



FCC RF Test Report

APPLICANT : FIH CO., LTD.
EQUIPMENT : Internet Gateway
BRAND NAME : FIH
MODEL NAME : FWF100V5L
FCC ID : RYQFWF100V5L
STANDARD : 47 CFR Part 2, 22(H), 24(E), 27(L), 27(F)
CLASSIFICATION : PCS Licensed Transmitter (PCB)
TEST DATE(S) : Aug. 15, 2022

We, Sporton International Inc. (Kunshan), would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.26-2015 and shown 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. (Kunshan), the test report shall not be reproduced except in full.

Jason Jia

Approved by: Jason Jia



Sporton International Inc. (Kunshan)

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG262206C	Rev. 01	Initial issue of report	Jan. 09, 2023



SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
-	§2.1046	Conducted Output Power	-	Report Only	1
	§22.913(a)(5)	Effective Radiated Power (Band 5)	ERP < 7 Watt	PASS	1
	§27.50(b)(2)	Effective Radiated Power (Band 13)	ERP < 1000 Watt		1
	§24.232(c)	Equivalent Isotropic Radiated Power (Band 2)	EIRP < 2Watt		1
	§27.50(d)(4)	Equivalent Isotropic Radiated Power (Band 66)	EIRP < 1Watt		1
-	§24.232(d)	Peak-to-Average Ratio	<13 dB	PASS	1
-	§2.1049	Occupied Bandwidth	-	Report Only	1
-	§2.1051 §22.917(a) §24.238(a) §27.53(c)(2)(4) §27.53(h)	Conducted Band Edge Measurement (Band 2) (Band 5) (Band 13) (Band 66)	< 43+10log ₁₀ (P[Watts])	PASS	1
-	§2.1051 §22.917(a) §24.238(a) §27.53(c)(2)(4) §27.53(h)	Conducted Spurious Emission (Band 2) (Band 5) (Band 13)(Band 66)	< 43+10log ₁₀ (P[Watts])	PASS	1
-	§2.1055 §22.355	Frequency Stability Temperature & Voltage	< 2.5 ppm for Part 22	PASS	1
	§2.1055 §24.235 §27.54		Within Authorized Band		
3.4	§2.1053 §22.917(a) §24.238(a) §27.53(c)(2) §27.53(f) §27.53(h)	Radiated Spurious Emission (Band 2) (Band 5) (Band 13) (Band 66)	< 43+10log ₁₀ (P[Watts])	PASS	Under limit 33.93 dB at 1664.000 MHz
Remark 1 : The test items of inter band CA were cover by LTE single carrier due to the CA power is reduced according to 3GPP MPR					



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.

1 General Description

1.1 Applicant

FIH CO., LTD.

No.4, Minsheng St., Tu-Cheng Dist., New Taipei City 23679, Taiwan

1.2 Manufacturer

FIH CO., LTD.

No.4, Minsheng St., Tu-Cheng Dist., New Taipei City 23679, Taiwan

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Internet Gateway
Brand Name	FIH
Model Name	FWF100V5L
FCC ID	RYQFWF100V5L
IMEI Code	Radiation: 358835490000293
EUT Stage	Identical Prototype

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx Frequency	LTE Band 2 : 1850 MHz ~ 1910 MHz LTE Band 5 : 824 MHz ~ 849 MHz LTE Band 13 : 777 MHz ~ 787 MHz LTE Band 66 : 1710 MHz ~ 1755 MHz
Rx Frequency	LTE Band 2 : 1930 MHz ~ 1990 MHz LTE Band 5 : 869 MHz ~ 894 MHz LTE Band 13 : 746 MHz ~ 756 MHz LTE Band 66 : 2110 MHz~ 2155 MHz
Uplink CA Bands	2A-5A, 2A-13A, 2A-66A 5A-66A 13A-66A
Type of Modulation	QPSK / 16QAM / 64QAM

