



# FCC RF Test Report

**APPLICANT** : Shenzhen Gongjin Electronics Co.,Ltd.  
**EQUIPMENT** : Nokia Smart Node  
**BRAND NAME** : Nokia  
**MODEL NAME** : Nokia Multi-Standard Smart Node B2B14B66 (SN4IBN)  
**FCC ID** : V4V1SN4IBN  
**STANDARD** : 47 CFR Part 2, 24, 27, 90  
**CLASSIFICATION** : PCS Licensed Transmitter (PCB)  
**TEST DATE(S)** : Jun. 30, 2021 ~ Jul. 02, 2021

We, Sporton International (Kunshan) Inc., 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 (Kunshan) Inc., the test report shall not be reproduced except in full.

Reviewed by: Jason Jia / Supervisor

Approved by: Alex Wang / Manager



**Sporton International (Kunshan) Inc.**

**No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300  
People's Republic of China**



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## SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
-	§2.1046	Conducted Output Power	Reporting Only	-	1
-	§24.232(a)	Equivalent Isotropic Radiated Power (Band 2)	EIRP < 1640Watt	-	1
-	§90.542 (a)(3)	Effective Radiated Power (Band 14)	ERP < 1000Watt	-	1
-	§27.50(d)(2)	Equivalent Isotropic Radiated Power (Band 66)	EIRP < 1640Watt	-	1
-	§24.232(d)	Peak-to-Average Ratio	<13 dB	-	1
-	§2.1049	Occupied Bandwidth	Reporting Only	-	1
-	§2.1051 §24.238(a) §27.53(h)	Conducted Band Edge Measurement (Band 2) (Band 66)	< 43+10log <sub>10</sub> (P[Watts])	-	1
-	§2.1053 §90.543 (e)(1)(3)	Conducted Band Edge Measurement (Band 14)	Refer standard	-	1
-	§2.1051 §24.238(a) §27.53(h)	Conducted Spurious Emission (Band 2) (Band 66)	< 43+10log <sub>10</sub> (P[Watts])	-	1
-	§2.1053 §90.543 (e)(3)	Conducted Spurious Emission (Band 14)	< 43+10log <sub>10</sub> (P[Watts])	-	1
-	§2.1055 §24.235 §27.54	Frequency Stability Temperature & Voltage	Within Authorized Band	-	1



Report Section	FCC Rule	Description	Limit	Result	Remark
3.4	§2.1053 §24.238(a) §27.53(h) §90.543 (e)(3) §90.543 (f)	Radiated Spurious Emission (Band 2) (Band 14) (Band 66)	$< 43+10\log_{10}(P[\text{Watts}])$	PASS	Under limit 36.5 dB at 7800.00 MHz

**Remark1:**

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

Shenzhen Gongjin Electronics Co.,Ltd.

No.2 Danzi North Road, Kengzi Street, Pingshan District, Shenzhen, Guangdong, 518122, P.R. China

## 1.2 Manufacturer

Nokia Solutions and Networks Oy

Karakaari 7, 02610 Espoo, Finland

## 1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Nokia Smart Node
Brand Name	Nokia
Model Name	Nokia Multi-Standard Smart Node B2B14B66 (SN4IBN)
FCC ID	V4V1SN4IBN
EUT supports Radios application	LTE
HW Version	V03
SW Version	56850
EUT Stage	Production Unit

## 1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx Frequency	LTE Band 2 : 1930 MHz ~ 1990 MHz LTE Band 14 : 758 MHz ~ 768 MHz LTE Band 66 : 2110 MHz~ 2180 MHz
Rx Frequency	LTE Band 2 : 1850 MHz ~ 1910 MHz LTE Band 14 : 788 MHz ~ 798 MHz LTE Band 66 : 1710 MHz ~ 1780 MHz
Bandwidth	LTE Band 2 : 5MHz / 10MHz / 15MHz / 20MHz LTE Band 14 : 5MHz / 10MHz LTE Band 66 : 5MHz / 10MHz / 15MHz / 20MHz
Uplink CA Bands	2A-14A, 2A-66A
Type of Modulation	QPSK / 16QAM / 64QAM

**Note:**

1. LTE CA Tx is non-signaling mode.
2. LTE only support full RB mode.



### 1.5 Modification of EUT

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

### 1.6 Testing Location

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

<b>Test Firm</b>	Sporton International (Kunshan) Inc.		
<b>Test Site Location</b>	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		
<b>Test Site No.</b>	<b>Sporton Site No.</b>	<b>FCC Designation No.</b>	<b>FCC Test Firm Registration No.</b>
	03CH04-KS	CN1257	314309

### 1.7 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH04-KS	AUDIX	E3	6.2009-8-24a

### 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, 24, 27, 90
- ♦ 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

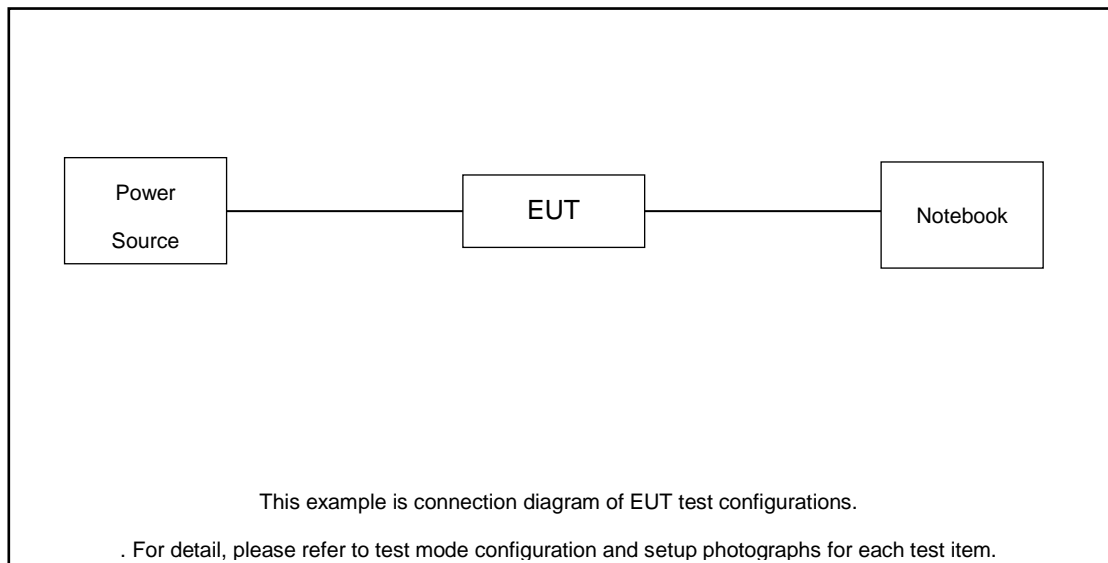
### 2.1 Test Mode

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.

The WWAN Tx mode was pre-scanned for harmonics in three orthogonal panels (Y, Z and X planes) for both horizontal and vertical polarizations, and then the worst mode(X planes) was performed the full test and recorded in this report.

Test Items	Band	Bandwidth (MHz)					Modulation			RB #			Test Channel				
		-	5	10	15	20	QPSK	16QAM	64QAM	1	Half	Full	L	M	H		
Radiated Spurious Emission	2A-66A	Worst Case														v	
	2A-14A	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.	Notebook	Lenovo	V130-15IKB005	N/A	N/A	shielded cable DC O/P 1.8m , Unshielded AC I/P cable 1.8m



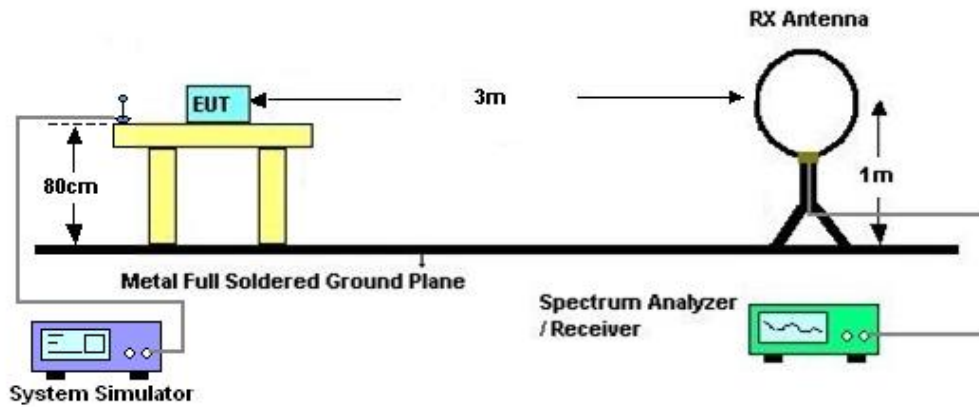
### 3 Radiated Test Items

#### 3.1 Measuring Instruments

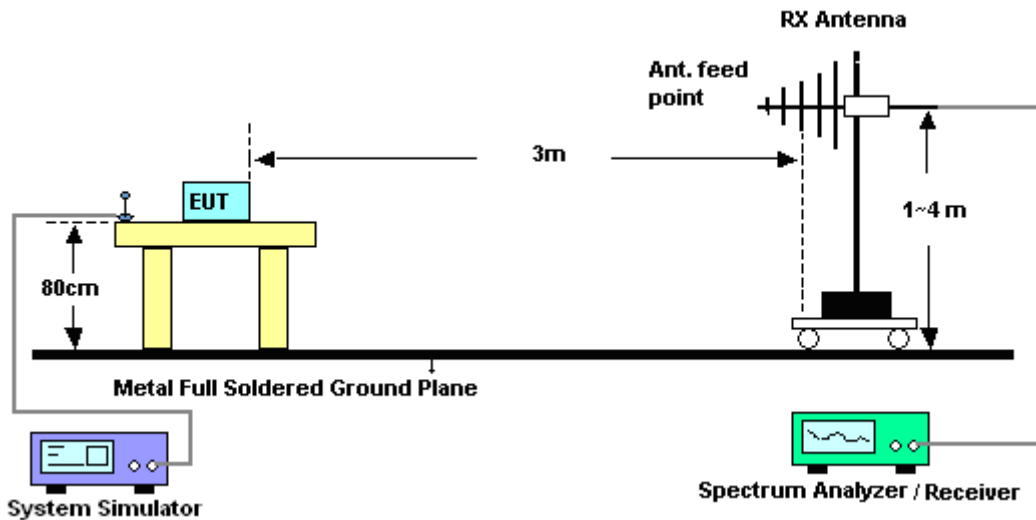
See list of measuring instruments of this test report.

#### 3.2 Test Setup

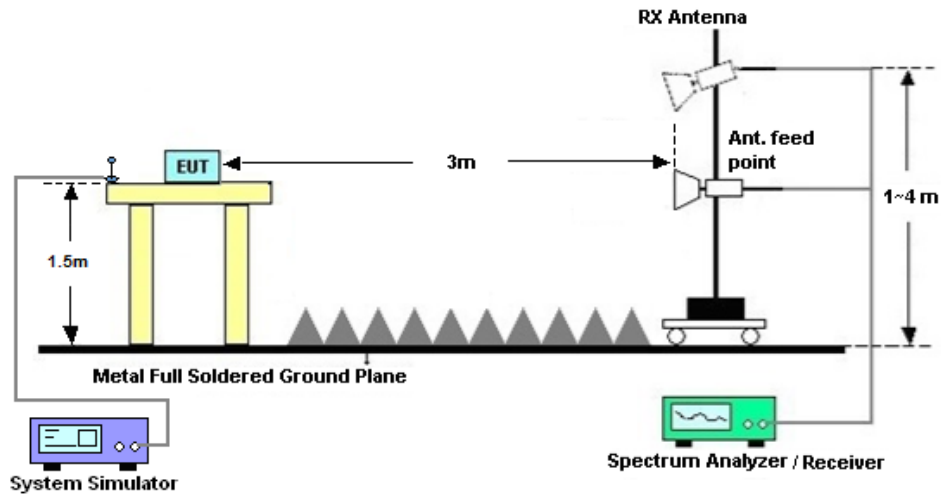
##### 3.2.1 For radiated test below 30MHz



##### 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 B.



### 3.4 Radiated Spurious Emission

#### 3.4.1 Description of Radiated Spurious Emission

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.

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. 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	N9010A	MY55150244	10Hz-44G,MAX 30dB	Apr. 13, 2021	Jun. 30, 2021~ Jul. 02, 2021	Apr. 12, 2022	Radiation (03CH04-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Nov. 1, 2020	Jun. 30, 2021~ Jul. 02, 2021	Oct. 31, 2021	Radiation (03CH04-KS)
Bilog Antenna	TeseQ	CBL6111D	49922	30MHz-1GHz	Jun. 07, 2021	Jun. 30, 2021~ Jul. 02, 2021	Jun. 06, 2022	Radiation (03CH04-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00218642	1GHz~18GHz	Apr. 01, 2021	Jun. 30, 2021~ Jul. 02, 2021	Mar. 31, 2022	Radiation (03CH04-KS)
SHF-EHF Horn	Com-power	AH-840	101115	18GHz~40GHz	Jan. 06, 2021	Jun. 30, 2021~ Jul. 02, 2021	Jan. 05, 2022	Radiation (03CH04-KS)
Amplifier	SONOMA	310N	187289	9KHz-1GHz	Jan. 06, 2021	Jun. 30, 2021~ Jul. 02, 2021	Jan. 05, 2022	Radiation (03CH04-KS)
Amplifier	MITEQ	EM18G40G GA	060728	18~40GHz	Jan. 07, 2021	Jun. 30, 2021~ Jul. 02, 2021	Jan. 06, 2022	Radiation (03CH04-KS)
high gain Amplifier	MITEQ	AMF-7D-00 101800-30-1 0P	2025788	1Ghz-18Ghz	Jan. 06, 2021	Jun. 30, 2021~ Jul. 02, 2021	Jan.05, 2022	Radiation (03CH04-KS)
Amplifier	Keysight	83017A	MY57280106	500MHz~26.5GHz	Oct. 14, 2020	Jun. 30, 2021~ Jul. 02, 2021	Oct. 13, 2021	Radiation (03CH04-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Jun. 30, 2021~ Jul. 02, 2021	NCR	Radiation (03CH04-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Jun. 30, 2021~ Jul. 02, 2021	NCR	Radiation (03CH04-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Jun. 30, 2021~ Jul. 02, 2021	NCR	Radiation (03CH04-KS)
Band Reject Filter	WI	WRCG 1850-1910-1 835-1925-40	1850-1910-183 5-1925 Tunable Notch	SN 15	NCR	Jul. 01, 2021	NCR	Radiation (03CH04-KS)
Band Reject Filter	WI	WTRCT8-69 8-850-20-40 -40SSK	698-850 Tunable Notch	SN 1	NCR	Jul. 01, 2021	NCR	Radiation (03CH04-KS)
High Pass Filter	WI	WHKX12-93 5-1000-1500 0-40ST	1G High Pass	SN 2	NCR	Jul. 01, 2021	NCR	Radiation (03CH04-KS)
High pass Filter	WI	WHKX12-28 05-3000-180 00-40ST	3G High Pass	SN 8	NCR	Jul. 01, 2021	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

ULCA_2A-14A								
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 B2 BW 20MHz Middle 1RB0, QPSK	3903	-55.11	-13	-42.11	-67.37	2.64	14.90	H
	5853	-52.35	-13	-39.35	-64.21	2.94	14.80	H
	7800	-49.79	-13	-36.79	-59.56	3.39	13.16	H
	3903	-53.57	-13	-40.57	-65.83	2.64	14.90	V
	5853	-53.18	-13	-40.18	-65.04	2.94	14.80	V
	7800	-49.50	-13	-36.50	-59.27	3.39	13.16	V
LTE B14 BW 10MHz Middle 1RB0, QPSK	1518	-60.16	-13	-47.16	-70.90	2.604	13.34	H
	2276	-58.76	-13	-45.76	-69.27	3.011	13.52	H
	3033	-56.14	-13	-43.14	-66.34	3.271	13.47	H
	1518	-60.39	-13	-47.39	-71.13	2.604	13.34	V
	2276	-56.41	-13	-43.41	-66.92	3.011	13.52	V
	3033	-54.95	-13	-41.95	-65.15	3.271	13.47	V

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

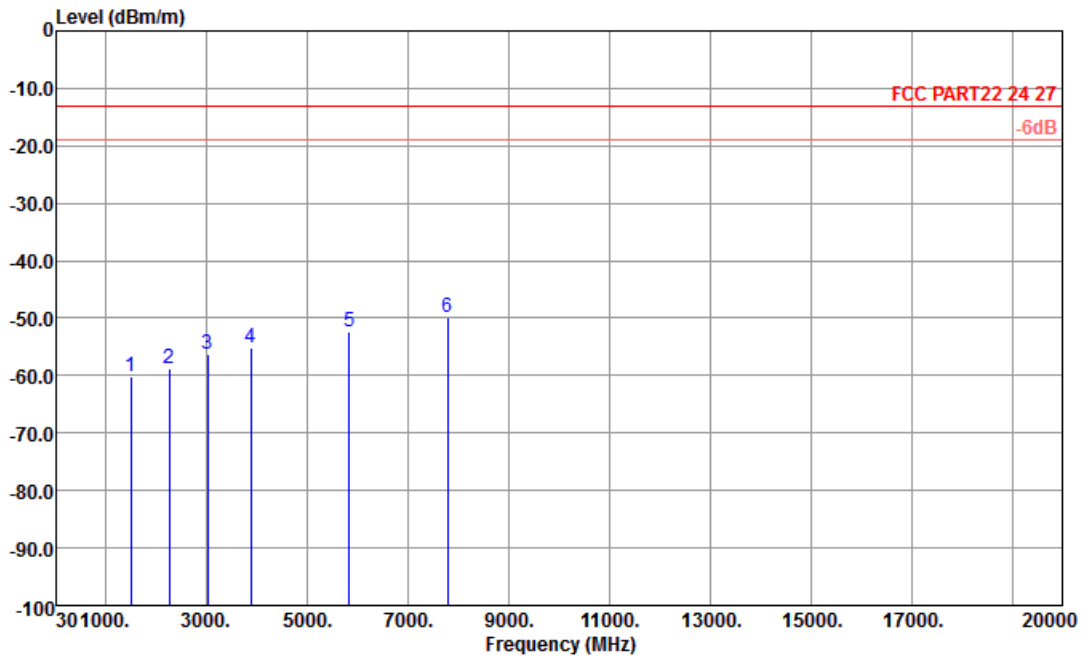
ULCA_2A-66A								
Channel	Frequency ( MHz )	EIRP ( dBm )	Limit ( dBm )	Over Limit ( dB )	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain ( dBi)	Polarization (H/V)
LTE B2 BW 20MHz Middle 1RB0, QPSK	3903	-55.19	-13	-42.19	-67.45	2.64	14.90	H
	5853	-52.30	-13	-39.30	-64.16	2.94	14.80	H
	7800	-49.76	-13	-36.76	-59.53	3.39	13.16	H
	3903	-56.21	-13	-43.21	-68.47	2.64	14.90	V
	5853	-53.28	-13	-40.28	-65.14	2.94	14.80	V
	7800	-51.35	-13	-38.35	-61.12	3.39	13.16	V
LTE B66 BW 20MHz Middle 1RB0, QPSK	4293	-54.95	-13	-41.95	-65.69	2.604	13.34	H
	6444	-54.39	-13	-41.39	-64.90	3.011	13.52	H
	8580	-50.41	-13	-37.41	-60.61	3.271	13.47	H
	4293	-54.04	-13	-41.04	-64.78	2.604	13.34	V
	6444	-54.23	-13	-41.23	-64.74	3.011	13.52	V
	8580	-50.35	-13	-37.35	-60.55	3.271	13.47	V

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



Worst test plots

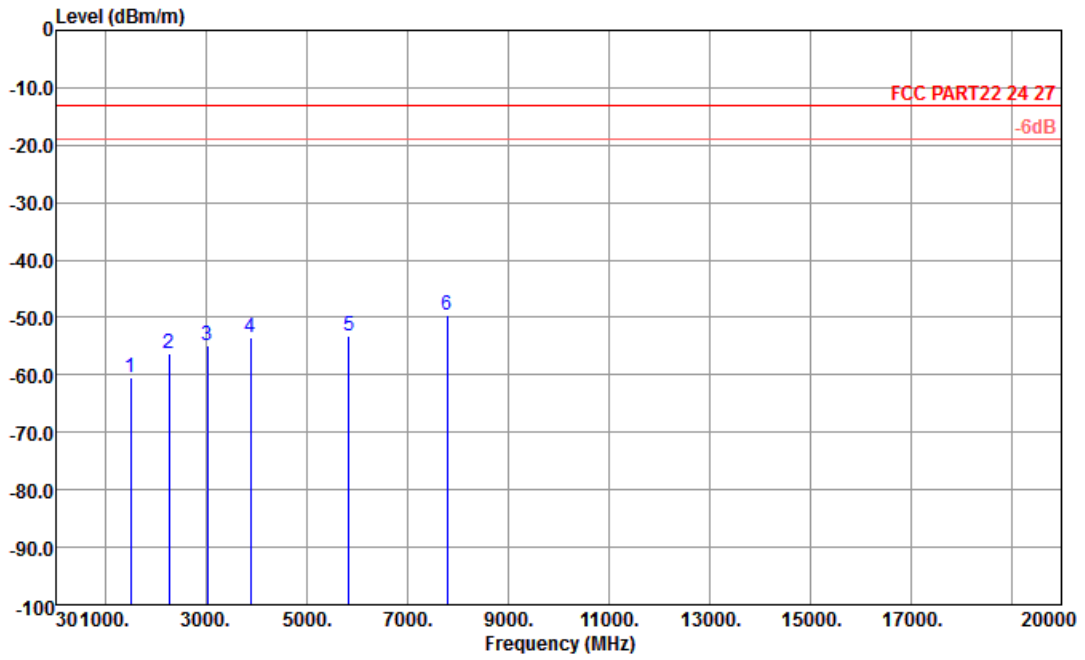
ULCA\_2A-14A / Max BW/ 1RB0/ Middle channel / QPSK



Site : 03CH04-KS  
 Condition : FCC PART22 24 27 3m HF PART 22/24/27 HORIZONTAL  
 Project : (FG) 151309

: QPSK, MaxBW = 20M+10M Combine, 1RB0

	Freq	Level	Over	Limit	Read	Pol/Phase
	MHz	dBm/m	Limit	Line	Level	
			dB	dBm/m	dBm	
1	1518.00	-60.16	-47.16	-13.00	-66.94	HORIZONTAL
2	2276.00	-58.76	-45.76	-13.00	-72.43	HORIZONTAL
3	3033.00	-56.14	-43.14	-13.00	-72.13	HORIZONTAL
4	3903.00	-55.11	-42.11	-13.00	-72.59	HORIZONTAL
5	5853.00	-52.35	-39.35	-13.00	-73.71	HORIZONTAL
6	7800.00	-49.79	-36.79	-13.00	-73.89	HORIZONTAL



Site : 03CH04-KS  
 Condition : FCC PART22 24 27 3m HF PART 22/24/27 VERTICAL  
 Project : (FG) 151309

: QPSK, MaxBW = 20M+10M Combine, 1RB0

Freq	Level	Over	Limit	Read	Pol/Phase
MHz	dBm/m	Limit	Line	Level	
1	1518.00	-60.39	-47.39	-13.00	-67.72 VERTICAL
2	2276.00	-56.41	-43.41	-13.00	-71.46 VERTICAL
3	3033.00	-54.95	-41.95	-13.00	-71.19 VERTICAL
4	3903.00	-53.57	-40.57	-13.00	-71.52 VERTICAL
5	5853.00	-53.18	-40.18	-13.00	-74.74 VERTICAL
6	7800.00	-49.50	-36.50	-13.00	-73.65 VERTICAL