Manual

DT-W5G1（2.4G &5G Double Frequency）

V1.1 20-12-2018 Num.：DM0029CN

Features

- SOC specifications
  - Built-in 160MHz MIPS RISC processor
  - 512K SRAM
  - Communication speed: 72Mbps（20MHz）
  - Optimum balance &LLR quantification
  -
- Wi-Fi specifications
  - Support 802.11 a/b/g/n,2.4-2.5GHz,4.9-5.85GHz
  - 2.4GHz Rx sensitivity: -75dBm/11n HT20 MCS7,Tx power: 21dBm
  - 5GHz Rx sensitivity: -74dBm/11n HT20 MCS7, Tx power: 16.5dBm
  - Support Station, SoftAP mode
  - Support Wi-Fi Direct(P2P)
  - Support CCMP(CBC-MAC, computing mode), TKIP(MIC、RC4), WAPI(SMS4), WEP(RC4)、CRC hardware acceleration
  - P2P discovery, P2P GO mode/GC mode and P2P power management
  - Support seamless roamless
  - Support AT remote updation and cloud OTA updation;
  - Support SmartConfig function for Android and iOS device SmartConfig.

Peripheral for Module

- 2xUART
- 3xADC
- 1xHSPI
- 1xI2C
- 1xI2S
- 2xDMA
- 2xPWM
- Max 23xGPIOs
- 2M byte SPI Flash
- Working temperature: -30℃-85℃
- Module size: 17.5mm×34.5mm

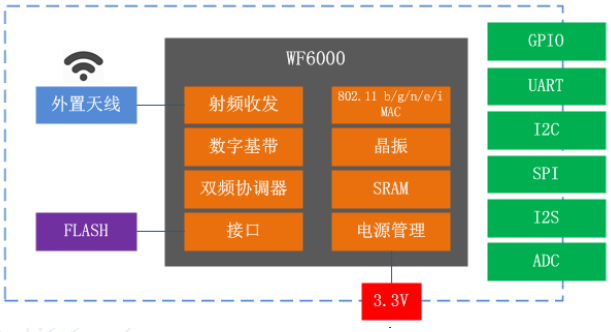
Application

- Serial Transparent transmission;
- Smart power plug/Smart LED light;
- Sensor networks;
- Wearable electronics;
- Security ID label;
- Wireless location recognition;
- Wireless location system beacon;
- WiFi prober;
- Mesh networks;
- Industrial wireless control.

Model

Name	Antenna
DT-W5G1	Ipex /PCB

Module Structure



Achieve Update

Date	Version	Content
2018-6-12	V1.0	Initialized version
2018-9-12	V1.1	Update size
2018-12-20	V2.0	Update encapsulation

Index

1. Introduction

The core processor of DT-W5G1 module adopts ultra-low power processor and 2G-5G dual-frequency chip. The chip integrates 32-bit microcontroller with 16-bit streamlined mode and 160 MHz main frequency in smaller size package. DT-W5G1 has a complete Wi-Fi network function, which can be used as a slave plane and carried on other host MCUs. DT-W5G1 can be booted directly from external Flash when it responds alone. The built-in cache memory can improve the system performance and optimize the storage system. In addition, DT-W5G1 can be used as Wi-Fi adapter only through SPI/SDIO or I2C/UART, and should be applied to any microcontroller-based design.

- DT-W5G1 module supports standard IEEE802.11a/b/g/n protocol and complete TCP/IP protocol stack. Users can use this module to add networking functions to existing devices, or to build independent network controllers.
- DT-W5G1 module for maximum practicability, Wi-Fi function embedded in other systems to provide unlimited possibilities.
- DT-W5G1 module has the characteristics of wide bandwidth and long distance communication, and can be used for wireless image transmission.

