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Kind regards,

Team Nexperia



BC51PAS; BC52PAS; BC53PAS

45 V/60 V/80 V, 1 A PNP medium power transistors

Rev. 1 — 19 June 2015

Product data sheet

1. Product profile

1.1 General description

PNP 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.

Table 1. Product overview

Type number ^[1]	Package		NPN complement
BC51PAS	DFN2020D-3	SOT1061D	BC54PAS
BC52PAS			BC55PAS
BC53PAS			BC56PAS

[1] Valid for all available selection groups.

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
- Three 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
- High-side switches
- Power management
- Amplifiers

1.4 Quick reference data

Table 2. Quick reference data

$T_{amb} = 25\text{ °C}$ unless otherwise specified

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base				
	BC51PAS series		-	-	-45	V
	BC52PAS series		-	-	-60	V
	BC53PAS series		-	-	-80	V



Table 2. Quick reference data ...continued

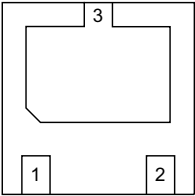
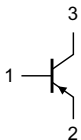
 $T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_C	collector current		-	-	-1	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1\text{ ms}$	-	-	-2	A
h_{FE}	DC current gain	$V_{CE} = -2\text{ V}$; $I_C = -150\text{ mA}$ [1]	63	-	250	
	h_{FE} selection -10	$V_{CE} = -2\text{ V}$; $I_C = -150\text{ mA}$ [1]	63	-	160	
	h_{FE} selection -16	$V_{CE} = -2\text{ V}$; $I_C = -150\text{ mA}$ [1]	100	-	250	

[1] Pulse test: $t_p \leq 300\text{ ms}$; $\delta \leq 0.02$.

2. Pinning information

Table 3. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	base	 Transparent top view	 sym013
2	emitter		
3	collector		

3. Ordering information

Table 4. Ordering information

Type number[1]	Package		
	Name	Description	Version
BC51PAS series	DFN2020D-3	plastic thermal enhanced ultra thin small outline package; no leads; 3 terminals; body $2 \times 2 \times 0.65\text{ mm}$.	SOT1061D
BC52PAS series			
BC53PAS series			

[1] Valid for all available selection groups.

4. Marking

Table 5. Marking codes

Type number	Marking code
BC51PAS	C4
BC51-10PAS	C5
BC51-16PAS	C6
BC52PAS	C7
BC52-10PAS	C8
BC52-16PAS	C9
BC53PAS	CA
BC53-10PAS	CB
BC53-16PAS	CC

