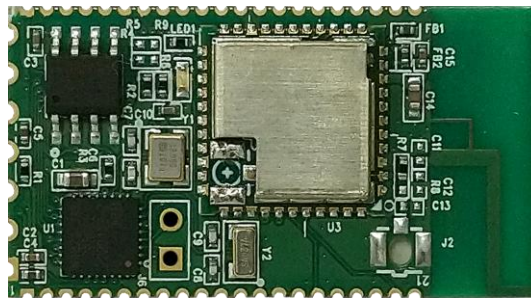


ITM-2262-Azure



IEEE 802.11b/g/n 1T1R WLAN + BLE 5.0
Ultra-Low Power Module Datasheet

(Preliminary)

V0.1

Revision History

Date	Revision Content	Revised By	Version
2022/08/23	Preliminary released	Eagle Chen	0.1
	-		
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1. General Description

The ITM-2262-Azure is a highly integrated wireless module with 2.4GHz band 1T1R 11b/g/n Wi-Fi, Bluetooth Low Energy 5.0, and MCU. A single chip MCU SoC targets for applications requiring optimal RF performance, strong security, low power consumption, and small form-factor with minimal external components. Equipped with a proven SDK, ITM-2262-Azure provides customers a fast time to market solution by leveraging existing software eco system, and still keeps possibilities for product differentiation.

ITM-2262-Azure features an application processor subsystem based on Andes D10F 32-bit RISC floating point core which runs at 320MHz. It includes 384KB embedded SRAM, which is peripheral addressable. Dedicated 16KB instruction cache and 16KB data cache provides great performance for the execute-in-Place (XIP) in NOR Flash.

ITM-2262-Azure has a built-in hardware crypto engine, a True Random Number Generator (TRNG), and a 2304b e-fuse block for storing chip-specific information. This combining with high efficiency security middleware library, including secure boot and Wi-Fi WPA3, the ITM-2262-Azure builds strong secure system products for smart home applications.

ITM-2262-Azure integrates the Balun, T/R switch, LNA, PA with advanced architecture enhancement to achieve great receive sensitivity even in noisy home scenarios. Besides, ITM-2262-Azure has very low power consumption: average 210uA at DTIM3; 33mA for receiving, and 212mA for transmission.

ITM-2262-Azure can connect to Azure through the configured WIFI. Commands are given to ITM-2262-Azure from the remote end through Azure, so that ITM-2262-Azure can use Bluetooth to control other machines to achieve a wider range of applications. For example: the remote end uses the mobile phone app send a command to let the ITM-2262-Azure at home use the Bluetooth control to open the door lock.

ITM-2262-Azure serves an easy integration to existing product with Brickcom SDK that would accomplish a goal that time to market. ITM-2262-Azure is an Azure- Ready solution for developers without spending months to learn/ understand/ certified Azure.

