SHORT RANGE

ODIN-W2 series

Stand-alone multiradio modules with Wi-Fi & Bluetooth

Data Sheet

Abstract

This technical data sheet describes the ODIN-W2 series short range multiradio modules with Wi-Fi and Bluetooth dual mode 4.0 (Classic Bluetooth and Bluetooth Low Energy). The ODIN-W2 is a compact yet powerful stand-alone multiradio module designed for Internet-of-Things applications in the compact ODIN form factor. The Wi-Fi support conforms to IEEE 802.11a/b/g/n, and has support for dual-band 2.4 GHz and 5 GHz operation and 2×2 MIMO (2.4 GHz).

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This document applies to the following products:

Product name	Type number	Firmware version	PCN / IN reference
ODIN-W260	ODIN-W260-00B-00	1.0.0	TBD
ODIN-W262	ODIN-W262-00B-00	1.0.0	TBD

Contents

1 Functional description

1.1 Overview

The ODIN-W2 series is a highly integrated multiradio module from u-blox and the module has been developed for integration in devices for demanding applications such as industrial and medical applications. The module is built around a multiradio chip, which includes Wi-Fi, Classic Bluetooth and Bluetooth Low Energy (Dual Mode / Bluetooth Smart Ready). The Wi-Fi support conforms to IEEE 802.11a/b/g/n, and has support for dual-band 2.4 GHz and 5 GHz operation and 2.4 GHz 2×2 MIMO.

The ODIN-W2 series module is developed for reliable, high demanding industrial devices and applications and delivers high performance. The ODIN-W2 module is available in different versions (see Product features). The module has a small form factor and the interface layout is the same as previous Bluetooth and Wi-Fi modules from u-blox in the 15x22 mm ODIN form factor.

The module is complete with embedded driver, stack and application for wireless data transfer and AT-command configuration.

1.2 Applications

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

1.3 Product features

Model	Radio									Interfaces		Power	Features							Grade		
	Bluetooth qualification	Bluetooth profiles	Low Energy Serial Port Service	Wi-Fi IEEE 802.11a/b/g/n***	Max output power incl. antenna	Max range, in meters	2.4 GHz channels 1-13*	5 GHz channels 36-165*	Antenna type	UART	RMII**	Power supply: 3.0 - 3.6 V	Bluetooth throughput (Mbit/s)	Wi-Fi throughput (Mbit/s)	AT command support	Extended Data Mode protocol	Android connectivity	iOS connectivity	Wi-Fi Security	Standard	Professional	Automotive
ODIN-W260	4.0	SDPG	•	•	19 dBm	TBD	•	•	E	•	•	•	1.3	TBD	•	•	•	W/LE	Sec		■	
ODIN-W262	4.0	SDPG	•	•	16 dBm	TBD	•	•	I	•	•	•	1.3	TBD	•	•	•	W/LE	Sec		■	

S = SPP
D = DUN
Sec = WPA2, Enterprise, EAP-TLS***
P = PAN***
G = GATT**
LE = Bluetooth Low Energy
E = U.FL connector(s) for external antenna
I = Internal antenna
W = WLAN / Wi-Fi
* = Depends on region.
** = Planned for version ODIN-W26x-01B-00
*** = Planned feature.

Table 1: Key features of ODIN-W2 series

1.4 Block diagram

The block diagram of the ODIN-W2 series is shown below:

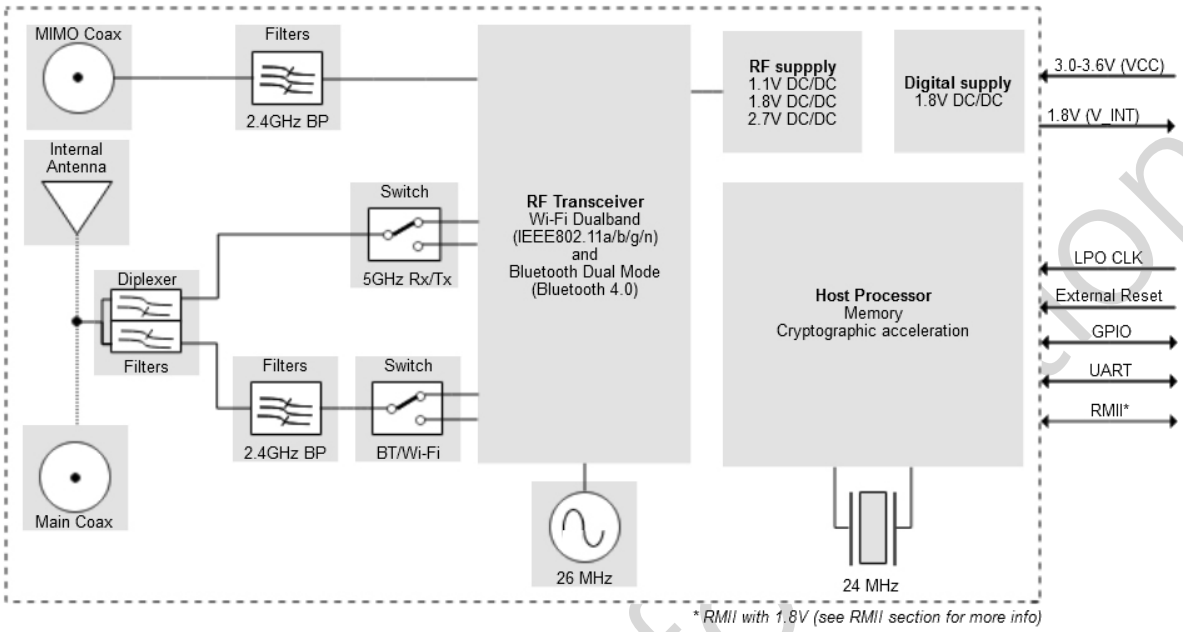


Figure 1: Block diagram of ODIN-W2 series

1.5 Product description

The ODIN-W2 series module supports Wi-Fi, classic Bluetooth and Bluetooth Low Energy (dual mode / Bluetooth Smart Ready). The Wi-Fi support conforms to IEEE 802.11a/b/g/n, and has support for dual-band 2.4 GHz and 5 GHz operation and 2×2 MIMO (2.4 GHz).

Wi-Fi	Classic Bluetooth	Bluetooth Low Energy
IEEE 802.11a/b/g/n*** ODIN-W260: 2X2 MIMO***(2.4GHz only)	Bluetooth 4.0, Classic Bluetooth +EDR Maximum number of slaves: 7 Bluetooth profiles: SPP, DUN, GATT and PAN	Bluetooth 4.0 BLE dual mode
Band support 2.4 GHz, channel 1-13* 5 GHz, channel 36-165*	Band support 2.4 GHz, 79 channels	Band support 2.4 GHz, 40 channels
Maximum conducted output power 16 dBm / 19 dBm EIRP**	Maximum conducted output power 11 dBm / 14 dBm EIRP**	Maximum conducted output power 6.5 dBm / 9.5 dBm EIRP**
Conducted sensitivity 2.4 GHz: -94 dBm / -97 dBm EIRP** 5 GHz: -88 dBm / -91 dBm EIRP**	Conducted sensitivity -90 dBm / -93 dBm EIRP**	Conducted sensitivity -94 dBm / -97 dBm EIRP**
Data rates: IEEE 802.11b: 1 / 2 / 5.5 / 11 Mbit/s IEEE 802.11a/g: 6 / 9 / 12 / 18 / 24 / 36 / 48 / 54 Mbit/s IEEE 802.11n SISO***: 6.5 / 13 / 19.5 / 26 / 39 / 52 / 58.5 / 65 Mbit/s IEEE 802.11n 2x2 MIMO***: 13 / 26 / 39 / 52 / 78 / 104 / 117 / 130 Mbit/s	Data rates: 1 / 2 / 3 Mbit/s	Data rates: 1 Mbit/s

* Maximum, supports 802.11d and depends on region.
** RF power including max antenna gain (3 dBi).
*** Planned feature.

Table 2: ODIN-W2 series Wi-Fi and Bluetooth characteristics

1.6 AT command support

The ODIN-W2 series modules support AT commands as mentioned in the ODIN-W2 AT Commands Manual [2].

See also the s-center software which is an easy to use tool from u-blox for evaluating, and configuration of u-blox Short Range modules. The s-center tool is available for download on the www.u-blox.com website.

1.7 IEEE 802.11d and additional regulatory domains

The ODIN-W2 series module support IEEE 802.11d. IEEE 802.11d is an amendment to the IEEE 802.11 specification that adds support for "additional regulatory domains". IEEE 802.11d allows ODIN-W2 based devices to self-configure and operate according to the regulations of its operating country and includes parameters like country name, channel quantity and maximum transmission level. The country information elements simplifies the creation of 802.11 wireless access points and client devices that meet the different regulations enforced in various parts of the world.

1.7.1 ODIN-W2 IEEE 802.11d implementation description

When ODIN-W2 is used as a Wi-Fi station the scan is used to detect which regulatory domain it is currently in. Passive scan is used for channels that are not available in all regulatory domains. The device supports three domains: WORLD, FCC and ETSI where WORLD is the considered all channels that are supported both by FCC, ETSI and most other countries in the world. See Table 3 for which channels are supported in the different regulatory domains. The state transition diagram Figure 2 below describes the algorithm for selecting the current regulatory domain.

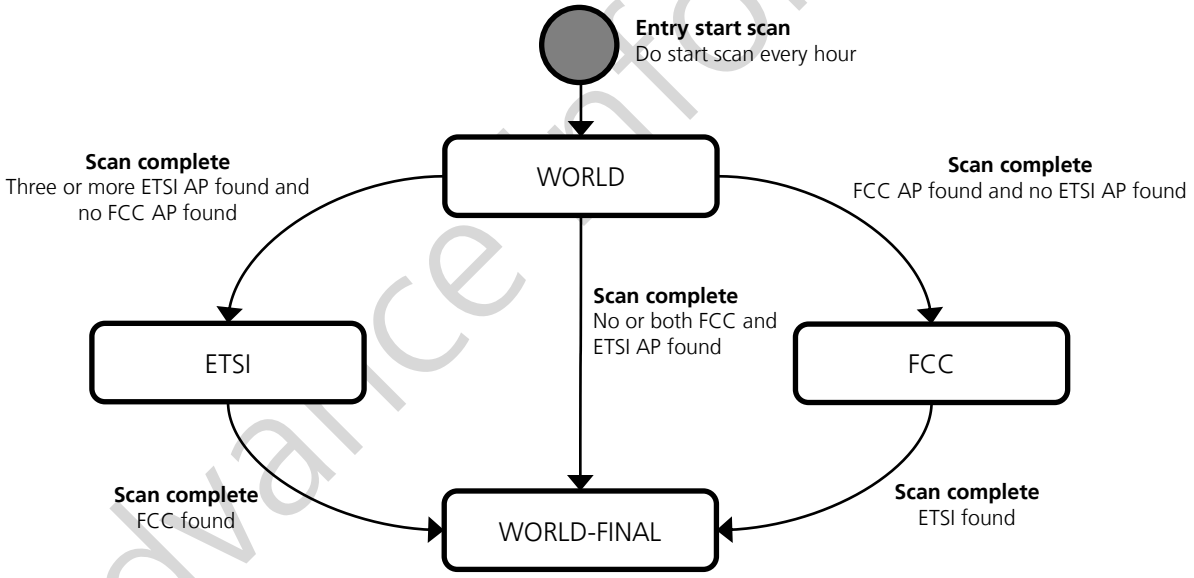


Figure 2: ODIN-W2 series IEEE 802.11d state transition diagram.

