

# ANTREX Electronics

Electronic Components Sourcing Information

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## Product Reference Information

**Part Number:** 2PD601BSL,215  
**Manufacturer:** Nexperia USA Inc.  
**Package:** TO-236-3, SC-59, SOT-23-3  
**Availability:** Please confirm with sales

### Product Page:

<https://antrexco.com/product/details/nexperia-usa-inc/2pd601bsl-215.html>

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### Note:

This PDF includes an ANTREX product reference cover page.

The original manufacturer datasheet follows from the next page.

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# 2PD601BRL; 2PD601BSL

50 V, 200 mA NPN general-purpose transistors

Rev. 1 — 28 June 2010

Product data sheet

## 1. Product profile

### 1.1 General description

NPN general-purpose transistors in a small SOT23 (TO-236AB) Surface-Mounted Device (SMD) plastic package.

Table 1. Product overview

| Type number | Package  |          | PNP complement |
|-------------|----------|----------|----------------|
|             | Nexperia | JEDEC    |                |
| 2PD601BRL   | SOT23    | TO-236AB | 2PB709BRL      |
| 2PD601BSL   |          |          | 2PB709BSL      |

### 1.2 Features and benefits

- Collector current  $I_C \leq 200$  mA
- Two current gain selections
- AEC-Q101 qualified
- Small SMD plastic package

### 1.3 Applications

- General-purpose switching and amplification

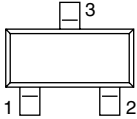
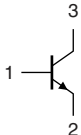
### 1.4 Quick reference data

Table 2. Quick reference data

| Symbol    | Parameter                 | Conditions                       | Min | Typ | Max | Unit |
|-----------|---------------------------|----------------------------------|-----|-----|-----|------|
| $V_{CE0}$ | collector-emitter voltage | open base                        | -   | -   | 50  | V    |
| $I_C$     | collector current         |                                  | -   | -   | 200 | mA   |
| $h_{FE}$  | DC current gain           | $V_{CE} = 10$ V;<br>$I_C = 2$ mA | 210 | -   | 460 |      |
|           | $h_{FE}$ group R          |                                  | 210 | -   | 340 |      |
|           | $h_{FE}$ group S          |                                  | 290 | -   | 460 |      |

## 2. Pinning information

Table 3. Pinning

| Pin | Description | Simplified outline                                                                  | Graphic symbol                                                                      |
|-----|-------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| 1   | base        |  |  |
| 2   | emitter     |                                                                                     |                                                                                     |
| 3   | collector   |                                                                                     |                                                                                     |

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## 3. Ordering information

Table 4. Ordering information

| Type number | Package |                                          |         |
|-------------|---------|------------------------------------------|---------|
|             | Name    | Description                              | Version |
| 2PD601BRL   | -       | plastic surface-mounted package; 3 leads | SOT23   |
| 2PD601BSL   |         |                                          |         |

## 4. Marking

Table 5. Marking codes

| Type number | Marking code <sup>[1]</sup> |
|-------------|-----------------------------|
| 2PD601BRL   | ML*                         |
| 2PD601BSL   | MM*                         |

[1] \* = -: made in Hong Kong  
 \* = p: made in Hong Kong  
 \* = t: made in Malaysia  
 \* = W: made in China

