

IRIS-W10 series

**Stand-alone multiradio module with dual band Wi-Fi 6,
Bluetooth LE and IEEE 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 (802.11 a/b/g/n/ax), Bluetooth Low Energy 5.4, and Thread connectivity.

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This document applies to the following products:

Product name	Type number	Hardware version	PCN reference	Product status
IRIS-W101	IRIS-W101-00B-00	03	N/A	Initial Production
IRIS-W106	IRIS-W106-00B-00	03	N/A	Initial Production
IRIS-W101	IRIS-W101-10B-00	03	N/A	Initial Production
IRIS-W106	IRIS-W106-10B-00	03	N/A	Initial Production
IRIS-W101	IRIS-W101-30B-00	03	N/A	Initial Production
IRIS-W106	IRIS-W106-30B-00	03	N/A	Initial Production

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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/RW610 wireless Micro Controller Unit (MCU) with integrated tri-radio, IRIS-W10 supports the latest Wi-Fi 6 technology, Bluetooth LE 5.4, IEEE 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 8/16 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 a temperature range of 40 °C to +85 °C.



*RW610 does not support IEEE 802.15.4

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](#).

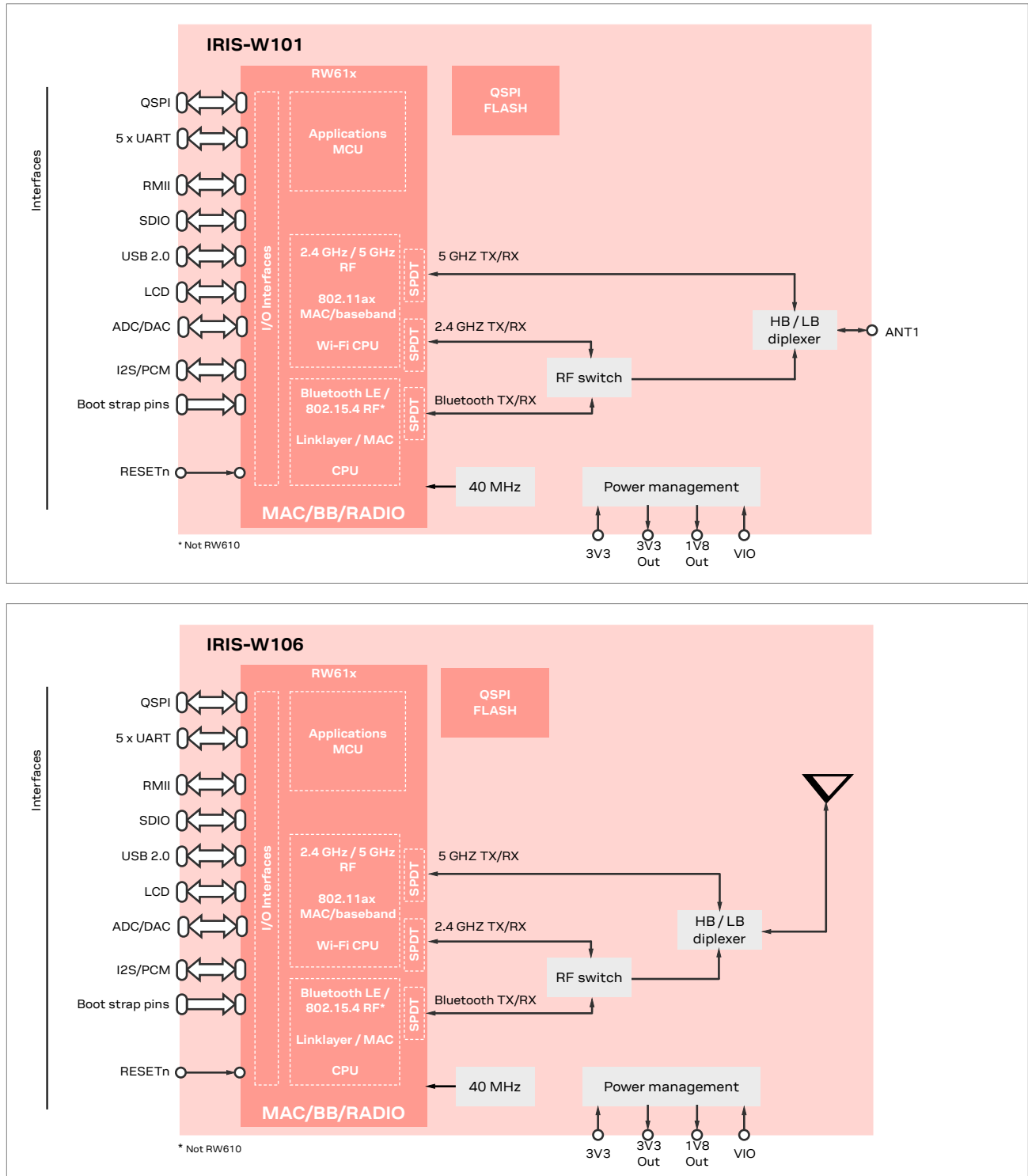


Figure 1: IRIS-W10 block diagrams

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 5.4 and IEEE 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 / IEEE 802.15.4* subsystem:
 - Bluetooth LE 5.4
 - Isochronous Channels supporting LE Audio
 - Bluetooth LE Advertising Extension
 - Bluetooth LE Long Range
 - Bluetooth LE 2 Mbps
 - IEEE 802.15.4 supporting Thread*
 - Matter over Thread*

 *IEEE 802.15.4 not supported in IRIS-W10x-30B

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	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 RW61x 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 [\[3\]](#) and RW610 data sheet [\[6\]](#).

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

IRIS-W10-00B and IRIS-W10-30B variants have an 8 MB QSPI flash memory and IRIS-W10-10B has a 16 MB QSPI flash memory. See also [Labeling and ordering information](#). See also [Ordering information](#).

1.8.4 ROM memory

RW61x 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, and Quad SPI Flash
- OTP API to program the OTP memory
- Random Number Generator (RNG) API

1.8.5 OTP memory

The RW61x MCU contains up to 2 kBytes of one-time-programmable memory that is used partly for configuration, security parameters, and other similar functions. The One Time Programmable (OTP) memory 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 x High speed USB 2.0 OTG (480Mbit/s)
- 1 x 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, so be sure to 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 and power-up. See also the IRIS-W10 system integration manual [\[1\]](#).

2.7 RF antenna interface

The RF antenna interface supports Wi-Fi, Bluetooth LE and IEEE 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/IEEE 802.15.4.

 * IEEE 802.15.4 not supported in IRIS-W10x-30B

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.

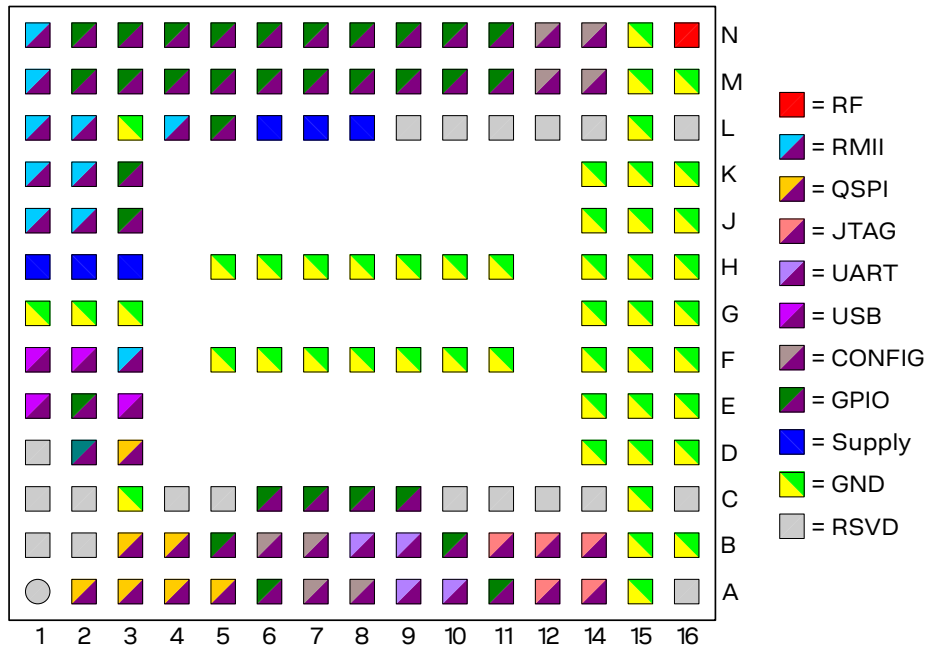


Figure 2: IRIS-W101 pin and column designations (top view/see through)

