IRIS-W10 series

Stand-alone multiradio module with dual band Wi-Fi 6, Bluetooth LE and 802.15.4

Data sheet

Abstract

This technical data sheet describes the series of IRIS-W10 stand-alone, Open CPU modules with dual-band Wi-Fi 6 (802.11ac/ax/b/g/n), Bluetooth Low Energy 5.3, and Thread connectivity. The modules include a powerful tri-radio MCU for advanced customer applications with support Matter over Wi-Fi and Thread. Including a full set of embedded security features, IRIS-W1 is ideal for critical IoT applications where security is crucial.

Aimed towards developers and other technical staff, this document provides an overview and full functional description of each module variant, including a detailed pin list, block diagram, mechanical and electrical specification, and ordering information.

Document information

Title	IRIS-W10 series	
Subtitle	Stand-alone multiradio module with dual band Wi-Fi 6, Bluetooth LE and 802.15.4	
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Product status	Corresponding content status	
Functional sample	Draft	For functional testing. Revised and supplementary data will be published later.
In development / Prototype	Objective Specification	Target values. Revised and supplementary data will be published later.
Engineering sample	Advance Information	Data based on early testing. Revised and supplementary data will be published later.
Initial production	Early Production Information	Data from product verification. Revised and supplementary data may be published later.
Mass production / End of Life	Production Information	Document contains the final product specification.

This document applies to the following products:

Product name	Type number	Hardware version	PCN reference	Product status
IRIS-W101	IRIS-W101-00B-00	01	N/A	In development
IRIS-W106	IRIS-W106-00B-00	01	N/A	In development

Contents

1   Functional description

1.1   Overview

The IRIS-W1 series of high performance, stand-alone, tri-radio, Wi-Fi 6 and Bluetooth LE modules offer strong Wi-Fi channel security and reliability with improved network efficiency and lower power consumption.

Featuring an NXP RW612 wireless Micro Controller Unit (MCU) with integrated tri-radio, IRIS-W1 supports the latest Wi-Fi 6 technology, Bluetooth LE 5.3, 802.15.4 low-rate wireless networks, and open-standard Matter over Wi-Fi, Thread, and Ethernet connectivity. With PCB antenna and external antenna options, IRIS-W1 is the ideal solution for securely connecting products in business and home ecosystems. The Open CPU module configuration embeds a powerful Arm® Cortex®-M33 MCU, clocked up to 260 MHz with 1.2 MB RAM and 8 MB flash, and supports several peripheral interfaces (UART, USB, SPI, SDIO, RMII, QVGA, I2S, I2C, and GPIOs).

IRIS-W10 is to be assessed for compliance against the EU Radio Equipment Directive (RED) and certification approval is also planned in the following countries: US (FCC), Canada (ISED), Japan (MIC), Taiwan (NCC), South Korea (KCC), Australia /New Zealand (ACMA), Brazil (ANATEL), South Africa (ICASA).

The modules will be qualified for professional grade operation, supporting an extended temperature range of -40 °C to +85 °C.

1.2   Applications

IRIS-W1 modules suit a wide range of applications, including:

- Internet of Things (IoT)
- Wi-Fi and Bluetooth LE networks
- Telematics
- Point-of-sales
- Medical and industrial networking
- Access to laptops, mobile phones, and similar consumer devices
- Home/building automation
- Ethernet/Wireless Gateway

1.3   Block diagram
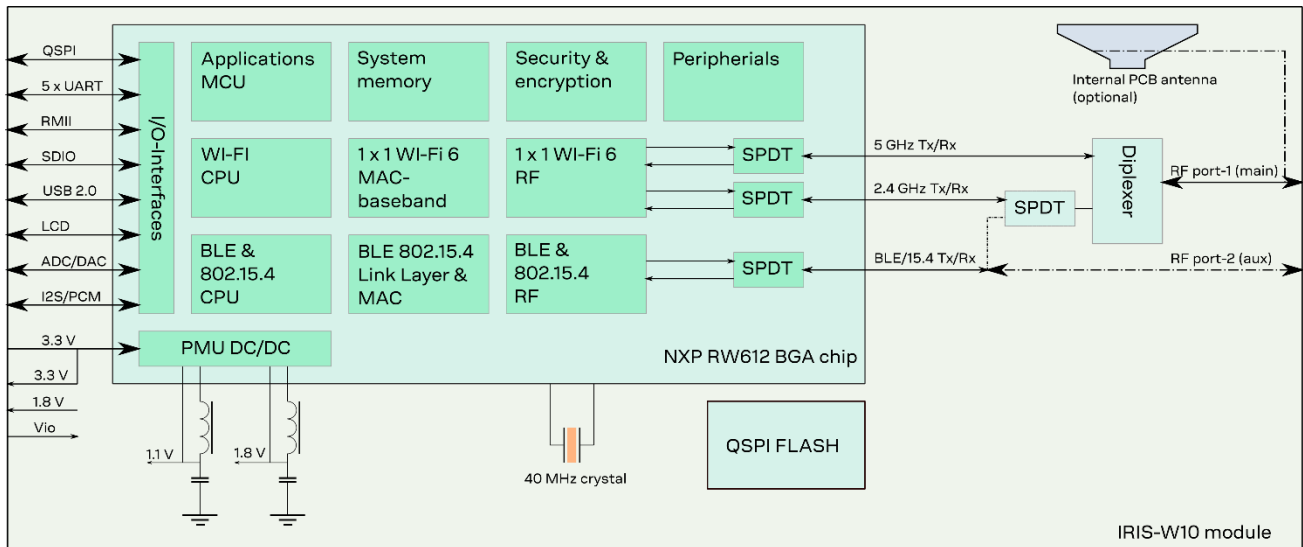
Figure 1: IRIS-W10 series block diagram

1.4   Product variants

1.4.1   IRIS-W101

As IRIS-W101 modules do not support an internal antenna, the PCB outline has been trimmed to 14.6 x 16.8 mm. Instead of an internal antenna, the RF signal is made available on a module pin for routing to an external antenna or antenna connector. See also IRIS-W101 mechanical specifications.

1.4.2   IRIS-W106

IRIS-W106 IRIS-W106 is equipped with an internal PCB trace antenna, using antenna technology licensed from Abracon. The RF signal is not available for external connection. The module outline is 14.6 x 20.9 mm. See also IRIS- W106 mechanical specifications.

