
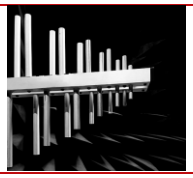
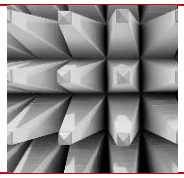

CETECOM™

**CETECOM ICT Services**
*consulting - testing - certification*

# TEST REPORT

**Test report no.: 1-9611/15-01-10-A**

ilac-MRA DAkkS Deutsche Akkreditierungsstelle D-PL-12076-01-00

## Testing laboratory


**CETECOM ICT Services GmbH**
Untertuerkheimer Strasse 6 – 10
66117 Saarbruecken / Germany
Phone: + 49 681 5 98 - 0
Fax: + 49 681 5 98 - 9075
Internet: http://www.cetecom.com
e-mail: ict@cetecom.com


**Accredited Testing Laboratory:**
The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAkkS)
The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-00

## Applicant


**Bowers & Wilkins**
Dale Rd, Worthing,
West Sussex BN11 2BH / UNITED KINGDOM
Phone: -/-
Fax: -/-
Contact: -/-
e-mail: -/-
Phone: -/-


## Manufacturer


**Bowers & Wilkins**
Dale Rd, Worthing,
West Sussex BN11 2BH / UNITED KINGDOM


## Test standard/s

| | |
|---|---|
| 47 CFR Part 15 | Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices |
| RSS - 247 Issue 1 | Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence - Exempt Local Area Network (LE-LAN) Devices |

For further applied test standards please refer to section 3 of this test report.

## Test Item

| | |
|---|---|
| **Kind of test item:** | **Wireless music system** |
| **Model name:** | **Zeppelin Wireless** |
| **FCC ID:** | **2ACIX-ZW** |
| **IC:** | **11946B-ZW** |
| Frequency: | UNII bands:<br>5150 MHz to 5350 MHz<br>5470 MHz to 5725 MHz<br>5725 MHz to 5850 MHz |
| Technology tested: | WLAN (OFDM / a-mode / n-HT20-mode) |
| Antenna: | Integrated antenna |
| Power supply: | 110 V AC by internal power supply unit |
| Temperature range: | +5°C to +35°C |

This test report is electronically signed and valid without handwriting signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

## Test report authorised:

cn=Marco Bertolino, o=CETECOM ICT Services GmbH, ou=BTL-100826, email=marco.bertolino@cetecom.com, c=DE
2015.07.30 10:38:57 +02'00'

Marco Bertolino
Lab Manager
Radio Communications & EMC

## Test performed:

cn=Christoph Schneider, o=CETECOM ICT Services GmbH, ou=SND-120402, email=christoph.schneider@cetecom.com, c=DE
2015.07.30 09:56:36 +02'00'

Christoph Schneider
Testing Manager
Radio Communications & EMC

# 1 Table of contents

# 2 General information

## 2.1 Notes and disclaimer

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This test report is electronically signed and valid without handwritten signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

**This test report replaces the test report with the number 1-9611/15-01-10 and dated 2015-06-30**

## 2.2 Application details

| | |
|---|---|
| Date of receipt of order: | 2015-04-22 |
| Date of receipt of test item: | 2015-05-28 |
| Start of test: | 2015-05-28 |
| End of test: | 2015-06-05 |
| Person(s) present during the test: | -/- |

# 3 Test standard/s

| Test standard | Date | Test standard description |
|---|---|---|
| 47 CFR Part 15 | -/- | Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices |
| RSS - 247 Issue 1 | 01.05.2015 | Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence - Exempt Local Area Network (LE-LAN) Devices |

## 3.1 Measurement guidance

| | | |
|---|---|---|
| UNII: KDB 789033 | 2014-06 | Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E |

## 4 Test environment

| | | |
|---|---|---|
| Temperature: | $T_{nom}$ | +22 °C during room temperature tests |
| | $T_{max}$ | No tests under extreme conditions |
| | $T_{min}$ | No tests under extreme conditions |
| Relative humidity content: | | 44 % |
| Barometric pressure: | | not relevant for this kind of testing |
| Power supply: | $V_{nom}$ | 110 V AC by internal power supply unit |
| | $V_{max}$ | No tests under extreme conditions |
| | $V_{min}$ | No tests under extreme conditions |

## 5 Test item

| | | |
|---|---|---|
| **Kind of test item** | : | Wireless music system |
| **Type identification** | : | Zeppelin Wireless |
| **HMN** | : | -/- |
| **PMN** | : | Zeppelin Wireless |
| **HVIN** | : | 1.0 |
| **FVIN** | : | MCU 1.00, WiFi CP15, BT 1.1 |
| **S/N serial number** | : | 1503-TR110095 |
| **HW hardware status** | : | TR1 |
| **SW software status** | : | Wifi ir-ser.tst.ven6.5-f32s16_V2.7.3.58736-1 |
| **Frequency band** | : | UNII bands:<br>5150 MHz to 5350 MHz<br>5470 MHz to 5725 MHz<br>5725 MHz to 5850 MHz |
| **Type of radio transmission**<br>**Use of frequency spectrum** | :<br>: | OFDM |
| **Type of modulation** | : | BPSK, QPSK, 16-QAM, 64-QAM |
| **Number of channels** | : | 16 |
| **Antenna** | : | Integrated antenna |
| **Power supply** | : | 110 V AC by internal power supply unit |
| **Temperature range** | : | +5°C to +35°C |

### 5.1 Additional information

The content of the following annexes is defined in the QA. It may be that not all of the listed annexes are necessary for this report, thus some values in between may be missing.

Test setup- and EUT-photos are included in test report: 1-9611/15-01-01_AnnexA
1-9611/15-01-01_AnnexB
1-9611/15-01-01_AnnexD

## 6 Test laboratories sub-contracted

None

## 7 Description of the test setup

Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Weekly chamber inspections and range calibrations are performed. Where possible, RF generating and signalling equipment as well as measuring receivers and analysers are connected to an external high-precision 10 MHz reference (GPS-based or rubidium frequency standard).

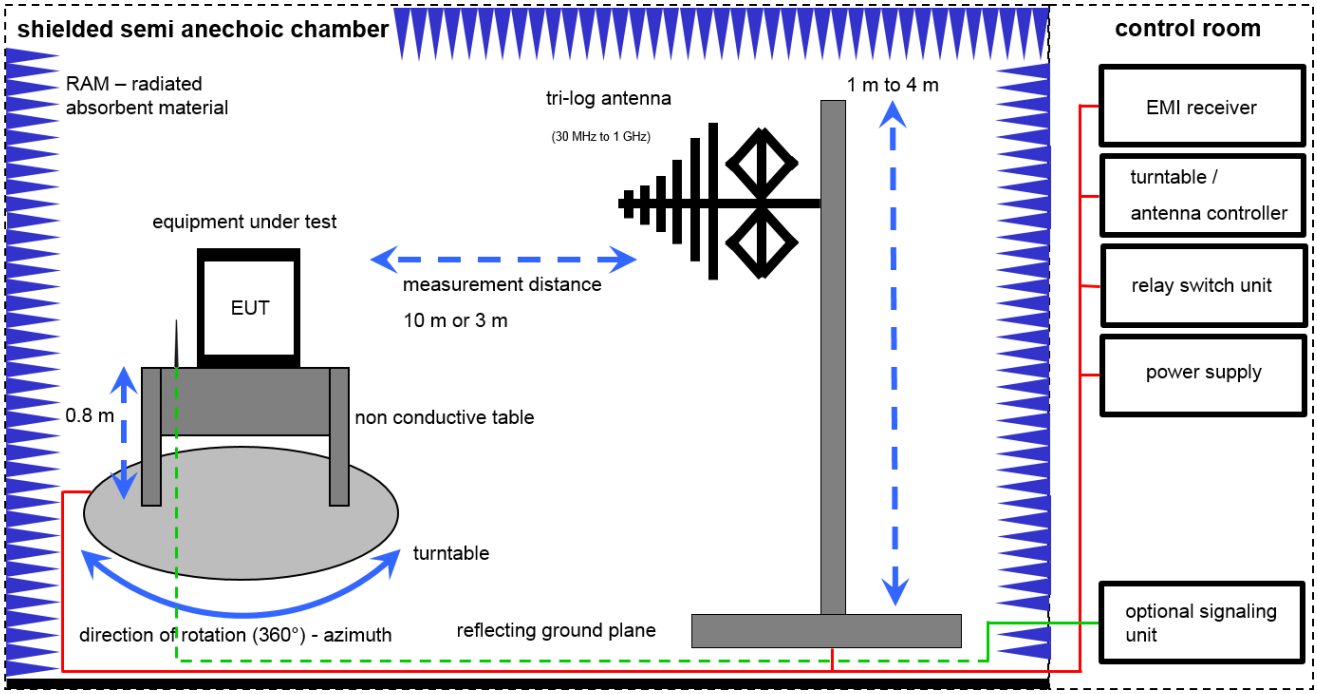
In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Lab/Item).

**Agenda:** Kind of Calibration

| | | | |
|---|---|---|---|
| k | calibration / calibrated | EK | limited calibration |
| ne | not required (k, ev, izw, zw not required) | zw | cyclical maintenance (external cyclical maintenance) |
| ev | periodic self verification | izw | internal cyclical maintenance |
| Ve | long-term stability recognized | g | blocked for accredited testing |
| vlkl! | Attention: extended calibration interval | | |
| NK! | Attention: not calibrated | *) | next calibration ordered / currently in progress |

## 7.1 Shielded semi anechoic chamber

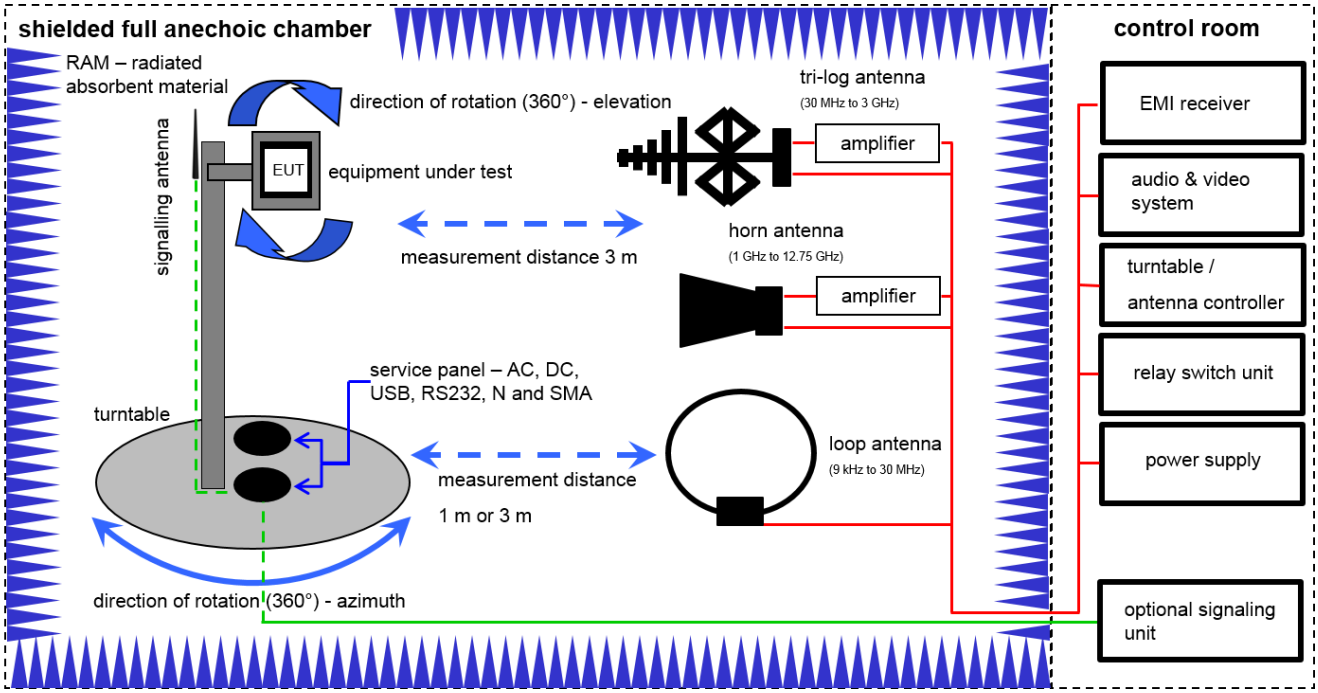
The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 1 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas are confirmed with specifications ANSI C63. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test setups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received. The wanted and unwanted emissions are received by spectrum analysers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63.




**Equipment table:**

| No. | Lab / Item | Equipment | Type | Manufact. | Serial No. | INV. No Cetecom | Kind of Calibration | Last Calibration | Next Calibration |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 45 | Switch-Unit | 3488A | HP | 2719A14505 | 300000368 | ev | | |
| 2 | 45 | EMI Test Receiver | ESCI 3 | R&S | 100083 | 300003312 | k | 26.01.2015 | 26.01.2016 |
| 3 | 45 | Antenna Tower | Model 2175 | ETS-Lindgren | 64762 | 300003745 | izw | | |
| 4 | 45 | Positioning Controller | Model 2090 | ETS-Lindgren | 64672 | 300003746 | izw | | |
| 5 | 45 | TRILOG Broadband Test-Antenna 30 MHz - 3 GHz | VULB9163 | Schwarzbeck | 295 | 300003787 | k | 22.04.2014 | 22.04.2016 |

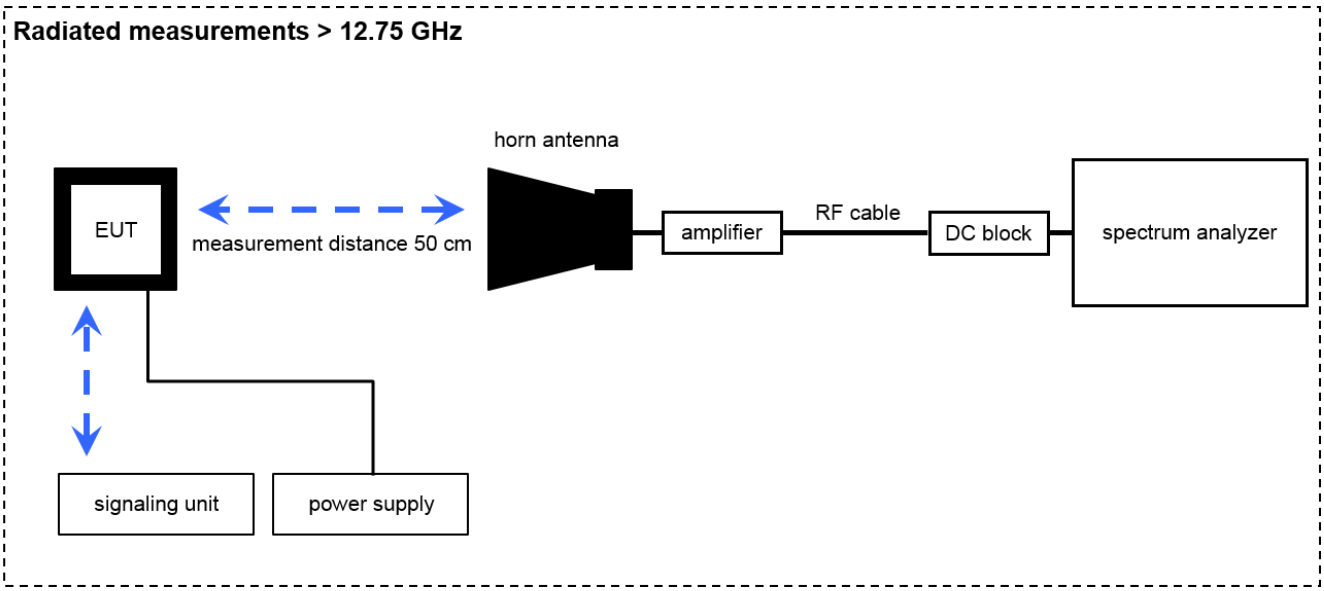
## 7.2 Shielded fully anechoic chamber




**Equipment table:**

| No. | Lab / Item | Equipment | Type | Manufact. | Serial No. | INV. No Cetecom | Kind of Calibration | Last Calibration | Next Calibration |
|---|---|---|---|---|---|---|---|---|---|
| 1 | n. a. | Double-Ridged Waveguide Horn Antenna 1-18.0GHz | 3115 | EMCO | 9709-5290 | 300000212 | k | 23.07.2013 | 23.07.2015 |
| 2 | n. a. | EMI Test Receiver 20Hz-26,5GHz | ESU26 | R&S | 100037 | 300003555 | k | 22.01.2015 | 22.01.2016 |
| 3 | n. a. | TRILOG Broadband Test-Antenna 30 MHz - 3 GHz | VULB9163 | Schwarzbeck | 318 | 300003696 | k | 22.04.2014 | 22.04.2017 |
| 4 | n. a. | Broadband Amplifier 0.5-18 GHz | CBLU5184540 | CERNEX | 22050 | 300004482 | ev | | |
| 5 | n. a. | 4U RF Switch Platform | L4491A | Agilent Technologies | MY50000032 | 300004510 | ne | | |
| 6 | n. a. | NEXIO EMV-Software | BAT EMC | EMCO | MY50000032 | 300004682 | ne | | |
| 7 | n. a. | Anechoic chamber | FAC 3/5m | MWB / TDK | 87400/02 | 300000996 | ev | | |

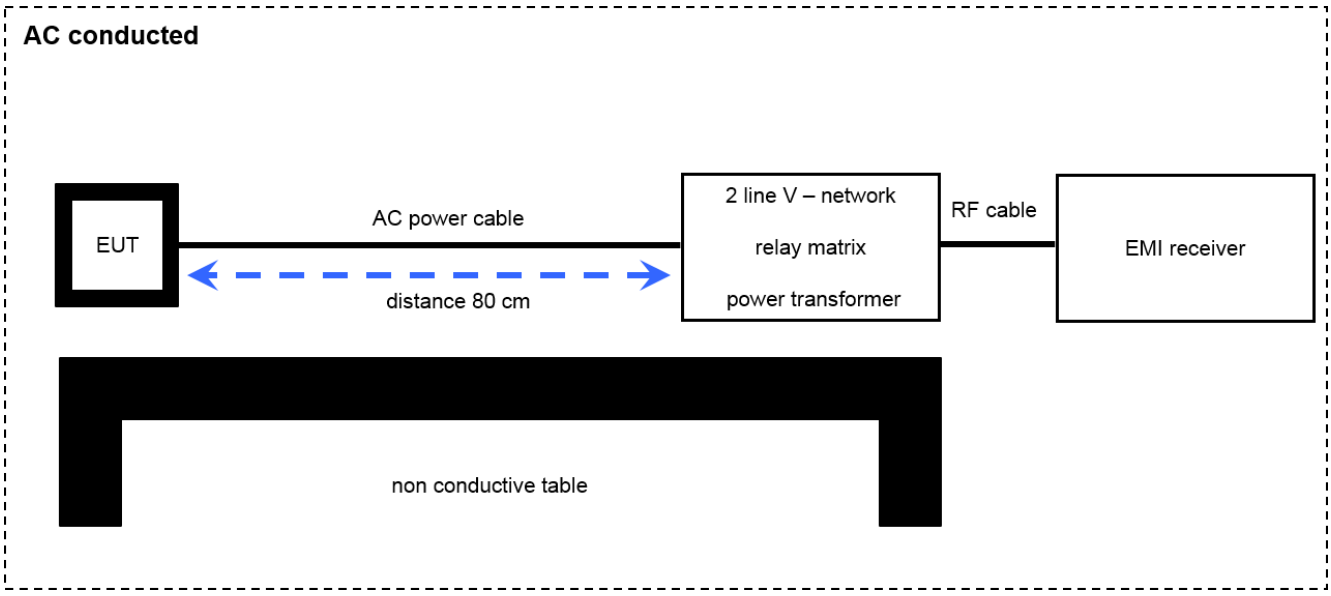
## 7.3 Radiated measurements > 12.75 GHz




**Equipment table:**

| No. | Lab / Item | Equipment | Type | Manufact. | Serial No. | INV. No Cetecom | Kind of Calibration | Last Calibration | Next Calibration |
|---|---|---|---|---|---|---|---|---|---|
| 1 | A026 | Std. Gain Horn Antenna 12.4 to 18.0 GHz | 639 | Narda | 8402 | 300000787 | k | 22.07.2013 | 22.07.2015 |
| 2 | A029 | Std. Gain Horn Antenna 18.0 to 26.5 GHz | 638 | Narda | 8205 | 300002442 | k | 19.07.2013 | 19.07.2015 |
| 3 | A031 | Std. Gain Horn Antenna 26.5 to 40.0 GHz | V637 | Narda | 8205 | 300000510 | k | 19.07.2013 | 19.07.2015 |
| 4 | A031 | Amplifier 2-40 GHz | JS32-02004000-57-5P | MITEQ | 1777200 | 300004541 | ev | | |
| 5 | A031 | Signal Analyzer 40 GHz | FSV40 | R&S | 101353 | 300004819 | k | 27.01.2015 | 27.01.2016 |

## 7.4 AC conducted




**Equipment table:**

| No. | Lab / Item | Equipment | Type | Manufact. | Serial No. | INV. No Cetecom | Kind of Calibration | Last Calibration | Next Calibration |
|---|---|---|---|---|---|---|---|---|---|
| 1 | n. a. | Netznachbildung | ESH3-Z5 | R&S | 892475/017 | 300002209 | k | 17.06.2014 | 17.06.2016 |
| 2 | 85 | Koppelnetzwerk | CDN 801 M2/M3 | EM-Test | 9350105 | 300000534 | k | | |
| 3 | 68 | EMI-Receiver | 8542E | HP | 3617A00170 | 300000568 | k | 28.01.2015 | 28.01.2016 |

## 8 Summary of measurement results

| | |
|---|---|
| ☐ | No deviations from the technical specifications were ascertained |
| ☐ | There were deviations from the technical specifications ascertained |
| ☒ | This test report is only a partial test report.<br>The content and verdict of the performed test cases are listed below. |

| TC Identifier | Description | Verdict | Date | Remark |
|---|---|---|---|---|
| RF-Testing | CFR Part 15<br>RSS 247, Issue 1 | see table | 2015-07-30 | Reduced tests according to customer demand! |

| Test specification clause | Test case | Temperature conditions | Power source voltages | Pass | Fail | NA | NP | Remark |
|---|---|---|---|---|---|---|---|---|
| -/- | Output power verification (conducted) | Nominal | Nominal | ☐ | ☐ | ☐ | ☒ | According to main report |
| -/- | Gain | Nominal | Nominal | ☐ | ☐ | ☐ | ☒ | No passed / fail criteria! |
| U-NII Part 15 | Duty cycle | Nominal | Nominal | ☐ | ☐ | ☐ | ☒ | No passed / fail criteria! |
| §15.407(a)<br>RSS - 247 (6.2.1) (1)<br>RSS - 247 (6.2.2) (1)<br>RSS - 247 (6.2.3) (1)<br>RSS - 247 (6.2.4) (1) | Maximum output power (conducted & radiated) | Nominal | Nominal | ☐ | ☐ | ☐ | ☒ | -/- |
| §15.407(a)<br>RSS - 247 (6.2.1) (1)<br>RSS - 247 (6.2.2) (1)<br>RSS - 247 (6.2.3) (1)<br>RSS - 247 (6.2.4) (1) | Power spectral density | Nominal | Nominal | ☐ | ☐ | ☐ | ☒ | -/- |
| §15.407(a) | Spectrum bandwidth 26dB bandwidth | Nominal | Nominal | ☐ | ☐ | ☐ | ☒ | -/- |
| RSS Gen clause 6.6 | Spectrum bandwidth 99% bandwidth | Nominal | Nominal | ☐ | ☐ | ☐ | ☒ | -/- |
| §15.407(a) | Peak excursion measurements | Nominal | Nominal | ☐ | ☐ | ☐ | ☒ | -/- |
| §15.205<br>RSS - 247 (6.2.1) (2)<br>RSS - 247 (6.2.2) (2)<br>RSS - 247 (6.2.3) (2)<br>RSS - 247 (6.2.4) (2) | Band edge compliance radiated | Nominal | Nominal | ☒ | ☐ | ☐ | ☐ | complies |
| §15.407(b)<br>RSS - 247 (6.2.1) (2)<br>RSS - 247 (6.2.2) (2)<br>RSS - 247 (6.2.3) (2)<br>RSS - 247 (6.2.4) (2) | TX spurious emissions radiated | Nominal | Nominal | ☒ | ☐ | ☐ | ☐ | complies |
| §15.109<br>RSS-Gen | RX spurious emissions radiated | Nominal | Nominal | ☒ | ☐ | ☐ | ☐ | complies |
| §15.209(a)<br>RSS-Gen | Spurious emissions radiated < 30 MHz | Nominal | Nominal | ☒ | ☐ | ☐ | ☐ | complies |
| §15.107(a)<br>§15.207 | Spurious emissions conducted emissions < 30 MHz | Nominal | Nominal | ☒ | ☐ | ☐ | ☐ | complies |

**Note:** NA = Not Applicable; NP = Not Performed

## 9 Additional comments

| | | |
|---|---|---|
| Reference documents: | Document 75917143 Report 06 Issue 1 (TÜV Süd) | |
| Special test descriptions: | None | |
| Configuration descriptions: | None | |
| Test mode: | ☐ | No test mode available. |
| | ☒ | Special software is used.<br>EUT is transmitting pseudo random data by itself |

# 10 Measurement results

## 10.1 Identify worst case datarate

The worst case datarate identification refers to the Document 75917143 Report 06 Issue 1 (TÜV Süd) which was provided by the customer.

**Results:**

| **Modulation** | Modulation scheme / bandwidth | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Frequency / MHz | 5180 | 5240 | 5260 | 5320 | 5500 | 5600 | 5700 | 5745 | 5785 | 5805 |
| OFDM / a – mode | 6 Mbit/s | | | | | | | | | |
| OFDM / n/ac – mode HT20 | MCS0 | | | | | | | | | |
| | | | | | | | | | | |

## 10.2 Band edge compliance radiated

**Description:**

Measurement of the radiated band edge compliance. The EUT is turned in the position that results in the maximum level at the band edge. Then a sweep over the corresponding restricted band is performed. The EUT is set to the lowest channel for the lower restricted band and to the highest channel for the upper restricted band. Measurement distance is 3m.

