

PAN1780-AT

Bluetooth® Low Energy Module with AT Command Set
Module Integration Guide

Rev. 1.0



Overview

The PAN1780-AT is a Bluetooth 5 Low Energy (LE) module based on the Nordic nRF52840 single-chip controller with integrated BlueRadios nBlue™ Bluetooth AT.s LE Command Set.

Features

- Surface mount type dimensions: 15.6 mm x 8.7 mm x 2 mm
- Same footprint as PAN1780
- Nordic nRF52840 featuring ARM® Cortex®-M4F with 64 MHz
- Bluetooth 5 LE including LE 2M and LE Coded PHY
- Embedded 1 MB flash memory and 256 kB internal RAM
- Up to 46 General Purpose I/Os (GPIO), which are shared with 1 UART, 8 ADC's, 1 NFC-A, and nRESET input
- USB 2.0 full-speed device interface
- Built in temperature sensor

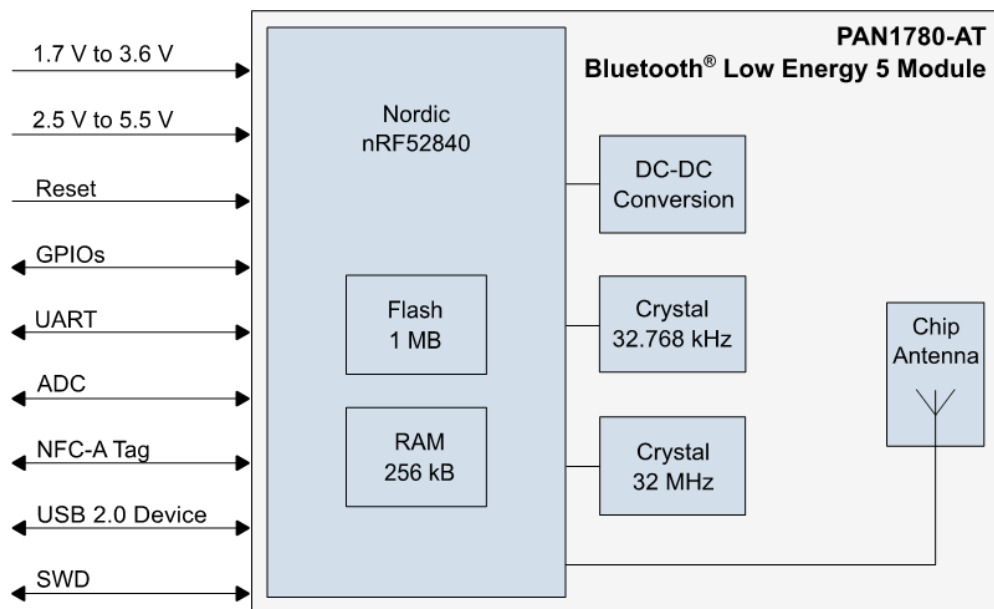
Bluetooth

- LE 2 Mbps high speed PHY, LE long range Coded PHY
- LE advertising extensions (advertising on 40 channels total)
- Channel selection algorithm #2
- LE secure connections
- Over-the-air update of AT Command Set

Characteristics

- Typical sensitivity: -95 dBm at 1 Mb/s and -103 dBm at 125 kb/s
- Typical max. output power: 8 dBm, configurable from -20 dBm in 4 dB steps and -40 dBm in whisper mode
- Typical current consumption: 4.8 mA in Tx (at 0 dBm) and 4.8 mA in Rx mode
- Typical current consumption: 0.4 µA in System OFF mode
- On-module DC-DC and LDO regulators with automated low current modes
- Voltage range: 1.7 V to 5.5 V
- Temperature range: -40 °C to 85 °C

Block Diagram



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1 About This Document

1.1 Purpose and Audience

This Module Integration Guide is intended to support the easy integration of the PAN1780-AT into a product and to ensure the compliance with regulatory requirements.

This guide gives an overview about the hardware design requirements by providing a reference design, which is the evaluation board of the PAN1780-AT. It describes how to start up and use the PAN1780-AT with the integrated BlueRadios nBlue Bluetooth AT.s LE Command Set on the evaluation board. It is intended for hardware design, application, and Original Equipment Manufacturers (OEM) engineers.




The product is referred to as “the PAN1780-AT” or “the module” within this document.

Please read this document carefully to assure the compliance of your product to regulatory.

1.2 Revision History

Revision	Date	Modifications/Remarks
1.0	2020-06-17	First version

1.3 Use of Symbols

Symbol	Description
	Note Indicates important information for the proper use of the product. Non-observance can lead to errors.
	Attention Indicates important notes that, if not observed, can put the product's functionality at risk.
	Tip Indicates useful information designed to facilitate working with the module and software.
⇒ [chapter number] [chapter title]	Cross reference Indicates cross references within the document. Example: Description of the symbols used in this document ⇒ 1.3 Use of Symbols.
✓	Requirement Indicates a requirement that must be met before the corresponding tasks can be completed.
→	Result Indicates the result of a task or the result of a series of tasks.

Symbol	Description
This font	GUI text Indicates fixed terms and text of the graphical user interface. Example: Click Save .
Menu > Menu item	Path Indicates a path, e.g. to access a dialog. Example: In the menu, select File > Setup page .
<code>This font</code>	File names, messages, user input Indicates file names or messages and information displayed on the screen or to be selected or entered by the user. Examples: <code>pan1760.c</code> contains the actual module initialization. The message <code>Failed to save your data</code> is displayed. Enter the value <code>Product 123</code> .
Key	Key Indicates a key on the keyboard, e.g. F10 .

1.4 Related Documents



For information on the “BlueRadios nBlue Bluetooth AT.s LE Command Set” please contact your local Panasonic Sales representative ⇒ [9.1 Contact Us](#).

For related documents please refer to the Panasonic website ⇒ [9.2 Product Information](#).

2 Overview

The PAN1780-AT is a Bluetooth 5 Low Energy module based on the Nordic nRF52840 single-chip controller with integrated BlueRadios nBlue Bluetooth AT.s LE Command Set.

Bluetooth 5 features additionally a higher symbol rate of 2 Mbps using the high-speed LE 2M PHY or a significantly longer range using the LE Coded PHY at 500 kb/s or 125 kb/s.

The new channel selection algorithm (CSA#2) improves the performance in high interference environments. Furthermore, the new LE advertising extensions allow for much larger amounts of data to be broadcasted in connectionless scenarios.

An output power of up to 8 dBm and the high sensitivity of the nRF52840 in combination with the LE Coded PHY make the module very attractive in applications, where a long range is required.

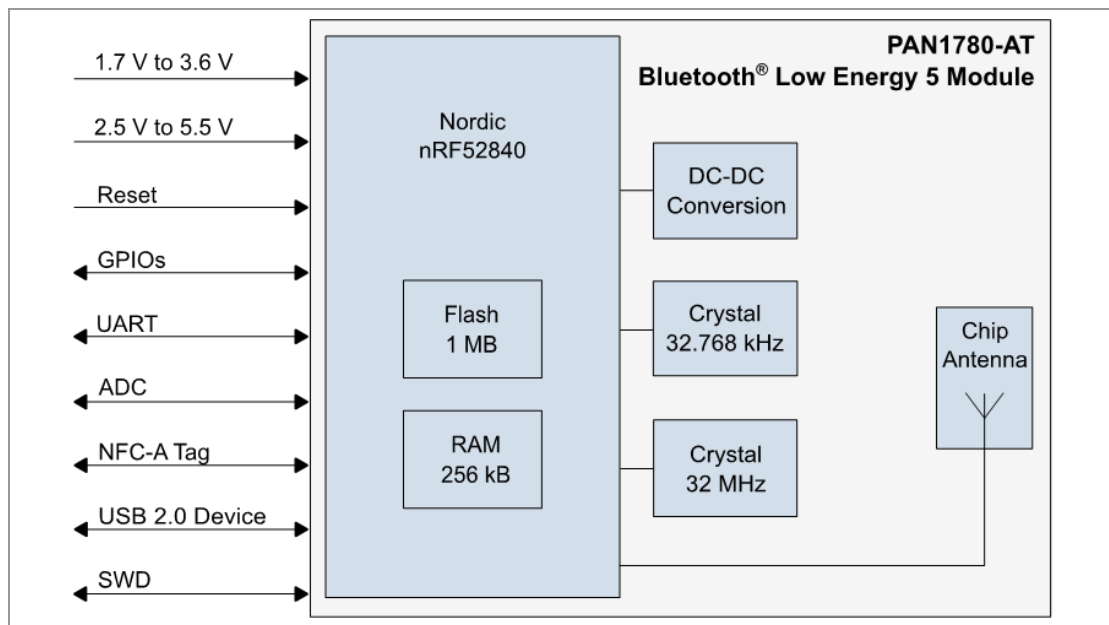
In addition the ultra-low current consumption of the PAN1780-AT make the module an ideal choice for battery powered devices.

The PAN1780-AT also supports Type 2 Near Field Communication (NFC-A) for use in simplified pairing and payment solutions (external antenna required).

For related documents please refer to [⇒ 9.2 Product Information](#).

