

NXP PN5190 NFC FRONTEND

POWERFUL HIGH-SENSITIVITY NFC FRONTEND OPTIMIZED FOR ACCESS AND EMVCo COMPLIANT DEVELOPMENT

Well-suited for use in challenging RF and space-constrained environments such as POS terminals or e-Locks, the PN5190 frontend builds on the features of the PN5180. It delivers even stronger RF output power, upgraded wave-shaping features and improved receiver sensitivity, all while using efficient power-saving modes to extend battery life.

KEY FEATURES

- NFC Forum-compliant NFC frontend with support for all relevant 13.56 MHz RF protocols, including peer-to-peer and card emulation mode
- Transmitter with high RF output power (up to 2 W operating power) and adaptive wave-shaping
- Receiver with high sensitivity, noise immunity and integrated EMD handling
- Supported RF frame size of up to 1024 bytes without chaining
- Counterpart for NTAG® 5 communication (ISO/IEC 15693), supporting data rates up to 212 kbit/s
- SPI host interface with speeds up to 15 MHz
- Integrated low-noise DC-DC converter for single 3.3 V supply at full RF output power
- Ultra-low-power card detection and multiple battery-saving configurations available
- Automatic antenna tuning through variable capacitors
- EMVCo 3.0-compliant development board with NXP Kinetis® K82 microcontroller, 45 x 45 mm antenna, and EMVCo L1 library support
- Wide temperature range: -40 °C to +105 °C
- VFBGA 64 (4.5 x 4.5 mm 0.5 mm pitch) or HVQFN 40 (5.0 x 5.0 mm 0.4 mm pitch) packages
- Overcurrent and overtemperature protection
- External clock input of 24,32,48 MHz for access management applications



KEY BENEFITS

- Simpler EMVCo 3.0 certification due to high RF output and high receiver sensitivity
- Greater re-use of existing designs with advanced features that simplify certification (DPC 2.0, AWC, noise immunity)
- Simpler antenna design for challenging RF environments (POS terminal antennas disturbed by display noise, small antennas for door locks)
- Prepared for upcoming EMVCo releases by protected firmware updates
- Non-intrusive RF debugging enabling faster time-to-market
- Lower system cost with integrated DC-DC converter
- Extended battery lifetime
- Robust communication for eGov applications with data rates up to 848 kbit/s

TARGET APPLICATIONS

- POS and mPOS terminals
- Physical access control
- Device parametrization
- eGovernment

High output power and receiver sensitivity give small antennas a good communication range, resulting in excellent performance in space-constrained designs. The wide temperature range enables operation in industrial and outdoor environments. The robust RF interface and data rates up to 848 kbit/s further meet the needs of eGov readers and application scenarios that rely on fast device-to-device communication. When used along with ISO/IEC 15693 devices (such as NXP's NTAG 5 IC), the PN5190 frontend enables fast sensor read-outs or firmware updates of up to 212 kbit/s.

HIGH RECEIVER SENSITIVITY

The PN5190 delivers excellent noise immunity, even in applications that experience external disturbances to the RF field. The PN5190's sophisticated analog power-supply concept further reduces receiver-signal disturbances, yielding a receiver sensitivity of 0.3 mV rms. Adaptive receiver control (ARC) adjusts the receiver sensitivity to deliver better reception performance.

DYNAMIC POWER CONTROL (DPC) 2.0

The upgraded DPC 2.0 improves interoperability, thus making it easier to achieve EMVCo compliancy. True current measurement provides maximum information for the regulation loop. The transmitter current can be limited and reduced according to detected transmitter current or antenna de-tuning conditions. DPC 2.0 works autonomously, without host interaction and independent of the antenna design with no additional processing load on the host or impact on EMVCo transaction time. The transmitter driver voltage can be controlled in 100-mV steps for reliable reception.

ADAPTIVE WAVE SHAPING (AWC)

Transmitter-related register settings can be automatically updated in response to detected levels of antenna detuning. AWC can be done based on firmware to allow for rise-time corrections and overshoot with linear transition shapes, or based on a look-up table for maximum flexibility.

NEW INTEGRATED BOOST DC-DC

The integrated, low-noise DC-DC converter simplifies the power-supply design by generating the transmitter supply from a single supply voltage without impacting receiver performance. Increasing the transmitter supply up to 6 V enables full RF output power, even with a single 3.3 V system power supply.

NEW RF DEBUGGING

The PN5190 frontend has a dedicated memory used by the contactless test station (CTS) to store sample RF debug data based on previously defined trigger conditions. Data captured from trigger conditions can be evaluated offline, making it much easier to debug all communication failures, even remote ones.

NEW FAST 15693 BASED COMMUNICATION

The PN5190 frontend is an ideal counterpart for the NXP NTAG 5, an ISO/IEC 15693 based, NFC Forum-compliant I²C bridge for tiny devices such as IoT sensors. With data rates of up to 212 kbit/s, the PN5190 frontend can add additional use cases to the device, including personalization, fast sensor data transfer or over-the-air firmware updates.




DEVELOPMENT TOOLS TO ACCELERATE TIME-TO-MARKET

NXP's NFC Cockpit is an intuitive GUI that simplifies configuration of the PN5190 frontend and can be used with NXP development boards and in any system where a standard V-COM interface (provided by NXP) is implemented on a customer's microcontroller.

The NFC Reader Library is a complete, full-featured support library for NFC frontends. It is compliant with ISO/IEC 14443, NFC Forum, and EMVCo 3.0 digital. It can be easily ported to many different microcontrollers and can be upgraded with minimal effort from the CLRC663 or PN5180 for use with the new PN5190 frontend.

The PN5190 development board (PNEV5190B-B) includes an NXP Arm-core-based Kinetis K82 microcontroller, verified for EMVCo 3.0 L1 analog and digital compliancy (test report available on NXP DocStore) and offers an antenna (45 x 45 mm) with copper damping to simulate challenging operating conditions.

SUPPORTED RF PROTOCOLS

<p>Read/Write Mode</p> 	<ul style="list-style-type: none"> • ISO/IEC 14443 type A&B R/W support up to 848 kbit/s • FeliCa® R/W support up to 424 kbit/s • NFC Forum tag type 1, 2, 3, 4, 5 reader • NFC Forum compliance for R/W – analog and digital • ISO/IEC 15693 reader (ICODE®) • Proprietary data rates based on ISO/IEC15693 with 106 kbit/s and 212 kbit/s for NTAG 5 communication • ISO/IEC 18000 EPC-HF reader (ICODE ILT) • EMVCo 3.0 (L1) with integrated EMD handling
<p>Peer-to-Peer Mode</p> 	<ul style="list-style-type: none"> • Passive and active communication (initiator/target) • P2P supported for types: A (106 kbit/s), F (212, 424 kbit/s) • Proprietary P2P mode for type A up to 848 kbit/s
<p>Card Emulation Mode</p> 	<ul style="list-style-type: none"> • ISO/IEC 14443 Type A host card emulation with active load Modulation for longer communication distances

To simplify design, the PN5190 frontend communicates with all FeliCa® and MIFARE® card products and implements CRYPTO in hardware for read/write of all MIFARE-based cards. IP licensing rights for NXP ISO/IEC 14443-A, Innovatron ISO/IEC 14443-B, and NXP MIFARE products are already included in the product.