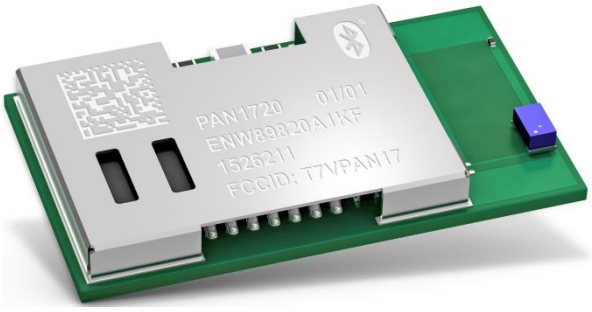
Panasonic

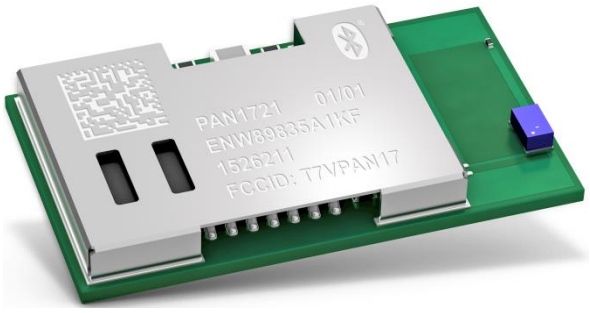
PAN1720/1721

Bluetooth® Low Energy Module

Product Specification

Rev. 2.4





Wireless Modules

Overview

The PAN1720/1721 is a Low Energy (LE) module with Texas Instruments CC2540/CC2541 Single Chip Bluetooth LE solution inside.

Characteristics

- Bluetooth 4.0
- Output power 4 dBm to -24 dBm
- High sensitivity (-94 dBm typ.)
- Link budget 96 dB
- Operating temperature range -40 °C to +85 °C

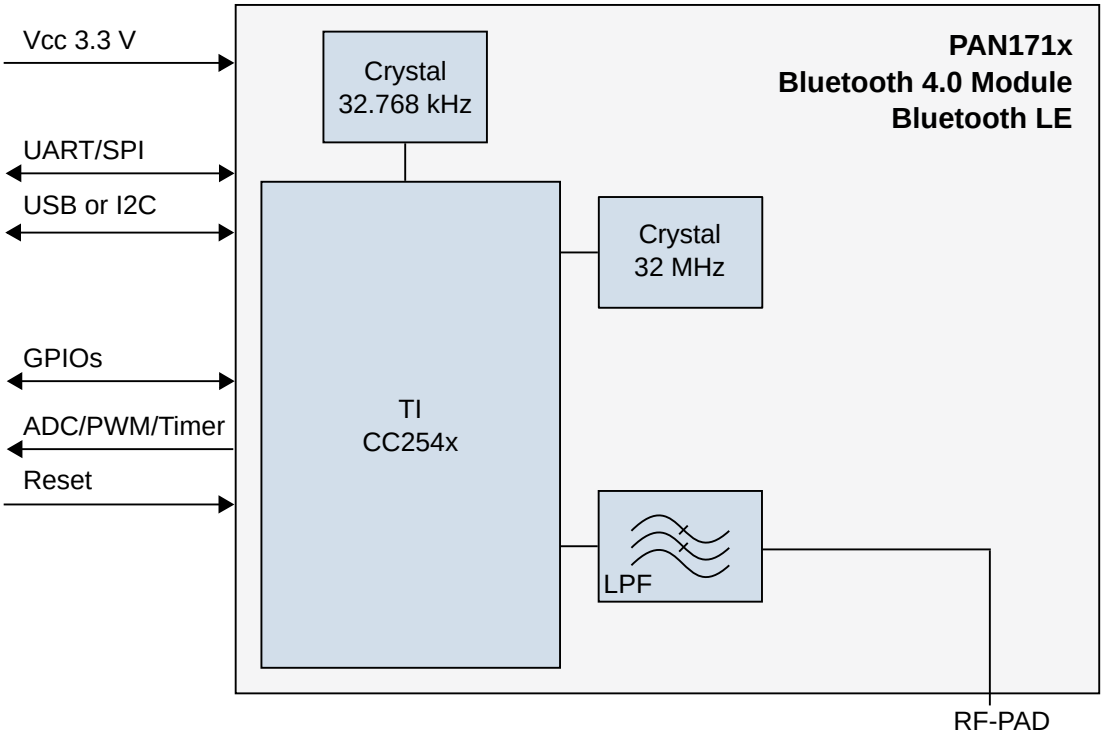
PAN1720 VS PAN1721

The PAN171x are the non antenna version where the PAN172x are the versions with antenna.

Features

- Surface mount type 15.6 mm x 8.7 mm x 1.8 mm
- PAN1720: Up to 4.0 dBm Tx power (typical) with transmit power control
- PAN1721: CC2541 has typically 0 dBm Tx power
- Texas Instrument's CC2540/CC2541 Single Chip Bluetooth LE solution inside
- High performance low power 8051 Microcontroller core
- No external components needed
- Fast Connection Setup
- Internal crystal oscillator (32 MHz)
- Internal 32 kHz crystal oscillator for Sleep Timer
- Two powerful USARTs
- UART, USB or I2C interface
- Powerful five channel DMA
- Latest Profiles included e.g. battery monitor and temperature sensor
- Integrated shielding to resist EMI
- Manufactured in conformance with RoHS

Block Diagram



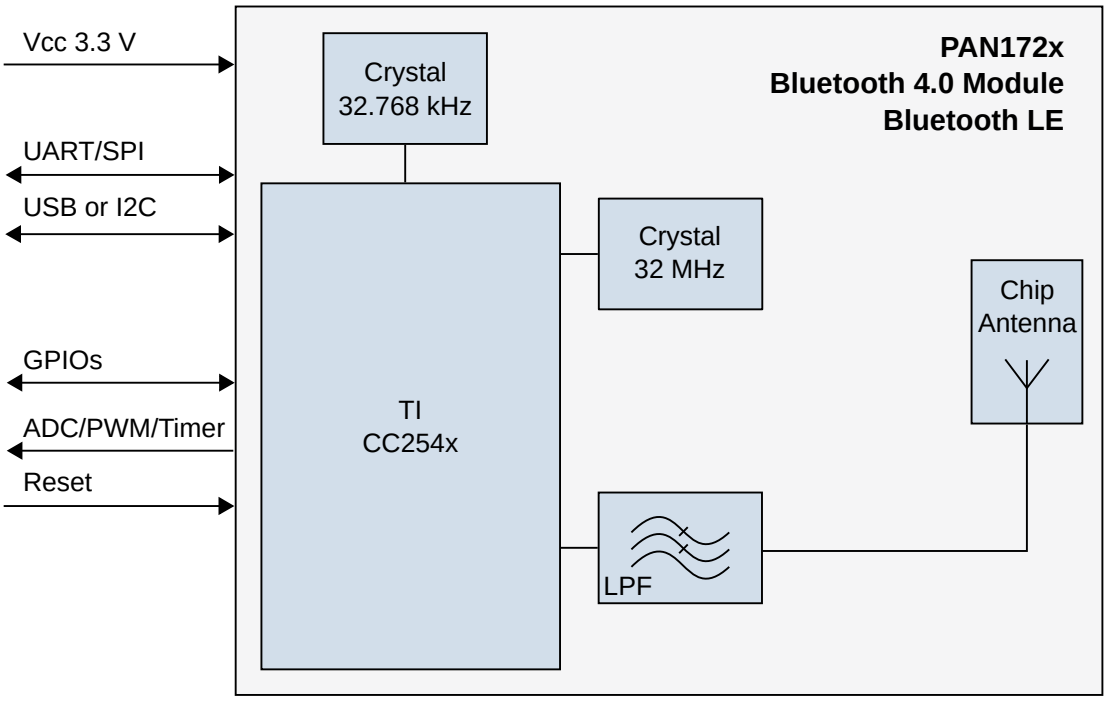

Vcc 3.3 V
UART/SPI
USB or I2C
GPIOs
ADC/PWM/Timer
Reset
Crystal
32.768 kHz
PAN172x
Bluetooth 4.0 Module
Bluetooth LE
Crystal
32 MHz
Chip
Antenna
TI
CC254x
LPF

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Table of Contents

1 About This Document 6
1.1 Purpose and Audience 6
1.2 Revision History 6
1.3 Use of Symbols 7
1.4 Related Documents 7

2 Overview 8
2.1 Difference between PAN1720/1721 8
2.2 Block Diagram 10
2.3 Pin Configuration 11
2.4 UART Interface 13
2.5 Bluetooth Features 13

3 Detailed Description 14
3.1 Dimensions 14
3.2 Footprint 16
3.3 Packaging 17
3.4 Case Marking 21

4 Specification 22
4.1 Default Test Conditions 22
4.2 Absolute Maximum Ratings 22
4.3 Recommended Operating Conditions 23
4.4 Current Consumption 23
4.5 Bluetooth 24
4.6 Reliability Tests 25
4.7 Recommended Soldering Profile 26

5 Cautions 27
5.1 Design Notes 27
5.2 Installation Notes 27
5.3 Usage Condition Notes 28
5.4 Storage Notes 28
5.5 Safety Cautions 28
5.6 Other Cautions 29
5.7 Restricted Use 30

6 Regulatory and Certification Information 31
6.1 Federal Communications Commission (FCC) for US 31
6.2 Innovation, Science, and Economic Development (ISED) for Canada 33
6.3 European Conformity According to RED (2014/53/EU) 36
6.4 Bluetooth 37
6.5 RoHS and REACH Declaration 37

7 Appendix 38
7.1 Ordering Information 38
7.2 Contact Details 39

1 About This Document

1.1 Purpose and Audience

This Product Specification provides details on the functional, operational, and electrical characteristics of the Panasonic PAN1720 and PAN1721 module. It is intended for hardware design, application, and Original Equipment Manufacturers (OEM) engineers.