3 PAN1780-AT Module

3.1 Block Diagram

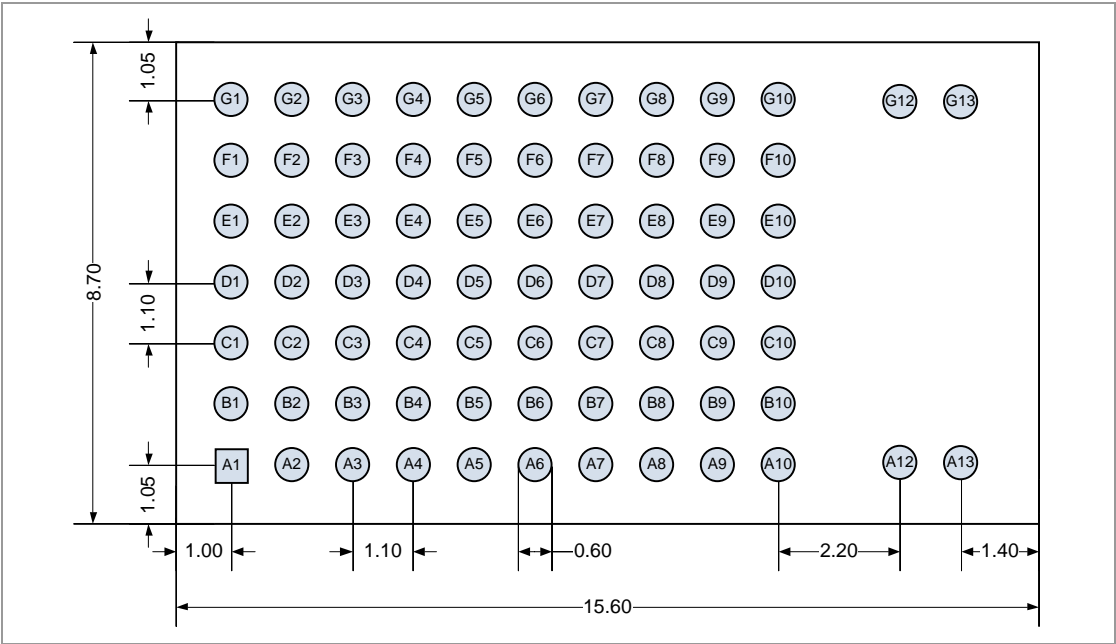


3.2 Footprint



The dimensions are in millimeters.
The outer dimensions have a tolerance of ± 0.3 mm.

Top View



3.3 Placement

**Antenna “Keep out Area”**

Do not place any ground plane under the marked restricted antenna area in any layer! This would be affecting the performance of the chip antenna in a critical manner.

**Impact of Placement on the Antenna Radiation Pattern**

The placement of the module, surrounding material, and customer components has an impact on the radiation pattern of the antenna.



The recommendation for the ground plane is based on a FR4 4-Layer PCB.

The following requirements must be met:

- ✓ Keep this product away from heat. Heat is the major cause of decreasing the life of these products.
- ✓ Keep this product away from other high frequency circuits.

The antenna requires a cutout area of 5 mm x 3 mm under the PAN1780-AT module. This “Keep out Area” shall be located in every layer under the module antenna. Note for example the “Keep out Area” in all four layers of the PAN1780-AT evaluation board.

It is recommended to verify the perfect position of the module in the target application before fixing the design.



All dimensions are in millimeters.

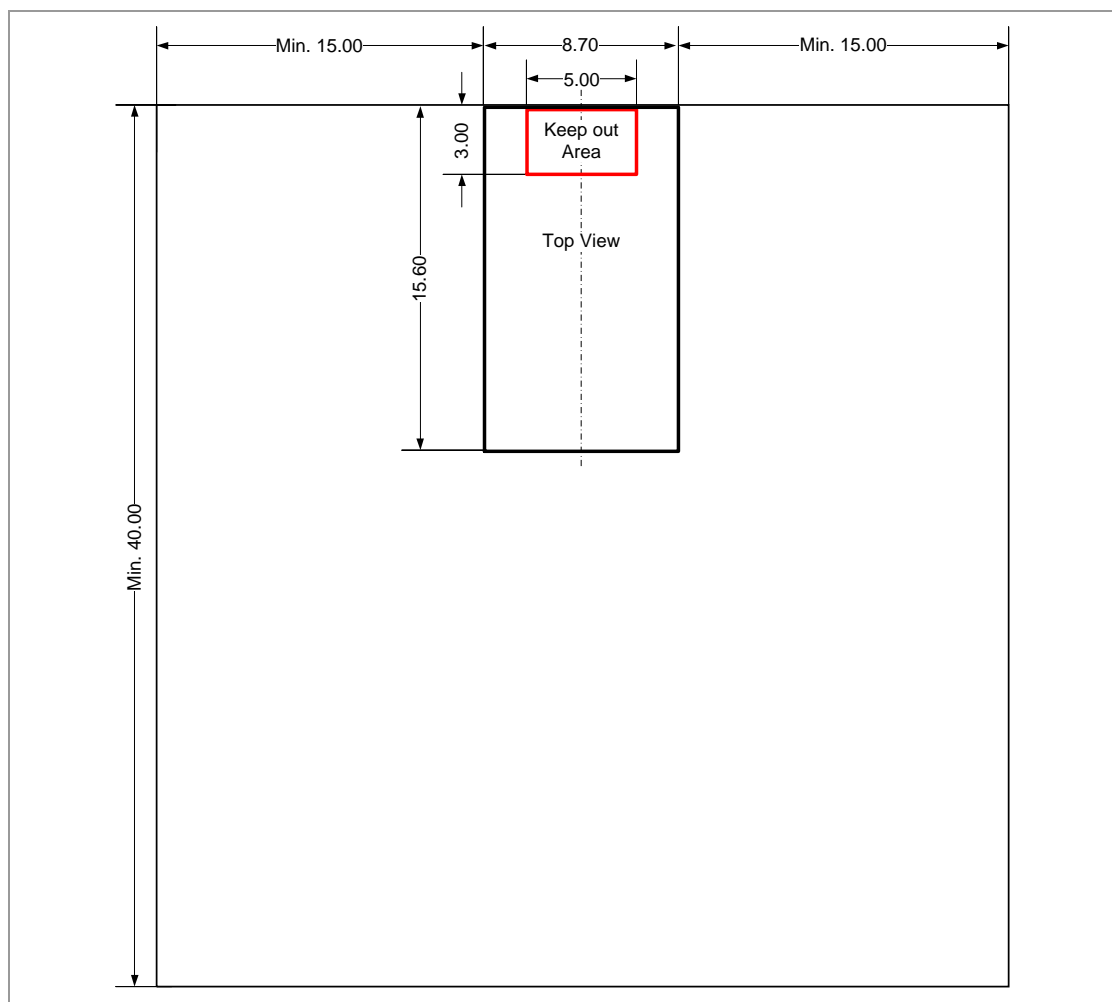


Use a ground plane in the area surrounding the module wherever possible.

It is recommended to place the module:

- In the center (horizontal) of mother PCB.
- At the edge (horizontal) of mother PCB.

Antenna Placement Recommendation



4 Reference Design



The evaluation board is identical to the regular PAN1780 evaluation board. Some functionality is not fully available and when used incorrectly may render the board unusable.

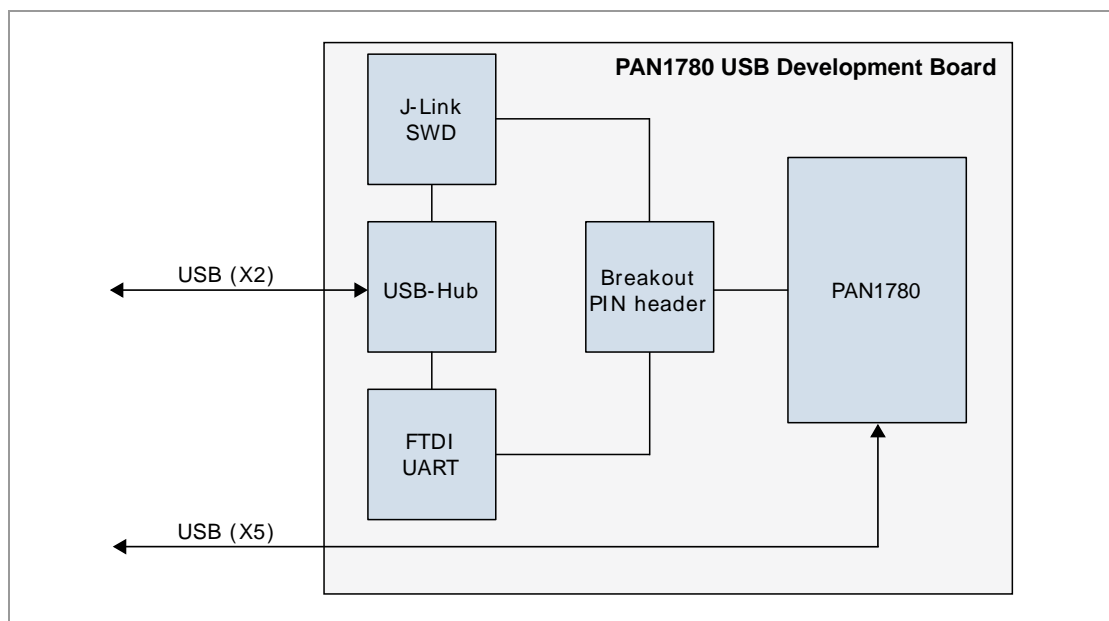
The reference design, shown in the block diagram below, gives an example of how to use the PAN1780-AT, to get a J-Link SWD and an FTDI UART connection on just one USB Port (X2).

The reference design of the evaluation board, including the provided peripherals is inspired by the design of the nRF52840 Development Kit from Nordic Semiconductors.

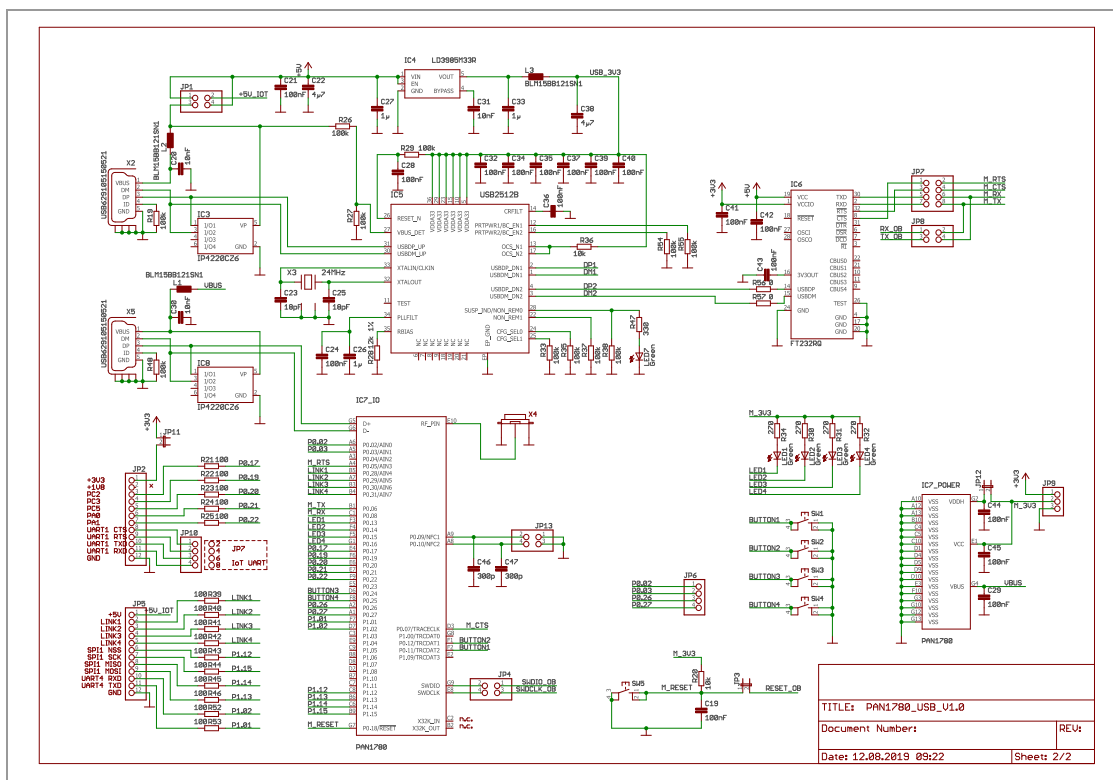
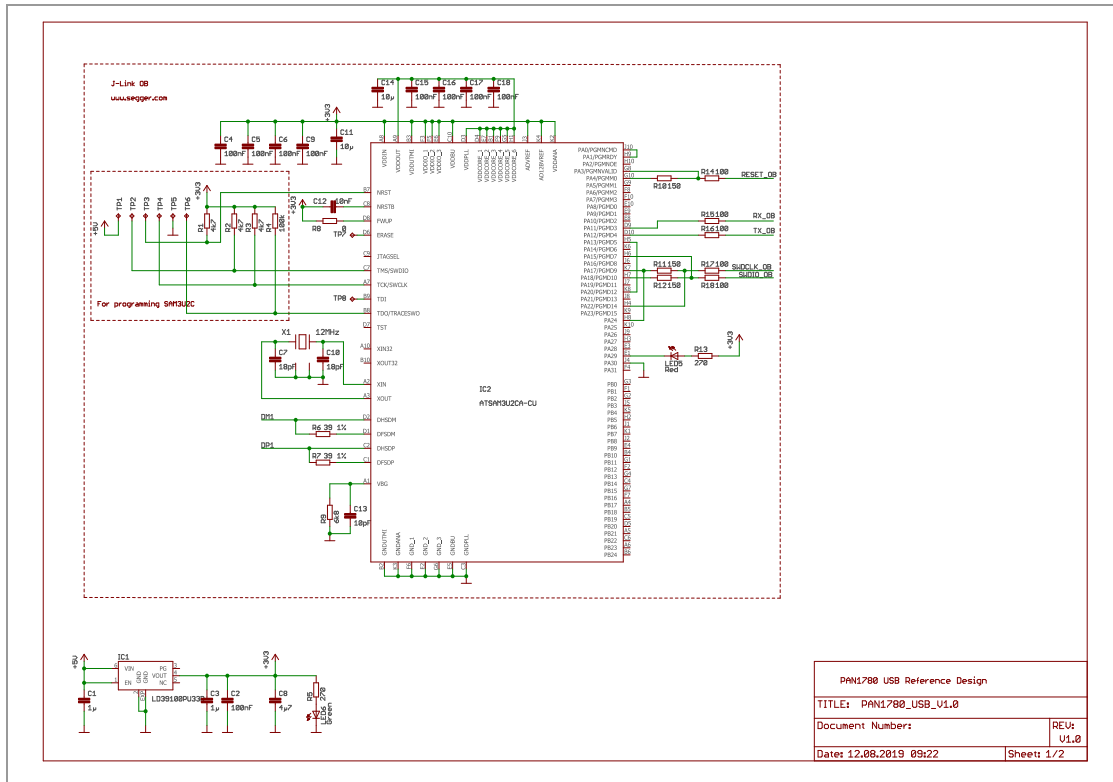
4.1 Block Diagram



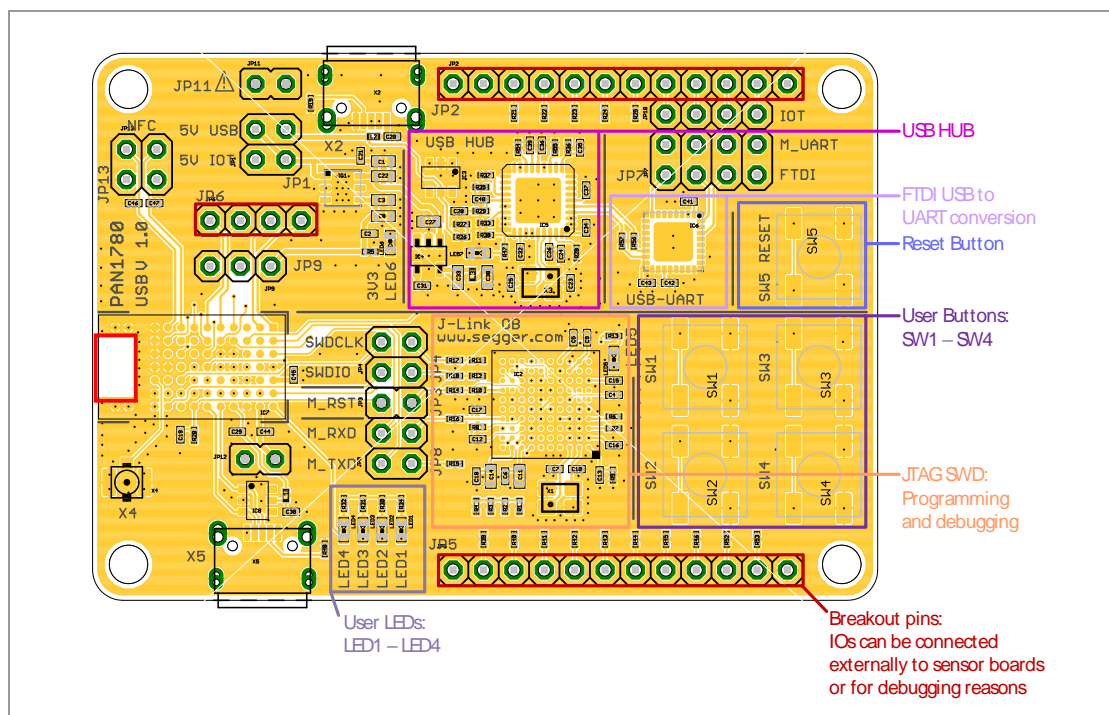
The second available USB port (X5) on the evaluation board is directly connected to the D+ and the D- pins of the PAN1780-AT. For schematics please refer to [4.2 Schematic](#).



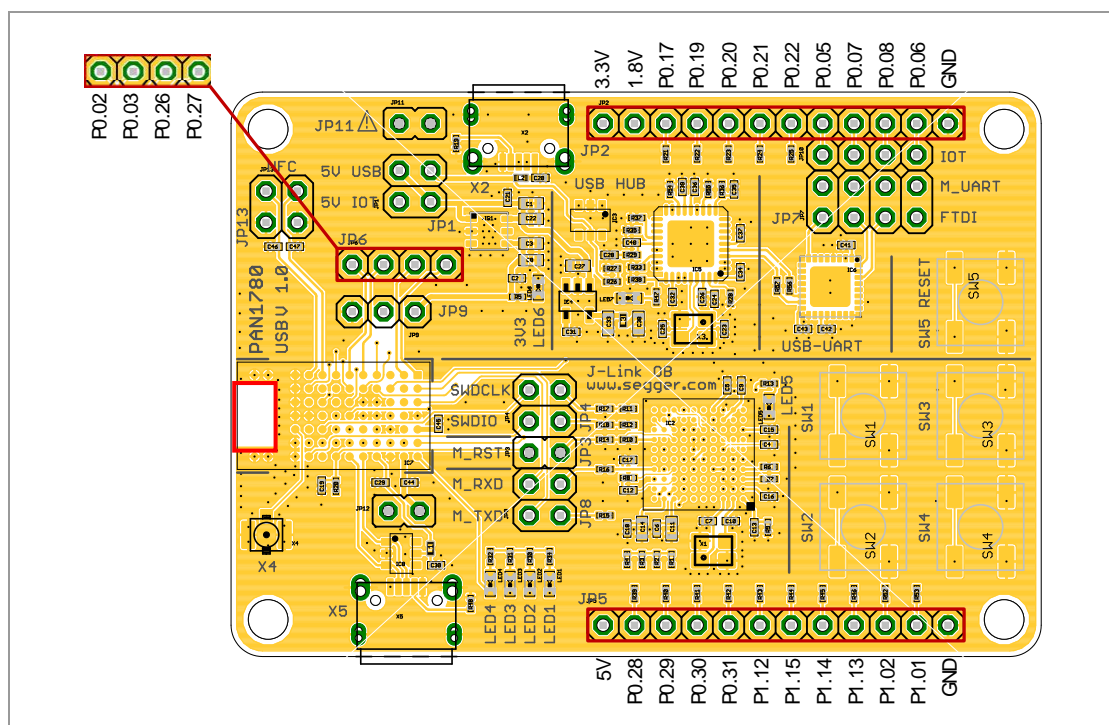
4.2 Schematic



4.3 Building Blocks



4.4 Breakout Pins



NFC Antenna

3.3V to pin → Do not place with external 3.3V supply

5V from USB

5V from pin

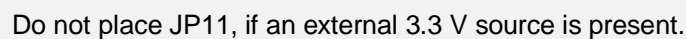
Module VCC




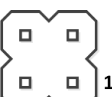

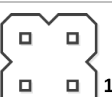

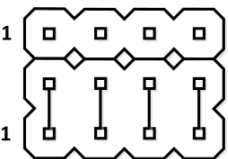
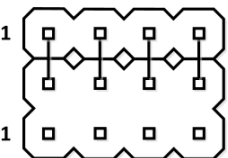





Module VCC 5V Breakout

Module Reset

UART

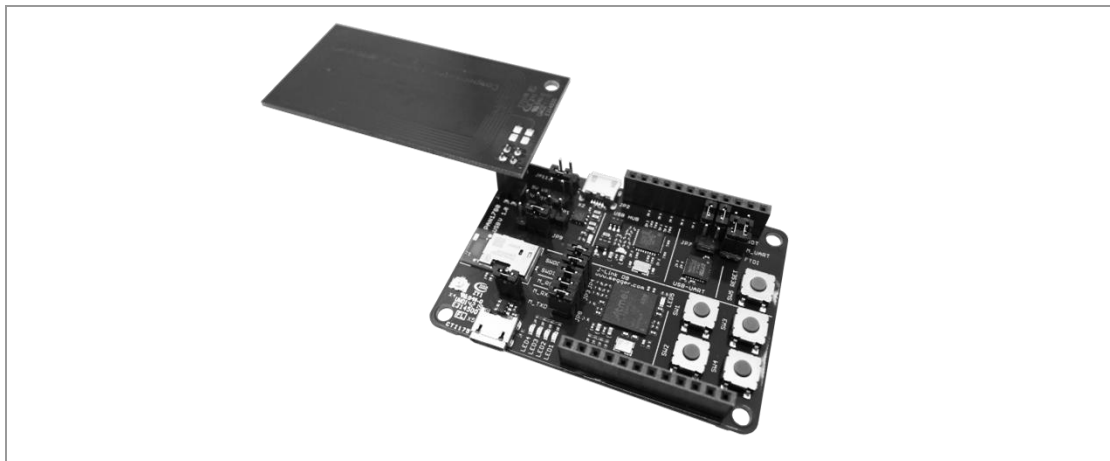
Switch Module UART:
Breakout pins
FTDI

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Jumper	Layout	Description	
JP3	 1	Module reset connected	
	 1	Module reset disconnected	
JP4	 1	SWD connected	Access to module and programmer SWD.
	 1	SWD disconnected	
JP8	 1	Module UART connected	Access to module UART Rx and Tx.
	 1	Module UART disconnected	
JP9	 1	Module V _{CC} connected	Module V _{CC} connection and GND pin. The module V _{CC} jumper can be removed for current measurements.
JP7, JP10	 1	FTDI connected to module UART	Option for module UART to breakout pin or FTDI. Place jumpers either just on JP7 or JP7 and JP10.
	 1	Breakout pins of JP2 connected to module UART	
JP11	 1	3.3 V are supplied to the breakout pin	Option to power an external sensor board with 3.3 V.
	 1	3.3 V are not supplied to the breakout pin	
JP12	 1	Module V _{CC} connected	Option to break 3.3 V supply via JP9 and connect 5 V supply to pin 1 of JP12 to power the module.
	 1	Module V _{CC} not connected	
JP13	 1, 2, 3, 4	1, 3: GND 2, 4: NFC Antenna	Option to connect NFC antenna to PAN1780-AT module.

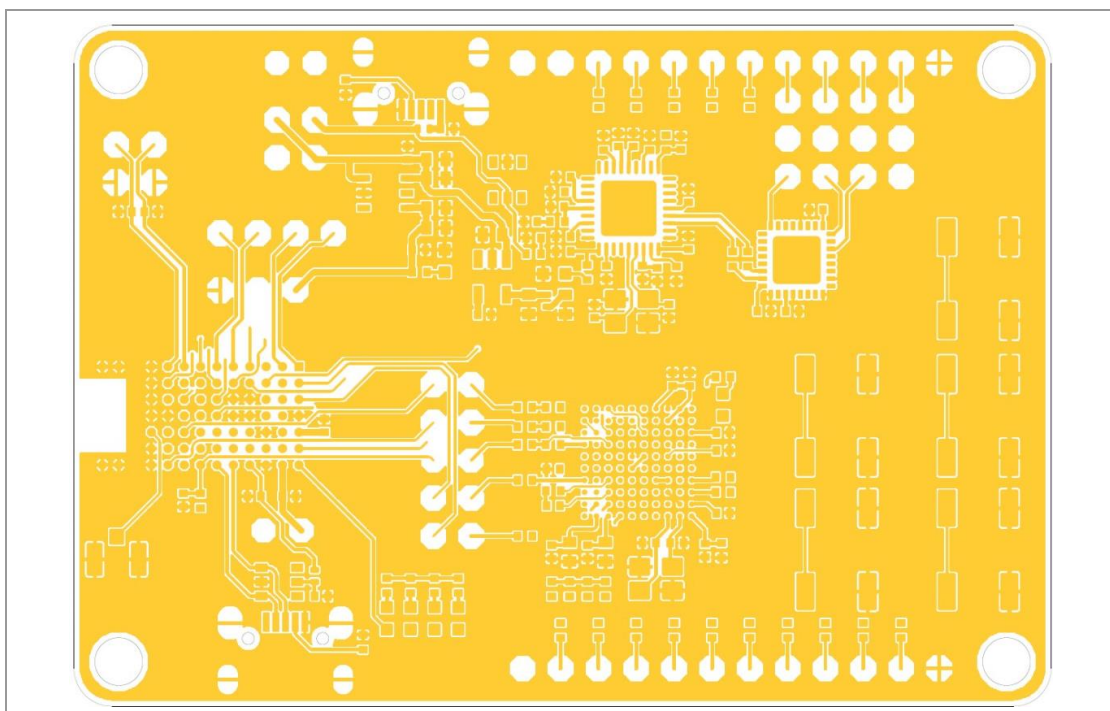
4.6 NFC Antenna Placement

An NFC antenna is provided inside the Evaluation Tool Kit. Please connect the antenna to JP13 as shown if use cases requiring NFC functionality are executed.