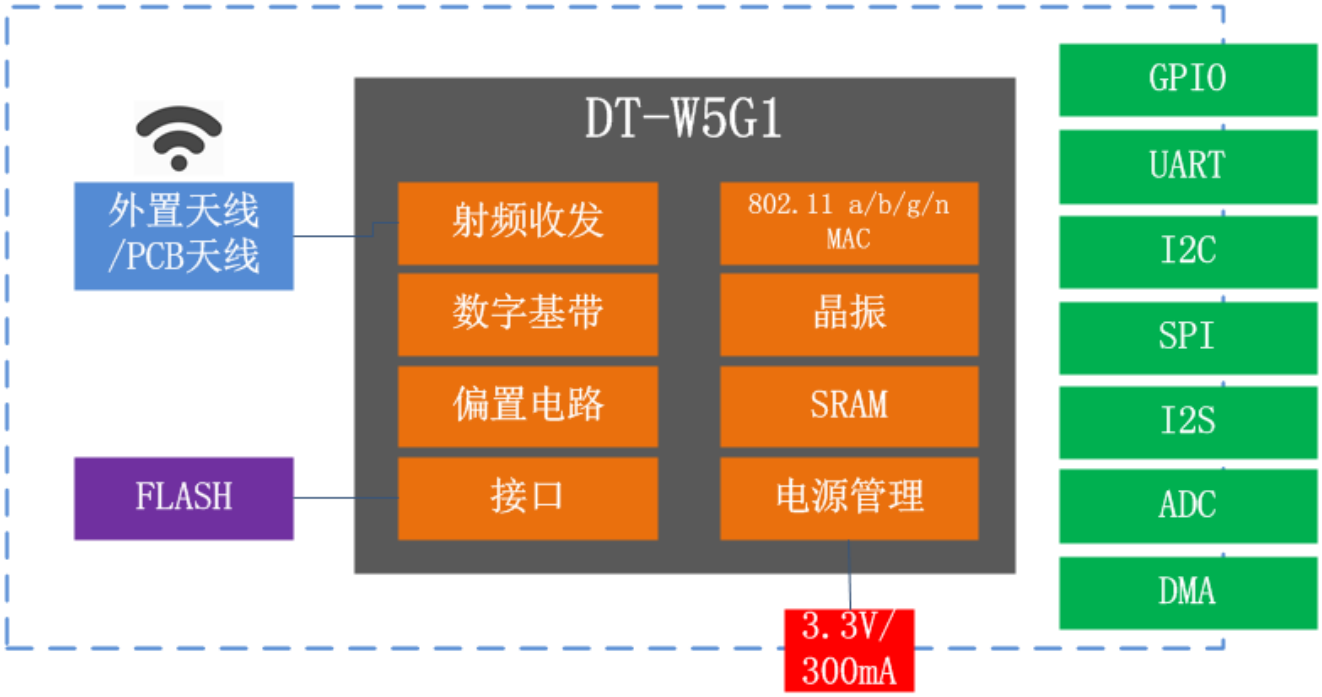


Fig. 1. 1 Module Structure

The main parameters of this module is shown as follows.

Table 1. 1 Main paramters

Type	Items	Parameters
2G	Frequency	2400M~2483.5M
	Transmitted power	802.11b: +19dBm
		802.11g: +17 dBm
		802.11n: +16 dBm
	Receiver sensitivity	802.11b: -90 dBm (11Mbps)
		802.11g: -78 dBm（54Mbps）
		802.11n: -75 dBm（MCS7）
	Antenna	PCB antenna on board/IPEX
5G	Frequency	4900M~5845M
	Transmitted power	14.5dBm
	Receiver sensitivity	OFDM, 54 Mbps :-77dbm
		HT20, MCS7 :-74dbm
	Peripheral	UART/SDIO/SPI/I2C/I2S/IR RC
		GPIO/ADC/PWM/SPI/I2C/I2S
	Working voltage	3.0V ~ 3.6V
	Working current	Average current: 60 mA
	Working temperature	-30 ℃ ~ 85 ℃
	Environment temperature	-30 ℃ ~ 125 ℃
	Size	17.5mm x 34.5mm x 3mm
Software	Wi-Fi mode	Station/SoftAP/SoftAP+Station
	Security mode	WPA/WPA2
	Encryption type	WEP/TKIP/AES
	Upgrade firmware	UART Download/OTA (by internet)
	Network protocol	IPv4, TCP/UDP/HTTP/FTP/MQTT

2. Interface definition

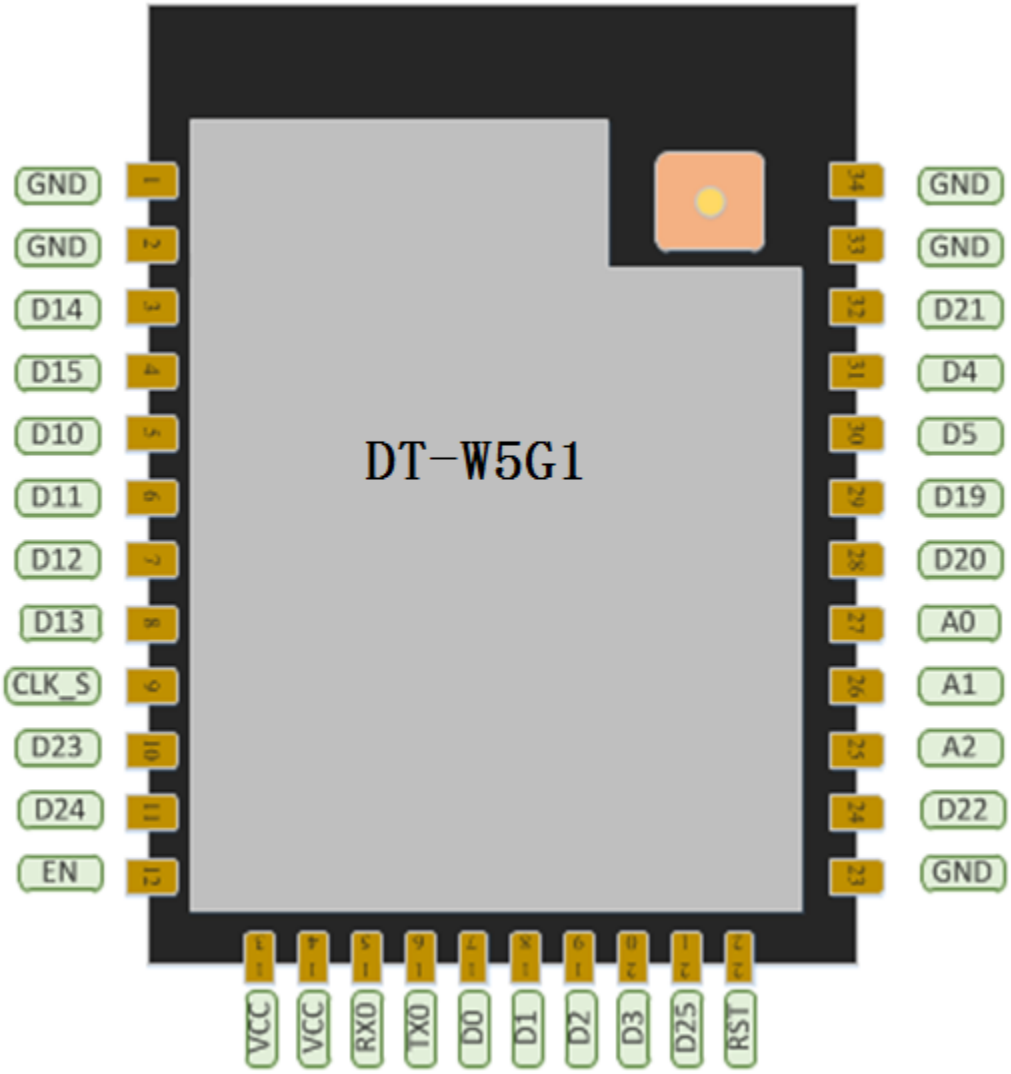


Fig. 2. 1 Pins of DT-W5G1

Table 2. 1 Pins definition of DT-W5G1

Num	Pin Name	Type	Function Illustration
1	GND	P	GND
2	GND	P	GND
3	D14	P	DIO14, receive IR signal, PWM1

