



2PB709BRL; 2PB709BSL

50 V, 200 mA PNP general-purpose transistors

Rev. 1 — 28 June 2010

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	Package		NPN complement
	NXP	JEDEC	
2PB709BRL	SOT23	TO-236AB	2PD601BRL
2PB709BSL			2PD601BSL

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

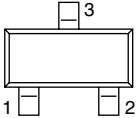
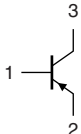
Table 2. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base	-	-	-50	V
I_C	collector current		-	-	-200	mA
h_{FE}	DC current gain	$V_{CE} = -10$ V; $I_C = -2$ 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		

sym013

3. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
2PB709BRL	-	plastic surface-mounted package; 3 leads	SOT23
2PB709BSL			

4. Marking

Table 5. Marking codes

Type number	Marking code ^[1]
2PB709BRL	MN*
2PB709BSL	MP*

- [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; $t_p \leq 1$ ms	-	-250	mA
I_{BM}	peak base current	single pulse; $t_p \leq 1$ 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_{tot}	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[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.

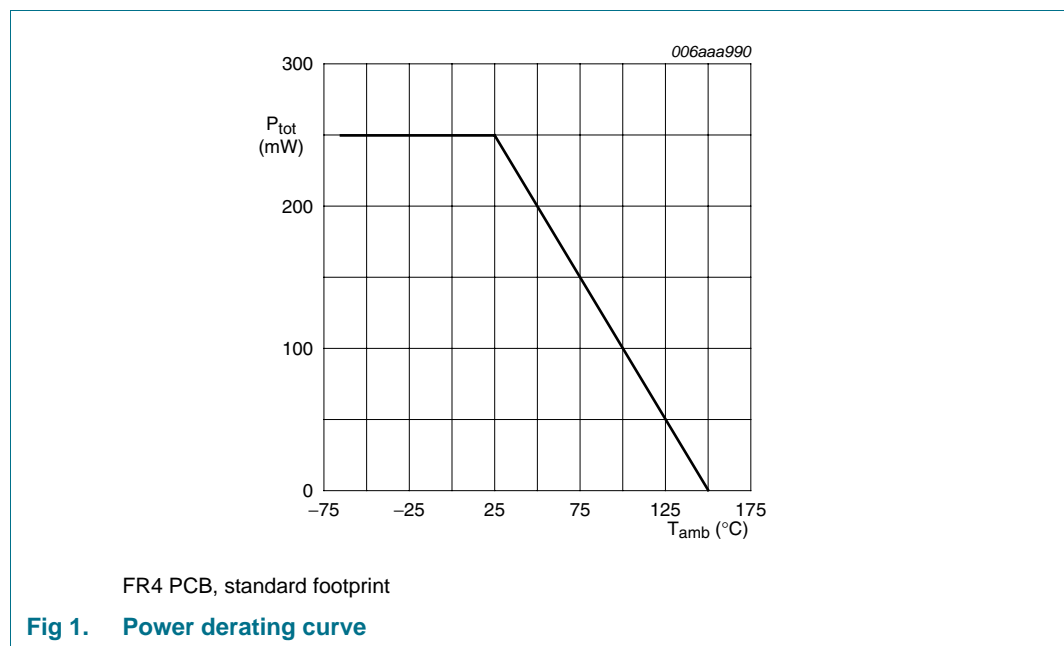


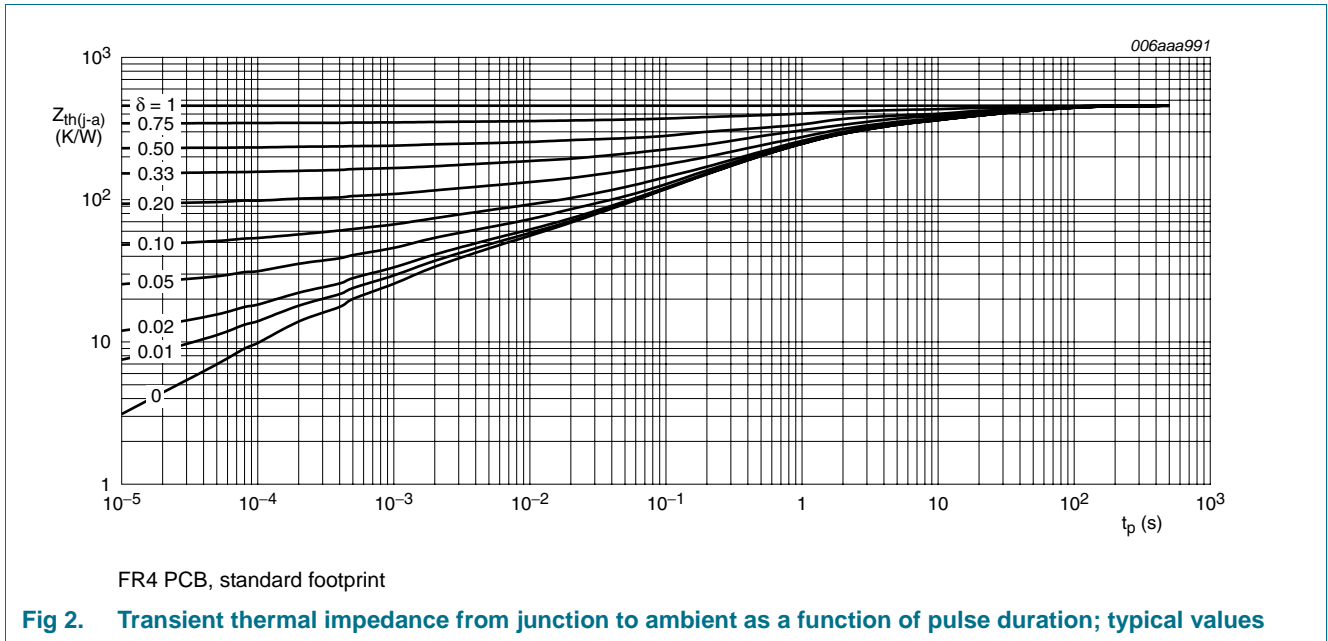
Fig 1. Power derating curve

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
$R_{th(j-sp)}$	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.

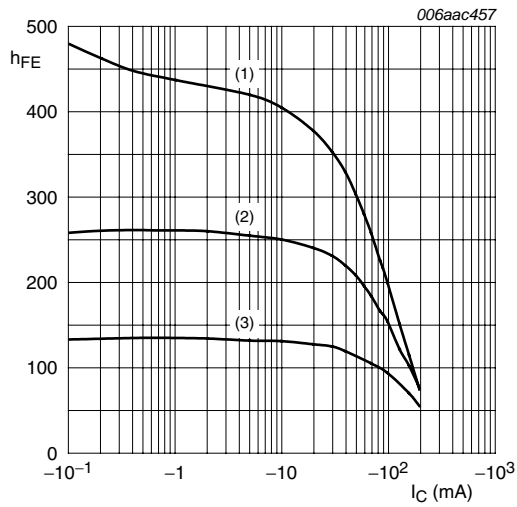


7. Characteristics

Table 8. Characteristics
T_{amb} = 25 °C unless otherwise specified.

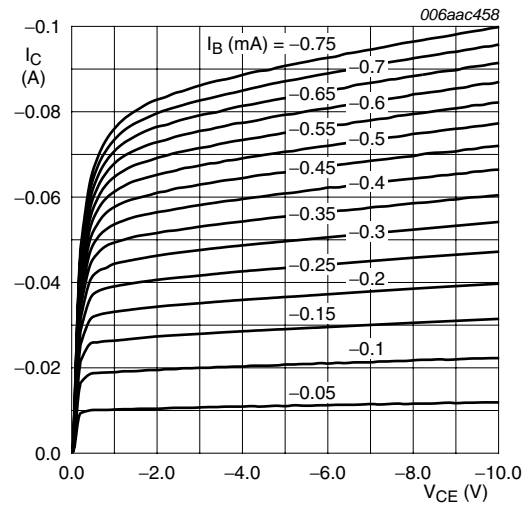
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I _{CBO}	collector-base cut-off current	V _{CB} = -60 V; I _E = 0 A	-	-	-10	nA
		V _{CB} = -60 V; I _E = 0 A; T _J = 150 °C	-	-	-5	μA
I _{EBO}	emitter-base cut-off current	V _{EB} = -5 V; I _C = 0 A	-	-	-10	nA
h _{FE}	DC current gain	V _{CE} = -10 V; I _C = -2 mA	210	-	460	
	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]	-	-250	mV
f _T	transition frequency	V _{CE} = -6 V; I _C = -10 mA; f = 100 MHz	100	200	-	MHz
C _C	collector capacitance	V _{CB} = -10 V; I _E = I _e = 0 A; f = 1 MHz	-	-	3	pF

[1] Pulse test: t_p ≤ 300 μs; δ ≤ 0.02.



