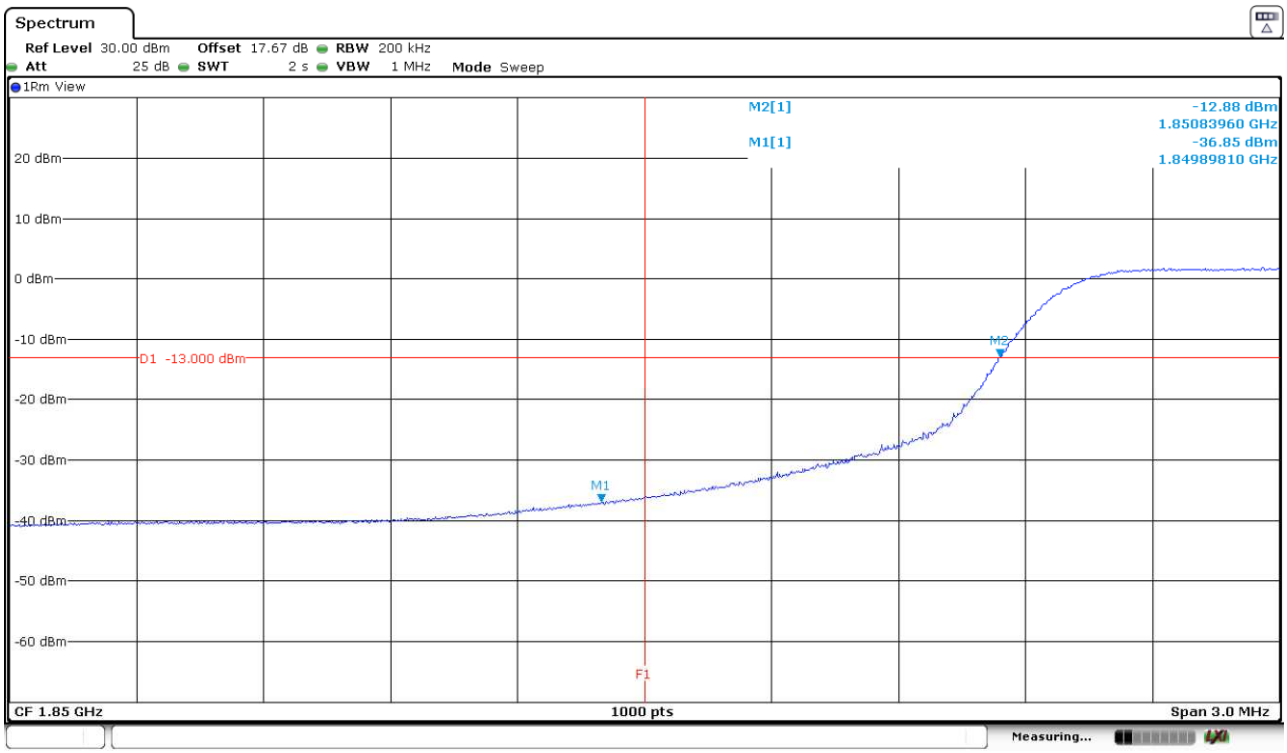
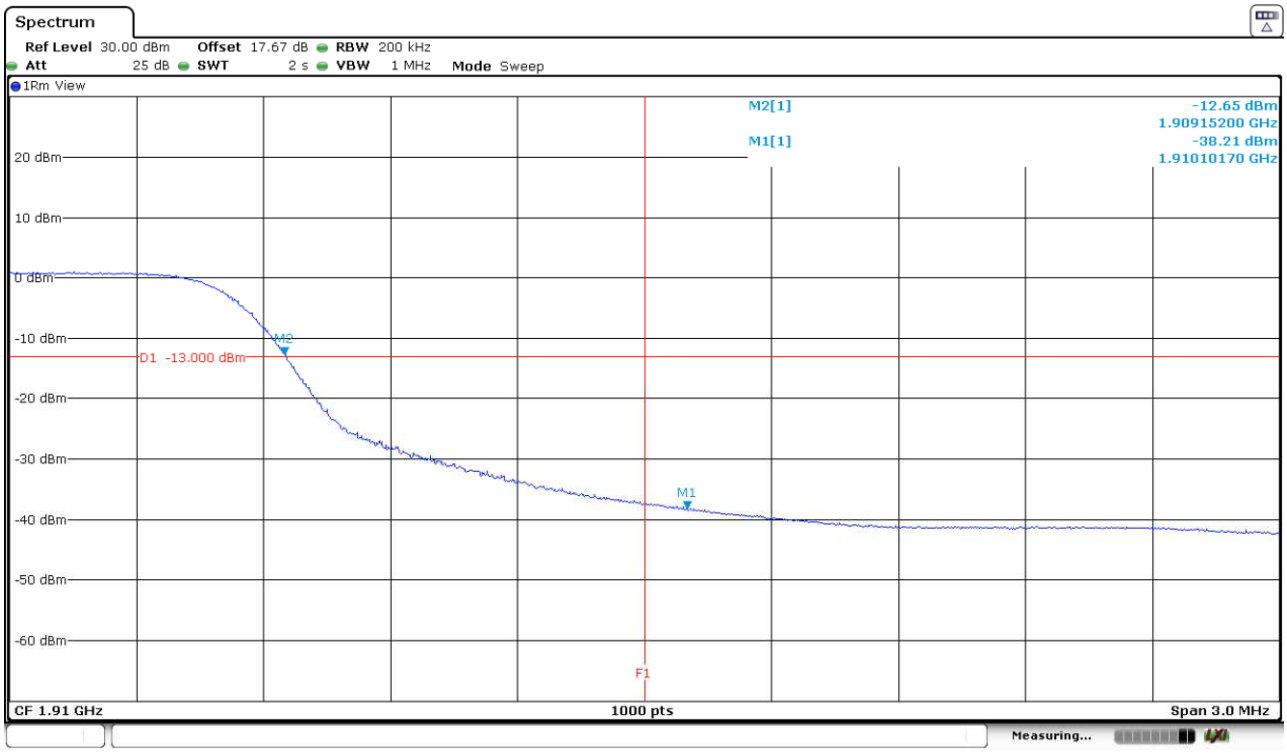
LTE Band 2. QPSK MODULATION. BW=20 MHz. RB=All. Offset=0. Lowest and Highest Block Edges:




The equipment transmits at the maximum output power




The equipment transmits at the maximum output power

Verdict: PASS

# Radiated emissions

SPECIFICATION:

FCC § 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.

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 highest frequency generated within the equipment.

The EUT was placed on a non-conductive stand at a 3 meter distance from the measuring antenna for measurements below 17 GHz and at 1 m distance for measurements above 17 GHz.

Each detected emission at less than 20 dB respect to the limit at a distance of 1 meter is substituted by the Substitution method, in accordance with the ANSI/TIA-603-E.

Detected emissions were maximized at each frequency by rotating the EUT and adjusting the measuring antenna height and polarization. The maximum meter reading was recorded.

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:

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

Where D is the measurement distance (in the far field region) in m. D = 3 m.

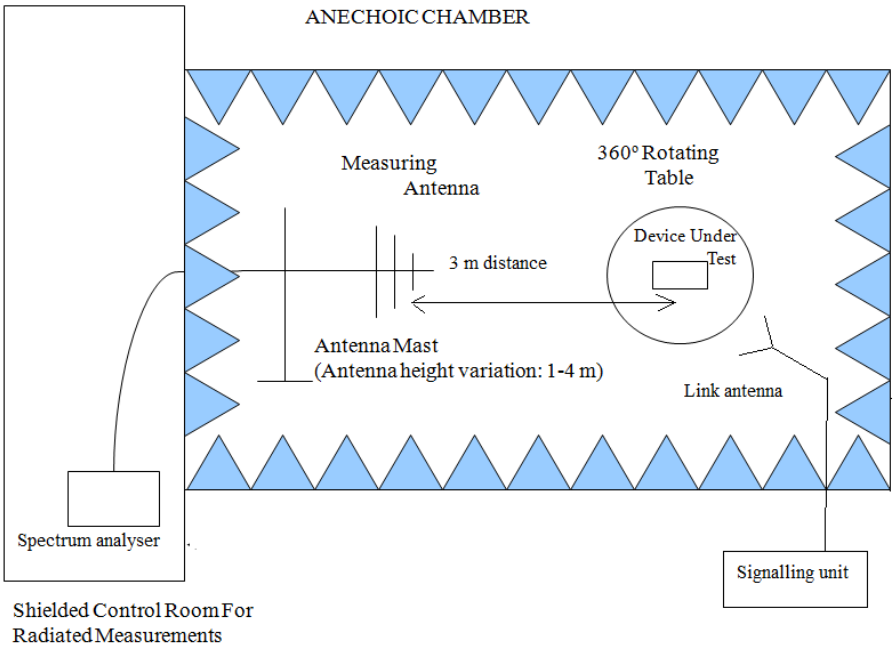
Measurement Limit:

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:

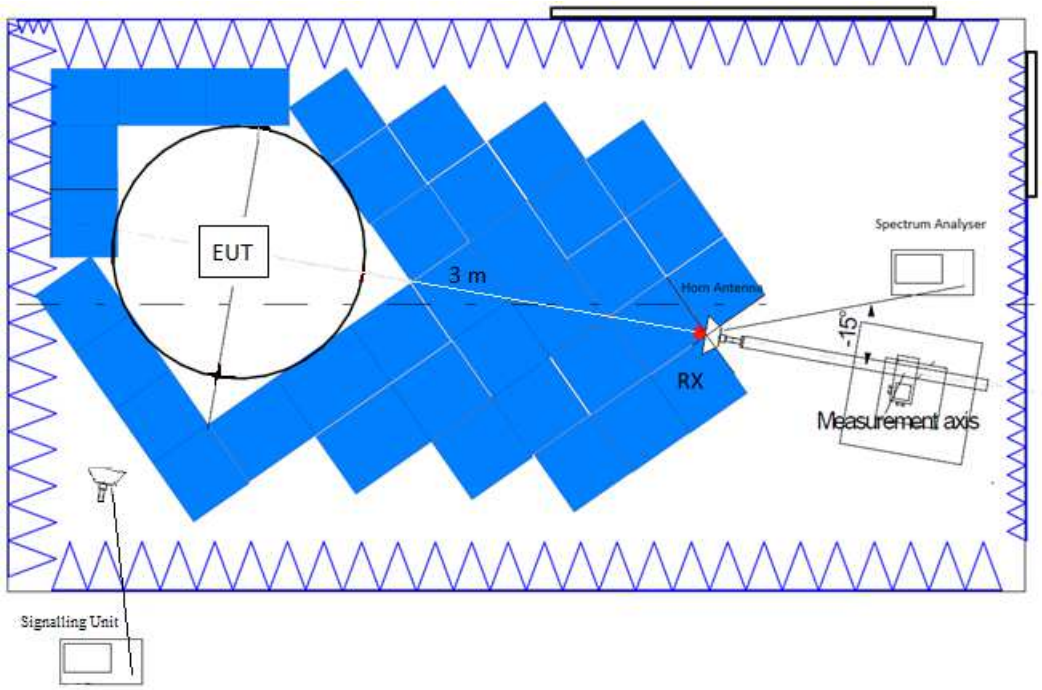
$$Po\ (dBm) - [43 + 10 \log (Po\ in\ mwatts) - 30] = -13\ dBm$$