The product is referred to as “the PAN172x” or “the module” within this document.

1.2 Revision History

Revision	Date	Modifications/Remarks
1.0	2012-04-01	Released version
1.1	2012-07-01	Added chapter “Information regarding Software Versions”. Link to LGA app note. UART pinning for BR-SW version. I2C pinning for PAN1721 version. FCC, IC, IDs. Corrected FCC ID to T7VPAN17.
1.2	2012-08-01	Change IC text in chapter “IC Notice”. New format for chapter “Related Documents”.
1.3	2012-11-01	Added remarks to PAN1721 version. Added non antenna version part number to “Ordering Information”.
1.4	2012-12-01	Added PAN1711 ES information
1.5	2013-01-01	Added dimensions and pinout for the non-antenna versions PAN171x. Minor changes in chapter “RF Exposure”. Added chapter “European R&TTE Declaration of Conformity” Bluetooth Certificiation.
1.6	2013-05-01	Changed Block Diagram
1.7	2013-08-01	Included cross-reference for GPIOs to BlueRadios Pinout
1.8	2013-12-01	Removed QDID from front page. QDID is described in chapter “Bluetooth Certification”.
1.9	2014-11-01	Added radiation pattern for Antenna. Added DoC.
2.0	2015-04-01	Updated REACH RoHS
2.1	2015-07-01	Correction of PAN1721 description
2.2	2017-06-01	Correction of general description
2.3	2018-08-10	Update layout and structure changes
2.4	2019-05-06	Added Yageo antenna to the approved antenna list. Small formatting update. Updated chapter “European Conformity According to RED (2014/53/EU)”.

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.
⇨ [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.

1.4 Related Documents

Please refer to the Panasonic website for related documents ⇨ 7.2.2 Product Information.

2 Overview

The PAN172x is a short-range, Class 2, Bluetooth LE single mode module for implementing Bluetooth functionality into various electronic devices.

The PAN172x is a cost-effective, low-power, true system-on-chip (SoC) for Bluetooth LE applications. It enables robust Bluetooth LE master or slave nodes to be built with very low total bill-of-material costs. The PAN172x combines an excellent RF transceiver with an industry-standard enhanced 8051 MCU, in-system programmable flash memory, 8-KB RAM, and many other powerful supporting features and peripherals. The PAN172x is suitable for systems where very low power consumption is required. Very low power sleep modes are available. Short transition times between operating modes further enable low power consumption.

Panasonic offers Bluetooth low energy protocol stacks and applications from Texas Instruments and BlueRadios. The Bluetooth low energy protocol stack from Texas Instruments, is a flexible and cost-effective single-mode Bluetooth low energy solution.

The BlueRadios stack enables rapid and low cost development using an AT command set without the need for a complier. Additional advantages include UART programming, over-the-air-updates, easy integration “C” library framework, serial streaming of data, and smartphone libraries and applications.

Please refer to the Panasonic website for related documents ⇨ 7.2.2 Product Information.

Further information on the variants and versions ⇨ 7.1 Ordering Information.

2.1 Difference between PAN1720/1721

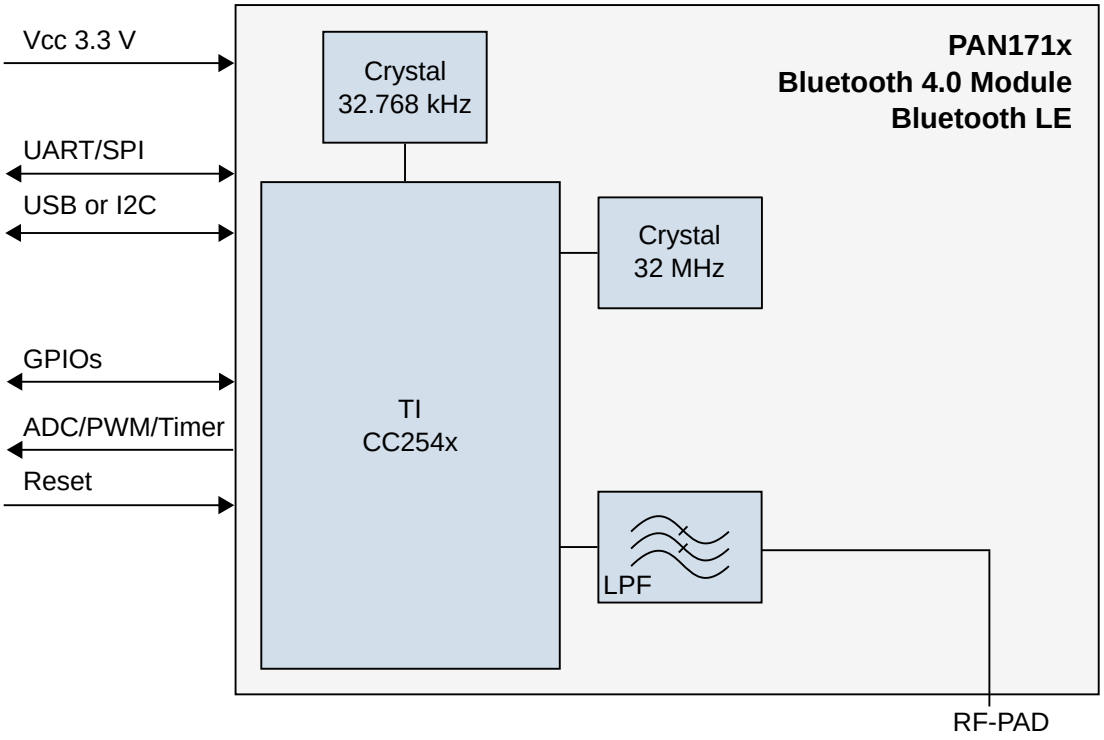
The PAN1721 is pin-compatible with the PAN1720, with the exception that USB is the hardware communication interface on the PAN1720 and I2C is the hardware communication interface on the PAN1721. Compared to the PAN1720, the PAN1721 provides lower RF current consumption. The PAN1721 does not have the USB interface found on the PAN1720, and provides lower maximum output power in TX mode.

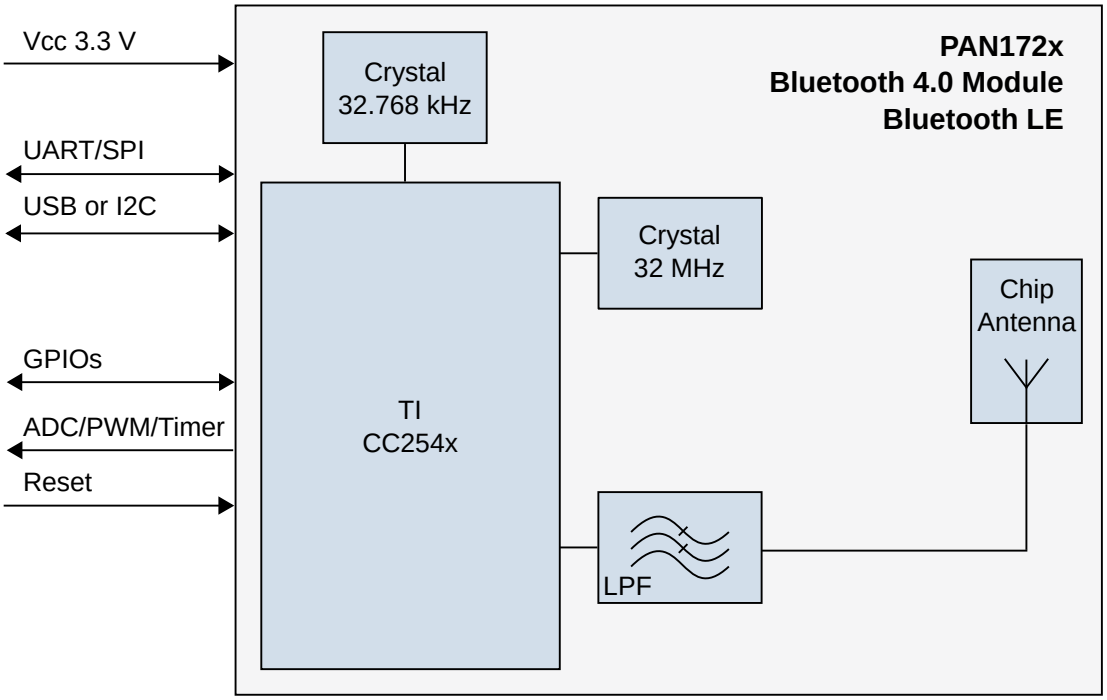
Both ICs the CC2540 as well as the CC2541 come with an internal 256 KB flash memory.

