www.lumoscontrols.com

lumos CONTROLS
A WISILICA BRAND

WIM1481

Bluetooth module for IoT

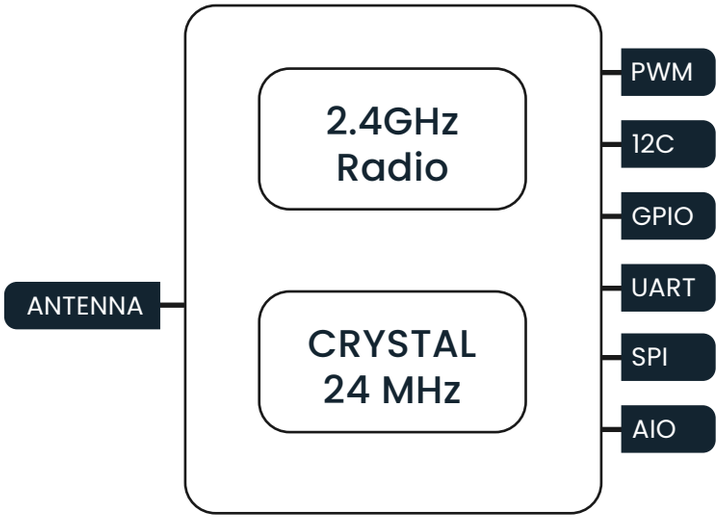
Product Overview

The compact-sized BLE 5.0 module, designed for intelligent wireless controls, enables ultra-low power connectivity and provides considerable design flexibility to the engineers. WIM1481, with options for an external or a chip antenna, also has 14 General Purpose IO pins including, 6 PWM, ADC, I2C, UART, and SPI

Features

- BLE 5.0 based non-flooding intelligent mesh
- PWM/AIO/SPI/I2C/UART/IO interface options
- TX output power up to +10dBm
- -96dBm RX sensitivity
- 14 programmable GPIOs
- 6 PWM channels
- External antenna
- Compact form factor
- Zero downtime Over-the-Air (OTA) firmware updates
- FCC, CE, ISED certified
- RoHS2.0 compliant

Block Diagram



Specifications

Electrical specifications

Specifications	Value	Remarks
Input voltage	1.8-3.6VDC	
IO supply voltage	-	

RF specifications

Specifications	Value	Remarks
Operating frequency	2402-2480MHz	
Maximum output power	10dBm	
Receiver sensitivity	-96dBm	

ADC specifications

Specifications	Value	Remarks
ADC input voltage	0-1.2V	@3.3V input

PWM specifications

Specifications	Symbol	Value	Typ	Remarks
PWM frequency		0.1-1000kHz	32	Up to 10KHz for low frequency PWM pins
Maximum voltage for logic low	V_{OL}	0-0.4V	-	
Maximum voltage for logic high	V_{OH}	VDDx0.7-VDD	-	

Current specifications

Specifications		Value	Typ	Remarks
Deep sleep current		0.4μA	32	@3V
TX peak current			13	@10dBm
RX peak current			5.3	@1Mbps

Environmental specifications

Specifications	Symbol	Value	Remarks
Operating temperature	Topr	-40-85°C	
Storage temperature	Tstr	-40-150°C	

Mechanical

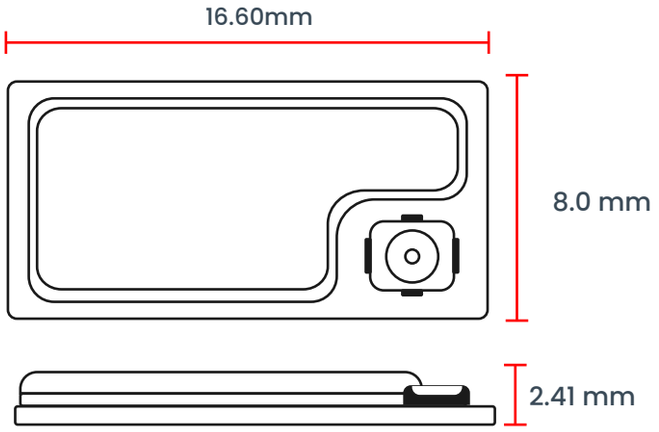
Specifications	Value	Remarks
Dimension	0.88 x 0.31 x 0.11 (inch) 22.5 x 8.0 x 2.95 (mm)	L x W x H (For chip antenna)
Dimension	0.65 x 0.31 x 0.09 (inch) 16.60 x 8.0 x 2.41 (mm)	L x W x H (For external antenna)