Initial regulatory domain is WORLD. At start up a scan is initiated to detect beacons containing country information IEs.

If at least one scan result contains country information indicating FCC and no country information indicates ETSI the regulatory domain is set to FCC.

If at least three scan results contain country information indicating ETSI and no country information indicates FCC then the regulatory domain is set to ETSI.

If the scan result contains country information indicating both FCC and country information indicating ETSI then the regulatory domain is set to WORLD. In the state transition diagram this is the state WORLD_FINAL. This state will not be exited until the device is reset.

A new scan is performed every hour to update the regulatory domain.

If the current regulatory domain is ETSI and at least one scan result contains country information indicating FCC and then the regulatory domain is set to WORLD. In the state transition diagram this is the state WORLD-FINAL. This state is will not be exited until the device is reset.

If the current regulatory domain is FCC and at least one scan result contains country information indicating ETSI and then the regulatory domain is set to WORLD. In the state transition diagram this is the state WORLD-FINAL. This state is will not be exited until the device is reset.

At restart of the device the algorithm is restarted.

It is not possible to override the algorithm described by reconfiguration the device.

Regulatory Domain	Band	Tx Channels
WORLD	2.4 GHz	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
	U-NII-1	36, 40, 44, 48
	U-NII-2	52, 56, 60, 64
	U-NII-2e	100, 104, 108, 112, 116, 132, 136, 140
	U-NII-3	-
ETSI	2.4 GHz	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
	U-NII-1	36, 40, 44, 48
	U-NII-2	52, 56, 60, 64
	U-NII-2e	100, 104, 108, 112, 116, 120, 124, 128, 132, 136, 140
	U-NII-3	149, 153, 157, 161, 165
FCC	2.4 GHz	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
	U-NII-1	36, 40, 44, 48
	U-NII-2	52, 56, 60, 64
	U-NII-2e	100, 104, 108, 112, 116, 132, 136, 140
	U-NII-3	149, 153, 157, 161, 165

Table 3: Channel list for supported regulatory domains. The max output power is reduced on some channels depending on regulatory requirements (e.g. can frequency band edge requirements limit the output power on channels close to band edges).

2 Interfaces

2.1 Power management

2.1.1 Module supply input (VCC)

The ODIN-W2 series modules must be supplied through the VCC pin by a DC power supply. Voltage must be stable as during operation the current drawn from VCC can vary significantly based on the power consumption profile of the Bluetooth/Wi-Fi technologies.

2.1.2 Digital I/O interfaces supply output (V_INT)

The ODIN-W2 series modules provide a 1.8 V supply rail output on the V_INT pin, which is internally generated when the module is powered on. The same voltage domain is used internally to supply the generic digital interfaces of the modules. The V_INT supply output can be used instead of an external discrete regulator. See the Electrical specifications section for maximum output current.

2.2 Antenna interfaces

The following two different antenna options are available in the ODIN-W2 series:

- ODIN-W260 equipped with dual U.FL. coaxial connectors for external antennas. Different types of external antennas are available and can be used.
- ODIN-W262 equipped with an integrated dual-band antenna

☞ While mounting the unit, ensure that it does not interfere with radio communication. The ODIN-W262 equipped with an internal surface mounted antenna should not be mounted in a metal enclosure. No metal casing or plastics using metal flakes should be used. Avoid metallic based paint or lacquer.

See Antennas chapter for information on the external antennas that can be used and for other RF and antenna design advices.

2.2.1 Antenna connectors and internal antenna

The ODIN-W260 module has two RF antenna U.FL. coaxial connectors with a characteristic impedance of 50Ω. The main antenna connector supports both Bluetooth and dual-band Wi-Fi. The second (MIMO) antenna connector adds support for 2x2 MIMO 2.4GHz single band Wi-Fi.

The ODIN-W262 module has an internal dual-band PIFA antenna and supports Bluetooth and dual-band Wi-Fi (SISO).

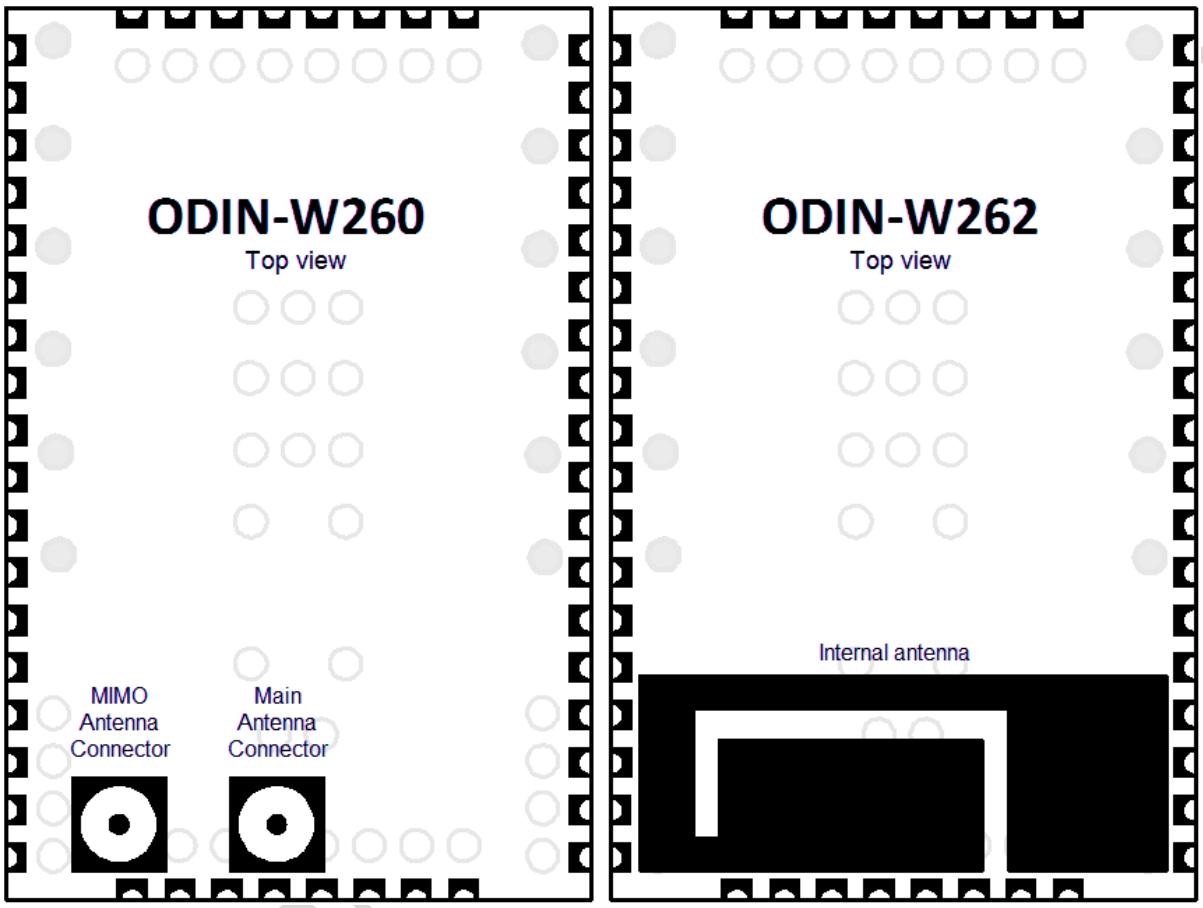


Figure 3: ODIN-W260 with connectors for external antennas and the ODIN-W262 with an internal antenna

2.3 Data communication interfaces

The ODIN-W2 series provides several data communication interfaces which are described below.

2.3.1 UART interface

The ODIN-W2 series modules include a 6-wire UART for communication with an application host processor (AT commands, Data communication and firmware 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)
- Link status (DTR as output, DSR as input)

It is recommended to use CMOS compatible signal levels. See ODIN-W2 AT Commands Manual [2] and ODIN-W2 series System Integration Manual [2] for more information about the UART interface.

2.3.2 Ethernet interface

Support for Ethernet interface is planned for version ODIN-W26x-01B-00.

The ODIN-W2 series modules include an integrated Ethernet MAC to communicate with other networked nodes over a shared medium. It supports 10/100 Mbit/s communication and can operate in both full- and half-duplex (CSMA/CD).

The Ethernet interface includes:

- RMII either for MAC to PHY or Ethernet MAC to MAC communication.
- SMI for PHY configuration

The IO voltage of the ODIN-W2 is 1.8 V, which means that the RMII interface operates outside the RMII specification v1.2. If the RMII is to be connected to a PHY circuit, then that circuit must support 1.8 V operation. If a direct RMII to RMII connection is used, then a level shifter might be needed depending on the selected host. The selected hardware setup must be verified on the application board to guarantee operation.

2.3.2.1 RMII

The RMII use 7 signals in total. The interface requires an external 50 MHz clock source either from a compatible PHY chip or an external oscillator. The ODIN-W2 module cannot provide this clock signal by itself.

2.3.2.2 SMI (MDC/MDIO management interface)

The two-wire SMI is used to configure the PHY chips. It uses a clock line and a data line to clock data to and from the PHY chips registers.

3 System functions

3.1 Module power modes

Support for power save mode is available in version ODIN-W26x-01B-00.

The ODIN-W2 series module does not have an internal low power oscillator (LPO) which is required for low power modes. An external 32.768kHz LPO signal can be supplied externally via the LPO_CLK pin if low power modes are required.

3.2 Module reset

The ODIN-W2 series modules can be reset (rebooted) in one of the following ways:

- Low level on the RESET_N pin, which is normally set high by an internal pull-up. This causes a "hardware" reset of the module. The RESET_N line should be driven by an open drain, open collector or contact switch.
- Using a reset AT command (see the ODIN-W2 AT Commands Manual [2]). This causes an "software" reset of the module.

3.3 System IO

The module has the following six different configurable IOs that can be used to indicate different system states or to be used as inputs, thus setting the module in different states:

- SWITCH_0
- RED
- GREEN/SWITCH_1
- BLUE
- UART_DTR
- UART_DSR

See Pin definition section for more information on the separate IOs. For more information on the use and configuration of the System IOs, see the ODIN-W2 AT Commands Manual [2].

4 Pin definition

4.1 Pin assignment

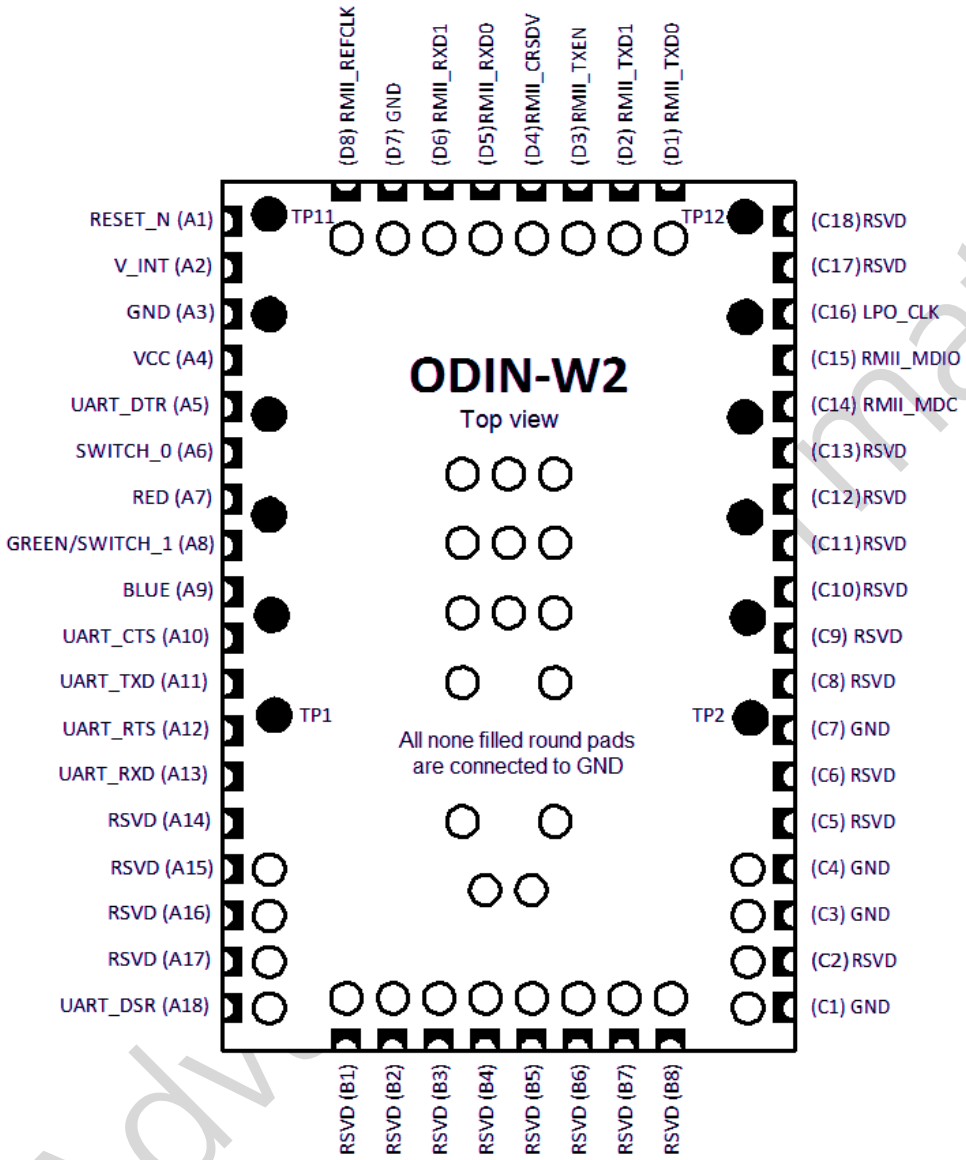


Figure 4: ODIN-W2 series pin assignment.

The signals are available on castellation pads on the edge of the PCB. All non-filled round pads are GND pads. Black circular pads are test and production points that should not be used. RSVD = Reserved, do not connect.

No	Name	I/O	Description	Remarks
A1	RESET_N	I	External reset input.	Internal active pull-up to V_INT.
A2	V_INT	O	Regulated output of the internal I/O voltage.	1.8V, maximum output current 100mA. The maximum output current can be limited by the internal current consumption of the V_INT rail. See the Current consumption section for current consumption figures.
A3	GND	N/A	Ground	All GND pads must be connected to ground.
A4	VCC	I	Module power supply.	3.0 - 3.6 V power supply.
A5	UART_DTR	O	UART Data Terminal Ready.	Active low. Can also be used as a System IO. See the System IO section for more information. Also see the ODIN-W2 AT Commands Manual [2] for more information about the pin functionality.
A6	SWITCH_0	I	Connect on external signal.	Active low. A secondary function is that the module will restore all factory settings if both the SWITCH_1 and SWITCH_0 signals are low during start up. See the ODIN-W2 AT Commands Manual [2] for more information about the pin functionality.
A7	RED	O	Logic Red LED Signal.	Active low. See the System IO section for more information. Also see the ODIN-W2 AT Commands Manual [2] for more information about the pin functionality.
A8	GREEN/ SWITCH_1	O/I	This signal is multiplexed: GREEN: Logic Green LED Signal. SWITCH_1: Default Serial Settings.	Active low. The GREEN signal is not valid until 500ms after startup. See the System IO section for more information. If the level on this pin is pulled-down during start-up the unit goes back to default serial settings. The SWITCH_1 input is only active during the first 500ms after startup. The module will restore all factory settings if both the SWITCH_1 and SWITCH_0 signals are low during start up. Also see the ODIN-W2 AT Commands Manual [2] for more information about the pin functionality.
A9	BLUE	O	Logic Blue LED Signal.	Active low. See the System IO section for more information. Also see the ODIN-W2 AT Commands Manual [2] for more information about the pin functionality.
A10	UART_CTS	I	UART Clear To Send, Hardware flow control.	Active low.
A11	UART_TXD	O	UART Transmit.	
A12	UART_RTS	O	UART Request To Send, Hardware flow control.	Active low.
A13	UART_RXD	I	UART Receive.	
A14	RSVD	N/A	Reserved pin.	Leave unconnected.
A15	RSVD	N/A	Reserved pin.	Leave unconnected.
A16	RSVD	N/A	Reserved pin.	Leave unconnected.
A17	RSVD	N/A	Reserved pin.	Leave unconnected.
A18	UART_DSR	I	UART Data Set Ready.	Active low. Can also be used as a System IO. See the System IO section for more information. Also see the ODIN-W2 AT Commands Manual [2] for more information about the pin functionality.
B1	RSVD	N/A	Reserved pin.	Leave unconnected.
B2	RSVD	N/A	Reserved pin.	Leave unconnected.

No	Name	I/O	Description	Remarks
B3	RSVD	N/A	Reserved pin.	Leave unconnected.
B4	RSVD	N/A	Reserved pin.	Leave unconnected.
B5	RSVD	N/A	Reserved pin.	Leave unconnected.
B6	RSVD	N/A	Reserved pin.	Leave unconnected.
B7	RSVD	N/A	Reserved pin.	Leave unconnected.
B8	RSVD	N/A	Reserved pin.	Leave unconnected.
C1	GND	N/A	Ground	All GND pads must be connected to ground.
C2	RSVD	N/A	Reserved pin.	Leave unconnected.
C3	GND	N/A	Ground	All GND pads must be connected to ground.
C4	GND	N/A	Ground	All GND pads must be connected to ground.
C5	RSVD	N/A	Reserved pin.	Leave unconnected.
C6	RSVD	N/A	Reserved pin.	Leave unconnected.
C7	GND	N/A	Ground	All GND pads must be connected to ground.
C8	RSVD	N/A	Reserved pin.	Leave unconnected.
C9	RSVD	N/A	Reserved pin.	Leave unconnected.
C10	RSVD	N/A	Reserved pin.	Leave unconnected.
C11	RSVD	N/A	Reserved pin.	Leave unconnected.
C12	RSVD	N/A	Reserved pin.	Leave unconnected.
C13	RSVD	N/A	Reserved pin.	Leave unconnected.
C14	RMII_MDC	O	Management Interface Clock output	According to RMII specification v1.2 with the exception that voltage level is 1.8V.
C15	RMII_MDIO	I/O	Management Interface Data I/O	An external pull-up resistor is required on the bidirectional data signal. According to RMII specification v1.2 with the exception that voltage level is 1.8V.
C16	LPO_CLK	I	Low Power Oscillator clock input	The module requires an external 32.768 kHz clock for low power modes. Leave this pin unconnected if not used as LPO clock input.
C17	RSVD	N/A	Reserved pin.	Leave unconnected.
C18	RSVD	N/A	Reserved pin.	Leave unconnected.
D1	RMII_TXD0	O	Transmit Data output 0	According to RMII specification v1.2 with the exception that voltage level is 1.8V.
D2	RMII_TXD1	O	Transmit Data output 1	According to RMII specification v1.2 with the exception that voltage level is 1.8V.
D3	RMII_TXEN	O	Transmit Enable output	Active high. According to RMII specification v1.2 with the exception that voltage level is 1.8V.
D4	RMII_CRSDV	I	Carrier Sense/Receive Data Valid input	Carrier Sense and Receive Data Valid signals are multiplexed together, multiplexing scheme varies with implementation. According to RMII specification v1.2 with the exception that voltage level is 1.8V.
D5	RMII_RXD0	I	Receive Data input 0	According to RMII specification v1.2 with the exception that voltage level is 1.8V.
D6	RMII_RXD1	I	Receive Data input 1	According to RMII specification v1.2 with the exception that voltage level is 1.8V.
D7	GND	N/A	Ground	All GND pads must be connected to ground.
D8	RMII_REFCLK	I	Reference Clock input	Continuous 50 MHz reference clock input. According to RMII specification v1.2 with the exception that voltage level is 1.8V.

Table 4: ODIN-W2 series pin-out

5 Electrical specifications

Stressing the device above one or more of the ratings listed in the Absolute maximum ratings section may 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 section should be avoided. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

5.1 Absolute maximum ratings

Symbol	Description	Condition	Min	Max	Unit
VCC	Module supply voltage	Input DC voltage at VCC pin	-0.3	5.5*	V
GDI	Generic digital interfaces	Input DC voltage at Generic digital interfaces pins	-0.3	2.2	V
ERS	External reset signal	Input DC voltage at RESET_N pin	-0.3	5.2	V
Tstg	Storage temperature		-40	+85	°C

* 5.5V up to 10 s cumulative in 7 years, 5V cumulative to 250 s, 4.8 V cumulative to 2.33 years - all includes charging dips and peaks.

Table 5: Absolute maximum ratings

5.1.1 Maximum ESD

Parameter	Max	Unit	Remarks
ESD immunity for antenna connector shielding	6000	V	Contact Discharge according to IEC 61000-4-2
	8000	V	Air Discharge according to IEC 61000-4-2
ESD sensitivity for all pins	1000	V	Human Body Model according to ANSI/ESDA/JEDEC JS-001
	250	V	Charged Device Model according to EIA-JEDEC JESD22-C101E

Table 6: Maximum ESD ratings

5.2 Operating conditions

Operating condition ranges define those limits within which the functionality of the device is guaranteed.

5.2.1 Temperature range

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

Table 7: Temperature range

5.2.2 Power supply

Read the safety notes in section Guidelines for Efficient and Safe Use before using the modules.

Symbol	Parameter	Min	Typ	Max	Unit
VCC	Supply voltage	3.00	3.30	3.60	V
V_INT	Output voltage	1.76	1.80	1.84	V
I_{VCC}	Supply voltage current drain*	-	-	1.0	A
I_{V_INT}	Output voltage current drain	-	-	100	mA

* **See**

Current consumption section for detailed information.

Table 8: Power supply voltage.

5.2.3 I/O DC characteristics

Symbol	Parameter		Min	Typ	Max	Unit
V_{IL}	LOW level input voltage			0	0.5	V
V_{IH}	HIGH level input voltage		1.31	1.8	2.0	V
V_{OL}	LOW level output voltage			0	0.4	V
V_{OH}	HIGH level output voltage		1.34	1.8		V
I_{IO}	I/O pin sink and source current				4.0*	mA
C_{IO}	I/O pin input capacitance			5		pF
R_{PU}	Internal active pull-up resistance	All IO pins except for UART_RXD	30	40	50	kΩ
		UART_RXD	8	11	15	kΩ
R_{PD}	Internal active pull-down resistance		30	40	50	kΩ

* 8.0 mA is possible but the output voltage level is not guaranteed.

Table 9: I/O DC characteristics

5.2.4 Reset characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{IL(RESET\_N)}$	RESET_N Input low level voltage				0.5	V
$V_{IH(RESET\_N)}$	RESET_N Input high level voltage		1.3			V
$V_{hys(RESET\_N)}$	RESET_N Schmitt trigger voltage hysteresis			200		mV
$R_{PU(RESET\_N)}$	Internal RESET_N pull-up resistance			8		kΩ
C_{RESET_N}	Internal RESET_N capacitance			100		nF
$V_{F(RESET\_N)}$	RESET_N Input filtered pulse				100	ns

Table 10: Reset characteristics

5.2.5 LPO clock

The ODIN-W2 series module does not have an internal low power oscillator (LPO) required for low power modes. An LPO can be supplied from an external oscillator if low power modes are required.

Symbol	Parameter	Min	Typ	Max	Unit
$LPO_{32.768kHz}$	Input clock frequency		32.768		kHz
	Input slow clock accuracy (Initial + temp + aging)			±150	ppm
Tr/Tf	Input transition time Tr/Tf -10% to 90%			100	ns
	Frequency input duty cycle	20	50	80	%
V_{IH}	Input voltage limits (Square wave, DC-coupled)	1.31		1.8	V
V_{IL}		0		0.5	V
	Input capacitance			10	pF

Table 11: External LPO clock characteristics

5.2.6 Universal asynchronous serial interface (UART)

Symbol	Parameter	Min	Typ	Max	Unit
f_{baud}	Baud rate	2400	115200	5.25M	bit/s

Table 12: UART characteristics

5.3 Current consumption

These measurements were made while running preliminary firmware (see the product version information on page 2) and are subject to change. No power save functionality is supported yet and especially the idle current consumption will be significantly reduced in coming firmwares.

5.3.1 General current consumption

V_{CC} = 3.3 V, T_A = 25°C unless otherwise specified.

Symbol	Parameter	Conditions	Typ	Peak	Unit
I_{DD}	Supply current	Reset	5.2	6.0*	mA
		Startup	90	900*	mA
		Idle, not connected, default configuration	90	170	mA
		Idle, not connected, no running services**	90	120	mA
		Stop mode***	TBD	TBD	mA
$I_{DD\_MAXIMUM}$	Absolute maximum current drain		-	1.0	A

* Wi-Fi and Bluetooth calibration during the startup phase causes large short current peaks.
** No server running and Bluetooth Connectable and Discoverable turned off.
**** Feature not supported in the current firmware version. See [1] for more info.

Table 13: General current consumption

5.3.2 Current consumption Wi-Fi 2.4 GHz

V_{CC} = 3.3 V, T_A = 25°C unless otherwise specified.

Symbol	Parameter	Conditions	Typ*	Active Typ**	Peak***	Unit
I_{DDW24}	Supply current not connected	Scan, 11 channels, 300 ms	93	380	550	mA
		Idle, Connected DTIM = 1, T_{beacon} = 100 ms	90	350	350	mA
		Idle, Connected DTIM = 5****, T_{beacon} = 100 ms	TBD	TBD	TBD	mA
I_{DDW24_TXSISO}	Supply current SISO transmitting	802.11b	170	350	550	mA
		802.11g	180	350	550	mA
		802.11n****	TBD	TBD	TBD	mA
I_{DDW24_TXMIMO}	Supply current 2x2 MIMO transmitting	802.11n****	TBD	TBD	TBD	mA
I_{DDW24_RXSISO}	Supply current SISO receiving	802.11b	120	-	550	mA
		802.11g	106	-	350	mA
		802.11n****	TBD	TBD	TBD	mA
I_{DDW24_RXMIMO}	Supply current 2x2 MIMO receiving	802.11n****	TBD	TBD	TBD	mA

* Average during transmission. UART 3 Mbit/s
** Average value for one transmission period.
*** Measured maximum at maximum output power.
**** Feature not supported in the current firmware version. See [1] for more info.

Table 14: Current consumption for Wi-Fi 2.4 GHz

5.3.3 Current consumption Wi-Fi 5 GHz

V_{CC} = 3.3 V, T_{amb} = 25°C

Symbol	Parameter	Conditions	Typ*	Active Typ**	Peak***	Unit
I_{DDW5}	Supply current not connected	Scan, 4 channels, 100 ms	100	400	650	mA
		Idle, Connected DTIM = 1, T_{beacon} = 100 ms	95	400	650	mA
		Idle, Connected DTIM = 5****, T_{beacon} = 100 ms	TBD	TBD	TBD	mA
I_{DDW5_TX}	Supply current SISO transmitting	802.11a	250	400	650	mA
		802.11n****	TBD	TBD	TBD	mA
I_{DDW5_RX}	Supply current SISO receiving	802.11a	102	-	610	mA
		802.11n****	TBD	TBD	TBD	mA

* Average during transmission. UART 3 Mbit/s
** Average value for one transmission period.
*** Measured maximum at maximum output power.
**** Feature not supported in the current firmware version. See [1] for more info.

Table 15: Current consumption for Wi-Fi 5 GHz

5.3.4 Current consumption Classic Bluetooth

V_{CC} = 3.3 V, T_{amb} = 25°C

Symbol	Parameter	Conditions	Typ*	Peak**	Unit
I_{DDBT_NDNC}	Supply current not connected	Not discoverable, Not connectable	90	100	mA
I_{DDBT_NDC}		Not discoverable, Connectable, scan interval = TBD, scan window = TBD	90	150	mA
I_{DDBT_DC}		Discoverable, Connectable, scan interval = TBD, scan window = TBD	90	150	mA
I_{DDBT_INQ}	Supply current inquiry		105	170	mA
I_{DDBT_IDLE}	Supply current connected	Idle	93	170	mA
I_{DDBT_TX1Mb}		Transmitting	115	170	mA
I_{DDBT_RX1Mb}		Receiving	100	150	mA

* Average: The cycle mean value for one transmission period.
** Measured at maximum output power.

Table 16: Current consumption for classic Bluetooth

5.3.5 Current consumption Bluetooth Low Energy (BLE)

V_{CC} = 3.3 V, T_{amb} = 25°C

Symbol	Parameter	Test conditions		Typ*	Peak**	Unit
$I_{DDBLE\_CD\_NC}$	Supply current not connected	Central device	Idle	91	150	mA
$I_{DDBLE\_CD\_INQ}$			Low Energy Inquiry, Scan interval = TBD, Scan window = TBD	95	170	mA
$I_{DDBLE\_PD\_NC}$		Peripheral device	Idle	90	150	mA
$I_{DDBLE\_PD\_ADV}$			Advertising interval = TBD	90	150	mA
$I_{DDBLE\_CD\_IDLE}$	Supply current connected	Central device	Idle	92	150	mA
$I_{DDBLE\_CD\_TX}$			Transmitting	95	150	mA
$I_{DDBLE\_CD\_RX}$			Receiving	95	150	mA
$I_{DDBLE\_PD\_IDLE}$		Peripheral device	Idle	92	150	mA
$I_{DDBLE\_PD\_TX}$			Transmitting	95	150	mA
$I_{DDBLE\_PD\_RX}$			Receiving	95	150	mA

* Average: The cycle mean value for one transmission period.
** Measured at maximum output power.

Table 17: Current consumption for Bluetooth Low Energy (BLE)

5.4 RF characteristics

5.4.1 Wi-Fi receiver characteristics 2.4 GHz

V_{CC} = 3.3 V, T_{amb} = 25 °C

Parameter	Test conditions	Antenna port	Channel / Freq [MHz]	IEEE limit	Typ*	Unit
Receive sensitivity SISO	802.11b, Rate = 1 Mbit/s, PER ≤ 8%	MAIN port	6 / 2437	-76	-94	dBm
	802.11b, Rate = 11 Mbit/s, PER ≤ 8%	MAIN port	6 / 2437	-76	-86	dBm
	802.11g, Rate = 6 Mbit/s, PER ≤ 10%	MAIN port	6 / 2437	-82	-89	dBm
	802.11g, Rate = 54 Mbit/s, PER ≤ 10%	MAIN port	6 / 2437	-65	-72	dBm
	802.11n**, Rate = 6.5 Mbit/s (MCS0), PER ≤ 10%	MAIN port	6 / 2437	-82	TBD	dBm
	802.11n**, Rate = 65 Mbit/s (MCS7), PER ≤ 10%	MAIN port	6 / 2437	-64	TBD	dBm
Receive sensitivity 2x2 MIMO	802.11n**, Rate = 13 Mbit/s (MCS8), PER ≤ 10%	MAIN port (stream 1)	6 / 2437	-64	TBD	dBm
		MIMO port (stream 2)	6 / 2437	-64	TBD	dBm
	802.11n**, Rate = 130 Mbit/s (MCS15), PER ≤ 10%	MAIN port (stream 1)	6 / 2437	-64	TBD	dBm
		MIMO port (stream 2)	6 / 2437	-64	TBD	dBm

* Measured conducted on ODIN-W260, measurement tolerance ±1.0 dB.
** Feature not supported in the current firmware version. See [1] for more info.

Table 18: Receiver characteristics for 2.4 GHz Wi-Fi

5.4.2 Wi-Fi receiver characteristics 5 GHz

V_{CC} = 3.3 V, T_{amb} = 25 °C

Parameter	Test conditions	Channel / Freq [MHz]	IEEE limit	Typ*	Unit
Receive sensitivity	802.11a, Rate = 6 Mbit/s, PER ≤ 10%	36 / 5180	-82	-85	dBm
		100 / 5500	-82	-88	dBm
		140 / 5825	-82	-86	dBm
	802.11a, Rate = 48 Mbit/s, PER ≤ 10%	36 / 5180	-66	-69	dBm
		100 / 5500	-66	-73	dBm
		140 / 5825	-66	-71	dBm
	802.11n**, Rate = 6.5 Mbit/s (MCS0) , PER ≤ 10%	36 / 5180	-82	TBD	dBm
		100 / 5500	-82	TBD	dBm
		140 / 5825	-82	TBD	dBm
	802.11n**, Rate = 65 Mbit/s (MCS7) , PER ≤ 10%	36 / 5180	-64	TBD	dBm
		100 / 5500	-64	TBD	dBm
		140 / 5825	-64	TBD	dBm

* Measured conducted on ODIN-W260, measurement tolerance ±1.0 dB.
** Feature not supported in the current firmware version. See [1] for more info.

Table 19: Receiver characteristics for 5 GHz Wi-Fi

5.4.3 Wi-Fi transmitter characteristics 2.4 GHz

V_{CC} = 3.3 V, T_{amb} = 25 °C

Parameter	Test conditions	Antenna port	IEEE EVM limit	EVM*	Typ*	Unit
Transmitting output power SISO	802.11b, Rate = 1 Mbit/s	MAIN port	-14	-28	15.2	dBm
	802.11b, Rate = 11 Mbit/s	MAIN port	-14	-26	15.6	dBm
	802.11g, Rate = 6 Mbit/s	MAIN port	-5	-16	15.2	dBm
	802.11g, Rate = 54 Mbit/s	MAIN port	-25	-25	12.3	dBm
	802.11n**, Rate = 6.5 Mbit/s (MCS0)	MAIN port	-5	TBD	TBD	dBm
	802.11n**, Rate = 65 Mbit/s (MCS7)	MAIN port	-28	TBD	TBD	dBm
Transmitting output power 2x2 MIMO	802.11n**, Rate = 13 Mbit/s (MCS8)	MAIN port (stream 1)	-5	TBD	TBD	dBm
		MIMO port (stream 2)	-5	TBD	TBD	dBm
	802.11n**, Rate = 130 Mbit/s (MCS15)	MAIN port (stream 1)	-28	TBD	TBD	dBm
		MIMO port (stream 2)	-28	TBD	TBD	dBm

* Measured conducted on ODIN-W260 with max output power, measurement tolerance ±1.0 dB.
Regional power limitation can reduce the max output power (especially on channels close to band edges).
** Feature not supported in the current firmware version. See [1] for more info.

Table 20: Wi-Fi transmitter characteristics 2.4 GHz

5.4.4 Wi-Fi transmitter characteristics 5 GHz

V_{CC} = 3.3 V, T_{amb} = 25 °C

Parameter	Test conditions	Channel / Freq [MHz]	IEEE EVM limit	EVM*	Typ*	Unit
Transmitting output power	802.11a, Rate = 6 Mbit/s	40 / 5180	-5	-26	14.2	dBm
		100 / 5500	-5	-25	14.1	dBm
		140 / 5700	-5	-18	15.1	dBm
	802.11a, Rate = 54 Mbit/s	40 / 5180	-25	-26	14.2	dBm
		100 / 5500	-25	-25	14.1	dBm
		140 / 5700	-25	-25	14.7	dBm
	802.11n**, Rate = 6.5 Mbit/s (MCS0)	40 / 5180	-5	TBD	TBD	dBm
		100 / 5500	-5	TBD	TBD	dBm
		140 / 5700	-5	TBD	TBD	dBm
	802.11n**, Rate = 65 Mbit/s (MCS7)	40 / 5180	-28	TBD	TBD	dBm
		100 / 5500	-28	TBD	TBD	dBm
		140 / 5700	-28	TBD	TBD	dBm

* Measured conducted on ODIN-W260 with max output power, measurement tolerance ±1.0 dB.
Regional power limitation can reduce the max output power (especially on channels close to band edges).
** Feature not supported in the current firmware version. See [1] for more info.

Table 21: Wi-Fi transmitter characteristics 5 GHz

5.4.5 Bluetooth classic receiver characteristics

V_{CC} = 3.3 V, T_{amb} = 25 °C

Parameter	Test conditions	Limit	Typ*	Min*	Unit
Rx sensitivity	BR 1Mbit, GFSK, BER ≤ 0.1%	-70	-89		dBm
	EDR 2Mbit, π/4-DQPSK, BER ≤ 0.007%	-70	-90		dBm
	EDR 3Mbit, 8DPSK , BER ≤ 0.007%	-70	-83		dBm
Maximum input level	BR 1Mbit, GFSK, BER ≤ 0.1%	-20		-6	dBm
	EDR 2Mbit, π/4-DQPSK, BER ≤ 0.1%	-20		-10	dBm
	EDR 3Mbit, 8DPSK , BER ≤ 0.1%	-20		-10	dBm

* Measured conducted on ODIN-W260, measurement tolerance ±1.0 dB.

Table 22: Bluetooth classic receiver sensitivity

5.4.6 Bluetooth Low Energy receiver sensitivity

V_{CC} = 3.3 V, T_{amb} = 25 °C

Parameter	Test conditions	Limit	Typ*	Min*	Unit
Rx sensitivity	PER ≤ 30.8%	-70	-94		dBm
Maximum input level	PER ≤ 30.8%	-10		-6	dBm

* Measured conducted on ODIN-W260, measurement tolerance ±1.0 dB.

Table 23: Bluetooth Low Energy receiver sensitivity

5.4.7 Bluetooth Classic transmitter characteristics

V_{CC} = 3.3 V, T_{amb} = 25 °C

Parameter	Test conditions	Typ*	Peak*	Unit
Transmitting output power	BR 1Mbit, GFSK	10.0	11.0	dBm
	EDR 2Mbit, π/4-DQPSK	5.0	8.0	dBm
	EDR 3Mbit, 8DPSK	5.0	8.0	dBm

* Measured conducted on ODIN-W260, measurement tolerance ±1.0 dB.

Table 24: Bluetooth transmitter output power

5.4.8 Bluetooth Low Energy transmitter characteristics

(V_{CC} = 3.3 V, T_{amb} = 25 °C

Parameter	Test conditions	Typ*	Peak*	Unit
Transmitting output power		5.0	6.0	dBm

* Measured conducted on ODIN-W260, measurement tolerance ±1.0 dB.

Table 25: Bluetooth Low Energy transmitter characteristics

6 Mechanical specifications

6.1 Dimensions

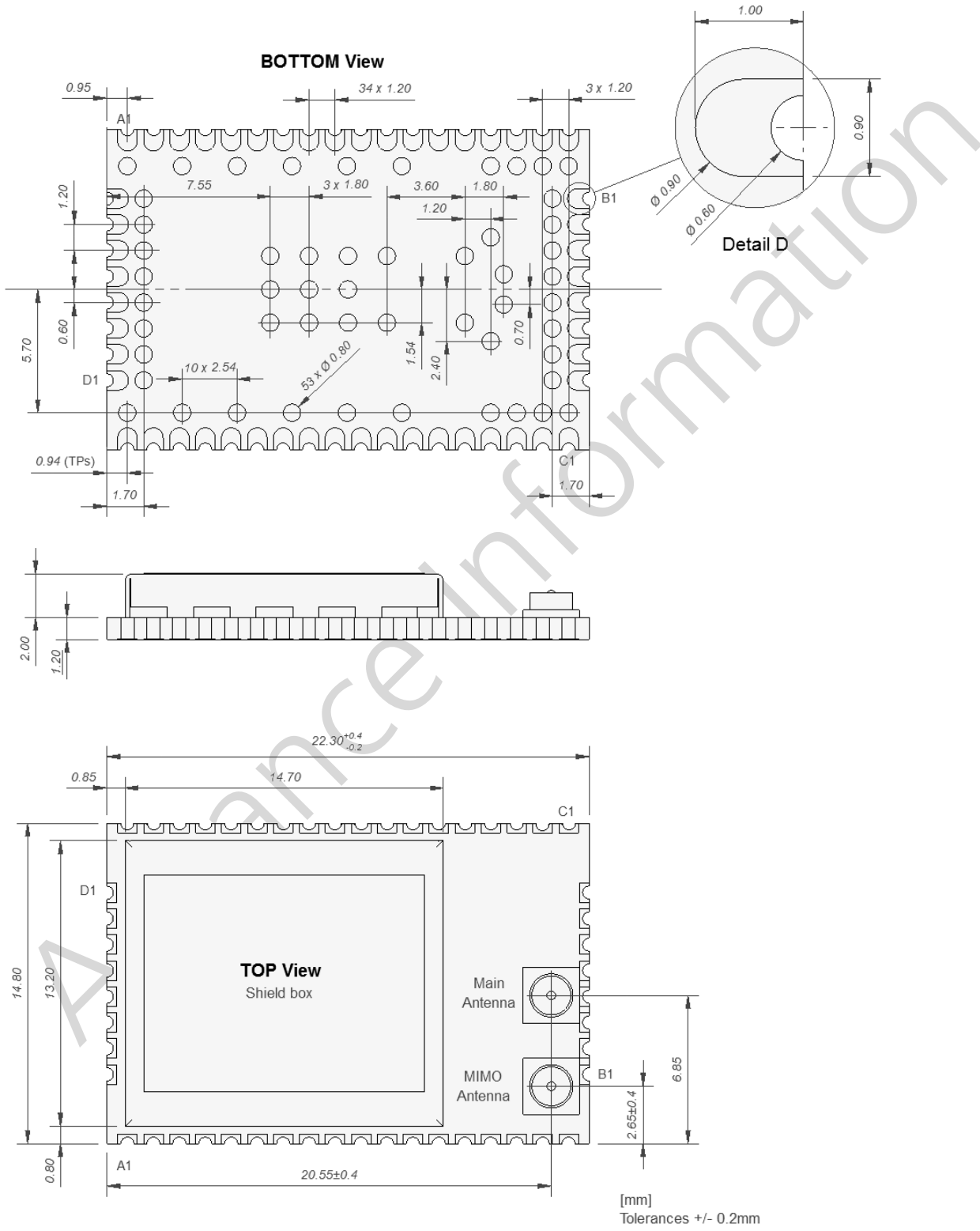


Figure 5: Physical dimensions of ODIN-W260

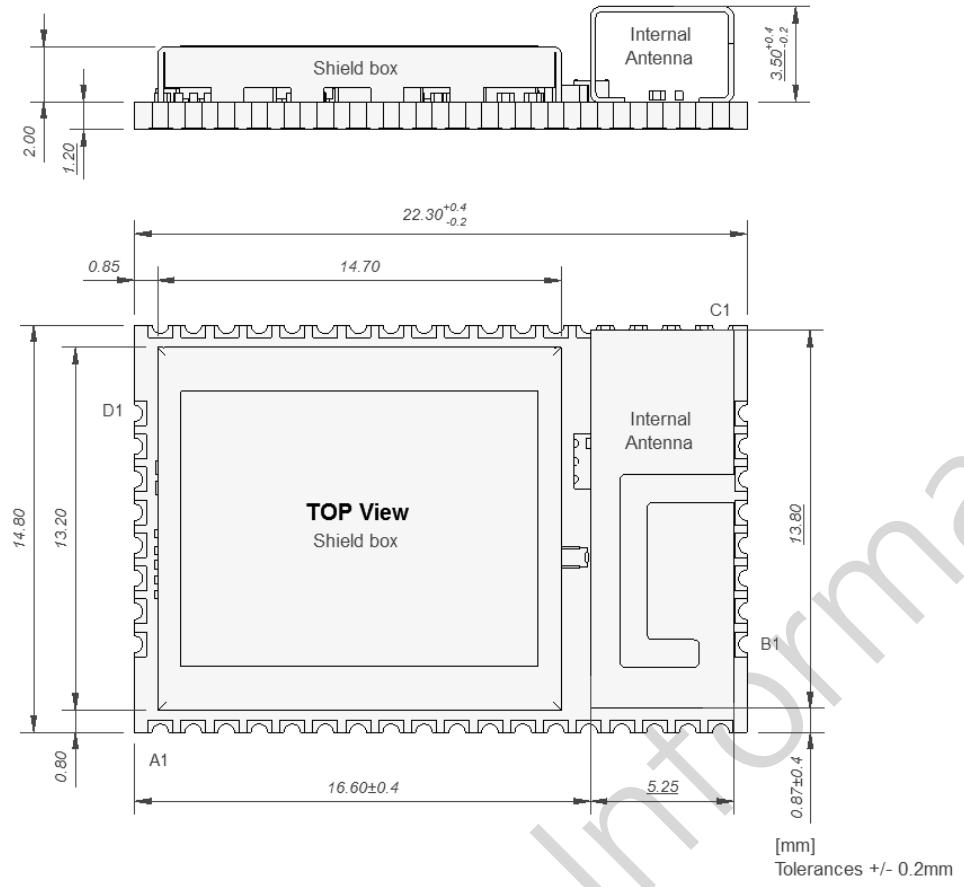


Figure 6: Physical dimensions of ODIN-W262

6.2 Module weight

Module	Typ	Unit
ODIN-W260	2	g
ODIN-W262	2	g

Table 26: Module weight

7 Qualification and approvals

7.1 Compliance with RoHS directive

The ODIN-W2 series modules comply with the "Directive 2011/65/EU of the European Parliament and the Council on the Restriction of Use of certain Hazardous Substances in Electrical and Electronic Equipment" (RoHS).

No natural rubbers, hygroscopic materials, or materials containing asbestos are employed.

7.2 Declaration of Conformity

We, u-blox Malmö AB, of
Östra Varvsgatan 4
SE-211 75 Malmö
Sweden

declare under our sole responsibility that our product ODIN-W2 to which this declaration relates, conforms to the following product specifications:

R&TTE Directive 1999/5/EC

Effective use of frequency spectrum:

EN 300 328 V1.9.1 (2015-02)

EN 301 893 V1.8.1 (2015-03)

EMC:

EN 301 489-1 V1.9.2 (2011-09)

EN 301 489-17 V2.2.1 (2012-09)

EN 61000-6-2 (2005)

Health and safety:

EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 + AC:2011 + A2:2013

IEC 60950-1:2005 (2nd Edition) + A1:2009 + A2:2013

EN 62311:2008 (WLAN)

EN 62479:2010 (BT + BLE)

Medical Electrical Equipment

IEC 60601-1-2:2007

7.3 Safety Compliance

In order to fulfill the safety standard EN 60950-1 the unit must be supplied by a limited power source.

7.4 FCC and IC Compliance

7.4.1 IC compliance

This device complies with Industry Canada license-exempt RSS standard(s).

Operation is subject to the following two conditions:

1. this device may not cause interference, and
2. this device must accept any interference, including interference that may cause undesired operation of the device.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

The device for operation in the band 5150-5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems;

The maximum antenna gain permitted for devices in the bands 5250-5350 MHz and 5470-5725 MHz shall comply with the e.i.r.p. limit; and

the maximum antenna gain permitted for devices in the band 5725-5825 MHz shall comply with the e.i.r.p. limits specified for point-to-point and non point-to-point operation as appropriate.

Operation in the 5600-5650 MHz band is not allowed in Canada. High-power radars are allocated as primary users (i.e. priority users) of the bands 5250-5350 MHz and 5650-5850 MHz and that these radars could cause interference and/or damage to LE-LAN devices.

This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.

7.4.2 Conformité aux normes d'IC

Cet appareil est conforme à la(aux) norme(s) RSS sans licence d'Industry Canada.

Son utilisation est soumise aux deux conditions suivantes :

1. Cet appareil ne doit pas causer d'interférences et
2. il doit accepter toutes interférences reçues, y compris celles susceptibles d'avoir des effets indésirables sur son fonctionnement.

Conformément aux réglementations d'Industry Canada, cet émetteur radio ne peut fonctionner qu'à l'aide d'une antenne dont le type et le gain maximal (ou minimal) ont été approuvés pour cet émetteur par Industry Canada. Pour réduire le risque d'interférences avec d'autres utilisateurs, il faut choisir le type d'antenne et son gain de telle sorte que la puissance isotrope rayonnée équivalente (p.i.r.e) ne soit pas supérieure à celle requise pour obtenir une communication satisfaisante.

Le dispositif de fonctionnement dans la bande 5150-5250 MHz est réservé à une utilisation en intérieur pour réduire le risqué d'interférences nuisibles à la co-canal systèmes mobiles par satellite.

Le gain d'antenne maximal autorisé pour les appareils dans les bandes 5250-5350 MHz et 5470-5725 MHz doit se conformer à la pire limite, et

le gain d'antenne maximal autorisé pour les appareils dans la bande 5725-5825 MHz doivent être conformes avec le pire limites spécifiées à point-à-ponctuelles et non point-à-point de fonctionnement selon qu'il convient.

Opération dans la bande 5600-5650 MHz n'est pas autorisée au Canada. Haute puissance radars sont désignés comme utilisateurs principaux (c.-àutilisateurs prioritaires) des bandes 5250-5350 MHz et 5650-5850 MHz et que ces radars pourraient causer des interférences et / ou des dommages à dispositifs LAN-EL.

Cet équipement respecte les limites d'exposition aux rayonnements IC RSS-102 définies pour un environnement non contrôlé. Il doit être installé et utilisé en maintenant une distance minimum de 20 cm entre le radiateur et votre corps.

7.4.3 FCC statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. this device may not cause harmful interference, and
2. this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

The ODIN-W2 module is for OEM integrations only. The end-user product will be professionally installed in such a manner that only the authorized antennas are used.

Any changes or modifications NOT explicitly APPROVED by u-blox could cause the module to cease to comply with FCC rules part 15, and thus void the user's authority to operate the equipment.

7.4.3.1 Cautions

Any changes or modifications could cause the module to cease to comply with FCC rules part 15 thus void the user's authority to operate the equipment.

§15.407 statement; in case of absence of information to transmit or operational failure the module types ODIN-W2 will automatically discontinue transmission.

7.4.4 Labeling Requirements for End Product

For an end product using the ODIN-W2 modules there must be a label containing, at least, the following information:

This device contains FCC ID: PVH0965 IC: 5325A-0965

The label must be affixed on an exterior surface of the end product such that it will be visible upon inspection in compliance with the modular approval guidelines developed by the FCC.

In accordance with 47 CFR § 15.19 the end product shall bear the following statement in a conspicuous location on the device:

"This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions;

(1) this device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation."

When the device is so small or for such use that it is not practicable to place the statement above on it, the information shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed.

In case, where the final product will be installed in locations where the end-user is not able to see the FCC ID and/or this statement, the FCC ID and the statement shall also be included in the end-product manual.

7.4.4.1 IC requirement

If the end product using the ODIN-W2 module is able to operate in the band 5150-5250 MHz within Canada (IC) it is only allowed to be used indoor to reduce the potential for harmful interference to co-channel mobile satellite systems. The label of the end product MUST in this case be marked with the text “For indoor use only”:

This device contains FCC ID: PVH0965 IC: 5325A-0965 For indoor use only

When the device is so small or for such use that it is not practicable to place the statement above on it, the information shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC ID label including the “For indoor use only” text must be displayed on the device.

7.5 Japan Radio Equipment Compliance

The ODIN-W2 module complies with the Japanese Technical Regulation Conformity Certification of Specified Radio Equipment (ordinance of MPT N°. 37, 1981), Article 2, Paragraph 1:

- Item 19 "2.4 GHz band wide band low power data communication system"
- Item 19-3 "Low power data communications system in the 5.2/5.3 GHz band"
- Item 19-3-2 "Low power data communications system in the 5.6 GHz band"

The ODIN-W2 module is restricted on the Japanese market to be used indoors only if the product is operating in the 5.2/5.3 GHz band. The information: "Indoor use only" translated into Japanese (この製品は屋内においてのみ使用可能です) must be visible:

- on the certified end product.
- on the product package in which the end product is marketed.
- in the users / installation manual of the end product.

The indoor usage information is recommended to be printed close to the Giteki mark but it is also permitted to place that information on another prominent position.

☞ The ODIN-W2 MIC certification number is 204-510009.

☞ The very small size of the module makes it not reasonable to fit the GITEKI mark and certification number onto the module label. Instead the Giteki mark and certification number is available in this document, the ODIN-W2 series System Integration Manual [2] and on the ODIN-W2 package.

When a product integrated with an ODIN-W2 module is placed on the Japanese market, either must:

- the ODIN-W2 module be affixed with a label with the Giteki marking below.
  In this case is it recommended that the product is marked with "Contains MIC ID: R 204-510009".
- the product be affixed with a label with the Giteki marking below. The marking must be visible for inspection.

Figure 7: Giteki mark, R and the ODIN-W2 MIC certification number. The "Indoor use only" information translated into Japanese below is mandatory if the product is operating in the 5.2/5.3 GHz band.

The recommended size of the Giteki mark is Ø5.0 mm but the minimum size is Ø3.0 mm.

The end product holder should also include a copy of the Japan Radio Certificate to the end product technical documentation. See the Contact information in the end of this document for a copy of the Radio Certificate.

7.6 Bluetooth qualification information

The ODIN-W2 series modules have been qualified according to the Bluetooth 4.0 specification.

For information how to List and Declare your product see the ODIN-W2 series System Integration Manual [2].

Please note that the ODIN-W2 series module is Bluetooth qualified as TBD - QD ID TBD. This means that you do not need to do any further qualification.

8 Antennas

This chapter gives an overview of the different external antennas that can be fitted to the module.

This radio transmitter IC: 5325A-0965 has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Cet émetteur radio IC: 5325A-0965 été approuvé par Industry Canada pour fonctionner avec les types d'antenne énumérés ci-dessous avec le gain maximum autorisé et l'impédance nécessaire pour chaque type d'antenne indiqué. Les types d'antenne ne figurant pas dans cette liste et ayant un gain supérieur au gain maximum indiqué pour ce type-là sont strictement interdits d'utilisation avec cet appareil.

For each antenna, the "Approvals" field defines in which test reports the antenna is included. Definitions of the «Approvals» field are:

- FCC - The antenna is included in the FCC test reports and thus approved for use in countries that accept the FCC radio approvals, primarily US.
- IC - The antenna is included in the IC (Industrie Canada) test reports and thus approved for use in countries that accept the IC radio approvals, primarily Canada.
- R&TTE - The antenna is included in the R&TTE test reports and thus approved for use in countries that accept the R&TTE radio approvals, primarily the European countries.
- MIC - The antenna is included in the Japanese government affiliated MIC test reports and thus approved for use in the Japanese market.

In general, antennas with SMD connection, Reverse Polarity SMA connector or U.FL connector are included in FCC, IC, R&TTE and MIC radio tests. The antennas with SMA connector are included in R&TTE and MIC radio tests but not in FCC or IC due to FCC/IC regulations.

The external antennas are connected to the board through U.FL connectors. Some of the antennas are connected directly to the U.FL connector of the board and some are connected using an SMA or reversed polarity SMA connector through a short U.FL to SMA or reversed polarity SMA adapter cable.

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 length	120 mm
Minimum cable loss	0.5 dB, The cable loss must be above the minimum cable loss to meet the regulatory requirements
Comment	The SMA connector can be mounted in a panel
Approval	R&TTE, MIC

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 length	120 mm
Minimum cable loss	0.5 dB, The cable loss must be above the minimum cable loss to meet the regulatory requirements
Comment	The Reverse Polarity SMA connector can be mounted in a panel
Approval	FCC, IC, R&TTE, MIC

Approved antennas

Single band antennas

Ex-IT 2400 RP-SMA 28-001	
Manufacturer	ProAnt
Polarization	Vertical
Gain	+3.0 dBi
Impedance	50 Ω
Size	Ø 12.0 x 28.0 mm
Connector	Reverse Polarity SMA plug (inner thread and pin receptacle). To be mounted on the U.FL to Reverse Polarity SMA adapter cable.
Comment	An SMA version antenna is also available but not recommended for use (Ex-IT 2400 SMA 28-001).
Approval	FCC, IC, R&TTE and MIC

Ex-IT 2400 MHF 28	
Manufacturer	ProAnt
Polarization	Vertical
Gain	+2.0 dBi
Impedance	50 Ω
Size	Ø 12.0 x 28.0 mm
Cable length	100 mm
Connector	U.FL. connector
Comment	To be mounted on the U.FL connector on the PCB.
Approval	FCC, IC, R&TTE and MIC

Ex-IT 2400 RP-SMA 70-002	
Manufacturer	ProAnt
Polarization	Vertical
Gain	+3.0 dBi
Impedance	50 Ω
Size	Ø 10 x 83 mm
Connector	Reverse Polarity SMA plug (inner thread and pin receptacle)
Comment	To be mounted on the U.FL to Reverse Polarity SMA adapter cable (cB-ACC-38). An SMA version antenna is also available but not recommended for use (Ex-IT 2400 SMA 70-002).
Approval	FCC, IC, R&TTE and MIC

Ex-IT 2400 MHF 70-001	
Manufacturer	ProAnt
Polarization	Vertical
Gain	+3.0 dBi
Impedance	50 Ω
Size	Ø 9.4 x 70.5 mm
Cable length	100 mm
Connector	U.FL. connector
Comment	To be mounted on the U.FL connector on the PCB.
Approval	FCC, IC, R&TTE and MIC

InSide-2400	
Manufacturer	ProAnt
Gain	+3.0 dBi
Impedance	50 Ω
Size	27 x 12 mm (triangular)
Cable length	100 mm
Connector	U.FL. connector
Comment	To be mounted on the U.FL connector on the PCB.
Approval	FCC, IC, R&TTE and MIC

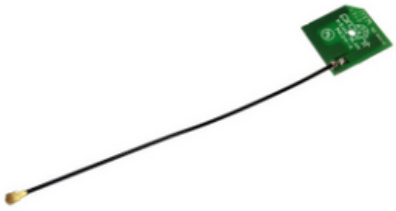
FlatWhip-2400	
Manufacturer	ProAnt
Gain	+3.0 dBi
Impedance	50 Ω
Size	Ø 50.0 x 30.0 mm
Connector	SMA plug (inner thread and pin)
Comment	To be mounted on the U.FL to SMA adapter cable.
Approval	R&TTE and MIC

Outside-2400	
Manufacturer	ProAnt
Gain	+3.0 dBi
Impedance	50 Ω
Size	36.0 x 18.0 x 16.0 mm
Cable length	70 mm
Connector	U.FL. connector
Comment	To be mounted on the U.FL connector on the PCB.
Approval	FCC, IC, R&TTE and MIC

Dual-band antennas

InSide-WLAN	
Manufacturer	ProAnt
Gain	+3.0 dBi
Impedance	50 Ω
Size	27 x 12 mm (triangular)
Cable length	100 mm
Connector	U.FL. connector
Comment	Dual-band (2.4 GHz / 5 GHz) antenna to be mounted on the U.FL connector on the PCB.
Approval	FCC, IC, R&TTE and MIC

InSide WLAN Square 403-100	
Manufacturer	ProAnt
Gain	+3.0 dBi
Impedance	50 Ω
Size	24x22x1 mm with mounting hole
Cable length	100 mm
Connector	U.FL. connector
Comment	Dual-band (2.4GHz / 5GHz) antenna to be mounted on the U.FL connector on the PCB.
Approval	FCC, IC, R&TTE and MIC



Ex-IT WLAN RPSMA / Ex-IT WLAN SMA	
Manufacturer	ProAnt
Type	½ wave dipole dual-band antenna
Polarization	Vertical
Gain	+3 dBi
Impedance	50 Ω
Size	107 mm (Straight)
Connector	• Reverse Polarity SMA plug (inner thread and pin receptacle) • SMA plug (inner thread and pin)
Comment	To be mounted on the U.FL to SMA or reverse polarity SMA adapter cable.
Approval	FCC, IC, R&TTE and MIC

9 Product handling and soldering

9.1 Packaging

The ODIN-W2 series modules are delivered as hermetically sealed, reeled tapes to enable efficient production, production lot set-up and tear-down. For more information about packaging, see the u-blox Package Information Guide [3].

9.1.1 Reels

The ODIN-W2 series modules are delivered on the reel as described in Table 27:

Parameter	Specification
Reel type	B2
Delivery quantity	200

Table 27: Reel information for ODIN-W2 series modules

9.1.2 Tapes

Figure 8 shows the position and the orientation of ODIN-W2 modules as they are delivered on the tape, while Figure 9 specifies the tape dimensions.

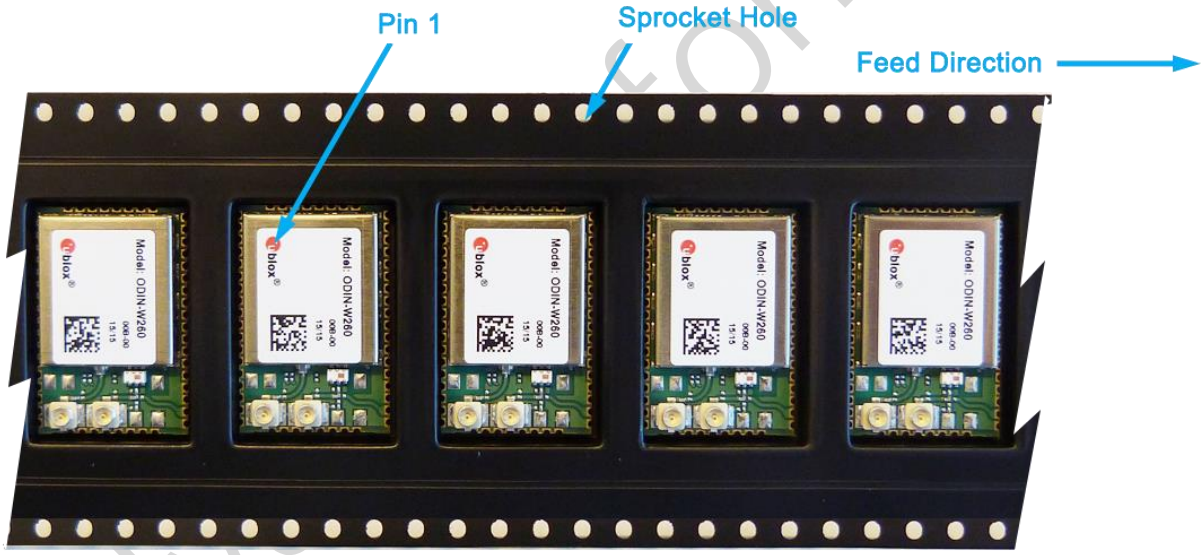


Figure 8: Orientation for ODIN-W2 modules on tape

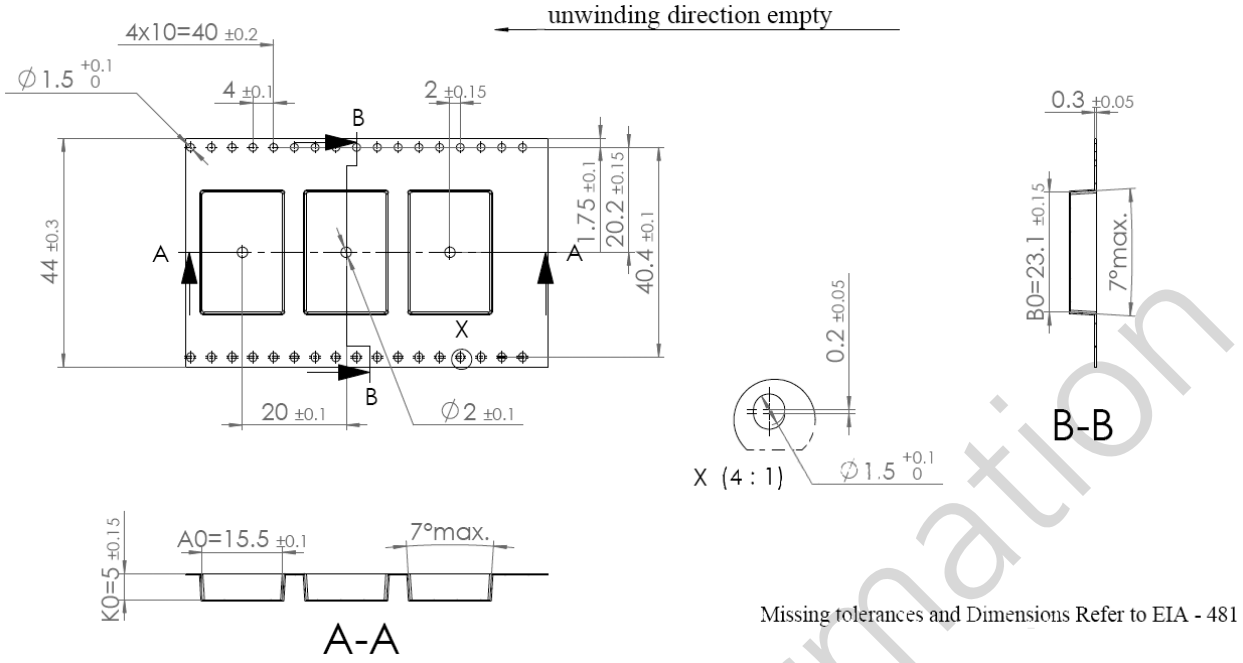


Figure 9: ODIN-W2 series tape dimensions

9.2 Moisture sensitivity levels

The ODIN-W2 series modules are Moisture Sensitive Devices (MSD) in accordance with the IPC/JEDEC specification.