5. Limiting values

Table 6. Limiting values

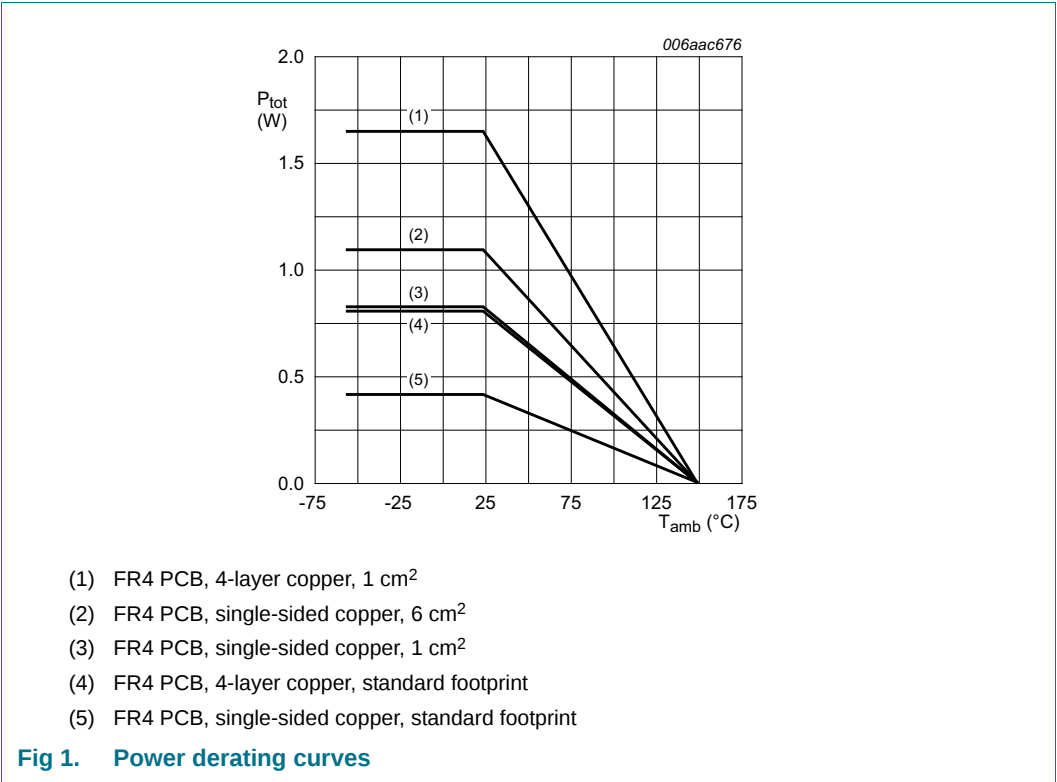
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CBO}	collector-base voltage	open emitter			
	BC51PAS series		-	-45	V
	BC52PAS series		-	-60	V
	BC53PAS series		-	-100	V
V_{CEO}	collector-emitter voltage	open base			
	BC51PAS series		-	-45	V
	BC52PAS series		-	-60	V
	BC53PAS series		-	-80	V
V_{EBO}	emitter-base voltage	open collector	-	-5	V
I_C	collector current		-	-1	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms	-	-2	A
I_B	base current		-	-0.3	A

Table 6. 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} ≤ 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.

