

Integration Manual: PN7462AU Customer Demo Board, PNEV7462B

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1. PN7462AU Customer Demo Board PNEV7462B: Photo



Figure 1: PN7462AU Customer Demo Board PNEV7462B – side view.

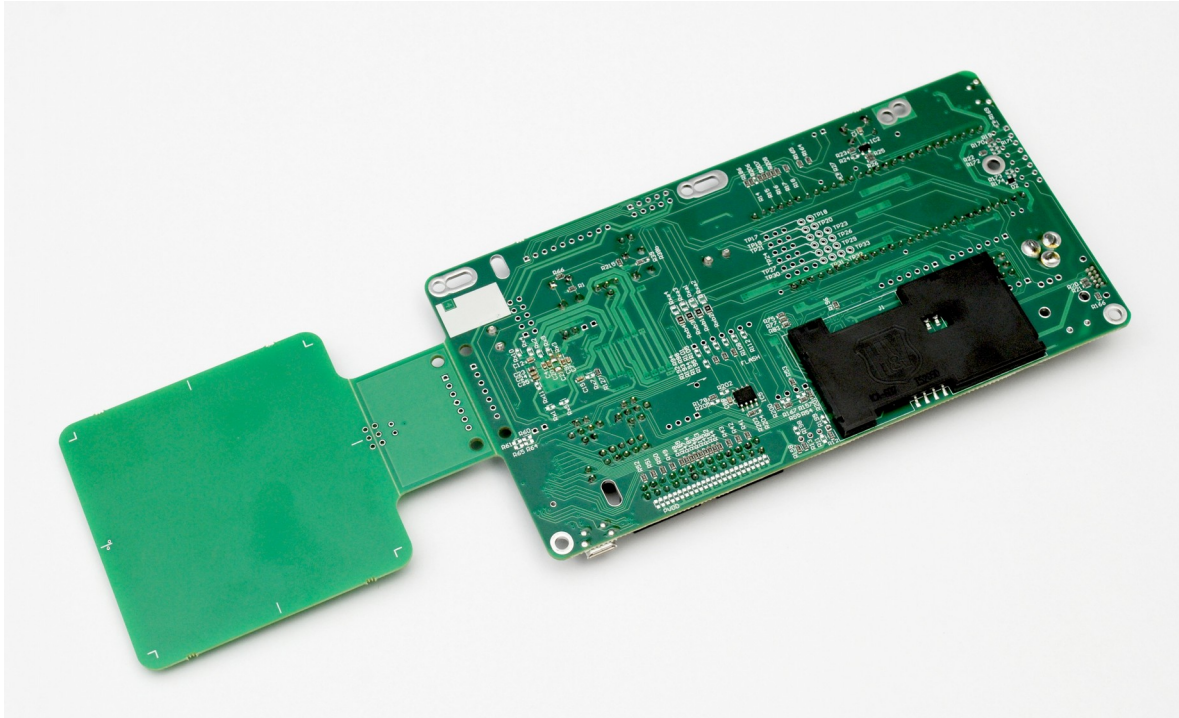


Figure 2: PN7462AU Customer Demo Board PNEV7462B – top view.

2. PN7462AU Customer Demo Board PNEV7462B: Description

1. Operational description

PN7462AU Customer Demo Board, PNEV7462B, is first evaluation board which represents one single integrated circuit controller solution for state-of-the-art RF interface (ISO/IEC 14443, ISO/IEC 15693, ISO/IEC 18000-3m3, Full NFC support) and contact interface (ISO/IEC 7816).

It includes Cortex-M0 core microcontroller and it can be loaded with fully-custom applications. Optimized RF antenna operation and low-power modes enable best-in-class performance. The onboard two USB connectors permits direct connection and communication with personal computer. LPC-Link2 debug adapter is added on the board. Also LPCExpresso connector to add a LPCExpresso board is present too. For smart card evaluation purposes are added two different connectors.

The heart of this Customer Demo Board is PN7462AU integrated circuit which includes at the same silicon:

- 20 MHz Cortex-M0 core microcontroller with 160 kB Flash memory for application code
- State-of-the-art RF interface (ISO/IEC 14443, ISO/IEC 15693, ISO/IEC 18000-3m3, Full NFC support)
- contact interface (ISO/IEC 7816)
- different communication ports / controllers.
- EMVCo and NFC forum compliances

NFC part of PN7462AU ic is a highly integrated high power output NFC frontend for contactless communication at 13.56 MHz. This frontend part of IC utilizes an outstanding modulation and demodulation concept completely integrated for different kinds of contactless communication methods and protocols at 13.56 MHz. Matching capacitors are needed for proper connection between pcb antenna and NFC part of IC PN7462AU power output. Optimized RF antenna operation and low-power modes enable best-in-class performance.

Microcontroller part of PN7462AU ic consists from Cortex-M0 microcontroller with 160 kB flash memory, 12 kB RAM and 4 kB EEPROM memory. Different communication interfaces (serial and GPIO ports) permits USB communication to personal computer, I2C and SPI ports to LPCXpresso board, JTAG connection to LPC-LINK2 board, SPI and I2C serial communication with external boards (option). JTAG connector is needed to connect computer to write application into PN7462AU Cortex-M0 microcontrollers flash memory and EEPROM. As an option also is provided connection to external LCD modul.

ISO/IEC 7816 interface part of PN7462AU ic is connected via TDA8026 (multiple smart card slot interface ic) to three SIM /SAM card connectors.

Some status LEDs are added for indicating Customer demo Board PNEV7462B states (readin or writing cards, mode status, erros etc.). Some test points are added to check states on pins.

The onboard two USB connectors permits direct connection and communication with personal computer. LPC-Link2 debug adapter is added on the board. Also LPCExpresso connector to add a LPCExpresso board is present too. LPC-Link2 debug adapter is added on the board. Also LPCExpresso connector to add a LPCExpresso board is present too. For smart card evaluation purposes are added two different connectors.

Power supply for PNEV7462B board is via one of two usb ports or via external power supply (7.0 ... 13.5 V DC / 1000 mA).

Disclaimer:

This module is intended only for development and evaluation purposes, and cannot be used in a finished product.

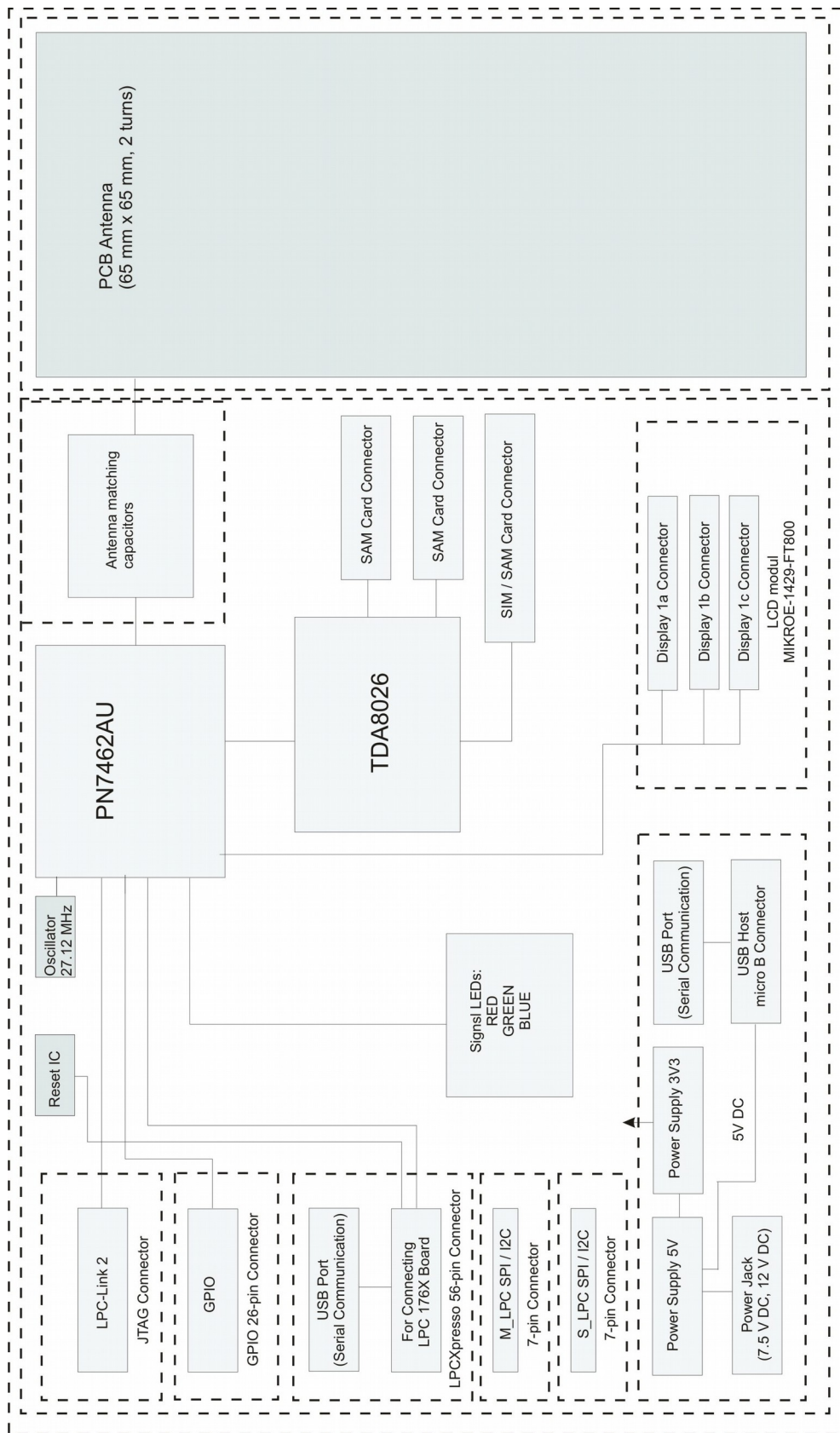
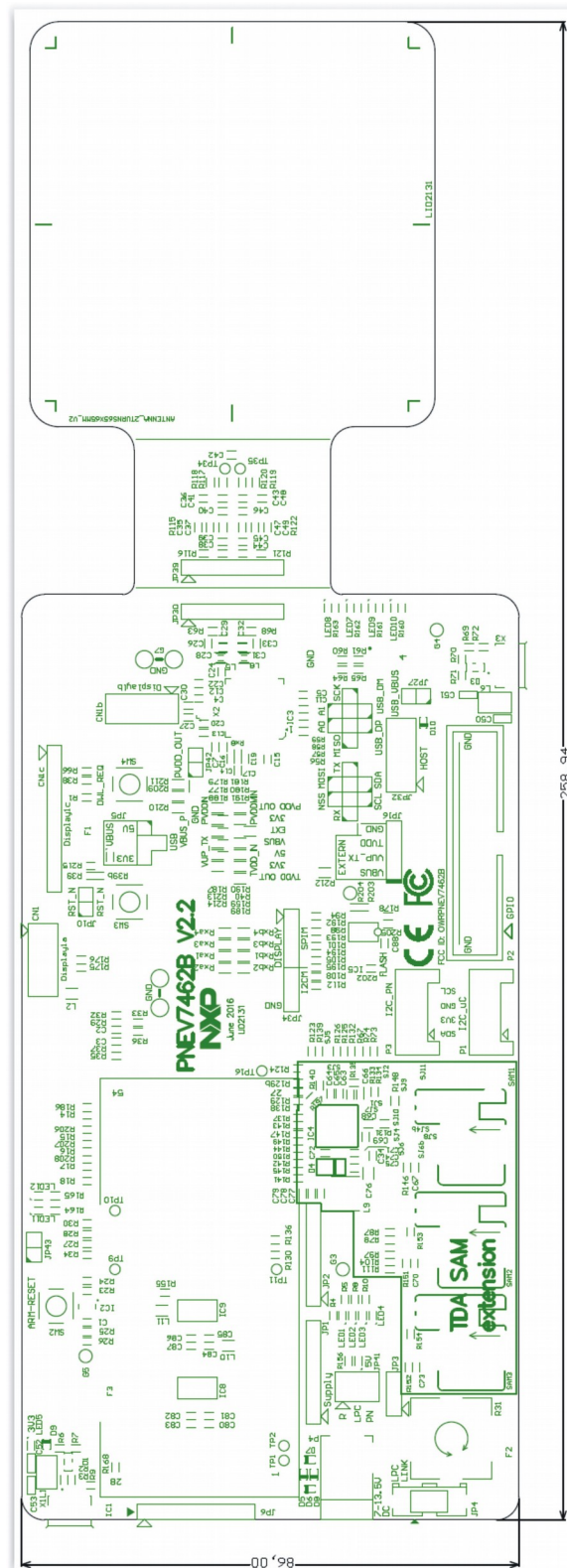


Figure 3: PN7462AU Customer demo Board, PNEV7462B - Block diagram.

Figure 4: PN7462AU Customer demo Board, PNEV7462B: dimensions, pcb with elements.



3. PN7462AU Customer Demo Board, PNEV7462B: SPECIFICATION

3.1. PN7462AU Customer Demo Board, PNEV7462B: Specifications

Table 2: PN7462AU Customer demo Board, PNEV7462B – specifications

Antenna	
	PCB type, 65 mm x 65 mm
Contactless operating frequency	
	13.56 MHz
Card reading/writing distance	
	Up to 50 mm
Contactless (RFID) Smart Card Interface (inside PN7462AU ic)	
Reader/Writer mode	
	ISO 14443 A up to 848 Kbps transmission rate (depending on card)
	ISO 14443 B up to 848 Kbps transmission rate (depending on card)
	Reader/Writer mode supporting JIS X 6319-4 (comparable with FeliCa scheme)
	NFC Forum tag type 1,2,3,4,A and 4B
	NFC IP1 and NFC IP2 support
	SO/IEC15693 reader (I-Code)
	ISO/IEC 153, ICODE, ISO/IEC18000-3
	EMVCo 4.3 Compliance
Peer to Peer mode	
	Passive-Initiator / Passive-Target
	Active-Initiator / Active-Target
	P2P supported for types: A (106 kbit/s), F (212,424 kbit/s)
Card Emulation	
	SO/IEC 14443A (up to 848 kbit/s)
Contact Interface (inside PN7462AU ic)	
	Class A, B and C cards support (1.8 V, 3 V, 5 V)
	ISO/IEC 7816 compliance
	Synchronous card support
	Clock generation up to 13.56 MHz
	Possibility to extend the number of contact interface thanks to the addition of slot extenders like TDA8026
	Automatic activation and deactivation sequence: initiated by software or by hardware
Microcontroller (inside PN7462AU ic)	
	ARM Cortex-M0 based microcontroller with 160 kB internal flash memory, 12 kB internal RAM, 4 kB internal EEPROM
Clock Crystals	
	27.12 MHz crystal for PN6742AU

Firmware	
Customer developed firmware for testing PN6742AU functionality	
Host Interface	
USB 2.0	12 Mbps (USB 2.0 full speed), bus powered,
SPI	Half duplex and full duplex, up to 7 Mbit/s
I ² C	Supporting fast plus (extended, up to 1 Mbds), multiple address support
Master Interface	
SPI	Half duplex, from 1 Mbit/s to 6.78 Mbit/s
I ² C	Supporting fast mode and clock stretching
Power Supply	
Power Supply	Bus powered
Power Supply	5V DC $\pm 5\%$, 500 mA (via USB port) or external power supply 7.0 V ... 13.5 V DC / 1000 mA
PCB Dimensions (L x W x H)	259 mm x 86 mm x 12 mm
Weight	approx. 88 g
Operating Temperature	0... + 40 °C (without condensing)
Storage temperature	-40 ... + 85 °C (without condensing)
Operating Humidity	5 ... 95% RH
Certificates	CE, FCC

3.2. PN7462AU Customer demo Board, PNEV7462B: Electrical characteristics

Table 3: PN7462AU Customer Demo Board, PNEV7462B – Electrical Specifications

Operating Range

Symbol	Description	Conditions	Min	Typ	Max	Unit
7_13.5V_DC	AC/DC Power Supply	Active Reader	7.0	12.0	13.5	V
VUSB_PN	DC Power Supply	Active Reader	4.75	5.0	5.25	V
VBUS_LPC	DC Power Supply	Active Reader	4.75	5.0	5.25	V
T _{amb}	Ambient Temperature	/	0	+25	+40	°C

Current Consumption

Symbol	Description	Conditions	Min	Typ	Max	Unit
IC5V	Supply Current	Active, RF on	-	300	450	mA

Operating Distance

Symbol	Description	Conditions	Min	Typ	Max	Unit
DST	Operating Distance	Measured from the center of the antenna	-	0 – 50	-	mm

USB Interface Characteristics

Symbol	Description	Conditions	Min	Typ	Max	Unit
USB	Baudrate	mini B USB Connector / micro B USB Connector	-	12	-	Mbaud
SPI	Baudrate	via 52-pin LPCXpresso connector	-	-	7	Mbit/s
I ² C	Baudrate	via 52-pin LPCXpresso connector	-	-	1	Mbit/s

4. INSTALLING MANUAL

4.1. Desktop use

PN7462AU Customer Demo Board, PNEV7462B, is intended for development use in development environment such as development departments in factories, at institutes. PNEV7462B board is powered via USB serial connection from personal computer or via external power supply.

Usual climate conditions in development environment (room temperature and humidity) are deep inside PN7462AU Customer Demo Board specified climate conditions.

4.2. Power supply

PN7462AU Customer Demo Board has no power supply mounted on pcb. There are three possibilities to connect external power supply:

- powering via one of two USB ports (micro B connector) from personal computer or
- via external power supply 7.0 V ... 13.5 V DC / 1000 mA.

Which option is used is set with jumper JP41 (figure cc).

The micro B USB connector is used for connection to the PC usb port – for power supply and USB serial communication. USB A male to micro B USB (5 pin) cable is used for connection between PN7462AU Customer Demo Board (PNEV7462B) and personal computer.

External power supply 7.0 ... 13.5 V DC / 1000 mA is connected to power jack P4 to supply PN7462AU Customer Demo Board. On board IC NCP1117LP is used to stabilize voltage to 5 V.

Note 1:

Power supply from USB port on personal computer has to comply with LPS requirement of IEC60950-1.

Maximum length for USB cable is 3 meter.

Note 2:

External power supply 7.0 V ... 13.5 V DC / 1000 mA has to comply with LPS requirement of IEC60950-1.

Maximum length for power cable is 3 meter.

5. USER MANUAL

PN7462AU Customer Demo Board, PNEV7462B, is an example of implementation of ISO/IEC 14443A and ISO/IEC 14443B reader/writer, NFC reader/writer, Card Emulation Device and Contact Card Reader on the same printed board. Middle size antenna, implemented on the same pcb (reader and antenna can be broken into separate parts), permits reading/writing on distance up to 50 mm (RFID card or other NFC device). The onboard USB connector permits direct connection and communication with personal computer.

PN7462AU Customer Demo Board, PNEV7462B, is intended to send and receive data according to the ISO 14443A and ISO 14443B protocol. Data transfer from reader to/from contactless cards operates at frequency 13.56 MHz. Data transfer between PN7462AU reader IC and personal computer is via USB port. Data transfer between PN7462AU reader IC and LPTXpresso board is via SPI or I²C serial communication.

The firmware for testing and development purposes is written into PN7462AU (into flash memory). But user can develop his own firmware and write it via JTAG port into PN7462AU memory.

Power supply is via usb port or via external power supply (7.0 V ... 13.5 V DC / 1000 mA).

How to installing user developed firmware is written in detail in Quick Start Guide (and ARM Board User Manual).

5.1. General user instructions

- Reading/writing is possible with MIFARE contactless cards, FeliCa cards or with NFC device.
- PNEV7462B board can detect contactless card or NFC device up to 50 mm from the center reader's antenna.
- PNEV7462B board can emulate contactless (NFC) card.
- Contactless card identification is possible in electromagnetic field (created from contactless reader). Nonmetal material between antenna and RFID contactless card have no influence to reading distance or reading reliability.
- Reading/writing to/from card is very simple: user approaches his contactless card to reader's antenna. PNEV7462B board detects card and confirm reading via serial (USB) communication to personal computer (depend from customer firmware). Successfully reading/writing can be signalled with status led diode on PNEV7462B board.

5.2. Instructions for safe work, maintaining and care

- Be careful not to damage the connectors, antenna, PCB, ICs and other connected parts.
 - Because of the specifics of the device and the damage, only qualified staff, authorized by the producer, are allowed to repair the device. All interventions of the unauthorized person and mechanical damage means repealing of the guarantee.
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6. ELECTROMAGNETIC COMPATIBILITY

PN7462AU Customer Demo Board, PNEV7462B, fulfils the following requirements of electromagnetic compatibility:

FCC, Part 15 and CE.

6.1 FCC Compliance Statement

NOTE:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Compliance for Limited Modular Approval (§15.212(b))

As note, the module is intended for PROFESSIONAL AND DEVELOPMENT USE ONLY and cannot be used in final products. The module is tested to comply with relevant part 15 rules without shielding and in the same configuration as it is intended to be used by developer. PNEV7462B board has passed spurious emissions test without shielding and is certified as limited modular transmitter. Under FCC part 15.212(b), shielding is not required.

Concerning §2.803 the PNEV7462B board will be not offered for sale to other parties or to end users located in a residential environment.

Caution!

The Federal Communications Commission warns the users that changes or modifications to the unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

6.2 COMPLIANCE INFORMATION according to 47CFR 2.1033

We, declare that the product

PN7462AU Customer Demo Board, PNEV7462B

FCC 12.225, Limited Modular Approval, FCC ID: OWRPNEV7462B

is in conformity with Part 15 of the FCC Rules.

Operation of this product is subject to the following conditions:

- (1) this device may not cause harmful interference
- (2) this device must accept any interference received, including interference that may cause undesired operation.

Note:

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.