

**TRaC Radio Test Report** : TRA-016954WUS1

**Applicant** : Pace Plc

**Apparatus** : PX032ANI Set Top Box

**Specification(s)** : CFR47 Part 15.225  
: CFR47 Part 15.247

**FCCID** :NQ8PX032ANI

**Purpose of Test** : Certification

**Authorised by**

: 

: Authorised Signatory

**Issue Date** :24<sup>th</sup> February 2014

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**Section 1:****Introduction****1.1 General**

This report contains an assessment of an apparatus against Electromagnetic Compatibility Standards based upon tests carried out on samples submitted to the Laboratory.

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## **1.2 Tests Requested By**

This testing in this report was requested by:

Pace Plc  
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## **1.3 Manufacturer**

As above

#### **1.4 Apparatus Assessed**

The following apparatus was assessed between: 02/12/13 and 19/12/13

PX032ANI Set Top Box

The PX032ANI Set Top Box was fitted with a RF4CE remote control, and a 13.56MHz NFC.

Radiated testing was performed using the EUTs integral antennas, conducted tests on the RF4CE were performed on a sample with coaxial cables fitted to the antenna terminals.

## 1.5 Test Result Summary

Full details of test results are contained within Appendices A, B and C. The following table summarises the results of the assessment.

The statements relating to compliance with the standards below apply ONLY as qualified in the notes and deviations stated in sections 1.6 to 1.7 of this test report.

| Test Type                                              | Regulation                                               | Measurement standard | Result |
|--------------------------------------------------------|----------------------------------------------------------|----------------------|--------|
| Radiated spurious emissions<br>(Restricted bands)      | Title 47 of the CFR:<br>Part 15 Subpart C; 15.247        | ANSI C63.10          | Pass   |
| Conducted spurious emissions<br>(Non-restricted bands) | Title 47 of the CFR:<br>Part 15 Subpart C; 15.247        | ANSI C63.10          | Pass   |
| AC Power conducted emissions                           | Title 47 of the CFR:<br>Part 15 Subpart C; 15.207        | ANSI C63.10          | Pass   |
| Occupied Bandwidth                                     | Title 47 of the CFR :<br>Part 15 Subpart C; 15.247(a)(2) | ANSI C63.10          | Pass   |
| Conducted Carrier Power                                | Title 47 of the CFR :<br>Part 15 Subpart C; 15.247(b)    | ANSI C63.10          | Pass   |
| Power Spectral Density                                 | Title 47 of the CFR :<br>Part 15 Subpart C; 15.247(d)    | ANSI C63.10          | Pass   |
| Unintentional Radiated Spurious Emissions              | Title 47 of the CFR:<br>Part 15 Subpart C; 15.109        | ANSI C63.10          | Pass   |
| RF Safety                                              | Title 47 of the CFR :<br>Part 15 Subpart C; 15.247(b)(5) | -                    | Pass   |
| Spurious Emissions Radiated <1000MHz                   | Title 47 of the CFR:<br>Part 15 Subpart (c) 15.209       | ANSI C63.10          | Pass   |
| Intentional Emission Frequency                         | Title 47 of the CFR:<br>Part 15 Subpart (c) 15.225       | ANSI C63.10          | Pass   |
| Intentional Emission Field Strength                    | Title 47 of the CFR:<br>Part 15 Subpart (c) 15.225       | ANSI C63.10          | Pass   |

Abbreviations used in the above table:

Mod : Modification  
CFR : Code of Federal Regulations  
REFE : Radiated Electric Field Emissions

ANSI : American National Standards Institution  
PLCE : Power Line Conducted Emissions

## **1.6 Notes Relating To The Assessment**

With regard to this assessment, the following points should be noted:

The results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

The apparatus was set up and exercised using the configurations, modes of operation and arrangements defined in this report only.

Particular operating modes, apparatus monitoring methods and performance criteria required by the standards tested to have been performed except where identified in Section 1.7 of this test report (Deviations from Test Standards).

For emissions testing, throughout this test report, "Pass" indicates that the results for the sample as tested were below the specified limit (refer also to Section 2, Measurement Uncertainty).

Where relevant, the apparatus was only assessed using the monitoring methods and susceptibility criteria defined in this report.

All testing with the exception of testing at the Open Area Test Site was performed under the following environmental conditions:

|                     |                 |
|---------------------|-----------------|
| Temperature         | : 17 to 23 °C   |
| Humidity            | : 45 to 75 %    |
| Barometric Pressure | : 86 to 106 kPa |

All dates used in this report are in the format dd/mm/yy.

This assessment has been performed in accordance with the requirements of ISO/IEC 17025.

## **1.7 Deviations from Test Standards**

There were no deviations from the standards tested to.

**Section 2:****Measurement Uncertainty****2.1 Measurement Uncertainty Values****Radiated Electric Field Emissions**

| Quantity Range              | Quantity                 | Expanded Uncertainty |
|-----------------------------|--------------------------|----------------------|
| 9kHz to 150 kHz             | Amplitude dB( $\mu$ V/m) | $\pm 1.6$ dB         |
| 150 kHz to 30 MHz           | Amplitude dB( $\mu$ V/m) | $\pm 2.1$ dB         |
| 30MHz to 300MHz Horizontal  | Amplitude dB( $\mu$ V/m) | $\pm 5.1$ dB         |
| 30MHz to 300MHz Vertical    | Amplitude dB( $\mu$ V/m) | $\pm 5.2$ dB         |
| 300MHz to 1GHz Horizontal   | Amplitude dB( $\mu$ V/m) | $\pm 5.4$ dB         |
| 300MHz to 1GHz Vertical     | Amplitude dB( $\mu$ V/m) | $\pm 5.2$ dB         |
| 1GHz to 18GHz Horizontal    | Amplitude dB( $\mu$ V/m) | $\pm 4.4$ dB         |
| 1GHz to 18GHz Vertical      | Amplitude dB( $\mu$ V/m) | $\pm 4.4$ dB         |
| 18GHz to 26.5GHz Horizontal | Amplitude dB( $\mu$ V/m) | $\pm 4.2$ dB         |
| 18GHz to 26.5GHz Vertical   | Amplitude dB( $\mu$ V/m) | $\pm 4.2$ dB         |
| 26.5GHz to 40GHz Horizontal | Amplitude dB( $\mu$ V/m) | $\pm 4.3$ dB         |
| 26.5GHz to 40GHz Vertical   | Amplitude dB( $\mu$ V/m) | $\pm 4.3$ dB         |

**Power Line Conducted Emissions**

| Quantity Range  | Quantity               | Expanded Uncertainty |
|-----------------|------------------------|----------------------|
| 9kHz to 150kHz  | Amplitude dB( $\mu$ V) | $\pm 4.2$ dB         |
| 150kHz to 30MHz | Amplitude dB( $\mu$ V) | $\pm 3.1$ dB         |

**Section 3:**

**Modifications**

**3.1 Modifications Performed During Assessment**

No modifications were performed during the assessment

**Appendix A:****RF4CE (Part 15.247) Test Results**

Abbreviations used in the tables in this appendix:

|      |                                 |      |                                |
|------|---------------------------------|------|--------------------------------|
| Spec | : Specification                 | ALSR | : Absorber Lined Screened Room |
| Mod  | : Modification                  | OATS | : Open Area Test Site          |
|      |                                 | ATS  | : Alternative Test Site        |
| EUT  | : Equipment Under Test          | Ref  | : Reference                    |
| SE   | : Support Equipment             | Freq | : Frequency                    |
| L    | : Live Power Line               | MD   | : Measurement Distance         |
| N    | : Neutral Power Line            | SD   | : Spec Distance                |
| E    | : Earth Power Line              |      |                                |
| Pk   | : Peak Detector                 | Pol  | : Polarisation                 |
| QP   | : Quasi-Peak Detector           | H    | : Horizontal Polarisation      |
| Av   | : Average Detector              | V    | : Vertical Polarisation        |
| CDN  | : Coupling & decoupling network |      |                                |

**A1 6 dB Bandwidth**

Title 47 of the CFR: Part 15 Subpart (c) 15.247(a)(2) requires the measurement of the bandwidth of the transmission between the -6 dB points on the transmitted spectrum.

| Test Details:          |                                                       |
|------------------------|-------------------------------------------------------|
| Regulation             | Title 47 of the CFR: Part 15 Subpart (c) 15.247(a)(2) |
| EUT sample number      | S02                                                   |
| Modification state     | 0                                                     |
| SE in test environment | None                                                  |
| SE isolated from EUT   | S06                                                   |
| EUT set up             | Refer to Appendix E                                   |

**Antenna 0**

| Channel Frequency (MHz) | F <sub>lower</sub> | F <sub>Higher</sub> | Measured 6 dB Bandwidth (MHz) | Limit (kHz) | Result |
|-------------------------|--------------------|---------------------|-------------------------------|-------------|--------|
| 2425                    | 2424.199           | 2425.817            | 1.618                         | >500        | Pass   |
| 2450                    | 2449.215           | 2450.785            | 1.570                         | >500        | Pass   |
| 2475                    | 2474.219           | 2475.789            | 1.570                         | >500        | Pass   |

**Antenna 1**

| Channel Frequency (MHz) | F <sub>lower</sub> | F <sub>Higher</sub> | Measured 6 dB Bandwidth (MHz) | Limit (kHz) | Result |
|-------------------------|--------------------|---------------------|-------------------------------|-------------|--------|
| 2425                    | 2424.195           | 2425.813            | 1.618                         | >500        | Pass   |
| 2450                    | 2449.191           | 2450.794            | 1.603                         | >500        | Pass   |
| 2475                    | 2474.219           | 2475.797            | 1.578                         | >500        | Pass   |

Plots of the 6 dB bandwidth are contained in Appendix D of this test report.

**A2 Transmitter Peak Output Power**

Carrier power was verified with the EUT transmitting on its lowest, centre and highest carrier frequency in turn.

| <b>Test Details:</b>   |                                                      |
|------------------------|------------------------------------------------------|
| Regulation             | Title 47 of the CFR: Part15 Subpart (c) 15.247(b)(3) |
| Measurement standard   | ANSI C63.10                                          |
| EUT sample number      | S02                                                  |
| Modification state     | 0                                                    |
| SE in test environment | None                                                 |
| SE isolated from EUT   | S06                                                  |
| EUT set up             | Refer to Appendix E                                  |

**Antenna 0**

| <b>Channel Frequency (MHz)</b> | <b>Peak Carrier Power (W)</b> | <b>Antenna Gain dBi</b> | <b>Radiated Power (W) (EIRP)</b> | <b>Limit (W)</b> | <b>Result</b> |
|--------------------------------|-------------------------------|-------------------------|----------------------------------|------------------|---------------|
| 2425                           | 0.00179                       | 2.2                     | 0.00297                          | 1.0000           | Pass          |
| 2450                           | 0.00175                       | 2.2                     | 0.00290                          | 1.0000           | Pass          |
| 2475                           | 0.00172                       | 2.2                     | 0.00285                          | 1.0000           | Pass          |

**Antenna 1**

| <b>Channel Frequency (MHz)</b> | <b>Peak Carrier Power (W)</b> | <b>Antenna Gain dBi</b> | <b>Radiated Power (W) (EIRP)</b> | <b>Limit (W)</b> | <b>Result</b> |
|--------------------------------|-------------------------------|-------------------------|----------------------------------|------------------|---------------|
| 2425                           | 0.00138                       | 3.6                     | 0.00316                          | 1.0000           | Pass          |
| 2450                           | 0.00137                       | 3.6                     | 0.00314                          | 1.0000           | Pass          |
| 2475                           | 0.00139                       | 3.6                     | 0.00318                          | 1.0000           | Pass          |

**Notes:**

Conducted Measurement

Measured Peak Carrier power includes the gain of each of the fixed antennas.

Highest Gain of any antenna to be used = 3.6 dBi

Conducted measurements were performed with a temporary antenna connector provided by the client.

**A3 Transmitter Power Spectral Density**

Transmitter Power Spectral Density was verified with the EUT transmitting on its lowest, centre and highest carrier frequency in turn.

| Test Details:          |                                                   |
|------------------------|---------------------------------------------------|
| Regulation             | Title 47 of the CFR: Part15 Subpart (c) 15.247(e) |
| Measurement standard   | ANSI C63.10                                       |
| EUT sample number      | S02                                               |
| Modification state     | 0                                                 |
| SE in test environment | None                                              |
| SE isolated from EUT   | S06                                               |
| EUT set up             | Refer to Appendix E                               |

**Antenna 0**

| Channel Frequency (MHz) | Peak Power Spectral Density (dBm/3kHz) | Limit (dBm/3kHz) | Result |
|-------------------------|----------------------------------------|------------------|--------|
| 2425                    | -11.6                                  | 8.0              | Pass   |
| 2450                    | -11.9                                  | 8.0              | Pass   |
| 2475                    | -11.4                                  | 8.0              | Pass   |

**Antenna 1**

| Channel Frequency (MHz) | Peak Power Spectral Density (dBm/3kHz) | Limit (dBm/3kHz) | Result |
|-------------------------|----------------------------------------|------------------|--------|
| 2425                    | -12.4                                  | 8.0              | Pass   |
| 2450                    | -12.7                                  | 8.0              | Pass   |
| 2475                    | -13.0                                  | 8.0              | Pass   |

**Notes:****Conducted Measurement**

Measured Power Spectral Density includes highest gain of any antenna to be used.

Highest Gain of any antenna to be used = 3.6 dBi

Conducted measurements were performed with a temporary antenna connector provided by the client.

The resolution bandwidth on the analyser was set to 3kHz and trace set to max hold.

The span is set to 2 MHz

The sweep time is 670 seconds (Span/3kHz).

**A4 RF Antenna Conducted Spurious Emissions**

Measurement of conducted spurious emissions at the antenna port was performed using a peak detector with the RBW set to 100kHz and the VBW>RBW. Frequencies were scanned up through to the 10th harmonic with the EUT transmitting on its lowest, centre and highest carrier frequency in turn.

| Test Details: 2425 MHz |                                                                             |
|------------------------|-----------------------------------------------------------------------------|
| Regulation             | Title 47 of the CFR: Part 15 Subpart (c) Clause 15.247(d) and Clause 15.205 |
| Measurement standard   | ANSI C63.10                                                                 |
| Frequency range        | 9 kHz to 25 GHz                                                             |
| EUT sample number      | S02                                                                         |
| Modification state     | 0                                                                           |
| SE in test environment | None                                                                        |
| SE isolated from EUT   | S06                                                                         |
| EUT set up             | Refer to Appendix E                                                         |

No emissions were detected within 20 dB of the test limit from either antenna port.

**RF Antenna Conducted Spurious Emissions continued:**

| Test Details: 2450 MHz |                                                                             |
|------------------------|-----------------------------------------------------------------------------|
| Regulation             | Title 47 of the CFR: Part 15 Subpart (c) Clause 15.247(d) and Clause 15.205 |
| Measurement standard   | ANSI C63.10                                                                 |
| Frequency range        | 9 kHz to 25 GHz                                                             |
| EUT sample number      | S02                                                                         |
| Modification state     | 0                                                                           |
| SE in test environment | None                                                                        |
| SE isolated from EUT   | S06                                                                         |
| EUT set up             | Refer to Appendix E                                                         |

No emissions were detected within 20 dB of the test limit from either antenna port.

**RF Antenna Conducted Spurious Emissions continued:**

| Test Details: 2475 MHz |                                                                             |
|------------------------|-----------------------------------------------------------------------------|
| Regulation             | Title 47 of the CFR: Part 15 Subpart (c) Clause 15.247(d) and Clause 15.205 |
| Measurement standard   | ANSI C63.10                                                                 |
| Frequency range        | 9 kHz to 25 GHz                                                             |
| EUT sample number      | S02                                                                         |
| Modification state     | 0                                                                           |
| SE in test environment | None                                                                        |
| SE isolated from EUT   | S06                                                                         |
| EUT set up             | Refer to Appendix E                                                         |

No emissions were detected within 20 dB of the test limit from either antenna port.

**Notes:**

1. The conducted emission limit for emissions outside the restricted bands, defined in 47CFR15.205(a) are based on a transmitted carrier level of 15.247(b). With the EUT transmitting on its lowest, centre and highest carrier frequencies in turn, emissions from the EUT are required to be 20 dB below the level of the highest fundamental as measured within a 100 kHz RBW in accordance with 15.247(d) using a peak detector.
2. The RBW = 100 kHz, Video bandwidth (VBW) > RBW and the radio spectrum was investigated up to the 10th harmonic in accordance 15.33 (a)(1).
3. The measurements at 2400 MHz and 2483.5 MHz were made to ensure band edge compliance.
4. The carrier level was measured whilst varying the supply voltage between 85% and 105% of the nominal supply voltage as required by 15.31(e). No variation in carrier level was observed. All other emissions were at least 20dB below the test limit

The limit outside the restricted band in 100 kHz RBW is defined using the following formula in accordance with 15.247(d):

The limit in 100 kHz RBW = (Maximum Peak Conducted Carrier measured in 100kHz RBW)-20dB

Where:

The maximum peak conducted power was measured using a spectrum analyser using a 100kHz resolution bandwidth.

Antenna 0:

| Channel No. | Channel Frequency (MHz) | Measured Peak Carrier (dBm) | Measured Peak Carrier -20dB (dBm) | Emission Limit In a 100 kHz RBW (dBm) |
|-------------|-------------------------|-----------------------------|-----------------------------------|---------------------------------------|
| 15          | 2425                    | -0.36                       | -20.36                            | -20.36                                |
| 20          | 2450                    | -1.06                       | -21.06                            | -21.06                                |
| 25          | 2475                    | -1.36                       | -21.36                            | -21.36                                |

Antenna 1:

| Channel No. | Channel Frequency (MHz) | Measured Peak Carrier (dBm) | Measured Peak Carrier -20dB (dBm) | Emission Limit In a 100 kHz RBW (dBm) |
|-------------|-------------------------|-----------------------------|-----------------------------------|---------------------------------------|
| 15          | 2425                    | -1.75                       | -21.75                            | -21.75                                |
| 20          | 2450                    | -1.73                       | -21.73                            | -21.73                                |
| 25          | 2475                    | -1.75                       | -21.75                            | -21.75                                |

#### **A5     Antenna Gain**

The maximum antenna gain for the antenna type to be used with the EUT, as declared by the client, is 2.2 dBi Peak gain for antenna 0 (on the front left), and 3.6 dBi Peak gain for antenna 1 (on the front right).

**A6 Radiated Electric Field Emissions within the Restricted Bands of 15.205**

Preliminary scans were performed using a peak detector with the RBW = 100kHz. The radiated electric field emission test applies to spurious emissions and harmonics that fall within the restricted bands listed in Section 15.205. The maximum permitted field strength is listed in Section 15.209. The EUT was set to transmit on its lowest, centre and highest carrier frequency.

The following test site was used for final measurements as specified by the standard tested to:

3m open area test site :

☐

3m alternative test site :

☒

The effect of the EUT set-up on the measurements is summarised in note (c) below.

| Test Details: 2475     |                                                        |
|------------------------|--------------------------------------------------------|
| Regulation             | Title 47 of the CFR: Part 15 Subpart (b) Clause 15.209 |
| Measurement standard   | ANSI C63.10                                            |
| Frequency range        | 30MHz to 25 GHz                                        |
| EUT sample number      | S01                                                    |
| Modification state     | 0                                                      |
| SE in test environment | S05, S07, S08                                          |
| SE isolated from EUT   | S04, S06                                               |
| EUT set up             | Refer to Appendix E                                    |

The worst case radiated emission measurements for spurious emissions:

| Ref No. | FREQ.<br>(MHz) | DETECTOR | FIELD<br>ST'GH<br>(dBµV/m) | Duty Cycle<br>Fact (dB) | FIELD ST'GH<br>(dBµV/m) | LIMIT<br>(dBµV/m) |
|---------|----------------|----------|----------------------------|-------------------------|-------------------------|-------------------|
| 1.      | 31.900         | Pk       | 38.7                       | 0                       | 38.7                    | 60                |
| 2.      | 31.900         | QP       | 32.4                       | 0                       | 32.4                    | 40                |
| 3.      | 63.622         | Pk       | 37.4                       | 0                       | 37.4                    | 60                |
| 4.      | 63.622         | QP       | 32.3                       | 0                       | 32.3                    | 40                |
| 5.      | 73.000         | Pk       | 36.9                       | 0                       | 36.9                    | 60                |
| 6.      | 73.000         | QP       | 29.1                       | 0                       | 29.1                    | 40                |
| 7.      | 75.200         | Pk       | 31.9                       | 0                       | 31.9                    | 60                |
| 8.      | 75.200         | QP       | 22.8                       | 0                       | 22.8                    | 40                |
| 9.      | 84.856         | Pk       | 45.0                       | 0                       | 45.0                    | 60                |
| 10.     | 84.856         | QP       | 38.0                       | 0                       | 38.0                    | 40                |
| 11.     | 98.000         | Pk       | 37.1                       | 0                       | 37.1                    | 63.5              |
| 12.     | 98.000         | QP       | 30.0                       | 0                       | 30.0                    | 43.5              |
| 13.     | 118.000        | Pk       | 44.4                       | 0                       | 44.4                    | 63.5              |
| 14.     | 118.000        | QP       | 38.3                       | 0                       | 38.3                    | 43.5              |
| 15.     | 161.444        | Pk       | 42.9                       | 0                       | 42.9                    | 63.5              |
| 16.     | 161.444        | QP       | 34.7                       | 0                       | 34.7                    | 43.5              |
| 17.     | 241.889        | Pk       | 38.3                       | 0                       | 38.3                    | 66                |
| 18.     | 241.889        | QP       | 30.5                       | 0                       | 30.5                    | 46                |
| 19.     | 472.000        | Pk       | 38.0                       | 0                       | 38.0                    | 66                |
| 20.     | 472.000        | QP       | 29.1                       | 0                       | 29.1                    | 46                |
| 21.     | 650.000        | Pk       | 39.6                       | 0                       | 39.6                    | 66                |
| 22.     | 650.000        | QP       | 37.3                       | 0                       | 37.3                    | 46                |
| 23.     | 741.741        | Pk       | 42.7                       | 0                       | 42.7                    | 66                |
| 24.     | 741.741        | QP       | 34.7                       | 0                       | 34.7                    | 46                |
| 25.     | 750.000        | Pk       | 43.4                       | 0                       | 43.4                    | 66                |
| 26.     | 750.000        | QP       | 41.3                       | 0                       | 41.3                    | 46                |
| 27.     | 850.000        | Pk       | 42.4                       | 0                       | 42.4                    | 66                |
| 28.     | 850.000        | QP       | 40.9                       | 0                       | 40.9                    | 46                |
| 29.     | 950.000        | Pk       | 43.9                       | 0                       | 43.9                    | 66                |
| 30.     | 950.000        | QP       | 42.2                       | 0                       | 42.2                    | 46                |

No further Spurious emissions within 20 dB of the test limit were detected.

Preview measurements indicated that there was no difference in emissions profile below 1GHz when the EUT was operating on channels 15, 20 and 25.

The Upper Band Edge radiated emission measurements – Channel 25, Antenna 0:

| Ref No. | FREQ.<br>(MHz) | DETECTOR | FIELD<br>ST'GH<br>(dBµV/m) | Duty Cycle<br>Fact (dB) | FIELD ST'GH<br>(dBµV/m) | LIMIT<br>(dBµV/m) |
|---------|----------------|----------|----------------------------|-------------------------|-------------------------|-------------------|
| 31.     | 2483.5         | Pk       | 46.4                       | 0                       | 46.4                    | 74                |
| 32.     | 2483.5         | Av       | 38.6                       | 0                       | 38.6                    | 54                |

The Upper Band Edge radiated emission measurements – Channel 25, Antenna 1:

| Ref No. | FREQ.<br>(MHz) | DETECTOR | FIELD<br>ST'GH<br>(dBµV/m) | Duty Cycle<br>Fact (dB) | FIELD ST'GH<br>(dBµV/m) | LIMIT<br>(dBµV/m) |
|---------|----------------|----------|----------------------------|-------------------------|-------------------------|-------------------|
| 31.     | 2483.5         | Pk       | 45.0                       | 0                       | 45.0                    | 74                |
| 32.     | 2483.5         | Av       | 34.9                       | 0                       | 34.9                    | 54                |

**Notes:**

- 1 Any testing performed below 30 MHz was performed using a magnetic loop antenna in accordance with ANSI C63.10: section 4.5, Table 1
- 2 In accordance with 15.35(b), above 1 GHz, emissions measured using a peak detector shall not exceed a level 20 dB above the average limit.
- 3 Testing was performed with the EUT orientated in three orthogonal planes and the maximum emissions level recorded. In addition, the EUT antenna was varied within its range of motion in order to maximise emissions.
- 4 For Frequencies below 1 GHz, RBW= 100 kHz, testing was performed with CISPR16 compliant test receiver with QP detector. Above 1 GHz tests were performed using a spectrum analyser using the following settings:
 

|         |               |
|---------|---------------|
| Peak    | RBW=VBW= 1MHz |
| Average | RBW=VBW= 1MHz |

These settings as per ANSI C63.10

The upper and lower frequency of the measurement range was decided according to CFR 47 Part 15: Clause 15.33(a) and 15.33(a)(1).

Radiated emission limits (CFR 47 Part 15: Clause 15.209) for emissions falling within the restricted bands defined in 15.205(a):

| Frequency of emission (MHz) | Field strength $\square V/m$ | Measurement Distance m | Field strength dB $\square V/m$ |
|-----------------------------|------------------------------|------------------------|---------------------------------|
| 0.009-0.490                 | $2400/F(\text{kHz})$         | 300                    | $67.6/F(\text{kHz})$            |
| 0.490-1.705                 | $24000/F(\text{kHz})$        | 30                     | $87.6/F(\text{kHz})$            |
| 1.705-30                    | 30                           | 30                     | 29.5                            |
| 30-88                       | 100                          | 3                      | 40.0                            |
| 88-216                      | 150                          | 3                      | 43.5                            |
| 216-960                     | 200                          | 3                      | 46.0                            |
| Above 960                   | 500                          | 3                      | 54.0                            |

**Notes:**

- (a) Where results have been measured at one distance, and a signal level displayed at another, the results have been extrapolated using the following formula:

$$\text{Extrapolation (dB)} = 20 \log_{10} \left( \frac{\text{measurement distance}}{\text{specification distance}} \right)$$

The results displayed take into account applicable antenna factors and cable losses.

- (b) The levels may have been rounded for display purposes.
- (c) The following table summarises the effect of the EUT operating mode, internal configuration and arrangement of cables / samples on the measured emission levels :

|                                                                                                                                                                                                                                                                                                                                | See (i) | See (ii) | See (iii) | See (iv) |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------|-----------|----------|
| Effect of EUT operating mode on emission levels                                                                                                                                                                                                                                                                                |         | ✓        |           |          |
| Effect of EUT internal configuration on emission levels                                                                                                                                                                                                                                                                        |         | ✓        |           |          |
| Effect of Position of EUT cables & samples on emission levels                                                                                                                                                                                                                                                                  | ✓       |          |           |          |
| (i) Parameter defined by standard and / or single possible, refer to Appendix E<br>(ii) Parameter defined by client and / or single possible, refer to Appendix E<br>(iii) Parameter had a negligible effect on emission levels, refer to Appendix E<br>(iv) Worst case determined by initial measurement, refer to Appendix E |         |          |           |          |

**Appendix B:****NFC (Part 15.225) Test Results**

Abbreviations used in the tables in this appendix:

|      |                                 |      |                                |
|------|---------------------------------|------|--------------------------------|
| Spec | : Specification                 | ALSR | : Absorber Lined Screened Room |
| Mod  | : Modification                  | OATS | : Open Area Test Site          |
|      |                                 | ATS  | : Alternative Test Site        |
| EUT  | : Equipment Under Test          |      |                                |
| SE   | : Support Equipment             | Ref  | : Reference                    |
|      |                                 | Freq | : Frequency                    |
| L    | : Live Power Line               |      |                                |
| N    | : Neutral Power Line            | MD   | : Measurement Distance         |
| E    | : Earth Power Line              | SD   | : Spec Distance                |
|      |                                 |      |                                |
| Pk   | : Peak Detector                 | Pol  | : Polarisation                 |
| QP   | : Quasi-Peak Detector           | H    | : Horizontal Polarisation      |
| Av   | : Average Detector              | V    | : Vertical Polarisation        |
|      |                                 |      |                                |
| CDN  | : Coupling & decoupling network |      |                                |

**B1 Transmitter Intentional Emission Radiated**

| Test Details           |                                                |
|------------------------|------------------------------------------------|
| Regulation             | Title 47 of the CFR: Part15 Subpart (c) 15.225 |
| Measurement standard   | ANSI C63.10                                    |
| EUT sample number      | S01                                            |
| Modification state     | 0                                              |
| SE in test environment | S05, S07, S08                                  |
| SE isolated from EUT   | S04, S06                                       |
| EUT set up             | Refer to Appendix E                            |

| Frequency (MHz)          | Receiver Level (dBμV/m) | Measurement Distance (m) | Specification Distance (m)  | Extrapolation Factor (dB) | Field Strength (dBμV/m) | Field Strength (μV/m) |
|--------------------------|-------------------------|--------------------------|-----------------------------|---------------------------|-------------------------|-----------------------|
| 13.56                    | 35.4                    | 3                        | 30                          | 40                        | 15.5                    | 5.957                 |
| 13.56                    | 47.2                    | 1                        | 30                          | 59.1                      | 8.2                     | 2.512                 |
| Limit value @ $f_c$      |                         |                          | 15848 μV/m at 30m           |                           |                         |                       |
| Band occupancy @ -20 dBc |                         |                          | 20dB Bandwidth = 93.884kHz  |                           |                         |                       |
| Band occupancy @ 99%     |                         |                          | 99% Bandwidth = 258.7256kHz |                           |                         |                       |

- Notes:**
- 1 Results quoted are extrapolated as indicated
  - 2 Receiver detector at  $f_c$  was Peak with 10kHz bandwidth
  - 3 When battery powered the EUT was powered with new batteries

- Test Method:**
- 1 As per Radio – Noise Emissions, ANSI C63.10
  - 2 Measuring distances 3m
  - 3 EUT 0.8 metre above ground plane
  - 4 Emissions maximised by rotation of EUT, on an automatic turntable
  - 5 EUT orientation in three orthogonal planes
  - 6 Maximum results recorded

**B2 Radiated Magnetic Field Emissions**

Preliminary scans were performed using a peak detector. The radiated magnetic field emissions test applies to all spurious emissions and harmonics emissions. The maximum permitted field strength is listed in Section 15.209. The EUT was set to transmit as required.

The following test site was used for final measurements as specified by the standard tested to:

3m open area test site :

☐

3m alternative test site :

☒

The effect of the EUT set-up on the measurements is summarised in note (c) below.

| Test Details           |                                                        |
|------------------------|--------------------------------------------------------|
| Regulation             | Title 47 of the CFR, Part 15 Subpart (c) Clause 15.209 |
| Measurement standard   | ANSI C63.10                                            |
| Frequency range        | 9kHz to 30MHz                                          |
| EUT sample number      | S01                                                    |
| Modification state     | 0                                                      |
| SE in test environment | S05, S07, S08                                          |
| SE isolated from EUT   | S04, S06                                               |
| EUT set up             | Refer to Appendix E                                    |

The worst case radiated emission measurements for spurious emissions are listed below.

| Frequency (MHz)                                            | Pk Level (dBuV/m) | Pk Limit (dBuV/m) | Pk Delta (dB) | Result Summary |
|------------------------------------------------------------|-------------------|-------------------|---------------|----------------|
| No Significant emissions detected within 20dB of the limit |                   |                   |               |                |

**Notes:**

- 1 Any testing performed below 30 MHz was performed using a magnetic loop antenna in accordance with ANSI C63.10: section 4.5, Table 1. For emissions below 30MHz the cable losses are assumed to be negligible.
- 2 In accordance with 15.35(b), above 1 GHz, emissions measured using a peak detector shall not exceed a level 20 dB above the average limit.
- 3 Testing was performed with the EUT orientated in three orthogonal planes and the maximum emissions level recorded. In addition, the EUT antenna was varied within its range of motion in order to maximise emissions.
- 4 For Frequencies below 1 GHz, RBW= 120 kHz, testing was performed with CISPR16 compliant test receiver with QP detector. Above 1 GHz tests were performed using a spectrum analyser using the following settings:

Peak RBW=VBW= 1MHz  
Average RBW=VBW= 1MHz

The upper and lower frequency of the measurement range was decided according to CFR 47 Part 15 Clause 15.33(a) and 15.33(a)(1). Radiated emission limits CFR 47 Part 15: Clause 15.209 for all emissions:

| Frequency of emission (MHz) | Field strength (μV/m) | Measurement Distance (m) | Field strength (dBμV/m) |
|-----------------------------|-----------------------|--------------------------|-------------------------|
| 0.009-0.490                 | 2400/F(kHz)           | 300                      | 67.6/F (kHz)            |
| 0.490-1.705                 | 24000/F(kHz)          | 30                       | 87.6/F (kHz)            |
| 1.705-30                    | 30                    | 30                       | 29.5                    |
| 30-88                       | 100                   | 3                        | 40.0                    |
| 88-216                      | 150                   | 3                        | 43.5                    |
| 216-960                     | 200                   | 3                        | 46.0                    |
| Above 960                   | 500                   | 3                        | 54.0                    |

- (a) Where results have been measured at one distance, and a signal level displayed at another, the results have been extrapolated using the following formula:

$$\text{Extrapolation (dB)} = x \log_{10} \left( \frac{\text{measurement distance}}{\text{specification distance}} \right)$$

- (b) The levels may have been rounded for display purposes.  
(c) The following table summarises the effect of the EUT operating mode, internal configuration and arrangement of cables / samples on the measured emission levels:

|                                                                                                                                                                                                                                                                                                                                | See (i) | See (ii) | See (iii) | See (iv) |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------|-----------|----------|
| Effect of EUT operating mode on emission levels                                                                                                                                                                                                                                                                                | ✓       |          |           |          |
| Effect of EUT internal configuration on emission levels                                                                                                                                                                                                                                                                        |         | ✓        |           |          |
| Effect of Position of EUT cables & samples on emission levels                                                                                                                                                                                                                                                                  |         |          | ✓         |          |
| (i) Parameter defined by standard and / or single possible, refer to Appendix E<br>(ii) Parameter defined by client and / or single possible, refer to Appendix E<br>(iii) Parameter had a negligible effect on emission levels, refer to Appendix E<br>(iv) Worst case determined by initial measurement, refer to Appendix E |         |          |           |          |

**B3 Frequency Stability**

| Test Details:          |                                                        |
|------------------------|--------------------------------------------------------|
| Regulation             | Title 47 of the CFR, Part 15 Subpart (c) Clause 15.225 |
| Measurement standard   | ANSI C63.10                                            |
| EUT sample number      | S02                                                    |
| Modification state     | 0                                                      |
| SE in test environment | None                                                   |
| SE isolated from EUT   | S06                                                    |
| EUT set up             | Refer to Appendix E                                    |

## Worse Case

| Vnom (Vac) | Temperature (°C) | Frequency (MHz) | Deviation (kHz) | Limit = $\pm 0.01\%$<br>= $\pm 1.3562\text{kHz}$ |
|------------|------------------|-----------------|-----------------|--------------------------------------------------|
| 115Vac     | 50               | 13.559984       | 0.000016        | Pass                                             |
| 115Vac     | 40               | 13.560048       | 0.000048        | Pass                                             |
| 115Vac     | 30               | 13.560096       | 0.000096        | Pass                                             |
| 115Vac     | 20               | 13.560160       | 0.000160        | Pass                                             |
| 115Vac     | 10               | 13.560208       | 0.000208        | Pass                                             |
| 115Vac     | 0                | 13.560224       | 0.000224        | Pass                                             |
| 115Vac     | -10              | 13.560224       | 0.000224        | Pass                                             |
| 115Vac     | -20              | 13.560224       | 0.000224        | Pass                                             |

| Voltage (Vac)<br>85% - 115% | Temperature (°C) | Frequency (MHz) | Deviation (kHz) | Limit = $\pm 0.01\%$<br>= $\pm 1.3562\text{kHz}$ |
|-----------------------------|------------------|-----------------|-----------------|--------------------------------------------------|
| 85% = 85                    | +20 °C           | 13.560144       | 0.000144        | Pass                                             |
| 115% = 138                  | +20 °C           | 13.560128       | 0.000128        | Pass                                             |

Note: The Voltage operating range of the RFID Transmitter 100Vac-120Vac

**Appendix C:****General Test Results**

Abbreviations used in the tables in this appendix:

|      |                                 |      |                                |
|------|---------------------------------|------|--------------------------------|
| Spec | : Specification                 | ALSR | : Absorber Lined Screened Room |
| Mod  | : Modification                  | OATS | : Open Area Test Site          |
|      |                                 | ATS  | : Alternative Test Site        |
| EUT  | : Equipment Under Test          | Ref  | : Reference                    |
| SE   | : Support Equipment             | Freq | : Frequency                    |
| L    | : Live Power Line               | MD   | : Measurement Distance         |
| N    | : Neutral Power Line            | SD   | : Spec Distance                |
| E    | : Earth Power Line              |      |                                |
| Pk   | : Peak Detector                 | Pol  | : Polarisation                 |
| QP   | : Quasi-Peak Detector           | H    | : Horizontal Polarisation      |
| Av   | : Average Detector              | V    | : Vertical Polarisation        |
| CDN  | : Coupling & decoupling network |      |                                |

**C1 Power Line Conducted Emissions**

Preview power line conducted emission measurements were performed with a peak detector in a screened room. The effect of the EUT set-up on the measurements is summarised in note (b). Where applicable formal measurements of the emissions were performed with a peak, average and/or quasi peak detector. The EUT was set to transmit on its lowest, centre and highest carrier frequency in turn. The formal measurements are detailed below:

| <b>Test Details: Transmit mode</b> |                                                        |
|------------------------------------|--------------------------------------------------------|
| Regulation                         | Title 47 of the CFR: Part 15 Subpart (c) Clause 15.207 |
| Measurement standard               | ANSI C63.10                                            |
| Frequency range                    | 150kHz to 30MHz                                        |
| EUT sample number                  | S01                                                    |
| Modification state                 | 0                                                      |
| SE in test environment             | S05, S07, S08                                          |
| SE isolated from EUT               | S04, S06                                               |
| EUT set up                         | Refer to Appendix E                                    |

The worst-case power line conducted emission measurements are listed below:

**Results measured using the average detector compared to the average limit**

| Ref No. | Freq (MHz) | Conductor | Result (dBuV) | Spec Limit (dBuV) | Margin (dB) | Result Summary |
|---------|------------|-----------|---------------|-------------------|-------------|----------------|
| 1       | 0.198      | L         | 35.9          | 53.7              | -17.8       | Pass           |
| 2       | 0.307      | L         | 20.2          | 50.1              | -29.9       | Pass           |
| 3       | 0.500      | L         | 22.6          | 46.0              | -23.4       | Pass           |
| 4       | 0.600      | L         | 19.0          | 46.0              | -27.0       | Pass           |
| 5       | 3.400      | L         | 33.0          | 46.0              | -13.0       | Pass           |
| 6       | 13.560     | L         | 25.2          | 50.0              | -24.8       | Pass           |
| 7       | 18.242     | L         | 41.2          | 50.0              | -8.8        | Pass           |
| 8       | 19.708     | L         | 40.1          | 50.0              | -9.9        | Pass           |
| 9       | 20.258     | L         | 38.1          | 50.0              | -11.9       | Pass           |
| 10      | 0.198      | N         | 35.9          | 53.7              | -17.8       | Pass           |
| 11      | 0.307      | N         | 20.5          | 50.1              | -29.6       | Pass           |
| 12      | 0.500      | N         | 24.1          | 46.0              | -21.9       | Pass           |
| 13      | 0.600      | N         | 18.7          | 46.0              | -27.3       | Pass           |
| 14      | 3.400      | N         | 32.9          | 46.0              | -13.1       | Pass           |
| 15      | 13.560     | N         | 28.8          | 50.0              | -21.2       | Pass           |
| 16      | 18.242     | N         | 41.1          | 50.0              | -8.9        | Pass           |
| 17      | 19.708     | N         | 40.0          | 50.0              | -10.0       | Pass           |
| 18      | 20.258     | N         | 37.8          | 50.0              | -12.2       | Pass           |

**Results measured using the quasi-peak detector compared to the quasi-peak limit**

| Ref No. | Freq (MHz) | Conductor | Result (dBuV) | Spec Limit (dBuV) | Margin (dB) | Result Summary |
|---------|------------|-----------|---------------|-------------------|-------------|----------------|
| 1       | 0.198      | L         | 52.4          | 63.7              | -11.3       | Pass           |
| 2       | 0.307      | L         | 38.6          | 60.1              | -21.5       | Pass           |
| 3       | 0.500      | L         | 36.4          | 56.0              | -19.6       | Pass           |
| 4       | 0.600      | L         | 34.6          | 56.0              | -21.4       | Pass           |
| 5       | 3.400      | L         | 39.3          | 56.0              | -16.7       | Pass           |
| 6       | 13.560     | L         | 33.5          | 60.0              | -26.5       | Pass           |
| 7       | 18.242     | L         | 45.8          | 60.0              | -14.2       | Pass           |
| 8       | 19.708     | L         | 44.3          | 60.0              | -15.7       | Pass           |
| 9       | 20.258     | L         | 42.7          | 60.0              | -17.3       | Pass           |
| 10      | 0.198      | N         | 52.1          | 63.7              | -11.6       | Pass           |
| 11      | 0.307      | N         | 38.0          | 60.1              | -22.1       | Pass           |
| 12      | 0.500      | N         | 37.2          | 56.0              | -18.8       | Pass           |
| 13      | 0.600      | N         | 34.4          | 56.0              | -21.6       | Pass           |
| 14      | 3.400      | N         | 38.6          | 56.0              | -17.4       | Pass           |
| 15      | 13.560     | N         | 44.9          | 60.0              | -15.1       | Pass           |
| 16      | 18.242     | N         | 45.6          | 60.0              | -14.4       | Pass           |
| 17      | 19.708     | N         | 44.1          | 60.0              | -15.9       | Pass           |
| 18      | 20.258     | N         | 42.6          | 60.0              | -17.4       | Pass           |

| Test Details: Receive mode |                                                        |
|----------------------------|--------------------------------------------------------|
| Regulation                 | Title 47 of the CFR: Part 15 Subpart (c) Clause 15.107 |
| Measurement standard       | ANSI C63.10                                            |
| Frequency range            | 150kHz to 30MHz                                        |
| EUT sample number          | S01                                                    |
| Modification state         | 0                                                      |
| SE in test environment     | S05, S07, S08                                          |
| SE isolated from EUT       | S04, S06                                               |
| EUT set up                 | Refer to Appendix E                                    |

The worst-case power line conducted emission measurements are listed below:

**Results measured using the average detector compared to the average limit**

| Ref No. | Freq (MHz) | Conductor | Result (dBuV) | Spec Limit (dBuV) | Margin (dB) | Result Summary |
|---------|------------|-----------|---------------|-------------------|-------------|----------------|
| 1       | 0.198      | L         | 35.4          | 53.7              | -18.3       | Pass           |
| 2       | 0.307      | L         | 19.8          | 50.1              | -30.3       | Pass           |
| 3       | 0.500      | L         | 22.8          | 46.0              | -23.2       | Pass           |
| 4       | 0.600      | L         | 18.1          | 46.0              | -27.9       | Pass           |
| 5       | 3.400      | L         | 32.4          | 46.0              | -13.6       | Pass           |
| 6       | 13.560     | L         | 25.0          | 50.0              | -25.0       | Pass           |
| 7       | 18.242     | L         | 39.5          | 50.0              | -10.5       | Pass           |
| 8       | 19.708     | L         | 38.8          | 50.0              | -11.2       | Pass           |
| 9       | 20.258     | L         | 38.8          | 50.0              | -11.2       | Pass           |
| 10      | 0.198      | N         | 35.5          | 53.7              | -18.2       | Pass           |
| 11      | 0.307      | N         | 20.4          | 50.1              | -29.7       | Pass           |
| 12      | 0.500      | N         | 23.9          | 46.0              | -22.1       | Pass           |
| 13      | 0.600      | N         | 17.1          | 46.0              | -28.9       | Pass           |
| 14      | 3.400      | N         | 17.7          | 46.0              | -28.3       | Pass           |
| 15      | 13.560     | N         | 24.2          | 50.0              | -25.8       | Pass           |
| 16      | 18.242     | N         | 39.3          | 50.0              | -10.7       | Pass           |
| 17      | 19.708     | N         | 38.7          | 50.0              | -11.3       | Pass           |
| 18      | 20.258     | N         | 38.7          | 50.0              | -11.3       | Pass           |

**Results measured using the quasi-peak detector compared to the quasi-peak limit**

| Ref No. | Freq (MHz) | Conductor | Result (dBuV) | Spec Limit (dBuV) | Margin (dB) | Result Summary |
|---------|------------|-----------|---------------|-------------------|-------------|----------------|
| 1       | 0.198      | L         | 51.6          | 63.7              | -12.1       | Pass           |
| 2       | 0.307      | L         | 38.0          | 60.1              | -22.1       | Pass           |
| 3       | 0.500      | L         | 35.9          | 56.0              | -20.1       | Pass           |
| 4       | 0.600      | L         | 33.8          | 56.0              | -22.2       | Pass           |
| 5       | 3.400      | L         | 38.6          | 56.0              | -17.4       | Pass           |
| 6       | 13.560     | L         | 33.1          | 60.0              | -26.9       | Pass           |
| 7       | 18.242     | L         | 43.6          | 60.0              | -16.4       | Pass           |
| 8       | 19.708     | L         | 42.5          | 60.0              | -17.5       | Pass           |
| 9       | 20.258     | L         | 42.5          | 60.0              | -17.5       | Pass           |
| 10      | 0.198      | N         | 51.6          | 63.7              | -12.1       | Pass           |
| 11      | 0.307      | N         | 37.7          | 60.1              | -22.4       | Pass           |
| 12      | 0.500      | N         | 36.7          | 56.0              | -19.3       | Pass           |
| 13      | 0.600      | N         | 33.0          | 56.0              | -23.0       | Pass           |
| 14      | 3.400      | N         | 33.5          | 56.0              | -22.5       | Pass           |
| 15      | 13.560     | N         | 31.0          | 60.0              | -29.0       | Pass           |
| 16      | 18.242     | N         | 43.4          | 60.0              | -16.6       | Pass           |
| 17      | 19.708     | N         | 42.3          | 60.0              | -17.7       | Pass           |
| 18      | 20.258     | N         | 42.4          | 60.0              | -17.6       | Pass           |

**Specification limits :**

Conducted emission limits (CFR 47 Part 15: Clause 15.207):

Conducted disturbance at the mains ports.

| Frequency range MHz | Limits dB $\mu$ V     |                       |
|---------------------|-----------------------|-----------------------|
|                     | Quasi-peak            | Average               |
| 0.15 to 0.5         | 66 to 56 <sup>2</sup> | 56 to 46 <sup>2</sup> |
| 0.5 to 5            | 56                    | 46                    |
| 5 to 30             | 60                    | 50                    |

Notes:

1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

**Notes:**

- (a) The levels may have been rounded for display purposes.
- (b) The following table summarises the effect of the EUT operating mode and internal configuration on the measured emission levels :

|                                                                                                                                                                                                                                                                                                                                | See (i) | See (ii) | See (iii) | See (iv) |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------|-----------|----------|
| Effect of EUT operating mode on emission levels                                                                                                                                                                                                                                                                                |         | ✓        |           |          |
| Effect of EUT internal configuration on emission levels                                                                                                                                                                                                                                                                        |         | ✓        |           |          |
| (i) Parameter defined by standard and / or single possible, refer to Appendix E<br>(ii) Parameter defined by client and / or single possible, refer to Appendix E<br>(iii) Parameter had a negligible effect on emission levels, refer to Appendix E<br>(iv) Worst case determined by initial measurement, refer to Appendix E |         |          |           |          |

**C2 Unintentional Radiated Electric Field Emissions - 15.109**

Preliminary scans were performed using a peak detector with the RBW = 100kHz. The maximum permitted field strength is listed in Section 15.109. The EUT was set to receive mode only on its lowest, centre and highest carrier frequency in turn.

