UWM200A, UWB (SR150) + BLE SoC (QN9090) Module

Applications

- ✓ Hand-Free Access Control
- ✓ Location-based Services
- ✓ Device to Device Applications

Features & Supports

- ✓ UWB Transceiver: NXP SR150
- ✓ 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 and localization with UWB
- ✓ Two-way and one-way ranging (TDoA)
- ✓ Dual-RX for AoA functionality
- ✓ 3 UWB RF ports (2D or 3D AoA support)
- ✓ 1 Bluetooth LE RF port
- ✓ UWB TX Power Calibration at FCC limits
- ✓ Interfaces: UART, I2C, SPI, SWD, GPIOs
- ✓ Supply Voltage: 3.3V
- ✓ Size [mm]: 13.0 (W) X 30.0 (L) X 2.8 (H)

Descriptions

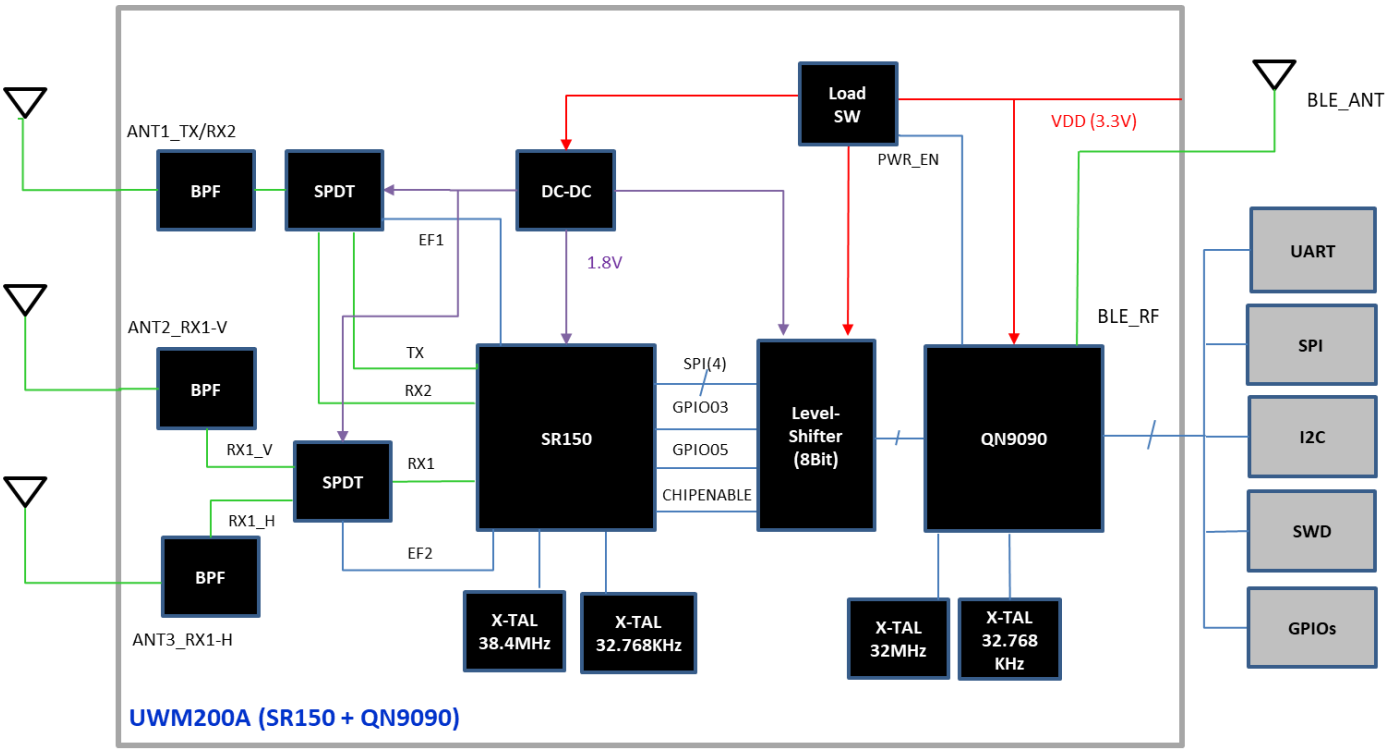
UWM200A module provides UWB and BLE wireless solution with configurations of NXP UWB transceiver IC, SR150 and NXP BLE SoC chip, QN9090 on board.

NXP SR150 chipset provides highly reliable UWB ranging technologies like SS-TWR, DS-TWR and TDoA ranging achieving an accuracy of <±10cm. also, can perform measurement of angle of arrival(AoA) with an accuracy of <±3°in one measurement cycle using the on-chip dual receiver architecture. NXP QN9090 is a host processor supporting Bluetooth LE 5.0. It controls UWB IC via SPI interface on module.

UWM200A module is designed to enable providing highly accurate ranging and positioning capabilities with these UWB technologies in IoT market applications.

SJIT Co., Ltd. • *www.seongji.co.kr* • *iot.sales@seongji.co.kr* • *Phone : 031-239-8194* • *Fax : 031-233-7048*
• *54-33, DongtanHana1(i)-gil, Hwaseong-si, Gyeonggi-do, 18423, KOREA*

Block Diagram

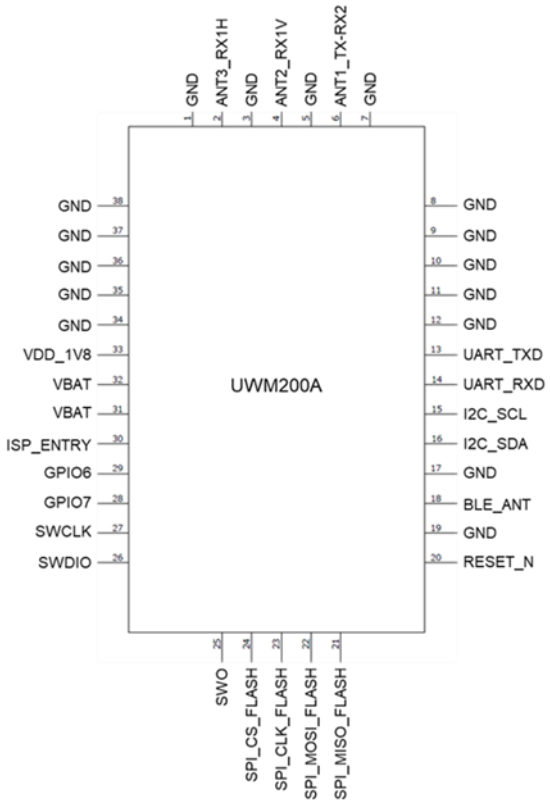


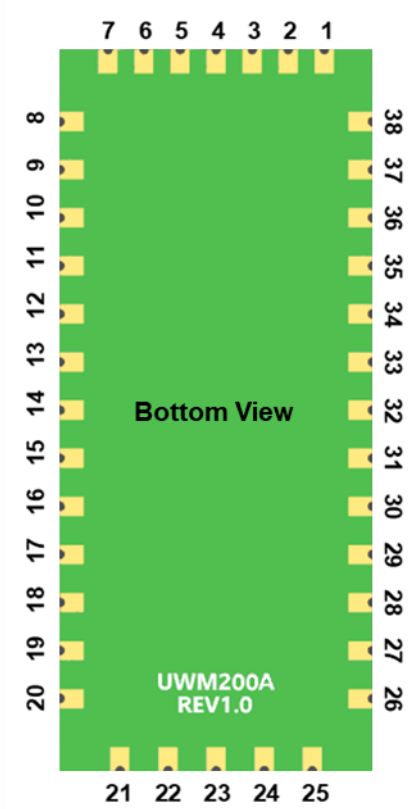
UWM200A Block Diagram

The UWM200 module consists of the following components:

- ✓ QN9090, Bluetooth Low Energy 5.0 wireless MCU
- ✓ SR150, Ultra-Wideband Transceiver
- ✓ 8-bit bidirectional multi-voltage level translator (1.8V to 3.3V)
- ✓ Low Iq step-down DC-DC convertor (3.3V to 1.8V)
- ✓ 2 SPDT RF switches and 3 Band pass filters for UWB 3D AoA
- ✓ 4 crystals for reference clock of transceiver IC and MCU

Pin Descriptions





UWM200A Pin Descriptions

Pin	Name	Type	Description
1	GND	-	Ground
2	ANT3_RX1H	RF In	UWB RF RX1 Input (connected to RX1_horizental antenna for 3D AoA)
3	GND	-	Ground
4	ANT2_RX1V	RF In	UWB RF RX1 Input (connected to RX1_Vertical antenna for 3D AoA)
5	GND	-	Ground
6	ANT1_TX-RX2	RF In/Out	UWB RF TX Out/ RX2 Input (connected to TX/RX2 antenna for 3D AoA)
7	GND	-	Ground
8	GND	-	Ground
9	GND	-	Ground
10	GND	-	Ground
11	GND	-	Ground
12	GND	-	Ground
13	UART_TXD	Digital Output	UART Transmit Data Output
14	UART_RXD	Digital Input	UART Receiver Data Input
15	I2C_SCL	Digital In/out	I^2C-Bus master/slave SCL Input / Output

16	I2C_SDA	Digital In/out	I^2C-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	SPI_MISO_FLASH	Digital In/out	Serial Peripheral Interface-bus, Master Input Slave Output on using external flash
22	SPI_MOSI_FLASH	Digital In/out	Serial Peripheral Interface-bus, Master Output Slave Input on using external flash
23	SPI_CLK_FLASH	Digital In/out	Serial Peripheral Interface-bus, Clock Input/ Output on using external flash
24	SPI_CS_FLASH	Digital Out	Serial Peripheral Interface-bus, chip select on using external flash
25	SWO	Digital Out	Serial Wire 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	Input to enter ISP_ENTRY mode
31	VBAT	Supply In	+3.3V Input supply
32	VBAT	Supply In	+3.3V Input supply
33	VDD_1V8	Analog Out	Internal DC-DC 1.8V Output
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_{DD}	Supply voltage	-	3.96	V
V_{IO}	IO pins voltage	-	3.96	V
T_{stg}	Storage temperature	-40	+ 85	℃
V_{ESD}	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_{in}	Input voltage	3.0	3.6	V
V_{IO}	IO pins voltage	3.0	3.6	V
T_A	Operating ambient temperature	-30	+ 85	℃

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		-91		dBm
	Ch9, 6.8Mbps data rate		-89		dBm
ToF Accuracy	Line of sight accuracy when STS is used.[2]	-10		10	cm
3D AoA Accuracy (AoA_{KPI}[1])	Azimuth and elevation sweep from -60° to +60° with a step of 6°.[2]		95		%

[1] AoA_{KPI}(%) = (Number of AoA_{ERROR}≤5°) / (Number of AoA Measurement)

[2] The AoA, 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

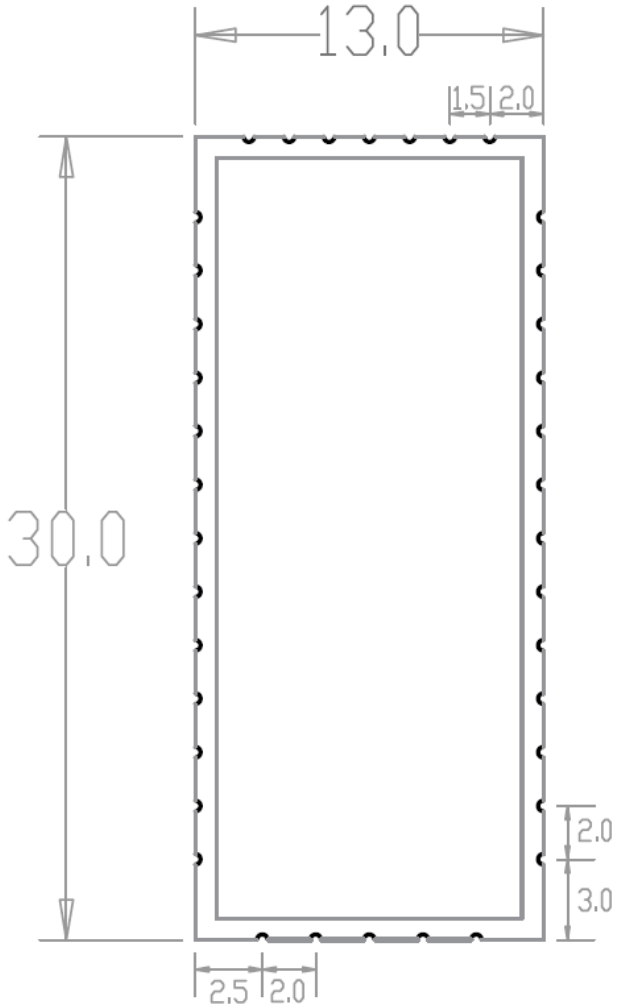
Parameter	Conditions	Min.	Typ	Max.	Unit.
Freq. Range	Operating frequency	2.40		2.48	GHz
Output Power	@Radiated Power		7		dBm
Sensitivity			-96		dBm

Electrical Reference data – Power consumption

@VDD=3.3V, T_A=25℃

Parameter	Conditions	Min.	Typ	Max.	Unit.
UWB / Peak Current RX	Single RX @9-channel(7.987GHz)	-	145	-	mA
	Dual RX @9-channel(7.987GHz)	-	230	-	mA
UWB / Peak Current TX	TX Max output power @9-channel(7.987GHz)	-	170	-	mA
	TX Calibrated power (RMS) at FCC limit @9-channel(7.987GHz)		124		mA
	TX Max output power CW Mode @9-channel(7.987GHz)	-	152	-	mA
UWB / DS-TWR average current consumption excluding DPD During active ranging	Controller/initiator average current consumption @9-channel(7.987GHz)	-	86	-	mA
	Controlee/responder average current consumption in dual RX mode @9-channel(7.987GHz)	-	91	-	mA
	Controlee/responder average current consumption in Single RX mode @9-channel(7.987GHz)	-	83	-	mA
UWB / DS-TWR average current consumption including DPD for 100ms ranging block	Controller/initiator average current consumption @9-channel(7.987GHz)	-	15	-	mA
	Controlee/responder average current consumption in dual RX mode @9-channel(7.987GHz)	-	16	-	mA
	Controlee/responder average current consumption in Single RX mode @9-channel(7.987GHz)	-	15	-	mA
BLE / TX Average Current	@19Channel(2440MHz), 1M, Max Power(+15dBm), PRBS9 random-payload	-	27	-	mA
BLE / TX (CW Mode) Average Current	@19Channel(2440MHz), 1M, Max Power(+15dBm)	-	33	-	mA
BLE / RX Average Current	@1Channel(2404MHz), 1M, RX Trigger mode test	-	15	-	mA
BLE / RX (Continuous) Average Current	@1Channel(2404MHz), 1M, RX Continuous mode test	-	21	-	mA
Supply Current	Active State, CPU Idle	-	15	-	mA
Sleep mode	@QN9090_Deep Power Down Mode	-	850	-	nA

Mechanical Specifications



TOP VIEW

BOTTOM VIEW

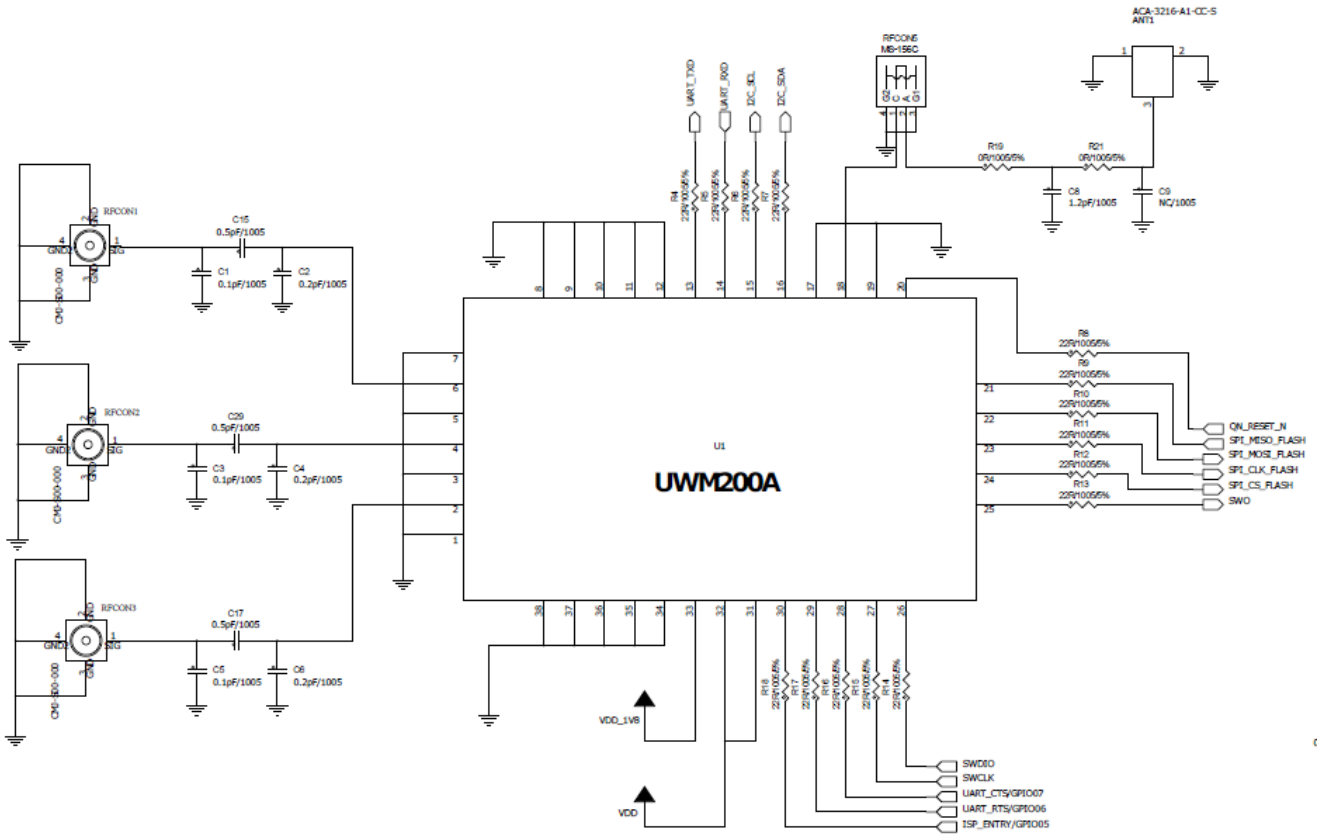
SIDE VIEW

Marking

Number	Description
1	QR Code (Serial Number)
2	Model Name : UWM200 Part Number : WSUWM200A00
3	IC Certification ID : 25119-UWM200
4	KC Certification ID : R-C-sJh-UWM200
5	FCC Certification ID : 2AS8LUWM200
6	CE Certification Mark
7	Software Version

* Laser marking can be replaced by label.

Reference Circuit



Ordering Information

W S U W M 2 0 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

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Revision history

Release Date	Change notice	Revision number
2022-12-14	Preliminary Datasheet	-
2023-01-19	Initial	-
2023-09-18	Changed module picture. Added 'Channel 5 Sensitivity' Data.	V01
2023-11-01	Update Marking information.	V02
2024-01-12	No updates to the content. Updated company name.	V03