



# FCC CO-LOCATION RADIO TEST REPORT

**FCC ID** : APYHRO00309  
**Equipment** : Smart phone  
**Brand Name** : SHARP  
**Model Name** : APYHRO00309  
**Applicant** : SHARP CORPORATION  
1 Takumi-cho, Sakai-ku, Sakai City Osaka, Japan 590-8522  
**Manufacturer** : SHARP CORPORATION  
1 Takumi-Cho, Sakai-Ku, Sakai-Shi, Osaka 590-8522, Japan  
**Standard** : FCC 47 CFR Part 2, 22(H), 27

The product was received on Jan. 14, 2022 and testing was performed from Feb. 16, 2022 to Feb. 17, 2022. We, Sporton International Inc. Wensan 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 test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Wensan Laboratory, the test report shall not be reproduced except in full.

*Louis Wu*

Approved by: Louis Wu

**Sporton International Inc. Wensan Laboratory**

No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.)



## Table of Contents

History of this test report.....	3
Summary of Test Result.....	4
<b>1 General Description .....</b>	<b>5</b>
1.1 Product Feature of Equipment Under Test.....	5
1.2 Modification of EUT .....	5
1.3 Testing Location .....	5
1.4 Applicable Standards.....	6
<b>2 Test Configuration of Equipment Under Test .....</b>	<b>7</b>
2.1 Test Mode.....	7
2.2 Connection Diagram of Test System.....	8
2.3 Support Unit used in test configuration and system .....	8
2.4 Frequency List of Low/Middle/High Channels .....	8
<b>3 Radiated Test Items .....</b>	<b>9</b>
3.1 Measuring Instruments .....	9
3.2 Radiated Spurious Emission Measurement .....	11
<b>4 List of Measuring Equipment.....</b>	<b>12</b>
<b>5 Uncertainty of Evaluation.....</b>	<b>13</b>
<b>Appendix A. Test Results of and Radiated Test</b>	
<b>Appendix B. Test Setup Photographs</b>	



### History of this test report

Report No.	Version	Description	Issued Date
FG211502C	01	Initial issue of report	Mar. 10, 2022
FG211502C	02	Revise Applicant Address	Mar. 18, 2022



### Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.2	§2.1053 §22.917 (a)	Radiated Spurious Emission (GSM850)	Pass	Under limit 17.38 dB at 10204.000 MHz
	§2.1051 §27.53 (m)(4)	Radiated Spurious Emission (Band 7)		

Declaration of Conformity:
1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers. It's means measurement values may risk exceeding the limit of regulation standards, if measurement uncertainty is include in test results.
2. The measurement uncertainty please refer to this report "Uncertainty of Evaluation".
Comments and Explanations:
The product specifications of the EUT presented in the report are declared by the manufacturer who shall take full responsibility for the authenticity.

Reviewed by: Keven Cheng

Report Producer: Amy Chen



# 1 General Description

## 1.1 Product Feature of Equipment Under Test

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

Product Feature	
Antenna Type	WWAN <Ant. 0>: Monopole Antenna <Ant. 1>: PIFA Antenna <Ant. 2>: Monopole Antenna WLAN: Loop Antenna Bluetooth: Loop Antenna GPS / Glonass / BDS / Galileo: PIFA Antenna NFC: Loop Antenna FM: Using earphone as antenna
Antenna Gain	Cellular Band: -5.35 dBi LTE Band 7: -2.84 dBi

Remark: The EUT's information above is declared by manufacturer. Please refer to Comments and Explanations in report summary.

## 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. Wensan Laboratory
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	<b>Sporton Site No.</b> 03CH13-HY
Test Engineer	Yuan Lee, Jacky Hong, and Peter Liao
Temperature	20~25°C
Relative Humidity	50~60%

Note: The test site complies with ANSI C63.4 2014 requirement.

FCC Designation No.: TW3786



## **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 47 CFR Part 2, 27
- ♦ FCC 47 CFR Part 2, 22(H)
- ♦ FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01
- ♦ FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05r02
- ♦ FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
- ♦ FCC KDB 414788 D01 Radiated Test Site v01r01
- ♦ FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

### **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.
3. The TAF code is not including all the FCC KDB listed without accreditation.



