RN00066

PN5190 B2 firmware release v03.08

Rev. 1.8 — 16 September 2026 **Release notes**

Document information

Information	Content
Keywords	PN5190, PN5190 B2, NFC frontend controller
Abstract	Contains information about a specific release product and component information

1 Document purpose

This document describes the tested functionality and limitations of the firmware PN5190 B2 FW v03.08.

It also describes the release summary, release history, known issues, work-arounds, limitations, and recommendations.

The functionality and limitations of the hardware and product support material (for example, customer development board and support software) are described in separate documents.

PN5190 B2 uses crypto-assisted download mode commands, where the opcodes are different compared with PN5190 B1 which uses the legacy download mode commands.

The user manual "UM11942 PN5190 instruction layer explains the different opcodes used for download mode commands in detail.

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2 PN5190 B2 firmware version information

PN5190 B2 software package version (including host utilities): v03.08

PN5190 B2 secure firmware version: v03.08

Note: *This firmware version is meant only for the PN5190 B2 IC. This firmware cannot be used for the PN5190 B1 IC version.*

For new designs, it is recommended to always use the latest firmware version available.

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3 Features supported in this release

This section provides the features supported in this firmware/software version release.

3.1 RF protocols

Table 1. RF protocols

Feature/functionality
Reader mode A (106/212/424/848 kbit/s)
Reader mode B (106/212/424/848 kbit/s)
Reader mode FeliCa (212/424 kbit/s)
Reader mode ISO/IEC15693 (26/53/106/212 kbit/s) - all data rates as specified in data sheet
Reader mode ISO/IEC18000 3M3 - all data rates as specified in data sheet
Host card emulation / Card mode ISO/IEC 14443 A-106, A-212, A-424, A-848
Peer-Peer passive communication (ISO18092, PI106, PI212, PI424, PT106, PT212, PT424)
Peer-Peer passive communication with proprietary baud rates (PI212, PI424, PI848, PT212, PT424, PT848)

3.2 Other system features/functionality protocols

Table 2. Other system features

Feature/functionality
Low-power card detection (LPCD) and ultra low-power card detection (ULPCD)
Dynamic power control
Automatic waveshape control
Automatic receiver control
Internal DC-DC for TX driver
Over temperature protection (automatic shutdown of TX drivers and entering low-power mode (Standby), over temperature event on GPIO)
Current limiter (automatic shutdown of TX drivers and event notification to host)
Supported to route analog and digital signal on AUX1(analog) and GPIO0 (digital).
Trimming of RF parameters (TX_NOV, current sensor, NFCLD, RFLD).

3.3 Compliancy with this firmware and PNEV5190B hardware (customer development board)

Table 3. Compliancy with this firmware and PNEV5190B hardware (customer development board)

Feature/Functionality
EMVCo L1 digital compliance
ISO 10373-PCD digital compliance
ISO 10373-PICC digital compliance
NFC Forum CR11 analog and digital compliance. NFC Forum CR13 internally qualified.
ISO 23917 Peer-Peer Passive compliance

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4 Version history

This section contains the firmware release version history.

The previously released hardware version had been **"B1"**.

The new hardware version is **"B2"**. There is no change in hardware functionality or software functionality features compared with **"B1"**.

Only the ROM code has been updated for the **"B2"** IC version.

The below table provides the firmware version history including feature updates and issues fixed.

Table 4. Firmware updates from v03.07 to v03.08

Sl No.	Function/feature update
1	Fixed an issue where DPR DYNAMIC_POWERLEVEL_REG (0x0064) was holding a random value during corner scenarios like short VEN (where VEN pulse differs from the specification in the PN5190 data sheet) and ULPCD/ULP standby cases.
2	Added Integrity Checks for User Area and Protocol Area. During boot PN5190 will indicate boot notification if integrity check failed (BOOT_PROTOCOL_AREA_INTEGRITY_ LOST and BOOT_USER_AREA_INTEGRITY_ LOST). During update of user area and protocol area using WRITE_E2PROM and UPDATE_RF_CONFIGURATION commands ,PN5190 first checks the integrity before updating the settings and returns with PN5190_STATUS_ INTEGRITY_RECOVERED, host /user needs to recover the entire area.
3	Automatic NFCLD/RFLD calibration during first boot after FW update has been removed, calibrations to be triggered by user using register 0x006A (NFCLD_RFLD_REG) after Secure FW update. Write operations to NFCLD_RFLD_REG [bit0]: 1: Perform NFCLD/RFLD Calibrations only if valid bits (EEPROM: 0x06D3) are zero, update & set valid bits. 0: Writing zero has no impact. Read NFCLD_RFLD_REG [bit0]: 1: Indicates calibration is done and valid bits are set. 0: Indicates calibration not done and valid bits are cleared.
4	Added noise robustness feature to improve RF communication in noisy environment, the algorithm dynamically adjusts receiver threshold settings and filter settings to improve communication.
5	Added card protection feature, this feature helps to identify NFC target as passive card or battery powered device.
6	Added new register 0x0065 (ULPCD_TESTBUS_CONFIG) for routing ULPCD test signals to GPIO pads. ULPCD_TESTBUS_MUX_SEL [Bit 4:1]: MUX_SEL will select a particular set of test signals to be available on GPIO pads. ULPCD_TESTBUS_ENABLE [Bit 0]: 1 → ULPCD Testbus enabled 0 → ULPCD Testbus disabled.
7	HCE Eeprom settings wDpllPhaseRfON (0x02D2) and wDpllPhaseCeA (0x02D4) are now made public. wDpllPhaseRfON (0x02D2): Initial phase on RF ON, is a Signed phase compensation with 1/4 degree resolution: 16 bits signed value (using complement of 2) Degree ranges from 0 to 90: 2 Byte computation, 4 times of selected degree, meaning: a. 0 ° → 0, b. 5 ° → 5*4 = 20, c. 90 ° → 90*4 = 360 wDpllPhaseCeA (0x02D4) For card emulation Type A, is a signed phase compensation with 1/4 degree resolution: 16 bits signed value (using complement of 2). Degree ranges from 0 to 90: 2 Byte computation, 4 times of selected degree, meaning: a. 0 ° → 0, b. 5 ° → 5*4 = 20, c. 90 ° → 90*4 = 360

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Table 5. Firmware updates from v03.06 to v03.07

Sl No.	Function/feature update
1	Added Delay Feature to support scenarios where Standby entry is prevented when the host is slow to de-assert NSS. Delay Feature: Added a new EEPROM field to configure NSS time delay, how long to wait for NSS to go low while entering standby. Name: bDelayNTSAssert. Address Offset: 0x0D0D Size: 1 Byte. Description: Time to wait in micro seconds for NSS to go low while entering standby The default is 0x64 = 100 µs.

Table 6. Firmware updates from v03.05 to v03.06

Sl No.	Function/feature update
1	Fix for issue in the second MIFARE Classic authentication, seen only with a particular card, and seen only when the coupling between card and reader is strong enough.
2	Update in firmware to improve robustness during LPCD and Standby power modes.

Table 7. Firmware updates from v03.04 to v03.05

Sl No.	Function/feature update
1	Added new LPCD command option which makes the IC enter LPCD mode and returns with an Autocoll Event if an external RF is detected. In SWITCH_MODE_LPCD(0x23) command, bControl field option LPCD_WITH_AUTOCOLL_EVENT (0x13) is added to support LPCD with Autocoll event when wake-up occurs due to load change/Ext RF from LPCD standby scenarios. Added EEPROM field to configure the time-out for Autocoll expiry: Name: LpcdWithAutocollExpiryInterval. Address Offset: 0xCEE Size: 1 Byte. Description: This field is the time before which Autocoll expires when LPCD is used with Autocoll option. 1unit - 100 ms. The default is 10 ms.
2	Added a new command CTS_FAST_CONFIGURE (0x2B) which both configures and enables CTS. For Enabling CTS, the Length should be 0x27(including both Configs and Enabling bytes). This command cannot be used for disabling CTS. First fast Init+Configure takes about 50 ms, second time onwards about 50 µs.
3	Added configuration to initialize the pullup/down state of SPI Pads (ATX Pins) in the secure flash init. This feature is disabled by default. Added the following EEPROM fields for reconfiguration of SPI pad configurations: Name: EnableHIFPadsReConfig. Address Offset: 0xCEF Size:1 Byte. Description: Enable/Disable reconfiguration of the SPI Pads configuration. Name: SPIPadReConfig. Address Offset: 0xCF0 Size: 4 Bytes. Description: SPI Pads PullUp/Down Configuration.
4	Fixed an issue which prevented exit from the Autocoll in some scenarios when external RF is removed.
5	Fixed an issue that caused changes in amplitude of response during Host Card emulation, when higher VDDPA Values are used in APC TX entries.

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Table 8. Firmware updates from v03.03 to v03.04

Sl No.	Function/feature update
1	Feature implemented DPR (Dynamic Power Regulation). Added new register DYNAMIC_POWERLEVEL_REG (Reg Addr: 0x64).
2	Feature implemented LFO timing calibration using frequency meter for higher LPCD pulse interval accuracy. Added new EEPROM setting LFO_TRIM_CALIBRATION (EEPROM Addr.0xCED).
3	Updated the DPC algorithm for higher control accuracy.
4	Updated command GET_CRC_USER_AREA (Command code: 0x29).

Table 9. Firmware updates from v03.02 to v03.03

Sl No.	Function/feature update
1	Resolved the issue of DPC not recovering to expected VDDPA regulation during load change conditions, when in some corner case scenarios the DPC has to manage other priority tasks.

Table 10. Firmware updates from v03.01 to v03.02

Sl No.	Function/feature update
1	Fixed an issue where in increased leakage current in SPI_NSS (ATX_C) during low-power mode operation.

Table 11. Firmware updates from v03.00 to v03.01

Sl No.	Function/feature update
1	Fixed an issue in the UPDATE_RF_CONFIGURATION and GET_RF_CONFIGURATION commands that occurred when used for TX index 0x000F (ISO180003m3_TARI_18.88us) and 0x0010 (ISO180003m3_TARI_9.44us).
2	Fixed an issue of not-restoring the analog TX settings when switching from reader mode to card mode. Removing of type-b detection during Autocoll. Supporting only Type-A and Type-F detection as part of Autocoll procedure.
3	Introduced a new EEPROM configuration: ENABLE_ULFO_TRIM_CALIBRATION (0xCEC). This configuration enables/disables the calibration of wake-up counter value based on the ULFO accuracy measured with frequency meter with Xtal as reference. ***Note:*** *This feature must be used only when Xtal is available and configured for use*
4	Deprecated the P2P active communication target mode functionality.

Table 12. Firmware updates in v03.00

Sl No.	Function/feature update
1	All of the features and functionalities present in PN5190 B1 FW v02.06 is included in this FW version. In a nut-shell, below are incremental features are added in PN5190 B2 v03.00 and PN5190 B1 v02.06. • Added new command:GET_CRC_USER_AREA[0x29]: This command is used to calculate the CRC for the complete User area including Protocol area. This command helps customer to ensure the integrity of their RF and analog settings by detecting manipulation of this area. • Modified SOF timing: In this FW version, we have modified the protocol settings of TypeB106 such that it supports SOF timing adjustment. We also provide better results during the EMVCo L1 analog test.

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5 Recommendations, known limitations, and precautions

This section provides the known limitations in the FW/HW recommendations

5.1 Known limitations

1. LPCD_CONFIG bit 4 and bit 5 to be considered as single group where both should be enabled/disabled , otherwise unexpected general status event will be observed.
2. In noisy environment, after thousands of RF exchanges TypeA communication starts failing continuously with protocol error, even after the noise is removed. PN5190 needs IC Reset i.e. VEN reset to perform RF communication again.
3. FW03.03 or higher requires a DPR register initialization to ZERO/intended value before performing RF-ON command. This is mandatory when :
   a. The startup VEN timing is different than recommended, or
   b. After every wake-up from ULP_Standby/ULPCD.
4. TX amplitude fading is observed when pairing PN5190 with another PN5190, and DC/DC is enabled. Issue not observed when using TXLDO power supply.
   Note: *Specific only to PN5190 as initiator as well as target (PN5190 vs PN5190).*
5. Randomly, PN5190 FW does not respond to the first REQA from an iPhone 12 Mini phone with HCE Mode + LPCD enabled.
   Note: *Specific only to iPhone 12 Mini phone.*
6. During Stress test scenarios where LPCD and Card mode are enabled, Firmware sends multiple responses, containing random data.
   Note: *Internal buffer overflow issue. Host can read and discard the additional responses, and then restart the operation.*
7. Performing SWITCH_MODE_STANDBY command while RF is ON, may damage the IC.
   Note: *Perform RF OFF before entering Standby (SWITCH_MODE_STANDBY command).*
8. During LPCD and StandBy, when LFO and ULFO trimming feature is enabled, and Timeout is set to Max, IC wakes up immediately due to overflow.
   Note: *Disable the LFO and ULFO trimming feature.*
9. Inconsistent behaviour of ARC, when DPC is disabled.
   Note: *Disable the ARC when disabling the DPC.*
10. With the default FDT settings for ISO18000 (dwFDT_18000_DefVal parameter, which is 1.26 ms), performance @ -40 °C is reduced when TARI = 18.88 µs.
    This shall be appropriately adjusted for better performance.

5.2 Recommendations

The following clock parameters for XTAL are recommended for active communication on the customer development board PNEV5190B and 45 x 45 mm antenna.

Table 13. Recommendations for v03.00 and above

Address	Parameter name	Default value	Value for active communication
1	ANA_PLL_CTRL_XTAL	0x00	0xC1
2	ANA_PLL_CTRL_XTAL	0x8A	0x13
3	ANA_PLL_CTRL_XTAL	0xEA	0xE8
4	ANA_PLL_CTRL_XTAL	0xA6	0xA6

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5.3 Precautionary notes

1. Do not disable the DPC and activate the RF field for IC's connected to antennas matched "Symmetric" (for example, customer development board antenna). Possible damage to the transmitter drivers due to overcurrent over a long period might occur.
2. PN5190 B1 samples cannot be upgraded with the PN5190 B2 FW.
   However, PN5190 B2 samples can be updated with this FW version.
   Note: *The FW upgrade/downgrade to v03.02 (3.2) must be done in a power-stable environment. This is applicable for PN5190B2EV/C130 and PN5190B2HN/C130 parts only. PN5190B2EV/C131 and PN5190B2HN/C131 contain FW v03.02 (3.2) by default.*
3. The ULPCD requires a specific power configuration with no DC-DC active and requires modifications to both the customer development board PNEV5190B EEPROM settings as described in the application notes.

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6 Revision history

Table 14. Revision history

Document ID	Release date	Description
RN00066 v.1.8	16 September 2026	• PN5190 B2 firmware v03.08 release: Section 4 "Version history" updated.
RN00066 v.1.7	24 February 2026	• PN5190 B2 firmware v03.07 release: Section 4 "Version history" updated.
RN00066 v.1.6	27 May 2025	• PN5190 B2 firmware v03.06 release: Section 4 "Version history" updated.
RN00066 v.1.5	9 December 2024	• PN5190 B2 firmware v03.05 release: Section 4 "Version history" updated.
RN00066 v.1.4	19 June 2024	• PN5190 B2 firmware v03.04 release: Section 4 "Version history" updated.
RN00066 v.1.3	23 May 2024	• PN5190 B2 firmware v03.03 release: Section 4 "Version history" updated.
RN00066 v.1.2	7 November 2023	• PN5190 B2 firmware v03.02 release: Section 4 "Version history" updated.
RN00066 v.1.1	8 September 2023	• PN5190 B2 firmware v03.01 release: Section 4 "Version history" updated.
RN00066 v.1.0	3 May 2023	• PN5190 B2 firmware v03.00 release: Section 4 "Version history" updated.

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