## 5. Limiting values

Table 6. Limiting values

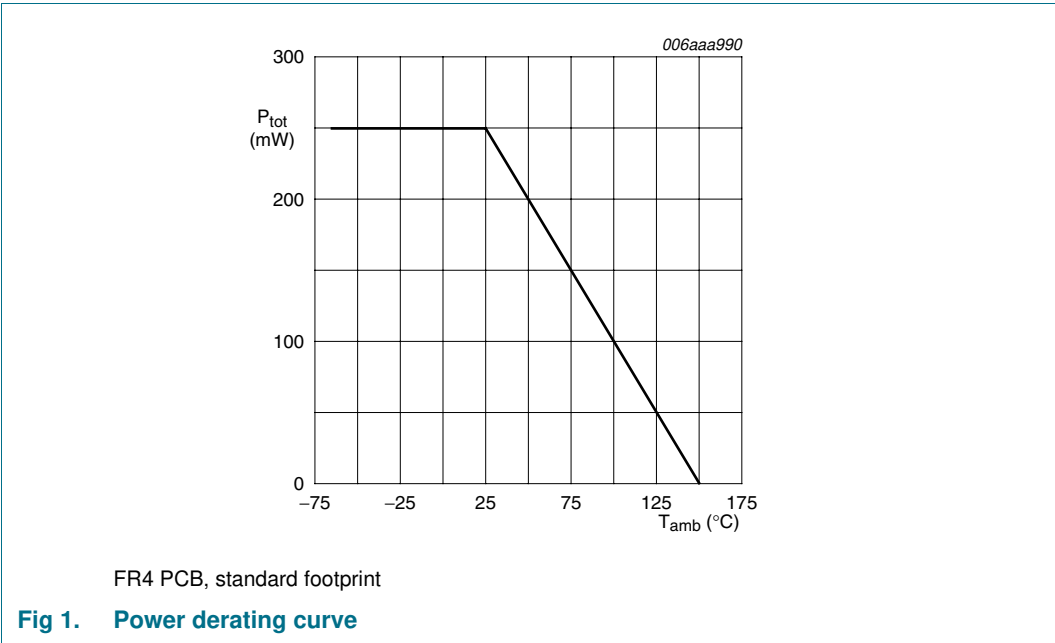
In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol    | Parameter                 | Conditions                       | Min | Max | Unit |
|-----------|---------------------------|----------------------------------|-----|-----|------|
| $V_{CBO}$ | collector-base voltage    | open emitter                     | -   | 60  | V    |
| $V_{CEO}$ | collector-emitter voltage | open base                        | -   | 50  | V    |
| $V_{EBO}$ | emitter-base voltage      | open collector                   | -   | 6   | V    |
| $I_C$     | collector current         |                                  | -   | 200 | mA   |
| $I_{CM}$  | peak collector current    | single pulse;<br>$t_p \leq 1$ ms | -   | 300 | mA   |
| $I_{BM}$  | peak base current         | single pulse;<br>$t_p \leq 1$ ms | -   | 200 | mA   |

Table 6. Limiting values ...continued  
In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol           | Parameter               | Conditions               | Min | Max  | Unit |
|------------------|-------------------------|--------------------------|-----|------|------|
| P <sub>tot</sub> | total power dissipation | T <sub>amb</sub> ≤ 25 °C | [1] | 250  | mW   |
| T <sub>j</sub>   | junction temperature    |                          | -   | 150  | °C   |
| T <sub>amb</sub> | ambient temperature     |                          | -55 | +150 | °C   |
| T <sub>stg</sub> | storage temperature     |                          | -65 | +150 | °C   |

