



# 2PB709ARL; 2PB709ASL

45 V, 100 mA PNP general-purpose transistors

Rev. 01 — 12 November 2008

Product data sheet

## 1. Product profile

### 1.1 General description

PNP 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		NPN complement
	Nexperia	JEDEC	
2PB709ARL	SOT23	TO-236AB	2PD601ARL
2PB709ASL			2PD601ASL
2PB709ARL/DG	SOT23	TO-236AB	2PD601ARL/DG
2PB709ASL/DG			2PD601ASL/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

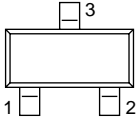
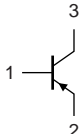
### 1.4 Quick reference data

Table 2. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{CE0}$	collector-emitter voltage	open base	-	-	-45	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		
2	emitter		
3	collector		

*sym013*

## 3. Ordering information

Table 4. Ordering information

Type number <sup>[1]</sup>	Package		
	Name	Description	Version
2PB709ARL	-	plastic surface-mounted package; 3 leads	SOT23
2PB709ASL			
2PB709ARL/DG			
2PB709ASL/DG			

[1] /DG: halogen-free

## 4. Marking

Table 5. Marking codes

Type number	Marking code <sup>[1]</sup>
2PB709ARL	SN*
2PB709ASL	SL*
2PB709ARL/DG	SS*
2PB709ASL/DG	SZ*

[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	-	-45	V
$V_{CEO}$	collector-emitter voltage	open base	-	-45	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	$V_{CB} = -45$ V; $I_E = 0$ A	-	-	-10	nA
		$V_{CB} = -45$ 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	$V_{CE} = -10$ V; $I_C = -2$ mA				
		$h_{FE}$ group R	210	-	340	
		$h_{FE}$ group S	290	-	460	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = -100$ mA; $I_B = -10$ mA	[1] -	-	-500	mV

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$f_T$	transition frequency	$V_{CE} = -10\text{ V}$ ; $I_C = -1\text{ mA}$ ; $f = 100\text{ MHz}$				
	$h_{FE}$ group R		70	-	-	MHz
	$h_{FE}$ group S		80	-	-	MHz
$C_c$	collector capacitance	$V_{CB} = -10\text{ V}$ ; $I_E = I_e = 0\text{ A}$ ; $f = 1\text{ MHz}$	-	-	5	pF

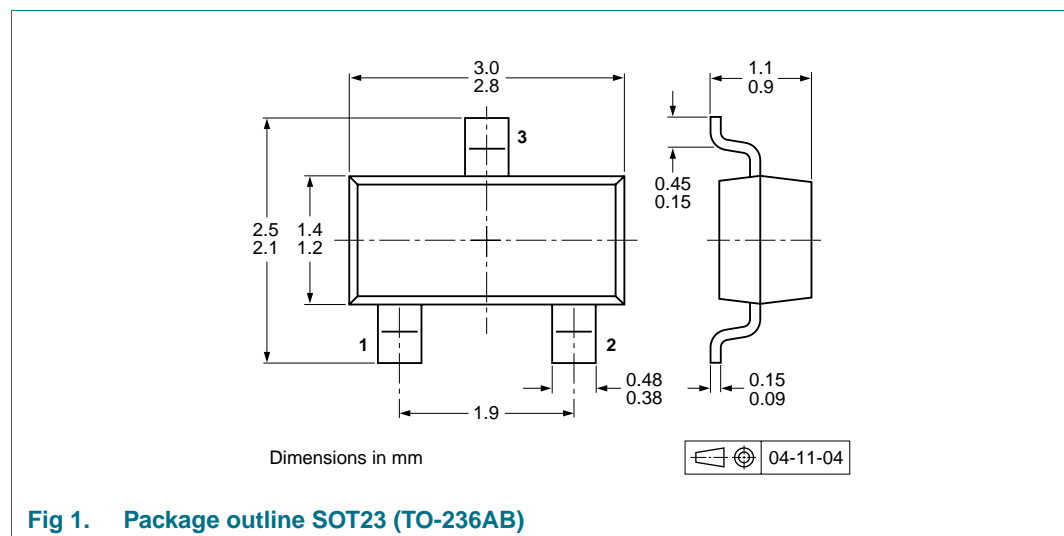
[1] Pulse test:  $t_p \leq 300\text{ }\mu\text{s}$ ;  $\delta \leq 0.02$ .

## 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**

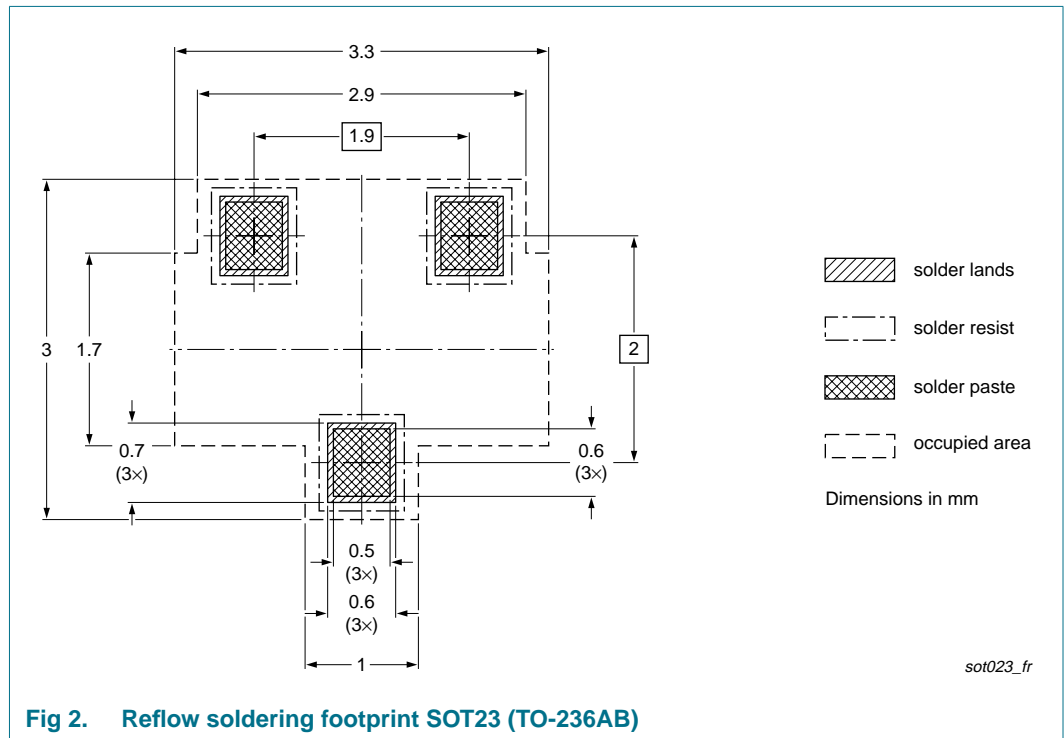
The indicated -xxx are the last three digits of the 12NC ordering code.<sup>[1]</sup>

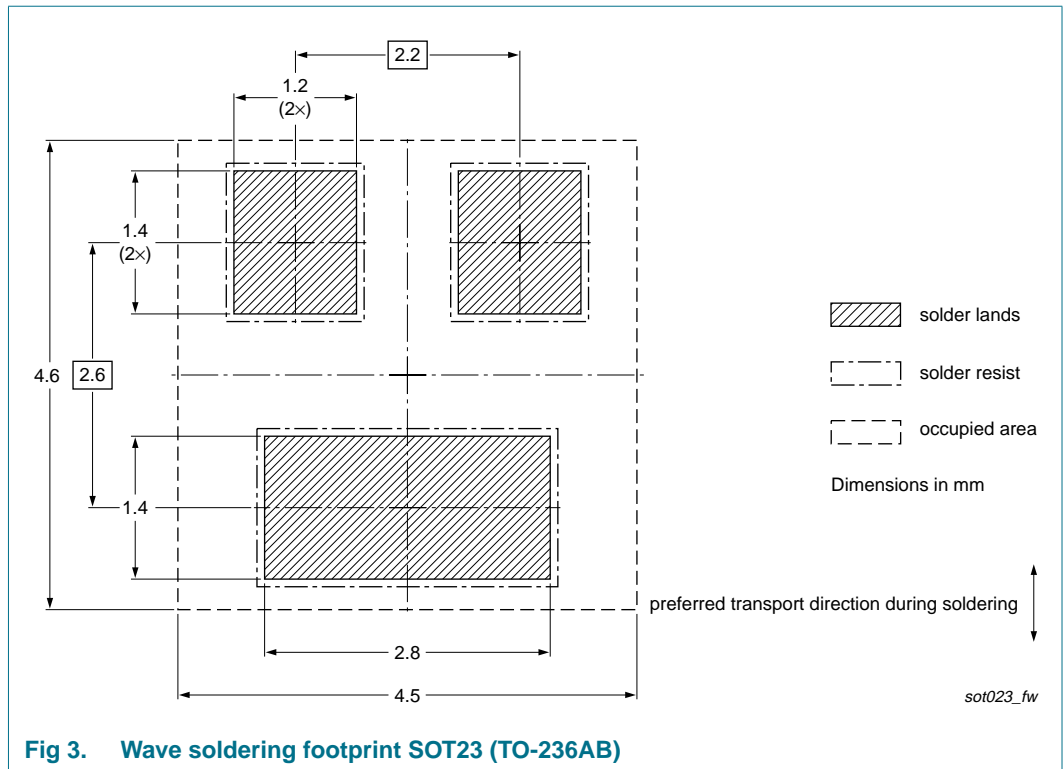
Type number <sup>[2]</sup>	Package	Description	Packing quantity	
			3000	10000
2PB709ARL	SOT23	4 mm pitch, 8 mm tape and reel	-215	-235
2PB709ASL				
2PB709ARL/DG				
2PB709ASL/DG				

[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
2PB709AXL_1	20081112	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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