

# UWM210A, UWB (SR040) + BLE SoC (QN9090) Module

## Applications

- ✓ IoT applications with coin cell battery
- ✓ UWB Trackers
- ✓ UWB Tags

## Features & Supports

- ✓ UWB Transceiver: NXP SR040
- ✓ BLE SoC: NXP QN9090
- ✓ IEEE 802.15.4z HRP PHY compliant
- ✓ 6.24GHz to 8.24GHz UWB band  
(UWB 5, 9-channels available.)
- ✓ 2.4GHz Bluetooth LE 5.0 Compliant
- ✓ Ranging technology  
Two Way Ranging (TWR)  
Time Difference of Arrival (TDoA)
- ✓ Reliable ranging accuracy  $< \pm 10\text{cm}$
- ✓ Low power consumption to support coin-cell battery operating
- ✓ Integrated all required RF components
- ✓ Interfaces: UART, I2C, SPI, SWD, GPIOs
- ✓ Supply Voltage: 3.3V
- ✓ Size [mm]: 13.0 (W) X 30.0 (L) X 2.8 (H)

## Descriptions

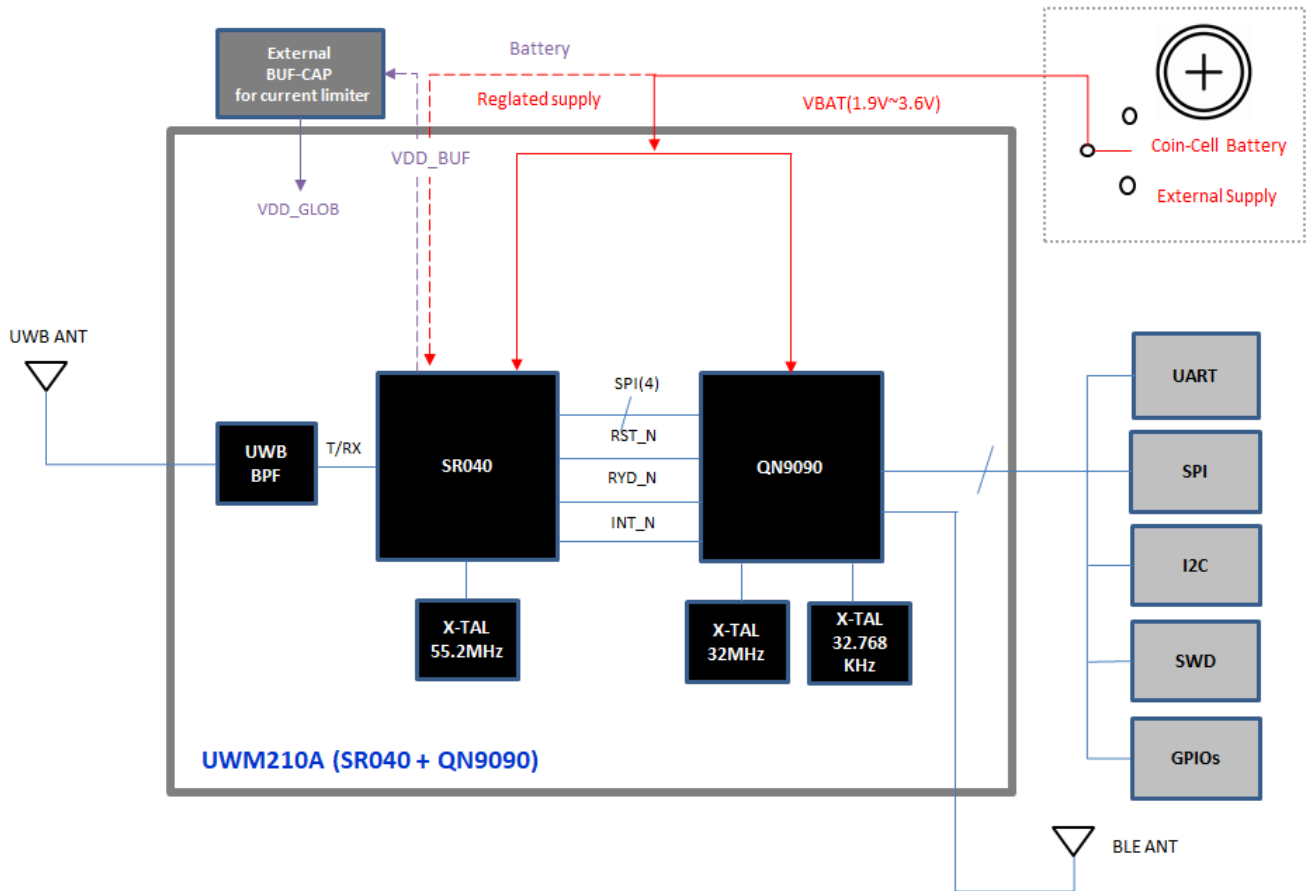
UWM210A module provides UWB and BLE wireless solution with configurations of NXP UWB transceiver IC, SR040 and NXP BLE SoC chip, QN9090 on board.

