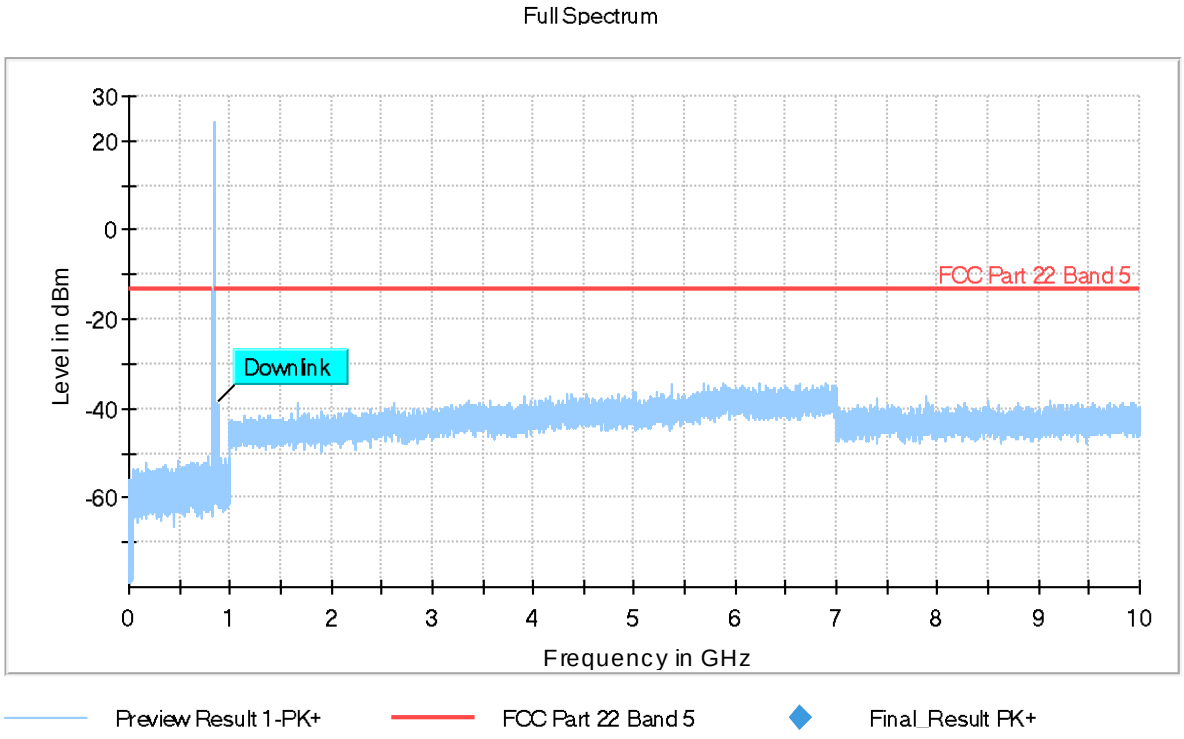
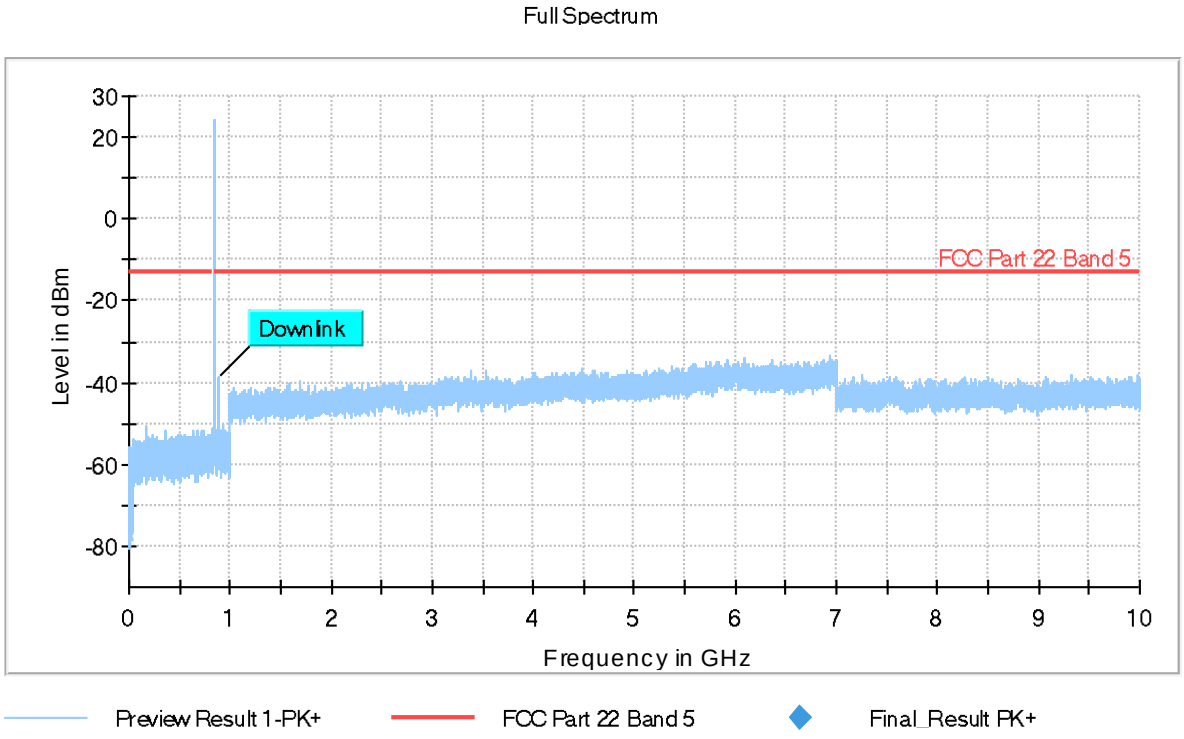
Middle Channel:



The peak above the limit is the carrier frequency. Downlink is also shown in the graphic.

High Channel:



The peak above the limit is the carrier frequency. Downlink is also shown in the graphic.

