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Simblee™ RFD77101

IoT for connecting Everyone and Everything



Only 7mm x 10mm

Simblee™ BLE Module RFD77101

PRELIMINARY DATASHEET

Features

- Bluetooth Low Energy (BLE) Stack built-in
- Fully encapsulated and hermetically sealed
- Long range
- Simblee™ interference immunity
- 3ms latency
- 10us accuracy (jitter)
- Physical range adjustable from a few inches to hundreds of feet
- Build iPhone and Android apps without Xcode or the Android SDK
- Built in AES encryption engine
- 7mm x 10mm x 2.2mm
- 29 GPIOs (flexible pin configuration)
- <4uA ULP with clock running (run for years on a coin cell)
- 600nA ULP Sleep mode
- 8mA TX @ 0dBm, 12mA TX @ +4dBm
- 10mA RX
- -93dBm receiver sensitivity
- -55dBm to +4dBm TX power
- ARM Cortex M0 processor
- Flash code space available for user application (no need for external controller)
- 6x ADC inputs, 4x PWM outputs, 2x SPI master/slave, 2x I2C, 1 x UART
- Temperature sensor
- Battery/Supply voltage monitoring
- Onchip UART bootloader
- OTA programming (optional)
- Operating Voltage: 1.8 – 3.6V
- Integrated 16 MHz crystal and 32KHz precision crystal
- Integrated antenna
- Integrated shield
- FCC, IC, CE, TELEC compliance pending
- Easy to pick and place
- Patents Pending

1. Overview of the Simblee™ RFD77101

1.1 Introduction

The Simblee RFD77101 is a high performance, professional grade Bluetooth Low Energy radio transceiver with a built-in ARM Cortex M0 microcontroller that can be programmed using the simple-to-use Arduino IDE using Simblee extensions.

Simblee is IoT for connecting Everyone and Everything (IoT4EE).

It incorporates Mobile, BLE, Mesh, Cloud and other forms of wireless connectivity.

Simblee is high-quality, cutting-edge and performance focused.

Using the Simblee mobile browser on a phone or tablet, anyone can interact with Simblee enabled devices instantly without needing to download additional apps for each device.

In just hours you can create functional IoT applications using the Simblee development environment.

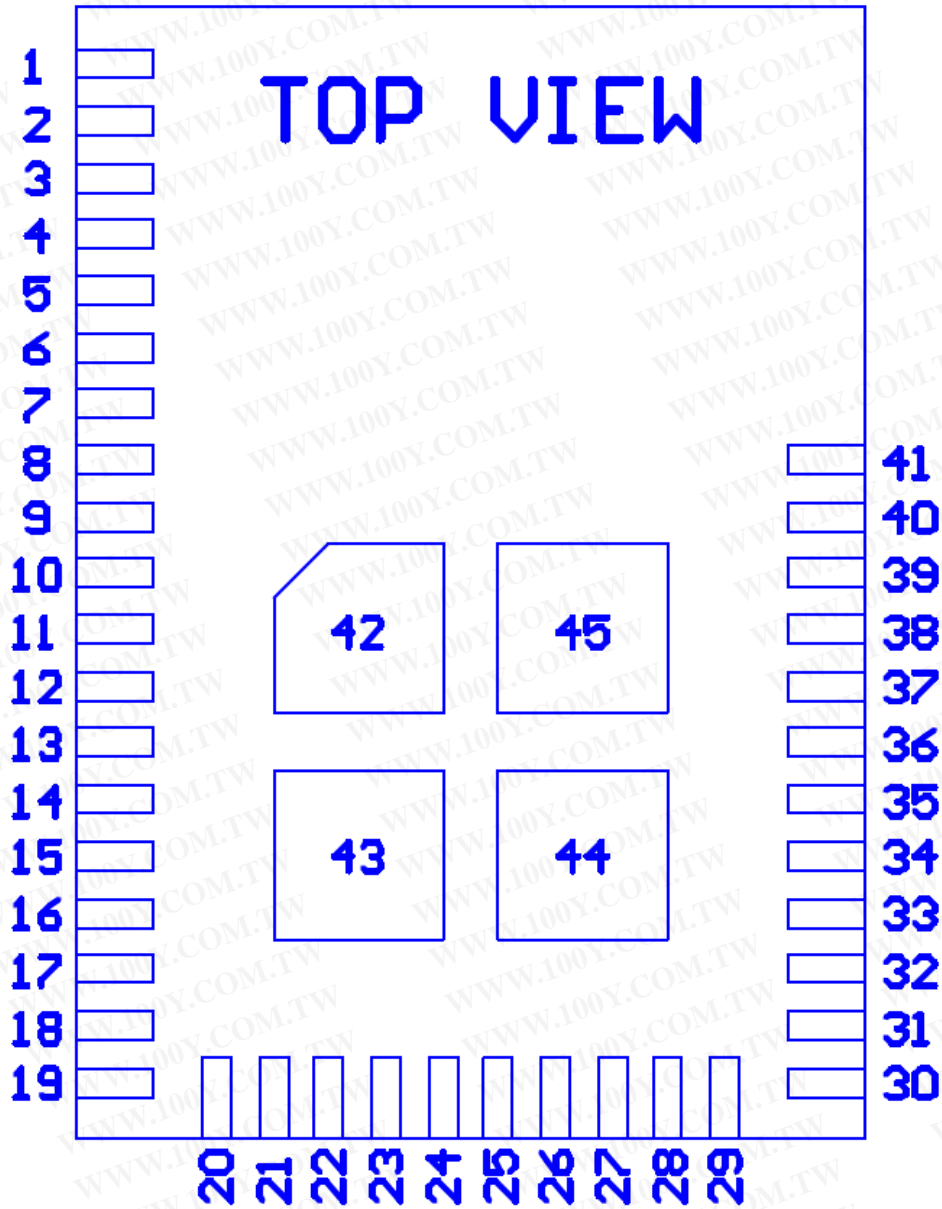
Developers can start developing mobile apps without having to first learn Xcode or Android SDKs.

1.2 Basic Operation

Simblee is programmed using the Arduino IDE. Code is loaded using the onchip UART bootloader or via OTA (over the air) programming.

2. Pinout

2.1 45-pin LGA 0.5mm pitch

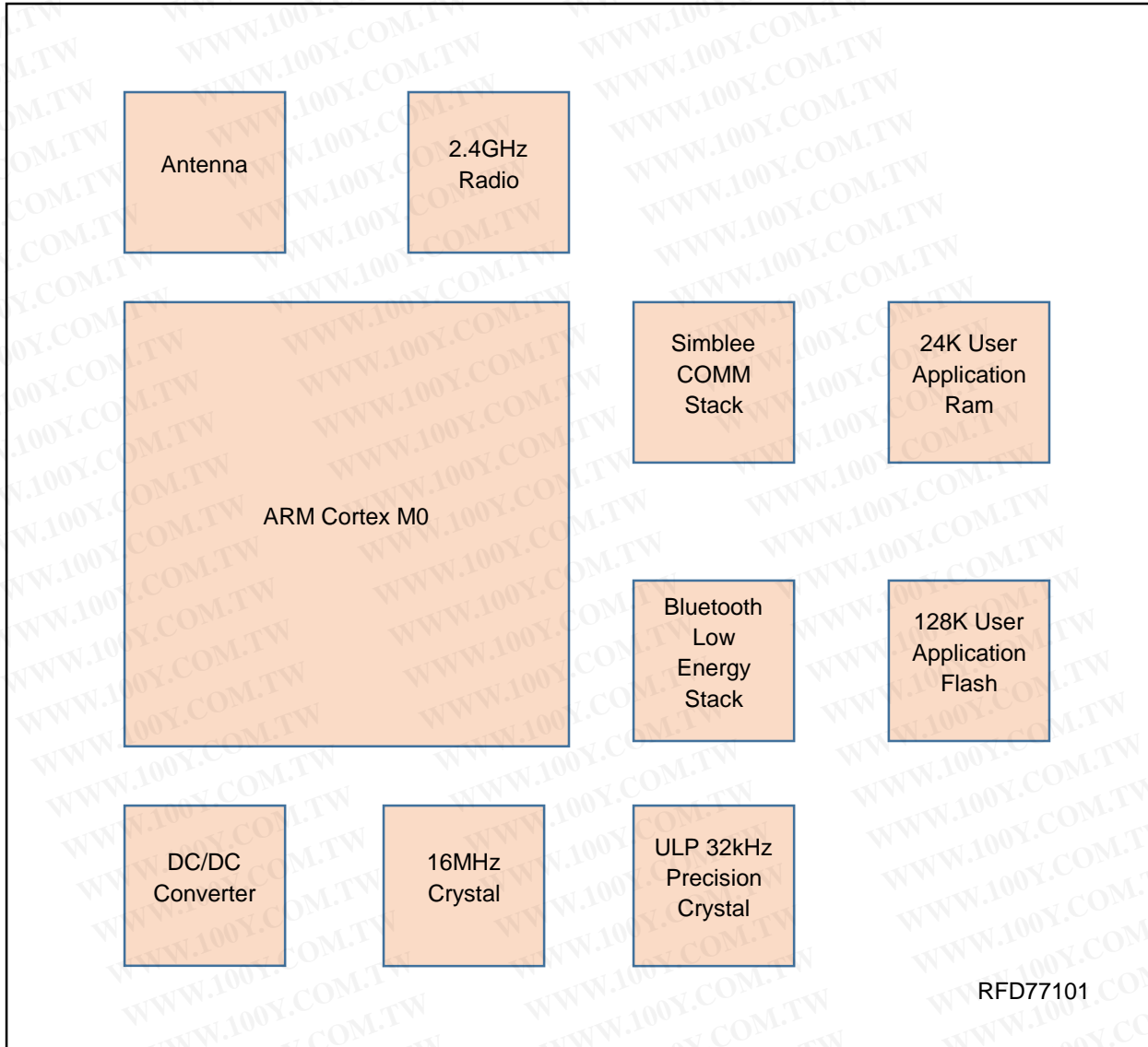


2.2 Pin Descriptions

Name	Pin	Type	Signal	Comments
1	GND	P	Supply ground	
2	GND	P	Supply ground	
3	DNC	X	DO NOT CONNECT	
4	GND	P	Supply ground	
5	DNC	X	DO NOT CONNECT	
6	GND	P	Supply ground	
7	VDD	P	1.8 – 3.6V Supply	
8	RST/SWDIO	I/O	Reset / SWDIO	
9	FACT/SWDCLK	I	Factory / SWDCLK	
10	DNC	X	DO NOT CONNECT	
11	P0.19	I/O	GPIO 19	
12	P0.17	I/O	GPIO 17	
13	P0.18	I/O	GPIO 18	
14	P0.16	I/O	GPIO 16	
15	P0.15	I/O	GPIO 15	
16	P0.12	I/O	GPIO 12	
17	P0.11	I/O	GPIO 11	
18	P0.09	I/O	GPIO 9	
19	GND	P	Supply ground	
20	P0.08	I/O	GPIO 8	
21	P0.05	I/O	GPIO 5 / ANALOG 6	
22	P0.03	I/O	GPIO 3 / ANALOG 4	
23	P0.01	I/O	GPIO 1 / ANALOG 2	
24	P0.02	I/O	GPIO 2 / ANALOG 3	
25	P0.00	I/O	GPIO 0 / AREF 0	
26	P0.07	I/O	GPIO 7	
27	P0.10	I/O	GPIO 10	
28	P0.13	I/O	GPIO 13	
29	P0.14	I/O	GPIO 14	
30	GND	P	Supply ground	
31	P0.06	I/O	GPIO 6 / AREF 1 / ANALOG 7	
32	P0.04	I/O	GPIO 4 / ANALOG 5	
33	P0.20	I/O	GPIO 20	
34	P0.23	I/O	GPIO 23	
35	P0.24	I/O	GPIO 24	
36	P0.21	I/O	GPIO 21	
37	P0.22	I/O	GPIO 22	
38	P0.25	I/O	GPIO 25	
39	P0.28	I/O	GPIO 28	
40	P0.29	I/O	GPIO 29	
41	P0.30	I/O	GPIO 30	
42	GND	P	Supply ground	
43	GND	P	Supply ground	
44	GND	P	Supply ground	
45	GND	P	Supply ground	

I Input only O Output only, push-pull I/O Input/output
X DO NOT CONNECT P Ground or power

3. Block Diagram

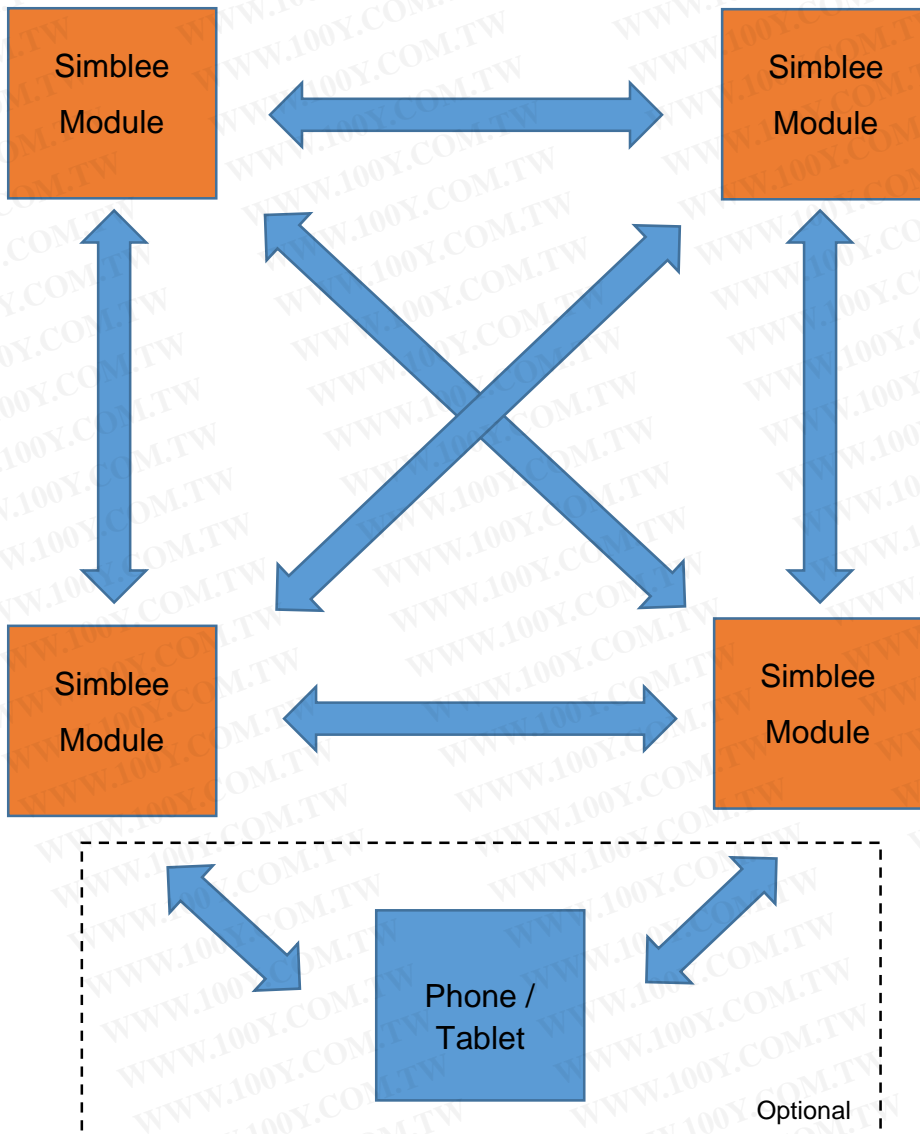


5. Modes of Use

Bluetooth Low Energy bi-directional communication with smart phone or tablet



Simblee COMM ad-hoc bi-directional communication between any number of devices



6. Specifications

6.1 Absolute Maximum Specifications

V_{DD} 0 to +3.7 V

Max continuous pin current, any control or drive pin	±5 mA
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CAUTION: Maximum ratings are the extreme limits the chip can be exposed to without causing permanent damage. Exposure to absolute maximum ratings for prolonged periods of time may affect the reliability of the chip.

6.2 Recommended Operating Conditions

V_{DD} +1.8 to 3.6 V

Operating temperature	-40°C to +85°C
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Power supply rise time (0V to V _{DD})	100ms maximum
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6.3 Radio Specifications

Parameter	Description	Min	Typ	Max	Units	Notes
F _{OP}	Operating Frequency	2400		2481	MHz	1 MHz channel spacing
BPS _{Fsk}	On-Air data rate	250		2000	kbps	
TX _{power}	TX Power	-55		+4	dBm	
TX _{IDC+4dBm}	TX Current at +4dBm w/ DC/DC		12		mA	
TX _{I+4dBm}	TX Current at +4dBm w/o DC/DC		16		mA	
RX _{IDC}	RX Current w/ DC/DC		10		mA	
RX _I	RX Current w/o DC/DC		13		mA	
RX _{s250}	Receiver sensitivity at 250kbps		-96		dBm	
RX _{s1000}	Receiver sensitivity at 1000kbps		-90		dBm	
RX _{s2000}	Receiver sensitivity at 2000kbps		-85		dBm	
RX _{SBLE}	Receiver sensitivity at BLE		-93		dBm	

6.4 Simblee COM Specifications

Parameter	Description	Min	Typ	Max	Units	Notes
RF_{T1}	End-to-end latency high speed		3		ms	
RF_{T2}	End-to-end latency long range		12		ms	
RF_J	Jitter / Accuracy		10		us	

6.5 GPIO Specifications

Parameter	Description	Min	Typ	Max	Units	Notes
V_{IH}	Input high voltage	0.7VDD		VDD	V	
V_{IL}	Input low voltage	VSS		0.3VDD	V	
GPIO_{IHD}	GPIO high drive sink/source		5		mA	3 pins max
GPIO_{ISD}	GPIO standard drive sink/source		0.5		mA	
R_{PU}	Internal pull-up resistance	11	13	16	kΩ	
R_{PD}	Internal pull-down resistance	11	13	16	kΩ	

6.6 ADC Specifications

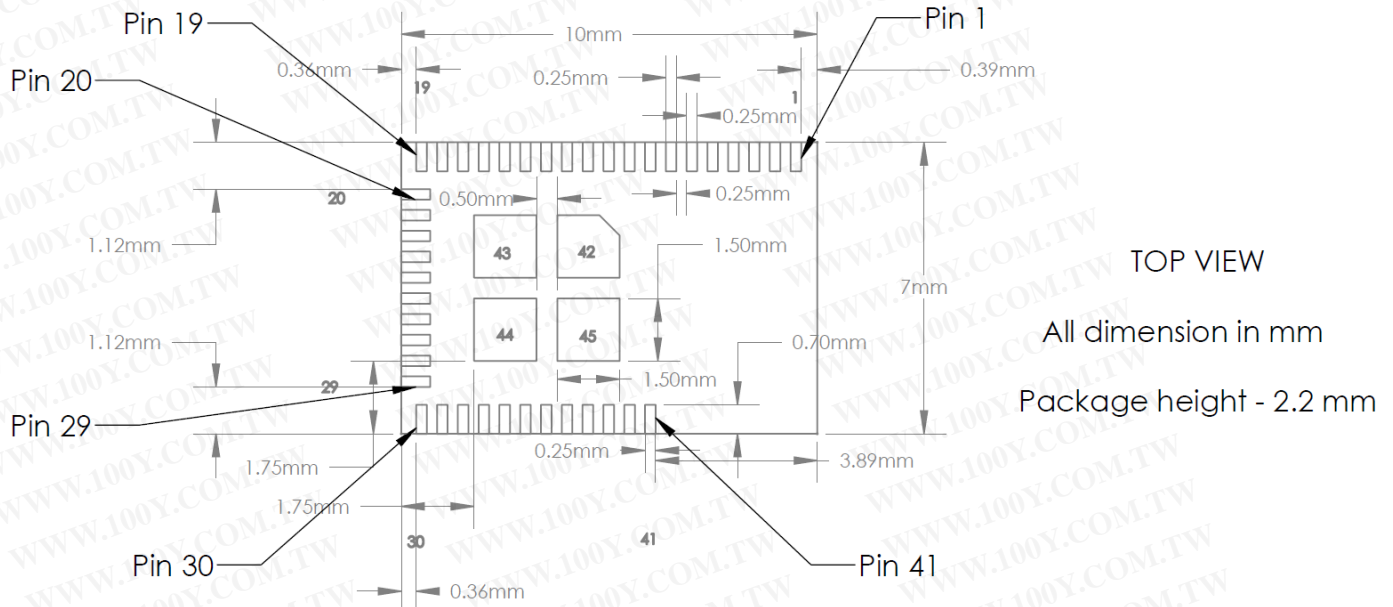
Parameter	Description	Min	Typ	Max	Units	Notes
ADC_{enob}	ADC bits		10		bit	
ADC_{ose}	Offset error	-2		+2	%	
ADC_{ge}	Gain error	-2		+2	%	
ADC_{ref}	Internal Band Gap reference error	-1.5		+1.5	%	1.2V Band Gap voltage
ADC_{rev_ext}	External reference voltage	0.83	1.2	1.3	V	
ADC_{t10}	Conversion time for 1 sample		68		us	10bit sample

6.7 I2C, SPI and UART Specifications

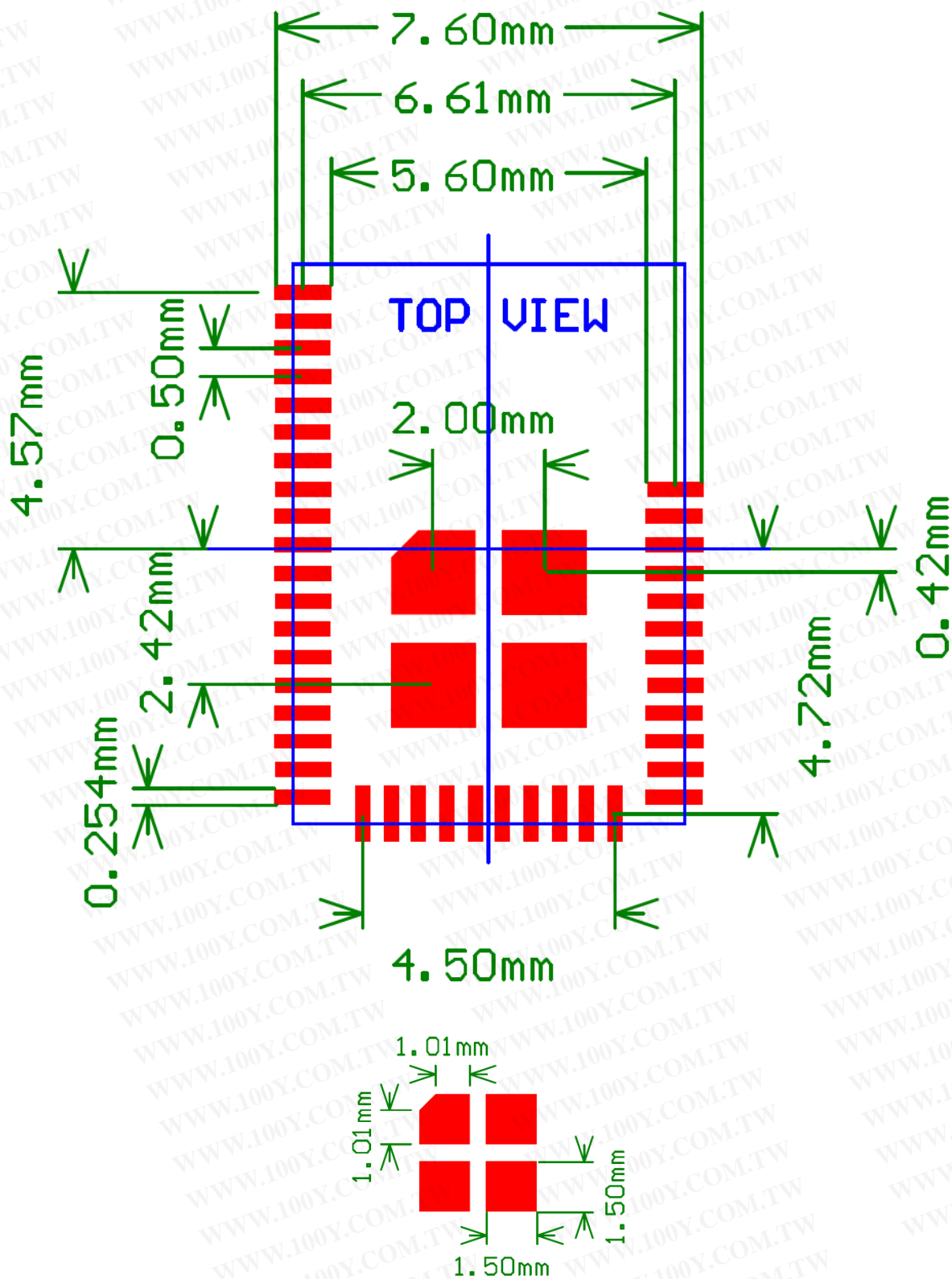
Parameter	Description	Min	Typ	Max	Units	Notes
I2C_{rate}	I2C bit rate	100		400	kbps	
SPI_{rate}	SPI master bit rate	0.125		4	Mbps	
SPIS_{rate}	SPI slave bit rate	0.125		2	Mbps	
UART_{rate}	UART bit rate	1.2		1000	kbps	

7. Mechanical Specifications

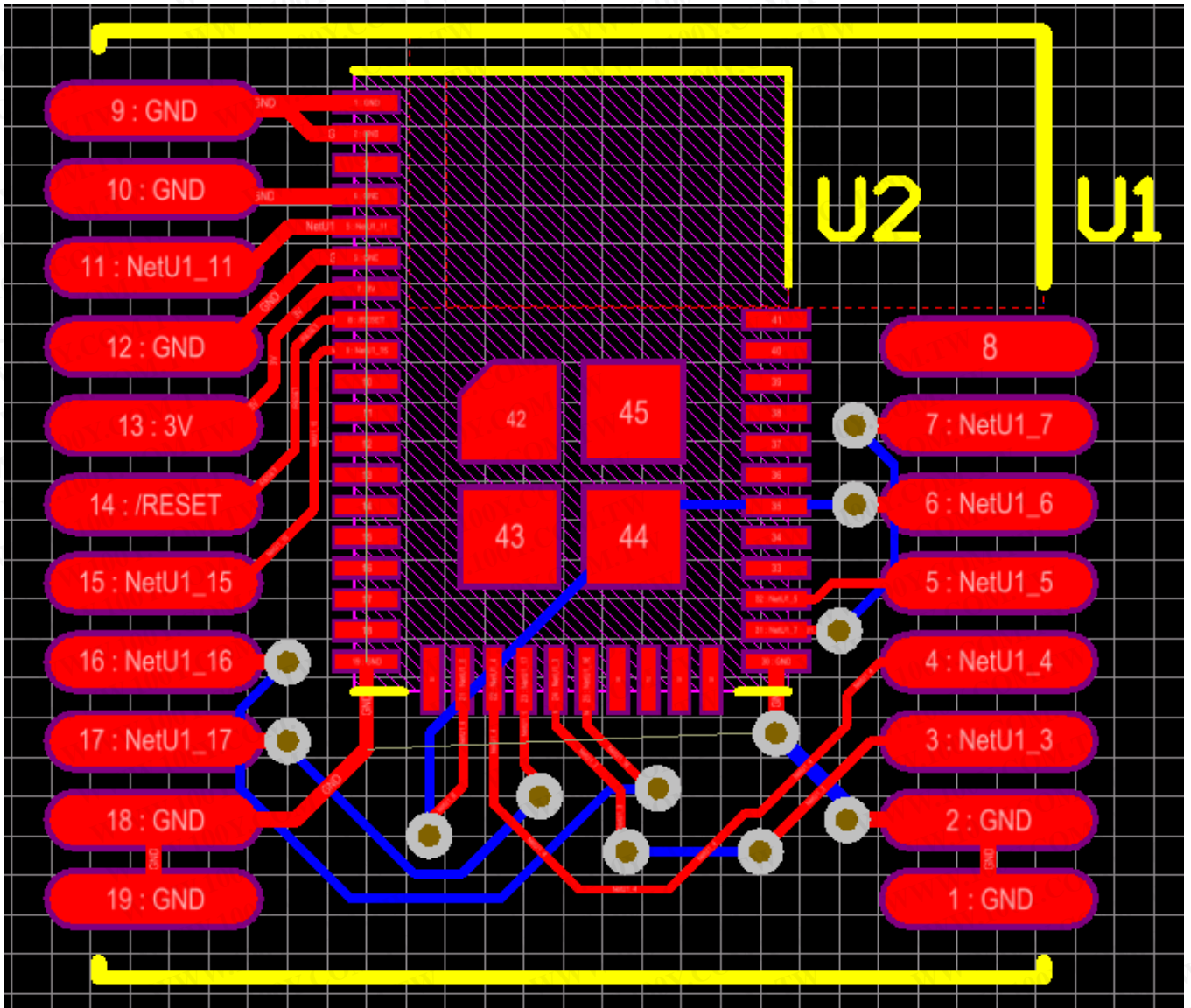
7.1 Physical Dimension



7.2 PCB Land Pattern



7.3 For RFduino users, Simblee / RFduino dual footprint



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