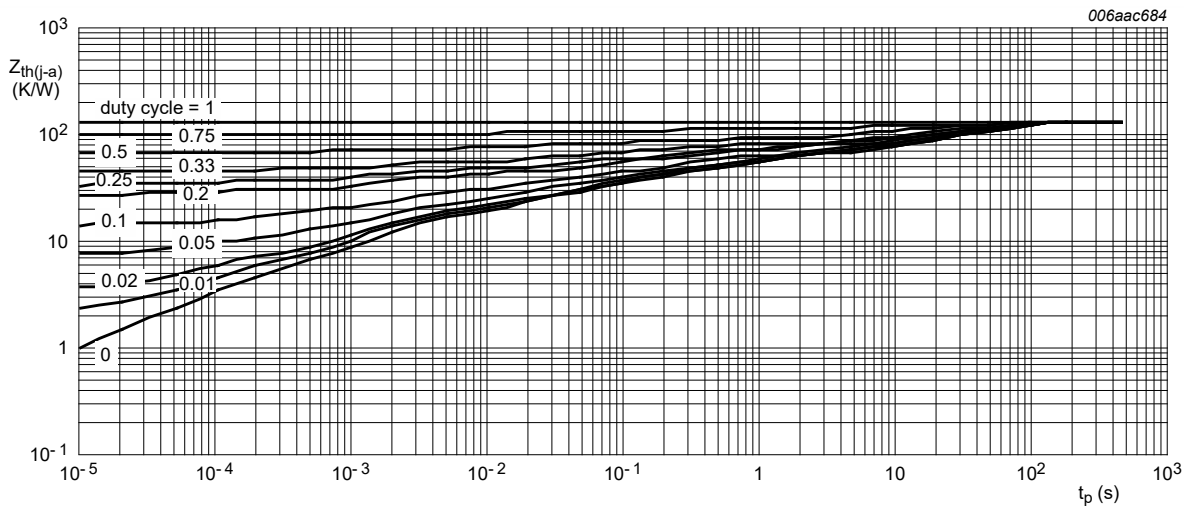
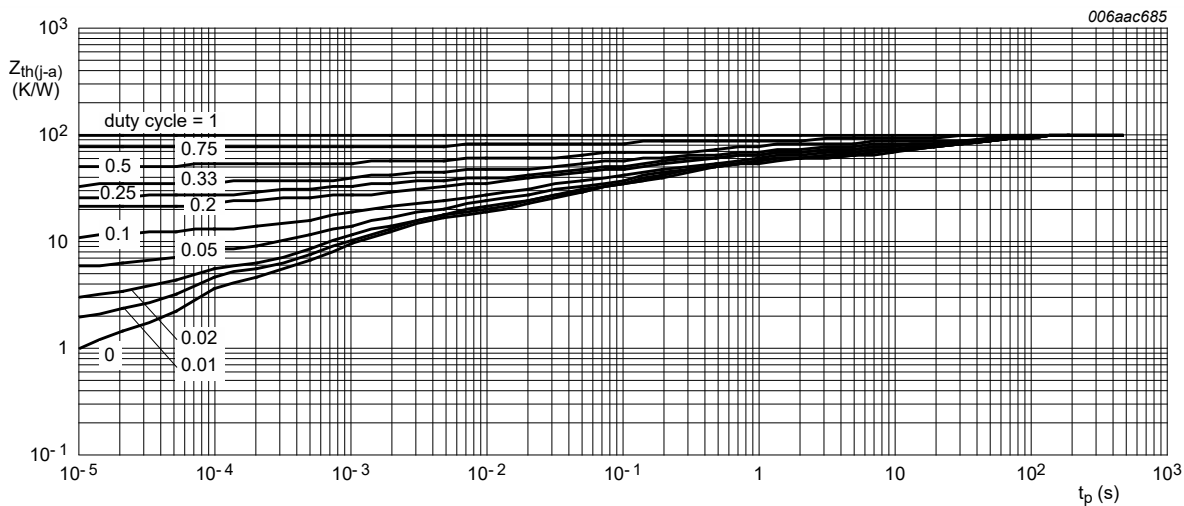


