IMPOSSIBLE
AEROSPACE

Impossible Radio

IAUS11901

User Manual

www.impossible.aero

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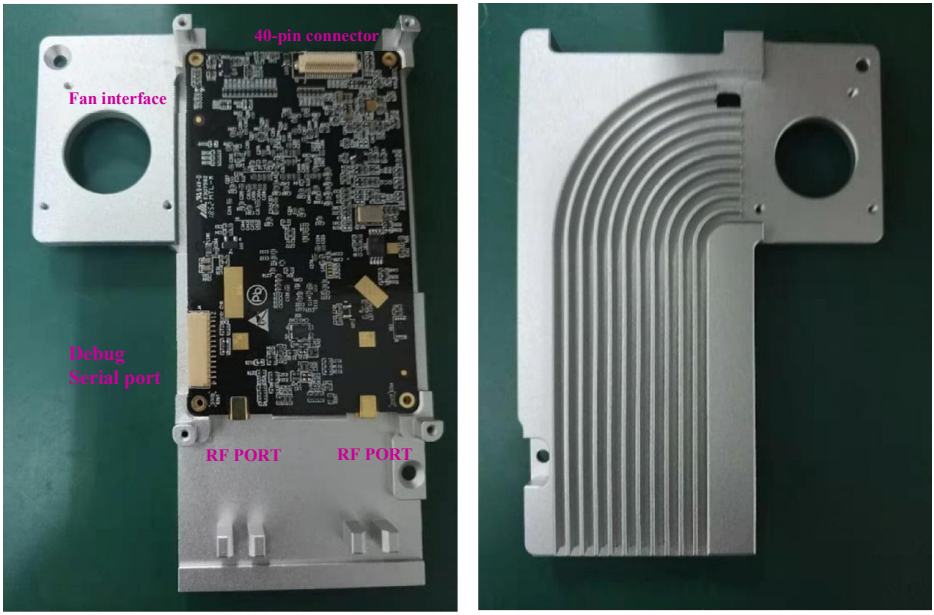
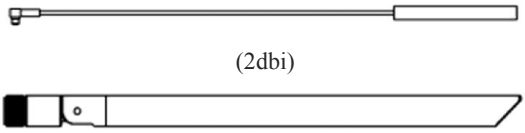
1. Package Contents

Model:IAUS11901



IAUS11901

Antenna



(2dbi)

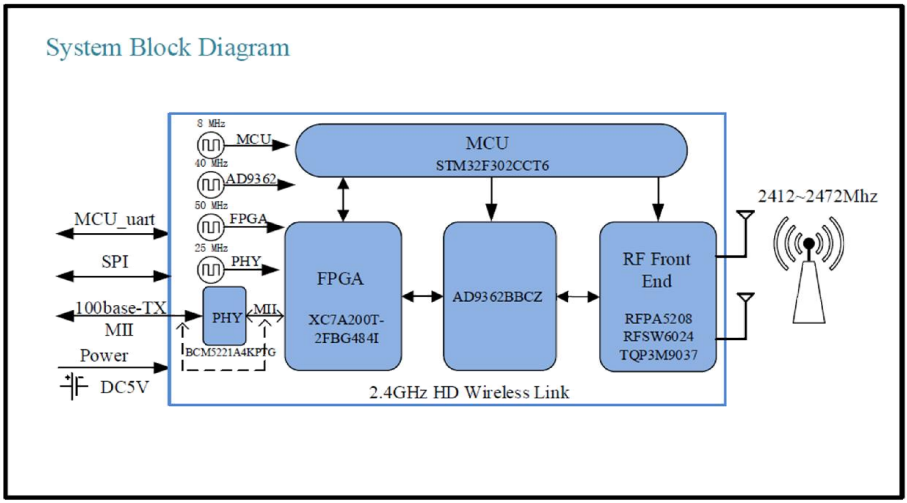
(5dbi)

Note: We provide different shielding structures according to different environment, so the IAUS11901 series contains three different types of structures currently. We number it IAUS11901a/b/c,there are supplementary pictures in the back.

2. Hardware Description

Impossible RF Transmission board is Software Defined Radio Architecture. The system is able to integrate the latest advanced communication technologies, like orthogonal frequency division multiplex (OFDM) modulation, Multiple Input Multiple Output (MIMO), low density parity check (LDPC)code, etc. and has the ability to keep evolving to accommodate future applications.