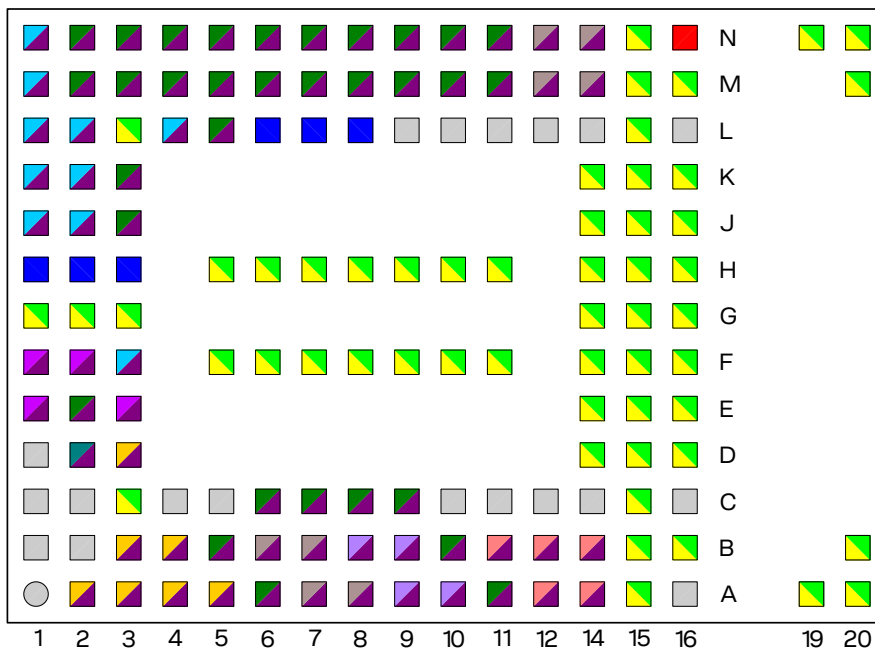
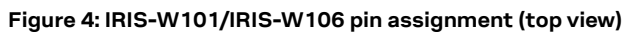


Figure 3: IRIS-W106 pin and column designations (top view/see through)



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

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



Many I/O-pins listed in [Table 2](#) and described in this data sheet may be multiplexed to several signals of different functions. To view the signal multiplexing pins and gain a clearer understanding of which signals can be used on each pin, see the [NXP RW612 Datasheet](#).

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 ($\leq 100\text{ k}\Omega$) to +3.3 V
L6	+VIO, GPIO supply voltage input. Select I/O-reference voltage by connecting this pin to either L7 or L8.
L7	+1V8, output from internal 1V8 DC/DC converter
L8	+3V3, output from internal +3V3

I/O-pins

Pin	Name	Type	Description	Alt. function	RW61x pin	Remarks
A1	RSVD	NC	Not Connected			Reserved for future use
A2	QSPI-RCLK	O	QSPI SRAM interface clock0	GPIO [35]	GPIO[35]	
A3	QSPI-RD3	I/O	Data bit 3 for QSPI SRAM interface	GPIO [41]	GPIO[41]	
A4	QSPI-RD1	I/O	Data bit 1 for QSPI SRAM interface	GPIO [39]	GPIO[39]	
A5	QSPI-RCE	O	QSPI SRAM interface slave select 0	GPIO [36]	GPIO[36]	
A6	FC2-RxD	I		SWCLK, GPIO [13]	GPIO[13]	
A7	CONFIG11		RF front-end control line 2		RF_CNTL2	Configuration pin. See also Configuration pins .
A8	CONFIG7				RF_CNTL3	Reserved, do not use
A9	FC3-CTS	I/O	SDIO_DAT1 SDIO data input/output 1	SDIO-D1, GPIO [20]	GPIO[20]	
A10	FC3-TxD	O		GPIO [26]	GPIO[26]	
A11	GPIO11	I/O	GPIO [11]	WAKE-UP	GPIO[11]	
A12	JTAG-TDO	O	JTAG test data output signal	GPIO [9]	GPIO[9]	
A14	JTAG-TMS	I	JTAG test mode select input signal	GPIO [7]	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]	GPIO[40]	
B4	QSPI-RD0	I/O	Data bit 2 for QSPI SRAM interface	GPIO [38]	GPIO[38]	
B5	FC2-TxD	O		SWDIO, GPIO [14]	GPIO[14]	
B6	CONFIG5				RF_CNTL0	Reserved, do not use
B7	CONFIG8				RF_CNTL1	Reserved, do not use
B8	FC3-RTS	I/O	SDIO_DAT0 SDIO data input/output 0	SDIO-D0, GPIO [19]	GPIO[19]	
B9	FC3-RxD	I		GPIO [24]	GPIO[24]	
B10	GPIO12	I/O	GPIO [12]	WAKE-HOST	GPIO[12]	
B11	JTAG-nRST	I	JTAG test reset signal	GPIO [10]	GPIO[10]	
B12	JTAG-TDI	I	JTAG test data input signal	GPIO [8]	GPIO[8]	
B14	JTAG-TCK	I	JTAG test clock input signal	GPIO [6]	GPIO[6]	

Pin	Name	Type	Description	Alt. function	RW61x pin	Remarks
C1	RSVD	NC	Not Connected			Reserved for future use
C2	RSVD	NC	Not Connected			Reserved for future use
C3	GND		GND		GND	
C4	RSVD	NC	Not Connected			Reserved for future use
C5	RSVD	NC	Not Connected			Reserved for future use
C6	SDIO-CLK	I	SD_CLK SDIO clock input	GPIO [15]	GPIO[15]	SDIO as peripheral only
C7	SDIO-CMD	I/O	SDIO_CMD SDIO command line	GPIO [17]	GPIO[17]	SDIO as peripheral only
C8	SDIO-D3	I/O	SDIO_DAT3 SDIO data input/output 3	GPIO [16]	GPIO[16]	SDIO as peripheral only
C9	SDIO-D2	I/O	SDIO_DAT2 SDIO data input/output 2	GPIO [18]	GPIO[18]	SDIO as peripheral only
C10	RSVD	NC	Not Connected			Reserved for future use
C11	RSVD	NC	Not Connected			Reserved for future use
C12	RSVD	NC	Not Connected			Reserved for future use
C14	RSVD	NC	Not Connected			Reserved for future use
C16	RSVD	NC	Not Connected			Reserved for future use
D1	RSVD	NC	Not Connected			Reserved for future use
D2	GPIO29	I/O	GPIO [29]		GPIO[29]	
D3	QSPI-RDQS	I/O	Data strobe I/O for QSPI SRAM interface	GPIO [37]	GPIO[37]	
E1	USB-Dm	I/O	USB bus data -		USB_DM	
E2	GPIO27	I/O	GPIO [27]		GPIO[27]	
E3	USB-VBUS	I/O	VBUS selection, 5V analog power supply		USB_VBUS	
F1	USB-Dp	I/O	USB bus data +		USB_DP	
F2	USB-ID	I	USB OTG pin		USB_ID	
F3	RMII-CLK	I/O	Ethernet controller reference clock	GPIO [25]	GPIO[25]	
J1	RMII-RxD0	I		GPIO [22]	GPIO[22]	32.768 kHz crystal input
J2	RMII-RxD1	I		GPIO [23]	GPIO[23]	32.768 kHz crystal output
J3	RMII-TxEN	O	Ethernet transmit mode enable	GPIO [60]	GPIO[60]	
K1	RMII-TxD0	I/O	Bit 0 of Ethernet transmit data	GPIO [58]	GPIO[58]	
K2	RMII-TxD1	I/O	Bit 1 of Ethernet transmit data	GPIO [59]	GPIO[59]	
K3	GPIO61	I/O	GPIO [61]		GPIO[61]	
L1	RMII-MDIO	I/O	Ethernet data input/output management	GPIO [57]	GPIO[57]	
L2	RMII-MDC	O	Ethernet controller data clock	GPIO [56]	GPIO[56]	
L3	GND	GND			GND	
L4	RMII-INT	I	Ethernet interrupt	GPIO [55]	GPIO[55]	
L9	RSVD	NC	Not Connected			Reserved for future use
L10	RSVD	NC	Not Connected			Reserved for future use
L11	RSVD	NC	Not Connected			Reserved for future use
L12	RSVD	NC	Not Connected			Reserved for future use
L14	RSVD	NC	Not Connected			Reserved for future use
L16	RSVD	NC	Not Connected			Reserved for future use
M1	RMII-CRSDV	I	Ethernet controller receive mode enable	GPIO [62]	GPIO[62]	