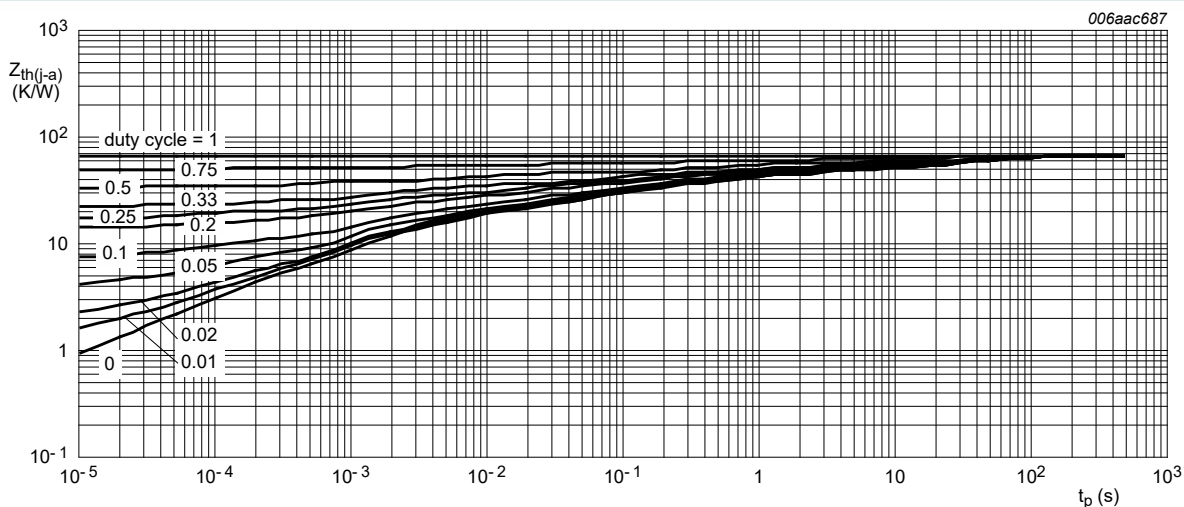
Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



FR4 PCB, single-sided copper, mounting pad for collector 1 cm^2
Fig. 4. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



FR4 PCB, single-sided copper, mounting pad for collector 6 cm^2
Fig. 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



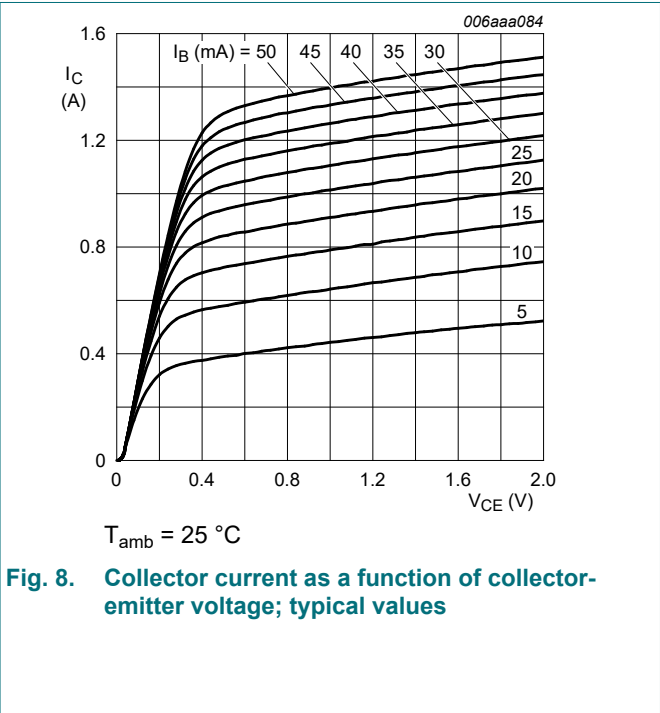
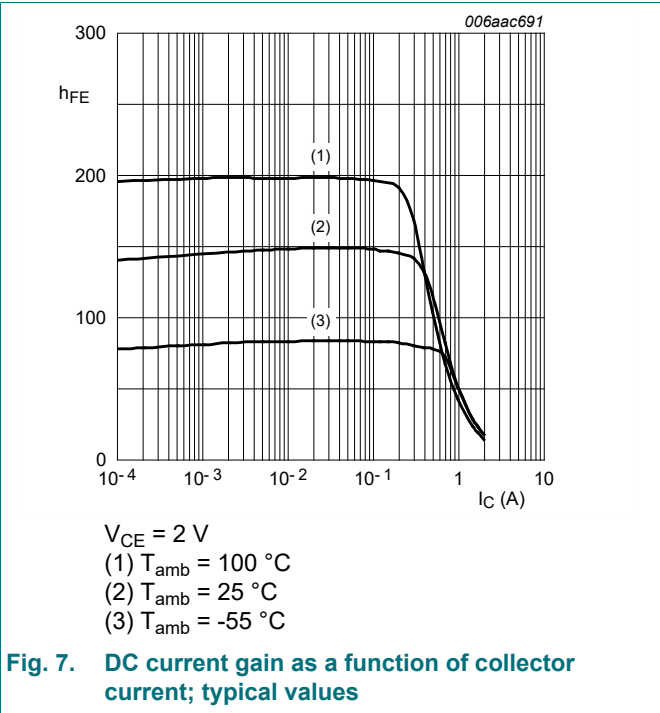
FR4 PCB, 4-layer copper, mounting pad for collector 1 cm^2
Fig. 6. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

