

User Manual
WIFI/BT Module

UWM-XP9098V2

Wistron NeWeb Corp.

Revision History

Revision	Author	Date	Description
V1	Darren	2023.12.25	Initial release
V2	Darren	2024.3.19	Remove the confidential announcement Add antenna limitation Adjust distance of antenna announcement
V2.1	Darren	2024.3.25	Add antenna limitation for DFS
V2.2	Darren	2024.3.26	Revise the antenna limitation

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1. INTRODUCTION

1.1 UWM-XP9098V2 INTRODUCTION

This document describes and specifies technical requirements for UWM-XP9098V2. UWM-XP9098V2 is an automotive-grade wireless module of LGA type form factor supporting 802.11 a/b/g/n/ac/ax 2T2R WLAN function, Bluetooth v5.3+LE function. This module is built by using NXP 88Q9098S chipset and it supports the automotive applications like In-Vehicle Infotainment and Telematics Control Unit.

1.2 PRODUCT FEATURES

- Chipset 88Q9098S meet Automotive grade 2.
- Concurrent Dual Wi-Fi(CDW): 2x2 Wifi6(802.11ax)+2x2 Wifi5(802.11ac)
- Support MU-MIMO, OFDMA and Zero Wait DFS
- Dual mode Bluetooth 5.3&BLE
- BDR and EDR: 1Mbit/s, 2Mbit/s and 3Mbit/s
- BLE: 1Mbit/s, 2Mbit/s and Long Range(LR)
- Up to 16 BLE links
- Two antenna (ANT1: WLAN 5GHz+BT ; ANT2: WLAN 5GHz+WLAN 2.4GHz)
- WLAN and Bluetooth Networking coexistence
- Supports WLAN/BT and LTE coexistence mechanism. Two wire UART are used to communicate between UWM-XP9098V2 module and LTE device
- MAC address and calibration data stored in OTP
- Sleep and standby modes for low-power operation
- LGA type with 109 pins, 19.2 by 18-mm

WLAN:

- Dual-band(2.4/5GHz) support 802.11 a/b/g/n/ac/ax standards, 20/40/80MHz bandwidth
- 802.11a data rates of 6, 9, 12, 18, 24, 36, 48, and 54 Mbps
- 802.11b data rates of 1, 2, 5.5 and 11 Mbps
- 802.11g data rates of 6, 9, 12, 18, 24, 36, 48, and 54 Mbps
- 802.11n data rates of MCS0~15 HT20 and HT40
- 802.11ac data rates of MCS0 ~MCS9 VHT20, VHT40 and VHT80
- 802.11ax data rates of MCS0~11 HE20, HE40 and HE80
- 802.11h transmit power control and DFS radar pulse detection
- 802.11e quality of service
- 802.11i enhanced security
- 802.11k radio resource measurement
- 802.11mc precise indoor location positioning
- 802.11r fast hand-off for AP roaming
- 802.11u Hotspot 2.0(SAT mode only)
- 802.11v TIM frame transmission/reception
- 802.11w protected management frames
- 802.11z tunneled direct link setup
- Wireless Security: WEP, AES, WPA2, WPA3 and WAPI
- Host interface: PCIe 2.0 interface (Gen.2, single lane)

Bluetooth:

- Dual-mode Bluetooth, supports Classic Bluetooth and Bluetooth Low Energy
- Bluetooth 5.3 specification support
- Bluetooth Class 1.5 and Class 2
- Baseband/radio BDR/EDR packet types – 1Mbit/s(GFSK), 2Mbit/s(DQPSK), 3Mbit/s(8DPSK)
- Full master and slave piconet support
- Scatternet support
- All standard pairing, authentication, link key and AES encryption operations
- Enhanced Power Control (EPC)
- BLE support link layer topology to be master and slave (connect up to 16 links)
- BLE Intelligent Adaptive Frequency Hopping(AFH)
- BLE Privacy 1.2 and Secure Connection
- BLE Data Length Extension
- BLE Advertising Extension
- 2Mbit/s BLE
- BLE Long Range
- Host interface: High speed UART
- Bluetooth voice interface: PCM

1.2.1 Module Interfaces

Interfaces	Function	Module Pin Name
PCIe	WLAN host interface	PCIE_CLK_P; PCIE_CLK_N; PCIE_TX_P; PCIE_TX_N; PCIE_RX_P; PCIE_RX_N; PCIE_CLKREQ_N; PCIE_WAKEUP_N; PCIE_perst_N
UART	BT/BLE host interface	UART_RTS; UART_CTS; UART_RX; UART_TX
PCM	BT/BLE voice interface	PCM_CLK; PCM_SYNC; PCM_DOUT; PCM_DIN
JTAG	JTAG interface	JTAG_TCM; JTAG_TMS; JTAG_TDI; JTAG_TDO
Coex UART*	LTE coexistence interface	Co-pin with JTAG_TDI; JTAG_TDO

*Coex UART interface need confirm with NXP

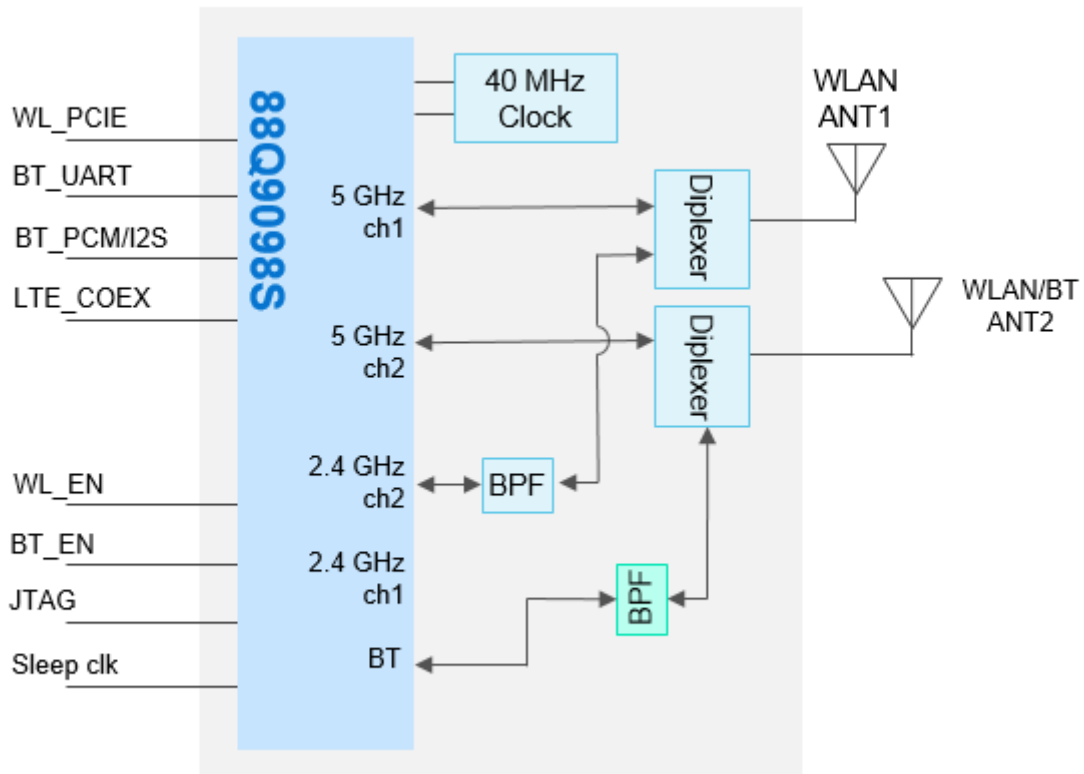
1.2.2 RF key specifications

RF Key Specifications	Value
Typical Tx output power @2.4G 11Mbps	19dBm
Typical Tx output power 20MHz per chain@2.4G OFDM 64-QAM(MCS7)	15dBm
Typical Tx output power 40MHz per chain@2.4G OFDM 64-QAM(MCS7)	15dBm
Typical Tx output power 20MHz per chain@5G OFDM 256-QAM(MCS9)	11dBm
Typical Tx output power 40MHz per chain@5G OFDM 256-QAM(MCS9)	11dBm
Typical Tx output power 80MHz per chain@5G OFDM 256-QAM(MCS9)	11dBm
Typical Tx output power @5G level control range	23dB
Typical Tx output power @5G control step	0.5dB
Typical Tx output power @5G accuracy	±2dB

