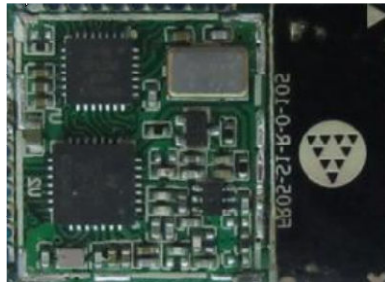


RF transceiver module

HPBU01-TR-915

Datasheet



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1. Introduction

The HPBU01-TR-915 is a compact, low power, bidirectional transceiver module in the 915 MHz range utilizing Sub-GHz technology. The module provides long range and high output power while also reducing current consumption to a minimum. The HPBU01-TR-915 also utilizes the widely used ATmega328P processor. The coupling of Sub-GHz transceiver technology and ATmega328P processor allows for faster prototyping and fast time to market. The HPBU01-TR-915 module utilizes a patch antenna to reduce the need for RF development and antenna tuning and provide consistent range expectations.



Figure 1-1: Picture of HPBU01-TR-915

Specifications

- Sub-GHz Transceiver
- 902 MHz – 928 MHz Frequency Range
- Built in AES-128 encryption
- Down to -120 dBm at 1.2kbps sensitivity
- Programmable output to +20 dBm (100mW)
- UART, SPI, and I2C interface
- Customizable GPIO for analog / digital signals
- ATmega328P Co-Processor
- Supply voltage range from 2.4v to 3.6v

Application

- Wireless Sensor Networks
- Home and Building Automation
- Wireless Alarm and Security Systems
- Meter Reading
- Remote Control
- Telemetry
- Environmental Alerts

2. Electrical Characteristics

2.1 Absolute Maximum Ratings

Absolute maximum values should not be exceeded or sustained for a long period of time.

Failure to comply may result in damaging the module.

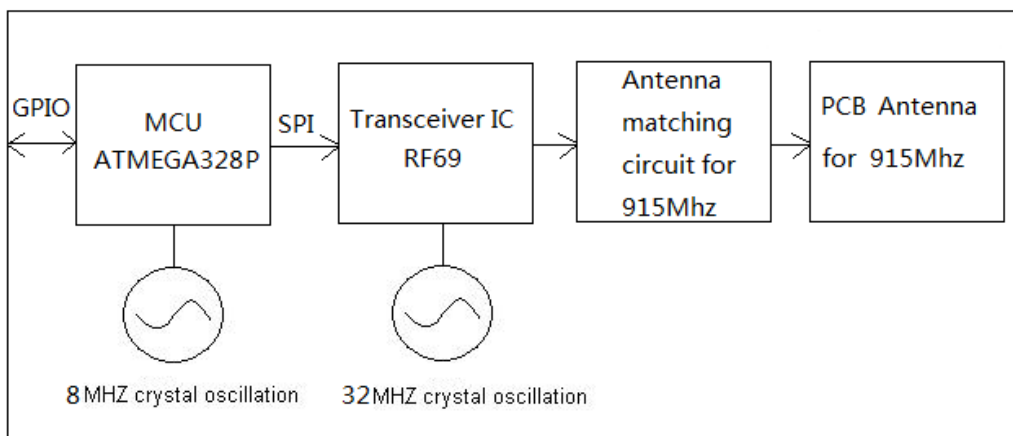
Symbol	Description	Min	Max	Unit
VDDmr	Supply Voltage	-0.5	3.9	V
Tmr	Temperature	-55	+115	° C
Tj	Junction temperature	-	+125	° C
Pmr	RF Input Level	-	+6	dBm
DC_20dBm	Duty Cycle of transmission at +20dBm output	-	1	%
VSWR_20dBm	Maximum VSWR at antenna port	-	3:1	-

2.2 Operating Range

Symbol	Description	Min	Max	Unit
VDDop	Supply voltage(1.8V-2.4V 17dBm, 2.4V- 3.6V 20dBm)	1.8	3.6	V
Top	Operational temperature range	-40	+85	°C
Clop	Load capacitance on digital ports	-	25	pF
ML	RF Input Level	-	0	dBm

2.3 Power Consumption

Symbol	Description	Conditions	Min	Typ	Max	Unit
IDDSL	Supply current in Sleep mode		-	0.1	1	uA
IDDIDLE	Supply current in Idle mode	RC oscillator enabled	-	1.2	-	uA
IDDST	Supply current in Standby mode	Crystal oscillator enabled	-	1.25	1.5	mA
IDDFS	Supply current in Synthesizer mode		-	9	-	mA
IDDR	Supply current in Receive mode		-	16	-	mA
IDDT	Supply current in Transmit mode with appropriate matching, stable across VDD range	RFOP = +20 dBm, on PA_BOOST	-	130	-	mA
		RFOP = +17 dBm, on PA_BOOST	-	95	-	mA
		RFOP = +13 dBm, on RFIO pin	-	45	-	mA
		RFOP = +10 dBm, on RFIO pin	-	33	-	mA
		RFOP = 0 dBm, on RFIO pin	-	20	-	mA
		RFOP = -1 dBm, on RFIO pin	-	16	-	mA

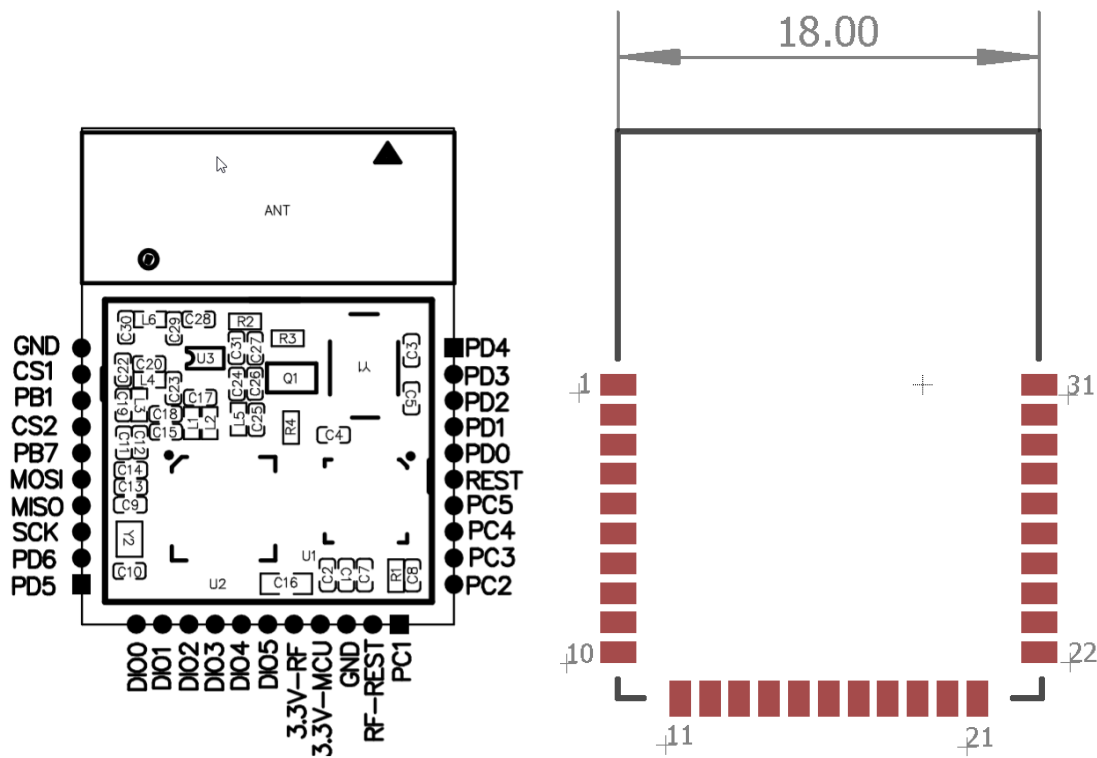


HPBU01-TR-915 915MHz FSK Transceiver Module

3. Module Package

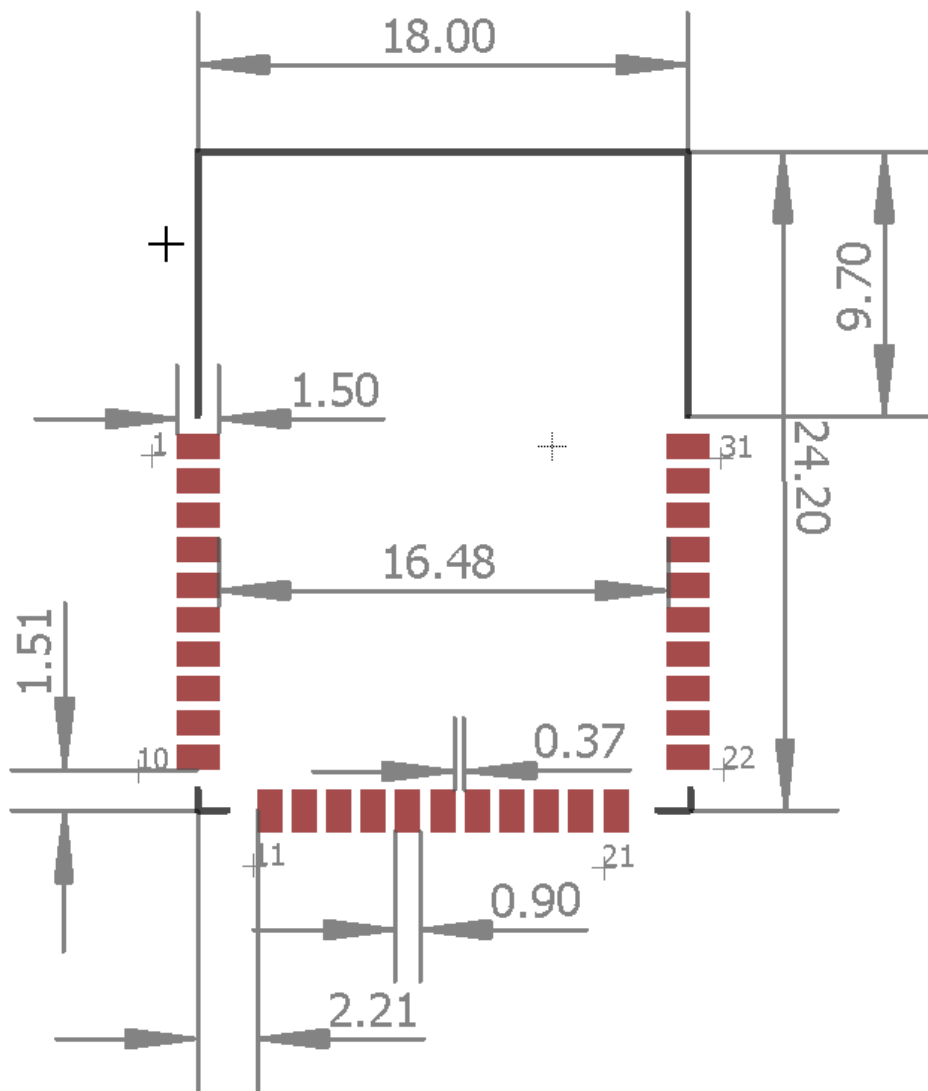
The pinout and recommended footprint for designing around the HPBU01-TR-915 module is defined below for east integration and implementation.

3.1 Pinout Description



PIN	PIN Name	Pin Type	MCU Pin	Description
1	GND	Supply		Ground Connection
2	CS1	D IN/OUT	PB2	DIGITAL IO / SPI NSS
3	PB1	D IN/OUT	PB1	DIGITAL IO
4	CS2	D IN/OUT	PB0	DIGITAL IO
5	PD7	D IN/OUT	PD7	DIGITAL IO
6	MOSI	D IN/OUT	PB3	DIGITAL IO / SPI MOSI
7	MISO	D IN/OUT	PB4	DIGITAL IO / SPI MISO
8	SCK	D IN/OUT	PB5	DIGITAL IO / SPI SCK
9	PD6	D IN/OUT	PD6	DIGITAL IO
10	PD5	D IN/OUT	PD5	DIGITAL IO
11	DIO0	D IN/OUT	DIO0	RF IO Pin
12	DIO1	D IN/OUT	DIO1	RF IO Pin
13	DIO2	D IN/OUT	DIO2	RF IO Pin
14	DIO3	D IN/OUT	DIO3	RF IO Pin
15	DIO4	D IN/OUT	DIO4	RF IO Pin
16	DIO5	D IN/OUT	DIO5	RF IO Pin
17	3.3V-RF	Supply		Supply Voltage
18	3.3V-MCU	Supply		Supply Voltage
19	GND	Supply		Ground Connection
20	RF-REST	D IN	REST	Reset Pin for RF69
21	PC1	D IN/OUT, A IN	PC1	DIGITAL IO / ADC
22	PC2	D IN/OUT, A IN	PC2	DIGITAL IO / ADC
23	PC3	D IN/OUT, A IN	PC3	DIGITAL IO / ADC
24	PC4	D IN/OUT, A IN	PC4	DIGITAL IO / ADC
25	PC5	D IN/OUT, A IN	PC5	DIGITAL IO / ADC
26	REST	D IN	PC6	Reset Pin for MCU
27	PD0	D IN/OUT	PD0	DIGITAL IO / RX
28	PD1	D IN/OUT	PD1	DIGITAL IO / TX
29	PD2	D IN/OUT	PD2	DIGITAL IO / INT0
30	PD3	D IN/OUT	PD3	DIGITAL IO / INT1
31	PD4	D IN/OUT	PD4	DIGITAL IO

3.2 Recommended Footprint



FCC WARNING:

This device complies with part 15 of the FCC Rules. 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.

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

NOTE:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generate, 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.

To maintain compliance with FCC's RF Exposure guidelines, this equipment should be installed and operated with minimum distance between 20cm the radiator your body:
Use only the supplied antenna.

FCC ID: 2APA5-HPBU01