a module solution provider

WG6031-00 WLAN Module

Realtek RTL8189EM IEEE 802.11b/g/n

1T/1R Solution with SPI Interface

Datasheet

Draft 0.1

Prepared By	Reviewed By	Approved By
Hsinwei Wang 2017.6.5	Victor Lee 2017/6/5	2017/6/5

a module solution provider

WG6031-00 WLAN Module

Realtek RTL8189EM IEEE 802.11b/g/n

1T/1R Solution with SPI Interface

Datasheet

Draft 0.1

Prepared By	Reviewed By	Approved By

Index

1. HISTORY CHANGE

Revision	Date	Description
Draft 0.1	2017-06-05	Initial Document creation.

2. GENERAL DESCRIPTION

The WG6031-00 is a 802.11b/g/n 1T1R Wireless LAN SiP (system in package) module with SPI interface. The WG6031-00 provides a complete solution for a high throughput performance integrated wireless LAN device.

2.1. FEATURES

- Dimension 13mm(L) x 13mm(W) x 2.35mm(H).
- LGA-20 pin package.
- CMOS MAC, Baseband PHY, and RF in a single chip for 802.11b/g/n compatible WLAN.
- Complete 802.11n solution for 2.4GHz band.
- 72.2Mbps receive PHY rate and 72.2Mbps transmit PHY rate using 20MHz bandwidth.
- 150Mbps receive PHY rate and 150Mbps transmit PHY rate using 40MHz bandwidth.
- Compatible with 802.11n specification.
- Backward compatible with 802.11b/g device while operating in 802.11n mode.
- Operating temperature: 0°C to 70°C