## 2 Test Configuration of Equipment Under Test

### 2.1 Test Mode

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

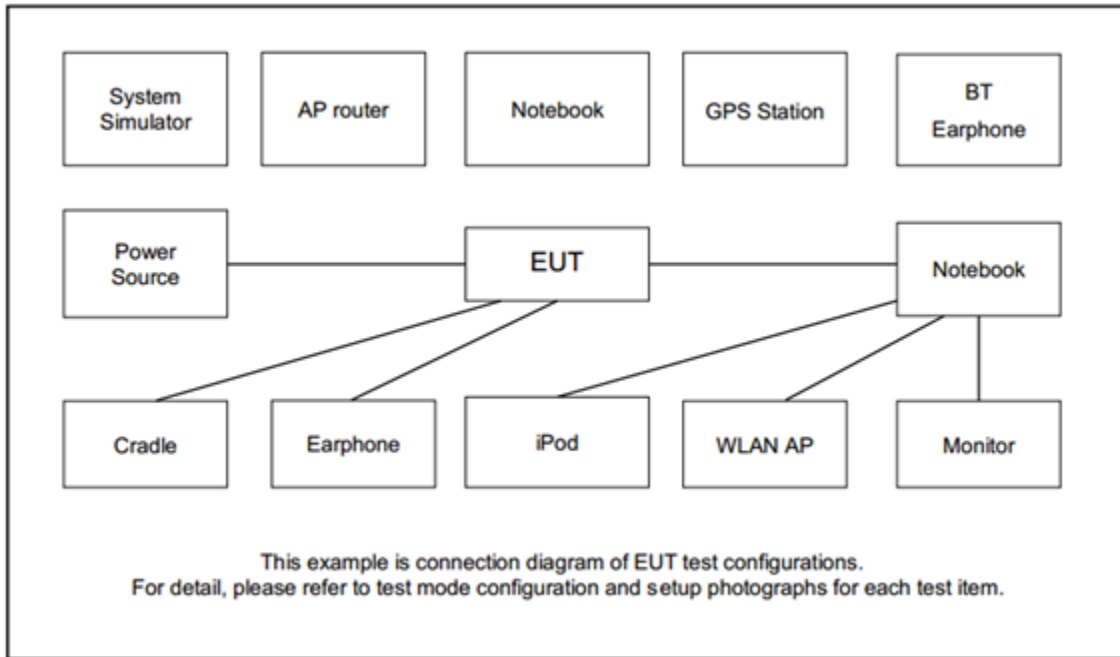
For radiated measurement, the measured emission level of the EUT was maximized by rotating the EUT on a turntable, adjusting the orientation of the EUT and EUT antenna in three orthogonal axis (X: flat, Y: portrait, Z: landscape), and adjusting the measurement antenna orientation, following C63.26 exploratory test procedures and find X Plane for Cellular Band; Y Plane for LTE Band 7 as worst plane.

Radiated emissions were investigated as following frequency range: 30 MHz to 9000 MHz for GSM850.

Test Modes	
Band	Radiated TCs
GSM850	■ GPRS Class 8 Link

Test Items	Band	Bandwidth (MHz)						Modulation				RB #			Test Channel			
		1.4	3	5	10	15	20	QPSK	16QAM	64QAM	256QAM	1	Half	Full	L	M	H	
Radiated Spurious Emission	7	-	-				v	v					v			v	v	v
Remark	1. The mark "v" means that this configuration is chosen for testing 2. The mark "-" means that this bandwidth is not supported. 3. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported. 4. 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 and system

Item	Equipment	Brand Name	Model No.	FCC ID	Data Cable	Power Cord
1.	Earphone	Nokia	WH-108	N/A	Unshielded, 1.5m	N/A
2.	System Simulator	Anritsu	MT8821C	N/A	N/A	Unshielded, 1.8 m