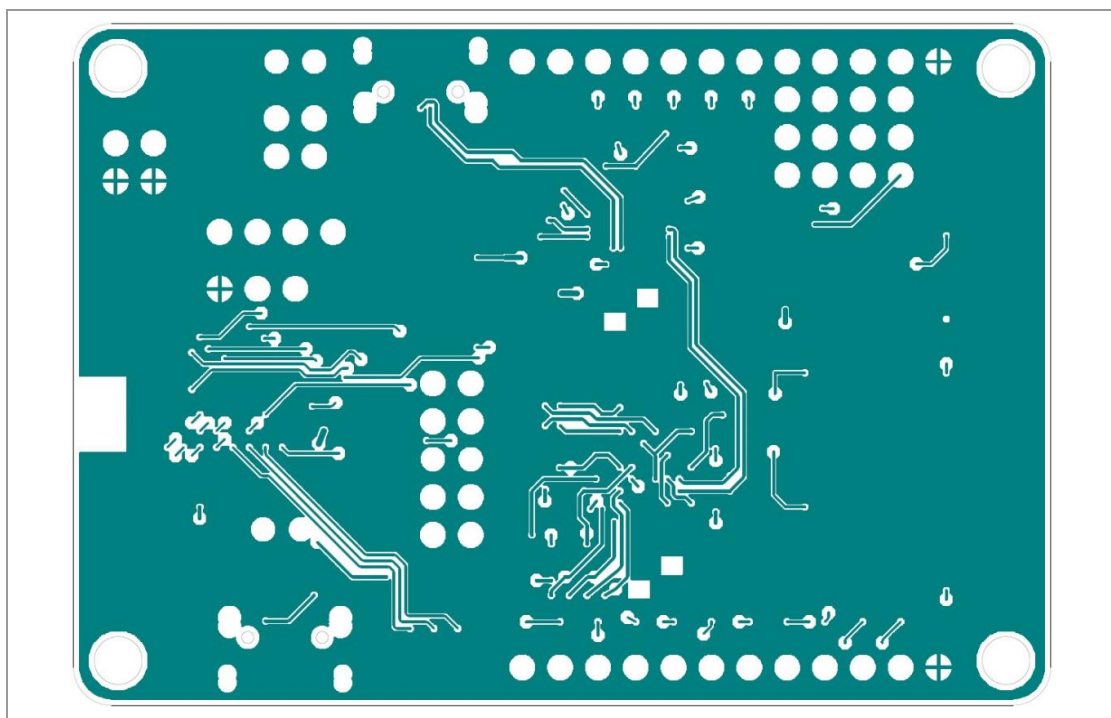


4.7 PCB Layout

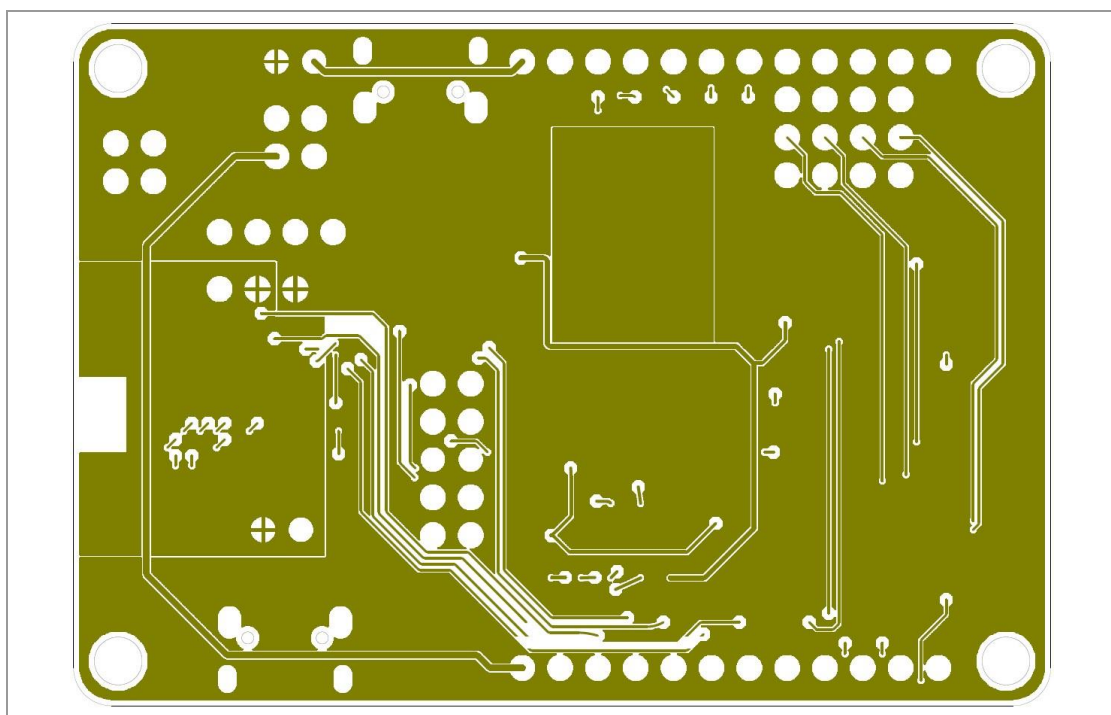
4.7.1 Top Layer



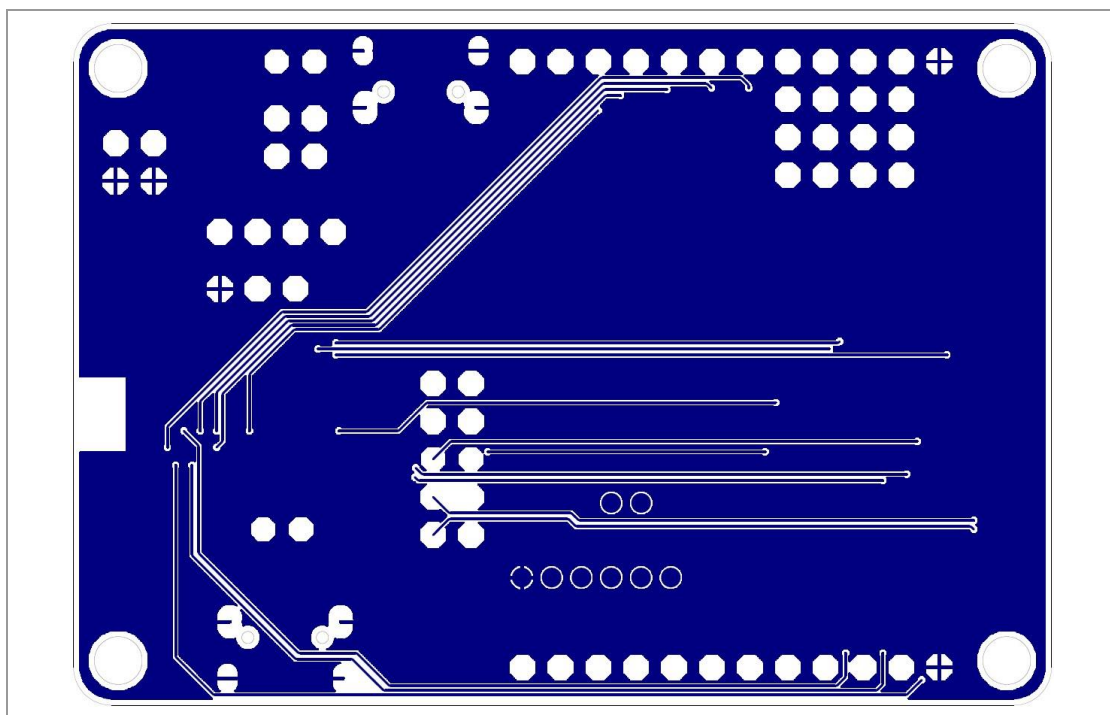
4.7.2 Second Layer



4.7.3 Third Layer



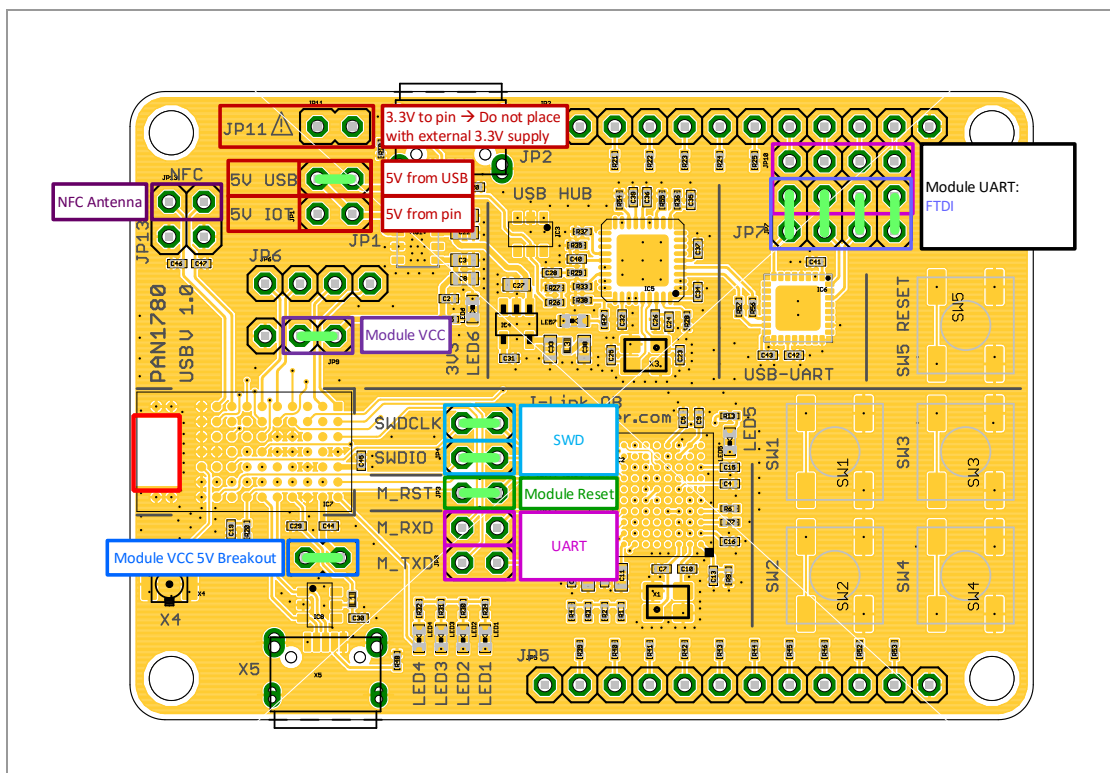
4.7.4 Bottom Layer



5 Getting Started

5.1 Default Jumper Configuration

1. Place all highlighted jumpers on PAN1780-AT ETU evaluation board.
2. Connect the device via USB (Socket X2) to power it.

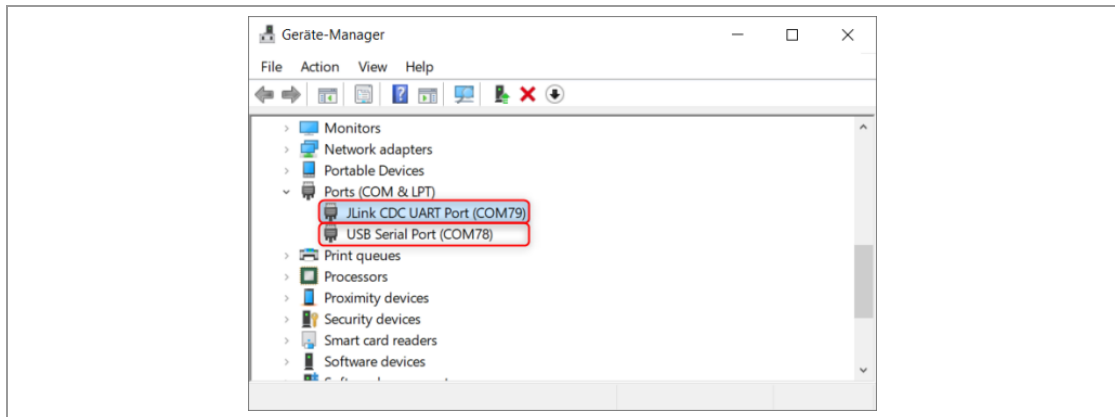


5.2 Device Drivers

5.2.1 General

It might be necessary to install drivers for some components.

Please note that the “FTDI USB UART” and the “Segger J-Link” SWD debugger provide COM ports to the system.



If the jumper configuration in ⇒ 5.1 Default Jumper Configuration was considered, then only the “UART Serial Port” can be used to open a UART connection to the PAN1780-AT.

The “JLink CDC UART Port” has no function and can be ignored.

5.2.2 FTDI USB UART

Depending on the operating system that is used, drivers for the “FTDI USB UART” might not be installed automatically. If in doubt, please check the FTDI website and install the drivers manually.

For further information please visit <https://www.ftdichip.com/Drivers/VCP.htm>.

5.2.3 Segger J-Link SWD Debugger



On the PAN1780-AT ETU evaluation board the “Segger J-Link” SWD debugger serves no purpose.

Do not use any tools provided by Nordic to access the underlying nRF52840 chipset because improper use may cause the device to function incorrectly.

Depending on the operating system that is used, drivers for “Segger J-Link” SWD debugger might not be installed automatically. If in doubt, please check the “Segger” website and install the drivers manually.

For further information please visit <https://www.segger.com/downloads/jlink/>.

5.3 First Steps

The PAN1780-AT USB evaluation board is delivered with integrated BlueRadios nBlue Bluetooth AT.s LE Command Set. The following chapters briefly describe how to interact with that software.



Please contact your local Panasonic Sales representative for further information on the BlueRadios nBlue Bluetooth AT.s LE Command Set.

The following requirements must be met:

- ✓ The jumper settings of the evaluation board are done as explained in ⇒ [5.1 Default Jumper Configuration](#).
- ✓ The terminal application is installed.

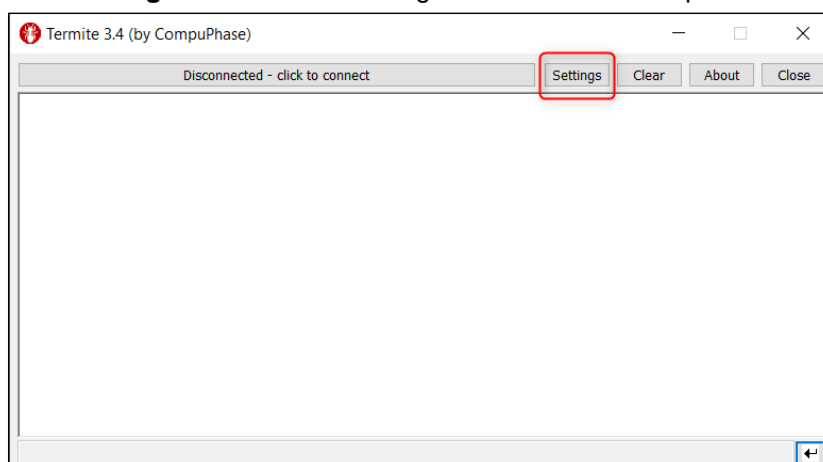


If you do not have any terminal application yet, you can try **Termite** from https://www.compuphase.com/software_termite.htm. In the following steps **Termite** is used.

5.3.1 COM Port Setup

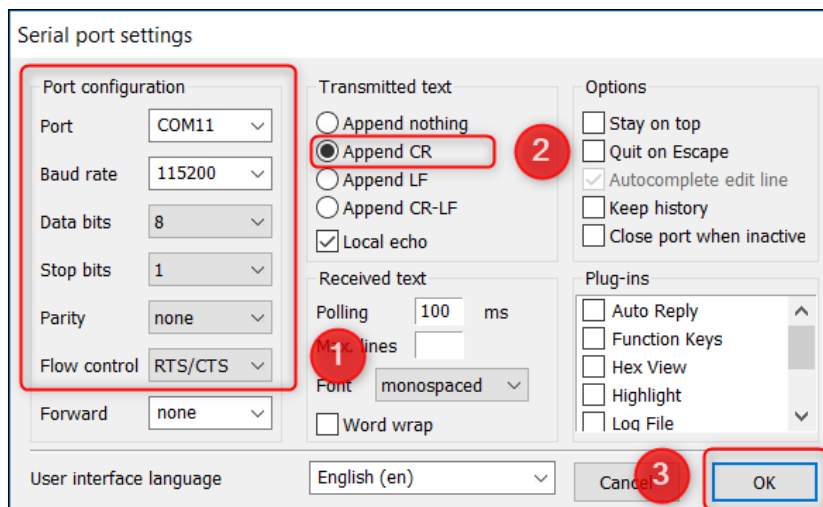
In the following steps **Termite** is used.

1. Start the terminal application.
2. Click **Settings** to choose and configure the desired COM port.



➔ The configuration dialog will be displayed.

- Configure the COM port as indicated (1) and select the known COM port.



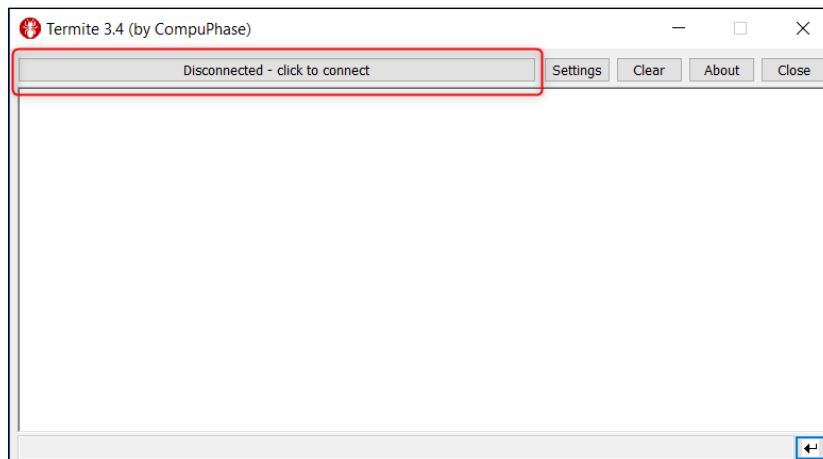
- Select the Transmitted Text **Append CR** (2).

- Click **OK** (3) to continue.

➔ The COM port is configured. The configuration dialog will be closed.

After closing the configuration dialog or after a new program start the COM port is usually opened automatically. If not:

- Click **Disconnected – click to connect**.



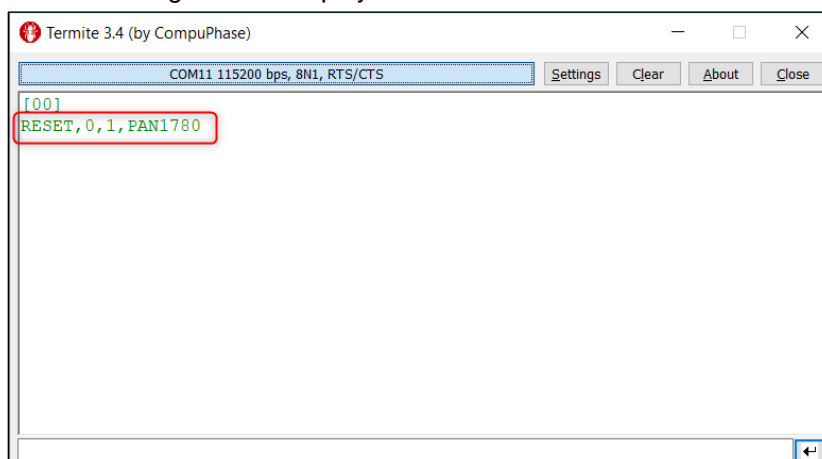
➔ The COM port is opened.

5.3.2 Connectivity Check

PAN1780-AT will output a diagnostic message after reset which can be used to check the connectivity of the module.

Press the button **SW5/RESET** on the evaluation board.

→ A boot message will be displayed.

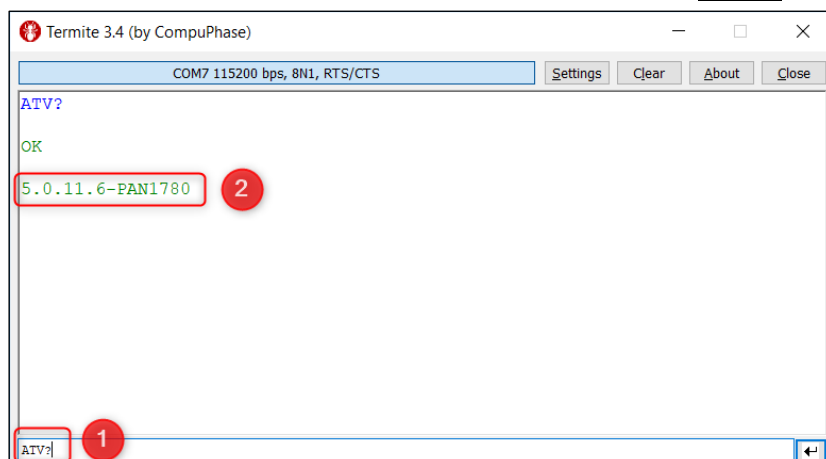


Now PAN1780-AT is fully operational.

5.3.3 Device Check

Various AT commands are available for checking the current device configuration and status.

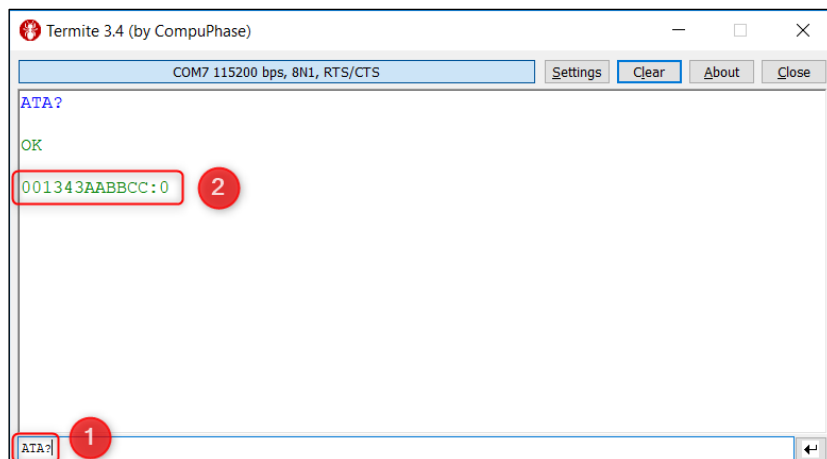
Enter the command **ATV?** (1) into the input field and press **Enter**.



→ The version number (2) of the firmware will be displayed.

5.3.4 Bluetooth Device Address Check

Enter the command **ATA?** (1) into the input field and press **Enter**.



➔ The currently used Bluetooth Device Address (2) of the device will be displayed.

6 Cable Replacement Use-Case

The PAN1780-AT Evaluation Kit comes with two PAN1780-AT USB evaluation boards, which can be easily used to demonstrate a cable-replacement use-case.

The following requirement must be met:

- ✓ The communication with both PAN1780-AT evaluation boards working correctly ⇒ [5.3 First Steps](#).



Please contact your local Panasonic Sales representative for further information on the BlueRadios nBlue Bluetooth AT.s LE Command Set.

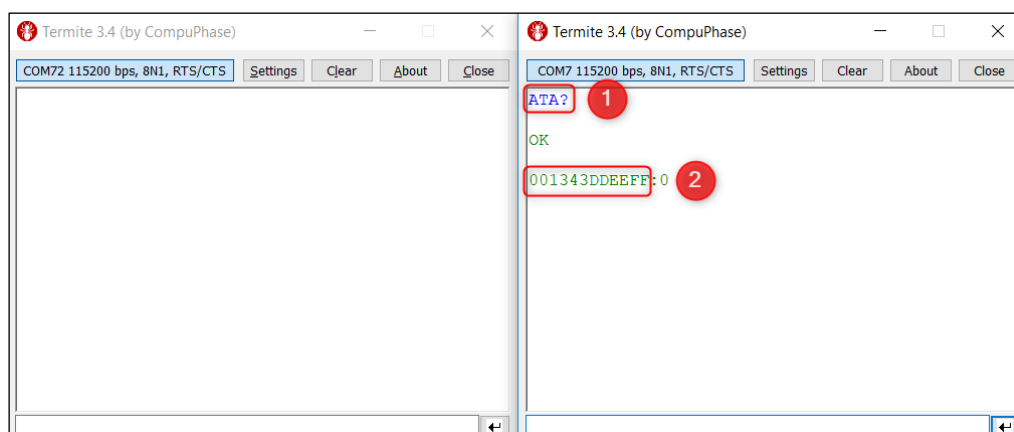
6.1 Setup

A connection can be established by using the Bluetooth Device Address of a peer.

The following requirement must be met:

- ✓ The devices are unconfigured. Ideally they are reset ⇒ [5.3.3 Device Check](#).

Execute the command **ATA?** (1) on one of the PAN1780-AT USB evaluation boards in order to retrieve the Bluetooth Device Address.

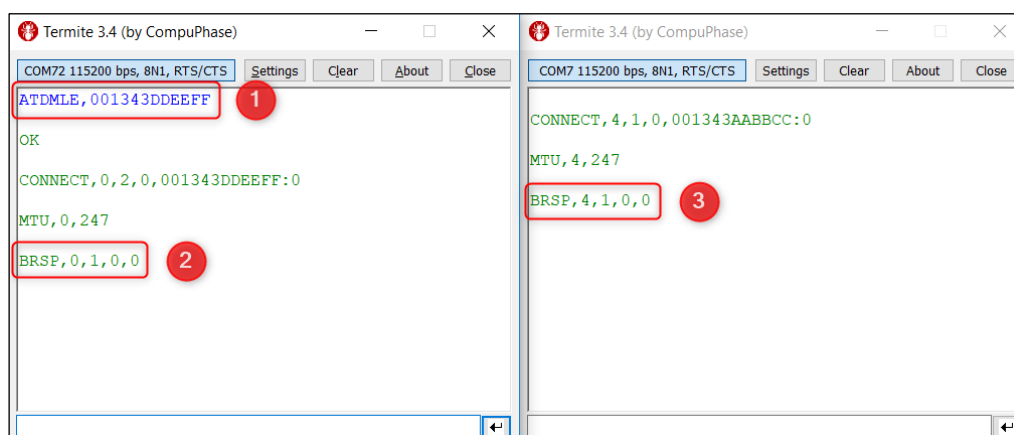


➔ The Bluetooth Device Address (2) will be displayed.

6.2 Connection Establishment

In the default configuration both PAN1780-AT USB evaluation boards are advertising after a restart, so a connection can be established to both of the devices at any time.

Execute the command **ATDMLE?** (1) on the other PAN1780-AT USB evaluation boards in order to establish a connection.

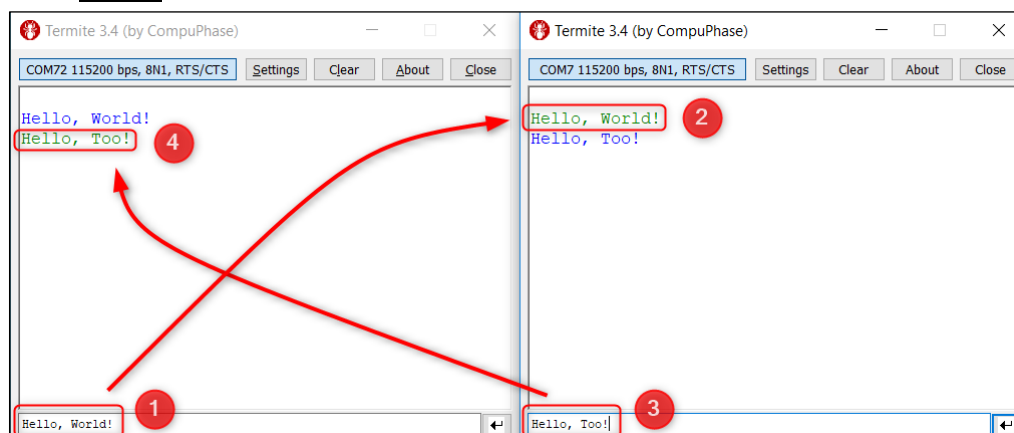


→ The events **BRSP** (2 + 3) indicate that a connection has been established successfully.

6.3 Data Transfer

After the connection has been established, both PAN1780-AT USB evaluation boards automatically enter the so-called “data mode”. In this mode all data, which is entered on the serial port of one of the boards, is directly transmitted to the other device and vice-versa.

1. Enter any message (1) on the one PAN1780-AT USB evaluation board and press **Enter**.



→ The data will be displayed on the other PAN1780-AT USB evaluation board (2).

This also works in the opposite direction:

2. Enter any message (3) and press **Enter**.
 - ➔ The data will be displayed on the other PAN1780-AT USB evaluation board (4).

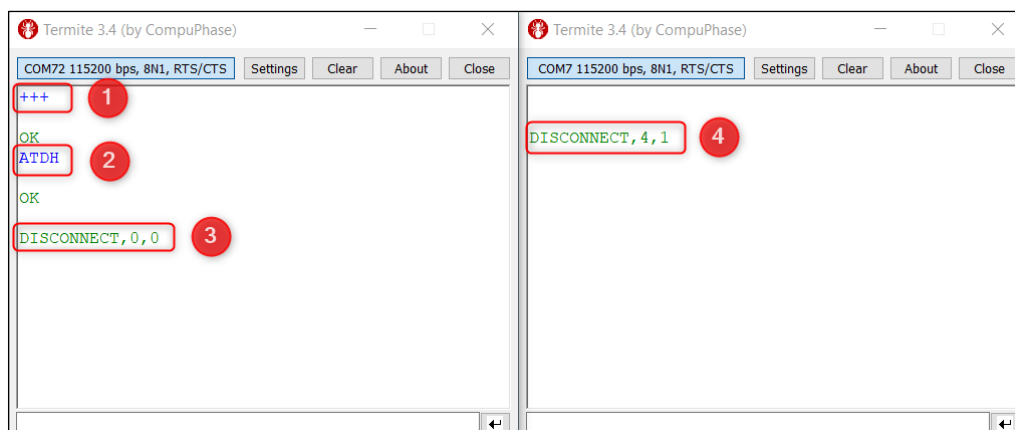
6.4 Connection Termination



Before any command can be send to one of the devices again the device must be switched from “data mode” to “command mode”.

Afterwards the connection can be terminated.

1. Execute the command `+++` (1) on one of the PAN1780-AT USB evaluation boards in order to switch to “command mode”.



- ➔ The event `OK` indicates that “command mode” was entered successfully.
2. Execute the command `ATDH` (1) on the same PAN1780-AT USB evaluation board in order terminate the connection.
 - ➔ The events `DISCONNECT` (3+4) indicates that the connection was terminated successfully.

7 Regulatory and Certification Information

7.1 General Certification Information



Regulatory certifications are valid for the following radio relevant software:

- Nordic Soft Device S140 (included Radio layer of BlueRadios nBlue Bluetooth AT.s LE Command Set)
- Bluetooth Specification 5



For further certification requests for other radio software please contact Panasonic ⇒ [9 Contact Details](#).

7.2 Federal Communications Commission (FCC) for US

7.2.1 FCC Statement

The following FCC statement has to be printed in the OEM end product user information:

The device meets the requirements for modular transmitter approval as detailed in FCC public Notice DA00-1407. The transmitter operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

7.2.2 Caution

The following FCC caution has to be printed in the OEM end product user information:



The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Panasonic Industrial Devices Europe GmbH may void the user's authority to operate the equipment.



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 in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, 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.

7.2.3 Label Requirements

The following labelling requirements have to be implemented on the OEM end product:



The OEM must ensure that FCC labelling requirements are met. This includes a clearly visible label on the outside of the OEM enclosure specifying the appropriate Panasonic FCC identifier for this product as well as the FCC notice above.

The FCC identifier is **FCC ID: T7V1780**.

This FCC identifier is valid for the PAN1780-AT.
The end product must in any case be labelled on the exterior with:

"Contains FCC ID: T7V1780"

Due to the PAN1780-AT model size, the FCC identifier is displayed in the installation instruction only and it cannot be displayed readable on the module's label due to the limited size.

7.2.4 Antenna Warning

The following Antenna has to be followed by the OEM:

This antenna warning refers to the device with the model number PAN1780-AT.

