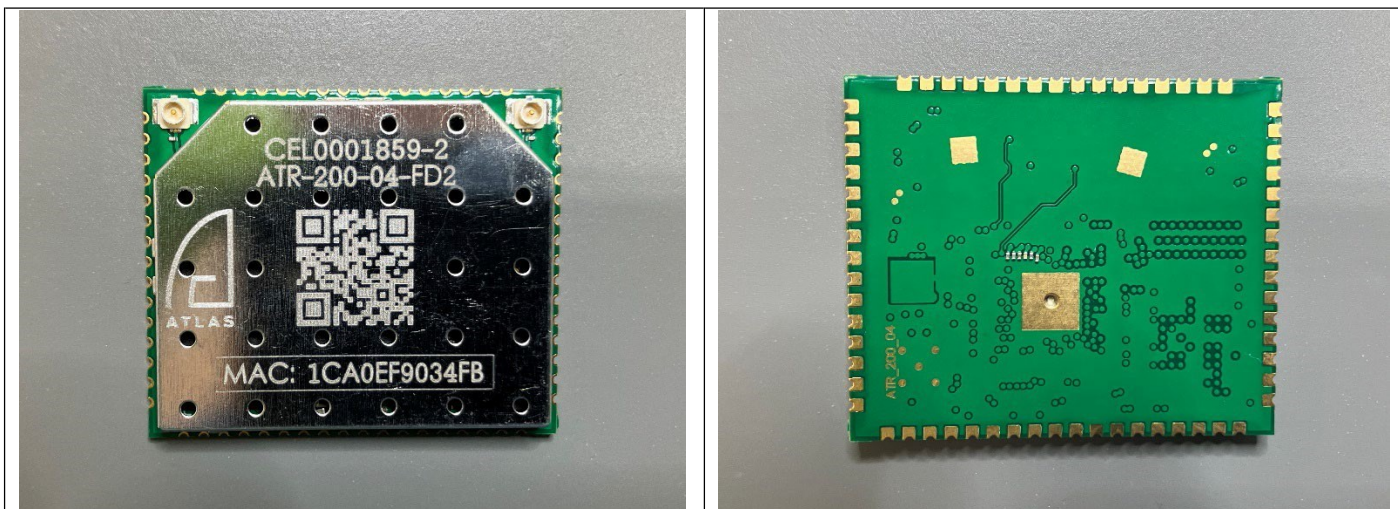


ATR200FD2

OVERVIEW



The ATR-200 is a full-featured radio router in a small (37x31mm) castellated holes solderable form factor (aka OEM). The radio module is available for 2.4GHz frequency ranges and has a configurable output power of up to 22dBm per channel. It has 2 ethernet ports, 1 USB FS port that can be used to add any kind of additional peripherals, SPI and PCI-E port, as well as 10 GPIO. The different kinds of pre-designed carrier boards are available upon request.

Key features

Frequency hopping - 10 hops per second (under EUA)

2412-2462 MHz (20MHz bandwidth), 2405-2469 MHz (5MHz bandwidth)

Low power consumption - 11 W @ full throttle (2x1W, max throughput)

Configurable channel width - 5, 20MHz

Configurable output power – up to 22dBm

Automatically adjustable or fixed type of modulation - BPSK, QPSK, QAM16 ... QAM64

Communication ports - USB, 2x100 Mbit Ethernet ports, SPI, PCIe, GPIO

Onboard Ethernet switch to support bridging and gateway configurations.

Supports 802.11 standard roles- AP/Station or mesh (802.11s)

Open platform to extend functionality with your own software services.

Over radio updatable firmware.

Security enhancement - WPA3 Personal (SAE)

Industrial temperature range - 40°C ... +85°C

Technical specification

Frequency range	2.4 GHz
Maximum output power	158mW (22dBm) configurable in 1dBm step
Modulations	BPSK...QAM64
Adaptive bitrate selection algorithm or fixed selection.	
Max. throughput (2 spatial streams) 5MHz, 20MHz	36Mbit/sec 72Mbit/sec 144Mbit/se
Antenna Connection *Reference Antenna	UFL (Antenna port 0 (left) is used for TX/RX, Antenna port 1 (right) is only for RX, no TX function, only MISO Mode support. CIROCOMM FSAJ0I22 (2.4G Peak Gain: 1.52dBi)
Interfaces	USB FS (12Mbit/s) 2x100Mbit ETH SPI PCIe
Supply voltage	+3.3V digital (2A max peak), +5V RF (2.5A max peak)
POWER CONSUMPTION	
Max (10Mb/sec @QAM64) Typical (1Mb/sec @QAM16) Idle	11W (external heatsink required) 2-3W 1.5W
ENVIRONMENTAL	
Temperature	-40C - +85C
Humidity	5-95%
DIMENSIONS	
OEM AtlasPRO drone carrier board	31x37x4m m
WEIGHT	
OEM AtlasPro Drone carrier board	~7g ~26g (w/o heatsink)

Typical throughput

Here are the experimental achieved throughput for a single channel configuration. Obtained by iperf3, UDP traffic.

1460 bytes packets. Single channel, 5MHz bandwidth.			
MCS level	Throughput (Mbps)	Throughput (Mbps)	Throughput (Mbps)
	-50dB	-85dB	-88dB
0 (BPSK)	1.49	1.48	1.49
1 (QPSK)	2.99	2.98	2.98
2 (QPSK)	4.47	4.51	4.49
3 (QAM16)	6.04	5.99	5.91
4 (QAM16)	8.93	8.89	8.83
5 (QAM64)	10.9	-	-
6 (QAM64)	11.6	-	-
7 (QAM64)	14.4	-	-

Increasing channel's bandwidth to 20 MHz will increase max throughput almost linear up to 4 times correspondingly.

Software and configuration

The module running under Open Wrt Linux operating system and can be configured through the standard Linux interfaces - serial console over UART interface, SSH session on any of net- work interface including wireless interface, RPCD, Web, etc. Addition Open Wrt services such as socat, ser2net, FTP, SFTP, QoS, DNS, HTTPS, ICMP, NTP, DHCP, VLAN and much more can be installed as add-ons. Please check Open Wrt v19.07 for details about available packages. The software can be updated over the air.

ATR-200 integration

The radio module supplied in OEM form factor needs to be integrated into the carrier system. The carrier system has to provide power supply and connection to the module's interfaces.

Maximum power consumption of the module is ~11W (1-2W for CPU, ~9W for RF). The recommended carrier system needs to be able to provide at least 2.5A for +5V RF rail. Digital +3.3V rail consumption is less than 2W for typical software packages, but it can be more depending on customer installed packages.

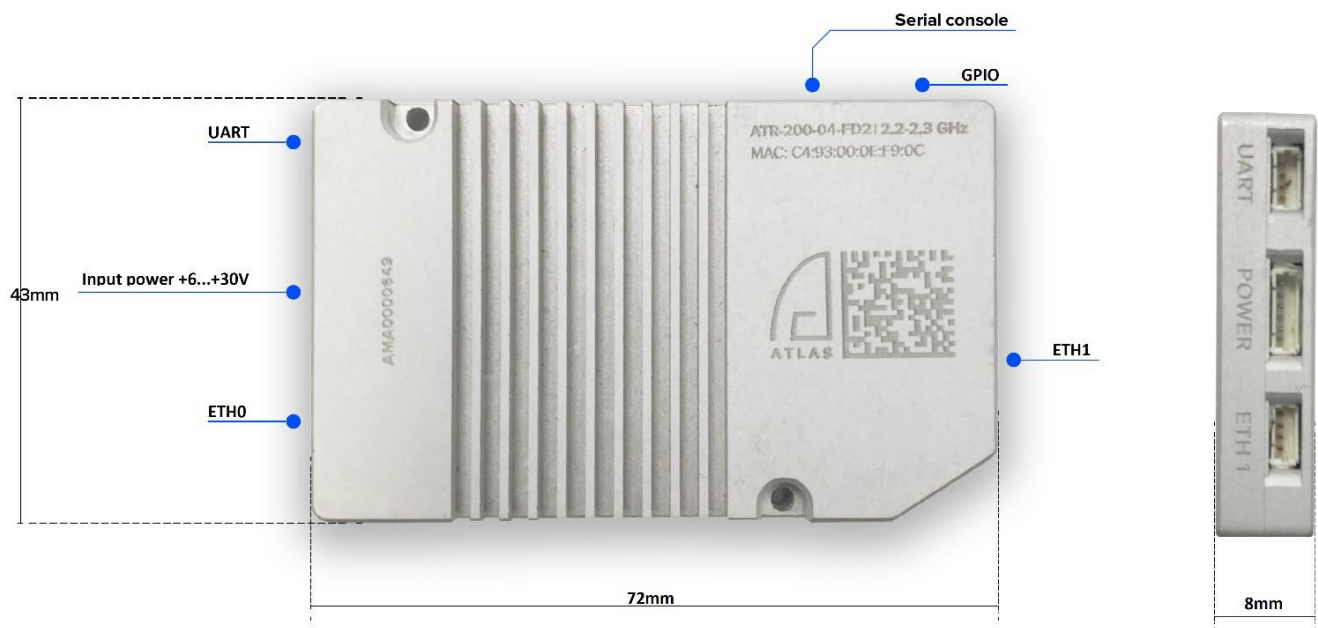
During the integration a special care needs to be taken to guarantee thermal characteristics. In a best case scenario a carrier system or a UAV's frame should be used as a heatsink. In some cases the external active cooling can be considered as an option.

For digital peripheral connection the USB Full speed is provided on the module. Accordingly, if a carrier system requires, for instance, UART, I2C or I2S interfaces, then corresponding USB converters need to be integrated as well. Several USB converters can be connected using a trivial USB FS hub.

For high speed data transmission the module provides 2x ETH ports that can be used in transformerless mode as well as in classic configuration with transformers (aka ethernet magnetics).

For easier integration and debugging it is recommended to add the ATR-200FD2 console port which is standard 115200 8N1 UART port. It should be considered that UART interface supposes high level of activity on TX pin, thus corresponding measures should be taken to avoid powering the module through the UART RX pin I.e. optical decoupling or additional MOSFET on console port.

As an example, please find ATR-200 integration for AtlasPro UAV:



The carrier board above has 2x100 Mbit/sec transformer less ethernet interfaces, one high speed UART port (up to 1 Mbit/s) to connect to AtlasPRO UAV autopilot, one I2 C temperature sensor connected via USB IO extender (based on STM32 MCU), one GPIO button for radio modules pairing, one serial console for debugging purposes and single input power connector. IO extender is a composite USB device with two interfaces:

HID (for temperature sensor, leds and active cooling control) and ACM for high speed UART.

The heatsink must be calculated for a particular design according to environmental characteristics, expected power consumption and requirements.

INFORMATION TO USER

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.

This equipment complies with radio frequency exposure limits set forth by the FCC for an uncontrolled environment.

This equipment should be installed and operated with a minimum distance of 4 cm between the device and the user or bystanders.

This device must not be co-located or operating in conjunction with any other antenna or transmitter.

Please note that 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 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.

Module Statement

The ATR-200 module has received Federal Communications Commission (FCC) CFR47 Telecommunications, Part 15 Subpart C “Intentional Radiators” single-modular approval in accordance with Part 15.212 Modular Transmitter approval. Single-modular transmitter approval is defined as a complete RF transmission sub-assembly, designed to be incorporated into another device, that must demonstrate compliance with FCC rules and policies independent of any host. A transmitter with a modular grant can be installed in different end-use products (referred to as a host, host product, or host device) by the grantee or other equipment manufacturer, then the host product may not require additional testing or equipment authorization for the transmitter function provided by that specific module or limited module device.

The user must comply with all of the instructions provided by the Grantee, which indicate installation and/or operating conditions necessary for compliance.

The host product itself is required to comply with all other applicable FCC equipment authorizations regulations, requirements and equipment functions that are not associated with the transmitter module portion. For example, compliance must be demonstrated: to regulations for other transmitter components within a host product; to requirements for unintentional radiators (Part 15 Subpart B), such as digital devices, computer peripherals, radio receivers, etc.; and to additional authorization requirements for the non-transmitter functions on the transmitter module (i.e., Suppliers Declaration of Conformity (SDoC) or certification) as appropriate.

LABELING AND USER INFORMATION REQUIREMENTS

The ATR-200 module has been labeled with its own FCC ID number, and if the FCC ID number is not visible when the module is installed inside another device, then the outside of the finished product into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wordings as follows:

Contains Transmitter Module

FCC ID: 2BCPM-ATLATR200

or

Contains FCC ID: 2BCPM-ATLATR200