Spurious emissions at antenna terminals at Block Edges

Limits

* FCC § 2.1051 and § 22.917:

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.

Compliance with these rules is based on the use of measurement instrumentation employing a reference bandwidth as follows:

In the spectrum below 1 GHz, instrumentation should employ a reference bandwidth of 100 kHz or greater. 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.

* RSS-132. 5.5: Mobile and base station equipment shall comply with the limits in (i) and (ii) below.

i. In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10 P (watts).

ii. After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10 P (watts). If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.

Method

The EUT RF output connector was connected to a spectrum analyzer and to the Universal Radio Communication tester R&S CMW500 (selecting maximum transmission power of the EUT and different modes of modulation) using a 50-Ohm attenuator and a power splitter.

The reading of the spectrum analyser is corrected with the path loss of the connection between the output terminal of the EUT and the input of the spectrum analyzer.

The configuration of modulation which is the worst case for conducted power was used.

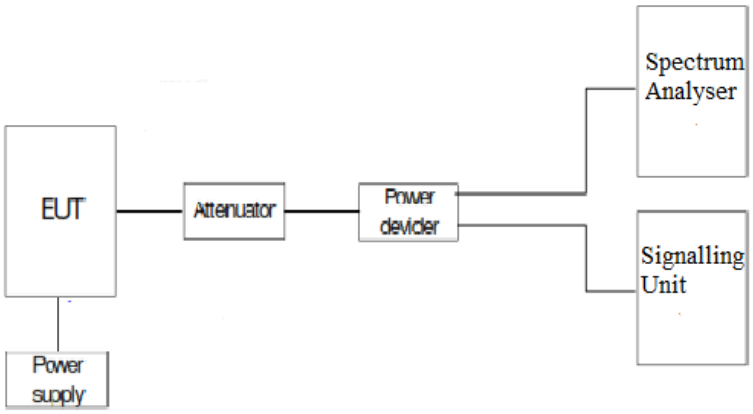
As stated in FCC part 22.917 / RSS-132 Clause 5.5, in the 1 MHz bands immediately outside and adjacent to the frequency block or band a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

Measurement Limit:

At Po transmitting power, the specified minimum attenuation 43 + 10 log10 p (watts) becomes:

$$Po\ (dBm) - [43 + 10 \log (Po\ in\ mwatts) - 30] = -13\ dBm$$

Test Setup



Results

LTE Cat 1bis Band 5:

Preliminary measurements determined QPSK, BW=3 MHz as the worst case.

LTE Cat 1bis Band 5. QPSK.	RB=1. Offset =0. BW=1.4 MHz	RB=1. Offset =0. BW=3 MHz	RB=1. Offset =0. BW=5 MHz	RB=1. Offset =0. BW=10 MHz
Maximum measured level at Low Block Edge at antenna port (dBm)	-23.73	-22.94	-21.7	-23.29

LTE Cat 1bis Band 5. QPSK.	RB= All. Offset=0. BW=1.4 MHz	RB= All. Offset=0. BW=3 MHz	RB= All. Offset=0. BW=5 MHz	RB= All. Offset=0. BW=10 MHz
Maximum measured level at Low Block Edge at antenna port (dBm)	-29.96	-24.52	-26.01	-27.83

LTE Cat 1bis Band 5. QPSK.	RB=1. Offset =Max. BW=1.4 MHz	RB=1. Offset =Max. BW=3 MHz	RB=1. Offset =Max. BW=5 MHz	RB=1. Offset =Max. BW=10 MHz
Maximum measured level at High Block Edge at antenna port (dBm)	-22.06	-20.46	-21.96	-23.06

LTE Cat 1bis Band 5. QPSK.	RB= All. Offset=0. BW=1.4 MHz	RB= All. Offset=0. BW=3 MHz	RB= All. Offset=0. BW=5 MHz	RB= All. Offset=0. BW=10 MHz
Maximum measured level at High Block Edge at antenna port (dBm)	-29.78	-30.16	-24.51	-29.11