The device is tested with a integrated antenna listed below. When integrated into the OEM's product, these fixed antennas require installation preventing end users from replacing them with non-approved antennas. Any antenna not in the following table must be tested to comply with FCC Section 15.203 for unique antenna connectors and with Section 15.247 for emissions.

7.2.5 Approved Antenna List

Item	Part Number	Manufacturer	Frequency Band	Type	Max. Gain (dBi)
1	ANT016008LCS2442MA1	TDK	2.4 GHz	Chip Antenna	-1.0

7.2.6 RF Exposure



To comply with FCC RF Exposure requirements, the OEM must ensure that only antennas from the Approved Antenna List are installed ⇒ [7.2.5 Approved Antenna List](#).

The preceding statement must be included as a “CAUTION” statement in manuals for products operating with the approved antennas to alert users on FCC RF Exposure compliance.

Any notification to the end user of installation or removal instructions about the integrated radio module is not allowed.

The radiated output power of the PAN1780-AT with a mounted ceramic antenna

(**FCC ID: T7V1780**) is below the FCC radio frequency exposure limits. Nevertheless, the PAN1780-AT shall be used in such a manner that the potential for human contact during normal operation is minimized.

End users may not be provided with the module installation instructions. OEM integrators and end users must be provided with transmitter operating conditions for satisfying RF exposure compliance.

7.3 Innovation, Science, and Economic Development (ISED) for Canada

The following IC rules have to be followed by end product OEM's:

English

The PAN1780-AT is licensed to meet the regulatory requirements of ISED.

License ID: **IC: 216Q-1780**

HVIN: **ENW89854A3KF**

Manufacturers of mobile, fixed or portable devices incorporating this module are advised to clarify any regulatory questions and ensure compliance for SAR and/or RF exposure limits. Users can obtain Canadian information on RF exposure and compliance from www.ic.gc.ca.

This device has been designed to operate with the antennas listed in Approved Antenna List, having a maximum gain of -1.0 dBi. Antennas not included in this list or having a gain greater than -1.0 dBi are strictly prohibited for use with this device. The required antenna impedance is 50 ohms. The antenna used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter without the need of re-assessment of conformity by ISED.

Due to the model size, the IC identifier is displayed in the installation instruction and on the package label only. It cannot be displayed readable on the module's label due to the limited size.



The end customer has to assure that the device has a distance of more than 15 mm from the human body under all circumstances.

If the end customer application intends to use the PAN1780-AT in a distance smaller 15 mm from the human body, SAR evaluation has to be repeated by the OEM.

The end customer equipment must meet the actual Safety/Health requirements according to ISED.

French

PAN1780-AT est garanti conforme aux dispositions réglementaires d'Industry Canada (ISED).

License: **IC: 216Q-1780**

HVIN: **ENW89854A3KF**

Il est recommandé aux fabricants d'appareils fixes, mobiles ou portables de consulter la réglementation en vigueur et de vérifier la conformité de leurs produits relativement aux limites d'exposition aux rayonnements radiofréquence ainsi qu'au débit d'absorption spécifique maximum autorisé.

Des informations pour les utilisateurs sur la réglementation Canadienne concernant l'exposition aux rayonnements RF sont disponibles sur le site www.ic.gc.ca.

Ce produit a été développé pour fonctionner spécifiquement avec les antennes listées dans le tableau Approved Antenna List, présentant un gain maximum de -1.0 dBi. Des antennes autres que celles listées ici, ou présentant un gain supérieur à -1.0 dBi ne doivent en aucune circonstance être utilisées en combinaison avec ce produit. L'impédance des antennes compatibles est 50 Ohm. L'antenne utilisée avec ce produit ne doit ni être située à proximité d'une autre antenne ou d'un autre émetteur, ni être utilisée conjointement avec une autre antenne ou un autre émetteur.

En raison de la taille du produit, l'identifiant IC est fourni dans le manuel d'installation.



Le client final doit s'assurer que l'appareil se trouve en toutes circonstances à une distance de plus de 15 mm du corps humain.

Si le client final envisage une application nécessitant d'utiliser le PAN1780-AT à une distance inférieure à 15 mm du corps humain, alors le FEO doit répéter l'évaluation DAS.

L'équipement du client final doit répondre aux exigences actuelles de sécurité et de santé selon l'ISED.

7.3.1 IC Notice

The following IC notice has to be printed in English and French in the OEM end product user information:

English



The device PAN1780-AT, including the integrated antenna mentioned in ⇒ [7.2.5 Approved Antenna List](#), complies with Canada RSS-GEN Rules. The device meets the requirements for modular transmitter approval as detailed in RSS-Gen.

Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

French



Le présent appareil PAN1780-AT, les antennes y compris ⇒ [7.2.5 Approved Antenna List](#) est conforme aux CNR-Gen d'Industrie Canada applicables aux appareils radio exempts de licence.

L'exploitation est autorisée aux deux conditions suivantes:

1. L'appareil ne doit pas produire de brouillage, et
2. L'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

7.3.2 Labeling Requirements

The following IC labelling requirements have to be followed by end product OEM's:

English



Labeling Requirements

The OEM must ensure that IC labelling requirements are met. This includes a clearly visible label on the outside of the OEM enclosure specifying the appropriate Panasonic IC identifier for this product as well as the IC Notice above.

The IC identifier is: **IC: 216Q-1780**

This IC identifier is valid for the PAN1780-AT module. In any case, the end product must be labelled on the exterior with:

"Contains IC: 216Q-1780"

French



Obligations d'étiquetage

Les fabricants d'équipements d'origine (FEO) – en anglais Original Equipment Manufacturer (OEM) – doivent s'assurer que les obligations d'étiquetage IC du produit final sont remplies. Ces obligations incluent une étiquette clairement visible à l'extérieur de l'emballage externe, comportant l'identifiant IC du module Panasonic inclus, ainsi que la notification ci-dessus.

L' identifiant IC est: **IC: 216Q-1780**

Cet identifiant est valide pour module PAN1780-AT. Dans tous les cas les produits finaux doivent indiquer sur leur emballage externe la mention suivante:

"Contient IC: 216Q-1780"

7.4 European Conformity According to RED (2014/53/EU)



All modules described in this Module Integration Guide comply with the standards according to the following LVD (2014/35/EU), EMC-D (2014/30/EU) together with RED (2014/53/EU) articles.

Standards

- Due to the model size, the CE marking is displayed in the installation instruction and on the package label only. It cannot be displayed according to regulation (EU) No. 765/2008 in 5 mm height on the module's label due to the limited space.
- The end product OEM has to re-assess the conformity of the end product to EU regulations, but can use the PAN1780-AT RED pre-assessment to shorten this procedure.
- The RED EU Type Examination Certificate No. **T818666M-02** issued by the Notified Body 0682 can be used for the OEM end product conformance assessment. If a Notified Body has been contracted for the end product conformity assessment, it should be noted that this EU Type Examination Certificate should be used for conformance assessment.

As a result of the OEM end product conformity assessment procedure described in 2014/53/EU Directive and other applicable EU directives, the end customer equipment should be labelled as follows:



The requirements for CE marking are described in regulation (EU) No. 765/2008 Annex II.



The end customer has to assure that the device has a distance of more than 5 mm from the human body under all circumstances.

If the end customer application intends to use the PAN1780-AT in a distance smaller 5 mm from the human body, SAR evaluation has to be repeated by the OEM.

The end customer equipment must meet the actual Safety/Health requirements according to RED.

PAN1780-AT and its model versions in the specified reference design can be used in all countries of the European Economic Area (Member States of the EU, European Free Trade Association States [Iceland, Liechtenstein, Norway]), Monaco, San Marino, Andorra, and Turkey.

7.5 Bluetooth

For Bluetooth end products which integrate the PAN1780-AT the OEM needs to apply for an own end product listing (EPL) at the Bluetooth SIG. If the PAN1780-AT is used on more than one OEM product, costs can be saved by applying for a family EPL.

For the end product EPL the following IDs can be used in order to avoid re-testing:

Bluetooth 5	Declaration ID	QDID
End product	D050150	148922

Bluetooth Marks

According to the Bluetooth SIG, the PAN1780-AT fulfills the criteria to label your product as a Bluetooth device:



For further information please refer to the Bluetooth website www.bluetooth.com

8 Restricted Use

8.1 Life Support Policy

This Panasonic Industrial Devices Europe GmbH product is not designed for use in life support appliances, devices, or systems where malfunction can reasonably be expected to result in a significant personal injury to the user, or as a critical component in any life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

Panasonic customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Panasonic Industrial Devices Europe GmbH for any damages resulting.

8.2 Restricted End Use

This Panasonic Industrial Devices Europe GmbH product is not designed for any restricted activity that supports the development, production, handling usage, maintenance, storage, inventory or proliferation of any weapons or military use.

Transfer, export, re-export, usage or reselling of this product to any destination, end-user or any end-use prohibited by the European Union, United States or any other applicable law is strictly prohibited.

9 Contact Details

9.1 Contact Us

Please contact your local Panasonic Sales office for details on additional product options and services:

For Panasonic Sales assistance in the **EU**, visit

<https://eu.industrial.panasonic.com/about-us/contact-us>

Email: wireless@eu.panasonic.com

For Panasonic Sales assistance in **North America**, visit the Panasonic website “Sales & Support” to find assistance near you at

<https://na.industrial.panasonic.com/distributors>

Please visit the **Panasonic Wireless Technical Forum** to submit a question at

<https://forum.na.industrial.panasonic.com>

9.2 Product Information

Please refer to the Panasonic Wireless Connectivity website for further information on our products and related documents:

For complete Panasonic product details in the **EU**, visit

<http://pideu.panasonic.de/products/wireless-modules.html>

For complete Panasonic product details in **North America**, visit

<http://www.panasonic.com/rfmodules>