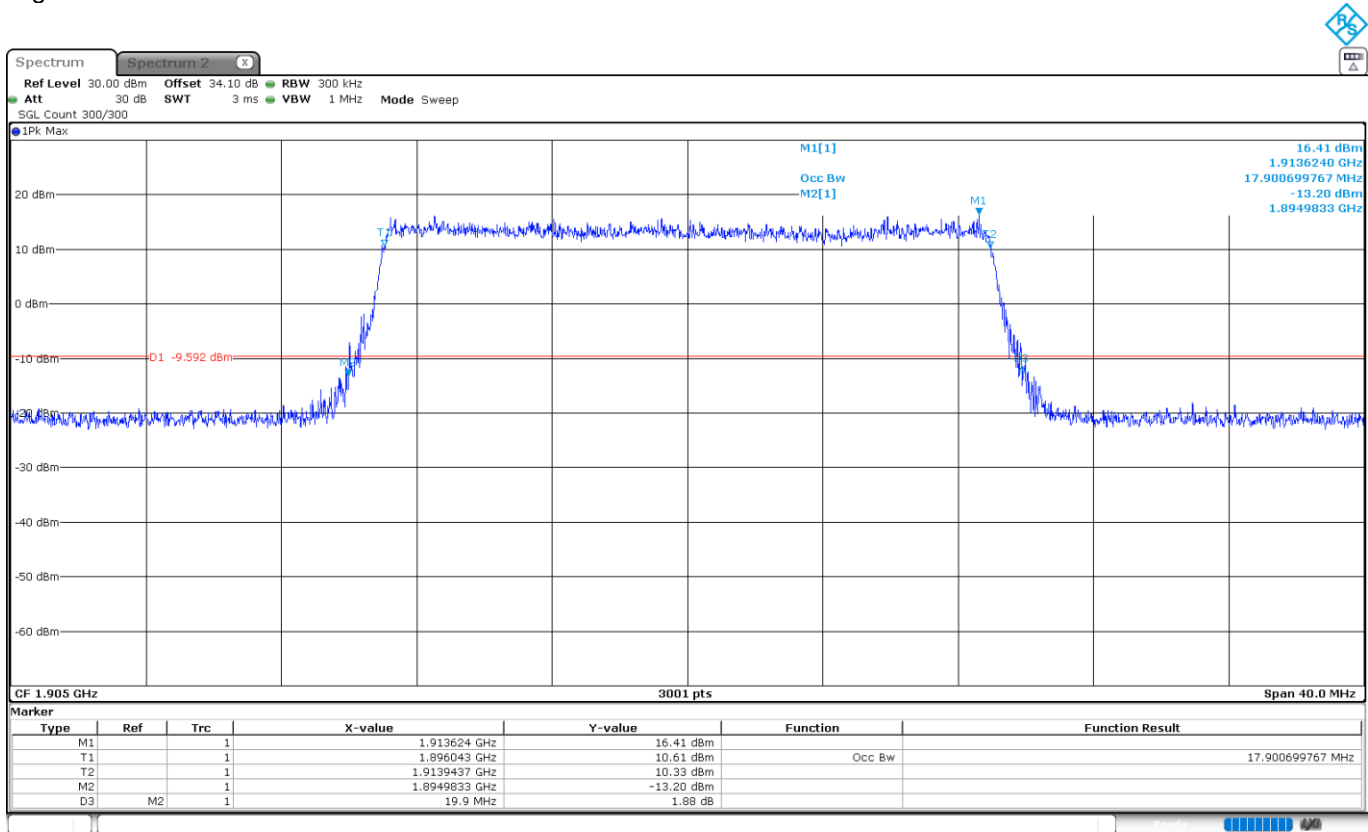
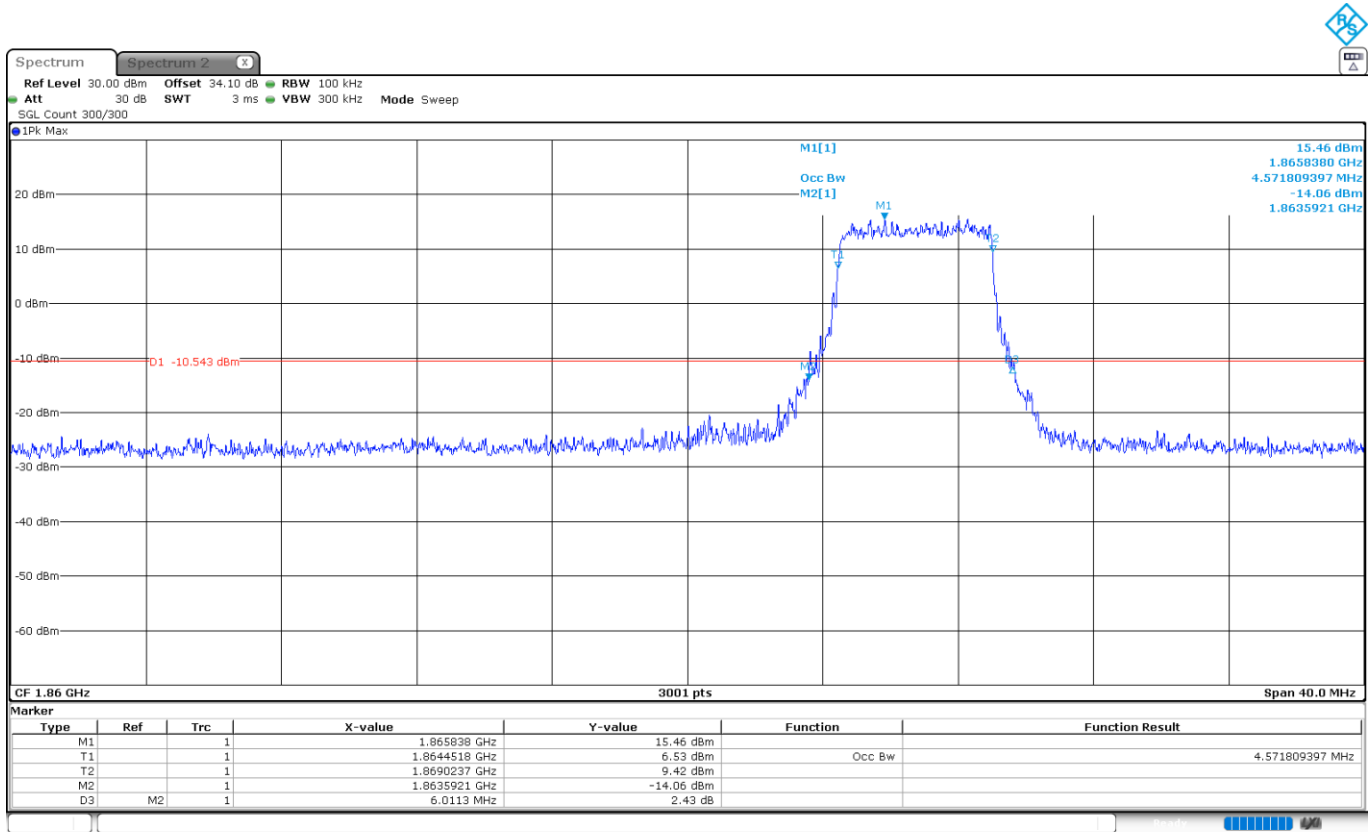


High Channel:

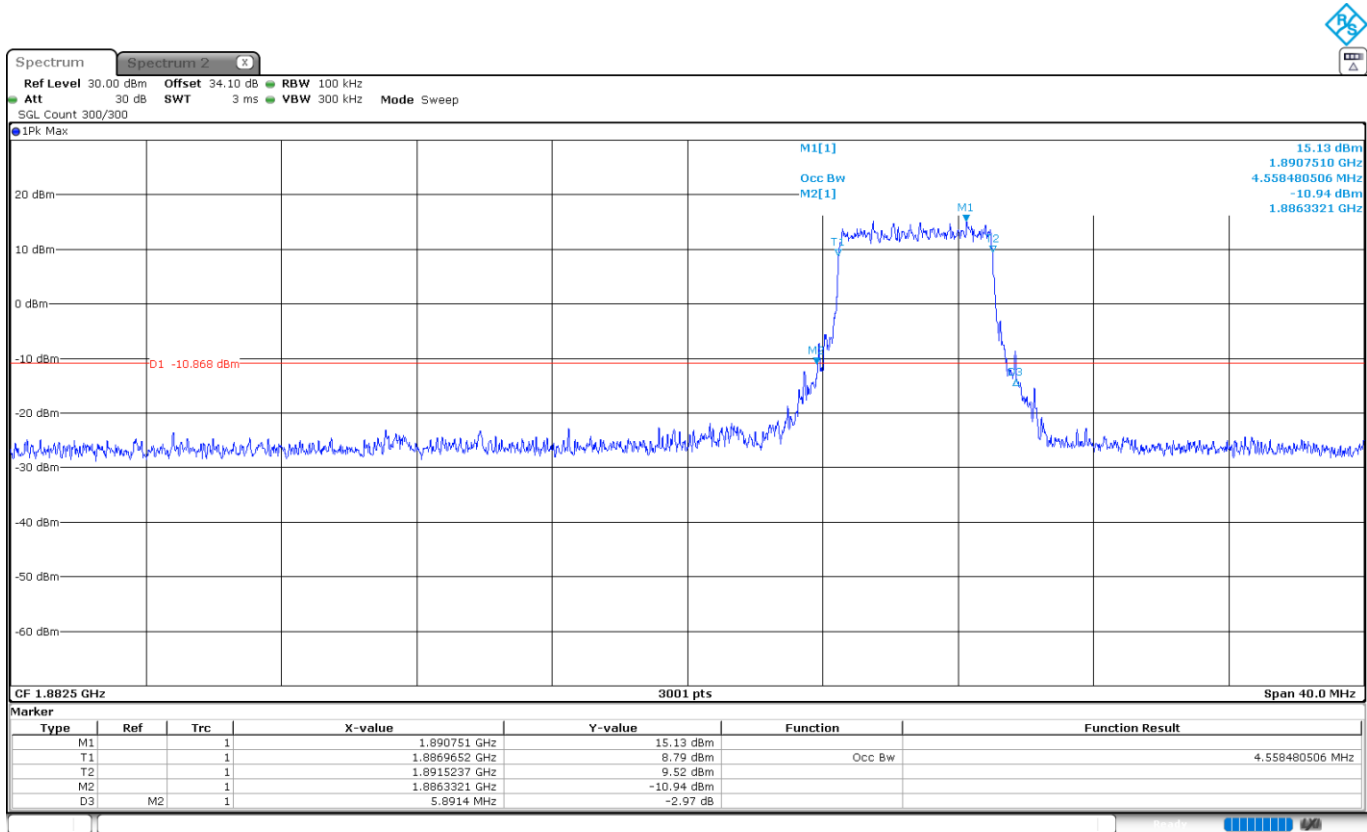


LTE Cat 1bis Band 25. BW=20 MHz. 16QAM. RB Size=All.