TEST SETUP:

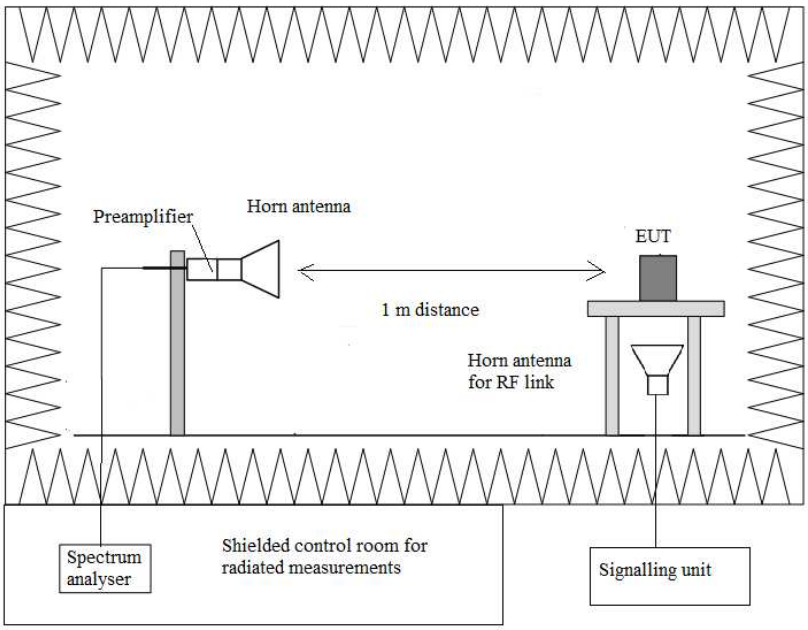
Radiated measurements below 1 GHz.




Radiated measurements between 1 GHz and 17 GHz.



Radiated measurements above 17 GHz.



RESULTS:

**2G Band 1900 MHz:**

GPRS AND EDGE MODULATIONS:
A preliminary scan determined the Tel1 antenna and the EDGE modulation as the worst case. The following tables and plots show the results for EDGE modulation.

**- Lowest Channel:**

**Frequency range 30 MHz - 1 GHz**

No spurious signals were found at less than 20 dB below the limit.

**Frequency range 1 - 17 GHz.**

No spurious signals were found at less than 20 dB below the limit.

**Frequency range 17 - 20 GHz**

No spurious signals were found at less than 20 dB below the limit.

**- Middle Channel:**

**Frequency range 30 MHz-1000 MHz**

No spurious signals were found at less than 20 dB below the limit.

**Frequency range 1 - 17 GHz**

Spurious frequencies detected at less than 20 dB below the limit:

| Spurious frequency (MHz) | Detector | E.I.R.P (dBm) | Polarization |
|---|---|---|---|
| 5640.63 | Peak | -25.29 | V |

**Frequency range 17 - 20 GHz**

No spurious signals were found at less than 20 dB below the limit.

**- Highest Channel:**

**Frequency range 30 MHz - 1 GHz**

No spurious signals were found at less than 20 dB below the limit.

**Frequency range 1 - 17 GHz**

No spurious signals were found at less than 20 dB below the limit.

**Frequency range 17 - 20 GHz**

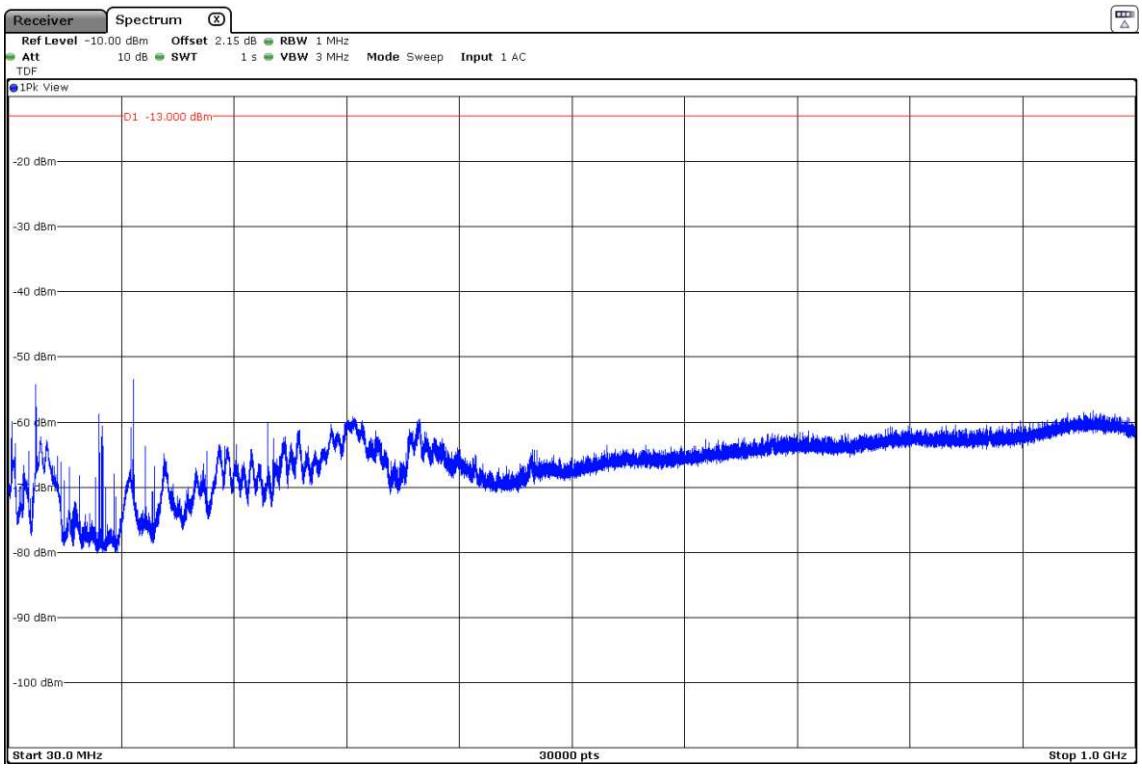
No spurious signals were found at less than 20 dB below the limit.

Measurement uncertainty (dB): <± 5.08 for f ≥ 30 MHz up to 1 GHz
<± 4.11 for f ≥ 1 GHz up to 3 GHz
<± 5.13 for f ≥ 3 GHz up to 17 GHz
<± 4.82 for f ≥ 17 GHz up to 20 GHz

Verdict: PASS

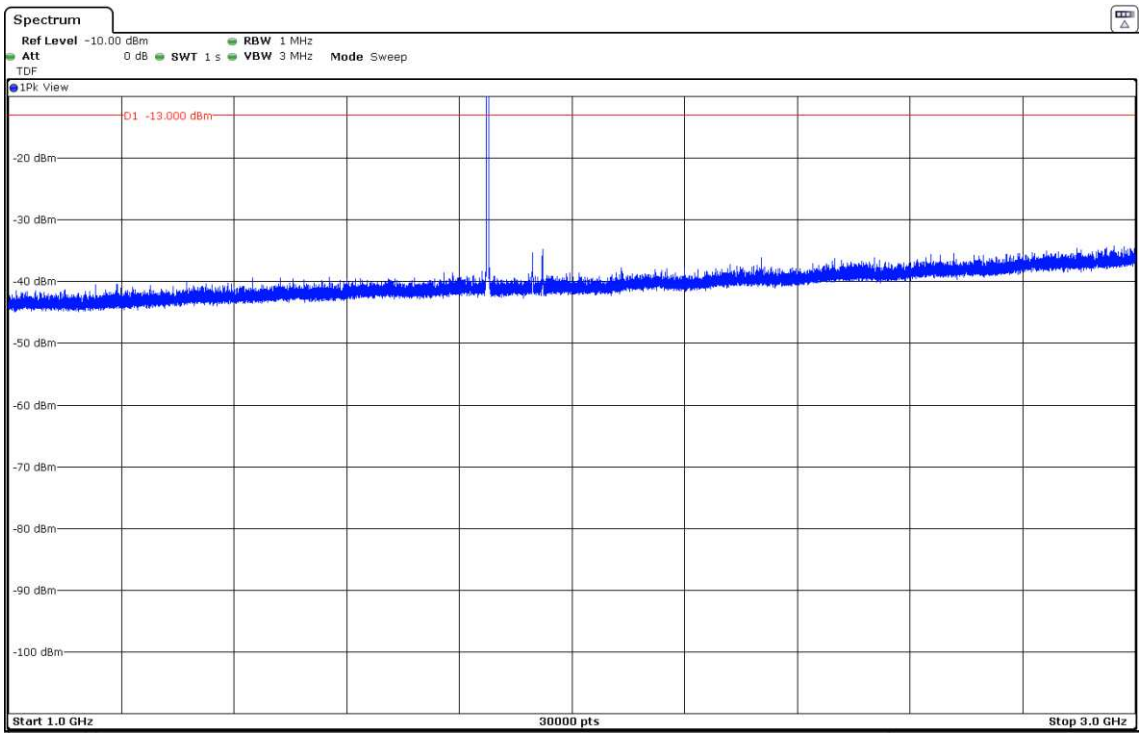
## FREQUENCY RANGE 30 MHz - 1 GHz

This plot is valid for the Lowest, Middle and Highest Channels:



