lumos
CONTROLS
A WISILICA BRAND

WIM2480

Bluetooth module for IoT

CE RoHS COMPLIANT Bluetooth

Product Overview

The compact-sized BLE 5.2 module, designed for intelligent wireless controls, enables ultra-low power connectivity and provides considerable design flexibility to the engineers. WIM2480, with options for an external or a chip antenna, also has 18 General Purpose IO pins including, 6 PWM, ADC, I2C, UART, and SPI. High performance and efficiency is guaranteed with the 2 MB external flash.
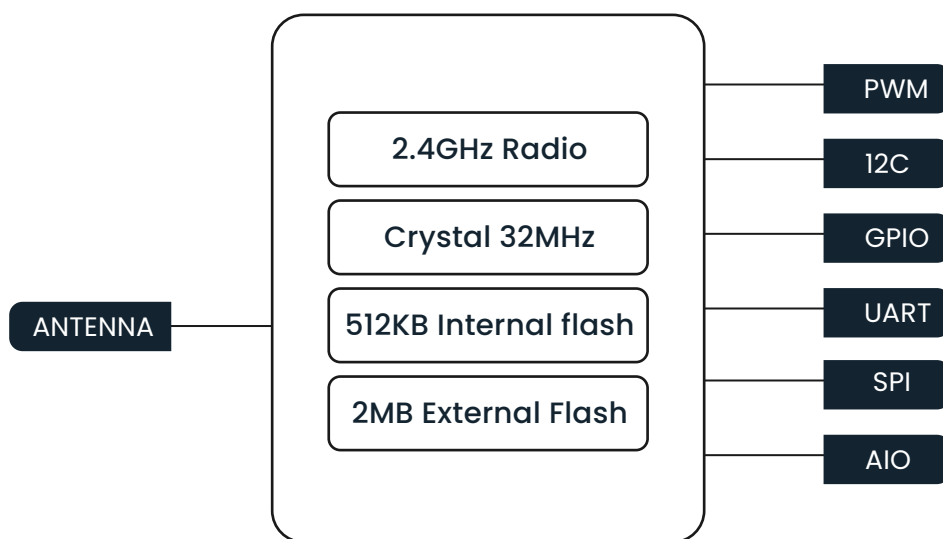
Features

- BLE 5.2 based non-flooding intelligent mesh
- PWM/AIO/SPI/I2C/UART/IO interfaces
- 2MB external Flash for high performance
- TX output power up to +8dBm
- -92dBm RX sensitivity
- 18 programmable GPIOs
- 6 PWM channels
- Flexibility with external or chip antenna options
- 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
Input voltage	2.7-3.6V
IO supply voltage	-

RF specifications

Specifications	Value
Operating frequency	2402-2480MHz
Maximum output power	8dBm
Receiver sensitivity	-92dBm

ADC specifications

Specifications	Value	Remarks
ADC input voltage	0.6-3.6V	@3.3V input

Current specifications

Specifications	Value	Remarks
Deep sleep current	1.5µA	@3V
TX peak current	15.5mA	@8dBm
RX peak current	6.0mA	@1Mbps

Environmentalspecifications

Specifications	Value
Operating temperature	-40 to 95ºC(-40 to 203ºF)
Storage temperature	-40 to 125ºC(-40 to 257ºF)

PWM specifications

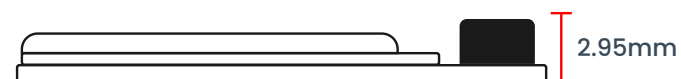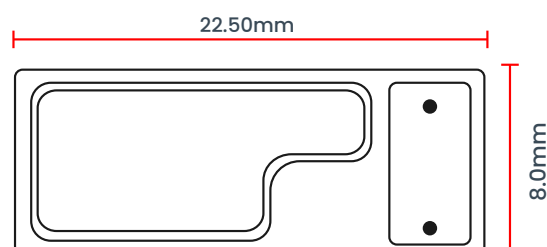| Specifications	Value	Remarks
PWM frequency	0.1-1000kHz	Up to 10kHz for low frequency PWM pins
Maximum voltage for logic low	0-0.4V	
Maximum voltage for logic high	VDD x 0.7-VDD	

Mechanical

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

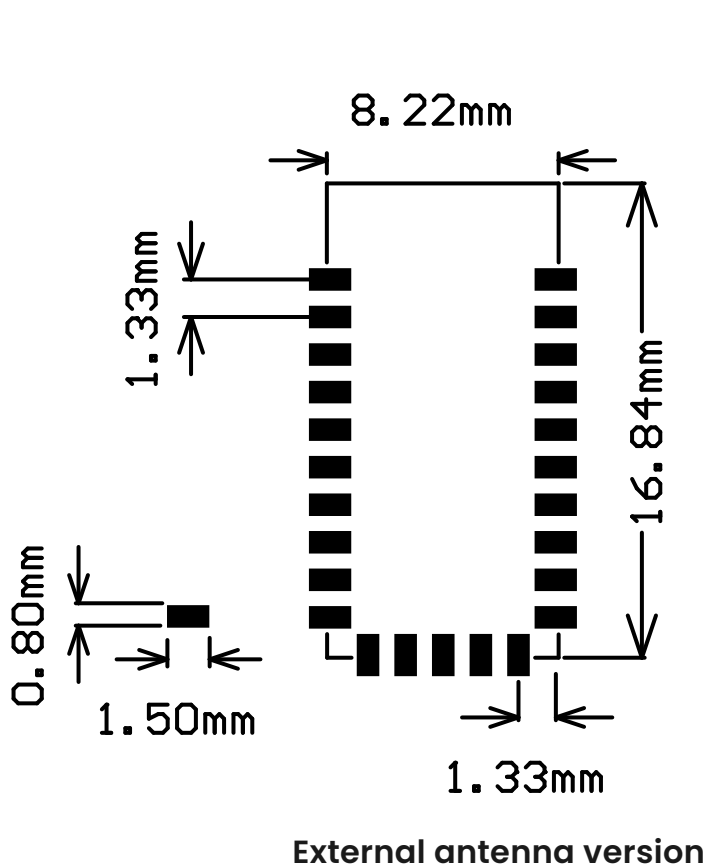# Module Dimensions

External antenna version

16.60mm

8.0mm

2.41mm

Chip antenna version

22.50mm

8.0mm

2.95mm
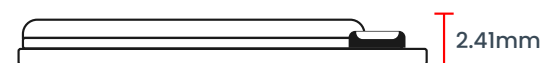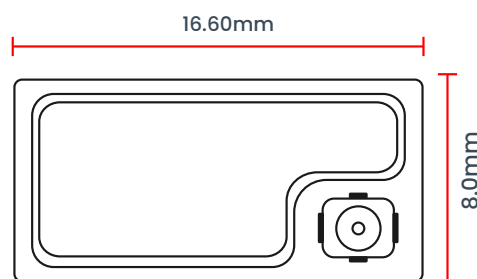
Land Pattern Dimensions