Certifications

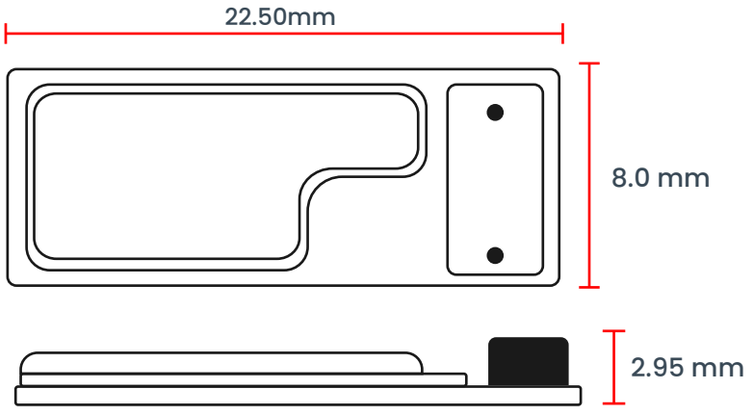
Certifications	Details
CE	Article 3, RED 2014/53/EU EMC test standards : ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.4 (2020-09) EN 55032: 2015 EN 55035: 2017 Radio test standard : ETSI EN 300 328 V2.2.2 (2019-07) Health test standard : EN 50663: 2017 Safety test standard : IEC 62368-1:2014
FCC	FCC Rule Part 15C, ID: 2AG4N-WIM1481
ISED	Cert No. - 25222-WIM1481
RoHS 2.0	RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU

Module Dimensions

External antenna version

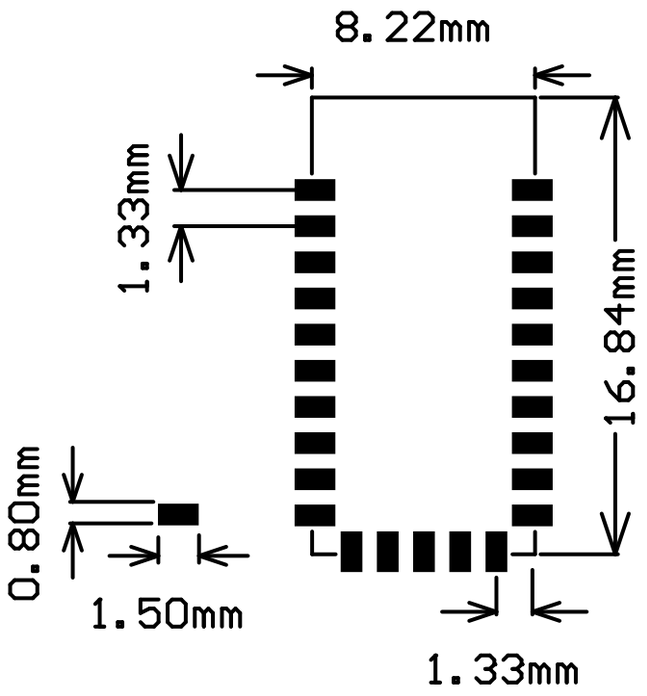


Chip antenna version

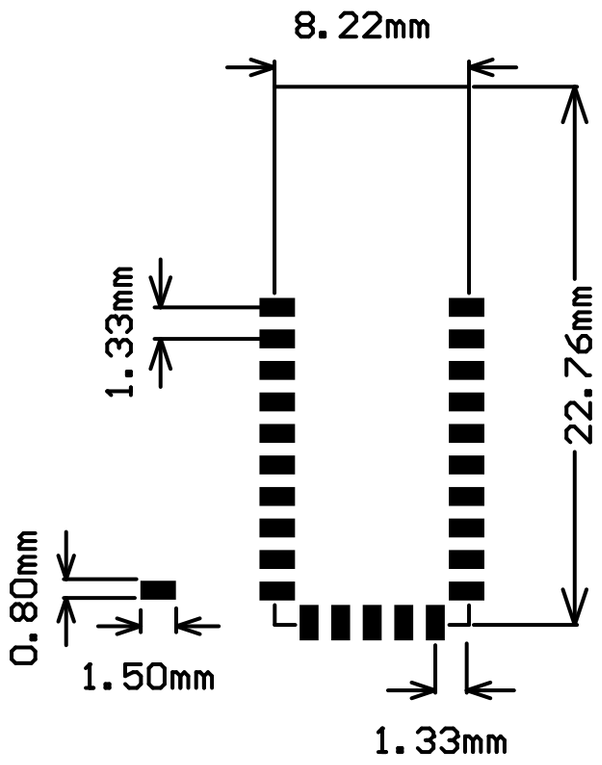


Land Pattern Dimensions

All dimensions are in mm



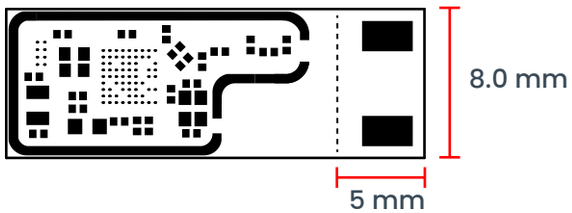
External antenna version



Chip antenna version

Design Recommendations

- Keep out enough area for the chip antenna.
- Avoid any routing under antenna area as shown in the below image.
- Better to place the module away from High frequency circuitry like other RF, and large components or metallic objects.
- All GND pins must be well grounded.
- The area around the module should be free of any ground planes, power planes, trace routings or metal for 6 mm from the module antenna position in all directions.
- Better not to route any traces underneath the module.
- The WIM1481 series modules contain highly sensitive electronic circuitry and are Electrostatic Sensitive Devices (ESD). Handling the WIM series modules without proper ESD protection may destroy or damage them permanently.



Antenna Information

37mm wire antenna

Frequency range	2.4GHz-2.5GHz
Impedance	50 Ω nominal
VSWR	1.92:1 Max
Return loss	-10dB Max
Gain (peak)	2dBi
Cable loss	0.3dBi max
Polarization	Linear Vertical

100mm wire antenna

Frequency range	2.4GHz-2.5GHz
Impedance	50 Ω nominal
SWR	≤ 2.0
Gain (Peak)	3dBi

600mm wire antenna

Frequency range	2.4GHz-2.5GHz
Impedance	50 Ω nominal
VSWR	≤ 1.3
Gain (Peak)	3dBi

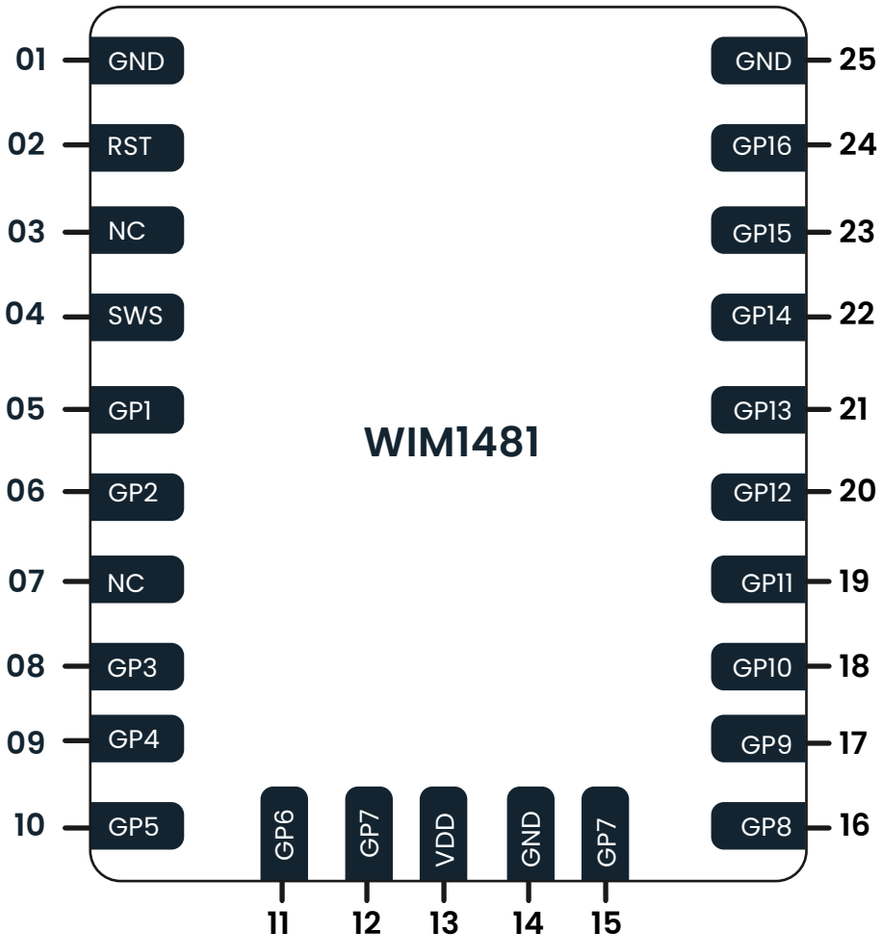
Stick antenna

Frequency range	2.4GHz-2.5GHz
Impedance	50 Ω nominal
VSWR	1.92:1 Max
Return loss	-10dB Max
Gain (peak)	2dBi
Cable loss	0.3dBi max
Polarization	Linear Vertical

Chip antenna

Frequency range	2.4GHz-2.5GHz
Impedance	50 Ω nominal
VSWR	<2:1
Peak Gain	1.7 dBi
Radiation pattern	Omnidirectional
Polarization	Linear

Pinout Details



Module Pin	Name	Supporting Functions	Comments
01	GND	GROUND	Ground
02	RST	RESET	Reset
03	NC	NC	NC
04	SWS	Single wire slave	Serial wire debug IO for debug and programming
05	GP1	IO/PWM/I2C/SPI/UART	PWM or Digital IO or Serial interface
06	GP2	IO/PWM/I2C/SPI/UART	PWM or Digital IO or Serial interface
07	NC	NC	NC
08	GP3	IO	AIO or Digital IO
09	GP4	IO/PWM/I2C/SPI/UART	PWM or Digital IO or Serial interface

Module Pin	Name	Supporting Functions	Comments
10	GP5	IO/PWM/I2C/SPI/UART/AIO	AIO or Digital IO or PWM or Serial interface
11	GP6	IO/PWM/I2C/SPI/UART	PWM or Digital IO or Serial interface
12	GP7	IO/PWM/I2C/SPI/UART	PWM or Digital IO or Serial interface
13	VDD	POWER (3.3V)	Power
14	GND	GROUND	Ground
15	NC	NC	NC
16	GP8	IO/PWM	Digital IO or PWM
17	GP9	IO/PWM	Digital IO or PWM
18	GP10	IO/PWM/AIO	AIO or Digital IO or PWM
19	GP11	IO/PWM	Digital IO or PWM
20	GP12	IO/PWM	Digital IO or PWM
21	GP13	IO/PWM/AIO	AIO or Digital IO or PWM
22	GP14	IO/PWM	PWM/ Digital IO
23	GP15	IO/PWM/I2C/SPI/UART	PWM or Digital IO or Serial interface
24	GP16	IO/PWM/I2C/SPI/UART	PWM or Digital IO or Serial interface
25	GND	GROUND	Ground

Note: If SPI is used with 8 Mbps data rate, the recommended GPIOs for the clock signal (SCK) are GP1, and GP16

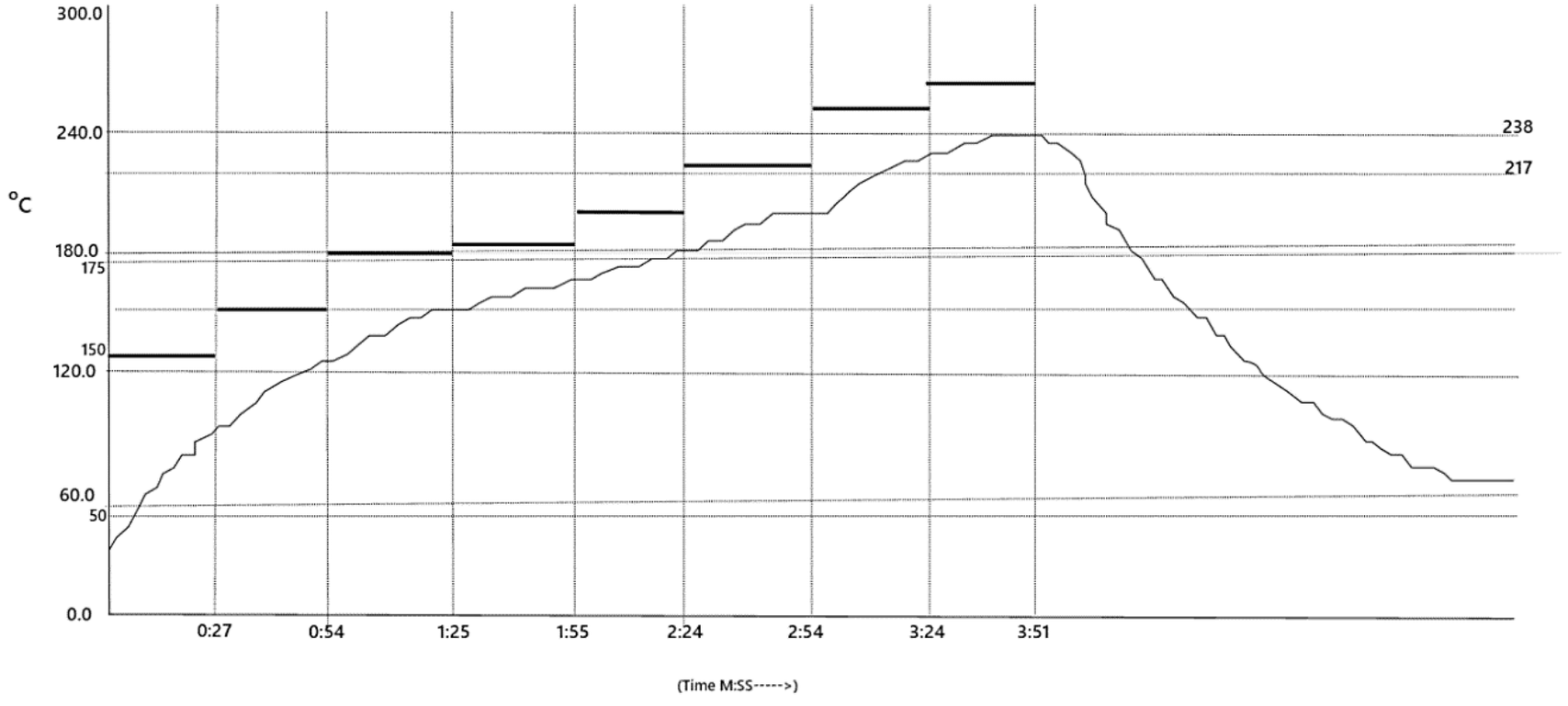
Firmware Pin Assignment

Profile Type **PIN DETAILS**	WCA	Curtain controller	CCT Light	DIM Bulb
Pin	19	16	23	20
Functionality	Analog input channel 2 (0-3V)	UART RX	CCT/ Cool channel	Relay
Pin	20	17	24	22
Functionality	Relay	UART TX	Intensity/Warm	Intensity
Pin	24			
Functionality	Analog input channel 1 (0-3V)			
Pin	23			
Functionality	CCT/CH2/Cool			
Pin	24			
Functionality	Intensity/CH1/Warm			

Profile Type **PIN DETAILS**	RGB	RGB-CCT	Tunable Light	AC Switch
Pin	5	5	23	5
Functionality	Red	Red	CCT/ Cool channel	IO1
Pin	6	6	24	6
Functionality	Green	Green	Intensity/Warm	IO2
Pin	18	18		8
Functionality	Blue	Blue		IO3
Pin		23		9
Functionality		CCT/ Cool channel		IO4
Pin		24		10
Functionality		Intensity/Warm		IO5
Functionality				19
Functionality				IO6
Functionality				20
Functionality				LED

Soldering Information

Leadfree reflow soldering



Do not exceed peak temperature (Tp) of 242°C. Time at maximum temperature is 27 seconds. After reflow soldering, optical inspection of the module is recommended to verify proper alignment. Hand soldering is also possible.

