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Test Report

Report Number:

F200628E1

Equipment under Test (EUT):

NB-IoT modem
ZSNB-L11

Applicant:

Gutermann Technology GmbH

Manufacturer:

Gutermann Technology GmbH

ilac-MRA
DAkkS Deutsche Akkreditierungsstelle
D-PL-17186-01-01
D-PL-17186-01-02
D-PL-17186-01-03

References

[1] **ANSI C63.26-2015** American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

[2] **CFR 47 Part 2** Frequency allocations and radio treaty matters; General rules and regulations

[3] **CFR 47 Part 22** Public mobile services, Subpart H – Cellular Radiotelephone service

[4] **CFR 47 Part 24** Public mobile services, Subpart E – Broadband PCS

[5] **CFR 47 Part 27** Miscellaneous wireless communications services

[6] **RSS-130 Issue 2** Equipment Operating in the Frequency Bands 617 - 652 MHz, 663 - 698 MHz, 698 - 756 MHz and 777 - 787 MHz

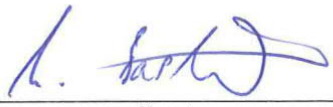
[7] **RSS-132 Issue 3** Cellular Telephone Systems Operating in the Bands 824 - 849 MHz and 869 - 894 MHz

[8] **RSS-133 Issue 6** 2 GHz Personal Communication Services

[9] **RSS-139 Issue 3** Advanced Wireless Services (AWS) Equipment Operating in the Bands 1710 - 1780 MHz and 2110 - 2180 MHz

Test Result

The requirements of the tests performed as shown in the overview (clause 4) were fulfilled by the equipment under test. The complete test results are presented in the following.

Tested and written by:	Manuel BASTERT Name	 Signature	28.07.2020 Date
Reviewed and approved by:	Wolfgang KASALOWSKY Name	 Signature	28.07.2020 Date

This test report is only valid in its original form.

The test results herein refer only to the tested sample. PHOENIX TESTLAB GmbH is not responsible for any generalisations or conclusions drawn from these test results concerning further samples. Any modification of the tested samples is prohibited and leads to the invalidity of this test report. Each page necessarily contains the PHOENIX TESTLAB Logo and the TEST REPORT NUMBER.

Contents: Page

1 Identification

1.1 Applicant

Name:	Gutermann Technology GmbH
Address:	Gottlieb Daimler Straße 10 88214 Ravensburg
Country:	Germany
Name for contact purposes:	Mr. Hermann WAIBEL
Phone:	+49 751 35 90 16 - 83
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eMail Address:	hermann.waibel@gutermann-water.com
Applicant represented during the test by the following person:	-

1.2 Manufacturer

Name:	Gutermann Technology GmbH
Address:	Gottlieb Daimler Straße 10 88214 Ravensburg
Country:	Germany
Name for contact purposes:	Mr. Hermann WAIBEL
Phone:	+49 751 35 90 16 - 83
Fax:	+49 751 35 90 16 - 99
eMail Address:	hermann.waibel@gutermann-water.com
Manufacturer represented during the test by the following person:	-

1.3 Test Laboratory

The tests were carried out at:

PHOENIX TESTLAB GmbH
Königswinkel 10
32825 Blomberg
Germany

Accredited by Deutsche Akkreditierungsstelle GmbH (DAkkS) in compliance with DIN EN ISO/IEC 17025 under Reg. No. D-PL-17186-01-06 and D-PL-17186-01-05, FCC Test Firm Designation Number DE0004, FCC Test Firm Registration Number 469623, CAB Identifier DE0003 and ISED# 3469A.

1.4 EUT (Equipment under Test)

EUT	
EUT: *	NB-IoT modem
PMN: *	ZSNB-L11
HVIN: *	ZSNB1x1
FVIN: *	NBGV01
IMEI: *	867997030746175
FCC ID: *	ZSS-ZSNBL10001
ISED: *	9789A-ZSNBL10001

* Declared by the applicant

Host device	
Host device: *	Leakage logger with NB-IoT modem
HMN: *	IoT Leak Logger
Serial number: *	500000928

* Declared by the applicant

Note: Phoenix Testlab GmbH does not take samples. The samples used for tests are provided exclusively by the applicant.

Ports / Connectors				
Identification			Length during test	Shielding (Yes / No)
	EUT	Ancillary		
Antenna / programming port	RP-SMA male	RP-SMA female	0.5 m	Yes

Ancillary Equipment	
Programming jig *2	ZSNB-JIG10
Laptop *2	Hewlett Packard TPN-126

*1 Provided by the laboratory
*2 Provided by the applicant

1.5 Technical Data of Equipment

General	
Supported GSM bands: * / **	None
Supported UMTS FDD bands: * / **	None
Supported E-UTRA FDD (NB-IoT) bands: * / **	1, 2, 3, 4, 5, 8, 12, 13, 17, 18, 19, 20, 25, 26, 28, 66
Max. output power (nom.): *	23 dBm

* Declared by the applicant
** Not all bands are used in the end application.

Cellular antennas	
Antenna type: *	External monopole antenna
Gain: * (max) (on a 10 cm x 10 cm Groundplane)	ANT-ZS-NBIOT-30-05 (Band 1, 2, 3, 4, 25, 66): -0.5 dBi @ 1710 MHz -3.7 dBi @ 1980 MHz
	ANT-ZS-NBIOT-76-05 (Band 5, 18, 19, 20, 26): -2.5 dBd @ 814 MHz -2.5 dBd @ 862 MHz
	ANT-ZS-NBIOT-90-05 (Band 12, 13, 17, 28): -0.8 dBd @ 699 MHz -3.5 dBd @ 787 MHz

* Declared by the applicant

1.6 Dates

Date of receipt of test sample:	02.06.2020
Start of test:	22.06.2020
End of test:	26.06.2020

2 Operational States

The operation mode of the equipment under test during the emission tests was defined as follows:

An NB-IoT-connection was established using a Wideband Radio Communication Tester CMW 500. The EUT was connected to the tester via suitable antennas and set to communicate with maximum throughput. The following parameters were set:

NB-IoT in E-UTRA band 2

- Downlink channel UARFCN 900 (1960.0 MHz),
- Uplink channel UARFCN 18900 (1880.0 MHz),
- BS-Power -75 dBm; Mobile-Power 23 dBm; Mode PRBS9.

NB-IoT in E-UTRA band 4

- Downlink channel UARFCN 2175 (2132.5 MHz),
- Uplink channel UARFCN 20175 (1732.5 MHz),
- BS-Power -75 dBm; Mobile-Power 23 dBm; Mode PRBS9.

NB-IoT in E-UTRA band 5

- Downlink channel UARFCN 2525 (881.5 MHz),
- Uplink channel UARFCN 20525 (836.5 MHz),
- BS-Power -75 dBm; Mobile-Power 23 dBm; Mode PRBS9.

NB-IoT in E-UTRA band 12

- Downlink channel UARFCN 5095 (737.5 MHz),
- Uplink channel UARFCN 23095 (707.5 MHz),
- BS-Power -75 dBm; Mobile-Power 23 dBm; Mode PRBS9.

NB-IoT in E-UTRA band 13

- Downlink channel UARFCN 5230 (751.0 MHz),
- Uplink channel UARFCN 23230 (782.0 MHz),
- BS-Power -75 dBm; Mobile-Power 23 dBm; Mode PRBS9.

NB-IoT in E-UTRA band 25

- Downlink channel UARFCN 8365 (1962.5 MHz),
- Uplink channel UARFCN 26365 (1882.5 MHz),
- BS-Power -75 dBm; Mobile-Power 23 dBm; Mode PRBS9.

NB-IoT in E-UTRA band 66

- Downlink channel UARFCN 66786 (2145.0 MHz),
- Uplink channel UARFCN 132322 (1745.0 MHz),
- BS-Power -75 dBm; Mobile-Power 23 dBm; Mode PRBS9.

3 Additional Information

The LTE-bands used during the measurements were defined by the manufacturer.
During all radiated spurious emission tests, the EUT was positioned on a non-conducting support with a height of 1.5 m. The measurement was carried out in three orthogonal positions. The worst-case plots are shown in this report. The radio module is already certified, therefore only the radiated emissions were measured in the final application. The lowest internal clock frequency is higher than 30 MHz. Therefore, no spurious emissions below 30 MHz were carried out.
The EUT was not labeled with an FCC ID or ISED number.

4 Overview

Application	Frequency range [MHz]	FCC 47 CFR Part 22 [3], 24 [4], 27 [5]	Status	Refer page
Radiated spurious emissions	30 – 26,000	22.917 (a) (b), 24.238 (a) (b), 27.53	Passed	14 et seq.

Application	Frequency range [MHz]	RSS-130 [6], RSS-132 [7], RSS-133 [8], RSS-139 [9]	Status	Refer page
Radiated spurious emissions	30 – 26,000	4.7.1 [6], 5.5 (i) & (ii) [7], 6.5.1 (i) & (ii) [8], 6.6 (i) & (ii) [9]	Passed	14 et seq.

5 Conducted power measurement

5.1 Test arrangement

A conducted power measurement was carried out to ensure that the maximum power is in the accepted range of 23 dBm ± 2 dB, because a further communication was implemented via the antenna port of the host device. The power measurement function of the Wideband Radio Communication Tester CMW500 was used for this purpose. The EUT was directly connected to the instrument and the measurement was carried out in all bands used in the final application. The EUT was set to transmit in multi-tone operation at all 12 subcarriers to ensure an operation with maximum traffic and power.

5.2 Results

Ambient temperature	23 °C	Relative humidity	54 %

Operation mode: Communication link established @ nom. 23 dBm UL power

NB-IoT in E-UTRA band	Maximum output power
2	21.6 dBm
4	21.5 dBm
5	21.1 dBm
12	21.1 dBm
13	21.4 dBm
25	21.5 dBm
66	21.3 dBm
Measurement uncertainty: ± 0.64 dB	

Test equipment used (see chapter 6 for details):

19

6 Spurious emissions (radiated)

6.1 Test arrangements for tabletop EUTs

For radiated emissions measurements performed at frequencies less than or equal to 1 GHz, the EUT shall be placed on a RF-transparent table or support at a nominal height of 80 cm above the reference ground plane. Radiated measurements shall be made with the measurement antenna positioned in both horizontal and vertical polarization. The measurement antenna shall be varied from 1 m to 4 m in height above the reference ground in a search for the relative positioning that produces the maximum radiated signal level (i.e., field strength or received power). When orienting the measurement antenna in vertical polarization, the minimum height of the lowest element of the antenna shall clear the site reference ground plane by at least 25 cm.

Figure 4 shows a typical EUT configuration with a wireless device placed on a tabletop on an appropriate radiated test site. The measurement antenna shall be placed at the specified distance from the closest point of the EUT. Tabletop devices shall be placed on a RF transparent platform with nominal top surface dimensions of 1 m by 1.5 m. Any necessary support equipment shall be placed far enough away from the EUT, such that changes in relative position of the EUT and support equipment do not influence the measured values. If the EUT requires a connection to a server or computer, via control/data cable(s), to exercise the product, then the controlling server or computer may be placed outside of the test area.

For radiated measurements performed at frequencies above 1 GHz, the EUT shall be placed on an RF transparent table or support at a nominal height of 1.5 m above the ground plane. Radiated measurements shall be made with the measurement antenna positioned in both horizontal and vertical polarization. The height scan of the measurement antenna shall be varied from 1 m to 4 m in a search for the relative positioning that produces the maximum radiated signal level (i.e., field strength or received power). When using the direct field strength method and the EUT is manipulated through three different orientations, then the scan height range of the measurement antenna is limited to 2.5 m or 0.5 m above the top of the EUT, whichever is higher.