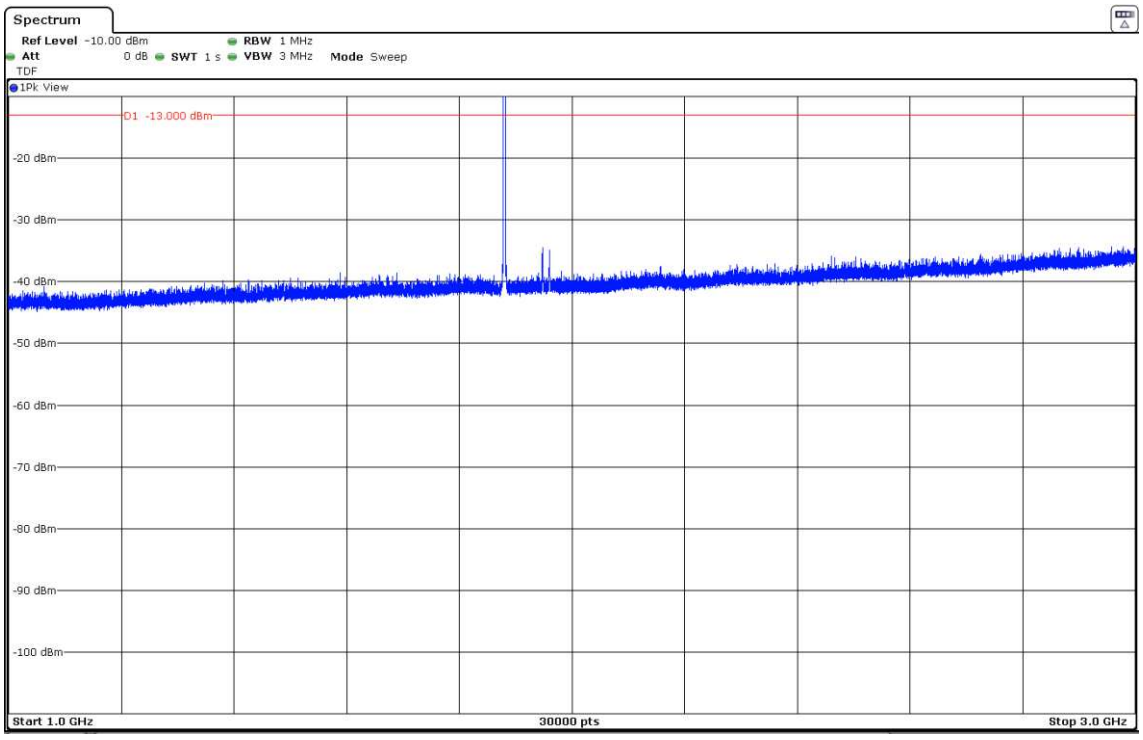

## FREQUENCY RANGE 1 - 3 GHz

- Lowest Channel:



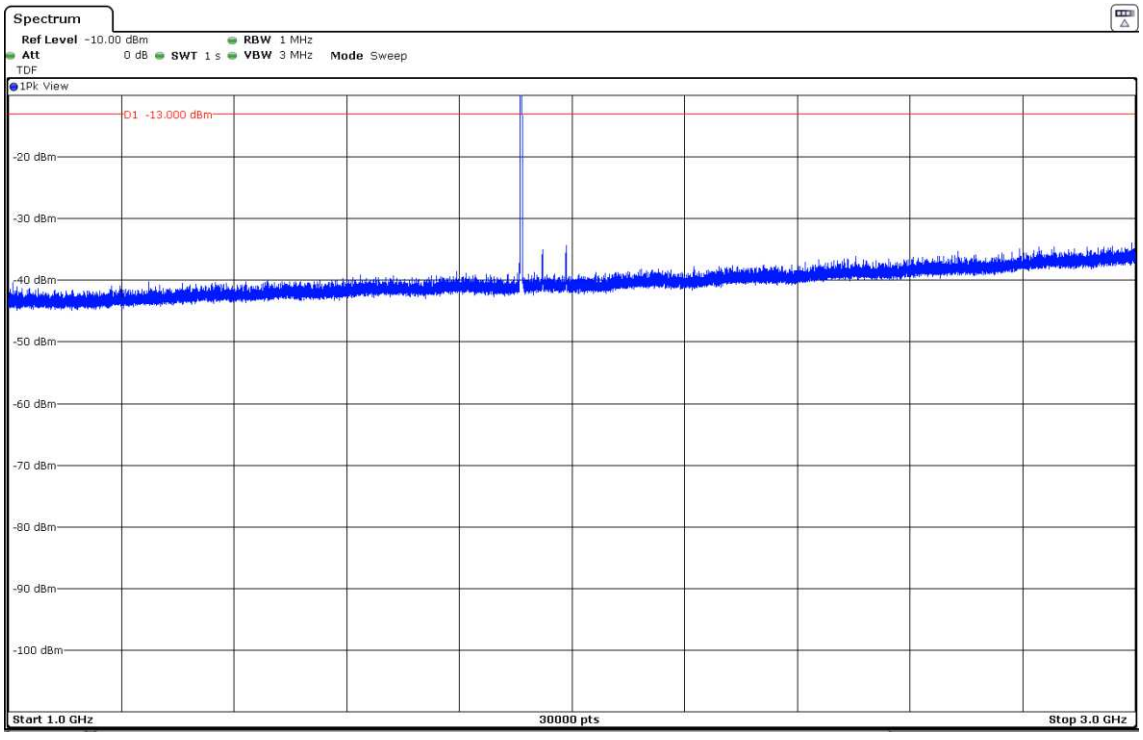

The peak above the limit is the carrier frequency.

- Middle Channel:




The peak above the limit is the carrier frequency.

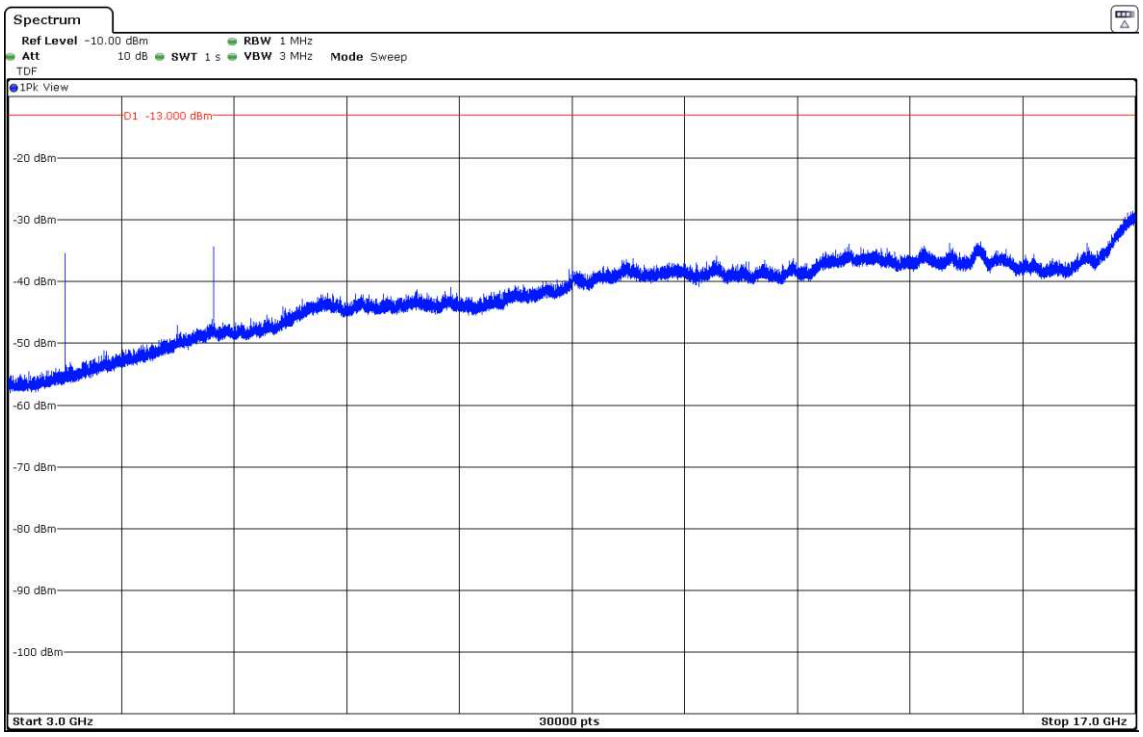
- Highest Channel:



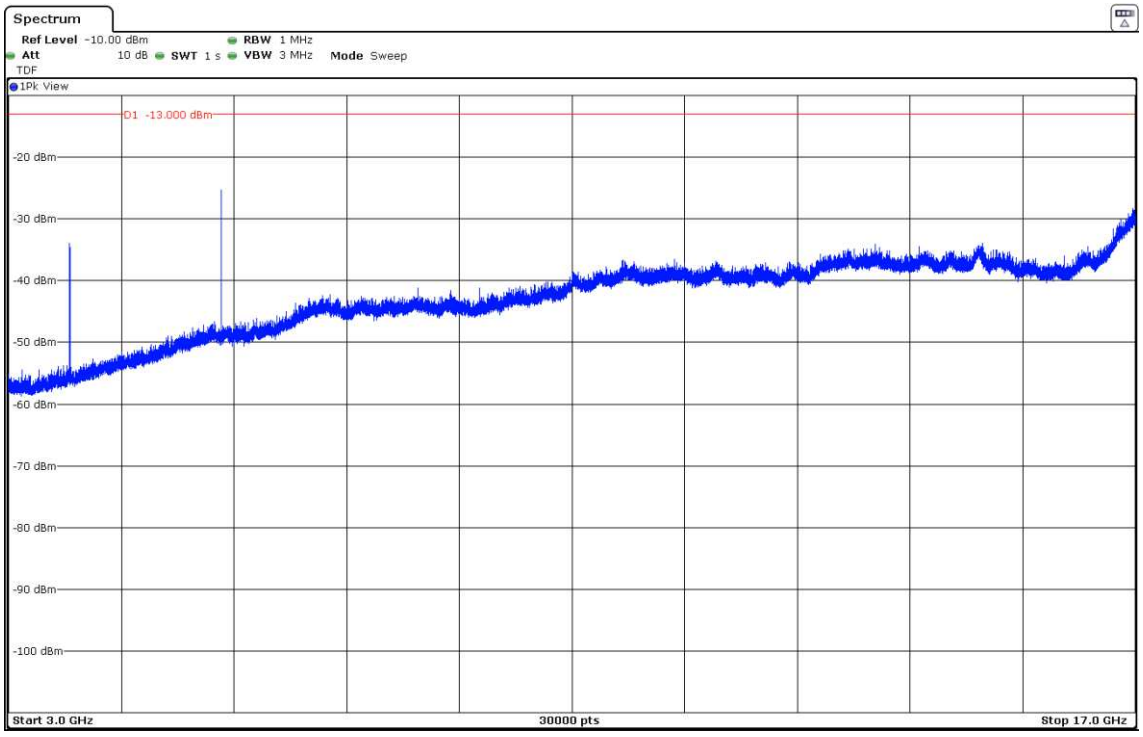

The peak above the limit is the carrier frequency.