Cleaning

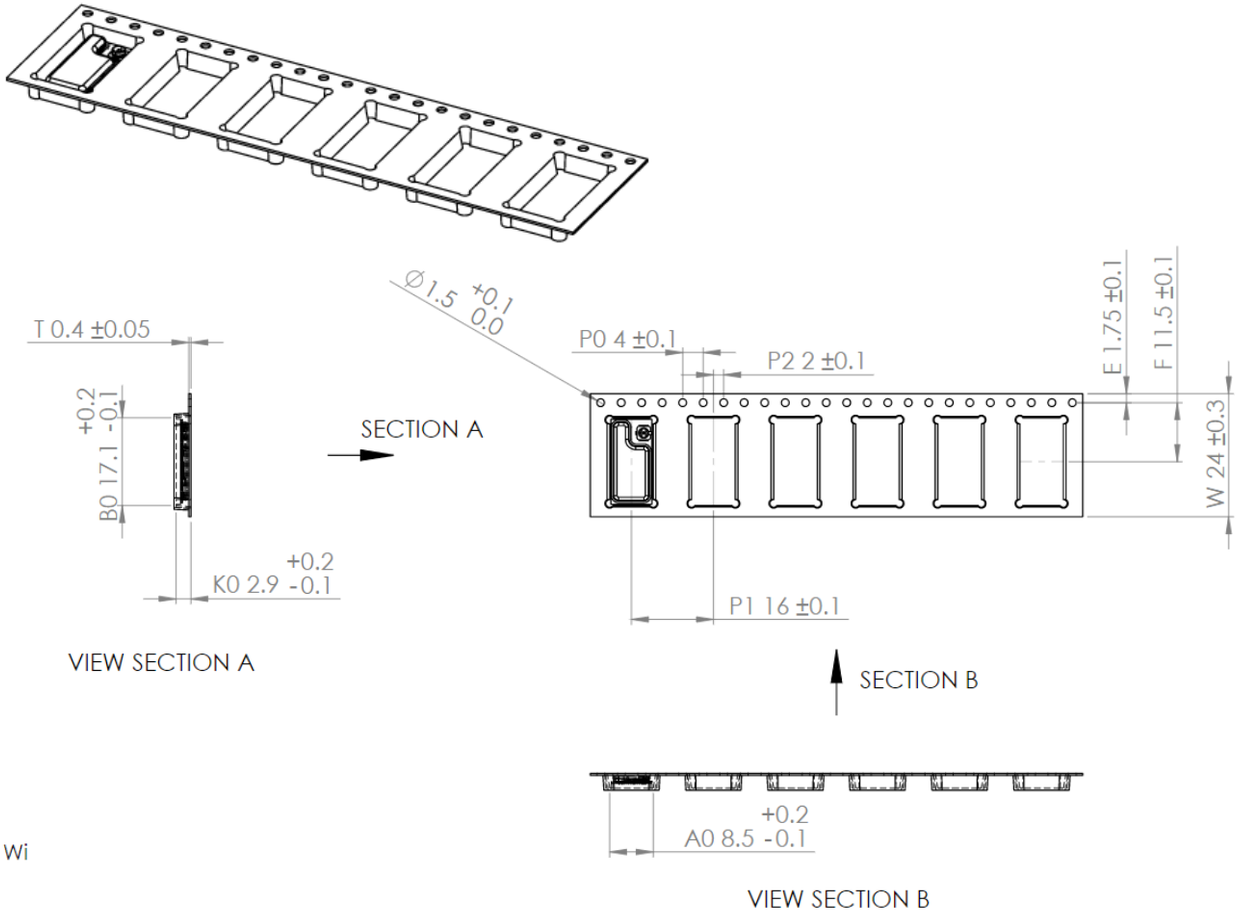
In general, cleaning the populated modules is strongly discouraged. Residuals under the module cannot be easily removed with any cleaning process.

- Cleaning with water can lead to capillary effects where water is absorbed into the gap between the host board and the module. The combination of soldering flux residuals and encapsulated water could lead to short circuits between neighboring pads. Water could also damage any stickers or labels.
- Cleaning with alcohol or a similar organic solvent will likely flood soldering flux residuals into the RF shield, which is not accessible for post-washing inspection. The solvent could also damage any stickers or labels.

Packaging Information

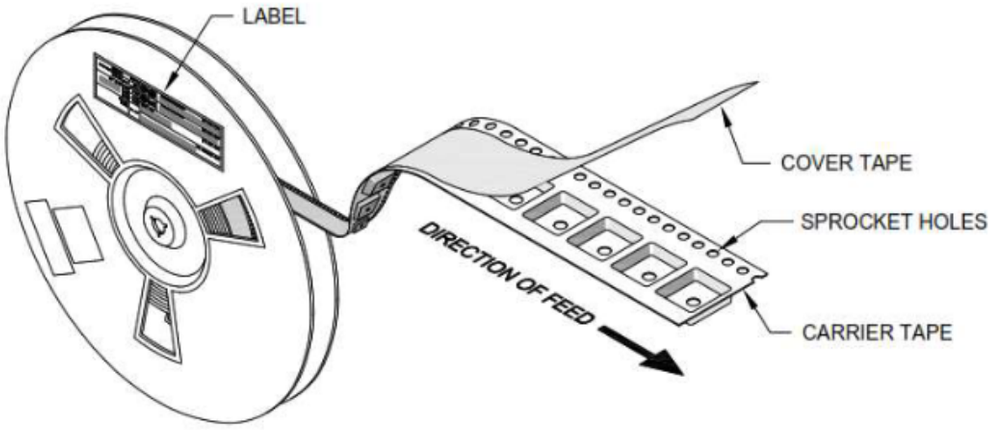
Tape Dimensions

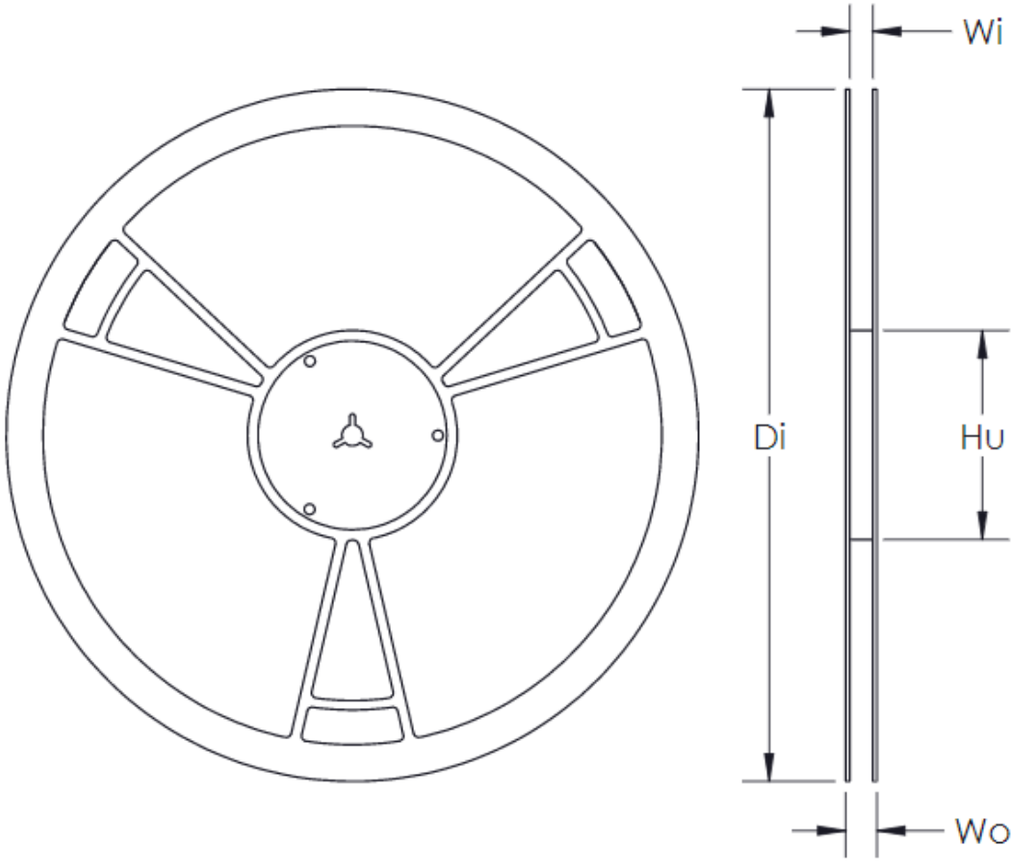
All dimensions are in mm



– Wi

Direction of Feed



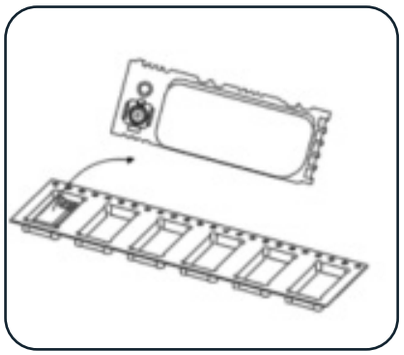


FLANGE (Di)	∅ 330 mm
HUB (Hu)	∅ 100 mm
Wi	73.1 mm
Wo	77.0 mm

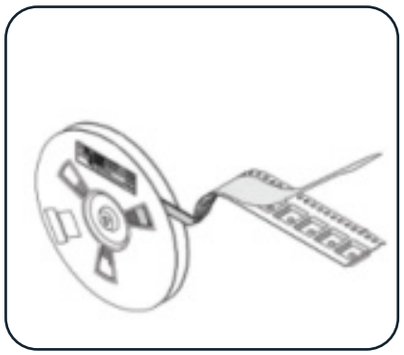
A full reel can hold 1000 modules and weighs approximately 1100 gm (including the modules). The module antennas are packed separately and supplied along with the modules.

- Tape material: Conductive Polystyrene; Black; 0.4mm thickness
- All tape and sprocket hole dimensioning are as per EIA-481 unless otherwise stated
- Order volume less than a full reel will be supplied on cut tape (without a reel)

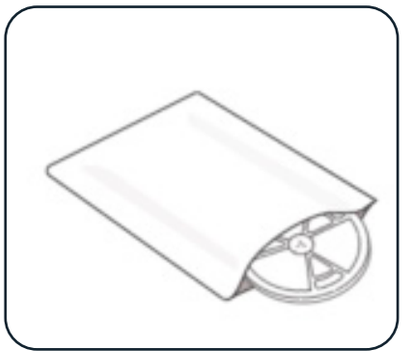
Packaging hierarchy



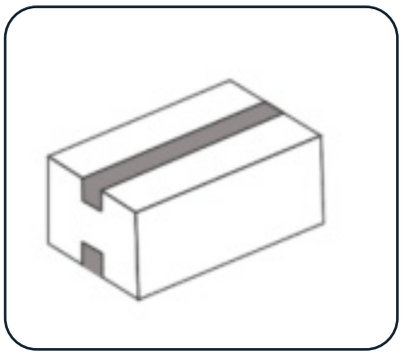
Modules on Tape



Tape on Reel



ESD Safe Cover



Master Carton

Ordering Information

Product Code	Communication	Voltage Rating	Analog Channel I/O	PWM I/O	Serial Interface	Antenna	Dimensions (mm)
WIM1481C	BLE 5.0	3.0V DC	4 AIO	6 Channels	UART/SPI/12C	External	16.60 x 8.0 x 2.41
WIM1481E	BLE 5.0	3.0V DC	4 AIO	6 Channels	UART/SPI/12C	Chip	22.50 x 8.0 x 2.95

Precautions

- While integrating module, make sure all the pads are soldered properly.
- Please use a voltage regulator if the power supply is above the max ratings.
- For best wireless signals, please avoid packing the antenna close to metal parts or cases.
- Stresses above the listed maximum ratings may cause permanent damage to the device

lumos CONTROLS A WISILICA BRAND

ISO/IEC 27001:2013 Information security certified

20321 Lake Forest Dr D6,
Lake Forest, CA 92630, USA

www.lumoscontrols.com

+1 949-397-9330