



a module solution provider

WG6611-00

WG6611-01


Series WLAN Module

Multi-Peripherals Interface

802.11b/g/n solution

Datasheet

Draft 0.8

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1. HISTORY CHANGE

Revision	Date	Description
D0.1	2016-01-13	Initial Document creation.
D0.2	2016-02-26	Verify Current Consumption
D0.3	2016-03-08	Verify Application Reference Circuit
D0.4	2016-03-17	Modify Functional Specification remove Certification
D0.5	2016-06-21	<ol style="list-style-type: none"> 1. Modify Functional Specification increased IPEX Connector 2. Cover modify Series Specifications 3. Modify Module Block Diagram
D0.6	2016-09-20	<ol style="list-style-type: none"> 1. Modify Application Reference Circuit 2. Modify pin Description 3. Modify Module Block Diagram
D0.7	2016-10-13	<ol style="list-style-type: none"> 1. Remove SDIO Interface 2. Add package marking
D0.8	2017-06-29	<ol style="list-style-type: none"> 1. Remove NFC function 2. Modify schematic pin define

2. GENERAL DESCRIPTION

WG6611-00 is a single chip wireless Internet-of-Things module. The advance Realtek RTL8711AM is a highly integrated single-chip low power 802.11n Wireless LAN (WLAN) network controller. It combines an ARM-Cortex M3 MCU, WLAN MAC, a 1T1R capable WLAN baseband, and RF in a single chip. It also provides a bunch of configurable GPIOs which are configured as digital peripherals for different applications and control usage.

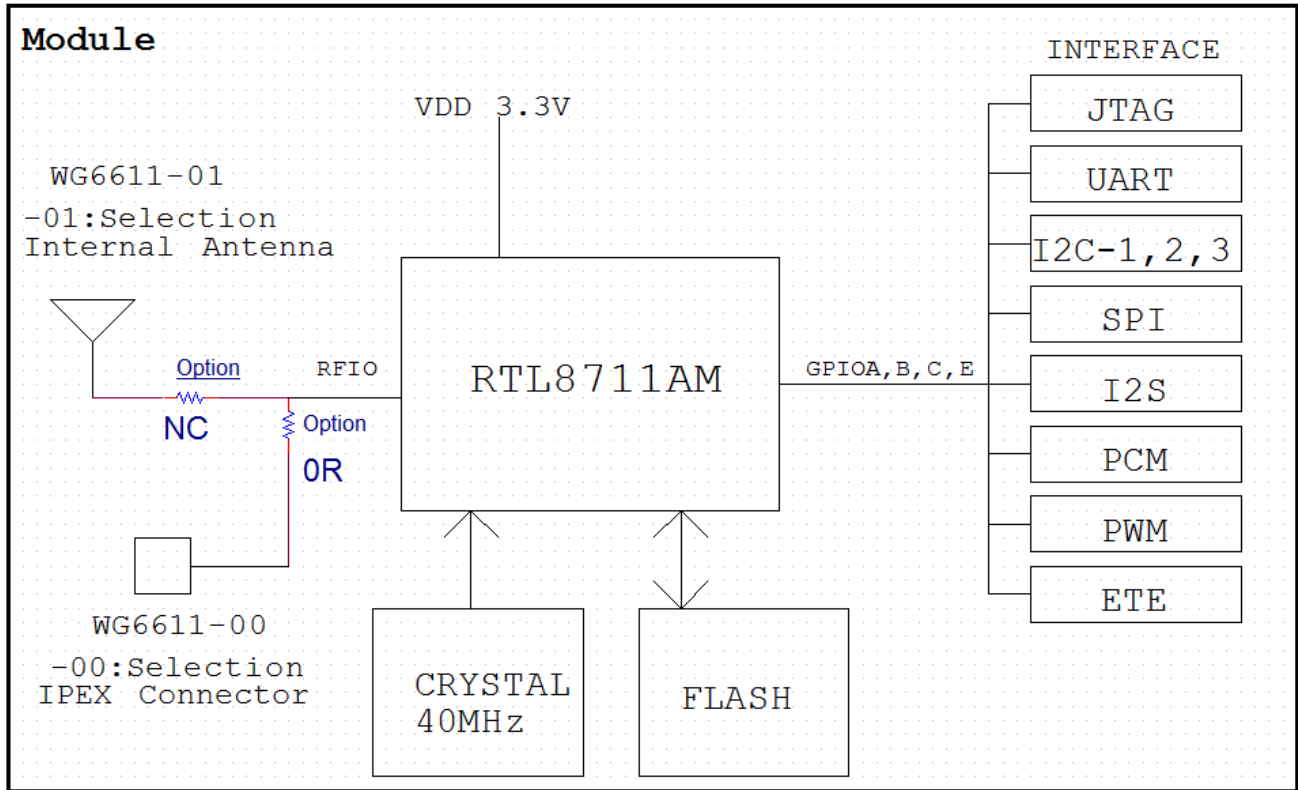
RTL8711AM integrates internal memories for complete WIFI protocol functions. The embedded memory configuration also provides simple application developments.

