



FCC EMI TEST REPORT

FCC ID : 2AVSJSWTPWMIT0120
Equipment : Soiltech Wireless Sensor
Brand Name : Soiltech Wireless Inc
Model Name : Soiltech Sensor
Applicant : Soiltech Wireless Inc
8 The Green, STE A, Dover, DE 19901, USA
Manufacturer : Soiltech Wireless Inc
8 The Green, STE A, Dover, DE 19901, USA
Standard : FCC 47 CFR FCC Part 15 Subpart B Class B

The product was received on Feb. 19, 2020 and testing was started from Mar. 20, 2020 and completed on Apr. 01, 2020. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI C63.4-2014 and has been in compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Louis Wu

Approved by: Louis Wu

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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History of this test report

Report No.	Version	Description	Issued Date
FC021946	01	Initial issue of report	Apr. 06, 2020



Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
-	15.107	AC Conducted Emission	Not Required	-
3.1	15.109	Radiated Emission	Pass	Under limit 13.73 dB at 958.700 MHz
Note: Not required means after assessing, test items are not necessary to carry out.				

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Dara Chiu

Report Producer: Lucy Wu

1. General Description

1.1. Product Feature of Equipment Under Test

LTE, Bluetooth, and GNSS.

Product Specification subjective to this standard	
Integrated the WWAN Module	Brand: QUECTEL Model: BG96
Integrated the Bluetooth-LE Module	Brand: HOLSER TECHNOLOGY CO., LTD. Model: HS-BT01-2
Antenna Type	WWAN: PCB Antenna Bluetooth: PCA Antenna GPS/Glonass/BDS: Ceramic Antenna

1.2. Modification of EUT

No modifications are made to the EUT during all test items.

1.3. Test Location

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Site No.	Sporton Site No. 03CH06-HY

FCC designation No.: TW1093

1.4. Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ FCC 47 CFR FCC Part 15 Subpart B Class B
- ♦ ANSI C63.4-2014

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

2. Test Configuration of Equipment Under Test

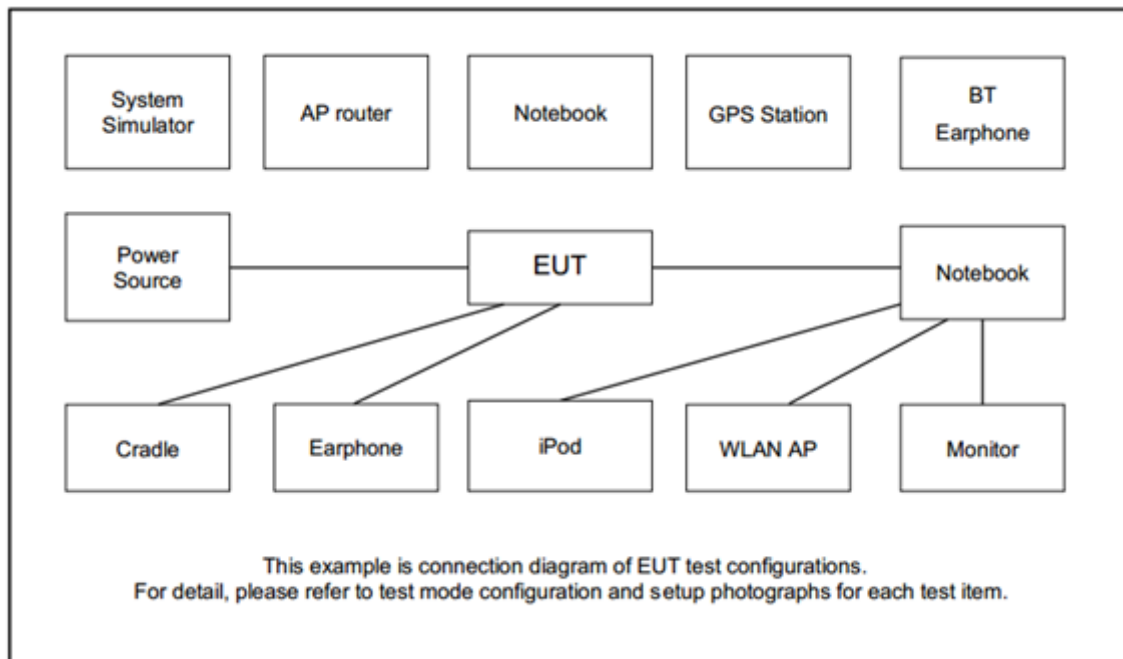
2.1. Test Mode

The EUT has been associated with peripherals pursuant to ANSI C63.4-2014 and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

Frequency range investigated: radiation emission (30MHz to the 5th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

Test Items	Function Type
Radiated Emissions	Mode 1: LTE Band 12 Cat. M1 Idle + Bluetooth-LE Idle + GPS Rx
Remark: For radiation emission after pre-scanned the cellular band between 30MHz ~ 960MHz (LTE Band 12); only the worst case for cellular band test data of this mode was reported.	

2.2. Connection Diagram of Test System



2.3. Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8821C	N/A	N/A	Unshielded, 1.8 m
2.	Bluetooth Phone	Asus	Zenfone5	N/A	N/A	N/A
3.	Notebook	DELL	Latitude E3340	FCC DoC/ Contains FCC ID: PD97260NGU	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	GPS Station	Pendulum	GSG-54	N/A	N/A	Unshielded, 1.8 m

2.4. EUT Operation Test Setup

The EUT was in LTE idle mode during the testing. The EUT was synchronized with the BCCH, and had been continuous receiving mode by setting paging reorganization of the system simulator.

At the same time, the EUT was attached to the Bluetooth Phone via Bluetooth function, and the following programs installed in the EUT were programmed during the test:

1. Execute "cmd" to make the EUT receive continuous signals from GPS station.

3. Test Result

3.1. Test of Radiated Emission Measurement

3.1.1. Limit of Radiated Emission

The emissions from an unintentional radiator shall not exceed the field strength levels specified in the following table:

<Class B>

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.1.2. Measuring Instruments

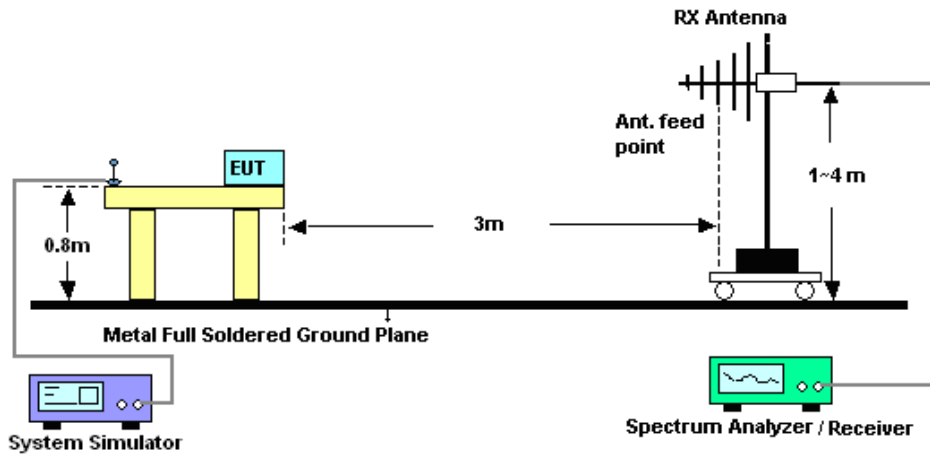
Refer a test equipment and calibration data table in this test report.

3.1.3. Test Procedures

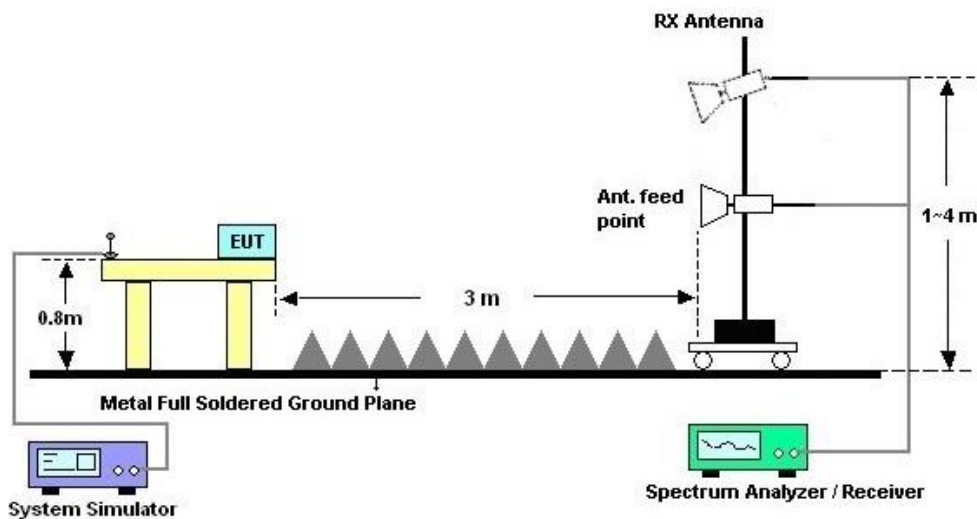
1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna is a Bi-Log antenna and its height is adjusted between one to four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode (RBW=120kHz/VBW=300kHz for frequency below 1GHz; RBW=1MHz VBW=3MHz (Peak), RBW=1MHz/VBW=10Hz (Average) for frequency above 1GHz).
7. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, peak values of EUT will be reported. Otherwise, the emission will be repeated by using the quasi-peak method and reported.
8. Emission level (dBμV/m) = 20 log Emission level (μV/m)
9. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

3.1.4. Test Setup of Radiated Emission

For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.1.5. Test Result of Radiated Emission

Please refer to Appendix A.

4. List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Amplifier	SONOMA	310N	186713	9kHz~1GHz	May 01, 2019	Mar. 20, 2020~ Apr. 01, 2020	Apr. 30, 2020	Radiation (03CH06-HY)
Bilog Antenna	Schaffner	CBL 6111C & N-6-06	2725 & AT-N0601	30MHz~1GHz	Jan. 09, 2020	Mar. 20, 2020~ Apr. 01, 2020	Jan. 08, 2021	Radiation (03CH06-HY)
EMI Test Receiver	Rohde & Schwarz	ESU26	100472	20Hz~26.5GHz	Jan. 10, 2020	Mar. 20, 2020~ Apr. 01, 2020	Jan. 09, 2021	Radiation (03CH06-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120 D	9120D-1156	1GHz~18GHz	Aug. 30, 2019	Mar. 20, 2020~ Apr. 01, 2020	Aug. 29, 2020	Radiation (03CH06-HY)
Preamplifier	MITEQ	00101800-30- 10P	1850117	1GHz~18GHz	May 23, 2019	Mar. 20, 2020~ Apr. 01, 2020	May 22, 2020	Radiation (03CH06-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104 / STORM/LL142	MY24966/4 / 00100A1O2A1 78T	30MHz~26GHz	Nov. 21, 2019	Mar. 20, 2020~ Apr. 01, 2020	Nov. 20, 2020	Radiation (03CH06-HY)
Controller	INN-CO	EM1000	060782	Control Turn table & Ant Mast	N/A	Mar. 20, 2020~ Apr. 01, 2020	N/A	Radiation (03CH06-HY)
Antenna Mast	MF	MF-7802	MF780208212	1m~4m	N/A	Mar. 20, 2020~ Apr. 01, 2020	N/A	Radiation (03CH06-HY)
Turn Table	INN-CO	DS2000	420/650/00	0-360 degree	N/A	Mar. 20, 2020~ Apr. 01, 2020	N/A	Radiation (03CH06-HY)
Software	Audix	E3 6.2009-8-24(k 5)	N/A	N/A	N/A	Mar. 20, 2020~ Apr. 01, 2020	N/A	Radiation (03CH06-HY)

5. Uncertainty of Evaluation

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

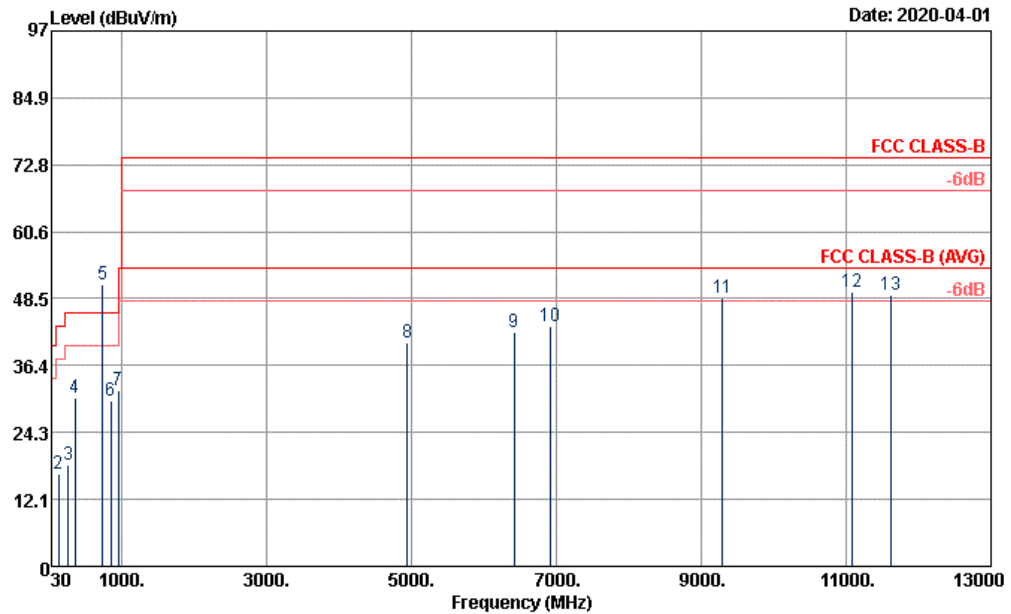
Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.3
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.8
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Appendix A. Radiated Emission Test Result

Test Engineer :	Brad Liu	Temperature :	23~24°C
		Relative Humidity :	43~45%
Test Distance :	3m	Polarization :	Horizontal
Remark :	#5 is system simulator signal which can be ignored.		

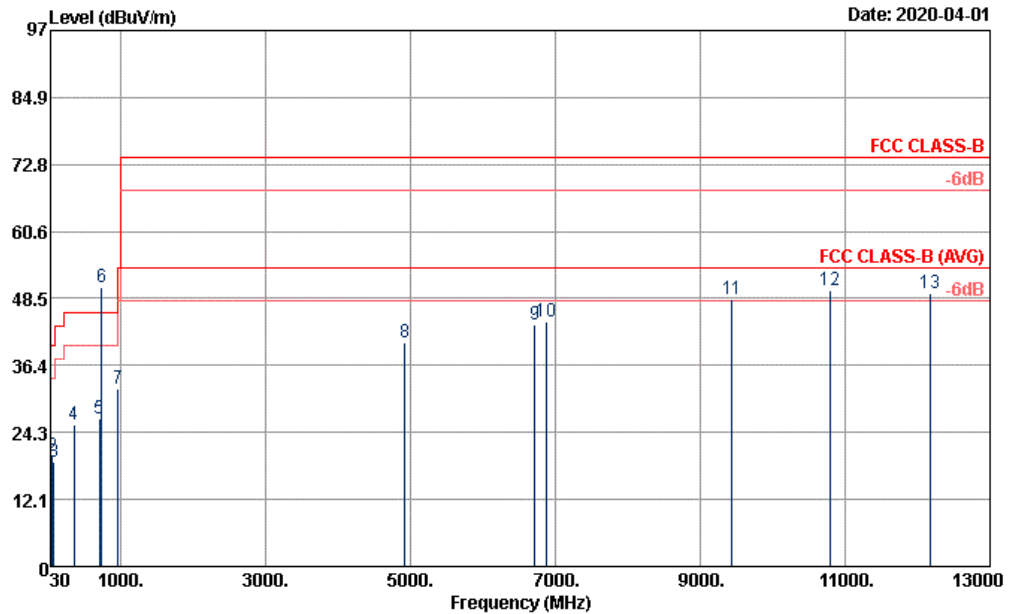


Site : 03CH06-HY
 Condition : FCC CLASS-B 3m 9120B_1156 HORIZONTAL
 Project : 021946
 Power : From Battery
 Memo : Mode 1

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	30.54	21.39	-18.61	40.00	28.79	23.57	0.66	31.64	---	---	Peak
2	130.98	16.62	-26.88	43.50	29.11	17.58	1.50	31.63	---	---	Peak
3	258.15	18.42	-27.58	46.00	28.26	19.50	2.12	31.55	---	---	Peak
4	357.40	30.56	-15.44	46.00	39.21	20.37	2.48	31.61	---	---	Peak
5 *	737.50	51.09			51.32	27.69	3.63	31.80	---	---	Peak
6	853.00	30.11	-15.89	46.00	28.32	29.03	3.92	31.50	---	---	Peak
7	950.30	31.96	-14.04	46.00	27.94	30.42	4.06	30.87	100	113	Peak
8	4942.00	40.61	-33.39	74.00	57.61	31.40	9.80	58.20	---	---	Peak
9	6418.00	42.35	-31.65	74.00	55.82	33.70	11.38	58.55	---	---	Peak
10	6916.00	43.37	-30.63	74.00	54.34	35.03	12.43	58.43	---	---	Peak
11	9298.00	48.51	-25.49	74.00	52.12	39.00	15.43	58.04	---	---	Peak
12	11086.00	49.77	-24.23	74.00	49.26	40.15	16.71	56.35	100	32	Peak
13	11626.00	49.30	-24.70	74.00	48.54	39.90	17.16	56.30	---	---	Peak



Test Engineer :	Brad Liu	Temperature :	23~24°C
		Relative Humidity :	43~45%
Test Distance :	3m	Polarization :	Vertical
Remark :	#6 is system simulator signal which can be ignored.		



Site : 03CH06-HY
Condition : FCC CLASS-B 3m 9120B_1156 VERTICAL
Project : 021946
Power : From Battery
Memo : Mode 1

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Preamp	A/Pos	T/Pos	Remark		
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	31.08	20.40	-19.60	40.00	27.80	23.57	0.66	31.64	---	---	Peak
2	54.57	20.06	-19.94	40.00	38.25	12.45	0.96	31.62	---	---	Peak
3	71.85	18.79	-21.21	40.00	36.94	12.39	1.07	31.64	---	---	Peak
4	355.30	25.70	-20.30	46.00	34.40	20.33	2.47	31.61	---	---	Peak
5	706.00	26.84	-19.16	46.00	28.45	26.52	3.53	31.86	---	---	Peak
6 *	737.50	50.52			50.75	27.69	3.63	31.80	---	---	Peak
7	958.70	32.27	-13.73	46.00	27.97	30.56	4.07	30.79	100	165	Peak
8	4924.00	40.56	-33.44	74.00	57.87	31.30	9.74	58.35	---	---	Peak
9	6712.00	43.75	-30.25	74.00	56.09	34.47	11.71	58.52	---	---	Peak
10	6874.00	44.18	-29.82	74.00	55.58	34.83	12.22	58.45	---	---	Peak
11	9436.00	48.47	-25.53	74.00	52.07	38.77	15.79	58.16	---	---	Peak
12	10786.00	50.01	-23.99	74.00	50.11	40.30	16.47	56.87	100	139	Peak
13	12184.00	49.32	-24.68	74.00	50.01	39.13	17.64	57.46	---	---	Peak