



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

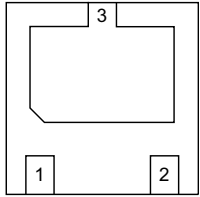
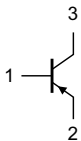
Table 2. Quick reference data ...continued
 $T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified

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	 <p>Transparent top view</p>	 <p>sym013</p>
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

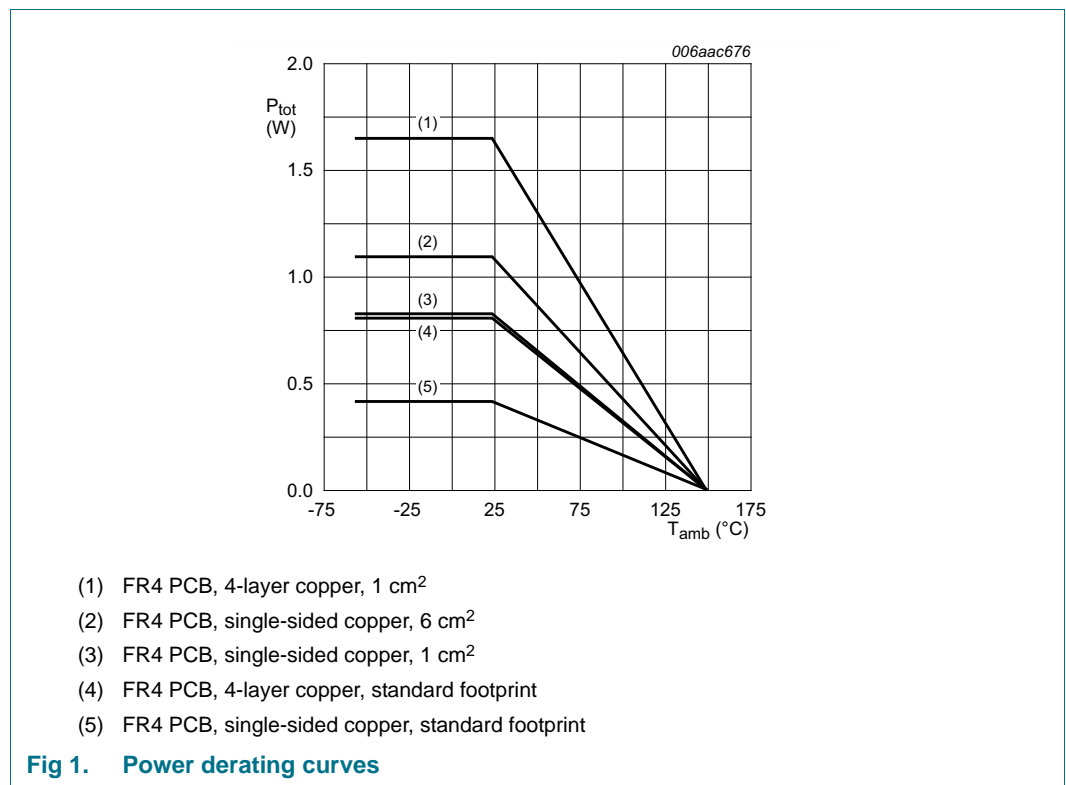
In accordance with the Absolute Maximum Rating System (IEC 60134).

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 ≤ 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.

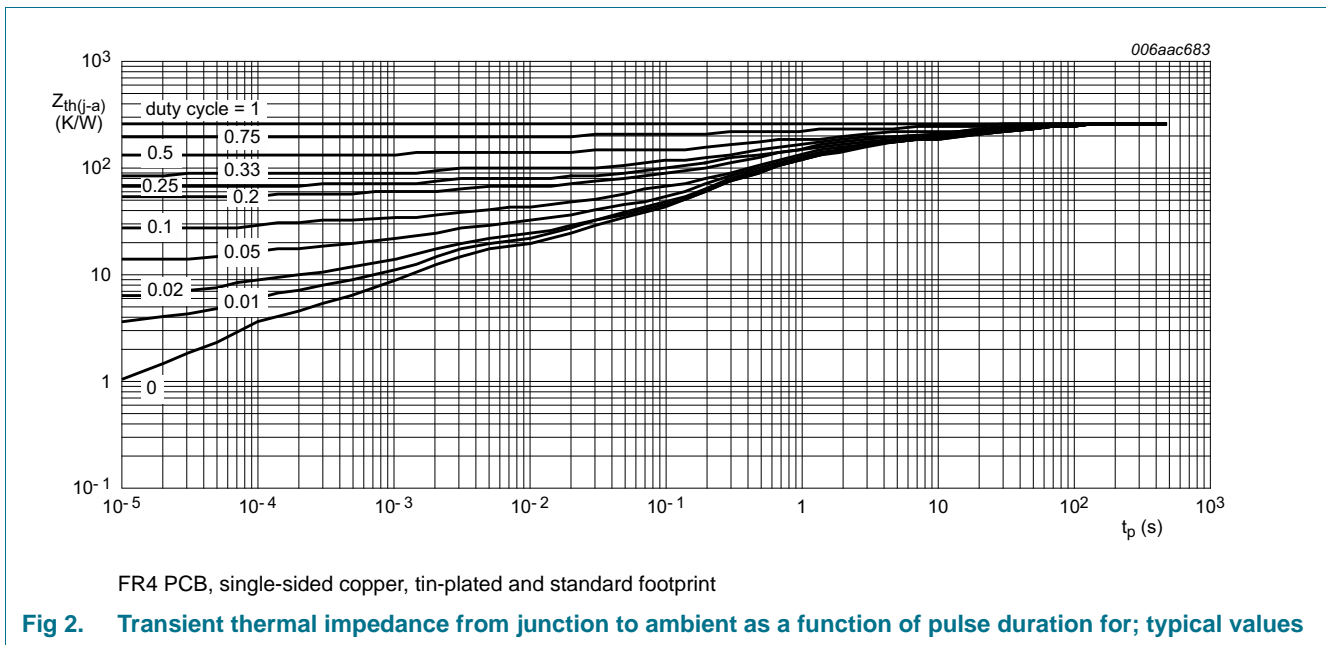


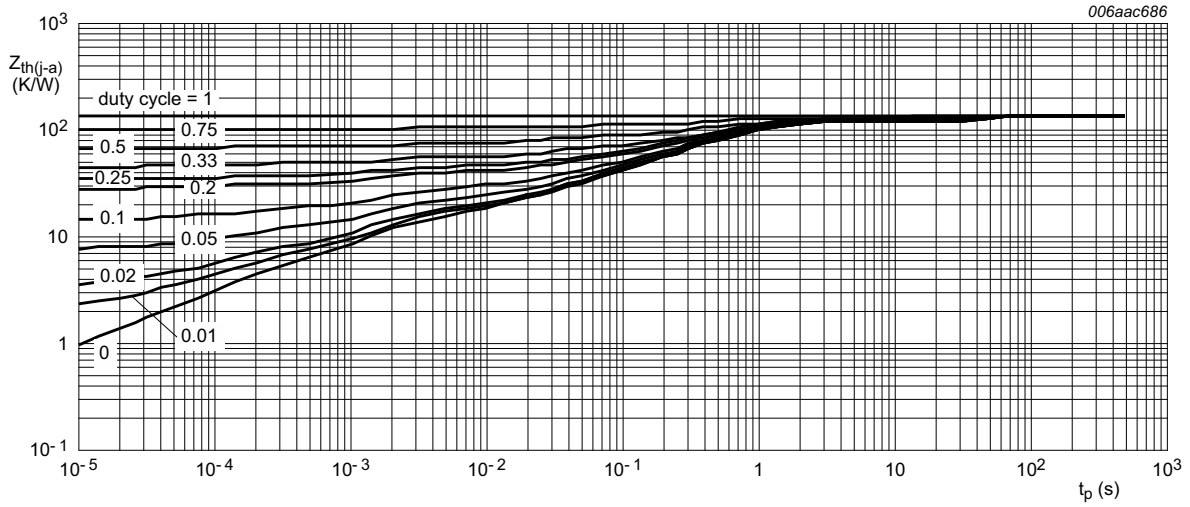
6. Thermal characteristics

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

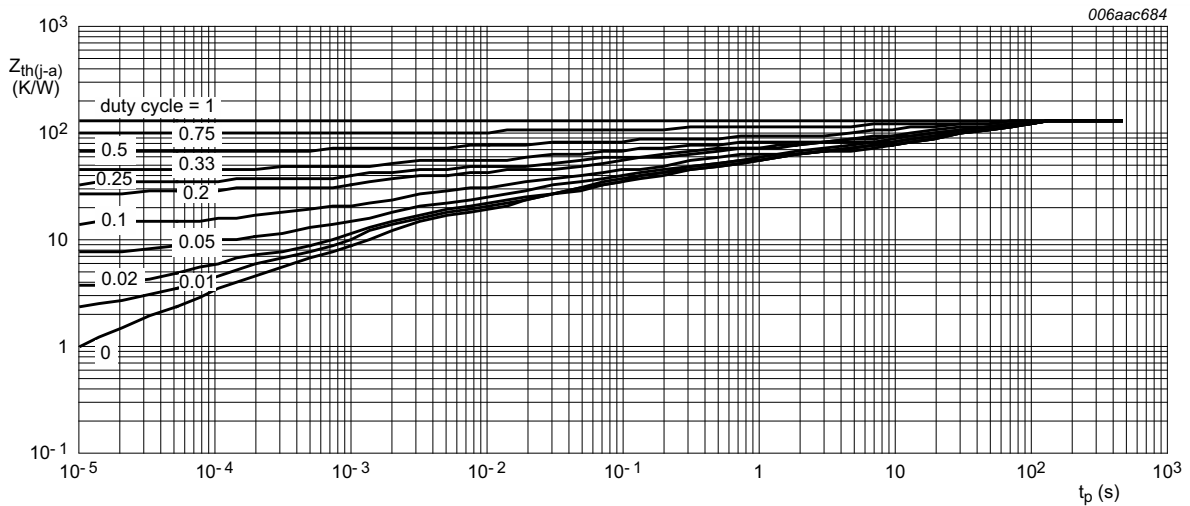
- [1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.
- [2] Device mounted on an FR4 PCB, 4-layer copper, tin-plated and standard footprint.
- [3] Device mounted on an FR4 PCB, single-sided copper, tin-plated and mounting pad for collector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





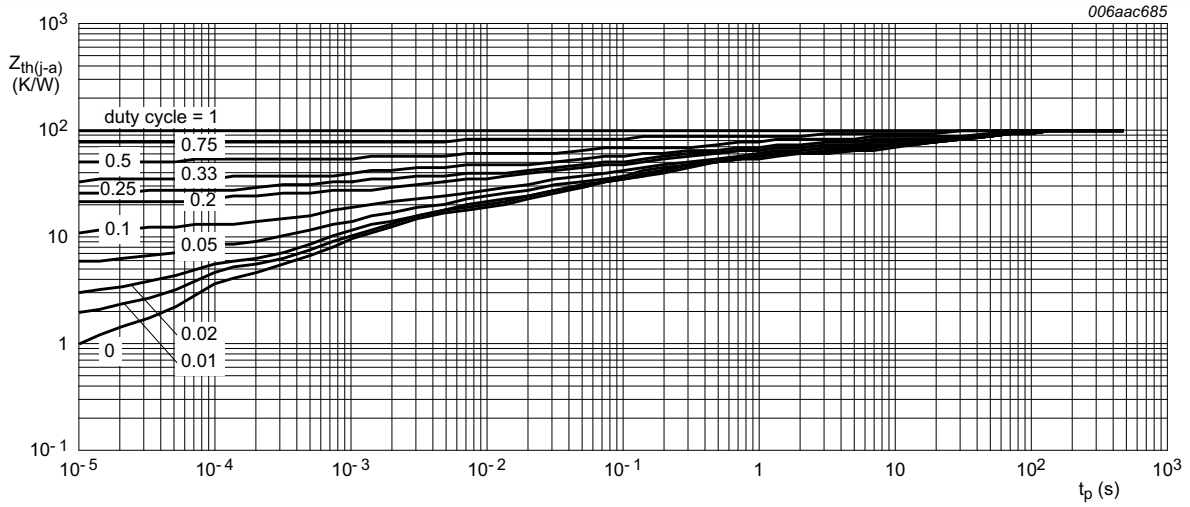
FR4 PCB, 4-layer copper, tin-plated and standard footprint.

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



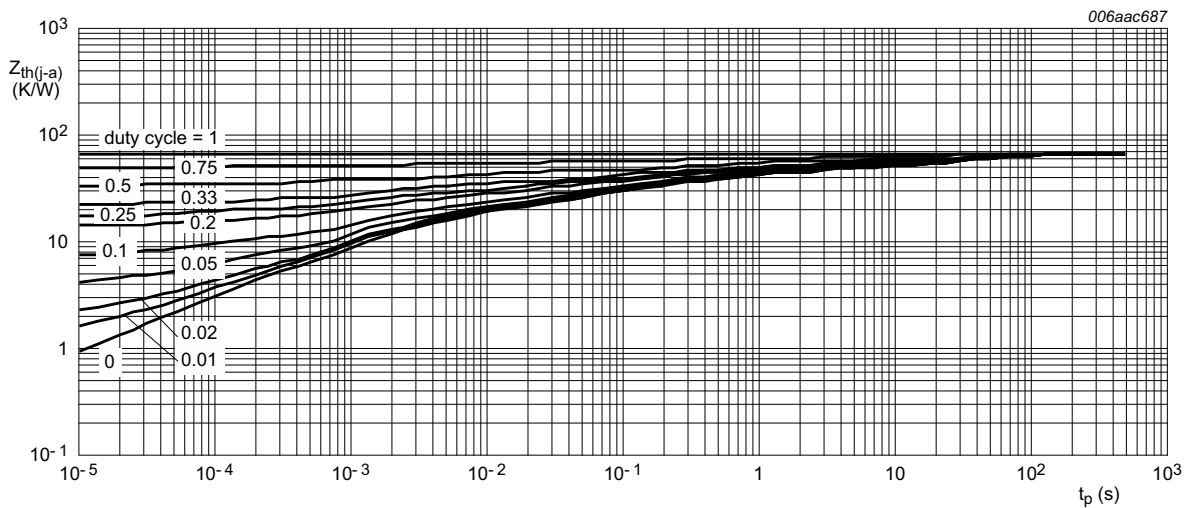
FR4 PCB, single-sided copper, tin-plated and mounting pad for collector 1 cm²

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

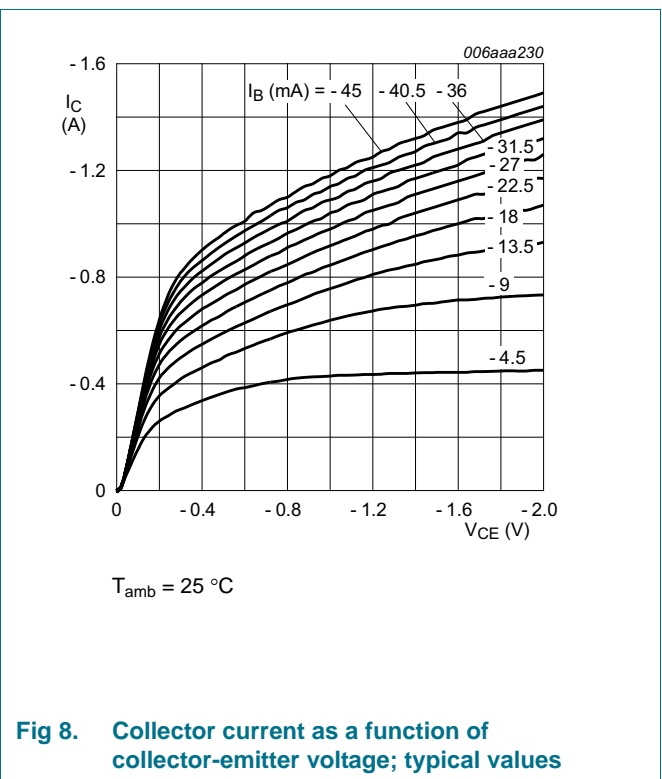
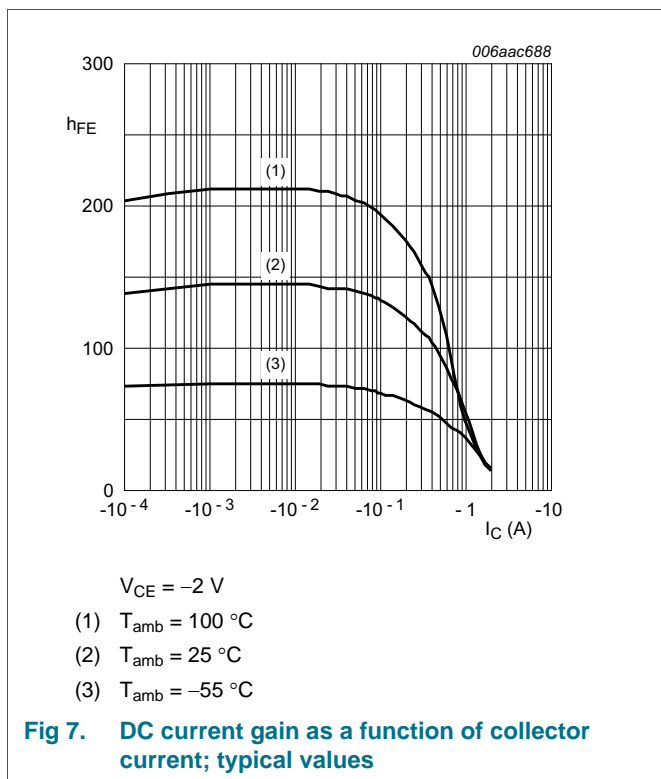
7. Characteristics

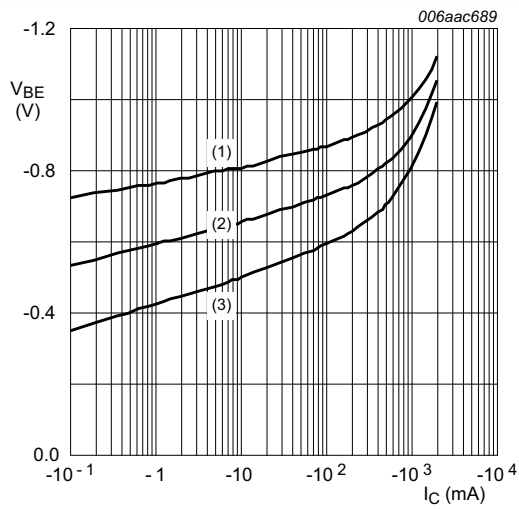
Table 8. Characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	$V_{CB} = -30\text{ V}; I_E = 0\text{ A}$	-	-	-100	nA
		$V_{CB} = -30\text{ V}; I_E = 0\text{ A}; T_J = 150\text{ °C}$	-	-	-10	μA
I_{EBO}	emitter-base cut-off current	$V_{EB} = -5\text{ V}; I_C = 0\text{ A}$	-	-	-100	nA
h_{FE}	DC current gain	$V_{CE} = -2\text{ V}; I_C = -5\text{ mA}$	63	-	-	
		$V_{CE} = -2\text{ V}; I_C = -150\text{ mA}$	[1] 63	-	250	
		$V_{CE} = -2\text{ V}; I_C = -500\text{ mA}$	[1] 40	-	-	
	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	
V_{CEsat}	collector-emitter saturation voltage	$I_C = -500\text{ mA}; I_B = -50\text{ mA}$	[1] -	-	-500	mV
V_{BE}	base-emitter voltage	$V_{CE} = -2\text{ V}; I_C = -500\text{ mA}$	[1] -	-	-1	V
C_c	collector capacitance	$V_{CB} = -10\text{ V}; I_E = i_e = 0\text{ A}; f = 1\text{ MHz}$	-	15	-	pF
f_T	transition frequency	$V_{CE} = -5\text{ V}; I_C = -50\text{ mA}; f = 100\text{ MHz}$	-	145	-	MHz

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

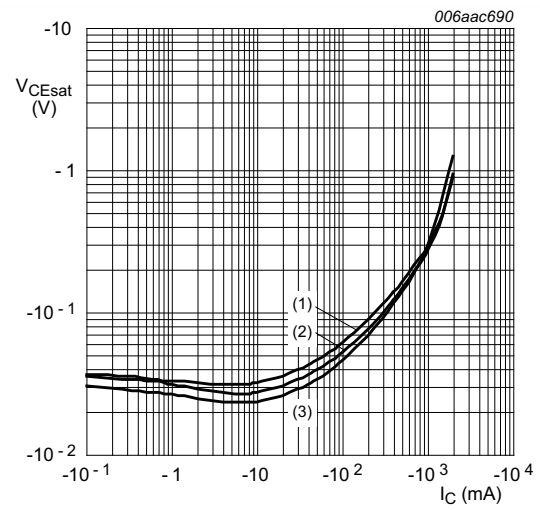




$$V_{CE} = -2 \text{ V}$$

- (1) $T_{amb} = -55 \text{ }^\circ\text{C}$
- (2) $T_{amb} = 25 \text{ }^\circ\text{C}$
- (3) $T_{amb} = 100 \text{ }^\circ\text{C}$

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



$$I_C/I_B = 10$$

- (1) $T_{amb} = 100 \text{ }^\circ\text{C}$
- (2) $T_{amb} = 25 \text{ }^\circ\text{C}$
- (3) $T_{amb} = -55 \text{ }^\circ\text{C}$

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

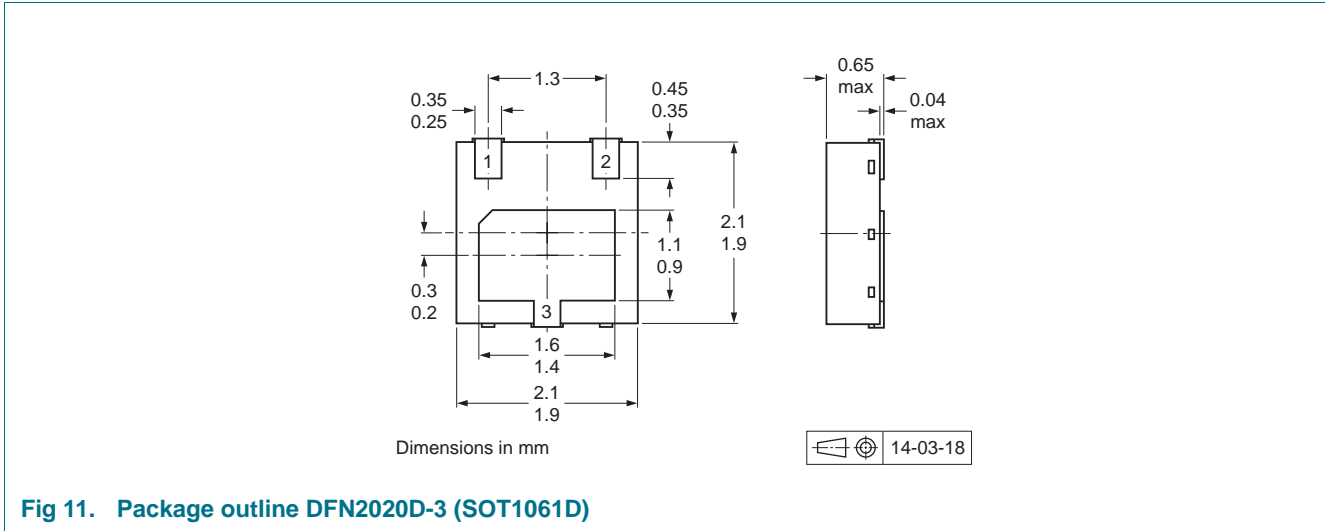
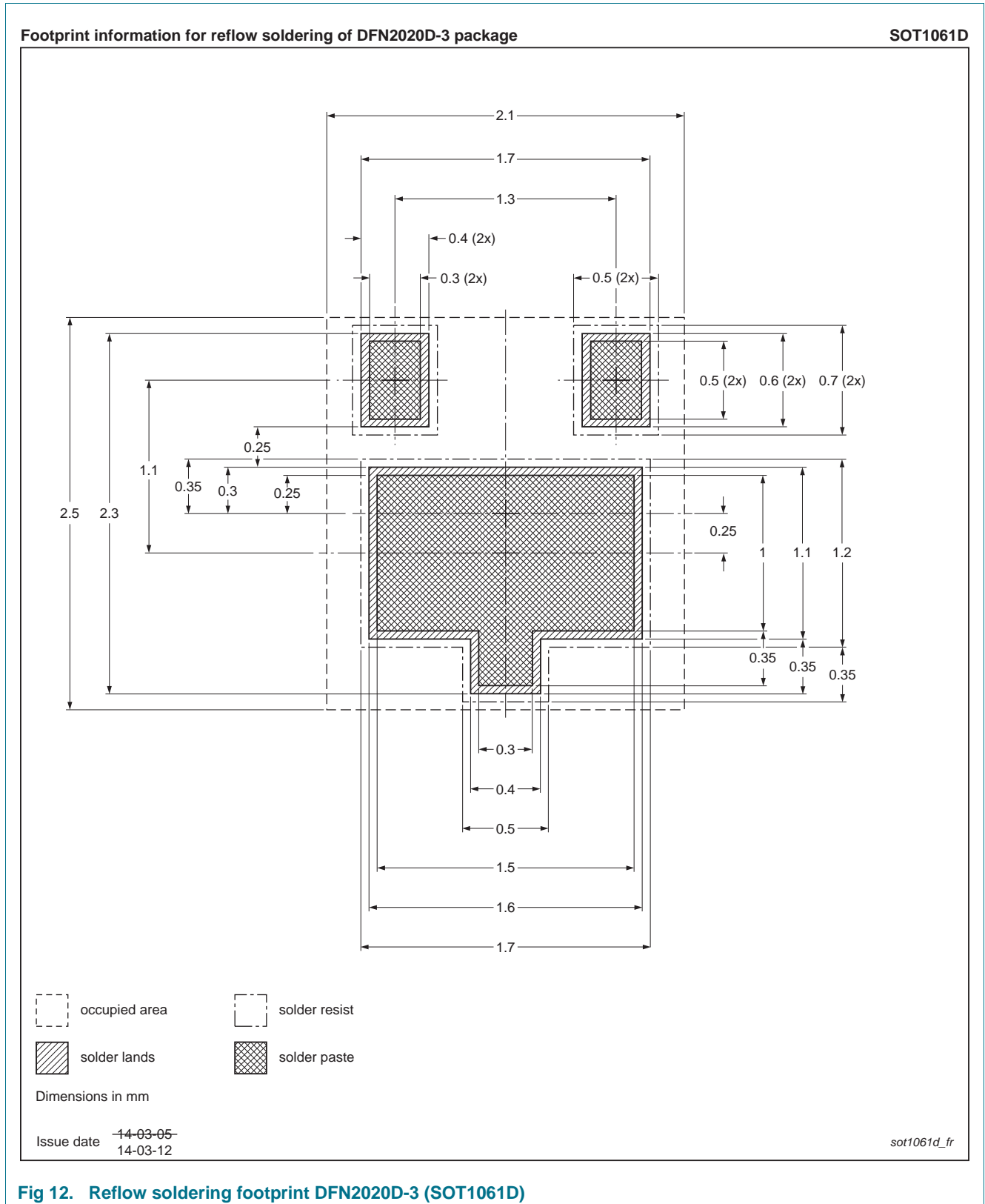


Fig 11. Package outline DFN2020D-3 (SOT1061D)

10. Soldering



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

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

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14. Contents

1	Product profile	1
1.1	General description	1
1.2	Features and benefits	1
1.3	Applications	1
1.4	Quick reference data	1
2	Pinning information	2
3	Ordering information	2
4	Marking	3
5	Limiting values	3
6	Thermal characteristics	5
7	Characteristics	8
8	Test information	9
8.1	Quality information	9
9	Package outline	10
10	Soldering	11
11	Revision history	12
12	Legal information	13
12.1	Data sheet status	13
12.2	Definitions	13
12.3	Disclaimers	13
12.4	Trademarks	14
13	Contact information	14
14	Contents	15

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