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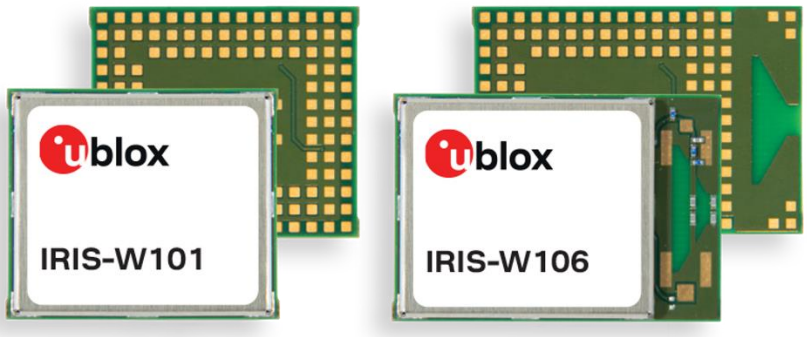
IRIS-W10 series

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

Data sheet



Abstract

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. IRIS-W10 stand-alone, Open CPU modules support dual-band Wi-Fi 6 (802.11a/b/g/n/ax), Bluetooth Low Energy 5.3, and Thread connectivity.

UBX-23002331 - R03
C1-Public

Document information

Title	**IRIS-W10 series**	
Subtitle	Stand-alone multiradio module with dual band Wi-Fi 6, Bluetooth LE and 802.15.4	
Document type	Data sheet	
Document number	UBX-23002331	
Revision and date	R03	16-Oct-2023
Disclosure restriction	C1-Public	

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	Engineering Sample
IRIS-W106	IRIS-W106-00B-00	01	N/A	Engineering Sample

Contents

1 Functional description

1.1 Overview

The IRIS-W10 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-W10 supports the latest Wi-Fi 6 technology, Bluetooth LE 5.3, 802.15.4 low-rate wireless networks, Matter over Wi-Fi, Thread, and Ethernet connectivity. With PCB antenna and external antenna options, IRIS-W10 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). Certification approval is also planned in the US (FCC), Great Britain (UKCA), Canada (ISED), Japan (MIC), Taiwan (NCC), South Korea (KCC), Australia /New Zealand (ACMA), Brazil (ANATEL) and 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-W10 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

Block diagrams for IRIS-W101 and IRIS-W106 modules are shown in Figure 1.

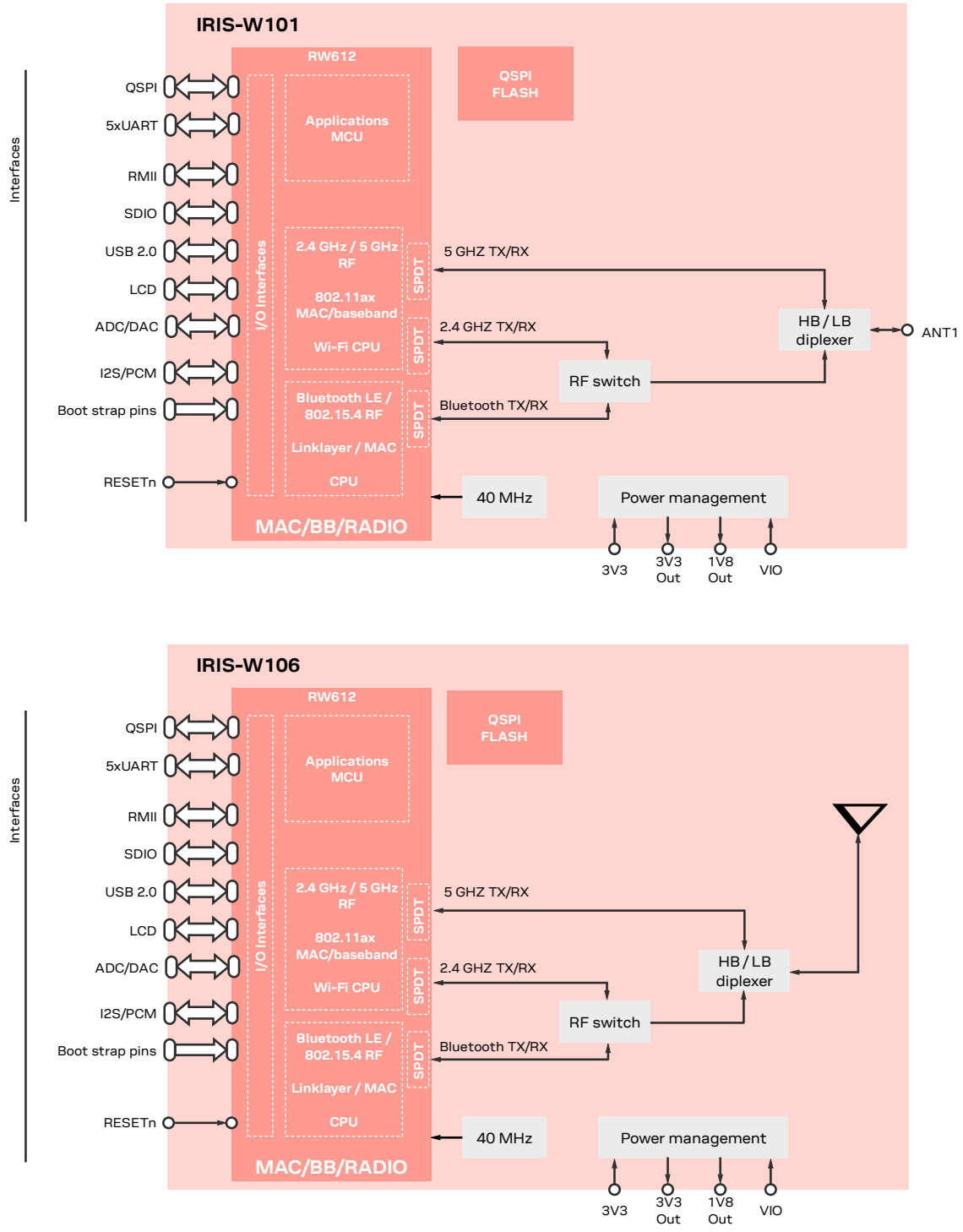


Figure 1: IRIS-W10 block diagrams

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 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:
  - 1x1 dual-band 2.4 GHz/5 GHz Wi-Fi 6 radio
  - 20 MHz channel operation
  - Wi-Fi 6 Target Wake Time (TWT) support
  - Wi-Fi 6 Extended Range (ER) and Dual Carrier Modulation (DCM)
  - WPA/WPA2/WPA3
  - 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 MAC addresses

The IRIS-W10 module series has four, unique, consecutive MAC addresses reserved for each module. The first address (Wi-Fi) is stored in the configuration memory during production. It is also 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 a module.