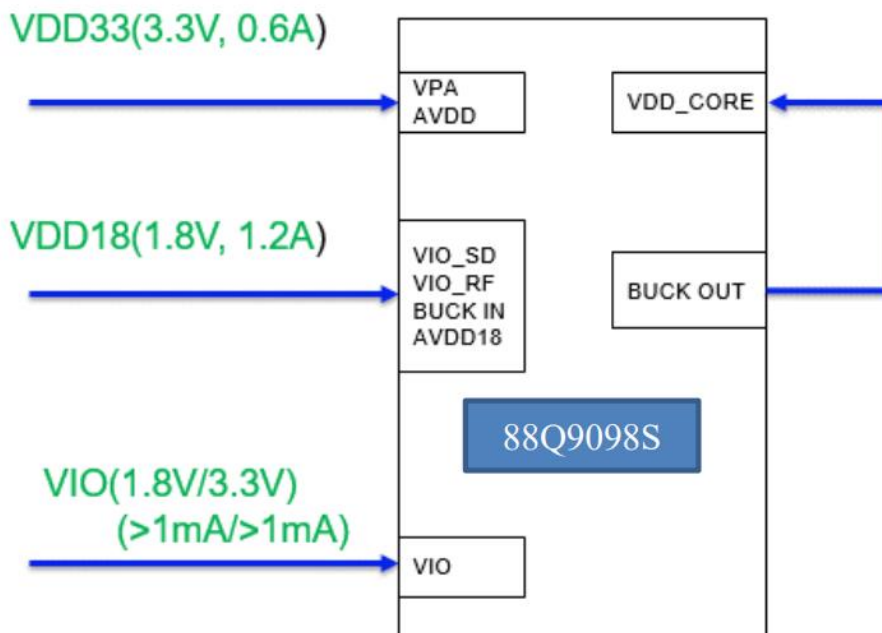
Typical Tx output power @2.4G level control range	22dB
Typical Tx output power @2.4G control step	0.5dB
Typical Tx output power @2.4G accuracy	±1dB
Typical 1x1 Rx Sensitivity @2.4G 11Mbps	-85dBm
Typical 1x1 Rx Sensitivity @2.4G 54Mbps	-71dBm
Typical 1x1 Rx Sensitivity @2.4G HT20 MCS7	-69dBm
Typical 1x1 Rx Sensitivity @2.4G HT40 MCS7	-67dBm
Typical 1x1 Rx Sensitivity @2.4G VHT20 MCS8	-66dBm
Typical 1x1 Rx Sensitivity @2.4G VHT40 MCS9	-61dBm
Typical 1x1 Rx Sensitivity @2.4G HE20 MCS11	-59dBm
Typical 1x1 Rx Sensitivity @2.4G HE40 MCS11	-56dBm
Typical 1x1 Rx Sensitivity @5G 54Mbps	-70dBm
Typical 1x1 Rx Sensitivity @5G HT20 MCS7	-68dBm
Typical 1x1 Rx Sensitivity @5G HT40 MCS7	-66dBm
Typical 1x1 Rx Sensitivity @5G VHT20 MCS8	-64dBm
Typical 1x1 Rx Sensitivity @5G VHT40 MCS9	-60dBm
Typical 1x1 Rx Sensitivity @5G VHT80 MCS9	-57dBm
Typical 1x1 Rx Sensitivity @5G HE20 MCS11	-57dBm
Typical 1x1 Rx Sensitivity @5G HE40 MCS11	-55dBm
Typical 1x1 Rx Sensitivity @5G HE80 MCS11	-53dBm
Typical Tx output power @BT BDR	8dBm
Typical Tx output power @BT EDR	6dBm
Typical Tx output power @BLE	2dBm
Typical Rx Sensitivity @BT DH1	-87dBm
Typical Rx Sensitivity @BLE PRBS9	-94dBm

*WiFi RX sensitivity are measured with LDPC waveform.

1.3 HW Block Diagram



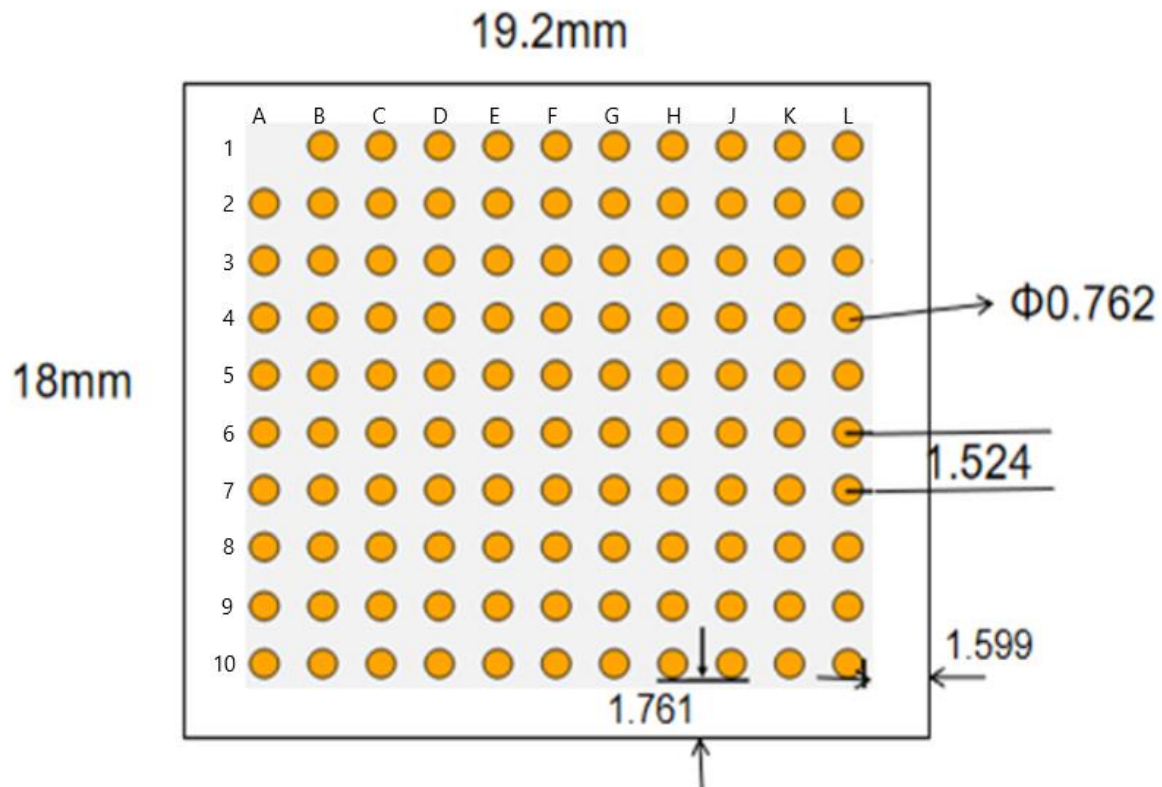
Power Supply Structure



2. PIN DEFINITIONS

2.1 I/O PARAMETERS DEFINITIONS

2.1.1 LGA Footprint Diagram



- Above diagram is Top to Bottom view
- There is no pad on the location A1 as Pin#1 indication