1.5   Radio features

IRIS-W10 supports dual-band 2.4/5 GHz and Wi-Fi 6 802.11ax 1x1 baseband, backward compatible with 802.11ac/n/a/g/b technology, Bluetooth Low Energy 5.3, and 802.15.4 Thread.

- Wi-Fi sub system:
  - o   1x1 dual-band 2.4 GHz/5 GHz Wi-Fi 6 radio
  - o   Integrated Wi-Fi PA, LNA, and T/R switch, up to +21 dBm Tx power
  - o   20 MHz channel operation
  - o   Wi-Fi 6 Target Wake Time (TWT) support
  - o   Wi-Fi 6 Extended Range (ER) and Dual Carrier Modulation (DCM)
  - o   WPA/WPA2/WPA3
  - o   Matter over Wi-Fi

- Bluetooth LE / 802.15.4 subsystem:
  - Bluetooth LE 5.3
  - Isochronous Channels supporting LE Audio
  - Bluetooth LE Advertising Extension
  - Bluetooth LE Long Range
  - Bluetooth LE 2 Mbps
  - 802.15.4 supporting Thread
  - Matter over Thread

1.6 Software options

TBD

1.6.1 Software upgrade

Information on how to upgrade the software for the IRIS-W10 series is provided in the IRIS-W1 series system integration manual [1].

1.7 MAC addresses

The IRIS-W10 module series has two, unique, consecutive MAC addresses reserved for each module. The addresses are stored in the configuration memory during production. The first Wi-Fi MAC address is encoded in the Data matrix that is included on the module label. See also Labeling and ordering information. Table 1 provides an example of the MAC address for two separate modules.

MAC address	Assignment	Last bits of MAC address	Example
Module 1, address 1	Wi-Fi	00	D4:CA:6E:90:04:90
Module 1, address 2	Bluetooth LE	01	D4:CA:6E:90:04:91
Module 2, address 1	Wi-Fi	00	D4:CA:6E:90:04:94
Module 2, address 2	Bluetooth LE	01	D4:CA:6E:90:04:95

Table 1: Example MAC addresses assignment for two modules

1.8 Power modes

IRIS-W10 series modules are power efficient devices capable of operating in different power saving modes and configurations. Various circuits in the module can be powered off when they are not needed and complex wake-up events can be generated from different external and internal inputs.

For more information about power modes, see the IRIS-W1 system integration manual [1].

1.9 MCU and memory

1.9.1 MCU

The RW612 MCU has a 260 MHz Arm® Cortex®-M33 core supporting

- Arm®-Trustzone® technology
- Quad FlexSPI external flash interface supporting execute-In-Place (XIP) and on-the-fly firmware encryption/decryption and authentication

See also the NXP RW612 data sheet [3].

1.9.2 RAM memory

- RW612 has a 1.2 MB integrated SRAM
- An external PSRAM interface for system memory expansion up to 128 MB is available for adding external RAM.

1.9.3 Flash memory

An 8 MB QSPI flash memory is available on the module.

1.9.4 ROM memory

RW612 includes a 256 kB on-chip ROM in which the secure bootloader and the following application programming interfaces (API) reside:

- In-application programming (IAP) and in-system programming (ISP)
- Supports secure booting from valid SPI EEPROM, USB, SDIO, and Quad SPI Flash
- OTP API to program the OTP memory
- Random Number Generator (RNG) API

1.9.5 OTP memory

The RW612 MCU contains up to 2 kB of one-time-programmable memory that is used partly for configuration, security parameters, and other similar functions. The OTP contains preprogrammed factory configuration data, such as on-chip oscillator calibration values. Applications can use the OTP to configure:

- Details of the device operation
- Code signature values
- Aspects of device security
- Debug options
- Boot options

2   Interfaces

The following interfaces are available on the module pads.

2.1   Primary data interfaces

- Up to five configurable (Flexcomm) universal serial interfaces, independently configured for:
    - UART Max 6.25 Mbit/s (excluding delays introduced by external device)
    - USART, Max 20 Mbit/s (excluding delays introduced by external device)
    - SPI, Max 30Mbit/s (excluding delays introduced by external device)
    - I2C, 1 Mbit/s (supports high-speed target mode up to 3.4 Mbit/s)
    - I2S
- 1 x 100 Mbit Ethernet RMII
- 1 × High speed USB 2.0 OTG (480Mbit/s)
- 1 × SDIO 3.0 host interfaces with 50 MHz maximum clock frequency
- FlexSPI Flash interface connected to the internal flash (mounted on IRIS-W1)
- FlexSPI pSRAM interface with 160 MHz maximum clock frequency

2.2   IO interfaces

- Up to 64 programmable GPIOs
- Up to 8 x 16-bit ADC
- 2 x 10-bit DAC
- 32-bit general purpose timers/PWM

2.3   Debug interface

- A full JTAG interface available (TDO, TDI, TMS, TCK and TRST)

2.4   Other functionalities

- High Speed USB 2.0 On-The-Go (OTG) with integrated PHY
- QVGA LCD interface
- 4 x digital microphone interfaces
- Embedded temperature sensor

2.5   Power supply

The power for IRIS-W10 series modules is supplied with DC voltage through the VCC and VCC_IO pins.

☞ The system power supply circuit must be able to support peak power, add a 20% margin over the listed typical current consumption. This is provision against the current drawn from **VCC** and **VCC_IO**, which can vary significantly against the various power consumption profiles for the Wi-Fi technology.

2.5.1 Module supply input (VCC)

IRIS-W10 includes integrated voltage regulators that transform the supply voltage presented at the **VCC** pin into a stable system voltage.

2.5.2 Digital I/O interfaces reference voltage (VCC_IO)

All IRIS-W10 series modules support an additional supply input for setting the I/O voltage level.

A separate **+VIO** pin (L6) allows the module to be integrated in applications with different voltage levels (1.8 V or 3.3 V) without the need for level converters.

2.6 Boot strapping pins

IRIS-W10 supports six boot configuration pins. For normal operation, the pins must have the correct settings during boot. It is also important that these are in the correct state during power-up.

