



# 2PD602AQL; 2PD602ARL; 2PD602ASL

50 V, 500 mA NPN general-purpose transistors

Rev. 01 — 27 October 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
	Nexperia	JEDEC	
2PD602AQL	SOT23	TO-236AB	-
2PD602ARL			2PB710ARL
2PD602ASL			2PB710ASL
2PD602AQL/DG	SOT23	TO-236AB	-
2PD602ARL/DG			2PB710ARL/DG
2PD602ASL/DG			2PB710ASL/DG

[1] /DG: halogen-free

### 1.2 Features

- General-purpose transistors
- Three 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		-	-	500	mA

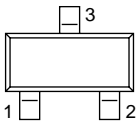
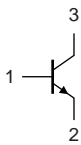
Table 2. Quick reference data ...continued

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$h_{FE}$	DC current gain	$V_{CE} = 10\text{ V};$ $I_C = 150\text{ mA}$	[1]			
	$h_{FE}$ group Q		85	-	170	
	$h_{FE}$ group R		120	-	240	
	$h_{FE}$ group S		170	-	340	

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

## 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
2PD602AQL	-	plastic surface-mounted package; 3 leads	SOT23
2PD602ARL			
2PD602ASL			
2PD602AQL/DG	-	plastic surface-mounted package; 3 leads	SOT23
2PD602ARL/DG			
2PD602ASL/DG			

[1] /DG: halogen-free

## 4. Marking

Table 5. Marking codes

Type number	Marking code <sup>[1]</sup>
2PD602AQL	SH*
2PD602ARL	SG*
2PD602ASL	SF*

**Table 5. Marking codes ...continued**

Type number	Marking code <sup>[1]</sup>
2PD602AQL/DG	SX*
2PD602ARL/DG	SW*
2PD602ASL/DG	SV*

- [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	-	5	V
$I_C$	collector current		-	500	mA
$I_{CM}$	peak collector current	single pulse; $t_p \leq 1$ ms	-	1	A
$I_{BM}$	peak base current	single pulse; $t_p \leq 1$ ms	-	200	mA
$P_{tot}$	total power dissipation	$T_{amb} \leq 25$ °C	<sup>[1]</sup> -	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	<sup>[1]</sup> -	-	500	K/W

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

## 7. Characteristics

**Table 8. Characteristics**

$T_{amb} = 25\text{ °C}$  unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{CBO}$	collector-base cut-off current	$V_{CB} = 60\text{ V}; I_E = 0\text{ A}$	-	-	10	nA
		$V_{CB} = 60\text{ V}; I_E = 0\text{ A}; T_j = 150\text{ °C}$	-	-	5	$\mu\text{A}$
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = 4\text{ V}; I_C = 0\text{ A}$	-	-	10	nA
$h_{FE}$	DC current gain	$V_{CE} = 10\text{ V}; I_C = 500\text{ mA}$	[1] 40	-	-	
	$h_{FE}$ group Q	$V_{CE} = 10\text{ V}; I_C = 150\text{ mA}$	[1] 85	-	170	
	$h_{FE}$ group R	$V_{CE} = 10\text{ V}; I_C = 150\text{ mA}$	[1] 120	-	240	
	$h_{FE}$ group S	$V_{CE} = 10\text{ V}; I_C = 150\text{ mA}$	[1] 170	-	340	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = 300\text{ mA}; I_B = 30\text{ mA}$	[1] -	-	600	mV
$f_T$	transition frequency	$V_{CE} = 10\text{ V}; I_C = 50\text{ mA}; f = 100\text{ MHz}$	[1]			
	$h_{FE}$ group Q		140	-	-	MHz
	$h_{FE}$ group R		160	-	-	MHz
	$h_{FE}$ group S		180	-	-	MHz
$C_c$	collector capacitance	$V_{CB} = 10\text{ V}; I_E = i_e = 0\text{ A}; f = 1\text{ MHz}$	-	-	15	pF

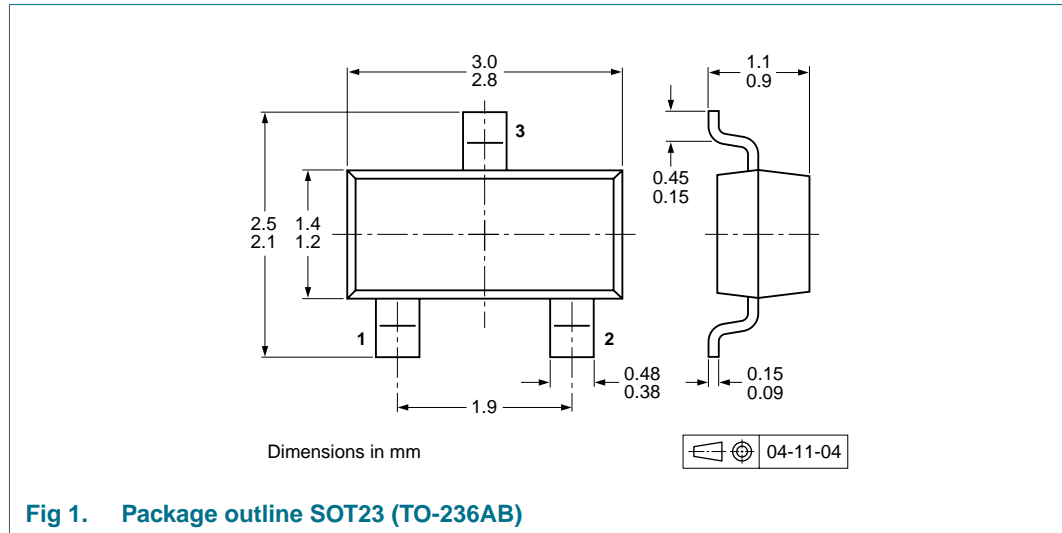
[1] Pulse test:  $t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02$ .

## 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
2PD602AQL	SOT23	4 mm pitch, 8 mm tape and reel	-215	-235
2PD602ARL				
2PD602ASL				
2PD602AQL/DG	SOT23	4 mm pitch, 8 mm tape and reel	-215	-235
2PD602ARL/DG				
2PD602ASL/DG				