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

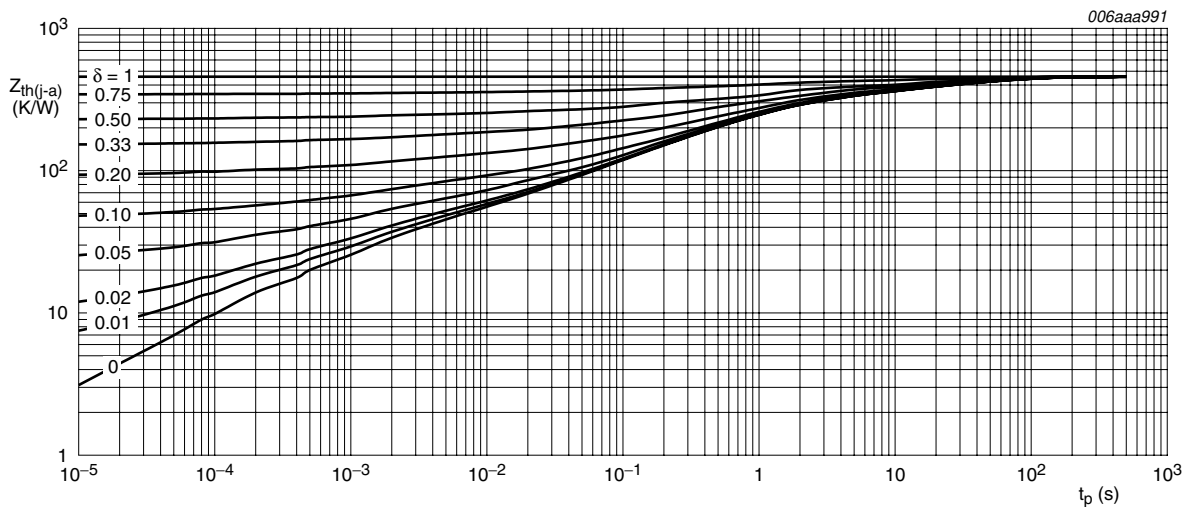


6. Thermal characteristics

Table 7. Thermal characteristics

| Symbol                | Parameter                                        | Conditions  | Min | Typ | Max | Unit |
|-----------------------|--------------------------------------------------|-------------|-----|-----|-----|------|
| R <sub>th(j-a)</sub>  | thermal resistance from junction to ambient      | in free air | [1] | -   | 500 | K/W  |
| R <sub>th(j-sp)</sub> | thermal resistance from junction to solder point |             | -   | -   | 140 | K/W  |

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



FR4 PCB, standard footprint

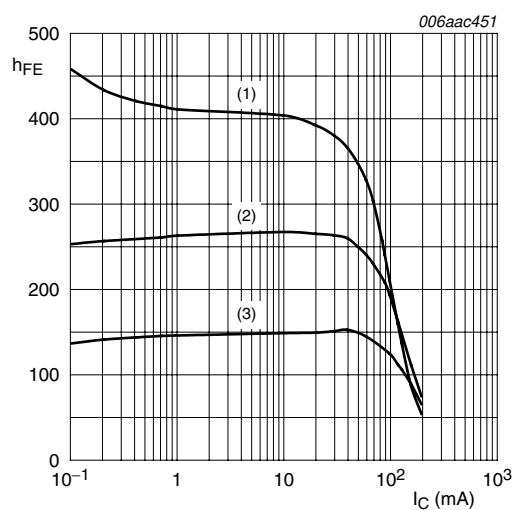
Fig 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

