

## 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.

## 2. Features and benefits

- High collector current capability I<sub>C</sub> and I<sub>CM</sub>
- · 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

| Symbol           | Parameter                    | Conditions   |     | Min | Тур | Max | Unit |
|------------------|------------------------------|--|-----|-----|-----|-----|------|
| V <sub>CEO</sub> | collector-emitter<br>voltage | open base  |     | -   | -   | -80 | V    |
| I <sub>C</sub>   | collector current            |  |     | -   | -   | -1  | А    |
| I <sub>CM</sub>  | peak collector current       | single pulse; t <sub>p</sub> ≤ 1 ms  |     | -   | -   | -2  | А    |
| h <sub>FE</sub>  | DC current gain              |  |     |     | _   |     |      |
|                  | BC53PAS                      | V <sub>CE</sub> = -2 V; I <sub>C</sub> = -150 mA; T <sub>amb</sub> = 25 °C | [1] | 63  | -   | 250 |      |
|                  | BC53-10PAS                   | 1  | [1] | 63  | -   | 160 |      |
|                  | BC53-16PAS                   |  | [1] | 100 | -   | 250 |      |

[1] pulsed;  $t_p \le 300 \ \mu s$ ;  $\delta \le 0.02$ 



# 5. Pinning information

| Table 2 | . Pinning info | rmation     |  |                  |
|---------|----------------|-------------|--|------------------|
| Pin     | Symbol         | Description | Simplified outline                                       | Graphic symbol   |
| 1       | В              | base        | 3  |                  |
| 2       | E              | emitter     |  | с                |
| 3       | C              | collector   | I   2     Transparent top view     DFN2020D-3 (SOT1061D) | B<br>E<br>sym013 |

# 6. Ordering information

### Table 3. Ordering information

| Type number | Package |  |          |  |  |  |
|-------------|---------|--|----------|--|--|--|
|             | Name    | Description  | Version  |  |  |  |
| BC53PAS     |         | plastic, leadless thermal enhanced ultra thin small outline  | SOT1061D |  |  |  |
| BC53-10PAS  |         | package with side-wettable flanks (SWF); no leads; 3 terminals; 1.3 mm pitch; 2 mm x 2 mm x 0.65 mm body |          |  |  |  |
| BC53-16PAS  |         |  |          |  |  |  |

# 7. Marking

| Table 4. Marking codes |              |  |  |  |  |  |
|------------------------|--------------|--|--|--|--|--|
| Type number            | Marking code |  |  |  |  |  |
| BC53PAS                | CA           |  |  |  |  |  |
| BC53-10PAS             | СВ           |  |  |  |  |  |
| BC53-16PAS             | СС           |  |  |  |  |  |

## 8. Limiting values

#### Table 5. Limiting values

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

| Symbol           | Parameter                 | Conditions                          |     | Min | Max  | Unit |
|------------------|---------------------------|-------------------------------------|-----|-----|------|------|
| V <sub>CBO</sub> | collector-base voltage    | open emitter                        |     | -   | -100 | V    |
| V <sub>CEO</sub> | collector-emitter voltage | open base                           |     | -   | -80  | V    |
| V <sub>EBO</sub> | emitter-base voltage      | open collector                      |     | -   | -5   | V    |
| I <sub>C</sub>   | collector current         |                                     |     | -   | -1   | A    |
| I <sub>CM</sub>  | peak collector current    | single pulse; t <sub>p</sub> ≤ 1 ms |     | -   | -2   | А    |
| I <sub>B</sub>   | base current              |                                     |     | -   | -0.3 | А    |
| P <sub>tot</sub> | total power dissipation   | T <sub>amb</sub> ≤ 25 °C            | [1] | -   | 0.42 | W    |
|                  |                           |                                     | [2] | -   | 0.81 | W    |
|                  |                           |                                     | [3] | -   | 0.83 | W    |
|                  |                           |                                     | [4] | -   | 1.1  | W    |
|                  |                           |                                     | [5] | -   | 1.65 | W    |
| Tj               | junction temperature      |                                     |     | -   | 150  | °C   |
| T <sub>amb</sub> | ambient temperature       |                                     |     | -55 | 150  | °C   |
| T <sub>stg</sub> | storage temperature       |                                     |     | -65 | 150  | °C   |

