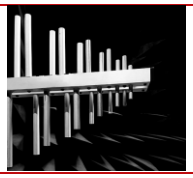
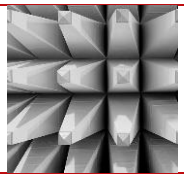

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CETECOM ICT Services
*consulting - testing - certification*

# TEST REPORT

**Test report no.: 1-8390/14-01-18-A**

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

## Testing laboratory


**CETECOM ICT Services GmbH**
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**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


**Thrane & Thrane A/S**
Lundtoftegaardsvej 93D
DK-2800 Kgs Lyngby / DENMARK
Phone: -/-
Fax: +45 3955 8888
Contact: Morten Becker Saul
e-mail: morten.saul@cobham.com
Phone: +45 3955 8209


## Manufacturer

**Thrane & Thrane A/S**
Lundtoftegaardsvej 93D
DK-2800 Kgs Lyngby / DENMARK

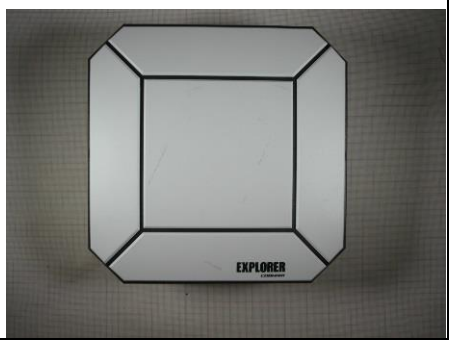
## Test standard/s

| | |
|---|---|
| 47 CFR Part 15 | Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices |
| RSS - 210 Issue 8 | Spectrum Management and Telecommunications Radio Standards Specification - Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment |

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

## Test Item

| | |
|---|---|
| **Kind of test item:** | **Satellite Terminal** |
| **Model name:** | **TT-3711A** |
| **FCC ID:** | **ROJ-TT3711A** |
| **IC:** | **6200B-TT3711A** |
| Frequency: | 2400 MHz to 2483.5 MHz ISM Band (lowest channel 01; highest channel 11) |
| Technology tested: | WLAN |
| Antenna: | External antenna |
| Power supply: | 24V DC |
| Temperature range: | -25°C to +55°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:

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2015.04.13 13:59:32 +02'00'

Marco Bertolino
Radio Communications & EMC

## Test performed:

David Lang
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2015.04.13 14:13:59 +02'00'

David Lang
Radio Communications & EMC

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# 2 General information

## 2.1 Notes and disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.
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## 2.2 Application details

| | |
|---|---|
| Date of receipt of order: | 2014-08-22 |
| Date of receipt of test item: | 2015-01-16 |
| Start of test: | 2015-01-19 |
| End of test: | 2015-02-11 |
| 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 - 210 Issue 8 | 01.12.2010 | Spectrum Management and Telecommunications Radio Standards Specification - Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment |

## 3.1 Measurement guidance

| | | |
|---|---|---|
| DTS : KDB 558074 | 2014-06 | Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 |

## 4 Test environment

| | | |
|---|---|---|
| Temperature: | $T_{nom}$ | +22 °C during room temperature tests |
| | $T_{max}$ | +55 °C during high temperature tests |
| | $T_{min}$ | -25 °C during low temperature tests |
| Relative humidity content: | | 55 % |
| Barometric pressure: | | not relevant for this kind of testing |
| Power supply: | $V_{nom}$ | 24 V DC |
| | $V_{max}$ | 32 V |
| | $V_{min}$ | 10.5 V |

## 5 Test item

| | |
|---|---|
| **Kind of test item :** | **Satellite Terminal** |
| **Type identification :** | **TT-3711A** |
| | |
| **S/N serial number :** | **Rad. Not available!**<br>**Cond. Not available!** |
| **HW hardware status :** | **Version: A** |
| **SW software status :** | **0.05 tt3711a-bganxl_ut-506 Sep 23 2014** |
| **Frequency band [MHz] :** | **2400 MHz to 2483.5 MHz ISM Band**<br>**(lowest channel 01; highest channel 11)** |
| **Type of radio transmission :**<br>**Use of frequency spectrum :** | **DSSS, OFDM** |
| **Type of modulation :** | **BPSK, QPSK, 16-QAM and 64-QAM** |
| **Number of channels :** | **11** |
| **Antenna :** | **External antenna** |
| **Power supply :** | **24 V DC** |
| **Temperature range :** | **-25°C to +55 °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: 1-8390/14-01-01_AnnexA
1-8390/14-01-01_AnnexB
1-8390/14-01-01_AnnexD

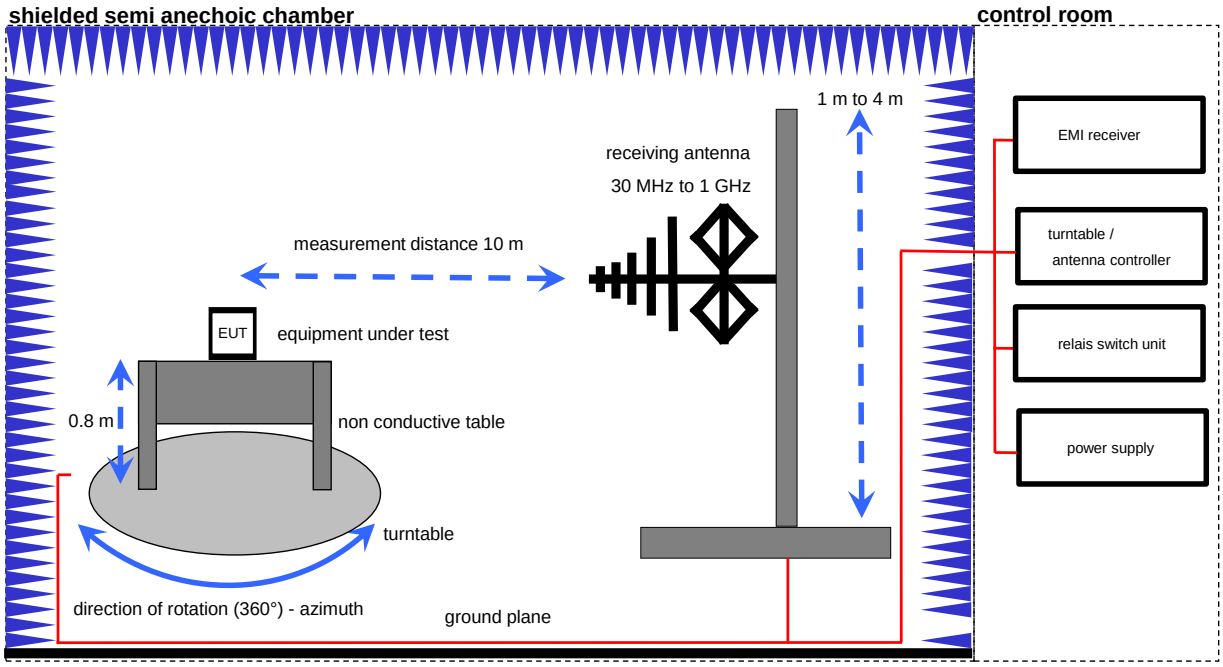
## 6 Test laboratories sub-contracted

None

# 7 Description of the test setup

## 7.1 Radiated measurements chamber F

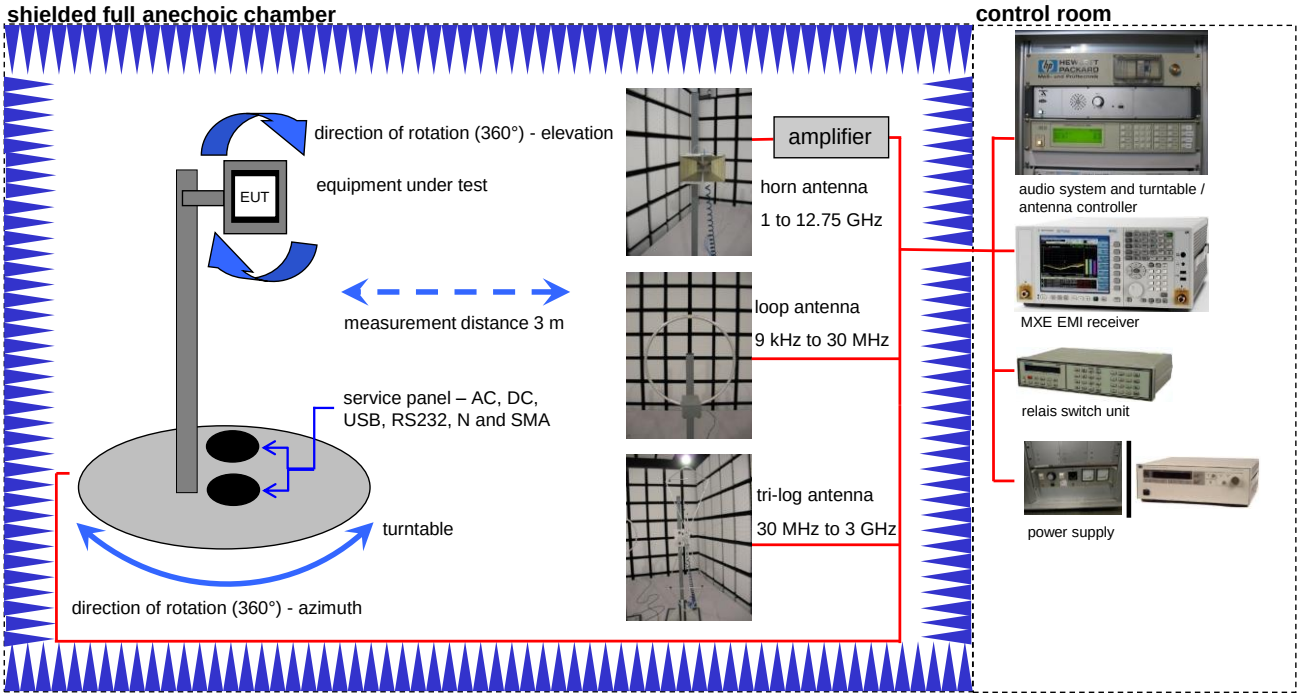
The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 1 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas 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:**

| Equipment | Type | Manufacturer | Serial No. | INV. No Cetecom |
|---|---|---|---|---|
| Software | EMC32 V.\| 9.12.05 | R&S | -/- | -/- |
| Switch-Unit | 3488A | HP Meßtechnik | 2719A14505 | 300000368 |
| DC power supply, 60Vdc, 50A, 1200 W | 6032A | HP Meßtechnik | 2920A04466 | 300000580 |
| EMI Test Receiver | ESCI 3 | R&S | 100083 | 300003312 |
| Amplifier | JS42-00502650-28-5A | MITEQ | 1084532 | 300003379 |
| Antenna Tower | Model 2175 | ETS-LINDGREN | 64762 | 300003745 |
| Positioning Controller | Model 2090 | ETS-LINDGREN | 64672 | 300003746 |
| Turntable Interface-Box | Model 105637 | ETS-LINDGREN | 44583 | 300003747 |
| TRILOG Broadband Test-Antenna 30 MHz - 3 GHz | VULB9163 | Schwarzbeck | 295 | 300003787 |

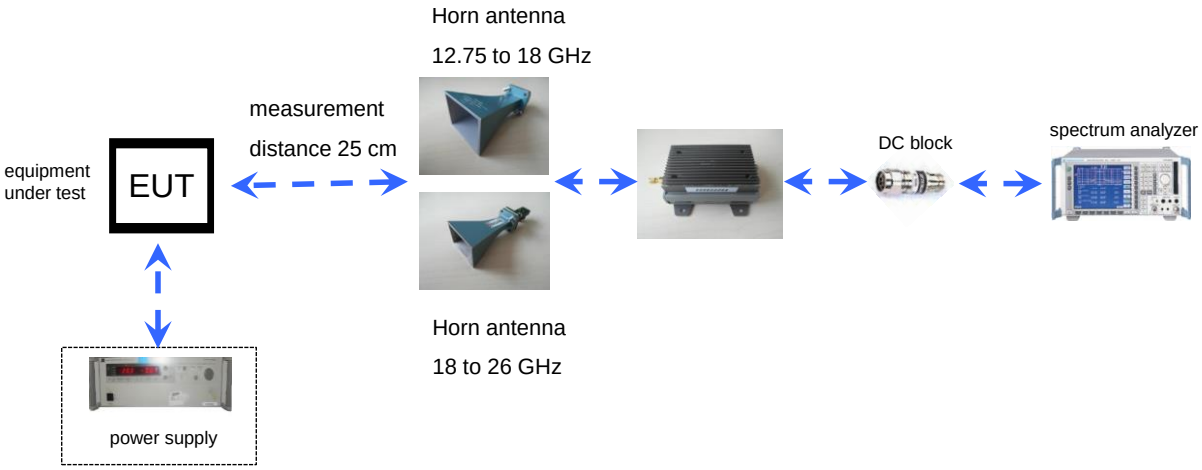
## 7.2 Radiated measurements chamber C




**Equipment table:**

| Equipment | Type | Manufacturer | Serial No. | INV. No Cetecom |
|---|---|---|---|---|
| MXE EMI Receiver 20 Hz bis 26,5 GHz | N9038A | Agilent Technologies | MY51210197 | 300004405 |
| TRILOG Broadband Test-Antenna 30 MHz - 3 GHz | VULB9163 | Schwarzbeck | 371 | 300003854 |
| Band Reject filter | WRCG2400/2483-2375/2505-50/10SS | Wainwright | 11 | 300003351 |
| Highpass Filter | WHKX7.0/18G-8SS | Wainwright | 18 | 300003789 |
| Double-Ridged Waveguide Horn Antenna 1-18.0GHz | 3115 | EMCO | 8812-3088 | 300001032 |
| Active Loop Antenna | 6502 | EMCO | 8905-2342 | 300000256 |
| Anechoic chamber | FAC 3/5m | MWB / TDK | 87400/02 | 300000996 |
| Switch / Control Unit | 3488A | HP Meßtechnik | * | 300000199 |
| Switch / Control Unit | 3488A | HP Meßtechnik | 2719A15013 | 300001156 |
| Isolating Transformer | MPL IEC625 Bus Regeltrenntravo | Erfi | 91350 | 300001155 |
| Three-Way Power Splitter, 50 Ohm | 11850C | HP Meßtechnik | | 300000997 |
| Amplifier | js42-00502650-28-5a | Parzich GMBH | 928979 | 300003143 |

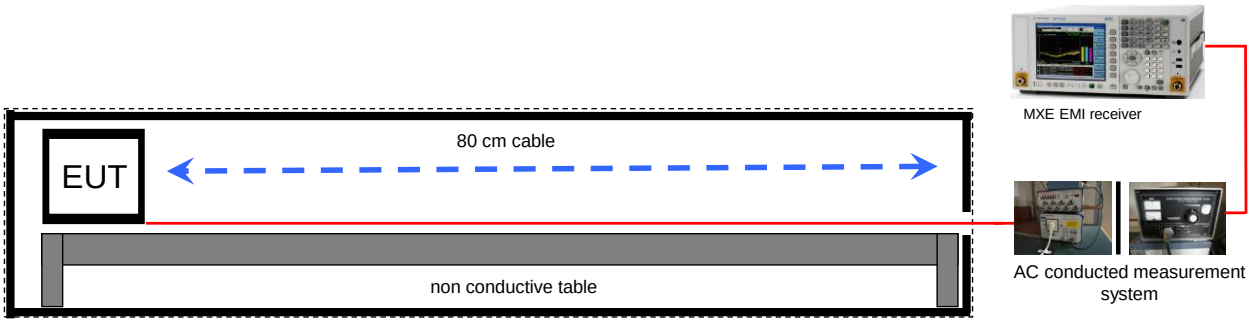
## 7.3 Radiated measurements 12.75 GHz to 26 GHz




**Equipment table:**

| Equipment | Type | Manufacturer | Serial No. | INV. No Cetecom |
|---|---|---|---|---|
| Std. Gain Horn Antenna 12.4 to 18.0 GHz | 639 | Narda | 8402 | 300000787 |
| Std. Gain Horn Antenna 18.0 to 26.5 GHz | 638 | Narda | 8205 | 300002442 |
| Microwave System Amplifier, 0.5-26.5 GHz | 83017A | HP Meßtechnik | 00419 | 300002268 |
| Signal Analyzer 40 GHz | FSV40 | R&S | 101042 | 300004517 |

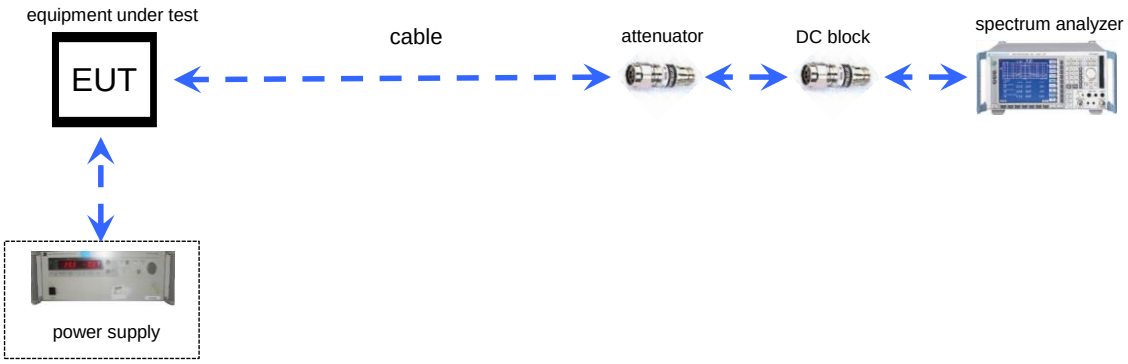
## 7.4 AC conducted




**Equipment table:**

| Equipment | Type | Manufacturer | Serial No. | INV. No Cetecom |
|---|---|---|---|---|
| MXE EMI Receiver 20 Hz bis 26,5 GHz | N9038A | Agilent Technologies | MY51210197 | 300004405 |
| Isolating Transformer | MPL IEC625 Bus Regeltrenntravo | Erfi | 91350 | 300001155 |
| Switch / Control Unit | 3488A | HP Meßtechnik | * | 300000199 |
| Switch / Control Unit | 3488A | HP Meßtechnik | 2719A15013 | 300001168 |
| Artificial Mains 9 kHz to 30 MHz | ESH3-Z5 | R&S | 828576/020 | 300001210 |

## 7.5 Conducted measurements




**Equipment table:**

| Equipment | Type | Manufacturer | Serial No. | INV. No Cetecom |
|---|---|---|---|---|
| Signal Analyzer 40 GHz | FSV40 | R&S | 101042 | 300004517 |

# 8 Summary of measurement results

| | |
|---|---|
| ☒ | **No deviations from the technical specifications were ascertained** |
| ☐ | There were deviations from the technical specifications ascertained |

| TC Identifier | Description | Verdict | Date | Remark |
|---|---|---|---|---|
| RF-Testing | CFR Part 15<br>RSS 210, Issue 8 | Passed | 2015-04-13 | Only partial tests performed.* |

| Test specification clause | Test case | Guideline | Temperature conditions | Power source voltages | Mode | Pass | Fail | NA | NP | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| §15.247(b)(4)<br>RSS 210 /<br>A8.4(2) | Antenna gain | -/- | Nominal | Nominal | DSSS | ☒ | ☐ | ☐ | ☐ | complies |
| §15.247(e)<br>RSS 210 /<br>A8.2(b) | Power spectral density | KDB 558074<br>DTS clause: 10.6 | Nominal | Nominal | DSSS<br>OFDM g & n | ☐<br>☐ | ☐<br>☐ | ☐<br>☐ | ☒<br>☒ | * |
| §15.247(a)(2)<br>RSS 210 /<br>A8.2(a) | DTS bandwidth – 6 dB bandwidth | KDB 558074<br>DTS clause: 8.1 | Nominal | Nominal | DSSS<br>OFDM g & n | ☐<br>☐ | ☐<br>☐ | ☐<br>☐ | ☒<br>☒ | * |
| RSS Gen<br>clause 4.6.1 | Occupied bandwidth | -/- | Nominal | Nominal | DSSS<br>OFDM g & n | ☐<br>☐ | ☐<br>☐ | ☐<br>☐ | ☒<br>☒ | * |
| §15.247(b)(3)<br>RSS-210 /<br>A8.4(4) | Maximum output power | KDB 558074<br>DTS clause:<br>9.2.2.5 | Nominal | Nominal | DSSS<br>OFDM g & n | ☐<br>☐ | ☐<br>☐ | ☐<br>☐ | ☒<br>☒ | * |
| §15.247(d)<br>RSS-210 /<br>A8.5 | Detailed spurious emissions @ the band edge - conducted | -/- | Nominal | Nominal | DSSS<br>OFDM g & n | ☐<br>☐ | ☐<br>☐ | ☐<br>☐ | ☒<br>☒ | * |
| §15.205<br>RSS-210 /<br>A8.5 | Band edge compliance radiated | KDB 558074<br>DTS clause:<br>13.3.2 | Nominal | Nominal | DSSS<br>OFDM g & n | ☒<br>☒ | ☐<br>☐ | ☐<br>☐ | ☐<br>☐ | complies |
| §15.247(d)<br>RSS-210 /<br>A8.5 | TX spurious emissions conducted | KDB 558074<br>DTS clause: 11.1<br>& 11.2 11.3 | Nominal | Nominal | DSSS<br>OFDM g & n | ☐<br>☐ | ☐<br>☐ | ☐<br>☐ | ☒<br>☒ | * |
| §15.247(d)<br>RSS-210 /<br>A8.5 | TX spurious emissions radiated | -/- | Nominal | Nominal | DSSS<br>OFDM g & n | ☒<br>☒ | ☐<br>☐ | ☐<br>☐ | ☐<br>☐ | complies |
| §15.109<br>RSS-Gen | RX spurious emissions radiated | -/- | Nominal | Nominal | -/- | ☒ | ☐ | ☐ | ☐ | complies |
| §15.209(a)<br>RSS-Gen | TX spurious emissions radiated < 30 MHz | -/- | Nominal | Nominal | DSSS | ☒ | ☐ | ☐ | ☐ | complies |
| §15.107(a)<br>§15.207 | Conducted emissions < 30 MHz | -/- | Nominal | Nominal | DSSS | ☒ | ☐ | ☐ | ☐ | complies |

**Note:** NA = Not Applicable; NP = Not Performed
* Module integration. For reference see section 9 of this test report.

## 9 Additional comments

| | |
|---|---|
| Reference documents: | Module report: FR3N2752-01C issued by Sporton International Inc. Jan. 27, 2014. |
| Special test descriptions: | None |
| Configuration descriptions: | All tests performed with the output power settings as below:<br>Low channel: 18 dBm<br>Mid channel: 20 dBm<br>High channel: 18 dBm |
| Test mode: | ☐ No test mode available.<br>Iperf was used to ping another device with the largest support packet size |
| | ☒ Special software is used.<br>EUT is transmitting pseudo random data by itself |
| Supported modulations: | bmode, gmode, HT20mode single chain |

# 10 Measurement results

## 10.1 Antenna gain

**Measurement:**

The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module. For normal WLAN devices, the DSSS mode is used.

