



# BC53PA-Q series

80 V, 1 A PNP medium power transistors

Rev. 1 — 11 September 2024

Product data sheet

## 1. General description

PNP medium power transistors in an ultra thin SOT1061 leadless small Surface-Mounted Device (SMD) plastic package.

## 2. Features and benefits

- High current
- Three current gain selections
- High power dissipation capability
- Exposed heatsink for excellent thermal and electrical conductivity
- Leadless very small SMD plastic package with medium power capability
- Qualified according to AEC-Q101 and recommended for use in automotive applications

## 3. Applications

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

## 4. Quick reference data

Table 1. Quick reference data

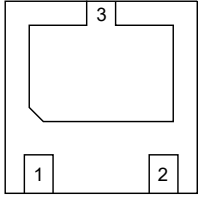
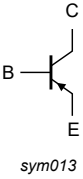
$T_{amb} = 25\text{ °C}$  unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$V_{CEO}$	collector-emitter voltage	open base	-	-	-80	V	
$I_C$	collector current		-	-	-1	A	
$I_{CM}$	peak collector current	single pulse; $t_p \leq 1\text{ ms}$	-	-	-2	A	
$h_{FE}$	DC current gain						
	BC53PA-Q	$V_{CE} = -2\text{ V}$ ; $I_C = -150\text{ mA}$ $T_{amb} = 25\text{ °C}$	[1]	63	-	250	
	BC53-10PA-Q		[1]	63	-	160	
	BC53-16PA-Q		[1]	100	-	250	

[1] pulsed;  $t_p \leq 300\text{ }\mu\text{s}$ ;  $\delta \leq 0.02$

## 5. Pinning information

Table 2. Pinning

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base	 <p>Transparent top view</p>	 <p>sym013</p>
2	E	emitter		
3	C	collector		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
<a href="#">BC53PA-Q</a>	-	plastic, leadless thermal enhanced ultra thin small outline package ; no leads; 3 terminals; 2 mm x 2 mm x 0.65 mm body	<a href="#">SOT1061</a>
<a href="#">BC53-10PA-Q</a>			
<a href="#">BC53-16PA-Q</a>			

## 7. Marking

Table 4. Marking

Type number	Marking code
BC53PA-Q	BV
BC53-10PA-Q	BW
BC53-16PA-Q	BX

## 8. Limiting values

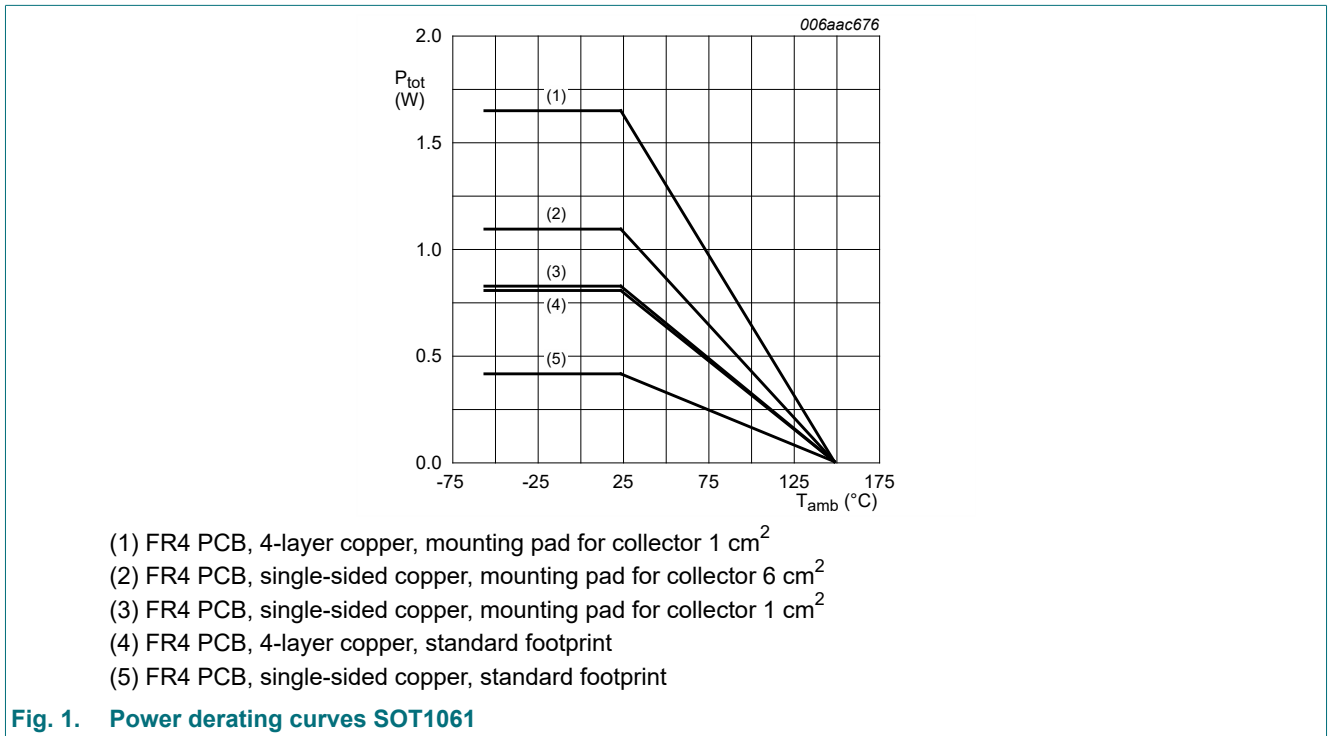
**Table 5. Limiting values**

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

$T_{amb} = 25\text{ °C}$  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; $t_p \leq 1\text{ ms}$	-	-2	A	
$I_B$	base current		-	-0.3	A	
$I_{BM}$	peak base current	single pulse; $t_p \leq 1\text{ ms}$	-	-0.3	A	
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[1]	-	0.42	W
			[2]	-	0.83	W
			[3]	-	1.10	W
			[4]	-	0.81	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; single-sided copper; tin-plated; mounting pad for collector  $1\text{ cm}^2$ .
- [3] Device mounted on an FR4 PCB; single-sided copper; tin-plated; mounting pad for collector  $6\text{ cm}^2$ .
- [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, mounting pad for collector  $1\text{ cm}^2$ .