The Moisture Sensitivity Level (MSL) relates to the required packaging and handling precautions. The ODIN-W2 series modules are rated at MSL level 4. For more information regarding moisture sensitivity levels, labeling, and storage, see the u-blox Package Information Guide [3].

For MSL standards, see IPC/JEDEC J-STD-020, which can be downloaded from www.jedec.org.

9.3 Reflow soldering

Reflow profiles are to be selected according to u-blox recommendations (see ODIN-W2 series System Integration Manual [2]).

Failure to observe these recommendations can result in severe damage to the device.

9.4 ESD precautions

The ODIN-W2 series modules contain highly sensitive electronic circuitry and are Electrostatic Sensitive Devices (ESD). Handling the ODIN-W2 series modules without proper ESD protection may destroy or damage them permanently.

The ODIN-W2 series modules are electrostatic sensitive devices (ESD) and require special ESD precautions typically applied to ESD sensitive components. The Maximum ESD section reports the maximum ESD ratings of the ODIN-W2 series modules.

Proper ESD handling and packaging procedures must be applied throughout the processing, handling and operation of any application that incorporates the ODIN-W2 series module. The ESD precautions should be implemented on the application board where the module is mounted as described in the ODIN-W2 series System Integration Manual [2].

Failure to observe these recommendations can result in severe damage to the device.

10 Labeling and ordering information

10.1 Product labeling

The labels of the ODIN-W2 series modules include important product information as described in this section.

Figure 8 illustrates the label of all the ODIN-W2 series modules, which includes u-blox logo, production lot, product type number and certification numbers (if applicable).

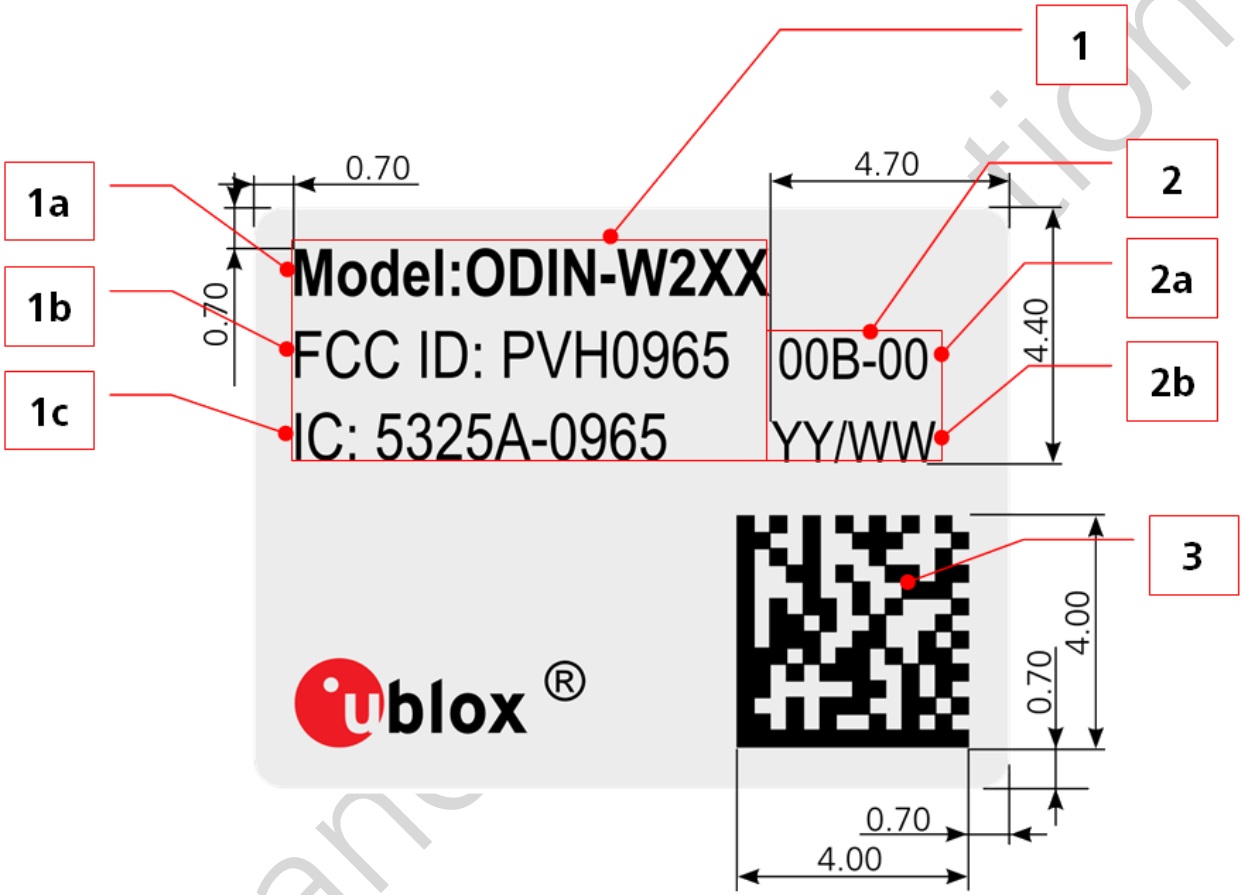


Figure 10: Location of product type number on the ODIN-W2 series module label

Reference	Description
1	Text box containing Product Name and approval ID:s
1a	Product Name (ID)
1b	FCC ID: (approval in progress)
1c	IC: (approval in progress)
2	Text box containing Product Revision and date of production
2a	Product Revision
2b	Date of unit production encoded YY/WW (year, week)
3	DataMatrix: unit serial number and hardware version: The 11 first symbols are the unit serial number, 4 last symbols are the hardware and firmware version encoded HHFF

Table 28: ODIN-W2 series label description

10.2 Explanation of codes

Three different product code formats are used. The **Product Name** is used in documentation such as this data sheet and identifies all u-blox products, independent of packaging and quality grade. The **Ordering Code** includes options and quality, while the **Type Number** includes the hardware and firmware versions. Table 29 below details these three different formats:

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

Table 29: Product code formats

Table 30 explains the parts of the product code.

Code	Meaning	Example
PPPP	Form factor	ODIN
TG	Platform (Technology and Generation) T – Dominant technology, For example, W: Wi-Fi, B: Bluetooth G - Generation	W2: Wi-Fi Generation 2
R	Wireless technology; range [0...9]	6: Multi-radio dual-band 2.4+5GHz
V	Variant based on the same platform; range [00…99]	0: default mounting, with connector for external antenna
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 30: Part identification code

10.3 Ordering information

Ordering Code	Product
ODIN-W260-00B	Wi-Fi IEEE802.11a/b/g/n (dual-band) 2.4 GHz 2x2 MIMO and Bluetooth dual-mode module with dual U.FL. coaxial antenna connectors.
ODIN-W262-00B	Wi-Fi IEEE802.11a/b/g/n (dual-band) and Bluetooth dual-mode module with internal dual-band antenna.

Table 31: Product ordering codes

Appendix

A Glossary

Name	Definition
ADC	Analog to Digital Converter
BT	Bluetooth
CAN	Controller Area Network
CTS	Clear To Send
DC	Direct Current
DSR	Data Set Ready
DTR	Data Terminal Ready
EIRP	Equivalent Isotropically Radiated Power
FW	Firmware
GND	Ground
GPIO	General Purpose Input Output
H	High
HW	Hardware
I	Input (means that this is an input port of the module)
IEEE	Institute of Electrical and Electronics Engineers
L	Low
LPO	low Power Oscillator
MIMO	Multi-Input Multi-Output
N/A	Not Applicable
O	Output (means that this is an output port of the module)
PCN / IN	Product Change Notification / Information Note
PD	Pull-Down
PU	Pull-Up
RMII	Reduced Media Independent Interface
RTS	Request To Send
RXD	Receive Data
SMI	Station Management Interface
SPI	Serial Peripheral Interface
TBD	To Be Defined
TXD	Transmit Data
UART	Universal Asynchronous Receiver-Transmitter serial interface

Table 32: Explanation of abbreviations and terms used

Related documents

[1] ODIN-W2 AT Commands Manual, document number UBX-14044127

[2] ODIN-W2 series System Integration Manual, document number UBX-14040040

[3] u-blox Package Information Guide, document number UBX-14001652

☞ For regular updates to u-blox documentation and to receive product change notifications please register on our homepage.

Revision history

Revision	Date	Name	Status / Comments
R01	05-Sep-2014	mwej	Initial release
R02	16-Feb-2015	fbro	Minor updates
R03	23-Apr-2015	ajoh	Updated features list, added input from early measurements and label specification
R04	08-July-2015	fbro, kgom	Updated and moved to MS word format
R05	07-Sept-2015	mwej	Major updated with after review: - Major text updates. - Some IO voltage levels updated. - Mechanical outline clarified and some tolerances updated. - Updated performance measurements with ODIN-W26x SPA FW v0.11.05 - Updated after type approval with approval information.
R06	09-Nov-2015	mwej	Antenna section added and text about indoor restrictions added.

Contact

For complete contact information visit us at www.u-blox.com.

u-blox Offices

North, Central and South America

u-blox America, Inc.
Phone: +1 703 483 3180
E-mail: info_us@u-blox.com

Regional Office West Coast:
Phone: +1 408 573 3640
E-mail: info_us@u-blox.com

Technical Support:
Phone: +1 703 483 3185
E-mail: support_us@u-blox.com

Headquarters
Europe, Middle East, Africa

u-blox AG
Phone: +41 44 722 74 44
E-mail: info@u-blox.com
Support: support @u-blox.com

Asia, Australia, Pacific

u-blox Singapore Pte. Ltd.
Phone: +65 6734 3811
E-mail: info_ap@u-blox.com
Support: support_ap@u-blox.com

Regional Office Australia:
Phone: +61 2 8448 2016
E-mail: info_anz@u-blox.com
Support: support_ap@u-blox.com

Regional Office China (Beijing):
Phone: +86 10 68 133 545
E-mail: info_cn@u-blox.com
Support: support_cn@u-blox.com

Regional Office China (Shenzhen):
Phone: +86 755 8627 1083
E-mail: info_cn@u-blox.com
Support: support_cn@u-blox.com

Regional Office India:
Phone: +91 959 1302 450
E-mail: info_in@u-blox.com
Support: support_in@u-blox.com

Regional Office Japan:
Phone: +81 3 5775 3850
E-mail: info_jp@u-blox.com
Support: support_jp@u-blox.com

Regional Office Korea:
Phone: +82 2 542 0861
E-mail: info_kr@u-blox.com
Support: support_kr@u-blox.com

Regional Office Taiwan:
Phone: +886 2 2657 1090
E-mail: info_tw@u-blox.com
Support: support_tw@u-blox.com