ABLUE TECHNOLOGY

PTR5605

Coin-size Ultra Low Power Bluetooth Low Energy System on Module
Embedded Cortex™ M4 32 bit processor

The PTR5605 ultra-low power Bluetooth Low Energy/ANT/2.4GHz Proprietary Multi-protocol modules based on the nRF52805 from Nordic Semiconductor. The module with an ARM® Cortex™ M4 32 bit processor, embedded 2.4GHz transceiver, and integrated antenna, provide a complete solution with no additional RF design, allowing faster time to market, while simplifying designs, reducing BOM costs, also reduce the burden of Regulatory approvals to enter the world market. Making you more quickly into the bluetooth smart application and remove the worries.

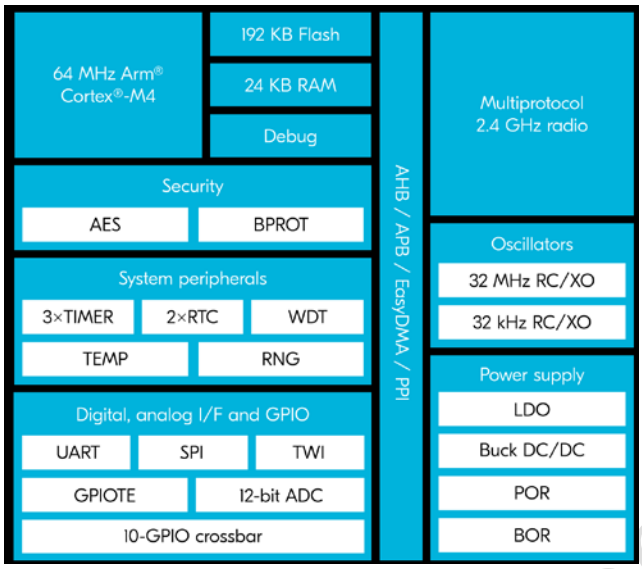
Features

- System on Module(SOM) base on Nordic nRF52805
- Bluetooth Low Energy/ANT/2.4GHz Proprietary Multi-protocol support
- Complete Bluetooth Low Energy stack/profiles solution (Bluetooth 5.x)
- ARM® Cortex™-M4 32 bit processor, 192 kB flash memory, 24 kB RAM
- 10 General Purpose I/O, Configurable mapping Pins, Simple layout of external application
- 12-bit/200KSPS ADC, SPI , Random Number Generator
- 2-wire (I2C compatible), UART (CTS/RTS and DMA), 128-bit AES HW encryption
- CPU independent Programmable Peripheral Interconnect (PPI)
- 3 x 32bit Timers, 2 x 24bit Real Timer Counters (RTC), Watchdog Timer
- Internal RC Oscillator 32.768 kHz(± 250 ppm), No external components required
- Ultra small size(smaller than CR2032 coin battery), about 15mmx15mmx1.6mm with Antenna.

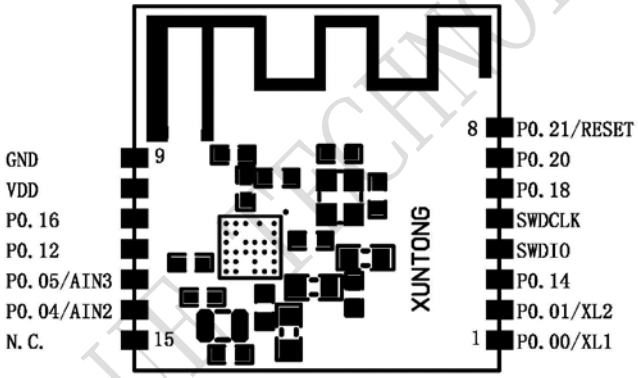
Typical Applications:

- - 2.4 GHz Bluetooth low energy systems
- - Proprietary 2.4 GHz systems
- - Sports and leisure equipment
- - Mobile phone accessories, Connected Appliances
- - Health Care and Medical
- - Consumer Electronics, Game pads
- - Human Interface Devices, Remote control
- - Building environment control / monitoring
- - RFID, Security Applications， Low-Power Sensors
- - Bluetooth Low Energy GateWay
- - iBeacons™, Eddystone™, Indoor navigation
- - Lighting Products
- - Fitness devices
- - Wearables

Block diagram:



Pin Description of Module（Top View）:



Pin No.	Name	Description	Note
1	P0.00/XL1	I/O	
2	P0.01/XL2	I/O	
3	P0.14	I/O	
4	SWDIO	Debug and flash programming	
5	SWDCLK	Debug and flash programming	
6	P0.18	I/O	
7	P0.20	I/O	
8	P0.21/RESET	I/O/ RESET	Configurable as pin reset.
9	GND	Power Ground	
10	VDD	Power Supply	
11	P0.16	I/O	
12	P0.12	I/O	
13	P0.05/AIN3	I/O/Analog Input	
14	P0.04/AIN2	I/O/ Analog Input	
15	N.C.	Not Use	

Note: An internal 4.7μF bulk capacitor has been included on the module. For those application that with heavy GPIO usage and/or current draw, it is good design practice to add additional bulk capacitance as required for your application.

General Purpose I/O:

The general purpose I/O is organized as one port enabling access and control of the 32 available GPIO pins through one port. Each GPIO can be accessed individually with the following user configurable features:

- Input/output direction
- Output drive strength
- Internal pull-up and pull-down resistors
- Wake-up from high or low level triggers on all pins
- Trigger interrupt on all pins
- All pins can be used by the PPI task/event system; the maximum number of pins that can be interfaced through the PPI at the same time is limited by the number of GPIOTE channels
- All pins can be individually configured to carry serial interface

Hardware RESET:

There is on-chip power-on reset circuitry, But can still be used in external reset mode, in this case, GPIO pin P0.21 as an external hardware reset pin(Active Low). In order to utilize P0.21 as a hardware reset, the UICR registers PSELRESET[0] and PSELRESET[1] must be set alike, to the value of 0x7FFFFF15. When P0.21 is programmed as RESET, the internal pull-up is automatically enabled.

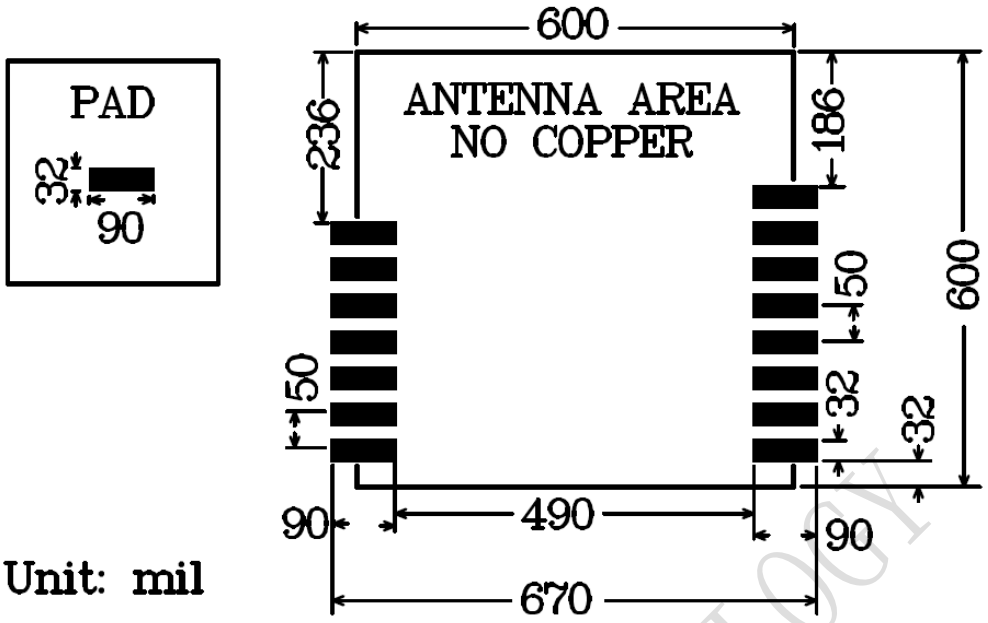
HW debug and flash programming of Module :

The Module support the two pin Serial Wire Debug (SWD) interface and offers flexible and powerful mechanism for non-intrusive debugging of program code. Breakpoints, single stepping, and instruction trace capture of code execution flow are part of this support.

Pin	Flash Program interface
SWDIO	Debug and flash programming I/O
SWCLK	Debug and flash programming I/O

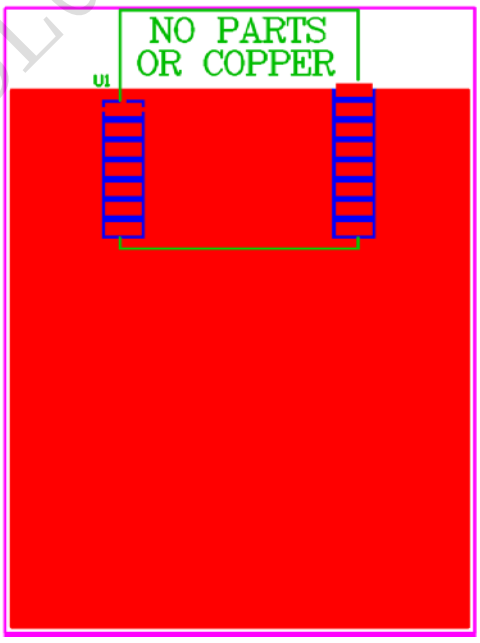
This is the hardware debug and flash programming of module, J-Link Lite support, please refer www.segger.com.

PCB Footprint （Top View）:



Recommended RF Layout & Ground Plane:

The module integrated antenna requires a suitable ground plane to radiate effectively. The area under and extending out from the antenna portion of the module should be kept clear of copper and other metal. The module should be placed at the edge of the PCB with the antenna edge facing out. Reducing the ground plane will reduce the effective radiated power.



Radio Specifications:

Parameter	Min.	Typ.	Max.	Unit
Frequency Range	2402		2480	MHz
Maximum Output Power		+4		dBm
Rx Sensitivity Level, BLE1 Mbps		-95		dBm
Data Rate on air	1000		2000	kbps
Operating Temperature Range	-40	25	85	°C

Radio current consumption (transmitter):

Parameter	Min.	Typ.	Max.	Unit
TX only current (DC/DC, 3 V) PRF = +4 dBm		7		mA
TX only current (DC/DC, 3 V) PRF = +0 dBm		4.6		mA
TX only current (DC/DC, 3 V) PRF = -4 dBm		3.6		mA
TX only current (DC/DC, 3 V) PRF = -8 dBm		3.2		mA
TX only current (DC/DC, 3 V) PRF = -20 dBm		2.5		mA

Radio current consumption (Receiver):

Parameter	Min.	Typ.	Max.	Unit
RX only current (DC/DC, 3 V) 1 Mbps BLE		4.6		mA
RX only current (DC/DC, 3 V) 2 Mbps BLE		5.2		mA

Operating Conditions:

Parameter	Min.	Typ.	Max.	Unit
Supply voltages				
VDD	1.7	3.0	+3.6	V
Operating Temperature Range	-40	25	85	°C

Absolute Maximum Ratings:

Parameter	Min.	Max.	Unit
Supply voltages			
VDD	-0.3	+3.9	V
VSS	0	0	V
I/O pin voltage			
Voltage on GPIO pins ($V_{CC} \leq 3.6V$)	-0.3	VDD + 0.3	
Voltage on GPIO pins ($V_{CC} > 3.6V$)	-0.3	+3.9	
RF input level		10	dBm
Environmental			
ESD Human Body Model		2	KV
ESD Human Body Model Class		2	

ESD Charged Device Model		1	KV
Storage temperature	-40	125	℃
Flash memory Endurance		10000	Write/erase cycles

Note: Exceeding one or more of the limiting values may cause permanent damage to the module.

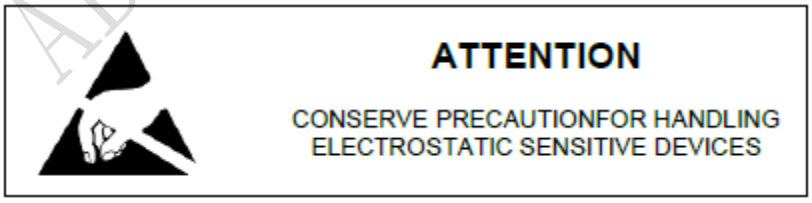
Notes and Cautions:

Design Notes

(1) It is critical to following the recommendations of this document to ensure the module meets the specifications.
(2) Power supply must be free of AC ripple voltage. If such noise is present, it is critical to provide proper filtering and decoupling.
(3) The module should not be stressed mechanically after installation.
(4) Exposing the module to significant temperatures will result in degradation and decreased lifetime.
(5) Keep module away from other high frequency devices which may interfere with operation such as other transmitters and devices generating high frequencies.
(6) Avoid static electricity, ESD and high voltage as these may damage the module.

Handling and Storage

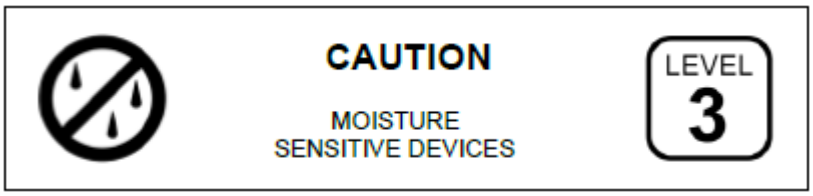
(1) Keep module away from other high frequency devices which may interfere with operation such as other transmitters and devices generating high frequencies.
(2) Do not expose the module to the following conditions: Corrosive gasses such as Cl2, H2S, NH3, SO2, or NOX Extreme humidity or salty air Prolonged exposure to direct Sunlight Temperatures beyond those specified for storage.
(3) Do not apply mechanical stress.
(4) Do not drop or shock the module.
(5) Avoid static electricity, ESD and high voltage as these may damage the module.



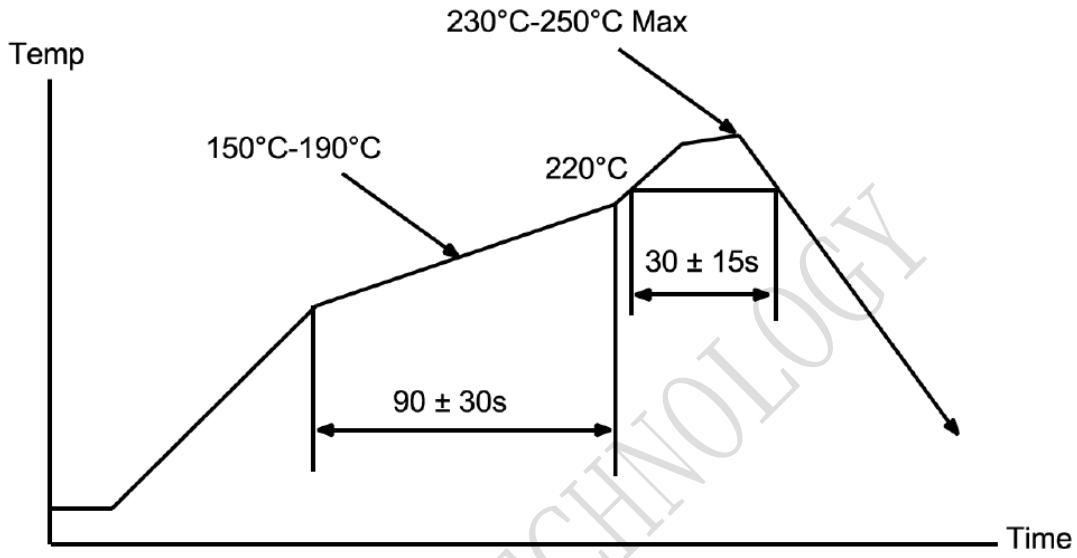
Moisture Sensitivity

All plastic packages absorb moisture. During typical solder reflow operations when SMDs are mounted onto a PCB, the entire PCB and device population are exposed to a rapid change in ambient temperature. Any absorbed moisture is quickly turned into superheated steam. This sudden change in vapor pressure can cause the package to swell. If the pressure exerted exceeds the flexural strength of the plastic mold compound, then it is possible to crack the package. Even if the package does not crack, interfacial delamination can occur.

Since the device package is sensitive to moisture absorption, it is recommended to bake the product before assembly.



Solder Reflow Temperature-Time Profile



Life Support Applications

Products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Customers using or selling these products for use in such applications do so at their own risk.

Additional Customization

We provide extensive customization, design and manufacturing services to ensure the perfect fit for your product. Our wide selection of modules allows developers to create any number of products. Should you need more information and assistance in integrating this module or developing your product, please contact us.

- Custom Hardware design including Modules, RF and Antenna Design
- Bluetooth Low Energy and Firmware Development
- Mobile Apps for iOS and Android
- Cloud Platform

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Ordering Information:

Part Number	Description
PTR5605	Bluetooth Low Energy 5.x System on Module
MPTR5605-EVB	Evaluation boards for module，with key, LED, I/O extend，sock for coin cell battery.