



a module solution provider

WG6611-E0

WG6611-E1

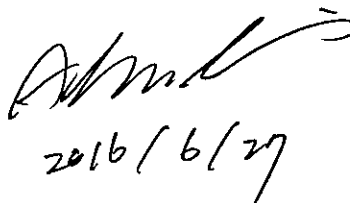
Series WLAN Module

Multi-Peripherals Interface

802.11b/g/n solution

Datasheet

Draft 0.2

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Index

1. HISTORY CHANGE	2
2. GENERAL DESCRIPTION	3
3. FUNCTIONAL FEATURES	4
3.1. MODULE BLOCK DIAGRAM	4
3.2. PIN ASSIGNMENT (TOP VIEW)	5
3.3. PIN DESCRIPTION	6
4. FUNCTIONAL SPECIFICATION	8
4.1. TEMPERATURE LIMIT RATINGS	10
4.2. DC POWER SUPPLY	10
4.3. CURRENT CONSUMPTION	10
4.4. WLAN 2.4-GHZ RF PERFORMANCE	11
4.5. PIN FUNCTION TABLE	12
5. PACKAGE INFORMATION	13
5.1. RECOMMEND LAYOUT INFORMATION	13
5.2. MODULE MECHANICAL OUTLINE	14
5.3. APPLICATION REFERENCE CIRCUIT	15
6. SMT AND BAKING RECOMMENDATION	16
6.1. BAKING RECOMMENDATION	16
6.2. SMT RECOMMENDATION	16

1. HISTORY CHANGE

Revision	Date	Description
D0.1	2016-04-22	Initial Document creation.
D0.2	2016-06-21	Modify Functional Specification increased IPEX Connector Note: IPEX Connector Test RF Performance Measurement Cover modify Series Specifications Modify Module Block Diagram

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2. GENERAL DESCRIPTION

WG6611-E0 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.

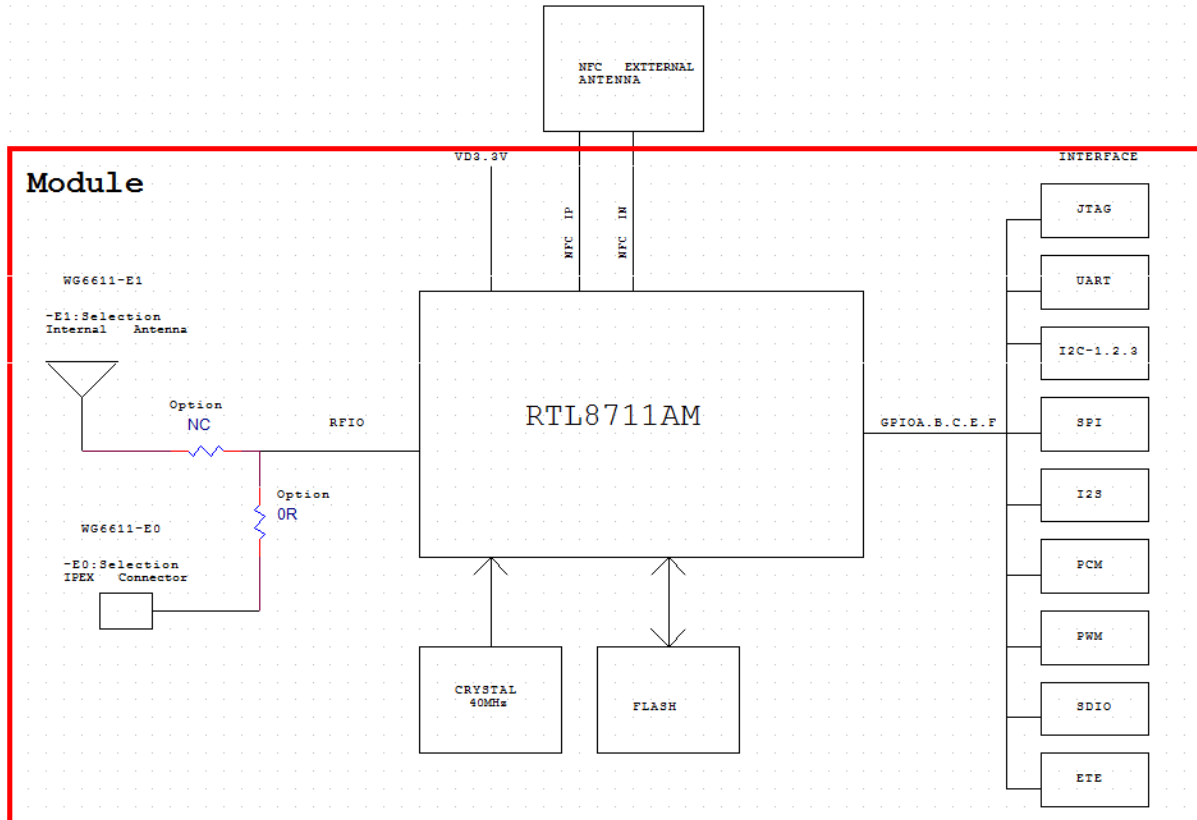
RTL8711AM contain Near Field Communication NFC is a short-range high frequency wireless communication technology, allowing contactless data transmission between electronic devices point to ten centimeters (3.9 inches) to exchange information