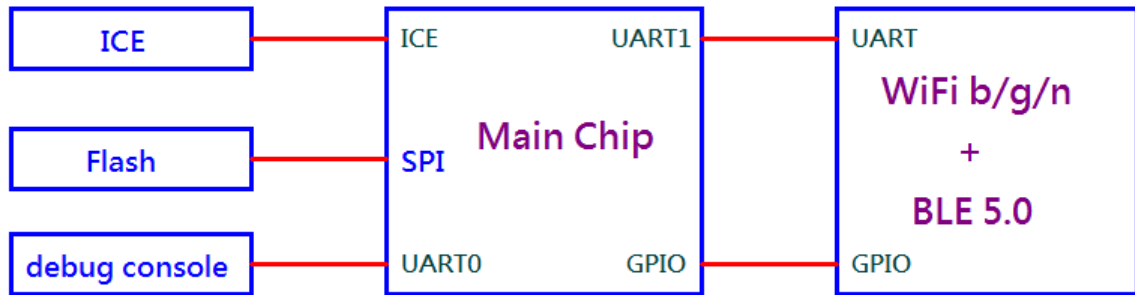
2. Features

- Main Chipset: Nuvoton M482ZIDAE
- System
 - Arm® Cortex®-M4F core, running up to 192 MHz
 - Built-in Memory Protection Unit (MPU)
 - Built-in Nested Vectored Interrupt Controller (NVIC)
 - Hardware IEEE 754 compliant Floating-point Unit (FPU)
 - DSP extension with hardware divider and single-cycle 32-bit hardware multiplier
 - 24-bit system tick timer
 - Programmable and maskable interrupt
 - Low Power Sleep mode by WFI and WFE instructions
 - Dual bank 512 KB on-chip Application ROM (APROM) for Over-The-Air (OTA) upgrade. (M48xID/M48xGA)
 - Up to 160 KB on-chip SRAM includes:
 - 32 KB SRAM located in bank 0 that supports hardware parity check and retention mode; Exception (NMI) generated upon a parity check error
 - 96/32 KB SRAM located in bank 1
 - 32 KB SRAM located in bank 2 that can be used as cache for external SPI Flash memory
 - Supports CRC-CCITT, CRC-8, CRC-16 and CRC-32 polynomials
 - ECC/AES/DES/3DES/SHA/HMAC hardware acceleration
- WIFI Features:
 - IEEE 802.11 b/g/n 1T1R
 - IEEE 802.11 d/e/i/k/r/w supported
 - Support 20/40MHz up to MCS7 150Mbps
 - 802.11n features supported
 - A-MPDU Tx & Rx for high MAC throughput
 - Support immediate Block-Ack
 - STA, Soft AP and Sniffer modes supported

- Concurrent STA + AP supported
- Ad-hoc, peer-to-peer and Wi-Fi Direct modes supported
- Low power Tx/Rx for short range scenario
- Low power beacon listen mode
- Low power dormant mode
- WFA features
 - WEP/WPA/WPA2/WPA3
 - WMM
- Short Guard Interval for 802.11n optimal performance
- Greenfield mode for 802.11n optimal performance
- STBC in RX mode
- Enhanced and robust sensitivity for wider coverage range

- BLUETOOTH Features
 - Bluetooth 5.0 Low Energy
 - Integrated Balun and PA
 - High power mode: up to 10 dBm
 - Rx sensitivity: -94 dBm
 - Channel assessment for AFH
 - Internal co-existence scheme between Wi-Fi and Bluetooth
 - Concurrently slave/advertiser/scanner operations supported
 - Master mode supported
 - SIG Mesh v1.01 supported
 - GATT and Mesh profile
 - Data channel long packet supported
 - Device Provision Protocol (DPP) with BLE 5.0 Extended Advertising supported

The block diagram of ITM-2262-Azure module is depicted in the figure below.



3. General Specification

Operating temperature	-20°C to 70°C
Storage temperature	-40°C to 85°C

3.1 Voltages

3.1.1 Absolute Maximum Ratings

Symbol	Description	Min.	Max.	Unit
VBAT	Input supply Voltage	-0.3	3.6	V

3.1.2 Recommended Operating Ratings

Test conditions: At room temperature				
Symbol	Min.	Typ.	Max.	Unit
VBAT	3.0	3.3	3.6	V

Note: The voltage of VDDIO is depended on system I/O voltage.

Test conditions: At operating temperature -20°C ~70°C				
Symbol	Min.	Typ.	Max.	Unit
VBAT	3.0	3.3	3.6	V

3.2 Wi-Fi RF Specification (RX)

Parameters	Conditions	Min.	Typ.	Max.	Unit
Frequency Range		2412		2484	MHz
RX Sensitivity 11b @ 8% PER	- 1Mbps		-95		dBm
	- 2Mbps		-93		dBm
	- 5.5Mbps		-91		dBm
	- 11Mbps		-88		dBm
RX Sensitivity 11g @ 10% PER	- 6Mbps		-91		dBm
	- 9Mbps		-90		dBm
	- 12Mbps		-88		dBm
	- 18Mbps		-86		dBm
	- 24Mbps		-82		dBm
	- 36Mbps		-79		dBm
	- 48Mbps		-74		dBm
	- 54Mbps		-73		dBm
Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0		-91		dBm
	- MCS=1		-88		dBm
	- MCS=2		-86		dBm
	- MCS=3		-81		dBm
	- MCS=4		-79		dBm
	- MCS=5		-74		dBm
	- MCS=6		-73		dBm
	- MCS=7		-72		dBm
Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0		-89		dBm
	- MCS=1		-85		dBm
	- MCS=2		-83		dBm
	- MCS=3		-78		dBm
	- MCS=4		-76		dBm
	- MCS=5		-71		dBm
	- MCS=6		-70		dBm
	- MCS=7		-69		dBm
Maximum Receive Level	- 802.11b		-10		dBm
	- 802.11g		-8		dBm
	- 802.11n		-8		dBm

