



NX1WP10

A4WP compliant high frequency wireless charging receiver front end

Rev. 1 — 1 October 2015

Objective short data sheet

1. General description

The NX1WP10 is an A4WP (Alliance for Wireless Power) compliant wireless power receiver front end. It contains a high-voltage, highly efficient active rectifier, integrated LDOs, a DC-to-DC converter, a multi-channel 12-bit ADC, four GPIOs and a Fast-Mode I²C-bus interface. The integrated rectifier supports voltages of up to 20 V and is protected by an integrated automatic clamping function and an automatic detuning function. The DC-to-DC regulator delivers an adjustable output voltage between 4.2 V and 10 V with a maximum DC current of up to 1.1 A. It is used to charge portable devices through a PMU or a charging controller. The integrated LDOs are directly linked to the rectifier output. They are automatically enabled once a sufficient voltage level at the output of the rectifier is reached. These voltages are used to supply the corresponding wireless power receiver controller and BT-LE transceiver. The host microcontroller configures the on-chip controller for automatic interrupt-driven system control.

The microcontroller can measure the rectifier output voltage, current level information, junction temperature and external temperature sensor information with the ADC. It controls the DC-to-DC converter as well as the GPIOs. Key safety functions are implemented with low power analog comparators. For example, one of the selectable safety functions prevents the junction temperature from exceeding its limits by automatically detuning the antenna. The overall system efficiency from the antenna input to the DC-to-DC output reaches 86 %.

2. Features and benefits

- 25 V tolerant antenna input pins
- Automatic over-voltage protection of the antenna inputs
- 6.78 MHz compatible integrated rectifier
- High efficiency with an active rectifier and a DC-to-DC converter
- AC input to DC-to-DC output efficiency exceeding 86 % at 6 to 9 W output
- Integrated LDOs (1.8 V and 3.3 V up to 50 mA) with auto enable and discharge path
- Integrated DC-to-DC buck regulator with 4.2 V to 10 V, 1.1 A output
- Multi-channel 12-bit ADC subsystem
- Temperature sensor (NTC) analog interface
- USB bus power supply detection
- 400 kHz I²C-bus slave interface
- Software and power-on reset of the on-chip digital controller
- Programmable rectifier modes: active, half-active and passive
- 2 digital General Purpose Input and Output ports (GPIOs) with open-drain outputs and up to 60 V tolerance for control and communication applications



- 2 digital General Purpose Input and Output ports (GPIOs) with open-drain outputs and 25 V tolerance for control and communication applications
- Protection circuitry
 - ◆ Automatic antenna detuning option
 - ◆ Automatic AC short to ground for OVP option
 - ◆ Automatic DC-to-DC over-voltage protection lock out option
 - ◆ Over-temperature protection
 - ◆ Over-voltage protection
 - ◆ Under-voltage protection
 - ◆ Under-voltage lockout (for LDOs and DC-to-DC controller)
- Specified from $-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$ ambient temperature
- $3.56 \times 3.41\text{ mm}$ WLCSP with 0.5 mm pitch

3. Ordering information

Table 1. Ordering information

Type number	Topside	Package		
	marking	Name	Description	Version
NX1WP10	NX1WP10			NX1WP10

3.1 Ordering options

Table 2. Ordering options

Type number	Orderable part number	Package	Packing method	Minimum order quantity	Temperature range
NX1WP10	NX1WP10Z		Reel 7" Q1/T1 *Standard mark chips DP	2000	$-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$

4. Revision history

Table 3. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
NX1WP10 v1.0	20151001	Objective short data sheet	-	-

5. Legal information

5.1 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>.

5.2 Definitions

Draft — The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. NXP Semiconductors does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

Short data sheet — A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local NXP Semiconductors sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

Product specification — The information and data provided in a Product data sheet shall define the specification of the product as agreed between NXP Semiconductors and its customer, unless NXP Semiconductors and customer have explicitly agreed otherwise in writing. In no event however, shall an agreement be valid in which the NXP Semiconductors product is deemed to offer functions and qualities beyond those described in the Product data sheet.

5.3 Disclaimers

Limited warranty and liability — Information in this document is believed to be accurate and reliable. However, NXP Semiconductors does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information. NXP Semiconductors takes no responsibility for the content in this document if provided by an information source outside of NXP Semiconductors.

In no event shall NXP Semiconductors be liable for any indirect, incidental, punitive, special or consequential damages (including - without limitation - lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory.

Notwithstanding any damages that customer might incur for any reason whatsoever, NXP Semiconductors' aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the *Terms and conditions of commercial sale* of NXP Semiconductors.

Right to make changes — NXP Semiconductors reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

Suitability for use — NXP Semiconductors products are not designed, authorized or warranted to be suitable for use in life support, life-critical or safety-critical systems or equipment, nor in applications where failure or malfunction of an NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental damage. NXP Semiconductors and its suppliers accept no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

Applications — Applications that are described herein for any of these products are for illustrative purposes only. NXP Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Customers are responsible for the design and operation of their applications and products using NXP Semiconductors products, and NXP Semiconductors accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the NXP Semiconductors product is suitable and fit for the customer's applications and products planned, as well as for the planned application and use of customer's third party customer(s). Customers should provide appropriate design and operating safeguards to minimize the risks associated with their applications and products.

NXP Semiconductors does not accept any liability related to any default, damage, costs or problem which is based on any weakness or default in the customer's applications or products, or the application or use by customer's third party customer(s). Customer is responsible for doing all necessary testing for the customer's applications and products using NXP Semiconductors products in order to avoid a default of the applications and the products or of the application or use by customer's third party customer(s). NXP does not accept any liability in this respect.

Limiting values — Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) will cause permanent damage to the device. Limiting values are stress ratings only and (proper) operation of the device at these or any other conditions above those given in the Recommended operating conditions section (if present) or the Characteristics sections of this document is not warranted. Constant or repeated exposure to limiting values will permanently and irreversibly affect the quality and reliability of the device.

Terms and conditions of commercial sale — NXP Semiconductors products are sold subject to the general terms and conditions of commercial sale, as published at <http://www.nxp.com/profile/terms>, unless otherwise agreed in a valid written individual agreement. In case an individual agreement is concluded only the terms and conditions of the respective agreement shall apply. NXP Semiconductors hereby expressly objects to applying the customer's general terms and conditions with regard to the purchase of NXP Semiconductors products by customer.

No offer to sell or license — Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

Export control — This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from competent authorities.

Non-automotive qualified products — Unless this data sheet expressly states that this specific NXP Semiconductors product is automotive qualified, the product is not suitable for automotive use. It is neither qualified nor tested in accordance with automotive testing or application requirements. NXP Semiconductors accepts no liability for inclusion and/or use of non-automotive qualified products in automotive equipment or applications.

In the event that customer uses the product for design-in and use in automotive applications to automotive specifications and standards, customer (a) shall use the product without NXP Semiconductors' warranty of the product for such automotive applications, use and specifications, and (b) whenever customer uses the product for automotive applications beyond NXP Semiconductors' specifications such use shall be solely at customer's

own risk, and (c) customer fully indemnifies NXP Semiconductors for any liability, damages or failed product claims resulting from customer design and use of the product for automotive applications beyond NXP Semiconductors' standard warranty and NXP Semiconductors' product specifications.

Translations — A non-English (translated) version of a document is for reference only. The English version shall prevail in case of any discrepancy between the translated and English versions.

5.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

I²C-bus — logo is a trademark of NXP Semiconductors N.V.

6. Contact information

For more information, please visit: <http://www.nxp.com>

For sales office addresses, please send an email to: salesaddresses@nxp.com

7. Contents

1	General description	1
2	Features and benefits	1
3	Ordering information	2
3.1	Ordering options	2
4	Revision history	2
5	Legal information	3
5.1	Data sheet status	3
5.2	Definitions	3
5.3	Disclaimers	3
5.4	Trademarks	4
6	Contact information	4
7	Contents	5

Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.

© NXP Semiconductors N.V. 2015.

All rights reserved.

For more information, please visit: <http://www.nxp.com>

For sales office addresses, please send an email to: salesaddresses@nxp.com

Date of release: 1 October 2015

Document identifier: NX1WP10_SDS