

TEST REPORT

Test report no.: 1-6965/13-16-15-A



Deutsche
 Akkreditierungsstelle
 D-PL-12076-01-01

Testing laboratory

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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-12076-01-01
 Area of Testing:
 Radio Communications & EMC (RCE)

Applicant

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Manufacturer

Sony Mobile Communications AB
 Nya Vattentornet
 22188 Lund / SWEDEN

Test standard/s

47 CFR Part 15 Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices

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

Test Item

Kind of test item: Smart Phone GPRS/EGPRS 850/900/1800/1900; UMTS HSPA FDD/II/V; LTE FDD1/3/17/18; LTE TDD41; CDMA 2K BC0/BC6; WLAN b/g/n/a/ac; BT 4.0; RFID; A-GPS
FCC ID: PY7PM-0750
Frequency: UNII band 5150 MHz to 5725 MHz (lowest channel 36 – 5180 MHz; highest channel 140 – 5700 MHz)
Technology tested: WLAN (OFDM/a – mode; n/ac HT20 / HT40 – mode and ac HT80 – mode)
Antenna: Integrated antenna
Power supply: 3.7V DC by Li - polymer battery
Temperature range: -30°C to +60°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:

Christoph Schneider
 Expert

Test performed:

Andreas Luckenbill
 Expert

| | |
|----------------------------|--|
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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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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.

2.2 Application details

| | |
|------------------------------------|------------|
| Date of receipt of order: | 2014-02-19 |
| Date of receipt of test item: | 2014-03-14 |
| Start of test: | 2014-03-15 |
| End of test: | 2014-03-26 |
| 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 |

3.1 Measurement guidance

| | | |
|------------------|---------|--|
| UNII: KDB 789033 | 2013-04 | 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} | +60 °C during high temperature tests |
| | T_{min} | -30 °C during low temperature tests |
| Relative humidity content: | | 42 % |
| Barometric pressure: | | not relevant for this kind of testing |
| Power supply: | V_{nom} | 3.7 V DC by Li - polymer battery |
| | V_{max} | 4.4 V |
| | V_{min} | 3.3 V |

5 Test item

| | | |
|----------------------------|---|---|
| Kind of test item | : | Smart Phone GPRS/EGPRS 850/900/1800/1900; UMTS HSPA FDDI/II/V; LTE FDD1/3/17/18; LTE TDD41; CDMA 2K BC0/BC6; WLAN b/g/n/a/ac; BT 4.0; RFID; A-GPS |
| Type identification | : | PY7PM-0750 |
| S/N serial number | : | Rad. CB5126D6YF Cond. CB5126DB1G |
| HW hardware status | : | AP1 |
| SW software status | : | RF test software |
| Frequency band [MHz] | : | UNII band 5150 MHz to 5725 MHz (lowest channel 36 – 5180 MHz; highest channel 140 – 5700 MHz) |
| Type of radio transmission | : | OFDM |
| Use of frequency spectrum | : | |
| Type of modulation | : | BPSK, QPSK, 16 – QAM, 64 – QAM and 256 – QAM |
| Number of channels | : | 19 |
| Antenna | : | Integrated antenna |
| Power supply | : | 3.7 V DC by Li - polymer battery |
| Temperature range | : | -30°C to +60°C |

5.1 Additional information

Test setup- and EUT-photos are included in test report: 1-6965/13-16-01_AnnexA
1-6965/13-16-01_AnnexB
1-6965/13-16-01_AnnexD

All conducted measurements performed by CETECOM ICT Services GmbH, Saarbrücken.
All radiated measurements performed by CETECOM GmbH, Essen.

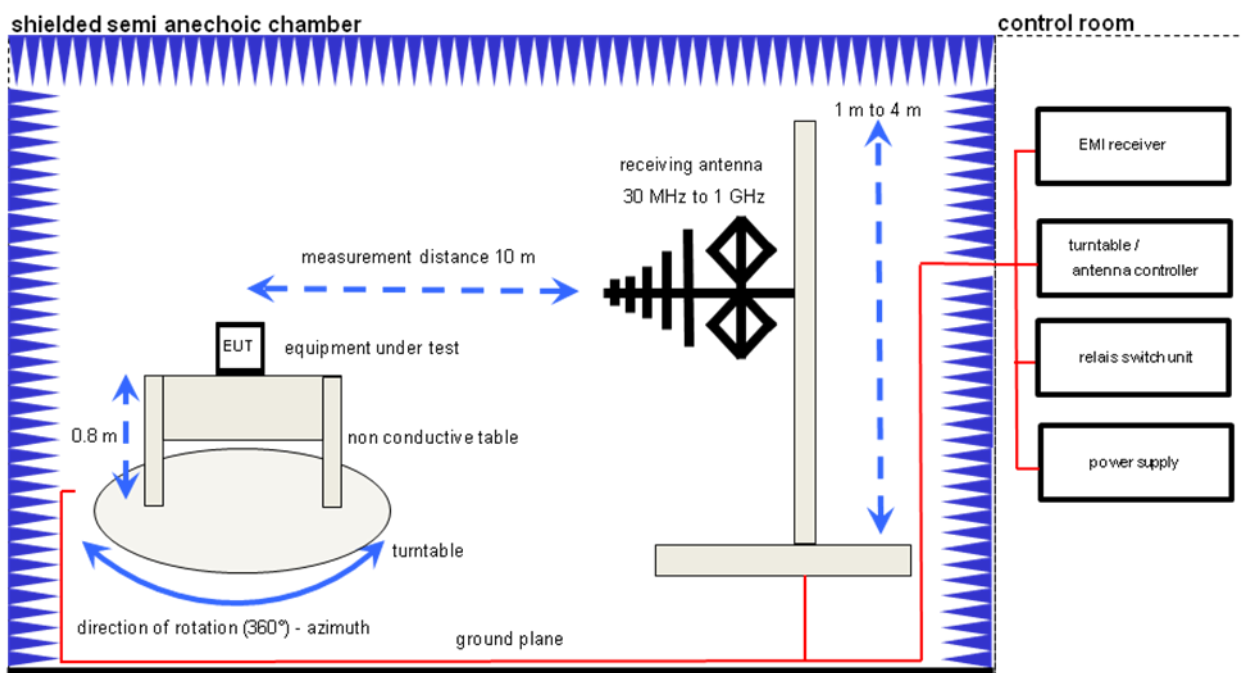
6 Test laboratories sub-contracted

None

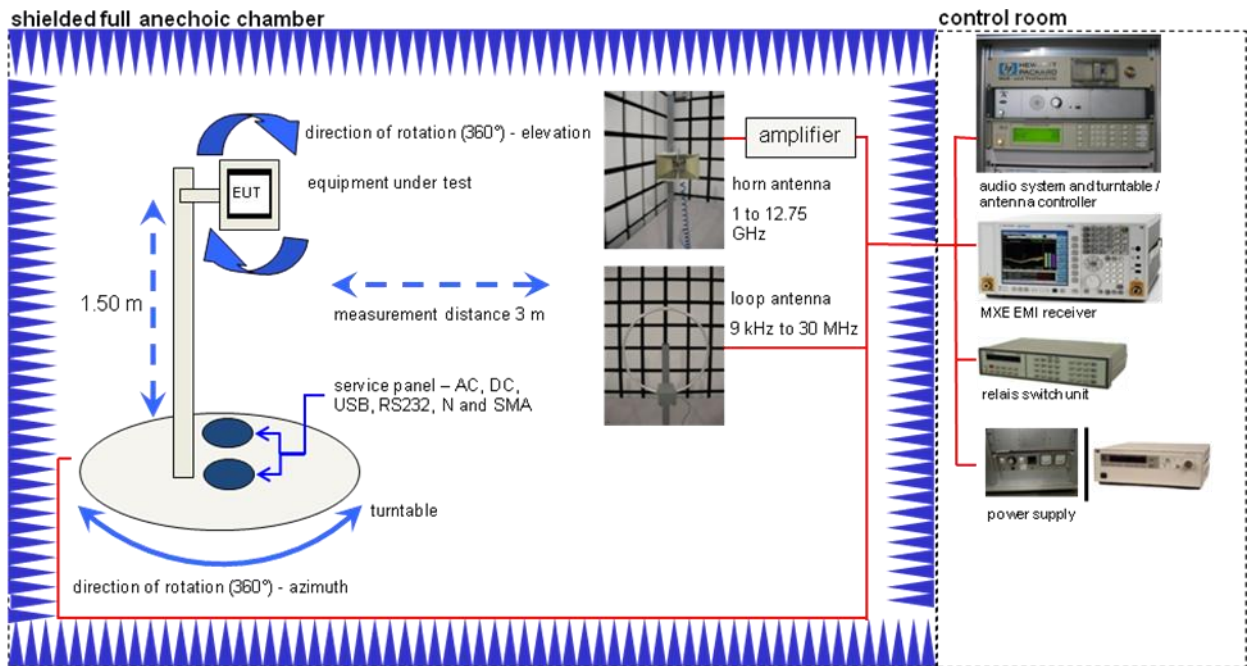
7 Description of the test setup

7.1 Radiated measurements in a semi-anechoic chamber

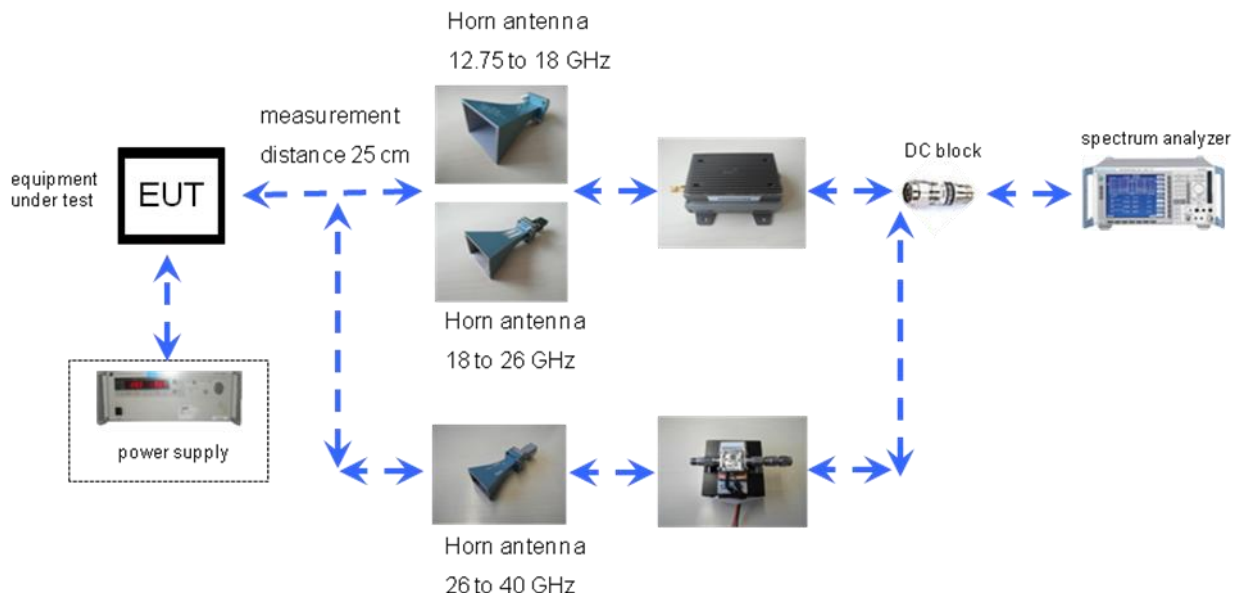
The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 1 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas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



7.2 Radiated measurements in a fully anechoic chamber



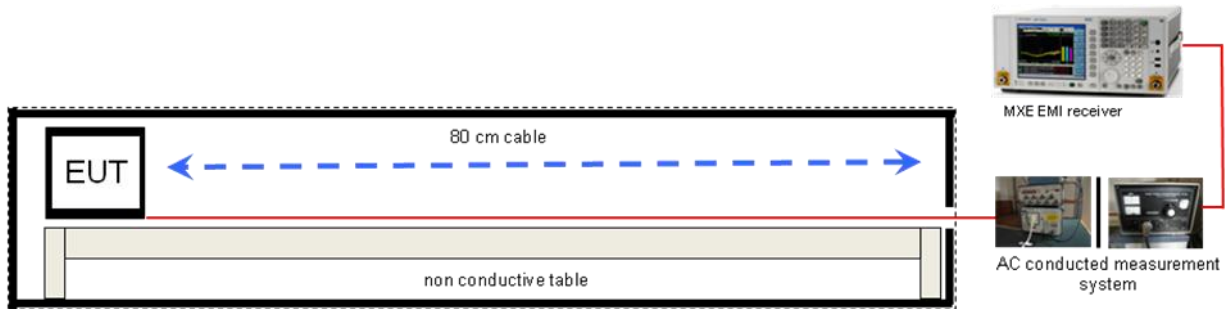
7.3 Radiated measurements 12.75 GHz to 40 GHz



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 |
| Std. Gain Horn Antenna 26.5-40.0 GHz | V637 | Narda | 7911 | 300001751 |
| Broadband Low Noise Amplifier 18-50 GHz | CBL18503070-XX | CERNEX | 19338 | 300004273 |
| Spectrum Analyzer 20 Hz - 50 GHz | FSU50 | R&S | 200012 | 300003443 |
| Signal Analyzer 40 GHz | FSV40 | R&S | 101042 | 300004517 |

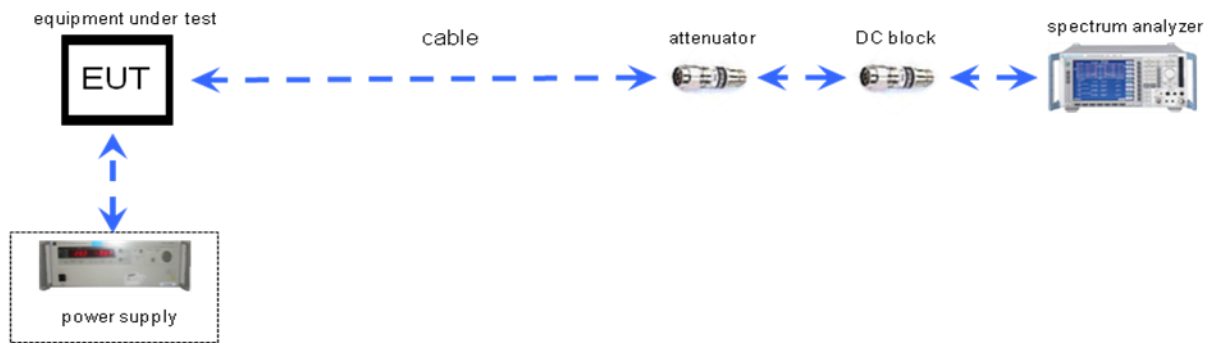
7.4 AC conducted



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 | Passed | 2014-03-31 | -/- |

| Test specification clause | Test case | Temperature conditions | Power source voltages | Pass | Fail | NA | NP | Results (max.) |
|---------------------------|---|------------------------|-----------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|----------------------------|
| -/- | Output power verification (conducted) | Nominal | Nominal | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | No passed / fail criteria! |
| -/- | Gain | Nominal | Nominal | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | No passed / fail criteria! |
| U-NII Part 15 | Duty cycle | Nominal | Nominal | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | No passed / fail criteria! |
| §15.407(a) | Maximum output power (conducted & radiated) | Nominal | Nominal | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | complies |
| §15.407(a) | Power spectral density | Nominal | Nominal | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | complies |
| §15.407(a) | Spectrum bandwidth 26dB bandwidth | Nominal | Nominal | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | complies |
| §15.407(a) | Peak excursion measurements | Nominal | Nominal | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | complies |
| §15.205 | Band edge compliance radiated | Nominal | Nominal | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | complies |
| §15.407(b) | TX spurious emissions radiated | Nominal | Nominal | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | complies |
| §15.109 | RX spurious emissions radiated | Nominal | Nominal | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | complies |
| §15.209(a) | Spurious emissions radiated < 30 MHz | Nominal | Nominal | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | complies |
| §15.107(a) §15.207 | Spurious emissions conducted emissions < 30 MHz | Nominal | Nominal | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | complies |

Note: NA = Not Applicable; NP = Not Performed

9 Additional comments

Reference documents: None

Special test descriptions: None

Configuration descriptions: None

Test mode: No test mode available.

Special software is used.
EUT is transmitting pseudo random data by itself

10 Measurement results

10.1 Identify worst case datarate

Measurement:

All modes of the EUT will be measured with an average powermeter to identify the maximum transmission power on low, mid and high channel. In the case that only one or two channels are available, only these will be measured.

In further tests only the identified worst case modulation scheme or bandwidth will be measured. Additional the band edge compliance test will be performed in the lowest and highest modulation scheme.

Measurement parameters:

Average Power Meter

Results:

| Modulation | Modulation scheme / bandwidth | | | | | | |
|-------------------------|-------------------------------|----------|----------|----------|----------|-----|----------|
| | 5180 MHz | 5240 MHz | 5260 MHz | 5320 MHz | 5500 MHz | -/- | 5700 MHz |
| Frequency | 6Mbit/s | 6Mbit/s | 6Mbit/s | 6Mbit/s | 6Mbit/s | -/- | 6Mbit/s |
| OFDM / a – mode | MCS6 | MCS6 | MCS6 | MCS6 | MCS6 | -/- | MCS7 |
| OFDM / n/ac – mode HT20 | MCS6 | MCS6 | MCS6 | MCS6 | MCS6 | -/- | MCS7 |
| Frequency | 5190 MHz | 5230 MHz | 5270 MHz | 5310 MHz | 5510 MHz | -/- | 5670 MHz |
| OFDM / n/ac – mode HT40 | MCS7 | MCS7 | MCS3 | MCS3 | MCS8 | -/- | MCS7 |
| Frequency | 5210 MHz | | 5290 MHz | | 5530 MHz | | -/- |
| OFDM / ac – mode HT80 | MCS0 | | MCS9 | | MCS0 | | -/- |

10.2 Gain

Description:

Measurement of the maximum output power conducted and radiated

Measurement:

| Measurement parameter | |
|-----------------------|----------------------|
| Detector: | Peak |
| Sweep time: | 5s |
| Resolution bandwidth: | 3 MHz |
| Video bandwidth: | 8 MHz / 10 MHz |
| Span: | See complete signal! |
| Trace-Mode: | Max Hold |

Limits:

| Antenna Gain |
|---------------|
| Maximum 6 dBi |

Result:

| OFDM Band 5150 MHz to 5250 MHz | Gain | | |
|------------------------------------|---------|--------------------|------|
| | Channel | Lowest 5180 MHz | -/- |
| Gain (declared by manufacturer) | -1.6 | -/- | -1.4 |
| Measurement uncertainty | ± 3 dB | | |

| OFDM Band 5250 MHz to 5350 MHz | Gain | | |
|------------------------------------|---------|--------------------|------|
| | Channel | Lowest 5260 MHz | -/- |
| Gain (declared by manufacturer) | -1.4 | -/- | -1.6 |
| Measurement uncertainty | ± 3 dB | | |

| OFDM Band 5470 MHz to 5725 MHz | Gain | | |
|------------------------------------|---------|--------------------|--------------------|
| | Channel | Lowest 5500 MHz | Middle 5600 MHz |
| Gain (declared by manufacturer) | -2.7 | -2.2 | -2.2 |
| Measurement uncertainty | ± 3 dB | | |

Result: **Passed**

10.3 Duty cycle

Measurement:

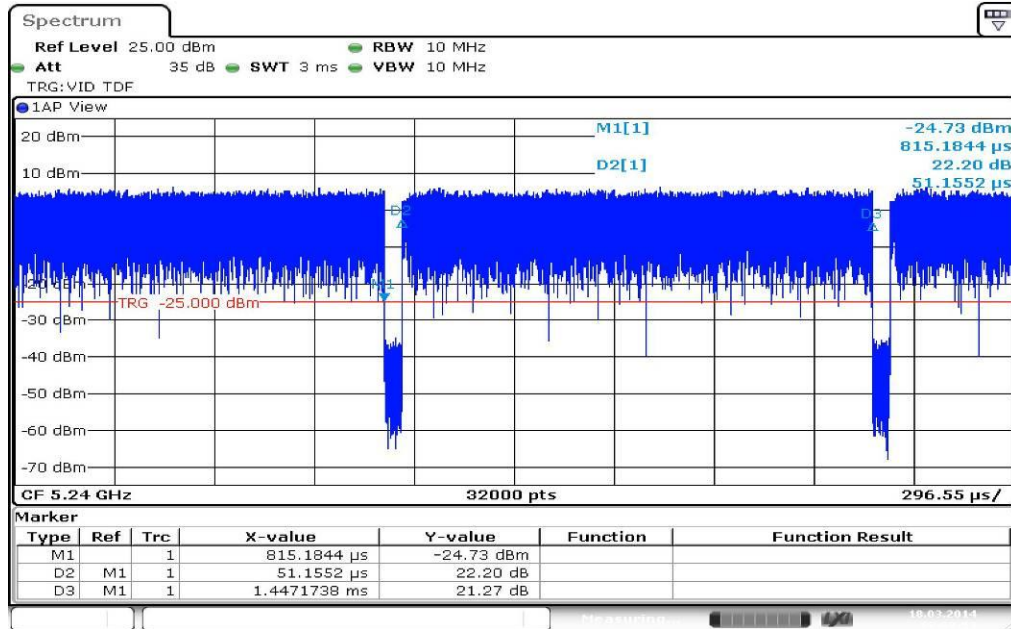
| Measurement parameter | |
|-----------------------|-------------------------------------|
| Detector: | Peak |
| Sweep time: | Auto |
| Resolution bandwidth: | 10 MHz |
| Video bandwidth: | 10 MHz |
| Span: | Zero |
| Trace-Mode: | Video trigger / view / single sweep |

Results:**Duty cycle and correction factor:**

| | | | |
|------------------------|--------------------|----|---------|
| OFDM / a – mode: | 96.47 % duty cycle | => | 0.16 dB |
| OFDM / n – mode HT20: | 96.24 % duty cycle | => | 0.17 dB |
| OFDM / n – mode HT40: | 92.62 % duty cycle | => | 0.33 dB |
| OFDM / ac – mode HT80: | 84.73 % duty cycle | => | 0.72 dB |

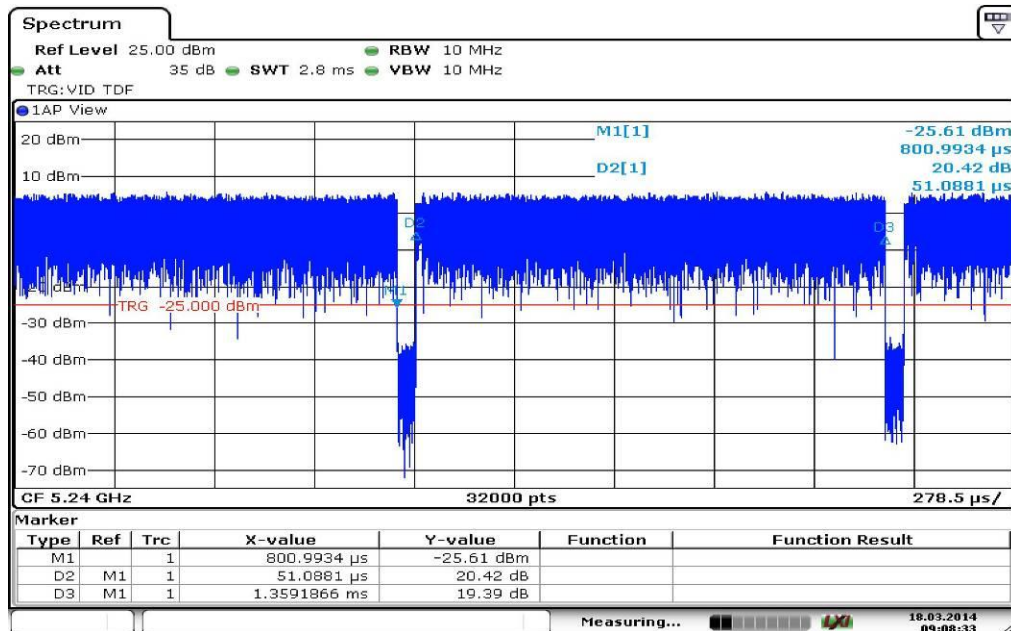
Plots:

Plot 1: duty cycle of the transmitter – OFDM / a – mode



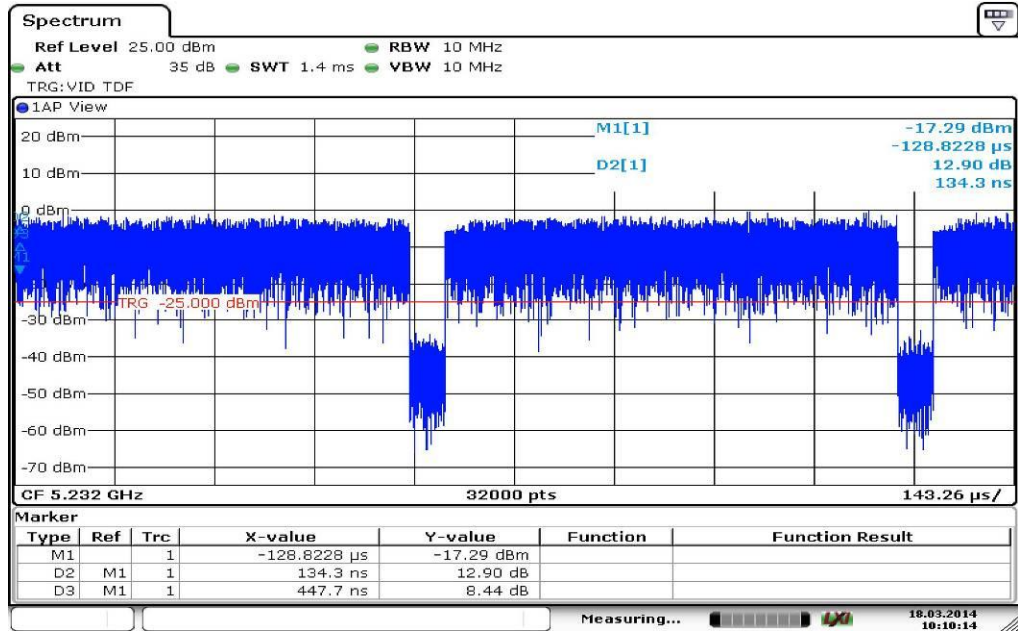
Date: 18.MAR.2014 08:08:54

Plot 2: duty cycle of the transmitter – OFDM / n – mode HT20



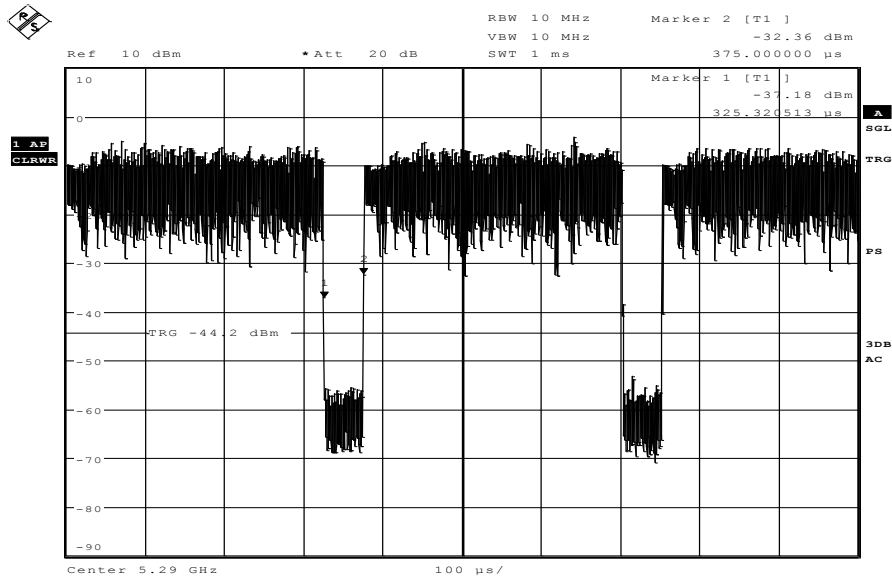
Date: 18.MAR.2014 09:08:34

Plot 3: duty cycle of the transmitter – OFDM / n – mode HT40



Date: 18.MAR.2014 10:10:15

Plot 4: duty cycle of the transmitter – OFDM / ac – mode HT80



Date: 21.MAR.2014 11:35:06

10.4 Maximum output power conducted

Description:

Measurement of the maximum output power conducted and radiated

Measurement:

| Measurement parameter | |
|-----------------------|--|
| Detector: | RMS |
| Sweep time: | 60s |
| Resolution bandwidth: | 1 MHz |
| Video bandwidth: | ≥ 3 MHz |
| Span: | > EBW |
| Trace-Mode: | Max hold |
| Analyzer function | Band power / channel power Interval > 26 dB EBW |

Limits:

| Radiated output power | Conducted output power |
|-------------------------------------|---|
| Conducted power + 6dBi antenna gain | The lesser one of 50mW or 4 dBm + 10 log Bandwidth 5.150-5.250 GHz 250mW or 11 dBm + 10 log Bandwidth 5.250-5.350 GHz 250mW or 11 dBm + 10 log Bandwidth 5.470-5.725 GHz 1W or 17 dBm + 10 log Bandwidth 5.725-5.825 GHz (where Bandwidth is the 26dB Bandwidth [MHz]) |

Result: OFDM / a – mode

| OFDM / a – mode Channel | Maximum output power conducted [dBm] | | | |
|--------------------------------|--------------------------------------|---------------------|---------------------|---------------------|
| | Lowest 5180 MHz | Highest 5240 MHz | Lowest 5260 MHz | Highest 5320 MHz |
| duty cycle correction included | 12.96 | 13.14 | 13.18 | 13.05 |
| Channel | Lowest 5500 MHz | Middle 5600 MHz | Highest 5700 MHz | -/- |
| duty cycle correction included | 13.67 | 13.17 | 13.29 | -/- |
| Measurement uncertainty | ± 1 dB | | | |

Result: Passed**Result: OFDM / n/ac – mode HT20**

| OFDM / n/ac – mode HT20 Channel | Maximum output power conducted [dBm] | | | |
|------------------------------------|--------------------------------------|---------------------|---------------------|---------------------|
| | Lowest 5180 MHz | Highest 5240 MHz | Lowest 5260 MHz | Highest 5320 MHz |
| duty cycle correction included | 13.10 | 13.25 | 13.33 | 13.20 |
| Channel | Lowest 5500 MHz | Middle 5600 MHz | Highest 5700 MHz | -/- |
| duty cycle correction included | 13.85 | 13.41 | 13.47 | -/- |
| Measurement uncertainty | ± 1 dB | | | |

Result: Passed

Result: OFDM / n/ac – mode HT40

| OFDM / n/ac – mode HT40 Channel | Maximum output power conducted [dBm] | | | |
|------------------------------------|--------------------------------------|---------------------|---------------------|---------------------|
| | Lowest 5190 MHz | Highest 5230 MHz | Lowest 5270 MHz | Highest 5310 MHz |
| duty cycle correction included | 10.64 | 9.94 | 10.58 | 9.36 |
| Channel | Lowest 5510 MHz | Middle 5590 MHz | Highest 5670 MHz | -/- |
| duty cycle correction included | 8.47 | 8.34 | 8.22 | -/- |
| Measurement uncertainty | ± 1 dB | | | |

Result: Passed**Result: OFDM / ac – mode HT80**

| OFDM / ac – mode HT80 Channel | Maximum output power conducted [dBm] | | | |
|----------------------------------|--------------------------------------|---------------------|--------------------|-----|
| | Lowest 5210 MHz | Highest 5290 MHz | Lowest 5530 MHz | -/- |
| duty cycle correction included | 7.78 | 7.52 | 7.54 | -/- |
| Measurement uncertainty | ± 1 dB | | | |

Result: Passed

10.5 Power spectral density

Description:

Measurement of the power spectral density of a digital modulated system. The measurement is repeated at the lowest, middle and highest channel.

Measurement:

| Measurement parameter | |
|-----------------------|--------------|
| Detector: | RMS |
| Sweep time: | 60 s / 120 s |
| Resolution bandwidth: | 1 MHz |
| Video bandwidth: | ≥ 3 MHz |
| Span: | > EBW |
| Trace-Mode: | Max hold |

Limits:

| Power Spectral Density |
|--|
| power spectral density conducted ≤ 4 dBm in any 1 MHz band (band 5150 – 5250 MHz) |
| power spectral density conducted ≤ 11 dBm in any 1 MHz band (band 5250 – 5350 MHz) |
| power spectral density conducted ≤ 11 dBm in any 1 MHz band (band 5470 – 5725 MHz) |
| power spectral density conducted ≤ 17 dBm in any 1 MHz band (band 5725 – 5825 MHz) |

Result: OFDM / a – mode

| OFDM / a – mode Channel | Power Spectral density [dBm/MHz] | |
|-----------------------------|----------------------------------|---------------------|
| | Lowest 5180 MHz | Highest 5240 MHz |
| incl. duty cycle correction | 0.9 | 1.0 |
| Channel | Lowest 5260 MHz | Highest 5320 MHz |
| incl. duty cycle correction | 0.9 | 1.1 |
| Channel | Lowest 5500 MHz | Highest 5700 MHz |
| incl. duty cycle correction | 1.4 | 1.2 |
| Measurement uncertainty | ± 1 dB | |

Result: Passed

Result: OFDM / n – mode HT20

| OFDM / n – mode HT20 Channel | Power Spectral density [dBm/MHz] | |
|---------------------------------|----------------------------------|---------------------|
| | Lowest 5180 MHz | Highest 5240 MHz |
| incl. duty cycle correction | 0.7 | 0.8 |
| Channel | Lowest 5260 MHz | Highest 5320 MHz |
| incl. duty cycle correction | 0.8 | 1.0 |
| Channel | Lowest 5500 MHz | Highest 5700 MHz |
| incl. duty cycle correction | 1.4 | 1.5 |
| Measurement uncertainty | ± 1 dB | |

Result: Passed

Result: OFDM / n – mode HT40

| OFDM / n – mode HT40 Channel | Power Spectral density [dBm/MHz] | | | |
|---------------------------------|----------------------------------|---------------------|---------------------|---------------------|
| | Lowest 5190 MHz | Highest 5230 MHz | Lowest 5270 MHz | Highest 5310 MHz |
| incl. duty cycle correction | -2.6 | -5.4 | -3.5 | -5.8 |
| Channel | Lowest 5510 MHz | | Highest 5670 MHz | |
| incl. duty cycle correction | -6.8 | | -6.9 | |
| Measurement uncertainty | ± 1 dB | | | |

Result: Passed

Result: OFDM / ac – mode HT80

| OFDM / ac – mode HT80 Channel | Power Spectral density [dBm/MHz] | | | |
|----------------------------------|----------------------------------|---------------------|--------------------|--|
| | Lowest 5210 MHz | Highest 5290 MHz | Lowest 5530 MHz | |
| incl. duty cycle correction | -8.1 | -8.5 | -8.2 | |
| Measurement uncertainty | ± 1 dB | | | |

Result: Passed

10.6 Spectrum bandwidth – 26 dB bandwidth

Description:

Measurement of the 26 dB bandwidth of the modulated signal.

Measurement:

| Measurement parameter | |
|-----------------------|--------------------|
| Detector: | Peak |
| Sweep time: | Auto |
| Resolution bandwidth: | 1% EBW |
| Video bandwidth: | ≥ RBW |
| Span: | > complete signal! |
| Trace-Mode: | Max hold |

Limits:

| Spectrum Bandwidth – 26 dB Bandwidth |
|--------------------------------------|
| -/- |

Result: OFDM / a – mode

| OFDM / a – mode Channel | 26 dB BANDWIDTH [MHz] | |
|----------------------------|-----------------------|---------------------|
| | Lowest 5180 MHz | Highest 5240 MHz |
| | 21.9 | 21.8 |
| Channel | Lowest 5260 MHz | Highest 5320 MHz |
| | 21.8 | 21.9 |
| Channel | Lowest 5500 MHz | Highest 5700 MHz |
| | 22.0 | 22.0 |
| Measurement uncertainty | ± 1 MHz | |

Result: Passed

Result: OFDM / n/ac – mode HT20

| OFDM / n/ac – mode Channel | 26 dB BANDWIDTH [MHz] | |
|-------------------------------|-----------------------|---------------------|
| | Lowest 5180 MHz | Highest 5240 MHz |
| | 22.1 | 22.2 |
| Channel | Lowest 5260 MHz | Highest 5320 MHz |
| | 22.2 | 22.2 |
| Channel | Lowest 5500 MHz | Highest 5700 MHz |
| | 22.2 | 22.0 |
| Measurement uncertainty | ± 1 MHz | |

Result: Passed

Result: OFDM / n/ac – mode HT40

| OFDM / n/ac – mode HT40 Channel | 26 dB BANDWIDTH [MHz] | | | |
|------------------------------------|-----------------------|---------------------|---------------------|---------------------|
| | Lowest 5190 MHz | Highest 5230 MHz | Lowest 5270 MHz | Highest 5310 MHz |
| | 40.1 | 39.8 | 40.0 | 39.8 |
| Channel | Lowest 5510 MHz | | Highest 5670 MHz | |
| | 40.2 | | 40.0 | |
| Measurement uncertainty | ± 1 MHz | | | |

Result: Passed

Result: OFDM / ac – mode HT80

| OFDM / ac – mode HT80 Channel | 26 dB BANDWIDTH [MHz] | | | |
|----------------------------------|-----------------------|---------------------|--------------------|-----|
| | Lowest 5210 MHz | Highest 5290 MHz | Lowest 5530 MHz | -/- |
| | 82.1 | 82.1 | 81.9 | |
| Measurement uncertainty | ± RBW | | | |

Result: Passed

10.7 Peak excursion measurements

Description:

Peak to average value.

Measurement:

| Measurement parameter | |
|-----------------------|-------------------|
| Detector: | Peak |
| Sweep time: | 60 s / 120 s |
| Resolution bandwidth: | 1 MHz |
| Video bandwidth: | ≥ 3 MHz |
| Span: | > Complete signal |
| Trace-Mode: | Max hold |

Limits:

| Peak excursion value |
|------------------------|
| Does not exceed 13 dB. |

Results:

| Modulation OFDM / a – mode | Peak excursion value | | |
|-------------------------------|----------------------|--|----------|
| | 5180 MHz | | 5240 MHz |
| Channel | 5180 MHz | | 5240 MHz |
| RMS | 0.9 | | 1.0 |
| Peak | 9.43 | | 9.63 |
| Peak excursion value | 8.53 | | 8.63 |
| Channel | 5260 MHz | | 5320 MHz |
| RMS | 0.9 | | 1.1 |
| Peak | 9.41 | | 9.58 |
| Peak excursion value | 8.51 | | 8.58 |
| Channel | 5500 MHz | | 5700 MHz |
| RMS | 1.4 | | 1.2 |
| Peak | 10.02 | | 10.01 |
| Peak excursion value | 8.62 | | 8.81 |
| Measurement uncertainty | ± 1 dB | | |

Result: Passed

Results:

| Modulation OFDM / n/ac – mode | Peak excursion value | | |
|----------------------------------|----------------------|----------|----------|
| | Channel | 5180 MHz | 5240 MHz |
| RMS | 0.7 | | 0.8 |
| Peak | 10.39 | | 10.45 |
| Peak excursion value | 9.69 | | 9.65 |
| Channel | 5260 MHz | | 5320 MHz |
| RMS | 0.8 | | 1.0 |
| Peak | 10.69 | | 10.59 |
| Peak excursion value | 9.89 | | 9.59 |
| Channel | 5500 MHz | | 5700 MHz |
| RMS | 1.4 | | 1.5 |
| Peak | 11.25 | | 11.2 |
| Peak excursion value | 9.85 | | 9.7 |
| Measurement uncertainty | ± 1 dB | | |

Result: Passed**Results:**

| Modulation OFDM / n/ac – mode HT40 | Peak excursion value | | |
|---------------------------------------|----------------------|----------|----------|
| | Channel | 5190 MHz | 5230 MHz |
| RMS | -2.6 | -5.4 | -3.5 |
| Peak | 2.9 | 3.17 | 3.45 |
| Peak excursion value | 5.50 | 8.57 | 6.95 |
| Channel | 5310 MHz | 5510 MHz | 5670 MHz |
| RMS | -5.8 | -6.8 | -6.9 |
| Peak | 3.46 | 3.15 | 2.89 |
| Peak excursion value | 9.26 | 9.95 | 9.79 |
| Measurement uncertainty | ± 1 dB | | |

Result: Passed**Results:**

| Modulation OFDM / ac – mode HT80 | Peak excursion value | | |
|-------------------------------------|----------------------|----------|----------|
| | Channel | 5210 MHz | 5290 MHz |
| RMS | -8.1 | -8.5 | -8.2 |
| Peak | 2.66 | 1.80 | 2.21 |
| Peak excursion value | 10.76 | 10.30 | 10.41 |
| Measurement uncertainty | ± 1 dB | | |

Result: Passed

10.8 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:

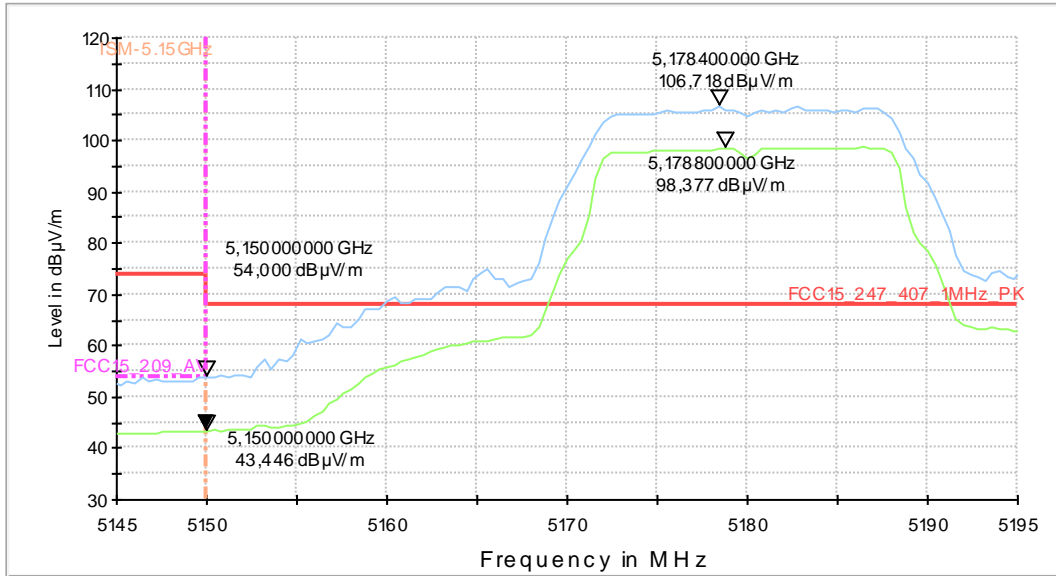
| Band Edge Compliance Radiated |
|--|
| In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz 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 dB μ V/m PEAK 54 dB μ V/m AVG |

Result:

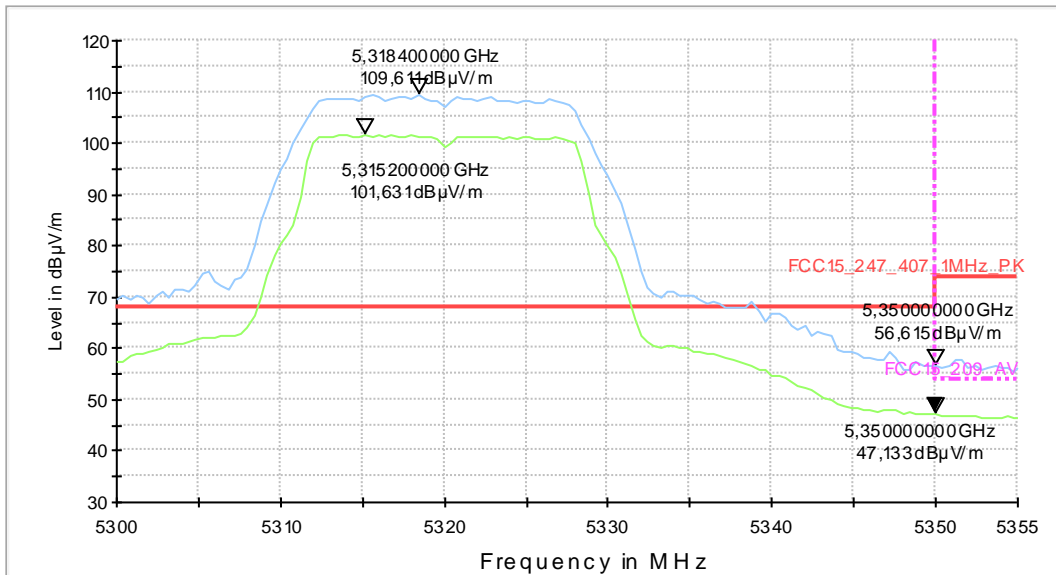
| Scenario | Band Edge Compliance Radiated [dB μ V/m] |
|-------------------------|---|
| band edge | < 74 dB μ V/m (AVG) < 54 dB μ V/m (PEAK) |
| Measurement uncertainty | \pm 3 dB |

Plots:

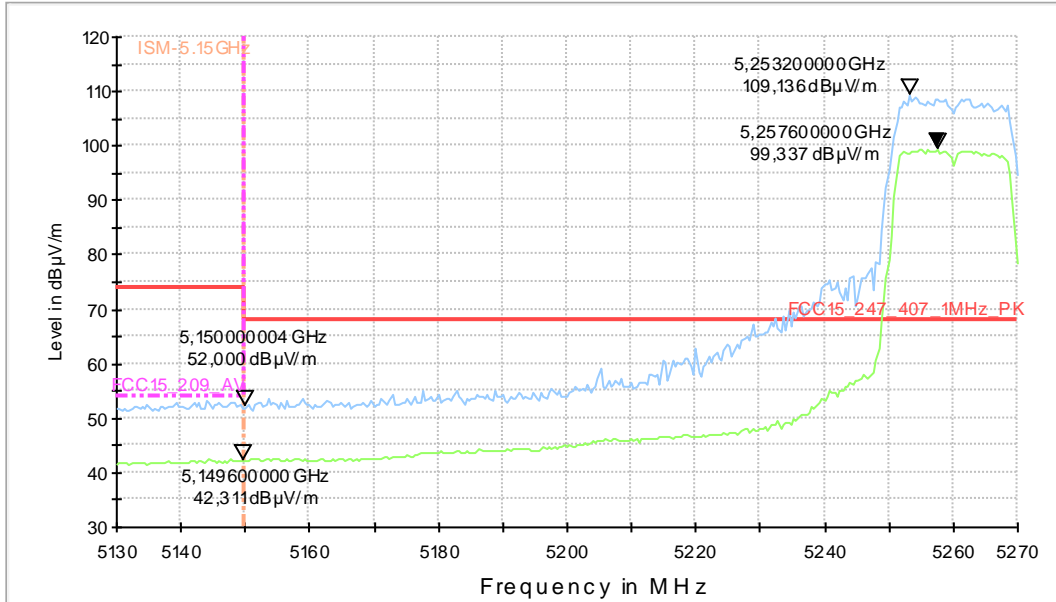
Plot 1: lower band edge, vertical & horizontal polarization (a mode), channel 36, 6Mbps



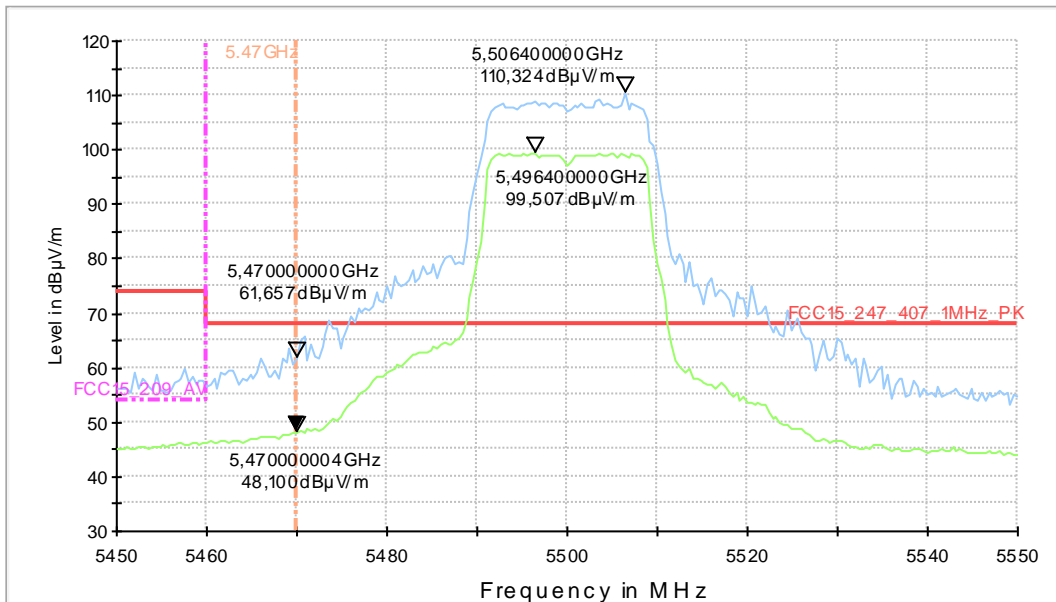
Plot 2: upper band edge, vertical & horizontal polarization (a mode), channel 64, 6Mbps



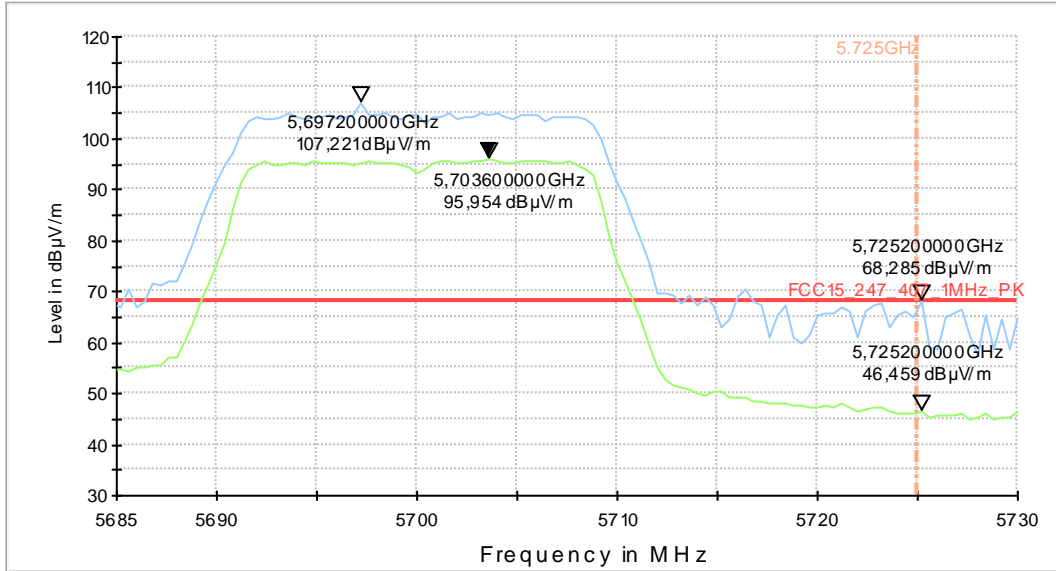
Plot 3: lower band edge, vertical & horizontal polarization (ac HT 20 mode), channel 52, MCS6



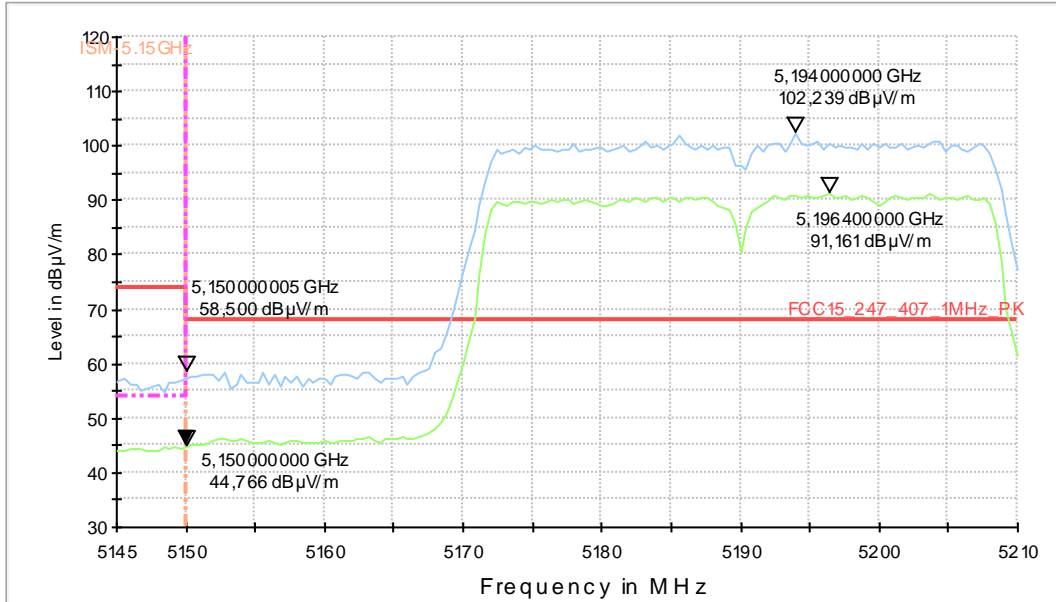
Plot 4: lower band edge, vertical & horizontal polarization (ac HT 20 mode), channel 100, MCS6



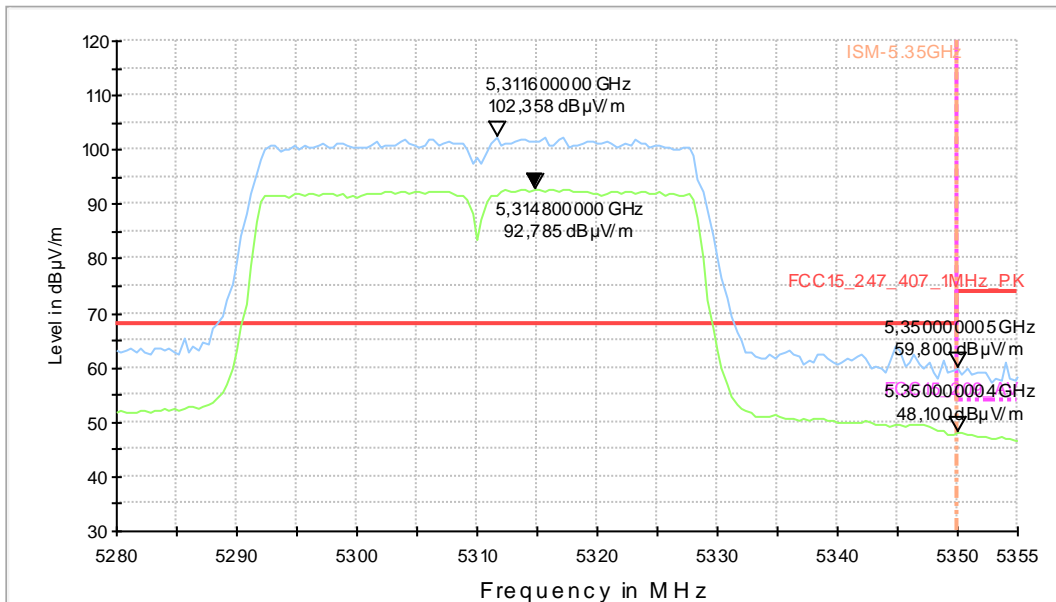
Plot 5: upper band edge, vertical & horizontal polarization (ac HT 20 mode), channel 140, MCS7



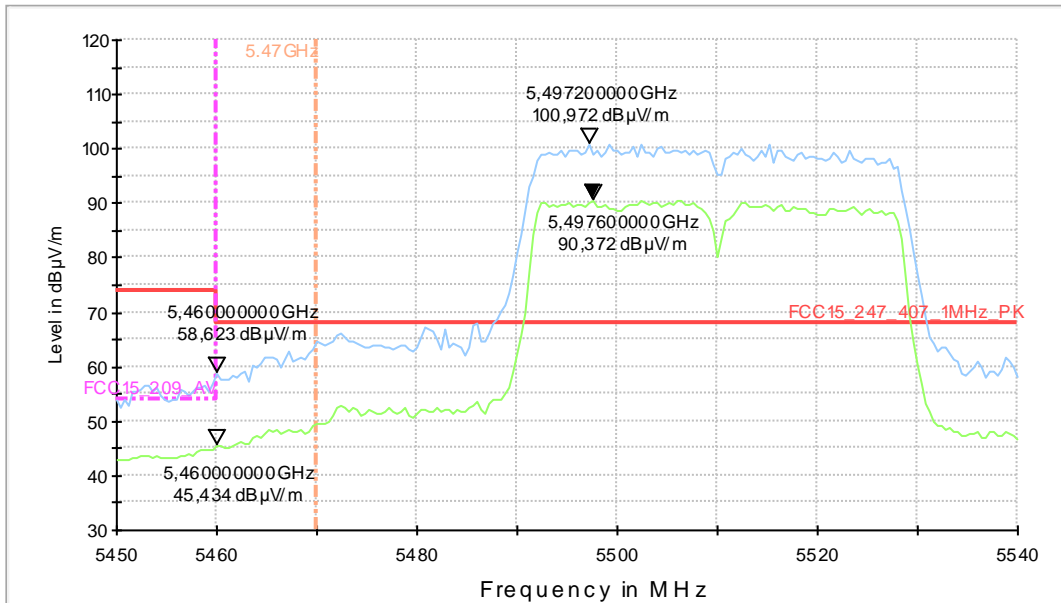
Plot 6: lower band edge, vertical & horizontal polarization (ac HT 40 mode), channel 38, MCS7



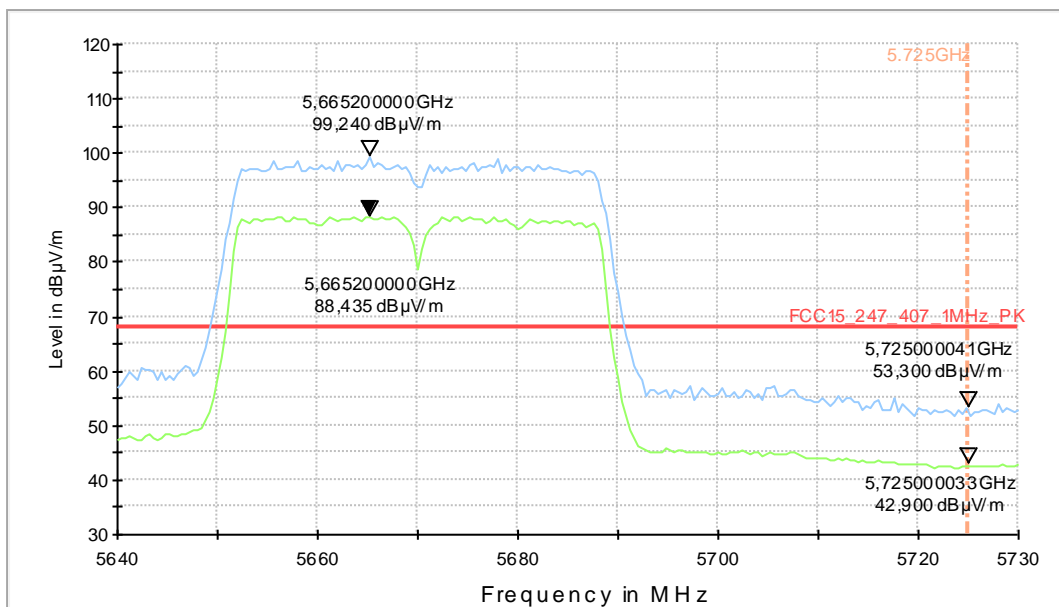
Plot 7: upper band edge, vertical & horizontal polarization (ac HT 40 mode), channel 62, MCS3



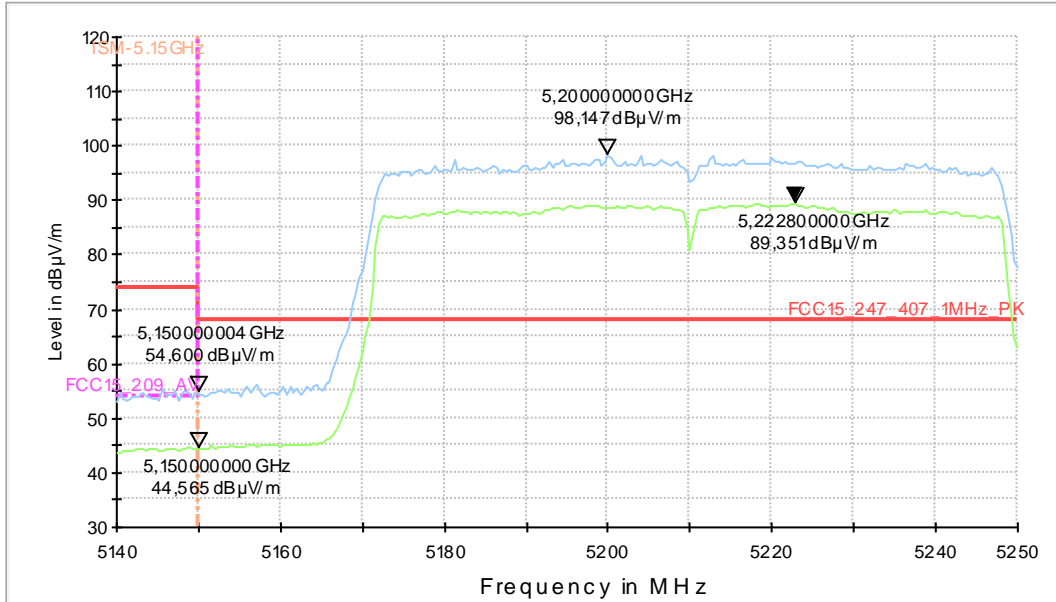
Plot 8: lower band edge, vertical & horizontal polarization (ac HT 40 mode), channel 102, MCS8



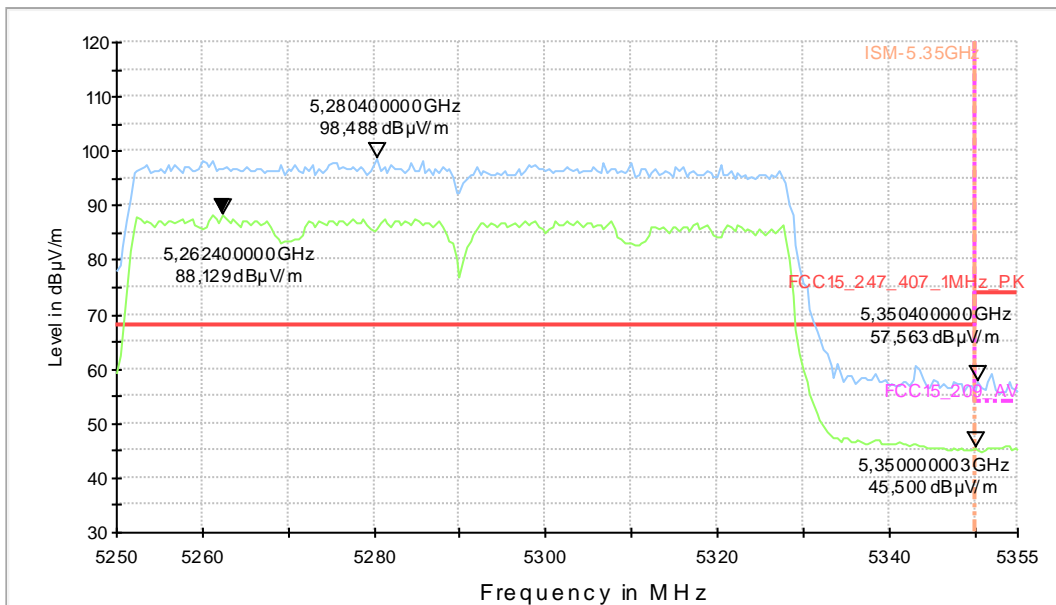
Plot 9: upper band edge, vertical & horizontal polarization (ac HT 40 mode), channel 134, MCS7



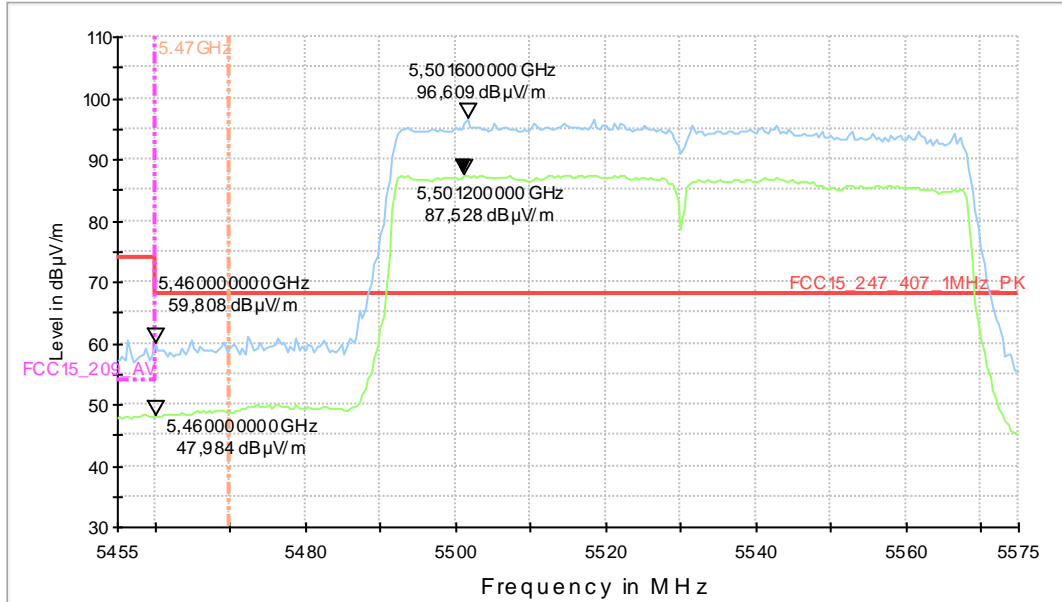
Plot 10: lower band edge, vertical & horizontal polarization (ac HT 80 mode), channel 42, MCS0



Plot 11: upper band edge, vertical & horizontal polarization (ac HT 80 mode), channel 58, MCS9



Plot 12: lower band edge, vertical & horizontal polarization (ac HT 80 mode), channel 106, MCS0



Result: Passed

10.9 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) Peak above 1 GHz / RMS |
| Sweep time: | Auto |
| Resolution bandwidth: | F < 1 GHz: 100 kHz F > 1 GHz: 1 MHz |
| Video bandwidth: | F < 1 GHz: 100 kHz F > 1 GHz: ≥ 3 MHz / 10 Hz |
| 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: OFDM / a – mode

| TX Spurious Emissions Radiated [dBµV/m] / dBm | | | | | | | | |
|---|----------|-------------------|--------------------|----------|-------------------|---------------------|----------|-------------------|
| OFDM a – mode | | | | | | | | |
| Lowest 5180 MHz | | | Middle 5200 MHz | | | 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. | | | No peaks found. | | |
| | | | | | | | | |
| | | | | | | | | |
| Measurement uncertainty | | | ± 3 dB | | | | | |

| TX Spurious Emissions Radiated [dBµV/m] / dBm | | | | | | | | |
|---|----------|-------------------|--------------------|----------|-------------------|---------------------|----------|-------------------|
| OFDM a – mode | | | | | | | | |
| Lowest 5260 MHz | | | Middle 5280 MHz | | | 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. | | | 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 5765 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 | | | | | |

Result: Passed

Results: OFDM / n – modeHT20

| TX Spurious Emissions Radiated [dBµV/m] / dBm | | | | | | | | |
|---|----------|-------------------|--------------------|----------|-------------------|---------------------|----------|-------------------|
| OFDM n – mode HT20 | | | | | | | | |
| Lowest 5180 MHz | | | Middle 5200 MHz | | | 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. | | | No peaks found. | | |
| | | | | | | | | |
| | | | | | | | | |
| Measurement uncertainty | | | ± 3 dB | | | | | |

| TX Spurious Emissions Radiated [dBµV/m] / dBm | | | | | | | | |
|---|----------|-------------------|--------------------|----------|-------------------|---------------------|----------|-------------------|
| OFDM n – mode HT20 | | | | | | | | |
| Lowest 5260 MHz | | | Middle 5280 MHz | | | 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. | | | No peaks found. | | |
| | | | | | | | | |
| | | | | | | | | |
| Measurement uncertainty | | | ± 3 dB | | | | | |

| TX Spurious Emissions Radiated [dBµV/m] / dBm | | | | | | | | |
|---|----------|-------------------|--------------------|----------|-------------------|---------------------|----------|-------------------|
| OFDM n – mode HT20 | | | | | | | | |
| 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 n – mode HT20 | | | | | | | | |
| Lowest 5745 MHz | | | Middle 5765 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 | | | | | |

Result: Passed

Results: OFDM / n – modeHT40

| TX Spurious Emissions Radiated [dB μ V/m] / dBm | | | | | | | | |
|---|----------|-------------------------|--------------------|----------|-------------------------|---------------------|----------|-------------------------|
| OFDM n – mode HT40 | | | | | | | | |
| Lowest 5190 MHz | | | Middle 5230 MHz | | | Highest 5270 MHz | | |
| F [MHz] | Detector | Level [dB μ V/m] | F [MHz] | Detector | Level [dB μ V/m] | F [MHz] | Detector | Level [dB μ V/m] |
| No peaks found. | | | No peaks found. | | | No peaks found. | | |
| | | | | | | | | |
| | | | | | | | | |
| Measurement uncertainty | | | ± 3 dB | | | | | |

| TX Spurious Emissions Radiated [dB μ V/m] / dBm | | | | | | | | |
|---|----------|-------------------------|--------------------|----------|-------------------------|---------------------|----------|-------------------------|
| OFDM n – mode HT40 | | | | | | | | |
| Lowest 5310 MHz | | | Middle 5510 MHz | | | Highest 5590 MHz | | |
| F [MHz] | Detector | Level [dB μ V/m] | F [MHz] | Detector | Level [dB μ V/m] | F [MHz] | Detector | Level [dB μ V/m] |
| No peaks found. | | | No peaks found. | | | No peaks found. | | |
| | | | | | | | | |
| | | | | | | | | |
| Measurement uncertainty | | | ± 3 dB | | | | | |

| TX Spurious Emissions Radiated [dB μ V/m] / dBm | | | | | | | | |
|---|----------|-------------------------|--------------------|----------|-------------------------|---------------------|----------|-------------------------|
| OFDM n – mode HT40 | | | | | | | | |
| Lowest 5670 MHz | | | Middle 5765 MHz | | | Highest 5795 MHz | | |
| F [MHz] | Detector | Level [dB μ V/m] | F [MHz] | Detector | Level [dB μ V/m] | F [MHz] | Detector | Level [dB μ V/m] |
| No peaks found. | | | No peaks found. | | | No peaks found. | | |
| | | | | | | | | |
| | | | | | | | | |
| Measurement uncertainty | | | ± 3 dB | | | | | |

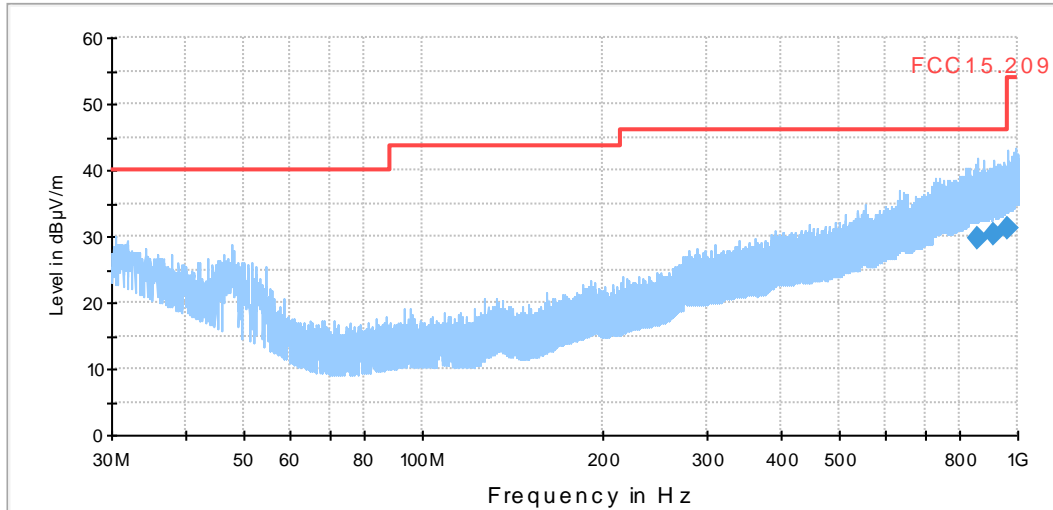
Result: Passed

Note:

Plots are added to show the behaviour of the EUT.

Plots: OFDM / a – mode

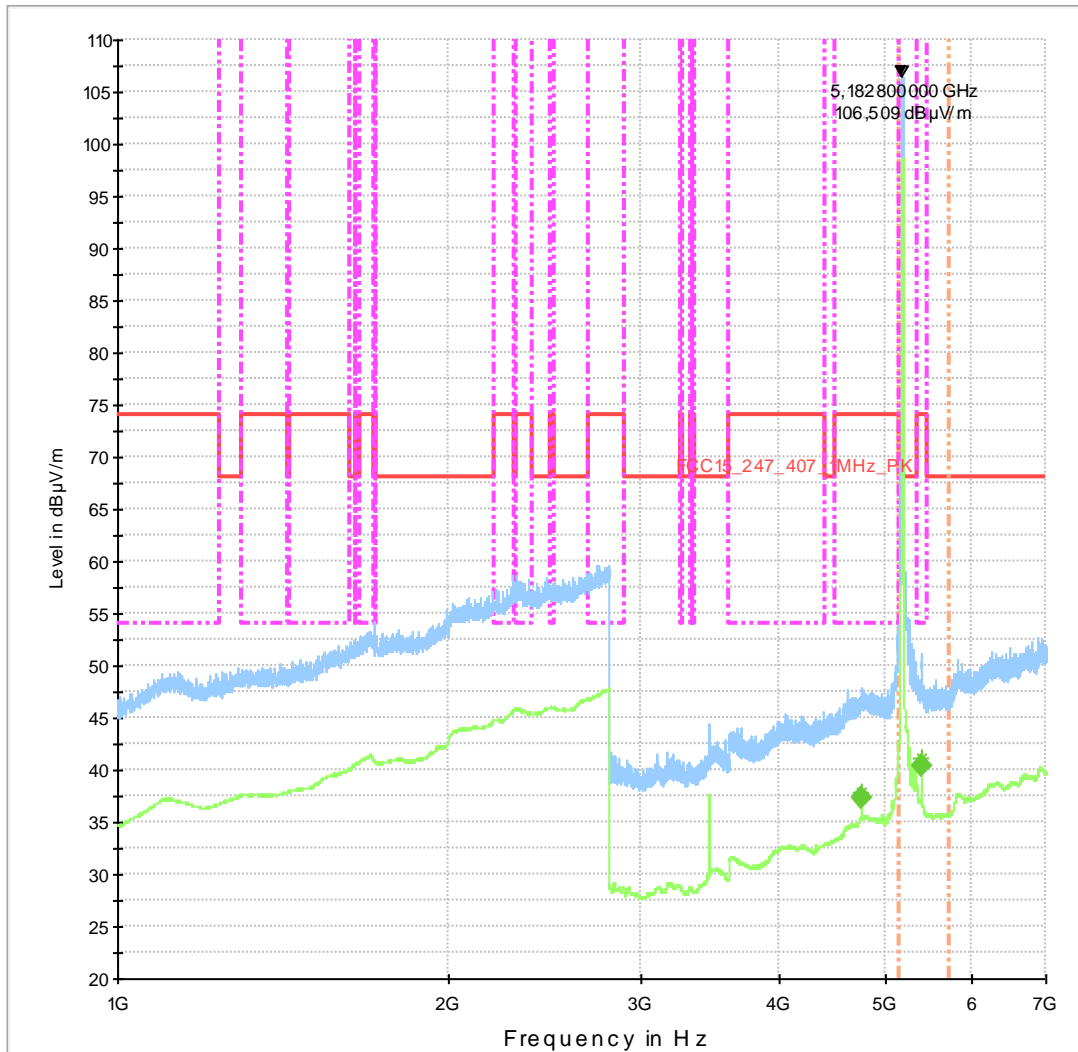
Plot 1: 30 MHz to 1 GHz, channel 36, 5180 MHz, 6Mbps, vertical & horizontal polarization
01_FCC15.209_hor+vert_kipp



Final Result 1

| Frequency (MHz) | QuasiPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Elevation (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) |
|-----------------|--------------------|-----------------|-----------------|-------------|--------------|---------------|-----------------|------------|-------------|----------------|
| 857.010000 | 29.7 | 1000.0 | 120.000 | 217.0 | V | 0.0 | 0.0 | 26.2 | 16.30 | 46.00 |
| 914.080000 | 30.4 | 1000.0 | 120.000 | 157.0 | V | 16.0 | 90.0 | 27.3 | 15.60 | 46.00 |
| 963.030000 | 31.3 | 1000.0 | 120.000 | 192.0 | H | 247.0 | 90.0 | 27.5 | 22.70 | 54.00 |

Plot 2: 1 GHz to 7GHz, channel 36, 5180 MHz, 6Mbps, vertical & horizontal polarization
00431_SM1_KP1_W LAN_FCC15407



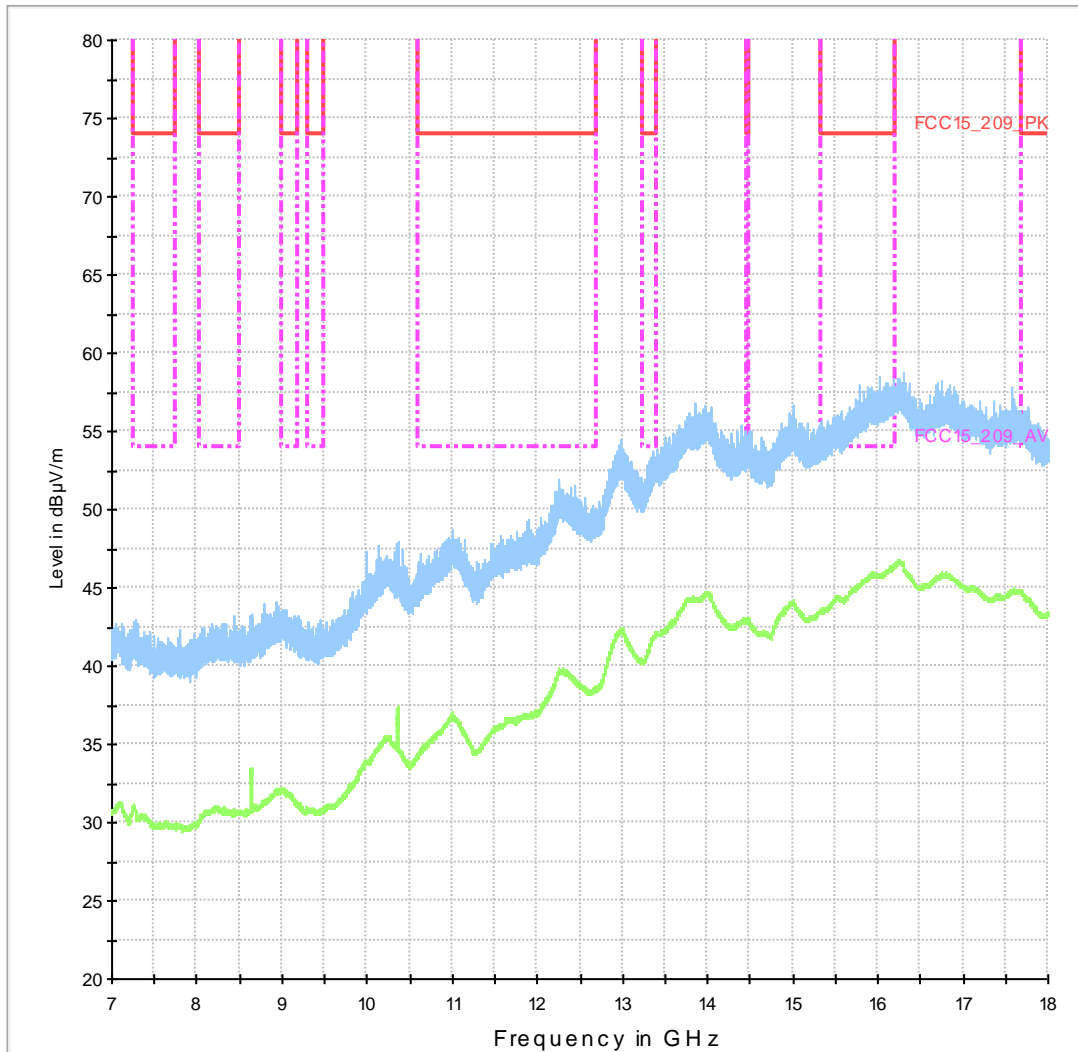
Final Result 2

| Frequency (MHz) | RMS (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Elevation (deg) | Corr. (dB) | Margin (dB) |
|-----------------|--------------|-----------------|-----------------|-------------|--------------|---------------|-----------------|------------|-------------|
| 4748.500000 | 37.3 | 100.0 | 1000.000 | 155.0 | V | 85.0 | 90.0 | 4.7 | 16.7 |
| 5388.500000 | 40.3 | 100.0 | 1000.000 | 155.0 | H | 89.0 | 0.0 | 5.7 | 13.7 |

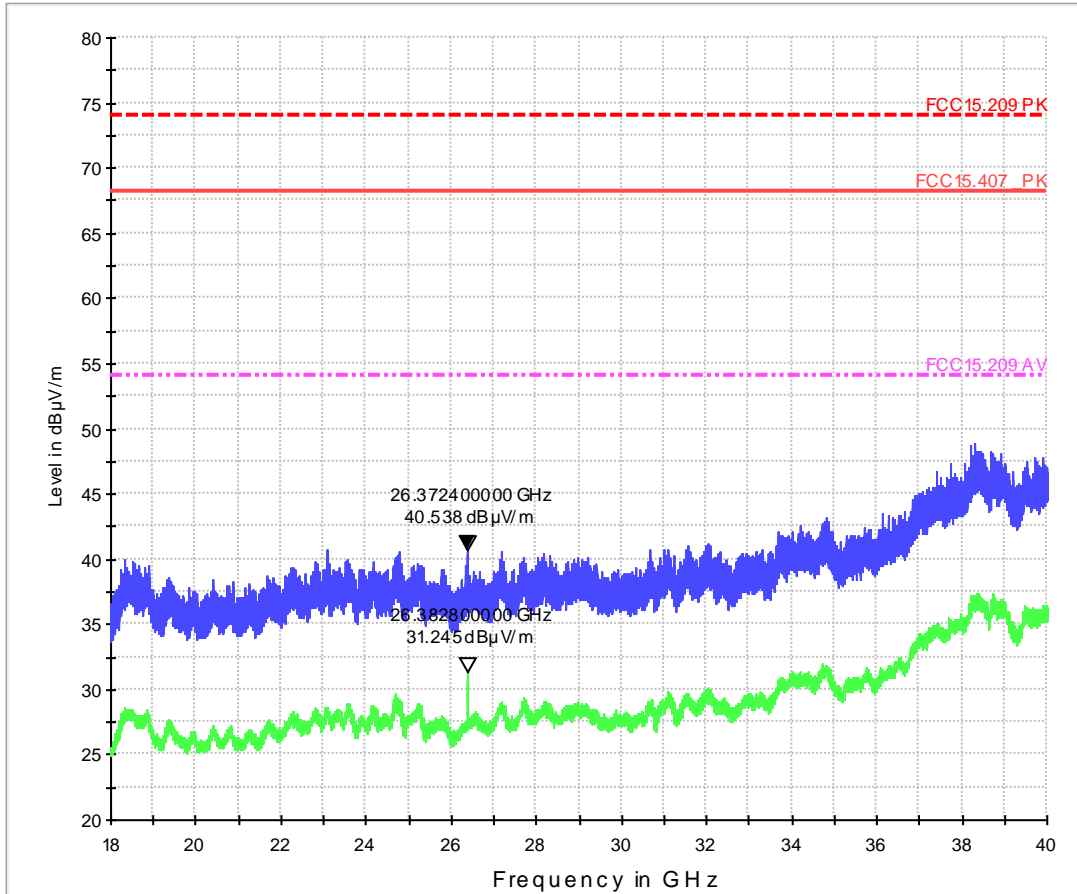
(continuation of the "Final Result 2" table from column 10 ...)

| Frequency (MHz) | Limit (dBµV/m) | Comment |
|-----------------|----------------|---------|
| 4748.500000 | 54.0 | |
| 5388.500000 | 54.0 | |

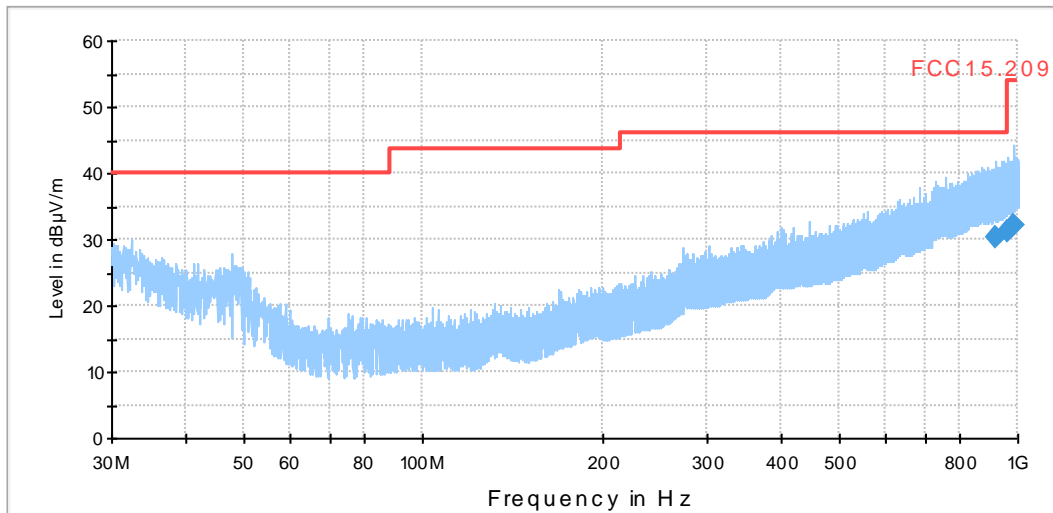
Plot 3: 7 GHz to 18 GHz, channel 36, 5180 MHz, 6Mbps, vertical & horizontal polarization
Sweep2_SM1_KP1_W LAN_FCC15247



Plot 4: 18 GHz to 40 GHz, channel 36, 5180 MHz, 6Mbps, vertical & horizontal polarization
EMI Scan_18_40GHz_Pre



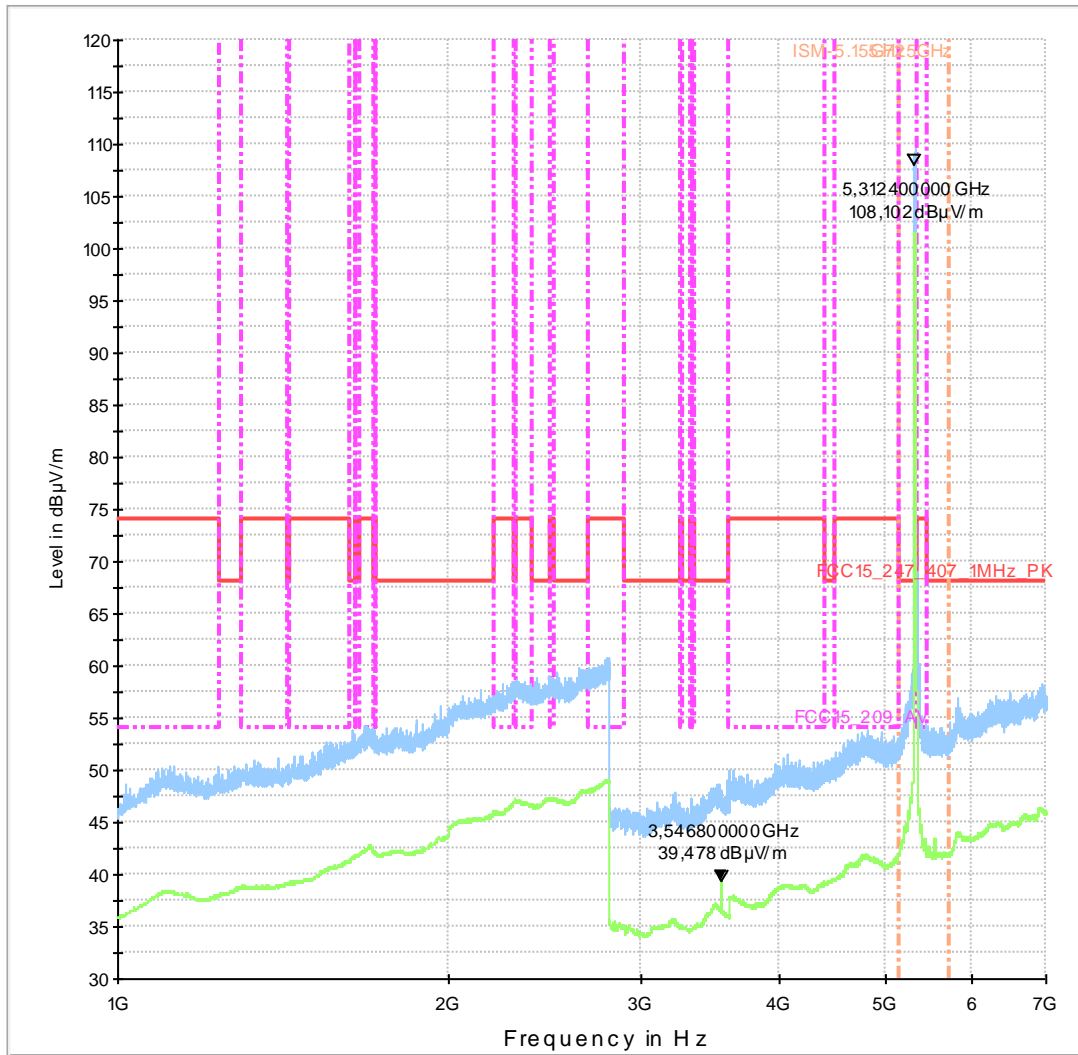
Plot 5: 30 MHz to 1 GHz, channel 64, 5320 MHz, 6Mbps, vertical & horizontal polarization
01_FCC15.209_hor+vert_kipp



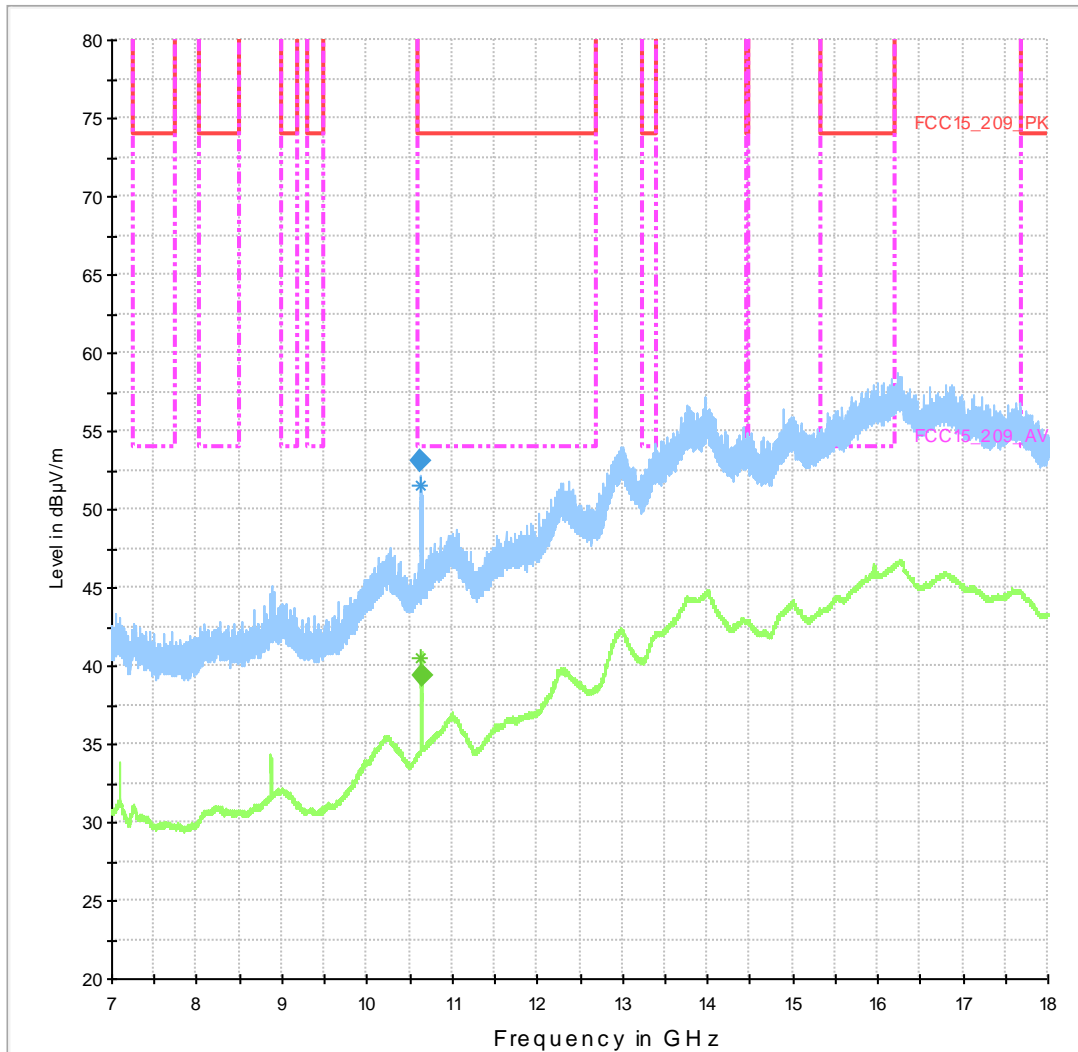
Final Result 1

| Frequency (MHz) | QuasiPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Elevation (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) |
|-----------------|--------------------|-----------------|-----------------|-------------|--------------|---------------|-----------------|------------|-------------|----------------|
| 919.740000 | 30.2 | 1000.0 | 120.000 | 182.0 | H | 48.0 | 90.0 | 27.1 | 15.80 | 46.00 |
| 962.670000 | 31.3 | 1000.0 | 120.000 | 291.0 | V | 352.0 | 90.0 | 27.5 | 22.70 | 54.00 |
| 984.130000 | 32.1 | 1000.0 | 120.000 | 165.0 | V | 188.0 | 0.0 | 27.8 | 21.90 | 54.00 |

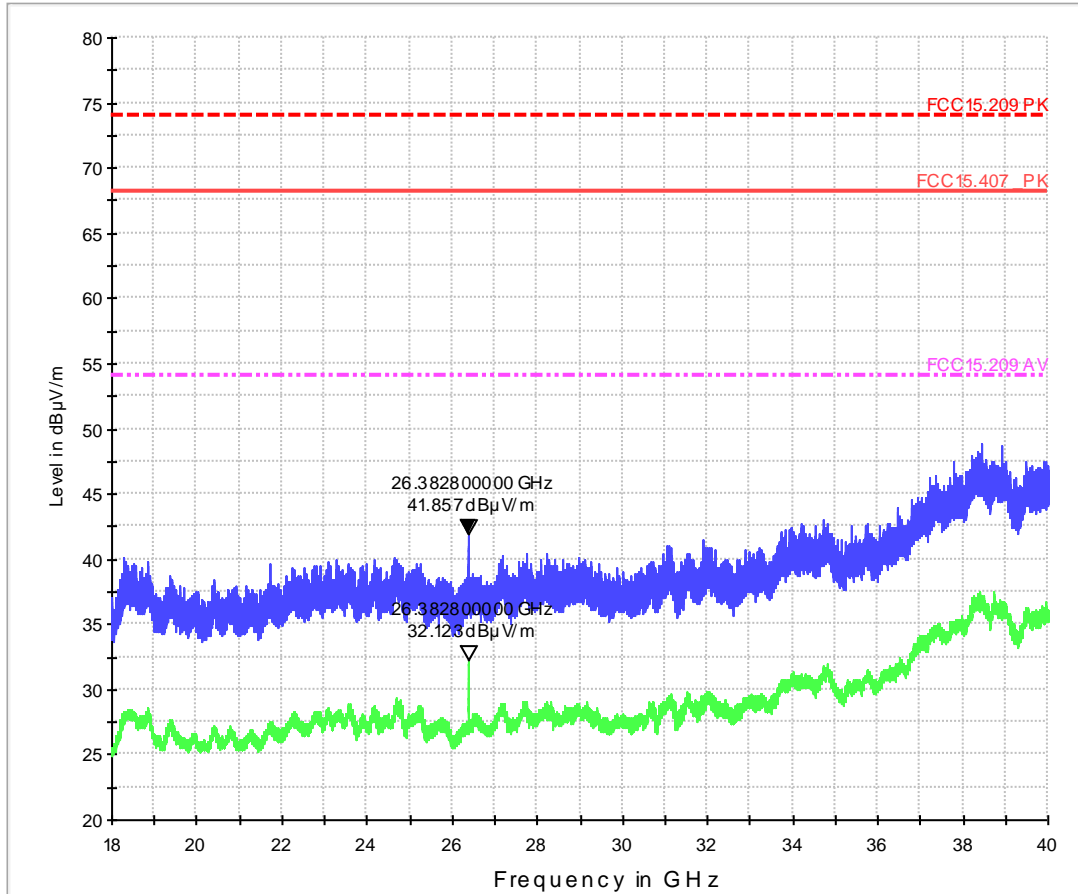
Plot 6: 1 GHz to 7 GHz, 5320 MHz, channel 64, 6Mbps, vertical & horizontal polarization
00431_Sweep1_SM1_KP1_W LAN_FCC15407



Plot 7: 7 GHz to 18 GHz, channel 64, 5320 MHz, 6Mbps, vertical & horizontal polarization
Sweep2_SM1_KP1_W LAN_FCC15247

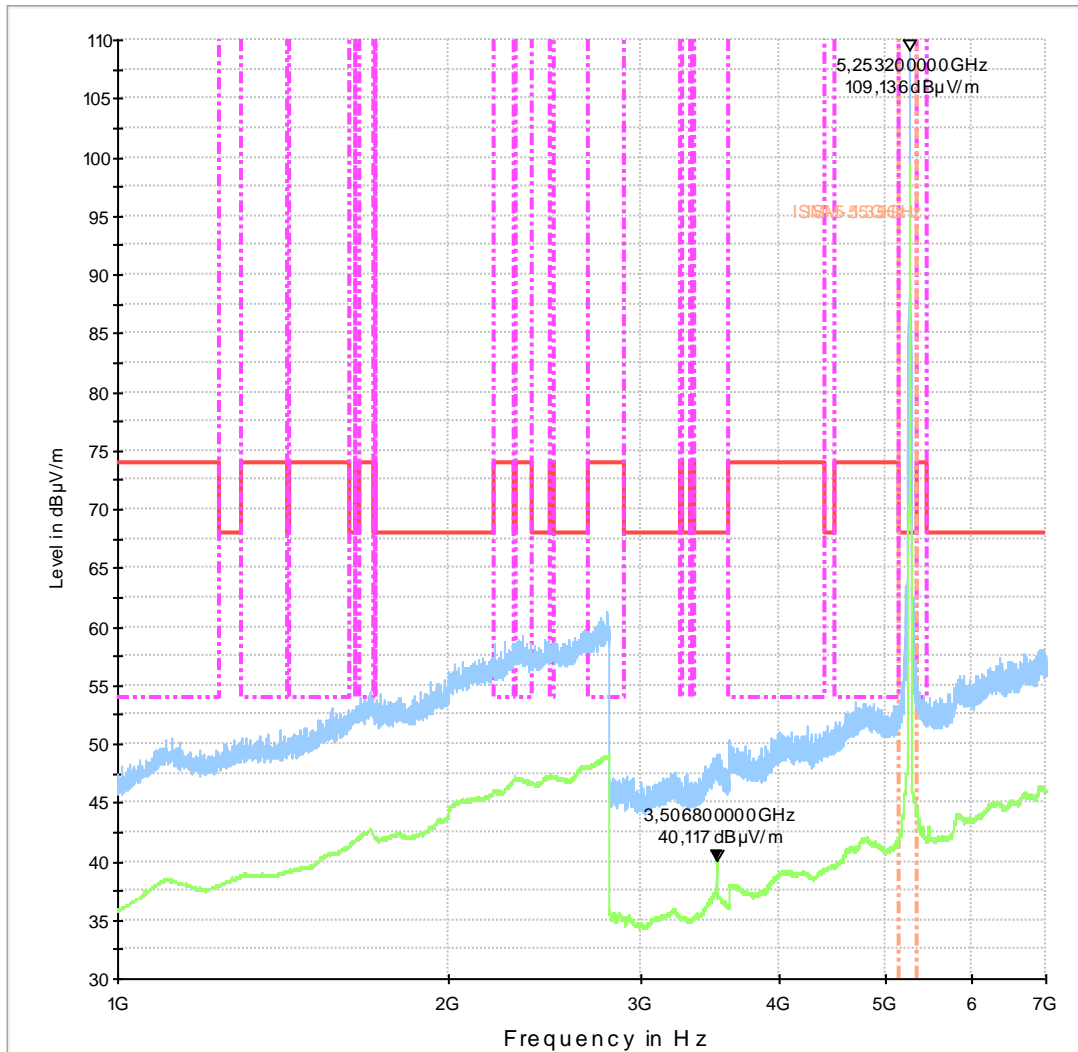


Plot 8: 18 GHz to 40 GHz, channel 64, 5320 MHz, 6Mbps, vertical & horizontal polarization
EMI Scan_18_40GHz_Pre

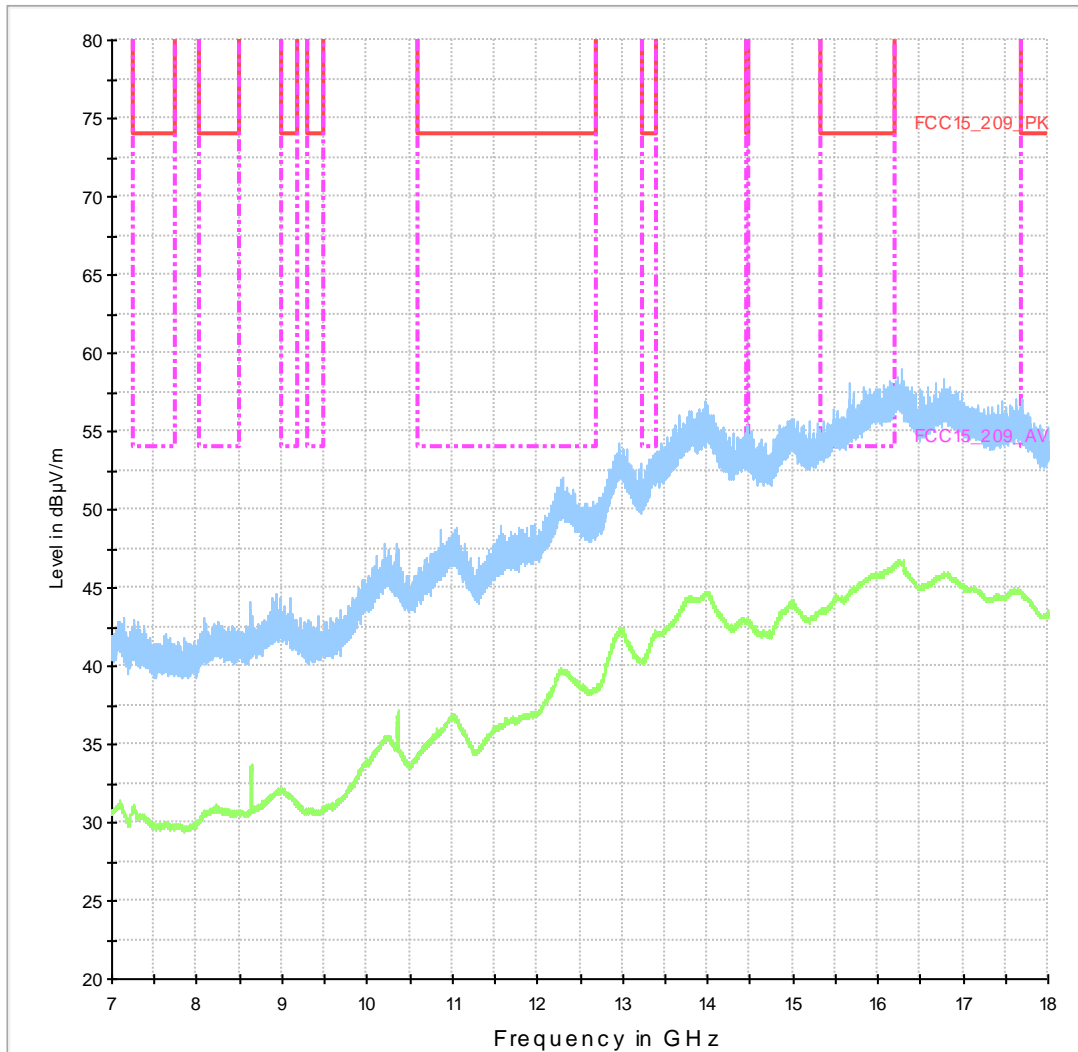


Plots: OFDM / ac – mode HT20

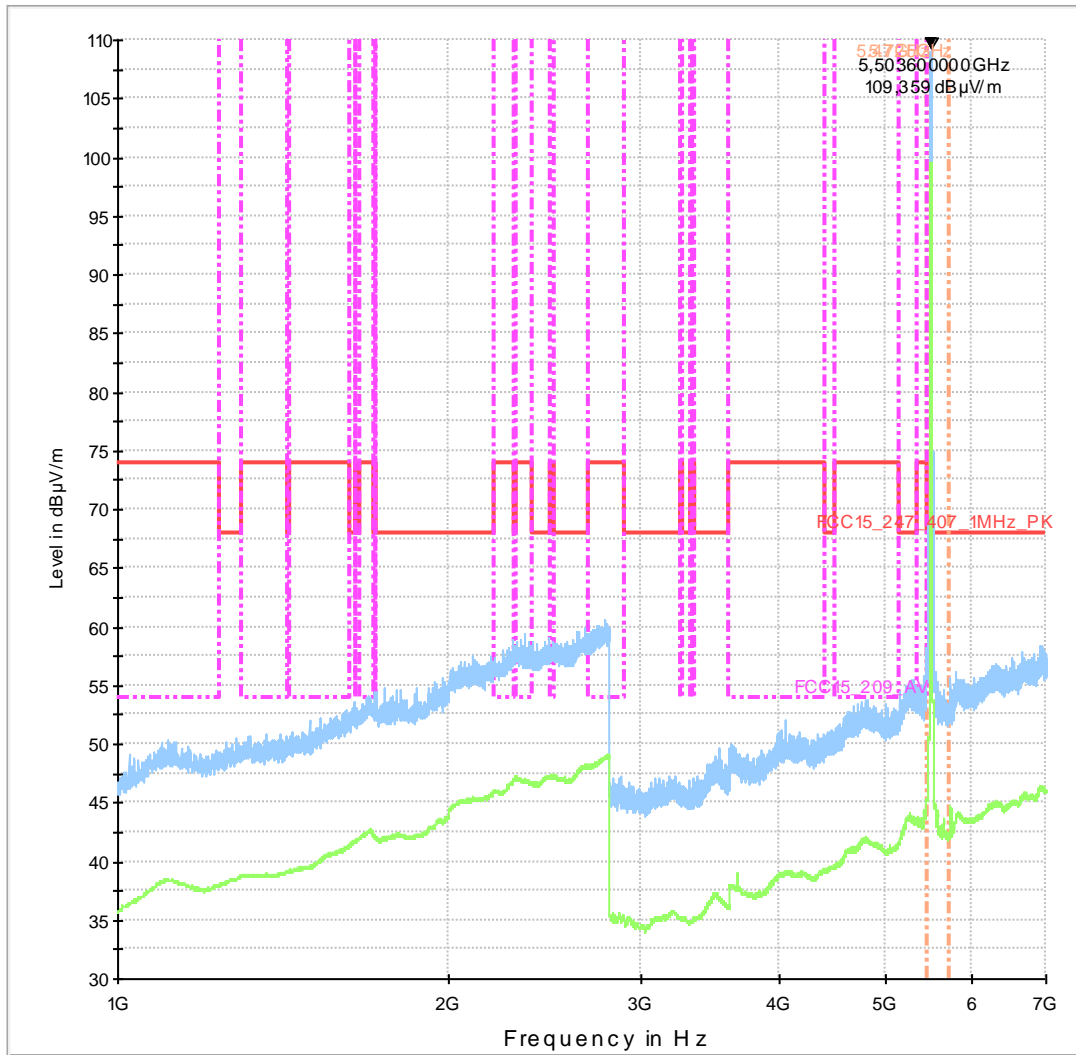
Plot 1: 1 GHz to 7 GHz, channel 52 ,5260 MHz, MCS6, vertical & horizontal polarization
00431_Sweep1_SM1_KP1_W LAN_FCC15407(b)(2)



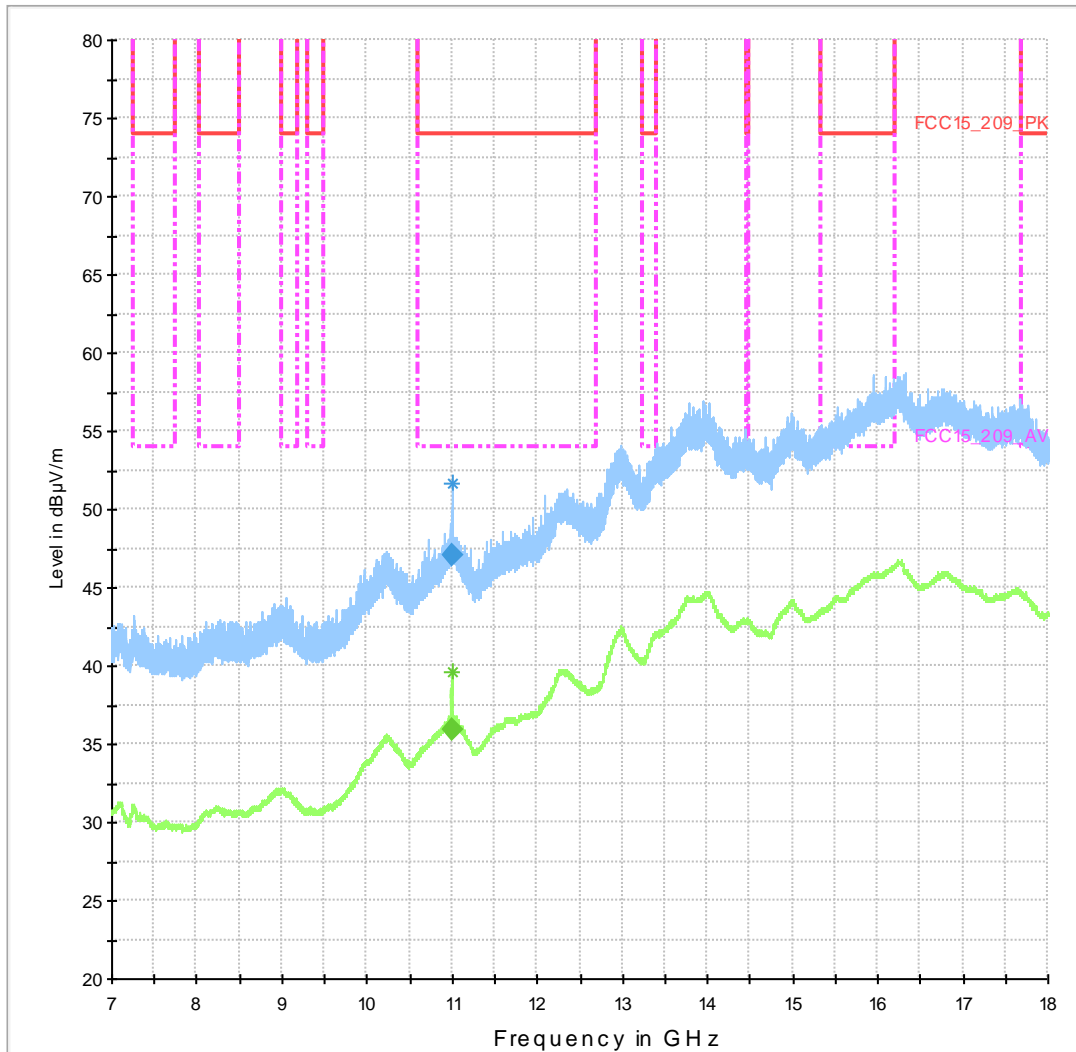
Plot 2: 7 GHz to 18 GHz, channel 52 ,5260 MHz, MCS6, vertical & horizontal polarization
Sweep2_SM1_KP1_W LAN_FCC15247



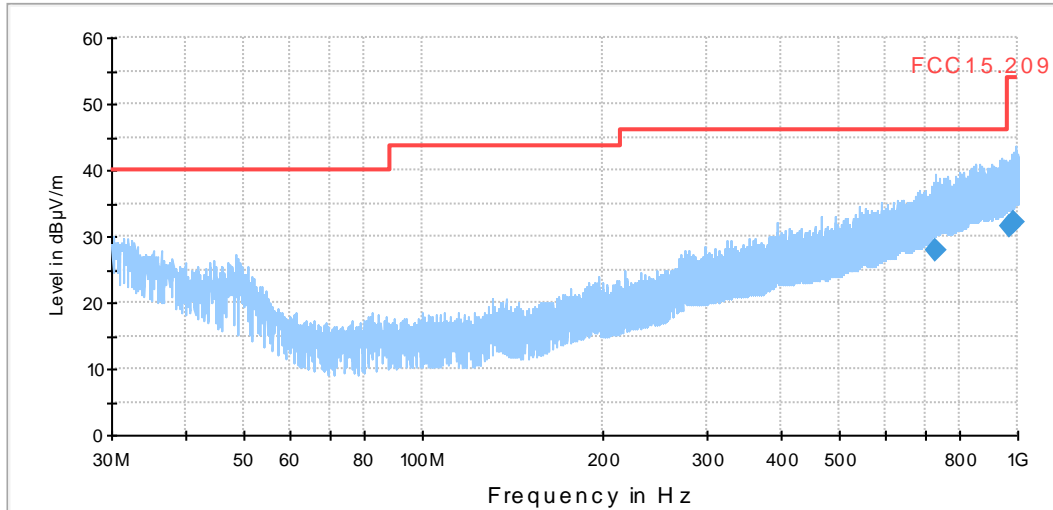
Plot 3: 1 GHz to 7 GHz, channel 100, 5500 MHz, MCS6, vertical & horizontal polarization
00431_Sweep1_SM1_KP1_W LAN_FCC15407(b)(3)



Plot 4: 7 GHz to 18 GHz, channel 100, 5500 MHz, MCS6, vertical & horizontal polarization
Sweep2_SM1_KP1_W LAN_FCC15247



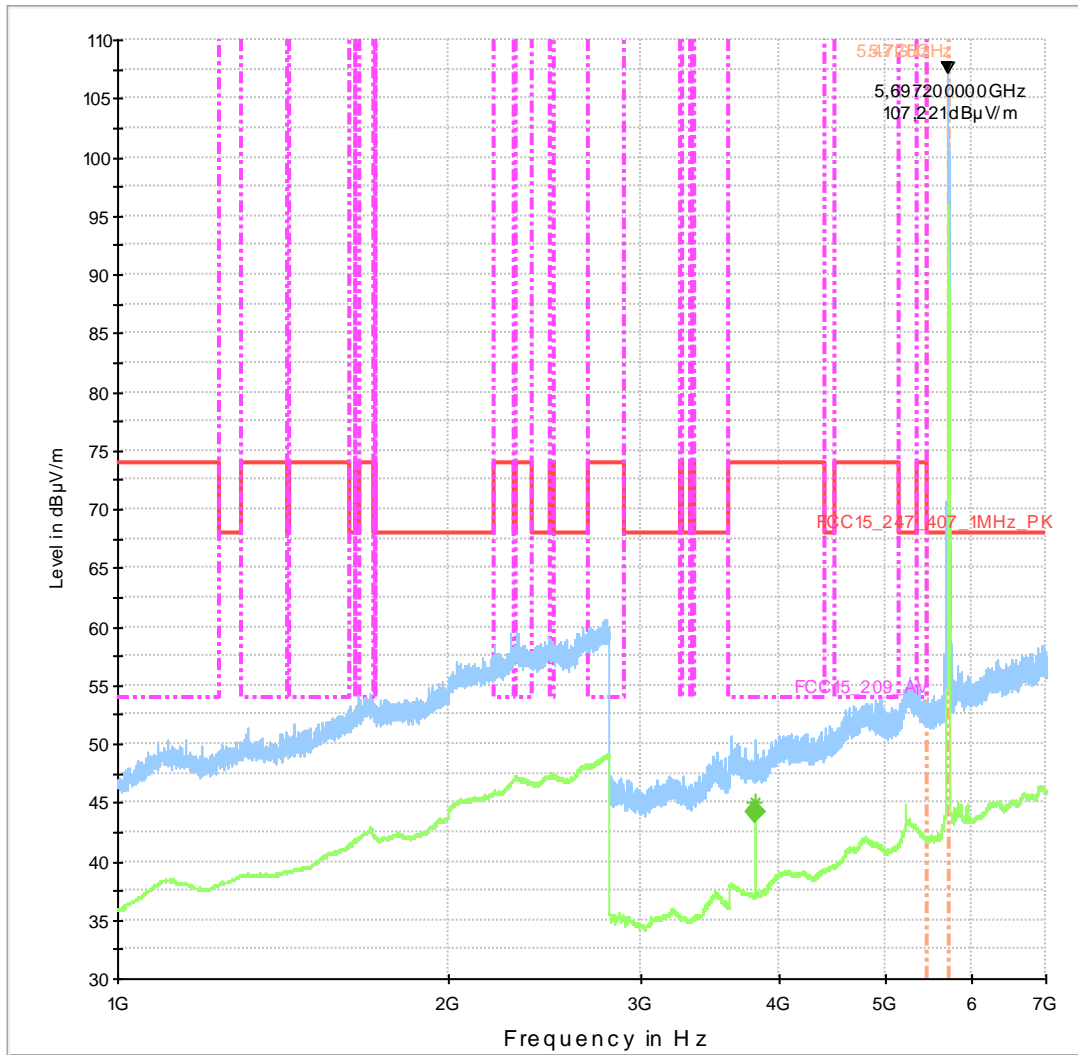
Plot 5: 30 MHz to 1 GHz, channel 140, 5700 MHz, MCS7, vertical & horizontal polarization
01_FCC15.209_hor+vert_kipp



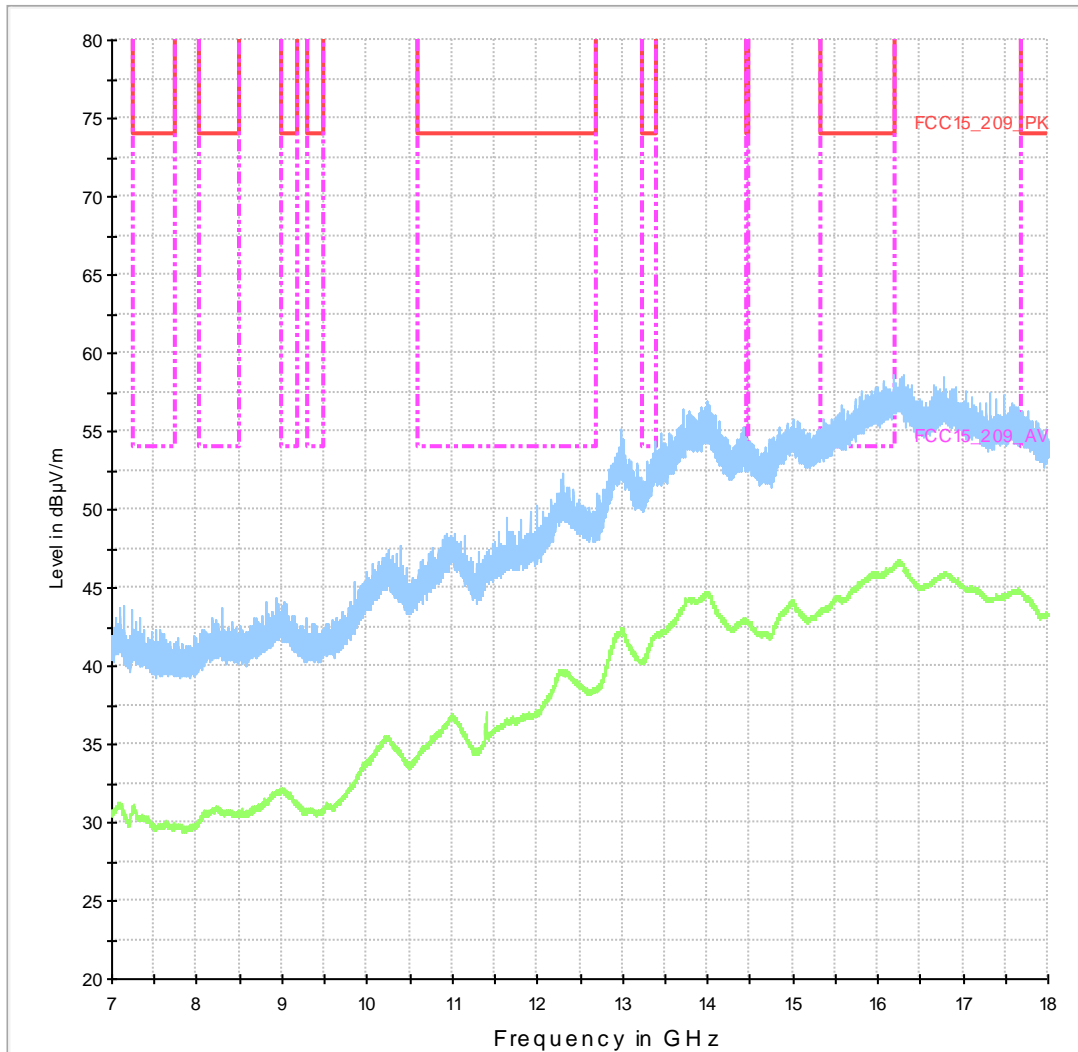
Final Result 1

| Frequency (MHz) | QuasiPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Elevation (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) |
|-----------------|--------------------|-----------------|-----------------|-------------|--------------|---------------|-----------------|------------|-------------|----------------|
| 727.450000 | 27.9 | 1000.0 | 120.000 | 284.0 | H | 84.0 | 90.0 | 24.3 | 18.10 | 46.00 |
| 973.100000 | 31.5 | 1000.0 | 120.000 | 198.0 | V | 0.0 | 0.0 | 27.7 | 22.50 | 54.00 |
| 987.560000 | 32.3 | 1000.0 | 120.000 | 259.0 | V | 335.0 | 90.0 | 27.9 | 21.70 | 54.00 |

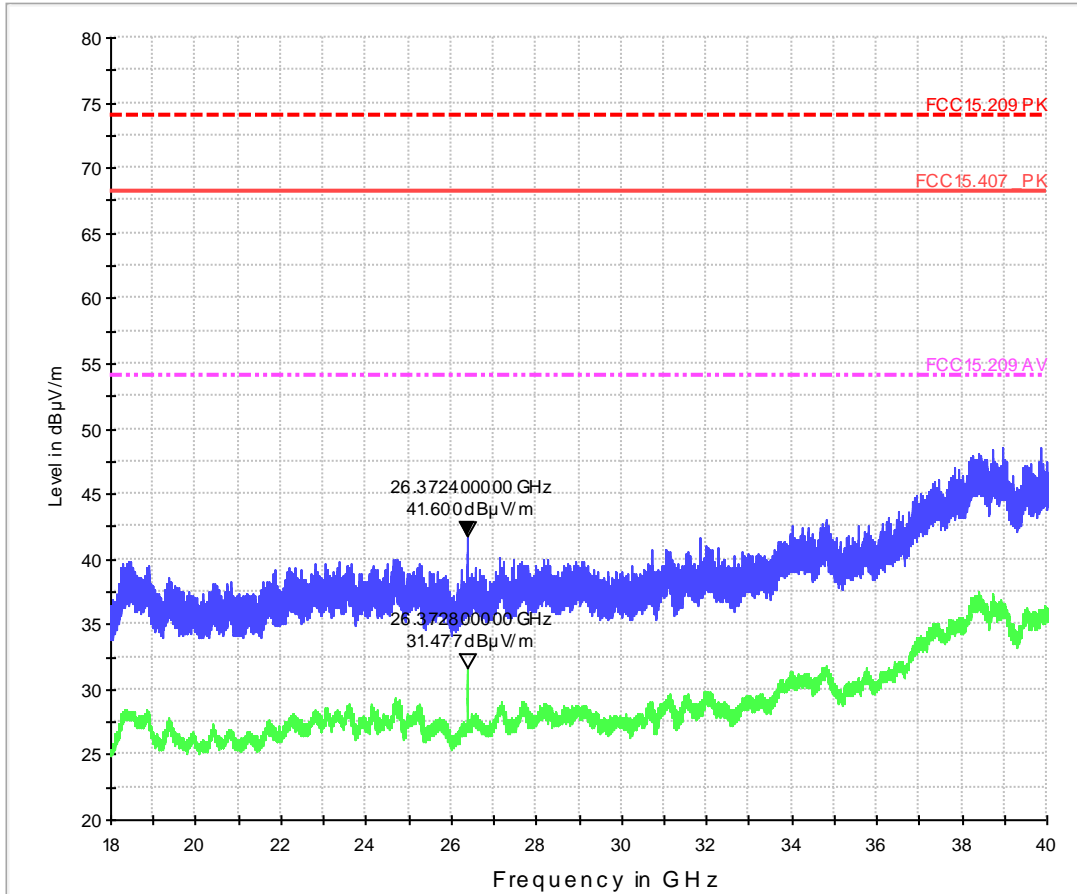
Plot 6: 1 GHz to 7 GHz, channel 140, 5700 MHz, MCS7, vertical & horizontal polarization
00431_Sweep1_SM1_KP1_W LAN_FCC15407(b)(3)



Plot 7: 7 GHz to 18 GHz, channel 140, 5700 MHz, MCS7, vertical & horizontal polarization
Sweep2_SM1_KP1_W LAN_FCC15247

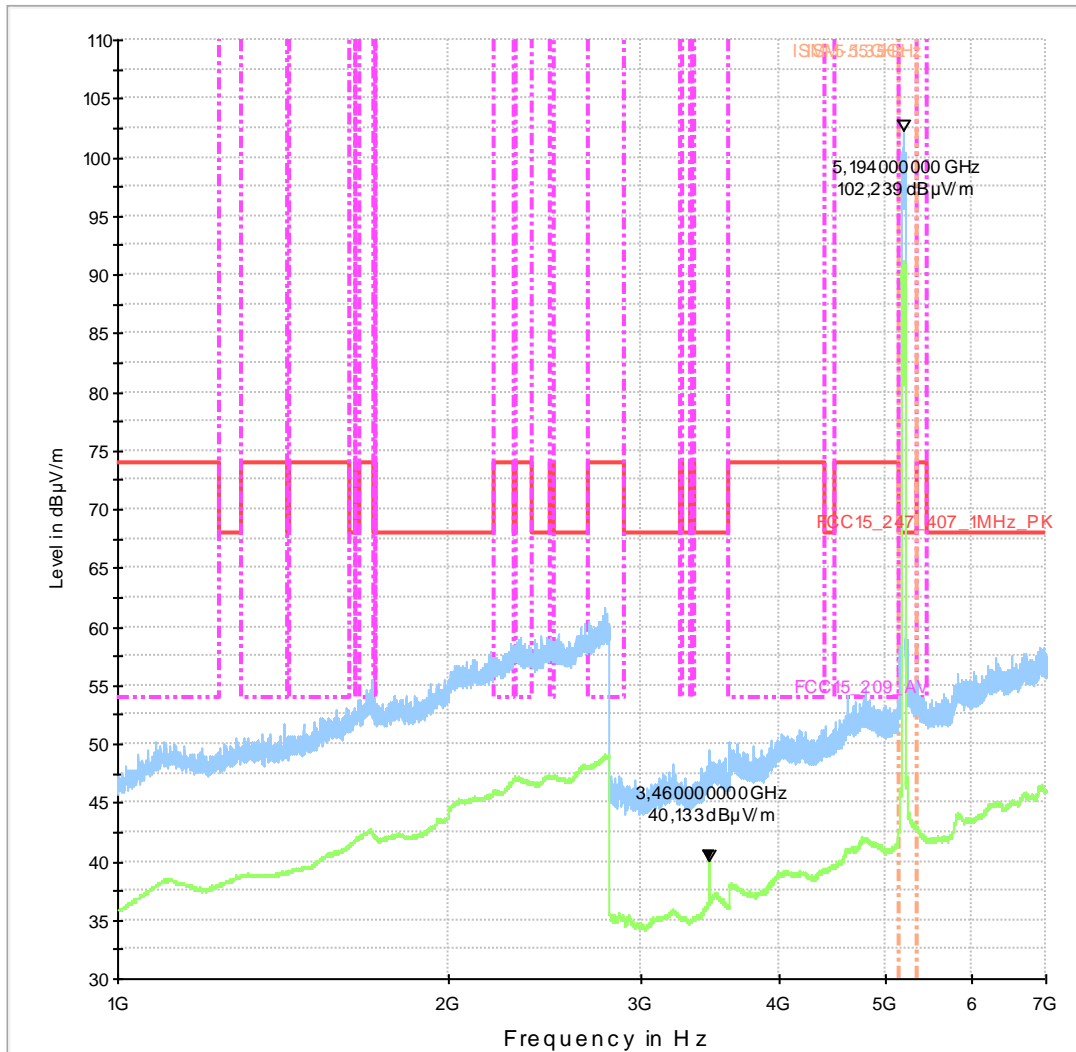


Plot 8: 18 GHz to 40 GHz, channel 140, 5700 MHz, MCS7, vertical & horizontal polarization
EMI Scan_18_40GHz_Pre

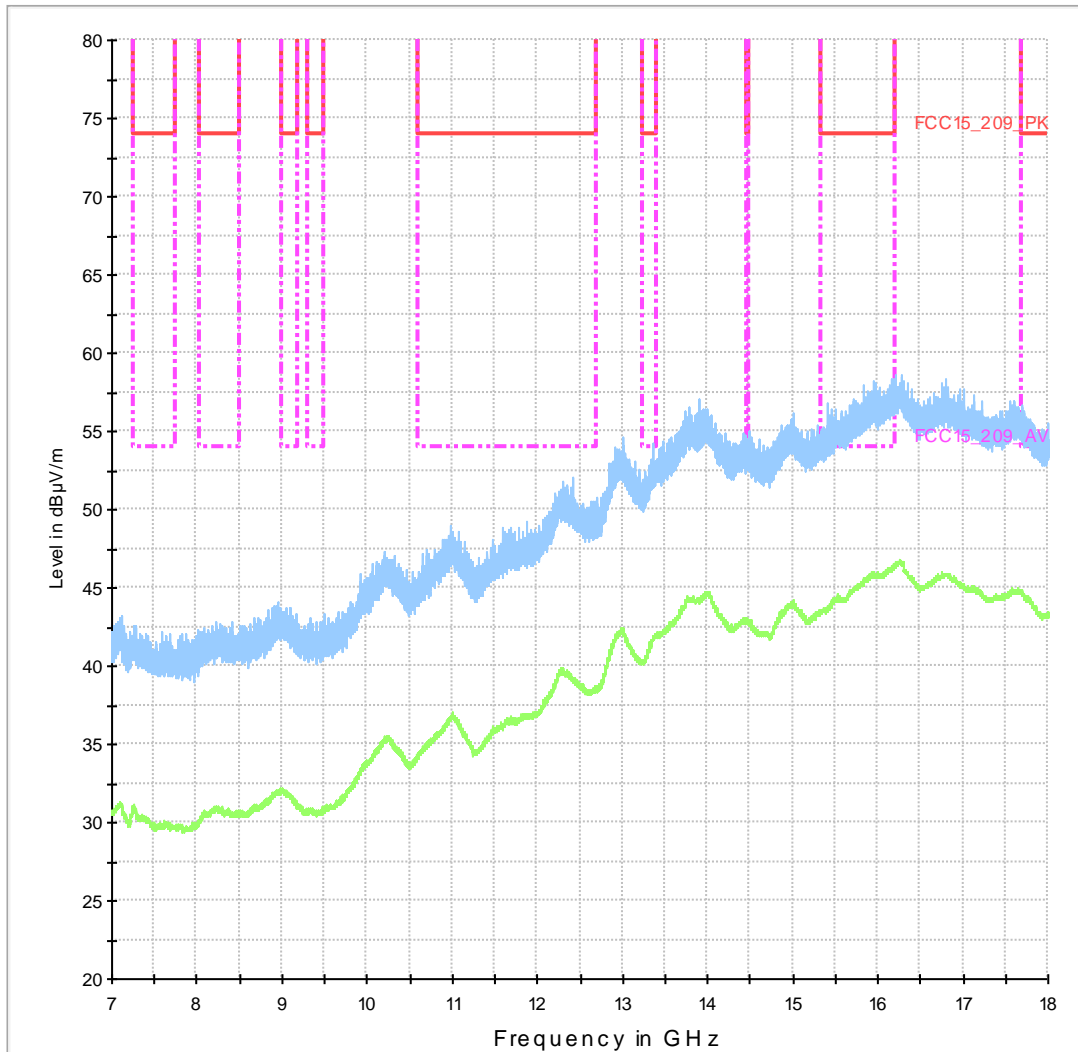


Plots: OFDM / ac – mode HT40

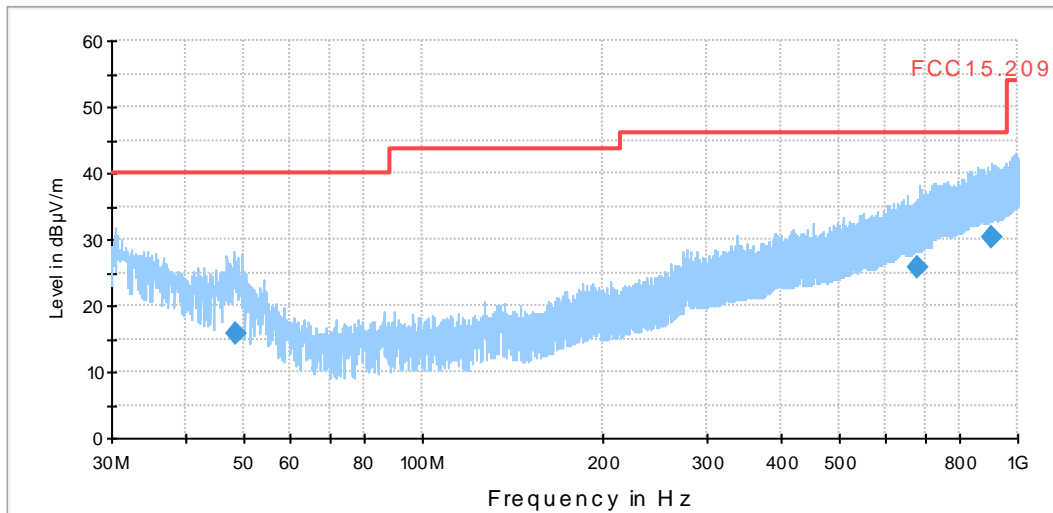
Plot 1: 1 GHz to 7 GHz, channel 38, 5190 MHz, MCS7, vertical & horizontal polarization
00431_Sweep1_SM1_KP1_W LAN_FCC15407(b)(1)



Plot 2: 7 GHz to 18 GHz, channel 38, 5190 MHz, MCS7, vertical & horizontal polarization
Sweep2_SM1_KP1_W LAN_FCC15247



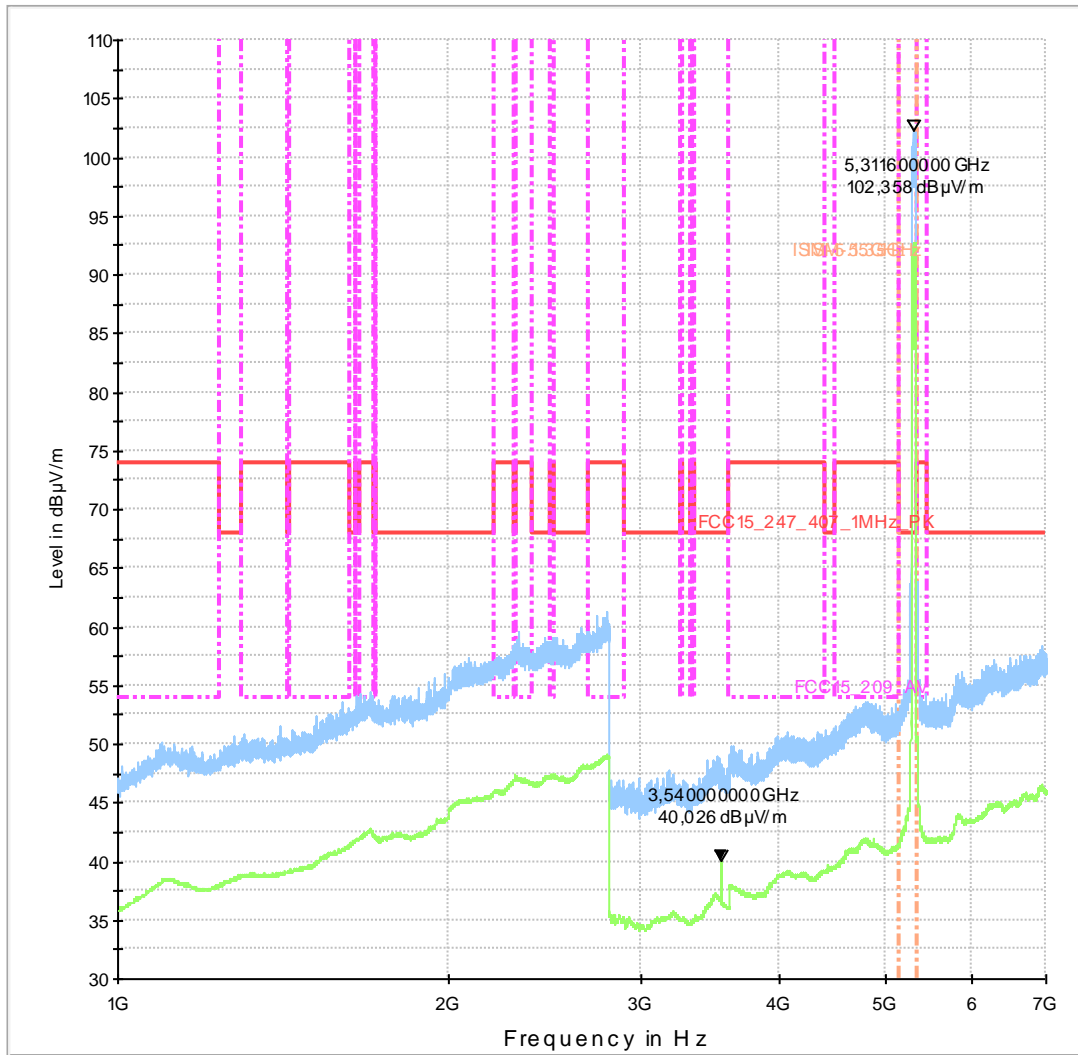
Plot 3: 30 MHz to 1 GHz, channel 62, 5310 MHz, MCS3, vertical & horizontal polarization
01_FCC15.209_hor+vert_kipp



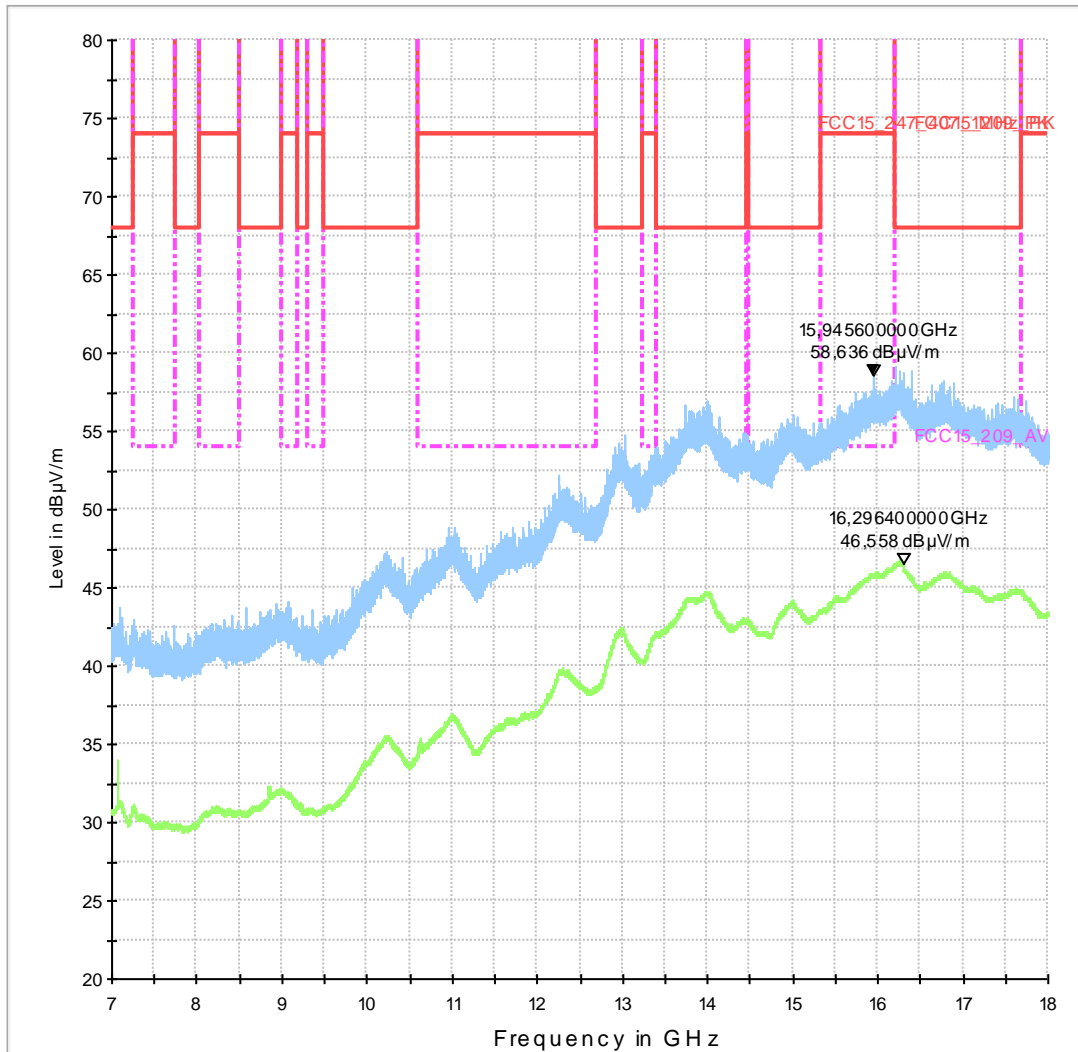
Final Result 1

| Frequency (MHz) | QuasiPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Elevation (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) |
|-----------------|--------------------|-----------------|-----------------|-------------|--------------|---------------|-----------------|------------|-------------|----------------|
| 48.580000 | 15.7 | 1000.0 | 120.000 | 227.0 | V | 305.0 | 90.0 | 14.1 | 24.30 | 40.00 |
| 680.580000 | 25.7 | 1000.0 | 120.000 | 116.0 | V | 0.0 | 90.0 | 23.5 | 20.30 | 46.00 |
| 907.200000 | 30.3 | 1000.0 | 120.000 | 225.0 | H | 182.0 | 0.0 | 27.1 | 15.70 | 46.00 |

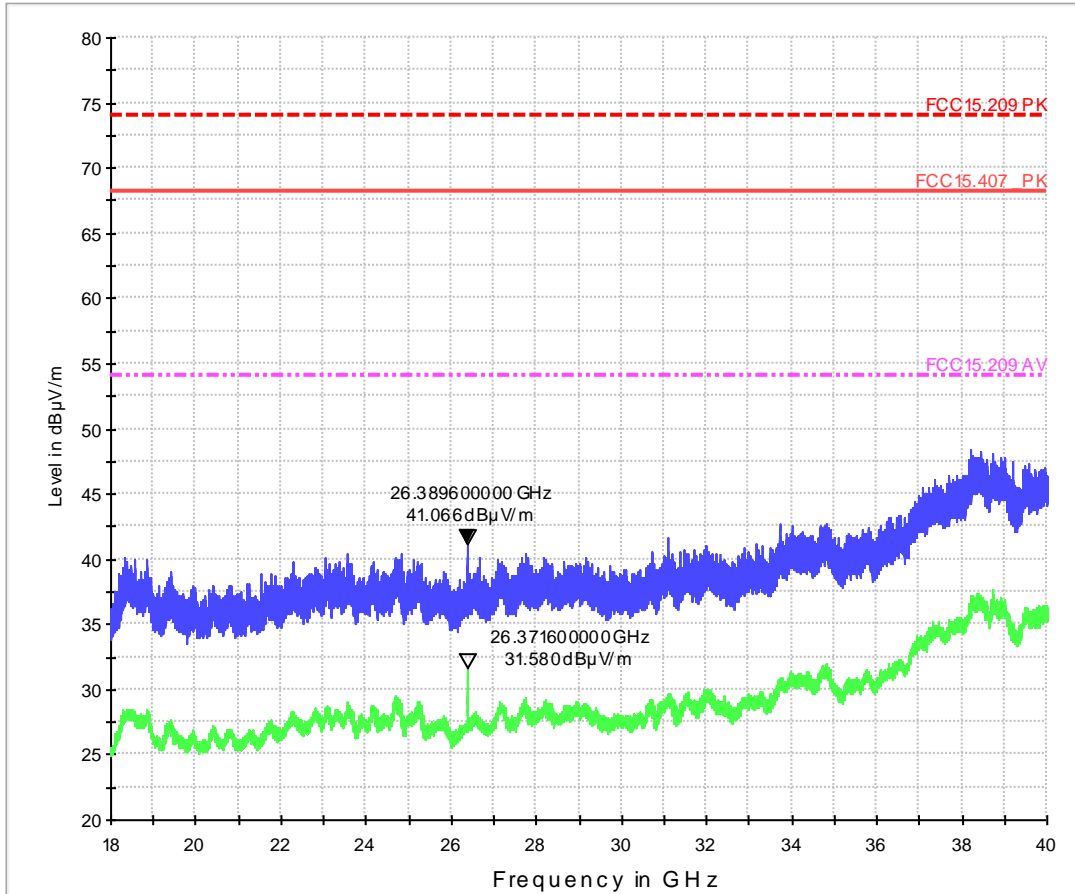
Plot 4: 1 GHz to 7 GHz, channel 62, 5310 MHz, MCS3, vertical & horizontal polarization
00431_Sweep1_SM1_KP1_W LAN_FCC15407(b)(2)



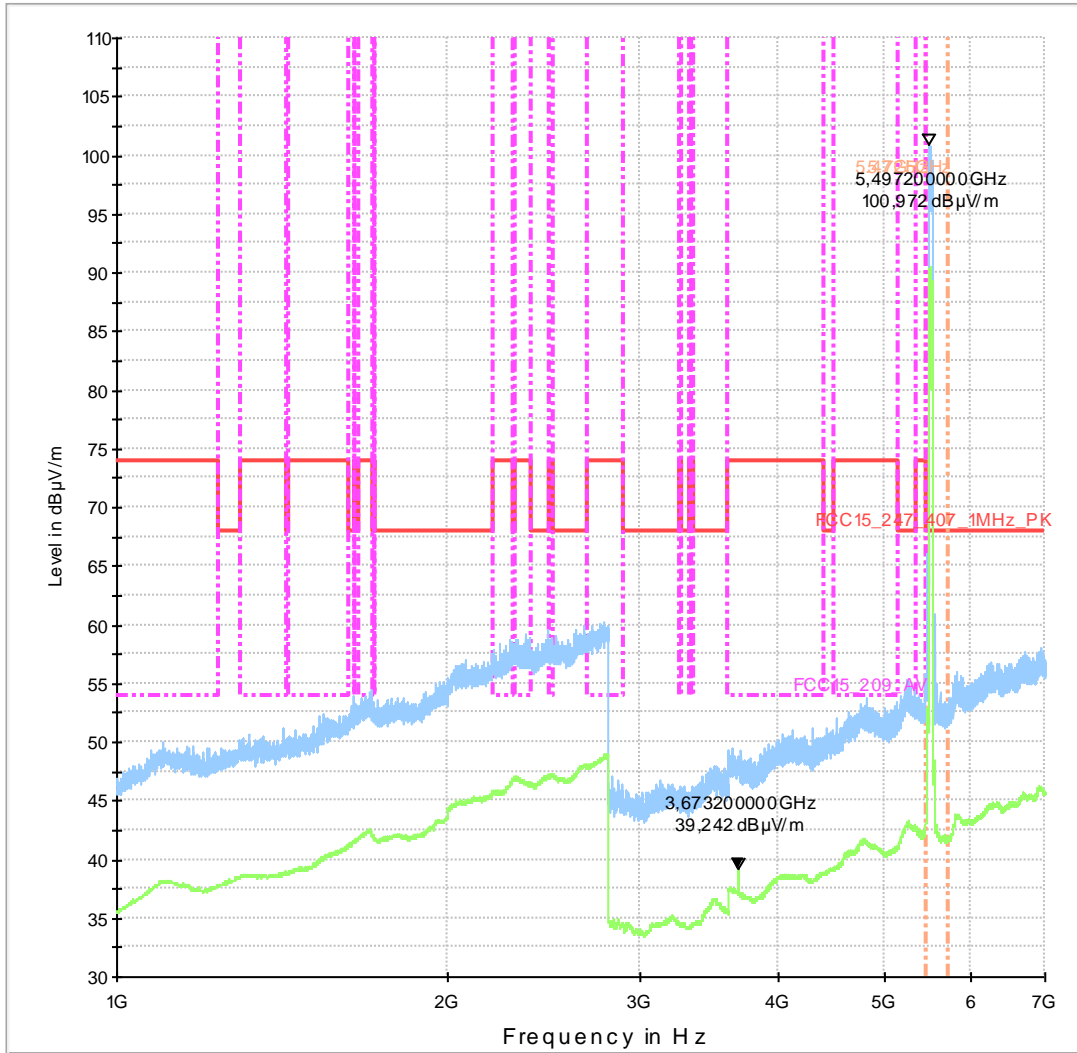
Plot 5: 7 GHz to 18 GHz, channel 62, 5310 MHz, MCS3, vertical & horizontal polarization
Sweep2_SM1_KP1_W LAN_FCC15247



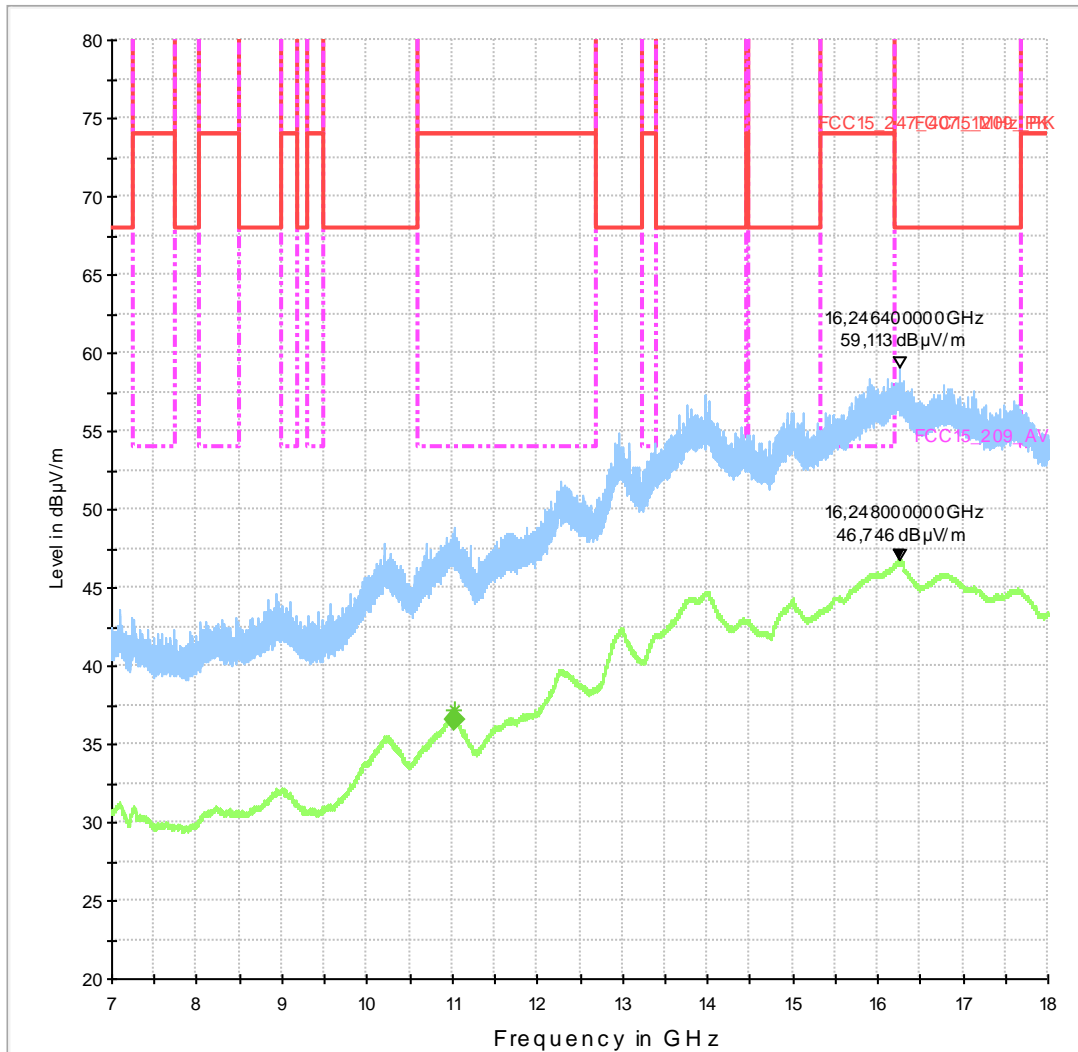
Plot 6: 18 GHz to 26 GHz, channel 62, 5310 MHz, MCS3, vertical & horizontal polarization
EMI Scan_18_40GHz_Pre



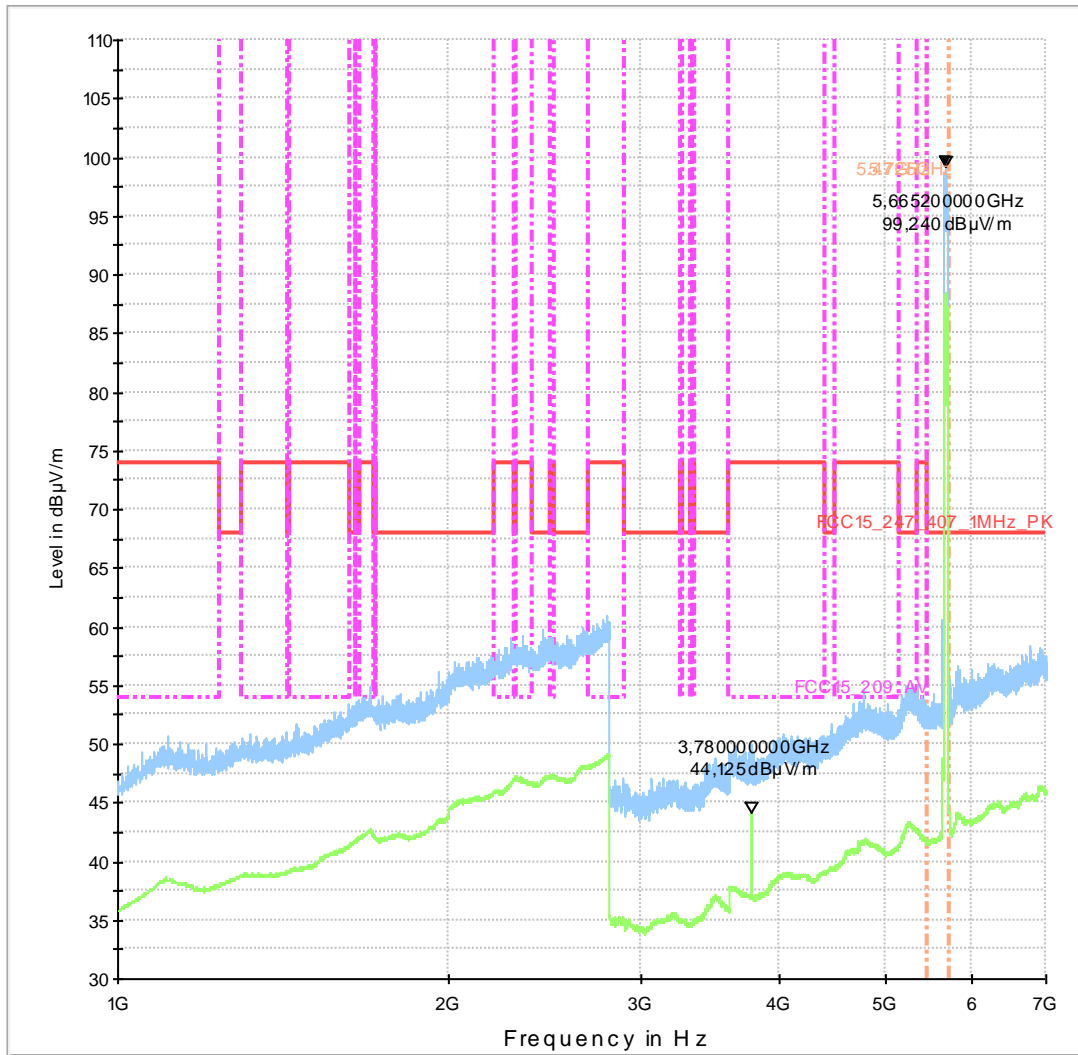
Plot 7: 1 GHz to 7 GHz, channel 102, 5510 MHz, MCS8, vertical & horizontal polarization
00431_Sweep1_SM1_KP1_W LAN_FCC15407(b)(3)



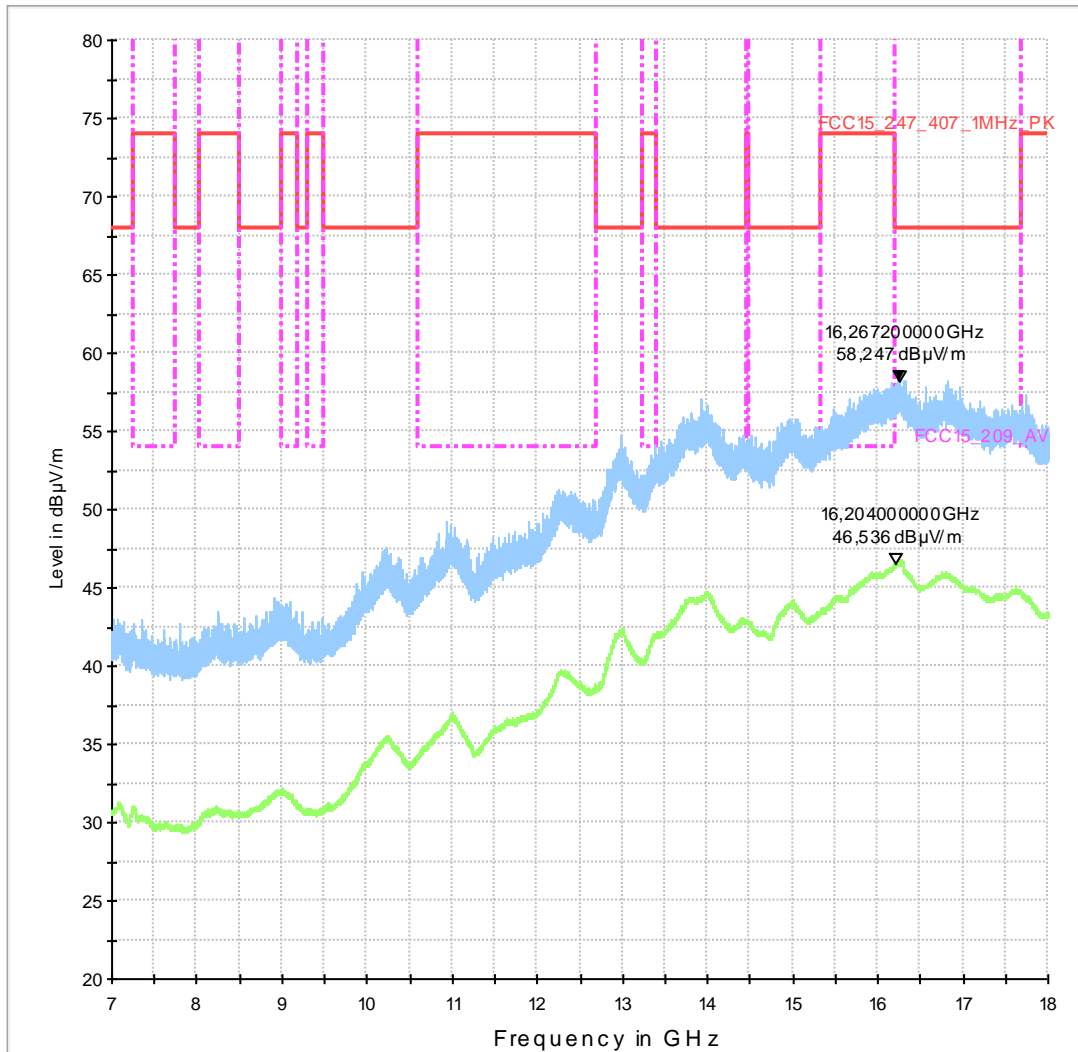
Plot 8: 7 GHz to 18 GHz, channel 102, 5510 MHz, MCS8, vertical & horizontal polarization
Sweep2_SM1_KP1_W LAN_FCC15247



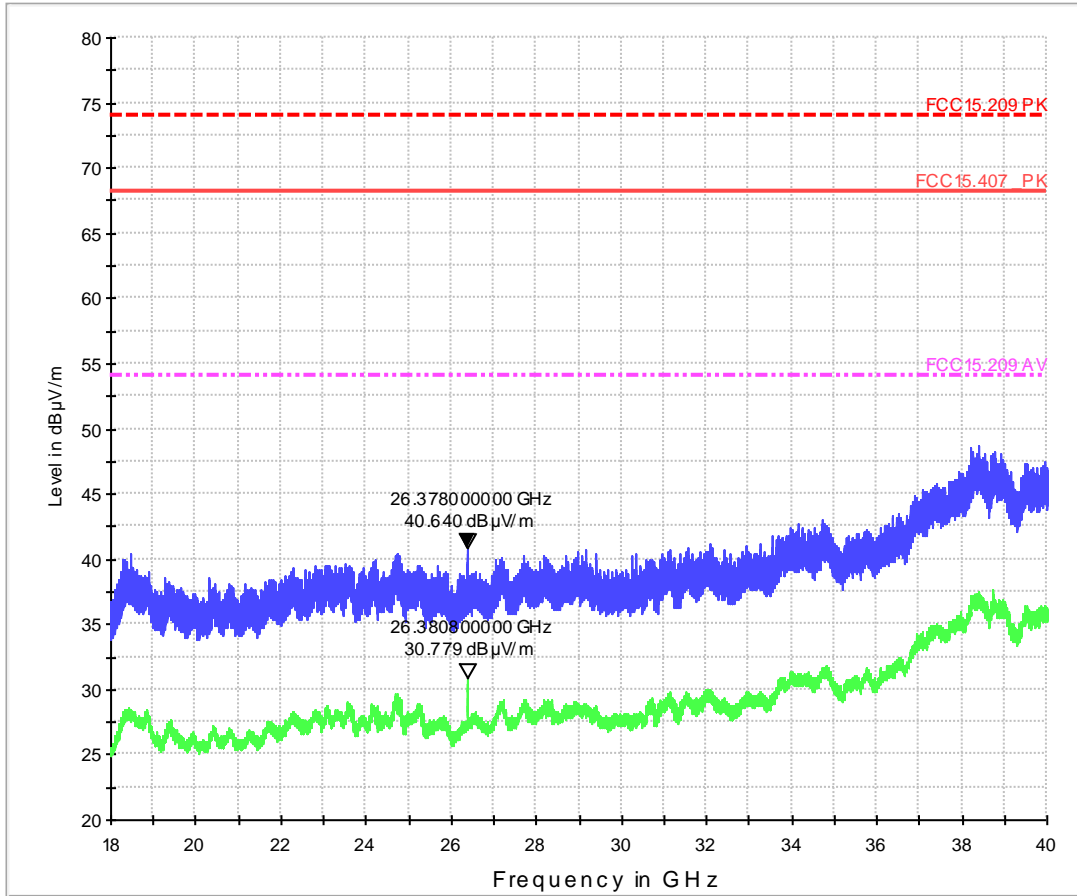
Plot 9: 1 GHz to 7 GHz, channel 134, 5670 MHz, MCS7, vertical & horizontal polarization
00431_Sweep1_SM1_KP1_W LAN_FCC15407(b)(3)



Plot 10: 7 GHz to 18 GHz, channel 134, 5670 MHz, MCS7, vertical & horizontal polarization
Sweep2_SM1_KP1_W LAN_FCC15407

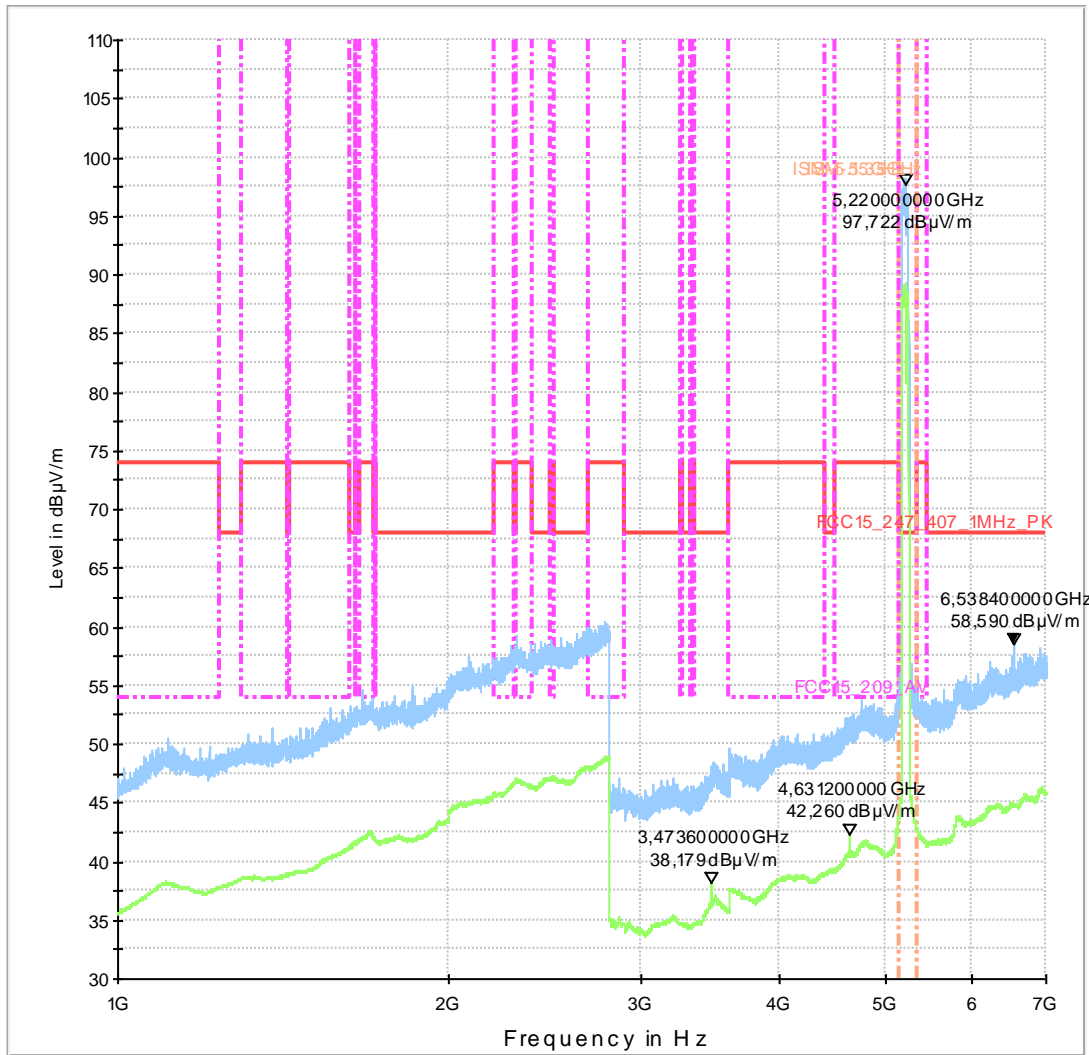


Plot 11: 18 GHz to 40 GHz, channel 134, 5670 MHz, MCS7, vertical & horizontal polarization
EMI Scan_18_40GHz_Pre

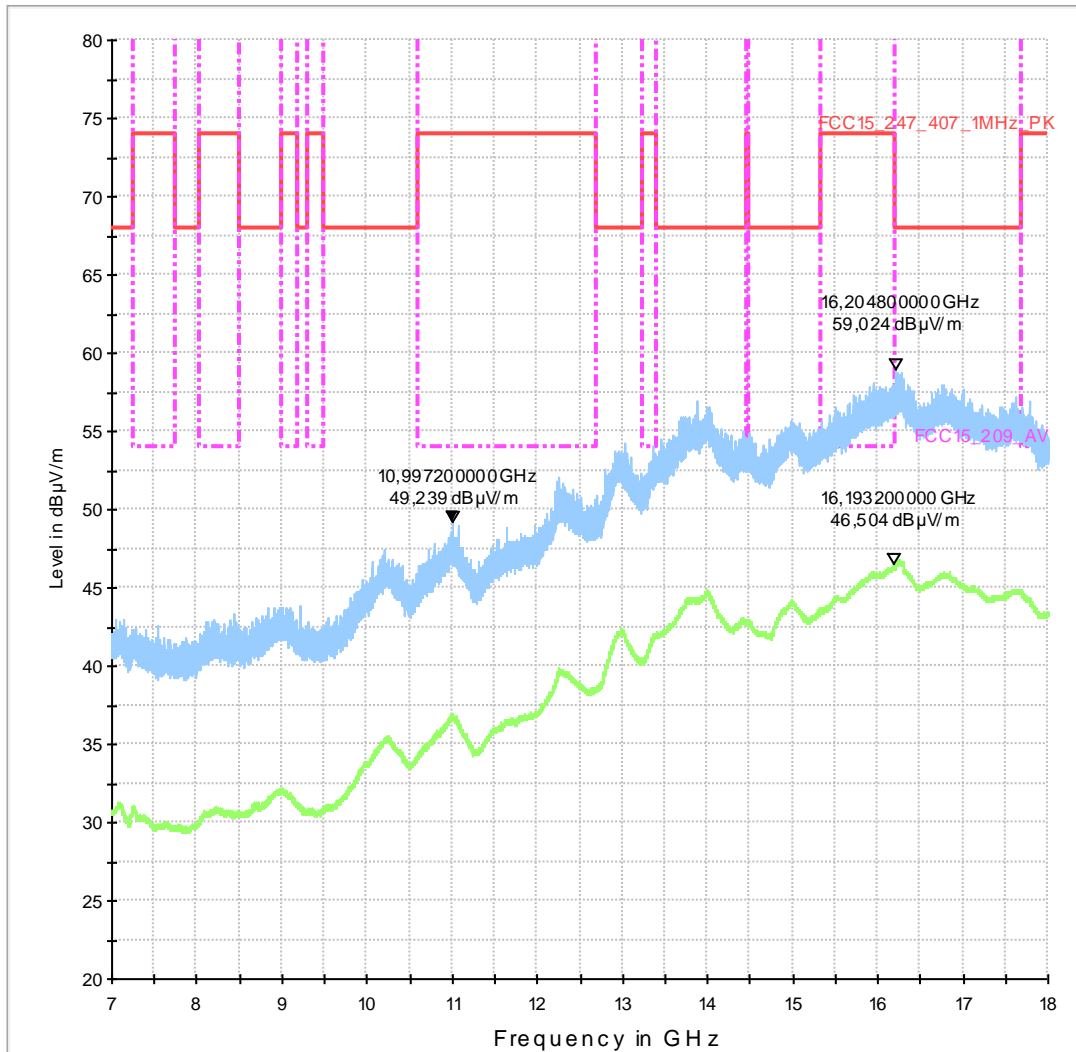


Plots: OFDM / ac – mode HT80

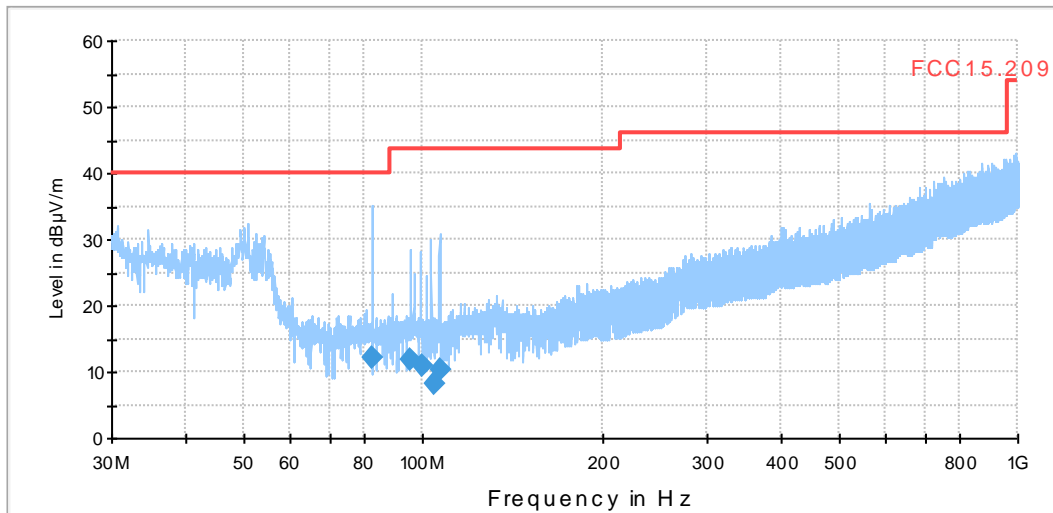
Plot 12: 1 GHz to 7 GHz, channel 42, 5210 MHz, MCS0, vertical & horizontal polarization
00431_Sweep1_SM1_KP1_W LAN_FCC15407(b)(1)



Plot 13: 7 GHz to 18 GHz, channel 42, 5210 MHz, MCS0, vertical & horizontal polarization
Sweep2_SM1_KP1_W LAN_FCC15407



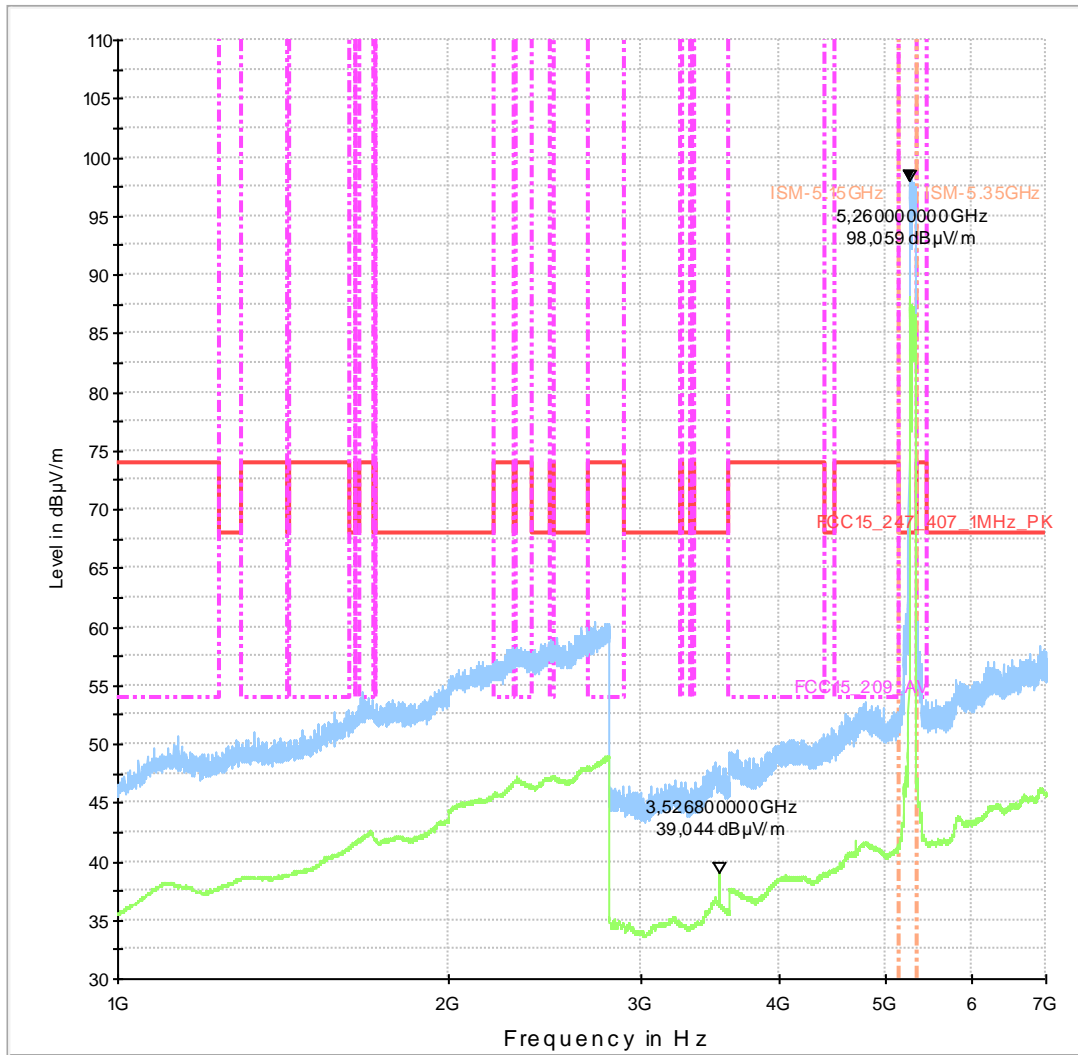
Plot 14: 30 MHz to 1 GHz, channel 58, 5290 MHz, MCS9, vertical & horizontal polarization
01_FCC15.209_hor+vert_kipp



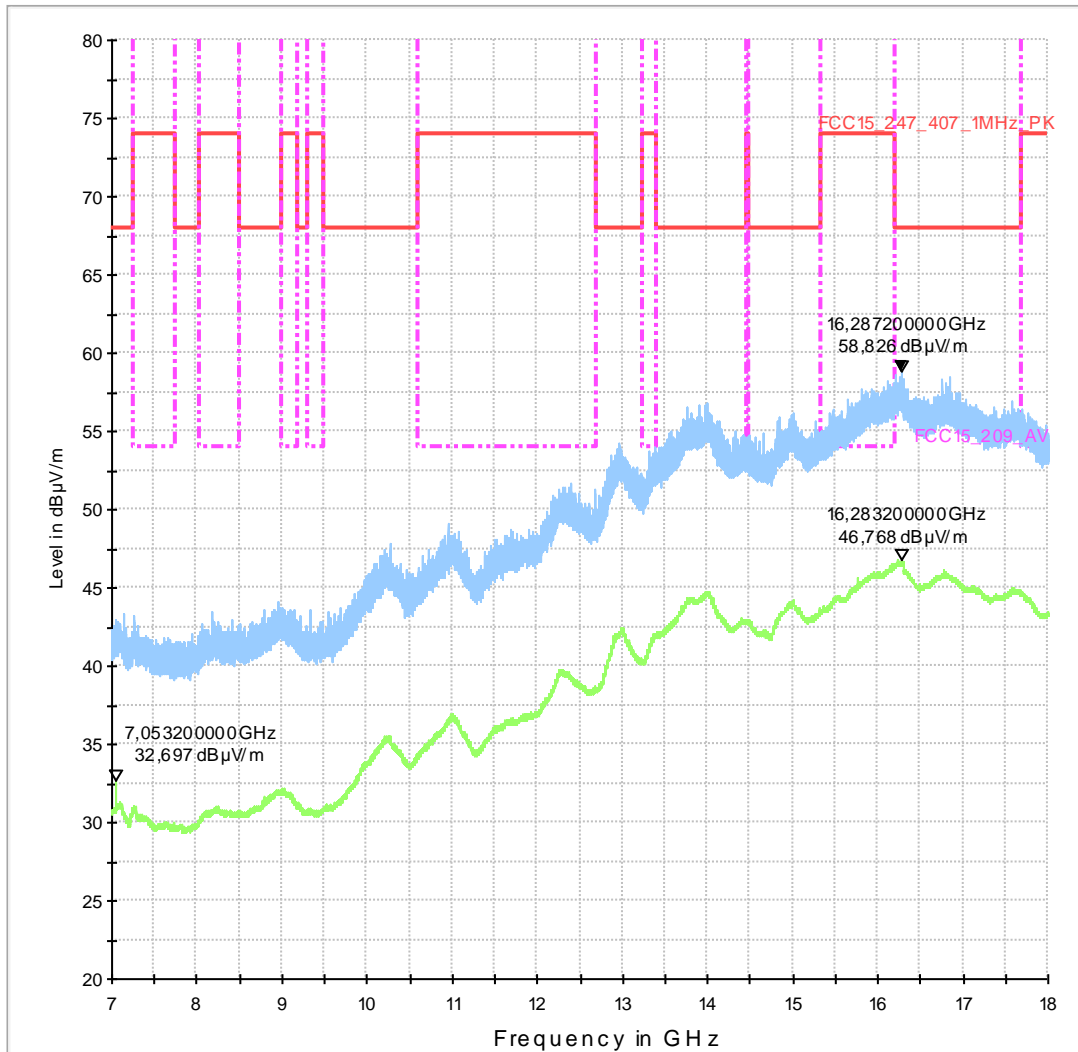
Final Result 1

| Frequency (MHz) | QuasiPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Elevation (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) |
|-----------------|--------------------|-----------------|-----------------|-------------|--------------|---------------|-----------------|------------|-------------|----------------|
| 82.490000 | 12.2 | 1000.0 | 120.000 | 133.0 | V | 209.0 | 90.0 | 8.2 | 27.80 | 40.00 |
| 95.200000 | 11.8 | 1000.0 | 120.000 | 117.0 | V | 96.0 | 0.0 | 8.8 | 31.70 | 43.50 |
| 99.910000 | 10.9 | 1000.0 | 120.000 | 105.0 | V | 146.0 | 90.0 | 8.6 | 32.60 | 43.50 |
| 104.220000 | 8.3 | 1000.0 | 120.000 | 235.0 | V | 84.0 | 90.0 | 8.5 | 35.20 | 43.50 |
| 106.880000 | 10.4 | 1000.0 | 120.000 | 144.0 | V | 135.0 | 90.0 | 8.5 | 33.10 | 43.50 |

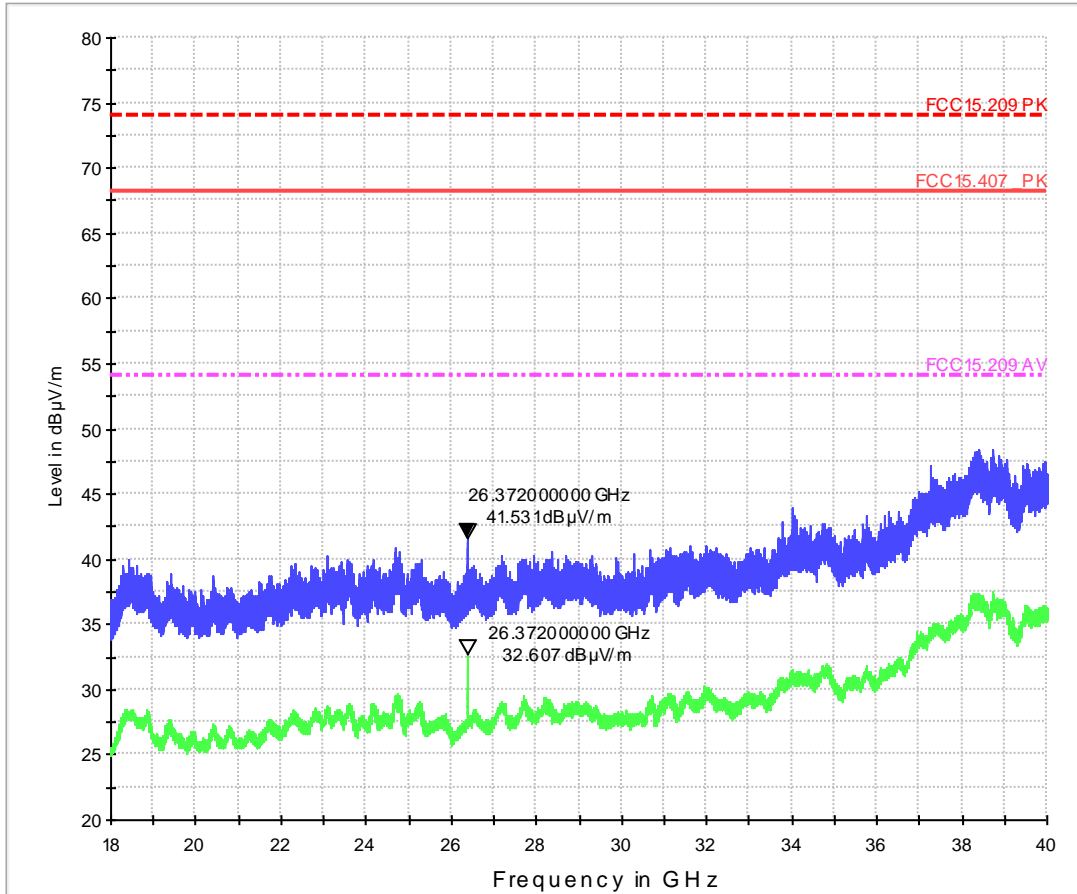
Plot 15: 1 GHz to 7 GHz, channel 58, 5290 MHz, MCS9, vertical & horizontal polarization
00431_Sweep1_SM1_KP1_W LAN_FCC15407(b)(2)



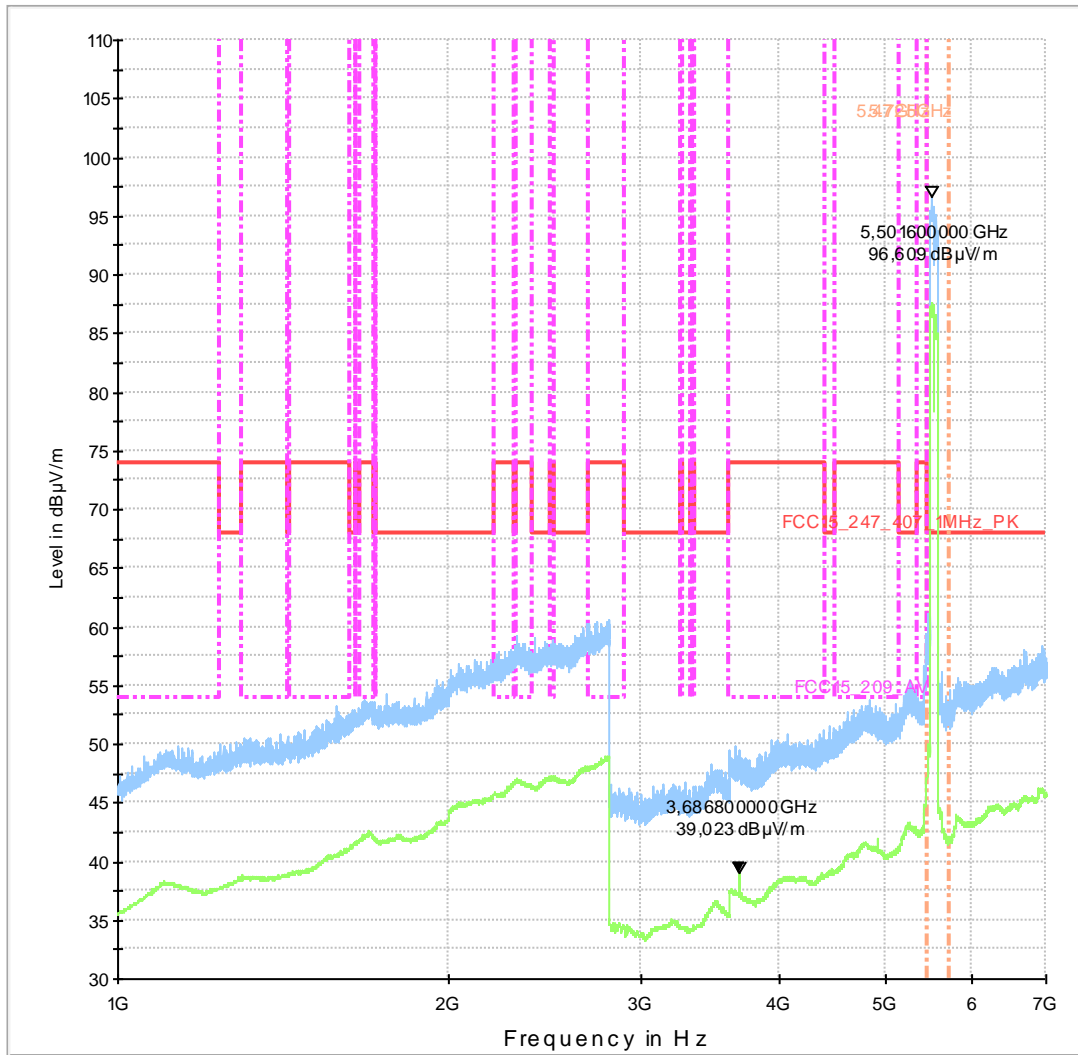
Plot 16: 7 GHz to 18 GHz, channel 58, 5290 MHz, MCS9, vertical & horizontal polarization
Sweep2_SM1_KP1_W LAN_FCC15407



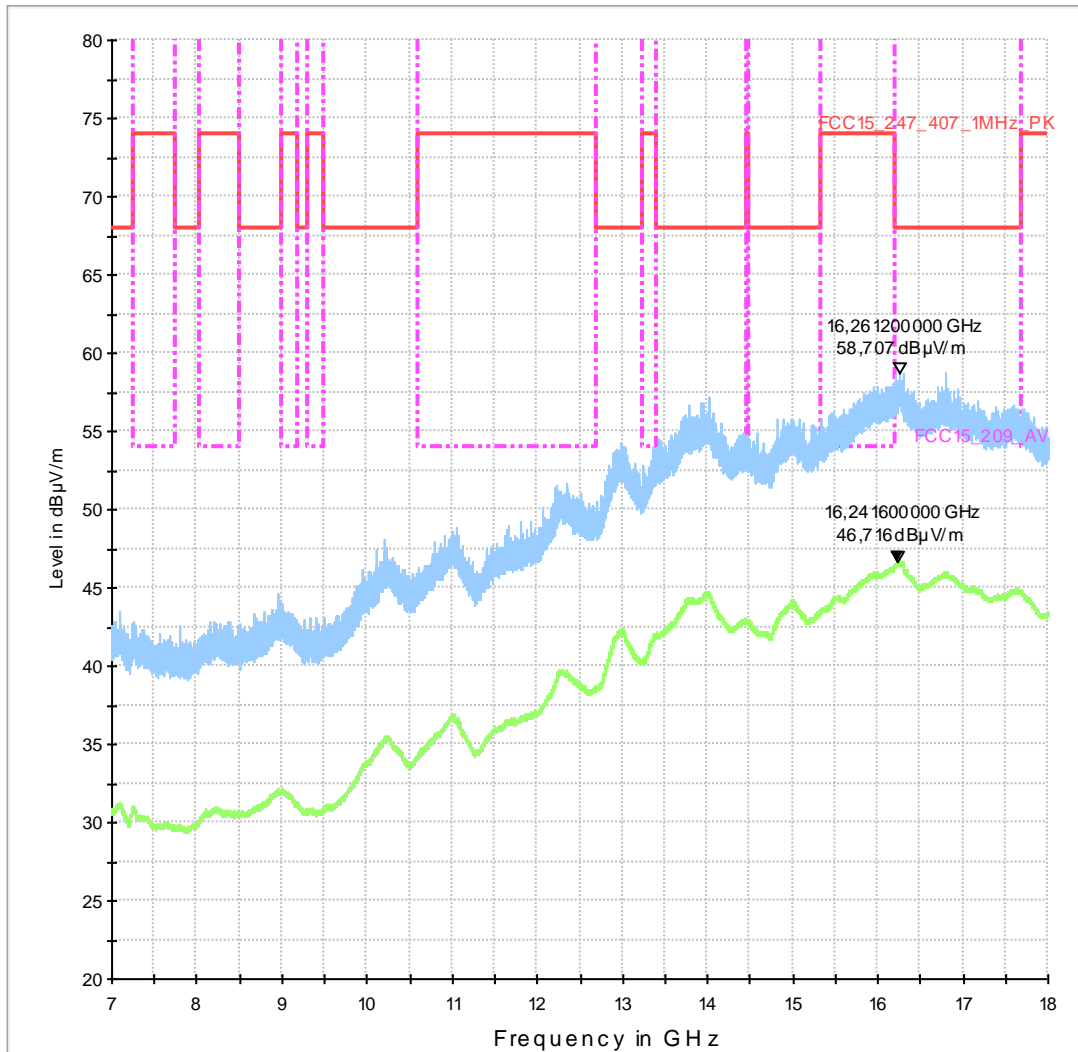
Plot 17: 18 GHz to 40 GHz, channel 58, 5290 MHz, MCS9, vertical & horizontal polarization
EMI Scan_18_40GHz_Pre



Plot 18: 1 GHz to 7 GHz, channel 106, 5530 MHz, MCS0, vertical & horizontal polarization
00431_Sweep1_SM1_KP1_W LAN_FCC15407(b)(3)



Plot 19: 7 GHz to 18 GHz, channel 106, 5530 MHz, MCS0, vertical & horizontal polarization
Sweep2_SM1_KP1_W LAN_FCC15407



10.10 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) Peak above 1 GHz / RMS |
| Sweep time: | Auto |
| Resolution bandwidth: | F < 1 GHz: 100 kHz F > 1 GHz: 1 MHz |
| Video bandwidth: | F < 1 GHz: 100 kHz F > 1 GHz: ≥ 3 MHz /10 Hz |
| 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:

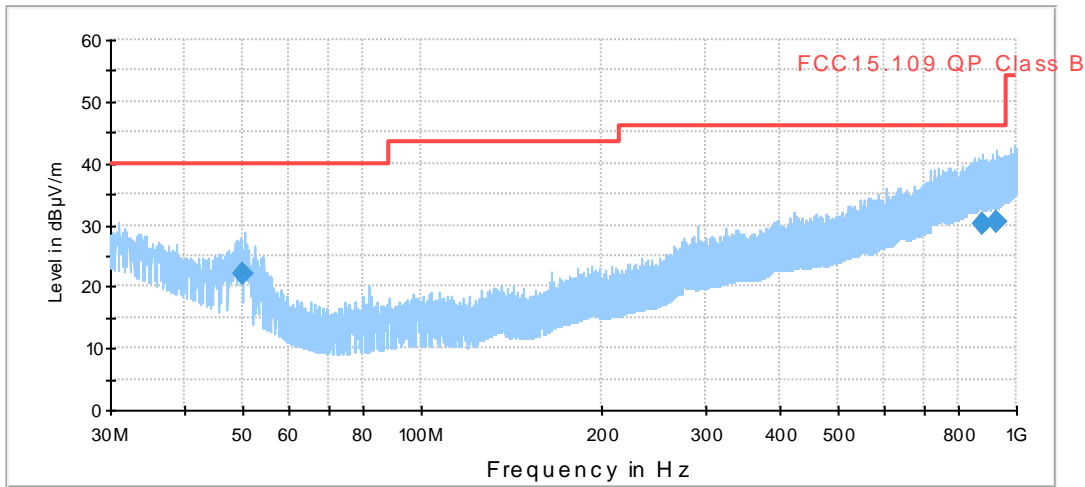
| RX Spurious Emissions Radiated [dBµV/m] | | |
|---|----------|----------------|
| F [MHz] | Detector | Level [dBµV/m] |
| No critical peaks found | | |
| | | |
| | | |
| Measurement uncertainty | ± 3 dB | |

Result: **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)

Plot 1: 30 MHz to 1 GHz, channel 56, vertical & horizontal polarization

05_FCC15.109_hor+vert_kipp

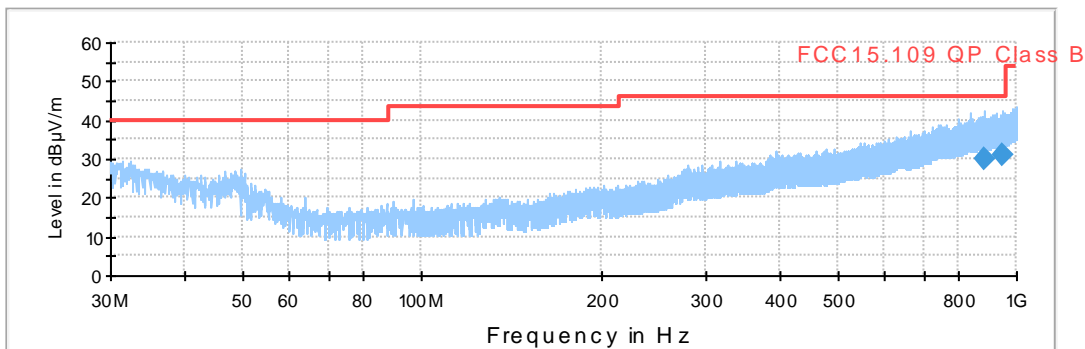


Final Result 1

| Frequency (MHz) | QuasiPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Elevation (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) |
|-----------------|--------------------|-----------------|-----------------|-------------|--------------|---------------|-----------------|------------|-------------|----------------|
| 49.950000 | 22.1 | 1000.0 | 120.000 | 105.0 | V | 243.0 | 90.0 | 13.6 | 17.9 | 40.0 |
| 873.930000 | 30.2 | 1000.0 | 120.000 | 360.0 | V | 0.0 | 0.0 | 26.7 | 15.8 | 46.0 |
| 922.740000 | 30.3 | 1000.0 | 120.000 | 184.0 | V | 311.0 | 90.0 | 27.1 | 15.7 | 46.0 |

Plot 2: 30 MHz to 1 GHz, channel 116, vertical & horizontal polarization

05_FCC15.109_hor+vert_kipp

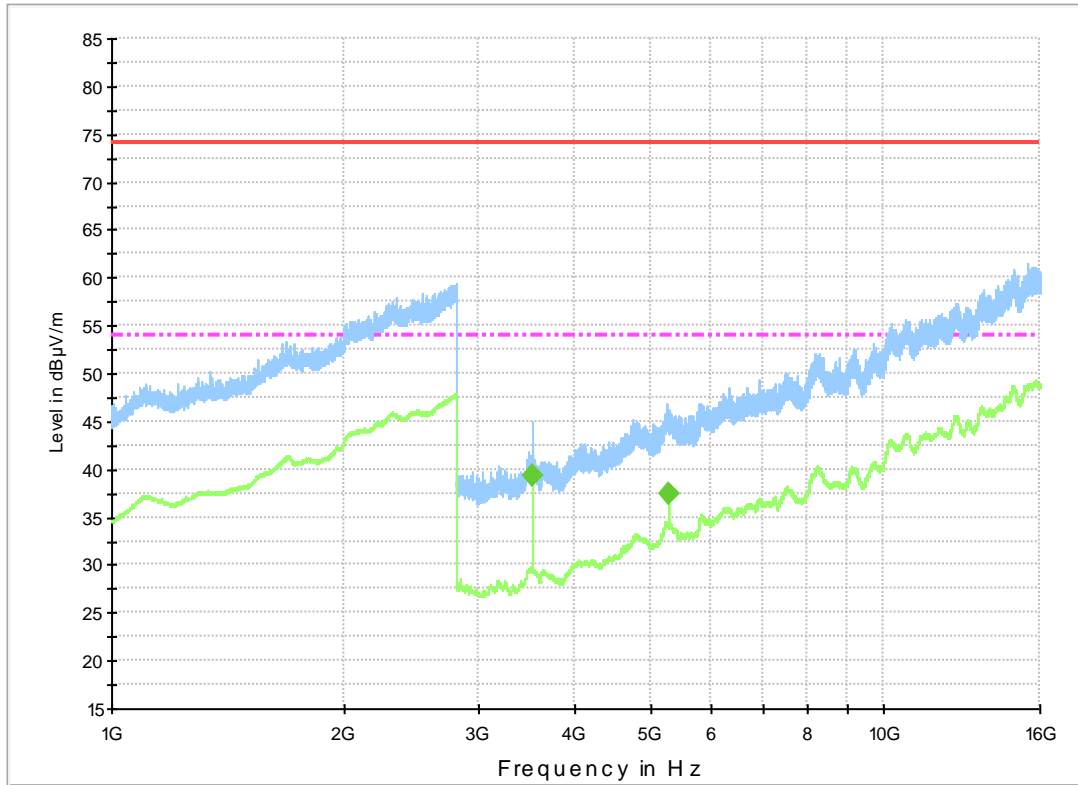


Final Result 1

| Frequency (MHz) | QuasiPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Elevation (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) |
|-----------------|--------------------|-----------------|-----------------|-------------|--------------|---------------|-----------------|------------|-------------|----------------|
| 884.210000 | 30.0 | 1000.0 | 120.000 | 368.0 | H | 241.0 | 0.0 | 26.7 | 16.0 | 46.0 |
| 950.690000 | 31.2 | 1000.0 | 120.000 | 105.0 | V | 155.0 | 90.0 | 27.5 | 14.8 | 46.0 |

Plot 3: 1 GHz to 16 GHz, channel 56, vertical & horizontal polarization

030442_FCC_Part15.109_Unint_Rad_Class_B_1G-20G_ESU40

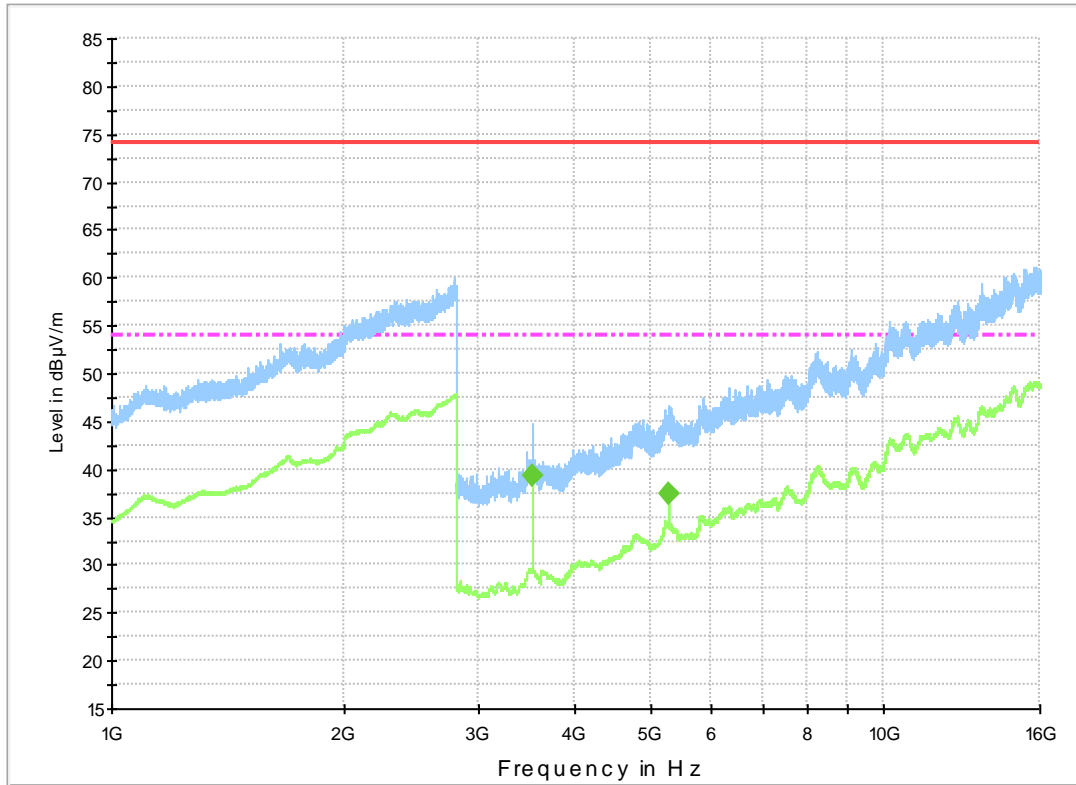


Final Result 2

| Frequency (MHz) | RMS (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Polarization | Azimuth (deg) | Elevation (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) |
|-----------------|--------------|-----------------|-----------------|--------------|---------------|-----------------|------------|-------------|----------------|
| 3520.200000 | 39.4 | 100.0 | 1000.000 | V | 88.0 | 90.0 | 1.5 | 14.6 | 54.0 |
| 5280.200000 | 37.4 | 100.0 | 1000.000 | V | 92.0 | 90.0 | 6.6 | 16.6 | 54.0 |

Plot 4: 1 GHz to 16 GHz, channel 116, vertical & horizontal polarization

030442_FCC_Part15.109_Unint_Rad_Class_B_1G-20G_ESU40

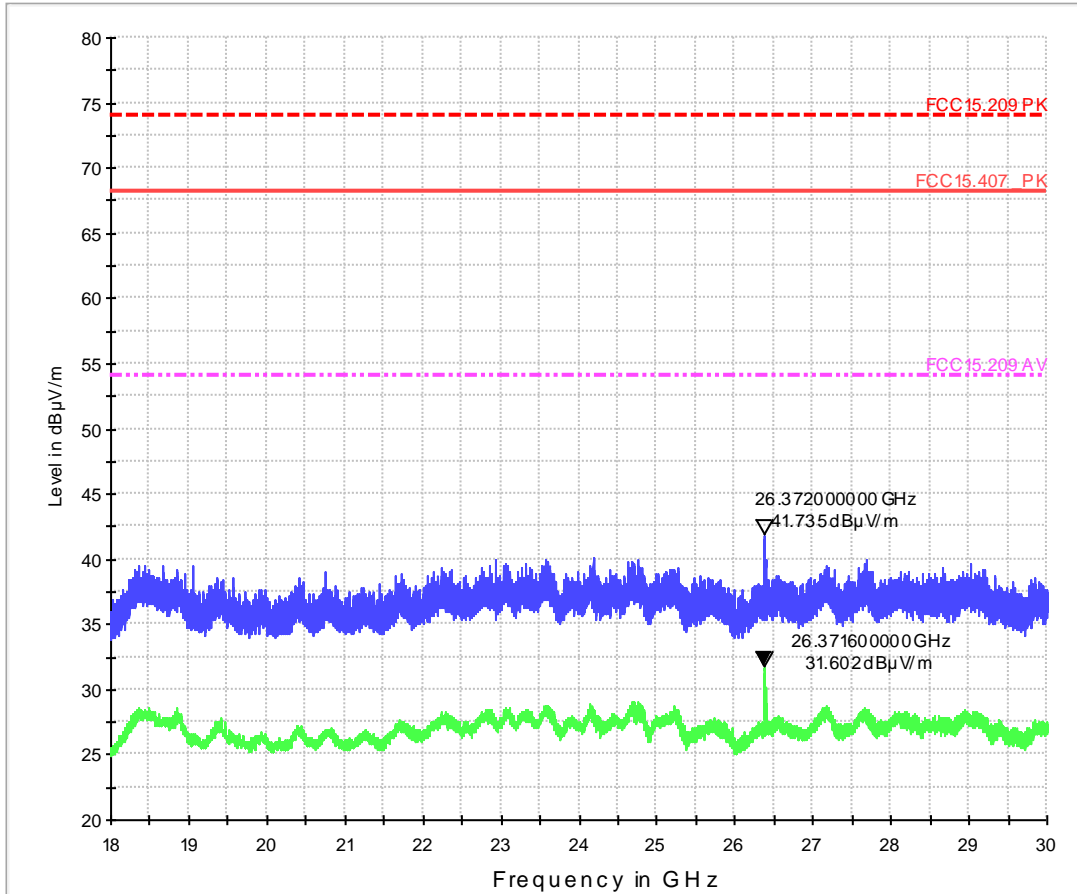


Final Result 2

| Frequency (MHz) | RMS (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Polarization | Azimuth (deg) | Elevation (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) |
|-----------------|--------------|-----------------|-----------------|--------------|---------------|-----------------|------------|-------------|----------------|
| 3520.200000 | 39.3 | 100.0 | 1000.000 | V | 92.0 | 90.0 | 1.5 | 14.7 | 54.0 |
| 5280.200000 | 37.4 | 100.0 | 1000.000 | V | 88.0 | 90.0 | 6.6 | 16.6 | 54.0 |

Plot 5: 18 GHz to 30 GHz, channel 116, vertical & horizontal polarization

EMI Scan_18_30GHz_RX-Mode-Pre



10.11 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 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 F > 150 kHz: 9 kHz |
| Resolution bandwidth: | F < 150 kHz: 1 kHz 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:

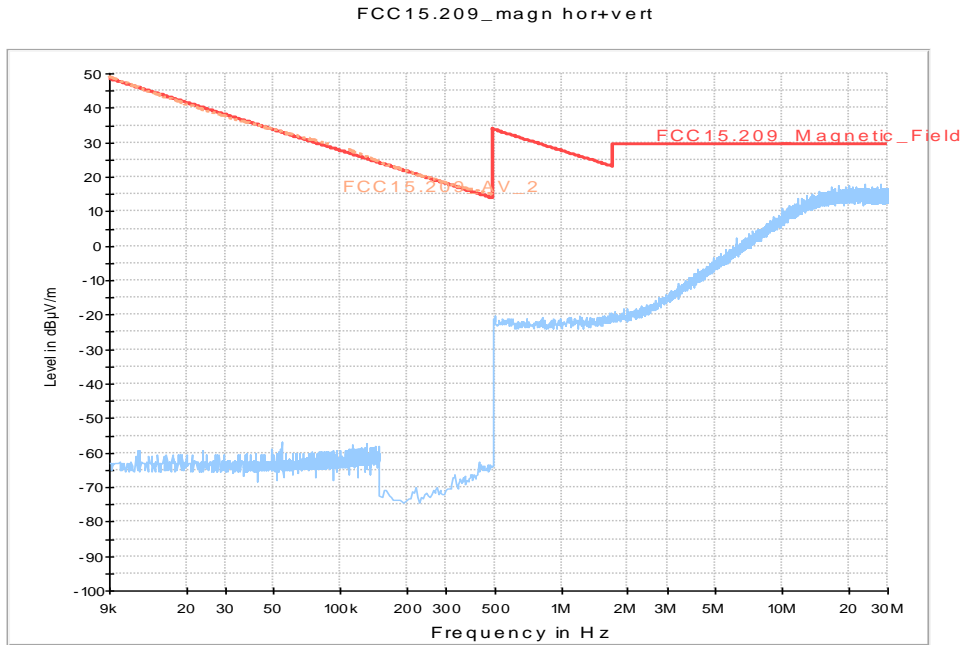
| Spurious Emissions Radiated < 30 MHz [dBµV/m] | | |
|---|----------|----------------|
| F [MHz] | Detector | Level [dBµV/m] |
| No peaks detected | | |
| | | |
| | | |
| Measurement uncertainty | ± 3 dB | |

Result: Passed

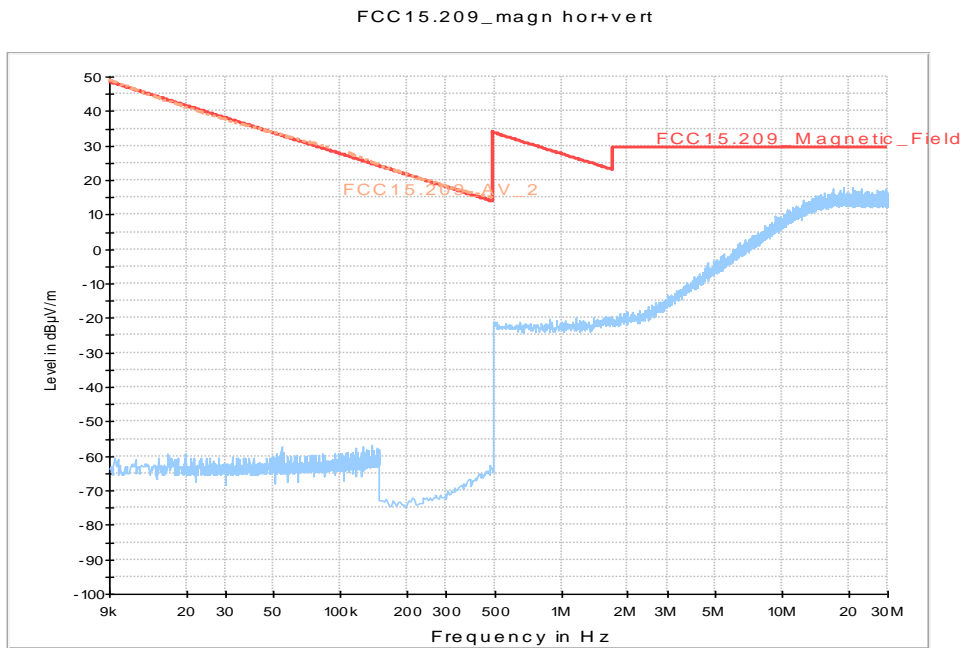
Note: The limit was recalculated with 20 dB / decade (Part 15.31) for all radiated spurious emissions 30 MHz to 1 GHz from 3 meter limit to a 10 meter distance. (40dB/decade for emissions < 30MHz)

Plots:

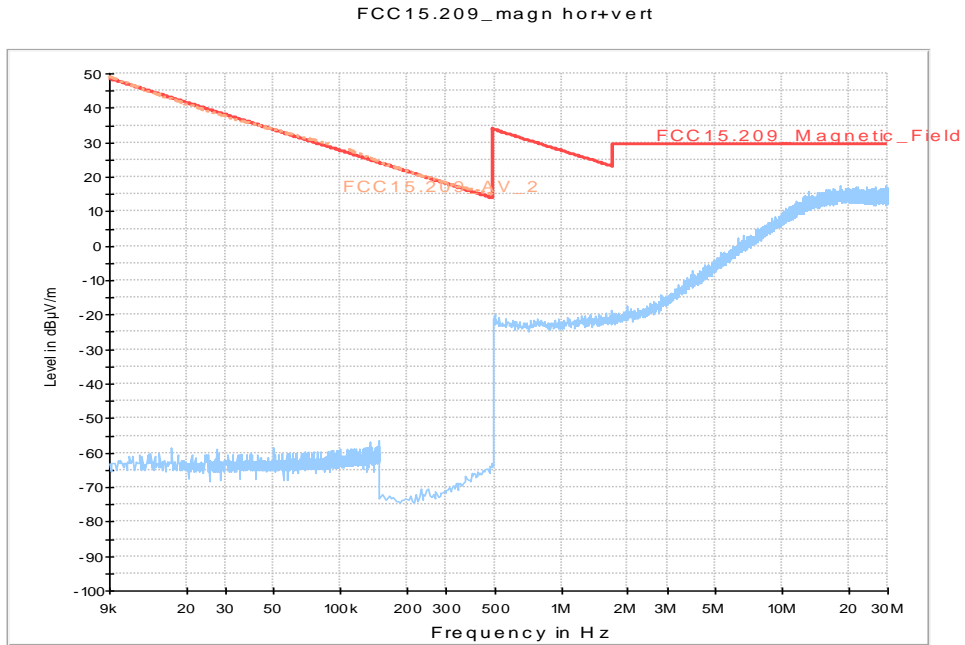
Plot 1: 9 kHz to 30 MHz, a-mode, channel 36, 6Mbps, TX mode



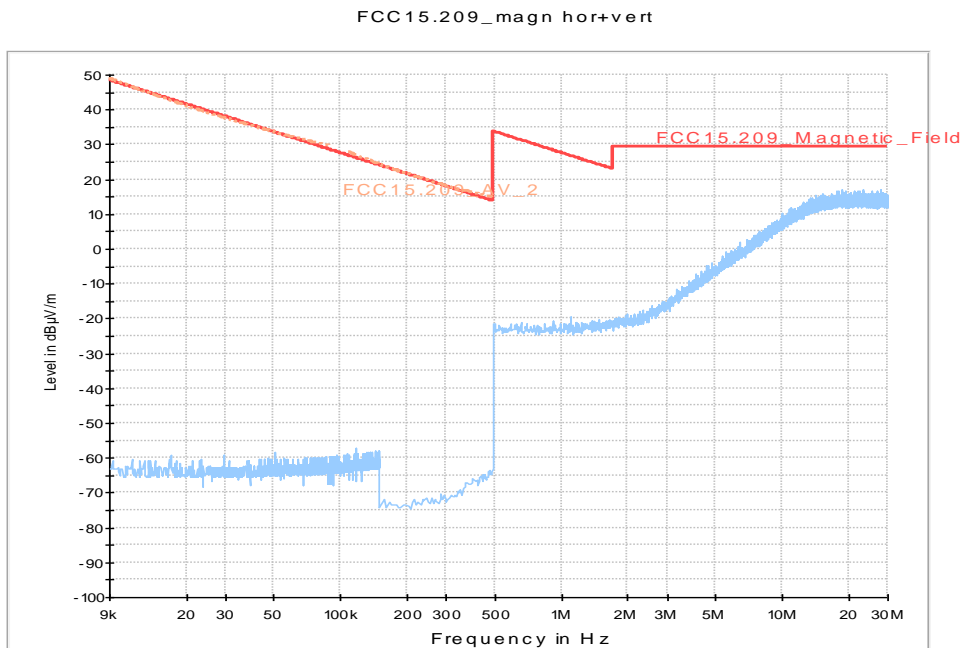
Plot 2: 9 kHz to 30 MHz, a-mode, channel 64, 6Mbps, TX mode



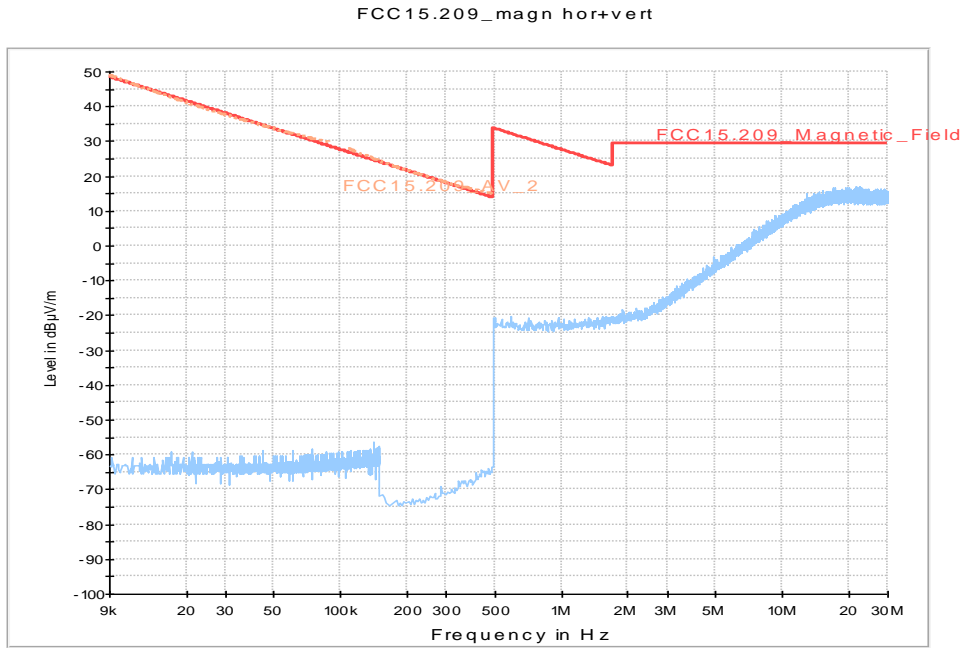
Plot 3: 9 kHz to 30 MHz, ac-mode HT20, channel 140, MCS7, TX mode



Plot 4: 9 kHz to 30 MHz, ac-mode HT40, channel 62, MCS3, TX mode



Plot 5: 9 kHz to 30 MHz, ac-mode HT80, channel 58, MCS9, TX mode



10.12 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 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 (dB μ V/m) | Average (dB μ V/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

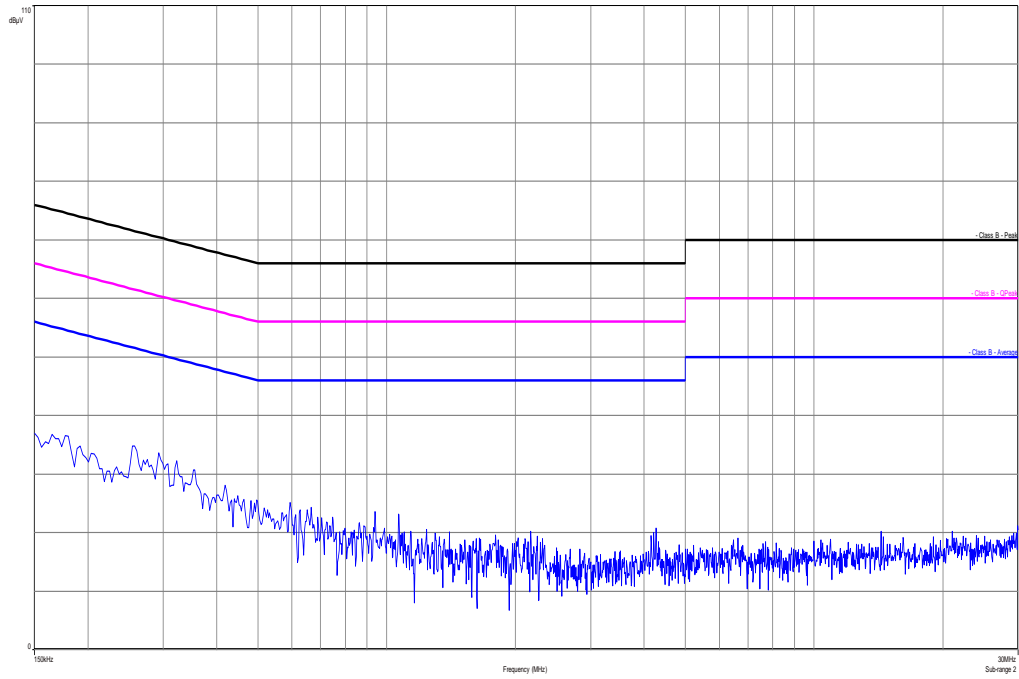
Results:

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

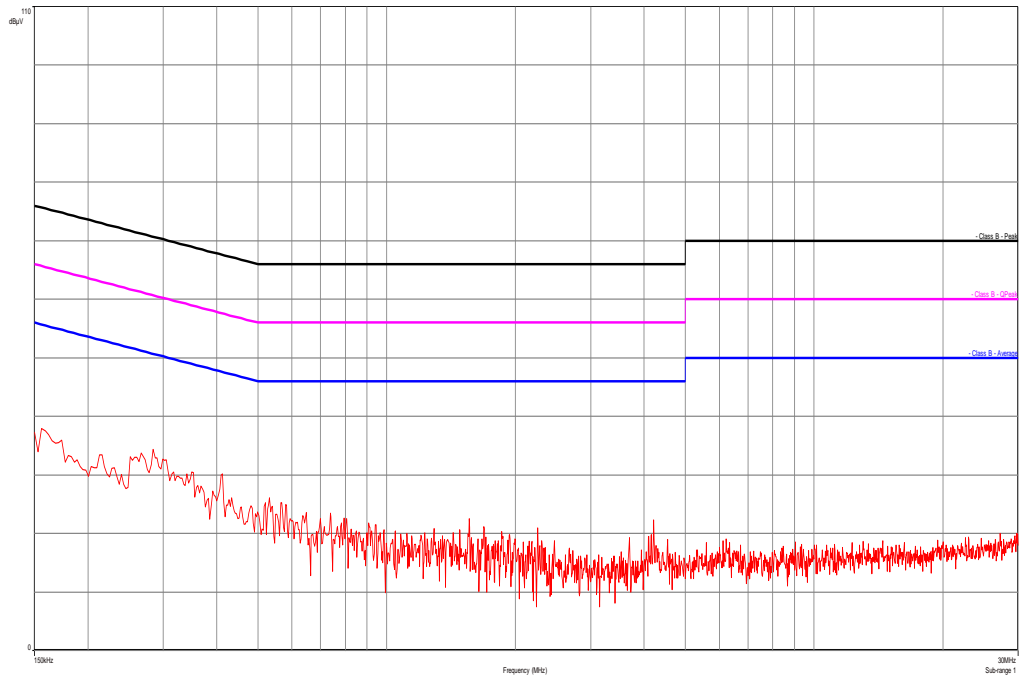
Result: Passed

Plots:

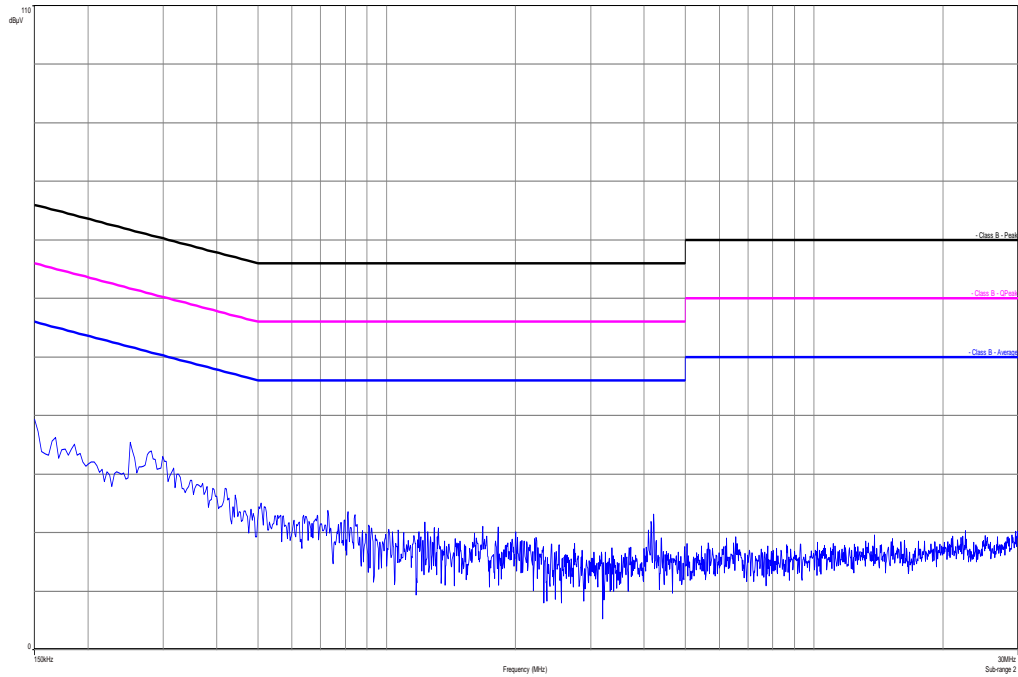
Plot 1: 150 kHz to 30 MHz / phase Line, TX mode



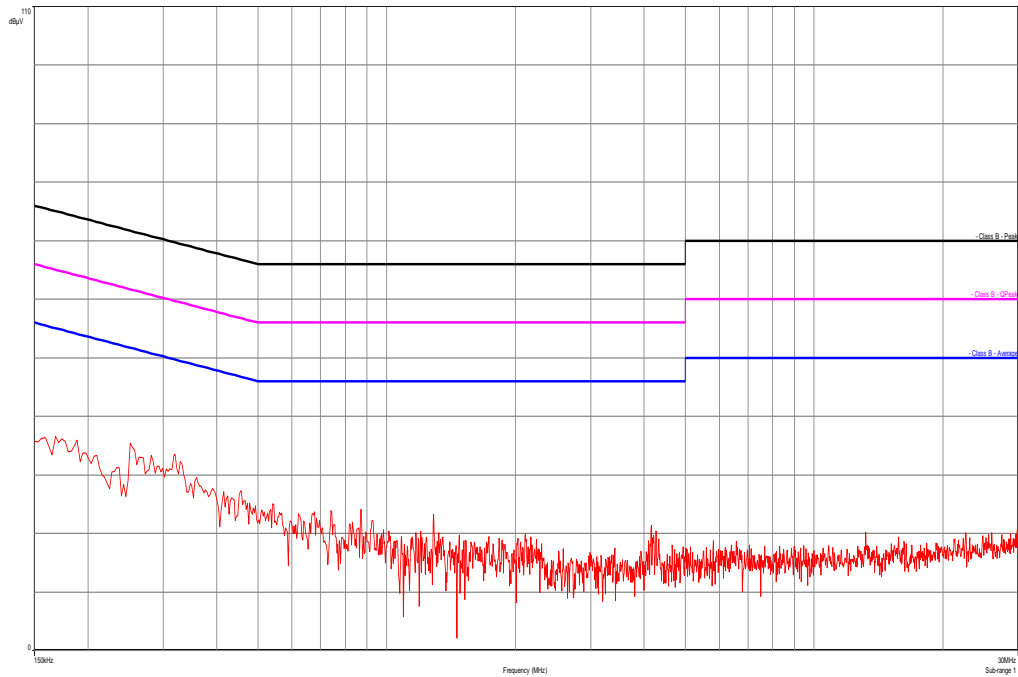
Plot 2: 150 kHz to 30 MHz / neutral Line, TX mode



Plot 3: 150 kHz to 30 MHz / phase Line, RX mode



Plot 4: 150 kHz to 30 MHz / neutral Line, RX mode



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).

Equipment from Cetecom ICT Services GmbH

| No. | Lab / Item | Equipment | Type | Manufact. | Serial No. | INV. No Cetecom | Kind of Calibration | Last Calibration | Next Calibration |
|-----|------------|--------------------------|---------------------------------------|---------------------------|-----------------|-----------------|---------------------|------------------|------------------|
| 1 | n. a. | Signal Analyzer 40 GHz | FSV40 | R&S | 101042 | 300004517 | k | 21.01.2014 | 21.01.2015 |
| 2 | n. a. | Power Supply 0-20V, 0-5A | 6632B | Agilent Technologies | GB42110541 | 400000562 | vkI! | 10.01.2013 | 10.01.2016 |
| 3 | n. a. | PC-WLAN Tester | Intel Core i3 3220/3,3 GHz, Prozessor | | 2V2403033A 4523 | 300004589 | ne | | |
| 4 | n. a. | Teststand | Teststand Custom Sequence Editor | National Instruments GmbH | | 300004590 | ne | | |

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 |
| vkI! | Attention: extended calibration interval | *) | next calibration ordered / currently in progress |
| NK! | Attention: not calibrated | | |

Equipment and Software of Cetecom GmbH

Used equipment "CTC"

The "Ref.-No" in the left column of the following tables allows the clear identification of the laboratory equipment.

Test software and firmware of equipment

| Ref.-No | Equipment | Type | Serial-No. | Version of Firmware or Software during the test |
|---------|---|----------|-------------|--|
| 001 | EMI Test Receiver | ESS | 825132/017 | Firm.= 1.21 , OTP=2.0, GRA=2.0 |
| 012 | Signal Generator (EMS-cond.) | SMY 01 | 839069/027 | Firm.= V 2.02 |
| 013 | Power Meter (EMS cond.) | NRVD | 839111/003 | Firm.= V 1.51 |
| 017 | Digital Radiocommunication Tester | CMD 60 M | 844365/014 | Firmware = V 3.52 .22.01.99, DECT = D2.87 13.01.99 |
| 053 | Audio Analyzer | UPA3 | 860612/022 | Firm. V 4.3 |
| 119 | RT Harmonics Analyzer dig. Flickermeter | B10 | G60547 | Firm.= V 3.1DHG |
| 140 | Signal Generator | SMHU | 831314/006 | Firm.= 3.21 |
| 261 | Thermal Power Sensor | NRV-Z55 | 825083/0008 | EPROM-Datum 02.12.04, SE EE 1 B |
| 262 | Power Meter | NRV-S | 825770/0010 | Firm.= 2.6 |

| Ref.- | Equipment | Type | Serial-No. | Version of Firmware or Software during the test |
|-------|-------------------------------------|------------------------|----------------|---|
| 263 | Signal Generator | SMP 04 | 826190/0007 | Firm.=3.21 |
| 264 | Spectrum Analyzer | FSEK 30 | 826939/005 | Bios=2.1, Analyzer= 3.20 |
| 295 | Racal Digital Radio Test Set | 6103 | 1572 | UNIT Firmware= 4.04, SW-Main=4.04, SW-BBP=1.04, SW-DSP=1.02, Hardboot=1.02, Softboot=2.02 |
| 298 | Univ. Radio Communication Tester | CMU 200 | 832221/091 | R&S Test Firmware =3.53 /3.54 (current Testsoftw. f. all band used |
| 323 | Digital Radiocommunication Tester | CMD 55 | 825878/0034 | Firm.= 3.52 .22.01.99 |
| 331 | Climatic Test Chamber -40/+80 Grad | HC 4055 | 43146 | TSI 1.53 |
| 335 | CTC-EMS-Conducted | System EMS Conducted | - | EMC 32 V 8.52 |
| 340 | Digital Radiocommunication Tester | CMD 55 | 849709/037 | Firm.= 3.52 .22.01.99 |
| 355 | Power Meter | URV 5 | 891310/027 | Firm.= 1.31 |
| 365 | 10V Insertion Unit 50 Ohm | URV5-Z2 | 100880 | Eprom Data = 31.03.08 |
| 366 | Ultra Compact Simulator | UCS 500 M4 | V0531100594 | Firm. UCS 500=001925/3.06a02, rc=ISMIEC 4.10 |
| 371 | Bluetooth Tester | CBT32 | 100153 | CBT V5,30+ SW-Option K55, K57 |
| 377 | EMI Test Receiver | ESCS 30 | 100160 | Firm.= 2.30, OTP= 02.01, GRA= 02.36 |
| 378 | Broadband RF Field Monitor | RadiSense III | 03D00013SNO-08 | Firm.= V.03D13 |
| 383 | Signal Generator | SME 03 | 842 828 /034 | Firm.= 4.61 |
| 389 | Digital Multimeter | Keithley 2000 | 0583926 | Firm. = A13 (Mainboard) A02 (Display) |
| 392 | Radio Communication Tester | MT8820A | 6K00000788 | Firm.= 4.50 #005, IPL=4.01#001, OS=4.02#001, GSM=4.41#013, W-CDMA= 4.54#004, scenario= 4.52#002 |
| 436 | Univ. Radio Communication Tester | CMU 200 | 103083 | R&S Test Firmware Base=5.14, Mess-Software= GSM:5.14 WCDMA:5.14 (current Testsoftw. F. all band |
| 441 | CTC-SAR-EMI Cable Loss | System EMI field (SAR) | - | EMC 32 Version 8.52 |
| 442 | CTC-SAR-EMS | System EMS field (SAR) | - | EMC 32 Version 8.40 |
| 443 | CTC-FAR-EMI-RSE | System CTC-FAR-EMI-RSE | - | Spuri 7.2.5 or EMC 32 Ver. 8.53 |
| 444 | CTC-FAR-EMS field | System-EMS-Field (FAR) | - | EMC 32 Version 8.40 |
| 460 | Univ. Radio Communication Tester | CMU 200 | 108901 | R&S Test Firmware Base=5.14, GSM=5.14 WCDMA=5.14 (current Testsoftw.,f. all band to be used, |
| 489 | EMI Test Receiver | ESU40 | 1000-30 | Firmware=4.43 SP3, Bios=V5.1-16-3, Spec. =01.00 |
| 491 | ESD Simulator dito | ESD dito | dito307022 | V 2.30 |
| 524 | Voltage Drop Simulator | VDS 200 | 0196-16 | Software Nr: 000037 Version V4.20a01 |
| 526 | Burst Generator | EFT 200 A | 0496-06 | Software Nr. 000034 Version V2.32 |
| 527 | Micro Pulse Generator | MPG 200 B | 0496-05 | Software-Nr. 000030 Version V2.43 |
| 528 | Load Dump Simulator | LD 200B | 0496-06 | Software-Nr. 000031 Version V2.35a01 |
| 546 | Univ. Radio Communication Tester | CMU 200 | 106436 | R&S Test Firmware Base=5.14, GSM=5.14 WCDMA=5.14 (current Testsoftw.,f. all band to be used |
| 547 | Univ. Radio Communication Tester | CMU 200 | 835390/014 | R&S Test Firmware Base=V5.1403 (current Testsoftw., f. all band used, GSM = 5.14 WCDMA: = 5.14 |
| 584 | Spectrum Analyzer | FSU 8 | 100248 | 2.82_SP3 |
| 597 | Univ. Radio Communication Tester | CMU 200 | 100347 | R&S Test Firmware Base=5.01, GSM=5.02 WCDMA= not installed, Mainboard= µP1=V.850 |
| 598 | Spectrum Analyzer | FSEM 30 (Reserve) | 831259/013 | Firmware Bios 3.40 , Analyzer 3.40 Sp 2 |
| 620 | EMI Test Receiver | ESU 26 | 100362 | 4.43_SP3 |
| 642 | Wideband Radio Communication Tester | CMW 500 | 126089 | Setup V03.26, Test programm component V03.02.20 |

Single instruments and test systems

| Ref.-No. | Equipment | Type | Serial-No. | Manufacturer | Interval of calibration | Remark | Cal due |
|----------|---|---------------------------|-----------------|-----------------------|-------------------------|--------|------------|
| 001 | EMI Test Receiver | ESS | 825132/017 | Rohde & Schwarz | 12 M | - | 31.03.2014 |
| 005 | AC - LISN (50 Ohm/50µH, test site 1) | ESH2-Z5 | 861741/005 | Rohde & Schwarz | 24/12 M | - | 31.03.2014 |
| 007 | Single-Line V-Network (50 Ohm/5µH) | ESH3-Z6 | 892563/002 | Rohde & Schwarz | 24/12 M | - | 31.03.2014 |
| 009 | Power Meter (EMS-radiated) | NRV | 863056/017 | Rohde & Schwarz | 24 M | - | 31.03.2015 |
| 016 | Line Impedance Simulating Network | Op. 24-D | B6366 | Spitzenberger+Spies | 36 M | - | 31.03.2016 |
| 020 | Horn Antenna 18 GHz (Subst 1) | 3115 | 9107-3699 | EMCO | 36/12 M | - | 31.03.2014 |
| 021 | Loop Antenna (H-Field) | 6502 | 9206-2770 | EMCO | 36 M | - | 31.03.2015 |
| 030 | Loop Antenna (H-field) | HFH-Z2 | 879604/026 | Rohde & Schwarz | 36 M | - | 31.03.2015 |
| 033 | RF-current probe (100kHz-30MHz) | ESH2-Z1 | 879581/18 | Rohde & Schwarz | 24 M | - | 31.03.2015 |
| 057 | relay-switch-unit (EMS system) | RSU | 494440/002 | Rohde & Schwarz | pre-m | 1a | |
| 060 | power amplifier (DC-2kHz) | PAS 5000 | B6363 | Spitzenberger+Spies | - | 3 | |
| 066 | notch filter (WCDMA; FDD1) | WRCT 1900/2200-5/40-10EEK | 5 | Wainwright GmbH | 12 M | 1g | 30.06.2014 |
| 086 | DC - power supply, 0 -10 A | LNG 50-10 | - | Heinzinger Electronic | pre-m | 2 | |
| 087 | DC - power supply, 0 -5 A | EA-3013 S | - | Elektro Automatik | pre-m | 2 | |
| 090 | Helmholtz coil: 2x10 coils in series | - | - | RWTÜV | - | 4 | |
| 091 | USB-LWL-Converter | OLS-1 | 007/2006 | Ing. Büro Scheiba | - | 4 | |
| 099 | passive voltage probe | ESH2-Z3 | 299.7810.52 | Rohde & Schwarz | 36 M | - | 31.03.2015 |
| 100 | passive voltage probe | Probe TK 9416 | without | Schwarzbeck | 36 M | - | 31.03.2015 |
| 110 | USB-LWL-Converter | OLS-1 | - | Ing. Büro Scheiba | - | 4 | |
| 119 | RT Harmonics Analyzer dig. Flickermeter | B10 | G60547 | BOCONSULT | 36 M | - | 31.03.2016 |
| 134 | horn antenna 18 GHz (Subst 2) | 3115 | 9005-3414 | EMCO | pre-m | - | 31.03.2014 |
| 136 | adjustable dipole antenna (Dipole 1) | 3121C-DB4 | 9105-0697 | EMCO | 36 M | - | 31.03.2015 |
| 140 | Signal Generator | SMHU | 831314/006 | Rohde & Schwarz | 24 M | - | 31.03.2014 |
| 248 | attenuator | SMA 6dB 2W | - | Radiall | pre-m | 2 | |
| 249 | attenuator | SMA 10dB 10W | - | Radiall | pre-m | 2 | |
| 252 | attenuator | N 6dB 12W | - | Radiall | pre-m | 2 | |
| 256 | attenuator | SMA 3dB 2W | - | Radiall | pre-m | 2 | |
| 257 | hybrid | 4031C | 04491 | Narda | pre-m | 2 | |
| 260 | hybrid coupler | 4032C | 11342 | Narda | pre-m | 2 | |
| 261 | Thermal Power Sensor | NRV-Z55 | 825083/0008 | Rohde & Schwarz | 24 M | - | 31.03.2014 |
| 262 | Power Meter | NRV-S | 825770/0010 | Rohde & Schwarz | 24 M | - | 31.03.2014 |
| 263 | Signal Generator | SMP 04 | 826190/0007 | Rohde & Schwarz | 36 M | - | 31.03.2016 |
| 264 | Spectrum Analyzer | FSEK 30 | 826939/005 | Rohde & Schwarz | 12 M | - | 31.03.2014 |
| 265 | peak power sensor | NRV-Z33, Model 04 | 840414/009 | Rohde & Schwarz | 24 M | - | 31.03.2014 |
| 266 | peak power sensor | NRV-Z31, Model 04 | 843383/016 | Rohde & Schwarz | 24 M | - | 31.03.2014 |
| 267 | notch filter GSM 850 | WRCA 800/960-6EEK | 9 | Wainwright GmbH | pre-m | 2 | |
| 270 | termination | 1418 N | BB6935 | Weinschel | pre-m | 2 | |
| 271 | termination | 1418 N | BE6384 | Weinschel | pre-m | 2 | |
| 272 | attenuator (20 dB) 50 W | Model 47 | BF6239 | Weinschel | pre-m | 2 | |
| 273 | attenuator (10 dB) 100 W | Model 48 | BF9229 | Weinschel | pre-m | 2 | |
| 274 | attenuator (10 dB) 50 W | Model 47 (10 dB) 50 W | BG0321 | Weinschel | pre-m | 2 | |
| 275 | DC-Block | Model 7003 (N) | C5129 | Weinschel | pre-m | 2 | |
| 276 | DC-Block | Model 7006 (SMA) | C7061 | Weinschel | pre-m | 2 | |
| 279 | power divider | 1515 (SMA) | LH855 | Weinschel | pre-m | 2 | |
| 287 | pre-amplifier 25MHz - 4GHz | AMF-2D-100M4G-35-10P | 379418 | Miteq | 12 M | 1c | 30.06.2014 |
| 291 | high pass filter GSM 850/900 | WHJ 2200-4EE | 14 | Wainwright GmbH | 12 M | 1c | 30.06.2014 |
| 298 | Univ. Radio Communication Tester | CMU 200 | 832221/091 | Rohde & Schwarz | pre-m | 3 | |
| 300 | AC LISN (50 Ohm/50µH, 1-phase) | ESH3-Z5 | 892 239/020 | Rohde & Schwarz | 24/12 M | - | 31.03.2014 |
| 301 | attenuator (20 dB) 50W, 18GHz | 47-20-33 | AW0272 | Lucas Weinschel | pre-m | 2 | |
| 302 | horn antenna 40 GHz (Meas 1) | BBHA9170 | 155 | Schwarzbeck | 36 M | - | 31.03.2014 |
| 303 | horn antenna 40 GHz (Subst 1) | BBHA9170 | 156 | Schwarzbeck | 36 M | - | 31.03.2014 |
| 331 | Climatic Test Chamber -40/+80 Grad | HC 4055 | 43146 | Heraeus Vötsch | 24 M | - | 30.11.2014 |
| 341 | Digital Multimeter | Fluke 112 | 81650455 | Fluke | 24 M | - | 31.03.2014 |
| 342 | Digital Multimeter | Voltcraft M-4660A | IB 255466 | Voltcraft | 24 M | - | 31.03.2015 |
| 347 | laboratory site | radio lab. | - | - | - | 5 | |
| 348 | laboratory site | EMI conducted | - | - | - | 5 | |
| 354 | DC - Power Supply 40A | NGPE 40/40 | 448 | Rohde & Schwarz | pre-m | 2 | |
| 355 | Power Meter | URV 5 | 891310/027 | Rohde & Schwarz | 24 M | - | 31.03.2014 |
| 356 | power sensor | NRV-Z1 | 882322/014 | Rohde & Schwarz | 24 M | - | 31.03.2015 |
| 357 | power sensor | NRV-Z1 | 861761/002 | Rohde & Schwarz | 24 M | - | 31.03.2015 |
| 371 | Bluetooth Tester | CBT32 | 100153 | R&S | 24 M | - | 31.03.2014 |
| 373 | Single-Line V-Network (50 Ohm/5µH) | ESH3-Z6 | 100535 | Rohde & Schwarz | 24/12 M | - | 31.03.2014 |
| 376 | Horn Antenna 6 GHz | BBHA9120 E | BBHA 9120 E 179 | Schwarzbeck | 12 M | - | 31.03.2014 |
| 377 | EMI Test Receiver | ESCS 30 | 100160 | Rohde & Schwarz | 12 M | - | 31.03.2014 |
| 389 | Digital Multimeter | Keithley 2000 | 0583926 | Keithley | 24 M | - | 31.03.2015 |
| 392 | Radio Communication Tester | MT8820A | 6K00000788 | Anritsu | 12 M | - | 31.03.2014 |
| 431 | Model 7405 | Near-Field Probe Set | 9305-2457 | EMCO | - | 4 | |

| Ref.-No. | Equipment | Type | Serial-No. | Manufacturer | Interval of calibration | Remark | Cal due |
|----------|---|------------------------------|------------------------|-----------------------------|-------------------------|--------|------------|
| 436 | Univ. Radio Communication Tester | CMU 200 | 103083 | Rohde & Schwarz | 12 M | - | 31.03.2014 |
| 441 | CTC-SAR-EMI Cable Loss | System EMI field (SAR) Cable | - | CETECOM | 12 M | 5 | 31.10.2014 |
| 443 | CTC-FAR-EMI-RSE | System CTC-FAR-EMI-RSE | - | ETS-Lindgren / CETECOM | 12 M | 5 | 15.07.2014 |
| 448 | notch filter WCDMA_FDD II | WRCT 1850.0/2170.0-5/40- | 5 | Wainwright Instruments GmbH | 12 M | 1c | 30.06.2014 |
| 449 | notch filter WCDMA FDD V | WRCT 824.0/894.0-5/40-8SSK | 1 | Wainwright | 12 M | 1c | 30.06.2014 |
| 454 | Oscilloscope | HM 205-3 | 9210 P 29661 | Hameg | - | 4 | |
| 456 | DC-Power supply 0-5 A | EA 3013 S | 207810 | Elektro Automatik | pre-m | 2 | |
| 459 | DC -Power supply 0-5 A , 0-32 V | EA-PS 2032-50 | 910722 | Elektro Automatik | pre-m | 2 | |
| 460 | Univ. Radio Communication Tester | CMU 200 | 108901 | Rohde & Schwarz | 12 M | - | 31.03.2014 |
| 463 | Universal source | HP3245A | 2831A03472 | Agilent | - | 4 | |
| 466 | Digital Multimeter | Fluke 112 | 89210157 | Fluke USA | 24 M | - | 31.03.2014 |
| 467 | Digital Multimeter | Fluke 112 | 89680306 | Fluke USA | 24 M | - | 31.03.2014 |
| 468 | Digital Multimeter | Fluke 112 | 90090455 | Fluke USA | 24 M | - | 31.03.2014 |
| 477 | ReRadiating GPS-System | AS-47 | - | Automotive Cons. Fink | - | 3 | |
| 480 | power meter (Fula) | NRVS | 838392/031 | Rohde & Schwarz | 24 M | - | 31.03.2015 |
| 482 | filter matrix | Filter matrix SAR 1 | - | CETECOM (Brl) | - | 1d | |
| 484 | pre-amplifier 2,5 - 18 GHz | AMF-5D-02501800-25-10P | 1244554 | Miteq | 12 M | - | 30.06.2014 |
| 487 | System CTC NSA-Verification SAR-EMI | System EMI field (SAR) NSA | - | ETS Lindgren / CETECOM | 24 M | - | 30.06.2015 |
| 489 | EMI Test Receiver | ESU40 | 1000-30 | Rohde & Schwarz | 12 M | - | 31.03.2014 |
| 502 | band reject filter | WRCG 1709/1786-1699/1796- | SN 9 | Wainwright | pre-m | 2 | |
| 503 | band reject filter | WRCG 824/849-814/859- | SN 5 | Wainwright | pre-m | 2 | |
| 512 | notch filter GSM 850 | WRCA 800/960-02/40-6EEK | SN 24 | Wainwright | 12 M | 1c | 30.06.2014 |
| 517 | relais switch matrix | HF Relais Box Keithley | SE 04 | Keithley | pre-m | 2 | |
| 523 | Digital Multimeter | L4411A | MY46000154 | Agilent | 24 M | - | 31.03.2015 |
| 529 | 6 dB Broadband resistive power divider | Model 1515 | LH 855 | Weinschel | pre-m | 2 | |
| 530 | 10 dB Broadband resistive power divider | R 416110000 | LOT 9828 | - | pre-m | 2 | |
| 546 | Univ. Radio Communication Tester | CMU 200 | 106436 | R&S | 12 M | - | 31.03.2014 |
| 547 | Univ. Radio Communication Tester | CMU 200 | 835390/014 | Rohde & Schwarz | 12 M | - | 31.03.2014 |
| 548 | Digital-Barometer | GBP 2300 | without | Greisinger GmbH | 36 M | - | 30.06.2015 |
| 549 | Log.Per-Antenna | HL025 | 1000060 | Rohde & Schwarz | 36/12 M | - | 31.03.2015 |
| 552 | high pass filter 2,8-18GHz | WHKX 2.8/18G-10SS | 4 | Wainwright | 12 M | 1c | 30.06.2014 |
| 558 | System CTC FAR S-VSWR | System CTC FAR S-VSWR | - | CTC | 24 M | - | 31.07.2015 |
| 574 | Biconilog Hybrid Antenna | BTA-L | 980026L | Frankonia | 36/12 M | - | 31.03.2016 |
| 584 | Spectrum Analyzer | FSU 8 | 100248 | Rohde & Schwarz | 24 M | - | 31.03.2014 |
| 597 | Univ. Radio Communication Tester | CMU 200 | 100347 | Rohde & Schwarz | 12 M | - | 31.03.2014 |
| 598 | Spectrum Analyzer | FSEM 30 (Reserve) | 831259/013 | Rohde & Schwarz | 24 M | - | 13.01.2015 |
| 600 | power meter | NRVD (Reserve) | 834501/018 | Rohde & Schwarz | 24 M | - | 31.03.2015 |
| 601 | medium-sensitivity diode sensor | NRV-Z5 (Reserve) | 8435323/003 | Rohde & Schwarz | 24 M | - | 31.03.2015 |
| 602 | peak power sensor | NRV-Z32 (Reserve) | 835080 | Rohde & Schwarz | 24 M | - | 31.03.2015 |
| 608 | UltraLog-Antenna | HL 562 | 830547/009 | Rohde & Schwarz | 36/12 M | - | 31.03.2014 |
| 611 | DC power supply | E3632A | KR 75305854 | Agilent | pre-m | 2 | |
| 612 | DC power supply | E3632A | MY 40001321 | Agilent | pre-m | 2 | |
| 613 | Attenuator | R416120000 20dB 10W | Lot. 9828 | Radiall | pre-m | 2 | |
| 616 | Digitalmultimeter | Fluke 177 | 88900339 | Fluke | 24 M | - | 31.03.2014 |
| 617 | Power Splitter/Combiner | ZFSC-2-2-S+ | S F987001108 | Mini Circuits | - | 2 | |
| 618 | Power Splitter/Combiner | 50PD-634 | 600994 | JFW Industries USA | - | 2 | |
| 619 | Power Splitter/Combiner | 50PD-634 | 600995 | JFW Industries, USA | - | 3 | |
| 620 | EMI Test Receiver | ESU 26 | 100362 | Rohde-Schwarz | 12 M | - | 01.03.2014 |
| 621 | Step Attenuator 0-139 dB | RSP | 100017 | Rohde & Schwarz | pre-m | 2 | |
| 625 | Generic Test Load USB | Generic Test Load USB | - | CETECOM | - | 2 | |
| 627 | data logger | OPUS 1 | 201.0999.9302.6.4.1.43 | G. Luft GmbH | 24 M | - | 30.05.2014 |
| 634 | Spectrum Analyzer | FSM (HF-Unit) | 826188/010 | Rohde & Schwarz | pre-m | 2 | |
| 636 | Thermal Imaging camera | Ti32 | Ti32-12060213 | Fluke Corporation | 24 M | - | 31.07.2014 |
| 637 | High Speed HDMI with Ethernet 1m | HDMI cable with Ethernet 1m | - | Kogilink | - | 2 | |
| 638 | HDMI Kabel with Ethernet 1,5 m flach | HDMI cable with Ethernet | - | Reichelt | - | 2 | |
| 640 | HDMI cable 2m rund | HDMI cable 2m rund | - | Reichelt | - | 2 | |
| 641 | HDMI cable with Ethernet | Certified HDMI cable with | - | PureLink | - | 2 | |
| 642 | Wideband Radio Communication Tester | CMW 500 | 126089 | Rohde&Schwarz | 24 M | - | 31.03.2014 |
| 644 | Amplifier | ZX60-2534M+ | SN865701299 | Mini-Circuits | - | - | |
| 670 | Univ. Radio Communication Tester | CMU 200 | 106833 | Rohde & Schwarz | 12 M | - | 31.03.2014 |
| 671 | DC-power supply 0-5 A | EA-3013S | - | Elektro Automatik | pre-m | 2 | |
| 678 | Power Meter | NRP | 101638 | Rohde&Schwarz | pre-m | - | |

| Ref- No. | Equipment | Type | Serial-No. | Manufacturer | Interval of calibration | Remark | Cal due |
|-------------|-------------------|-------------------|------------|--------------------------------|----------------------------|--------|------------|
| 683 | Spectrum Analyzer | FSU 26 | 200571 | Rohde & Schwarz | 12 M | - | 26.11.2014 |
| 686 | Field Analyzer | EHP-200A | 160WX30702 | Narda Safety Test Solutions | 24 M | - | 18.07.2015 |
| 687 | Signal Generator | SMF 100A | 102073 | Rohde&Schwarz | 12 M | - | 27.11.2014 |
| 688 | Pre Amp | JS-18004000-40-8P | 1750117 | Miteq | pre-m | - | |
| | | | | | | | |

12 Observations

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

Annex A Document history

| Version | Applied changes | Date of release |
|---------|-------------------|-----------------|
| | Initial release | 2014-03-28 |
| -A | Editorial changes | 2014-03-31 |

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
Befehlense 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 Akkreditierungskunde gilt nur in Verbindung mit dem Bescheid vom 18.01.2013 mit der Akkreditierungsnummer D-PI-12076-01 und ist gültig 17.01.2018. Sie besteht aus diesem Deckblatt, der Rückseite des Deckblatts und der folgenden Anlage mit insgesamt 80 Seiten.

Registrierungsnummer der Urkunde: D-PI-12076-01-01

Frankfurt am Main, 18.01.2015
siehe Hinweistafel auf der Rückseite

Im Auftrag
Diana (PH) Jäger
Abteilungsleiter

Back side of certificate

Deutsche Akkreditierungsstelle GmbH

| | | |
|--|---|---|
| Standort Berlin Spittelmarkt 10 10117 Berlin | Standort Frankfurt am Main Gartenstraße 6 60594 Frankfurt am Main | Standort Braunschweig Rundesalle 100 38116 Braunschweig |
|--|---|---|

Die auszugsweise Veröffentlichung der Akkreditierungskunde bedarf der vorherigen schriftlichen Zustimmung der Deutsche Akkreditierungsstelle GmbH (DAkKS). Ausgenommen davon ist die separate Weiterverbreitung des Deckblatts 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 (Abt. 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.

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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.

<http://www.cetecom.com/eu/de/cetecom-group/europa/deutschland-saarbruecken/akkreditierungen.html>