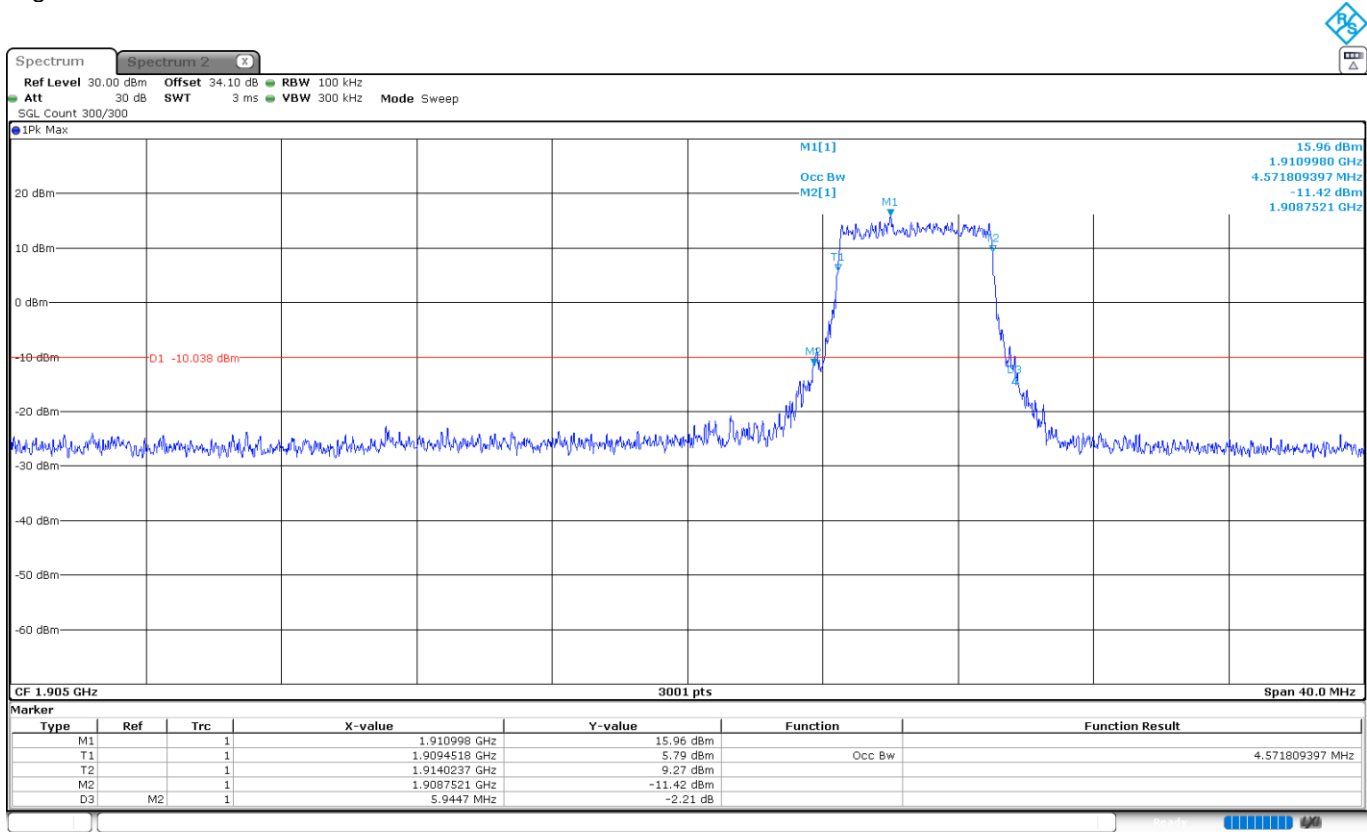
Low Channel:



Middle Channel:



High Channel:



Spurious emissions at antenna terminals

Limits

* FCC §2.1051 and §24.238. RSS-133, 6.5.

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.

Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater.

At P_o transmitting power, the specified minimum attenuation becomes $43 + 10 \log (P_o)$, and the level in dBm relative to P_o becomes:

$$P_o \text{ (dBm)} - [43 + 10 \log (P_o \text{ in mW}) - 30] = -13 \text{ dBm}$$

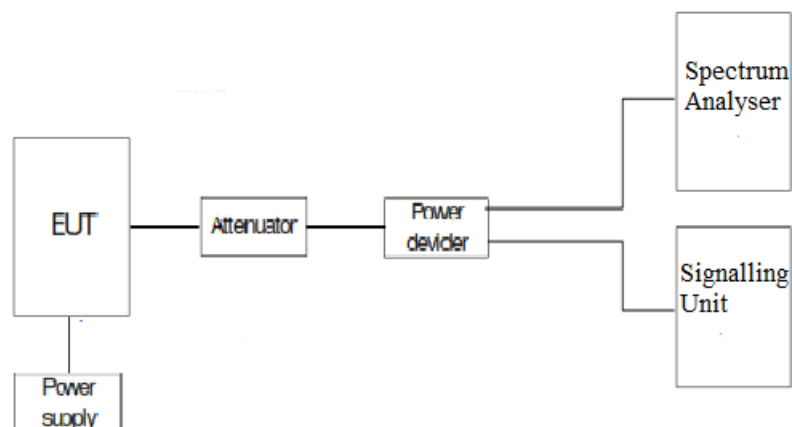
Method

The EUT RF output connector was connected to a spectrum analyser 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 divider.

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

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

Test Setup



Results

LTE Cat 1bis Band 25:

A preliminary scan determined the worst-case:

BW=5 MHz. QPSK. RB Size=1. RB Offset=12.

The next results are for this worst-case configuration.

Frequency range 9 KHz - 20 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): $<\pm 2.76$

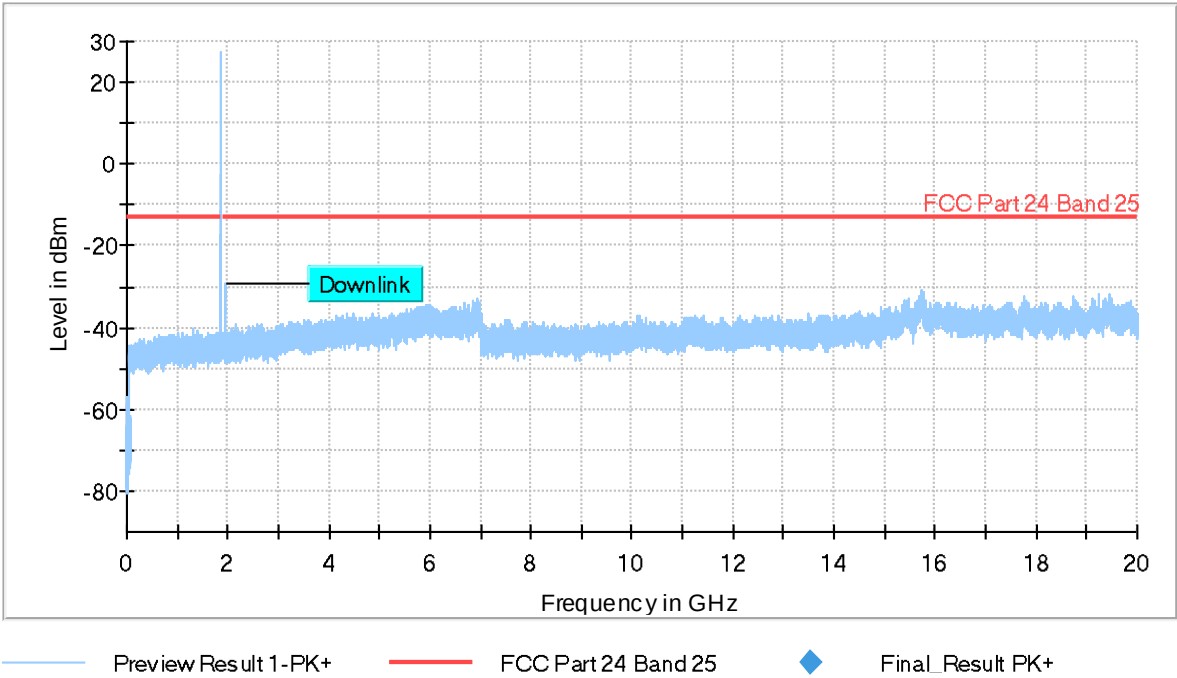
Verdict: PASS

LTE Cat 1bis Band 25: BW=5 MHz. QPSK. RB Size=1. RB Offset=12.

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [FSV 40]					
9 kHz - 150 kHz	14,1 Hz	PK+	300 Hz	Coupled	0 dB
150 kHz - 30 MHz	932,812 Hz	PK+	10 kHz	Coupled	0 dB
30 MHz - 1 GHz	303,125 kHz	PK+	1 MHz	Coupled	0 dB
1 GHz - 10 GHz	281,25 kHz	PK+	1 MHz	Coupled	0 dB
10 GHz - 20 GHz	312,5 kHz	PK+	1 MHz	Coupled	0 dB

Low Channel:

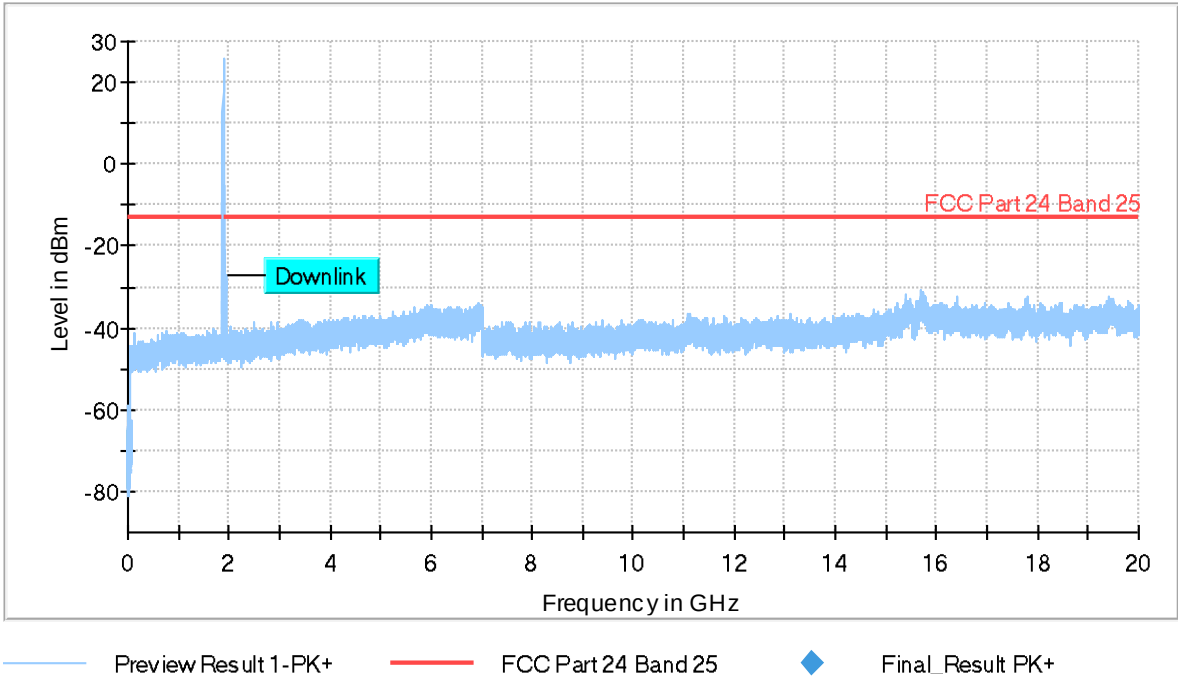
Full Spectrum



The peak above the limit is the carrier frequency.

Middle Channel:

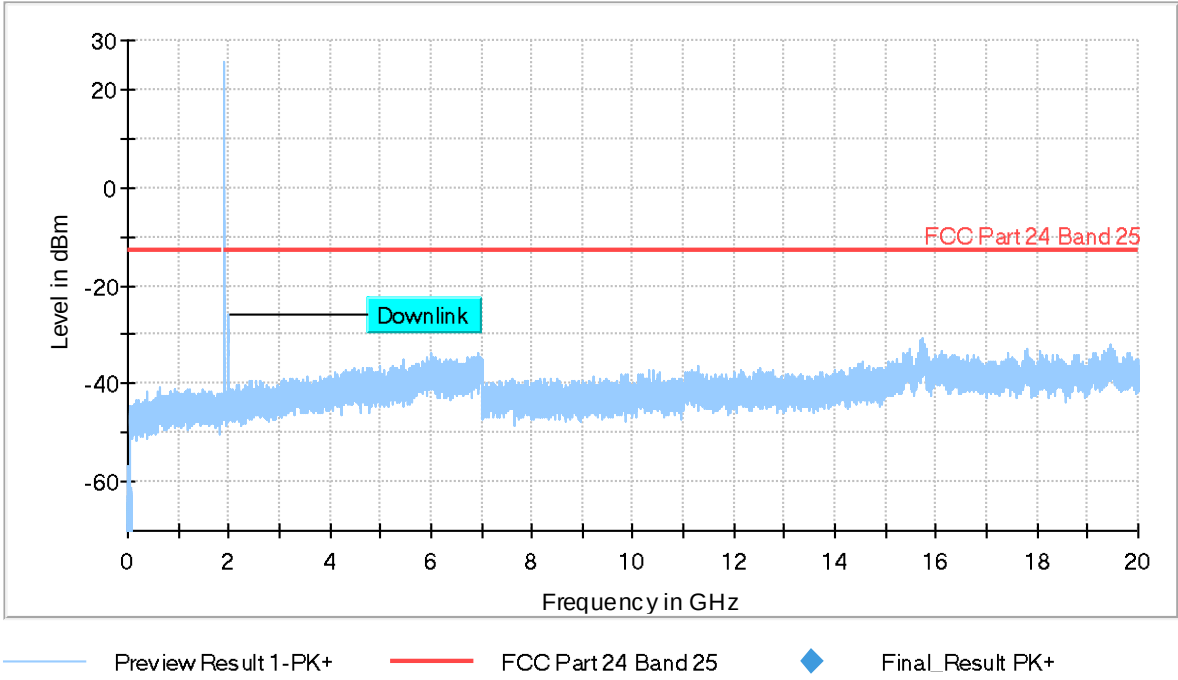
Full Spectrum



The peak above the limit is the carrier frequency.

High Channel:

Full Spectrum



The peak above the limit is the carrier frequency.

Spurious emissions at antenna terminals at Block Edges

Limits

* FCC §2.1051 and §24.238. RSS-133, 6.5.

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.

Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater.

At P_o transmitting power, the specified minimum attenuation becomes $43 + 10 \log(P_o)$, and the level in dBm relative to P_o becomes:

$$P_o \text{ (dBm)} - [43 + 10 \log(P_o \text{ in mW}) - 30] = -13 \text{ dBm}$$

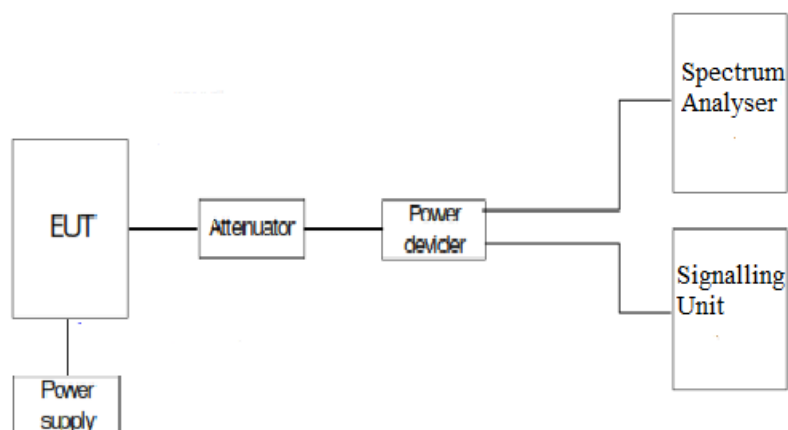
Method

The EUT RF output connector was connected to a spectrum analyser 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 attenuation loss of connection between output terminal of EUT and input of the spectrum analyser.

As stated in FCC part 24.238 / RSS-133 Clause 6.5, 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.

Test Setup



Results

LTE Cat 1bis Band 2:

Note: Low Block Edge for LTE Cat 1bis Band 2 is the same as for Band 25.

Preliminary measurements determined QPSK, BW=20 MHz as the worst-case.

LTE Cat 1bis Band 2. 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	RB=1. Offset =Max. BW=15 MHz	RB=1. Offset =Max. BW=20 MHz
Maximum measured level at High Block Edge at antenna port (dBm)	-20.8	-19.99	-18.25	-18.45	-21.23	-17.89

LTE Cat 1bis Band 2. 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	RB=All. Offset=0. BW=15 MHz	RB=All. Offset=0. BW=20 MHz
Maximum measured level at High Block Edge at antenna port (dBm)	-24.68	-28.33	-23.38	-29.65	-29.66	-33.19

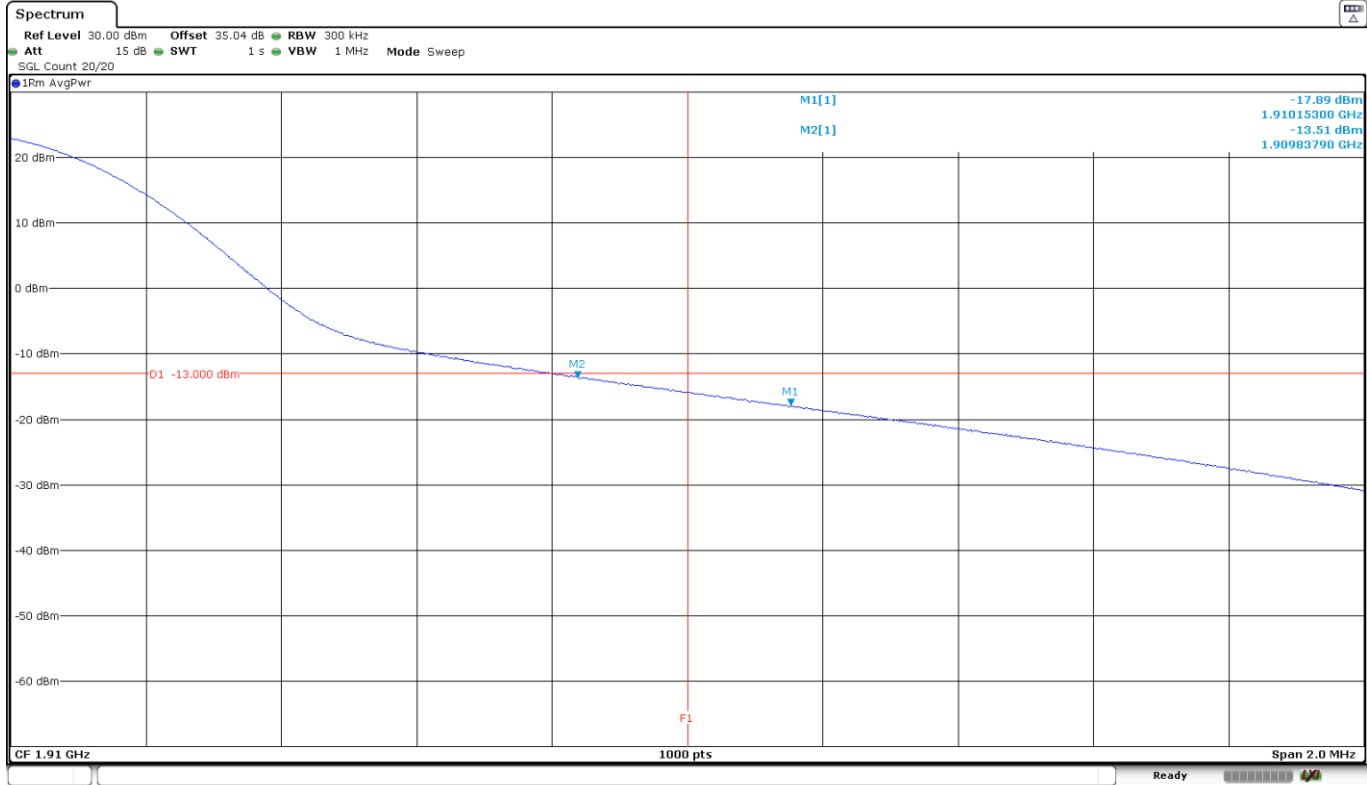
Measurement uncertainty (dB) <± 2.76

Verdict

PASS

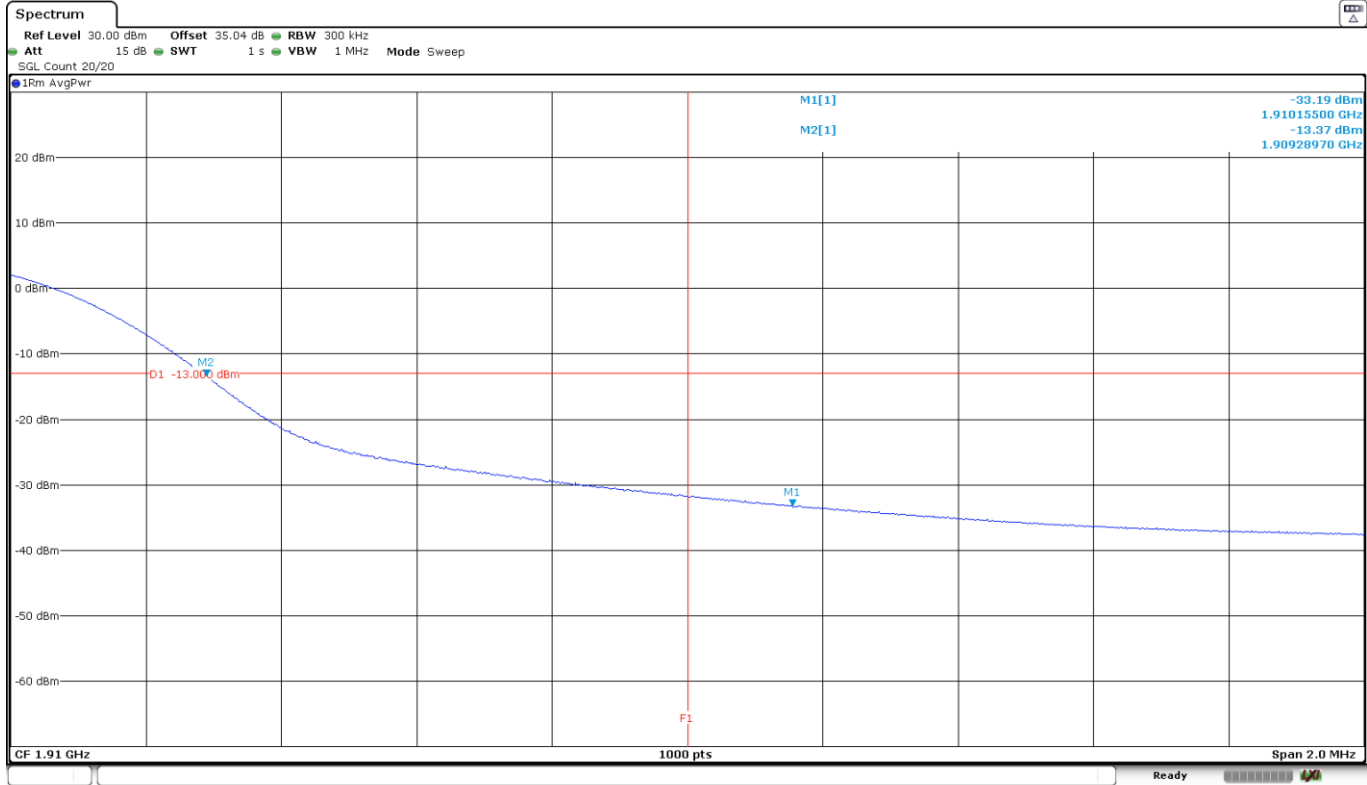
The plots below are for the worst case configuration specified before.

LTE Cat 1bis Band 2. BW=20 MHz. QPSK. RB Size=1. RB Offset=Max. High Block Edge:



The equipment transmits at the maximum output power.

LTE Cat 1bis Band 2. BW=20 MHz. QPSK. RB Size=All. RB Offset=0. High Block Edge:



The equipment transmits at the maximum output power.

LTE Cat 1bis Band 25:

Preliminary measurements determined QPSK, BW=5 MHz as the worst-case.

LTE Cat 1bis Band 25. 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	RB=1. Offset =0. BW=15 MHz	RB=1. Offset =0. BW=20 MHz
Maximum measured level at <u>Low Block Edge</u> at antenna port (dBm)	-22.49	-21.08	-19.69	-21.67	-24.04	-27.76

LTE Cat 1bis Band 25. 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	RB=All. Offset=0. BW=15 MHz	RB=All. Offset=0. BW=20 MHz
Maximum measured level at <u>Low Block Edge</u> at antenna port (dBm)	-28.01	-23.95	-25.08	-26.8	-30.61	-33.67

LTE Cat 1bis Band 25. 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	RB=1. Offset =Max. BW=15 MHz	RB=1. Offset =Max. BW=20 MHz
Maximum measured level at <u>High Block Edge</u> at antenna port (dBm)	-22.22	-22.21	-20.31	-21.32	-24.43	-27.56

LTE Cat 1bis Band 25. 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	RB=All. Offset=0. BW=15 MHz	RB=All. Offset=0. BW=20 MHz
Maximum measured level at <u>High Block Edge</u> at antenna port (dBm)	-26.8	-23.33	-24.6	-26.71	-28.91	-32.74

Measurement uncertainty (dB) $< \pm 2.76$

Verdict

PASS

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

Spectrum

Ref Level 30.00 dBm Offset 35.04 dB RBW 20 kHz
 Att 15 dB SWT 1 s VBW 100 kHz Mode Sweep
 SGL Count 20/20

1Rm AvgPwr

M1[1] -19.69 dBm 1.84999100 GHz
 M2[1] -13.50 dBm 1.85009670 GHz

O1 -13.000 dBm

F1

CF 1.85 GHz 1000 pts Span 2.0 MHz

Date: 24-JAN-2025 10:27:02

Spectrum

Ref Level 30.00 dBm Offset 35.04 dB RBW 100 kHz
 Att 15 dB SWT 1 s VBW 300 kHz Mode Sweep
 SGL Count 20/20

1Rm AvgPwr

M1[1] -25.08 dBm 1.84995100 GHz
 M2[1] -13.39 dBm 1.85013870 GHz

O1 -13.000 dBm

M1 M2

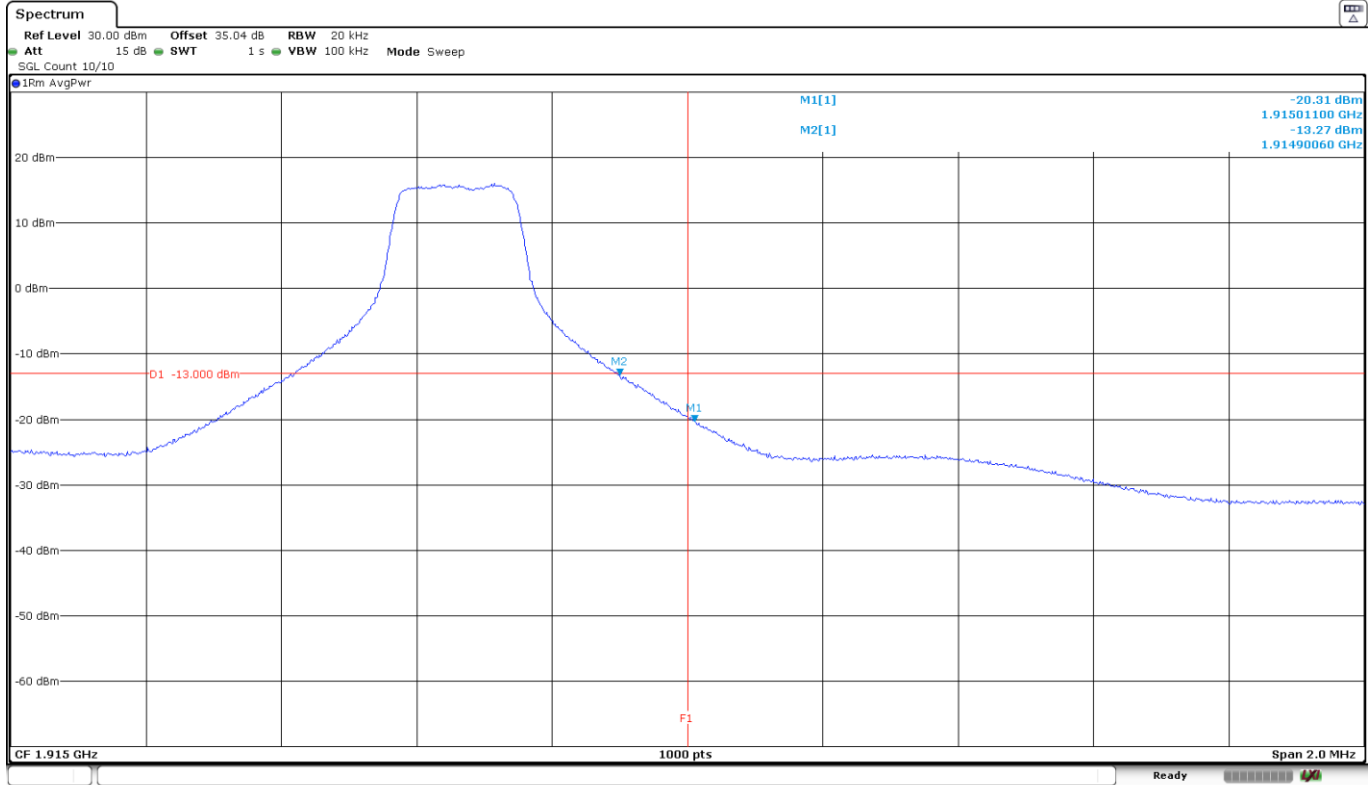
F1

CF 1.85 GHz 1000 pts Span 2.0 MHz

Date: 24.JAN.2025 11:42:37

2025-04-24

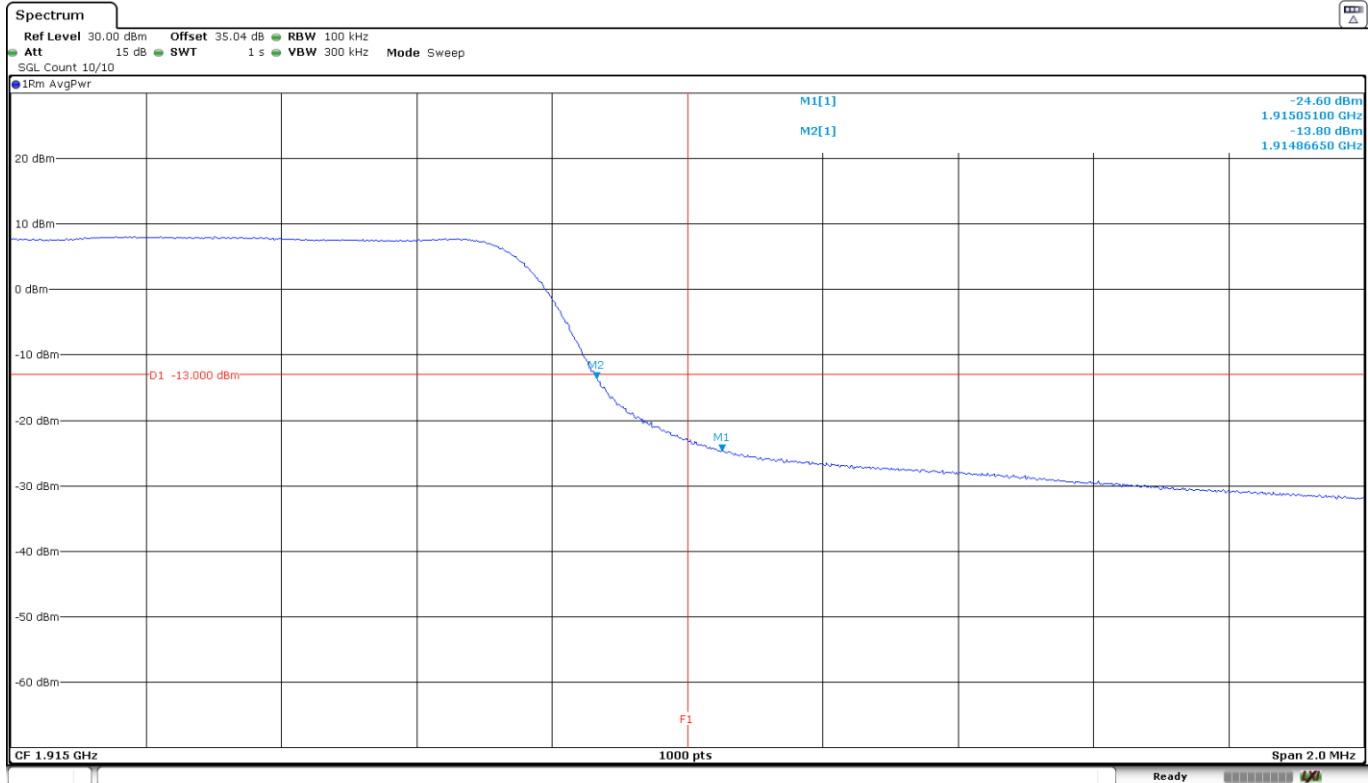
LTE Cat 1bis Band 25. BW=5 MHz. QPSK. RB Size=1. RB Offset=Max. High Block Edge:



Date: 24.JAN.2025 12:41:15

The equipment transmits at the maximum output power.

LTE Cat 1bis Band 25. BW=5 MHz. QPSK. RB Size=All. RB Offset=0. High Block Edge:



Date: 24.JAN.2025 13:13:00

The equipment transmits at the maximum output power.

Radiated emissions

Limits

* FCC §2.1051 and §24.238. RSS-133, Clause 6.5.

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.

Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater.

At P_o transmitting power, the specified minimum attenuation becomes $43 + 10 \log(P_o)$, and the level in dBm relative to P_o becomes:

$$P_o \text{ (dBm)} - [43 + 10 \log(P_o \text{ in mW}) - 30] = -13 \text{ dBm}$$

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 non-conductive stand at 3-meter distance from the measuring antenna for measurements up to 17 GHz. Measurements above 17 GHz require the distance to be reduced to 1.5 meters.

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:

At P_o transmitting power. the specified minimum attenuation becomes $43 + 10 \log(P_o)$ and the level in dBm relative P_o becomes:

$$P_o \text{ (dBm)} - [43 + 10 \log(P_o \text{ in mwatts}) - 30] = -13 \text{ dBm}$$

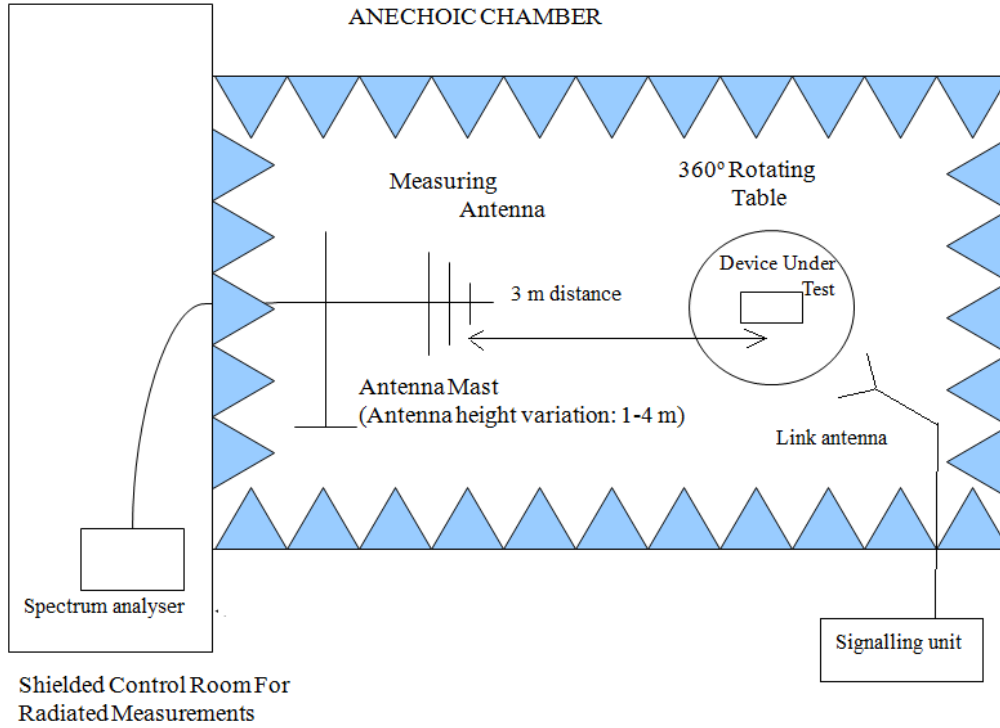
The maximum field strength (dB μ V/m) of each detected emission at less than 20 dB respect to the limit is converted to an equivalent EIRP level (dBm) according to ANSI C63.26 with the formula:

$$\text{EIRP (dBm)} = E \text{ (dB}\mu\text{V/m)} + 20 \log(D) - 104.8;$$

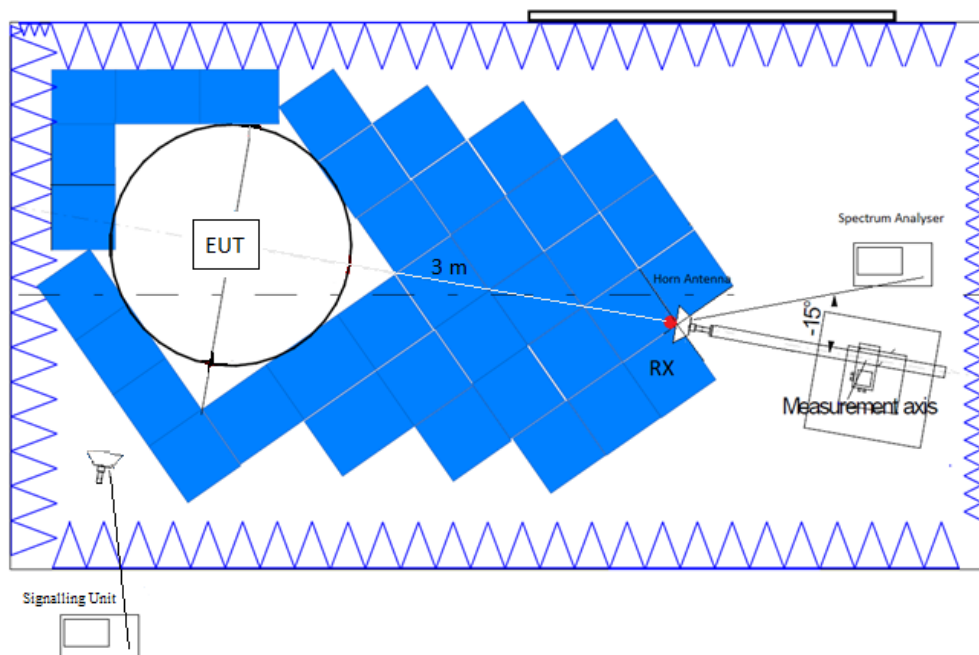
where D is the measurement distance (in the far field region) in m.

Test Setup

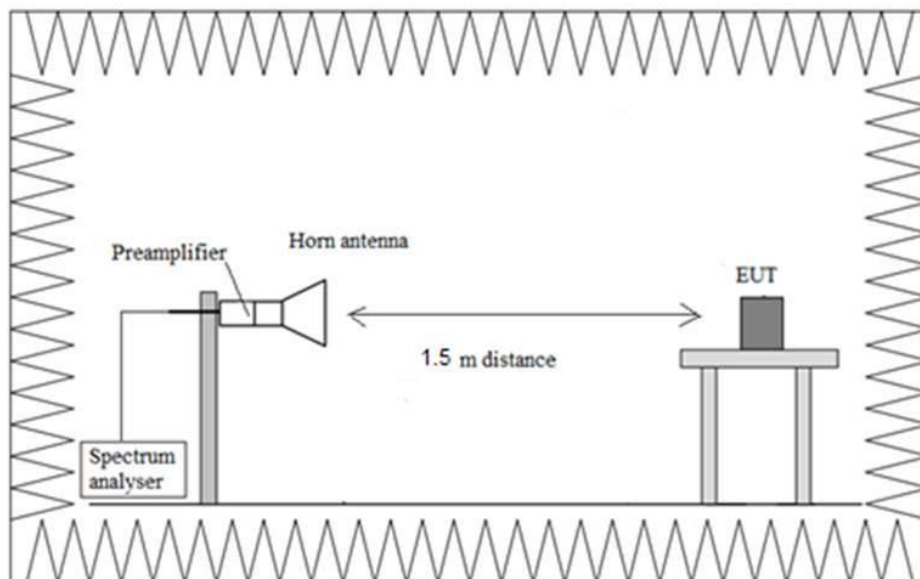
Radiated measurements below 1 GHz:



Radiated measurements above 1 GHz up to 17 GHz:



Radiated measurements above 17 GHz:



Results

LTE Cat 1bis Band 25:

A preliminary scan determined the BW=5 MHz, QPSK, RB Size=1, RB Offset=12 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 10^o sub-armonic, no further investigation required

Frequency range 30 MHz - 1 GHz:

- LOW CHANNEL:

Spurious signals were found at less than 20 dB below the limit:

Spurious frequency (MHz)	E.I.R.P (dBm)	Polarization	Detector
949.347813	-29.77	V	Peak

- MIDDLE CHANNEL:

Spurious signals were found at less than 20 dB below the limit:

Spurious frequency (MHz)	E.I.R.P (dBm)	Polarization	Detector
937.344063	-29.88	H	Peak

- HIGH CHANNEL:

Spurious signals were found at less than 20 dB below the limit:

Spurious frequency (MHz)	E.I.R.P (dBm)	Polarization	Detector
957.744375	-30.13	H	Peak

Frequency range 1 - 18 GHz:

- LOW CHANNEL:

Spurious signals were found at less than 20 dB below the limit:

Spurious frequency (MHz)	E.I.R.P (dBm)	Polarization	Detector
1848.466667	-2.86	H	Peak
5557.240000	-28.76	V	Peak
14686.640000	-25.07	H	Peak

- MIDDLE CHANNEL:

Spurious signals were found at less than 20 dB below the limit:

Spurious frequency (MHz)	E.I.R.P (dBm)	Polarization	Detector
1219.266667	-30.68	V	Peak
5647.400000	-24.97	V	Peak
14766.440000	-25.62	V	Peak

- HIGH CHANNEL:

Spurious signals were found at less than 20 dB below the limit:

Spurious frequency (MHz)	E.I.R.P (dBm)	Polarization	Detector
1191.200000	-31.14	V	Peak
5738.120000	-28.65	V	Peak
14631.480000	-25.69	V	Peak

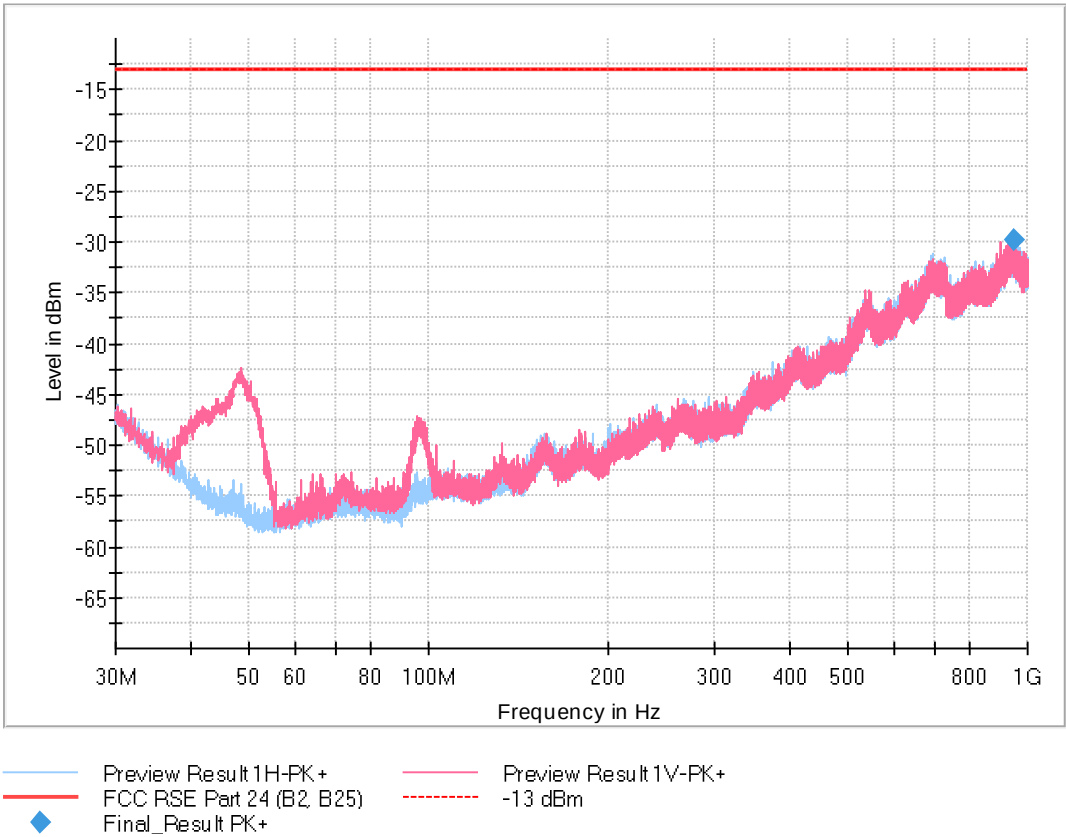
Measurement uncertainty (dB) <± 5.03 for f < 1 GHz
 <± 4.32 for f ≥ 1 GHz up to 17 GHz
 <± 4.58 for f ≥ 17 GHz up to 20 GHz

Verdict Pass

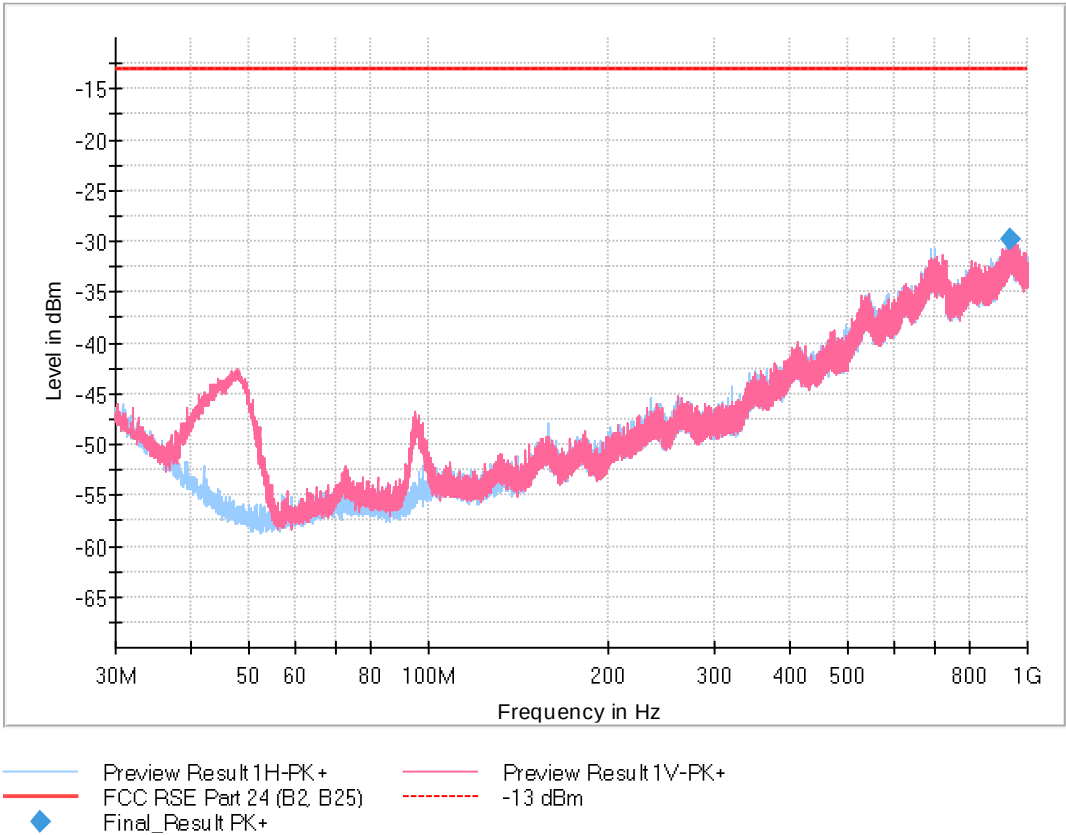
Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [ESW 44]					
30 MHz - 1 GHz	30,312 kHz	PK+	1 MHz	Coupled	0 dB
1 GHz - 3 GHz	62,5 kHz	PK+	1 MHz	1 s	0 dB
3 GHz - 17 GHz	437,5 kHz	PK+	1 MHz	1 s	0 dB
17 GHz -20 GHz	62,5 kHz	PK+	1 MHz	1 s	0 dB

FREQUENCY RANGE 30 MHz - 1 GHz:

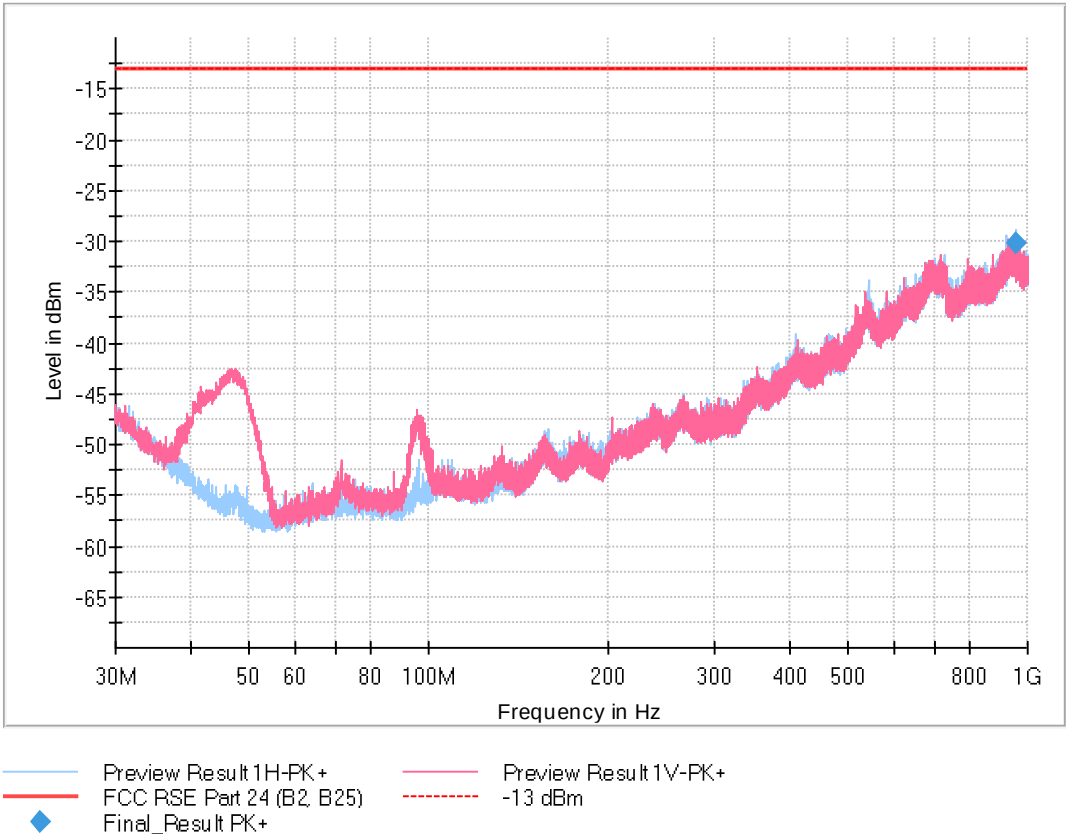
- Low Channel:



- Middle Channel:

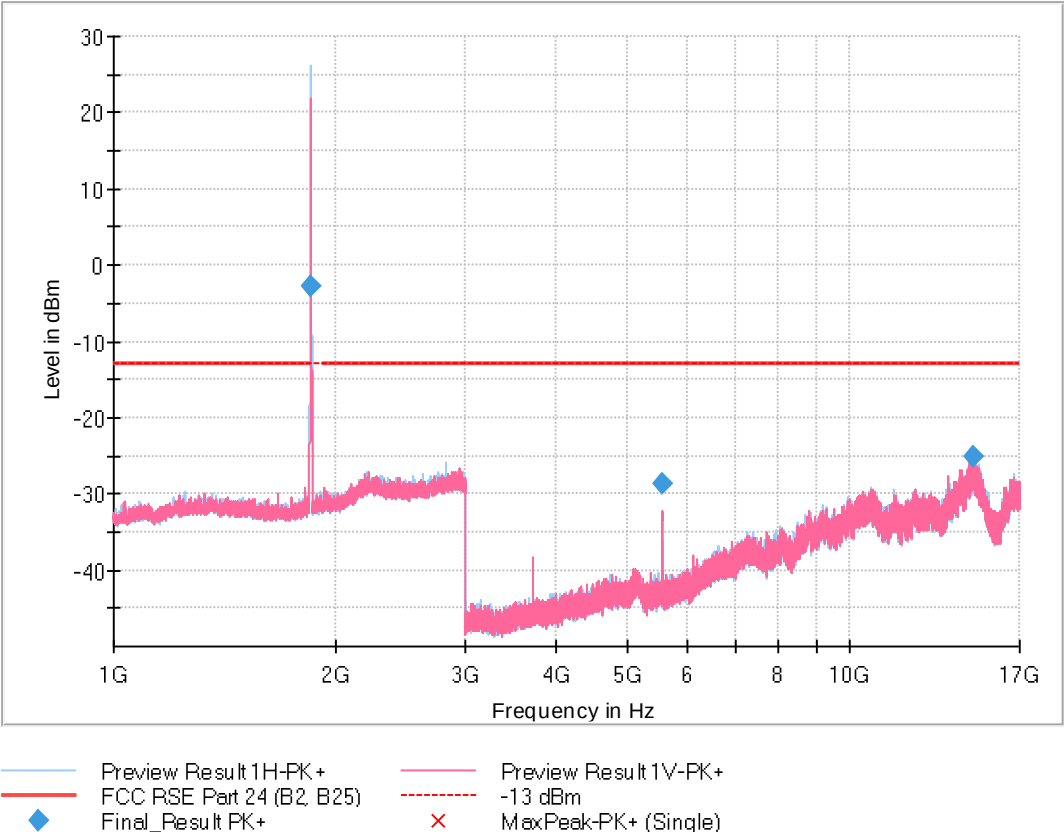


- High Channel:

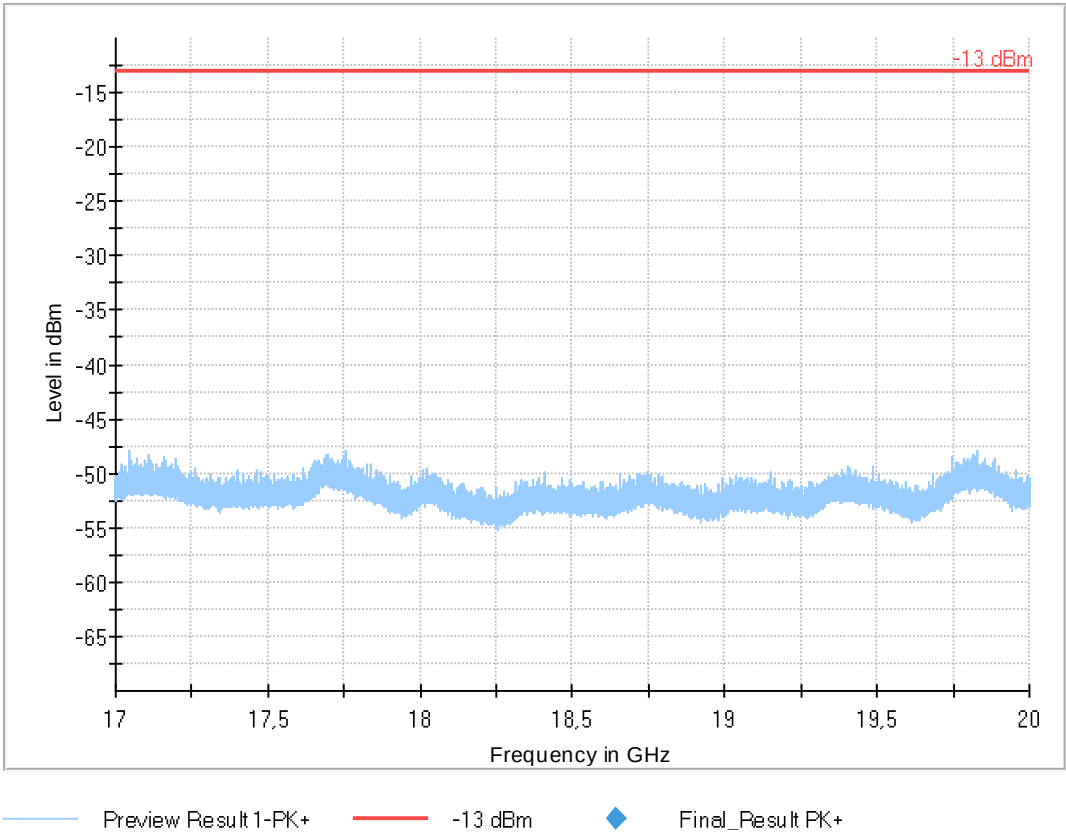


FREQUENCY RANGE 1 - 20 GHz:

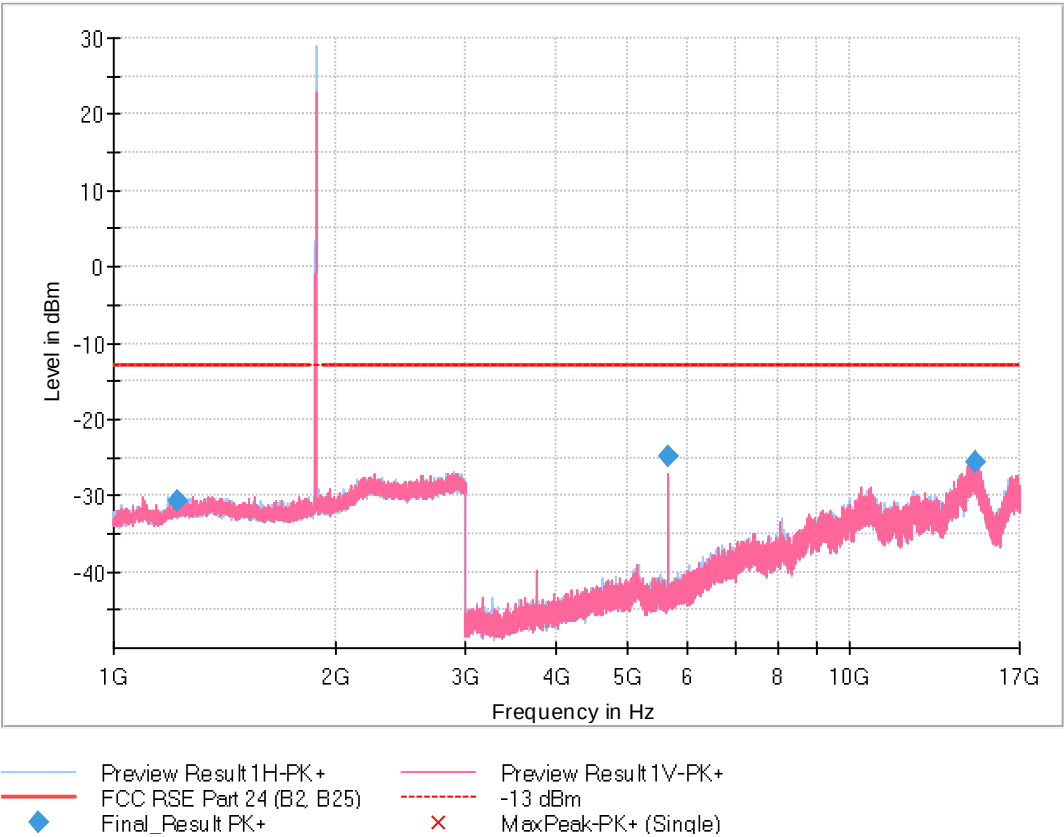
- Low Channel:



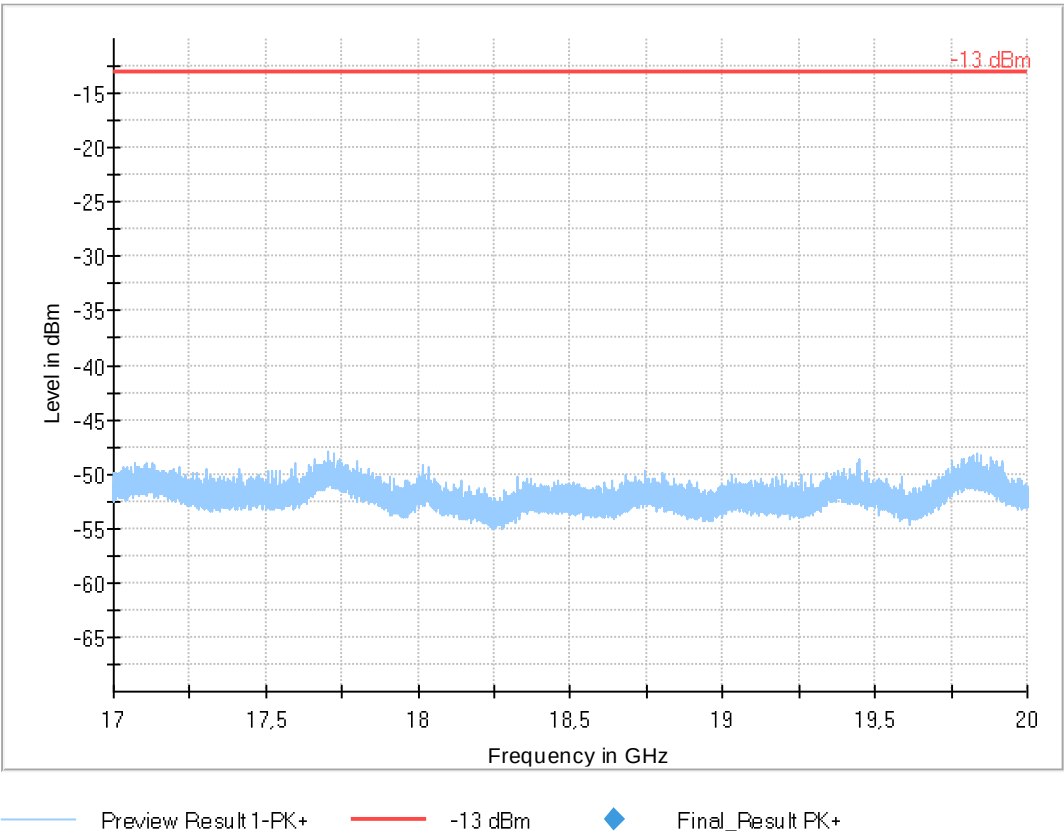
The peak above the limit is the carrier frequency.



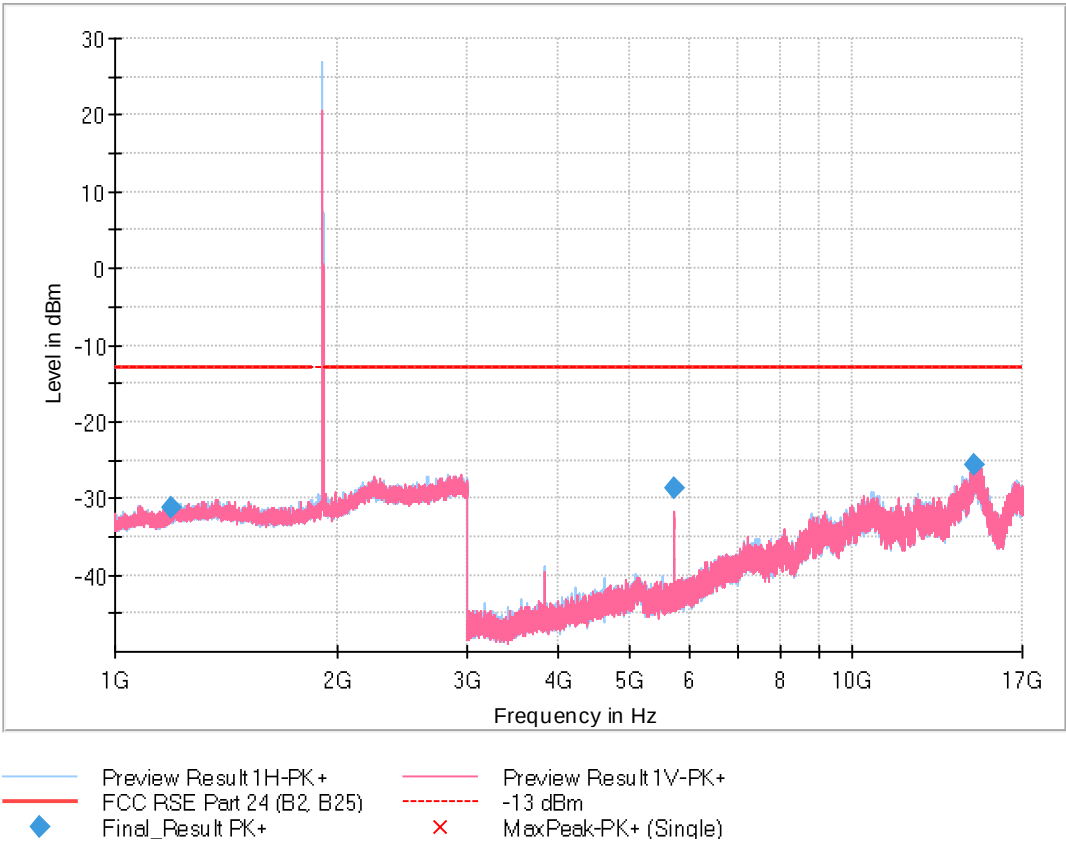
- Middle Channel:



The peak above the limit is the carrier frequency.



- High Channel:



The peak above the limit is the carrier frequency.

