



TEST REPORT FOR BLUETOOTH RF-CONFORMANCE TESTING

Report No: SRTC2017-9004(S)-17080403(A)

Product Name: Module

Product Model: SIM868E

Applicant: Shanghai Simcom Wireless Solutions Co., Ltd

Manufacturer: Shanghai Simcom Wireless Solutions Co., Ltd

Specification: Radio Frequency (RF) Bluetooth Test Specification

RF PHY Bluetooth Test Specification

The State Radio_monitoring_center Testing Center (SRTC)

15th Building, No.30 Shixing Street, Shijingshan District,

Beijing, P.R.China

Tel: 86-10-57996123 Fax: 86-10-57996388

Contents

1 GENERAL INFORMATION	2
1.1 Notes of the test report	2
1.2 Information about the testing laboratory	2
1.3 Applicant’s details	2
1.4 Manufacturer’s details	2
1.5 Test Environment	3
2 DESCRIPTION OF THE EUT	4
3 REFERENCE SPECIFICATION	5
4 KEY TO NOTES AND RESULT CODES	6
5 RESULTS SUMMARY	7
6 TEST RESULTS	8
7 MEASUREMENT UNCERTAINTIES	10
7.1 Conducted measurements: T1111	10
7.2 Conducted measurements: Inter Lab	11
8 TEST EQUIPMENT LIST	14
8.1 Keysight T1111	14
8.2 InterLab	15
Annex A –Protocol Implementation Conformance Statement(PICS)	16
Annex B –Protocol Implementation Extra Information For Testing(PIXIT)	18
Annex C –EUT Photograph	20

1 GENERAL INFORMATION

1.1 Notes of the test report

The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written permission of The State Radio_monitoring_center Testing Center (SRTC).

The test results relate only to individual items of the samples which have been tested.

1.2 Information about the testing laboratory

Company:	The State Radio_monitoring_center Testing Center (SRTC)
Address:	15th Building, No.30 Shixing Street, Shijingshan District
City:	Beijing
Country or Region:	P.R.China
Contacted person:	Peng Zhen
Tel:	+86 10 57996123
Fax:	+86 10 57996388
Email:	pengzhen@srtc.org.cn

1.3 Applicant's details

Company:	Shanghai Simcom Wireless Solutions Co., Ltd
Address:	BuildingA, SIM Technology Building, No. 633, Jinzhong Road, Changning District, Shanghai P.R.China
City:	Shanghai
Country or Region:	P.R.China
Contacted person:	Wu Feiping
Tel:	021-32523255
Fax:	---
Email:	feiping.wu@sim.com

1.4 Manufacturer's details

Company:	Shanghai Simcom Wireless Solutions Co., Ltd
Address:	BuildingA, SIM Technology Building, No. 633, Jinzhong Road, Changning District, Shanghai P.R.China
City:	Shanghai
Country or Region:	P.R.China
Contacted person:	Wu Feiping
Tel:	021-32523255
Fax:	---
Email:	feiping.wu@sim.com

1.5 Test Environment

Date of Receipt of test sample at SRTC:	2017.8.04
Testing Start Date:	2017.8.04
Testing End Date:	2017.8.23

Environmental Data:	Temperature (°C)	Humidity (%)
Ambient:	25	38
Maximum Extreme:	---	---
Minimum Extreme:	---	---

Normal Supply Voltage (V d.c.):	3.8
Maximum Extreme Supply Voltage (V d.c.):	---
Minimum Extreme Supply Voltage (V d.c.):	---

PIXIT:	See annex B
Conformance log reference:	Refer to LOG documents
Retention date for log reference:	5 years

2 DESCRIPTION OF THE EUT

Product Name:	Module
Product Model:	SIM868E
Software Revision:	R14.18
Hardware Revision:	V2.01
Serial Number:	865725031342310
PICS:	See Annex A
Description of EUT:	Module
Sampling Method:	Sample Delivered

3 REFERENCE SPECIFICATION

Specification	Version	Title
Radio Frequency(RF)	V 5.0.0	Radio Frequency Bluetooth Test Specification, Revision RF.
RF PHY	V 5.0.0	RF PHY Bluetooth Test Specification, Revision RF-PHY

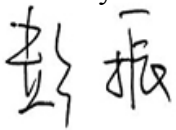
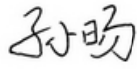

4 KEY TO NOTES AND RESULT CODES

Code	Meaning
PASS	Test result shows that the requirements of the relevant specification have been met.
FAIL	Test result shows that the requirements of the relevant specification have not been met.
NTNV	Normal voltage, Normal Temperature
T1111	Keysight BITE T1111 Bluetooth RF Tester
InterLab	InterLab Bluetooth RF Test Solution

5 RESULTS SUMMARY

The following table summarises the test results obtained.

PASS	34
FAIL	0
Total	34

This Test Report Is Issued by: Mr. Peng Zhen 	Checked by: Mr. Sun Yang 
Tested by: Mr. Yu Yacheng 	Issued date: 20170823

6 TEST RESULTS

The following tables reflect the requirements of the relevant specification and show the tests performed. Result files verifying these verdicts are available for inspection at SRTC.

No.	Test Case Id	Conditions	Verdict	Platform
1.	TRMCA01C.- Output Power	NTNV	PASS	Interlab
2.	TRMCA02C.- Power density	NTNV	PASS	Interlab
3.	TRMCA03C.- Power Control	NTNV	PASS	Interlab
4.	TRMCA04C.- TX Output Spectrum - Frequency range	NTNV	PASS	Interlab
5.	TRMCA05C.- TX Output Spectrum - 20 dB Bandwidth	NTNV	PASS	Interlab
6.	TRMCA06C.- TX Output Spectrum -Adjacent channel power	NTNV	PASS	T1111
7.	TRMCA07C.- Modulation Characteristics	NTNV	PASS	Interlab
8.	TRMCA08C.- Initial Carrier Frequency Tolerance	NTNV	PASS	Interlab
9.	TRMCA09C.- Carrier Frequency Drift	NTNV	PASS	Interlab
10.	TRMCA10C.- EDR Relative Transmit Power	NTNV	PASS	Interlab
11.	TRMCA11C.- EDR Carrier Frequency Stability and Modulation Accuracy	NTNV	PASS	Interlab
12.	TRMCA12C.- EDR Differential Phase Encoding	NTNV	PASS	Interlab
13.	TRMCA13C.- EDR In-band Spurious Emissions	NTNV	PASS	Interlab
14.	TRMCA14C.- Enhance Power Control	NTNV	PASS	Interlab
15.	RCVCA01C.- Sensitivity - single slot packets	NTNV	PASS	Interlab
16.	RCVCA02C.- Sensitivity - multi-slot packets	NTNV	PASS	Interlab
17.	RCVCA03C.- C/I performance	NTNV	PASS	Interlab
18.	RCVCA04C.- Blocking performance	NTNV	PASS	Interlab
19.	RCVCA05C.- Intermodulation performance	NTNV	PASS	Interlab
20.	RCVCA06C.- Maximum input level	NTNV	PASS	Interlab
21.	RCVCA07C.- EDR Sensitivity	NTNV	PASS	Interlab
22.	RCVCA08C.- EDR BER Floor Performance	NTNV	PASS	Interlab
23.	RCVCA09C.- EDR C-I Performance	NTNV	PASS	Interlab

No.	Test Case Id	Conditions	Verdict	Platform
24.	RCVCA10C.- EDR Maximum Input Level	NTNV	PASS	Interlab
25.	TRM-LE-01C.- Output Power at NOC	NTNV	PASS	Interlab
26.	TRM-LE-03C.- In-band emissions at NOC	NTNV	PASS	Interlab
27.	TRM-LE-05C.- Modulation characteristics	NTNV	PASS	Interlab
28.	TRM-LE-06C.- Carrier frequency offset and drift at NOC	NTNV	PASS	Interlab
29.	RCV-LE-01C.- Receiver sensitivity at NOC	NTNV	PASS	Interlab
30.	RCV-LE-03C.- C/I and receiver selectivity performance	NTNV	PASS	Interlab
31.	RCV-LE-04C.- Blocking performance	NTNV	PASS	Interlab
32.	RCV-LE-05C.- Intermodulation performance	NTNV	PASS	Interlab
33.	RCV-LE-06C.- Maximum input signal level	NTNV	PASS	Interlab
34.	RCV-LE-07C.- PER Report Integrity	NTNV	PASS	Interlab

7 MEASUREMENT UNCERTAINTIES

According to Radio Frequency (RF) Bluetooth Test Specification, Revision RF.TS/5.0.0, RF PHY Bluetooth Test Specification, Revision RF-PHY.TS/5.0.0, the following uncertainty values^{1,2} have been calculated and compared to the specified limits as in the table below.

7.1 Conducted measurements: T1111

Uncertainty values for BDR

Measurement uncertainty	RF Tester uncertainty	Specification limit	Test Case
Conducted measurements			
Absolute RF power (wanted channel)	1 dB	1.2 dB	TRM01-04, 06
Absolute RF power (for unwanted emissions in the BT band)	1.57 dB	3 dB	TRM02,04, 06
Absolute RF power (for unwanted emissions outside BT band, below 4 GHz)	2.38 dB	3 dB	TRC01
Absolute RF power (for unwanted emissions outside BT band, above 4 GHz)	2.97 dB	4 dB	TRC01
Relative RF power	0.94 dB	1 dB	TRM01, 03, 05
Absolute radio frequency	3.7 kHz	5 kHz	TRM08
Relative drift radio frequency	0.6 kHz	1 kHz	TRM09
Peak frequency deviation	1.4 kHz	4 kHz	TRM07

Uncertainty values for EDR

Measurement uncertainty	RF Tester uncertainty	Specification limit	Test Case
Conducted measurements			
Absolute RF power (wanted channel)	1.08 dB	1.2 dB	TRM13
Absolute RF power (for unwanted emissions in the BT band)	1.62 dB	3 dB	TRM13
Relative RF power	0.87 dB	1 dB	TRM10
Absolute radio frequency	3.435KHZ	5kHz	TRM11

Uncertainty values for LE

Measurement uncertainty	RF Tester uncertainty	Specification limit	Test Case
Conducted measurements			
Absolute RF power (wanted channel)	1.19 dB	1.2 dB	TRM-LE 01, 02
Absolute RF power (for unwanted emissions in the BT band)	1.19 dB	3 dB	TRM-LE 03,04
Absolute radio frequency	0.321 kHz	5 kHz	TRM-LE 05,06,07
Relative drift radio frequency	0.432 kHz	1 kHz	TRM-LE 06,07
frequency deviation	1.229 kHz	4 kHz	TRM-LE 05,

Note 1: All values reflect a 95% confidence level.

Note 2: All values are valid for operating system temperatures between 20°C and 30°C.

7.2 Conducted measurements: Inter Lab

Uncertainty values for BR/EDR

Measurement uncertainty	RF Tester uncertainty	Specification limit	Test Case
Absolute RF power	0.90 dB	1.2 dB	TRM01,02,03,04, 05,14
Absolute RF power (wanted channel)	0.90 dB	1.2 dB	TRM 06,13
Absolute RF power (for unwanted emissions in the BT band)	0.90 dB	3 dB	
Freq dev uncertainty in payload(GFSK)	4 kHz	4 kHz	TRM 07,08,09
Freq drift uncertainty(GFSK)	1 kHz	1 kHz	
Absolute radio frequency	5 kHz	5 kHz	
Relative RF Power	0.50 dB	1 dB	TRM 10
Absolute radio frequency	5 kHz	5 kHz	TRM 11
RMS DEVM	3%	<5%	

Measurement uncertainty	RF Tester uncertainty	Specification limit	Test Case
Relative drift radio frequency	1 kHz	1 kHz	
Symbol Error	1ppm	1ppm	TRM12
Frequency Accuracy	<0.5us or 1 ppm	1ppm	
Absolute RF power (wanted channel)	0.74 dB	1.2 dB	RCV01,02,06,07,08,10
Absolute RF power (wanted channel)	0.88 dB	1.2 dB	RCV03,09
Absolute RF power (for interfering signal)	1.12 dB	3 dB	
Absolute RF power (wanted channel)	0.88 dB	1.2 dB	RCV04
Absolute RF power (for 1st interfering signal)	1.12 dB	3 dB	
Absolute RF power (for 2nd interfering signal)	1.78 dB	3 dB	
Absolute RF power (wanted channel)	0.88 dB	1.2 dB	RCV05
Absolute RF power (for 1st interfering signal)	1.07 dB	3 dB	
Absolute RF power (for 2nd interfering signal)	1.20 dB	3 dB	

Uncertainty values for LE

Measurement uncertainty	RF Tester uncertainty	Specification limit	Test Case
Absolute RF power	0.90 dB	1.2 dB	TRM-LE 01,02
Absolute RF power (wanted channel)	0.90 dB	1.2 dB	TRM-LE 03,04
Absolute RF power (for unwanted emissions in the BT band)	0.90 dB	3 dB	
Freq dev uncertainty in payload(GFSK)	4 kHz	4 kHz	TRM-LE 05,06,07
Freq drift uncertainty(GFSK)	1 kHz	1 kHz	
Absolute radio frequency	5 kHz	5 kHz	
Absolute RF power (wanted channel)	0.74 dB	1.2 dB	RCV-LE 01,02,03,06,07

Measurement uncertainty	RF Tester uncertainty	Specification limit	Test Case
Absolute RF power (for interfering signal)	1.12 dB	3 dB	RCV-LE 03
Absolute RF power (wanted channel)	0.74 dB	1.2 dB	RCV-LE 04
Absolute RF power (for 1st interfering signal)	1.12 dB	3 dB	
Absolute RF power (for 2nd interfering signal)	1.78 dB	3 dB	
Absolute RF power (wanted channel)	0.74 dB	1.2 dB	RCV-LE 05
Absolute RF power (for 1st interfering signal)	1.07 dB	3 dB	
Absolute RF power (for 2nd interfering signal)	1.20 dB	3 dB	

Note 1: All values reflect a 95% confidence level.

Note 2: All values are valid for operating system temperatures between 20°C and 30°C.

8 TEST EQUIPMENT LIST

Conformance testing was performed using test equipment calibrated in accordance with CNAS accreditation requirements. Calibration, configuration records and equipment details used for conformance testing are available for inspection at SRTC if required.

8.1 Keysight T1111

Hardware:					
No.	Equipment Name	Manufacturer	Model Number	Serial Number	Calibration Due Date
1	Spectrum Analyzer	Agilent	E7405A	MY45111747	2018.02.28
2	Sweep Generator	Agilent	E8257D	MY46520645	2018.02.28
3	RF Signal Generator	Agilent	E4438C	MY45090847	2018.02.28
4	Bluetooth Test Set	Anritsu	MT8852B	1239003	2018.02.28
5	Distribution Amplifier	TIMETECH	TIMETECH	---	---
6	Switching Unit	AT4	E1210	E1210000024	---
7	Temperature and Humidity Box	ESPEC	SH241	92013770	2018.08.19
8	Power Supply	Agilent	66311B	MY43009400	2018.03.01
9	Power Meter	Agilent	E4416A	GB41292546	2018.02.28
10	Power Sensor	Agilent	8485D	MY41090634	2018.02.28
		Agilent	8482A	MY41092445	2018.02.28
11	EDR Signal Unit	AT4	E1111	E1111000146	---
Software:					
BITE RF Tester (GFSK-SW ver 1.3.22)					
BITE RF Tester (EDR-SW ver 1.0.0.24)					
BITE RF Tester (LE-SW ver 1.0.0.8)					

8.2 InterLab

Hardware:					
Items	Test Equipment Name	Manufacturer	Model	Serial Number	Cal Due data
001	Spectrum Analyzer	R&S	FSL3	104526	2017.12.15
002	Sweep Generator	R&S	SMF100A	104774	2017.12.15
003	RF Signal Generator	R&S	SMBV100A	261074	2017.12.15
004	Bluetooth Test Set	R&S	CMW270	100555	2017.12.15
005	Switching Unit	InterLab	---	---	---
006	Temperature and Humidity Box	ESPEC	E0517	92000390	2018.08.19
007	Power Supply	R&S	HMP2020	021921846	2017.12.15
008	Power Sensor	R&S	NRP-Z21	104690	2017.12.15
Software:					
Test Engine ver 5.0.7					

Annex A –Protocol Implementation Conformance Statement(PICS)

PICS performance for Radio(BR/EDR)

Item	Capability	Reference	Status	Support: Yes or No	Values Allowed	Values Supported
1	Power Class 1	RF, 3	M,1	YES		
2	Power Class 2	RF, 3	M,1	NO		
3	Power Class 3	RF, 3	M,1	NO		
4	Power Control	RF, 3	C.1	YES	-	-
5	1-slot packets supported	BB,6.5	M	YES	-	-
6	3-slot packets supported	BB,6.5	O	YES	-	-
7	5-slot packets supported	BB,6.5	O	YES	-	-
8	79 Channels	RF, 2	M	YES	-	-
9	Support for GFSK modulation	RF, 3.1	M	YES		
10	Support for $\pi/4$ -DQPSK modulation	RF, 3.2	C.2	YES		
11	Support for 8DPSK modulation	RF, 3.2	C.3	YES		
12	Enhanced Power Control	RF,3	C.4	YES		

M.1: Must choose one only one power class.

C.1: Mandatory to support if 1/1 is supported, ELSE Optional to support if 1/2 OR 1/3 is supported.

Mandatory if SUM_ICS 21/4 OR SUM_ICS 21/6 OR (SUM_ICS 21/8 AND EDR Support) is

C.2: claimed; ELSE Optional if SUM_ICS 21/3 OR SUM_ICS 21/5 OR SUM_ICS 21/8 is claimed; ELSE Excluded.

Mandatory if SUM_ICS 21/4 OR SUM_ICS 21/6 OR (SUM_ICS 21/8 AND EDR Support) is

C.3: claimed; ELSE Optional if 1/8 AND (SUM_ICS 21/3 OR SUM_ICS 21/5 OR SUM_ICS 21/8) is claimed; ELSE Excluded.

C.4: Optional if Sum_ICS,21/8 AND 1/4 supported, ELSE Excluded.

PICS performance for RF-PHY(LE)

Item	Capability	Reference	Status	Support: Yes or No
1	LE Transmitter (Non-connectable, Broadcaster)	Specification Part A, Volume 6 Physical Layer , 3	C,1	YES
2	LE Receiver (Non-connectable, Observer)	Specification Part A, Volume 6 Physical Layer , 4	C,1	YES
3	LE Transceiver (connectable, Peripheral/Central)	Specification Part A, Volume 6 Physical Layer , 3&4	C,1	YES
4	HCI Test Interface	Specification Part F, Volume 6 Direct Test Mode, 2	C,1	YES
5	UART Test Interface	Specification Part F, Volume 6 Direct Test Mode, 3	C,1	YES

C.1: At least one of the capabilities shall be supported.

Annex B –Protocol Implementation Extra Information For Testing(PIXIT)

Item	Identifier	Units	Comments	Value
P1:1	Inband Image frequency -Low Frequency	MHz	RCV-LE/CA/03/C(C/I and Receiver selectivity Performance)	0
P1:2	Inband Image frequency -Middle Frequency	MHz	RCV-LE/CA/03/C(C/I and Receiver selectivity Performance)	0
P1:3	Inband Image frequency -High Frequency	MHz	RCV-LE/CA/03/C(C/I and Receiver selectivity Performance)	0
P2:1	Value n for intermodulation test -Low Frequency	Integer	RCV-LE/CA/05/C(Intermodulation Performance)	5
P2:2	Value n for intermodulation test -Middle Frequency	Integer	RCV-LE/CA/05/C(Intermodulation Performance)	5
P2:3	Value n for intermodulation test -High Frequency	Integer	RCV-LE/CA/05/C(Intermodulation Performance)	5
P3	Type of power source	-	Chapter 7.5.2, Bluetooth Low Energy RF-PHY Test Specification	Dc
P4:1	Power source voltage -Nominal(NOC)	V	Chapter 7.4.2, Bluetooth Low Energy RF PHY Test Specification	3.8
P4:2	Power source voltage -Maximum(EOC)	V	Chapter 7.5.2, Bluetooth Low Energy RF PHY Test Specification	4.4
P4:3	Power source voltage -Minimum(EOC)	V	Chapter 7.5.2, Bluetooth Low Energy RF PHY Test Specification	3.4
P5:1	Operating temperature -Nominal (NOC)	°C	Chapter 7.4.1, Bluetooth Low Energy RF PHY Test Specification	25

Item	Identifier	Units	Comments	Value
P5:2	Operating temperature -Maximum (EOC)	°C	Chapter 7.5.1, Bluetooth Low Energy RF PHY Test Specification	---
P5:1	Operating temperature -Minimum (EOC)	°C	Chapter 7.5.1, Bluetooth Low Energy RF PHY Test Specification	---
P6:1	Air humidity range (relative) -Maximum(NOC)	%	Chapter 7.5.1, Bluetooth Low Energy RF PHY Test Specification	75
P6:2	Air humidity range (relative) -Minimum(NOC)	%	Chapter 7.5.1, Bluetooth Low Energy RF PHY Test Specification	20
P7:1	Test interface implementation -HCI or UART	--	Part F, Chapter 1.1, Bluetooth Low Energy Controller Specification	UART
P7:2	Test interface implementation -Datarate	bps	Part F, Chapter 3, Bluetooth Low Energy Controller Specification	1M
P8	Antenna gain	dBi	Part A, Chapter 3, Bluetooth Low Energy Controller Specification	2.18
P9	Time for TX power control	ms	TRM/CA/03/ (E/C) Power Control	0

Annex C –EUT Photograph

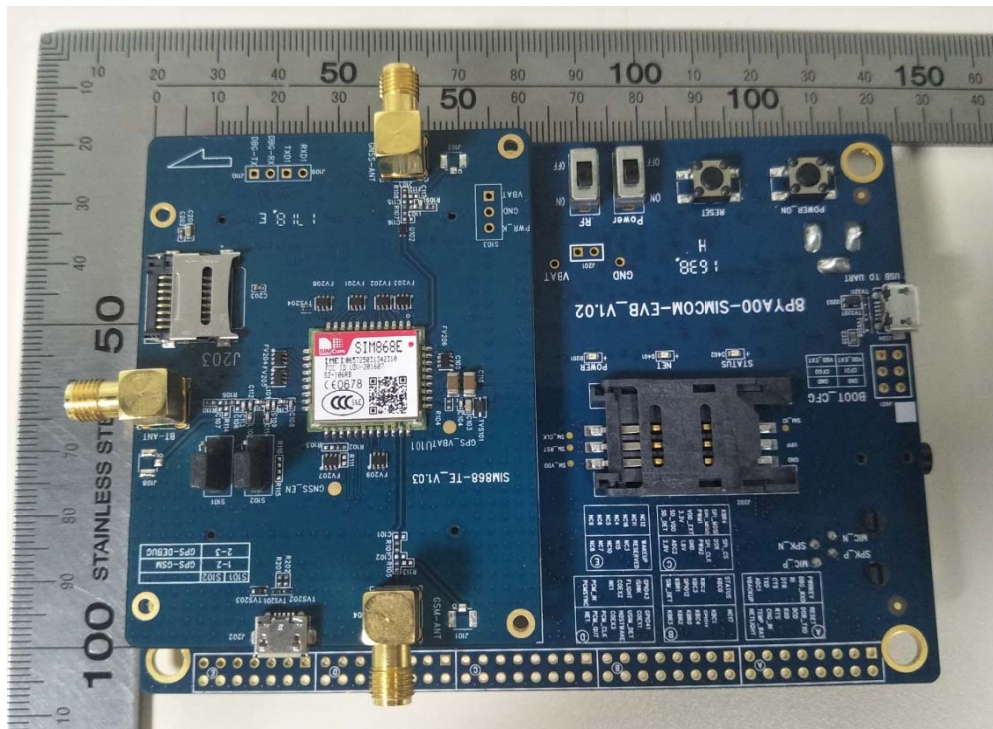


Photo1: The front view of EUT

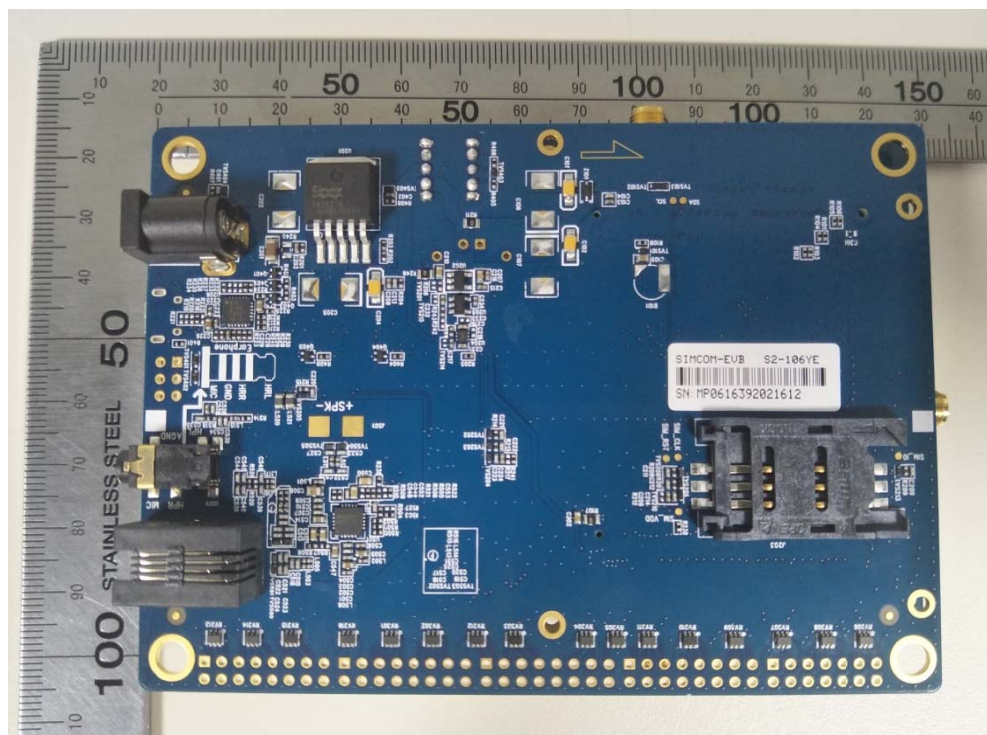


Photo2: The back view of EUT

---End of Test Report---