

# User Manual

## PTM21

### Version 1.0

Document Version	Component Version	Date	Author	Description	Status
1.0	1.0	05.07.2020	Bosch PT		Released



**BOSCH**

<b>1. About this Document</b> .....	<b>3</b>
1.1 Purpose and Audience .....	3
<b>2. Overview</b> .....	<b>3</b>
2.1 Block Diagram .....	3
2.2 Communication interface.....	4
2.3 Position of the PTM21 on the host board.....	4
<b>3. Mechanical Details</b> .....	<b>5</b>
3.1 Dimensions.....	5
3.2 Label.....	6
<b>4. Specifications</b> .....	<b>6</b>
4.1 Recommended operating conditions .....	6
4.2 Current consumption .....	6
4.3 Bluetooth .....	6
<b>5. Cautions</b> .....	<b>7</b>
5.1 Design notes.....	7

# 1.About this Document

## 1.1 Purpose and Audience

This Product Specification provides details on the functional, operational, and electrical characteristics of the Bosch PTM21 module. It is intended for hardware design, application, and purpose team engineers. The product is referred to as “the PTM21” or “the module” within this document.

## 2.Overview

The PTM21 is a small form factor connectivity module based on Bluetooth Low Energy 4.2 (BLE) technology. This is the 1st generation of the connectivity module of this type.

The basic concept of PTM21 is that it works as a gateway between a BLE client; mobile phone or a power tool with integrated PTM21 and tool electronics. The PTM21 uses Bluetooth Low Energy 4.2 technology for wireless data communication and it uses Smart Tools Protocol (STP) (Bosch Power Tools proprietary communication protocol) bus to communicate with the main electronics. The module’s design is based on TI-CC2640R2 microcontroller.

### 2.1 Block Diagram

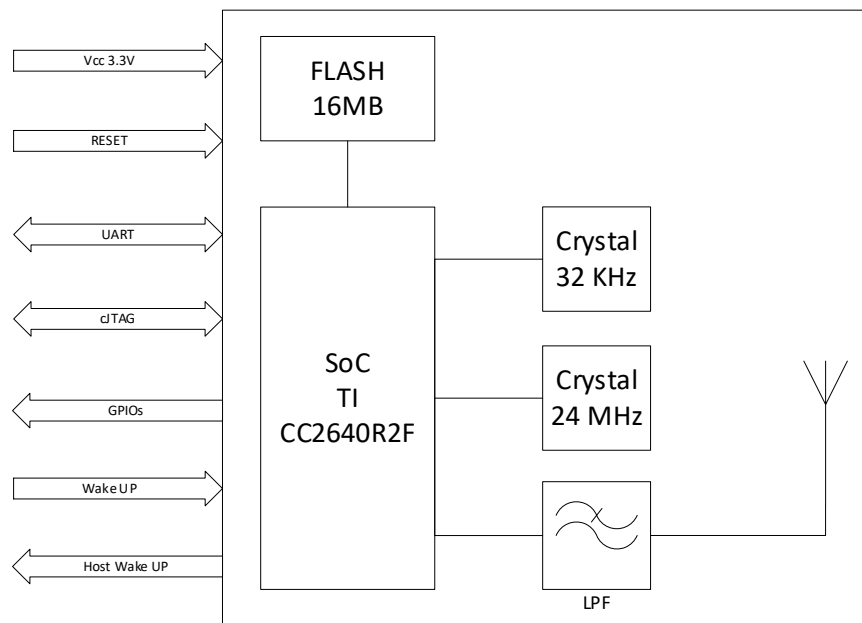


Figure 1 - PTM21 Block Diagram

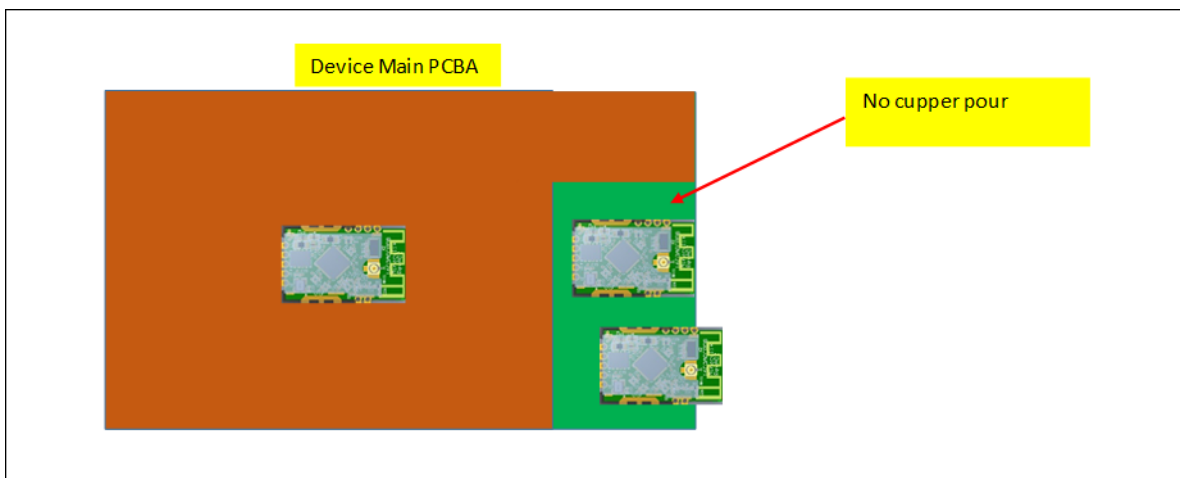
## 2.2 Communication interface

Hardware layer -> UART

- Half Duplex – One wire interface. HW adoption on the host board necessary.
- Baud rate: 115200 bps
- Data format: 8N1

Communication layer -> STB (Smart Tools Bus)

## 2.3 Position of the PTM21 on the host board

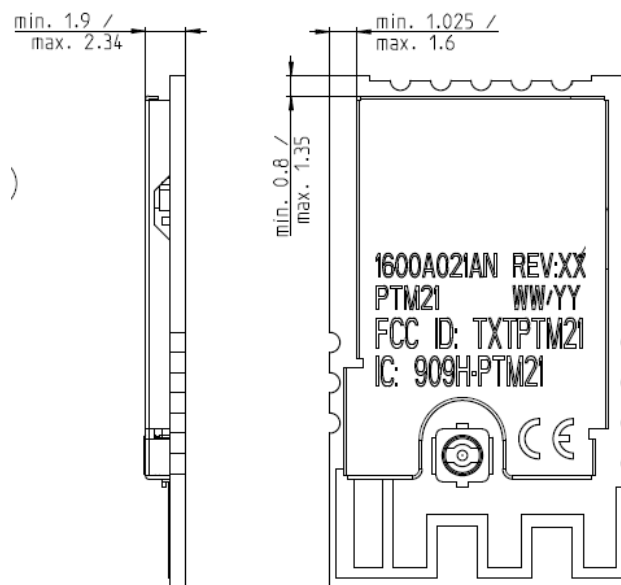
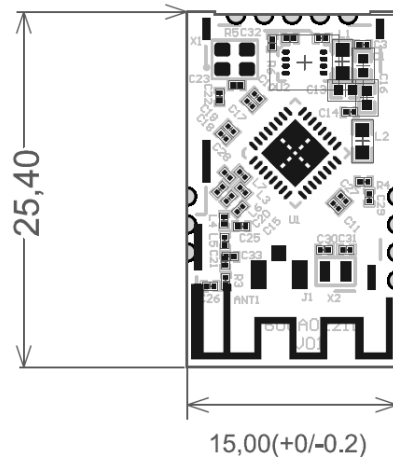


### Guidelines for Enclosure and Ground Plane

- There should not be any ground directly below the antenna
- Ensure that there is no component, mounting screw, or ground plane near the tip of the antenna or the length of antenna. No large components should be placed near the antenna.
- No battery cable, microphone cable, or any trace should cross the antenna trace on the PCB on the same side of the antenna.
- The antenna should not be covered by a metallic enclosure completely. If the product has a metallic casing or a shield, the casing should not cover the antenna. No metal is allowed in the antenna near field.
- Ensure the paint on the plastic enclosure is non-metallic near the antenna for best performance.
- The orientation of the antenna should be in line with the final product orientation so that the radiation is maximized in the desired direction. The polarization of the receive antenna and the position of the receive antenna should be taken into account to orient the module in a way that maximum radiation occurs.
- Keep away from antenna, as far as possible, large metal objects to avoid electromagnetic field blocking
- Keep any components that may radiate noise or signals within the 2.4GHz – 2.5GHz frequency-cy band far away from the antenna or better yet, shield the components that are generating the noise. Any noise radiated from the customer PCB in this frequency band will degrade the sensitivity of the module

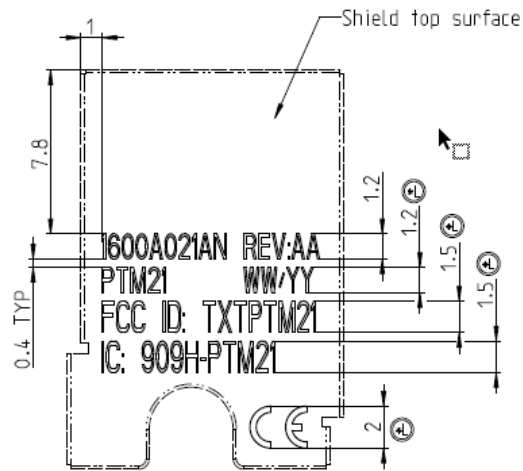
## 3. Mechanical Details

### 3.1 Dimensions



No.	Item	Dimension	Tolerance
1	Width	15 mm	±0.2
2	Length	25.4 mm	±0.2
3	Height	2.1 mm	±0.2

### 3.2 Label



## 4. Specifications

### 4.1 Recommended operating conditions

Symbol	Parameter	Condition	Min	Typ.	Max	Unit
Ta	Ambient temperature		-20		+50	°C
Vdd	3V3 Power supply		2.8	3	3.3	V

### 4.2 Current consumption

Parameter	Condition	Min	Typ.	Max	Unit
Operating current	Connected	1,4	1,5	1,8	mA
Operating current	Connected and communicating	2	2,2	2,4	mA
Sleep mode	Plus advertising	4	5	6	uA

### 4.3 Bluetooth

Parameter	Condition	Min	Typ.	Max	Unit
Frequency		2402		2480	MHz
Output power				0	dBm
Sensitivity			-90		dBm

## 5. Cautions

### 5.1 Design notes

- Follow the conditions written in this specification, especially the control signals of this module.
- The supply voltage should abide by the maximum ratings
- 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  $\mu\text{F}$  directly at the module).
- This module should not be mechanically stressed when installed.
- Keep this module away from heat. Heat is the major cause of decreasing the life time of these modules.
- Keep this module away from other high frequency circuits.
- Refer to the recommended pattern when designing a board.