3.3 Wi-Fi RF Specification (TX)

Parameters	Conditions	Min.	Typ.	Max.	Unit
Frequency Range		2412		2484	MHz
Output Power	802.11b		18.0		dBm
	802.11g		14.0		dBm
	802.11n		14.0		dBm
@EVM	802.11b		-30	-10	dB
	802.11g		-30	-25	dB
	802.11n		-30	-28	dB

3.4 BLE RF Specification (RX)

Parameters	Conditions	Min.	Typ.	Max.	Unit
Frequency Range		2402		2480	MHz
RX Sensitivity			-91		dBm
Maximum Input Level		-	-	-	dBm

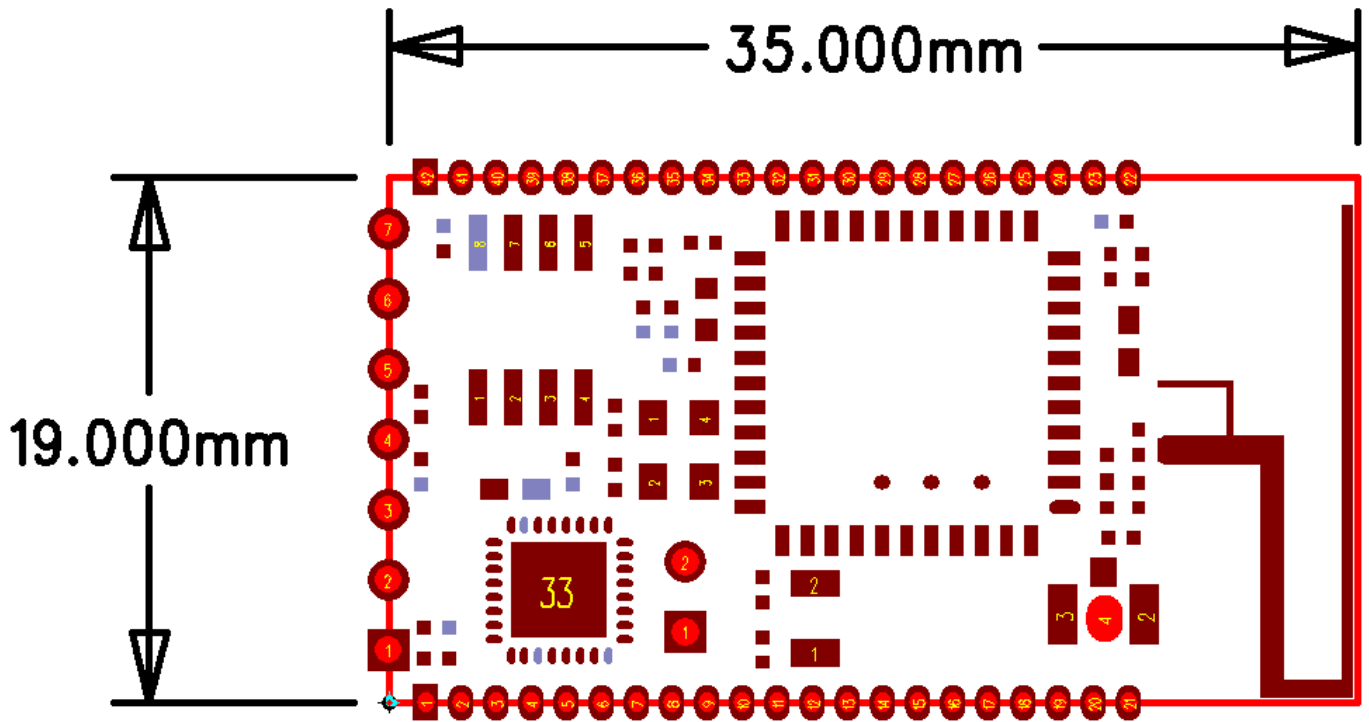
3.5 BLE RF Specification (TX)

Parameters	Conditions	Min.	Typ.	Max.	Unit
Frequency Range		2402		2480	MHz
Maximum Output Power		-2	5	8	dBm
WLAN Operational Modes		Typ. ^c		Unit	
OFF ^a		1.5		uA	
Rx, CCK, 1 Mbps ^e		33		mA	
Rx, OFDM, 54 Mbps ^e		33		mA	
Rx, HT20, MCS7 ^e		33		mA	
Rx, HT40, MCS7 ^e		33		mA	
Tx, CCK, 1 Mbps@19dBm ^d		212		mA	
Tx, OFDM, 54 Mbps@15dBm ^d		182		mA	
Tx, HT20, MCS7@15dBm ^d		183		mA	
Tx, HT40, MCS7@15dBm ^d		183		mA	
Power-saving(MCU_off) ^b , DTIM1		0.43		mA	
Power-saving(MCU_off) ^b , DTIM3		0.21		mA	
Power-saving(MCU_off) ^b , DTIM3 with SV32WB0xL		0.150		mA	

4. Pin Assignments

4.1 PCB Pin Outline (19X35mm)

< TOP VIEW >



4.2 Pin Definition

NO	Name	Type	Description
1	nRESET	I	Reset, active low
2	PB.12	I/O	Multi-function PB.12
3	GND	G	Ground connections
4	PA.2	—	Multi-function PA.2
5	NC	—	Should not be connected
6	NC	—	Should not be connected
7	VDD	P	Main power voltage source input
8	GPIO22	I/O	Multi-function IO22
9	GPIO21	I/O	Multi-function IO21
10	GPIO18	I/O	Multi-function IO18
11	GPIO17	I/O	Multi-function IO17
12	GPIO20	I/O	Multi-function IO20
13	GPIO19	I/O	Multi-function IO19
14	GND	G	Ground connections
15	NC	—	Should not be connected
16	GPIO36	I/O	Multi-function IO36
17	NC	—	Should not be connected
18	NC	—	Should not be connected
19	NC	—	Should not be connected
20	GPIO29	I/O	Multi-function IO29
21	NC	—	Should not be connected
22	NC	—	Should not be connected
23	NC	—	Should not be connected
24	NC	—	Should not be connected
25	NC	—	Should not be connected
26	PC.1	—	Multi-function PC.1
27	PC.0	—	Multi-function PC.0
28	VDD	P	Main power voltage source input
29	NC	—	Should not be connected
30	PF.3	I/O	Multi-function PF.3
31	PF.2	I/O	Multi-function PF.2
32	NC	—	Should not be connected
33	NC	—	Should not be connected
34	UART0_RX	I	UART communication - receive
35	UART0_TX	O	UART communication - transmission