MAC address	Assignment	Last bits of MAC address	Example
Module 1, address 0	Wi-Fi	00	*D4:CA:6E:90:04:90*
Module 1, address 1	Bluetooth LE	01	*D4:CA:6E:90:04:91*
Module 1, address 2	Reserved (Ethernet)	10	*D4:CA:6E:90:04:92*
Module 1, address 3	Reserved (Thread)	11	*D4:CA:6E:90:04:93*

Table 1: Example MAC address assignment for a module

1.7 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-W10 system integration manual [1].

1.8 MCU and memory

1.8.1 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].

1.8.2 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.

1.8.3 Flash memory

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

1.8.4 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

1.8.5 OTP memory

The RW612 MCU contains up to 2 kBytes 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 30 Mbit/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 PSRAM interface with 160 MHz maximum clock frequency

2.1.1 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)
- 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.

2.1.2 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-W10 system integration manual [1].

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 interfaces

- JTAG interface available (TDO, TDI, TMS, TCK and TRST)
- SWD interface (SWCLK and SWDIO)

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 typical listed 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 Configuration pins

IRIS-W10 supports seven 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. Further details are available in the EVK-IRIS-W1 user guide [5].

Configuration bits	Pin name	Pin number	Description
CON[11]	RF_CNTL2 / CONFIG_DAP_USE_JTAG	B7	0: SWD 1: (Default): JTAG
CON[8]	RF_CNTL1 / CONFIG_DIS_KEY_ROT_DBG	A7	0: Enable key rotation, 1: (Default): Disable key rotation
CON[7]	RF_CNTL3 / CONFIG_VTOR_SEL	A8	0: addr defined by software (hard coded value, 0x1300_0000) is multiplexed to CM33 VTOR 1: (Default): CM 33 hardware default boot address is multiplexed to CM33 VTOR (0x1303_0000)
CON[3,2,1,0]	EXT_FREQ, ECT_PRI, EXT_GNT, CEXT_REQ / CONFIG HOST BOOT [3..0]	M14, N14l, M12, N12	CONFIG HOST BOOT [3..0] table: 1111: (Default) boot from QSPI FLASH 1110: ISP boot 1101: Serial boot 1100 :SDIO boot 1011: USB boot 1010: SPI EEPROM boot

Table 2: Boot configuration pins

2.7 RF antenna interface

The RF antenna interface supports Wi-Fi, Bluetooth LE and 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-W10 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-W10 system integration manual [1].

3 Pin definition

Figure 2 and Figure 3 shows the row and column pin designations for IRIS-W101 and IRIS-W106. The antenna area is removed on IRIS-W101. The green/yellow pins represent GND connections.

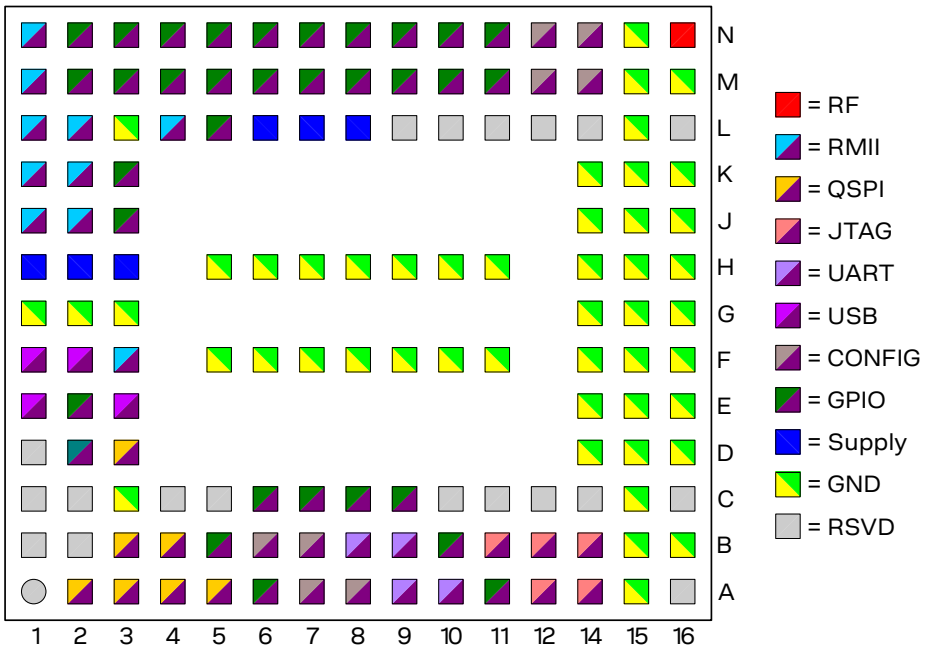


Figure 2: IRIS-W101 pin and column designations (top view/see through)

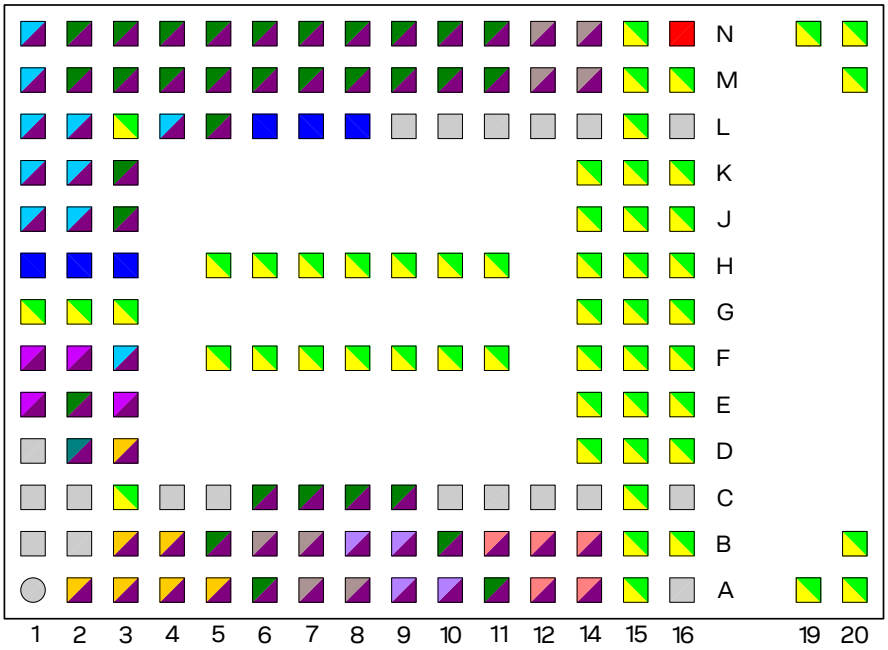


Figure 3: IRIS-W106 pin and column designations (top view/see through)