Brand Name	Description	
PAN1720	CLASS 2 Bluetooth single mode Module according Bluetooth 4.0	Bluetooth smart device
PAN1720	Same as above including BlueRadios BR-SPP FW version.	
PAN1721	CLASS 2 Bluetooth single mode Module according Bluetooth 4.0	
PAN1721	Same as above including BlueRadios BR-SPP FW version.	

Brand Name	Description	
PAN1711	CLASS 2 Bluetooth single mode Module according Bluetooth 4.0	Bluetooth smart device without antenna
PAN1711	Same as above without antenna including BlueRadios BR-SPP FW version.	

2.2 Block Diagram

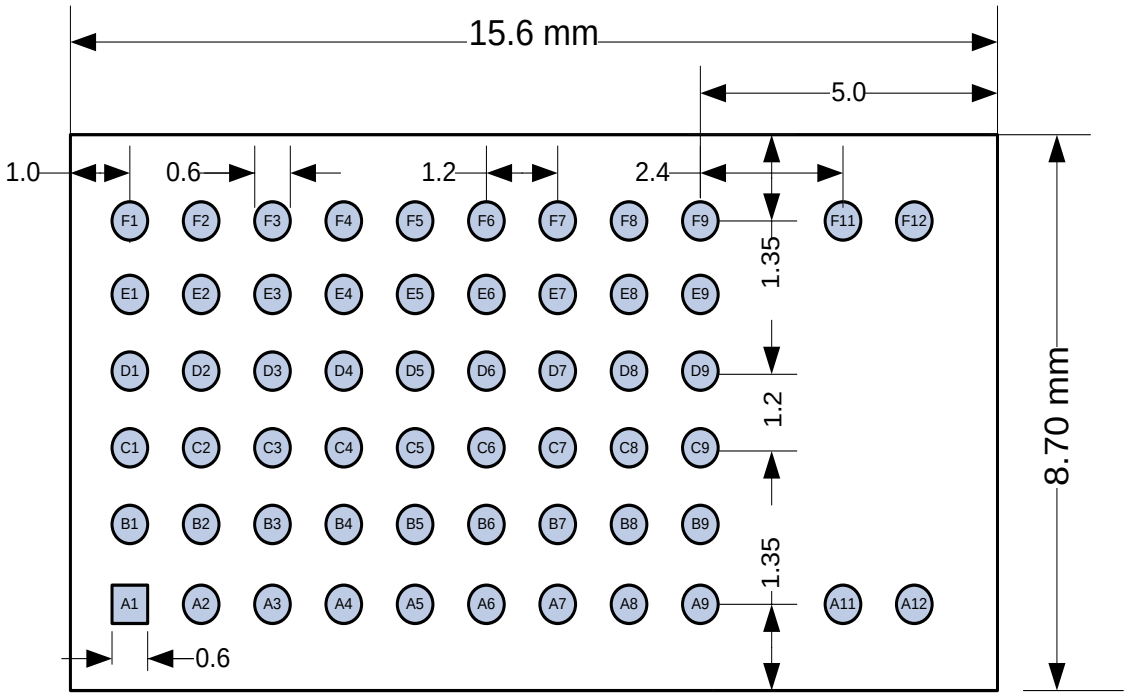




2.3 Pin Configuration

Pin Assignment

Top View



Pin Functions

No	Pin Name	Pin Type	Description
A1	GND	Ground Pin	Connect to ground
A2	P1.0	Digital I/O	Port 1.0 – 20 mA drive capability
A3	RESET	Digital Input	Reset, active low
A4	VCC	Power	Analog/digital power supply connection
A5	VCC	Power	Analog/digital power supply connection
A6	VCC	Power	Analog/digital power supply connection
A7	GND	Ground Pin	Connect to ground
A8	NC		Not connected
A9	GND	Ground Pin	Connect to ground
A11	GND	Ground Pin	Connect to ground
A12	GND	Ground Pin	Connect to ground
B1	P1.3	Digital I/O	Port 1.3
B2	P1.2	Digital I/O	Port 1.2

No	Pin Name	Pin Type	Description
B3	P1.1	Digital I/O	Port 1.1 – 20 mA drive capability
B4	P0.6	Digital I/O	Port 0.6
B5	NC		Not connected
B6	P0.1	Digital I/O	Port 0.1
B7	P0.0	Digital I/O	Port 0.0
B8	NC		Not connected
B9	NC		Not connected,
C1	NC		Not connected,
C2	P1.4	Digital I/O	Port 1.4/BR-SW UART CTS
C3	P1.5	Digital I/O	Port 1.5/BR-SW UART RTS
C4	P0.7	Digital I/O	Port 0.7
C5	NC		Not connected
C6	NC		Not connected
C7	NC		Not connected
C8	GND	Ground Pin	Connect to ground
C9	GND	Ground Pin	Connect to Ground
D1	DVDD_USB	Power (digital)	2 V-3.6 V digital power supply connection
D2	USB_N	Digital I/O	USB N/PAN17x1 I2C SDA Leave floating if not used.
D3	USB_P	Digital I/O	USB P/PAN17x1 I2C SCL Leave floating if not used
D4	NC		Not connected
D5	NC		Not connected
D6	NC		Not connected
D7	GND	Ground Pin	Connect to ground
D8	GND	Ground Pin	Connect to ground
D9	NC/RF		PAN172x not Connected/50 Ω RF_Out PAN171x
E1	P2.1/DD	Digital I/O	Port 2.1/Programming Interface DD
E2	P2.2/DC	Digital I/O	Port 2.2/Programming Interface DC
E3	DGND_USB	Ground Pin	Connect to Ground
E4	NC		Not connected
E5	NC		Not connected
E6	P0.2/RX/MISO	Digital I/O	Port 0.2/TI-SW UART RX/SPI MISO

No	Pin Name	Pin Type	Description
E7	NC		Not connected
E8	GND	Ground Pin	Connect to ground
E9	GND	Ground Pin	Connect to ground
F1	GND	Ground Pin	Connect to ground
F2	P1.6	Digital I/O	Port 1.6/BR-SW UART TX
F3	P1.7	Digital I/O	Port 1.7/BR-SW UART RX
F4	P2.0	Digital I/O	Port 2.0
F5	P0.4/CTS/CS	Digital I/O	Port 0.4/TI-SW UART CTS/SPI CS
F6	NC		Not connected
F7	P0.3/TX/MOSI	Digital I/O	Port 0.3/TI-SW UART TX/SPI MOSI
F8	P0.5/RTS/CLK	Digital I/O	Port 0.5/TI-SW UART RTS/SPI CLK
F9	GND	Ground Pin	Connect to ground
F11	GND	Ground Pin	Connect to ground
F12	GND	Ground Pin	Connect to ground

2.4 UART Interface

- Full-duplex 4-wire data transfer: RX, TX, RTS, and CTS
- Default baud rate: 115 200 bps
- Data format: 8N1

2.5 Bluetooth Features

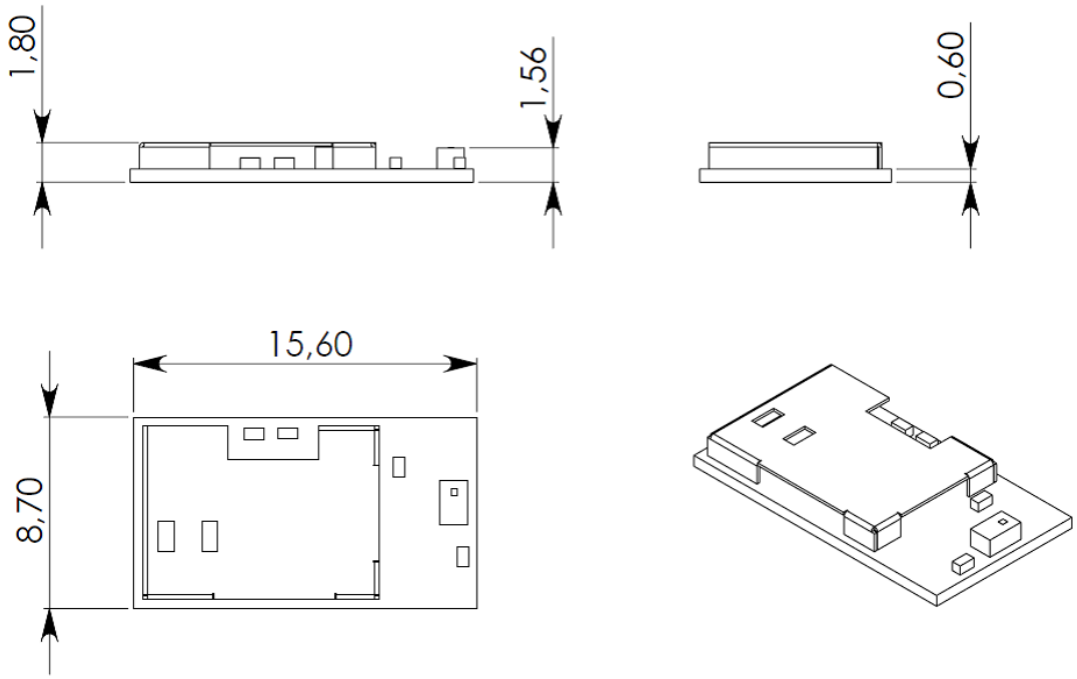
- Bluetooth 4.0 single mode low energy technology.
- Class 2 TX power w/o external PA, improving link robustness.
- Excellent link budget (up to 96 dB), enabling long-range applications.
- Accurate digital received signal-strength indicator (RSSI)
- Integrates the new low power profiles and services
- Embedded Bluetooth-Stack available

3 Detailed Description

3.1 Dimensions

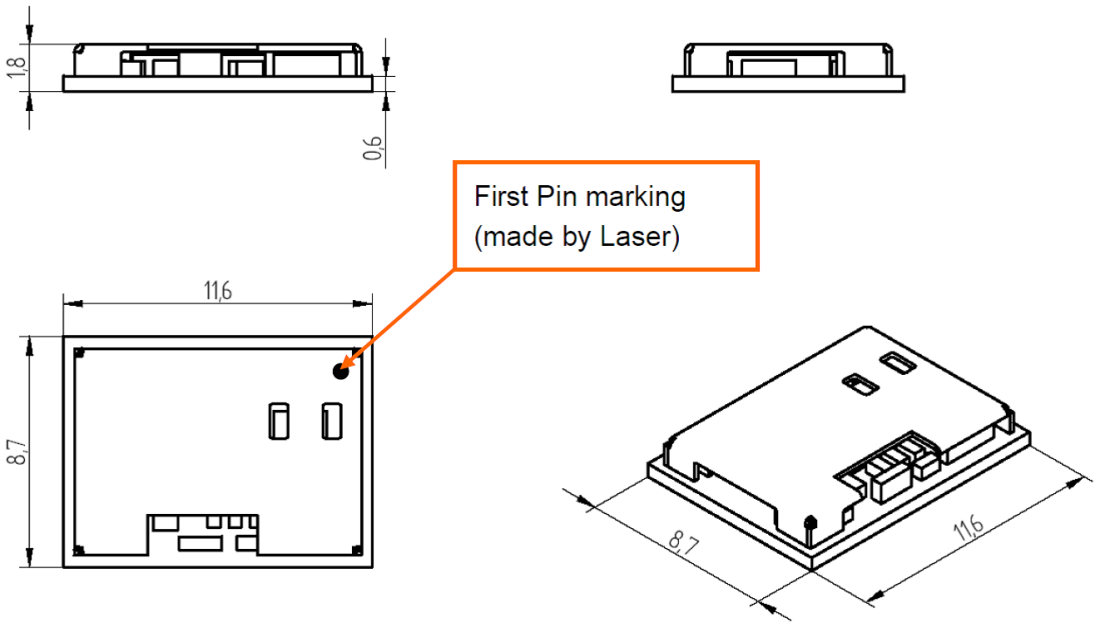
All dimensions are in millimeters.

PAN172x



No.	Item	Dimension	Tolerance	Remark
1	Width	8.70	±0.20	
2	Length	15.60	±0.20	
3	Height	1.80	±0.20	With case

PAN171X



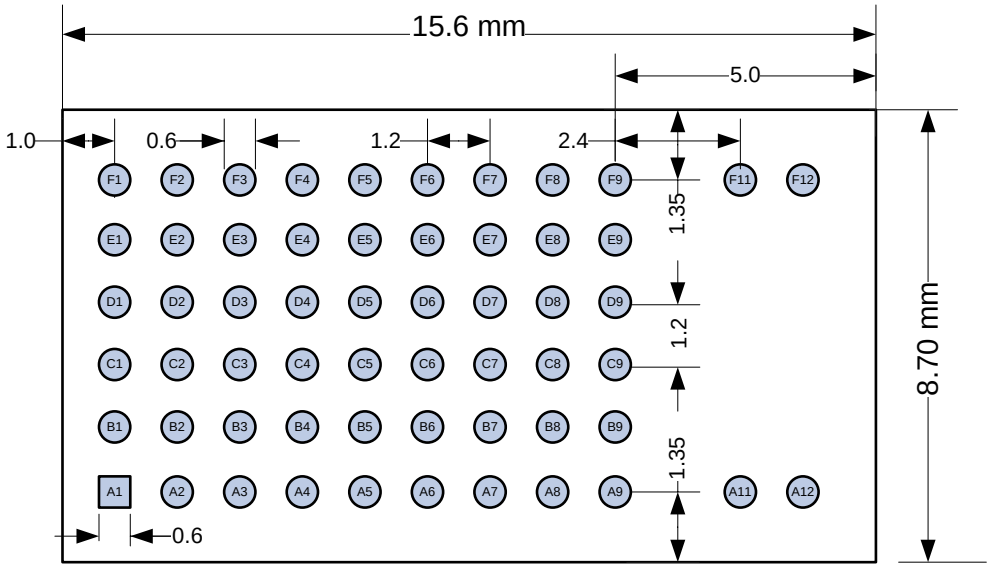
No.	Item	Dimension	Tolerance	Remark
1	Width	8.70	±0.20	
2	Length	11.60	±0.20	
3	Height	1.80	±0.20	With case

3.2 Footprint

The outer dimensions have a tolerance of ±0.2 mm.

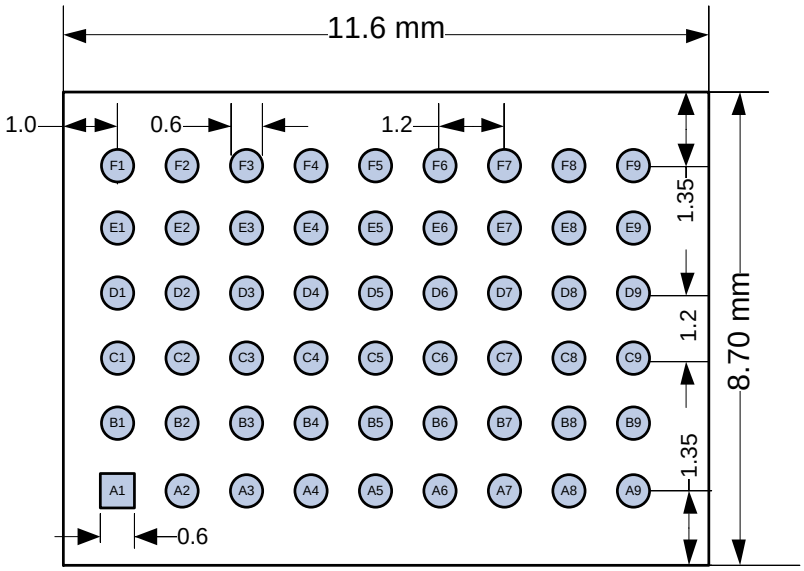
PAN172x

Top View



PAN171X

Top View

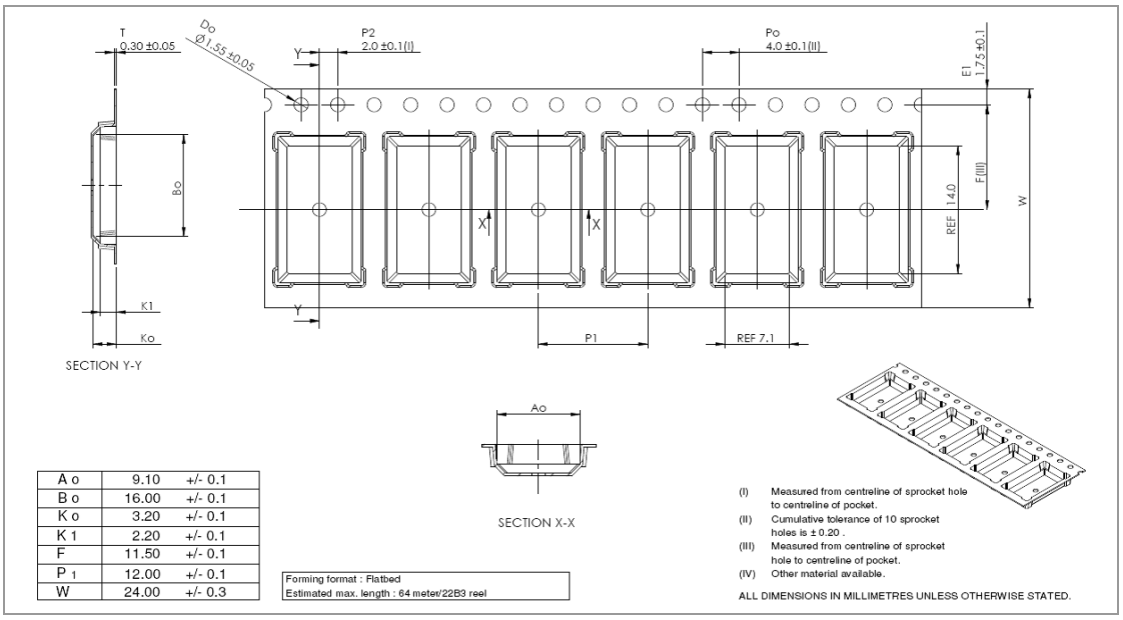


3.3 Packaging

The product is a mass production status product and will be delivered in the package described below.

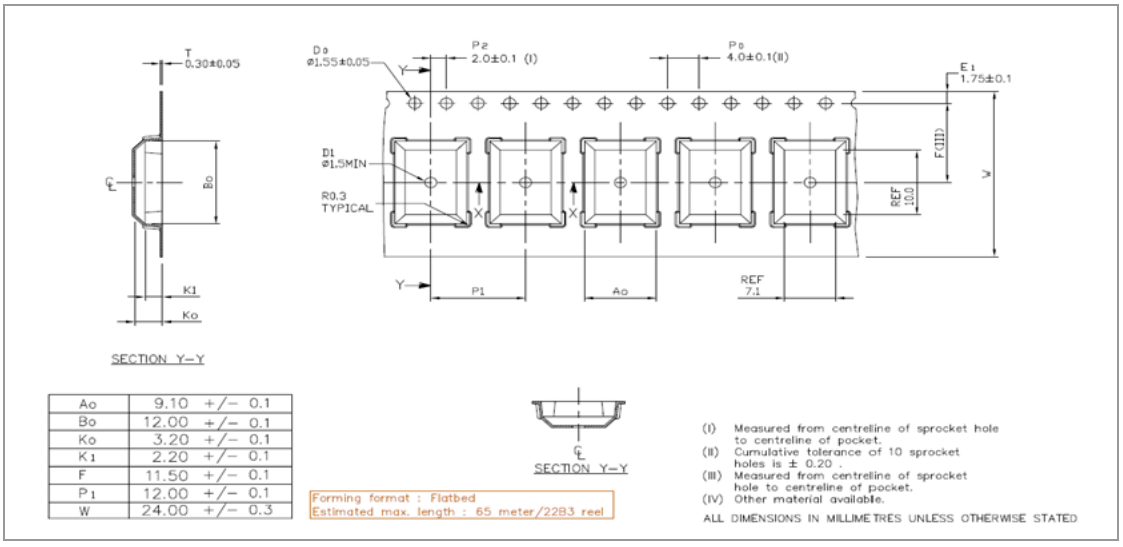
3.3.1 Tape Dimensions

PAN172x



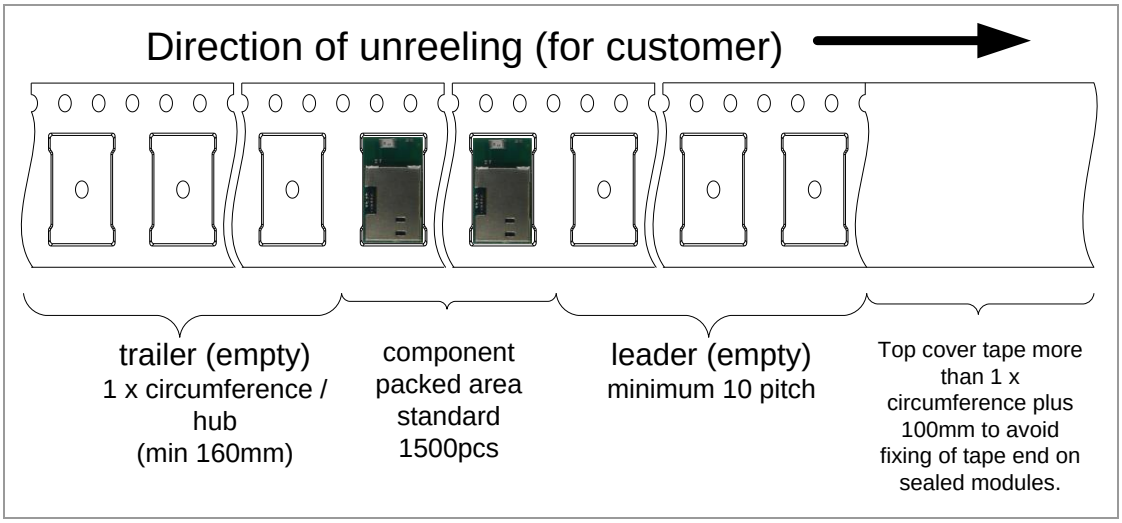
A o	9.10	+/- 0.1
B o	16.00	+/- 0.1
K o	3.20	+/- 0.1
K 1	2.20	+/- 0.1
F	11.50	+/- 0.1
P 1	12.00	+/- 0.1
W	24.00	+/- 0.3

PAN171X



Ao	9.10	+/− 0.1
Bo	12.00	+/− 0.1
Ko	3.20	+/− 0.1
K1	2.20	+/− 0.1
F	11.50	+/− 0.1
P1	12.00	+/− 0.1
W	24.00	+/− 0.3

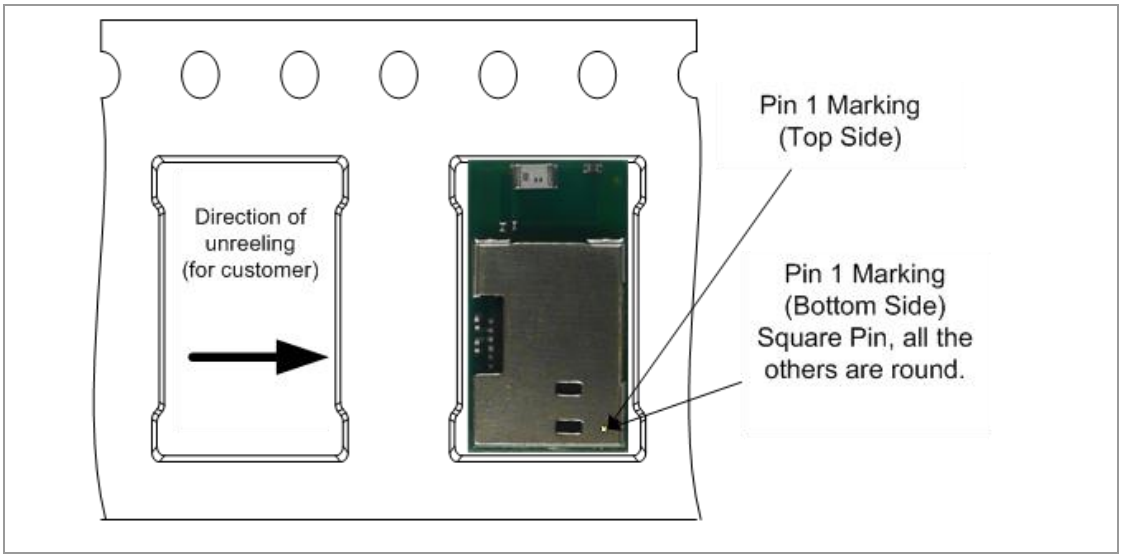
3.3.2 Packing in Tape



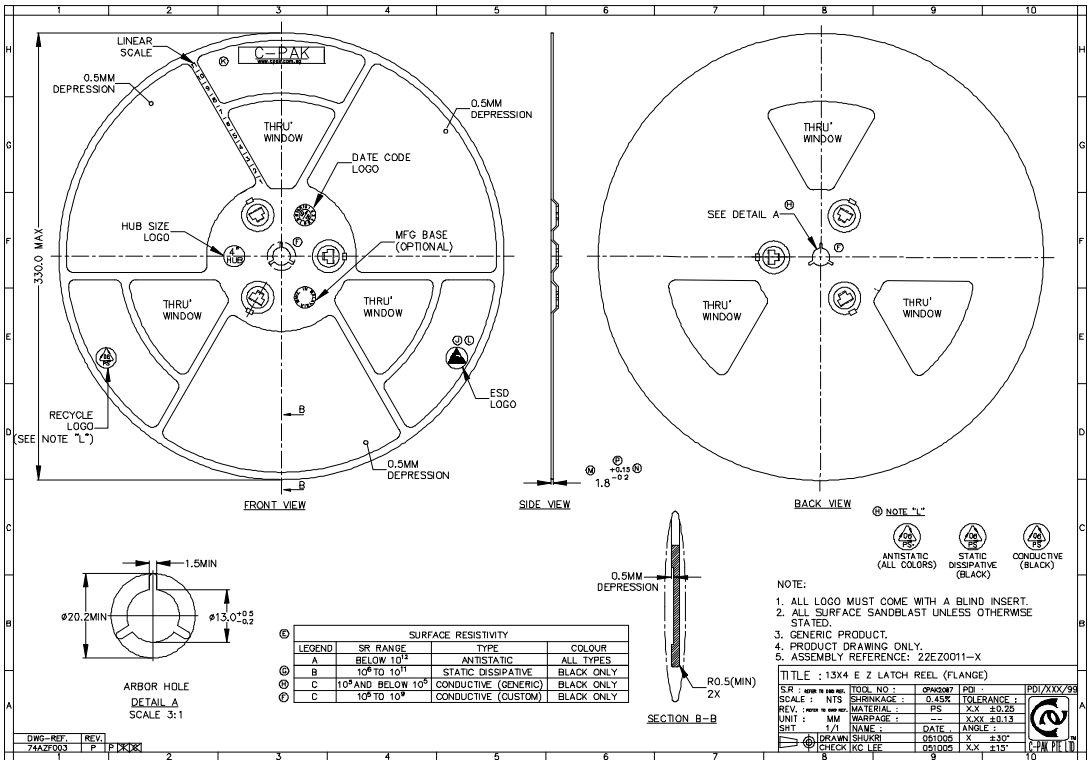
Empty spaces in the component packed area shall be less than two per reel and those spaces shall not be consecutive.

The top cover tape shall not be found on reel holes and it shall not stick out from the reel.

3.3.3 Component Direction

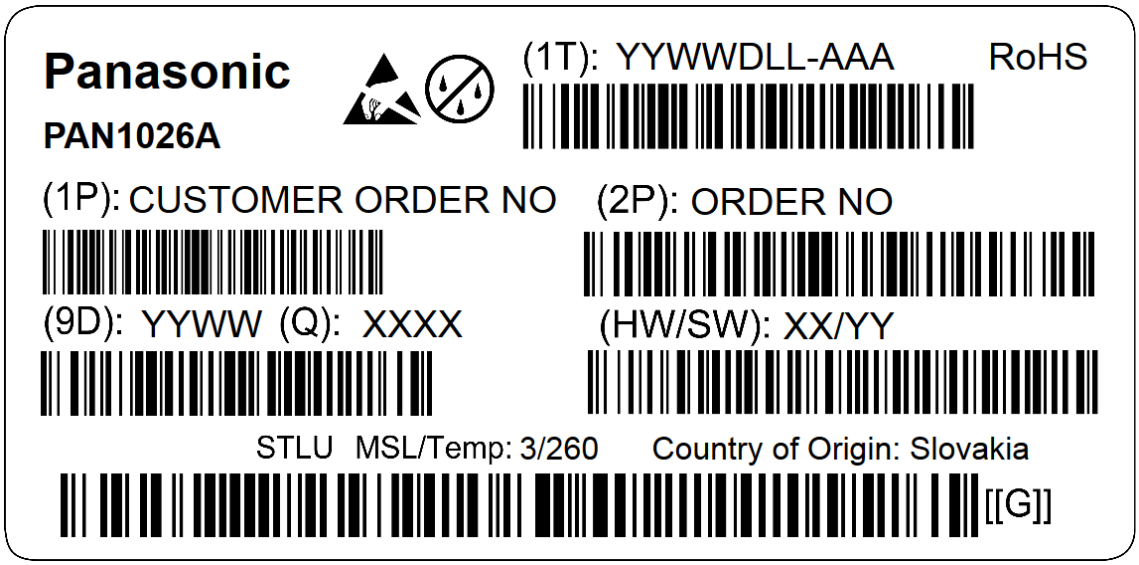


3.3.4 Reel Dimension



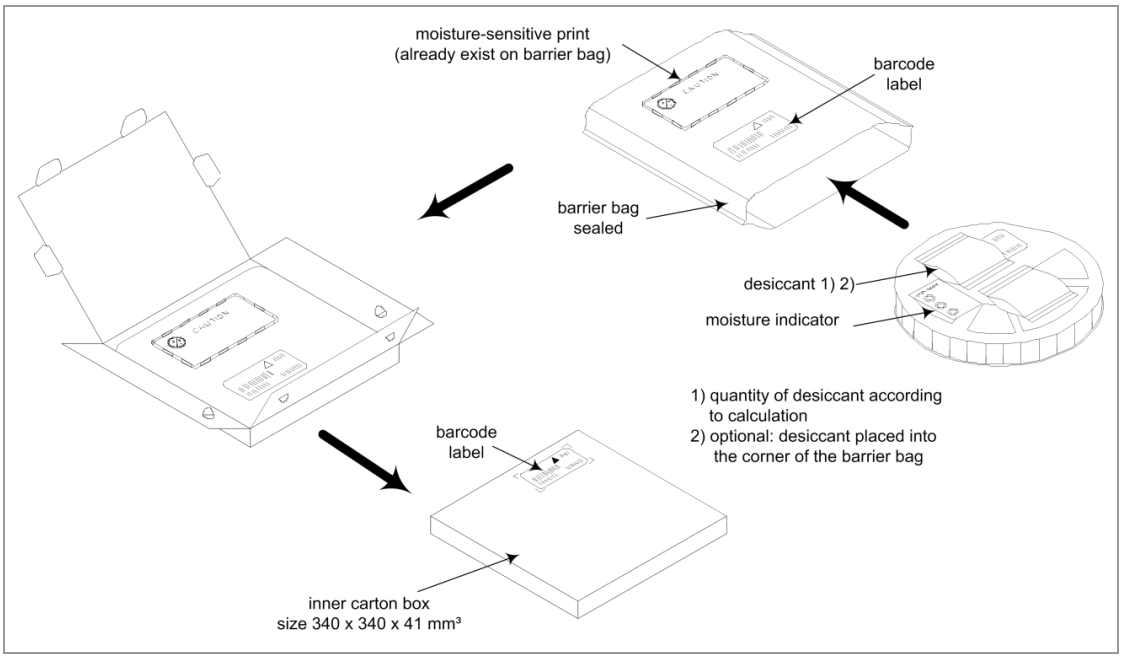
3.3.5 Package Label

Example



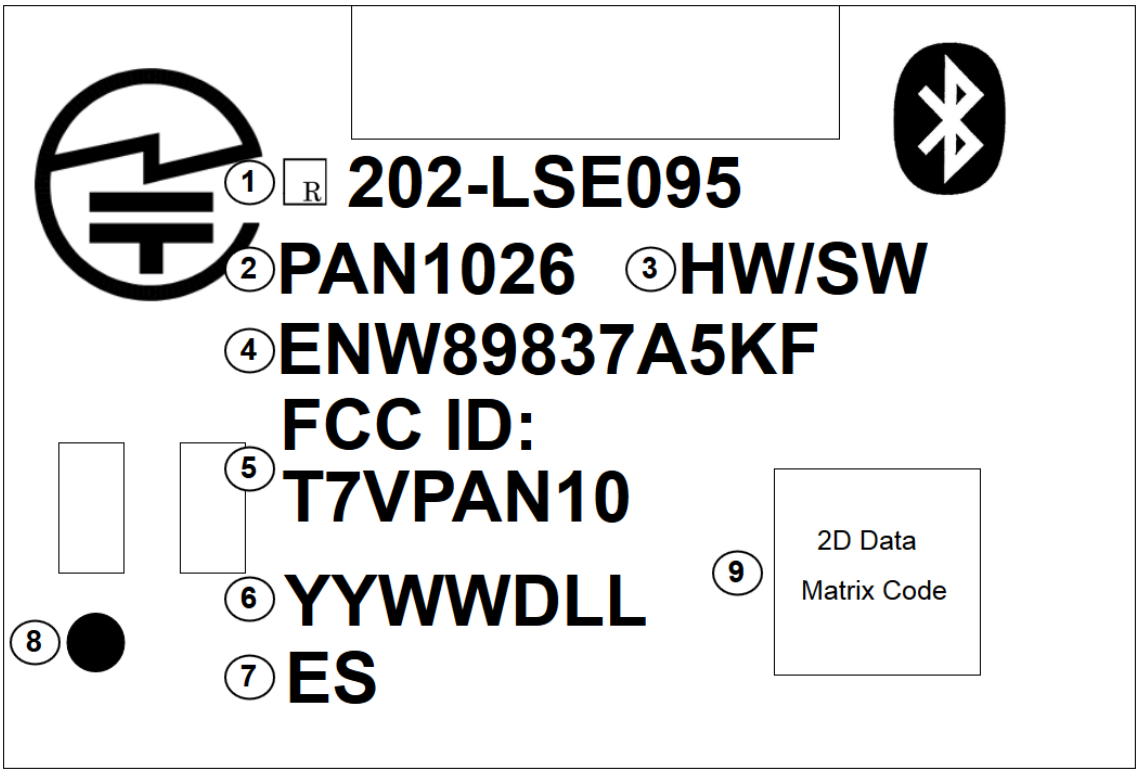
(1T)	Lot code
(1P)	Customer order number, if applicable
(2P)	Order number
(9D)	Date code
(Q)	Quantity
(HW/SW)	Hardware/software version

3.3.6 Total Package



3.4 Case Marking

Example



1	MIC ID
2	Brand name
3	Hardware/software version
4	Order number
5	FCC ID
6	Lot code
7	Engineering Sample marking, if applicable
8	Marking for Pin 1
9	2D barcode, for internal usage only

4 Specification

All specifications are over temperature and process, unless indicated otherwise.

4.1 Default Test Conditions

Temperature:	25±10 °C
Humidity:	40-85 % RH
Supply Voltage:	3.3 V

4.2 Absolute Maximum Ratings

The maximum ratings may not be exceeded under any circumstances, not even momentarily or individually, as permanent damage to the module may result.

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
T_{STOR}	Storage Temperature		-40		+125	°C
V_{ESD}	ESD Robustness	All pads, according to human body model (HBM), JEDEC STD 22, method A114			1 000	V
		According to charged device model (CDM), JEDEC STD 22, method C101			500	V
P_{RF}	RF Input Level				+10	dBm
V_{DIG}	Voltage on any Digital Pins		-0.3		V_{DD} +0.3	V

4.3 Recommended Operating Conditions

The maximum ratings may not be exceeded under any circumstances, not even momentarily or individually, as permanent damage to the module may result.

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
T_A	Ambient Operating Temperature Range		-40		+85	°C
V_{DD}	3V3 Supply Voltage		2	3.3	3.6	V

4.4 Current Consumption

The current consumption depends on the user scenario and on the setup and timing in the power modes.

Assume V_{DD}=3 V, T_{amb}=25 °C, if nothing else stated.

Parameter	Condition	Min.	Typ.	Max.	Units
I_{core} Core Current Consumption	Power mode 1. Digital regulator on; 16 MHz RCOSC and 32 MHz crystal oscillator off; 32.768 kHz XOSC, POR, BOD and sleep timer active; RAM and register retention.		235		µA
	Power mode 2. Digital regulator off; 16 MHz RCOSC and 32 MHz crystal oscillator off; 32.768 kHz XOSC, POR, and sleep timer active; RAM and register retention.		0.9		
	Power mode 3. Digital regulator off; no clocks; POR active; RAM and register retention		0.4		
	Low MCU activity: 32 MHz XOSC running. No radio or peripherals. No flash access, no RAM access.		6.7		mA
I_{peri} Peripheral Current Consumption (Add to core current I_{core} for	Timer 1. Timer running, 32 MHz XOSC used		90		µA
	Timer 2. Timer running, 32 MHz XOSC used		90		µA
	Timer 3. Timer running, 32 MHz XOSC used		60		µA
	Timer 4. Timer running, 32 MHz XOSC used		70		µA
	Sleep timer, including 32.753 kHz RCOSC		0.6		µA

Parameter	Condition	Min.	Typ.	Max.	Units
each peripheral unit activated)	ADC, when converting		1.2		mA
Power mode 1 (Active)	Digital regulator on, 16 MHz RCOSC and 32 MHz crystal oscillator off. Startup of 16 MHz RCOSC		4		µs
Power mode 2 or power mode 3 (Active)	Digital regulator off, 16 MHz RCOSC and 32 MHz crystal oscillator off. Startup of regulator and 16 MHz RCOSC		120		µs
TX or RX	Crystal ESR=16 Ω. Initially running on 16 MHz RCOSC, with 32 MHz XOSC off		410		µs
	With 32 MHz XOSC initially on		160		µs
RX/TX turnaround			150		µs
RF frequency range	Programmable in 2 MHz steps	2 402		2 480	MHz
Data rate and modulation format	1 Mbps, GFSK, 250 kHz deviation				

4.5 Bluetooth

PAN1720

Parameter	Condition	Min.	Typ.	Max.	Units
Operation Frequency Range		2 402		2 480	MHz
Channel Spacing	Bluetooth LE		2		MHz
Output Power	Maximum setting, measured at single ended 50 Ω.		4		dBm
	Maximum setting, measured at single ended 50 Ω.		-24		dBm
Sensitivity	High-gain Mode		-93		dBm
	Standard Mode		-92.5		

PAN1721

Parameter	Condition	Min.	Typ.	Max.	Units
Operation Frequency Range		2 402		2 480	MHz
Channel Spacing	Bluetooth LE		2		MHz
Output Power	Maximum setting, measured at single ended 50 Ω.		0		dBm
	Maximum setting, measured at single ended 50 Ω.		-24		dBm
Sensitivity	High-gain Mode		-93		dBm
	Standard Mode		-92.5		

PAN1720/1721

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
1	Spurious Emissions	Conducted measurement with a 50 Ω single-ended load. Complies with EN 300 328, EN 300 440 class 2, FCC CFR47, Part 15 and ARIB STD-T-66.		<-30	-41	dBm

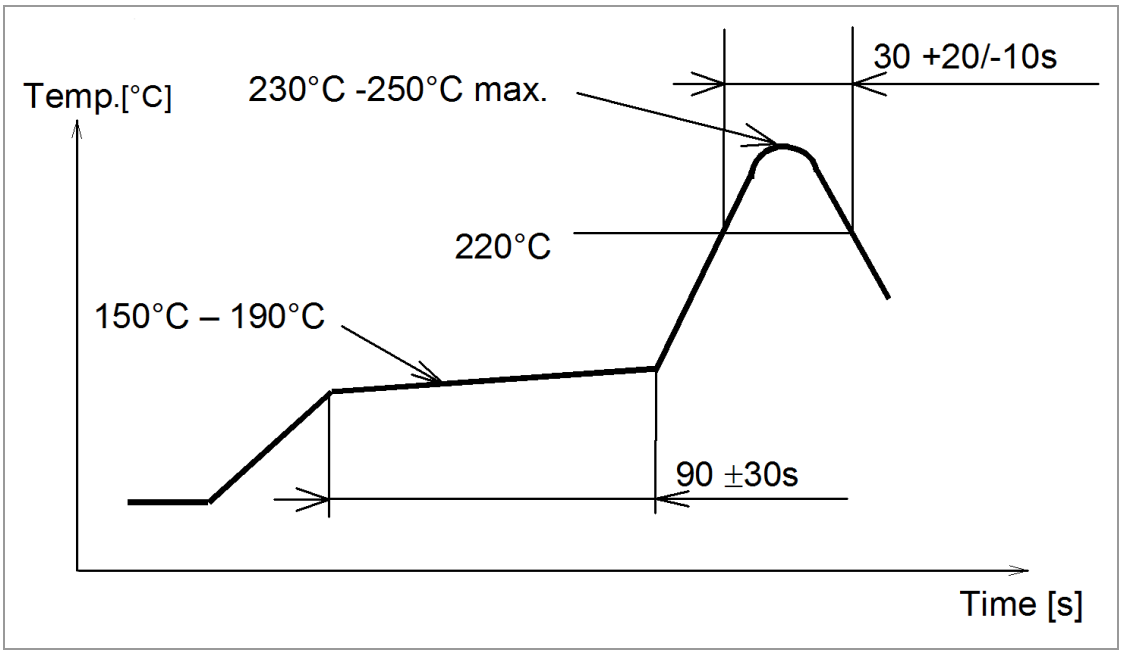
4.6 Reliability Tests

The measurement should be done after the test device has been exposed to room temperature and humidity for one hour.

No.	Item	Limit	Condition
1	Vibration test	Electrical parameter should be in specification	• Freq.: 10~50 Hz; Amplitude: 1.5 mm; 20 min./cycle, 1 h each of XYZ axis • Freq.: 30~100 Hz, 6 G; 20 min./cycle, 1 h each of XYZ axis
2	Shock test	See above	Dropped onto hard wood from a height of 50 cm for 3 times
3	Heat cycle test	See above	-40 °C for 30 min. and +85 °C for 30 min.; each temperature 300 cycles
4	Moisture test	See above	+60 °C, 90 % RH, 300 h
5	Low temperature test	See above	-40 °C, 300 h
6	High temperature test	See above	+85 °C, 300 h

4.7 Recommended Soldering Profile

- Reflow permissible cycles: 2
- Opposite side reflow is prohibited due to module weight
- More than 75 percent of the soldering area shall be coated by solder
- The soldering profiles should be adhered to in order to prevent electrical or mechanical damage
- Soldering profile assumes lead-free soldering



5 Cautions

Failure to follow the guidelines set forth in this document may result in degrading of the modules functions and damage to the module.

5.1 Design Notes

1. Follow the conditions written in this specification, especially the control signals of this module.
2. The supply voltage must be free of AC ripple voltage (for example from a battery or a low noise regulator output). For noisy supply voltages, provide a decoupling circuit (for example a ferrite in series connection and a bypass capacitor to ground of at least 47 µF directly at the module).
3. This module should not be mechanically stressed when installed.
4. Keep this module away from heat. Heat is the major cause of decreasing the life time of these modules.
5. The supply voltage should abide by the maximum ratings (⇨ 4.2 Absolute Maximum Ratings). It should not carry noise and/or spikes.
6. Avoid assembly and use of the target equipment in conditions where the module temperature may exceed the maximum tolerance.
7. Keep this module away from other high frequency circuits.
8. Refer to the recommended pattern when designing a board.

5.2 Installation Notes

1. Reflow soldering is possible twice based on the conditions set forth in ⇨ 4.7 Recommended Soldering Profile. Set up the temperature at the soldering portion of this module according to this reflow profile.
2. Carefully position the modules so that their heat will not burn into printed circuit boards or affect the other components that are susceptible to heat.
3. Carefully locate the module, to avoid an increased temperature caused by heat generated by neighboring components.
4. If a vinyl-covered wire comes into contact with the module, the wire cover will melt and generate toxic gas, damaging the insulation. Never allow contact between a vinyl cover and these modules to occur.
5. This module should not be mechanically stressed or vibrated when reflowed.
6. To repair the board by hand soldering, follow the conditions set forth in this chapter.
7. Do not wash the module.
8. Pressing on parts of the metal cover or fastening objects to the metal will cause damage to the unit.

5.3 Usage Condition Notes

1. Take measures to protect the module against static electricity.
   If pulses or transient loads (a large load, which is suddenly applied) are applied to the modules, check and evaluate their operation before assembly of the final products.
2. Do not use dropped modules.
3. Do not touch, damage or soil the pins.
4. Follow the recommended condition ratings about the power supply applied to this module.
5. Electrode peeling strength: Do not apply a force of more than 4.9 N in any direction on the soldered module.
6. Pressing on parts of the metal cover or fastening objects to the metal cover will cause damage.
7. These modules are intended for general purpose and standard use in general electronic equipment, such as home appliances, office equipment, information, and communication equipment.

5.4 Storage Notes

1. The module should not be stressed mechanically during storage.
2. Do not store these modules in the following conditions or the performance characteristics of the module, such as RF performance will be adversely affected:

– Storage in salty air or in an environment with a high concentration of corrosive gas, such as Cl_2, H_2S, NH_3, SO_2, or NO_X,
– Storage in direct sunlight,
– Storage in an environment where the temperature may be outside the range of 5 °C to 35 °C, or where the humidity may be outside the 45 % to 85 % range,
– Storage of the modules for more than one year after the date of delivery storage period: Please check the adhesive strength of the embossed tape and soldering after six months of storage.

3. Keep this module away from water, poisonous gas, and corrosive gas.
4. This module should not be stressed or shocked when transported.
5. Follow the specification when stacking packed crates (max. 10).

5.5 Safety Cautions

These specifications are intended to preserve the quality assurance of products and individual components.

Before use, check and evaluate the operation when mounted on your products. Abide by these specifications without deviation when using the products. These products may short-circuit. If electrical shocks, smoke, fire, and/or accidents involving human life are anticipated when a short circuit occurs, provide the following failsafe functions as a minimum:

1. Ensure the safety of the whole system by installing a protection circuit and a protection device.
2. Ensure the safety of the whole system by installing a redundant circuit or another system to prevent a single fault causing an unsafe status.

5.6 Other Cautions

1. Do not use the module for other purposes than those listed in section ⇨ 5.3 Usage Condition Notes.
2. Be sure to provide an appropriate fail-safe function on your product to prevent any additional damage that may be caused by the abnormal function or the failure of the module.
3. This module has been manufactured without any ozone chemical controlled under the Montreal Protocol.
4. These modules are not intended for use under the special conditions shown below. Before using these modules under such special conditions, carefully check their performance and reliability under the said special conditions to determine whether or not they can be used in such a manner:

– In liquid, such as water, salt water, oil, alkali, or organic solvent, or in places where liquid may splash,
– In direct sunlight, outdoors, or in a dusty environment,
– In an environment where condensation occurs,
– In an environment with a high concentration of harmful gas (for exmaple salty air, HCl, Cl_2, SO_2, H_2S, NH_3, and NO_X).

5. If an abnormal voltage is applied, due to a problem occurring in other components or circuits, replace these modules with new modules. They may not be able to provide normal performance even if their electronic characteristics and appearances appear satisfactory.

Please refer to the Panasonic website for for further information
⇨ 7.2.2 Product Information.

5.7 Restricted Use

5.7.1 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.

5.7.2 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.

6 Regulatory and Certification Information

6.1 Federal Communications Commission (FCC) for US

6.1.1 FCC Notice

The PAN172x including the antennas, which are listed in ⇨ 6.1.5 Approved Antenna List, complies with Part 15 of the FCC Rules.

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.

6.1.2 Caution

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.

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.

6.1.3 Label Requirements

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: T7VPAN17**.

This FCC identifier is valid for the PAN172x. The end product must in any case be labelled on the exterior with:

"Contains FCC ID: T7VPAN17"

6.1.4 Antenna Warning

This antenna warning refers to the test device with the model number PAN172x ⇨ 7.1 Ordering Information

The device is tested with a standard SMA connector and with the 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. The FCC identifier for the device with the antenna listed in ⇨ 6.1.5 Approved Antenna List is the same (**FCC ID: T7VPAN17**).

6.1.5 Approved Antenna List

Item	Part Number	Manufacturer	Frequency Band	Type	Gain (dBi)
1	LDA212G3110K	Murata	2.4 GHz	Chip antenna	+0.9
2	ANT2012LL13R2400A	Yageo	2.4 GHz	Chip antenna	+0.9

6.1.6 RF Exposure

To comply with FCC RF Exposure requirements, the OEM must ensure that only antennas from the Approved Antenna List are installed ⇨ 6.1.5 Approved Antenna List.

The preceding statement must be included as a CAUTION statement in manuals for products operating with the approved antennas in the previous table 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 PAN172x with a mounted ceramic antenna (FCC ID: **T7VPAN17**) is below the FCC radio frequency exposure limits. Nevertheless, the PAN172x 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.

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

English

The PAN172x is licensed to meet the regulatory requirements of ISED.

License ID: **IC: T7VPAN17**

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 ⇨ 6.1.5 Approved Antenna List, having a maximum gain of +0.9 dBi. Antennas not included in this list or having a gain greater than +0.9 dBi are strictly prohibited for use with this device. The required antenna impedance is 50 Ohm. The antenna used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

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

French

PAN172x est garanti conforme aux dispositions règlementaires d'Industry Canada (ISED).

License: **IC: T7VPAN17**

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 ⇨ 6.1.5 Approved Antenna List, présentant un gain maximum de 0.9 dBi. Des antennes autres que celles listées ici, ou présentant un gain supérieur à 0.9 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.

6.2.1 IC Notice

English

The device PAN172x (⇨ 7.1 Ordering Information), including the antennas (⇨ 6.1.5 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 PAN172x (⇨ 7.1 Ordering Information), les antennes y compris (⇨ 6.1.5 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.

6.2.2 Labeling Requirements

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: T7VPAN17

This IC identifier is valid for all PAN172x modules ⇨ 7.1 Ordering Information. In any case, the end product must be labelled on the exterior with:

"Contains IC: T7VPAN17".

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: T7VPAN17

Cet identifiant est valide pour tous les modules PAN172x ⇨ 7.1 Ordering Information. Dans tous les cas les produits finaux doivent indiquer sur leur emballage externe la mention suivante:

"Contient IC: T7VPAN17".

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

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

3.1a Safety/Health:	EN 60950-1:2006+A11:2009+A1:2010+A12:2011+AC:2011+A2:2013
	EN 62311:2008
	EN 62479:2010
3.1b EMC:	EN 301 489-1 V2.1.1:2017-02
	EN 301 489-17 V3.1.1:2017-02
3.2 Radio:	EN 300 328 V2.1.1:2016-11

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

CE

The end customer has to assure that the device has a distance of more than 20 cm from the human body under all circumstances.

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

PAN172x 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.

6.4 Bluetooth

Bluetooth end products which integrate the PAN172x need to receive the following IDs at creation:

Bluetooth 3.0	Declaration ID	QDID
Profile SubSystem (SDP/SPP)	B019234	36438
Controller Subsystem	B020093	40254
Host Subsystem	B019248	38386

Bluetooth 4.0	Declaration ID	QDID
Profile Subsystem (Gatt)	B019935	40735
Controller Subsystem	B021165	48177
Host Subsystem	B020932	48566

Bluetooth Marks

According to the Bluetooth SIG, the PAN172x fulfills the criteria to label your product as a Bluetooth device:

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

6.5 RoHS and REACH Declaration

The latest declaration of environmental compatibility (Restriction of Hazardous Substances, RoHS and Registration, Evaluation, Authorisation and Restriction of Chemicals, REACH) for supplied products can be found on the Panasonic website in the “Downloads” section of the respective product ⇨ 7.2.2 Product Information.

7 Appendix

7.1 Ordering Information

Variants and Versions

Order Number	Brand Name	Description	MOQ[1]
ENW89820A1KF	PAN1720	CLASS 2 Bluetooth single mode Module according Bluetooth 4.0. Bluetooth smart device	1 500
ENW89820A3KF	PAN1720	Same as above including BlueRadios BR-SPP FW version. Bluetooth smart device	1 500
ENW89835A1KF	PAN1721	CLASS 2 Bluetooth single mode Module according Bluetooth 4.0. Bluetooth smart device	1 500
ENW89835A3KF	PAN1721	Same as above including BlueRadios BR-SPP FW version. Bluetooth smart device	1 500
ENW89835C1KF	PAN1711	CLASS 2 Bluetooth single mode Module according Bluetooth 4.0. Bluetooth smart device without antenna	ES
ENW89835C3KF	PAN1711	Same as above without antenna including BlueRadios BR-SPP FW version. Bluetooth smart device without antenna	ES

[1] Abbreviation for Minimum Order Quantity (MOQ). The default MOQ for mass production is 1 500 pieces, fewer only on customer demand. Samples for evaluation can be delivered at any quantity via the distribution channels.

7.2 Contact Details

7.2.1 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

7.2.2 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