## 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

LTE Band 7 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
20	Channel	20850	21100	21350
	Frequency	2510	2535	2560



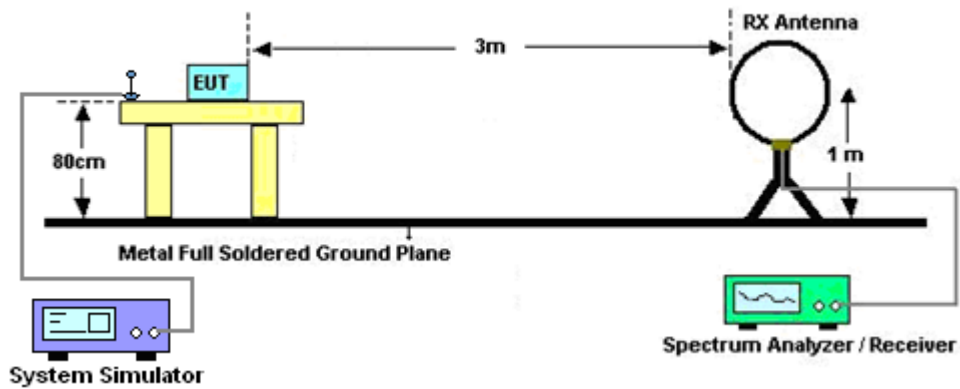
### 3 Radiated Test Items

#### 3.1 Measuring Instruments

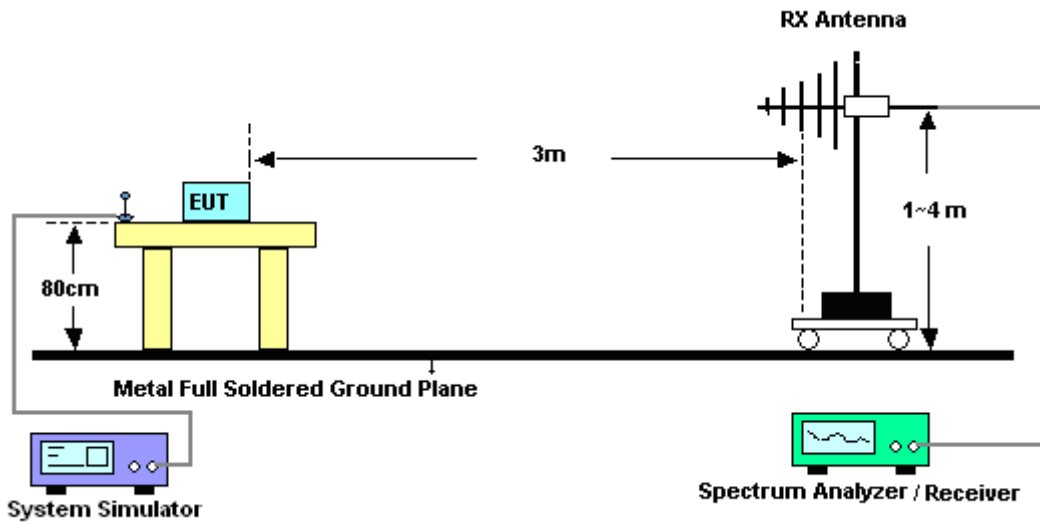
See list of measuring instruments of this test report.

##### 3.1.1 Test Setup

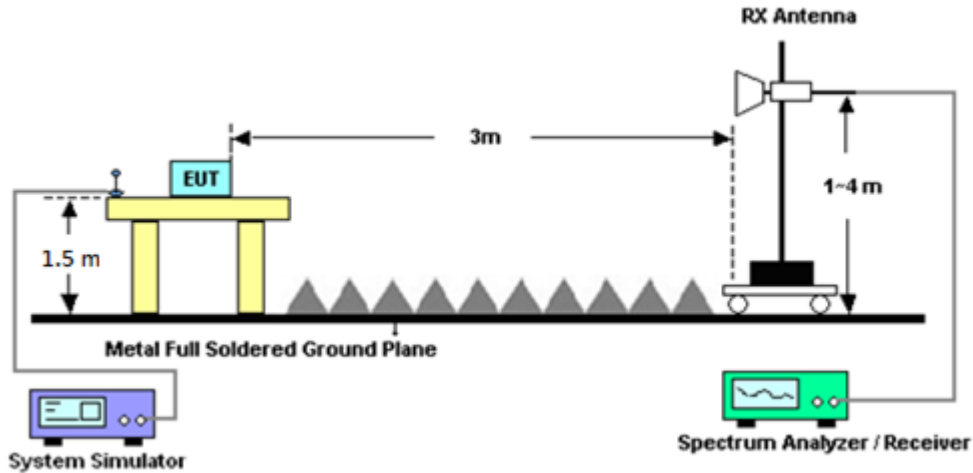
For radiated test below 30MHz



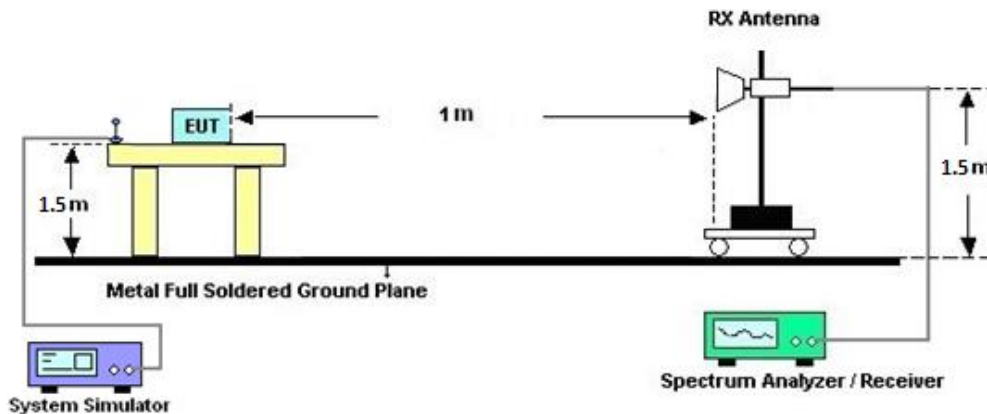
For radiated test from 30MHz to 1GHz



For radiated test from 1GHz to 18GHz



For radiated test above 18GHz



### 3.1.2 Test Result of Radiated Test

Please refer to Appendix A.

**Note:**

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is adequate comparison measurement of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.



## 3.2 Radiated Spurious Emission Measurement

### 3.2.1 Description of Radiated Spurious Emission Measurement

The radiated spurious emission was measured by substitution method according to ANSI / TIA-603-E. 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.

For LTE Band 7

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  $55 + 10 \log (P)$  dB.

The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

### 3.2.2 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 turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above 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 the maximum spurious emission for both horizontal and vertical polarizations.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the 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. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

For LTE Band 7

The limit line is derived from  $55 + 10\log(P)$ dB below the transmitter power P(Watts)

$EIRP \text{ (dBm)} = S.G. \text{ Power} - Tx \text{ Cable Loss} + Tx \text{ Antenna Gain}$

$ERP \text{ (dBm)} = EIRP - 2.15$



## 4 List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Amplifier	SONOMA	310N	187282	9kHz~1GHz	Dec. 15, 2021	Feb. 16, 2022~ Feb. 17, 2022	Dec. 14, 2022	Radiation (03CH13-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D01N-06	40103 & 07	30MHz~1GHz	Apr. 28, 2021	Feb. 16, 2022~ Feb. 17, 2022	Apr. 27, 2022	Radiation (03CH13-HY)
Bilog Antenna	TESEQ	CBL 6111D&00802N1 D01N-06	54682 & AT-N0603	30MHz~1GHz	Sep. 09, 2021	Feb. 16, 2022~ Feb. 17, 2022	Sep. 08, 2022	Radiation (03CH13-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120 D	9120D-1241	1GHz~18GHz	Jul. 13, 2021	Feb. 16, 2022~ Feb. 17, 2022	Jul. 12, 2022	Radiation (03CH13-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120 D	9120D-1620	1GHz~18GHz	Oct. 25, 2021	Feb. 16, 2022~ Feb. 17, 2022	Oct. 24, 2022	Radiation (03CH13-HY)
SHF-EHF Horn Antenna	SCHWARZBE CK	BBHA 9170	BBHA9170576	18GHz~40GHz	May 21, 2021	Feb. 16, 2022~ Feb. 17, 2022	May 20, 2022	Radiation (03CH13-HY)
SHF-EHF Horn Antenna	SCHWARZBE CK	BBHA 9170	00994	18GHz~40GHz	Nov. 04, 2021	Feb. 16, 2022~ Feb. 17, 2022	Nov. 03, 2022	Radiation (03CH13-HY)
Preamplifier	EMEC	EM18G40G	060801	18GHz~40GHz	Jun. 22, 2021	Feb. 16, 2022~ Feb. 17, 2022	Jun. 21, 2022	Radiation (03CH13-HY)
Hygrometer	TECPEL	DTM-303B	TP200889	N/A	Sep. 30, 2021	Feb. 16, 2022~ Feb. 17, 2022	Sep. 29, 2022	Radiation (03CH13-HY)
Preamplifier	MITEQ	AMF-7D-0010180 0-30-10P	1590074	1GHz~18GHz	May 18, 2021	Feb. 16, 2022~ Feb. 17, 2022	May 17, 2022	Radiation (03CH13-HY)
Preamplifier	Keysight	83017A	MY53270147	1GHz~26.5GHz	Oct. 26, 2021	Feb. 16, 2022~ Feb. 17, 2022	Oct. 25, 2022	Radiation (03CH13-HY)
Spectrum Analyzer	Keysight	N9010A	MY55370526	10Hz~44GHz	Mar. 18, 2021	Feb. 16, 2022~ Feb. 17, 2022	Mar. 17, 2022	Radiation (03CH13-HY)
Filter	Wainwright	WLK4-1000-1530- 8000-40SS	SN12	1.53GHz Low Pass Filter	Sep. 14, 2021	Feb. 16, 2022~ Feb. 17, 2022	Sep. 13, 2022	Radiation (03CH13-HY)
Filter	Wainwright	WHKX12-1080-12 00-15000-60SS	SN3	1.2GHz High Pass Filter	Jul. 01, 2021	Feb. 16, 2022~ Feb. 17, 2022	Jun. 30, 2022	Radiation (03CH13-HY)
Filter	Wainwright	WHKX12-2700-30 00-18000-60SS	SN2	3GHz High Pass Filter	Jul. 12, 2021	Feb. 16, 2022~ Feb. 17, 2022	Jul. 11, 2022	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 126E	0030/126E	30MHz~18GHz	Feb. 09, 2022	Feb. 16, 2022~ Feb. 17, 2022	Feb. 08, 2023	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	804793/4	30MHz~18GHz	Feb. 09, 2022	Feb. 16, 2022~ Feb. 17, 2022	Feb. 08, 2023	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY24961/4	30MHz~18GHz	Feb. 09, 2022	Feb. 16, 2022~ Feb. 17, 2022	Feb. 08, 2023	Radiation (03CH13-HY)
Controller	EMEC	EM1000	N/A	Control Turn table & Ant Mast	N/A	Feb. 16, 2022~ Feb. 17, 2022	N/A	Radiation (03CH13-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1m~4m	N/A	Feb. 16, 2022~ Feb. 17, 2022	N/A	Radiation (03CH13-HY)
Turn Table	EMEC	TT2000	N/A	0~360 Degree	N/A	Feb. 16, 2022~ Feb. 17, 2022	N/A	Radiation (03CH13-HY)



## 5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	3.45 dB
---	---------

### Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	3.73 dB
---	---------

### Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.00 dB
---	---------



## Appendix A. Test Results of Radiated Test

<Ant. 0>

### GPRS 850 + WLAN 2.4GHz 802.11n HT20 CH01

GPRS 850 + WLAN 2.4GHz 802.11n HT20 CH01									
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	1651	-48.35	-13	-35.35	-64.33	-49.23	6.35	9.38	H
	2473	-40.68	-13	-27.68	-58	-40.87	8.03	10.37	H
	4125	-51.46	-13	-38.46	-73.88	-51.35	10.56	12.60	H
									H
									H
									H
	1651	-50.18	-13	-37.18	-66.15	-51.06	6.35	9.38	V
	2473	-48.20	-13	-35.20	-65.38	-48.39	8.03	10.37	V
	3302	-56.25	-13	-43.25	-76.27	-56.99	9.17	12.06	V
									V
									V
Middle	1673	-49.01	-13	-36.01	-65.27	-49.93	6.39	9.46	H
	2510	-45.75	-13	-32.75	-63.06	-45.99	8.16	10.55	H
	3346	-55.91	-13	-42.91	-75.89	-56.79	9.27	12.30	H
									H
									H
									H
	1673	-50.74	-13	-37.74	-66.97	-51.66	6.39	9.46	V
	2510	-48.80	-13	-35.80	-65.96	-49.04	8.16	10.55	V
	3346	-56.29	-13	-43.29	-76.33	-57.17	9.27	12.30	V
									V
									V



Highest	1698	-46.92	-13	-33.92	-63.47	-47.88	6.43	9.54	H
	2546	-46.21	-13	-33.21	-63.98	-46.70	8.09	10.73	H
	3396	-55.75	-13	-42.75	-75.8	-56.80	9.38	12.58	H
									H
									H
									H
	1698	-48.00	-13	-35.00	-64.5	-48.96	6.43	9.54	V
	2546	-52.83	-13	-39.83	-70.5	-53.32	8.09	10.73	V
	3396	-55.93	-13	-42.93	-76	-56.98	9.38	12.58	V
									V
									V
									V

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



<Ant. 1>

**LTE Band 7 + WLAN 5GHz 802.11n HT20 CH36**

LTE Band 7 + WLAN 5GHz 802.11n HT20_CH36 / 20MHz / QPSK									
Channel	Frequency ( MHz )	EIRP ( 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	5002	-52.61	-25	-27.61	-76.95	-53.29	11.92	12.60	H
	7503	-46.50	-25	-21.50	-76.68	-42.96	14.75	11.21	H
	10004	-43.79	-25	-18.79	-77.47	-37.72	17.17	11.10	H
									H
									H
									H
	5002	-52.21	-25	-27.21	-76.86	-52.89	11.92	12.60	V
	7503	-46.37	-25	-21.37	-76.64	-42.83	14.75	11.21	V
	10004	-44.31	-25	-19.31	-77.32	-38.24	17.17	11.10	V
									V
									V
									V
Middle	5052	-51.63	-25	-26.63	-76.06	-52.27	11.99	12.63	H
	7578	-46.28	-25	-21.28	-76.05	-42.66	15.13	11.51	H
	10104	-43.05	-25	-18.05	-76.74	-36.92	17.17	11.04	H
									H
									H
									H
	5052	-51.95	-25	-26.95	-76.68	-52.59	11.99	12.63	V
	7578	-46.64	-25	-21.64	-76.48	-43.02	15.13	11.51	V
	10104	-43.74	-25	-18.74	-76.89	-37.61	17.17	11.04	V
									V
									V
									V





Highest	5102	-51.73	-25	-26.73	-76.27	-52.32	12.06	12.65	H
	7653	-46.40	-25	-21.40	-76.02	-43.07	14.96	11.63	H
	10204	-42.38	-25	-17.38	-76.08	-36.19	17.17	10.98	H
									H
									H
									H
	5102	-51.97	-25	-26.97	-76.77	-52.56	12.06	12.65	V
	7653	-46.28	-25	-21.28	-75.97	-42.95	14.96	11.63	V
	10204	-43.38	-25	-18.38	-76.66	-37.19	17.17	10.98	V
									V
									V
									V

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