7. Characteristics

Table 8. Characteristics  
*T<sub>amb</sub> = 25 °C unless otherwise specified.*

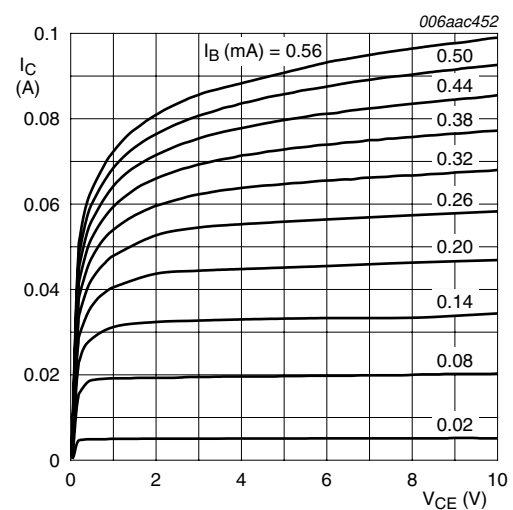
| Symbol             | Parameter                            | Conditions                                                                     | Min | Typ | Max | Unit |
|--------------------|--------------------------------------|--------------------------------------------------------------------------------|-----|-----|-----|------|
| I <sub>CBO</sub>   | collector-base cut-off current       | V <sub>CB</sub> = 60 V; I <sub>E</sub> = 0 A                                   | -   | -   | 10  | nA   |
|                    |                                      | V <sub>CB</sub> = 60 V; I <sub>E</sub> = 0 A;<br>T <sub>j</sub> = 150 °C       | -   | -   | 5   | μA   |
| I <sub>EBO</sub>   | emitter-base cut-off current         | V <sub>EB</sub> = 5 V; I <sub>C</sub> = 0 A                                    | -   | -   | 10  | nA   |
| h <sub>FE</sub>    | DC current gain                      | V <sub>CE</sub> = 10 V;<br>I <sub>C</sub> = 2 mA                               | 210 | -   | 460 |      |
|                    | h <sub>FE</sub> group R              |                                                                                | 210 | -   | 340 |      |
|                    | h <sub>FE</sub> group S              |                                                                                | 290 | -   | 460 |      |
| V <sub>CEsat</sub> | collector-emitter saturation voltage | I <sub>C</sub> = 100 mA;<br>I <sub>B</sub> = 10 mA                             | [1] | -   | 250 | mV   |
| f <sub>T</sub>     | transition frequency                 | V <sub>CE</sub> = 6 V;<br>I <sub>C</sub> = 10 mA;<br>f = 100 MHz               | 100 | 250 | -   | MHz  |
| C <sub>c</sub>     | collector capacitance                | V <sub>CB</sub> = 10 V;<br>I <sub>E</sub> = i <sub>e</sub> = 0 A;<br>f = 1 MHz | -   | -   | 3   | pF   |

[1] Pulse test: t<sub>p</sub> ≤ 300 μs; δ ≤ 0.02.



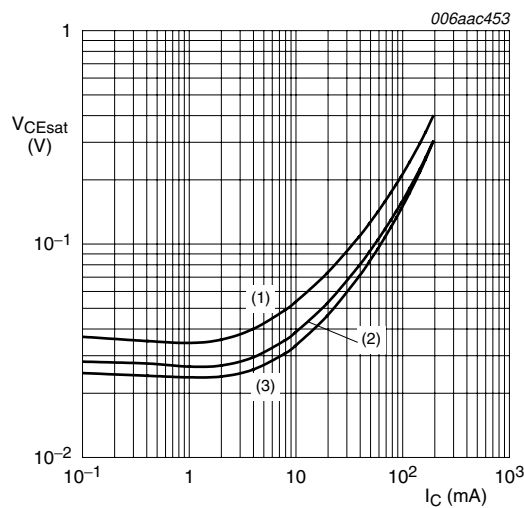
$V_{CE} = 10\text{ V}$   
(1)  $T_{amb} = 150\text{ }^{\circ}\text{C}$   
(2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
(3)  $T_{amb} = -55\text{ }^{\circ}\text{C}$

Fig 3. 2PD601BRL: DC current gain as a function of collector current; typical values



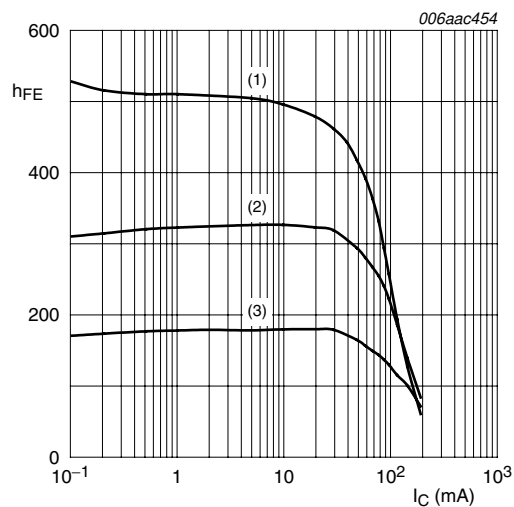
$T_{amb} = 25\text{ }^{\circ}\text{C}$

Fig 4. 2PD601BRL: Collector current as a function of collector-emitter voltage; typical values



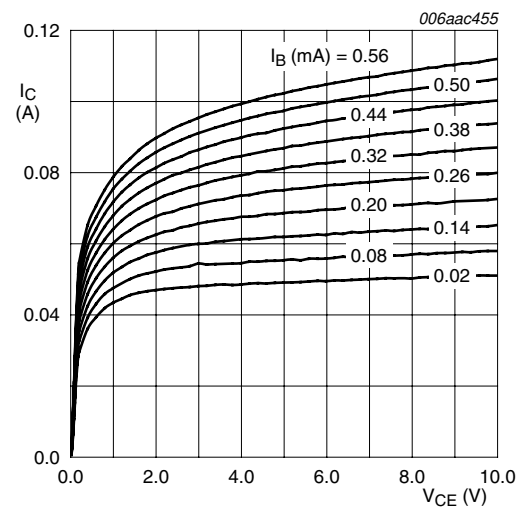
$I_C/I_B = 10$   
(1)  $T_{amb} = 150\text{ }^{\circ}\text{C}$   
(2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
(3)  $T_{amb} = -55\text{ }^{\circ}\text{C}$

Fig 5. 2PD601BRL: Collector-emitter saturation voltage as a function of collector current; typical values



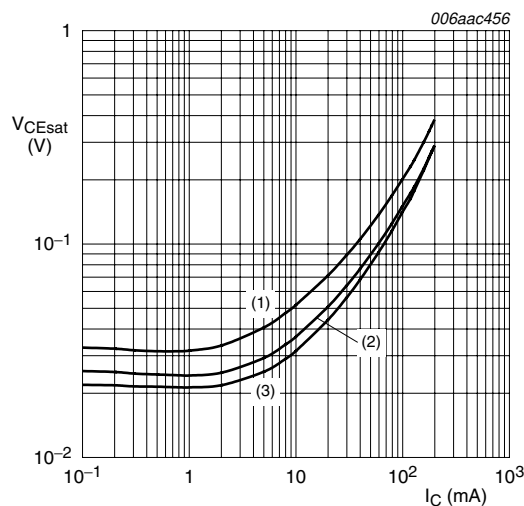
- $V_{CE} = 10\text{ V}$
- (1)  $T_{amb} = 150\text{ }^{\circ}\text{C}$
  - (2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$
  - (3)  $T_{amb} = -55\text{ }^{\circ}\text{C}$

Fig 6. 2PD601BSL: DC current gain as a function of collector current; typical values



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

Fig 7. 2PD601BSL: Collector current as a function of collector-emitter voltage; typical values



- $I_C/I_B = 10$
- (1)  $T_{amb} = 150\text{ }^{\circ}\text{C}$
  - (2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$
  - (3)  $T_{amb} = -55\text{ }^{\circ}\text{C}$

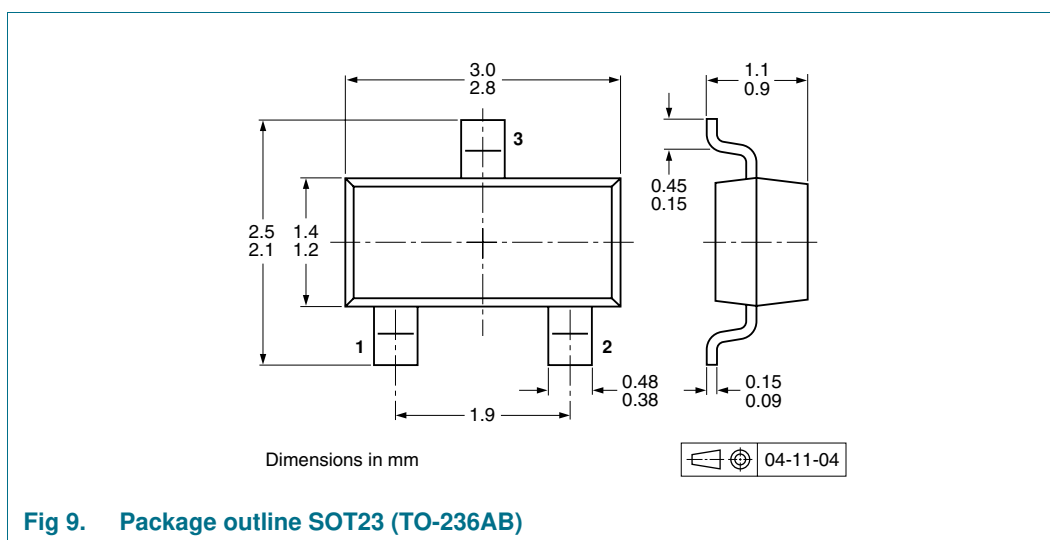
Fig 8. 2PD601BSL: Collector-emitter saturation voltage as a function of collector current; typical values

## 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



10. Packing information

Table 9. Packing methods  
The indicated -xxx are the last three digits of the 12NC ordering code.<sup>[1]</sup>

| Type number | Package | Description                    | Packing quantity |       |
|-------------|---------|--------------------------------|------------------|-------|
|             |         |                                | 3000             | 10000 |
| 2PD601BRL   | SOT23   | 4 mm pitch, 8 mm tape and reel | -215             | -235  |
| 2PD601BSL   |         |                                |                  |       |

[1] For further information and the availability of packing methods, see [Section 14](#).