2.1.System block diagram



Parameters	Specifications
Radio Frequency	2.4GHz
Bandwidth	10Mhz, 20MHz
Max. Transmission Power	27dbm(FCC), 20dbm(CE)
LOS Range	>12km(27dbm)
Modulation	OFDM
FEC	LDPC
Duplex	TDD

Data Input	Ethernet MII (or 100Base-TX)
RF interface	MMCX
Dimensions (mm)	75mmX45mm
Power Input	5.0V/1.5A
Max. Power Consumption	5.5W

2.2.Connecter

Pin definition on 40-Pin connector			
Part number: DF12B-40Ds-0p5V_86, Manufacture: HRS			
Pin	Net	Level	Description
1	FPGA_DONE	LVCMOS(3.3V)	
2	MCU_UART2_RX	LVCMOS(3.3V)	UART2
3	FPGA_GPIO1	LVCMOS(3.3V)	GPIO
4	MCU_UART2_TX	LVCMOS(3.3V)	UART2
5	MII_RXC	LVCMOS(3.3V)	FPGA_MII (or 100BASE-TX)
6	MII_TXC (ETH_TDP)	LVCMOS(3.3V)	
7	MII_RXD0	LVCMOS(3.3V)	
8	MII_TXEN (ETH_TDN)	LVCMOS(3.3V)	
9	MII_RXD1	LVCMOS(3.3V)	
10	MII_TXD0 (ETH_RDP)	LVCMOS(3.3V)	
11	MII_RXD2	LVCMOS(3.3V)	
12	MII_TXD1 (ETH_RDN)	LVCMOS(3.3V)	
13	MII_RXD3	LVCMOS(3.3V)	
14	MII_TXD2 (ETH_ACTLED)	LVCMOS(3.3V)	
15	MII_RXDV	LVCMOS(3.3V)	
16	MII_TXD3(ETH_LNKLED)	LVCMOS(3.3V)	

17	SBUS_PPM	LVCMOS(3.3V)	Remote signal
18	CAN_TX	LVCMOS(3.3V)	CAN
19	FPGA_GPIO2	LVCMOS(3.3V)	GPIO
20	CAN_RX	LVCMOS(3.3V)	CAN
21	FPGA_GPIO3	LVCMOS(3.3V)	GPIO
22	FPGA_SPI_SCK	LVCMOS(3.3V)	SPI
23	FPGA_GPIO4	LVCMOS(3.3V)	GPIO
24	FPGA_SPI_MOSI	LVCMOS(3.3V)	SPI
25	FPGA_PROG	LVCMOS(3.3V)	
26	FPGA_SPI_CS	LVCMOS(3.3V)	SPI
27	MCU_RST	LVCMOS(3.3V)	MCU_RST
28	FPGA_SPI_MISO	LVCMOS(3.3V)	SPI
29	FPGA_GPIO5	LVCMOS	GPIO
30	GND	GROUND	POWER
31	GND	GROUND	
32	GND	GROUND	
33	GND	GROUND	
34	VCC_IN (5V)	POWER@0.3A	
35	VCC_IN (5V)	POWER@0.3A	
36	VCC_IN (5V)	POWER@0.3A	
37	GND	GROUND	
38	VCC_IN (5V)	POWER@0.3A	
39	GND	GROUND	
40	VCC_IN (5V)	POWER@0.3A	

2.3.Debug

This is a 12PIN side mount, mainly used for debugging MCU and FPGA, and provides a debugging serial port. Type: SH-1X12P_1P0MM.

Pin	Signal name	Signal description	Level attributes - Remarks
1	MCU1_JTMS-SWDIO	MCU_DEBUG	LVCMOS(3.3V)
2	MCU1_JTCK-SWCLK		LVCMOS(3.3V)
3	NRST#	MCU_RST	LVCMOS(3.3V)
4	GND	Ground	POWER
5	3.3V	Power source	POWER
6	JTAG_TCK	FPGA_JTAG	LVCMOS(3.3V)
7	JTAG_TMS		LVCMOS(3.3V)
8	JTAG_TDO		LVCMOS(3.3V)
9	JTAG_TDI		LVCMOS(3.3V)
10	MCU1_USART1_RX	debugging serial port	LVCMOS(3.3V)
11	MCU1_USART1_TX		LVCMOS(3.3V)
12	GND	Ground	POWER

2.4.Interface board

We also provide a test broad that can be used with this wireless module(IAUS11901).

There are MB_LAN board, MB_HDMI&USB-OUT board, MB_HDMI-IN board,which can support different external communication interfaces.

- Micro USB（upgrade）port

Transmission boards with any interface board provide a microUSB interface.

- Lan port

This interface will only be provided with the LAN board.

- UART port

Transmission boards with any interface board provide a UART interface.

- HDMI port(in & out)

MB_HDMI&USB-OUT Supports a HDMI video onput interface.

MB_HDMI-IN Supports a HDMI video input interface.

- PPM/S.bus port(in & out)

Interface definition and line order: 凸 G V+ G L H(PPM/SBUS, GND, POWER(3.3V), GND, CAN_L, CAN_H). Can bus is not supported now.

- USB port

This port supports connecting mobile phone to output video.

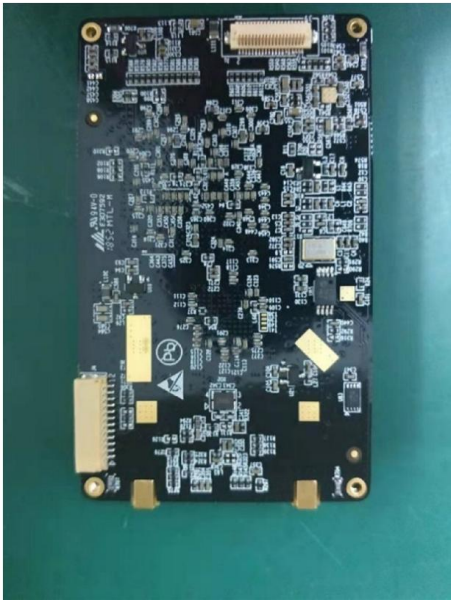
- Power port

Power supply port for the whole module.

3. Other structure

3.1.ETH module (IAUS11901a)

3.2.HDMI-in module (IAUS11901b)



3.3.HDMI -out module(IAUS11901c)

4. Unit combination

4.1.Air unit

Air unit(video input with HDMI port): transmission board, MB_HDMI-IN board.

Air unit(video input with LAN port): transmission board, MB_LAN board.

4.2.Ground unit

Ground unit(video output with HDMI&USB port): transmission board, MB_HDMI&USB-OUT board.

Ground unit(video output with LAN port): transmission board, MB_LAN board.

4.3.System setup

Any combination of the air unit and the ground unit can setup communication.

Choose different combinations according to different application scenarios.

5. Software Program

5.1.Transmission board

Tranmission board needs to program baseband and MCU1 firmware.

Tranmission board can be programed for air unit or ground unit.

5.2.Interface board

MB_LAN board can be programed for air unit or ground unit.

MB_HDMI-IN board can only be programed for air unit.

MB_HDMI&USB-OUT board can only be programed for ground unit.

Federal Communications Commission (FCC) Interference Statement

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 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.

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.

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

RF exposure warning

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment must be installed and operated in accordance with provided instructions and the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be collocated or operating in conjunction with any other antenna or transmitter.

OEM Integration Instructions：

This device is intended only for OEM integrators under the following conditions：

The module can be used to installation in other host. The antenna must be installed such that 20 cm is maintained between the antenna and users, and the transmitter module may not be co-located with any other transmit or antenna. The module shall be only used with the integral antenna(s) that has been originally tested and certified with this module. As long as 3 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirement with this module installed (for example, digital device emission, PC peripheral requirements, etc.)

IMPORTANT NOTE：

In the event that these conditions cannot be met (for example certain laptop configuration or co-location with another transmitter), then the FCC authorization for this module in combination with the host equipment is no longer considered valid and the FCC ID of the module cannot be used on the final product. In these and circumstance, the OEM integrator will be responsible for re-evaluating. The end product (including the transmitter) and obtaining a separate FCC authorization. The final end product must be labeled in a visible area with the following: "**Contains Transmitter Module FCC ID: 2ASGB-US142019**" or
"Contains FCC ID: 2ASGB-US142019".

Antenna Specification:

Antenna Name	Frequency Band (GHz)	TX Paths	Max Peak Gain (dBi)
RP-SMA Antenna (Ant 1)	2.4 ~ 2.5	1	5.0
PCB Antenna (Ant 2)	2.4 ~ 2.5	1	2.0

Note: The device can only use the Ant 1 When it is working at 2.5MHz Bandwidth.