

# TEST REPORT

EUT Description	<b>Notebook</b>
Brand Name	<b>HP</b>
Model Name	<b>HSN-I38C</b>
FCC ID	<b>B94HNI38PKHP2</b>
Date of Test Start/End	<b>2020-02-21 / 2020-03-03</b>
Features	<b>WWAN (LTE, UMTS), WLAN, BT (see section 5)</b>

Applicant	<b>HP Inc.</b>
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Reference Standards	<b>FCC CFR Title 47 Part 2, 22, 24, 27, 90 (see section 1)</b>
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Test Report identification	<b>200120-08.TR13</b>
Revision Control	<b>Rev. 00 This test report revision replaces any previous test report revision (see section 8)</b>

The test results relate only to the samples tested.  
The test report shall not be reproduced in full, without written approval of the laboratory.  
Reference to accreditation shall be used only by full reproduction of test report.

Issued by \_\_\_\_\_ Reviewed by \_\_\_\_\_

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# Table of Contents

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<b>1. Standards, reference documents and applicable test methods .....</b>	<b>3</b>
<b>2. General conditions, competences and guarantees .....</b>	<b>3</b>
<b>3. Environmental Conditions .....</b>	<b>3</b>
<b>4. Test samples .....</b>	<b>4</b>
<b>5. EUT Features .....</b>	<b>4</b>
<b>6. Remarks and comments .....</b>	<b>4</b>
<b>7. Test Verdicts summary .....</b>	<b>5</b>
<b>8. Document Revision History .....</b>	<b>5</b>
<b>Annex A. Test &amp; System Description .....</b>	<b>6</b>
A.1 MEASUREMENT SYSTEM.....	6
A.2 TEST EQUIPMENT LIST .....	8
A.3 MEASUREMENT UNCERTAINTY EVALUATION .....	8
<b>Annex B. Test Results .....</b>	<b>9</b>
B.1 RADIATED SPURIOUS EMISSION .....	9
<b>Annex C. Photographs .....</b>	<b>13</b>
C.1 RADIATED TEST SETUP .....	13
C.2 TEST SAMPLE .....	14

## 1. Standards, reference documents and applicable test methods

1. FCC 47 CFR part 2 - Subpart J - Equipment Authorization Procedures.
2. FCC 47 CFR part 22 - Subpart H - Cellular Radiotelephone Service.
3. FCC 47 CFR part 24 – Subpart E - Broadband PCS.
4. FCC 47 CFR part 27 – Subpart C - Technical Standards.
5. FCC 47 CFR part 27 – Subpart L - 1695-1710, 1710-1755 MHz, 1755-1780 MHz, 2110-2155 MHz, 2155-2180 MHz, 2180-2200 MHz Bands.
6. FCC 47 CFR part 90 – Subpart R - Regulations Governing the Licensing and Use of Frequencies in the 763-775 and 793-805 MHz Bands
7. FCC 47 CFR part 90 – Subpart S - Regulations Governing Licensing and Use of Frequencies in the 806-824, 851-869, 896-901, and 935-940 MHz Bands
8. FCC OET KDB 971168 D01 v03r01 Measurement guidance for certification of licensed digital transmitters.
9. C63.26-2015 - IEEE/ANSI Standard for Compliance Testing of Transmitters Used in Licensed Radio Services.

## 2. General conditions, competences and guarantees

- ✓ Intel Corporation SAS Wireless RF Lab (Intel WRF Lab) is an ISO/IEC 17025:2017 laboratory accredited by the American Association for Laboratory Accreditation (A2LA) with the certificate number 3478.01.
- ✓ Intel Corporation SAS Wireless RF Lab (Intel WRF Lab) is an Accredited Test Firm recognized by the FCC, with Designation Number FR0011.
- ✓ Intel WRF Lab declines any responsibility with respect to the identified information provided by the customer and that may affect the validity of results.
- ✓ Intel WRF Lab only provides testing services and is committed to providing reliable, unbiased test results and interpretations.
- ✓ Intel WRF Lab is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.
- ✓ Intel WRF Lab has developed calibration and proficiency programs for its measurement equipment to ensure correlated and reliable results to its customers.
- ✓ This report is only referred to the item that has undergone the test.
- ✓ This report does not imply an approval of the product by the Certification Bodies or competent Authorities.
- ✓ Complete or partial reproduction of the report cannot be made without written permission of Intel WRF Lab.

## 3. Environmental Conditions

- ✓ At the site where the measurements were performed the following limits were not exceeded during the tests:

Temperature	22°C ± 3°C
Humidity	43% ± 5%

#### 4. Test samples

Sample	Control #	Description	Model	Serial #	Date of receipt	Note
#01	200120-08.S14	Convertible_HongBo AX201NGW + L860-GL	HP Oleander	00095100PM	27/01/2020	N/A

#### 5. EUT Features

Brand Name	HP																																																																																																																																																																														
Model Name	HSN-I38C																																																																																																																																																																														
Prototype / Production	Production																																																																																																																																																																														
Supported Radios	The Fibocom M2 L860 GL module supports only UMTS and LTE, without carrier aggregation. The applicable frequency bands and operating modes are identified in the following table, where North America bands are shown in bold.																																																																																																																																																																														
	<b>WWAN:</b> <table border="1"> <thead> <tr> <th rowspan="2">Mode</th> <th rowspan="2">Bands</th> <th colspan="4">Supported Tx Mode</th> </tr> <tr> <th>WCDMA</th> <th>HSDPA</th> <th>HSUPA</th> <th>DC-HSDPA</th> </tr> </thead> <tbody> <tr> <td rowspan="4">WCDMA / HSPA+</td> <td><b>FDD II (1850.0 – 1910.0 MHz)</b></td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td><b>FDD IV (1710.0 – 1755.0 MHz)</b></td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td><b>FDD V (824.0 – 849.0 MHz)</b></td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>FDD VIII (880.0 – 915.0 MHz)</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <th>Mode</th> <th>Bands</th> <th colspan="5">Supported Channel Bandwidth (MHz)</th> </tr> <tr> <td></td> <td></td> <td>1.4</td> <td>3</td> <td>5</td> <td>10</td> <td>15</td> <td>20</td> </tr> <tr> <td rowspan="14">LTE FDD</td> <td><b>Band 2 (1850.0 – 1910.0 MHz)</b></td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td><b>Band 4 (1710.0 – 1755.0 MHz)</b></td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td><b>Band 5 (824.0 – 849.0 MHz)</b></td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>Band 7 (2500.0 – 2570.0 MHz)</td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td><b>Band 12 (699.0 – 716.0 MHz)</b></td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td><b>Band 13 (777.0 – 787.0 MHz)</b></td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td><b>Band 14 (788 – 798 MHz)</b></td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td><b>Band 17 (704.0 – 716.0 MHz)</b></td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>Band 18 (815.0 – 830.0 MHz)</td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td>✓</td> <td></td> </tr> <tr> <td>Band 19 (830.0 – 845.0 MHz)</td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td>✓</td> <td></td> </tr> <tr> <td><b>Band 25 (1850 – 1915 MHz)</b></td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td><b>Band 26 (814.0 – 849.0 MHz)</b></td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td></td> </tr> <tr> <td>Band 28 (703.0 – 748.0 MHz)</td> <td></td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td><b>Band 30 (2305.0 – 2315.0 MHz)</b></td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td><b>Band 66 (1710.0 – 1780.0 MHz)</b></td> <td>✓</td> <td></td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td rowspan="3">LTE TDD</td> <td>Band 38 (2570.0 – 2620.0 MHz)</td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>Band 40 (2300.0 – 2400.0 MHz)</td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td><b>Band 41 (2496.0 – 2690.0 MHz)</b></td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> </tbody> </table>	Mode	Bands	Supported Tx Mode				WCDMA	HSDPA	HSUPA	DC-HSDPA	WCDMA / HSPA+	<b>FDD II (1850.0 – 1910.0 MHz)</b>	✓	✓	✓	✓	<b>FDD IV (1710.0 – 1755.0 MHz)</b>	✓	✓	✓	✓	<b>FDD V (824.0 – 849.0 MHz)</b>	✓	✓	✓	✓	FDD VIII (880.0 – 915.0 MHz)	✓	✓	✓	✓	Mode	Bands	Supported Channel Bandwidth (MHz)							1.4	3	5	10	15	20	LTE FDD	<b>Band 2 (1850.0 – 1910.0 MHz)</b>	✓	✓	✓	✓	✓	✓	<b>Band 4 (1710.0 – 1755.0 MHz)</b>	✓	✓	✓	✓	✓	✓	<b>Band 5 (824.0 – 849.0 MHz)</b>	✓	✓	✓	✓			Band 7 (2500.0 – 2570.0 MHz)			✓	✓	✓	✓	<b>Band 12 (699.0 – 716.0 MHz)</b>	✓	✓	✓	✓			<b>Band 13 (777.0 – 787.0 MHz)</b>			✓	✓			<b>Band 14 (788 – 798 MHz)</b>			✓	✓			<b>Band 17 (704.0 – 716.0 MHz)</b>			✓	✓			Band 18 (815.0 – 830.0 MHz)			✓	✓	✓		Band 19 (830.0 – 845.0 MHz)			✓	✓	✓		<b>Band 25 (1850 – 1915 MHz)</b>	✓	✓	✓	✓	✓	✓	<b>Band 26 (814.0 – 849.0 MHz)</b>	✓	✓	✓	✓	✓		Band 28 (703.0 – 748.0 MHz)		✓	✓	✓	✓	✓	<b>Band 30 (2305.0 – 2315.0 MHz)</b>			✓	✓			<b>Band 66 (1710.0 – 1780.0 MHz)</b>	✓		✓	✓	✓	✓	LTE TDD	Band 38 (2570.0 – 2620.0 MHz)			✓	✓	✓	✓	Band 40 (2300.0 – 2400.0 MHz)			✓	✓	✓	✓	<b>Band 41 (2496.0 – 2690.0 MHz)</b>			✓	✓	✓	✓
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Antenna Information	HONG-BO PIFA Antenna WWAN (TX1), 6036B0251801 (260-27363) HONG-BO PIFA Antenna WWAN (TX2), 6036B0252501 (260-27364)																																																																																																																																																																														