Pin	Name	Type	Description	Alt. function	RW61x pin	Remarks
M2	GPIO21	I/O	GPIO [21]		GPIO[21]	
M3	GPIO52	I/O	GPIO [52]		GPIO[52]	
M4	GPIO50	I/O	GPIO [50]		GPIO[50]	
M5	GPIO48	I/O	GPIO [48]		GPIO[48]	
M6	GPIO46	I/O	GPIO [46]		GPIO[46]	
M7	GPIO44	I/O	GPIO [44]		GPIO[44]	
M8	GPIO42	I/O	GPIO [42]		GPIO[42]	
M9	FC0-SCK		GPIO [4]		GPIO[4]	
M10	FC0-RxD		GPIO [2]		GPIO[2]	
M11	FC0-CTS		GPIO [0]		GPIO[0]	
M12	CONFIG1			EXT-GNT	EXT_GNT	Configuration pin (see Configuration pins)
M14	CONFIG3			EXT-FRQ	EXT_FREQ(I)/ WCI-2_SOUT	Configuration pin. See also Configuration pins .
N1	RMII-RxERR	I	Ethernet controller receive error	GPIO [63]	GPIO[63]	
N2	FC14-SCK	I/O	GPIO [54]		GPIO[54]	
N3	FC14-CTS	I	GPIO [53]		GPIO[53]	
N4	GPIO51	I/O	GPIO [51]		GPIO[51]	
N5	GPIO49	I/O	GPIO [49]		GPIO[49]	
N6	GPIO47	I/O	GPIO [47]		GPIO[47]	
N7	GPIO45	I/O	GPIO [45]		GPIO[45]	
N8	GPIO43	I/O	GPIO [43]		GPIO[43]	
N9	FC0-RTS	O	GPIO [5]		GPIO[5]	
N10	FC0-TxD	O	GPIO [3]		GPIO[3]	
N11	GPIO1	I/O	GPIO [1]		GPIO[1]	
N12	CONFIG0			EXT-REQ	EXT_REQ	Configuration pin. See also Configuration pins .
N14	CONFIG2			EXT-PRI	EXT_PRI	Configuration pin. See also Configuration pins .
N16	RF-1		RF port		RF_TR_2/ RF_TR_5/ BRF_ANT	Only available in IRIS-W101

Table 2: 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
DPV	Digital pin voltage	Input DC voltage at any digital I/O pin	-0.3	+V _{io} + 0.3	V
P_ANT	Maximum power at receiver	Input RF power at antenna pin		-3	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	kV	Human body model according to JEDEC JS001
			500	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

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 °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 6: Input characteristics of voltage supply pins

4.3 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 to UART response)		<2		s

Table 7: PDn characteristics

4.4 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 8: Digital pin characteristics

4.5 Current consumption



The typical current consumption of IRIS-W1 module is shown in Table 9.

Power mode	Activity	Typ.	Unit	Remarks
Wi-Fi 2.4 GHz	Rx	85	mA	
	Tx, 17 dBm	350	mA	
Wi-Fi 5 GHz	Rx	95	mA	
	Tx, 17 dBm	375	mA	
Bluetooth LE	Rx	58	mA	
	Tx, 0dBm	62	mA	
	Tx, 4 dBm	66	mA	
	Tx, 7 dBm	72	mA	
802.15.4 (OT-CLI)	Rx	30	mA	
	Tx, 0dBm	38	mA	
	Tx, 4dBm	41	mA	
	Tx, 7 dBm	46	mA	
Module Init		575	mA	

Table 9: Current consumption during typical use cases, Vcc = 3.3 V @ +25 °C

4.6 Wi-Fi radio characteristics

 $V_{DD} = 3.3\text{ V}$, $T_{amb} = 25\text{ °C}$

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
	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
Transmit power (typical)*	2.4 GHz DBPSK	1 Mbit/s	18	dBm
		11 Mbit/s	18	dBm
	2.4 GHz OFDM	6 Mbit/s	16	dBm
		54 Mbit/s	16	dBm
	2.4 GHz HT20	MCS0	15.6	dBm
		MCS7	15.6	dBm
	5 GHz OFDM	6 Mbit/s	15.7	dBm
		54 Mbit/s	15.7	dBm
	5 GHz HT20	MCS0	15.5	dBm
		MCS7	15.5	dBm
Receiver Sensitivity (typical)	2.4 GHz CCK	1 Mbit/s	–96	dBm
		11 Mbit/s	–88	dBm
	2.4 GHz OFDM	6 Mbit/s	–91	dBm
		54 Mbit/s	–74	dBm
	2.4 GHz 802.11n/ac	MCS0	–90	dBm
		MCS7	–72	dBm
	2.4 GHz 802.11ax	MCS0	–90	dBm
		MCS9	–65	dBm
	5 GHz OFDM	6 Mbit/s	–91	dBm
		54 Mbit/s	–74	dBm
	5GHz 802.11n/ac	MCS0	–90	dBm
		MCS7	–72	dBm
	5 GHz 802.11ax	MCS0	–90	dBm
		MCS9	–65	dBm

* There is lower output power on band edge channels and certain regulatory domains.

Table 10: Wi-Fi radio characteristics

4.7 Bluetooth Low Energy characteristics

 $V_{DD} = 3.3\text{ V}$, $T_{amb} = 25\text{ °C}$

Parameter	Specification	Unit
RF Frequency Range	2.402 – 2.480	GHz
Supported Modes	Bluetooth Low Energy 5.4	
Number of channels	40	
Modulation	GFSK	
Transmit Power (typical)*	12	dBm
Receiver Sensitivity (typical)	1 Mbps	-97 ± 2
	2 Mbps	-95 ± 2
	LR 125 kbps	-99 ± 2

* There is lower output power on band edge channels and certain regulatory domains

Table 11: Bluetooth Low Energy characteristics

4.8 802.15.4 characteristics

 $V_{DD} = 3.3\text{ V}$, $T_{amb} = 25\text{ °C}$

Parameter	Specification	Unit
RF Frequency Range	2.402 – 2.475	GHz
Number of channels	15	
Modulation	O-QPSK	
Transmit Power (typical)*	12	dBm
Receiver Sensitivity (typical)	250 kbps	-100 ± 2

* There is lower output power on band edge channels and certain regulatory domains

Table 12: 802.15.4 characteristics

4.9 Antenna radiation patterns

Figure 5 provides an overview of the measurement procedure and describes how the IRIS-W106 module is aligned to the XYZ-coordinate system.

Measurements are taken at every dotted position above the module image (shown left). Each measurement is represented as a grid point in the radiation pattern (shown right).

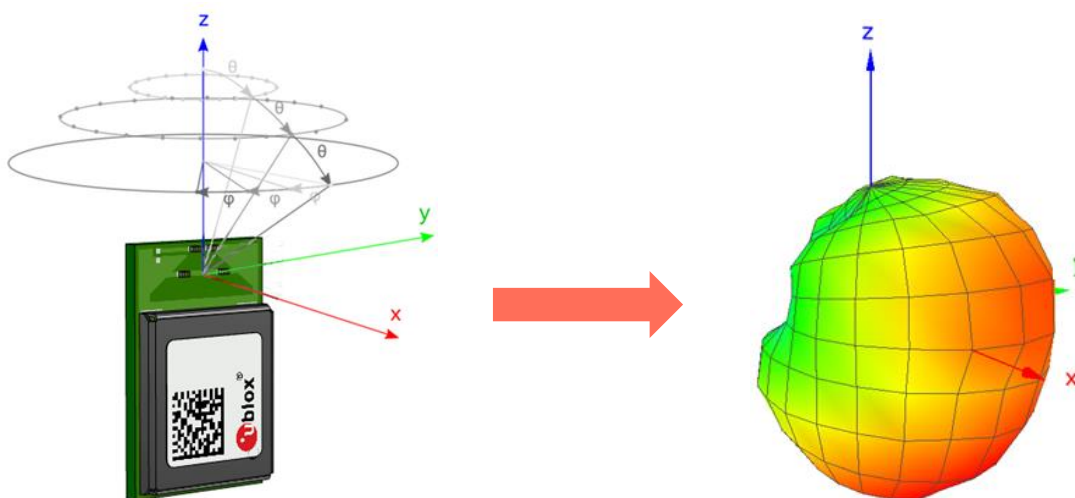
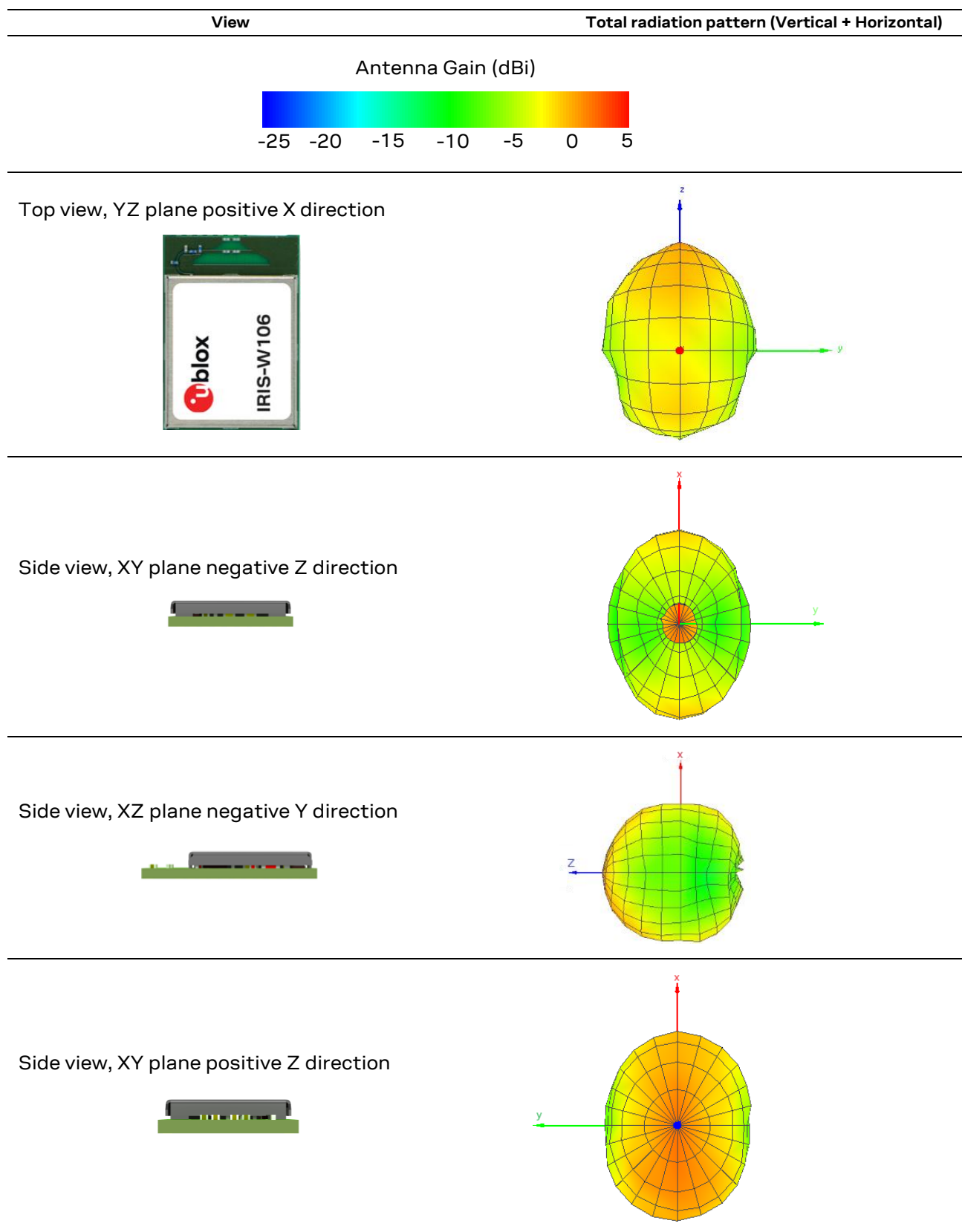


Figure 5: Measurement procedure for determining radiation patterns

Table 13 shows the radiation patterns of the IRIS-W106 module at 2.4 GHz with internal antenna.



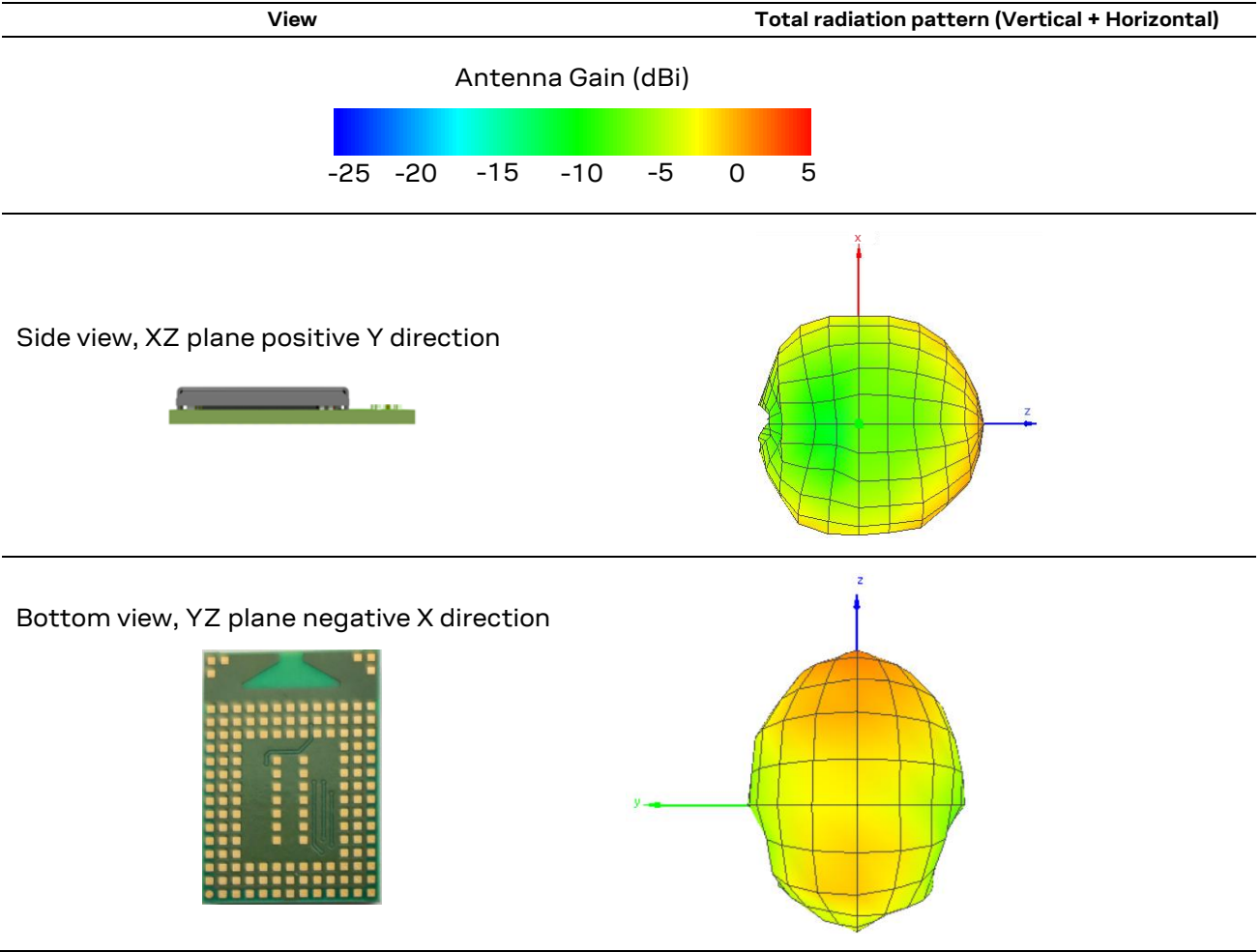
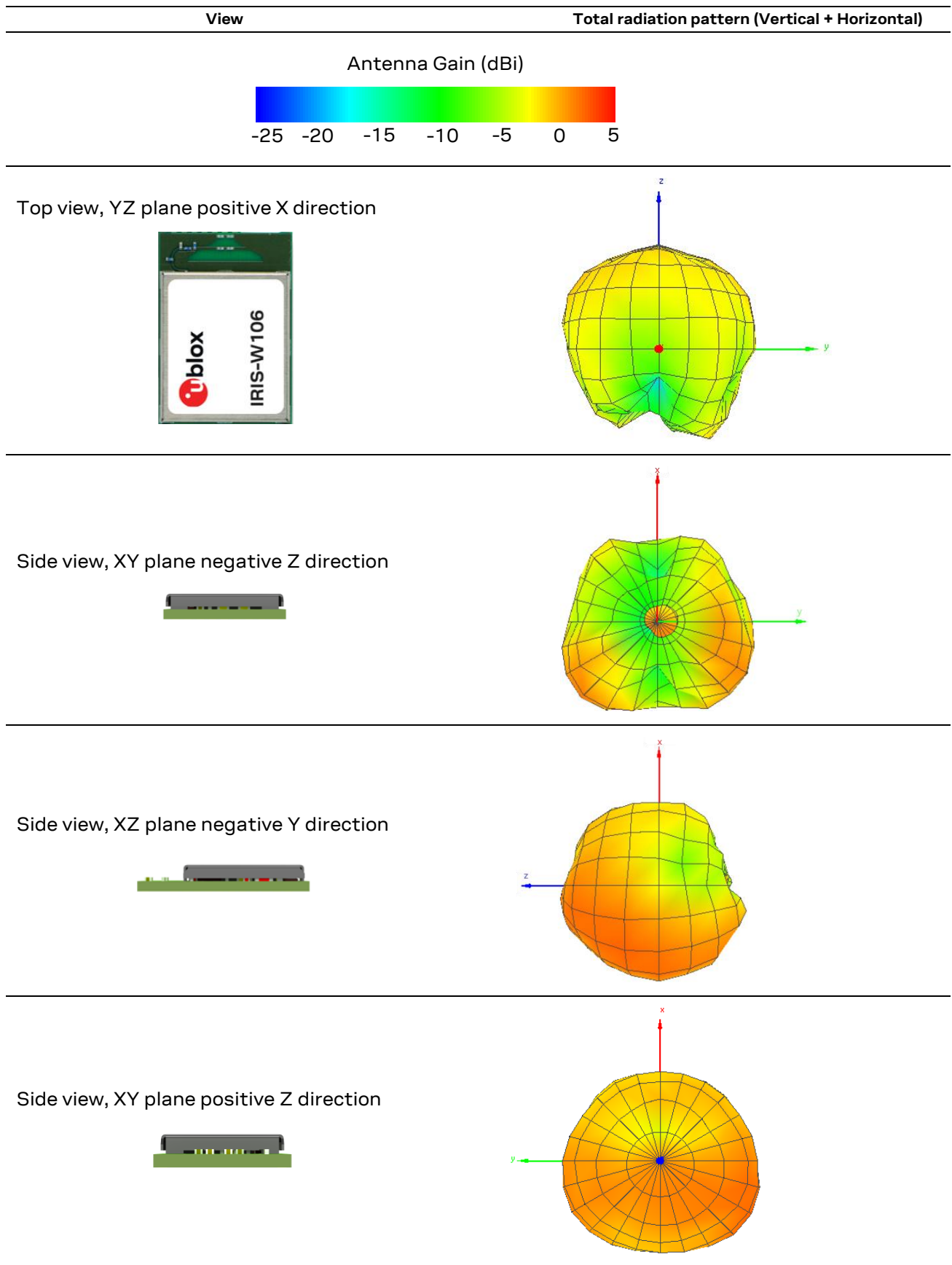


Table 13: IRIS-W106 antenna radiation patterns at 2.4 GHz

Table 14 shows the radiation patterns of the IRIS-W106 module at 5 GHz with internal antenna.



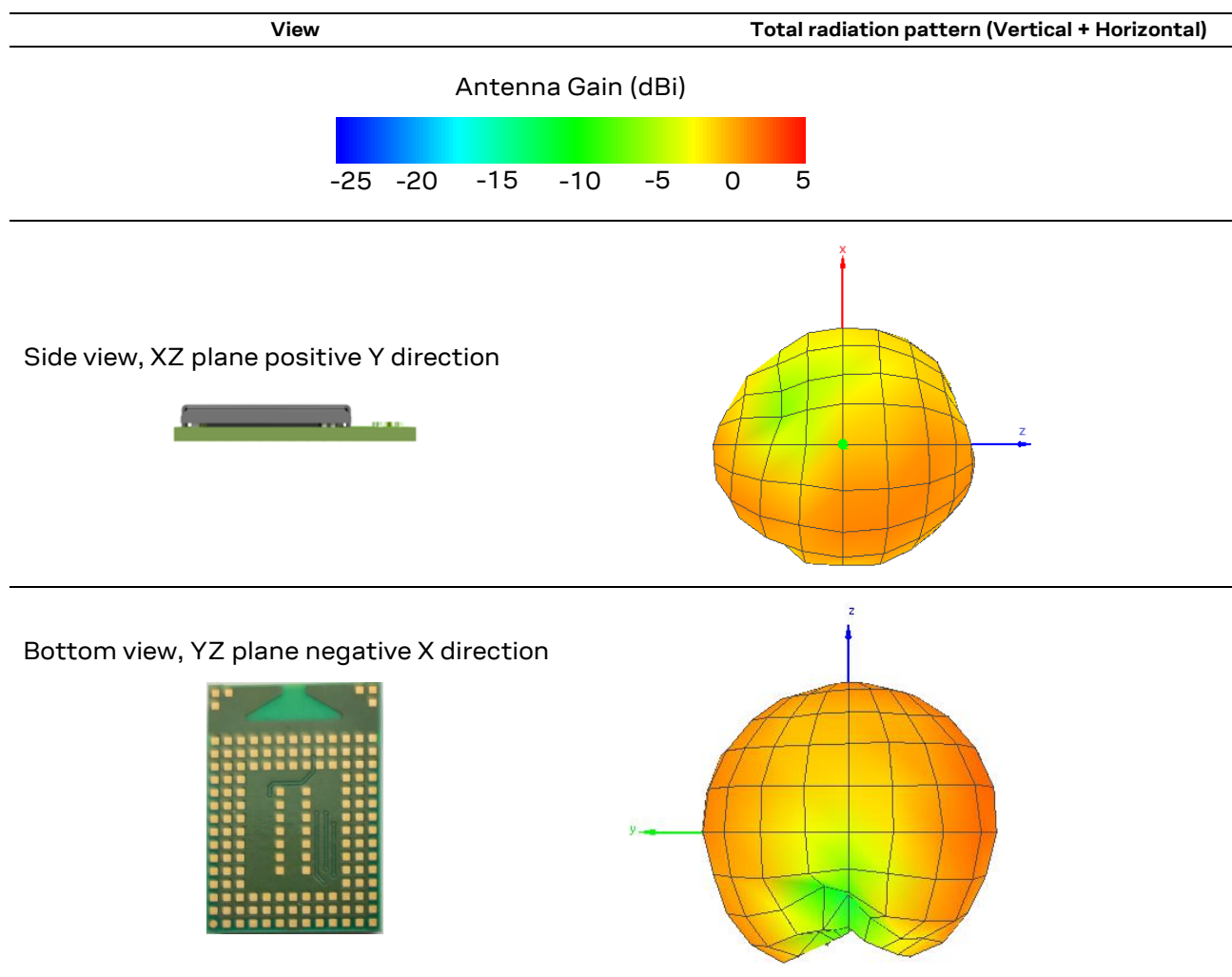


Table 14: IRIS-W106 antenna radiation patterns at 5 GHz

5 Mechanical specifications

5.1 IRIS-W101 mechanical specifications

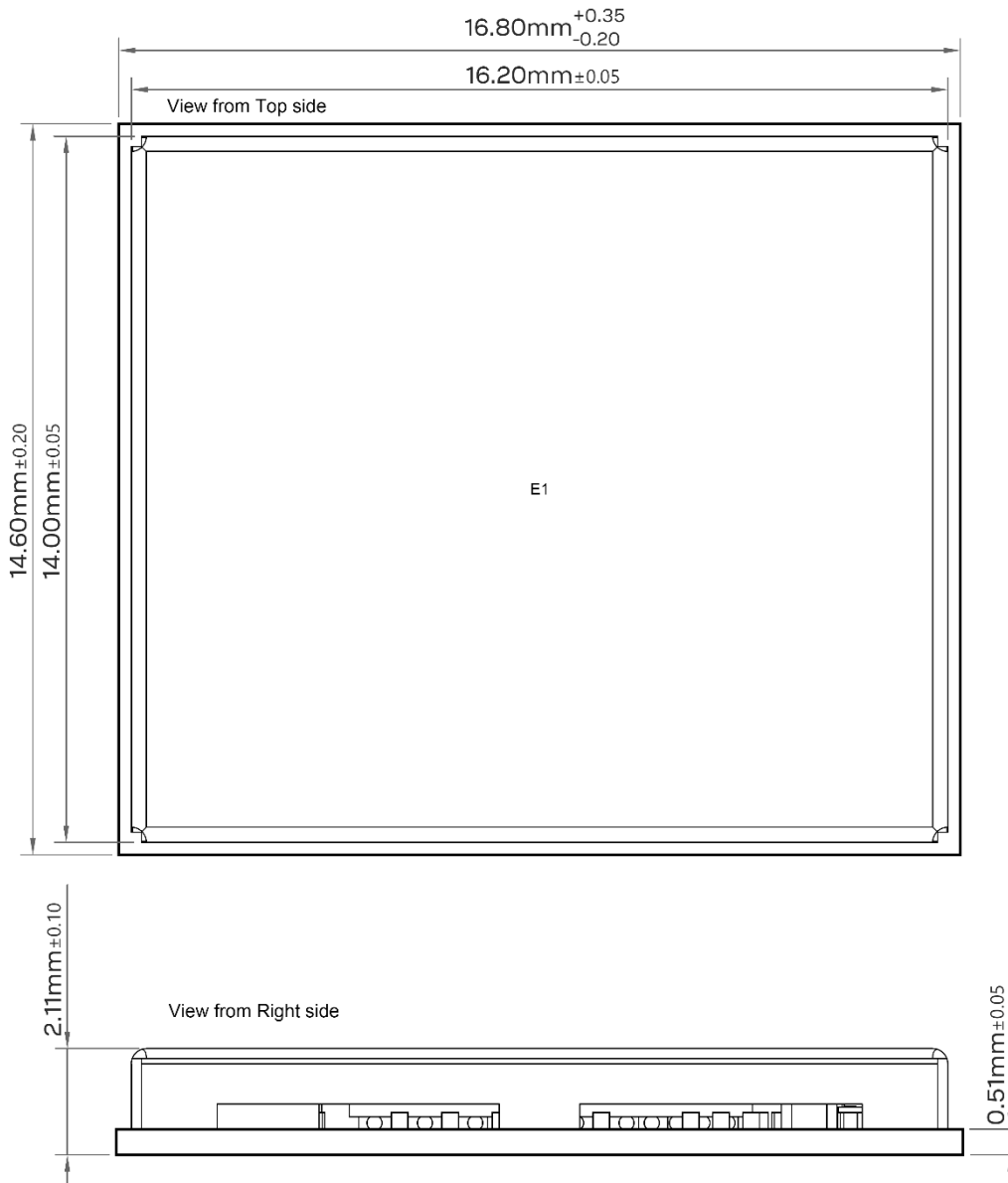


Figure 6: IRIS-W101 mechanical outline

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 mil)
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 15: IRIS-W101 mechanical outline data

5.2 IRIS-W106 mechanical specifications

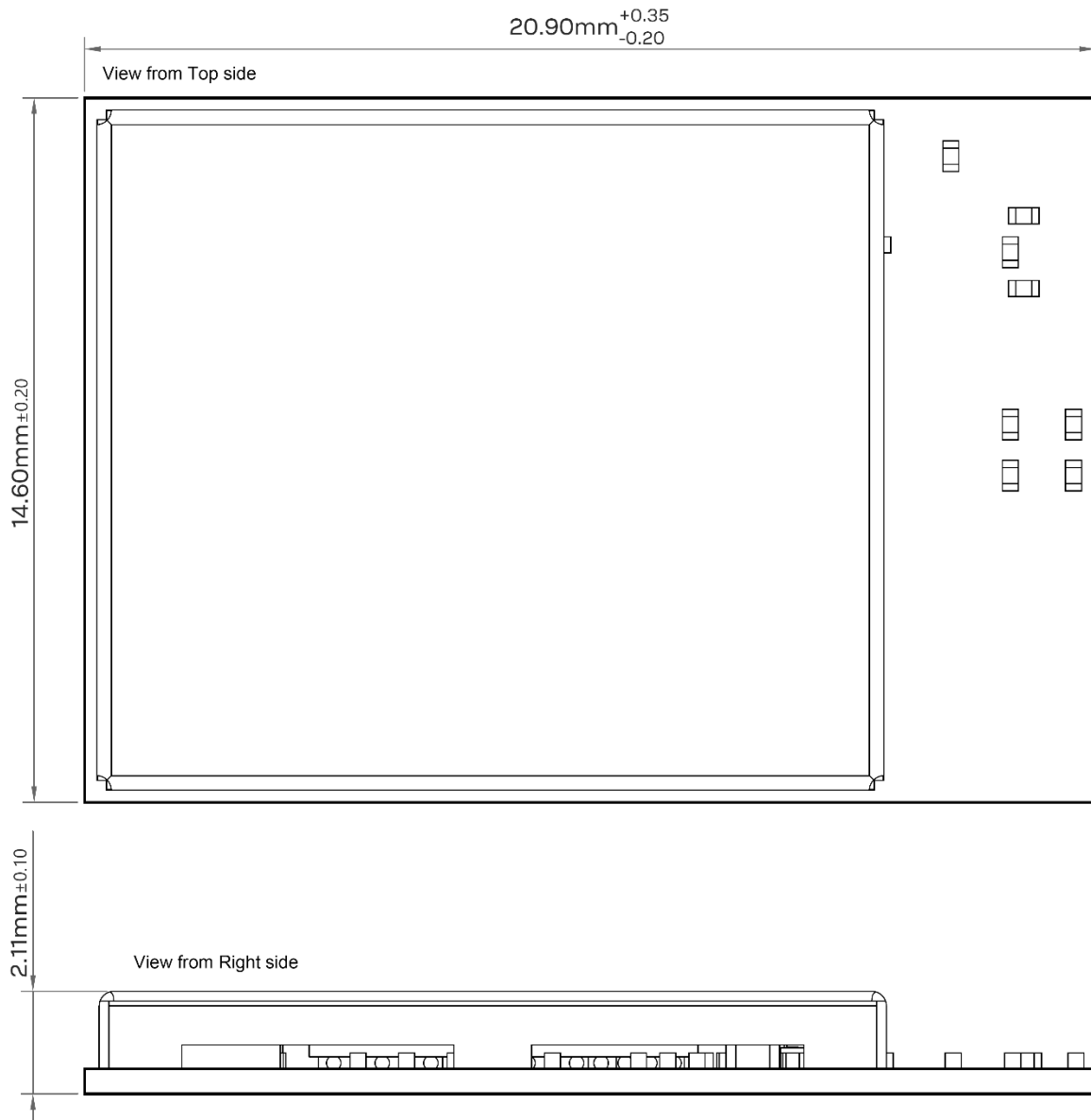


Figure 7: IRIS-W106 mechanical outline

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 16: IRIS-W106 mechanical outline data

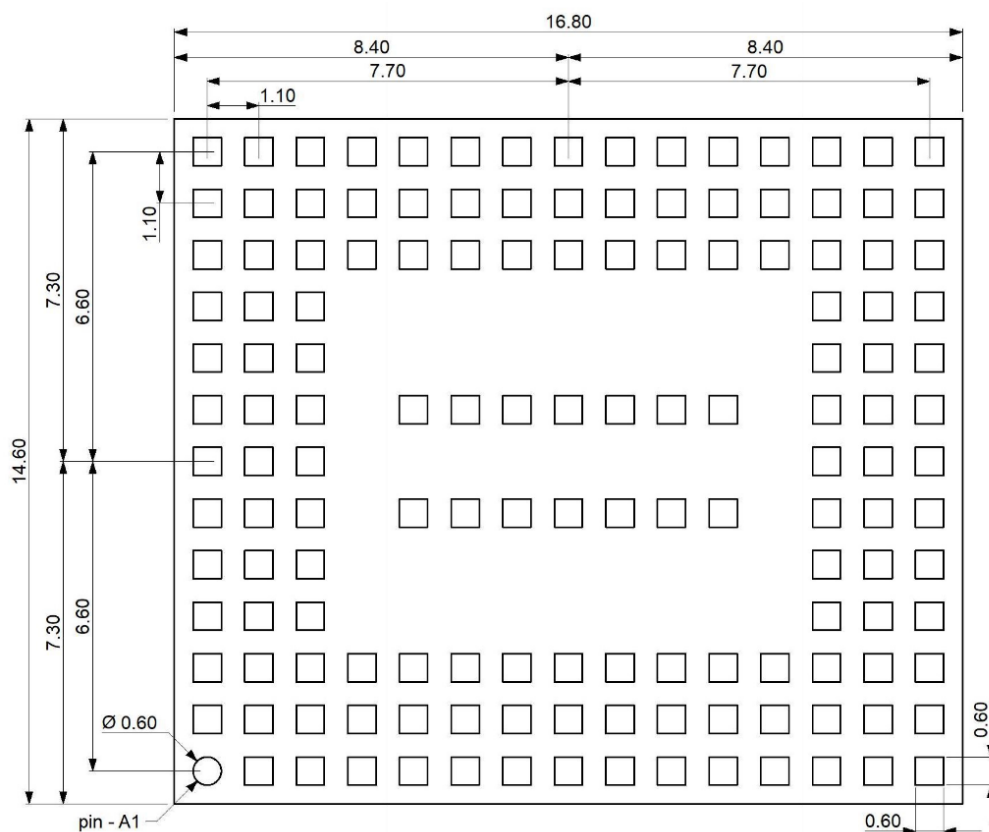


Figure 8: IRIS-W101 recommended PCB footprint (top view)

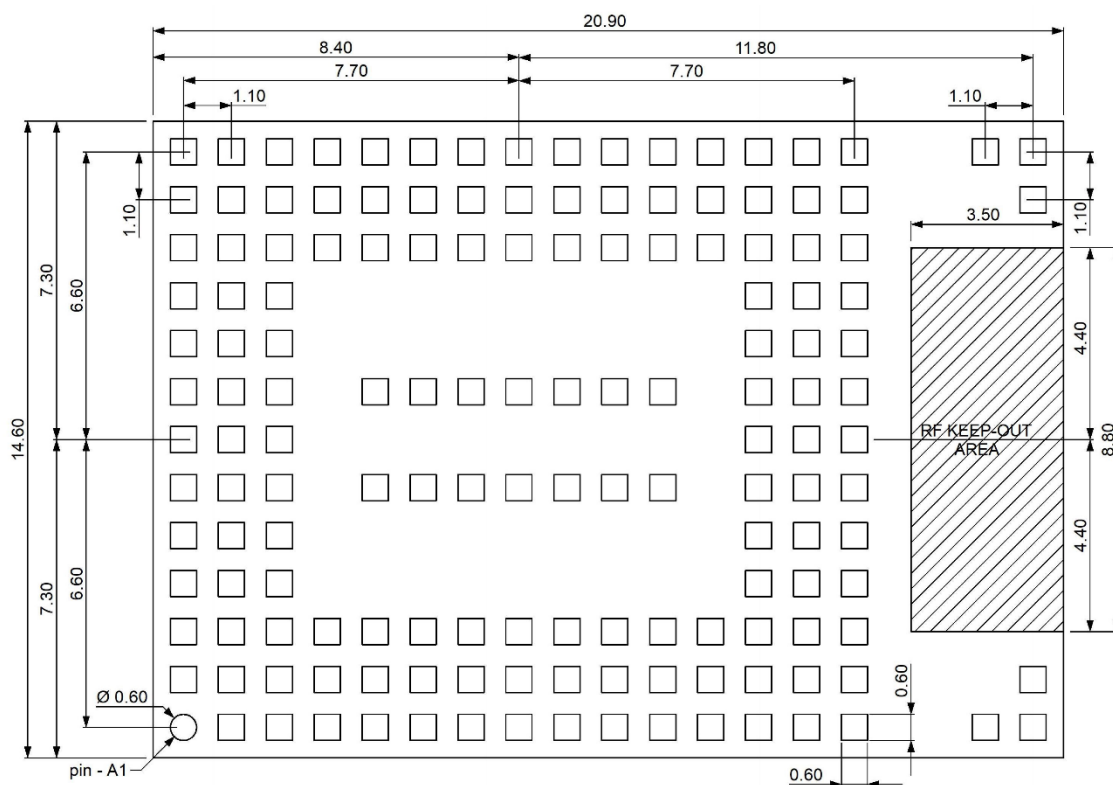


Figure 9: IRIS-W106 recommended PCB footprint (top view)

6 Qualification and approvals

6.1 Country approvals

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

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



The IRIS-W10 module series is a Bluetooth qualified design, listed in accordance with the Bluetooth specification.

All products that use Bluetooth technology must be qualified with the Bluetooth Special Interest Group (SIG) to obtain their own declaration ID. This is applicable also for products that are using an already Bluetooth qualified module.

The Bluetooth Qualification Process begins with the registration of your product on the [Bluetooth SIG Launch Studio website](#). To list your product that integrates the IRIS-W1 series module with no additional testing required, combine the QDID for the Bluetooth stack implemented in the Host Subsystem with the QDID of the pre-qualified Controller Subsystem shown in [Table 17](#).

Product type	QDID
Controller Subsystem	242302

Table 17: Bluetooth qualified design ID for IRIS-W10series data sheet

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 250 pieces on a reel. The reel types used to distribute IRIS-W10 modules are described in [Table 18](#). 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 18: Reel types for product variants

7.1.2 Tapes

[Figure 10](#) and [Figure 11](#) 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 12](#) and [Figure 13](#) show the tape drawings with dimensions.

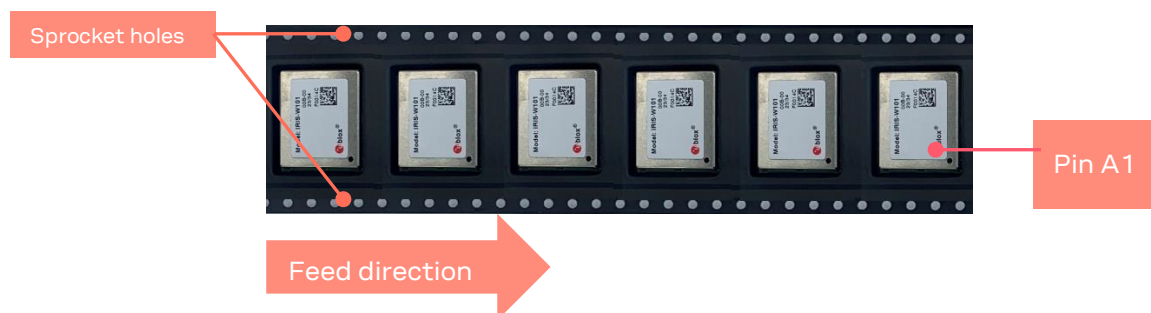


Figure 10: Orientation of IRIS-W101 module on tape

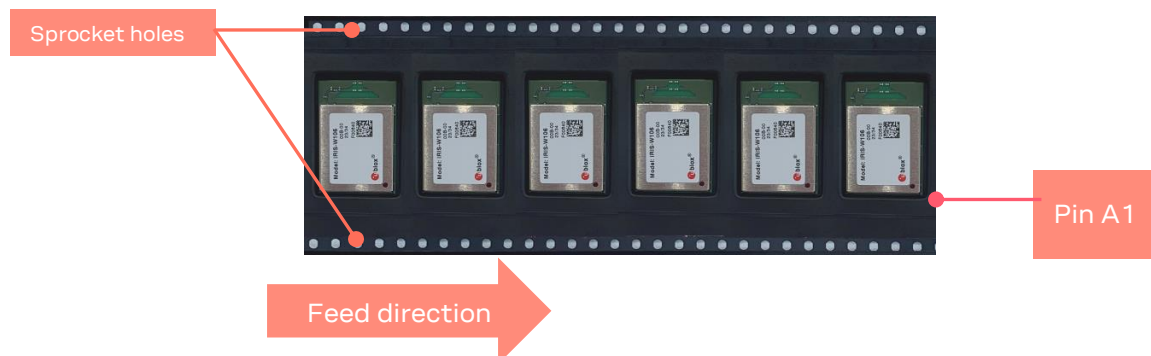


Figure 11: Orientation of IRIS-W106 module on tape

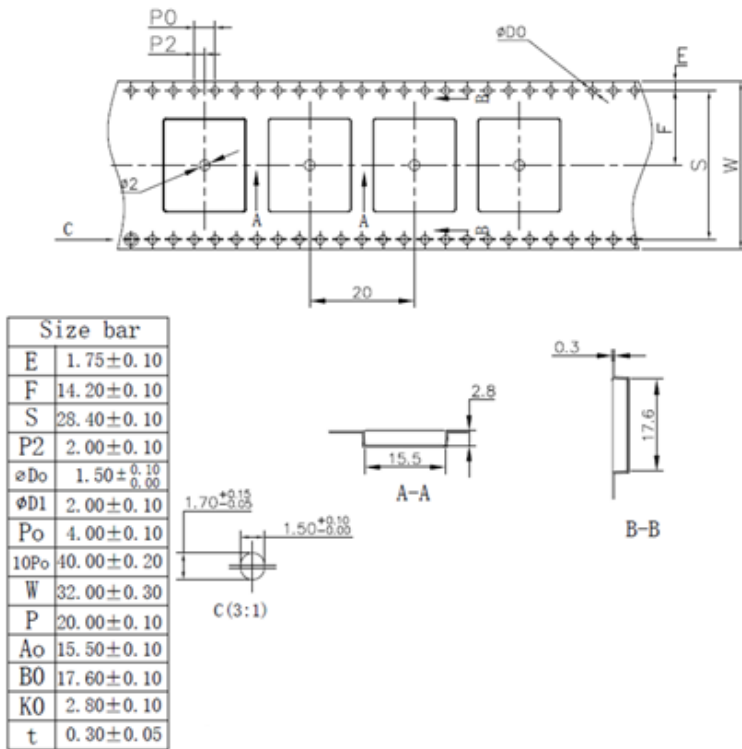


Figure 12: Tape drawing for IRIS-W101 modules

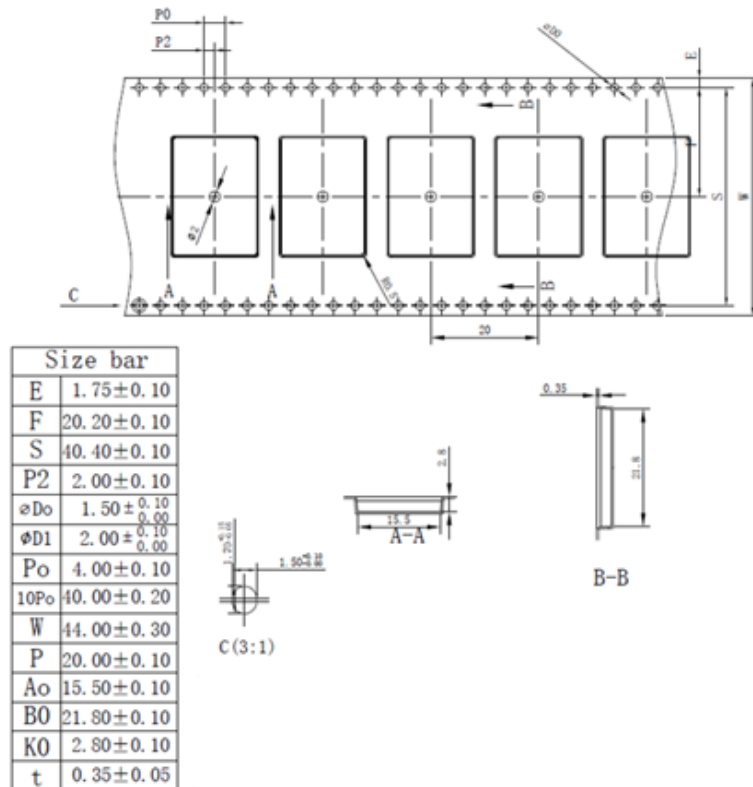


Figure 13: Tape drawing for IRIS-W106 modules

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 two-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 14 shows the label applied to IRIS-W10 series modules. Each of the given label references are described in Table 19.

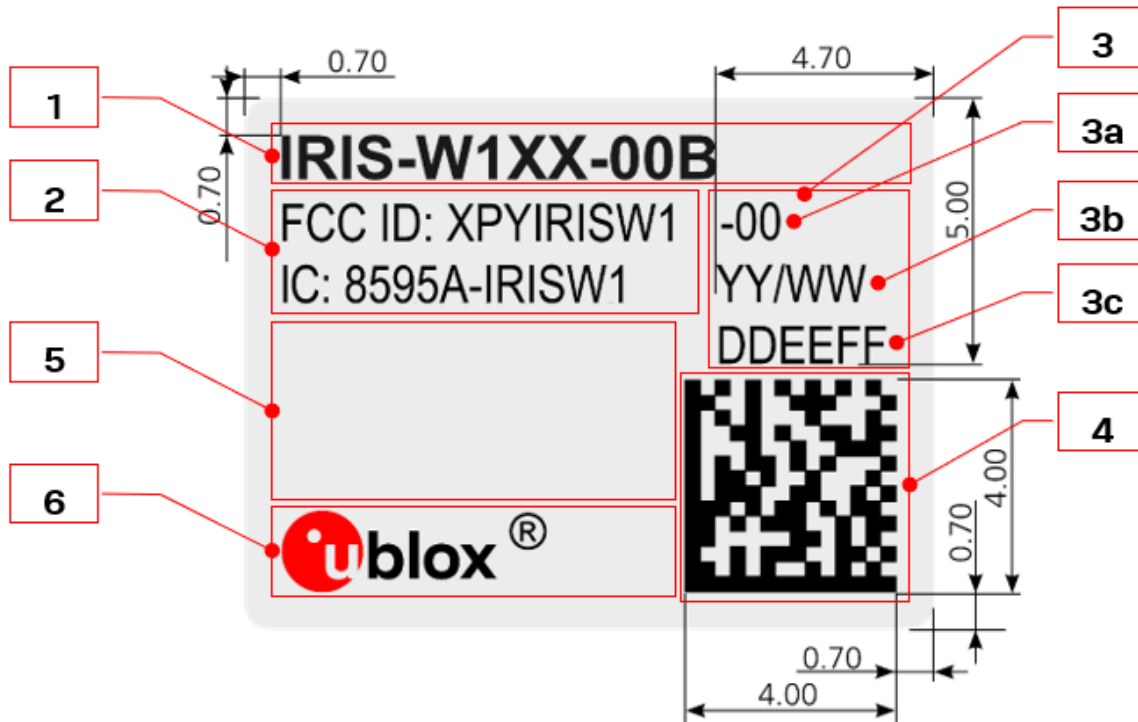


Figure 14: Location of product type number on the IRIS-W10 series module label

Reference	Description
1	Product ordering code (IRIS-W101-x0B or IRIS-W106-x0B)
2	Regulatory certification IDs
3	Minor product version information and date of unit production encoded YY/WW (year, week)
4	Data Matrix with a 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 19: IRIS-W10 series label description

8.2 Explanation of codes

Table 20 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 20: Product code formats

Table 21 describes the individual identification codes represented in each product identifier.

Code	Meaning	Example
PPPP	Form factor	IRIS
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 21: Part identification code

8.3 Ordering information

Ordering code	Product
IRIS-W101-00B	Wi-Fi 6 IEEE802.11a/b/g/n/ac/ax and Bluetooth LE/IEEE 802.15.4 with antenna pin, 8 MB flash memory, RW612 chipset.
IRIS-W106-00B	Wi-Fi 6 IEEE802.11a/b/g/n/ac/ax and Bluetooth LE/IEEE 802.15.4 with embedded PCB antenna. 8 MB flash memory, RW612 chipset.
IRIS-W101-10B	Wi-Fi 6 IEEE802.11a/b/g/n/ac/ax and Bluetooth LE/IEEE 802.15.4 with antenna pin, 16 MB flash memory, RW612 chipset.
IRIS-W106-10B	Wi-Fi 6 IEEE802.11a/b/g/n/ac/ax and Bluetooth LE/IEEE 802.15.4 with embedded PCB antenna, 16 MB flash memory, RW612 chipset.
IRIS-W101-30B	Wi-Fi 6 IEEE802.11a/b/g/n/ac/ax and Bluetooth LE with antenna pin, 8 MB flash memory, RW610 chipset.
IRIS-W106-30B	Wi-Fi 6 IEEE802.11a/b/g/n/ac/ax and Bluetooth LE with embedded PCB antenna., 8 MB flash memory, RW610 chipset.

Table 22: 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 ² C	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 23: 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](#)
- [6] [NXP RW610 Datasheet](#)

 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.
R04	31-May-2024	hisa, yach	Added module variants IRIS-W10-10B/30B, including references to 30B not supporting IEEE 802.15.4. Added tape drawings and corrected reel quantity in Product handling . Changed the number of approved reflows to two in Reflow soldering . Updated front page image. Updated Figure 4: IRIS-W101/IRIS-W106 pin assignment (top view) . Added 'RW61x pin' column in Table 2: IRIS-W101/IRIS-W106 pinout . Revised ESD sensitivity in Maximum ESD ratings .
R05	17-Jul-2024	yach, fkru	Added antenna radiation patterns in Antenna radiation patterns . Updated the image formatting of IRIS-W101/IRIS-W106 pin assignment (top view) . Updated Bluetooth LE 5.3 to 5.4. Updated product status to IP for IRIS-W10-00B in Document information . Added qualification and certification information in Bluetooth qualification .
R06	20-Sep-2024	ovik, hisa	Changed product status to IP for -10B and Prototype for -30B variants. Added AUS/NZ approved status.
R07	15-Jan-2024	ovik, hisa	Changed product status to IP for -30B variants. Updated Wi-Fi radio characteristics with max value allowed and removed reference to antenna gain. Updated KCC status to approved in Country approvals . Updates and clarifications in Table 2 for SDIO and RF_CNTL pins.

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[IRIS-W106-00B](#) [IRIS-W101-00B](#) [USB-IRIS-W106](#) [IRIS-W101-10B](#) [IRIS-W106-10B](#)