

# 2PD601ARL; 2PD601ASL

50 V, 100 mA NPN general-purpose transistors

Rev. 01 — 6 November 2008

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 <sup>[1]</sup> | Package |          | PNP complement |
|----------------------------|---------|----------|----------------|
|                            | NXP     | JEDEC    |                |
| 2PD601ARL                  | SOT23   | TO-236AB | 2PB709ARL      |
| 2PD601ASL                  |         |          | 2PB709ASL      |
| 2PD601ARL/DG               | SOT23   | TO-236AB | 2PB709ARL/DG   |
| 2PD601ASL/DG               |         |          | 2PB709ASL/DG   |

[1] /DG: halogen-free.

### 1.2 Features

- General-purpose transistors
- Two current gain selections
- AEC-Q101 qualified
- Small SMD plastic package

### 1.3 Applications

- General-purpose switching and amplification

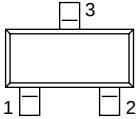
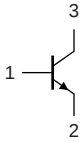
### 1.4 Quick reference data

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         |                                                | -   | -   | 100 | mA   |
| $h_{FE}$  | DC current gain           | $V_{CE} = 10\text{ V};$<br>$I_C = 2\text{ mA}$ |     |     |     |      |
|           | $h_{FE}$ 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   |                                                                                     |                                                                                     |

*sym021*

3. Ordering information

Table 4. Ordering information

| Type number <sup>[1]</sup> | Package |                                          |         |
|----------------------------|---------|------------------------------------------|---------|
|                            | Name    | Description                              | Version |
| 2PD601ARL                  | -       | plastic surface-mounted package; 3 leads | SOT23   |
| 2PD601ASL                  |         |                                          |         |
| 2PD601ARL/DG               |         |                                          |         |
| 2PD601ASL/DG               |         |                                          |         |

[1] /DG: halogen-free.

4. Marking

Table 5. Marking codes

| Type number  | Marking code <sup>[1]</sup> |
|--------------|-----------------------------|
| 2PD601ARL    | SM*                         |
| 2PD601ASL    | SK*                         |
| 2PD601ARL/DG | SR*                         |
| 2PD601ASL/DG | SY*                         |

[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         |                                  | -     | 100  | mA   |
| $I_{CM}$  | peak collector current    | single pulse;<br>$t_p \leq 1$ ms | -     | 200  | mA   |
| $I_{BM}$  | peak base current         | single pulse;<br>$t_p \leq 1$ ms | -     | 100  | mA   |
| $P_{tot}$ | total power dissipation   | $T_{amb} \leq 25$ °C             | [1] - | 250  | mW   |
| $T_j$     | 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.

## 6. Thermal characteristics

**Table 7. Thermal characteristics**

| Symbol        | Parameter                                   | Conditions  | Min   | Typ | Max | Unit |
|---------------|---------------------------------------------|-------------|-------|-----|-----|------|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | [1] - | -   | 500 | K/W  |

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

## 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 | $V_{CB} = 60$ V; $I_E = 0$ A                    | -      | -   | 10  | nA   |
|           |                                | $V_{CB} = 60$ V; $I_E = 0$ A;<br>$T_j = 150$ °C | -      | -   | 5   | μA   |
| $I_{EBO}$ | emitter-base cut-off current   | $V_{EB} = 5$ V; $I_C = 0$ A                     | -      | -   | 10  | nA   |
| $h_{FE}$  | DC current gain                | $V_{CE} = 2$ V;<br>$I_C = 100$ mA               | [1] 90 | -   | -   |      |
|           | $h_{FE}$ group R               | $V_{CE} = 10$ V;<br>$I_C = 2$ mA                | 210    | -   | 340 |      |
|           | $h_{FE}$ group S               | $V_{CE} = 10$ V;<br>$I_C = 2$ mA                | 290    | -   | 460 |      |

Table 8. Characteristics ...continued  
 $T_{amb} = 25^{\circ}\text{C}$  unless otherwise specified.

| Symbol      | Parameter                            | Conditions                                                                 | Min | Typ | Max | Unit |
|-------------|--------------------------------------|----------------------------------------------------------------------------|-----|-----|-----|------|
| $V_{CEsat}$ | collector-emitter saturation voltage | $I_C = 100\text{ mA};$<br>$I_B = 10\text{ mA}$                             | [1] | -   | 250 | mV   |
| $f_T$       | transition frequency                 | $V_{CE} = 10\text{ V};$<br>$I_C = 2\text{ mA};$<br>$f = 100\text{ MHz}$    | 100 | -   | -   | MHz  |
| $C_c$       | collector capacitance                | $V_{CB} = 10\text{ V};$<br>$I_E = i_e = 0\text{ A};$<br>$f = 1\text{ MHz}$ | -   | -   | 3   | pF   |