Pin			Description
C12	CON[11], RF_CNTL2	CONFIG_DAP_USE_JTAG	0: DFT TAP uses JTAG, 1 (Default): DAP uses JTAG
C11	CON[8], RF_CNTL1	CONFIG_DIS_KEY_ROT_DBG	0: Enable key rotation, 1 (Default): Disable key rotation
C13	CON[7], RF_CNTL3	CONFIG_VTOR_SEL	0: addr defined by SW (hard coded value, 0x1300_0000) is muxed to CM33 VTOR 1 (Default): CM 33 hardware default boot address is muxed to CM33 VTOR (0x1303_0000)
C10	CON[5], RF_CNTL0	CONFIG XOSC_SEL	0: 38.4 MHz, 1 (Default): 40 MHz
M14	CON[3], EXT_FRQ	CONFIG HOST BOOT [3:0]	1111, boot from QSPI FLASH (default)
N14I	CON[2], EXT_PRI	CONFIG HOST BOOT [3:0]	1110, ISP boot
M12	CON[1], EXT_GNT	CONFIG HOST BOOT [3:0]	1101, Serial boot
N12	CON[0], EXT_REQ	CONFIG HOST BOOT [3:0]	1100, SDIO boot
		CONFIG HOST BOOT [3:0]	1011, USB boot
		CONFIG HOST BOOT [3:0]	1010, SPI EEPROM boot

2.7 RF antenna interface

The RF antenna interface supports Wi-Fi and Bluetooth Low Energy/802.15.4 on the same RF antenna signal. As the different RF technologies are never active simultaneously, the RF signal is switched between Wi-Fi and Bluetooth/802.15.4.

2.7.1 Embedded PCB antenna

IRIS-W106 supports an internal, dual-band antenna (2.4 and 5 GHz). The antenna is embedded in the PCB and is optimized for the IRIS form factor.

For information about the design constraints related to the embedded antenna and the integration of the module into product applications, see the IRIS-W1 system integration manual [1].

⚠ The ANT signal is not available on the solder pins of the IRIS-W106 module.

2.7.2 External RF antenna interface

IRIS-W101 is equipped with an RF pin with a characteristic impedance of 50 Ω for use with an external antenna. The antenna signal to this pin supports both Tx and Rx.

The external antenna can be surface-mounted (SMD) or implemented as an integrated antenna on the host board. A connector for attaching an external antenna with a coaxial cable can also be implemented in the application design. A cable antenna might be necessary if the module is mounted in a shielded enclosure, such as a metal box or cabinet.

An external U.FL antenna connector is included in the IRIS-W1 reference design, which must be followed for compliance with the IRIS-W1 FCC/IC modular approvals.

For a description of the various antenna options and the list of approved antennas, see the IRIS-W1 system integration manual [1].

2.8   IO signals

2.8.1   UART

IRIS-W101 and IRIS-W106 each support five Flexcomm interfaces that are configurable as SPI, I2C, I2S, or UART. Each of the interfaces can be configured for four-wire UART communication with a host application processor using AT commands. The configured UART interface can also be used for data communication and software upgrades.

The following UART signals are available:

- Data lines (**RXD** as input, **TXD** as output)
- Hardware flow control lines (**CTS** as input, **RTS** as output)
- If Link status (**DTR** as output, **DSR** as input) is needed it must be managed by GPIO
- Programmable baud-rate generator allows most industry standard rates, as well as non-standard rates up to 3 Mbit/s.
- Frame format configuration:
  - 8 data bits
  - Even or no-parity bit
  - 1 stop bit
- Default frame configuration is 8N1, meaning eight (8) data bits, no (N) parity bit, and one (1) stop bit.

2.8.2   RMII

The RMII (Reduced Media Independent Interface) Ethernet interface is intended for connecting to an external PHY. An MDIO (Management Data Input/Output) interface used for controlling the external PHY is also available.

For more information about how to use the RMII interface, see the IRIS-W1 system integration manual [1].

3   Pin definition

Figure 2 shows the row and column pin designations for IRIS-W101/IRIS-W106. The antenna area is removed on IRIS-W101, where the grey line above row 16 represents the cut. The grey pins represent GND connections.

Figure 2: IRIS-W101/IRIS-W106 pin and column designations

☞   Row "13" and column "I" are not used and omitted in the pinout.

3.1 Pin assignment

Figure 3 shows the pin configuration for the IRIS-W101 and IRIS-W106 modules.
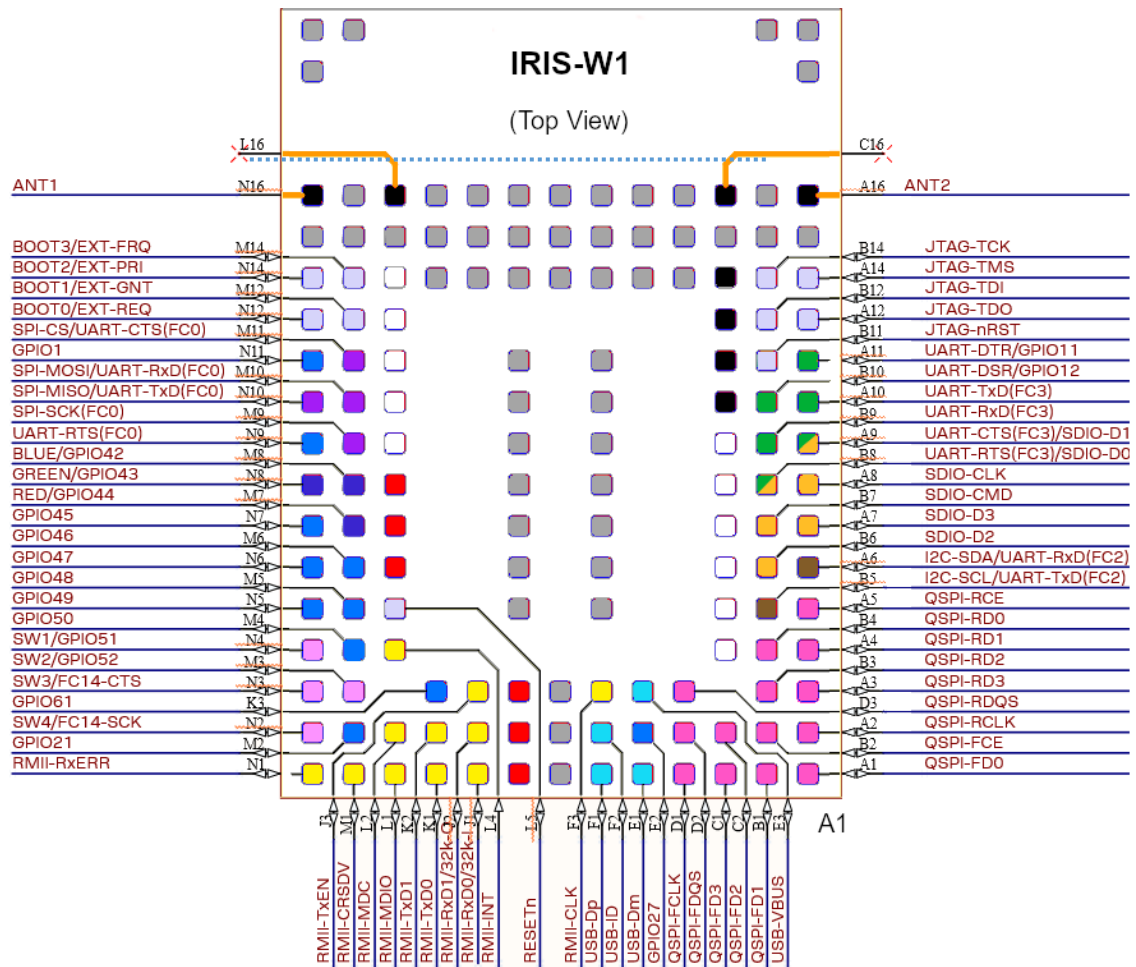
Figure 3: IRIS-W101/IRIS-W106 pin assignment (top view)

☞ Several pins are boot strap signals, as described in Table 2. It is important that these signals are in the correct state during startup. See also Boot strapping pins.

Power pins

Pin number	Description
A15, A19, A20, B15, B16, B20, C15, D14–16, E14–16, F5 - 11, F14–16, G1 - 3, G14 - 16, H5 - 11, H14 - 16, J14 - 16, K14 - 16, L15, M15, M16, M20, N15, N19, N20	GND
H1 - 3	+Vin, 3.15 – 3.45 V module supply
L5	PDn, module reset active low, connect external pull-up (≤100 kΩ) to +3.3 V
L6	+VIO, GPIO supply voltage input, select I/O-reference voltage by connect pin to either L7 or L8
L7	+1V8, output from internal +1V8 DC/DC
L8	+3V3, output from internal +3V3

I/O-pins

Pin	Name	I/O	Description	Alt. Function	Remarks
A1	QSPI-FD0				
A2	QSPI-RCLK				
A3	QSPI-RD3				
A4	QSPI-RD1				
A5	QSPI-RCE				
A6	SDIO-D2				
A7	SDIO-D3				
A8	SDIO-CLK				
A9	SDIO-D1				
A10	FC3-TxD				
A11	GPIO11				
A12	JTAG-TDO				
A14	JTAG-TMS				
A16	RF-2				
B1	QSPI-FD1				
B2	QSPI-FCE				
B3	QSPI-RD2				
B4	QSPI-RD0				
B5	FC2-TxD				
B6	SDIO-D2				
B7	SDIO-CMD				
B8	SDIO-D0				
B9	FC3-RxD				
B10	GPIO12				
B11	JTAG-nRST				
B12	JTAG-TDI				
B14	JTAG-TCK				
C1	QSPI-FD3				
C2	QSPI-FD2				
C3	RSVD		Reserved for future use.		
C4	RSVD		Reserved for future use.		
C5	RSVD		Reserved for future use.		
C6	RSVD		Reserved for future use.		
C7	RSVD		Reserved for future use.		
C8	RSVD		Reserved for future use.		
C9	RSVD		Reserved for future use.		
C10	RF-CNT-0				Boot strap pin. See also Debug interface.
C11	RF-CNT-1				Boot strap pin. See also Debug interface.
C12	RF-CNT-2				Boot strap pin. See also Debug interface.
C14	RF-CNT-3				Boot strap pin. See also Debug interface.
C16	RF-4		Reserved for future use		
D1	QSPI-FCLK				
D2	QSPI-FDQS				
D3	QSPI-RDQS				
E1	USB-Dm				

Pin	Name	I/O	Description	Alt. Function	Remarks
E2	GPIO27				
E3	USB-VBUS				
F1	USB-Dp				
F2	USB-ID				
F3	RMII-CLK				
J1	RMII-RxD0				
J2	RMII-RxD1				
J3	RMII-TxEN				
K1	RMII-TxD0				
K2	RMII-TxD1				
K3	GPIO61				
L1	RMII-MDIO				
L2	RMII-MDC				
L3	RSVD				
L4	RMII-INT				
L9	RSVD				
L10	RSVD				
L11	RSVD				
L12	RSVD				
L14	RSVD				
L16	RF-3		Reserved for future use		
M1	RMII-CRSDV				
M2	GPIO21				
M3	GPIO52				
M4	GPIO50				
M5	GPIO48				
M6	GPIO46				
M7	GPIO44				
M8	GPIO42				
M9	FC0-SCK				
M10	FCO-RxD				
M11	FC0-CTS				
M12	EXT-GNT				Boot strap pin. See also Debug interface.
M14	EXT-FRQ				Boot strap pin. See also Debug interface.
N1	RMII-RxERR				
N2	FC14-SCK				
N3	FC14-CTS				
N4	GPIO51				
N5	GPIO49				
N6	GPIO47				
N7	GPIO45				
N8	GPIO43				
N9	FC0-RTS				
N10	FC0-TxD				
N11	GPIO1				
N12	EXT-REQ				Boot strap pin. See also Debug interface.

Pin	Name	I/O	Description	Alt. Function	Remarks
N14	EXT-PRI				Boot strap pin. See also Debug interface.
N16	RF-1				

Table 2: IRIS-W101/IRIS-W106 pinout

4 Electrical specifications

⚠ Stressing the device above one or more of the Absolute maximum ratings can cause permanent damage. These are stress ratings only. Operating the module at these or at any conditions other than those specified in the Operating conditions should be avoided. Exposure to absolute maximum rating conditions for extended periods can affect device reliability.

☞ All application information is advisory only and does not form part of the specification.

4.1 Absolute maximum ratings

Symbol	Description	Condition	Min.	Max.	Unit
VCC/ VCC_IO	Module supply voltage	Input DC voltage at VCC and VCC_IO pins	-0.3	3.6	V
$I_{VCC\ MAX}$ + $I_{VCC\_IO\ MAX}$	Absolute maximum power consumption			TBD	mA
DPV	Digital pin voltage	Input DC voltage at any digital I/O pin	-0.3	+Vio + 0.3	V
P_ANT	Maximum power at receiver	Input RF power at antenna pin		0	dBm
Tstr	Storage temperature		-40	+85	°C

Table 3: Absolute maximum ratings

⚠ The product is not protected against overvoltage or reversed voltages. If necessary, supply voltage transients that might otherwise exceed the power boundary values described in Table 3.

4.1.1 Maximum ESD ratings

Parameter	Min.	Typical	Max.	Unit	Remarks
ESD immunity			8	kV	Indirect discharge according to IEC 61000-4-2
ESD sensitivity			2.5	kV	Human body model according to JEDEC JS001
			250	V	Charged device model according to JESD22-C101

Table 4: Maximum ESD ratings

⚠ IRIS-W10 series modules are Electrostatic Sensitive Devices that require special precautions during handling. See also ESD precautions.

4.2 Operating conditions

⚠ Operation beyond the specified operating conditions is not recommended and extended exposure beyond them may affect device reliability.

☞ Unless otherwise specified, all operating condition specifications are at an ambient temperature of 25 °C and a supply voltage of 3.3 V.

4.2.1 Operating temperature range

Parameter	Min.	Max.	Unit
Operating temperature	-40	+85	°C
Storage temperature	-55	+125	°C

Table 5: Temperature range

4.2.2   Supply/Power pins

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
VCC	Input supply voltage	3.3 V VCC supply, Ta -40 ℃ to +85 ℃	3.15	3.30	3.45	V
VCC_IO	I/O reference voltage	1.8 V VIO supply, Ta -40 ℃ to +85 ℃	1.71	1.8	1.89	V
		3.3 V VIO supply, Ta -40 ℃ to +85 ℃	3.15	3.30	3.45	V

Ta=ambient temperature

Table 6: Input characteristics of voltage supply pins

4.2.3   PDn pin

The PDn pin provides an external reset input of the module. This pin must be connected with an external pull-up resistor to +3.3 V. Table 7 describes the electrical characteristics of the pin.

☞   Do not use the PDn pin on modules that include an RW612 MCU version A0.

Pin name	Parameter	Min.	Typ.	Max.	Unit
PDn	Low-level input	0		0.3*VCC	V
	External pull-up resistance to +3.3 V		100		kΩ
	External decoupling capacitance		10		nF
t_Startup	Startup time after release of reset		TBD		s

Table 7: PDn characteristics

4.2.4   Digital pins

Pin name	Parameter	Min.	Typ.	Max.	Unit	Remarks
Any digital pin	Input characteristic: Low-level input	0		0.3*VCC_IO	V	
	Input characteristic: high-level input	0.7*VCC_IO		VCC_IO	V	
	Output characteristic: Low-level output	0		0.4	V	Normal drive strength
		0		0.4	V	High drive strength
	Output characteristic: High-level output	VCC_IO-0.4		VCC_IO	V	Normal drive strength
		VCC_IO-0.4		VCC_IO	V	High drive strength
	Pull-up/pull-down resistance		30		kΩ.	
Signals rerouted via the IO MUX	Output signal speed			20	MHz	
	Input signal speed			10	MHz	The GPIO-Matrix delays the input-signals by 2 cycles of the AHB-clock typical 80 MHz -> 25 ns delay

Table 8: Digital pin characteristics

5 Mechanical specifications
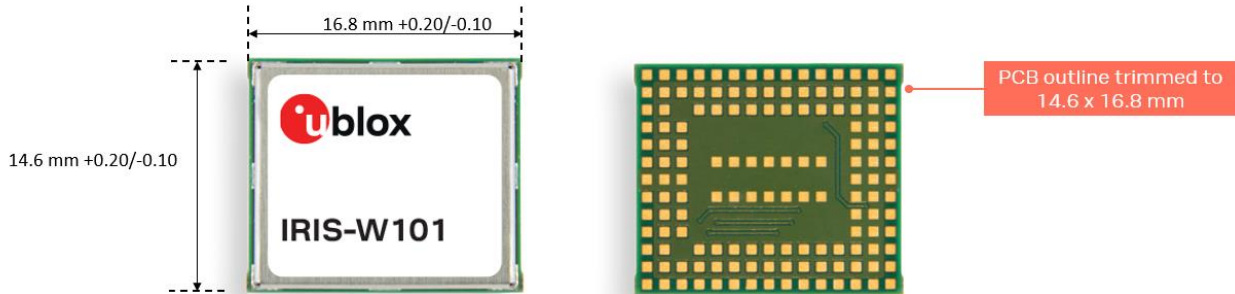
5.1 IRIS-W101 mechanical specifications

Figure 4: IRIS-W101 mechanical outline

Parameter	Description	Typical		Tolerance	
A	Module PCB Length [mm]	16.8	(661.4 mil)	+0.20/-0.10	(+3.9/-3.9 mil)
B	Module PCB Width [mm]	14.6	(574.8 mil)	+0.20/-0.10	(+3.9/-3.9 mil)
C	Module Thickness [mm]	2.1	(82.7 mil)	+0.10/-0.10	(+3.9/-3.9 mil)
ccc	Seating Plane Coplanarity [mm]	0.10	(3.9 mil)	+0.02/-0.10	(+0.8/-3.9 mil)

Table 9: IRIS-W101 mechanical outline data

5.2 IRIS-W106 mechanical specifications
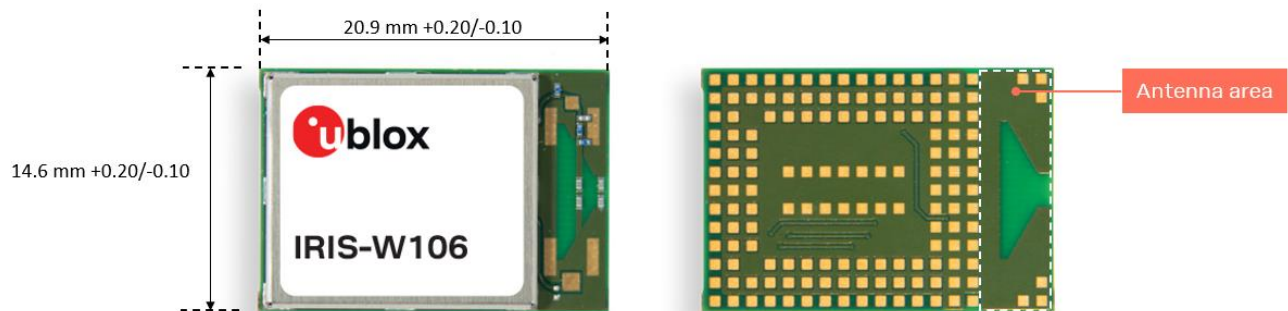
Figure 5: IRIS-W106 mechanical outline

Parameter	Description	Typical		Tolerance	
A	Module PCB Length [mm]	20.9	(822.8 mil)	+0.20/-0.10	(+3.9/-3.9 mil)
B	Module PCB Width [mm]	14.6	(574,8 mil)	+0.20/-0.10	(+3.9/-3.9 mil)
C	Module Thickness [mm]	2.1	(82.7 mil)	+0.10/-0.10	(+3.9/-3.9 mil)
ccc	Seating Plane Coplanarity [mm]	0.10	(3.9 mil)	+0.02/-0.10	(+0.8/-3.9 mil)

Table 10: IRIS-W106 mechanical outline data

6 Qualification and approvals

6.1 Country approvals

The IRIS-W10 series modules will be certified for use in the following countries/regions:

Country/Region	Qualification status
Europe (RED)	Pending
Great Britain (UKCA)	Pending
USA (FCC)	Pending
Canada (IC)	Pending
Japan (MIC)	Pending
Taiwan (NCC)	Pending
South Korea (KCC)	Pending
Brazil (Anatel)	Pending
Australia and New Zealand (ACMA)	Pending
South Africa (ICASA)	Pending

For detailed information about the regulatory requirements that must be met when integrating IRIS-W10 modules into an end product, see IRIS-W1 series system integration manual [1].

6.2 Bluetooth qualification

QDID TBD

☞ For more information about the declaration process for a product using IRIS-W1, see the IRIS-W1 series system integration manual [1].

7   Antennas

7.1   Antenna accessories

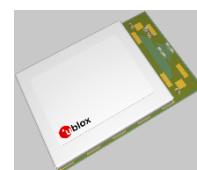| Name	U.FL to SMA adapter cable
Connector	U.FL and SMA jack (outer thread and pin receptacle)
Impedance	50 Ω
Minimum cable loss	0.5 dB, The cable loss must be above the minimum cable loss to meet the regulatory requirements. Minimum cable length 100 mm.
Comment	The SMA connector can be mounted in a panel. For information describing how to integrate the U.FL connecto, see the IRIS-W1 series system integration manual [1].
Approval	

Name	U.FL to Reverse Polarity SMA adapter cable
Connector	U.FL and Reverse Polarity SMA jack (outer thread and pin)
Impedance	50 Ω
Minimum cable loss	0.5 dB, The cable loss must be above the minimum cable loss to meet the regulatory requirements. Minimum cable length 100 mm.
Comment	The Reverse Polarity SMA connector can be mounted in a panel. See IRIS-W1 series System Integration Manual [1] for information how to integrate the U.FL connector. It is required to followed this reference design to comply with the IRIS-W10 FCC/IC modular approvals.
Approval	

7.2   Approved antennas

7.2.1   Single band antennas

IRIS-W106	
Manufacturer	Abracon
Gain	+1 dBi
Impedance	50 Ω
Size (HxWxL)	Embedded into the PCB
Type	PIFA
Comment	Embedded PCB antenna on IRIS-W106. Should not be mounted inside a metal enclosure. See also Embedded PCB antenna. .
Approval	

GW.26.0111	
Manufacturer	Taoglas
Polarization	Vertical
Gain	+2.0 dBi
Impedance	50 Ω
Size	Ø 7.9 x 30.0 mm

GW.26.0111

Type	Monopole
Connector	SMA (M)
Comment	To be mounted on the U.FL to SMA adapter cable.
Approval	

ANT-2.4-CW-RH-RPS

Manufacturer	Linx
Polarization	Vertical
Gain	-1.0 dBi
Impedance	50 Ω
Size	Ø 7.4 x 27.0 mm
Type	Monopole
Connector	Reverse Polarity SMA plug (inner thread and pin receptacle).
Comment	To be mounted on the U.FL to Reverse Polarity SMA adapter cable. An SMA version antenna is also available but not recommended for use (ANT-2.4-CW-RH-SMA).
Approval	

Ex-IT 2400 RP-SMA 28-001

Manufacturer	Abracom
Polarization	Vertical
Gain	+3.0 dBi
Impedance	50 Ω
Size	Ø 12.0 x 28.0 mm
Type	Monopole
Connector	Reverse Polarity SMA plug (inner thread and pin receptacle).
Comment	This antenna requires to be mounted on a metal ground plane for best performance. To be mounted on the U.FL to Reverse Polarity SMA adapter cable. An SMA version antenna is also available but not recommended for use (Ex-IT 2400 SMA 28-001).
Approval	

Ex-IT 2400 MHF 28

Manufacturer	Abracom
Polarization	Vertical
Gain	+2.0 dBi
Impedance	50 Ω
Size	Ø 12.0 x 28.0 mm
Type	Monopole
Cable length	100 mm
Connector	U.FL. connector
Comment	This antenna requires to be mounted on a metal ground plane for best performance. To be mounted on a U.FL connector. See IRIS-W1 system integration manual [1] for information about how to integrate the U.FL connector. It is required to followed this reference design to comply with the IRIS -W10 FCC/IC modular approvals.

Approval

Ex-IT 2400 RP-SMA 70-002

Manufacturer	Abracom
Polarization	Vertical
Gain	+3.0 dBi
Impedance	50 Ω
Size	Ø 10 x 83 mm
Type	Monopole
Connector	Reverse Polarity SMA plug (inner thread and pin receptacle)
Comment	To be mounted on the U.FL to Reverse Polarity SMA adapter cable. An SMA version antenna is also available but not recommended for use (Ex-IT 2400 SMA 70-002).

Approval

Ex-IT 2400 MHF 70-001

Manufacturer	Abracom
Polarization	Vertical
Gain	+3.0 dBi
Impedance	50 Ω
Size	Ø 9.4 x 70.5 mm
Type	Monopole
Cable length	100 mm
Connector	U.FL. connector
Comment	To be mounted on a U.FL connector. For information about how to integrate the U.FL connector, see the IRIS-W1 system integration manual [1]. This reference design must be followed to comply with IRIS-W10 FCC/IC modular approvals.

Approval

InSide-2400

Manufacturer	Abracom
Gain	+3.0 dBi
Impedance	50 Ω
Size	27 x 12 mm (triangular)
Type	Patch
Cable length	100 mm
Connector	U.FL. connector
Comment	Should be attached to a plastic enclosure or part for best performance. To be mounted on a U.FL connector. For information about how to integrate the U.FL connector, see the IRIS-W1 system integration manual [1]. This reference design must be followed to comply with IRIS-W10 FCC/IC modular approvals.

Approval

FlatWhip-2400

Manufacturer	Abracom
Gain	+3.0 dBi

FlatWhip-2400

Impedance	50 Ω
Size	Ø 50.0 x 30.0 mm
Type	Monopole
Connector	SMA plug (inner thread and pin)
Comment	To be mounted on the U.FL to SMA adapter cable.
Approval	

Outside-2400

|	
Manufacturer	Abracom
Gain	+3.0 dBi
Impedance	50 Ω
Size	36.0 x 18.0 x 16.0 mm
Type	Patch
Cable length	70 mm
Connector	U.FL. connector
Comment	To be mounted on a U.FL connector. For information about how to integrate the U.FL connector, see the IRIS-W1 system integration manual [1]. This reference design must be followed to comply with IRIS-W10 FCC/IC modular approvals.
Approval	

7.2.2 Dual-band antennas

InSide-WLAN

Manufacturer	Abracom
Gain	+3.0 dBi
Impedance	50 Ω
Size	27 x 12 mm (triangular)
Type	Patch
Cable length	100 mm
Connector	U.FL. connector
Comment	Should be attached to a plastic enclosure or part for best performance. Dual-band (2.4 GHz / 5 GHz) antenna to be mounted on a U.FL connector. For information about how to integrate the U.FL connector, see the IRIS-W1 system integration manual [1]. This reference design must be followed to comply with IRIS-W10 FCC/IC modular approvals.
Approval	

InSide-WLAN Square (InSide™ WLAN P.No 403-100)

Manufacturer	Abracom
Gain	+3.0 dBi
Impedance	50 Ω
Size	24x22x1 mm with mounting hole
Type	Patch
Cable length	100 mm
Connector	U.FL. connector
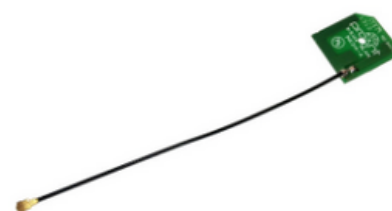
InSide-WLAN Square (InSide™ WLAN P.No 403-100)

Comment	Should be attached to a plastic enclosure or part for best performance.
	Dual-band (2.4 GHz / 5 GHz) antenna to be mounted on a U.FL connector.
	For information about how to integrate the U.FL connector, see the IRIS-W1 system integration manual [1]. This reference design must be followed to comply with IRIS-W10 FCC/IC modular approvals..
Approval	

Ex-IT WLAN RPSMA

Manufacturer	Abracom
Type	½ wave dipole dual-band antenna
Polarization	Vertical
Gain	+3 dBi
Impedance	50 Ω
Size	107 mm (Straight)
Type	Monopole
Connector	Reverse Polarity SMA plug (inner thread and pin receptacle)
Comment	To be mounted on the U.FL to Reverse Polarity SMA adapter cable.
Approval	

8   Product handling

8.1   Packaging

⚠ The packaging information in this section is valid only once the module has been approved and reached Initial Production status defined in the Document information. IRIS-W10 series modules are currently in Development/Prototype status.

8.1.1   Reels

For efficient production, production lot setup, and tear-down, IRIS-W10 series modules are delivered as hermetically sealed, reeled tapes.

IRIS-W10 modules are deliverable in quantities of 500 pieces on a reel. The reel types used to distribute IRIS-W10 modules are described in Table 11. The physical dimensions of each reel type and the packaging for each product variant are described in the Product packaging guide [2].

Model	Reel type
IRIS-W101	B2 tape width = 44 mm
IRIS-W106	B2 tape width = 44 mm

Table 11: Reel types for product variantsIRIS-W10 series

8.1.2   Tapes

Figure 6 and Figure 7 show the position and orientation of IRIS-W1 modules as they are delivered on tape.

Figure 6: Orientation of IRIS-W101 module on tape (not actual module, for representation only)

Figure 7: Orientation of IRIS-W106 module on tape

The dimensions of the tapes are TBD.

8.2   Moisture sensitivity levels

IRIS-W10 series modules are rated as MSL Level 4 devices in accordance with the IPC/JEDEC J-STD-020 standard. For more information, see the moisture sensitive warning label on the MBB (Moisture Barrier Bag).

After opening the dry pack, the modules must be mounted within 72 hours in factory conditions of maximum 30 °C/60%RH or must be stored at less than 10%RH. The modules require baking if the humidity indicator card shows more than 10% when read at 23±5 °C or if the conditions mentioned above are not met. For information about the bake procedure, see also the J-STD-033B standard.

8.3   Reflow soldering

IRIS-W10 series modules are approved for one-time reflow processes only.

⚠   Reflow soldering profiles must be selected in accordance with u-blox soldering recommendations described in the IRIS-W1 series system integration manual [1]. Failure to observe these recommendations can result in severe damage to the product.

8.4   ESD precautions

IRIS-W10 series modules are Electrostatic Sensitive Devices that demand the observance of special handling precautions against static damage. Failure to observe these precautions can result in severe damage to the product. See also Maximum ESD ratings.

Proper ESD handling and packaging procedures must be applied throughout the processing, handling, and operation of any application that incorporates the IRIS-W10 series module. ESD precautions are particularly relevant when handling the application board on which the module is mounted.

For further information about the handling of IRIS-W10 series modules, see also the IRIS-W10 system integration manual [1].

9 Labeling and ordering information

The labels (11 x 8 mm) of the IRIS-W10 series modules include important product information.

9.1 Product labeling

Figure 8 shows the label applied to IRIS-W10 series modules. Each of the given label references are described in Table 12.
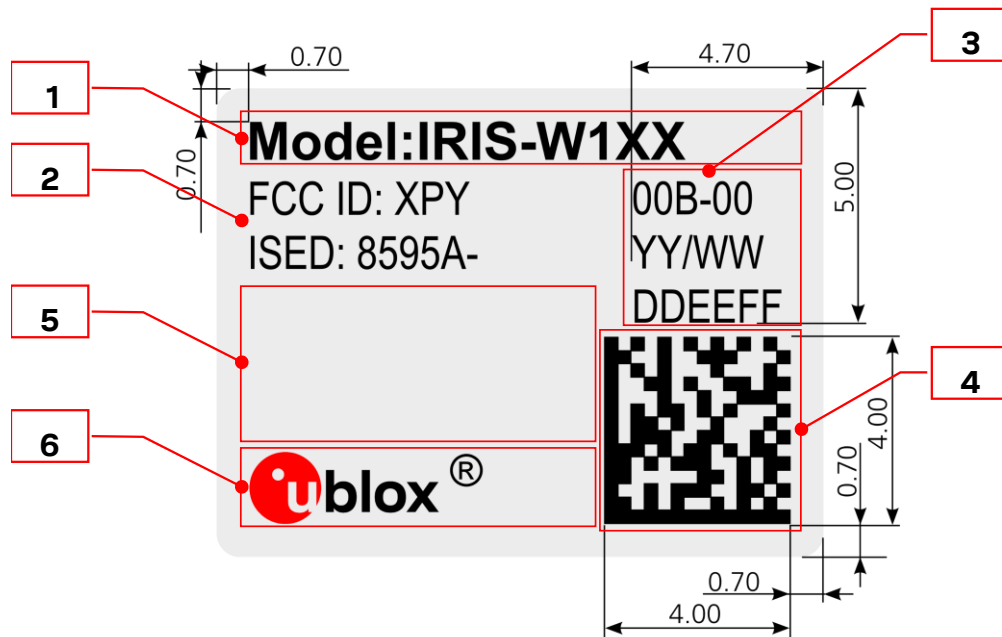

Figure 8: Location of product type number on the IRIS-W10 series module label

Reference	Description
1	Product model name (IRIS-W101 or IRIS-W106)
2	Regulatory certification IDs
3	Major and minor product version information and date of unit production encoded YY/WW (year, week)
4	Data Matrix with unique serial number of 19 alphanumeric symbols. The first 3 symbols represent a unique module type number. The next 12 symbols represent the unique hexadecimal Wi-Fi MAC address of the module AABBCCDDEEFF, and the last 4 symbols represent the hardware and software version encoded HHFF. See also MAC addresses.
5	Area reserved for certifications logos
6	u-blox logo. The red dot is also indicating pin no A1.

Table 12: IRIS-W10 series label description

9.2 Explanation of codes

Table 13 describes the three product identifiers, namely the Type number, Model name, and Ordering code.

Format	Structure
Product Name	PPPP-TGVV
Ordering Code	PPPP -TGVV-TTQ
Type Number	PPPP -TGVV-TTQ-XX

Table 13: Product code formats

Table 14 describes the individual identification codes represented in each product identifier.

Code	Meaning	Example
PPPP	Form factor	NINA
TG	Platform (Technology and Generation) T – Dominant technology, For example, W: Wi-Fi, B: Bluetooth G - Generation	W1: Wi-Fi Generation 1
VV	Variant based on the same platform; range [00…99]	61: u-blox connectivity software product with antenna pin
TT	Major Product Version	00: first revision
Q	Quality grade A: Automotive B: Professional C: Standard	B: professional grade
XX	Minor product version (not relevant for certification)	Default value is 00

Table 14: Part identification code

9.3 Ordering information

Ordering Code	Product
IRIS-W101-00B	Wi-Fi 6 IEEE802.11ac/ax/b/g/n and Bluetooth LE with antenna pin.
IRIS-W106-00B	Wi-Fi 6 IEEE802.11ac/ax/b/g/n and Bluetooth LE with embedded PCB antenna.

Table 15: Product ordering codes

Appendix

A Glossary

Abbreviation	Definition
ADC	Analog to Digital Converter
BLE	Bluetooth Low Energy
BPF	Band Pass Filter
CTS	Clear To Send
DAC	Digital to Analog Converter
DC	Direct Current
DSR	Data Set Ready
DTR	Data Terminal Ready
ESD	Electro Static Discharge
FCC	Federal Communications Commission
GND	Ground
GPIO	General Purpose Input/Output
I	Input (means that this is an input port of the module)
I²C	Inter-Integrated Circuit
IC	Industry Canada
IEEE	Institute of Electrical and Electronics Engineers
IoT	Internet of Things
L	Low
LPO	Low Power Oscillator
MCU	Micro Controller Unit
MDIO	Management Data Input / Output
MII	Media-Independent Interface
MRD	Market Requirement Document
MSD	Moisture Sensitive Device
N/A	Not Applicable
O	Output (means that this is an output port of the module)
PCN	Product Change Notification
PIFA	Planar Inverted F Antenna
PD	Pull-Down
PU	Pull-Up
QSPI	Quad Serial Peripheral Interface
RMII	Reduced Media Independent Interface
RTS	Request To Send
RXD	Receive Data
SDIO	Secure Digital Input Output
SDK	Software Development Kit
SPI	Serial Peripheral Interface
TBD	To Be Defined
TXD	Transmit Data
UART	Universal Asynchronous Receiver/Transmitter

Table 16: Explanation of the abbreviations and terms used

Related documents

[1]   IRIS-W1 system integration manual, UBX-23003263
[2]   Product packaging guide, UBX-14001652
[3]   NXP RW612 Datasheet
[4]   IRIS-W10 product summary, UBX-23000279

☞   For product change notifications and regular updates of u-blox documentation, register on our website, www.u-blox.com.

Revision history

Revision	Date	Name	Comments
R01	01-Mar-2023	mwej, ovik	Initial release

Contact

For further support and contact information, visit us at www.u-blox.com/support.