1.5 Modification of EUT

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

1.6 Testing Location

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	03CH04-KS	CN1257	314309

1.7 Test Software

Item	Site	Manufacture	Name	Version
1.	03CH04-KS	AUDIX	E3	6.2009-8-24al

1.8 Applicable Standards

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

- 47 CFR Part 2, 22(H), 24(E), 27(L), 27(F)
- ANSI C63.26-2015
- FCC KDB 971168 D01 Power Meas License Digital Systems v03r01
- FCC KDB 412172 D01 Determining ERP and EIRP v01r01

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

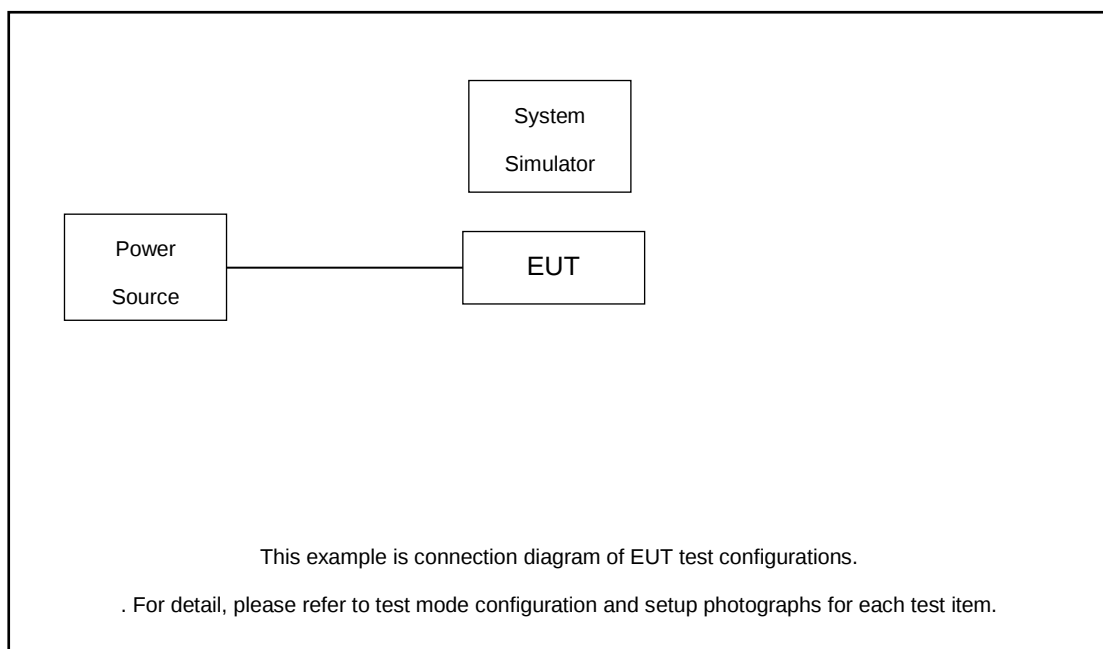
2.1 Test Mode

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

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes to find the maximum emission. (Y-Plane)

Test Items	Band	Bandwidth (MHz)						Modulation			RB #			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	64QAM	1	Half	Full	L	M	H
	2A-5A	Worst Case													v	
	2A-13A	Worst Case													v	
	2A-66A	Worst Case													v	
	5A-66A	Worst Case													v	
	13A-66A	Worst Case													v	
Note	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.															

2.2 Connection Diagram of Test System





2.3 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	Base Station	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m

2.4 Frequency List of Low/Middle/High Channels

LTE Band 2 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
20	Channel	18700	18900	19100
	Frequency	1860	1880	1900
15	Channel	18675	18900	19125
	Frequency	1857.5	1880	1902.5
10	Channel	18650	18900	19150
	Frequency	1855	1880	1905
5	Channel	18625	18900	19175
	Frequency	1852.5	1880	1907.5
3	Channel	18615	18900	19185
	Frequency	1851.5	1880	1908.5
1.4	Channel	18607	18900	19193
	Frequency	1850.7	1880	1909.3

LTE Band 5 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
10	Channel	20450	20525	20600
	Frequency	829	836.5	844
5	Channel	20425	20525	20625
	Frequency	826.5	836.5	846.5
3	Channel	20415	20525	20635
	Frequency	825.5	836.5	847.5
1.4	Channel	20407	20525	20643
	Frequency	824.7	836.5	848.3



LTE Band 13 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
10	Channel	-	23230	-
	Frequency	-	782	-
5	Channel	23205	23230	23255
	Frequency	779.5	782	784.5

LTE Band 66 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
20	Channel	132072	132197	132322
	Frequency	1720	1732.5	1745
15	Channel	132047	132197	132347
	Frequency	1717.5	1732.5	1747.5
10	Channel	132022	132197	132372
	Frequency	1715	1732.5	1750
5	Channel	131997	132197	132397
	Frequency	1712.5	1732.5	1752.5
3	Channel	131987	132197	132407
	Frequency	1711.5	1732.5	1753.5
1.4	Channel	131979	132197	132417
	Frequency	1710.7	1732.5	1754.5

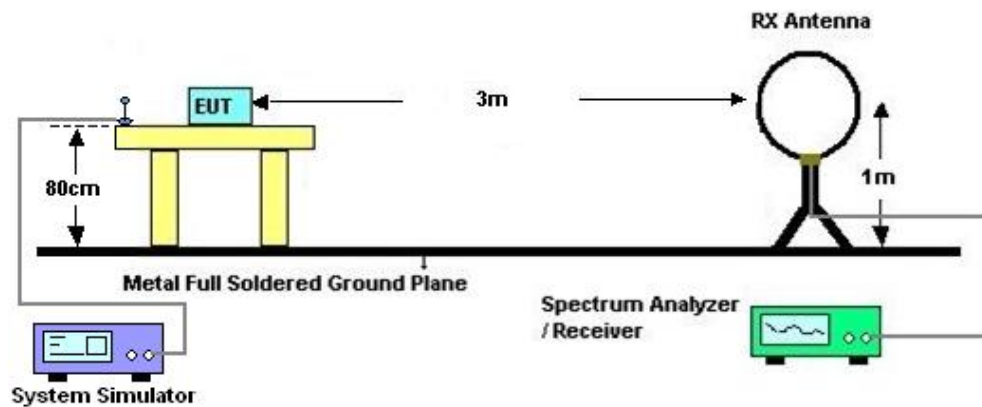
3 Radiated Test Items

3.1 Measuring Instruments

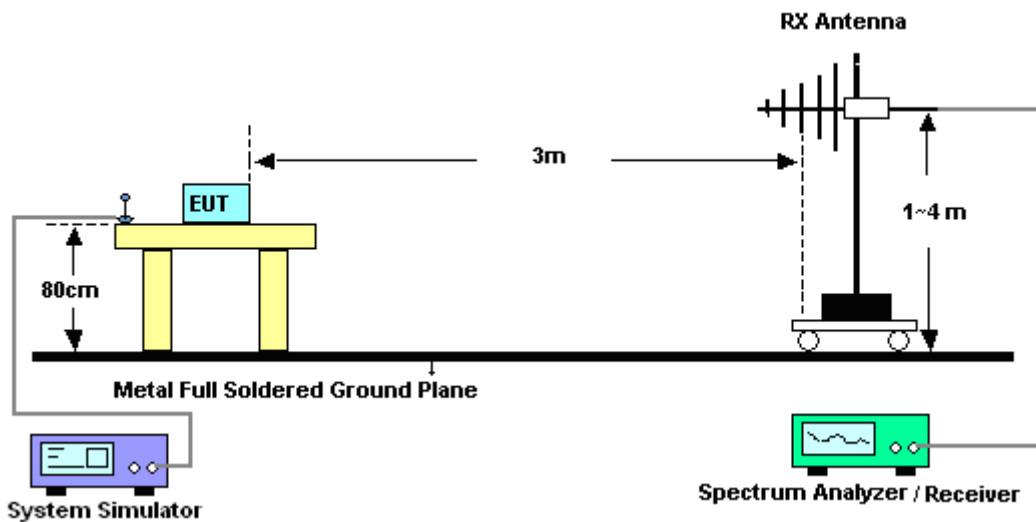
See list of measuring instruments of this test report.

3.2 Test Setup

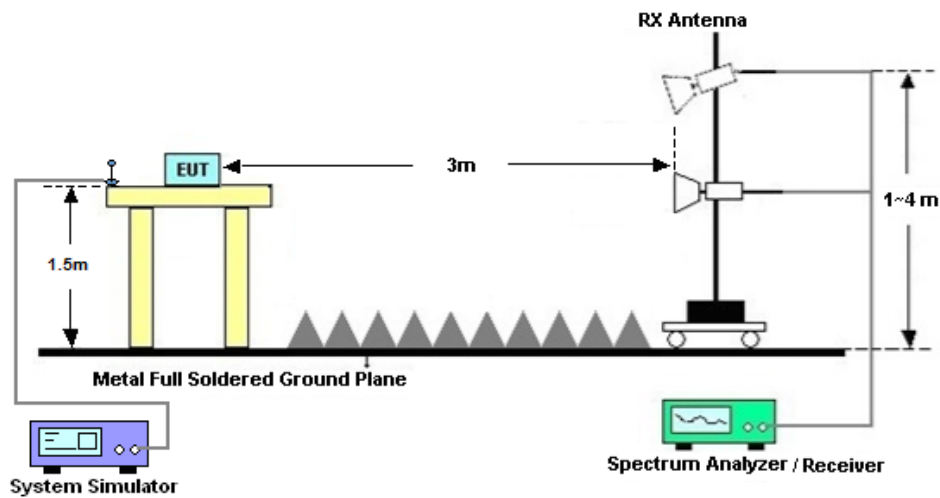
3.2.1 For radiated test below 30MHz



3.2.2 For radiated test from 30MHz to 1GHz



3.2.3 For radiated test above 1GHz



3.3 Test Result of Radiated Test

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.

Please refer to Appendix A.



3.4 Radiated Spurious Emission

3.4.1 Description of Radiated Spurious Emission

For LTE Band 2, 5, 66

The radiated spurious emission was measured by substitution method according to ANSI C63.26. 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 13

For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth.

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

3.4.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.5
2. The EUT was placed on a turntable with 0.8 meter height for frequency below 1GHz and 1.5 meter height for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the receiving antenna mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. The height of the receiving antenna is varied between 1m to 4m to search the maximum spurious emission for both horizontal and vertical polarizations.
6. During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power.
7. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
8. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
9. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
10. $EIRP \text{ (dBm)} = S.G. \text{ Power} - Tx \text{ Cable Loss} + Tx \text{ Antenna Gain}$
11. $ERP \text{ (dBm)} = EIRP - 2.15$
12. For Band 2, 5, 13, 66

The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P(Watts)
 $= P(W) - [43 + 10\log(P)] \text{ (dB)}$
 $= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$
 $= -13\text{dBm}.$



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
EXA Spectrum Analyzer	Keysight	N9010B	MY57471079	10Hz-44G,MAX 30dB	Oct. 13, 2021	Aug. 15, 2022	Oct. 12, 2022	Radiation (03CH04-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 30, 2021	Aug. 15, 2022	Oct. 29, 2022	Radiation (03CH04-KS)
Bilog Antenna	TeseQ	CBL6111D	49922	30MHz-1GHz	May 24, 2022	Aug. 15, 2022	May 23, 2023	Radiation (03CH04-KS)
Horn Antenna	Schwarzbeck	BBHA9120D	1284	1GHz~18GHz	Jan. 05, 2022	Aug. 15, 2022	Jan. 04, 2023	Radiation (03CH04-KS)
SHF-EHF Horn	Com-power	AH-840	101070	18GHz~40GHz	Jan. 05, 2022	Aug. 15, 2022	Jan. 04, 2023	Radiation (03CH04-KS)
Amplifier	SONOMA	310N	187289	9KHz-1GHz	Jan. 05, 2022	Aug. 15, 2022	Jan. 04, 2023	Radiation (03CH04-KS)
Amplifier	MITEQ	EM18G40G GA	060728	18~40GHz	Jan. 05, 2022	Aug. 15, 2022	Jan. 04, 2023	Radiation (03CH04-KS)
high gain Amplifier	EM	EM01G18G A	060840	1Ghz-18Ghz	Oct. 13, 2021	Aug. 15, 2022	Oct. 12, 2022	Radiation (03CH04-KS)
Amplifier	Agilent	8449B	3008A02370	1Ghz-18Ghz	Oct. 13, 2021	Aug. 15, 2022	Oct. 12, 2022	Radiation (03CH04-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Aug. 15, 2022	NCR	Radiation (03CH04-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Aug. 15, 2022	NCR	Radiation (03CH04-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Aug. 15, 2022	NCR	Radiation (03CH04-KS)

NCR: No Calibration Required

5 Uncertainty of Evaluation

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.26-2015. All the measurement uncertainty value were shown with a coverage $K=2$ to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.3dB
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Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.8dB
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Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.8dB
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Appendix A. Test Results of Radiated Test

Radiated Spurious Emission

Test Engineer :	Levi zhuo	Temperature :	22~23°C
		Relative Humidity :	41~42%

Note: Pre-scanned harmonic for the different antenna combinations, we choose the worst antenna mode to perform final test and record in the report.

ULCA_2A-5A Ant.1+0								
Channel	Frequency (MHz)	EIRP/ERP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
LTE B2 BW 20MHz Middle 1RB0,QPSK	3744	-58.53	-13	-45.53	-64.48	2.39	8.34	H
	5616	-57.05	-13	-44.05	-63.48	2.97	9.40	H
	7480	-54.66	-13	-41.66	-62.54	3.39	11.27	H
	3744	-58.63	-13	-45.63	-64.58	2.39	8.34	V
	5616	-57.29	-13	-44.29	-63.72	2.97	9.40	V
	7480	-54.45	-13	-41.45	-62.33	3.39	11.27	V
LTE B5 BW 10MHz Middle 1RB0,QPSK	1664.00	-66.03	-13	-53.03	-67.48	1.58	5.18	H
	2496.00	-60.48	-13	-47.48	-63.48	1.94	7.09	H
	3328.00	-60.56	-13	-47.56	-64.23	2.25	8.08	H
	1664.00	-65.15	-13	-52.15	-66.60	1.58	5.18	V
	2496.00	-58.91	-13	-45.91	-61.91	1.94	7.09	V
	3328.00	-60.22	-13	-47.22	-63.89	2.25	8.08	V

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

ULCA_2A-13A Ant.1+0								
Channel	Frequency (MHz)	EIRP/ERP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
LTE B2 BW 20MHz Middle 1RB0,QPSK	3744	-58.85	-13	-45.85	-64.80	2.39	8.34	H
	5616	-56.80	-13	-43.80	-63.23	2.97	9.40	H
	7480	-54.80	-13	-41.80	-62.68	3.39	11.27	H
	3744	-58.80	-13	-45.80	-64.75	2.39	8.34	V
	5616	-57.49	-13	-44.49	-63.92	2.97	9.40	V
	7480	-54.69	-13	-41.69	-62.57	3.39	11.27	V
LTE B13 BW 10MHz Middle 1RB0,QPSK	1552	-61.65	-13	-48.65	-63.11	1.53	5.14	H
	2328	-61.34	-13	-48.34	-63.80	1.87	6.48	H
	3112	-59.84	-13	-46.84	-63.39	2.19	7.89	H
	1552	-63.97	-13	-50.97	-65.43	1.53	5.14	V
	2328	-59.59	-13	-46.59	-62.05	1.87	6.48	V
	3112	-59.58	-13	-46.58	-63.13	2.19	7.89	V

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



ULCA_2A-66A Ant.1+0								
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
LTE B66 BW 20MHz Middle 1RB0,QPSK	3471	-51.26	-13	-38.26	-57.16	2.29	8.20	H
	5208	-51.17	-13	-38.17	-57.74	2.84	9.41	H
	6948	-49.92	-13	-36.92	-57.07	3.30	10.46	H
	3471	-47.23	-13	-34.23	-53.13	2.29	8.20	V
	5208	-53.91	-13	-40.91	-60.48	2.84	9.41	V
	6948	-52.66	-13	-39.66	-59.81	3.30	10.46	V
LTE B2 BW 20MHz Middle 1RB0,QPSK	3741	-57.19	-13	-44.19	-63.14	2.39	8.34	H
	5613	-54.90	-13	-41.90	-61.33	2.97	9.40	H
	7488	-52.22	-13	-39.22	-60.10	3.39	11.27	H
	3741	-56.82	-13	-43.82	-62.77	2.39	8.34	V
	5613	-55.51	-13	-42.51	-61.94	2.97	9.40	V
	7488	-52.13	-13	-39.13	-60.01	3.39	11.27	V

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

ULCA_5A-66A Ant.0+1								
Channel	Frequency (MHz)	EIRP/ERP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
LTE B5 BW 10MHz Middle 1RB0,QPSK	1664.00	-46.93	-13	-33.93	-48.38	1.58	5.18	H
	2496.00	-58.49	-13	-45.49	-61.49	1.94	7.09	H
	3327.00	-57.47	-13	-44.47	-61.14	2.25	8.08	H
	1664.00	-56.00	-13	-43.00	-57.45	1.58	5.18	V
	2496.00	-57.33	-13	-44.33	-60.33	1.94	7.09	V
	3327.00	-57.52	-13	-44.52	-61.19	2.25	8.08	V
LTE B66 BW 20MHz Middle 1RB0,QPSK	3471	-50.93	-13	-37.93	-56.83	2.29	8.20	H
	5208	-50.38	-13	-37.38	-56.95	2.84	9.41	H
	6948	-49.64	-13	-36.64	-56.79	3.30	10.46	H
	3471	-47.48	-13	-34.48	-53.38	2.29	8.20	V
	5208	-54.32	-13	-41.32	-60.89	2.84	9.41	V
	6948	-52.84	-13	-39.84	-59.99	3.30	10.46	V

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



ULCA_13A-66A Ant.0+1								
Channel	Frequency (MHz)	EIRP/ERP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
LTE B13 BW 10MHz Middle 1RB0,QPSK	1556	-57.33	-13	-44.33	-58.79	1.53	5.14	H
	2332	-58.91	-13	-45.91	-61.37	1.87	6.48	H
	3309	-57.59	-13	-44.59	-61.14	2.19	7.89	H
	1556	-58.80	-13	-45.80	-60.26	1.53	5.14	V
	2332	-57.03	-13	-44.03	-59.49	1.87	6.48	V
	3309	-58.21	-13	-45.21	-61.76	2.19	7.89	V
LTE B66 BW 20MHz Middle 1RB0,QPSK	3471	-51.00	-13	-38.00	-56.90	2.29	8.20	H
	5208	-51.40	-13	-38.40	-57.97	2.84	9.41	H
	6948	-49.25	-13	-36.25	-56.40	3.30	10.46	H
	3471	-47.33	-13	-34.33	-53.23	2.29	8.20	V
	5208	-53.89	-13	-40.89	-60.46	2.84	9.41	V
	6948	-52.99	-13	-39.99	-60.14	3.30	10.46	V

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