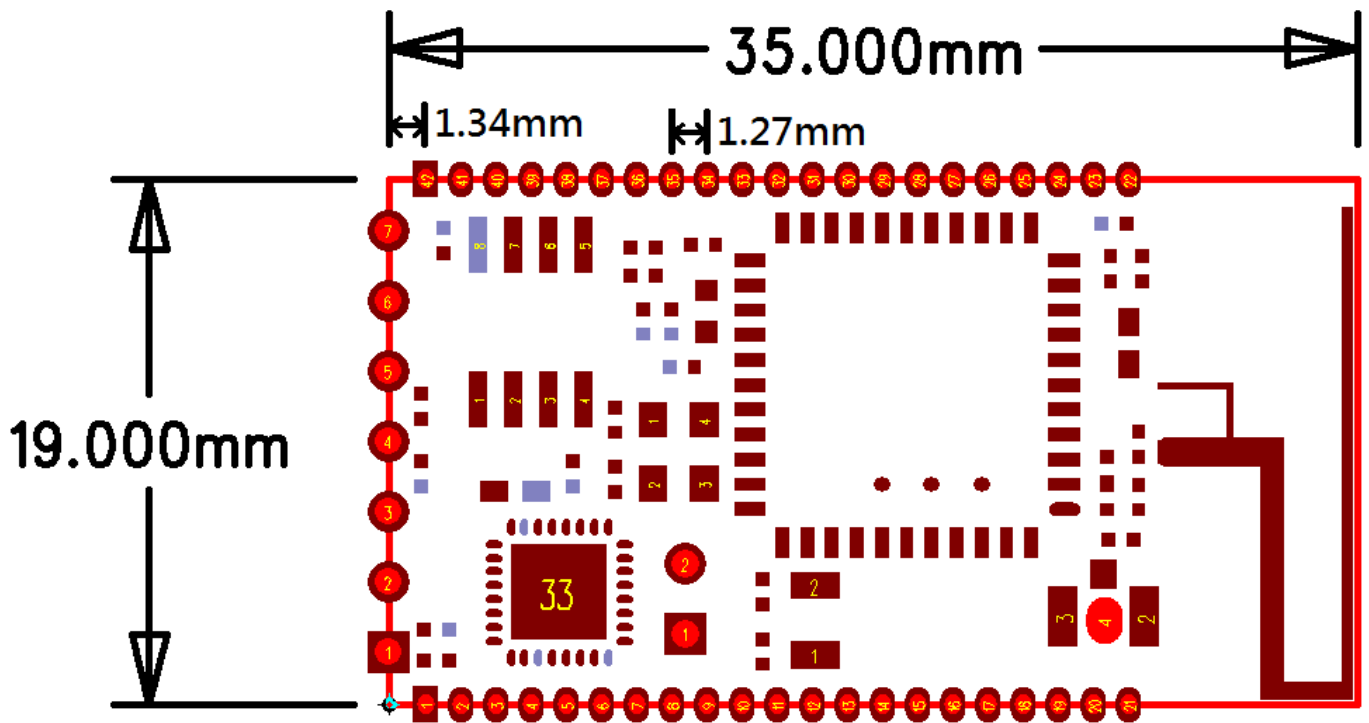
36	NC	—	Should not be connected
37	NC	—	Should not be connected
38	VDD	P	Main power voltage source input
39	VDD	P	Main power voltage source input
40	VDD	P	Main power voltage source input
41	PB.15	—	Multi-function PB.15
42	PB.14	—	Multi-function PB.14

5. Dimensions

5.1 Layout Recommendation

(Unit: mm)

< TOP VIEW >



6. Host Interface Timing Diagram

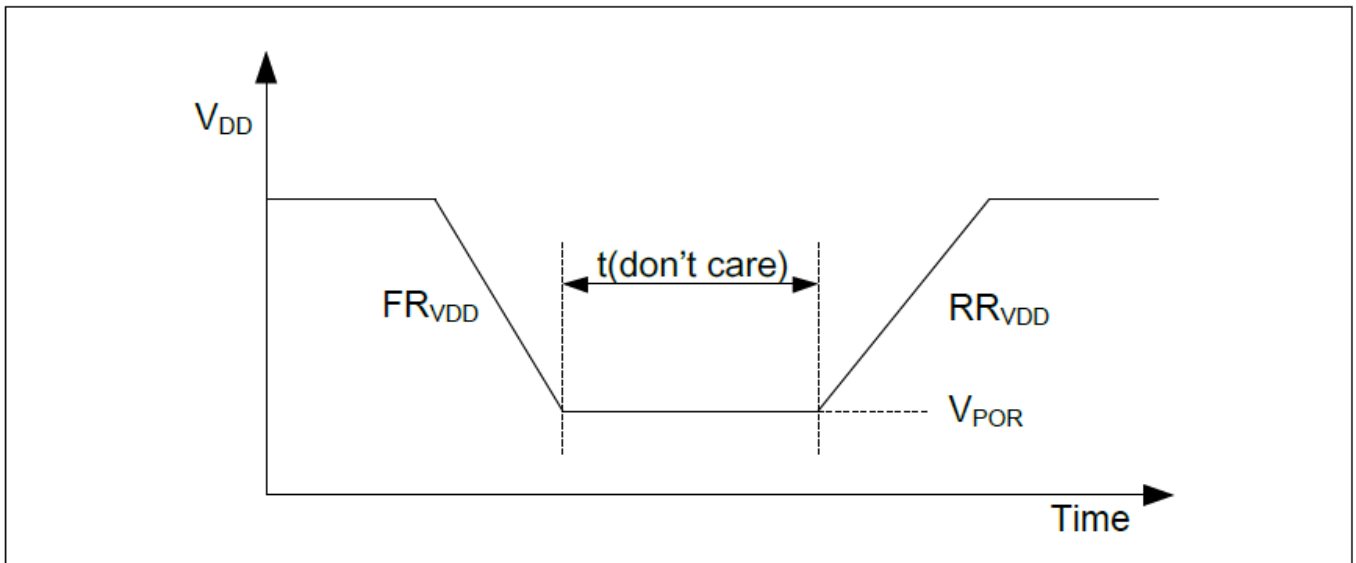
6.1 Reset Timing

Power-on Reset

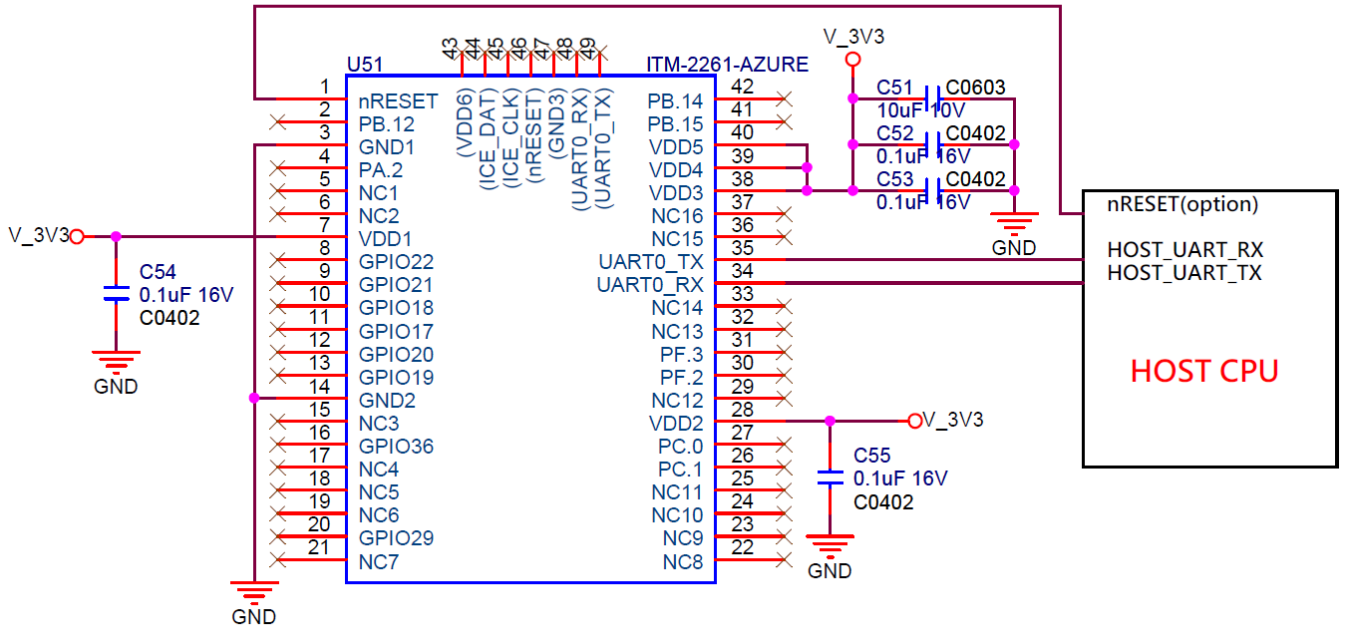
Symbol	Parameter	Min	Typ	Max	Unit	Test Condition
T_A	Temperature	-40	-	+105	°C	-
V_{POR}	Reset Voltage		1.47		V	-
RR_{VDD}	V_{DD} Raising Rate to Ensure Power-on Reset[*1]	10			us/V	
FR_{VDD}	V_{DD} Falling Rate to Ensure Power-on Reset[*1]	320			us/V	

Note:

- Guaranteed by characterization, not tested in production



7. Reference Design



8. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature: <250°C

Number of Times: ≤2 times