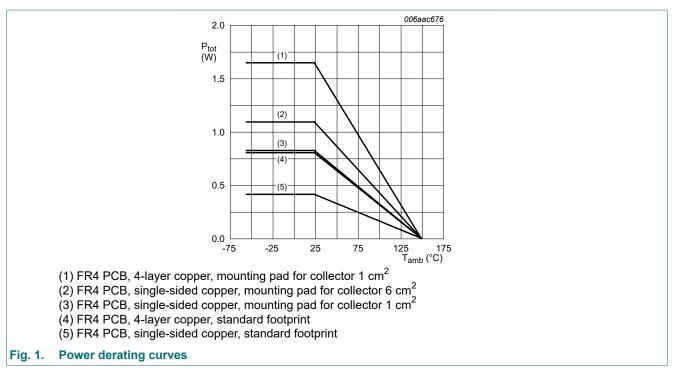
Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint. [1]

Device mounted on an FR4 PCB, 4-layer copper, tin-plated and standard footprint. [2]

[3]

Device mounted on an FR4 PCB, single-sided copper, tin-plated and mounting pad for collector 1 cm<sup>2</sup>. Device mounted on an FR4 PCB, single-sided copper, tin-plated and mounting pad for collector 6 cm<sup>2</sup>. Device mounted on an FR4 PCB, 4-layer copper, tin-plated and mounting pad for collector 1 cm<sup>2</sup>. [4]

[5]



# 9. Thermal characteristics

| Symbol                | Parameter  | Conditions |     | Min | Тур | Мах | Unit |
|-----------------------|--|------------|-----|-----|-----|-----|------|
| R <sub>th(j-a)</sub>  | thermal resistance from junction to ambient      |            | [1] | -   | -   | 298 | K/W  |
|                       |  |            | [2] | -   | -   | 154 | K/W  |
|                       |  |            | [3] | -   | -   | 151 | K/W  |
|                       |  |            | [4] | -   | -   | 114 | K/W  |
|                       |  |            | [5] | -   | -   | 76  | K/W  |
| R <sub>th(j-sp)</sub> | thermal resistance from junction to solder point |            |     | -   | -   | 20  | K/W  |

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

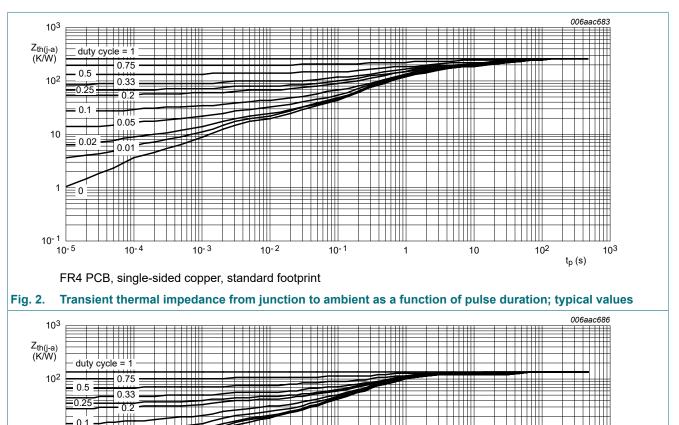
[2] Device mounted on an FR4 PCB, 4-layer copper, tin-plated and standard footprint.

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

Device mounted on an FR4 PCB, single-sided copper, tin-plated and mounting pad for collector 6 cm<sup>2</sup>. [4]

10-2

[5] Device mounted on an FR4 PCB, 4-layer copper, tin-plated and mounting pad for collector 1 cm<sup>2</sup>.



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

10<sup>-1</sup>

1

#

10

10<sup>2</sup>

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10<sup>3</sup>

t<sub>p</sub> (s)

01

0.02

0.05

₩

0.01

111

10-4

10<sup>-3</sup>

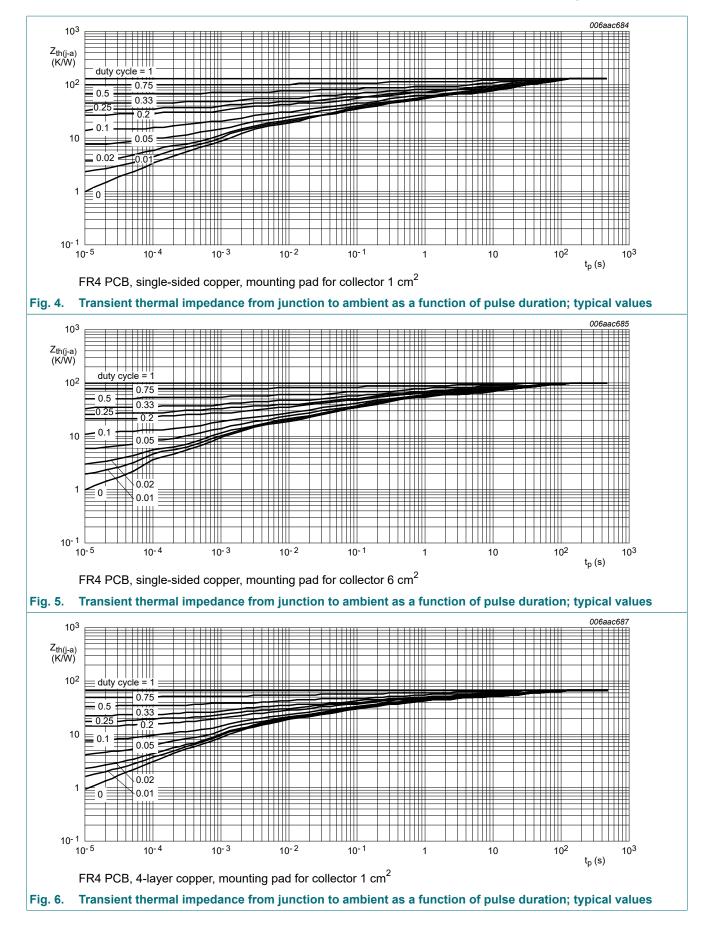
FR4 PCB, 4-layer copper, standard footprint

10

10-1 10<sup>-5</sup>

# **BC53xPAS series**

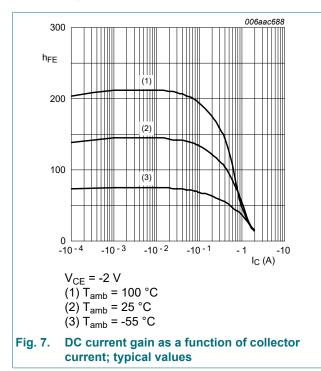
#### 80 V, 1 A PNP medium power transistors

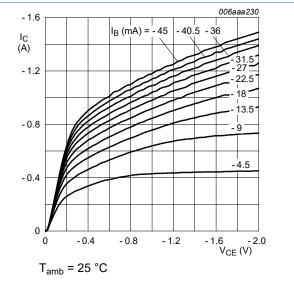


# **10. Characteristics**

| Symbol             | Parameter  | Conditions  |     | Min | Тур | Max  | Unit |  |  |
|--------------------|--|---|-----|-----|-----|------|------|--|--|
| I <sub>CBO</sub>   | collector-base cut-off                           | V <sub>CB</sub> = -30 V; I <sub>E</sub> = 0 A; T <sub>amb</sub> = 25 °C                   |     | -   | -   | -100 | nA   |  |  |
|                    | current (emitter open)                           | V <sub>CB</sub> = -30 V; I <sub>E</sub> = 0 A; T <sub>amb</sub> = 150 °C                  |     | -   | -   | -10  | μA   |  |  |
| I <sub>EBO</sub>   | emitter-base cut-off<br>current (collector open) | V <sub>EB</sub> = -5 V; I <sub>C</sub> = 0 A; T <sub>amb</sub> = 25 °C                    |     | -   | -   | -100 | nA   |  |  |
| h <sub>FE</sub>    | DC current gain                                  |   |     |     |     |      |      |  |  |
|                    | BC53PAS  | V <sub>CE</sub> = -2 V; I <sub>C</sub> = -5 mA; T <sub>amb</sub> = 25 °C                  |     | 63  | -   | -    |      |  |  |
|                    | BC53-10PAS                                       |   |     | 63  | -   | -    |      |  |  |
|                    | BC53-16PAS                                       |   |     | 63  | -   | -    |      |  |  |
|                    | BC53PAS  | V <sub>CE</sub> = -2 V; I <sub>C</sub> = -150 mA; T <sub>amb</sub> = 25 °C                |     | 63  | -   | 250  |      |  |  |
|                    | BC53-10PAS                                       |   |     | 63  | -   | 160  |      |  |  |
|                    | BC53-16PAS                                       |   |     | 100 | -   | 250  |      |  |  |
|                    | BC53PAS  | V <sub>CE</sub> = -2 V; I <sub>C</sub> = -500 mA; T <sub>amb</sub> = 25 °C                |     | 40  | -   | -    |      |  |  |
|                    | BC53-10PAS                                       |   |     | 40  | -   | -    |      |  |  |
|                    | BC53-16PAS                                       |   | [1] | 40  | -   | -    |      |  |  |
| V <sub>CEsat</sub> | collector-emitter saturation voltage             | $I_{C}$ = -500 mA; $I_{B}$ = -50 mA; $T_{amb}$ = 25 °C                                    | [1] | -   | -   | -500 | mV   |  |  |
| V <sub>BE</sub>    | base-emitter voltage                             | V <sub>CE</sub> = -2 V; I <sub>C</sub> = -500 mA; T <sub>amb</sub> = 25 °C                | [1] | -   | -   | -1   | V    |  |  |
| C <sub>c</sub>     | collector capacitance                            | V <sub>CB</sub> = -10 V; i <sub>e</sub> = 0 A; f = 1 MHz;<br>T <sub>amb</sub> = 25 °C     |     | -   | 15  | -    | pF   |  |  |
| f <sub>T</sub>     | transition frequency                             | V <sub>CE</sub> = -5 V; I <sub>C</sub> = -50 mA; f = 100 MHz;<br>T <sub>amb</sub> = 25 °C |     | -   | 145 | -    | MHz  |  |  |

[1] pulsed;  $t_p \le 300 \ \mu s$ ;  $\delta \le 0.02$ 



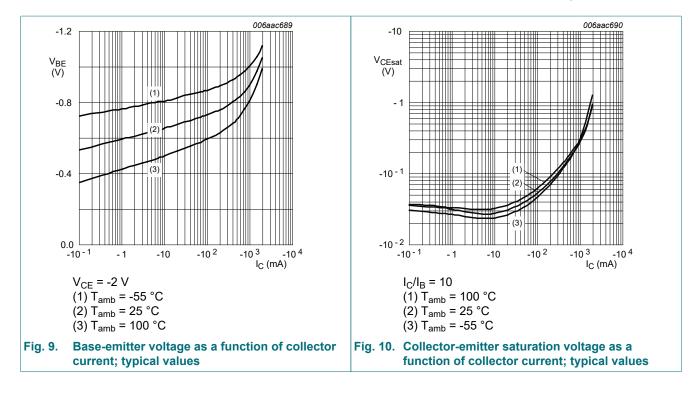




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## **BC53xPAS** series

#### 80 V, 1 A PNP medium power transistors

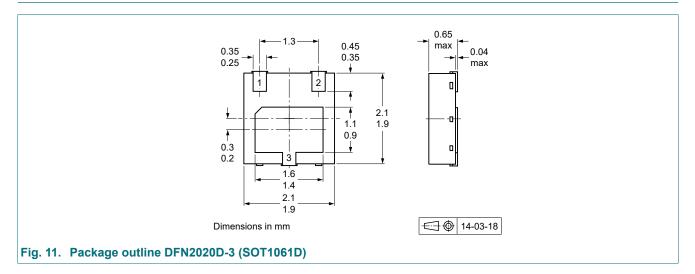


## **11. Test information**

### 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.

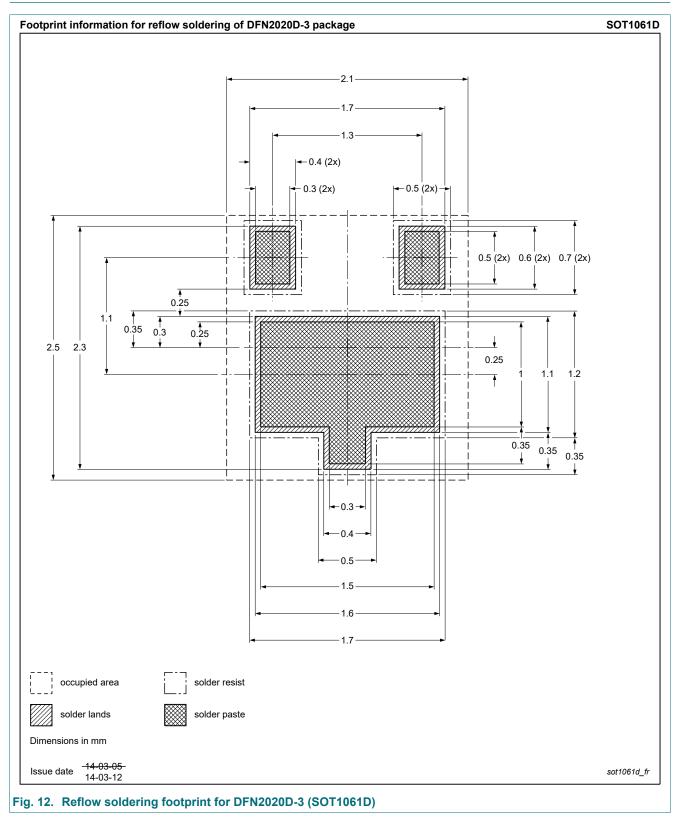
## 12. Package outline



# **BC53xPAS series**

### 80 V, 1 A PNP medium power transistors

# 13. Soldering



# 14. Revision history

| Table 8. Revision history |                 |                        |                  |                       |
|---------------------------|-----------------|------------------------|------------------|-----------------------|
| Data sheet ID             | Release date    | Data sheet<br>status   | Change<br>notice | Supersedes            |
| BC53XPAS_SER v.2          | 20221206        | Product data sheet     | -                | BC51_52_53PAS_SER v.1 |
| Modifications:            | Family data she | et splitted to three o | lata sheets      |                       |
| BC51_52_53PAS_SER v.1     | 20150619        | Product data sheet     | -                | -                     |

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# 15. Legal information

#### Data sheet status

| Document status<br>[1][2]         | Product<br>status [3] | Definition  |
|-----------------------------------|-----------------------|---|
| Objective [short]<br>data sheet   | Development           | This document contains data from<br>the objective specification for<br>product development. |
| Preliminary [short]<br>data sheet | Qualification         | This document contains data from the preliminary specification.                             |
| Product [short]<br>data sheet     | Production            | This document contains the product specification.   |

 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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### 80 V, 1 A PNP medium power transistors

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