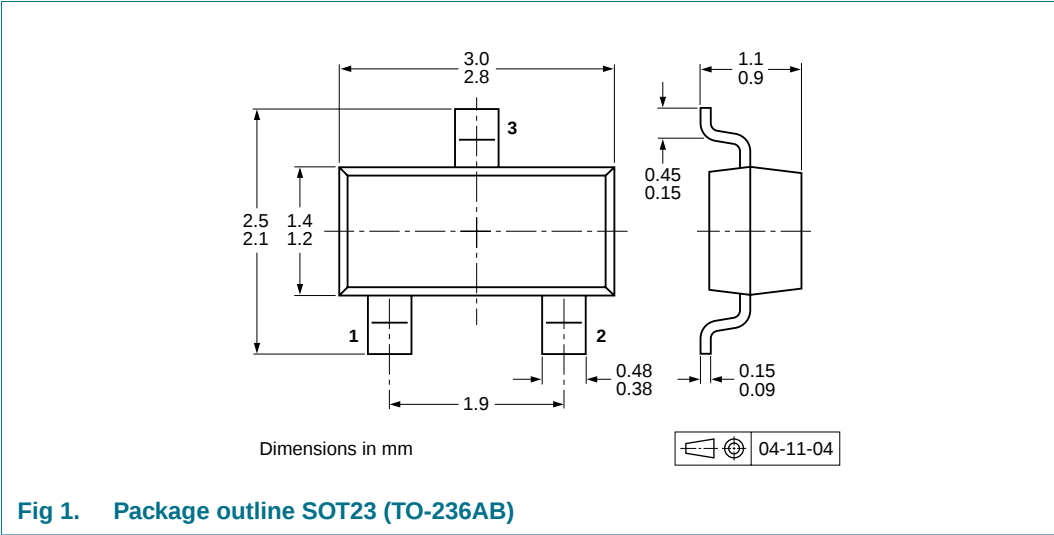
[1] Pulse test:  $t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02$ .

8. Test information

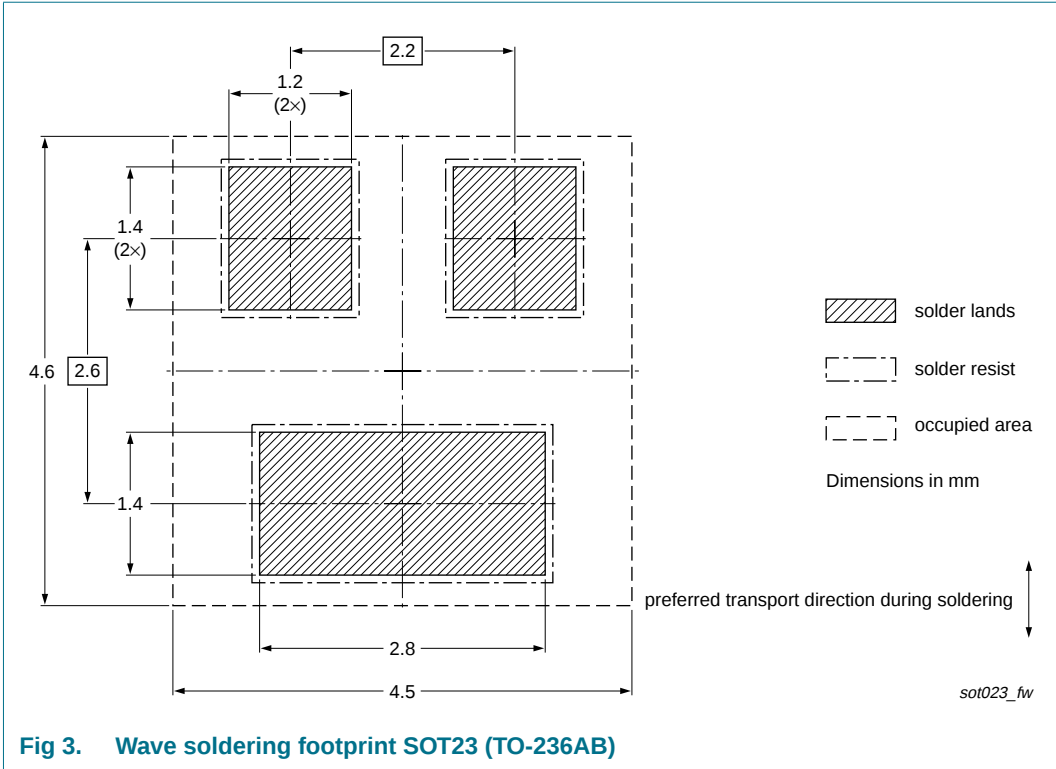
8.1 Quality information

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







12. Revision history

Table 10. Revision history

| Document ID | Release date | Data sheet status  | Change notice | Supersedes |
|-------------|--------------|--------------------|---------------|------------|
| 2PD601AXL_1 | 20081106     | 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".

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