11. Soldering

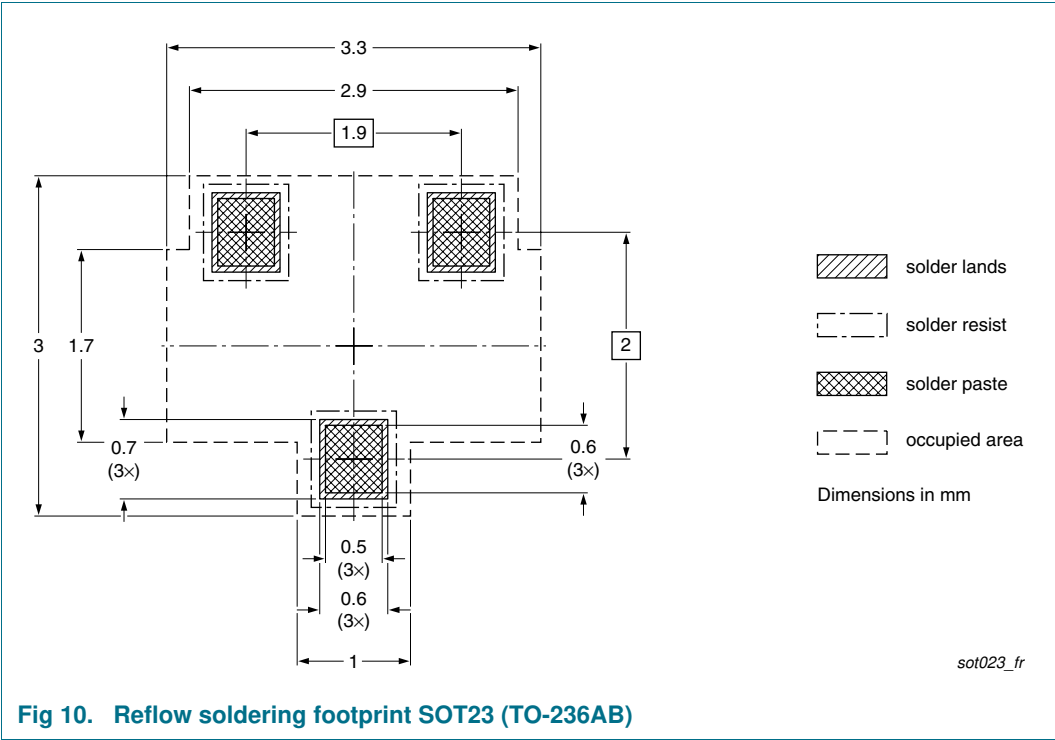
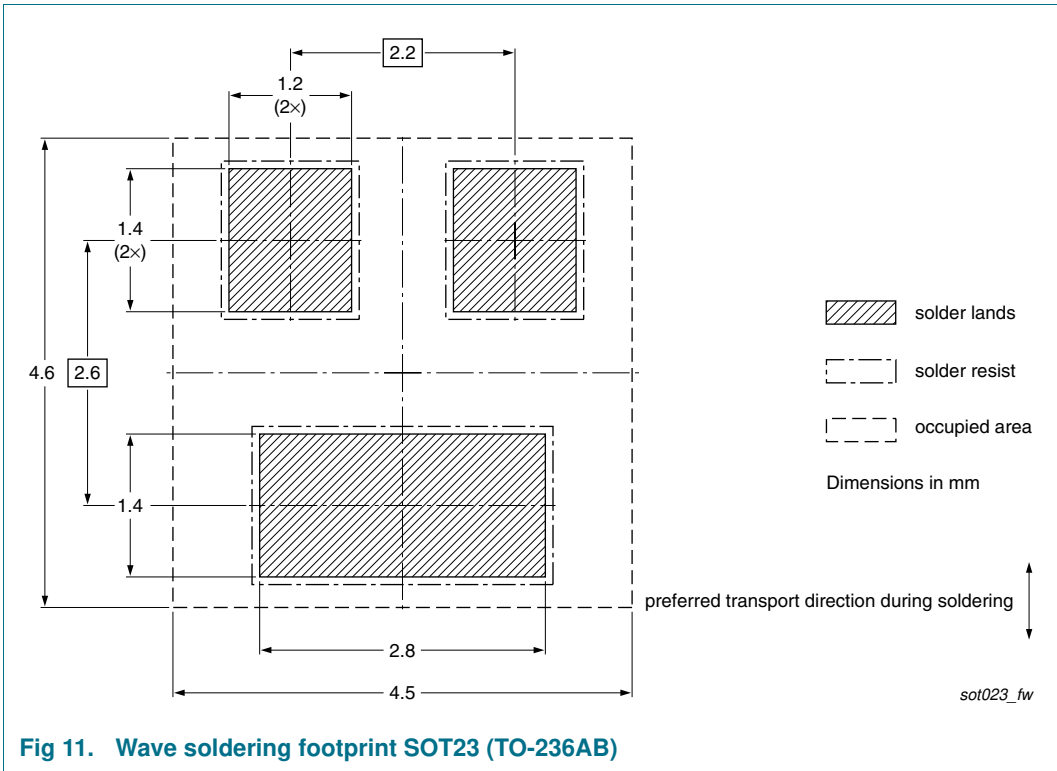


Fig 10. Reflow soldering footprint SOT23 (TO-236AB)



12. Revision history

Table 10. Revision history

| Document ID             | Release date | Data sheet status  | Change notice | Supersedes |
|-------------------------|--------------|--------------------|---------------|------------|
| 2PD601BRL_2PD601BSL v.1 | 20100628     | Product data sheet | -             | -          |

## 13. Legal information

### 13.1 Data sheet status

| Document status <sup>[1][2]</sup> | Product status <sup>[3]</sup> | 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".

[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 URL <http://www.nexperia.com>.

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## 14. Contact information

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For more information, please visit: <http://www.nexperia.com>

For sales office addresses, please send an email to: [salesaddresses@nexperia.com](mailto:salesaddresses@nexperia.com)

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