NOTE—The use of waveguide and/or flexible waveguide may be necessary when performing measurements at frequencies above 10 GHz to achieve usable signal-to-noise ratios at acceptable measurement distances. If so, it may be necessary to restrict the height search of the antenna, or conversely to raise or lower the EUT relative to the elevation of the measurement antenna, including its relative angle with respect to the ground plane. In any case, special care should be exercised to ensure that the maximum emissions are identified and measured.

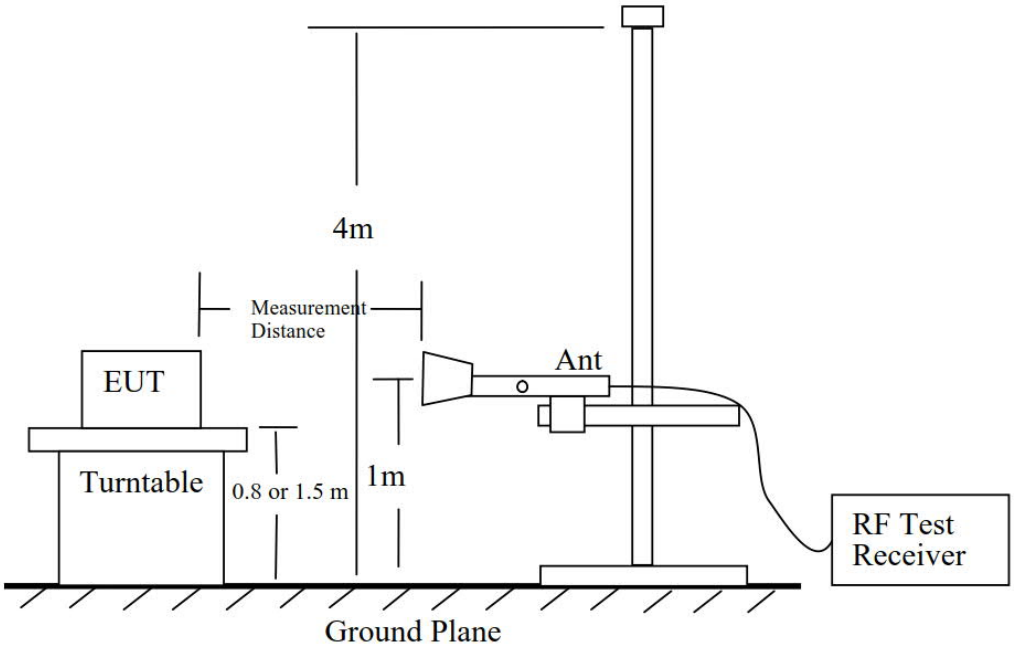


Figure 4—Test set-up for radiated spurious measurements

Radiated unwanted emissions measurements shall be made over the frequency range specified in 5.1, dependent upon the relevant operational frequency band. These radiated measurements shall be made around the EUT (or alternatively, with the EUT rotated on a turntable), while varying the measurement antenna height and examining both horizontal and vertical polarization of the measurement antenna, as described above. Ordinarily, this will require the use of a turntable and an antenna positioner.

The EUT shall be set up in its typical configuration and arrangement and operated in its various modes of operation. Unless the EUT uses an integral antenna, the EUT shall be terminated with a non-radiating transmitter load. In cases where the EUT uses an adjustable antenna, the antenna shall be adjusted through typical positions and lengths to maximize emissions levels. EUTs with integral antennas shall be evaluated in their normal orientation. Where EUTs are designed to be installed in one of two distinct orientations, they shall be tested in both of their possible orientations. EUTs that can be operated in one of multiple orientations (e.g., handheld, portable, or modular devices) shall be tested in a minimum of three orientations. See Figure 5. When large antennas (e.g., high gain) or antennas not structurally supported by the EUT are utilized, a RF transparent supporting structure shall be used to facilitate the compliance testing. In all cases, the EUT, including the transmit antenna, shall be orientated such that the measurement of the emission is maximized.

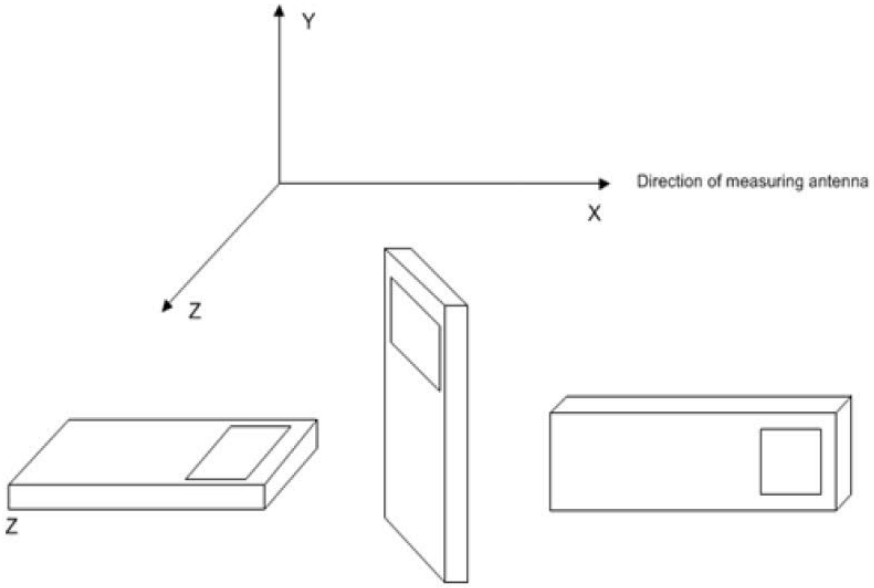


Figure 5—EUT configuration positions

Cables or wires inclusive to the EUT shall be configured so as to maximize the measured emission levels. The EUT controls shall also be adjusted to maximize the emission according to the manufacturer's specifications. The modulation applied shall be based on the guidance provided in the manufacturer's specifications. When necessary, field strength measurements shall be converted to ERP or EIRP for comparison to the applicable regulatory limits. See 5.2.7 for additional guidance.

6.2 Results

6.2.1 Radiated emissions (UE) in traffic mode (NB-IoT in E-UTRA band 2)

Ambient temperature	23 °C	Relative humidity	54 %

Measurement at uplink channel 18900:

Spurious emissions level					
f (MHz)	Polarisation	Level (dBm)	f (MHz)	Polarisation	Level (dBm)
1880.0	Uplink channel, no spurious		-	-	-
1960.0	Downlink channel, no spurious				
-	-	-	-	-	-
Measurement uncertainty: ±4.8 dB					

Limit: 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 [1].

This results into a limit of -13 dBm for all power levels of the UE.

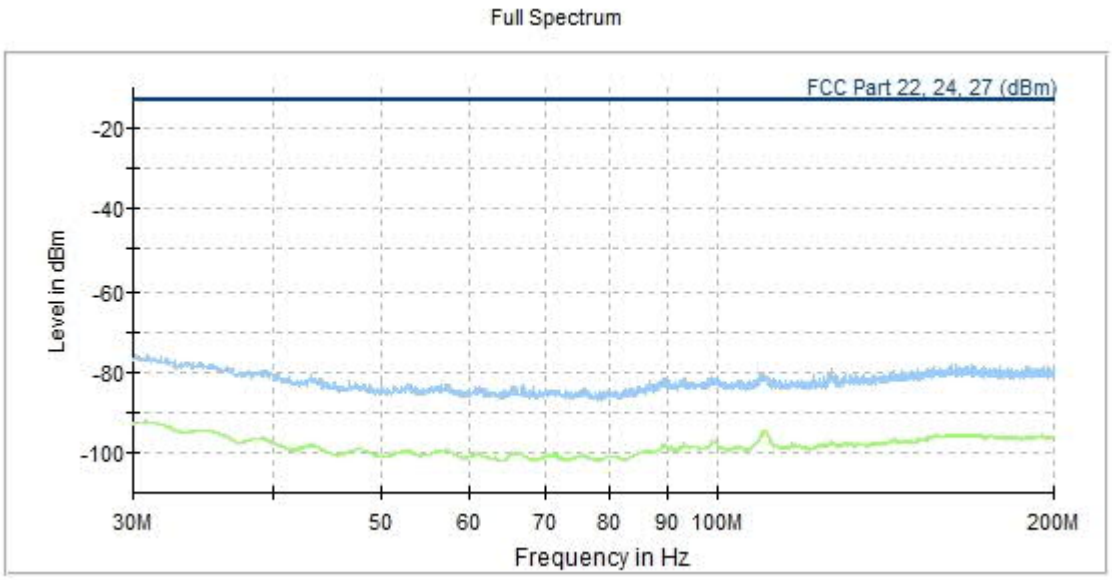
No significant frequencies were found during the spurious emission measurement.

Test equipment used (see chapter 6 for details):

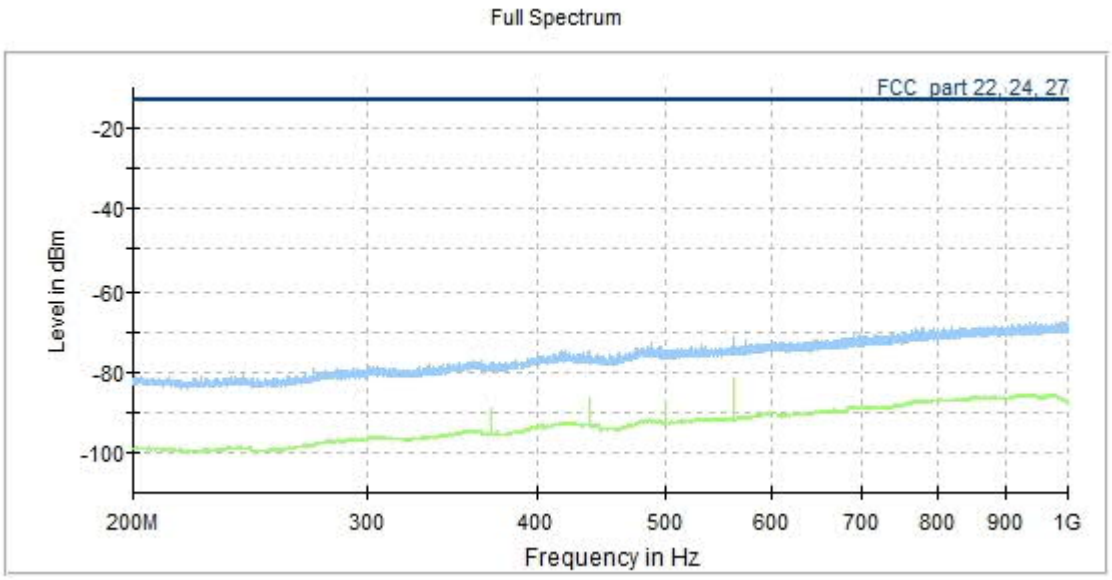
1 – 10, 12, 13, 15, 19, 20, 23, 24

The measurement plots are shown in the following:

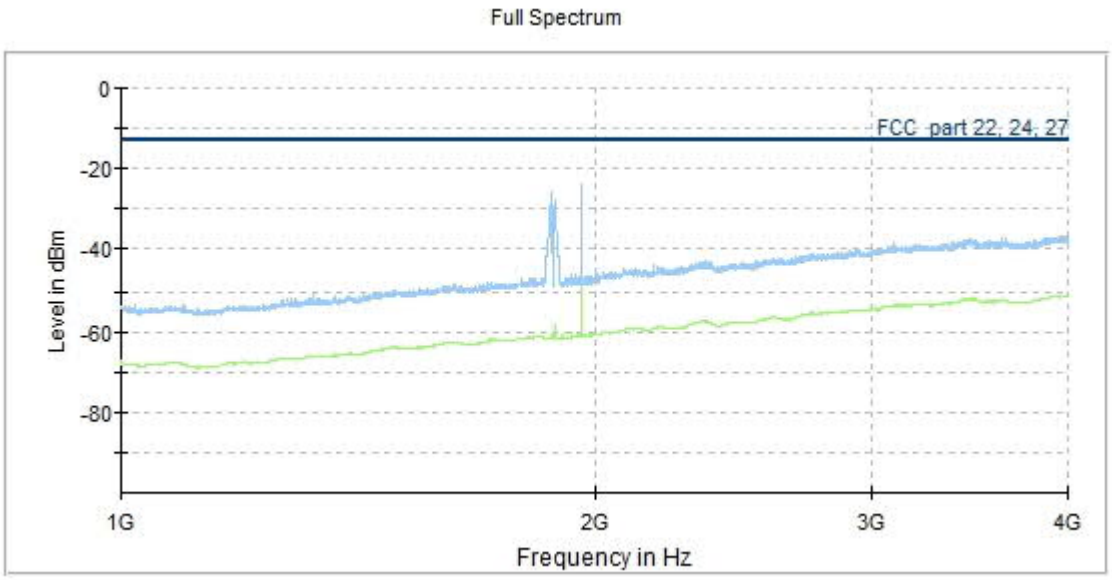
NB-IoT-EUTRA-Bd2_pos1_30-200M.PNG:



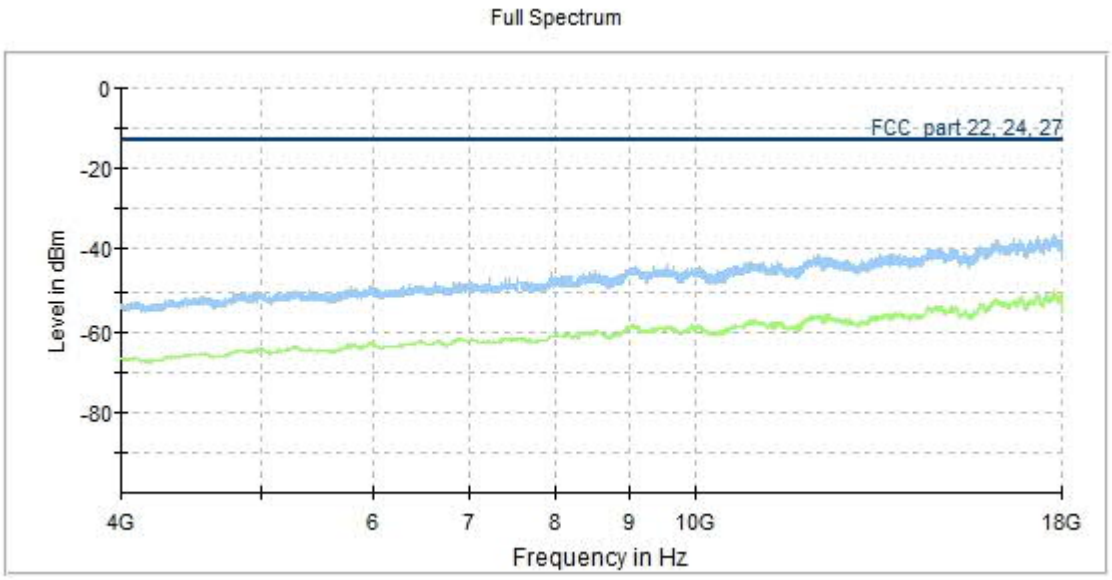
NB-IoT-EUTRA-Bd2_pos1_200-1000M.PNG:



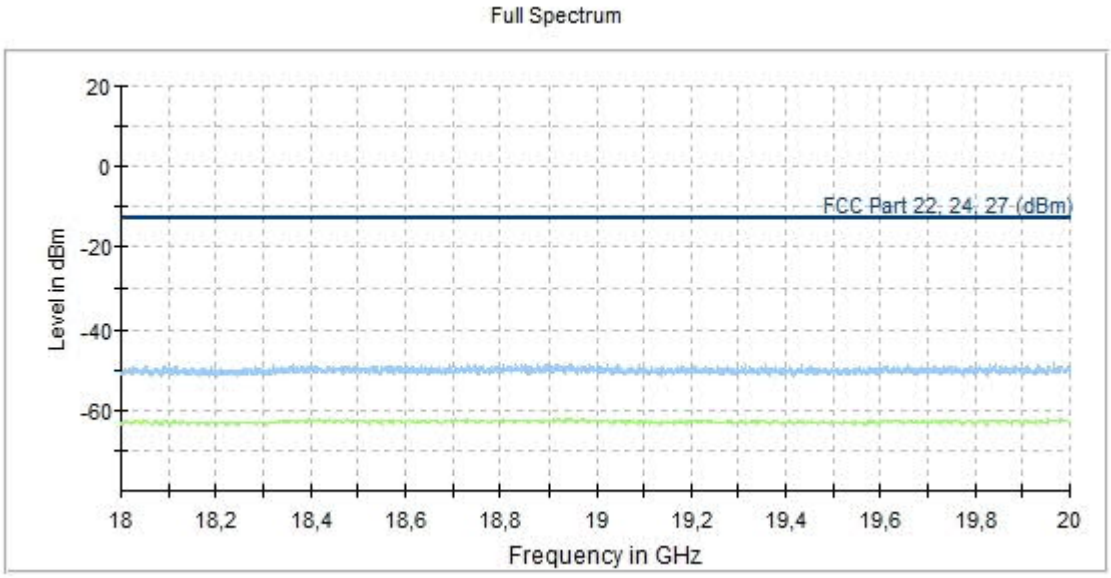
NB-IoT-EUTRA-Bd2_pos1_1-4G.PNG:



NB-IoT-EUTRA-Bd2_pos1_4-18G.PNG:



NB-IoT-EUTRA-Bd2_pos1_18-20G.PNG:



6.2.2 Radiated emissions (UE) in traffic mode (NB-IoT in E-UTRA band 4)

Ambient temperature	23 °C	Relative humidity	54 %

Measurement at uplink channel 20175:

Spurious emissions level					
f (MHz)	Polarisation	Level (dBm)	f (MHz)	Polarisation	Level (dBm)
1732.5	Uplink channel, no spurious		-	-	-
2132.5	Downlink channel, no spurious		-	-	-
-	-	-	-	-	-
Measurement uncertainty: ±4.8 dB					

Limit: 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 [1].

This results into a limit of -13 dBm for all power levels of the UE.

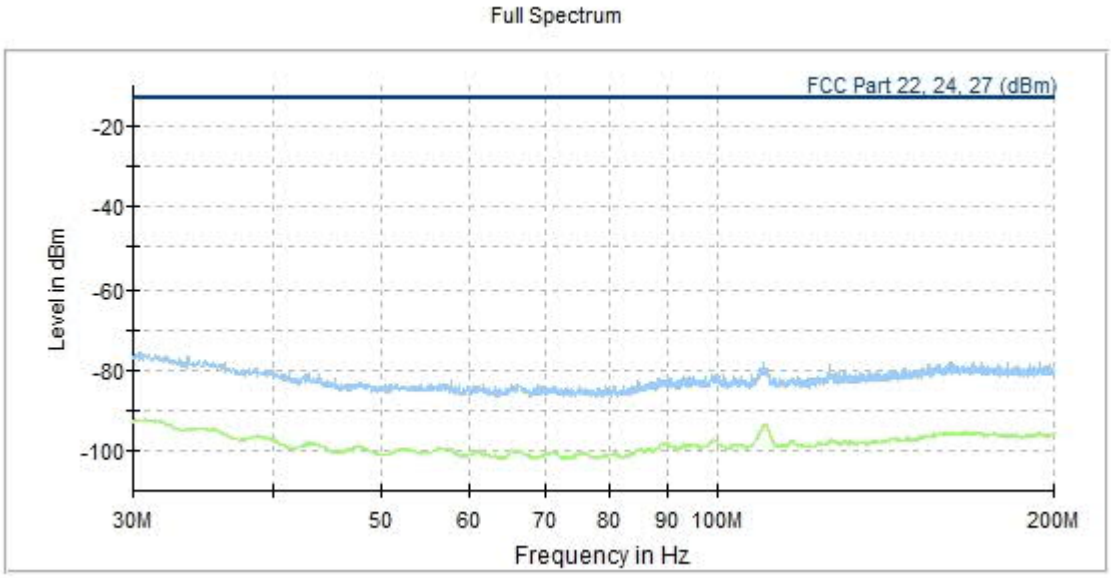
No significant frequencies were found during the spurious emission measurement.

Test equipment used (see chapter 6 for details):

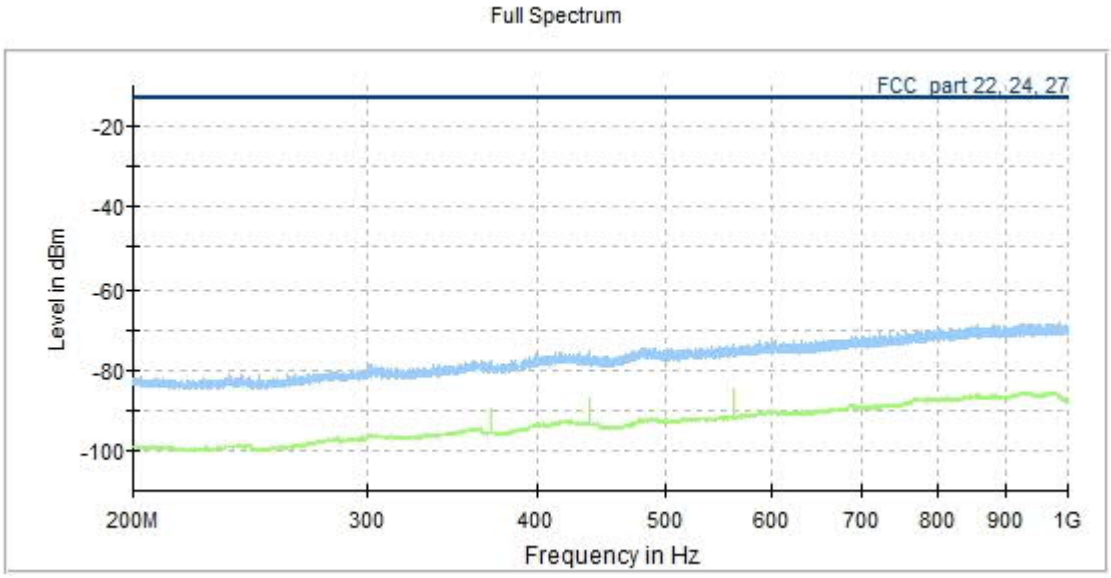
1 – 10, 13, 19, 21, 23, 24

The measurement plots are shown in the following:

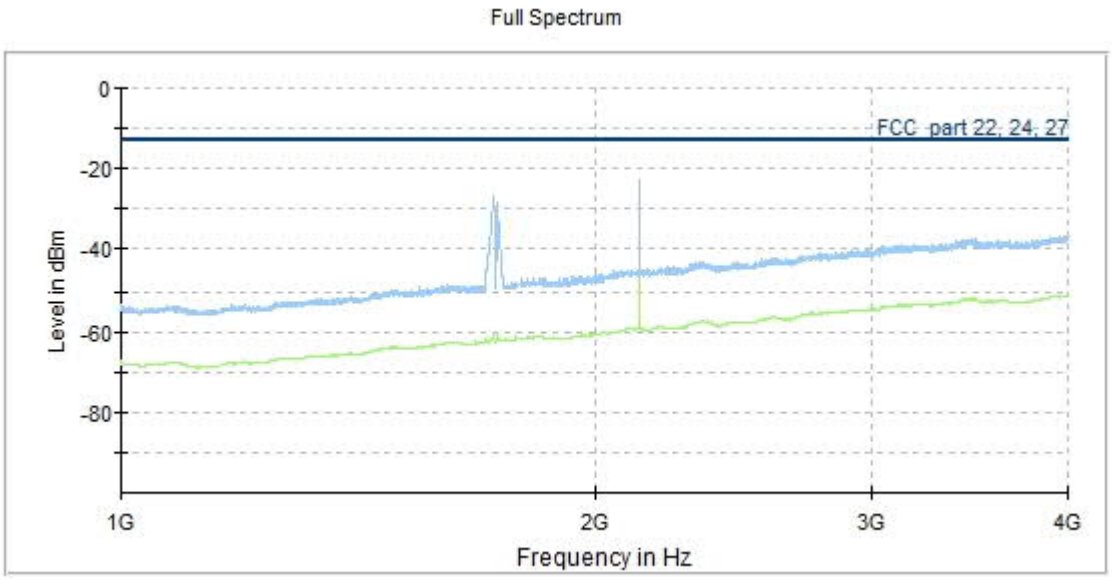
NB-IoT-EUTRA-Bd4_pos1_30-200M.PNG:



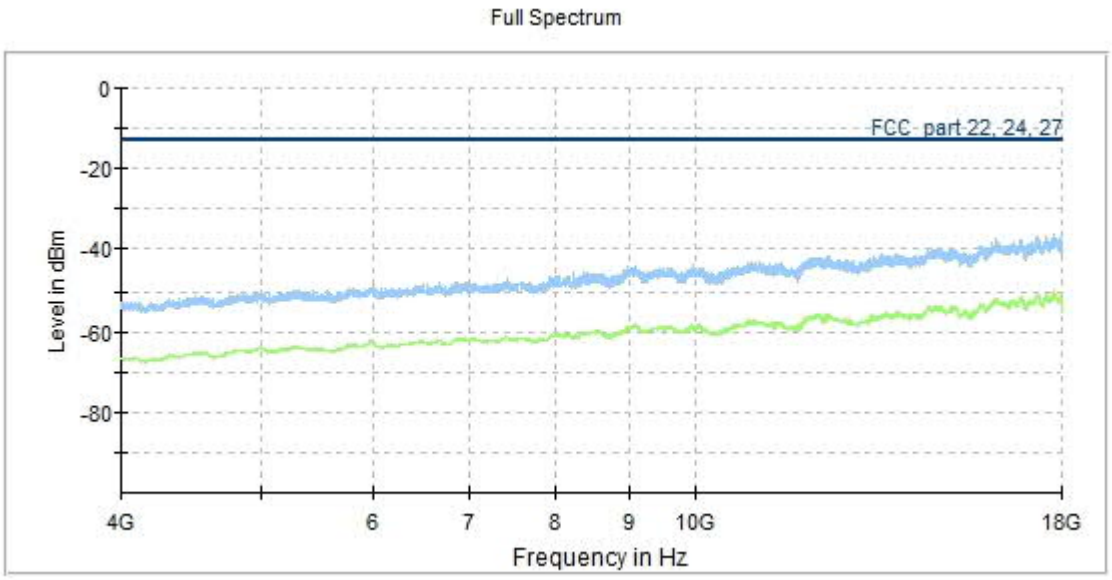
NB-IoT-EUTRA-Bd4_pos1_200-1000M.PNG:



NB-IoT-EUTRA-Bd4_pos1_1-4G.PNG:



NB-IoT-EUTRA-Bd2_pos1_4-18G.PNG:



6.2.3 Radiated emissions (UE) in traffic mode (NB-IoT in E-UTRA band 5)

Ambient temperature	23 °C	Relative humidity	54 %

Measurement at uplink channel 20525:

Spurious emissions level					
f (MHz)	Polarisation	Level (dBm)	f (MHz)	Polarisation	Level (dBm)
836.5	Uplink channel, no spurious		-	-	-
881.5	Downlink channel, no spurious		-	-	-
-	-	-	-	-	-
Measurement uncertainty: ±4.8 dB					

Limit: 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 [1].

This results into a limit of -13 dBm for all power levels of the UE.

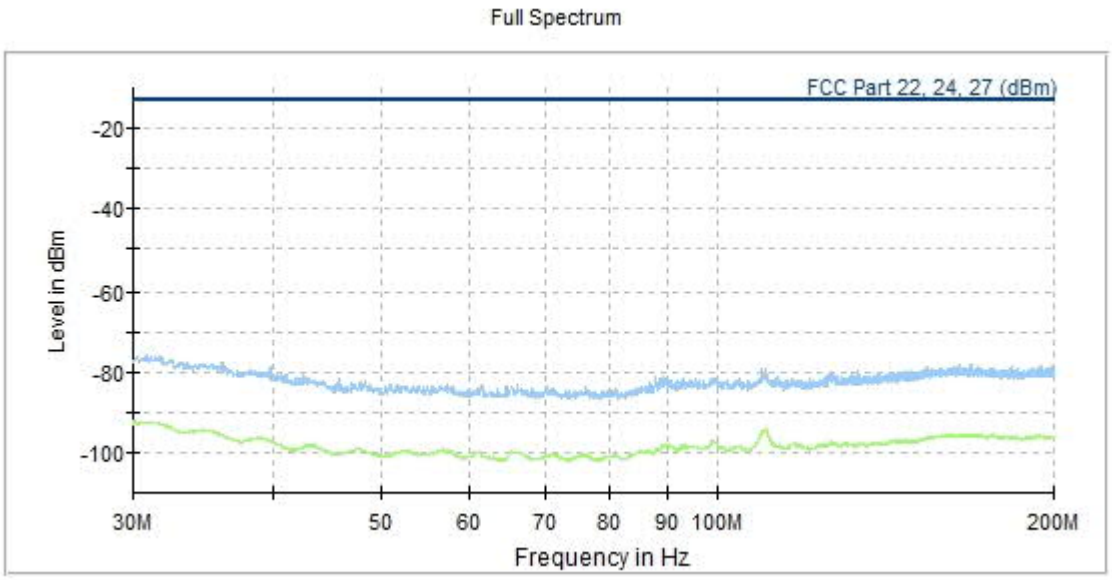
No significant frequencies were found during the spurious emission measurement.

Test equipment used (see chapter 6 for details):

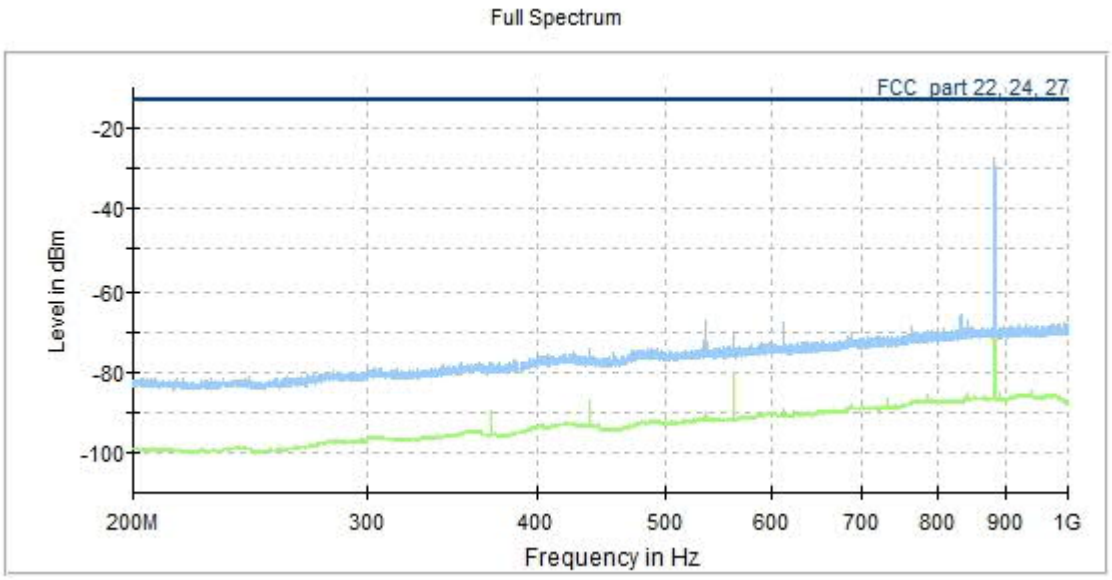
1 - 10, 13, 19, 22, 23

The measurement plots are shown in the following:

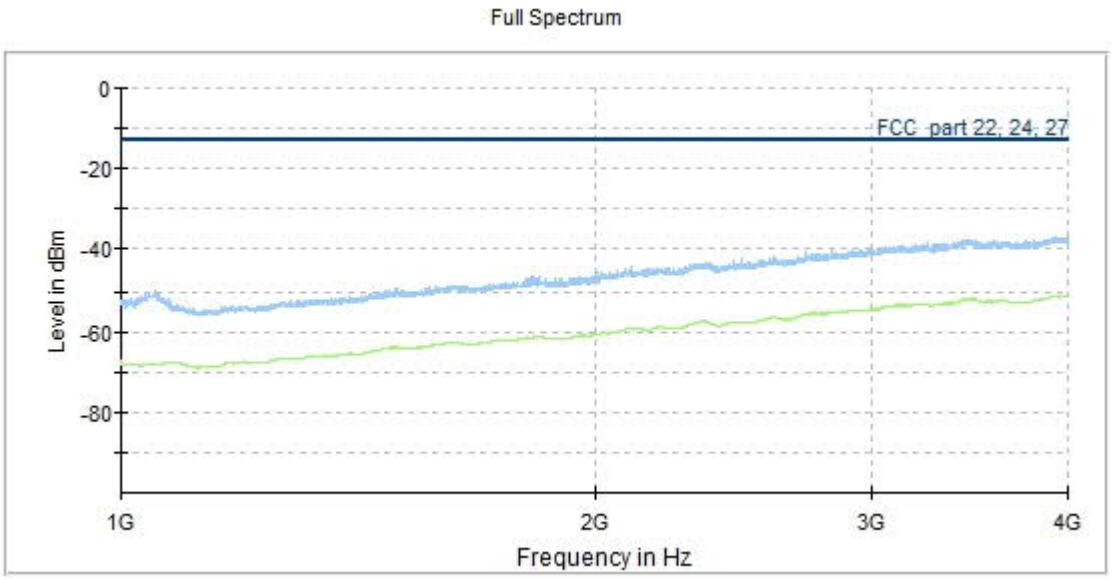
NB-IoT-EUTRA-Bd5_pos1_30-200M.PNG:



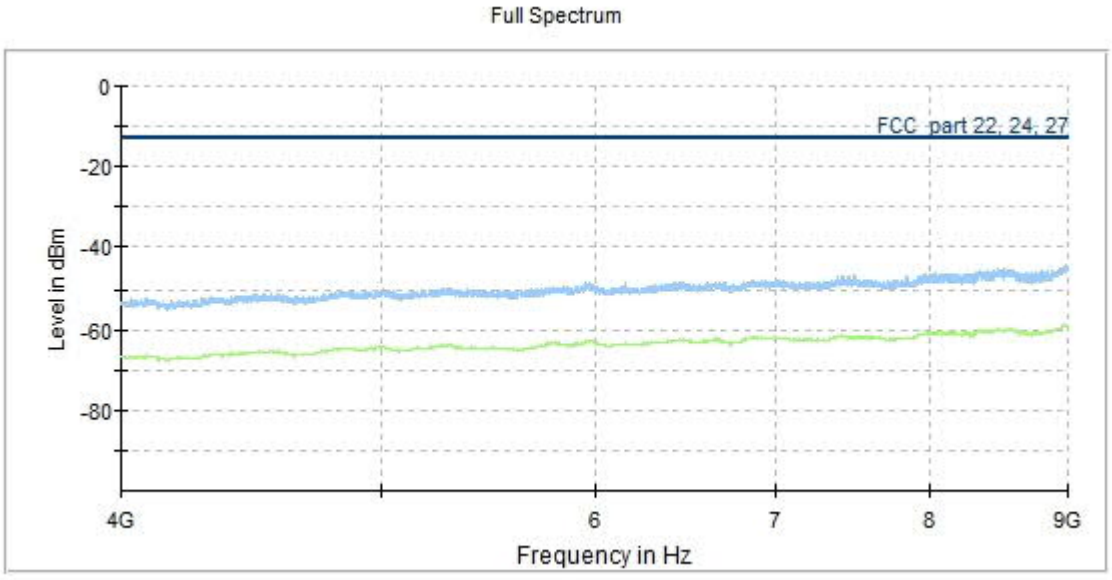
NB-IoT-EUTRA-Bd5_pos1_200-1000M.PNG:



NB-IoT-EUTRA-Bd5_pos1_1-4G.PNG:



NB-IoT-EUTRA-Bd5_pos1_4-9G.PNG:



6.2.4 Radiated emissions (UE) in traffic mode (NB-IoT in E-UTRA band 12)

Ambient temperature	23 °C	Relative humidity	54 %

Measurement at uplink channel 23095:

Spurious emissions level								
Frequency (MHz)	MaxPeak (dBm)	Average (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
535.105	-	-88.2	-13.0	75.2	100.0	100.0	105.0	V
535.105	-60.0	-	-13.0	47.0	100.0	100.0	105.0	V
611.535	-59.6	-	-13.0	46.6	100.0	100.0	100.0	V
611.535	-	-84.9	-13.0	71.9	100.0	100.0	100.0	V
687.980	-62.6	-	-13.0	49.6	100.0	100.0	103.0	V
687.980	-	-85.8	-13.0	72.8	100.0	100.0	103.0	V
707.500	Uplink channel, no spurious							
737.500	Downlink channel, no spurious							
Measurement uncertainty: +2.2 dB / -3.6 dB								

Limit: 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 [1].

This results into a limit of -13 dBm for all power levels of the UE.

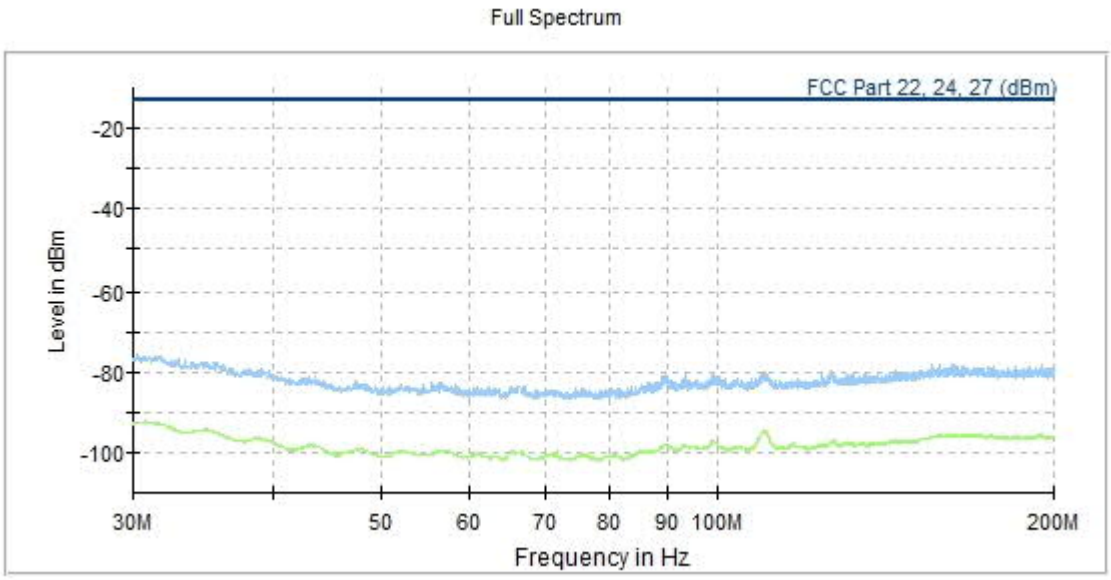
No significant frequencies were found during the spurious emission measurement.

Test equipment used (see chapter 6 for details):

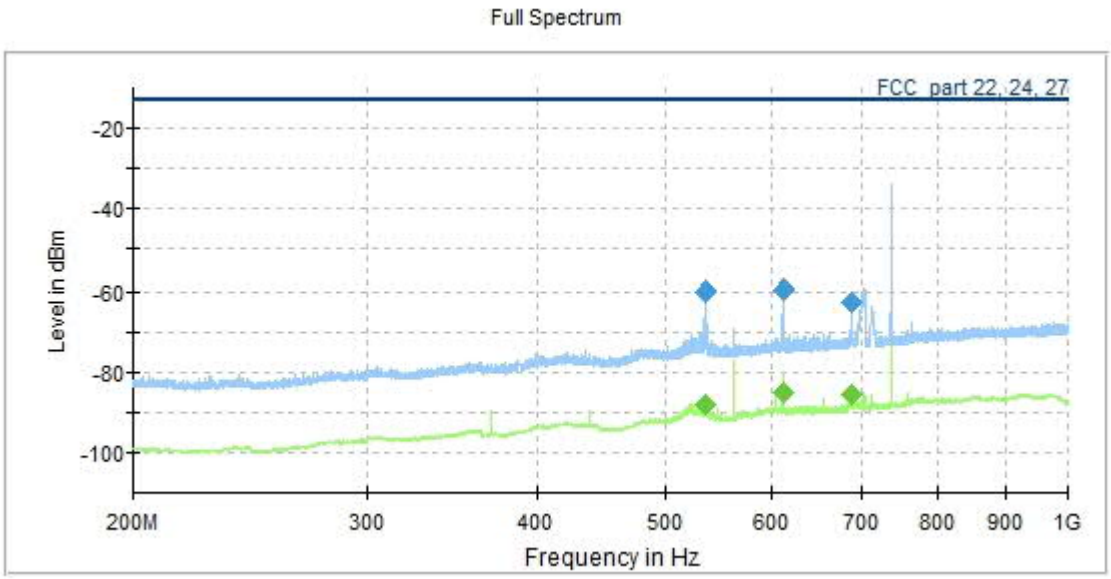
1 - 10, 13, 17, 19, 22, 23, 26

The measurement plots are shown in the following:

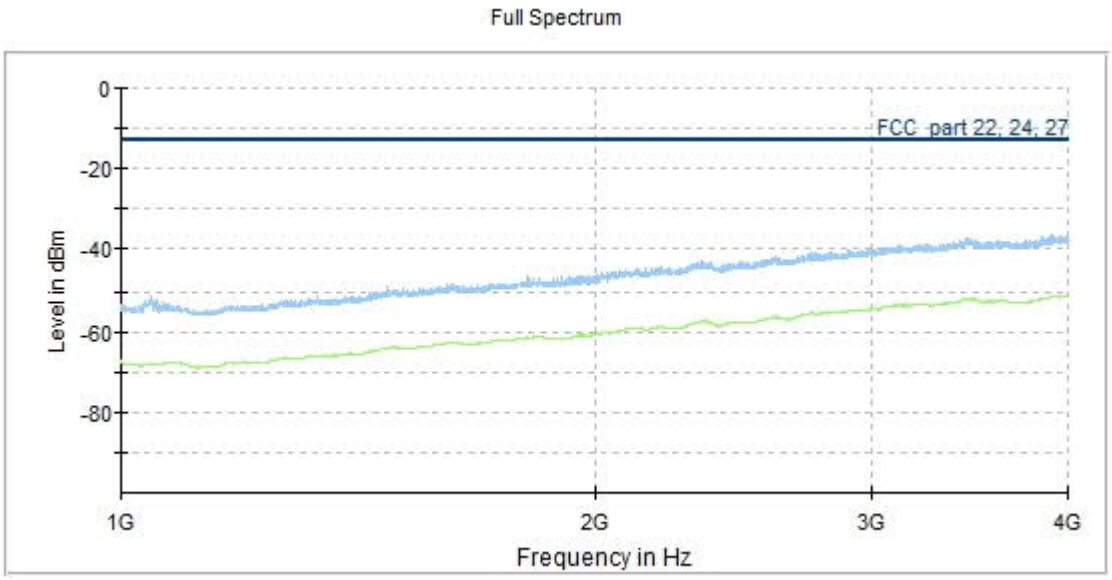
NB-IoT-EUTRA-Bd12_pos1_30-200M.PNG:



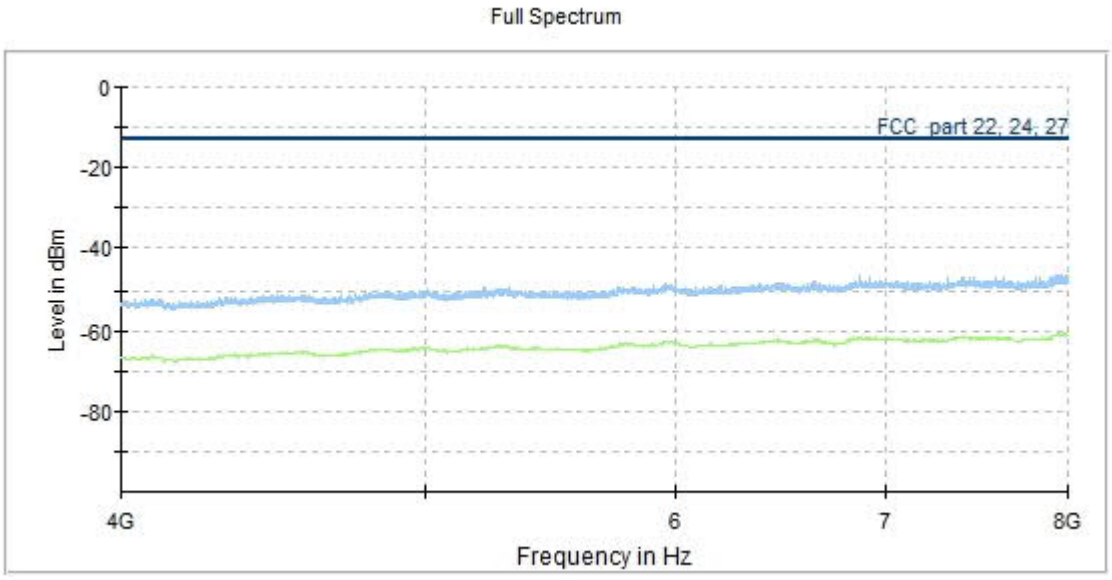
NB-IoT-EUTRA-Bd12_pos1_200-1000M.PNG:



NB-IoT-EUTRA-Bd12_pos1_1-4G.PNG:



NB-IoT-EUTRA-Bd12_pos1_4-8G.PNG:



6.2.5 Radiated emissions (UE) in traffic mode (NB-IoT in E-UTRA band 13)

Ambient temperature	23 °C	Relative humidity	54 %

Measurement at uplink channel 23230:

Spurious emissions level								
Frequency (MHz)	MaxPeak (dBm)	Average (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
535.080	-60.0	-	-13.0	47.0	100.0	100.0	100.0	V
535.080	-	-88.0	-13.0	75.0	100.0	100.0	100.0	V
611.530	-60.6	-	-13.0	47.6	100.0	100.0	183.0	V
611.530	-	-85.6	-13.0	72.6	100.0	100.0	183.0	V
688.005	-	-84.9	-13.0	71.9	100.0	100.0	132.0	V
688.005	-57.6	-	-13.0	44.6	100.0	100.0	132.0	V
782.000	Uplink channel, no spurious							
751.000	Downlink channel, no spurious							
Measurement uncertainty: ±4.8 dB								

Limit: 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 [1].

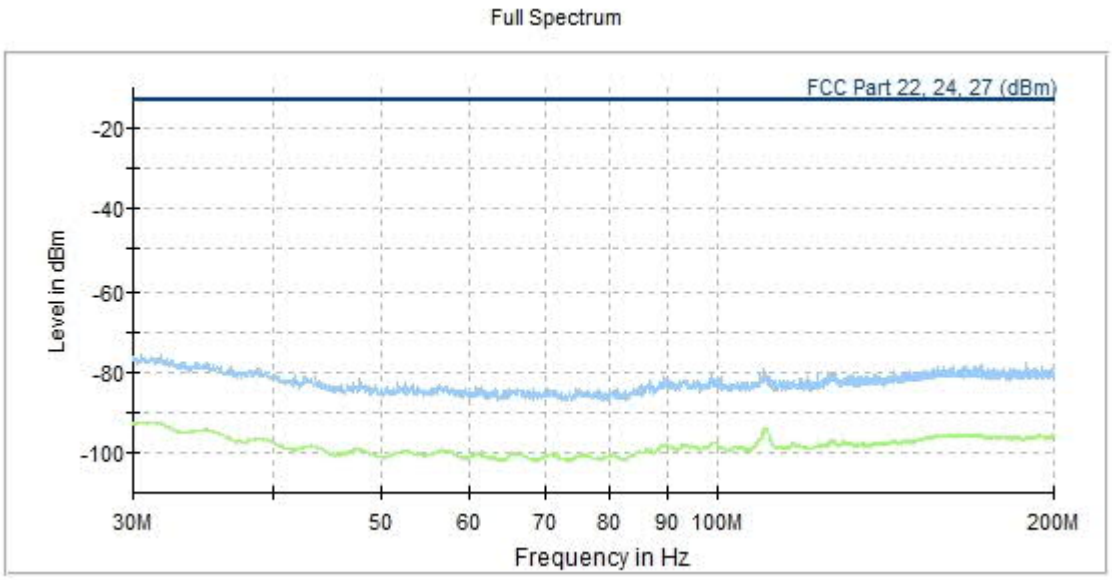
This results into a limit of -13 dBm for all power levels of the UE.

Test equipment used (see chapter 6 for details):

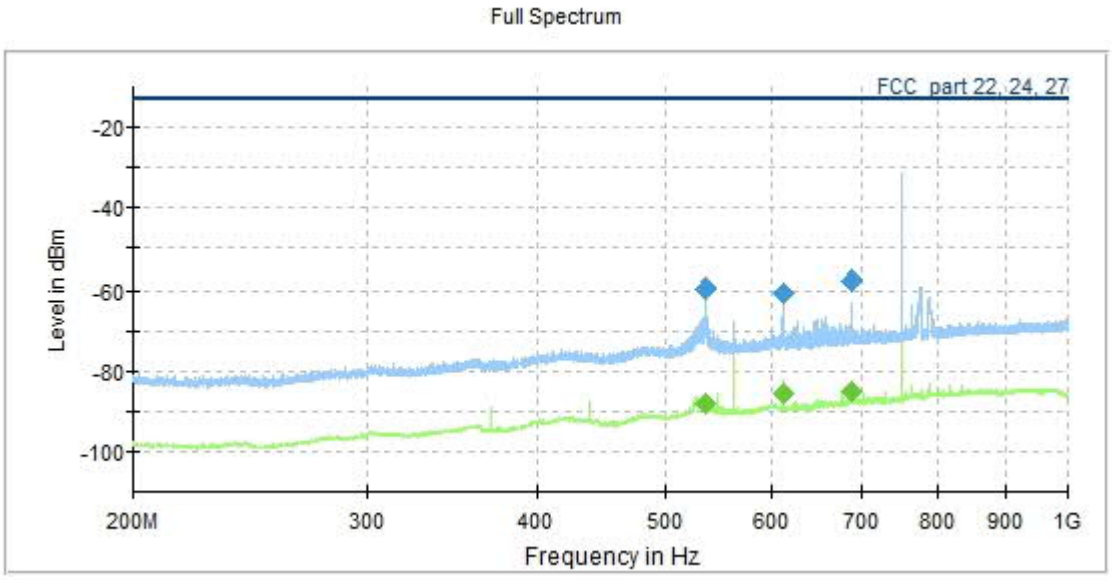
1 - 10, 13, 17, 19, 22, 23, 26

The measurement plots are shown in the following:

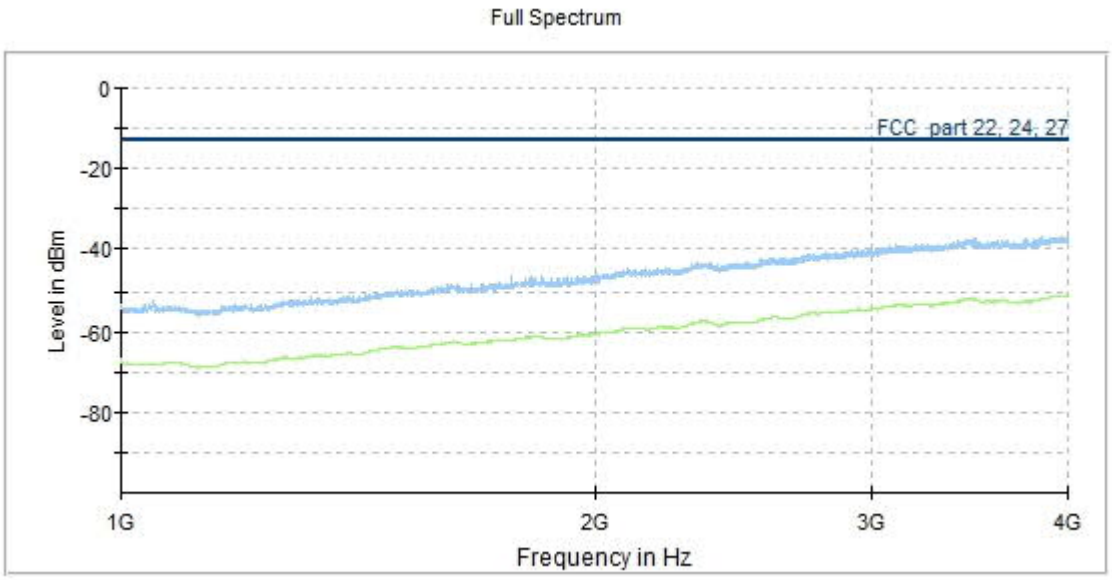
NB-IoT-EUTRA-Bd13_pos1_30-200M.PNG:



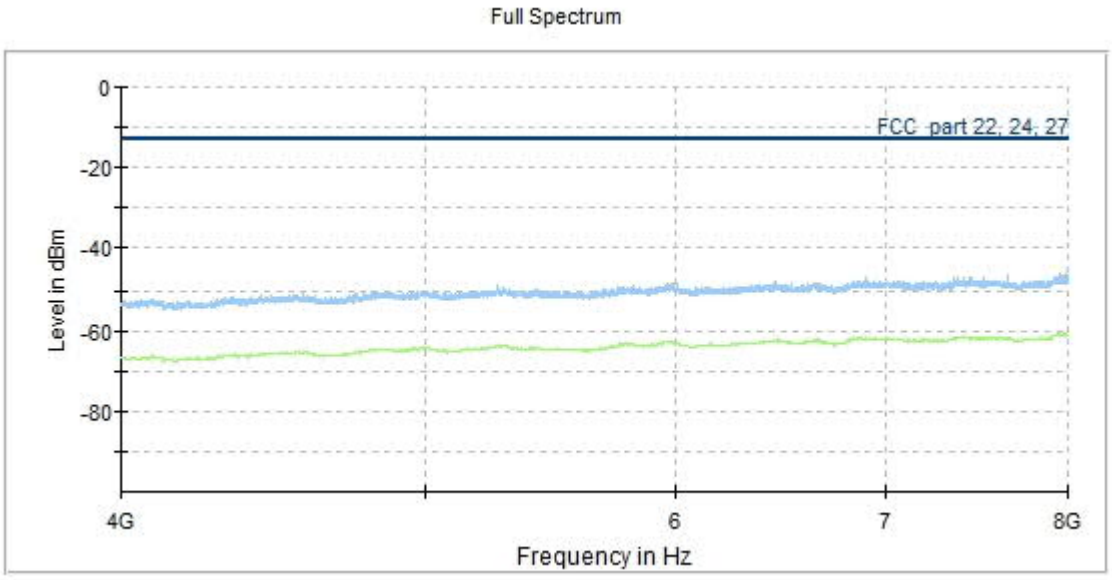
NB-IoT-EUTRA-Bd1_pos1_200-1000M.PNG:



NB-IoT-EUTRA-Bd13_pos1_1-4G.PNG:



NB-IoT-EUTRA-Bd13_pos1_4-8G.PNG:



6.2.6 Radiated emissions (UE) in traffic mode (NB-IoT in E-UTRA band 25)

Ambient temperature	23 °C	Relative humidity	54 %

Measurement at uplink channel 26365:

Spurious emissions level					
f (MHz)	Polarisation	Level (dBm)	f (MHz)	Polarisation	Level (dBm)
1882.5	Uplink channel, no spurious		-	-	-
1962.5	Downlink channel, no spurious		-	-	-
-	-	-	-	-	-
Measurement uncertainty: ±4.8 dB dB					

Limit: 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 [1].

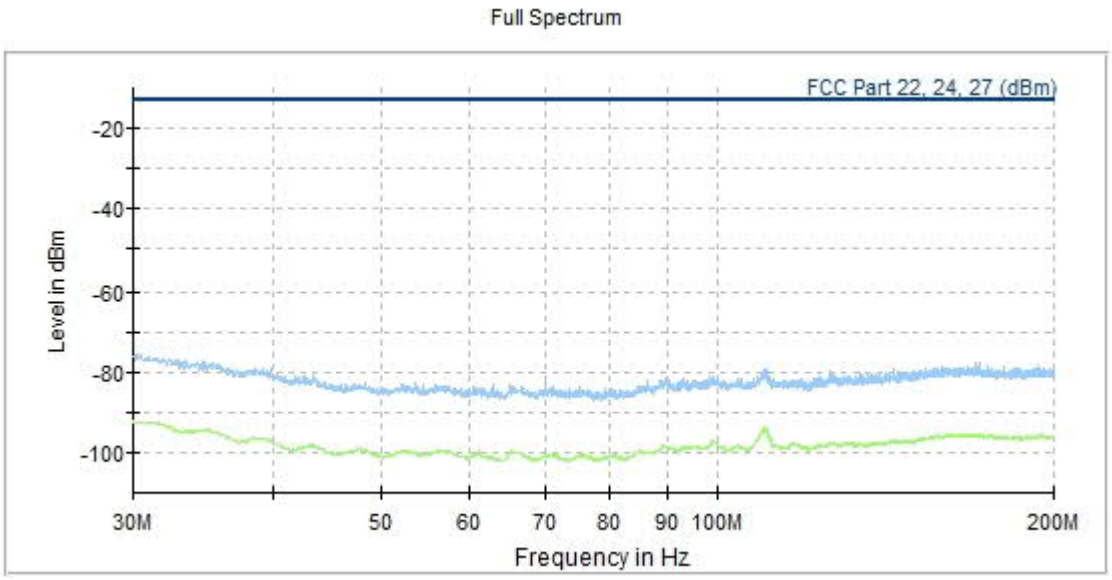
This results into a limit of -13 dBm for all power levels of the UE.

Test equipment used (see chapter 6 for details):

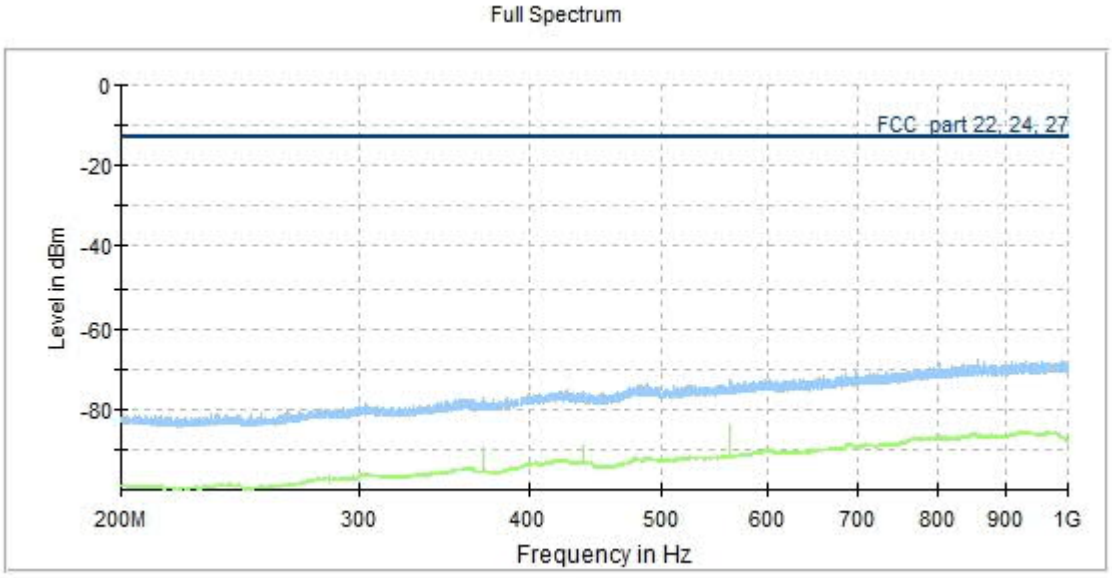
1 – 10, 12, 13, 15, 19, 20, 23, 24

The measurement plots are shown in the following:

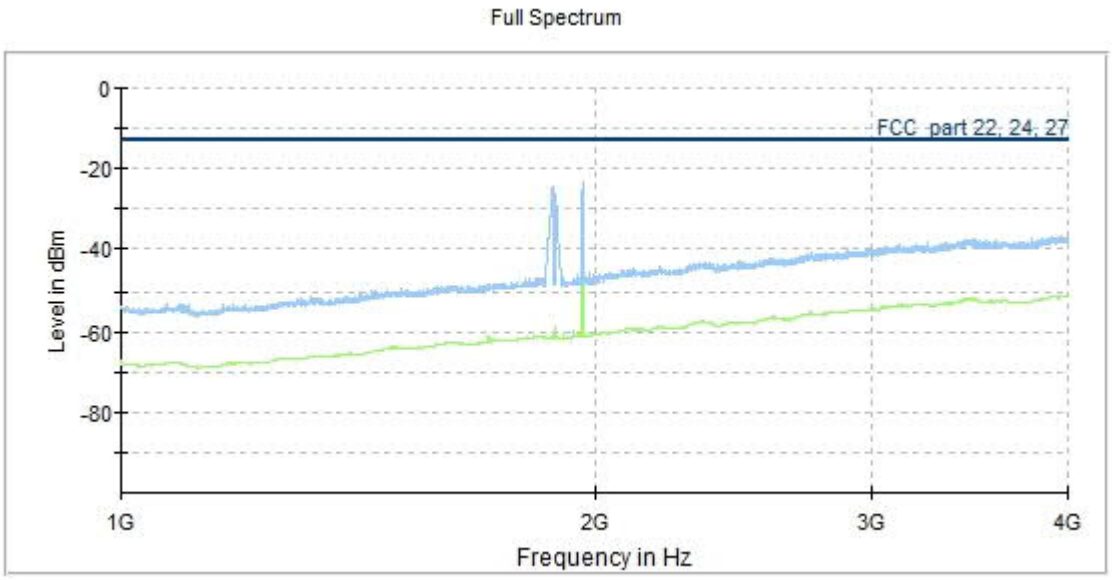
NB-IoT-EUTRA-Bd25_pos1_30-200M.PNG:



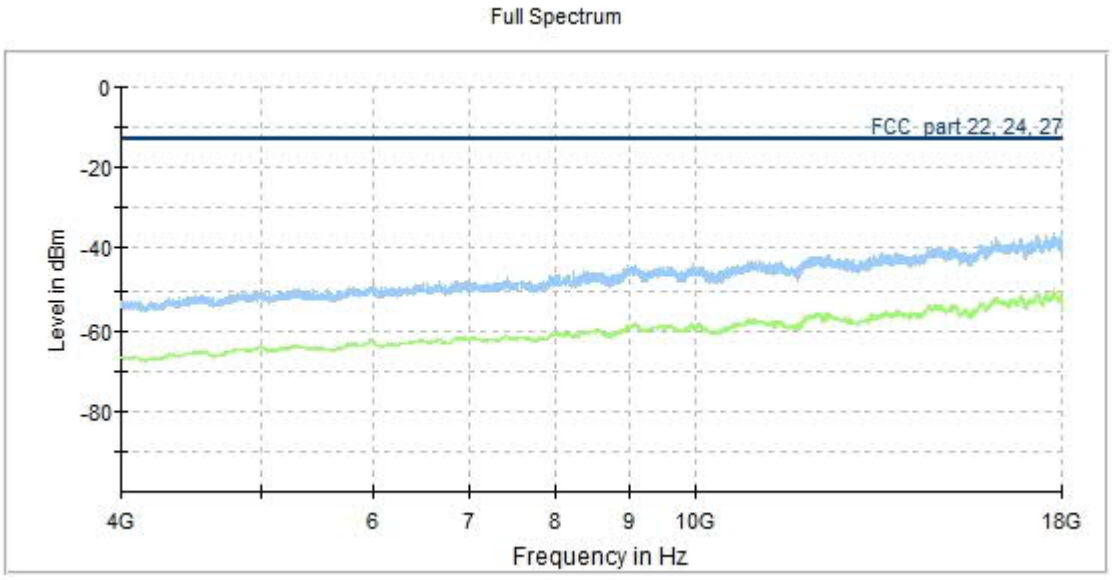
NB-IoT-EUTRA-Bd25_pos1_200-1000M.PNG:



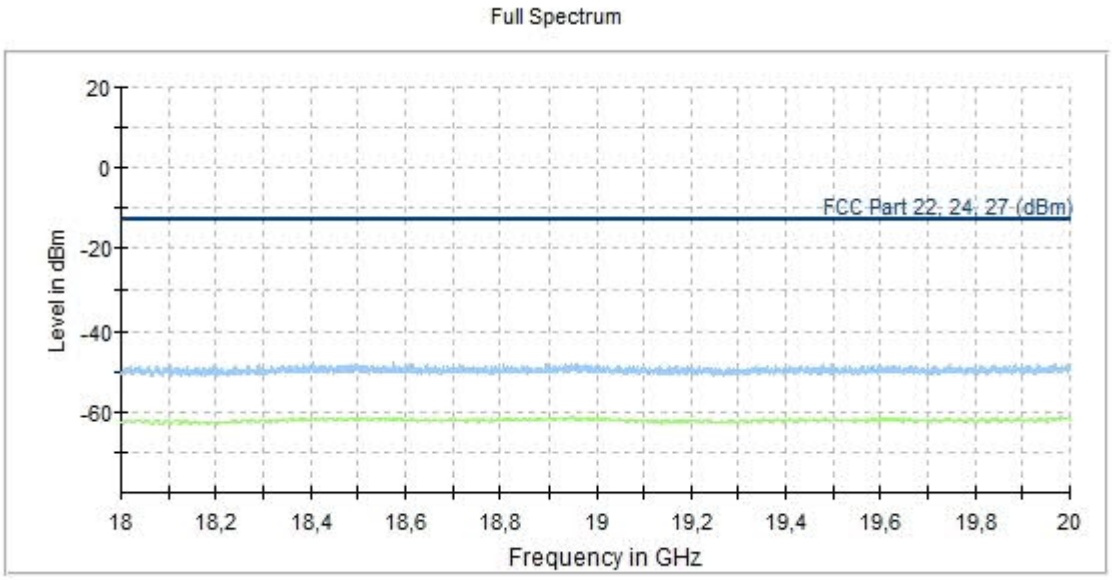
NB-IoT-EUTRA-Bd25_pos1_1-4G.PNG:



NB-IoT-EUTRA-Bd25_pos1_4-18G.PNG:



NB-IoT-EUTRA-Bd25_pos1_18-20G.PNG:



6.2.7 Radiated emissions (UE) in traffic mode (NB-IoT in E-UTRA band 66)

Ambient temperature	23 °C	Relative humidity	54 %

Measurement at uplink channel 132322:

Spurious emissions level					
f (MHz)	Polarisation	Level (dBm)	f (MHz)	Polarisation	Level (dBm)
1745.0	Uplink channel, no spurious		-	-	-
2145.0	Downlink channel, no spurious		-	-	-
-	-	-	-	-	-
Measurement uncertainty: ±4.8 dB					

Limit: 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 [1].

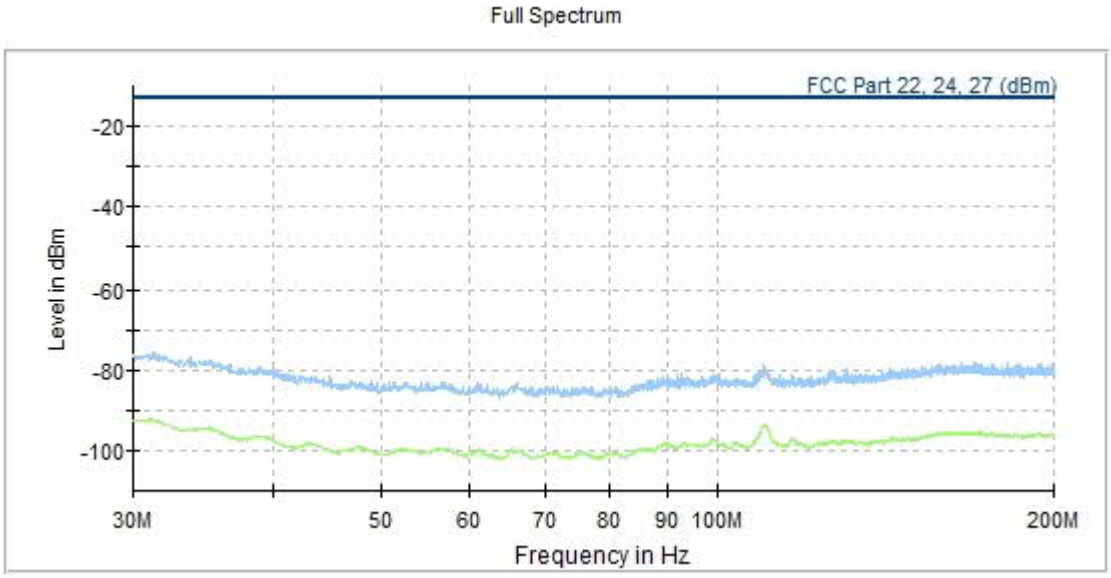
This results into a limit of -13 dBm for all power levels of the UE.

Test equipment used (see chapter 6 for details):

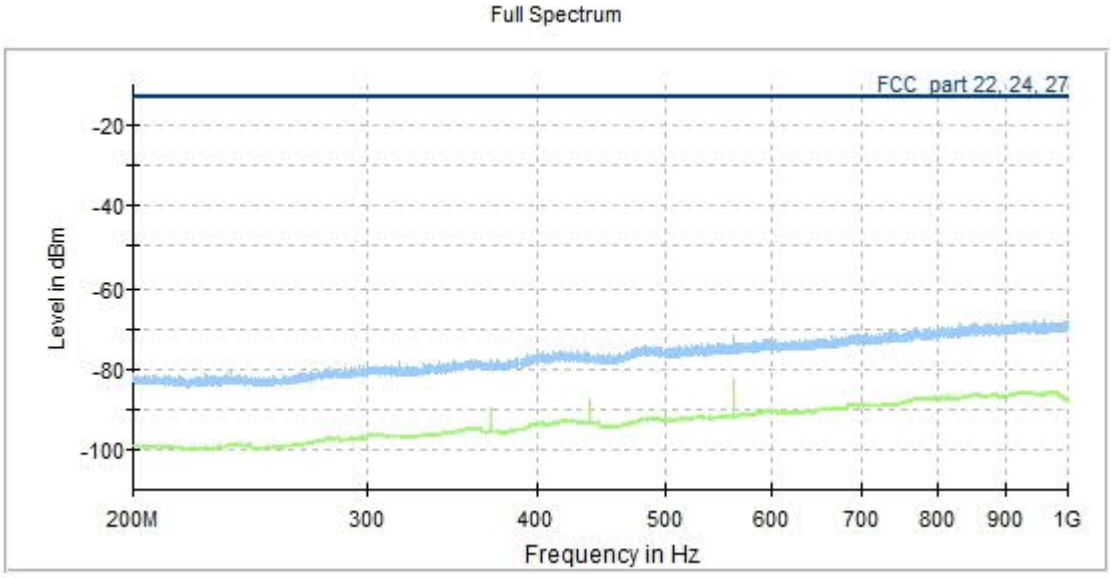
1 – 10, 13, 19, 21, 23, 24

The measurement plots are shown in the following:

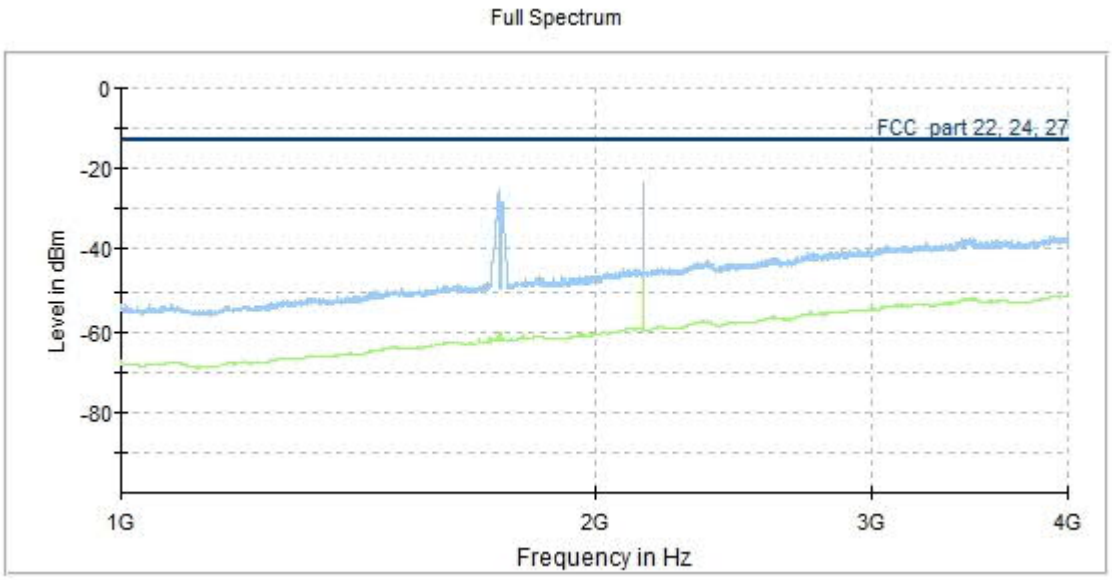
NB-IoT-EUTRA-Bd66_pos1_30-200M.PNG:



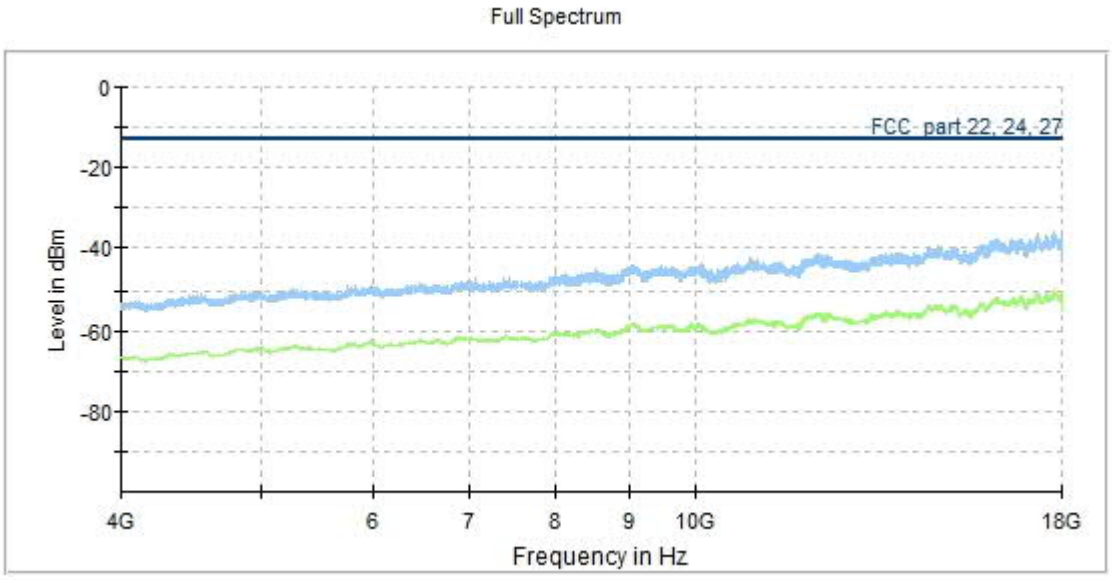
NB-IoT-EUTRA-Bd66_pos1_200-1000M.PNG:



NB-IoT-EUTRA-Bd66_pos1_1-4G.PNG:



NB-IoT-EUTRA-Bd66_pos1_4-18G.PNG:



7 Test equipment

No.	Test equipment	Type	Manufacturer	Serial No.	PM. No.	Cal. Date	Cal Due
1	Log.-Per. Antenna	VUSLP 9111B	Schwarzbeck Mess-Elektronik	464	483279	Calibration not necessary	
2	Bikon Antenna	VHA 9103B + VHBB 9124	Schwarzbeck Mess-Elektronik	768	483278	Calibration not necessary	
3	Systemsoftware	EMC32	Rohde & Schwarz	100970	482972	Calibration not necessary	
4	RF switch matrix	OSP220	Rohde & Schwarz		482976	Calibration not necessary	
5	Turntable	TT3.0-3t	Maturo	825/2612/.01	483224	Calibration not necessary	
6	Antenna support	BAM 4.5-P-10kg	Maturo	222/2612.01	483225	Calibration not necessary	
7	Controller	NCD	Maturo	474/2612.01	483226	Calibration not necessary	
8	Semi Anechoic Chamber M276	SAC5-2	Albatross Projects	C62128-A540-A138-10-0006	483227	Calibration not necessary	
9	EMI Testreceiver	ESW44	Rohde & Schwarz	101828	482979	14.11.2019	11.2021
10	Low Noise Amplifier 100 MHz – 18 GHz	LNA-30-00101800-25-10P	Narda-Miteq	2110917	482967	18.02.2020	02.2022
11	Low Noise Amplifier 12 GHz – 18 GHz	LNA-30-12001800-13-10P	Narda-Miteq	2089798	482968	17.02.2020	02.2022
12	Low Noise Amplifier 18 GHz – 26.5 GHz	LNA-30-18002650-20-10P	Narda-Miteq	2110911	482969	17.02.2020	02.2022
13	Log.-Per. Antenna	HL050	Rohde & Schwarz	4062.4063.02-100908	482977	13.08.2019	08.2022
14	Low Noise Amplifier 26 MHz – 40 GHz	LNA-30-26004000-27-10P	Narda-Miteq	2110293	482970	17.02.2020	02.2022
15	Standard Gain Horn	20240-20	Flann	266399	483026	Calibration not necessary	
16	Precision Dipole	HZ-12	Rohde & Schwarz	831781/02	480061	Calibration not necessary	
17	Precision Dipole	HZ-13	Rohde & Schwarz	831782/02	480062	Calibration not necessary	
18	Antenna (Horn)	3115	EMCO Elektronik	9609-4918	480183	05.02.2018	02.2021
19	Wideband Radio Communication Tester	CMW500	Rohde & Schwarz	167339	483023	15.04.2019	04.2021
20	Tunable Band Reject Filter	WRCT1850/2170-5/40-10EESD	Wainwright Instruments	1	480715	Calibration not necessary	
21	Tuneable Band Reject Filter	WTRCD10-1700-1900-5-13-60EEK	Wainwright Instruments	1	482011	Calibration not necessary	
22	Tuneable Band Reject Filter	WTRCD8-800-960EEK	Wainwright Instruments	2	482012	Calibration not necessary	
23	Cable C417	Sucoflex 118	Huber+Suhner	500654/118	-	Calibration not necessary	
24	Cable C416	Sucoflex 118	Huber+Suhner	500651/118	-	Calibration not necessary	
25	Cable C416.1	Sucoflex 118	Huber+Suhner	500653/118	-	Calibration not necessary	
26	Vector Network analyzer	ZVA40	Rohde & Schwarz	100298	481538	19.02.2020	02.2022

8 Test site validation

Test equipment	PM. No.	Frequency range	Type of validation	According to	Val. Date	Val Due
Semi anechoic chamber M276	483227	30 – 1000 MHz	NSA	ANSI C63.4-2014	28.10.2019	27.10.2020
Semi anechoic chamber M276	483227	1 -18 GHz	SVSWR	CISPR 16-1-4 Amd. 1	28.10.2019	27.10.2020

9 Report History

Report Number	Date	Comment
F200628E1	28.07.2020	Initial Test Report
-	-	-
-	-	-
-	-	-

10 List of Annexes

Annex A	Test Setup Photos	7 pages
Annex B	External Photos	5 pages
Annex C	Internal Photos	4 pages