3. MODULE BLOCK DIAGRAM

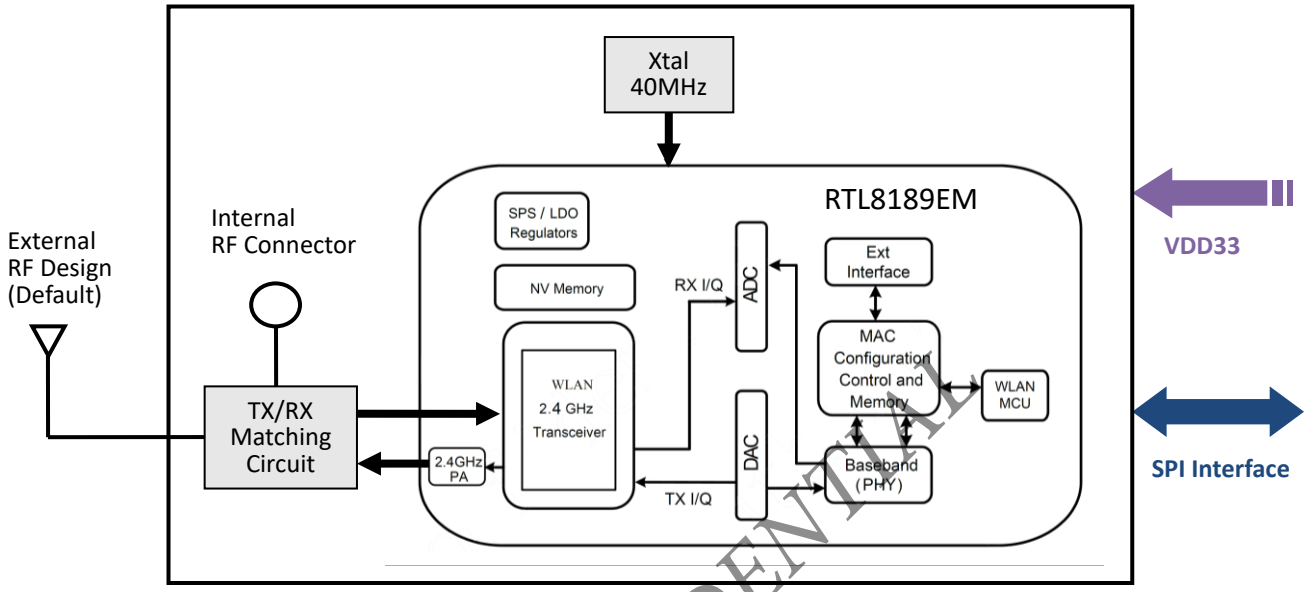


Figure 3-1. WG6031-00 Block Diagram

4. MODULE OUTLINE

4.1. Signal Layout (Top View)

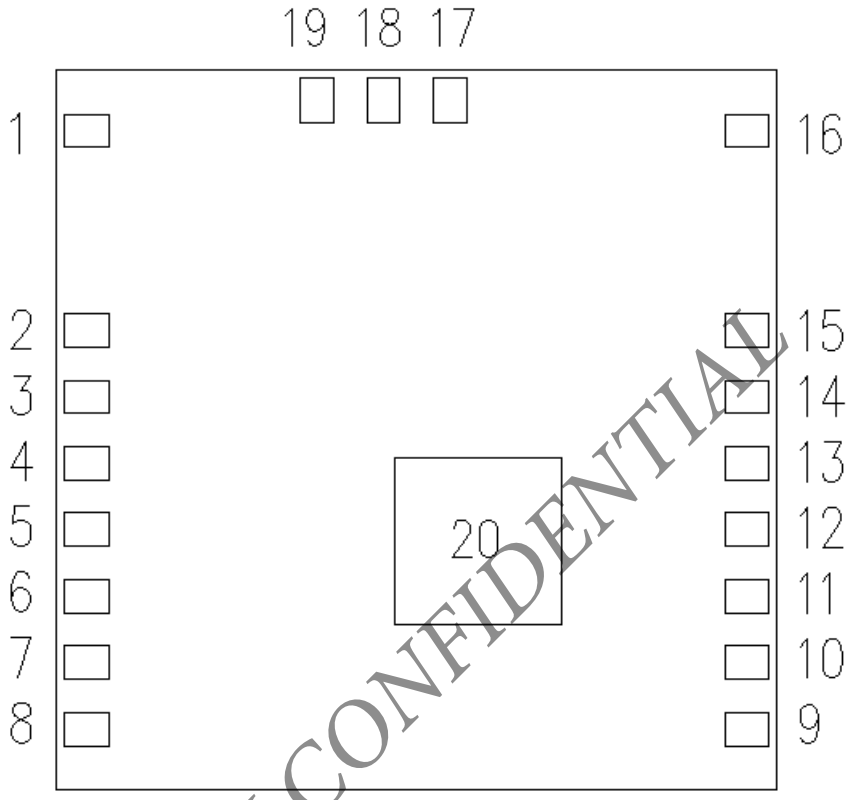


Figure 4-1 Device pins (Top View)

4.2. Pin Description

Pin	Signal Name	Type	Description
1	GND	Power	Ground
2	GND	Power	Ground
3	GND	Power	Ground
4	NC	-	Not Connection.
5	SPI_IRQ	O	SPI Interrupt Output
6	SPI_SS	I	SPI Slave Select
7	SPI_MISO	O	SPI Master in / Slave out Data
8	SPI_MOSI	I	SPI Master out / Slave in Data
9	SPI_CLK	I	SPI Clock Input
10	RESET	I	Hardware Reset
11	WAKE	I/O	General Purpose Input / Output Pin
12	GND	Power	Ground
13	VDD	Power	Power supply input. Typical 3.3V.
14	VDD	Power	Power supply input. Typical 3.3V.
15	GND	Power	Ground.
16	GND	Power	Ground.
17	GND	Power	Ground.
18	RF_OUT	RF	WLAN 2.4GHz External RF port.
19	GND	Power	Ground.
20	PGND	Power	Ground. Module Thermal PAD.

5. MODULE SPECIFICATION

5.1. General Module Requirements and Operation

5.1.1. Temperature Limit Ratings

Parameter	Min	Max	Units
Storage Temperature	-40	+125	℃
Ambient Operating	0	+70	℃

5.1.2. DC Power Supply Characteristics

Parameter	Condition	Min	Typical	Max	Units
VDD	DC supply Voltage	3.0	3.3	3.6	V

5.1.3. Digital IO DC Characteristics

Parameter	Condition	Min	Normal	Max	Units
V_{IH}	Input high voltage	2.0	3.3	3.6	V
V_{IL}	Input low voltage	-	0	0.9	V
V_{OH}	Output high voltage	2.97	-	3.3	V
V_{OL}	Output low voltage	0	-	0.33	V

5.2. WLAN RF Performance

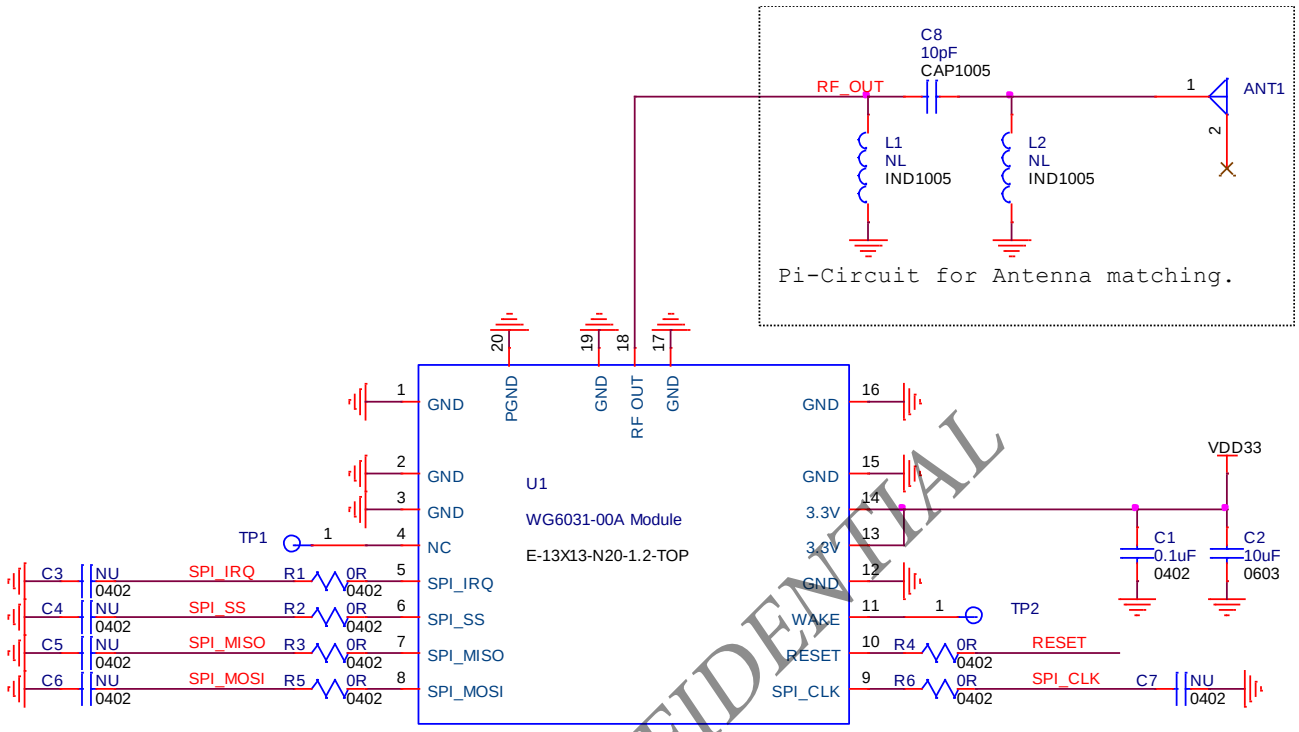
5.2.1. WLAN 2.4-GHz Receiver Characteristics

Parameter		Condition	Min	Typ	Max	Units
Operation frequency range			2412		2484	MHz
Sensitivity	At < 8% PER limit	1 Mbps DSSS		-96		dBm
		2 Mbps DSSS		-94		
		5.5 Mbps CCK		-91		
		11 Mbps CCK		-87		
	At < 10% PER limit	6 Mbps OFDM		-90		
		9 Mbps OFDM		-90		
		12 Mbps OFDM		-88		
		18 Mbps OFDM		-87		
		24 Mbps OFDM		-84		
		36 Mbps OFDM		-81		
		48 Mbps OFDM		-76		
		54 Mbps OFDM		-74		
		MCS0 MM 4K		-90		
		MCS1 MM 4K		-87		
		MCS2 MM 4K		-85		
		MCS3 MM 4K		-82		
		MCS4 MM 4K		-78		
		MCS5 MM 4K		-74		
		MCS6 MM 4K		-73		
		MCS7 MM 4K		-71		
		MCS0 MM 4K 40MHz		-87		
		MCS1 MM 4K 40MHz		-84		
		MCS2 MM 4K 40MHz		-82		
		MCS3 MM 4K 40MHz		-79		
		MCS4 MM 4K 40MHz		-75		
		MCS5 MM 4K 40MHz		-71		
		MCS6 MM 4K 40MHz		-70		
		MCS7 MM 4K 40MHz		-68		

5.2.2. WLAN 2.4-GHz Transmitter Power

Parameter	Condition	Min	Typ	Max	
Output Power	1 Mbps DSSS		17	–	dBm
	2 Mbps DSSS		17	–	
	5.5 Mbps CCK		17	–	
	11 Mbps CCK		17	–	
	6 Mbps OFDM		18	–	
	9 Mbps OFDM		18	–	
	12 Mbps OFDM		18	–	
	18 Mbps OFDM		17	–	
	24 MbpS OFDM		17	–	
	36 Mbps OFDM		16	–	
	48 Mbps OFDM		16	–	
	54 Mbps OFDM		15	–	
	MCS0 MM		18	–	
	MCS1 MM		17	–	
	MCS2 MM		17	–	
	MCS3 MM		15	–	
	MCS4 MM		15	–	
	MCS5 MM		14	–	
	MCS6 MM		14	–	
	MCS7 MM		13	–	
	MCS0 MM 40MHz		18	–	
	MCS1 MM 40MHz		17	–	
	MCS2 MM 40MHz		17	–	
	MCS3 MM 40MHz		15	–	
	MCS4 MM 40MHz		15	–	
	MCS5 MM 40MHz		14	–	
	MCS6 MM 40MHz		14	–	
	MCS7 MM 40MHz		13	–	
Frequency Accuracy		-20		+20	ppm

6. REFERENCE SCHEMATICS



7. PACKAGE INFORMATION

7.1. Module mechanical outline

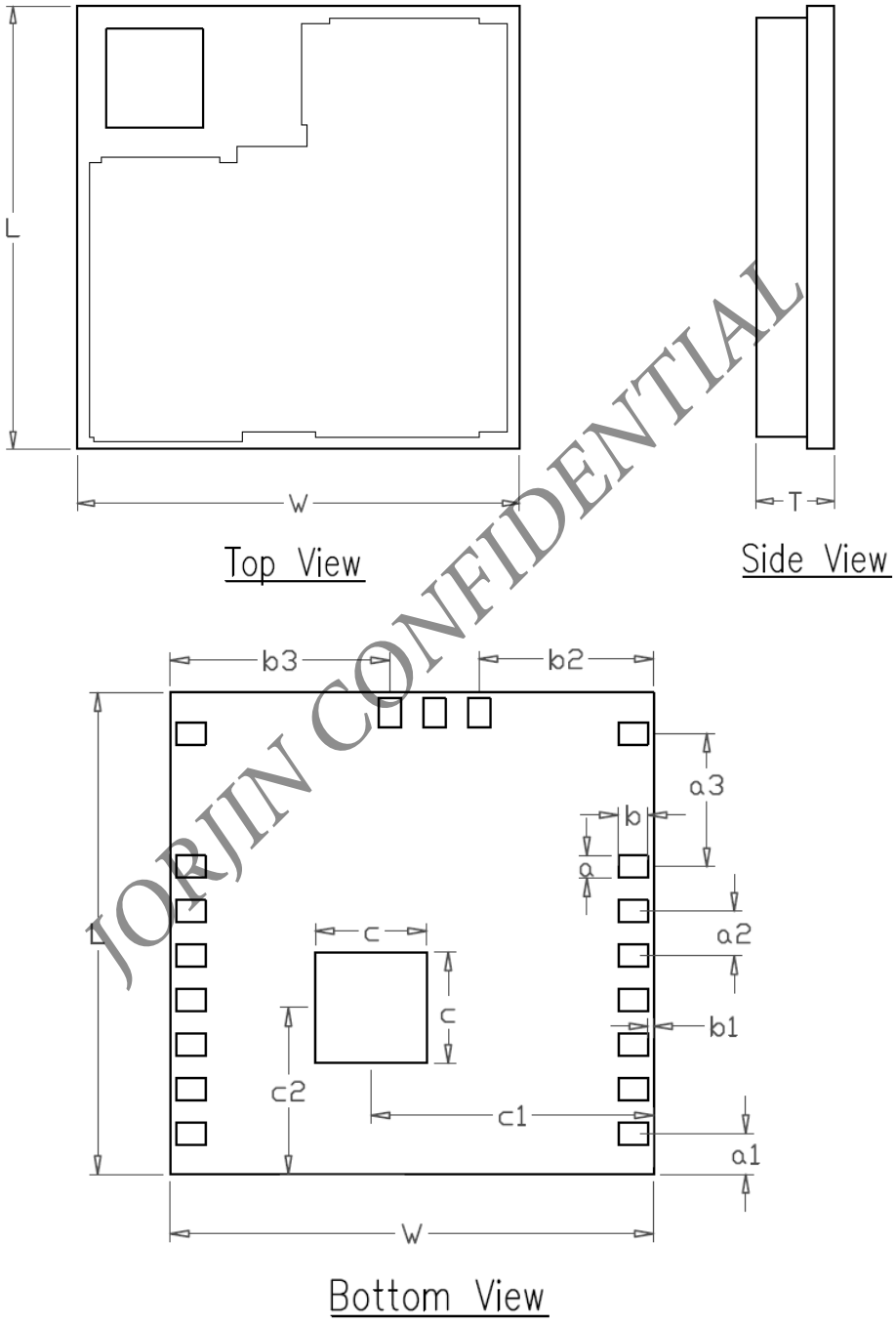


Figure 6-1 Module Pad Dimensions

Marking	Min	Nom	Max	Marking	Min	Nom	Max
L (Body size)	12.90	13.00	13.10	b	0.75	0.80	0.85
W (Body size)	12.90	13.00	13.10	b1	0.10	0.15	0.20
T (Thickness)	2.20	2.35	2.50	b2	4.65	4.70	4.75
a	0.55	0.60	0.65	b3	5.85	5.90	5.95
a1	1.05	1.10	1.15	c	2.95	3.00	3.05
a2	1.15	1.20	1.25	c1	7.55	7.60	7.65
a3	3.55	3.60	3.65	c2	4.45	4.50	4.55

Unit: mm

Table 6-1. Dimensions for Module Mechanical Outline

7.2. Ordering Information

Part number:	WG6031-00A

8. SMT AND BAKING RECOMMENDATION

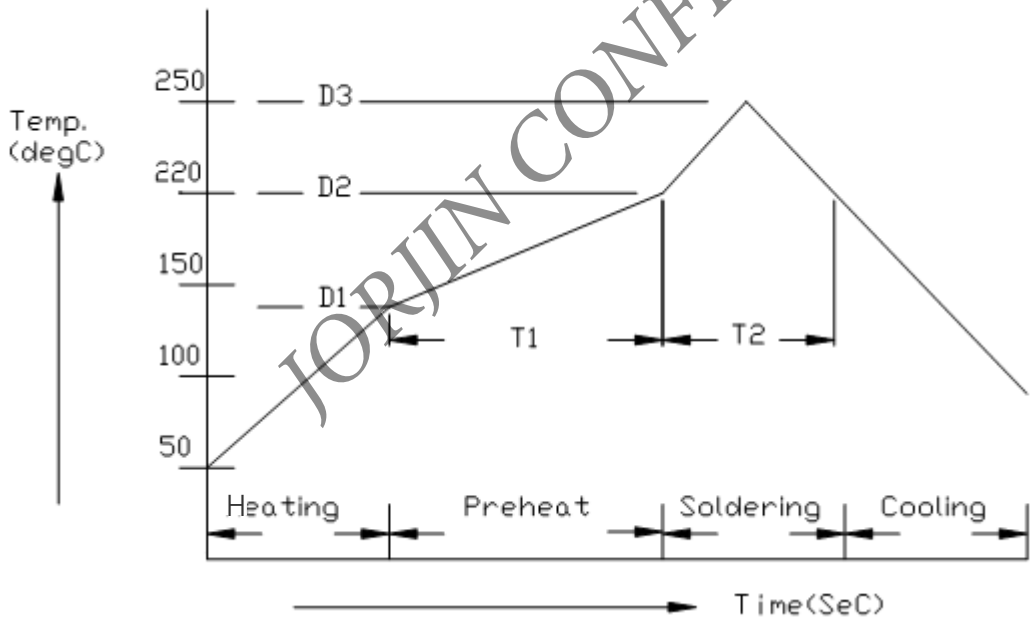
8.1. Baking Recommendation

- **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.

8.2. 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.