The following test site was used for final measurements as specified by the standard tested to :

3m open area test site :

☐

3m alternative test site :

☒

| Test Details:          |                                                        |
|------------------------|--------------------------------------------------------|
| Regulation             | Title 47 of the CFR: Part 15 Subpart (b) Clause 15.109 |
| Measurement standard   | ANSI C63.10                                            |
| Frequency range        | 30MHz to 25 GHz                                        |
| EUT sample number      | S01                                                    |
| Modification state     | 0                                                      |
| SE in test environment | S05, S07, S08                                          |
| SE isolated from EUT   | S04, S06                                               |
| EUT set up             | Refer to Appendix E                                    |

| Ref No. | FREQ.<br>(MHz) | DETECTOR | FIELD<br>ST'GH<br>(dBµV/m) | Duty Cycle<br>Fact (dB) | FIELD ST'GH<br>(dBµV/m) | LIMIT<br>(dBµV/m) |
|---------|----------------|----------|----------------------------|-------------------------|-------------------------|-------------------|
| 1.      | 31.900         | Pk       | 38.7                       | 0                       | 38.7                    | 60                |
| 2.      | 31.900         | QP       | 32.4                       | 0                       | 32.4                    | 40                |
| 3.      | 63.622         | Pk       | 37.4                       | 0                       | 37.4                    | 60                |
| 4.      | 63.622         | QP       | 32.3                       | 0                       | 32.3                    | 40                |
| 5.      | 84.856         | Pk       | 45.0                       | 0                       | 45.0                    | 60                |
| 6.      | 84.856         | QP       | 38.0                       | 0                       | 38.0                    | 40                |
| 7.      | 98.000         | Pk       | 37.1                       | 0                       | 37.1                    | 63.5              |
| 8.      | 98.000         | QP       | 30.0                       | 0                       | 30.0                    | 43.5              |
| 9.      | 118.000        | Pk       | 44.4                       | 0                       | 44.4                    | 63.5              |
| 10.     | 118.000        | QP       | 38.3                       | 0                       | 38.3                    | 43.5              |
| 11.     | 161.444        | Pk       | 42.9                       | 0                       | 42.9                    | 63.5              |
| 12.     | 161.444        | QP       | 34.7                       | 0                       | 34.7                    | 43.5              |
| 13.     | 241.889        | Pk       | 38.3                       | 0                       | 38.3                    | 66                |
| 14.     | 241.889        | QP       | 30.5                       | 0                       | 30.5                    | 46                |
| 15.     | 472.000        | Pk       | 38.0                       | 0                       | 38.0                    | 66                |
| 16.     | 472.000        | QP       | 29.1                       | 0                       | 29.1                    | 46                |
| 17.     | 650.000        | Pk       | 39.6                       | 0                       | 39.6                    | 66                |
| 18.     | 650.000        | QP       | 37.3                       | 0                       | 37.3                    | 46                |
| 19.     | 741.741        | Pk       | 42.7                       | 0                       | 42.7                    | 66                |
| 20.     | 741.741        | QP       | 34.7                       | 0                       | 34.7                    | 46                |
| 21.     | 750.000        | Pk       | 43.4                       | 0                       | 43.4                    | 66                |
| 22.     | 750.000        | QP       | 41.3                       | 0                       | 41.3                    | 46                |
| 23.     | 850.000        | Pk       | 42.4                       | 0                       | 42.4                    | 66                |
| 24.     | 850.000        | QP       | 40.9                       | 0                       | 40.9                    | 46                |
| 25.     | 950.000        | Pk       | 43.9                       | 0                       | 43.9                    | 66                |
| 26.     | 950.000        | QP       | 42.2                       | 0                       | 42.2                    | 46                |

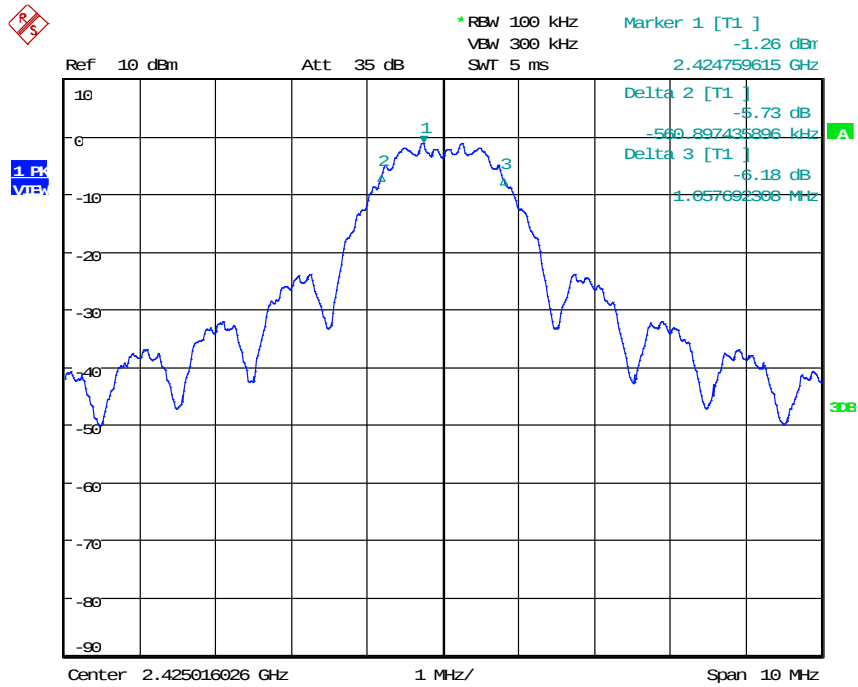
No further Spurious emissions within 20 dB of the test limit were detected.

**Appendix D:****Supporting Graphical Data**

This appendix contains graphical data obtained during testing.

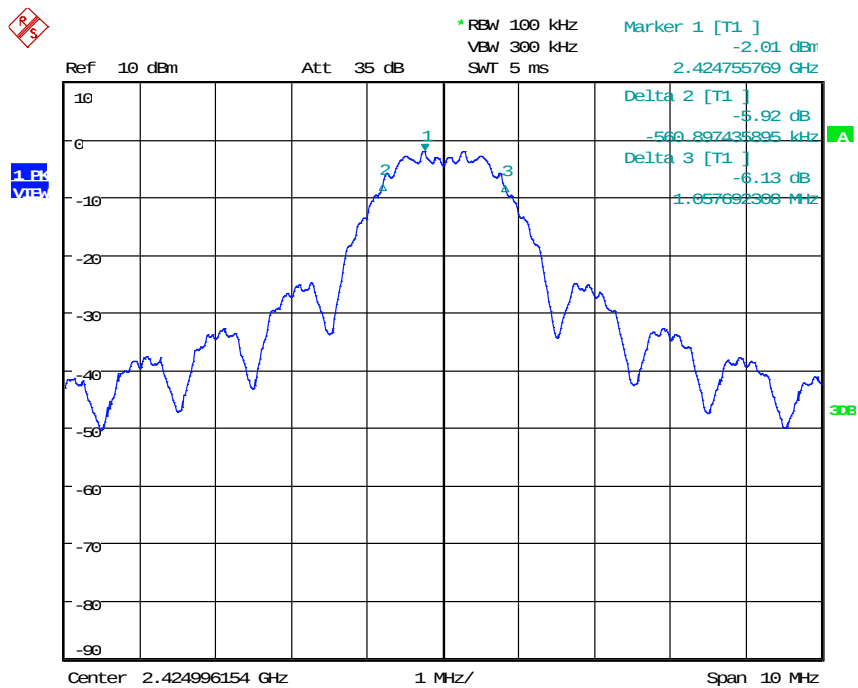
Notes:

- (a) The radiated electric field emissions and conducted emissions graphical data in this appendix is preview data. For details of formal results, refer to Appendices A, B and C.
- (b) The time and date on the plots do not necessarily equate to the time of the test.
- (c) Where relevant, on power line conducted emission plots, the limit displayed is the average limit, which is stricter than the quasi peak limit.
- (d) Appendix E details the numbering system used to identify the sample and its modification state.
- (e) The plots presented in this appendix may not be a complete record of the measurements performed, but are a representative sample, relative to the final assessment.



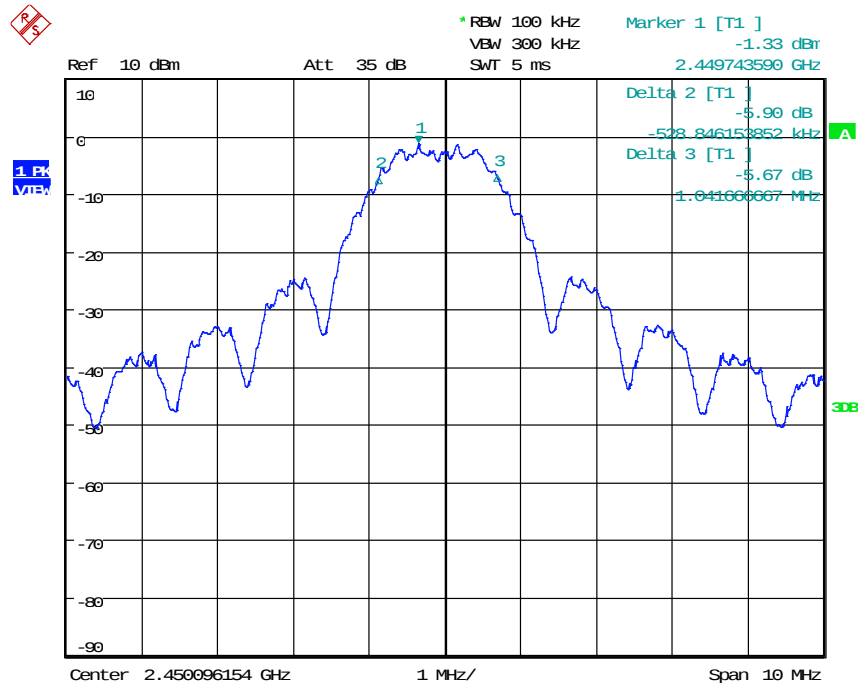
Date: 5.DEC.2013 14:54:52

### 6dB Bandwidth Antenna 0 –2425 MHz



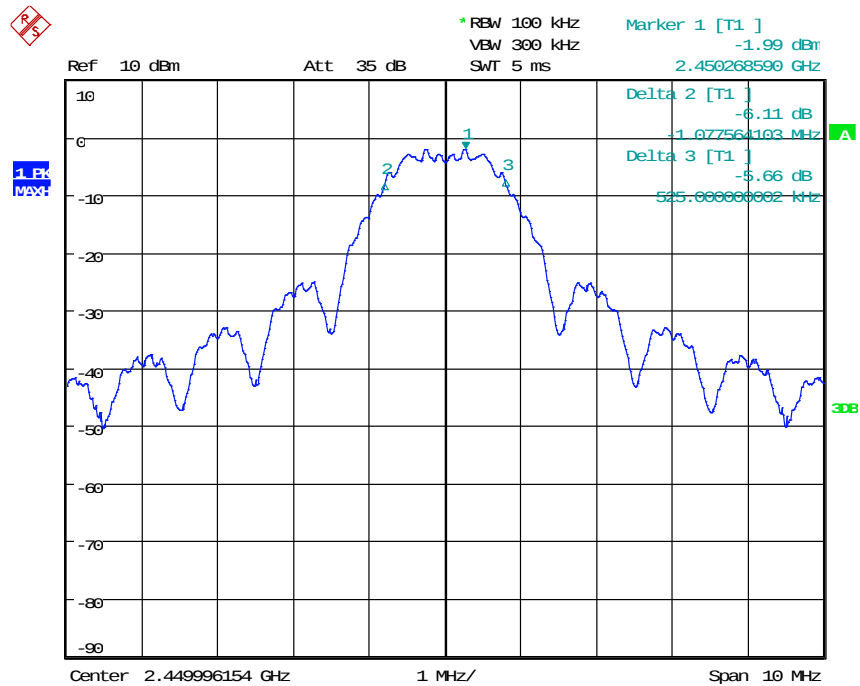
Date: 5.DEC.2013 15:30:44

### 6dB Bandwidth Antenna 1 –2425 MHz



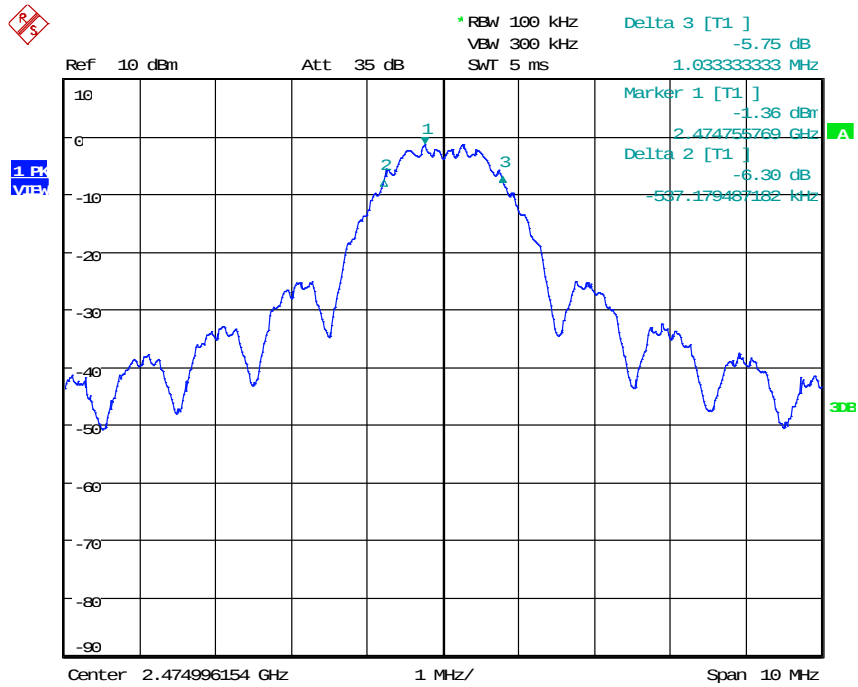
Date: 5.DEC.2013 14:57:53

### 6dB Bandwidth Antenna 0 – 2450 MHz



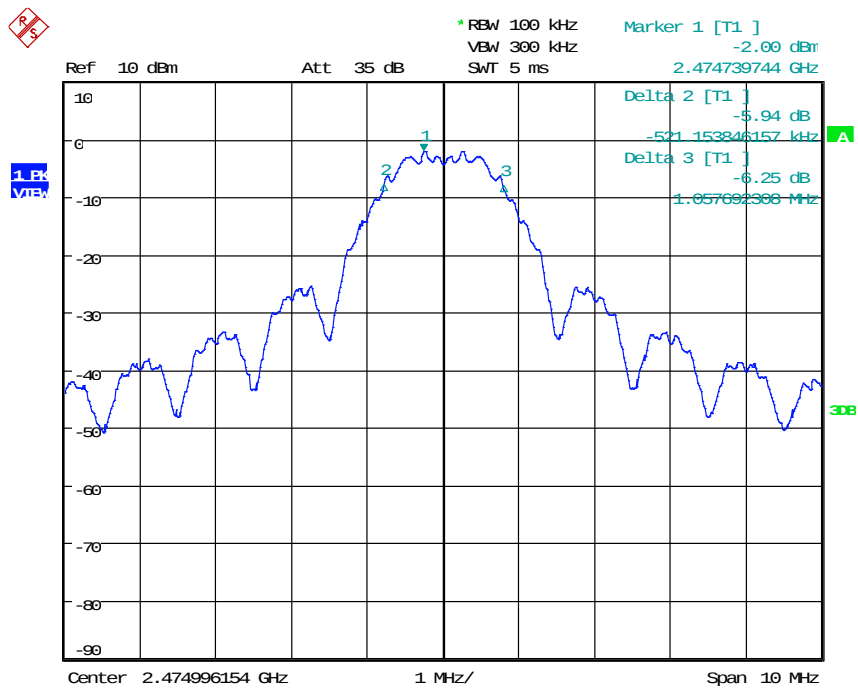
Date: 5.DEC.2013 15:17:06

### 6dB Bandwidth Antenna 1 – 2450 MHz



Date: 5.DEC.2013 15:01:31

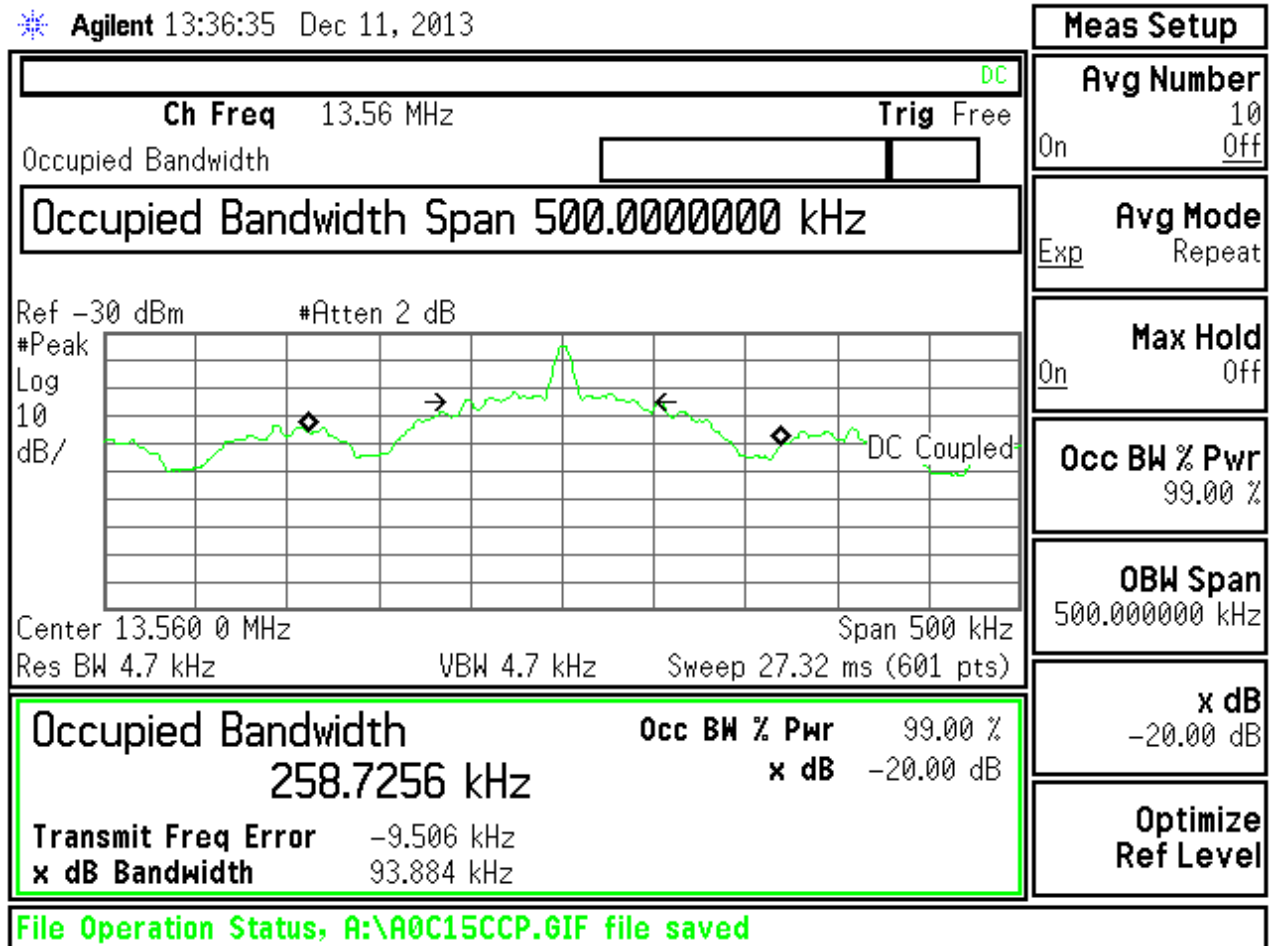
### 6dB Bandwidth Antenna 0 - 2475 MHz



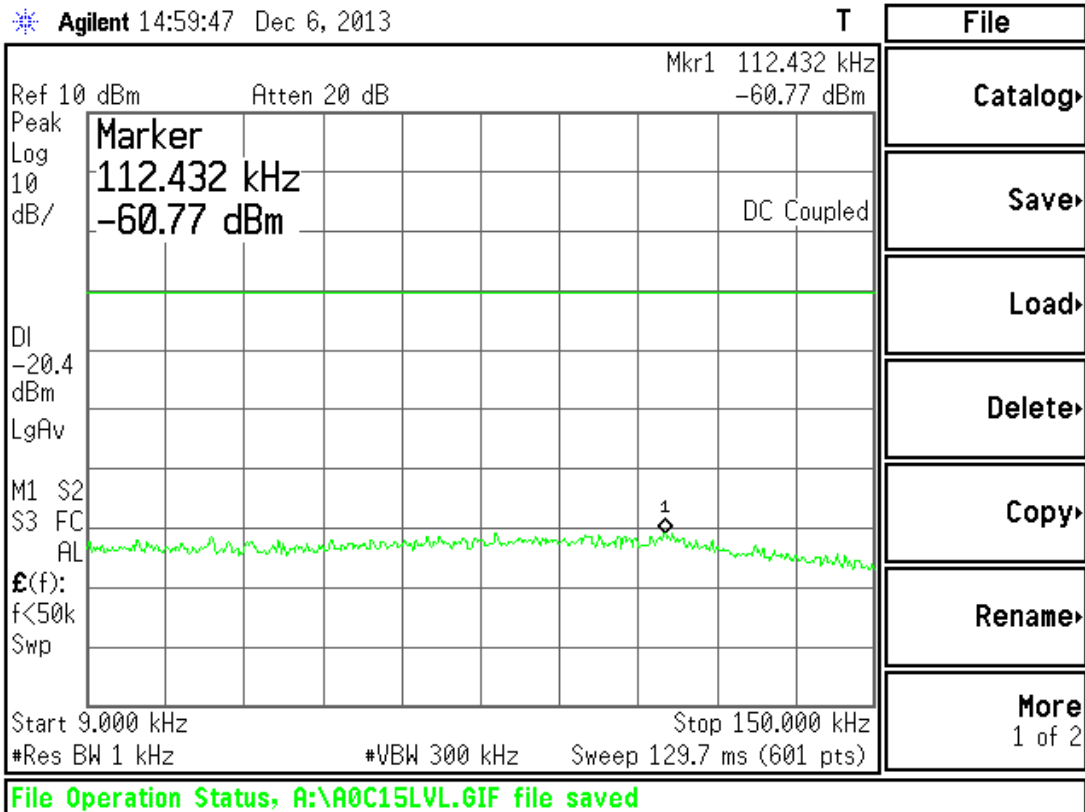
Date: 5.DEC.2013 15:09:51

### 6dB Bandwidth Antenna 1 - 2475 MHz

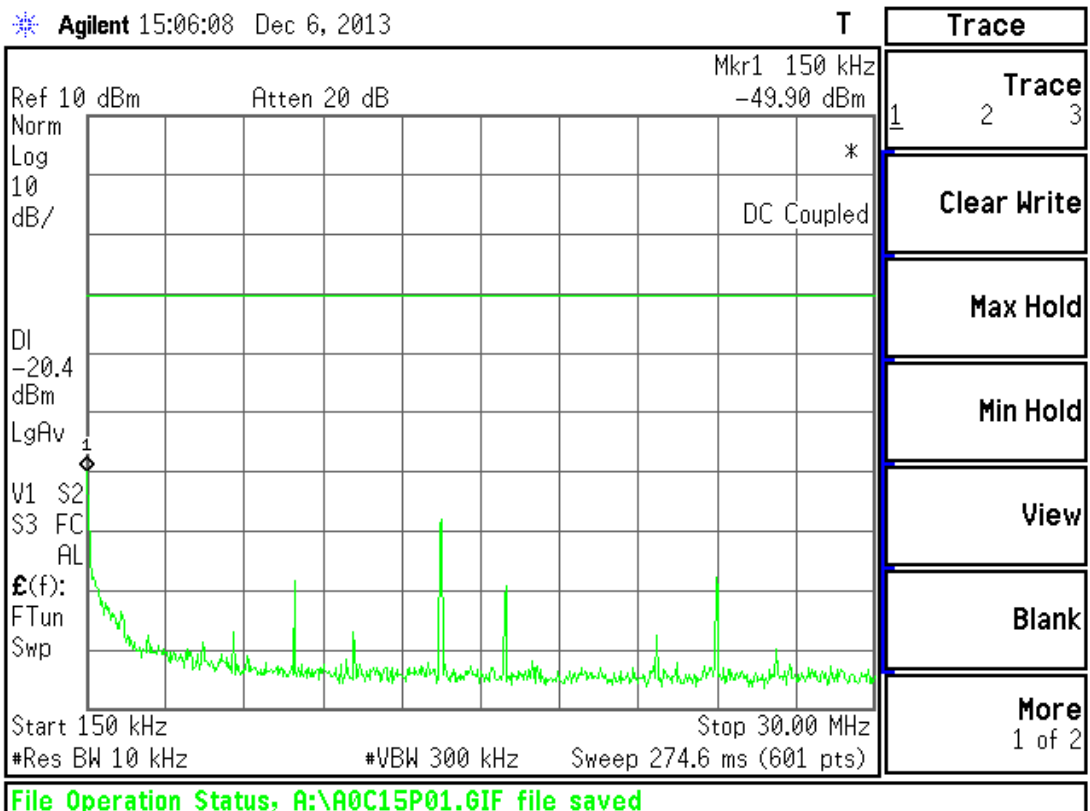
Agilent 13:36:35 Dec 11, 2013



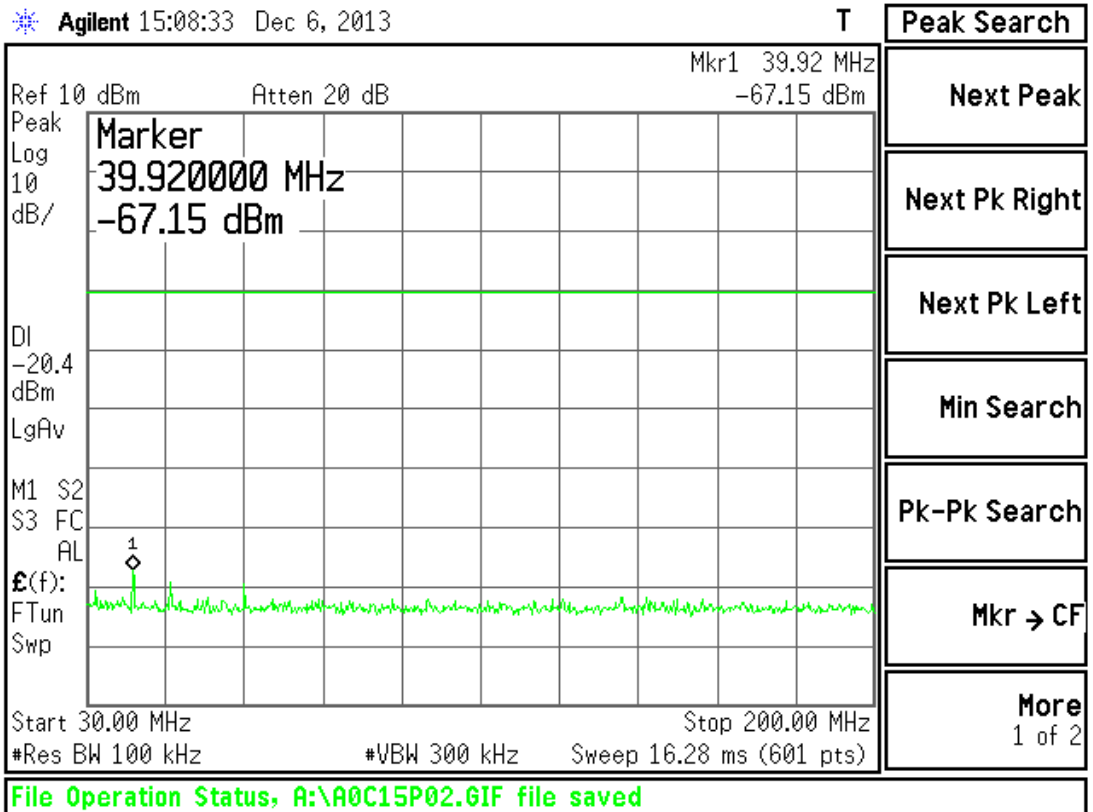
20dB Bandwidth NFC – 13.56MHz



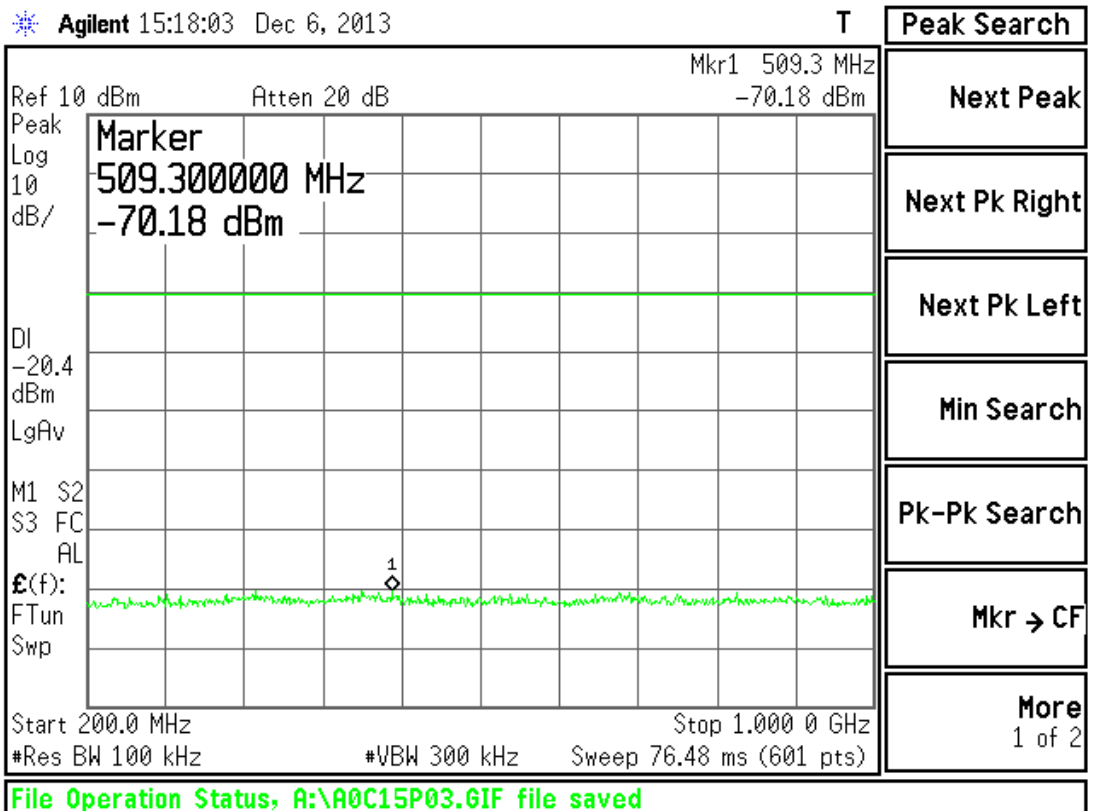
Conducted Spurious emissions 9kHz to 150 kHz Antenna 0 – 2425 MHz



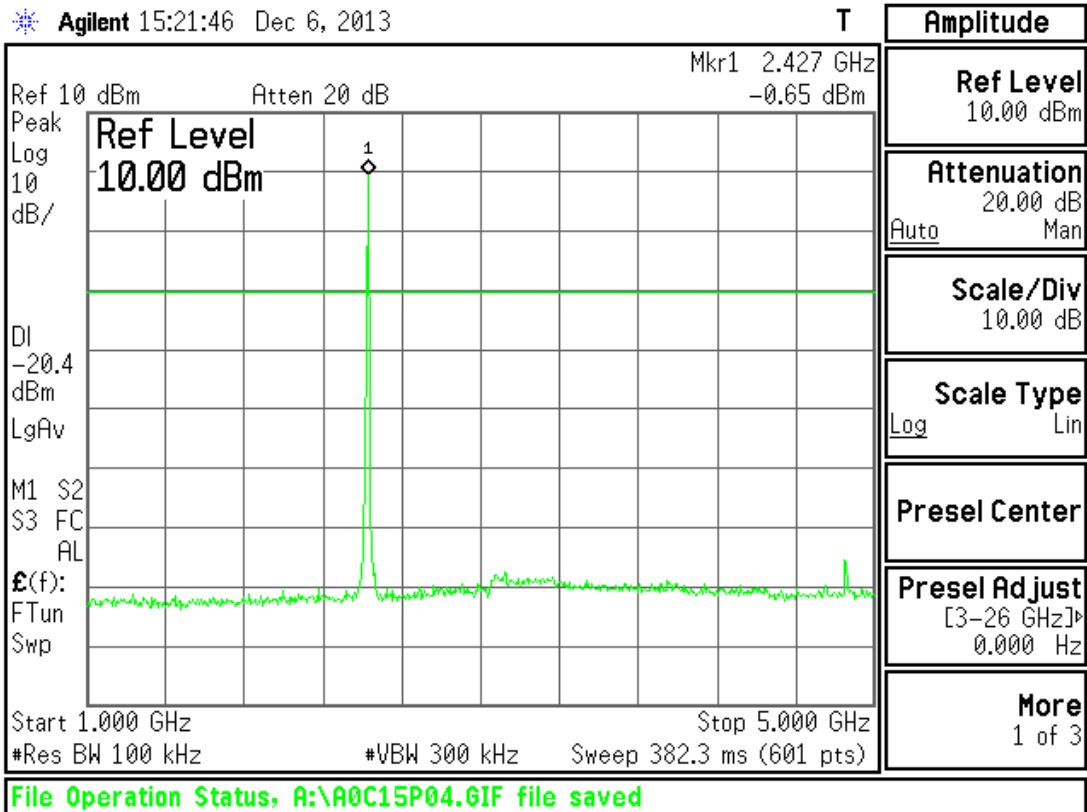
Conducted Spurious emissions 150 kHz to 30 MHz Antenna 0 – 2425 MHz



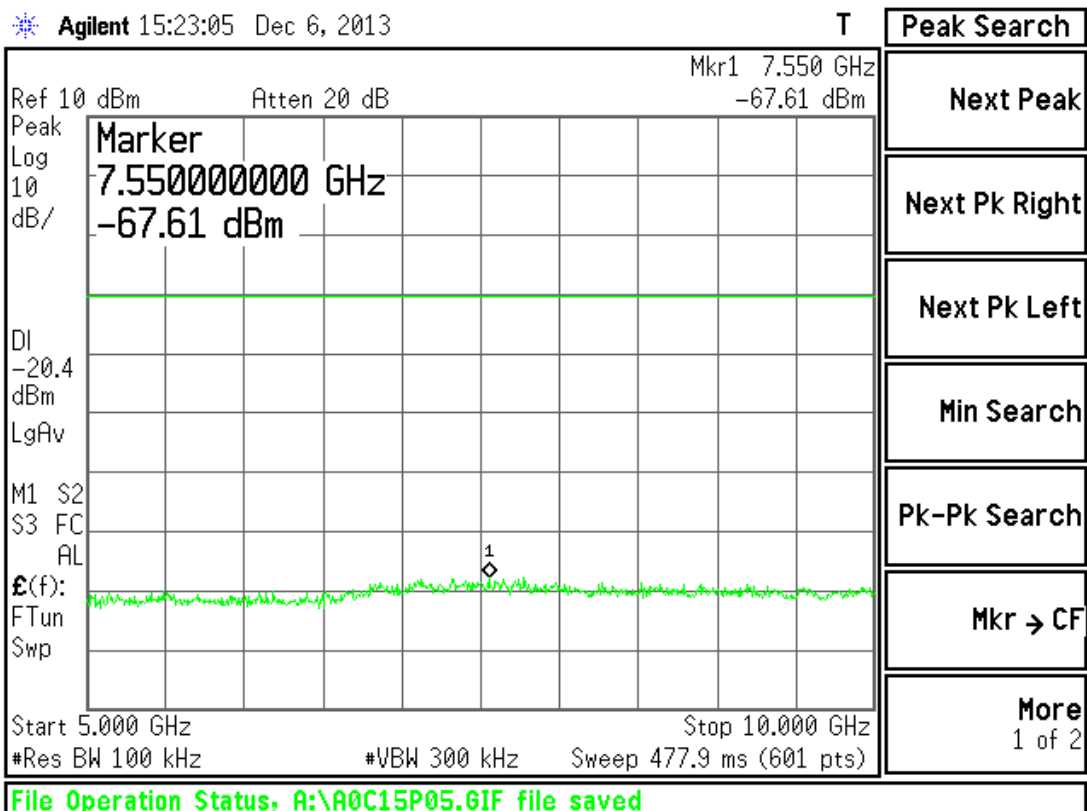
Conducted Spurious emissions 30 MHz to 200 MHz Antenna 0 - 2425 MHz



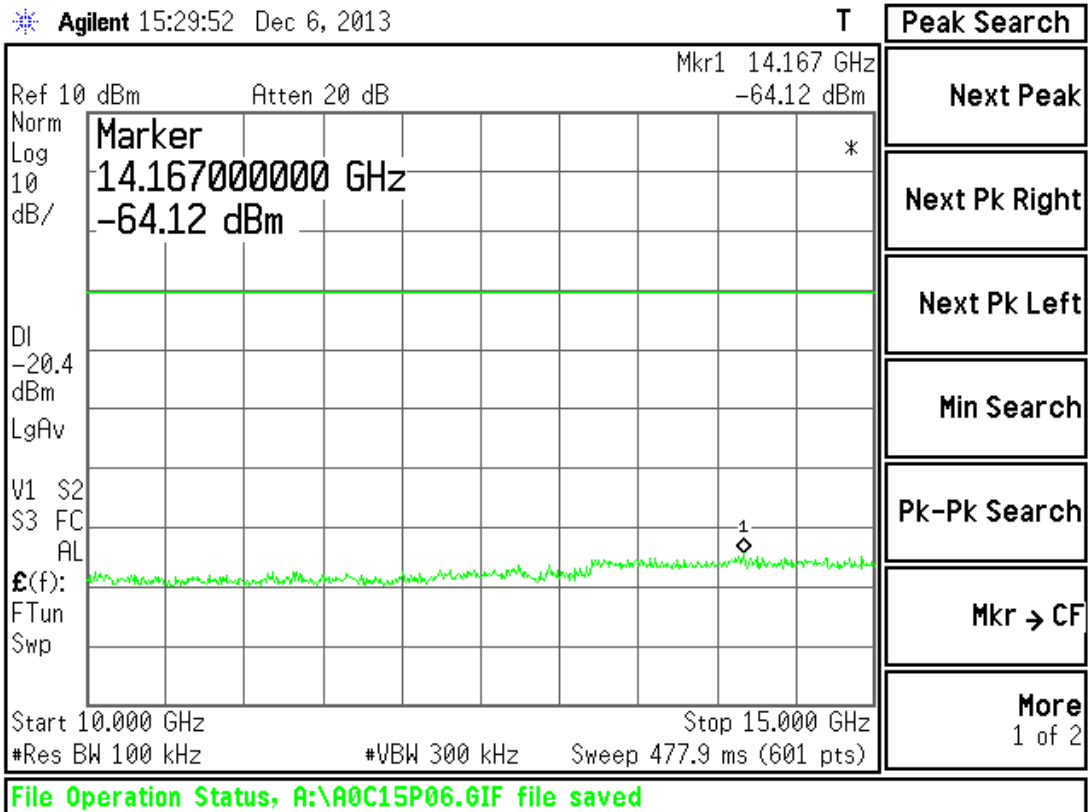
Conducted Spurious emissions 200 MHz to 1 GHz Antenna 0 - 2425 MHz



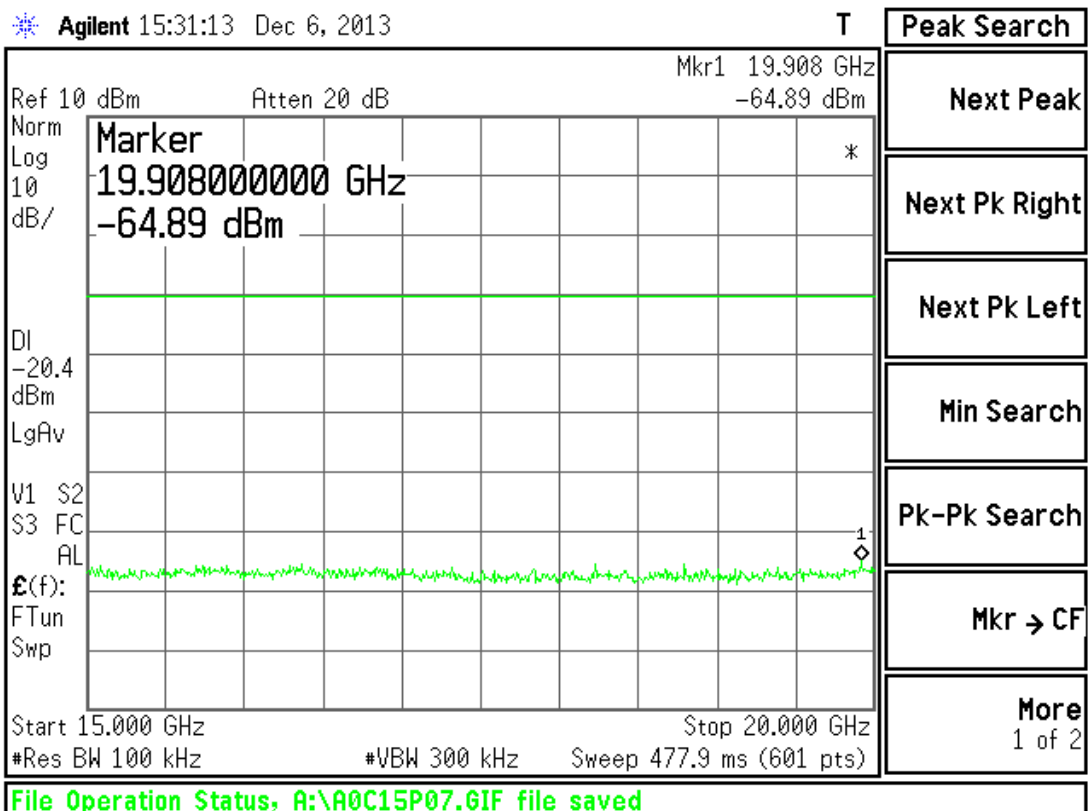
Conducted Spurious emissions 1 GHz to 5 GHz Antenna 0 - 2425 MHz



Conducted Spurious emissions 5 GHz to 10 GHz Antenna 0 - 2425 MHz



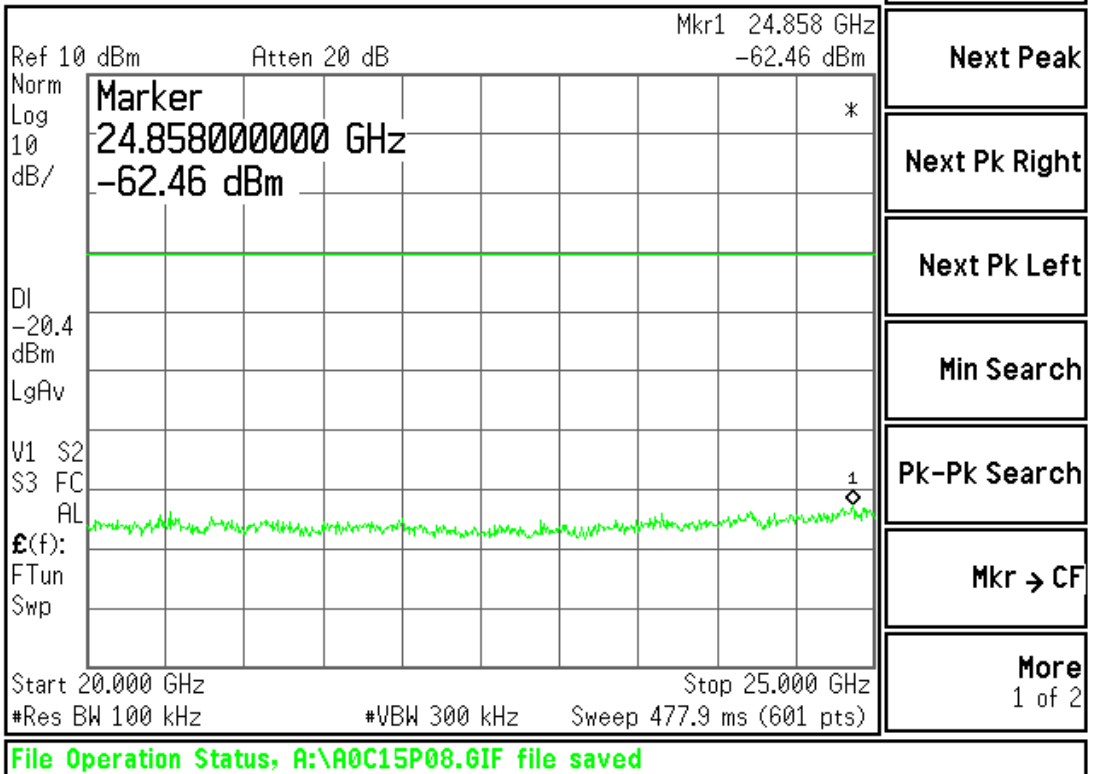
Conducted Spurious emissions 10 GHz to 15 GHz Antenna 0 - 2425 MHz



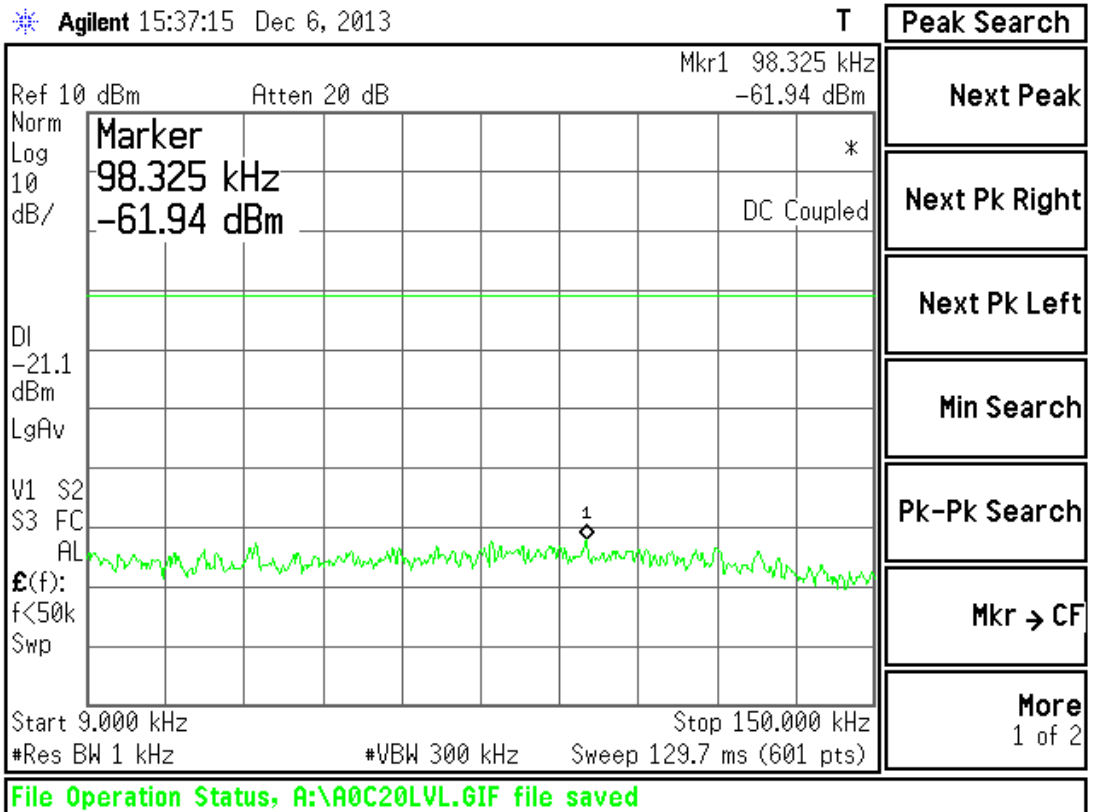
Conducted Spurious emissions 15 GHz to 20GHz Antenna 0 - 2425 MHz

\* Agilent 15:33:39 Dec 6, 2013

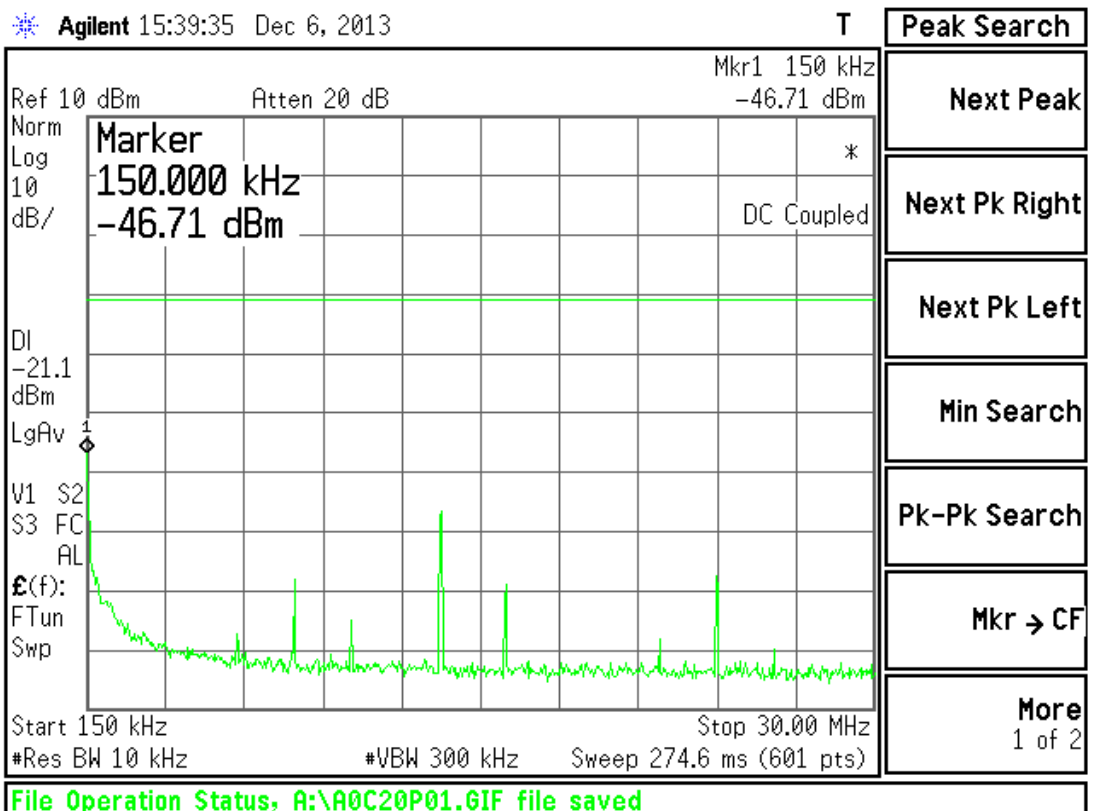
T



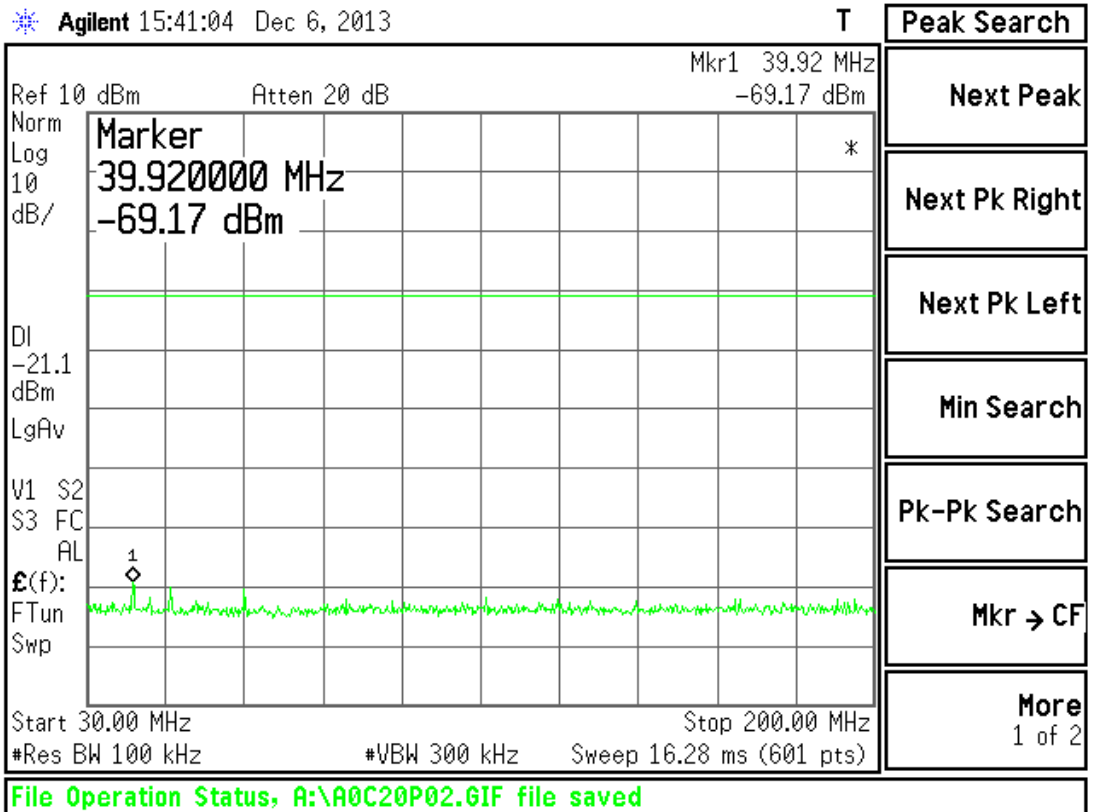
Conducted Spurious emissions 20 GHz to 25GHz Antenna 0 - 2425 MHz



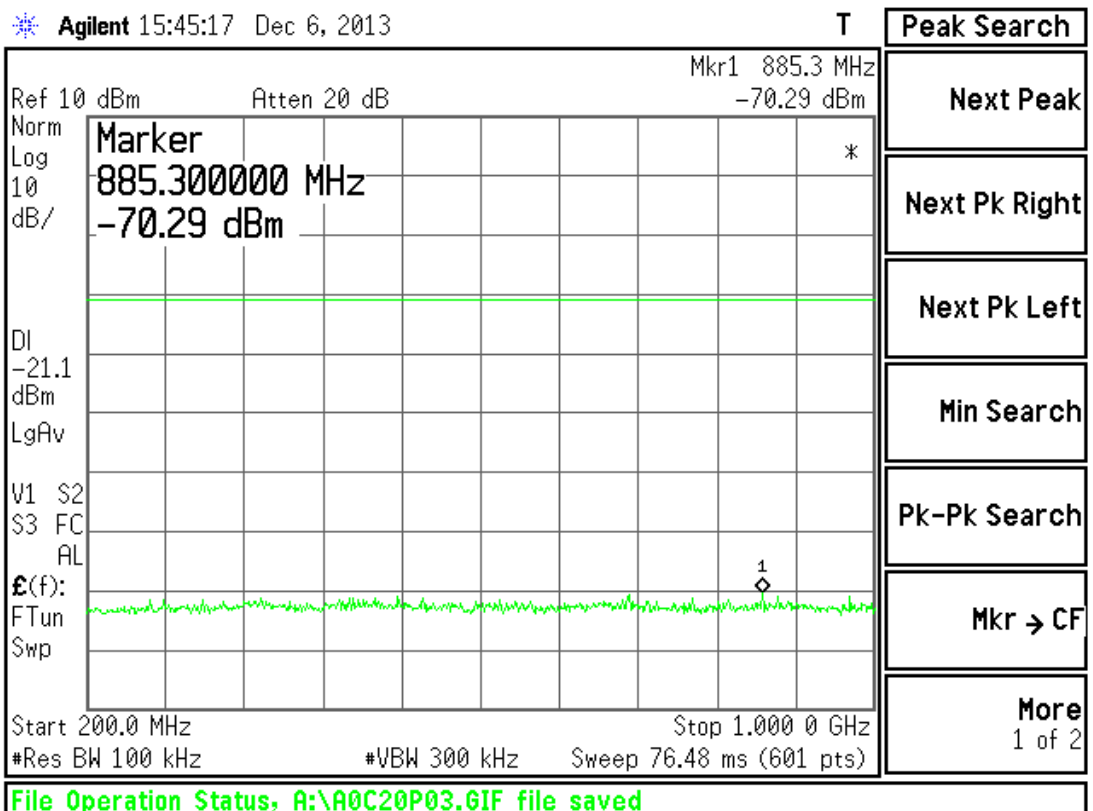
Conducted Spurious emissions 9kHz to 150 kHz Antenna 0 – 2450 MHz



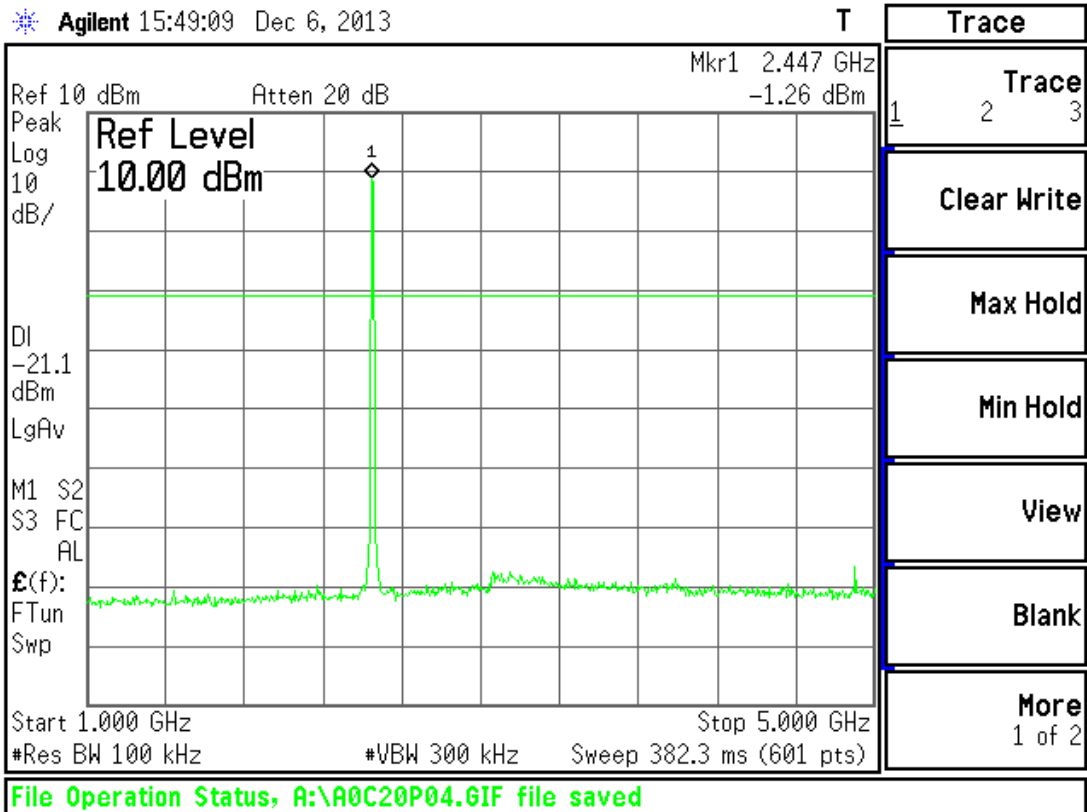
Conducted Spurious emissions 150 kHz to 30 MHz Antenna 0 – 2450 MHz



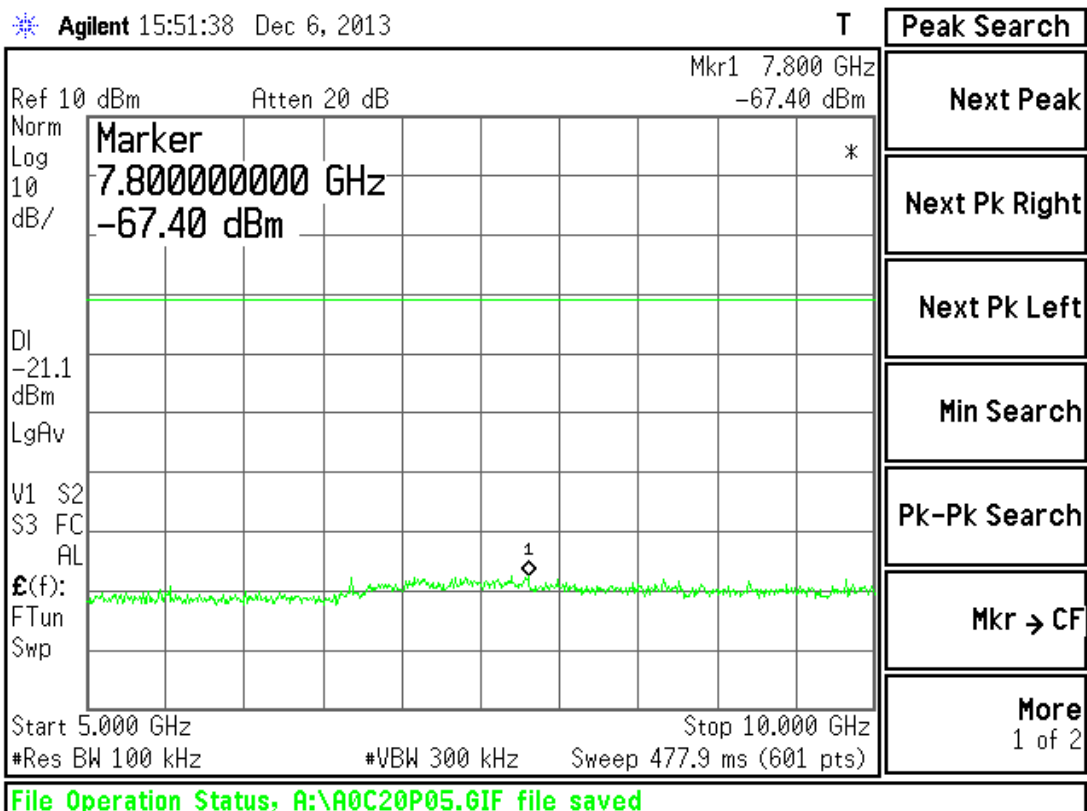
Conducted Spurious emissions 30 MHz to 200 MHz Antenna 0 - 2450 MHz



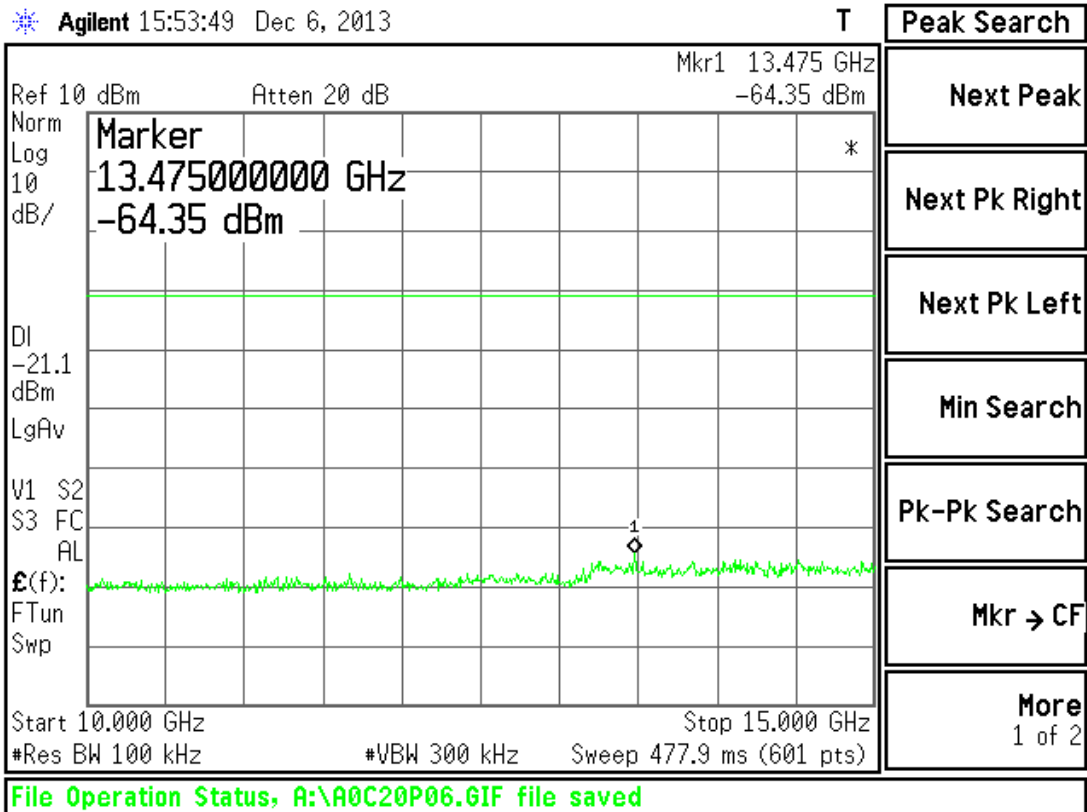
Conducted Spurious emissions 200 MHz to 1 GHz Antenna 0 - 2450 MHz



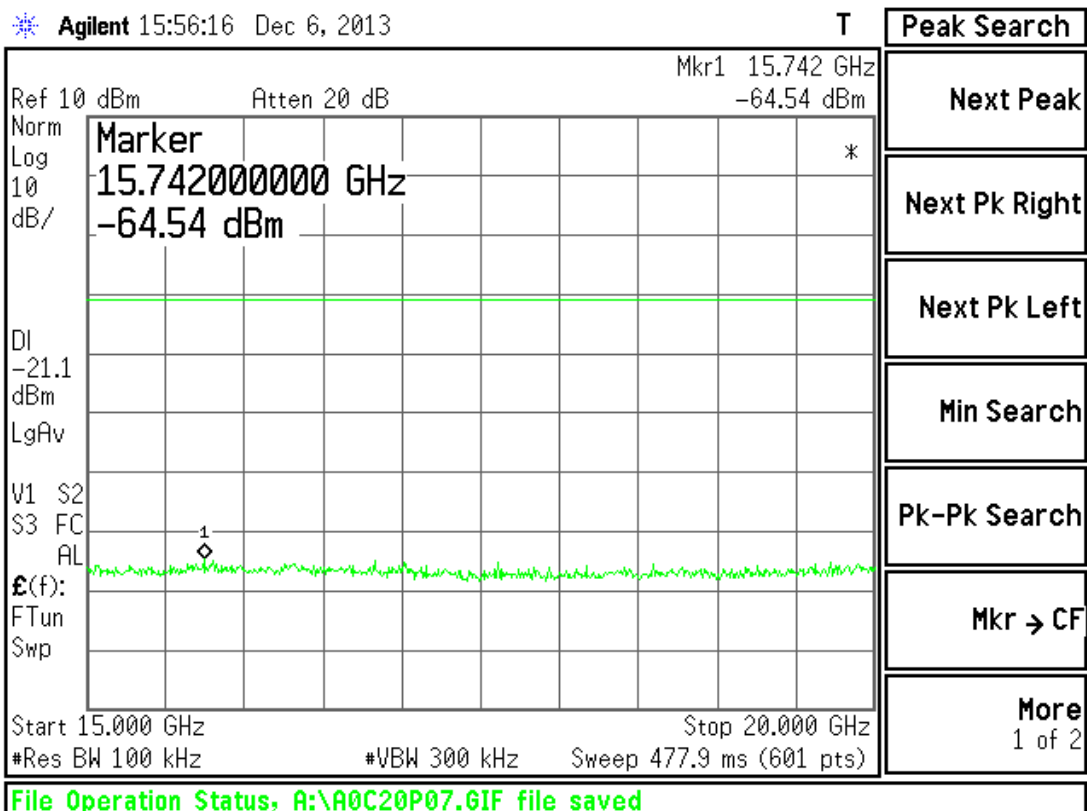
Conducted Spurious emissions 1 GHz to 5 GHz Antenna 0 - 2450 MHz



Conducted Spurious emissions 5 GHz to 10 GHz Antenna 0 - 2450 MHz

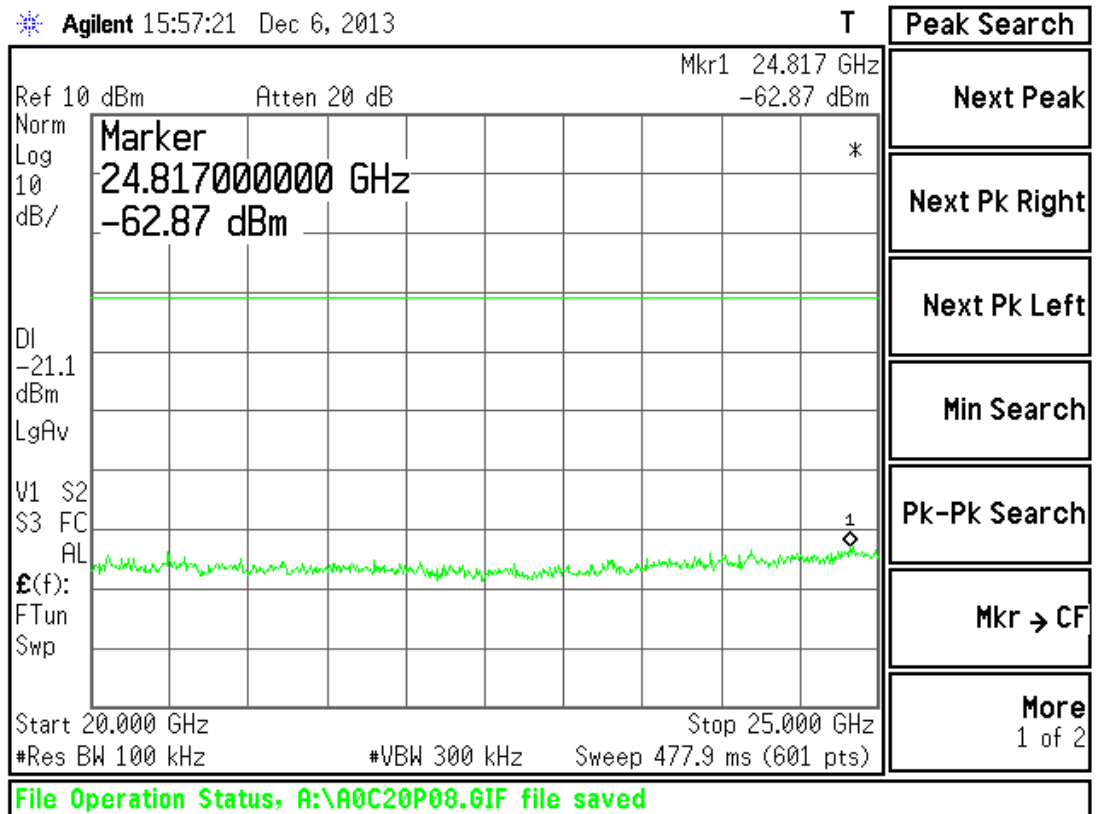


Conducted Spurious emissions 10 GHz to 15 GHz Antenna 0 - 2450 MHz

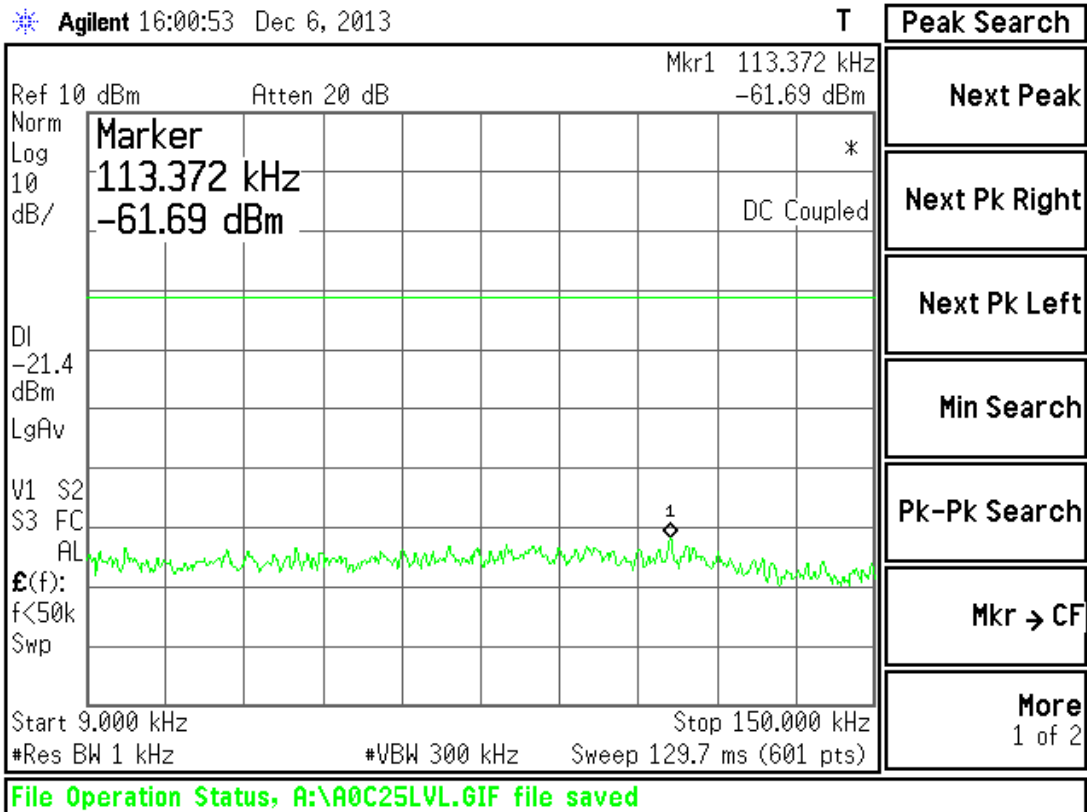


Conducted Spurious emissions 15 GHz to 20 GHz Antenna 0 - 2450 MHz

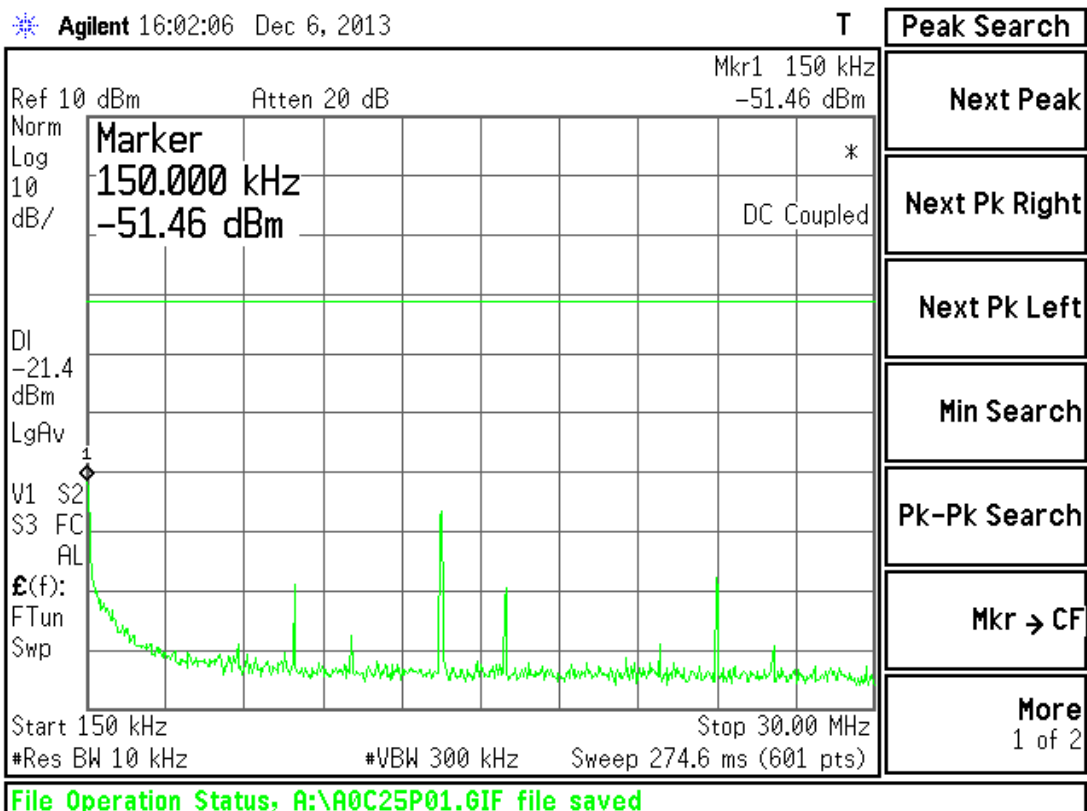
\* Agilent 15:57:21 Dec 6, 2013



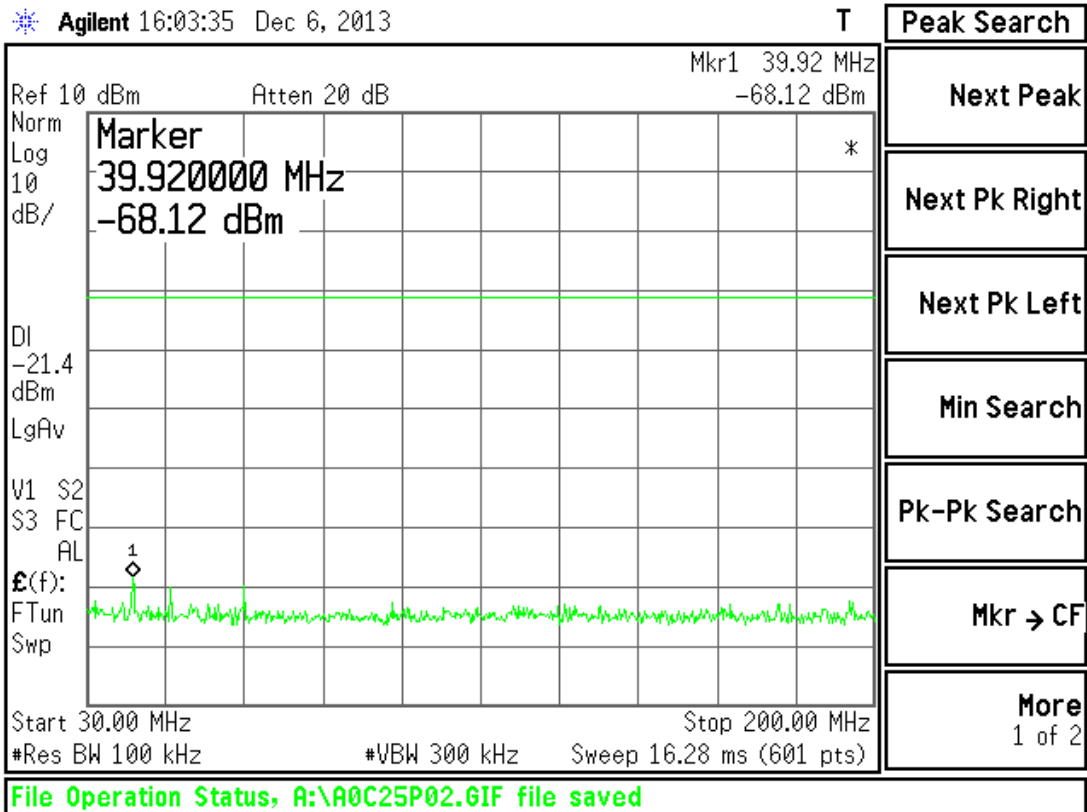
Conducted Spurious emissions 20 GHz to 25 GHz Antenna 0 - 2450 MHz



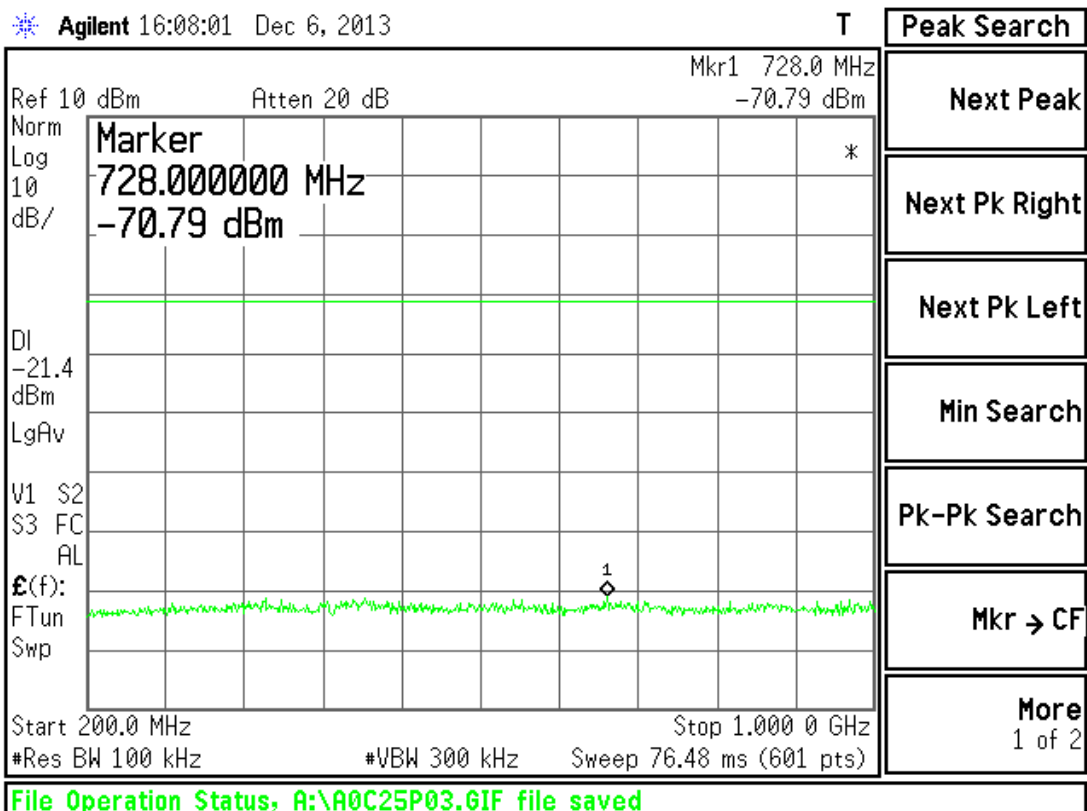
Conducted Spurious emissions 9kHz to 150 kHz Antenna 0 – 2475 MHz



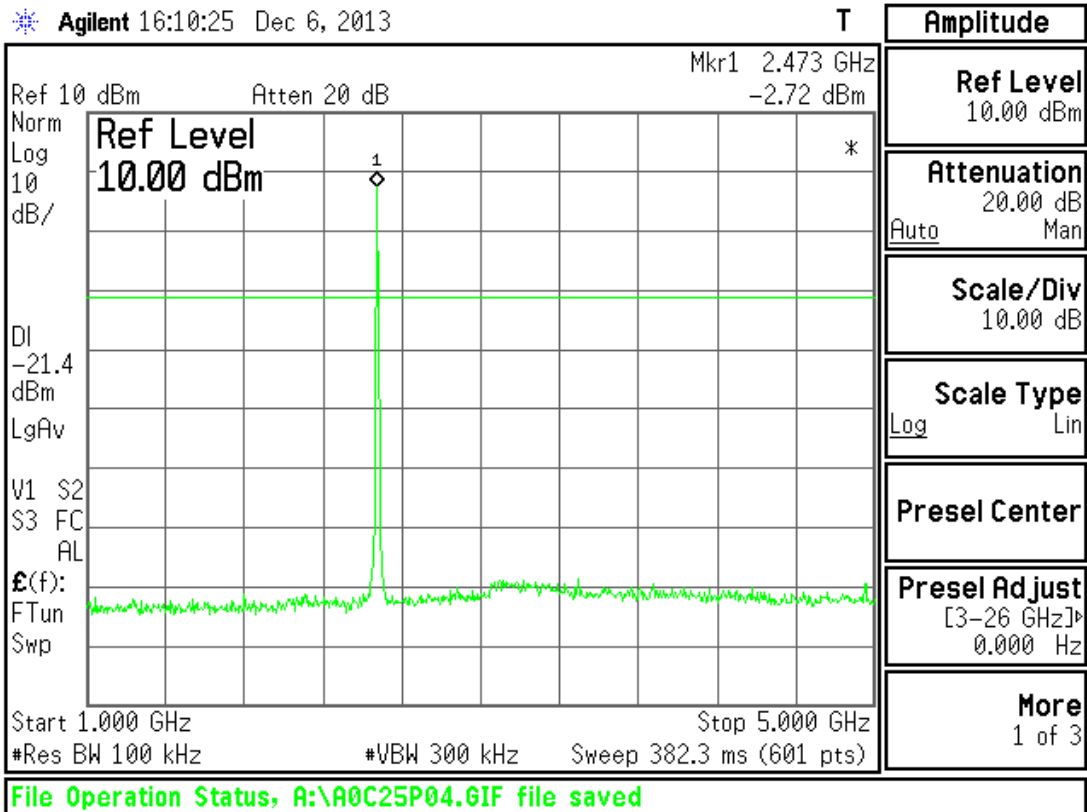
Conducted Spurious emissions 150 kHz to 30 MHz Antenna 0 – 2475 MHz



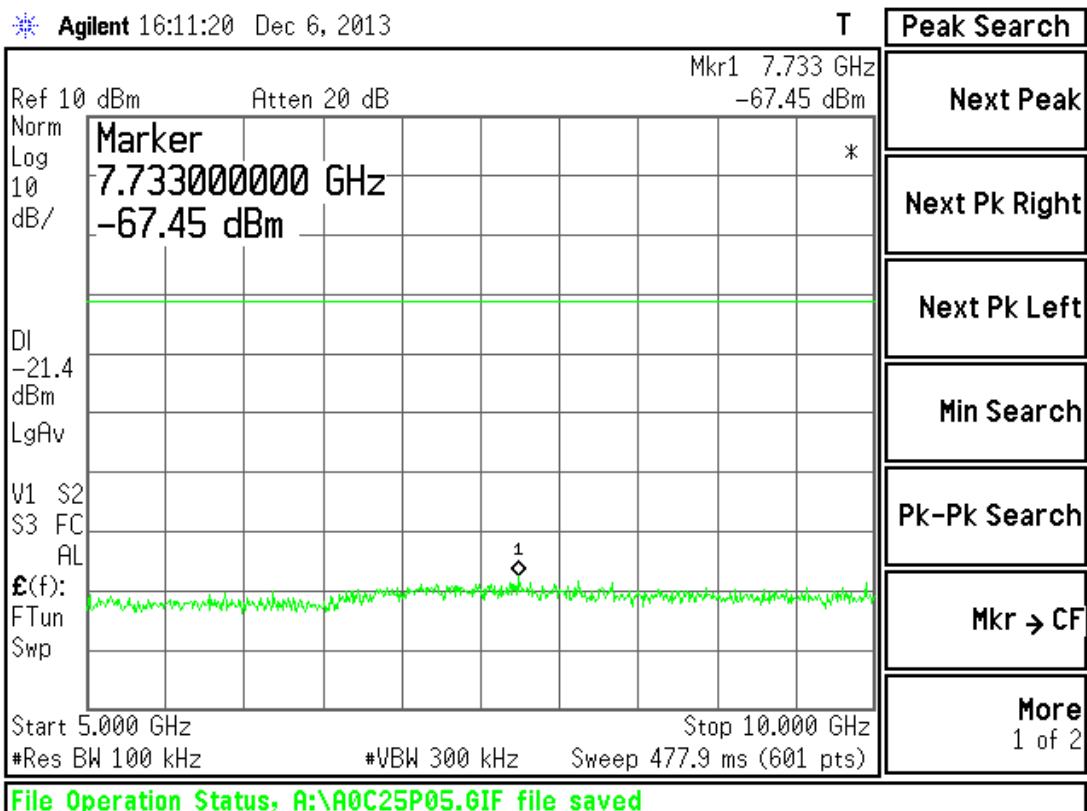
Conducted Spurious emissions 30 MHz to 200 MHz Antenna 0 - 2475 MHz



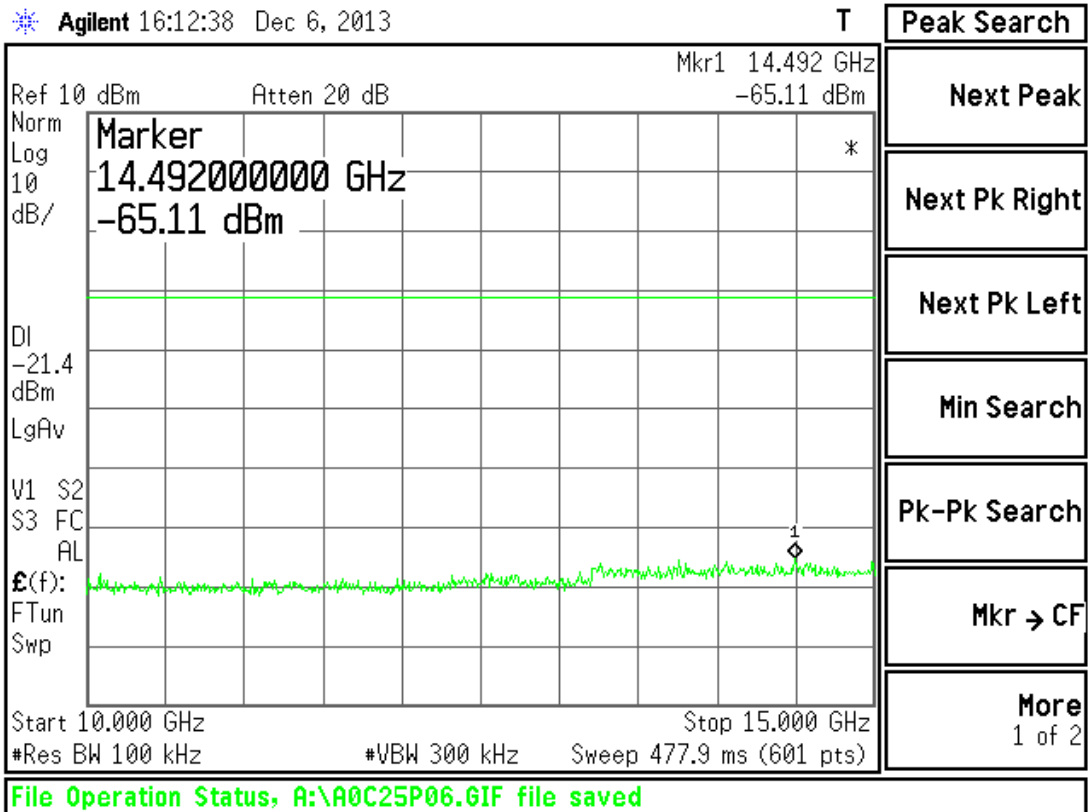
Conducted Spurious emissions 200 MHz to 1 GHz Antenna 0 - 2475 MHz



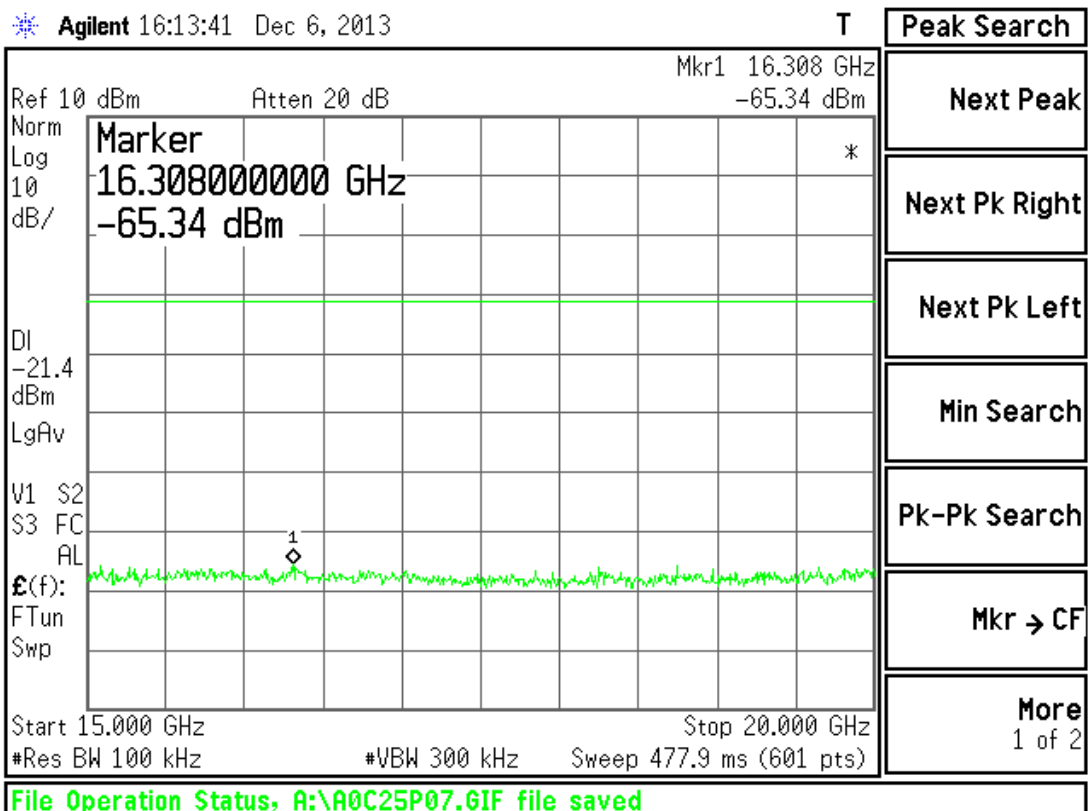
Conducted Spurious emissions 1 GHz to 5 GHz Antenna 0 - 2475 MHz



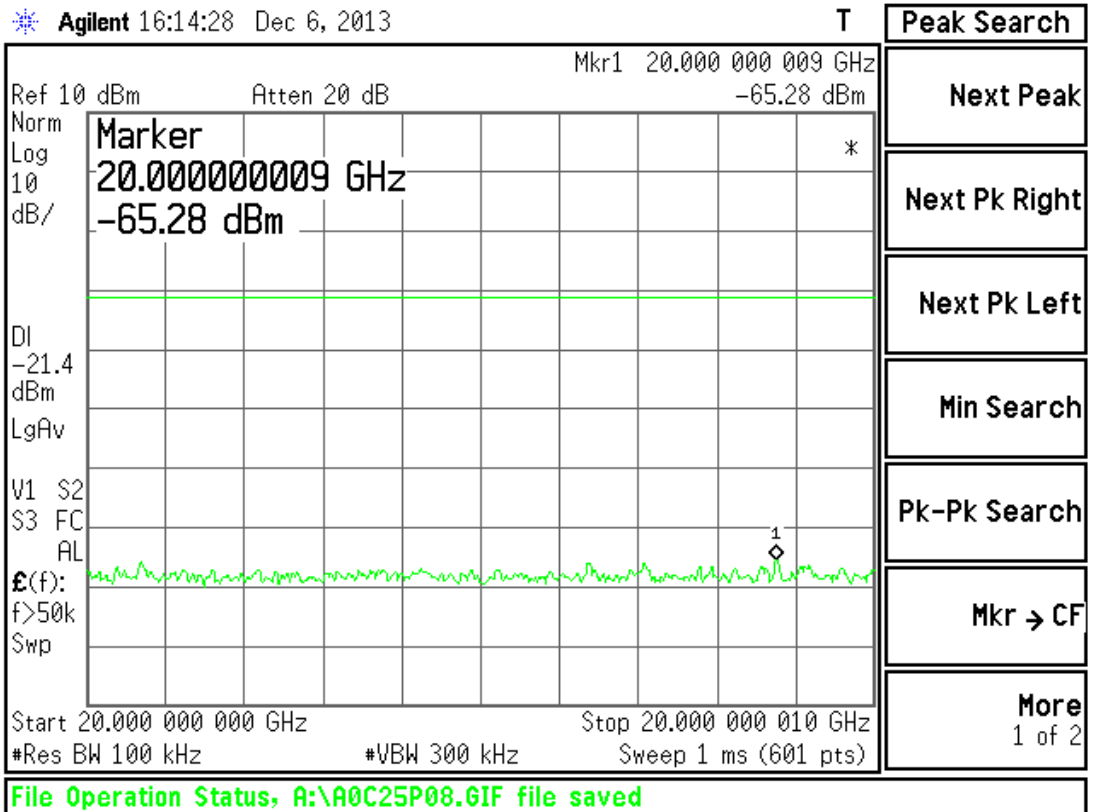
Conducted Spurious emissions 5 GHz to 10 GHz Antenna 0 - 2475 MHz



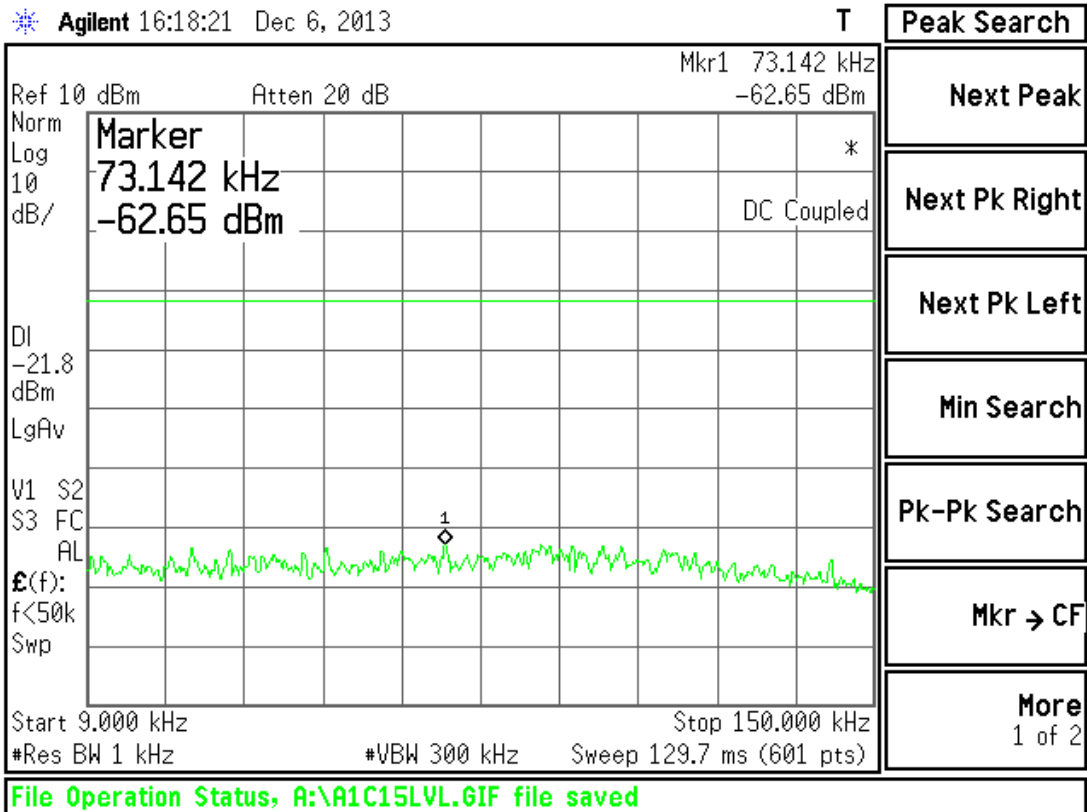
Conducted Spurious emissions 10 GHz to 15 GHz Antenna 0 - 2475 MHz



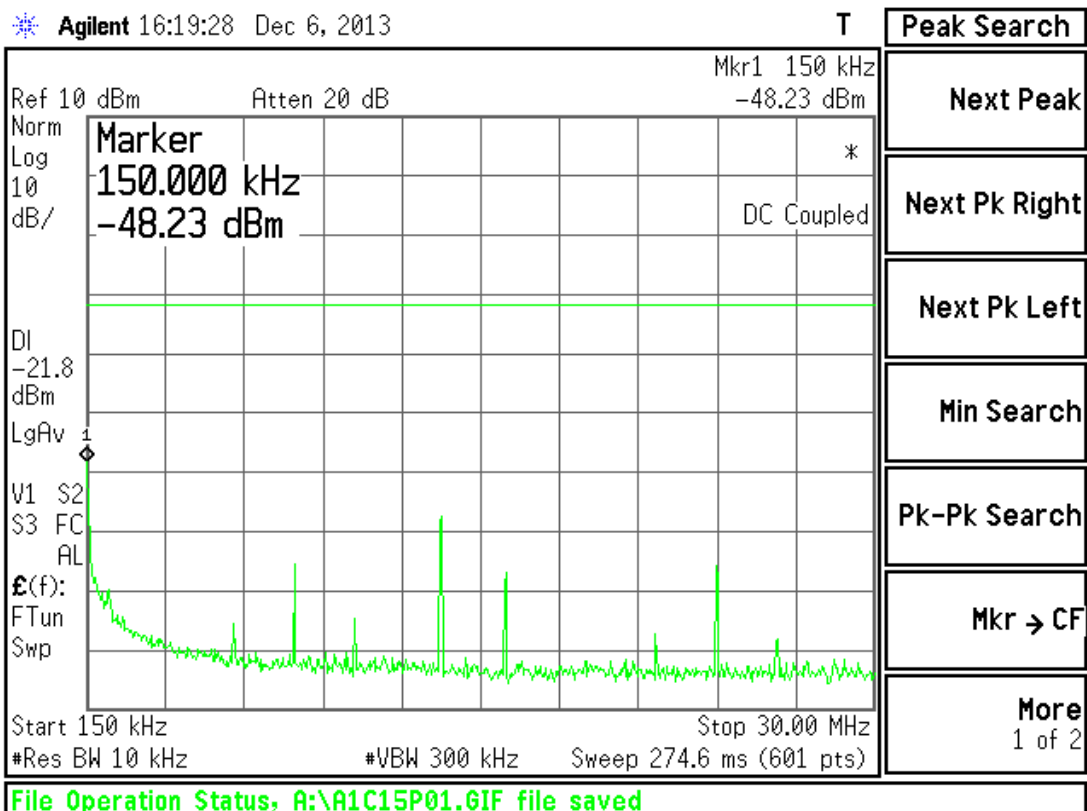
Conducted Spurious emissions 15 GHz to 20 GHz Antenna 0 - 2475 MHz



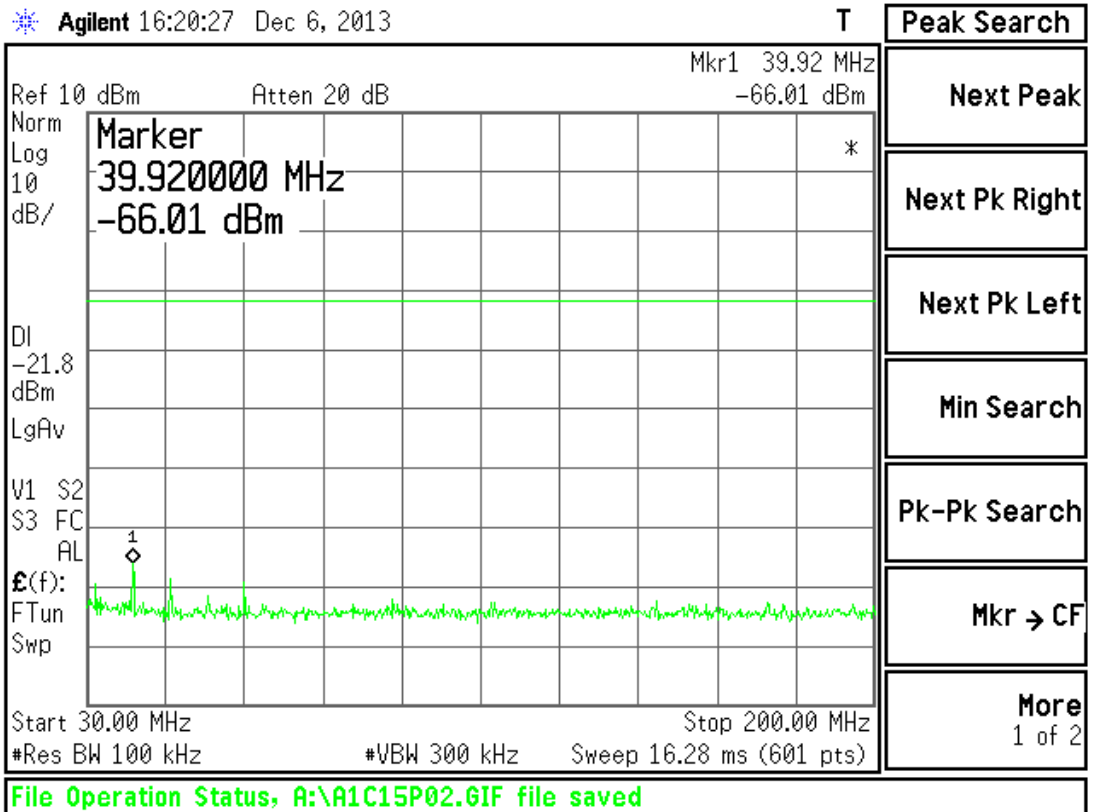
Conducted Spurious emissions 20 GHz to 25 GHz Antenna 0 - 2475 MHz



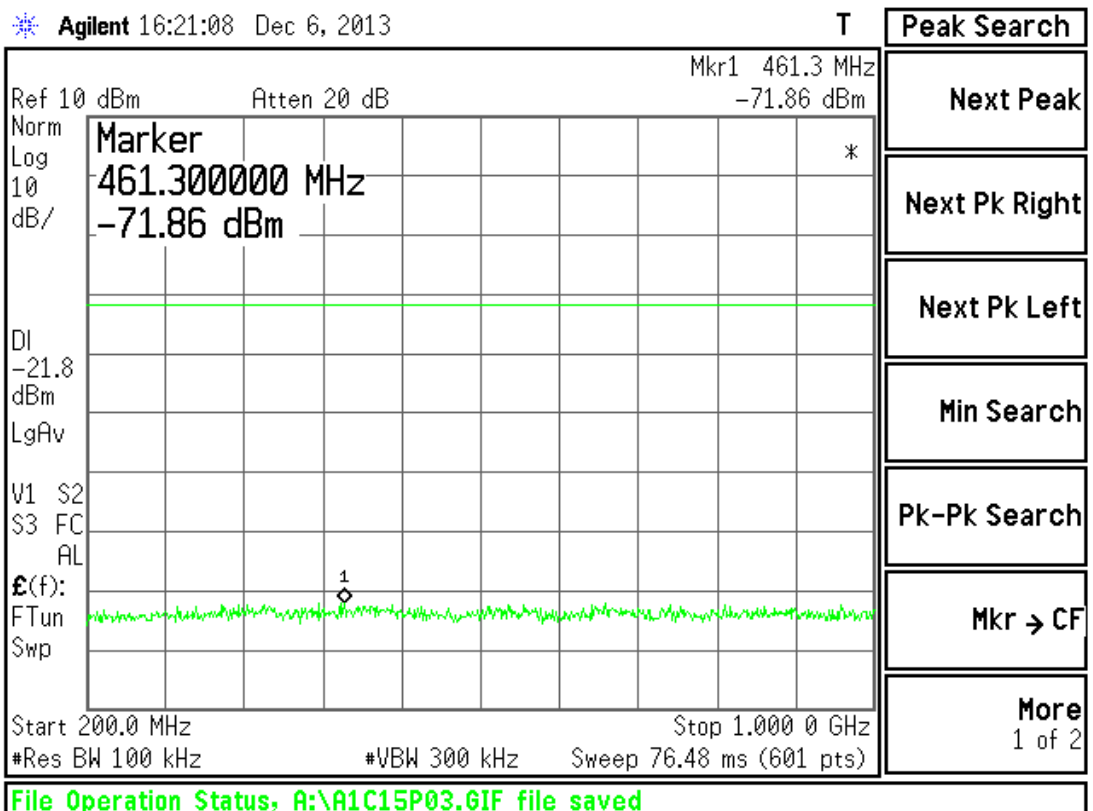
Conducted Spurious emissions 9kHz to 150 kHz Antenna 1 – 2425 MHz



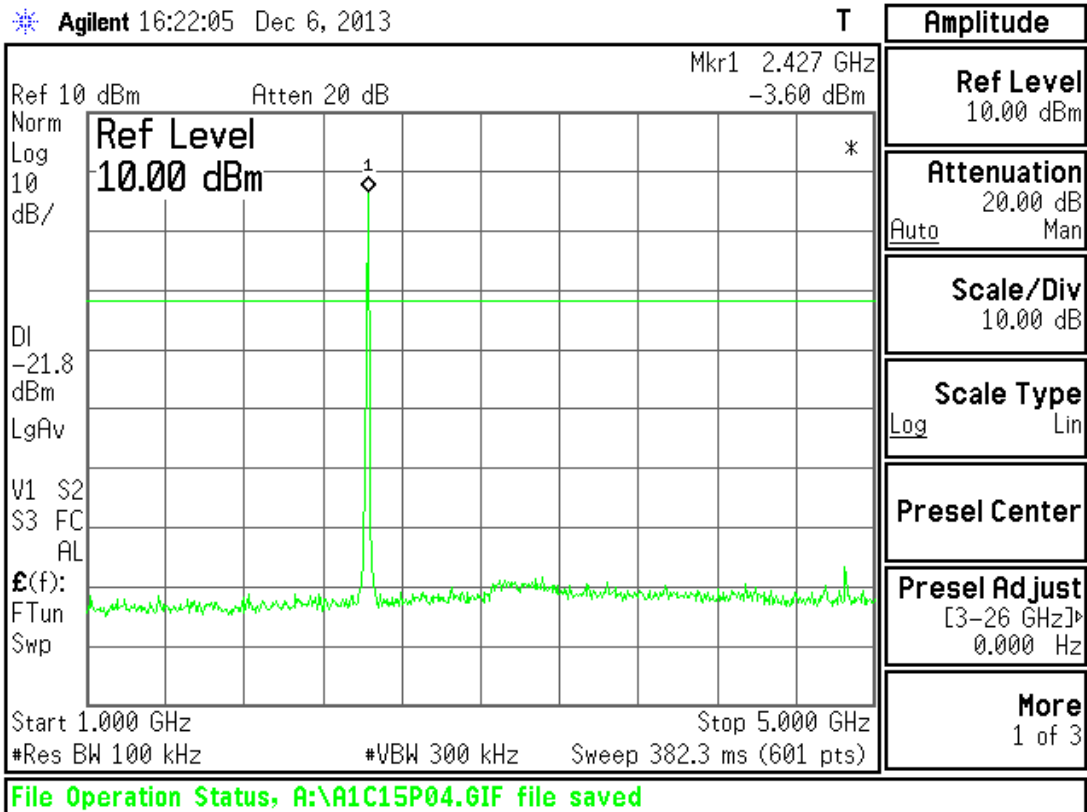
Conducted Spurious emissions 150 kHz to 30 MHz Antenna 1 – 2425 MHz



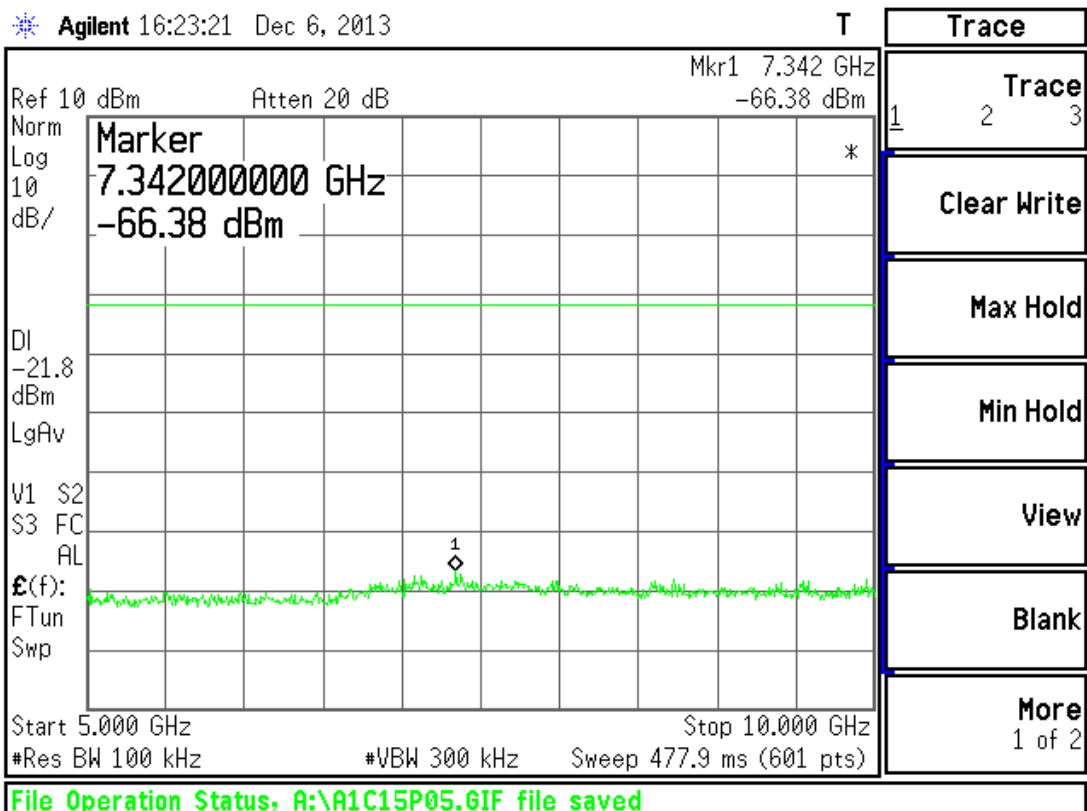
Conducted Spurious emissions 30 MHz to 200 MHz Antenna 1 - 2425 MHz



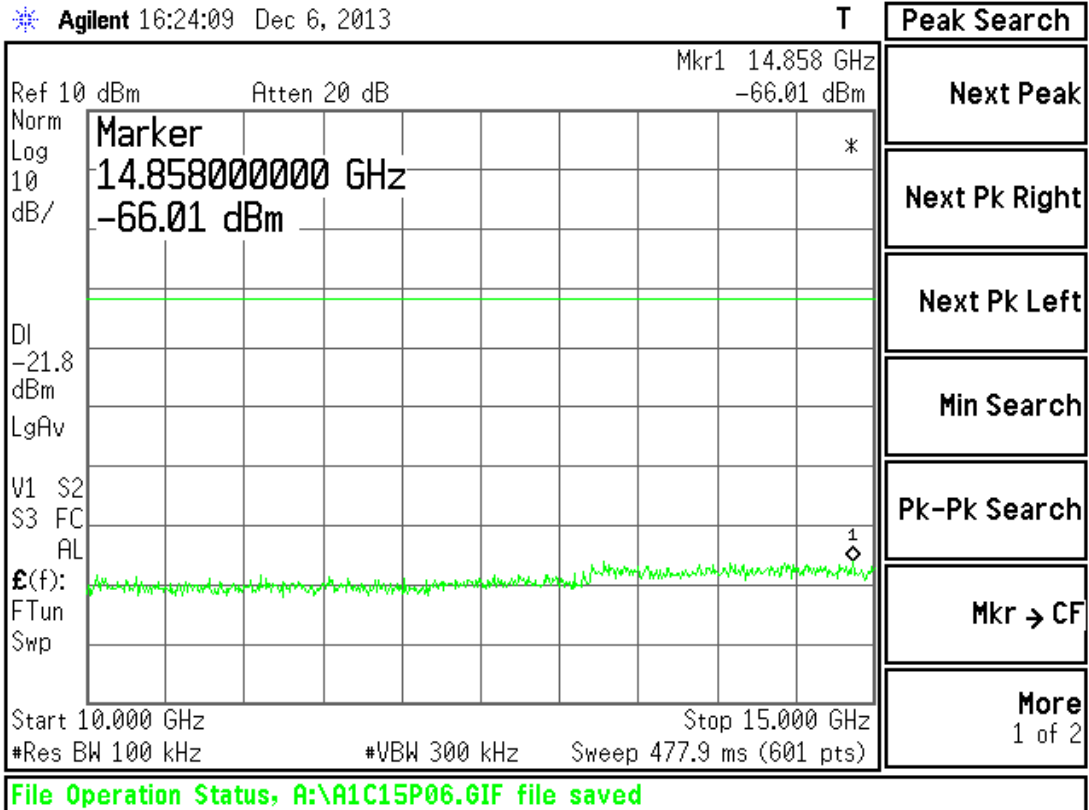
Conducted Spurious emissions 200 MHz to 1 GHz Antenna 1 - 2425 MHz



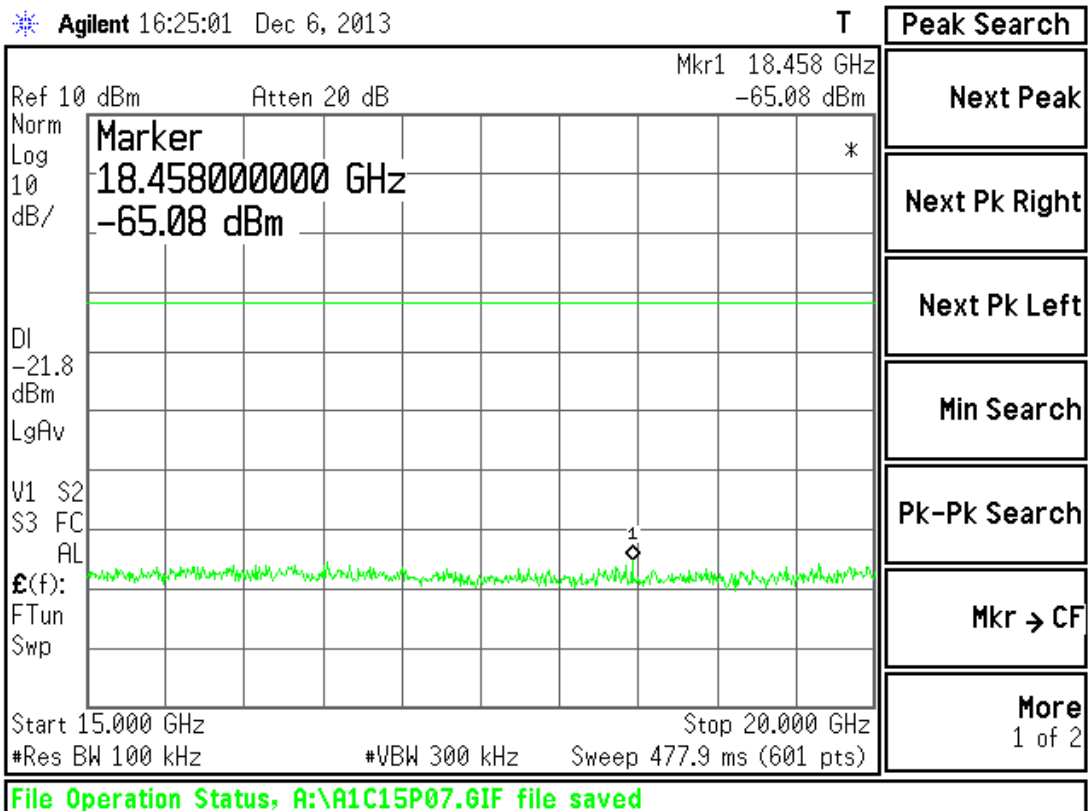
Conducted Spurious emissions 1 GHz to 5 GHz Antenna 1 - 2425 MHz



Conducted Spurious emissions 5 GHz to 10 GHz Antenna 1 - 2425 MHz

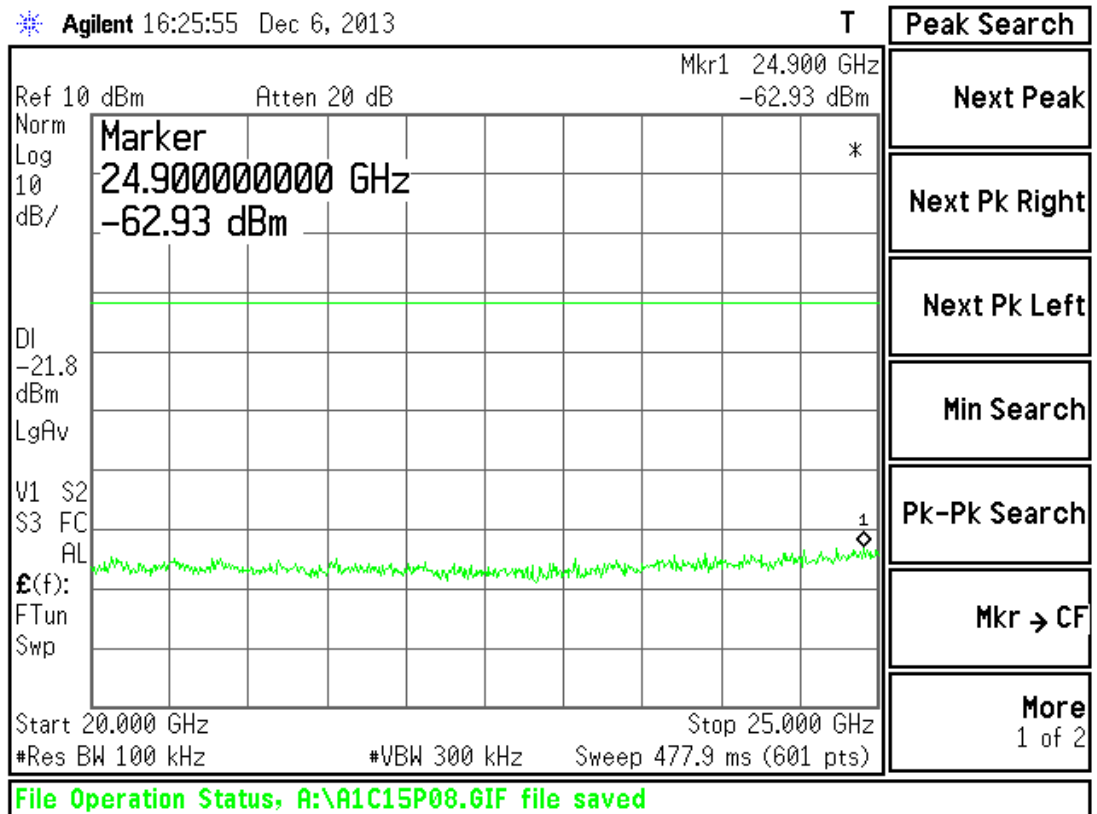


Conducted Spurious emissions 10 GHz to 15 GHz Antenna 1 - 2425 MHz

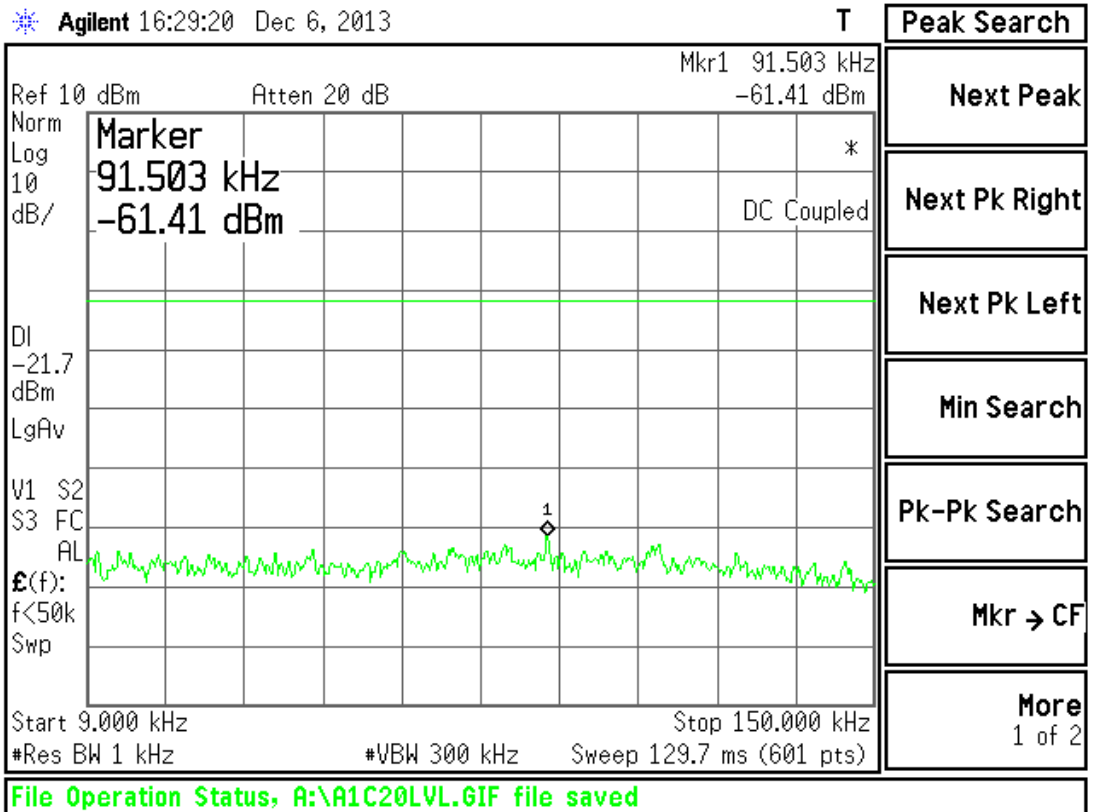


Conducted Spurious emissions 15 GHz to 20 GHz Antenna 1 - 2425 MHz

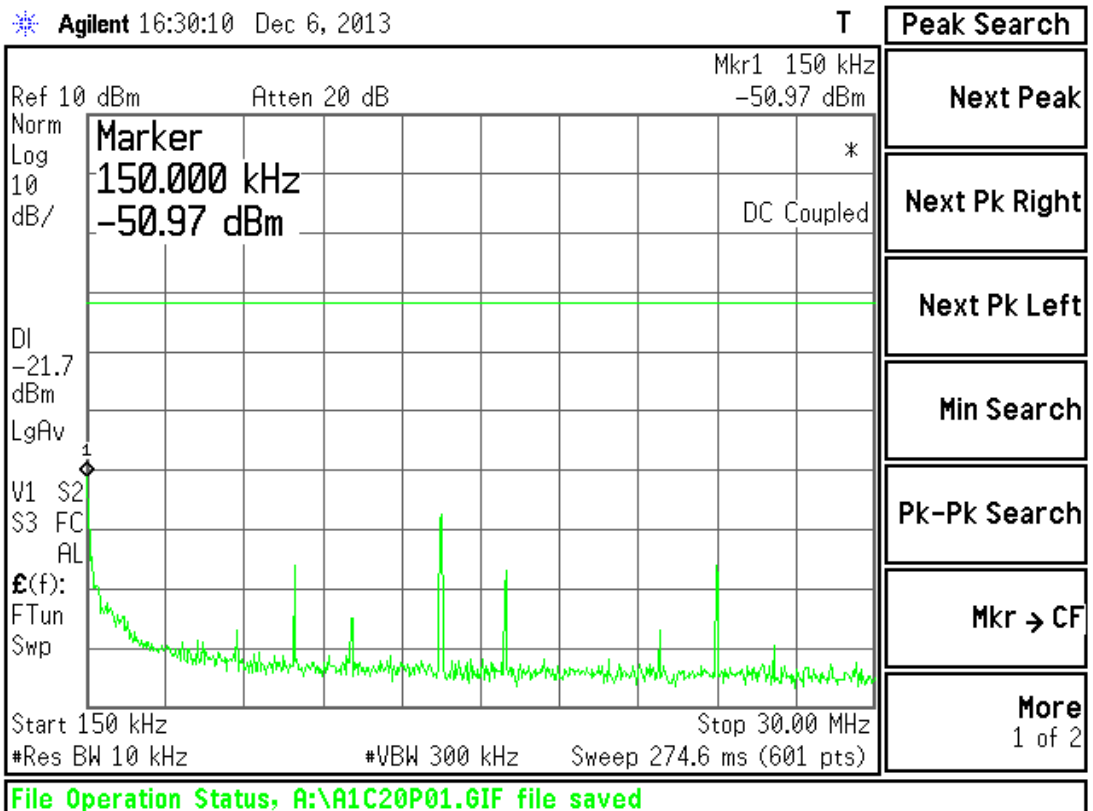
\* Agilent 16:25:55 Dec 6, 2013



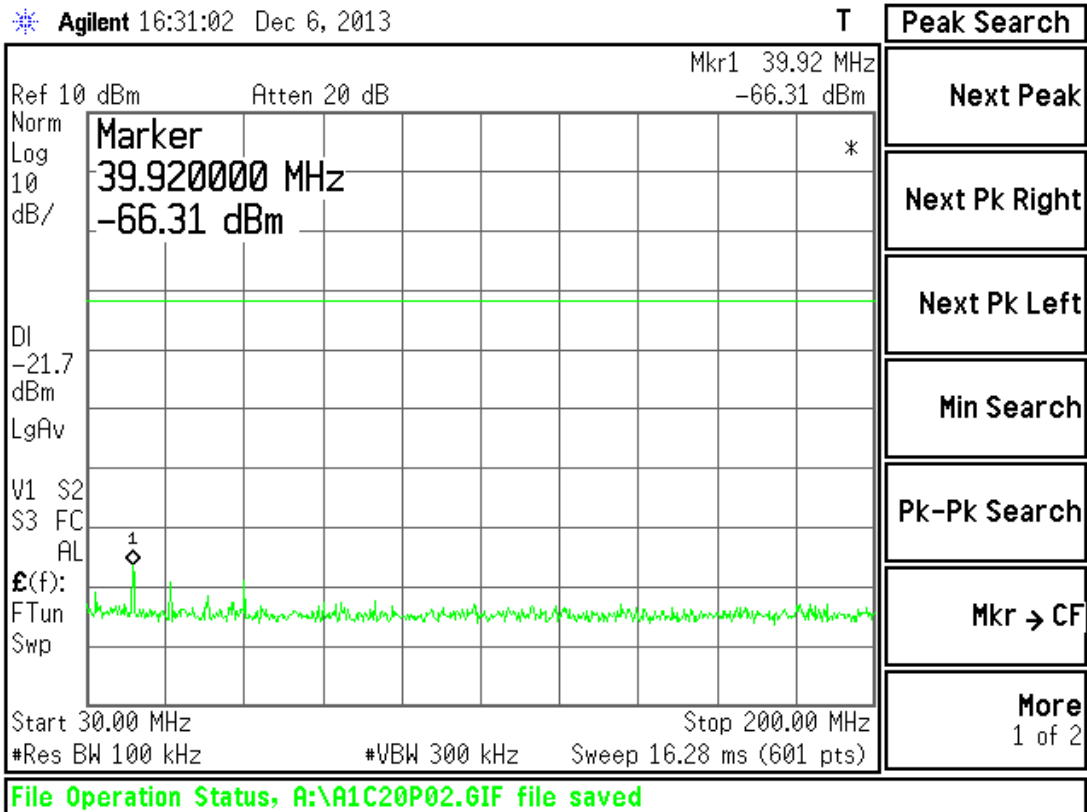
Conducted Spurious emissions 20 GHz to 25GHz Antenna 1 - 2425 MHz



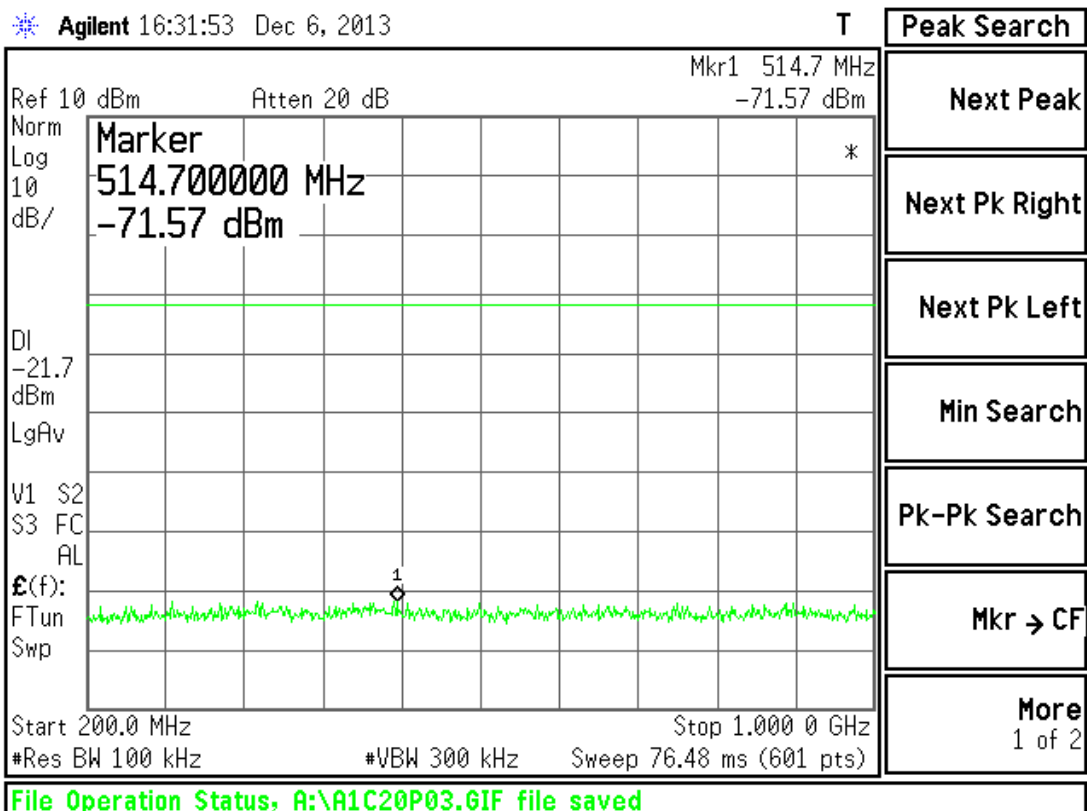
Conducted Spurious emissions 9kHz to 150 kHz Antenna 1 – 2450 MHz



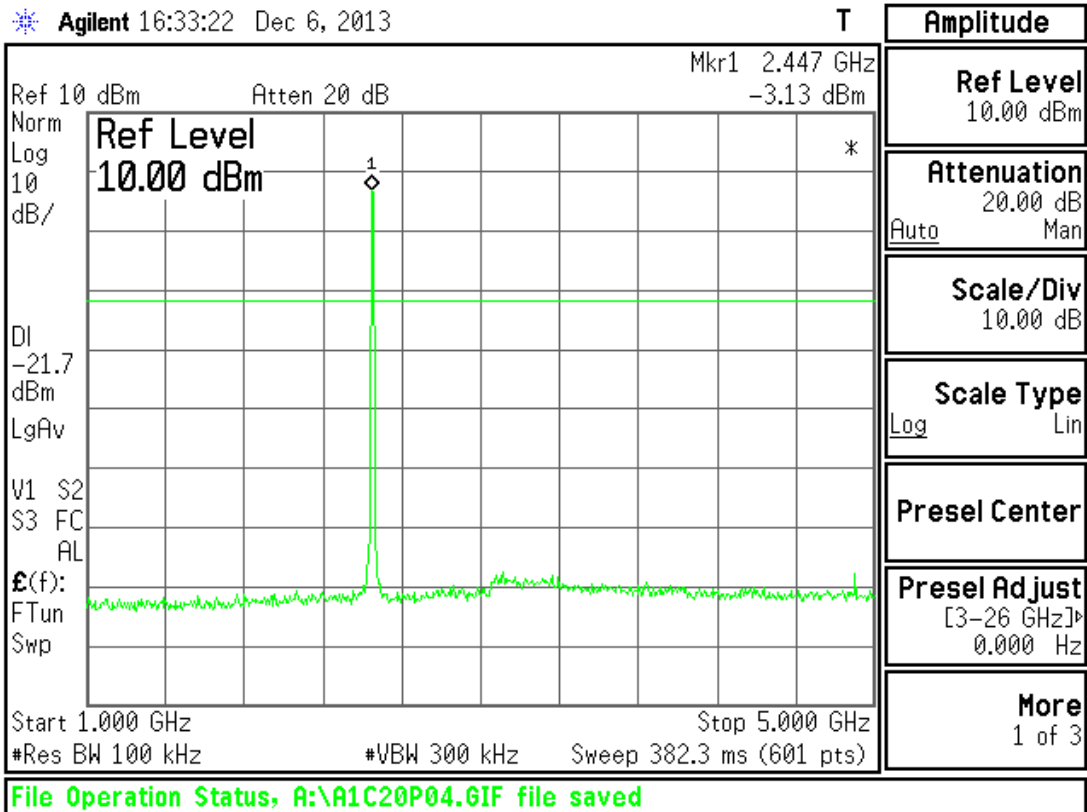
Conducted Spurious emissions 150 kHz to 30 MHz Antenna 1 – 2450 MHz



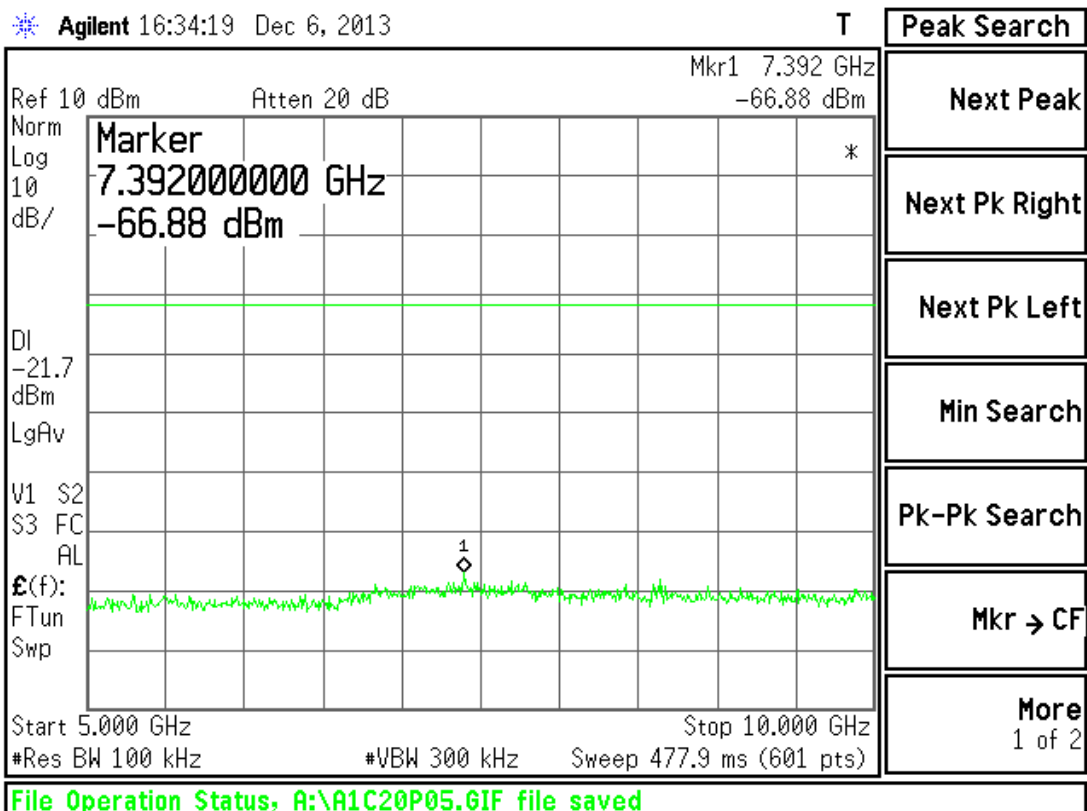
Conducted Spurious emissions 30 MHz to 200 MHz Antenna 1 - 2450 MHz



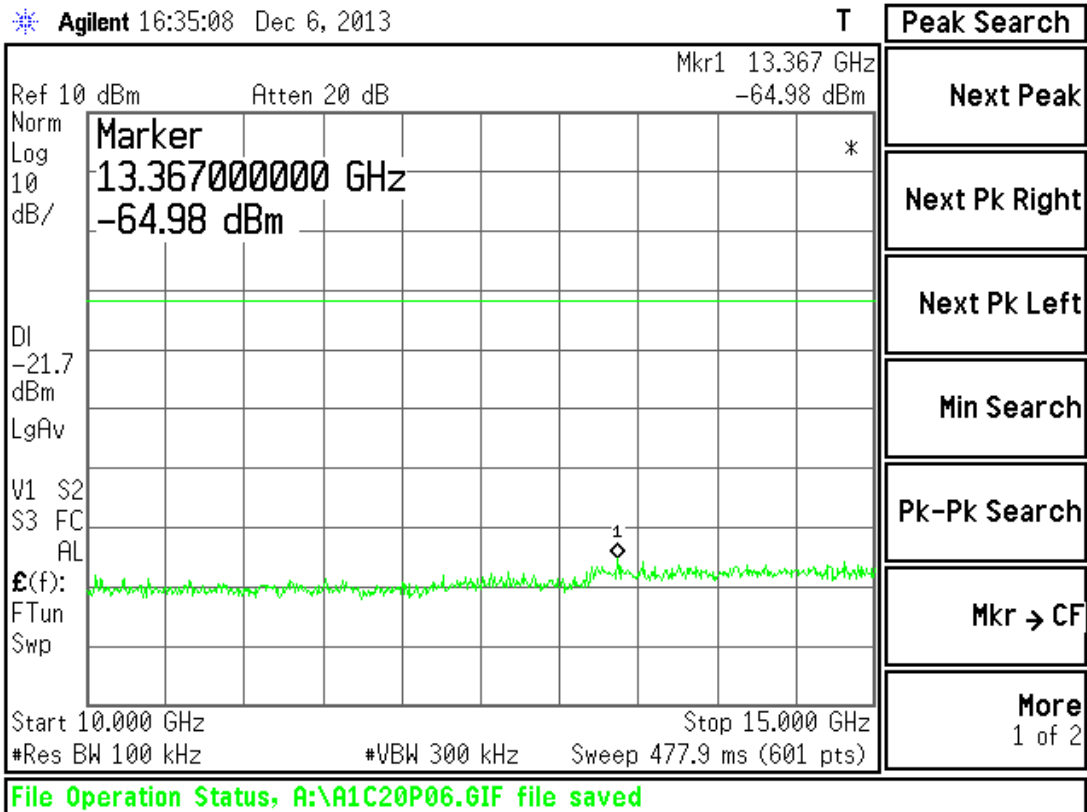
Conducted Spurious emissions 200 MHz to 1 GHz Antenna 1 - 2450 MHz



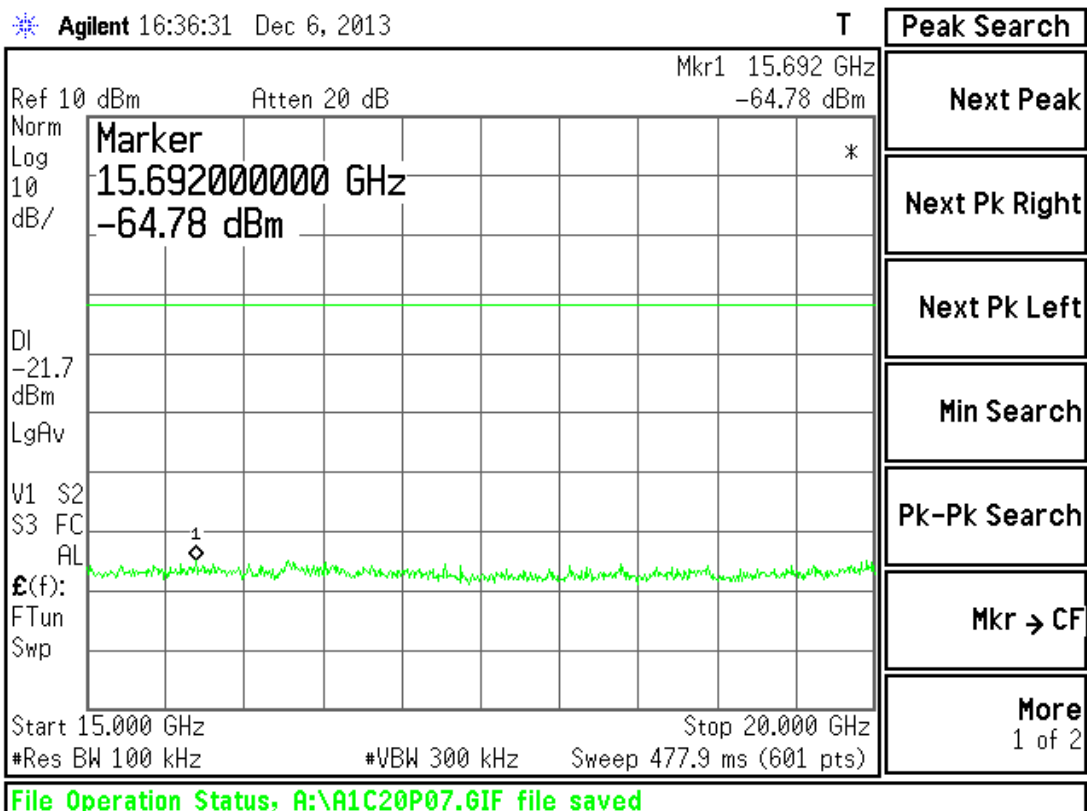
Conducted Spurious emissions 1 GHz to 5 GHz Antenna 1 - 2450 MHz



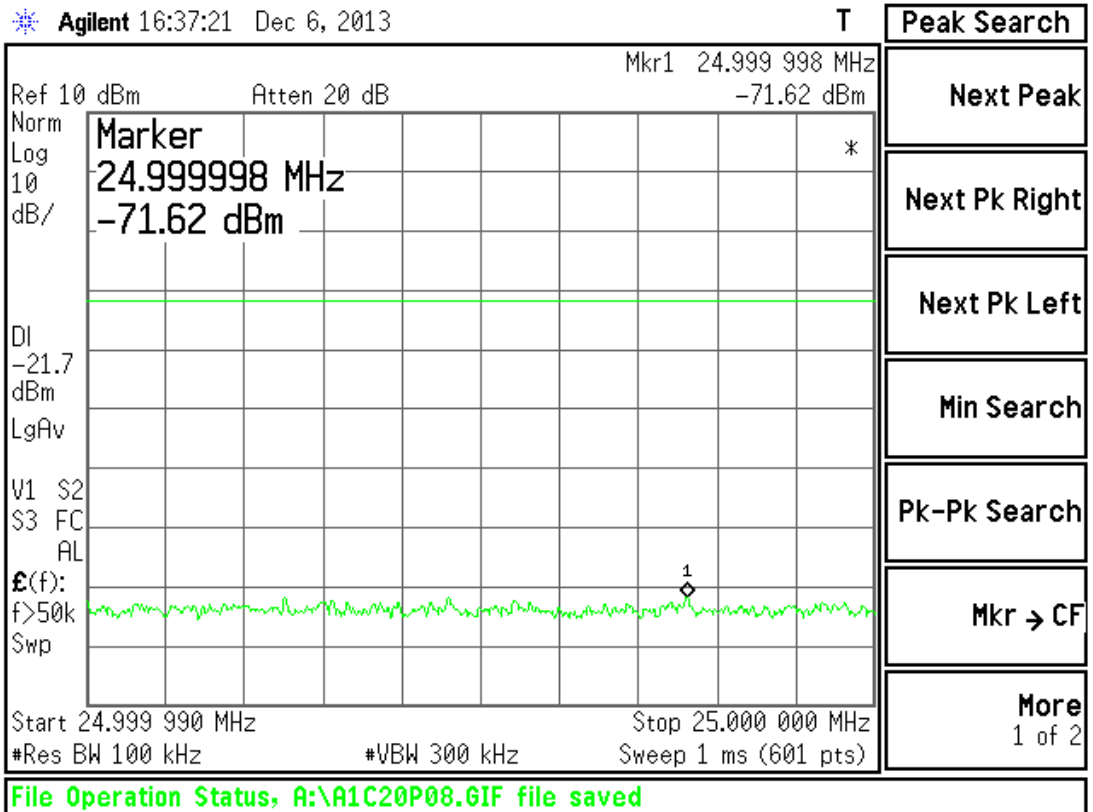
Conducted Spurious emissions 5 GHz to 10 GHz Antenna 1 - 2450 MHz



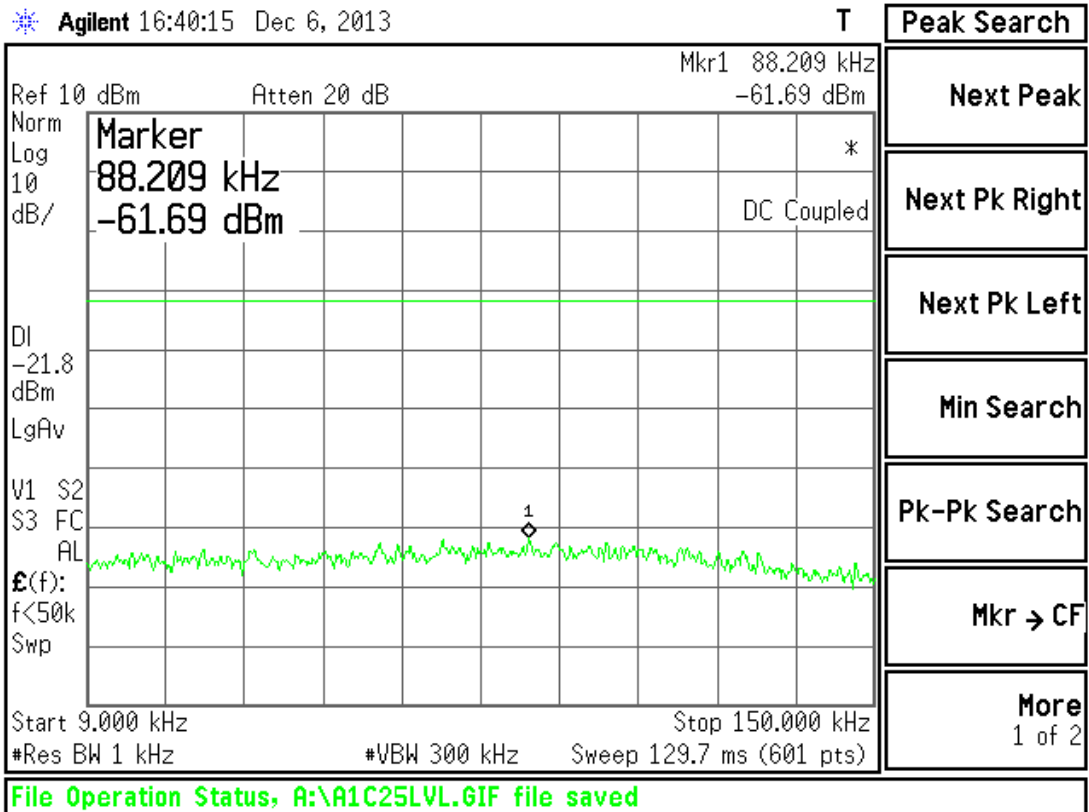
Conducted Spurious emissions 10 GHz to 15 GHz Antenna 1 - 2450 MHz



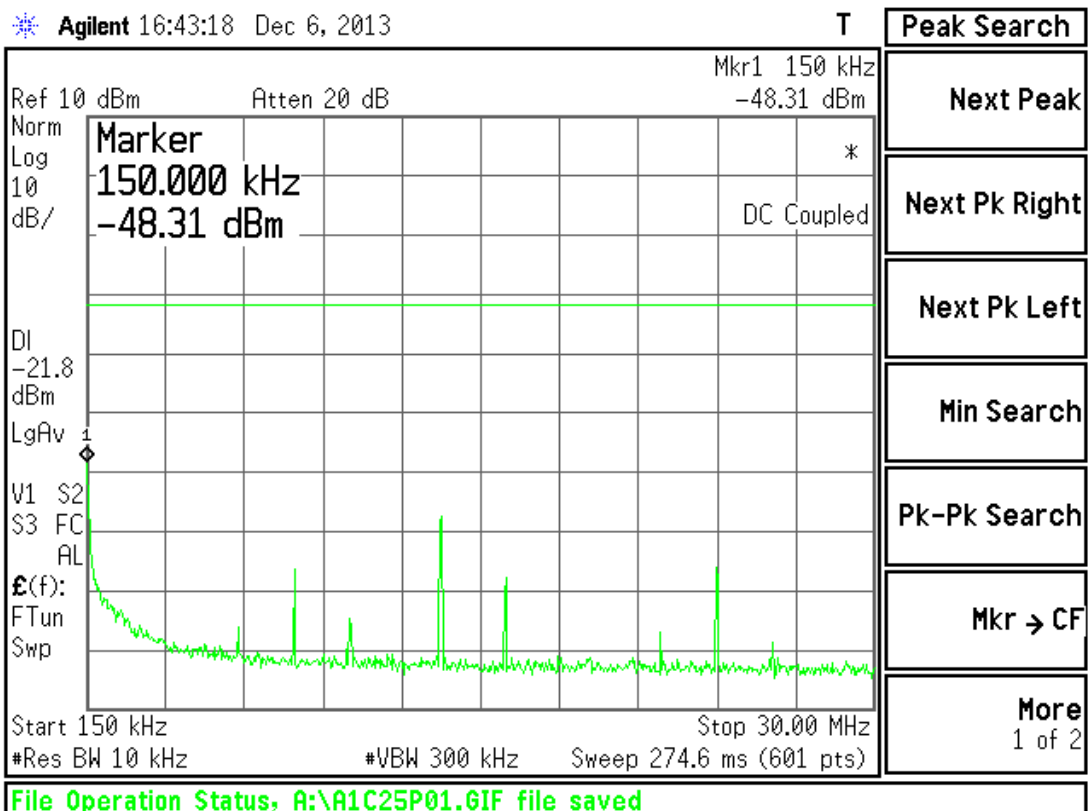
Conducted Spurious emissions 15 GHz to 20 GHz Antenna 1 - 2450 MHz



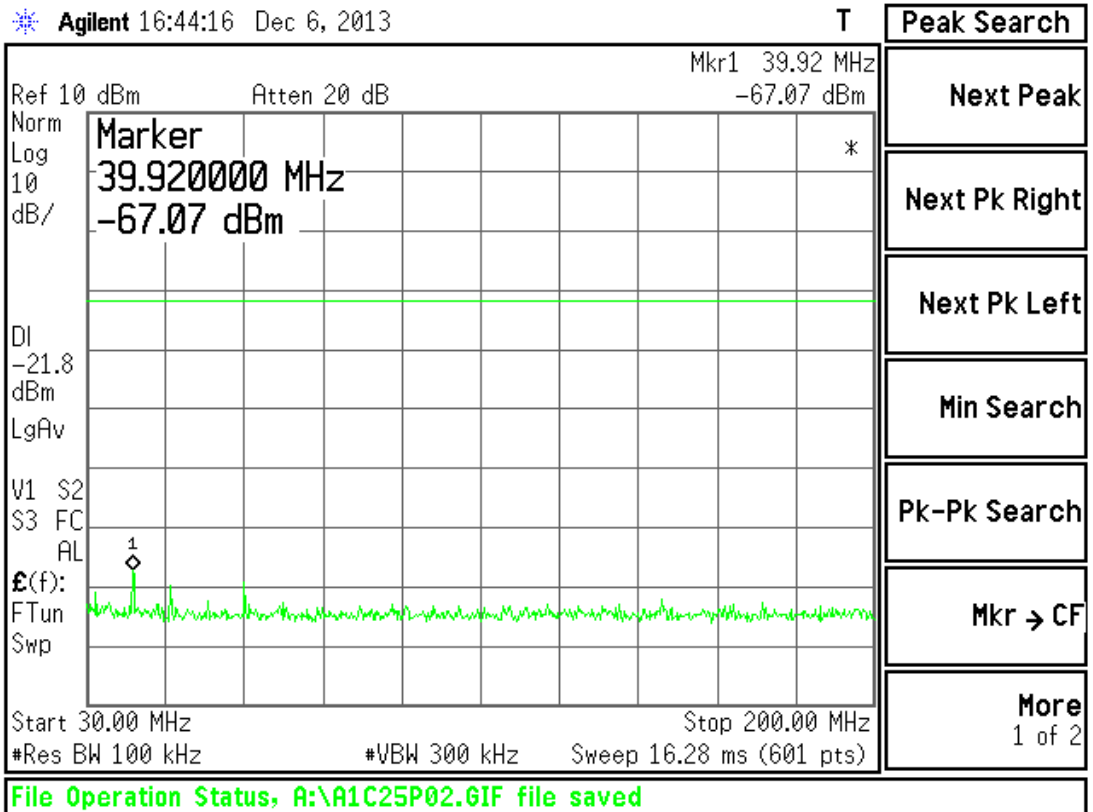
Conducted Spurious emissions 20 GHz to 25 GHz Antenna 1 - 2450 MHz



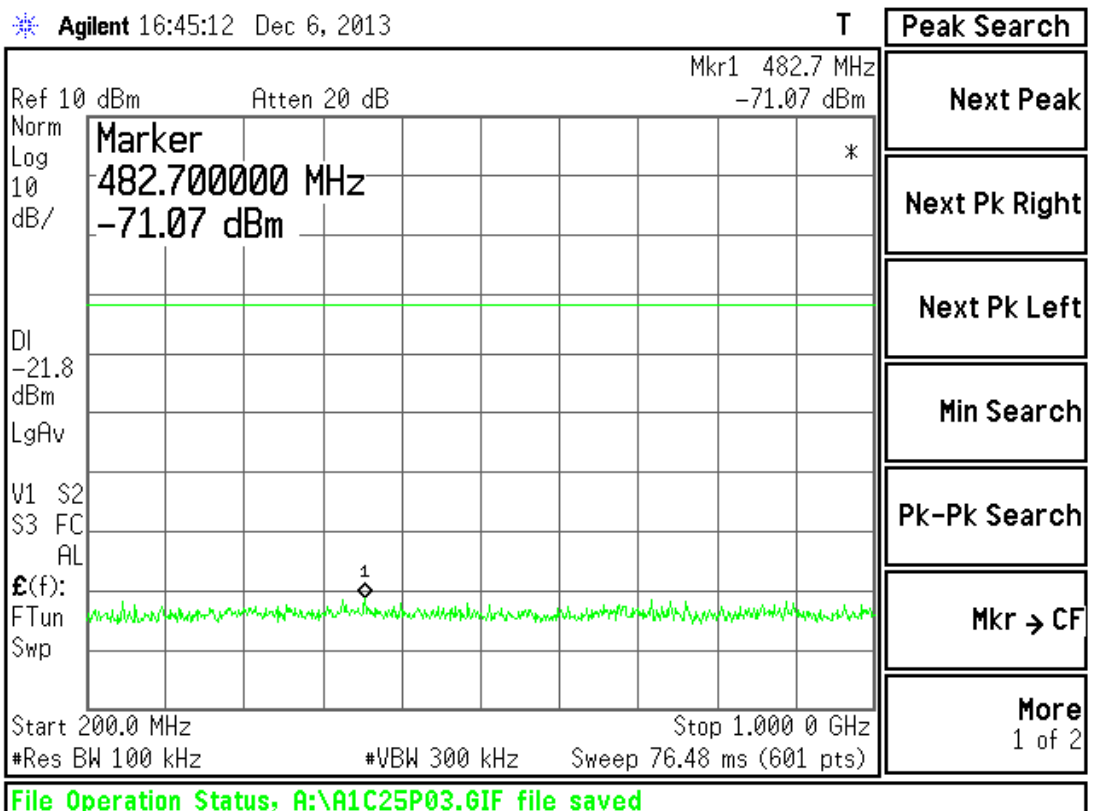
Conducted Spurious emissions 9kHz to 150 kHz Antenna 1 – 2475 MHz



Conducted Spurious emissions 150 kHz to 30 MHz Antenna 1 – 2475 MHz

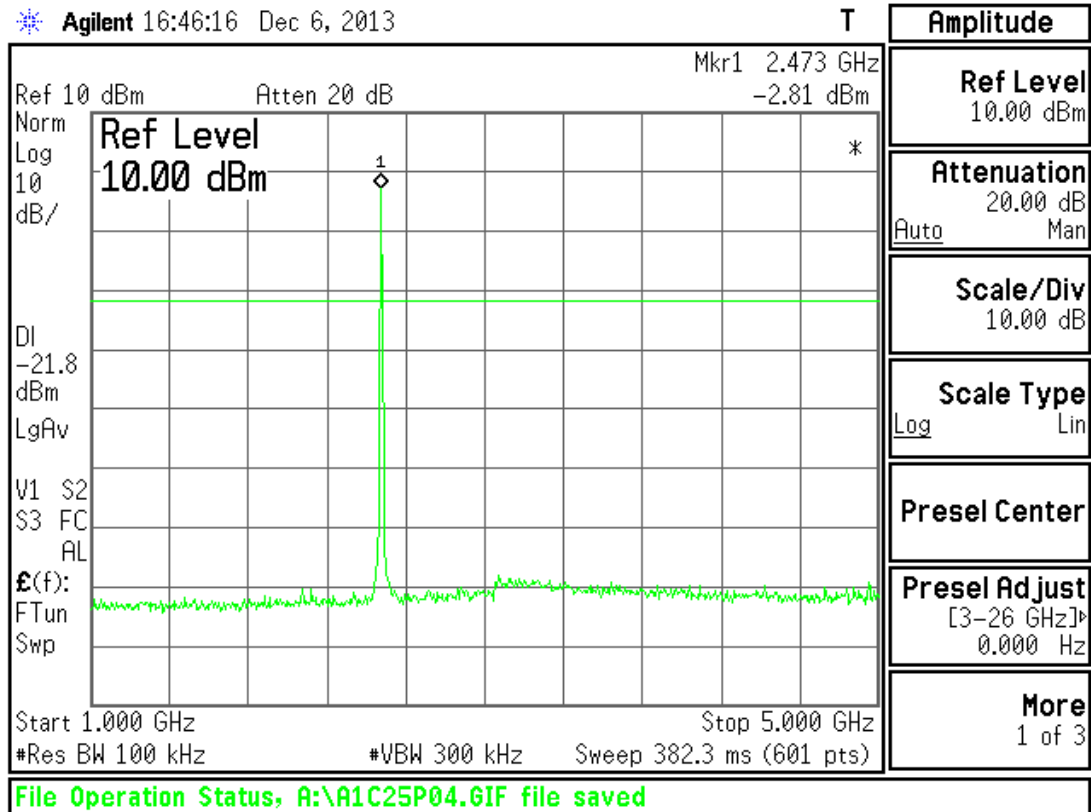


Conducted Spurious emissions 30 MHz to 200 MHz Antenna 1 - 2475 MHz



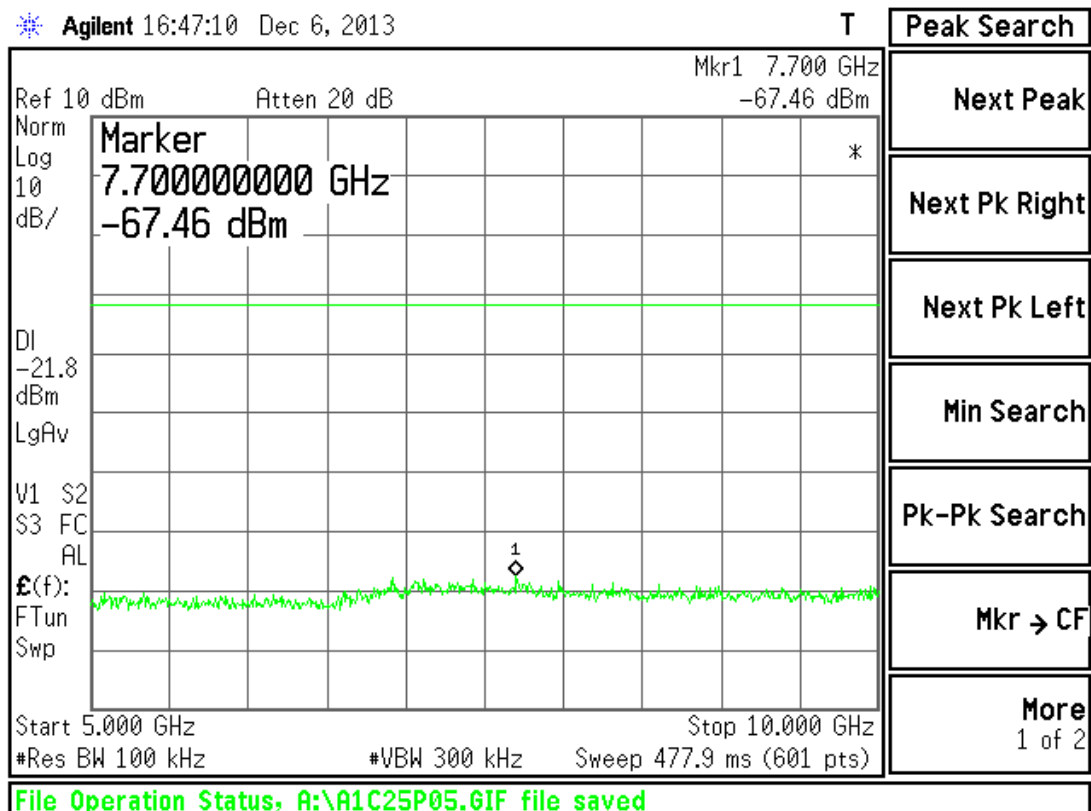
Conducted Spurious emissions 200 MHz to 1 GHz Antenna 1 - 2475 MHz

\* Agilent 16:46:16 Dec 6, 2013

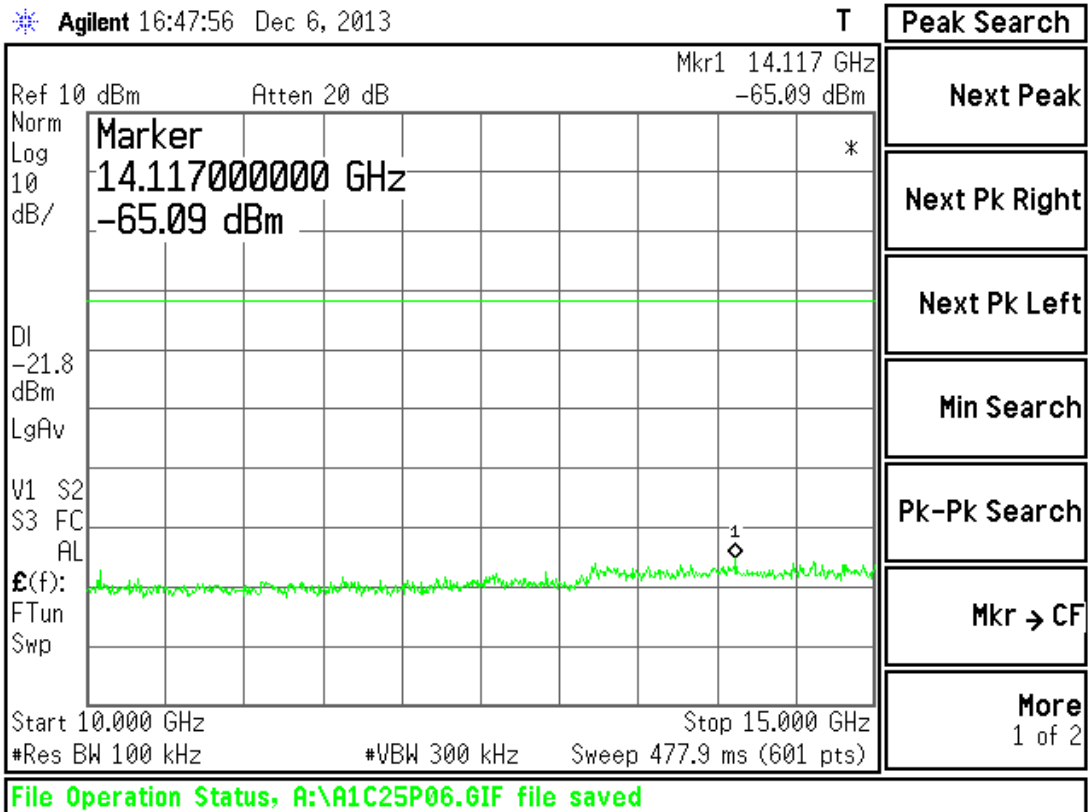


Conducted Spurious emissions 1 GHz to 5 GHz Antenna 1 - 2475 MHz

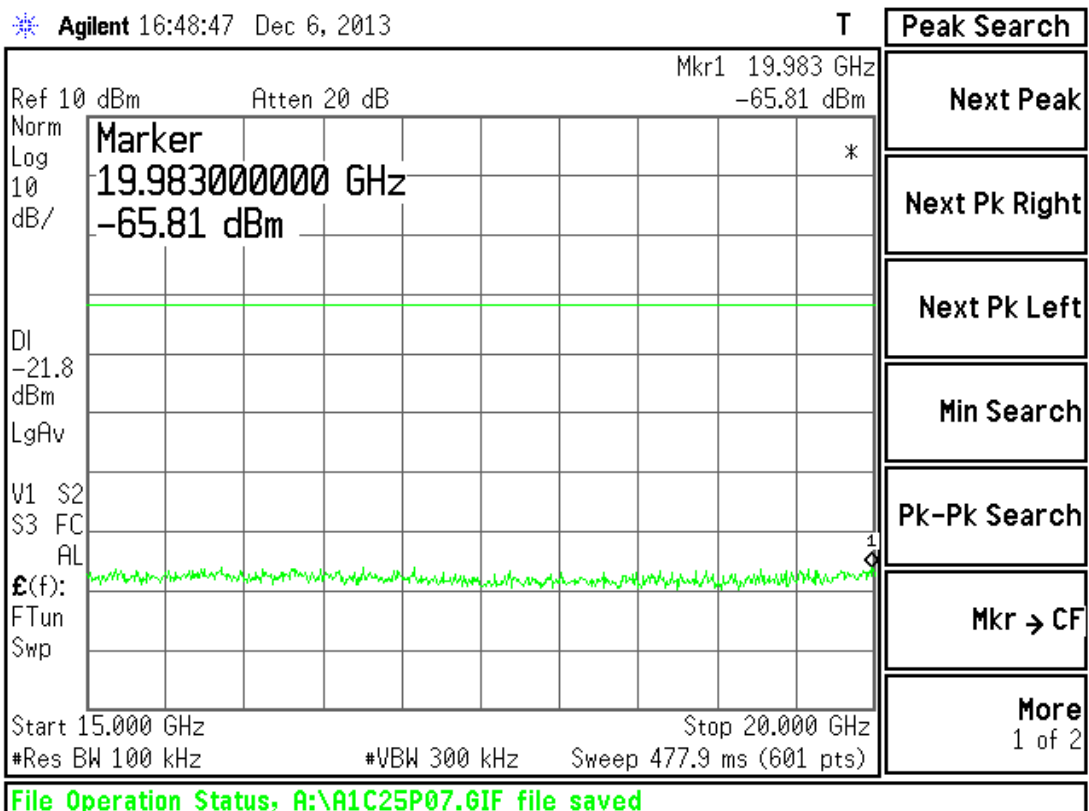
\* Agilent 16:47:10 Dec 6, 2013



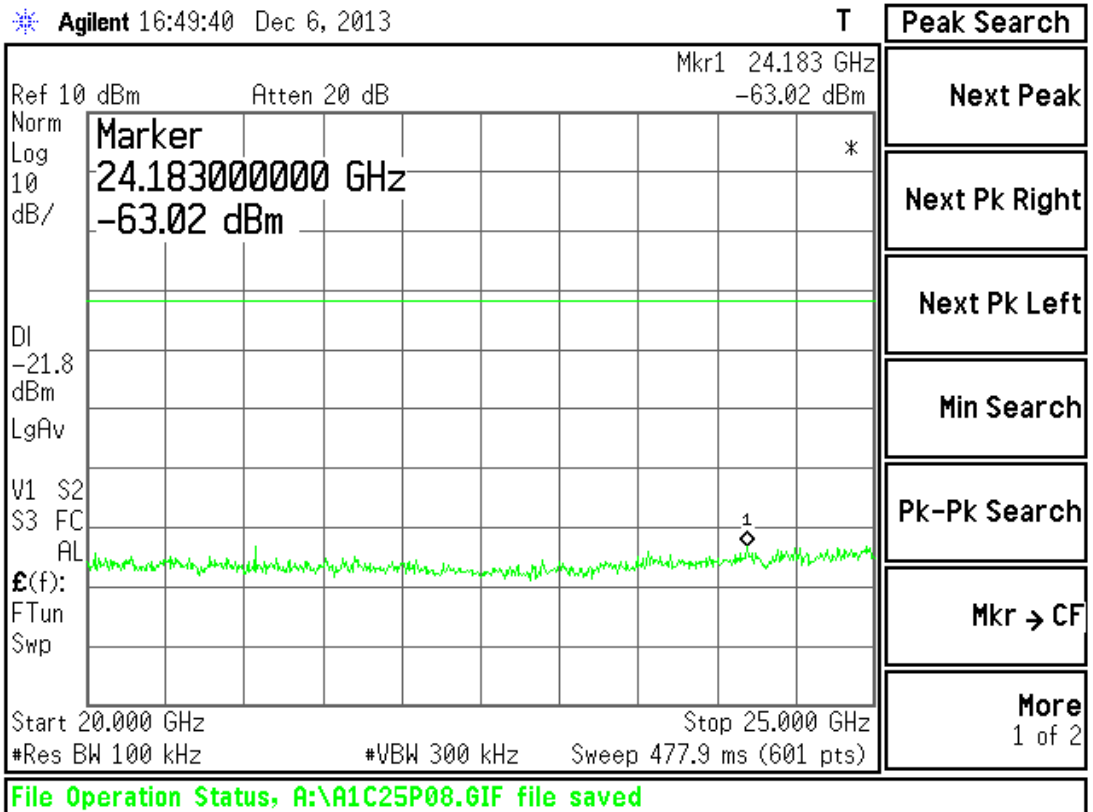
Conducted Spurious emissions 5 GHz to 10 GHz Antenna 1 - 2475 MHz



Conducted Spurious emissions 10 GHz to 15 GHz Antenna 1 - 2475 MHz

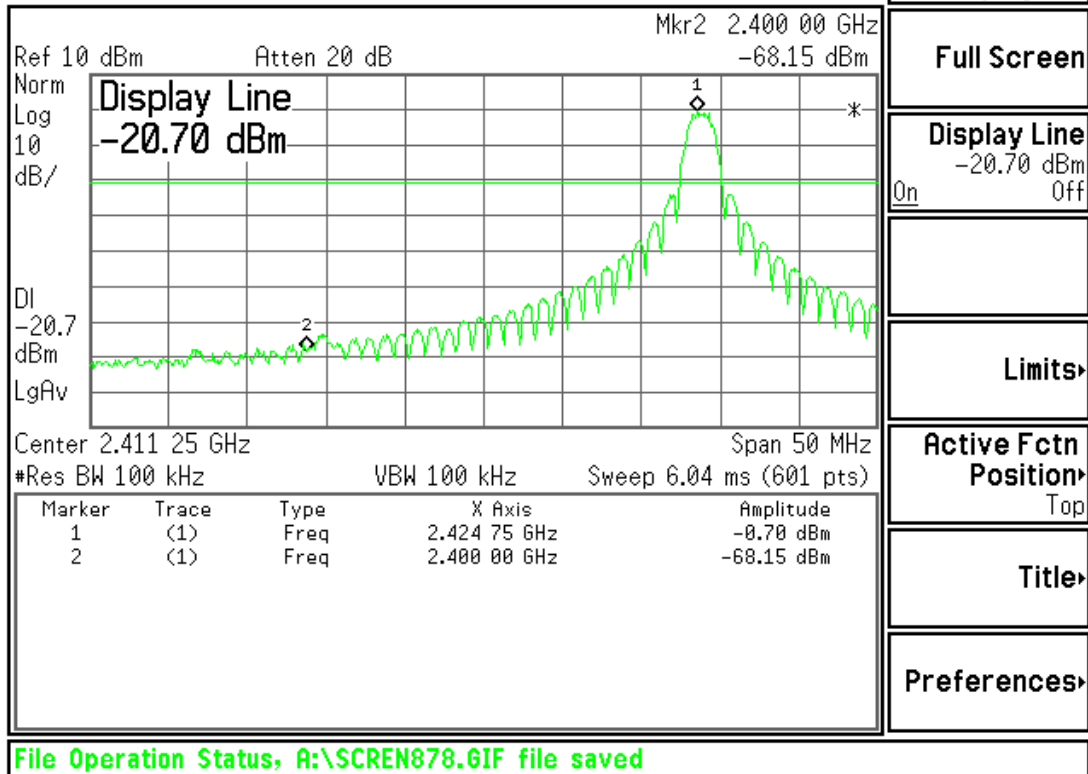


Conducted Spurious emissions 15 GHz to 20 GHz Antenna 1 - 2475 MHz



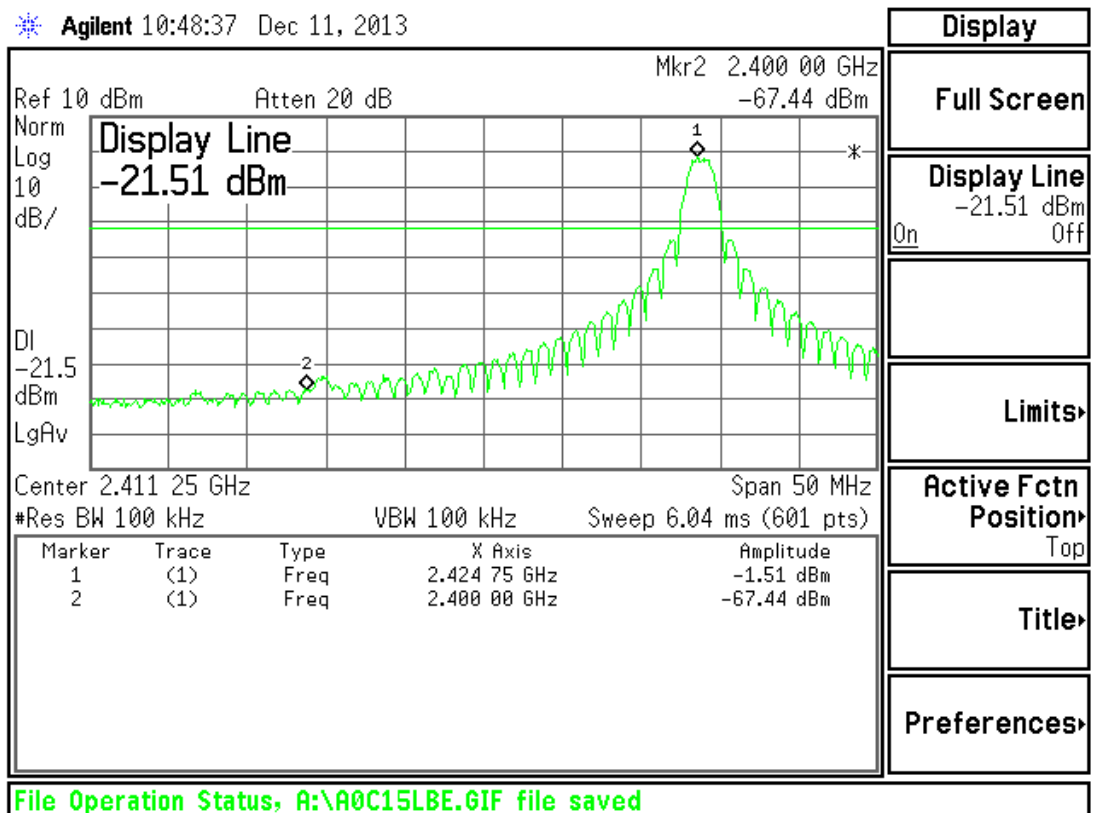
Conducted Spurious emissions 20 GHz to 25 GHz Antenna 1 - 2475 MHz

\* Agilent 10:37:22 Dec 11, 2013



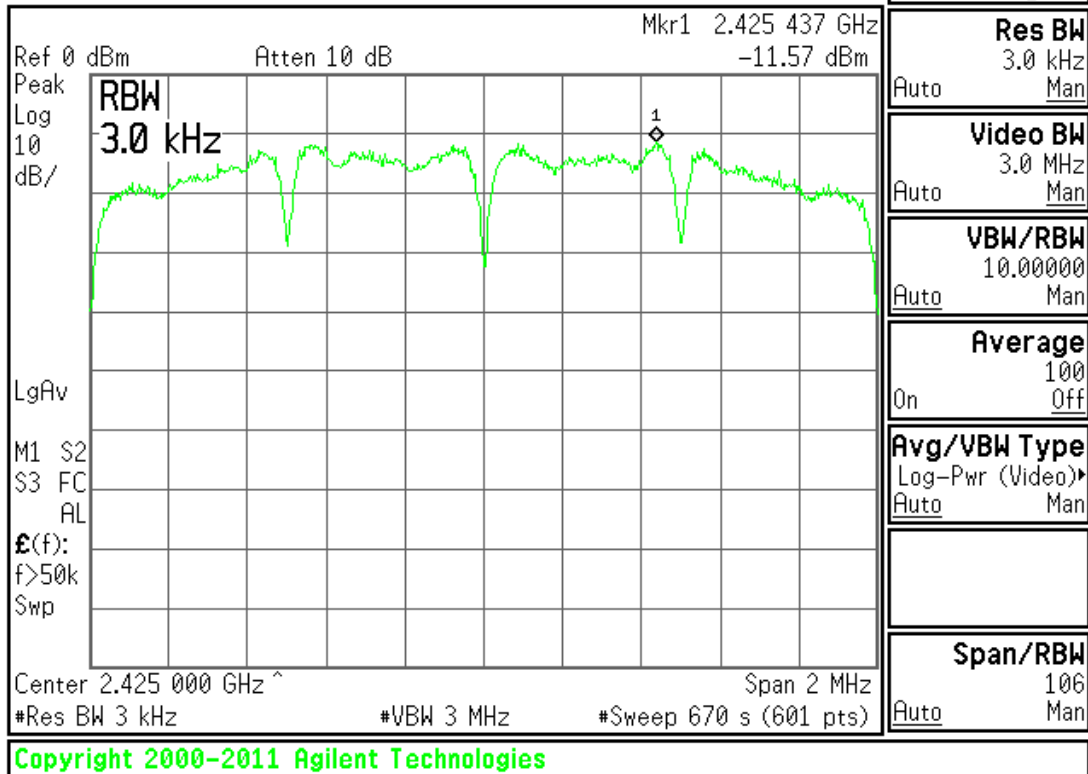
Lower Band Edge Antenna 0

\* Agilent 10:48:37 Dec 11, 2013



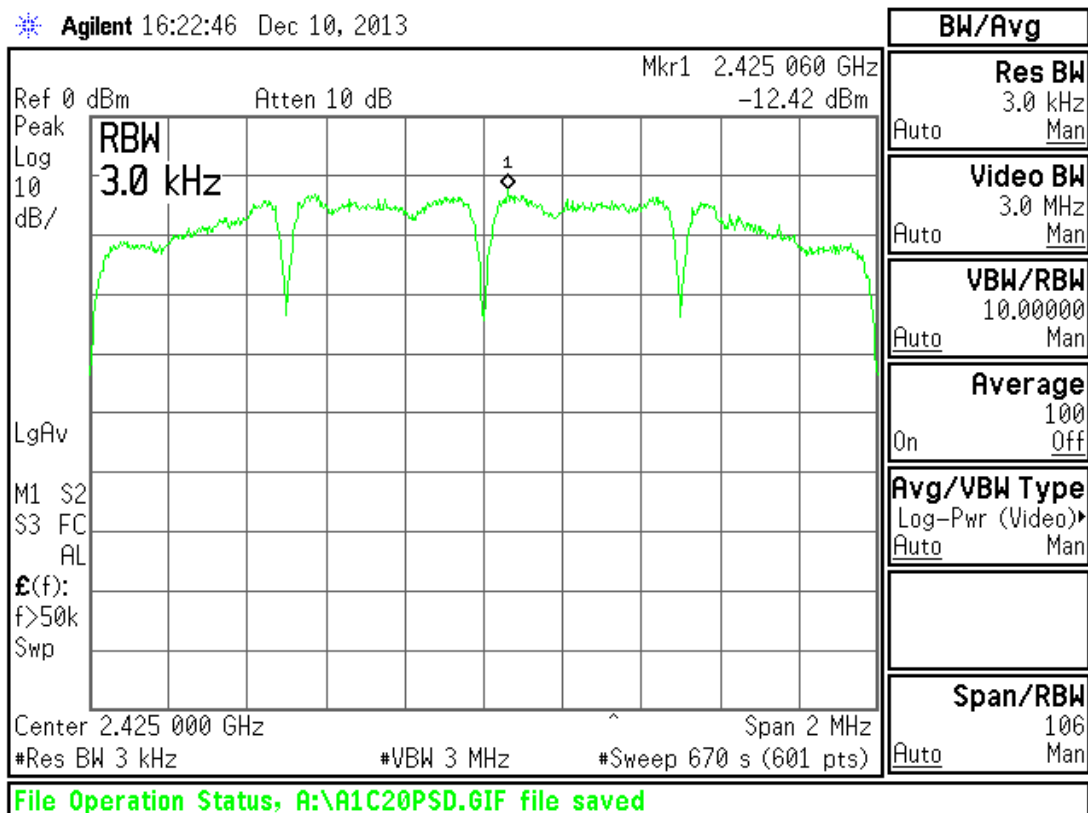
Lower Band Edge Antenna 1

\* Agilent 14:42:30 Dec 10, 2013



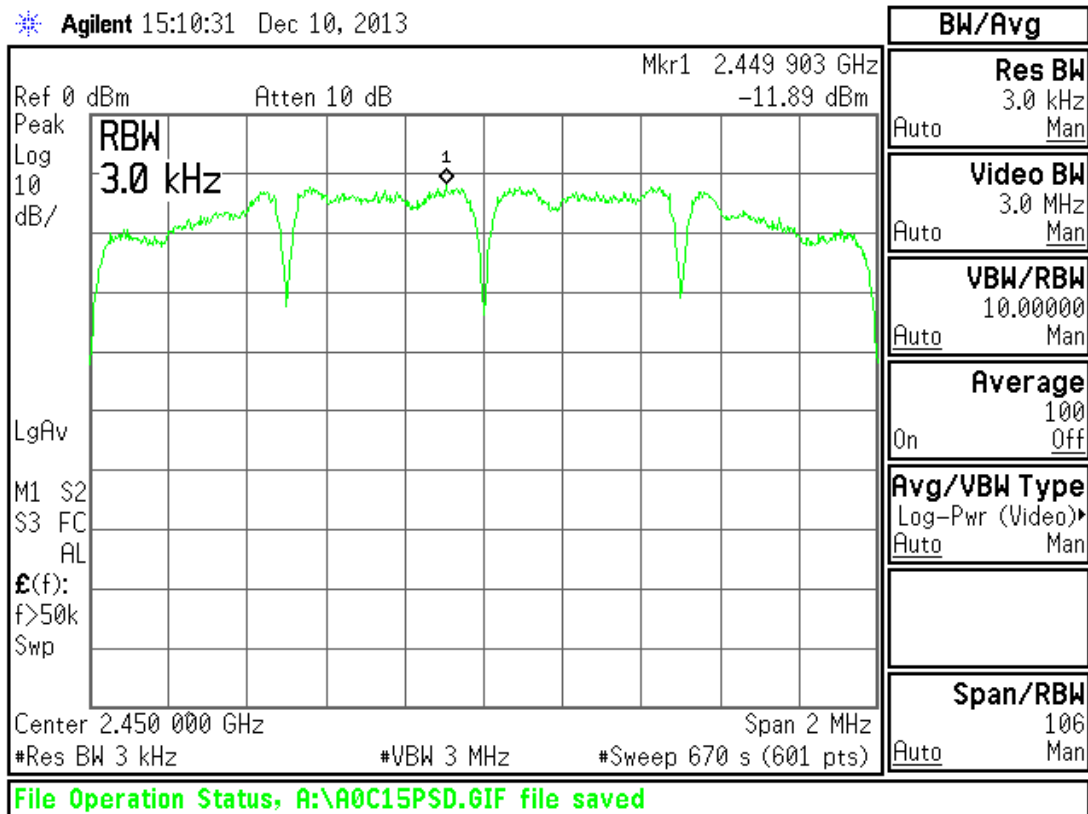
Conducted power spectral density Antenna 0 – 2425 MHz

\* Agilent 16:22:46 Dec 10, 2013



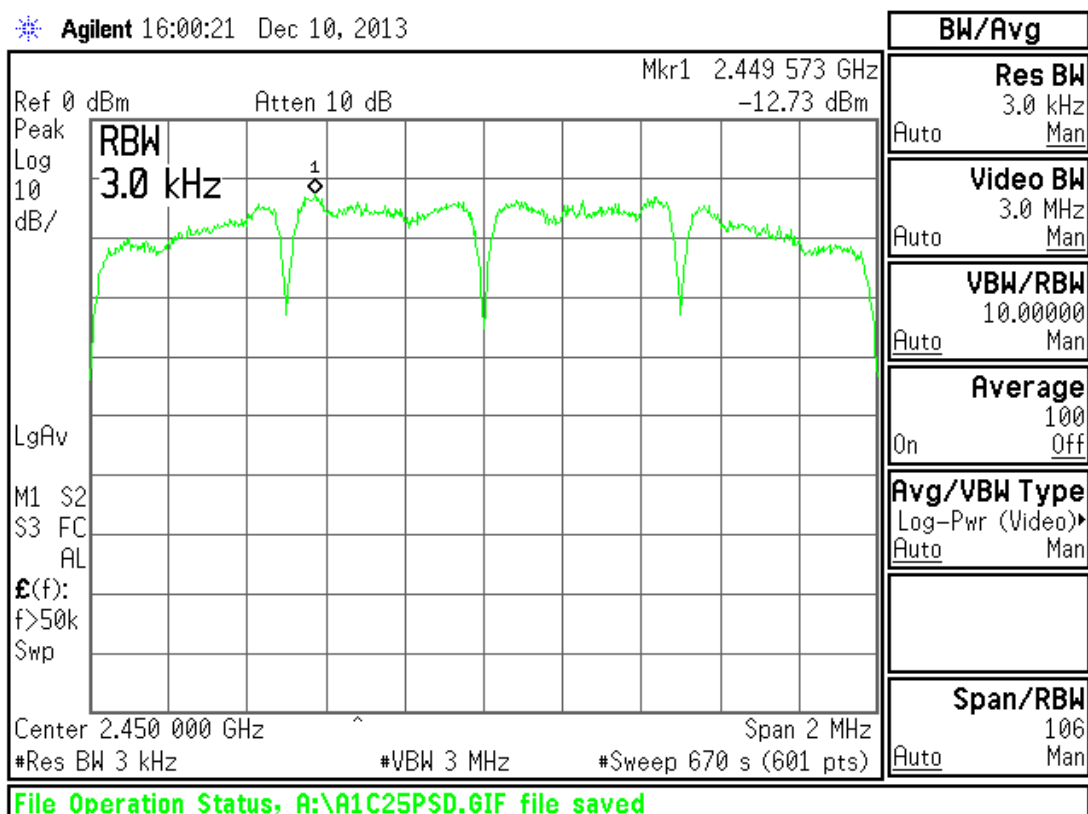
Conducted power spectral density Antenna 1 – 2425 MHz

\* Agilent 15:10:31 Dec 10, 2013



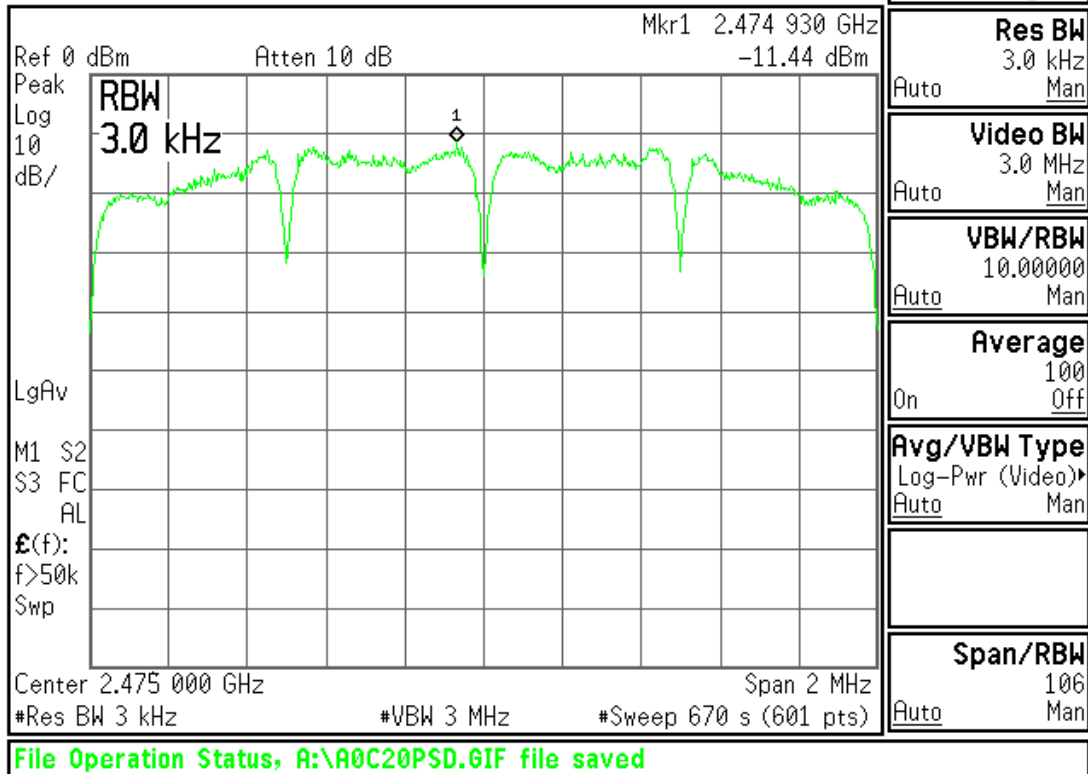
Conducted power spectral density Antenna 0- 2450 MHz

\* Agilent 16:00:21 Dec 10, 2013



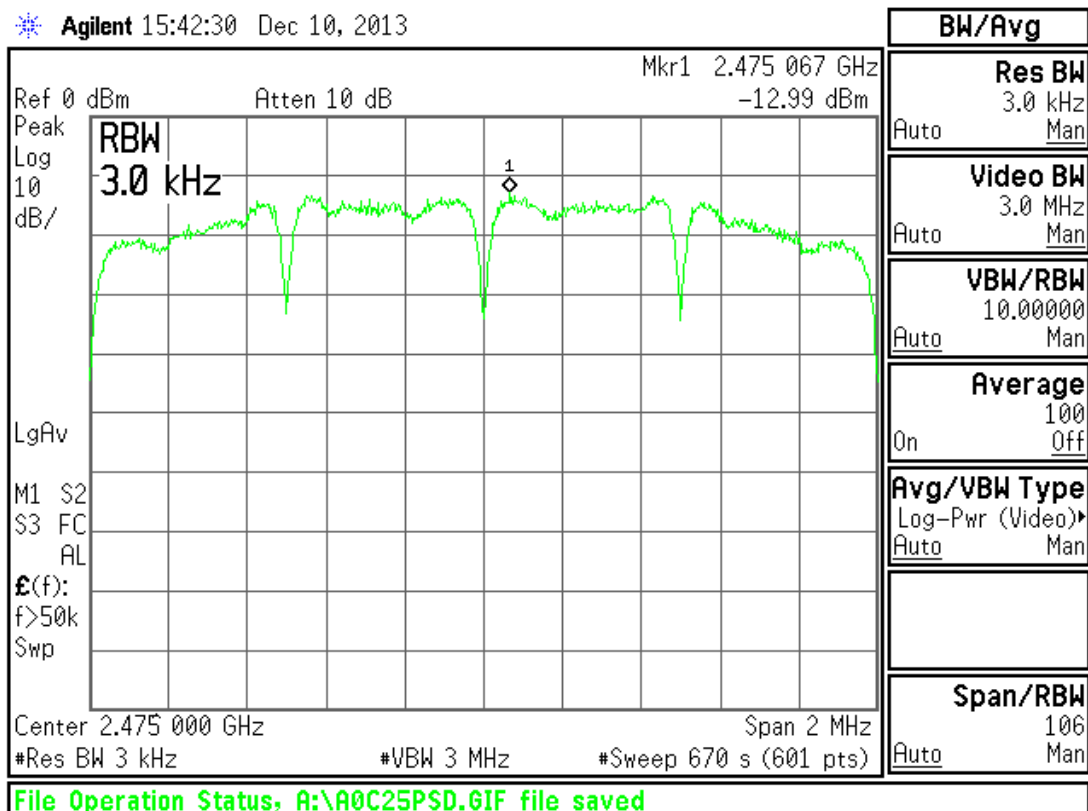
Conducted power spectral density Antenna 1- 2450 MHz

\* Agilent 15:25:50 Dec 10, 2013

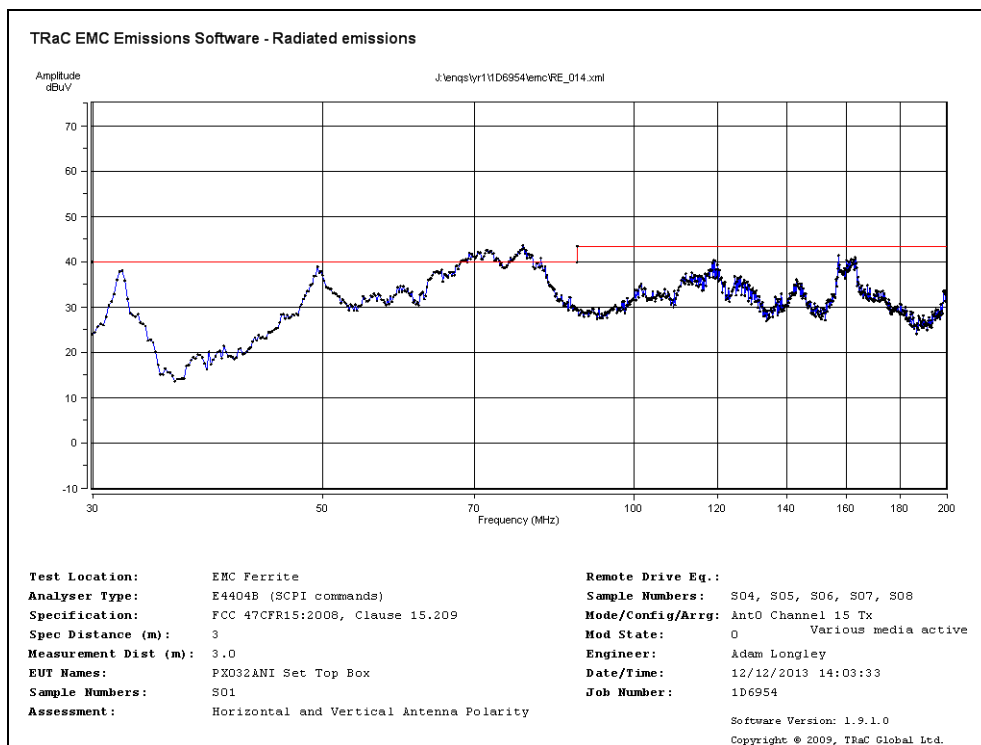


Conducted power spectral density Antenna 0- 2475 MHz

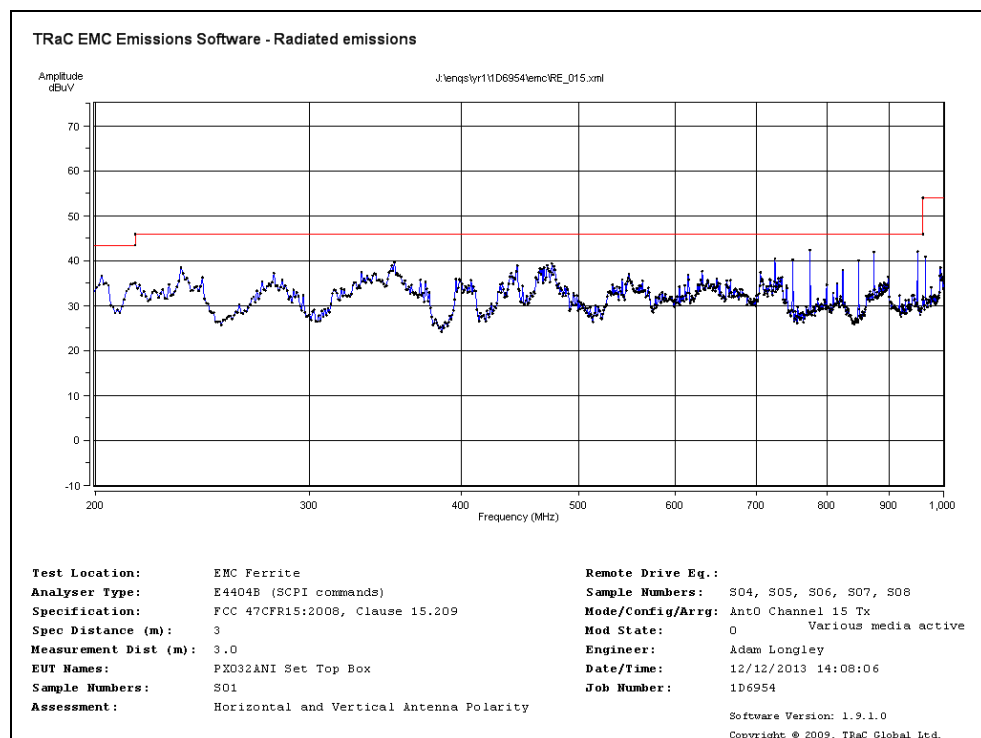
\* Agilent 15:42:30 Dec 10, 2013



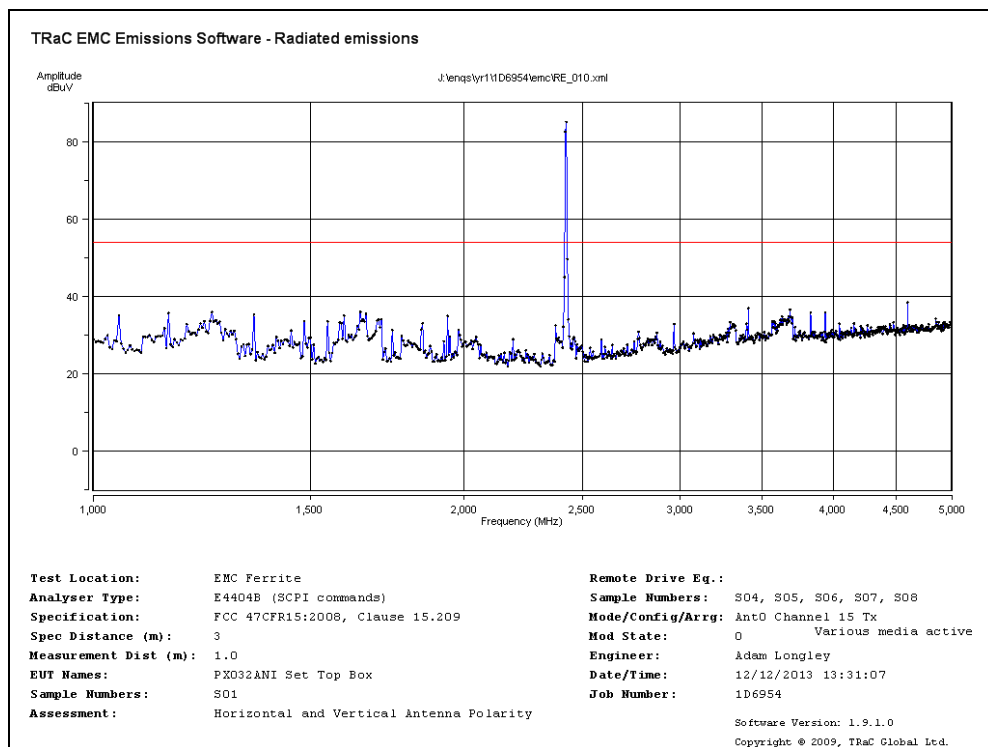
Conducted power spectral density Antenna 1- 2475 MHz



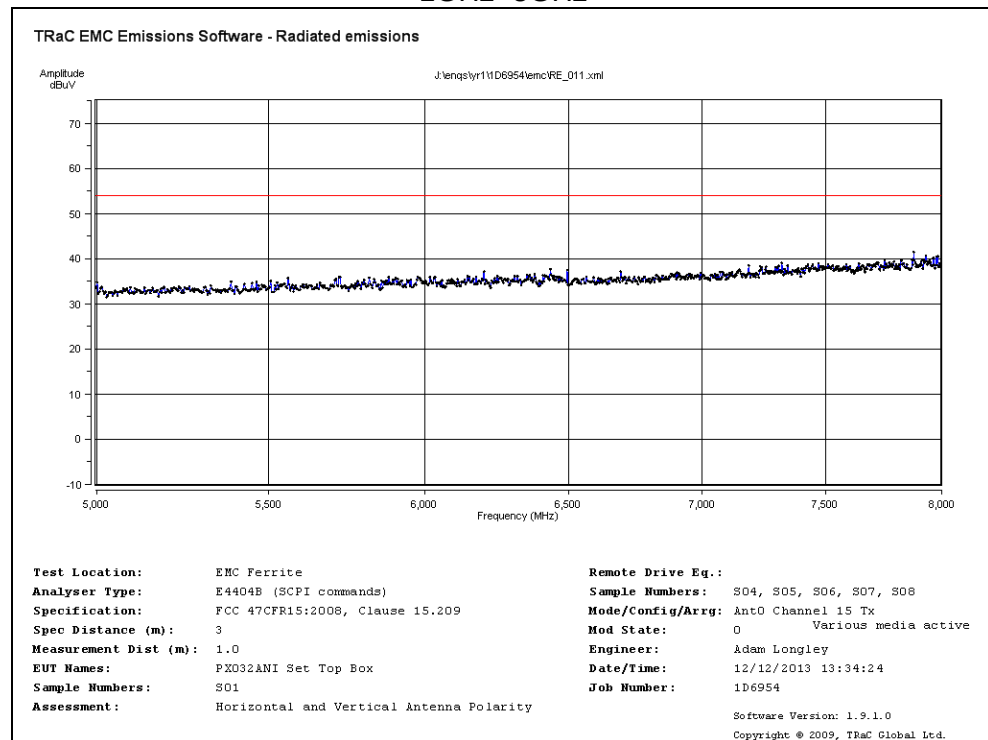
Radiated Transmitter Emissions Channel 15 2425MHz (15.209) Antenna 0  
30MHz -200MHz



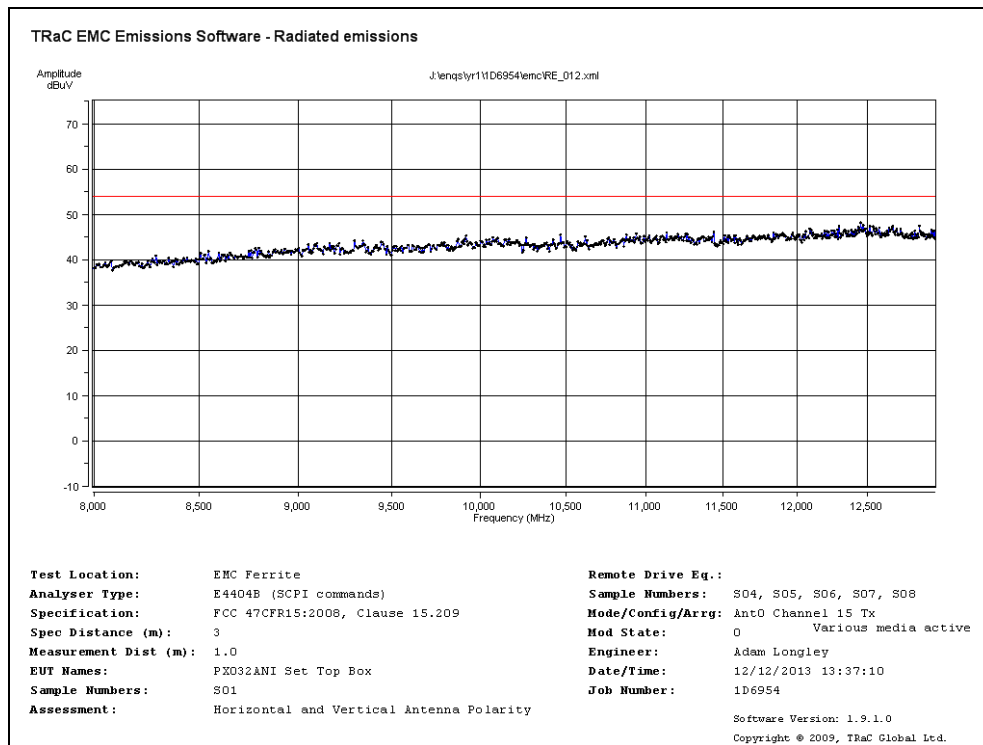
Radiated Transmitter Emissions Channel 15 2425MHz (15.209) Antenna 0  
200MHz - 1GHz



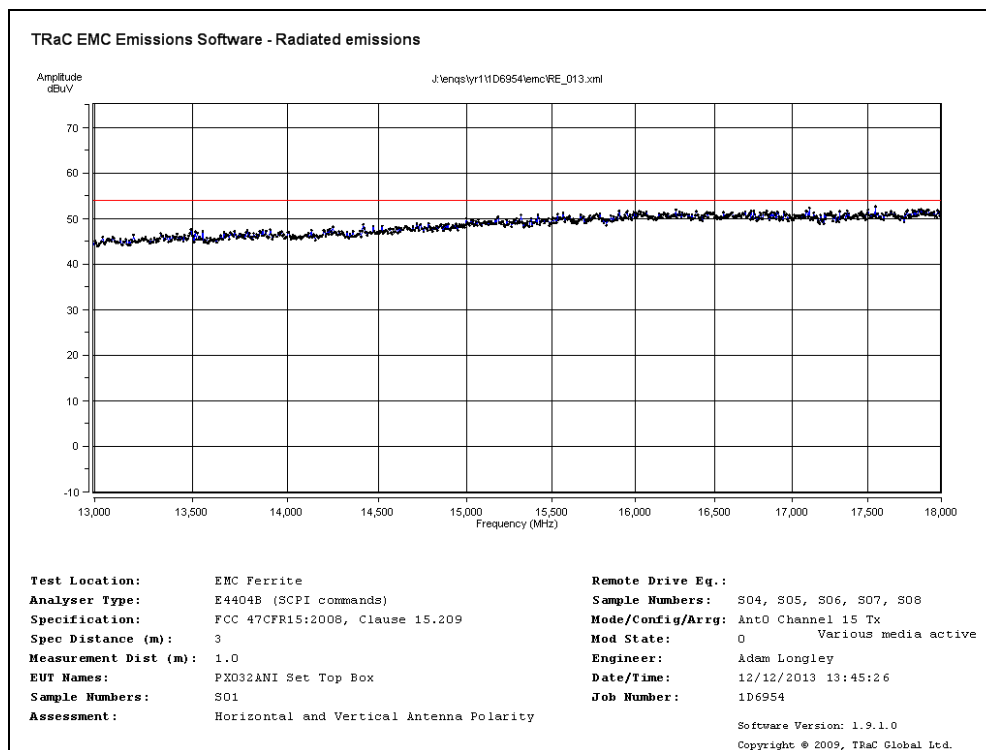
Radiated Transmitter Emissions Channel 15 2425MHz (15.209) Antenna 0  
1GHz- 5GHz



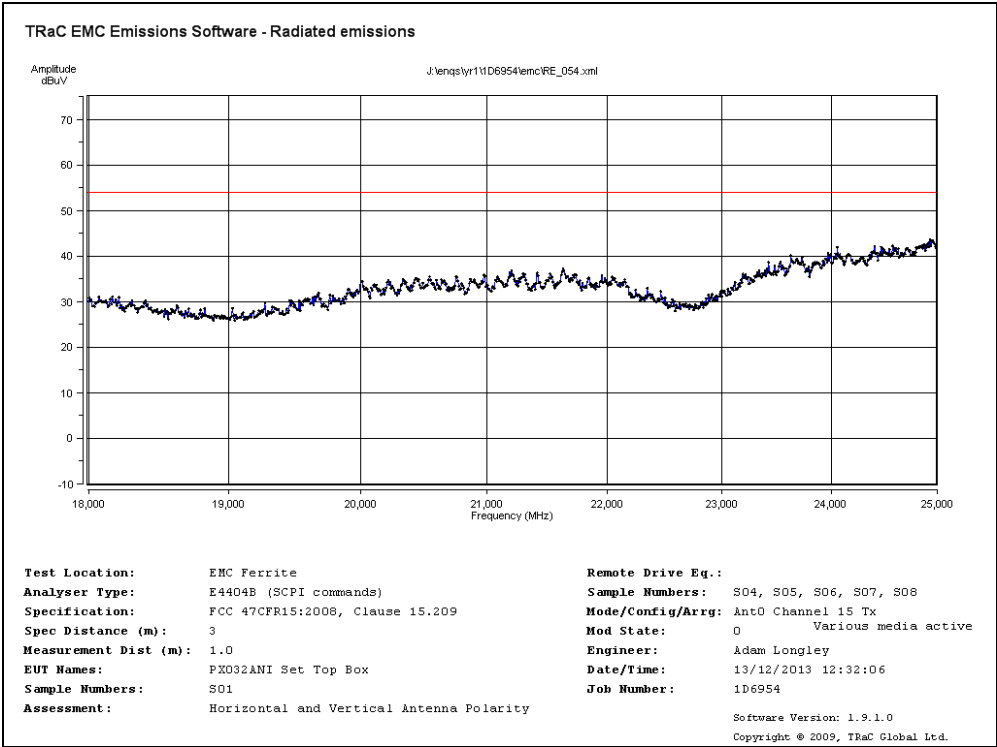
Radiated Transmitter Emissions Channel 15 2425MHz (15.209) Antenna 0  
5GHz- 8GHz



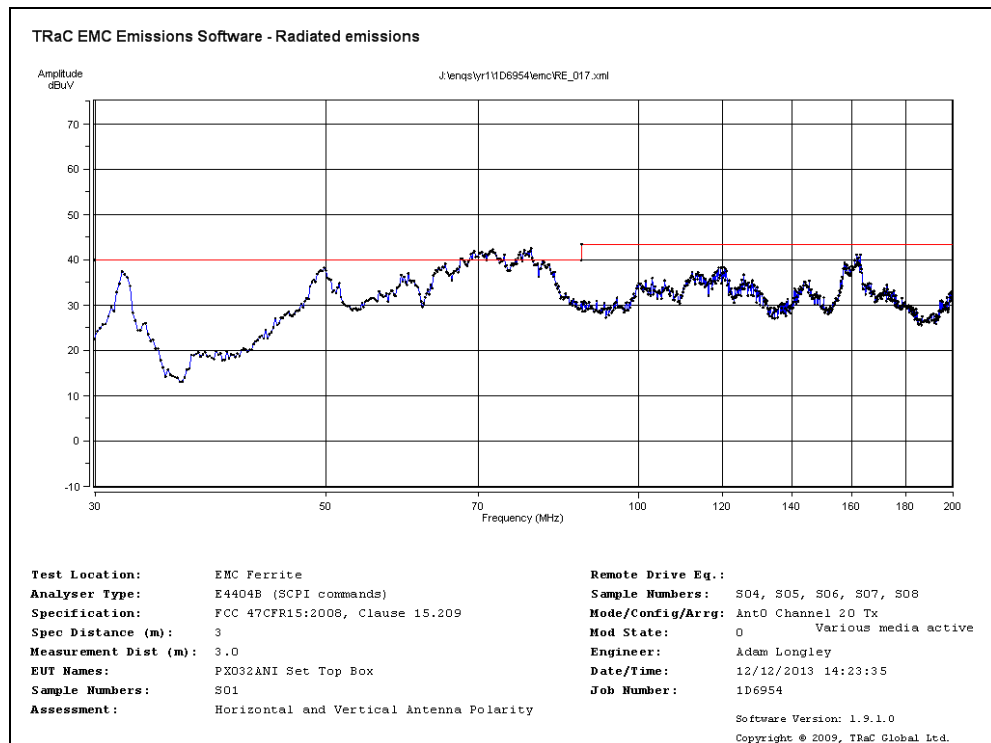
Radiated Transmitter Emissions Channel 15 2425MHz (15.209) Antenna 0  
8GHz- 13GHz



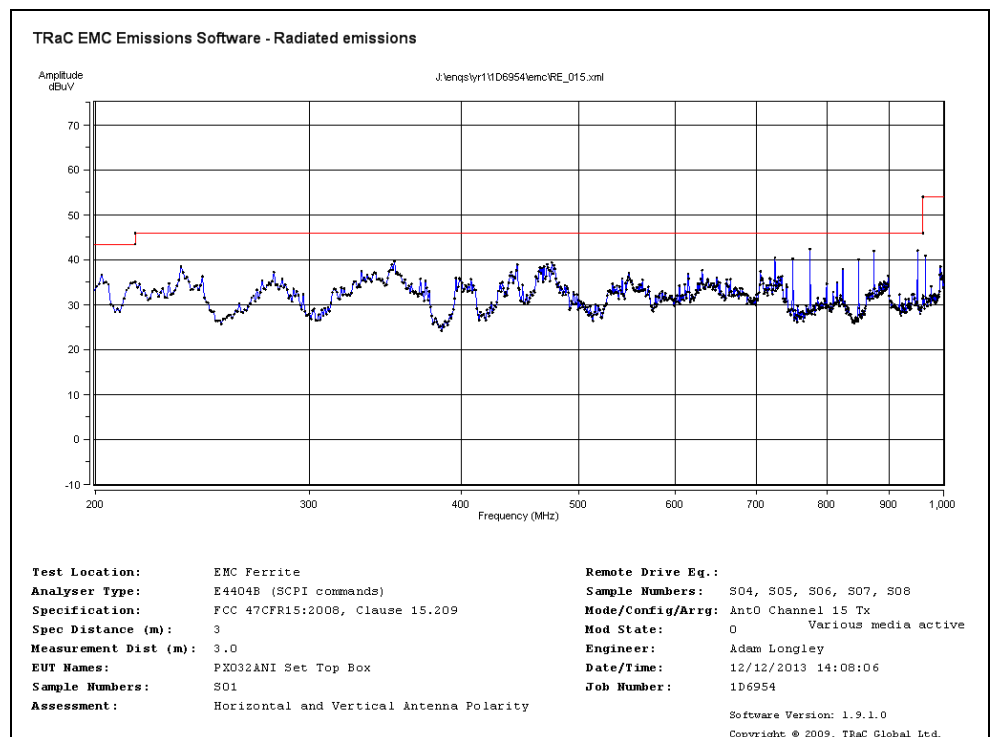
Radiated Transmitter Emissions Channel 15 2425MHz (15.209) Antenna 0  
13GHz- 15GHz



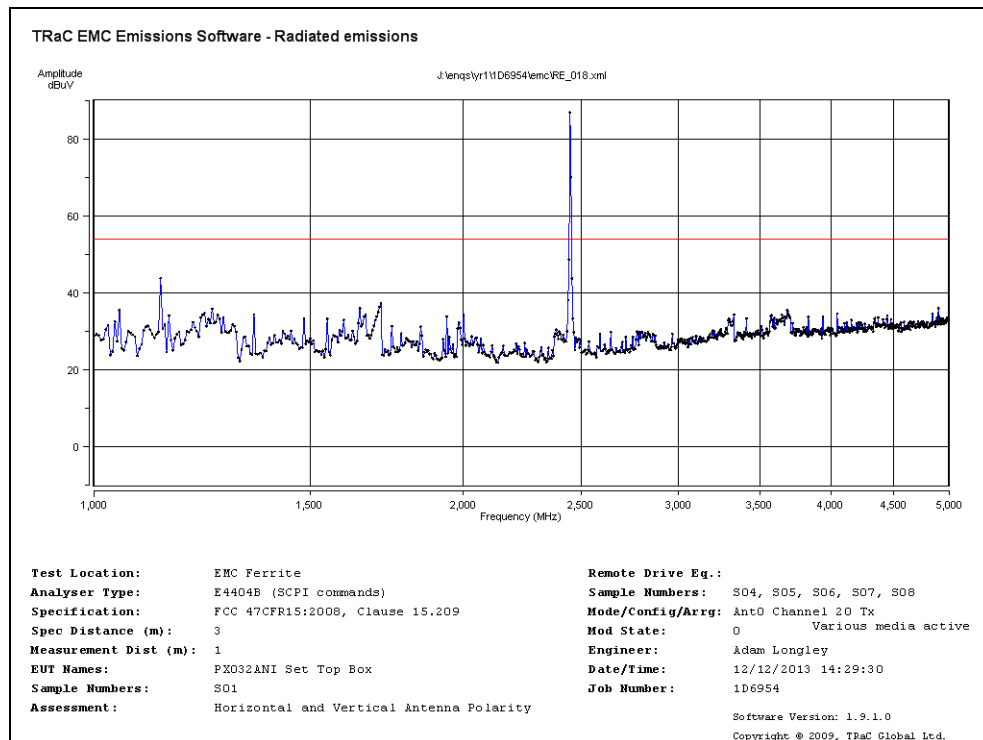
Radiated Transmitter Emissions Channel 15 2425MHz (15.209) Antenna 0  
13GHz- 25GHz



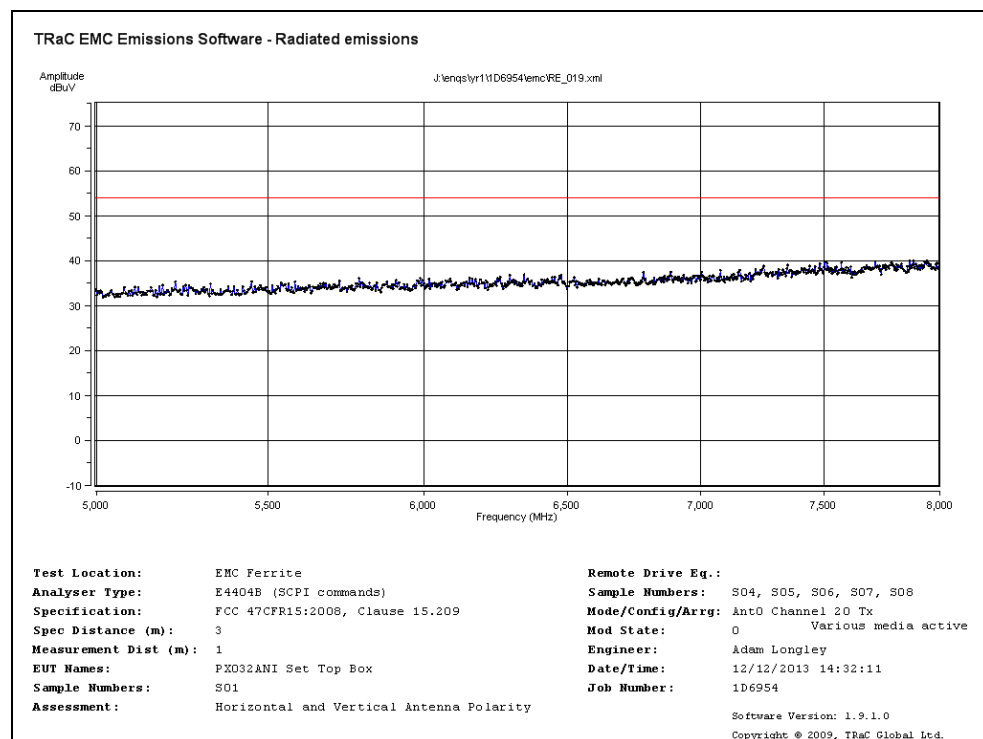
Radiated Transmitter Emissions Channel 20 2450MHz (15.209) Antenna 0  
30MHz -200MHz



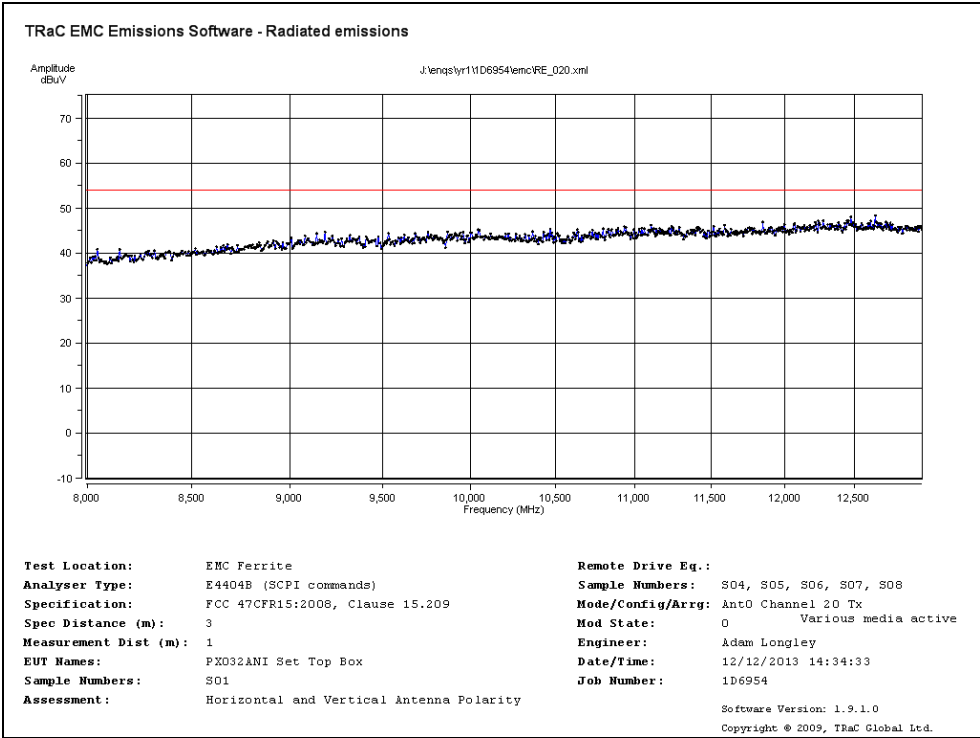
Radiated Transmitter Emissions Channel 20 2450MHz (15.209) Antenna 0  
200MHz -1GHz



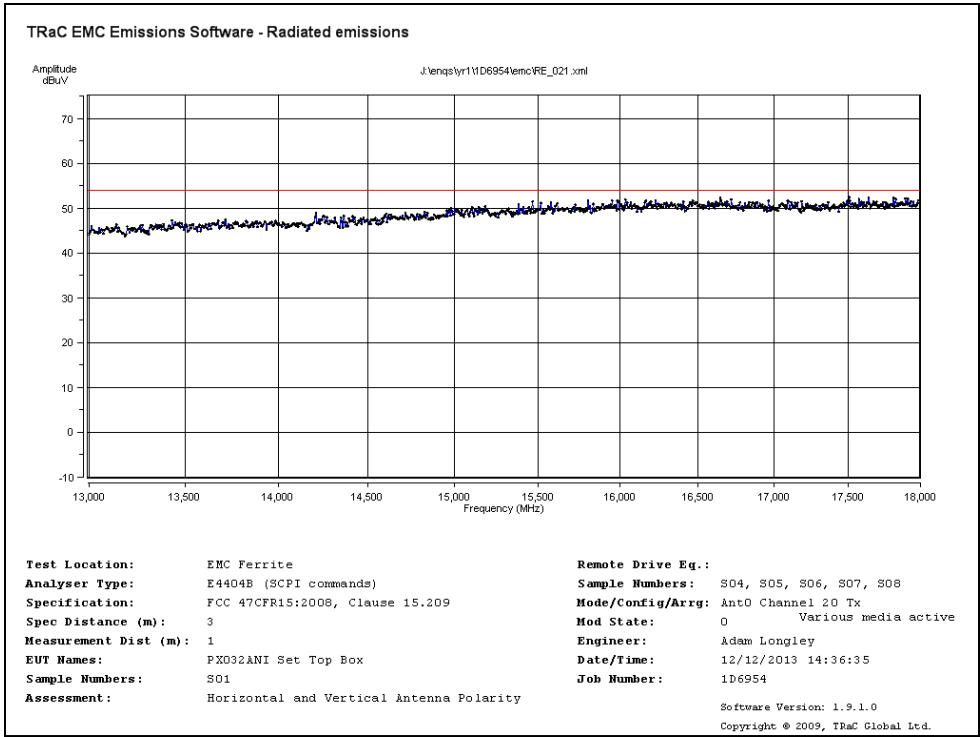
Radiated Transmitter Emissions Channel 20 2450MHz (15.209) Antenna 0  
1GHz -5GHz



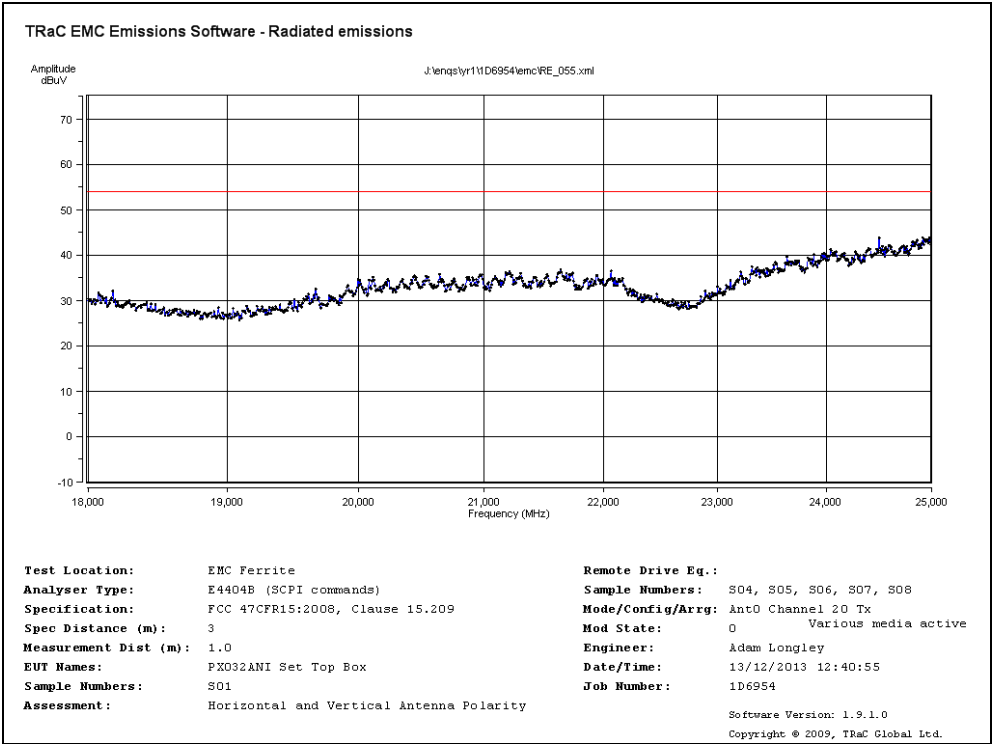
Radiated Transmitter Emissions Channel 20 2450MHz (15.209) Antenna 0  
5GHz -8GHz



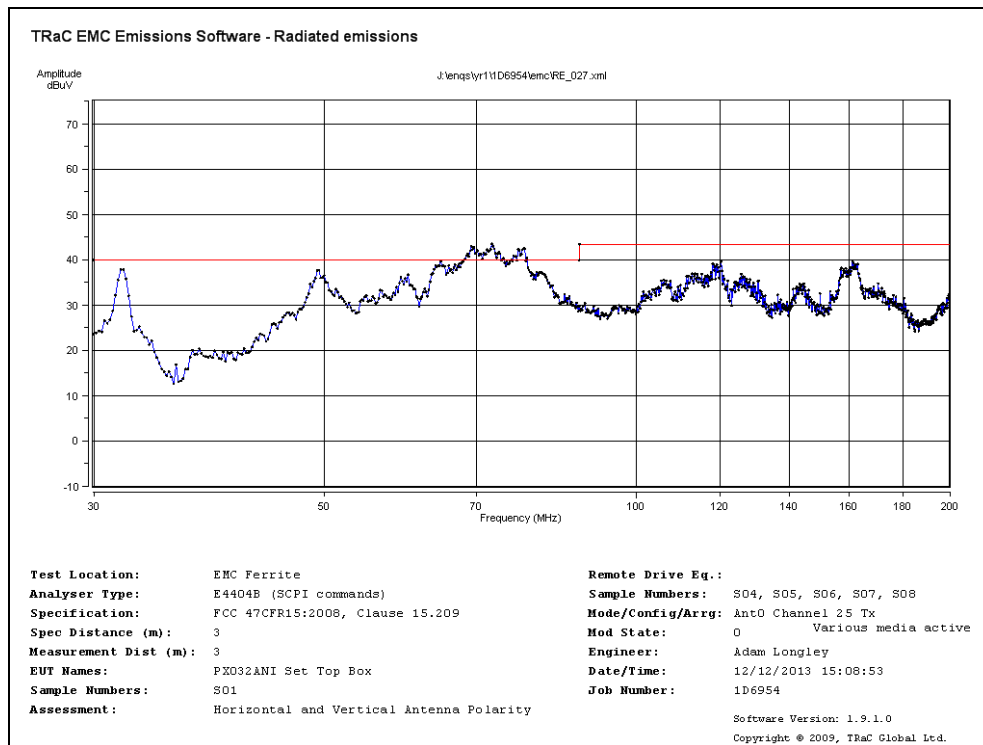
Radiated Transmitter Emissions Channel 20 2450MHz (15.209) Antenna 0  
8GHz -13GHz



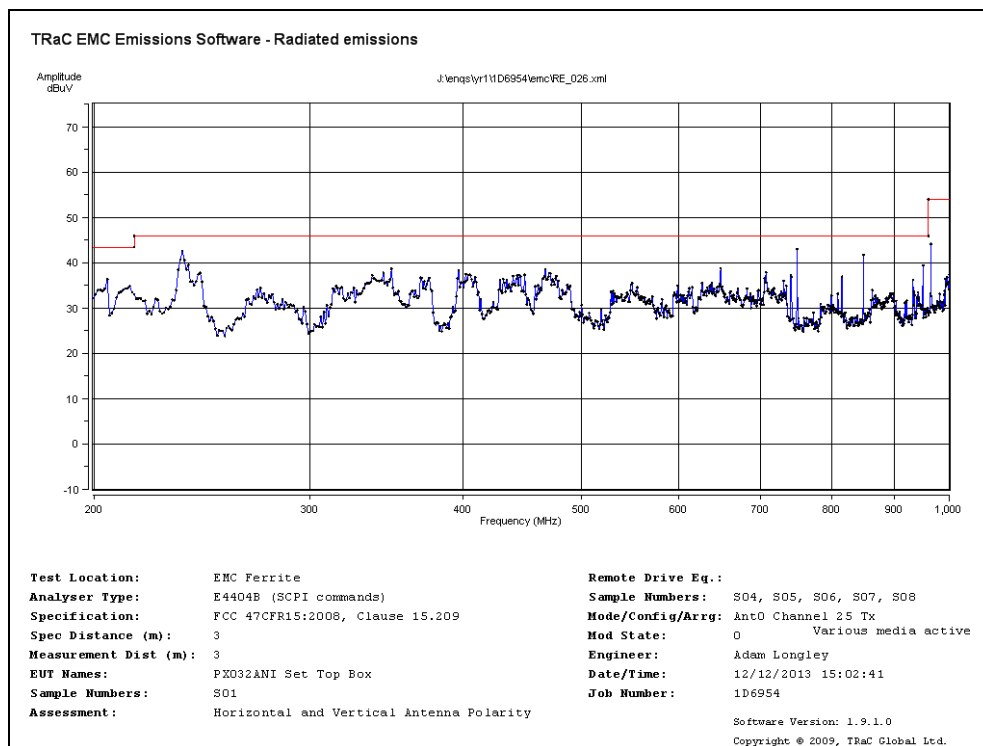
Radiated Transmitter Emissions Channel 20 2450MHz (15.209) Antenna 0  
13GHz -15GHz



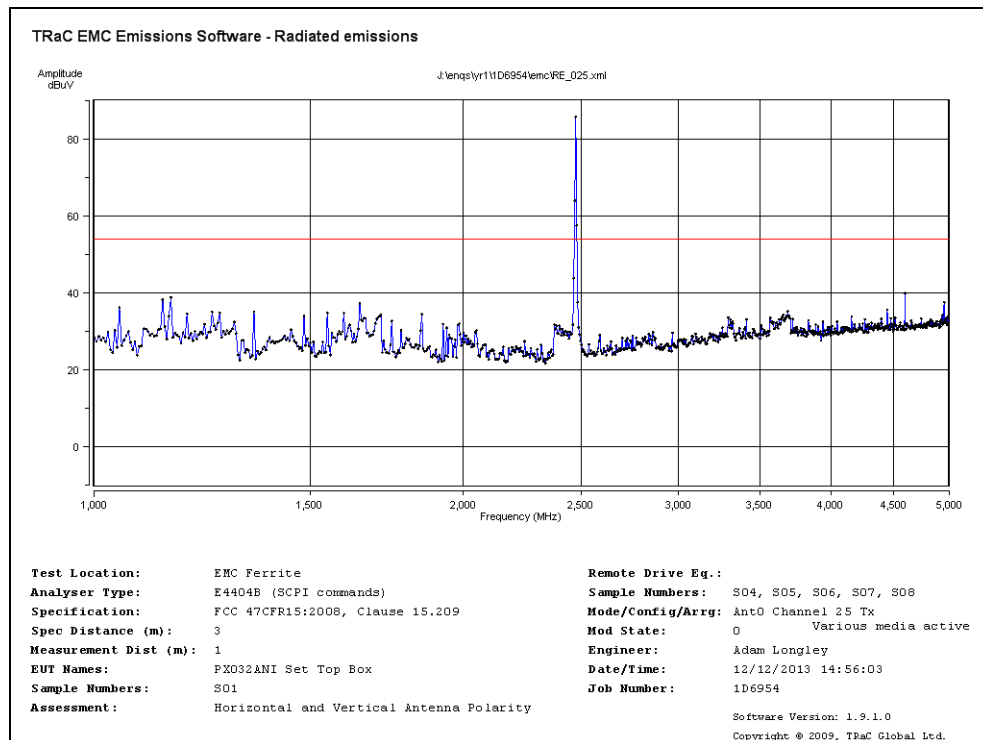
Radiated Transmitter Emissions Channel 20 2450MHz (15.209) Antenna 0  
15GHz -25GHz



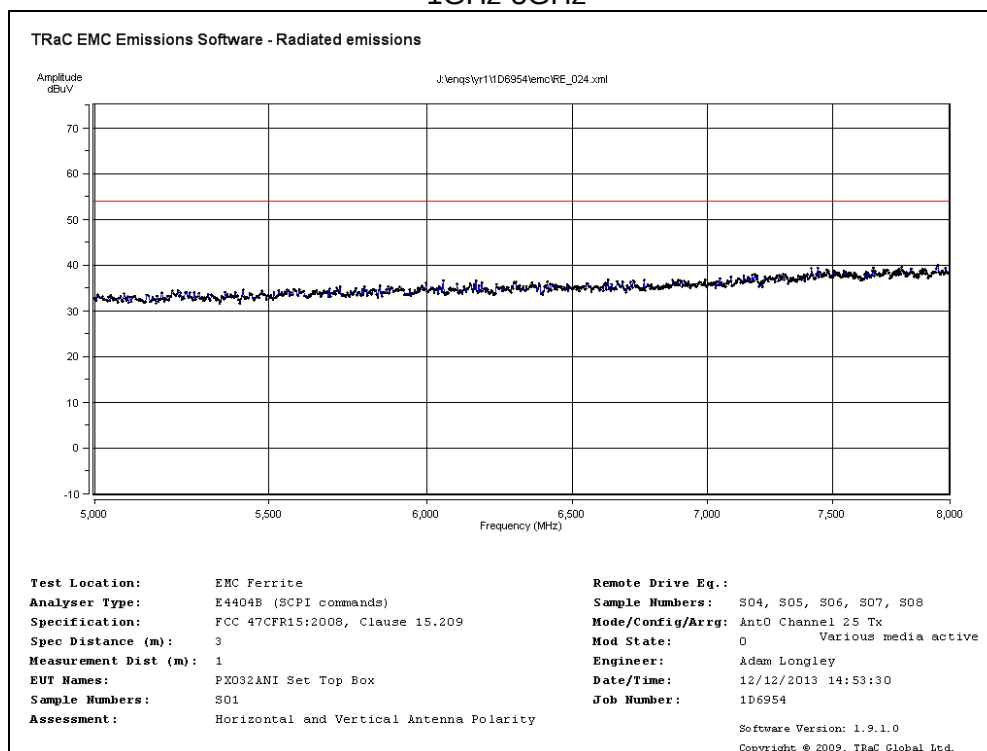
Radiated Transmitter Emissions Channel 25 2475MHz (15.209) Antenna 0  
30MHz-200MHz



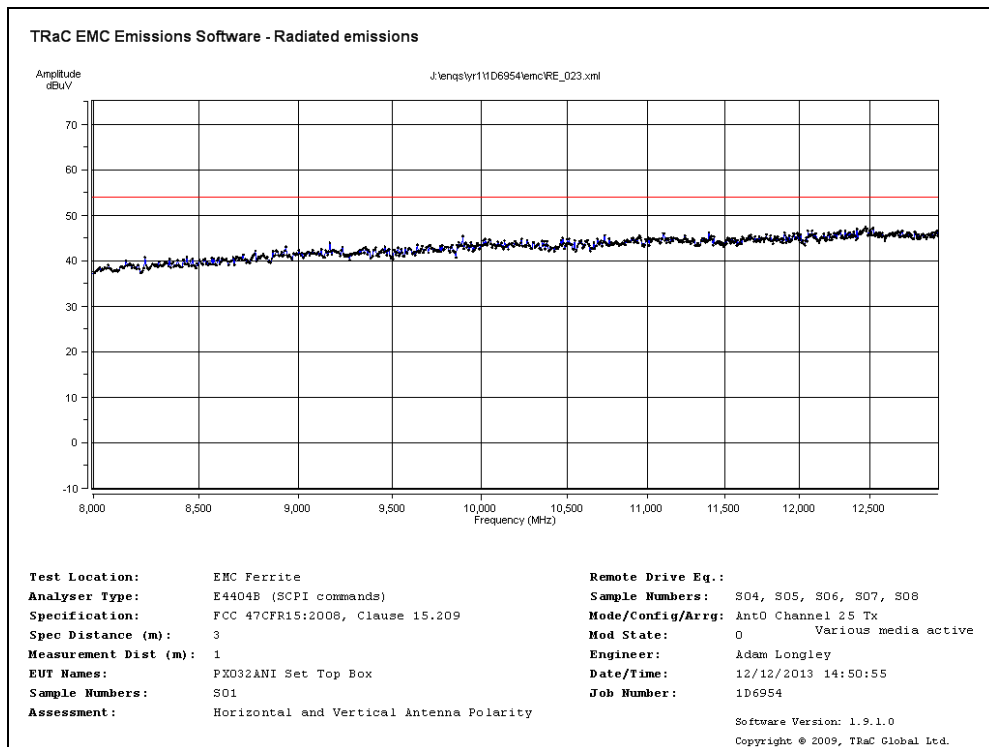
Radiated Transmitter Emissions Channel 25 2475MHz (15.209) Antenna 0  
200MHz-1GHz



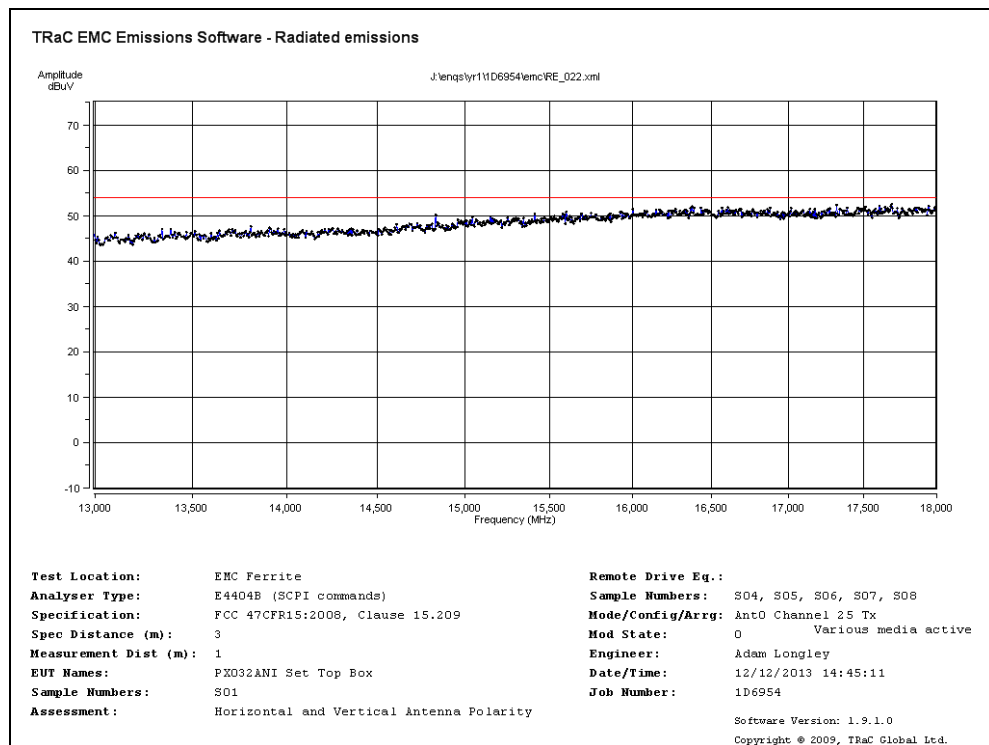
Radiated Transmitter Emissions Channel 25 2475MHz (15.209) Antenna 0  
1GHz-5GHz



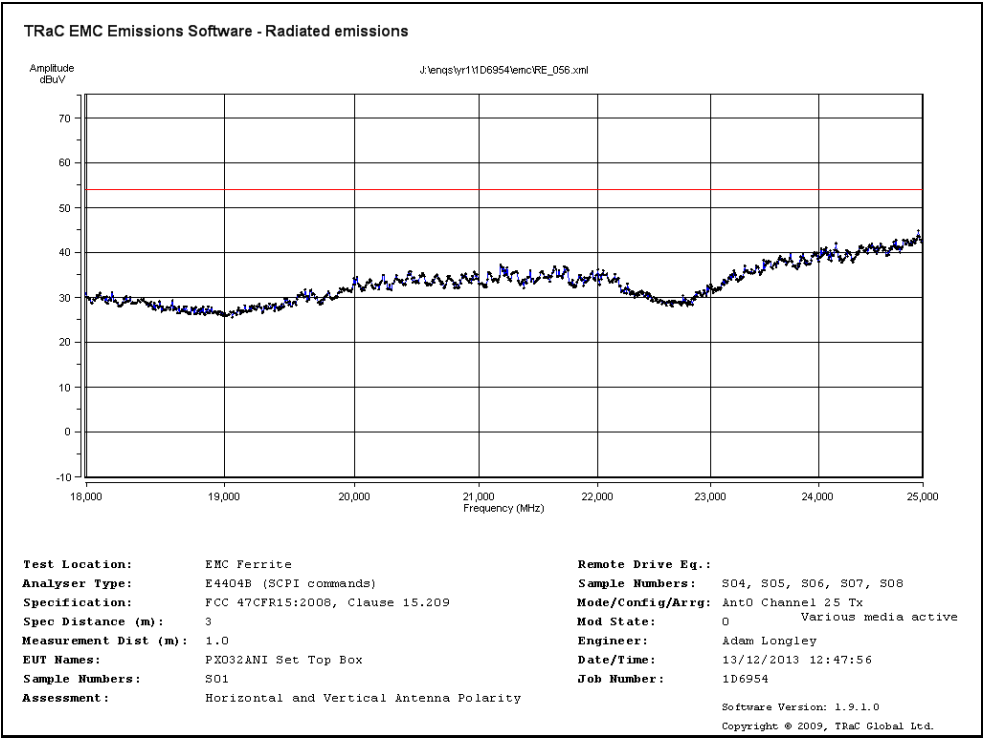
Radiated Transmitter Emissions Channel 25 2475MHz (15.209) Antenna 0  
5GHz-8GHz



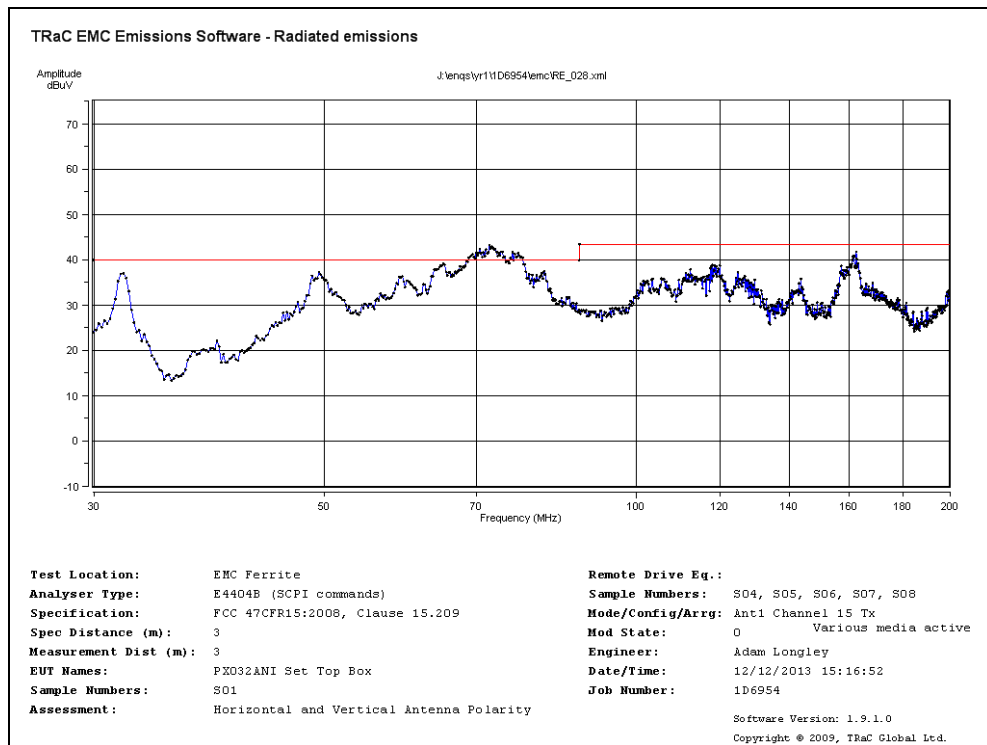
Radiated Transmitter Emissions Channel 25 2475MHz (15.209) Antenna 0  
8GHz-13GHz



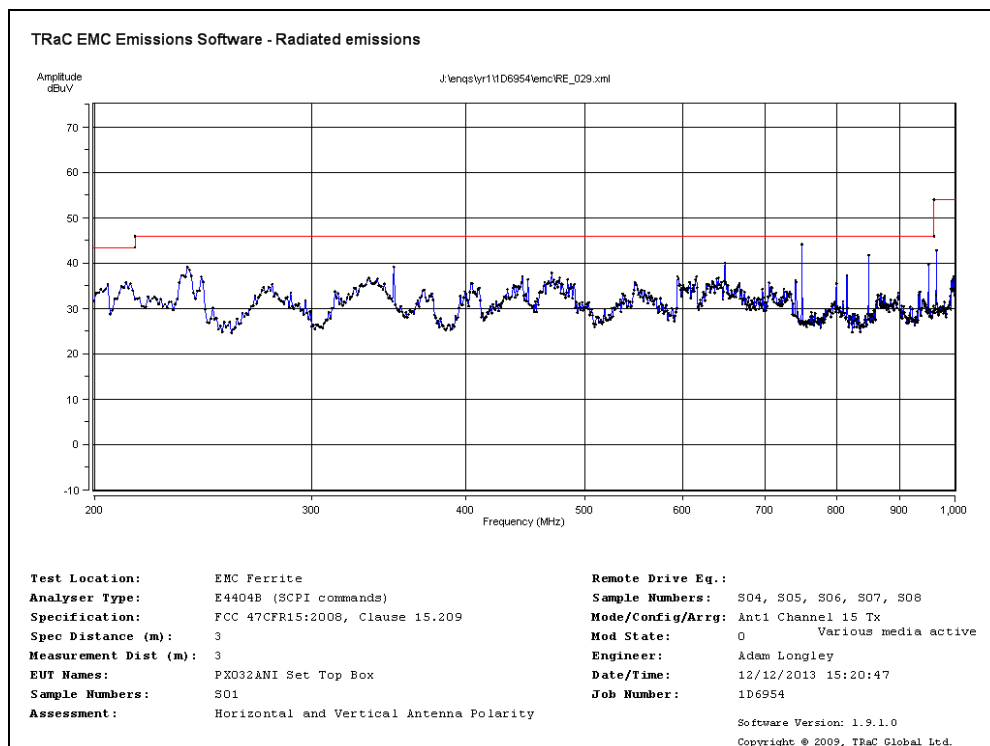
Radiated Transmitter Emissions Channel 25 2475MHz (15.209) Antenna 0  
13GHz-18GHz



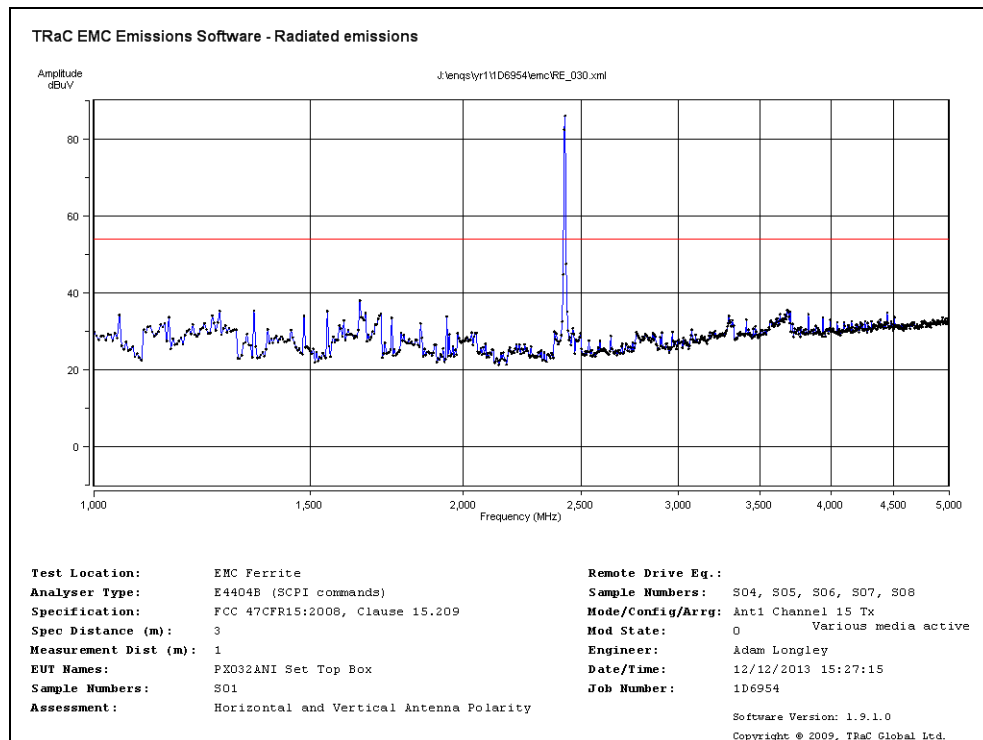
Radiated Transmitter Emissions Channel 25 2475MHz (15.209) Antenna 0  
18GHz-25GHz



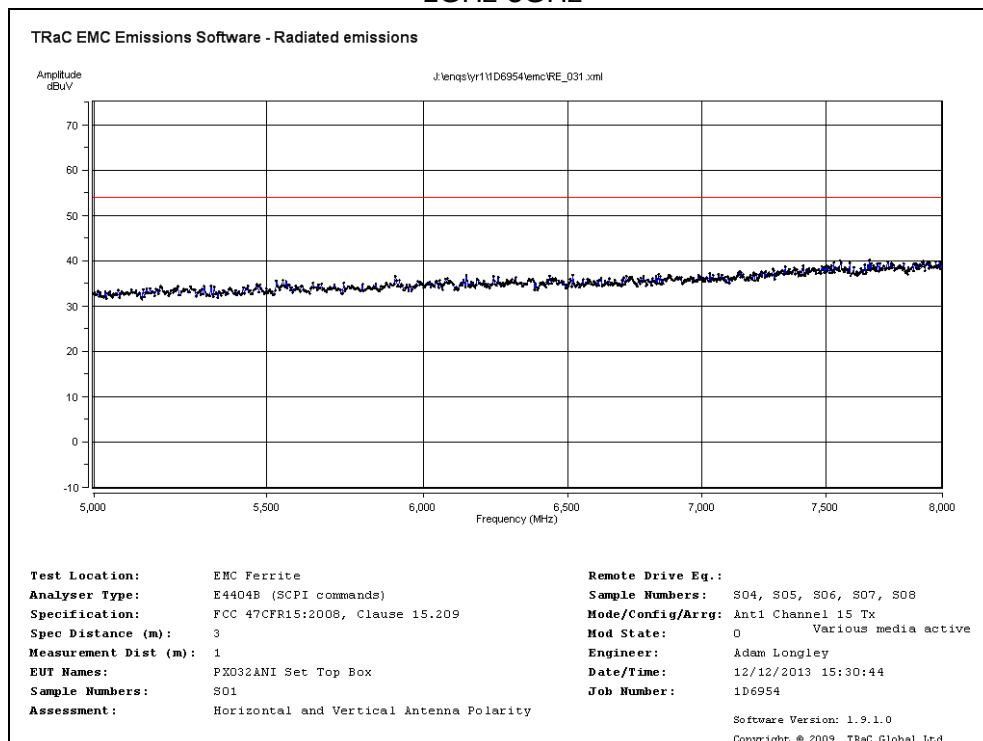
Radiated Transmitter Emissions Channel 15 2425MHz (15.209) Antenna 1  
30MHz-200MHz



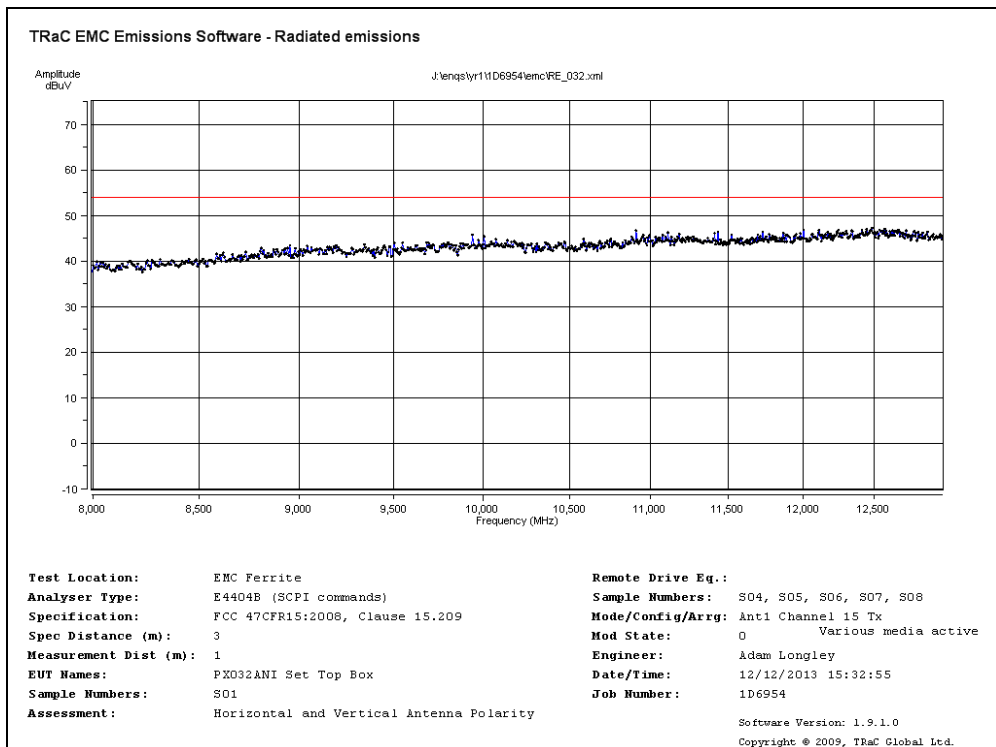
Radiated Transmitter Emissions Channel 15 2425MHz (15.209) Antenna 1  
200MHz-1GHz



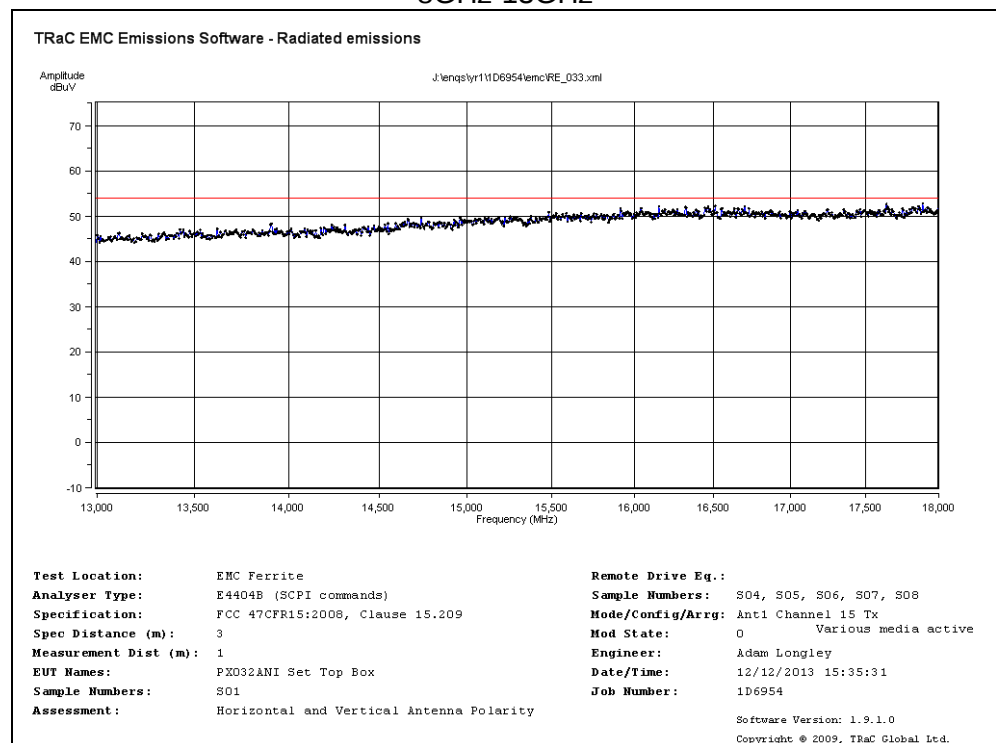
### Radiated Transmitter Emissions Channel 15 2425MHz (15.209) Antenna 1 1GHz-5GHz



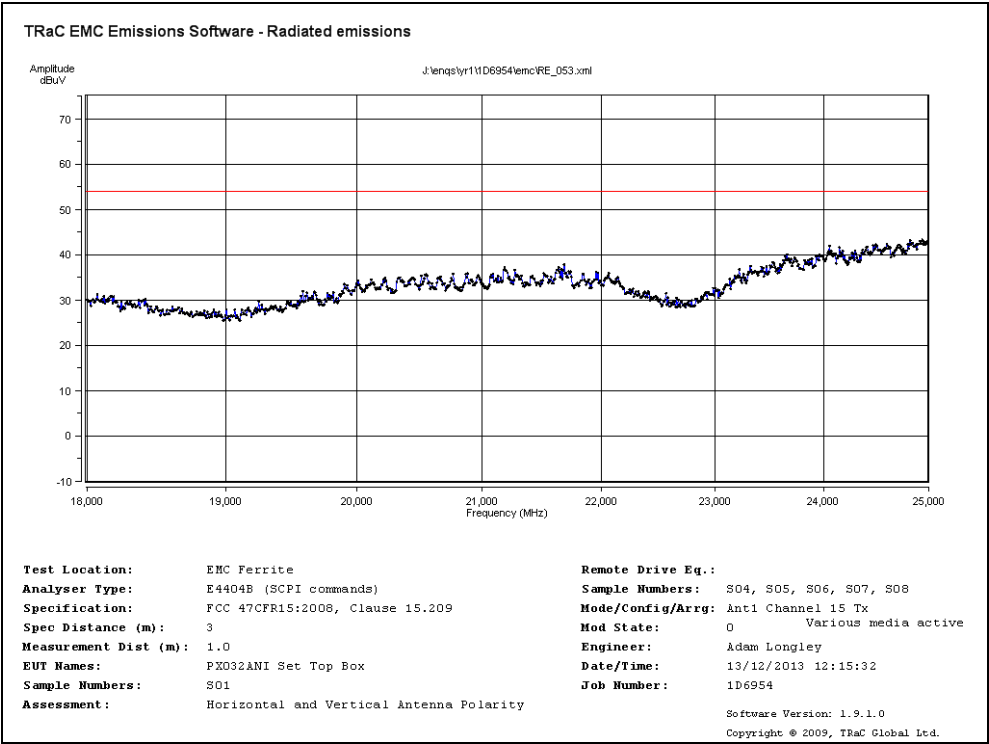
### Radiated Transmitter Emissions Channel 15 2425MHz (15.209) Antenna 1 5GHz-8GHz



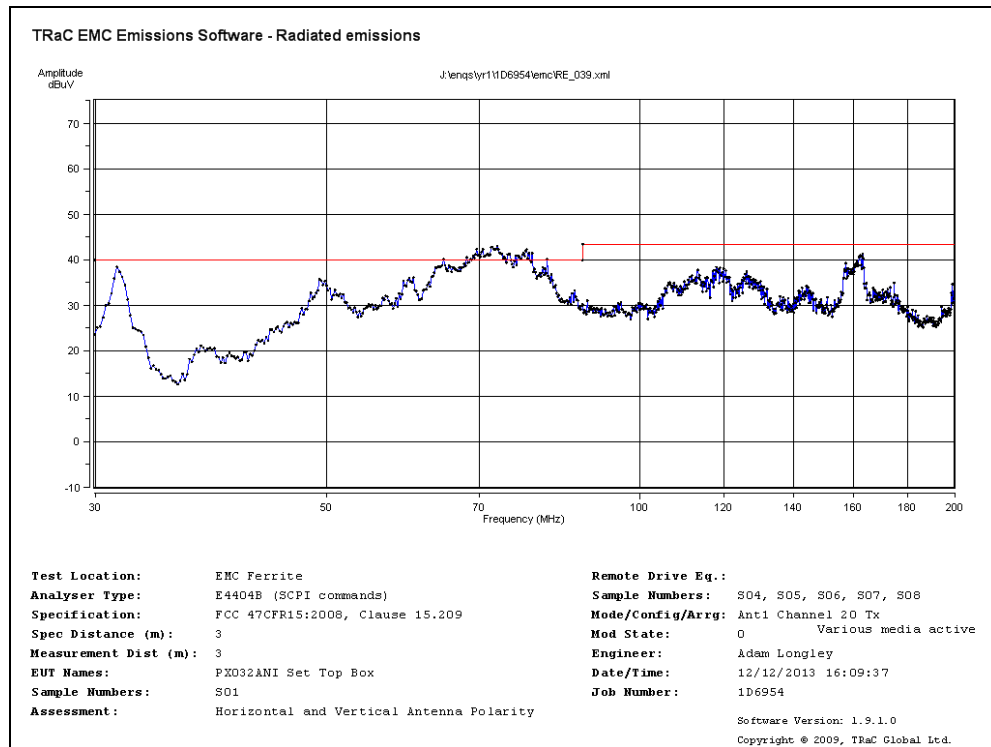
### Radiated Transmitter Emissions Channel 15 2425MHz (15.209) Antenna 1 8GHz-13GHz



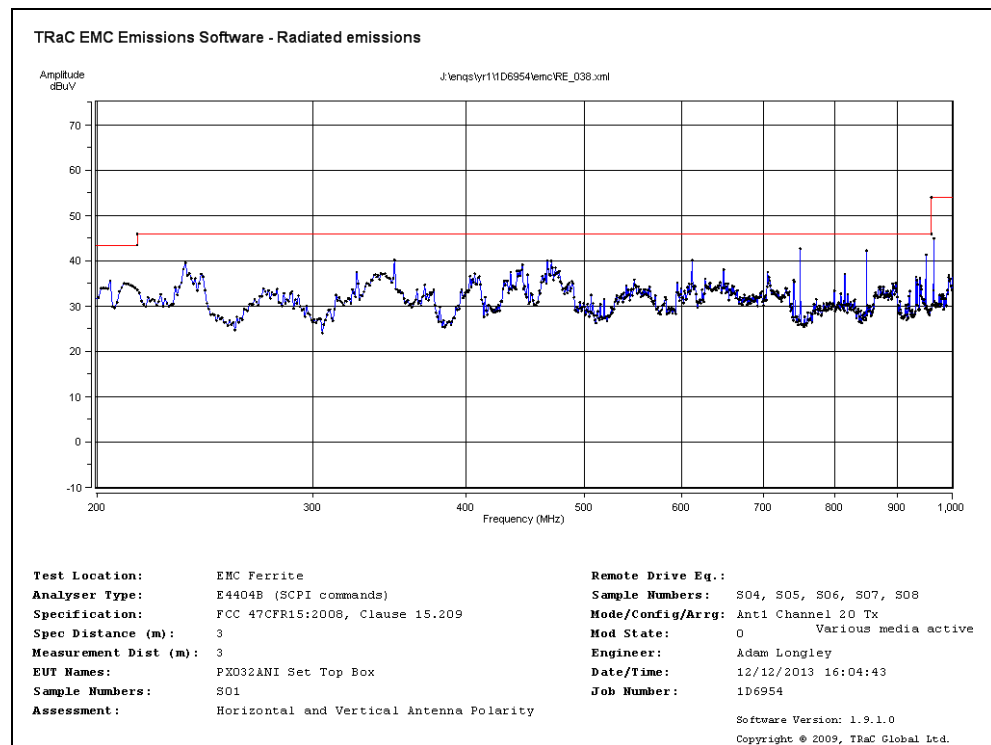
### Radiated Transmitter Emissions Channel 15 2425MHz (15.209) Antenna 1 13GHz-18GHz



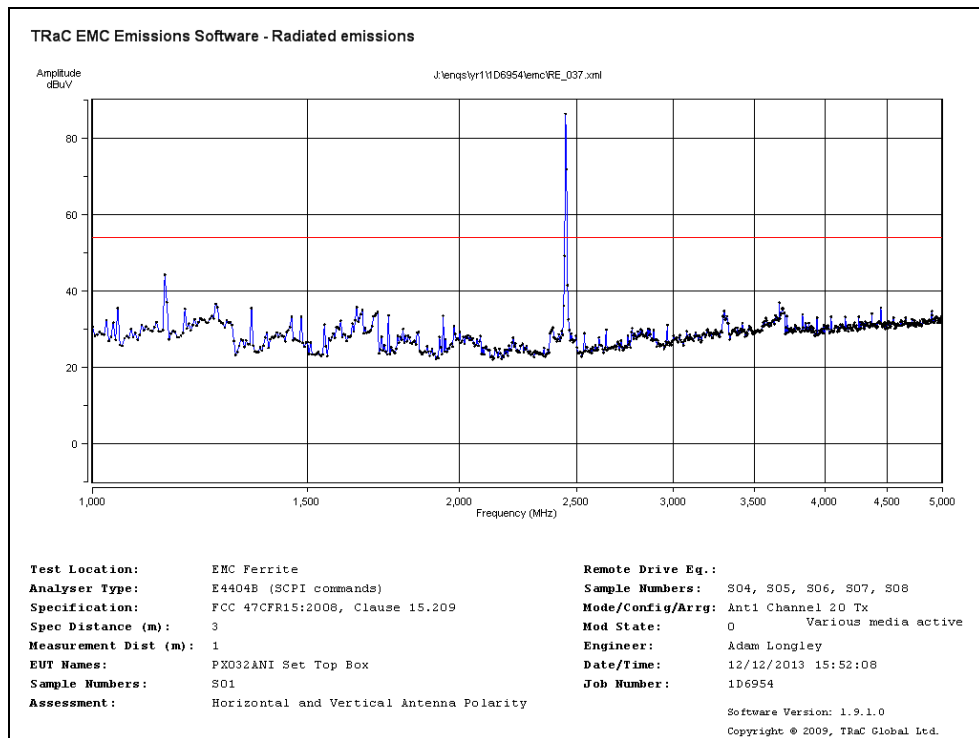
Radiated Transmitter Emissions Channel 15 2425MHz (15.209) Antenna 1  
18GHz-25GHz



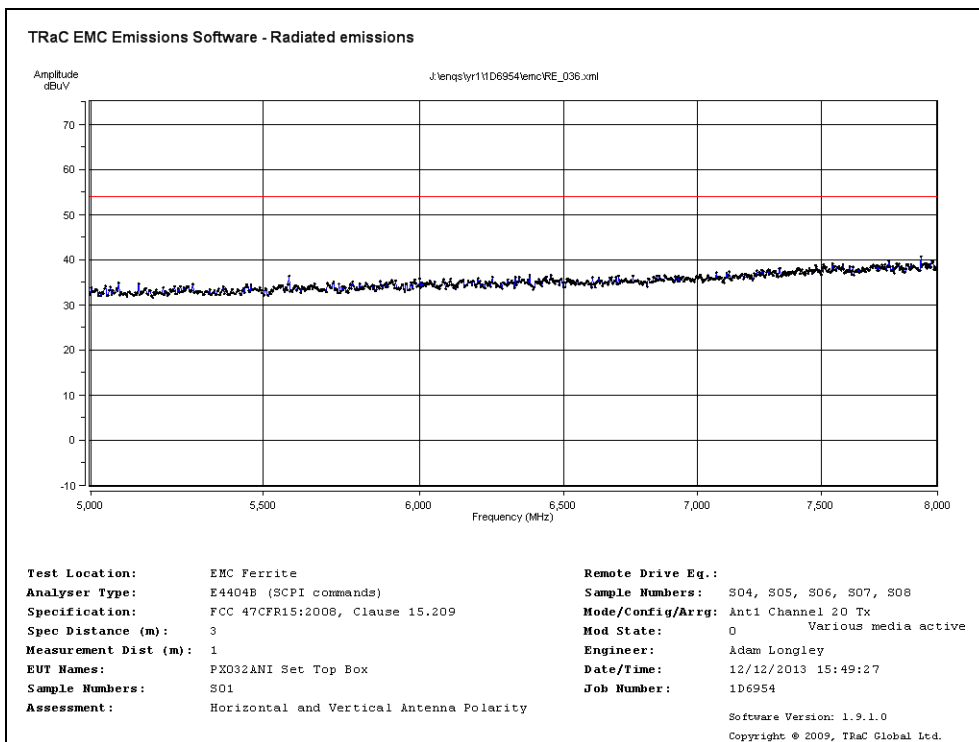
Radiated Transmitter Emissions Channel 20 2450MHz (15.209) Antenna 1  
30MHz -200MHz



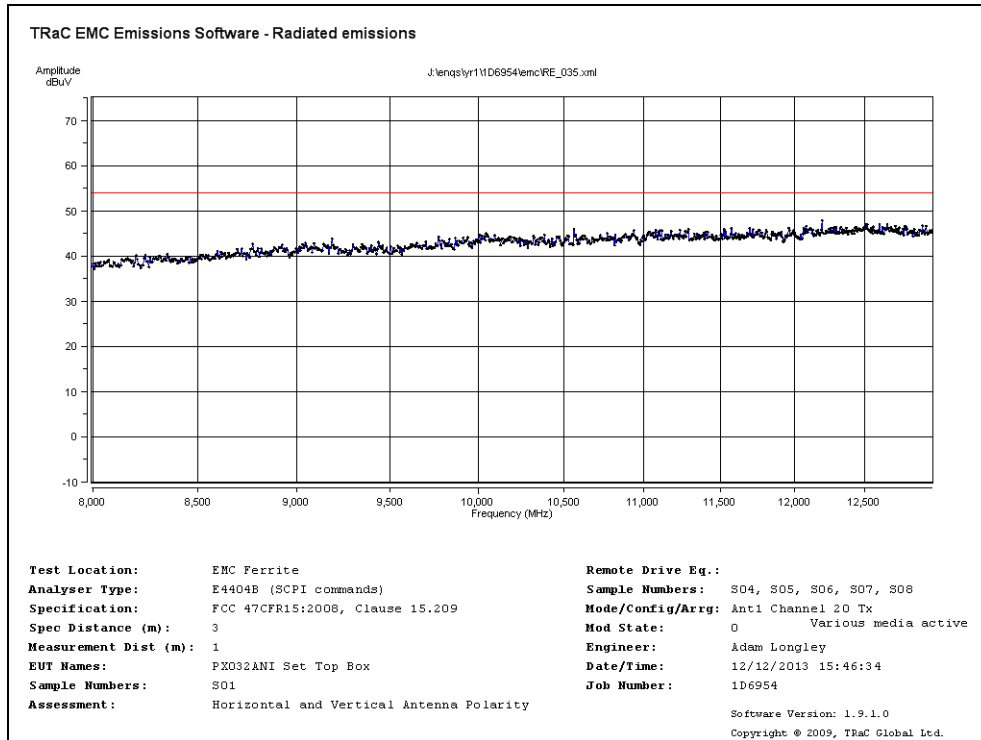
Radiated Transmitter Emissions Channel 20 2450MHz (15.209) Antenna 1  
200MHz -1GHz



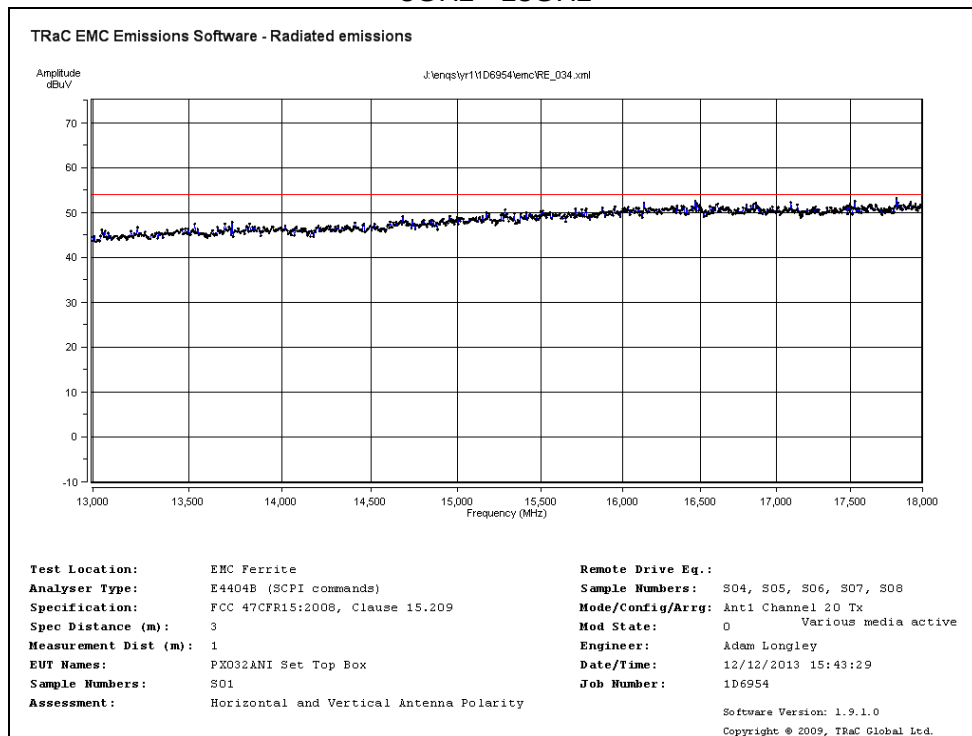
Radiated Transmitter Emissions Channel 20 2450MHz (15.209) Antenna 1  
1GHz - 5GHz



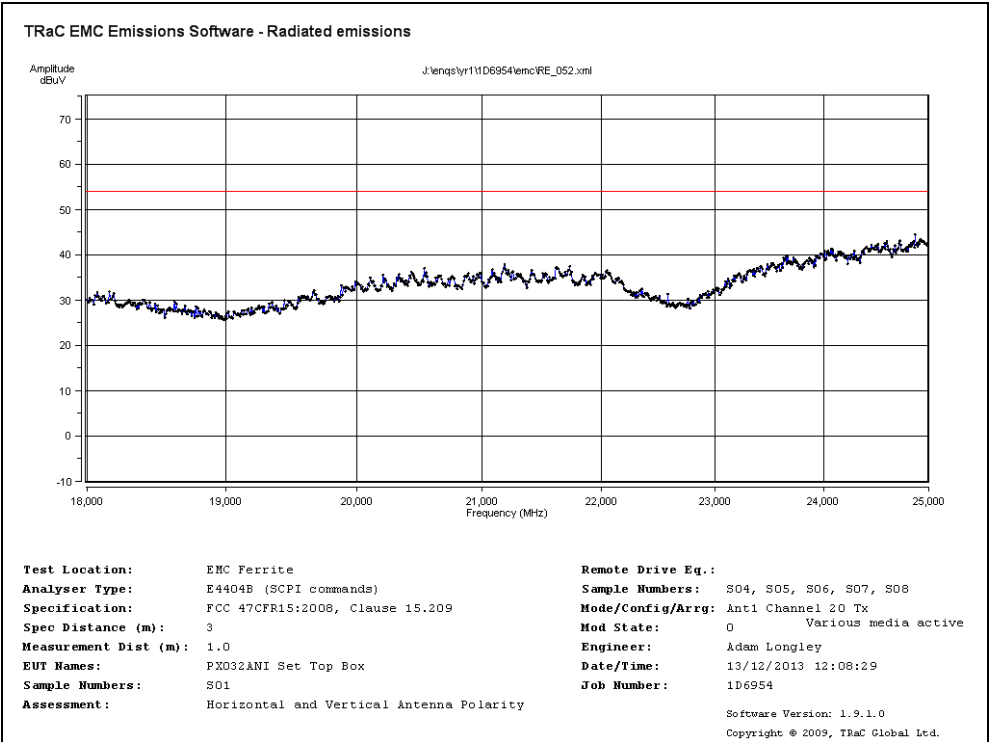
Radiated Transmitter Emissions Channel 20 2450MHz (15.209) Antenna 1  
5GHz - 8GHz



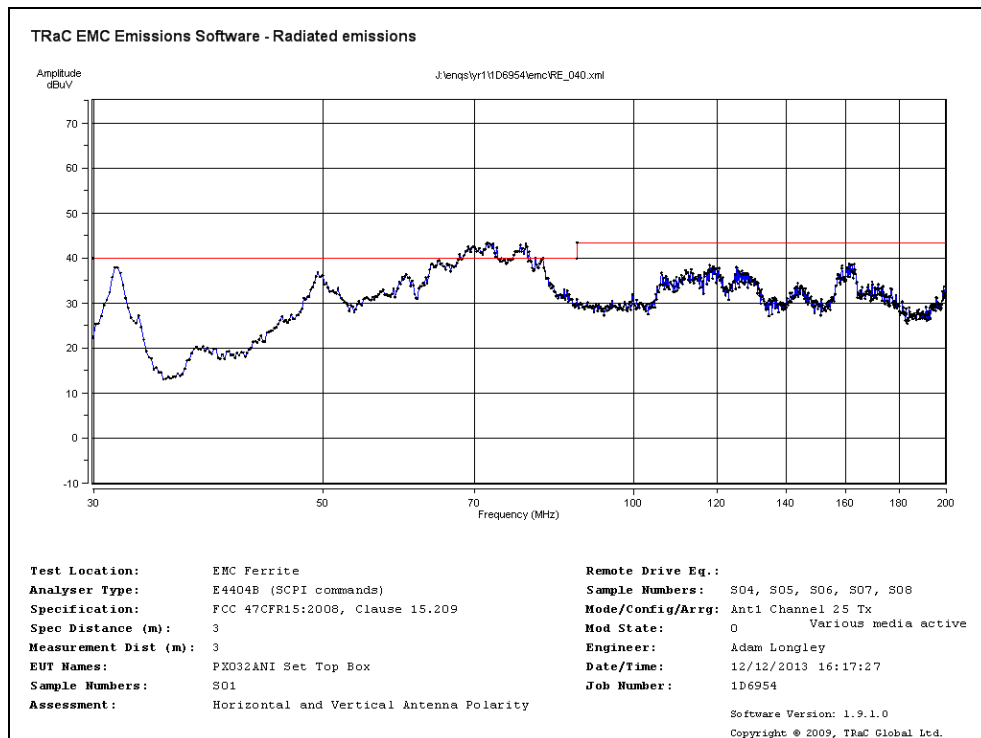
Radiated Transmitter Emissions Channel 20 2450MHz (15.209) Antenna 1  
8GHz - 13GHz



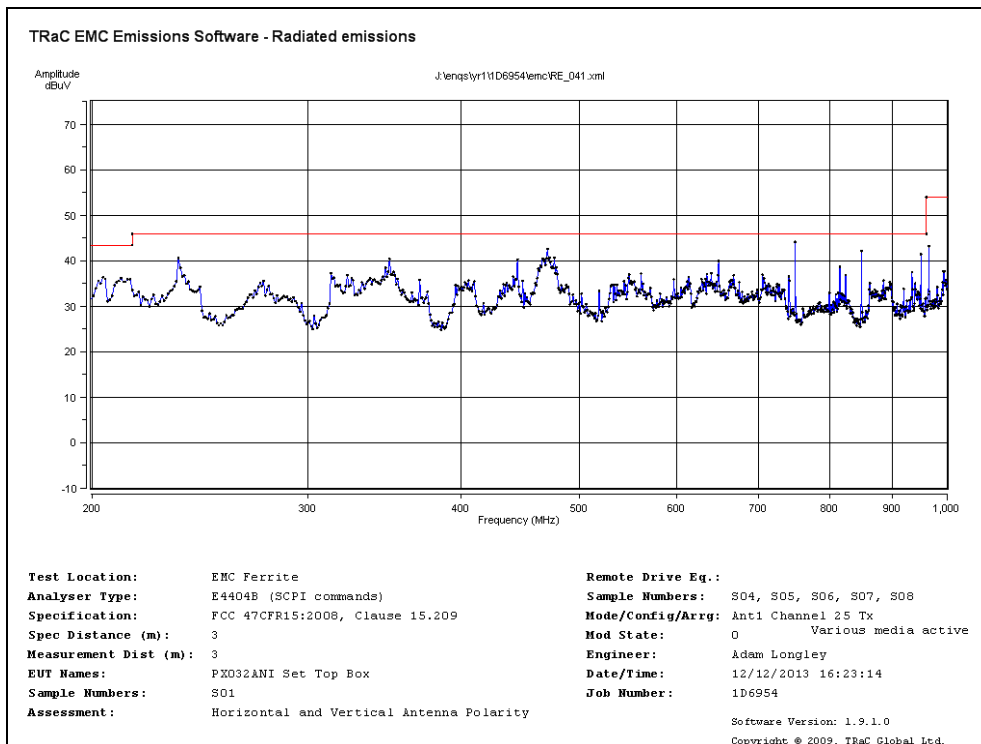
Radiated Transmitter Emissions Channel 20 2450MHz (15.209) Antenna 1  
13GHz - 18GHz



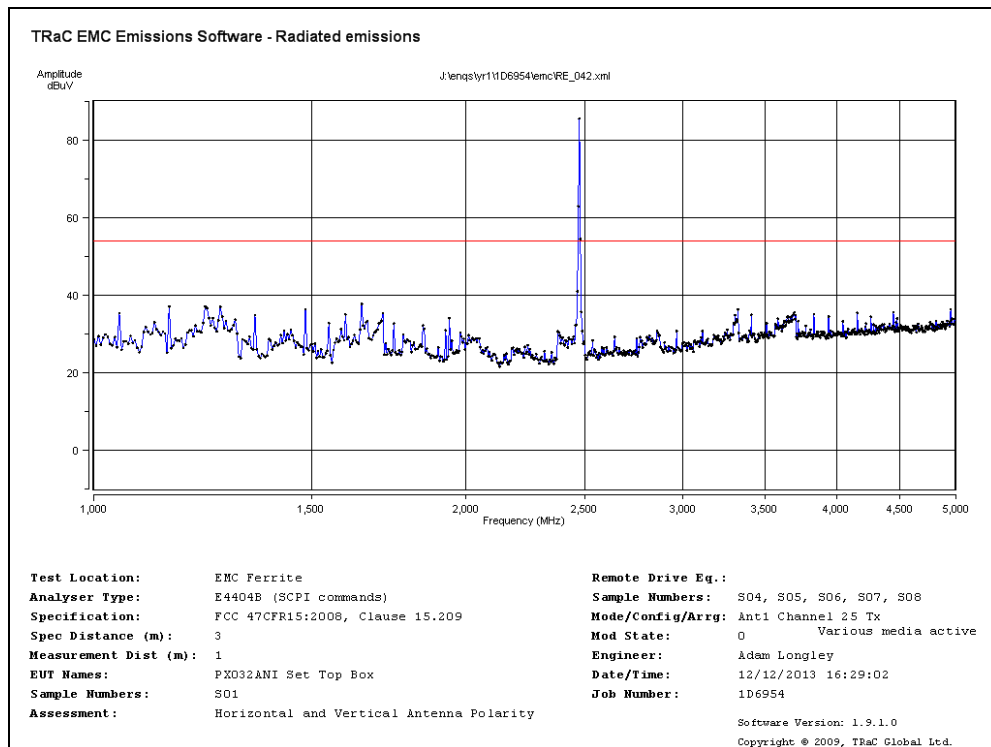
Radiated Transmitter Emissions Channel 20 2450MHz (15.209) Antenna 1  
18GHz - 25GHz



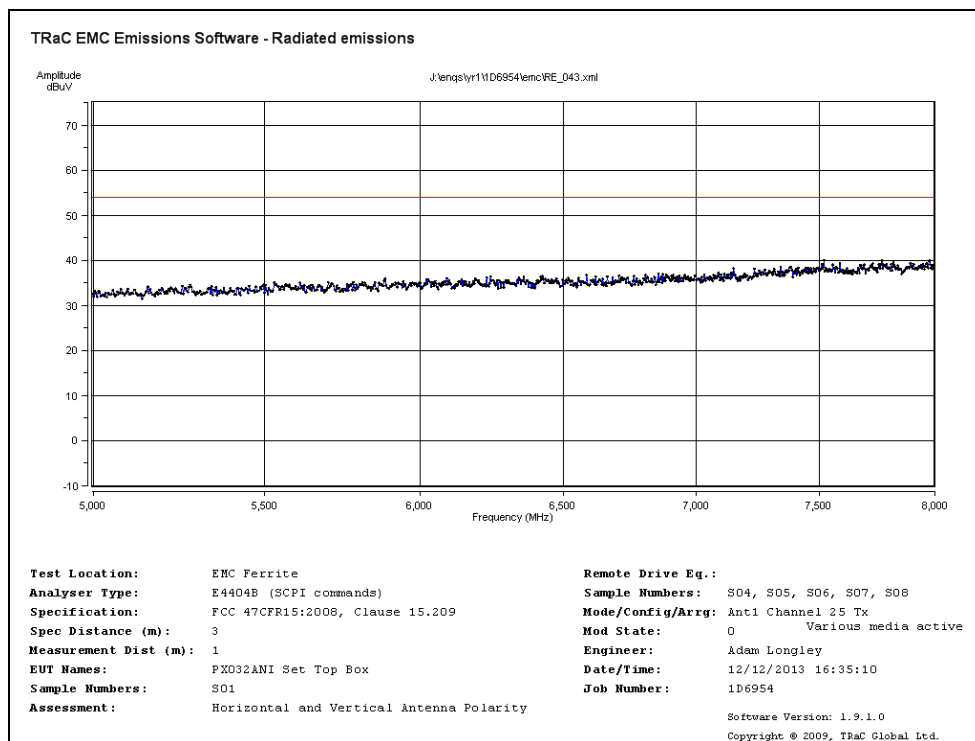
### Radiated Transmitter Emissions Channel 25 2475MHz (15.209) Antenna 1 30MHz-200MHz



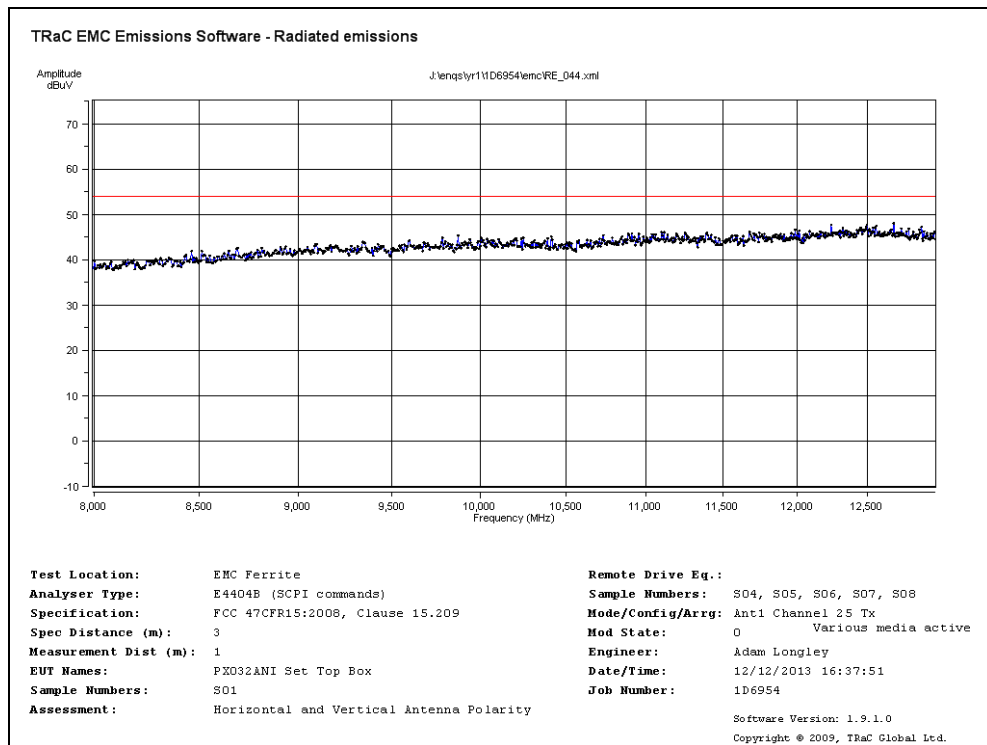
### Radiated Transmitter Emissions Channel 25 2475MHz (15.209) Antenna 1 200MHz-1GHz



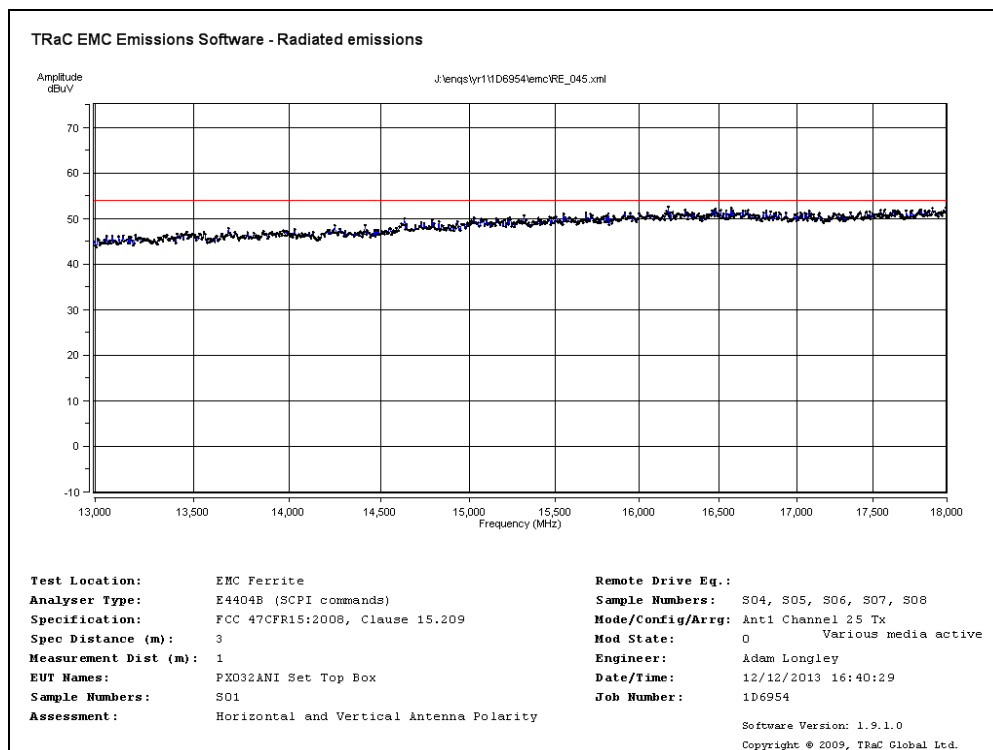
Radiated Transmitter Emissions Channel 25 2475MHz (15.209) Antenna 1  
1GHz-5GHz



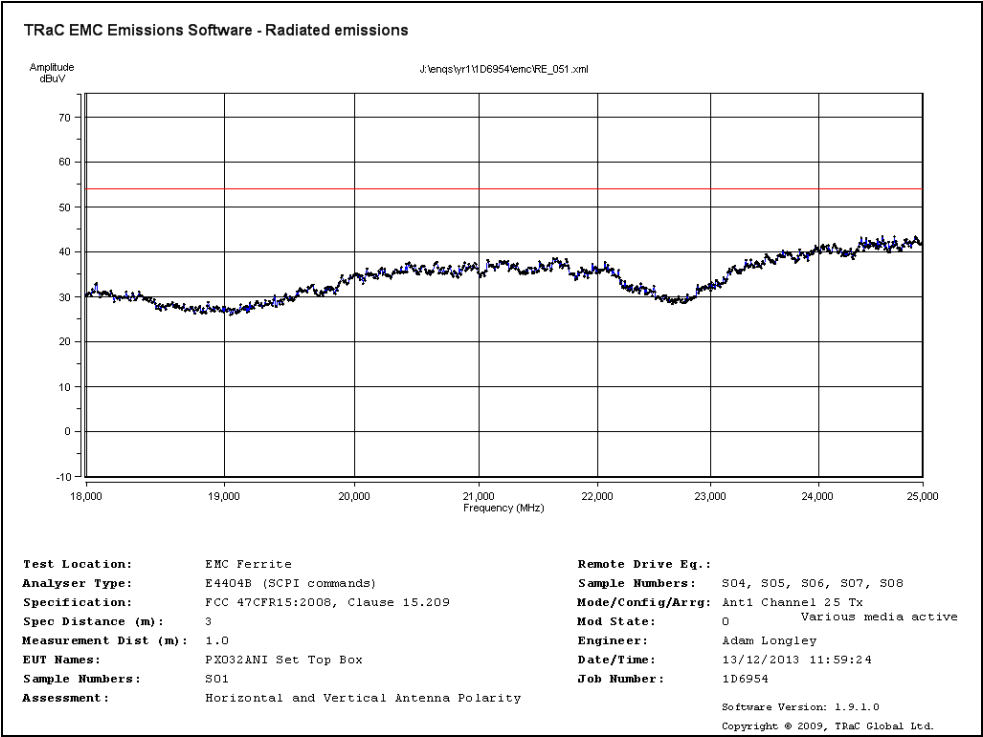
Radiated Transmitter Emissions Channel 25 2475MHz (15.209) Antenna 1  
5GHz-8GHz



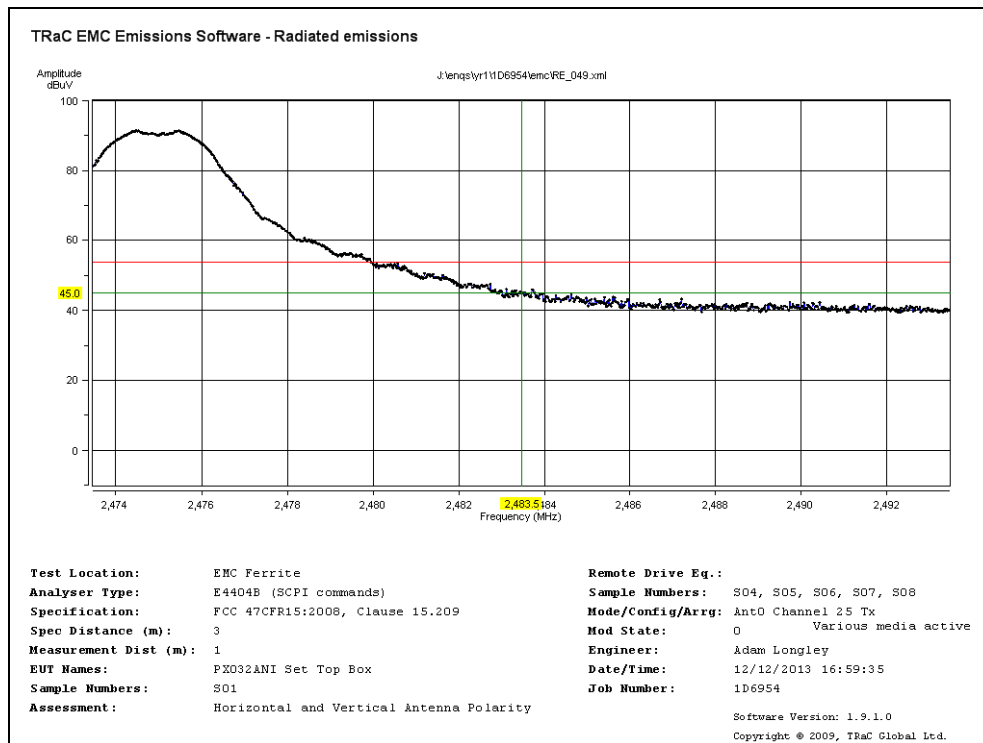
Radiated Transmitter Emissions Channel 25 2475MHz (15.209) Antenna 1  
8GHz-13GHz



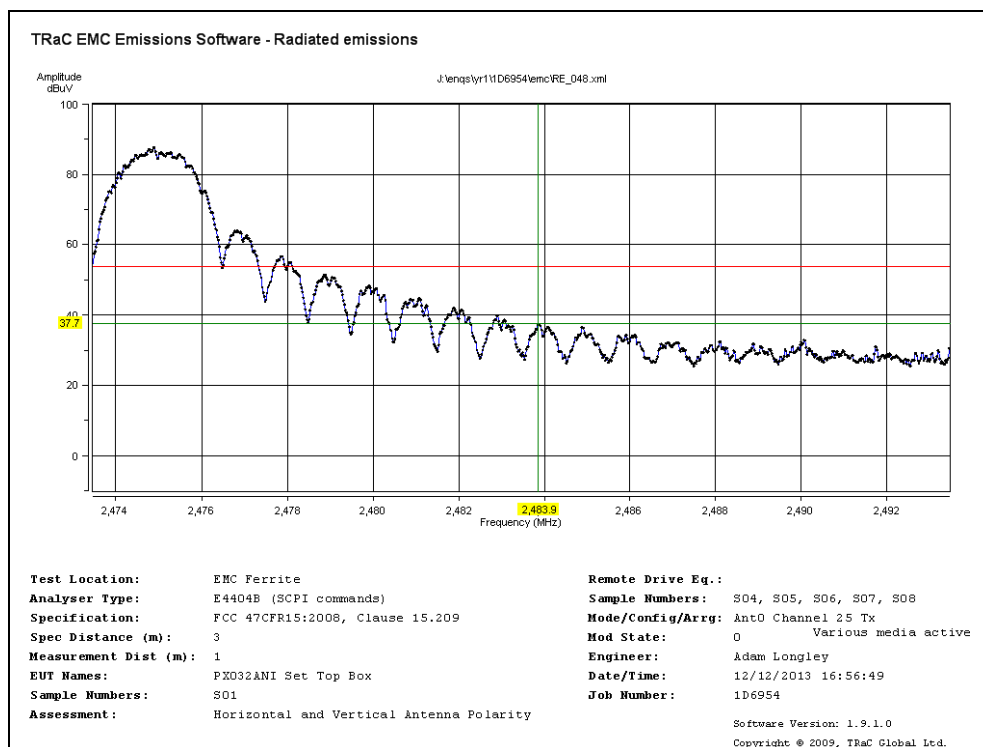
Radiated Transmitter Emissions Channel 25 2475MHz (15.209) Antenna 1  
13GHz-18GHz



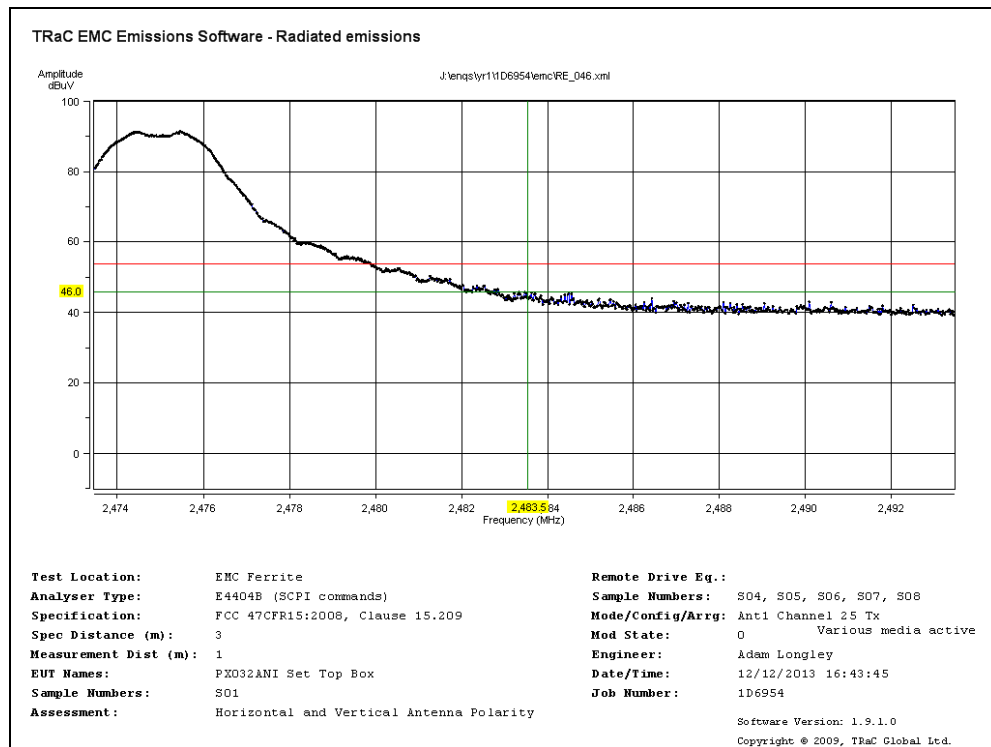
Radiated Transmitter Emissions Channel 25 2475MHz (15.209) Antenna 1  
18GHz-25GHz



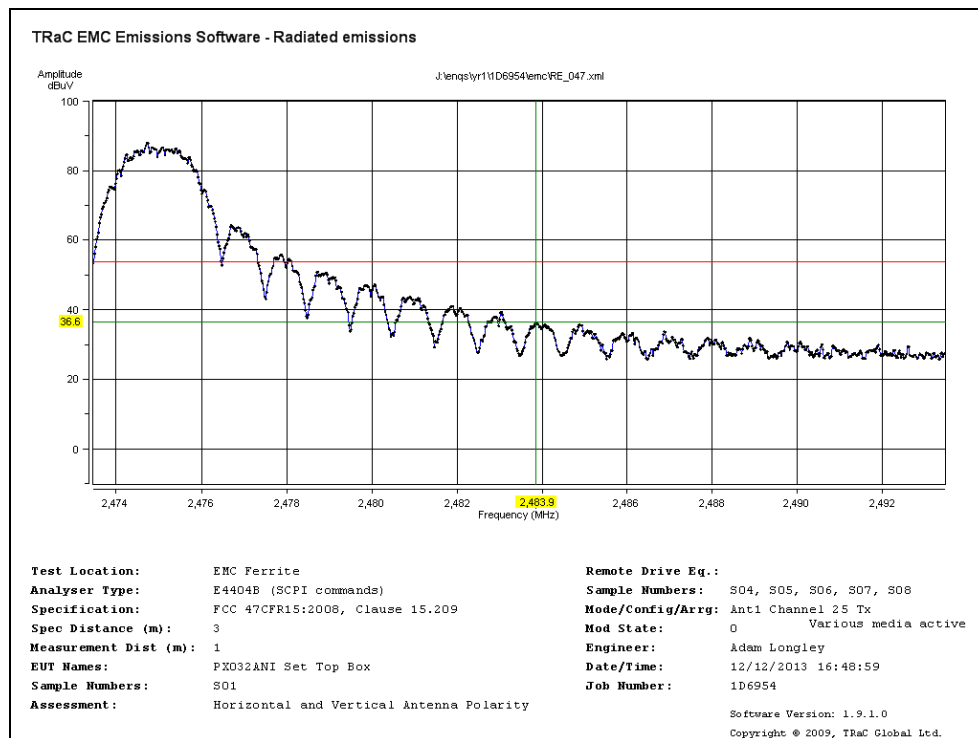
Radiated Transmitter Emissions Channel 25 2475MHz (15.209) Band Edge Compliance  
Antenna 0 - RBW 1MHz



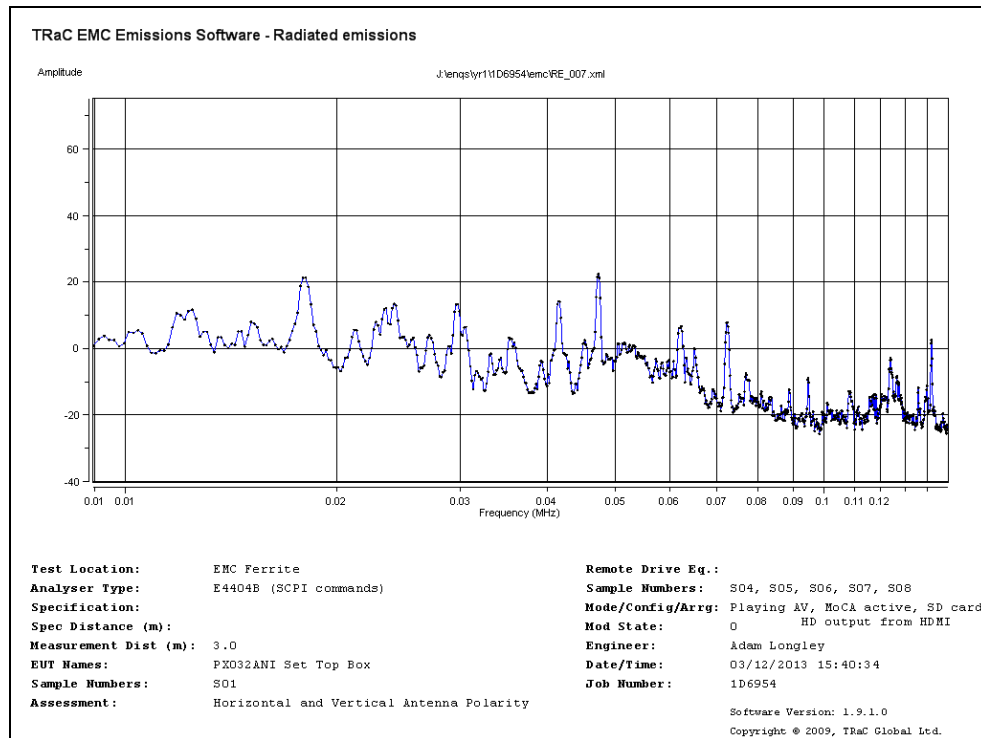
Radiated Transmitter Emissions Channel 25 2475MHz (15.209) Band Edge Compliance  
Antenna 0 - RBW 100kHz



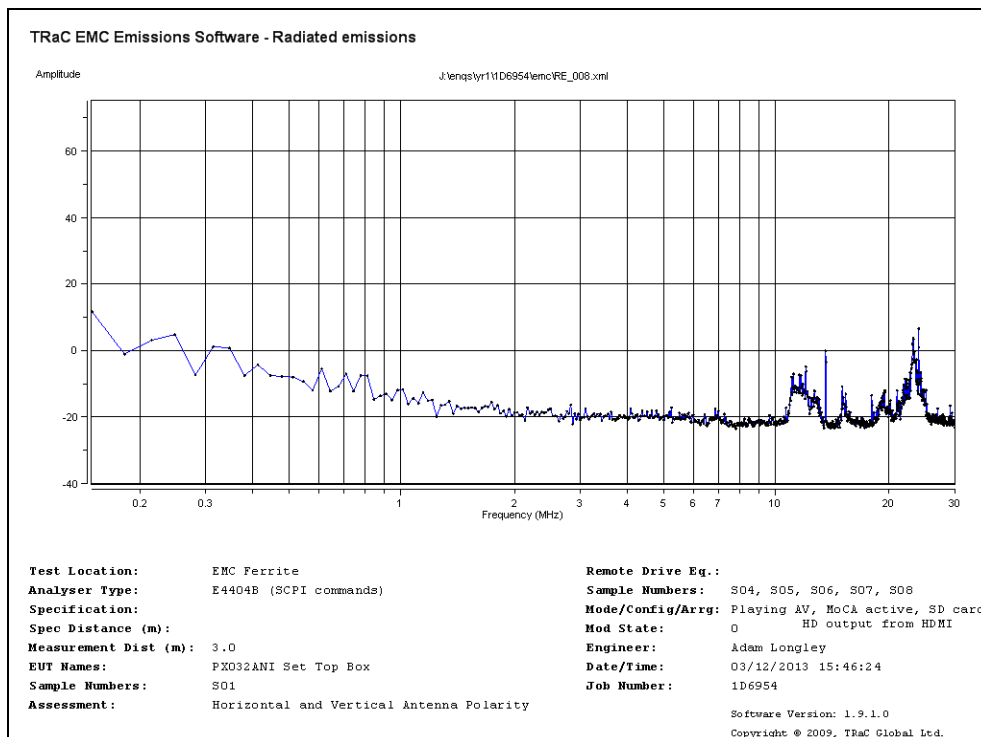
Radiated Transmitter Emissions Channel 25 2475MHz (15.209) Band Edge Compliance  
Antenna 1 - RBW 1MHz



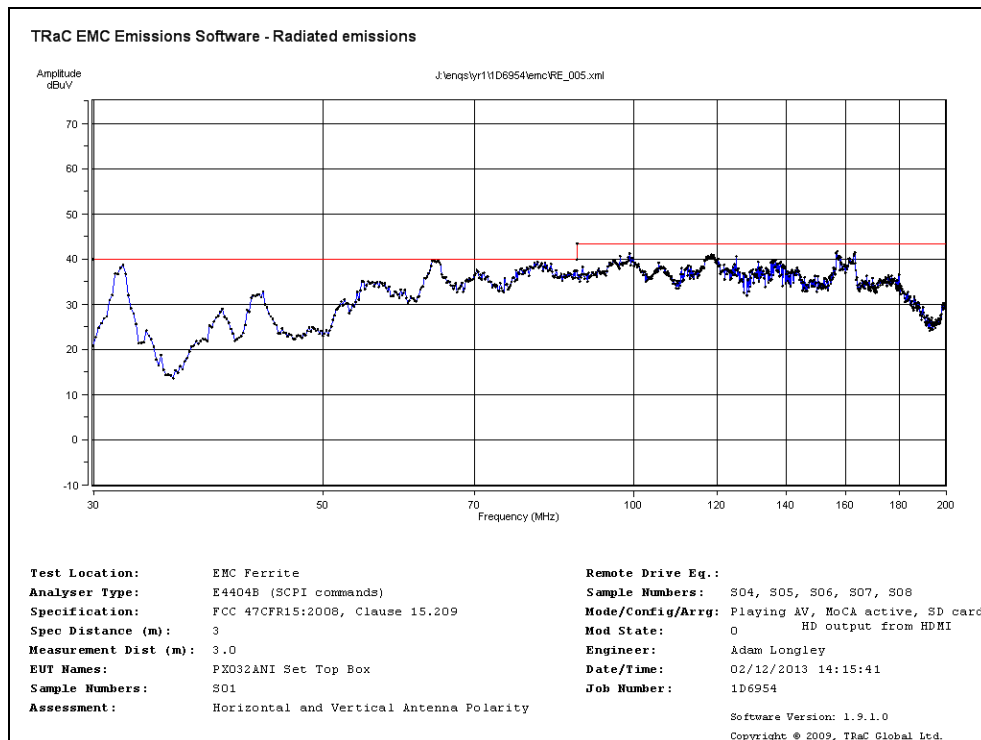
Radiated Transmitter Emissions Channel 25 2475MHz (15.209) Band Edge Compliance  
Antenna 1 - RBW 100kHz



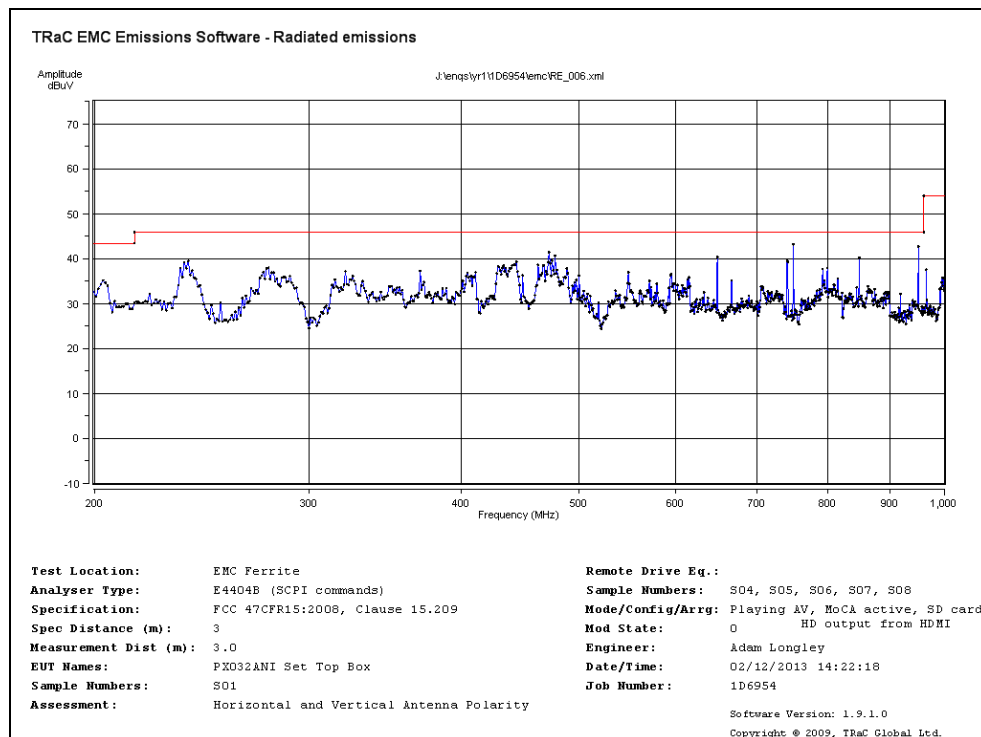
Radiated RX Mode Emissions (15.109)  
9kHz-150kHz



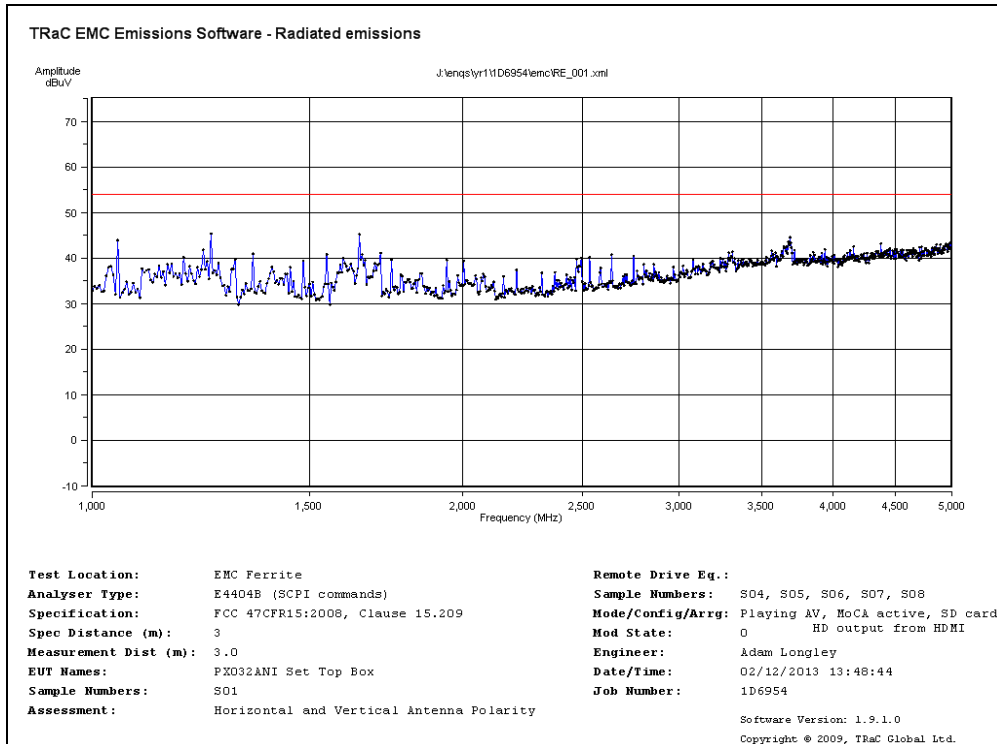
Radiated RX Mode Emissions (15.109)  
150kHz - 30MHz



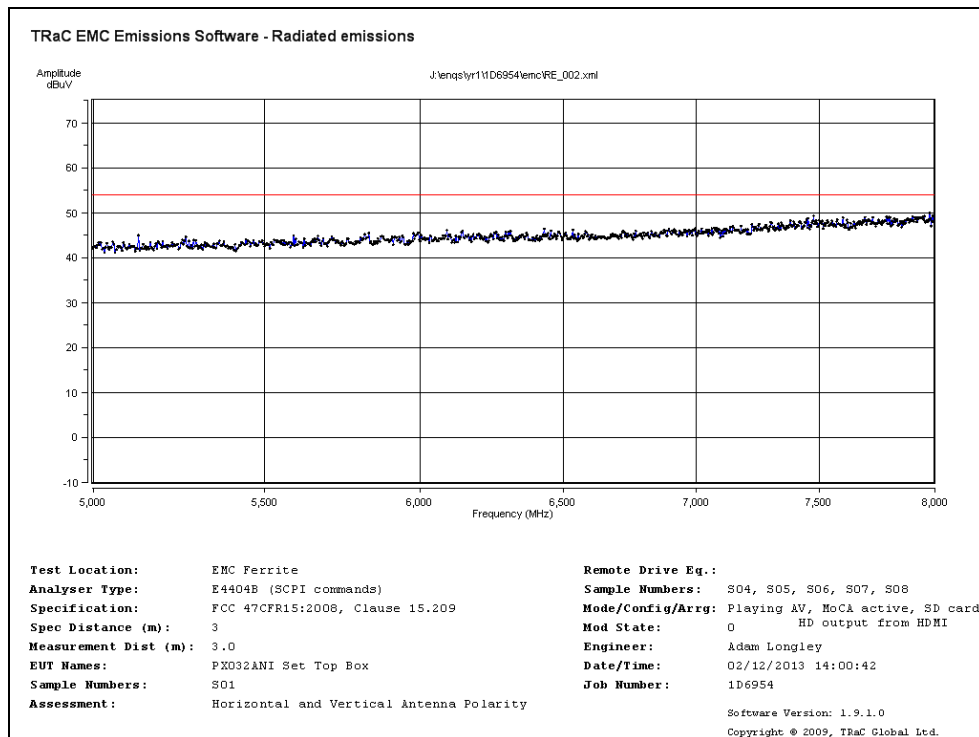
Radiated RX Mode Emissions (15.109)  
30MHz-200MHz



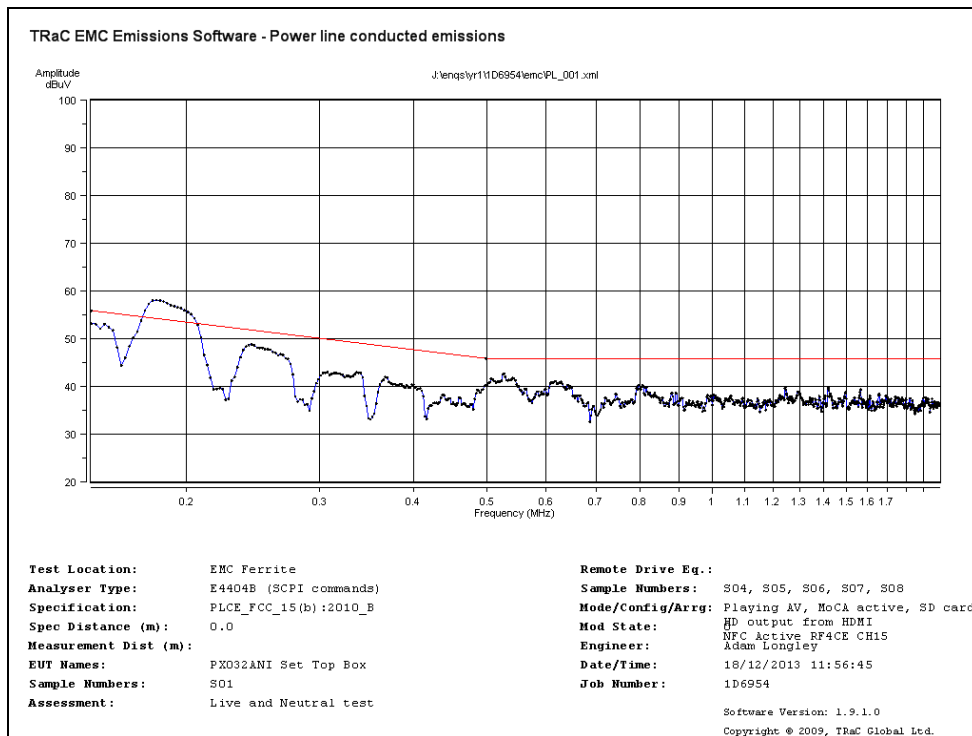
Radiated RX Mode Emissions (15.109)  
200MHz-1GHz



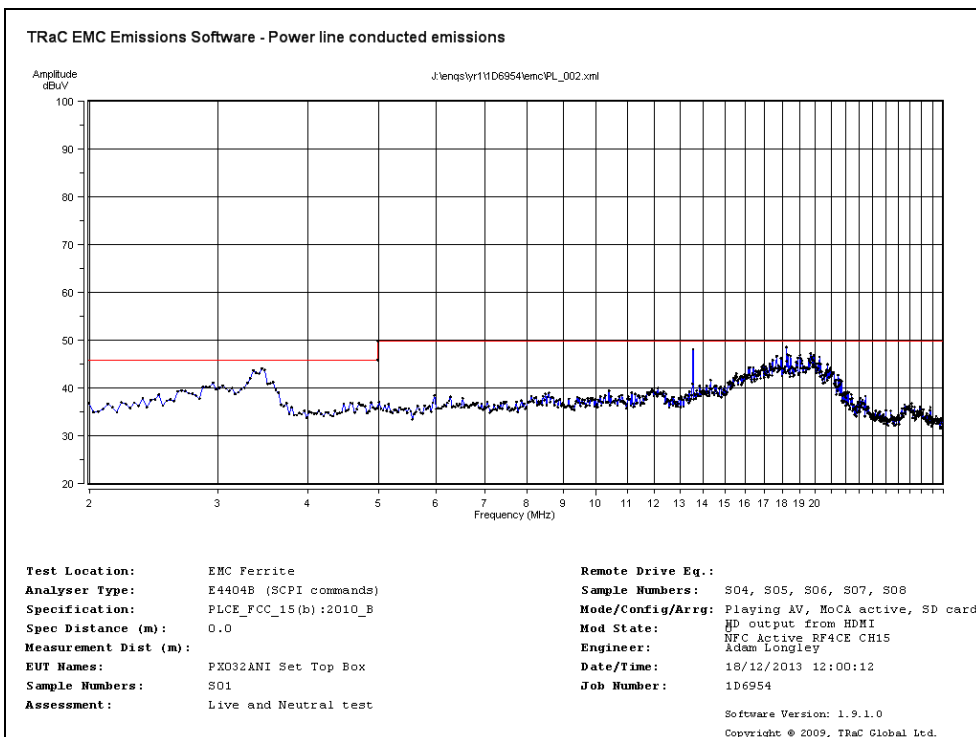
Radiated RX Mode Emissions (15.109)  
1GHz-5GHz



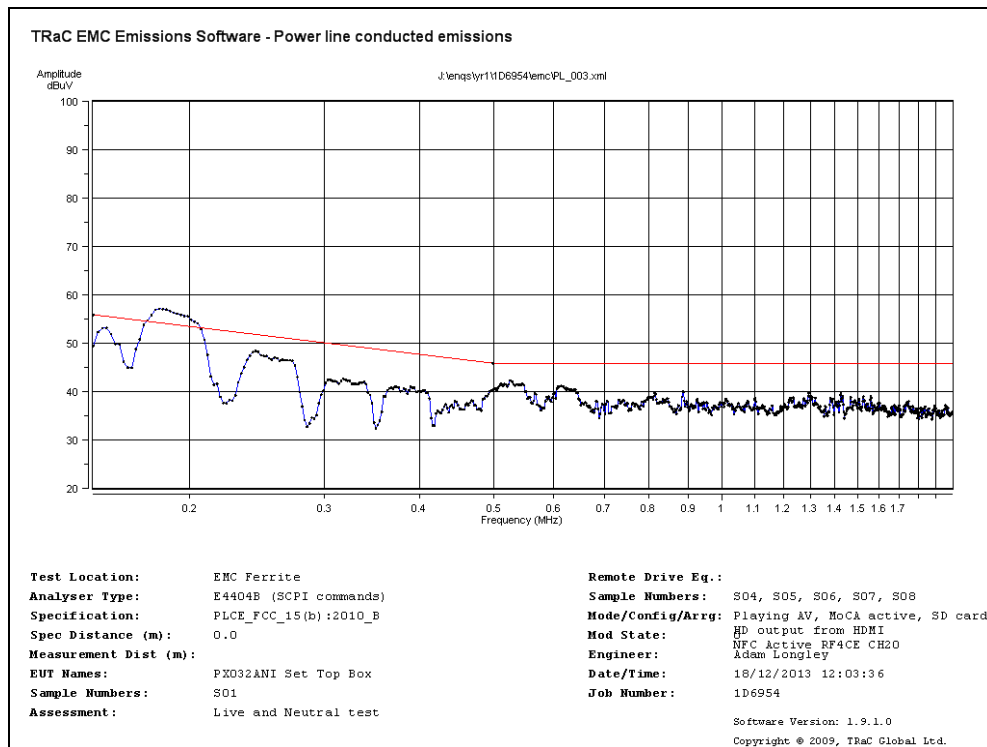
Radiated RX Mode Emissions (15.109)  
5GHz-8GHz



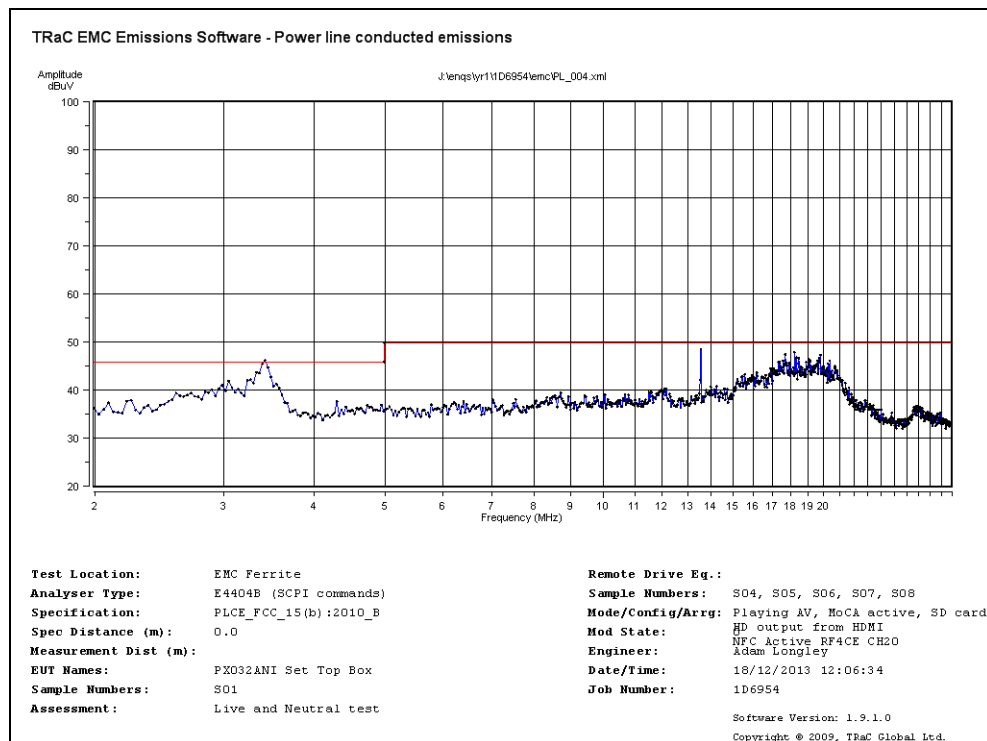
## PLCE- EUT NFC Transmitting (RF4CE Ch15) 0.15MHz - 2 MHz



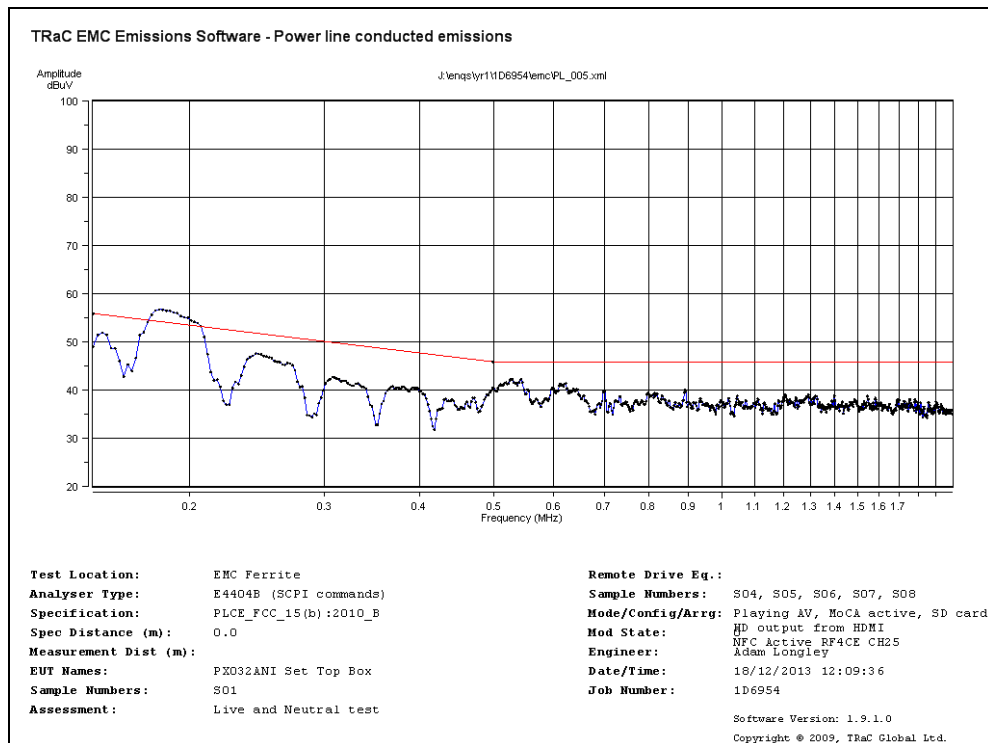
## PLCE- EUT NFC Transmitting (RF4CE Ch15) 2MHz - 30 MHz



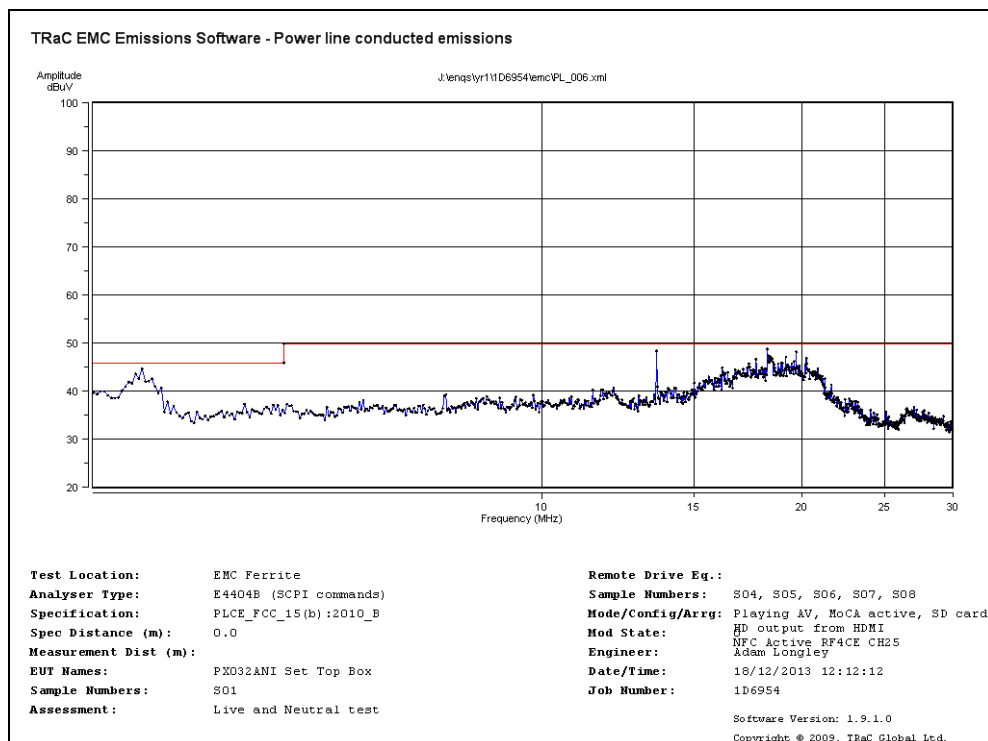
## PLCE- EUT NFC Transmitting (RF4CE Ch20) 0.15MHz - 2 MHz



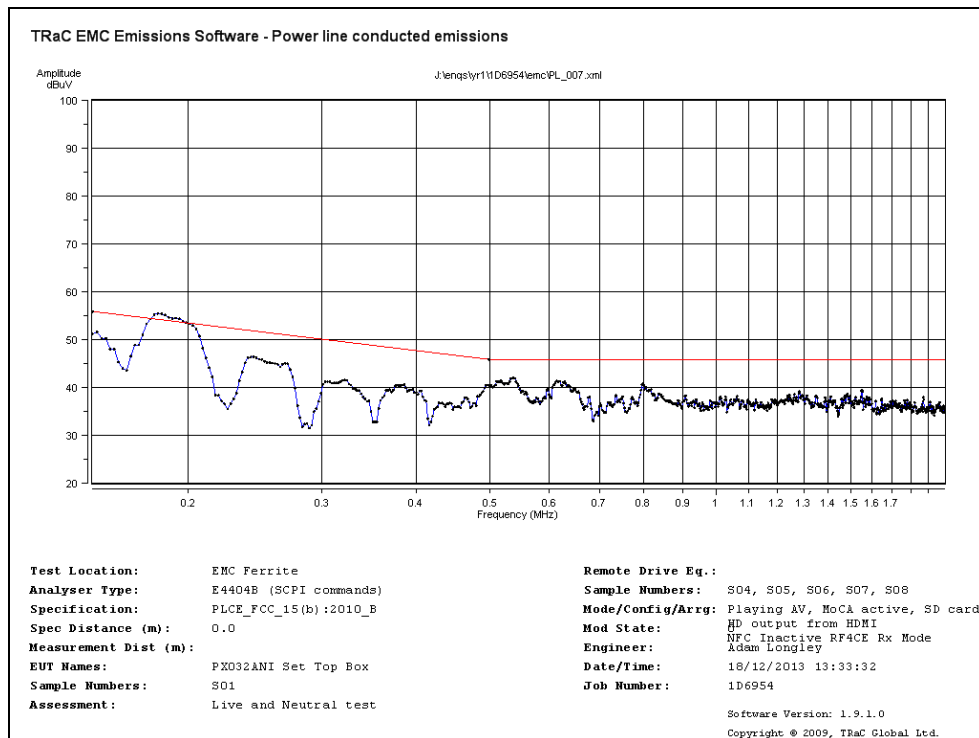
## PLCE- EUT NFC Transmitting (RF4CE Ch20) 2MHz - 30 MHz



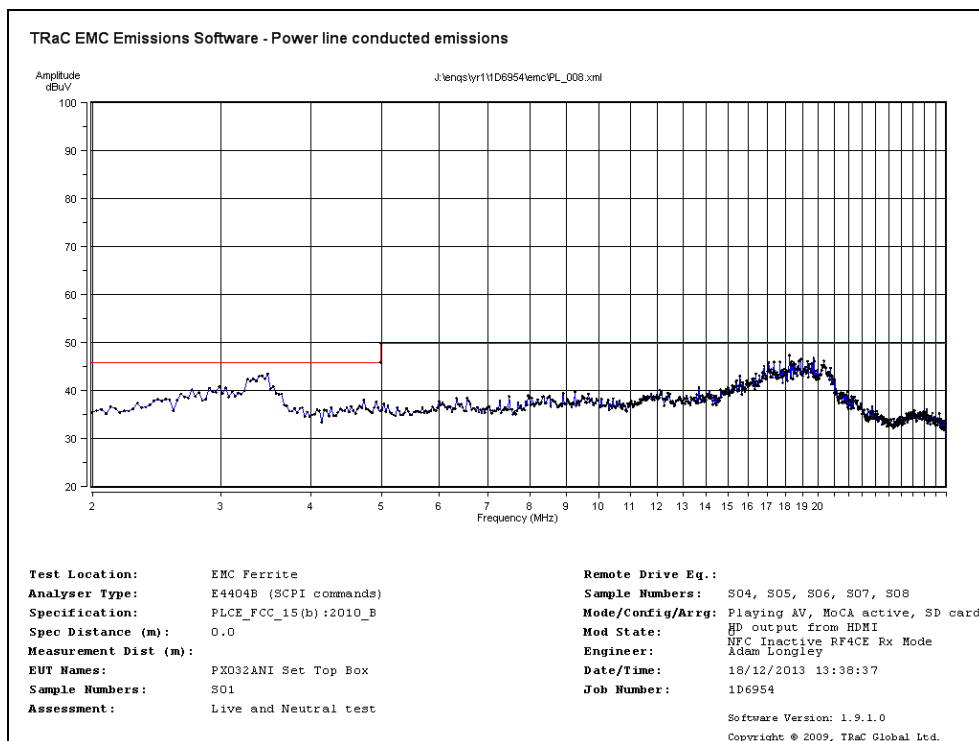
PLCE- EUT NFC Transmitting (RF4CE Ch25) 0.15MHz - 2 MHz



PLCE – EUT NFC Transmitting (RF4CE Ch25) 2 to 30 MHz



## PLCE – EUT NFC Receiving (RF4CE Rx) 0.15 to 2 MHz



## PLCE- EUT NFC Receiving (RF4CE Rx) 2MHz - 30 MHz

**Appendix E:****Additional Test and Sample Details**

This appendix contains details of:

1. The samples submitted for testing.
2. Details of EUT operating mode(s)
3. Details of EUT configuration(s) (see below).
4. EUT arrangement (see below).

Throughout testing, the following numbering system is used to identify the sample and it's modification state:

**Sample No:** Sxx Mod w

where:

|    |                       |           |
|----|-----------------------|-----------|
| xx | = sample number       | eg. S01   |
| w  | = modification number | eg. Mod 2 |

The following terminology is used throughout the test report:

**Support Equipment (SE)** is any additional equipment required to exercise the EUT in the applicable operating mode. Where relevant SE is divided into two categories:

SE in test environment: The SE is positioned in the test environment and is not isolated from the EUT (e.g. on the table top during REFE testing).

SE isolated from the EUT: The SE is isolated via filtering from the EUT. (e.g. equipment placed externally to the ALSR during REFE testing).

**EUT configuration** refers to the internal set-up of the EUT. It may include for example:

- Positioning of cards in a chassis.
- Setting of any internal switches.
- Circuit board jumper settings.
- Alternative internal power supplies.

Where no change in EUT configuration is **possible**, the configuration is described as "single possible configuration".

EUT arrangement refers to the termination of EUT ports / connection of support equipment, and where relevant, the relative positioning of samples (EUT and SE) in the test environment.

For further details of the test procedures and general test set ups used during testing please refer to the related document "EMC Test Methods - An Overview", which can be supplied by TRaC Global Ltd upon request.

**E1) Test samples**

The following samples of the apparatus were submitted by the client for testing :

| Sample No. | Description                             | Identification |
|------------|-----------------------------------------|----------------|
| S01        | PX032ANI Set Top Box (Radiated sample)  | PADA00042725   |
| S02        | PX032ANI Set Top Box (Conducted sample) | PADA00042737   |

The following samples of the apparatus were submitted by the client as support equipment (SE)

| Sample No. | Description                             | Identification                    |
|------------|-----------------------------------------|-----------------------------------|
| S04        | D-link Ethernet to coaxial bridge       | F3XX18A000018                     |
| S05        | Xi3 7428                                | DP2012110026                      |
| S06        | Dell Laptop (Latitude D620)             | Pace Asset No =<br>Pace0000015275 |
| S07        | Samsung LCD monitor LE19B450C4W         | 85793HMS600925K                   |
| S08        | Block SAT100 Autotransformer (115V O/P) | Pace Asset No = 0111              |

**E2) EUT Operating Mode During Testing.**

During testing, the EUT was exercised as described in the following tables :

| Test                                 | Description of Operating Mode: Transmit                                                                                                                                                                                                                                                                                  |
|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| All tests, except as described below | NFC powered and scan mode enabled<br>RF4CE powered and placed in transmit mode<br>Connected to ECB via MoCA link decoding HD AV stream<br>SD card inserted and powered<br>HDMI output resolution = 1080i<br>HDMI input connected to HDMI output of set-top box (S05) playing HD stream<br>USB port loaded with USB stick |

| Test                                                                            | Description of Operating Mode: Receive/Standby mode                                                                                                                                                                                                                                                                     |
|---------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Receiver Radiated Spurious Emissions<br>Receiver Power Line Conducted Emissions | NFC powered and scan mode enabled<br>RF4CE powered and placed in receive mode<br>Connected to ECB via MoCA link decoding HD AV stream<br>SD card inserted and powered<br>HDMI output resolution = 1080i<br>HDMI input connected to HDMI output of set-top box (S05) playing HD stream<br>USB port loaded with USB stick |

| Test                             | Description of Operating Mode: Transmit                                                                                                                                                       |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Conducted RF port tests on RF4CE | NFC powered and scan mode enabled<br>RF4CE powered and placed in transmit mode<br>SD card inserted and powered<br>HDMI output resolution = 1080i<br>USB port loaded with control laptop (S06) |

**E3) EUT Configuration Information.**

The EUT was submitted for testing in one single possible configuration.

**E4) List of EUT Ports**

The tables below describe the termination of EUT ports:

The table below describes the termination of EUT ports:

Sample : S02

Tests : RF Antenna Port Conducted Spurious Emissions, 6dB Bandwidth, Power Spectral Density and Conducted Fundamental Carrier Power

| Port         | Description of Cable Attached | Cable length | Equipment Connected |
|--------------|-------------------------------|--------------|---------------------|
| Cable In     | None                          | -            | None                |
| HDMI In      | None                          | -            | None                |
| HDMI Out     | None                          | -            | None                |
| USB          | USB Null modem cable          | 7m           | Laptop S06          |
| SD card slot | N/A                           | N/A          | SD card             |
| Mains Power  | 2 core figure-8 mains lead    | 2m           | Mains supply        |

Sample : S01

Tests : Radiated Electric Field Emissions Restricted band 15.209 (15.205) and 15.109 digital circuitry

| Port         | Description of Cable Attached | Cable length | Equipment Connected |
|--------------|-------------------------------|--------------|---------------------|
| Cable In     | 75Ohm coax                    | >3m          | D-Link S04          |
| HDMI In      | HDMI to HDMI cable            | 2m           | S05                 |
| HDMI Out     | HDMI to HDMI cable            | 2m           | TV S07              |
| USB          | None                          | -            | USB drive           |
| SD card slot | N/A                           | N/A          | SD card             |
| Mains Power  | 2 core figure-8 mains lead    | 2m           | Mains supply        |

**E5 Details of Equipment Used**

For Radiated Measurements:

| TRAC<br>REF/RFG<br>No. | Type   | Description              | Manufacturer    | Date Calibrated. |
|------------------------|--------|--------------------------|-----------------|------------------|
| REF886                 | ATS    | Ferrite Lined Chamber    | TRaC            | 10/05/13         |
| 095                    |        | Biconical Antenna        | EMCO            | 09/05/13         |
| 191                    |        | Log Periodic Antenna     | EMCO            | 09/05/13         |
| 023                    |        | Active Loop Antenna      | Rhode & Schwarz | 09/07/13         |
| RFG682                 | HL050  | GHz Log Periodic Antenna | Rhode & Schwarz | 16/07/13         |
| RFG629                 |        | Horn Antenna             | Q-Par           | 19/09/13         |
| REF927                 | 310    | Pre-Amp (9kHz – 1GHz)    | Sonoma          | 15/09/11         |
| REF913                 | 8449B  | Pre-Amp (1 – 26.5GHz)    | Agilent         | 31/01/13         |
| RFG452                 |        | SMA RF coaxial cable     |                 | 03/07/13         |
| REF881                 |        | N-Type RF coaxial cable  |                 | 01/07/13         |
| REF882                 |        | N-Type RF coaxial cable  |                 | 01/07/13         |
| REF884                 |        | N-Type RF coaxial cable  |                 | 01/07/13         |
| REF885                 |        | N-Type RF coaxial cable  |                 | 01/07/13         |
| RFG832                 |        | K-Type RF coaxial cable  | Teleydyne       | 04/07/13         |
| RFG919                 |        | K-Type RF coaxial cable  | Teleydyne       | 04/07/13         |
| REF837                 | E4440A | Spectrum Analyser        | Agilent         | 10/05/13         |

For Conducted Measurements

| TRAC<br>REF/RFG<br>No. | Type   | Description       | Manufacturer    | Date Calibrated. |
|------------------------|--------|-------------------|-----------------|------------------|
| REF909                 | FSU    | Spectrum Analyser | Rhode & Schwarz | 30/02/13         |
| REF837                 | E4440A | Spectrum Analyser | Agilent         | 10/05/13         |

For Power Line Conducted Emissions

| TRAC<br>REF/RFG<br>No. | Type    | Description               | Manufacturer    | Date Calibrated. |
|------------------------|---------|---------------------------|-----------------|------------------|
| n/a                    | Lab 5   | Screened room 2           | TRaC            | CAL date N/A     |
| 189                    | ESH3-Z5 | 2-phase LISN              | Rhode & Schwarz | 17/06/13         |
| 680                    | ESH3-Z2 | Pulse Limiter             | Rhode & Schwarz | 29/06/13         |
| 404                    | E4407B  | Spectrum Analyser         | Agilent         | 12/07/13         |
| 125                    | ESHS10  | Measuring Receiver        | Rhode & Schwarz | 17/06/13         |
| 109                    | 8859    | AC 110 /60Hz power supply | -               | CAL date N/A     |

**Appendix F:**

**Additional Information**

No additional information provided.

**Appendix G:**

**Photographs and Figures**

Attached to the FCC submission as separate exhibits.

**Appendix H:****MPE Calculation**

OET Bulletin No. 65, Supplement C 01-01

**47 CFR §§1.1307 and 2.1091**

2.1091 Radio frequency radiation exposure evaluation: mobile devices.

For purposes of these requirements mobile devices are defined by the FCC as transmitters designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimetres is normally maintained between radiating structures and the body of the user or nearby persons. These devices are normally evaluated for exposure potential with relation to the MPE limits. As the 20cm separation specified under FCC rules may not be achievable under normal operation of the EUT, an RF exposure calculation is needed to show the minimum distance required to be less than 1mW/cm<sup>2</sup> power density limit, as required under FCC rules.

**Prediction of MPE limit at a given distance**

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = \frac{EIRP}{4\pi R^2} \text{ re - arranged } R = \sqrt{\frac{EIRP}{S 4\pi}}$$

where:

S = power density

R = distance to the centre of radiation of the antenna

EIRP = EUT Maximum power

Note:

The EIRP measurement was performed using the peak conducted power measurement in conjunction with the maximum declared antenna gain.

**Result**

| Prediction Frequency (MHz) | Maximum EIRP (mW) | Power density limit (S) (mW/cm <sup>2</sup> ) | Distance (R) cm required to be less than 1mW/cm <sup>2</sup> (cm) |
|----------------------------|-------------------|-----------------------------------------------|-------------------------------------------------------------------|
| 2475                       | 3.184             | 1                                             | 0.504                                                             |