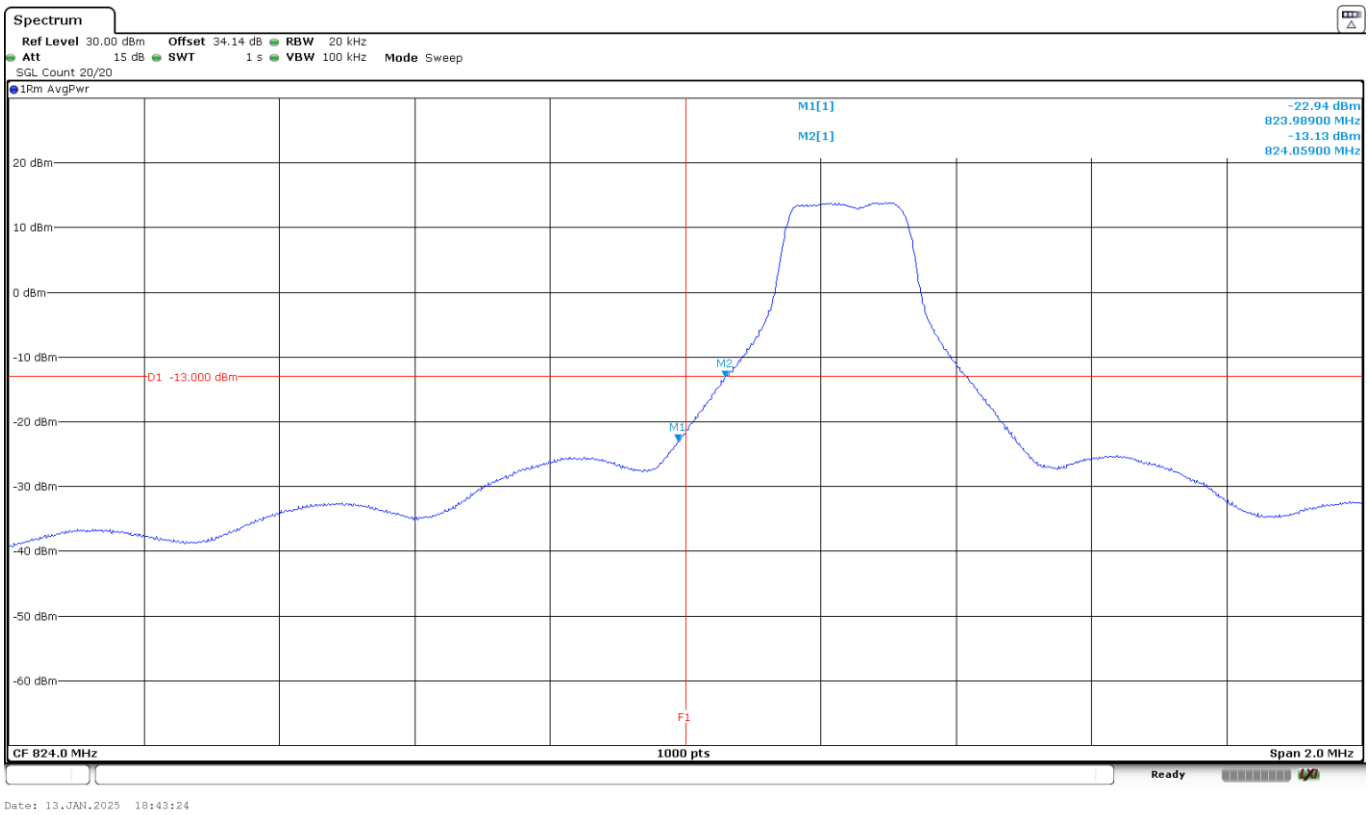
Measurement uncertainty (dB): <±2.76

Verdict

Pass

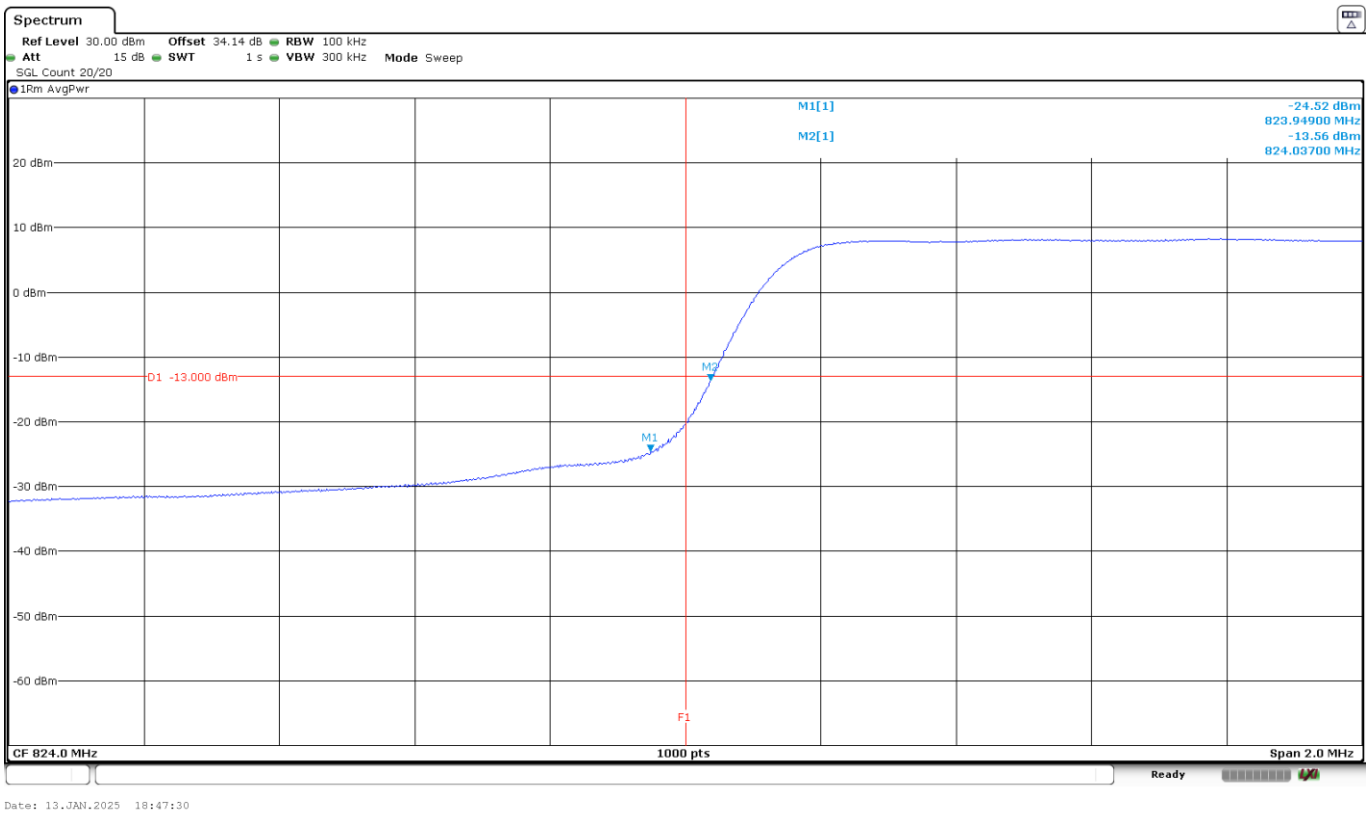
The plots below are for the worst case configuration specified before.

LTE Cat 1bis Band 5. BW=3 MHz. QPSK. RB Size= 1. RB Offset = 0. Low Block Edge:



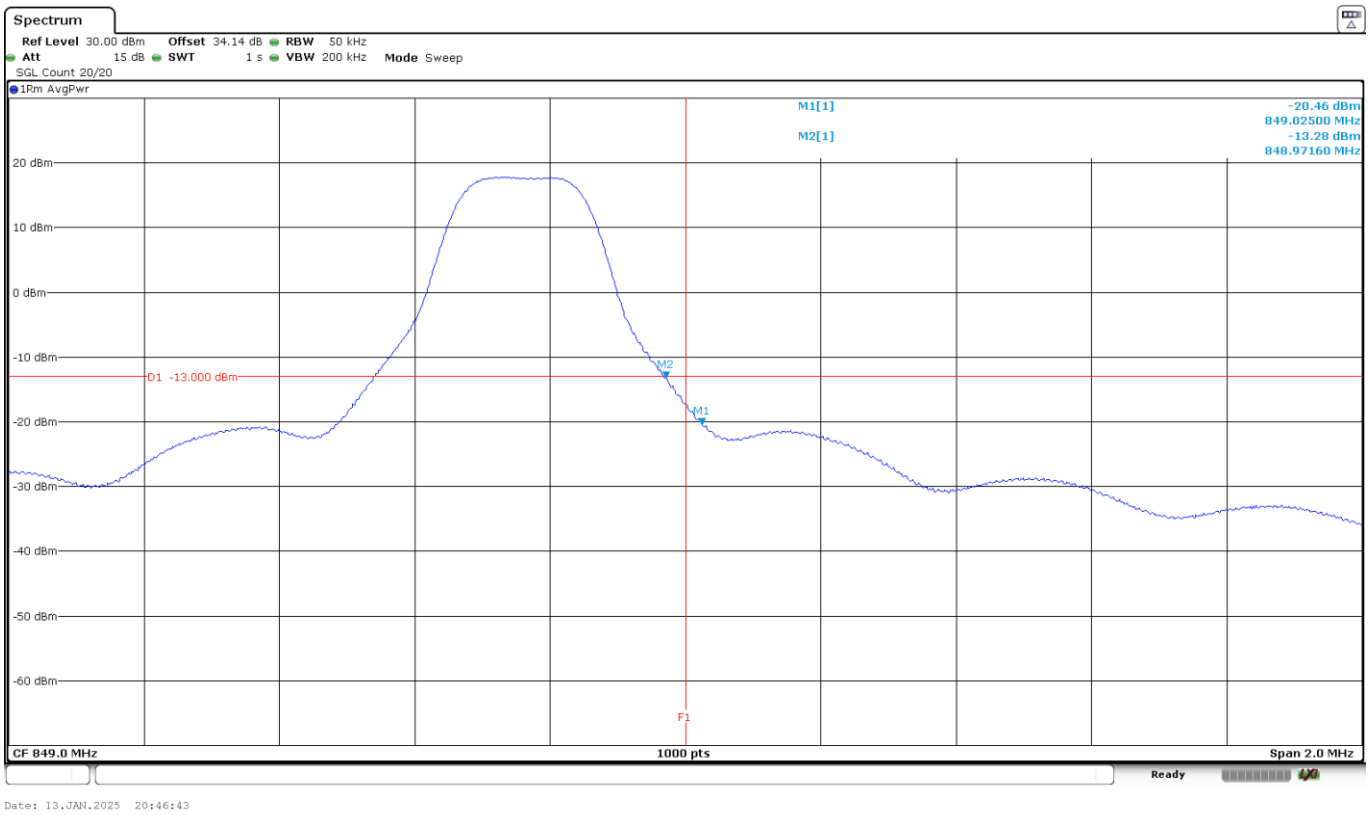
The equipment transmits at the maximum output power.

LTE Cat 1bis Band 5. BW=3 MHz. QPSK. RB Size=All. RB Offset=0. Low Block Edge:



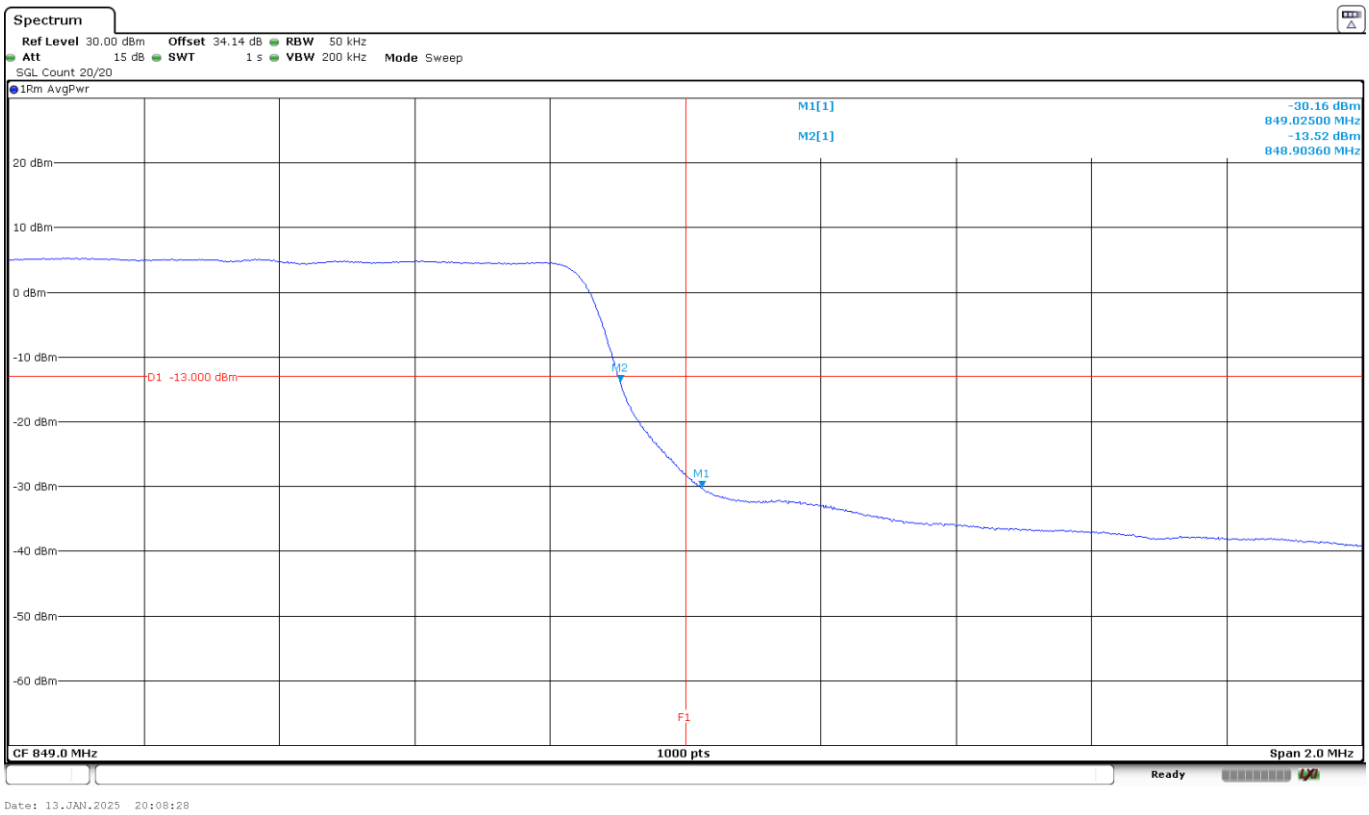
The equipment transmits at the maximum output power.

LTE Cat 1bis Band 5. BW=3 MHz. QPSK. RB Size=1. RB Offset=Max. High Block Edge:



The equipment transmits at the maximum output power.

LTE Cat 1bis Band 5. BW=3 MHz. QPSK. RB Size=All. RB Offset=0. High Block Edge:



The equipment transmits at the maximum output power.

Verdict: PASS

Radiated emissions

Limits

* FCC § 2.1051 and § 22.917:

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.

Compliance with these rules is based on the use of measurement instrumentation employing a reference bandwidth as follows:

In the spectrum below 1 GHz, instrumentation should employ a reference bandwidth of 100 kHz or greater. 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.

* RSS-132. 5.5: Mobile and base station equipment shall comply with the limits in (i) and (ii) below.

iii. In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10 P (watts).

iv. After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10 P (watts). If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.

Method

The measurement was performed with the EUT inside an anechoic chamber. The spectrum was scanned from 30 MHz to at least the 10th harmonic of the high frequency generated within the equipment.

The EUT was placed on a 80 centimetres high non-conductive stand at a 3 meter distance from the measuring antenna.
Detected emissions were maximized at each frequency by rotating the EUT and adjusting the height and polarization of the measuring antenna. The maximum meter reading was recorded.

Measurement Limit:

According to specification, the power of emissions shall be attenuated below the transmitter power (P) by a factor of at least 43 + 10 log (P) dB, P in watts.
At Po transmitting power, the specified minimum attenuation becomes 43+10log (Po), and the level in dBm relative Po becomes:

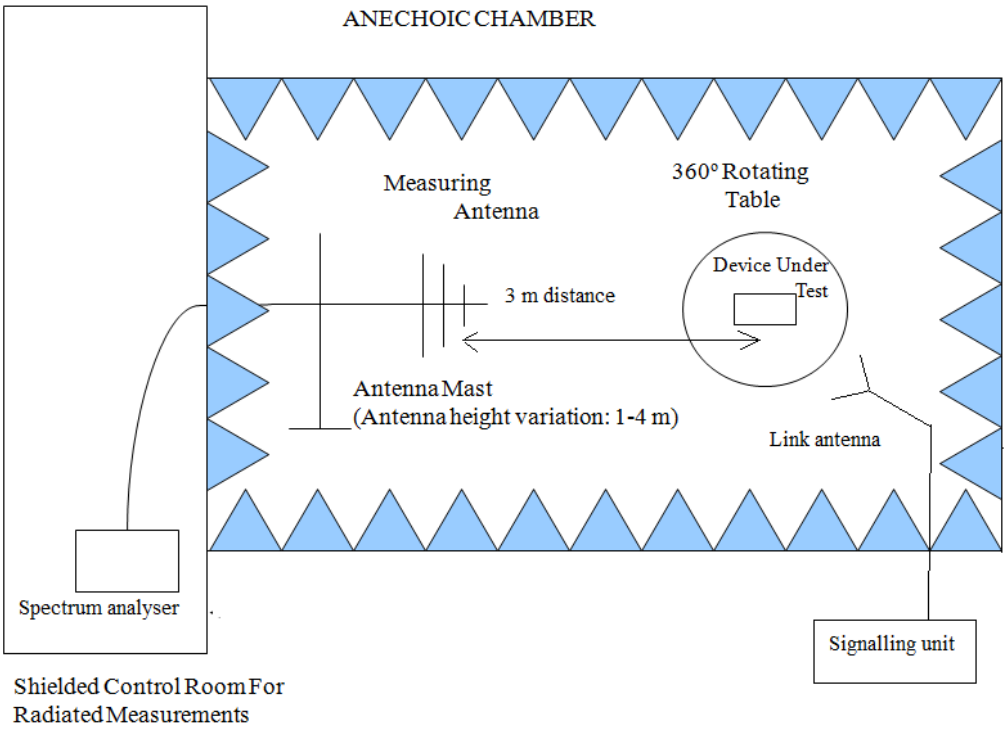
$$Po\ (dBm) – [43 + 10 \log (Po\ in\ mwatts) - 30] = - 13\ dBm$$

The maximum field strength (dBµV/m) of each detected emission at less than 20 dB respect to the limit is converted to an equivalent EIRP level (dBm) according to ANSI C63.26 with the formula:

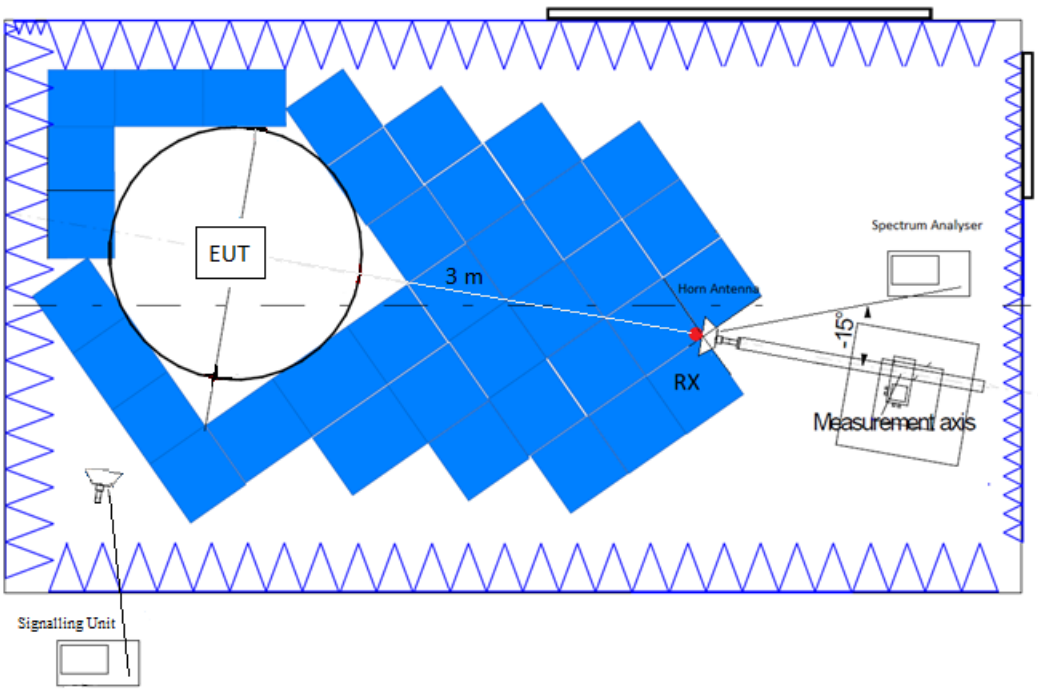
EIRP (dBm) = E (dBµV/m) + 20 log(D) - 104.8; where D is the measurement distance (in the far field region) in m. D = 3 m

Test Setup

Radiated measurements below 1 GHz:



Radiated measurements above 1 GHz:



Results

LTE Cat 1bis Band 5:

A preliminary scan determined the BW=10 MHz, QPSK, RB Size=1, RB Offset=24 as the worst case. The following results are for this worst-case configuration.

Frequency range 9 kHz - 30 MHz:

No radiofrequency signal generated in the device found below 10º sub-armonic, no further investigation required

Frequency range 30 MHz - 1 GHz:

- LOW CHANNEL:

No spurious frequencies at less than 20 dB below the limit.

- MIDDLE CHANNEL:

No spurious frequencies at less than 20 dB below the limit.

- HIGH CHANNEL:

No spurious frequencies at less than 20 dB below the limit.

Frequency range 1 - 8.5 GHz:

- LOW CHANNEL:

No spurious frequencies at less than 20 dB below the limit.

- MIDDLE CHANNEL:

No spurious frequencies at less than 20 dB below the limit.

- HIGH CHANNEL:

No spurious frequencies at less than 20 dB below the limit.

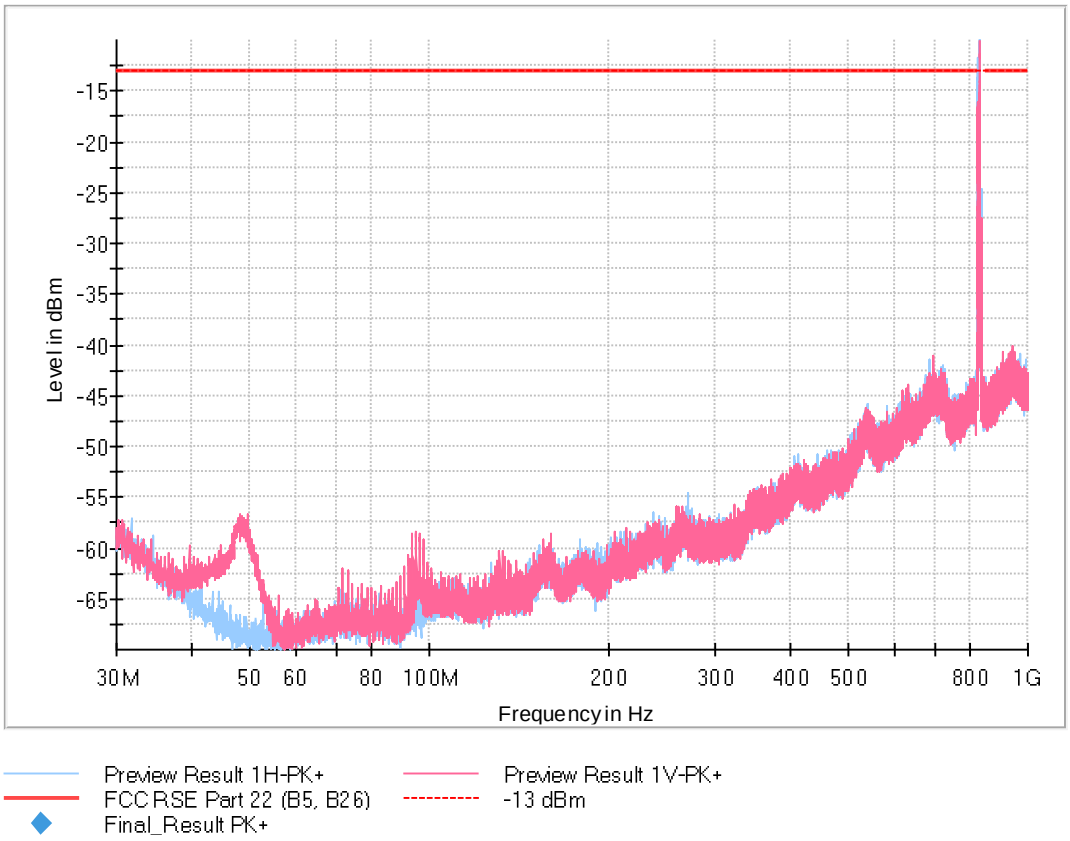
Measurement uncertainty (dB): <± 5.03 for f ≥ 30 MHz up to 1 GHz
<± 4.32 for f ≥ 1 GHz up to 8.5 GHz

Verdict: PASS

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
30 MHz - 1 GHz	30.312 kHz	PK+	100 kHz	Coupled	0 dB
1 GHz - 8.5 GHz	234.375 kHz	PK+	100 kHz	1 s	0 dB

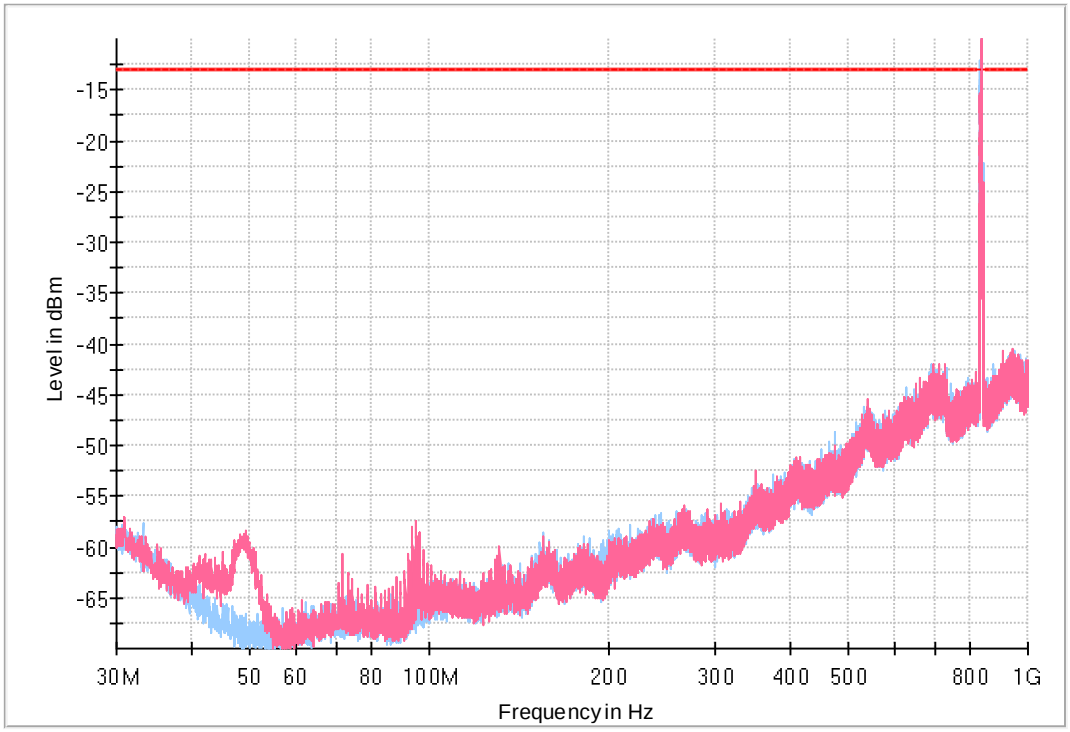
FREQUENCY RANGE 30 MHz - 1 GHz:

- LOW CHANNEL:



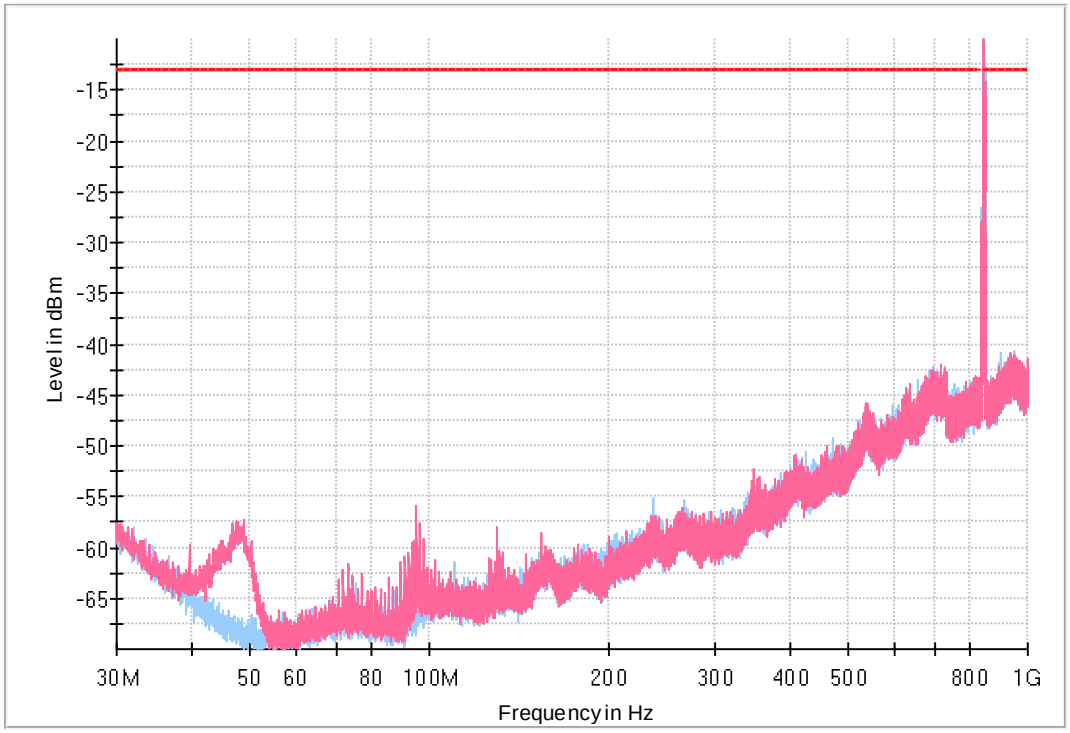
The peak above the limit is the carrier frequency.

- MIDDLE CHANNEL:



The peak above the limit is the carrier frequency.

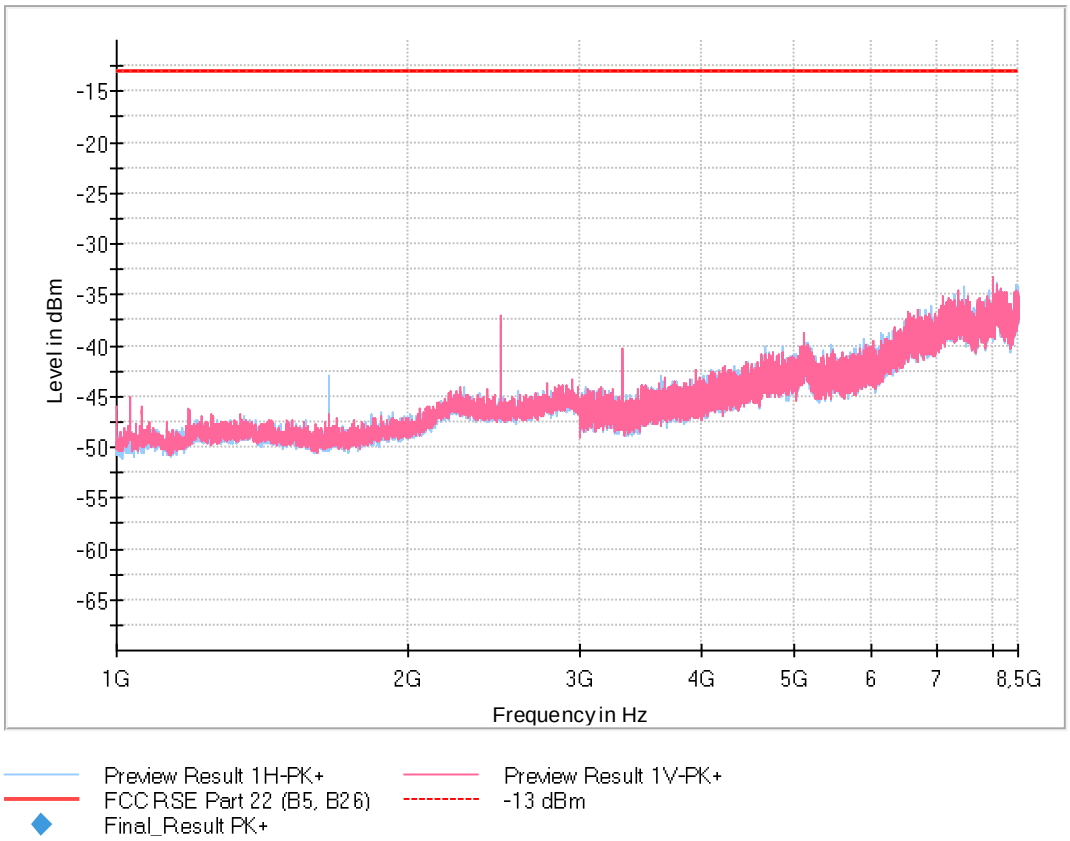
- HIGH CHANNEL:



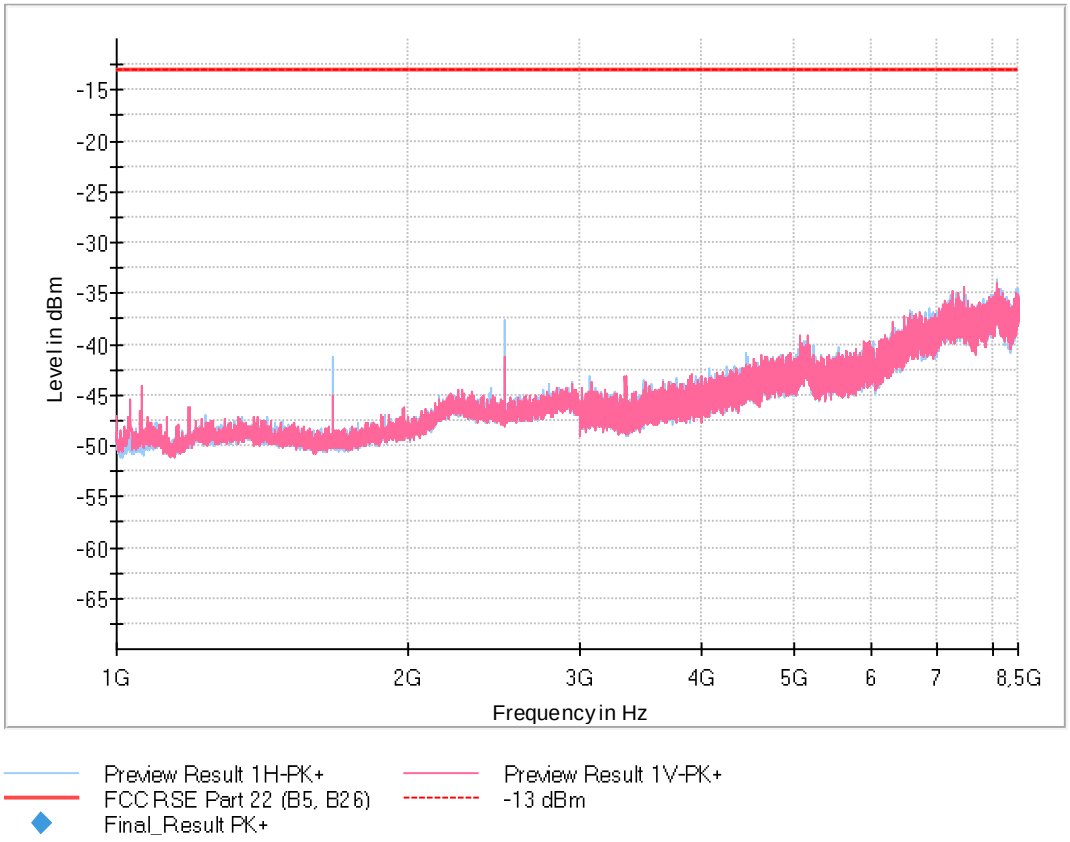
The peak above the limit is the carrier frequency.

FREQUENCY RANGE 1 - 8.5 GHz:

- LOW CHANNEL:



- MIDDLE CHANNEL:



- HIGH CHANNEL: