



WT8089-SF1 Datasheet

V1.0.0

January 19, 2021

Wireless-Tag Technology Co., Ltd.



About this document

This document provides users with the technical specifications of WT8089-SF1.

Document version

Please visit Wireless-Tag's official website to download the latest version of the document.

Revision history

Please go to the document revision history page to view the revisions of the document.

Disclaimer and copyright notice

Information in this paper, including URL references, is subject to change without prior notice.

This document is provided “as is” with no warranties whatsoever, including any warranty of merchantability, non-infringement, fitness for any particular purpose, or any warranty otherwise arising out of any proposal, specification or sample. All liability, including liability for infringement of any patent rights, relating to use of information in this document is disclaimed. No licenses, either express or implied, by estoppel or otherwise, to any intellectual property rights are granted herein.

All trade names, trademarks and registered trademarks mentioned in this document are property of their respective owners, and are hereby acknowledged.

Copyright © 2020 Wireless-Tag Technology Co., Ltd. All rights reserved.

Statement

Due to product version upgrade or other reasons, the contents of this manual may be changed. Wireless-Tag Technology Co., Ltd reserves the right to modify the contents of this manual without any notice or prompt. This manual is only used as a guide. Wireless-Tag Technology Co., Ltd makes every effort to provide accurate information in this manual, but it does not guarantee that the contents of the manual are completely free of errors. All statements, information and suggestions in this manual do not constitute any express or implied guarantee.



Document Revision History

No.	Version	Changes	Change (+/-) description	Author	Date
1	V1.0.0	C	First release	Fiona	January 19, 2021

*Changes: C--Create, A--Add, M--Modify, D--Delete

<http://www.wireless-tag.cn/>



Contents

1 Overview.....	5
2 Hardware Specifications.....	6
2.1 Pin Layout.....	6
2.2 Pin Description.....	6
2.3 Parameters.....	8
2.3.1 Module Parameters.....	8
2.3.2 Electrical Characteristics.....	8
2.3.3 RF Parameters.....	9
2.4 Mechanical Dimensions.....	10
3 Typical Circuit Connection of Wi-Fi Module.....	10

1 Overview

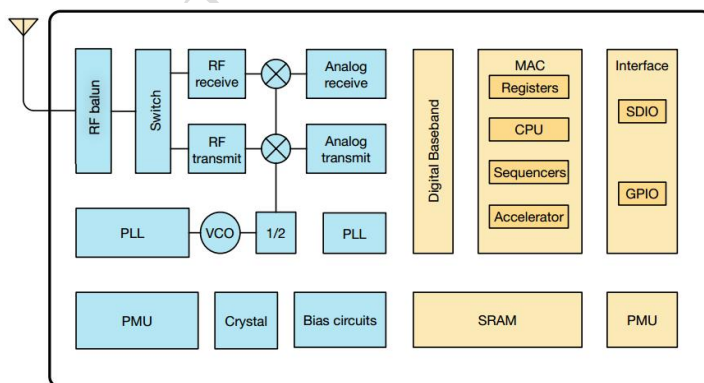
WT8089-SF1 is a Wi-Fi module based on Espressif's ESP8089 SoC developed by Wireless-Tag, which features simple interface, low power consumption, and high power data transmission. WT8089-SF1 supports standard IEEE 802.11 b/g/n protocol; it can achieve communication with external MCU through SPI/SDIO interface or central processor unit AHB bridge interface in terms of hardware.

WT8089-SF1 supports fast switching between sleep/wake mode for energy-efficient VoIP, adaptive radio biasing for low-power operation, advanced signal processing, and spur cancellation and radio co-existence features for cellular/BLE/802.11 interference mitigation. It is widely used in the following fields: home automation, home security, smart home appliances, accessories and remote controls, drones, OTT boxes, industrial Internet, etc.

Product features:

- Support standard IEEE802.11 b/g/n protocol
- Support Wi-Fi Direct(P2P), Miracast, SoftAP
- Integrated TR switch, balun, LNA, power amplifier and matching network
- Integrated PLL, regulators and power management units
- +19 dBm output power in 802.11b mode
- Power down leakage current of $< 10 \mu\text{A}$
- SDIO2.0, SPI interfaces
- STBC, 1x1 MIMO, 2x1MIMO
- A-MPDU & A-MSDU aggregation & $0.4 \mu\text{s}$ guard interval
- Wake up, connect and transmit data packets within 22ms
- Standby power consumption of $< 1.0 \text{ mW}$ (DTIM3)

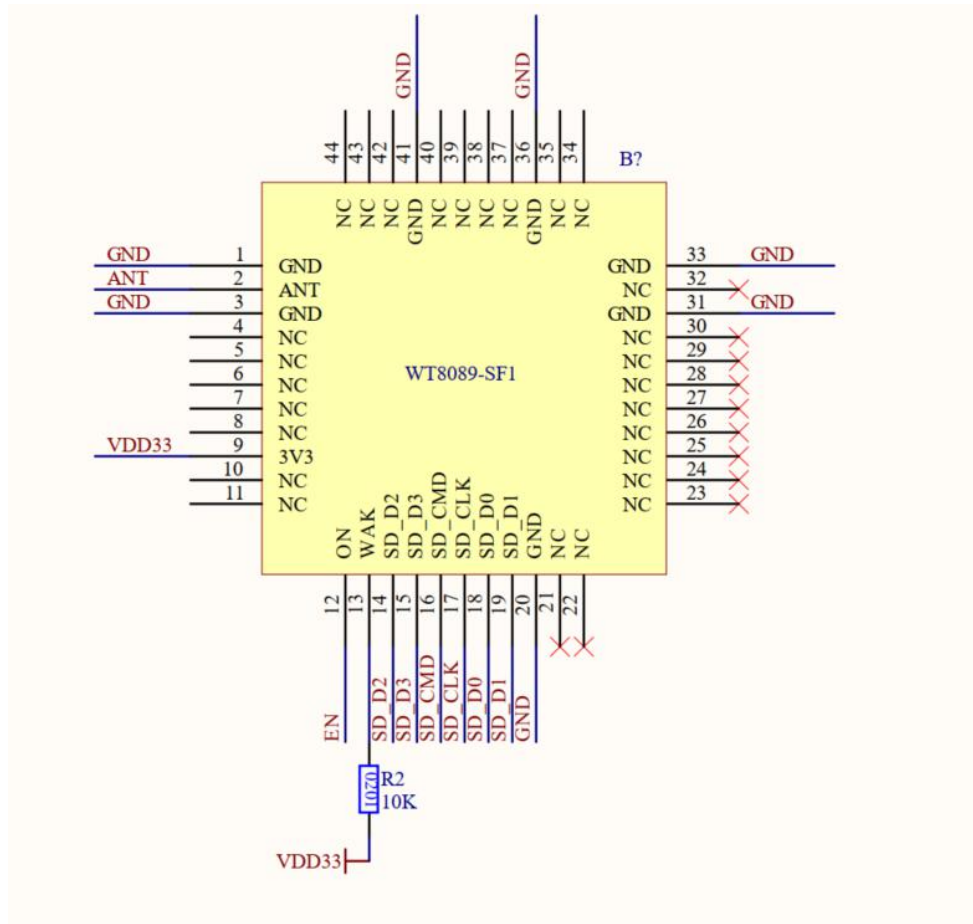
Figure 1. Block Diagram



2 Hardware Specifications

2.1 Pin Layout

Figure 2. Top View of Pin Layout



2.2 Pin Description

The module has a total of 44 pins, as shown in Table 1.

Table 1. Pin Functions

Pin No.	Pin Name	Function Definition	Description
1	GND		GND
2	ANT		ANT
3	GND		GND
4	NC		NC
5	NC		NC
6	NC		NC
7	NC		NC
8	NC		NC
9	VDD33	3V3	Power supply voltage DC: 2.5v-3.6v (3.3V, 500mA or above is recommended)



Pin No.	Pin Name	Function Definition	Description
10	NC		NC
11	NC		NC
12	EN	ON	Enable pin, high level enable (the module has been pulled up to high level by default), which can be connected to the main control IO port.
13	VDD33	WAKE	NC
14	SD_D2		SDIO_DATA_2
15	SD_D3		SDIO_DATA_3
16	SD_CMD		SDIO_CMD
17	SD_CLK		SDIO_CLK
18	SD_D0		SDIO_DATA_0
19	SD_D1		SDIO_DATA_1
20	GND		GND
21	NC		NC
22	NC		NC
23	NC		NC
24	NC		NC
25	NC		NC
26	NC		NC
27	NC		NC
28	NC		NC
29	NC		NC
30	NC		NC
31	GND		GND
32	NC		NC
33	GND		GND
34	NC		NC
35	NC		NC
36	GND		GND
37	NC		NC
38	NC		NC
39	NC		NC
40	NC		NC
41	GND		GND
42	NC		NC
43	NC		NC
44	NC		NC

2.3 Parameters

2.3.1 Module Parameters

The detailed parameters of WT8089-SF1 module are shown in Table 2.

Table 2 Module Parameters

PCB	1. Layer: 4 layers		
	2. Dimensions: 13.5*13*1.8mm		
	3. Interface: Standard 1.5mm half hole pins, directly mounted on circuit boards		
	4. Material: high permittivity and low loss plate for RF		
Module features	1. Operating Voltage: 2.5V-3.6V		
	2. Operating temperature: - 20 °C-85 °C		
	3. Wi-Fi standard: 802.11 b/g/n		
	4. Antenna: stamp hole expansion antenna interface		
	5. Transmit power: maximum +19dBm in 802.11b mode		
	6. Communication interface: SDIO	4-bit 25MHz	SDIO v1.1
4-bit 50MHz		SDIO v2.0	

2.3.2 Electrical Characteristics

Table 3. Electrical Characteristics

Parameter	Condition	Minimum	Typical	Maximum	Unit
Storage temperature range		-40	Room temperature	125	°C
Maximum welding temperature	IPC/JEDEC J-STD-020	-	-	260	°C
Working voltage VIO	-	2.5	3.3	3.6	V
Arbitrary I/O	VIL/VIH	-	-0.3/0.75VIO	0.25VIO/3.3	V
	VOL/VOH	-	-/0.8VIO	0.1VIO/-	
	I MAX	-	-	-	12
Electrostatic discharge (human body model)	TAMB=25°C	-	-	2	KV
Electrostatic discharge (machine model)	TAMB=25°C	-	-	0.5	KV



2.3.3 RF Parameters

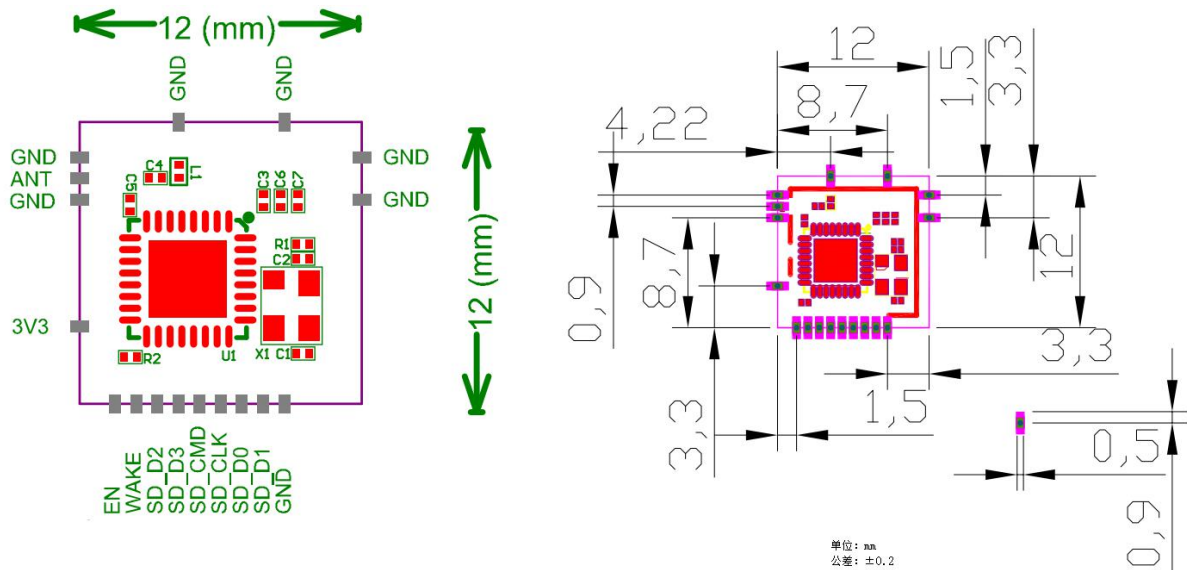
The following parameters are tested under normal temperature and the module voltage is 3.3V. The detailed parameters are shown in Table 4.

Table 4. RF Parameters

Parameter	Minimum	Typical	Maximum	Unit
Input frequency	2412		2484	MHz
Input impedance	-	50	-	Ω
PA output power under MCS0	17.2	17.9	18.2	dBm
PA output power under 11M	17.1	18.3	18.5	dBm
Sensitivity				
DSSS, 1Mbps	-	-98	-	dBm
CCK, 11Mbps	-	-91	-	dBm
6Mbps (1/2 BPSK)	-	-93	-	dBm
54Mbps (3/4 64-QAM)	-	-74	-	dBm
HT20, MCS0	-	-92	-	dBm
HT20, MCS7 (65Mbps, 72.2Mbps)	-	-70	-	dBm
Adjacent Channel Rejection				
OFDM, 6Mbps		37		dB
OFDM, 54Mbps		21		dB
HT20, MCS0		37		dB
HT20, MCS7		20		dB
Startup Time				
Crystal startup time		500		μ S
Crystal frequency deviation	-5	0	2	ppm
Baseband PLL startup time		100		μ S
RF PLL startup time		200		μ S
Rx RF startup time		2		μ S
Tx RF startup time		2		μ S

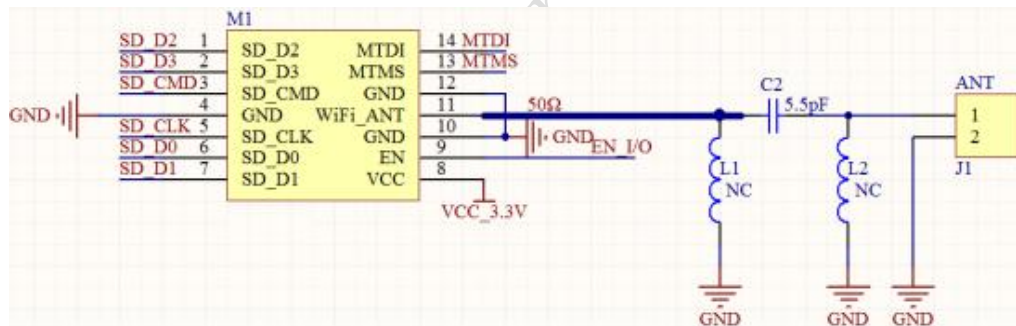
2.4 Mechanical Dimensions

Figure 3. Module Dimensions



3 Typical Circuit Connection of Wi-Fi Module

Figure 4 Typical Circuit Connection



Notes for PCB layout:

1. The output impedance of Pin11 (WiFi_ANT) of the module is 50Ω , so there is no need to match the module. It is recommended to keep the π -type matching network to match the antenna.
2. Pin9 (EN) is active at high level. It is recommended to design according to the above reference circuit, or it can be controlled by the main control I/O port;
3. SDIO wiring should be short;
4. It is recommended not to route wires under the WiFi module on the motherboard, and keep away from sensitive devices (such as crystal oscillators, cameras, etc.);
5. After the module is soldered on the motherboard, antenna matching and RF performance testing are required.