**Measurement parameters:**

| Measurement parameter | |
|---|---|
| Detector: | Peak |
| Sweep time: | Auto |
| Resolution bandwidth: | 3 MHz |
| Video bandwidth: | 3 MHz |
| Trace-Mode: | Max hold |

**Limits:**

| FCC | IC |
|---|---|
| Antenna Gain | |
| 6 dBi | |

**Results:**

| $T_{nom}$ | $V_{nom}$ | lowest channel 2412 MHz | middle channel 2437 MHz | highest channel 2462 MHz |
|---|---|---|---|---|
| Conducted power [dBm] Measured with DSSS modulation | | 13.0 | 14.0 | 14.3 |
| Radiated power [dBm] Measured with DSSS modulation | | 12.8 | 16.0 | 14.4 |
| Gain [dBi] Calculated | | 0.2 | 2.0 | 0.1 |
| Measurement uncertainty | | ± 1.5 dB (cond.) / ± 3 dB (rad.) | | |

**Verdict:** **Passed**

## 10.2 Maximum output power

**Description:**

Measurement of the maximum output power conducted and radiated. The measurements are performed using the data rate producing the highest conducted output power.

**Measurement:**

| Measurement parameter | |
|---|---|
| **According to DTS clause: 9.2.2.5** | |
| Detector: | Peak |
| Sweep time: | Auto |
| Resolution bandwidth: | 1 – 5 % of the OBW |
| Video bandwidth: | ≥3x RBW |
| Span: | 40 MHz |
| Integration bandwidth: | 99 % power - bandwidth (OBW) |
| Trace-Mode: | Max hold<br>(allow trace to fully stabilize) |
| Measurement function: | Channel power with OBW |

**Limits:**

| FCC | IC |
|---|---|
| Maximum Output Power | |
| Conducted: 1.0 W – Antenna Gain max. 6 dBi | |

**Results:**

Note: Conducted values taken from the module report. For reference see section 5.1 of this test report.

| **DSSS / b – mode** | **Maximum Output Power [dBm]** | | |
|---|---|---|---|
| Frequency | 2412 MHz | 2437 MHz | 2462 MHz |
| Output power conducted incl. DC corr.<br>Worst case data rate | 17.6 | 18.0 | 17.6 |
| **OFDM / g – mode** | **Maximum Output Power [dBm]** | | |
| Frequency | 2412 MHz | 2437 MHz | 2462 MHz |
| Output power conducted incl. DC corr.<br>Worst case data rate | 20.2 | 20.6 | 19.9 |
| **OFDM / n HT20 – mode** | **Maximum Output Power [dBm]** | | |
| Frequency | 2412 MHz | 2437 MHz | 2462 MHz |
| Output power conducted incl. DC corr.<br>Worst case data rate | 20.0 | 20.6 | 20.3 |
| Measurement uncertainty | ± 1.5 dB (cond.) | | |

| **DSSS / b – mode** | **Maximum Output Power [dBm]** | | |
|---|---|---|---|
| Frequency | 2412 MHz | 2437 MHz | 2462 MHz |
| Output power radiated*<br>Worst case data rate | 17.8 | 20.0 | 17.7 |
| **OFDM / g – mode** | **Maximum Output Power [dBm]** | | |
| Frequency | 2412 MHz | 2437 MHz | 2462 MHz |
| Output power radiated*<br>Worst case data rate | 20.4 | 22.6 | 20.0 |
| **OFDM / n HT20 – mode** | **Maximum Output Power [dBm]** | | |
| Frequency | 2412 MHz | 2437 MHz | 2462 MHz |
| Output power radiated*<br>Worst case data rate | 20.2 | 22.6 | 20.4 |
| Measurement uncertainty | ± 3 dB (rad.) | | |

*Calculated values = conducted power + max. antenna gain (measured with DSSS modulation)

Additional Peak Power mearurements conducted acc. Module report no. FR3N2752-01C

| **DSSS / b – mode** | **Maximum Output Power [dBm]** | | |
|---|---|---|---|
| Frequency | -/- | 2437 MHz | -/- |
| Peak output power conducted 1 Mbit/s | -/- | 17.52 | -/- |
| **OFDM / g – mode** | **Maximum Output Power [dBm]** | | |
| Frequency | -/- | 2437 MHz | -/- |
| Peak output power conducted 6 Mbit/s | -/- | 19.95 | -/- |
| **OFDM / n HT20 – mode** | **Maximum Output Power [dBm]** | | |
| Frequency | -/- | 2437 MHz | -/- |
| Peak output power conducted MCS0 | -/- | 19.73 | -/- |
| Measurement uncertainty | ± 3 dB (rad.) | | |

**Verdict:** **Passed**

## 10.3 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 channel 1 for the lower restricted band and to channel 11 for the upper restricted band. The measurement is repeated for all modulations. Measurement distance is 3m.

**Measurement:**

| Measurement parameter for peak measurements | |
|---|---|
| Detector: | Peak |
| Sweep time: | Auto |
| Resolution bandwidth: | 1 MHz |
| Video bandwidth: | 1 MHz |
| Span: | See plot! |
| Trace-Mode: | Max Hold |

| Measurement parameter for average measurements | |
|---|---|
| According to DTS clause: 13.3.2 | |
| Detector: | RMS |
| Sweep time: | Auto |
| Resolution bandwidth: | 100 kHz |
| Video bandwidth: | 300 kHz |
| Span: | 2 MHz |
| Trace-Mode: | RMS Average over 101 sweeps |

**Limits:**

| FCC | IC |
|---|---|
| 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 | |

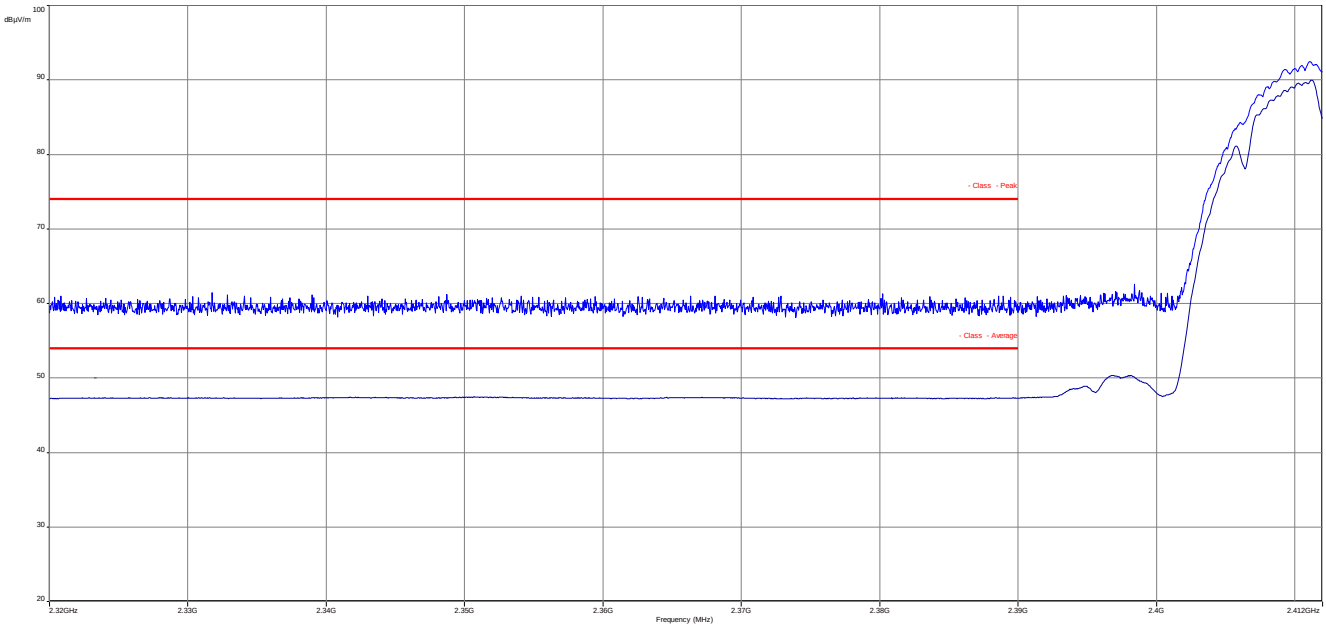
**Results:**

| Scenario | Band Edge Compliance Conducted [dB] | | |
|---|---|---|---|
| Modulation | DSSS / b – mode | OFDM / g – mode | OFDM / n HT20 – mode |
| Lower Band Edge – Channel 1 | > 20 dB (Peak)<br>> 20 dB (AVG) | > 10 dB (Peak)<br>> 20 dB (AVG) | > 10 dB (Peak)<br>> 20 dB (AVG) |
| Upper Band Edge – Channel 11 | > 20 dB (Peak)<br>> 20 dB (AVG) | > 10 dB (Peak)<br>> 20 dB (AVG) | > 10 dB (Peak)<br>> 20 dB (AVG) |
| Measurement uncertainty | ± 3 dB | | |

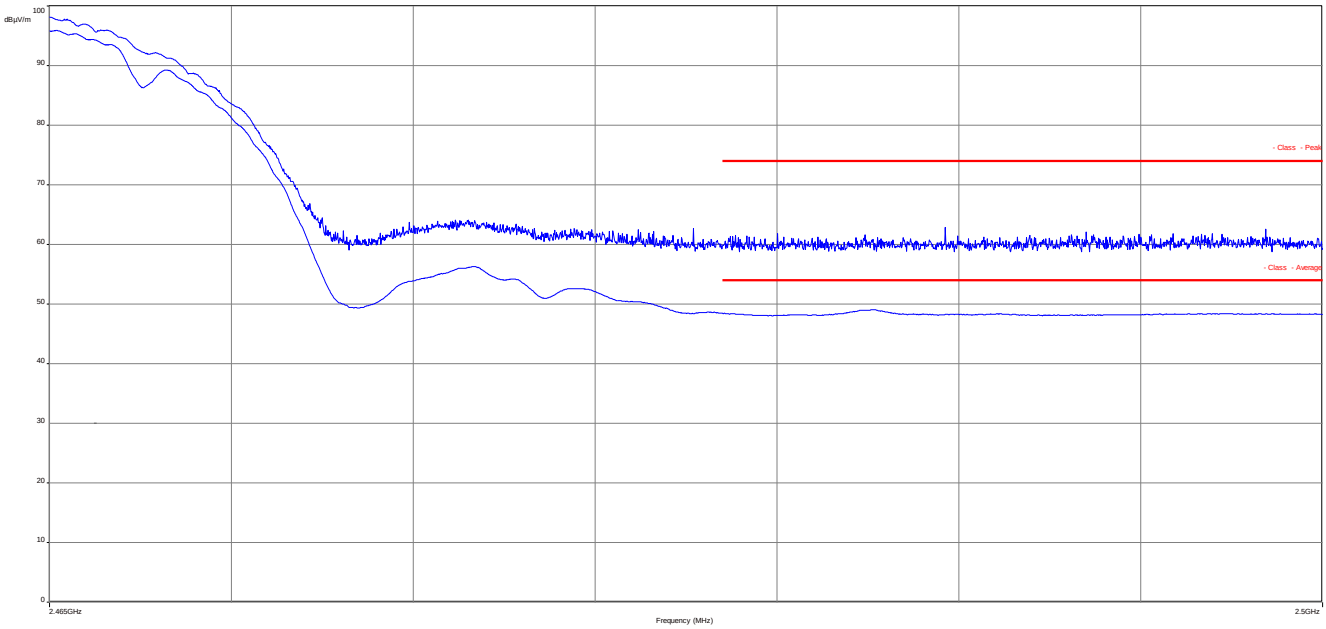
**Verdict:** **Passed**

## Plots: DSSS/ b – mode peak / average

**Plot 1:** TX mode, lower band edge, vertical & horizontal polarization

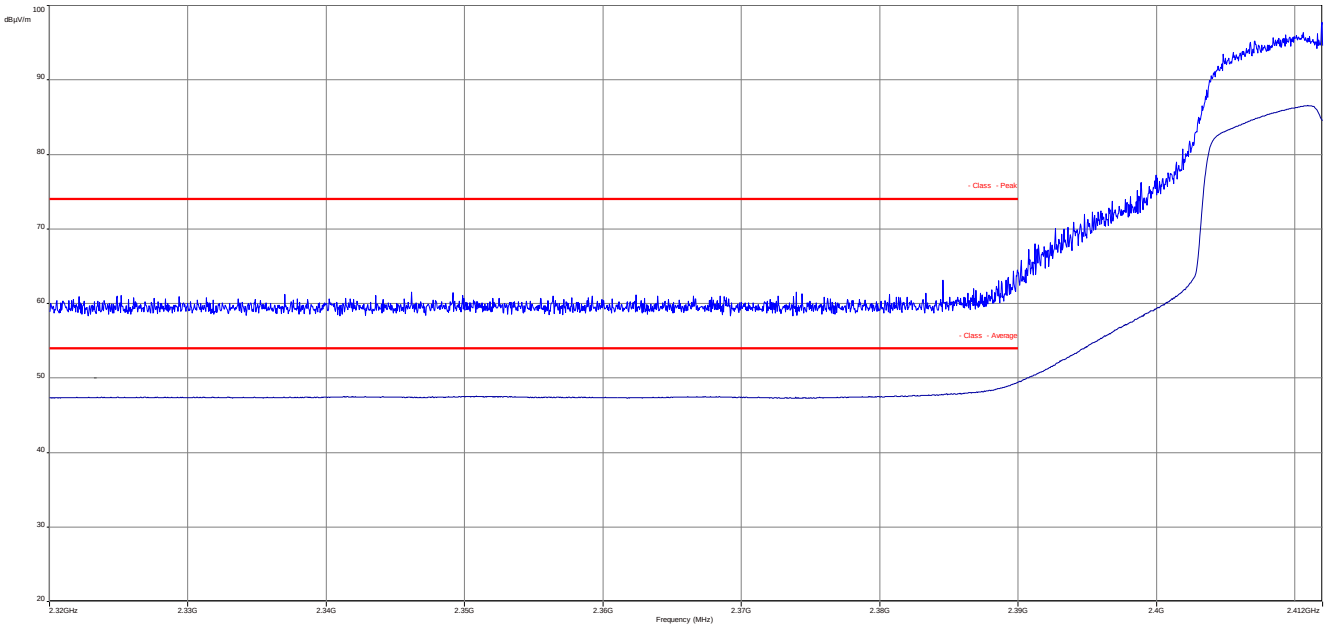



**Plot 2:** TX mode, upper band edge, vertical & horizontal polarization

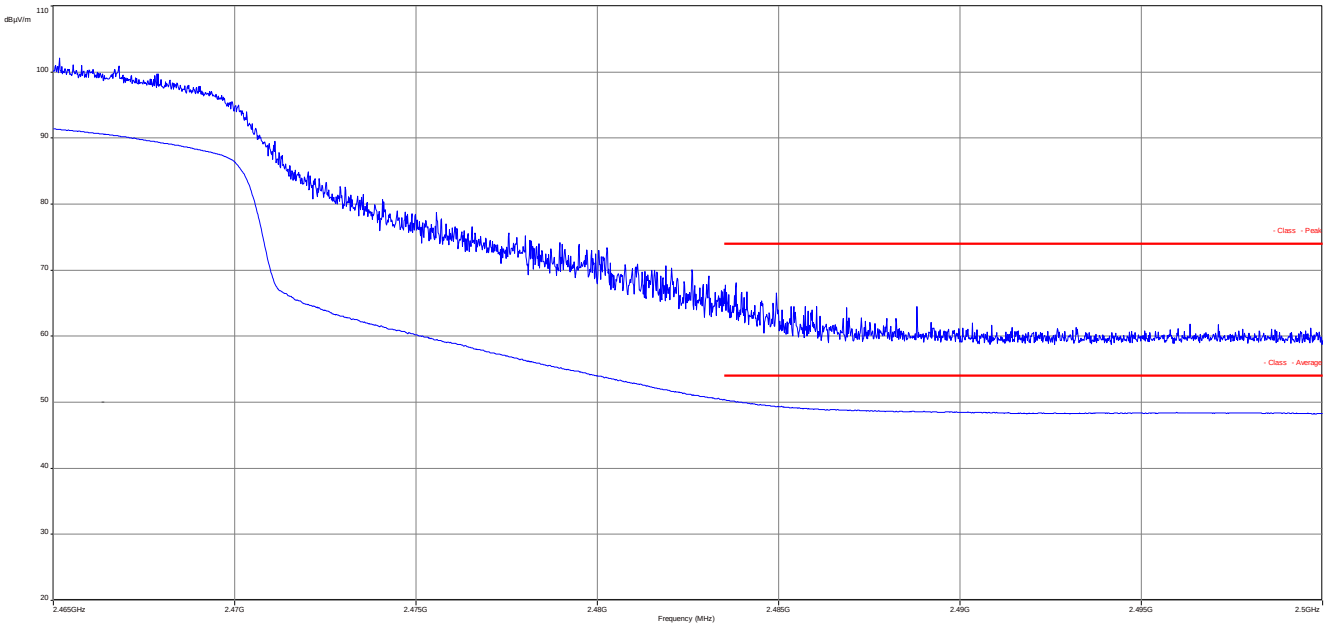


## Plots: OFDM / g – mode peak / average

**Plot 1:** TX mode, lower band edge, vertical & horizontal polarization

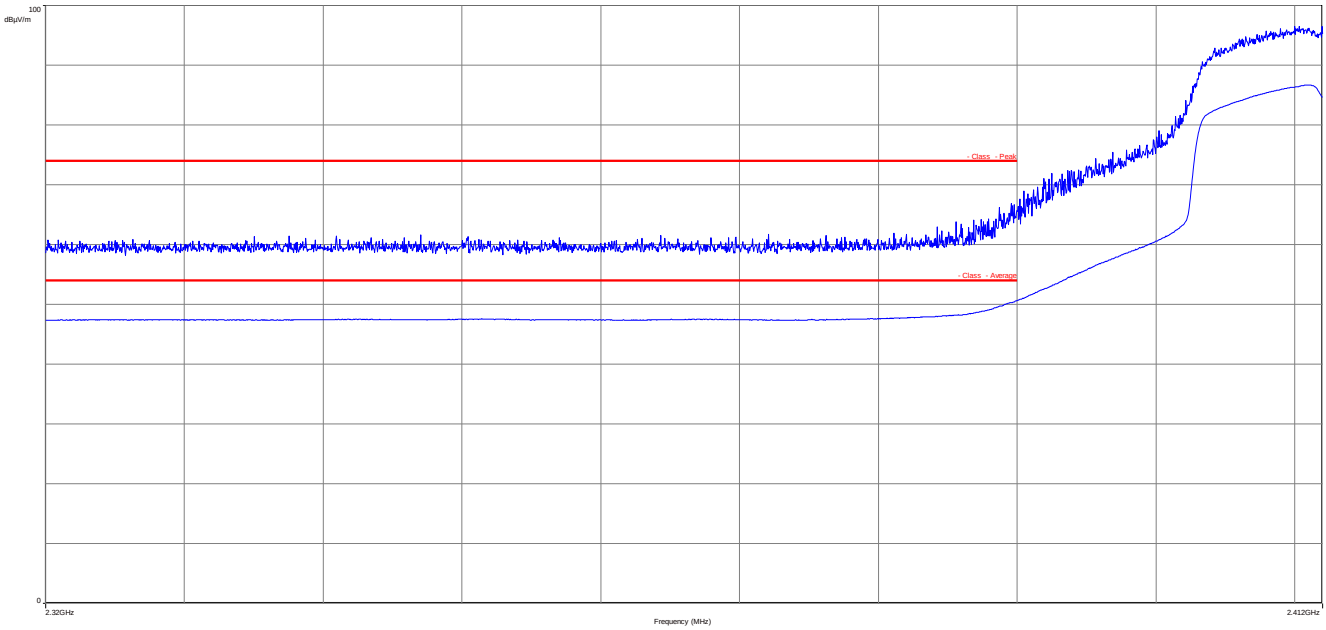



**Plot 2:** TX mode, upper band edge, vertical & horizontal polarization

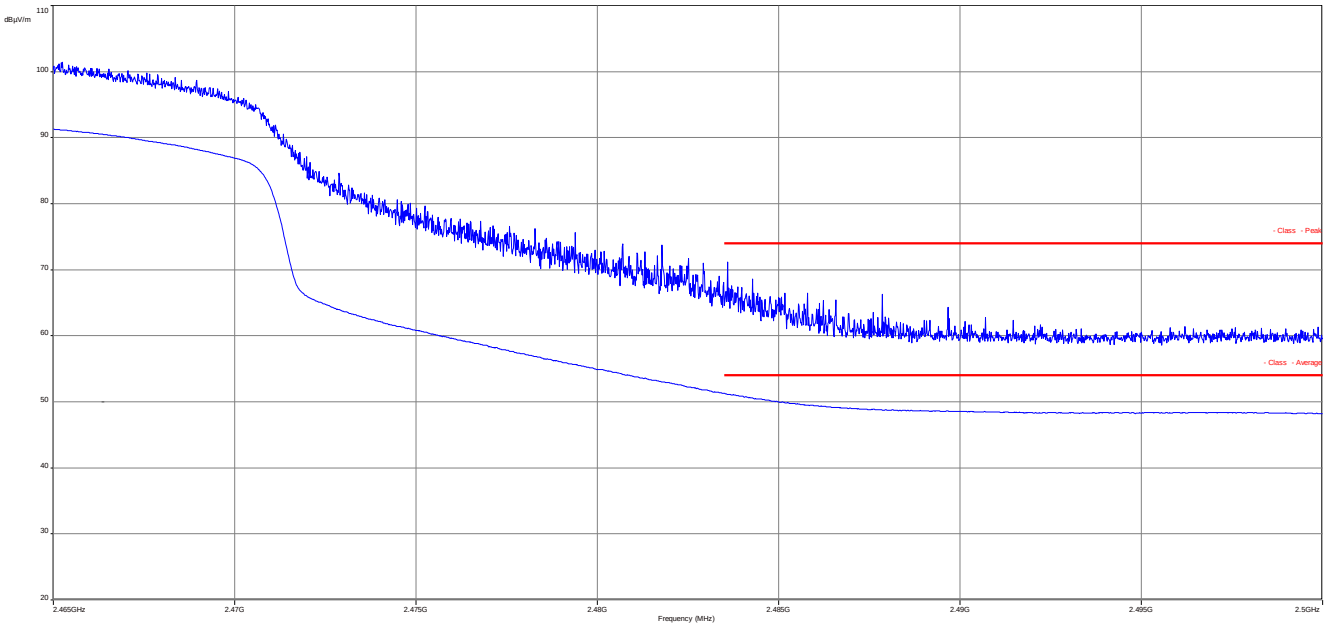


## Plots: OFDM / n HT20 – mode peak / average

**Plot 1:** TX mode, lower band edge, vertical & horizontal polarization




**Plot 2:** TX mode, upper band edge, vertical & horizontal polarization



## 10.4 TX spurious emissions radiated

**Description:**

Measurement of the radiated spurious emissions in transmit mode. The measurement is performed at channel 1, 6 and 11. The measurement is repeated for all modulations.

**Measurement:**

| Measurement parameter | |
|---|---|
| Detector: | Peak / Quasi Peak / RMS |
| Sweep time: | Auto |
| Resolution bandwidth: | F > 1 GHz: 1 MHz<br>F < 1 GHz: 100 kHz |
| Video bandwidth: | 3 x RBW<br>Remeasurement: 10 Hz / 3 MHz |
| Span: | 30 MHz to 26 GHz |
| Trace-Mode: | Max Hold |
| Measured Modulation | ☒ DSSS b – mode<br>☒ OFDM g – mode<br>☒ OFDM n – mode |

The modulation with the highest output power was used to perform the transmitter spurious emissions. If spurious were detected a re-measurement was performed on the detected frequency with each modulation.

**Limits:**

| FCC | | IC |
|---|---|---|
| TX Spurious Emissions 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 §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)). | | |
| 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: DSSS / b – mode**

| TX Spurious Emissions Radiated [dBµV/m] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DSSS / b – mode | | | | | | | | |
| 2412 MHz | | | 2437 MHz | | | 2462 MHz | | |
| F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] |
| For emissions below 1 GHz, please take a look at the table below the 1 GHz plot. | | | For emissions below 1 GHz, please take a look at the table below the 1 GHz plot. | | | For emissions below 1 GHz, please take a look at the table below the 1 GHz plot. | | |
| No spurious emissions above 1 GHz detected. | | | No spurious emissions above 1 GHz detected. | | | No spurious emissions above 1 GHz detected. | | |
| | | | | | | | | |
| Measurement uncertainty | | | ± 3 dB | | | | | |

**Verdict:** **Passed**

**Results: OFDM / g – mode**

| TX Spurious Emissions Radiated [dBµV/m] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DSSS / g – mode | | | | | | | | |
| 2412 MHz | | | 2437 MHz | | | 2462 MHz | | |
| F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] |
| For emissions below 1 GHz, please take a look at the table below the 1 GHz plot. | | | For emissions below 1 GHz, please take a look at the table below the 1 GHz plot. | | | For emissions below 1 GHz, please take a look at the table below the 1 GHz plot. | | |
| No spurious emissions above 1 GHz detected. | | | No spurious emissions above 1 GHz detected. | | | No spurious emissions above 1 GHz detected. | | |
| | | | | | | | | |
| Measurement uncertainty | | | ± 3 dB | | | | | |

**Verdict:** **Passed**

**Results: OFDM / n HT20 – mode**

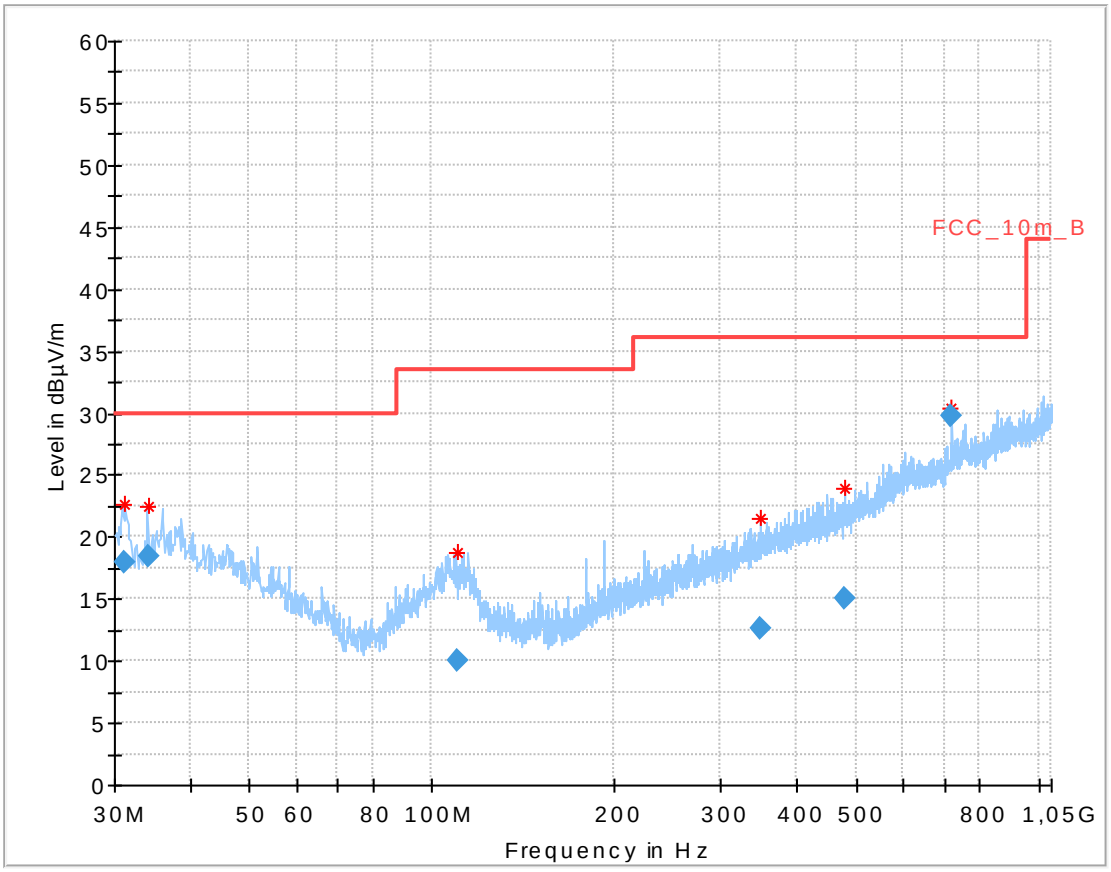
| TX Spurious Emissions Radiated [dBµV/m] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DSSS / n – mode | | | | | | | | |
| 2412 MHz | | | 2437 MHz | | | 2462 MHz | | |
| F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] |
| For emissions below 1 GHz, please take a look at the table below the 1 GHz plot. | | | For emissions below 1 GHz, please take a look at the table below the 1 GHz plot. | | | For emissions below 1 GHz, please take a look at the table below the 1 GHz plot. | | |
| No spurious emissions above 1 GHz detected. | | | No spurious emissions above 1 GHz detected. | | | No spurious emissions above 1 GHz detected. | | |
| | | | | | | | | |
| Measurement uncertainty | | | ± 3 dB | | | | | |

**Verdict:** **Passed**

**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)

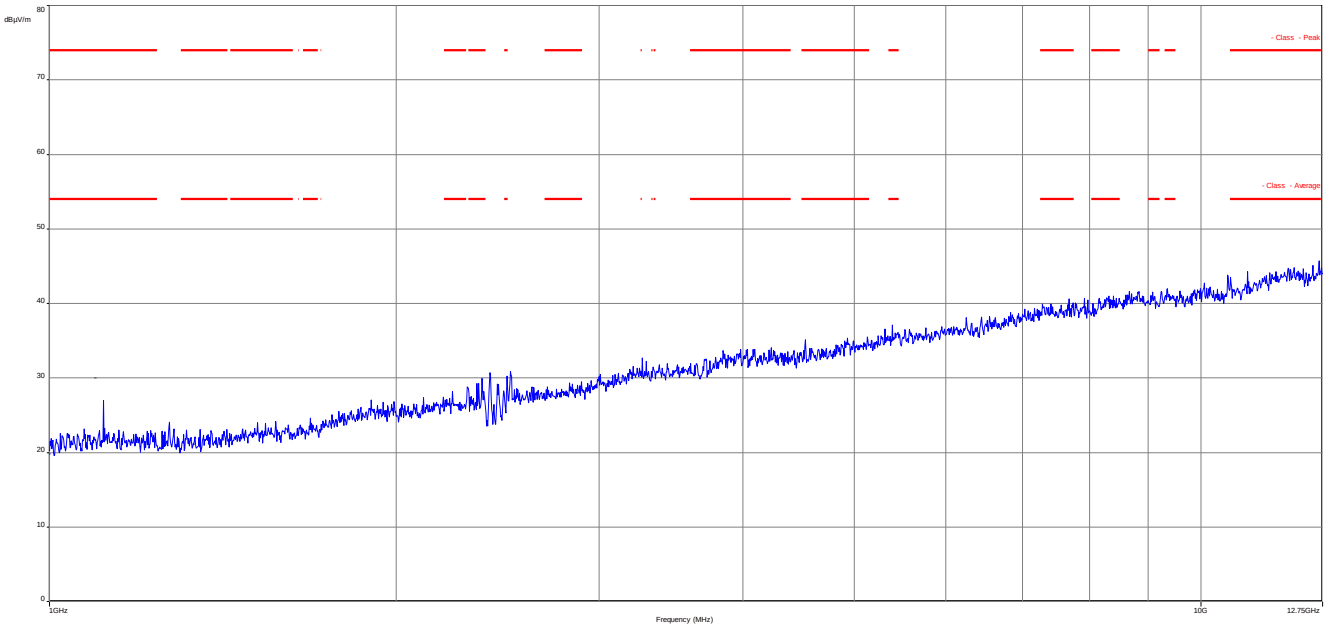
**Plots: DSSS / b – mode**

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



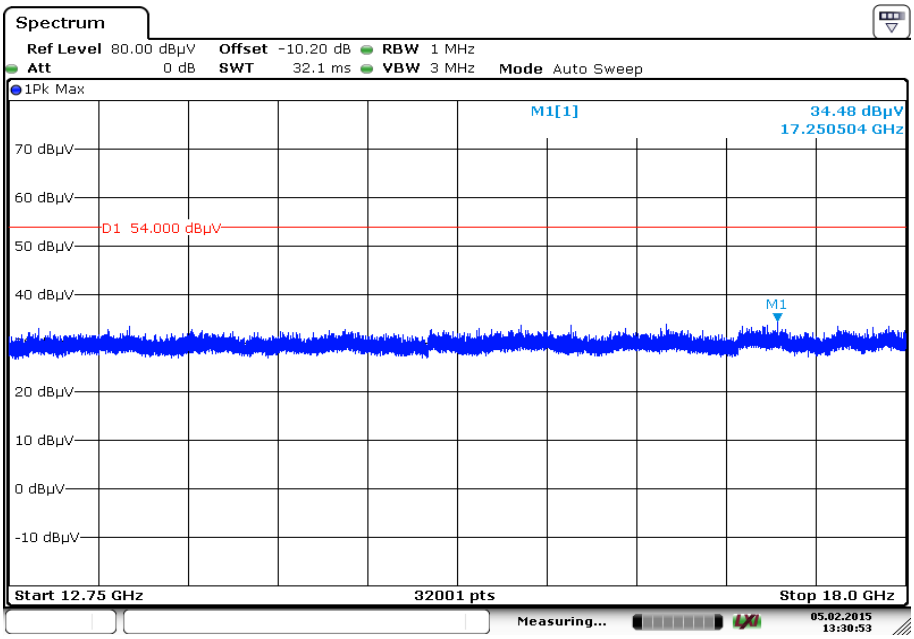

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 31.221000 | 18.02 | 30.00 | 11.98 | 1000.0 | 120.000 | 174.0 | V | -50 | 13.4 |
| 34.015650 | 18.49 | 30.00 | 11.51 | 1000.0 | 120.000 | 102.0 | V | 252 | 13.7 |
| 110.103000 | 10.04 | 33.50 | 23.46 | 1000.0 | 120.000 | 272.0 | V | 252 | 11.1 |
| 347.548950 | 12.66 | 36.00 | 23.34 | 1000.0 | 120.000 | 200.0 | V | 265 | 15.9 |
| 480.733500 | 14.97 | 36.00 | 21.03 | 1000.0 | 120.000 | 274.0 | H | 230 | 18.3 |
| 720.049050 | 29.68 | 36.00 | 6.32 | 1000.0 | 120.000 | 103.0 | H | 298 | 22.0 |

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




The carrier signal is notched with a 2.4 GHz band rejection filter.

**Plot 3:** Lowest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization

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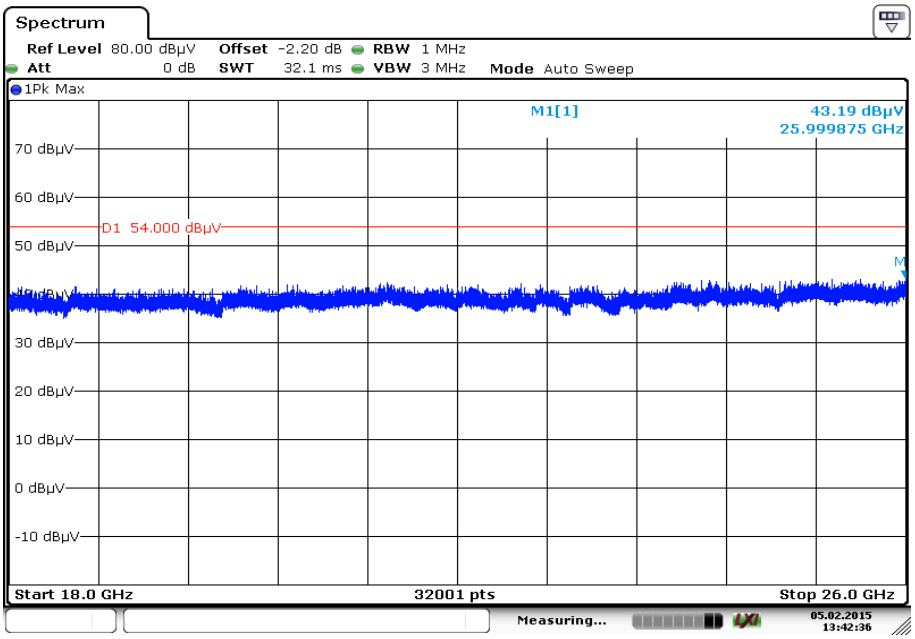
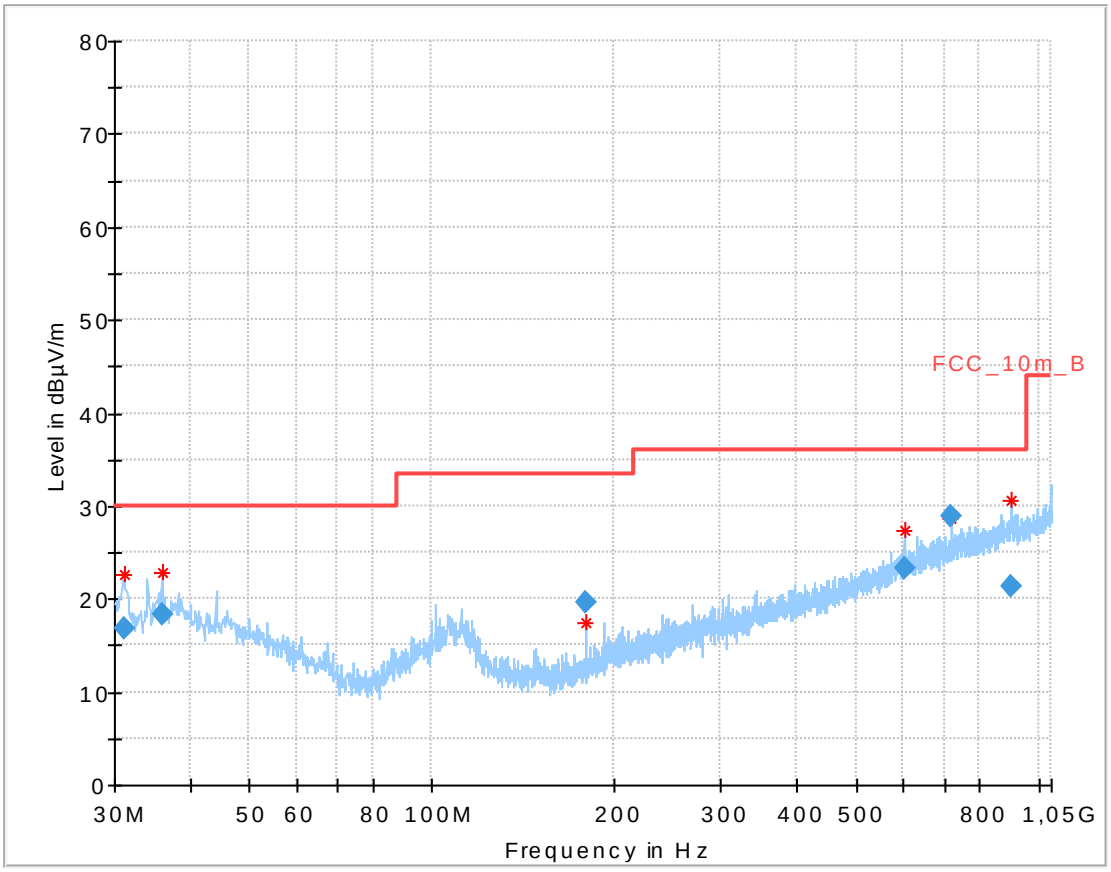
**Plot 4:** Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization

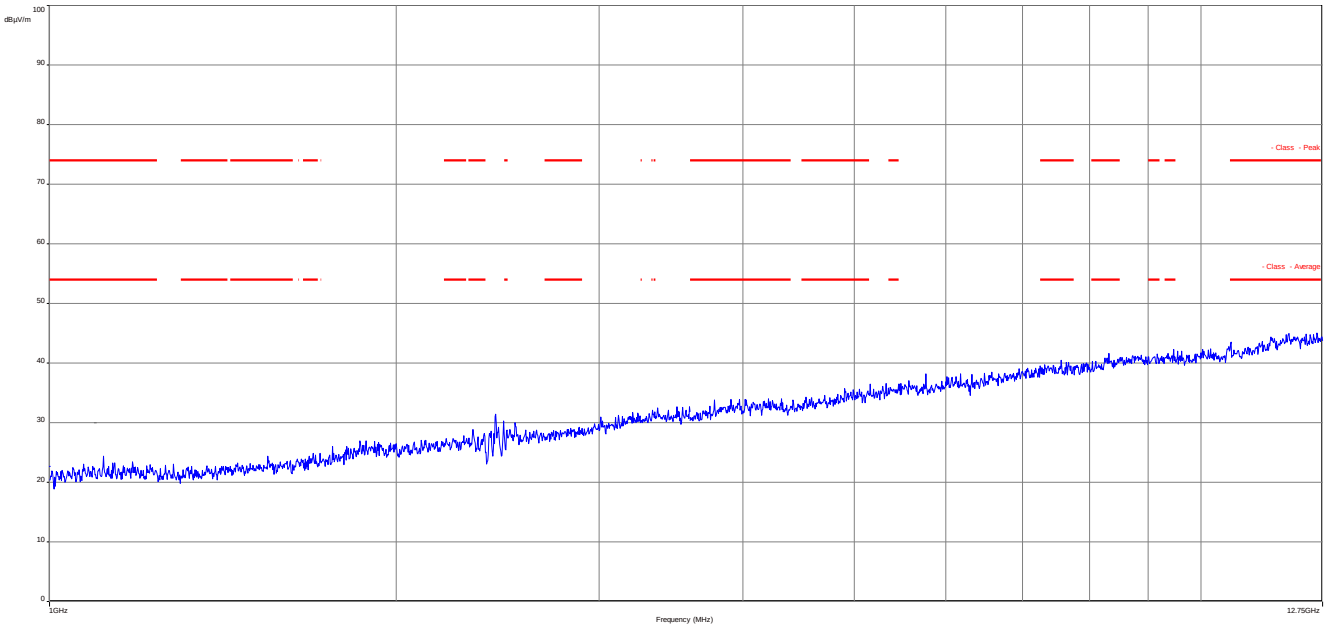


**Plot 5:** Middle channel, 30 MHz to 1 GHz, vertical & horizontal polarization



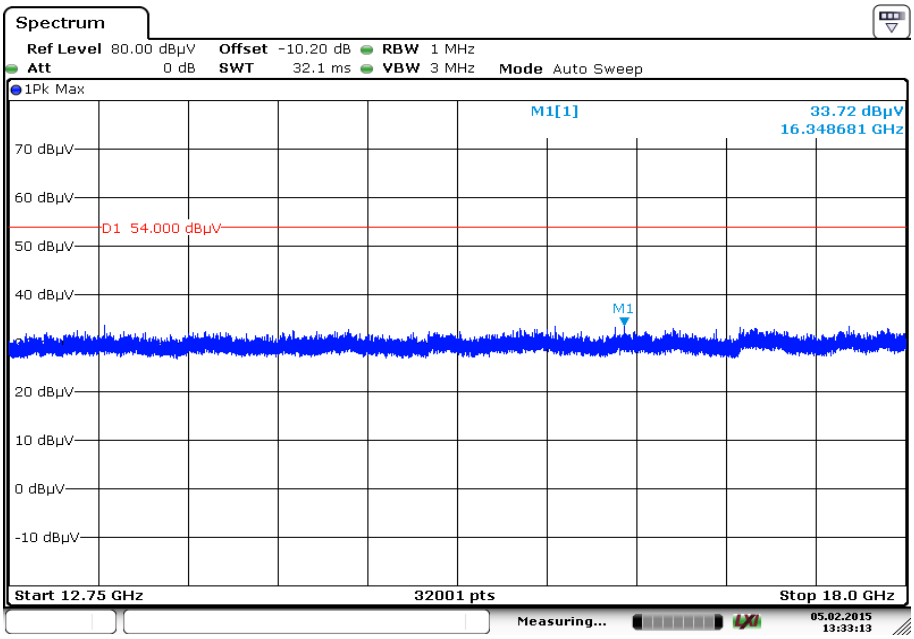

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 31.181850 | 16.90 | 30.00 | 13.10 | 1000.0 | 120.000 | 170.0 | V | 115 | 13.4 |
| 36.016500 | 18.23 | 30.00 | 11.77 | 1000.0 | 120.000 | 101.0 | V | 25 | 13.8 |
| 180.018450 | 19.55 | 33.50 | 13.95 | 1000.0 | 120.000 | 98.0 | V | 155 | 10.4 |
| 600.080550 | 23.30 | 36.00 | 12.70 | 1000.0 | 120.000 | 170.0 | H | 107 | 20.7 |
| 720.065550 | 28.83 | 36.00 | 7.17 | 1000.0 | 120.000 | 170.0 | H | 263 | 22.0 |
| 902.650350 | 21.30 | 36.00 | 14.70 | 1000.0 | 120.000 | 98.0 | H | 107 | 24.1 |

**Plot 6:** Middle channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization




The carrier signal is notched with a 2.4 GHz band rejection filter.

**Plot 7:** Middle channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization

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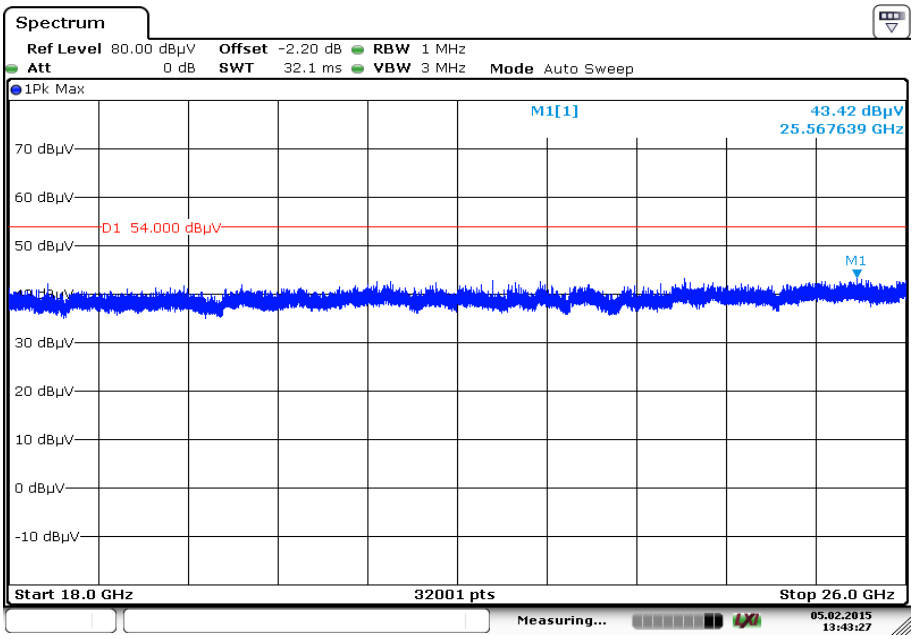
**Plot 8:** Middle channel, 18 GHz to 26 GHz, vertical & horizontal polarization

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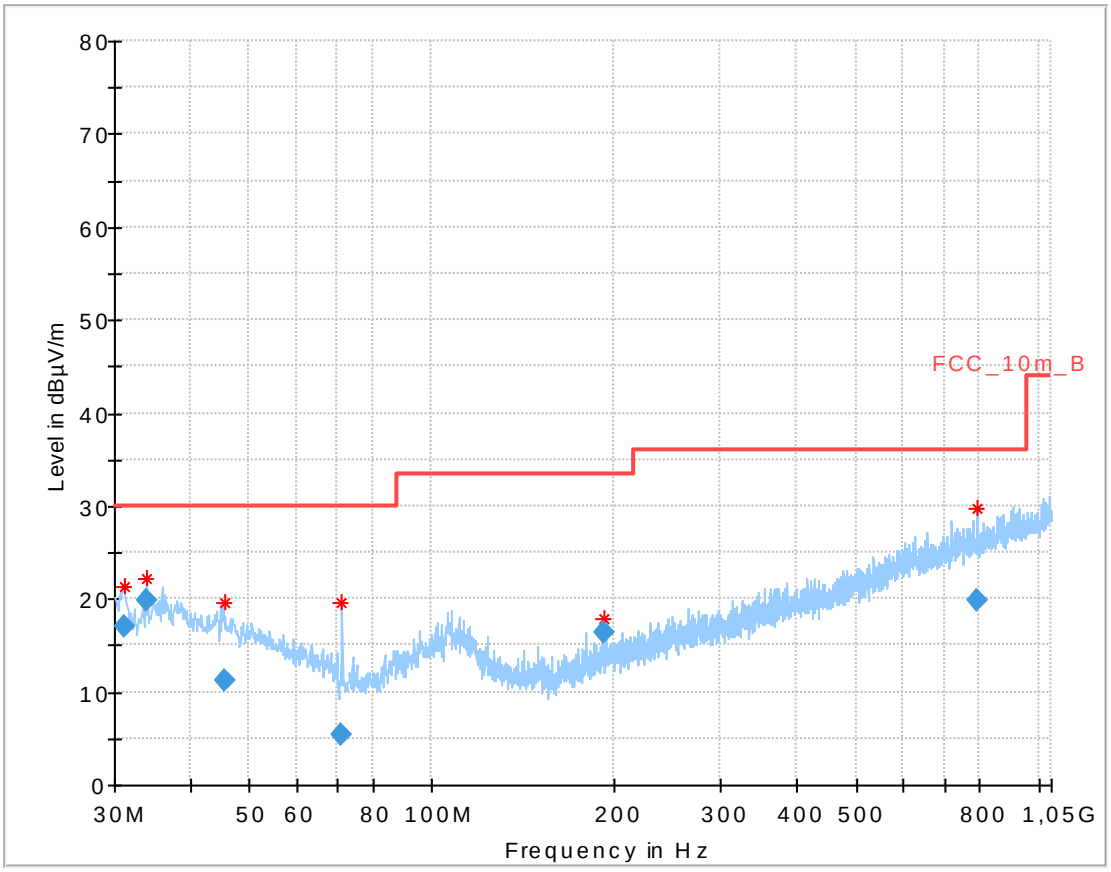
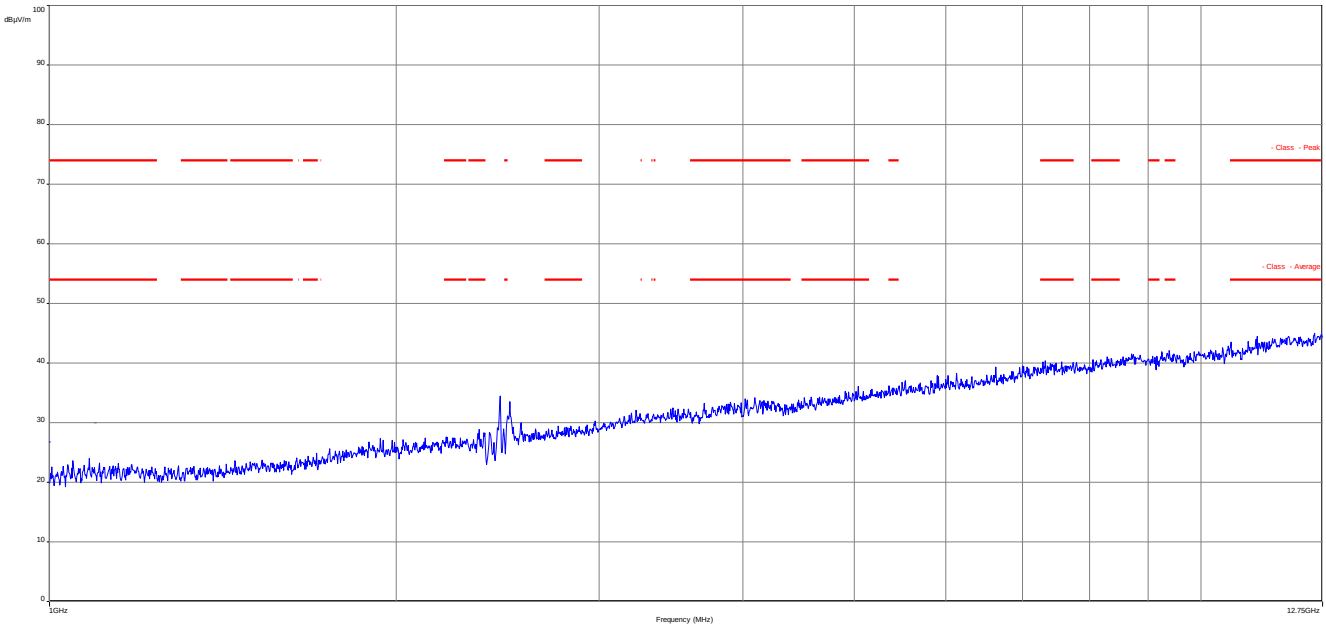
**Plot 9:** Highest channel, 30 MHz to 1 GHz, vertical & horizontal polarization



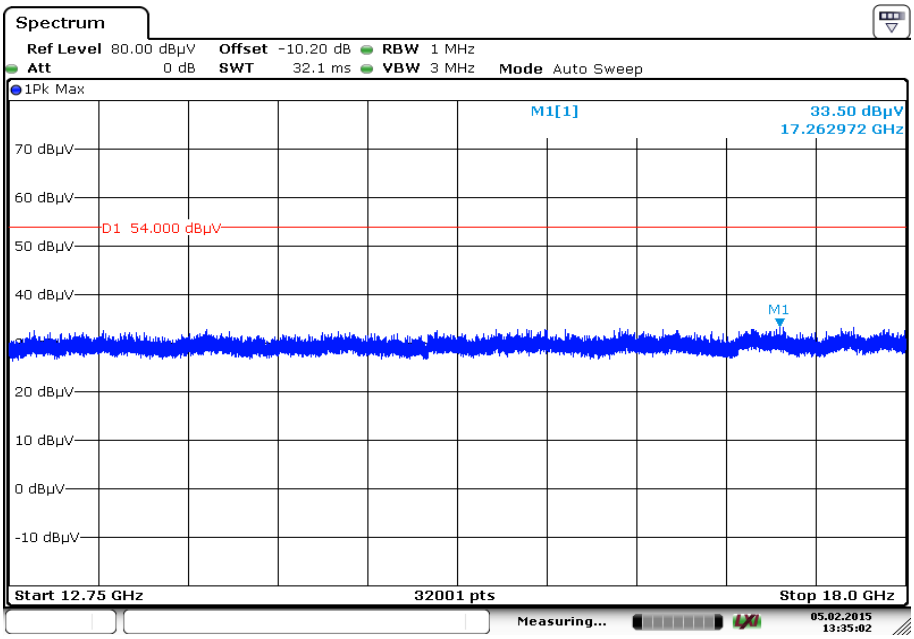

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 31.242300 | 17.00 | 30.00 | 13.00 | 1000.0 | 120.000 | 101.0 | V | -25 | 13.5 |
| 34.007100 | 19.86 | 30.00 | 10.14 | 1000.0 | 120.000 | 101.0 | V | 25 | 13.7 |
| 45.476250 | 11.24 | 30.00 | 18.76 | 1000.0 | 120.000 | 170.0 | V | 17 | 13.7 |
| 70.953600 | 5.40 | 30.00 | 24.60 | 1000.0 | 120.000 | 101.0 | V | 155 | 8.4 |
| 191.997000 | 16.46 | 33.50 | 17.04 | 1000.0 | 120.000 | 98.0 | V | 197 | 11.2 |
| 792.791100 | 19.89 | 36.00 | 16.11 | 1000.0 | 120.000 | 170.0 | V | 173 | 22.7 |

**Plot 10:** Highest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization




The carrier signal is notched with a 2.4 GHz band rejection filter.

**Plot 11:** Highest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization

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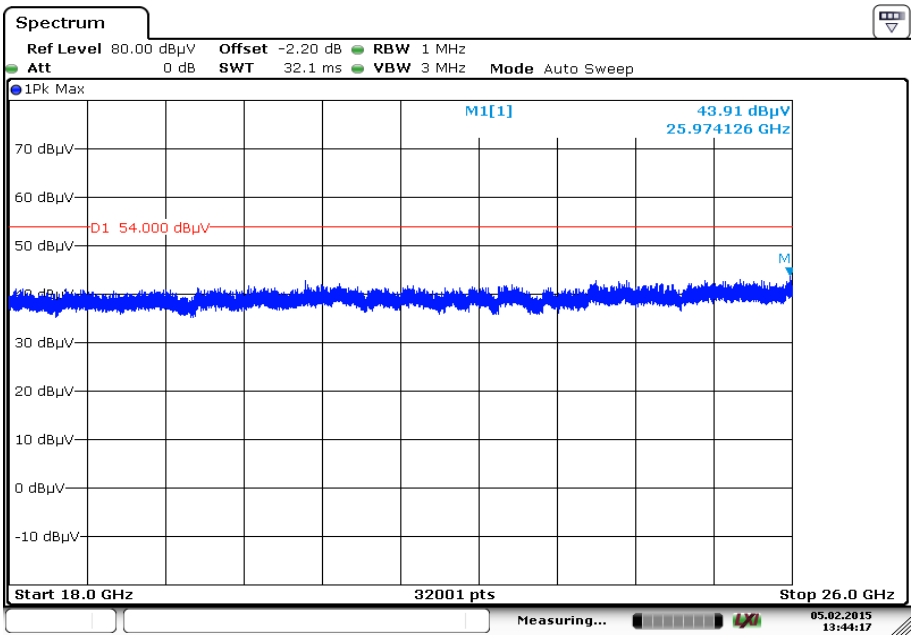
**Plot 12:** Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization

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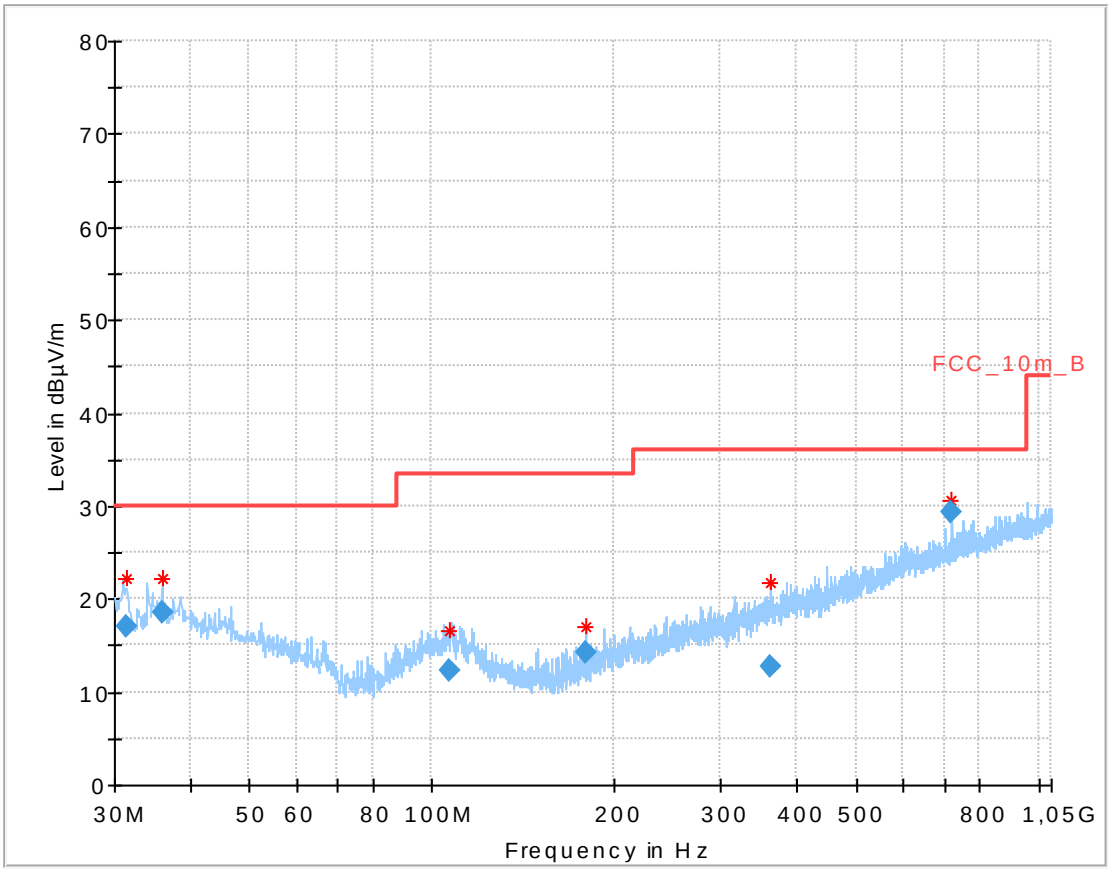
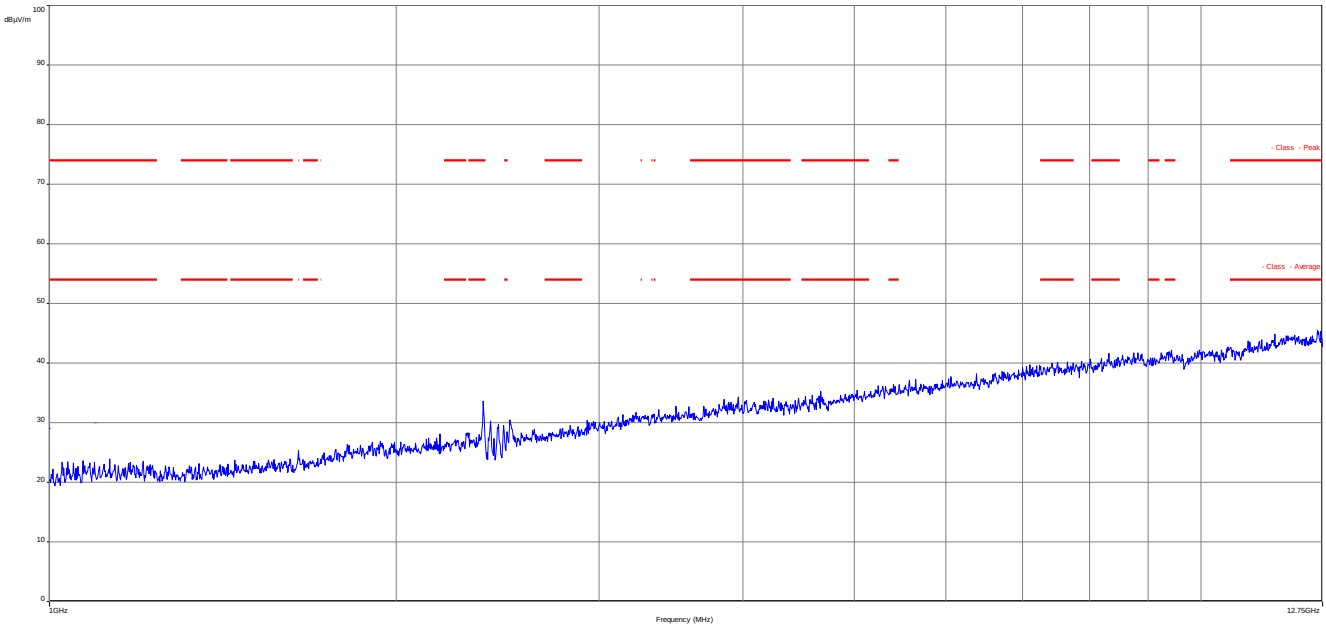
**Plots: OFDM / g – mode**

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



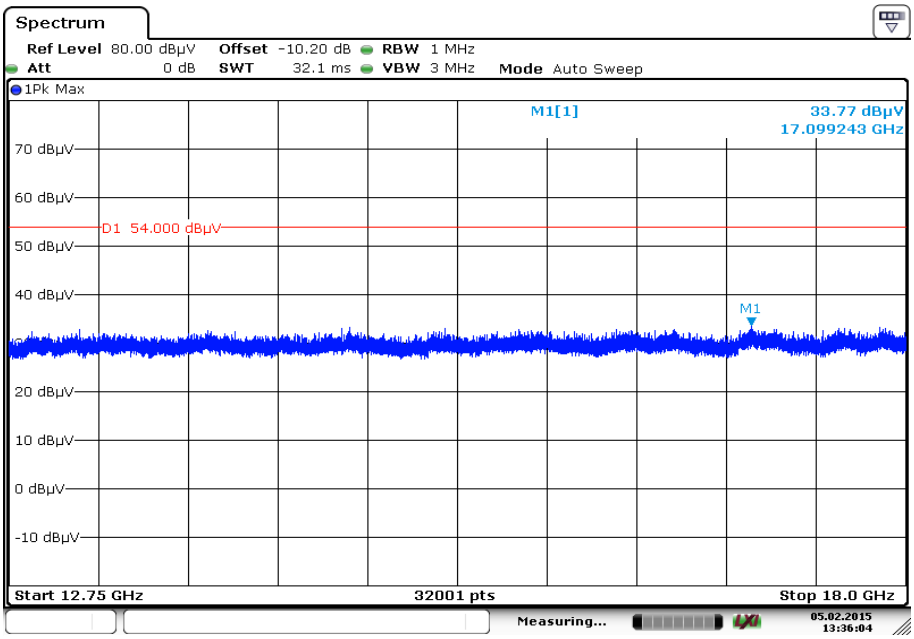

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 31.367100 | 17.00 | 30.00 | 13.00 | 1000.0 | 120.000 | 101.0 | V | -25 | 13.5 |
| 35.977050 | 18.49 | 30.00 | 11.51 | 1000.0 | 120.000 | 101.0 | V | 287 | 13.8 |
| 107.166000 | 12.27 | 33.50 | 21.23 | 1000.0 | 120.000 | 101.0 | V | 87 | 11.4 |
| 179.953950 | 14.31 | 33.50 | 19.19 | 1000.0 | 120.000 | 98.0 | V | 107 | 10.4 |
| 362.208900 | 12.76 | 36.00 | 23.24 | 1000.0 | 120.000 | 170.0 | V | 107 | 16.2 |
| 720.052050 | 29.24 | 36.00 | 6.76 | 1000.0 | 120.000 | 98.0 | H | 287 | 22.0 |

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



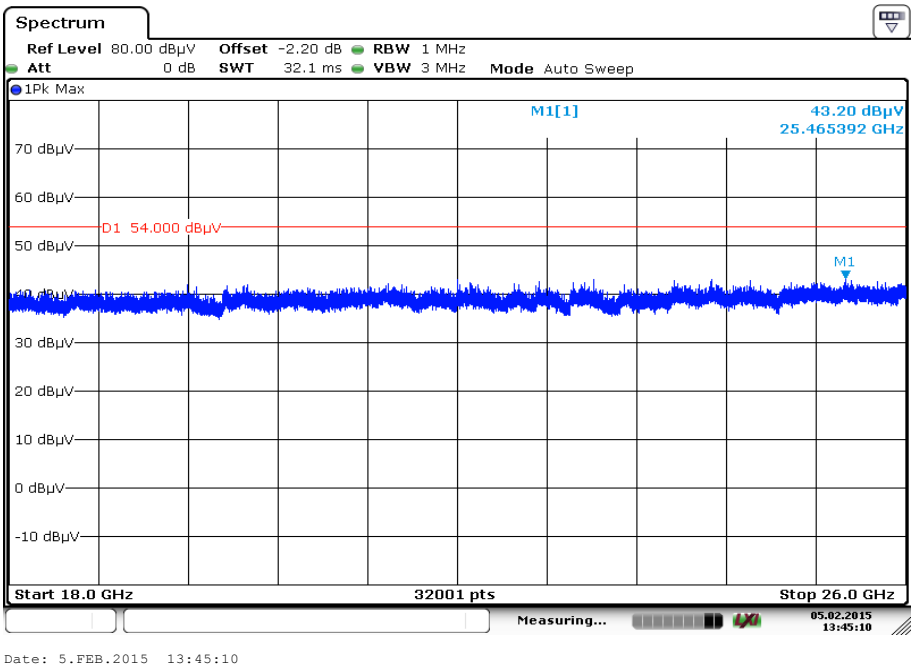

The carrier signal is notched with a 2.4 GHz band rejection filter.

**Plot 3:** Lowest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization

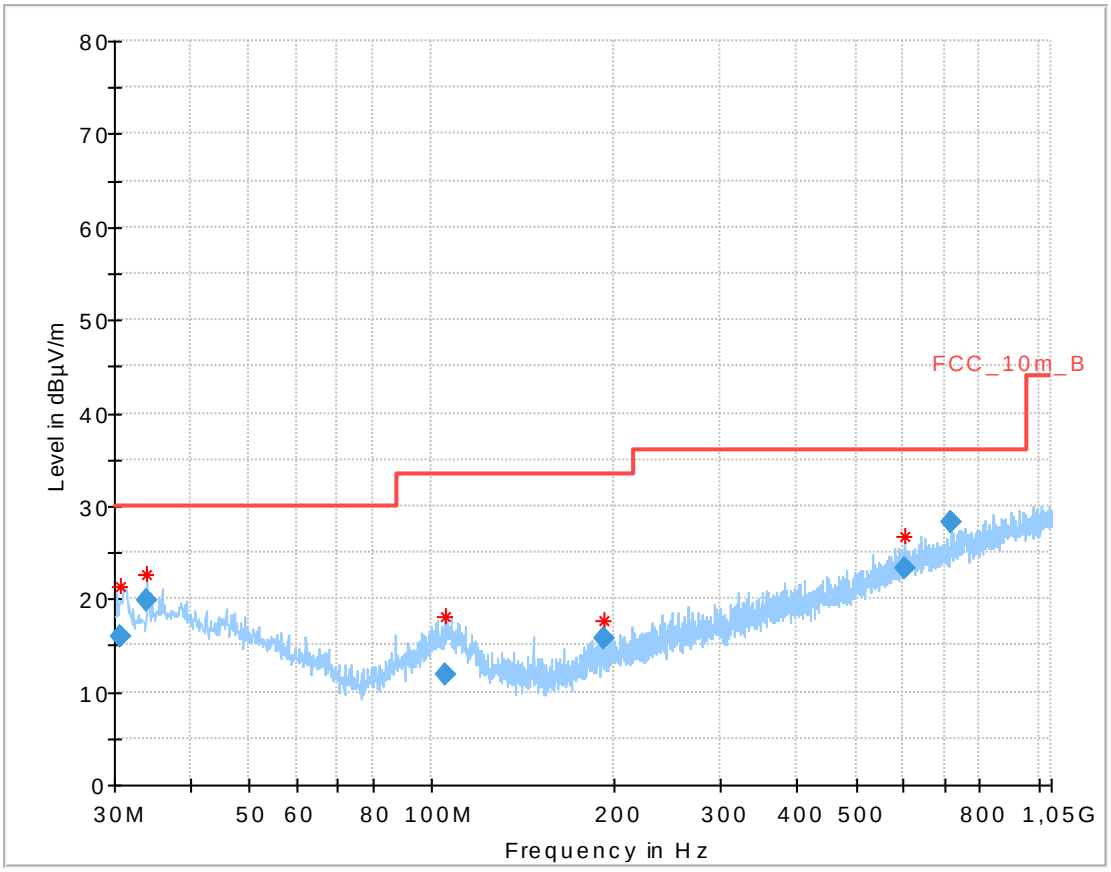



Date: 5.FEB.2015 13:36:04

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

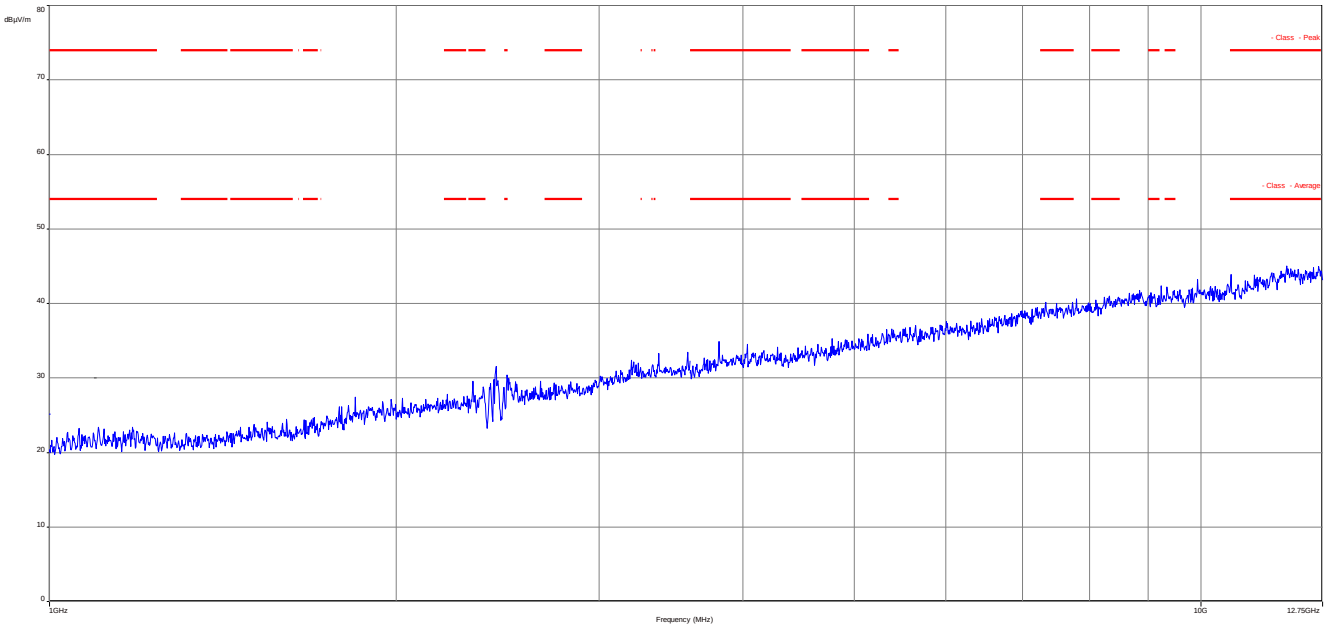


**Plot 5:** Middle channel, 30 MHz to 1 GHz, vertical & horizontal polarization



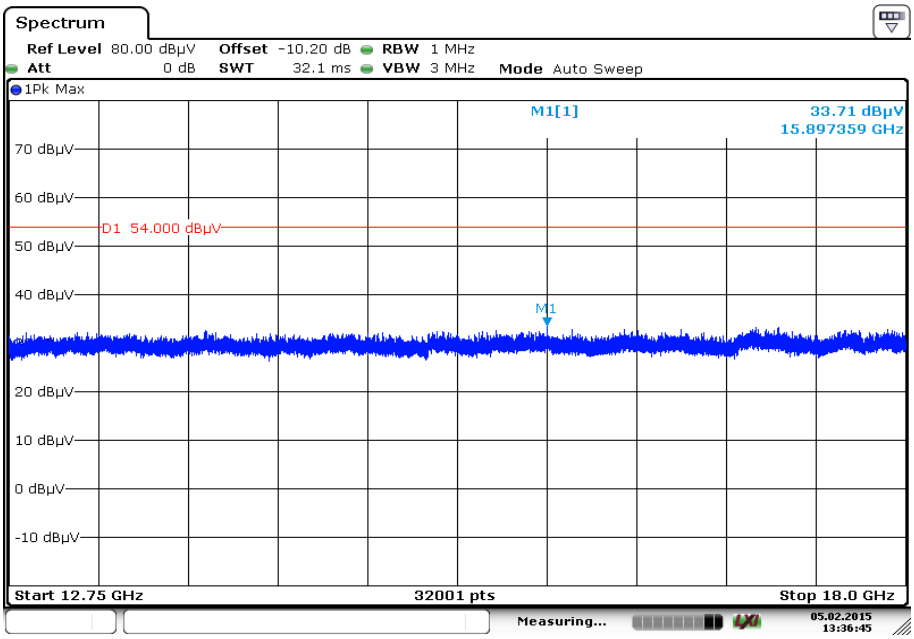

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 30.733650 | 15.99 | 30.00 | 14.01 | 1000.0 | 120.000 | 170.0 | V | 295 | 13.4 |
| 33.999000 | 19.93 | 30.00 | 10.07 | 1000.0 | 120.000 | 101.0 | V | 83 | 13.7 |
| 105.444000 | 11.94 | 33.50 | 21.56 | 1000.0 | 120.000 | 101.0 | V | 107 | 11.6 |
| 192.024000 | 15.83 | 33.50 | 17.67 | 1000.0 | 120.000 | 98.0 | V | -7 | 11.2 |
| 600.058350 | 23.30 | 36.00 | 12.70 | 1000.0 | 120.000 | 101.0 | H | 295 | 20.7 |
| 720.050850 | 28.22 | 36.00 | 7.78 | 1000.0 | 120.000 | 101.0 | H | 287 | 22.0 |

**Plot 6:** Middle channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization



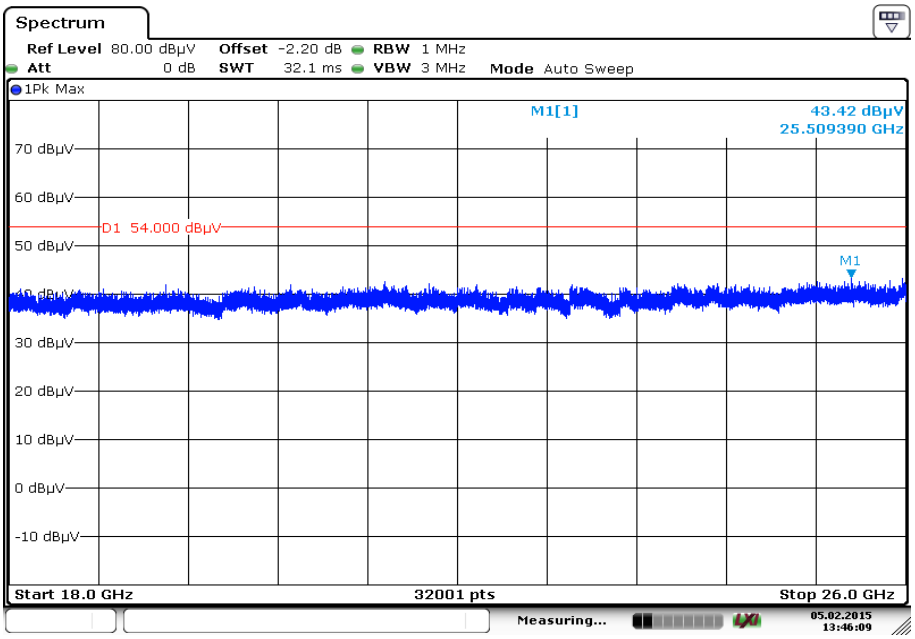

The carrier signal is notched with a 2.4 GHz band rejection filter.

**Plot 7:** Middle channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



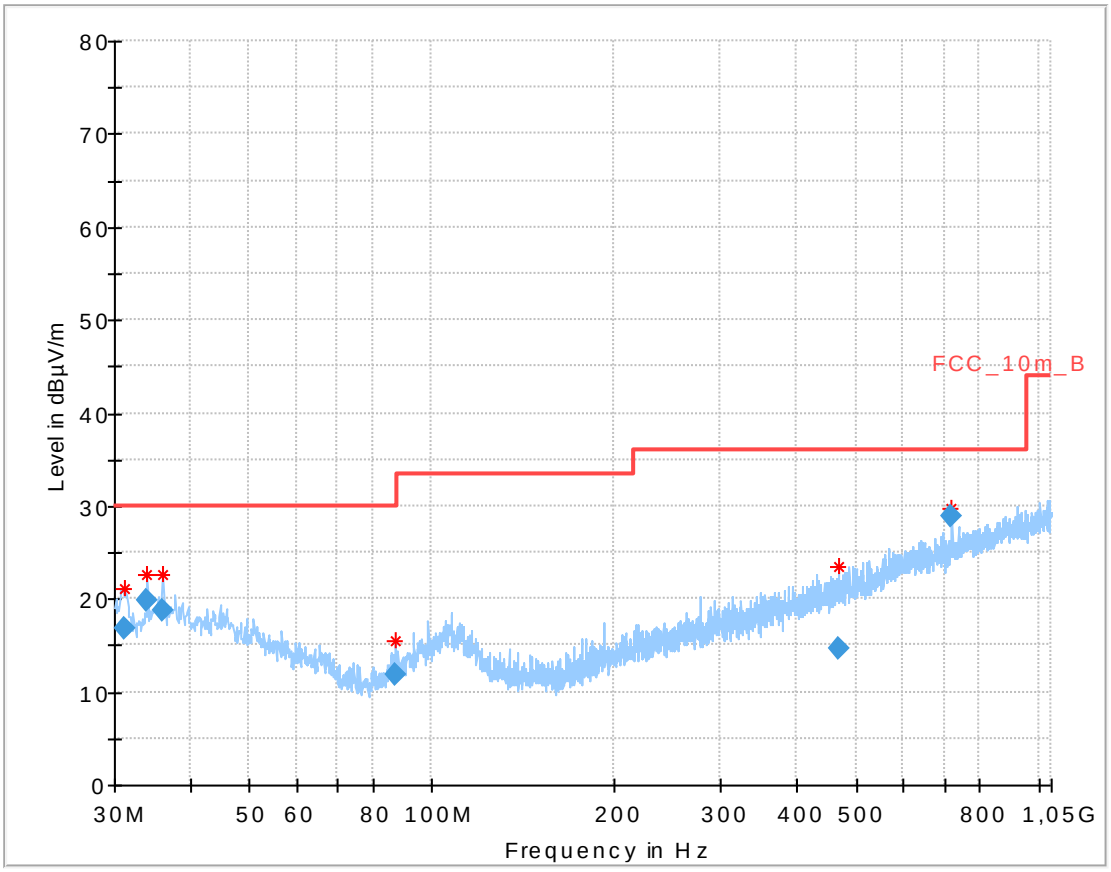

Date: 5.FEB.2015 13:36:45

**Plot 8:** Middle channel, 18 GHz to 26 GHz, vertical & horizontal polarization



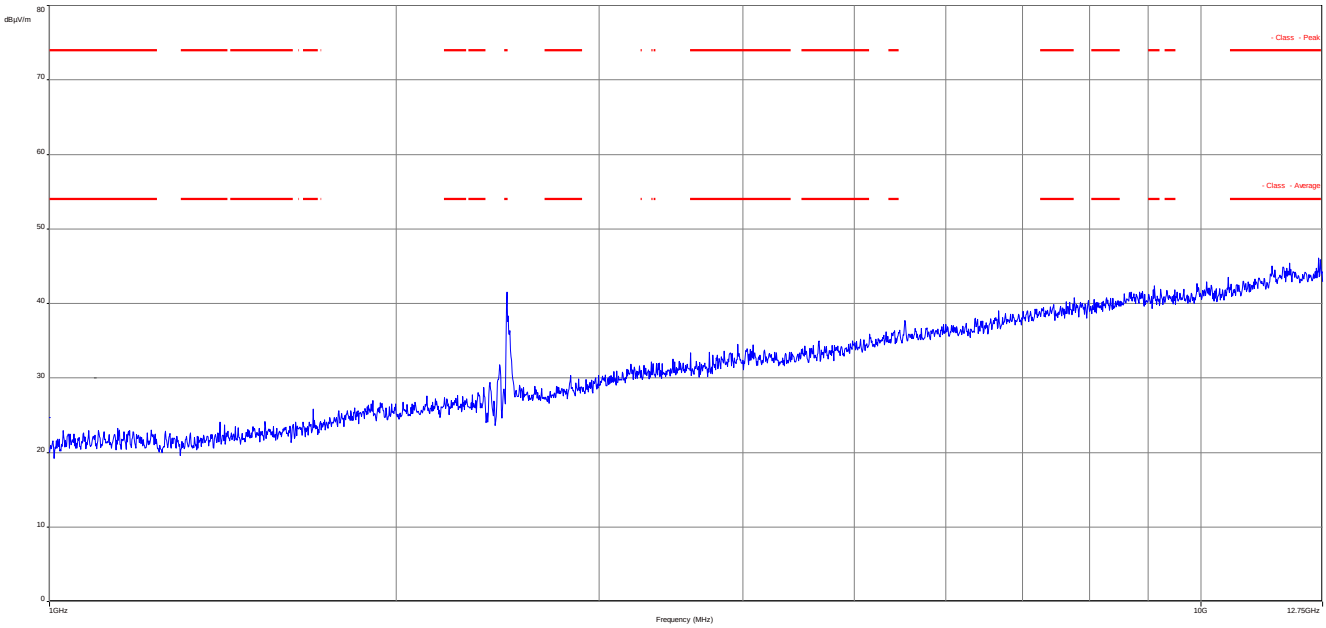

Date: 5.FEB.2015 13:46:09

**Plot 9:** Highest channel, 30 MHz to 1 GHz, vertical & horizontal polarization



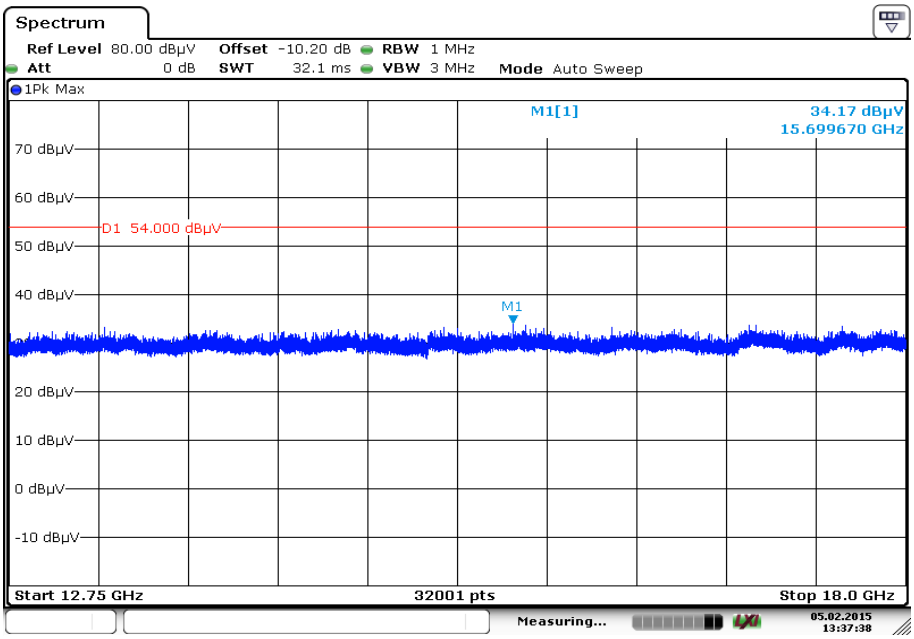

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 31.253550 | 16.86 | 30.00 | 13.14 | 1000.0 | 120.000 | 101.0 | V | 263 | 13.5 |
| 33.993000 | 19.91 | 30.00 | 10.09 | 1000.0 | 120.000 | 106.0 | V | 295 | 13.7 |
| 35.994150 | 18.83 | 30.00 | 11.17 | 1000.0 | 120.000 | 101.0 | V | 295 | 13.8 |
| 87.008100 | 11.80 | 30.00 | 18.20 | 1000.0 | 120.000 | 101.0 | V | -6 | 9.8 |
| 469.828500 | 14.70 | 36.00 | 21.30 | 1000.0 | 120.000 | 100.0 | H | 25 | 18.1 |
| 720.041400 | 28.79 | 36.00 | 7.21 | 1000.0 | 120.000 | 98.0 | H | 263 | 22.0 |

**Plot 10:** Highest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

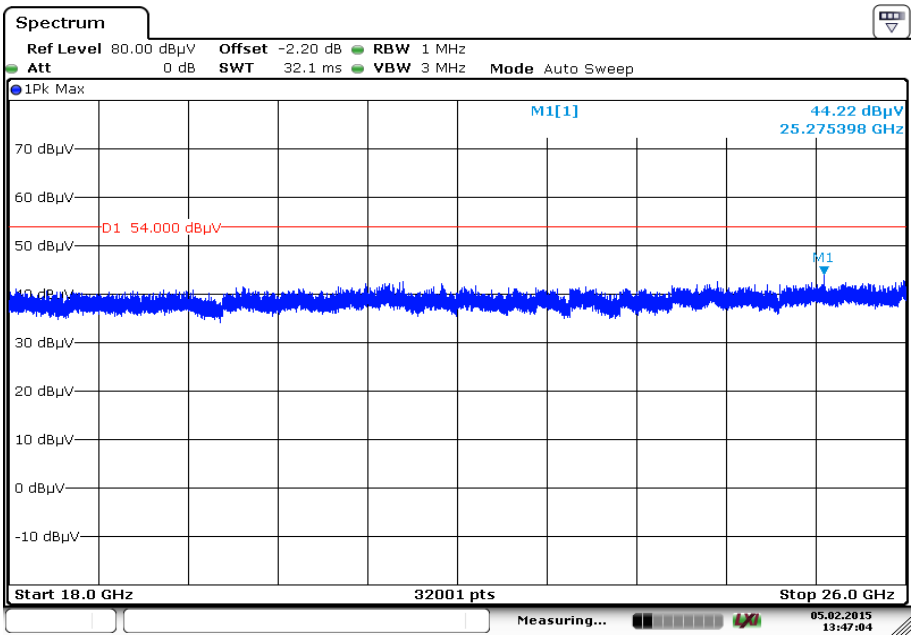



The carrier signal is notched with a 2.4 GHz band rejection filter.

**Plot 11:** Highest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



**Plot 12:** Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization

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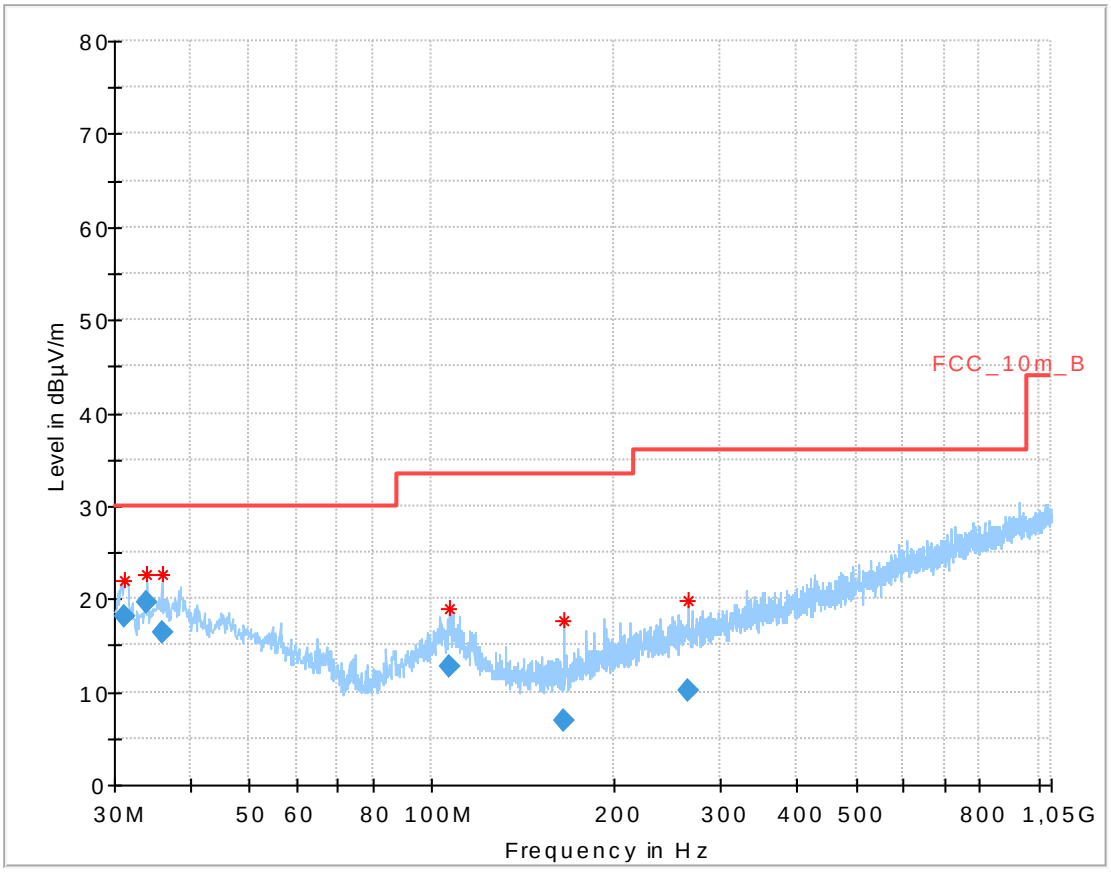
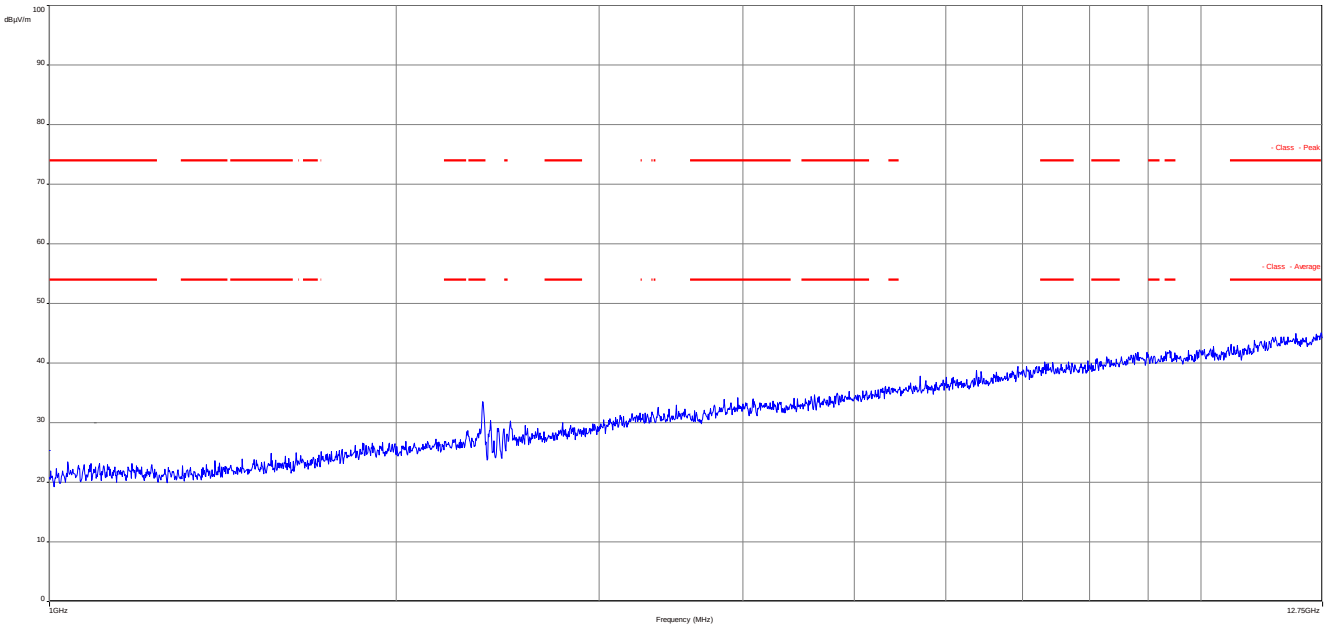
**Plots: OFDM / n – mode**

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



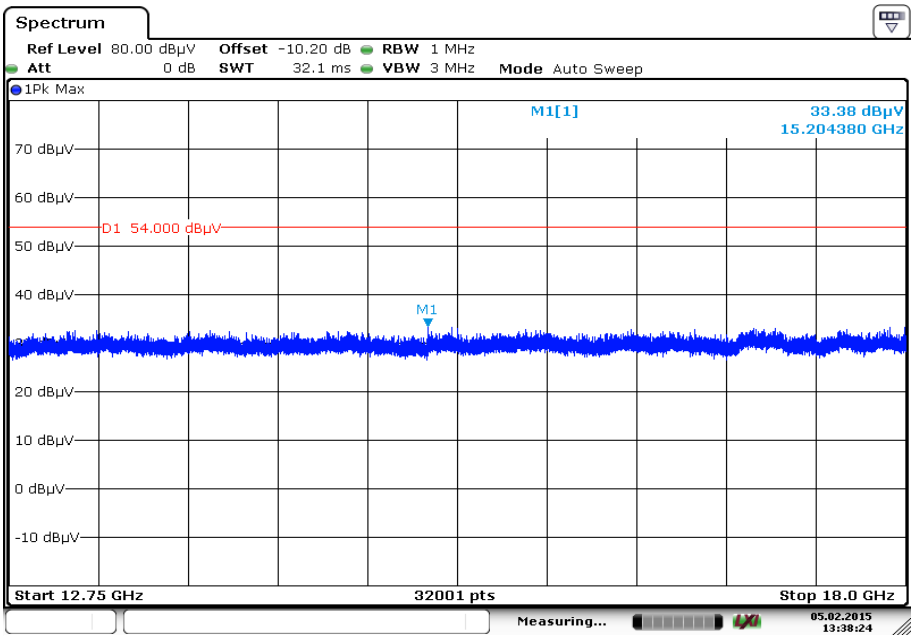

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 31.176300 | 18.12 | 30.00 | 11.88 | 1000.0 | 120.000 | 101.0 | V | 65 | 13.4 |
| 33.965700 | 19.54 | 30.00 | 10.46 | 1000.0 | 120.000 | 101.0 | V | 17 | 13.7 |
| 36.045600 | 16.49 | 30.00 | 13.51 | 1000.0 | 120.000 | 101.0 | V | 25 | 13.8 |
| 107.255550 | 12.67 | 33.50 | 20.83 | 1000.0 | 120.000 | 170.0 | V | 287 | 11.4 |
| 164.817900 | 6.90 | 33.50 | 26.60 | 1000.0 | 120.000 | 101.0 | V | 65 | 9.4 |
| 265.039950 | 10.13 | 36.00 | 25.87 | 1000.0 | 120.000 | 170.0 | H | -6 | 13.7 |

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




The carrier signal is notched with a 2.4 GHz band rejection filter.

**Plot 3:** Lowest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization

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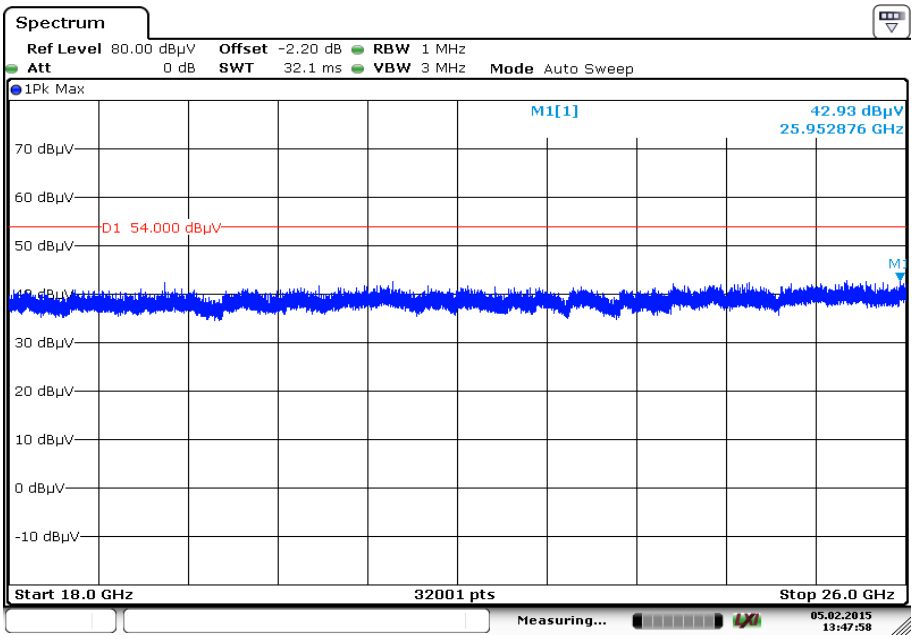
**Plot 4:** Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization

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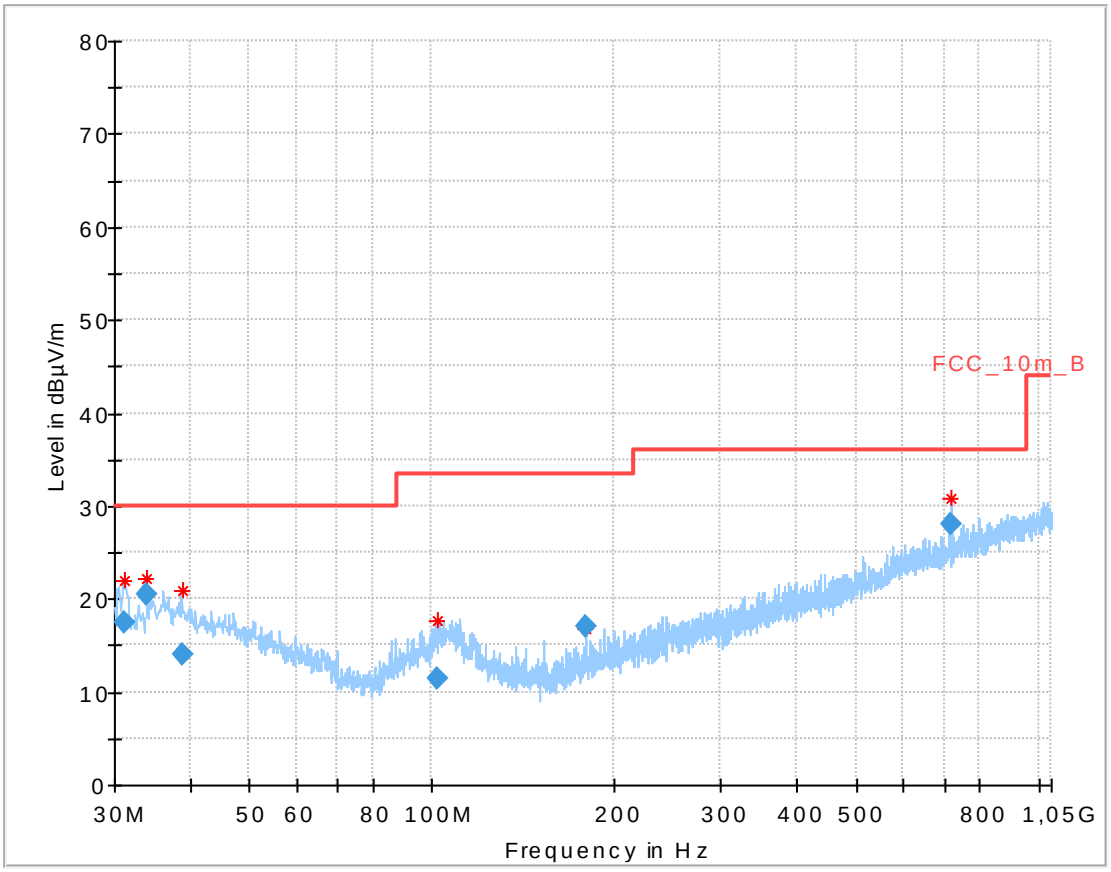
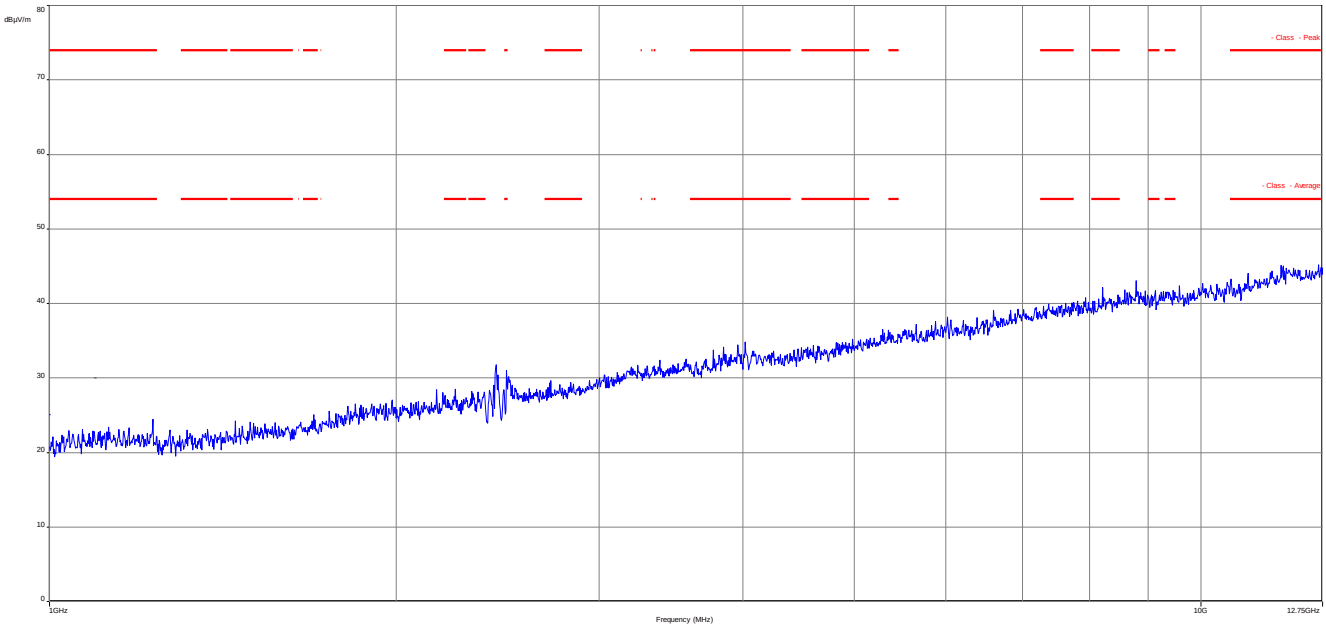
**Plot 5:** Middle channel, 30 MHz to 1 GHz, vertical & horizontal polarization



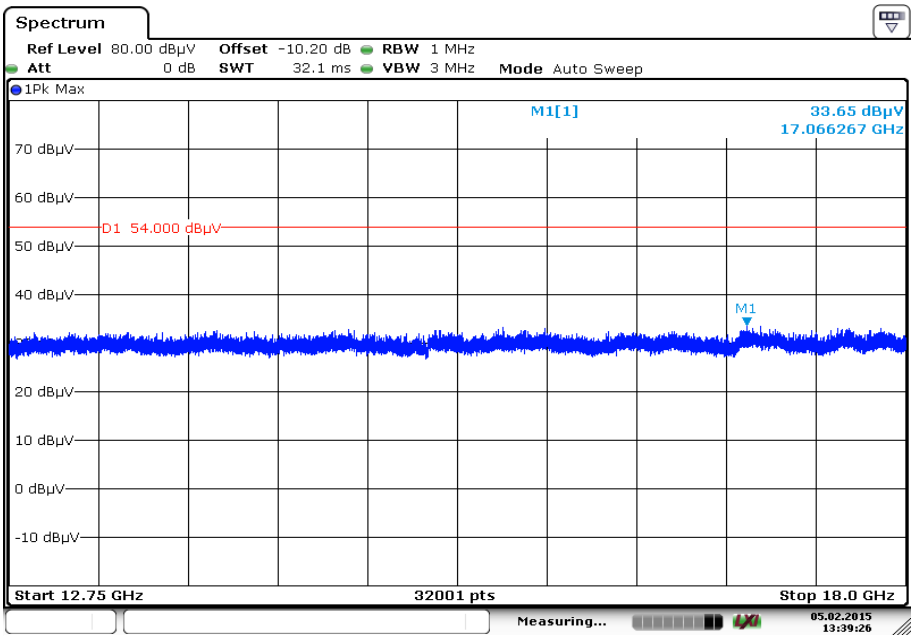

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 31.181400 | 17.43 | 30.00 | 12.57 | 1000.0 | 120.000 | 170.0 | V | 65 | 13.4 |
| 33.991800 | 20.55 | 30.00 | 9.45 | 1000.0 | 120.000 | 101.0 | V | 264 | 13.7 |
| 38.901150 | 14.01 | 30.00 | 15.99 | 1000.0 | 120.000 | 98.0 | V | 289 | 14.0 |
| 102.318000 | 11.52 | 33.50 | 21.98 | 1000.0 | 120.000 | 101.0 | V | 25 | 11.9 |
| 179.970600 | 16.93 | 33.50 | 16.57 | 1000.0 | 120.000 | 98.0 | V | 155 | 10.4 |
| 720.060450 | 28.04 | 36.00 | 7.96 | 1000.0 | 120.000 | 98.0 | H | 264 | 22.0 |

**Plot 6:** Middle channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization




The carrier signal is notched with a 2.4 GHz band rejection filter.

**Plot 7:** Middle channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization

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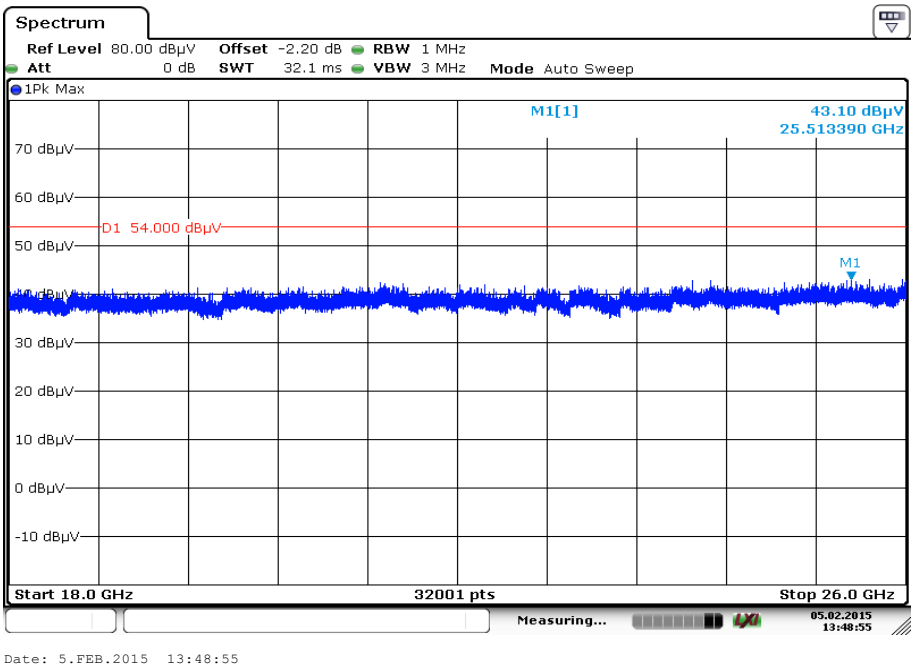
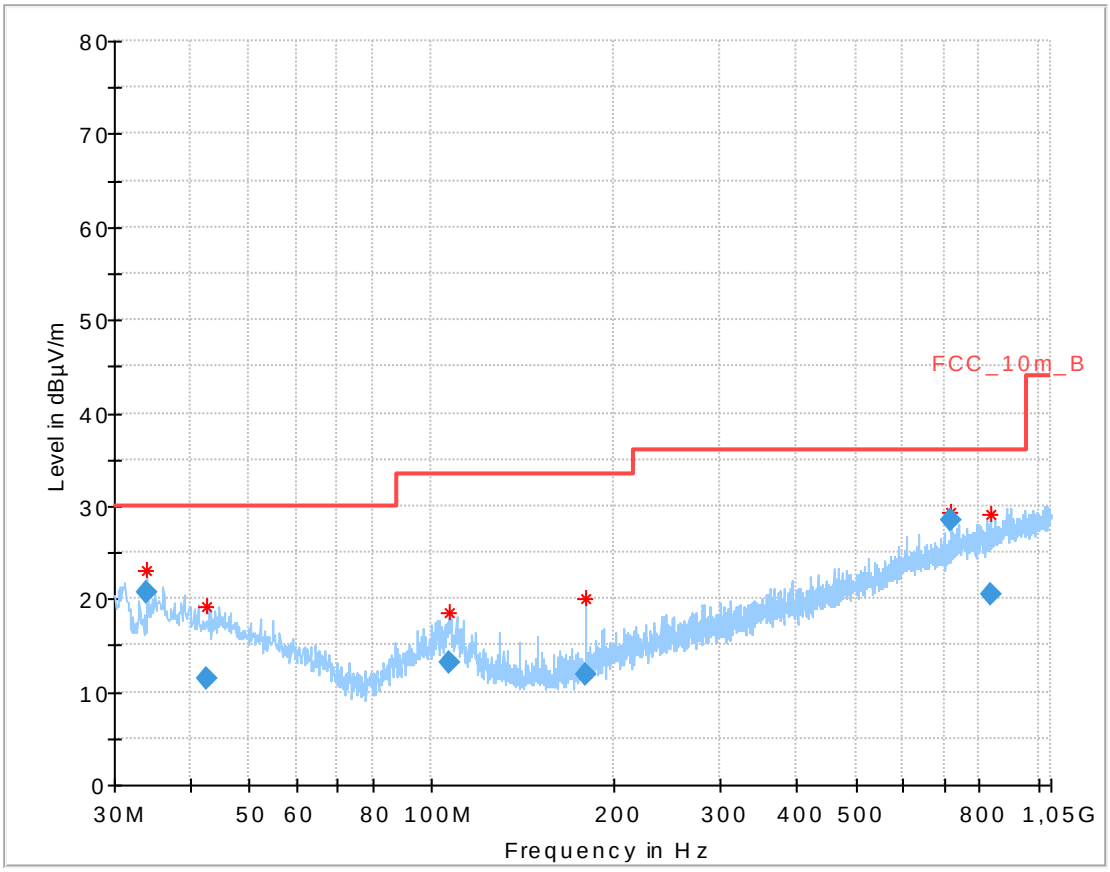
**Plot 8:** Middle channel, 18 GHz to 26 GHz, vertical & horizontal polarization

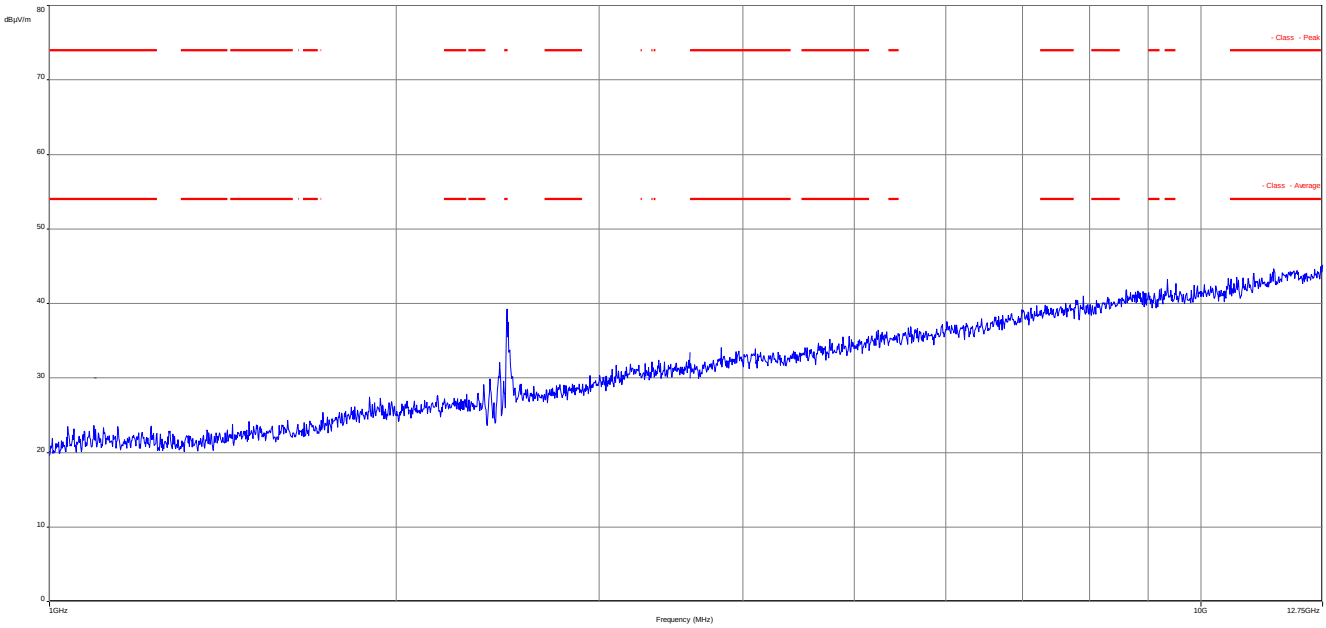


**Plot 9:** Highest channel, 30 MHz to 1 GHz, vertical & horizontal polarization



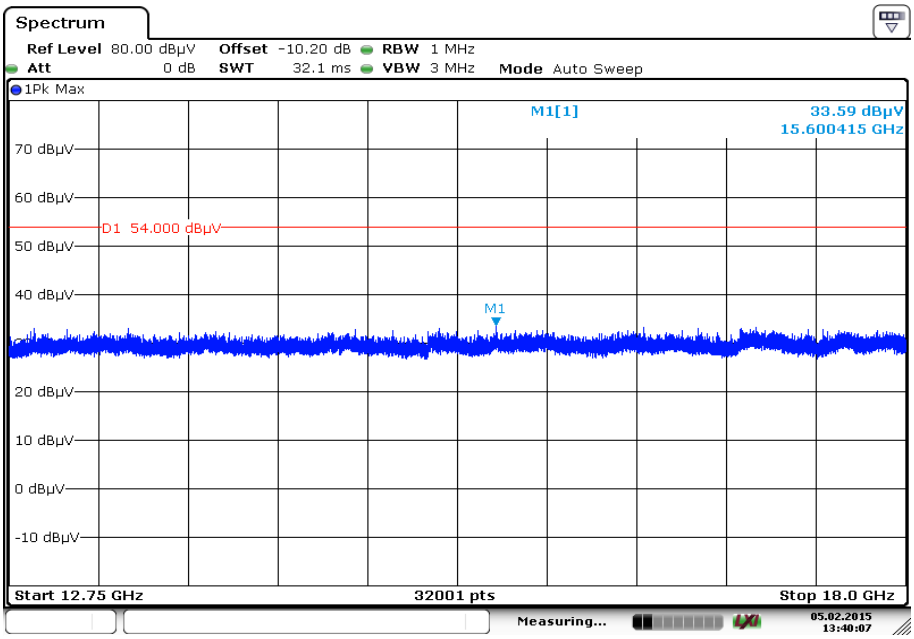

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 33.994350 | 20.65 | 30.00 | 9.35 | 1000.0 | 120.000 | 101.0 | V | 107 | 13.7 |
| 42.508950 | 11.52 | 30.00 | 18.48 | 1000.0 | 120.000 | 98.0 | V | 115 | 13.9 |
| 107.340000 | 13.12 | 33.50 | 20.38 | 1000.0 | 120.000 | 170.0 | V | -6 | 11.4 |
| 180.041250 | 11.81 | 33.50 | 21.69 | 1000.0 | 120.000 | 170.0 | V | 173 | 10.4 |
| 720.061950 | 28.37 | 36.00 | 7.63 | 1000.0 | 120.000 | 101.0 | H | 295 | 22.0 |
| 832.879350 | 20.57 | 36.00 | 15.43 | 1000.0 | 120.000 | 101.0 | V | -25 | 23.2 |

**Plot 10:** Highest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

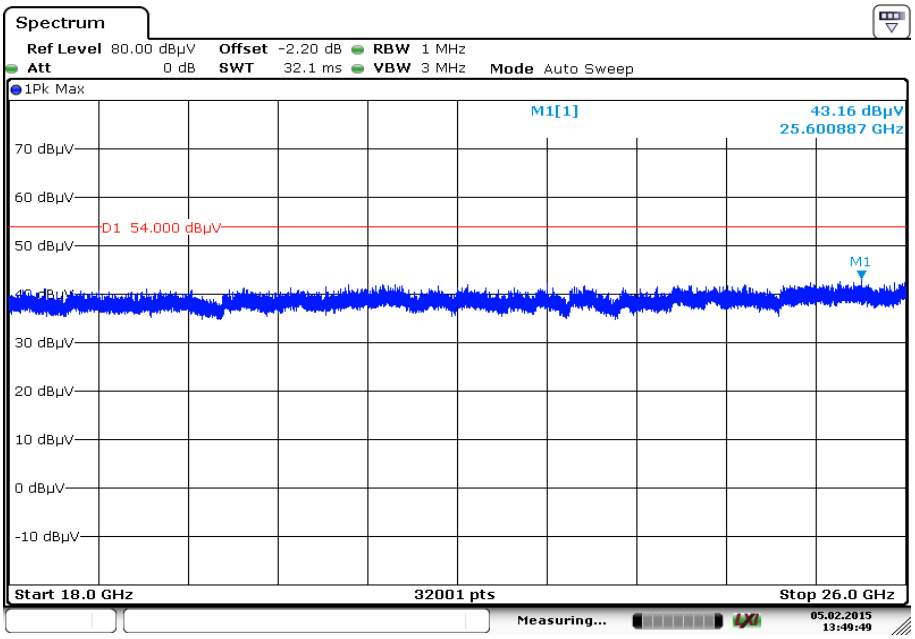



The carrier signal is notched with a 2.4 GHz band rejection filter.

**Plot 11:** Highest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



**Plot 12:** Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization

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## 10.5 RX spurious emissions radiated

**Description:**

Measurement of the radiated spurious emissions in idle/receive mode. The results are valid for both modes.

**Measurement:**

| Measurement parameter | |
|---|---|
| Detector: | Peak / Quasi Peak / RMS |
| Sweep time: | Auto |
| Resolution bandwidth: | F > 1 GHz: 1 MHz<br>F < 1 GHz: 100 kHz |
| Video bandwidth: | 3 x RBW<br>Remeasurement: 10 Hz / 3 MHz |
| Span: | 30 MHz to 26 GHz |
| Trace-Mode: | Max Hold |

**Limits:**

| FCC | | IC |
|---|---|---|
| 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:**

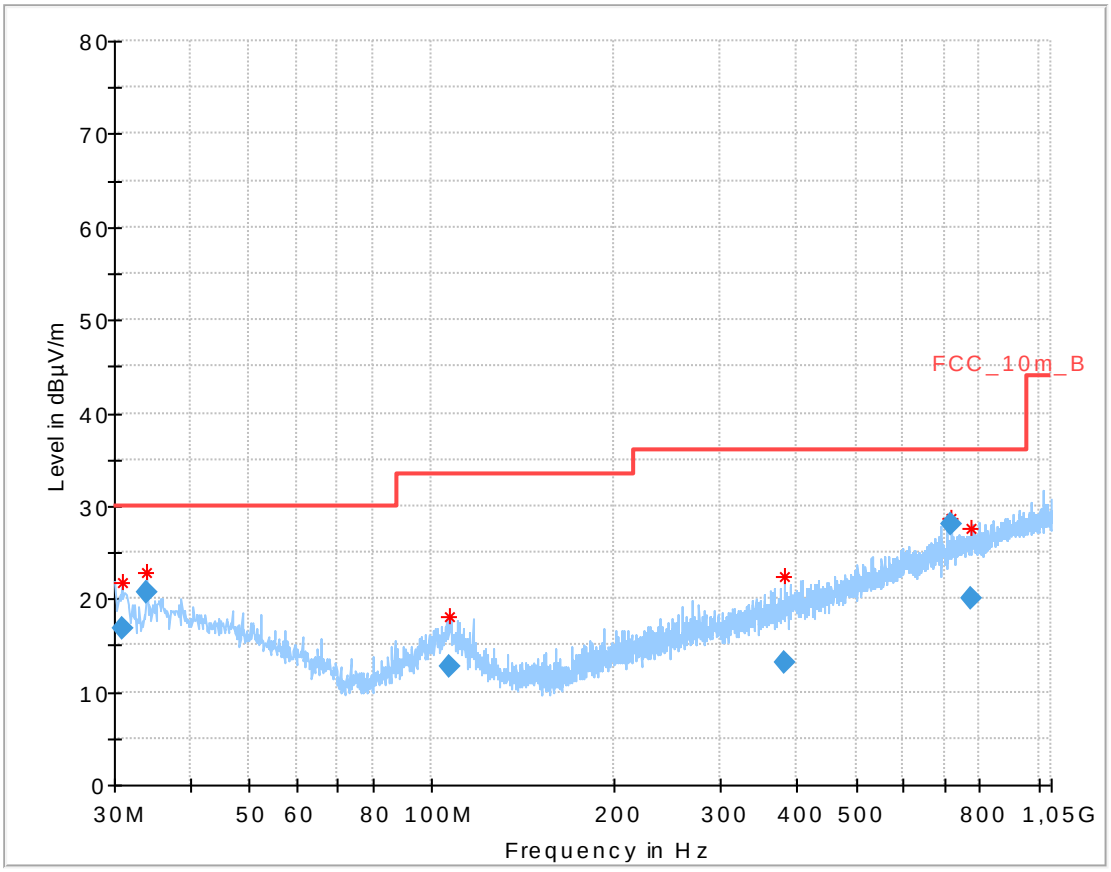
| RX Spurious Emissions Radiated [dBµV/m] | | |
|---|---|---|
| F [MHz] | Detector | Level [dBµV/m] |
| For emissions below 1 GHz, please take a look at the table below the 1 GHz plot. | | |
| No spurious emissions above 1 GHz detected. | | |
| | | |
| Measurement uncertainty | ± 3 dB | |

**Verdict:** **Passed**

**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)

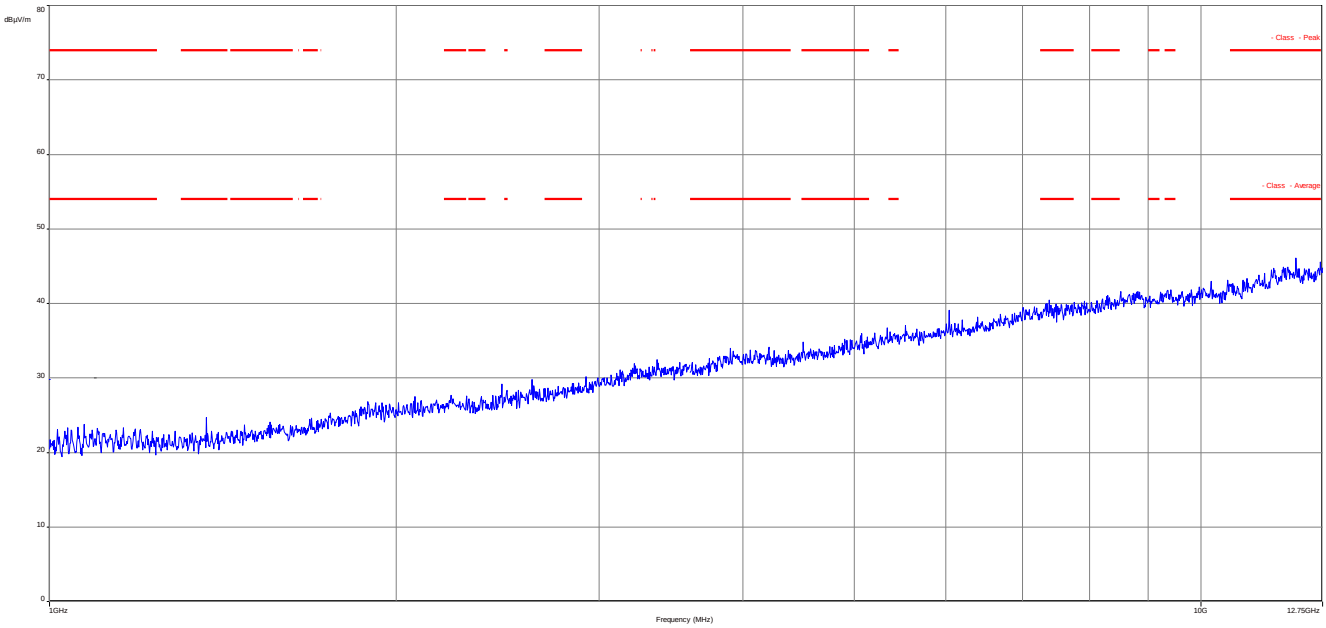
**Plots: RX / Idle – mode**

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

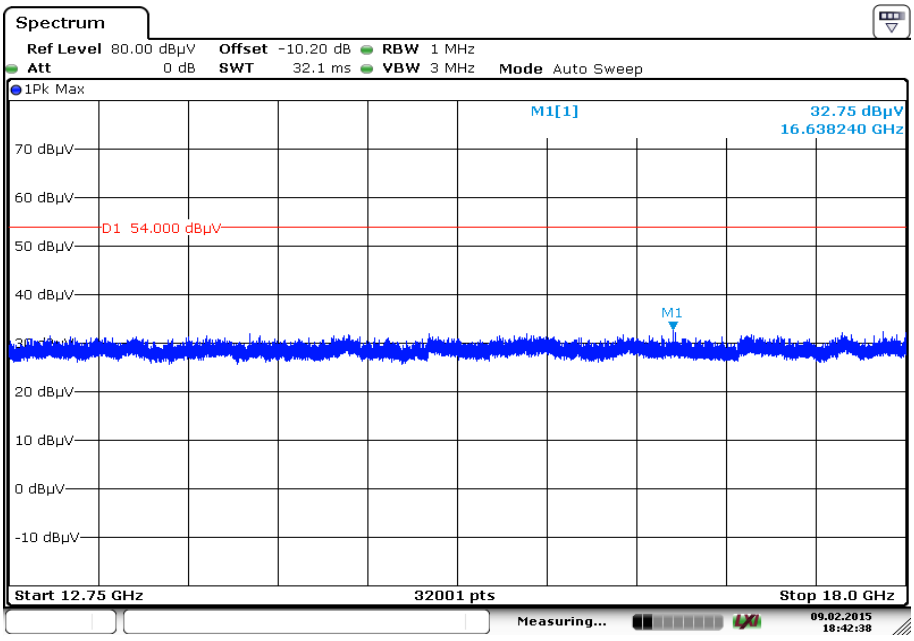



| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 30.867450 | 16.74 | 30.00 | 13.26 | 1000.0 | 120.000 | 101.0 | V | 263 | 13.4 |
| 34.000950 | 20.65 | 30.00 | 9.35 | 1000.0 | 120.000 | 98.0 | V | 295 | 13.7 |
| 107.196750 | 12.79 | 33.50 | 20.71 | 1000.0 | 120.000 | 170.0 | V | 106 | 11.4 |
| 382.420050 | 13.18 | 36.00 | 22.82 | 1000.0 | 120.000 | 170.0 | V | 197 | 16.6 |
| 720.052650 | 28.13 | 36.00 | 7.87 | 1000.0 | 120.000 | 170.0 | H | 295 | 22.0 |
| 776.297400 | 19.97 | 36.00 | 16.03 | 1000.0 | 120.000 | 101.0 | H | 245 | 22.7 |

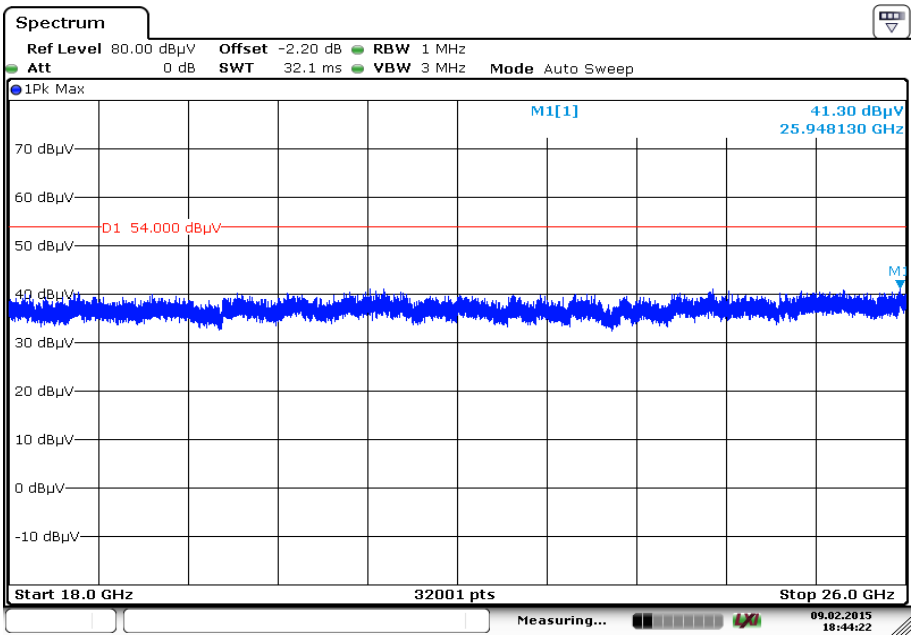
**Plot 2:** 1 GHz to 12.75 GHz, vertical & horizontal polarization




**Plot 3:** 12.75 GHz to 18 GHz, vertical & horizontal polarization



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

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## 10.6 Spurious emissions radiated < 30 MHz

**Description:**

Measurement of the radiated spurious emissions in transmit mode below 30 MHz. The EUT is set to channel 6. This measurement is representative for all channels and modes. If peaks are found channel 1 and channel 11 will be measured too. The measurement is performed with the data rate producing the highest output power. 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:**

| FCC | | IC |
|---|---|---|
| TX 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 |

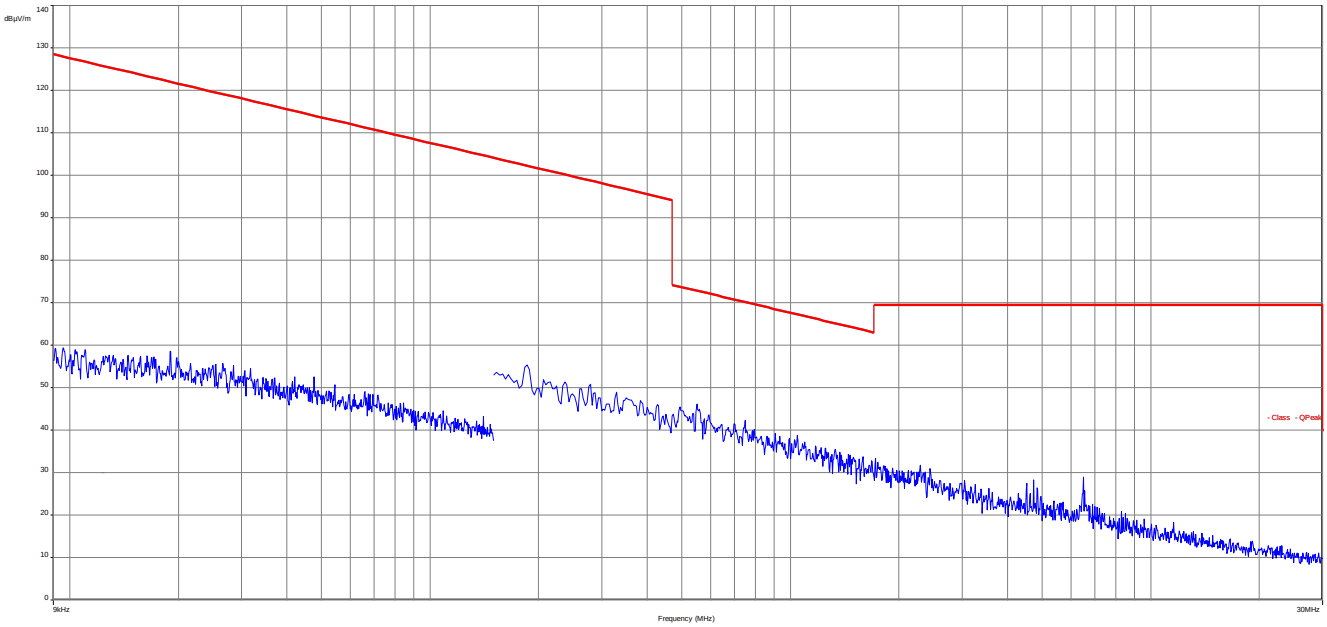
**Results:**

| TX Spurious Emissions Radiated < 30 MHz [dBµV/m] | | |
|---|---|---|
| F [MHz] | Detector | Level [dBµV/m] |
| No peaks detected. | | |
| | | |
| Measurement uncertainty | ± 3 dB | |

**Verdict:** **Passed**

## Plots: TX mode

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



## 10.7 Spurious emissions conducted < 30 MHz

**Description:**

Measurement of the conducted spurious emissions in transmit mode below 30 MHz. The EUT is set to channel 6. This measurement is repeated for DSSS and OFDM modulation. If peaks are found channel 1 and channel 11 will be measured too. The measurement is performed with the data rate producing the highest output power. 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: 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:**

| FCC | | IC |
|---|---|---|
| TX 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

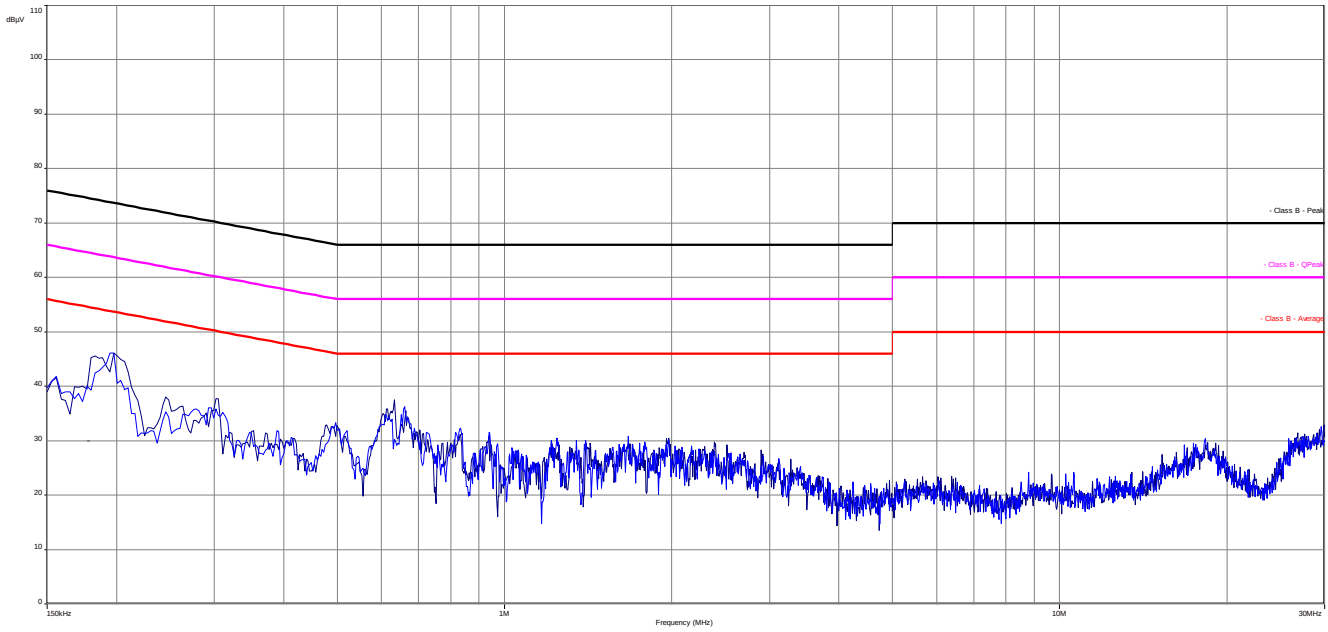
**Results:**

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

**Verdict:** **Passed**

**Plots:**

**Plot 1: 1**50 kHz to 30 MHz, phase line & neutral line



## 11 Test equipment and ancillaries used for tests

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 analyzers 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).

| No. | Lab / Item | Equipment | Type | Manufact. | Serial No. | INV. No Cetecom | Kind of Calibration | Last Calibration | Next Calibration |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 45 | Switch-Unit | 3488A | HP Meßtechnik | 2719A14505 | 300000368 | g | | |
| 2 | 45 | EMI Test Receiver | ESCI 3 | R&S | 100083 | 300003312 | k | 27.01.2014 | 27.01.2015 |
| 3 | 45 | Antenna Tower | Model 2175 | ETS-LINDGREN | 64762 | 300003745 | izw | | |
| 4 | 45 | Positioning Controller | Model 2090 | ETS-LINDGREN | 64672 | 300003746 | izw | | |
| 5 | 45 | Turntable Interface-Box | Model 105637 | ETS-LINDGREN | 44583 | 300003747 | izw | | |
| 6 | 45 | TRILOG Broadband Test-Antenna 30 MHz - 3 GHz | VULB9163 | Schwarzbeck | 295 | 300003787 | k | 22.04.2014 | 22.04.2016 |
| 7 | n. a. | Double-Ridged Waveguide Horn Antenna 1-18.0GHz | 3115 | EMCO | 8812-3088 | 300001032 | vlKl! | 08.05.2013 | 08.05.2015 |
| 8 | n. a. | Anechoic chamber | FAC 3/5m | MWB / TDK | 87400/02 | 300000996 | ev | | |
| 9 | n. a. | Switch / Control Unit | 3488A | HP Meßtechnik | * | 300000199 | ne | | |
| 10 | 9 | Isolating Transformer | MPL IEC625 Bus Regeltrenntravo | Erfi | 91350 | 300001155 | ne | | |
| 11 | 90 | Active Loop Antenna 10 kHz to 30 MHz | 6502 | Kontron Psychotech | 8905-2342 | 300000256 | k | 13.06.2013 | 13.06.2015 |
| 12 | 90 | Amplifier | js42-00502650-28-5a | Parzich GMBH | 928979 | 300003143 | ne | | |
| 13 | 90 | Band Reject filter | WRCG2400/2483-2375/2505-50/10SS | Wainwright | 11 | 300003351 | ev | | |
| 14 | 90 | TRILOG Broadband Test-Antenna 30 MHz - 3 GHz | VULB9163 | Schwarzbeck | 371 | 300003854 | vlKl! | 29.10.2014 | 29.10.2017 |
| 15 | 90 | MXE EMI Receiver 20 Hz bis 26,5 GHz | N9038A | Agilent Technologies | MY51210197 | 300004405 | k | 13.03.2014 | 13.03.2015 |
| 16 | 11b | Microwave System Amplifier, 0.5-26.5 GHz | 83017A | HP Meßtechnik | 00419 | 300002268 | ev | | |
| 17 | A026 | Std. Gain Horn Antenna 12.4 to 18.0 GHz | 639 | Narda | 8402 | 300000787 | k | 22.07.2013 | 22.07.2015 |
| 18 | A029 | Std. Gain Horn Antenna 18.0 to 26.5 GHz | 638 | Narda | 8205 | 300002442 | k | 19.07.2013 | 19.07.2015 |
| 19 | A029 | Signal Analyzer 40 GHz | FSV40 | R&S | 101042 | 300004517 | k | 21.01.2014 | 21.01.2015 |

**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 |

## 12 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 | 2015-02-12 |
| -A | Additional output power measurement | 2015-04-13 |

## 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

## Annex C Accreditation Certificate

Front side of certificate

DAkkS Deutsche Akkreditierungsstelle

Deutsche Akkreditierungsstelle GmbH

**Beliehene gemäß § 8 Absatz 1 AkkStelleG i.V.m. § 1 Absatz 1 AkkStelleGBV**
Unterzeichnerin der Multilateralen Abkommen
von EA, ILAC und IAF zur gegenseitigen Anerkennung

**Akkreditierung**

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:

**Drahtgebundene Kommunikation einschließlich xDSL**
**VoIP und DECT**
**Akustik**
**Funk einschließlich WLAN**
**Short Range Devices (SRD)**
**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**
**Wi-Fi- Services**

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.

Registrierungsnummer der Urkunde: **D-PL-12076-01-00**

Frankfurt am Main, 07.03.2014

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

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Die auszugsweise Veröffentlichung der Akkreditierungsurkunde bedarf der vorherigen schriftlichen Zustimmung der Deutsche Akkreditierungsstelle GmbH (DAkkS). Ausgenommen davon ist die separate Weiterverbreitung des Deckblattes durch die umseitig genannte Konformitätsbewertungsstelle in unveränderter Form.

Es darf nicht der Anschein erweckt werden, dass sich die Akkreditierung auch auf Bereiche erstreckt, die über den durch die DAkkS bestätigten Akkreditierungsbereich hinausgehen.

Die Akkreditierung erfolgte gemäß des Gesetzes über die Akkreditierungsstelle (AkkStelleG) vom 31. Juli 2009 (BGBl. I S. 2625) sowie der Verordnung (EG) Nr. 765/2008 des Europäischen Parlaments und des Rates vom 9. Juli 2008 über die Vorschriften für die Akkreditierung und Marktüberwachung im Zusammenhang mit der Vermarktung von Produkten (Abl. L 218 vom 9. Juli 2008, S. 30).
Die DAkkS ist Unterzeichnerin der Multilateralen Abkommen zur gegenseitigen Anerkennung der European co-operation for Accreditation (EA), des International Accreditation Forum (IAF) und der International Laboratory Accreditation Cooperation (ILAC). Die Unterzeichner dieser Abkommen erkennen ihre Akkreditierungen gegenseitig an.

Der aktuelle Stand der Mitgliedschaft kann folgenden Webseiten entnommen werden:
EA: www.european-accreditation.org
ILAC: www.ilac.org
IAF: www.iaf.nu

**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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