#### 6. Remarks and comments

The tested configurations were selected based on the worst case spurious emissions per frequency band from modular type approval report.

The smallest bandwidth and RB were selected in order to guarantee the worst case in terms of power density.

## 7. Test Verdicts summary

The statement of conformity to applicable standards in the table below are based on the measured values, without taking into account the measurement uncertainties.

Band	FCC part	Test name	Verdict
WCDMA II	24.238, 2.1053	Radiated spurious emission	P
WCDMA IV	27.53 (h), 2.1053	Radiated spurious emission	P
WCDMA V	22.917, 2.1053	Radiated spurious emission	P
LTE 4	27.53(h), 2.1053	Radiated spurious emission	P
LTE 14	90.543(c),(f), 2.1053	Radiated spurious emission	P
LTE 25	24.238, 2.1053	Radiated spurious emission	P
LTE 26	90.691, 22.917, 2.1053	Radiated spurious emission	P
LTE 30	27.53 (a)(4), 2.1053	Radiated spurious emission	P

P: Pass

F: Fail

NM: Not Measured

NA: Not Applicable

## 8. Document Revision History

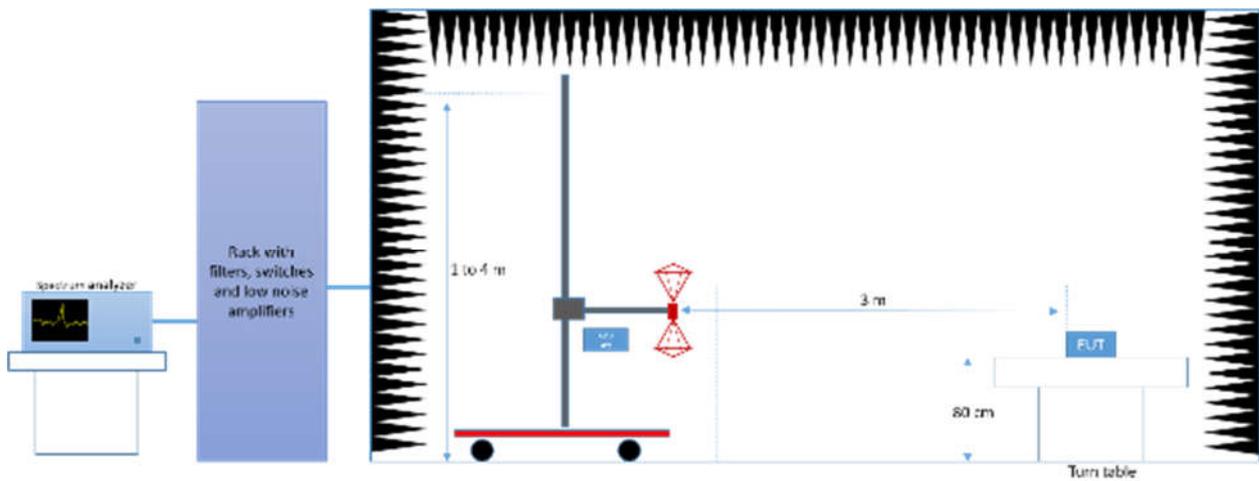
Revision #	Date	Modified by	Revision Details
Rev. 00	2020-03-03	A.LOUNES	First Issue