**Measurement:**

| Measurement parameter | |
|---|---|
| Detector: | Peak / RMS |
| Sweep time: | Auto |
| Resolution bandwidth: | 1 MHz |
| Video bandwidth: | 10 Hz / 1 MHz |
| Span: | See plots! |
| Trace-Mode: | Max Hold |

**Limits:**

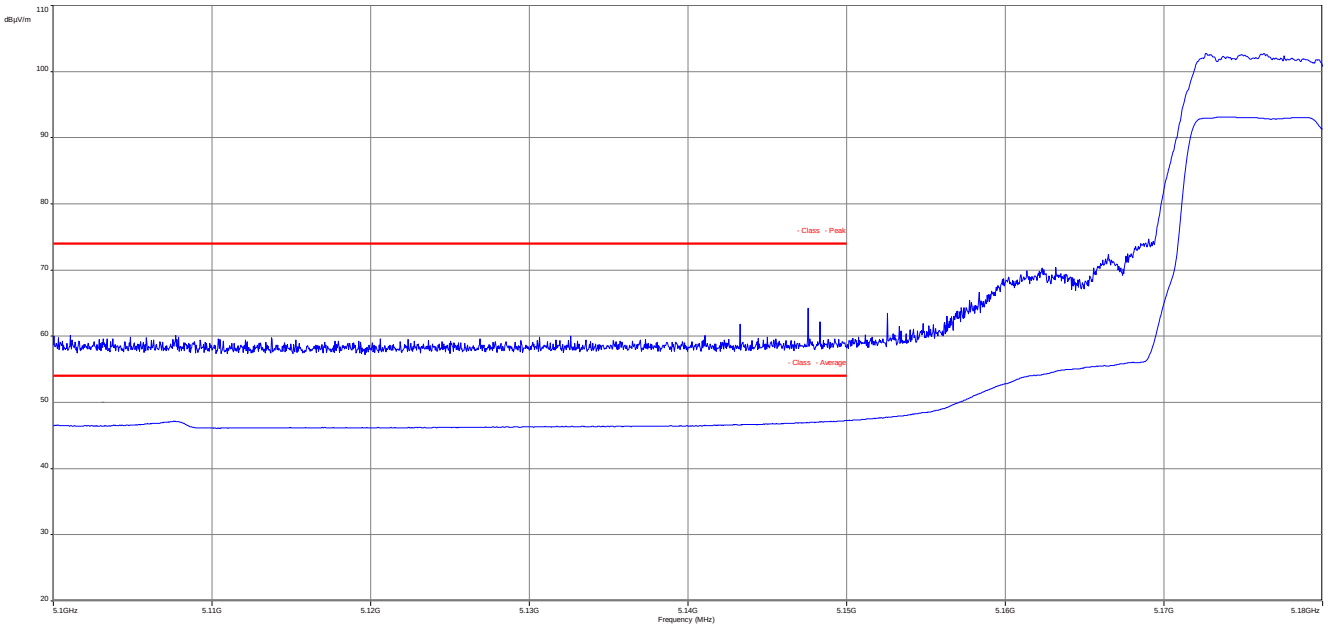
| Band Edge Compliance Radiated |
|---|
| In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 5.205(c)). |
| 74 dBµV/m PEAK<br>54 dBµV/m AVG |

**Result:**

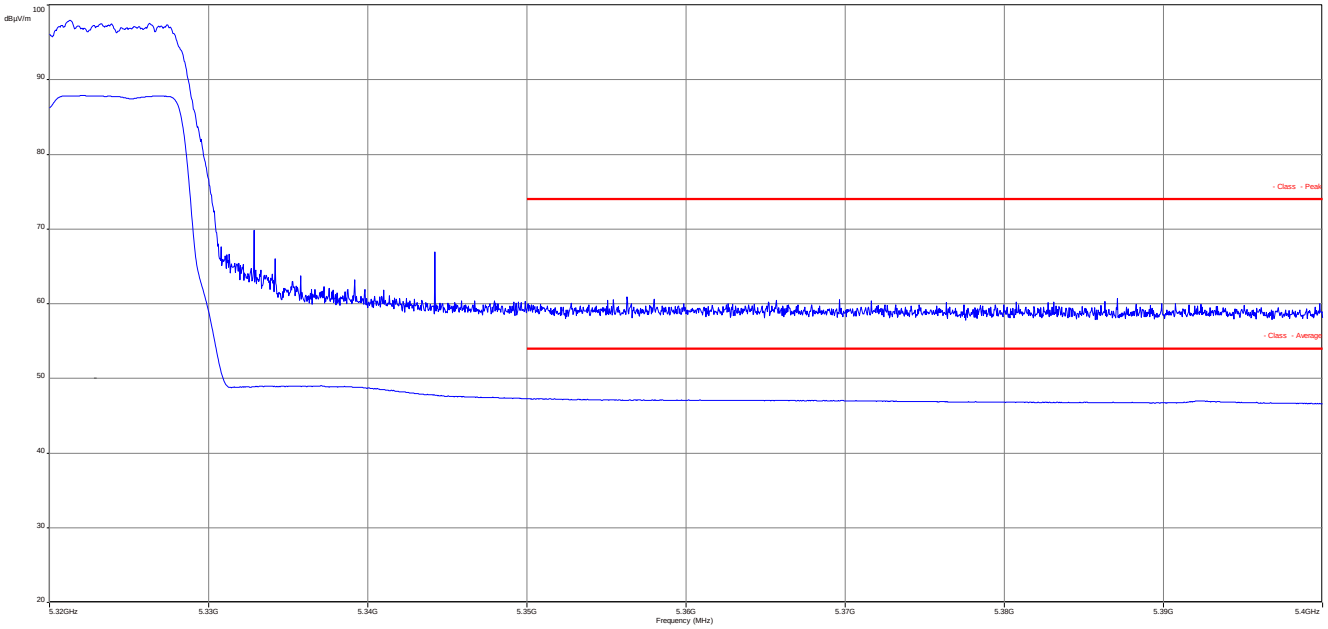
| Scenario | Band Edge Compliance Radiated [dBµV/m] |
|---|---|
| band edge | < 74 dBµV/m (PEAK)<br>< 54 dBµV/m (AVG) |
| Measurement uncertainty | ± 3 dB |

**Plots, a mode:**

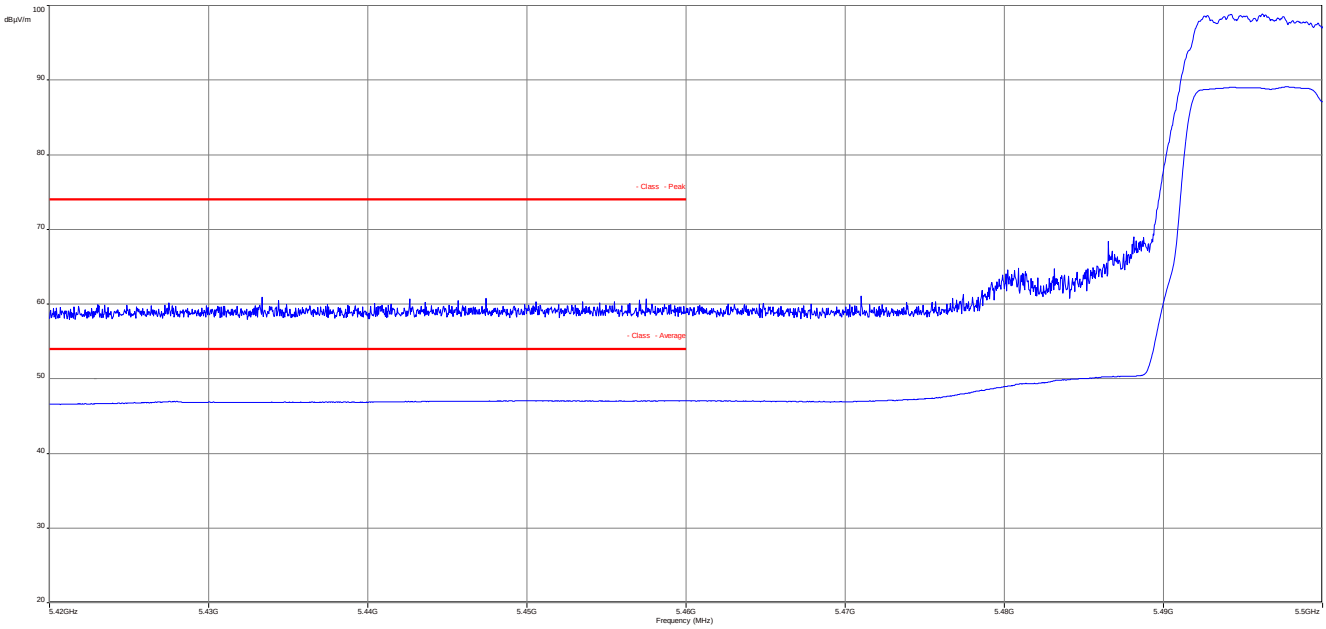
**Plot 1:** lower band edge, vertical & horizontal polarization, channel 36




**Plot 2:** upper band edge, vertical & horizontal polarization, channel 64



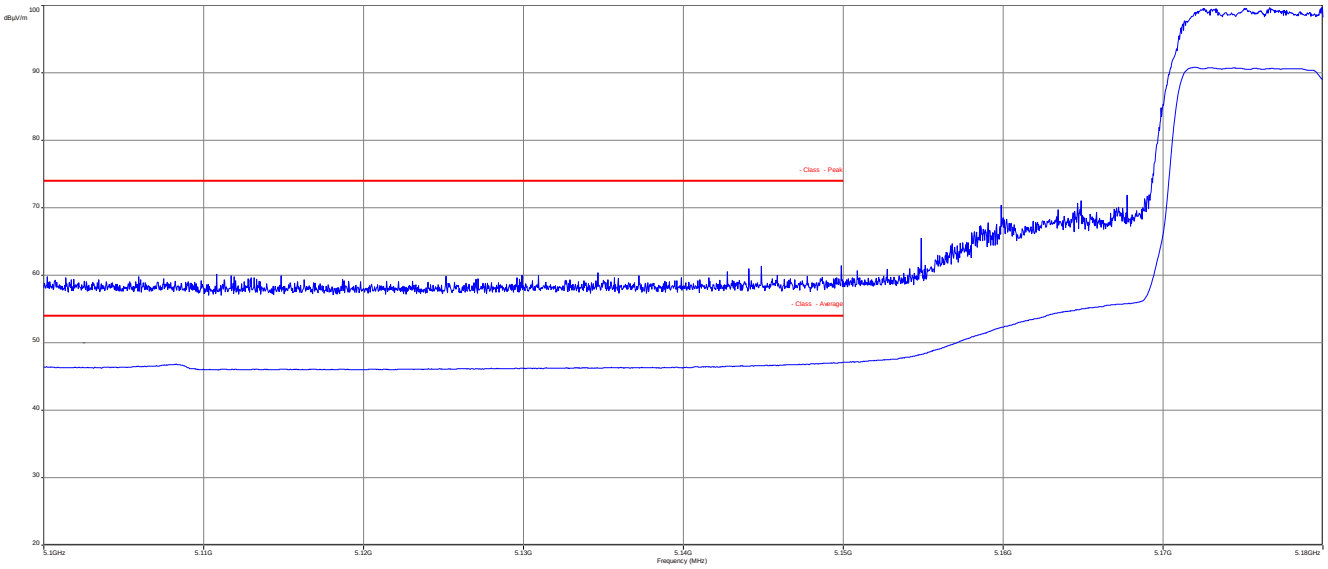
**Plot 3:** lower band edge, vertical & horizontal polarization, channel 100



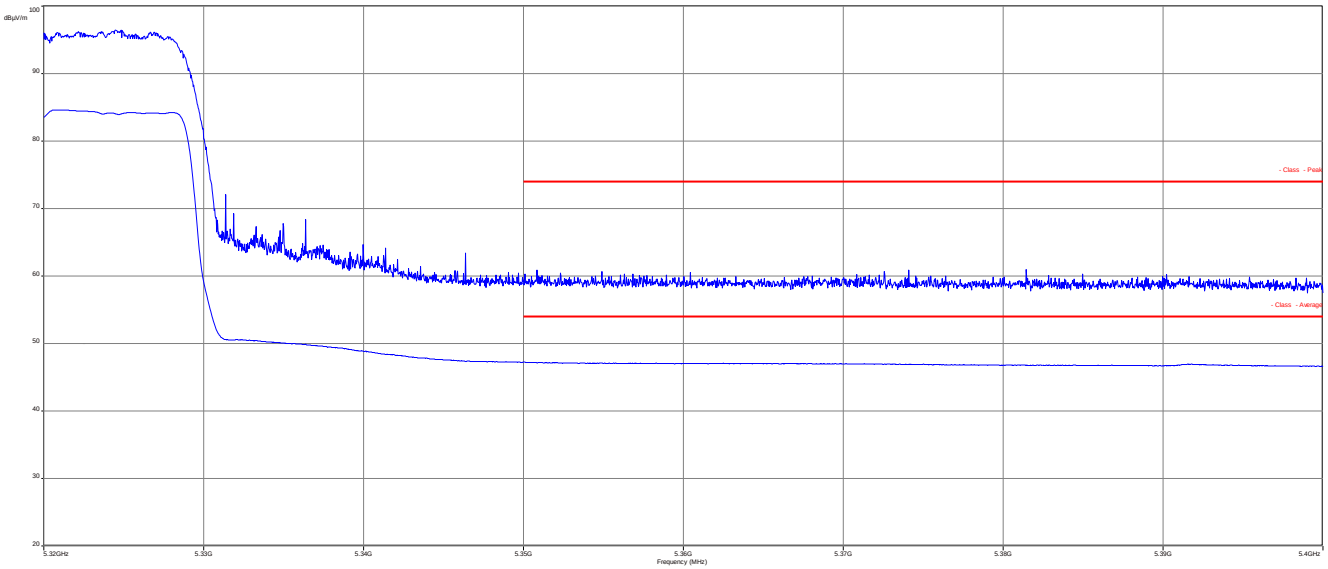

**Verdict:** **Complies**

## Plots, n mode:

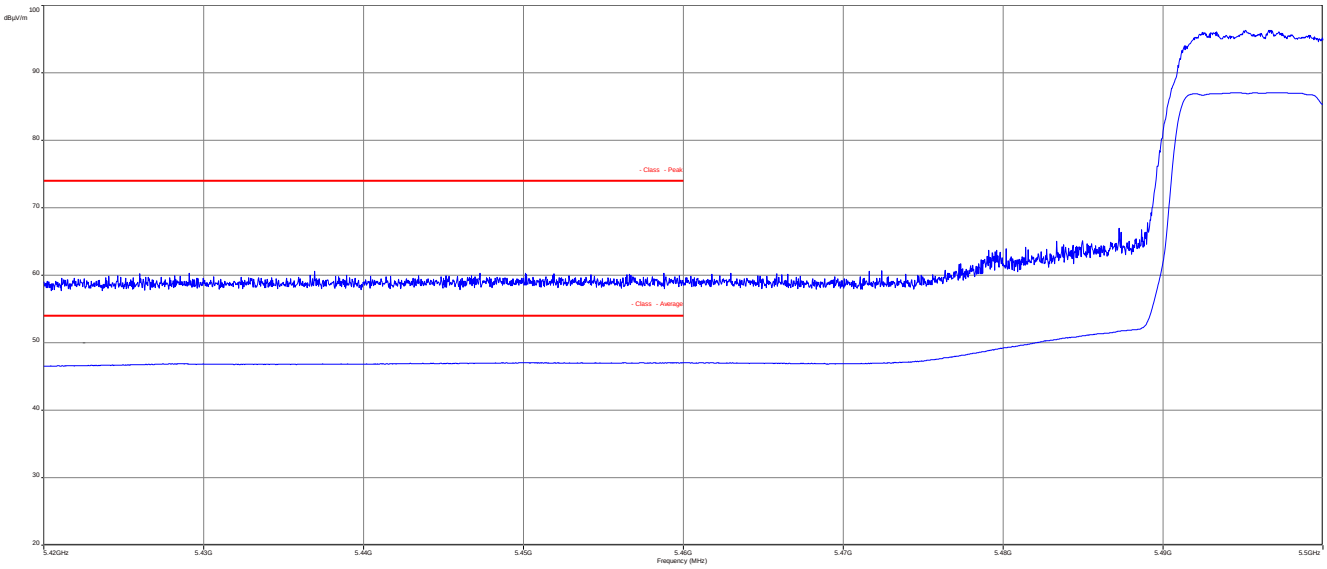
**Plot 4:** lower band edge, vertical & horizontal polarization, channel 36




**Plot 5:** upper band edge, vertical & horizontal polarization, channel 64



**Plot 6:** lower band edge, vertical & horizontal polarization, channel 100




**Verdict:** **Complies**

## 10.3 TX spurious emissions radiated

**Description:**

Measurement of the radiated spurious emissions in transmit mode. The measurement is performed at lowest, middle and highest channel.

**Measurement:**

| Measurement parameter | |
|---|---|
| Detector: | Quasi Peak below 1 GHz (alternative Peak)<br><br>Peak above 1 GHz / RMS |
| Sweep time: | Auto |
| Resolution bandwidth: | F < 1 GHz: 100 kHz<br>F > 1 GHz: 1 MHz |
| Video bandwidth: | F < 1 GHz: 100 kHz<br>F > 1 GHz: ≥ 3 MHz / 1 MHz |
| Span: | 30 MHz to 40 GHz |
| Trace-Mode: | Max Hold / Average with 100 counts + 20 log (1 / X) for duty cycle lower than 100 % |

**Limits:**

| TX Spurious Emissions Radiated | | |
|---|---|---|
| §15.209 | | |
| Frequency (MHz) | Field Strength (dBµV/m) | Measurement distance |
| 30 - 88 | 30.0 | 10 |
| 88 – 216 | 33.5 | 10 |
| 216 – 960 | 36.0 | 10 |
| Above 960 | 54.0 | 3 |
| §15.407 | | |
| Outside the restricted bands! | -27 dBm / MHz | |

**Results: a-mode**

| TX Spurious Emissions Radiated [dBµV/m] / dBm | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| OFDM a – mode | | | | | | | | |
| Lowest 5180 MHz | | | Middle | | | Highest 5240 MHz | | |
| F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] |
| No peaks found. | | | -/- | | | No peaks found. | | |
| | | | -/- | -/- | -/- | | | |
| | | | -/- | -/- | -/- | | | |
| Measurement uncertainty | | | ± 3 dB | | | | | |

| TX Spurious Emissions Radiated [dBµV/m] / dBm | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| OFDM a – mode | | | | | | | | |
| Lowest 5260 MHz | | | Middle | | | Highest 5320 MHz | | |
| F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] |
| No peaks found. | | | -/- | | | No peaks found. | | |
| | | | -/- | -/- | -/- | | | |
| | | | -/- | -/- | -/- | | | |
| Measurement uncertainty | | | ± 3 dB | | | | | |

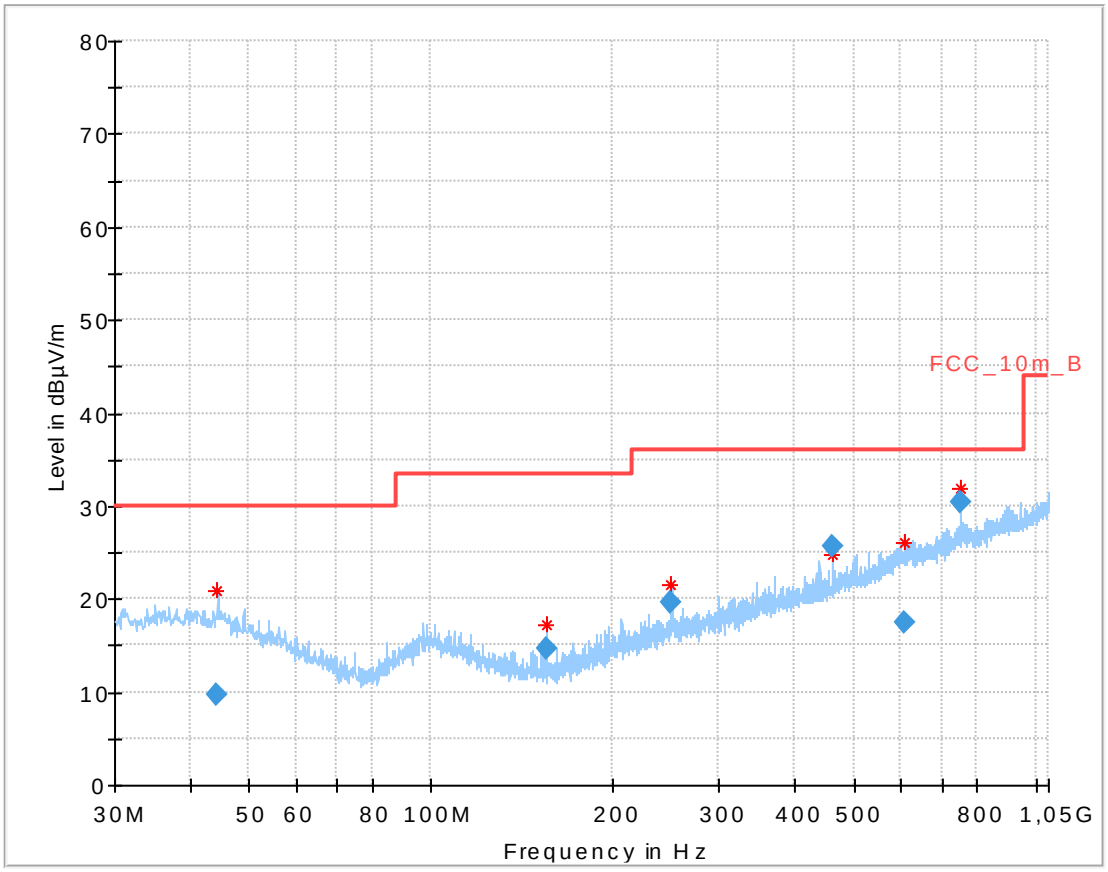
| TX Spurious Emissions Radiated [dBµV/m] / dBm | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| OFDM a – mode | | | | | | | | |
| Lowest 5500 MHz | | | Middle 5600 MHz | | | Highest 5700 MHz | | |
| F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] |
| No peaks found. | | | No peaks found. | | | No peaks found. | | |
| | | | | | | | | |
| | | | | | | | | |
| Measurement uncertainty | | | ± 3 dB | | | | | |

| TX Spurious Emissions Radiated [dBµV/m] / dBm | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| OFDM a – mode | | | | | | | | |
| Lowest 5745 MHz | | | Middle 5785 MHz | | | Highest 5805 MHz | | |
| F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] |
| No peaks found. | | | No peaks found. | | | No peaks found. | | |
| | | | | | | | | |
| | | | | | | | | |
| Measurement uncertainty | | | ± 3 dB | | | | | |

**Verdict:** complies

**Plots:** OFDM / a – mode

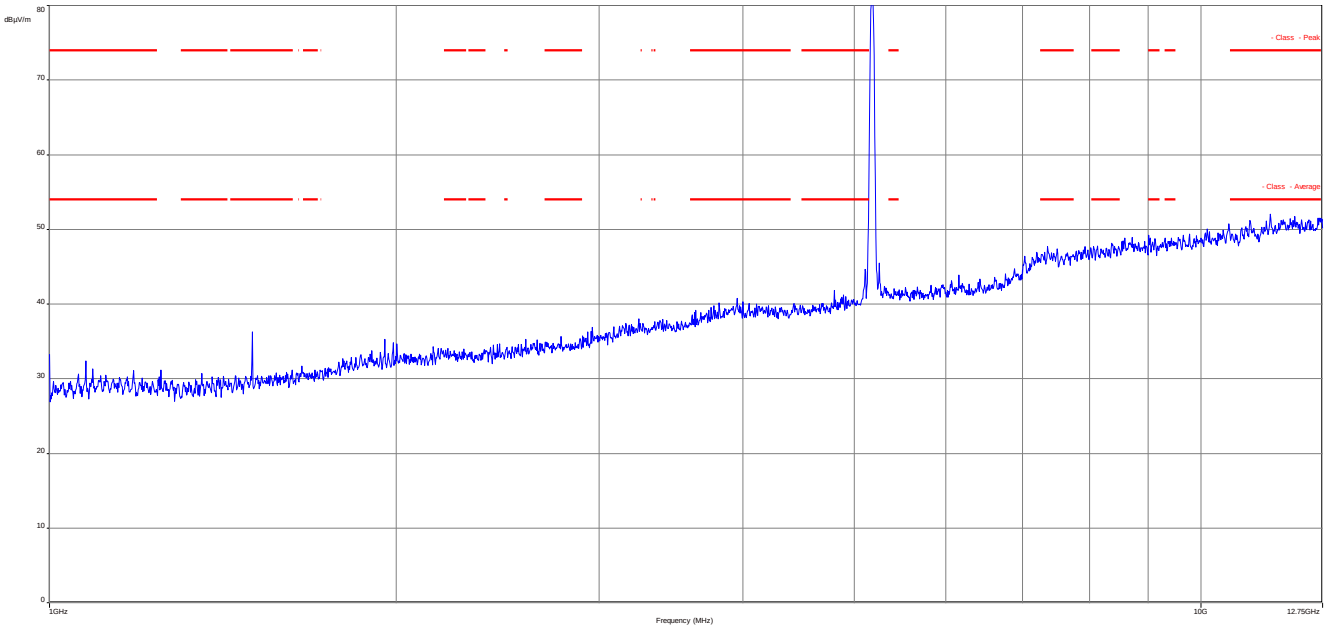
**Plot 1:** 30 MHz to 1 GHz, 5180 MHz, vertical & horizontal polarization



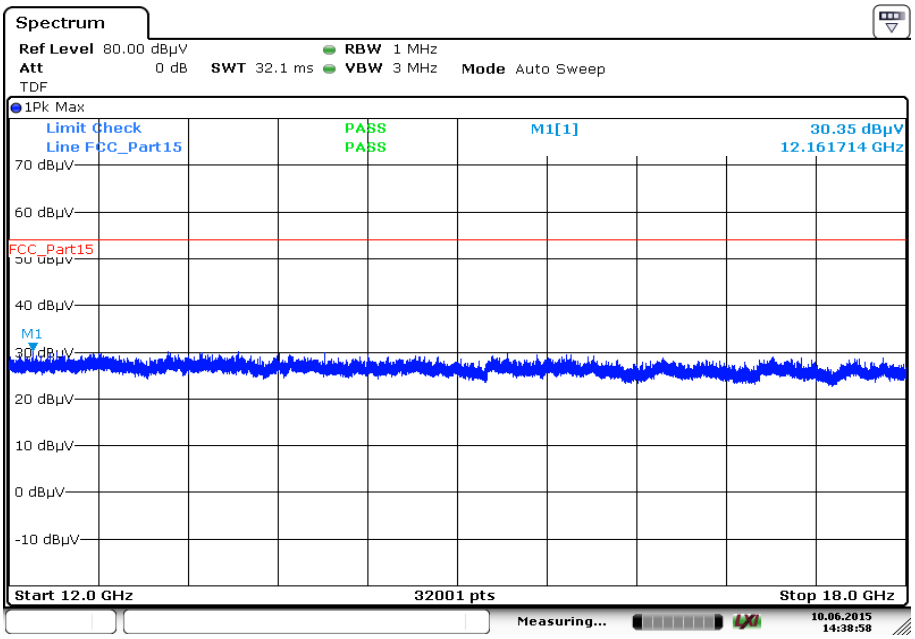

**Final_Result**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 44.067300 | 9.81 | 30.00 | 20.19 | 1000.0 | 120.000 | 170.0 | V | 27 | 13.9 |
| 154.961100 | 14.57 | 33.50 | 18.93 | 1000.0 | 120.000 | 98.0 | V | 139 | 9.0 |
| 249.997650 | 19.55 | 36.00 | 16.45 | 1000.0 | 120.000 | 98.0 | V | 203 | 13.3 |
| 460.776900 | 25.65 | 36.00 | 10.35 | 1000.0 | 120.000 | 170.0 | H | 217 | 17.8 |
| 607.930650 | 17.57 | 36.00 | 18.43 | 1000.0 | 120.000 | 98.0 | V | 356 | 20.8 |
| 750.026400 | 30.38 | 36.00 | 5.62 | 1000.0 | 120.000 | 101.0 | H | 266 | 22.7 |

**Plot 2:** 1 GHz to 12.75 GHz, 5180 MHz, vertical & horizontal polarization

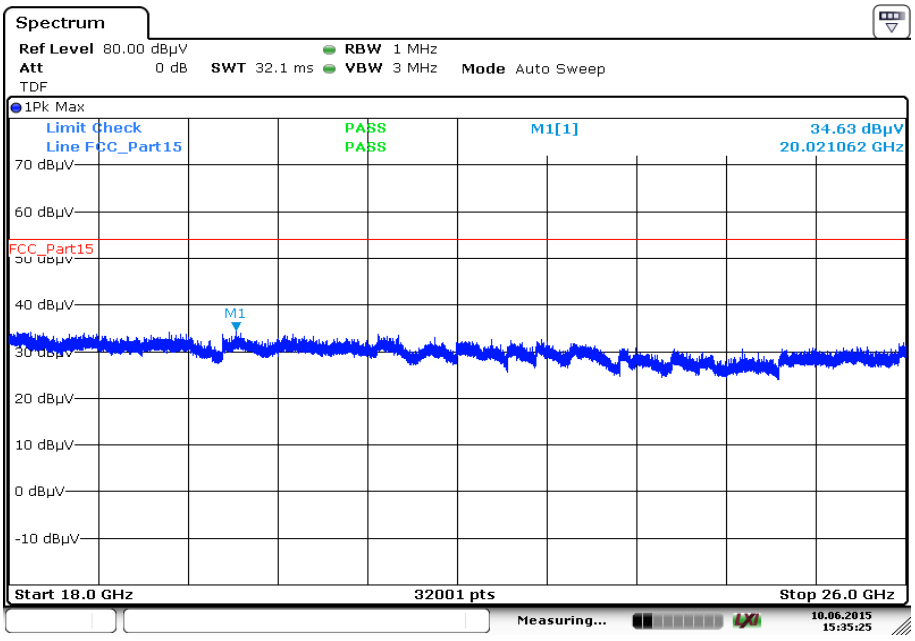



**Plot 3:** 12 GHz to 18 GHz, 5180 MHz, vertical & horizontal polarization



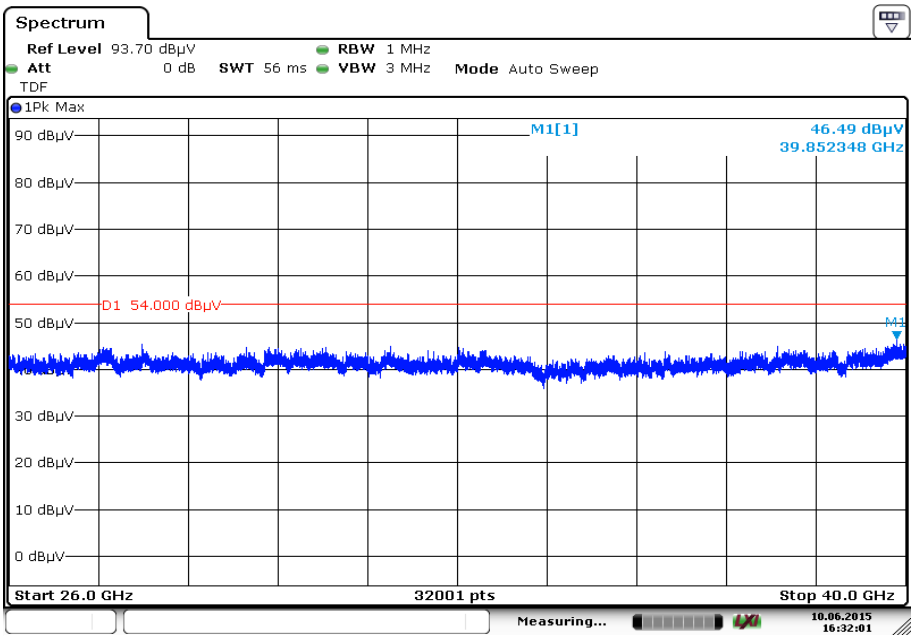

Date: 10.JUN.2015 14:38:59

**Plot 4:** 18 GHz to 26 GHz, 5180 MHz, vertical & horizontal polarization



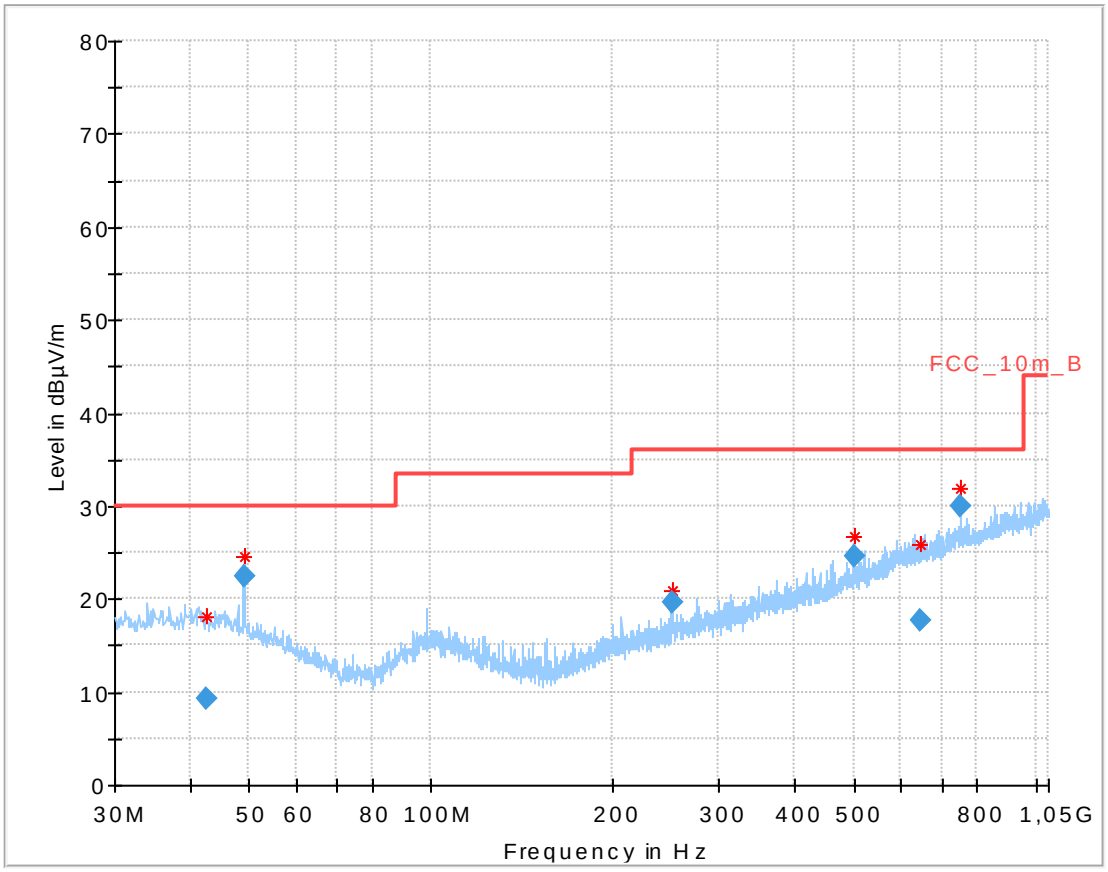

Date: 10.JUN.2015 15:35:26

**Plot 5:** 26 GHz to 40 GHz, 5180 MHz, vertical & horizontal polarization




Date: 10.JUN.2015 16:32:02

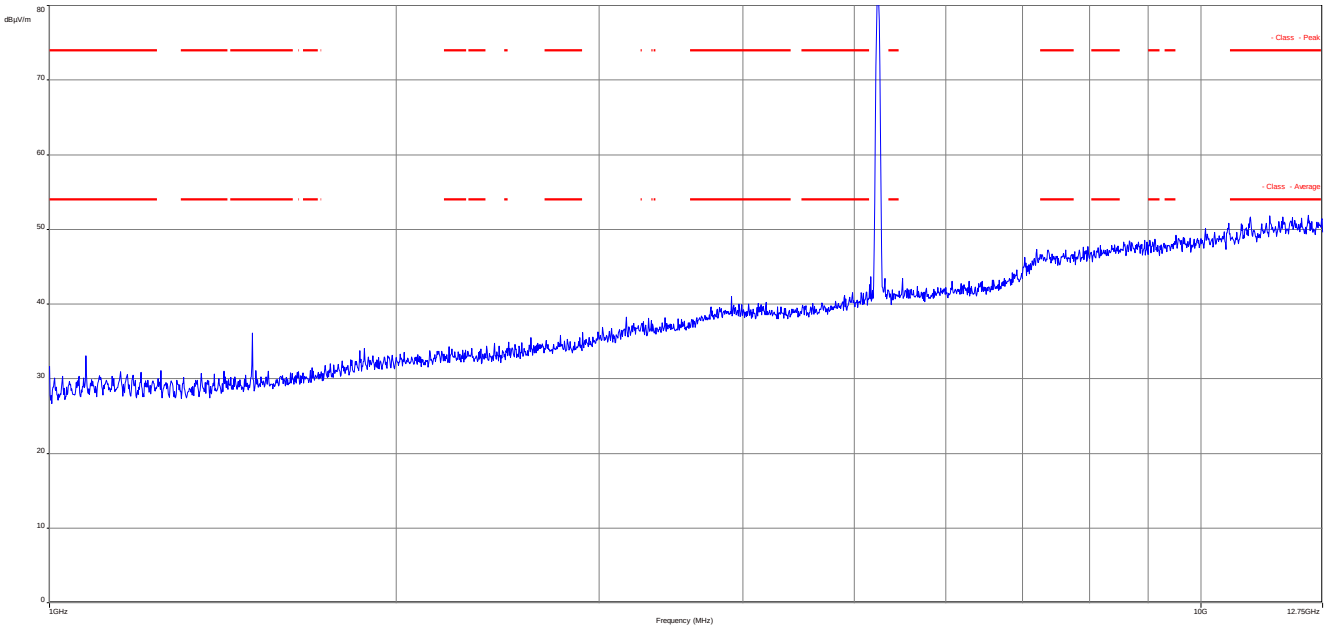
**Plot 6:** 30 MHz to 1 GHz, 5240 MHz, vertical & horizontal polarization



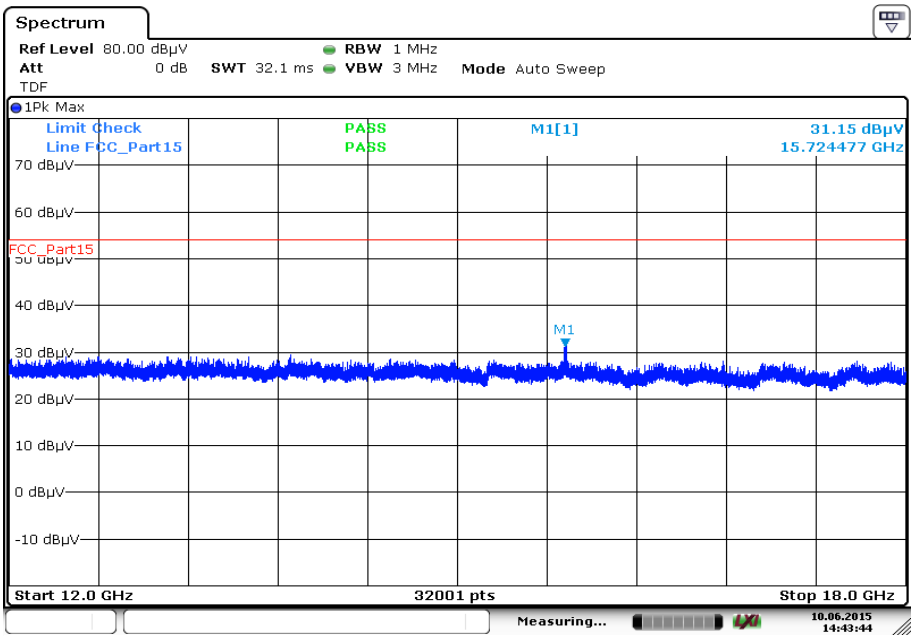

**Final_Result**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 42.722550 | 9.32 | 30.00 | 20.68 | 1000.0 | 120.000 | 170.0 | H | 216 | 13.9 |
| 49.138200 | 22.48 | 30.00 | 7.52 | 1000.0 | 120.000 | 98.0 | V | 94 | 12.8 |
| 250.025400 | 19.56 | 36.00 | 16.44 | 1000.0 | 120.000 | 98.0 | V | 201 | 13.4 |
| 500.038200 | 24.50 | 36.00 | 11.50 | 1000.0 | 120.000 | 170.0 | H | 45 | 18.7 |
| 644.794050 | 17.75 | 36.00 | 18.25 | 1000.0 | 120.000 | 101.0 | V | 216 | 21.1 |
| 750.043950 | 30.05 | 36.00 | 5.95 | 1000.0 | 120.000 | 98.0 | H | 254 | 22.7 |

**Plot 7:** 1 GHz to 12.75 GHz, 5240 MHz, vertical & horizontal polarization

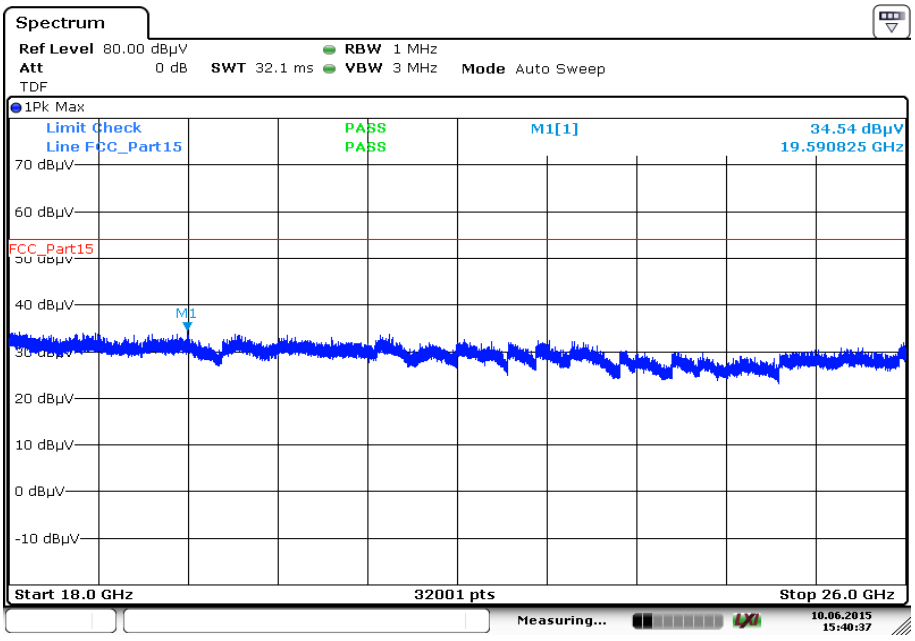



**Plot 8:** 12 GHz to 18 GHz, 5240 MHz, vertical & horizontal polarization



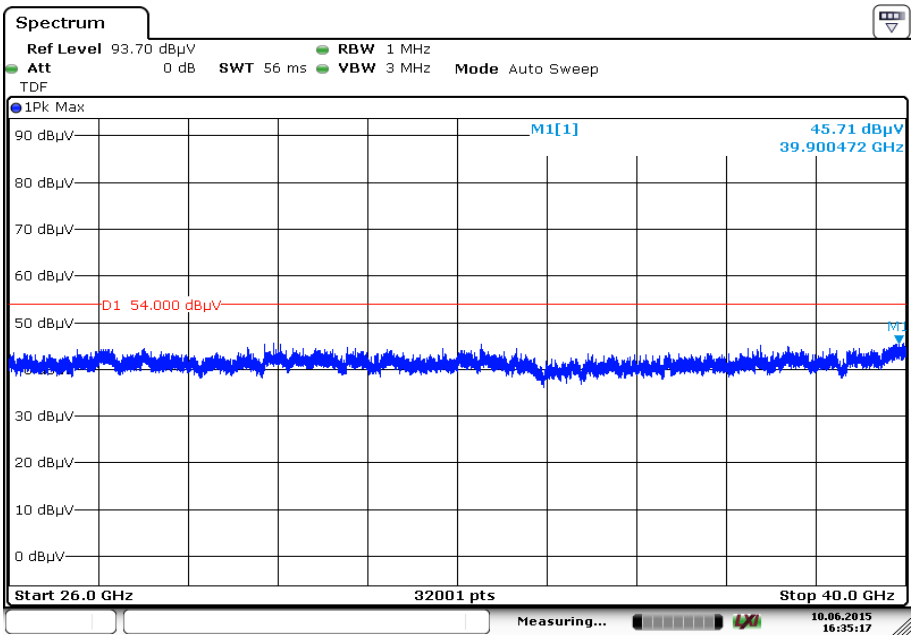

Date: 10.JUN.2015 14:43:44

**Plot 9:** 18 GHz to 26 GHz, 5240 MHz, vertical & horizontal polarization



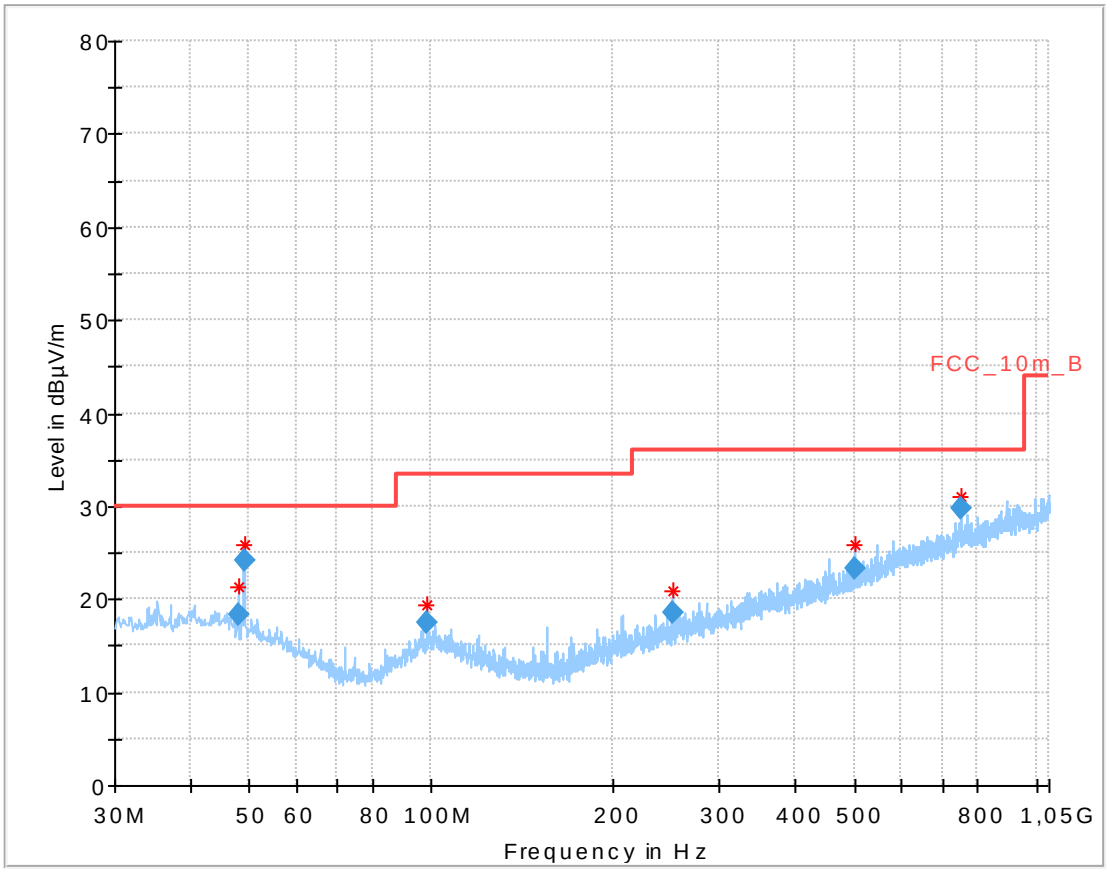

Date: 10.JUN.2015 15:40:37

**Plot 10:** 26 GHz to 40 GHz, 5240 MHz, vertical & horizontal polarization




Date: 10.JUN.2015 16:35:18

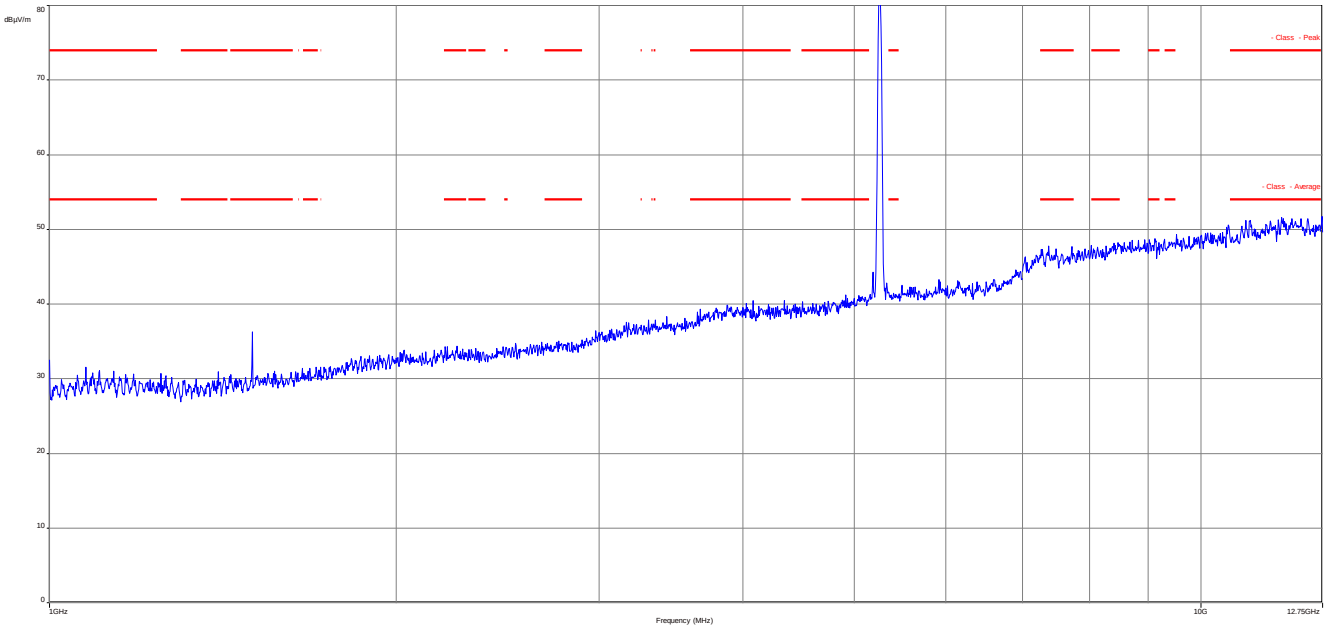
**Plot 11:** 30 MHz to 1 GHz, 5260 MHz, vertical & horizontal polarization



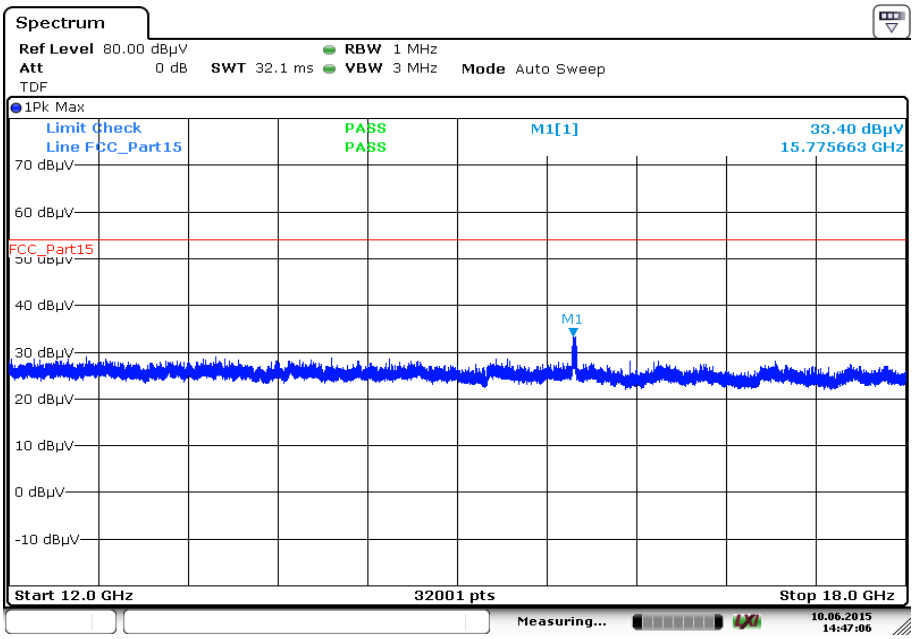

**Final_Result**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 48.002850 | 18.33 | 30.00 | 11.67 | 1000.0 | 120.000 | 101.0 | V | 102 | 13.1 |
| 49.147800 | 24.15 | 30.00 | 5.85 | 1000.0 | 120.000 | 98.0 | V | 125 | 12.8 |
| 98.299800 | 17.53 | 33.50 | 15.97 | 1000.0 | 120.000 | 101.0 | V | 358 | 11.9 |
| 250.026750 | 18.65 | 36.00 | 17.35 | 1000.0 | 120.000 | 98.0 | V | 161 | 13.4 |
| 500.007450 | 23.29 | 36.00 | 12.71 | 1000.0 | 120.000 | 101.0 | H | 51 | 18.7 |
| 750.049650 | 29.70 | 36.00 | 6.30 | 1000.0 | 120.000 | 98.0 | H | 265 | 22.7 |

**Plot 12:** 1 GHz to 12.75 GHz, 5260 MHz, vertical & horizontal polarization

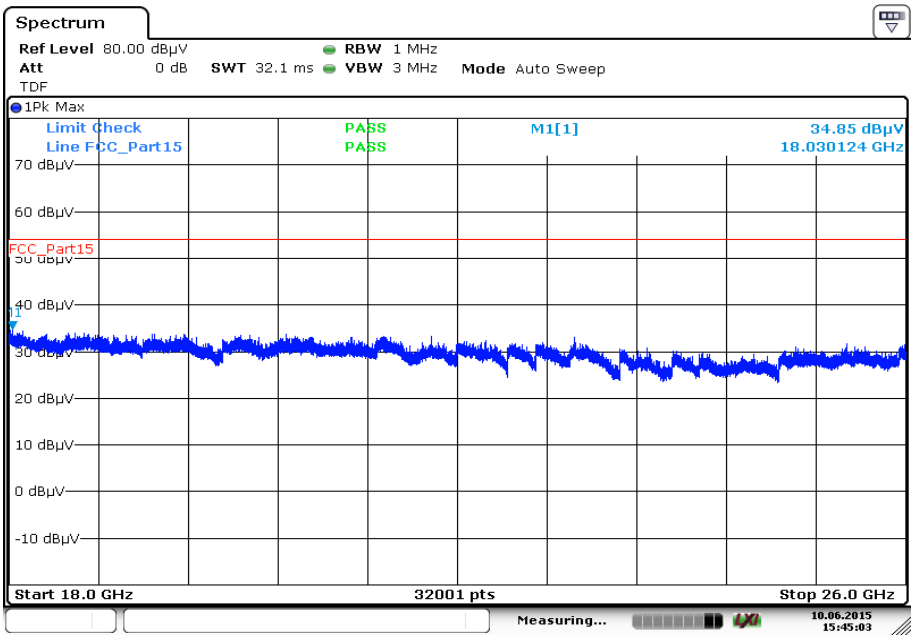



**Plot 13:** 12 GHz to 18 GHz, 5260 MHz, vertical & horizontal polarization



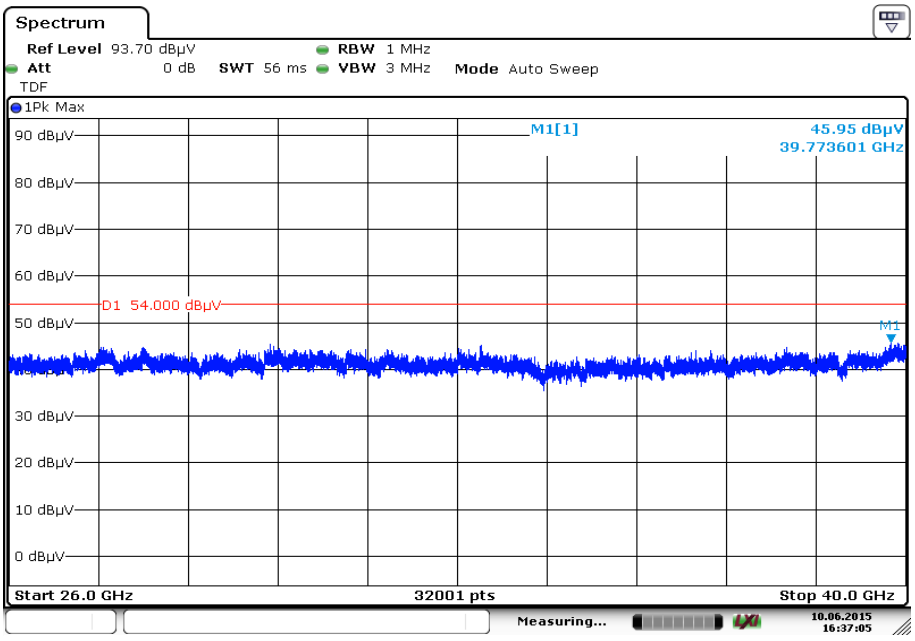

Date: 10.JUN.2015 14:47:07

**Plot 14:** 18 GHz to 26 GHz, 5260 MHz, vertical & horizontal polarization



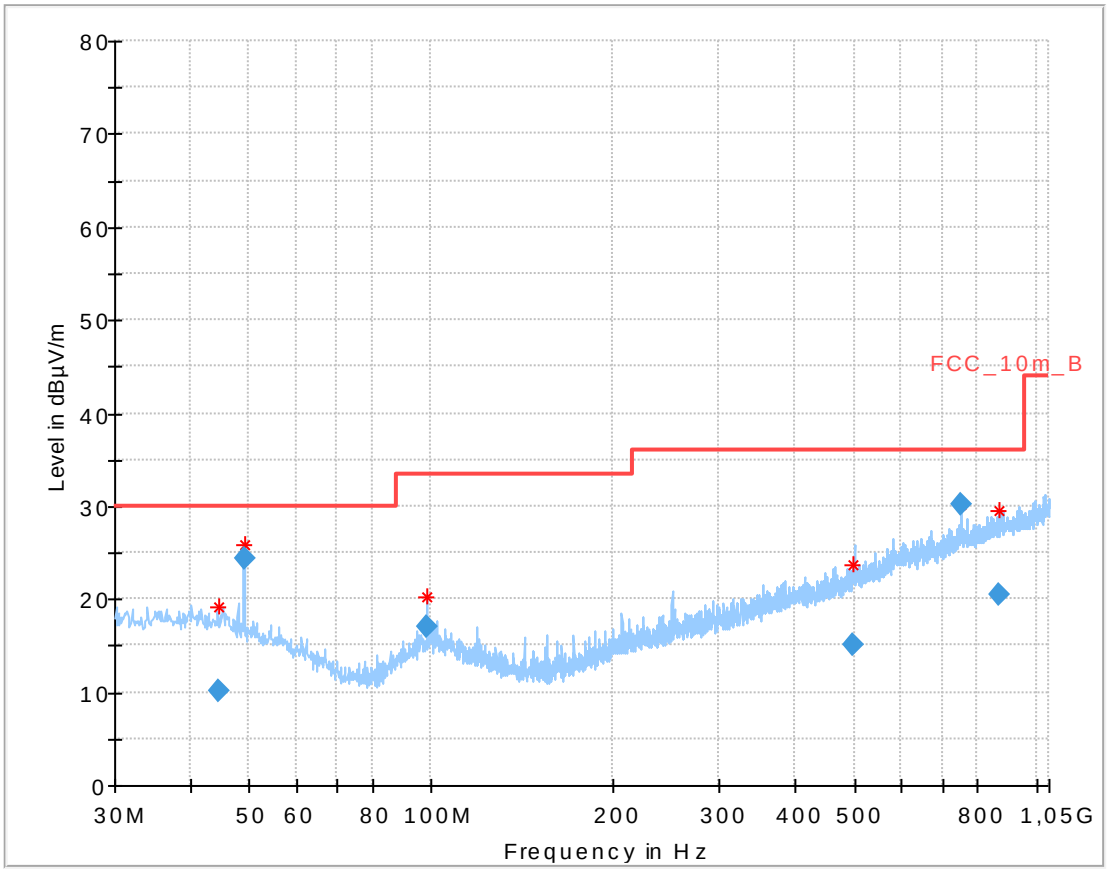

Date: 10.JUN.2015 15:45:03

**Plot 15:** 26 GHz to 40 GHz, 5260 MHz, vertical & horizontal polarization




Date: 10.JUN.2015 16:37:05

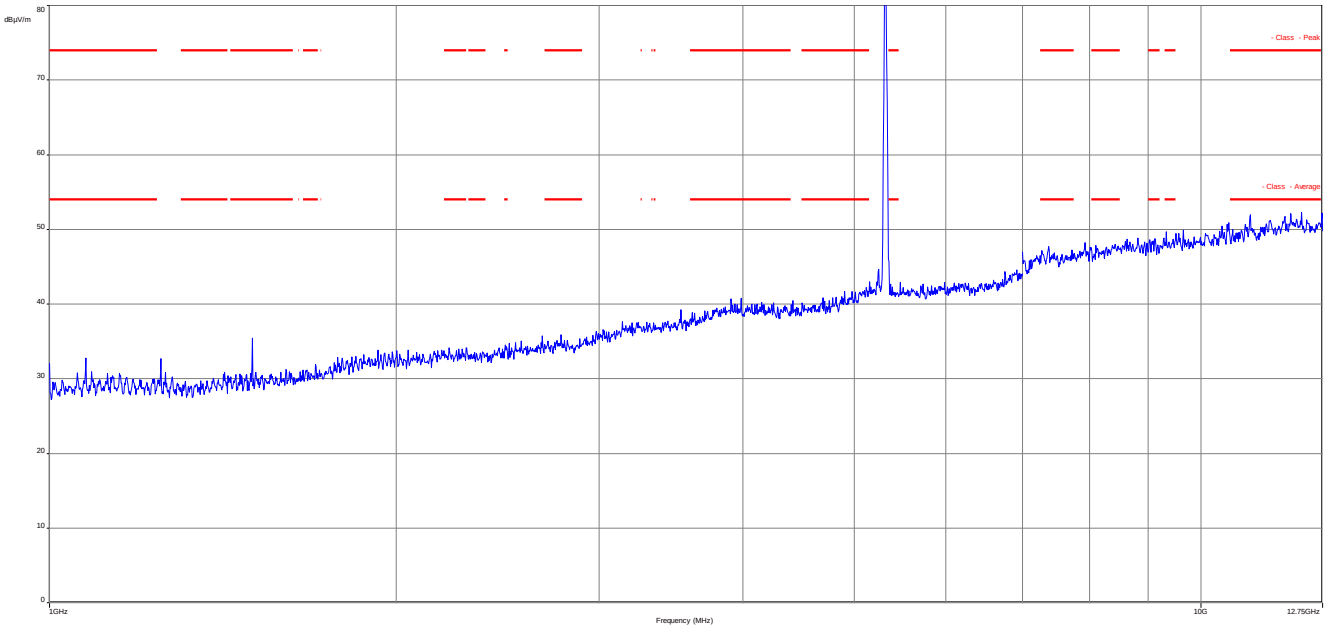
**Plot 16:** 30 MHz to 1 GHz, 5320 MHz, vertical & horizontal polarization



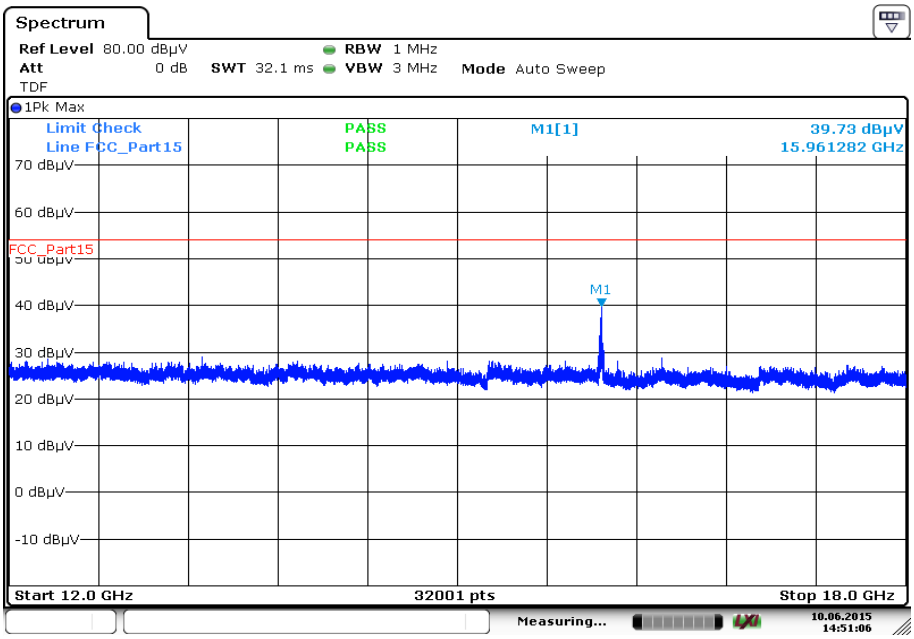

**Final_Result**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 44.711700 | 10.19 | 30.00 | 19.81 | 1000.0 | 120.000 | 98.0 | V | 238 | 13.9 |
| 49.147200 | 24.43 | 30.00 | 5.57 | 1000.0 | 120.000 | 98.0 | V | 93 | 12.8 |
| 98.286450 | 17.05 | 33.50 | 16.45 | 1000.0 | 120.000 | 98.0 | V | 352 | 11.9 |
| 497.603700 | 15.08 | 36.00 | 20.92 | 1000.0 | 120.000 | 170.0 | V | 35 | 18.7 |
| 750.036150 | 30.29 | 36.00 | 5.71 | 1000.0 | 120.000 | 98.0 | H | 3 | 22.7 |
| 867.949800 | 20.57 | 36.00 | 15.43 | 1000.0 | 120.000 | 170.0 | H | 28 | 23.7 |

**Plot 17:** 1 GHz to 12.75 GHz, 5320 MHz, vertical & horizontal polarization

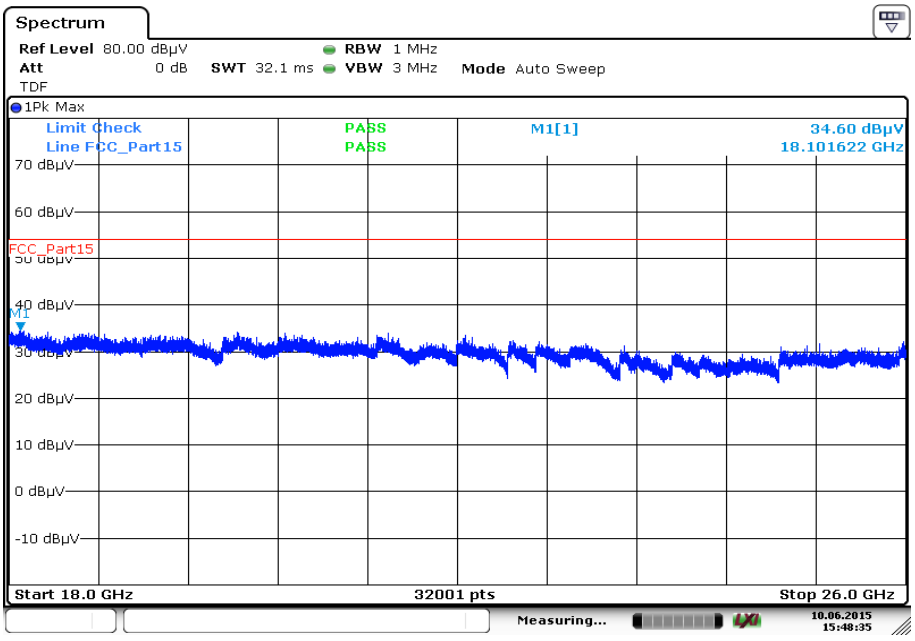



**Plot 18:** 12 GHz to 18 GHz, 5320 MHz, vertical & horizontal polarization



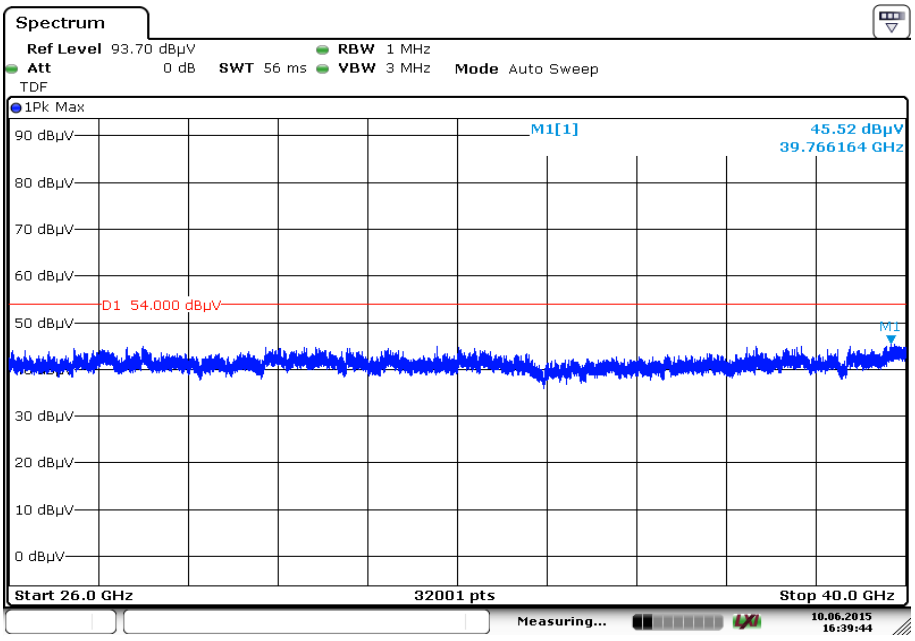

Date: 10.JUN.2015 14:51:06

**Plot 19:** 18 GHz to 26 GHz, 5320 MHz, vertical & horizontal polarization



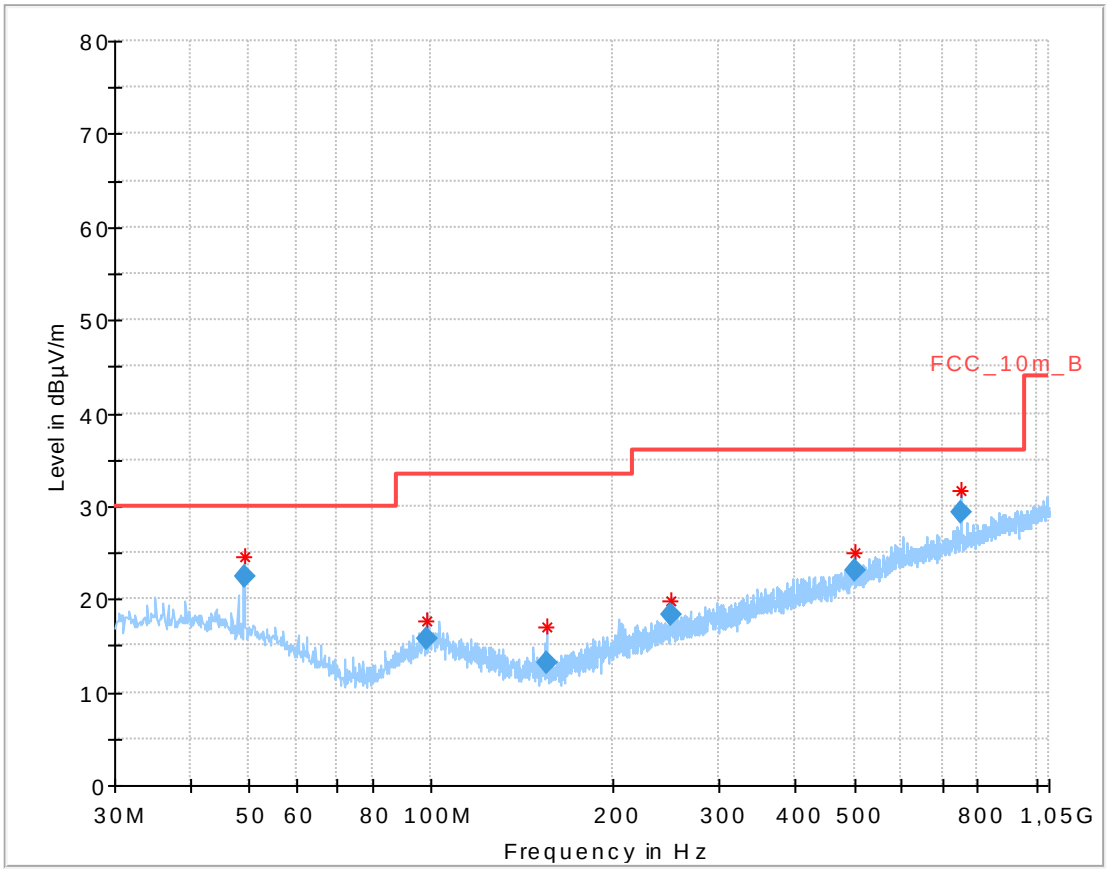

Date: 10.JUN.2015 15:48:36

**Plot 20:** 26 GHz to 40 GHz, 5320 MHz, vertical & horizontal polarization




Date: 10.JUN.2015 16:39:45

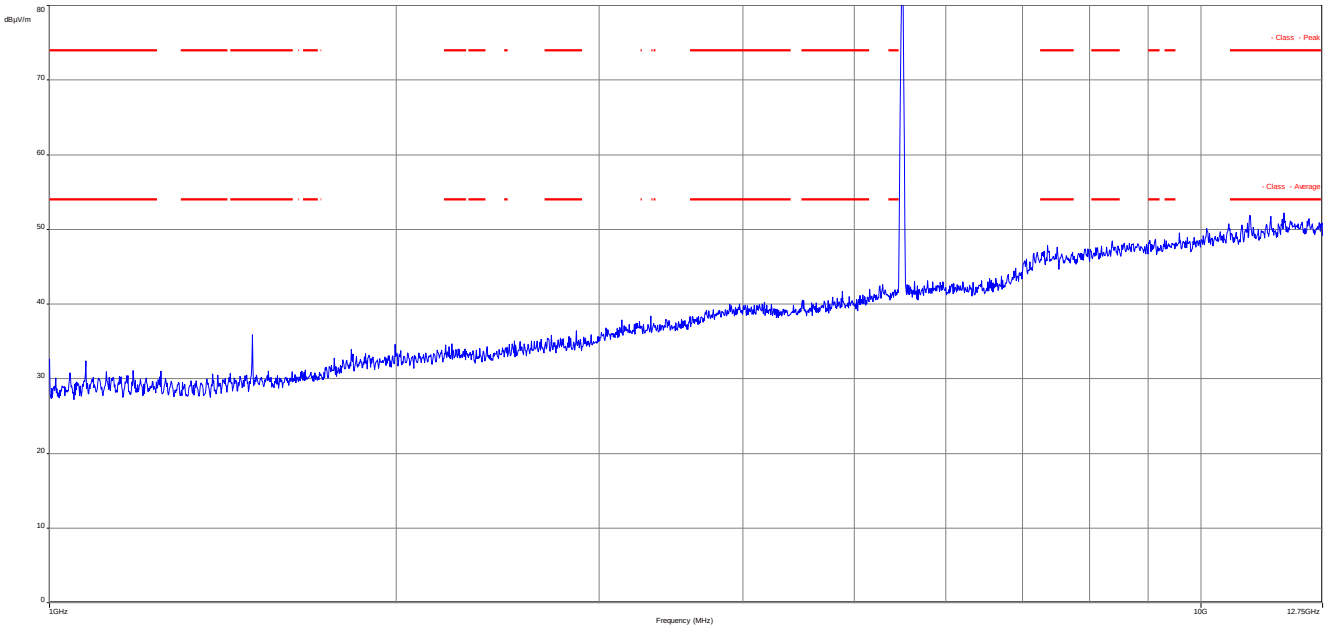
**Plot 21:** 30 MHz to 1 GHz, 5500 MHz, vertical & horizontal polarization



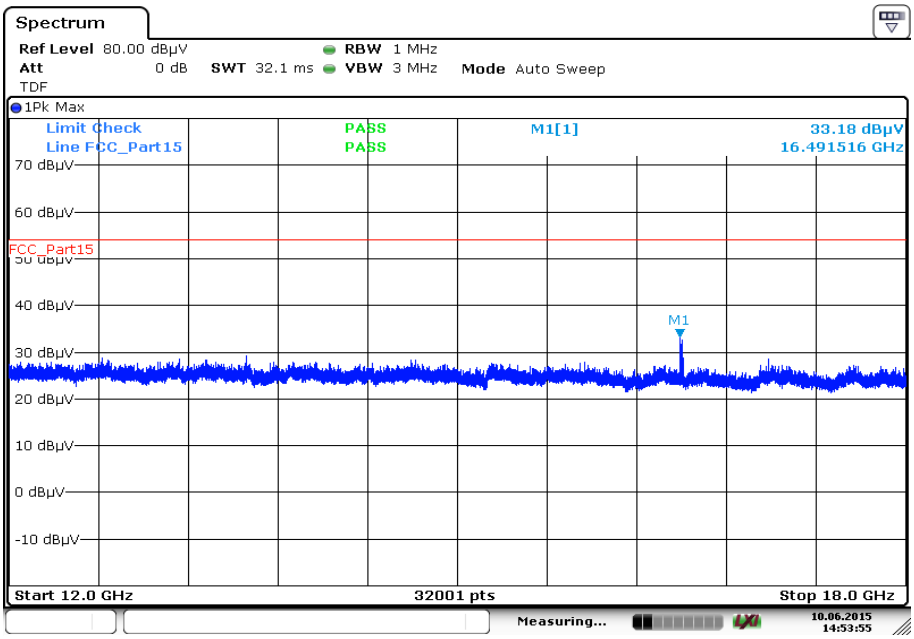

**Final_Result**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 49.146600 | 22.48 | 30.00 | 7.52 | 1000.0 | 120.000 | 98.0 | V | 136 | 12.8 |
| 98.304600 | 15.81 | 33.50 | 17.69 | 1000.0 | 120.000 | 101.0 | V | 350 | 11.9 |
| 154.950450 | 13.26 | 33.50 | 20.24 | 1000.0 | 120.000 | 98.0 | V | 151 | 9.0 |
| 249.979500 | 18.31 | 36.00 | 17.69 | 1000.0 | 120.000 | 98.0 | V | 177 | 13.3 |
| 500.004450 | 23.18 | 36.00 | 12.82 | 1000.0 | 120.000 | 100.0 | H | 52 | 18.7 |
| 750.049650 | 29.22 | 36.00 | 6.78 | 1000.0 | 120.000 | 98.0 | H | 281 | 22.7 |

**Plot 22:** 1 GHz to 12.75 GHz, 5500 MHz, vertical & horizontal polarization

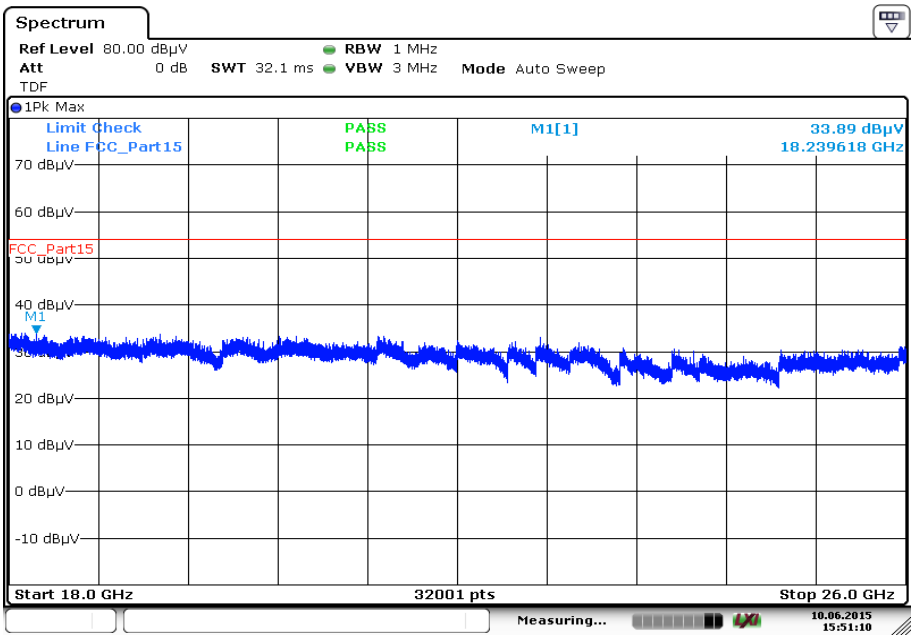



**Plot 23:** 12 GHz to 18 GHz, 5500 MHz, vertical & horizontal polarization



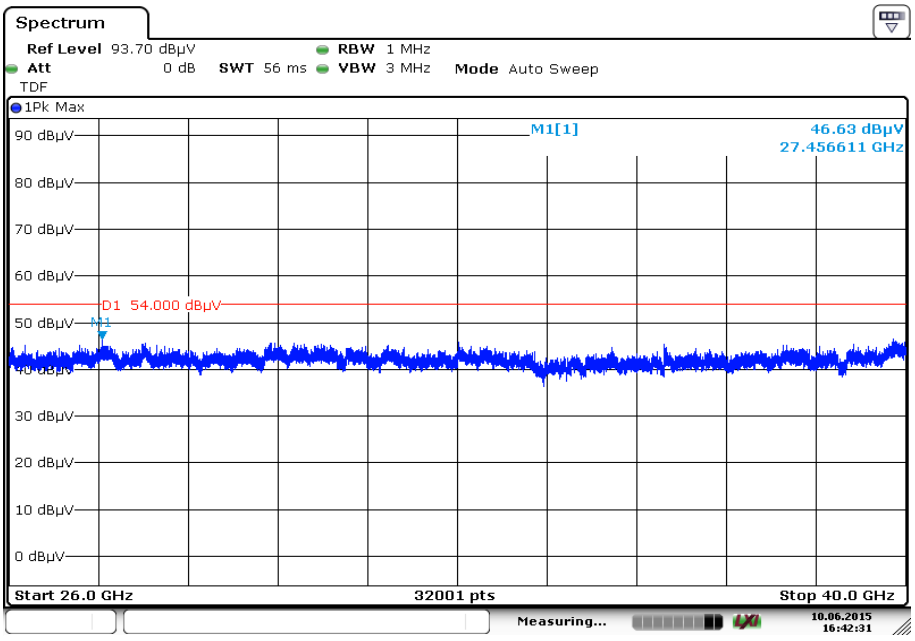

Date: 10.JUN.2015 14:53:55

**Plot 24:** 18 GHz to 26 GHz, 5500 MHz, vertical & horizontal polarization



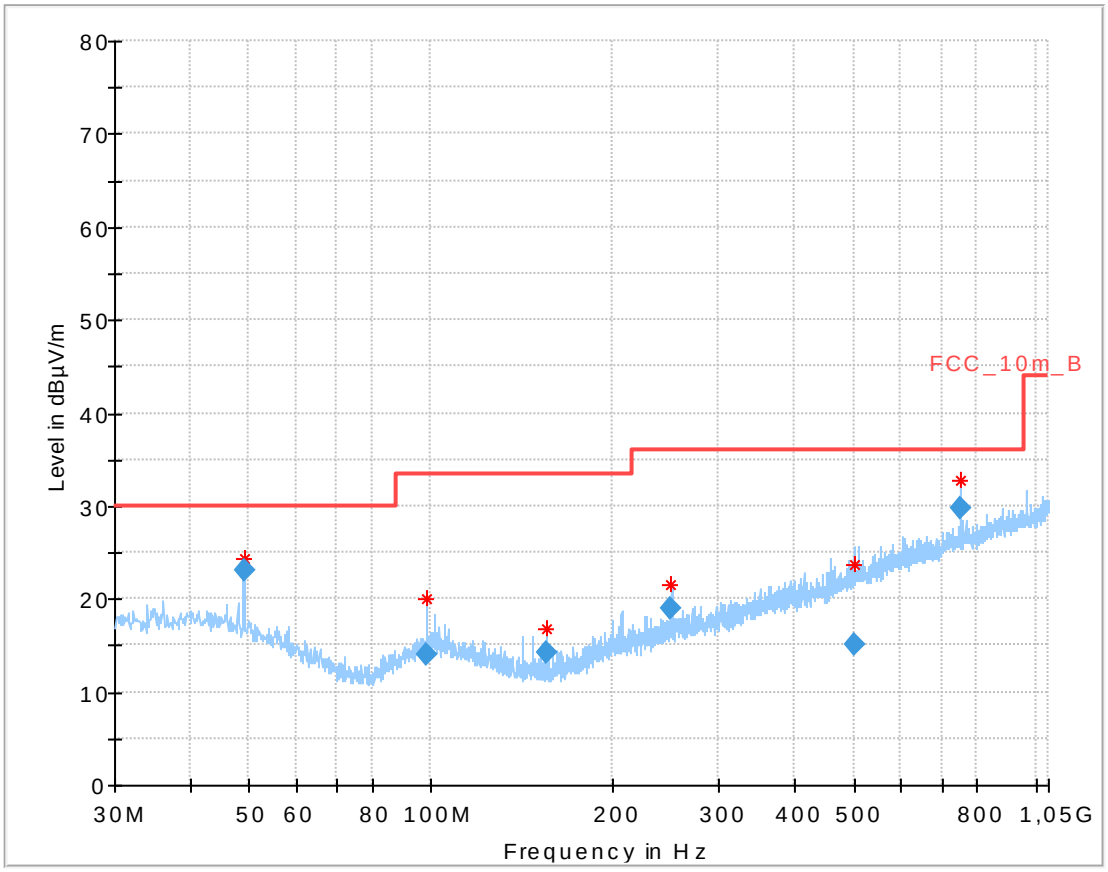

Date: 10.JUN.2015 15:51:11

**Plot 25:** 26 GHz to 40 GHz, 5500 MHz, vertical & horizontal polarization




Date: 10.JUN.2015 16:42:32

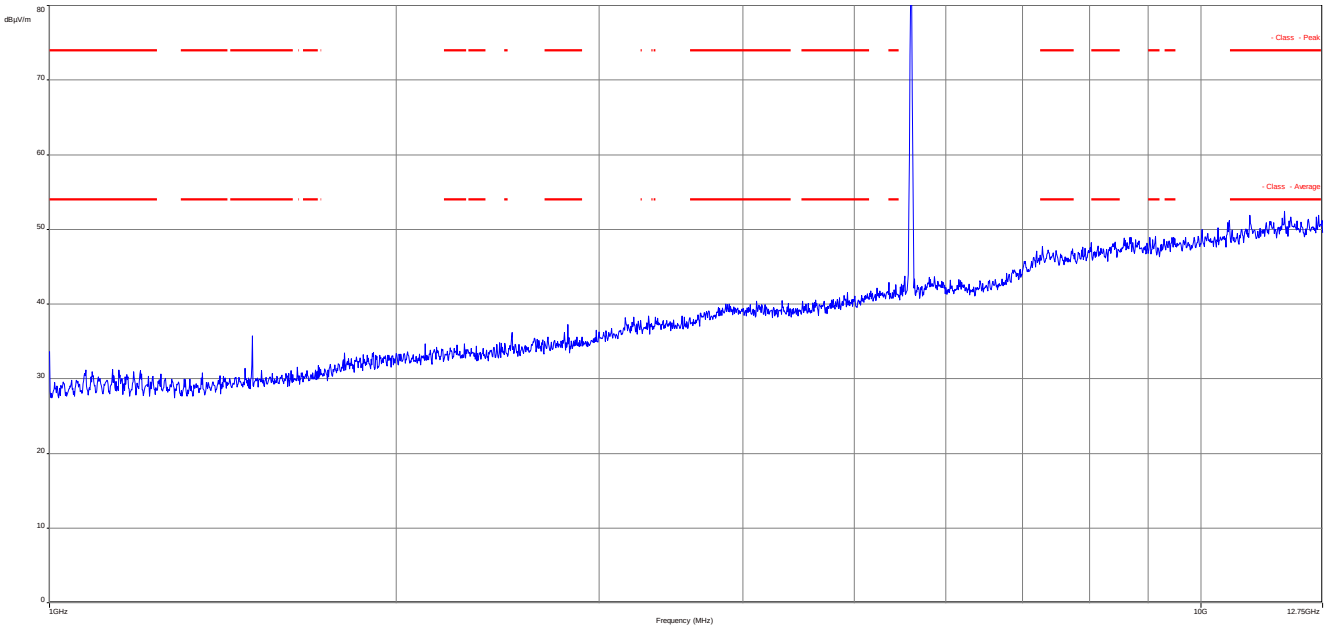
**Plot 26:** 30 MHz to 1 GHz, 5600 MHz, vertical & horizontal polarization



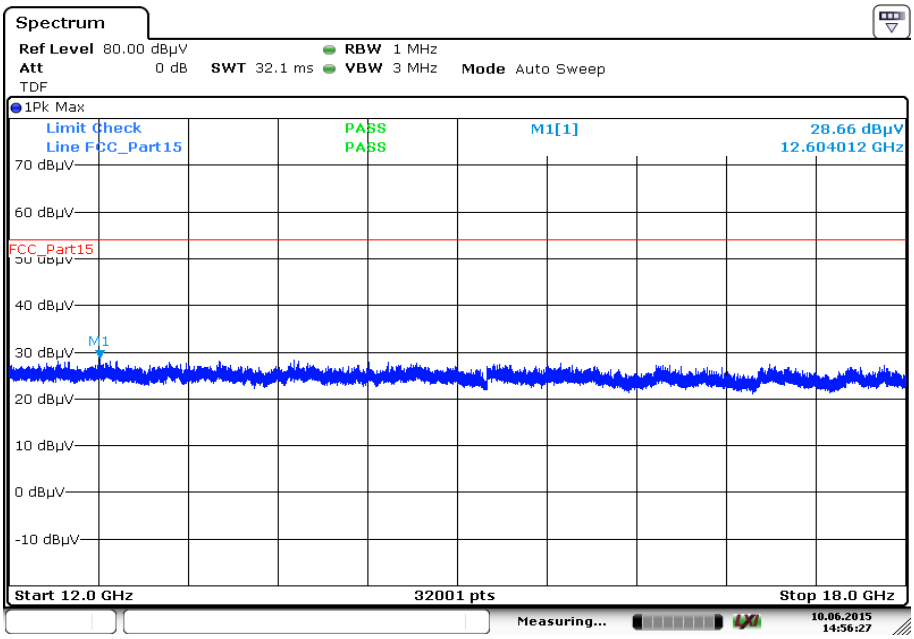

**Final_Result**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 49.144500 | 23.00 | 30.00 | 7.00 | 1000.0 | 120.000 | 98.0 | V | 99 | 12.8 |
| 98.314800 | 14.11 | 33.50 | 19.39 | 1000.0 | 120.000 | 170.0 | V | 99 | 11.9 |
| 154.981050 | 14.16 | 33.50 | 19.34 | 1000.0 | 120.000 | 98.0 | V | 146 | 9.0 |
| 249.990150 | 19.00 | 36.00 | 17.00 | 1000.0 | 120.000 | 98.0 | V | 166 | 13.3 |
| 502.301700 | 15.06 | 36.00 | 20.94 | 1000.0 | 120.000 | 170.0 | V | 107 | 18.7 |
| 750.045750 | 29.73 | 36.00 | 6.27 | 1000.0 | 120.000 | 170.0 | H | 247 | 22.7 |

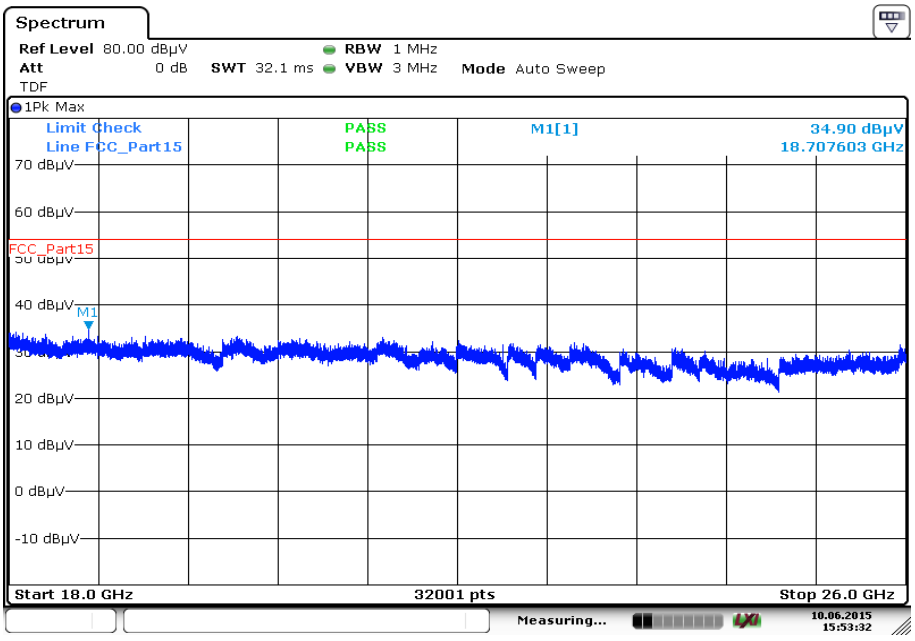
**Plot 27:** 1 GHz to 12.75 GHz, 5600 MHz, vertical & horizontal polarization




**Plot 28:** 12 GHz to 18 GHz, 5600 MHz, vertical & horizontal polarization

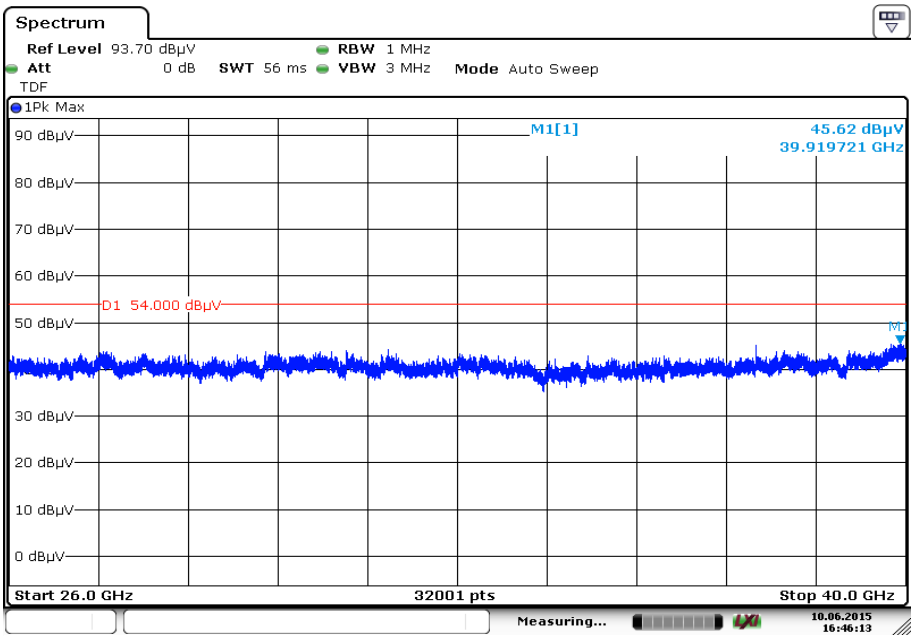


**Plot 29:** 18 GHz to 26 GHz, 5600 MHz, vertical & horizontal polarization



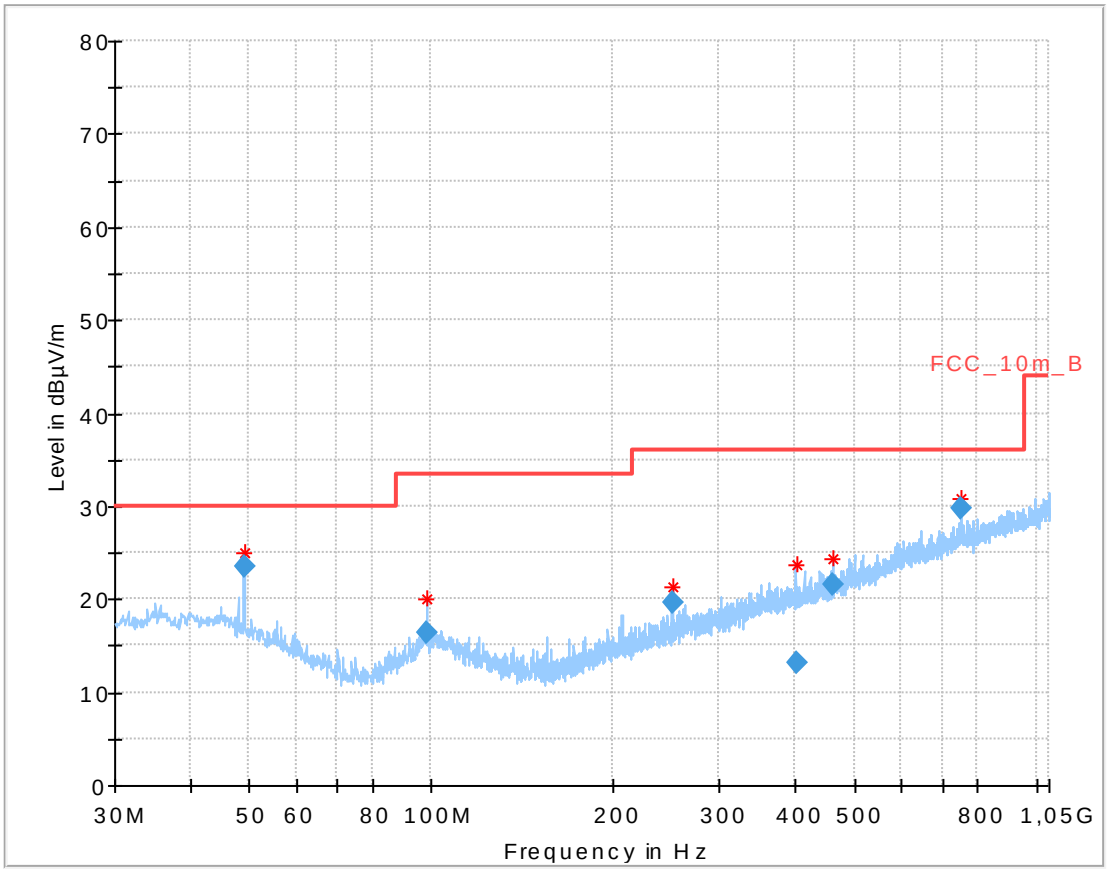

Date: 10.JUN.2015 15:53:32

**Plot 30:** 26 GHz to 40 GHz, 5600 MHz, vertical & horizontal polarization




Date: 10.JUN.2015 16:46:14

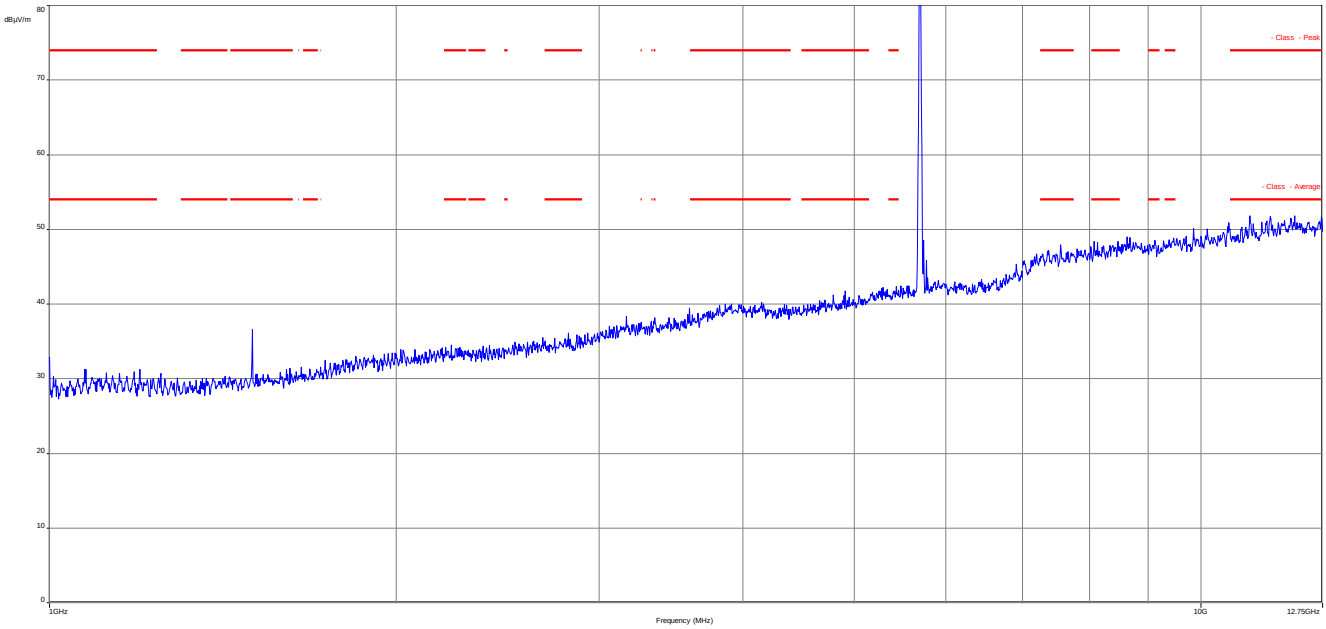
**Plot 31:** 30 MHz to 1 GHz, 5700 MHz, vertical & horizontal polarization



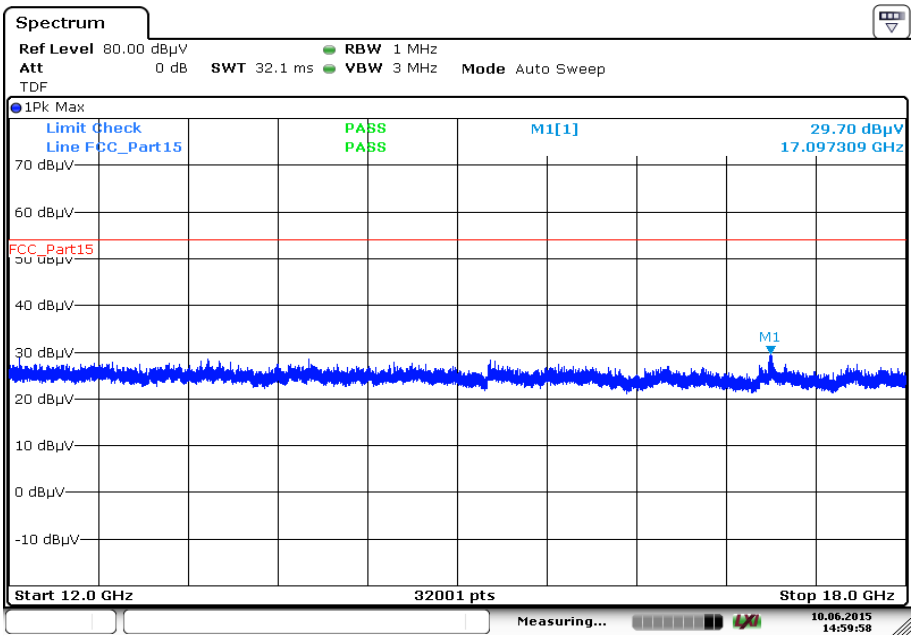

**Final_Result**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 49.145400 | 23.52 | 30.00 | 6.48 | 1000.0 | 120.000 | 98.0 | V | 115 | 12.8 |
| 98.294400 | 16.41 | 33.50 | 17.09 | 1000.0 | 120.000 | 101.0 | V | 6 | 11.9 |
| 250.019850 | 19.55 | 36.00 | 16.45 | 1000.0 | 120.000 | 98.0 | V | 171 | 13.4 |
| 400.911150 | 13.17 | 36.00 | 22.83 | 1000.0 | 120.000 | 170.0 | H | 128 | 16.9 |
| 460.775850 | 21.57 | 36.00 | 14.43 | 1000.0 | 120.000 | 170.0 | H | 349 | 17.8 |
| 750.029700 | 29.67 | 36.00 | 6.33 | 1000.0 | 120.000 | 101.0 | H | 266 | 22.7 |

**Plot 32:** 1 GHz to 12.75 GHz, 5700 MHz, vertical & horizontal polarization

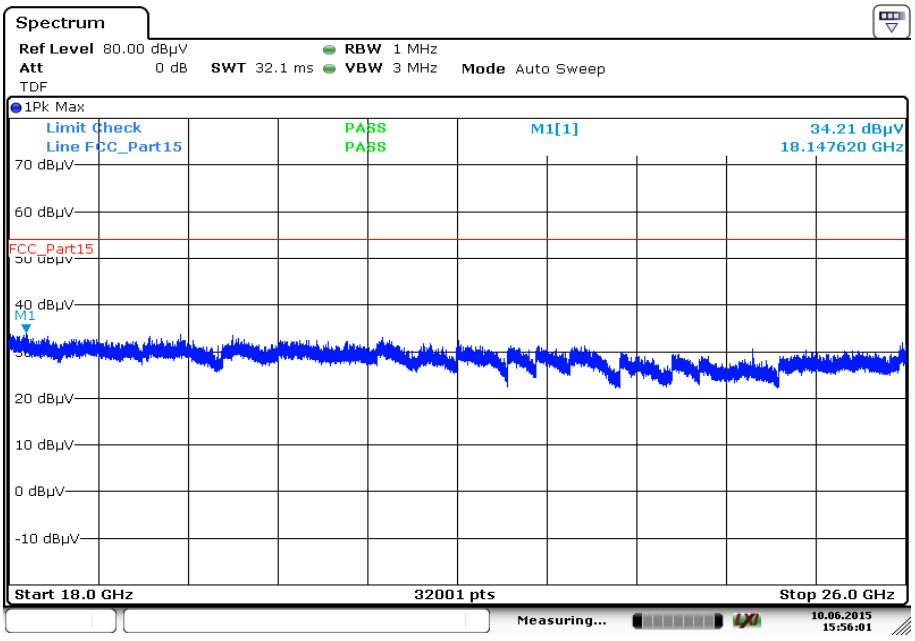



**Plot 33:** 12 GHz to 18 GHz, 5700 MHz, vertical & horizontal polarization



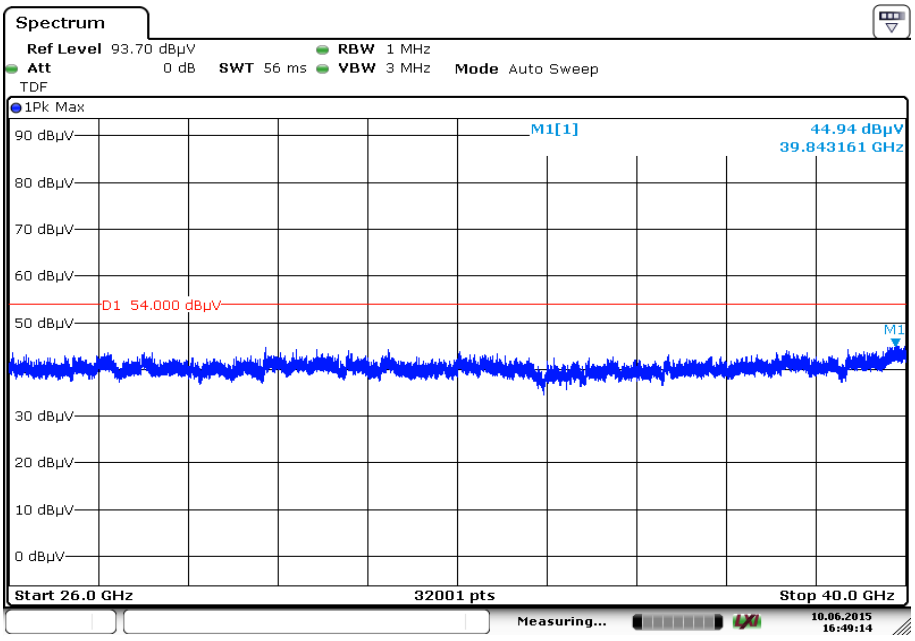

Date: 10.JUN.2015 14:59:58

**Plot 34:** 18 GHz to 26 GHz, 5700 MHz, vertical & horizontal polarization



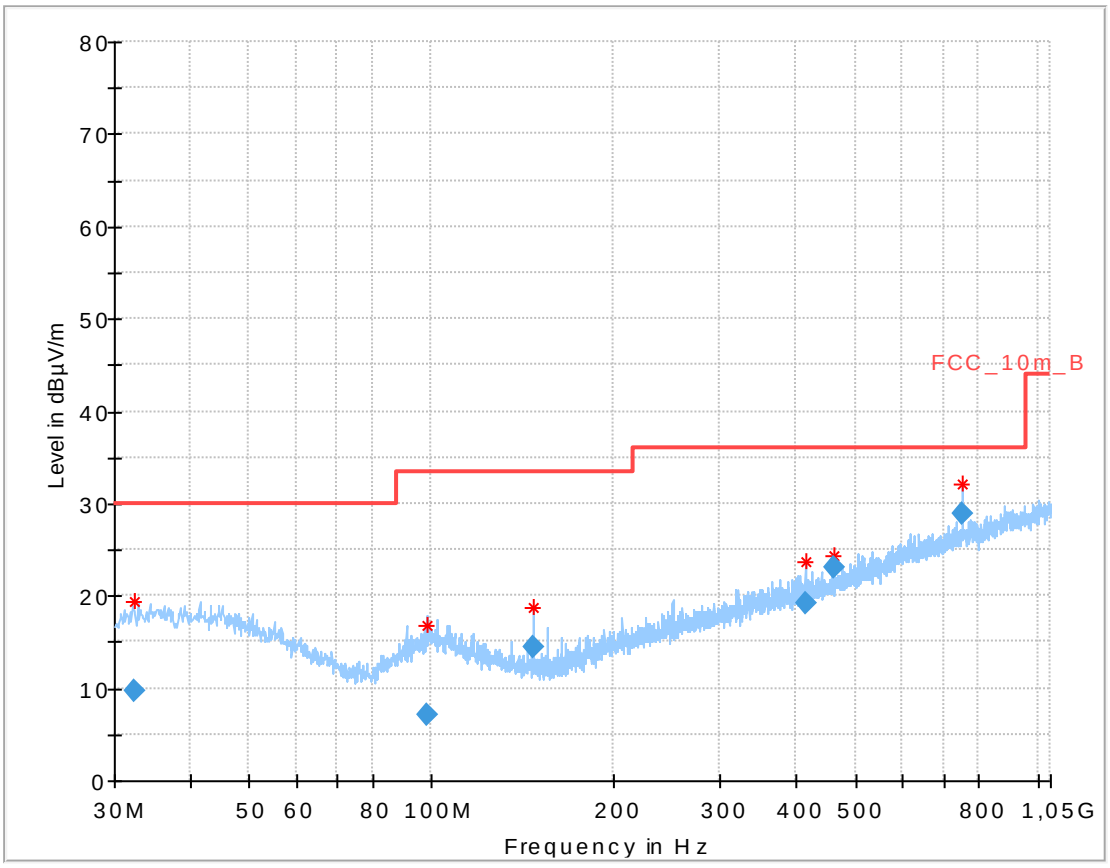

Date: 10.JUN.2015 15:56:01

**Plot 35:** 26 GHz to 40 GHz, 5700 MHz, vertical & horizontal polarization




Date: 10.JUN.2015 16:49:15

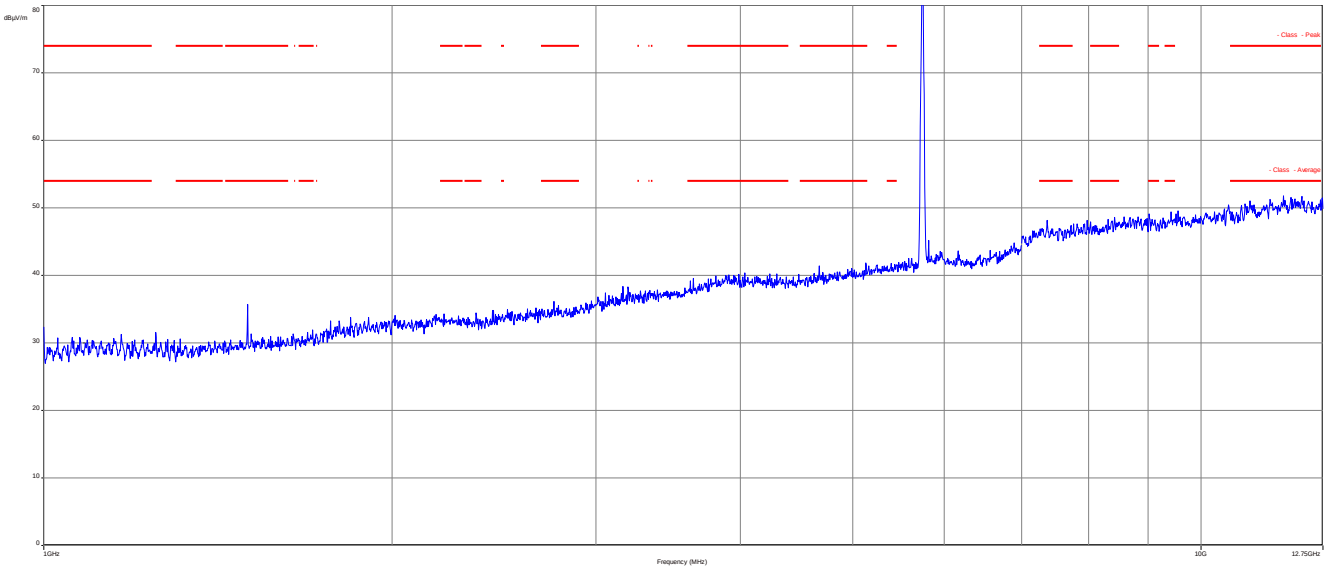
**Plot 36:** 30 MHz to 1 GHz, 5745 MHz, vertical & horizontal polarization



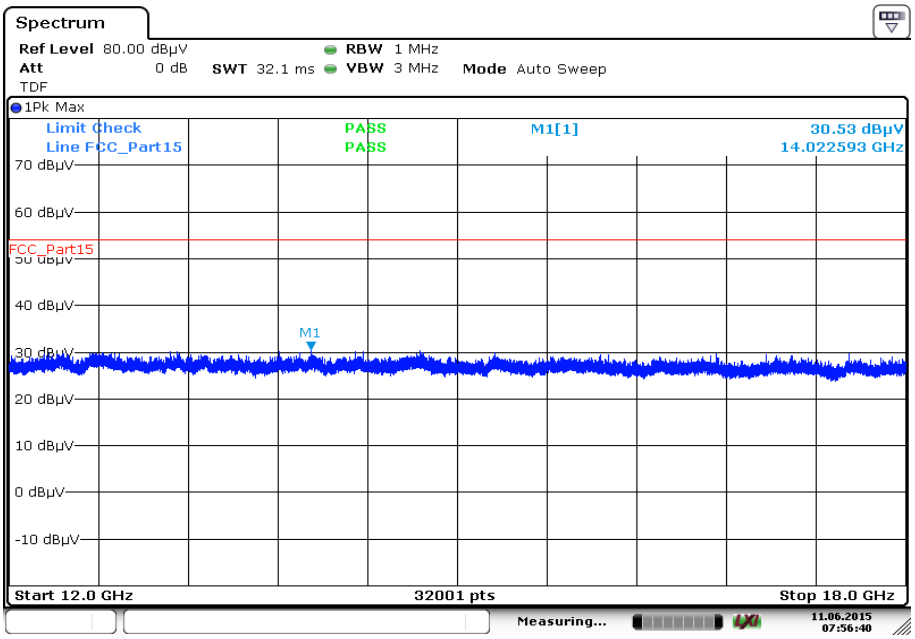

## Final_Result

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 32.440200 | 9.80 | 30.00 | 20.20 | 1000.0 | 120.000 | 101.0 | H | 11 | 13.6 |
| 98.543550 | 7.17 | 33.50 | 26.33 | 1000.0 | 120.000 | 100.0 | H | 182 | 11.9 |
| 147.437850 | 14.54 | 33.50 | 18.96 | 1000.0 | 120.000 | 98.0 | V | 182 | 8.8 |
| 413.406600 | 19.25 | 36.00 | 16.75 | 1000.0 | 120.000 | 170.0 | H | 105 | 17.1 |
| 460.763700 | 23.00 | 36.00 | 13.00 | 1000.0 | 120.000 | 170.0 | H | 11 | 17.8 |
| 750.008850 | 28.98 | 36.00 | 7.02 | 1000.0 | 120.000 | 101.0 | H | 266 | 22.7 |

**Plot 37:** 1 GHz to 12.75 GHz, 5745 MHz, vertical & horizontal polarization

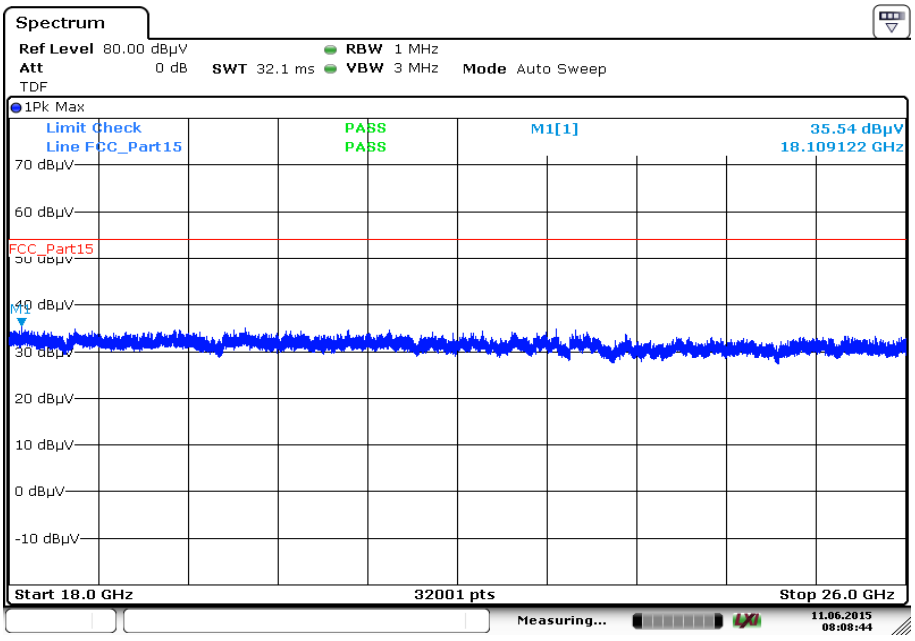



**Plot 38:** 12 GHz to 18 GHz, 5745 MHz, vertical & horizontal polarization



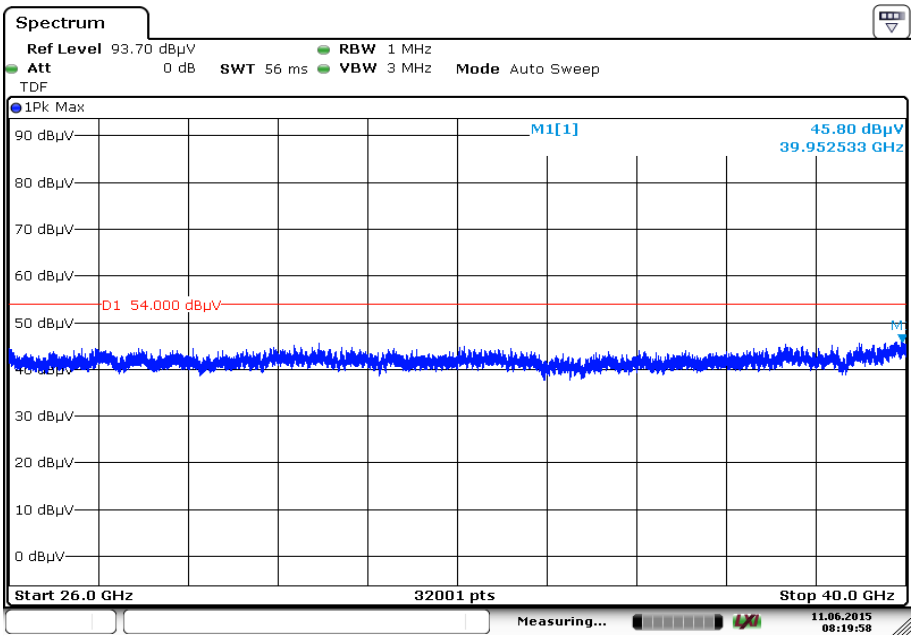

Date: 11.JUN.2015 07:56:40

**Plot 39:** 18 GHz to 26 GHz, 5745 MHz, vertical & horizontal polarization



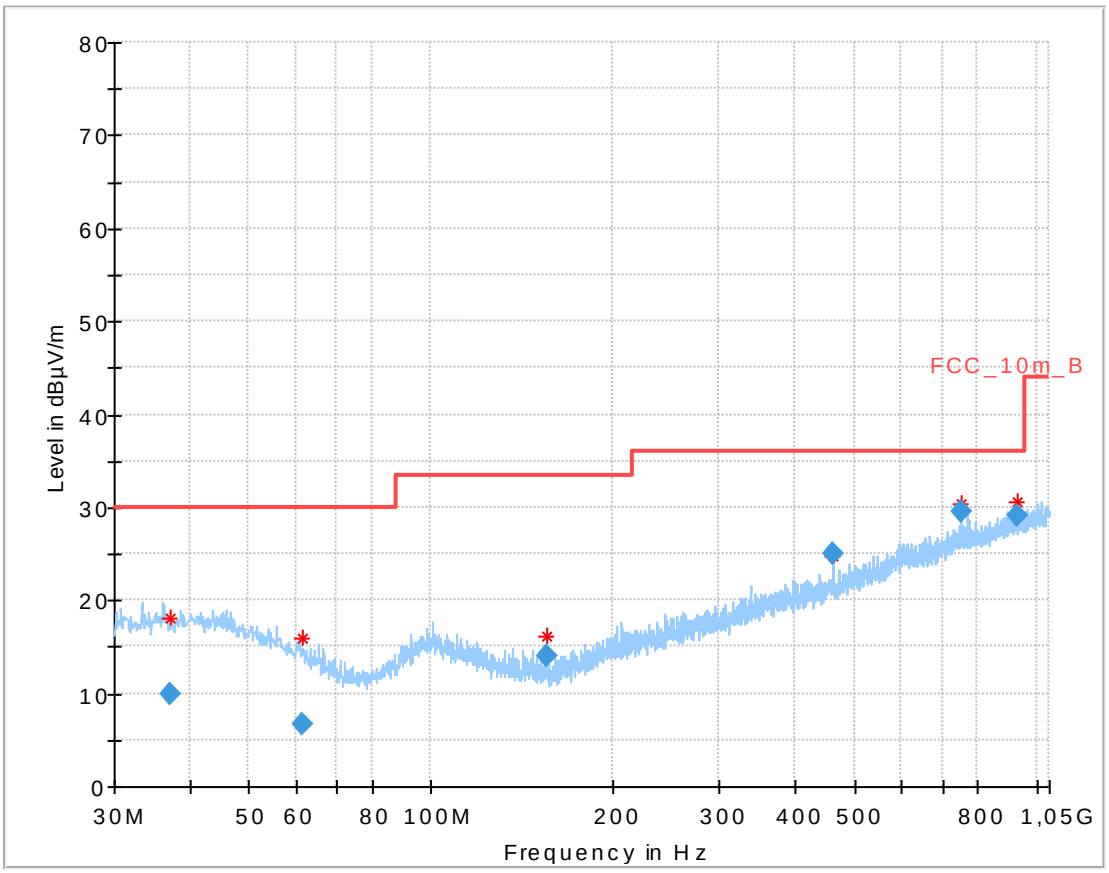

Date: 11.JUN.2015 08:08:43

**Plot 40:** 26 GHz to 40 GHz, 5745 MHz, vertical & horizontal polarization




Date: 11.JUN.2015 08:19:58

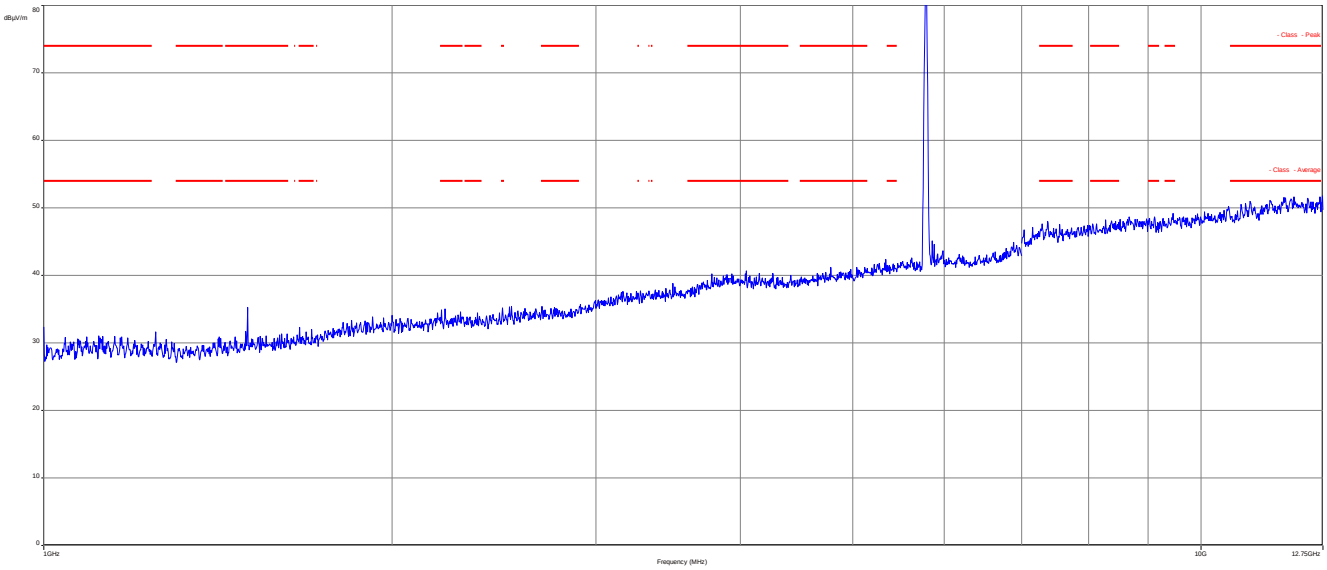
**Plot 41:** 30 MHz to 1 GHz, 5785 MHz, vertical & horizontal polarization



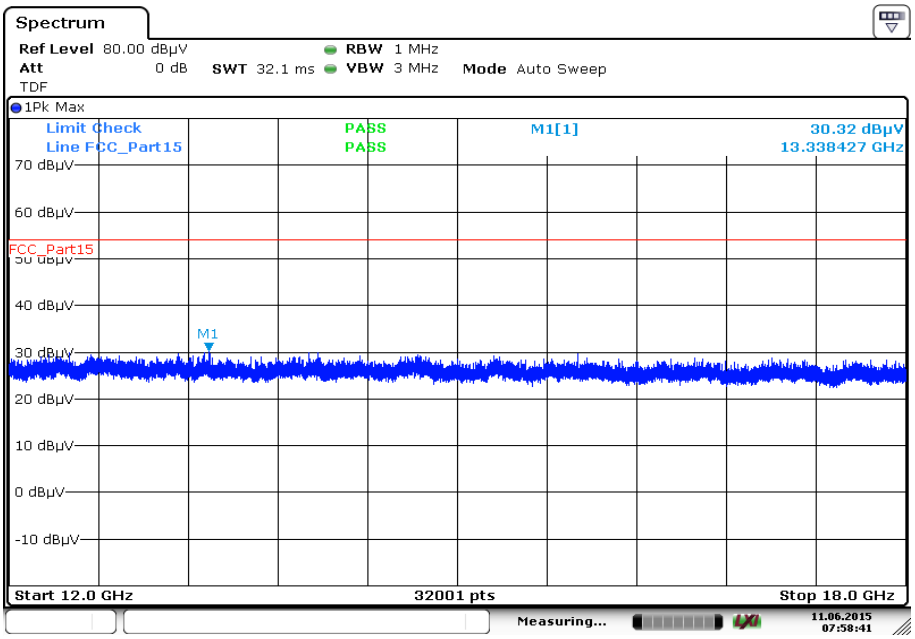

## Final_Result

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 37.086600 | 9.94 | 30.00 | 20.06 | 1000.0 | 120.000 | 101.0 | V | 34 | 13.9 |
| 61.162500 | 6.75 | 30.00 | 23.25 | 1000.0 | 120.000 | 170.0 | H | 34 | 10.3 |
| 155.043150 | 14.07 | 33.50 | 19.43 | 1000.0 | 120.000 | 98.0 | V | 223 | 9.0 |
| 460.773600 | 25.05 | 36.00 | 10.95 | 1000.0 | 120.000 | 170.0 | H | 223 | 17.8 |
| 750.039450 | 29.44 | 36.00 | 6.56 | 1000.0 | 120.000 | 101.0 | H | 288 | 22.7 |
| 927.479700 | 29.04 | 36.00 | 6.96 | 1000.0 | 120.000 | 101.0 | V | 306 | 24.2 |

**Plot 42:** 1 GHz to 12.75 GHz, 5785 MHz, vertical & horizontal polarization

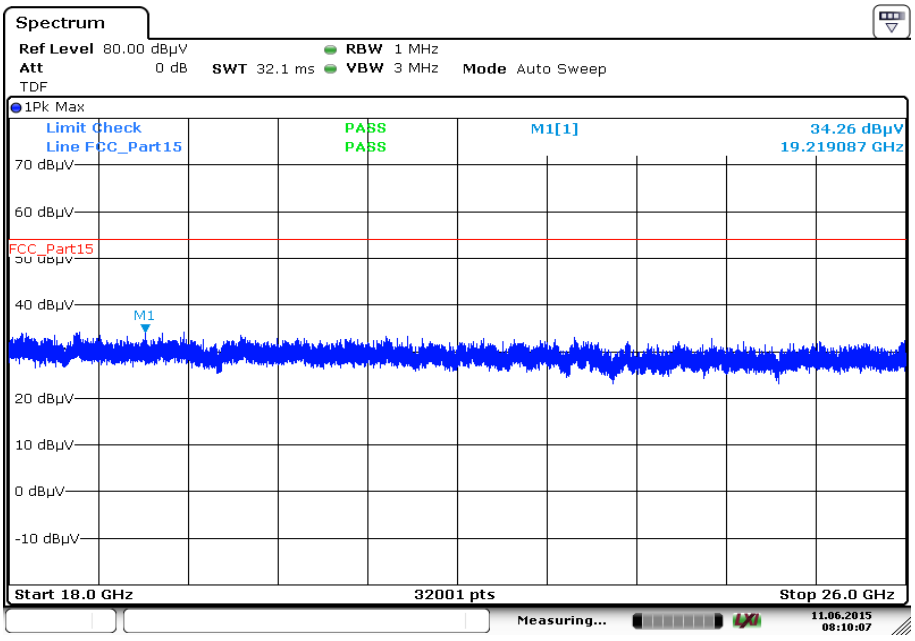



**Plot 43:** 12 GHz to 18 GHz, 5785 MHz, vertical & horizontal polarization



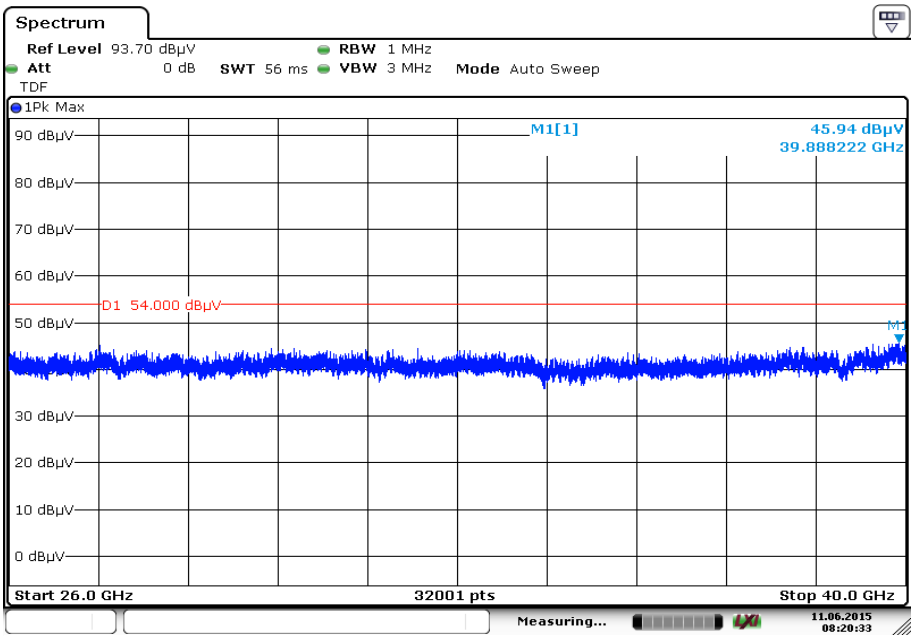

Date: 11.JUN.2015 07:58:41

**Plot 44:** 18 GHz to 26 GHz, 5785 MHz, vertical & horizontal polarization



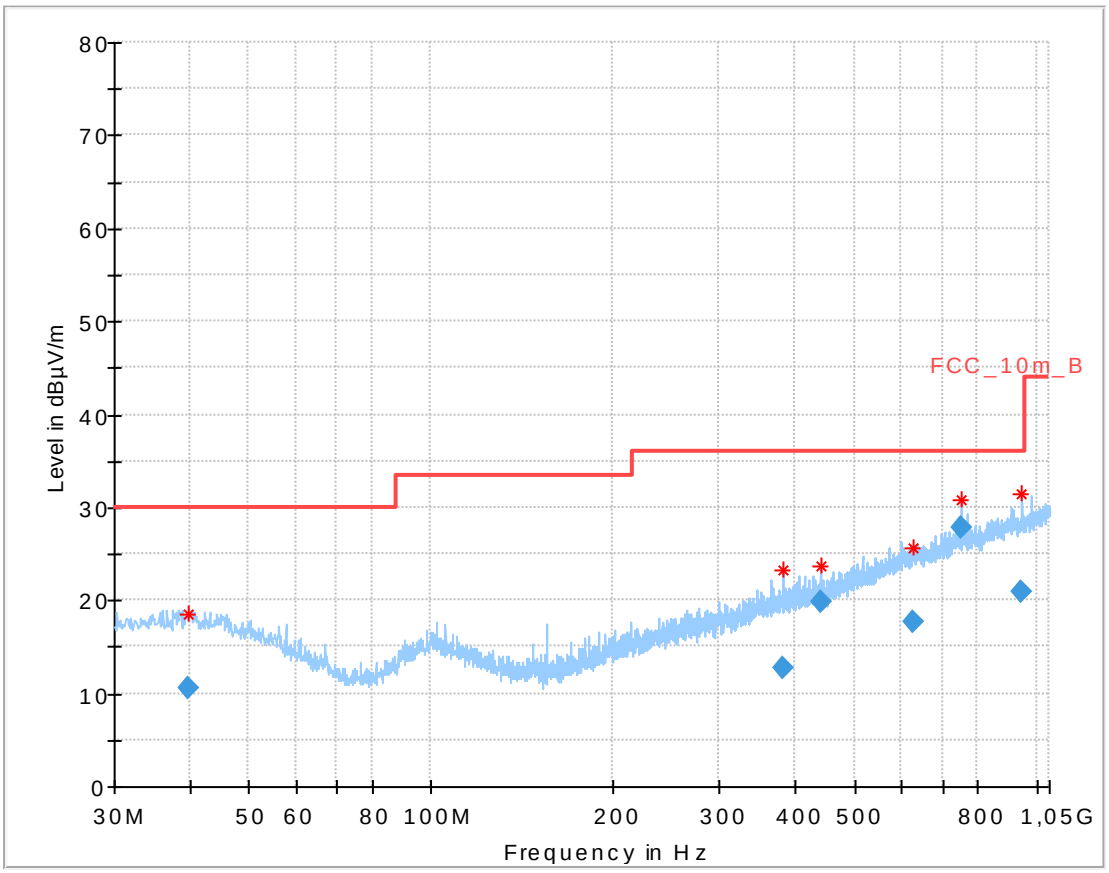

Date: 11.JUN.2015 08:10:07

**Plot 45:** 26 GHz to 40 GHz, 5785 MHz, vertical & horizontal polarization




Date: 11.JUN.2015 08:20:33

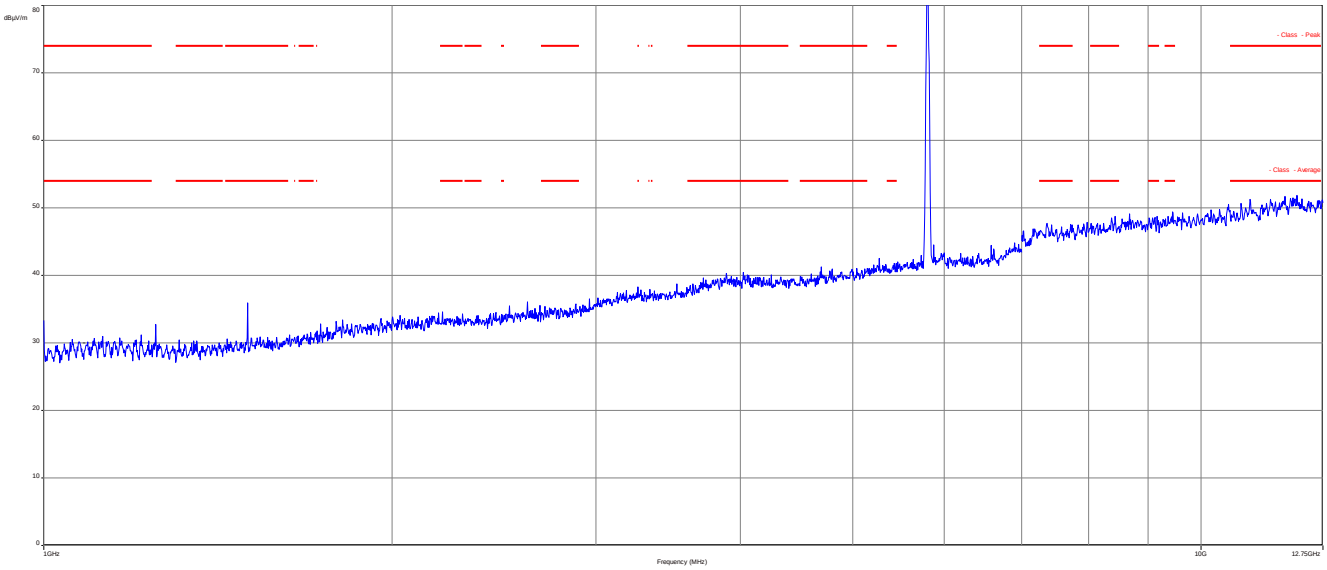
**Plot 46:** 30 MHz to 1 GHz, 5805 MHz, vertical & horizontal polarization



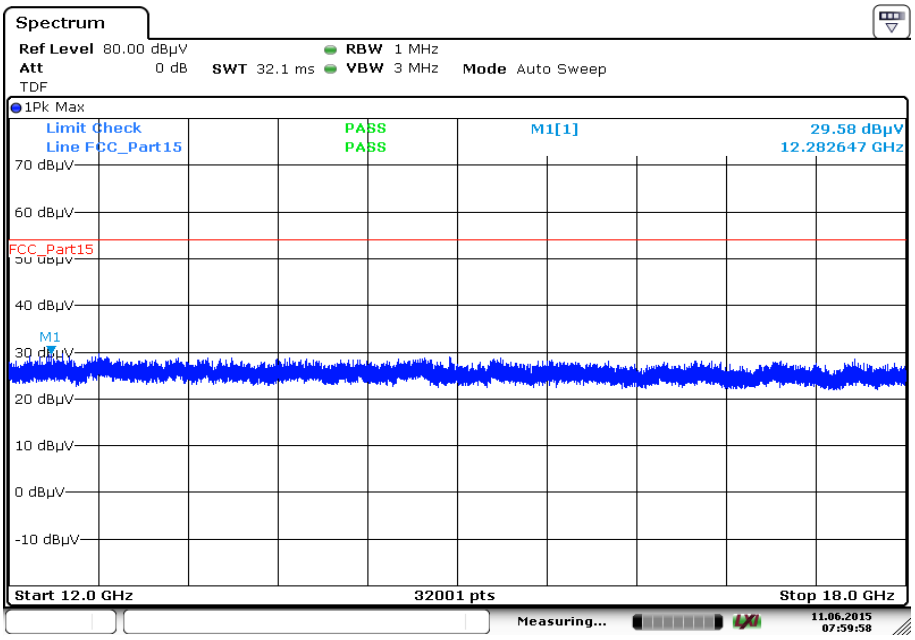

## Final_Result

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 39.867150 | 10.55 | 30.00 | 19.45 | 1000.0 | 120.000 | 101.0 | H | 1 | 14.0 |
| 380.984700 | 12.66 | 36.00 | 23.34 | 1000.0 | 120.000 | 170.0 | H | 350 | 16.6 |
| 439.262700 | 19.90 | 36.00 | 16.10 | 1000.0 | 120.000 | 98.0 | V | 39 | 17.4 |
| 626.637900 | 17.65 | 36.00 | 18.35 | 1000.0 | 120.000 | 170.0 | V | 335 | 20.9 |
| 750.070650 | 27.72 | 36.00 | 8.28 | 1000.0 | 120.000 | 98.0 | H | 15 | 22.7 |
| 946.856700 | 20.98 | 36.00 | 15.02 | 1000.0 | 120.000 | 170.0 | H | 118 | 24.3 |

**Plot 47:** 1 GHz to 12.75 GHz, 5805 MHz, vertical & horizontal polarization

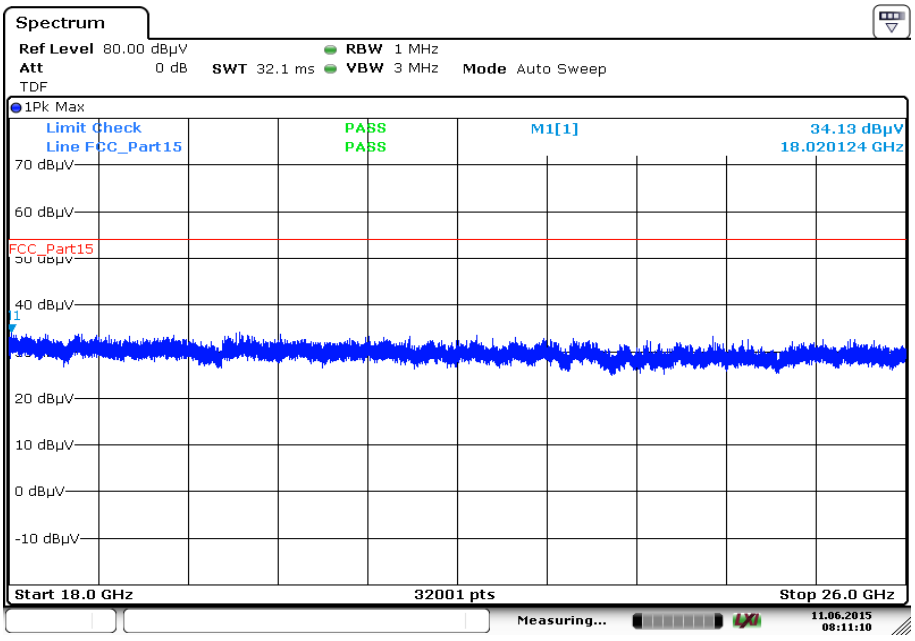



**Plot 48:** 12 GHz to 18 GHz, 5805 MHz, vertical & horizontal polarization



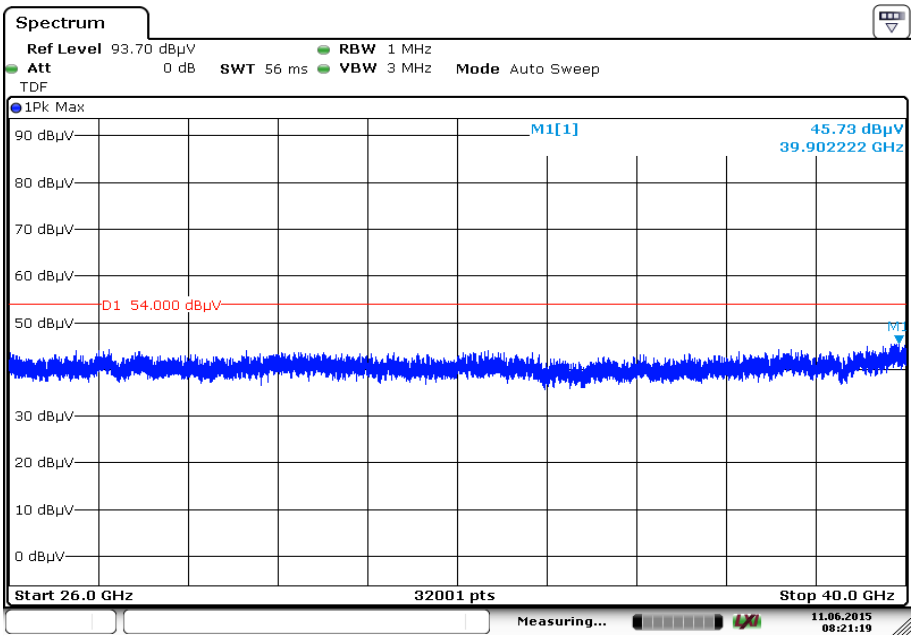

Date: 11.JUN.2015 07:59:58

**Plot 49:** 18 GHz to 26 GHz, 5805 MHz, vertical & horizontal polarization




Date: 11.JUN.2015 08:11:10

**Plot 50:** 26 GHz to 40 GHz, 5805 MHz, vertical & horizontal polarization




Date: 11.JUN.2015 08:21:19

## 10.4 RX spurious emissions radiated

**Description:**

Measurement of the radiated spurious emissions in idle/receive mode.

**Measurement:**

| Measurement parameter | |
|---|---|
| Detector: | Quasi Peak below 1 GHz (alternative Peak)<br><br>Peak above 1 GHz / RMS |
| Sweep time: | Auto |
| Resolution bandwidth: | F < 1 GHz: 100 kHz<br>F > 1 GHz: 1 MHz |
| Video bandwidth: | F < 1 GHz: 100 kHz<br>F > 1 GHz: ≥ 3 MHz |
| Span: | 30 MHz to 40 GHz |
| Trace-Mode: | Max Hold / Average with 100 counts + 20 log (1 / X) for duty cycle lower than 100 % |

**Limits:**

| RX Spurious Emissions Radiated | | |
|---|---|---|
| Frequency (MHz) | Field Strength (dBµV/m) | Measurement distance |
| 30 - 88 | 30.0 | 10 |
| 88 – 216 | 33.5 | 10 |
| 216 – 960 | 36.0 | 10 |
| Above 960 | 54.0 | 3 |

**Results:**

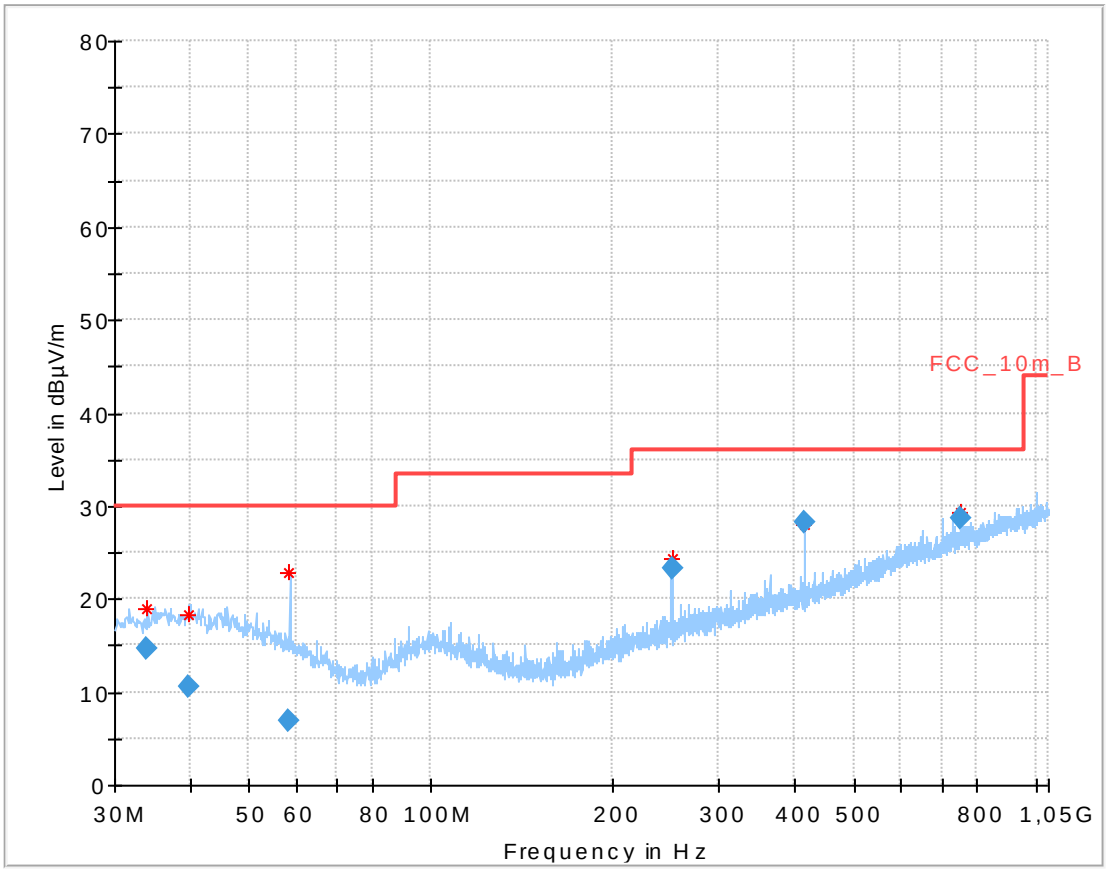
| RX Spurious Emissions Radiated [dBµV/m] | | |
|---|---|---|
| F [MHz] | Detector | Level [dBµV/m] |
| 1000 | Peak | 36.9 |
| 1250 | Peak | 31.1 |
| 1500 | Peak | 37.1 |
| 1830 | Peak | 32.2 |
| Measurement uncertainty | ± 3 dB | |

**Verdict:** **Complies**

**Note:** The limit was recalculated with 20 dB / decade (Part 15.31) for all radiated spurious emissions 30 MHz to 1 GHz from 3 meter limit to a 10 meter distance. (40dB/decade for emissions < 30MHz)

**Plots:** RX / Idle – mode

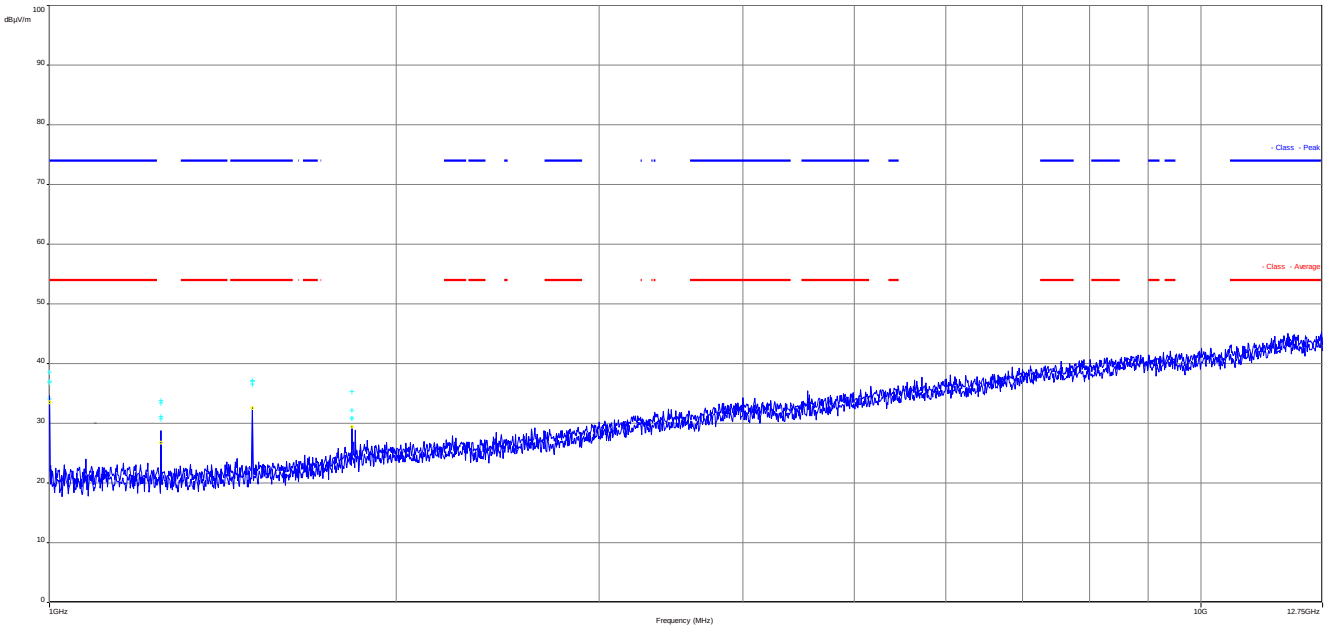
**Plot 1:** 30 MHz to 1 GHz, vertical & horizontal polarization



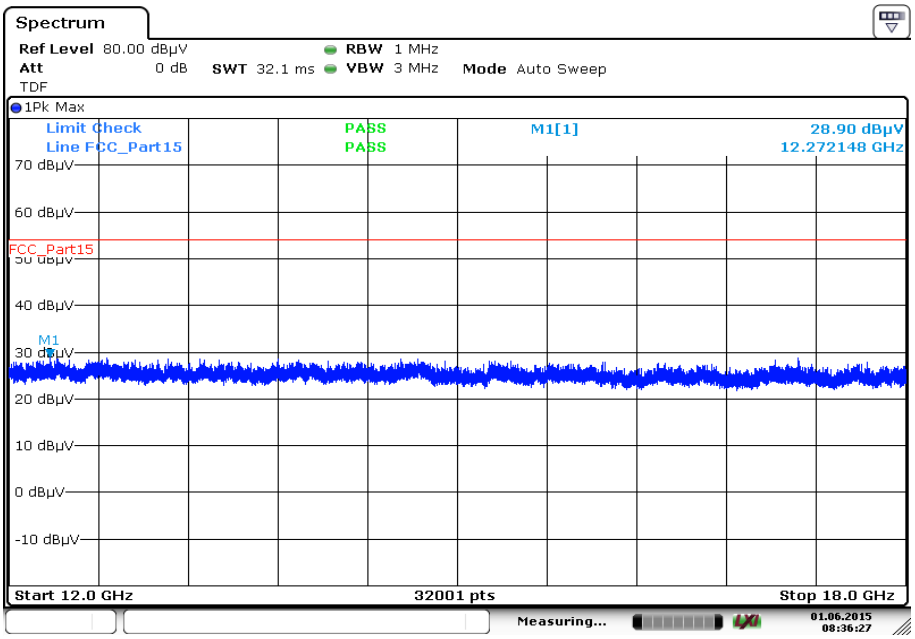

**Final_Result:**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 34.006950 | 14.59 | 30.00 | 15.41 | 1000.0 | 120.000 | 101.0 | V | 7 | 13.7 |
| 39.648750 | 10.61 | 30.00 | 19.39 | 1000.0 | 120.000 | 101.0 | V | 25 | 14.0 |
| 58.230900 | 6.89 | 30.00 | 23.11 | 1000.0 | 120.000 | 101.0 | V | 56 | 11.0 |
| 250.007700 | 23.22 | 36.00 | 12.78 | 1000.0 | 120.000 | 98.0 | V | 164 | 13.4 |
| 415.008600 | 28.19 | 36.00 | 7.81 | 1000.0 | 120.000 | 170.0 | H | 49 | 17.1 |
| 750.042900 | 28.68 | 36.00 | 7.32 | 1000.0 | 120.000 | 98.0 | H | 270 | 22.7 |

**Plot 2:** 1 GHz to 12.75 GHz, vertical & horizontal polarization

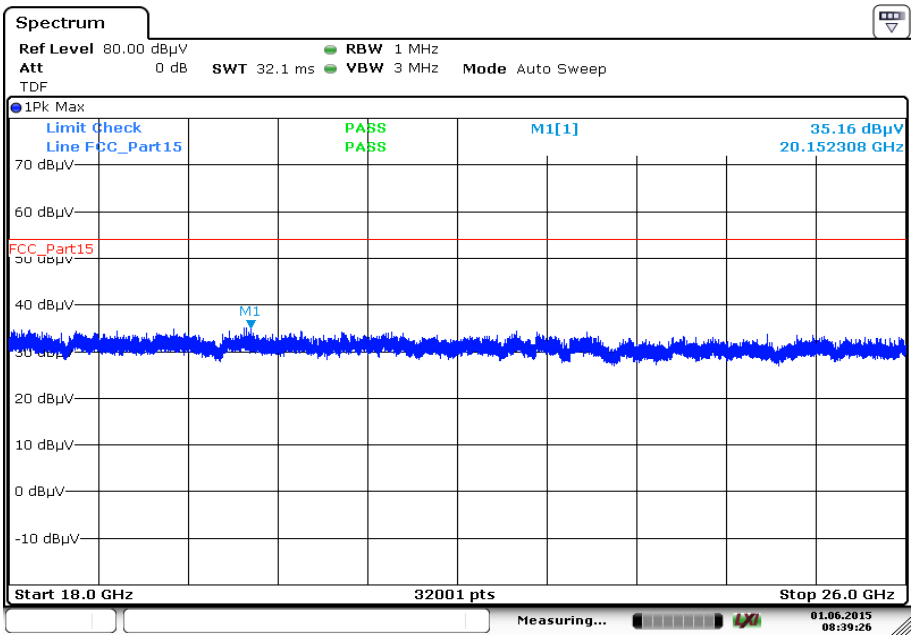



**Plot 3:** 12 GHz to 18 GHz, vertical & horizontal polarization



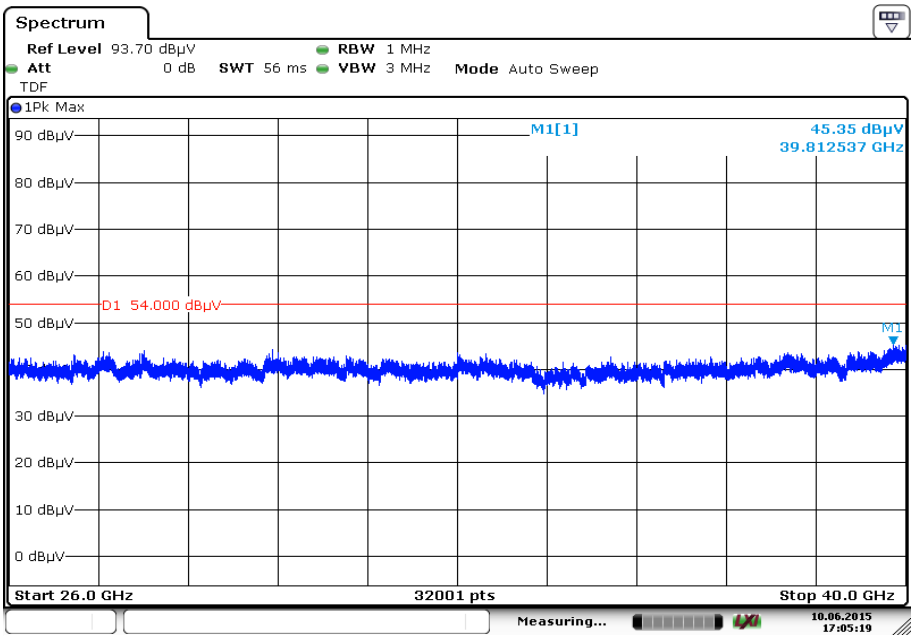

Date: 1.JUN.2015 08:36:28

**Plot 4:** 18 GHz to 26 GHz, vertical & horizontal polarization




Date: 1.JUN.2015 08:39:26

**Plot 5:** 26 GHz to 40 GHz, vertical & horizontal polarization




Date: 10.JUN.2015 17:05:20

## 10.5 Spurious emissions radiated < 30 MHz

**Description:**

Measurement of the radiated spurious emissions in transmit mode and receive mode below 30 MHz. The EUT is set first to middle channel. This measurement is representative for all channels and modes. If critical peaks are found the lowest channel and the highest channel will be measured too. Then the EUT is set to receive or idle mode. The limits are recalculated to a measurement distance of 3 m with 40 dB/decade according CFR Part 2.

**Measurement:**

| Measurement parameter | |
|---|---|
| Detector: | Peak / Quasi Peak |
| Sweep time: | Auto |
| Video bandwidth: | F < 150 kHz: 200 Hz<br>F > 150 kHz: 9 kHz |
| Resolution bandwidth: | F < 150 kHz: 1 kHz<br>F > 150 kHz: 100 kHz |
| Span: | 9 kHz to 30 MHz |
| Trace-Mode: | Max Hold |

**Limits:**

| Spurious Emissions Radiated < 30 MHz | | |
|---|---|---|
| Frequency (MHz) | Field Strength (dBµV/m) | Measurement distance |
| 0.009 – 0.490 | 2400/F(kHz) | 300 |
| 0.490 – 1.705 | 24000/F(kHz) | 30 |
| 1.705 – 30.0 | 30 | 30 |

**Results: a-mode**

| Spurious Emissions Radiated < 30 MHz [dBµV/m] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Lowest 5180 MHz | | | Middle | | | Highest 5240 MHz | | |
| F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] |
| All detected peaks are more than 20 dBµV/m below the limit | | | -/- | | | All detected peaks are more than 20 dBµV/m below the limit | | |
| | | | -/- | -/- | -/- | | | |
| | | | -/- | -/- | -/- | | | |
| Measurement uncertainty | | | ± 3 dB | | | | | |

| Spurious Emissions Radiated < 30 MHz [dBµV/m] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Lowest 5260 MHz | | | Middle | | | Highest 5320 MHz | | |
| F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] |
| All detected peaks are more than 20 dBµV/m below the limit | | | -/- | | | All detected peaks are more than 20 dBµV/m below the limit | | |
| | | | -/- | -/- | -/- | | | |
| | | | -/- | -/- | -/- | | | |
| Measurement uncertainty | | | ± 3 dB | | | | | |

| Spurious Emissions Radiated < 30 MHz [dBµV/m] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Lowest 5500 MHz | | | Middle 5600 MHz | | | Highest 5700 MHz | | |
| F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] |
| All detected peaks are more than 20 dBµV/m below the limit | | | All detected peaks are more than 20 dBµV/m below the limit | | | All detected peaks are more than 20 dBµV/m below the limit | | |
| | | | | | | | | |
| | | | | | | | | |
| Measurement uncertainty | | | ± 3 dB | | | | | |

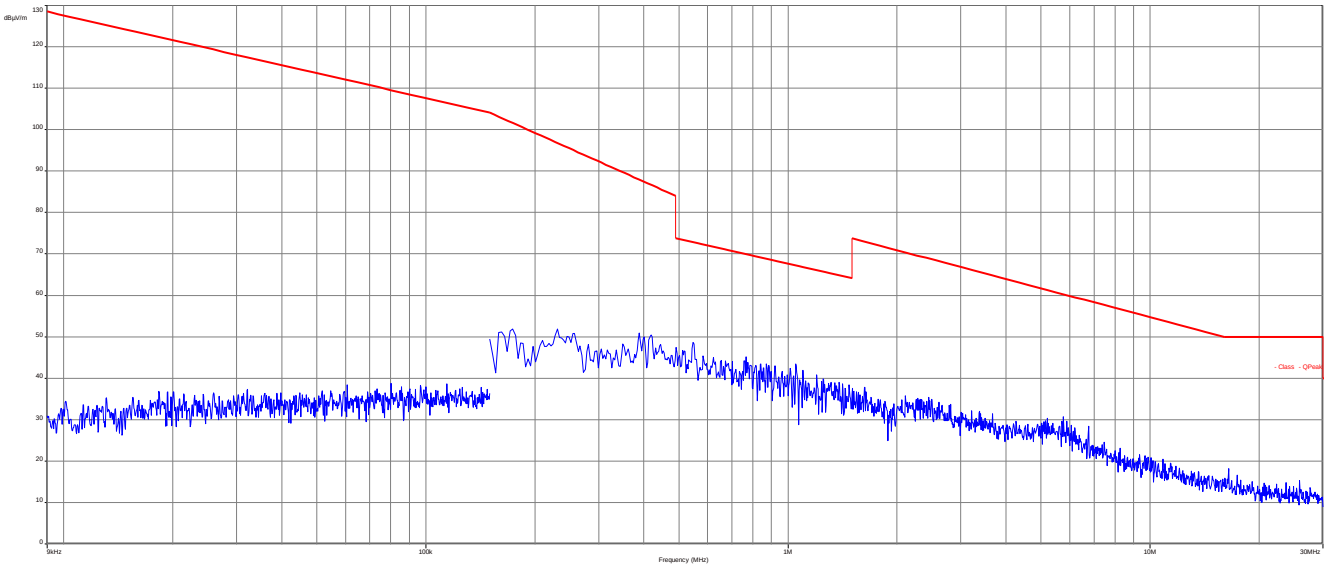
| Spurious Emissions Radiated < 30 MHz [dBµV/m] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Lowest 5745 MHz | | | Middle 5785 MHz | | | Highest 5805 MHz | | |
| F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] |
| All detected peaks are more than 20 dBµV/m below the limit | | | All detected peaks are more than 20 dBµV/m below the limit | | | All detected peaks are more than 20 dBµV/m below the limit | | |
| | | | | | | | | |
| | | | | | | | | |
| Measurement uncertainty | | | ± 3 dB | | | | | |

**Verdict:** **Complies**

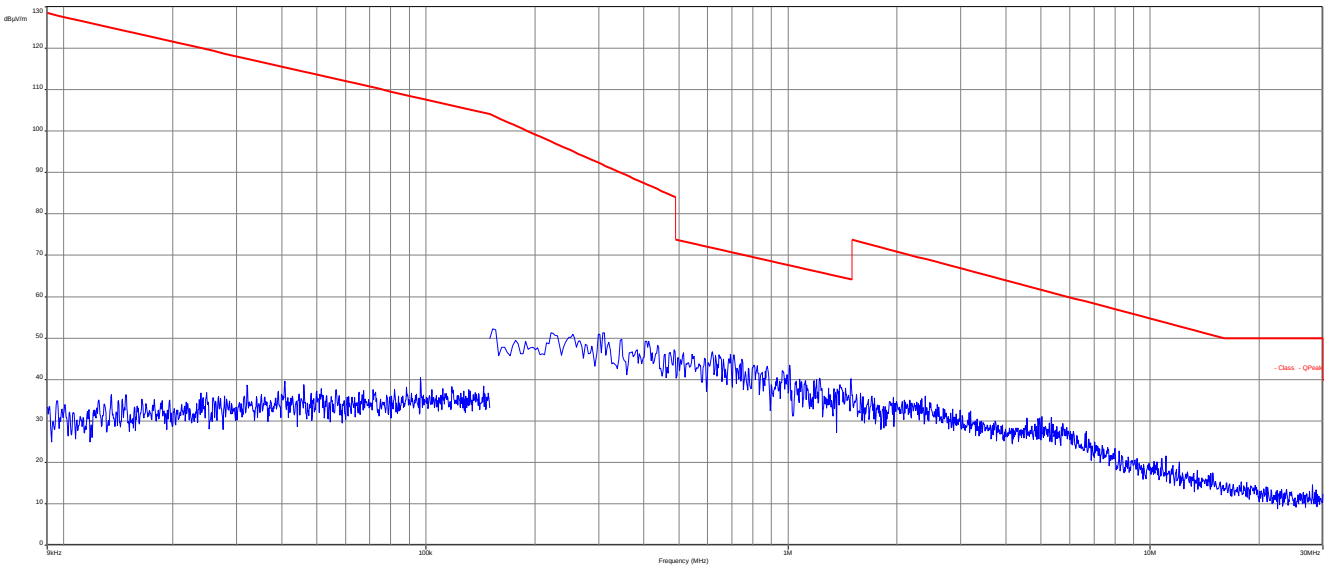
**Note:** The limit was recalculated with 20 dB / decade (Part 15.31) for all radiated spurious emissions 30 MHz to 1 GHz from 3 meter limit to a 10 meter distance. (40dB/decade for emissions < 30MHz)