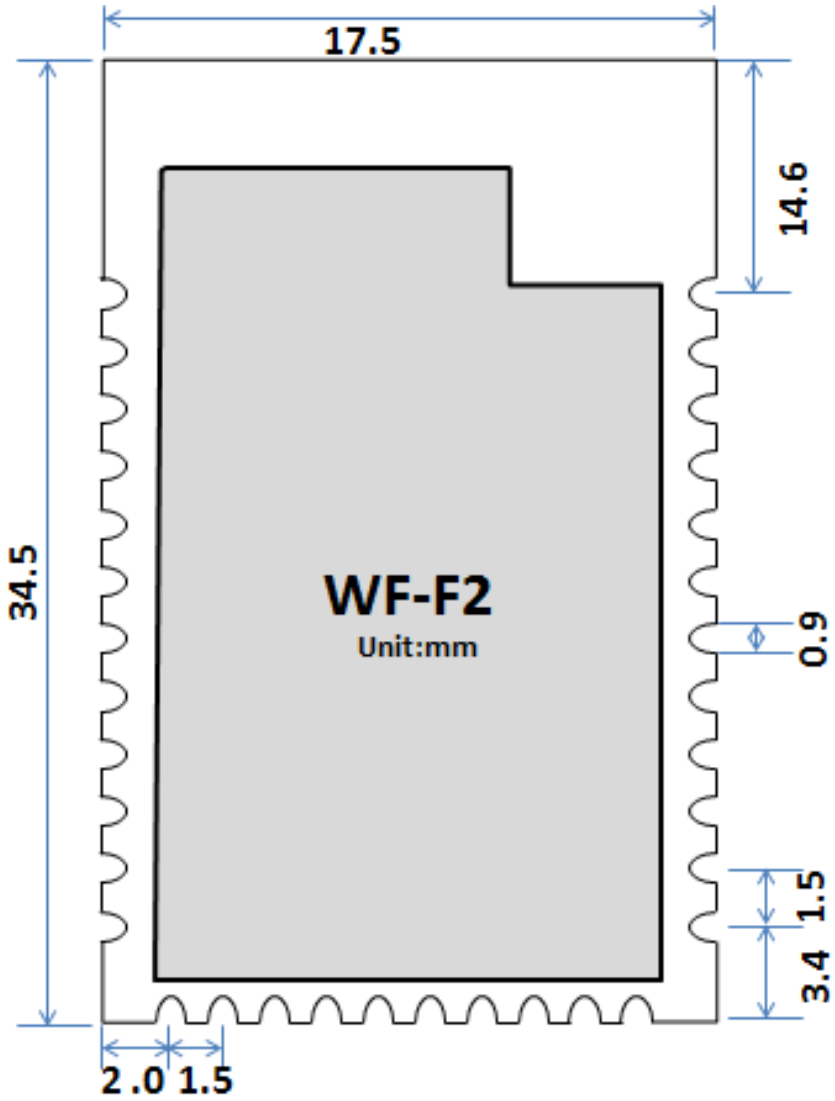
4	D15	I/O	DIO15，RX1
5	D10	I/O	DIO10
6	D11	I/O	DIO11
7	D12	I/O	DIO12, TX1
8	D13	I/O	DIO13, IIC clock, IR ouput, TX2
9	CLK_S	I/O	DIO18, sleep clock
10	D23	I/O	DIO1; used to built in Flash as UART Tx
11	D24	I/O	DIO24, IR input
12	EN	I	Enable, built-in pull-up resistance, effective with low level
13	VCC	P	Power, 3.3V
14	VCC	P	Power, 3.3V
15	RX0	I/O	DIO8, download RX
16	TX0	I/O	DIO9, download TX
17	D0	I/O	DIO0, I2S, RX1
18	D1	I/O	DIO1, TX1
19	D2	I/O	DIO2, RX2
20	D3	I/O	DIO3, TX2
21	D25	I/O	DIO25, pull-up: interrupt enable from outside; pull-down: interrupt enable from inside
22	RST	I	Reset, effective with low level
23	GND	P	GND
24	D22	I/O	DIO22, pull-up: Flash start; pull-down: ROM start
25	AD2	I/O	DIO16, AD2, analog IO
26	AD1	I/O	AD1, ananlog IO
27	AD0	I/O	AD0, analog IO
28	D20	I/O	DIO20

29	D19	I/O	DIO19
30	D5	I/O	DIO5，RX1
31	D4	I/O	DIO4，TX1
32	D21	I/O	DIO21，PWM2，I2S，wake up
33	GND	P	GND
34	GND	P	GND

3. Shape and Size

The size is 17.5mm x 34.5mm x 3mm, as shown in picture, with 16Mbits (2M Bytes) Flash.

Fig. 3. 1 Shape of Size



(a) top view

(b) side view

Fig. 3. 2 Size of module

Table 3. 1 Size of Module

Length	Width	Height	PAD (bottom)	Distance of Pins
34.5mm	17.5mm	3 mm	0.9mm x 1.7 mm	1.5mm

4. Electronical Characteristics

Table 4.1 Electronics

Parameters		Condition	Min	Classical	Max	Unite
Store Temperature		-	-40	Normal	125	℃
Sold Temperature		IPC/JEDEC J-STD-020	-	-	260	℃
Working Voltage		-	2.5	3.3	3.6	V
I/O	V_{IL}/V_{IH}	-	$-0.3/0.75V_{IO}$	-	$0.25V_{IO}/3.6$	V
	V_{OL}/V_{OH}	-	$N/0.8V_{IO}$	-	$0.1V_{IO}/N$	
	I_{MAX}	-	-	-	12	mA
Electrostatic release quantity (Human model)		TAMB=25℃	-	-	2	KV
Electrostatic release quantity (Human model)		TAMB=25℃	-	-	0.5	KV

5. Power consumption

Table 5. 1 Power consumption

parameters	minimum	Classical value	Max value	Unite
2.4 GHz, Rx 11n Active				
5 GHz, Rx 11n Active	-	190	-	mW
2.4 GHz, Tx 11b, CCK	-	220	-	mW
2.4 GHz, Tx 11n, MCS7	-	908	-	mW
5 GHz, Tx 11n, MCS7	-	750	-	mW
Sleep	-	220	-	μA

6. Wi-Fi RF Features

The following data is gotten at indoor (25℃), voltage= 3.3V.

Table 6. 1 Wi-Fi RF Features (2G)

Parameters	min	classical	max	unite
Input frequency	2412	-	2484	MHz
Input impedance	-	50	-	Ω
802.11b, EVM = -9 dB	-	21	-	
OFDM,EVM=-8dBm	-	20	-	dBm
OFDM,EVM=-27dBm	-	17	-	dBm
sensitivity				
DSSS, 1Mbps	-	-98	-	dBm
CCK,11Mbps	-	-90	-	dBm

OFDM 54Mbps	-	-78	-	dBm
HT20, MCS7	-	-75	-	dBm
Neighborhood inhibition				
CCK,1Mbps	-	42	-	dB
CCK，11Mbps	-	42	-	
OFDM, 6Mbps	-	36	-	dB
OFDM, 54Mbps	-	24	-	dB
HT20, MCS0	-	36	-	dB
HT20, MCS7	-	22	-	dB

Table 6. 2 Wi-Fi RF Features（5G）

Parameters	min	classical	max	unite
Input frequency	4900	-	5845	MHz
Input impedance	-	50	-	Ω
OFDM, QPSK, EVM = -13 dB	-	18	-	
OFDM, 16-QAM, EVM = -19 dB	-	20	-	dBm
OFDM, 64-QAM 5/6, EVM = -27 dB	-	16.5	-	dBm
sensitivity				
OFDM, 6 Mbps	-	-94	-	dBm
OFDM, 54 Mbps	-	-77	-	dBm
HT20, MCS7	-	-74	-	dBm
Neighborhood inhibition				
OFDM, 6 Mbps (Signal: -79 dBm)	-	30	-	dB
OFDM, 54 Mbps (Signal: -62 dBm)	-	26	-	
HT20, MCS0 (Signal: -79 dBm)	-	25	-	dB
HT20, MCS7 (Signal: -61 dBm)	-	22	-	dB

7. The Recommended Sold Temperature Curve

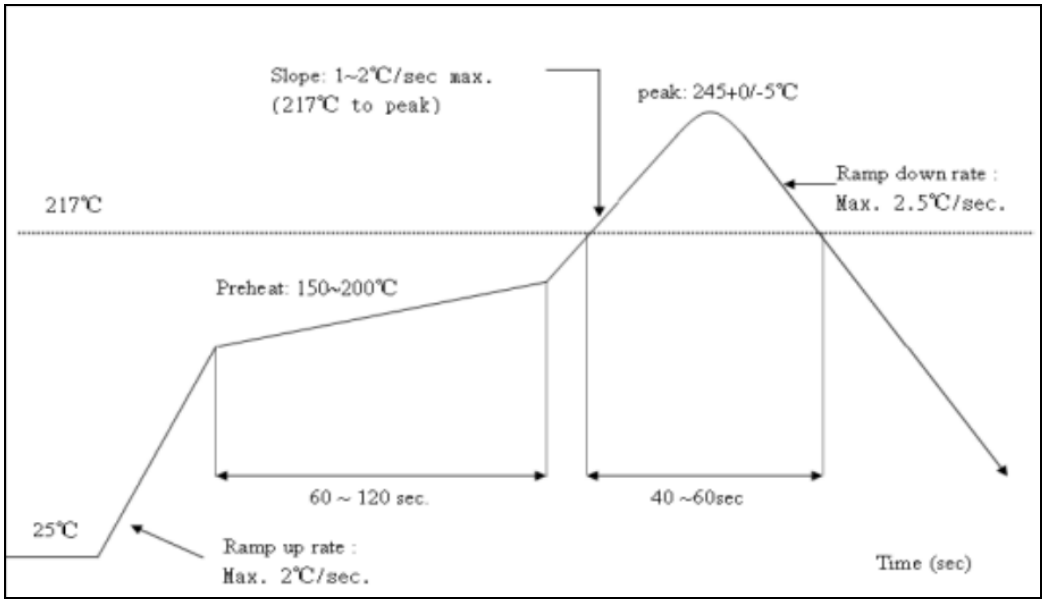


Fig. 7.1 Temperature Curve when Sold

8. Minimum System

The circuit of this minimum system is shown as follows.

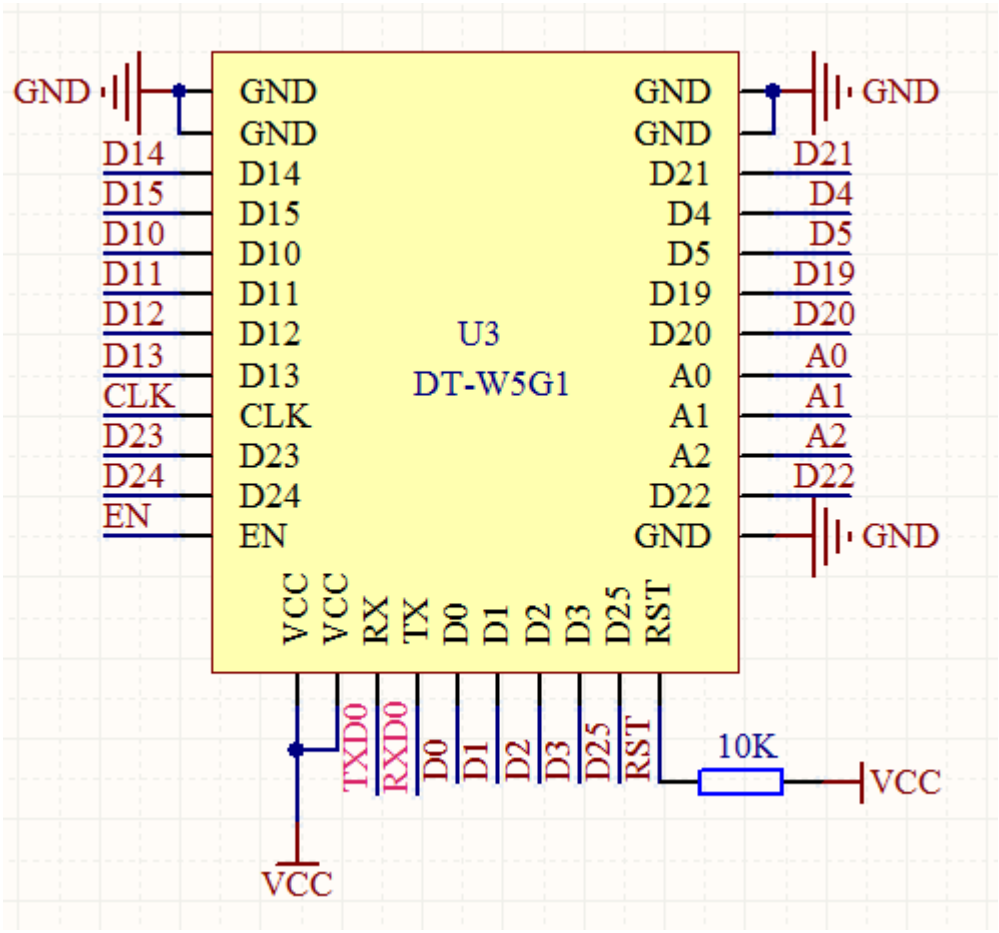


Fig. 9. 1 minimum system

Note

(1) the working voltage for module is DC 3.3V;

(2) the max current from IO of this module is 12mA;

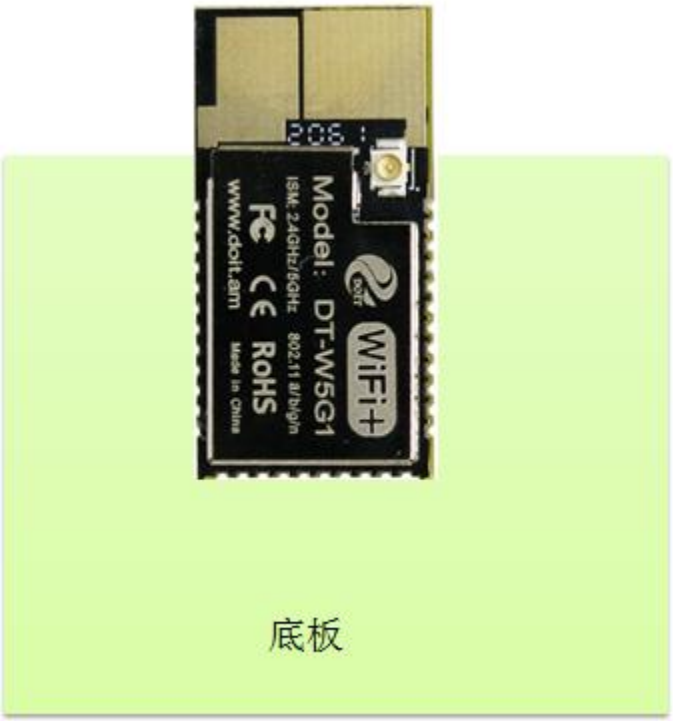
(3) RST Pin is enabled when it is low level; and EN pin is enabled when it is high level;

(4) WiFi module is at update mode: GPIO0 is low level, then module reset to power; Wi-Fi module is at working mode: GPIO0 is at high level, and then reset to power;

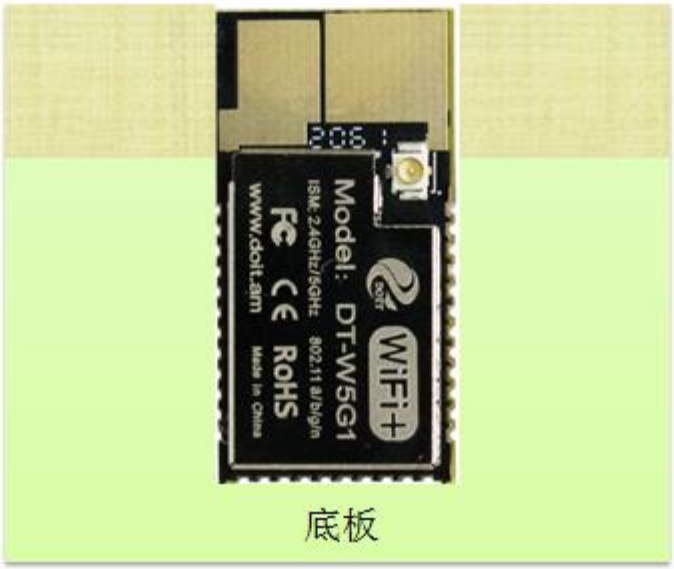
(5) Wi-Fi module is connected to RXD of the other MCU, and TXD is connected to RXD of the other MCU.

9. The Recommended PCB Design

Wi-Fi module can be inserted into the PCB board directly. For the high RF performance for the end device, please note the placement for the antenna and the module.



The recommended mode



Suboptimal placement (No copper or metal objects under the antenna)

10. Peripheral Line Suggestion

Wi-Fi module is already integrated into high-speed GPIO and Peripheral interface, which may be generated the switch noise. If there is a high request for the power consumption and EMI characteristics, it is suggested to connect a serial 10~100 ohm resistance, which can suppress overshoot when switching power supply, and can smooth signal. At the same time, it also can, to a certain extent, prevent electrostatic discharge (ESD).

Appendix.

From DOIT	
Official site	www.doit.am
Chinese book	ESPDuino 智慧物联开发宝典
Online shop	www.smartarduino.com
Forum	https://github.com/SmartArduino/SZDOITWiKi/wiki
IoT Application	智能建筑云
	光伏监控云
	Doit 玩家云
	免费 TCP 公网调试服务
Contact Us	
Emails	yichone@doit.am
	yichoneyi@163.com
Skype	yichone
WhatsAPP	008618676662425
WeChat	18676662425
QQ	123433772

From Espressif ESP8266	
Chip	ESP8266 Quick Start Guide
Software	ESP8266 SDK Start Guide
	ESP8266 SDK
Download Tools	ESP8266 Download Tool
Others	ESP8266 Forum
	ESP8266 Resources

Disclaimer and Copyright Notice

The information in this article, including the URL for reference, if there is any change, without prior notice.

Documents are provided by the current version without any guarantee responsibility, including merchantability, suitable for any particular purpose or non-infringement guarantees, and any guarantees presented by any proposal, specification, or sample mentioned elsewhere. This document has no any responsibility, including the use of the information within this document produced by the infringement of any patent rights. This document in this, by estoppel or otherwise, grant any intellectual property licensing, whether express or implied license.

The Wi-Fi alliance marks shall be owned by the Wi-Fi alliance.

All the mentioned brand names, trademarks and registered trademarks presented in this document are the property of their respective owners, and hereby declare.

Notice

Because of the product update or other reasons, this manual may change. Doctors of Intelligence & Technology Co., LTD Keeps the right to change the contents of this manual in the absence of any notice or reminders. This manual is used only as a guide, Doctors of Intelligence & Technology Co., LTD would try their best to provide the accurate information in this manual, but it does not ensure that the manual content is completely right and national, all the statements in this manual, and information and advice do not mean to provide any express or implied guarantees.