# Annex A. Test & System Description

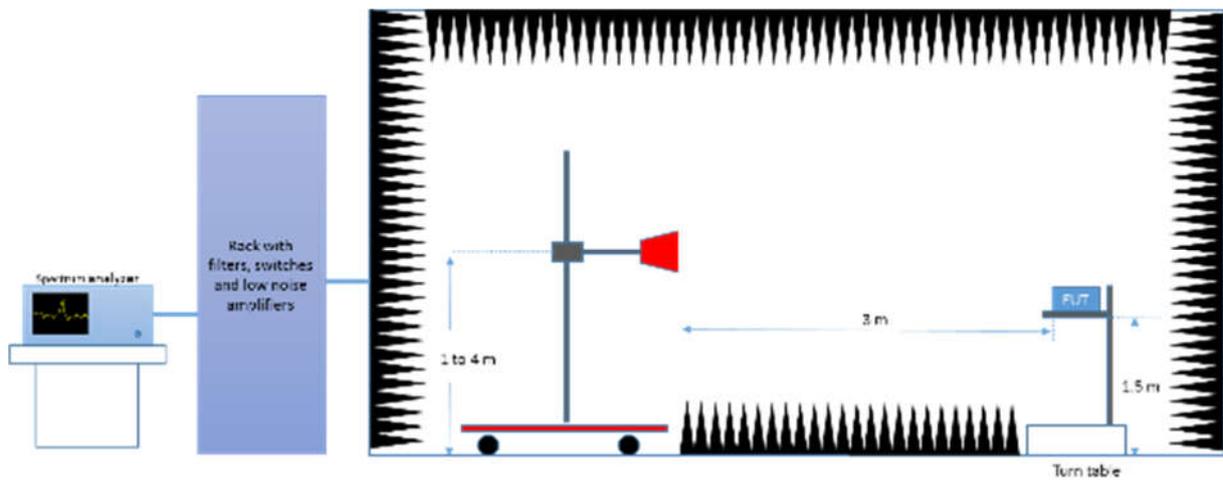
## A.1 Measurement System

Measurements were performed using the following setups. A communication tester was used to establish a communication link with the EUT, and the communication tester parameters were set to get the maximum output power from the EUT.