All dimensions are in mm

External antenna version

Chip antenna version
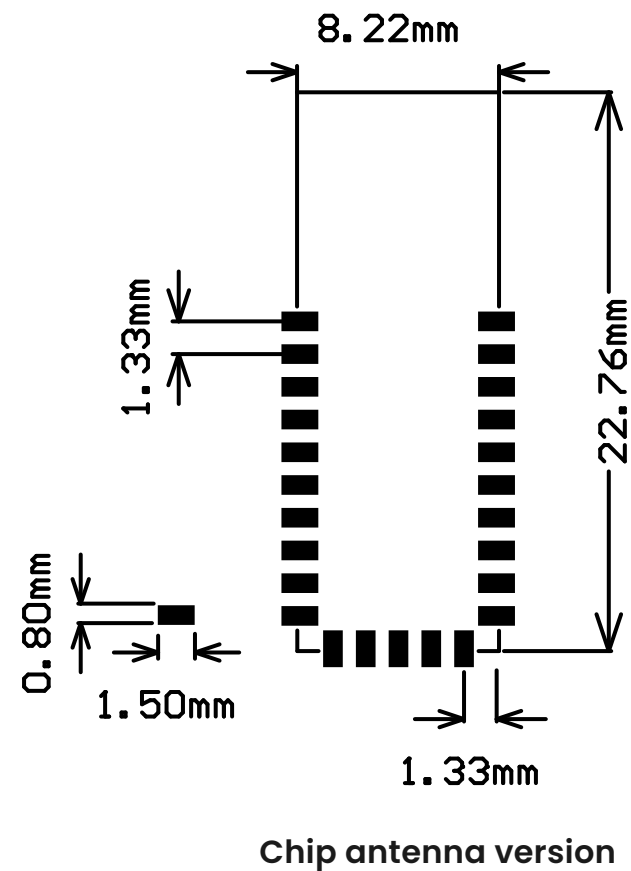
Design Recommendations

- 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 6mm from the module antenna position in all directions.

- Better not to route any traces underneath the module.

- The WIM2480 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.
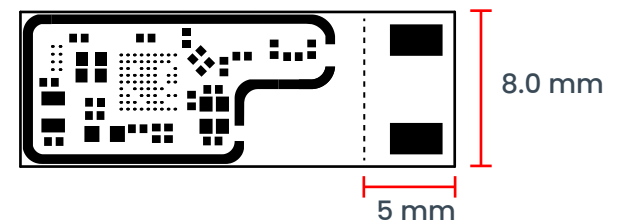
Antenna Information

37mm wire antenna

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

100mm wire antenna

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

600mm wire antenna

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

Stick antenna

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

Pinout Details
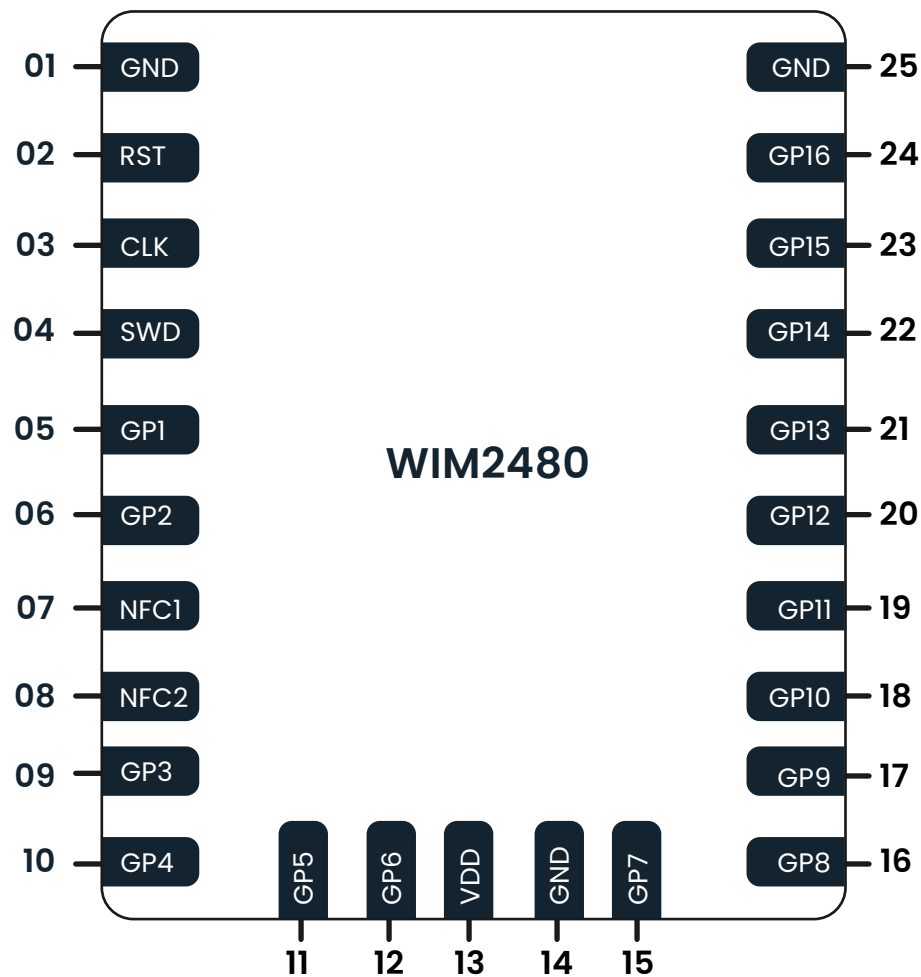
Module Pin	Chip Pin	Name	Supporting Functions	Comments
01		GND	GROUND	Ground
02	H4/P0.18	RST	RESET	Reset
03	H2	CLK	SWDCLK	Serial wire debug clock input for debug and programming
04	J2	SWD	SWDIO	Serial wire debug IO for debug and programming
05	C8/P0.27	GP1	IO/PWM/I2C/SPI/UART	PWM or Digital IO or Serial interface
06	F7/P0.13	GP2	IO/PWM/I2C/SPI/UART	PWM or Digital IO or Serial interface
07	F2/P0.09	NFC1	NFC1/IO	Digital IO (Low Freq)
08	E2/P0.10	NFC2	NFC2/IO	Digital IO (Low Freq)
09	E7/P0.08	GP3	IO/PWM/I2C/SPI/UART	PWM or Digital IO or Serial interface

Module Pin	Chip Pin	Name	Supporting Functions	Comments
10	D9/P0.05	GP4	IO/PWM/I2C/SPI/UART/AIO	AIO or Digital IO or PWM or Serial interface
11	J3/P0.22	GP5	IO/PWM/I2C/SPI/UART	PWM or Digital IO or Serial interface
12	J5/P0.17	GP6	IO/PWM/I2C/SPI/UART	PWM or Digital IO or Serial interface
13		VDD	POWER	
14		GND	GROUND	
15	A4/P0.03	GP7	IO/PWM/AIO	AIO or Digital IO or PWM (upto 10KHz)
16	A3/P0.25	GP8	IO/PWM	Digital IO or PWM (upto 10KHz)
17	B4/P1.03	GP9	IO/PWM	Digital IO or PWM (upto 10KHz)
18	C6/P0.02	GP10	IO/PWM/AIO	AIO or Digital IO or PWM (upto 10KHz
19	C4/P1.05	GP11	IO/PWM	Digital IO or PWM (upto 10KHz)
20	C5/P0.19	GP12	IO/PWM	Digital IO or PWM (upto 10KHz)
21	A5/P0.29	GP13	IO/PWM/AIO	AIO or Digital IO or PWM (upto 10KHz)
22	E9/P0.06	GP14	IO/PWM	PWM/ Digital IO
23	C9/P0.26	GP15	IO/PWM/I2C/SPI/UART	PWM or Digital IO or Serial interface
24	F9/P1.08	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**	Intensity	Intensity, CCT	Relay On/off, Analog input and dual channel output	DALI
Pin	24 (GP16)	23 (GP15)	8 (NFC2)	5 (GP1)
Functionality	Intensity channel	Cool channel	Relay PIO	DALI-
Pin		24 (GP16)	6 (GP2)	6 (GP2)
Functionality		Warm channel	Color temperature channel	DALI+
Pin			5 (GP1)	
Functionality			Intensity channel	
Pin			15 (GP7)	
Functionality			Analog input channel	

Profile Type **PIN DETAILS**	Sensor	RGB, CCT, Intensity	UART	Analog dual channel input and output
Pin	24 (GP16)	5 (GP1)	10 (GP4)	23 (GP15)
Functionality	Sensor trigger PIO	Red channel	UART TX	Color temperature channel/ Relay
Pin	11 (GP5)	6 (GP2)	9 (GP3)	24 (GP16)
Functionality	Sensor data communication	Green channel	UART RX	Intensity channel
Pin	12 (GP6)	10 (GP4)		18 (GP10)
Functionality	Sensor data communication	Blue channel		Analog input channel 1
Pin		23 (GP15)		21 (GP13)
Functionality		Cool channel		Analog input channel 2
Pin		24 (GP16)		
Functionality		Warm channel		

Application Circuit Diagrams

- ▪ **Schematic for RGB, CCT, intensity control**
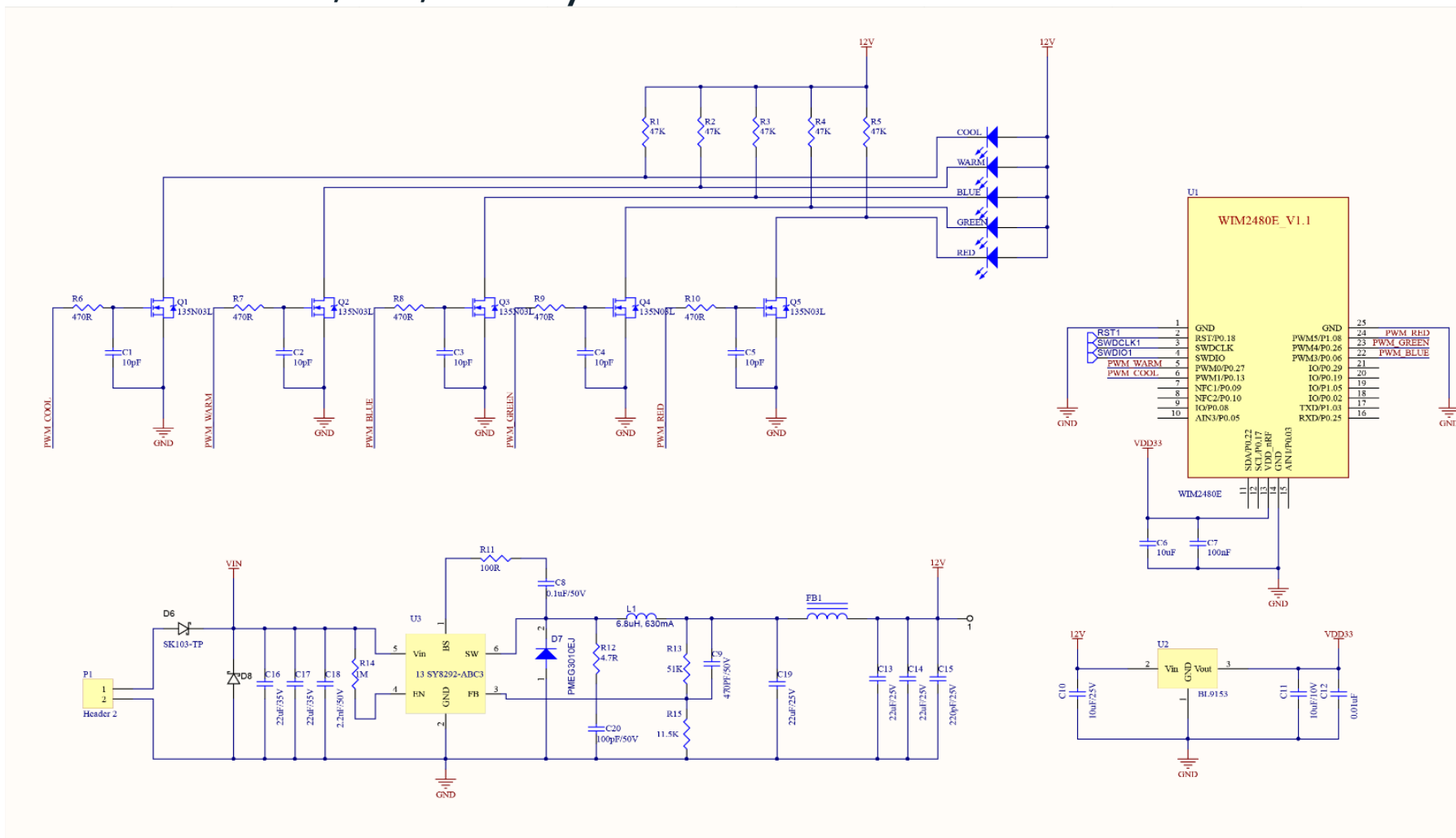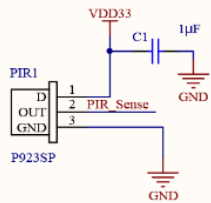
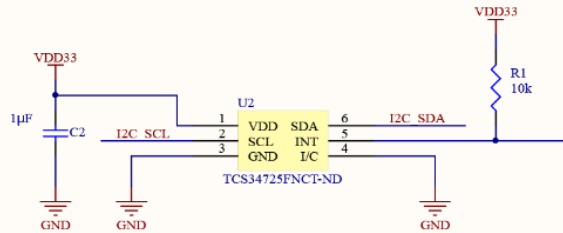## Schematic for dual channel analog 0-10V output
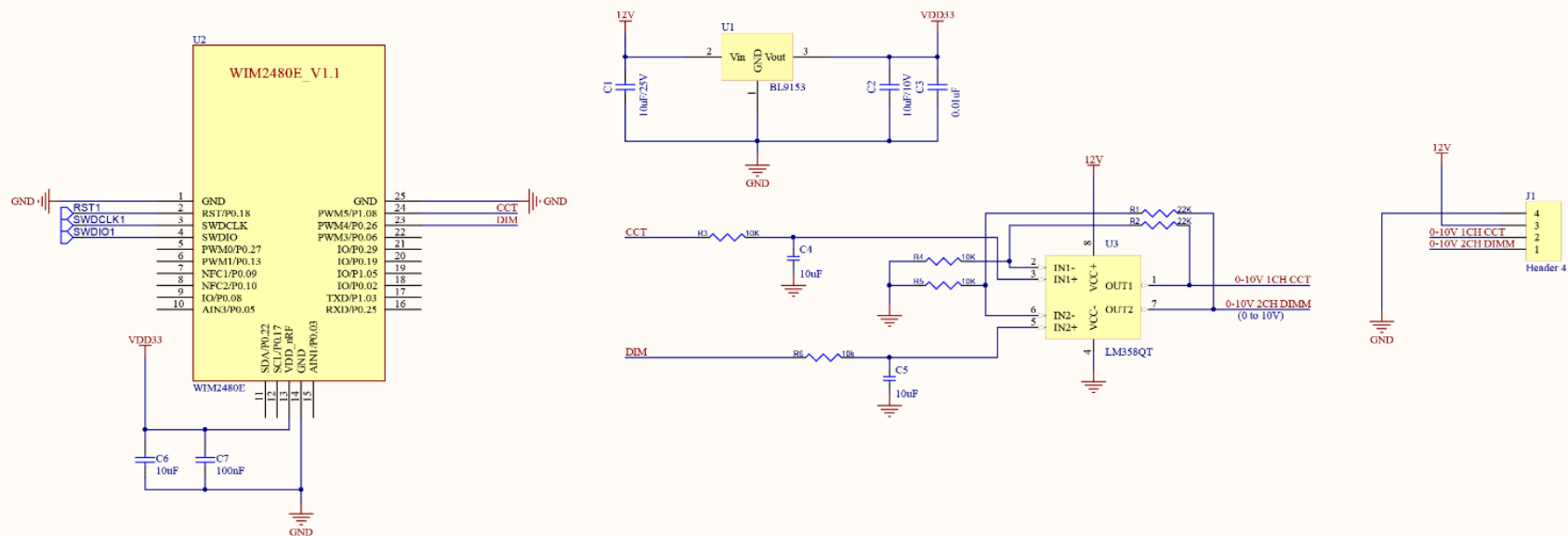
Schematic for AC power monitoring

Power measurement section
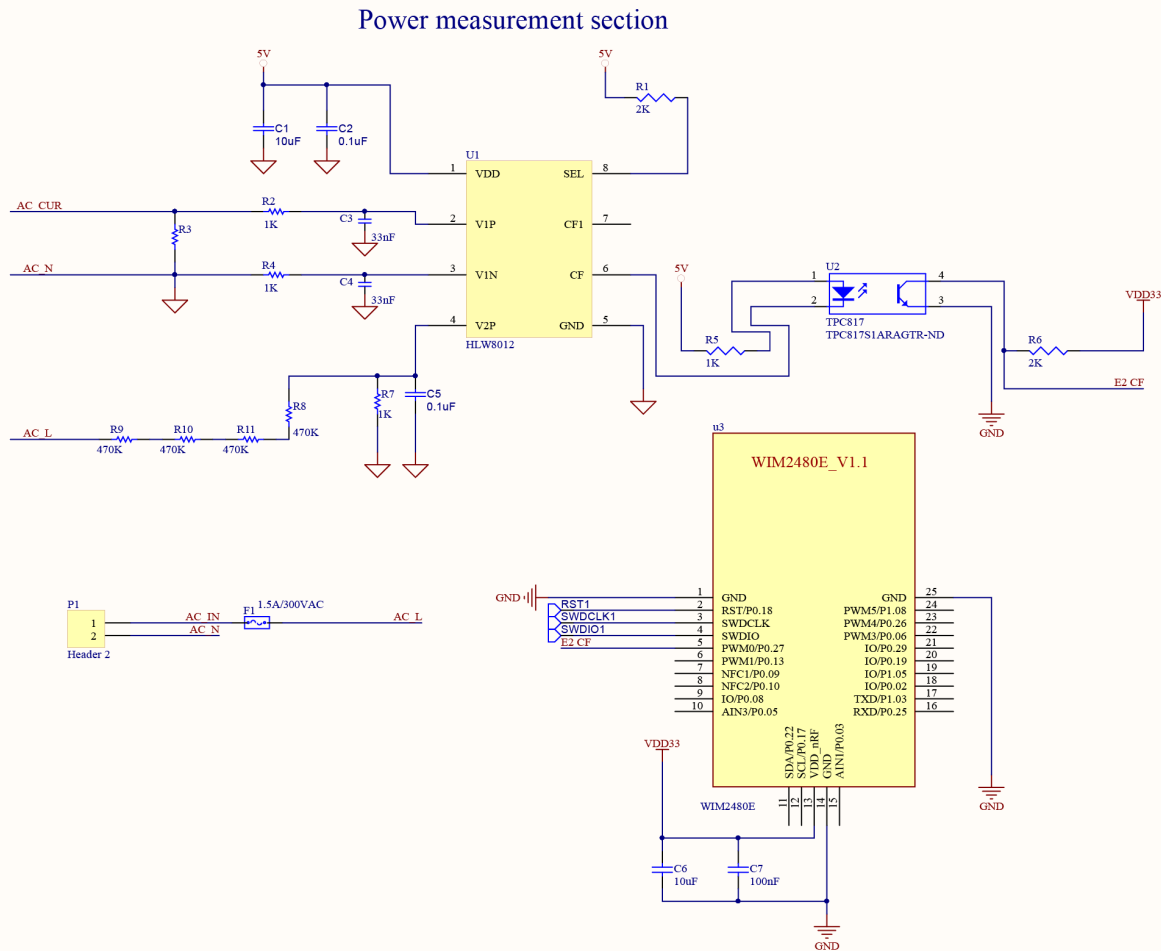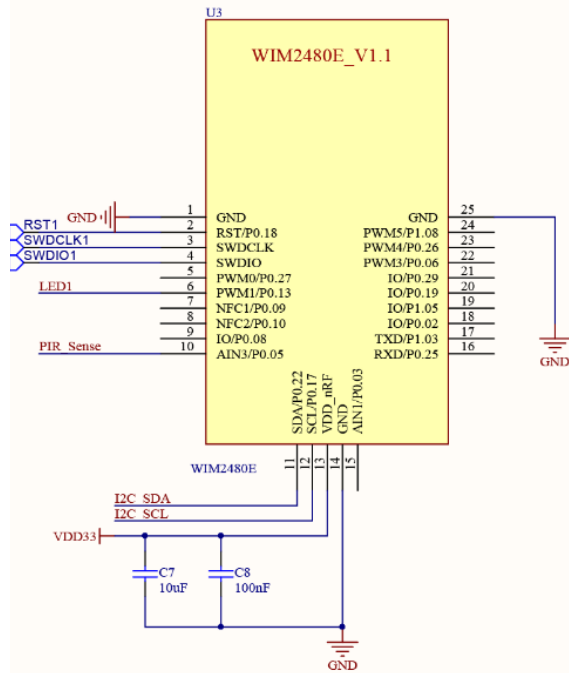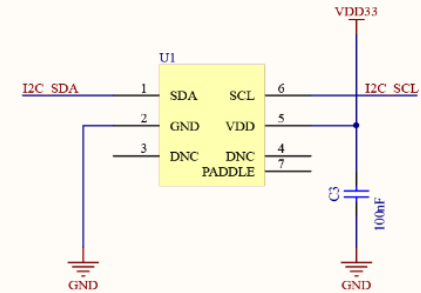
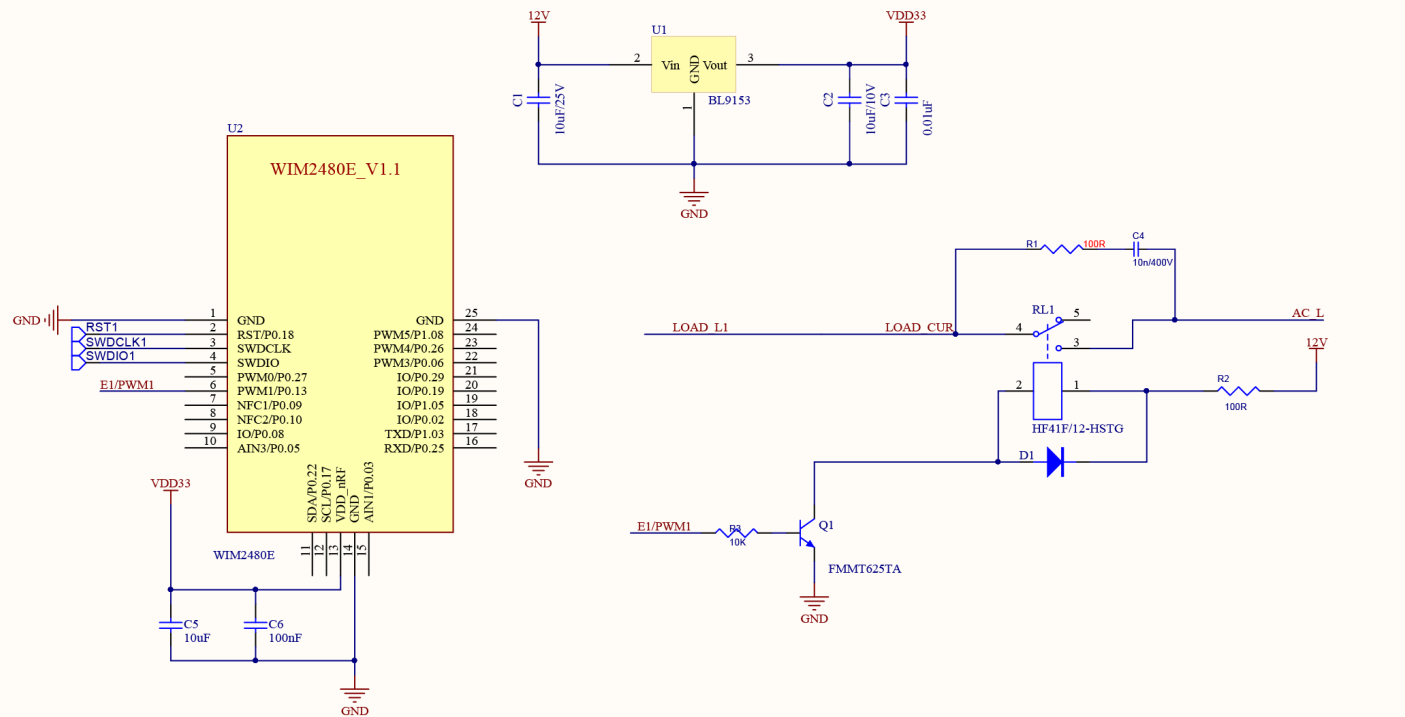## ▪ Schematic for smart sensor interfacing
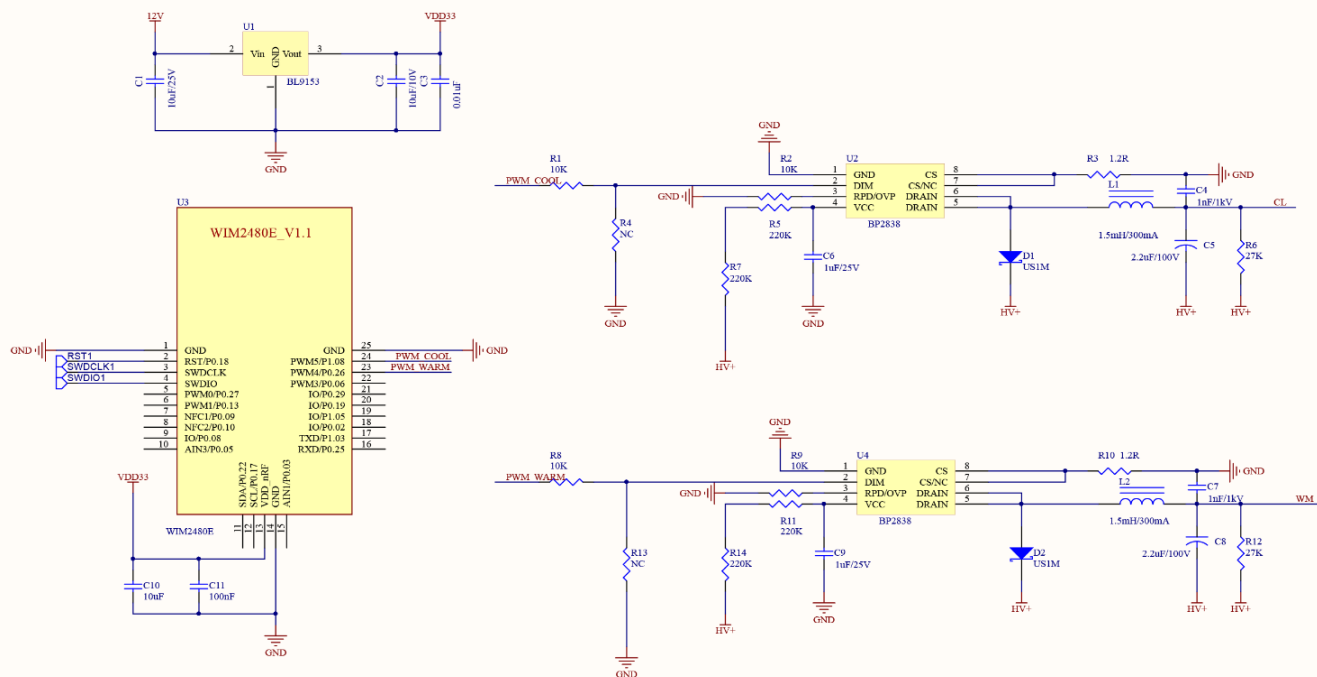

PIR SENSOR

COLOR SENSOR

HUMIDITY AND TEMPERATURE SENSOR
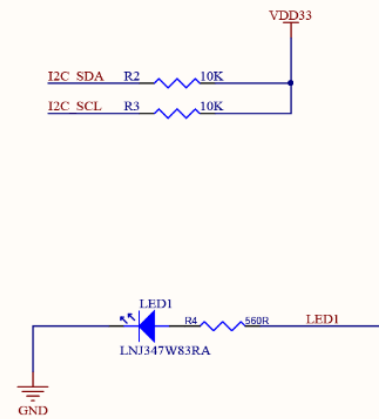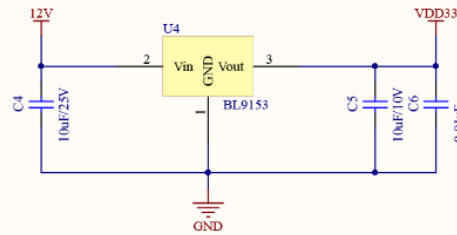
▪ **Schematic for smart switch**

▪ **Schematic for Warm Cool LED control**

Soldering Information

Leadfree reflow soldering
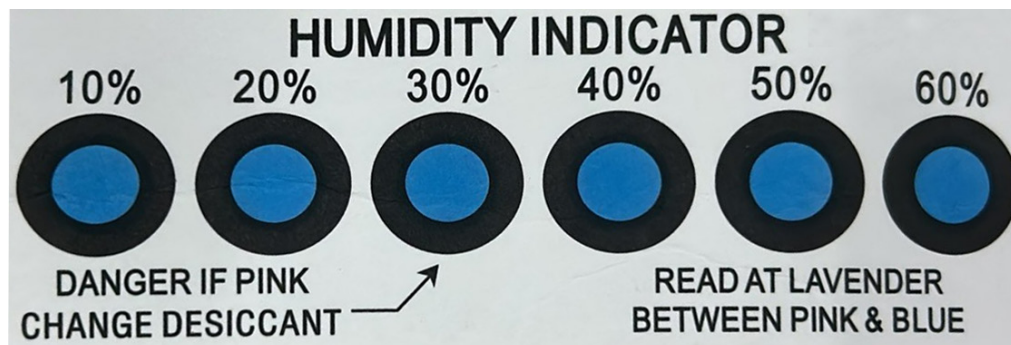

(Time M:SS----->)
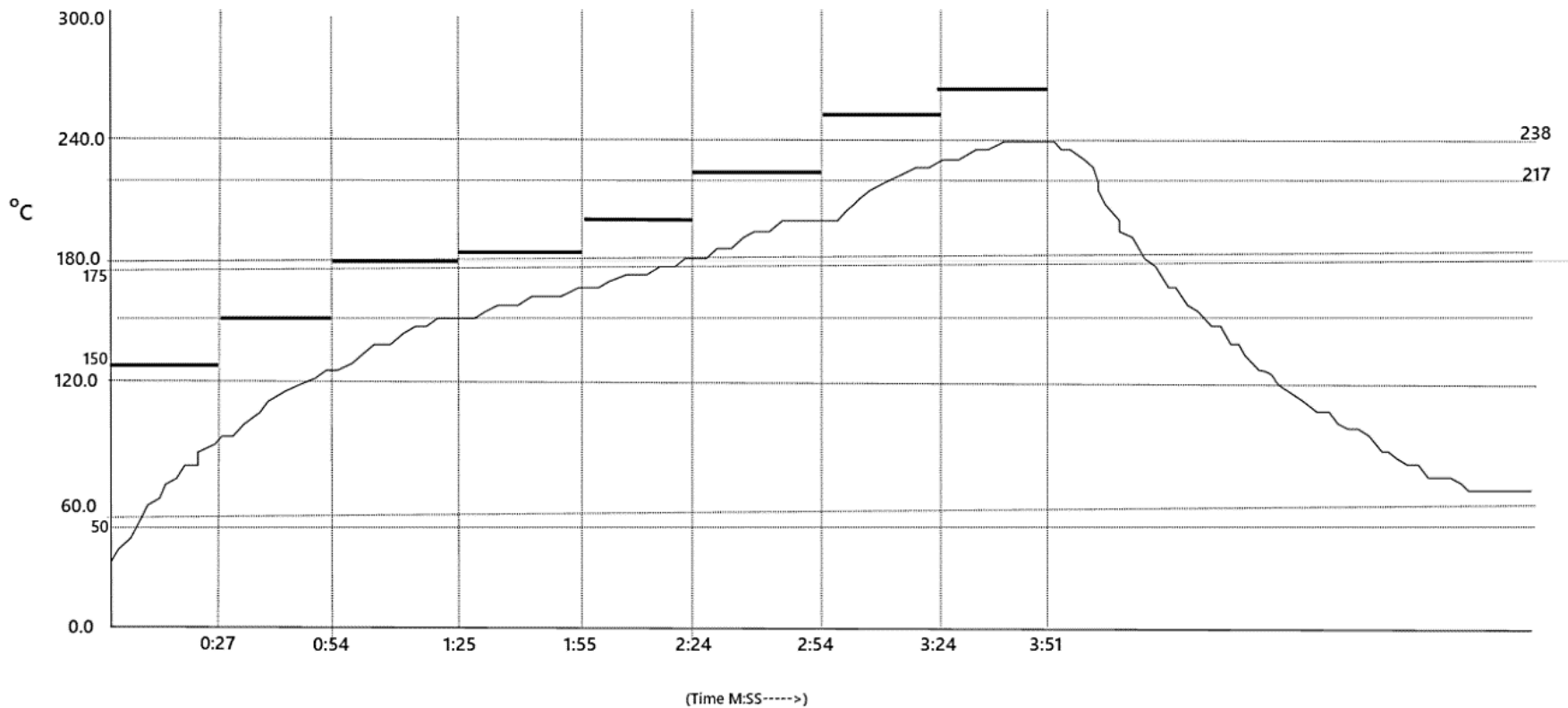
Don'ts

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.

Module Storage Conditions

- The moisture-proof bag must be placed in an environment where the temperature is below 40°C and the relative humidity is lower than 85%.

- The shelf life of a dry-packaged product is 12 months (MSL2) from the date when the product is packaged and sealed.

- There is a humidity indicator card in the packaging bag.

HUMIDITY INDICATOR
10%   20%   30%   40%   50%   60%

DANGER IF PINK
CHANGE DESICCANT →

READ AT LAVENDER
BETWEEN PINK & BLUE

a) The module needs to be baked in the following cases:

- The packaging bag is damaged before unpacking.

- There is no humidity indicator card (HIC) in the packaging bag.

- After unpacking, circles of 10% and above on the HIC become pink.

- The total exposure time has lasted for over 168 hours since unpacking.

- More than 12 months have passed since the sealing of the bag.

b) Baking settings:

- Temperature: 40°C and ≤ 5% RH for reel package

- Time: 168 hours for reel package

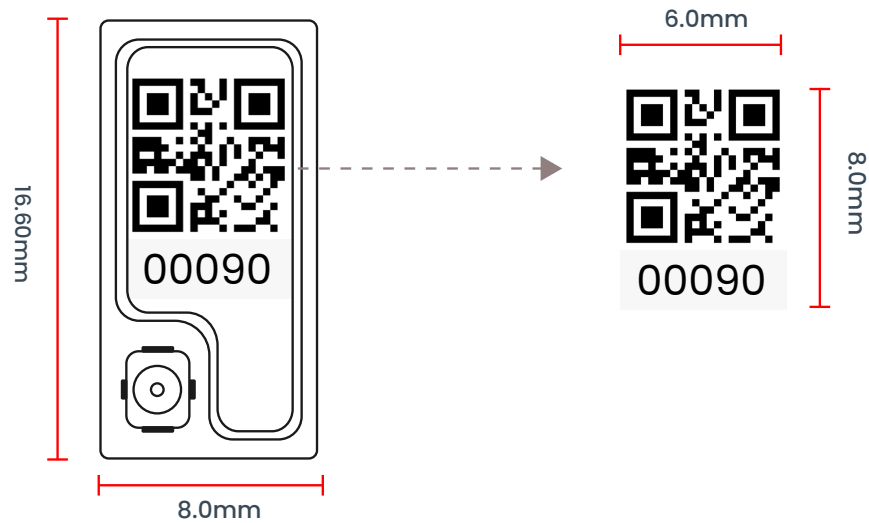- Alarm temperature: 50°C for reel package

  Production-ready temperature after natural cooling: < 36°C

- Re-baking situation: If a module remains unused for over 168 hours after being baked, it needs to be baked again.

- If a batch of modules is not baked within 168 hours, do not use the reflow soldering or wave soldering to solder them. Because these modules are Level-2 moisture-sensitive devices, they are very likely to get damp when exposed beyond the allowable time. In this case, if they are soldered at high temperatures, it may result in device failure or poor soldering.

c) In the whole production process, take electrostatic discharge (ESD) protective measures.

d) To guarantee the passing rate, it is recommended that you use the SPI and AOI to monitor the quality of solder paste printing and mounting.
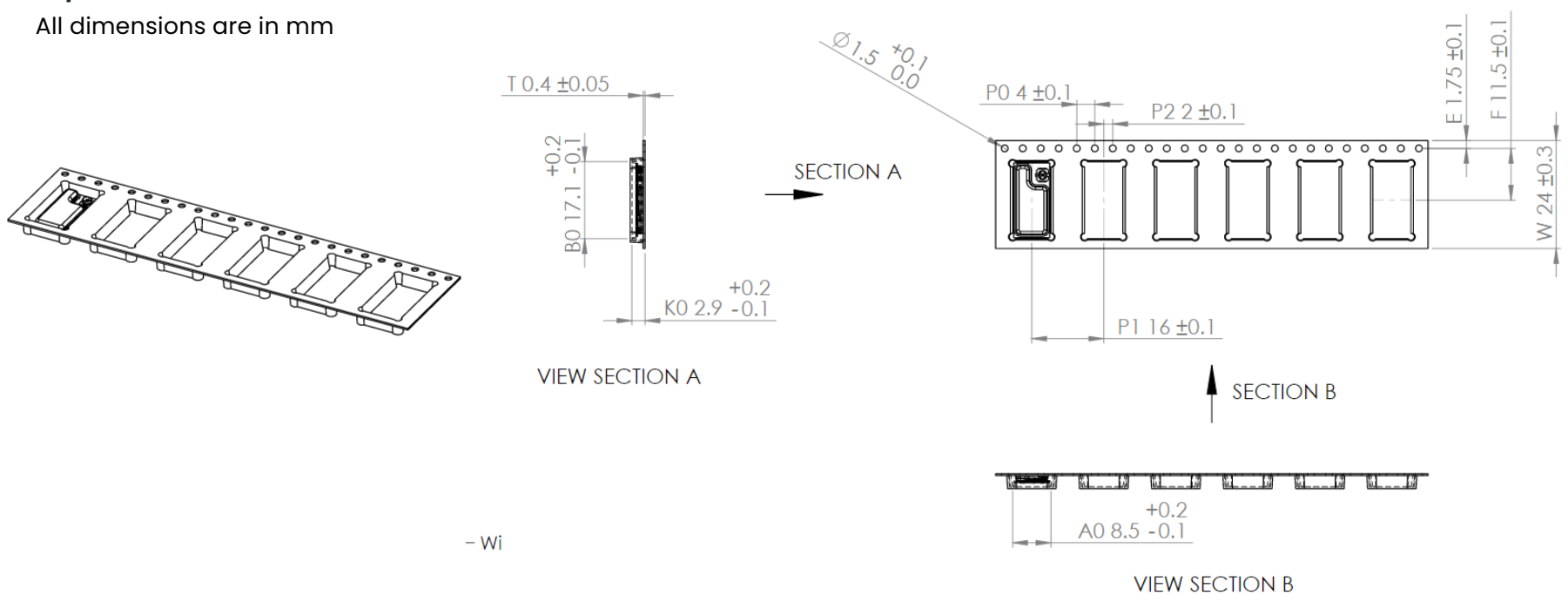
QR -Dimension and Placement

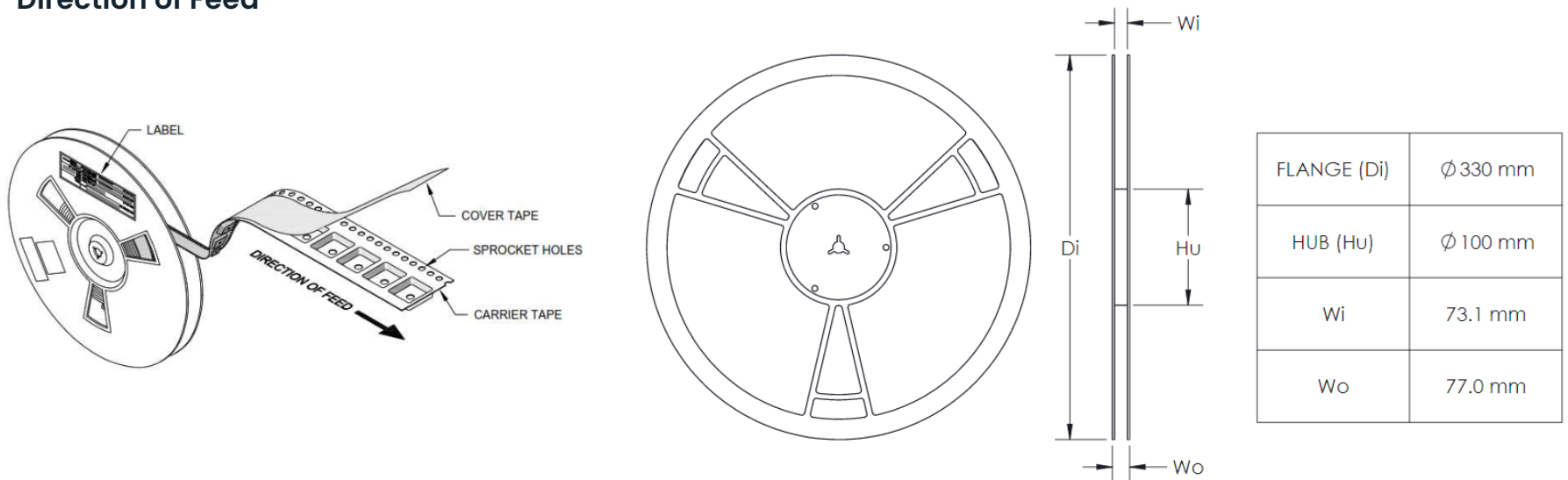The QR Code contains the serial number and production information such as the batch code and production date

# Packaging Information

Tape Dimensions

All dimensions are in mm

VIEW SECTION A

SECTION A

SECTION B

VIEW SECTION B

Direction of Feed

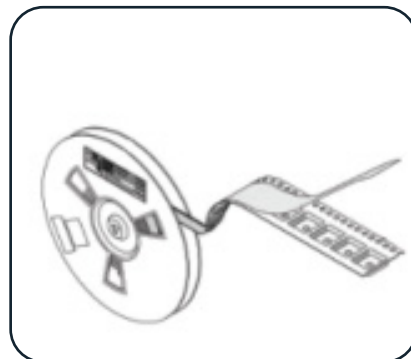| FLANGE (Di)	Ø 330 mm
HUB (Hu)	Ø 100 mm
Wi	73.1 mm
Wo	77.0 mm

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
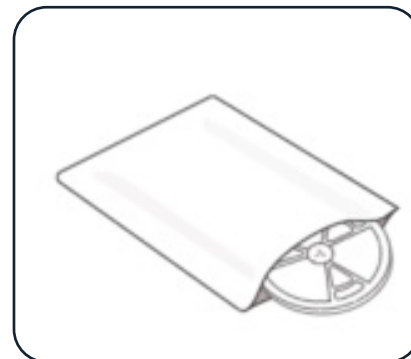- Order volume less than a full reel will be supplied on cut tape (without a reel)
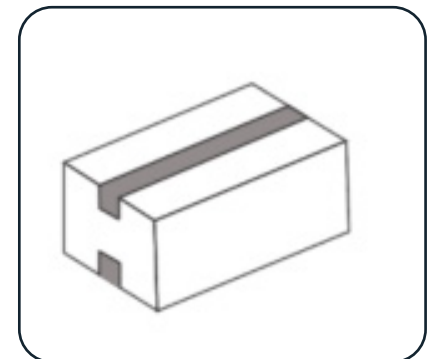
Packaging hierarchy
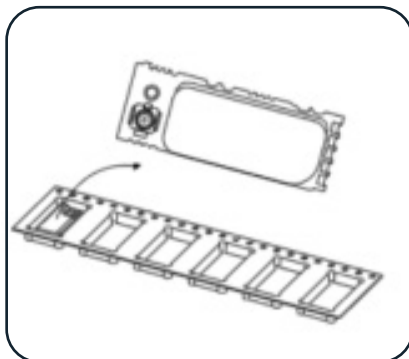
Modules on Tape

Tape on Reel

ESD Safe Cover

Master Carton

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-WIM2480
ISED	Cert No: 25222-WIM2480
RoHS 2.0	RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU

Ordering Information

Product Code	Communication	Voltage Rating	Analog Channel I/O	PWM I/O	Serial Interface	Dimensions (mm)	Antenna
WIM2480E	BLE 5.2	3.0VDC	4 AIO	6 Channels	UART/SPI/12C	0.88 x 0.31 x 0.11in (22.5 x 8.0 x 2.95mm)	External
WIM2480C	BLE 5.2	3.0VDC	4 AIO	6 Channels	UART/SPI/12C	0.65 x 0.31 x 0.09in (16.60 x 8.0 x 2.41mm)	Chip

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

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