**Plots:** OFDM / a – mode

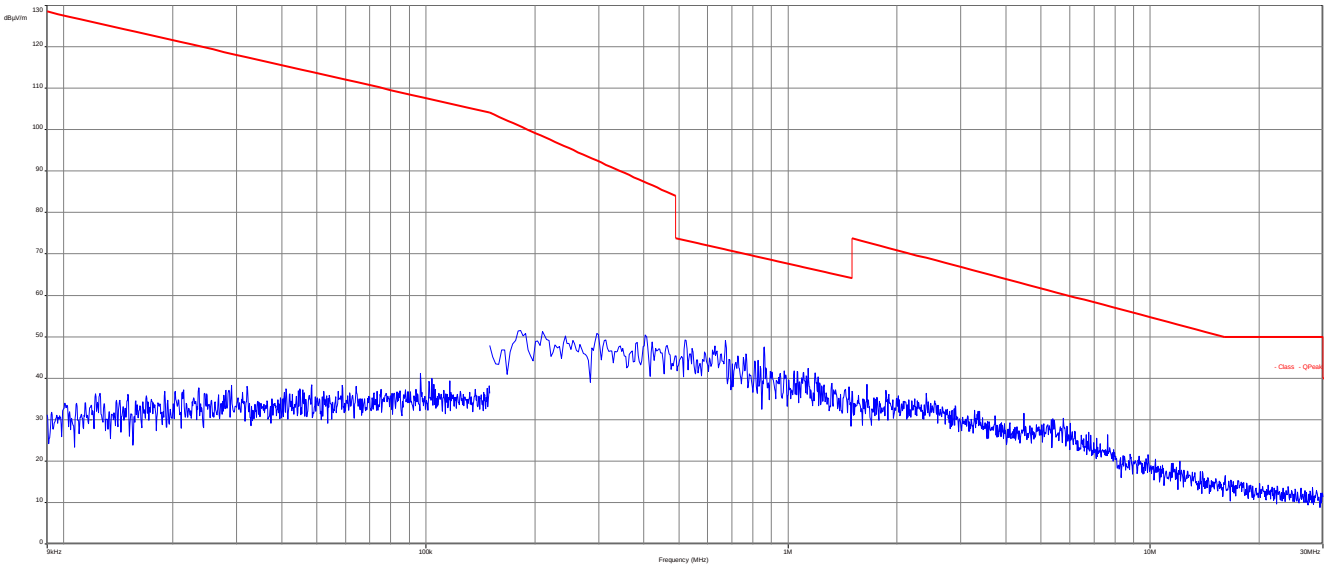
**Plot 1:** 9 kHz to 30 MHz, 5180 MHz



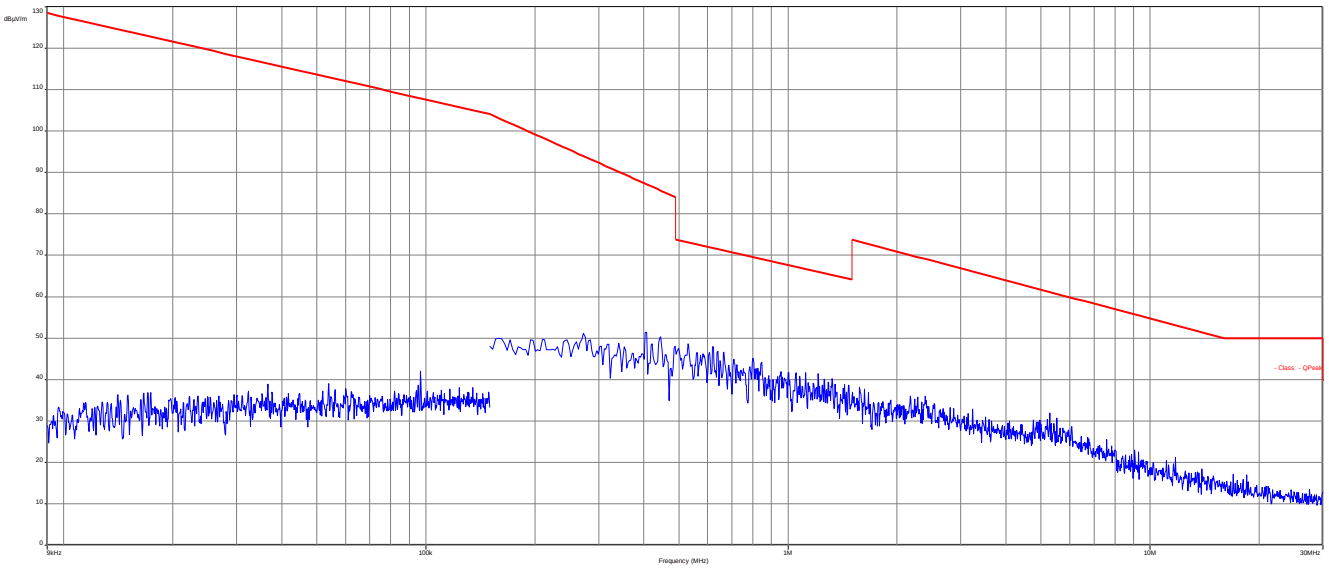

**Plot 2:** 9 kHz to 30 MHz, 5240 MHz



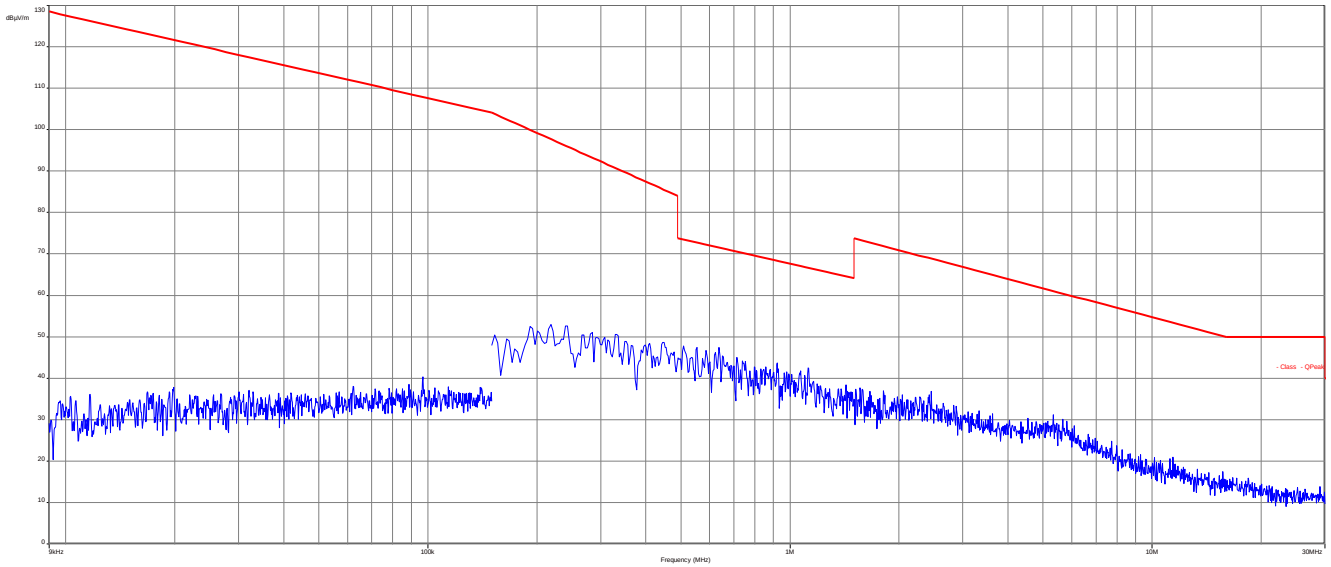
**Plot 3:** 9 kHz to 30 MHz, 5260 MHz



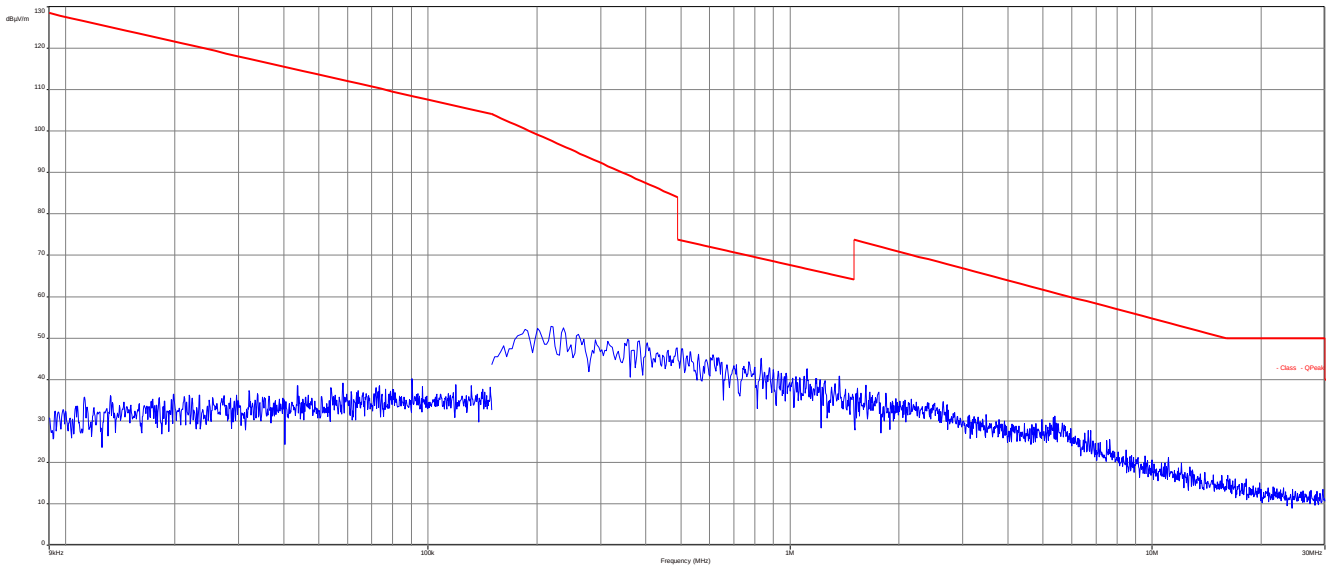

**Plot 4:** 9 kHz to 30 MHz, 5320 MHz



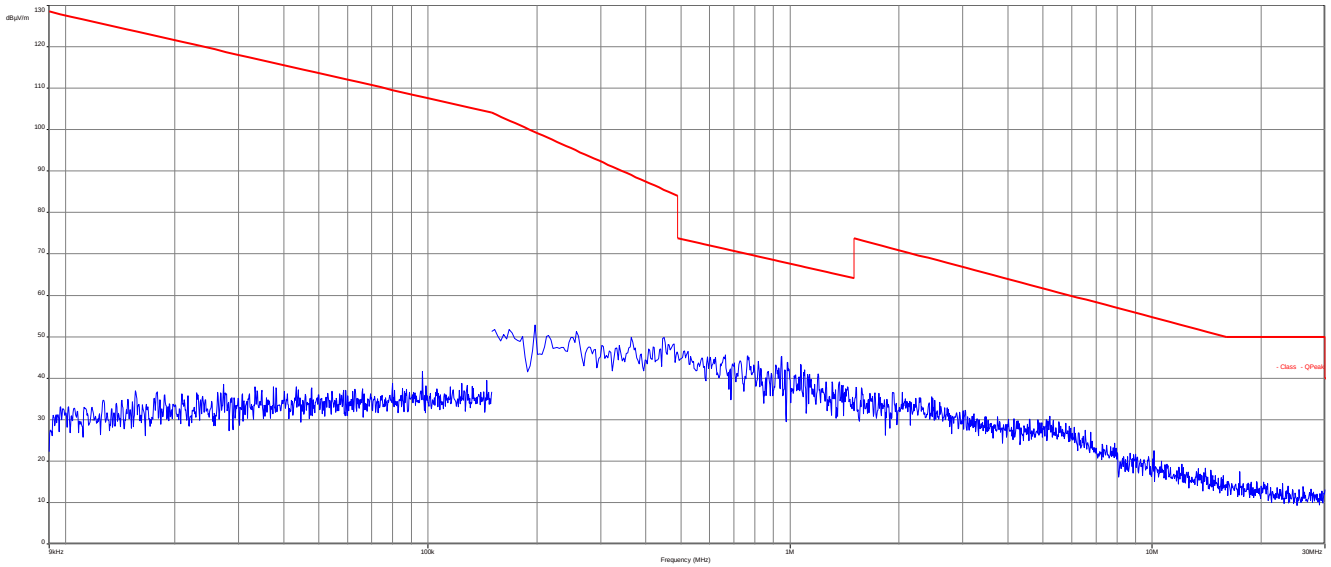
**Plot 5:** 9 kHz to 30 MHz, 5500 MHz



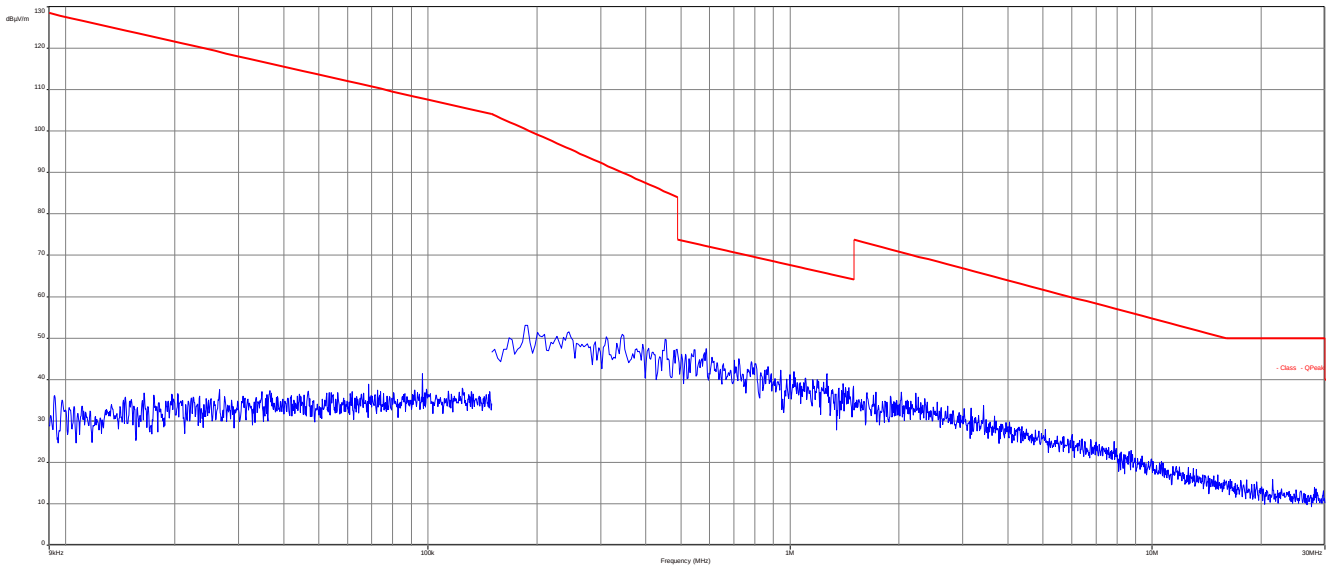

**Plot 6:** 9 kHz to 30 MHz, 5600 MHz



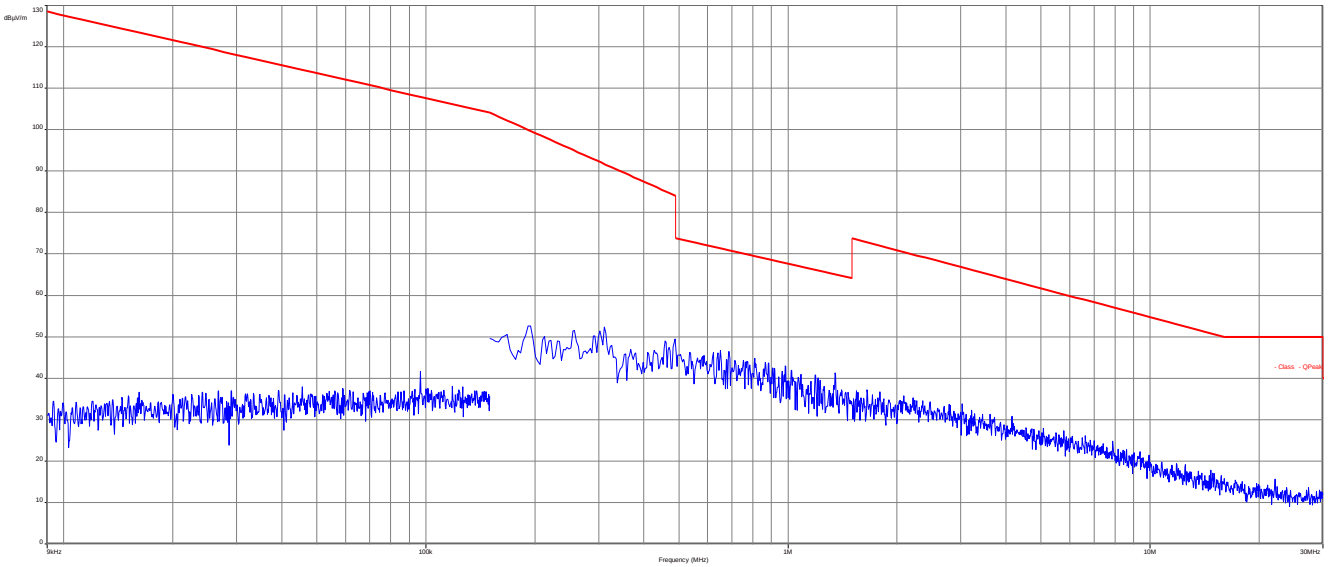
**Plot 7:** 9 kHz to 30 MHz, 5700 MHz



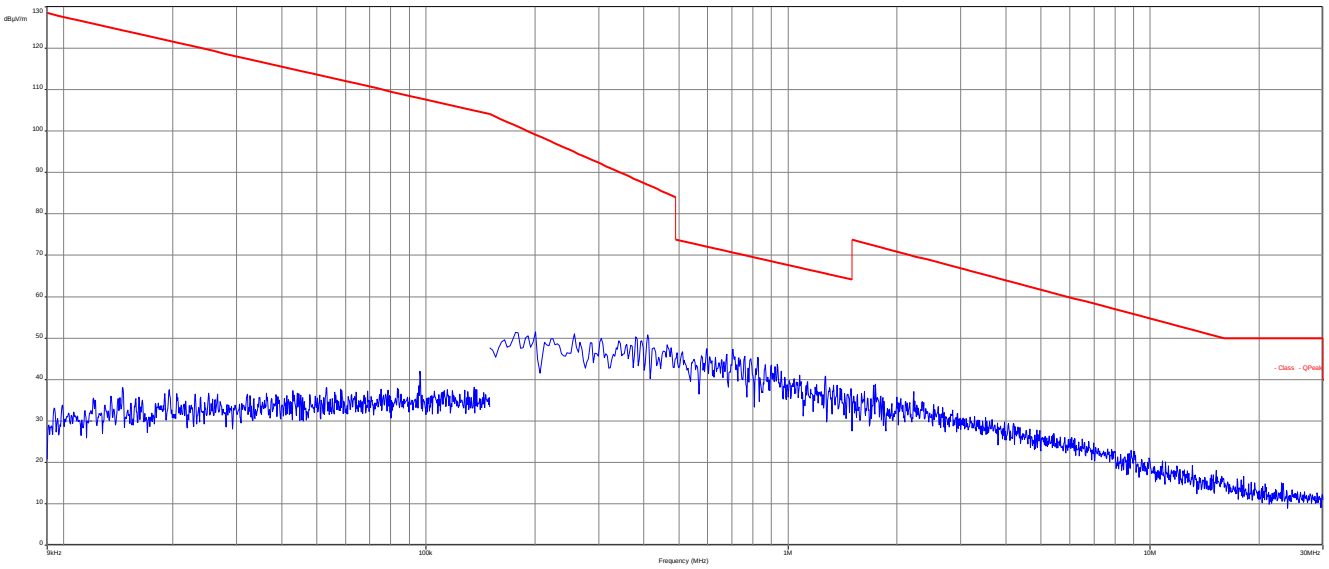

**Plot 8:** 9 kHz to 30 MHz, 5745 MHz



**Plot 9:** 9 kHz to 30 MHz, 5785 MHz




**Plot 10:** 9 kHz to 30 MHz, 5805 MHz



## 10.6 Spurious emissions conducted < 30 MHz

**Description:**

Measurement of the conducted spurious emissions in transmit mode below 30 MHz. The EUT is set to middle channel. If critical peaks are found the lowest channel and the highest channel will be measured too. Both power lines, phase and neutral line, are measured. Found peaks are remeasured with average and quasi peak detection to show compliance to the limits.

**Measurement:**

| Measurement parameter | |
|---|---|
| Detector: | Peak - Quasi Peak / Average |
| Sweep time: | Auto |
| Video bandwidth: | F > 150 kHz: 9 kHz |
| Resolution bandwidth: | F > 150 kHz: 100 kHz |
| Span: | 150 kHz to 30 MHz |
| Trace-Mode: | Max Hold |

**Limits:**

| Spurious Emissions Conducted < 30 MHz | | |
|---|---|---|
| Frequency (MHz) | Quasi-Peak (dBµV/m) | Average (dBµV/m) |
| 0.15 – 0.5 | 66 to 56* | 56 to 46* |
| 0.5 – 5 | 56 | 46 |
| 5 – 30.0 | 60 | 50 |

*Decreases with the logarithm of the frequency

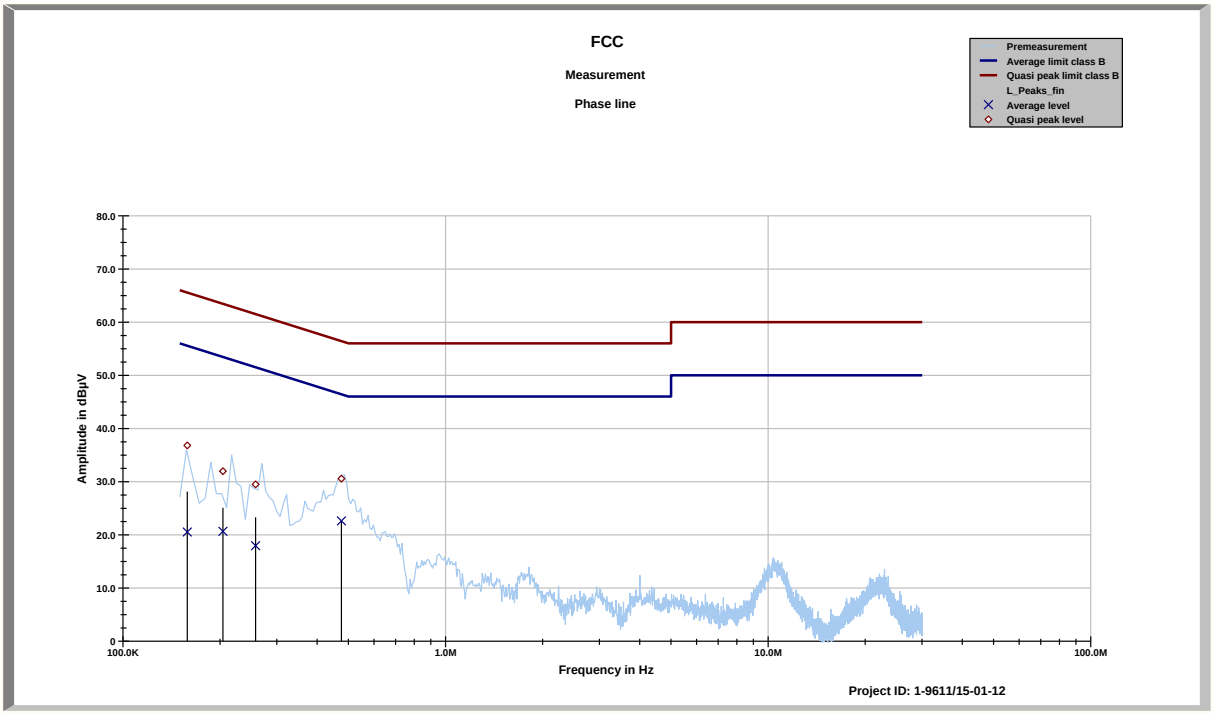
**Results:**

| Spurious Emissions Conducted < 30 MHz [dBµV/m] | | |
|---|---|---|
| F [MHz] | Detector | Level [dBµV/m] |
| No peaks found | | |
| | | |
| Measurement uncertainty | ± 3 dB | |

**Verdict:** Complies

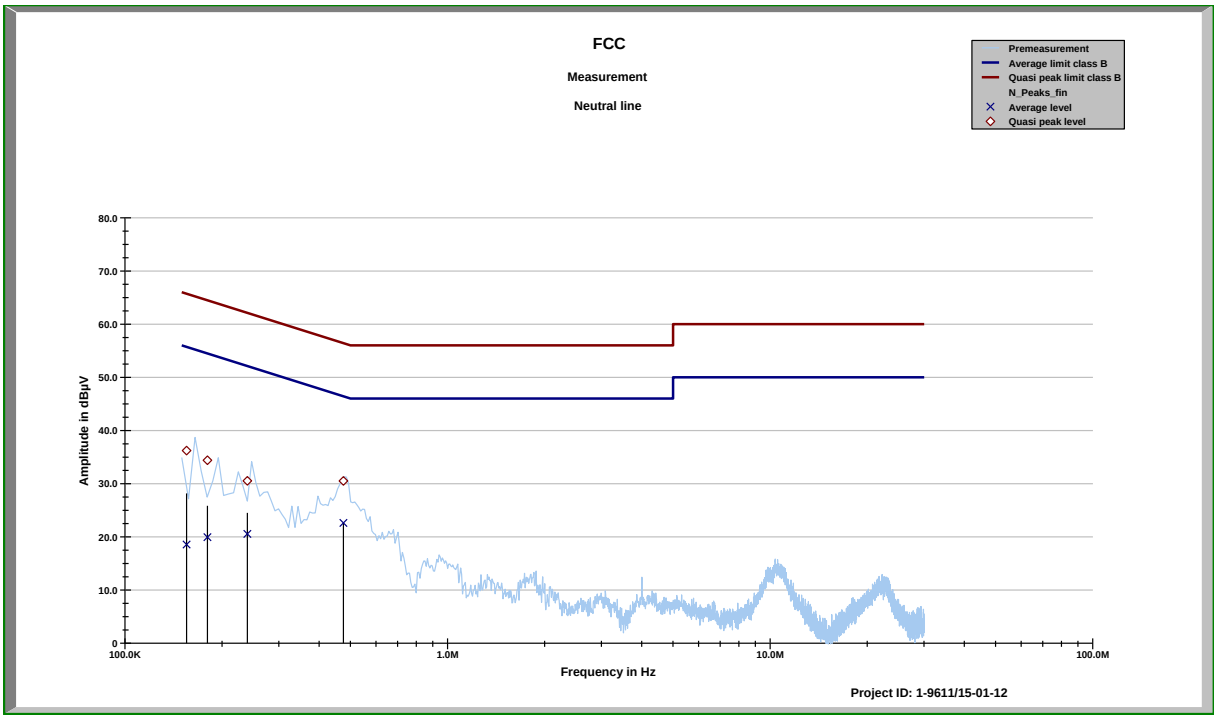
**Plots:**

**Plot 1:** 150 kHz to 30 MHz, phase line




| Frequency | Quasi peak level | Margin quasi peak | Average level | Margin average |
|---|---|---|---|---|
| MHz | dBµV | dBµV | dBµV | dBµV |
| | | | | |
| **0.15834** | 36.81 | 28.74 | 20.53 | 35.23 |
| **0.20414** | 31.97 | 31.47 | 20.66 | 33.80 |
| **0.25777** | 29.50 | 32.00 | 17.95 | 34.97 |
| **0.47553** | 30.56 | 25.85 | 22.62 | 24.08 |

**Plot 2:** 150 kHz to 30 MHz, neutral line




| Frequency | Quasi peak level | Margin quasi peak | Average level | Margin average |
|---|---|---|---|---|
| MHz | dBµV | dBµV | dBµV | dBµV |
| | | | | |
| **0.15532** | 36.22 | 29.49 | 18.55 | 37.30 |
| **0.18018** | 34.39 | 30.09 | 19.93 | 35.21 |
| **0.23959** | 30.52 | 31.59 | 20.54 | 32.90 |
| **0.47546** | 30.51 | 25.90 | 22.61 | 24.09 |

## 11 Observations

No observations except those reported with the single test cases have been made.

## Annex A Document history

| Version | Applied changes | Date of release |
|---|---|---|
| | Initial release | 2015-06-30 |
| A | Measurements for channels 149, 157 and 161 added | 2015-07-30 |

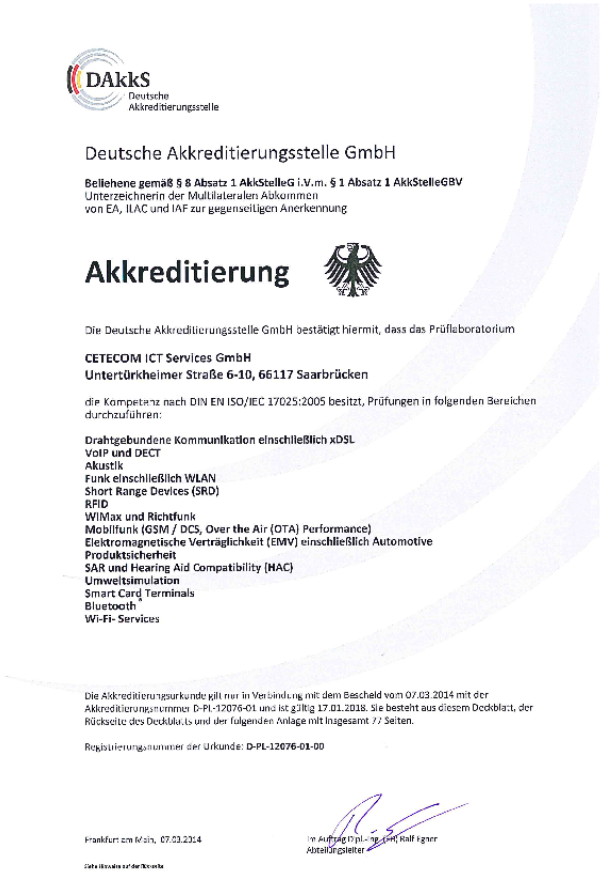
## Annex B Further information

**Glossary**

| | | |
|---|---|---|
| AVG | - | Average |
| DUT | - | Device under test |
| EMC | - | Electromagnetic Compatibility |
| EN | - | European Standard |
| EUT | - | Equipment under test |
| ETSI | - | European Telecommunications Standard Institute |
| FCC | - | Federal Communication Commission |
| FCC ID | - | Company Identifier at FCC |
| HW | - | Hardware |
| IC | - | Industry Canada |
| Inv. No. | - | Inventory number |
| N/A | - | Not applicable |
| PP | - | Positive peak |
| QP | - | Quasi peak |
| S/N | - | Serial number |
| SW | - | Software |
| PMN | | Product marketing name |
| HMN | | Host marketing name |
| HVIN | | Hardware version identification number |
| FVIN | | Firmware version identification number |

## Annex C Accreditation Certificate

Front side of certificate



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Unterzeichnerin der Multilateralen Abkommen
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Die Deutsche Akkreditierungsstelle GmbH bestätigt hiermit, dass das Prüflaboratorium

**CETECOM ICT Services GmbH**
**Untertürkheimer Straße 6-10, 66117 Saarbrücken**

die Kompetenz nach DIN EN ISO/IEC 17025:2005 besitzt, Prüfungen in folgenden Bereichen durchzuführen:

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**Akustik**
**Funk einschließlich WLAN**
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**RFID**
**WiMax und Richtfunk**
**Mobilfunk (GSM / DCS, Over the Air (OTA) Performance)**
**Elektromagnetische Verträglichkeit (EMV) einschließlich Automotive**
**Produktsicherheit**
**SAR und Hearing Aid Compatibility (HAC)**
**Umweltsimulation**
**Smart Card Terminals**
**Bluetooth**
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Die Akkreditierungsurkunde gilt nur in Verbindung mit dem Bescheid vom 07.03.2014 mit der Akkreditierungsnummer D-PL-12076-01 und ist gültig 17.01.2018. Sie besteht aus diesem Deckblatt, der Rückseite des Deckblatts und der folgenden Anlage mit insgesamt 77 Seiten.

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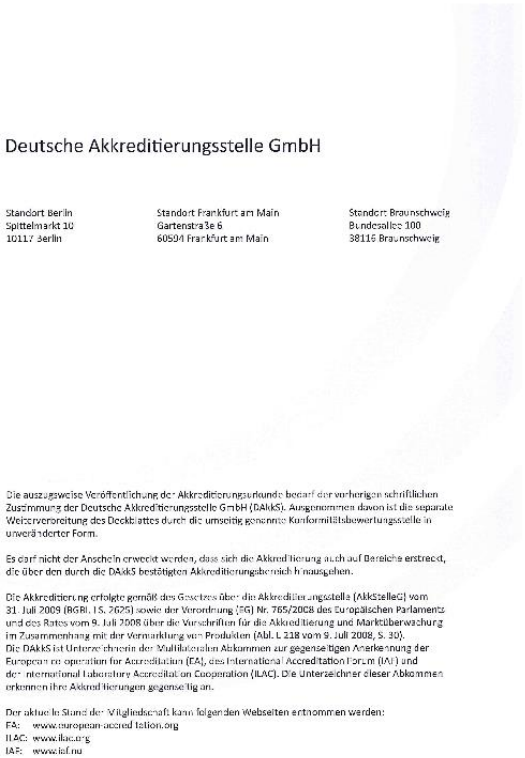
Frankfurt am Main, 07.03.2014

Im Auftrag Dipl.-Ing. (FH) Rolf Egner
Abteilungsleiter

Back side of certificate



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ILAC: www.ilac.org
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**Note:**

**The current certificate including annex is published on our website (see link below) or may be received from CETECOM ICT Services on request.**

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