



FCC CO-LOCATION RADIO TEST REPORT

FCC ID : APYHRO00278
Equipment : Smart phone
Brand Name : SHARP
Applicant : SHARP CORPORATION
1 Takumi-cho, Sakai-ku, Sakai City, Osaka,
Japan 590-8522
Manufacturer : SHARP CORPORATION
2-13-1, HACHIHONMATSU-IIDA,
HIGASHI-HIROSHIMA-SHI, HIROSHIMA
PREFECTURE 739-0192, JAPAN
Standard : 47 CFR Part 2, 22(H)

The product was received on Aug. 06, 2019 and testing was started from Aug. 29, 2019 and completed on Sep. 05, 2019. 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 / TIA-603-E 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
FG960602-01C	01	Initial issue of report	Sep. 18, 2019
FG960602-01C	02	Revising company address of applicant	Oct. 17, 2019

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.4	§2.1053 §22.917 (a)	Field Strength of Spurious Radiation	Pass	Under limit 12.73 dB at 2472.000 MHz

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: Wii Chang

Report Producer: Jessie Ho



1 General Description

1.1 Product Feature of Equipment Under Test

GSM/WCDMA/LTE, Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n, Wi-Fi 5GHz 802.11a/n/ac, NFC, and GNSS.

Product Specification subjective to this standard	
Antenna Type	WWAN: Fixed Internal Antenna WLAN: PIFA Antenna Bluetooth: PIFA Antenna GPS / Glonass / BDS / Galileo: PIFA Antenna NFC: Loop Antenna

1.2 Modification of EUT

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

1.3 Testing 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. 03CH07-HY
Test Engineer	Jesse Wang and Stan Hsieh
Temperature	25~26
Relative Humidity	56~57

Note: The test site complies with ANSI C63.4 2014 requirement.
FCC Designation No.: TW1190

1.4 Applicable Standards

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

- ♦ ANSI C63.26-2015
- ♦ ANSI / TIA-603-E
- ♦ FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05r02.
- ♦ FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01..
- ♦ 47 CFR Part 2, 22(H)
- ♦ FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

2.1 Test Mode

Antenna port conducted and radiated test items were performed according to KDB 971168 D01 Power Meas. License Digital Systems v03r01 with maximum output power.

For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Z plane for Cellular Band with Main Ant.) were recorded in this report.

Radiated emissions were investigated as following frequency range:

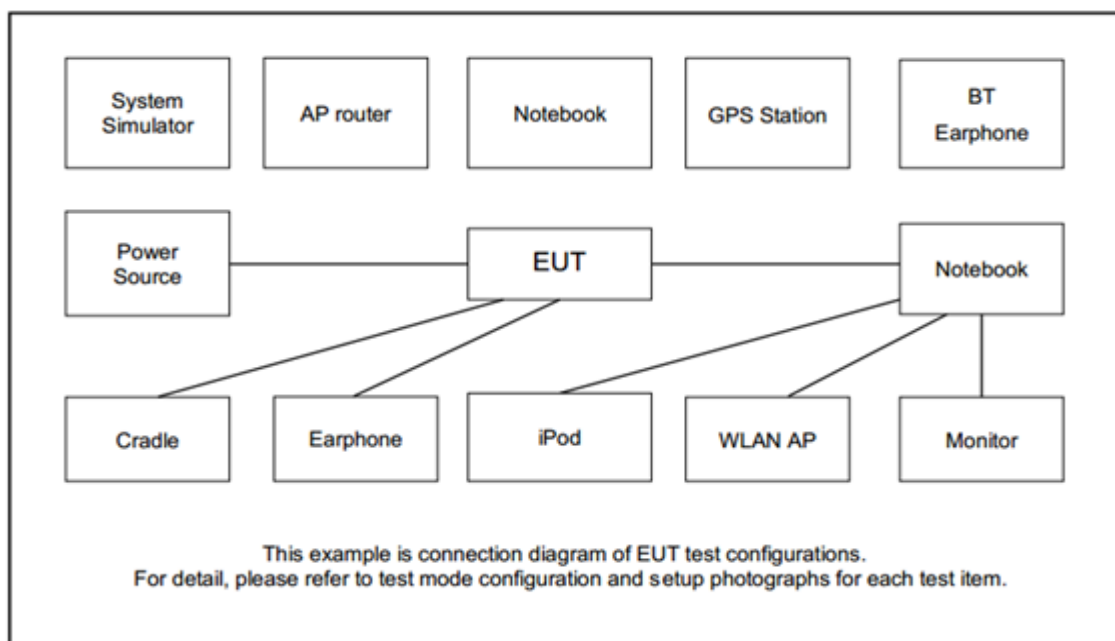
30 MHz to 9000 MHz for GSM850.

All modes and data rates and positions were investigated.

Test modes are chosen to be reported as the worst case configuration below:

Test Modes	
Band	Radiated TCs
GSM 850	GPRS Class 8 Link
Remark: During the Radiated Spurious Emission test, the EUT turn on the WLAN functions simultaneously.	

2.2 Connection Diagram of Test System





2.3 Support Unit used in test configuration

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	iPhone Earphone	Apple	A1387	FCC DoC	N/A	N/A

2.4 Frequency List of Low/Middle/High Channels

Frequency List				
Band	Channel/Frequency(MHz)	Lowest	Middle	Highest
GSM850	Channel	128	189	251
	Frequency	824.2	836.4	848.8

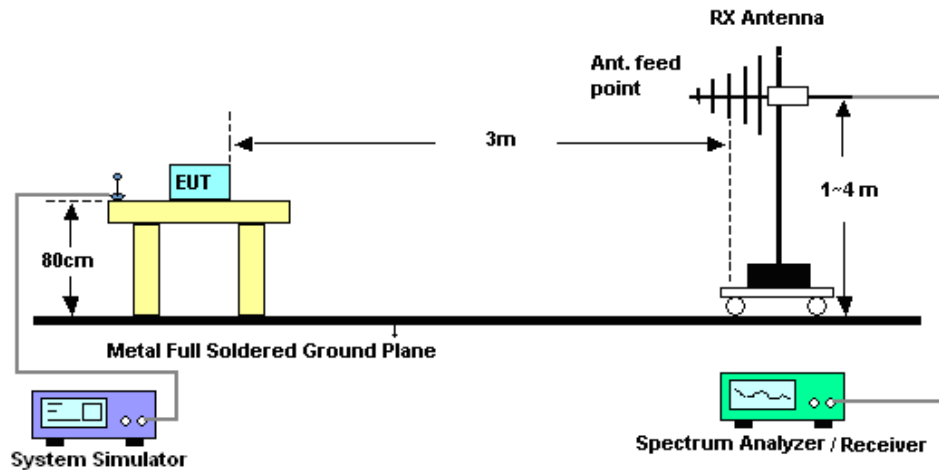
3 Radiated Test Items

3.1 Measuring Instruments

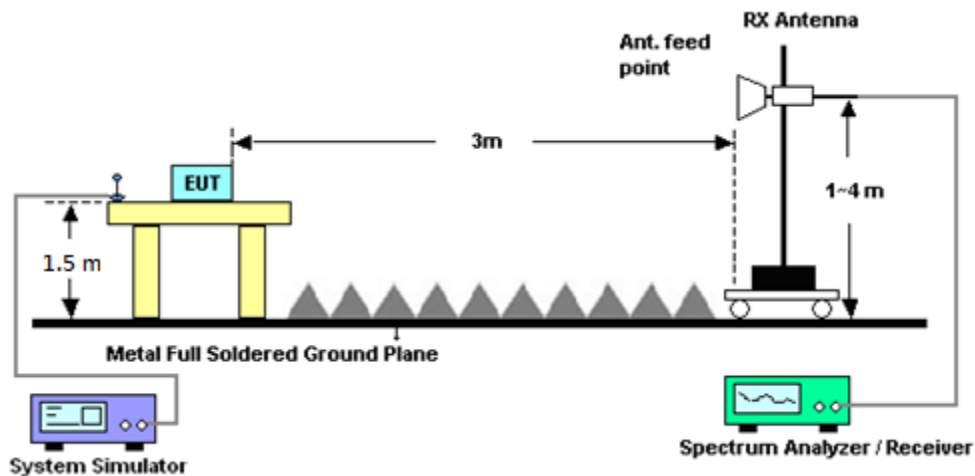
See list of measuring instruments of this test report.

3.2 Test Setup

For radiated test from 30MHz to 1GHz



For radiated test above 1GHz



3.3 Test Result of Radiated Test

Please refer to Appendix A.

3.4 Field Strength of Spurious Radiation Measurement

3.4.1 Description of Field Strength of Spurious Radiated Measurement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least $43 + 10 \log (P)$ dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

3.4.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 7 and ANSI / TIA-603-E Section 2.2.12.

1. The EUT was placed on a rotatable wooden table 0.8 meters for frequency below 1GHz and 1.5 meter for frequency above 1GHz above the ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search for the maximum spurious emission for both horizontal and vertical polarizations.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking record of maximum spurious emission.
6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Taking the record of output power at antenna port.
9. Repeat step 7 to step 8 for another polarization.
10. $EIRP \text{ (dBm)} = S.G. \text{ Power} - Tx \text{ Cable Loss} + Tx \text{ Antenna Gain}$
11. $ERP \text{ (dBm)} = EIRP - 2.15$
12. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
13. The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P(Watts)



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D 01N-06	35419 & 03	30MHz~1GHz	Apr. 30, 2019	Aug. 29, 2019~ Sep. 05, 2019	Apr. 29, 2020	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Dec. 02, 2018	Aug. 29, 2019~ Sep. 05, 2019	Dec. 03, 2019	Radiation (03CH07-HY)
EMI Test Receiver	Agilent	N9038A(M XE)	MY5329005 3	20Hz~26.5GHz	Jan. 23, 2019	Aug. 29, 2019~ Sep. 05, 2019	Jan. 22, 2020	Radiation (03CH07-HY)
Preamplifier	COM-POWE R	PA-103A	161241	10MHz~1GHz	May 20, 2019	Aug. 29, 2019~ Sep. 05, 2019	May 19, 2020	Radiation (03CH07-HY)
Preamplifier	Agilent	8449B	3008A02362	1GHz~26.5GHz	Nov. 02, 2018	Aug. 29, 2019~ Sep. 05, 2019	Nov. 01, 2019	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLE X 104	MY28655/4, MY24971/4, MY15682/4	30MHz~1GHz	Feb. 26, 2019	Aug. 29, 2019~ Sep. 05, 2019	Feb. 25, 2020	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLE X 104	MY28655/4, MY24971/4, MY15682/4	1GHz~18GHz	Feb. 26, 2019	Aug. 29, 2019~ Sep. 05, 2019	Feb. 25, 2020	Radiation (03CH07-HY)
Antenna Mast	Max-Full	MFA520B S	N/A	1m~4m	N/A	Aug. 29, 2019~ Sep. 05, 2019	N/A	Radiation (03CH07-HY)
Turn Table	ChainTek	Chaintek 3000	N/A	0~360 Degree	N/A	Aug. 29, 2019~ Sep. 05, 2019	N/A	Radiation (03CH07-HY)
Preamplifier	MITEQ	TTA1840-3 5-HG	1871923	18GHz~40GHz, VSWR : 2.5:1 max	N/A	Aug. 29, 2019~ Sep. 05, 2019	N/A	Radiation (03CH07-HY)
Horn Antenna	ESCO	3117	00143261	1GHz~18GHz	Jan. 07, 2019	Aug. 29, 2019~ Sep. 05, 2019	Jan. 06, 2020	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBE CK	BBHA 9170	BBHA91702 51	18GHz~40GHz	Nov. 20, 2018	Aug. 29, 2019~ Sep. 05, 2019	Nov. 19, 2019	Radiation (03CH07-HY)
Signal Generator	Anritsu	MG3694C	163401	0.1Hz~40GHz	Jan. 21, 2019	Aug. 29, 2019~ Sep. 05, 2019	Jan. 20, 2020	Radiation (03CH07-HY)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.05
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Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.44
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Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.95
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**Radiated Spurious Emission****GPRS850**

GPRS 850									
Channel	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	1648	-47.53	-13	-34.53	-59.73	-49.29	0.98	4.89	H
	2472	-32.49	-13	-19.49	-49.85	-34.37	1.28	5.32	H
	3296	-57.86	-13	-44.86	-77.32	-61.27	1.54	7.10	H
	4120	-51.03	-13	-38.03	-71.71	-55.67	1.83	8.62	H
									H
									H
									H
	1648	-41.06	-13	-28.06	-53.73	-42.82	0.98	4.89	V
	2472	-25.73	-13	-12.73	-43.53	-27.61	1.28	5.32	V
	3296	-57.57	-13	-44.57	-77.35	-60.98	1.54	7.10	V
	4120	-54.98	-13	-41.98	-75.83	-59.62	1.83	8.62	V
									V
									V
									V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.