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

3.1 Pin assignment

Figure 4 shows the pin configuration for the IRIS-W101 and IRIS-W106 modules.

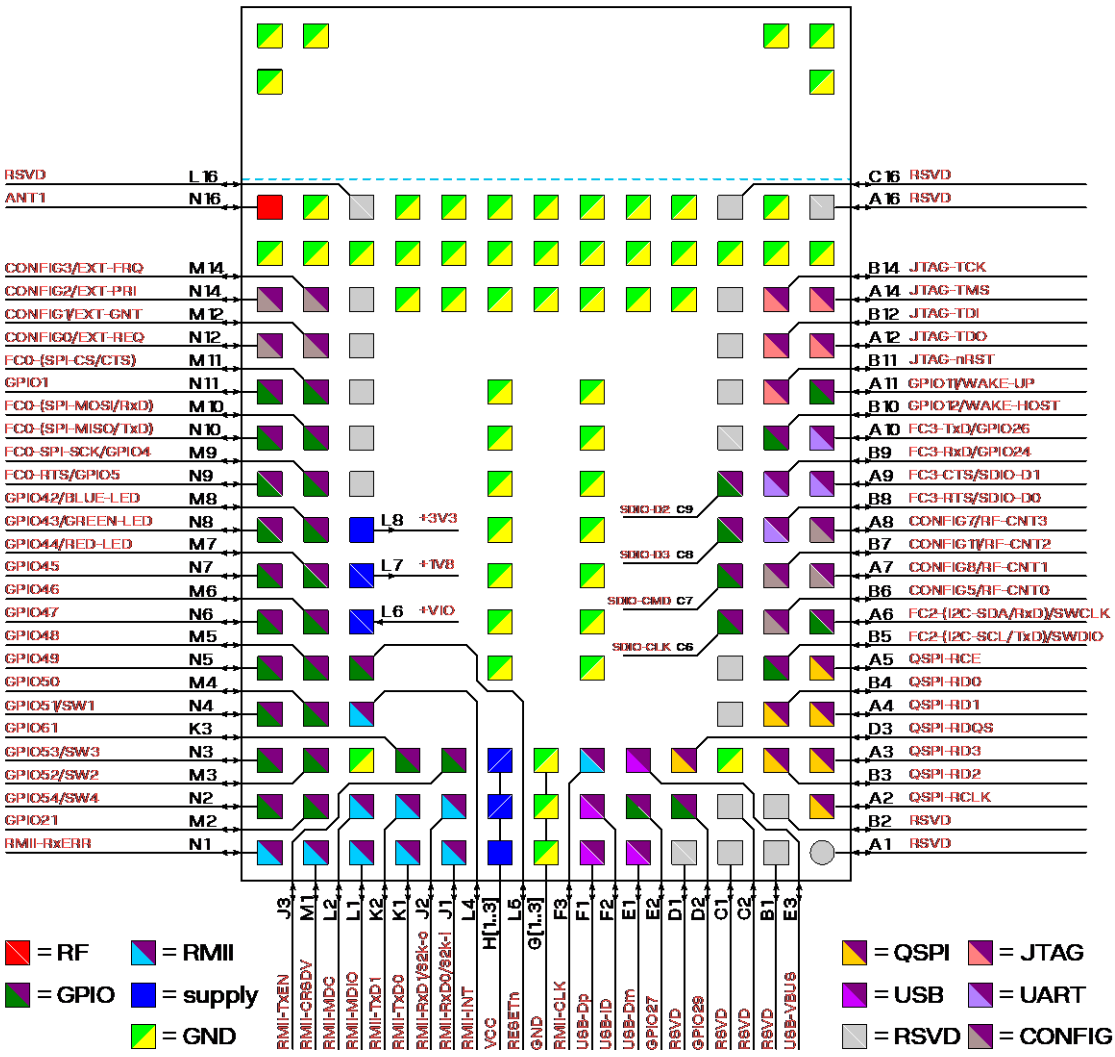


Figure 4: IRIS-W101/IRIS-W106 pin assignment (top view)

☞ Several pins are configuration signals, as described in Table 3. It is important that these signals are in the correct state during startup. See also Configuration pins.

Power pins

Pin number	Description
A15, A19, A20, B15, B16, B20, C3, C15, D14–16, E14–16, F5-11, F14–16, G1-3, G14-16, H5-11, H14 -16, J14-16, K14-16, L3, 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	Type	Description	Alt. Function	Remarks
A1	RSVD	NC	Not Connected		Reserved for future use
A2	QSPI-RCLK	O	QSPI SRAM interface clock0	GPIO [35]	
A3	QSPI-RD3	I/O	Data bit 3 for QSPI SRAM interface	GPIO [41]	
A4	QSPI-RD1	I/O	Data bit 1 for QSPI SRAM interface	GPIO [39]	
A5	QSPI-RCE	O	QSPI SRAM interface slave select 0	GPIO [36]	
A6	FC2-RxD	I		SWCLK, GPIO [13]	
A7	CONFIG8				Configuration pin (see Configuration pins)
A8	CONFIG7				Configuration pin (see Configuration pins)
A9	FC3-CTS	I/O	SDIO_DAT1 SDIO data input/output 1	SDIO-D1, GPIO [20]	
A10	FC3-TxD	O		GPIO [26]	
A11	GPIO11	I/O	GPIO [11]	WAKE-UP	
A12	JTAG-TDO	O	JTAG test data output signal	GPIO [9]	
A14	JTAG-TMS	I	JTAG test mode select input signal	GPIO [7]	
A16	RF-2	-			Reserved for future use
B1	RSVD	NC	Not Connected		Reserved for future use
B2	RSVD	NC	Not Connected		Reserved for future use
B3	QSPI-RD2	I/O	Data bit 0 for QSPI SRAM interface	GPIO [40]	
B4	QSPI-RD0	I/O	Data bit 2 for QSPI SRAM interface	GPIO [38]	
B5	FC2-TxD	O		SWDIO, GPIO [14]	
B6	CONFIG5				Configuration pin (see Configuration pins)
B7	CONFIG11				Configuration pin (see Configuration pins)
B8	FC3-RTS	I/O	SDIO_DAT0 SDIO data input/output 0	SDIO-D0, GPIO [19]	
B9	FC3-RxD	I		GPIO [24]	
B10	GPIO12	I/O	GPIO [12]	WAKE-HOST	
B11	JTAG-nRST	I	TAG test reset signal	GPIO [10]	
B12	JTAG-TDI	I	JTAG test data input signal	GPIO [8]	
B14	JTAG-TCK	I	JTAG test clock input signal	GPIO [6]	
C1	RSVD	NC			Reserved for future use
C2	RSVD	NC			Reserved for future use
C3	GND		GND		
C4	RSVD	NC			Reserved for future use
C5	RSVD	NC			Reserved for future use
C6	SDIO-CLK	I	SD_CLK SDIO clock inpu	GPIO [15]	Reserved for future use
C7	SDIO-CMD	I/O	SDIO_CMD SDIO command line	GPIO [17]	Reserved for future use
C8	SDIO-D3	I/O	SDIO_DAT3 SDIO data input/output 3	GPIO [16]	Reserved for future use
C9	SDIO-D2	I/O	SDIO_DAT2 SDIO data input/output 2	GPIO [18]	Reserved for future use
C10	RSVD	NC			Reserved for future use
C11	RSVD	NC			Reserved for future use

Pin	Name	Type	Description	Alt. Function	Remarks
C12	RSVD	NC			Reserved for future use
C14	RSVD	NC			Reserved for future use
C16	RSVD	NC			Reserved for future use
D1	RSVD	NC			Reserved for future use
D2	GPIO29	I/O	GPIO [29]		
D3	QSPI-RDQS	I/O	Data strobe I/O for QSPI SRAM interface	GPIO [37]	
E1	USB-Dm	I/O	USB bus data -		
E2	GPIO27	I/O	GPIO [27]		
E3	USB-VBUS	I/O	VBUS selection, 5V analog power supply		
F1	USB-Dp	I/O	USB bus data +		
F2	USB-ID	I	USB OTG pin		
F3	RMII-CLK	I/O	Ethernet controller reference clock	GPIO [25]	
J1	RMII-RxD0	I		GPIO [22]	
J2	RMII-RxD1	I		GPIO [23]	
J3	RMII-TxEN	0	Ethernet transmit mode enable	GPIO [60]	
K1	RMII-TxD0	I/O	Bit 0 of Ethernet transmit data	GPIO [58]	
K2	RMII-TxD1	I/O	Bit 1 of Ethernet transmit data	GPIO [59]	
K3	GPIO61	I/O	GPIO [61]		
L1	RMII-MDIO	I/O	Ethernet data input/output management	GPIO [57]	
L2	RMII-MDC	O	Ethernet controller data clock	GPIO [56]	
L3	GND	GND			
L4	RMII-INT	I	Ethernet interrupt	GPIO [55]	
L9	RSVD	NC			Reserved for future use
L10	RSVD	NC			Reserved for future use
L11	RSVD	NC			Reserved for future use
L12	RSVD	NC			Reserved for future use
L14	RSVD	NC			Reserved for future use
L16	RSVD	NC			Reserved for future use
M1	RMII-CRSDV	I	Ethernet controller receive mode enable	GPIO [62]	
M2	GPIO21	I/O	GPIO [21]		
M3	GPIO52	I/O	GPIO [52]		
M4	GPIO50	I/O	GPIO [50]		
M5	GPIO48	I/O	GPIO [48]		
M6	GPIO46	I/O	GPIO [46]		
M7	GPIO44	I/O	GPIO [44]		
M8	GPIO42	I/O	GPIO [42]		
M9	FC0-SCK		GPIO [4]		
M10	FCO-RxD		GPIO [2]		
M11	FC0-CTS		GPIO [0]		
M12	CONFIG1			EXT-GNT	Configuration pin (see Configuration pins)
M14	CONFIG3			EXT-FRQ	Configuration pin (see Configuration pins)
N1	RMII-RxERR	I	Ethernet controller receive error	GPIO [63]	
N2	FC14-SCK	I/O	GPIO [54]		

Pin	Name	Type	Description	Alt. Function	Remarks
N3	FC14-CTS	I	GPIO [53]		
N4	GPIO51	I/O	GPIO [51]		
N5	GPIO49	I/O	GPIO [49]		
N6	GPIO47	I/O	GPIO [47]		
N7	GPIO45	I/O	GPIO [45]		
N8	GPIO43	I/O	GPIO [43]		
N9	FC0-RTS	O	GPIO [5]		
N10	FC0-TxD	O	GPIO [3]		
N11	GPIO1	I/O	GPIO [1]		
N12	CONFIG0			EXT-REQ	Configuration pin (see Configuration pins)
N14	CONFIG2			EXT-PRI	Configuration pin (see Configuration pins)
N16	RF-1		RF port		

Table 3: IRIS-W101/IRIS-W106 pinout

I/O notations: I=Input, O=Output, I/O=Input or Output, NC=Not Connected

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		-3	dBm
Tstr	Storage temperature		-40	+85	°C

Table 4: 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 4.

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 5: 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

Table 6: 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 °C to +85 °C	3.15	3.30	3.45	V
VCC_IO	I/O reference voltage	1.8 V VIO supply, Ta -40 °C to +85 °C	1.71	1.8	1.89	V
		3.3 V VIO supply, Ta -40 °C to +85 °C	3.15	3.30	3.45	V

Ta=ambient temperature

Table 7: 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 8 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 8: 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 two cycles of the AHB-clock typical 80 MHz -> 25 ns delay

Table 9: Digital pin characteristics

4.2.5 Wi-Fi radio characteristics

V_{DD} = 3.3 V, T_{amb} = 25 °C

Parameter	Operation mode	Specification	Unit
RF frequency range	802.11a/n/ac/ax	5.180 – 5.825	GHz
	802.11b/g/n/ax	2.412 – 2.472	GHz
Supported Data Rates	802.11a	6, 9, 12, 18, 24, 36, 48, 54	Mbit/s
	802.11b	1, 2, 5.5, 11	Mbit/s

Parameter	Operation mode		Specification	Unit
	802.11g		6, 9, 12, 18, 24, 36, 48, 54	Mbit/s
	802.11n		MCS0 – MCS7	
	802.11ac		MCS0 – MCS8	
	802.11ax		MCS0 – MCS9	
Supported Bandwidth	802.11n/ac/ax		20	MHz
Supported Guard Interval	802.11n		400, 800	Ns
Conducted Transmit Power (typical)	2.4 GHz DBPSK QPSK	1 Mbit/s	17	dBm
		11 Mbit/s	17	dBm
	2.4 GHz OFDM	6 Mbit/s	17	dBm
		54 Mbit/s	15	dBm
	2.4 GHz HT20	MCS0	17	dBm
		MCS7	15	dBm
	5 GHz OFDM	6 Mbit/s	19	dBm
		54 Mbit/s	17	dBm
	5 GHz HT20	MCS0	22	dBm
		MCS7	19	dBm
Receiver Sensitivity (typical)	2.4 GHz CCK	1 Mbit/s	–94	dBm
		11 Mbit/s	–87	dBm
	2.4 GHz OFDM	6 Mbit/s	–90	dBm
		54 Mbit/s	–72	dBm
	2.4 GHz 802.11n/ac	MCS0	–88	dBm
		MCS7	–71	dBm
	2.4 GHz 802.11ax	MCS0	–89	dBm
		MCS9	–65	dBm
	5 GHz OFDM	6 Mbit/s	–92	dBm
		54 Mbit/s	–75	dBm
	5GHz 802.11n/ac	MCS0	–91	dBm
		MCS7	–73	dBm
	5 GHz 802.11ax	MCS0	–91	dBm
		MCS9	–66	dBm

Table 10: Wi-Fi radio characteristics

4.2.6 Bluetooth Low Energy characteristics

V_{DD} = 3.3 V, T_{amb} = 25 °C

Parameter		Specification	Unit
RF Frequency Range		2.402 – 2.480	GHz
Supported Modes		Bluetooth Low Energy 5.3	
Number of channels		40	
Modulation		GFSK	
Transmit Power (typical)		11 ± 1	dBm*
Receiver Sensitivity (typical)	1 Mbps	-97 ± 2	dBm
	2 Mbps	-95 ± 2	dBm
	LR 125 kbps	-100 ± 2	dBm

* Conducted output power

Table 10: Bluetooth Low Energy characteristics

5 Mechanical specifications

5.1 IRIS-W101 mechanical specifications

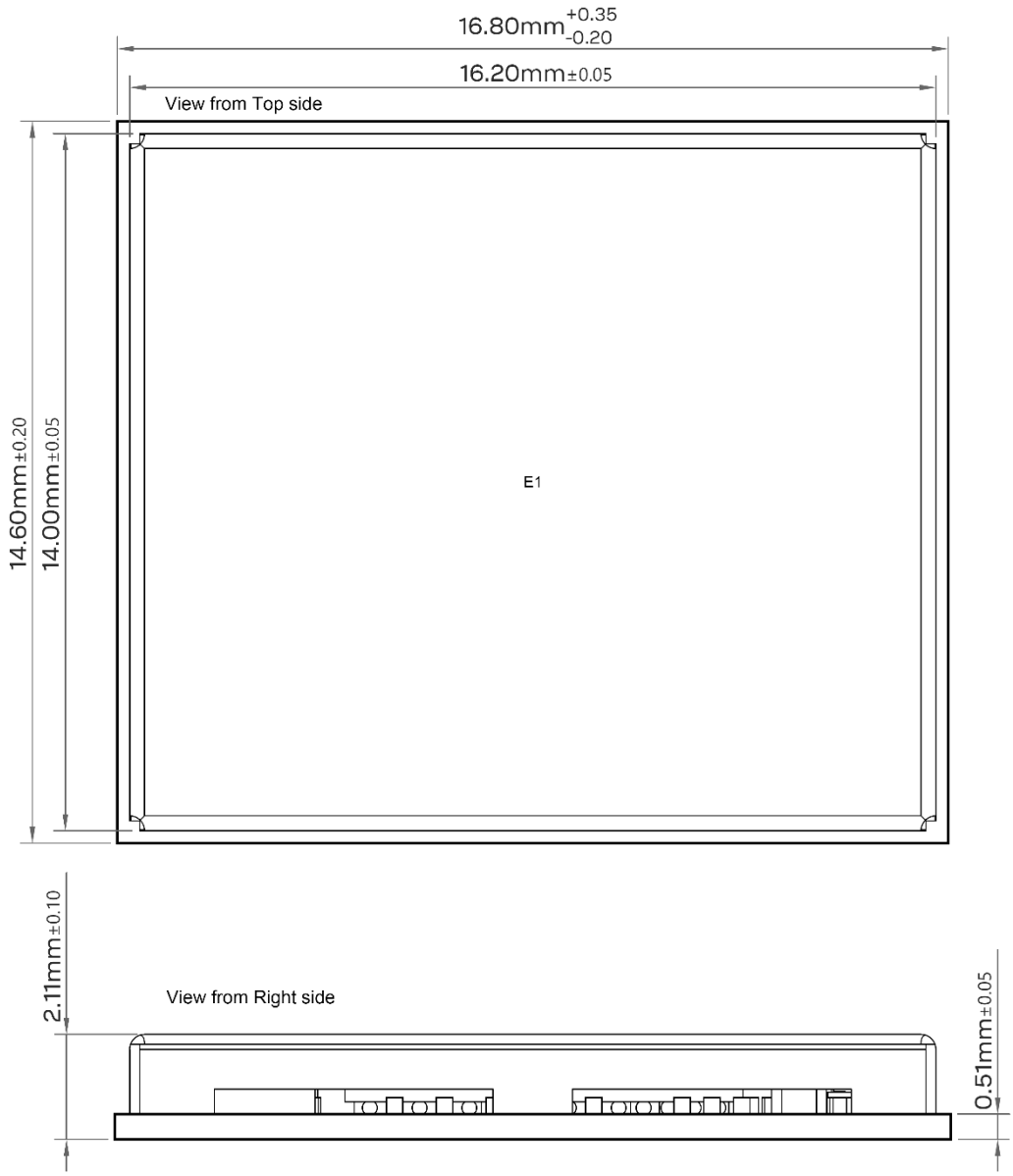


Figure 5: IRIS-W101 mechanical outline

Paramete	Description	Typical		Tolerance	
A	Module PCB Length [mm]	16.8	(661.4	+0.35/-0.20	(+13.8/-7.9 mil)
B	Module PCB Width [mm]	14.6	(574.8	+0.20/-0.20	(+7.9/-7.9 mil)
C	Shield Length [mm]	14.0	(551.2	+0.05/-0.05	(+2.0/-2.0
D	Shield Width [mm]	16.20	(637.8	+0.05/-0.05	(+2.0/-2.0 mil)
E	Module Thickness [mm]	2.11	(83.1 mil)	+0.10/-0.10	(+3.9/-3.9 mil)
ccc	Seating Plane Coplanarity [mm]	<0.10	(<3.9 mil)		

Table 11: IRIS-W101 mechanical outline data

5.2 IRIS-W106 mechanical specifications

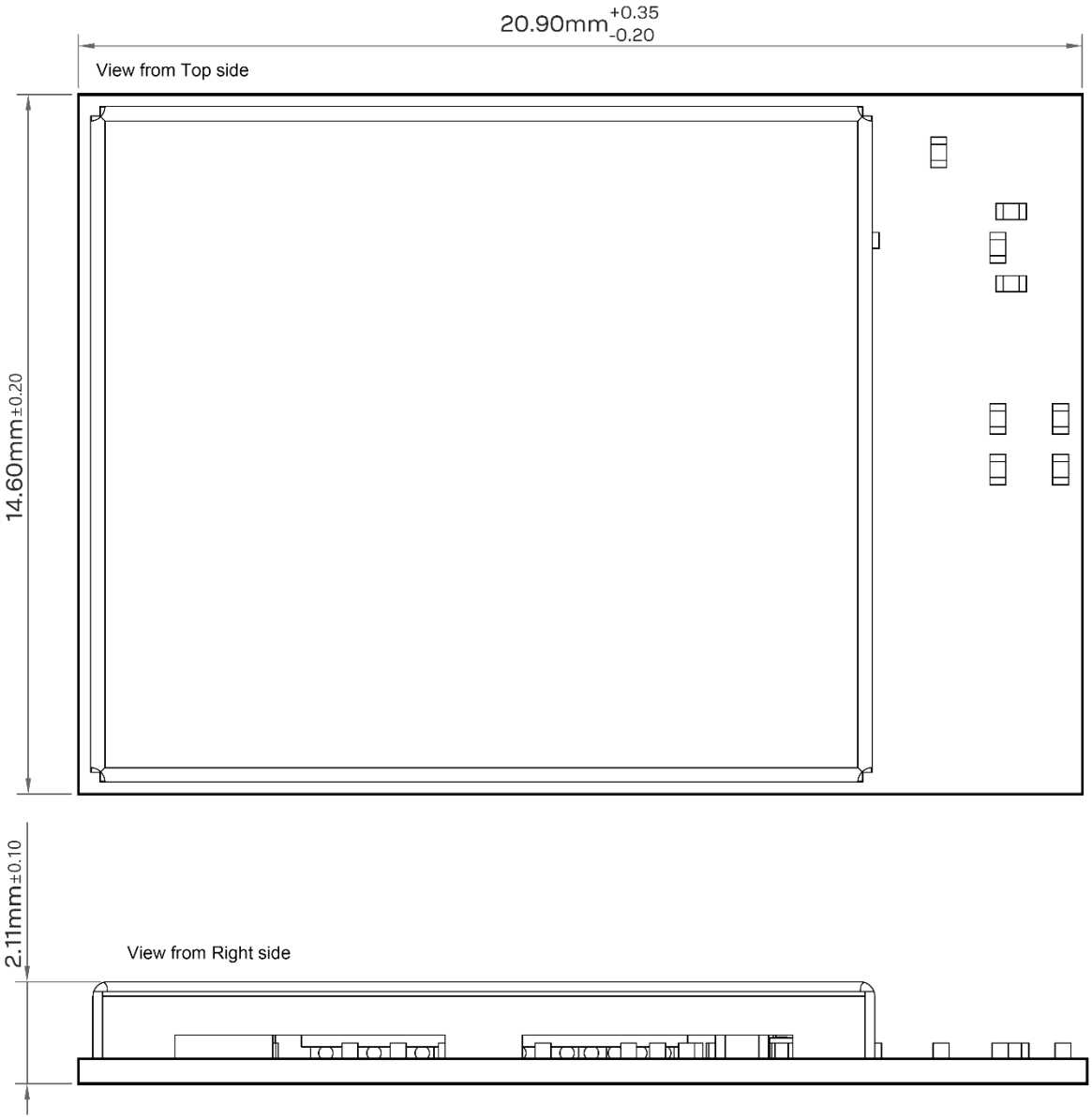


Figure 6: IRIS-W106 mechanical outline

Parameter	Description	Typical		Tolerance	
A	Module PCB Length [mm]	20.9	(822.8 mil)	+0.35/-0.20	(+13.8/-7.9
B	Module PCB Width [mm]	14.6	(574,8 mil)	+0.20/-0.20	(+7.9/-7.9 mil)
C	Module Thickness [mm]	2.11	(83.1 mil)	+0.10/-0.10	(+3.9/-3.9 mil)
ccc	Seating Plane Coplanarity [mm]	<0.10	(<3.9 mil)		

Table 12: IRIS-W106 mechanical outline data

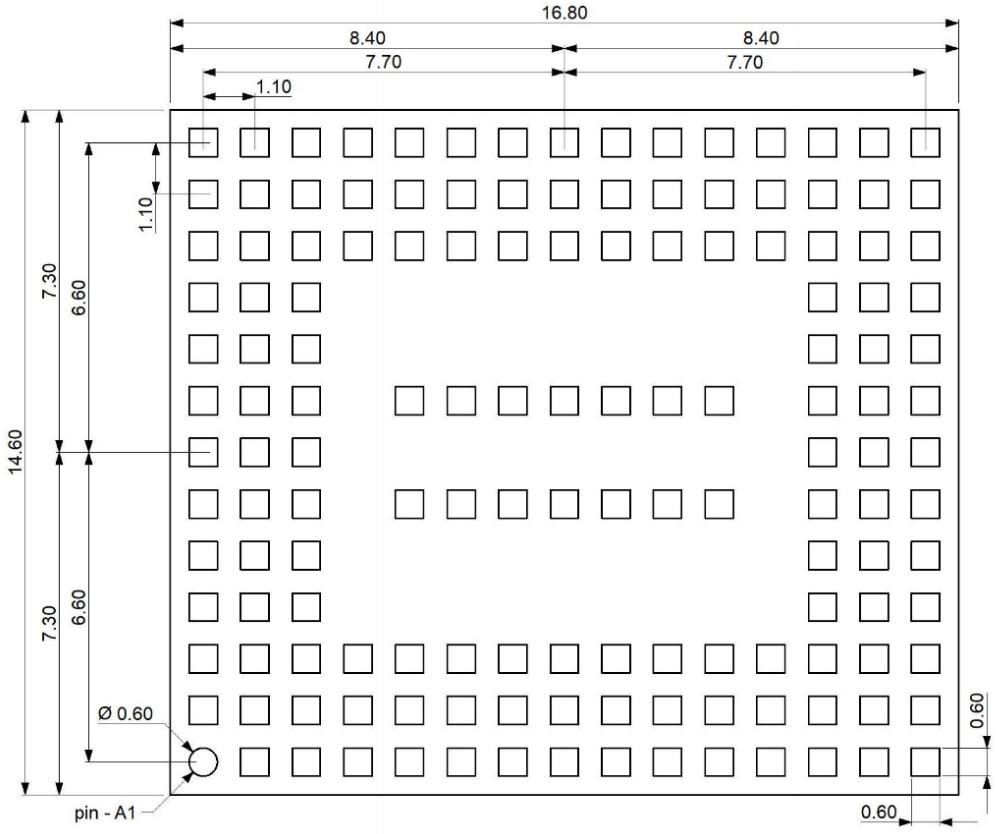


Figure 7: IRIS-W101 recommended PCB footprint (top view)

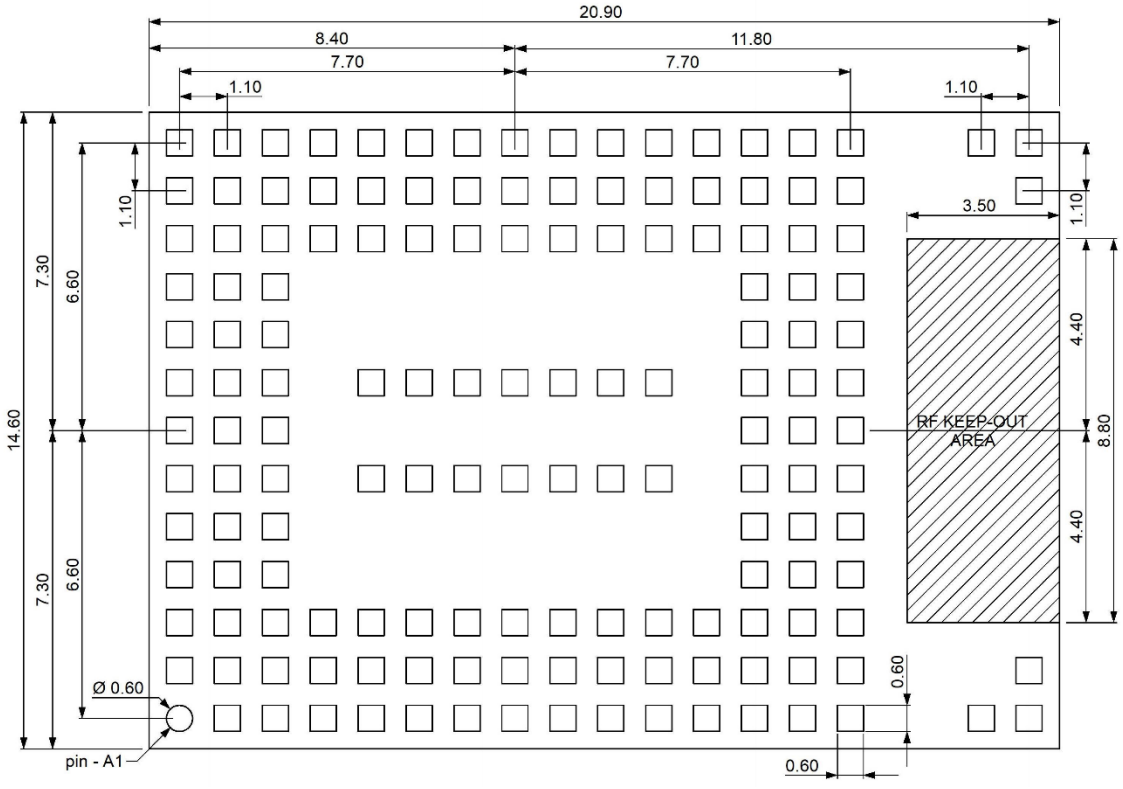


Figure 8: IRIS-W106 recommended PCB footprint (top view)

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 the IRIS-W1 series system integration manual [1].

6.2 Bluetooth qualification

QDID will be updated once BT qualification process is finished.

For more information about the declaration process for a product using IRIS-W10, see the IRIS-W1 series system integration manual [1].

7 Product handling

7.1 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.

7.1.1 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 13. 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	A4, tape width = 32 mm
IRIS-W106	B2, tape width = 44 mm

Table 13: Reel types for product variants

7.1.2 Tapes

Figure 9 and Figure 10 show the position and orientation of IRIS-W10 modules as they are delivered on tape. Note that there are sprocket holes on both sides.

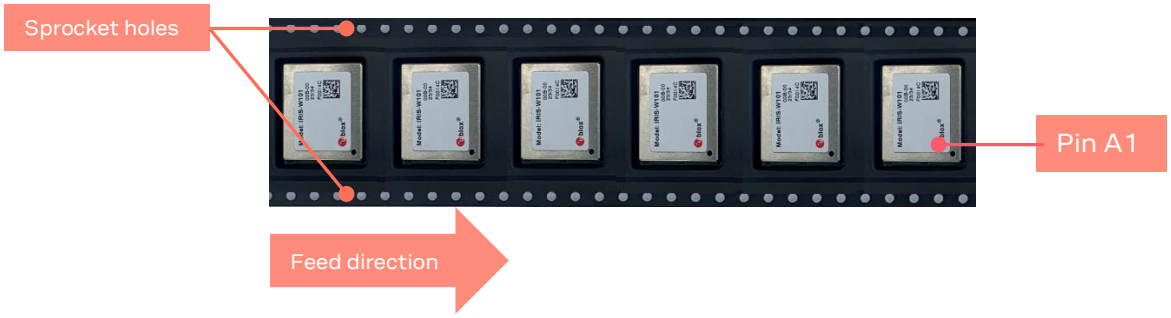


Figure 9: Orientation of IRIS-W101 module on tape

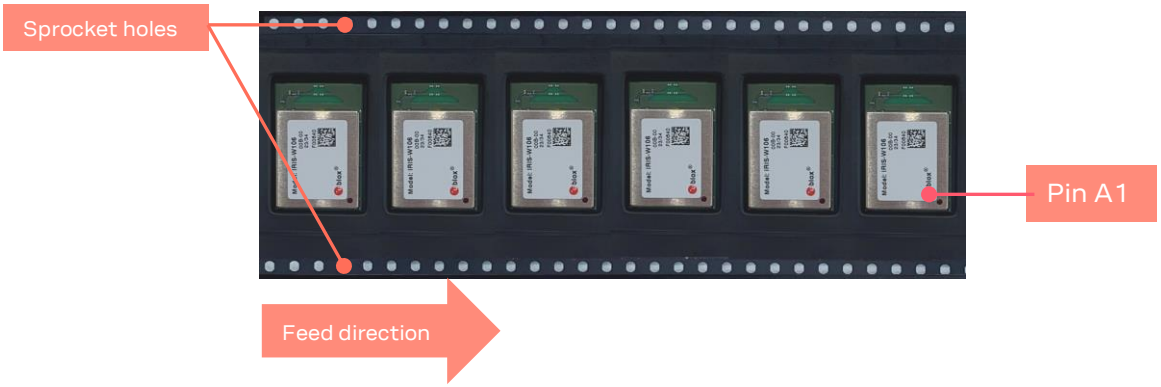


Figure 10: Orientation of IRIS-W106 module on tape

7.2 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 detailed 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.

For more information regarding MSL (Moisture Sensitivity Level), labeling, and storage, see also the Product packaging guide [2].

7.3 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-W10 series system integration manual [1]. Failure to observe these recommendations can result in severe damage to the product.

7.4 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].

8 Labeling and ordering information

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

8.1 Product labeling

Figure 11 shows the label applied to IRIS-W10 series modules. Each of the given label references are described in Table 14.

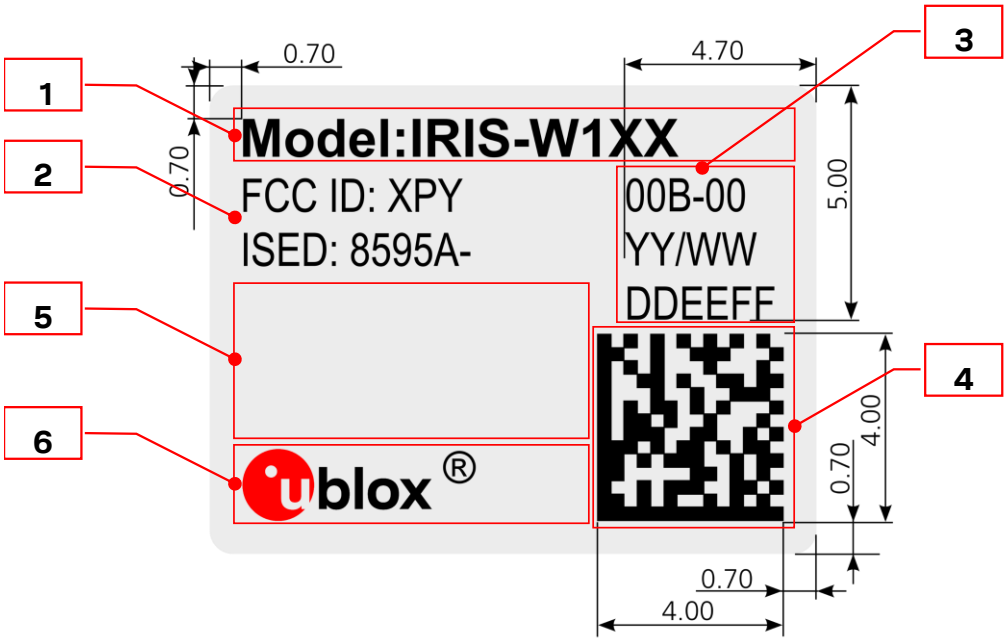


Figure 11: Location of product type number on the IRIS-W10 series module label

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 14: IRIS-W10 series label description

8.2 Explanation of codes

Table 15 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 15: Product code formats

Table 16 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 16: Part identification code

8.3 Ordering information

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

Table 17: 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)
I^2C	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 18: Explanation of the abbreviations and terms used

Related documents

[1] IRIS-W10 system integration manual, UBX-23003263
[2] Product packaging guide, UBX-14001652
[3] NXP RW612 Datasheet
[4] IRIS-W10 product summary, UBX-23000279
[5] EVK-IRIS-W1 user guide, UBX-23007837

☞ 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
R02	10-Jul-2023	mwej, ovik	Included changes to Pin assignment and revised table data in Configuration pins with other minor editorial changes.
R03	16-Oct-2023	ovik, habd, hisa	Moved Antenna list to SIM. Updated pin assignments and pinout data in Pin definition. Updated figures in Mechanical specifications. Updated width and figure in Tapes section. Editorial changes throughout the document.

Contact

u-blox AG

Address: Zürcherstrasse 68
8800 Thalwil
Switzerland

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