



PEMB2

50 V, 100 mA PNP/PNP resistor-equipped double transistor;
R1 = 47 kΩ, R2 = 47 kΩ

28 December 2022

Product data sheet

1. General description

PNP/PNP double Resistor-Equipped Transistor (RET) in a ultra small flat lead SOT666 Surface-Mounted Device (SMD) plastic package.

NPN/PNP complement: PEMD12

NPN/NPN complement: PEMH2

2. Features and benefits

- 100 mA output current capability
- Built-in bias resistors
- Simplifies circuit design
- Reduces component count
- Reduces pick and place costs

3. Applications

- Low current peripheral driver
- Control of IC inputs
- Replaces general-purpose transistors in digital applications

4. Quick reference data

Table 1. Quick reference data

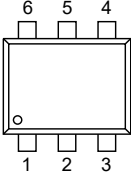
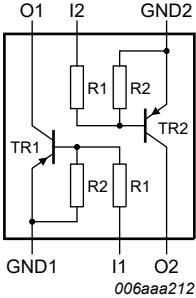
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per transistor						
V _{CEO}	collector-emitter voltage	open base	-	-	-50	V
I _O	output current		-	-	-100	mA
R1	bias resistor 1 (input)	[1]	33	47	61	kΩ
R2/R1	bias resistor ratio	[1]	0.8	1	1.2	

[1] See "Test information" for resistor calculation and test conditions.

50 V, 100 mA PNP/PNP resistor-equipped double transistor; R1 = 47 kΩ, R2 = 47 kΩ

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	GND1	GND (emitter) TR1	 SOT666	
2	I1	input (base) TR1		
3	O2	output (collector) TR2		
4	GND2	GND (emitter) TR2		
5	I2	input (base) TR2		
6	O1	output (collector) TR1		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PEMB2	SOT666	plastic, surface-mounted package; 6 leads; 0.5 mm pitch; 1.6 mm x 1.2 mm x 0.55 mm body	SOT666

7. Marking

Table 4. Marking codes

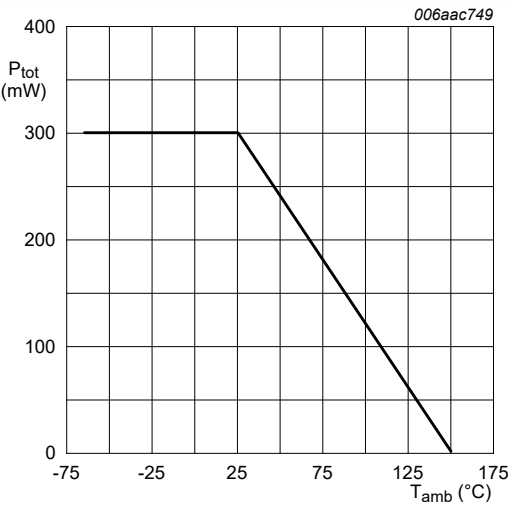
Type number	Marking code
PEMB2	B2

8. Limiting values

Table 5. Limiting values
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
Per transistor						
V _{CBO}	collector-base voltage	open emitter		-	-50	V
V _{CEO}	collector-emitter voltage	open base		-	-50	V
V _{EBO}	emitter-base voltage	open collector		-	-10	V
V _I	input voltage	positive		-	10	V
		negative		-	-40	V
I _O	output current			-	-100	mA
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[1] [2]	-	200	mW
Per device						
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[1] [2]	-	300	mW
T _j	junction temperature			-	150	°C
T _{amb}	ambient temperature			-65	150	°C
T _{stg}	storage temperature			-65	150	°C

- [1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided, 35 μm copper, tin-plated and standard footprint.
[2] Reflow soldering is the only recommended soldering method.



FR4 PCB, single-sided, 35 μm copper, tin-plated and standard footprint

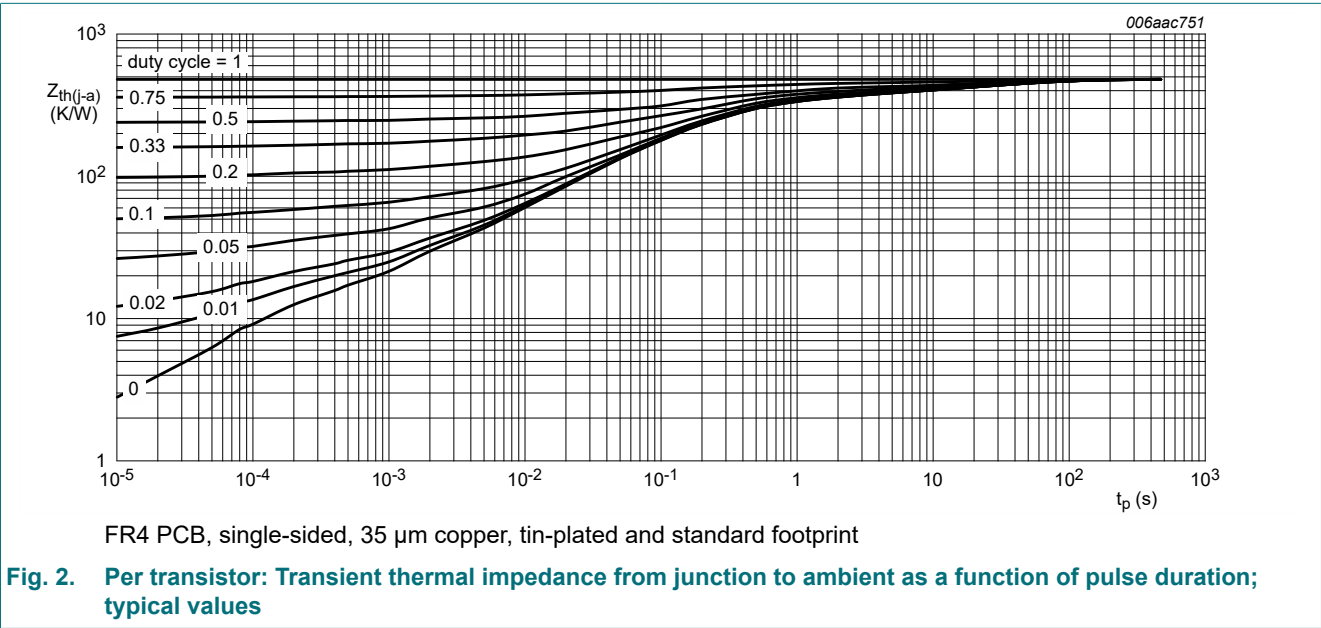
Fig. 1. Per device: Power derating curve

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1] [2]	-	-	625	K/W
Per device							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1] [2]	-	-	417	K/W

- [1] Device mounted on an FR4 PCB, single-sided, 35 μm copper, tin-plated and standard footprint.
[2] Reflow soldering is the only recommended soldering method.



10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per transistor						
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = -100 \mu A$; $I_E = 0 A$; $T_{amb} = 25^\circ C$	-50	-	-	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_C = -2 mA$; $I_B = 0 A$; $T_{amb} = 25^\circ C$	-50	-	-	V
I_{CBO}	collector-base cut-off current	$V_{CB} = -50 V$; $I_E = 0 A$; $T_{amb} = 25^\circ C$	-	-	-100	nA
I_{CEO}	collector-emitter cut-off current	$V_{CE} = -30 V$; $I_B = 0 A$; $T_{amb} = 25^\circ C$	-	-	-1	μA
		$V_{CE} = -30 V$; $I_B = 0 A$; $T_j = 150^\circ C$	-	-	-5	μA
I_{EBO}	emitter-base cut-off current	$V_{EB} = -5 V$; $I_C = 0 A$; $T_{amb} = 25^\circ C$	-	-	-90	μA
h_{FE}	DC current gain	$V_{CE} = -5 V$; $I_C = -5 mA$; $T_{amb} = 25^\circ C$	80	-	-	
V_{CEsat}	collector-emitter saturation voltage	$I_C = -10 mA$; $I_B = -0.5 mA$; $T_{amb} = 25^\circ C$	-	-	-150	mV
$V_{I(off)}$	off-state input voltage	$V_{CE} = -5 V$; $I_C = -100 \mu A$; $T_{amb} = 25^\circ C$	-	-1.2	-0.8	V
$V_{I(on)}$	on-state input voltage	$V_{CE} = -0.3 V$; $I_C = -2 mA$; $T_{amb} = 25^\circ C$	-3	-1.6	-	V
R1	bias resistor 1 (input)	[1]	33	47	61	kΩ
R2/R1	bias resistor ratio	[1]	0.8	1	1.2	
C_c	collector capacitance	$V_{CB} = -10 V$; $I_E = 0 A$; $i_e = 0 A$; $f = 1 MHz$; $T_{amb} = 25^\circ C$	-	-	3	pF
f_T	transition frequency	$V_{CE} = -5 V$; $I_C = -10 mA$; $f = 100 MHz$; $T_{amb} = 25^\circ C$	[2]	180	-	MHz

[1] See "Test information" for resistor calculation and test conditions.

[2] Characteristics of built-in transistor

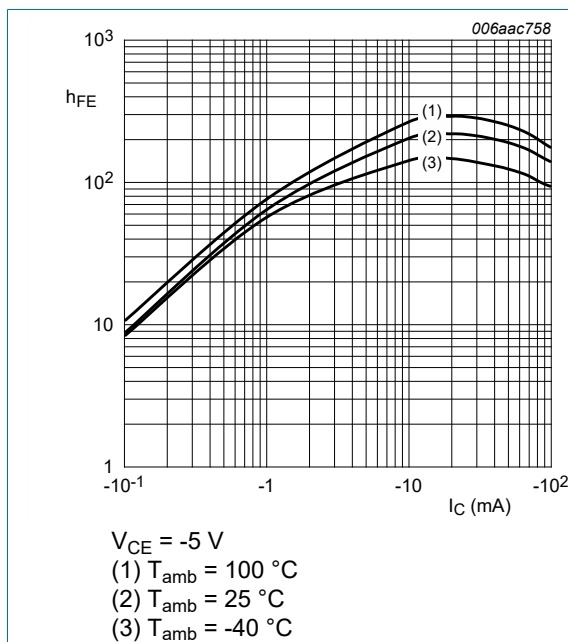


Fig. 3. DC current gain as a function of collector current; typical values

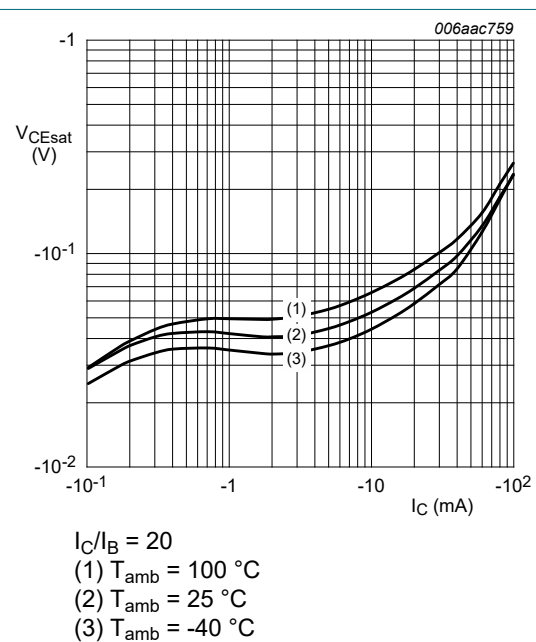


Fig. 4. Collector-emitter saturation voltage as a function of collector current; typical values

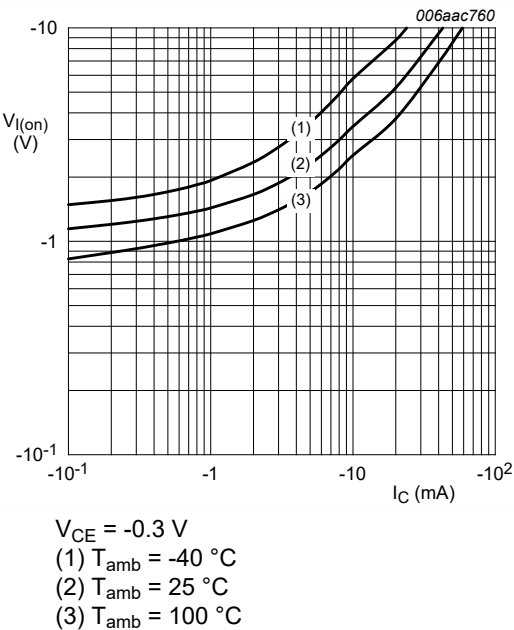


Fig. 5. On-state input voltage as a function of collector current; typical values

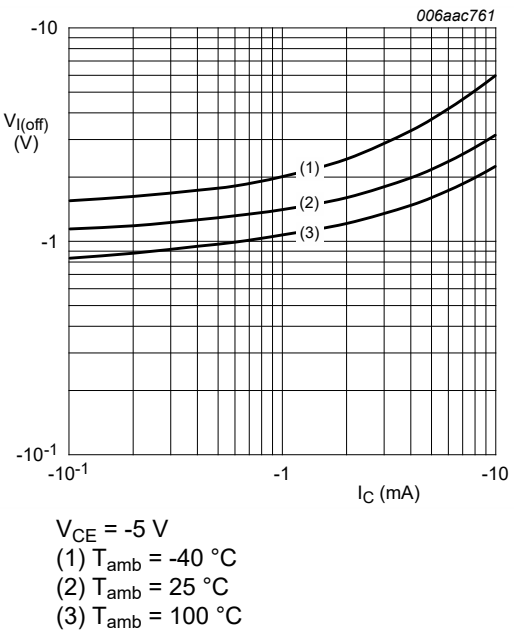


Fig. 6. Off-state input voltage as a function of collector current; typical values

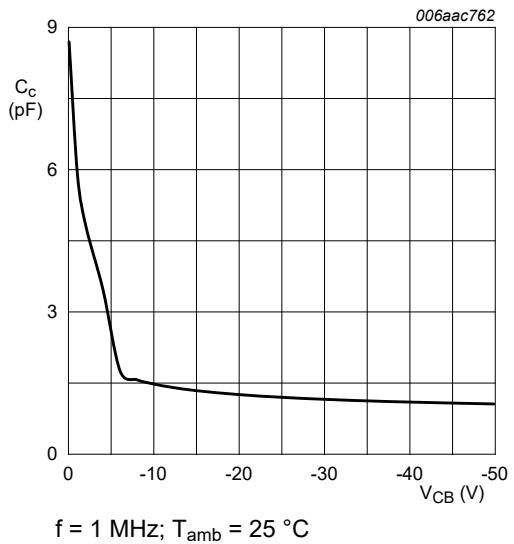


Fig. 7. Collector capacitance as a function of collector-base voltage; typical values

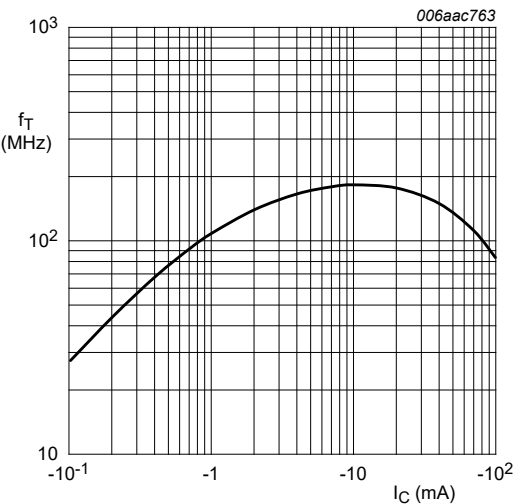


Fig. 8. Transition frequency as a function of collector current; typical values of built-in transistor

11. Test information

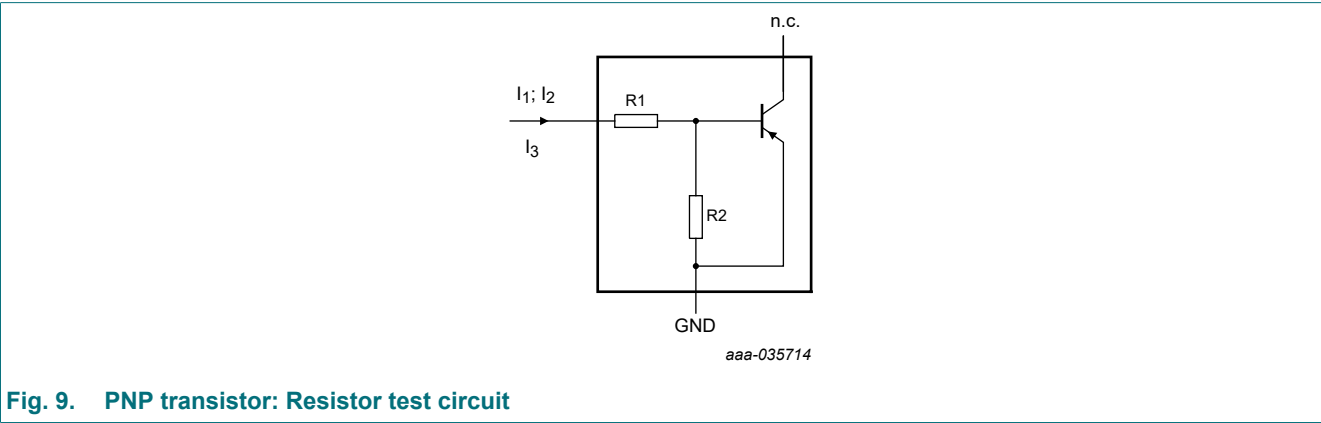
Resistor calculation

- Calculation of bias resistor 1 (R1)

$$R_1 = \frac{V(I_2) - V(I_1)}{I_2 - I_1}$$

- Calculation of bias resistor ratio (R2/R1)

$$\frac{R_2}{R_1} = \frac{V(I_3)}{R_1 \cdot I_3} - 1$$



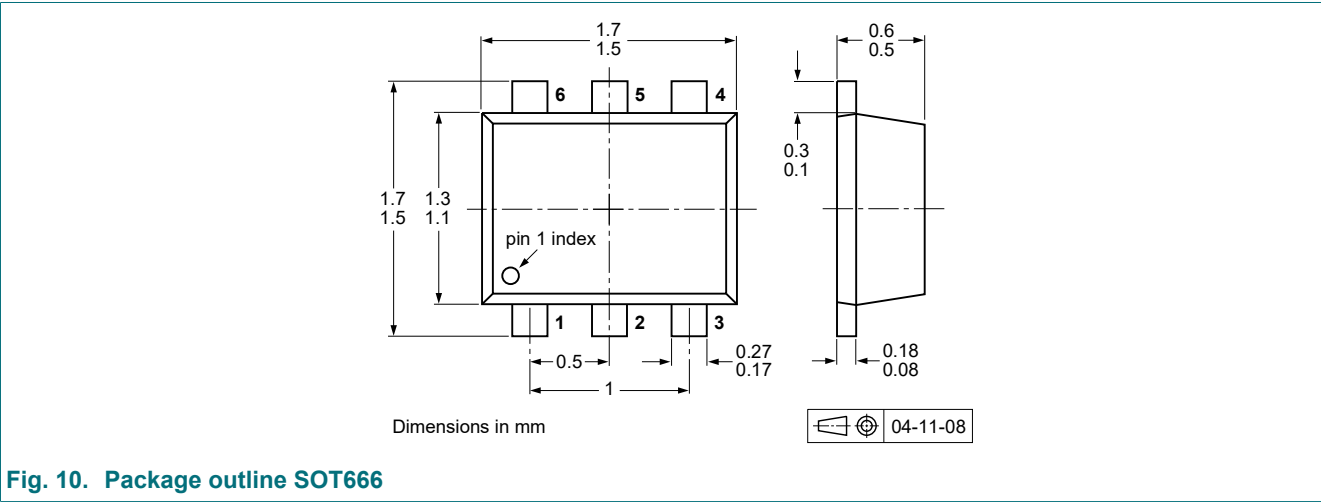
Resistor test conditions

Table 8. Resistor test conditions

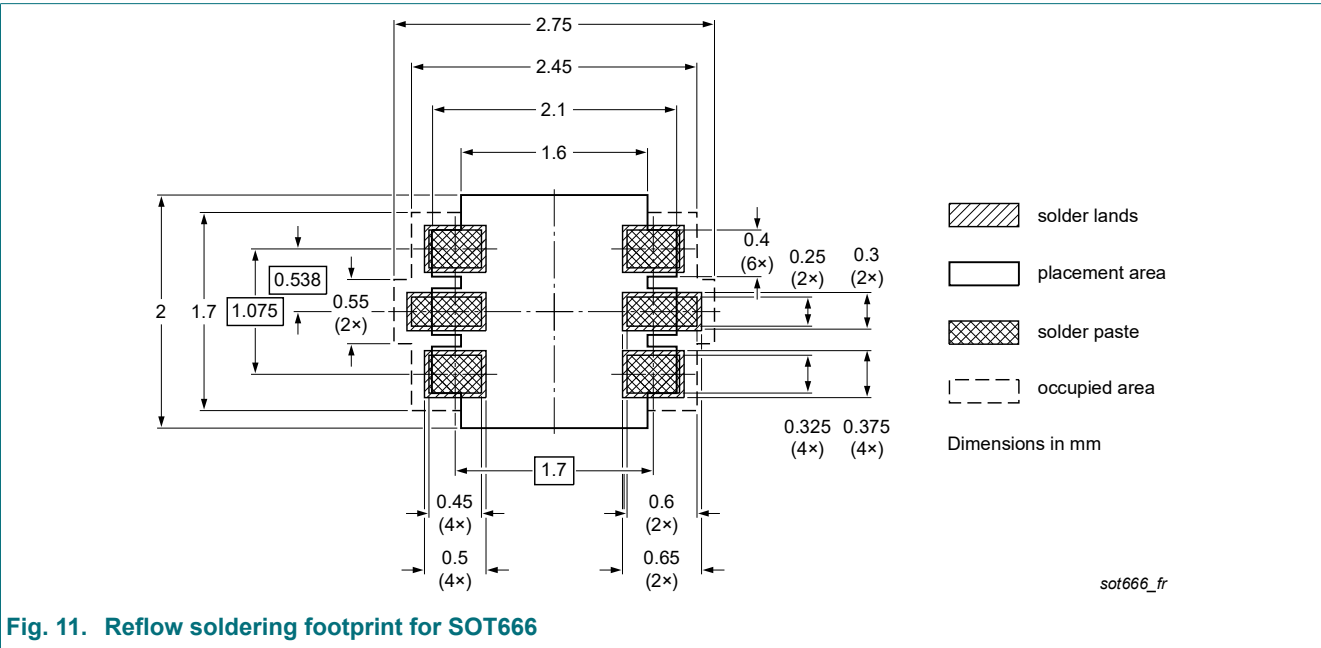
Per transistor

Type number	R1 (kΩ)	R2 (kΩ)	Test conditions		
			I ₁	I ₂	I ₃
PEMB2	47	47	-60 μA	-110 μA	85 μA

12. Package outline



13. Soldering



14. Revision history

Table 9. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PEMB2 v.4	20221228	Product data sheet	-	PEMB2_PUMB2 v.3
Modifications:	- The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. - Legal texts have been adapted to the new company name where appropriate. - Family data sheet reduced to single type data sheet. - Packing information is removed. - Product(s) changed to non-automotive qualification.			
PEMB2_PUMB2 v.3	20111117	Product data sheet	-	PEMB2_PUMB2 v.2
PEMB2_PUMB2 v.2	20031015	Product data sheet	-	PUMB2 v.1 PEMB2 v.1
PEMB2 v.1	20010914	Product specification	-	-
PUMB2 v.1	19910803	Product specification	-	-

15. Legal information

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 <https://www.nexperia.com>.

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