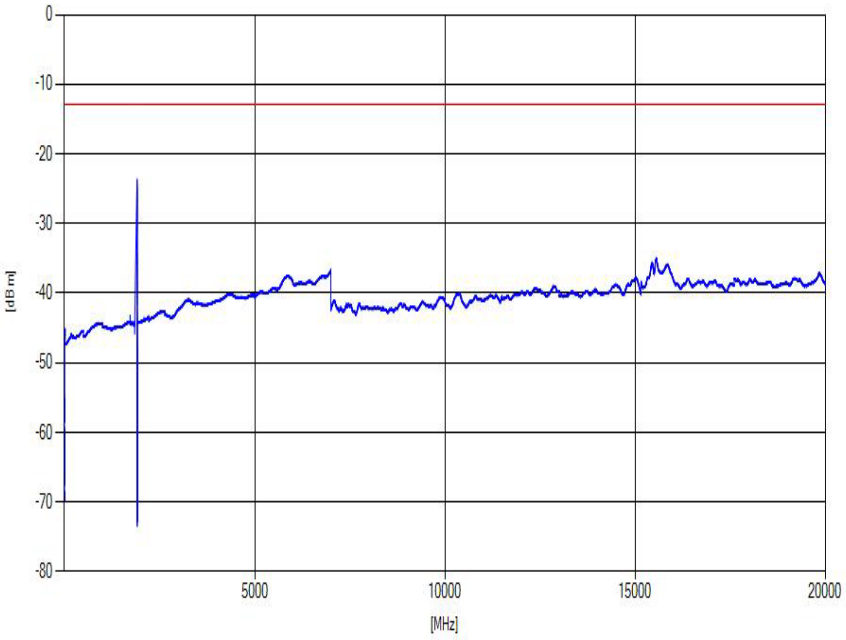
Technology = NB-IoT, Radio Technology = eFDD 2, Operating Frequency = high channel (S01_AE01)



5.10.5 TEST EQUIPMENT USED

- Radio Lab

5.11 FIELD STRENGTH OF SPURIOUS RADIATION

Standard **FCC PART 24 Subpart E**

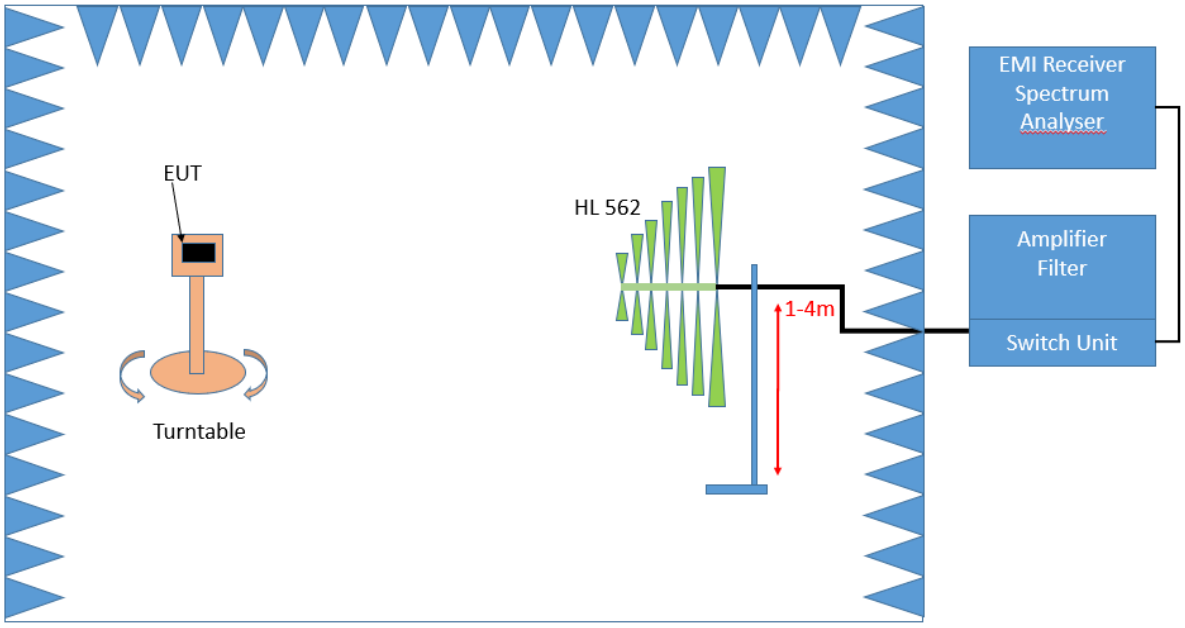
The test was performed according to:
ANSI C63.26: 2015; 5.5.2.3.1

5.11.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the applicable radiated spurious emission measurements per § 2.1053 and RSS-GEN 6.13. The limit and requirements come from the applicable rule part and ISED RSS-Standard for the operating band of the cellular device.

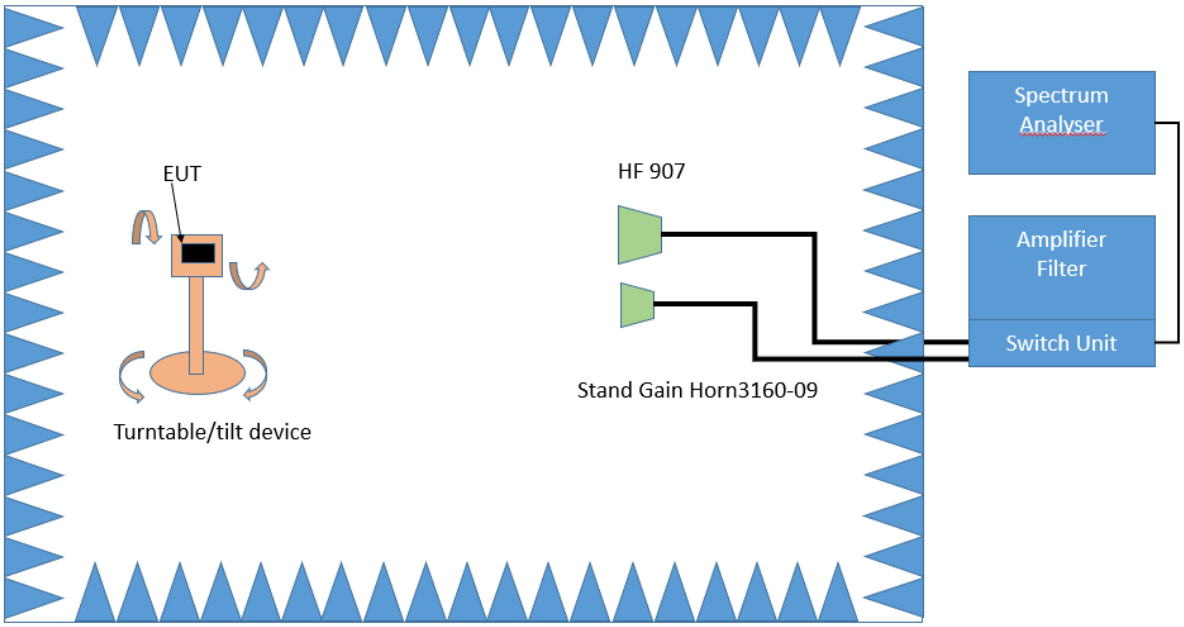
The EUT was connected to the test setup according to the following diagram:

Frequency Range: 30 MHz – 1 GHz:



Test Setup; Spurious Emission Radiated (SAC), 30 MHz- 1GHz

Frequency Range: 1 GHz – 26.5 GHz



Test Setup; Spurious Emission Radiated (FAC), 1 GHz-26.5 GHz

The test set-up was made in accordance to the general provisions of ANSI C63.26 in a typical installation configuration. The Equipment Under Test (EUT) was set up on a non-conductive table 1.0 x 2.0 m² in the semi-anechoic chamber. The influence of the EUT support table that is used between 30–1000 MHz was evaluated.
The measurement procedure is implemented into the EMI test software EMC32 from R&S. Exploratory tests are performed at 3 orthogonal axes to determine the worst-case orientation of a body-worn or handheld EUT. The final test on all kind of EUTs is also performed at 3 axes. A pre-check is performed while the EUT is powered from a DC power source.

1. Measurement above 30 MHz and up to 1 GHz

Step 1: Preliminary scan
This is a preliminary test to identify the highest amplitudes relative to the limit.
Settings for step 1:
- Antenna distance: 3 m
- Detector: Peak
- RBW: 1 MHz
- VBW: 3 MHz
- Sweep time: coupled
- Turntable angle range: –180° to 90°
- Turntable step size: 90°
- Height variation range: 1 – 3 m
- Height variation step size: 2 m
- Polarisation: Horizontal + Vertical

Intention of this step is, to determine the radiated EMI-profile of the EUT. Afterwards the relevant emissions for the final measurement are identified.

Step 2: Adjustment measurement
In this step the accuracy of the turntable azimuth and antenna height will be improved. This is necessary to find out the maximum value of every frequency.
For each frequency, which was determined the turntable azimuth and antenna height will be adjusted. The turntable azimuth will slowly vary by ± 45° around this value. During this action,

the value of emission is continuously measured. The turntable azimuth at the highest emission will be recorded and adjusted. In this position, the antenna height will also slowly vary by ± 100 cm around the antenna height determined. During this action, the value of emission is also continuously measured. The antenna height of the highest emission will also be recorded and adjusted.
- Detector: Peak
- Measured frequencies: in step 1 determined frequencies
- RBW: 1 MHz
- VBW: 3 MHz
- Sweep time: coupled
- Turntable angle range: ± 45 ° around the determined value
- Height variation range: ± 100 cm around the determined value
- Antenna Polarisation: max. value determined in step 1

Step 3: Final measurement with RMS detector
With the settings determined in step 3, the final measurement will be performed:
EMI receiver settings for step 4:
- Detector: RMQ
- Measured frequencies: in step 1 determined frequencies
- RBW: 1 MHz
- VBW: 3 MHz
- Sweep time: 1 s

After the measurement a plot will be generated which contains a diagram with the results of the preliminary scan and a chart with the frequencies and values of the results of the final measurement.

3. Measurement above 1 GHz
The following modifications apply to the measurement procedure for the frequency range above 1 GHz:
Step 1:
The Equipment Under Test (EUT) was set up on a non-conductive support (tilt device) at 1.5 m height in the fully-anechoic chamber.
All steps were performed with one height (1.5 m) of the receiving antenna only.
The EUT is turned during the preliminary measurement across the elevation axis, with a step size of 90 °.
The turn table step size (azimuth angle) for the preliminary measurement is 45 °.
- Antenna distance: 3 m
- Detector: Peak
- RBW: 1 MHz
- VBW: 3 MHz
- Sweep time: coupled
- Turntable angle range: –180° to 90°
- Turntable step size: 90°
- Polarisation: Horizontal + Vertical

Step 2:
Due to the fact, that in this frequency range the test is performed in a fully anechoic room, the height scan of the receiving antenna instep 2 is omitted. Instead of this, a maximum search with a step size ± 45° for the elevation axis is performed.
The turn table azimuth will slowly vary by ± 22.5°.
The elevation angle will slowly vary by ± 45°
EMI receiver settings (for all steps):
- Detector: Peak,
- RBW: 1 MHz

- VBW: 3 MHz
- Sweep time: coupled

Step 3:

Spectrum analyser settings for step 3:
- Detector: RMS
- Measured frequencies: in step 1 determined frequencies
- RBW: 1 MHz
- VBW: 3 MHz
- Sweep Time: 1 s

5.11.2 TEST REQUIREMENTS / LIMITS

FCC Part 2.1053; Measurement required: Field strength of spurious radiation:

Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of §2.1049, as appropriate.

Part 24, Subpart E – Broadband PCS

§ 24 238 – Emission limitations for Broadband PCS equipment

a) Out of band emissions. 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.

b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

RSS-133; 6.5 Transmitter Unwanted Emissions

Mobile and base station equipment shall comply with the limits in (1) and (2) below.

1. In the 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 $\log_{10}$p (watts).
2. After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 $\log_{10}$p (watts). If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required.

5.11.3 TEST PROTOCOL

Ambient temperature: 20 - 28 °C
Relative humidity: 30 - 40 %

Radio Technology	Channel	Detector	Trace	Resolution Bandwidth /kHz	Frequency /MHz	Peak Value /dBm	Limit /dBm	Margin to Limit /dB
GSM 1900	low	rms	maxhold	3	1850.0	-27.9	-13	14.90
GSM 1900	mid	rms	maxhold	-	-	-	-13	> 20
GSM 1900	high	rms	maxhold	3	1910.0	-28.7	-13	15.70

Radio Technology	Channel	Detector	Trace	Resolution Bandwidth /kHz	Frequency /MHz	Peak Value /dBm	Limit /dBm	Margin to Limit /dB
EDGE 1900	low	rms	maxhold	3	1850.0	-30.4	-13	17.40
EDGE 1900	mid	rms	maxhold	-	-	-	-13	> 20
EDGE 1900	high	rms	maxhold	3	1910.0	-30.9	-13	17.90

Radio Technology	Channel	Detector	Trace	Resolution Bandwidth /kHz	Frequency /MHz	Peak Value /dBm	Limit /dBm	Margin to Limit /dB
CAT-M1 eFDD 2	low	rms	maxhold	5	1850.0	-32.89	-17.5	15.39
CAT-M1 eFDD 2	mid	rms	maxhold	-	-	-	-13	> 20
CAT-M1 eFDD 2	high	rms	maxhold	5	1910.0	-35.844	-17.5	18.34
CAT-M1 eFDD 2	high	rms	maxhold	100	1911.1	-25.5	-23	2.50

Radio Technology	Channel	Detector	Trace	Resolution Bandwidth /kHz	Frequency /MHz	Peak Value /dBm	Limit /dBm	Margin to Limit /dB
CAT-M1 eFDD 25	low	rms	maxhold	20	1850.0	-26.1	-13	13.10
CAT-M1 eFDD 25	mid	rms	maxhold	-	-	-	-13	> 20
CAT-M1 eFDD 25	high	rms	maxhold	20	1915.0	-29.8	-13	16.80
CAT-M1 eFDD 25	high	rms	maxhold	100	1916.3	-27.8	-23	4.80

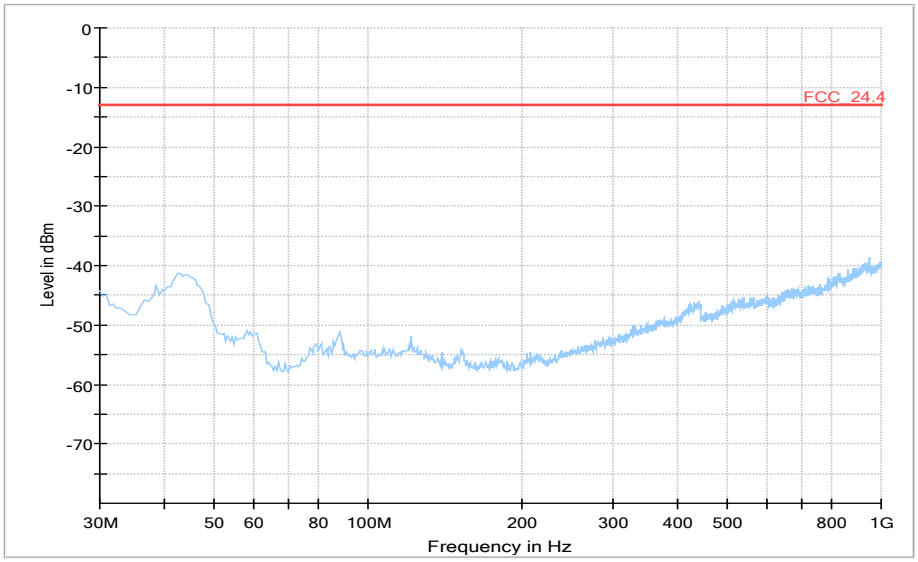
Radio Technology	Channel	Detector	Trace	Resolution Bandwidth /kHz	Frequency /MHz	Peak Value /dBm	Limit /dBm	Margin to Limit /dB
NB-IoT eFDD 2	low	rms	maxhold	2	1850.0	-19.2	-13	6.20
NB-IoT eFDD 2	mid	rms	maxhold	-	-	-	-13	> 20
NB-IoT eFDD 2	high	rms	maxhold	2	1910.0	-16.9	-13	3.90

Remark: Please see next sub-clause for the measurement plot.

5.11.4 MEASUREMENT PLOT (EXAMPLE PLOT, SHOWING WORST CASE, IF APPLICABLE)

Technology = GSM, Radio Technology = GSM 1900, Operating Frequency = low channel (S01_AA01)

30 MHz – 1 GHz



Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
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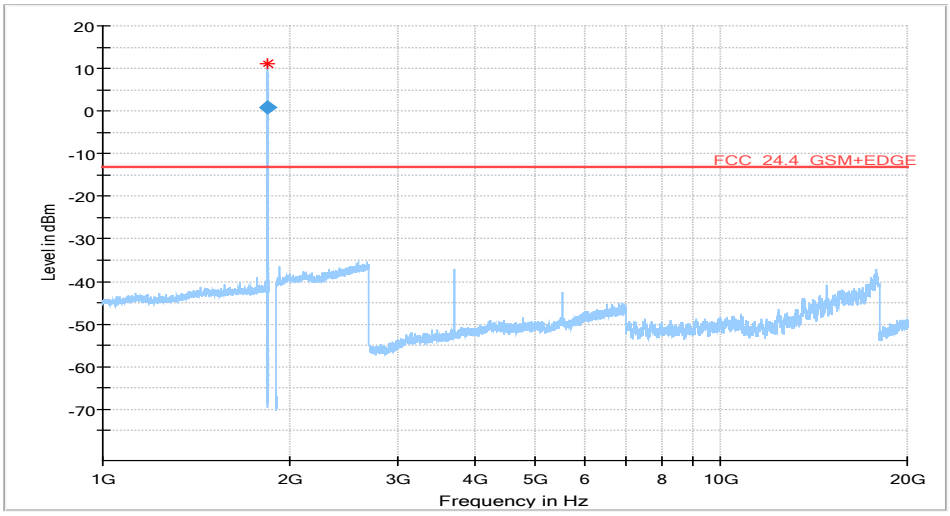
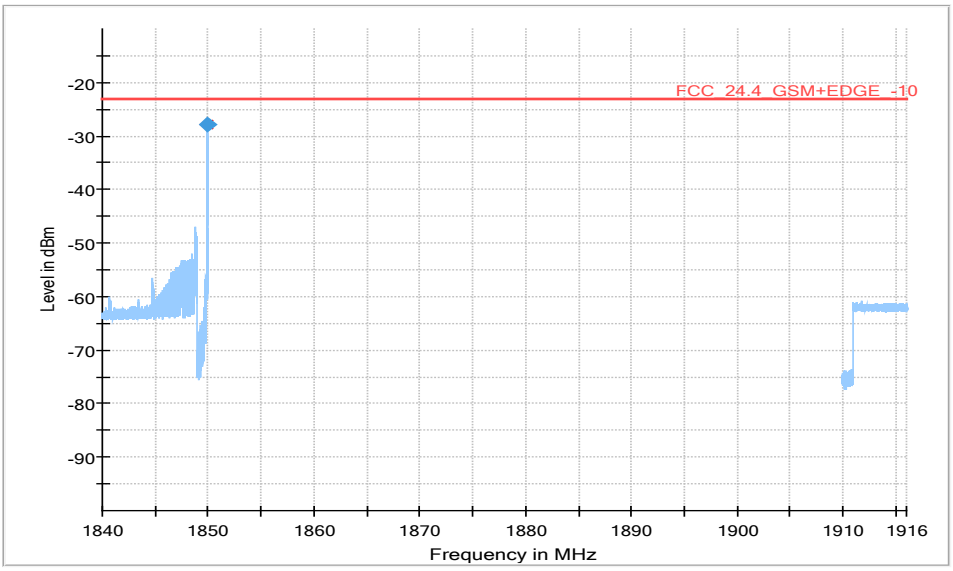
1 GHz – 20 GHz



Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
1848.865	0.9	-13.00	-13.93	1000.0	1000.000	150.0	H	129.0	-4.0	-64.6

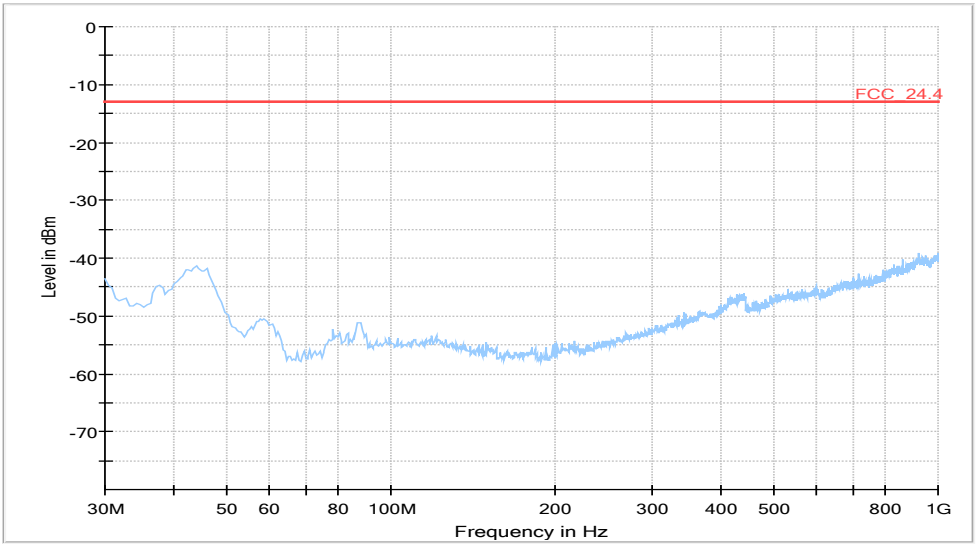
re-measurement at band edge



Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
1849.998	-27.9	-23.00	4.89	2000.0	3.000	150.0	H	-45.0	0.0	-66.3

Technology = GSM, Radio Technology = GSM 1900 EDGE, Operating Frequency = low channel (S01_AA01)
30 MHz – 1 GHz



Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Comment
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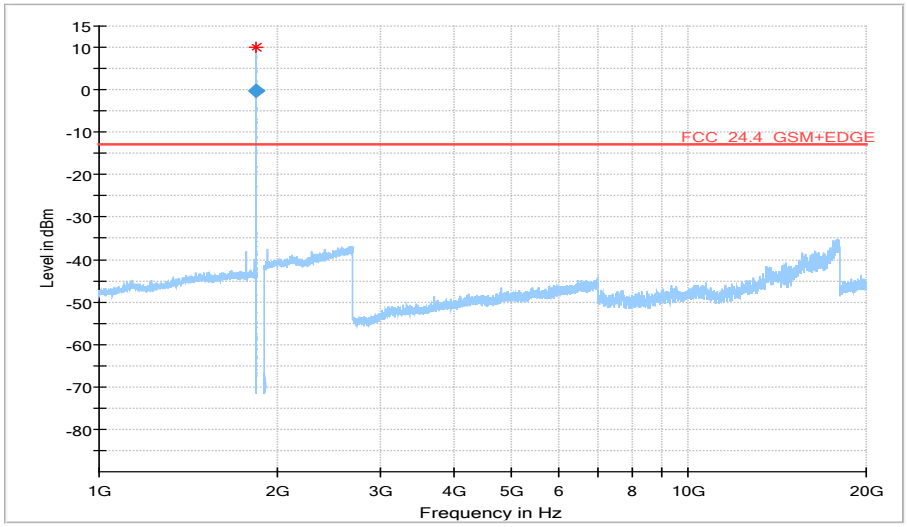
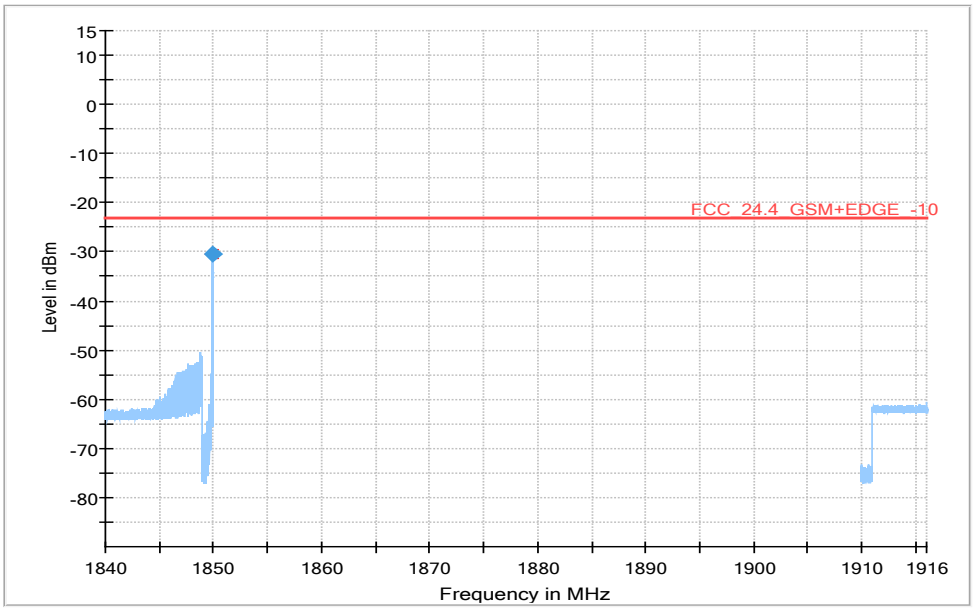
1 GHz – 20 GHz



Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
1848.946	-0.2	-13.00	-12.82	1000.0	1000.000	150.0	V	-136.0	87.0	-66.3

Re-measurement at band edge



Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
1849.985	-30.4	-23.00	7.43	2000.0	3.000	150.0	V	-135.0	90.0	-66.3

Technology = CAT-M1, Radio Technology = eFDD 25, Operating Frequency = high channel (S01_AA01)
30 MHz – 1 GHz

Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
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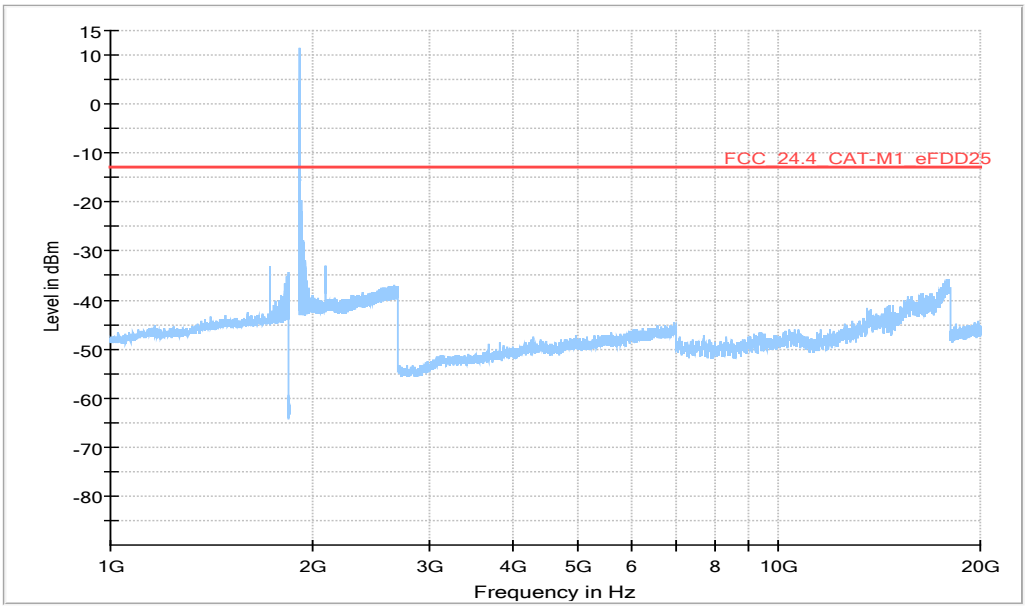
1 GHz – 20 GHz



Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)
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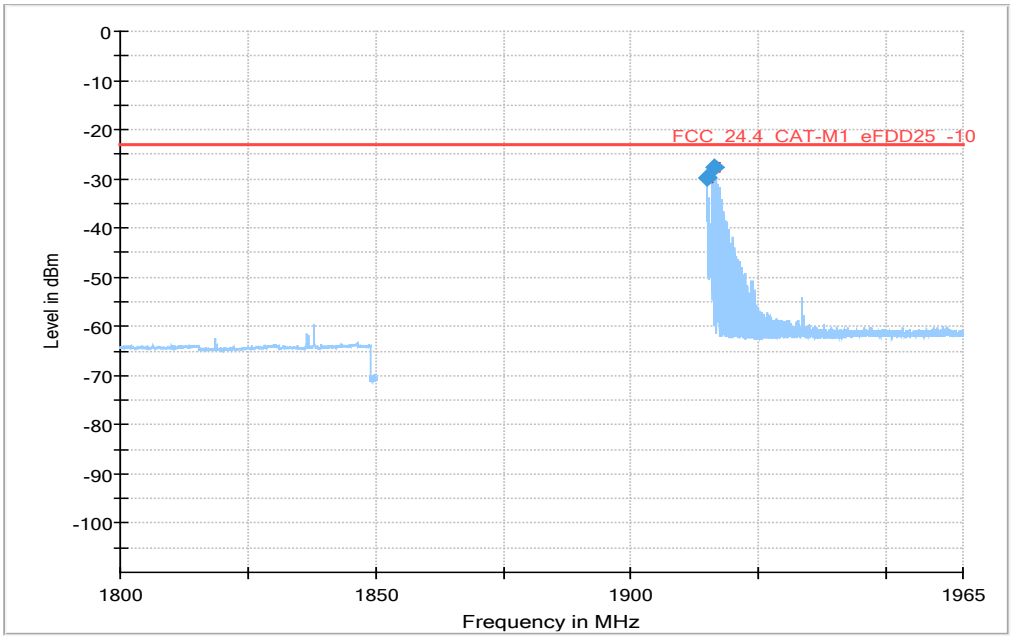
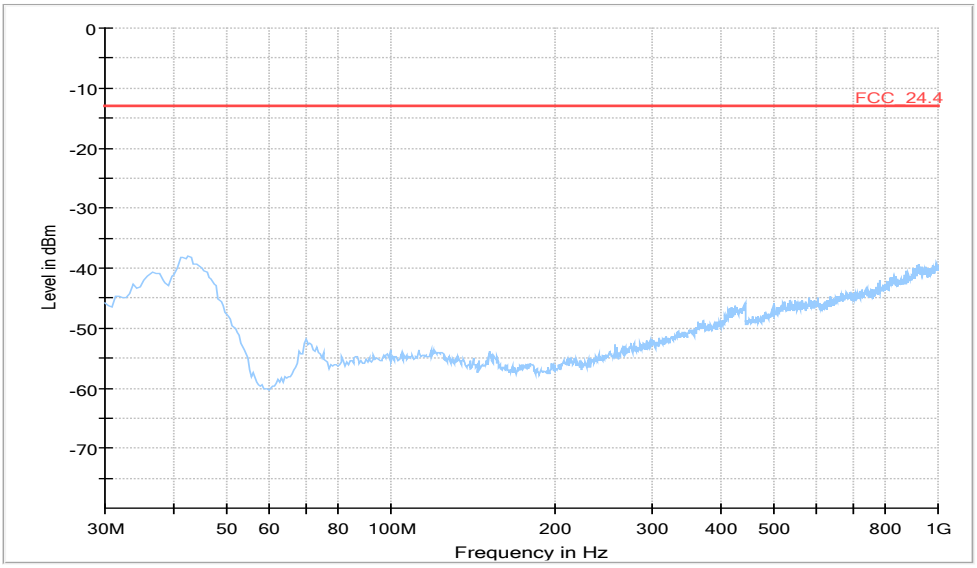
Re-measurement at band edge



Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)
1915.000	-29.8	-23.00	6.83	3000.0	20.000	150.0	V	-135.0	90.0
1916.308	-27.8	-23.00	4.81	3000.0	100.000	150.0	V	-135.0	90.0

Technology = CAT-M1, Radio Technology = eFDD 2, Operating Frequency = high channel (S01_AA01)
30 MHz – 1 GHz



Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
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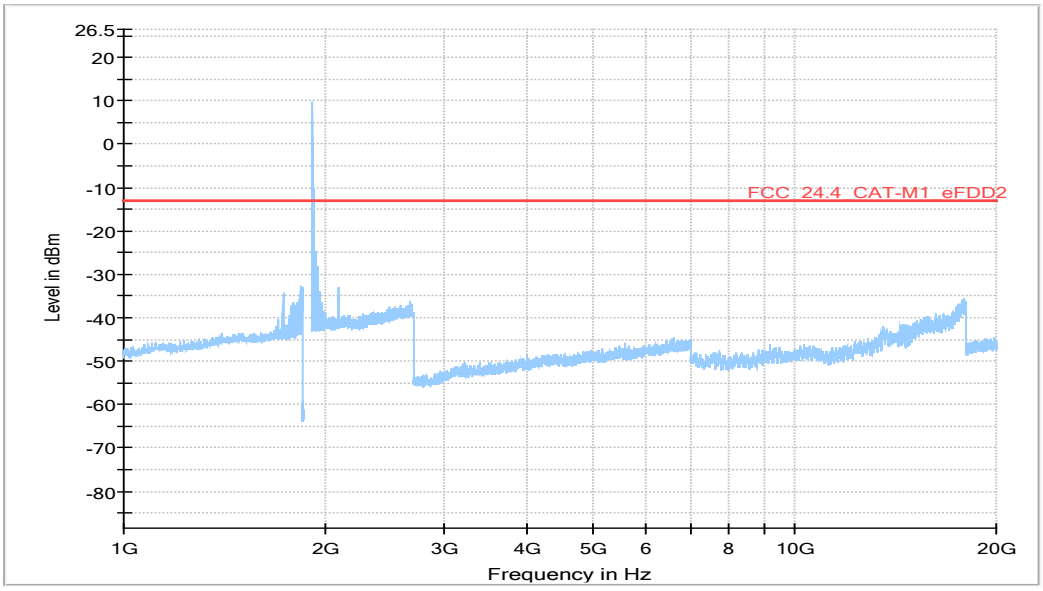
1 GHz – 20 GHz



Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)
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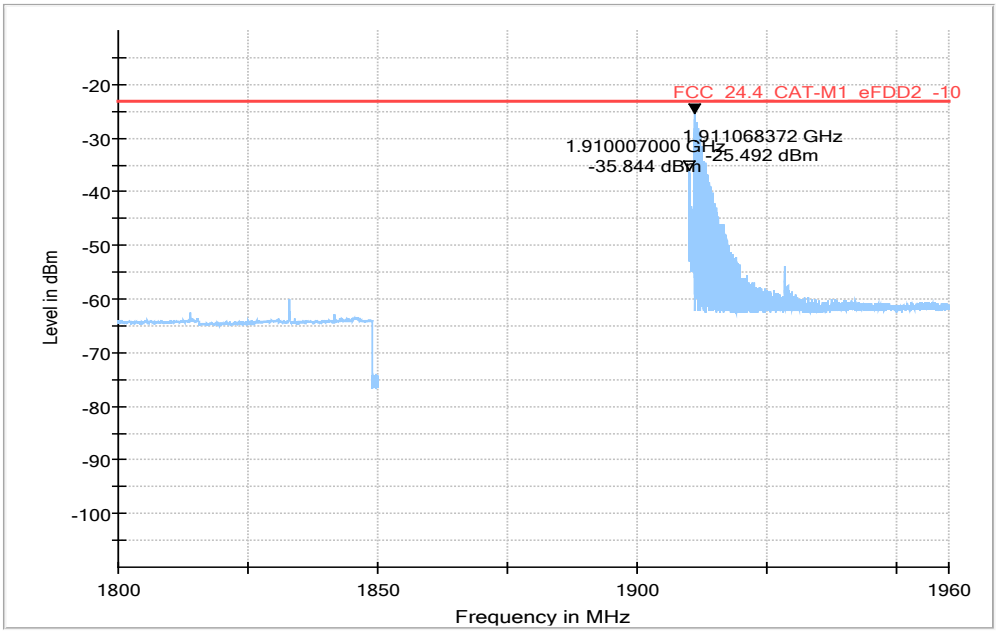
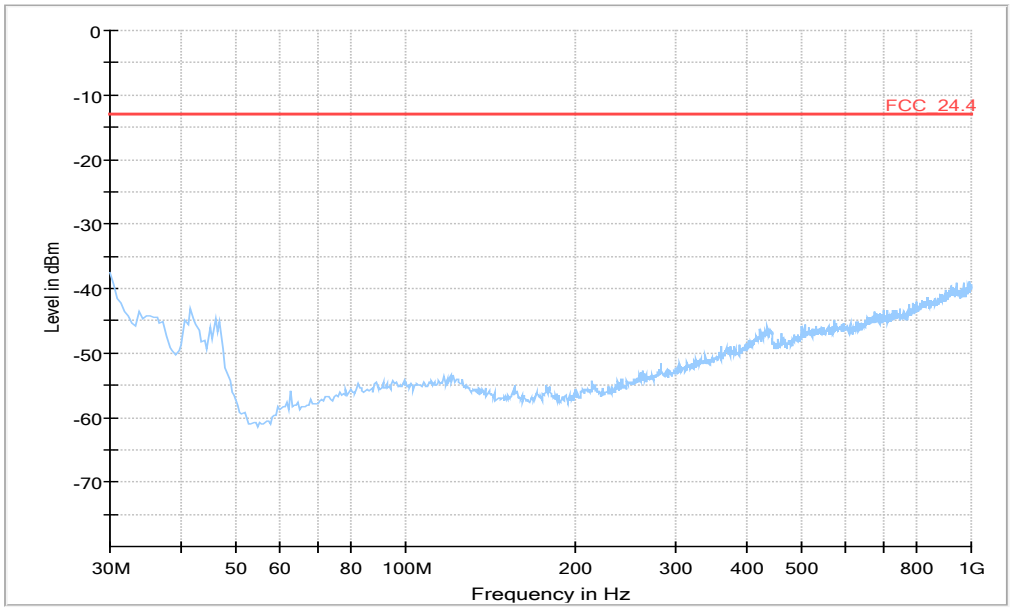
Re-measurement at band edge



echnology = NB-IoT, Radio Technology = eFDD 2, Operating Frequency = high channel (S01_AA01)
30 MHz – 1 GHz



Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
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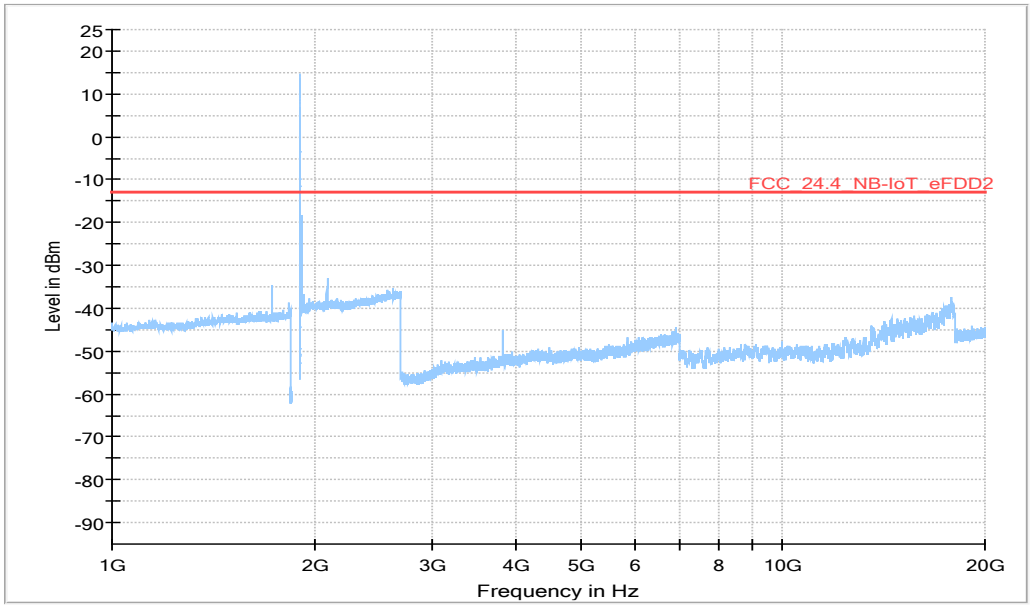

Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
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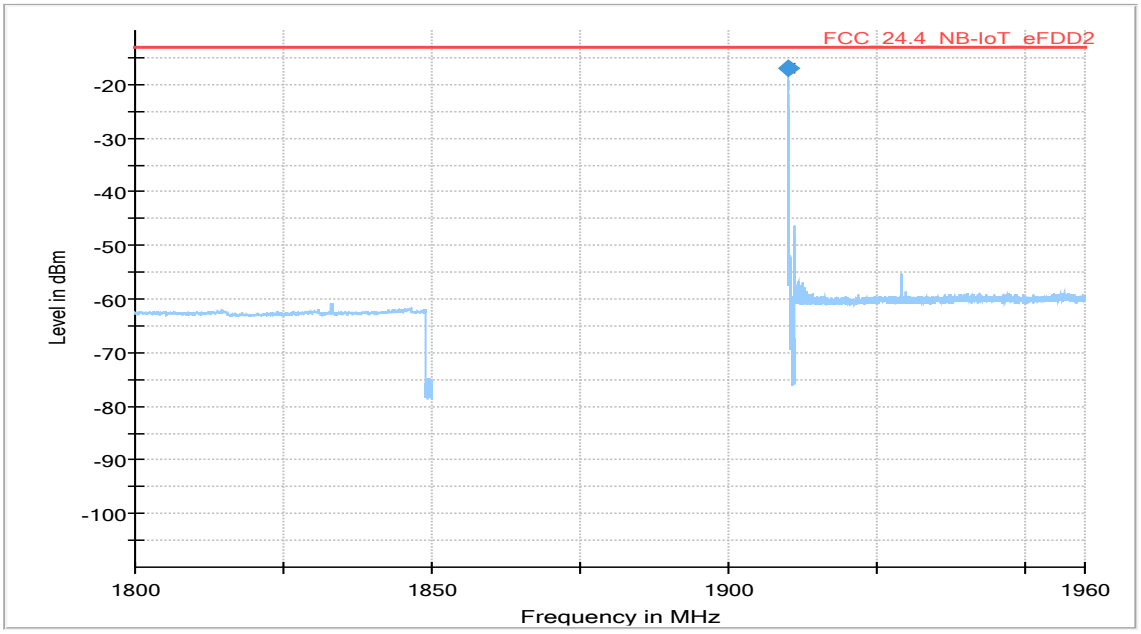
Re-measurement at band edge



Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)
1910.001	-16.9	-13.00	3.90	1000.0	2.000	150.0	V	0.0	0.0

5.11.5 TEST EQUIPMENT USED

- Radiated Emissions

5.12 EMISSION AND OCCUPIED BANDWIDTH

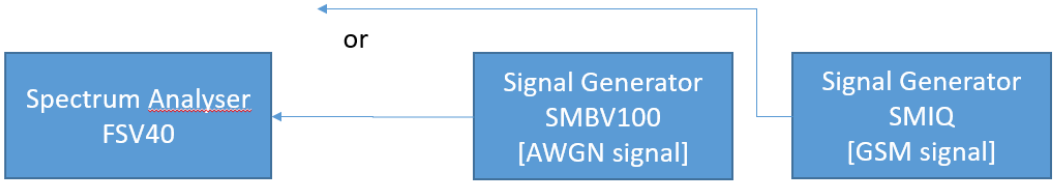
Standard **FCC PART 24 Subpart E**

The test was performed according to:
ANSI C63.26: 2015; 5.4.3 (relative meas. Procedure [26dB for GSM, EGDE, WCDMA, HSDPA, HSUPA]) 5.4.4 (Power bandwidth (99%))

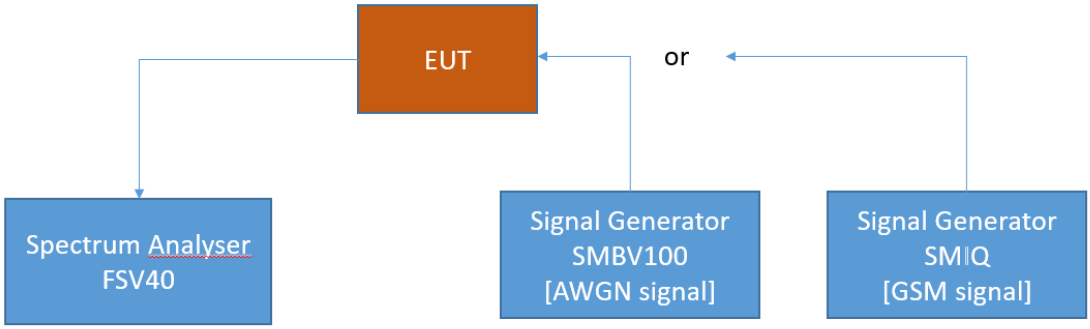
5.12.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the applicable conducted spurious emission test case per FCC §2.1049 and RSS-GEN 6.7. The limit and the requirements come from the applicable rule part and ISED RSS-Standard for the operating band of the cellular device.

The EUT was connected to the test setups according to the following diagram:



FCC Part 22/24/27/90; Industrial Signal Booster
Test Setup step 1: Measuring characteristics of test signals



FCC Part 22/24/27/90; Industrial Signal Booster
Test Setup step 2; Occupied Bandwidth/Input-versus-output spectrum

The attenuation of the measuring and stimulus path are known for each measured frequency and are considered.

The Spectrum Analyzer settings can be directly found in the measurement diagrams.

5.12.2 TEST REQUIREMENTS / LIMITS

FCC Part 2.1049; Occupied Bandwidth:

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions as applicable:

(h) Transmitters employing digital modulation techniques—when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudo-random generators or other devices required in normal service. Additionally, the occupied bandwidth shall be shown for operation with any devices used for modifying the spectrum when such devices are optional at the discretion of the user.

(i) Transmitters designed for other types of modulation—when modulated by an appropriate signal of sufficient amplitude to be representative of the type of service in which used. A description of the input signal should be supplied.

RSS-GEN; 6.7 Occupied Bandwidth (or 99% emission bandwidth) and x dB bandwidth

The occupied bandwidth or the "99% emission bandwidth" is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

In some cases, the "x dB bandwidth" is required, which is defined as the frequency range between two points, one at the lowest frequency below and one at the highest frequency above the carrier frequency, at which the maximum power level of the transmitted emission is attenuated x dB below the maximum in-band power level of the modulated signal, where the two points are on the outskirts of the in-band emission.

The following conditions shall be observed for measuring the occupied bandwidth and x dB bandwidth:

The transmitter shall be operated at its maximum carrier power measured under normal test conditions.

The span of the spectrum analyzer shall be set large enough to capture all products of the modulation process, including the emission skirts, around the carrier frequency, but small enough to avoid having other emissions (e.g. on adjacent channels) within the span.
The detector of the spectrum analyzer shall be set to "Sample". However, a peak, or peak hold, may be used in place of the sampling detector since this usually produces a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold (or "Max Hold") may be necessary to determine the occupied / x dB bandwidth if the device is not transmitting continuously.
The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the actual occupied / x dB bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value. Video averaging is not permitted.

Note: It may be necessary to repeat the measurement a few times until the RBW and VBW are in compliance with the above requirement.

For the 99% emission bandwidth, the trace data points are recovered and directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached, and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded. The difference between the two recorded frequencies is the occupied bandwidth (or the 99% emission bandwidth).

5.12.3 TEST PROTOCOL

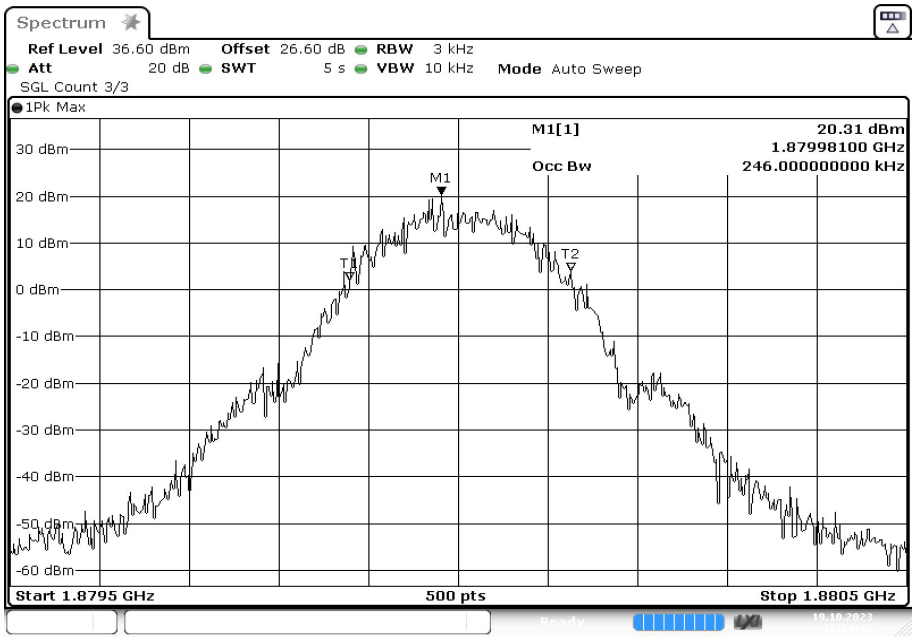
Ambient temperature: 20 - 28 °C
Relative humidity: 30 - 40 %

Radio Technology	Channel	Resource Blocks / Subcarrier	Bandwidth [MHz]	Nominal BW [MHz]	26 dB BW [kHz]	99 % BW [kHz]
GSM 1900	low	-	0.2	0.2	319	242
GSM 1900	mid	-	0.2	0.2	317	246
GSM 1900	high	-	0.2	0.2	315	248
GSM 1900 EDGE	low	-	0.2	0.2	281	238
GSM 1900 EDGE	mid	-	0.2	0.2	285	226
GSM 1900 EDGE	high	-	0.2	0.2	285	226
CAT-M1 eFDD 2 QPSK	low	6	1.4	1.4	-	1092
CAT-M1 eFDD 2 QPSK	mid	6	1.4	1.4	-	1098
CAT-M1 eFDD 2 QPSK	high	6	1.4	1.4	-	1092
CAT-M1 eFDD 2 16QAM	low	5	1.4	1.4	-	930
CAT-M1 eFDD 2 16QAM	mid	5	1.4	1.4	-	930
CAT-M1 eFDD 2 16QAM	high	5	1.4	1.4	-	924
CAT-M1 eFDD 25 QPSK	low	6	1.4	1.4	-	1092
CAT-M1 eFDD 25 QPSK	mid	6	1.4	1.4	-	1098
CAT-M1 eFDD 25 QPSK	high	6	1.4	1.4	-	1098
CAT-M1 eFDD 25 16QAM	low	5	1.4	1.4	-	930
CAT-M1 eFDD 25 16QAM	mid	5	1.4	1.4	-	930
CAT-M1 eFDD 25 16QAM	high	5	1.4	1.4	-	930
NB-IoT eFDD 2 QPSK	low	12	0.2	0.2	-	186
NB-IoT eFDD 2 QPSK	mid	12	0.2	0.2	-	188
NB-IoT eFDD 2 QPSK	high	12	0.2	0.2	-	186
NB-IoT eFDD 2 BPSK	low	1	0.2	0.2	-	136
NB-IoT eFDD 2 BPSK	mid	1	0.2	0.2	-	132
NB-IoT eFDD 2 BPSK	high	1	0.2	0.2	-	136

Remark: Please see next sub-clause for the measurement plot.

5.12.4 MEASUREMENT PLOT (EXAMPLE PLOT, SHOWING WORST CASE, IF APPLICABLE)

Technology = GSM, Radio Technology = GSM 1900, Operating Frequency = mid channel (S01_AE01)

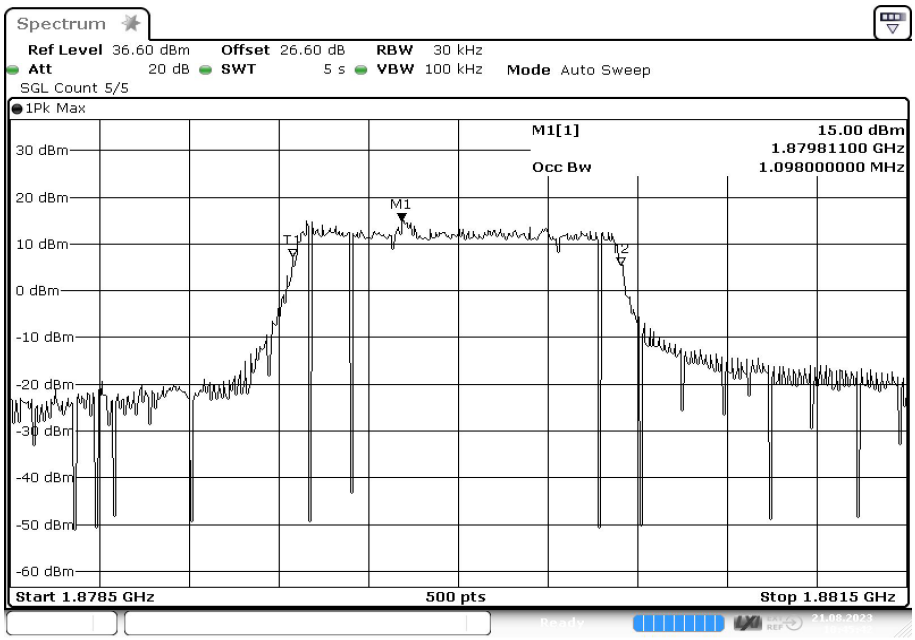


Date: 19.OCT.2023 16:38:37

Technology = GSM, Radio Technology = GSM 1900 EDGE, Operating Frequency = mid channel (S01_AE01)

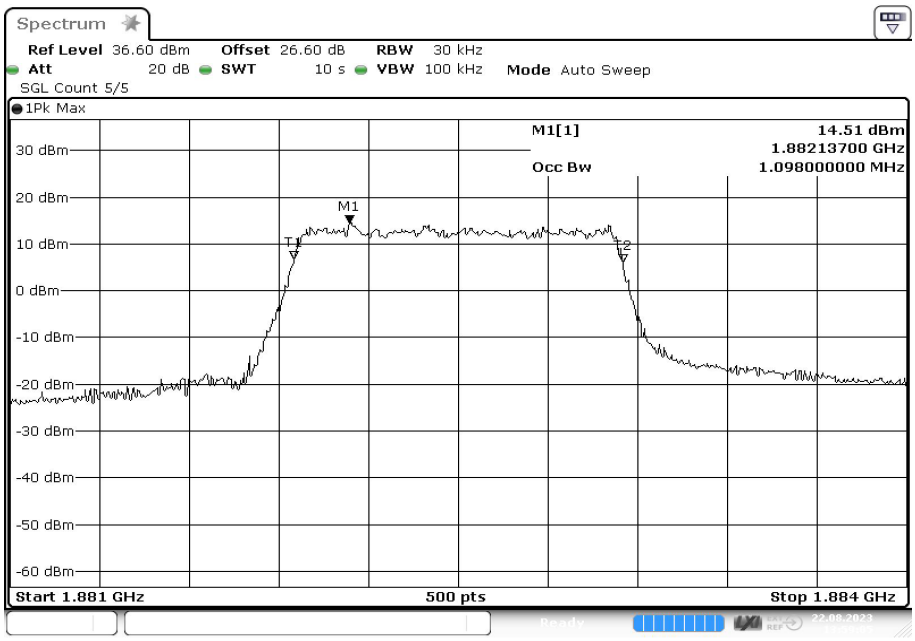
Date: 20.OCT.2023 09:13:49

Technology = CAT-M1, Radio Technology = eFDD 2, Operating Frequency = mid channel (S01_AB01)



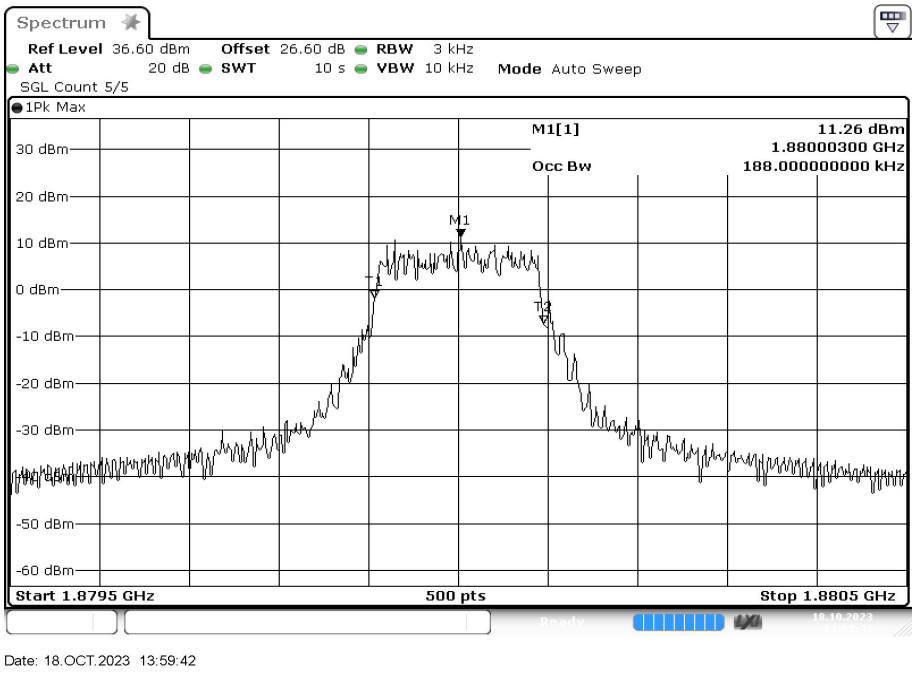
Date: 21.AUG.2023 10:45:42

Technology = CAT-M1, Radio Technology = eFDD 25, Operating Frequency = mid channel (S01_AB01)



Date: 22.AUG.2023 13:59:06

Technology = NB-IoT, Radio Technology = eFDD 2, Operating Frequency = mid channel (S01_AE01)



5.12.5 TEST EQUIPMENT USED

- Radio Lab

5.13 BAND EDGE COMPLIANCE

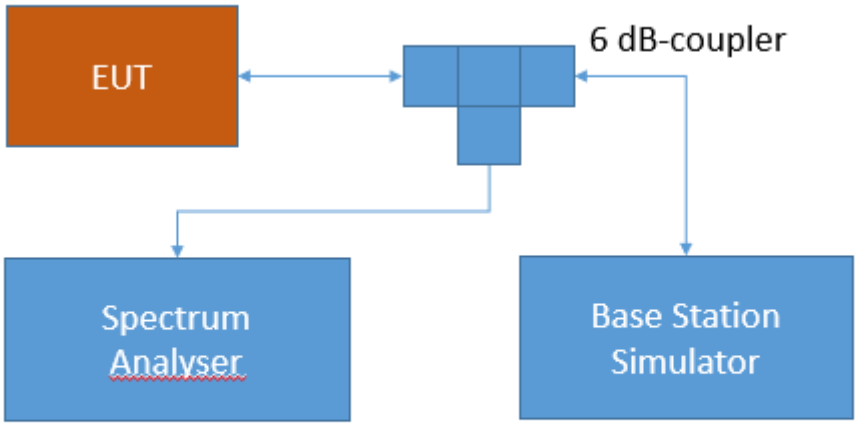
Standard **FCC PART 24 Subpart E**

The test was performed according to:
ANSI C63.26: 2015; 5.7.3

5.13.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the applicable conducted spurious emission test case per § 2. 1051 and RSS-GEN 6.13. The limit comes from the applicable rule part and ISED RSS-Standard for the operating band of the cellular device.

The EUT was connected to the test setup according to the following diagram:



Test Setup FCC Part 22/24/27/90 Cellular;
Band edge compliance

The attenuation of the measuring and stimulus path are known for each measured frequency and are considered.

The Spectrum Analyzer settings can be directly found in the measurement diagrams.

5.13.2 TEST REQUIREMENTS / LIMITS

FCC Part 2.1051; Measurement required: Spurious emissions at antenna terminal:

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated

under the conditions specified in §2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

Part 24, Subpart E – Broadband PCS

§24 238 – Emission limitations for Broadband PCS equipment

a) Out of band emissions. 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.

b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

RSS-133; 6.5 Transmitter Unwanted Emissions

Mobile and base station equipment shall comply with the limits in (1) and (2) below.

1. In the 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 $\log_{10}$p (watts).
2. After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 $\log_{10}$p (watts). If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required.

5.13.3 TEST PROTOCOL

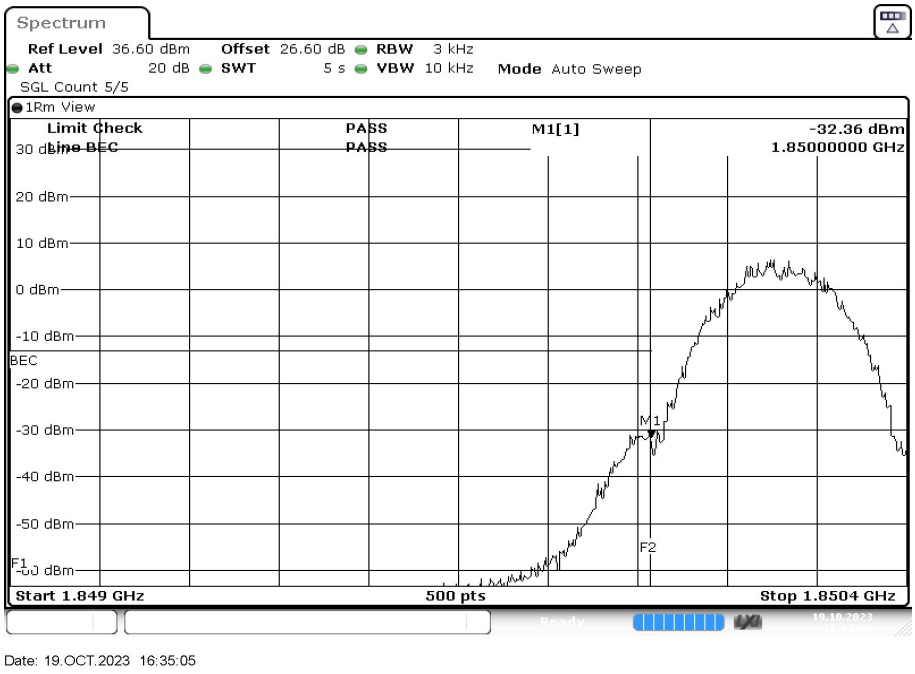
Ambient temperature: 20 - 28 °C
Relative humidity: 30 - 40 %

Radio Technology	Channel	Resource Blocks / Subcarrier	Band-width [MHz]	Peak [dBm]	Average [dBm]	RMS [dBm]	Limit /dBm	Margin to Limit /dB
GSM 1900	low	-	0.2	-21	-41	-32	-13	19.36
GSM 1900	high	-	0.2	-24	-41	-34	-13	21.21
GSM 1900 EDGE	low	-	0.2	-27	-44	-37	-13	23.51
GSM 1900 EDGE	high	-	0.2	-31	-48	-41	-13	28.33
CAT-M1 eFDD 2 QPSK	low	6	1.4	-23.25	-47.48	-36.84	-13	23.84
CAT-M1 eFDD 2 QPSK	high	6	1.4	-14.65	-44.69	-37.04	-13	24.04
CAT-M1 eFDD 2 16QAM	low	5	1.4	-16.82	-42.85	-38.28	-13	25.28
CAT-M1 eFDD 2 16QAM	high	5	1.4	-25.01	-48.05	-40.67	-13	27.67
CAT-M1 eFDD 25 QPSK	low	6	1.4	-19.09	-45.57	-37.55	-13	24.55
CAT-M1 eFDD 25 QPSK	high	6	1.4	-16.26	-47.67	-37.43	-13	24.43
CAT-M1 eFDD 25 16QAM	low	5	1.4	-18.51	-45.17	-36.63	-13	23.63
CAT-M1 eFDD 25 16QAM	high	5	1.4	-17.06	-49.03	-39.94	-13	26.94
NB-IoT eFDD 2 QPSK	low	12	0.2	-8.05	-30.12	-20.48	-13	7.48
NB-IoT eFDD 2 QPSK	high	12	0.2	-8.33	-27.22	-17.77	-13	4.77
NB-IoT eFDD 2 BPSK	low	1	0.2	-13.46	-20.31	-19.11	-13	6.11
NB-IoT eFDD 2 BPSK	high	1	0.2	-14.38	-21.36	-21.50	-13	8.50

Remark: Please see next sub-clause for the measurement plot.

5.13.4 MEASUREMENT PLOT (EXAMPLE PLOT, SHOWING WORST CASE, IF APPLICABLE)

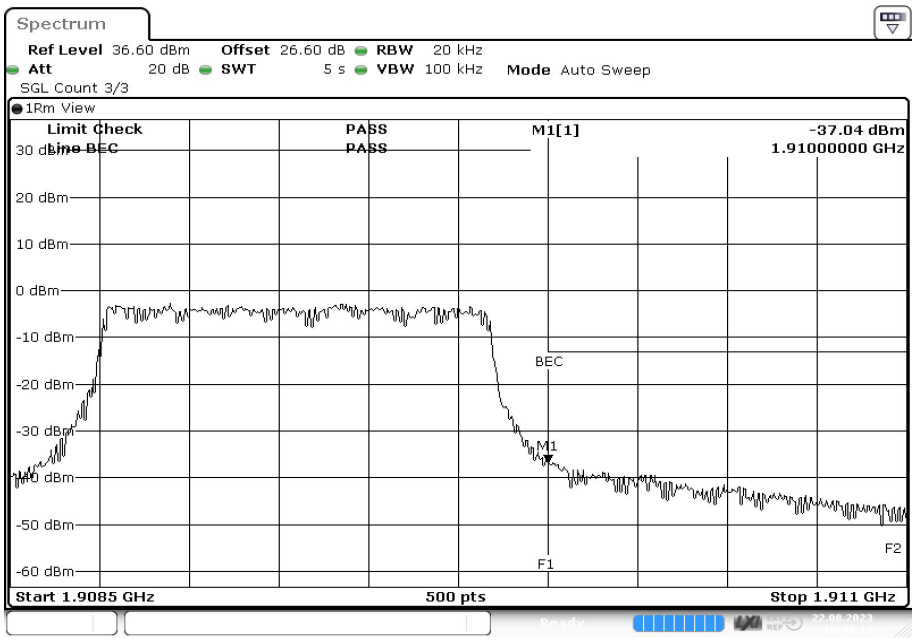
Technology = GSM, Radio Technology = GSM 1900, Operating Frequency = low channel (S01_AE01)



Technology = GSM, Radio Technology = GSM 1900 EDGE, Operating Frequency = low channel (S01_AE01)

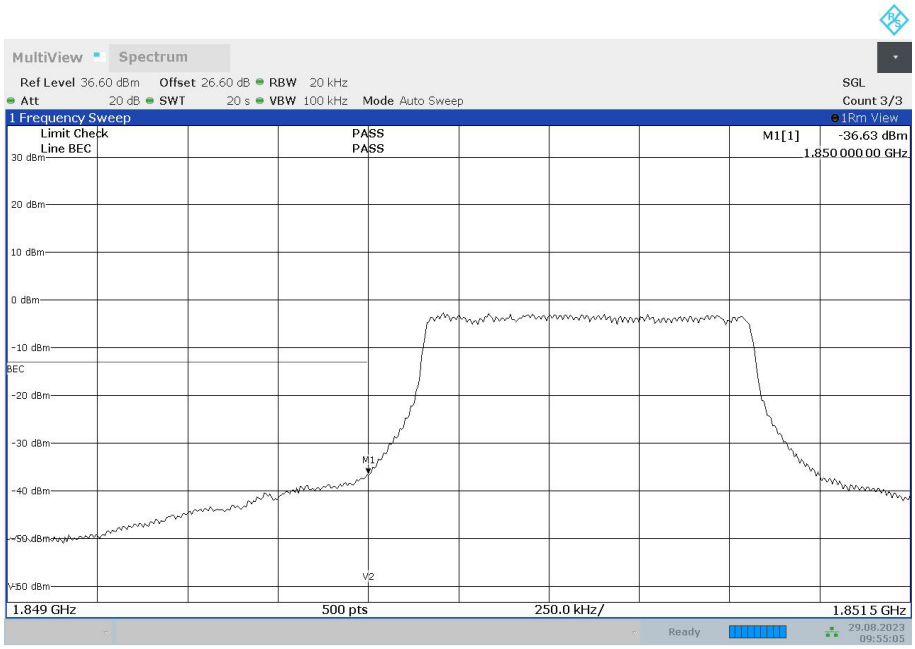
Date: 20.OCT.2023 08:42:47

Technology = CAT-M1, Radio Technology = eFDD 2, Operating Frequency = high channel (S01_AB01)



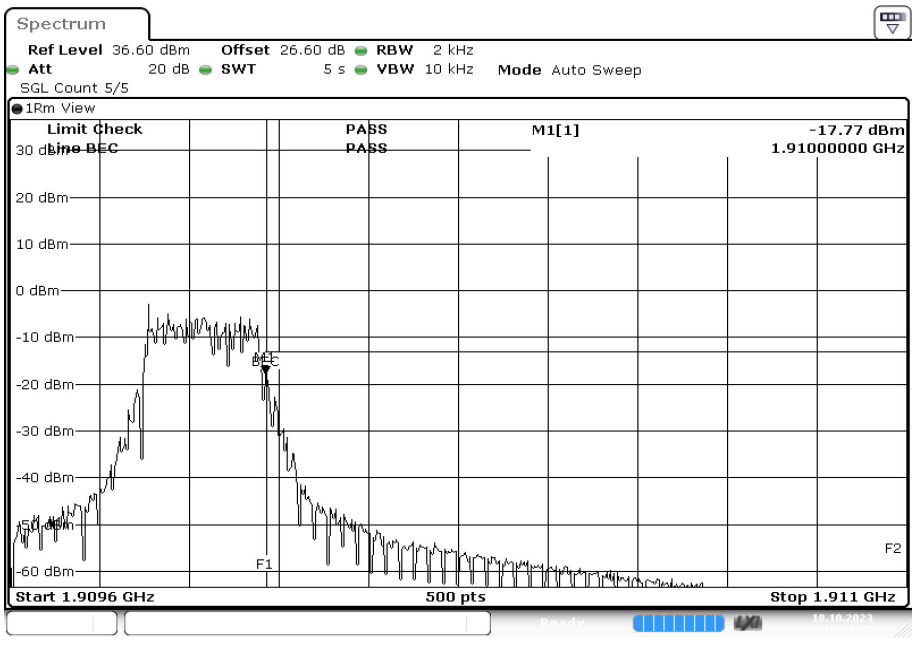
Date: 22.AUG.2023 16:48:13

Technology = CAT-M1, Radio Technology = eFDD 25, Operating Frequency = low channel (S01_AB01)



09:55:06 29.08.2023

Technology = NB-IoT, Radio Technology = eFDD 2, Operating Frequency = high channel (S01_AE01)



Date: 18.OCT.2023 16:02:27

5.13.5 TEST EQUIPMENT USED

- Radio Lab

5.14 PEAK TO AVERAGE RATIO

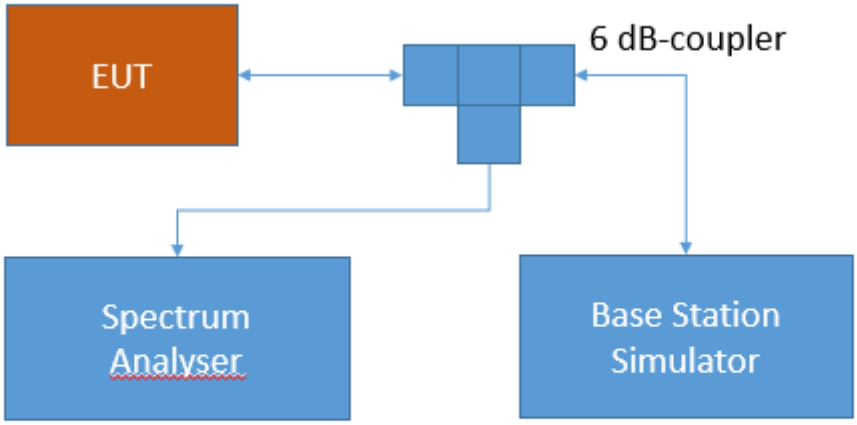
Standard **FCC PART 24 Subpart E**

The test was performed according to:
ANSI C63.26: 2015; 5.2.3.4 (broadband noise-like signal using CCDF [LTE, CAT-M1, NB-IoT])
5.2.6 (alternative procedure for PAPR [GSM, EDGE, WCDMA, HSDPA, HSUPA])

5.14.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance of the EUT to the peak-to-average limits and requirements of the applicable rule part and ISED RSS-Standard for the operating band of the cellular device.

The EUT was connected to the test setup according to the following diagram:



Test Setup FCC Part 22/24/27/90 Cellular;
Peak-average ratio

The attenuation of the measuring and stimulus path are known for each measured frequency and are considered.

The Spectrum Analyzer settings can be directly found in the measurement diagrams. The internal CCDF (complementary cumulative distribution function) of the spectrum analyser is used for this measurement

5.14.2 TEST REQUIREMENTS / LIMITS

FCC Part 24, § 24.232

(d) Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be

authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

RSS-133; 6.4 Transmitter Output Power and Equivalent Isotropically Radiated Power

In addition, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time using a signal corresponding to the highest PAPR during periods of continuous transmission.

5.14.3 TEST PROTOCOL

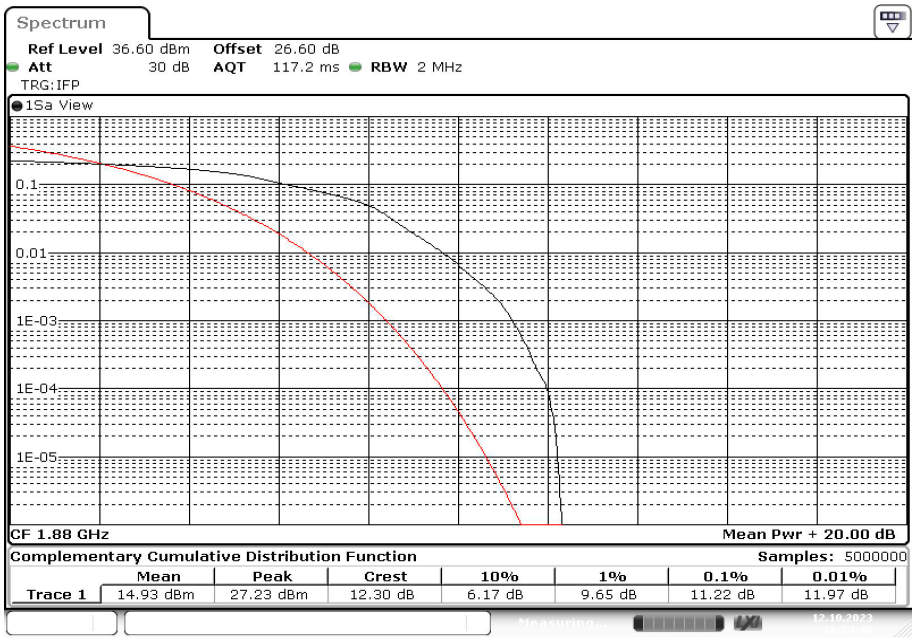
Ambient temperature: 20 - 28 °C
Relative humidity: 30 - 40 %

Radio Technology	Channel	Resource Blocks / Subcarrier	Bandwidth [MHz]	Peak to Average Ratio	Limit (IC) [dB]
GSM 1900	low	-	0.2	0.86	13
GSM 1900	mid	-	0.2	0.74	13
GSM 1900	high	-	0.2	0.74	13
GSM 1900 EDGE	low	-	0.2	2.84	13
GSM 1900 EDGE	mid	-	0.2	2.91	13
GSM 1900 EDGE	high	-	0.2	2.97	13
CAT-M1 eFDD 2 QPSK	low	6	1.4	10.46	13
CAT-M1 eFDD 2 QPSK	mid	6	1.4	10.43	13
CAT-M1 eFDD 2 QPSK	high	6	1.4	10.46	13
CAT-M1 eFDD 2 16QAM	low	5	1.4	11.28	13
CAT-M1 eFDD 2 16QAM	mid	5	1.4	11.22	13
CAT-M1 eFDD 2 16QAM	high	5	1.4	11.19	13
CAT-M1 eFDD 25 QPSK	low	6	1.4	10.41	13
CAT-M1 eFDD 25 QPSK	mid	6	1.4	10.46	13
CAT-M1 eFDD 25 QPSK	high	6	1.4	10.35	13
CAT-M1 eFDD 25 16QAM	low	5	1.4	11.13	13
CAT-M1 eFDD 25 16QAM	mid	5	1.4	11.25	13
CAT-M1 eFDD 25 16QAM	high	5	1.4	11.19	13
NB-IoT eFDD 2 QPSK	low	12	0.2	8.23	13
NB-IoT eFDD 2 QPSK	mid	12	0.2	8.20	13
NB-IoT eFDD 2 QPSK	high	12	0.2	8.20	13
NB-IoT eFDD 2 BPSK	low	1	0.2	8.32	13
NB-IoT eFDD 2 BPSK	mid	1	0.2	8.41	13
NB-IoT eFDD 2 BPSK	high	1	0.2	8.23	13

Remark: Please see next sub-clause for the measurement plot.

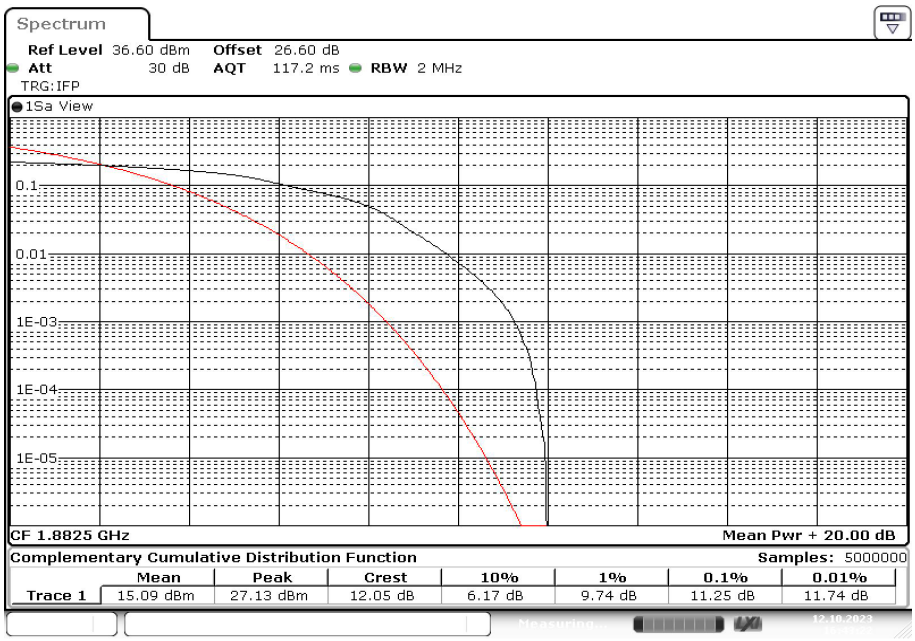
5.14.4 MEASUREMENT PLOT (EXAMPLE PLOT, SHOWING WORST CASE, IF APPLICABLE)

Technology = CAT-M1, Radio Technology = eFDD 2, Operating Frequency = mid channel (S01_AB01)



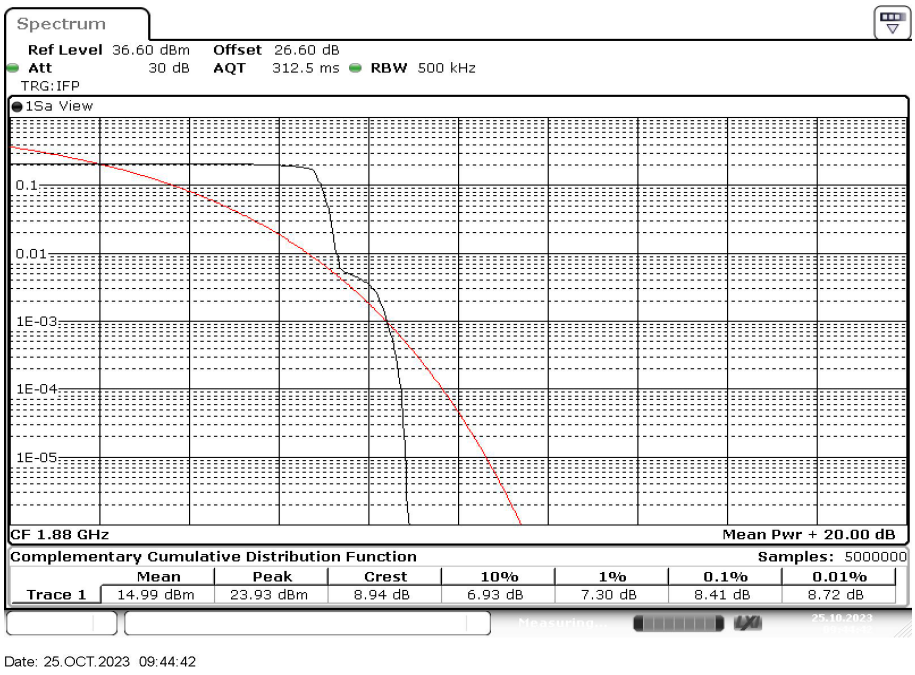
Date: 12.OCT.2023 16:24:41

Technology = CAT-M1, Radio Technology = eFDD 25, Operating Frequency = mid channel (S01_AB01)



Date: 12.OCT.2023 16:43:22

Technology = NB-IoT, Radio Technology = eFDD 2, Operating Frequency = mid channel (S01_AE01)



5.14.5 TEST EQUIPMENT USED

- Radio Lab

5.15 RF OUTPUT POWER

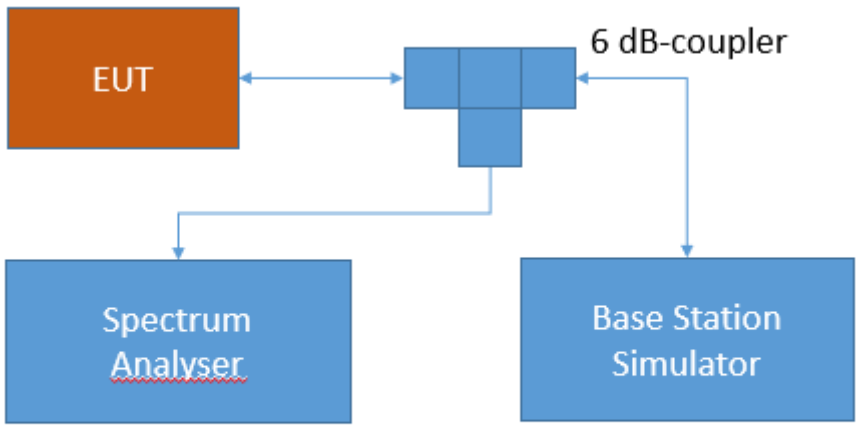
Standard **FCC PART 27 Subpart C**

The test was performed according to:
ANSI C63.26: 2015; 5.2.4.1, Wideband Signal: 5.2.4.4

5.15.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the applicable RF Output power test case per § 2.1046 and RSS-GEN 6.12. The limit and the requirements come from the applicable rule part and ISED RSS-Standard for the operating band of the cellular device.

The EUT was connected to the test setup according to the following diagram:



Test Setup FCC Part 22/24/27/90 Cellular;
RF Output power

The attenuation of the measuring and stimulus path are known for each measured frequency and are considered.

The Spectrum Analyzer settings can be directly found in the measurement diagrams.

5.15.2 TEST REQUIREMENTS / LIMITS

FCC Part 27; Miscellaneous Wireless Communication Services

Subpart C – Technical standards

§ 27.50 - Power limits and duty cycle

Band 13:

(b) The following power limits apply to transmitters operating in the 746-758 MHz, 775-788 MHz and 805-806 MHz bands:

(10) Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP.

RSS-130; 4.6.3 Transmitter Output Power

The e.r.p. shall not exceed 3 watts for portable equipment and indoor fixed subscriber equipment.

Band 12:

c) The following power and antenna height requirements apply to stations transmitting in the 600 MHz band and the 698-746 MHz band:

(10) Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.

RSS-130; 4.6.3 Transmitter Output Power

The e.r.p. shall not exceed 3 watts for portable equipment and indoor fixed subscriber equipment.

Band 4/66:

d) The following power and antenna height requirements apply to stations transmitting in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz and 2180-2200 MHz bands:

(4) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP. Fixed stations operating in the 1710-1755 MHz band are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum.

RSS-139; 5.5 Transmitter Output Power

The maximum output power of the equipment shall comply with the limits specified below. In the tables, maximum power refers to the equivalent isotropically radiated power (e.i.r.p.) or total radiated power (TRP), measured in terms of average values.

Table 3: Maximum power of equipment in the 1710 – 1780 MHz	
Equipment type	Maximum power
Fixed station and base station	30 dBm e.i.r.p. / channel bandwidth
Subscriber equipment	30 dBm e.i.r.p. / channel bandwidth

5.15.3 TEST PROTOCOL

Ambient temperature: 20 - 28 °C
Relative humidity: 30 - 40 %

Radio Technology	Channel	Resource Blocks / Subcarrier	Band-width [MHz]	RMS Cond. Power (dBm)	FCC Limit (W)	IC Limit (W)	Maximum Antenna Gain FCC (dBi)	Maximum Antenna Gain IC (dBi)
CAT-M1 eFDD 4 QPSK	low	1	1.4	22.79	1 (EIRP)	1 (EIRP)	7.21	7.21
CAT-M1 eFDD 4 QPSK	low	3	1.4	21.74	1 (EIRP)	1 (EIRP)	8.26	8.26
CAT-M1 eFDD 4 QPSK	low	6	1.4	20.72	1 (EIRP)	1 (EIRP)	9.28	9.28
CAT-M1 eFDD 4 QPSK	mid	1	1.4	22.78	1 (EIRP)	1 (EIRP)	7.22	7.22
CAT-M1 eFDD 4 QPSK	mid	3	1.4	21.79	1 (EIRP)	1 (EIRP)	8.21	8.21
CAT-M1 eFDD 4 QPSK	mid	6	1.4	20.71	1 (EIRP)	1 (EIRP)	9.29	9.29
CAT-M1 eFDD 4 QPSK	high	1	1.4	22.64	1 (EIRP)	1 (EIRP)	7.36	7.36
CAT-M1 eFDD 4 QPSK	high	3	1.4	21.70	1 (EIRP)	1 (EIRP)	8.30	8.30
CAT-M1 eFDD 4 QPSK	high	6	1.4	20.68	1 (EIRP)	1 (EIRP)	9.32	9.32
CAT-M1 eFDD 4 16QAM	low	1	1.4	21.85	1 (EIRP)	1 (EIRP)	8.15	8.15
CAT-M1 eFDD 4 16QAM	low	5	1.4	20.91	1 (EIRP)	1 (EIRP)	9.09	9.09
CAT-M1 eFDD 4 16QAM	mid	1	1.4	21.67	1 (EIRP)	1 (EIRP)	8.33	8.33
CAT-M1 eFDD 4 16QAM	mid	5	1.4	20.85	1 (EIRP)	1 (EIRP)	9.15	9.15
CAT-M1 eFDD 4 16QAM	high	1	1.4	21.52	1 (EIRP)	1 (EIRP)	8.48	8.48
CAT-M1 eFDD 4 16QAM	high	5	1.4	20.74	1 (EIRP)	1 (EIRP)	9.26	9.26
CAT-M1 eFDD 4 QPSK	low	1	3	22.79	1 (EIRP)	1 (EIRP)	7.21	7.21
CAT-M1 eFDD 4 QPSK	low	3	3	21.75	1 (EIRP)	1 (EIRP)	8.25	8.25
CAT-M1 eFDD 4 QPSK	low	6	3	20.71	1 (EIRP)	1 (EIRP)	9.29	9.29
CAT-M1 eFDD 4 QPSK	mid	1	3	22.84	1 (EIRP)	1 (EIRP)	7.16	7.16
CAT-M1 eFDD 4 QPSK	mid	3	3	21.73	1 (EIRP)	1 (EIRP)	8.27	8.27
CAT-M1 eFDD 4 QPSK	mid	6	3	20.68	1 (EIRP)	1 (EIRP)	9.32	9.32
CAT-M1 eFDD 4 QPSK	high	1	3	22.60	1 (EIRP)	1 (EIRP)	7.40	7.40
CAT-M1 eFDD 4 QPSK	high	3	3	21.62	1 (EIRP)	1 (EIRP)	8.38	8.38
CAT-M1 eFDD 4 QPSK	high	6	3	20.62	1 (EIRP)	1 (EIRP)	9.38	9.38
CAT-M1 eFDD 4 16QAM	low	1	3	21.65	1 (EIRP)	1 (EIRP)	8.35	8.35
CAT-M1 eFDD 4 16QAM	low	5	3	20.78	1 (EIRP)	1 (EIRP)	9.22	9.22
CAT-M1 eFDD 4 16QAM	mid	1	3	21.95	1 (EIRP)	1 (EIRP)	8.05	8.05
CAT-M1 eFDD 4 16QAM	mid	5	3	20.79	1 (EIRP)	1 (EIRP)	9.21	9.21
CAT-M1 eFDD 4 16QAM	high	1	3	21.67	1 (EIRP)	1 (EIRP)	8.33	8.33
CAT-M1 eFDD 4 16QAM	high	5	3	20.71	1 (EIRP)	1 (EIRP)	9.29	9.29
CAT-M1 eFDD 4 QPSK	low	1	5	22.87	1 (EIRP)	1 (EIRP)	7.13	7.13
CAT-M1 eFDD 4 QPSK	low	3	5	21.71	1 (EIRP)	1 (EIRP)	8.29	8.29
CAT-M1 eFDD 4 QPSK	low	6	5	21.73	1 (EIRP)	1 (EIRP)	8.27	8.27
CAT-M1 eFDD 4 QPSK	mid	1	5	22.81	1 (EIRP)	1 (EIRP)	7.19	7.19
CAT-M1 eFDD 4 QPSK	mid	3	5	21.74	1 (EIRP)	1 (EIRP)	8.26	8.26
CAT-M1 eFDD 4 QPSK	mid	6	5	21.71	1 (EIRP)	1 (EIRP)	8.29	8.29
CAT-M1 eFDD 4 QPSK	high	1	5	22.69	1 (EIRP)	1 (EIRP)	7.31	7.31
CAT-M1 eFDD 4 QPSK	high	3	5	21.61	1 (EIRP)	1 (EIRP)	8.39	8.39
CAT-M1 eFDD 4 QPSK	high	6	5	21.60	1 (EIRP)	1 (EIRP)	8.40	8.40
CAT-M1 eFDD 4 16QAM	low	1	5	22.57	1 (EIRP)	1 (EIRP)	7.43	7.43
CAT-M1 eFDD 4 16QAM	low	5	5	20.73	1 (EIRP)	1 (EIRP)	9.27	9.27
CAT-M1 eFDD 4 16QAM	mid	1	5	22.89	1 (EIRP)	1 (EIRP)	7.11	7.11
CAT-M1 eFDD 4 16QAM	mid	5	5	20.74	1 (EIRP)	1 (EIRP)	9.26	9.26
CAT-M1 eFDD 4 16QAM	high	1	5	22.59	1 (EIRP)	1 (EIRP)	7.41	7.41
CAT-M1 eFDD 4 16QAM	high	5	5	20.63	1 (EIRP)	1 (EIRP)	9.37	9.37
CAT-M1 eFDD 4 QPSK	low	1	10	22.86	1 (EIRP)	1 (EIRP)	7.14	7.14
CAT-M1 eFDD 4 QPSK	low	3	10	22.69	1 (EIRP)	1 (EIRP)	7.31	7.31
CAT-M1 eFDD 4 QPSK	low	6	10	21.71	1 (EIRP)	1 (EIRP)	8.29	8.29
CAT-M1 eFDD 4 QPSK	mid	1	10	22.79	1 (EIRP)	1 (EIRP)	7.21	7.21
CAT-M1 eFDD 4 QPSK	mid	3	10	22.68	1 (EIRP)	1 (EIRP)	7.32	7.32
CAT-M1 eFDD 4 QPSK	mid	6	10	21.66	1 (EIRP)	1 (EIRP)	8.34	8.34
CAT-M1 eFDD 4 QPSK	high	1	10	22.41	1 (EIRP)	1 (EIRP)	7.59	7.59
CAT-M1 eFDD 4 QPSK	high	3	10	22.55	1 (EIRP)	1 (EIRP)	7.45	7.45
CAT-M1 eFDD 4 QPSK	high	6	10	21.55	1 (EIRP)	1 (EIRP)	8.45	8.45
CAT-M1 eFDD 4 16QAM	low	1	10	22.52	1 (EIRP)	1 (EIRP)	7.48	7.48
CAT-M1 eFDD 4 16QAM	low	5	10	21.74	1 (EIRP)	1 (EIRP)	8.26	8.26
CAT-M1 eFDD 4 16QAM	mid	1	10	22.81	1 (EIRP)	1 (EIRP)	7.19	7.19
CAT-M1 eFDD 4 16QAM	mid	5	10	21.69	1 (EIRP)	1 (EIRP)	8.31	8.31
CAT-M1 eFDD 4 16QAM	high	1	10	22.57	1 (EIRP)	1 (EIRP)	7.43	7.43

CAT-M1 eFDD 4 16QAM	high	5	10	21.60	1 (EIRP)	1 (EIRP)	8.40	8.40
CAT-M1 eFDD 12 QPSK	low	1	1.4	22.94	3 (ERP)	3 (ERP)	11.83	11.83
CAT-M1 eFDD 12 QPSK	low	3	1.4	21.96	3 (ERP)	3 (ERP)	12.81	12.81
CAT-M1 eFDD 12 QPSK	low	6	1.4	20.88	3 (ERP)	3 (ERP)	13.89	13.89
CAT-M1 eFDD 12 QPSK	mid	1	1.4	22.93	3 (ERP)	3 (ERP)	11.84	11.84
CAT-M1 eFDD 12 QPSK	mid	3	1.4	21.94	3 (ERP)	3 (ERP)	12.83	12.83
CAT-M1 eFDD 12 QPSK	mid	6	1.4	20.84	3 (ERP)	3 (ERP)	13.93	13.93
CAT-M1 eFDD 12 QPSK	high	1	1.4	22.76	3 (ERP)	3 (ERP)	12.01	12.01
CAT-M1 eFDD 12 QPSK	high	3	1.4	21.74	3 (ERP)	3 (ERP)	13.03	13.03
CAT-M1 eFDD 12 QPSK	high	6	1.4	20.66	3 (ERP)	3 (ERP)	14.11	14.11
CAT-M1 eFDD 12 16QAM	low	1	1.4	22.06	3 (ERP)	3 (ERP)	12.71	12.71
CAT-M1 eFDD 12 16QAM	low	5	1.4	20.87	3 (ERP)	3 (ERP)	13.90	13.90
CAT-M1 eFDD 12 16QAM	mid	1	1.4	21.87	3 (ERP)	3 (ERP)	12.90	12.90
CAT-M1 eFDD 12 16QAM	mid	5	1.4	20.82	3 (ERP)	3 (ERP)	13.95	13.95
CAT-M1 eFDD 12 16QAM	high	1	1.4	21.86	3 (ERP)	3 (ERP)	12.91	12.91
CAT-M1 eFDD 12 16QAM	high	5	1.4	20.72	3 (ERP)	3 (ERP)	14.05	14.05
CAT-M1 eFDD 12 QPSK	low	1	3	23.25	3 (ERP)	3 (ERP)	11.52	11.52
CAT-M1 eFDD 12 QPSK	low	3	3	22.21	3 (ERP)	3 (ERP)	12.56	12.56
CAT-M1 eFDD 12 QPSK	low	6	3	21.29	3 (ERP)	3 (ERP)	13.48	13.48
CAT-M1 eFDD 12 QPSK	mid	1	3	22.87	3 (ERP)	3 (ERP)	11.90	11.90
CAT-M1 eFDD 12 QPSK	mid	3	3	21.82	3 (ERP)	3 (ERP)	12.95	12.95
CAT-M1 eFDD 12 QPSK	mid	6	3	20.72	3 (ERP)	3 (ERP)	14.05	14.05
CAT-M1 eFDD 12 QPSK	high	1	3	22.67	3 (ERP)	3 (ERP)	12.10	12.10
CAT-M1 eFDD 12 QPSK	high	3	3	21.63	3 (ERP)	3 (ERP)	13.14	13.14
CAT-M1 eFDD 12 QPSK	high	6	3	20.56	3 (ERP)	3 (ERP)	14.21	14.21
CAT-M1 eFDD 12 16QAM	low	1	3	22.15	3 (ERP)	3 (ERP)	12.62	12.62
CAT-M1 eFDD 12 16QAM	low	5	3	21.26	3 (ERP)	3 (ERP)	13.51	13.51
CAT-M1 eFDD 12 16QAM	mid	1	3	22.24	3 (ERP)	3 (ERP)	12.53	12.53
CAT-M1 eFDD 12 16QAM	mid	5	3	20.70	3 (ERP)	3 (ERP)	14.07	14.07
CAT-M1 eFDD 12 16QAM	high	1	3	22.02	3 (ERP)	3 (ERP)	12.75	12.75
CAT-M1 eFDD 12 16QAM	high	5	3	20.61	3 (ERP)	3 (ERP)	14.16	14.16
CAT-M1 eFDD 12 QPSK	low	1	5	22.89	3 (ERP)	3 (ERP)	11.88	11.88
CAT-M1 eFDD 12 QPSK	low	3	5	21.87	3 (ERP)	3 (ERP)	12.90	12.90
CAT-M1 eFDD 12 QPSK	low	6	5	21.81	3 (ERP)	3 (ERP)	12.96	12.96
CAT-M1 eFDD 12 QPSK	mid	1	5	22.80	3 (ERP)	3 (ERP)	11.97	11.97
CAT-M1 eFDD 12 QPSK	mid	3	5	21.76	3 (ERP)	3 (ERP)	13.01	13.01
CAT-M1 eFDD 12 QPSK	mid	6	5	21.68	3 (ERP)	3 (ERP)	13.09	13.09
CAT-M1 eFDD 12 QPSK	high	1	5	22.66	3 (ERP)	3 (ERP)	12.11	12.11
CAT-M1 eFDD 12 QPSK	high	3	5	21.61	3 (ERP)	3 (ERP)	13.16	13.16
CAT-M1 eFDD 12 QPSK	high	6	5	21.52	3 (ERP)	3 (ERP)	13.25	13.25
CAT-M1 eFDD 12 16QAM	low	1	5	22.95	3 (ERP)	3 (ERP)	11.82	11.82
CAT-M1 eFDD 12 16QAM	low	5	5	20.78	3 (ERP)	3 (ERP)	13.99	13.99
CAT-M1 eFDD 12 16QAM	mid	1	5	22.66	3 (ERP)	3 (ERP)	12.11	12.11
CAT-M1 eFDD 12 16QAM	mid	5	5	20.69	3 (ERP)	3 (ERP)	14.08	14.08
CAT-M1 eFDD 12 16QAM	high	1	5	22.74	3 (ERP)	3 (ERP)	12.03	12.03
CAT-M1 eFDD 12 16QAM	high	5	5	20.55	3 (ERP)	3 (ERP)	14.22	14.22
CAT-M1 eFDD 12 QPSK	low	1	10	22.91	3 (ERP)	3 (ERP)	11.86	11.86
CAT-M1 eFDD 12 QPSK	low	3	10	22.81	3 (ERP)	3 (ERP)	11.96	11.96
CAT-M1 eFDD 12 QPSK	low	6	10	21.75	3 (ERP)	3 (ERP)	13.02	13.02
CAT-M1 eFDD 12 QPSK	mid	1	10	22.84	3 (ERP)	3 (ERP)	11.93	11.93
CAT-M1 eFDD 12 QPSK	mid	3	10	22.72	3 (ERP)	3 (ERP)	12.05	12.05
CAT-M1 eFDD 12 QPSK	mid	6	10	21.67	3 (ERP)	3 (ERP)	13.10	13.10
CAT-M1 eFDD 12 QPSK	high	1	10	22.41	3 (ERP)	3 (ERP)	12.36	12.36
CAT-M1 eFDD 12 QPSK	high	3	10	22.58	3 (ERP)	3 (ERP)	12.19	12.19
CAT-M1 eFDD 12 QPSK	high	6	10	21.49	3 (ERP)	3 (ERP)	13.28	13.28
CAT-M1 eFDD 12 16QAM	low	1	10	22.98	3 (ERP)	3 (ERP)	11.79	11.79
CAT-M1 eFDD 12 16QAM	low	5	10	21.74	3 (ERP)	3 (ERP)	13.03	13.03
CAT-M1 eFDD 12 16QAM	mid	1	10	22.74	3 (ERP)	3 (ERP)	12.03	12.03
CAT-M1 eFDD 12 16QAM	mid	5	10	21.64	3 (ERP)	3 (ERP)	13.13	13.13
CAT-M1 eFDD 12 16QAM	high	1	10	22.50	3 (ERP)	3 (ERP)	12.27	12.27
CAT-M1 eFDD 12 16QAM	high	5	10	21.55	3 (ERP)	3 (ERP)	13.22	13.22
CAT-M1 eFDD 13 QPSK	low	1	5	22.79	3 (ERP)	3 (ERP)	11.98	11.98
CAT-M1 eFDD 13 QPSK	low	3	5	21.80	3 (ERP)	3 (ERP)	12.97	12.97
CAT-M1 eFDD 13 QPSK	low	6	5	21.75	3 (ERP)	3 (ERP)	13.02	13.02
CAT-M1 eFDD 13 QPSK	mid	1	5	22.82	3 (ERP)	3 (ERP)	11.95	11.95
CAT-M1 eFDD 13 QPSK	mid	3	5	21.78	3 (ERP)	3 (ERP)	12.99	12.99
CAT-M1 eFDD 13 QPSK	mid	6	5	21.69	3 (ERP)	3 (ERP)	13.08	13.08
CAT-M1 eFDD 13 QPSK	high	1	5	23.03	3 (ERP)	3 (ERP)	11.74	11.74
CAT-M1 eFDD 13 QPSK	high	3	5	21.90	3 (ERP)	3 (ERP)	12.87	12.87
CAT-M1 eFDD 13 QPSK	high	6	5	21.88	3 (ERP)	3 (ERP)	12.89	12.89
CAT-M1 eFDD 13 16QAM	low	1	5	22.72	3 (ERP)	3 (ERP)	12.05	12.05
CAT-M1 eFDD 13 16QAM	low	5	5	20.71	3 (ERP)	3 (ERP)	14.06	14.06
CAT-M1 eFDD 13 16QAM	mid	1	5	22.55	3 (ERP)	3 (ERP)	12.22	12.22

CAT-M1 eFDD 13 16QAM	mid	5	5	20.80	3 (ERP)	3 (ERP)	13.97	13.97
CAT-M1 eFDD 13 16QAM	high	1	5	23.11	3 (ERP)	3 (ERP)	11.66	11.66
CAT-M1 eFDD 13 16QAM	high	5	5	20.97	3 (ERP)	3 (ERP)	13.80	13.80
CAT-M1 eFDD 13 QPSK	mid	1	10	22.86	3 (ERP)	3 (ERP)	11.91	11.91
CAT-M1 eFDD 13 QPSK	mid	3	10	22.73	3 (ERP)	3 (ERP)	12.04	12.04
CAT-M1 eFDD 13 QPSK	mid	6	10	21.68	3 (ERP)	3 (ERP)	13.09	13.09
CAT-M1 eFDD 13 16QAM	mid	1	10	22.91	3 (ERP)	3 (ERP)	11.86	11.86
CAT-M1 eFDD 13 16QAM	mid	5	10	21.75	3 (ERP)	3 (ERP)	13.02	13.02
CAT-M1 eFDD 66 QPSK	low	1	1.4	22.92	1 (EIRP)	1 (EIRP)	7.08	7.08
CAT-M1 eFDD 66 QPSK	low	3	1.4	21.91	1 (EIRP)	1 (EIRP)	8.09	8.09
CAT-M1 eFDD 66 QPSK	low	6	1.4	20.84	1 (EIRP)	1 (EIRP)	9.16	9.16
CAT-M1 eFDD 66 QPSK	mid	1	1.4	22.85	1 (EIRP)	1 (EIRP)	7.15	7.15
CAT-M1 eFDD 66 QPSK	mid	3	1.4	21.84	1 (EIRP)	1 (EIRP)	8.16	8.16
CAT-M1 eFDD 66 QPSK	mid	6	1.4	20.77	1 (EIRP)	1 (EIRP)	9.23	9.23
CAT-M1 eFDD 66 QPSK	high	1	1.4	22.64	1 (EIRP)	1 (EIRP)	7.36	7.36
CAT-M1 eFDD 66 QPSK	high	3	1.4	21.62	1 (EIRP)	1 (EIRP)	8.38	8.38
CAT-M1 eFDD 66 QPSK	high	6	1.4	20.60	1 (EIRP)	1 (EIRP)	9.40	9.40
CAT-M1 eFDD 66 16QAM	low	1	1.4	22.02	1 (EIRP)	1 (EIRP)	7.98	7.98
CAT-M1 eFDD 66 16QAM	low	5	1.4	20.99	1 (EIRP)	1 (EIRP)	9.01	9.01
CAT-M1 eFDD 66 16QAM	mid	1	1.4	21.73	1 (EIRP)	1 (EIRP)	8.27	8.27
CAT-M1 eFDD 66 16QAM	mid	5	1.4	20.88	1 (EIRP)	1 (EIRP)	9.12	9.12
CAT-M1 eFDD 66 16QAM	high	1	1.4	21.56	1 (EIRP)	1 (EIRP)	8.44	8.44
CAT-M1 eFDD 66 16QAM	high	5	1.4	20.59	1 (EIRP)	1 (EIRP)	9.41	9.41
CAT-M1 eFDD 66 QPSK	low	1	3	23.32	1 (EIRP)	1 (EIRP)	6.68	6.68
CAT-M1 eFDD 66 QPSK	low	3	3	22.29	1 (EIRP)	1 (EIRP)	7.71	7.71
CAT-M1 eFDD 66 QPSK	low	6	3	21.14	1 (EIRP)	1 (EIRP)	8.86	8.86
CAT-M1 eFDD 66 QPSK	mid	1	3	23.10	1 (EIRP)	1 (EIRP)	6.90	6.90
CAT-M1 eFDD 66 QPSK	mid	3	3	22.10	1 (EIRP)	1 (EIRP)	7.90	7.90
CAT-M1 eFDD 66 QPSK	mid	6	3	20.95	1 (EIRP)	1 (EIRP)	9.05	9.05
CAT-M1 eFDD 66 QPSK	high	1	3	22.91	1 (EIRP)	1 (EIRP)	7.09	7.09
CAT-M1 eFDD 66 QPSK	high	3	3	22.04	1 (EIRP)	1 (EIRP)	7.96	7.96
CAT-M1 eFDD 66 QPSK	high	6	3	20.76	1 (EIRP)	1 (EIRP)	9.24	9.24
CAT-M1 eFDD 66 16QAM	low	1	3	22.04	1 (EIRP)	1 (EIRP)	7.96	7.96
CAT-M1 eFDD 66 16QAM	low	5	3	21.14	1 (EIRP)	1 (EIRP)	8.86	8.86
CAT-M1 eFDD 66 16QAM	mid	1	3	22.10	1 (EIRP)	1 (EIRP)	7.90	7.90
CAT-M1 eFDD 66 16QAM	mid	5	3	21.02	1 (EIRP)	1 (EIRP)	8.98	8.98
CAT-M1 eFDD 66 16QAM	high	1	3	21.93	1 (EIRP)	1 (EIRP)	8.07	8.07
CAT-M1 eFDD 66 16QAM	high	5	3	20.93	1 (EIRP)	1 (EIRP)	9.07	9.07
CAT-M1 eFDD 66 QPSK	low	1	5	23.18	1 (EIRP)	1 (EIRP)	6.82	6.82
CAT-M1 eFDD 66 QPSK	low	3	5	22.09	1 (EIRP)	1 (EIRP)	7.91	7.91
CAT-M1 eFDD 66 QPSK	low	6	5	22.18	1 (EIRP)	1 (EIRP)	7.82	7.82
CAT-M1 eFDD 66 QPSK	mid	1	5	22.95	1 (EIRP)	1 (EIRP)	7.05	7.05
CAT-M1 eFDD 66 QPSK	mid	3	5	21.97	1 (EIRP)	1 (EIRP)	8.03	8.03
CAT-M1 eFDD 66 QPSK	mid	6	5	21.91	1 (EIRP)	1 (EIRP)	8.09	8.09
CAT-M1 eFDD 66 QPSK	high	1	5	22.91	1 (EIRP)	1 (EIRP)	7.09	7.09
CAT-M1 eFDD 66 QPSK	high	3	5	21.91	1 (EIRP)	1 (EIRP)	8.09	8.09
CAT-M1 eFDD 66 QPSK	high	6	5	21.84	1 (EIRP)	1 (EIRP)	8.16	8.16
CAT-M1 eFDD 66 16QAM	low	1	5	23.08	1 (EIRP)	1 (EIRP)	6.92	6.92
CAT-M1 eFDD 66 16QAM	low	5	5	21.17	1 (EIRP)	1 (EIRP)	8.83	8.83
CAT-M1 eFDD 66 16QAM	mid	1	5	22.95	1 (EIRP)	1 (EIRP)	7.05	7.05
CAT-M1 eFDD 66 16QAM	mid	5	5	20.99	1 (EIRP)	1 (EIRP)	9.01	9.01
CAT-M1 eFDD 66 16QAM	high	1	5	22.71	1 (EIRP)	1 (EIRP)	7.29	7.29
CAT-M1 eFDD 66 16QAM	high	5	5	20.86	1 (EIRP)	1 (EIRP)	9.14	9.14
CAT-M1 eFDD 66 QPSK	low	1	10	23.26	1 (EIRP)	1 (EIRP)	6.74	6.74
CAT-M1 eFDD 66 QPSK	low	3	10	23.01	1 (EIRP)	1 (EIRP)	6.99	6.99
CAT-M1 eFDD 66 QPSK	low	6	10	22.15	1 (EIRP)	1 (EIRP)	7.85	7.85
CAT-M1 eFDD 66 QPSK	mid	1	10	23.06	1 (EIRP)	1 (EIRP)	6.94	6.94
CAT-M1 eFDD 66 QPSK	mid	3	10	23.04	1 (EIRP)	1 (EIRP)	6.96	6.96
CAT-M1 eFDD 66 QPSK	mid	6	10	21.96	1 (EIRP)	1 (EIRP)	8.04	8.04
CAT-M1 eFDD 66 QPSK	high	1	10	22.69	1 (EIRP)	1 (EIRP)	7.31	7.31
CAT-M1 eFDD 66 QPSK	high	3	10	23.03	1 (EIRP)	1 (EIRP)	6.97	6.97
CAT-M1 eFDD 66 QPSK	high	6	10	21.85	1 (EIRP)	1 (EIRP)	8.15	8.15
CAT-M1 eFDD 66 16QAM	low	1	10	23.04	1 (EIRP)	1 (EIRP)	6.96	6.96
CAT-M1 eFDD 66 16QAM	low	5	10	22.18	1 (EIRP)	1 (EIRP)	7.82	7.82
CAT-M1 eFDD 66 16QAM	mid	1	10	23.01	1 (EIRP)	1 (EIRP)	6.99	6.99
CAT-M1 eFDD 66 16QAM	mid	5	10	22.04	1 (EIRP)	1 (EIRP)	7.96	7.96
CAT-M1 eFDD 66 16QAM	high	1	10	22.46	1 (EIRP)	1 (EIRP)	7.54	7.54
CAT-M1 eFDD 66 16QAM	high	5	10	21.86	1 (EIRP)	1 (EIRP)	8.14	8.14
NB-IoT eFDD 4 QPSK	low	1	0.2	22.88	1 (EIRP)	1 (EIRP)	7.12	7.12
NB-IoT eFDD 4 QPSK	low	3	0.2	22.62	1 (EIRP)	1 (EIRP)	7.38	7.38
NB-IoT eFDD 4 QPSK	low	6	0.2	22.81	1 (EIRP)	1 (EIRP)	7.19	7.19
NB-IoT eFDD 4 QPSK	low	12	0.2	22.85	1 (EIRP)	1 (EIRP)	7.15	7.15
NB-IoT eFDD 4 QPSK	mid	1	0.2	22.90	1 (EIRP)	1 (EIRP)	7.10	7.10

NB-IoT eFDD 4 QPSK	mid	3	0.2	22.66	1 (EIRP)	1 (EIRP)	7.34	7.34
NB-IoT eFDD 4 QPSK	mid	6	0.2	22.76	1 (EIRP)	1 (EIRP)	7.24	7.24
NB-IoT eFDD 4 QPSK	mid	12	0.2	22.92	1 (EIRP)	1 (EIRP)	7.08	7.08
NB-IoT eFDD 4 QPSK	high	1	0.2	22.83	1 (EIRP)	1 (EIRP)	7.17	7.17
NB-IoT eFDD 4 QPSK	high	3	0.2	22.62	1 (EIRP)	1 (EIRP)	7.38	7.38
NB-IoT eFDD 4 QPSK	high	6	0.2	22.74	1 (EIRP)	1 (EIRP)	7.26	7.26
NB-IoT eFDD 4 QPSK	high	12	0.2	22.85	1 (EIRP)	1 (EIRP)	7.15	7.15
NB-IoT eFDD 4 BPSK	low	1	0.2	22.87	1 (EIRP)	1 (EIRP)	7.13	7.13
NB-IoT eFDD 4 BPSK	mid	1	0.2	22.89	1 (EIRP)	1 (EIRP)	7.11	7.11
NB-IoT eFDD 4 BPSK	high	1	0.2	22.86	1 (EIRP)	1 (EIRP)	7.14	7.14
NB-IoT eFDD 12 QPSK	low	1	0.2	22.79	3 (ERP)	3 (ERP)	11.98	11.98
NB-IoT eFDD 12 QPSK	low	3	0.2	22.28	3 (ERP)	3 (ERP)	12.49	12.49
NB-IoT eFDD 12 QPSK	low	6	0.2	22.33	3 (ERP)	3 (ERP)	12.44	12.44
NB-IoT eFDD 12 QPSK	low	12	0.2	22.35	3 (ERP)	3 (ERP)	12.42	12.42
NB-IoT eFDD 12 QPSK	mid	1	0.2	22.72	3 (ERP)	3 (ERP)	12.05	12.05
NB-IoT eFDD 12 QPSK	mid	3	0.2	22.18	3 (ERP)	3 (ERP)	12.59	12.59
NB-IoT eFDD 12 QPSK	mid	6	0.2	22.29	3 (ERP)	3 (ERP)	12.48	12.48
NB-IoT eFDD 12 QPSK	mid	12	0.2	22.23	3 (ERP)	3 (ERP)	12.54	12.54
NB-IoT eFDD 12 QPSK	high	1	0.2	22.69	3 (ERP)	3 (ERP)	12.08	12.08
NB-IoT eFDD 12 QPSK	high	3	0.2	22.13	3 (ERP)	3 (ERP)	12.64	12.64
NB-IoT eFDD 12 QPSK	high	6	0.2	22.25	3 (ERP)	3 (ERP)	12.52	12.52
NB-IoT eFDD 12 QPSK	high	12	0.2	22.21	3 (ERP)	3 (ERP)	12.56	12.56
NB-IoT eFDD 12 BPSK	low	1	0.2	22.84	3 (ERP)	3 (ERP)	11.93	11.93
NB-IoT eFDD 12 BPSK	mid	1	0.2	22.72	3 (ERP)	3 (ERP)	12.05	12.05
NB-IoT eFDD 12 BPSK	high	1	0.2	22.67	3 (ERP)	3 (ERP)	12.10	12.10
NB-IoT eFDD 13 QPSK	low	1	0.2	22.49	3 (ERP)	3 (ERP)	12.28	12.28
NB-IoT eFDD 13 QPSK	low	3	0.2	22.10	3 (ERP)	3 (ERP)	12.67	12.67
NB-IoT eFDD 13 QPSK	low	6	0.2	22.17	3 (ERP)	3 (ERP)	12.60	12.60
NB-IoT eFDD 13 QPSK	low	12	0.2	22.09	3 (ERP)	3 (ERP)	12.68	12.68
NB-IoT eFDD 13 QPSK	mid	1	0.2	22.55	3 (ERP)	3 (ERP)	12.22	12.22
NB-IoT eFDD 13 QPSK	mid	3	0.2	22.10	3 (ERP)	3 (ERP)	12.67	12.67
NB-IoT eFDD 13 QPSK	mid	6	0.2	22.23	3 (ERP)	3 (ERP)	12.54	12.54
NB-IoT eFDD 13 QPSK	mid	12	0.2	22.20	3 (ERP)	3 (ERP)	12.57	12.57
NB-IoT eFDD 13 QPSK	high	1	0.2	22.64	3 (ERP)	3 (ERP)	12.13	12.13
NB-IoT eFDD 13 QPSK	high	3	0.2	22.17	3 (ERP)	3 (ERP)	12.60	12.60
NB-IoT eFDD 13 QPSK	high	6	0.2	22.24	3 (ERP)	3 (ERP)	12.53	12.53
NB-IoT eFDD 13 QPSK	high	12	0.2	22.24	3 (ERP)	3 (ERP)	12.53	12.53
NB-IoT eFDD 13 BPSK	low	1	0.2	22.56	3 (ERP)	3 (ERP)	12.21	12.21
NB-IoT eFDD 13 BPSK	mid	1	0.2	22.60	3 (ERP)	3 (ERP)	12.17	12.17
NB-IoT eFDD 13 BPSK	high	1	0.2	22.64	3 (ERP)	3 (ERP)	12.13	12.13
NB-IoT eFDD 66 QPSK	low	1	0.2	22.82	1 (EIRP)	1 (EIRP)	7.18	7.18
NB-IoT eFDD 66 QPSK	low	3	0.2	22.57	1 (EIRP)	1 (EIRP)	7.43	7.43
NB-IoT eFDD 66 QPSK	low	6	0.2	22.62	1 (EIRP)	1 (EIRP)	7.38	7.38
NB-IoT eFDD 66 QPSK	low	12	0.2	22.60	1 (EIRP)	1 (EIRP)	7.40	7.40
NB-IoT eFDD 66 QPSK	mid	1	0.2	22.80	1 (EIRP)	1 (EIRP)	7.20	7.20
NB-IoT eFDD 66 QPSK	mid	3	0.2	22.42	1 (EIRP)	1 (EIRP)	7.58	7.58
NB-IoT eFDD 66 QPSK	mid	6	0.2	22.57	1 (EIRP)	1 (EIRP)	7.43	7.43
NB-IoT eFDD 66 QPSK	mid	12	0.2	22.55	1 (EIRP)	1 (EIRP)	7.45	7.45
NB-IoT eFDD 66 QPSK	high	1	0.2	22.76	1 (EIRP)	1 (EIRP)	7.24	7.24
NB-IoT eFDD 66 QPSK	high	3	0.2	22.45	1 (EIRP)	1 (EIRP)	7.55	7.55
NB-IoT eFDD 66 QPSK	high	6	0.2	22.50	1 (EIRP)	1 (EIRP)	7.50	7.50
NB-IoT eFDD 66 QPSK	high	12	0.2	22.48	1 (EIRP)	1 (EIRP)	7.52	7.52
NB-IoT eFDD 66 BPSK	low	1	0.2	22.78	1 (EIRP)	1 (EIRP)	7.22	7.22
NB-IoT eFDD 66 BPSK	mid	1	0.2	22.80	1 (EIRP)	1 (EIRP)	7.20	7.20
NB-IoT eFDD 66 BPSK	high	1	0.2	22.73	1 (EIRP)	1 (EIRP)	7.27	7.27
NB-IoT eFDD 85 QPSK	low	1	0.2	22.68	3 (ERP)	3 (ERP)	12.09	12.09
NB-IoT eFDD 85 QPSK	low	3	0.2	22.07	3 (ERP)	3 (ERP)	12.70	12.70
NB-IoT eFDD 85 QPSK	low	6	0.2	22.08	3 (ERP)	3 (ERP)	12.69	12.69
NB-IoT eFDD 85 QPSK	low	12	0.2	22.08	3 (ERP)	3 (ERP)	12.69	12.69
NB-IoT eFDD 85 QPSK	mid	1	0.2	22.54	3 (ERP)	3 (ERP)	12.23	12.23
NB-IoT eFDD 85 QPSK	mid	3	0.2	21.96	3 (ERP)	3 (ERP)	12.81	12.81
NB-IoT eFDD 85 QPSK	mid	6	0.2	21.98	3 (ERP)	3 (ERP)	12.79	12.79
NB-IoT eFDD 85 QPSK	mid	12	0.2	22.03	3 (ERP)	3 (ERP)	12.74	12.74
NB-IoT eFDD 85 QPSK	high	1	0.2	22.62	3 (ERP)	3 (ERP)	12.15	12.15
NB-IoT eFDD 85 QPSK	high	3	0.2	22.02	3 (ERP)	3 (ERP)	12.75	12.75
NB-IoT eFDD 85 QPSK	high	6	0.2	22.05	3 (ERP)	3 (ERP)	12.72	12.72
NB-IoT eFDD 85 QPSK	high	12	0.2	21.99	3 (ERP)	3 (ERP)	12.78	12.78
NB-IoT eFDD 85 BPSK	low	1	0.2	22.74	3 (ERP)	3 (ERP)	12.03	12.03
NB-IoT eFDD 85 BPSK	mid	1	0.2	22.52	3 (ERP)	3 (ERP)	12.25	12.25
NB-IoT eFDD 85 BPSK	high	1	0.2	22.60	3 (ERP)	3 (ERP)	12.17	12.17

Remark: Please see next sub-clause for the measurement plot.
COMMENT: The max. antenna gain is regarding the output power not SAR / MPE.

5.15.4 MEASUREMENT PLOT (EXAMPLE PLOT, SHOWING WORST CASE, IF APPLICABLE)

Technology = CAT-M1, Radio Technology = eFDD 4, Operating Frequency = mid channel (S01_AB01)