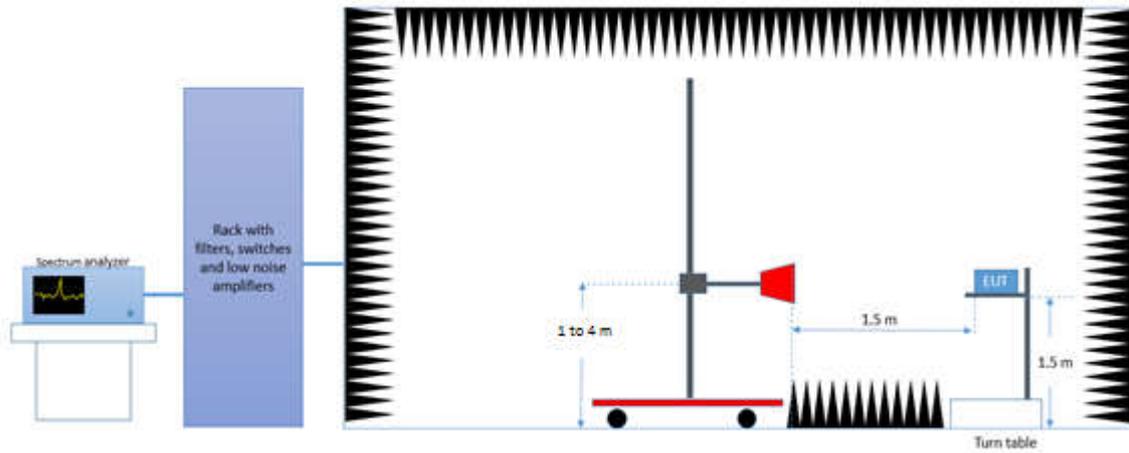
### Radiated Setup 30MHz- 1GHz



### Radiated Setup Frequency range 1 GHz to 18 GHz



*Radiated Setup Frequency range 18 GHz to 26.5 GHz*



Sample Calculation

The spurious received power P at the spectrum Analyzer is converted to EIRP the equivalent isotropically radiated power, in dBm using the transducer factor F corresponding to the Rx path Loss:

$$F \text{ (dB)} = \text{Free Space Attenuation (dB)} + \text{Cable losses (dB)} - \text{Amplifiers Gain (dB)} - \text{Rx Antenna Gain (dBi)}$$

$$\text{EIRP (dBm)} = P(\text{dBm}) + F \text{ (dB)}$$

## A.2 Test Equipment List

### A.2.1 Radiated Setup #1

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
0420	Spectrum analyzer	FSV40	101556	Rohde & Schwarz	2018-05-17	2020-05-17
0993	BiConical antenna 25 MHz – 1 GHz	UBAA9115+BBVU9135+ DGA9552N	0286+CH 9044	Schwarzbeck	2019-11-22	2021-11-21
0141	Double Ridged Horn Antenna 1 GHz – 18 GHz	3117	00157736	ETS Lindgren	2018-05-11	2020-05-11
0325	Double Ridged Horn Antenna 1 GHz – 18 GHz	3117	00157734	ETS Lindgren	2019-08-12	2021-08-12
0139	Horn Antenna 3116+ Amplifier 18GHz – 26.5GHz	3116	00167100	ETS Lindgren	2018-04-06	2020-04-06
0135	Semi Anechoic chamber	FACT 3	5720	ETS Lindgren	2018-04-18	2020-04-18
0530	Measurement Software	EMC32 V10.40.10	100623	Rohde & Schwarz	N/A	N/A
0622	Communication tester	CMW500	163186	Rohde & Schwarz	2019-05-02	2020-05-02
0210	Communication tester	CMW500	147712	Rohde & Schwarz	N/A	N/A
0996	Communication tester	CMW500	163104	Rohde & Schwarz	N/A	N/A
0797	Temperature & Humidity logger	RA12E-TH1-RAS	RA12-D0EB1A	AVTECH	2019-04-07	2021-04-07

## A.3 Measurement Uncertainty Evaluation

The system uncertainty evaluation is shown in the below table:

Measurement type	Uncertainty [ $\pm$ dB]
Radiated test < 1GHz	$\pm 3.0$
Radiated test 1GHz – 26.5 GHz	$\pm 4.3$

# Annex B. Test Results

## B.1 Radiated spurious emission

### B.1.1 Standard references

BAND	FCC part	Limits
WCDMA II	24.238, 2.1053	The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB
WCDMA IV LTE 4	27.53 (h), 2.1053	The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB
WCDMA V LTE 26	22.917, 2.1053	The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB
LTE 14	90.543(c),(f), 2.1053	The power of any emission must be reduced below the mean output power (P) by at least $43 + 10 \log(P)$ dB measured in a 100 kHz bandwidth for frequencies less than 1 GHz, and in a 1 MHz bandwidth for frequencies greater than 1 GHz  For operations in the 758-775 MHz and 788-805 MHz bands, all emissions including harmonics 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.
LTE 25	24.238, 2.1053	The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB
LTE 30	27.53 (a)(4), 2.1053	By a factor of not less than: $43 + 10 \log(P)$ dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than $55 + 10 \log(P)$ dB on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than $61 + 10 \log(P)$ dB on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than $67 + 10 \log(P)$ dB on all frequencies between 2328 and 2337 MHz;  (ii) By a factor of not less than $43 + 10 \log(P)$ dB on all frequencies between 2300 and 2305 MHz, $55 + 10 \log(P)$ dB on all frequencies between 2296 and 2300 MHz, $61 + 10 \log(P)$ dB on all frequencies between 2292 and 2296 MHz, $67 + 10 \log(P)$ dB on all frequencies between 2288 and 2292 MHz, and $70 + 10 \log(P)$ dB below 2288 MHz;  (iii) By a factor of not less than $43 + 10 \log(P)$ dB on all frequencies between 2360 and 2365 MHz, and not less than $70 + 10 \log(P)$ dB above 2365 MHz.

### B.1.2 Test procedure

The setup described in Test & System Description was used to measure the radiated spurious emissions. The test was done following the FCC OET KDB 971168 D01 v03r01.

Depending of the frequency range and bands being tested, different antennas and filters were used.

The final measurement is done by varying the antenna height from 1 to 4 meters, the EUT azimuth over  $360^\circ$  and for both Vertical and Horizontal polarizations.

### B.1.3 Test Results

#### WCDMA 2

30 MHz to 26.5 GHz - Radiated Spurious WCDMA 2- QPSK - Low channel – 1850 MHz			
Frequency	RMS	Limit	Margin
MHz	dBm	dBm	dB
217.0	-70.9	-13.0	57.9
5555.0	-47.2	-13.0	34.2
17686.0	-38.8	-13.0	25.8
24593.2	-61.9	-13.0	48.9

#### WCDMA 4

30 MHz to 18GHz - Radiated Spurious WCDMA 4- QPSK - Mid channel – 1732.5 MHz			
Frequency	RMS	Limit	Margin
MHz	dBm	dBm	dB
217.0	-69.0	-13.0	56.0
2975.0	-48.7	-13.0	35.7
17695.9	-38.6	-13.0	25.6

#### WCDMA 5

30 MHz to 9 GHz - Radiated Spurious WCDMA 5- QPSK - Mid channel – 836.5 MHz			
Frequency	RMS	Limit	Margin
MHz	dBm	dBm	dB
1000.0	-35.5	-13.0	22.5
2506.4	-45.7	-13.0	32.7

**LTE 4**

**30MHz to 18GHz - Radiated Spurious  
LTE 4- QPSK – Low channel – 1710 MHz  
BW 1.4 MHz– RB 1**

Frequency	RMS	Limit	Margin
MHz	dBm	dBm	dB
216.9	-69.5	-13.0	56.5
5130.6	-47.9	-13.0	34.9
17693.1	-37.1	-13.0	24.1

**LTE 14**

**30MHz to 9GHz - Radiated Spurious  
LTE 14 - QPSK - Mid channel – 793 MHz  
BW 5 MHz– RB 1**

Frequency	RMS	Limit	Margin
MHz	dBm	dBm	dB
992.0	-35.9	-13.0	22.9
2372.3	-44.8	-13.0	31.8

**LTE 25**

**30MHz to 26.5GHz - Radiated Spurious  
LTE 25 - QPSK - High channel – 1915 MHz  
BW 1.4 MHz– RB 1**

Frequency	RMS	Limit	Margin
MHz	dBm	dBm	dB
217.0	-74.4	-13.0	61.4
7654.9	-47.7	-13.0	34.7
17451.8	-38.3	-13.0	25.3
24588.4	-62.3	-13.0	49.3

**LTE 26****30MHz to 9GHz - Radiated Spurious  
LTE 26 - QPSK - Mid channel - 831.5 MHz  
BW 1.4 MHz- RB 1**

Frequency	RMS	Limit	Margin
MHz	dBm	dBm	dB
967.7	-36.4	-13.0	23.4
2493.2	-44.9	-13.0	31.9

**LTE 30****30MHz to 26.5GHz - Radiated Spurious  
LTE 30 - QPSK - Mid channel - 2310 MHz  
BW 5 MHz- RB 1**

Frequency	RMS	Limit	Margin
MHz	dBm	dBm	dB
216.9	-72.1	-40.0	32.1
4615.7	-51.9	-40.0	11.9
16335.1	-55.7	-40.0	15.7
24584.7	-61.7	-40.0	21.7