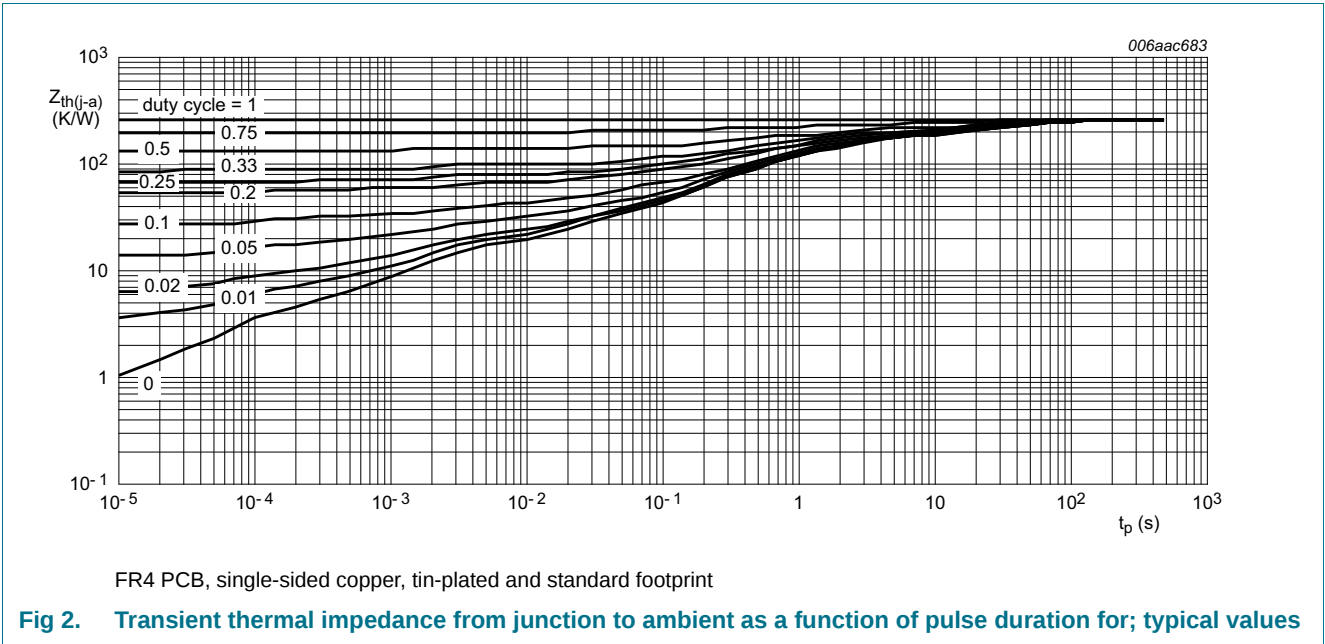


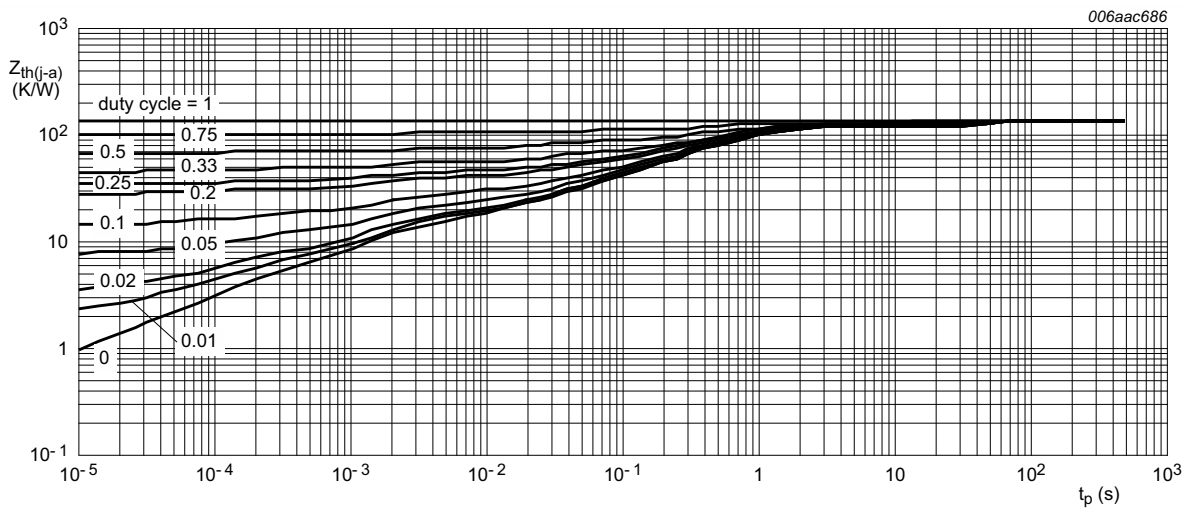
6. Thermal characteristics

Table 7. 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] 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	in free air	20	K/W

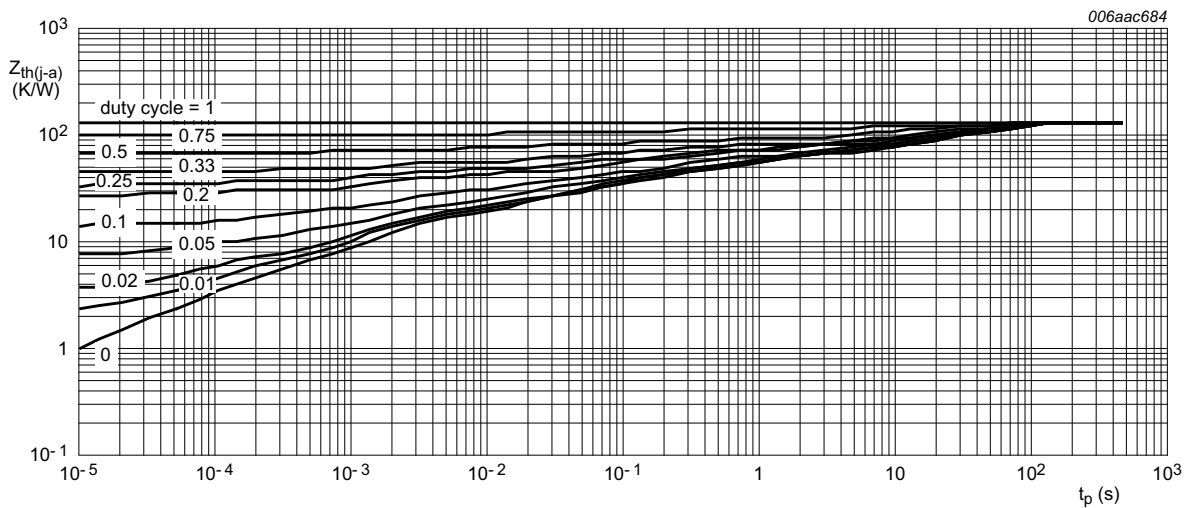
- [1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.
- [2] Device mounted on an FR4 PCB, 4-layer copper, tin-plated and standard footprint.
- [3] Device mounted on an FR4 PCB, single-sided copper, tin-plated and mounting pad for collector 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





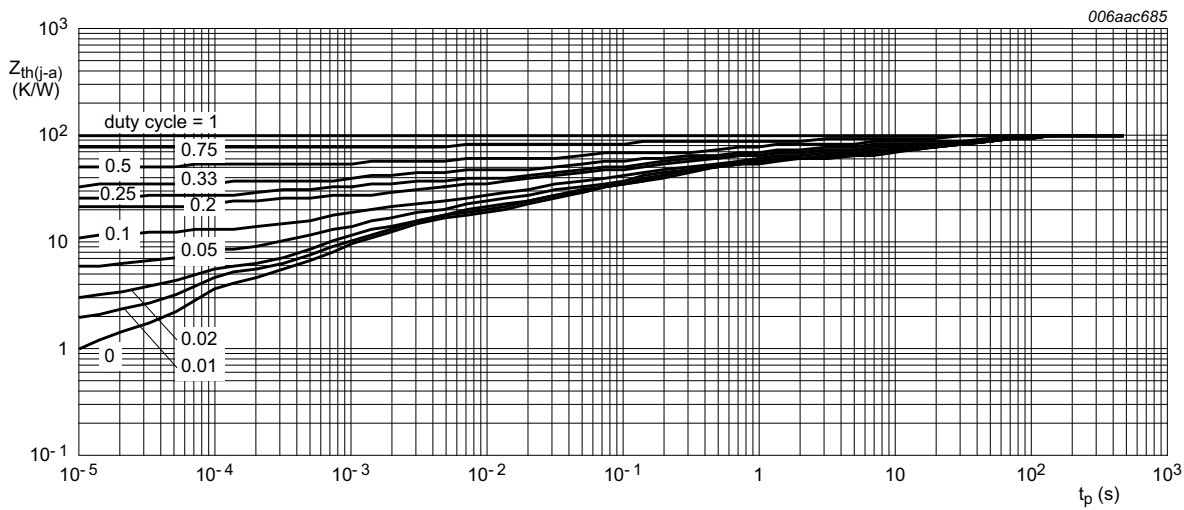
FR4 PCB, 4-layer copper, tin-plated and standard footprint.

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



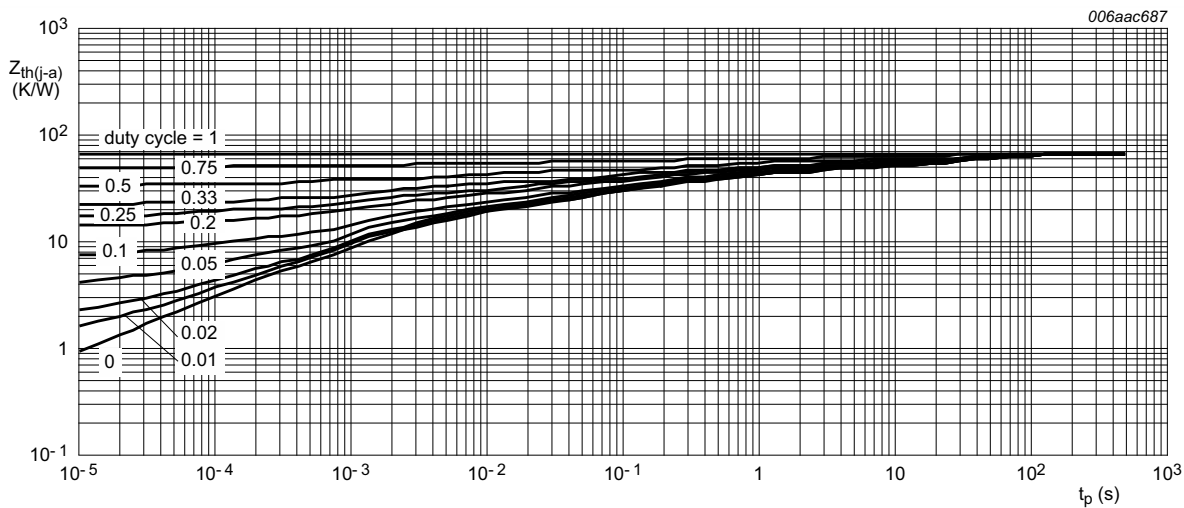
FR4 PCB, single-sided copper, tin-plated and mounting pad for collector 1 cm²

Fig 4. 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 cm²

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 cm²

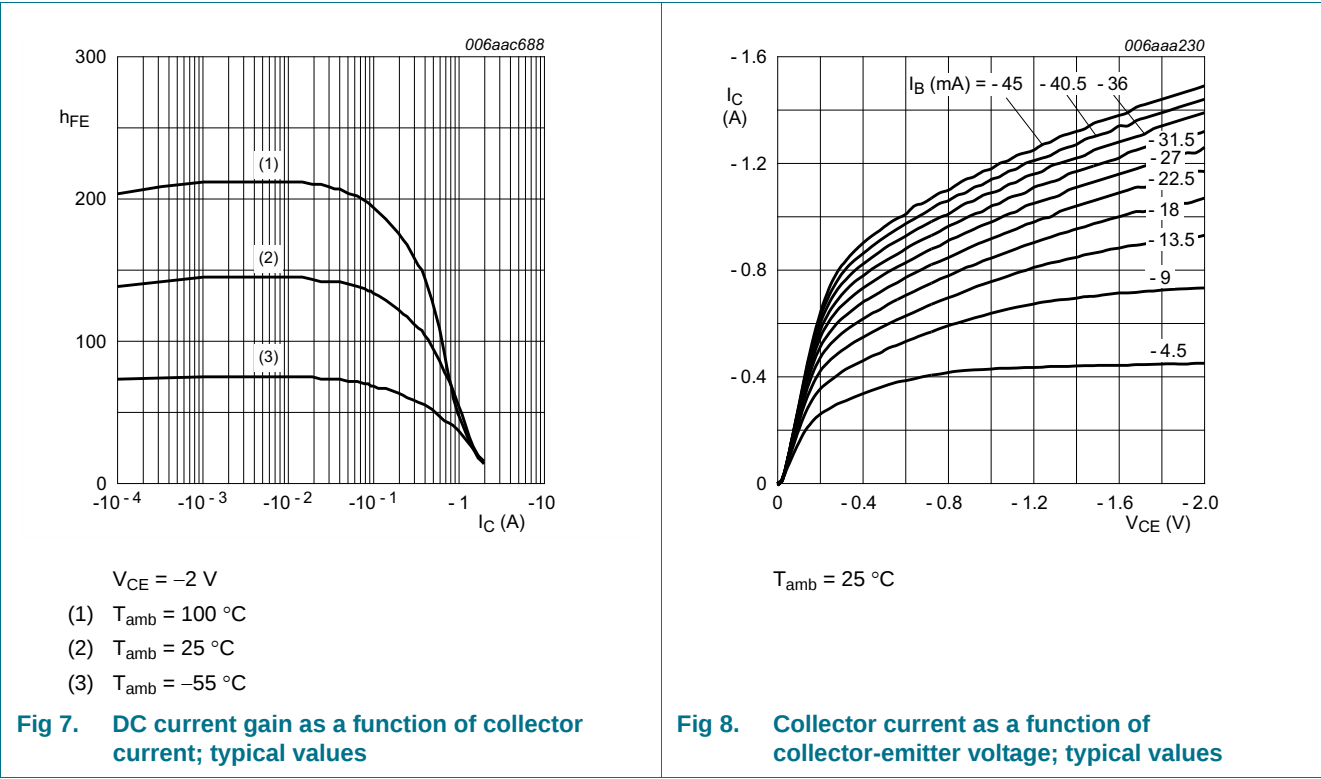
Fig 6. Transient thermal impedance from junction to ambient as a function of pulse duration for; typical values

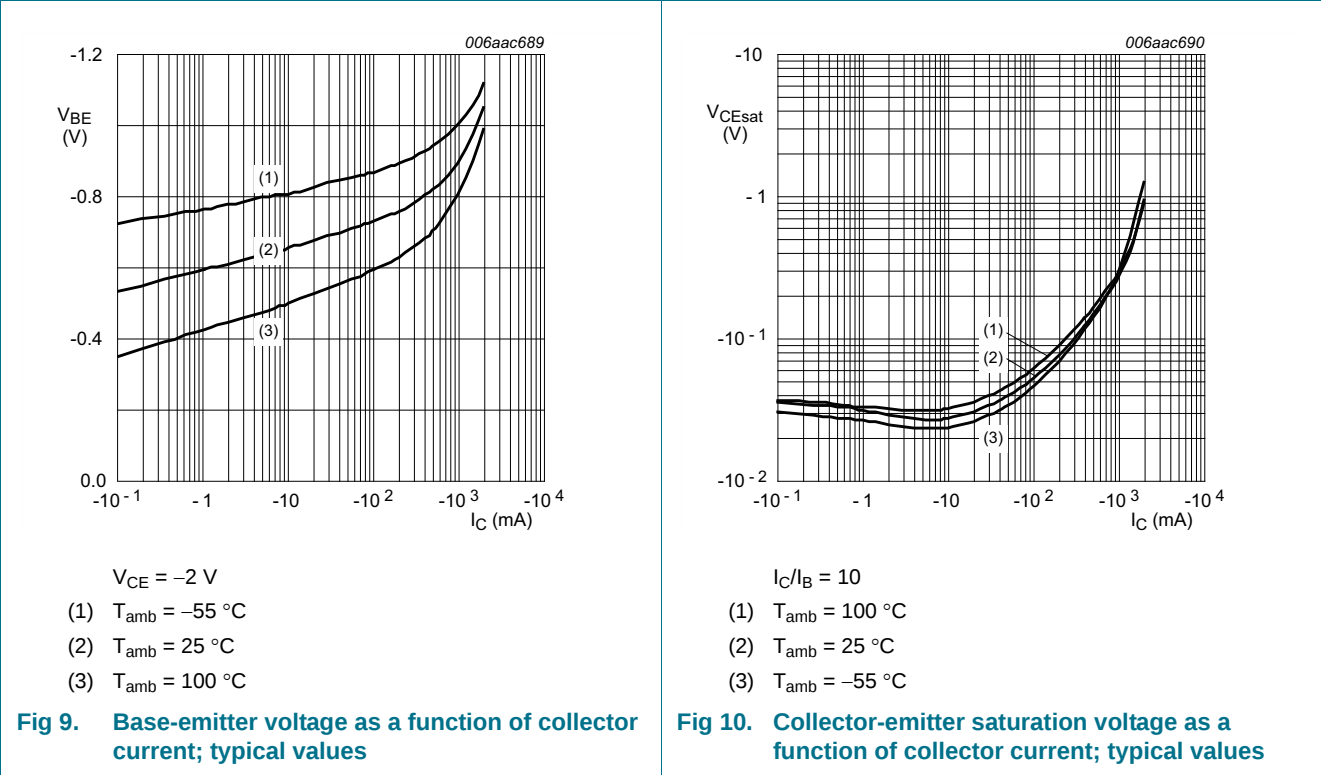
7. Characteristics

Table 8. Characteristics
T_{amb} = 25 °C unless otherwise specified

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
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	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	-	-	
	h _{FE} selection -10	V _{CE} = -2 V; I _C = -150 mA	[1] 63	-	160	
	h _{FE} selection -16	V _{CE} = -2 V; I _C = -150 mA	[1] 100	-	250	
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
C _c	collector capacitance	V _{CB} = -10 V; I _E = i _e = 0 A; f = 1 MHz	-	15	-	pF
f _T	transition frequency	V _{CE} = -5 V; I _C = -50 mA; f = 100 MHz	-	145	-	MHz

[1] Pulse test: t_p ≤ 300 ms; δ ≤ 0.02.