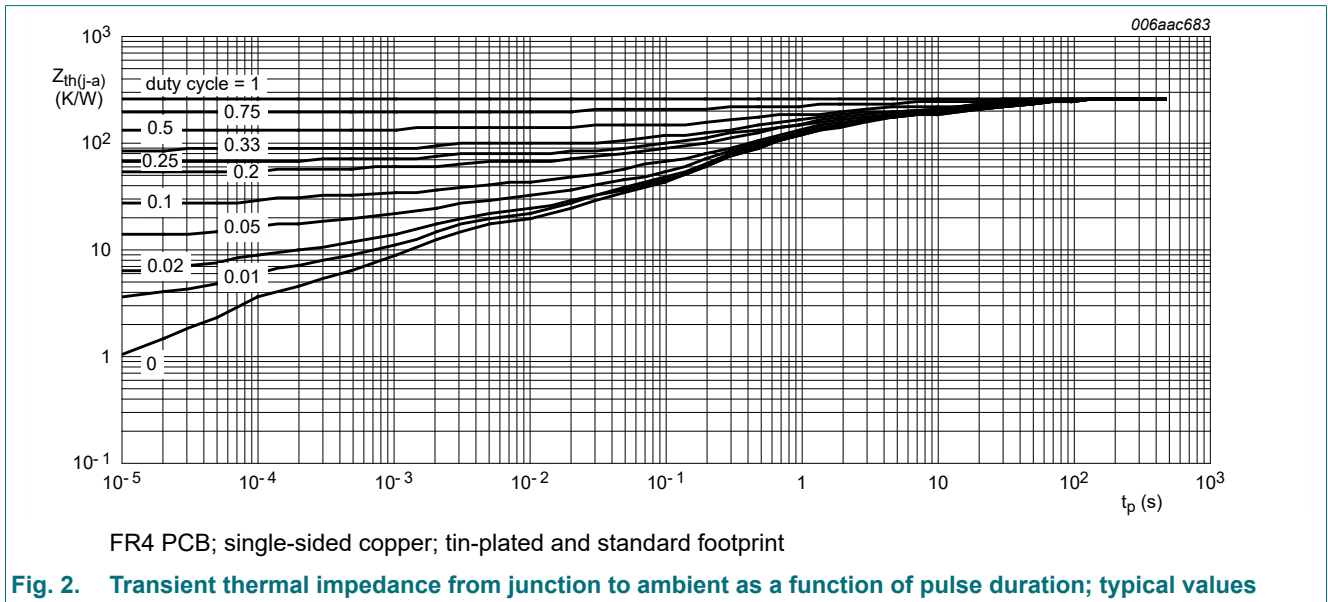
## 9. Thermal characteristics

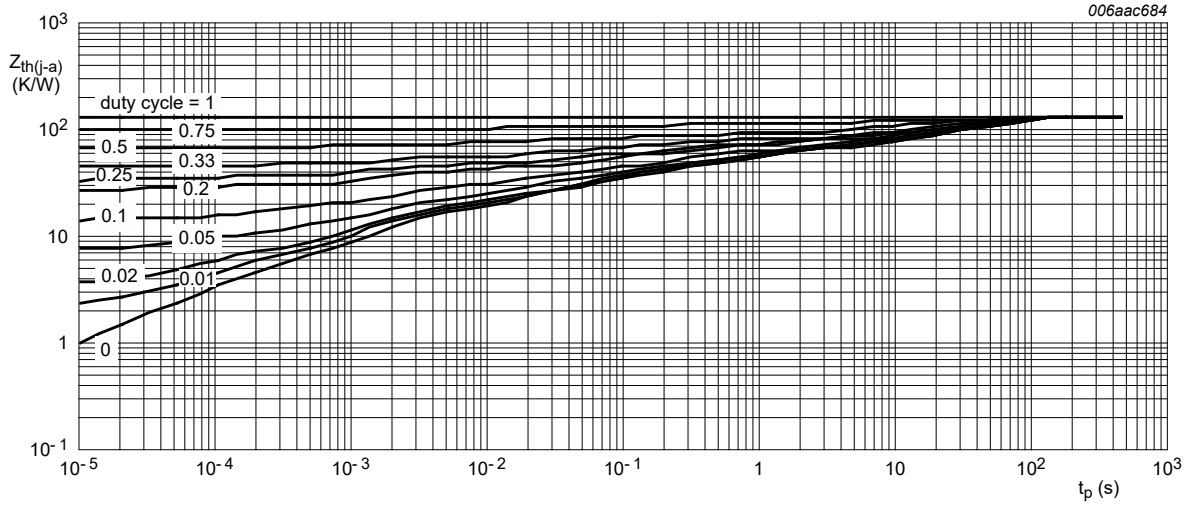
**Table 6. Thermal characteristics**

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

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

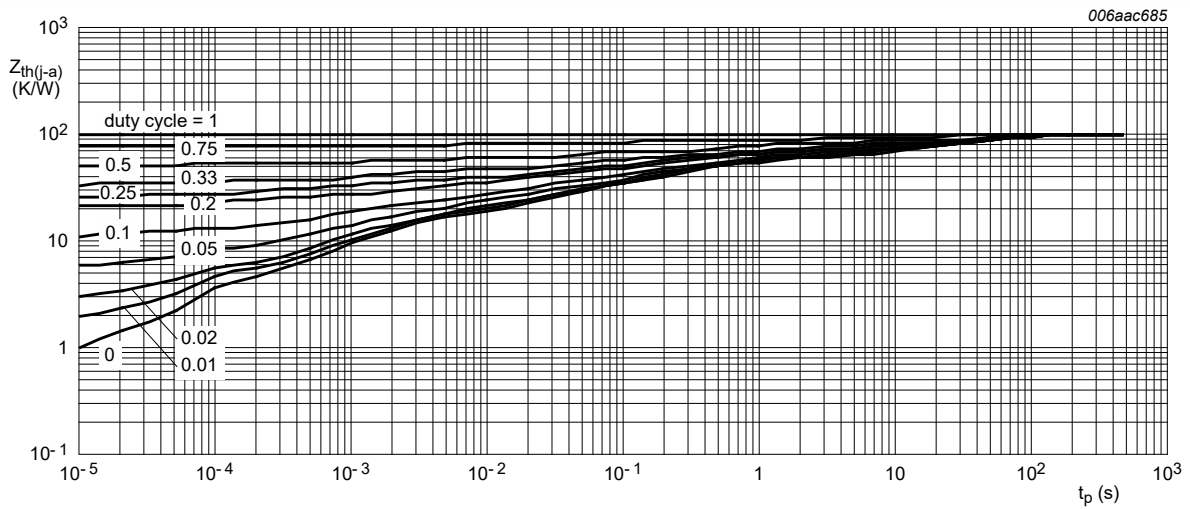
- [1] Device mounted on an FR4 PCB; single-sided copper; tin-plated and standard footprint.
- [2] Device mounted on an FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 1 cm<sup>2</sup>.
- [3] Device mounted on an FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 6 cm<sup>2</sup>.
- [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, mounting pad for collector 1 cm<sup>2</sup>.





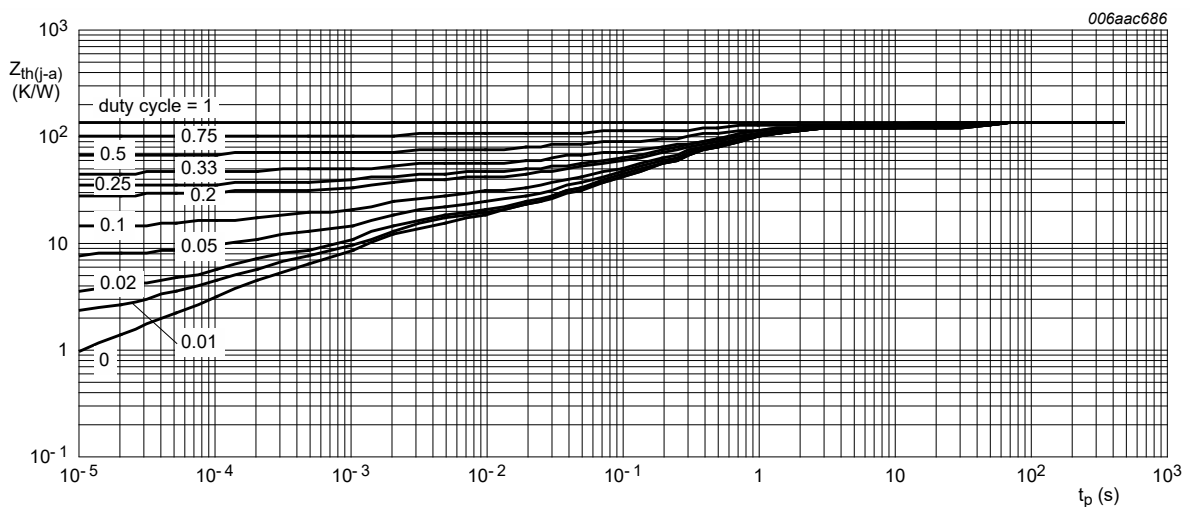
FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 1 cm<sup>2</sup>

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



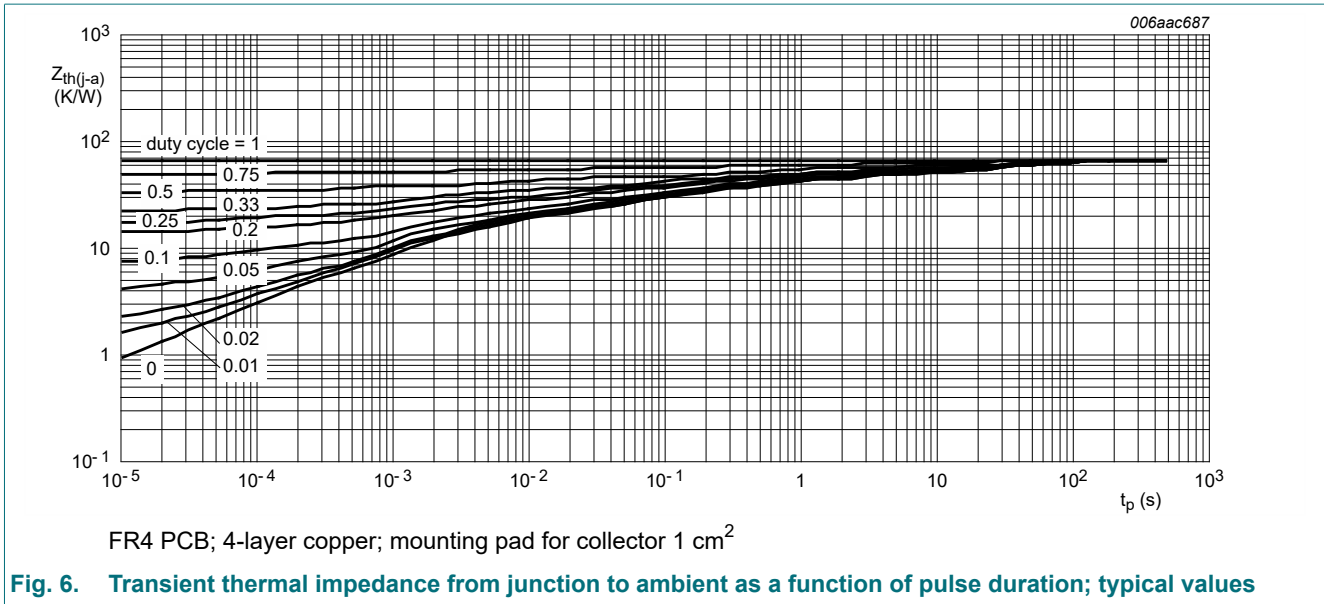
FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 6 cm<sup>2</sup>

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



FR4 PCB; 4-layer copper, standard footprint

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

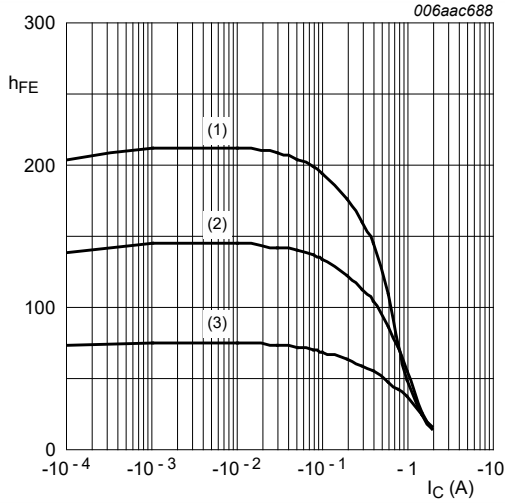


## 10. Characteristics

Table 7. Characteristics

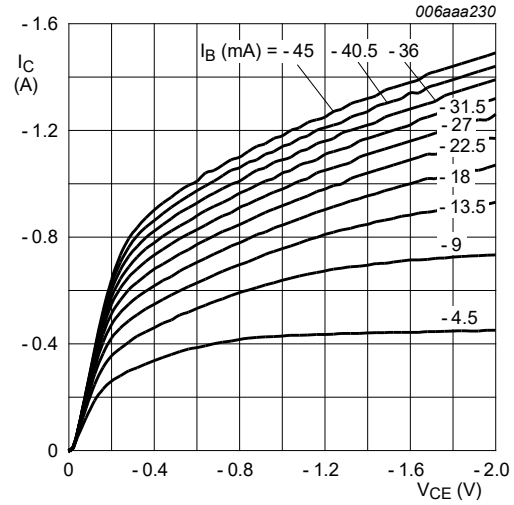
Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$I_{CBO}$	collector-base cut-off current	$V_{CB} = -30 \text{ V}; I_E = 0 \text{ A}$ $T_{amb} = 25 \text{ }^\circ\text{C}$	-	-	-100	nA	
		$V_{CB} = -30 \text{ V}; I_E = 0 \text{ A}; T_j = 150 \text{ }^\circ\text{C}$	-	-	-10	$\mu\text{A}$	
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = -5 \text{ V}; I_C = 0 \text{ A}$ $T_{amb} = 25 \text{ }^\circ\text{C}$	-	-	-100	nA	
$h_{FE}$	DC current gain						
	BC53PA-Q	$V_{CE} = -2 \text{ V}; I_C = -5 \text{ mA}$ $T_{amb} = 25 \text{ }^\circ\text{C}$	[1]	63	-	-	
		$V_{CE} = -2 \text{ V}; I_C = -150 \text{ mA}$ $T_{amb} = 25 \text{ }^\circ\text{C}$		63	-	250	
		$V_{CE} = -2 \text{ V}; I_C = -500 \text{ mA}$ $T_{amb} = 25 \text{ }^\circ\text{C}$		40	-	-	
	BC53-10PA-Q	$V_{CE} = -2 \text{ V}; I_C = -5 \text{ mA}$ $T_{amb} = 25 \text{ }^\circ\text{C}$	[1]	63	-	-	
		$V_{CE} = -2 \text{ V}; I_C = -150 \text{ mA}$ $T_{amb} = 25 \text{ }^\circ\text{C}$		63	-	160	
		$V_{CE} = -2 \text{ V}; I_C = -500 \text{ mA}$ $T_{amb} = 25 \text{ }^\circ\text{C}$		40	-	-	
	BC53-16PA-Q	$V_{CE} = -2 \text{ V}; I_C = -5 \text{ mA}$ $T_{amb} = 25 \text{ }^\circ\text{C}$	[1]	63	-	-	
		$V_{CE} = -2 \text{ V}; I_C = -150 \text{ mA}$ $T_{amb} = 25 \text{ }^\circ\text{C}$		100	-	250	
		$V_{CE} = -2 \text{ V}; I_C = -500 \text{ mA}$ $T_{amb} = 25 \text{ }^\circ\text{C}$		40	-	-	
	$V_{CEsat}$	collector-emitter saturation voltage	$I_C = -500 \text{ mA}; I_B = -50 \text{ mA}$ $T_{amb} = 25 \text{ }^\circ\text{C}$	[1]	-	-0.5	V
	$V_{BE}$	base-emitter voltage	$V_{CE} = -2 \text{ V}; I_C = -500 \text{ mA}$ $T_{amb} = 25 \text{ }^\circ\text{C}$	[1]	-	-1	V
$C_c$	collector capacitance	$V_{CB} = -10 \text{ V}; I_E = I_e = 0 \text{ A}; f = 1 \text{ MHz}$ $T_{amb} = 25 \text{ }^\circ\text{C}$	-	15	-	pF	
$f_T$	transition frequency	$V_{CE} = -5 \text{ V}; I_C = -50 \text{ mA}; f = 100 \text{ MHz}$ $T_{amb} = 25 \text{ }^\circ\text{C}$	-	145	-	MHz	

[1] pulsed;  $t_p \leq 300 \text{ } \mu\text{s}$ ;  $\delta \leq 0.02$



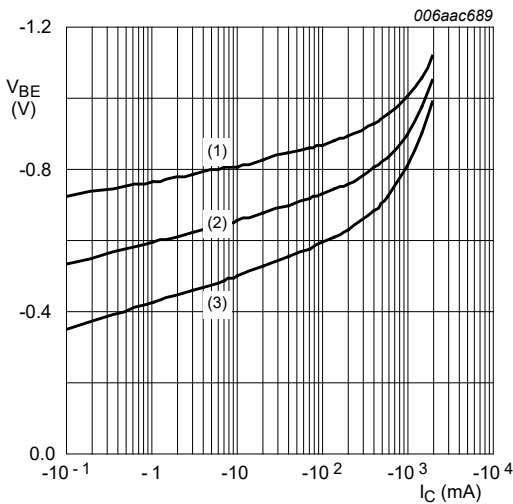
$V_{CE} = -2\text{ V}$   
 (1)  $T_{amb} = 100\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

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



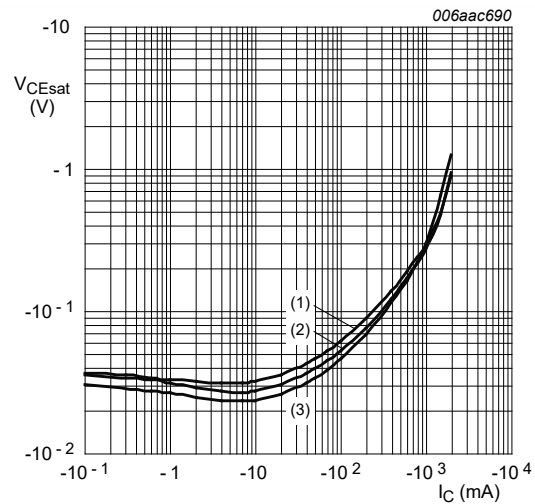
$T_{amb} = 25\text{ °C}$

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



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

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



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

Fig. 10. Collector-emitter saturation voltage 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

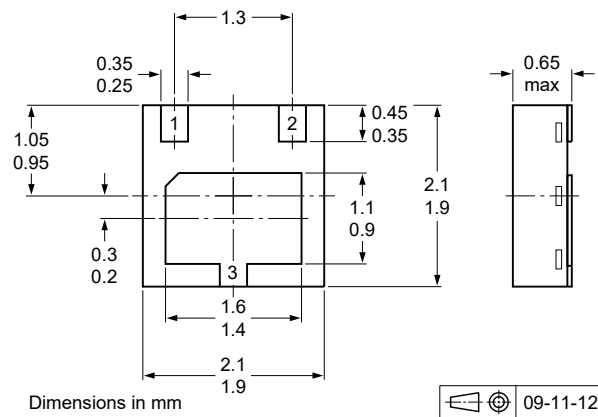
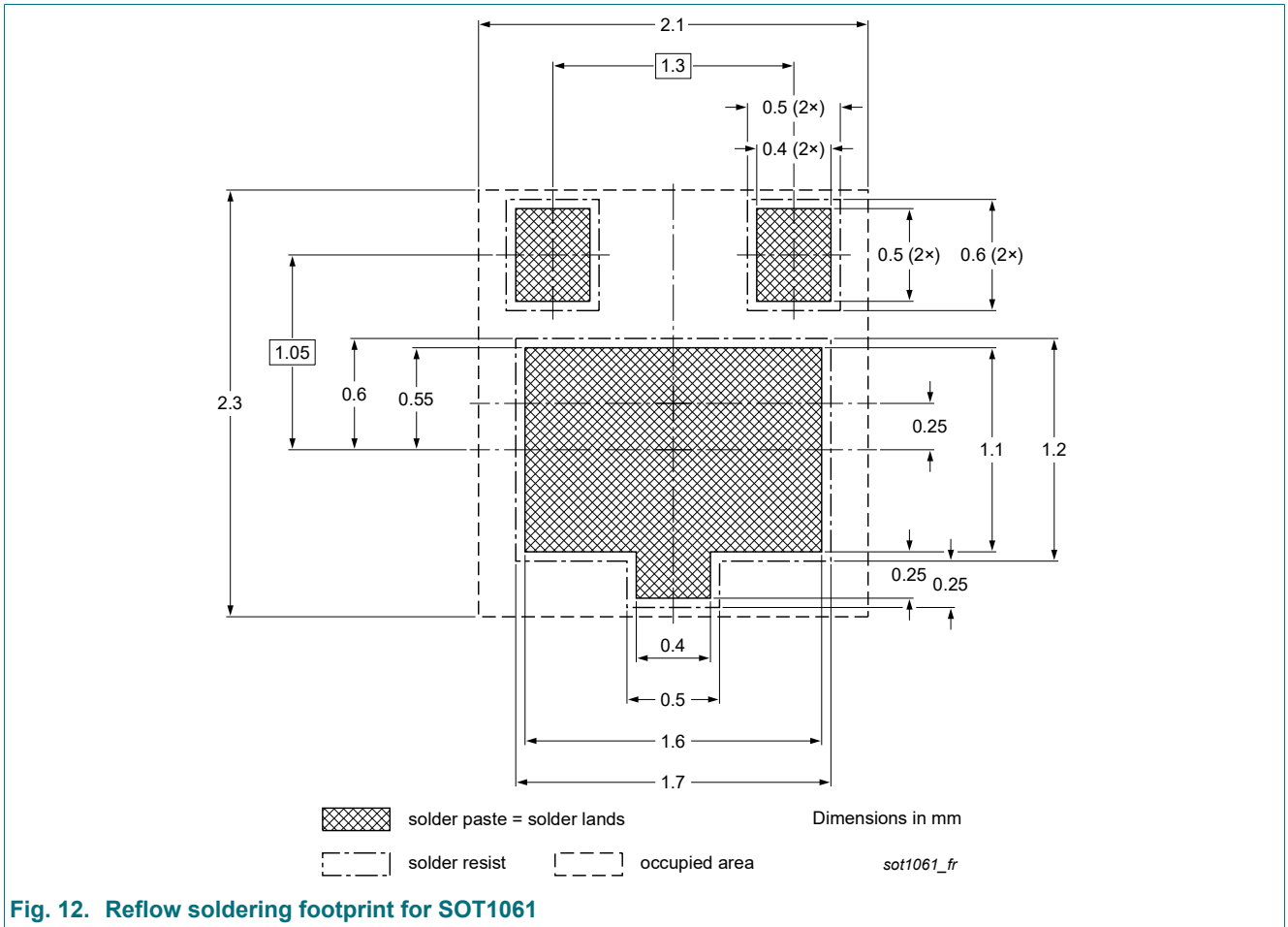


Fig. 11. Package outline SOT1061

### 13. Soldering



**Fig. 12. Reflow soldering footprint for SOT1061**

## 14. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BC53PA-Q_SER v.1	20240911	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".
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## Contents

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1. General description.....	1
2. Features and benefits.....	1
3. Applications.....	1
4. Quick reference data.....	1
5. Pinning information.....	2
6. Ordering information.....	2
7. Marking.....	2
8. Limiting values.....	3
9. Thermal characteristics.....	4
10. Characteristics.....	7
11. Test information.....	9
11.1. Quality information.....	9
12. Package outline.....	9
13. Soldering.....	10
14. Revision history.....	11
15. Legal information.....	12

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