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

[2] /DG: halogen-free

11. Soldering

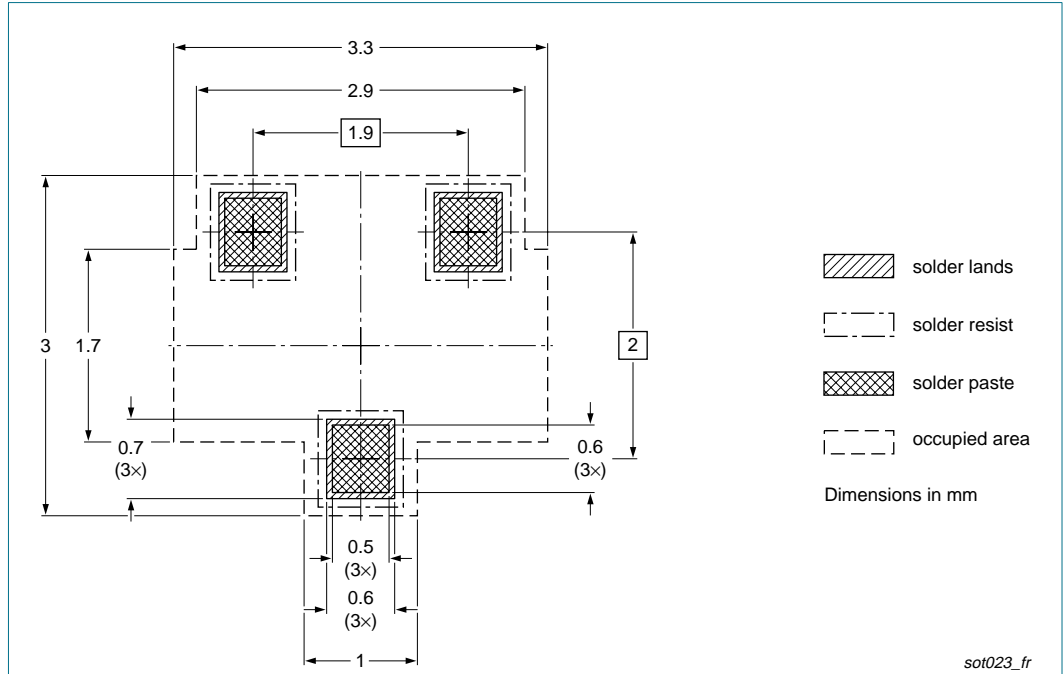


Fig 2. Reflow soldering footprint SOT23 (TO-236AB)

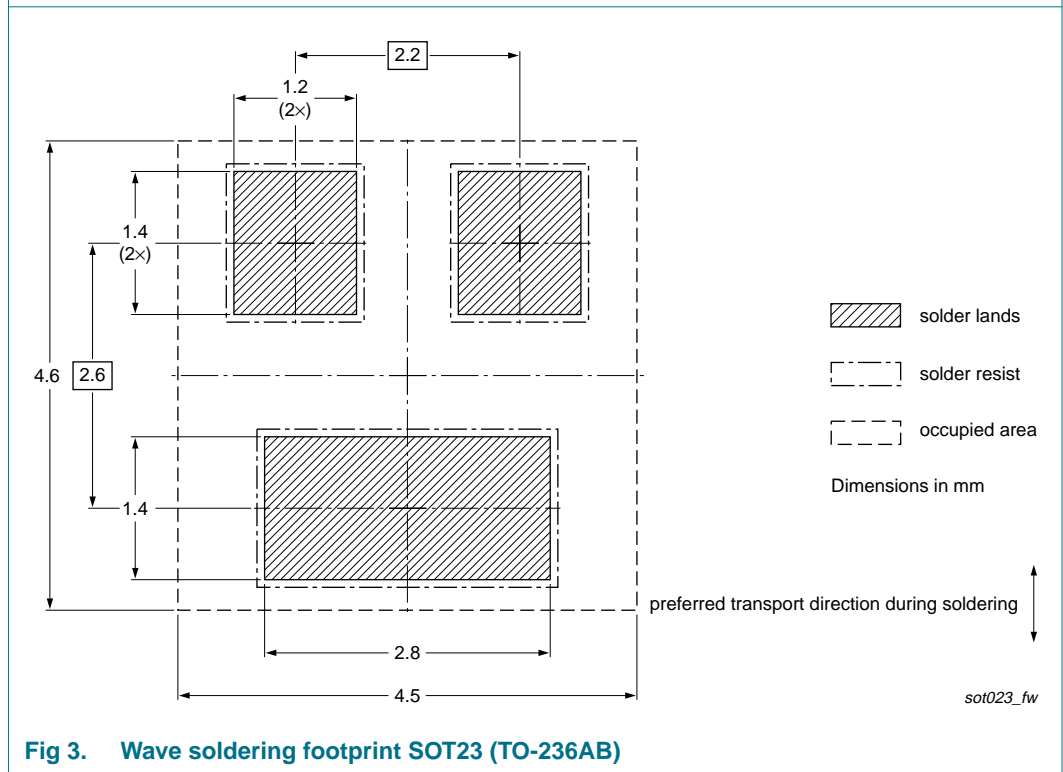


Fig 3. Wave soldering footprint SOT23 (TO-236AB)

## 12. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
2PD602AXL_1	20081027	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.
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[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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### Наши контакты:

**Телефон:** +7 812 627 14 35

**Электронная почта:** [sales@st-electron.ru](mailto:sales@st-electron.ru)

**Адрес:** 198099, Санкт-Петербург,  
Промышленная ул, дом № 19, литера Н,  
помещение 100-Н Офис 331