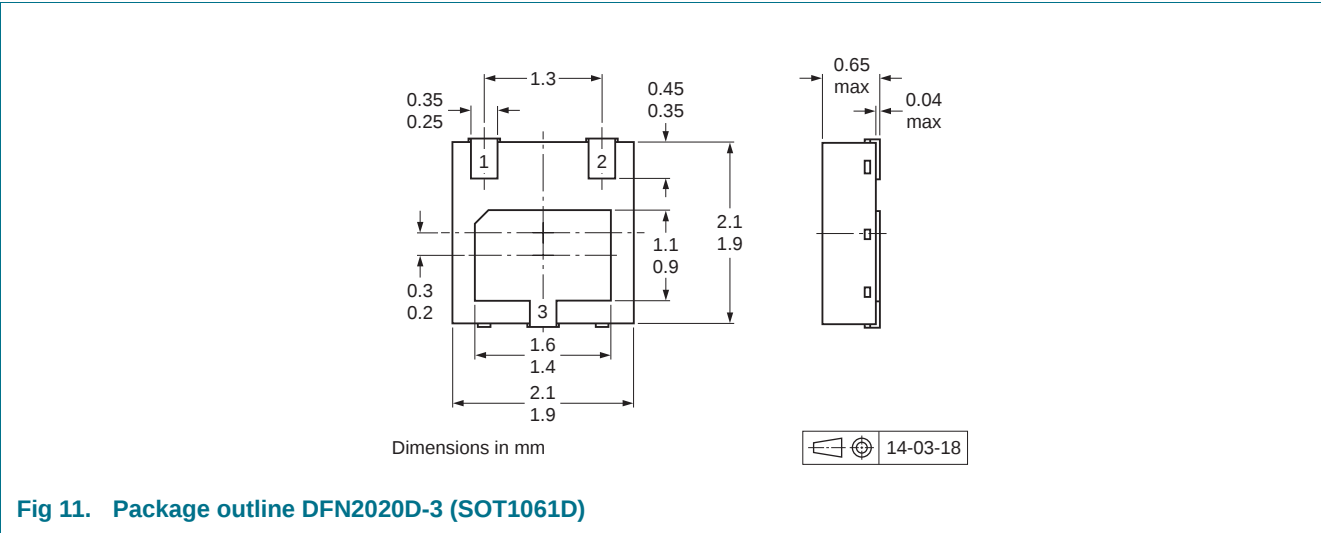


8. Test information

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



10. Soldering

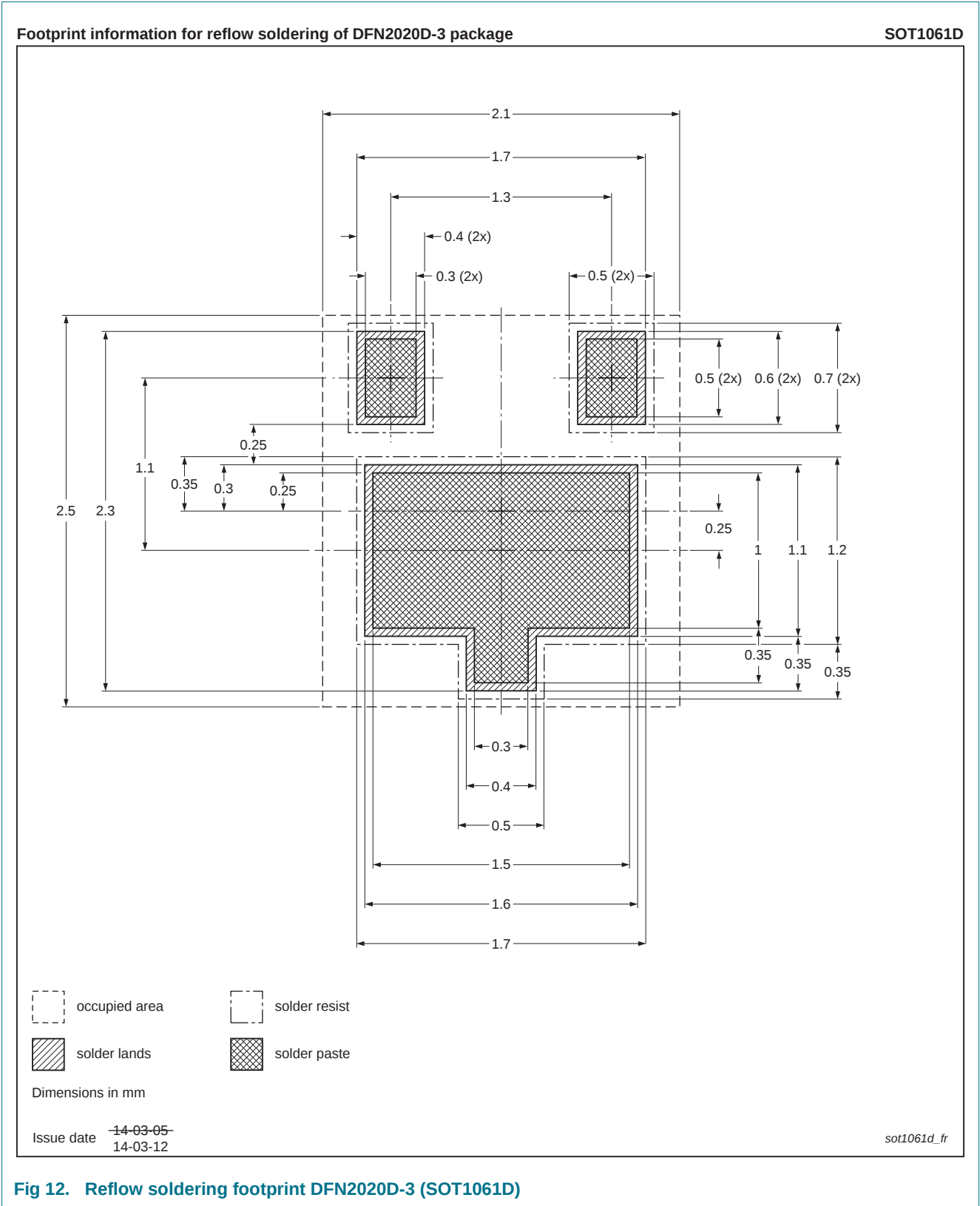


Fig 12. Reflow soldering footprint DFN2020D-3 (SOT1061D)

11. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BC51_52_53PAS_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.

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

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