2.1.2 LGA Pin Map

	A	B	C	D	E	F	G	H	J	K	L
1		GND	VDD_3V3	UART_TX	UART_CTS	GND	NC	GND	VDD_1V8	GND	PCIE_RX_P
2	GND	GND	VDD_3V3	UART_RX	UART_RTS	GND	GND	GND	VDD_1V8	GND	PCIE_RX_N
3	NC	GND	NC	BT_HOST_WAKE	JTAG_TCK	JTAG_TDI	JTAG_TMS	JTAG_TDO	PCIE_PERS_T	GND	GND
4	GND	GND	NC	GPIO12	GND	GND	GND	GND	PCIE_WAKEUP	GND	PCIE_TX_N
5	GND	GND	NC	GPIO13	GND	GND	GND	GND	PCIE_CLKREQ	GND	PCIE_TX_P
6	GND	GND	NC	GND	GND	GND	GND	GND	NC	GND	GND
7	GND	GND	NC	GND	GND	GND	GND	GND	GPIO1	GND	PCIE_CLK_N
8	ANT_RF2	GND	NC	NC	NC	GND	NC	GPIO15	NC	GND	PCIE_CLK_P
9	GND	GND	GND	WLAN_RESET	NC	GND	GPIO 0	NC	PCM_SYNC	PCM_DOUT	GND
10	ANT_RF1	GND	GND	GND	BT_RESET	VIO	PDn	PCM_CLK	PCM_DIN	GND	GND

2.2 PIN DESCRIPTION

2.2.1 Preliminary Pin List

Pin#	Interface	Pin Name	Pin Description
J3	PCIe	PCIE_PERST	PCIe reset
J4		PCIE_WAKEUP	PCIe wake
J5		PCIE_CLKREQ	PCIe clock request
L8		PCIE_CLK_P	PCIe differential clock-positive
L7		PCIE_CLK_N	PCIe differential clock-negative
L5		PCIE_TX_P	PCIe transmit data-positive
L4		PCIE_TX_N	PCIe transmit data-negative
L1		PCIE_RX_P	PCIe receive data-positive
L2	UART	PCIE_RX_N	PCIe receive data-negative
E1		UART_CTS	UART clear-to-send input
D2		UART_RX	UART receive data

D1		UART_TX	UART transmit data
E2		UART_RTS	UART request-to-send output
H10	PCM	PCM_CLK	PCM clock signal
J9		PCM_SYNC	PCM synchronization signal
K9		PCM_DOUT	PCM data output
J10		PCM_DIN	PCM data input
G10	Control	PDn	Full power-down input
D9		WLAN_RESET	Software reset for WLAN subsystem
E10		BT_RESET	Software reset for Bluetooth subsystem
D3		BT_HOST_WAKE	Bluetooth to wake up host
E3	JTAG	JTAG_TCK	JTAG test clock input
F3		JTAG_TDI	JTAG test data input
H3		JTAG_TDO	JTAG test data output
G3		JTAG_TMS	JTAG test mode select input
A10	RF_ANT	ANT_RF1	RF port of WLAN 5GHz+BT
A8		ANT_RF2	RF port of WLAN 5GHz+WLAN 2.4GHz
G9	GPIO	GPIO0	Reserve for future use
J7		GPIO1	Reserve for future use
D4		GPIO12	Reserve for future use
D5		GPIO13	Reserve for future use
H8		GPIO15	Reserve for future use
C1	Power	VDD_3V3	DC 3.3V voltage in
C2		VDD_3V3	DC 3.3V voltage in
J1		VDD_1V8	DC 1.8V voltage in
J2		VDD_1V8	DC 1.8V voltage in
F10		VIO	I/O voltage supply in
A2		GND	Ground
A4		GND	Ground
A5		GND	Ground
A6		GND	Ground
A7		GND	Ground
A9		GND	Ground
B1		GND	Ground
B2		GND	Ground
B3		GND	Ground
B4		GND	Ground
B5		GND	Ground
B6		GND	Ground
B7		GND	Ground
B8		GND	Ground
B9		GND	Ground
B10		GND	Ground
C9		GND	Ground

C10	GND	Ground
D6	GND	Ground
D7	GND	Ground
D10	GND	Ground
E4	GND	Ground
E5	GND	Ground
E6	GND	Ground
E7	GND	Ground
F1	GND	Ground
F2	GND	Ground
F4	GND	Ground
F5	GND	Ground
F6	GND	Ground
F7	GND	Ground
F8	GND	Ground
F9	GND	Ground
G2	GND	Ground
G4	GND	Ground
G5	GND	Ground
G6	GND	Ground
G7	GND	Ground
H1	GND	Ground
H2	GND	Ground
H4	GND	Ground
H5	GND	Ground
H6	GND	Ground
H7	GND	Ground
K1	GND	Ground
K2	GND	Ground
K3	GND	Ground
K4	GND	Ground
K5	GND	Ground
K6	GND	Ground
K7	GND	Ground
K8	GND	Ground
K10	GND	Ground
L3	GND	Ground
L6	GND	Ground
L9	GND	Ground
L10	GND	Ground

NC pad: A3, C3, C4, C5, C6, C7, C8, D8, E8, E9, G1, G8, H9, J6, J8.

3. ELECTRICAL SPECIFICATIONS

3.1 ABSOLUTE MAXIMUM RATINGS

Parameter	Minimum	Maximum	Unit
Power-supply Voltages			
VDD_33	--	3.63	V
VDD_18	--	1.98	V
I/O Signals			
I/O(1.8V)	--	1.98	V
I/O(3.3V)	--	3.63	V
ESD Protection			
Human Body Mode	-2000	+2000	V
Charge Device Mode	-500	+500	V
Thermal Conditions			
Storage Temperature	-40	105	deg-C
Environmental			
Operating Humidity	0	85	%RH

3.2 RECOMMENDED OPERATING CONDITIONS

Parameter		Minimum	Typical	Maximum	Unit
Power-supply Voltages					
VDD_33		3.14	3.3	3.46	V
VDD_18		1.71	1.8	1.89	V
VIO(3.3V)		3.14	3.3	3.46	V
VIO(1.8V)		1.71	1.8	1.89	V
Thermal Conditions					
T _A	Module level Ambient Operating Temperature	-40	25	85	degree-C
T _J	Chipsets 88Q9098S Maximum Junction Temperature	--	--	125	degree-C

3.3 POWER SEQUENCES

6.2.1 Power-up sequence - Internal PA

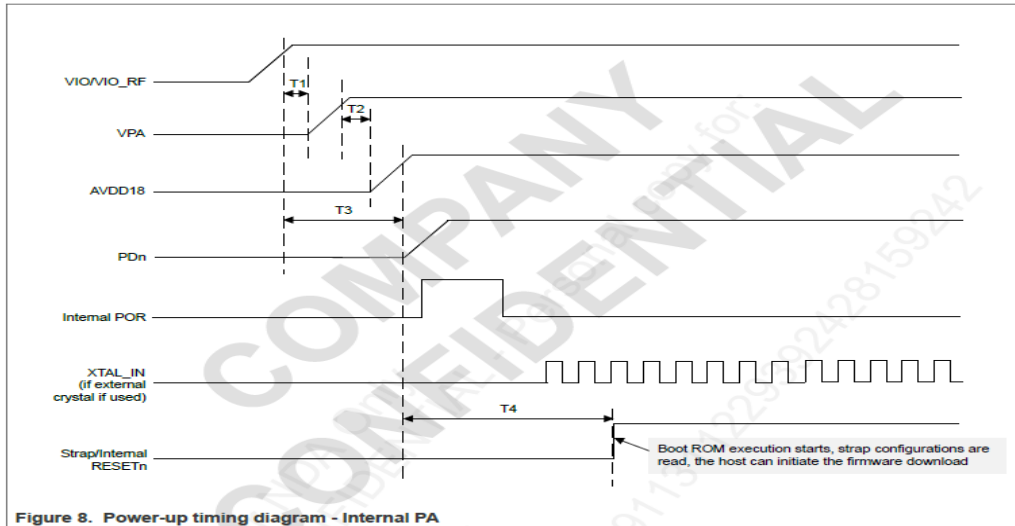


Figure 8. Power-up timing diagram - Internal PA

Table 23. Power-up timing parameters - Internal PA^[1]

Symbol	Description	Min	Typ	Max	Unit
T1	Delay from VIO/VIO_RF high (at least 90%) to start of VPA ramp-up	0	--	--	ms
T2	Delay from VPA high (at least 90%) to start of AVDD18 ramp-up	0	100	--	ms
T3	Delay from VIO/VIO_RF high (at least 90%) to start of PDn ramp-up	0	--	--	ms
T4	Delay from AVDD18 high (90%) to start of Boot ROM	--	10	--	ms

[1] The ramp-up time of VIO/VIO_RF, VPA and AVDD18 must be less than 100 ms.
All supplies must be monotonic.
If using an external crystal oscillator, the reference clock must be stable before PDn ramps up.

6.3 Power-down sequence

6.3.1 Power-down sequence - Internal PA

PDn must be discharged to less than 0.2 V before Power-On Reset (POR) is triggered again.

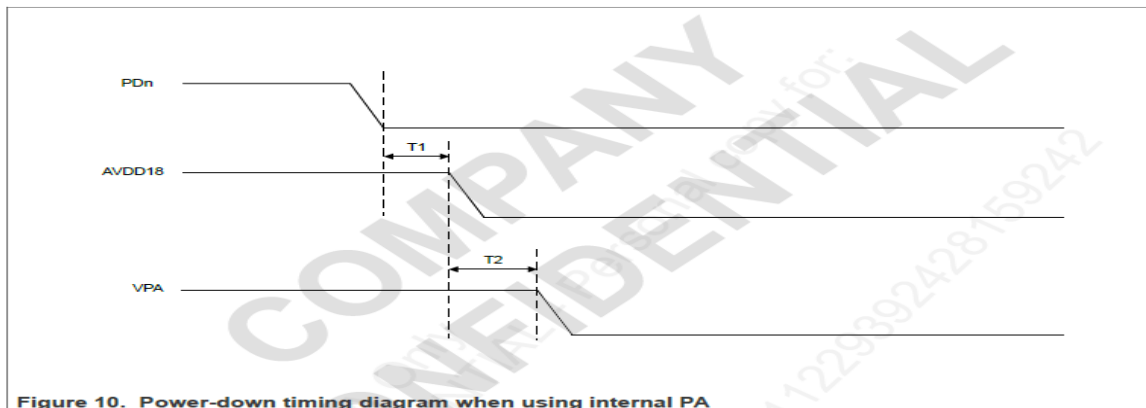


Figure 10. Power-down timing diagram when using internal PA

Table 25. Power-down timing parameters - when using internal PA

Symbol	Description	Min	Typ	Max	Units
T1	Recommended delay from PDn low (less than 0.2V) to start of AVDD18 ramp-down	0	--	--	ms
T2	Recommended delay from start of AVDD18 ramp-down to start of VPA ramp-down	0	--	--	ms

3.4 INTERFACT CHARACTERISTICS

3.4.1 PCIE INTERFACE

PCI Express 2.0 interface (Gen 2, single lane) is the host interface of WLAN and are powered by VDD18 voltage supply.

Pin#	Symbol Name	Power Domain	Description
J3	PCIE_PERST	VIO	PCie host indication to reset the device
J4	PCIE_WAKEUP	VIO	PCie wake signal(active low)
J5	PCIE_CLKREQ	VIO	PCie clock request(active low)
L8	PCIE_CLK_P	VDD18	PCie differential clock-positive
L7	PCIE_CLK_N	VDD18	PCie differential clock-negative
L5	PCIE_TX_P	VDD18	PCie transmit data-positive
L4	PCIE_TX_N	VDD18	PCie transmit data-negative
L1	PCIE_RX_P	VDD18	PCie receive data-positive
L2	PCIE_RX_N	VDD18	PCie receive data-negative

3.4.2 UART INTERFACE

High-speed UART is the host interface of Bluetooth and are powered by VIO voltage supply.

Pin#	Symbol Name	Power Domain	Description
E1	UART_CTS	VIO	UART clear-to-send input(active low)
D2	UART_RX	VIO	UART receive data
D1	UART_TX	VIO	UART transmit data
E2	UART_RTS	VIO	UART request-to-send output(active low)

3.4.3 PCM INTERFACE

PCM interface is for voice application and are powered by VIO voltage supply.

Pin#	Symbol Name	Power Domain	Description
H10	PCM_CLK	VIO	PCM clock signal
J9	PCM_SYNC	VIO	PCM synchronization signal
K9	PCM_DOUT	VIO	PCM data output
J10	PCM_DIN	VIO	PCM data input

3.4.4 JTAG INTERFACE

JTAG interface is for JTAG test and are powered by VIO voltage supply.

Pin#	Symbol Name	Power Domain	Description
E3	JTAG_CLK	VIO	JTAG test clock input
F3	JTAG_TDI	VIO	JTAG test data input
H3	JTAG_TDO	VIO	JTAG test data output
G3	JTAG_TMS	VIO	JTAG test mode select input

3.4.5 CONTROL SIGNALS

Control signals are for host/device wakeup and reset.

Pin#	Symbol Name	Power Domain	Description
G10	PDn	VDD18	Full power-down input(active low)
D9	WLAN_RESET	VIO	Software reset for WLAN subsystem(active high)
E10	BT_RESET	VIO	Software reset for Bluetooth subsystem(active high)
D3	BT_HOS_WAKE	VIO	Bluetooth to wake up host(active low)
G9	GPIO0	VIO	Reserve for future use
J7	GPIO1	VIO	Reserve for future use
D4	GPIO12	VIO	Reserve for future use
D5	GPIO13	VIO	Reserve for future use
H8	GPIO15	VIO	Reserve for future use

3.5 WLAN RF PERFORMANCE

3.5.1 2.4G WLAN RF PERFORMANCE

Note: Unless otherwise stated, all specifications are at 25°C

Parameter	Description	Min.	Typ.	Max.	Unit
Transmit Power	802.11b, 11Mbps	17	19	21	dBm
	802.11n, HT20 MCS7	13	15	17	dBm
	802.11n, HT40 MCS7	13	15	17	dBm
EVM	802.11b, 11Mbps	-44.3	-42.3	-41.4	dB
	802.11g, 54Mbps	-40.2	-38.8	-36.3	dB
	802.11n, HT20 MCS7	-39.7	-37.8	-35.8	dB
	802.11n, HT40 MCS7	-39.2	-37.4	-35.4	dB
Frequency Error	All Data Rate	-4		4	ppm
TX Power Accuracy	All Data Rate	-2		2	dB
Rx Sensitivity	802.11b, 11Mbps		-85		dBm
	802.11g, 54Mbps		-71.5		dBm
	802.11n, HT20 MCS7		-69		dBm
	802.11n, HT40 MCS7		-67		dBm
PCB Trace Loss	Antenna port to RFIC		0.28		dB

3.5.2 5G WLAN RF PERFORMANCE

Note: Unless otherwise stated, all specifications are at 25°C

Parameter	Description	Min.	Typ.	Max.	Unit
Transmit Power	802.11a, 54Mbps	13	15	17	dBm
	802.11n, HT20MCS7	12	14	16	dBm
	802.11n, HT40 MCS7	11	13	15	dBm

	802.11ac, VHT20 MCS8	9	11	13	dBm
	802.11ac, VHT40/80 MCS9	9	11	13	dBm
	802.11ax, HE20/40 MCS11	5	7	9	dBm
	802.11ax, HE80 MCS11	5	7	9	dBm
EVM	802.11a, 54Mbps	-40.1	-36	-31.6	dB
	802.11n, HT20/40 MCS7	-39.5	-36.7	-32.7	dB
	802.11ac, VHT20 MCS8	-40.6	-38.5	-36.6	dB
	802.11ac, VHT40/80 MCS9	-40.2	-37.7	-35.4	dB
	802.11ax, HE20 MCS11	-41	-39.3	-36.4	dB
	802.11ax, HE40 MCS11	-40.8	-39.6	-38.2	dB
	802.11ax, HE80 MCS11	-40.4	-38.7	-36.5	dB
Frequency Error	All Data Rate	-3		3	ppm
TX power accuracy	All Data Rate	-2		2	dB
Rx Sensitivity	802.11a, 54Mbps		-70		dBm
	802.11n, HT20 MCS7		-68		dBm
	802.11n, HT40 MCS7		-65.5		dBm
	802.11ac, VHT20 MCS8		-63		dBm
	802.11ac, VHT40 MCS9		-60		dBm
	802.11ac, VHT80 MCS9		-56.5		dBm
	802.11ax, HE20 MCS11		-57.6		dBm
	802.11ax, HE40 MCS11		-55		dBm
	802.11ax, HE80 MCS11		-53		dBm
PCB trace Loss	Antenna port to RFIC		0.42		dB

3.6 BLUETOOTH RF PERFORMANCE

Note: Unless otherwise stated, all specifications are at 25°C

Parameter	Description	Min.	Typ.	Max.	Unit
Transmit Power	BDR, Class 2	6	8	10	dBm
	EDR, Class 2	4	6	8	dBm
	LE	0	2	4	dBm
ICFT DH1			-20		kHz
TX power accuracy	All Data Rate		0.5		dB
Rx Sensitivity	BDR-DH1		-86.8		dBm
	EDR-3DH5		-82.5		dBm
	BLE-PRBS9		-94.8		dBm

3.7 POWER CONSUMPTION

Mode	Conditions	1.8V(Typ)	3.3V(Typ)	Unit
Power down				
Power down	—	0.028	0.225	mA
Sleep mode				
Ultra Bluetooth LE only in deep sleep mode	—	0.17	0.11	mA
Bluetooth only in deep sleep mode	—	1.2	0.13	mA
Wi-Fi only in deep sleep mode	—	1.21	0.07	mA
Wi-Fi and Bluetooth in deep sleep mode	—	1.3	0.13	mA
Bluetooth LE current consumption[1]				
Ultra Bluetooth LE advertise	Interval = 1.28s	0.24	0.11	mA
Ultra Bluetooth LE scan	Interval = 1.28s Window = 11.25ms	0.38	0.11	mA
Bluetooth LE advertise	Interval = 1.28 s	1.32	0.16	mA
Bluetooth LE scan	Interval = 1.28 s Window = 11.25 ms	1.53	0.16	mA
Bluetooth LE link	Interval=1.28s	1.62	0.16	mA
Bluetooth LE peak transmit	@ 0 dBm, 1 Mbps	49	0.5	mA
Bluetooth LE peak transmit	@ 5 dBm, 1 Mbps	67	0.5	mA
Bluetooth LE peak transmit	@ 10 dBm, 1 Mbps	92	0.5	mA
Bluetooth LE peak receive	1 Mbps	35	0.5	mA
Bluetooth current consumption[1] (0 dBm if not mentioned)				
Bluetooth idle	—	19.5	0.5	mA
Bluetooth SCO HV3 peak Tx	@ 0 dBm	49	0.5	mA
Bluetooth SCO HV3 peak Tx	@ 5 dBm	67	0.5	mA
Bluetooth SCO HV3 peak Tx	@ 10 dBm	92	0.5	mA
Bluetooth SCO HV3 peak Tx	@ max	112	0.5	mA
Bluetooth SCO HV3 peak Rx	—	35	0.5	mA
Bluetooth peak Tx	@ 0 dBm, DH5	49	0.5	mA
Bluetooth peak Tx	@ 5 dBm, DH5	67	0.5	mA
Bluetooth peak Tx	@ 10 dBm, DH5	91	0.5	mA
Bluetooth peak Tx	@ 13 dBm, DH5	111	0.5	mA
Bluetooth peak Rx	DH5	35	0.5	mA
Bluetooth ACL	Data pump, DH1	32	0.5	mA
Bluetooth ACL	Data pump, 2-DH3	40	0.5	mA
Bluetooth ACL	Data pump, 3-DH5	42.7	0.5	mA
Bluetooth ACL link	Master sniff mode interval=1.28s	1.63	0.16	mA
Bluetooth ACL link	Master sniff mode interval = 500 ms	2.22	0.16	mA

Bluetooth page scan	—	1.69	0.16	mA
Bluetooth page and inquiry scan	—	2.02	0.16	mA
IEEE power save mode - 1x1 Rx[2]				
IEEE-PS_2GHz-Legacy (DTIM-1)	Beacon interval : 100 ms 5G basic rate for beacon Tx: 6 Mbps 2G basic rate for beacon Tx: 1 Mbps	4.52	0.05	mA
IEEE-PS_2GHz-Legacy (DTIM-3)		2.65	0.05	mA
IEEE-PS_2GHz-Legacy (DTIM-5)		2.25	0.05	mA
IEEE-PS_2GHz-Legacy (DTIM-10)		2.13	0.05	mA
IEEE-PS_5GHz-Legacy (DTIM-1)		3.39	0.05	mA
IEEE-PS_5GHz-Legacy (DTIM-3)		2.28	0.05	mA
IEEE-PS_5GHz-Legacy (DTIM-5)		2.08	0.05	mA
IEEE-PS_5GHz-Legacy (DTIM-10)		1.95	0.05	mA
2.4 GHz Wi-Fi receive 1x1 Rx[2]				
2.4 GHz, 802.11b, 11 Mbps	—	148	0.4	mA
2.4 GHz, 802.11g, 54 Mbps	—	159	0.4	mA
2.4 GHz, 802.11n, 20 MHz, MCS7	—	181	0.4	mA
2.4 GHz, 802.11n, 40 MHz, MCS7	—	174	0.4	mA
2.4 GHz, 802.11ax, 20 MHz, MCS11	—	255	0.4	mA
2.4 GHz, 802.11ax, 40 MHz, MCS11	—	275	0.4	mA
5 GHz Wi-Fi receive 1x1 Rx[2]				
5 GHz, 802.11a, 54 Mbps	—	262	0.4	mA
5 GHz, 802.11n, 20 MHz, MCS7	—	286	0.4	mA
5 GHz, 802.11n, 40 MHz, MCS7	—	302	0.4	
5 GHz, 802.11ac, 20 MHz, MCS8	—	283	0.4	mA
5 GHz, 802.11ac, 40 MHz MCS9	—	290	0.4	mA
5 GHz, 802.11ac, 80 MHz MCS9,	—	317	0.4	mA
5 GHz, 802.11ax, 20 MHz MCS11	—	287	0.4	mA
5 GHz, 802.11ax, 40 MHz MCS11	—	288	0.4	mA
5 GHz, 802.11ax, 80 MHz, MCS11	—	337	0.4	mA
5 GHz Wi-Fi receive 2x2 Rx[2]				
5 GHz, 802.11a, 54 Mbps	—	297	0.4	mA
5 GHz, 802.11n, 20 MHz, ,MCS15	—	324	0.4	mA
5 GHz, 802.11n, 40 MHz, MCS15	—	320	0.4	mA
5 GHz, 802.11ac, 20 MHz, MCS8	—	325	0.4	mA
5 GHz, 802.11ac, 40 MHz, MCS9	—	347	0.4	mA
5 GHz, 802.11ac, 80 MHz, MCS9	—	430	0.4	mA
5 GHz, 802.11ax, 20 MHz, MCS11	—	323	0.4	mA
5 GHz, 802.11ax, 40 MHz, MCS11	—	336	0.4	mA
5 GHz, 802.11ax, 80 MHz, MCS11	—	436	0.4	mA
2.4 GHz Wi-Fi transmit 1x1 Tx[2] (Tx referred to pin)				
2.4 GHz, 802.11b, 11 Mbps @ 20 dBm	—	216	290	mA

2.4 GHz, 802.11g, 54 Mbps @ 20 dBm	—	233	256	mA
2.4 GHz, 802.11n, 20 MHz, MCS0 @ 20 dBm	—	233	253	mA
2.4 GHz, 802.11n, 20 MHz, MCS7 @ 20 dBm	—	233	253	mA
2.4 GHz, 802.11n, 40 MHz, MCS0 @ 20 dBm	—	238	253	mA
2.4 GHz, 802.11n, 40 MHz, MCS7 @ 20 dBm	—	240	255	mA
2.4 GHz, 802.11ax, 20 MHz, MCS0 @ 20 dBm	—	270	252	mA
2.4 GHz, 802.11ax, 20 MHz, MCS11 @ 20 dBm	—	270	252	mA
2.4 GHz, 802.11ax, 40 MHz, MCS0 @ 20 dBm	—	275	258	mA
2.4 GHz, 802.11ax, 40 MHz, MCS11 @ 20 dBm	—	275	258	mA
5 GHz Wi-Fi transmit 1x1 Tx[2] (Tx referred to pin)				
5 GHz, 802.11a, 6 Mbps @ 19 dBm	—	313	248	mA
5 GHz, 802.11a, 54 Mbps @ 19 dBm	—	312	249	mA
5 GHz, 802.11n, 20 MHz, MCS0 @ 19 dBm	—	322	250	mA
5 GHz, 802.11n, 20 MHz, MCS7 @ 19 dBm	—	323	250	mA
5 GHz, 802.11n, 40 MHz, MCS0 @ 17 dBm	—	323	220	mA
5 GHz, 802.11n, 40 MHz, MCS7 @ 17 dBm	—	325	219	mA
5 GHz, 802.11ac, 20 MHz, MCS0 @ 19 dBm	—	322	248	mA
5 GHz, 802.11ac, 20 MHz, MCS8 @ 19 dBm	—	322	248	mA
5 GHz, 802.11ac, 40 MHz, MCS0 @ 17 dBm	—	322	219	mA
5 GHz, 802.11ac, 40 MHz, MCS9 @ 17 dBm	—	322	218	mA
5 GHz, 802.11ac, 80 MHz, MCS0 @ 15 dBm	—	317	200	mA
5 GHz, 802.11ac, 80 MHz, MCS9 @ 15 dBm	—	310	198	mA
5 GHz, 802.11ax, 20 MHz, MCS0 @ 19 dBm	—	321	254	mA
5 GHz, 802.11ax, 20 MHz, MCS11 @ 19 dBm	—	323	255	mA
5 GHz, 802.11ax, 40 MHz, MCS0 @ 17 dBm	—	312	221	mA
5 GHz, 802.11ax, 40 MHz, MCS11 @ 17 dBm	—	320	221	mA
5 GHz, 802.11ax, 80 MHz, MCS0 @ 15 dBm	—	319	203	mA
5 GHz, 802.11ax, 80 MHz, MCS11 @ 15 dBm	—	313	201	mA
5 GHz Wi-Fi transmit 2x2 Tx[2](Tx referred to pin)				
5 GHz, 802.11a, 6 Mbps @ 19 dBm	—	477	515	mA
5 GHz, 802.11a, 54 Mbps @ 19 dBm	—	471	512	mA
5 GHz, 802.11n, 20 MHz, MCS8 @ 19 dBm	—	485	514	mA
5 GHz, 802.11n, 20 MHz, MCS15 @ 19 dBm	—	497	513	mA
5 GHz, 802.11n, 40 MHz, MCS8 @ 17 dBm	—	497	446	mA
5 GHz, 802.11n, 40 MHz, MCS15 @ 17 dBm	—	480	441	mA
5 GHz, 802.11ac, 20 MHz, MCS0 @ 19 dBm	—	492	513	mA
5 GHz, 802.11ac, 20 MHz, MCS8 @ 19 dBm	—	492	507	mA
5 GHz, 802.11ac, 40 MHz, MCS0 @ 17 dBm	—	498	446	mA
5 GHz, 802.11ac, 40 MHz, MCS9 @ 17 dBm	—	476	436	mA
5 GHz, 802.11ac, 80 MHz, MCS0 @ 15 dBm	—	500	398	mA

5 GHz, 802.11ac, 80 MHz, MCS9 @ 15 dBm	—	484	398	mA
5 GHz, 802.11ax, 20 MHz, MCS0 @ 19 dBm	—	492	518	mA
5 GHz, 802.11ax, 20 MHz, MCS11 @ 19 dBm	—	489	513	mA
5 GHz, 802.11ax, 40 MHz, MCS0 @ 17 dBm,	—	500	455	mA
5 GHz, 802.11ax, 40 MHz, MCS11 @ 17 dBm,	—	472	450	mA
5 GHz, 802.11ax, 80 MHz, MCS0 @ 15 dBm	—	511	415	mA
5 GHz, 802.11ax, 80 MHz, MCS11 @ 15 dBm	—	489	401	mA
Dual-band concurrent mode receive[2]				
Rx 5 GHz 802.11ax, 1x1, 80 MHz, MCS11 2.4 GHz 802.11n, 1x1, 20 MHz, MCS7	—	419	0.4	mA
Rx 5 GHz 802.11ac, 1x1, 40 MHz, MCS9 2.4 GHz 802.11ax, 1x1, 20 MHz, MCS11	—	383	0.4	mA
Rx 5 GHz 802.11ac, 1x1, 80 MHz, MCS9 2.4 GHz 802.11n, 1x1, 40 MHz, MCS7	—	437	0.4	mA
Rx 5 GHz 802.11ac, 1x1, 20 MHz, MCS8 2.4 GHz 802.11n, 1x1, 20 MHz, MCS7	—	366	0.4	mA
Concurrent dual-band transmit[2] (Tx referred to pin)				
Tx 5 GHz 802.11ax, 1x1, 80 MHz, MCS11 @ 15 dBm 2.4 GHz 802.11n, 1x1, 20 MHz, MCS7 @ 20 dBm	—	480	480	mA
Tx 5 GHz 802.11ac, 1x1, 40 MHz, MCS9 @ 17 dBm 2.4 GHz 802.11ax, 1x1, 20 MHz, MCS11 @ 20 dBm	—	481	515	mA
Tx 5 GHz 802.11ac, 1x1, 80 MHz, MCS9 @ 15 dBm 2.4 GHz 802.11n, 1x1, 40 MHz, MCS7 @ 20 dBm	—	478	480	mA
Tx 5 GHz 802.11ac, 1x1, 20 MHz, MCS8 @ 19 dBm 2.4 GHz 802.11n, 1x1, 20 MHz, MCS7 @ 20 dBm	—	489	540	mA

Unless otherwise stated, all specifications are at 25 °C, nominal voltage, and typical value

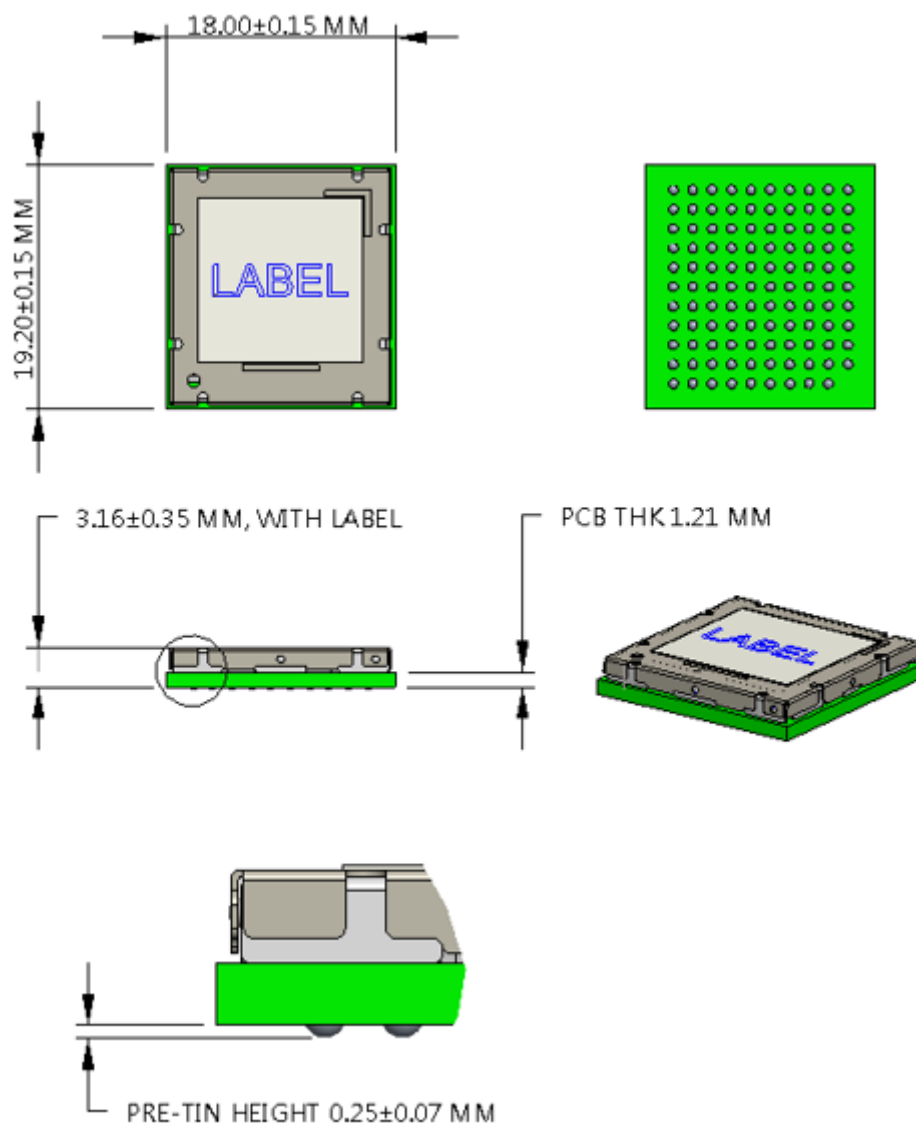
[1] Wi-Fi not enabled

[2] Bluetooth not enabled

4. MECHANICAL INFORMATION

4.1 MODULE PHYSICAL DIMENSIONS

19.2mm(L)x18mm(W)x3.16mm(H)



Co-planarity < 0.1mm

4.2 MODULE MOISTURE-SENSITIVITY LEVEL

This module complies IPC/JEDEC J-STD-020 Standard MSL3

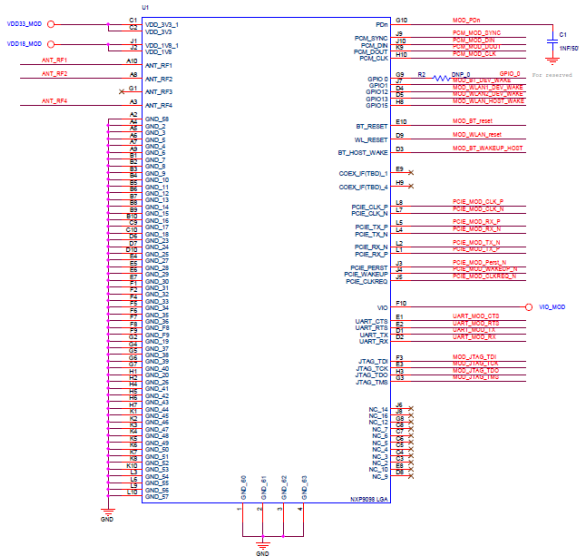
4.3 THERMAL CHARACTERISTICS

When NXP9098S junction temperature reach to 115°C threshold, the SOC will trigger carry out thermal mitigation to terminate 1*TX(keep 2*RX) cool down method.

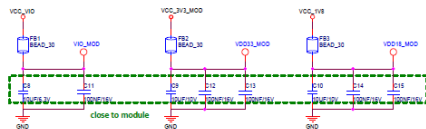
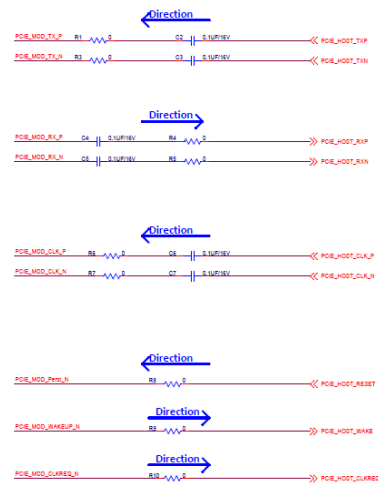
5. APPLICATION NOTE

5.1 Reference Circuit

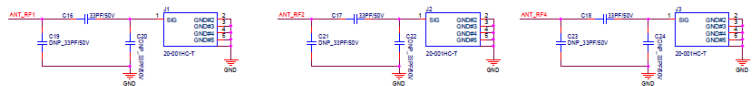
88Q9098 Module



PCIe Interface



RF CONN



5.2 PCIe coupling capacitors

On PCIe data paths, 0.1uF coupling capacitors shall be placed close to transmitting devices.

5.3 PCIe traces routing

The differential pairs of PCIe traces (Tx/Rx/CLK) should be symmetrically routed, and the trace length needs to match.

The differential impedance of PCIe traces (Tx/Rx/CLK) should be 85ohms.

5.4 VIO 1.8V/3.3V option

VIO dominate the voltage level of I/O which the power domain are VIO. It is DC 1.8V/3.3V optional based on the application host I/O voltage level.

5.5 Power decoupling capacitors

The decoupling capacitors of power input shall be placed close the module.

5.5 Antenna

For this device, please use the dipole antenna with 50 ohm impedance, and the max gain must be no more than 2.47dBi, and no less than 1.69dBi.

6. CARRIER, STORAGE & HANDLING

6.1.1 Electrostatic discharge(ESD)

We strongly recommend that developers place ESD suppression components on the interconnection signal traces between the NAD bottom pads and the application board. This is to prevent the NAD from being subjected to ESD events with voltage strength exceeding the requirements defined in the table below.

Specification/Requirements	Contact Discharge
Human Body Model(HBM)	2000 Voltages
Charge Device Model(CDM)	500 Voltages

7. PCB MOUNTING GUIDELINES

7.1 RoHS COMPLIANCE

UWM-XP9098V2 is lead-free and RoHS compliant. WNC defines it is lead-free(or Pb-free) product

7.2 SMT PARAMETER

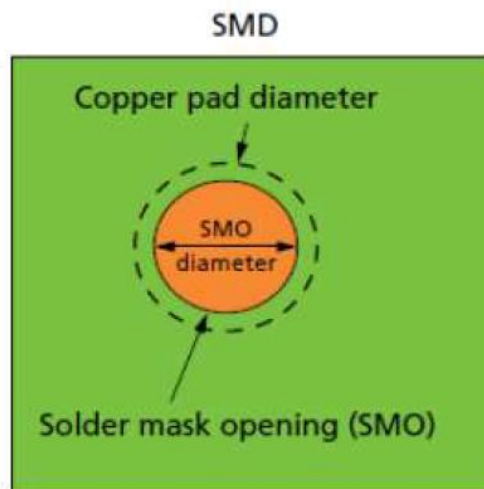
This section describes WNC board-level characterization process parameters. It will help customers on their SMT process development; it is not intended to be a specification for their SMT process.

7.2.1 Land pad and stencil design

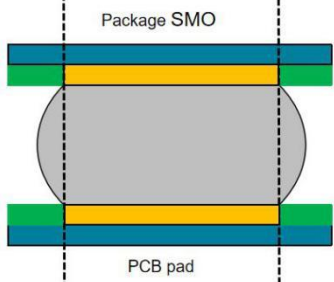
This section shows the details of Land pad parameters:

- Process: pre-TIN (Solder paste: PF606-PW005, vendor: SHENMAO)
- Ball Pitch ψ : 1.524 mm
- Solder mask opening (SMO) :0.762mm
- Ball Diameter: 0.762 mm

Below figure shows the different pad type of Land pad layout. It's recommend to use SMD type (Package SMO: PCB PAD=1:1) for customer's adapter board design.



See Table below for the detail pad design in detail.

Package Pad Type	PCB Pad Type	Recommended Package Interconnect Diameter to PCB ratio	Interconnect Schematic	Package SMO Interconnect Diameter	Recommended PCB Interconnect Diameter
SMD	SMD	1 : 1		0.762mm	0.762mm

It's recommended that the stencil thickness = 0.12mm. Ball PAD: Stencil=1:1.

7.2.2 SMT process verification

WNC recommends verification of the SMT process prior to high volume board assembly, including

- In-line solder paste deposition monitoring
- Reflow temperature profile measurement and verification
- Visual and X-ray inspection after soldering to confirm adequate alignment, solder voids, solder pad shape, and solder bridging
- Cross-section inspection of solder joints for wetting, solder pad shape, and voiding

8. WARNING STATEMENT

Federal Communication Commission Interference 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 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.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Radiation Exposure Statement:

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

This module is intended for OEM integrators only. Per FCC KDB 996369 D03 OEM Manual v01 guidance, the following conditions must be strictly followed when using this certified module:

KDB 996369 D03 OEM Manual v01 rule sections:

2.2 List of applicable FCC rules

This module has been tested for compliance to FCC Part 27, 22, 24, 90

2.3 Summarize the specific operational use conditions

The module is tested for standalone mobile RF exposure use condition. Any other usage conditions such as co-location with other transmitter(s) or being used in a portable condition will need a separate reassessment through a class II permissive change application or new certification.

2.4 Limited module procedures

Not applicable.

2.5 Trace antenna designs

Refer to "Operational Description Antenna trace"

Please contact the module supplier

2.6 RF exposure considerations

This equipment complies with FCC mobile radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator & your body. If the module is installed in a portable host, a separate SAR evaluation is required to confirm compliance with relevant FCC portable RF exposure rules.

2.7 Antennas

The following antennas have been certified for use with this module; antennas of the same type with equal or lower gain may also be used with this module. The antenna must be installed such that 20 cm can be maintained between the antenna and users

Antenna Type	Dipole
Antenna connector	SMA

2.8 Label and compliance information

The final end product must be labeled in a visible area with the following: “Contains FCC ID: NKRUMC-MT2731CBN”. The grantee's FCC ID can be used only when all FCC compliance requirements are met.

2.9 Information on test modes and additional testing requirements

This transmitter is tested in a standalone mobile RF exposure condition and any co-located or simultaneous transmission with other transmitter(s) or portable use will require a separate class II permissive change re-evaluation or new certification.

2.10 Additional testing, Part 15 Subpart B disclaimer

This transmitter module is tested as a subsystem and its certification does not cover the FCC Part 15 Subpart B (unintentional radiator) rule requirement applicable to the final host. The final host will still need to be reassessed for compliance to this portion of rule requirements if applicable.

As long as all conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

IMPORTANT NOTE:

In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

Manual Information To the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as show in this manual.

OEM/Host manufacturer responsibilities

OEM/Host manufacturers are ultimately responsible for the compliance of the Host and Module. The final product must be reassessed against all the essential requirements of the FCC rule such as FCC Part 15 Subpart B before it can be placed on the US market. This includes reassessing the transmitter module for compliance with the Radio and EMF essential requirements of the FCC rules. This module must not be incorporated into any other device or system without retesting for compliance as multi-radio and combined equipment

Industry Canada statement:

This device complies with ISED's licence-exempt RSSs. 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.

Le présent appareil est conforme aux CNR d'ISED applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) le dispositif ne doit pas produire de brouillage préjudiciable, et (2) ce dispositif doit accepter tout brouillage reçu, y compris un brouillage susceptible de provoquer un fonctionnement indésirable.

Radiation Exposure Statement

This equipment complies with ISED radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with greater than 20cm between the radiator & your body.

Déclaration d'exposition aux radiations:

Cet équipement est conforme aux limites d'exposition aux rayonnements ISED établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé à plus de 20 cm entre le radiateur et votre corps.

This device is intended only for OEM integrators under the following conditions

- 1) The antenna must be installed and operated with greater than 20 cm between the antenna and users

2) The transmitter module may not be co-located with any other transmitter or antenna.
3) Module approval valid only when the module is installed in the tested host or compatible series of host which have similar RF exposure characteristic with equal or larger antenna separation distance.
As long as 3 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

Cet appareil est conçu uniquement pour les intégrateurs OEM dans les conditions suivantes:

- 1) L'antenne doit être installée et exploitée avec plus de 20 cm entre l'antenne et les utilisateurs
- 2) Le module émetteur peut ne pas être co-implanté avec un autre émetteur ou antenne.
- 3) Approbation du Module valable que lorsque le module est installé dans l'hôte testé ou de la série de l'hôte compatible qui ont même caractéristique de l'exposition aux RF avec la distance égale ou supérieure séparation antenne.

Tant que les 3 conditions ci-dessus sont remplies, des essais supplémentaires sur l'émetteur ne seront pas nécessaires. Toutefois, l'intégrateur OEM est toujours responsable des essais sur son produit final pour toutes exigences de conformité supplémentaires requis pour ce module installé

IMPORTANT NOTE

In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the Canada authorization is no longer considered valid and the IC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate Canada authorization.

NOTE IMPORTANTE

Dans le cas où ces conditions ne peuvent être satisfaites (par exemple pour certaines configurations d'ordinateur portable ou de certaines co-localisation avec un autre émetteur), l'autorisation du Canada n'est plus considérée comme valide et l'ID IC ne peut pas être utilisé sur le produit final. Dans ces circonstances, l'intégrateur OEM sera chargé de réévaluer le produit final (y compris l'émetteur) et l'obtention d'une autorisation distincte au Canada.

End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed and operated with greater than 20cm between the antenna and users. The final end product must be labeled in a visible area with the following: "Contains IC: 4441A-MT2731CBN".

Plaque signalétique du produit final

Ce module émetteur est autorisé uniquement pour une utilisation dans un appareil où l'antenne peut être installée et utilisée à plus de 20 cm entre l'antenne et les utilisateurs. Le produit final doit être étiqueté dans un endroit visible avec l'inscription suivante: "Contient des IC: 4441A-MT2731CBN".

Manual Information To the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.

Manuel d'information à l'utilisateur final

L'intégrateur OEM doit être conscient de ne pas fournir des informations à l'utilisateur final quant à la façon d'installer ou de supprimer ce module RF dans le manuel de l'utilisateur du produit final qui intègre ce module. Le manuel de l'utilisateur final doit inclure toutes les informations réglementaires requises et avertissements comme indiqué dans ce manuel

DETACHABLE ANTENNA USAGE

This radio transmitter [IC: 4441A-MT2731CBN] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Le présent émetteur radio [IC: 4441A-MT2731CBN] a été approuvé par Innovation, Sciences et Développement économique Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué pour tout type figurant sur la liste, sont strictement interdits pour l'exploitation de l'émetteur.

Manufacturer	Model	Antenna Type	MaxGain (dBi)	Impedance (Ω)
WNC	SMA	Dipole	2.47	50

EU Statement:

This device meets the EU requirements (2014/53/EU) on the limitation of exposure of the general public to electromagnetic fields by way of health protection.

This equipment should be installed and operated with minimum distance 20 cm between the radiator and your body.

Declaration of Conformity

Hereby, Wistron NeWeb Corporation declares that the radio equipment type cellular module is in compliance with Directive 2014/53/EU.

The frequency and maximum transmitted power in EU are listed as follows,

2400 --- 2500 MHz: 16.9dBm

4900 --- 5925 MHz: 14.25dBm

CE Mark Warning



AT	BE	BG	CH	CY	CZ
DE	DK	EE	EL	ES	FI
FR	HR	HU	IE	IS	IT
LI	LT	LU	LV	MT	NL
NO	PL	PT	RO	SE	SI
SK	TR				

EU Declaration of Conformity (DoC)

Hereby we,

Name of manufacturer: Wistron NeWeb Corporation
Address: 20 Park Ave. II, Hsinchu Science Park
Zip code & City: Hsinchu 308
Country: Taiwan
Telephone number: +886 3-666-7799

declare that this DoC is issued under our sole responsibility and that this product:

Product description: BT&WIFI module
Type designation(s): UWM-XP9098V2
Trademark: WNC
Batch / Serial number: UWM-XP9098V2

Object of the declaration (further identification of the radio equipment allowing traceability; it may include a color image for the identification of the radio equipment):

.....[Insert identification information or photo].....

is in conformity with the relevant Union harmonization legislation:

Radio Equipment directive: 2014 / 53 / EU

with reference to the following standards applied:

EN IEC 62311:2020
EN 62368-1:2014+A11:2017
EN301489-1 V2.2.3 , EN301489-52 V1.2.1
EN 55032: 2015 + A11: 2020, Class B
EN 55035: 2017+A11:2020
EN301908-1 V15.1.1, EN301908-2 V13.1.1, EN301511 V12.5.1

The Notified Body Telefication B.V., with Notified Body number 0560 performed:

[choose applicable Modules: B+C or H]

Where applicable:

The issued EU-type examination certificate: [note certificate number]

Description of accessories and components, including software, which allow the radio equipment to operate as intended and covered by the DoC: