

**A RADIO TEST REPORT  
FOR  
DISPLAYDATA LTD  
ON  
AURA 29 ELECTRONIC LABEL  
DOCUMENT NO.TRA-017329WUS1**

**HULL**

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**TRaC Wireless Test Report** : TRA-017329WUS1

**Applicant** : Displaydata Ltd

**Apparatus** : Aura 29 Electronic Label

**Specification(s)** : CFR47 Part 15.249

**Purpose of Test** : **Certification**

**FCCID** : VC7120-0112

**Authorised by**

:



: Radio Product Manager

**Issue Date**

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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:

Displaydata Ltd

Building 3  
Kingswood  
Kings Ride  
Ascot  
Berkshire  
SL5 8AD  
United Kingdom

## **1.3 Manufacturer**

As Above

## **1.4 Apparatus Assessed**

The following apparatus was assessed between 18<sup>th</sup> December 2013 – 10<sup>th</sup> January 2014:

Aura 29 Electronic Label

The above device is a Radio Transceiver Module operating in the 902 – 928 MHz band.

## 1.5 Test Result Summary

Full details of test results are contained within Appendix A. 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.

Full details of test results are contained within Appendix A. The following table summarises the results of the assessment.

Test Type	Regulation	Measurement standard	Result
	Title 47 of the CFR: Part 15 Subpart (c)		
Intentional Emission Field Strength	15.249 (a)	ANSI C63.10:2009	Pass
Intentional Emission Band Occupancy	15.215 (c)	ANSI C63.10:2009	Pass
Spurious Emissions Radiated <1000MHz	15.209 & 15.249 (a) (d)	ANSI C63.10:2009	Pass
Unintentional Radiated Spurious Emissions	15.109	ANSI C63.10:2009	Pass

Abbreviations used in the above table:

ANSI C 63.10:2009 is outside the scope of the laboratories UKAS accreditation.

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 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 CFR47 Part 2 & RSS-Gen.

## **1.7 Deviations from Test Standards**

There were no deviations from the standards tested to.

**Section 2:****Measurement Uncertainty****2.1 Measurement Uncertainty Values**

For the test data recorded in accordance with note (iii) of Section 2.1 the following measurement uncertainty was calculated:

**Radio Testing – General Uncertainty Schedule**

*All statements of uncertainty are expanded standard uncertainty using a coverage factor of 1.96 to give a 95% confidence where no required test level exists.*

**[1] Adjacent Channel Power**

Uncertainty in test result = **1.86dB**

**[2] Carrier Power**

Uncertainty in test result (Power Meter) = **1.08dB**

Uncertainty in test result (Spectrum Analyser) = **2.48dB**

**[3] Effective Radiated Power**

Uncertainty in test result = **4.71dB**

**[4] Spurious Emissions**

Uncertainty in test result = **4.75dB**

**[5] Maximum frequency error**

Uncertainty in test result (Frequency Counter) = **0.113ppm**

Uncertainty in test result (Spectrum Analyser) = **0.265ppm**

**[6] Radiated Emissions, field strength OATS 14kHz-18GHz Electric Field**

Uncertainty in test result (14kHz – 30MHz) = **4.8dB**,

Uncertainty in test result (30MHz – 1GHz) = **4.6dB**,

Uncertainty in test result (1GHz – 18GHz) = **4.7dB**

**[7] Frequency deviation**

Uncertainty in test result = **3.2%**

**[8] Magnetic Field Emissions**

Uncertainty in test result = **2.3dB**

**[9] Conducted Spurious**

Uncertainty in test result – Up to 8.1GHz = **3.31dB**

Uncertainty in test result – 8.1GHz – 15.3GHz = **4.43dB**

Uncertainty in test result – 15.3GHz – 21GHz = **5.34dB**

Uncertainty in test result – Up to 26GHz = **3.14dB**

**[10] Channel Bandwidth**

Uncertainty in test result = **15.5%**



**[11] Amplitude and Time Measurement – Oscilloscope**

Uncertainty in overall test level = **2.1dB**,  
Uncertainty in time measurement = **0.59%**,  
Uncertainty in Amplitude measurement = **0.82%**

**[12] Power Line Conduction**

Uncertainty in test result = **3.4dB**

**[13] Spectrum Mask Measurements**

Uncertainty in test result = **2.59% (frequency)**  
Uncertainty in test result = **1.32dB (amplitude)**

**[14] Adjacent Sub Band Selectivity**

Uncertainty in test result = **1.24dB**

**[15] Receiver Blocking – Listen Mode, Radiated**

Uncertainty in test result = **3.42dB**

**[16] Receiver Blocking – Talk Mode, Radiated**

Uncertainty in test result = **3.36dB**

**[17] Receiver Blocking – Talk Mode, Conducted**

Uncertainty in test result = **1.24dB**

**[18] Receiver Threshold**

Uncertainty in test result = **3.23dB**

**[19] Transmission Time Measurement**

Uncertainty in test result = **7.98%**

## **Section 3:**

## **Modifications**

### **3.1 Modifications Performed During Assessment**

No modifications were performed during the assessment

**Appendix A:****Formal Emission 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		

**A1 Transmitter Intentional Emission Radiated**

<b>Test Details:</b>	
Regulation	Part 15.249 (a)
Measurement standard	ANSI C63.10:2009
EUT sample number	S11
Modification state	0
SE in test environment	None
SE isolated from EUT	S1, S3, TRaC Belkin Router
EUT set up	Refer to Appendix C
Temperature	21.5
Photographs	Appendix F

FREQ. (MHz)	MEASUREMENT Rx. READING (dBµV)	CABLE LOSS (dB)	ANT FACTOR (dB/m)	PRE AMP (dB)	FIELD STRENGTH (dBµV/m)	FIELD STRENGTH (mV/m)
902.5	68.0	2.8	20.8	N/A	91.6	38.0
927.5	67.9	2.8	20.8	N/A	91.5	37.6
Limit value @ fc			50mV/m @ 3m			

- Notes:**
- 1 Results quoted are extrapolated as indicated
  - 2 Receiver detector @ fc Quasi Peak 120kHz bandwidth
  - 3 When battery powered the EUT was powered with new batteries

- Test Method:**
- 1 As per Radio – Noise Emissions, ANSI C63.10:2009
  - 2 Measuring distances 3m
  - 3 EUT 0.8 metre above ground plane
  - 4 Emissions maximised by rotation of EUT, on an automatic turntable.  
Raising and lowering the receiver antenna between 1m & 4m.  
Horizontal and vertical polarisations, of the receive antenna.  
EUT orientation in three orthogonal planes.  
Maximum results recorded

**A2 Transmitter Bandwidth**

<b>Test Details:</b>	
Regulation	Part 15.215 (c)
Measurement standard	ANSI C63.10:2009
EUT sample number	S11
Modification state	0
SE in test environment	None
SE isolated from EUT	S1, S3, TRaC Belkin Router
EUT set up	Refer to Appendix C
Temperature	25

<b>Band occupancy @ -20 dBc</b>			
<b>FREQ. (MHz)</b>	<b>f lower (MHz)</b>	<b>f higher (MHz)</b>	<b>Occ BW (kHz)</b>
902.5	902.474038462	902.537980769	63.9423
927.5	927.475721154	927.538221154	62.5000

**Notes:**

The 20dB Band Width of the carrier must be contained within the frequency band 902-928MHz.

**A3 Radiated Electric Field Emissions**

Preliminary scans were performed using a peak detector with the RBW = 100kHz. The radiated electric field emission 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	Part 15.209, 15.249 (a) & (d), Annex 2 A2.9(a)
Measurement standard	ANSI C63.10:2009
Frequency range	30MHz -10GHz
EUT sample number	S11
Modification state	0
SE in test environment	None
SE isolated from EUT	S1, S3, TRaC Belkin Router
EUT set up	Refer to Appendix C
Temperature	23.7
Photographs	Appendix F

The worst case radiated emission measurements for spurious emissions and harmonics that fall within the restricted bands are listed below:

Test Details: EUT Transmitting @ 902.5 MHz									
DET	FREQ. (MHz)	MEAS Rx (dBµV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	FIELD ST'GH (dBµV/m)	EXTRAP FACT (dB)	FIELD ST'GH (µV/m)	LIMIT (µV/m)
Qp	308.15	8	1.9	13.4	N/A	23.3	-	14.6	200
Qp	805.5	13.2	3.5	20.3	N/A	37.0	-	70.8	200
Qp	889.5	19.9	3.5	20.8	N/A	44.2	-	162.2	200
Qp	903.35	16.8	3.5	20.9	N/A	41.2	-	114.8	200
Qp	915.5	19.1	3.6	20.9	N/A	43.6	-	151.4	200
Qp	954.5	13.8	3.6	21.3	N/A	38.7	-	86.1	200
Pk	5415.04	54.73	3.5	34	35.8	56.7	-	683.9	5000
Av	5415.04	51.11	3.5	34	35.8	53.1	-	451.9	500

Test Details: EUT Transmitting @ 927.5 MHz									
DET	FREQ. (MHz)	MEAS Rx (dBµV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	FIELD ST'GH (dBµV/m)	EXTRAP FACT (dB)	FIELD ST'GH (µV/m)	LIMIT (µV/m)
Qp	823.5	11.8	3.4	20.3	N/A	35.5	-	59.6	200
Qp	875.52	13.6	3.5	20.4	N/A	37.5	-	75.0	200
Qp	914.5	17.3	3.6	20.9	N/A	41.8	-	123.0	200
Qp	940.5	17.2	3.6	21.1	N/A	41.9	-	124.5	200
Qp	979.5	14.0	3.6	21.7	N/A	39.3	-	92.3	200
Pk	5565.05	55.1	3.5	33.9	35.8	57.0	-	707.9	5000
Av	5565.05	51.3	3.5	33.9	35.8	53.2	-	457.1	500

**Notes:**

- 1 Any testing performed below 30 MHz was performed using a magnetic loop antenna in accordance with ANSI C63.10:2009: 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= 1MHz, VBW ≥ RBW  
 Average RBW= 1MHz, VBW ≥ RBW

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

Radiated emission limits 47 CFR Part 15: Clause 15.209 for all emissions:

Frequency of emission (MHz)	Field strength $\mu\text{V/m}$	Measurement Distance m	Field strength $\text{dB}\mu\text{V/m}$
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:

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

- (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 C (ii) Parameter defined by client and / or single possible, refer to Appendix C (iii) Parameter had a negligible effect on emission levels, refer to Appendix C (iv) Worst case determined by initial measurement, refer to Appendix C				



#### A4 Unintentional Radiated Emissions

Preliminary scans were performed using a peak detector with the RBW = 100kHz. The radiated electric field emission test applies to all spurious emissions on directly related to the transmitter. The maximum permitted field strength is listed in Section 15.109. The EUT was set to operate in a transmit standby / receive mode.

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 15.109
Measurement standard	ANSI C63.10:2009
EUT sample number	S11
Modification state	0
SE in test environment	None
SE isolated from EUT	S1, S3, TRaC Belkin Router
EUT set up	Refer to Appendix C
Temperature	24.9
Photographs	Appendix F

The worst case radiated emission measurements for spurious emissions within the restricted bands are listed below:

Test Details: EUT Operating @ 902.5 MHz									
DET	FREQ. (MHz)	MEAS Rx (dBµV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	FIELD ST'GH (dBµV/m)	EXTRAP FACT (dB)	FIELD ST'GH (µV/m)	LIMIT (µV/m)
Pk	5414.08	55.4	3.5	34.0	35.8	57.1	-	716.1	5000
Av	5414.08	52.2	3.5	34.0	35.8	53.9	-	495.5	500

Test Details: EUT Operating @ 927.5 MHz									
DET	FREQ. (MHz)	MEAS Rx (dBµV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	FIELD ST'GH (dBµV/m)	EXTRAP FACT (dB)	FIELD ST'GH (µV/m)	LIMIT (µV/m)
Pk	1600.17	53.1	2.1	25.6	36.7	44.1	-	160.3	5000
Av	1600.17	38.9	2.1	25.6	36.7	29.9	-	31.3	500
Pk	5564.11	55.1	3.5	33.9	35.8	56.7	-	683.9	5000
Av	5564.11	51.5	3.5	33.9	35.8	53.1	-	451.9	500

**Notes:**

- 1 Any testing performed below 30 MHz was performed using a magnetic loop antenna in accordance with ANSI C63.10:2009: 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= 1MHz, VBW ≥ RBW  
 Average RBW= 1MHz, VBW ≥ RBW

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

Radiated emission limits 47 CFR Part 15: Clause 15.109 for all emissions:

Frequency of emission (MHz)	Field strength $\mu\text{V/m}$	Measurement Distance m	Field strength $\text{dB}\mu\text{V/m}$
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:

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

- (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 :

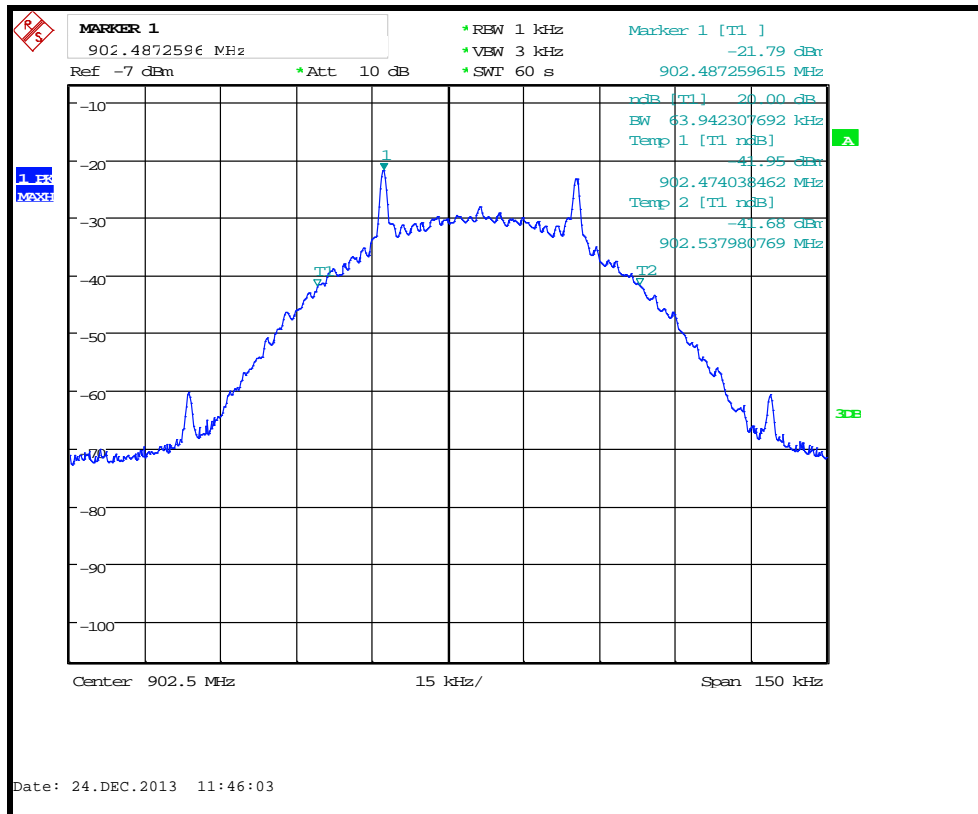
	See (i)	See (ii)	See (iii)	See (iv)
Effect of EUT operating mode on emission levels	✓			
Effect of EUT internal configuration on emission levels				✓
Effect of Position of EUT cables & samples on emission levels				✓
(i) Parameter defined by standard and / or single possible, refer to Appendix C (ii)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

**Appendix B:****Supporting Graphical Data**

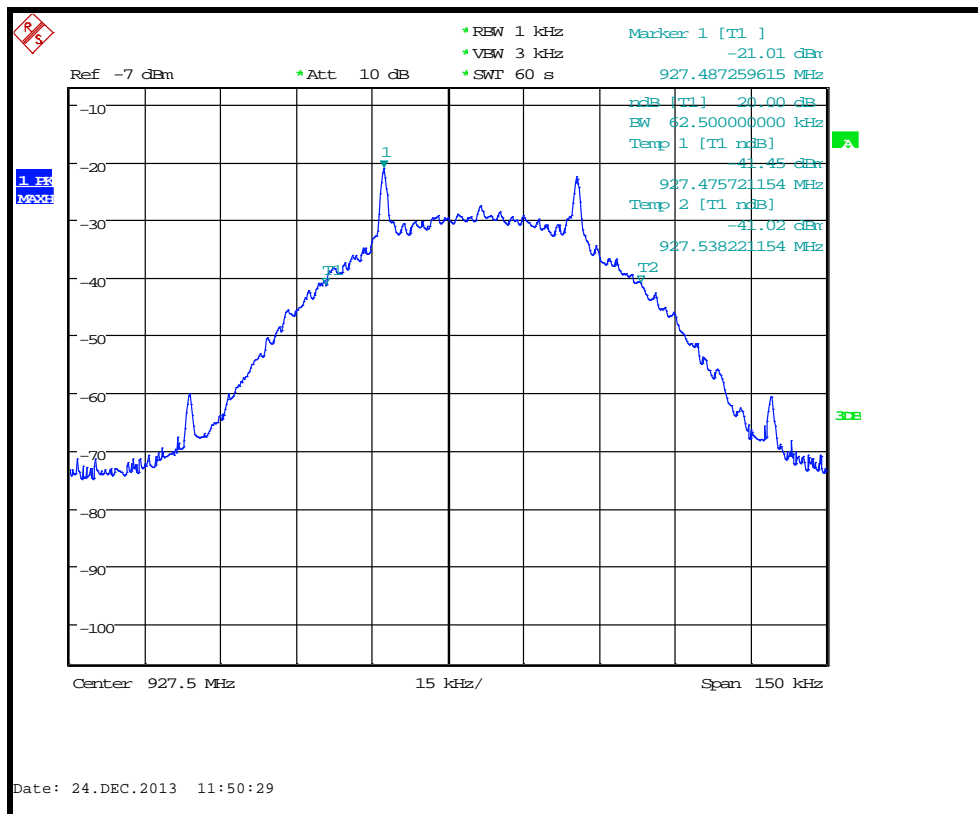
This appendix contains graphical data obtained during testing.

Notes:

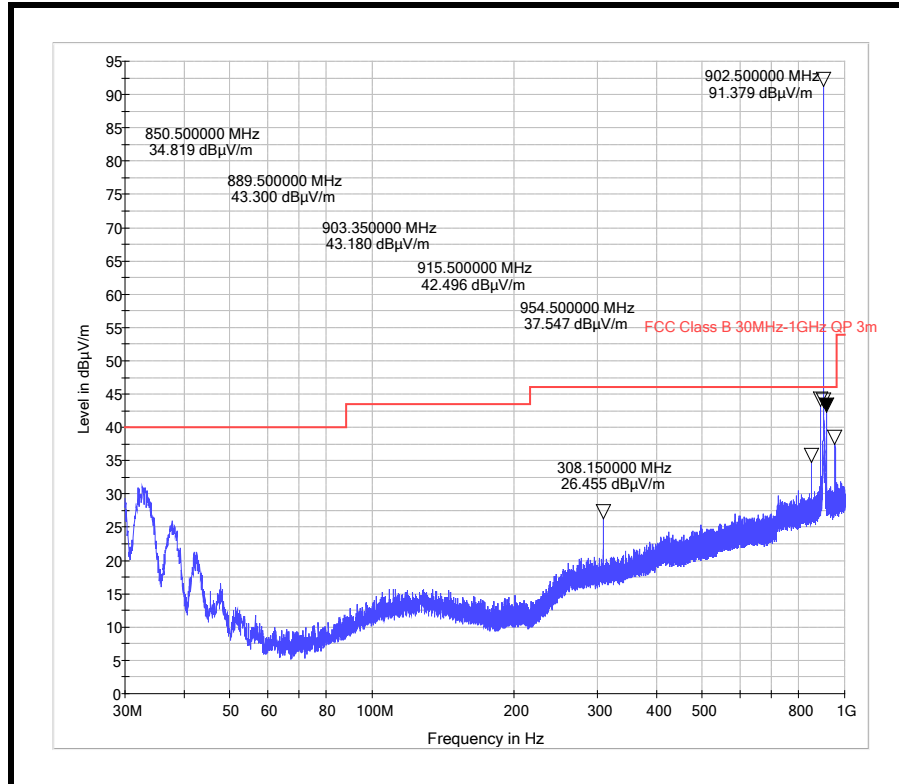
- (a) The radiated electric field emissions and conducted emissions graphical data in this appendix is preview data. For details of formal results, refer to Appendix A.
- (b) The time and date on the plots do not necessarily equate to the time of the test.
- (c) Where relevant, on power line conducted emission plots, the limit displayed is the average limit, which is stricter than the quasi peak limit.
- (d) Appendix C 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.



