

# NFC WIRELESS CHARGING

THE FUTURE OF CHARGING SMALL DEVICES

Alex.luo@nxp.com



SECURE CONNECTIONS  
FOR A SMARTER WORLD

EXTERNAL

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# Introduction

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## WHAT IS NFC

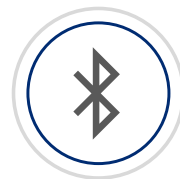
- NFC is a contactless short range technology, based on inductive coupling (10cm / 4 in)
- Co-invented in 2002 by NXP and Sony
- Operating frequency 13.56MHz, bit rates up to 848 kbits/s

## Big reasons to consider NFC



### More intuitive than any technology

It's like shaking hands



### Trusted addition to other technology

Especially for pairing devices



### NFC Power to charge small Battery Devices

Power Transfer and communication

# Wireless power landscape and standardization

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# WIRELESS POWER LANDSCAPE



**High frequency, Low Power 0 – 1W (3W)**

Small Consumer & IOT Devices



**NFC Charging**



**Low frequency, High power 5W – 2kW**

Medium-High Power Devices



**Qi Charging**



## STANDARDIZED SOLUTION

### NFC Forum

- NFC wireless charging standard **release April 2020**
- **Press Release:** <https://nfc-forum.org/nfc-forum-approves-global-wireless-charging-specification/>
- Upcoming Tasks
  - Extending Power Levels **up to 3W**
  - Adding **dedicated antenna formfactors** for use cases (e.g. Stylus Charging)



### Universal Stylus Initiative

- Members: HP, Google, Maxeye, Chicony, Lenovo, Dell, Intel, Sunwoda, NXP,...
- **Liaison** established between USI and NFC forum to share specifications
- NXP chairing TWG of adding NFC Charging to the USI specification for wireless power transfer
- WLC specification addendum release planned for Q1 2021



# Applications

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# NFC WIRELESS CHARGING INTO DIFFERENT APPLICATIONS



## Hearables

- TWS Earbuds
- Wireless Headphones
- Hearing Aids



## Automotive

- Key Fob Charging



## Mixed Verticals

- Gaming
  - Connected Toys
- Remote Control Charging
- Industrial
  - Sensors
- Home Appliance
  - Fridge Display Charging
- Health Care
  - Medical Tools & Implants



## Computer Accessories

- Digital Pen
- Mouse
- Typecover/Keyboards



## Wearables

- Fitness trackers
- Smart watches
- Smart rings
- Audio glasses



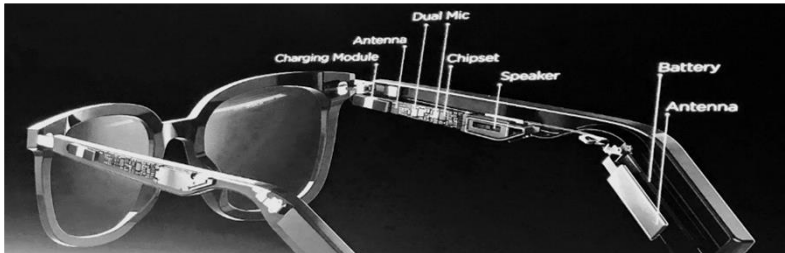


## SUCCESS CASE OF NXP NFC WLC SOLUTION



### Laptop/Tablet E-Pen

Wireless charging removes the hassle to plug a USB cable to the pen or to change battery. Just enjoy the convenience to snap it to the charging area. (antenna Size 8.5 x 3.5 x 0.35 mm )



### Smart glasses

**Curved antenna design**, only NFC charging could deliver the miniaturization needed to make this product happen!



### Wristband

Wireless charging removes pogo pins, makes the products smaller and hermetic, enables cool design flexibility, and increases consumer convenience.



# NFC WLC System

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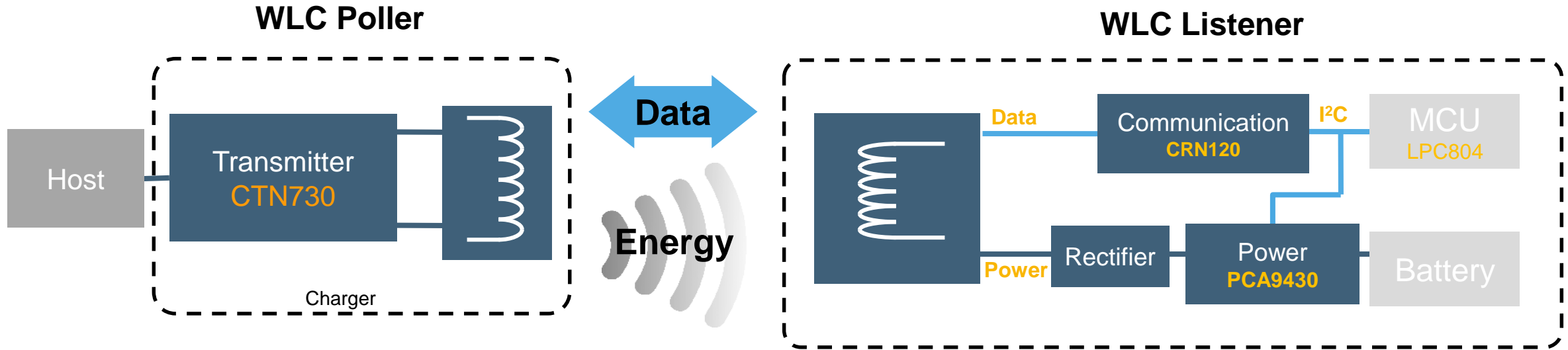
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## NFC WIRELESS CHARGING BLOCKDIAGRAM



- › Smallest solution, single chip
- › Integrated M0 MCU with power control
- › Low power device detection mode <1mW
- › Optional host interface for external controller

- › Power and communication IC's for minimal BoM solution
- › Reliable NFC communication for data transfer
- › Schottky rectifier for high efficiency
- › Portable firmware library for reuse of existing MCU

# CRN120 – NFC charging communication receiver

CRN ... Charging Receiver NFC

- NFC Forum T2T compliant
- 888/1912 Bytes User EEPROM
- Multiple Block Read and Block Write commands
- 64 Byte SRAM based Data Pass Through Mode
- 32-bit password protection of memory access
- Dedicated field detection pin (FD)
- I<sup>2</sup>C Slave Interface with 100/400kbit/s
- Event handling pin (ED)
- 1.67V up to 3.6V supply voltage range
- -40°C to 105°C operating temperature range
- XQFN8 Package with 1.6mm x 1.6mm x 0.5mm
- Availability: Mass production



Low bill of material

Easy to use

Easy to integrate



# PCA943x – NFC charging power receiver

- Supports 500mW NFC Wireless Charging, up to 200mA output current
- Auxiliary 50mA LDO for dead battery supply, adjustable (1V8, 2V3, 2V8, 3V3)
- Supports external rectifier for highest efficiency in low power applications
- Very Low  $V_{BAT}$  standby current, around 200nA
- I<sup>2</sup>C Interface for Host communication
- Integrated 10 bit ADC for measurements
- Integrated overvoltage protection
- Integrated overtemperature protection
- Offered in two options:
  - PCA9430 – w/ integrated linear battery charger
  - PCA9431 – programmable LDO output
- XQFN16 Package (2.2\*2.8mm)
- Availability: Mass production



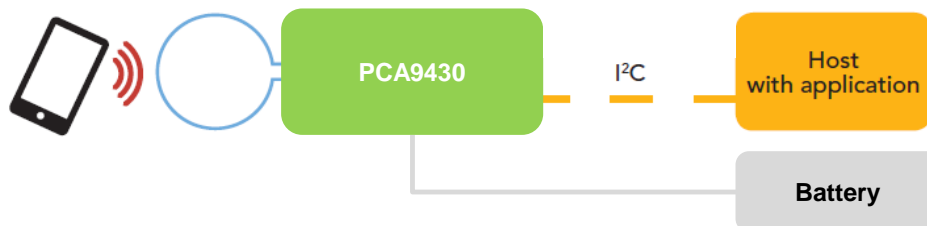
Low bill of material

Easy to use

Easy to integrate

Ideal for wireless charging applications

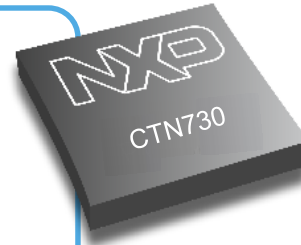
Maximum efficiency



# CTN730 – Single chip charging controller

CTN ... Charging Transmitter NFC

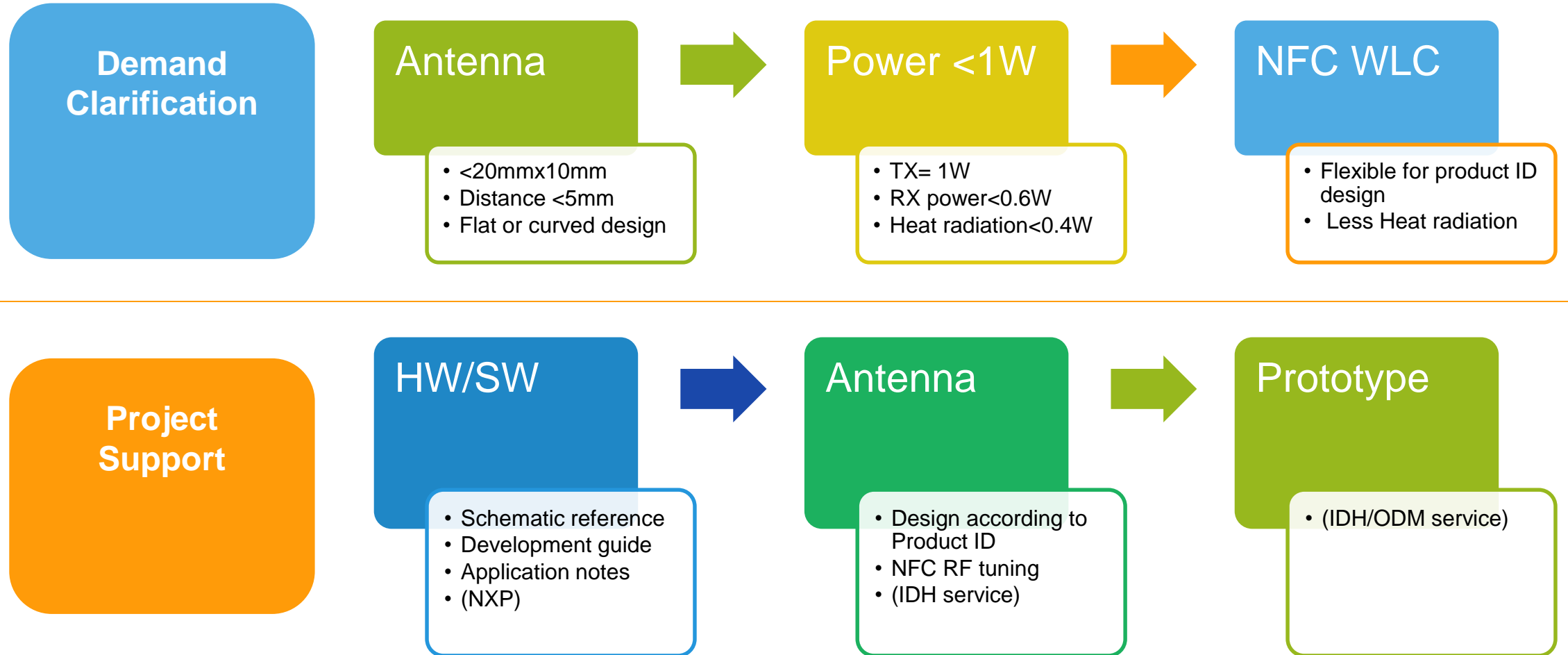
- Integrated 1.25W full bridge driver.
- Multi- Protocol support: all NFC forum tag types (1-5)
- Integrated 20MHz Cortex M0 microcontroller with 160kB flash memory, 12kB RAM and 4kB EEPROM
- One configurable host interface: I<sup>2</sup>C, SPI, USB, HSUART
- Two master interfaces: I<sup>2</sup>C and SPI
- 12 to 21 GPIOs
- Low power device discovery
- Advanced power management
- BGA package (4,5x4,5 mm)
- Availability: Mass production



**TX, MCU, and software in one chip**



# Project Support







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