

# 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

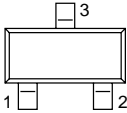
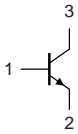
### 1.4 Quick reference data

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	$V_{CE} = 10\text{ V};$ $I_C = 2\text{ mA}$				
	$h_{FE}$ group R		210	-	340	
	$h_{FE}$ group S		290	-	460	

## 2. Pinning information

**Table 3. Pinning**

Pin	Description	Simplified outline	Graphic symbol
1	base		 sym021
2	emitter		
3	collector		

## 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; $t_p \leq 1$ ms	-	200	mA
$I_{BM}$	peak base current	single pulse; $t_p \leq 1$ 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; $T_j = 150$ °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; $I_C = 100$ mA	[1] 90	-	-	
		$V_{CE} = 10$ V; $I_C = 2$ mA	210	-	340	
		$V_{CE} = 10$ V; $I_C = 2$ 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	$I_C = 100\text{ mA};$ $I_B = 10\text{ mA}$	[1]	-	250	mV
$f_T$	transition frequency	$V_{CE} = 10\text{ V};$ $I_C = 2\text{ mA};$ $f = 100\text{ MHz}$	100	-	-	MHz
$C_c$	collector capacitance	$V_{CB} = 10\text{ V};$ $I_E = i_e = 0\text{ A};$ $f = 1\text{ MHz}$	-	-	3	pF

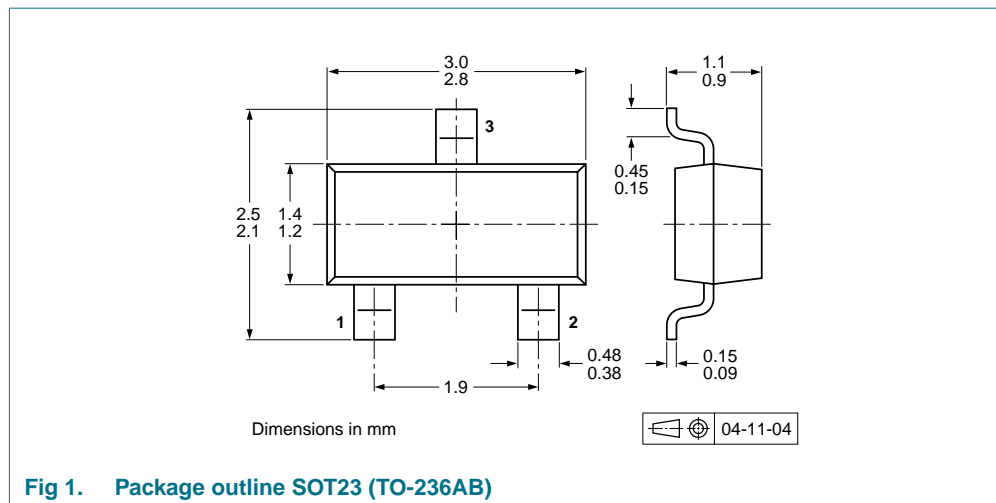
[1] Pulse test:  $t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02$ .

## 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



## 10. Packing information

**Table 9. Packing methods**

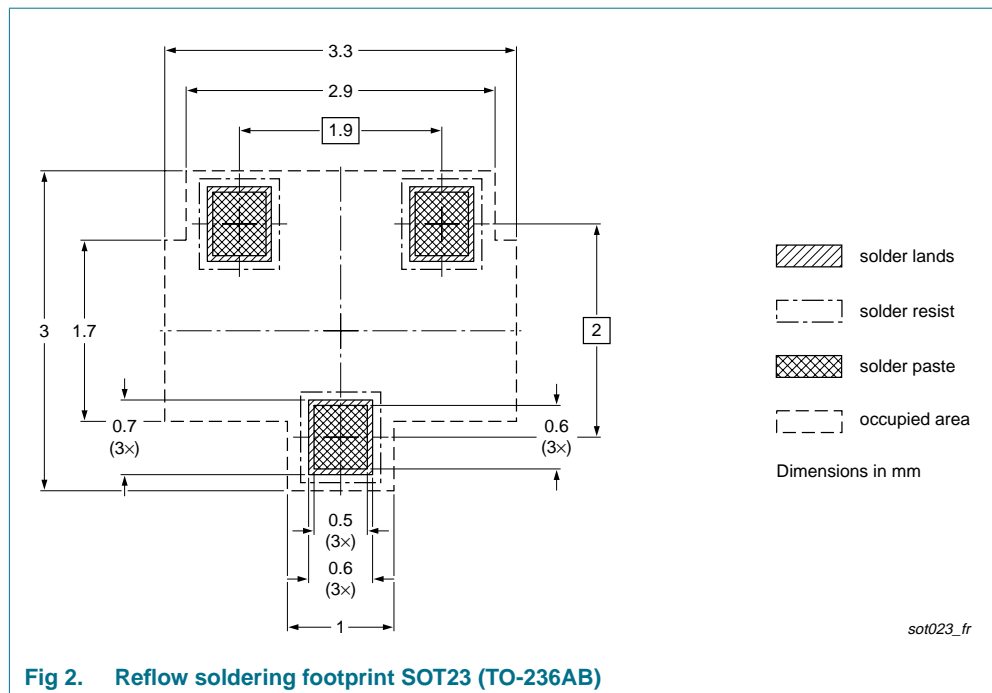
The indicated -xxx are the last three digits of the 12NC ordering code.<sup>[1]</sup>

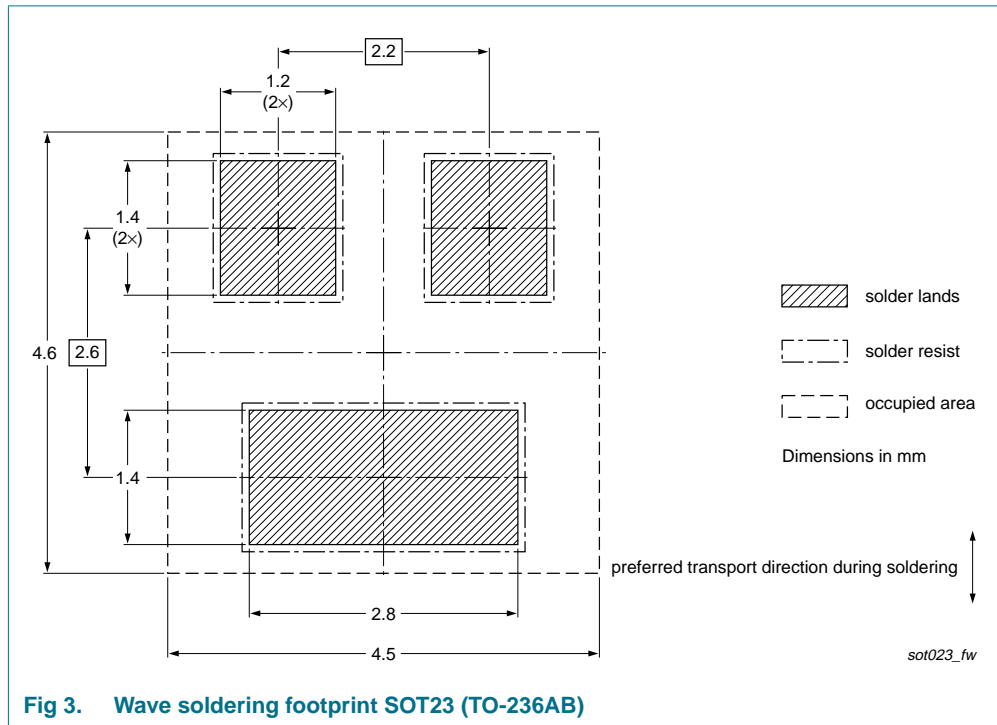
Type number <sup>[2]</sup>	Package	Description	Packing quantity	
			3000	10000
2PD601ARL	SOT23	4 mm pitch, 8 mm tape and reel	-215	-235
2PD601ASL				
2PD601ARL/DG				
2PD601ASL/DG				

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

[2] /DG: halogen-free.

## 11. Soldering





## 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".

[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.nxp.com>.

### 13.2 Definitions

**Draft** — The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. NXP Semiconductors does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

**Short data sheet** — A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local NXP Semiconductors sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

### 13.3 Disclaimers

**General** — Information in this document is believed to be accurate and reliable. However, NXP Semiconductors does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information.

**Right to make changes** — NXP Semiconductors reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

**Suitability for use** — NXP Semiconductors products are not designed, authorized or warranted to be suitable for use in medical, military, aircraft, space or life support equipment, nor in applications where failure or malfunction of an NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental

damage. NXP Semiconductors accepts no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

**Applications** — Applications that are described herein for any of these products are for illustrative purposes only. NXP Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

**Limiting values** — Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) may cause permanent damage to the device. Limiting values are stress ratings only and operation of the device at these or any other conditions above those given in the Characteristics sections of this document is not implied. Exposure to limiting values for extended periods may affect device reliability.

**Terms and conditions of sale** — NXP Semiconductors products are sold subject to the general terms and conditions of commercial sale, as published at <http://www.nxp.com/profile/terms>, including those pertaining to warranty, intellectual property rights infringement and limitation of liability, unless explicitly otherwise agreed to in writing by NXP Semiconductors. In case of any inconsistency or conflict between information in this document and such terms and conditions, the latter will prevail.

**No offer to sell or license** — Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

**Quick reference data** — The Quick reference data is an extract of the product data given in the Limiting values and Characteristics sections of this document, and as such is not complete, exhaustive or legally binding.

### 13.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

## 14. Contact information

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

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



## 15. Contents

<b>1</b>	<b>Product profile</b> . . . . .	<b>1</b>
1.1	General description . . . . .	1
1.2	Features . . . . .	1
1.3	Applications . . . . .	1
1.4	Quick reference data . . . . .	1
<b>2</b>	<b>Pinning information</b> . . . . .	<b>2</b>
<b>3</b>	<b>Ordering information</b> . . . . .	<b>2</b>
<b>4</b>	<b>Marking</b> . . . . .	<b>2</b>
<b>5</b>	<b>Limiting values</b> . . . . .	<b>3</b>
<b>6</b>	<b>Thermal characteristics</b> . . . . .	<b>3</b>
<b>7</b>	<b>Characteristics</b> . . . . .	<b>3</b>
<b>8</b>	<b>Test information</b> . . . . .	<b>4</b>
8.1	Quality information . . . . .	4
<b>9</b>	<b>Package outline</b> . . . . .	<b>4</b>
<b>10</b>	<b>Packing information</b> . . . . .	<b>5</b>
<b>11</b>	<b>Soldering</b> . . . . .	<b>5</b>
<b>12</b>	<b>Revision history</b> . . . . .	<b>7</b>
<b>13</b>	<b>Legal information</b> . . . . .	<b>8</b>
13.1	Data sheet status . . . . .	8
13.2	Definitions . . . . .	8
13.3	Disclaimers . . . . .	8
13.4	Trademarks . . . . .	8
<b>14</b>	<b>Contact information</b> . . . . .	<b>8</b>
<b>15</b>	<b>Contents</b> . . . . .	<b>9</b>

Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.



© NXP B.V. 2008.

All rights reserved.

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

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

Date of release: 6 November 2008

Document identifier: 2PD601AXL\_1