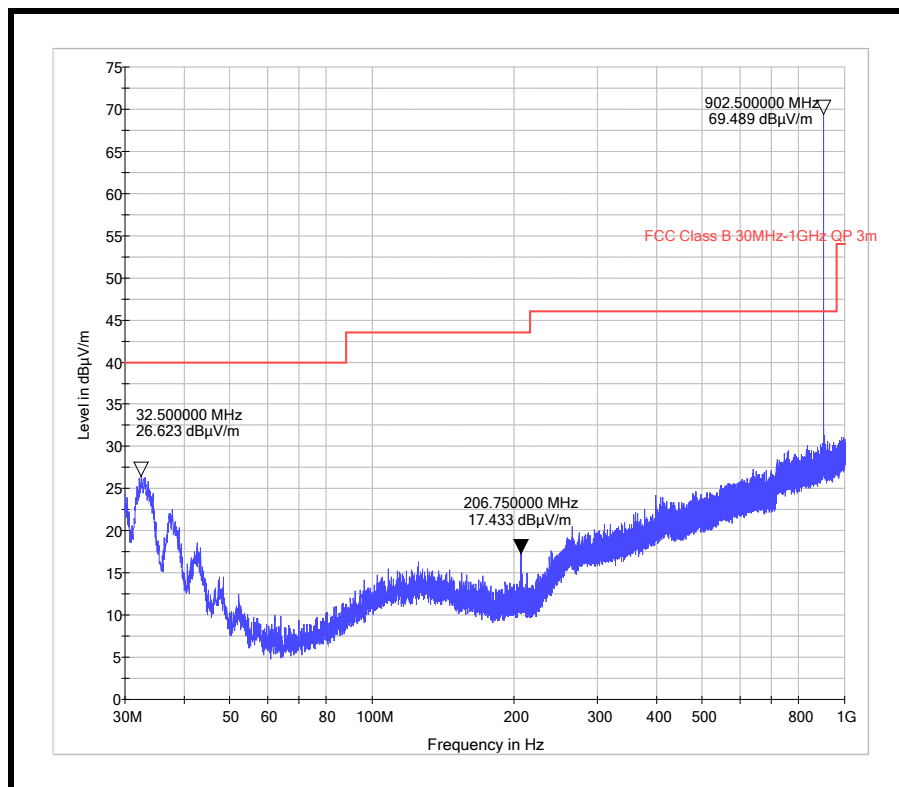
Fc = 902.5 MHz - 20dB Bandwidth



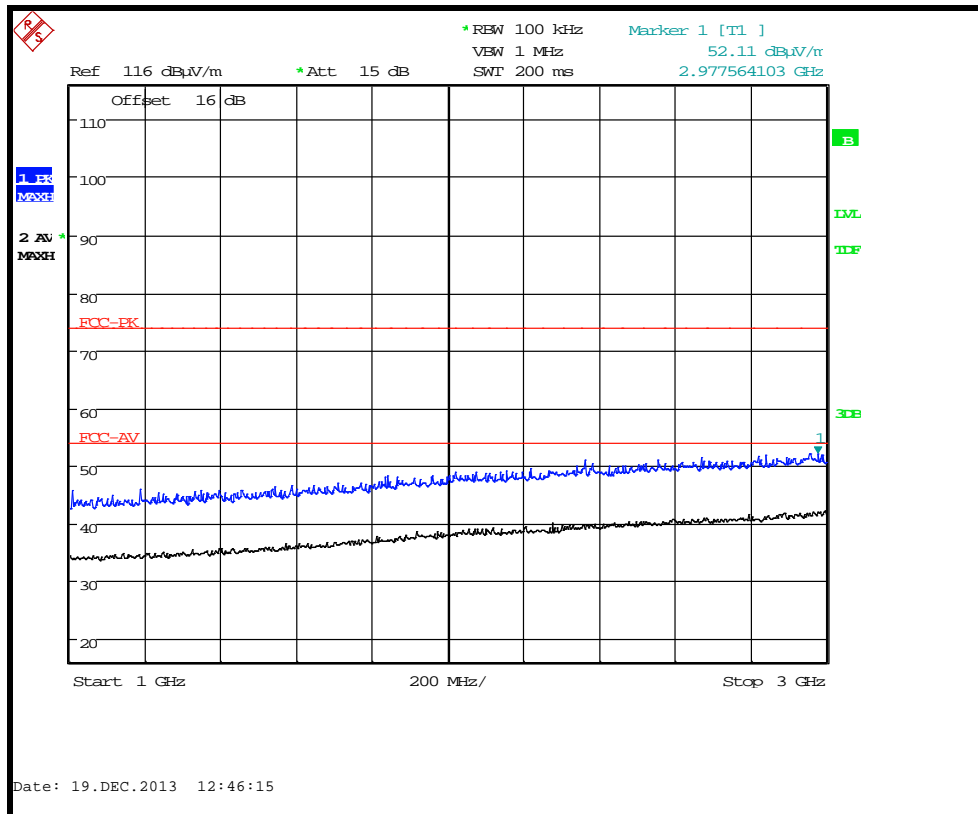
Fc = 927.5 MHz - 20dB Bandwidth



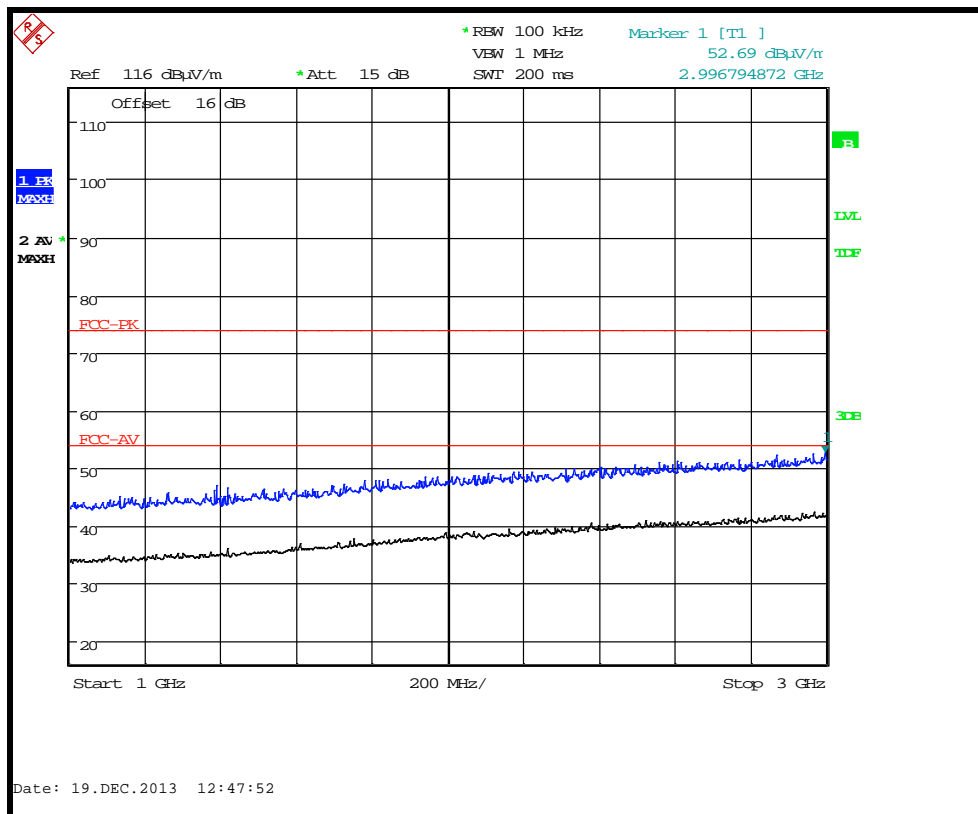
Fc = 902.5 MHz Radiated spurious emissions 30 MHz to 1 GHz Horizontal



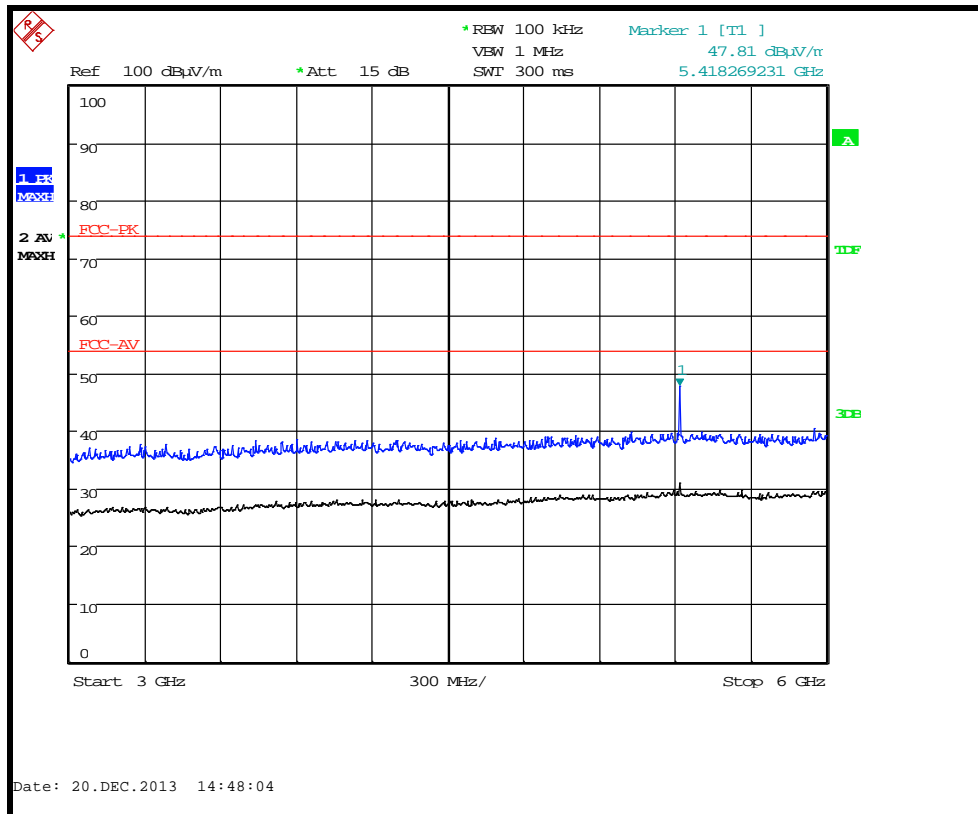
Fc = 902.5 MHz Radiated spurious emissions 30 MHz to 1 GHz Vertical



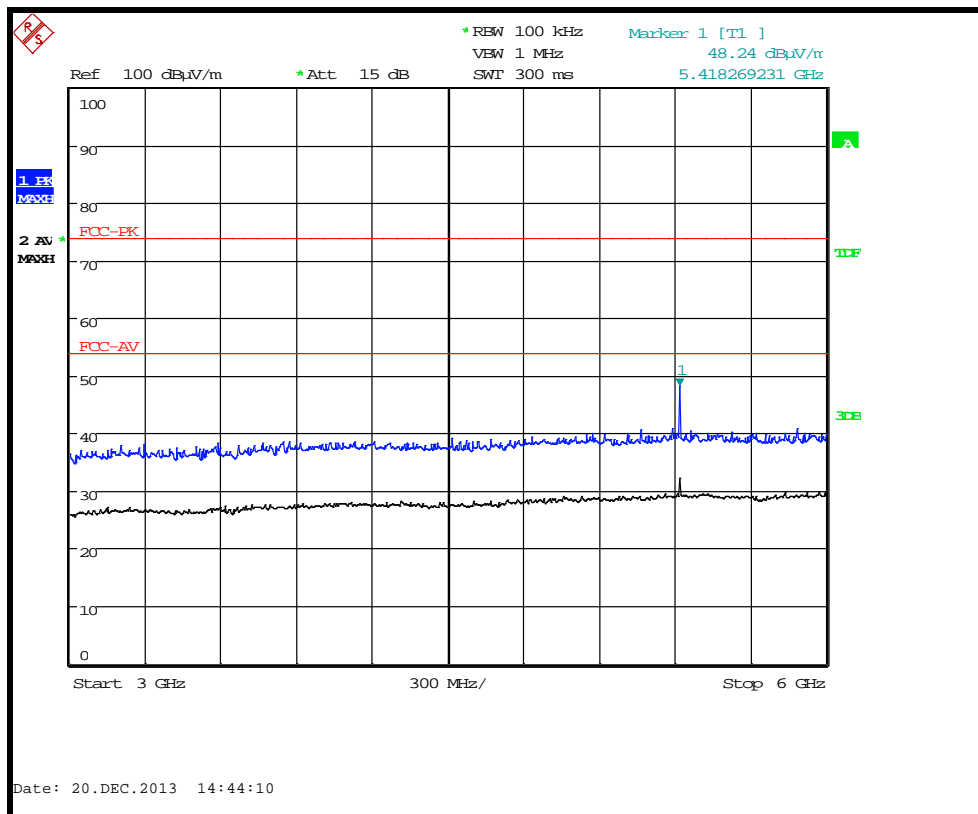
Fc = 902.5 MHz Radiated spurious emissions 1 GHz to 3 GHz Horizontal



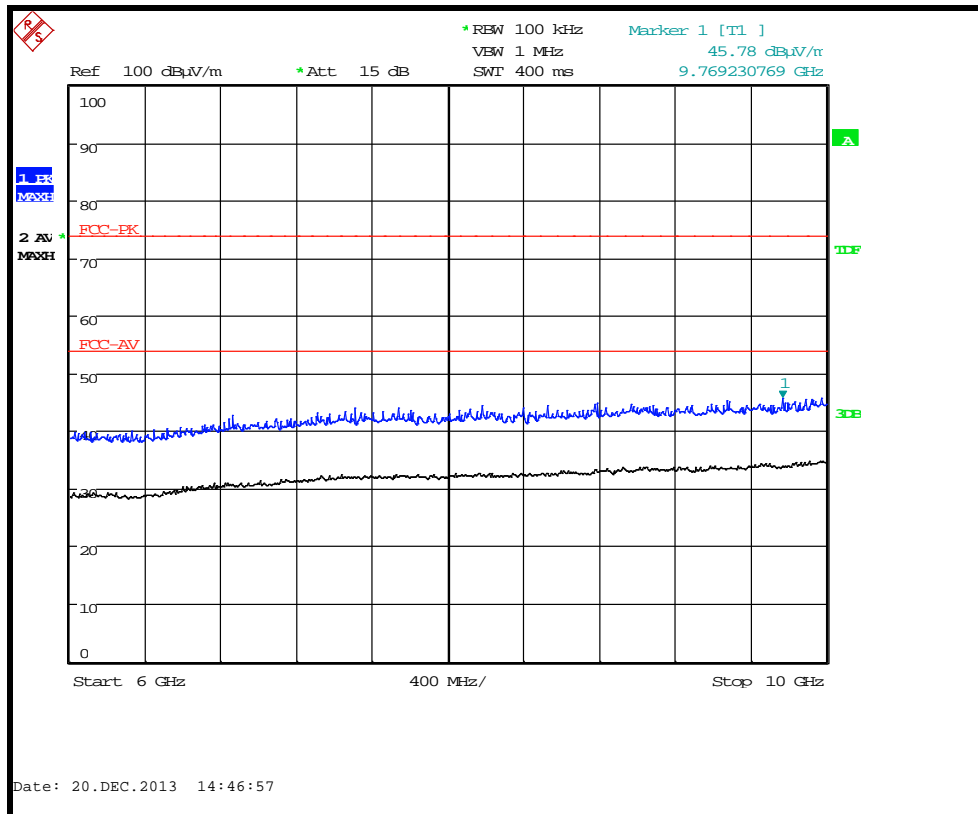
Fc = 902.5 MHz Radiated spurious emissions 1 GHz to 3 GHz Vertical



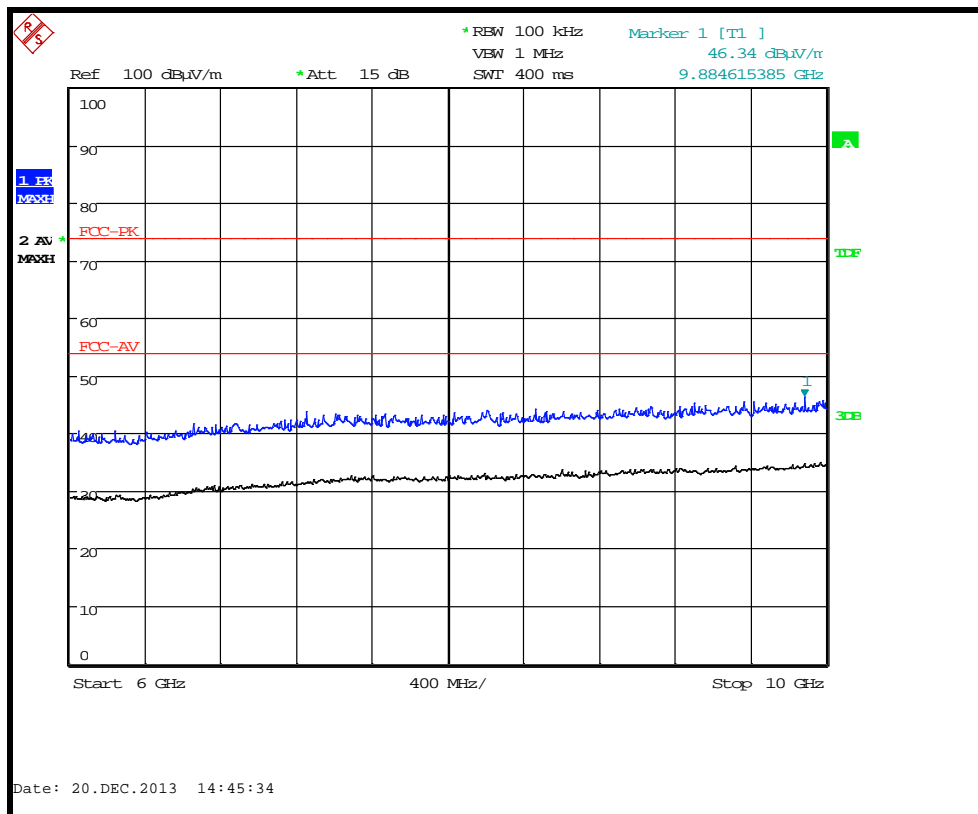
Fc = 902.5 MHz Radiated spurious emissions 3 GHz to 6 GHz Horizontal



Fc = 902.5 MHz Radiated spurious emissions 3 GHz to 6 GHz Vertical

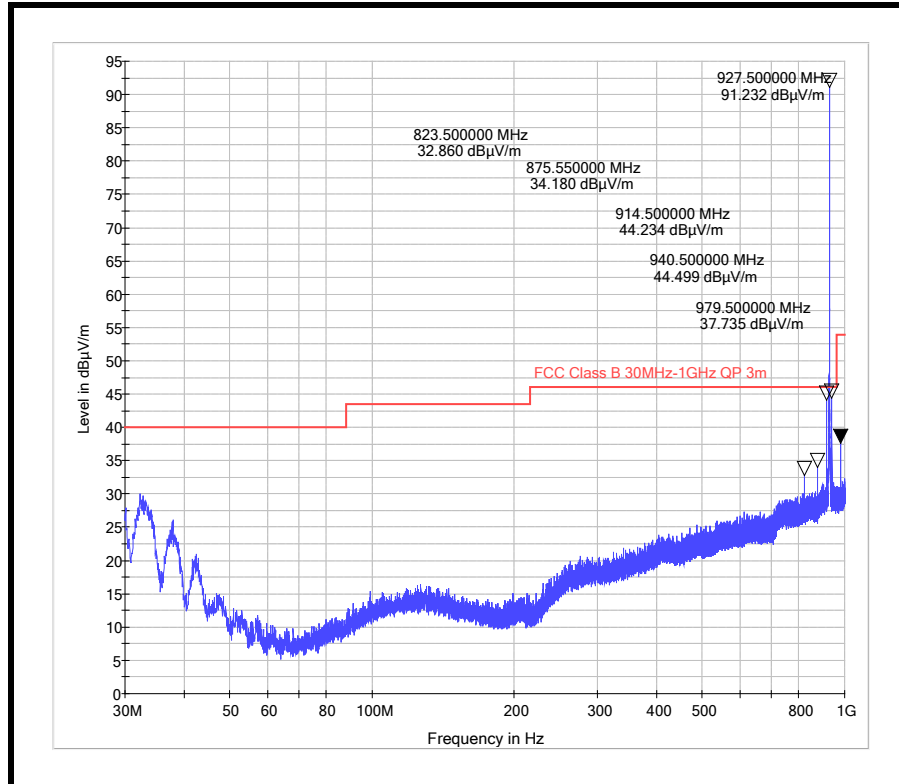


Fc = 902.5 MHz Radiated spurious emissions 6 GHz to 10 GHz Horizontal

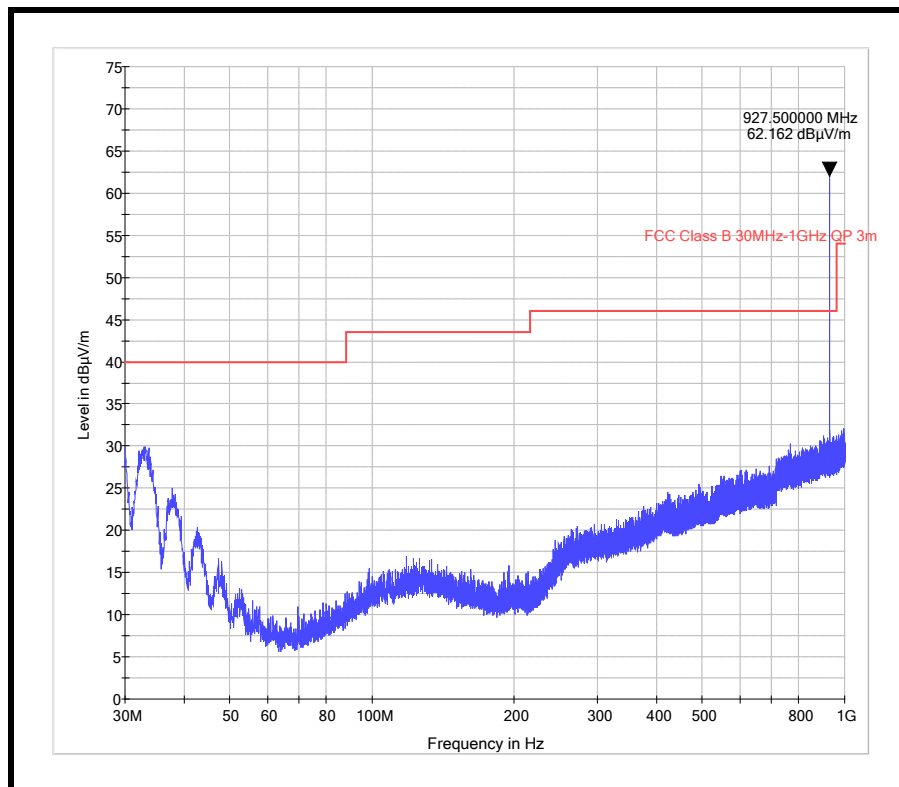


Fc = 902.5 MHz Radiated spurious emissions 6 GHz to 10 GHz Vertical

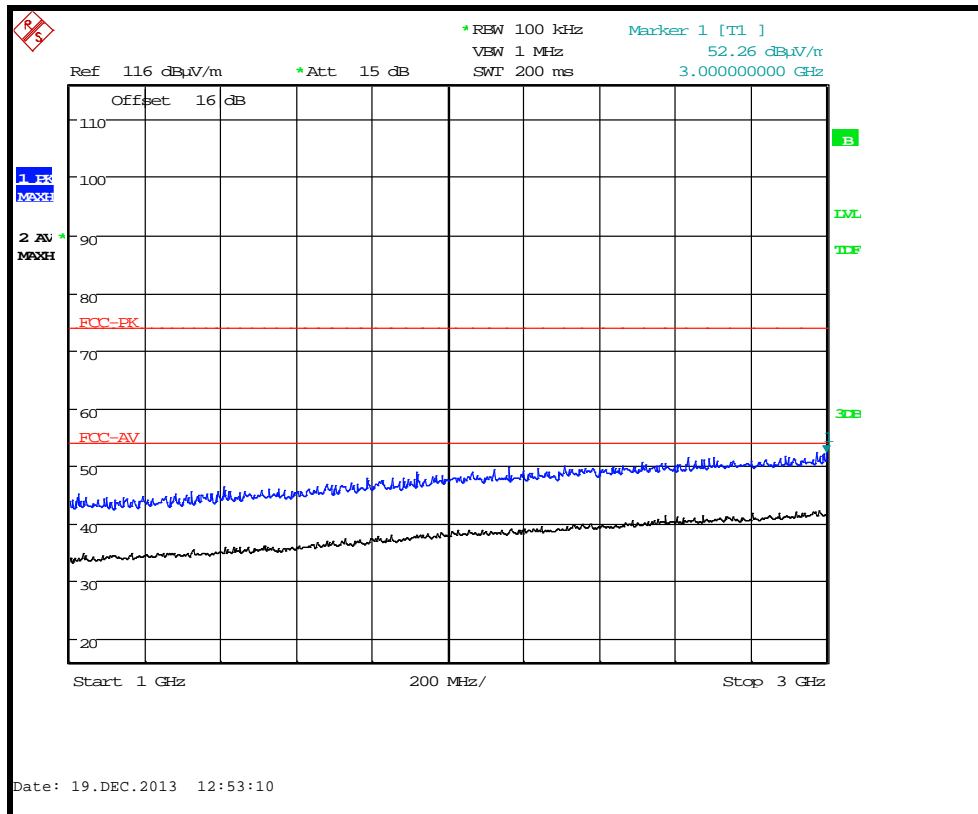




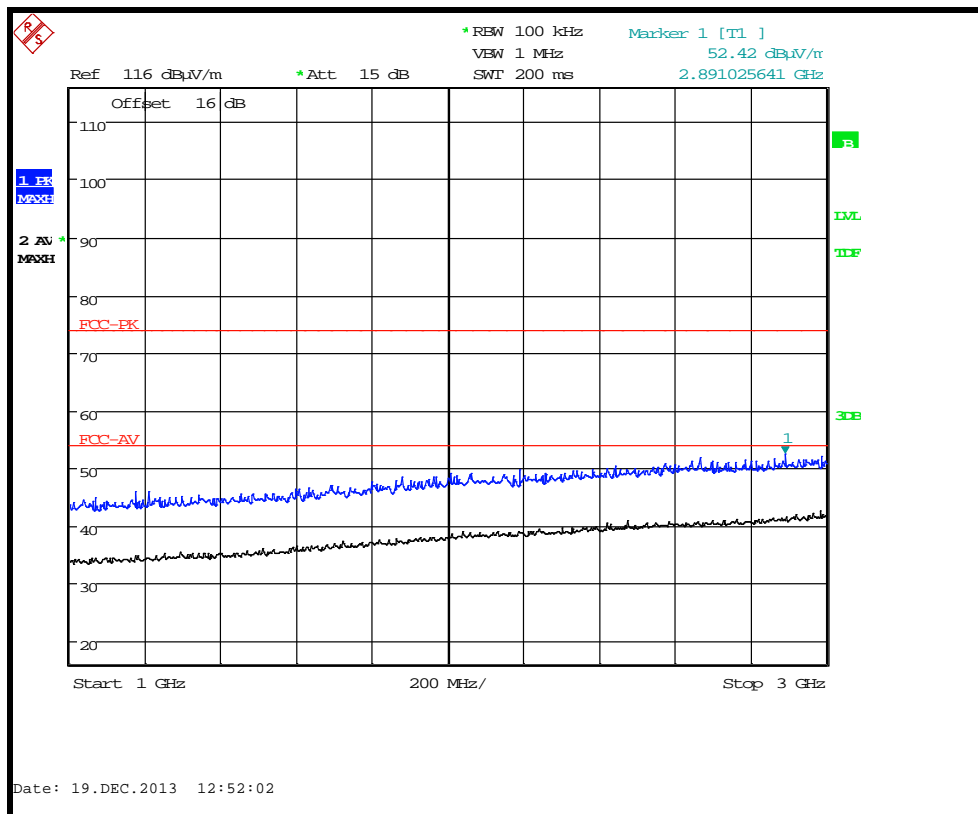
Fc = 927.5 MHz Radiated spurious emissions 30 MHz to 1 GHz Horizontal



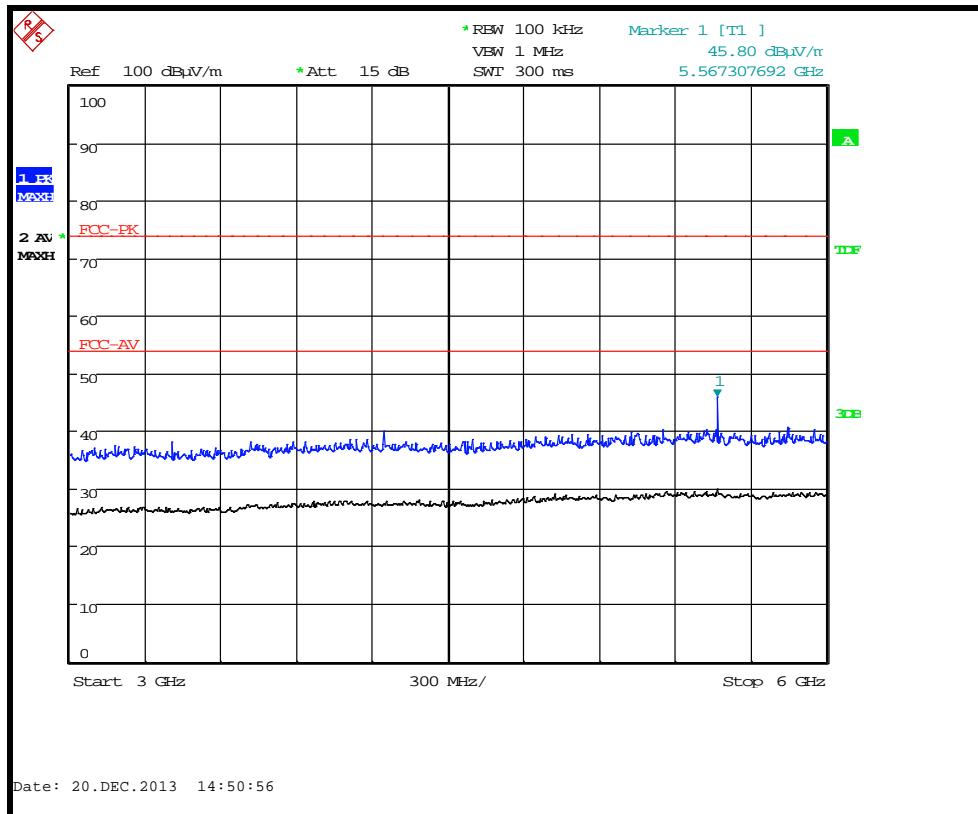
Fc = 927.5 MHz Radiated spurious emissions 30 MHz to 1 GHz Vertical



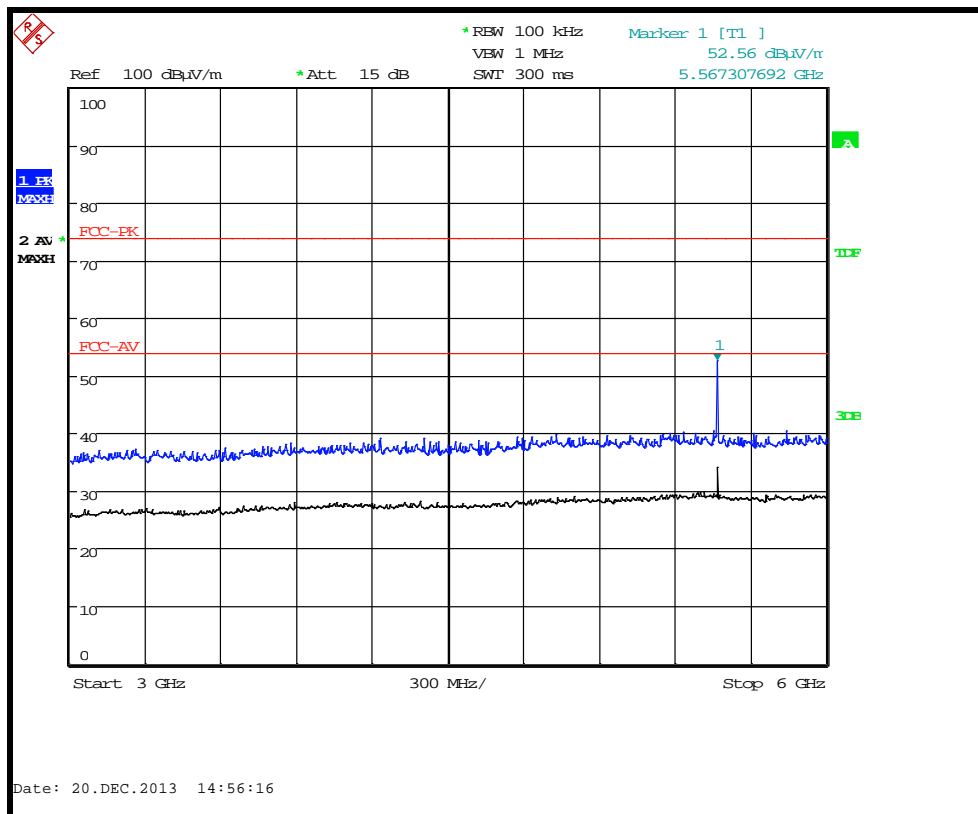
Fc = 927.5 MHz Radiated spurious emissions 1 GHz to 3 GHz Horizontal



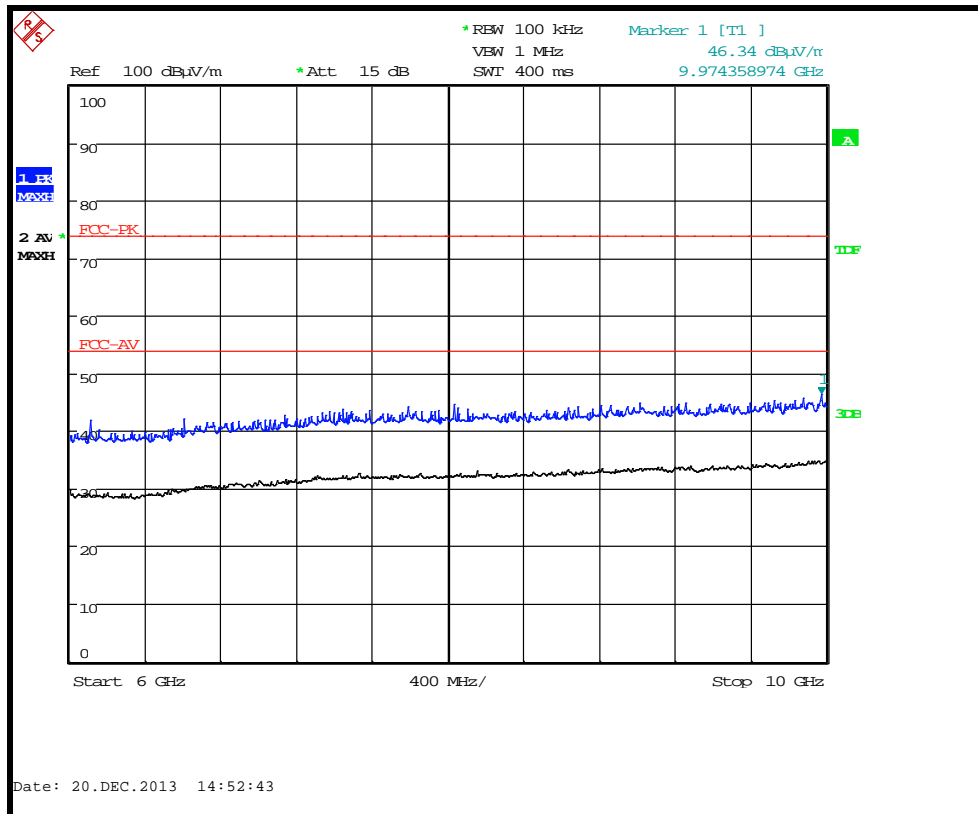
Fc = 927.5 MHz Radiated spurious emissions 1 GHz to 3 GHz Vertical



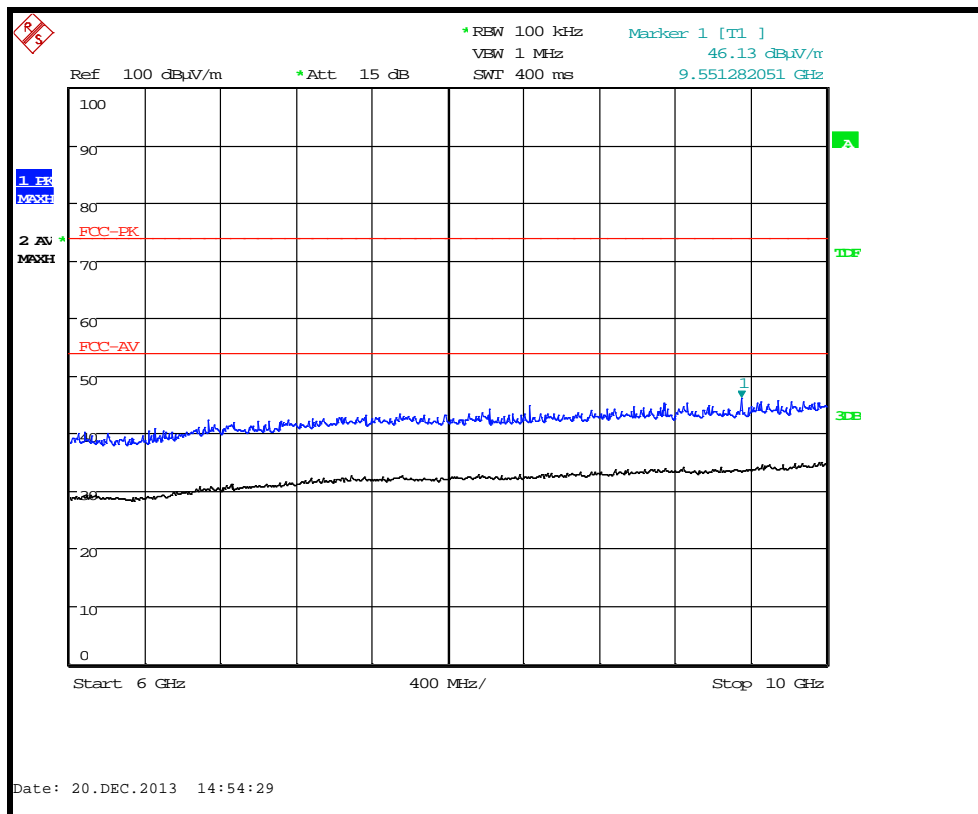
Fc = 927.5 MHz    Radiated spurious emissions 3 GHz to 6 GHz Horizontal



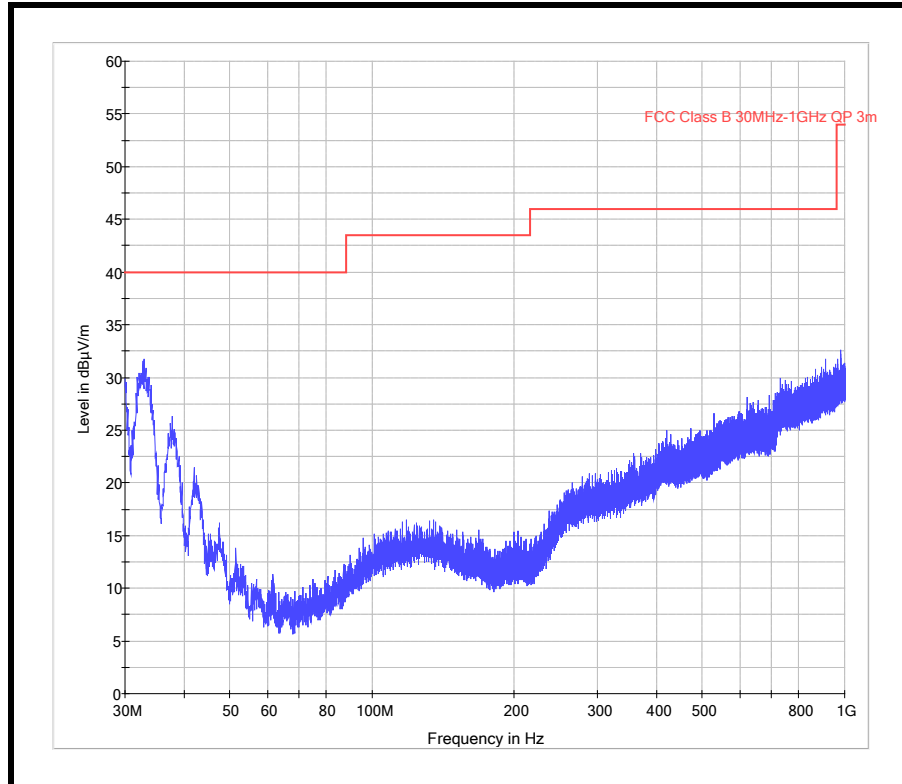
Fc = 927.5 MHz    Radiated spurious emissions 3 GHz to 6 GHz Vertical



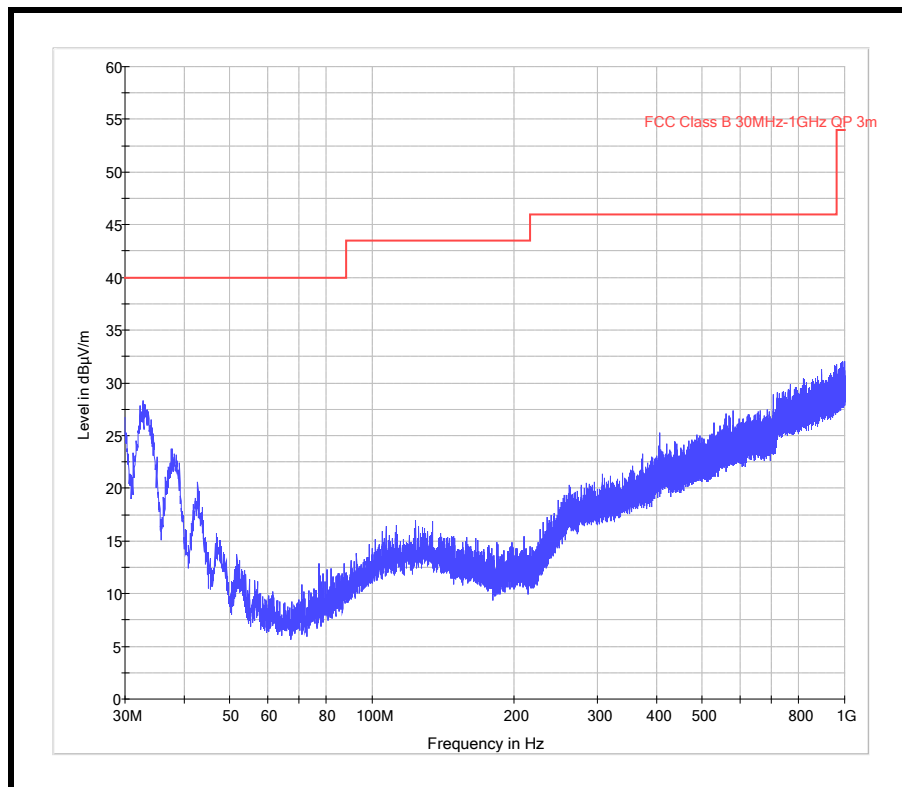
Fc = 927.5 MHz Radiated spurious emissions 6 GHz to 10 GHz Horizontal



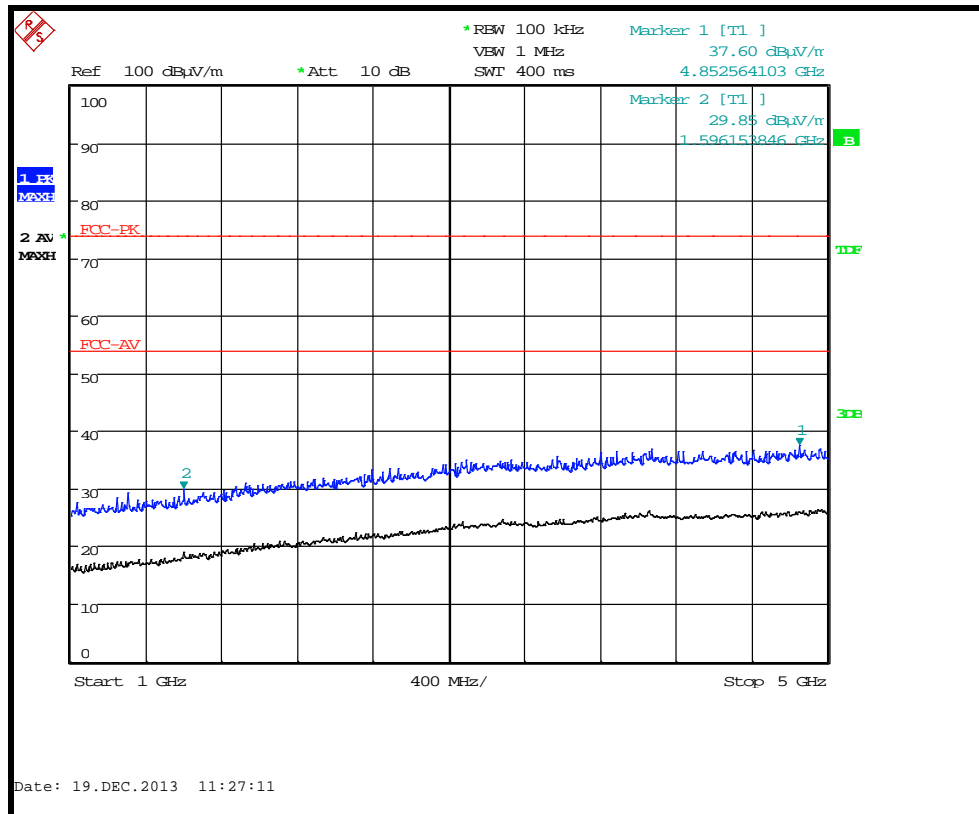
Fc = 927.5 MHz Radiated spurious emissions 6 GHz to 10 GHz Vertical



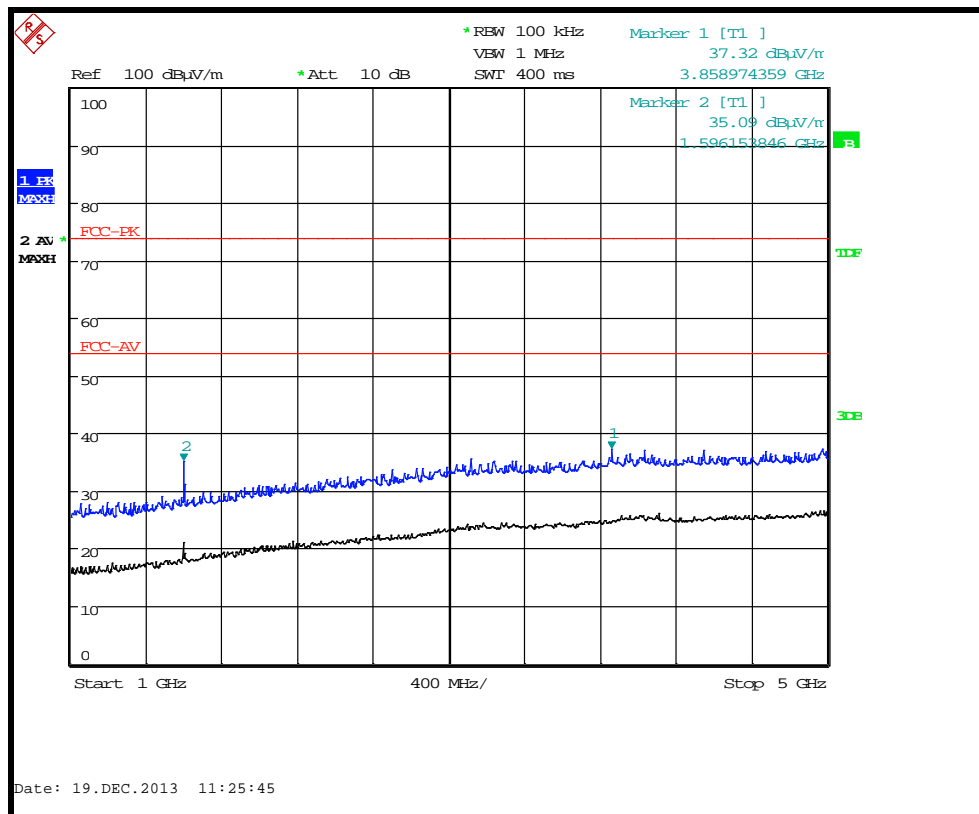
Fc = 902.5 MHz Unintentional Radiated spurious emissions 30 MHz to 1 GHz Horizontal



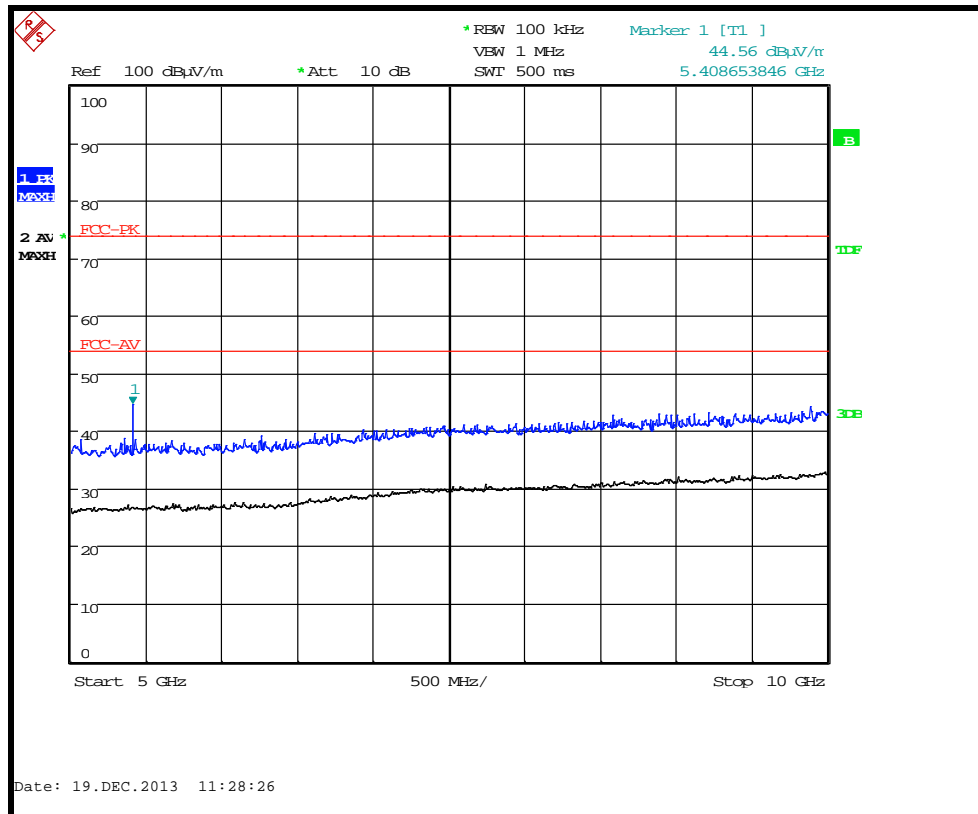
Fc = 902.5 MHz Unintentional Radiated spurious emissions 30 MHz to 1 GHz Vertical



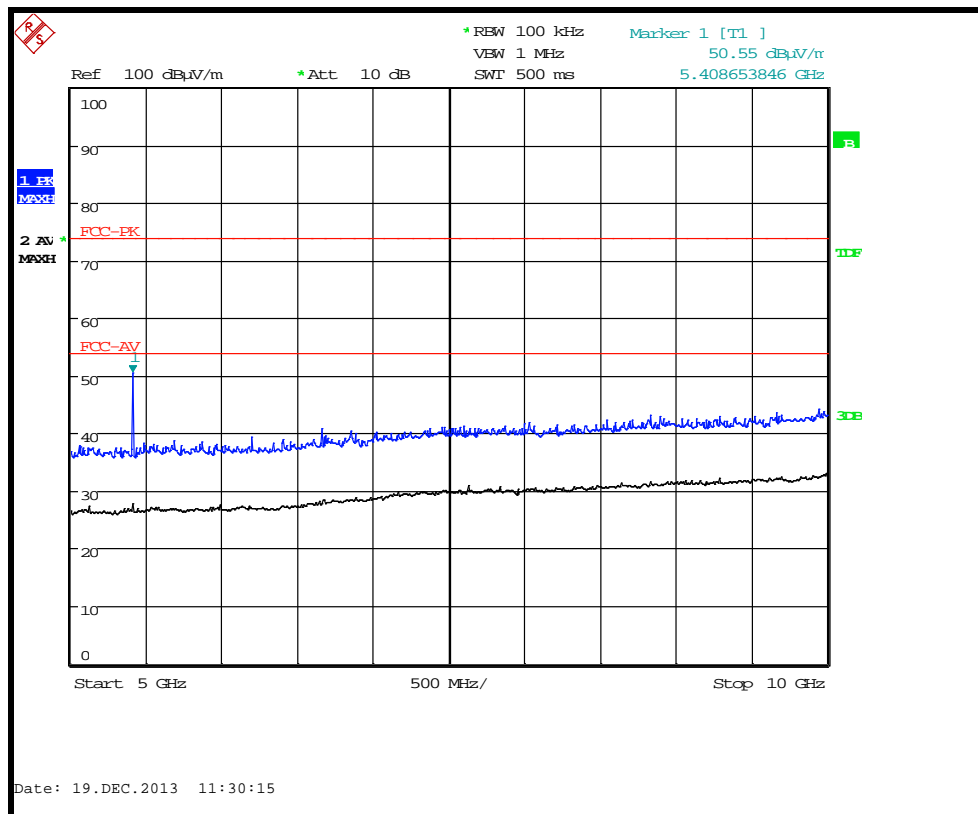
Fc = 902.5 MHz Unintentional Radiated spurious emissions 1 GHz to 5 GHz Horizontal



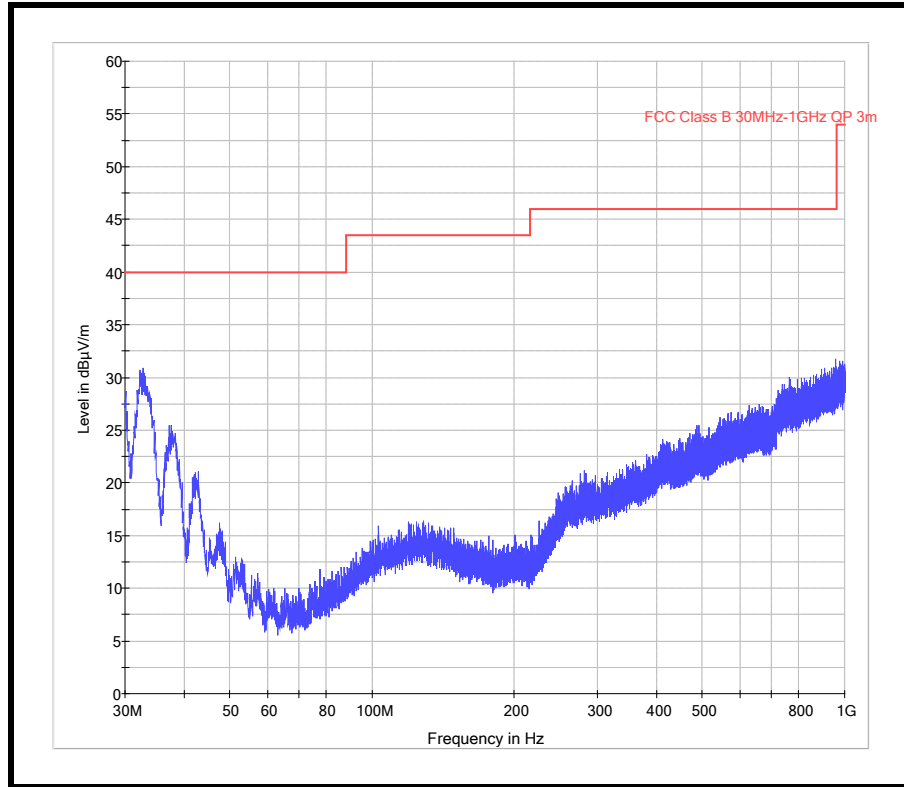
Fc = 902.5 MHz Unintentional Radiated spurious emissions 1 GHz to 5 GHz Vertical



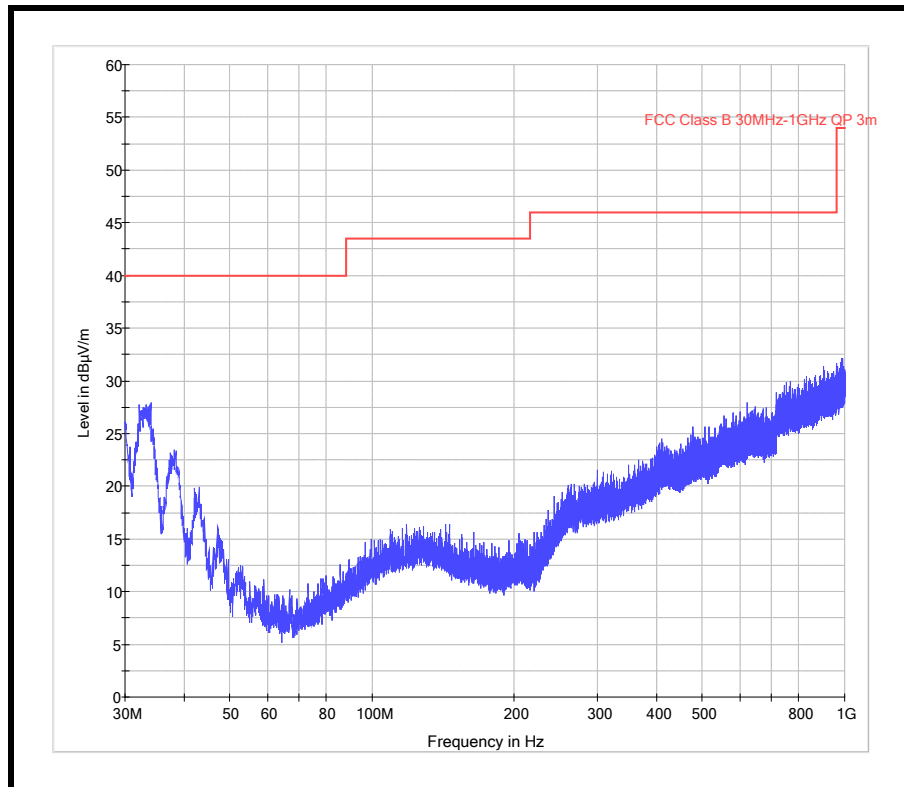
Fc = 902.5 MHz Unintentional Radiated spurious emissions 5 GHz to 10 GHz Horizontal



Fc = 902.5 MHz Unintentional Radiated spurious emissions 5 GHz to 10 GHz Vertical

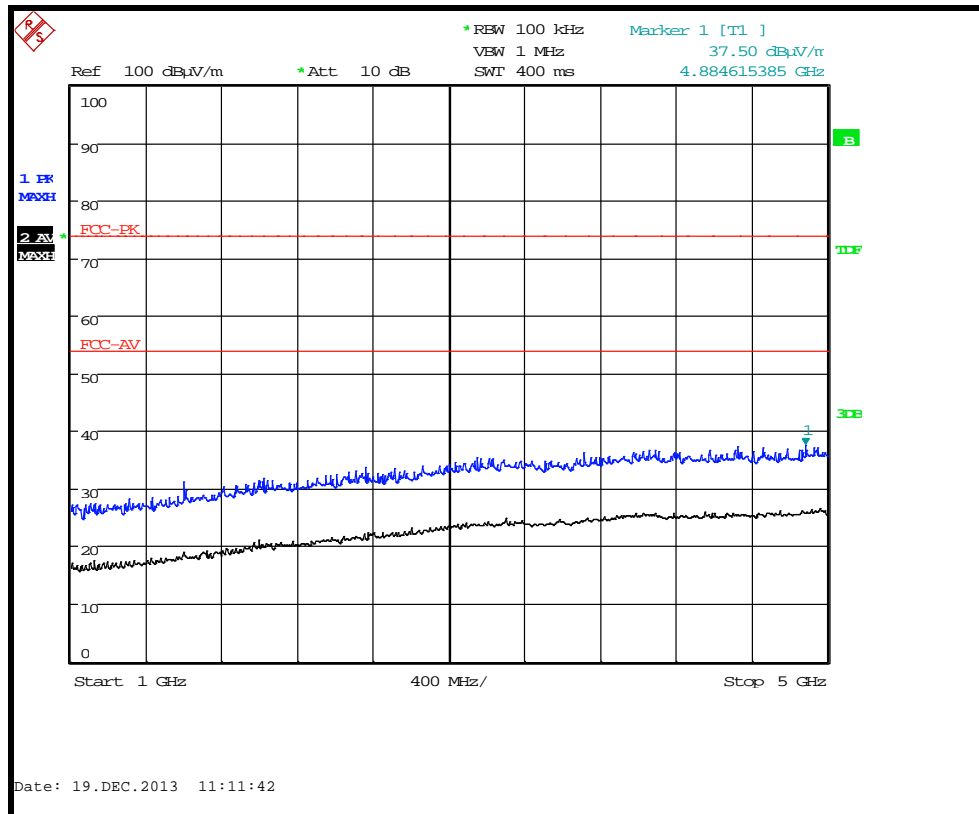


Fc = 927.5 MHz Unintentional Radiated spurious emissions 30 MHz to 1 GHz Horizontal

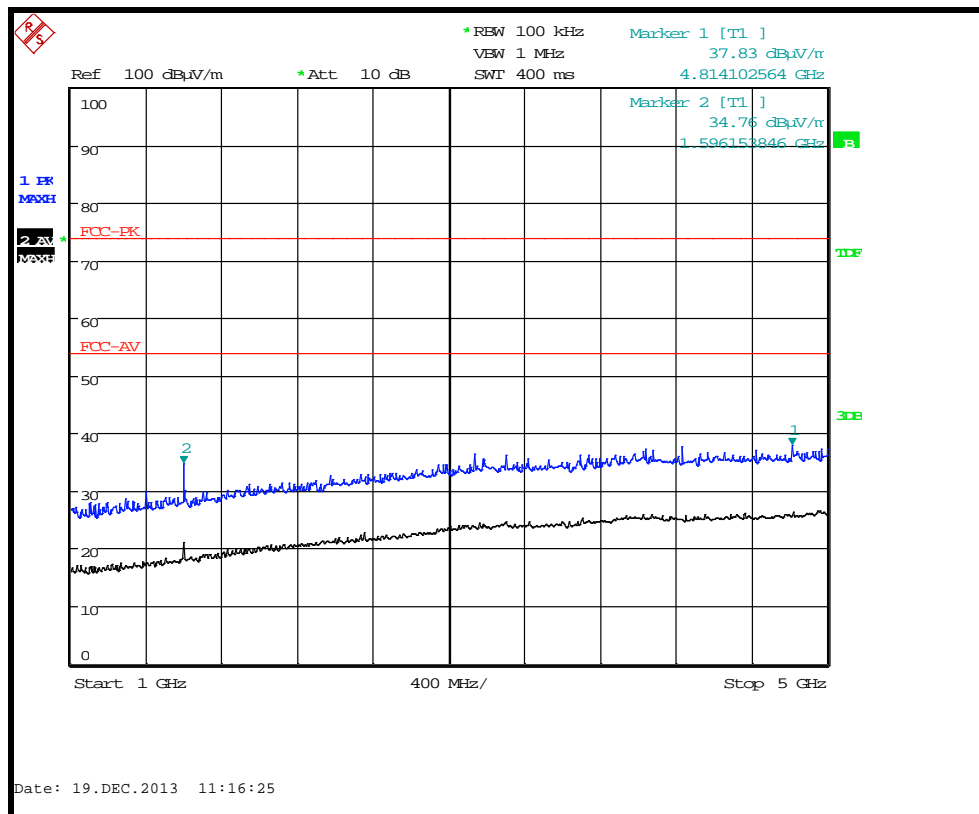


Fc = 927.5 MHz Unintentional Radiated spurious emissions 30 MHz to 1 GHz Vertical

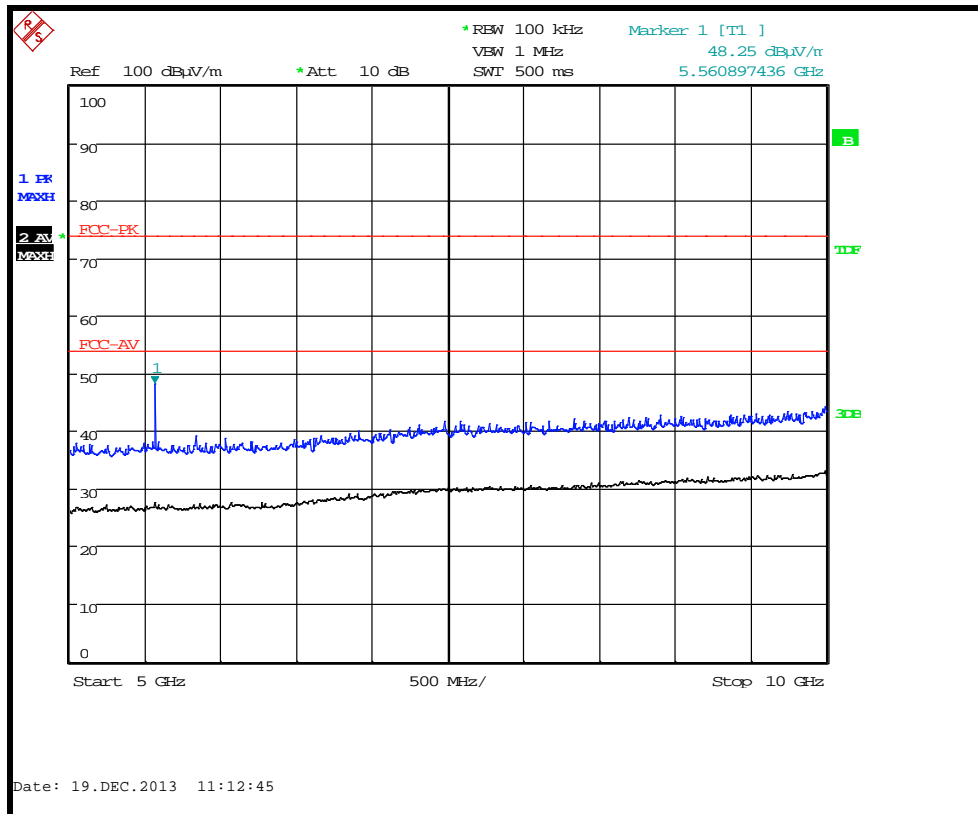




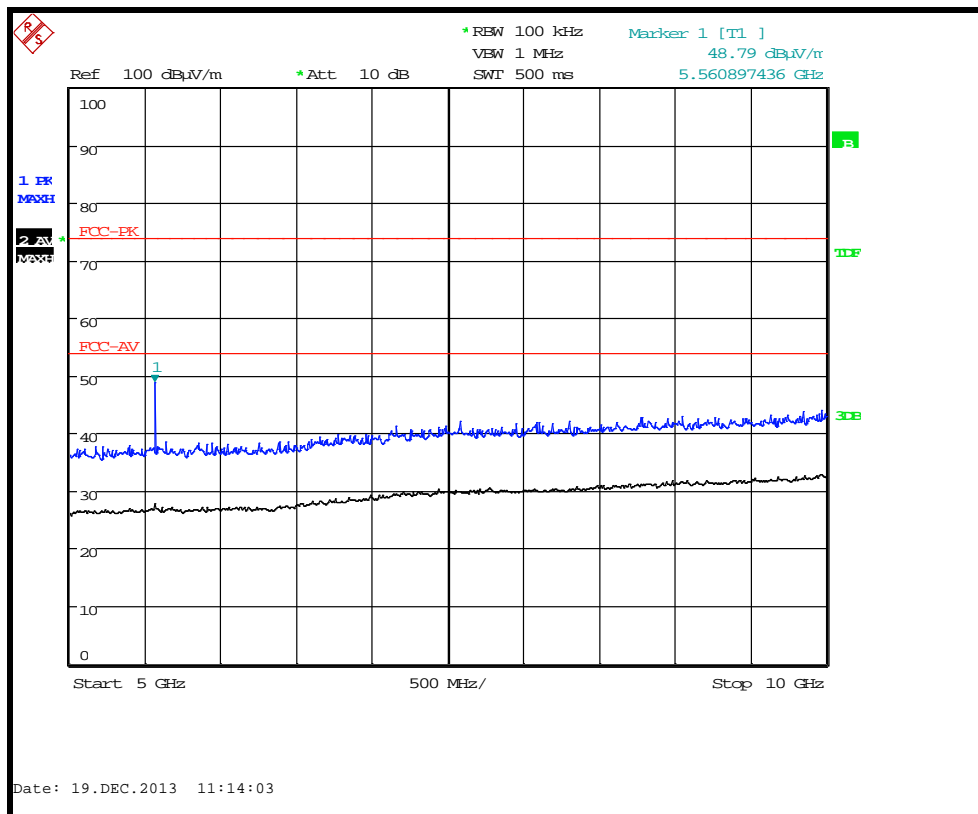
Fc = 927.5 MHz Unintentional Radiated spurious emissions 1 GHz to 5 GHz Horizontal



Fc = 927.5 MHz Unintentional Radiated spurious emissions 1 GHz to 5 GHz Vertical



Fc = 927.5 MHz Unintentional Radiated spurious emissions 5 GHz to 10 GHz Horizontal



Fc = 927.5 MHz Unintentional Radiated spurious emissions 5 GHz to 10 GHz Vertical

**Appendix C:****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 upon request.

**C1) Test samples**

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

Sample No.	Description	Identification
S11	Aura 29	KA00000168B

The following samples of apparatus were submitted by the client as host, support or drive equipment (auxiliary equipment):

Sample No.	Description	Identification
S01	Toshiba Laptop	None
S04	Ethernet Communicator RFV13 915 MHz	ZE000000528

The following samples of apparatus were supplied by TRaC Global as support or drive equipment (auxiliary equipment):

Identification	Description
F5D7231-4	Belkin Router

**C2) EUT Operating Mode During Testing.**

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

Test	Description of Operating Mode:
Carrier power Radiated Spurious Emissions Bandwidth	EUT active Transmitting on top and bottom channel as required.

Test	Description of Operating Mode:
Unintentional radiated spurious emissions	EUT active but non-transmitting on the top or bottom channel as required

**C3) EUT Configuration Information.**

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

**C4) List of EUT Ports**

The tables below describe the termination of EUT ports:

Sample : S11  
Tests : Radiated Emissions

Port	Description of Cable Attached	Cable length	Equipment Connected
None	The equipment is battery powered with no external ports		

**C5 Details of Equipment Used**

TRaC No	Equipment Type	Equipment Description	Manufacturer	Last Cal Calibration	Calibration Period	Due For Calibration
UH004	ESVS10	Receiver	R&S	11/02/2013	12	11/02/2014
UH093	CBL6112B	Bilog	Chase	08/07/2013	24	08/07/2015
UH281	FSU46	Spectrum Analyser	R&S	06/03/2013	12	06/03/2014
UH387	ATS	Chamber 1	Rainford EMC	04/07/2013	12	04/07/2014
L138	3115	1-18GHz Horn	EMCO	17/10/2013	24	17/10/2015
L572	8449B	Pre Amp	Agilent	12/12/2012	24	12/12/2014
REF940	ATS	Radio Chamber - PP	Rainford EMC	09/07/2013	12	09/07/2014
REF977	SH4141	High Pass Filter	BSC	25/02/2013	24	25/02/2015



**Appendix D:**

**Additional Information**

No Additional Information was provided by the client to support the assessment.

**Appendix E:** **Calculation of the duty cycle correction factor**

Duty cycle correction is not required by the device covered in this report.

## **Appendix F:**

## **Photographs and Figures**

The following photographs were taken of the test samples:

1. Radiated electric field emissions arrangement: Overview.
2. Radiated electric field emissions arrangement: close up.



Photograph 1



Photograph 2

**Appendix G:****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 0.6mW/cm<sup>2</sup> power density limit, as required under FCC rules

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

Equation from page 20 of OET Bulletin 65, Edition 97-01

$$S = \frac{1.64ERP}{4\pi R^2} \text{ re - arranged } R = \sqrt{\frac{1.64ERP}{S4\pi}}$$

where:

S = power density

R = distance to the centre of radiation of the antenna

ERP = EUT Maximum power

Result:

Prediction Frequency (MHz)	Maximum ERP (mW)	Power density limit (S) (mW/cm <sup>2</sup> )	Distance (R) cm required to be less than 0.6mW/cm <sup>2</sup>
902.5	26.4	0.6	2.4