FEATURES INTRODUCTION

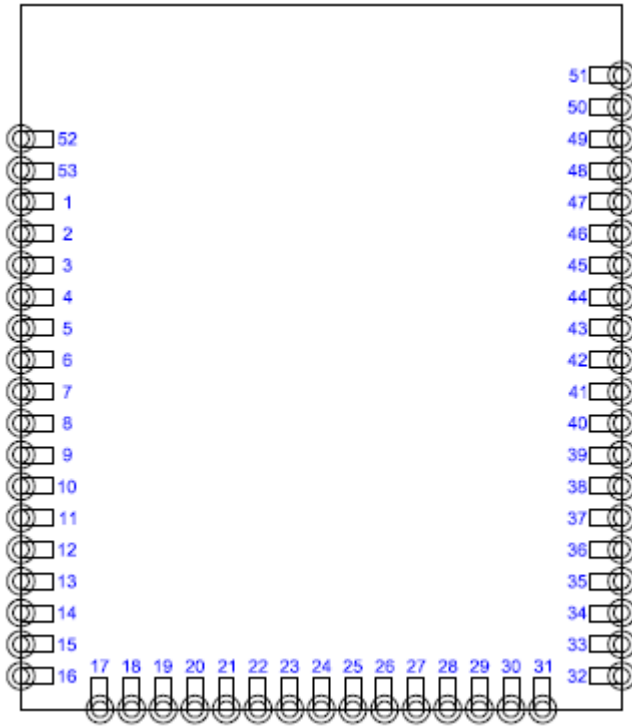
- Dimension, L x W x H = 22.25 mm x 19mm x2.3mm (Deviation +/-0.1mm)
- Support IEEE 802.11 b/g/n Standard
- One Transmit and one Receive path (1T1R)
- Frequency range: 2.412GHz – 2.484GHz
- ARM® Cortex®-M3 Core
- CPU Clock: 166MHz
- Memory capacity: 512kB of ROM
- 1MB of Flash
- 448kB of SRAM
- Operating Voltage: DC 3.3V
- Other interface: UART, JTAG, I2S, I2C, SPI, ETE(External Timer Trigger Event),PCM,PWM
- RoHS Compliant
- Module is for Client mode & Address point & Router
- Default is for RF IPEX Connector
- Antenna Type(1T1R) Gain(dBi): 3.58
- Crystal: 40MHz

3. FUNCTIONAL FEATURES

3.1. Module Block Diagram



3.2. Pin Assignment (Top view)



3.3. Pin Description

Pin#	Name	Description	Type
1	GND	Ground	G
2	GND	Ground	G
3	NC	Not Connected is not used	N
4	NC	Not Connected is not used	N
5	NC	Not Connected is not used	N
6	NC	Not Connected is not used	N
7	VDDIO(1.8~3.3V)	GPIOE, GPIOC, GPIOA, GPIOB group IO power	P
8	NC	Not Connected is not used	N
9	SWCLK/GPIOE_4	Clock into the core	I/O
10	SWDIO/GPIOE_3	SWD data in/out	I/O
11	GPIOE_2/PWM2	GPIO Pin, PWM(multiplexing)	I/O
12	GPIOE_1/I2C2_SDA/PWM1	GPIO Pin, PWM, I2C(multiplexing)	I/O
13	GPIOE_0/I2C2_SCL	GPIO Pin, I2C(multiplexing)	I/O
14	NC	Not Connected is not used	N
15	ADC_CH2	ADC_CH2,AD converter input	I
16	NC	Not Connected is not used	N
17	GND	Ground	G
18	CHIP_EN	1: Enable Chip 0: Disable chip in shutdown mode	I
19	NC	Not Connected is not used	N
20	NC	Not Connected is not used	N
21	NC	Not Connected is not used	N
22	GPIOA_3/UART0_RTS	GPIO Pin, UART(multiplexing)	I/O
23	NC	Not Connected is not used	N
24	GPIOA_5/UART0_CTS	GPIO Pin, UART(multiplexing)	I/O
25	GPIOA_7/UART0_TXD	GPIO Pin, UART(multiplexing)	I/O
26	GPIOA_6/UART0_RXD	GPIO Pin, UART(multiplexing)	I/O
27	GND	Ground	G
28	NC	Not Connected is not used	N
29	NC	Not Connected is not used	N
30	GND	Ground	G
31	NC	Not Connected is not used	N
32	NC	Not Connected is not used	N

33	GND	Ground	G
34	VD33	3.3V Power Supply	P
35	GND	Ground	G
36	GPIOC_3/SPI0_MISO/I2S1_MCK	GPIO Pin, SPI, I2S(multiplexing)	I/O
37	GPIOC_2/SPI0_MOSI/I2S1_SD_TX	GPIO Pin, SPI, I2S(multiplexing)	I/O
38	GPIOC_1/SPI0_CLK/I2S1_CLK	GPIO Pin, SPI, I2S(multiplexing)	I/O
39	GPIOC_0/PWM0/I2S1_WS	GPIO Pin, PWM, I2S(multiplexing)	I/O
40	GPIOC_4/SPI0_CS1/I2S1_SD_RX	GPIO Pin, SPI, I2S(multiplexing)	I/O
41	GPIOC_5	GPIO Pin	I/O
42	GPIOB_3/I2C3_SDA	GPIO Pin, I2C(multiplexing)	I/O
43	GPIOB_2/I2C3_SCL/NORMAL_MODE_SEL	GPIO Pin, /I2C(multiplexing), Shared with GPIOB_2 1:Normal operation 0:Enter into test/debug mode	I/O
44	UART_RXD/GPIOB_1	UART_LOG_IN(Debug)	I/O
45	UART_TXD/GPIOB_0/BOOT_SCENARIO	UART_LOG_OUT(Debug), Shared with GPIOB_0 0:booting from flash 1:booting from internal memory	I/O
46	NC	Not Connected is not used	N
47	NC	Not Connected is not used	N
48	GND	Ground	G
49	NC	Not Connected is not used	N
50	NC	Not Connected is not used	N
51	GND	Ground	G
52	GND	Ground	G
53	NC	Not Connected is not used	N

4. FUNCTIONAL SPECIFICATION

Main Chipset	Realtek RTL8711AM
Wireless standard	IEEE 802.11 b/g /n
Frequency	2.4~2.483GHz ISM Band
Transmit Speed	802.11b: 11,5.5,2,1 Mbps
	802.11g: 54,48,36,24,18,12,9,6 Mbps
	802.11n: up to 150Mbps

Wireless Security	WPAK2-AES(802.11i(WPA,WP2))
	OPEN,shared key,and pair-wise key authentication services
Channel	Channel 1~14
Modulation	802.11b(DSSS): CCK(11, 5.5Mbps), DQPSK(2Mbps), DBPSK(1Mbps);
	802.11g(OFDM): BPSK(9,6Mbps), QPSK(18,12Mbps), 16QAM(36,24Mbps), 64QAM(54,48Mbps);
	802.11n(OFDM): BPSK, QPSK, 16QAM, 64QAM(150Mbps)
Sensitivity	150Mbps: Typical - 64dBm @ 10% PER
	54Mbps: Typical - 65dBm @ 10% PER
	11Mbps: Typical - 76dBm @ 8% PER
TX Power	11Mbps: 802.11b 17±2dBm
	54Mbps:802.11g 14±2dBm
	150Mbps:802.11n 13±2dBm
EVM	11Mbps: 802.11b EVM ≤ 8%
	54Mbps:802.11g EVM ≤ -28dB
	150Mbps:802.11n EVM ≤ -30dB
Antenna	RF path selection feature
	-00 : IPEX Connector
	-01 : Internal Antenna
Network Architecture	AP Mode (Default)
	Client Mode
I/O Voltage Level	Please refer to Table 1 and Table 2 below
I/O Interface	UART x2 (Maximum 2 high speed UART interface with baud rate up to 4Mbps)
	I2C x3 (Three speeds: Standard mode(0 to 100 Kb/s) Fast mode(<400Kb/s) High-speed mode(<3.4Mb/s)(with appropriate bus loading)
	I2S x1 (Support 8/16/24/32/48/96KHz,44.1/88.2KHz)
	SPI x2 (Support Master/Slave mode(SPI0 only),and Slave only(SPI1 and SPI2);

	Support DMA to offload CPU bandwidth. 1 very high speed SPI with baud rate up to 41 MHz. 1 high speed SPI with baud rate up to 10MHz).
	PWM x4 (PWM with configurable duration and duty cycle from 0 ~ 100%)
	GPIO x19
	PCM x2 (Master clock output:64,128,256,or 512kHz)
	ETE x1
Dimensions	22.25 x 19 x 2.3mm

Table1-Typeical Digital IO DC Parameters(3.3V Case)

Symbol	Parameter	Min	Typ.	Max	Units
VIH	Input-High-Voltage	2.0			V
VIL	Input-Low-Voltage			0.8	V
VOH	Output-High-Voltage	2.4			V
VOL	Output-Low-Voltage			0.4	V

Table2-Typeical Digital IO DC Parameters(1.8V Case)

Symbol	Parameter	Min	Typ.	Max	Units
VIH	Input-High-Voltage	0.65xV _{CC}			V
VIL	Input-Low-Voltage			0.35xV _{CC}	V
VOH	Output-High-Voltage	V _{CC} -0.45			V
VOL	Output-Low-Voltage			0.45	V

4.1. Temperature Limit Ratings

Parameter	Min.	Max.	Units
Storage Temperature	-40	+80	°C
Operating Temperature	0	+70	°C

4.2. DC POWER SUPPLY

Symbol	Parameter	Min	Typ.	Max	Units
VDD	3.3V Supply Voltage	3.0	3.3	3.6	V
VDIO	Digital IO Supply Voltage	1.62	1.8~3.3	3.6	V

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4.3. Current Consumption

State	Current(3.3V)	Description
Deep Sleep	5.5uA	Low Power Timer and GPIO Evnet Wakeup
Deep Standby	25uA	Low Power Timer and GPIO Evnet Wakeup
Sleep	0.5mA	Associated with AP but no traffic
Associated Idle (DTIM=1)	3.3mA	Associated with AP and no traffic
Associated Idle (DTIM=2)	2.41mA	Associated with AP and no traffic
Associated Idle (DTIM=3)	1.985mA	Associated with AP and no traffic
Run in Active clock	25mA	CPU clock 166MHz, UART/SPI/I2C available WiFi is disable
11n RX Mode	62mA	CPU clock 166MHz, UART/SPI/I2C available WiFi is in 11n Rx
11n TX Throughput @ 13dBm	162mA	CPU clock 166MHz, UART/SPI/I2C available WiFi is in 11n Tx transmitting data(throughput) WiFi is in 11n Rx

Mode	Condition	Typical Current at 3.3V
Active:	TX at 11 Mbps	343mA
	TX at 54 Mbps	282mA
	TX at HT20-MCS7	267mA
	TX at HT40-MCS7	262mA
	RX at 11Mbps	68mA
	RX at 54Mbps	74mA
	RX at HT20-MCS7	74mA
	RX at HT40-MCS7	74mA

4.4. WLAN 2.4-GHz RF Performance

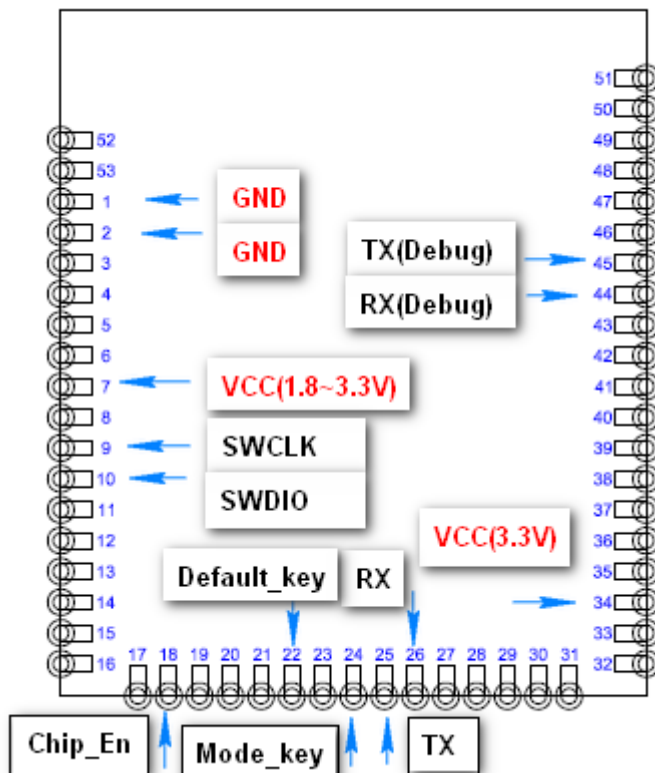
2.4G WLAN Transmitter					
Characteristics	Condition	Min	Typ.	Max	Unit
11b Output Power	11M CCK		17		dBm
	1M DSSS		17		
11g Output Power	54M OFDM		14		
	6M OFDM		16		
11n Output Power	MCS7		13		
	MCS0		15		

2.4G WLAN Receiver					
Characteristics	Condition	Min	Tyd	Max	Unit
11b Rx Sensitivity	11M CCK		-76		dBm
	1M DSSS		-83		
11g Rx Sensitivity	54M OFDM		-65		
	6M OFDM		-82		
11n Rx Sensitivity	MCS7		-64		
	MCS0		-82		

Note: IPEX Connector Test RF Performance Measurement

4.5. Pin Function Table

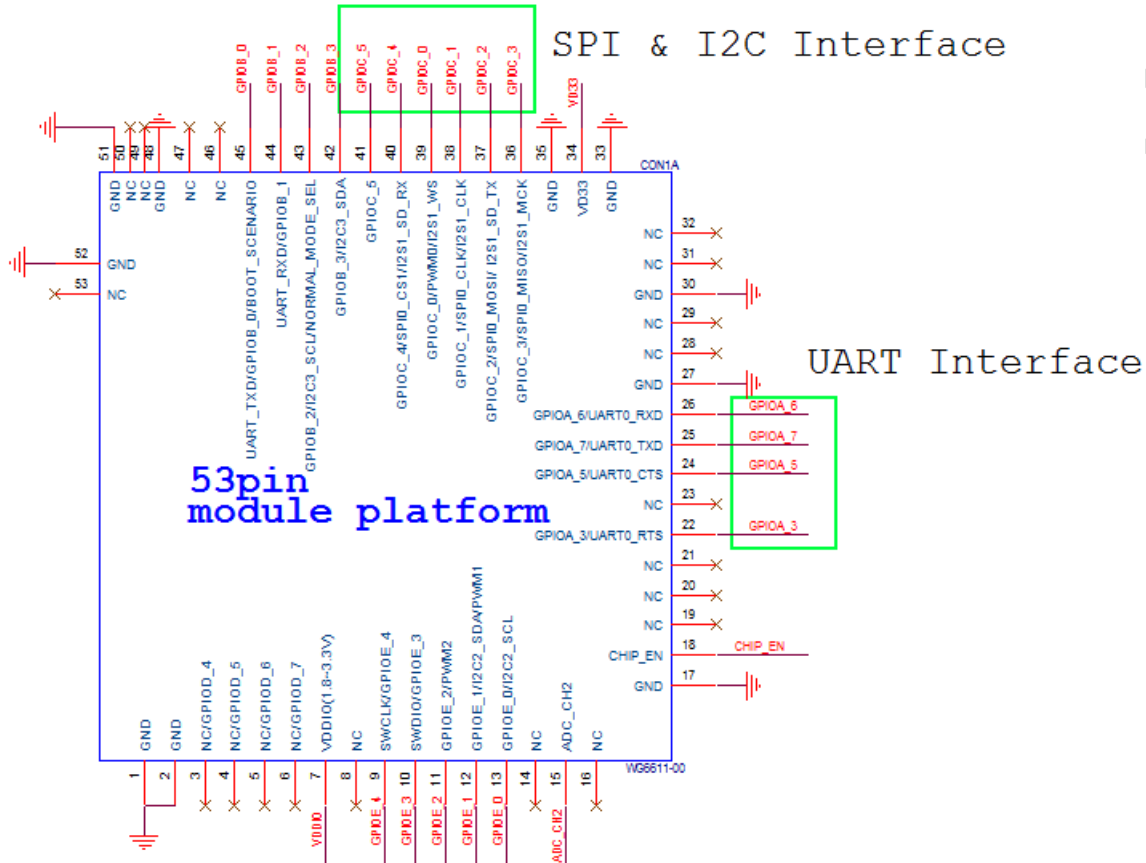
PIN name	JTAG	UART Function	I2C Group	SPI Group	I2S Group	PCM Group	WL_LED0	PWM0 Group	ETE Group	WKDT	GPIO INT
GPIOA_3		UART0_RTS									Default_key
GPIOA_5		UART0_CTS								WKDT0	Mode_key
GPIOA_6		UART0_IN									GPIO
GPIOA_7		UART0_OUT/ UART2_OUT									
GPIOB_0		UART0_LOG_OUT							ETE0		
GPIOB_1		UART_LOG_IN					WL_LED0		ETE1		
GPIOB_2			I2C3_SCL						ETE2		
GPIOB_3			I2C3_SDA						ETE3		GPIO INT
GPIOC_0		UART0_IN		SPI0_CS0	I2S1_WS	PCM1_SYNC		PWM0	ETE0		
GPIOC_1		UART0_CTS	I2C	SPI0_CLK	I2S1_CLK	PCM1_CLK		PWM1	ETE1		GPIO INT
GPIOC_2		UART0_RTS		SPI0_MOSI	I2S1_SD_TX	PCM1_OUT		PWM2	ETE2		
GPIOC_3		UART0_OUT		SPI0_MISO	I2S1_MCK	PCM1_IN		PWM3	ETE3		GPIO INT
GPIOC_4	JTAG		I2C1_SDA	SPI0_CS1	I2S1_SD_RX						GPIO INT
GPIOC_5			I2C1_SCL	SPI0_CS2	I2S0_SD_RX			PWM			GPIO INT
GPIOE_0	JTAG_TRST	UART0_OUT	I2C2_SCL	SPI0_CS0	I2S0_WS	PCM0_SYNC		PWM0			
GPIOE_1	JTAG_TDI	UART0_RTS	I2C2_SDA	SPI0_CLK	I2S0_CLK	PCM0_CLK		PWM1			GPIO INT
GPIOE_2	JTAG_TDO	UART0_CTS	I2C3_SCL	SPI0_MOSI	I2S0_SD_TX	PCM0_OUT		PWM2			GPIO INT
GPIOE_3	JTAG_TMS	UART0_IN	I2C3_SDA	SPI0_MISO	I2S0_MCK	PCM0_IN		PWM3		WKDT3	GPIO INT
GPIOE_4	JTAG_CLK		I2C3_SCL	SPI0_CS1	I2S1_WS						



5. REFERENCE SCHEMATIC

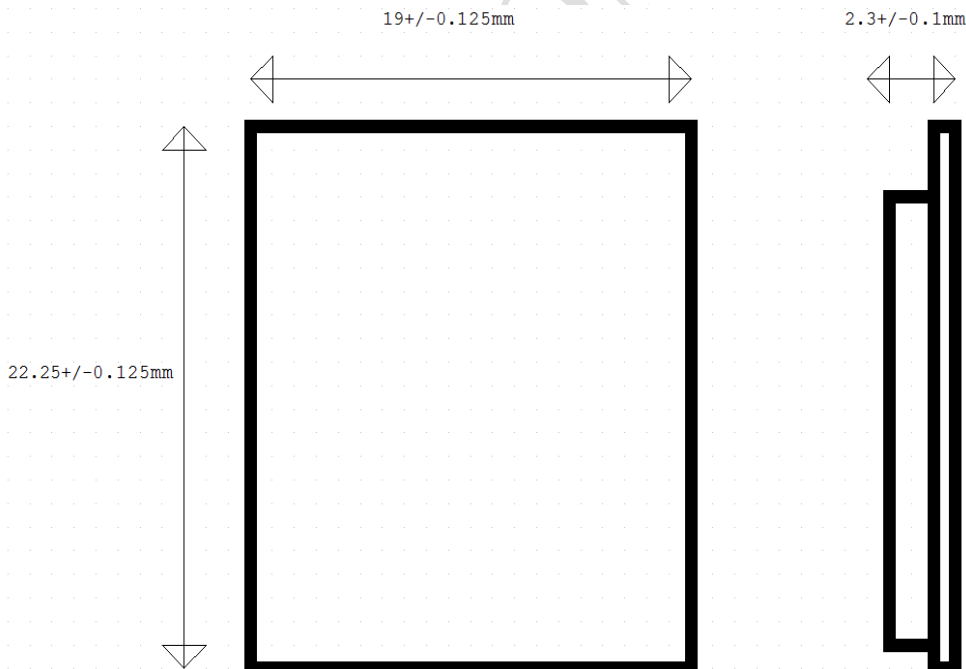
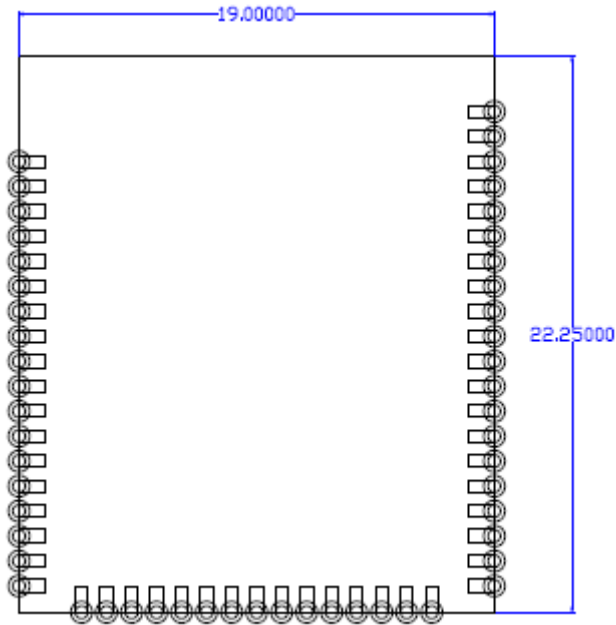
5.1. Application Reference Circuit

External circuit design

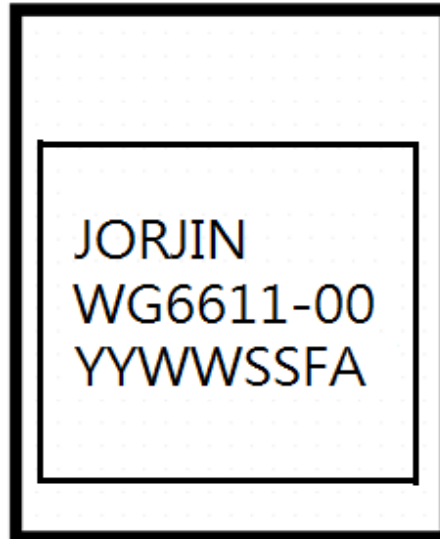


6. PACKAGE INFORMATION

6.1. Module mechanical outline



6.2. Package Marking



Data Code: **YYWWSSFA**

YY = Digit of the year, ex: 2012=12

WW = Week (01~52)

SS = Serial number from 01~98 match to MFG's lot number or 99 to repair control code

F = Reverse for internal use

A = Module version from A to Z

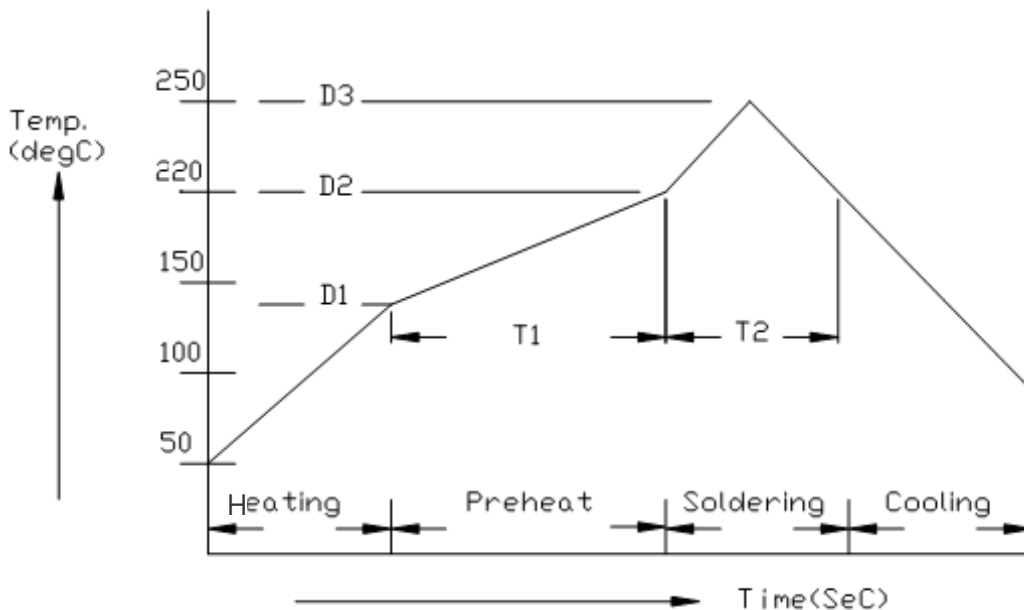
7. SMT AND BAKING RECOMMENDATION

7.1. Baking Recommendation

- **Baking condition :**
 - Follow MSL Level 4 to do baking process.
 - After bag is opened, devices that will be subjected to reflow solder or other high temperature process must be
 - a) Mounted within 72 hours of factory conditions <30°C/60% RH, or
 - b) Stored at <10% RH.
 - Devices require bake, before mounting, if Humidity Indicator Card reads >10%
- If baking is required, Devices may be baked for 8 hrs at 125 °C.**

7.2. SMT Recommendation

- **Recommended Reflow profile :**



No.	Item	Temperature (°C)	Time (sec)
1	Pre-heat	D1: 140 ~ D2: 200	T1: 80 ~ 120
2	Soldering	D2: = 220	T2: 60 ± 10
3	Peak-Temp.	D3: 250 °C max	

Note: (1) Reflow soldering is recommended two times maximum.

(1) Add Nitrogen while Reflow process : SMT solder ability will be better.

- **Stencil thickness** : 0.1~ 0.15 mm (Recommended)
- **Soldering paste (without Pb)** : Recommended SENJU N705-GRN3360-K2-V can get better soldering effects.

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FCC Statement

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 or more 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 Radiation Exposure Statement

This device complies with FCC radiation exposure limits set forth for an uncontrolled environment and it also complies with Part 15 of the FCC RF Rules. This equipment must be installed and operated in accordance with provided instructions and the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. End-users and installers must be provided with antenna installation instructions and consider removing the no-collocation 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.

Caution!

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

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

- 1) The antenna must be installed such that 20cm is maintained between the antenna and users, and
- 2) The transmitter module may not be co-located with any other transmitter or antenna,
- 3) For all products market in US, OEM has to limit the operation channels in CH1 to CH11 for 2.4Gband by supplied firmware programming tool. OEM shall not supply any tool or info to the end-user regarding to Regulatory Domain change.

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.

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.

End Product Labelling

The final end product must be labelled in a visible area with the following:

“Contains FCC ID:WS2-WG6611.

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.