## FREQUENCY RANGE 3 - 17 GHz

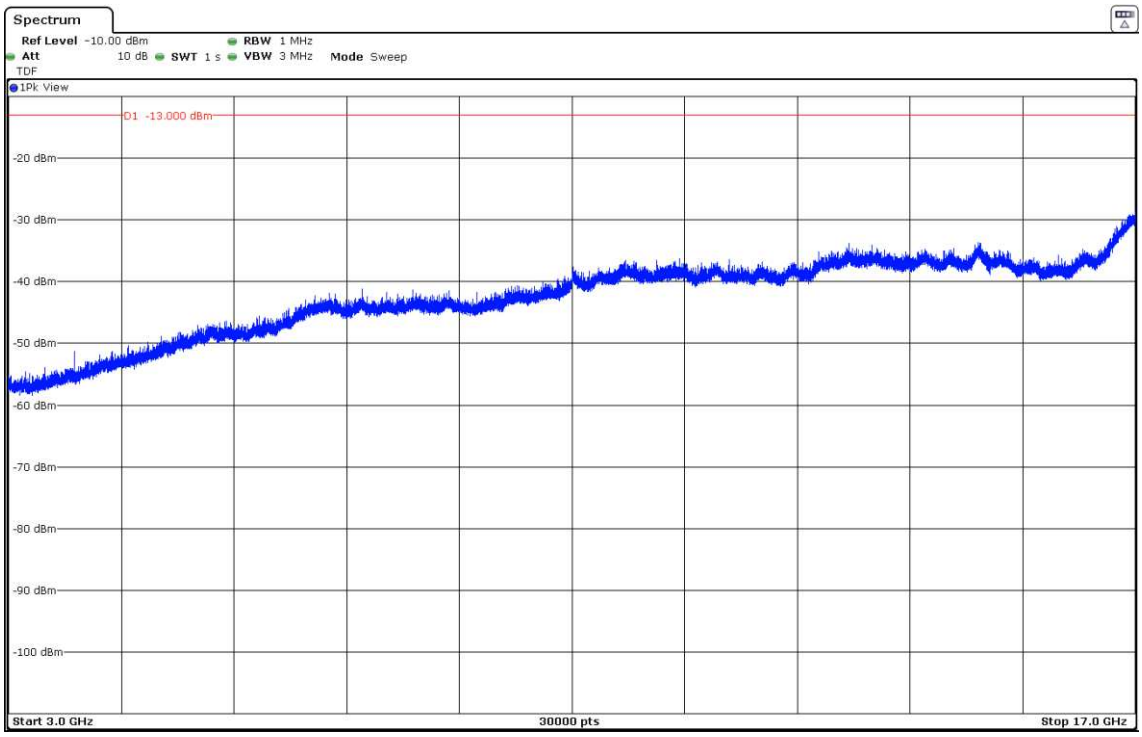
- Lowest Channel:




- Middle Channel:

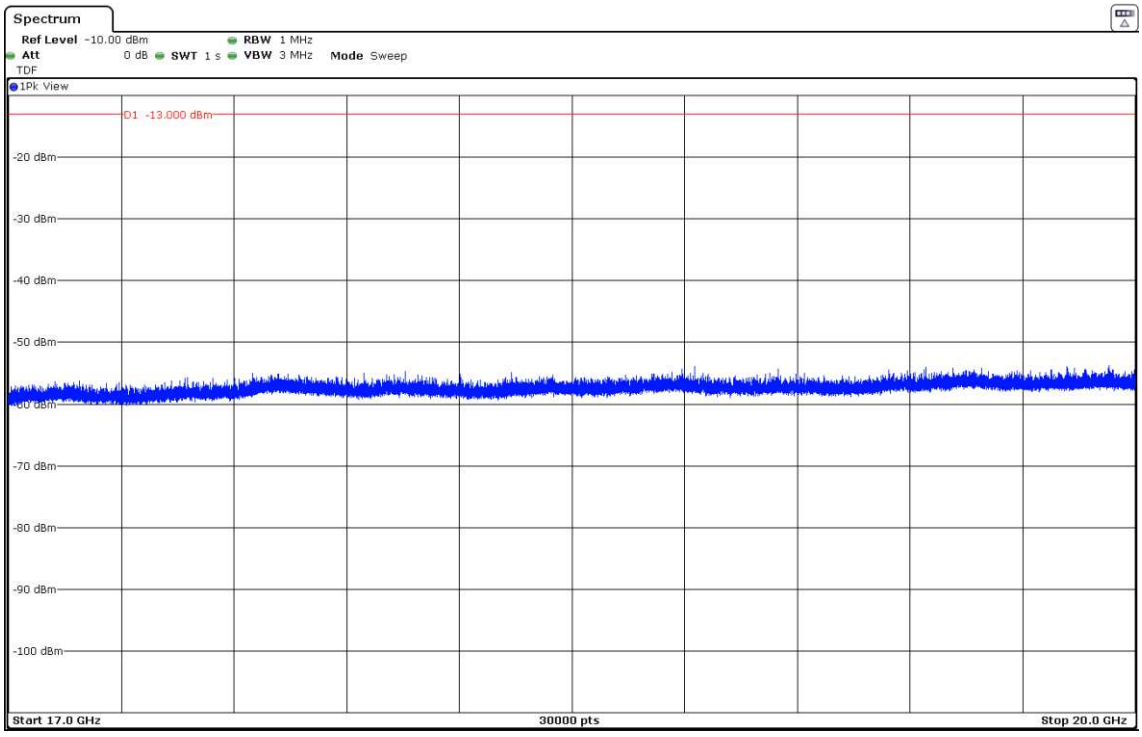


- Highest Channel:




**FREQUENCY RANGE 17 - 20 GHz**

This plot is valid for the Lowest, Middle and Highest Channels:



**3G Band II:**

WCDMA AND HSUPA MODULATION:
A preliminary scan determined the Backup antenna and the WCDMA modulation as the worst case. The following tables and plots show the results for WCDMA modulation.

**- Lowest Channel:**

**Frequency range 30 MHz - 1 GHz**

No spurious signals were found at less than 20 dB below the limit.

**Frequency range 1 - 17 GHz**

No spurious signals were found at less than 20 dB below the limit.

**Frequency range 17 - 20 GHz**

No spurious signals were found at less than 20 dB below the limit.

**- Middle Channel:**

**Frequency range 30 MHz - 1 GHz**

No spurious signals were found at less than 20 dB below the limit.

**Frequency range 1 - 17 GHz**

No spurious signals were found at less than 20 dB below the limit.

**Frequency range 17 - 20 GHz**

No spurious signals were found at less than 20 dB below the limit.

**- Highest Channel:**

**Frequency range 30 MHz - 1 GHz**

No spurious signals were found at less than 20 dB below the limit.

**Frequency range 1 - 17 GHz**

No spurious signals were found at less than 20 dB respect to the limit.

**Frequency range 17 - 20 GHz**

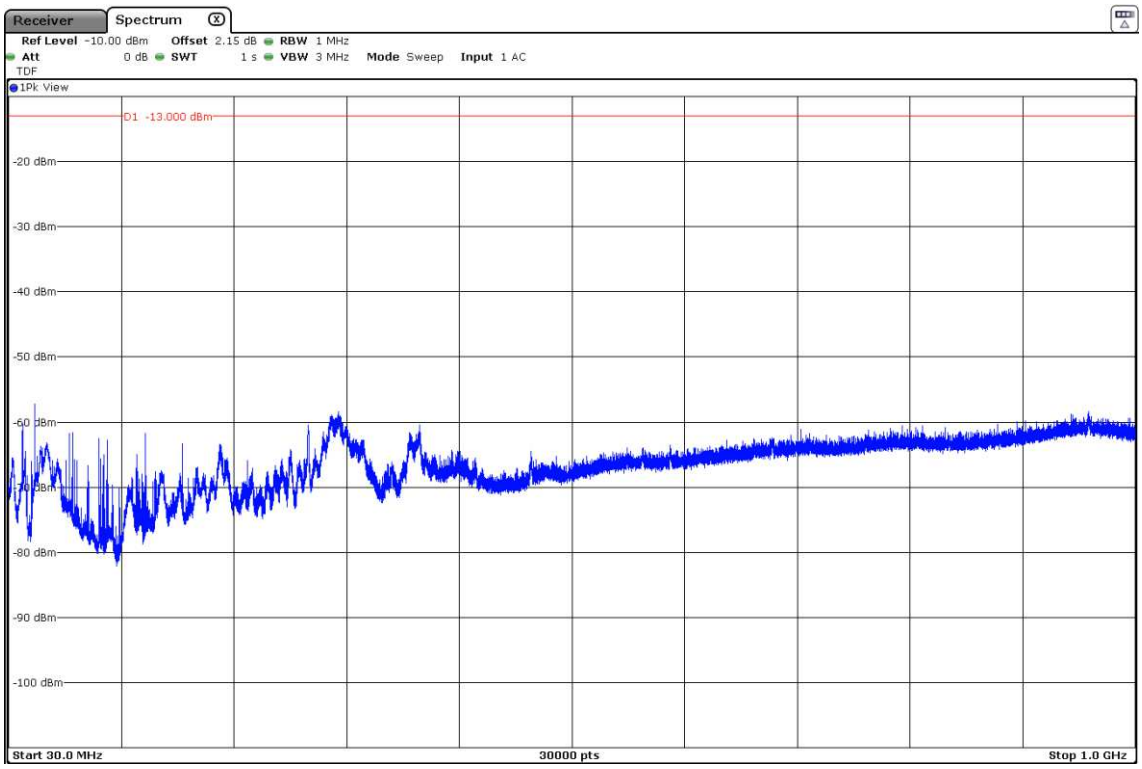
No spurious signals were found at less than 20 dB below the limit.

Measurement uncertainty (dB): <± 5.08 for f ≥ 30 MHz up to 1 GHz
<± 4.11 for f ≥ 1 GHz up to 3 GHz
<± 5.13 for f ≥ 3 GHz up to 17 GHz
<± 4.82 for f ≥ 17 GHz up to 20 GHz

Verdict: PASS

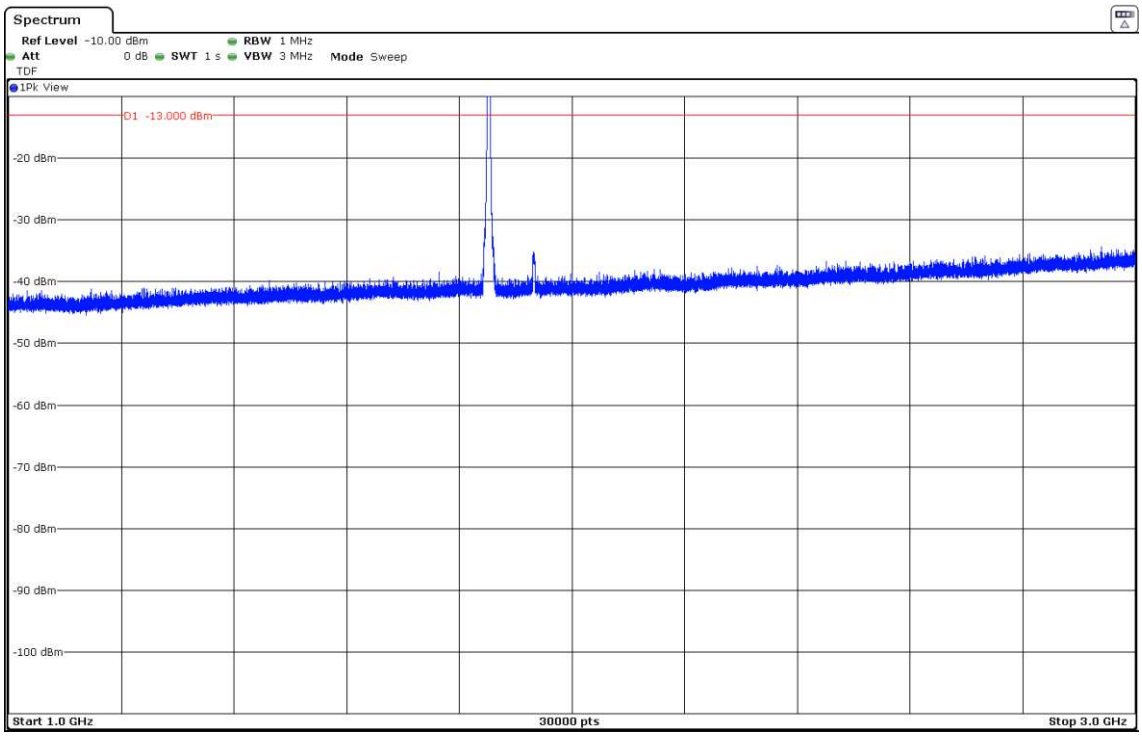
## FREQUENCY RANGE 30 MHz - 1 GHz

This plot is valid for the Lowest, Middle and Highest Channels:



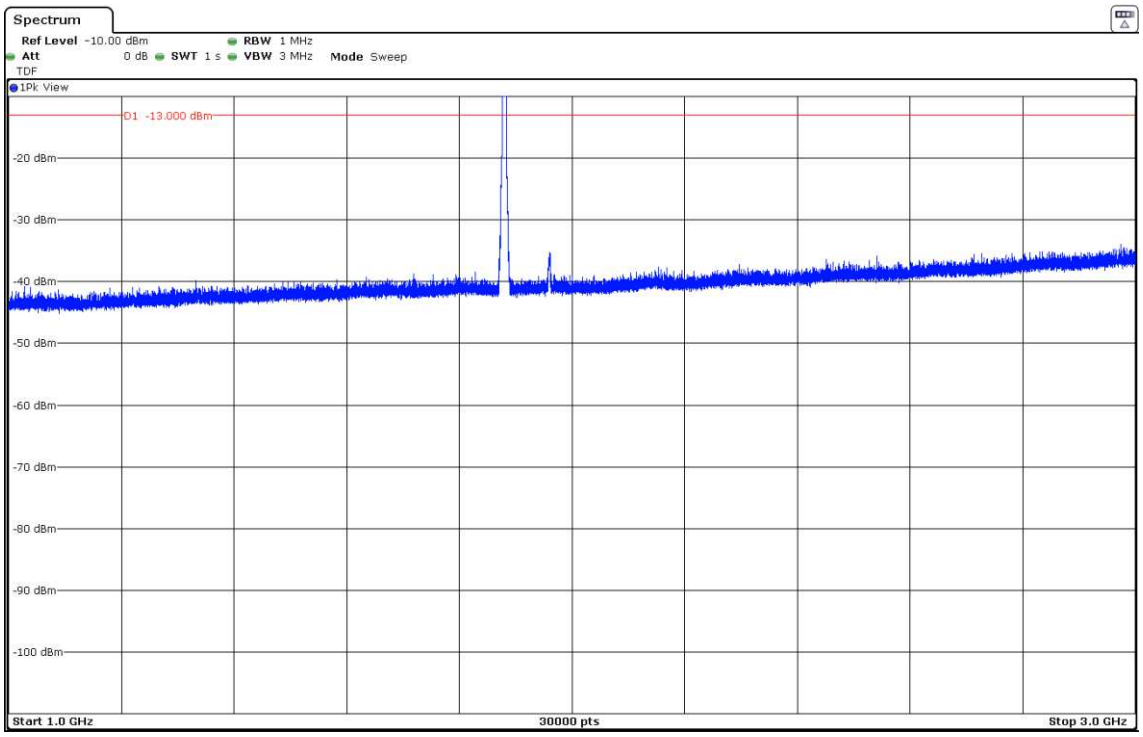

## FREQUENCY RANGE 1 - 3 GHz

- Lowest Channel:



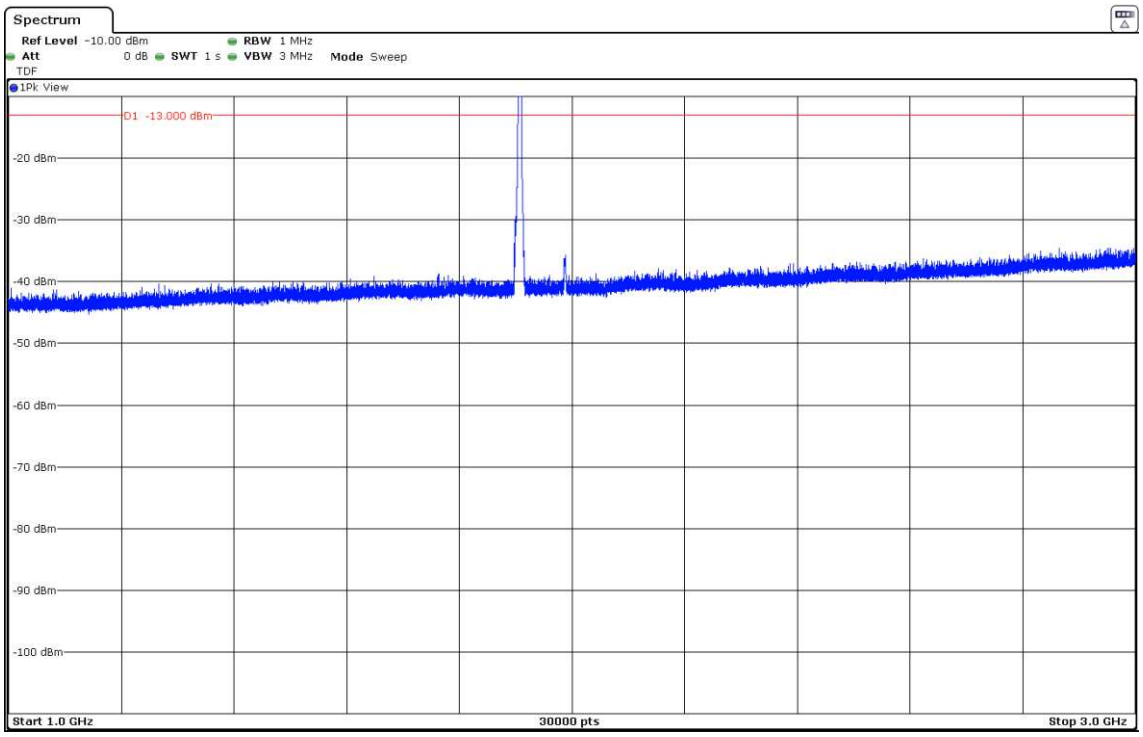

The peak above the limit is the carrier frequency.

- Middle Channel:




The peak above the limit is the carrier frequency.

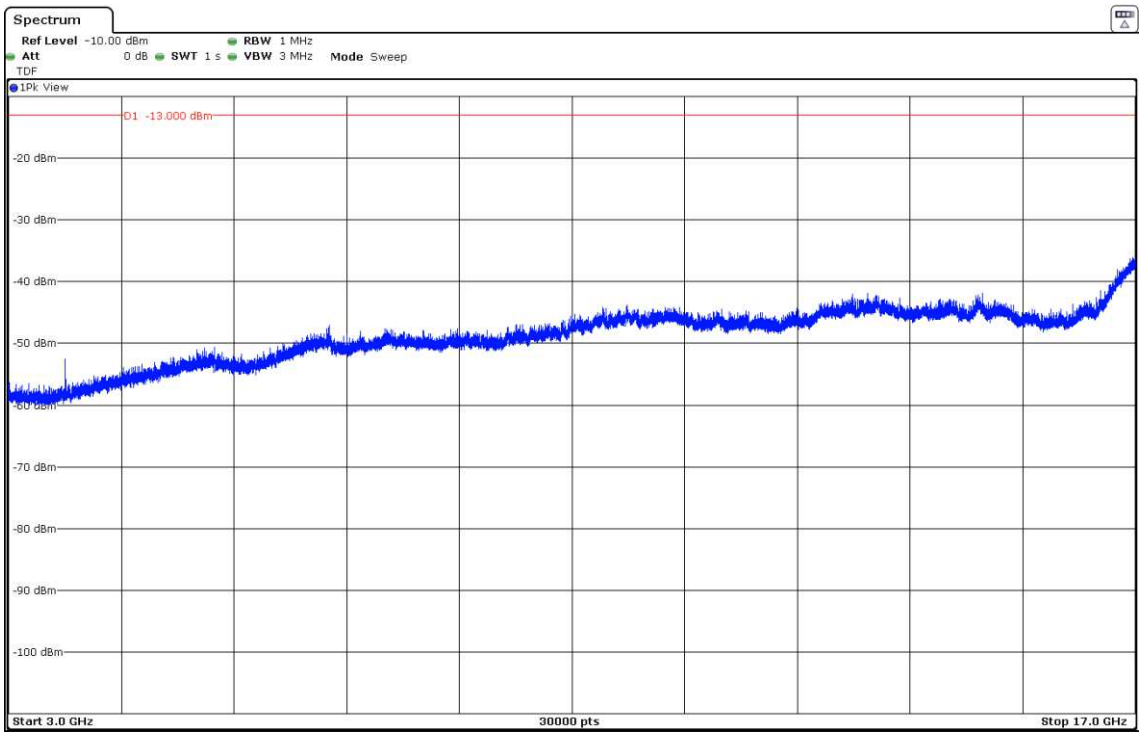
- Highest Channel:



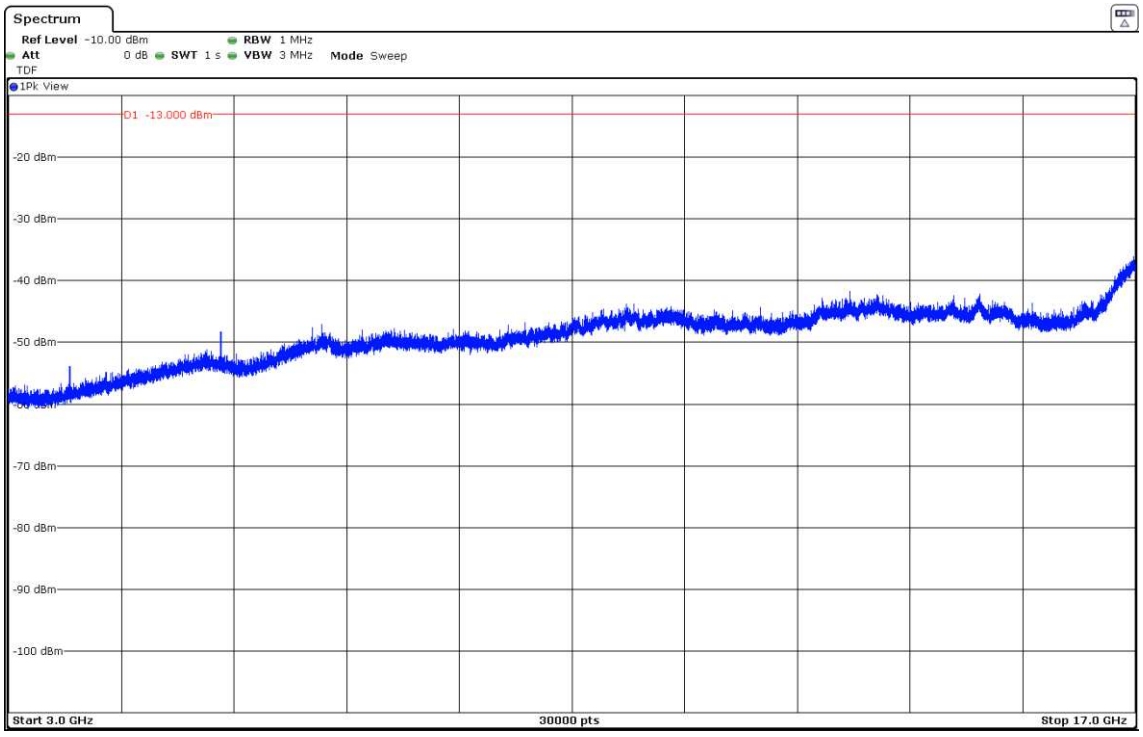

The peak above the limit is the carrier frequency.

## FREQUENCY RANGE 3 - 17 GHz

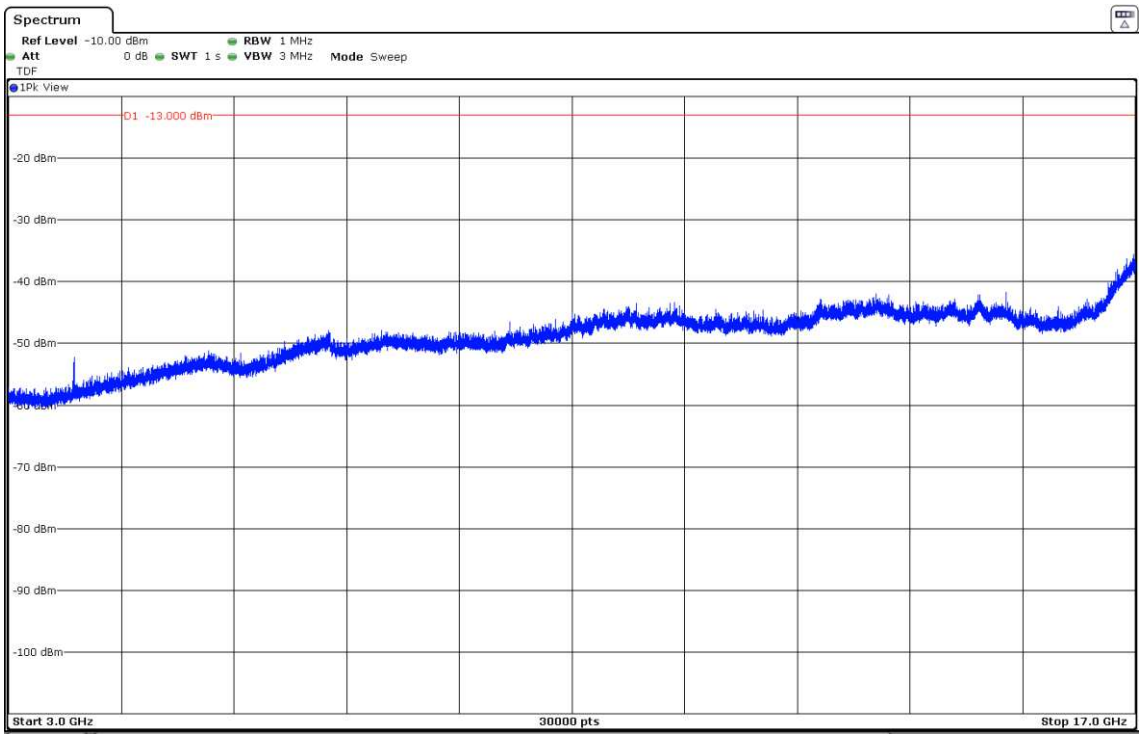
- Lowest Channel:




- Middle Channel:

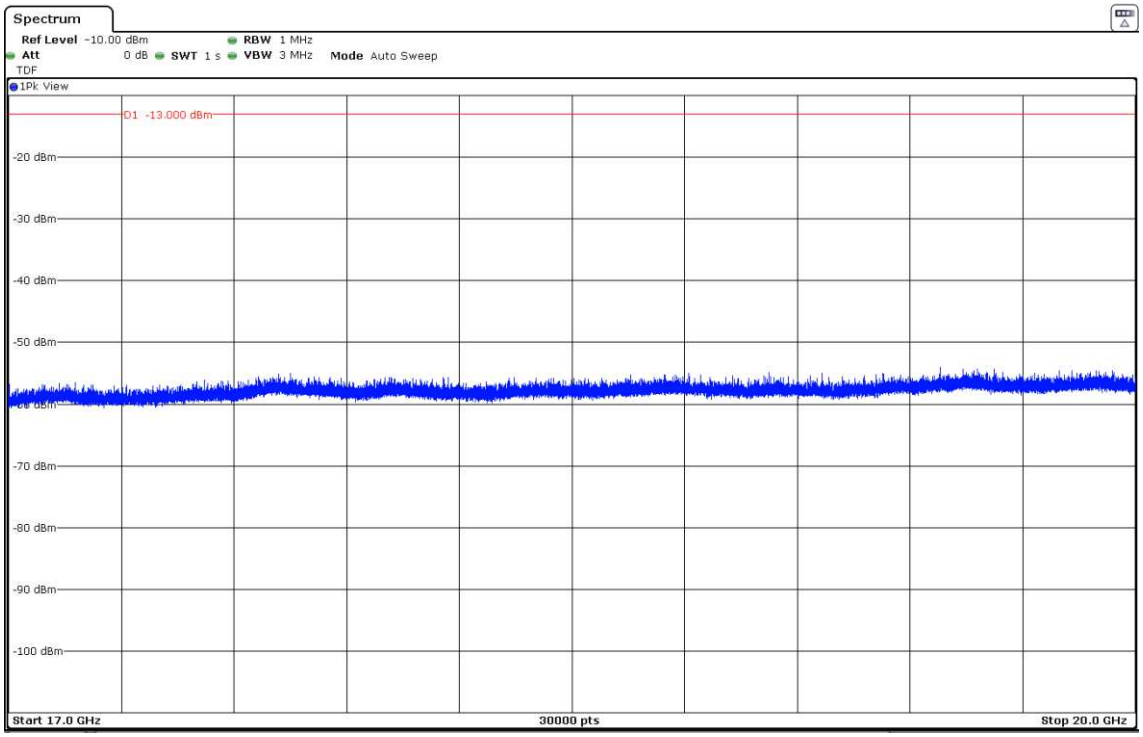


- Highest Channel:




**FREQUENCY RANGE 17 - 20 GHz**

This plot is valid for the Lowest, Middle and Highest Channels



**LTE Band 2:**

QPSK and 16QAM Modulations:
A preliminary scan determined the Tel1 antenna, the QPSK modulation, BW=3 MHz, RB=1, Offset=14 as the worst case. The following tables and plots show the results for this combination.

**- Lowest Channel:**

**Frequency range 30 MHz - 1 GHz**

No spurious signals were found at less than 20 dB below the limit.

**Frequency range 1 - 17 GHz**

Spurious frequencies detected at less than 20 dB below the limit:

| Spurious frequency (MHz) | Detector | E.I.R.P (dBm) | Polarization |
|---|---|---|---|
| 5558.03 | Peak | -25.95 | V |

**Frequency range 17 - 20 GHz**

No spurious signals were found at less than 20 dB below the limit.

**- Middle Channel:**

**Frequency range 30 MHz - 1 GHz**

No spurious signals were found at less than 20 dB below the limit.

**Frequency range 1 GHz-17 GHz**

Spurious frequencies detected at less than 20 dB below the limit:

| Spurious frequency (MHz) | Detector | E.I.R.P (dBm) | Polarization |
|---|---|---|---|
| 3762.3 | Peak | -30.54 | V |
| 5643.9 | Peak | -21.59 | V |

**Frequency range 17 - 20 GHz**

No spurious signals were found at less than 20 dB below the limit.

**- Highest Channel:**

**Frequency range 30 MHz - 1 GHz**

No spurious signals were found at less than 20 dB below the limit.

**Frequency range 1 GHz-17 GHz**.

No spurious signals were found at less than 20 dB below the limit.

**Frequency range 17 - 20 GHz**

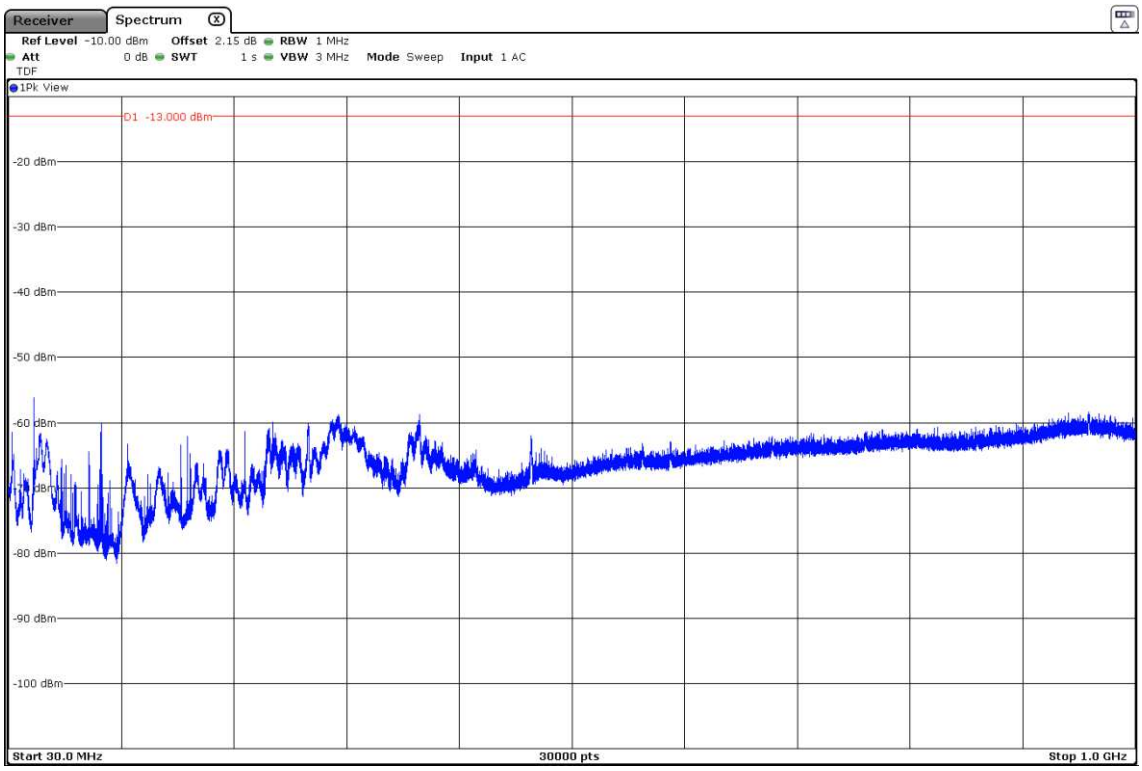
No spurious signals were found at less than 20 dB below the limit.

Measurement uncertainty (dB): <± 5.08 for f ≥ 30 MHz up to 1 GHz
<± 4.11 for f ≥ 1 GHz up to 3 GHz
<± 5.13 for f ≥ 3 GHz up to 17 GHz
<± 4.82 for f ≥ 17 GHz up to 20 GHz

Verdict: PASS

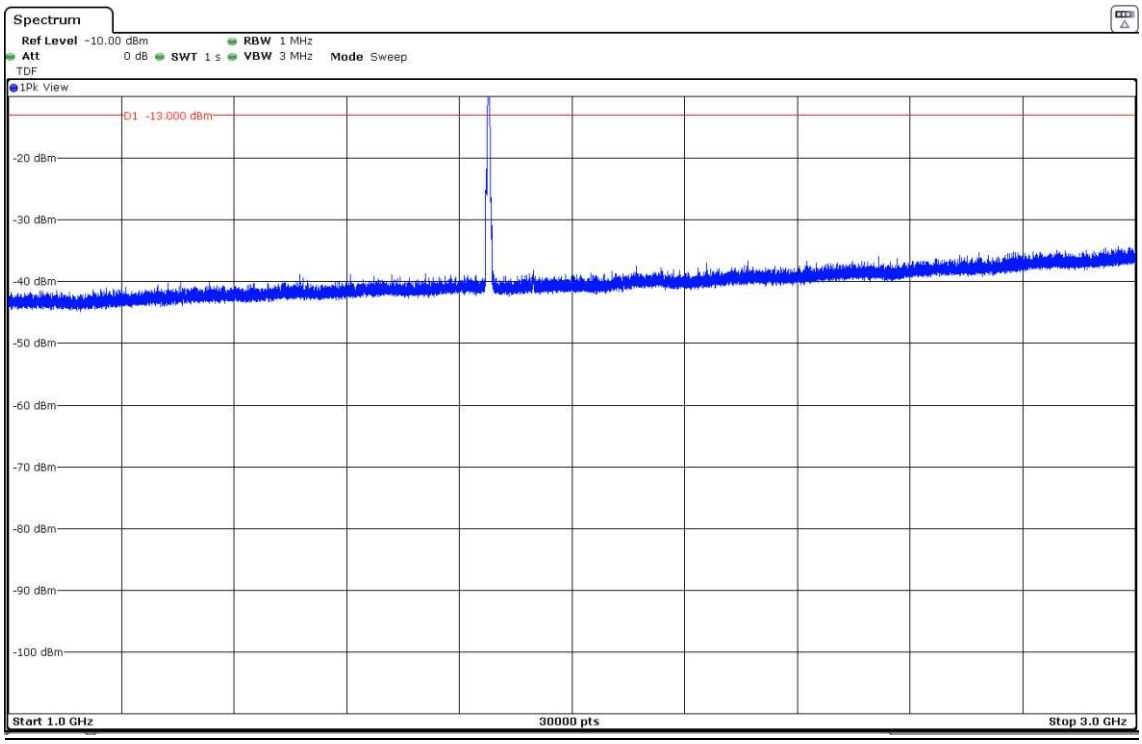
## FREQUENCY RANGE 30 MHz - 1 GHz

This plot is valid for the Lowest, Middle and Highest Channels:



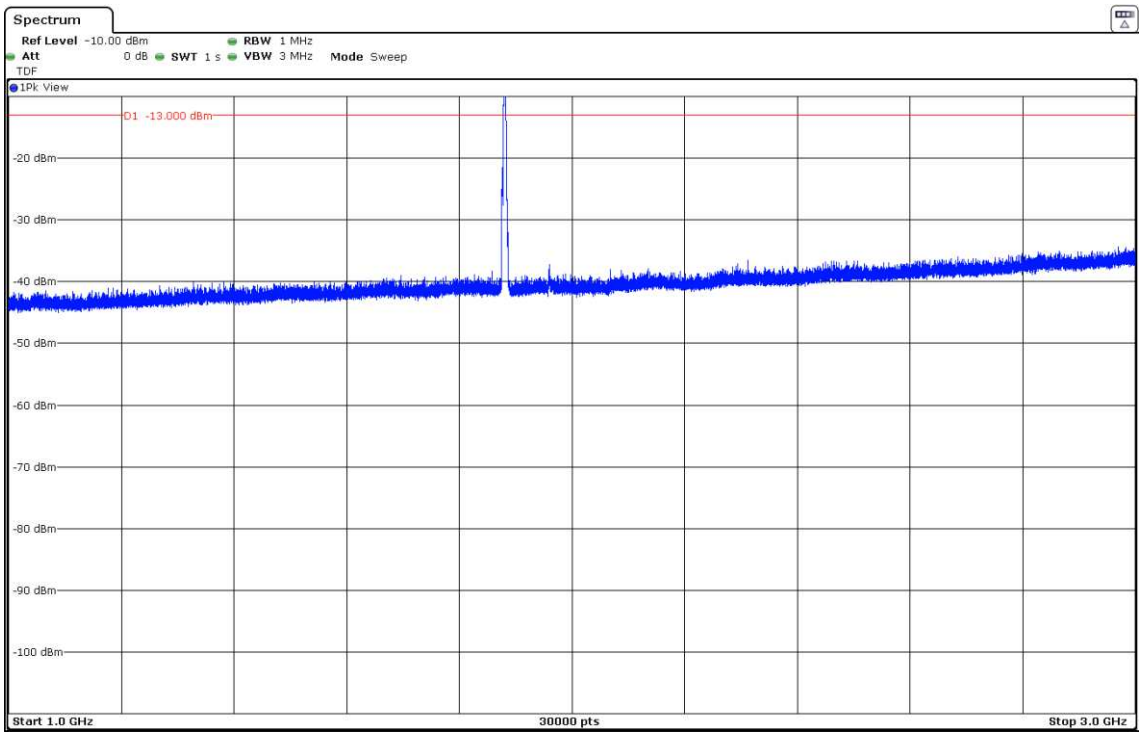

## FREQUENCY RANGE 1 - 3 GHz

- Lowest Channel:



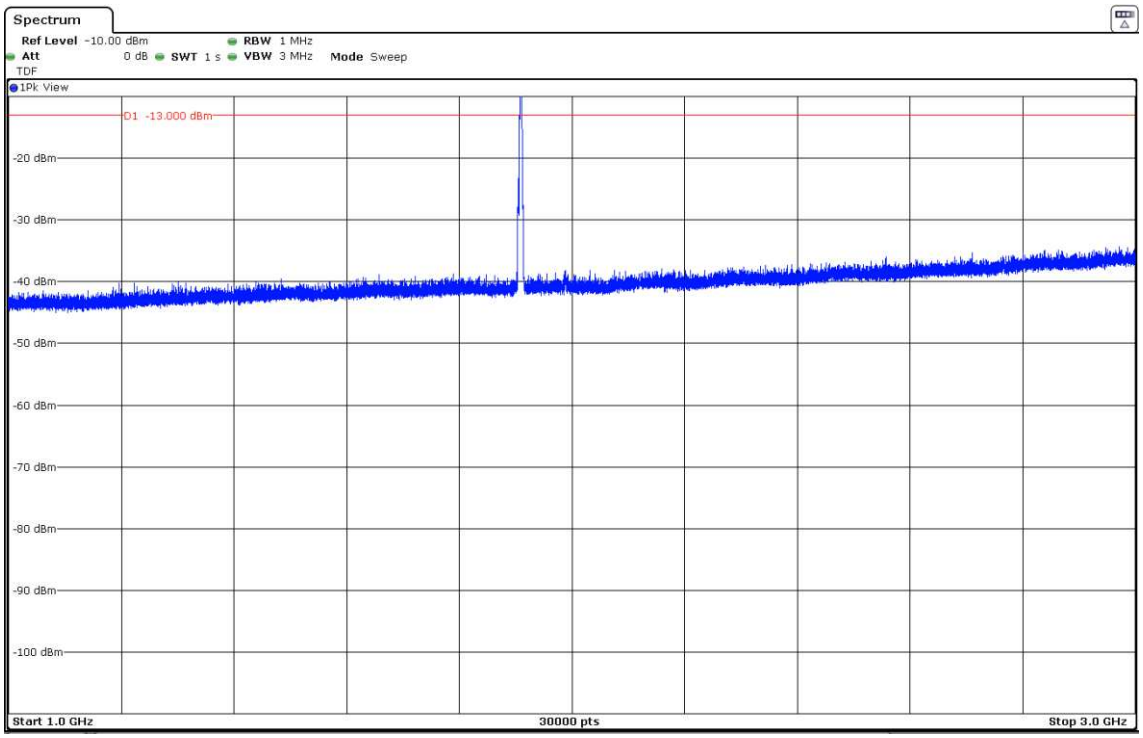

The peak above the limit is the carrier frequency.

- Middle Channel:




The peak above the limit is the carrier frequency.

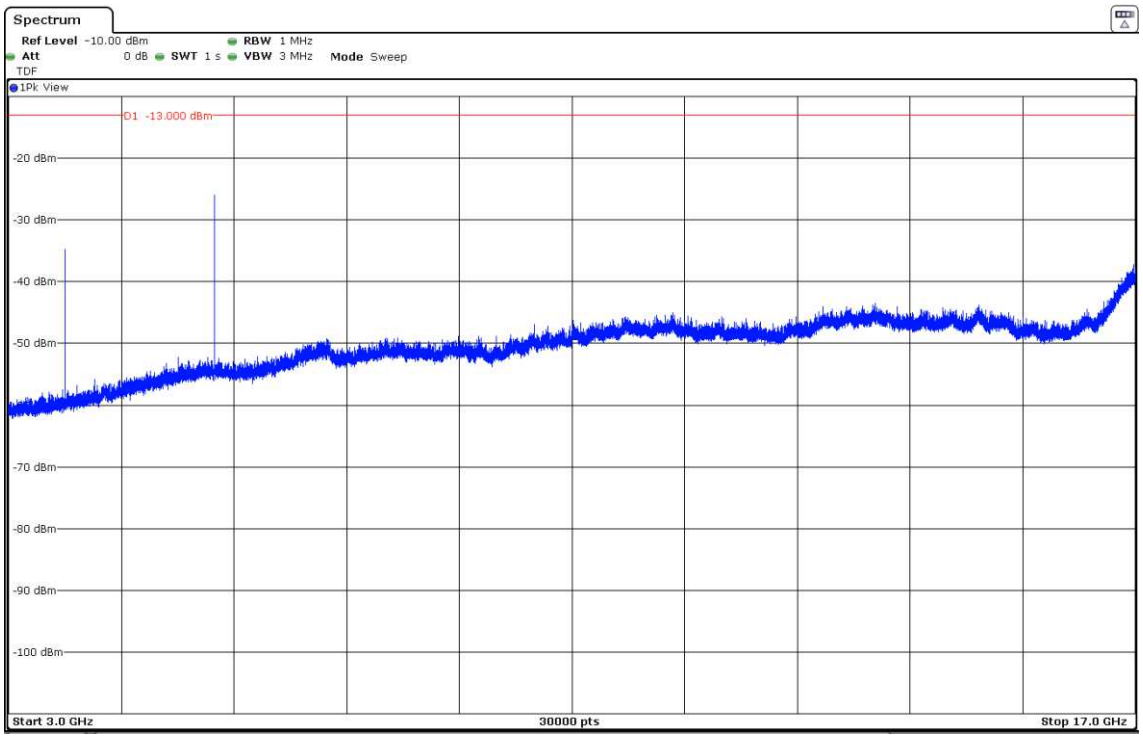
- Highest Channel:



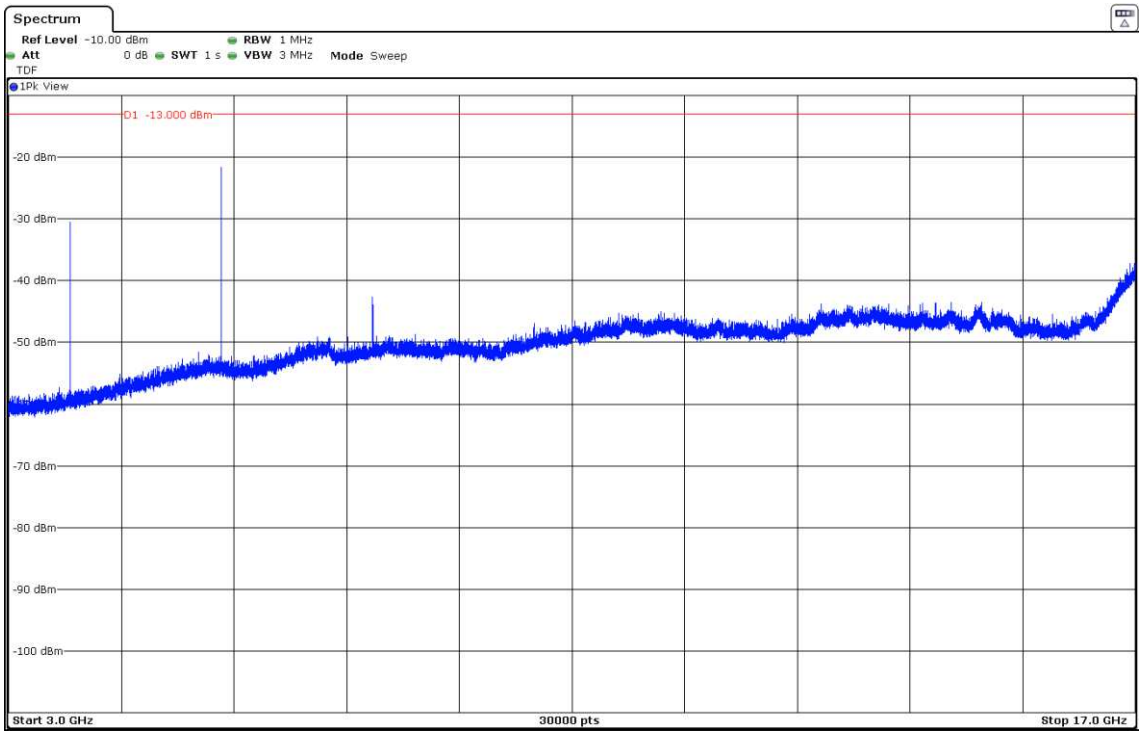

The peak above the limit is the carrier frequency.

## FREQUENCY RANGE 3 - 17 GHz

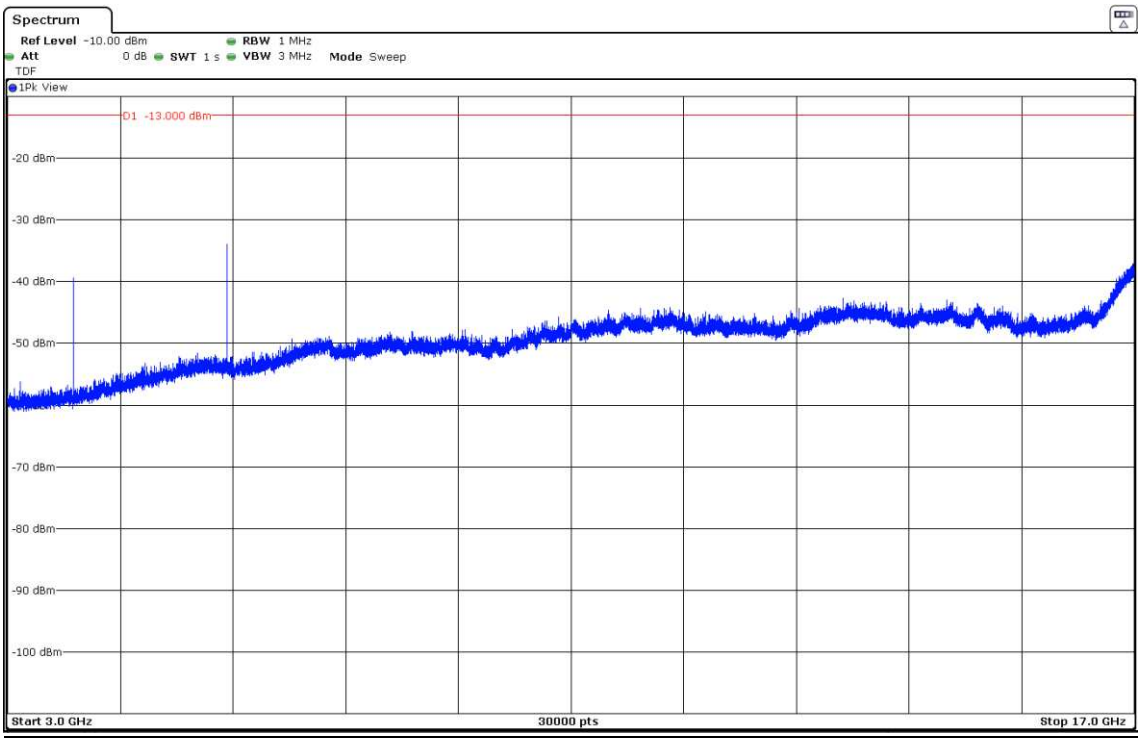
- Lowest Channel:




- Middle Channel:



- Highest Channel:




**FREQUENCY RANGE 17 - 20 GHz**

This plot is valid for the Lowest, Middle and Highest Channels: