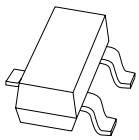


PBRP113ZT

PNP 800 mA, 40 V BISS RET; R1 = 1 kΩ, R2 = 10 kΩ

Rev. 01 — 16 January 2008 Product data sheet

1. Product profile

1.1 General description

800 mA PNP low V_{CEsat} Breakthrough In Small Signal (BISS) Resistor-Equipped Transistor (RET) in a small SOT23 (TO-236AB) Surface-Mounted Device (SMD) plastic package.

NPN complement: PBRN113ZT.

1.2 Features

- 800 mA repetitive peak output current
- High current gain h_{FE}
- Built-in bias resistors
- Simplifies circuit design
- Low collector-emitter saturation voltage V_{CEsat}
- Reduces component count
- Reduces pick and place costs
- ±10 % resistor ratio tolerance

1.3 Applications

- Digital application in automotive and industrial segments
- Medium current peripheral driver
- Switching loads

1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base		-	-	–40	V
I_O	output current		[1][2]	-	-	–600	mA
I_{ORM}	repetitive peak output current	$t_p \leq 1$ ms; $\delta \leq 0.33$	[3]	-	-	–800	mA
R1	bias resistor 1 (input)			0.7	1	1.3	kΩ
R2/R1	bias resistor ratio			9	10	11	

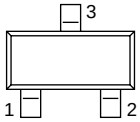
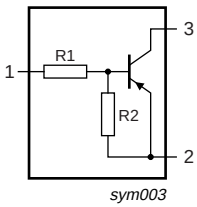
[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for collector 1 cm^2.

[2] Device mounted on a ceramic PCB, Al_2O_3, standard footprint.

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

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Symbol
1	input (base)		
2	GND (emitter)		
3	output (collector)		

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PBRP113ZT	-	plastic surface-mounted package; 3 leads	SOT23

4. Marking

Table 4. Marking codes

Type number	Marking code[1]
PBRP113ZT	*7M

[1] * = -: made in Hong Kong
* = p: made in Hong Kong
* = t: made in Malaysia
* = W: made in China

5. Limiting values

Table 5. 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		-	–40	V
V_{CEO}	collector-emitter voltage	open base		-	–40	V
V_{EBO}	emitter-base voltage	open collector		-	–5	V
V_I	input voltage					
	positive			-	+5	V
	negative			-	–10	V
I_O	output current		[1][2]	-	–600	mA
I_{ORM}	repetitive peak output current	$t_p \leq 1$ ms; $\delta \leq 0.33$	[3]	-	–800	mA

Table 5. Limiting values *…continued*

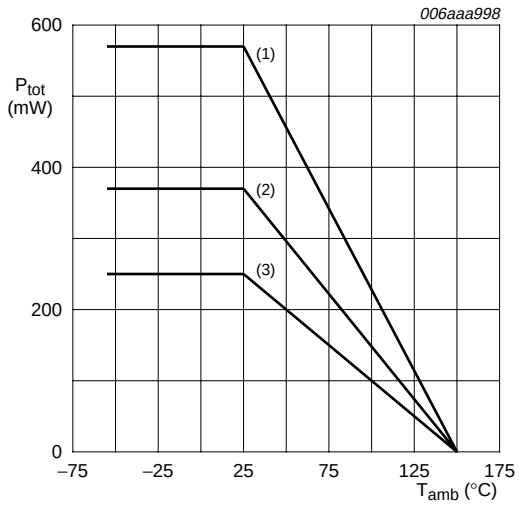
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C				
			[3]	-	250	mW
			[1]	-	370	mW
			[2]	-	570	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 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm^2.

[2] Device mounted on a ceramic PCB, Al_2O_3, standard footprint.

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



(1) Ceramic PCB, Al_2O_3 standard footprint

(2) FR4 PCB, mounting pad for collector 1 cm^2

(3) FR4 PCB, standard footprint

Fig 1. Power derating curves for SOT23 (TO-236AB)

6. Thermal characteristics

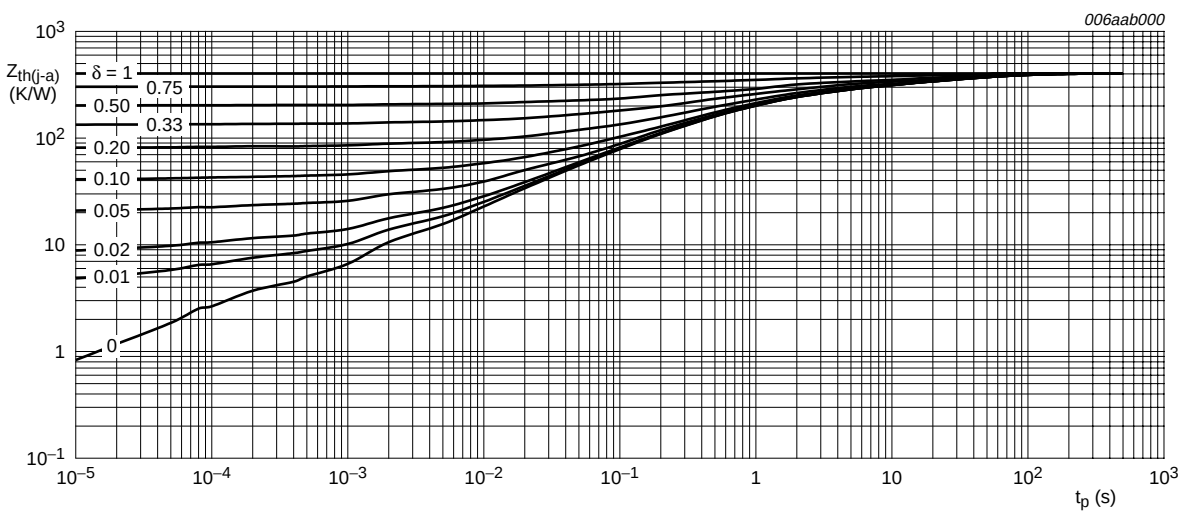
Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air					
			[1]	-	-	500	K/W
			[2]	-	-	338	K/W
			[3]	-	-	219	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	-	105	K/W

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

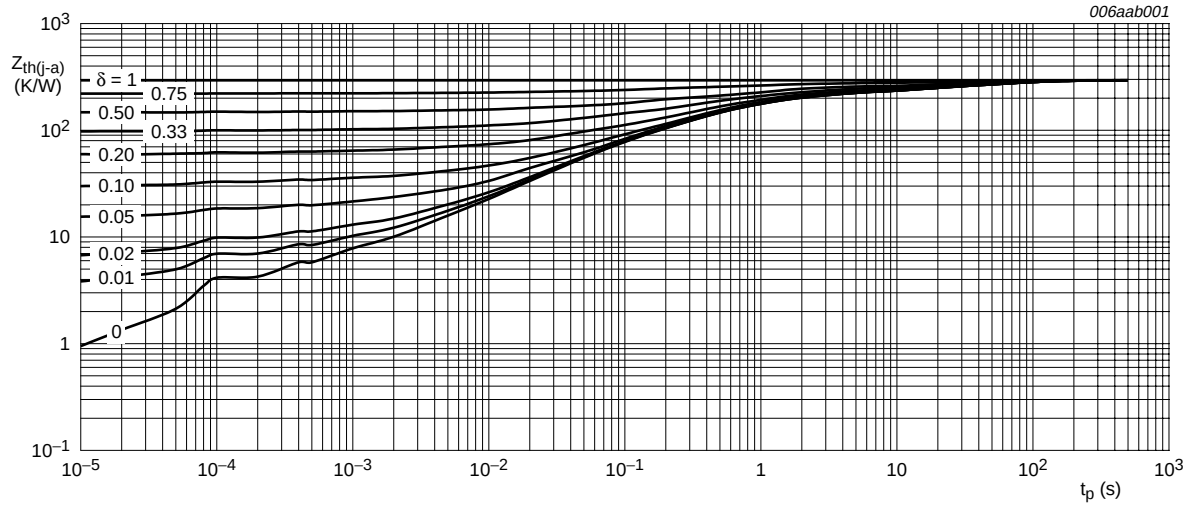
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm^2.

[3] Device mounted on a ceramic PCB, Al_2O_3, standard footprint.



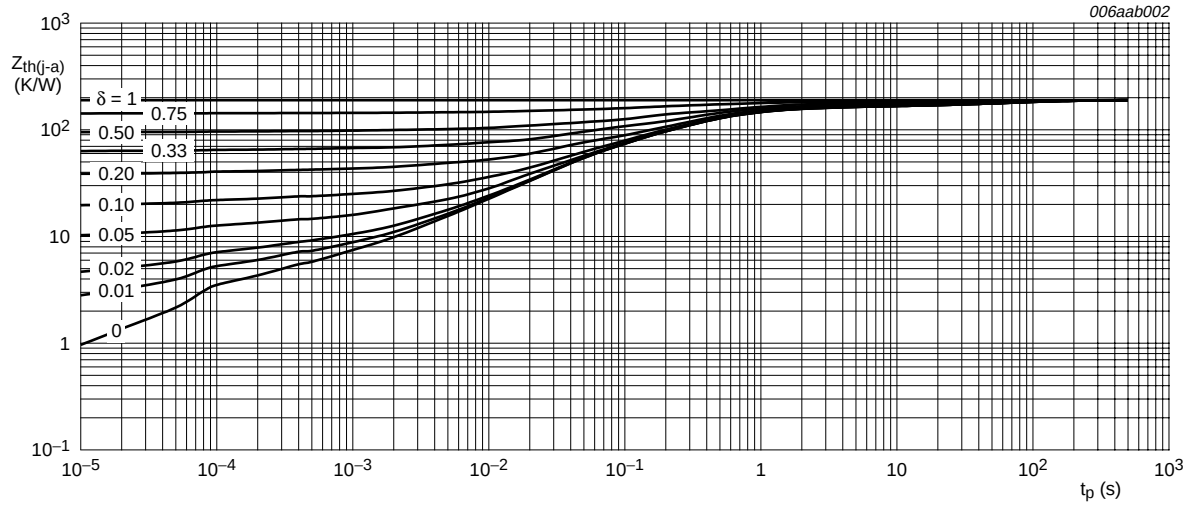
FR4 PCB, standard footprint

Fig 2. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT23 (TO-236AB); typical values



FR4 PCB, mounting pad for collector 1 cm^2

Fig 3. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT23 (TO-236AB); typical values



Ceramic PCB, Al_2O_3 standard footprint

Fig 4. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT23 (TO-236AB); typical values

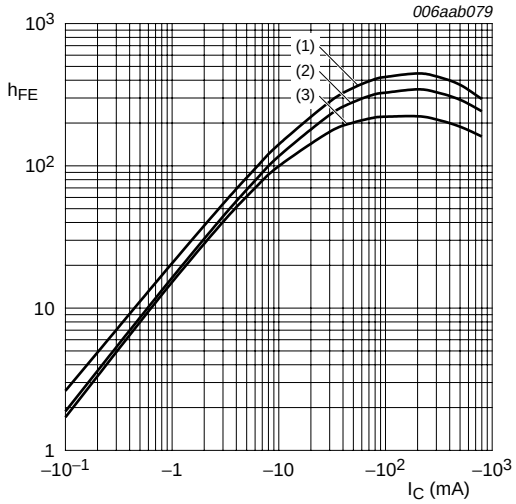
7. Characteristics

Table 7. Characteristics

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

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	V_{CB} = –30 V; I_E = 0 A		-	-	–100	nA
I_{CEO}	collector-emitter cut-off current	V_{CE} = –30 V; I_B = 0 A		-	-	–0.5	µA
I_{EBO}	emitter-base cut-off current	V_{EB} = –5 V; I_C = 0 A		-	-	–0.8	mA
h_{FE}	DC current gain	V_{CE} = –5 V; I_C = –50 mA		190	270	-	
		V_{CE} = –5 V; I_C = –300 mA	[1]	230	320	-	
		V_{CE} = –5 V; I_C = –600 mA	[1]	190	270	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = –50 mA; I_B = –2.5 mA		-	–35	–45	mV
		I_C = –200 mA; I_B = –10 mA		-	–70	–100	mV
		I_C = –500 mA; I_B = –10 mA	[1]	-	–200	–300	mV
		I_C = –600 mA; I_B = –6 mA	[1]	-	–450	–750	mV
$V_{I(off)}$	off-state input voltage	V_{CE} = –5 V; I_C = –100 µA		–0.3	–0.5	–1	V
$V_{I(on)}$	on-state input voltage	V_{CE} = –0.3 V; I_C = –20 mA		–0.4	–0.7	–1.4	V
R1	bias resistor 1 (input)			0.7	1	1.3	kΩ
R2/R1	bias resistor ratio			9	10	11	
C_c	collector capacitance	V_{CB} = –10 V; I_E = i_e = 0 A; f = 1 MHz		-	11	-	pF

[1] Pulse test: $t_p \leq 300$ µs; $\delta \leq 0.02$.



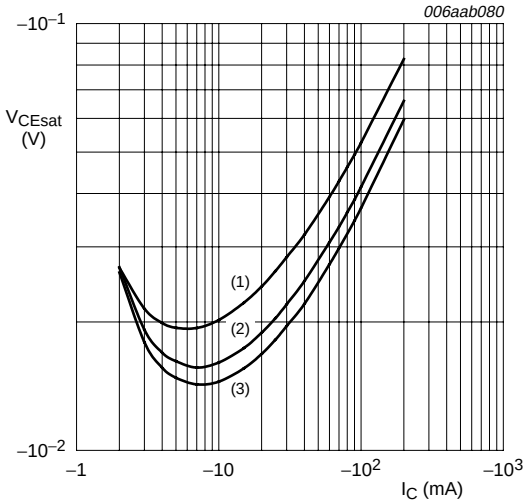
V_{CE} = −5 V

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −40 °C

Fig 5. DC current gain as a function of collector current; typical values



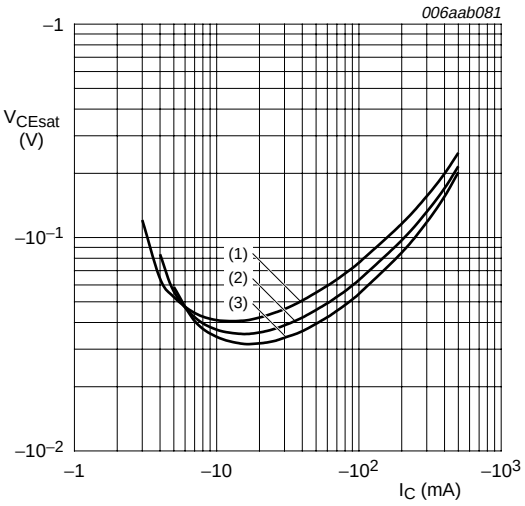
I_C/I_B = 20

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −40 °C

Fig 6. Collector-emitter saturation voltage as a function of collector current; typical values



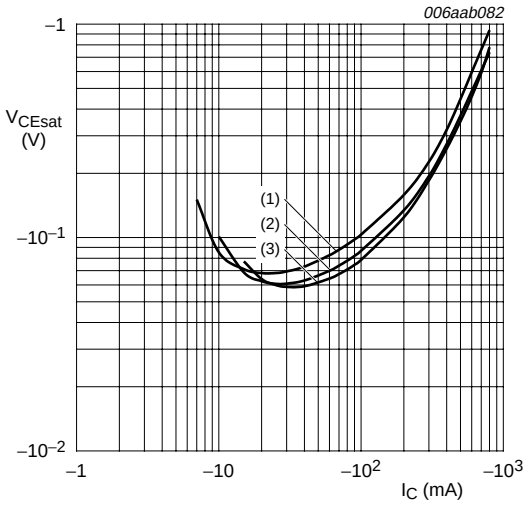
I_C/I_B = 50

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −40 °C

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



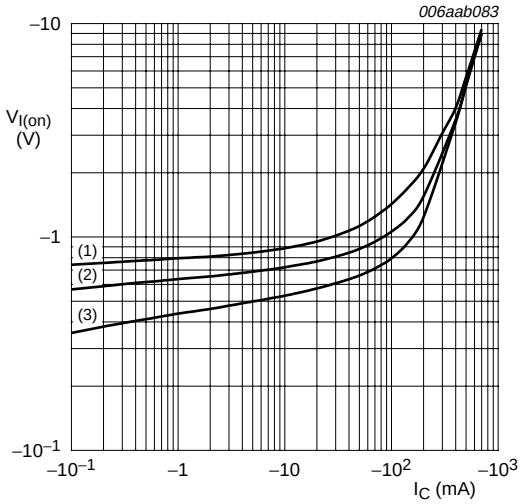
I_C/I_B = 100

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −40 °C

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



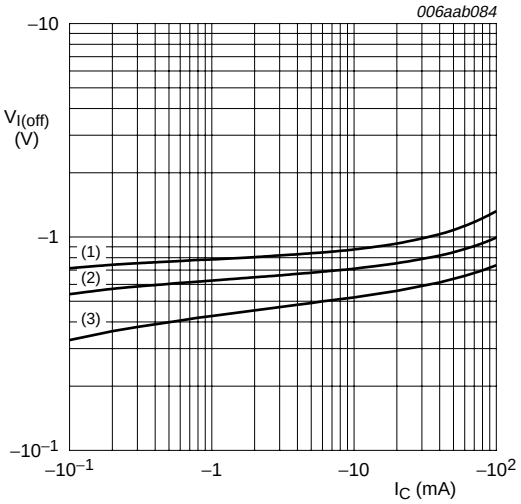
V_{CE} = −0.3 V

(1) T_{amb} = −40 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 100 °C

Fig 9. On-state input voltage as a function of collector current; typical values



V_{CE} = −5 V

(1) T_{amb} = −40 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 100 °C

Fig 10. Off-state input voltage as a function of collector current; typical values

8. Package outline

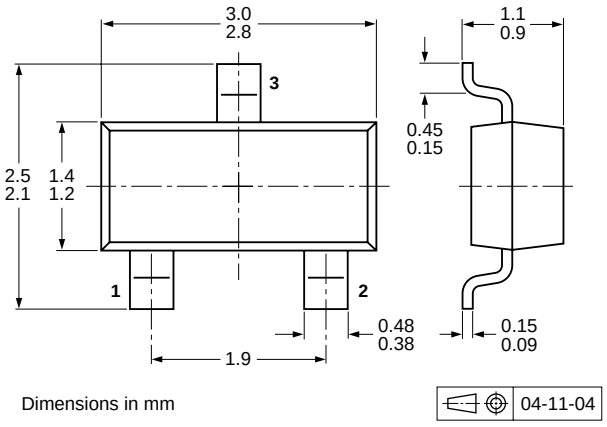


Fig 11. Package outline SOT23 (TO-236AB)

9. Packing information

Table 8. Packing methods

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

Type number	Package	Description	Packing quantity	
			3000	10000
PBRP113ZT	SOT23	4 mm pitch, 8 mm tape and reel	-215	-235

[1] For further information and the availability of packing methods, see Section 13.

10. Soldering

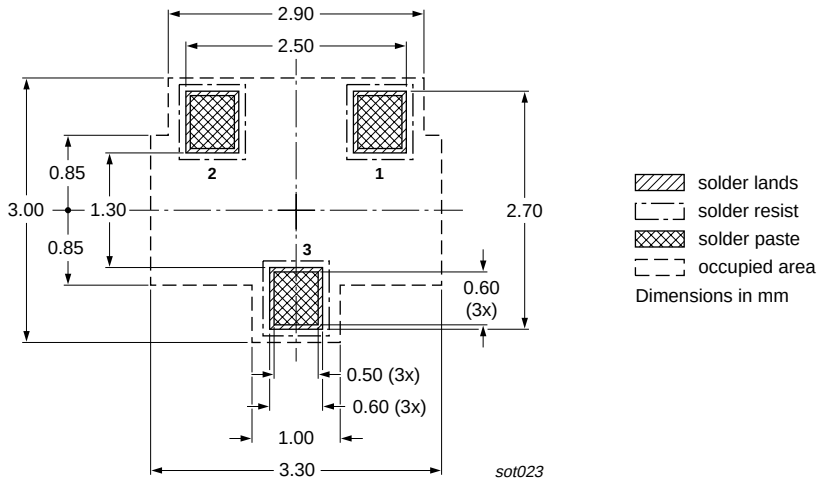


Fig 12. Reflow soldering footprint SOT23 (TO-236AB)

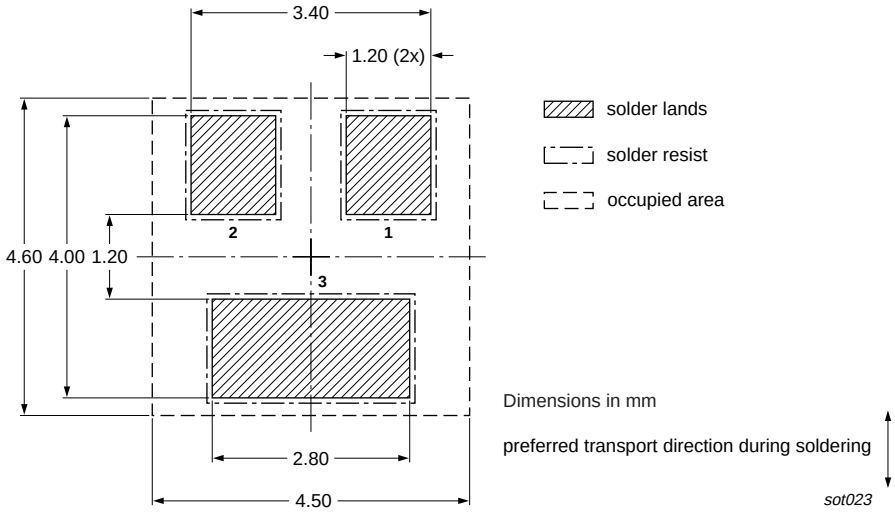


Fig 13. Wave soldering footprint SOT23 (TO-236AB)

11. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PBRP113ZT_1	20080116	Product data sheet	-	-

12. Legal information

12.1 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.

[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.

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