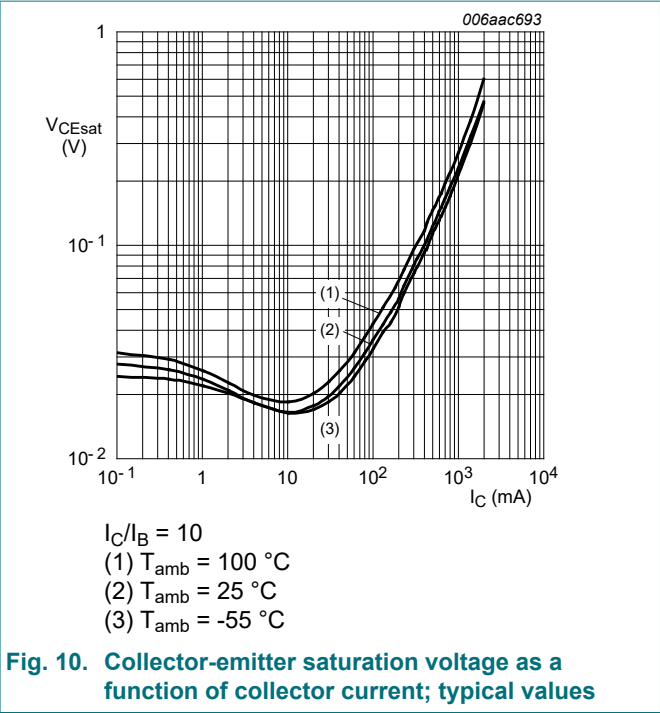
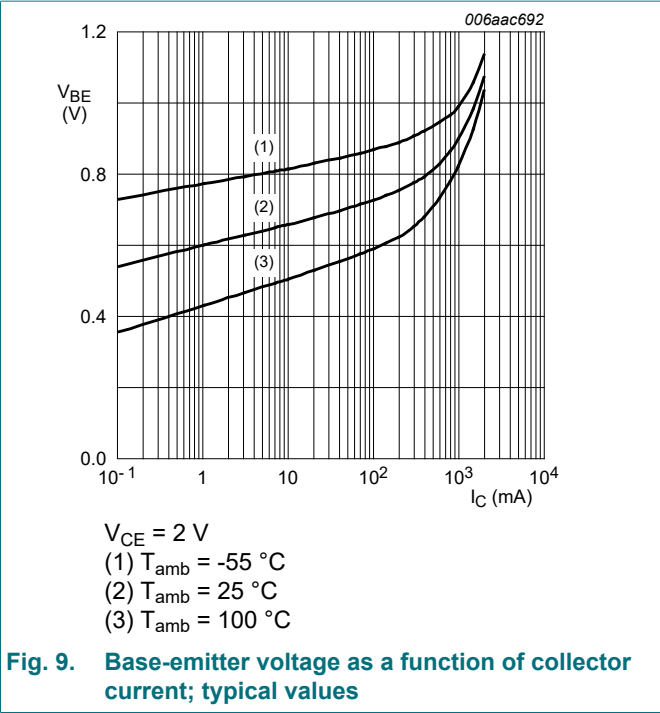
10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I _{CBO}	collector-base cut-off current (emitter open)	V _{CB} = 30 V; I _E = 0 A; T _{amb} = 25 °C		-	-	100	nA
		V _{CB} = 30 V; I _E = 0 A; T _{amb} = 150 °C		-	-	10	μA
I _{EBO}	emitter-base cut-off current (collector open)	V _{EB} = 5 V; I _C = 0 A; T _{amb} = 25 °C		-	-	100	nA
h _{FE}	DC current gain						
	BC56PAS	V _{CE} = 2 V; I _C = 5 mA; T _{amb} = 25 °C		63	-	-	
	BC56-10PAS			63	-	-	
	BC56-16PAS			63	-	-	
	BC56PAS	V _{CE} = 2 V; I _C = 150 mA; T _{amb} = 25 °C	[1]	63	-	250	
	BC56-10PAS		[1]	63	-	160	
	BC56-16PAS		[1]	100	-	250	
	BC56PAS	V _{CE} = 2 V; I _C = 500 mA; T _{amb} = 25 °C	[1]	40	-	-	
	BC56-10PAS		[1]	40	-	-	
	BC56-16PAS		[1]	40	-	-	
V _{CEsat}	collector-emitter saturation voltage	I _C = 500 mA; I _B = 50 mA; T _{amb} = 25 °C	[1]	-	-	500	mV
V _{BE}	base-emitter voltage	V _{CE} = 2 V; I _C = 500 mA; T _{amb} = 25 °C	[1]	-	-	1	V
C _c	collector capacitance	V _{CB} = 10 V; i _e = 0 A; f = 1 MHz; T _{amb} = 25 °C		-	6	-	pF
f _T	transition frequency	V _{CE} = 5 V; I _C = 50 mA; f = 100 MHz; T _{amb} = 25 °C		100	180	-	MHz

[1] pulsed; t_p ≤ 300 μs; δ ≤ 0.02



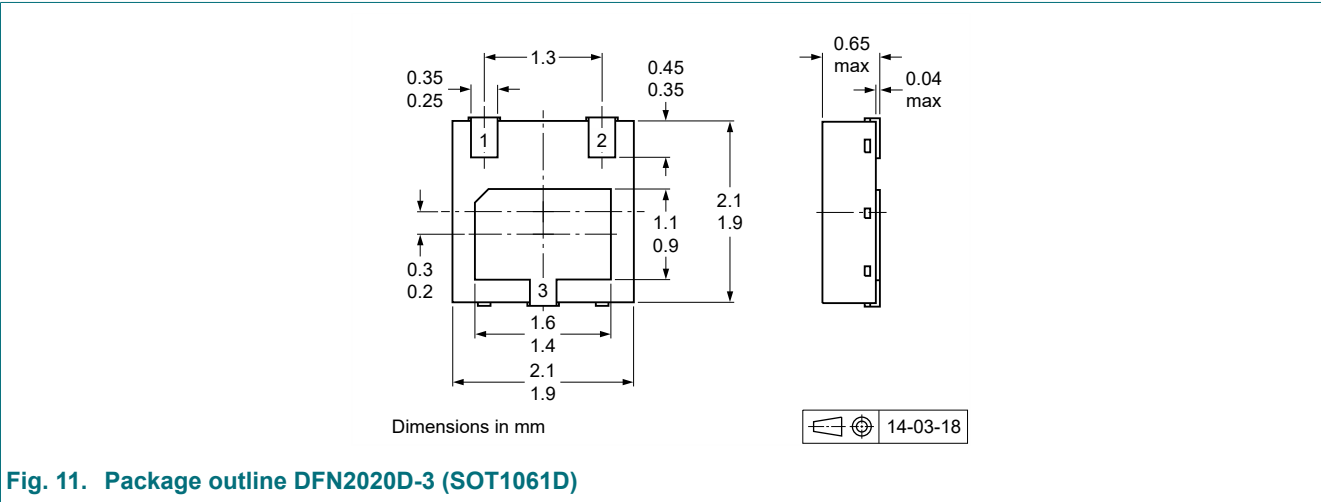


11. Test information

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



13. Soldering

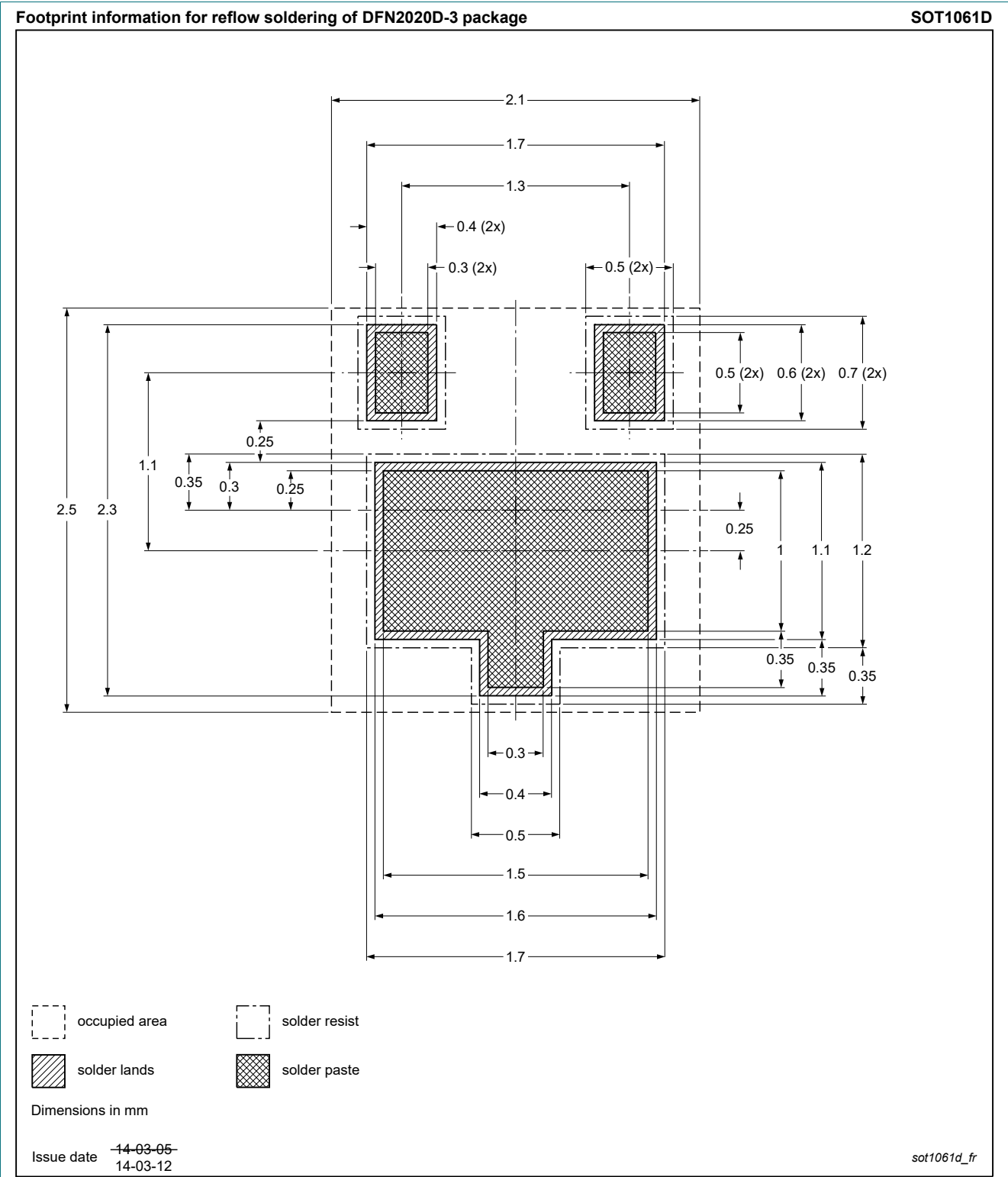


Fig. 12. Reflow soldering footprint for DFN2020D-3 (SOT1061D)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BC56XPAS_SER v.2	20230502	Product data sheet	-	BC54_55_56PAS_SER v.1
Modifications:	• Family data sheet splitted to three data sheets			
BC54_55_56PAS_SER v.1	20141111	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.

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- [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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