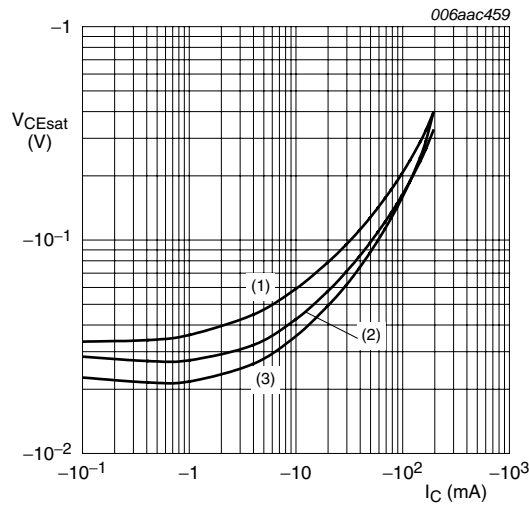
$V_{CE} = -10\text{ V}$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

Fig 3. 2PB709BRL: DC current gain as a function of collector current; typical values



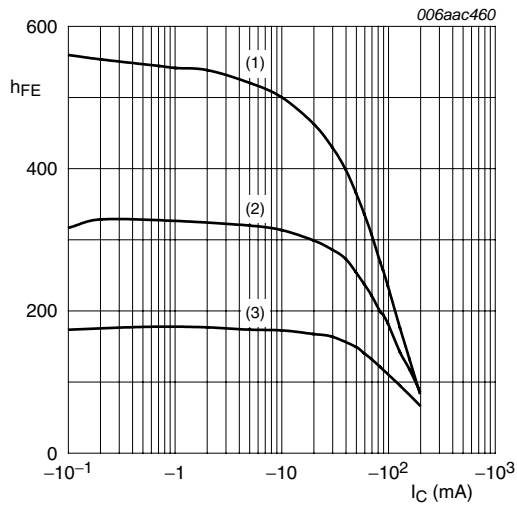
$T_{amb} = 25\text{ °C}$

Fig 4. 2PB709BRL: Collector current as a function of collector-emitter voltage; typical values



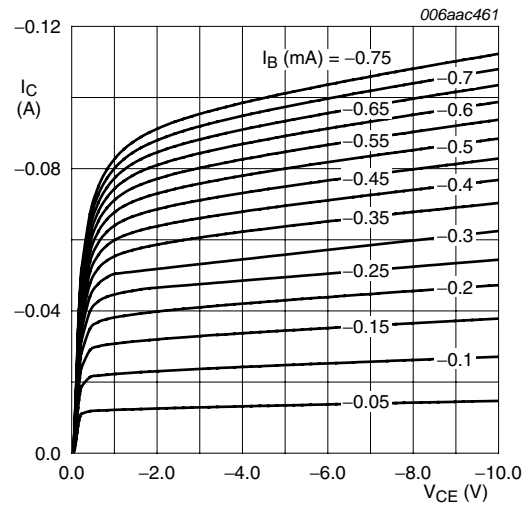
$I_C/I_B = 10$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

Fig 5. 2PB709BRL: Collector-emitter saturation voltage as a function of collector current; typical values



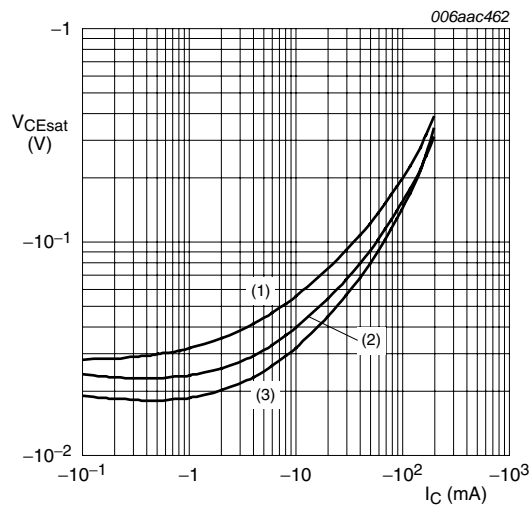
$V_{CE} = -10\text{ V}$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

Fig 6. 2PB709BSL: DC current gain as a function of collector current; typical values



$T_{amb} = 25\text{ °C}$

Fig 7. 2PB709BSL: Collector current as a function of collector-emitter voltage; typical values



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

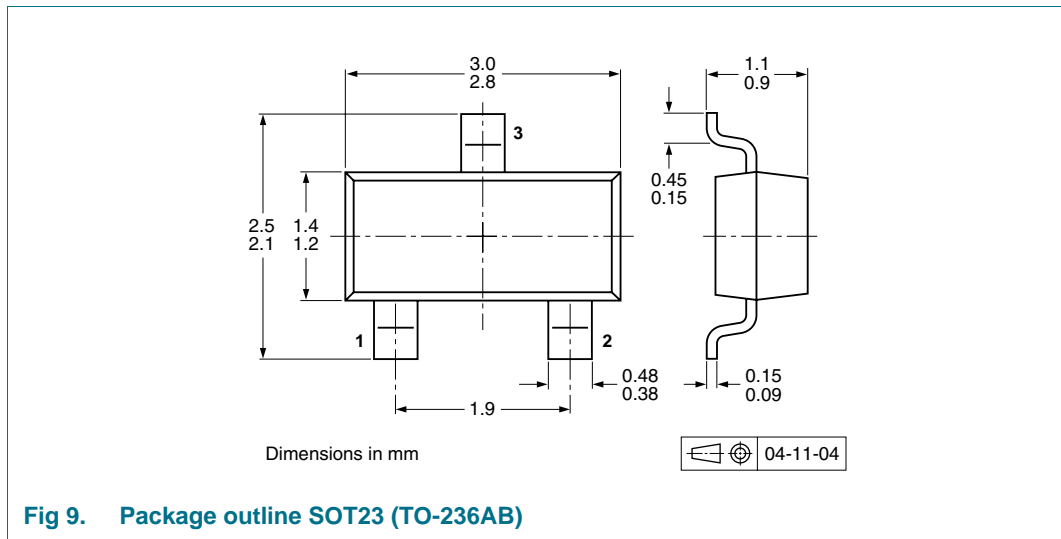
Fig 8. 2PB709BSL: Collector-emitter saturation voltage as a function of collector current; typical values

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

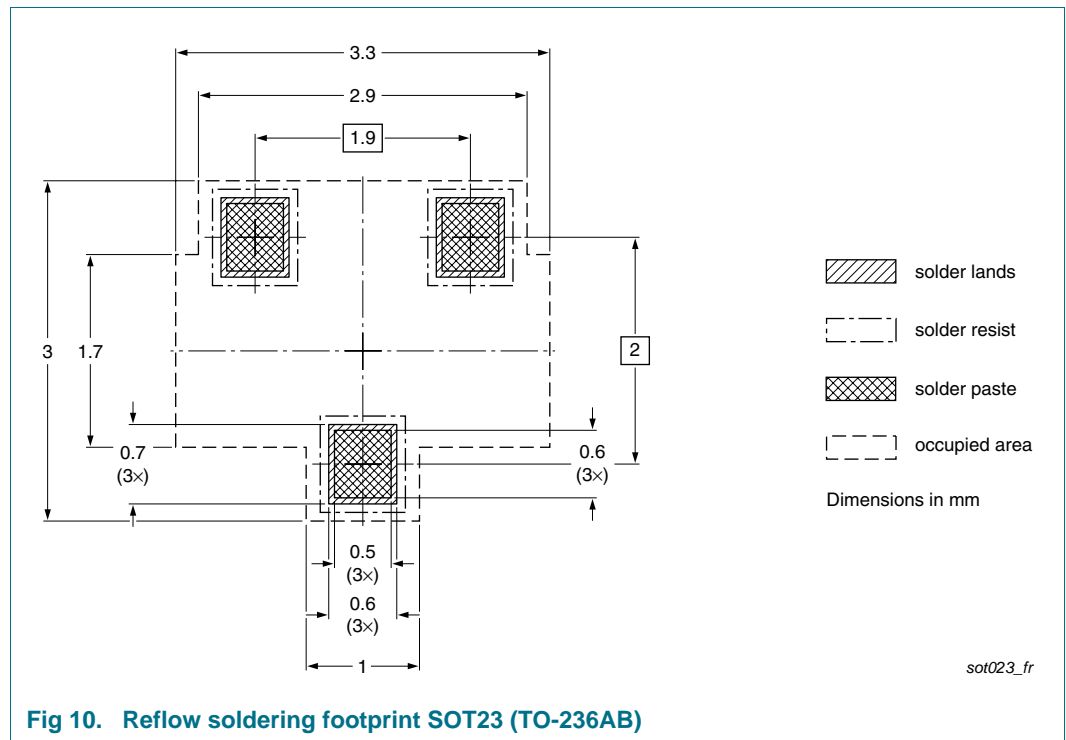
Table 9. Packing methods

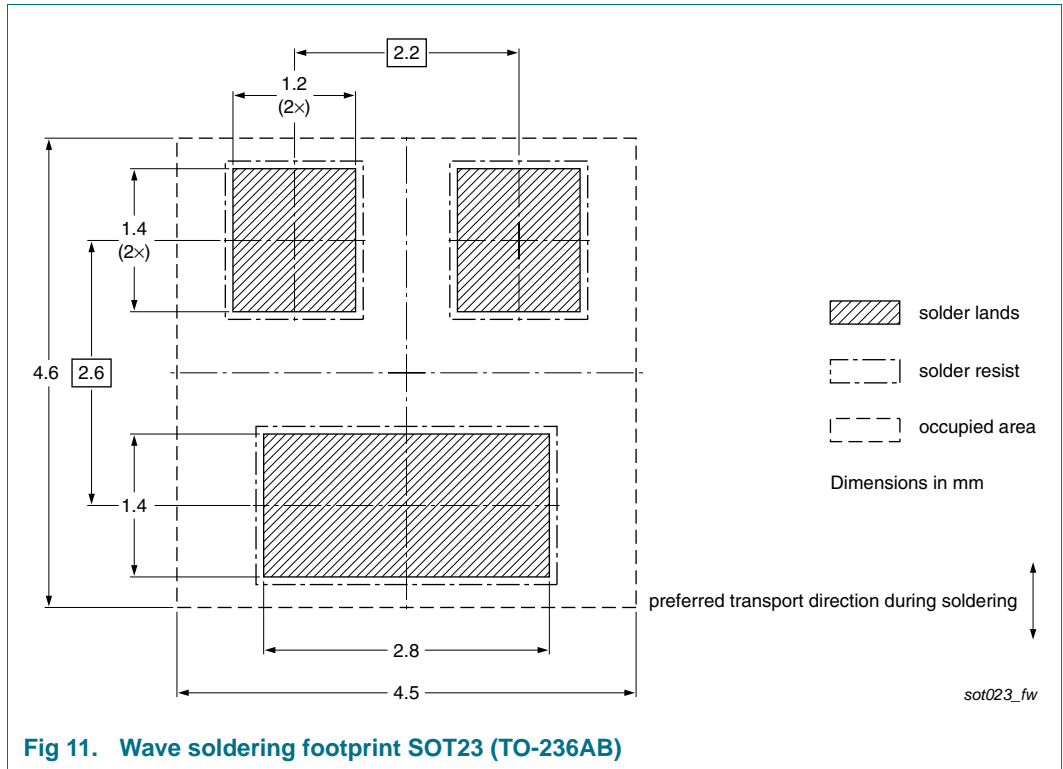
The indicated -xxx are the last three digits of the 12NC ordering code.^[1]

Type number	Package	Description	Packing quantity	
			3000	10000
2PB709BRL	SOT23	4 mm pitch, 8 mm tape and reel	-215	-235
2PB709BSL				

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

11. Soldering





12. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
2PB709BRL_2PB709BSL v.1	20100628	Product data sheet	-	-

13. Legal information

13.1 Data sheet status

Document status ^{[1][2]}	Product status ^[3]	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.

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[2] The term 'short data sheet' is explained in section "Definitions".

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