FEATURES INTRODUCTION

- Dimension, L x W x H = 22.25 mm x 19mm x2.3mm (Deviation +/-0.05mm)
- 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, SDIO,ETE(External Timer Trigger Event),PCM,PWM
- RoHS Compliant
- Module is for Client mode & Address point & Router
- Default is for RF IPEX Connector
- This IC has a built-in NFC Tag Modem and need external NFC antenna

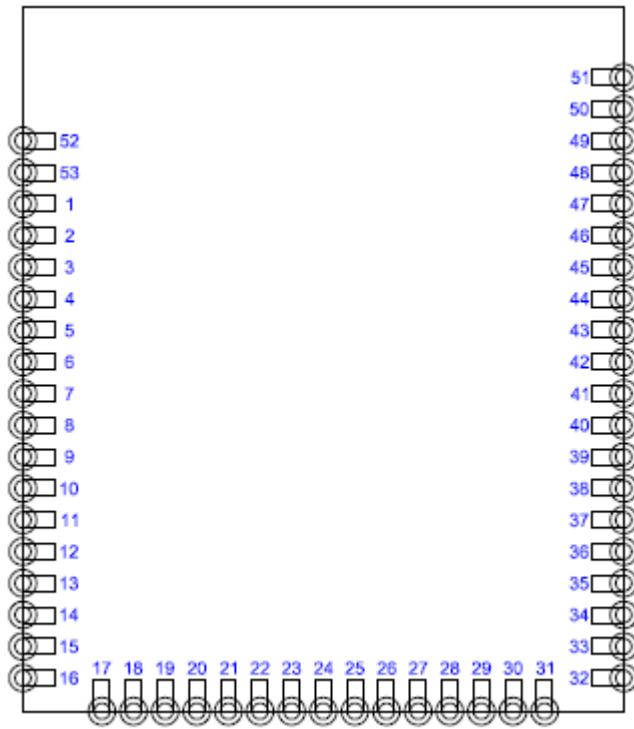
3. FUNCTIONAL FEATURES

3.1. Module Block Diagram



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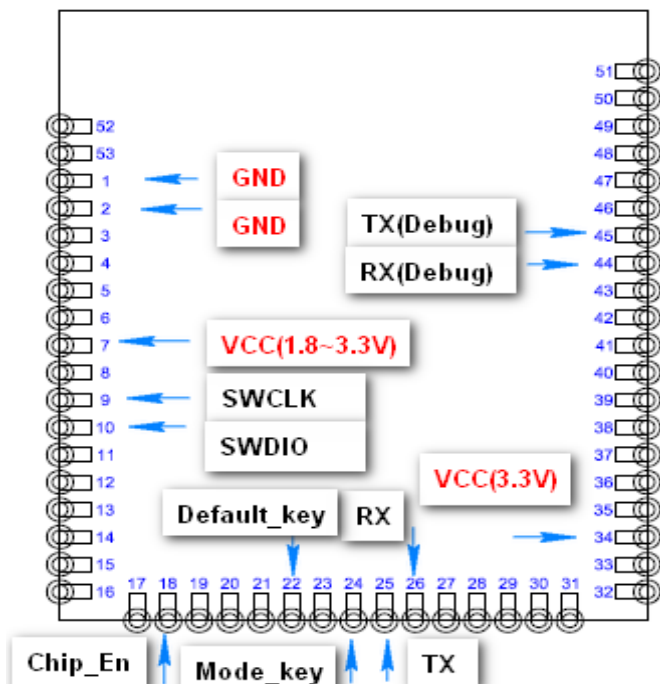
3.2. Pin Assignment (Top view)



3.3. Pin Description

Pin#	Name	Description	Type
1	GND	Ground	G
2	GND	Ground	G
3	NC	Not Connected	N
4	NC	Not Connected	N
5	NC	Not Connected	N
6	NC	Not Connected	N
7	VDDIO_1.8~3.3V	GPIOE, GPIOC, GPIOA, GPIOB group IO power	P
8	NC	Not Connected	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	N
15	ADC_CH2	AD converter input	I
16	NC	Not Connected	N
17	GND	Ground	G
18	CHIP_EN	1: Enable Chip 0: Disable chip in shutdown mode	I
19	NC	Not Connected	N
20	NC	Not Connected	N
21	NC	Not Connected	N
22	GPIOA_3/UART0_RTS	GPIO Pin, UART(multiplexing)	I/O
23	NC	Not Connected	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	N
29	NC	Not Connected	N
30	GND	Ground	G
31	NC	Not Connected	N
32	NC	Not Connected	N

33	GND	Ground	G
34	VD33	3.3V Power Supply	P
35	GND	Ground	G
36	GPIOC_3/SPIO_MISO/I2S1_MCK	GPIO Pin, SPI, I2S(multiplexing)	I/O
37	GPIOC_2/SPIO_MOSI/ I2S1_SD_TX	GPIO Pin, SPI, I2S(multiplexing)	I/O
38	GPIOC_1/SPIO_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/SPIO_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	GPIO Pin, /I2C(multiplexing)	I/O
44	UART_RXD/GPIOB_1	UART_LOG_IN(Debug)	I
45	UART_TXD/GPIOB_0	UART_LOG_OUT(Debug)	O
46	NC	Not Connected	N
47	NC	Not Connected	N
48	GND	Ground	G
49	NFC_IP	NFC input differential signal	Analog I/O
50	NFC_IN	NFC input differential signal	Analog I/O
51	GND	Ground	G
52	GND	Ground	G
53	RF_IO	WL RF signal	I/O



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
Other RF Standard	NFC
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	802.11b 17±2dBm
	802.11g 14±2dBm
	802.11n 13±2dBm
EVM	802.11b EVM ≤ 8%
	802.11g EVM ≤ -28dB
	802.11n EVM ≤ -30dB
Antenna	RF path selection feature
	-E0 : IPEX Connector
	-E1 : Internal Antenna
Network Architecture	AP Mode (Default)
	Client Mode
I/O Voltage Level	Table1&2
I/O	UART x2 (Maximum 2 high speed UART interface with baud rate up to 4MHz)

I/O Voltage Level	<p>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)</p>
I/O Dimension	<p>I2S x1 (Support 8/16/24/32/48/96KHz,44.1/88.2KHz)</p> <p>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)</p> <p>PWM x4 (PWM with configurable duration and duty cycle from 0 ~ 100%)</p> <p>SDIO 2.0 SDR25 x1 specification defines the following timing modes: (Single data rate 25 (SDR25): 50 MHz, 1.8 V)</p> <p>GPIO x21</p> <p>PCM x1 (Master clock output:64,128,256,or 512kHz)</p> <p>ETE x1</p> <p>22.25 x 19 x2.3mm</p>

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

Symbol	Parameter	Min	Typ	Max	Units
VIH	Input-High-Voltage	2.00	3.3	3.6	V
VIL	Input-Low-Voltage		0	0.9	V
VOH	Output-High-Voltage	2.97		3.3	V
VOL	Output-Low-Voltage	0		0.33	V

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

Symbol	Parameter	Min	Typ	Max	Units
VIH	Input-High-Voltage	1.70	1.80	2.0	V
VIL	Input-Low-Voltage		0	0.8	V
VOH	Output-High-Voltage	1.62		1.8	V
VOL	Output-Low-Voltage	0		0.18	V

4.1. Temperature Limit Ratings

Parameter	Min.	Max.	Units
Storage Temperature	-55	+125	°C
Operating Temperature	-40	+105	°C

4.2. DC POWER SUPPLY

Symbol	Parameter	Min	Typ.	Max	Units
VDD	Operating Voltage	3.0	3.3	3.6	V

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 Barker		-83		
11g Rx Sensitivity	54M OFDM		-65		
	6M OFDM		-82		
11n Rx Sensitivity	MCS7		-64		
	MCS0		-82		

Note: IPEX Connector Test RF Performance Measurement

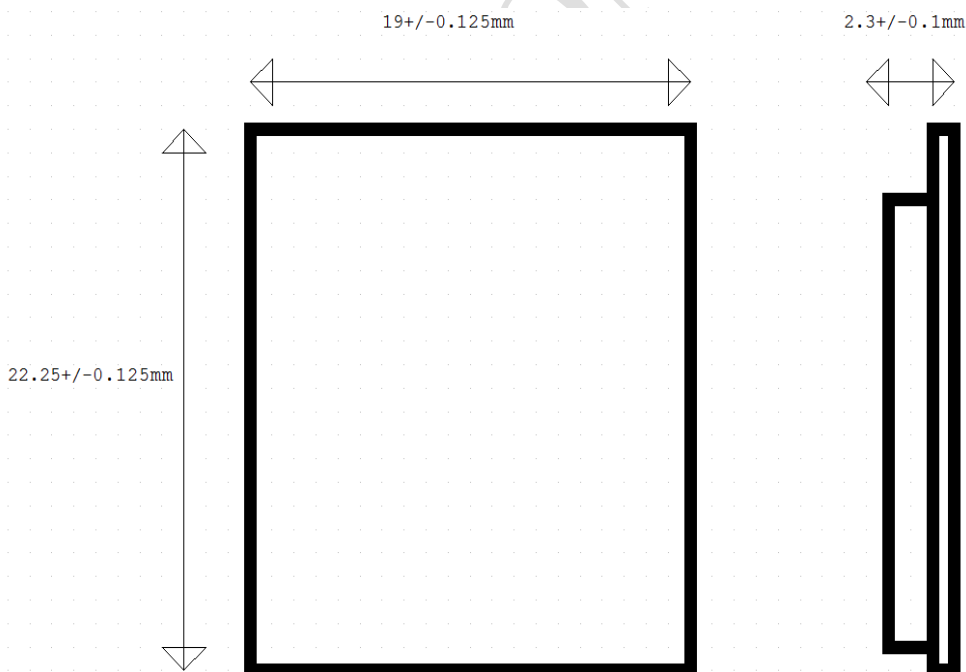
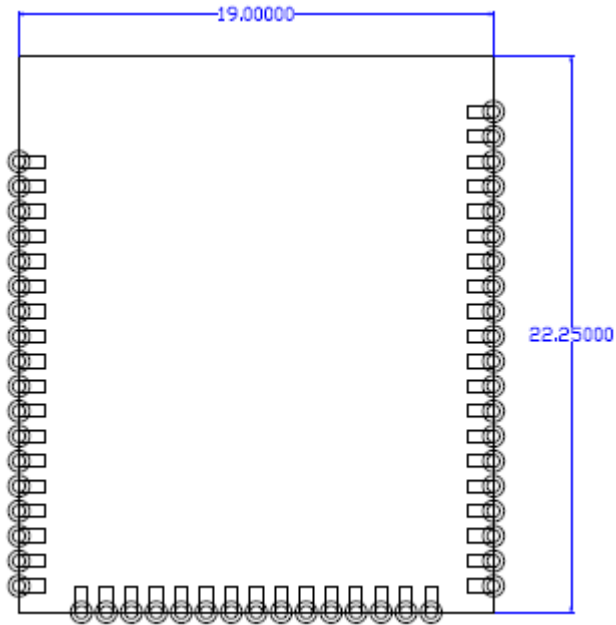
4.5. Pin Function Table

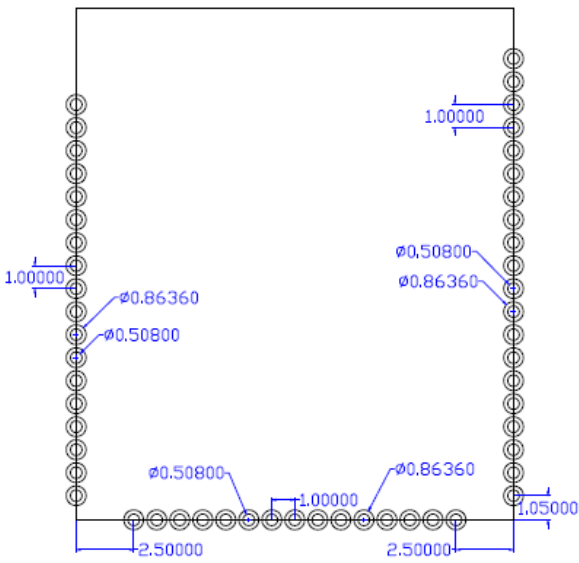
Pin Name	JTAG	UART Group	I2C Group	SPI Group	IIS Group	PCM Group	WL LED	PWM	ETE	WKDT	GPIO INT
GPIOA_3		UART0_RTS									Default_key
GPIOA_5		UART0_CTS								WKDT0	Mode_key
GPIOA_6		UART0_IN									
GPIOA_7		UART0_OUT									
GPIOB_0		UART_LOG_OUT							ETE0		
GPIOB_1		UART_LOG_IN					WL_LED0		ETE1		
GPIOB_2			I2C3_SCL						ETE2		
GPIOB_3			I2C3_SDA						ETE3		GPIO INT
GPIOC_0		UART0_IN		SPI0_CS0	IS1_WS	PCM1_SYNC		PWM0	ETE0		
GPIOC_1		UART0_CTS		SPI0_CLK	IS1_CLK	PCM1_CLK		PWM1	ETE1		GPIO INT
GPIOC_2		UART0_RTS		SPI0_MOSI	IS1_SD_TX	PCM1_OUT		PWM2	ETE2		
GPIOC_3		UART0_OUT		SPI0_MISO	IS1_MCK	PCM1_IN		PWM3	ETE3		GPIO INT
GPIOC_4	JTAG ⁺		I2C1_SDA	SPI0_CS1	IS1_SD_RX						GPIO INT
GPIOC_5			I2C1_SCL	SPI0_CS2							GPIO INT
GPIOE_0	JTAG_TRST	UART0_OUT	I2C2_SCL	SPI0_CS0		PCM0_SYNC		PWM0			
GPIOE_1	JTAG_TDI	UART0_RTS	I2C2_SDA	SPI0_CLK		PCM0_CLK		PWM1			GPIO INT
GPIOE_2	JTAG_VDDO	UART0_CTS	I2C3_SCL	SPI0_MOSI		PCM0_OUT		PWM2			GPIO INT
GPIOE_3	JTAG_TMS	UART0_IN	I2C3_SDA	SPI0_MISO		PCM0_IN		PWM3		WKDT3	GPIO INT
GPIOE_4	JTAG_CLK		I2C3_SCL	SPI0_CS1							

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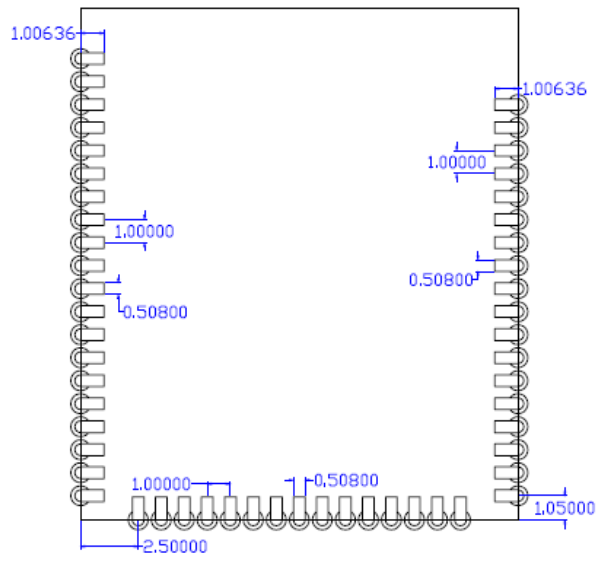
5. PACKAGE INFORMATION

5.1. Recommend Layout Information





TOP View



BOT View

5.2. Module mechanical outline

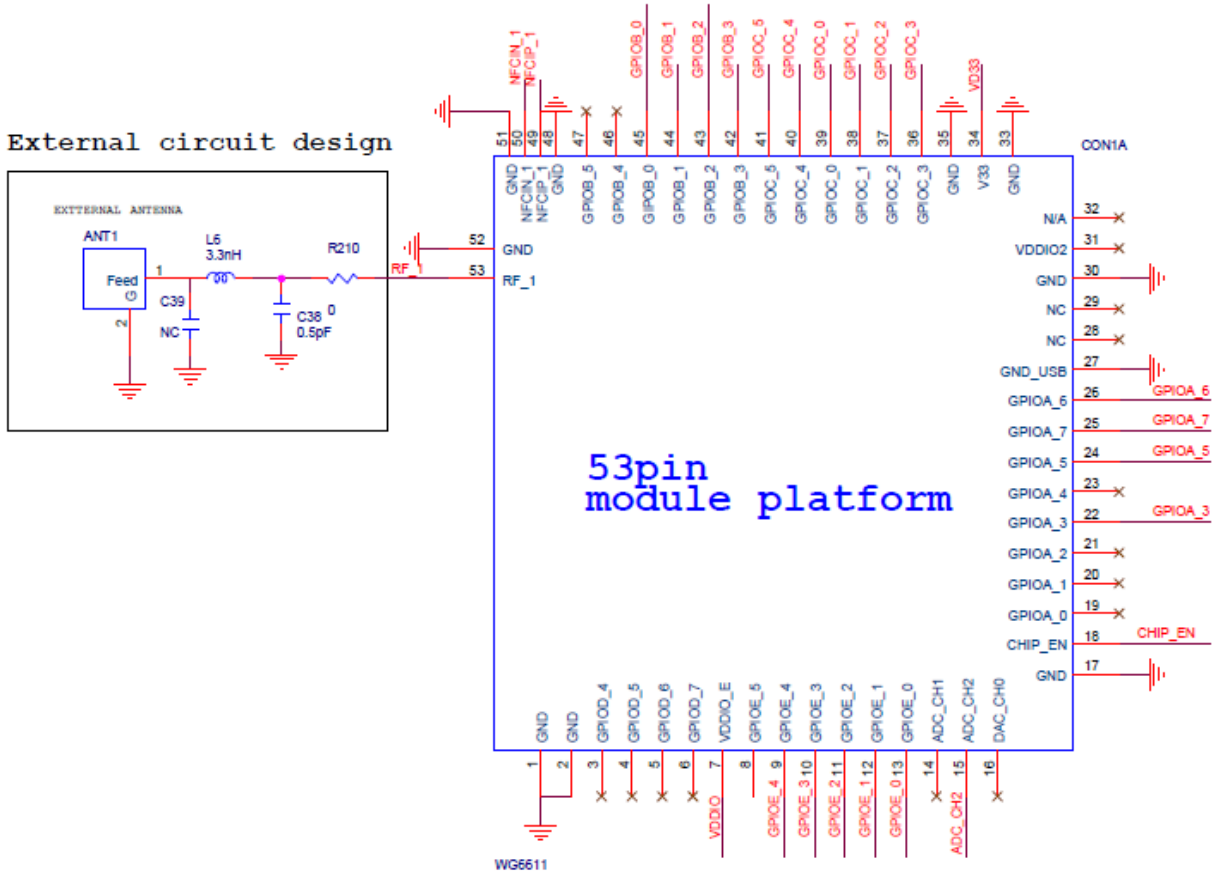
TOP VIEW



5.3. Application Reference Circuit

External circuit design

External circuit design



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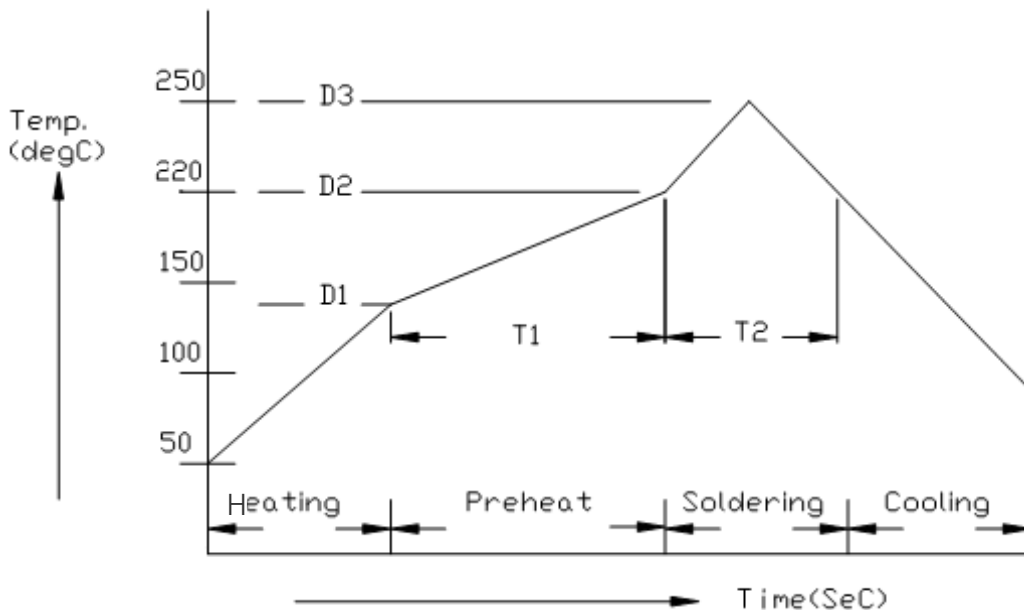
6. SMT AND BAKING RECOMMENDATION

6.1. 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.**

6.2. 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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