NXP SR040, a UWB controller provides highly reliable UWB ranging technologies like TWR and TDoA ranging achieving an accuracy of  $< \pm 10\text{cm}$  in non-line of sight. The distance estimate is based on a Time of Flight measurement. Time of Flight-based distance bounding improves the measured distance with ultra-high reliability compared to an RSSI-based distance measurement. NXP QN9090 is a host processor supporting Bluetooth LE 5.0. It controls UWB IC via SPI interface on module.

UWM210A module is designed to enable providing highly accurate ranging with these UWB technologies in IoT environment



## Block Diagram



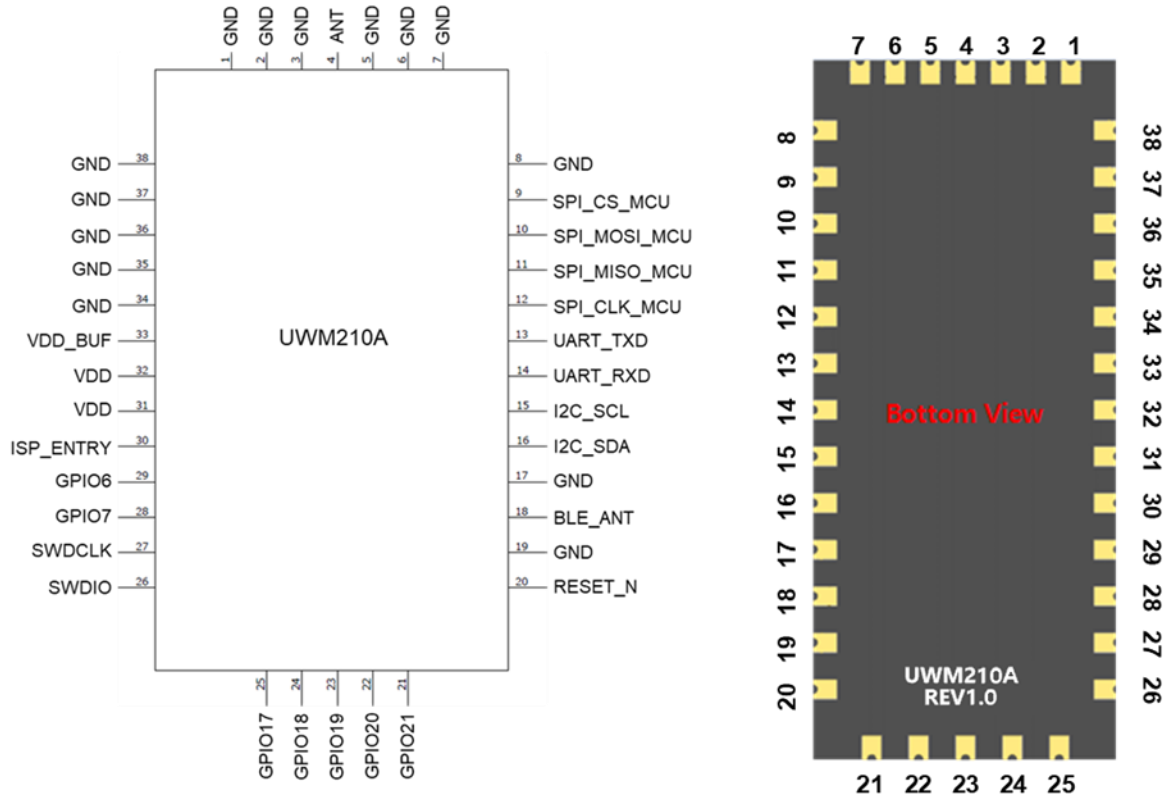
UWM210A Block Diagram

The UWM210 module consists of the following components:

- ✓ QN9090, Bluetooth Low Energy 5.0 wireless MCU
- ✓ SR040, Ultra-Wideband Transceiver
- ✓ UWB RF bandpass filter
- ✓ 3 crystals for reference clock of transceiver IC and MCU

## UWM210A Datasheet

### Pin Descriptions



### UWM210A Pin Descriptions

Pin	Name	Type	Description
1	GND	-	Ground
2	GND	-	Ground
3	GND	-	Ground
4	UWB_ANT	RF In/Out	UWB RF TX Output/ RX Input
5	GND	-	Ground
6	GND	-	Ground
7	GND	-	Ground
8	GND	-	Ground
9	SPI_CS	Digital In/out	Serial Peripheral Interface-bus, Chip Select
10	SPI_MOSI	Digital In/out	Serial Peripheral Interface-bus, Master Output / Slave Input
11	SPI_MISO	Digital In/out	Serial Peripheral Interface-bus, Master Input / Slave Output
12	SPI_CLK	Digital In/out	Serial Peripheral Interface-bus, Clock
13	UART_TXD	Digital Output	UART Transmit Data Output
14	UART_RXD	Digital Input	UART Receiver Data Input

## UWM210A Datasheet

15	I2C_SCL	Digital In/out	I <sup>2</sup> C-Bus master/slave SCL Input / Output
16	I2C_SDA	Digital In/out	I <sup>2</sup> C-Bus master/slave SDA Input / Output
17	GND	-	Ground
18	BLE_ANT	RF In/Out	Bluetooth LE RF TX Output/ RX Input
19	GND	-	Ground
20	RESET_N	Digital In	Reset signal; Active low
21	GPIO21	Digital In/out	GPIO Input/ Output
22	GPIO20	Digital In/out	GPIO Input/ Output
23	GPIO19	Digital In/out	GPIO Input/ Output
24	GPIO18	Digital In/out	GPIO Input/ Output
25	GPIO17	Digital In/out	GPIO Input/ Output
26	SWDIO	Digital In/out	Serial Wire Data Input/ Output
27	SWCLK	Digital In/out	Serial Wire Clock Input/ Output
28	GPIO7	Digital In/out	GPIO Input/ Output
29	GPIO6	Digital In/out	GPIO Input/ Output
30	ISP ENTRY	Digital In	Enter ISP_ENTRY mode in active low on boot up.
31	VDD	Supply In	+3.3V Input supply
32	VDD	Supply In	+3.3V Input supply
33	VDD_BUF	Supply In	Buffer capacitor connection pin. When coin cell battery is used, connect buffer capacitor to VDD_BUF pin. When regulated supply is used, connect between VBAT and VDD_BUF.
34	GND	-	Ground
35	GND	-	Ground
36	GND	-	Ground
37	GND	-	Ground
38	GND	-	Ground

## Electrical Specifications

### Absolute Maximum Ratings

Symbol	Parameter	Min.	Max.	Unit.
V <sub>DD</sub>	Supply voltage	-	3.96	V
V <sub>IO</sub>	IO pins voltage	-	3.96	V
T <sub>stg</sub>	Storage temperature	-40	+ 85	°C
V <sub>ESD</sub>	Static Discharge Voltage*		±2	KV

\* System level ESD : IEC 61000-4-2; C = 150pF, R = 330Ω

### Recommended Operating Conditions

Symbol	Parameter	Min.	Max.	Unit.
V <sub>in</sub>	Input voltage	2.8	3.6	V
V <sub>IO</sub>	IO pins voltage	2.8	3.6	V
T <sub>A</sub>	Operating ambient temperature	-30	+ 85	°C

### Electrical Reference data – UWB

Parameter	Conditions	Min.	Typ	Max.	Unit.
Freq. Range	Operating frequency	6.24		8.24	GHz
Output Power	Calibrated power (RMS) at FCC limit			-41.3	dBm/MHz
Sensitivity	Ch5, 6.8Mbps data rate		-93		dBm
	Ch9, 6.8Mbps data rate		-91		dBm
ToF Accuracy	Line of sight accuracy when STS is used. <sup>[1]</sup>	-10		10	cm

[1] The ToF performance is measured and verified in conducted and radiated test environment using UWM2X0 evaluation platform connected to UWB antennas. More details can be found in the application note 'AoA, ToF Performance Report'

### Electrical Reference data – BLE RF

Parameter	Conditions	Min.	Typ	Max.	Unit.
Freq. Range	Operating frequency	2.40		2.48	GHz
Output Power	@Radiated Power		7		dBm
Sensitivity			-96		dBm

## UWM210A Datasheet

### Electrical Reference data – Power consumption

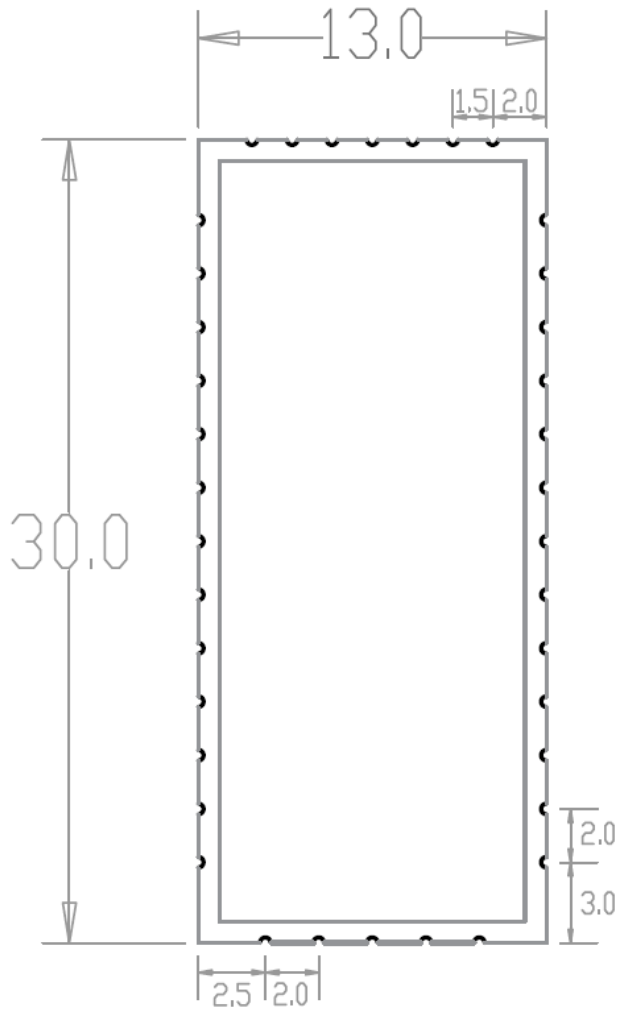
@VDD=3.3V, T<sub>A</sub>=25°C

Parameter	Conditions	Min.	Typ	Max.	Unit.
UWB / Peak Current RX	RX @9-channel(7.987GHz)	-	136	-	mA
UWB / Peak Current TX	TX Max output power @9-channel(7.987GHz)	-	117	-	mA
	TX Calibrated power (RMS) at FCC limit @9-channel(7.987GHz)	-	105	-	mA
UWB / DS-TWR average current consumption during active ranging	Controller/initiator average current consumption @9-channel(7.987GHz)	-	25	-	mA
UWB / DS-TWR average current consumption for 100ms ranging block	Controller/initiator average current consumption @9-channel(7.987GHz)	-	22	-	mA
UWB / DS-TWR Peak current with current limiter enabled <sup>[1]</sup>	Controller/initiator peak current consumption @Current limiter is set to '0x14', 9-channel(7.987GHz)	-	25	-	mA
	Controller/initiator peak current consumption @Current limiter is set to '0x0F', 9-channel(7.987GHz)	-	20	-	mA
BLE / TX Average Current	@19Channel(2440MHz), 1M, Max Power(+15dBm), PRBS9 random-payload	-	21	-	mA
BLE / TX (CW Mode) Average Current	@19Channel(2440MHz), 1M, Max Power(+15dBm)	-	27	-	mA
BLE / RX Average Current	@1Channel(2404MHz), 1M, RX Trigger mode test	-	13	-	mA
BLE / RX (Continuous) Average Current	@1Channel(2404MHz), 1M, RX Continuous mode test	-	14	-	mA
Supply Current	Active State, CPU Idle	-	4	-	mA
Sleep mode	@QN9090_Deep Power Down Mode	-	800	-	nA

[1] Using the coin cell battery (Voltage at TEST of the coin cell battery = 3.262V).

Configurable current limit from 15mA to 20 mA, in steps of 1 mA.

## Mechanical Specifications



TOP VIEW

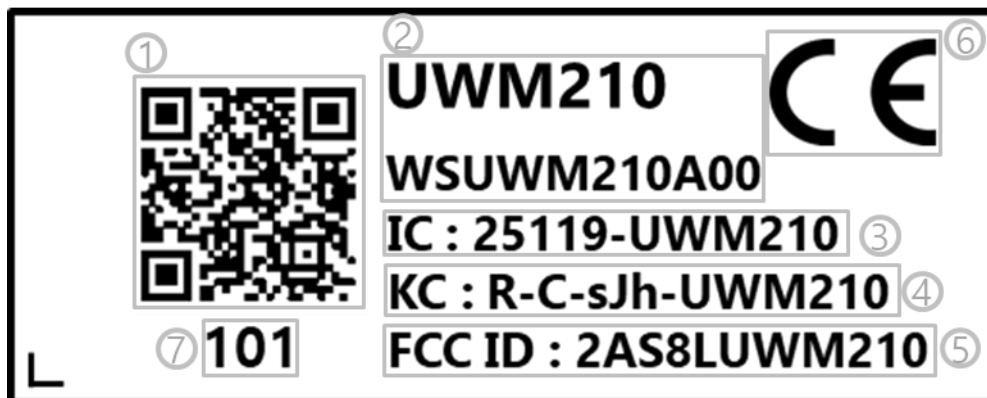


BOTTOM VIEW



SIDE VIEW

## Marking

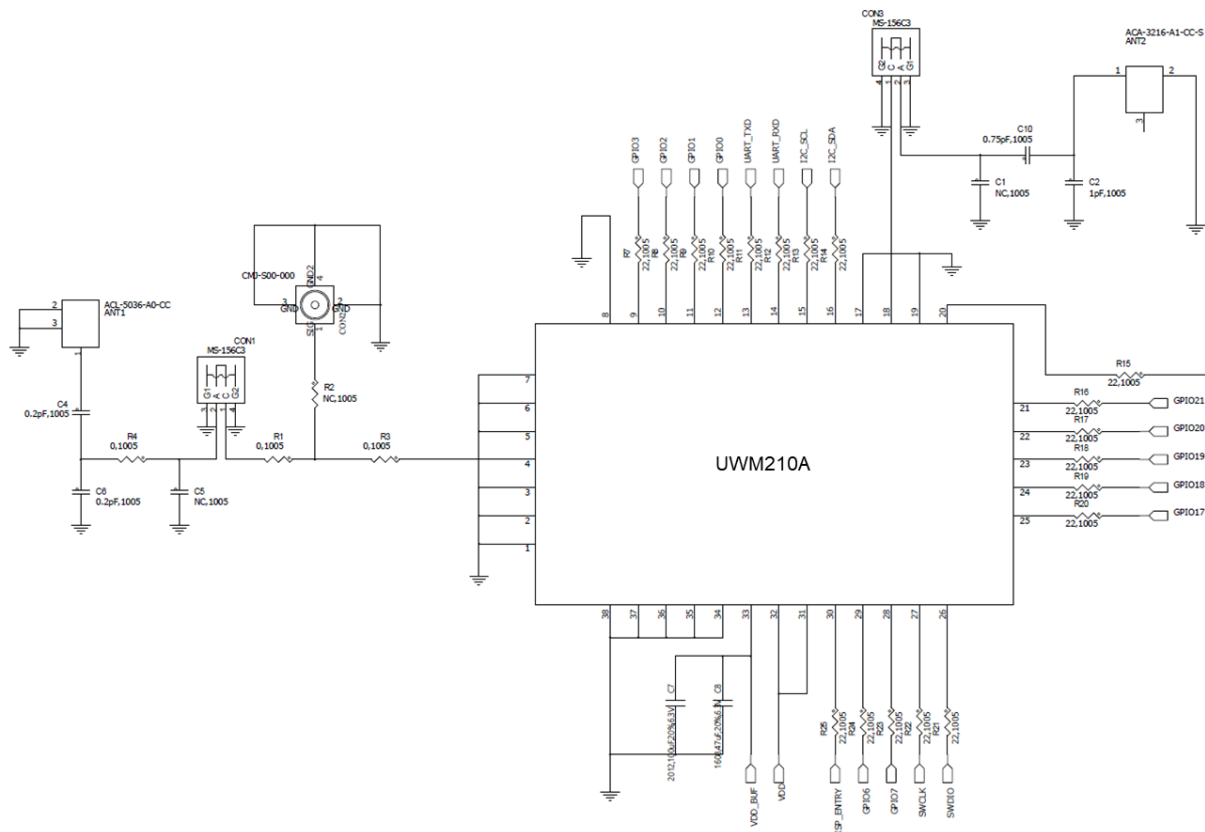


Number	Description
1	QR Code (Serial Number)
2	Model Name : UWM210 Part Number : WSUWM210A00
3	IC Certification ID : 25119-UWM210
4	KC Certification ID : R-C-sJh-UWM210
5	FCC Certification ID : 2AS8LUWM210
6	CE Certification Mark
7	Software Version

\* Laser marking can be replaced by label.



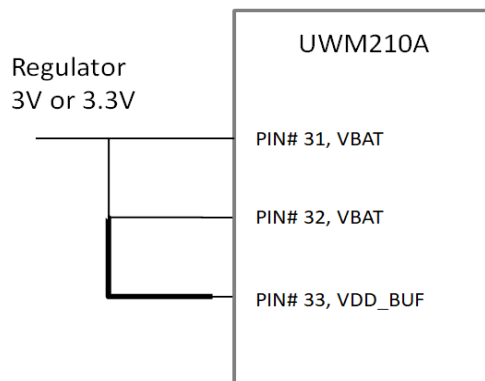
## Reference Circuit



### Power management circuit according to external power supply use cases

#### 1) Supplied with regulated 3V (3.3V) supply

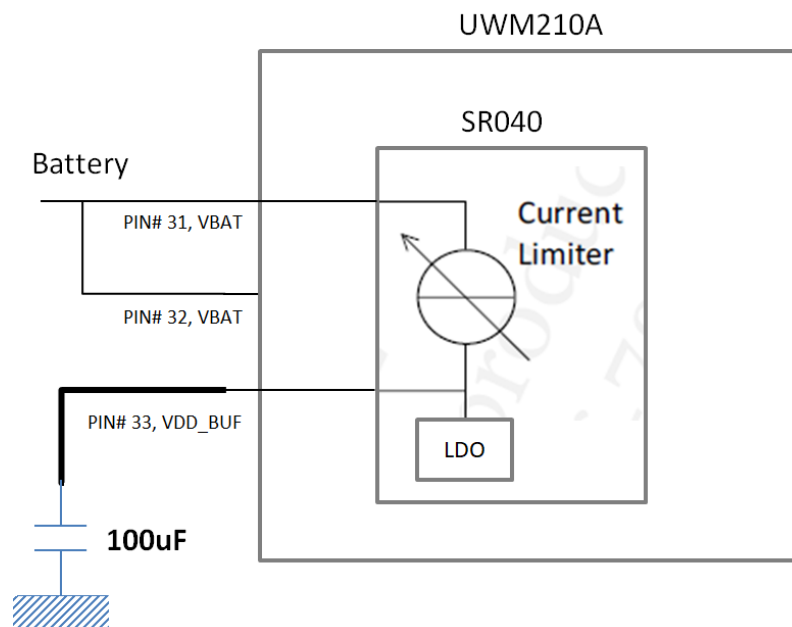
When the UWM210A is supplied by a regulated supply (with appreciate peak current capability) then VBAT pins (pin31 and pin32) and VDD\_BUF pin (pin33) have to be connected externally to same supply source.



## 2) Supplied with battery

In case of the UWM210A is supplied by a battery with limited peak current capability such as coin-cell, then current limiter built in SR040 IC of this module should be enabled and decoupling capacitor values should be adjusted. Due to typical coin cell battery cannot provide a high peak current in operating UWB use cases, the current limiter is intended to avoid exceeding battery capability, minimizes battery stress and maximizes the lifetime of it.

The current limiter of SR040 chip is internally connected between VBAT\_IO and VDD\_BUF. In external circuit of module, it is only needed a buffer capacitor connected to VDD\_BUF pin (pin#33) as following picture.



The buffer capacitor size is typically required 100uF( $\pm 10\%$ ) when coin cell battery powered. The capacitor size is a critical value as the ranging energy is temporarily stored here. For practical implementations, it is a critical component due to costs and required board space. Reducing the capacitor value will on one side reduce the physical dimensions, on the other side it will also lead to a faster and deeper voltage drop during the transmission or reception of a ranging frame.

For stable operation the ranging sequence and the buffer capacitor size must be adjusted in a way that the minimal buffer capacitor voltage (VDD\_BUF) will never drop below 1.8 V

## Ordering Information

**W S U W M 2 1 0 A 0 0 S**

(1) WS : Wireless Solution

(2) UW : Ultra-Wide band(UWB)

(3) M : Module

(4) 200 : UWB Transceiver(SR150) + BLE MCU(QN9090)

210 : UWB Transceiver(SR040) + BLE MCU(QN9090)

(5) A : Standard Model

(6) 00 : Reserve Code (Default:00)

*This code will be used when there is a functional special requirement.*

(7) S : SJIT Co., Ltd

## Revision history

[illegible]