

**A Radio Test Report**

**FOR**

**Airtame ApS**

**ON**

**HDMI Dongle**

**DOCUMENT NO. TRA-021973WUS2**

**HULL**

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**TRaC Wireless Test Report : TRA-021973WUS2**

**Applicant** : Airtame ApS

**Apparatus** : HDMI Dongle

**Specification(s)** : CFR47 Part 15.407

**FCCID** : 2ADEFAT-DG1

**Purpose of Test** : Certification

**Authorised by**

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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 :

Airtame ApS  
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Copenhagen  
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Denmark

## **1.3 Manufacturer**

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Copenhagen  
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#### **1.4 Apparatus Assessed**

The following apparatus was assessed between 28/10/2014 and 29/01/2015:

##### **HDMI Dongle**

The apparatus was an HDMI Dongle intended for wireless screen duplication between screen and smartphone/tablet or PC using IEEE 802.11 WiFi.

The apparatus consisted of a mini PC running Linux connected to any screen using an HDMI Male connector and powered by an external USB AC Adapter connected with a Micro USB cable. The device included a Micro SD card which the OS booted from and which ran the AIRTAME test application. Two WiFi IC's with individual MAC addresses were integrated at the PCB for 2.4GHz and 5GHz WiFi connection.

## 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
Radiated spurious emissions (Restricted bands)	Title 47 of the CFR: Part 15 Subpart C; 15.205 & Subpart E; 15.407(b)(7)	ANSI C63.10:2009	Pass
Radiated spurious emissions (Non-restricted bands)	Title 47 of the CFR: Part 15 Subpart E; 15.407(b)	ANSI C63.10:2009	Pass
AC Power conducted emissions	Title 47 of the CFR: Part 15 Subpart C; 15.207 & Subpart E; 15.407(b)(6)	ANSI C63.10:2009	Pass
Occupied Bandwidth	Title 47 of the CFR : Part 15 Subpart E; 15.407(e)	ANSI C63.10:2009	Pass
Emission Bandwidth	Title 47 of the CFR : Part 15 Subpart E; 15.407(a)(5)	ANSI C63.10:2009	Pass
Conducted Carrier Power	Title 47 of the CFR : Part 15 Subpart E; 15.407(a)	ANSI C63.10:2009	Pass
Power Spectral Density	Title 47 of the CFR : Part 15 Subpart E; 15.407(a)	ANSI C63.10:2009	Pass
Transmitter Frequency Stability	Title 47 of the CFR : Part 15 Subpart E; 15.407(g)	ANSI C63.10:2009	Pass
Unintentional Radiated Spurious Emissions	Title 47 of the CFR: Part 15 Subpart B; 15.109	ANSI C63.10:2009	Pass
Digital Modulation	Title 47 of the CFR: Part 15 Subpart C; 15.403	-	Pass
RF Safety	Title 47 of the CFR : Part 15 Subpart E; 15.407(f)	-	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**

For the test data recorded the following measurement uncertainty was calculated:

Parameter	Uncertainty
Radio frequency	$\pm 1 \times 10^{-7}$
RF power, conducted	$\pm 1.5$ dB
Maximum frequency deviation: - within 300 Hz and 6 kHz of audio frequency - within 6 kHz and 25 kHz of audio frequency	$\pm 5$ % $\pm 3$ dB
Adjacent channel power	$\pm 3$ dB
Conducted spurious emission of transmitter, valid up to 6 GHz	$\pm 3$ dB
Conducted emission of receivers	$\pm 3$ dB
Radiated emission of transmitter, valid up to 6 GHz	$\pm 6$ dB
Radiated emission of receiver, valid up to 6 GHz	$\pm 6$ dB
RF level uncertainty for a given BER	$\pm 1.5$ dB
Temperature	$\pm 1^{\circ}\text{C}$
Humidity	$\pm 10$ %

**Section 3:****Modifications****3.1 Modifications Performed During Assessment**

1. The HDMI port shield was connected to the PCB ground as a result of EMC measurements for Radiated Electric Field Emissions. Measurements showed that this modification had no effect on the emissions measured on the rf port due to the transmitters.

**Section 4****General Test Procedures****4.1 Radiated Test Setup and Procedures**

Radiated electromagnetic emissions from the EUT are checked first by preview scans. Preview scans for all spectrum and modulation characteristics are checked, using a peak detector and where applicable worst case determined for function, operation, orientation etc for both vertical and horizontal polarisations

If the EUT connects to auxiliary equipment and is table or floor standing, the configurations prescribed in ANSI C63.10 are followed. Alternatively, a layout closest to normal use (as declared by the provider) is employed, (see EUT setup photographs for more detail).

For devices with intentional emissions below 30 MHz, a shielded loop antenna is used as the test antenna. It is placed at a 1 meter receive height and appropriate low frequency magnetic field extrapolation to the regulatory limit distance is employed. The EUT is rotated through 360° in the azimuth.

Emissions between 30 MHz and 1 GHz are measured using calibrated broadband antennas. Emissions above 1 GHz are characterized using standard gain horn antennas. Pre-amplifiers and filters are used where required. Care is taken to ensure that test receiver resolution bandwidth, video bandwidth and detector type(s) meet the regulatory requirements.

For both horizontal and vertical polarizations, the EUT is then rotated through 360° in azimuth until the highest emission is detected. At the previously determined azimuth the test antenna is raised and lowered from 1 to 4 m in height until a maximum emission level is detected, this maximum value is recorded.

Where regulations allow for direct measurement of field strength, power values measured on the test receiver / analyzer are converted to dB<sub>uV/m</sub> at the regulatory distance, using:

$$FS = PR + AF + CL - PA + KG + DC - CF \text{ (dB}_{uV/m}$$

Where:

PR is the power recorded on receiver / spectrum analyzer (dB<sub>uV</sub>),

AF is the test antenna factor in dB/m,

CL is the cable loss in dB,

PA is the pre-amplifier gain dB (when applicable),

DC is duty correction factor (when applicable) in dB, and

CF is a distance correction (employed only for measurements at alternate distance to limit) in dB.

This field strength value is then compared with the regulatory limit.

If effective radiated power (ERP) or effective isotropic radiated power (EIRP) is required, it is computed as per ANSI C63.10

$$P = \frac{(Ed)^2}{30G}$$

Where

P is the power, in W

E is the measured peak field strength, in V/m

d is the distance at which the measurement was made, in m

G is the numeric gain of the radiating element

If the gain of the radiating element is not known, then either the effective radiated power (ERP) or the effective isotropic radiated power (EIRP) may be calculated from the measured peak field strength, by using either G = 1.64 or G = 1, respectively.

## 4.2 AC Powerline Conducted Emissions Test Setup and Procedures

AC Powerline Conducted Emissions from the EUT are checked first by preview scans with Peak and average detectors covering both live and neutral lines. A spectrum analyser is used to determine if any periodic emissions are present. Preview scans are performed in standby or receive mode if the device is subject to these requirements. For transmit mode of operation the device is set to one of the following modes.

- Transmitting operating at full power (single mode device)
- Transmitting at freq / modulation that gives highest output power (multi mode device)
- Transmitter operating in normal TX mode (e.g. FHSS, TDMA etc)

Formal measurements using the correct detector(s) and bandwidth are made on frequencies identified from the preview scans.

Battery Power devices are not subject to power line conducted emissions measurements when it is powered solely by its internal battery.

## 4.3 Antenna Port Conducted Emissions

Antenna port conducted emissions can include, but are not limited to, Carrier power, Power Spectral Density, Occupied bandwidth and spurious emission.

Spurious Emissions from the EUT are checked first by preview scans. Preview scans for all spectrum and modulation characteristics are checked to identify frequencies to perform formal measurements on.

Formal measurements are made on frequencies identified from the preview scans and fundamental emission(s). Measurements are made using the correct instrumentation (inc. power meter, receiver, spectrum analyser) that operate with the required detector(s) and bandwidth.

Care is taken to ensure the measurement instrument is not overloaded by the presence of the transmitted signal by use of external attenuation and filtering where required.

Measured levels are corrected for cables, attenuators, and filters. If applicable, for the specific measurement, antenna gain is also taken into account.

#### **4.4 Power Supply Variation**

Tests at extreme supply voltages are made if required by the procedures specified in the test standard, and results of this testing are detailed in this report.

In the case the EUT is designed for operation from a lead-acid battery power source, the extreme test voltages are evaluated between 90% and 130% of the nominal battery voltage declared by the manufacturer.

For float charge applications using gel-cell type batteries, extreme test voltages are evaluated between 85% and 115% of the nominal battery voltage declared.

For all battery operated equipment, worst case intentional and spurious emissions are re-checked employing a new (fully charged) battery.

#### **4.5 Thermal Variation**

Tests at extreme temperatures are made if required by the procedures specified in the test standard, and results of this testing are detailed in this report.

Tests are performed at the upper and lower extremes as required and typically at 10° steps between.

Before any temperature measurements are made, the equipment is allowed to reach a thermal balance in the test chamber.

#### **4.6 Time Domain Measurements**

Time domain measurements are made for (but not limited to) use in duty cycle correction, to ensure compliance with time restrictions on certain types of devices.

If measurements of a transmitter's on time are required these are performed with a spectrum analyser in the time domain or with an oscilloscope and RF detector. If time on a specific frequency is required (e.g. FHSS timing) the measurement can only be made with a spectrum analyser.

The triggering, timescale and amplitude settings are adjusted according to the signal to be measured on a case by case basis.

For devices with sharp rise/fall times measurements are made between RF reaching full power ( $T_{on}$ ) and RF dropping to the measurement instrument noise floor ( $T_{off}$ ). For longer rise times measurements are made for  $T_{on}$  and  $T_{off}$  at the RF level required by the occupied bandwidth measurement (e.g. 6 dB, 20 dB etc).

**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
EUT	: Equipment Under Test	ATS	: Alternative Test Site
SE	: Support Equipment	Ref	: Reference
L	: Live Power Line	Freq	: Frequency
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 6 dB Bandwidth

Title 47 of the CFR: Part 15 Subpart E 15.407(e) requires the measurement of the bandwidth of the transmission between the -6 dB points on the transmitted spectrum within the 5.725-5.85GHz band.

Test Details:	
Regulation	Title 47 of the CFR: Part 15 Subpart E 15.407(e)
EUT sample number	S03, S07
Modification state	0
SE in test environment	None
SE isolated from EUT	TRaC Laptop
Temperature	22
EUT set up	Refer to Appendix C

### Mode: HT20 MCS6

Channel Frequency (MHz)	$F_{lower}$	$F_{Higher}$	Measured 6 dB Bandwidth (kHz)	Limit	Result
5745	5736.089744	5753.782051	17692.30769	>500kHz	Pass
5785	5776.089744	5793.846154	17756.41026	>500kHz	Pass
5825	5816.089744	5833.782051	17692.46154	>500kHz	Pass

### Mode: HT20 MCS0

Channel Frequency (MHz)	$F_{lower}$	$F_{Higher}$	Measured 6 dB Bandwidth (kHz)	Limit	Result
5745	5736.217949	5753.717949	17500.00000	>500kHz	Pass
5785	5776.217949	5793.717949	17500.00000	>500kHz	Pass
5825	5816.217949	5833.525641	17307.69231	>500kHz	Pass

### Mode: 54Mb/s

Channel Frequency (MHz)	$F_{lower}$	$F_{Higher}$	Measured 6 dB Bandwidth (kHz)	Limit	Result
5745	5736.666667	5753.269231	16602.56410	>500kHz	Pass
5785	5776.666667	5793.269231	16602.56410	>500kHz	Pass
5825	5816.666667	5833.269231	16602.56410	>500kHz	Pass

**Mode: 6Mb/s**

Channel Frequency (MHz)	$F_{lower}$	$F_{Higher}$	Measured 6 dB Bandwidth (kHz)	Limit	Result
5745	5736.730769	5753.205128	16474.35897	>500kHz	Pass
5785	5776.730769	5793.205128	16474.35897	>500kHz	Pass
5825	5816.730769	5833.205128	16474.35897	>500kHz	Pass

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

## A2 26 dB Bandwidth

Title 47 of the CFR: Part 15 Subpart E 15.407(a)(5) requires the measurement of the bandwidth of the transmission between the -26 dB points on the transmitted in order to set the reference bandwidth for Power Spectral Density testing.

Test Details:	
Regulation	Title 47 of the CFR: Part 15 Subpart E 15.407(a)(5)
EUT sample number	S03, S07
Modification state	0
SE in test environment	None
SE isolated from EUT	TRaC Laptop
Temperature	22
EUT set up	Refer to Appendix C

### Mode: HT20 MCS6

Channel Frequency (MHz)	F <sub>lower</sub>	F <sub>Higher</sub>	Measured 26 dB Bandwidth (MHz)	Limit	Result
5180	5168.974359	5191.153846	22.197487	None	N/A
5240	5229.166667	5250.961538	21.794872	None	N/A
5260	5248.910256	5271.025641	22.115384	None	N/A
5320	5309.487179	5330.961538	21.474359	None	N/A
5500	5489.230769	5510.833333	21.602564	None	N/A
5600	5589.166667	5610.833333	21.666667	None	N/A
5700	5689.102564	5710.769231	21.666667	None	N/A
5745	5733.782051	5755.897436	22.115385	None	N/A
5785	5774.102564	5795.769231	21.666667	None	N/A
5825	5813.846154	5835.769231	21.923077	None	N/A

**Mode: HT20 MCS0**

Channel Frequency (MHz)	$F_{lower}$	$F_{Higher}$	Measured 26 dB Bandwidth (MHz)	Limit	Result
5180	5169.166667	5190.897436	21.730769	None	N/A
5240	5229.038462	5250.833333	21.794872	None	N/A
5260	5248.974359	5270.897436	21.923077	None	N/A
5320	5308.974359	5331.025641	22.051282	None	N/A
5500	5488.974359	5510.769231	21.794872	None	N/A
5600	5588.910256	5610.641026	21.730769	None	N/A
5700	5688.846154	5710.641026	21.794872	None	N/A
5745	5733.974359	5755.705128	21.730769	None	N/A
5785	5773.782051	5795.769231	21.987179	None	N/A
5825	5813.717949	5835.641026	21.923077	None	N/A

**Mode: 54Mb/s**

Channel Frequency (MHz)	$F_{lower}$	$F_{Higher}$	Measured 26 dB Bandwidth (MHz)	Limit	Result
5180	5169.551282	5190.320513	20.769231	None	N/A
5240	5229.615385	5250.064103	20.448718	None	N/A
5260	5249.551282	5270.128205	20.576923	None	N/A
5320	5309.551282	5330.384615	20.833333	None	N/A
5500	5489.487179	5510.448718	20.961538	None	N/A
5600	5589.294872	5640.448718	21.153846	None	N/A
5700	5689.294872	5709.871795	20.576923	None	N/A
5745	5734.487179	5755.064103	20.576923	None	N/A
5785	5774.423077	5795.064103	20.641026	None	N/A
5825	5814.294872	5835.192308	20.897436	None	N/A

**Mode: 6Mb/s**

Channel Frequency (MHz)	$F_{lower}$	$F_{Higher}$	Measured 26 dB Bandwidth (MHz)	Limit	Result
5180	5169.551282	5190.192308	20.641026	None	N/A
5240	5229.487179	5250.128205	20.641026	None	N/A
5260	5249.487179	5270.192308	20.705128	None	N/A
5320	5309.358974	5330.320513	20.961538	None	N/A
5500	5489.358974	5510.320513	20.961538	None	N/A
5600	5588.974359	5610.128205	21.153846	None	N/A
5700	5689.102564	5710.256410	21.153846	None	N/A
5745	5734.166667	5754.935897	20.769231	None	N/A
5785	5774.230769	5795.320513	21.089744	None	N/A
5825	5813.974359	5835.064103	21.089744	None	N/A

Plots of the 26 dB bandwidth are contained in Appendix B of this test report.

### A3 Transmitter Frequency Stability

The transmitter's frequency stability was assessed over a range of temperatures to ensure that the emission was maintained within the band of operation under all conditions of normal operation. This was verified with the EUT transmitting on its lowest and highest carrier frequency in turn.

Test Details:	
Regulation	Title 47 of the CFR: Part15 Subpart E 15.407(g)
Measurement standard	ANSI C63.10
EUT sample number	S03, S07
Modification state	0
SE in test environment	None
SE isolated from EUT	TRaC Laptop
EUT set up	Refer to Appendix C
Temperature	22

The following tables show the worst case frequency deviation across all operating modes for each frequency at each temperature measured:

#### Temperature: -20°C

Channel Frequency (MHz)	F <sub>lower</sub> (MHz)	F <sub>Higher</sub> (MHz)	Peak Deviation (Hz)	Band Limit (Lower) (MHz)	Band Limit (Upper) (MHz)	Result
5180	5168.974359	5191.153846	11006	>5150	<5350	Pass
5240	5229.038462	5250.961538	12896	>5150	<5350	Pass
5260	5248.910256	5271.025641	13814	>5150	<5350	Pass
5320	5308.974359	5331.025641	13987	>5150	<5350	Pass
5500	5488.974359	5510.833333	13967	>5470	<5725	Pass
5700	5688.846154	5710.769231	14439	>5470	<5725	Pass
5745	5733.782051	5755.897436	14471	>5725	<5850	Pass
5825	5813.717949	5835.769231	14102	>5725	<5850	Pass

**Temperature: -10°C**

Channel Frequency (MHz)	$F_{lower}$ (MHz)	$F_{Higher}$ (MHz)	Peak Deviation (Hz)	Band Limit (Lower) (MHz)	Band Limit (Upper) (MHz)	Result
5180	5168.974359	5191.153846	13314	>5150	<5350	Pass
5240	5229.038462	5250.961538	12608	>5150	<5350	Pass
5260	5248.910256	5271.025641	10446	>5150	<5350	Pass
5320	5308.974359	5331.025641	8975	>5150	<5350	Pass
5500	5488.974359	5510.833333	7988	>5470	<5725	Pass
5700	5688.846154	5710.769231	7273	>5470	<5725	Pass
5745	5733.782051	5755.897436	6325	>5725	<5850	Pass
5825	5813.717949	5835.769231	5646	>5725	<5850	Pass

**Temperature: 0°C**

Channel Frequency (MHz)	$F_{lower}$ (MHz)	$F_{Higher}$ (MHz)	Peak Deviation (Hz)	Band Limit (Lower) (MHz)	Band Limit (Upper) (MHz)	Result
5180	5168.974359	5191.153846	8737	>5150	<5350	Pass
5240	5229.038462	5250.961538	1939	>5150	<5350	Pass
5260	5248.910256	5271.025641	4053	>5150	<5350	Pass
5320	5308.974359	5331.025641	5312	>5150	<5350	Pass
5500	5488.974359	5510.833333	6790	>5470	<5725	Pass
5700	5688.846154	5710.769231	7940	>5470	<5725	Pass
5745	5733.782051	5755.897436	8188	>5725	<5850	Pass
5825	5813.717949	5835.769231	11574	>5725	<5850	Pass

**Temperature: 10°C**

Channel Frequency (MHz)	$F_{lower}$ (MHz)	$F_{Higher}$ (MHz)	Peak Deviation (Hz)	Band Limit (Lower) (MHz)	Band Limit (Upper) (MHz)	Result
5180	5168.974359	5191.153846	8252	>5150	<5350	Pass
5240	5229.038462	5250.961538	13075	>5150	<5350	Pass
5260	5248.910256	5271.025641	15196	>5150	<5350	Pass
5320	5308.974359	5331.025641	17482	>5150	<5350	Pass
5500	5488.974359	5510.833333	19021	>5470	<5725	Pass
5700	5688.846154	5710.769231	20783	>5470	<5725	Pass
5745	5733.782051	5755.897436	21182	>5725	<5850	Pass
5825	5813.717949	5835.769231	22433	>5725	<5850	Pass

**Temperature: 20°C**

Channel Frequency (MHz)	$F_{lower}$ (MHz)	$F_{Higher}$ (MHz)	Peak Deviation (Hz)	Band Limit (Lower) (MHz)	Band Limit (Upper) (MHz)	Result
5180	5168.974359	5191.153846	25907	>5150	<5350	Pass
5240	5229.038462	5250.961538	28384	>5150	<5350	Pass
5260	5248.910256	5271.025641	29190	>5150	<5350	Pass
5320	5308.974359	5331.025641	29985	>5150	<5350	Pass
5500	5488.974359	5510.833333	31319	>5470	<5725	Pass
5700	5688.846154	5710.769231	32359	>5470	<5725	Pass
5745	5733.782051	5755.897436	32851	>5725	<5850	Pass
5825	5813.717949	5835.769231	33910	>5725	<5850	Pass

**Temperature: 30°C**

Channel Frequency (MHz)	$F_{lower}$ (MHz)	$F_{Higher}$ (MHz)	Peak Deviation (Hz)	Band Limit (Lower) (MHz)	Band Limit (Upper) (MHz)	Result
5180	5168.974359	5191.153846	28811	>5150	<5350	Pass
5240	5229.038462	5250.961538	32698	>5150	<5350	Pass
5260	5248.910256	5271.025641	34006	>5150	<5350	Pass
5320	5308.974359	5331.025641	35210	>5150	<5350	Pass
5500	5488.974359	5510.833333	36238	>5470	<5725	Pass
5700	5688.846154	5710.769231	37663	>5470	<5725	Pass
5745	5733.782051	5755.897436	38178	>5725	<5850	Pass
5825	5813.717949	5835.769231	39552	>5725	<5850	Pass

**Temperature: 40°C**

Channel Frequency (MHz)	$F_{lower}$ (MHz)	$F_{Higher}$ (MHz)	Peak Deviation (Hz)	Band Limit (Lower) (MHz)	Band Limit (Upper) (MHz)	Result
5180	5168.974359	5191.153846	31290	>5150	<5350	Pass
5240	5229.038462	5250.961538	31305	>5150	<5350	Pass
5260	5248.910256	5271.025641	30469	>5150	<5350	Pass
5320	5308.974359	5331.025641	30298	>5150	<5350	Pass
5500	5488.974359	5510.833333	31301	>5470	<5725	Pass
5700	5688.846154	5710.769231	31960	>5470	<5725	Pass
5745	5733.782051	5755.897436	31920	>5725	<5850	Pass
5825	5813.717949	5835.769231	31946	>5725	<5850	Pass

**Temperature: 50°C**

Channel Frequency (MHz)	$F_{lower}$ (MHz)	$F_{Higher}$ (MHz)	Peak Deviation (Hz)	Band Limit (Lower) (MHz)	Band Limit (Upper) (MHz)	Result
5180	5168.974359	5191.153846	24306	>5150	<5350	Pass
5240	5229.038462	5250.961538	20283	>5150	<5350	Pass
5260	5248.910256	5271.025641	16293	>5150	<5350	Pass
5320	5308.974359	5331.025641	14331	>5150	<5350	Pass
5500	5488.974359	5510.833333	12888	>5470	<5725	Pass
5700	5688.846154	5710.769231	11622	>5470	<5725	Pass
5745	5733.782051	5755.897436	11352	>5725	<5850	Pass
5825	5813.717949	5835.769231	10897	>5725	<5850	Pass

**Notes:**

The EUT would not operate at -30°C, testing at this temperature was not performed.

The Peak Deviation listed in the tables is the absolute value of the largest frequency error across all operating modes at each carrier frequency.

The emission (as bounded by the 26dB Bandwidth) was maintained within the band of operation under all conditions of normal operation.

#### A4 Transmitter Peak Output Power

Carrier power was verified with the EUT transmitting on its lowest, centre and highest carrier frequency in turn, using an rf power meter calibrated in terms of rms-equivalent voltage.

Test Details:	
Regulation	Title 47 of the CFR: Part15 Subpart E 15.407(a)(1)(ii) Title 47 of the CFR: Part15 Subpart E 15.407(a)(2) Title 47 of the CFR: Part15 Subpart E 15.407(a)(3)
Measurement standard	ANSI C63.10
EUT sample number	S03, S07
Modification state	0
SE in test environment	None
SE isolated from EUT	TRaC Laptop
EUT set up	Refer to Appendix C
Temperature	22

#### Mode: MCS6

Channel Frequency (MHz)	Conducted Peak Carrier Power (dBm)	Conducted Peak Carrier Power (W)	Limit (W)	Result
5180	5.4	0.003	1	Pass
5240	8.0	0.006	1	Pass
5260	8.0	0.006	0.25	Pass
5320	8.9	0.008	0.25	Pass
5500	9.0	0.008	0.25	Pass
5600	8.5	0.007	0.25	Pass
5700	7.4	0.005	0.25	Pass
5745	7.0	0.005	1	Pass
5785	7.0	0.005	1	Pass
5825	7.4	0.005	1	Pass

**Mode: MCS0**

Channel Frequency (MHz)	Conducted Peak Carrier Power (dBm)	Conducted Peak Carrier Power (W)	Limit (W)	Result
5180	6.4	0.004	1	Pass
5240	10.7	0.012	1	Pass
5260	10.3	0.011	0.25	Pass
5320	10.9	0.012	0.25	Pass
5500	11.1	0.013	0.25	Pass
5600	10.6	0.011	0.25	Pass
5700	9.8	0.010	0.25	Pass
5745	9.2	0.008	1	Pass
5785	9.5	0.009	1	Pass
5825	9.4	0.009	1	Pass

**Mode: 54Mb/s**

Channel Frequency (MHz)	Conducted Peak Carrier Power (dBm)	Conducted Peak Carrier Power (W)	Limit (W)	Result
5180	7.1	0.005	1	Pass
5240	8.8	0.008	1	Pass
5260	9.2	0.008	0.25	Pass
5320	10.3	0.011	0.25	Pass
5500	3.5	0.002	0.25	Pass
5600	10.5	0.011	0.25	Pass
5700	4.8	0.003	0.25	Pass
5745	7.4	0.005	1	Pass
5785	9.0	0.008	1	Pass
5825	10.9	0.012	1	Pass

**Mode: 6Mb/s**

Channel Frequency (MHz)	Conducted Peak Carrier Power (dBm)	Conducted Peak Carrier Power (W)	Limit (W)	Result
5180	10.0	0.010	1	Pass
5240	11.0	0.013	1	Pass
5260	11.2	0.013	0.25	Pass
5320	11.5	0.014	0.25	Pass
5500	6.6	0.005	0.25	Pass
5600	11.6	0.014	0.25	Pass
5700	7.4	0.005	0.25	Pass
5745	9.3	0.009	1	Pass
5785	11.1	0.013	1	Pass
5825	11.8	0.015	1	Pass

Notes:

Conducted Measurement

Measured Conducted Peak Carrier power does not require adjustment due to antenna gain for antennas with a gain less than 6dBi.

Highest Gain of any antenna to be used = 2dBi

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

## A5 Transmitter Power Spectral Density

Transmitter Power Spectral Density 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 E 15.407(a)(1)(ii) Title 47 of the CFR: Part15 Subpart E 15.407(a)(2) Title 47 of the CFR: Part15 Subpart E 15.407(a)(3) Title 47 of the CFR: Part15 Subpart E 15.407(a)(5)
Measurement standard	ANSI C63.10
EUT sample number	S03, S07
Modification state	0
SE in test environment	None
SE isolated from EUT	TRaC Laptop
EUT set up	Refer to Appendix C
Temperature	24

### Mode: MCS6

Channel Frequency (MHz)	Conducted Peak Power Spectral Density (dBm)	Limit (dBm)	Result
5180	-6.84	17	Pass
5240	-4.88	17	Pass
5260	-4.90	11	Pass
5320	-3.78	11	Pass
5500	-3.07	11	Pass
5600	-3.63	11	Pass
5700	-4.77	11	Pass
5745	-6.10	30	Pass
5785	-5.50	30	Pass
5825	-5.43	30	Pass

**Mode: MCS0**

Channel Frequency (MHz)	Conducted Peak Power Spectral Density (dBm)	Limit (dBm)	Result
5180	-5.43	17	Pass
5240	-1.78	17	Pass
5260	-1.29	11	Pass
5320	-0.67	11	Pass
5500	-1.12	11	Pass
5600	-1.64	11	Pass
5700	-2.37	11	Pass
5745	-3.76	30	Pass
5785	-2.85	30	Pass
5825	-3.09	30	Pass

**Mode: 54Mb/s**

Channel Frequency (MHz)	Conducted Peak Power Spectral Density (dBm)	Limit (dBm)	Result
5180	-5.17	17	Pass
5240	-3.32	17	Pass
5260	-3.18	11	Pass
5320	-1.92	11	Pass
5500	-8.76	11	Pass
5600	-1.21	11	Pass
5700	-6.93	11	Pass
5745	-5.65	30	Pass
5785	-3.40	30	Pass
5825	-1.23	30	Pass

**Mode: 6Mb/s**

Channel Frequency (MHz)	Conducted Peak Power Spectral Density (dBm)	Limit (dBm)	Result
5180	-1.86	17	Pass
5240	-0.36	17	Pass
5260	-0.29	11	Pass
5320	0.21	11	Pass
5500	-5.74	11	Pass
5600	0.58	11	Pass
5700	-4.50	11	Pass
5745	-3.74	30	Pass
5785	-0.36	30	Pass
5825	1.48	30	Pass

## Notes:

## Conducted Measurement

Measured Conducted Peak Carrier power does not require adjustment due to antenna gain for antennas with a gain less than 6dBi, as the same method is specified this also applies to the measured Power Spectral Density.

Highest Gain of any antenna to be used = 2 dBi

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

The resolution bandwidth on the analyser was set to according to the table below and the trace was set to max hold.

The span is set as appropriate to ensure the capture of the peak Power Spectral Density.

Frequency Band (GHz)	Resolution Bandwidth of PSD measurement (kHz)
5.15-5.25	1000
5.25-5.35 & 5.47-5.725	1000
5.725-5.85	500

## A6 Radiated Electric Field Emissions outside of the Restricted Band

Preliminary scans were performed using a peak detector with the RBW = 100kHz. The radiated electric field emission test results for spurious emissions and harmonics that fall within the restricted bands listed in Section 15.205 are presented in Appendix A7. The EUT was set to transmit on its lowest and highest carrier frequency in each band.

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.

<b>Test Details: 5180 MHz</b>	
Regulation	Title 47 of the CFR, Part 15 Subpart E Clause 15.407(b)(1)
Measurement standard	ANSI C63.10
Frequency range	30MHz – 40GHz
EUT sample number	S06, S09
Modification state	1
SE in test environment	TRaC Monitor
SE isolated from EUT	TRaC Laptop
EUT set up	Refer to Appendix C
Temperature	22
Photographs (Appendix F)	Photographs 1, 2 & 3

There were no significant radiated spurious emissions that fell outside of the restricted bands specified in section 15.205. Lower Band Edge measurements have been performed using radiated test methods for emissions within the restricted bands, please see Appendix A7.

**Radiated Electric Field Emissions outside of the Restricted Band continued:**

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

<b>Test Details: 5320 MHz</b>	
Regulation	Title 47 of the CFR, Part 15 Subpart E Clause 15.407(b)(2)
Measurement standard	ANSI C63.10
Frequency range	30MHz – 40GHz
EUT sample number	S06, S09
Modification state	1
SE in test environment	TRaC Monitor
SE isolated from EUT	TRaC Laptop
EUT set up	Refer to Appendix C
Temperature	22
Photographs (Appendix F)	Photographs 1, 2 & 3

There were no significant radiated spurious emissions that fell outside of the restricted bands specified in section 15.205. Upper Band Edge measurements have been performed using radiated test methods for emissions within the restricted bands, please see Appendix A7.

**Radiated Electric Field Emissions outside of the Restricted Band continued:**

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

<b>Test Details: 5500 MHz</b>	
Regulation	Title 47 of the CFR, Part 15 Subpart E Clause 15.407(b)(3)
Measurement standard	ANSI C63.10
Frequency range	30MHz – 40GHz
EUT sample number	S06, S09
Modification state	1
SE in test environment	TRaC Monitor
SE isolated from EUT	TRaC Laptop
EUT set up	Refer to Appendix C
Temperature	22
Photographs (Appendix F)	Photographs 1, 2 & 3

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

**Mode: MCS6**

Ref No.	FREQ. (MHz)	MEAS Rx (dB $\mu$ V)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	EXTRAP FACT (dB)	FIELD ST'GH (dB $\mu$ V/m)	E.I.R.P. (dBm/MHz)	LIMIT (dBm/MHz)
1.	5470	61.64	8.2	34.2	34.54	-9.5	60.3	-34.9	-7
2.	5470	41.78	8.2	34.2	34.54	-9.5	40.4	-54.8	-27

**Mode: MCS0**

Ref No.	FREQ. (MHz)	MEAS Rx (dB $\mu$ V)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	EXTRAP FACT (dB)	FIELD ST'GH (dB $\mu$ V/m)	E.I.R.P. (dBm/MHz)	LIMIT (dBm/MHz)
1.	5470	66.60	8.2	34.2	34.54	-9.5	65.3	-29.9	-7
2.	5470	46.22	8.2	34.2	34.54	-9.5	44.9	-50.3	-27

**Mode: 54Mb/s**

Ref No.	FREQ. (MHz)	MEAS Rx (dB $\mu$ V)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	EXTRAP FACT (dB)	FIELD ST'GH (dB $\mu$ V/m)	E.I.R.P. (dBm/MHz)	LIMIT (dBm/MHz)
1.	5470	55.83	8.2	34.2	34.54	-9.5	54.5	-40.7	-7
2.	5470	39.07	8.2	34.2	34.54	-9.5	37.7	-57.5	-27

**Mode: 6Mb/s**

Ref No.	FREQ. (MHz)	MEAS Rx (dB $\mu$ V)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	EXTRAP FACT (dB)	FIELD ST'GH (dB $\mu$ V/m)	E.I.R.P. (dBm/MHz)	LIMIT (dBm/MHz)
1.	5470	57.34	8.2	34.2	34.54	-9.5	56.0	-39.2	-7
2.	5470	40.91	8.2	34.2	34.54	-9.5	39.6	-55.6	-27

**Radiated Electric Field Emissions outside of the Restricted Band continued:**

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

<b>Test Details: 5700 MHz</b>	
Regulation	Title 47 of the CFR, Part 15 Subpart E Clause 15.407(b)(3)
Measurement standard	ANSI C63.10
Frequency range	30MHz – 40GHz
EUT sample number	S06, S09
Modification state	1
SE in test environment	TRaC Monitor
SE isolated from EUT	TRaC Laptop
EUT set up	Refer to Appendix C
Temperature	22
Photographs (Appendix F)	Photographs 1, 2 & 3

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

**Mode: MCS6**

Ref No.	FREQ. (MHz)	MEAS Rx (dB $\mu$ V)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	EXTRAP FACT (dB)	FIELD ST'GH (dB $\mu$ V/m)	E.I.R.P. (dBm/MHz)	LIMIT (dBm/MHz)
1.	5725	63.95	8.0	34.0	34.58	-9.5	61.9	-33.3	-7
2.	5725	40.36	8.0	34.0	34.58	-9.5	38.3	-56.9	-27

**Mode: MCS0**

Ref No.	FREQ. (MHz)	MEAS Rx (dB $\mu$ V)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	EXTRAP FACT (dB)	FIELD ST'GH (dB $\mu$ V/m)	E.I.R.P. (dBm/MHz)	LIMIT (dBm/MHz)
1.	5725	67.77	8.0	34.0	34.58	-9.5	65.7	-29.5	-7
2.	5725	54.10	8.0	34.0	34.58	-9.5	43.0	-52.2	-27

**Mode: 54Mb/s**

Ref No.	FREQ. (MHz)	MEAS Rx (dB $\mu$ V)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	EXTRAP FACT (dB)	FIELD ST'GH (dB $\mu$ V/m)	E.I.R.P. (dBm/MHz)	LIMIT (dBm/MHz)
1.	5725	56.83	8.0	34.0	34.58	-9.5	54.8	-40.4	-7
2.	5725	39.00	8.0	34.0	34.58	-9.5	36.9	-58.3	-27

**Mode: 6Mb/s**

Ref No.	FREQ. (MHz)	MEAS Rx (dB $\mu$ V)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	EXTRAP FACT (dB)	FIELD ST'GH (dB $\mu$ V/m)	E.I.R.P. (dBm/MHz)	LIMIT (dBm/MHz)
1.	5725	61.86	8.0	34.0	34.58	-9.5	59.8	-35.4	-7
2.	5725	41.48	8.0	34.0	34.58	-9.5	39.4	-55.8	-27

**Radiated Electric Field Emissions outside of the Restricted Band continued:**

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

<b>Test Details: 5745 MHz</b>	
Regulation	Title 47 of the CFR, Part 15 Subpart E Clause 15.407(b)(4)
Measurement standard	ANSI C63.10
Frequency range	30MHz – 40GHz
EUT sample number	S06, S09
Modification state	1
SE in test environment	TRaC Monitor
SE isolated from EUT	TRaC Laptop
EUT set up	Refer to Appendix C
Temperature	22
Photographs (Appendix F)	Photographs 1, 2 & 3

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

**Mode: MCS6**

Ref No.	FREQ. (MHz)	MEAS Rx (dB $\mu$ V)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	EXTRAP FACT (dB)	FIELD ST'GH (dB $\mu$ V/m)	E.I.R.P. (dBm/MHz)	LIMIT (dBm/MHz)
1.	5715	63.99	8.0	34.0	34.57	-9.5	61.9	-33.3	-7
2.	5715	43.68	8.0	34.0	34.57	-9.5	41.6	-53.6	-27
3.	5725	66.8	8.0	34.0	34.58	-9.5	64.7	-30.5	+3
4.	5725	43.7	8.0	34.0	34.58	-9.5	41.6	-53.6	-17

**Mode: MCS0**

Ref No.	FREQ. (MHz)	MEAS Rx (dB $\mu$ V)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	EXTRAP FACT (dB)	FIELD ST'GH (dB $\mu$ V/m)	E.I.R.P. (dBm/MHz)	LIMIT (dBm/MHz)
1.	5715	69.72	8.0	34.0	34.57	-9.5	67.7	-27.5	-7
2.	5715	48.05	8.0	34.0	34.57	-9.5	46.0	-49.2	-27
3.	5725	73.87	8.0	34.0	34.58	-9.5	71.8	-23.6	+3
4.	5725	50.19	8.0	34.0	34.58	-9.5	48.1	-47.1	-17

**Mode: 54Mb/s**

Ref No.	FREQ. (MHz)	MEAS Rx (dB $\mu$ V)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	EXTRAP FACT (dB)	FIELD ST'GH (dB $\mu$ V/m)	E.I.R.P. (dBm/MHz)	LIMIT (dBm/MHz)
1.	5715	63.73	8.0	34.0	34.57	-9.5	61.7	-33.5	-7
2.	5715	42.91	8.0	34.0	34.57	-9.5	40.8	-54.4	-27
3.	5725	67.79	8.0	34.0	34.58	-9.5	65.7	-29.5	+3
4.	5725	43.67	8.0	34.0	34.58	-9.5	41.6	-53.6	-17

**Mode: 6Mb/s**

Ref No.	FREQ. (MHz)	MEAS Rx (dB $\mu$ V)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	EXTRAP FACT (dB)	FIELD ST'GH (dB $\mu$ V/m)	E.I.R.P. (dBm/MHz)	LIMIT (dBm/MHz)
1.	5715	65.95	8.0	34.0	34.57	-9.5	63.9	-31.3	-7
2.	5715	46.57	8.0	34.0	34.57	-9.5	44.5	-50.7	-27
3.	5725	70.86	8.0	34.0	34.58	-9.5	68.8	-26.43	+3
4.	5725	48.53	8.0	34.0	34.58	-9.5	46.5	-48.7	-17

**Radiated Electric Field Emissions outside of the Restricted Band continued:**

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

<b>Test Details: 5825 MHz</b>	
Regulation	Title 47 of the CFR, Part 15 Subpart E Clause 15.407(b)(4)
Measurement standard	ANSI C63.10
Frequency range	30MHz – 40GHz
EUT sample number	S06, S09
Modification state	1
SE in test environment	TRaC Monitor
SE isolated from EUT	TRaC Laptop
EUT set up	Refer to Appendix C
Temperature	22
Photographs (Appendix F)	Photographs 1, 2 & 3

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

**Mode: MCS6**

Ref No.	FREQ. (MHz)	MEAS Rx (dB $\mu$ V)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	EXTRAP FACT (dB)	FIELD ST'GH (dB $\mu$ V/m)	E.I.R.P. (dBm/MHz)	LIMIT (dBm/MHz)
1.	5850	63.83	8.4	34.0	34.6	-9.5	62.1	-33.1	+3
2.	5850	41.38	8.4	34.0	34.6	-9.5	39.7	-55.5	-17
3.	5860	56.20	8.6	34.0	34.6	-9.5	54.7	-40.5	-7
4.	5860	38.83	8.6	34.0	34.6	-9.5	37.3	-57.9	-27

**Mode: MCS0**

Ref No.	FREQ. (MHz)	MEAS Rx (dB $\mu$ V)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	EXTRAP FACT (dB)	FIELD ST'GH (dB $\mu$ V/m)	E.I.R.P. (dBm/MHz)	LIMIT (dBm/MHz)
1.	5850	68.14	8.4	34.0	34.6	-9.5	66.4	-28.8	+3
2.	5850	46.19	8.4	34.0	34.6	-9.5	44.5	-50.7	-17
3.	5860	62.71	8.6	34.0	34.6	-9.5	61.2	-34.0	-7
4.	5860	41.20	8.6	34.0	34.6	-9.5	39.7	-55.5	-27

**Mode: 54Mb/s**

Ref No.	FREQ. (MHz)	MEAS Rx (dB $\mu$ V)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	EXTRAP FACT (dB)	FIELD ST'GH (dB $\mu$ V/m)	E.I.R.P. (dBm/MHz)	LIMIT (dBm/MHz)
1.	5850	70.50	8.4	34.0	34.6	-9.5	68.8	-23.4	+3
2.	5850	48.78	8.4	34.0	34.6	-9.5	47.1	-48.1	-17
3.	5860	64.03	8.6	34.0	34.6	-9.5	62.5	-32.7	-7
4.	5860	41.23	8.6	34.0	34.6	-9.5	39.7	-55.5	-27

**Mode: 6Mb/s**

Ref No.	FREQ. (MHz)	MEAS Rx (dB $\mu$ V)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	EXTRAP FACT (dB)	FIELD ST'GH (dB $\mu$ V/m)	E.I.R.P. (dBm/MHz)	LIMIT (dBm/MHz)
1.	5850	73.88	8.4	34.0	34.6	-9.5	72.2	-23.0	+3
2.	5850	57.04	8.4	34.0	34.6	-9.5	55.3	-39.9	-17
3.	5860	69.04	8.6	34.0	34.6	-9.5	67.5	-27.7	-7
4.	5860	49.88	8.6	34.0	34.6	-9.5	48.4	-46.8	-27

**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 Measurements at 5470, 5725 & 5850 MHz were made to ensure band edge compliance.
- 4 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.
- 5 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 47 CFR Part 15 Clause 15.33(a) and 15.33(a)(1).

Radiated emission limits (47 CFR Part 15: Clause 15.407(b)) for emissions falling outside the restricted bands defined in 15.205(a):

47 CFR Part 15: Clause 15.407(b)(1):

For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35GHz band shall not exceed an e.i.r.p of -27 dBm/MHz.

47 CFR Part 15: Clause 15.407(b)(2):

For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz

47 CFR Part 15: Clause 15.407(b)(3):

For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz

47 CFR Part 15: Clause 15.407(b)(4):

For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of -27 dBm/MHz.

**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 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				

## A7 Radiated Electric Field Emissions within the Restricted Bands

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: 5180 MHz	
Regulation	Title 47 of the CFR, Part 15 Subpart E Clause 15.407(b)(7) and Part 15 Subpart C Clause 15.205
Measurement standard	ANSI C63.10
Frequency range	30MHz to 40GHz
EUT sample number	S06, S09
Modification state	0
SE in test environment	TRaC Monitor
SE isolated from EUT	TRaC Laptop
EUT set up	Refer to Appendix C
Temperature	22
Photographs (Appendix F)	Photographs 1, 2 & 3

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

### Mode: MCS6

Ref No.	FREQ. (MHz)	MEAS Rx (dB $\mu$ V)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	EXTRAP FACT (dB)	FIELD ST'GH (dB $\mu$ V/m)	FIELD ST'GH ( $\mu$ V/m)	LIMIT ( $\mu$ V/m)
1.	5150	54.80	8.2	33.9	34.64	-9.5	52.8	436.52	5000
2.	5150	34.51	8.2	33.9	34.64	-9.5	32.5	42.17	500

### Mode: MCS0

Ref No.	FREQ. (MHz)	MEAS Rx (dB $\mu$ V)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	EXTRAP FACT (dB)	FIELD ST'GH (dB $\mu$ V/m)	FIELD ST'GH ( $\mu$ V/m)	LIMIT ( $\mu$ V/m)
1.	5150	54.40	8.2	33.9	34.64	-9.5	52.4	416.87	5000
2.	5150	35.90	8.2	33.9	34.64	-9.5	33.9	49.55	500

**Mode: 54Mb/s**

Ref No.	FREQ. (MHz)	MEAS Rx (dB $\mu$ V)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	EXTRAP FACT (dB)	FIELD ST'GH (dB $\mu$ V/m)	FIELD ST'GH ( $\mu$ V/m)	LIMIT ( $\mu$ V/m)
1.	5150	58.12	8.2	33.9	34.64	-9.5	56.1	638.26	5000
2.	5150	35.71	8.2	33.9	34.64	-9.5	33.7	48.42	500

**Mode: 6Mb/s**

Ref No.	FREQ. (MHz)	MEAS Rx (dB $\mu$ V)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	EXTRAP FACT (dB)	FIELD ST'GH (dB $\mu$ V/m)	FIELD ST'GH ( $\mu$ V/m)	LIMIT ( $\mu$ V/m)
1.	5150	57.79	8.2	33.9	34.64	-9.5	55.8	616.60	5000
2.	5150	38.37	8.2	33.9	34.64	-9.5	36.3	65.31	500

**Radiated Electric Field Emissions within the Restricted Band 15.205 continued:**

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

<b>Test Details: 5320 MHz</b>	
Regulation	Title 47 of the CFR, Part 15 Subpart E Clause 15.407(b)(7) and Part 15 Subpart C Clause 15.205
Measurement standard	ANSI C63.10
Frequency range	30MHz to 40GHz
EUT sample number	S06, S09
Modification state	0
SE in test environment	TRaC Monitor
SE isolated from EUT	TRaC Laptop
EUT set up	Refer to Appendix C
Temperature	22
Photographs (Appendix F)	Photographs 1, 2 & 3

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

**Mode: MCS6**

Ref No.	FREQ. (MHz)	MEAS Rx (dB $\mu$ V)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	EXTRAP FACT (dB)	FIELD ST'GH (dB $\mu$ V/m)	FIELD ST'GH ( $\mu$ V/m)	LIMIT ( $\mu$ V/m)
1.	5350	60.08	8.5	34.2	34.58	-9.5	58.7	860.99	5000
2.	5350	39.79	8.5	34.2	34.58	-9.5	38.4	83.18	500

**Mode: MCS0**

Ref No.	FREQ. (MHz)	MEAS Rx (dB $\mu$ V)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	EXTRAP FACT (dB)	FIELD ST'GH (dB $\mu$ V/m)	FIELD ST'GH ( $\mu$ V/m)	LIMIT ( $\mu$ V/m)
1.	5350	64.70	8.5	34.2	34.58	-9.5	63.3	1462.18	5000
2.	5350	44.38	8.5	34.2	34.58	-9.5	43.0	141.25	500

**Mode: 54Mb/s**

Ref No.	FREQ. (MHz)	MEAS Rx (dB $\mu$ V)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	EXTRAP FACT (dB)	FIELD ST'GH (dB $\mu$ V/m)	FIELD ST'GH ( $\mu$ V/m)	LIMIT ( $\mu$ V/m)
1.	5350	62.50	8.5	34.2	34.58	-9.5	61.1	1135.01	5000
2.	5350	50.59	8.5	34.2	34.58	-9.5	39.2	91.20	500

**Mode: 6Mb/s**

Ref No.	FREQ. (MHz)	MEAS Rx (dB $\mu$ V)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	EXTRAP FACT (dB)	FIELD ST'GH (dB $\mu$ V/m)	FIELD ST'GH ( $\mu$ V/m)	LIMIT ( $\mu$ V/m)
1.	5350	65.44	8.5	34.2	34.58	-9.5	64.1	1603.25	5000
2.	5350	45.33	8.5	34.2	34.58	-9.5	44.0	158.49	500

**Radiated Electric Field Emissions within the Restricted Band 15.205 continued:**

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

<b>Test Details: 5500 MHz</b>	
Regulation	Title 47 of the CFR, Part 15 Subpart E Clause 15.407(b)(7) and Part 15 Subpart C Clause 15.205
Measurement standard	ANSI C63.10
Frequency range	30MHz to 40GHz
EUT sample number	S06, S09
Modification state	0
SE in test environment	TRaC Monitor
SE isolated from EUT	TRaC Laptop
EUT set up	Refer to Appendix C
Temperature	22
Photographs (Appendix F)	Photographs 1, 2 & 3

There were no significant radiated emissions measured for spurious emissions that fell within the restricted bands with the EUT transmitting on this frequency channel in any of the operating modes.

**Radiated Electric Field Emissions within the Restricted Band 15.205 continued:**

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

<b>Test Details: 5700 MHz</b>	
Regulation	Title 47 of the CFR, Part 15 Subpart E Clause 15.407(b)(7) and Part 15 Subpart C Clause 15.205
Measurement standard	ANSI C63.10
Frequency range	30MHz to 40GHz
EUT sample number	S06, S09
Modification state	0
SE in test environment	TRaC Monitor
SE isolated from EUT	TRaC Laptop
EUT set up	Refer to Appendix C
Temperature	22
Photographs (Appendix F)	Photographs 1, 2 & 3

There were no significant radiated emissions measured for spurious emissions that fell within the restricted bands with the EUT transmitting on this frequency channel in any of the operating modes.

**Radiated Electric Field Emissions within the Restricted Band 15.205 continued:**

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

<b>Test Details: 5745 MHz</b>	
Regulation	Title 47 of the CFR, Part 15 Subpart E Clause 15.407(b)(7) and Part 15 Subpart C Clause 15.205
Measurement standard	ANSI C63.10
Frequency range	30MHz to 40GHz
EUT sample number	S06, S09
Modification state	0
SE in test environment	TRaC Monitor
SE isolated from EUT	TRaC Laptop
EUT set up	Refer to Appendix C
Temperature	22
Photographs (Appendix F)	Photographs 1, 2 & 3

There were no significant radiated emissions measured for spurious emissions that fell within the restricted bands with the EUT transmitting on this frequency channel in any of the operating modes.

**Radiated Electric Field Emissions within the Restricted Band 15.205 continued:**

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

<b>Test Details: 5825 MHz</b>	
Regulation	Title 47 of the CFR, Part 15 Subpart E Clause 15.407(b)(7) and Part 15 Subpart C Clause 15.205
Measurement standard	ANSI C63.10
Frequency range	30MHz to 40GHz
EUT sample number	S06, S09
Modification state	0
SE in test environment	TRaC Monitor
SE isolated from EUT	TRaC Laptop
EUT set up	Refer to Appendix C
Temperature	22
Photographs (Appendix F)	Photographs 1, 2 & 3

There were no significant radiated emissions measured for spurious emissions that fell within the restricted bands with the EUT transmitting on this frequency channel in any of the operating modes.

**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 Measurements at 5150 & 5350 MHz were made to ensure band edge compliance.
- 4 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.
- 5 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 47 CFR Part 15 Clause 15.33(a) and 15.33(a)(1).

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

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

**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 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				

## A8 Power Line Conducted Emissions

Previous 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:

Test Details:	
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, S08
Modification state	0
SE in test environment	TRaC Monitor
SE isolated from EUT	TRaC Laptop
EUT set up	Refer to Appendix C

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

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

Frequency (MHz)	Average (dB $\mu$ V)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
0.415000	29.9	15000.0	10.000	GND	N	10.1	17.6	47.5
0.425000	28.3	15000.0	10.000	GND	N	10.1	19.0	47.3
0.535000	31.4	15000.0	10.000	GND	L1	10.1	14.6	46.0
0.945000	22.4	15000.0	10.000	GND	L1	10.1	23.6	46.0
3.845000	21.5	15000.0	10.000	GND	L1	10.1	24.5	46.0
7.085000	27.8	15000.0	10.000	GND	L1	10.4	22.2	50.0
7.345000	24.8	15000.0	10.000	GND	N	10.5	25.2	50.0
7.520000	23.5	15000.0	10.000	GND	N	10.5	26.5	50.0
7.690000	28.1	15000.0	10.000	GND	N	10.5	21.9	50.0
13.560000	13.4	15000.0	10.000	GND	N	10.8	36.6	50.0
13.640000	12.8	15000.0	10.000	GND	N	10.8	37.2	50.0
13.780000	12.3	15000.0	10.000	GND	L1	10.8	37.7	50.0

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

Frequency (MHz)	QuasiPeak (dB $\mu$ V)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
0.415000	42.0	15000.0	10.000	GND	N	10.1	15.6	57.5
0.425000	41.4	15000.0	10.000	GND	N	10.1	15.9	57.3
0.535000	45.9	15000.0	10.000	GND	L1	10.1	10.1	56.0
0.945000	35.7	15000.0	10.000	GND	L1	10.1	20.3	56.0
3.845000	34.7	15000.0	10.000	GND	L1	10.1	21.3	56.0
7.085000	45.4	15000.0	10.000	GND	L1	10.4	14.6	60.0
7.345000	43.5	15000.0	10.000	GND	N	10.5	16.5	60.0
7.520000	44.3	15000.0	10.000	GND	N	10.5	15.7	60.0
7.690000	46.1	15000.0	10.000	GND	N	10.5	13.9	60.0
13.560000	21.0	15000.0	10.000	GND	N	10.8	39.0	60.0
13.640000	30.1	15000.0	10.000	GND	N	10.8	29.9	60.0
13.780000	21.0	15000.0	10.000	GND	L1	10.8	39.0	60.0

**Specification limits :**

Conducted emission limits (47 CFR 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 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				

#### A9 Antenna Gain

The maximum antenna gain for the antenna types to be used with the EUT, as declared by the client, is 2 dBi.

**A10 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 :  X

Test Details: Tx Standby mode	
Regulation	Title 47 of the CFR: Part 15 Subpart (b) Clause 15.109(g)
Measurement standard	ANSI C63.10
Frequency range	30MHz to 40 GHz
EUT sample number	S01, S08
Modification state	1
SE in test environment	None
SE isolated from EUT	TRaC Laptop
EUT set up	Refer to Appendix C
Temperature	22
Photographs (Appendix F)	Photographs 1, 2 & 3

The worst case radiated emission measurements for spurious emissions:

Radiated Spurious Emissions 30MHz to 1GHz (Quasi-Peak detector)

Frequency (MHz)	QuasiPeak (dB $\mu$ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Limit (dB $\mu$ V/m)	Margin (dB)
58.508760	27.2	15000.0	120.000	118.0	V	170.0	-21.5	40.0	12.8
142.059320	37.0	15000.0	120.000	101.0	V	210.0	-14.8	40.0	3.0
148.532453	38.2	15000.0	120.000	101.0	V	178.0	-15.0	40.0	1.8
151.726827	34.7	15000.0	120.000	101.0	V	220.0	-15.1	40.0	5.3
445.495813	31.6	15000.0	120.000	114.0	V	264.0	-10.1	47.0	15.4
742.495653	34.9	15000.0	120.000	101.0	V	253.0	-4.5	47.0	12.1
890.980573	42.9	15000.0	120.000	101.0	V	192.0	-4.1	47.0	4.1
974.992893	40.9	15000.0	120.000	106.0	H	176.0	-1.8	47.0	6.1

No Radiated Spurious Emissions >1GHz were measured within 10dB of the limit line.

**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 47 CFR Part 15 Clause 15.33(a) and 15.33(a)(1).

Radiated emission limits (47 CFR Part 15: Clause 15.109) for emissions above 1GHz:

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

Radiated emission limits (47 CFR Part 15: Clause 15.109(g)) for emissions below 1GHz:

Frequency of emission (MHz)	Field strength $\text{dB}\mu\text{V}/\text{m}$ @ 10m	Measurement Distance Used (m)	Field strength $\text{dB}\mu\text{V}/\text{m}$ @ 3m
30 – 230	30	3	40
230 - 1000	37	3	47

**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 :

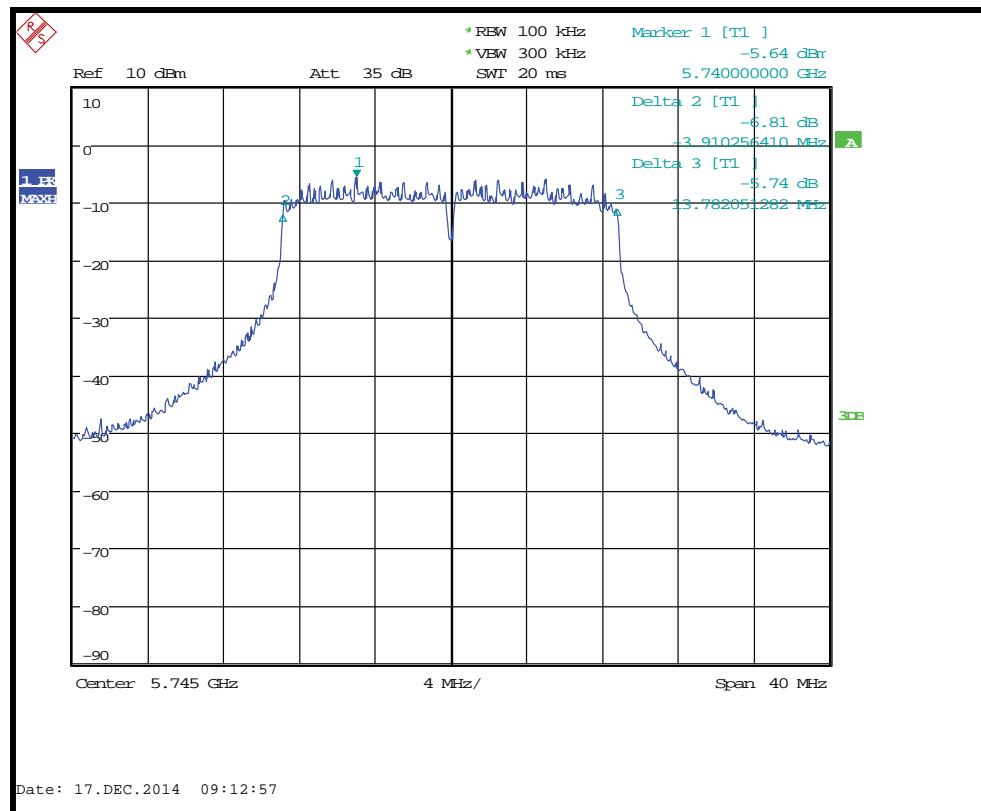
	See (i)	See (ii)	See (iii)	See (iv)
Effect of EUT operating mode on emission levels				✓
Effect of EUT internal configuration on emission levels		✓		
Effect of Position of EUT cables & samples on emission levels	✓			
(i) Parameter defined by standard and / or single possible, refer to Appendix C (ii) 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**

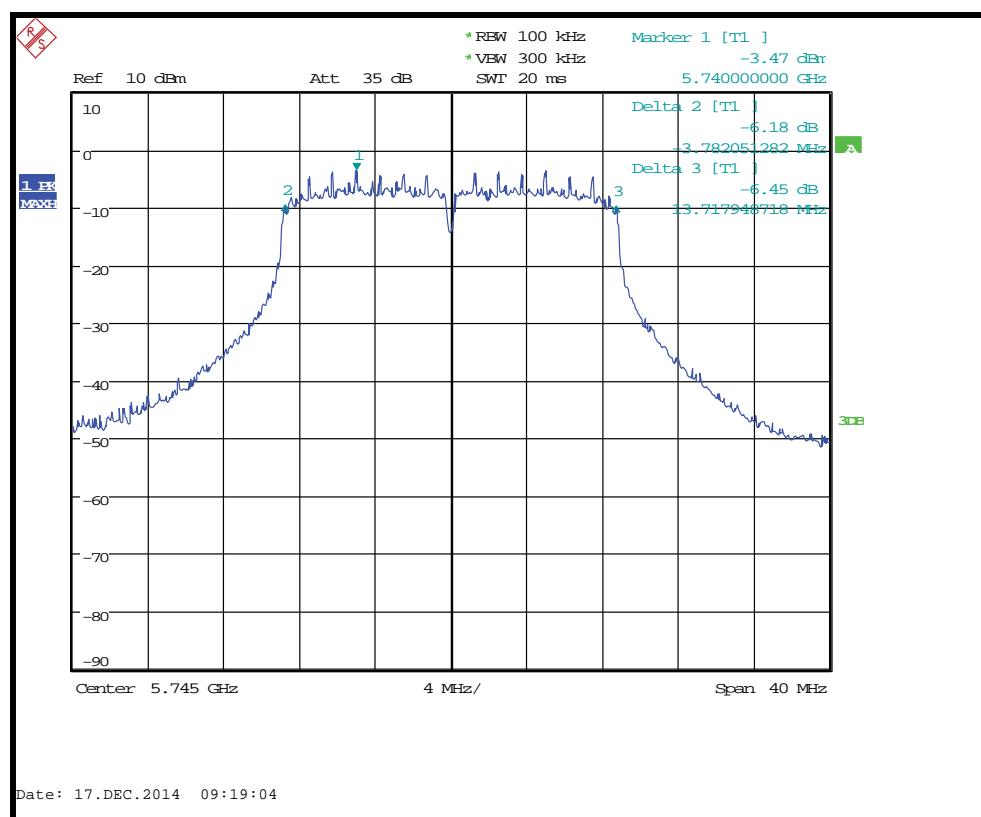
This appendix contains graphical data obtained during testing.

Notes:

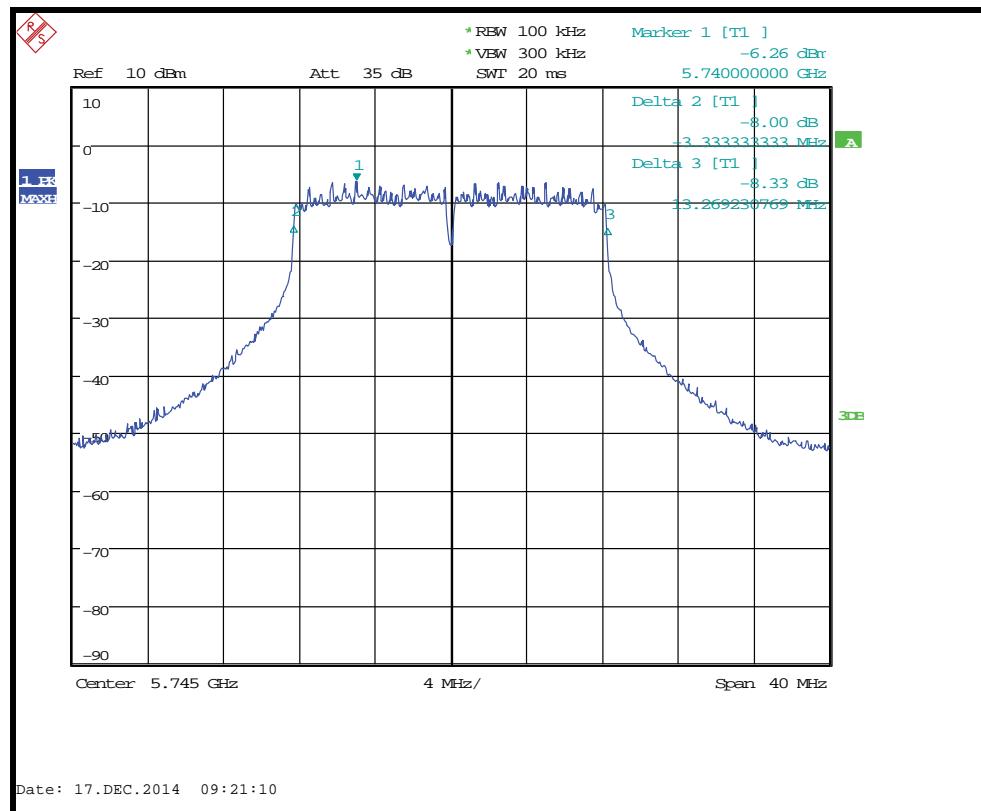
- (a) The radiated electric field emissions and conducted emissions graphical data in this appendix is preview data. For details of formal results, refer to Appendix A.
- (b) The time and date on the plots do not necessarily equate to the time of the test.
- (c) Where relevant, on power line conducted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



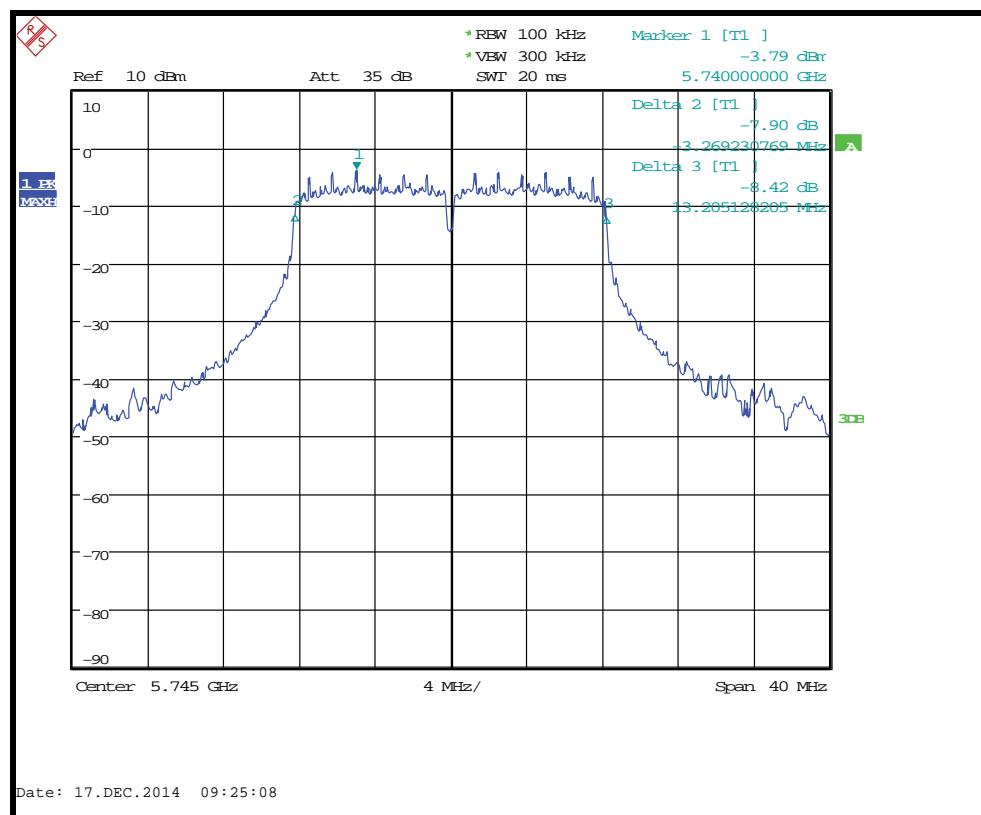
## 6dB Bandwidth 5745MHz MCS6



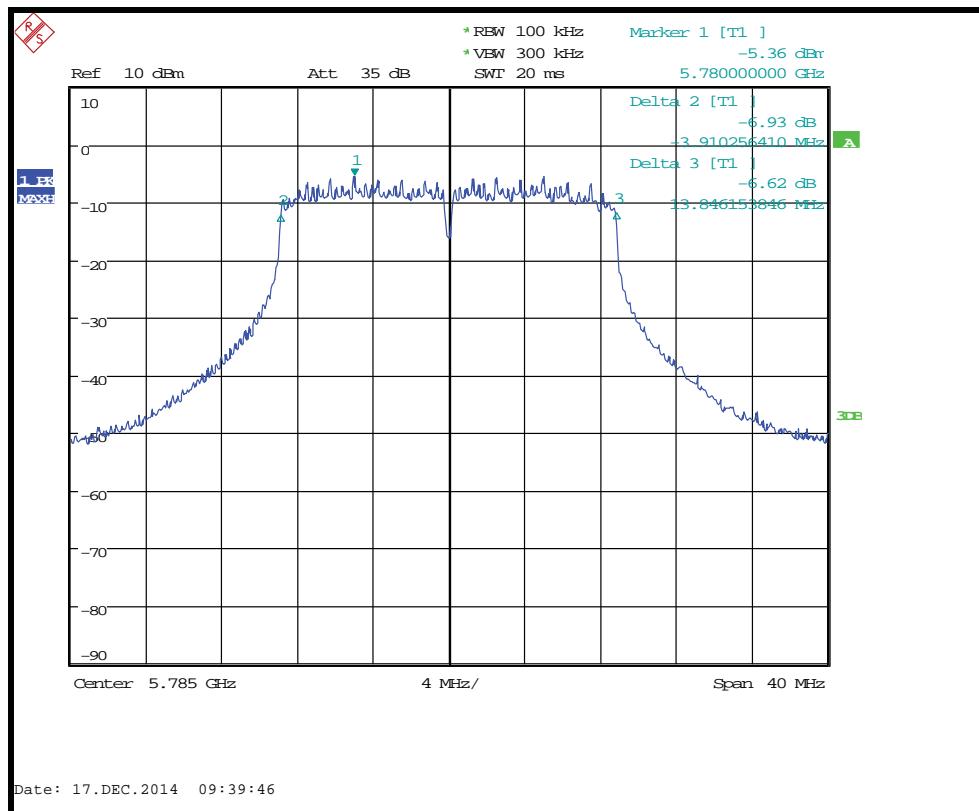
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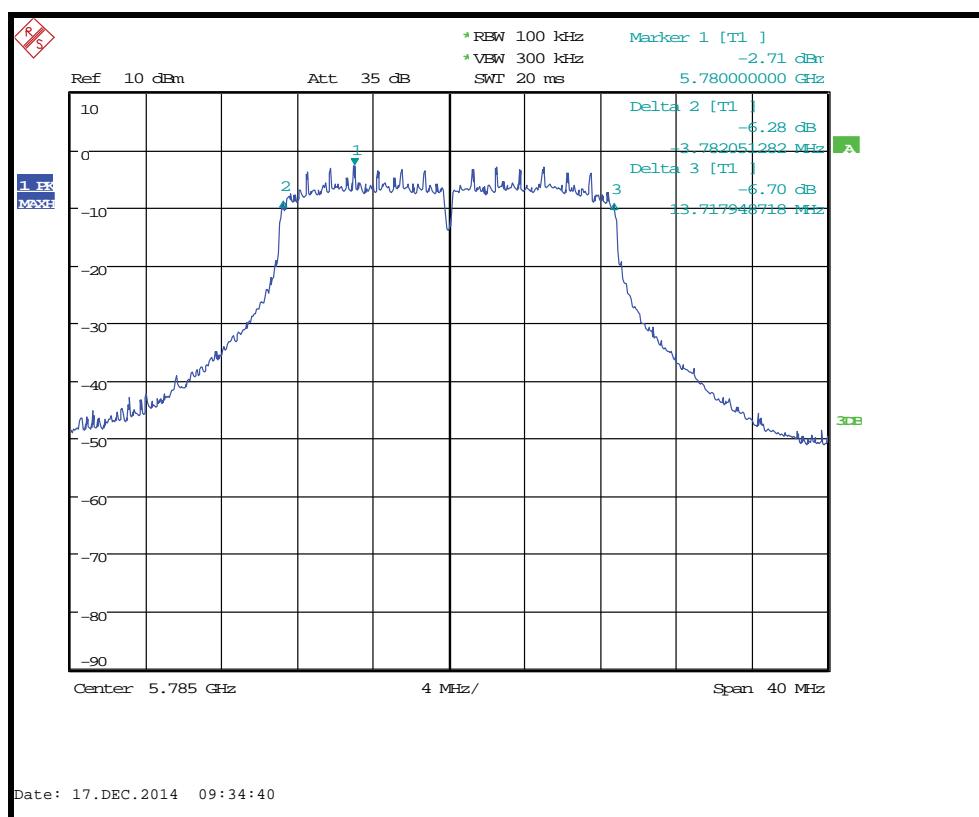
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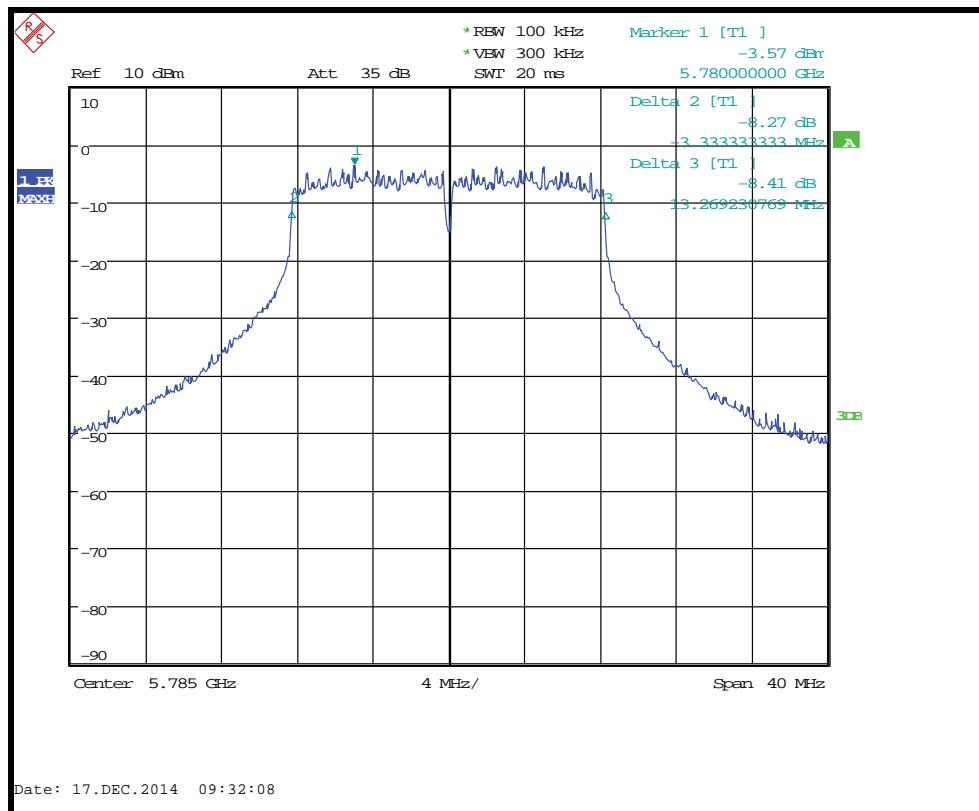
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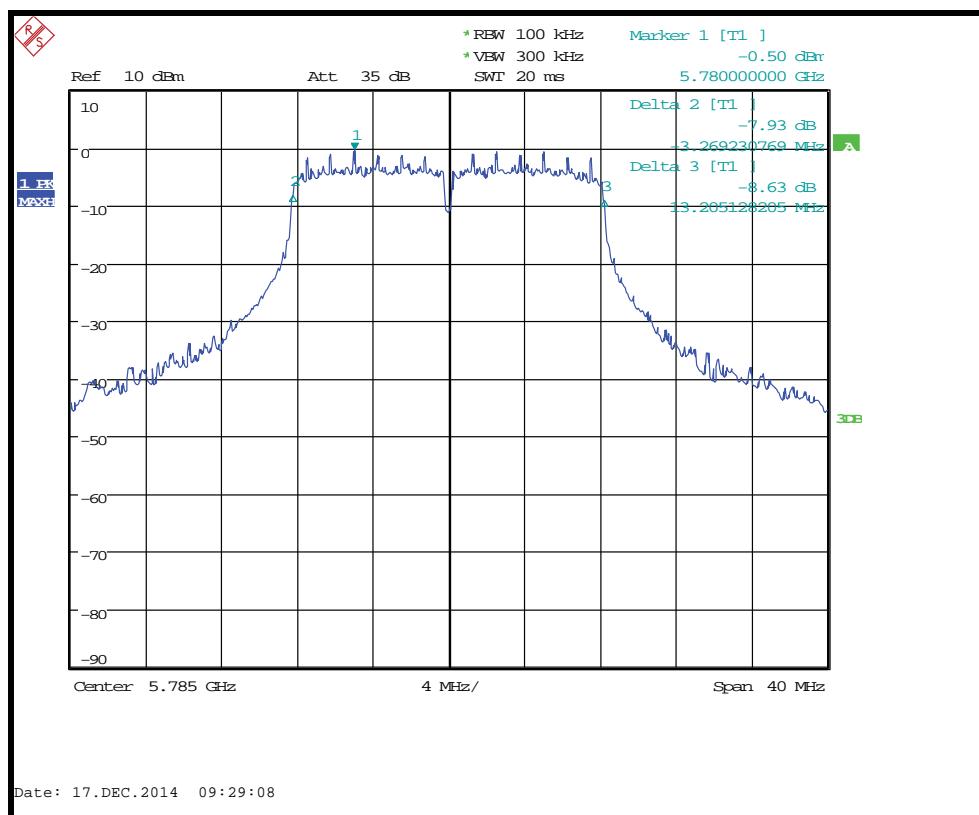
## 6dB Bandwidth 5785MHz MCS6



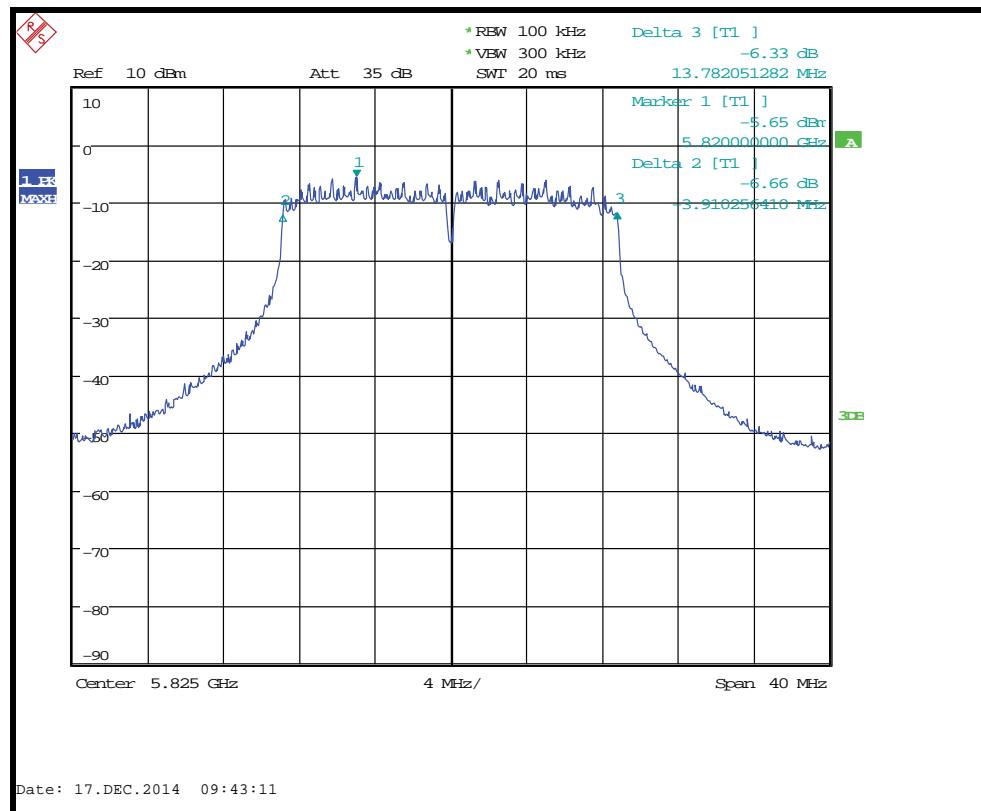
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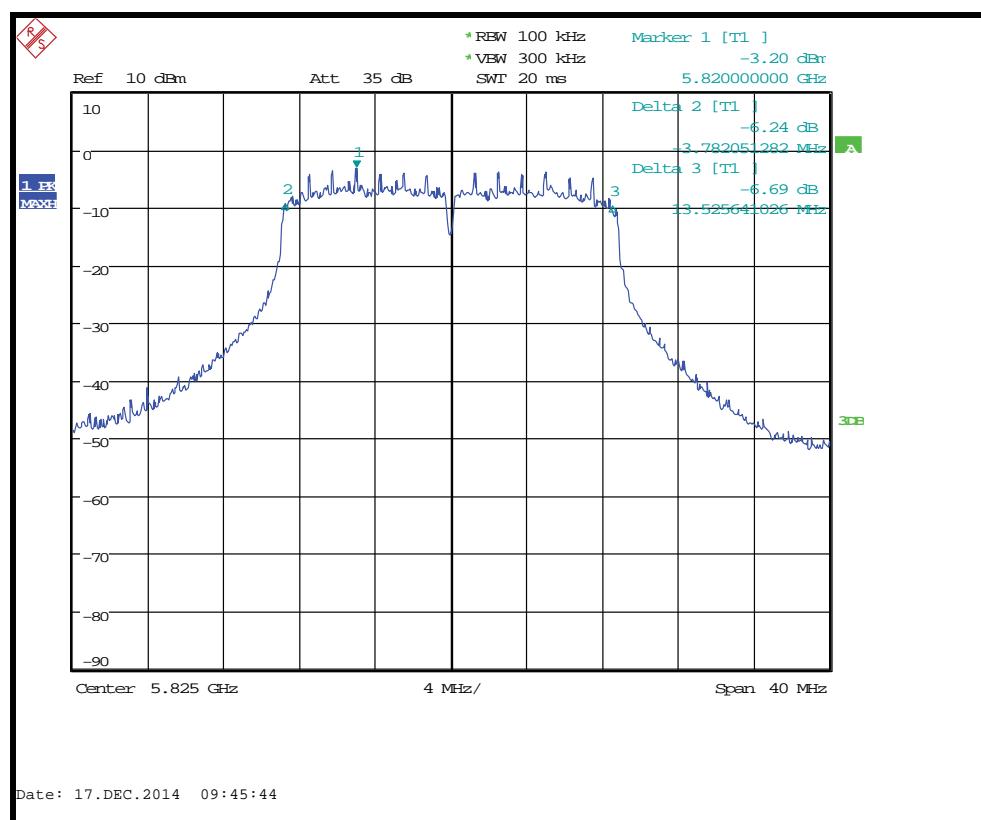
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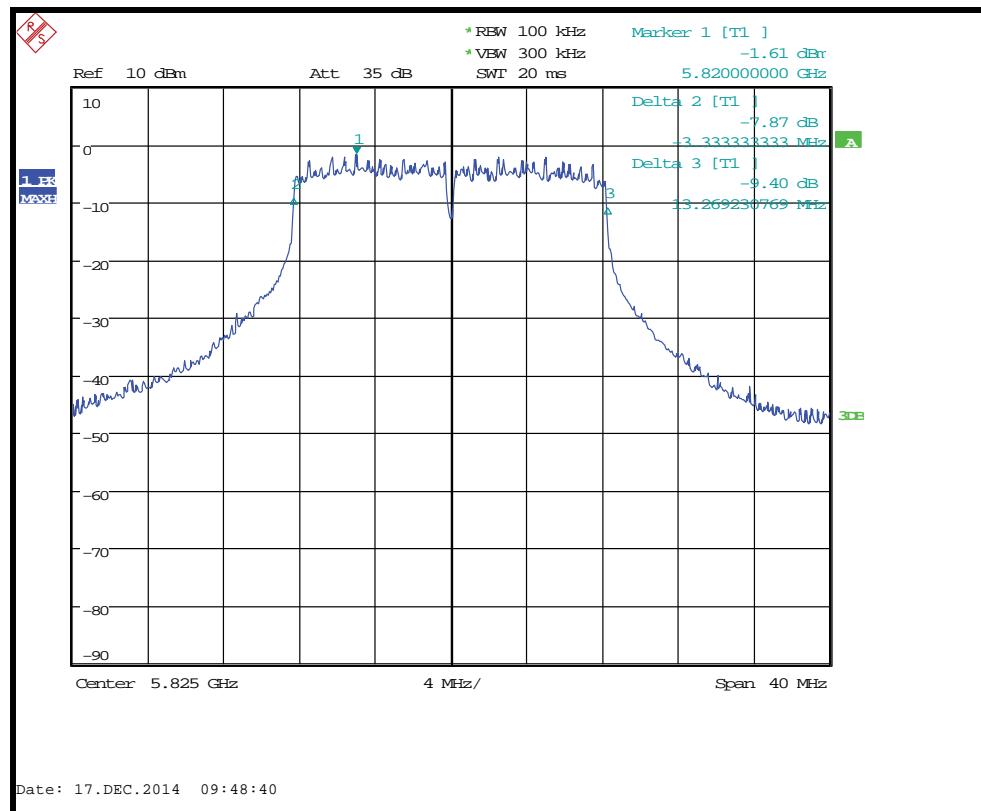
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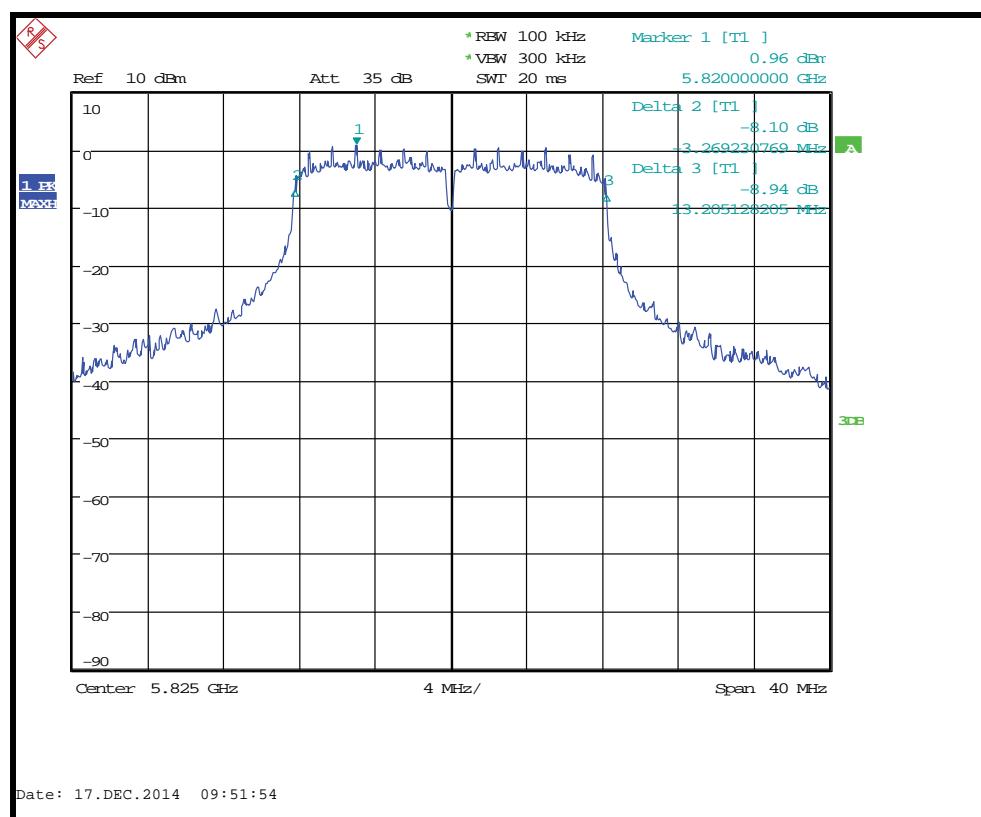
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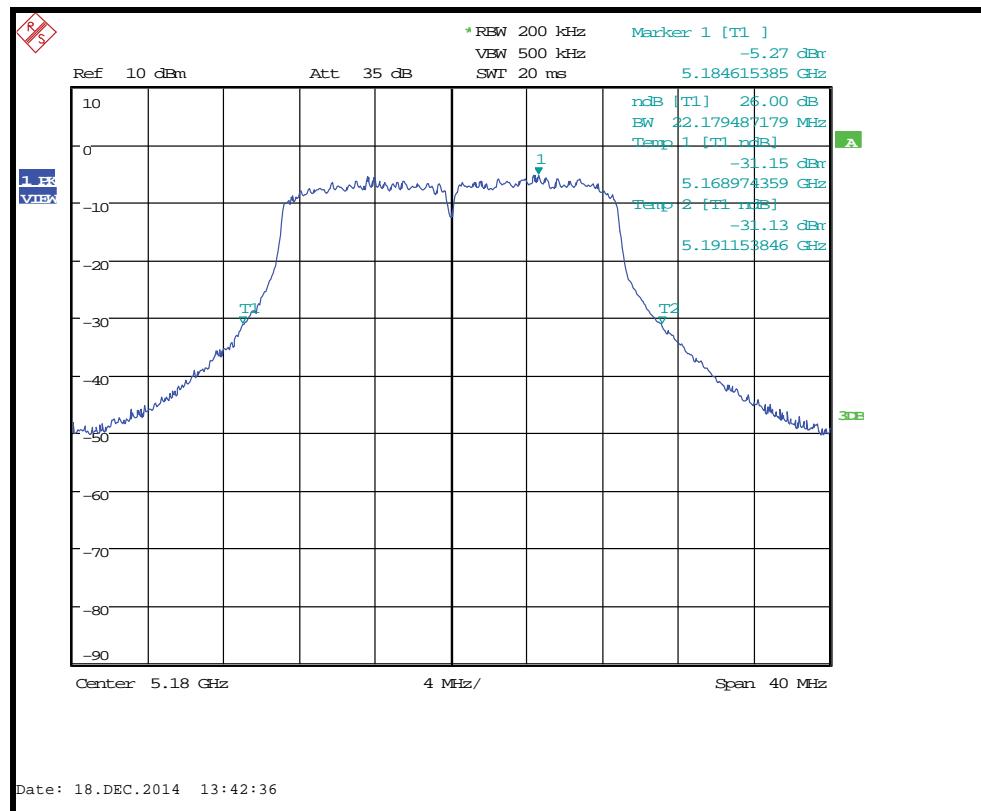
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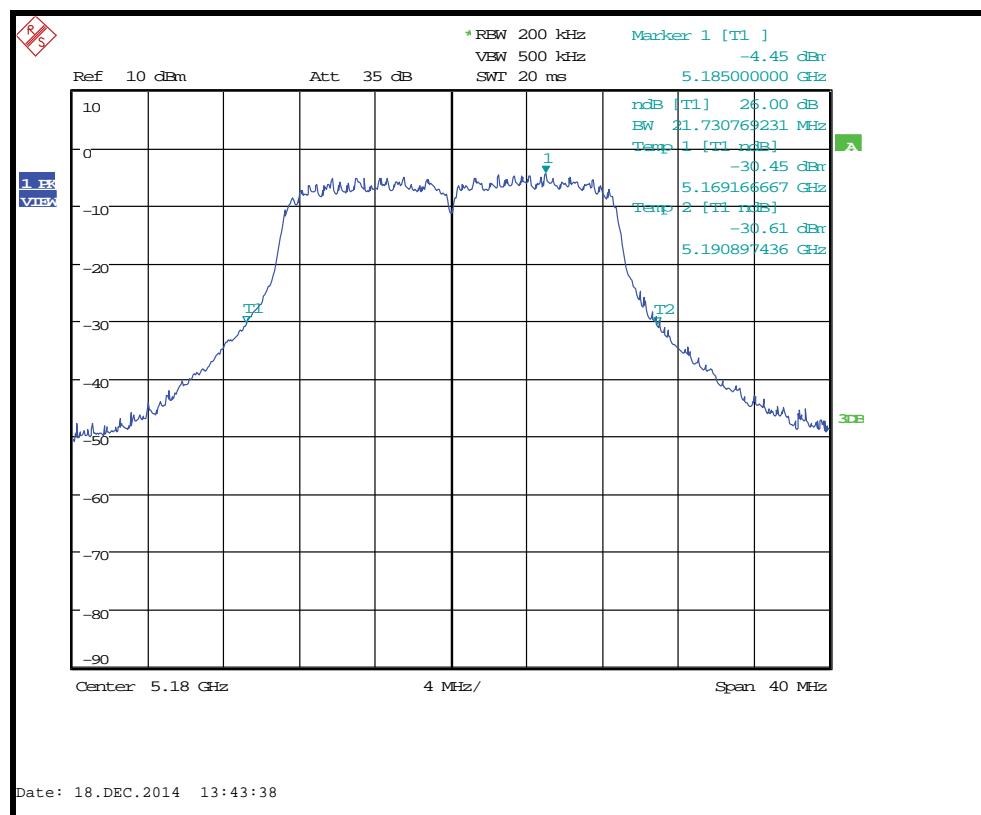
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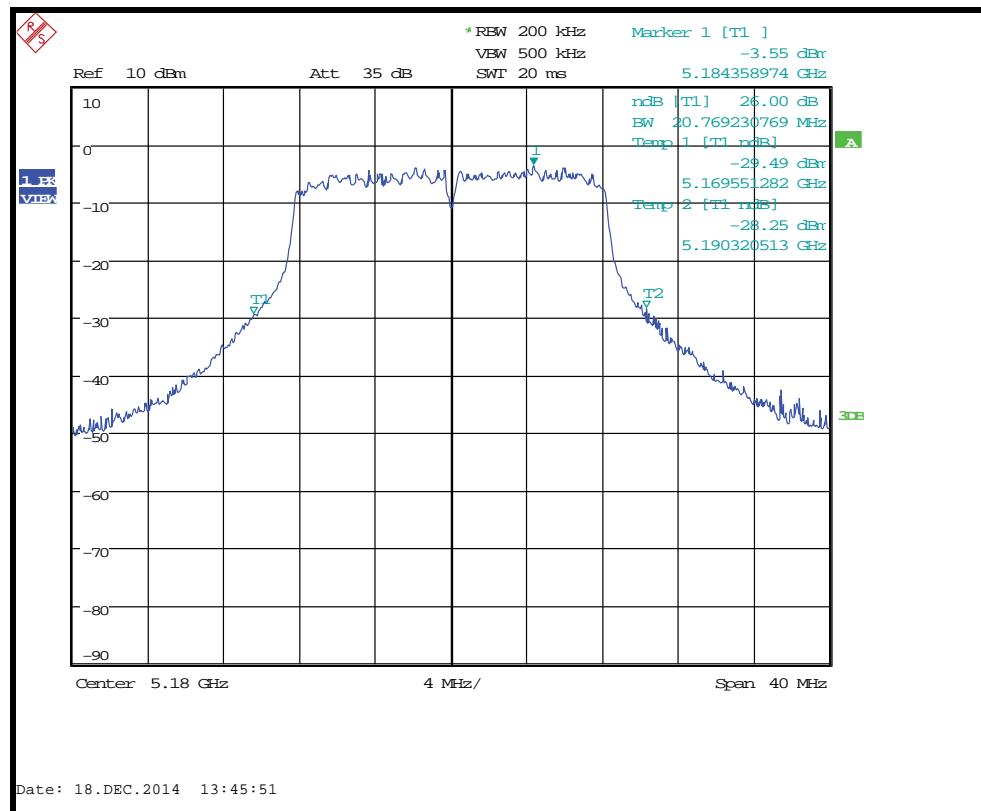
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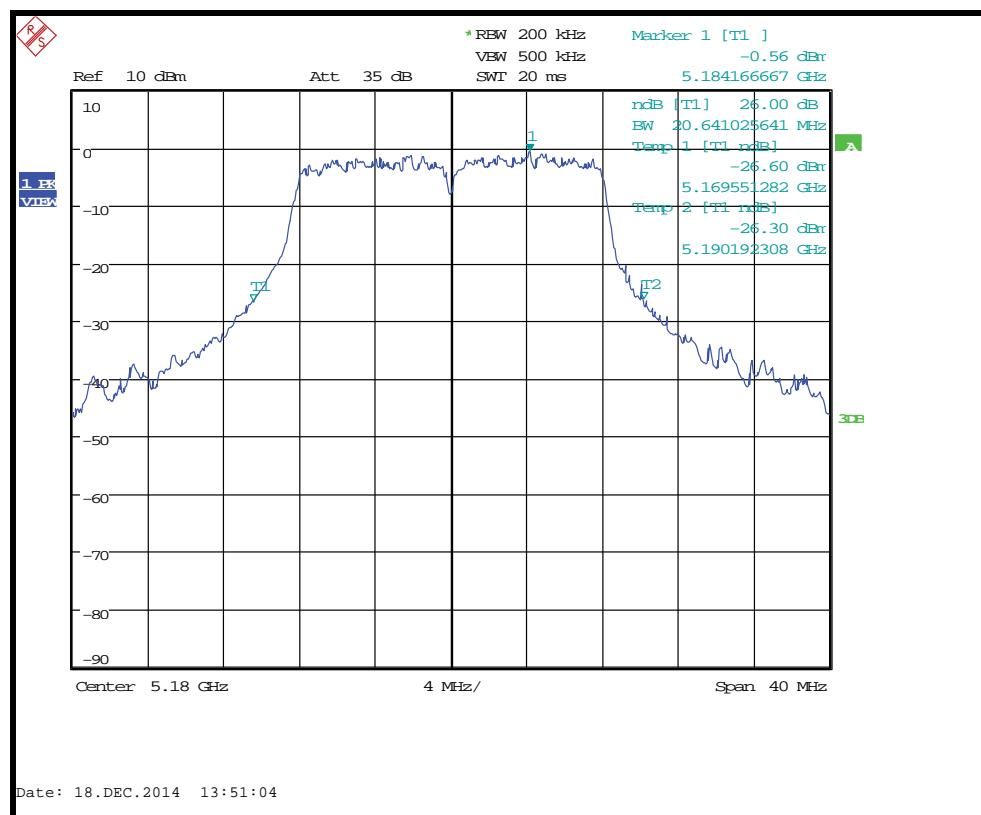
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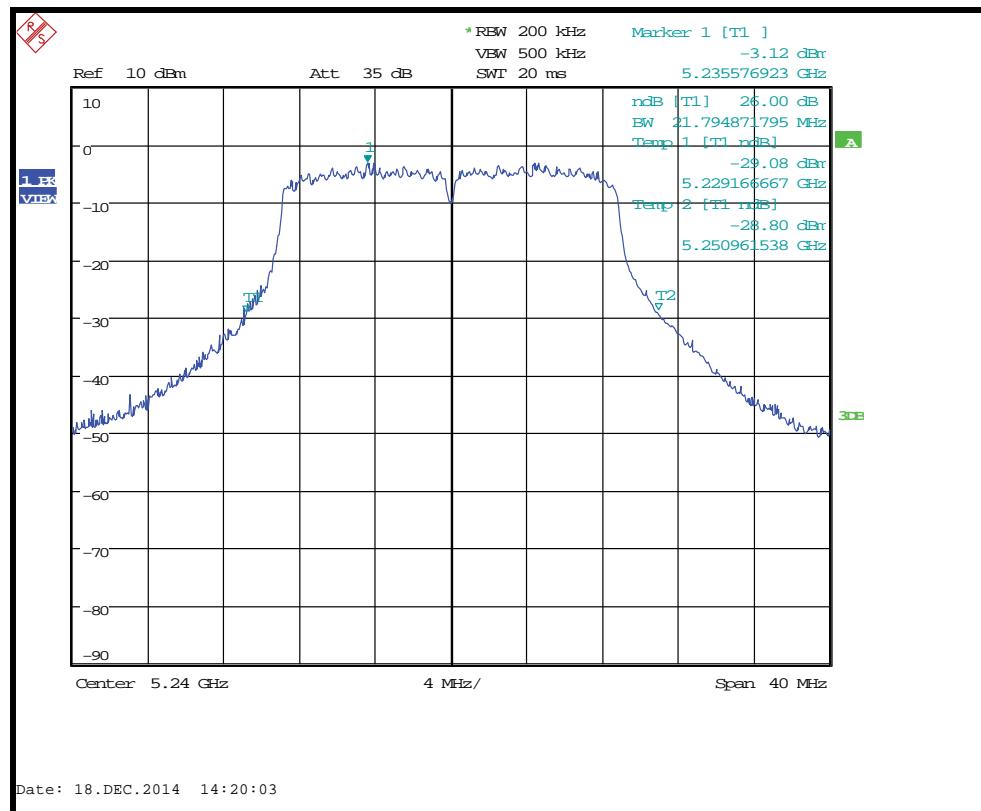
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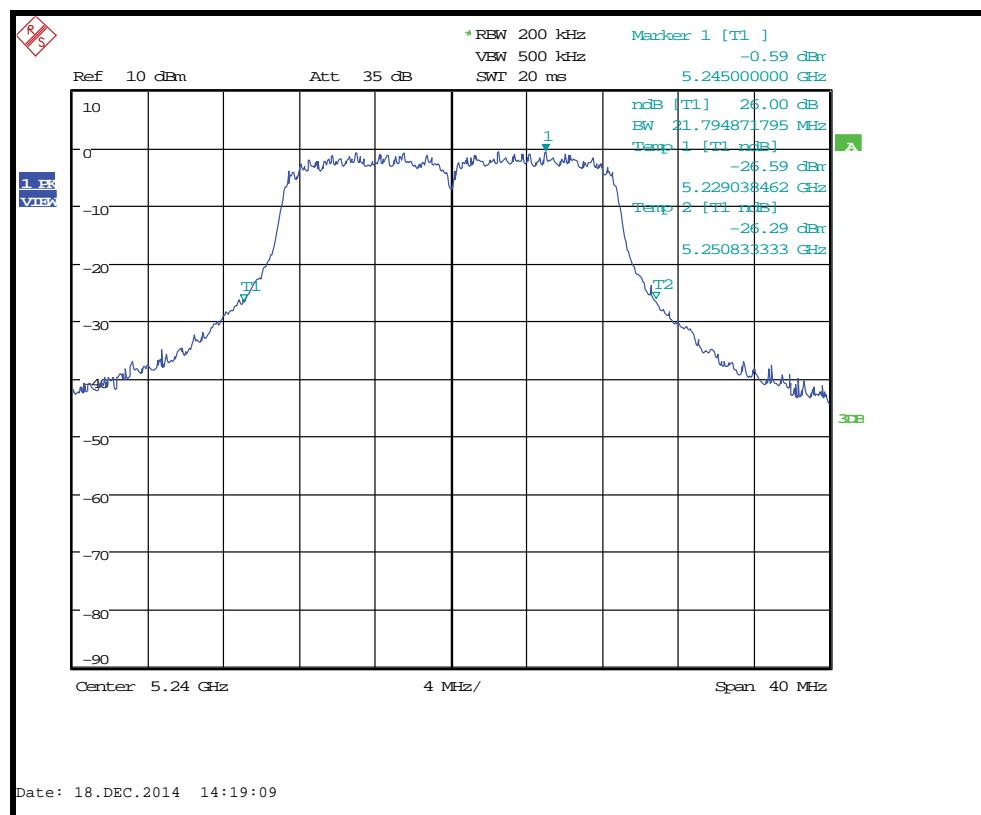
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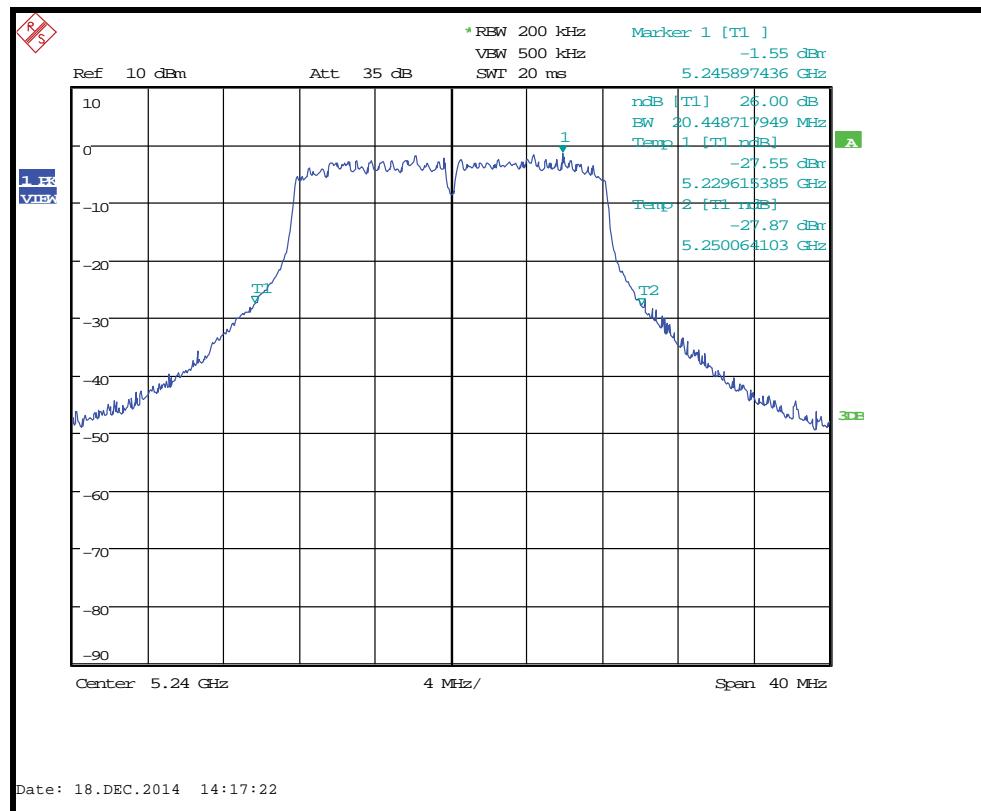
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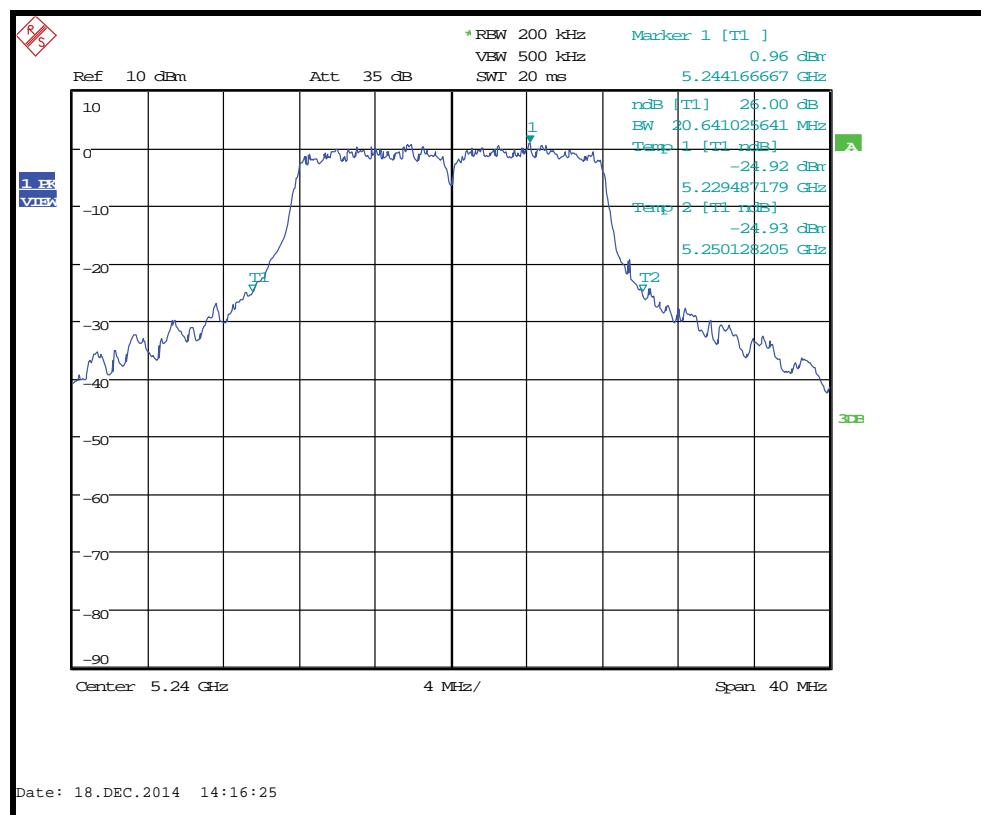
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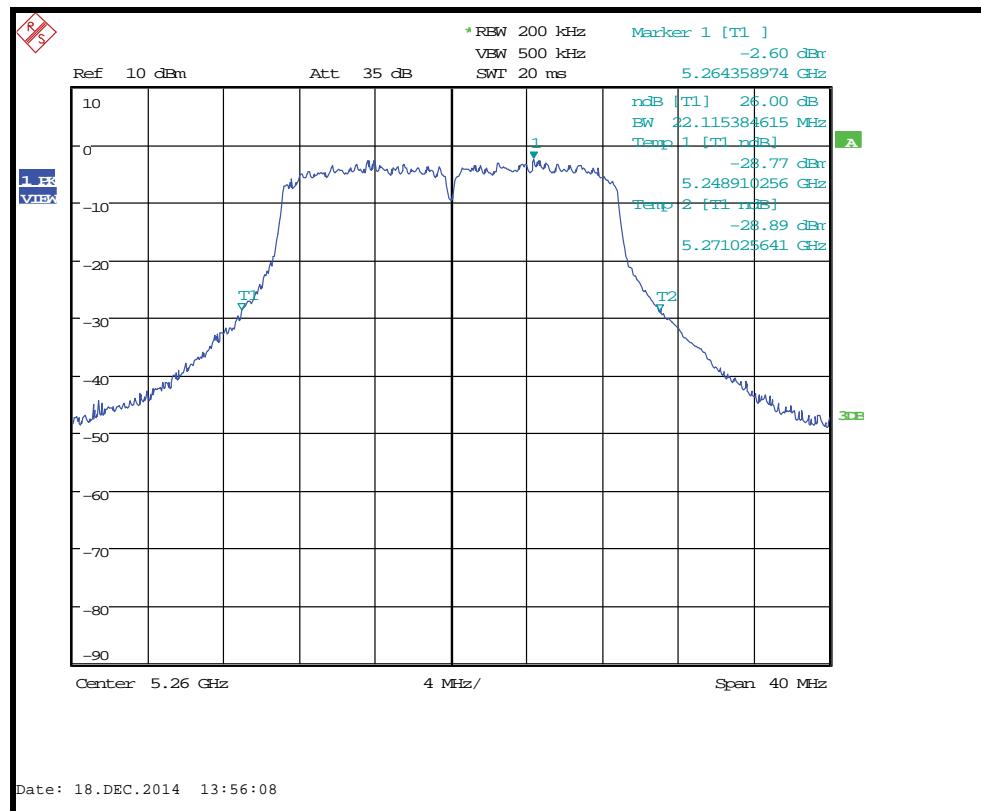
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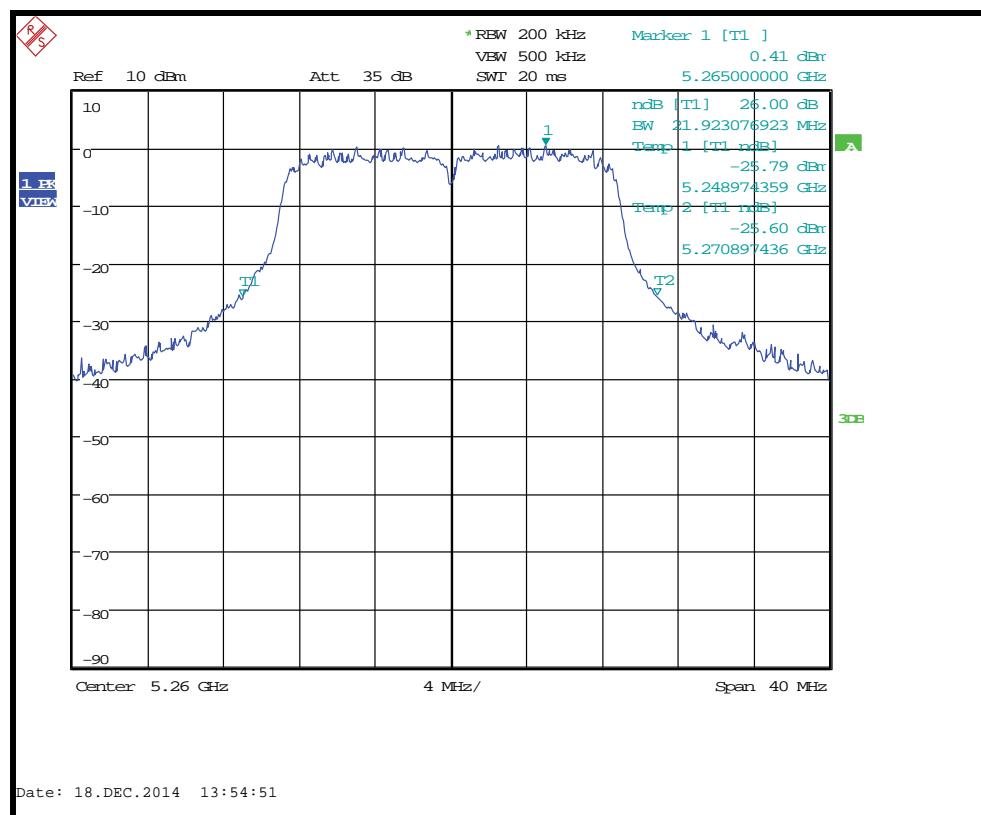
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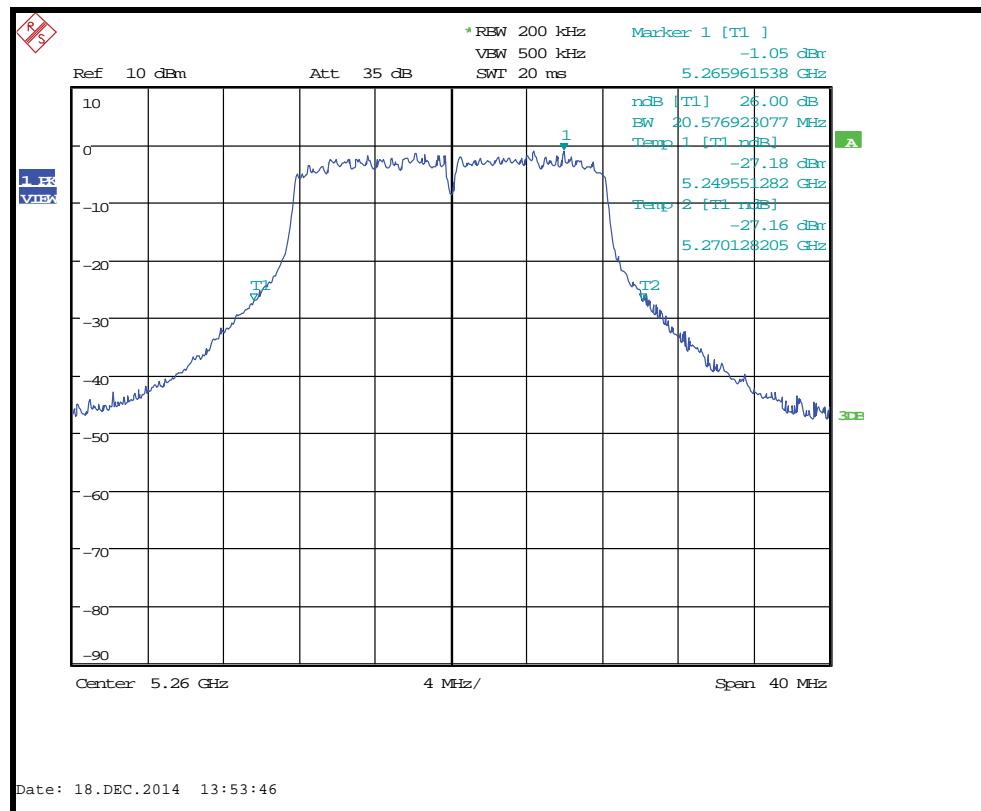
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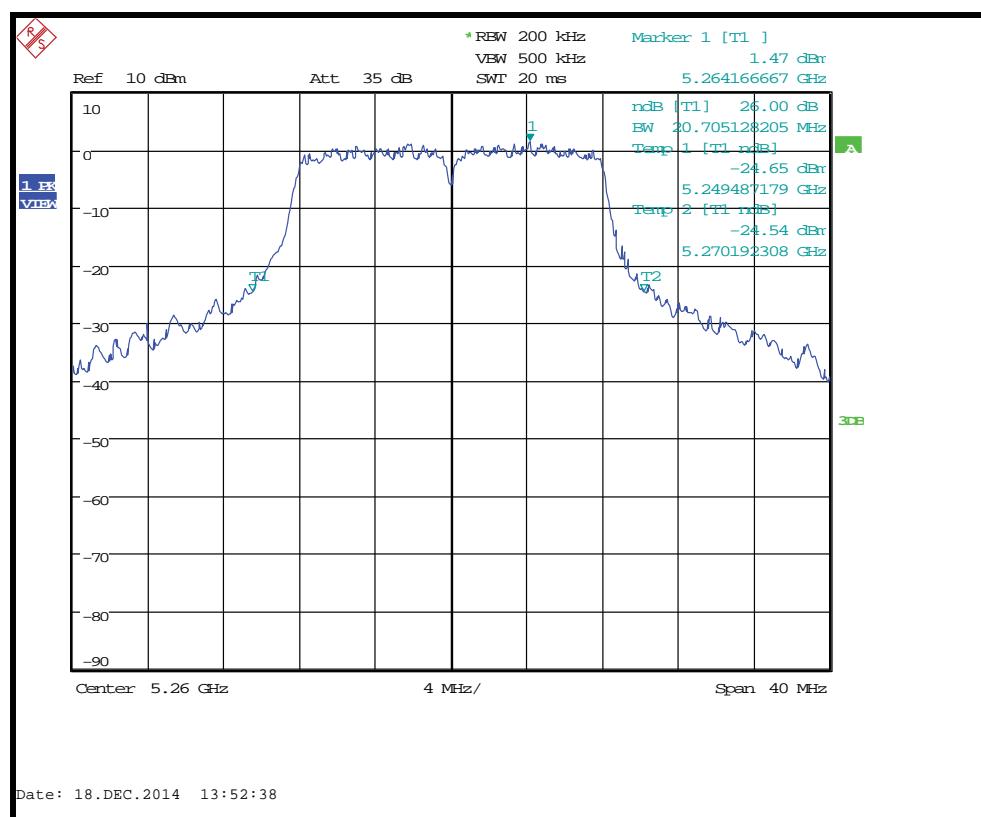
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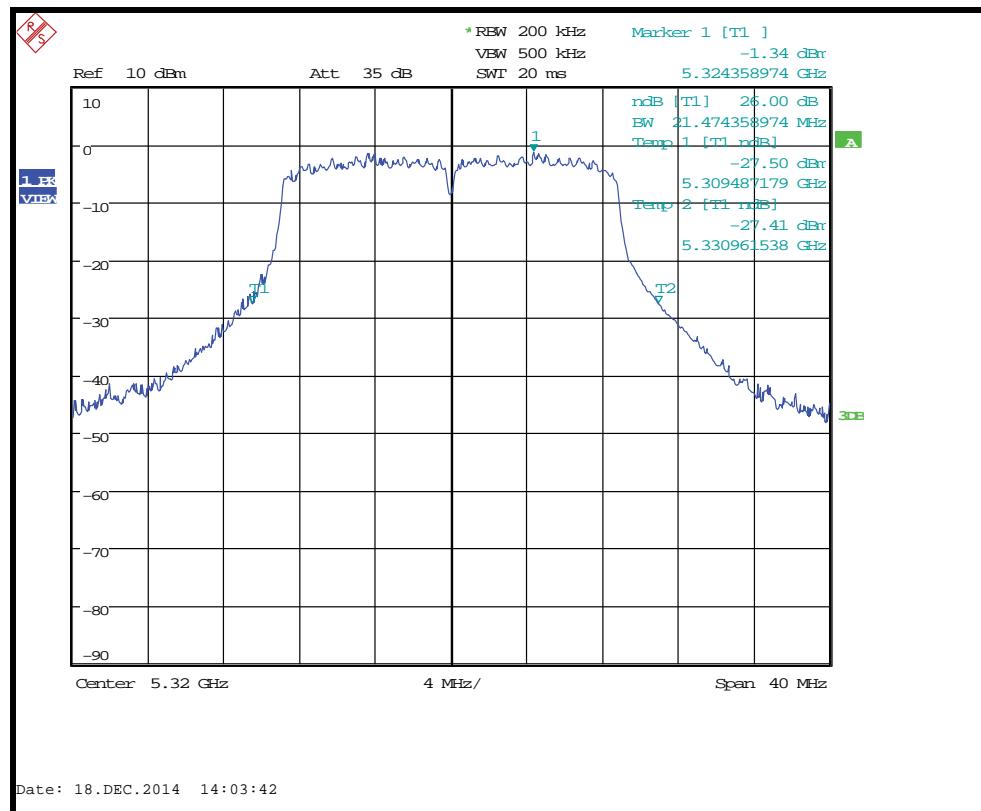
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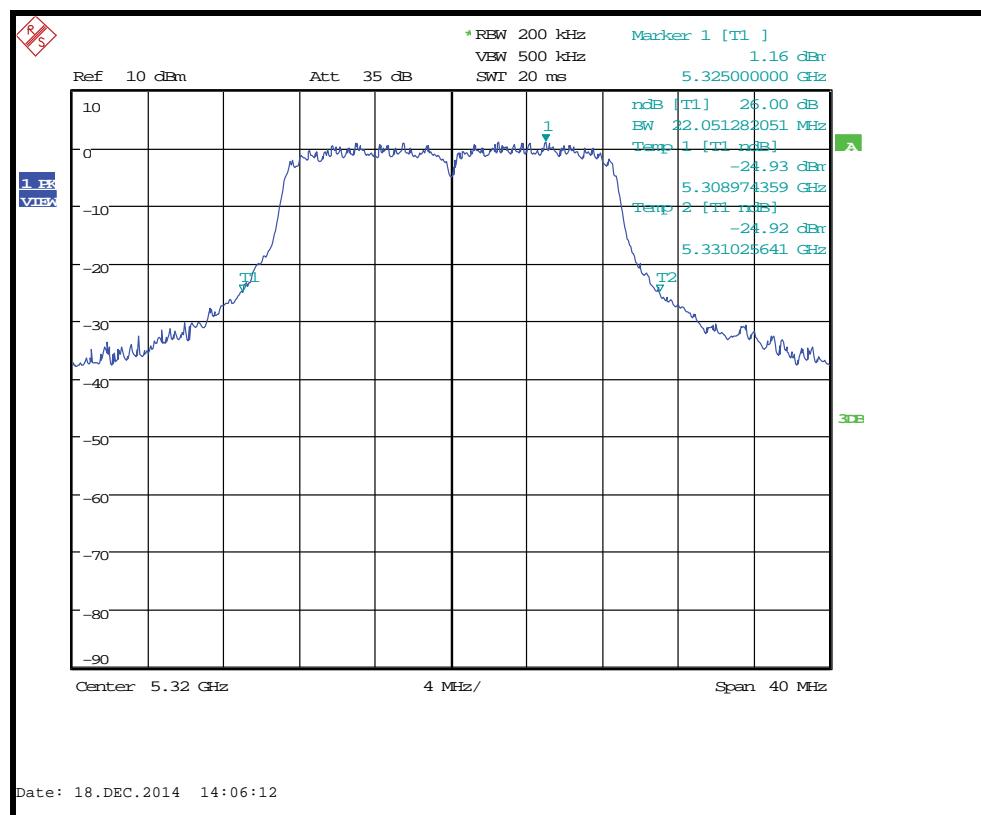
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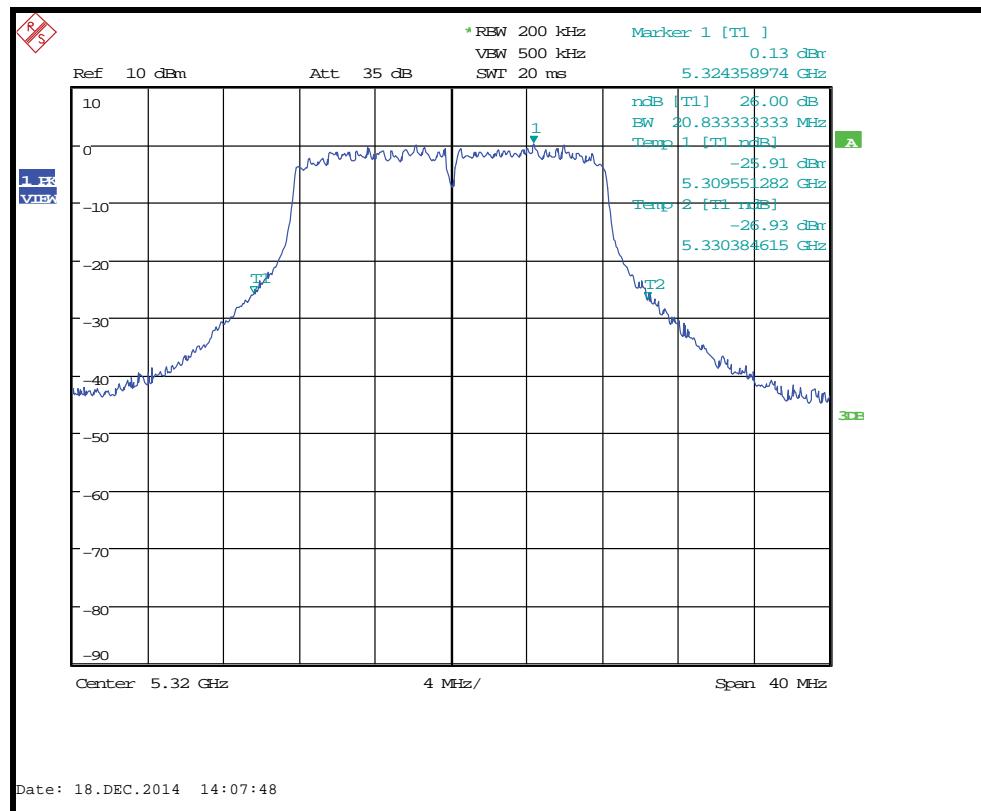
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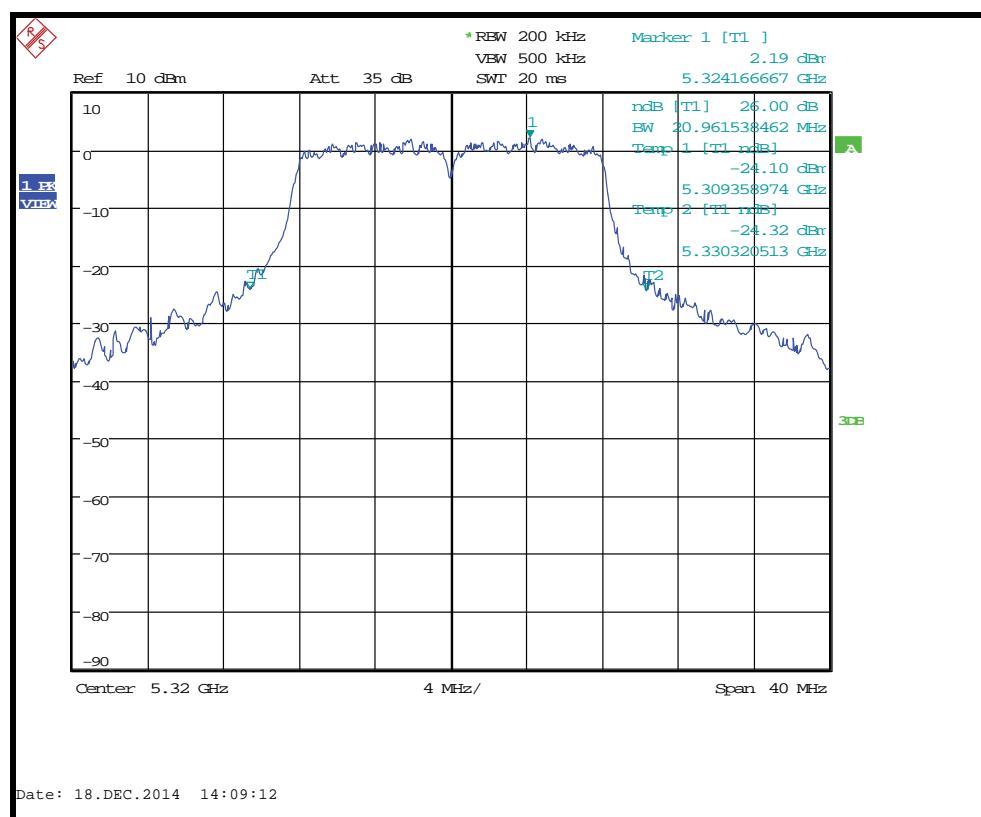
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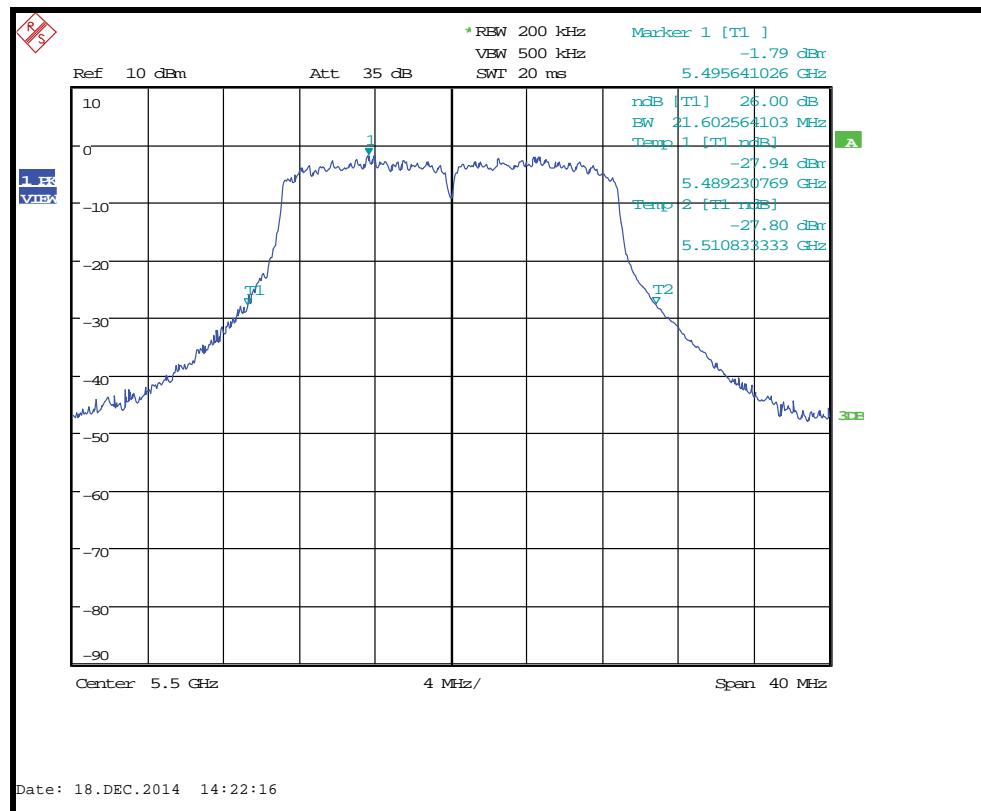
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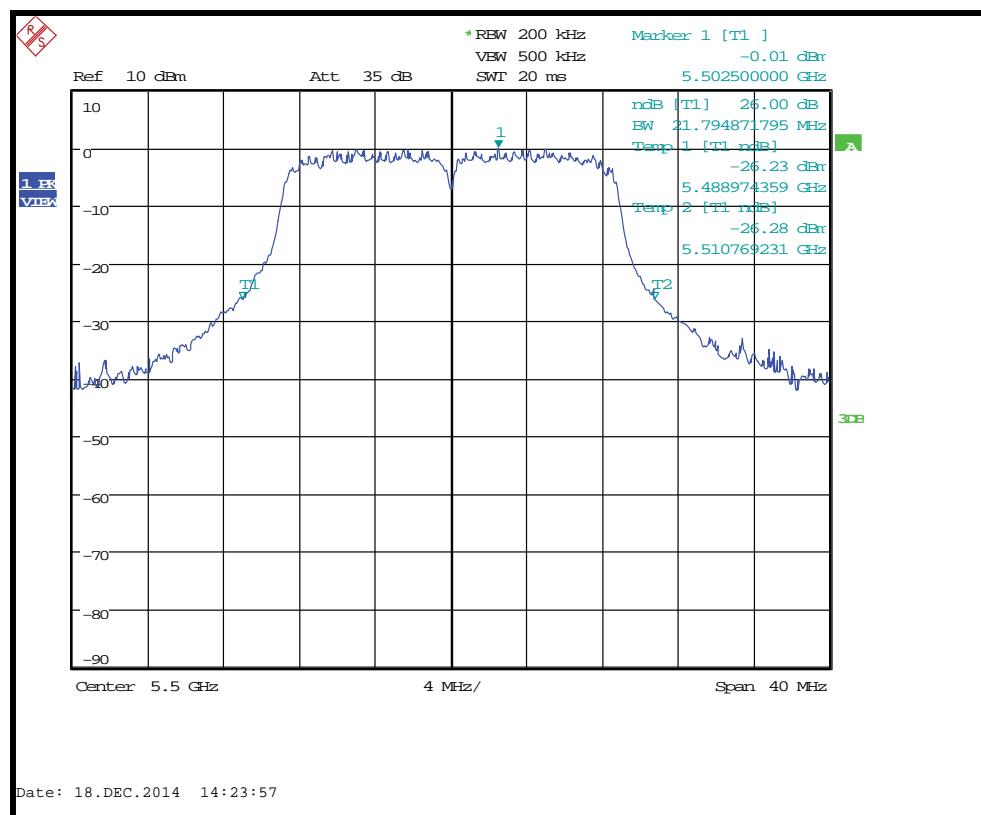
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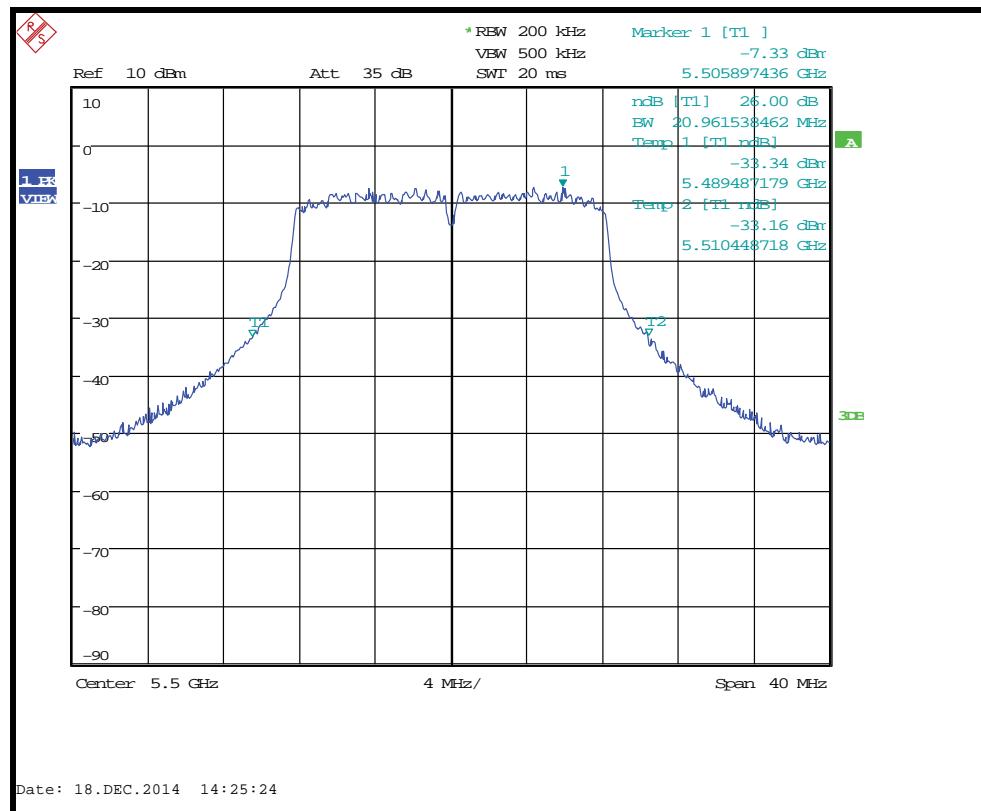
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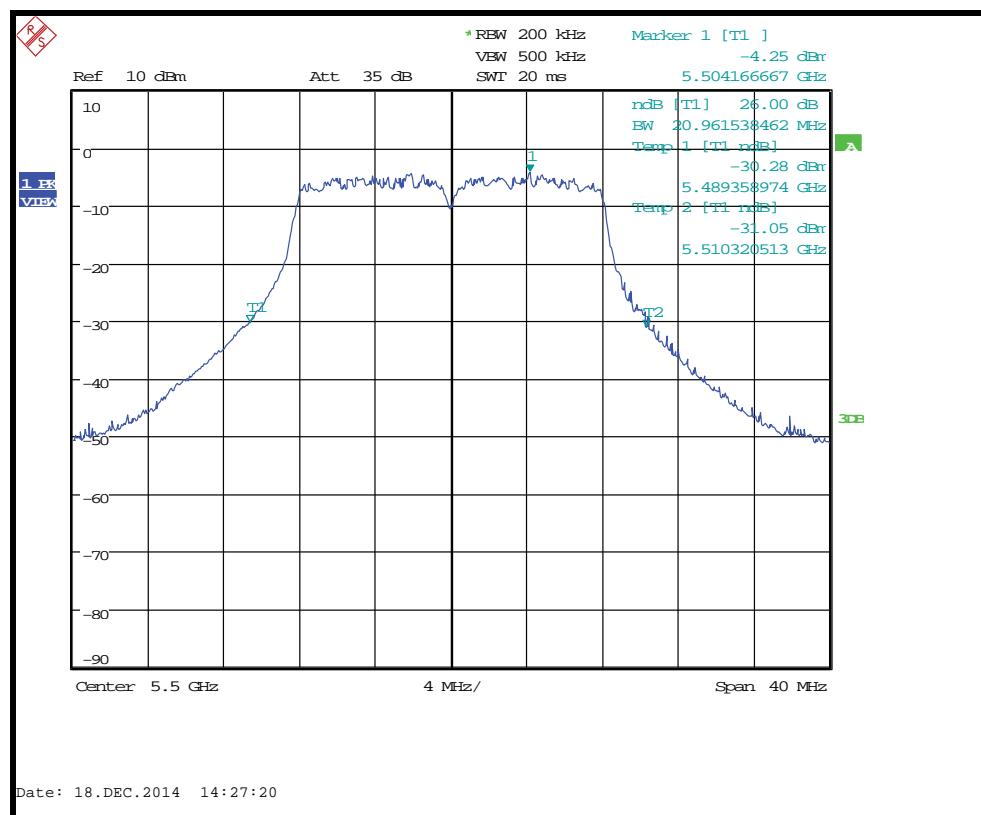
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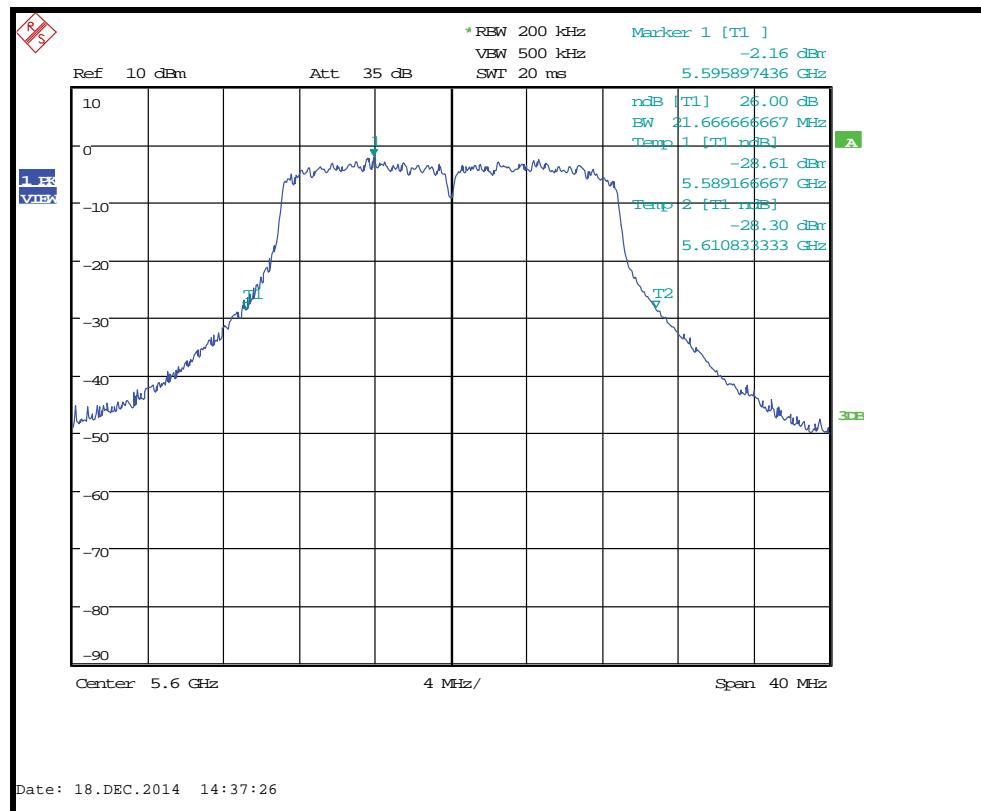
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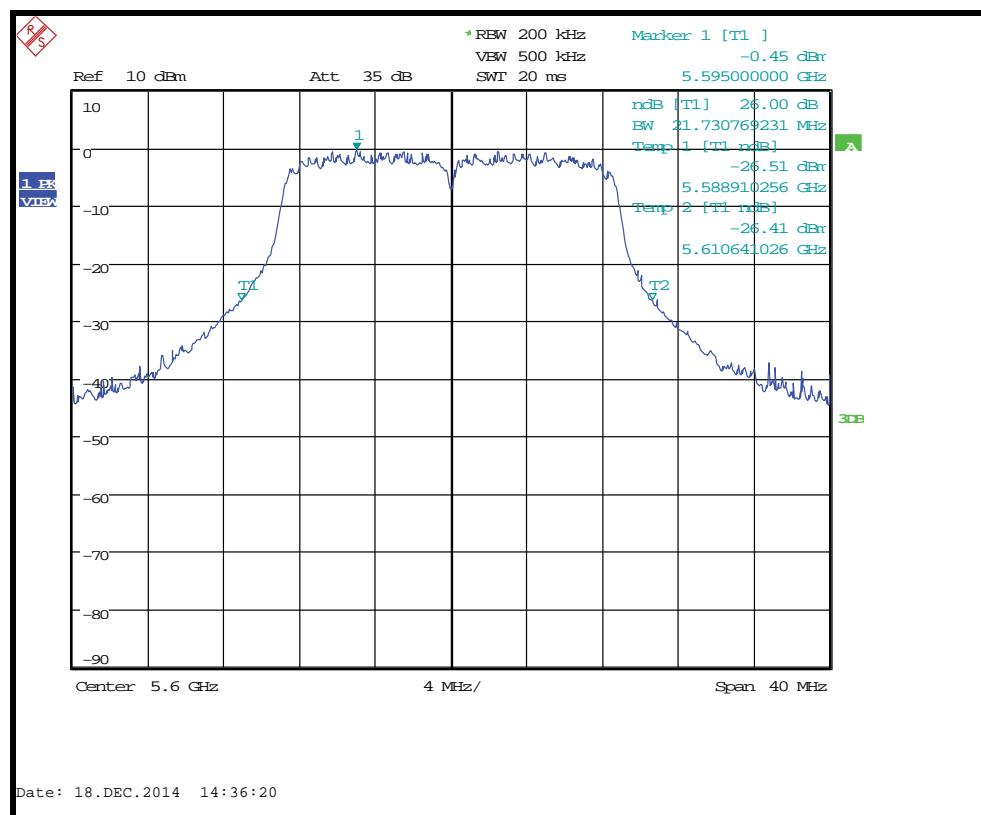
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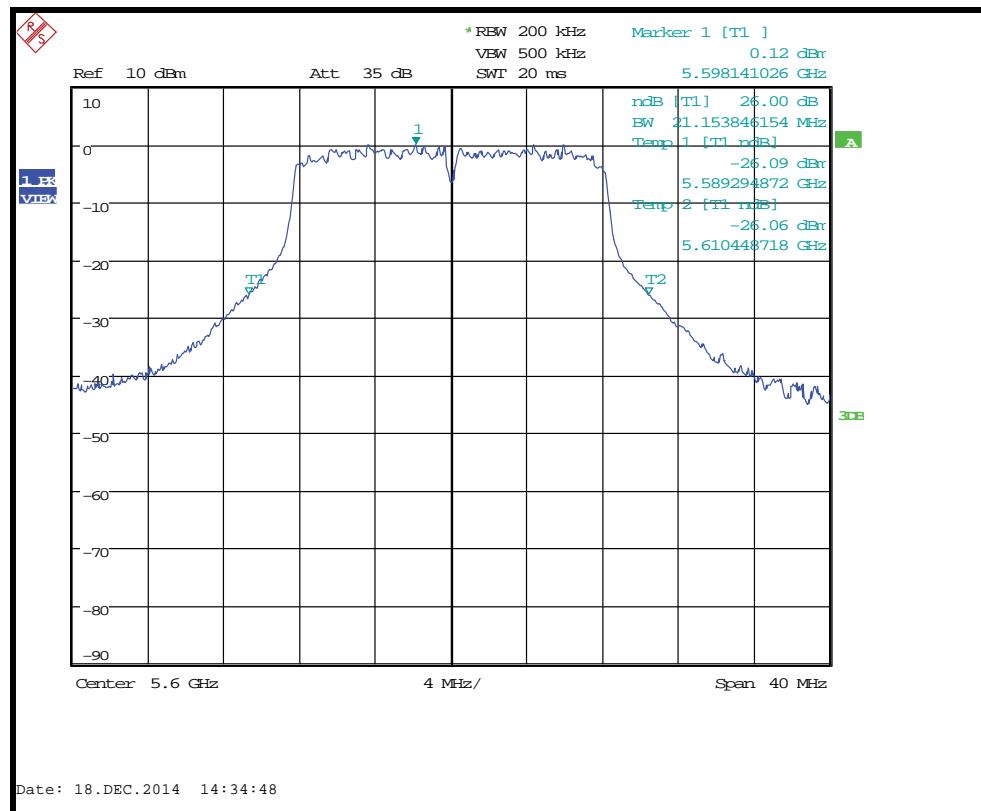
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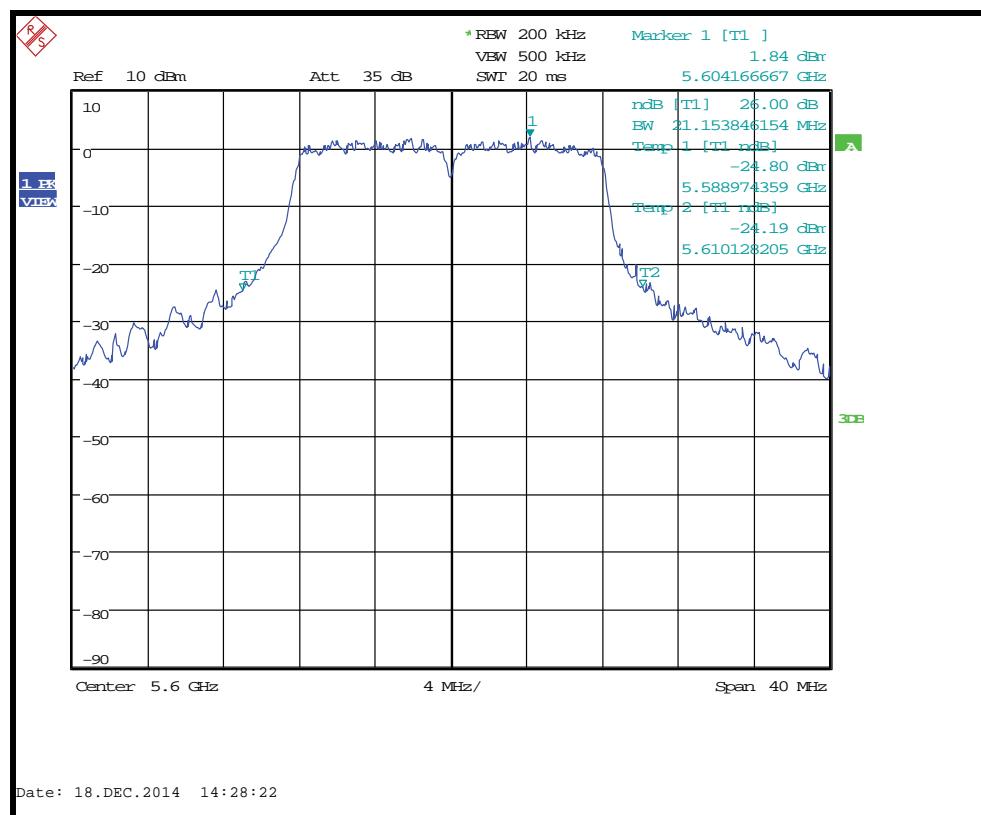
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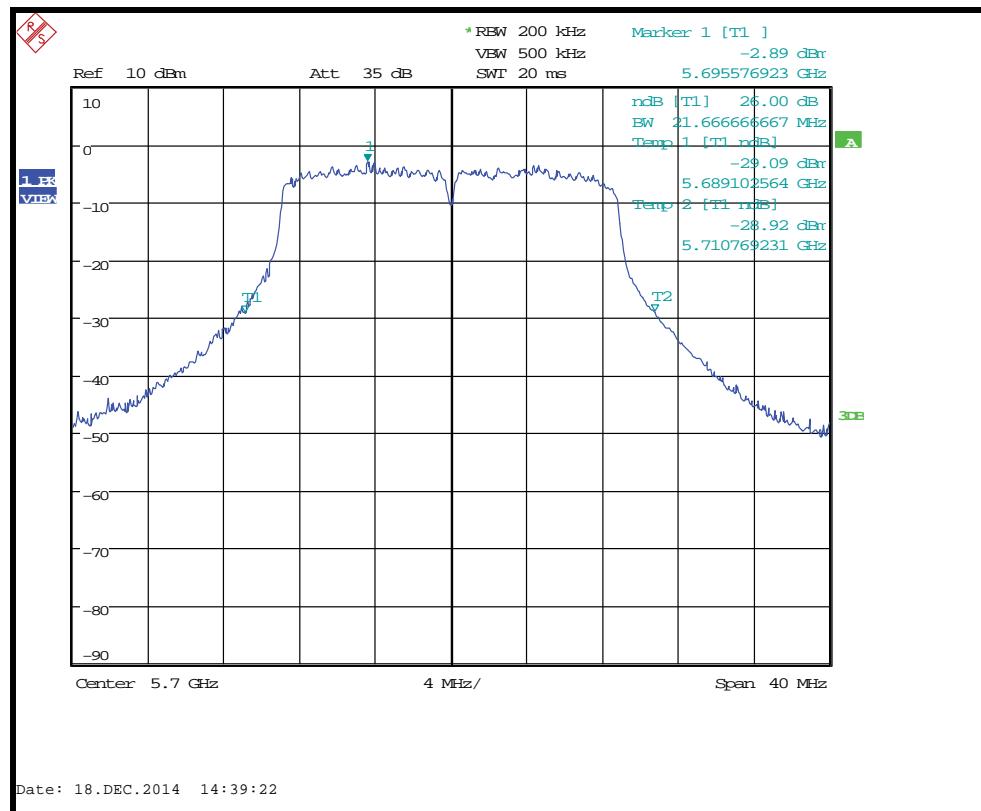
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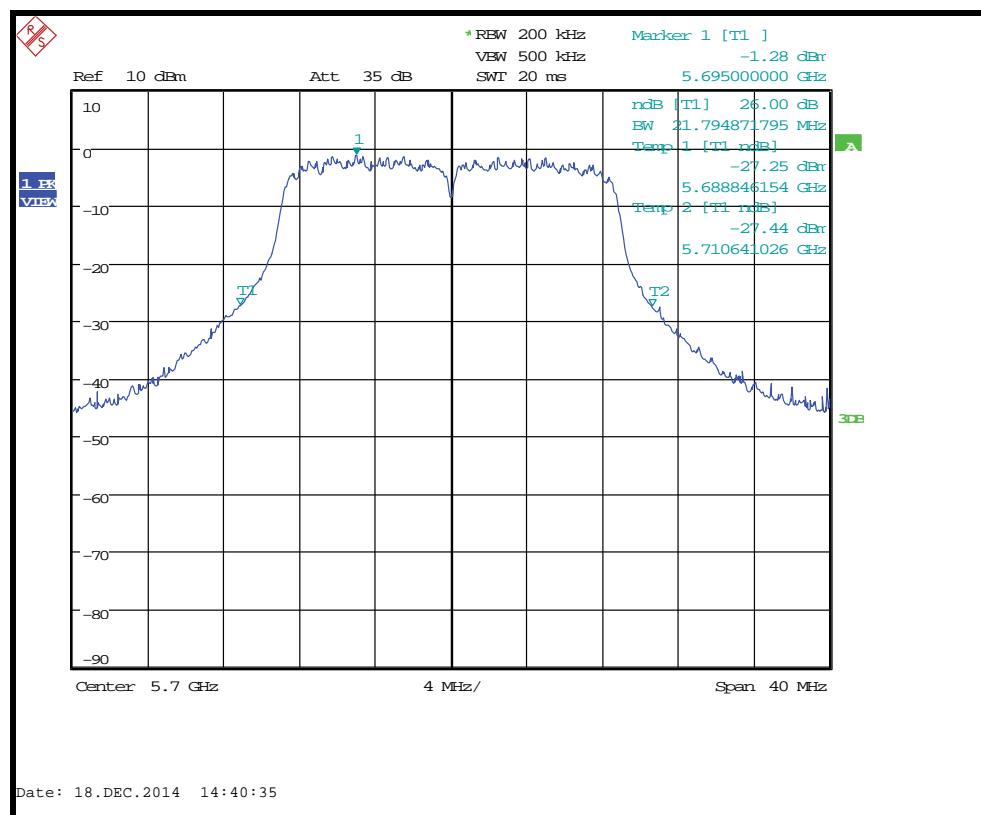
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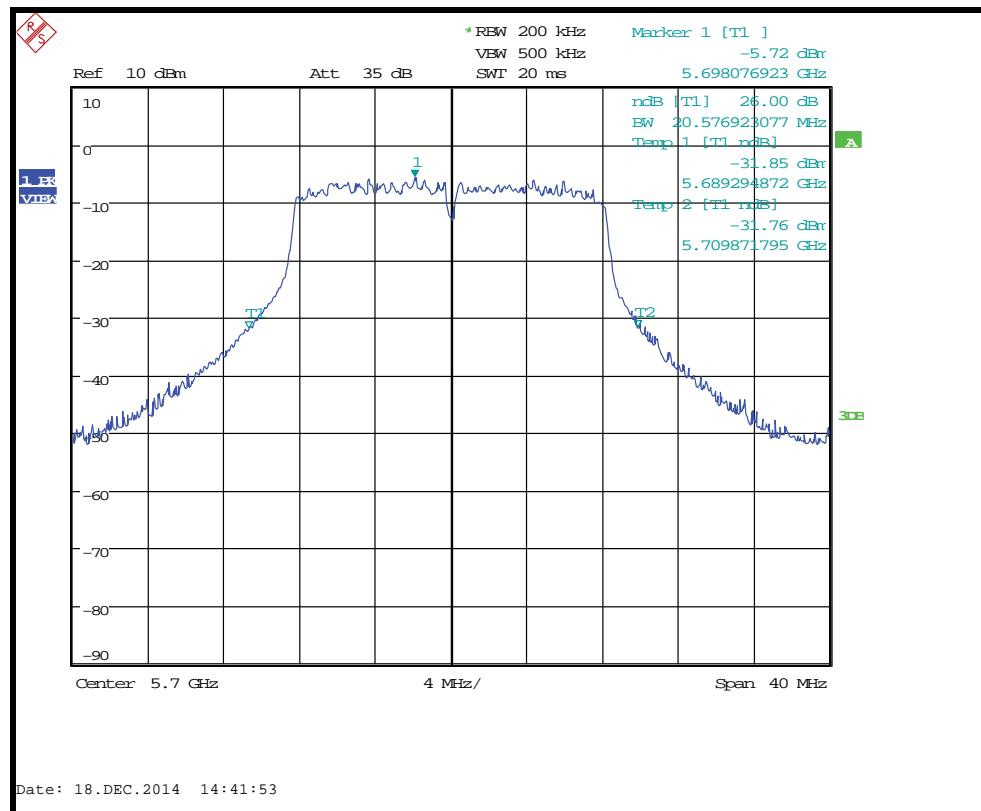
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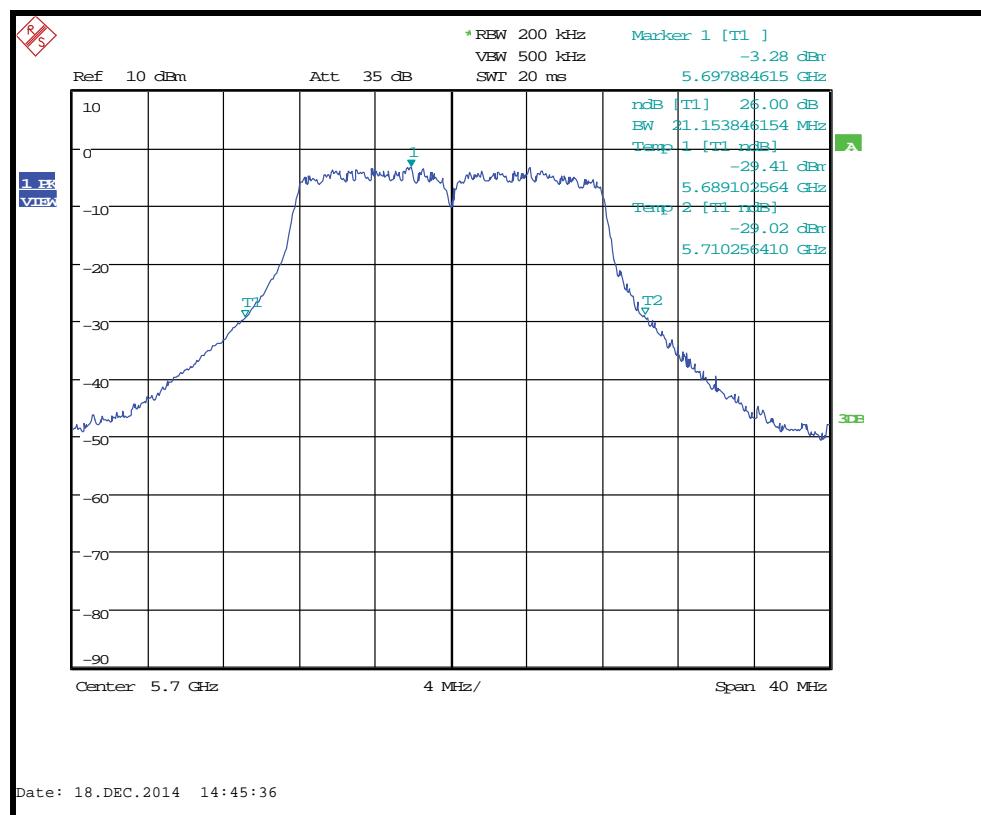
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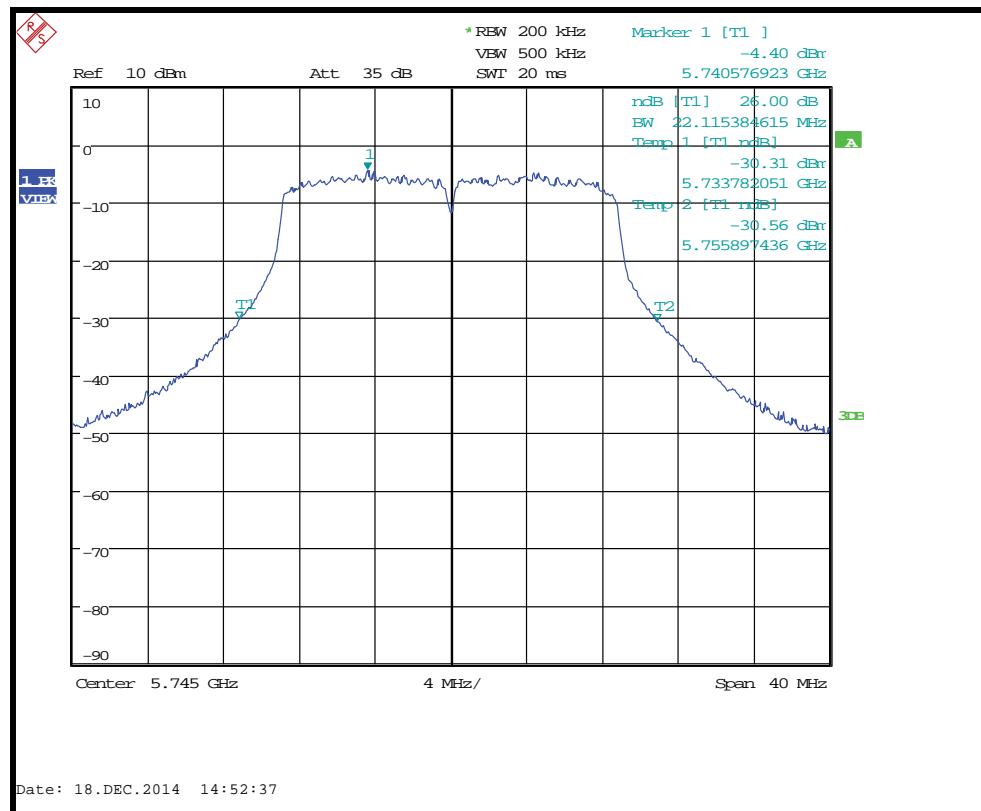
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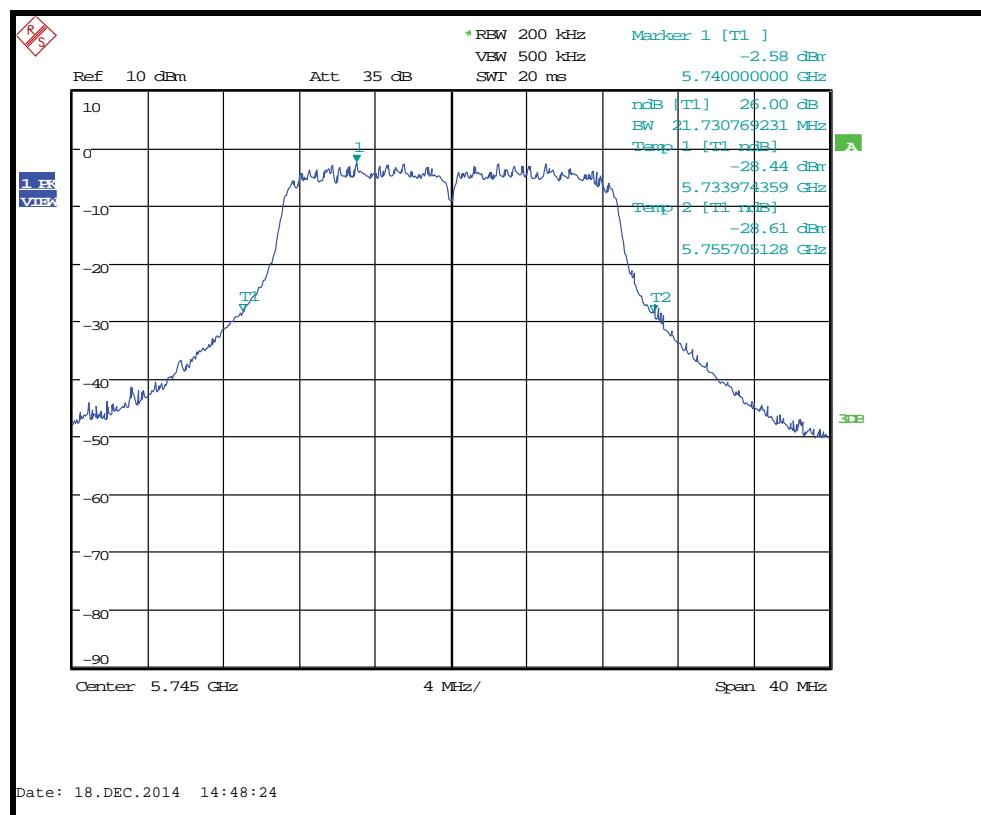
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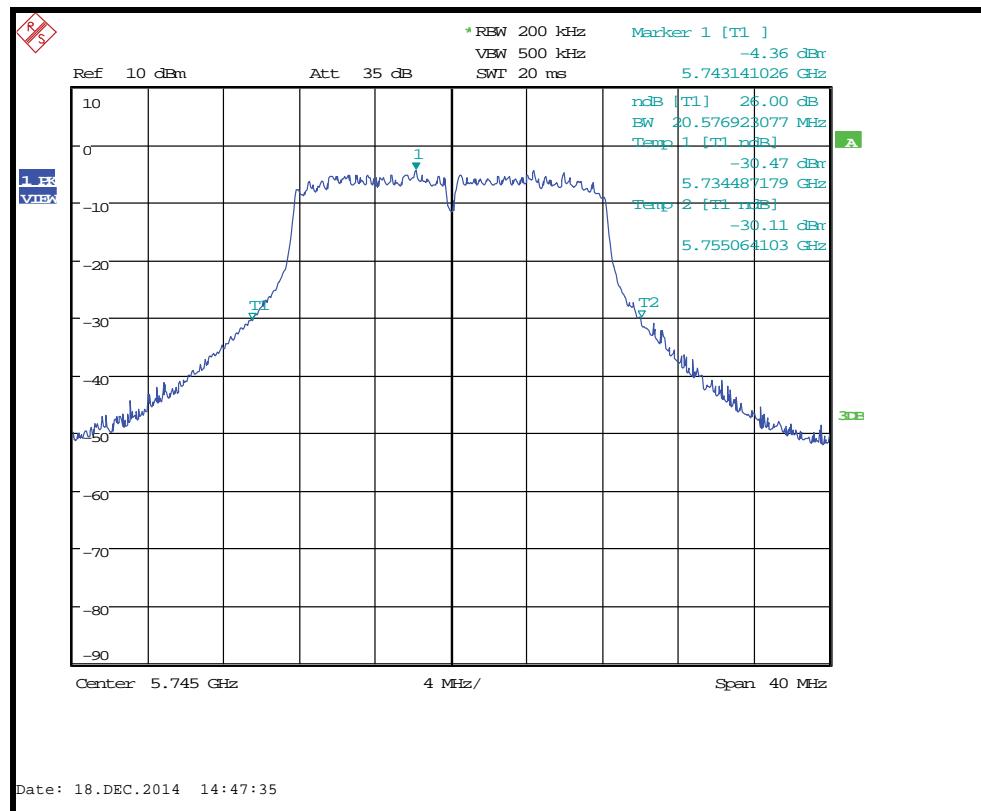
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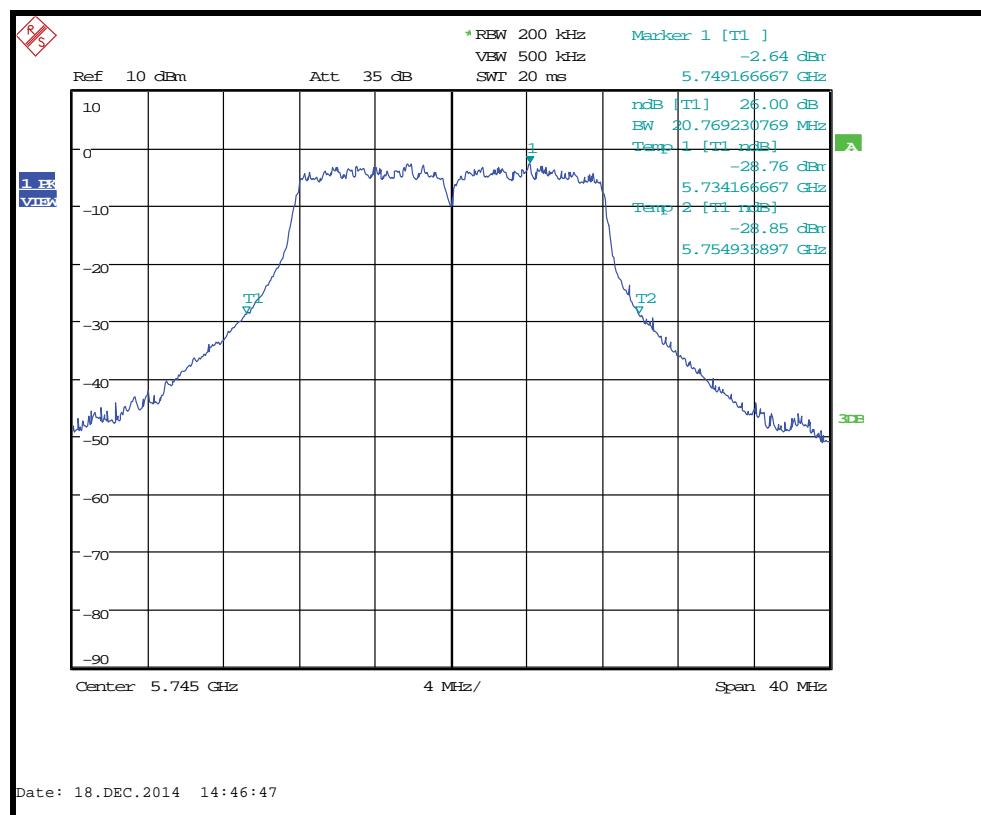
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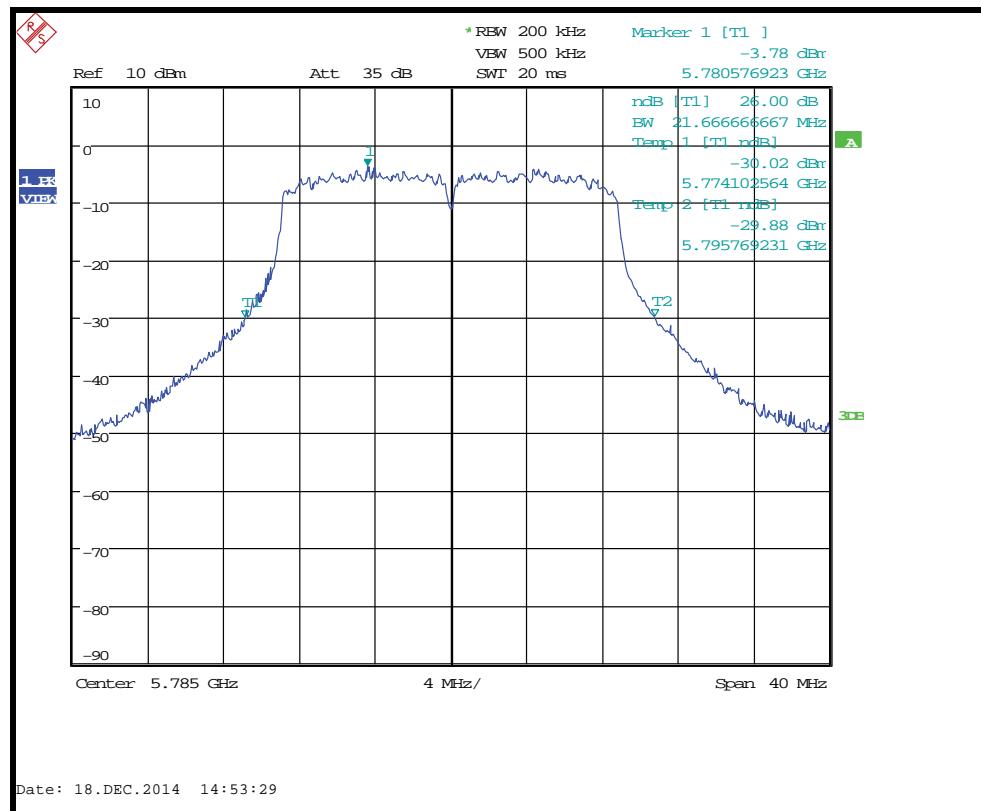
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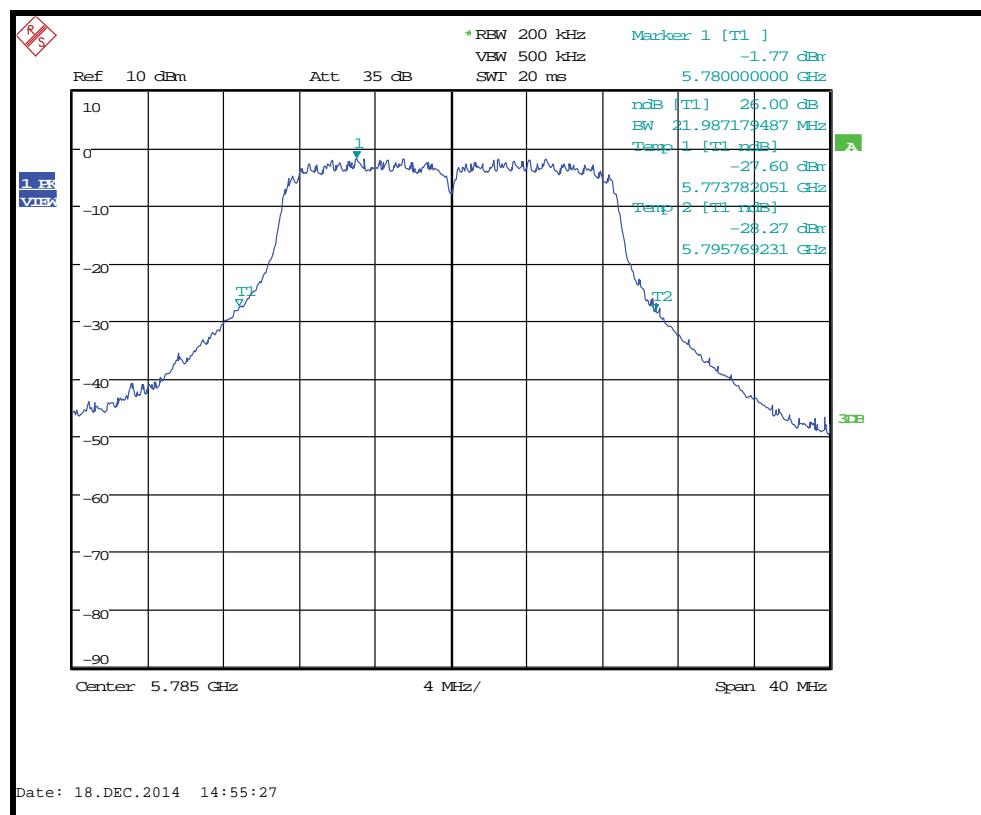
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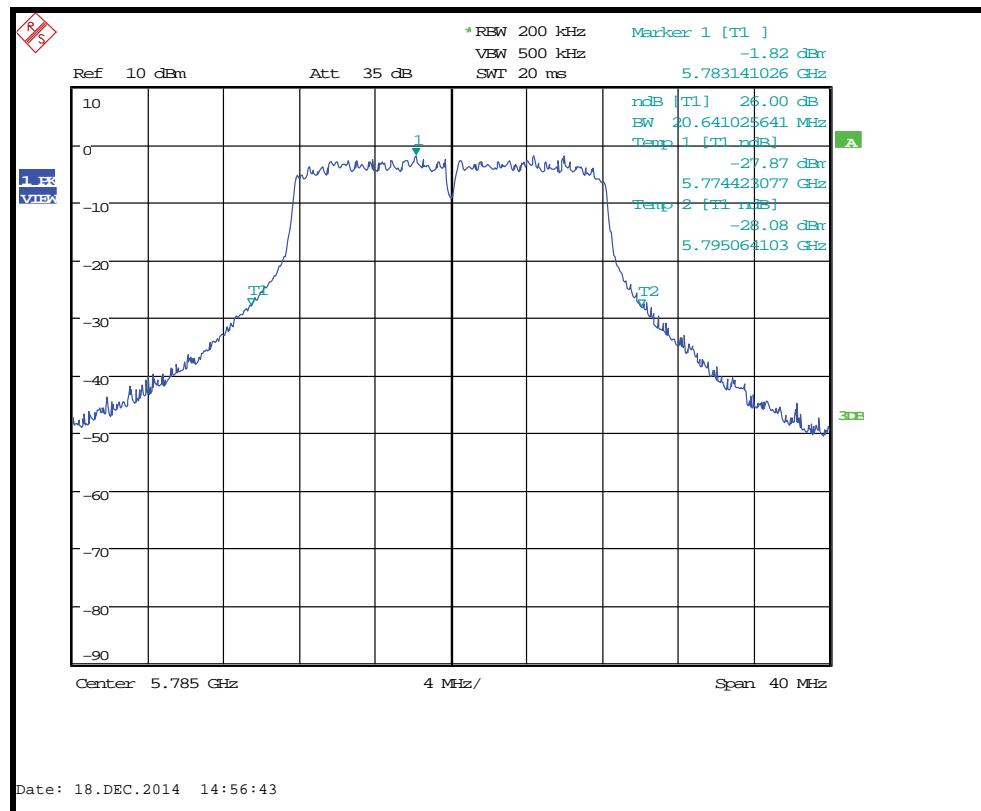
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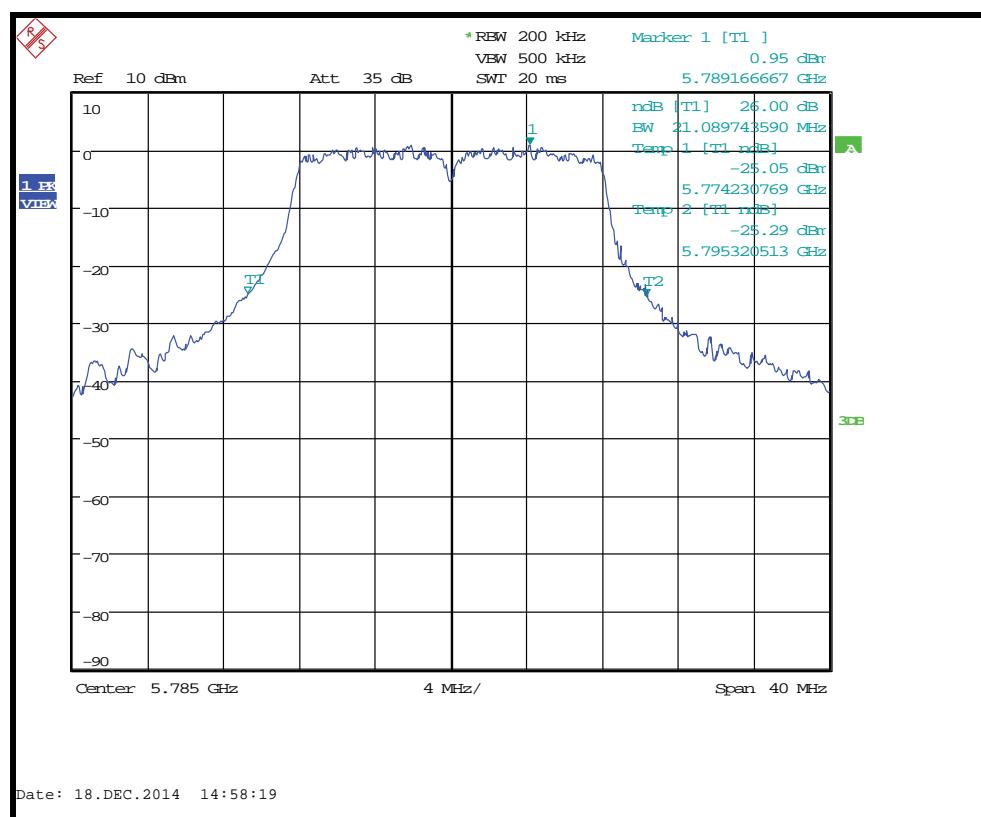
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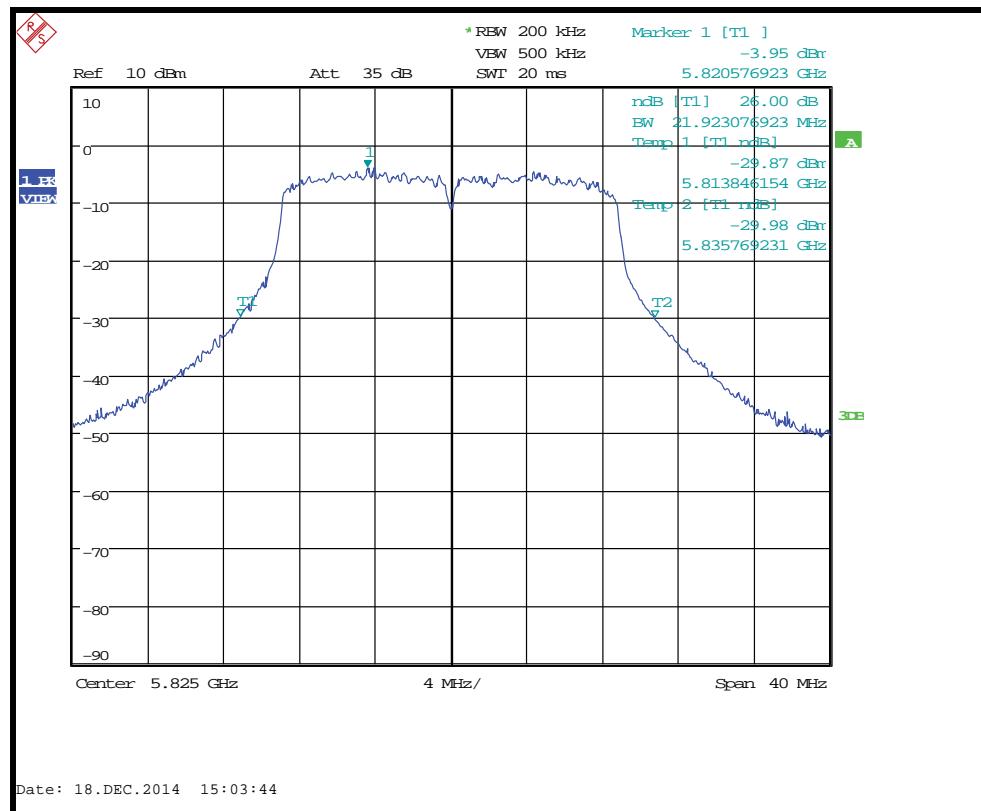
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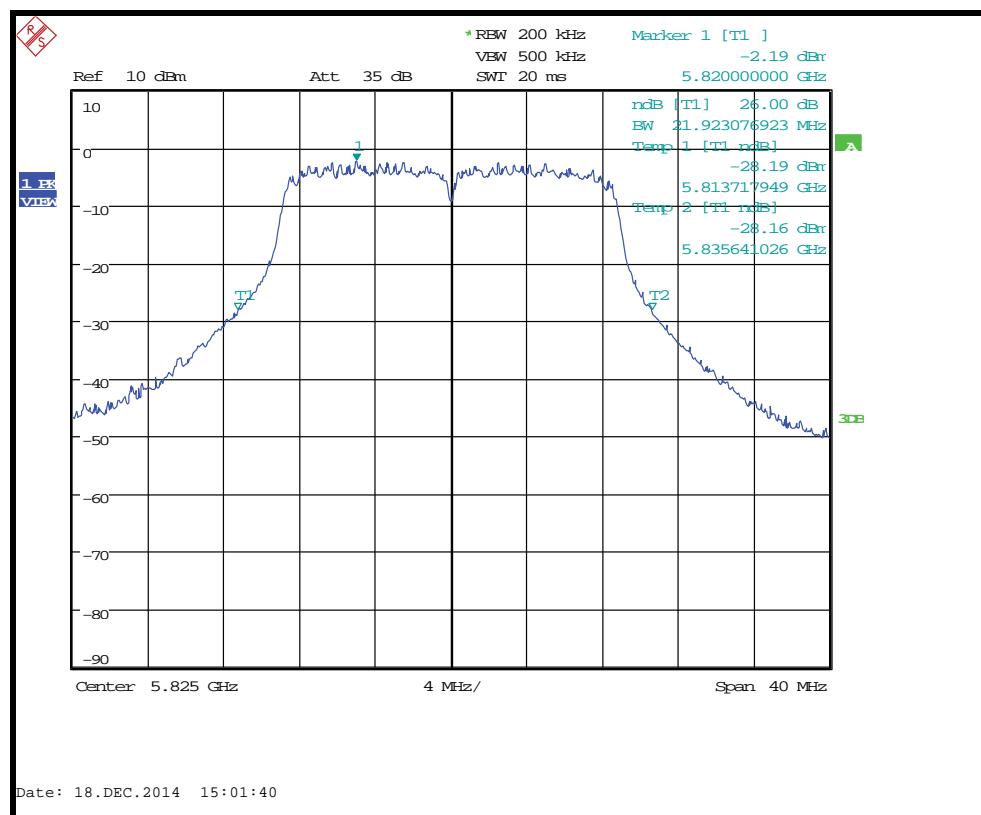
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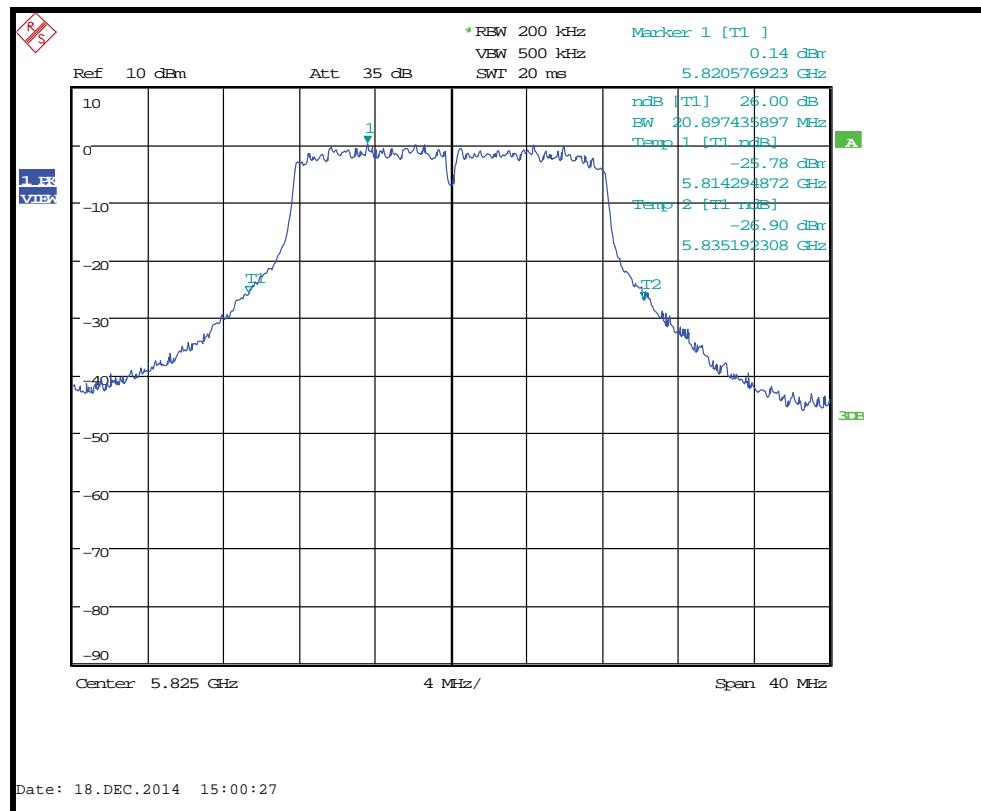
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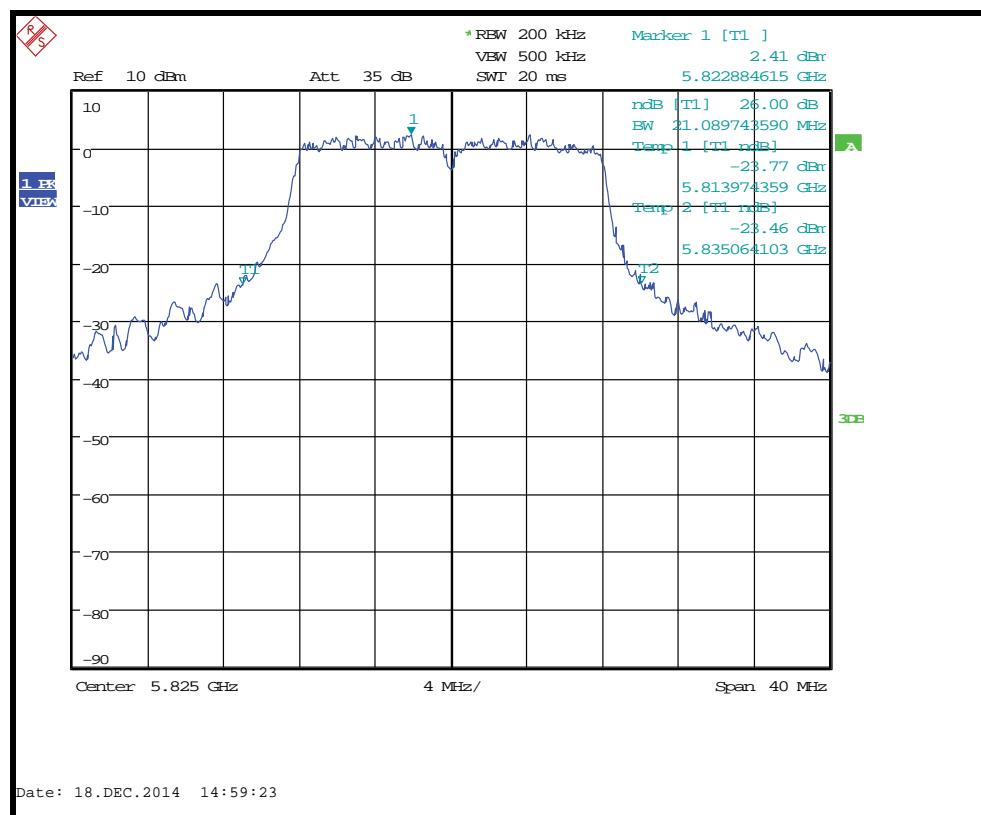
## 26dB Bandwidth 5825MHz MCS6



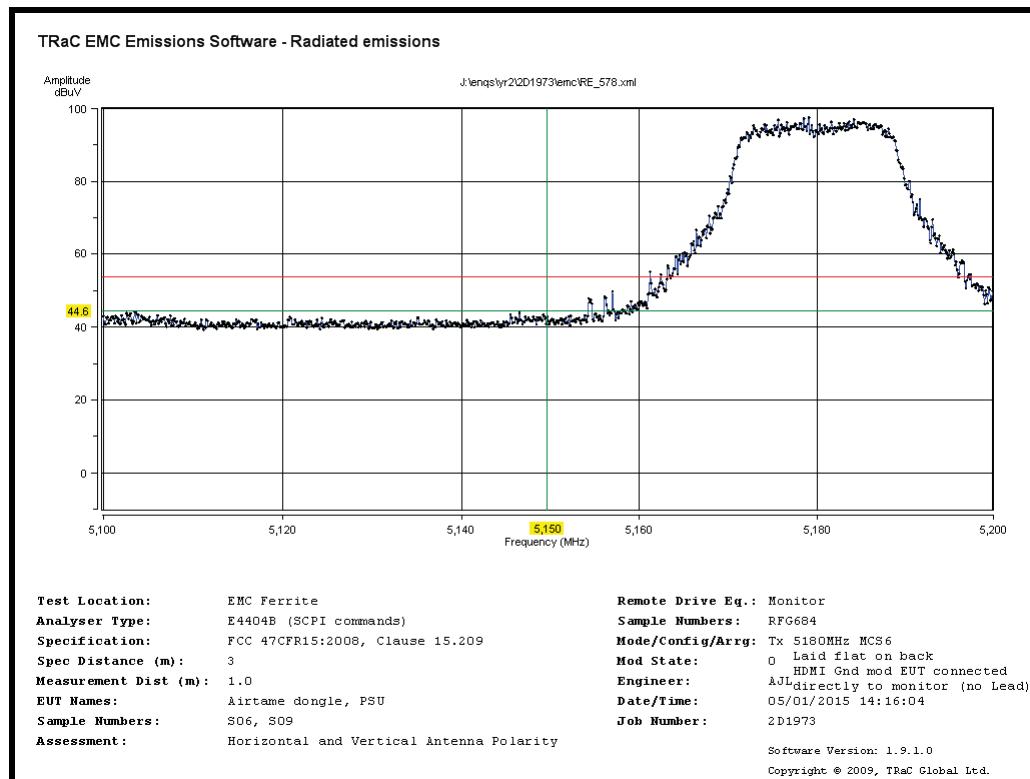
## 26dB Bandwidth 5825MHz MCS0



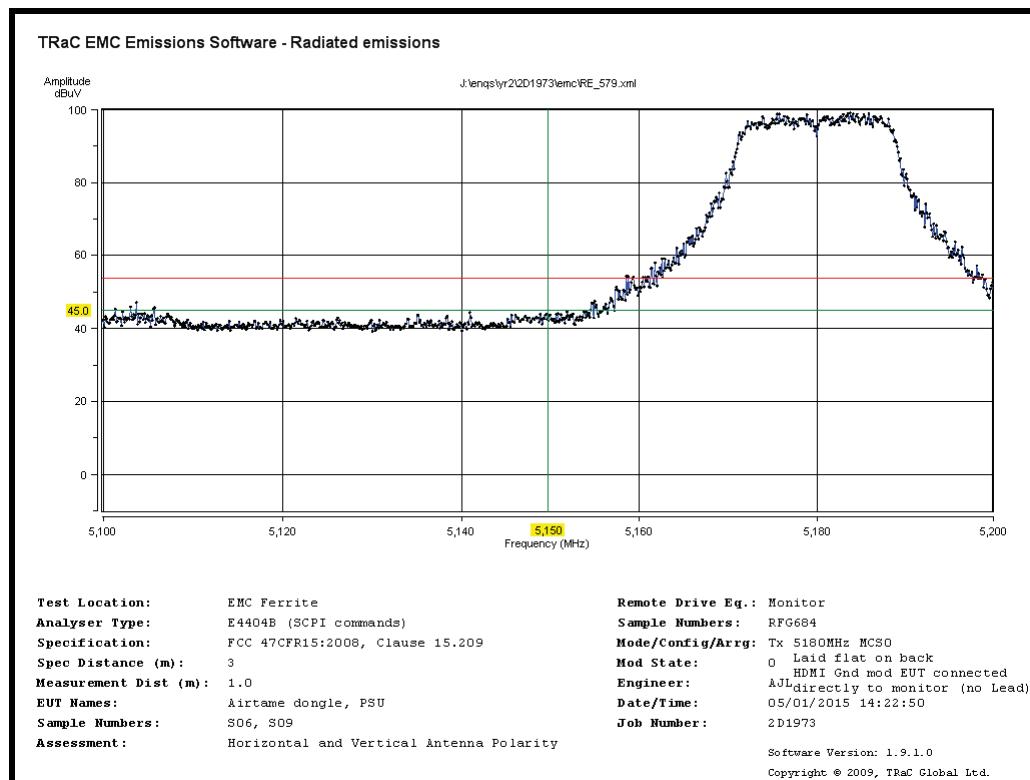
26dB Bandwidth 5825MHz 54Mb/s



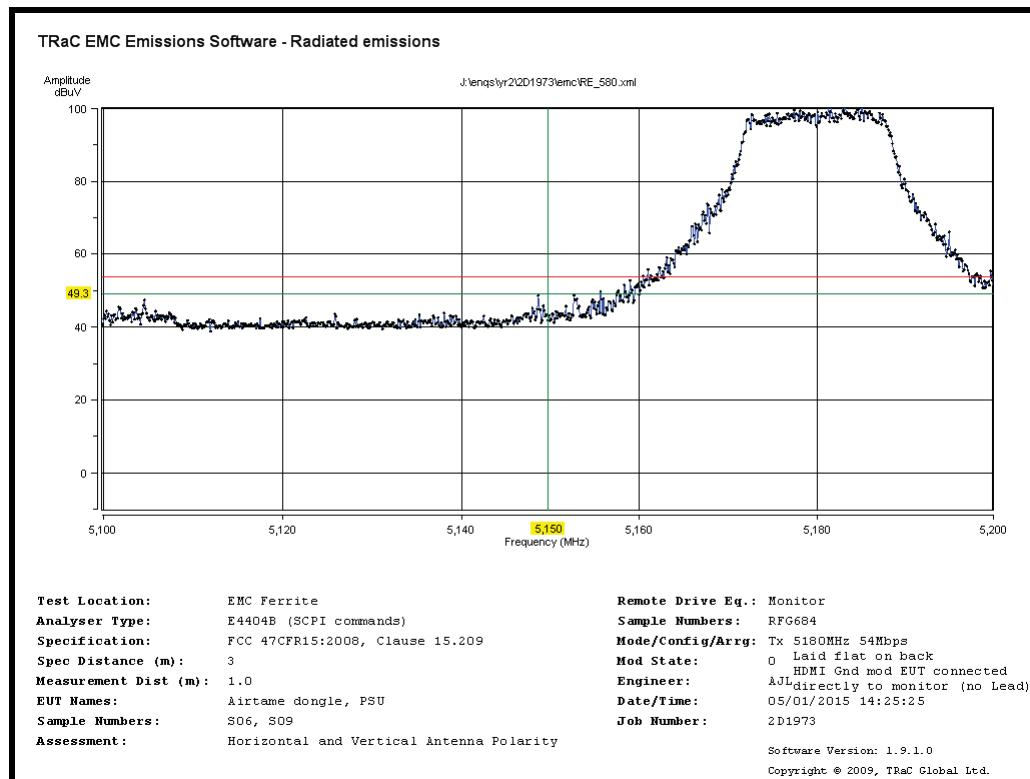
26dB Bandwidth 5180MHz 6Mb/s



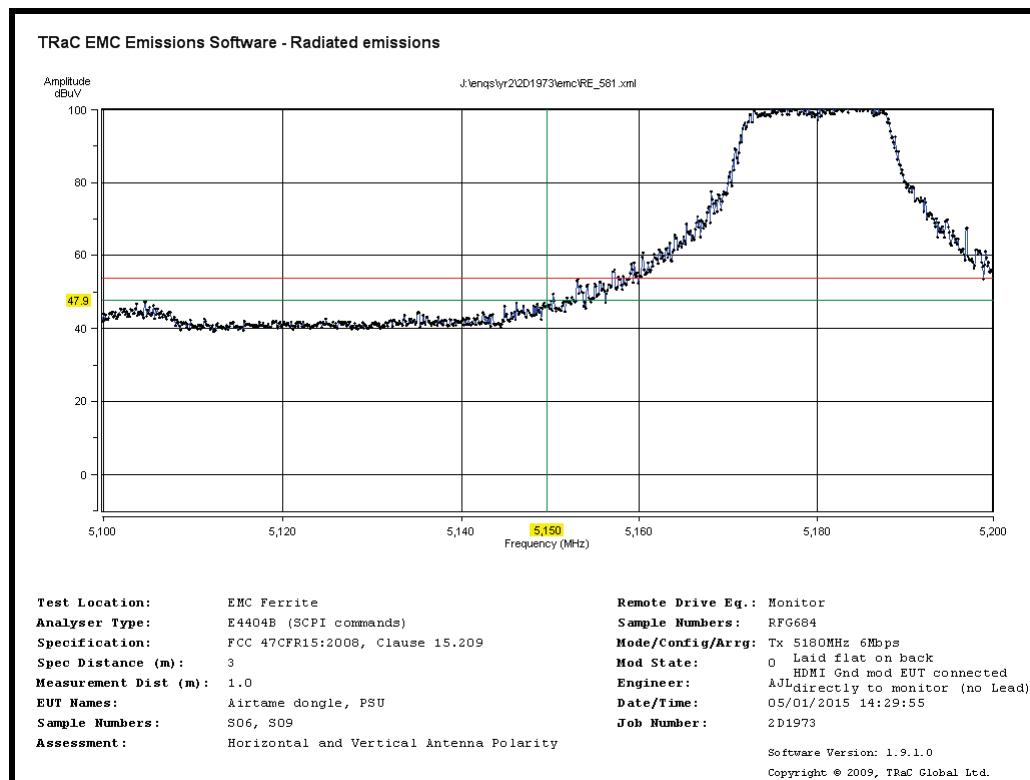
### Radiated Lower Band Edge 5180MHz MCS6



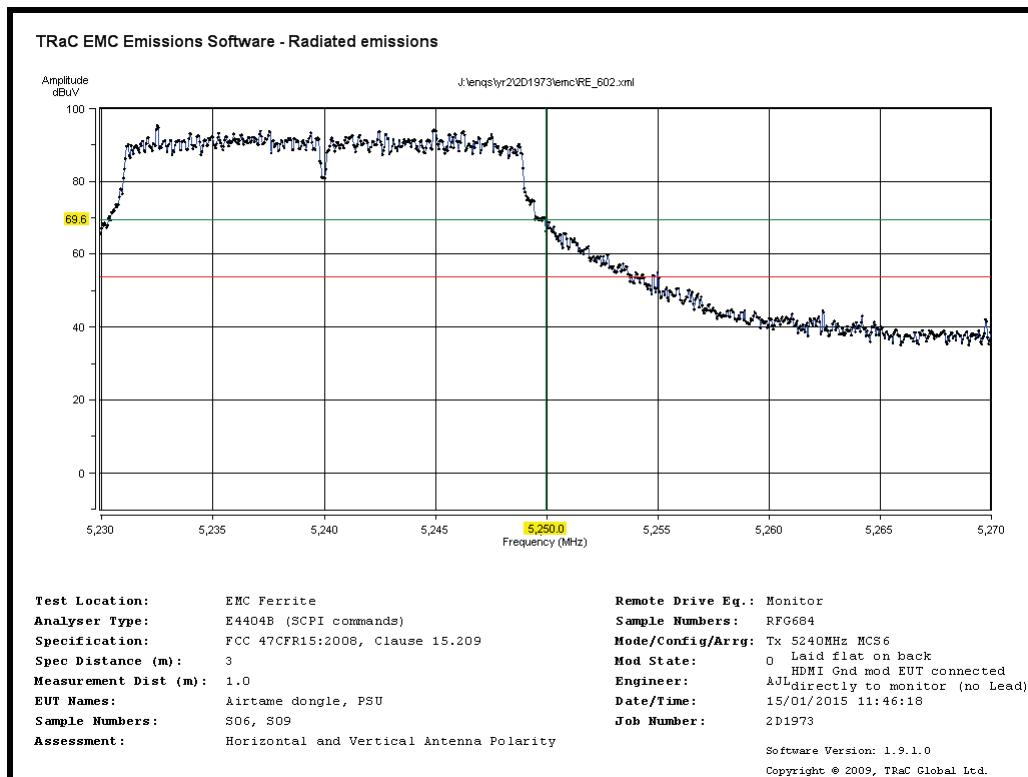
### Radiated Lower Band Edge 5180MHz MCS0



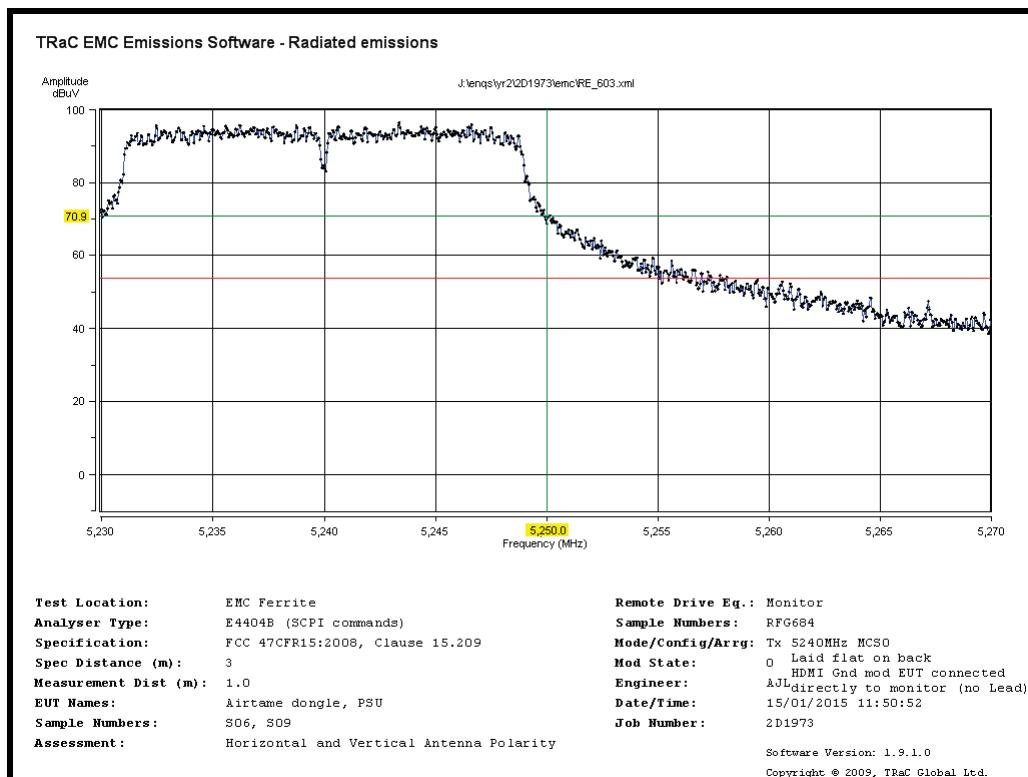
### Radiated Lower Band Edge 5180MHz 54Mb/s



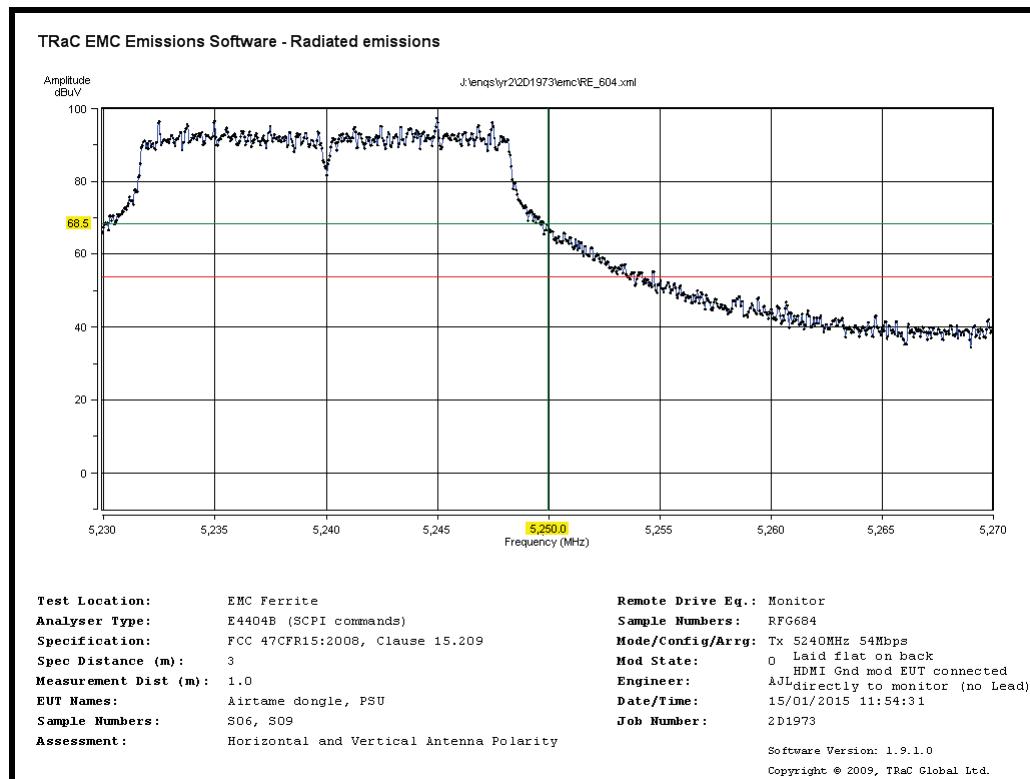
### Radiated Lower Band Edge 5180MHz 6Mb/s



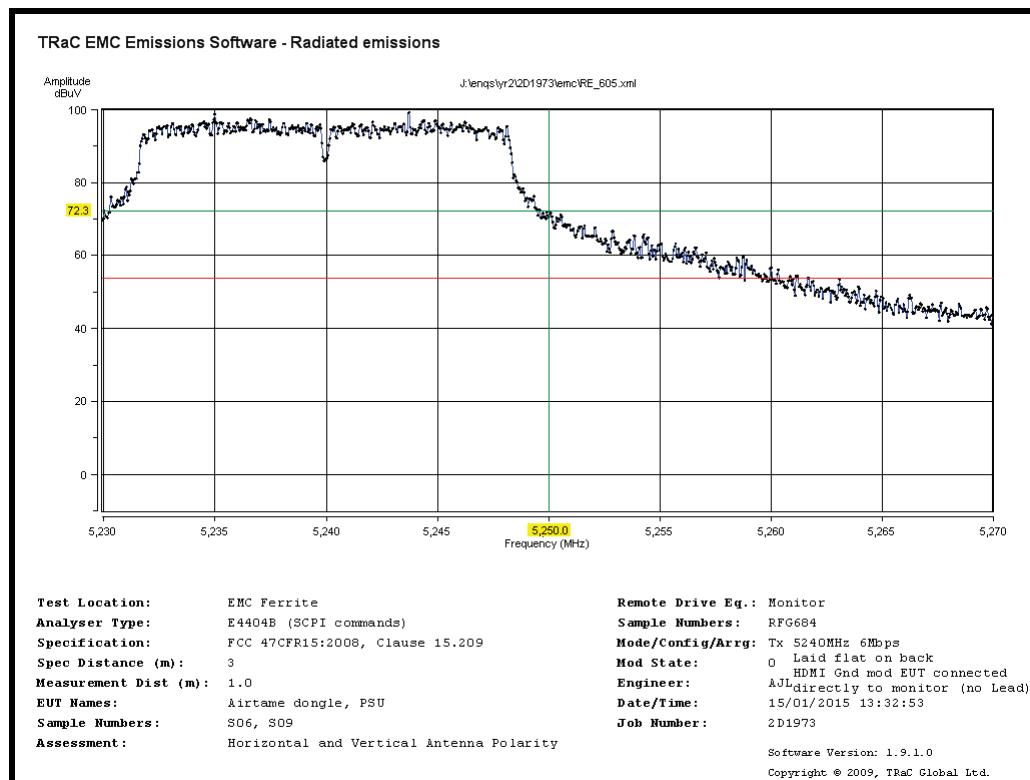
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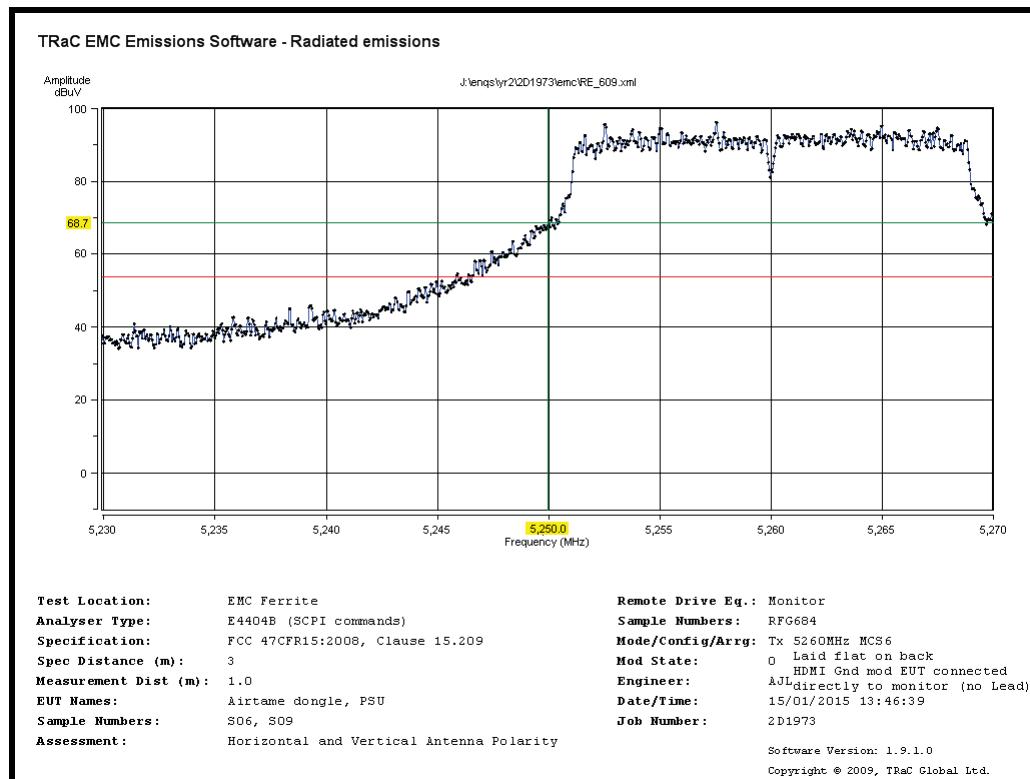
### Radiated Upper Band Edge 5240MHz MCS0



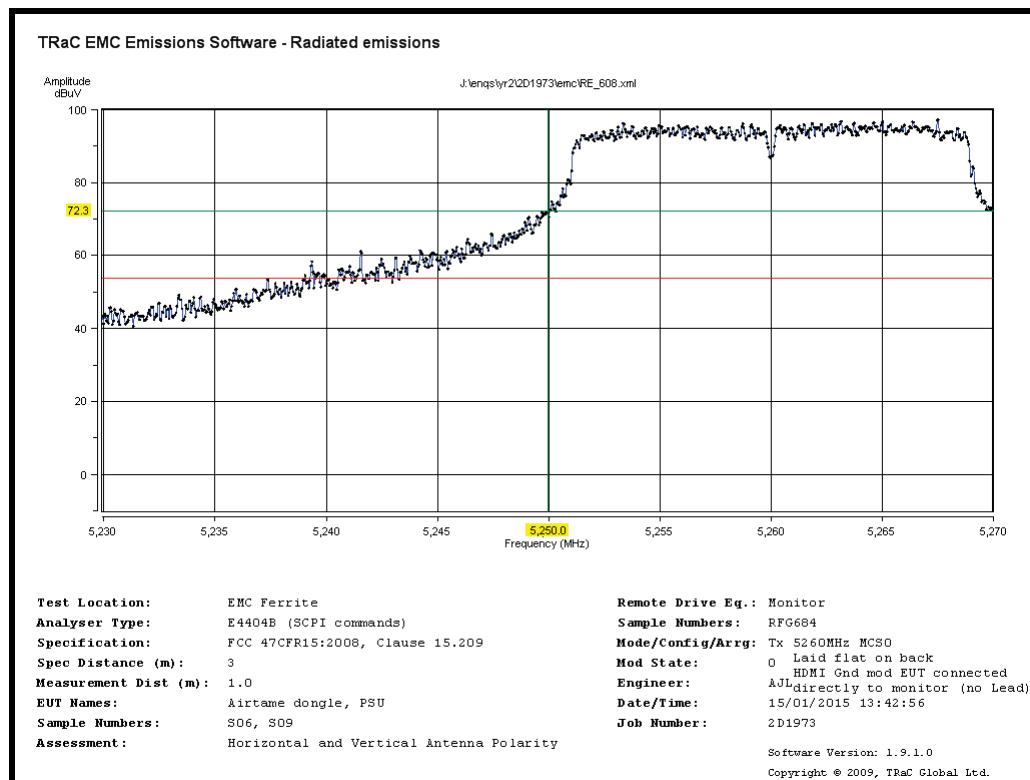
### Radiated Upper Band Edge 5240MHz 54Mb/s



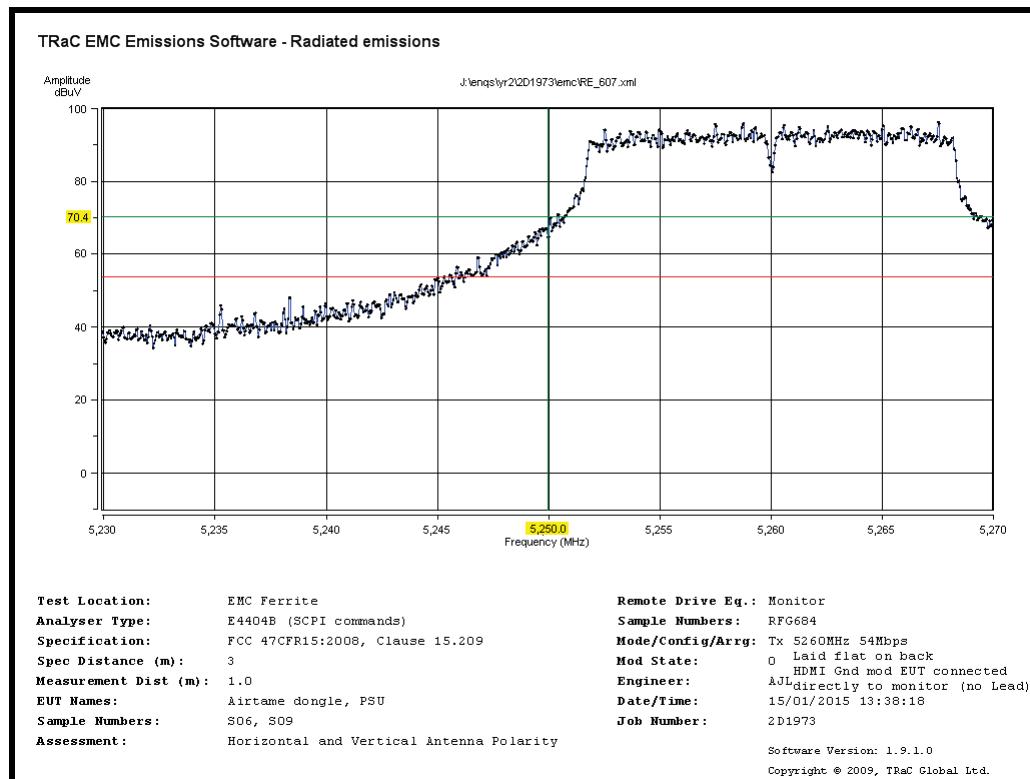
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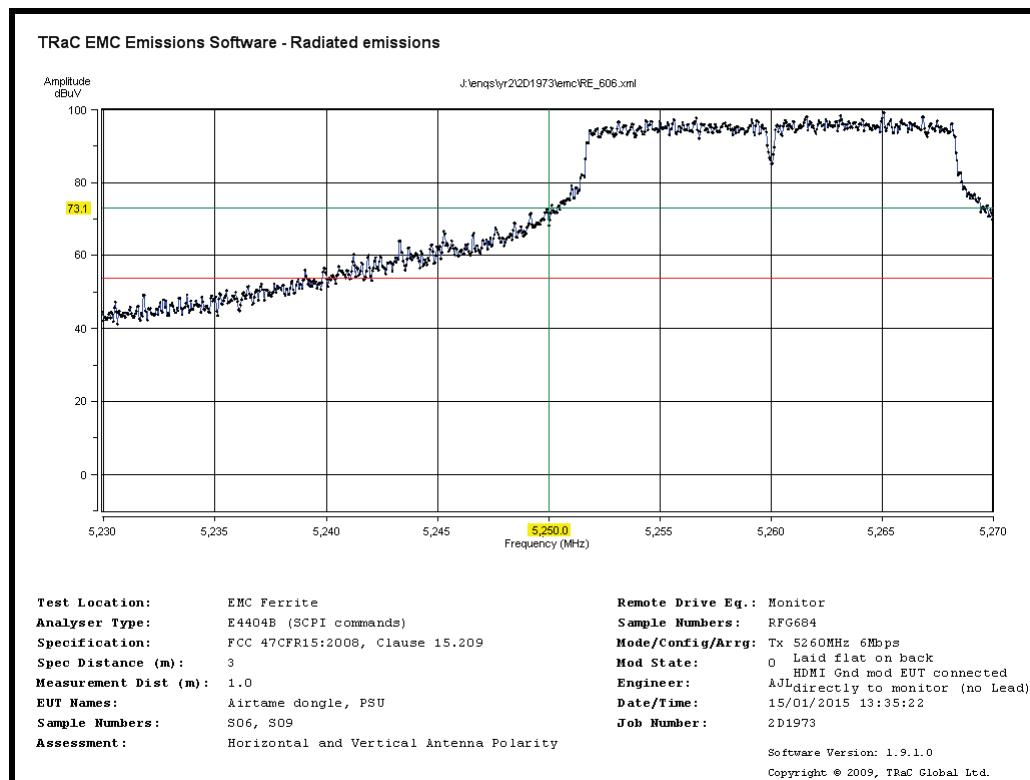
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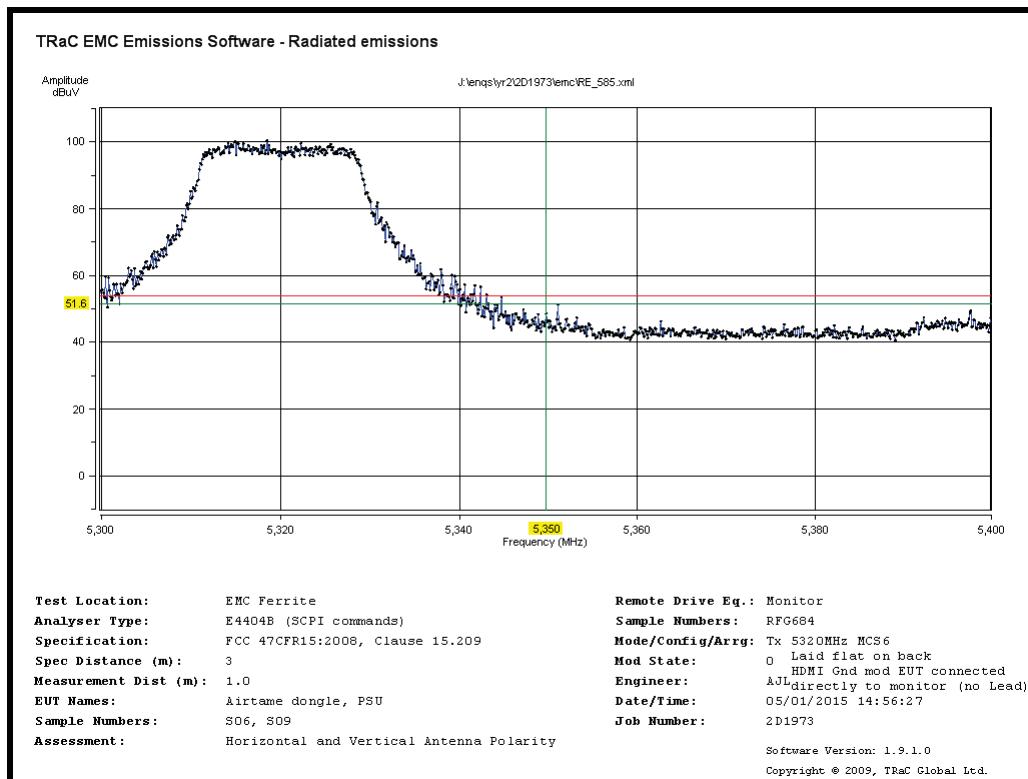
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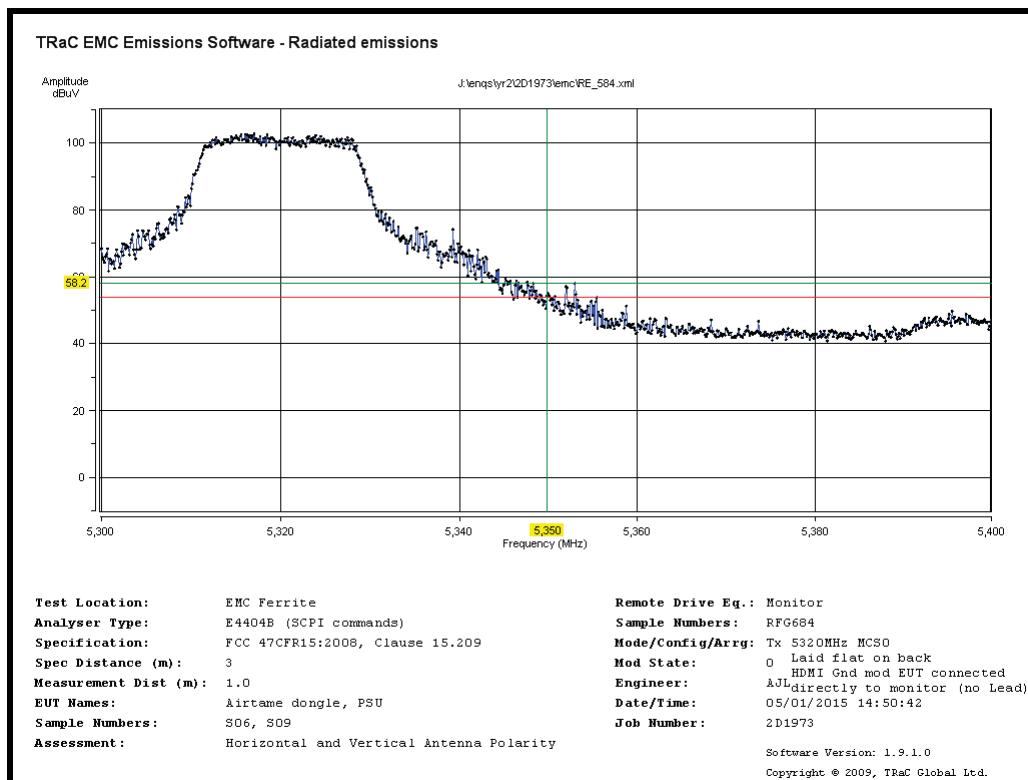
### Radiated Upper Band Edge 5260MHz 54Mb/s



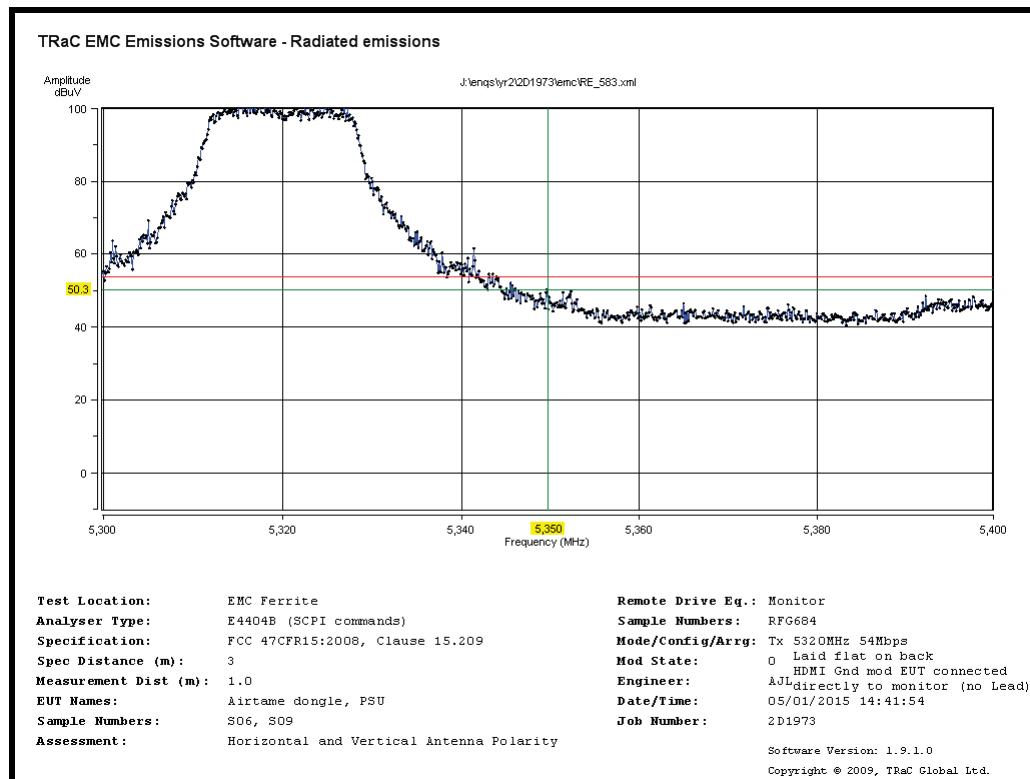
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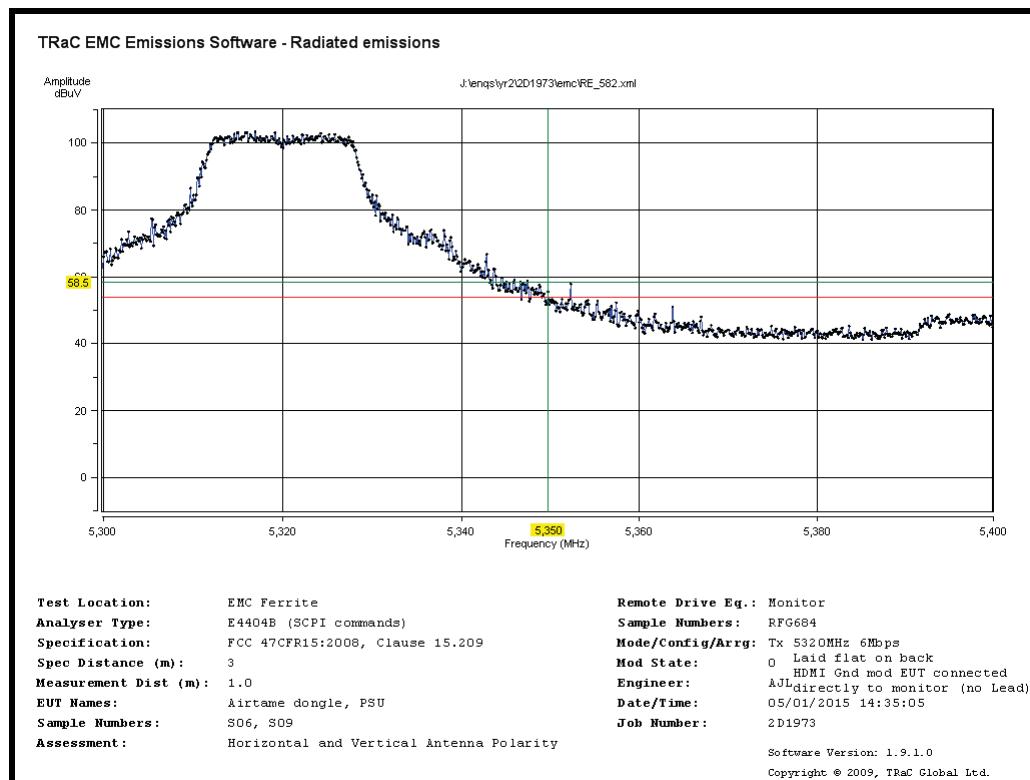
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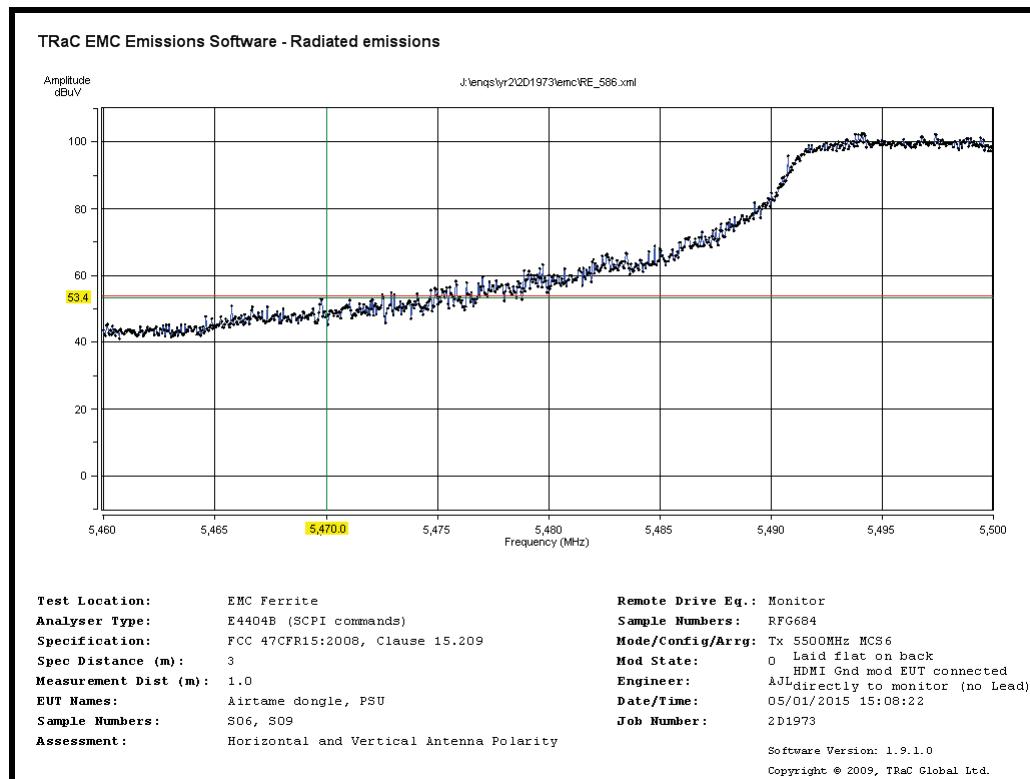
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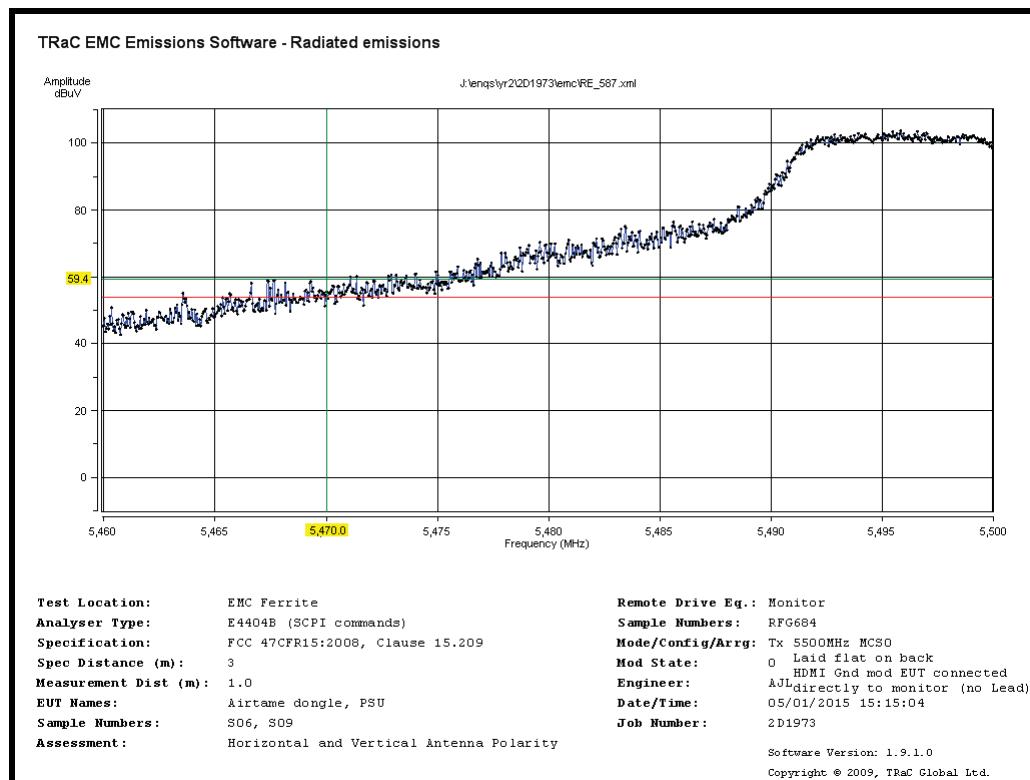
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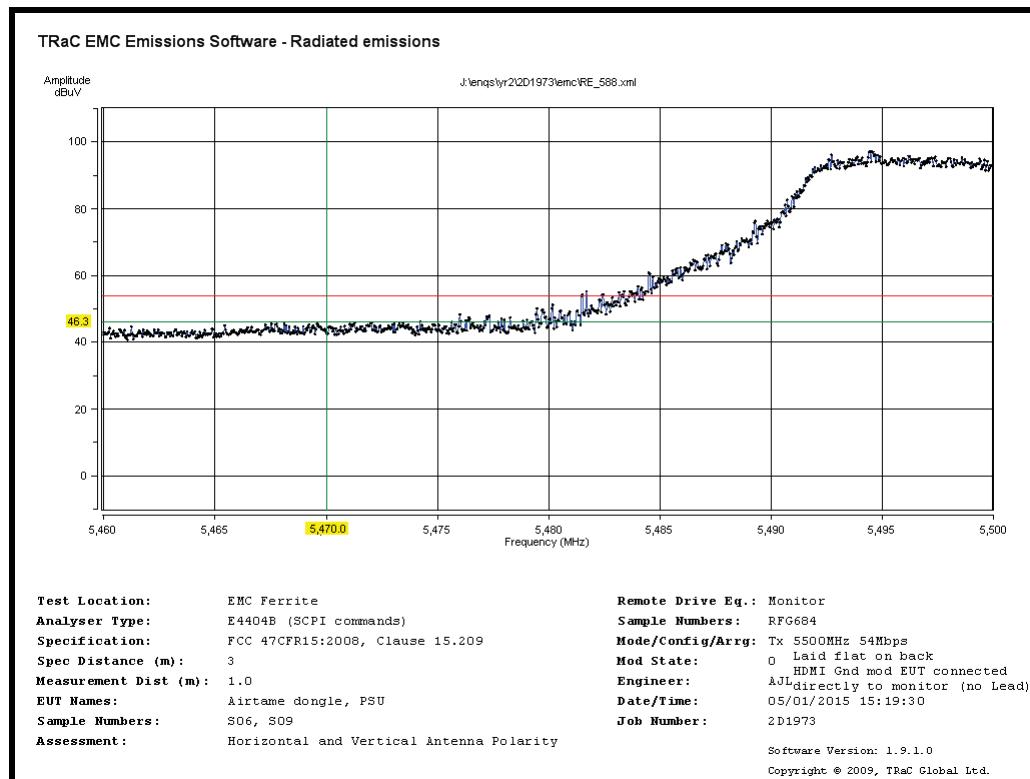
### Radiated Lower Band Edge 5320MHz 6Mb/s



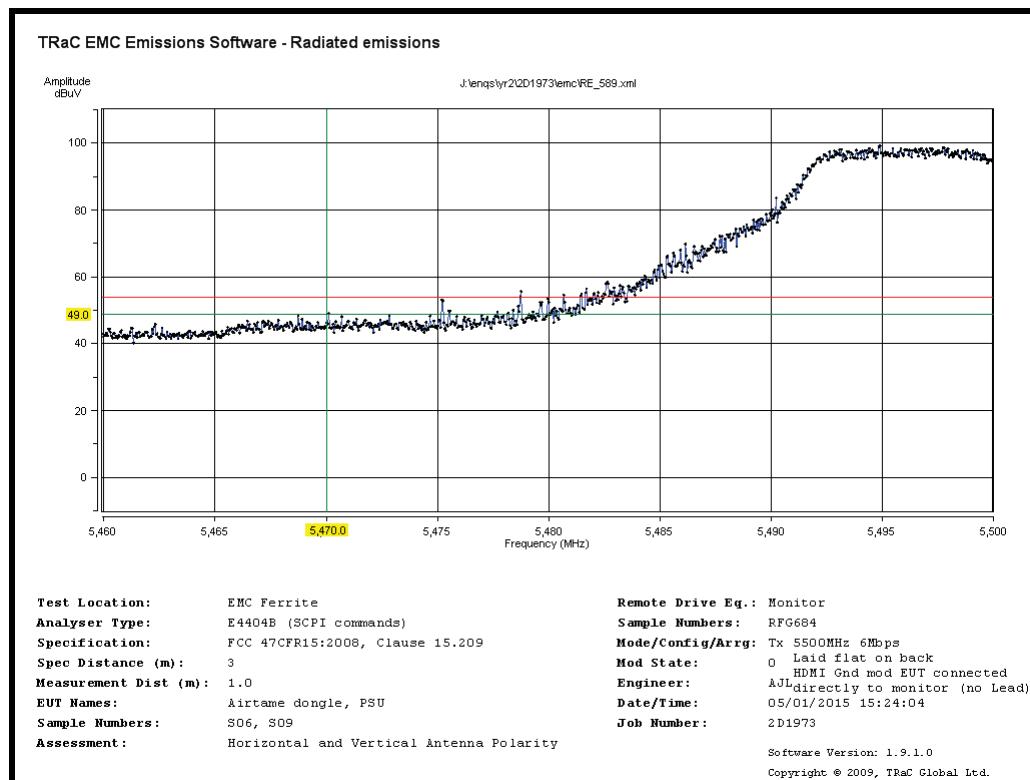
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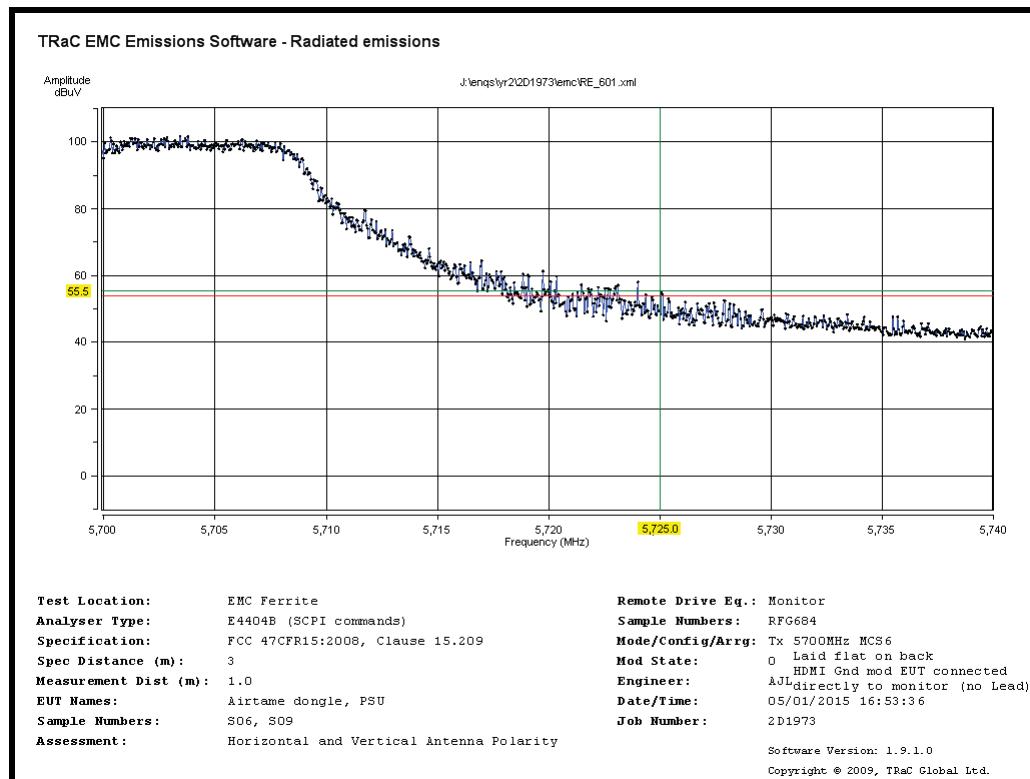
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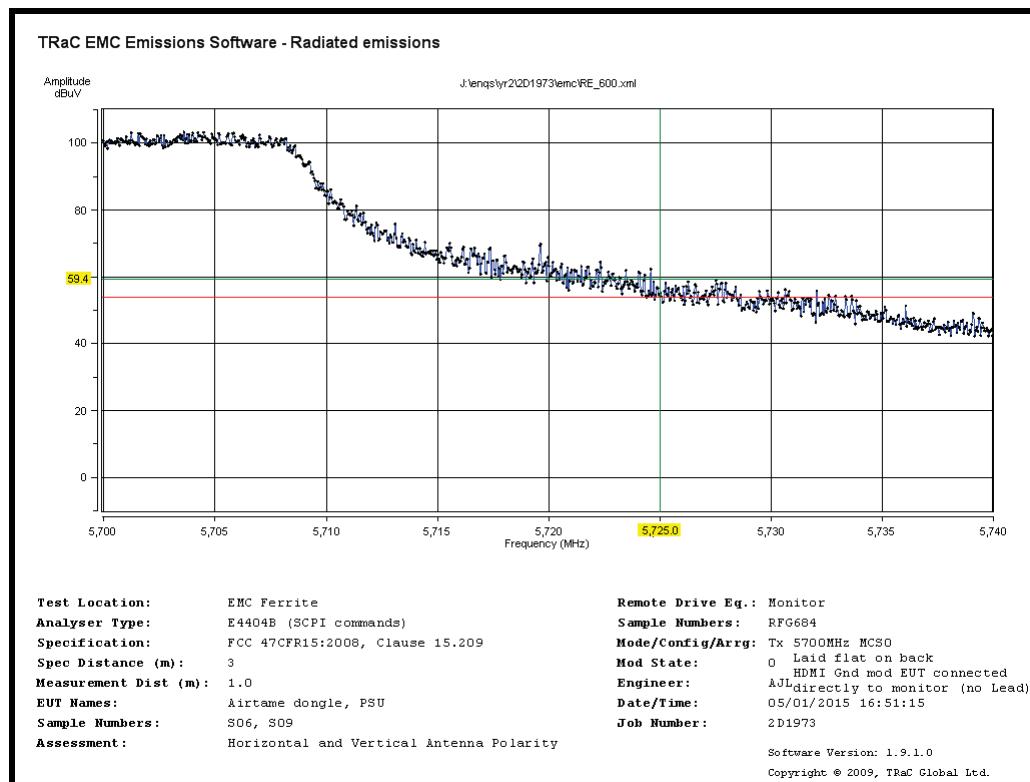
### Radiated Lower Band Edge 5500MHz 54Mb/s



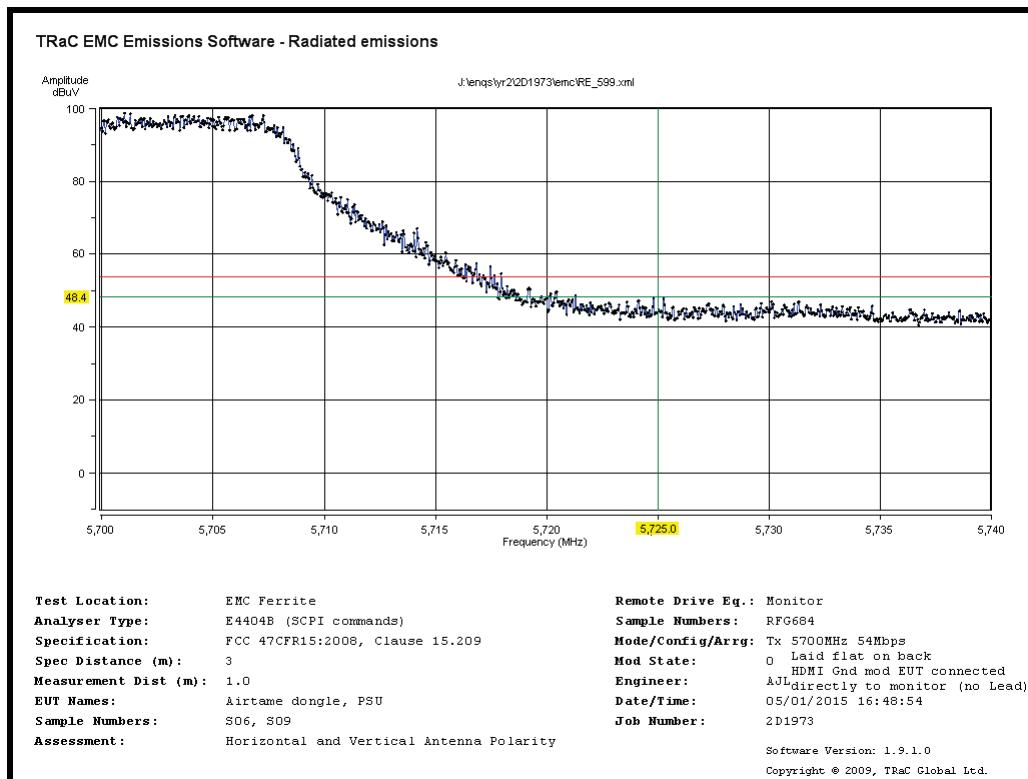
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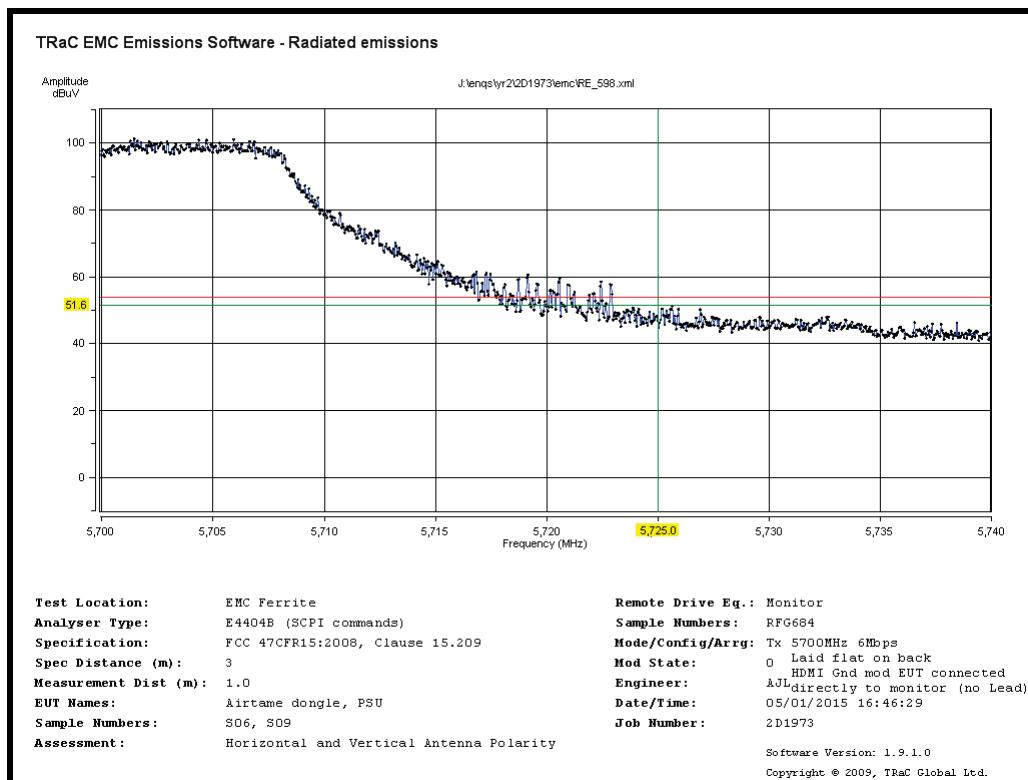
### Radiated Upper Band Edge 5700MHz MCS6



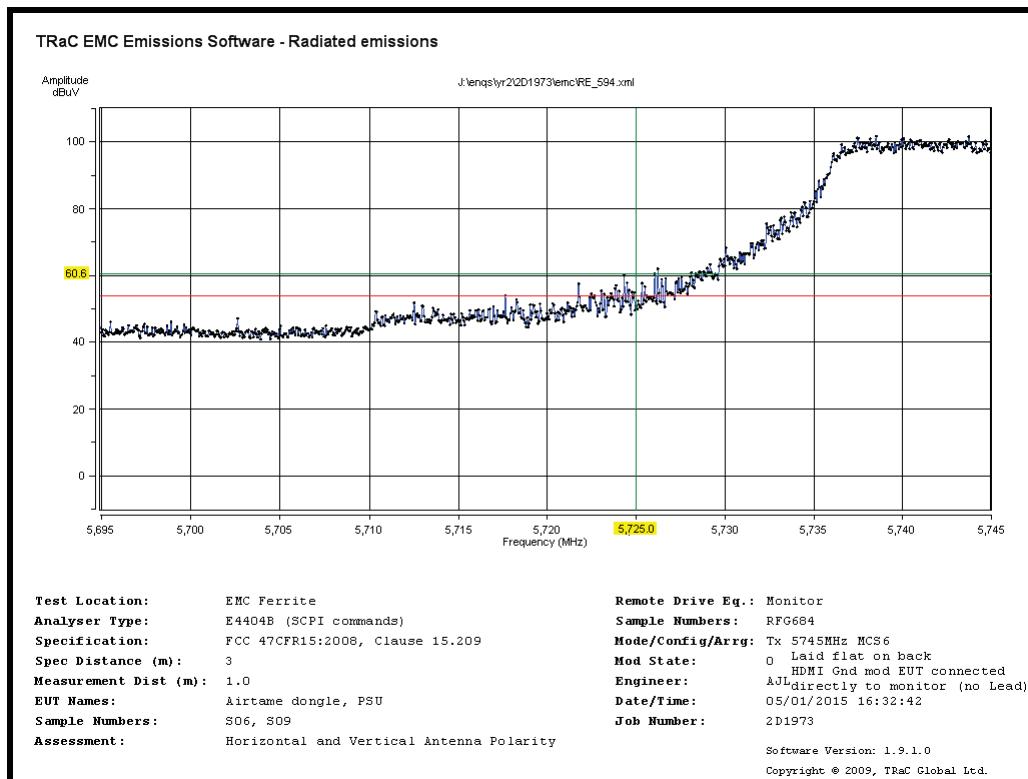
### Radiated Upper Band Edge 5700MHz MCS0



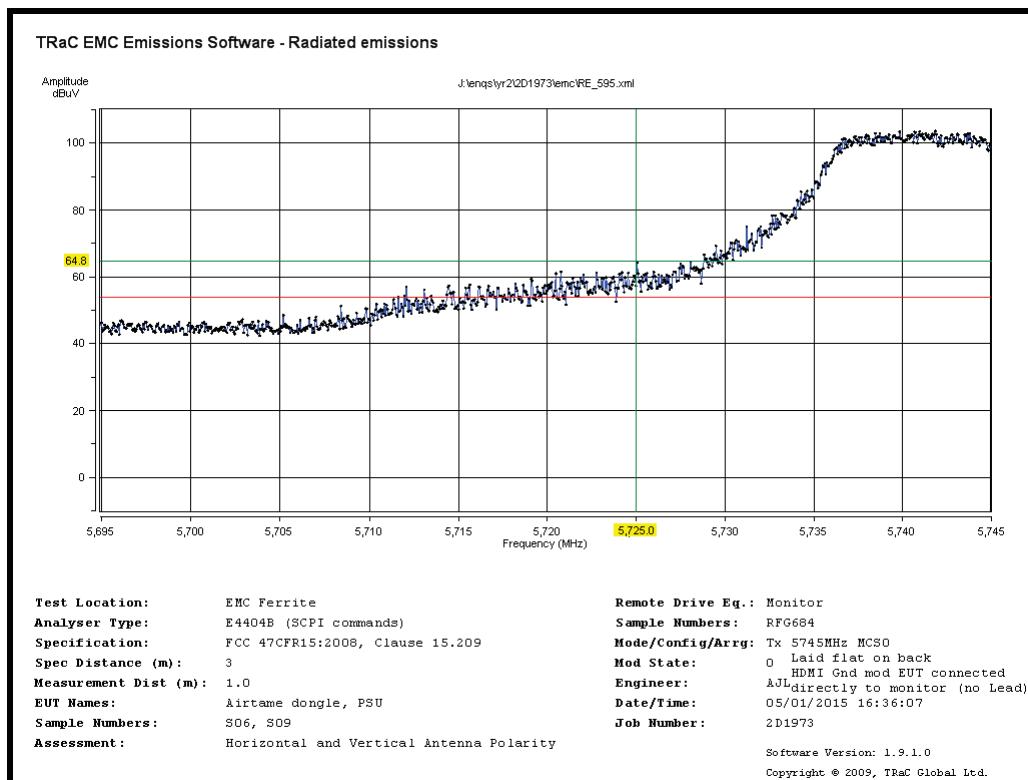
### Radiated Upper Band Edge 5700MHz 54Mb/s



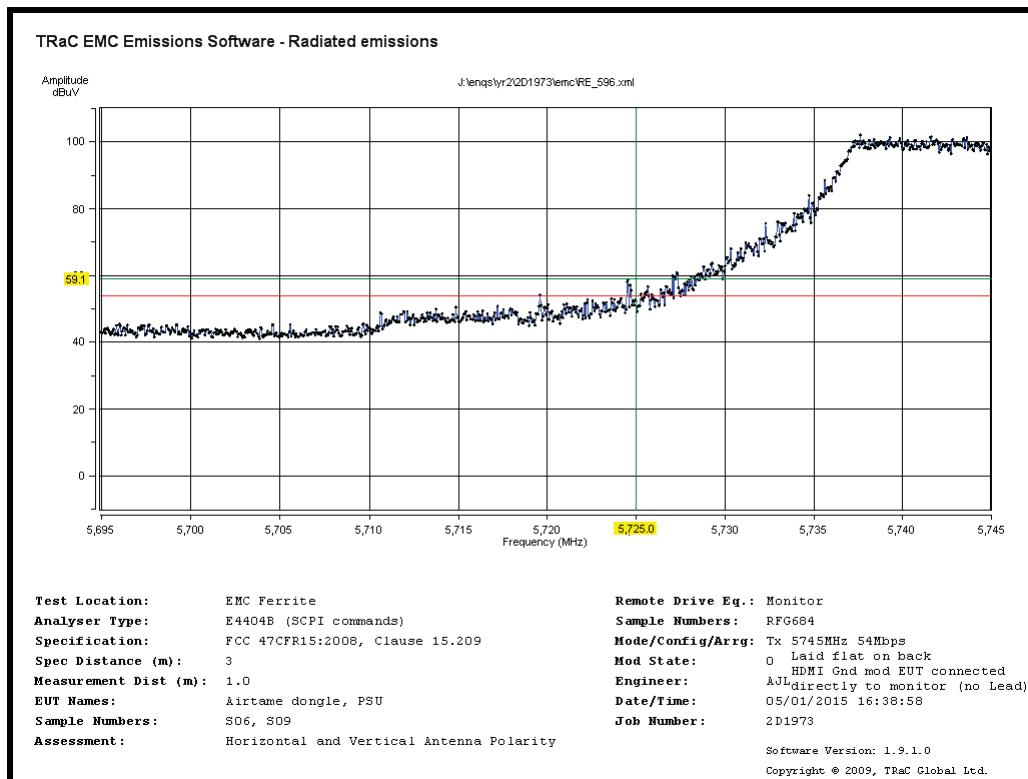
### Radiated Upper Band Edge 5700MHz 6Mb/s



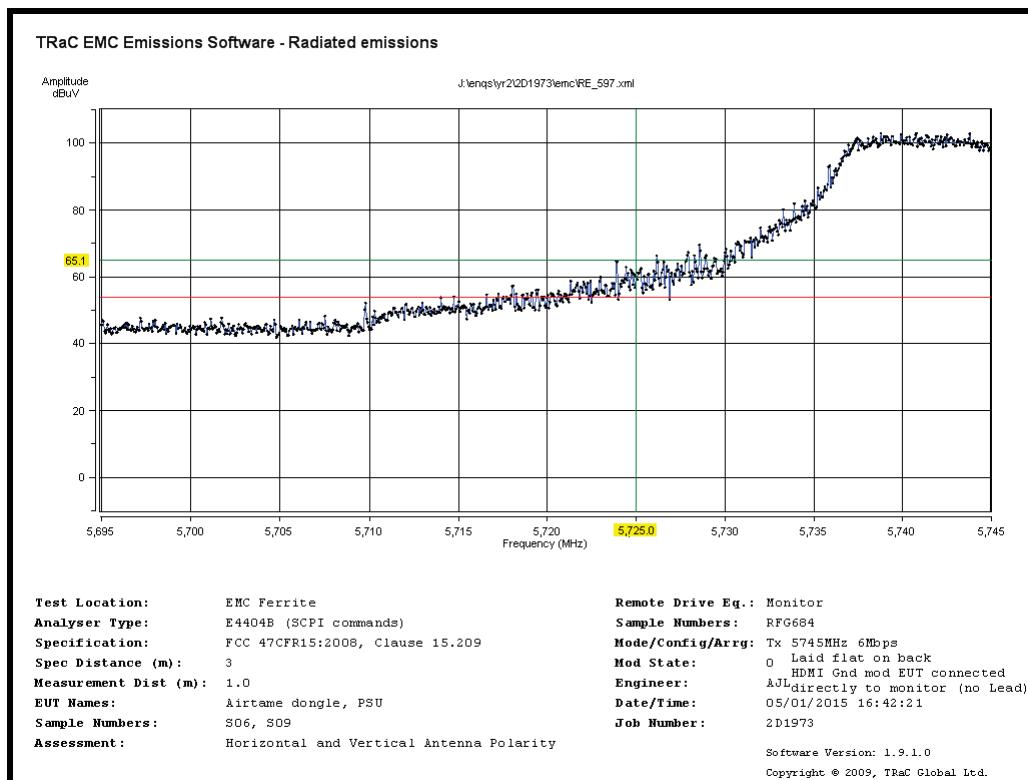
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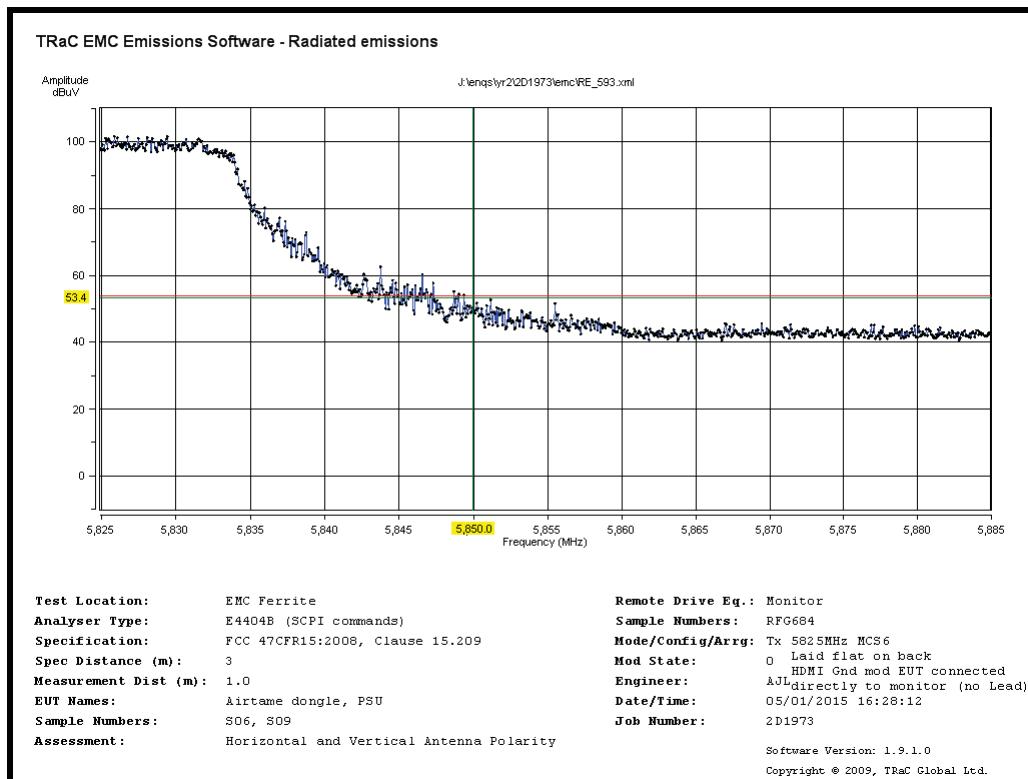
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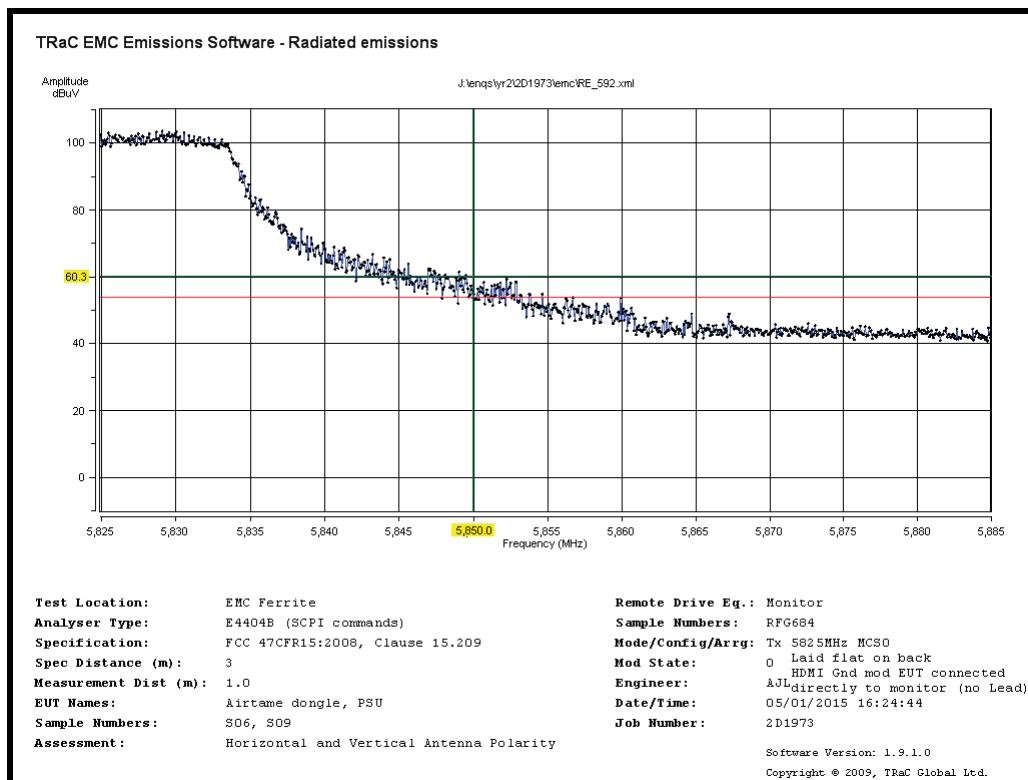
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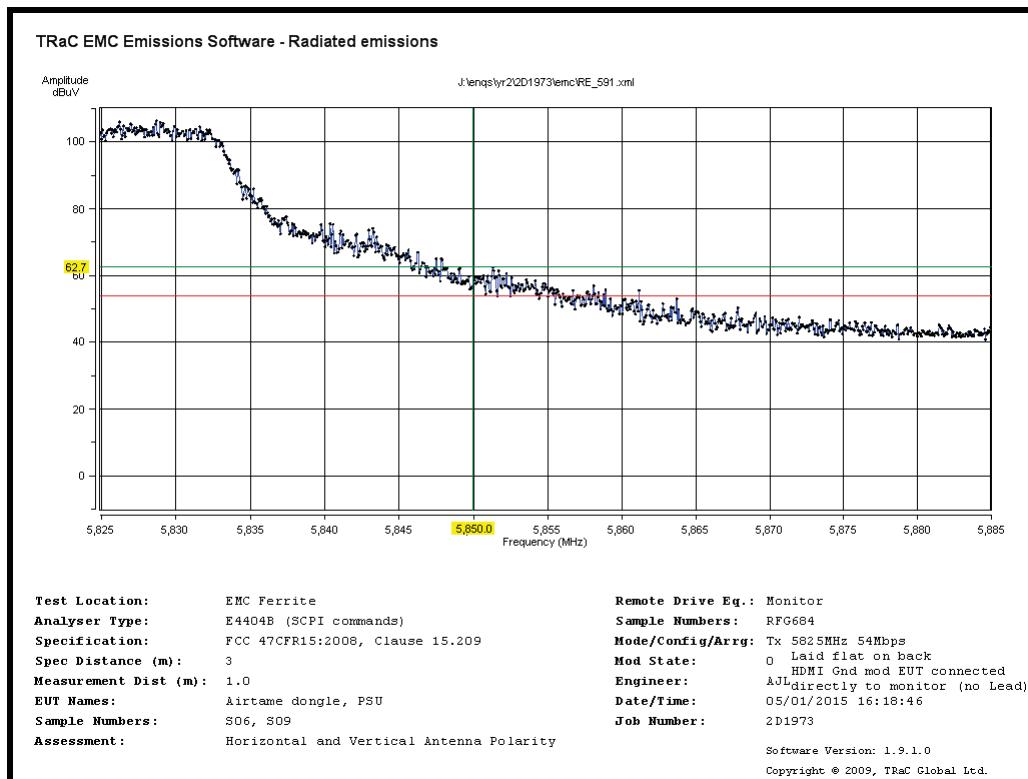
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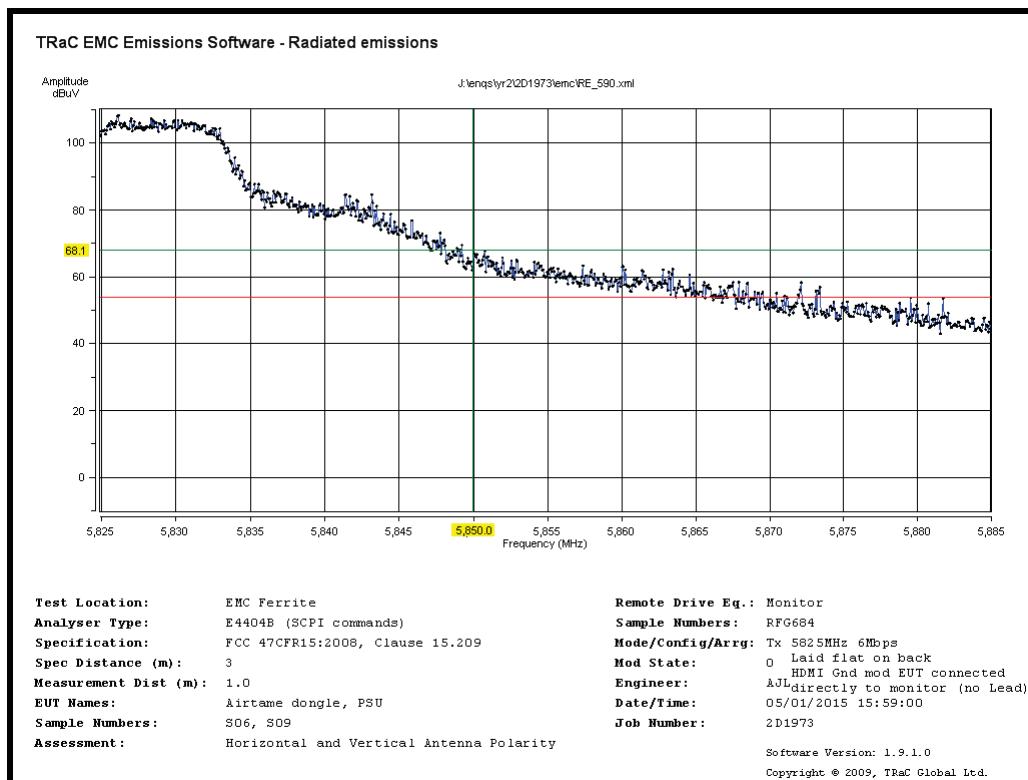
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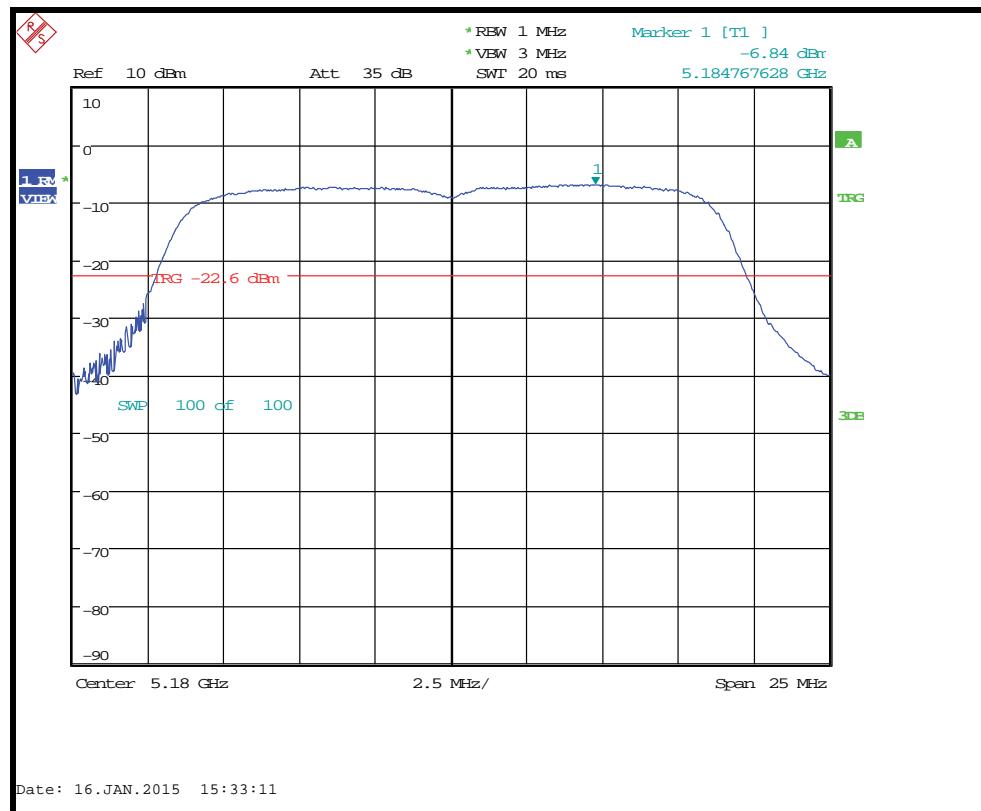
### Radiated Upper Band Edge 5825MHz MCS0



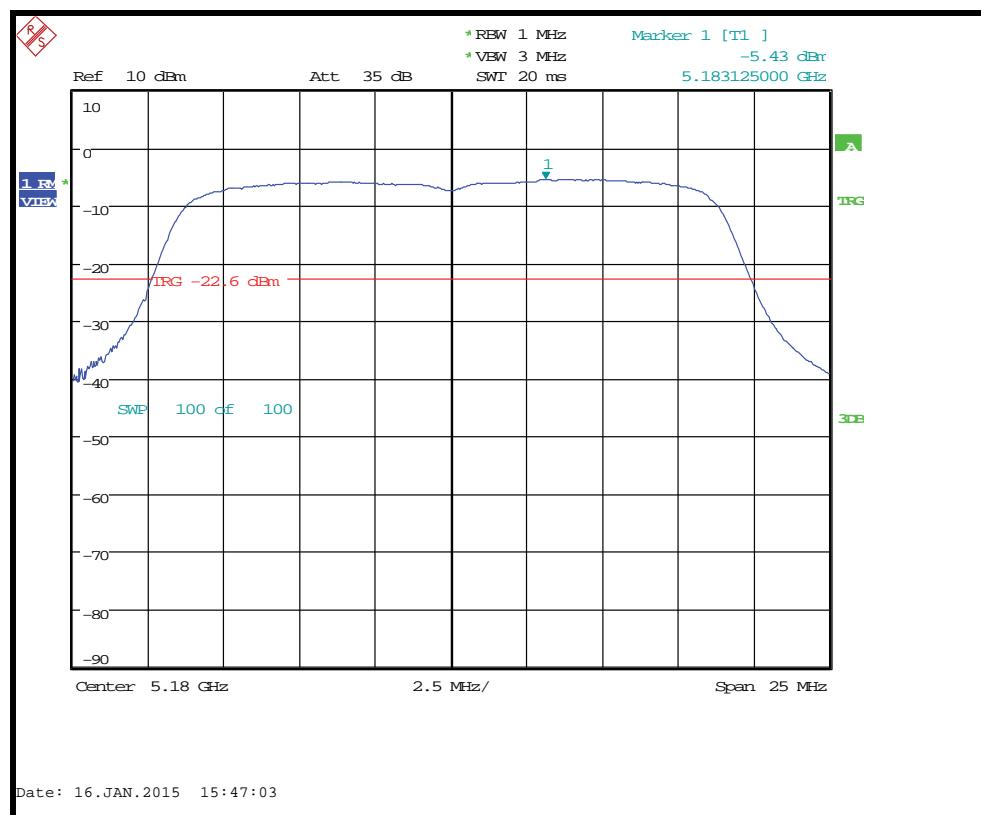
### Radiated Upper Band Edge 5825MHz 54Mb/s



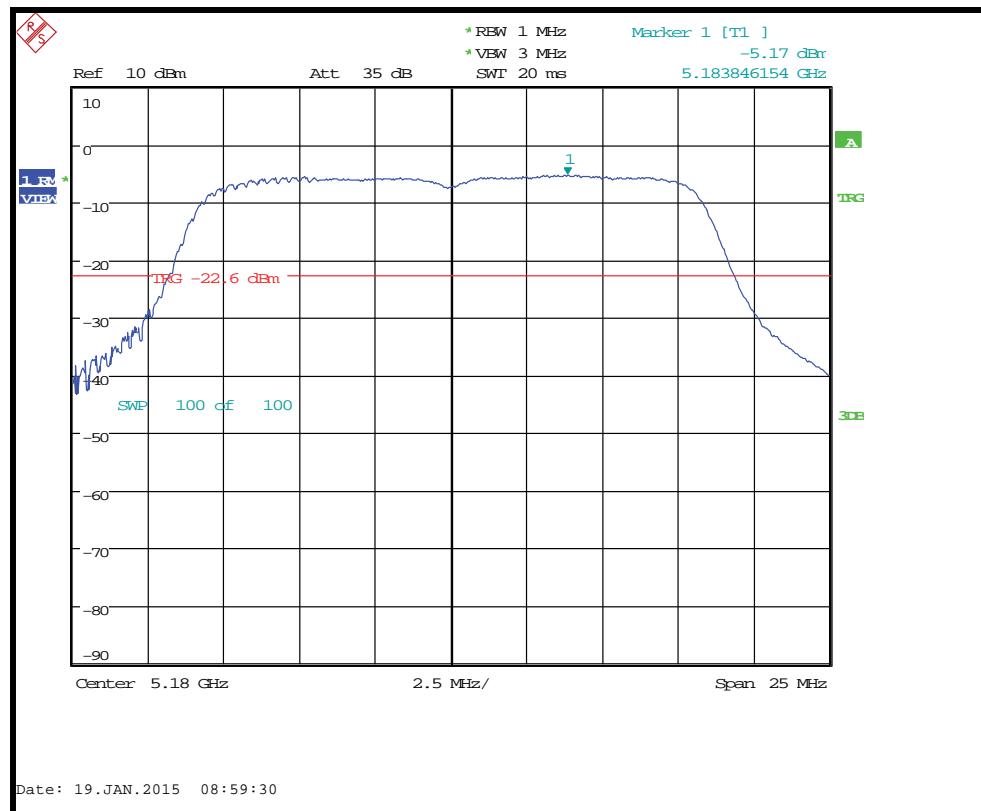
### Radiated Upper Band Edge 5825MHz 6Mb/s



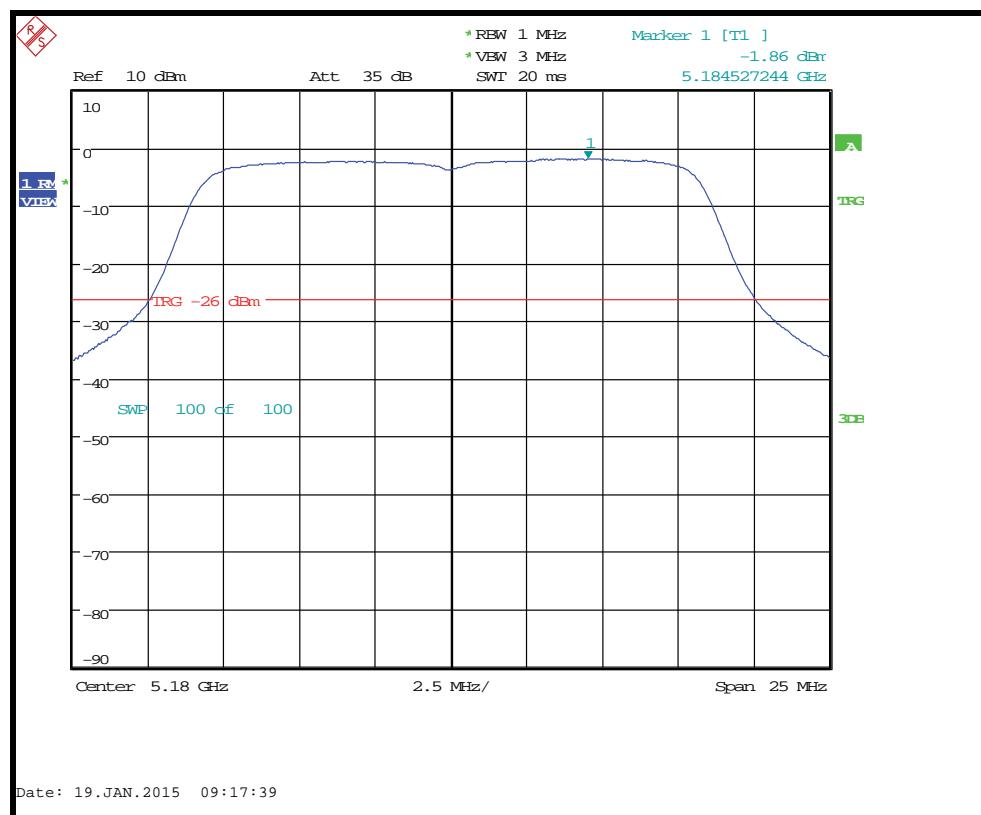
Conducted power spectral density 5180MHz MCS6



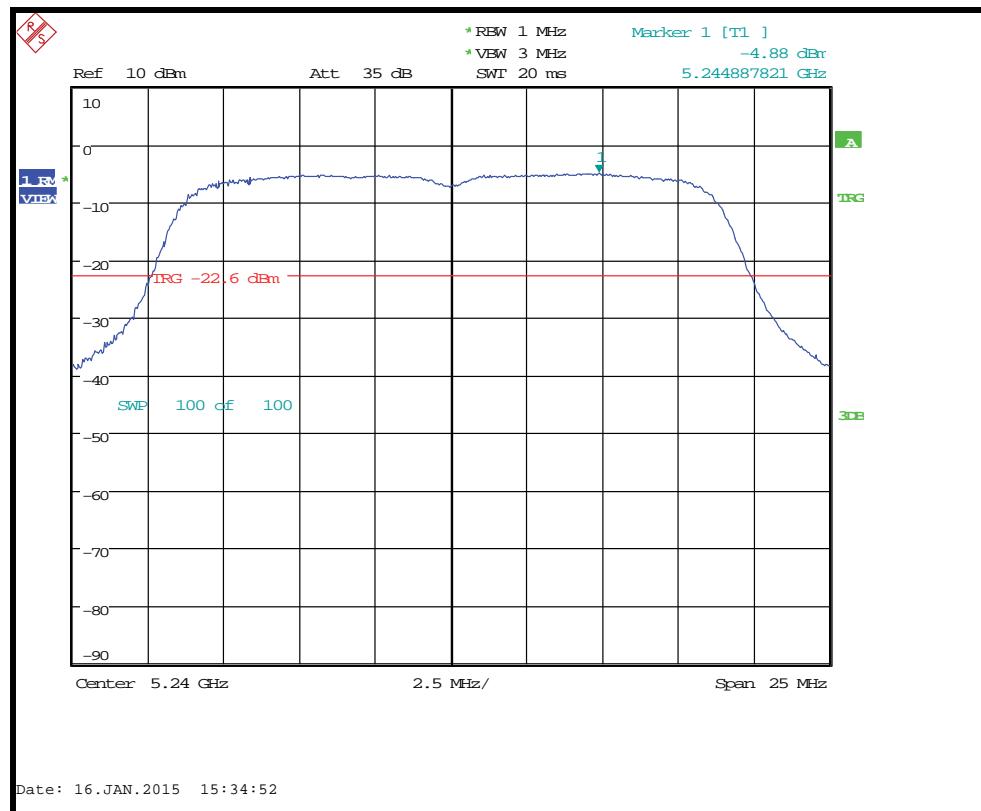
Conducted power spectral density 5180MHz MCS0



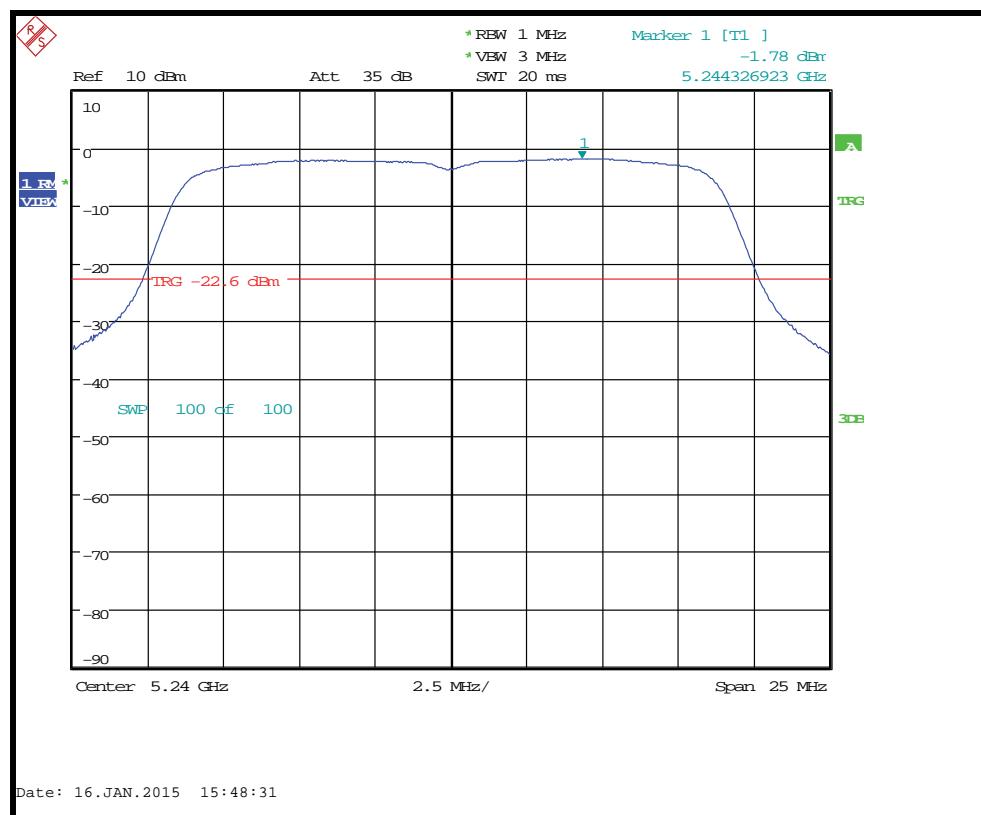
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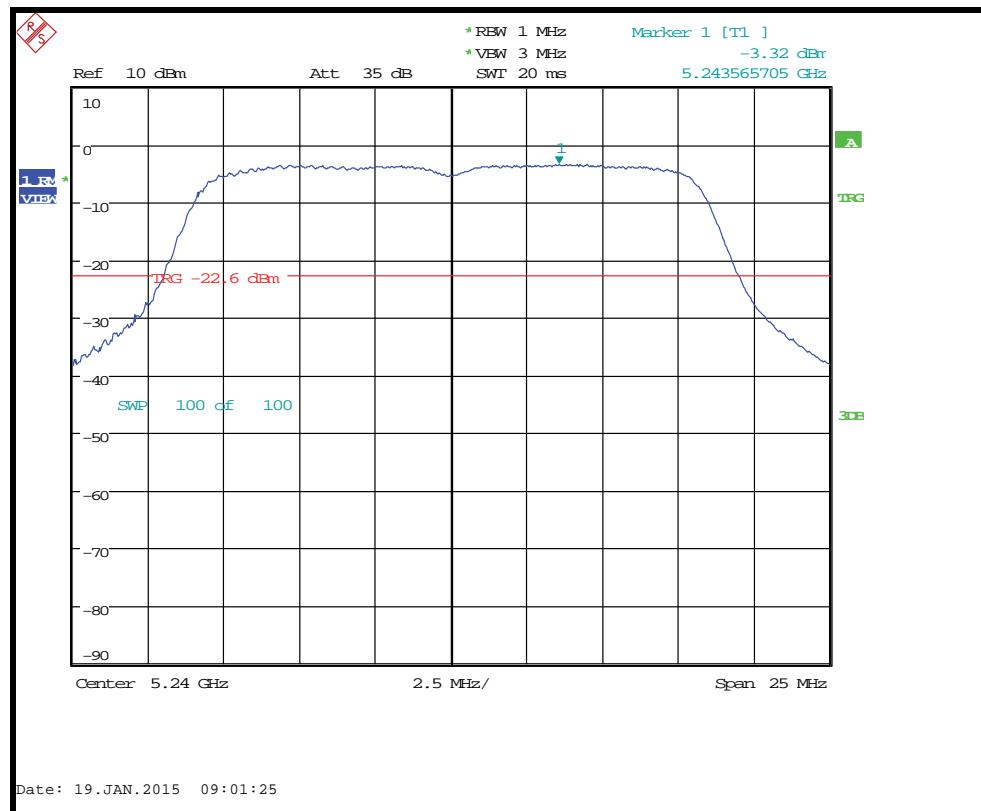
Conducted power spectral density 5180MHz 6Mb/s



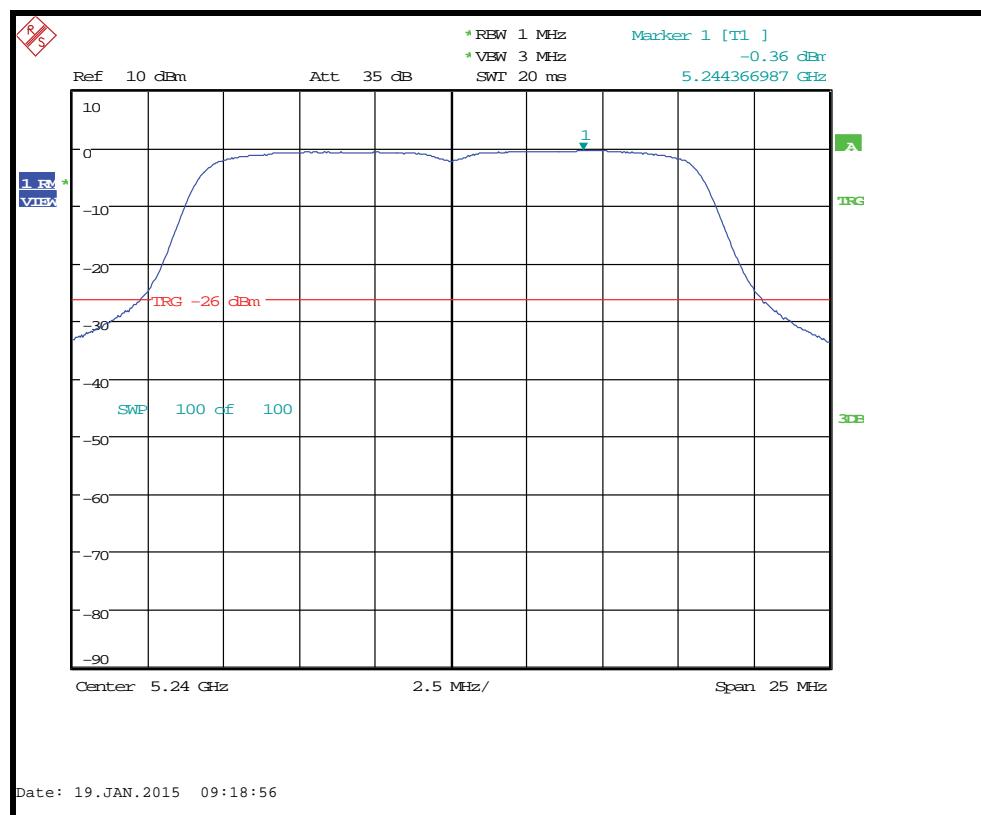
Conducted power spectral density 5240MHz MCS6



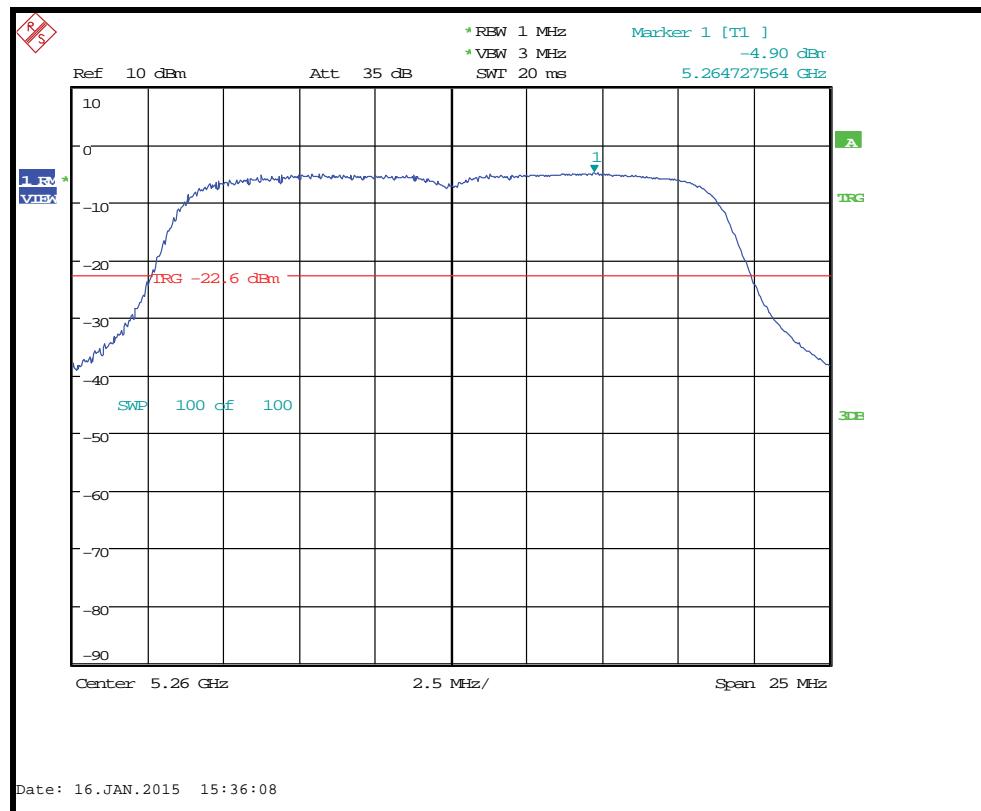
Conducted power spectral density 5240MHz MCS0



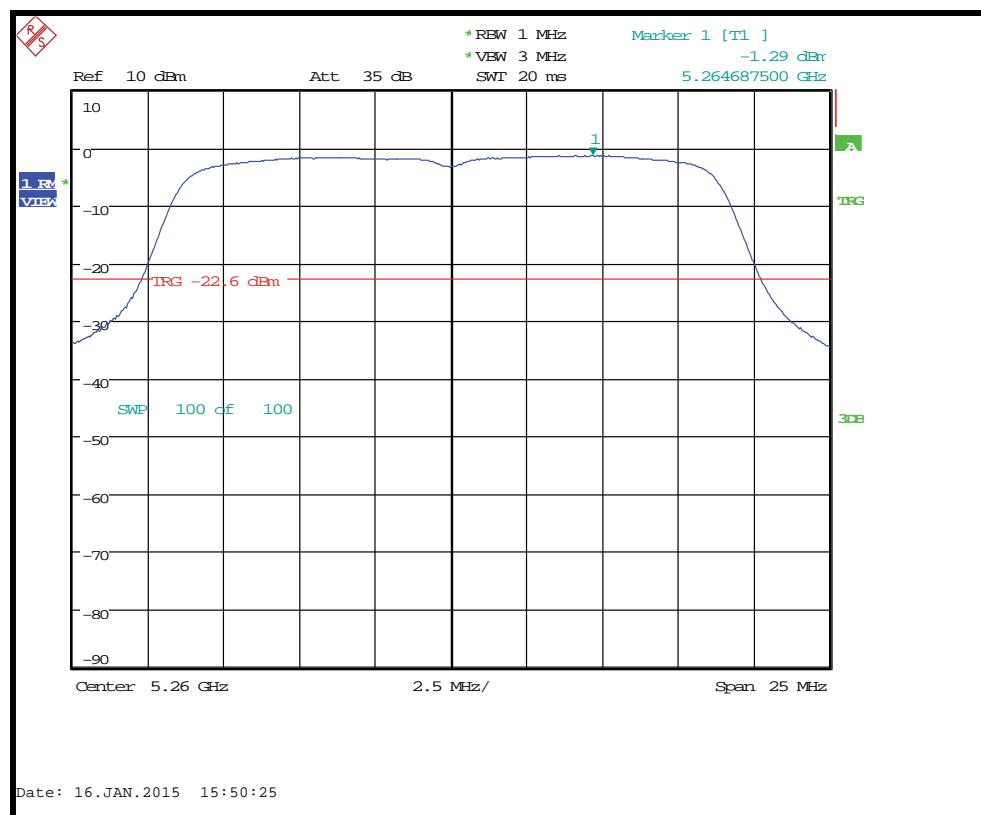
Conducted power spectral density 5240MHz 54Mb/s



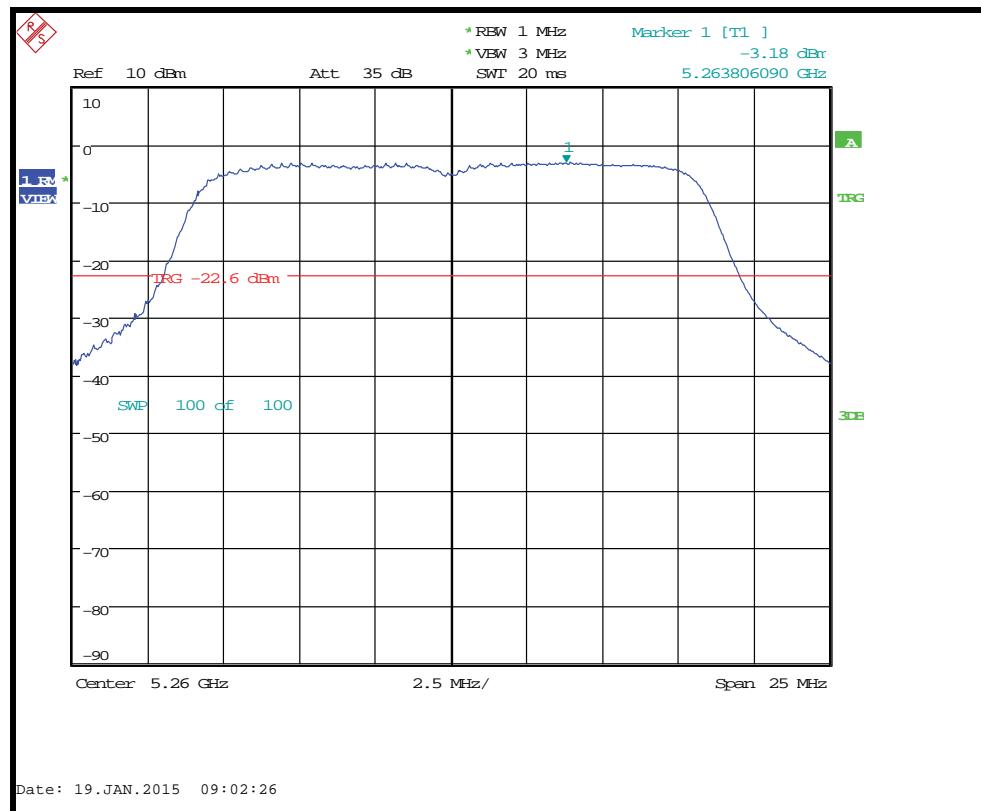
Conducted power spectral density 5240MHz 6Mb/s



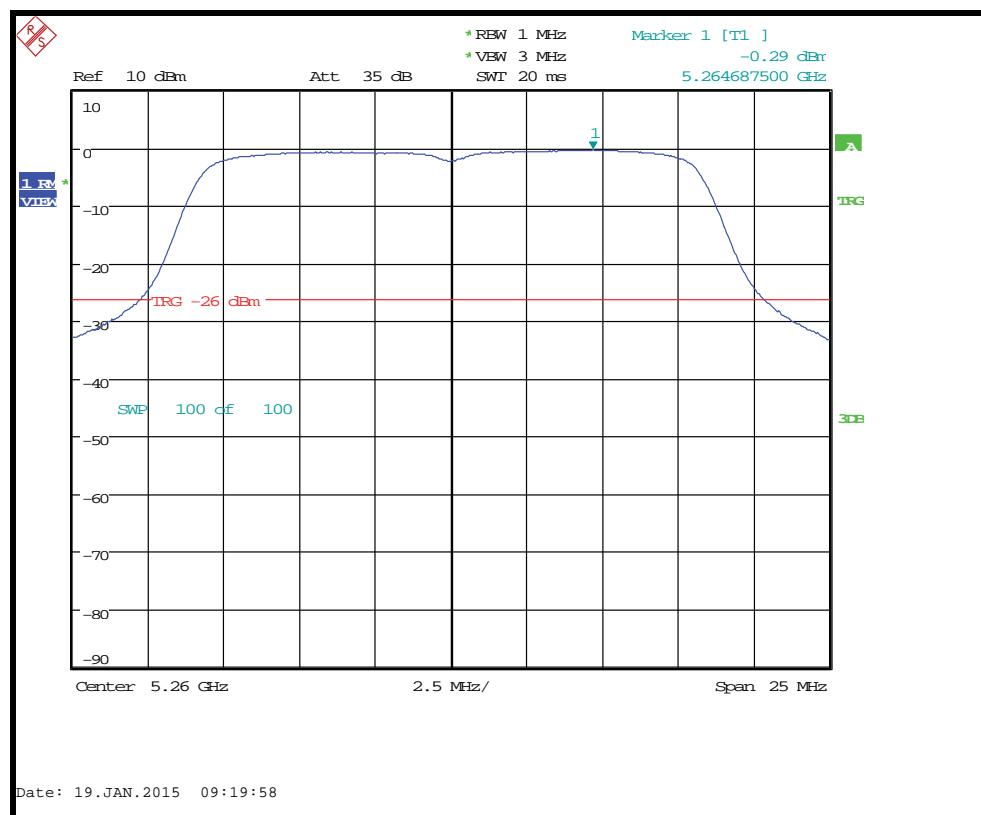
Conducted power spectral density 5260MHz MCS6



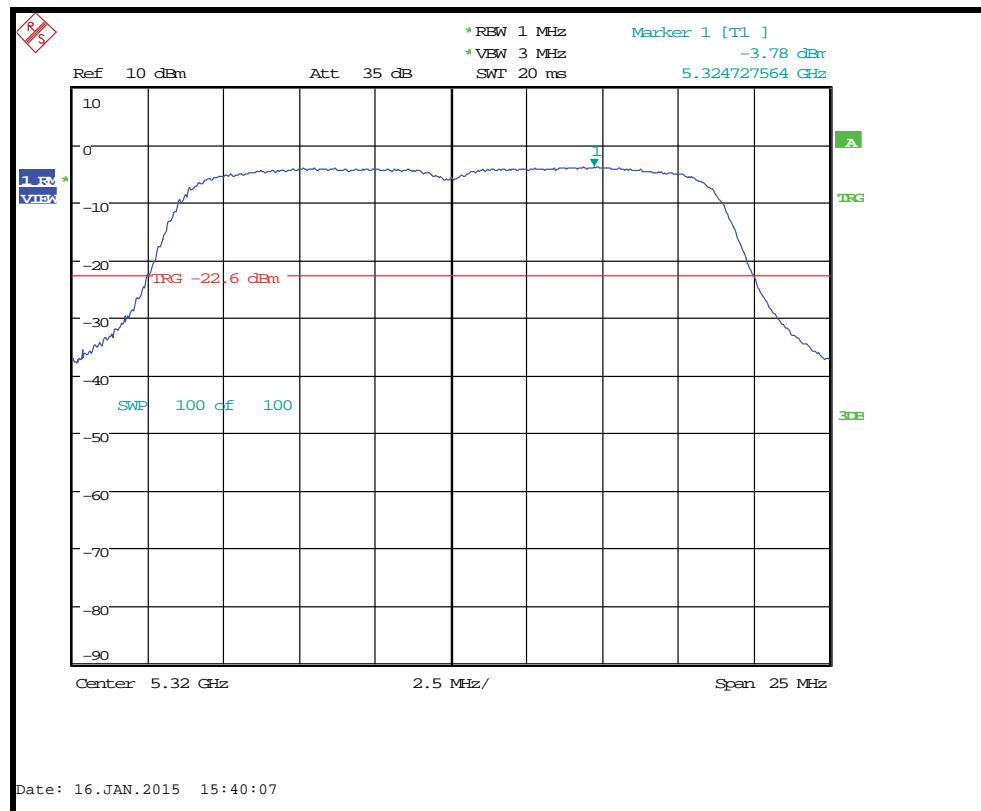
Conducted power spectral density 5260MHz MCS0



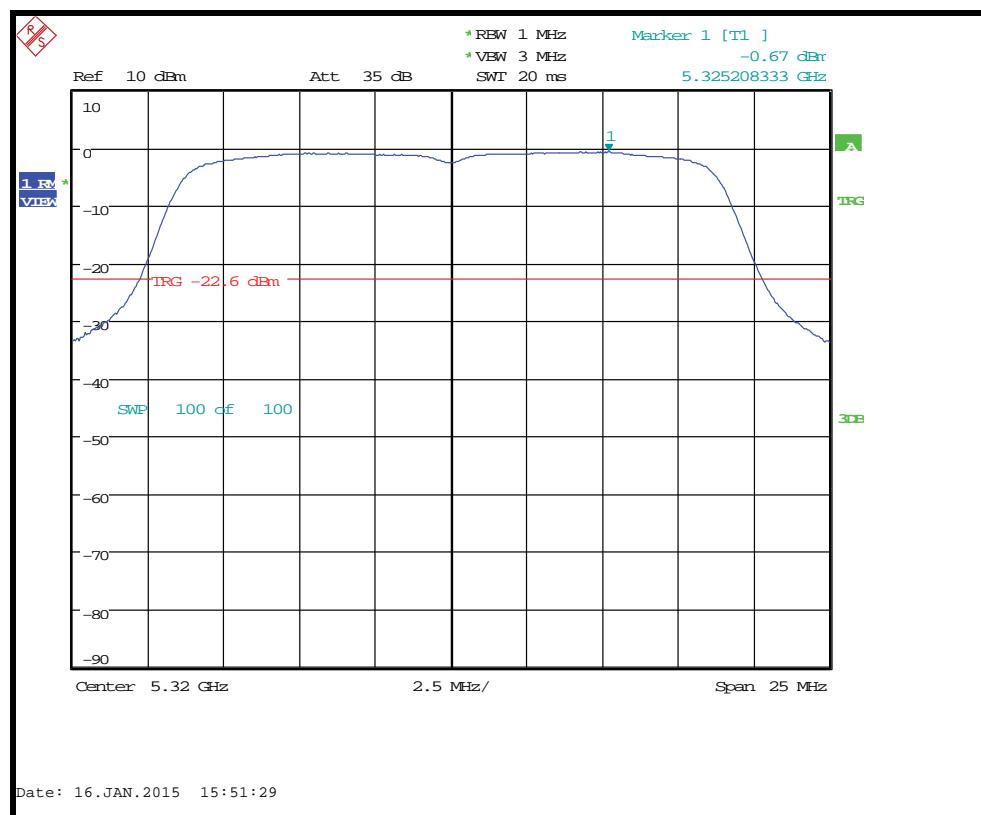
Conducted power spectral density 5260MHz 54Mb/s



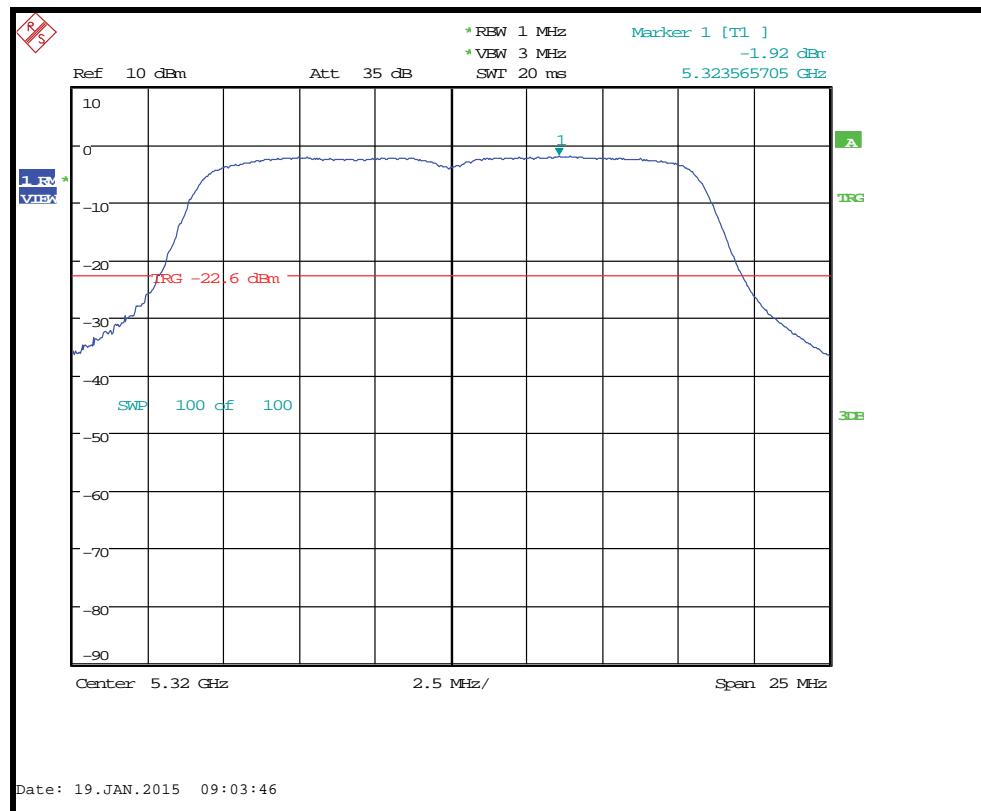
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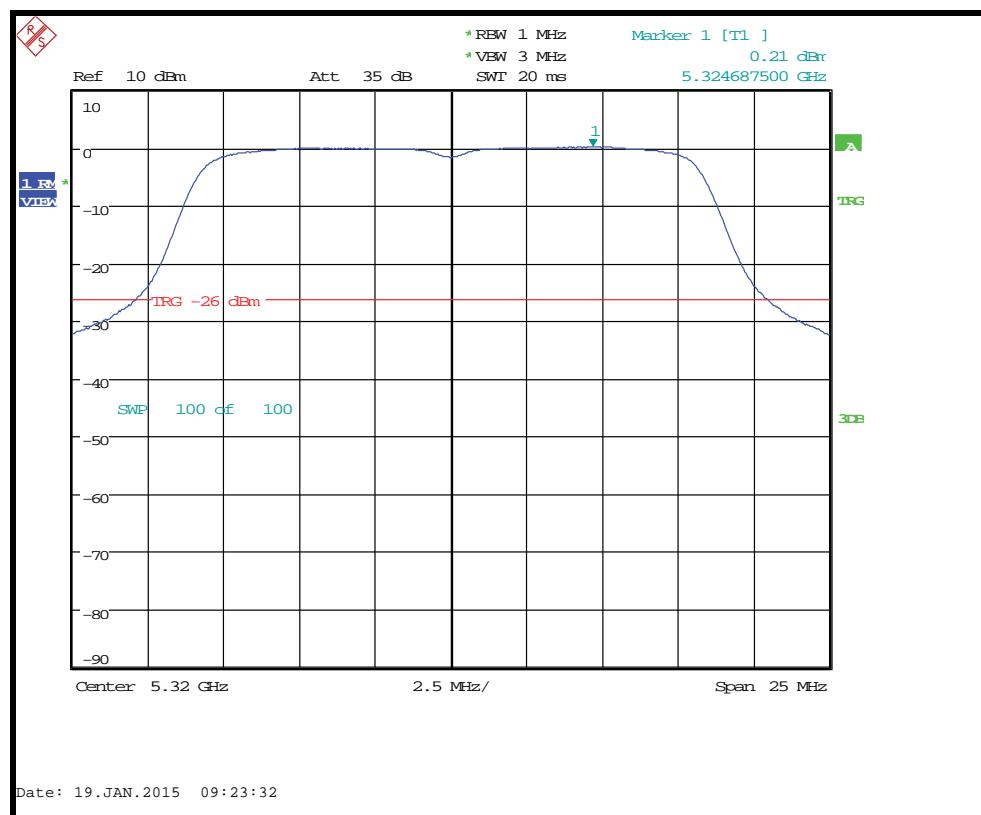
Conducted power spectral density 5320MHz MCS6



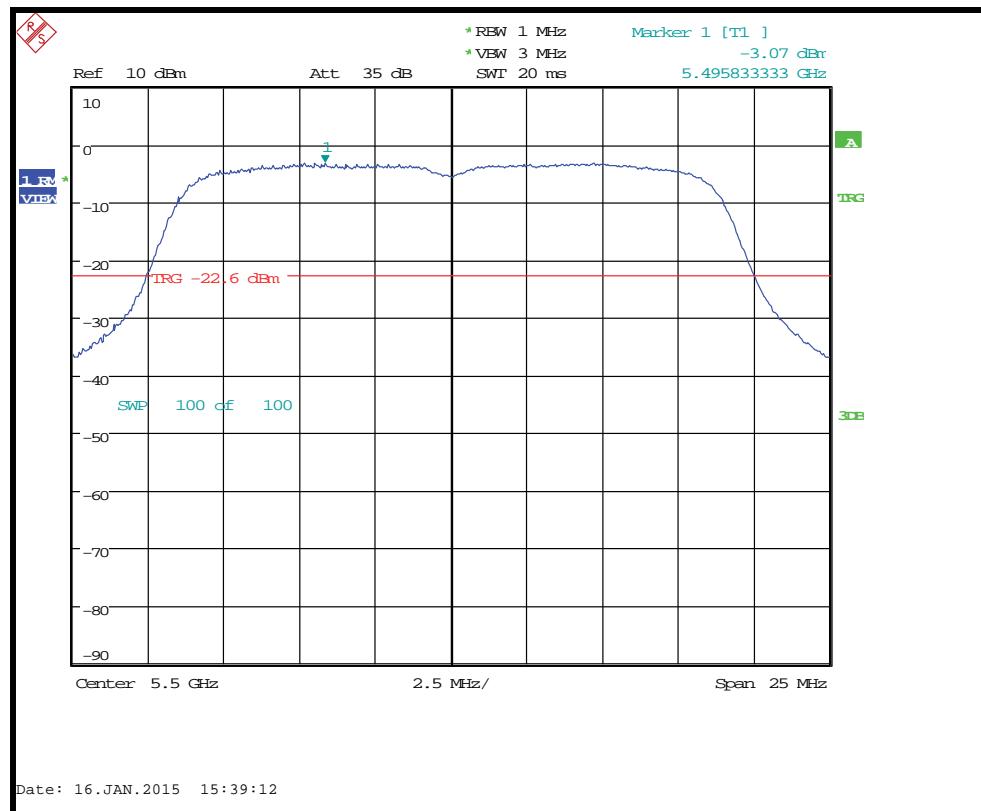
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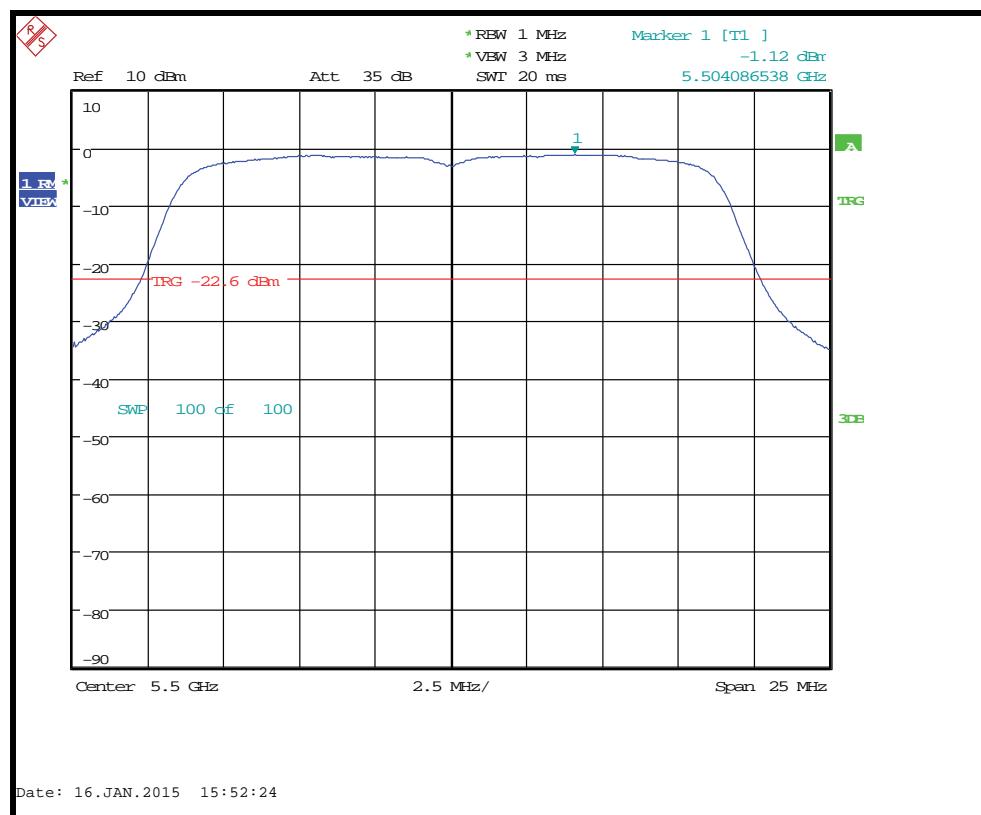
Conducted power spectral density 5320MHz 54Mb/s



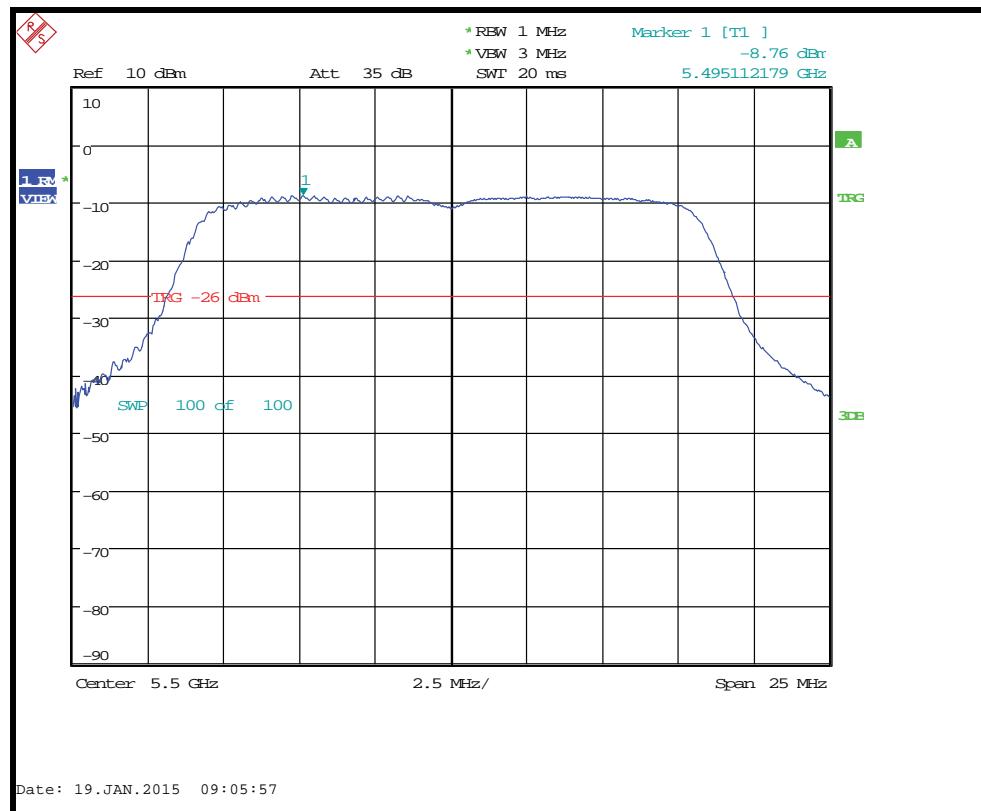
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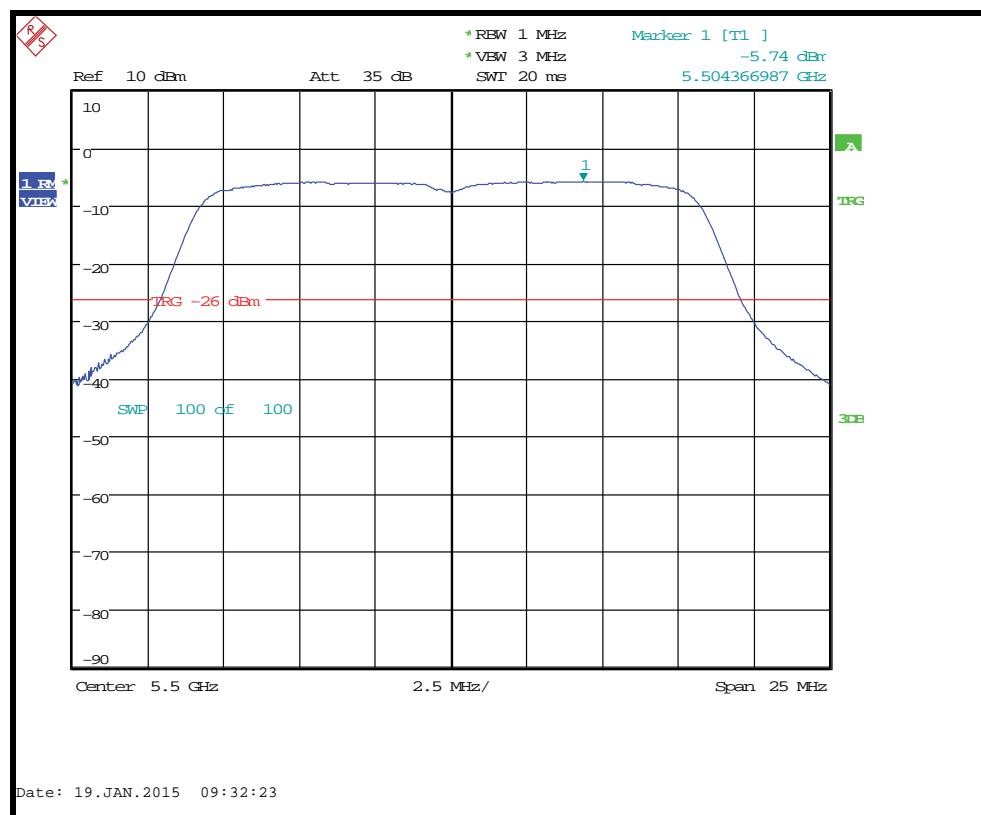
Conducted power spectral density 5500MHz MCS6



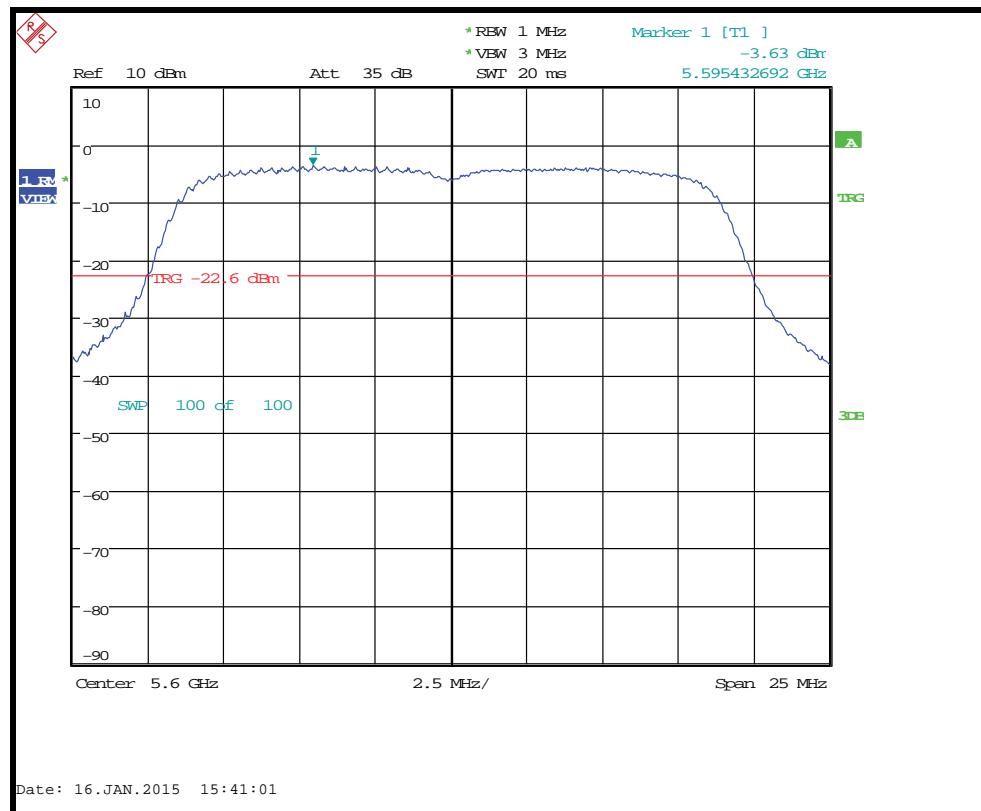
Conducted power spectral density 5500MHz MCS0



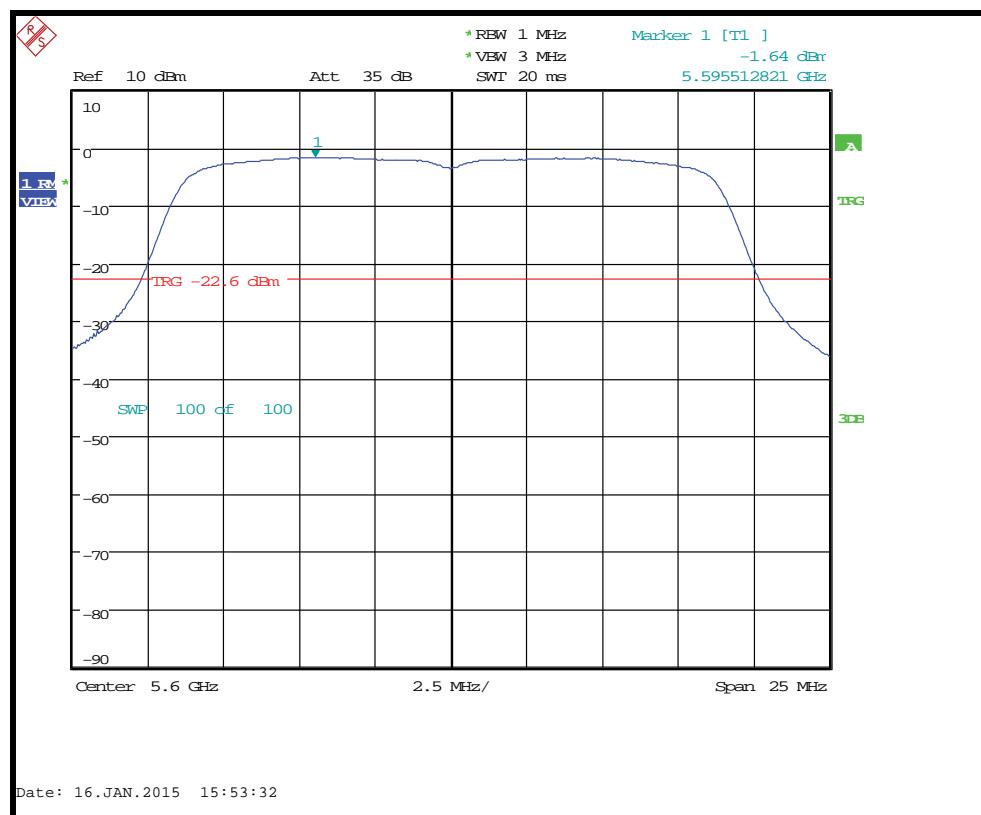
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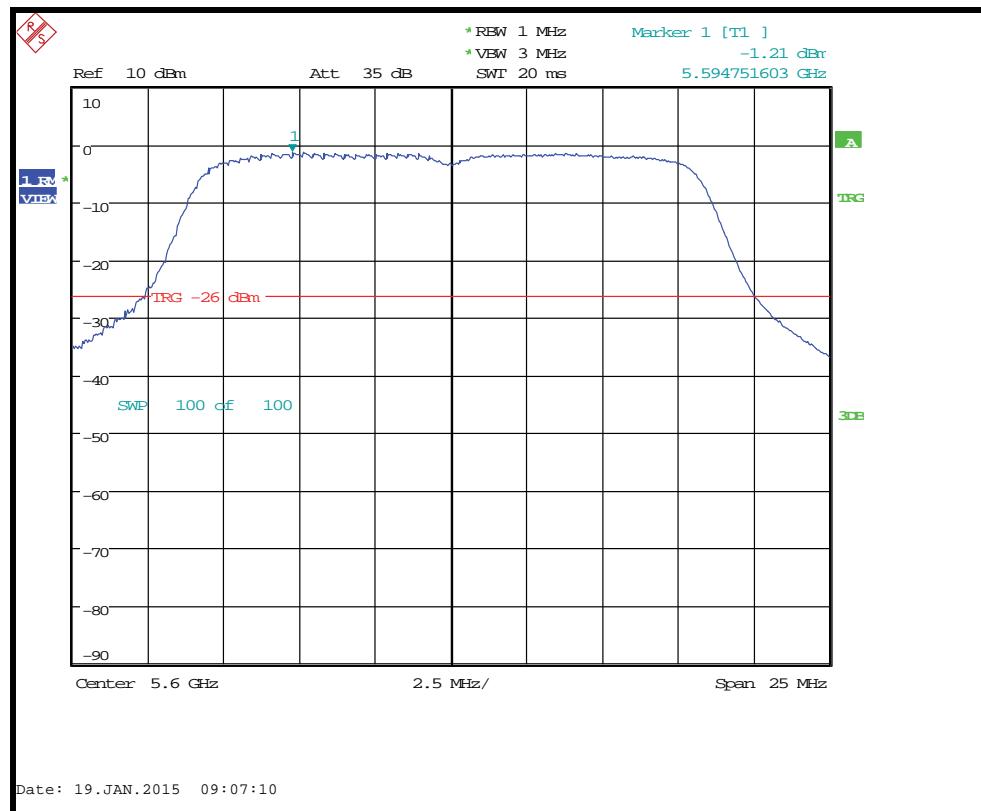
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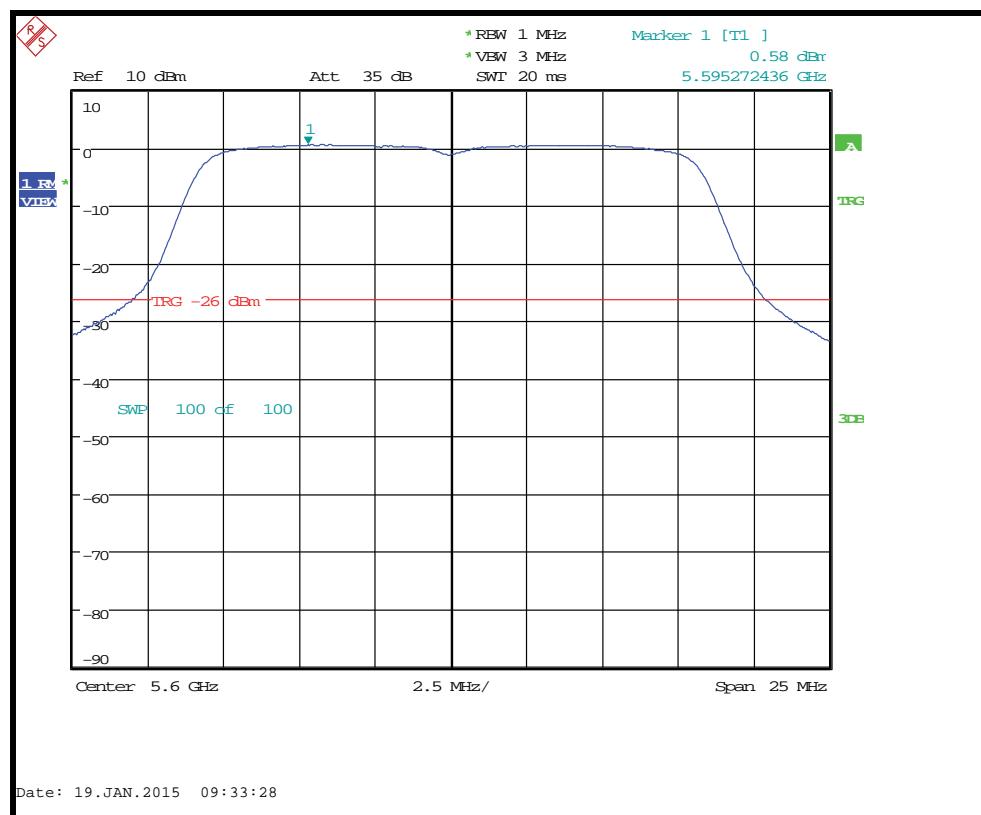
Conducted power spectral density 5600MHz MCS6



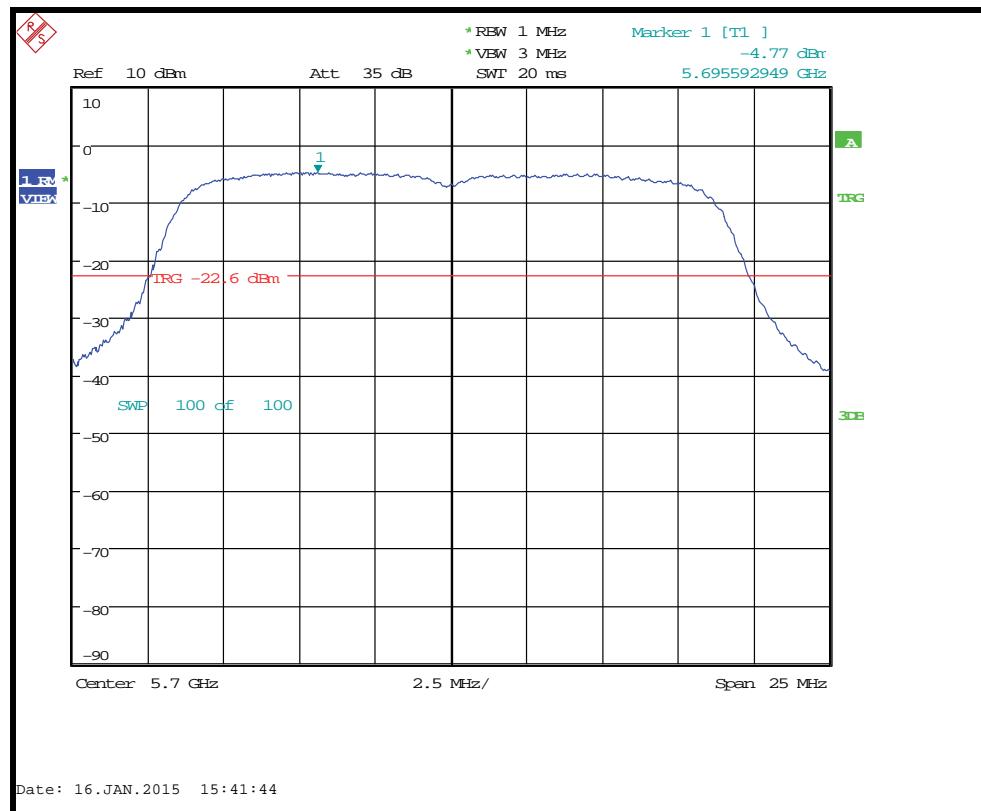
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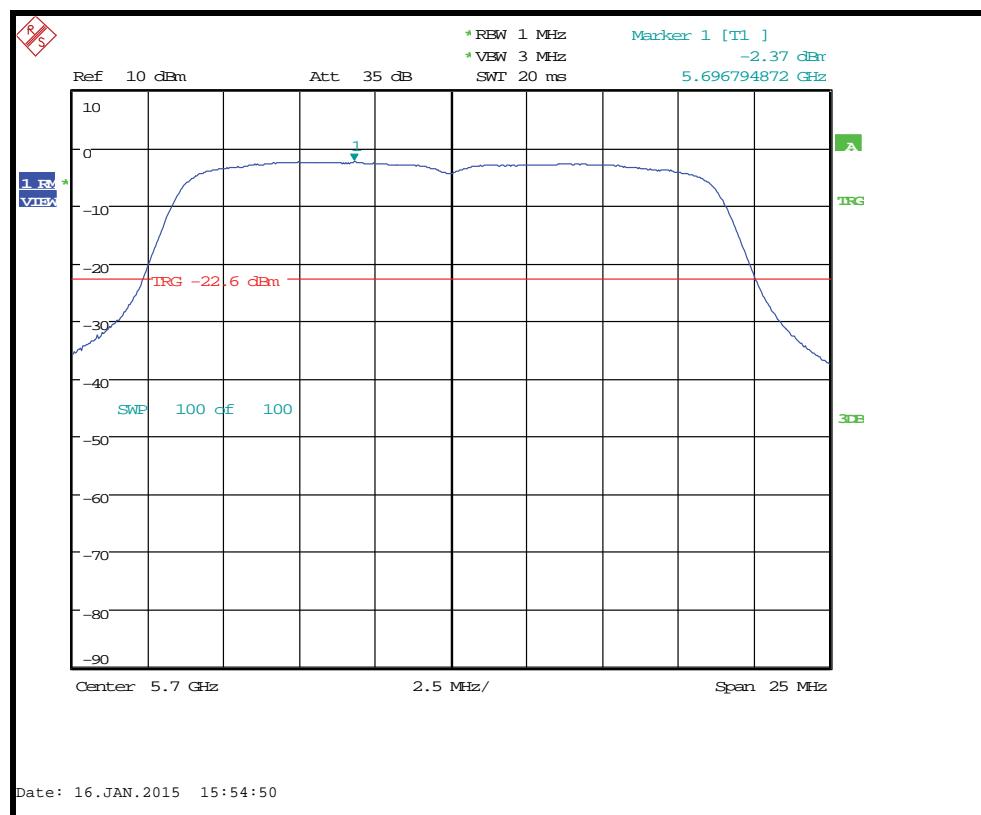
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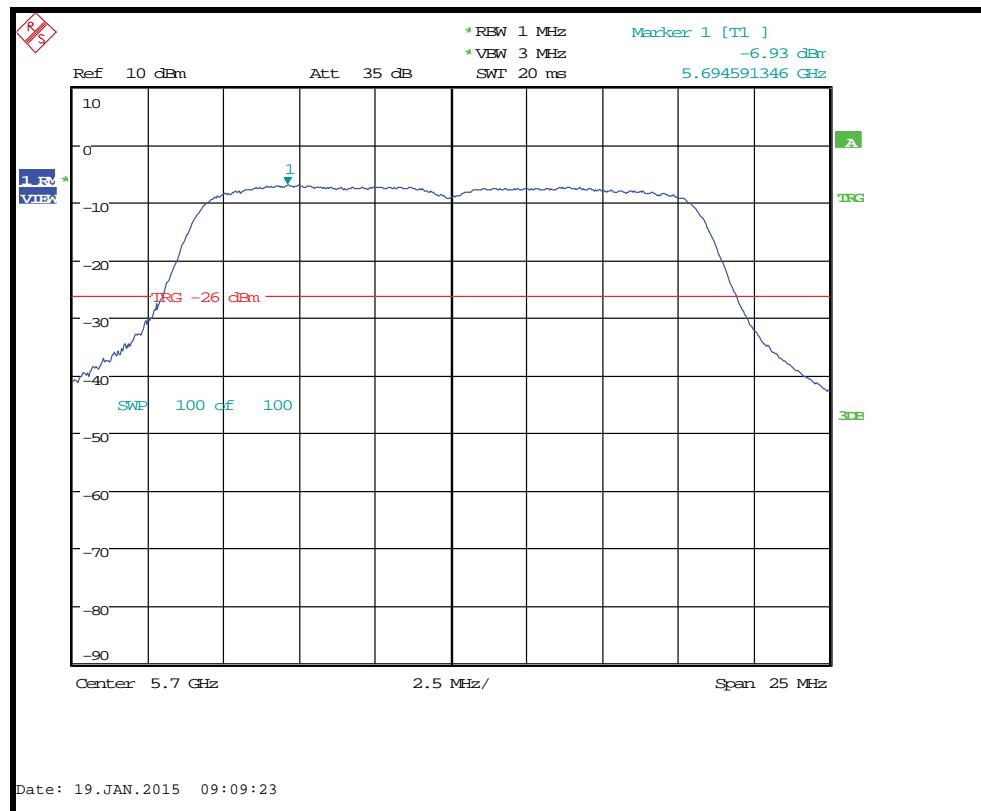
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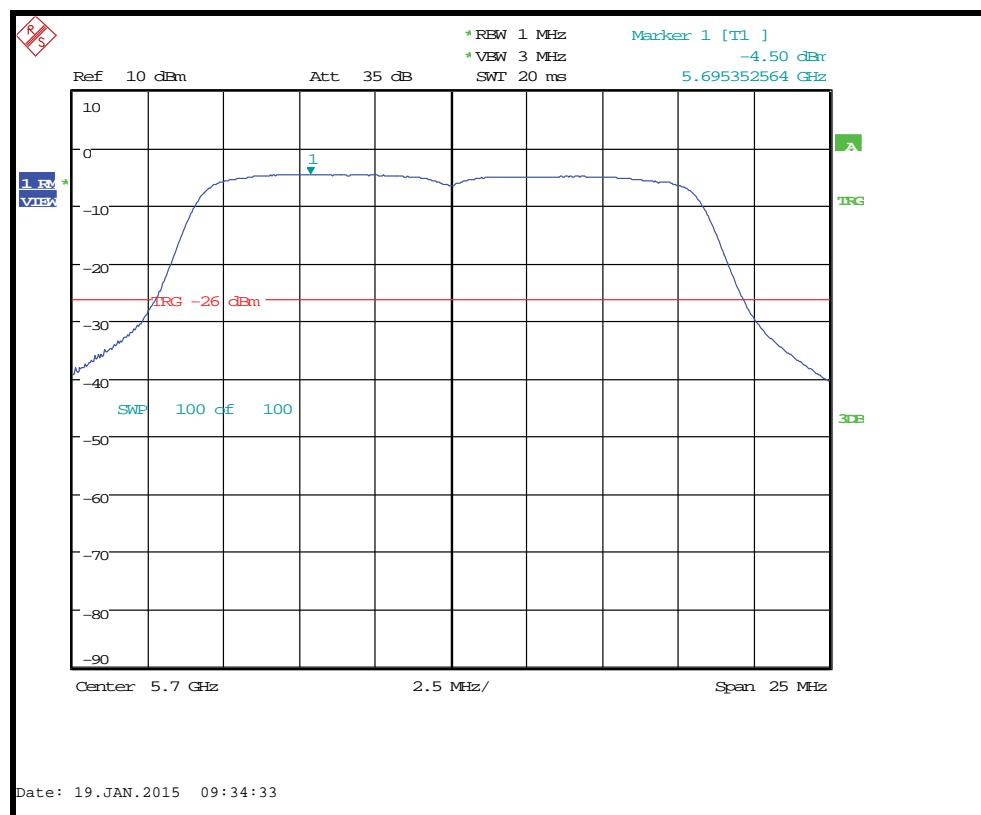
Conducted power spectral density 5700MHz MCS6



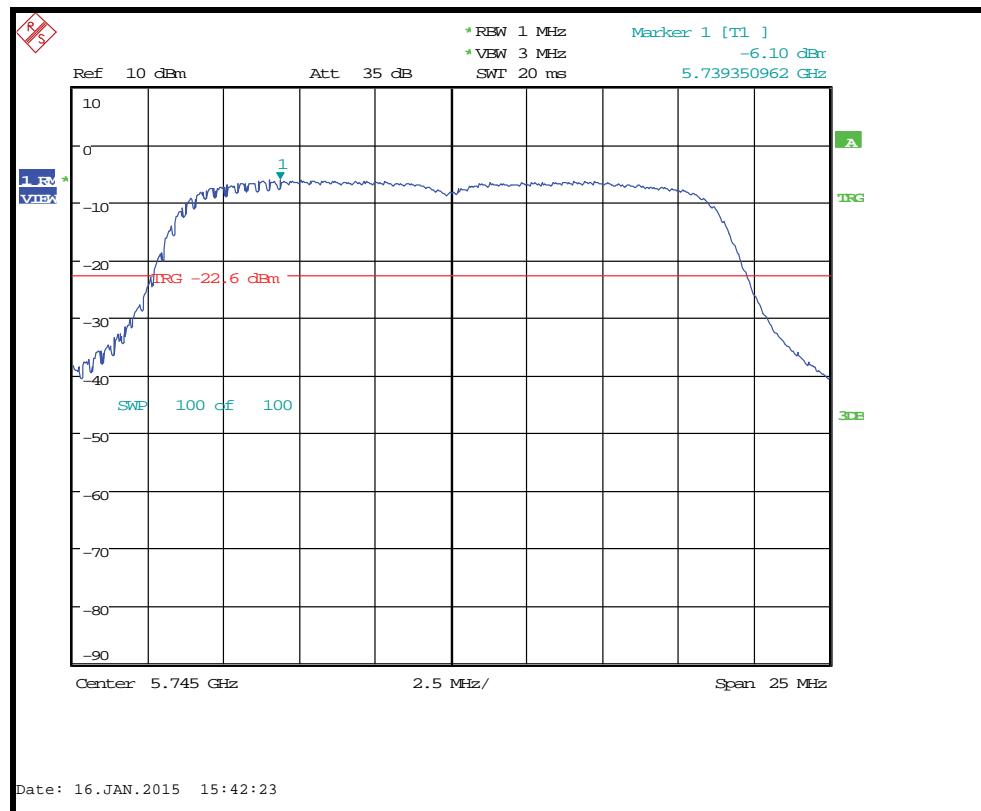
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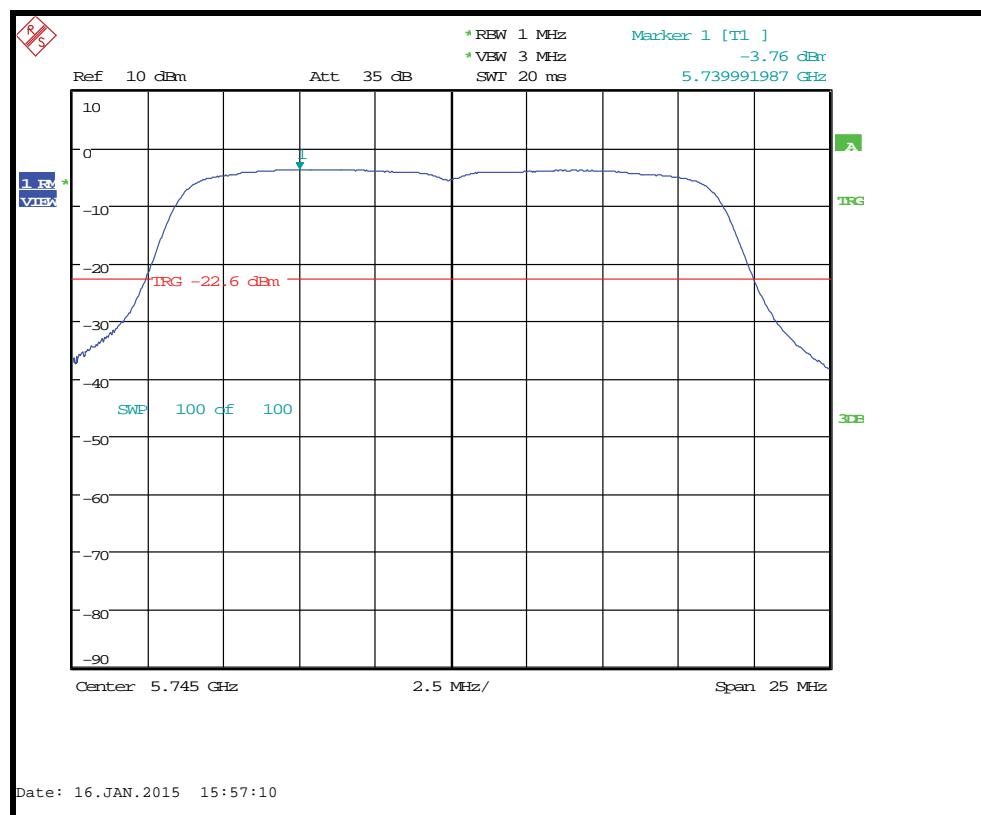
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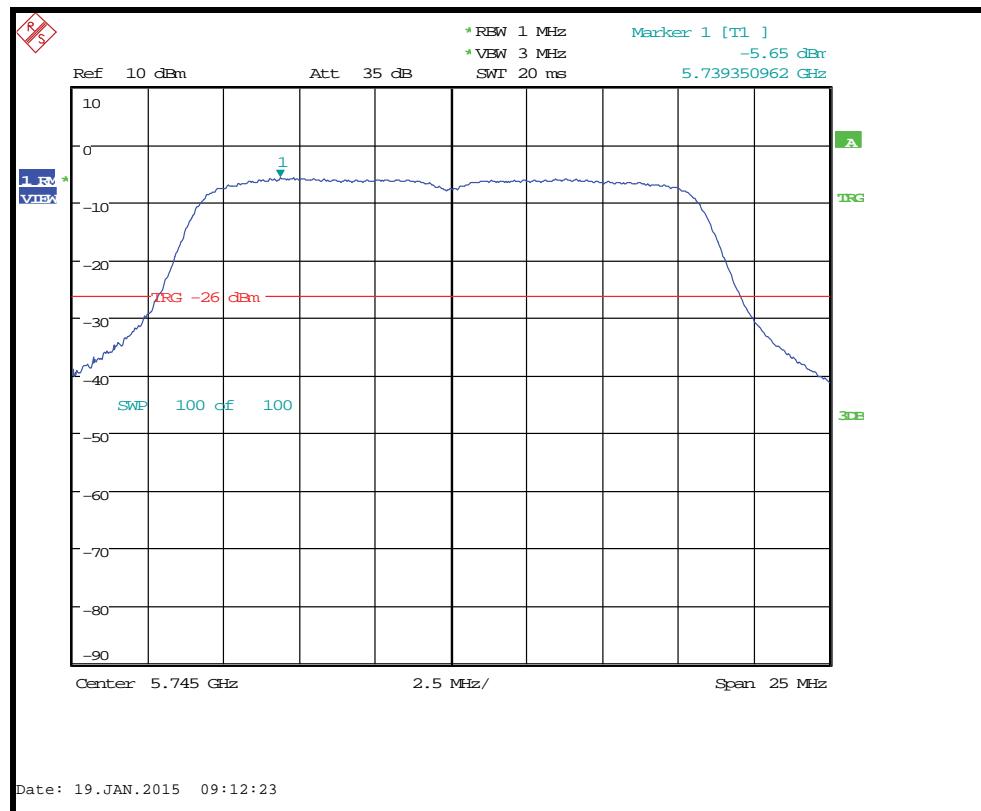
Conducted power spectral density 5700MHz 6Mb/s



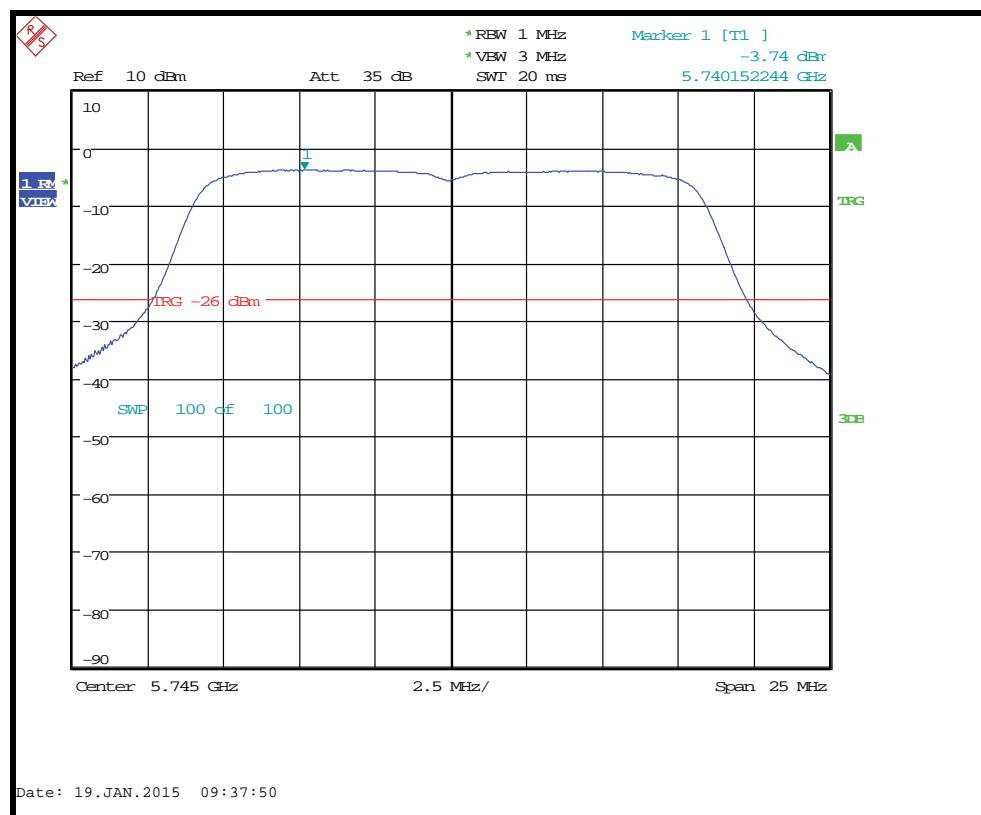
Conducted power spectral density 5745MHz MCS6



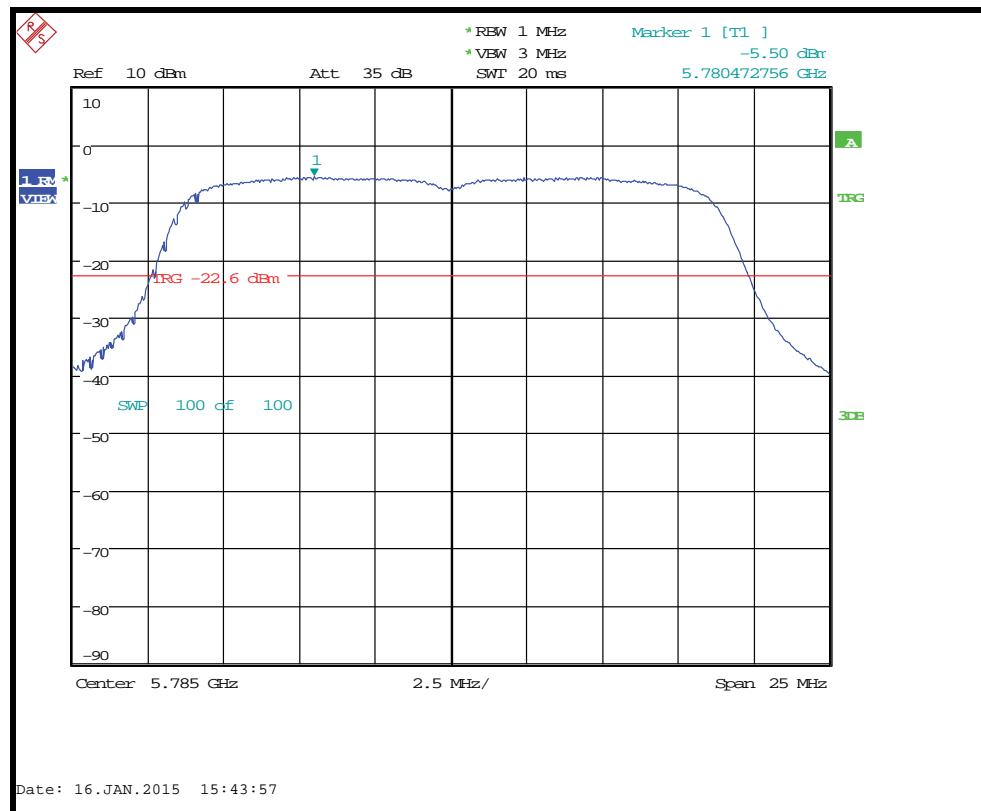
Conducted power spectral density 5745MHz MCS0



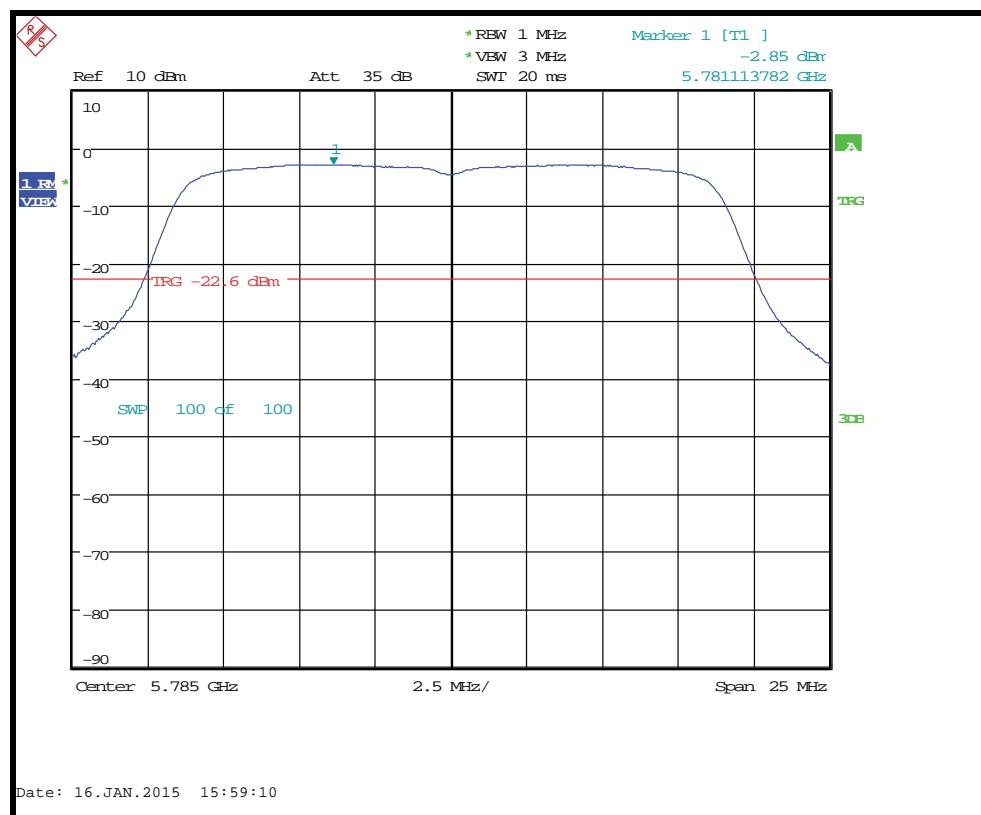
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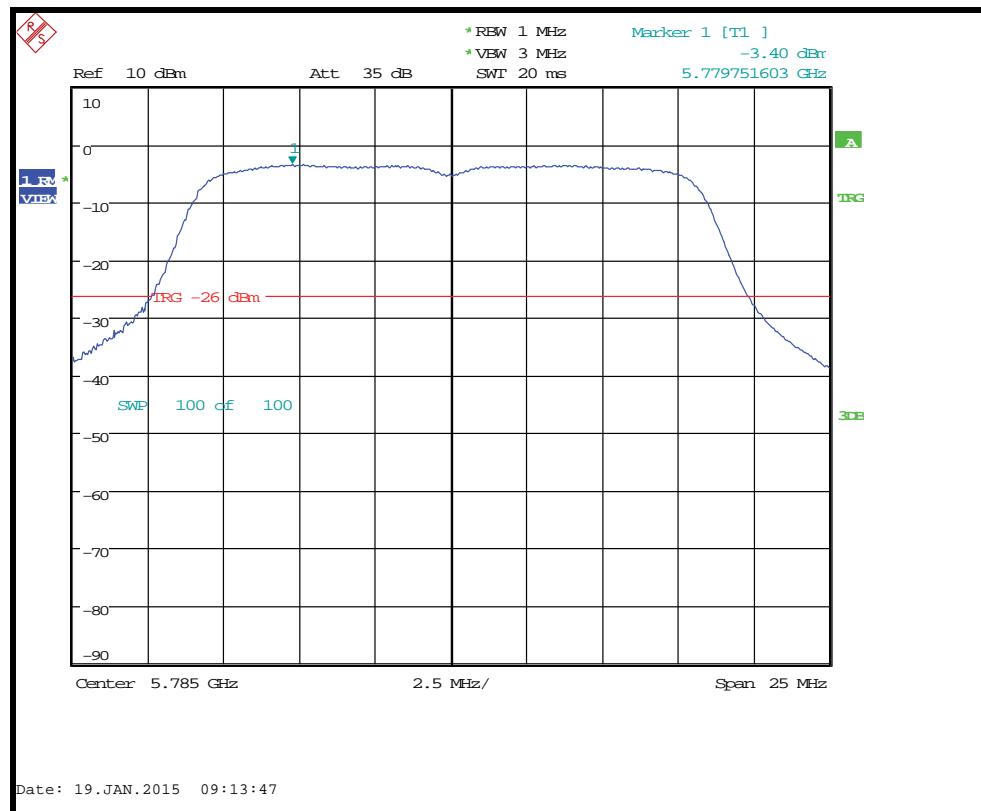
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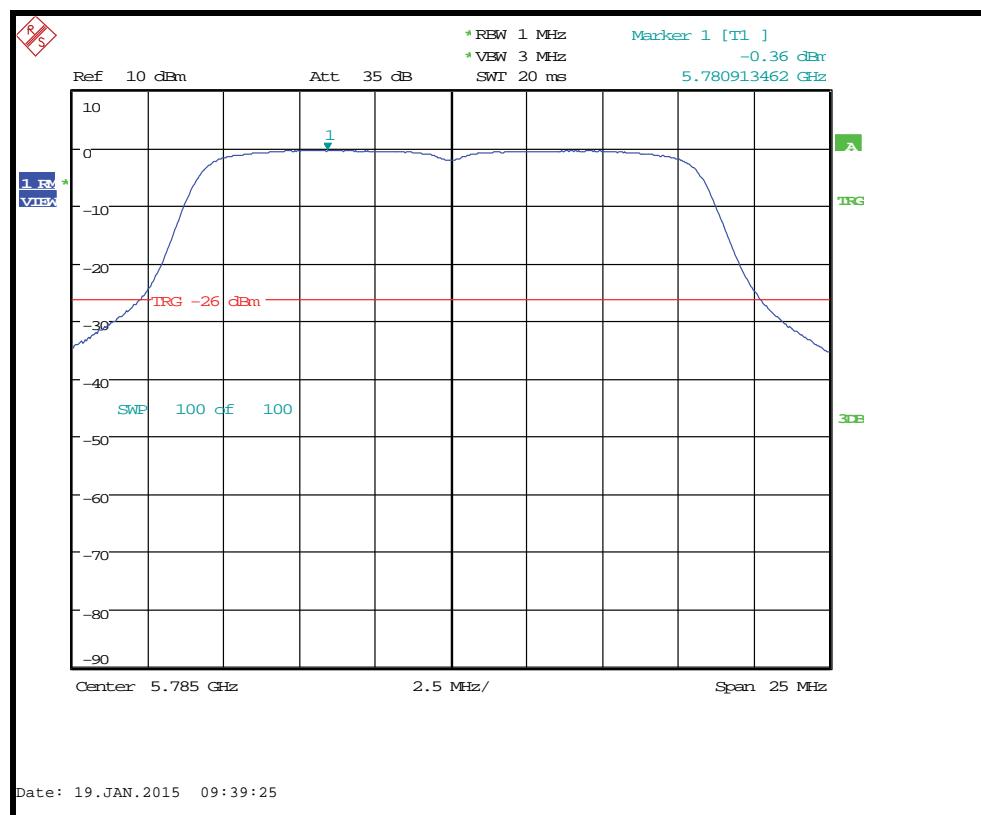
Conducted power spectral density 5785MHz MCS6



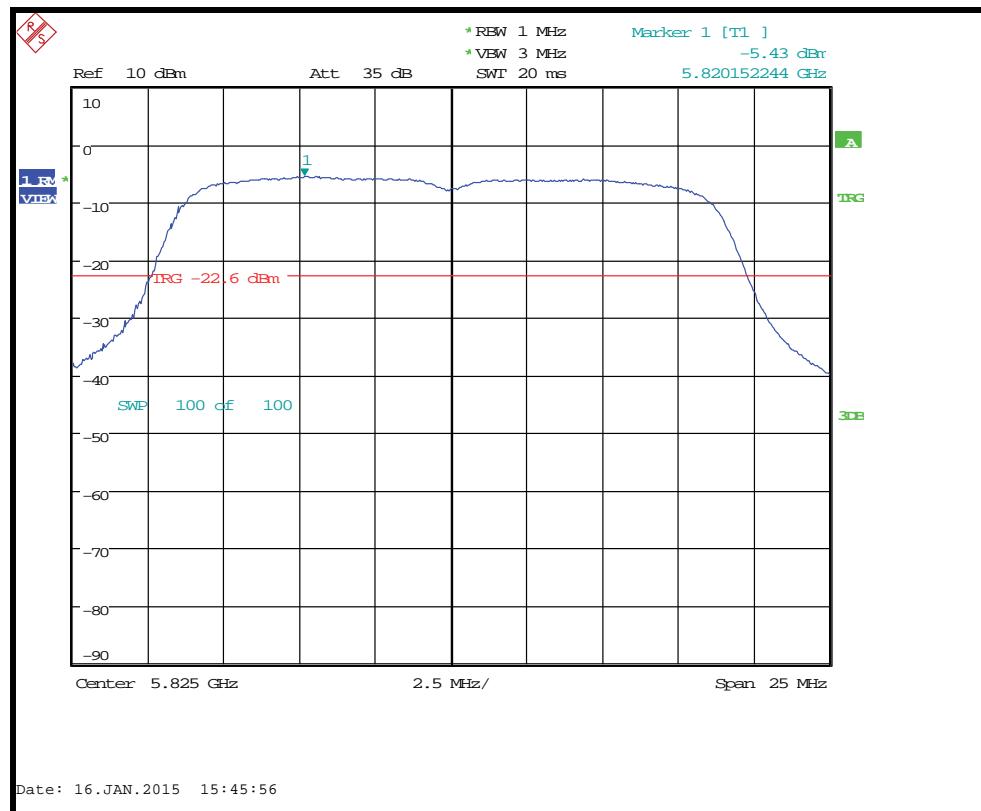
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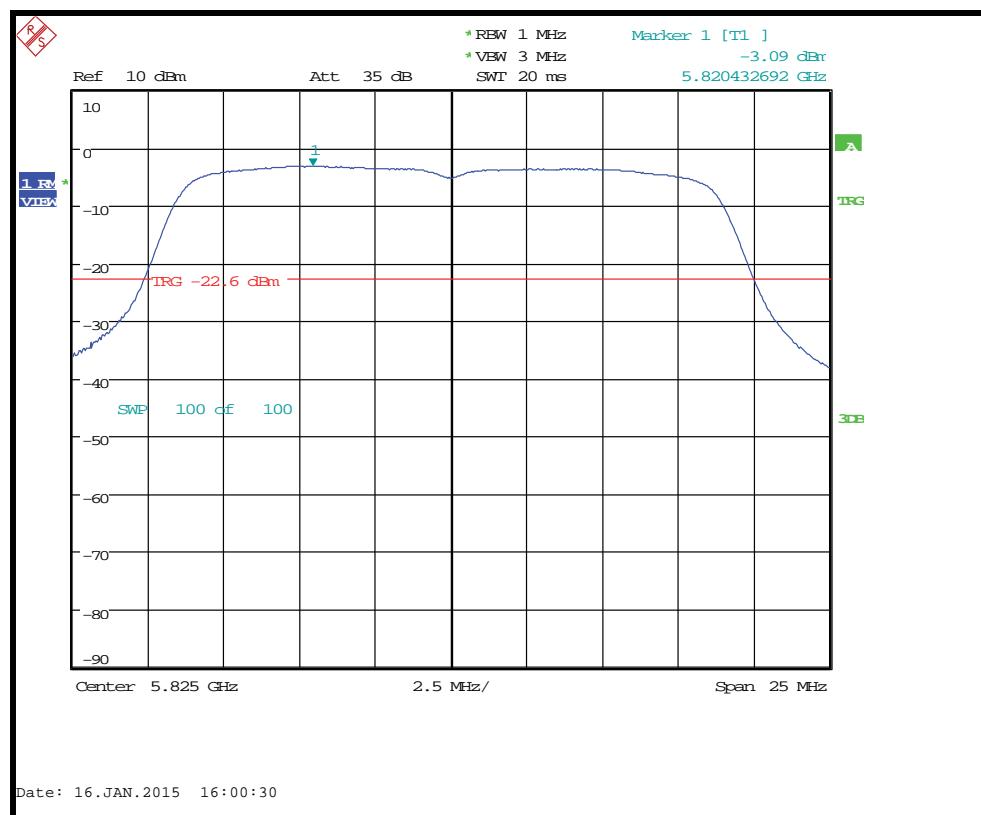
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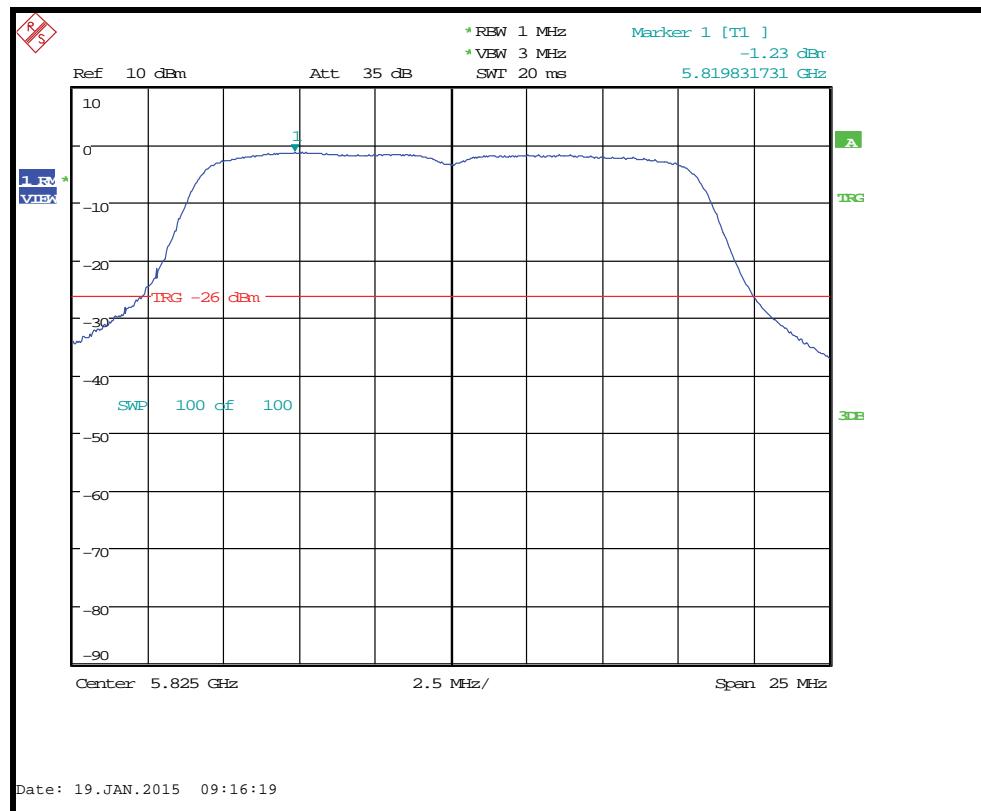
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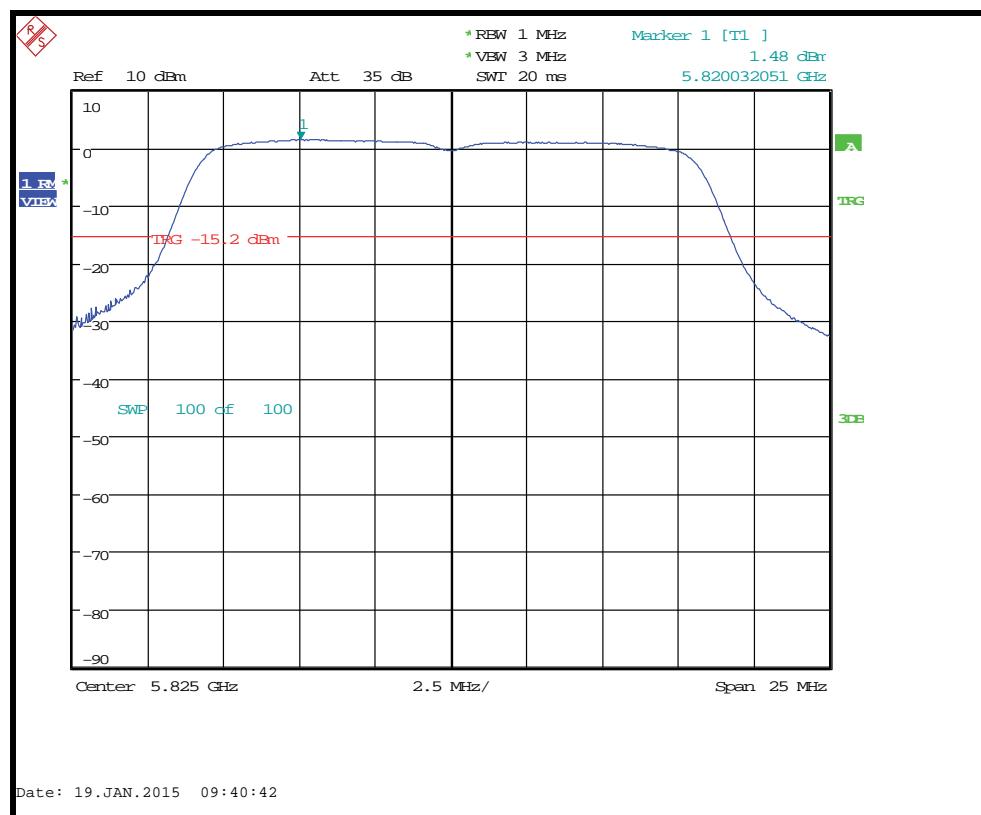
Conducted power spectral density 5825MHz MCS6



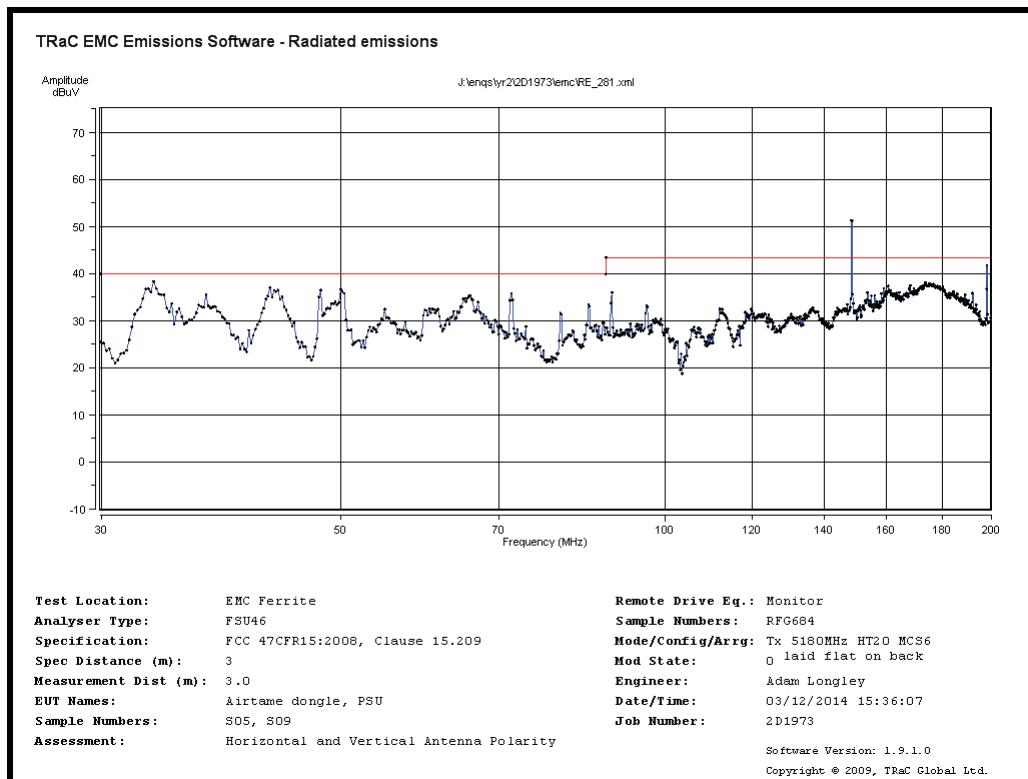
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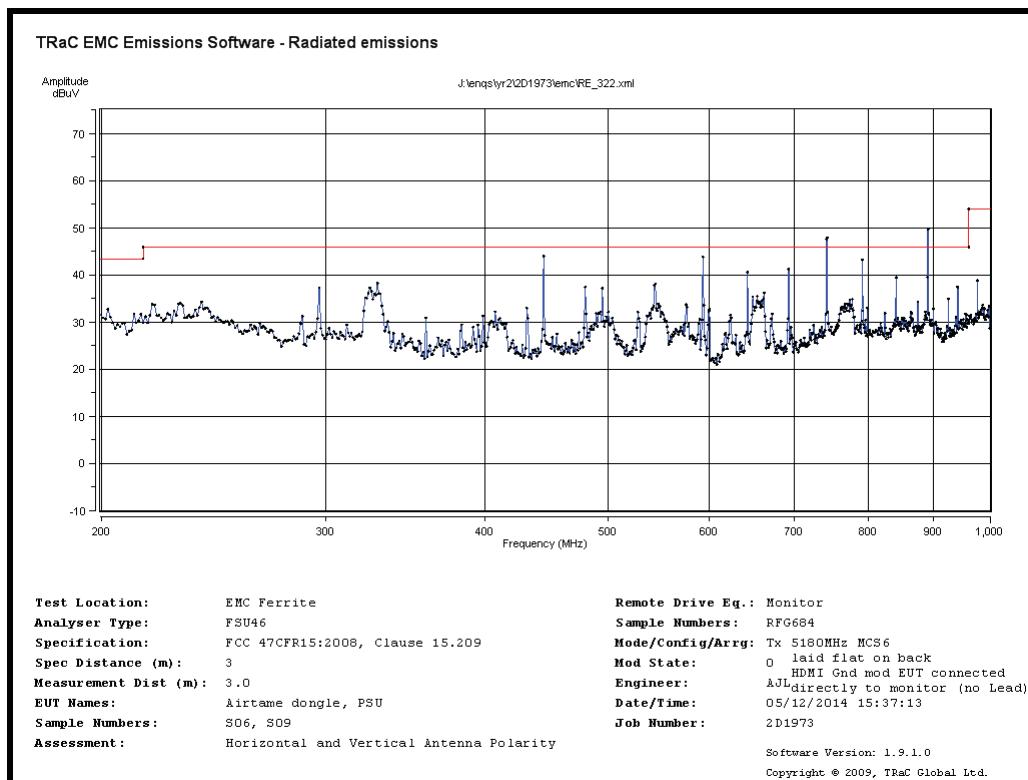
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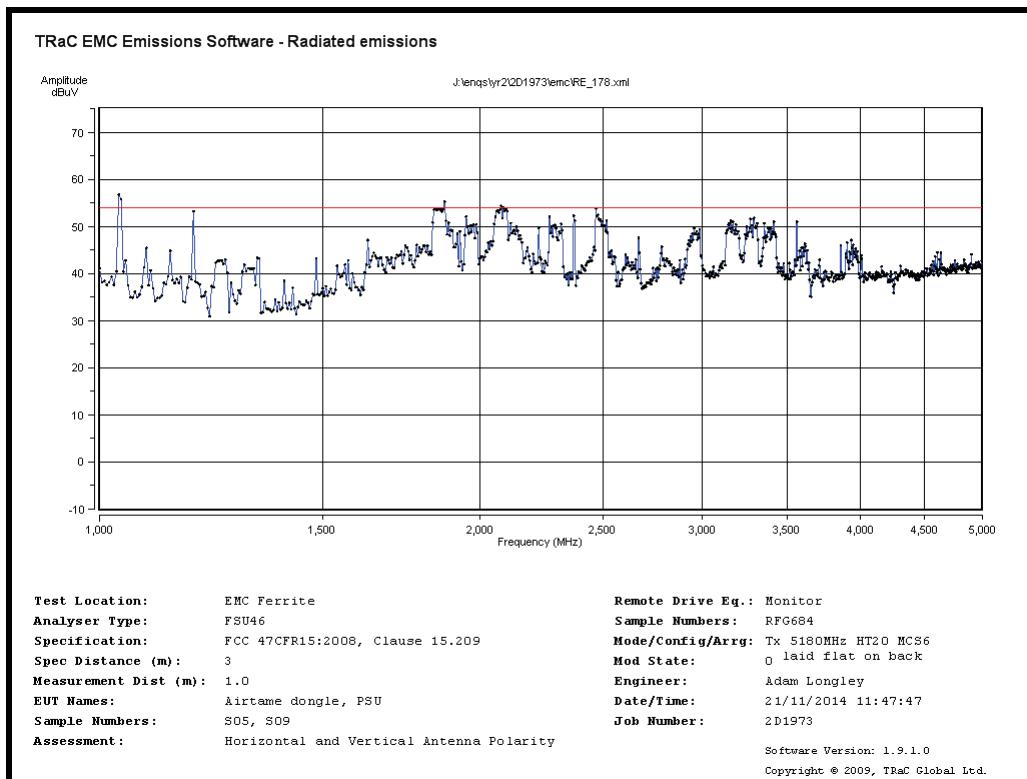
Conducted power spectral density 5825MHz 6Mb/s



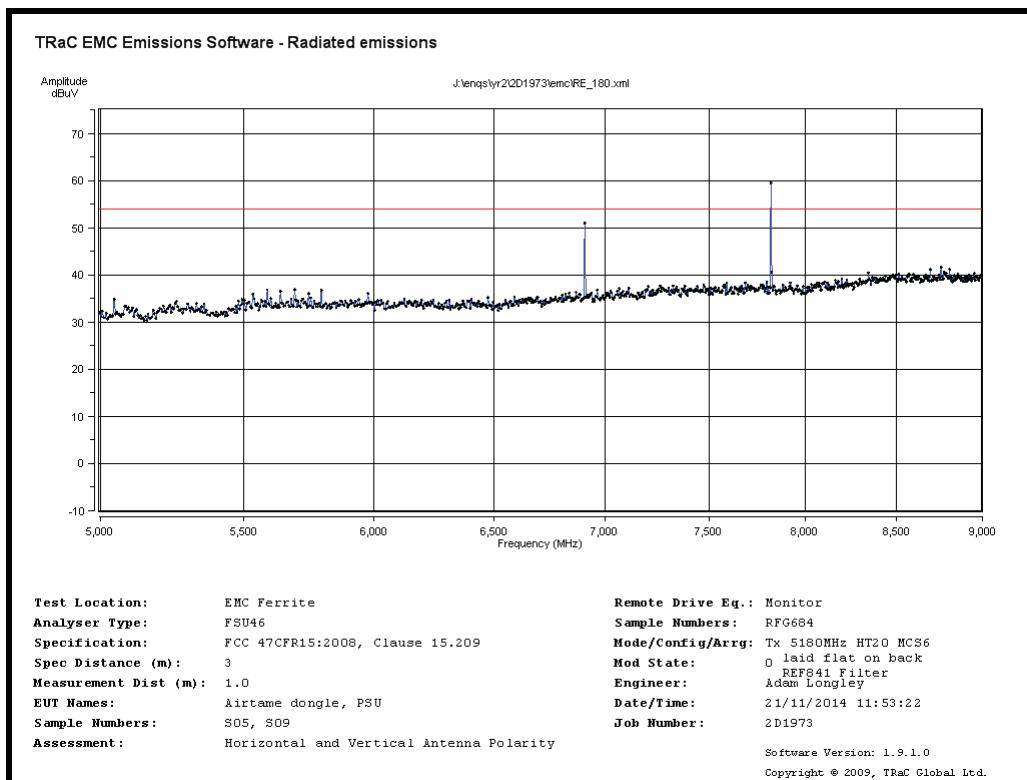
### Radiated Spurious emissions 30MHz to 200MHz – 5180MHz MCS6



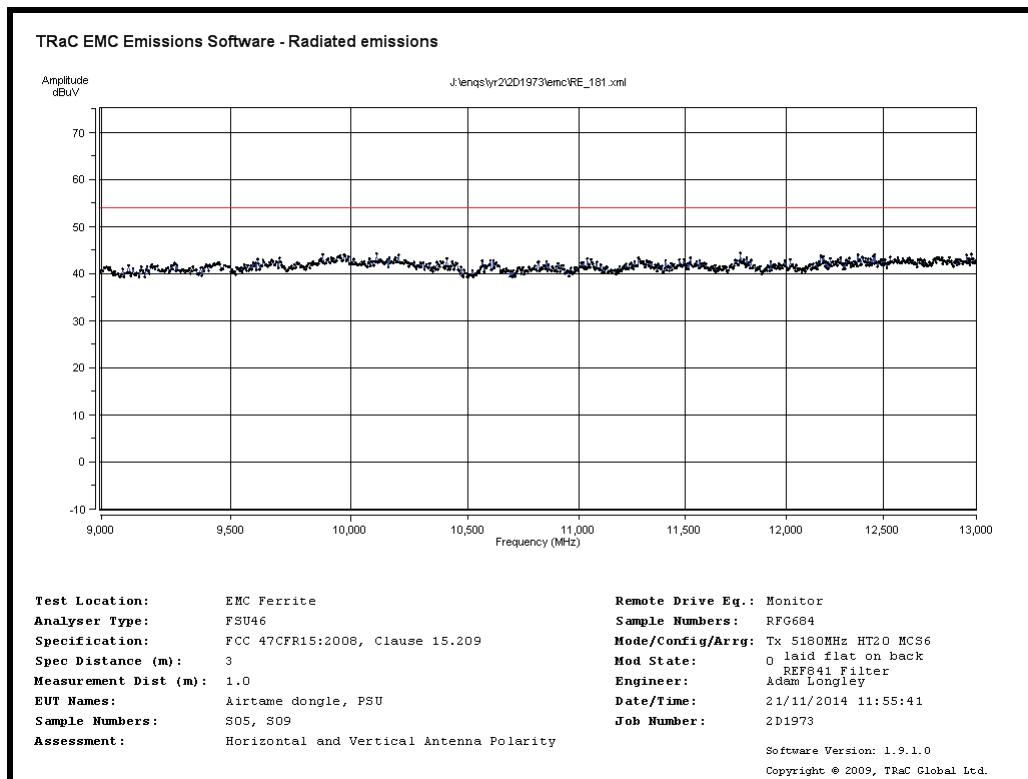
### Radiated Spurious emissions 200MHz to 1GHz – 5180MHz MCS6



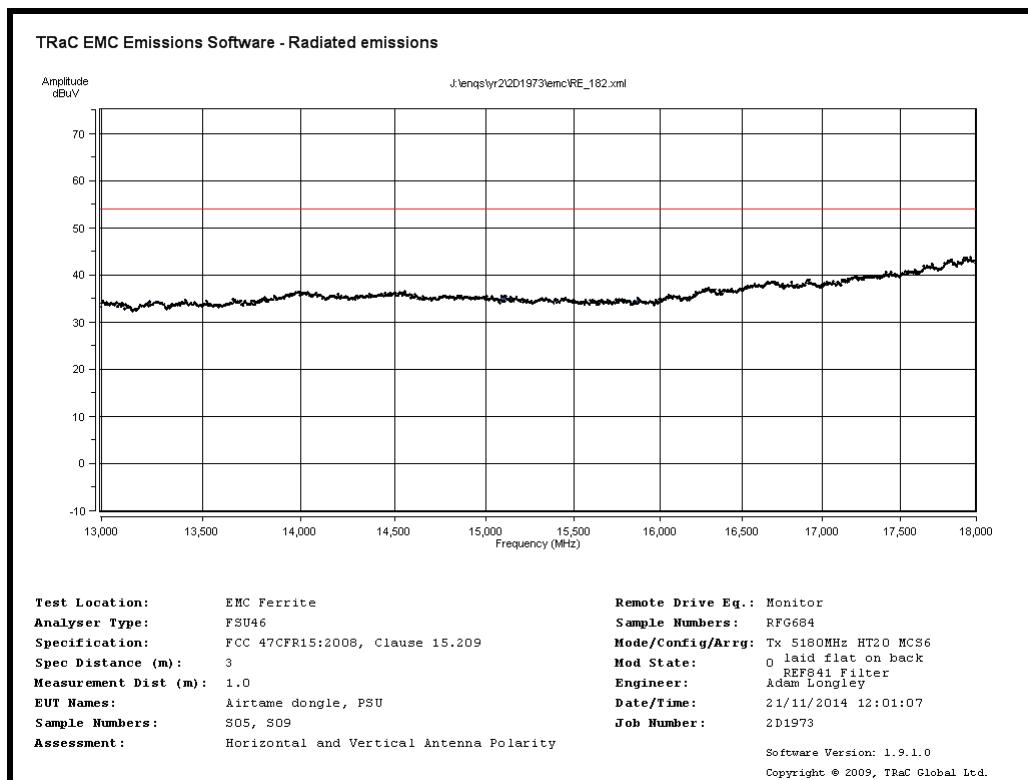
### Radiated Spurious emissions 1GHz to 5GHz – 5180MHz MCS6



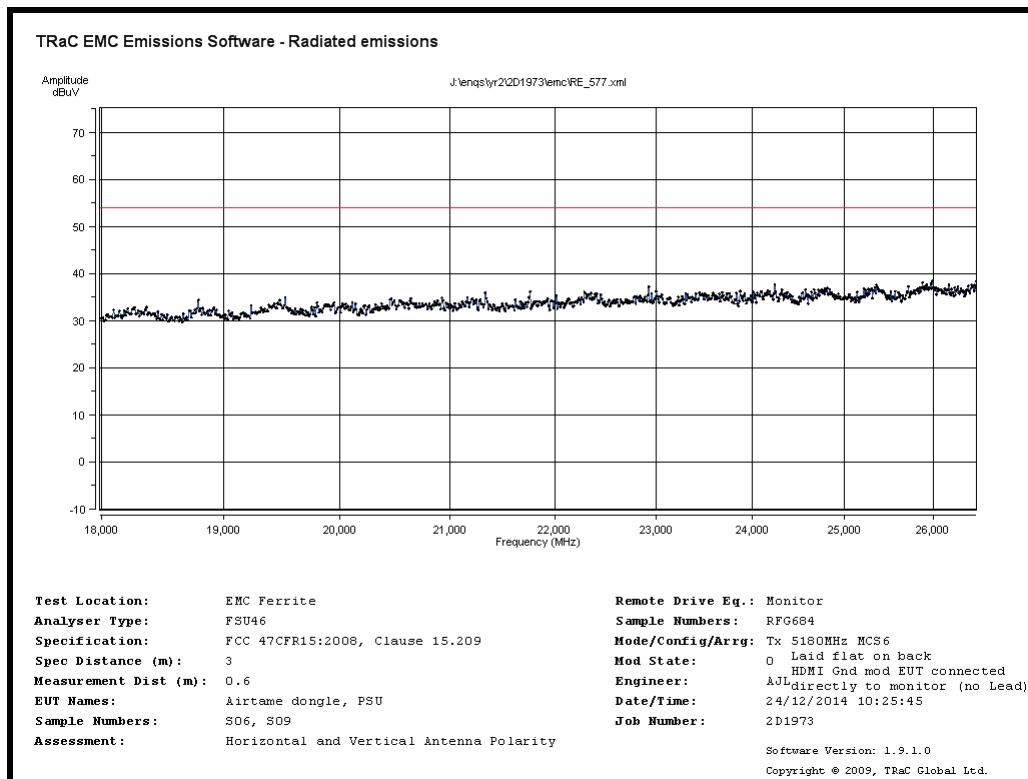
### Radiated Spurious emissions 5GHz to 9GHz – 5180MHz MCS6



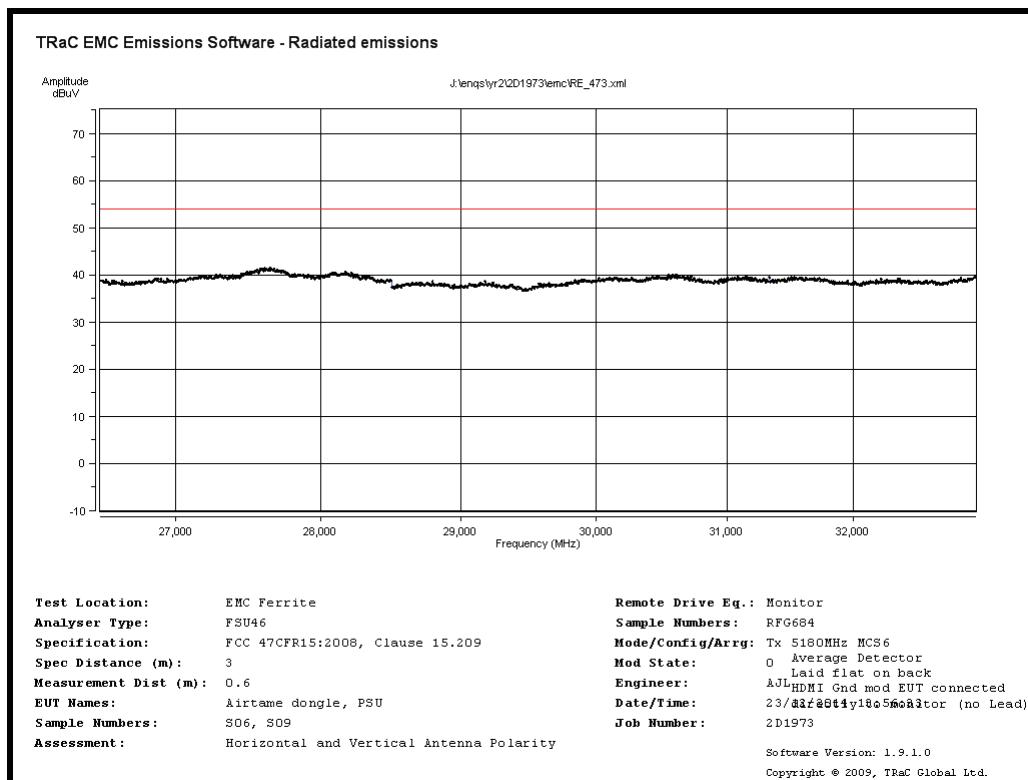
### Radiated Spurious emissions 9GHz to 13GHz – 5180MHz MCS6



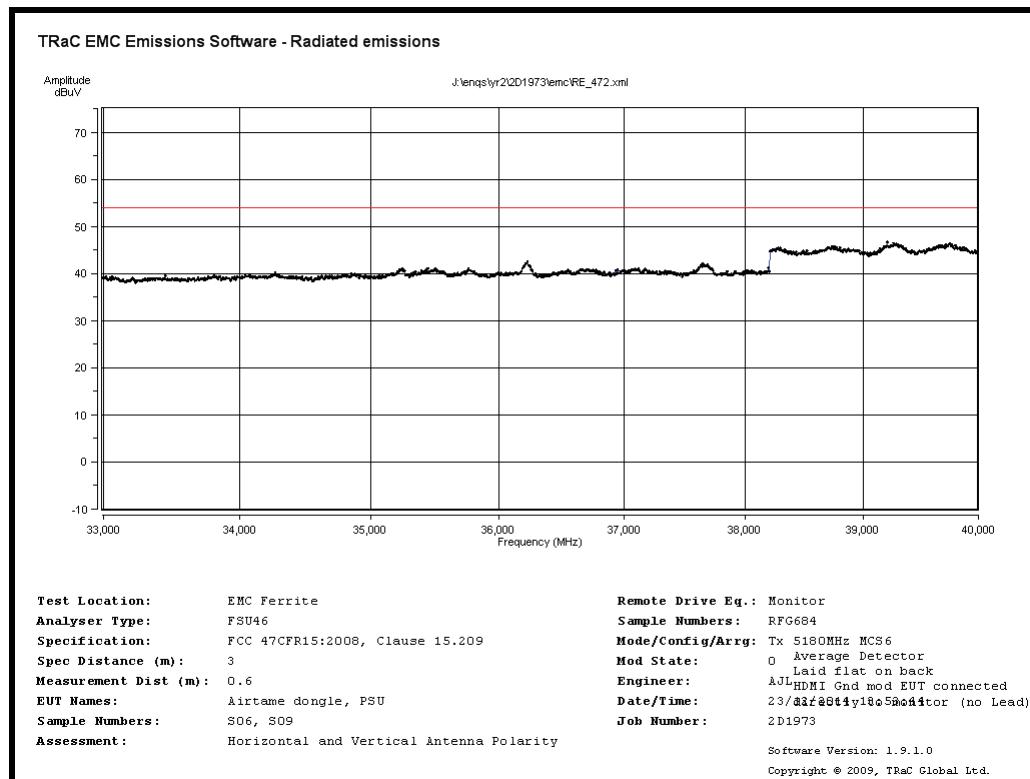
### Radiated Spurious emissions 13GHz to 18GHz – 5180MHz MCS6



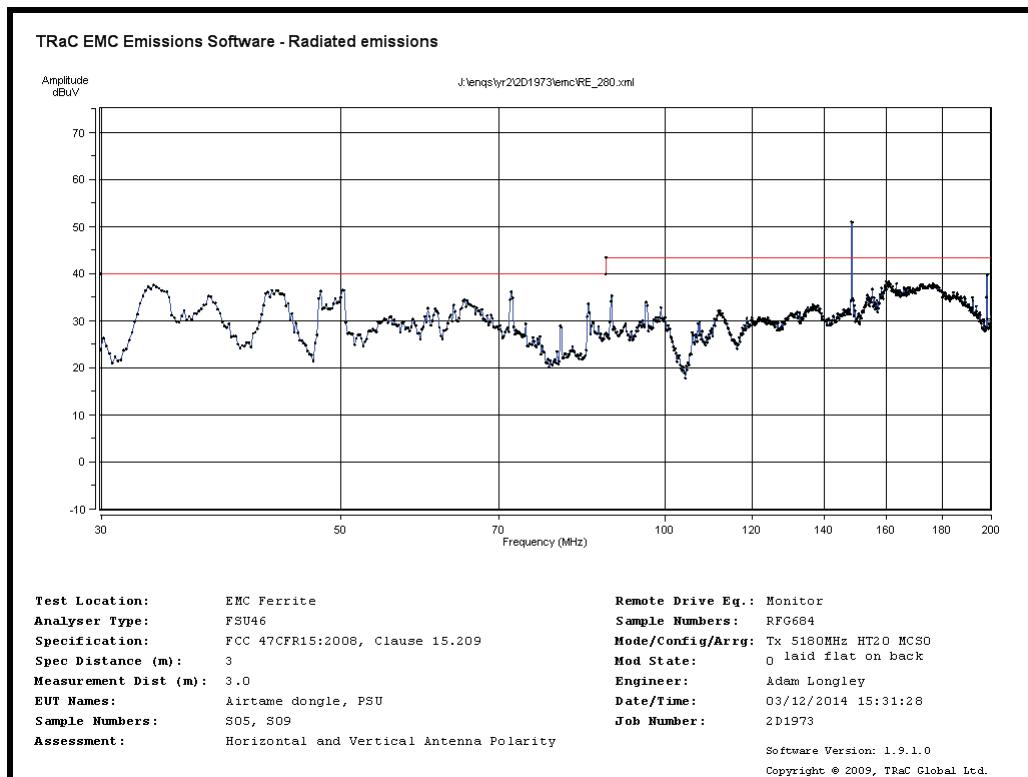
### Radiated Spurious emissions 18GHz to 26.5GHz – 5180MHz MCS6



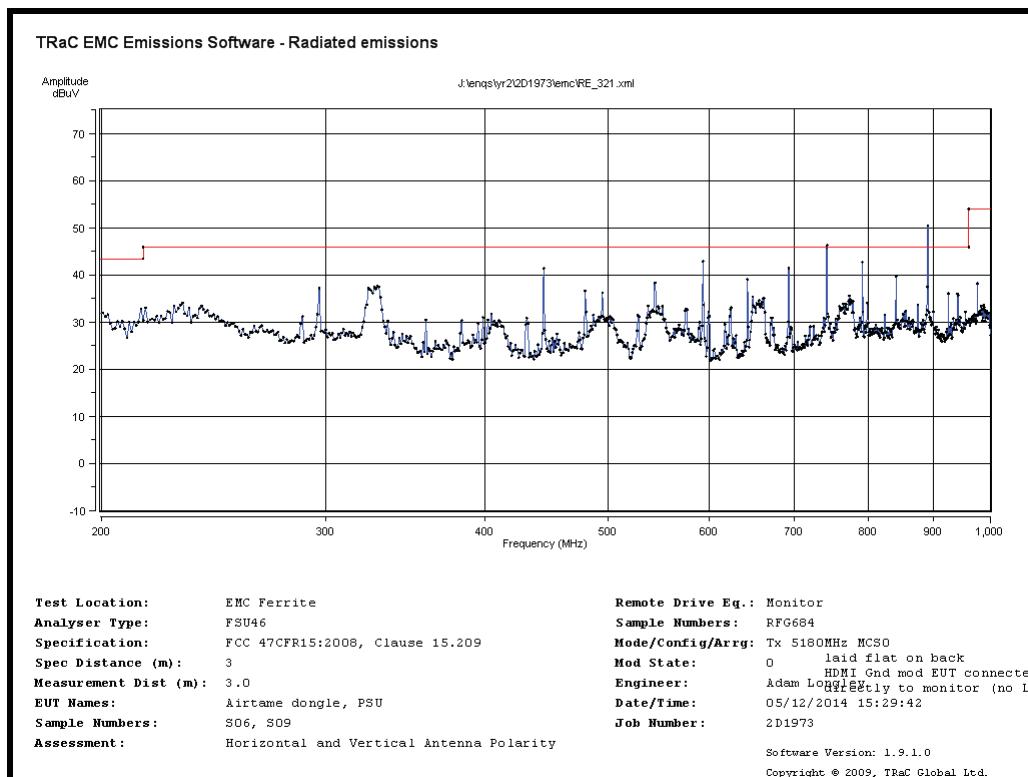
### Radiated Spurious emissions 26.5GHz to 33GHz – 5180MHz MCS6



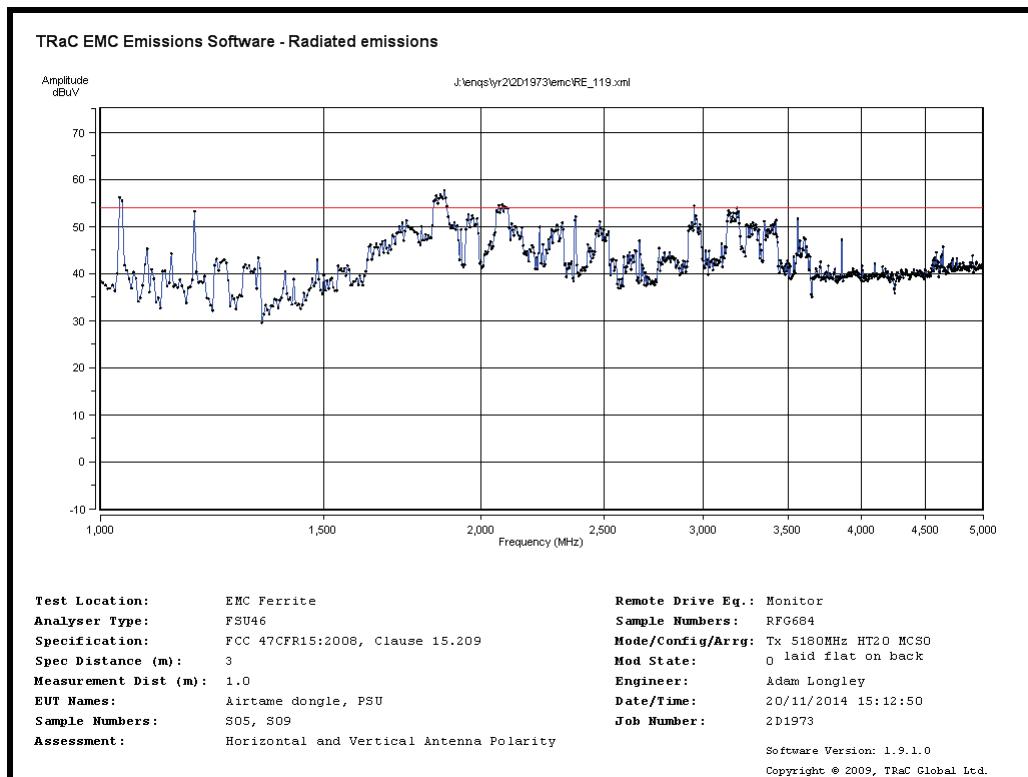
Radiated Spurious emissions 33GHz to 40GHz – 5180MHz MCS6



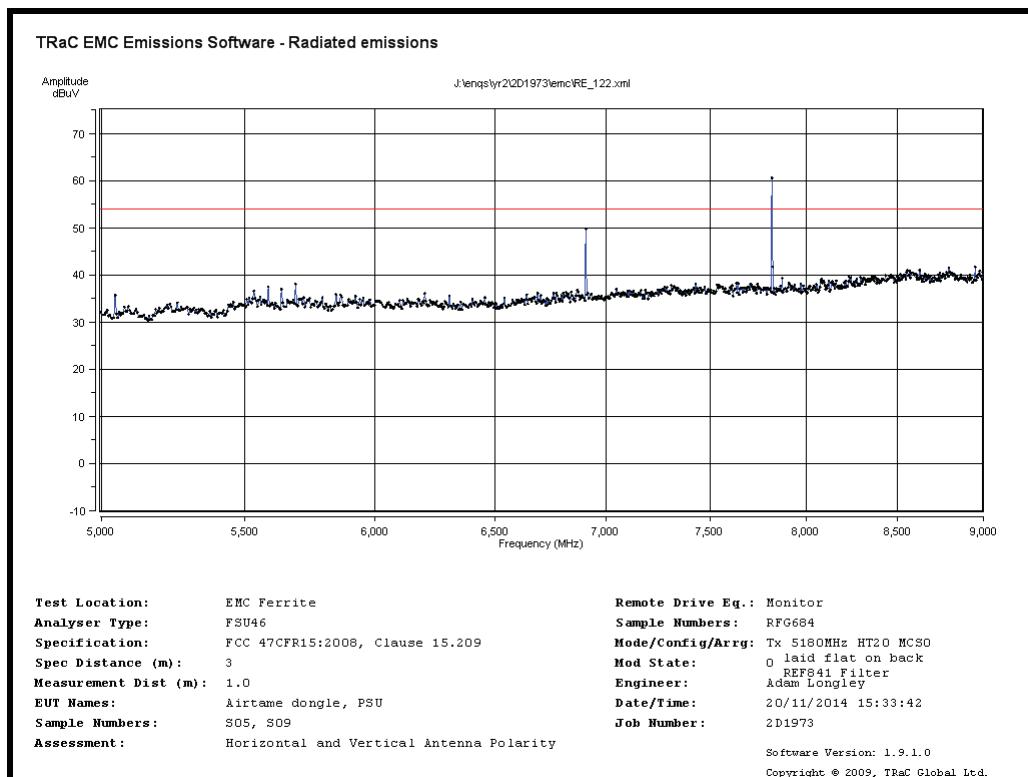
### Radiated Spurious emissions 30MHz to 200MHz – 5180MHz MCS0



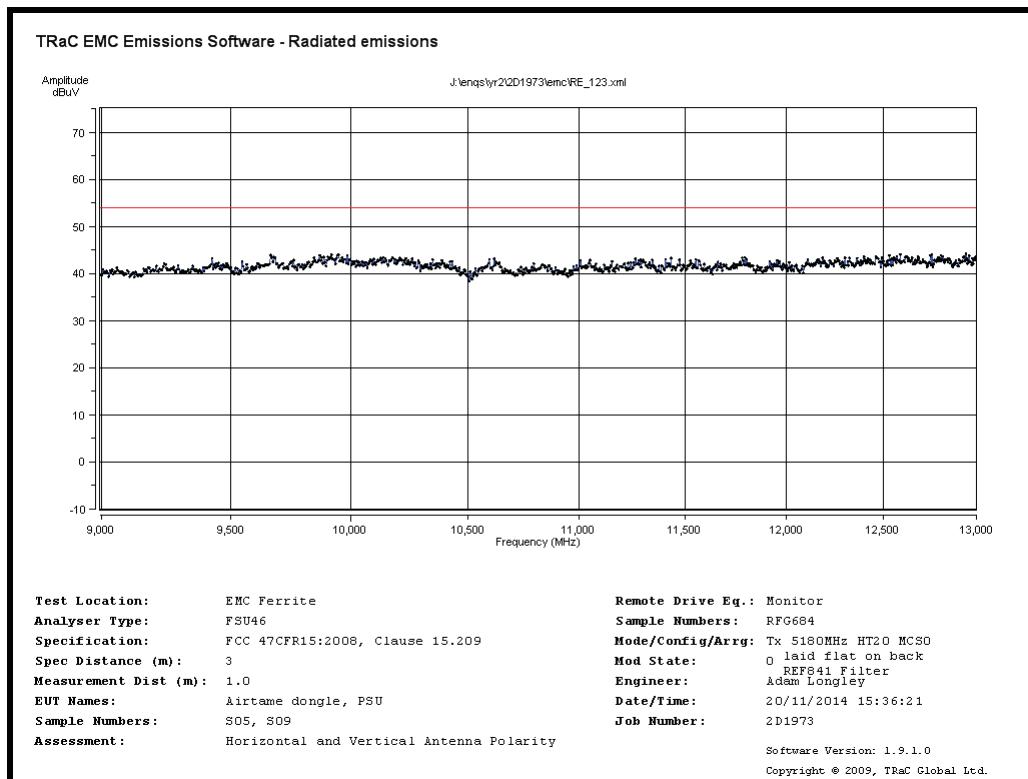
### Radiated Spurious emissions 200MHz to 1GHz – 5180MHz MCS0



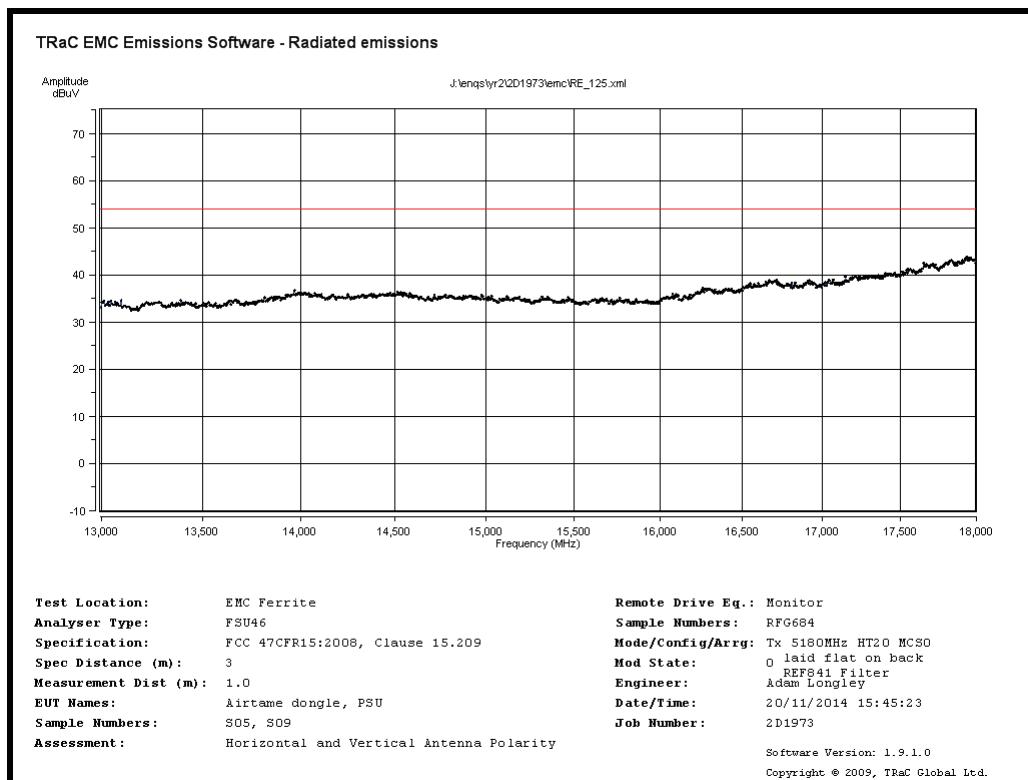
### Radiated Spurious emissions 1GHz to 5GHz – 5180MHz MCS0



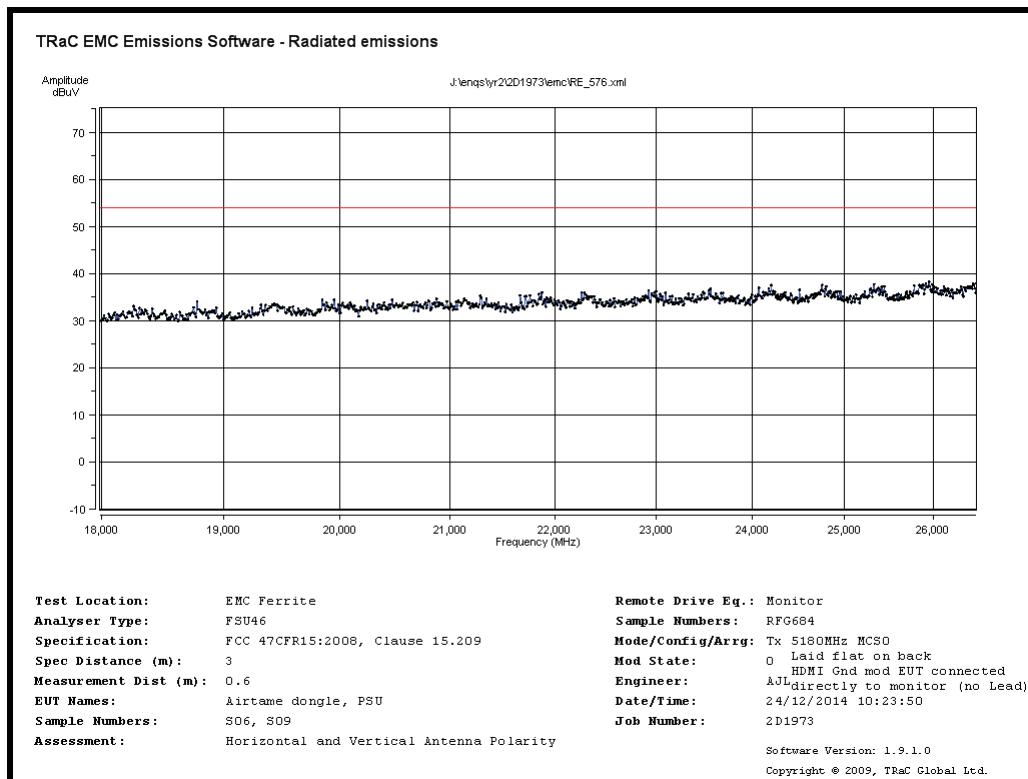
### Radiated Spurious emissions 5GHz to 9GHz – 5180MHz MCS0



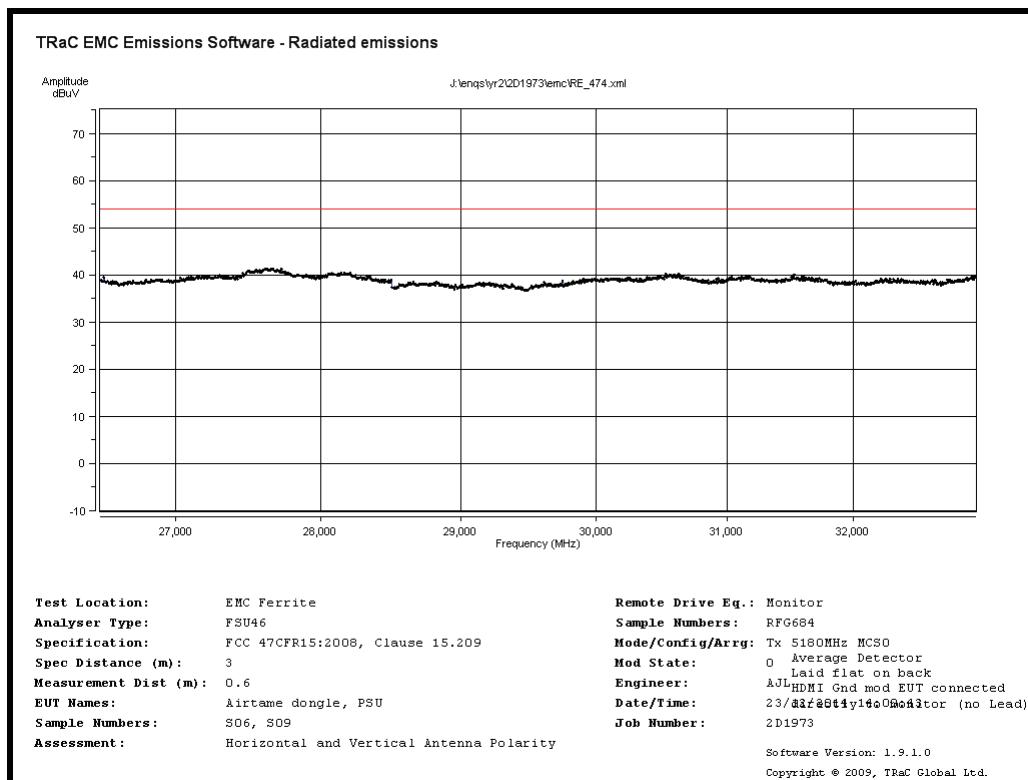
### Radiated Spurious emissions 9GHz to 13GHz – 5180MHz MCS0



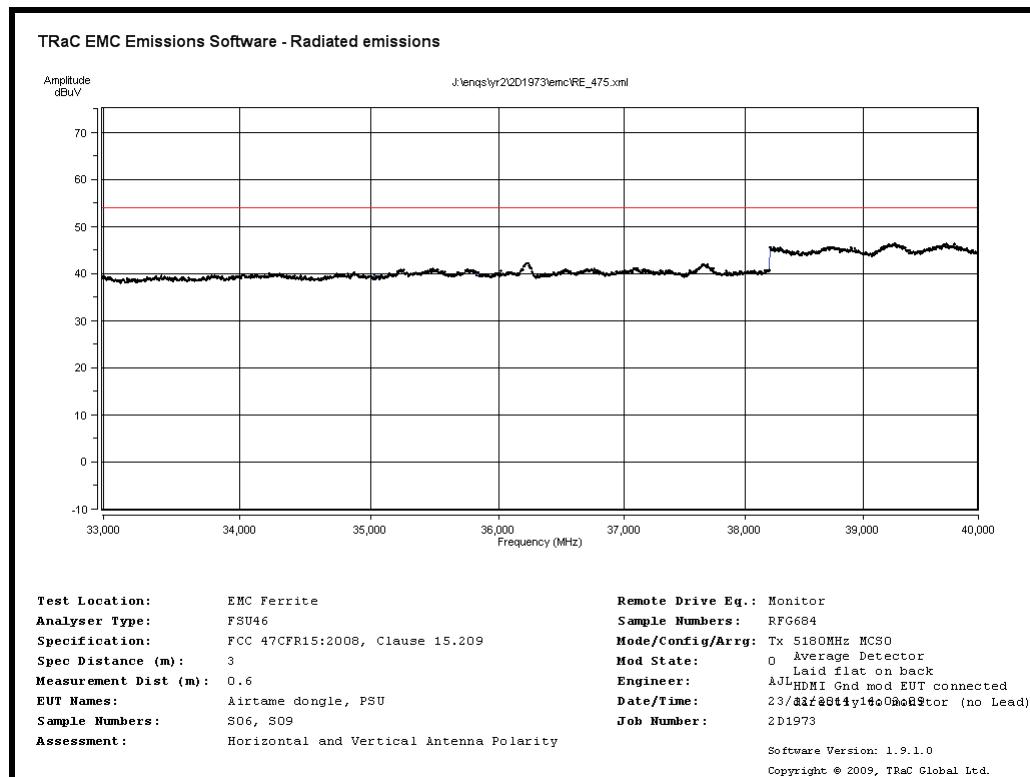
### Radiated Spurious emissions 13GHz to 18GHz – 5180MHz MCS0



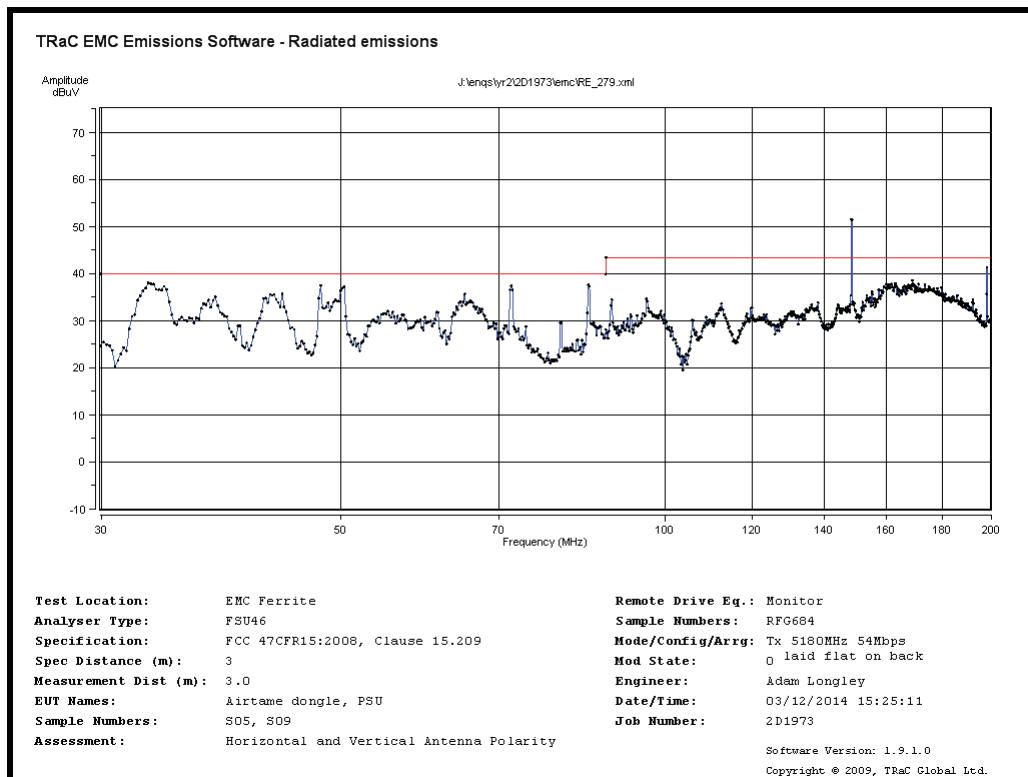
### Radiated Spurious emissions 18GHz to 26.5GHz – 5180MHz MCS0



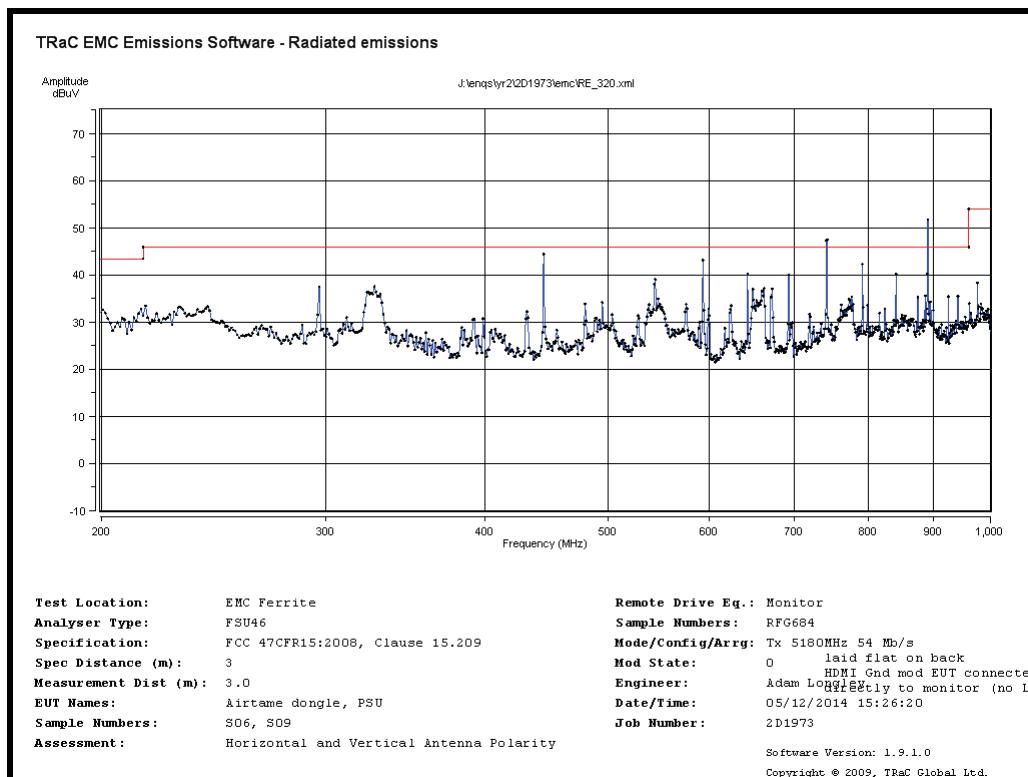
### Radiated Spurious emissions 26.5GHz to 33GHz – 5180MHz MCS0



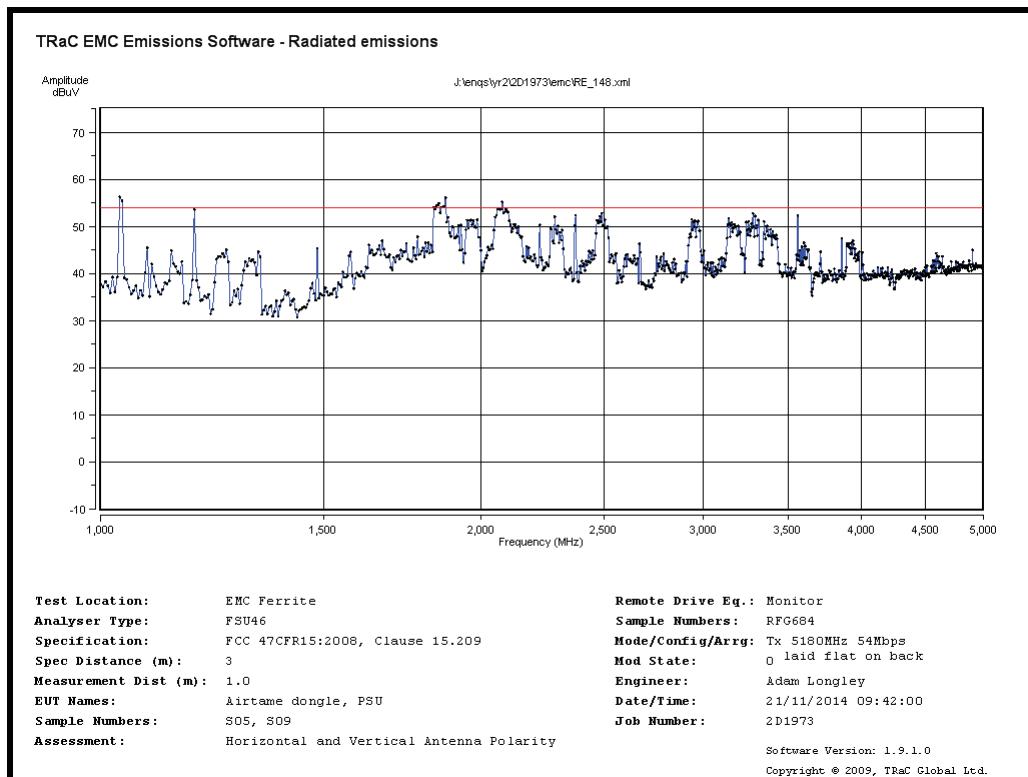
Radiated Spurious emissions 33GHz to 40GHz – 5180MHz MCS0



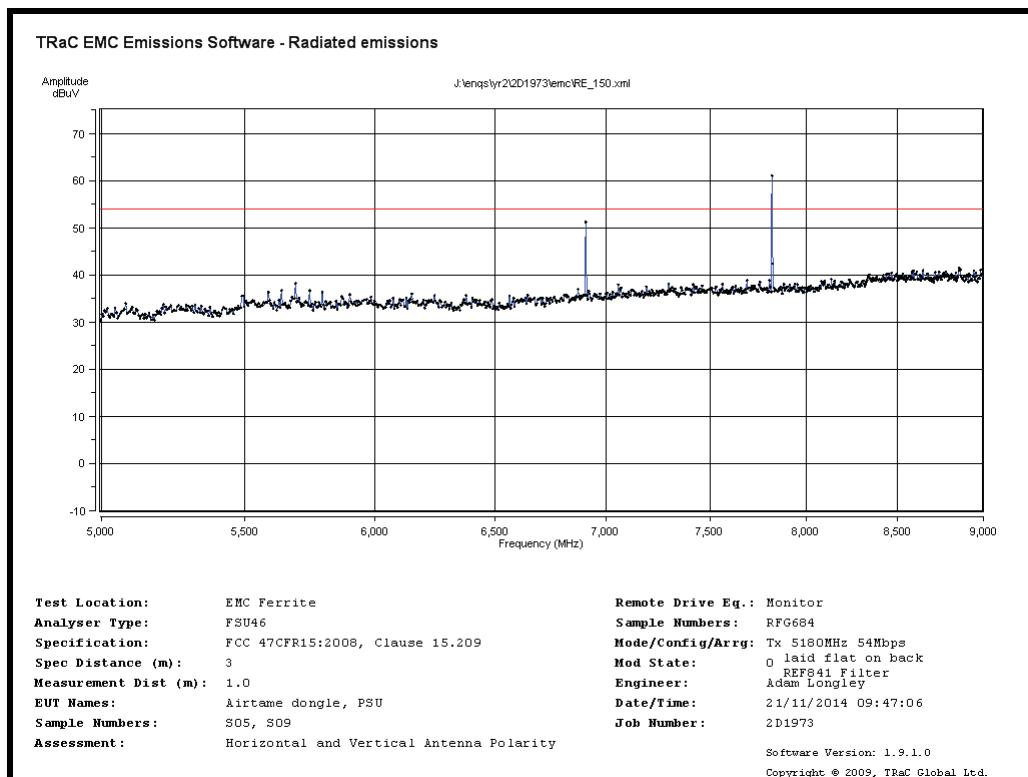
### Radiated Spurious emissions 30MHz to 200MHz – 5180MHz 54Mb/s



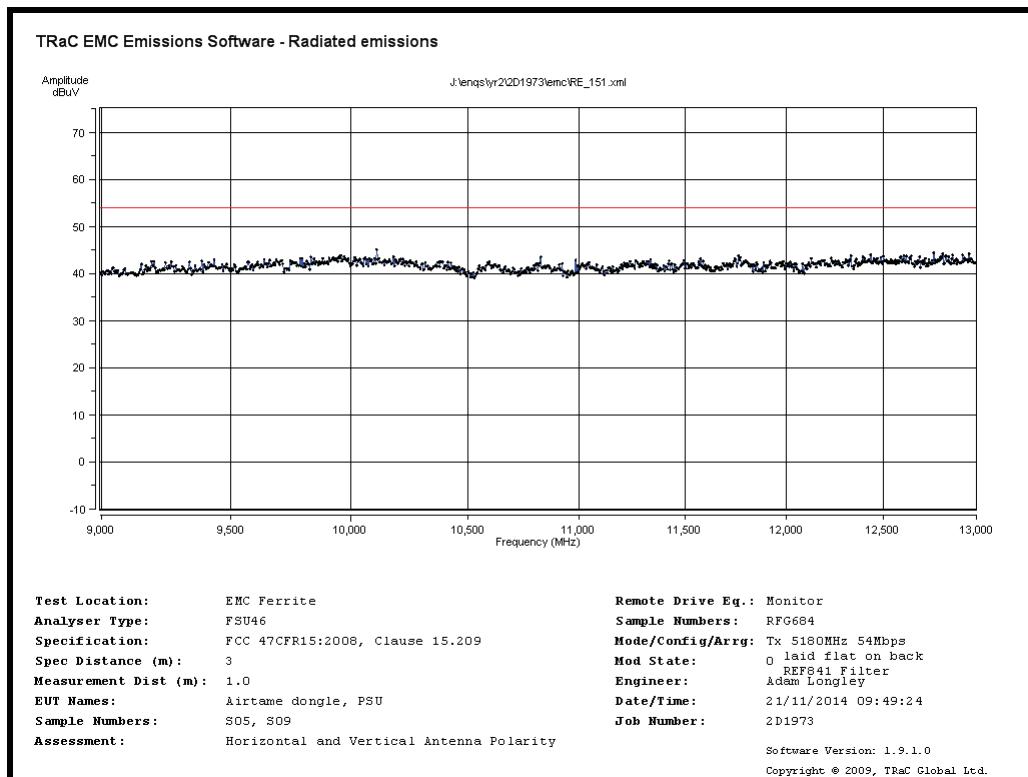
### Radiated Spurious emissions 200MHz to 1GHz – 5180MHz 54Mb/s



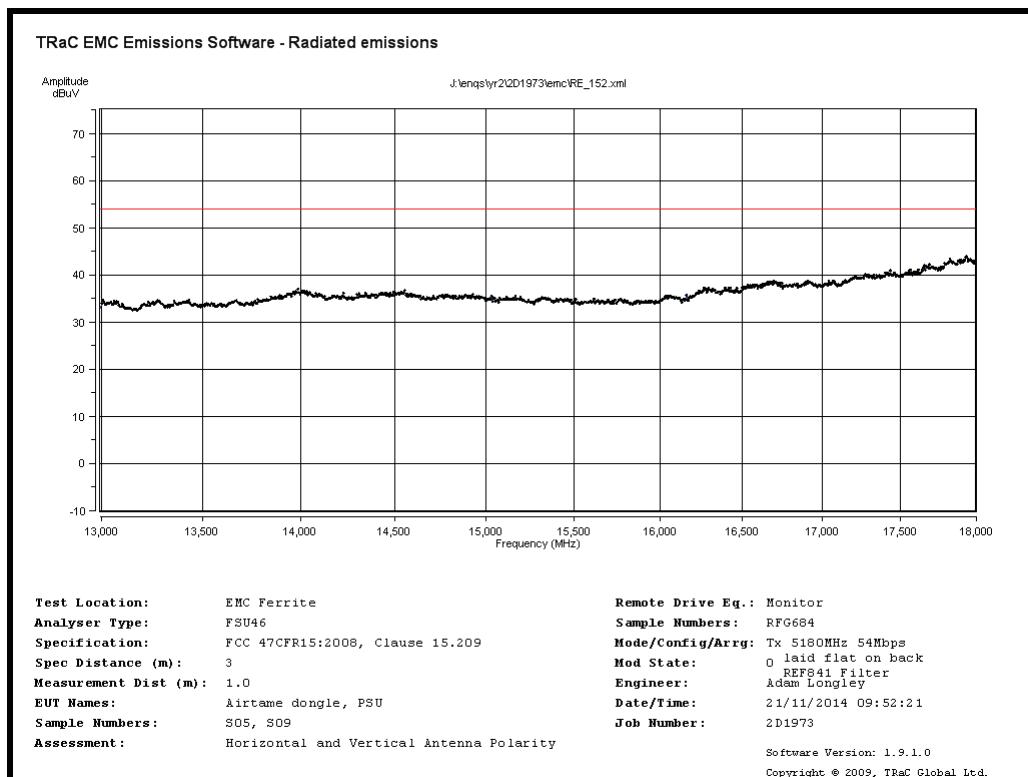
### Radiated Spurious emissions 1GHz to 5GHz – 5180MHz 54Mb/s



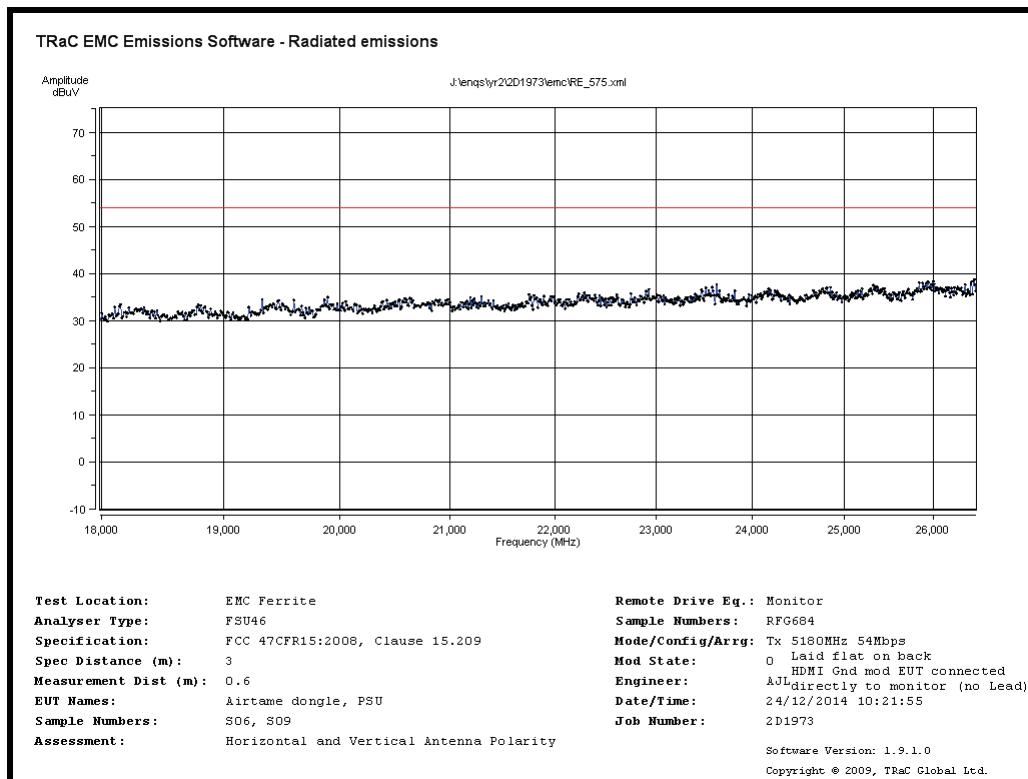
### Radiated Spurious emissions 5GHz to 9GHz – 5180MHz 54Mb/s



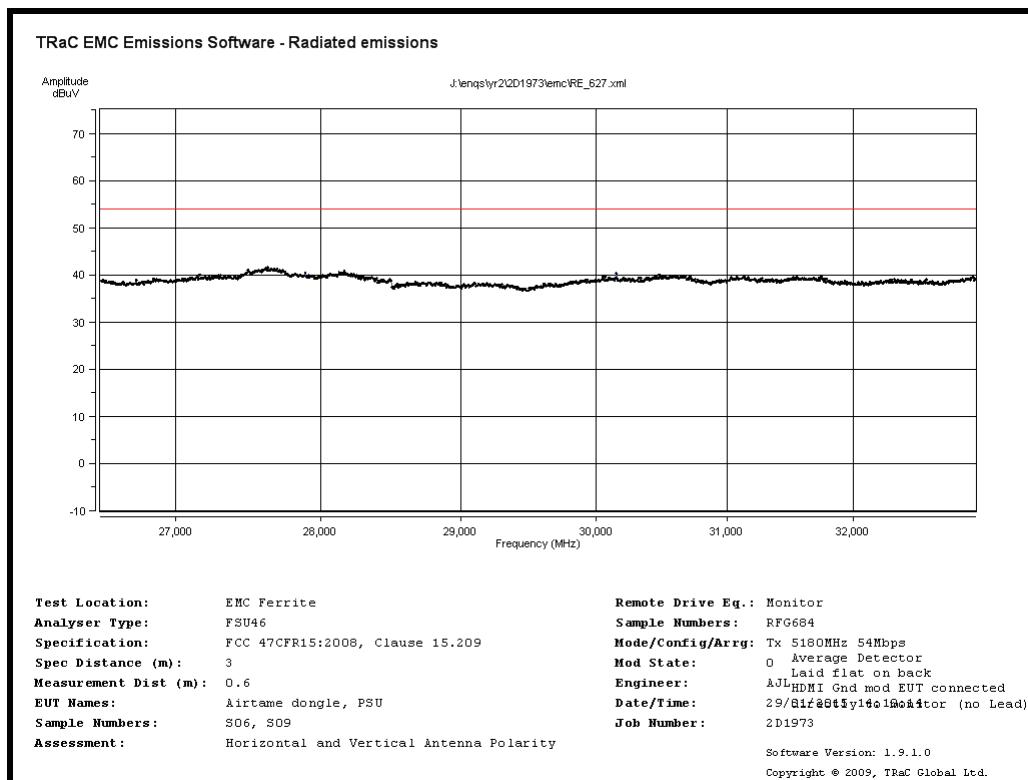
### Radiated Spurious emissions 9GHz to 13GHz – 5180MHz 54Mb/s



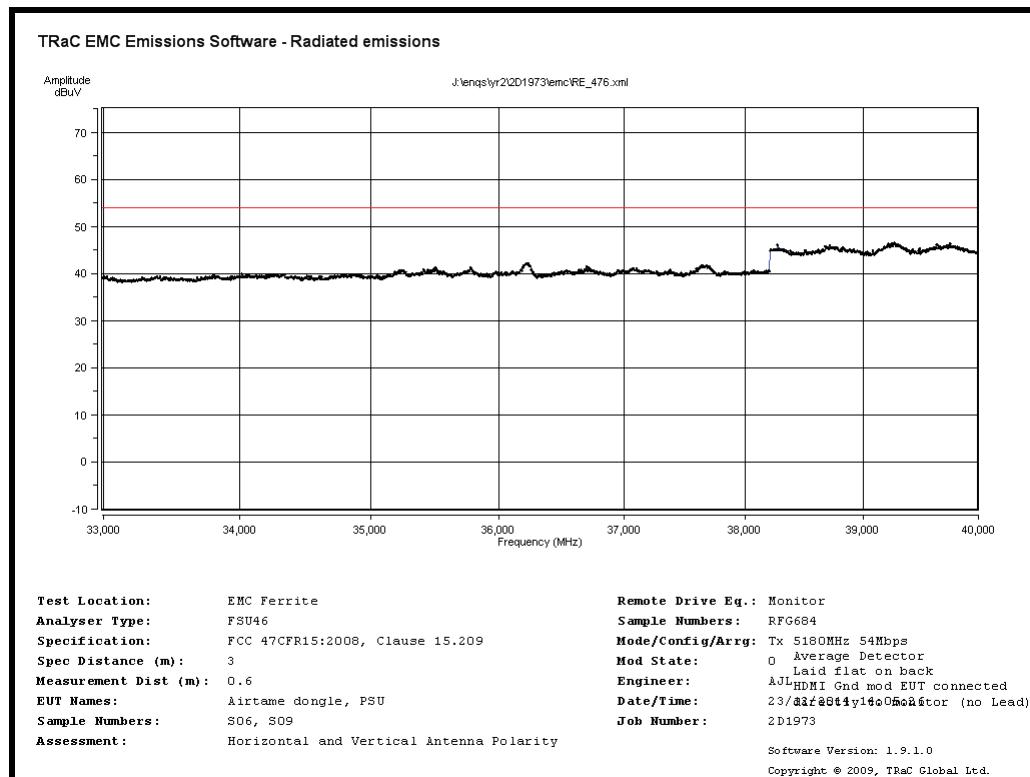
### Radiated Spurious emissions 13GHz to 18GHz – 5180MHz 54Mb/s



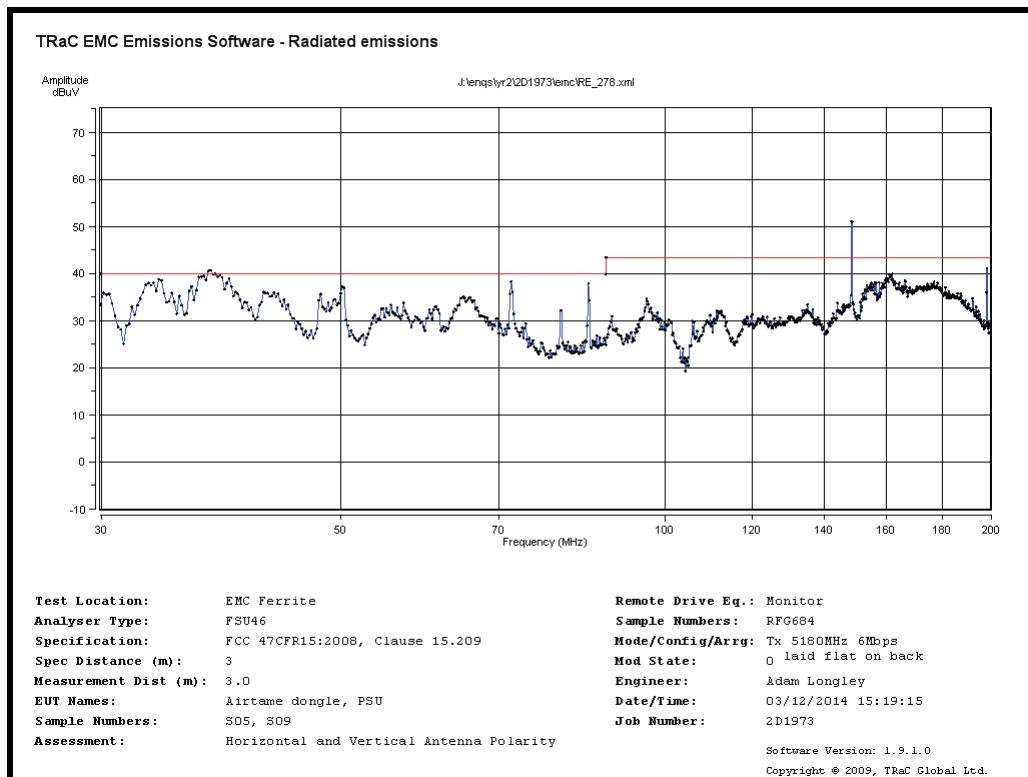
### Radiated Spurious emissions 18GHz to 26.5GHz – 5180MHz 54Mb/s



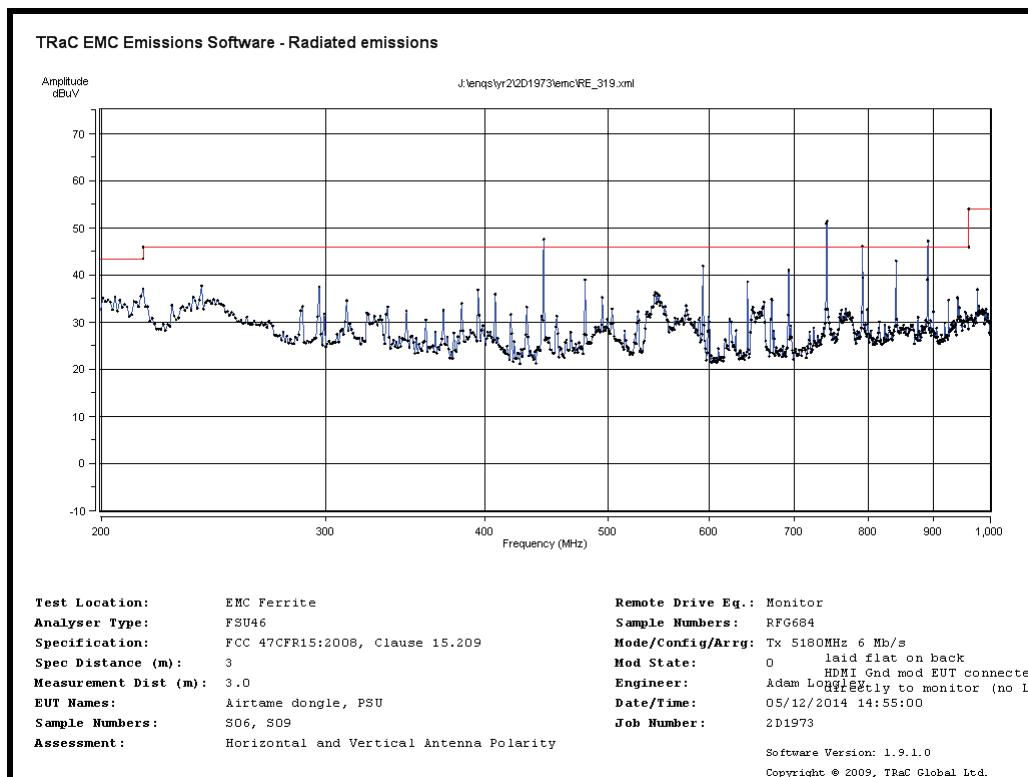
### Radiated Spurious emissions 26.5GHz to 33GHz – 5180MHz 54Mb/s



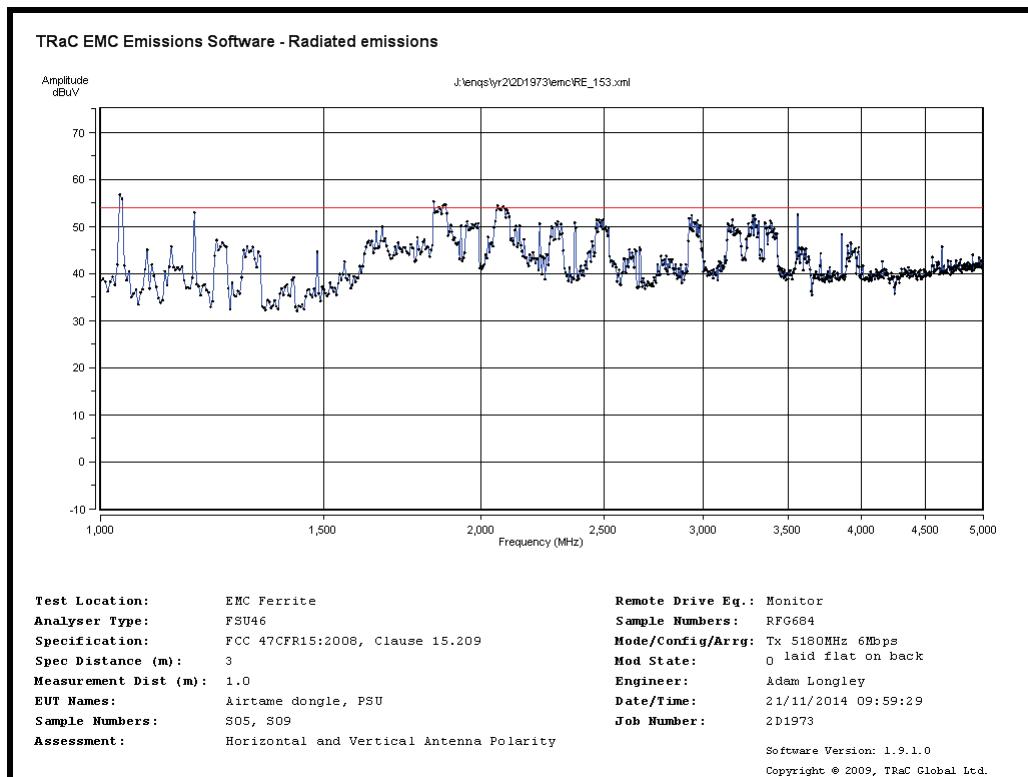
Radiated Spurious emissions 33GHz to 40GHz – 5180MHz 54Mb/s



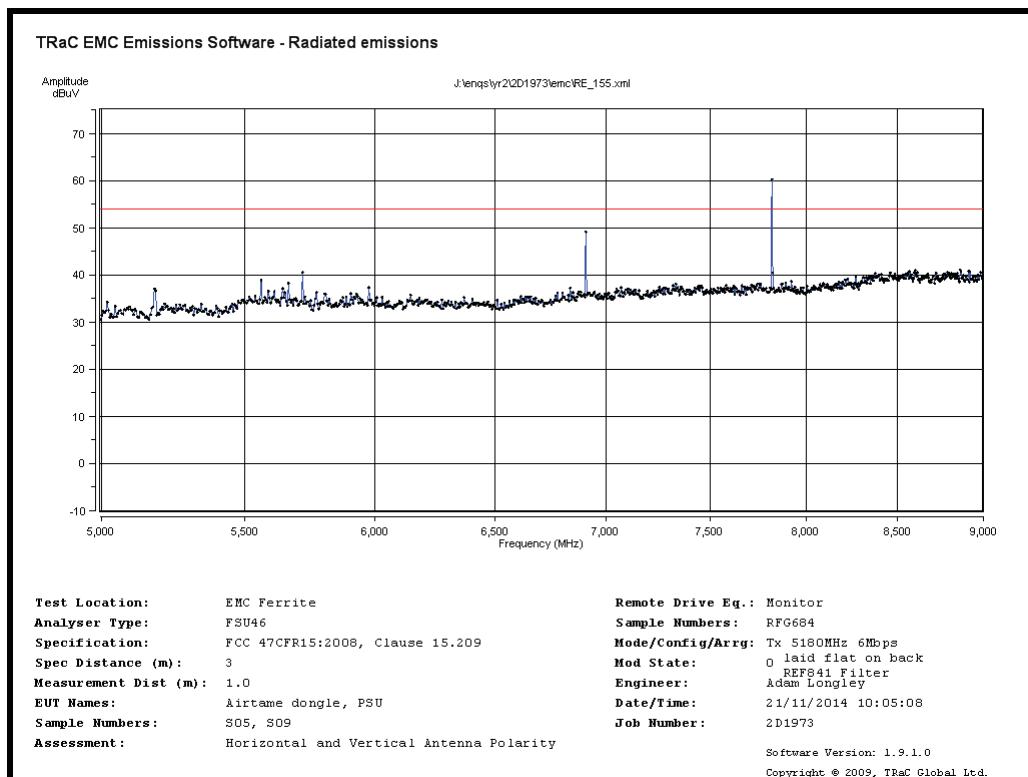
Radiated Spurious emissions 30MHz to 200MHz – 5180MHz 6Mb/s



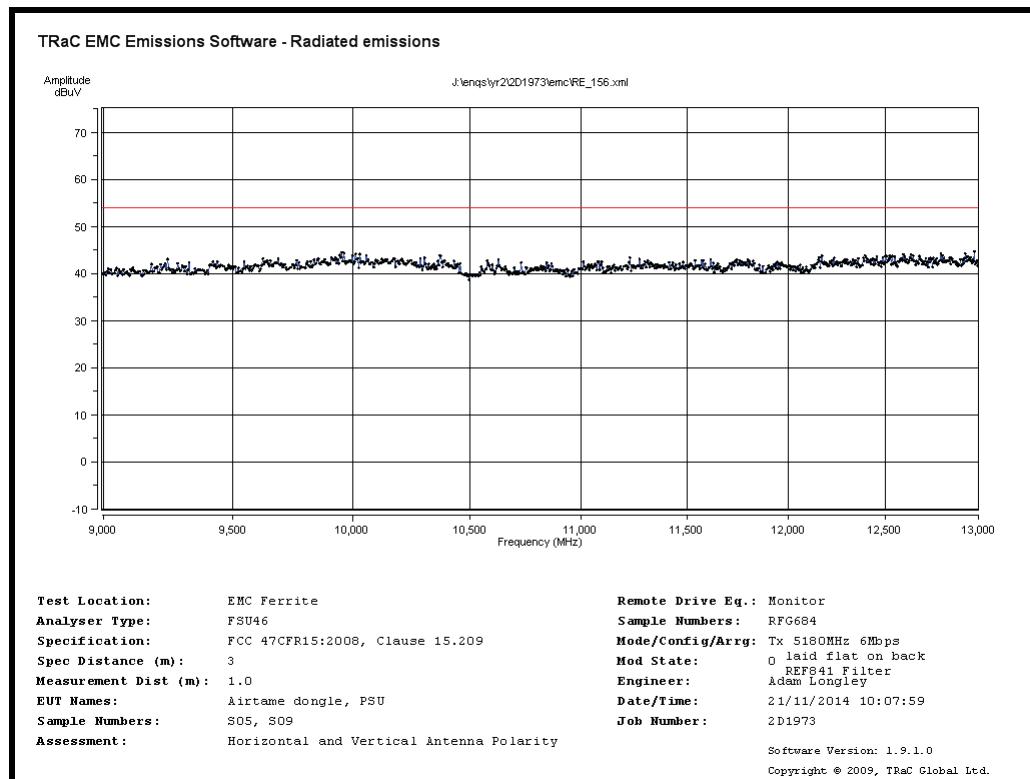
Radiated Spurious emissions 200MHz to 1GHz – 5180MHz 6Mb/s



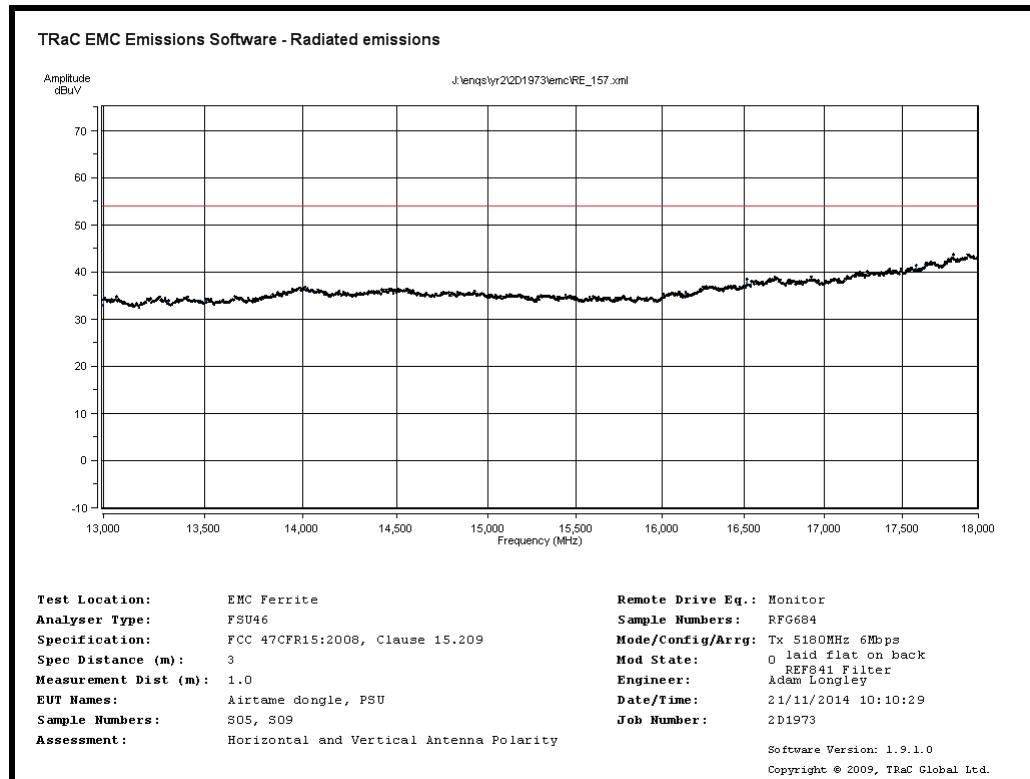
### Radiated Spurious emissions 1GHz to 5GHz – 5180MHz 6Mb/s



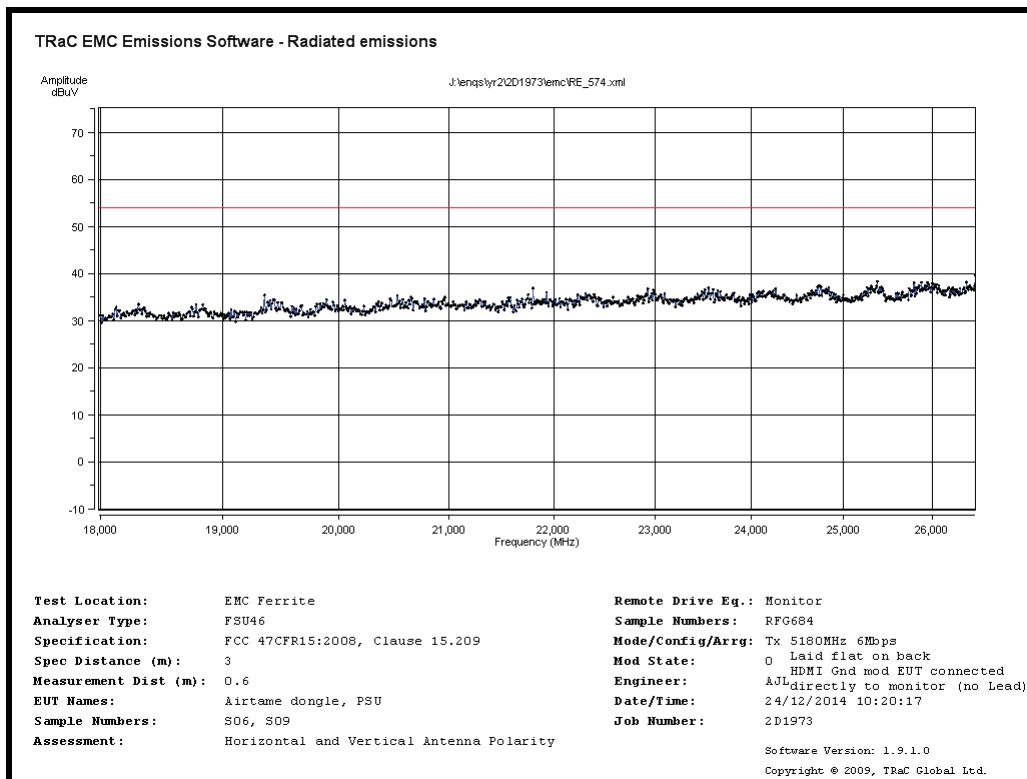
### Radiated Spurious emissions 5GHz to 9 GHz – 5180MHz 6Mb/s



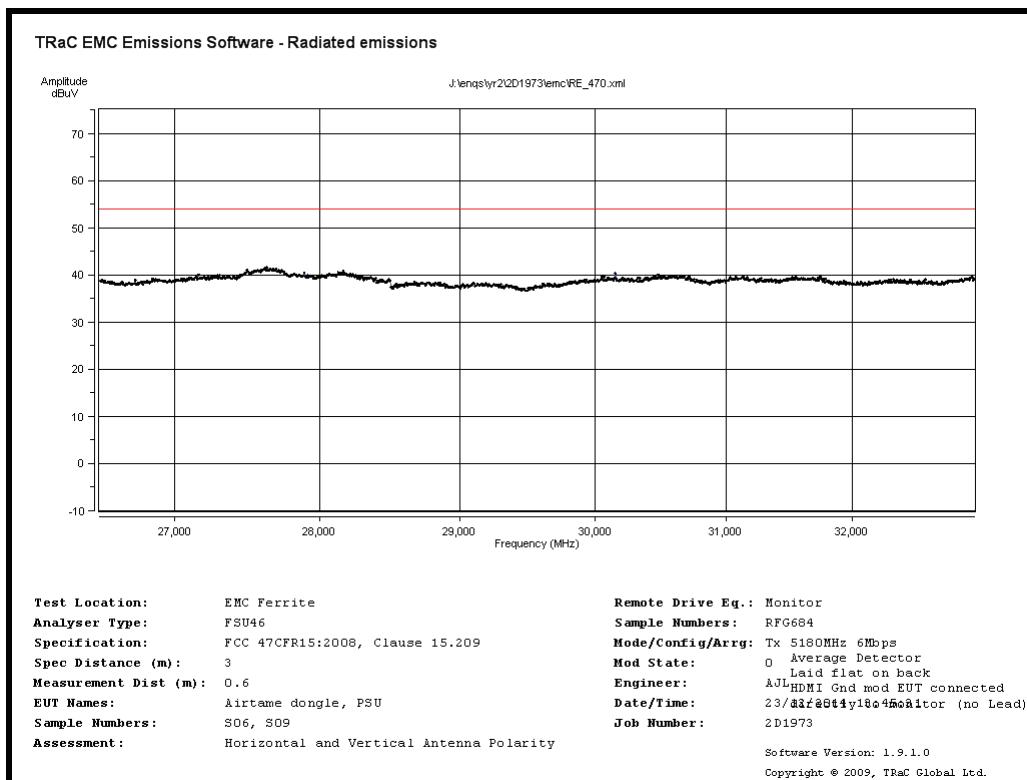
### Radiated Spurious emissions 9GHz to 13GHz – 5180MHz 6Mb/s



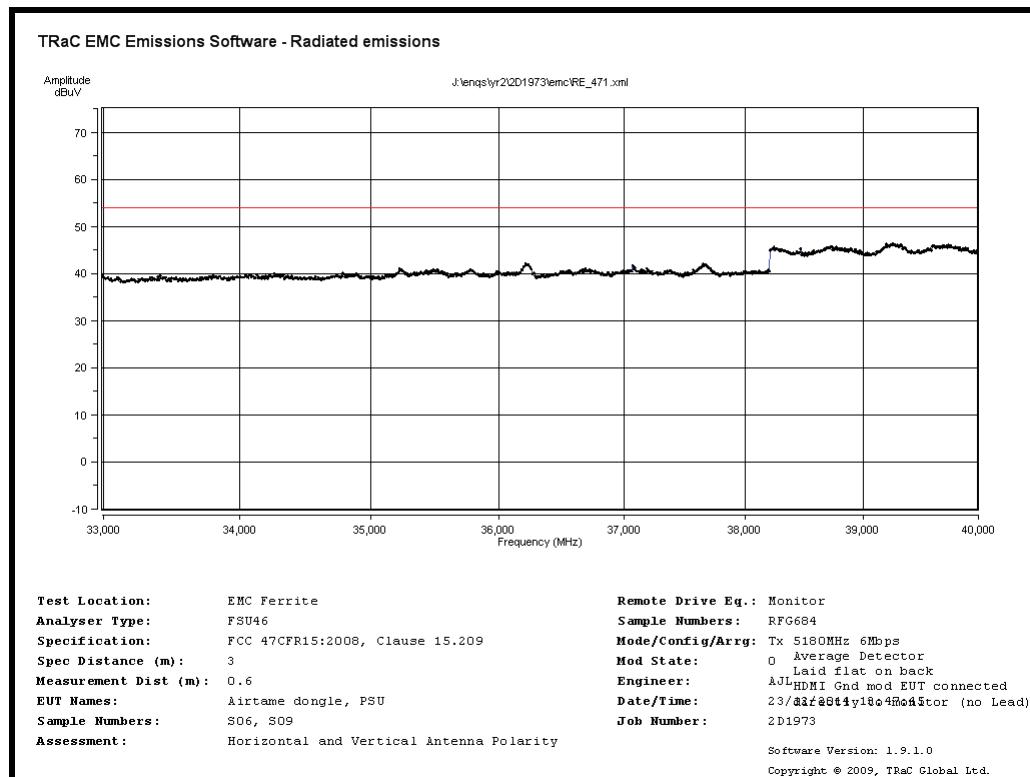
### Radiated Spurious emissions 13GHz to 18GHz – 5180MHz 6Mb/s



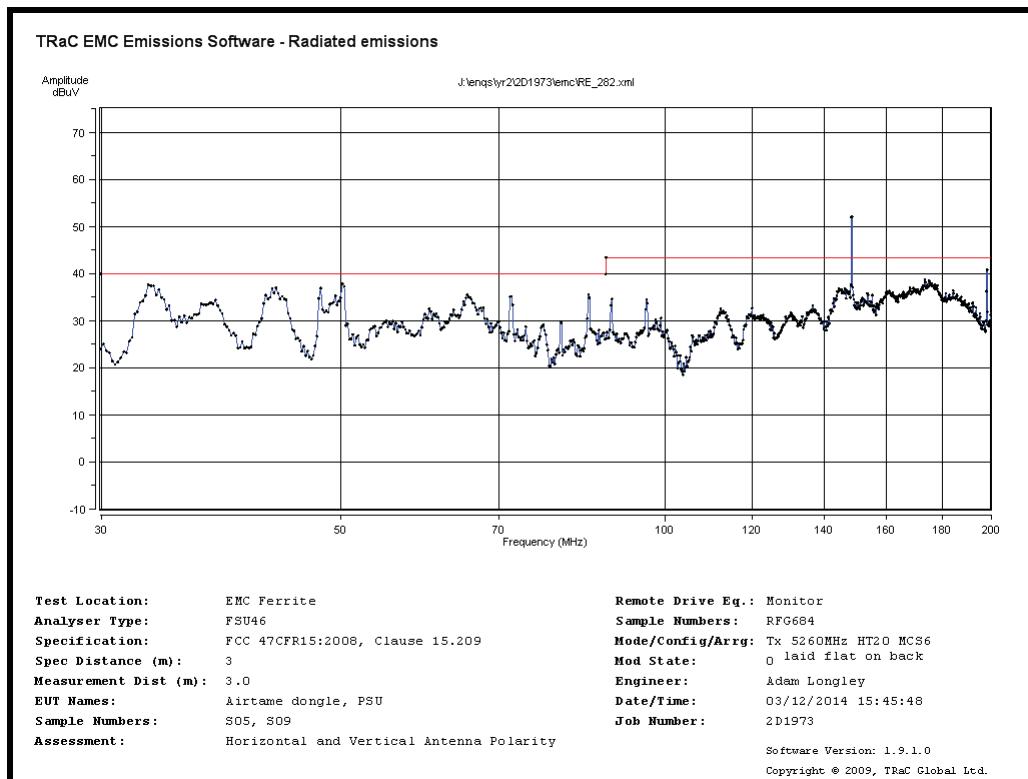
### Radiated Spurious emissions 18GHz to 26.5GHz – 5180MHz 6Mb/s



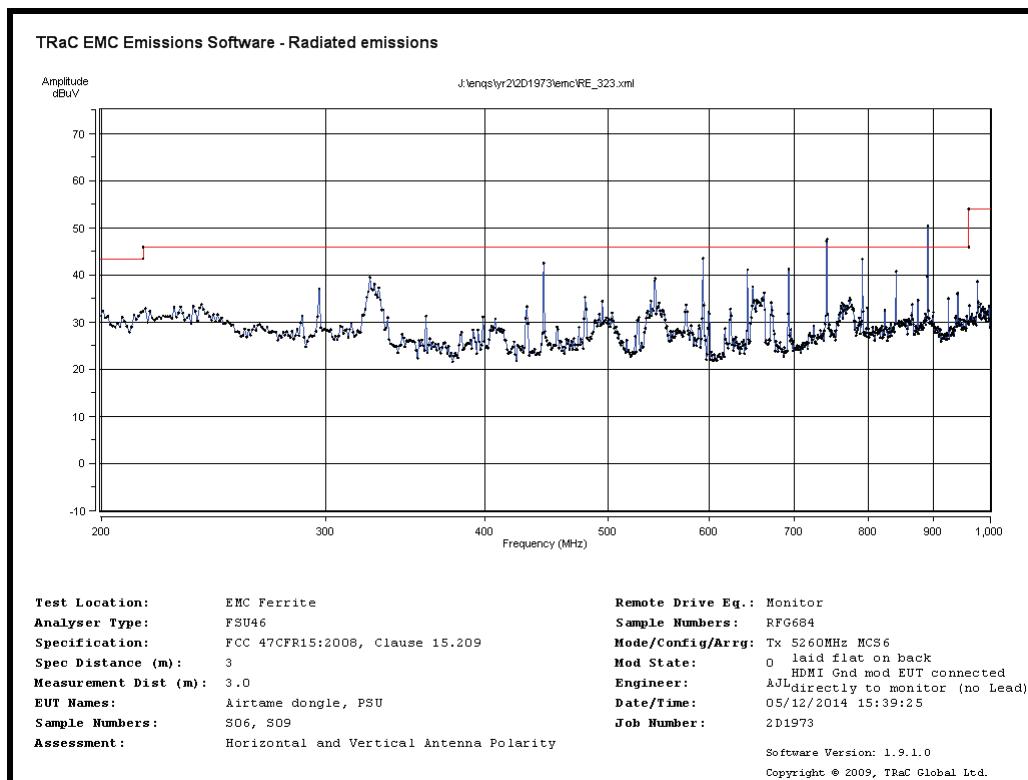
### Radiated Spurious emissions 26.5GHz to 33GHz – 5180MHz 6Mb/s



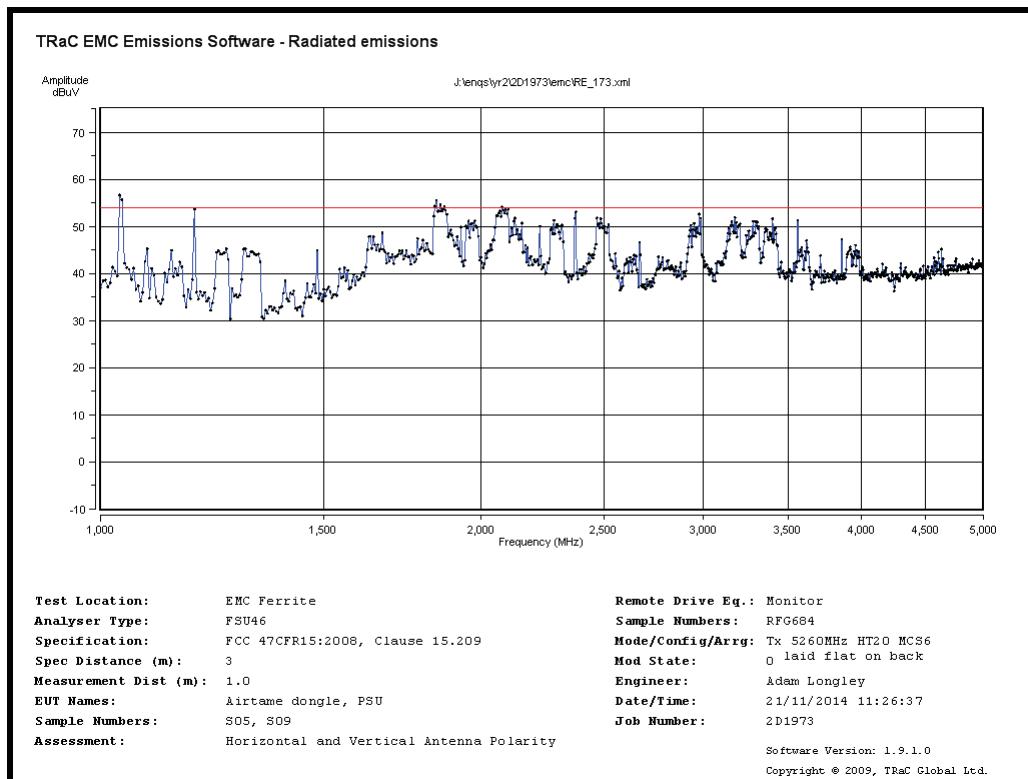
Radiated Spurious emissions 33GHz to 40GHz – 5180MHz 6Mb/s



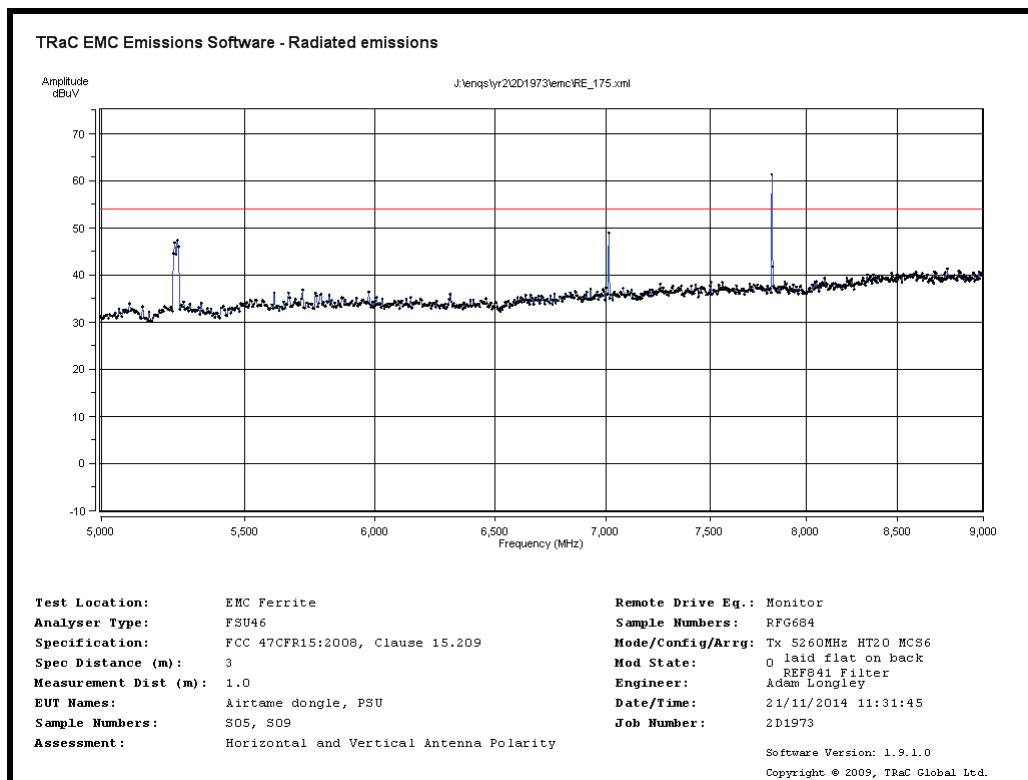
### Radiated Spurious emissions 30MHz to 200MHz – 5260MHz MCS6



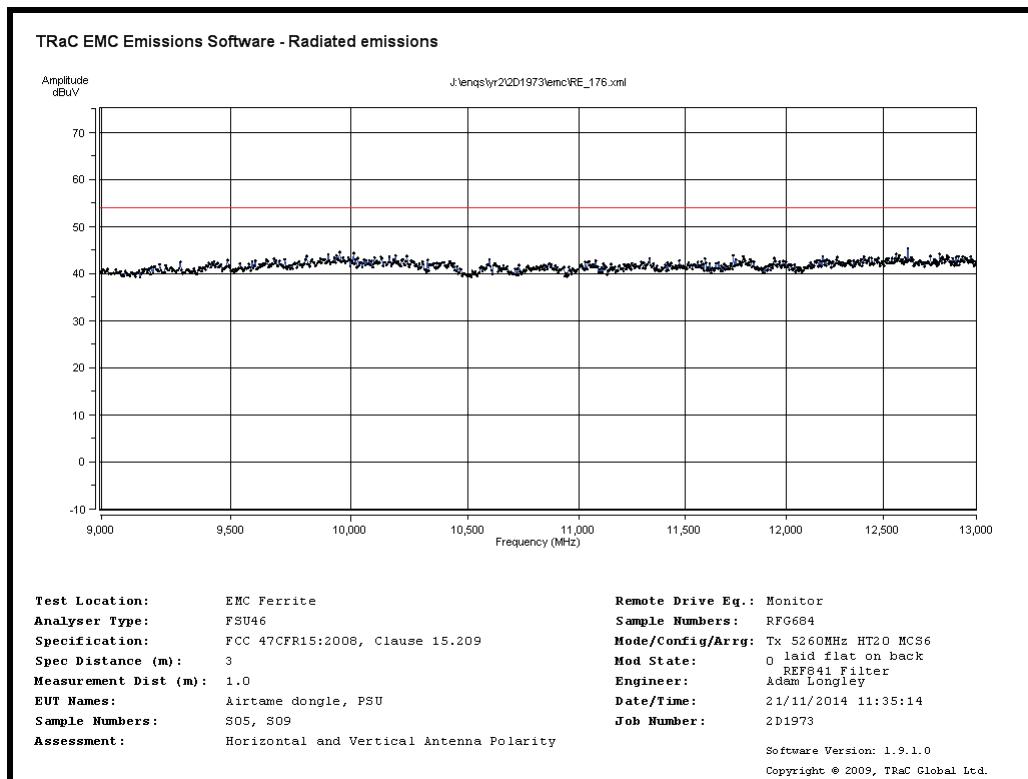
### Radiated Spurious emissions 200MHz to 1GHz – 5260MHz MCS6



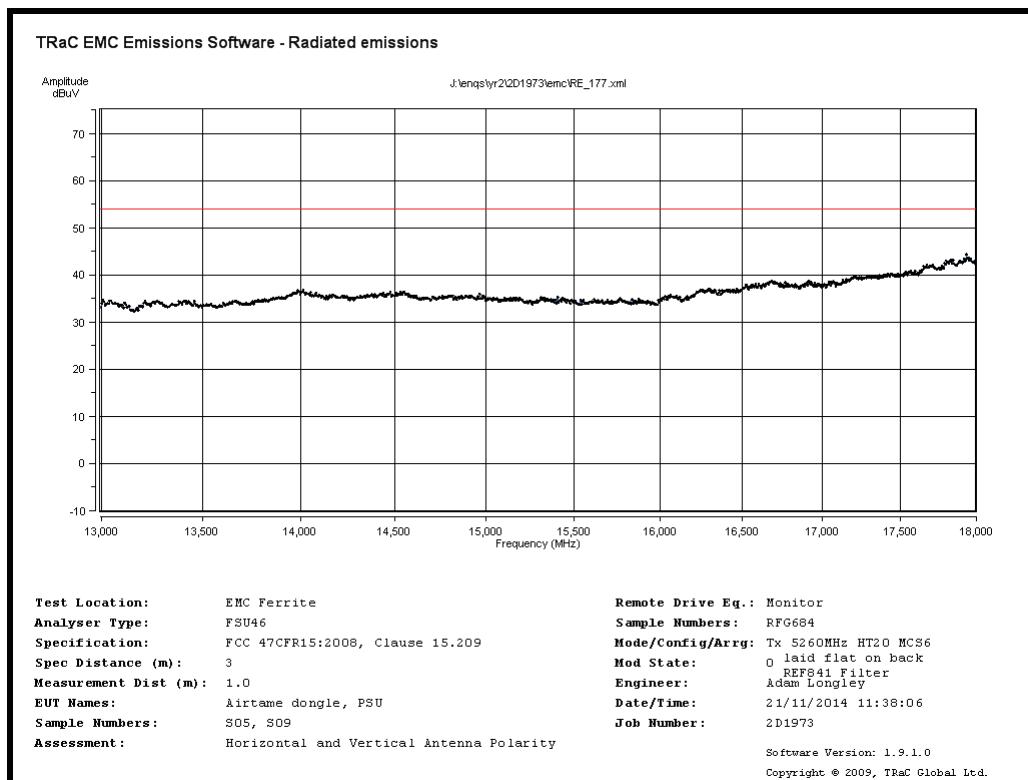
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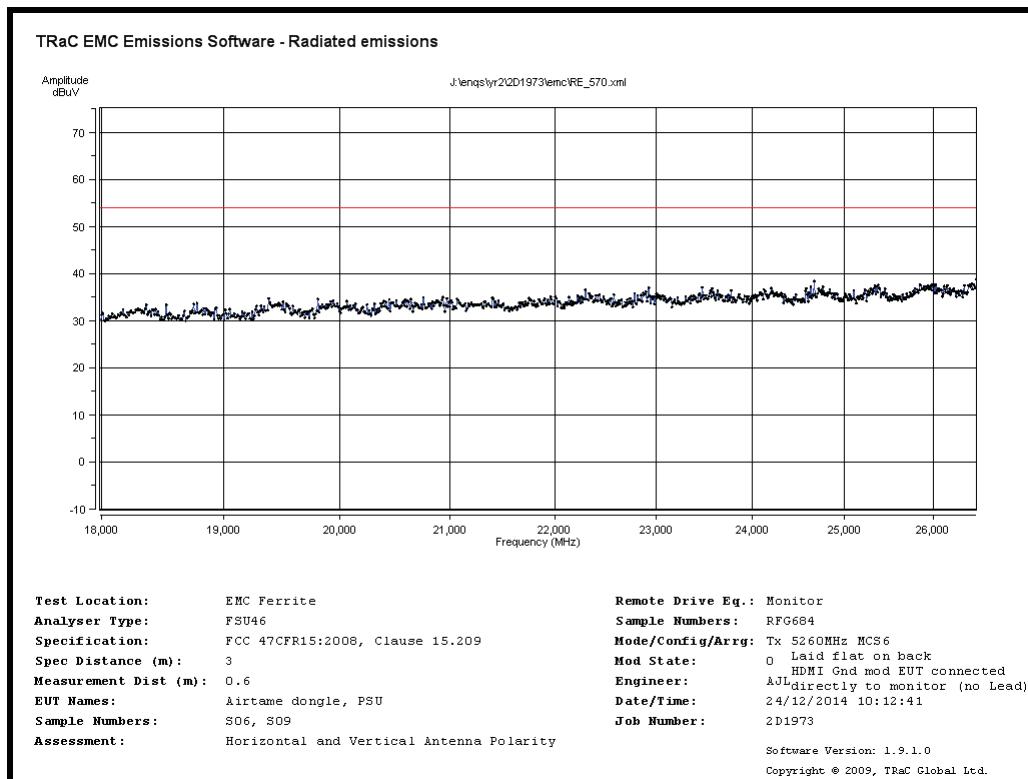
### Radiated Spurious emissions 5GHz to 9GHz – 5260MHz MCS6



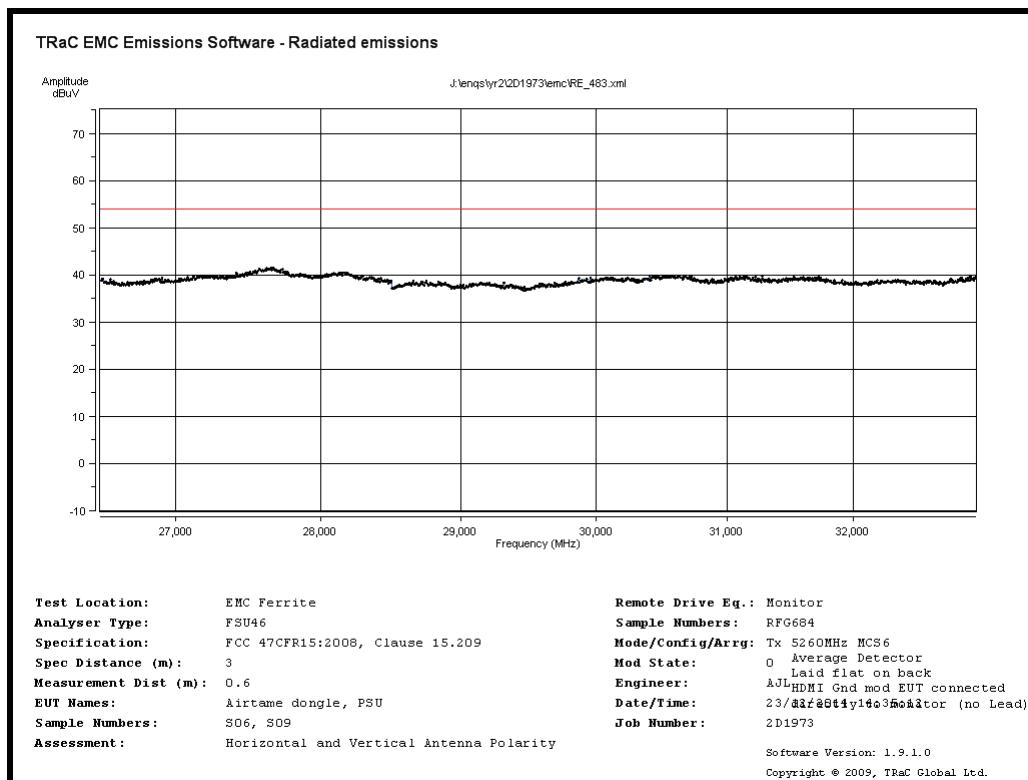
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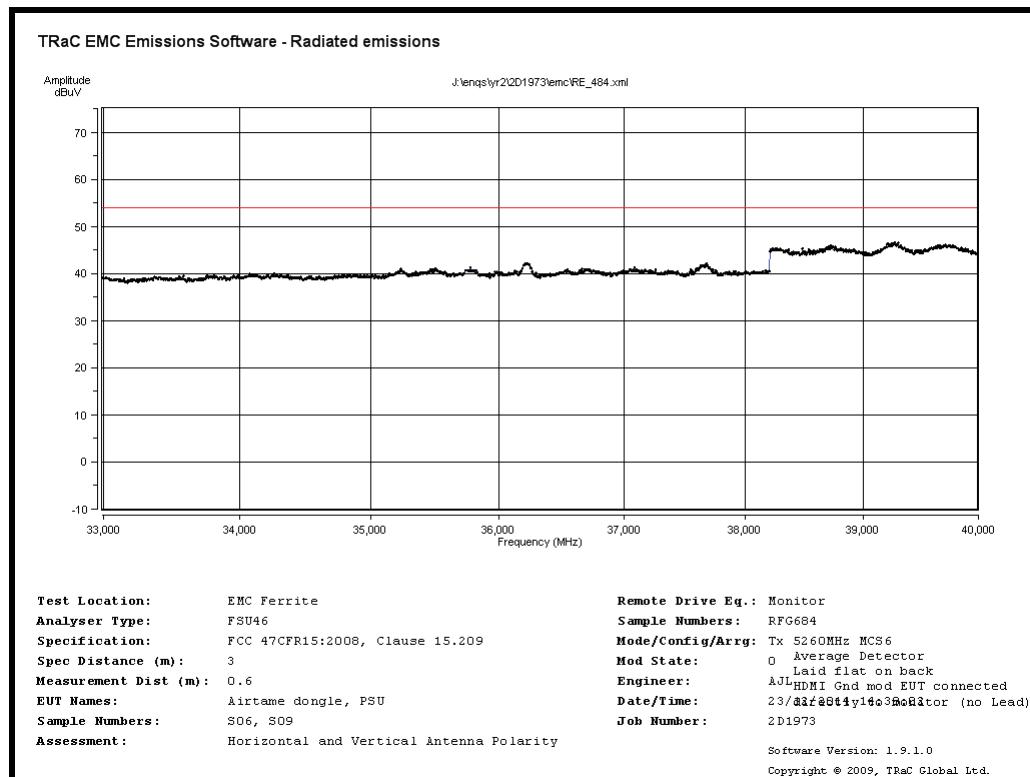
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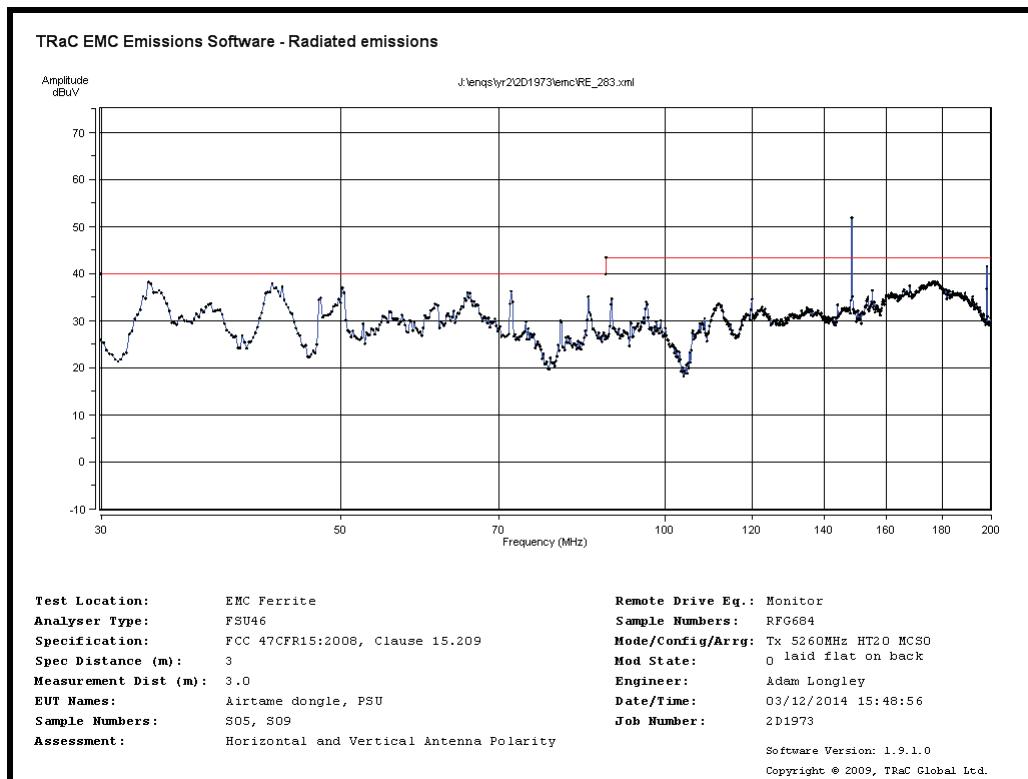
### Radiated Spurious emissions 18GHz to 26.5GHz – 5260MHz MCS6



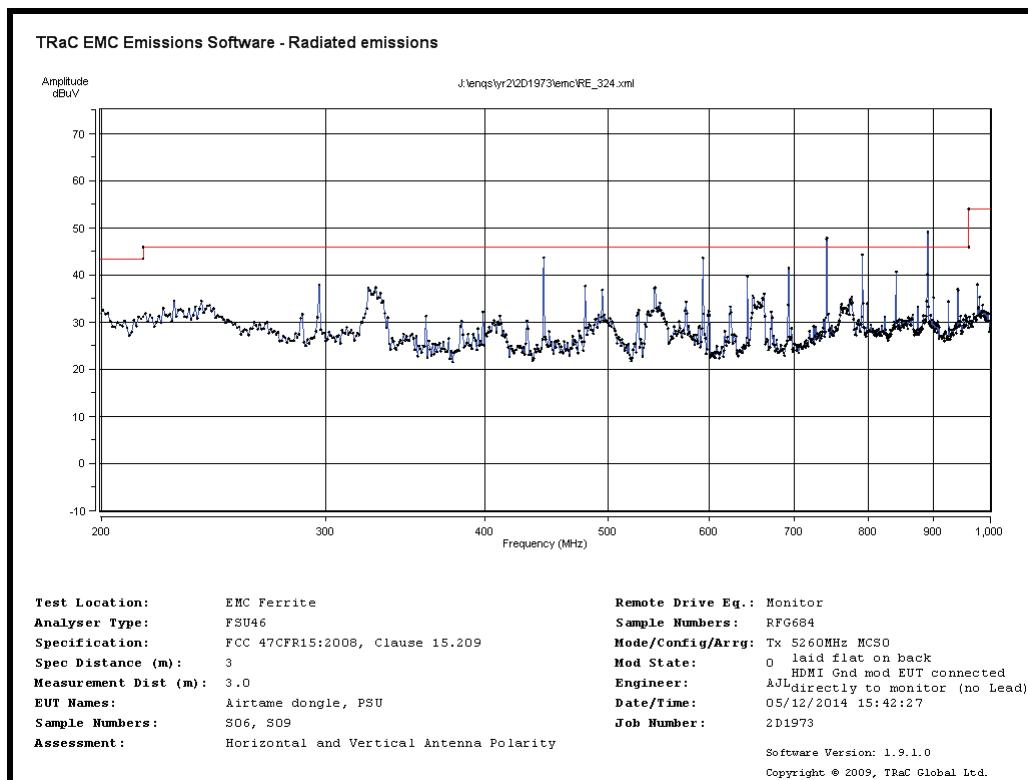
### Radiated Spurious emissions 26.5GHz to 33GHz – 5260MHz MCS6



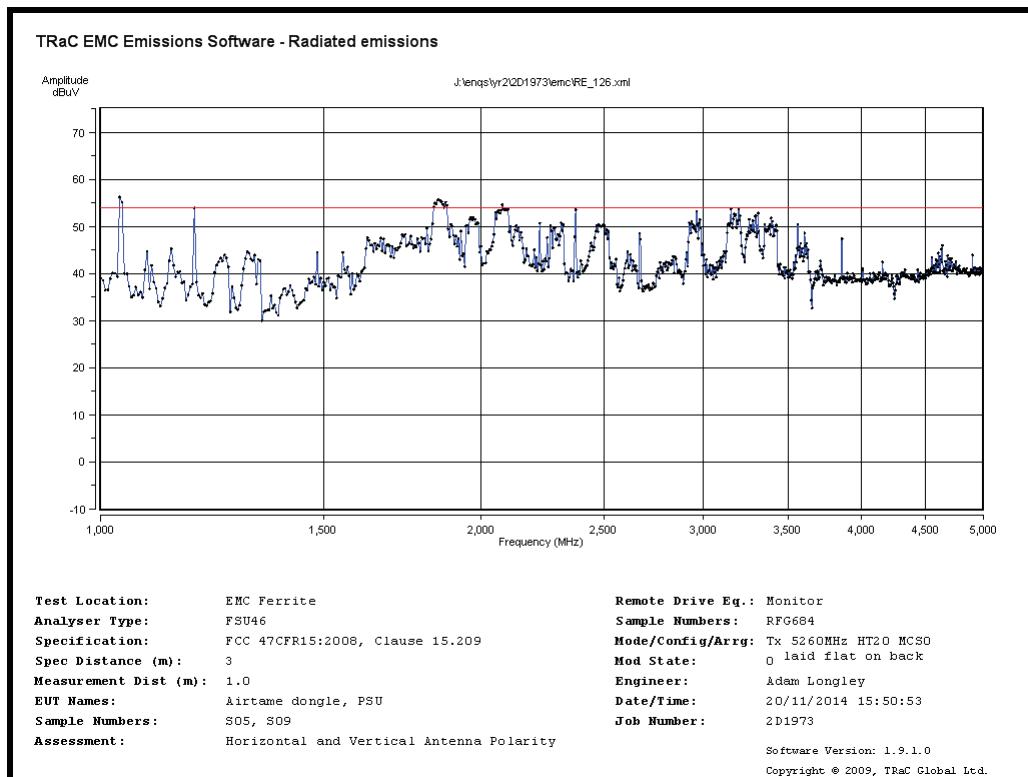
Radiated Spurious emissions 33GHz to 40GHz – 5260MHz MCS6



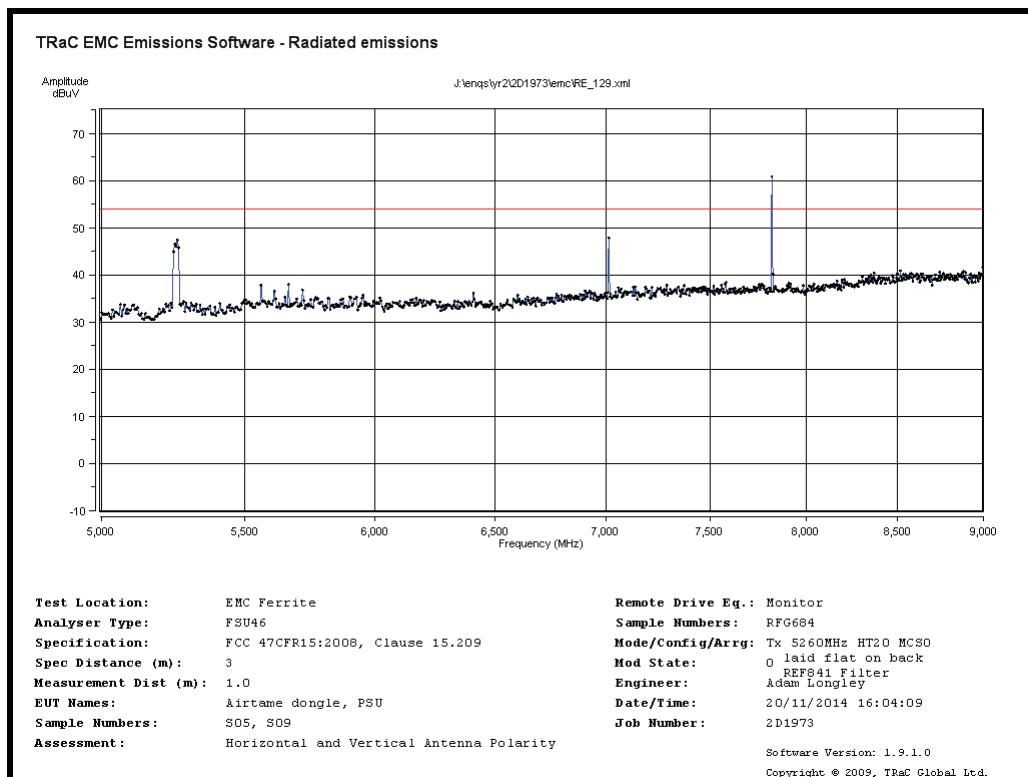
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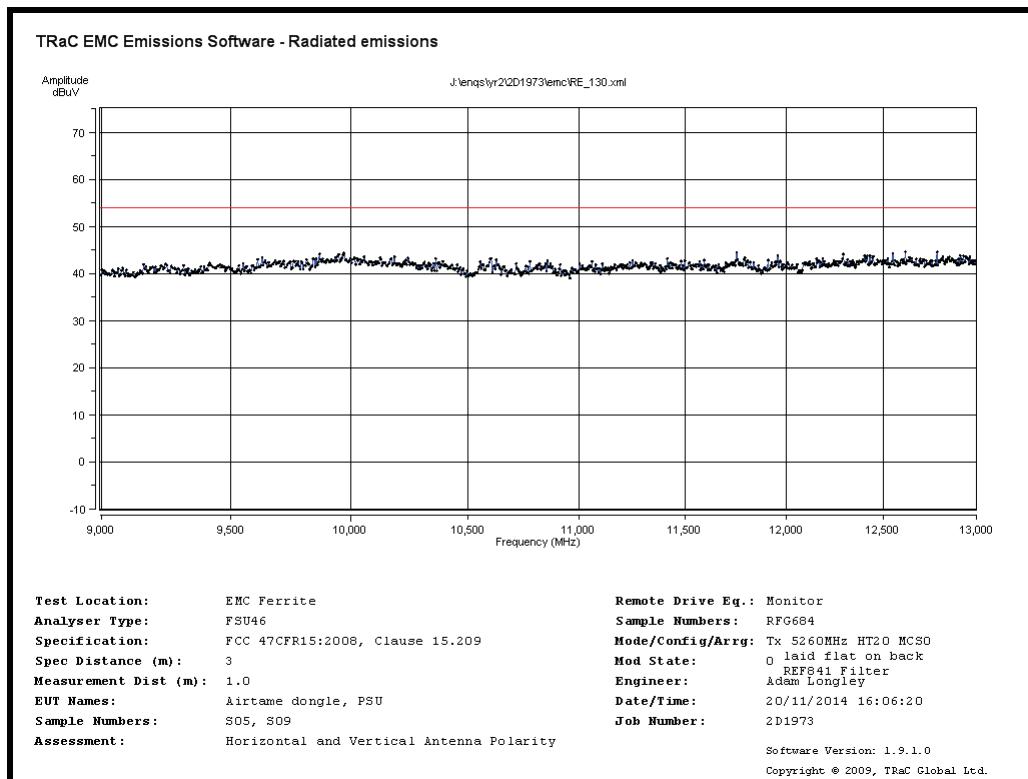
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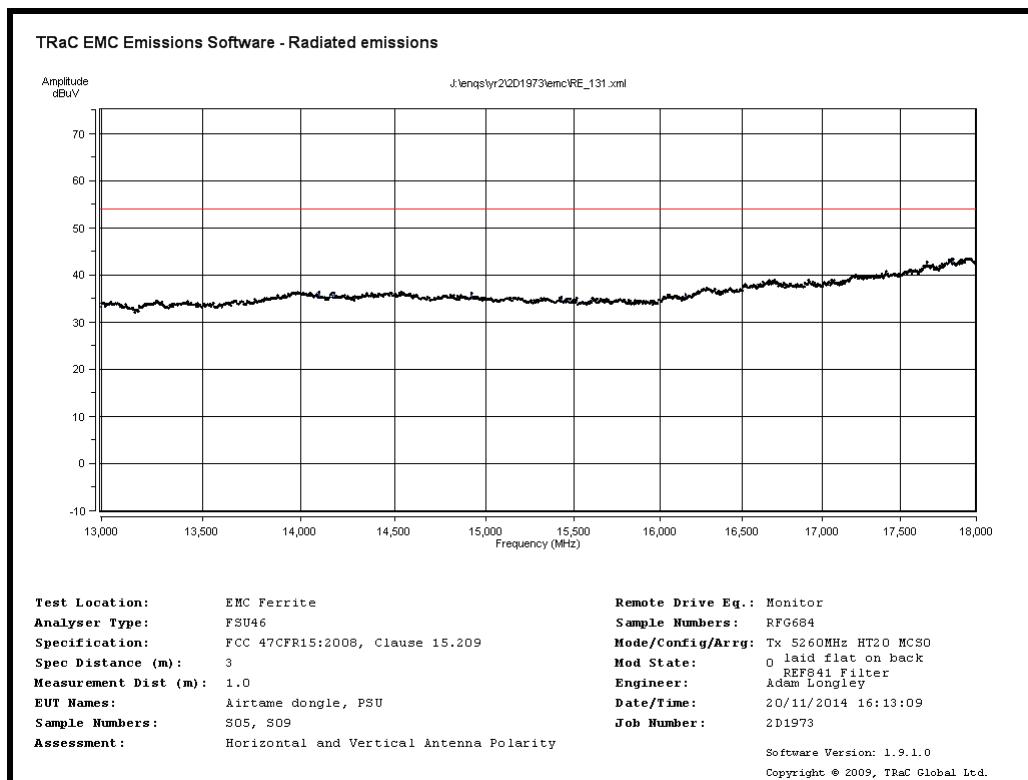
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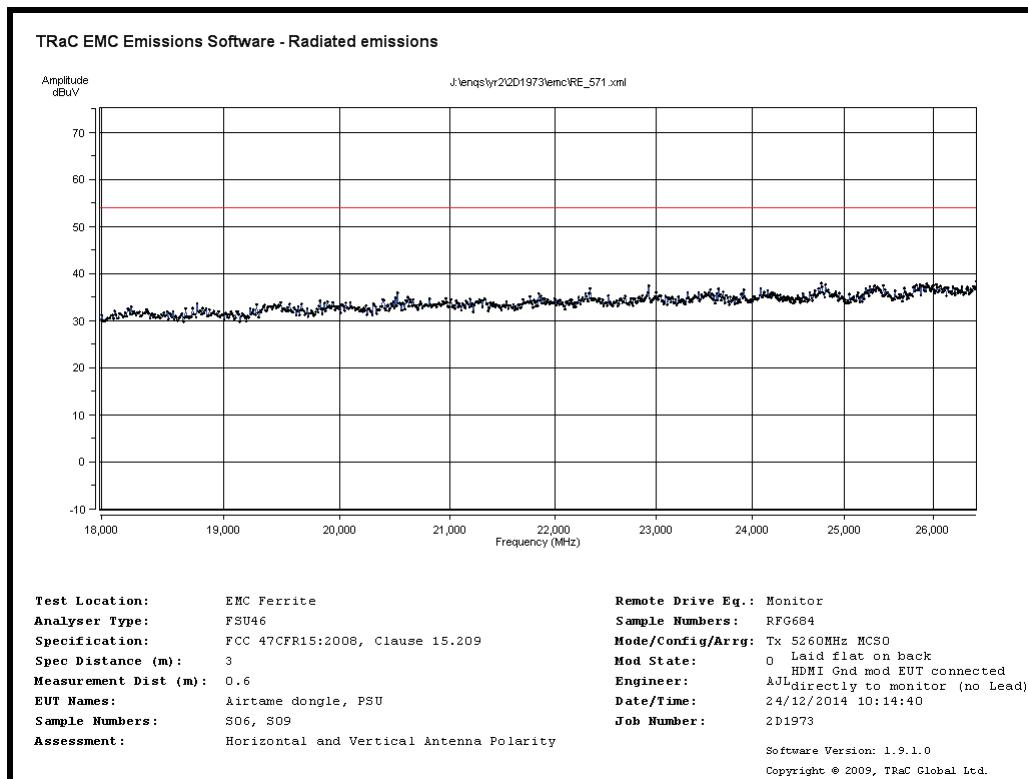
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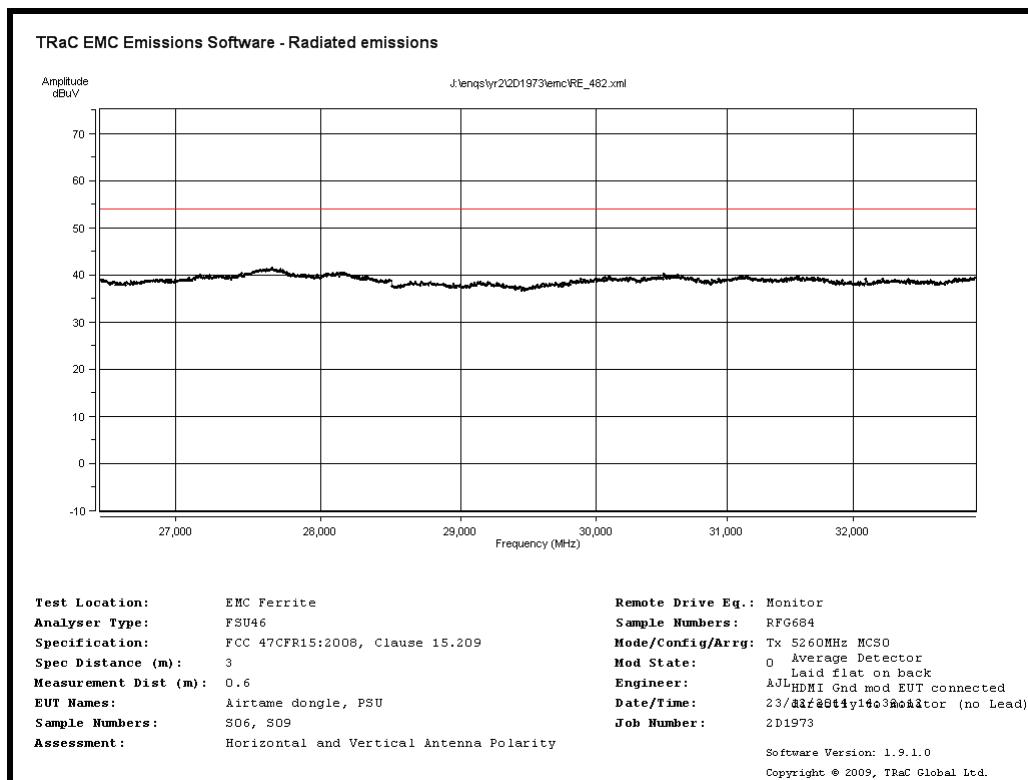
### Radiated Spurious emissions 9GHz to 13GHz – 5260MHz MCS0



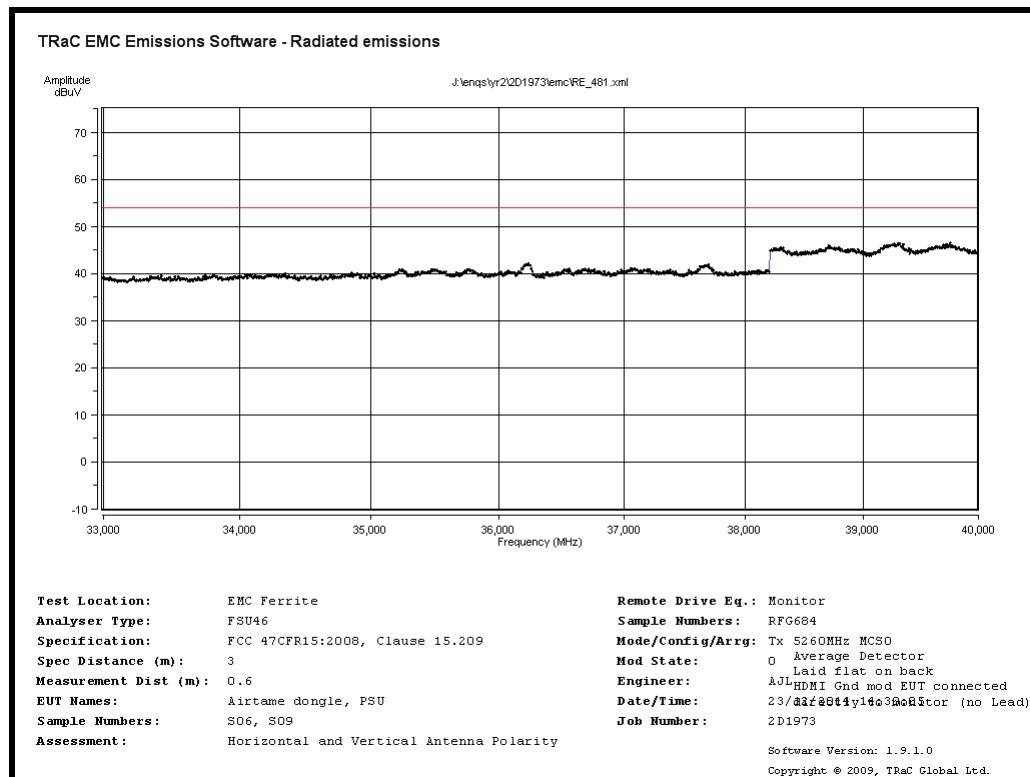
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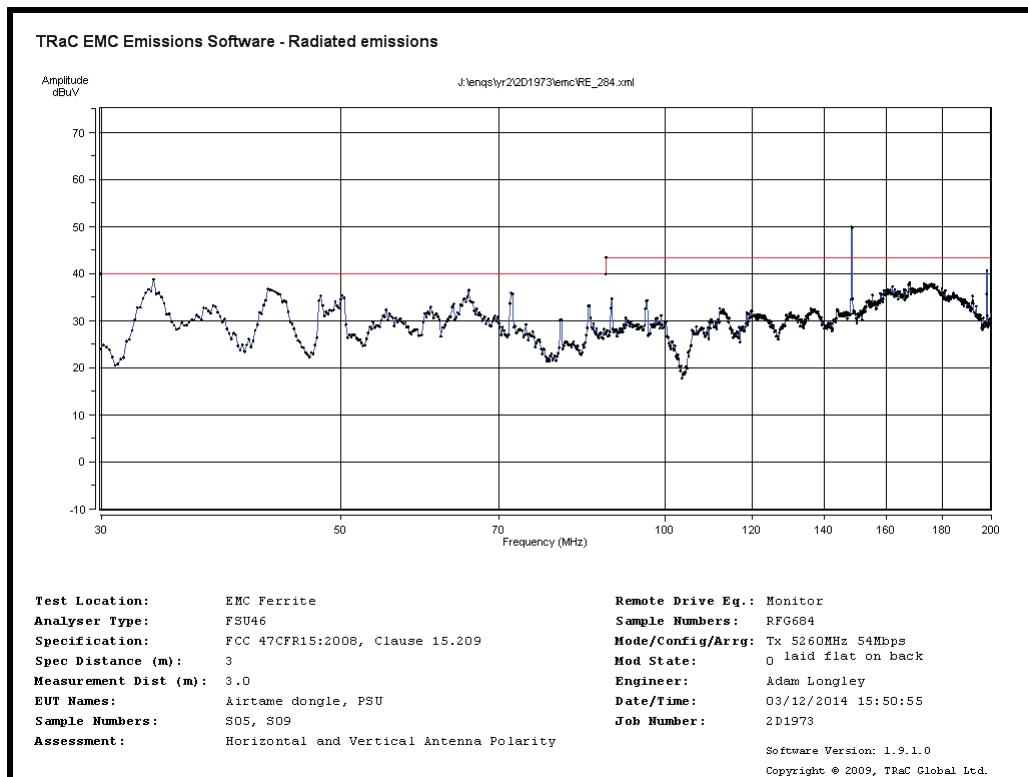
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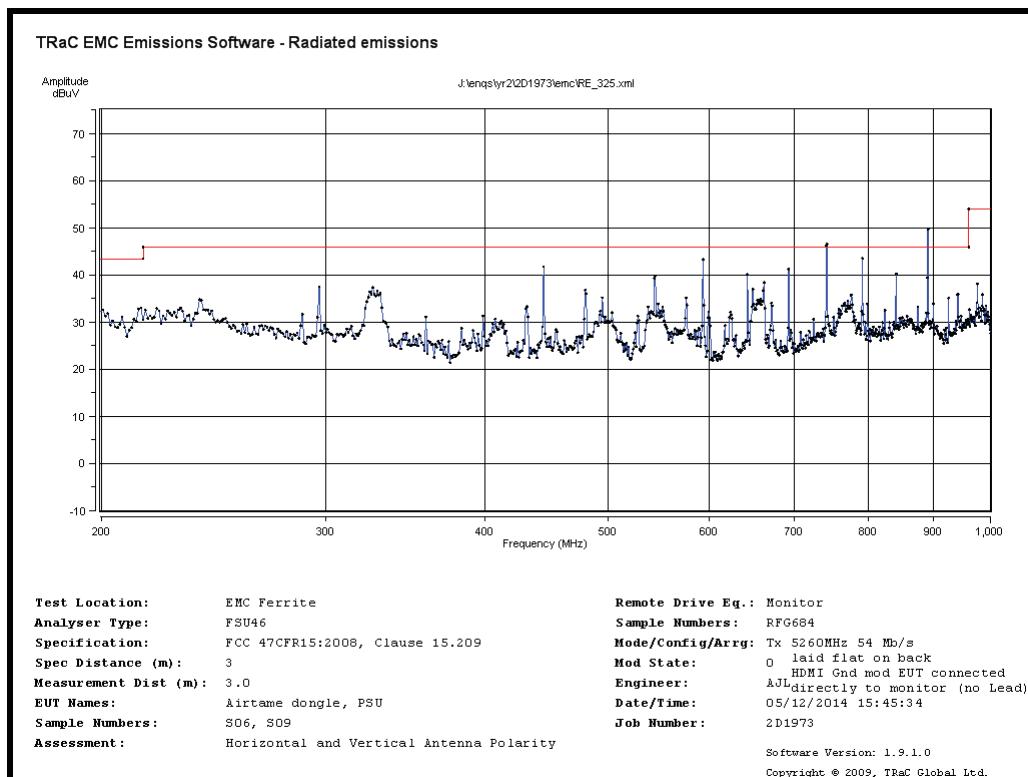
### Radiated Spurious emissions 26.5GHz to 33GHz – 5260MHz MCS0



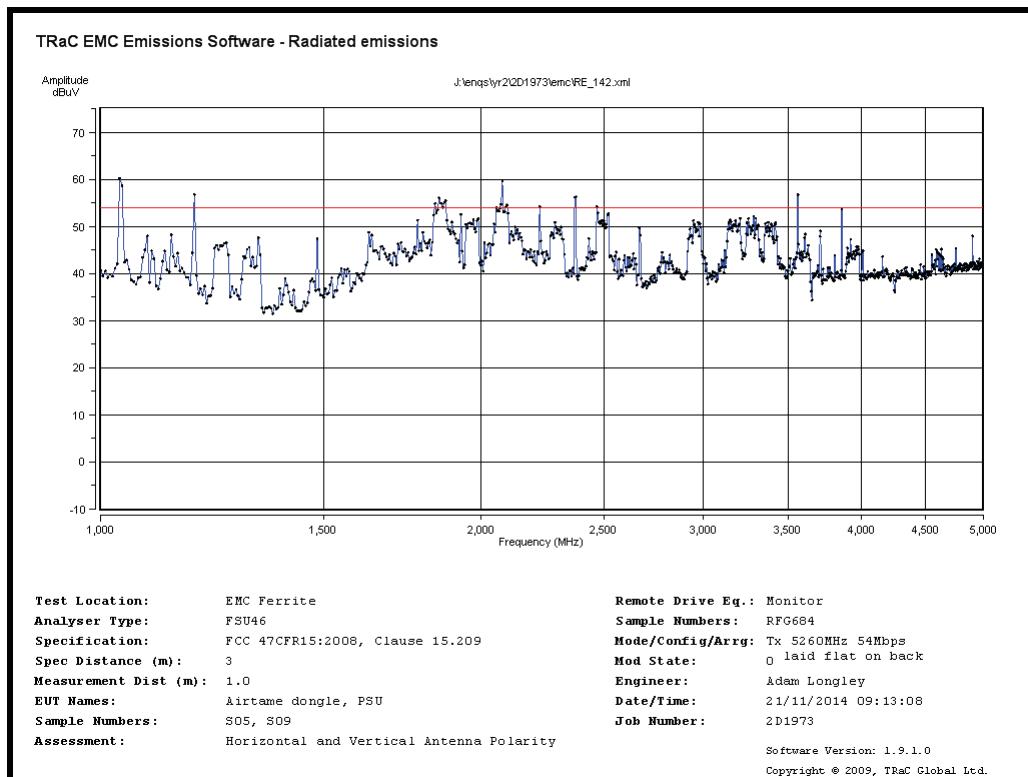
Radiated Spurious emissions 33GHz to 40GHz – 5260MHz MCS0



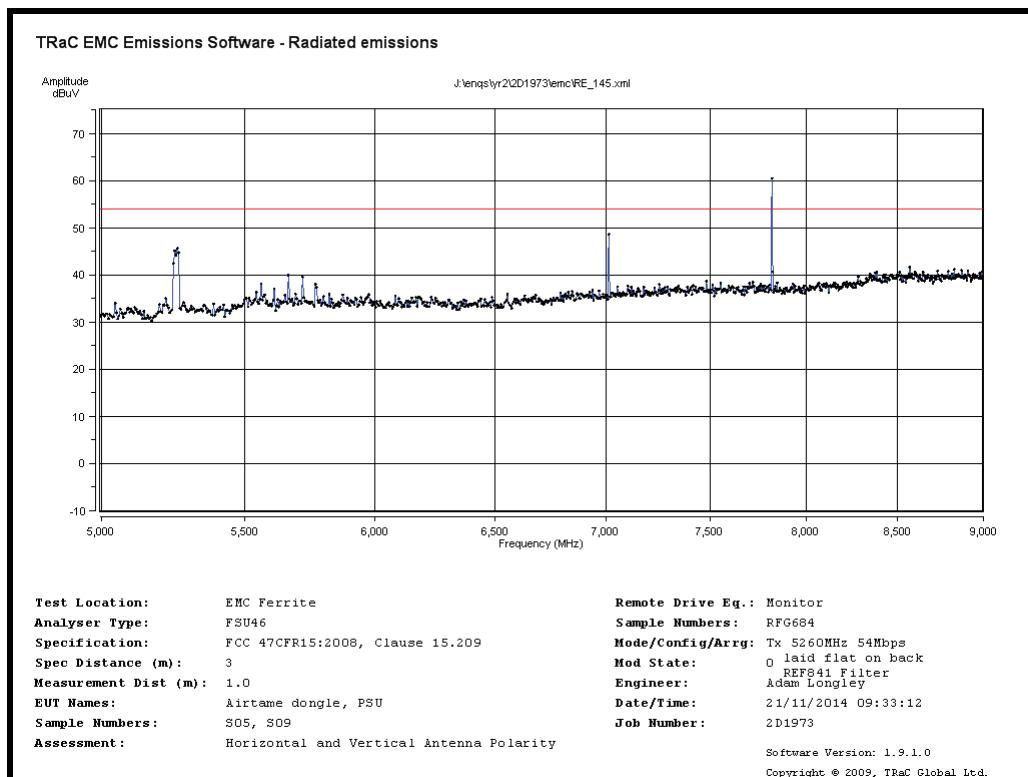
### Radiated Spurious emissions 30MHz to 200MHz – 5260MHz 54Mb/s



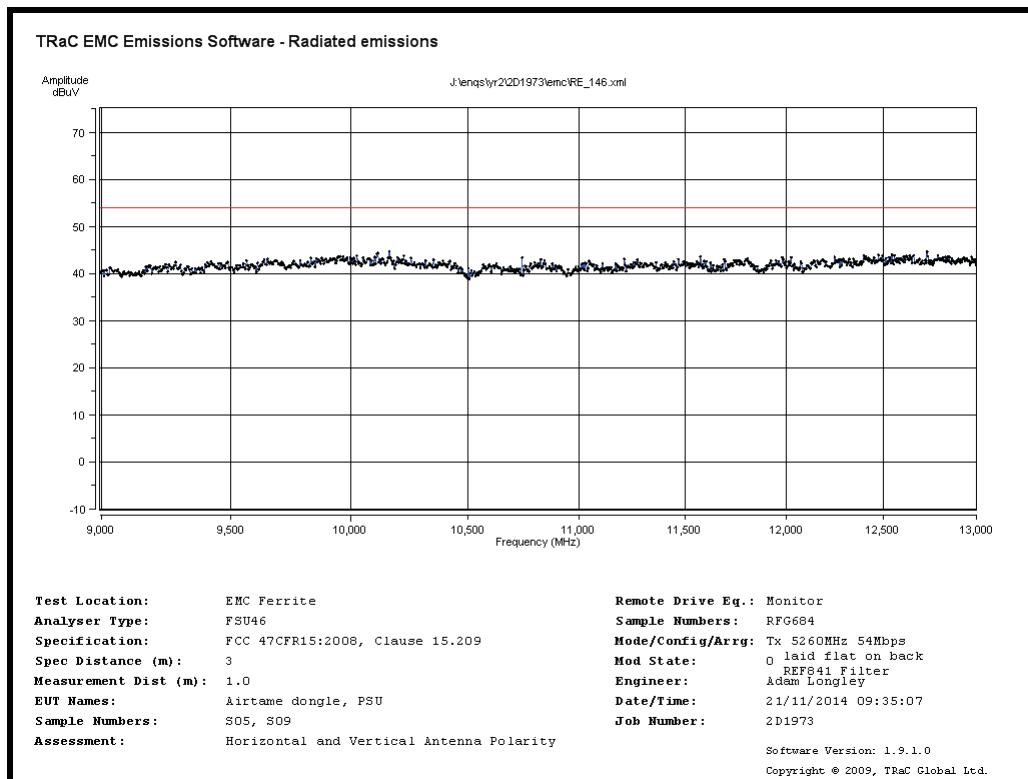
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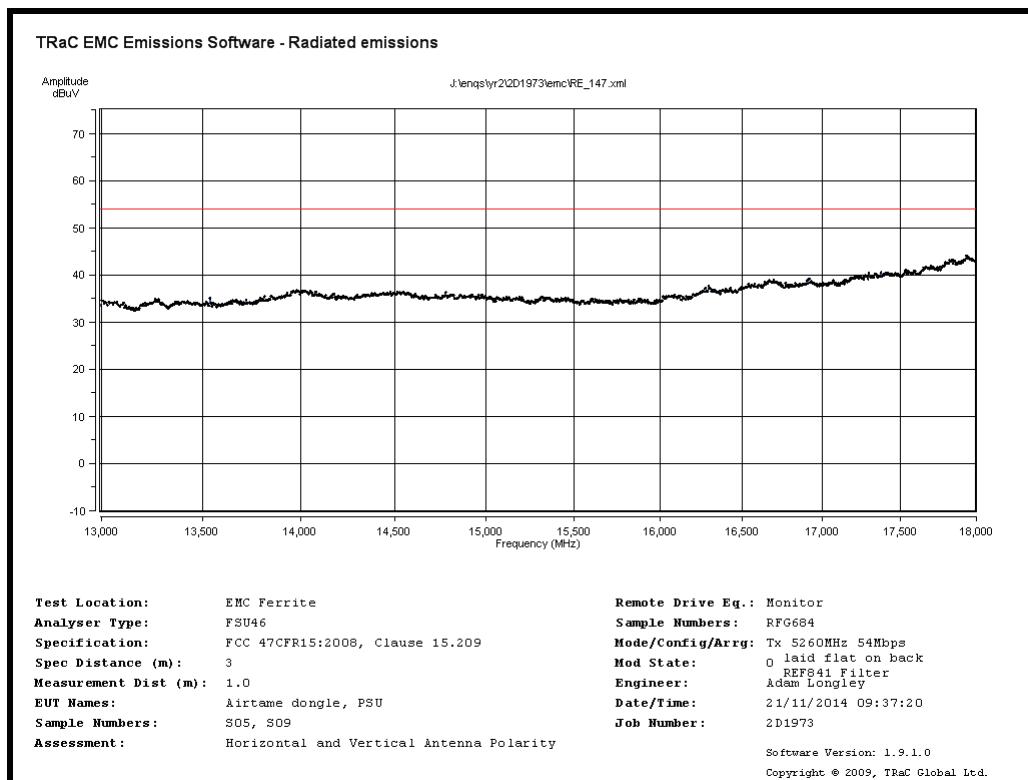
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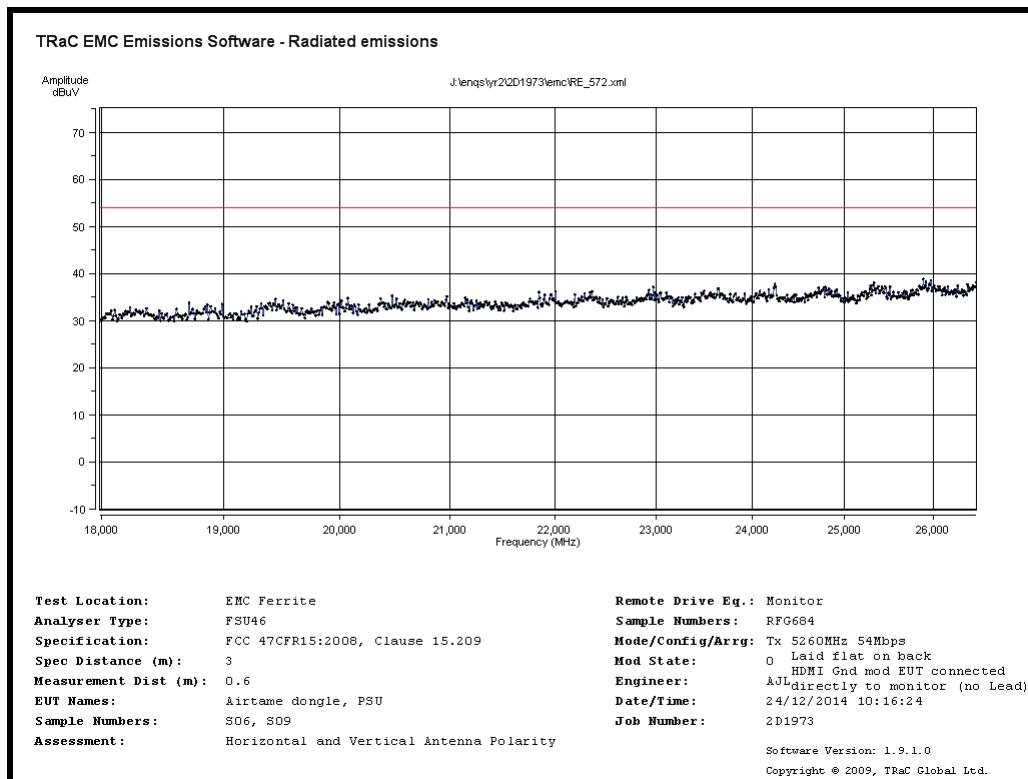
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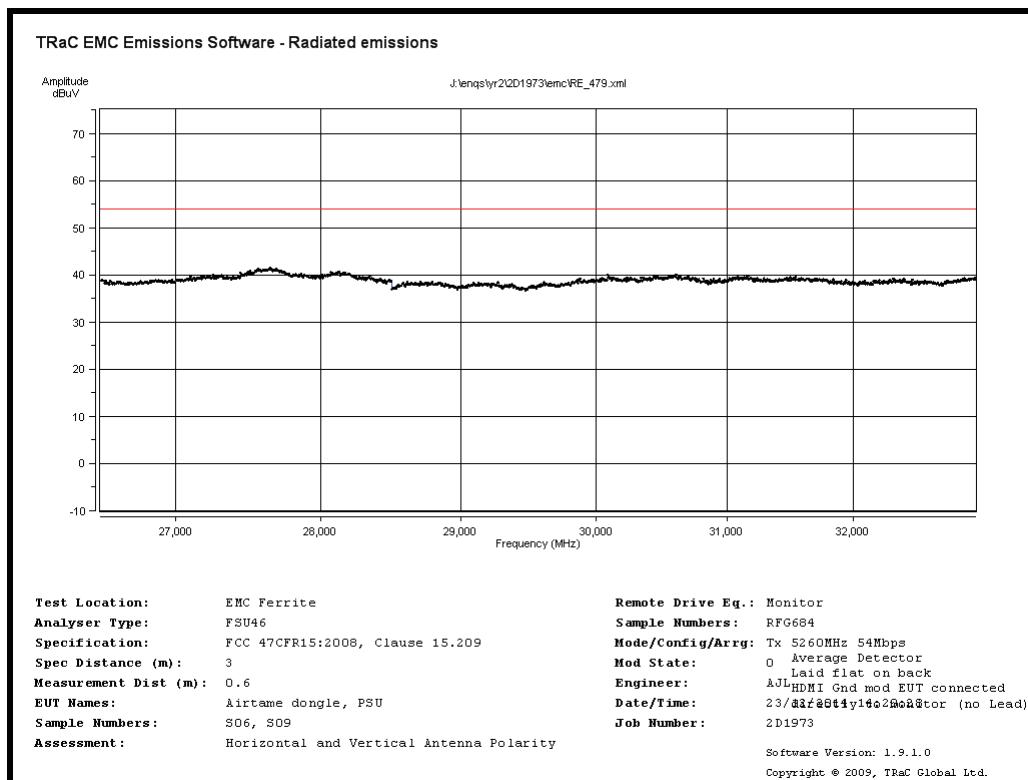
### Radiated Spurious emissions 9GHz to 13GHz – 5260MHz 54Mb/s



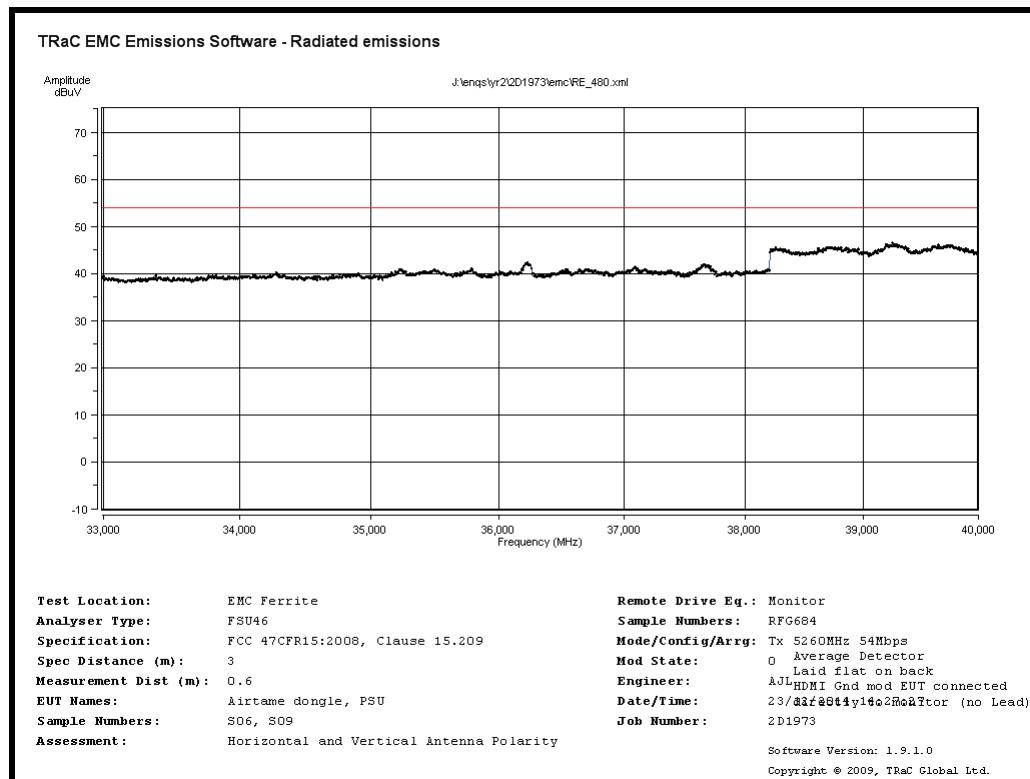
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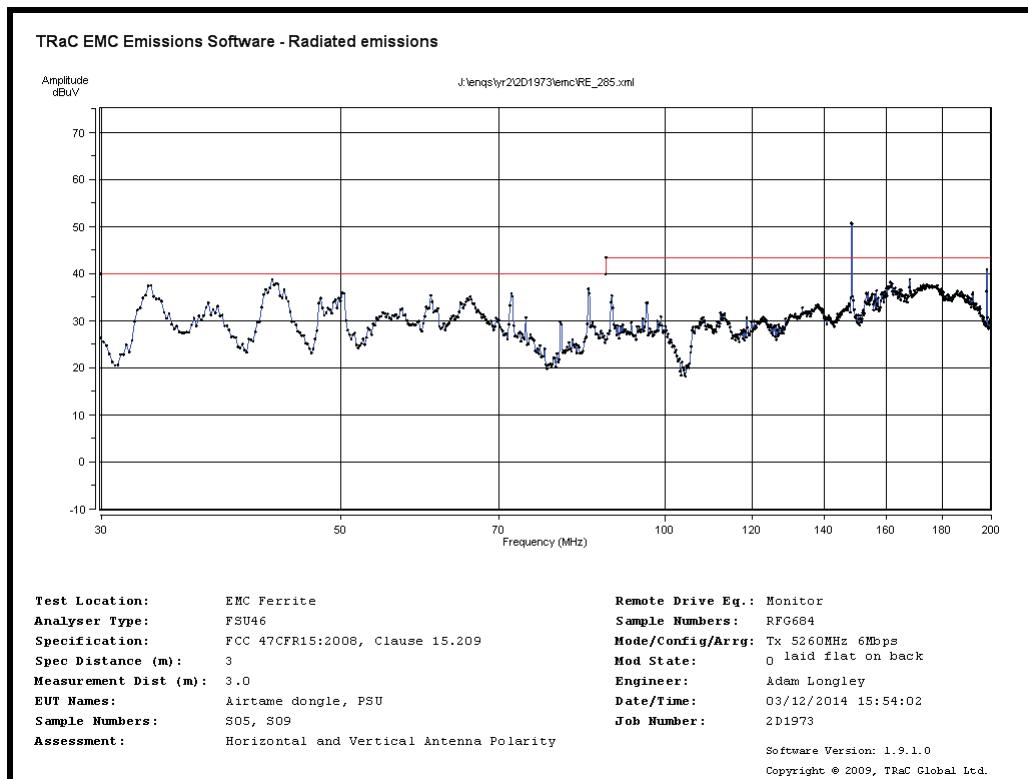
### Radiated Spurious emissions 18GHz to 26.5GHz – 5260MHz 54Mb/s



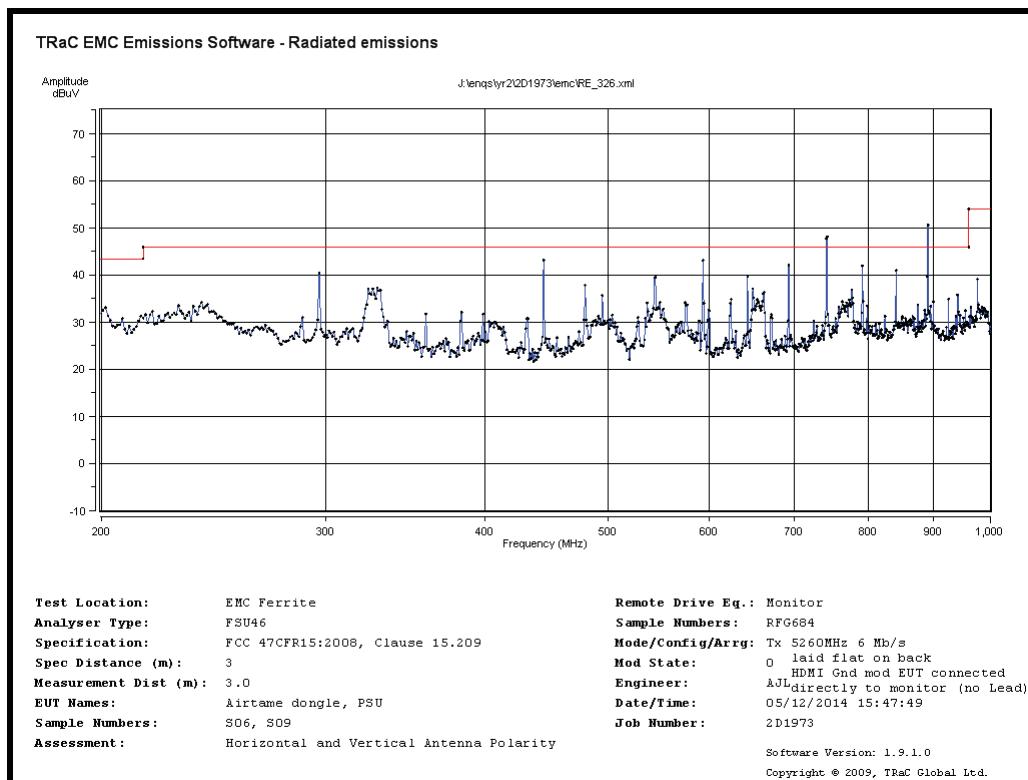
### Radiated Spurious emissions 26.5GHz to 33GHz – 5260MHz 54Mb/s



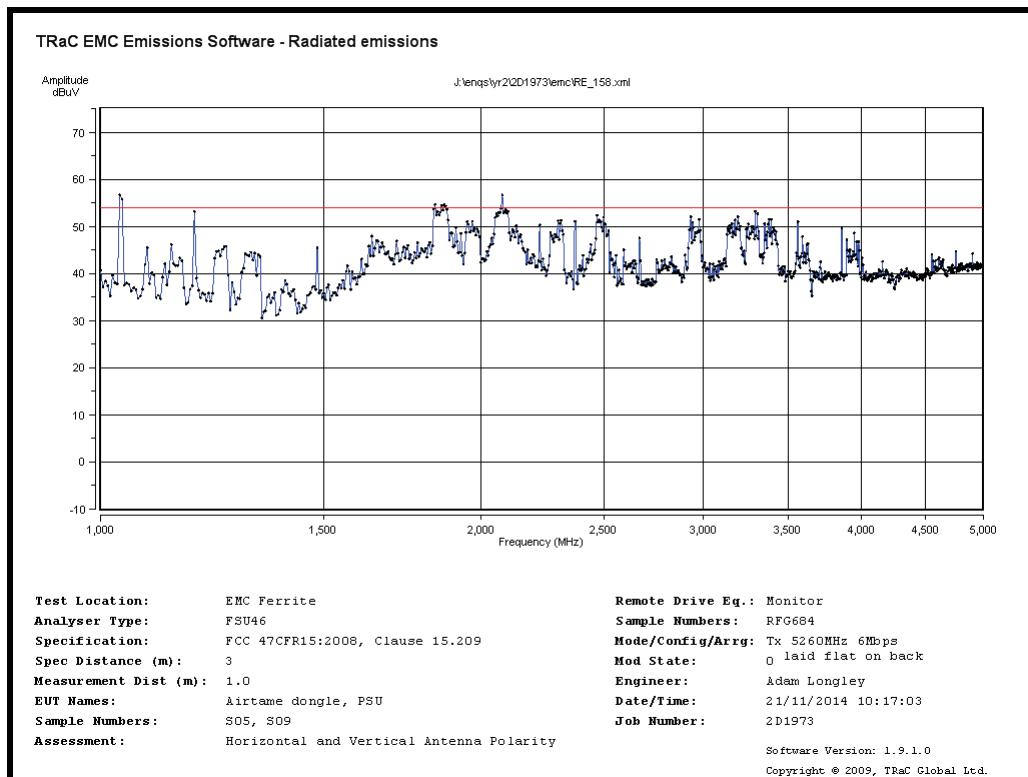
Radiated Spurious emissions 33GHz to 40GHz – 5260MHz 54Mb/s



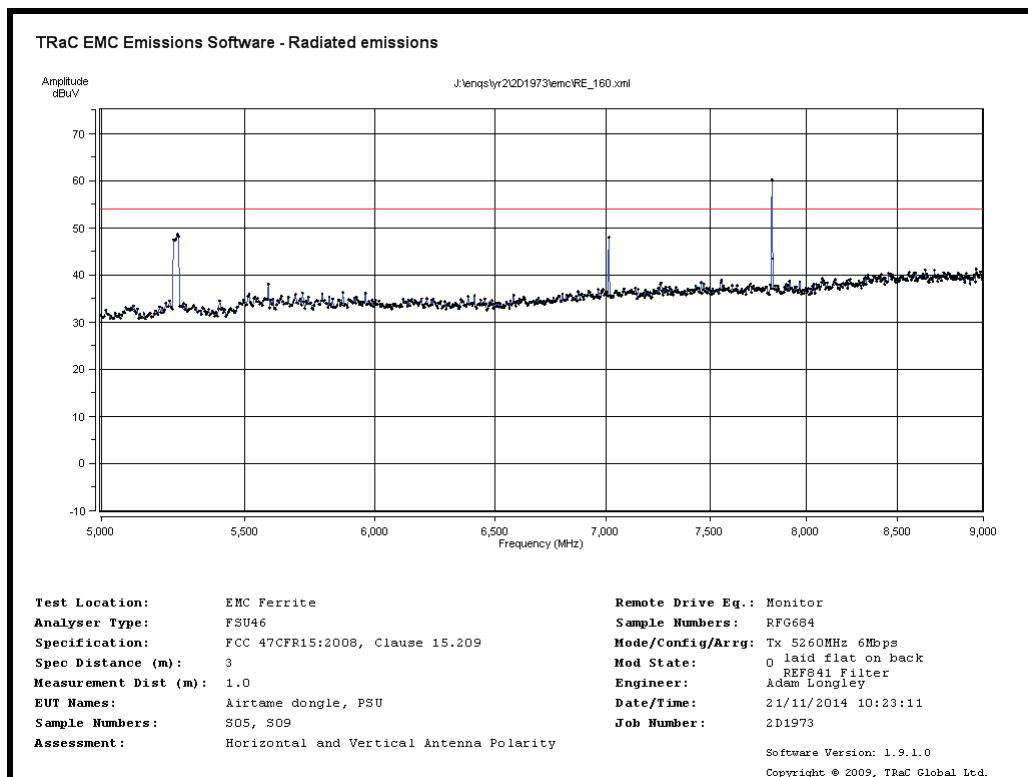
Radiated Spurious emissions 30MHz to 200MHz – 5260MHz 6Mb/s



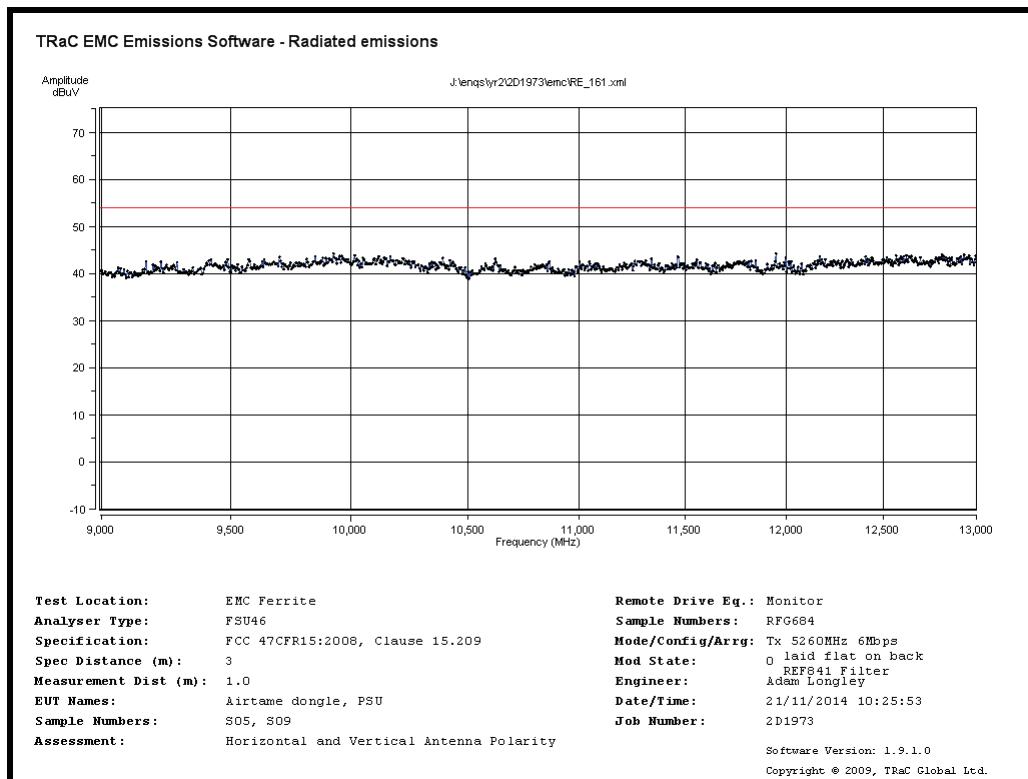
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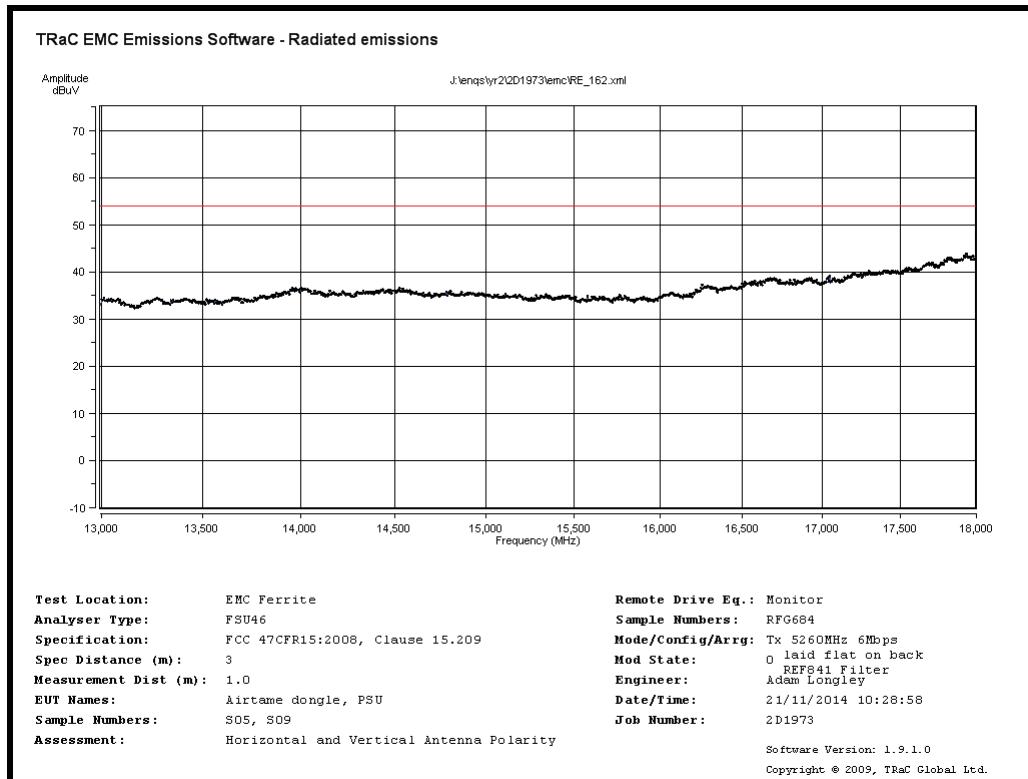
### Radiated Spurious emissions 1GHz to 5GHz – 5260MHz 6Mb/s



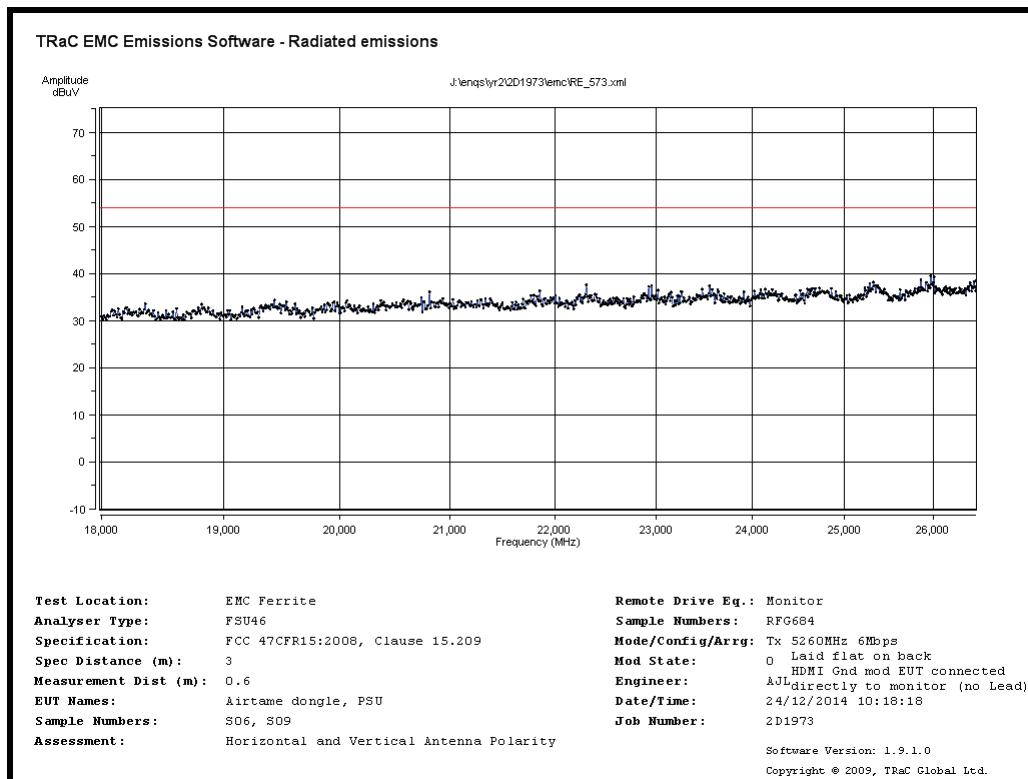
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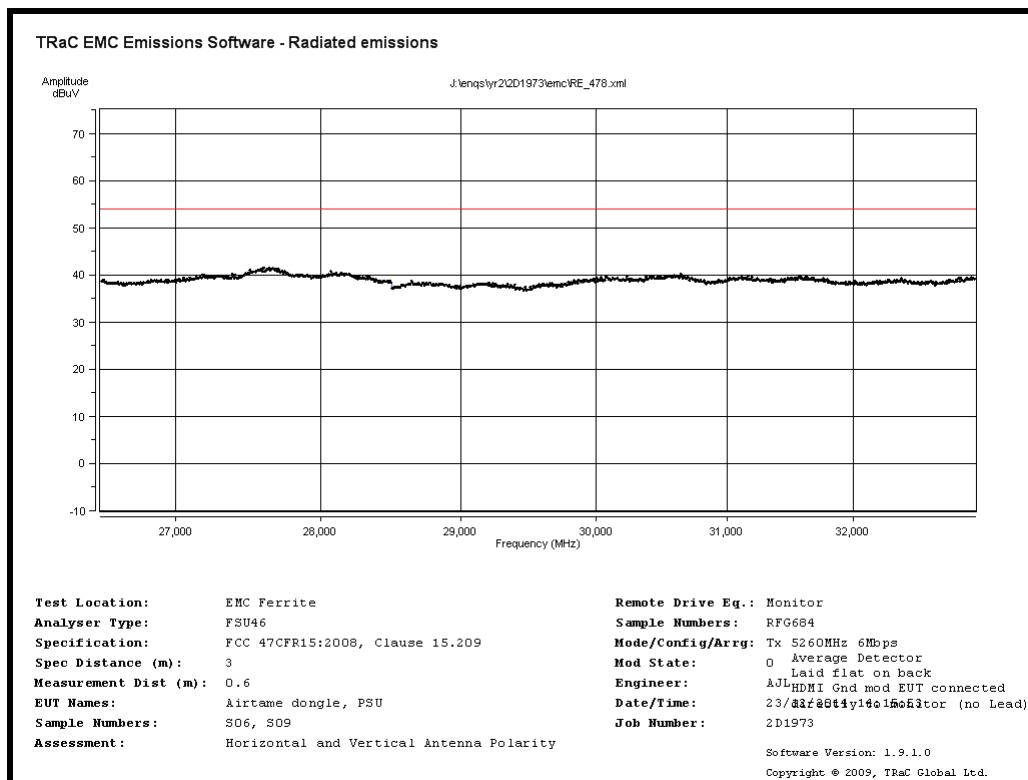
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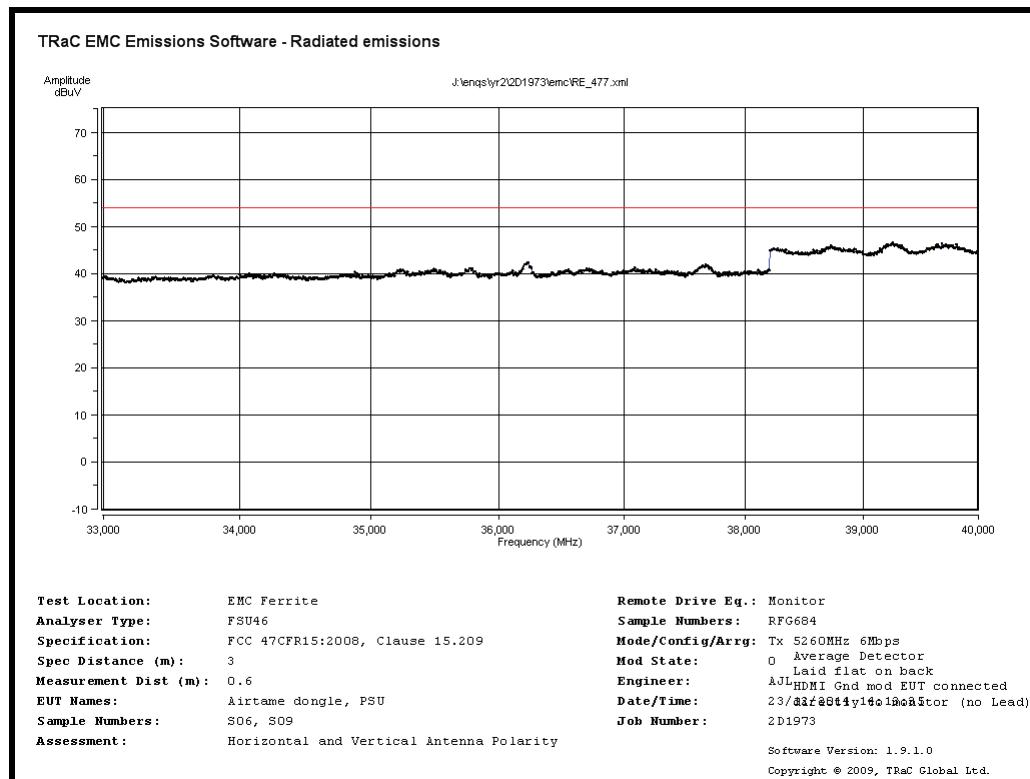
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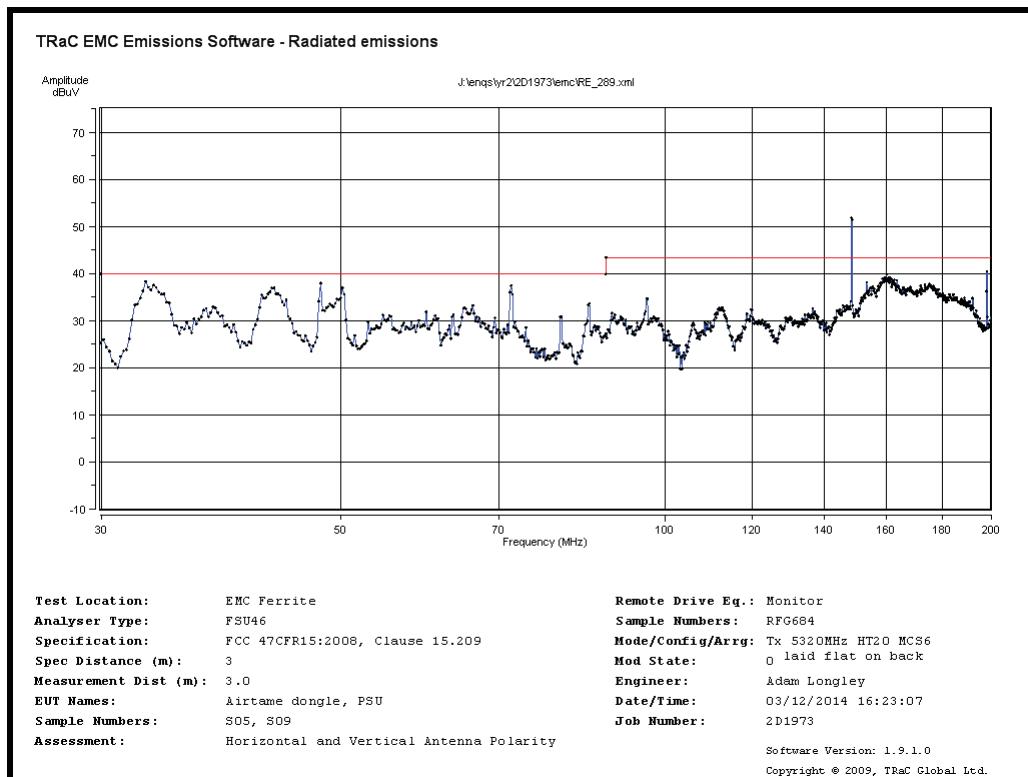
### Radiated Spurious emissions 18GHz to 26.5GHz – 5260MHz 6Mb/s



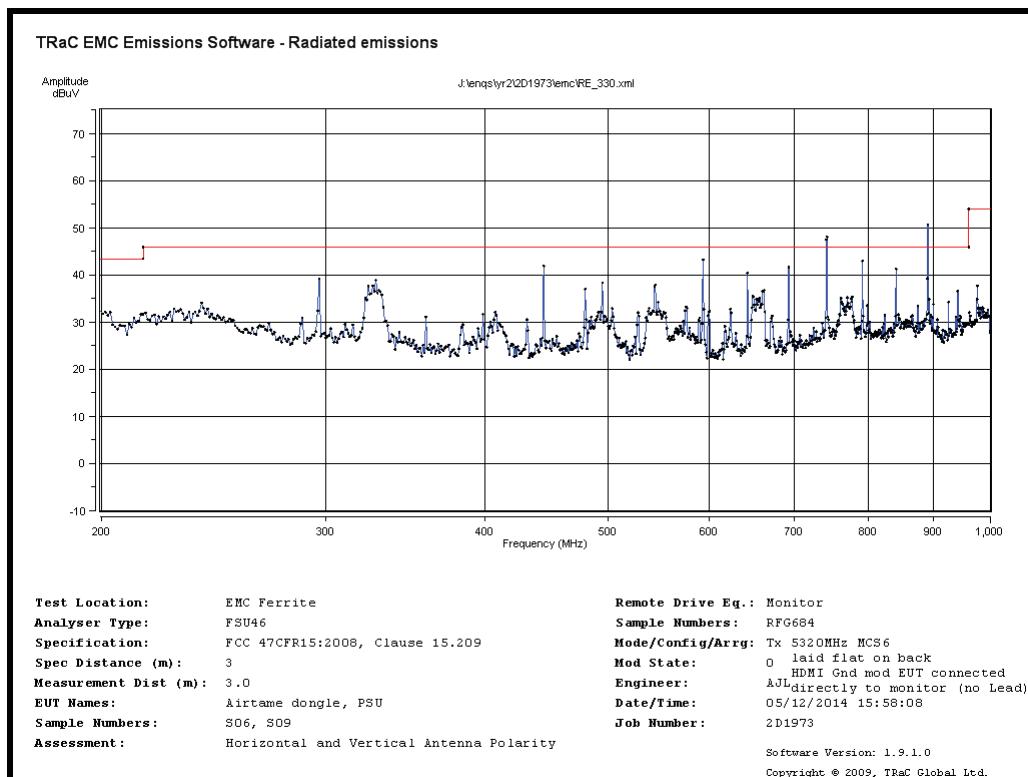
### Radiated Spurious emissions 26.5GHz to 33GHz – 5260MHz 6Mb/s



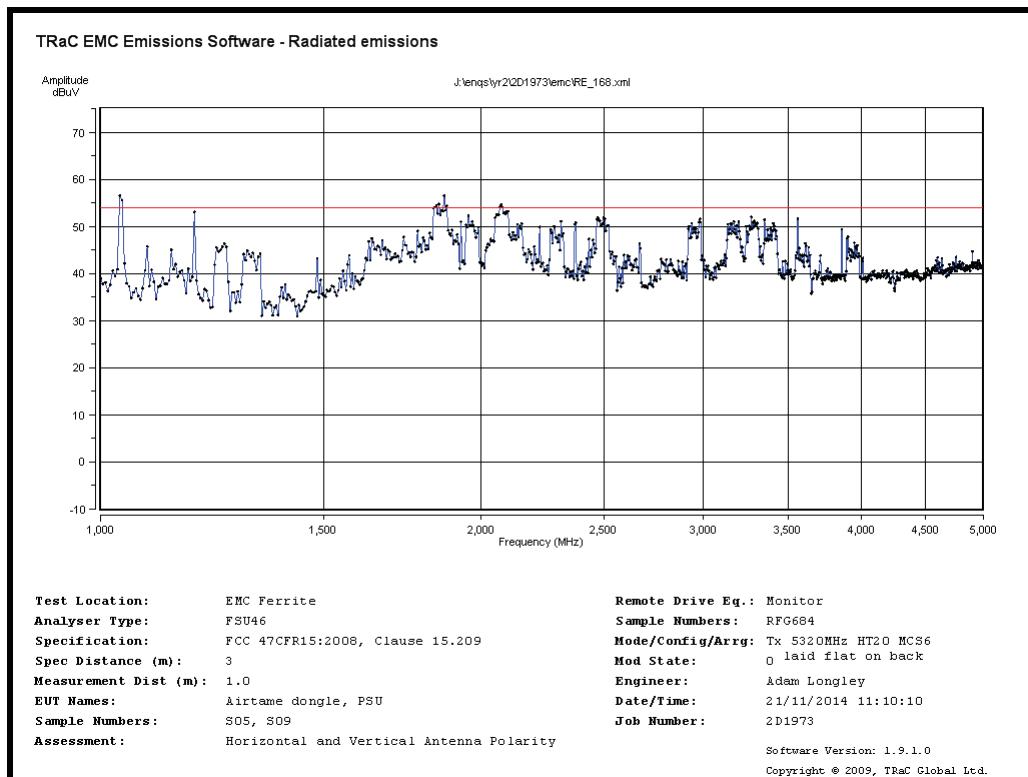
Radiated Spurious emissions 33GHz to 40GHz – 5260MHz 6Mb/s



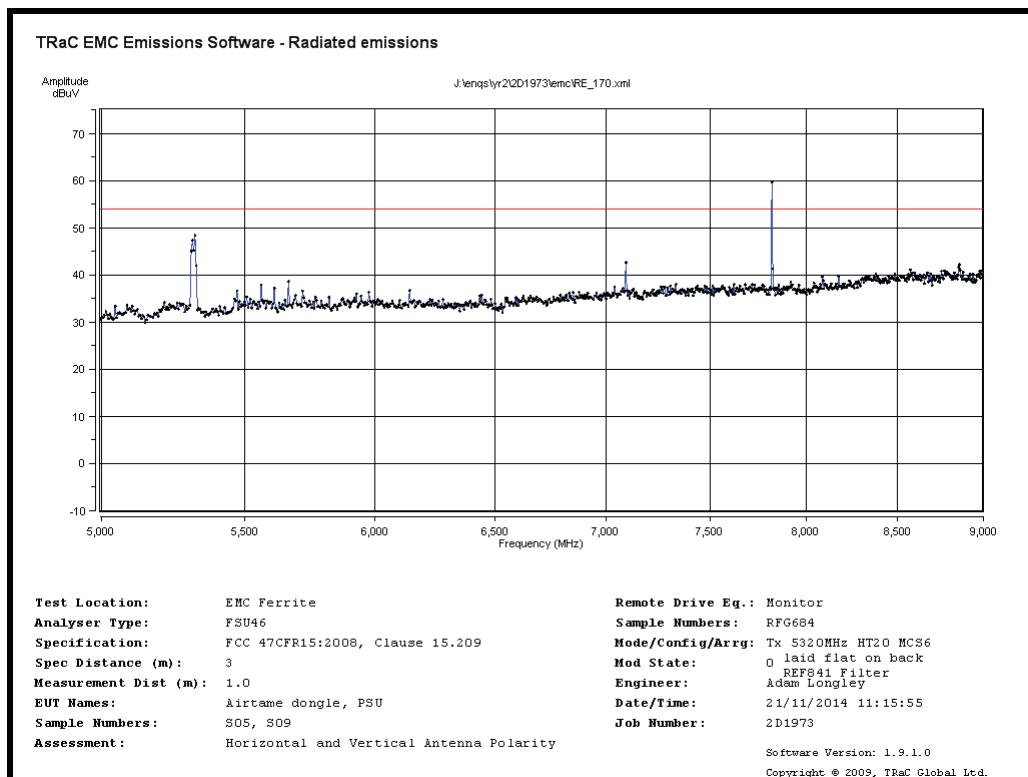
### Radiated Spurious emissions 30MHz to 200MHz – 5320MHz MCS6



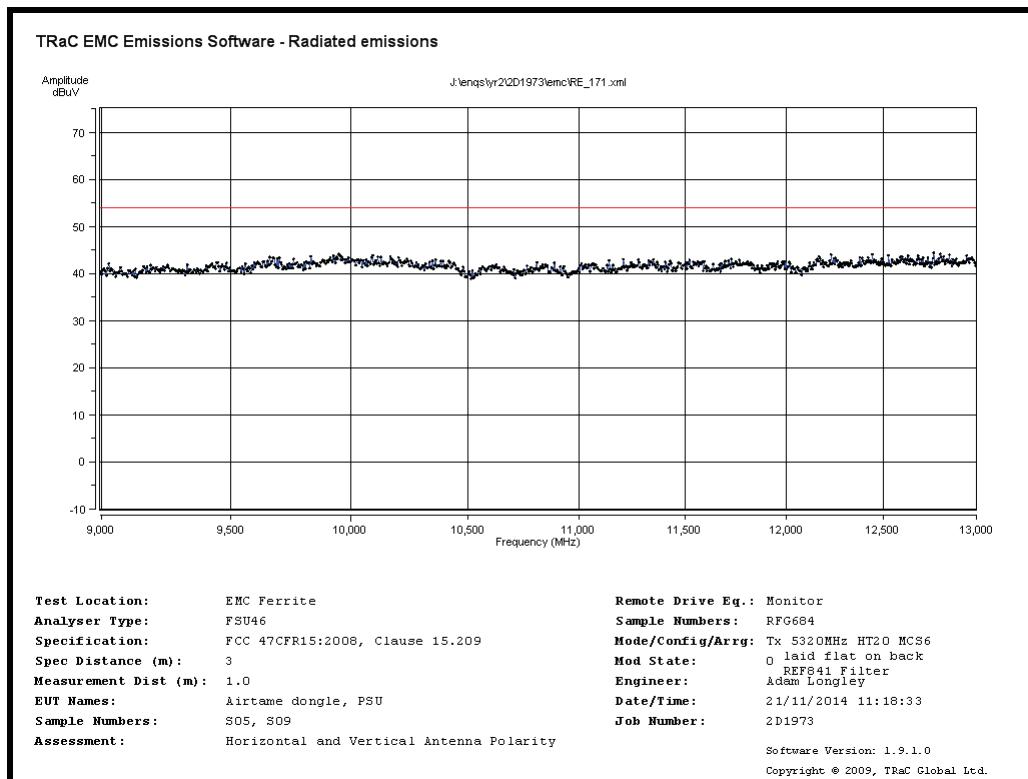
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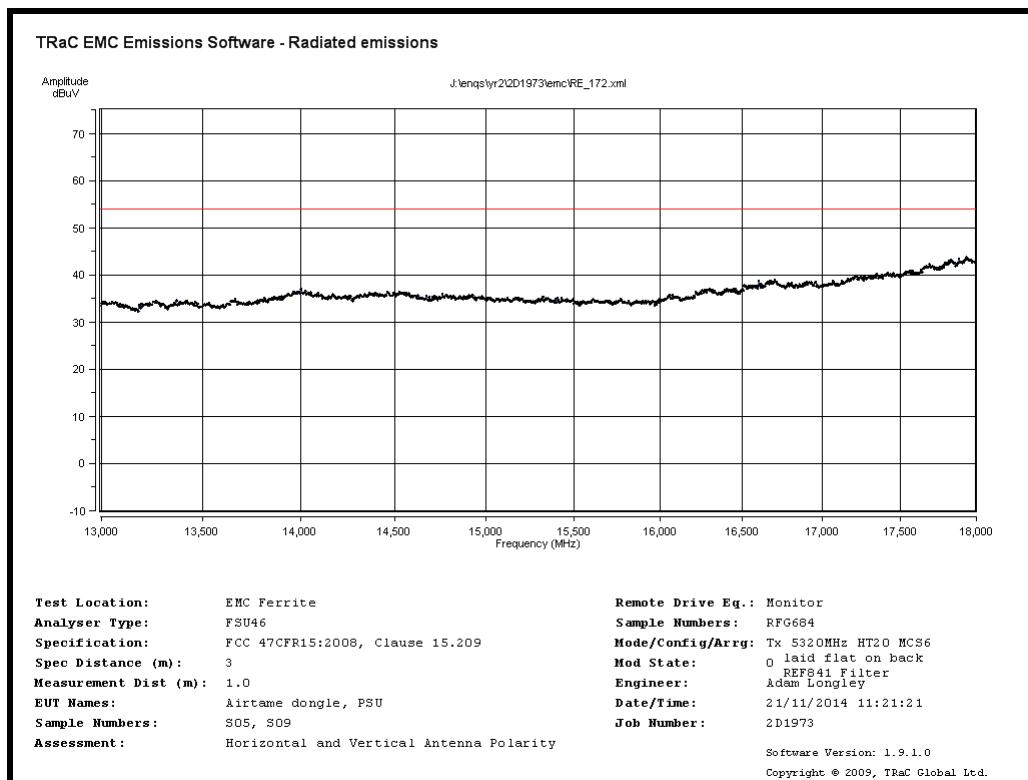
### Radiated Spurious emissions 1GHz to 5GHz – 5320MHz MCS6



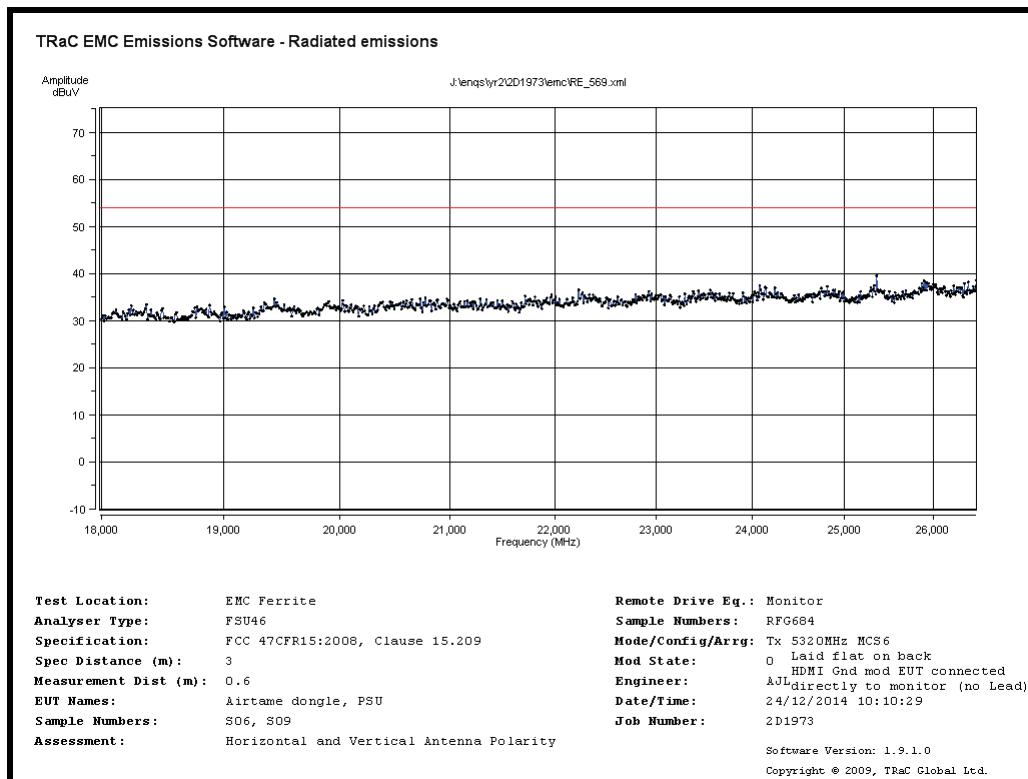
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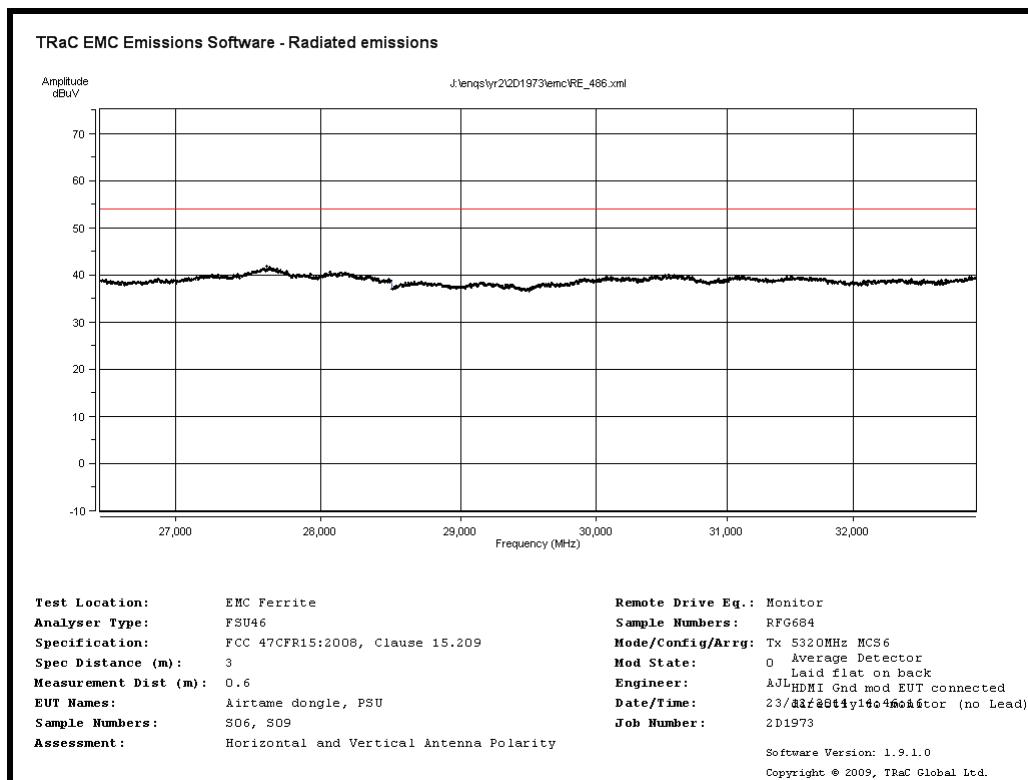
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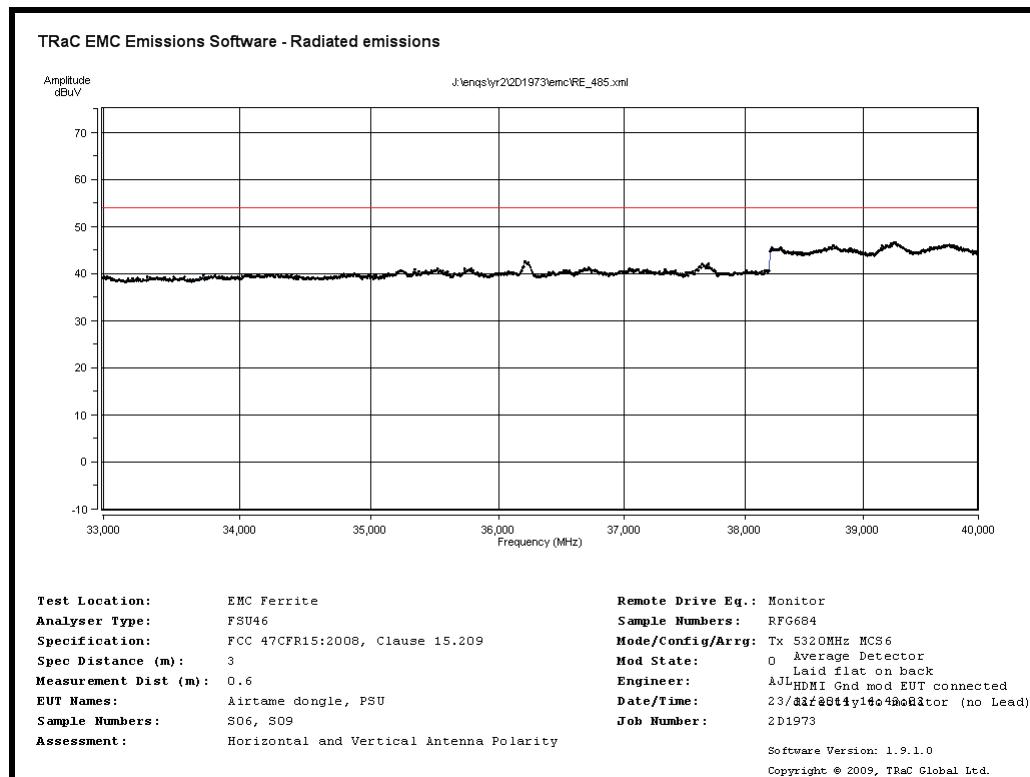
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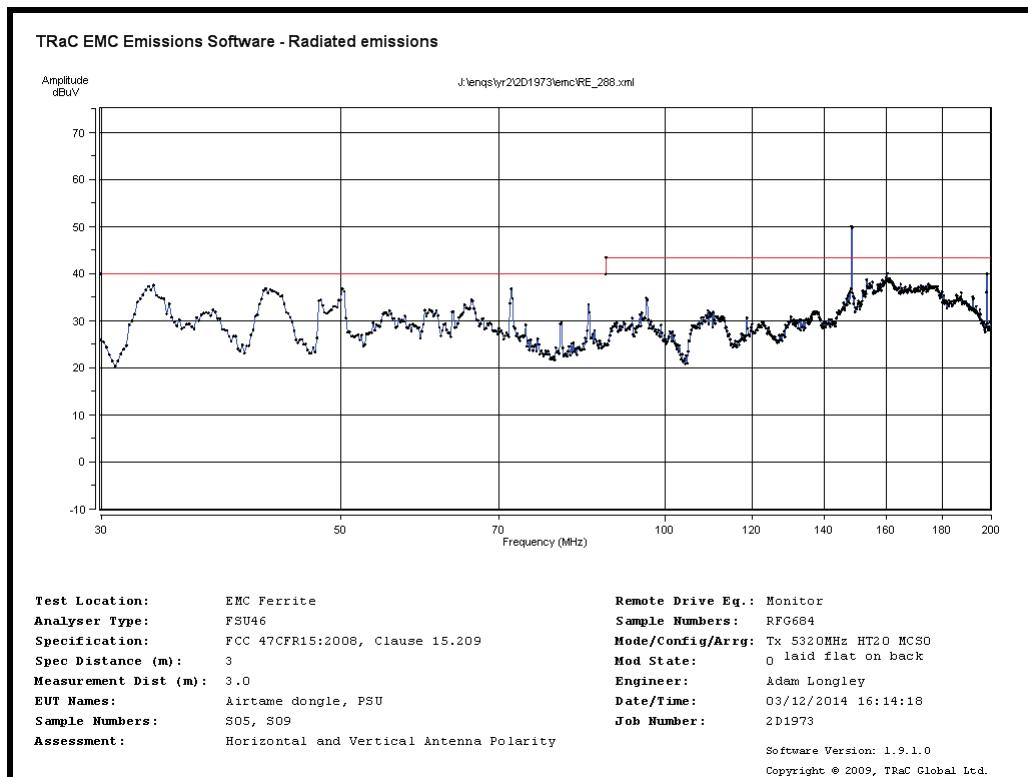
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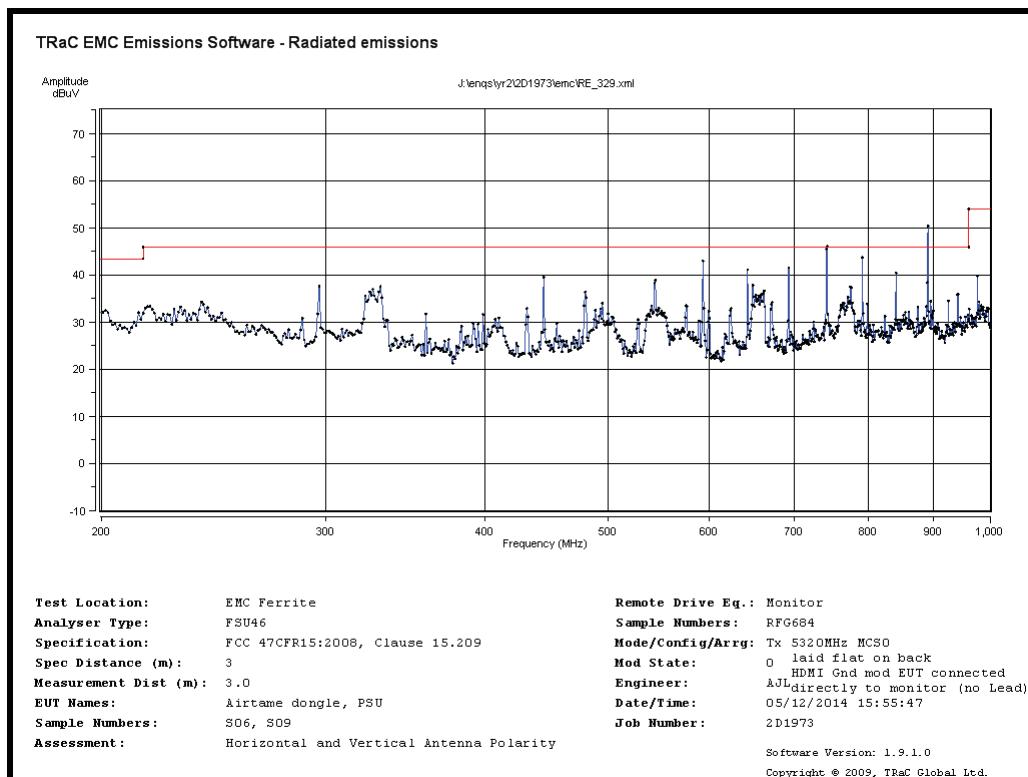
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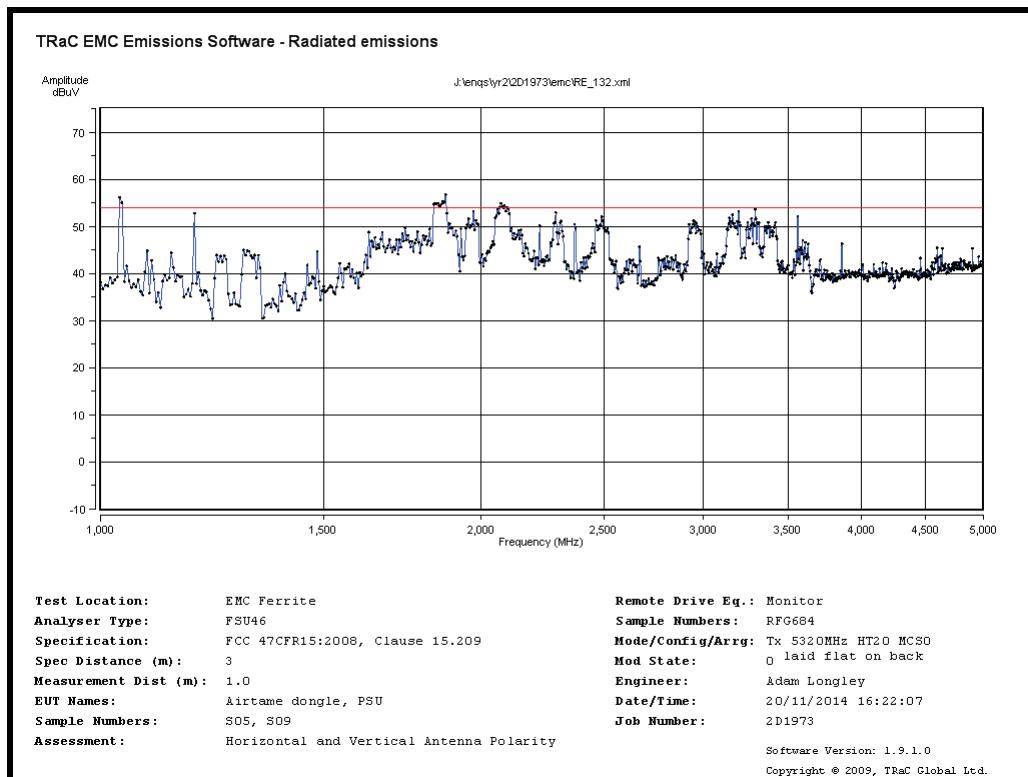
Radiated Spurious emissions 33GHz to 40GHz – 5320MHz MCS6



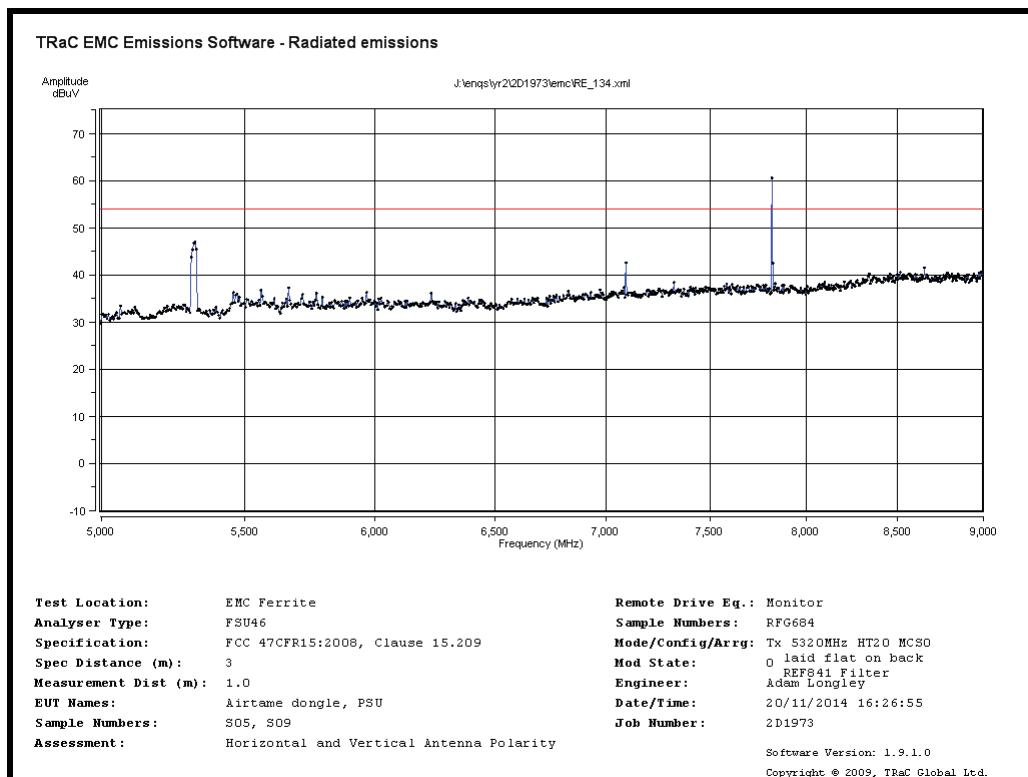
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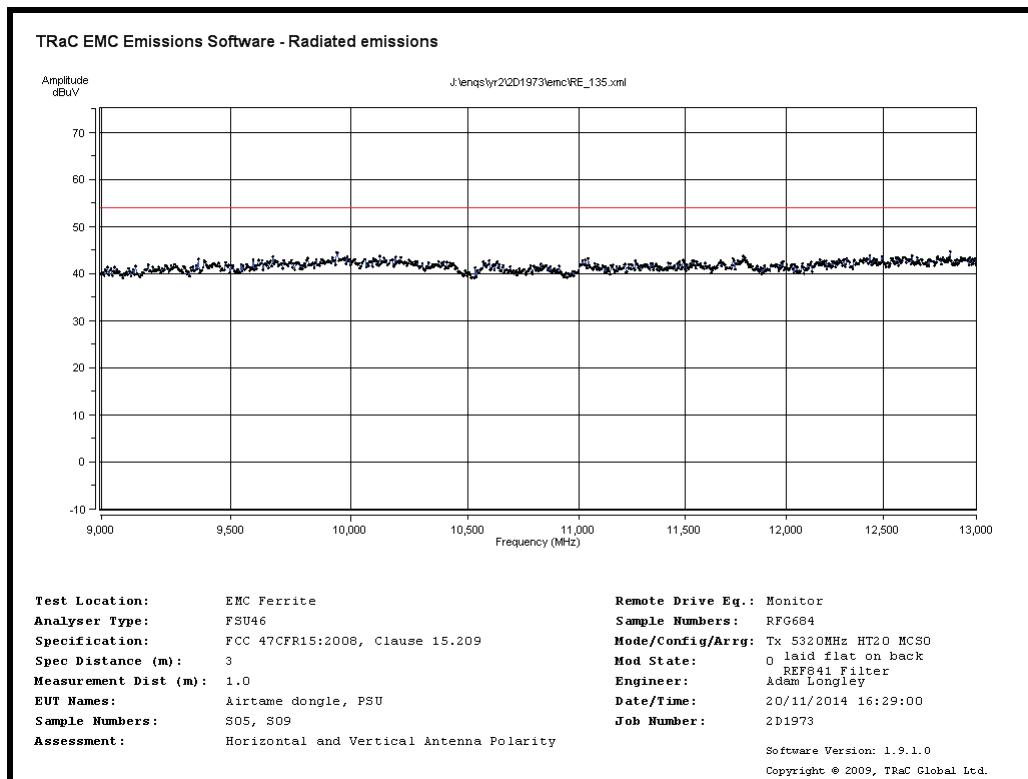
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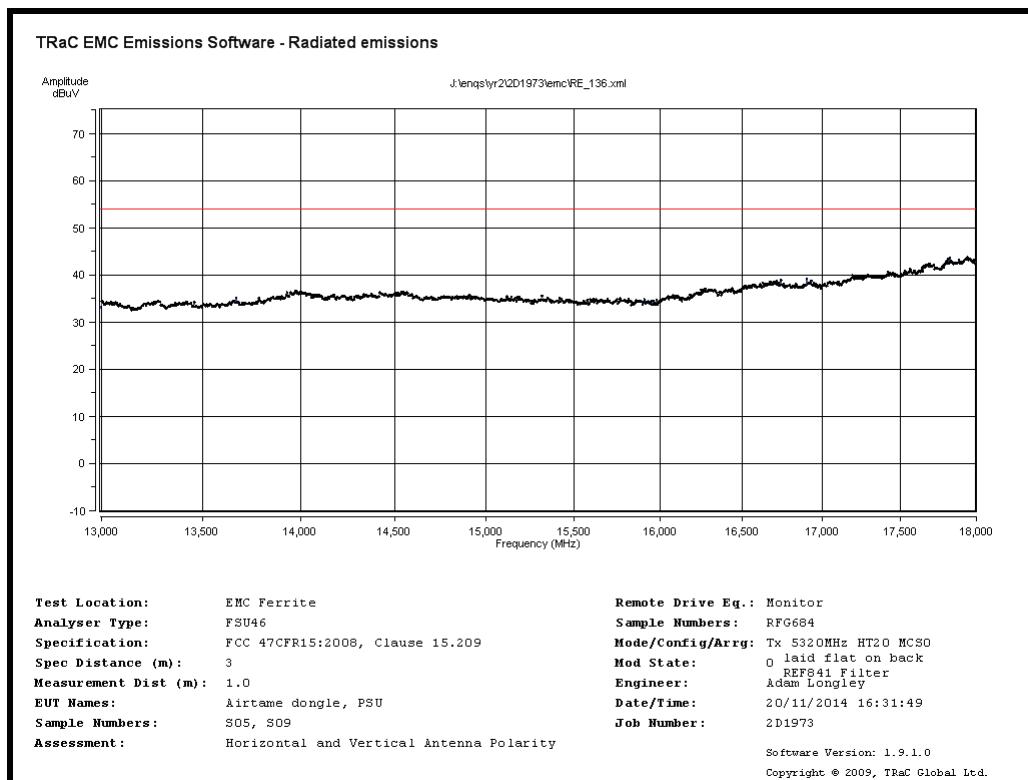
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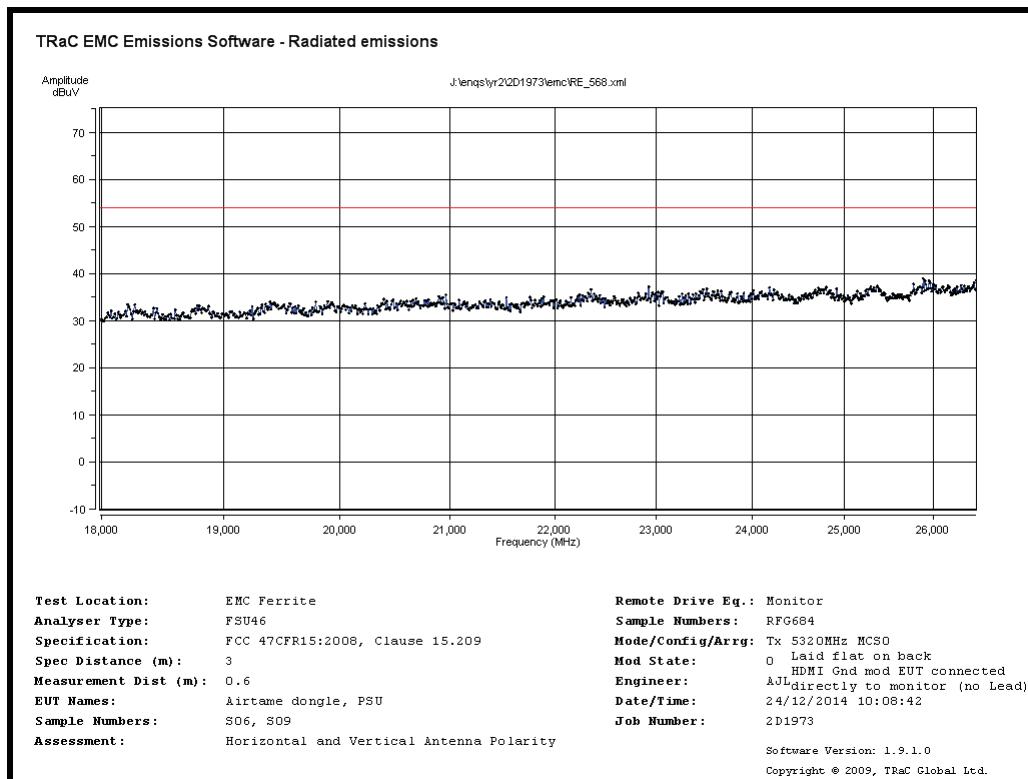
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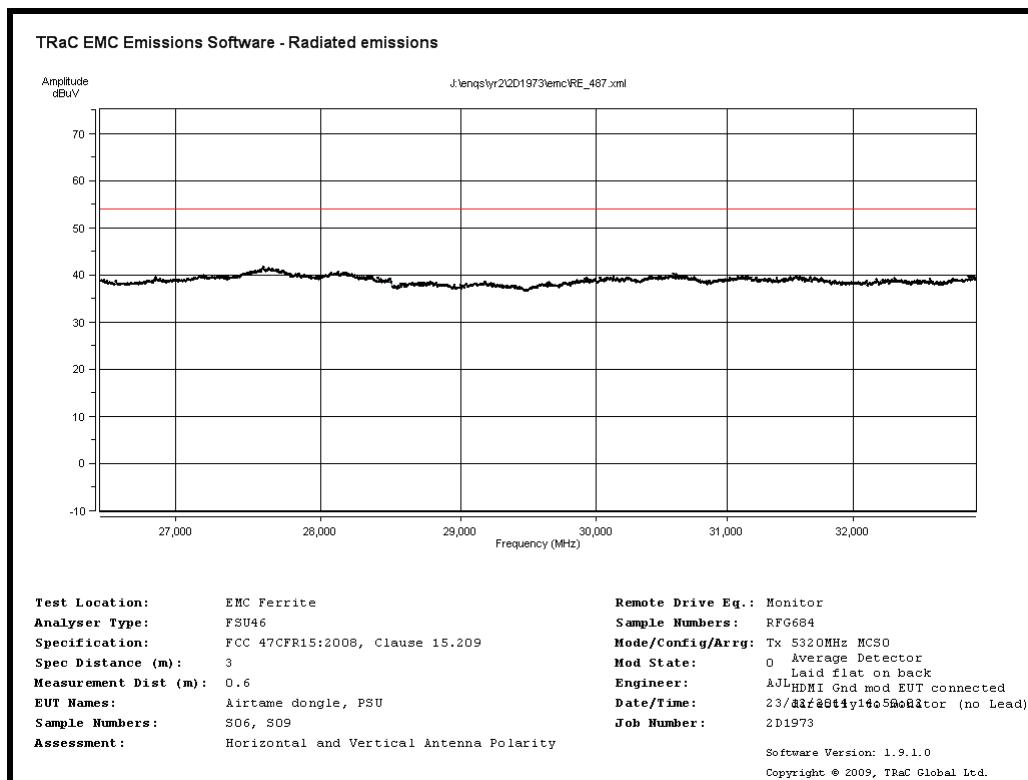
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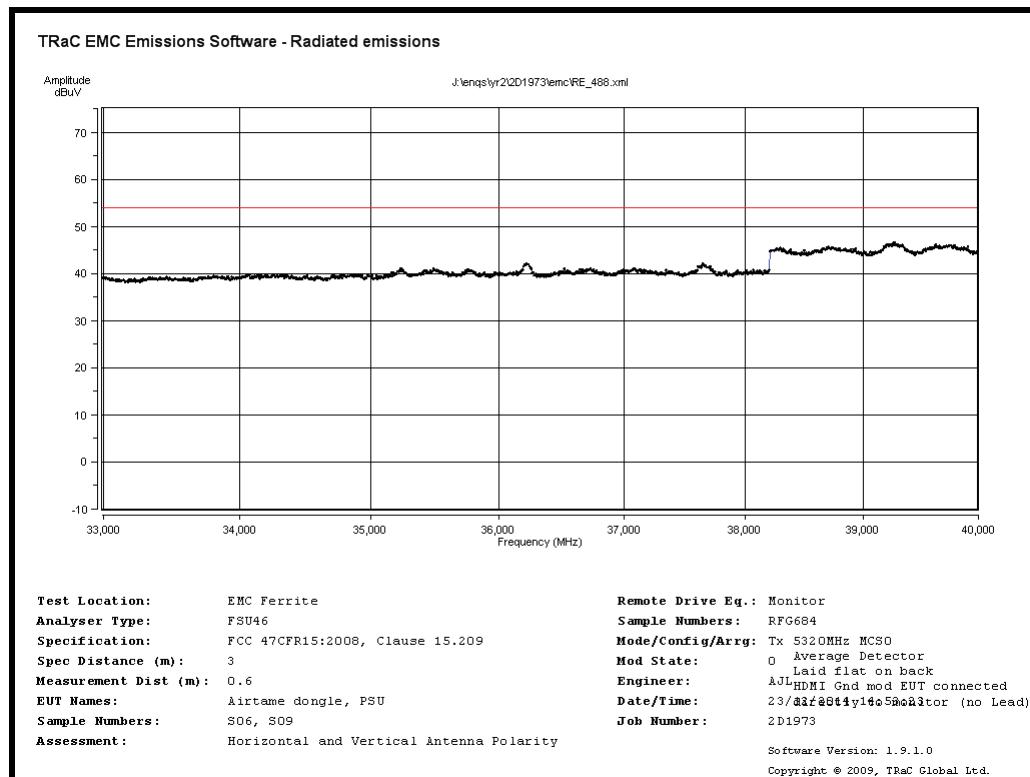
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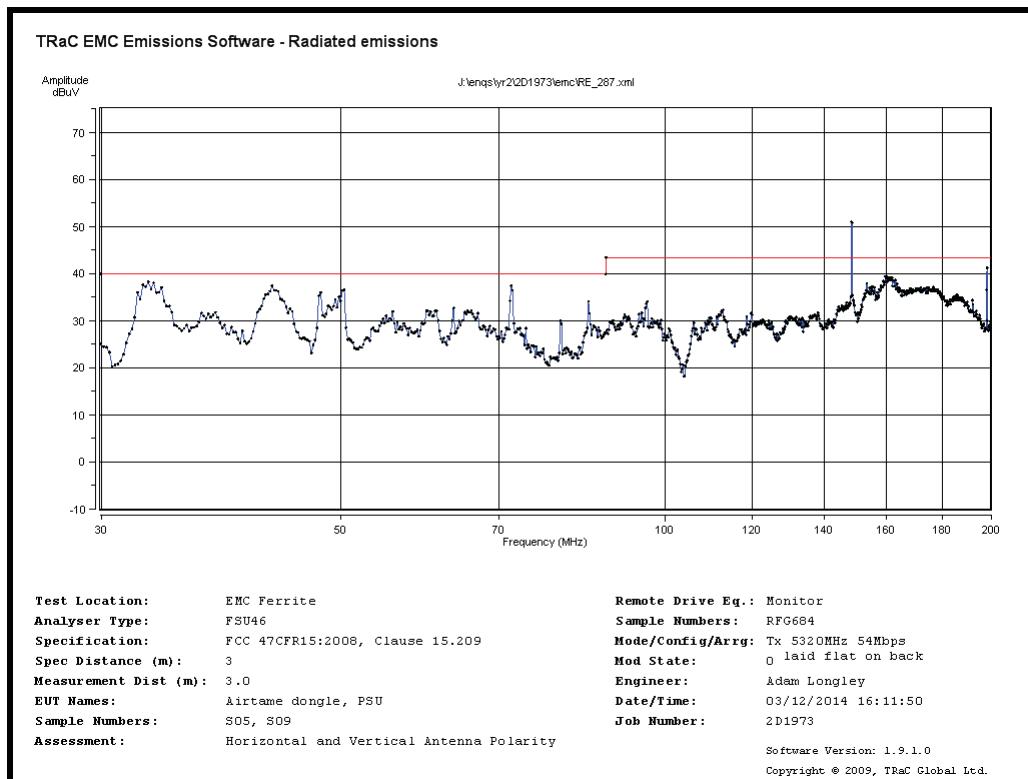
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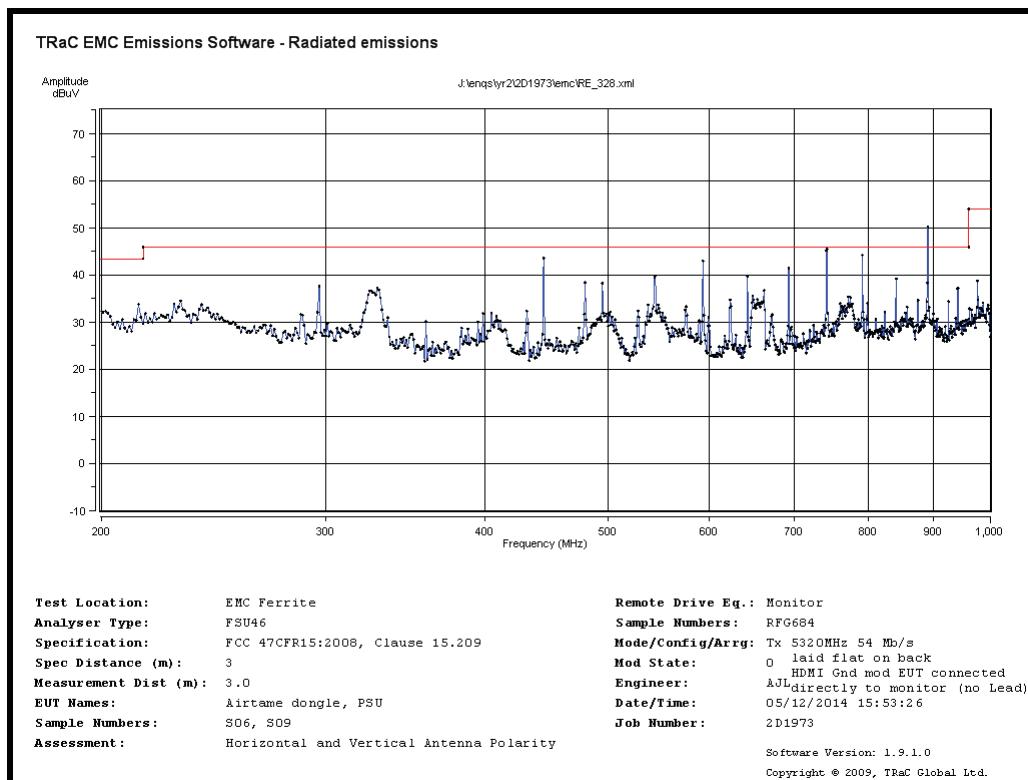
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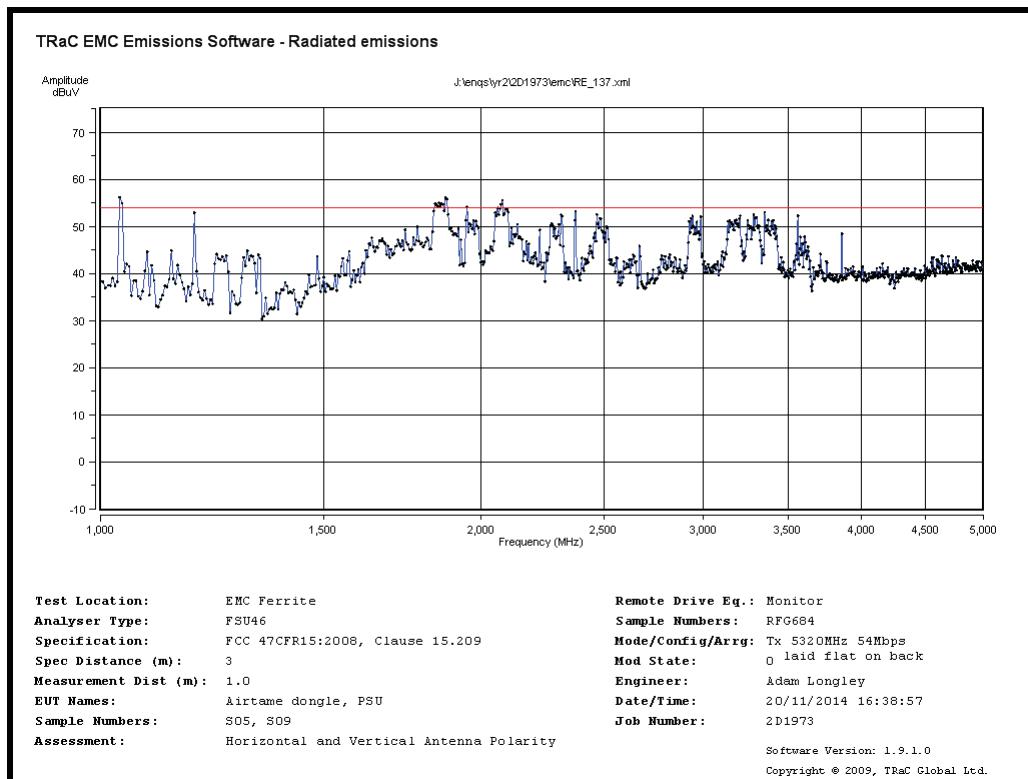
Radiated Spurious emissions 33GHz to 40GHz – 5320MHz MCS0



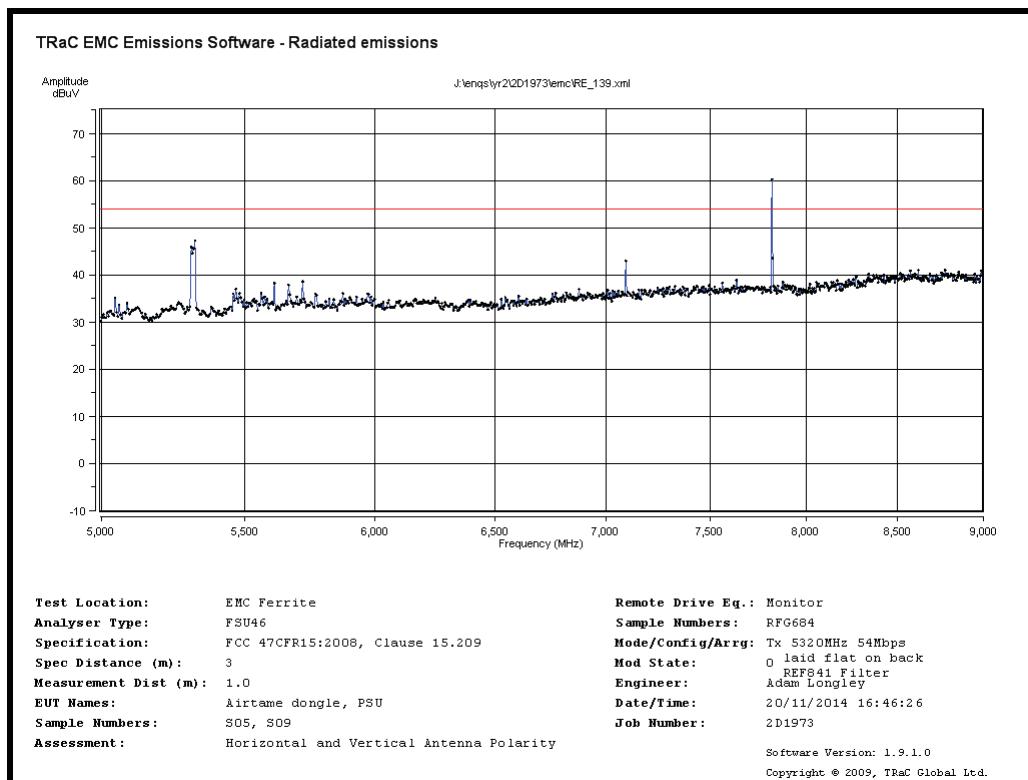
### Radiated Spurious emissions 30MHz to 200MHz – 5320MHz 54Mb/s



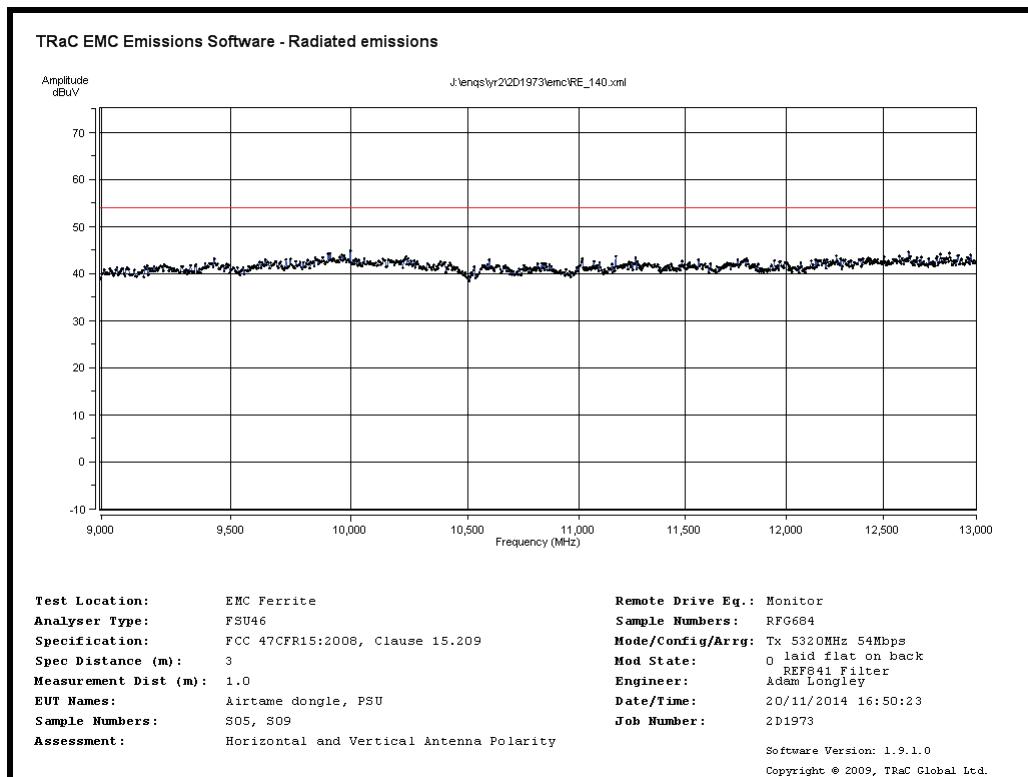
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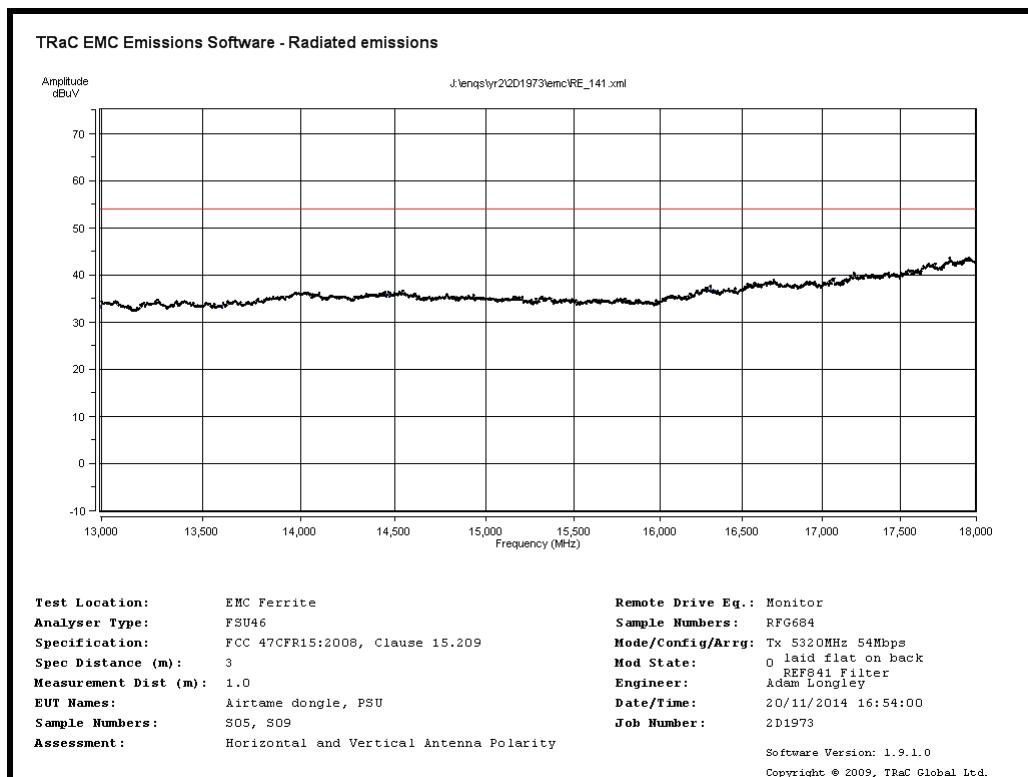
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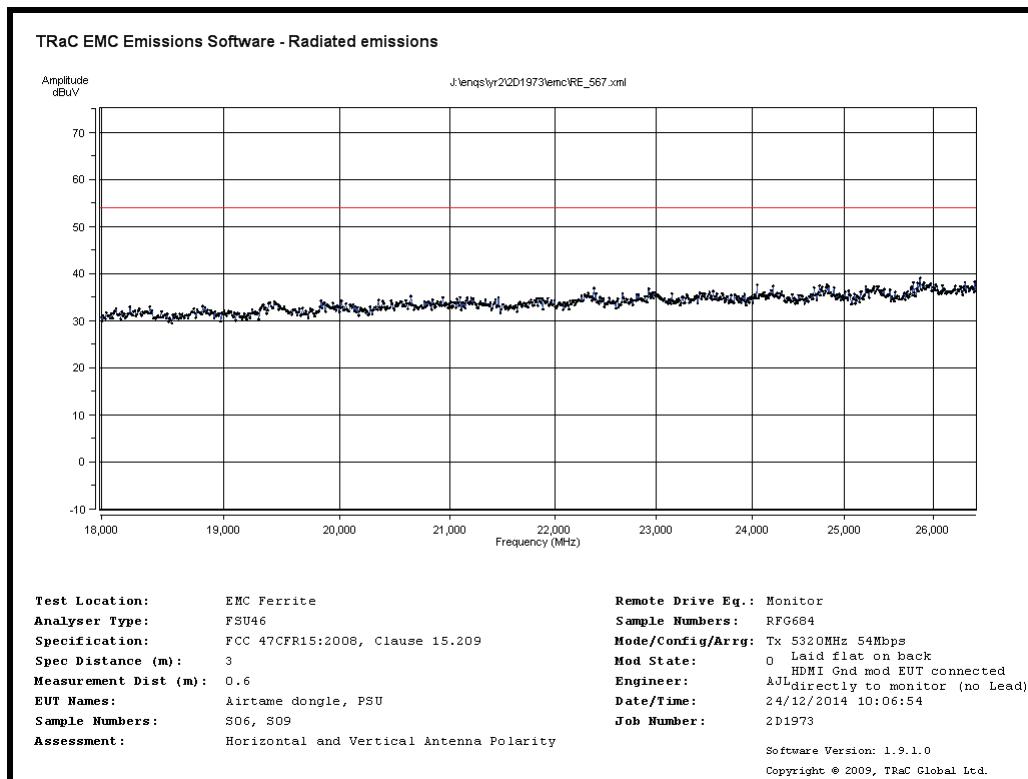
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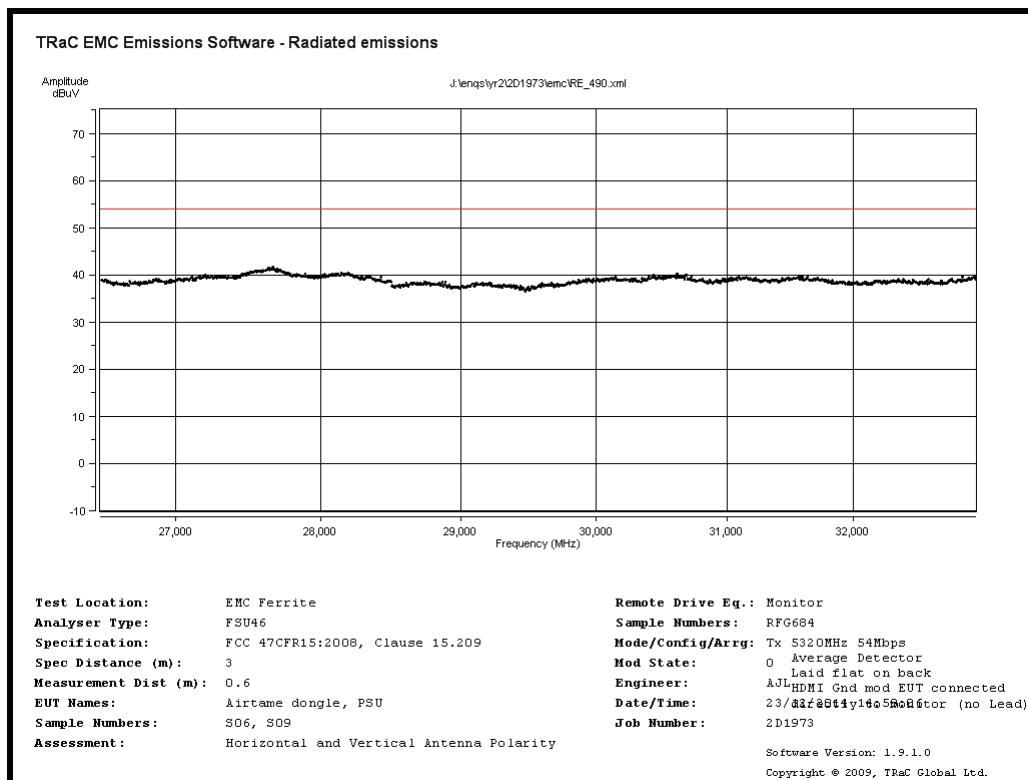
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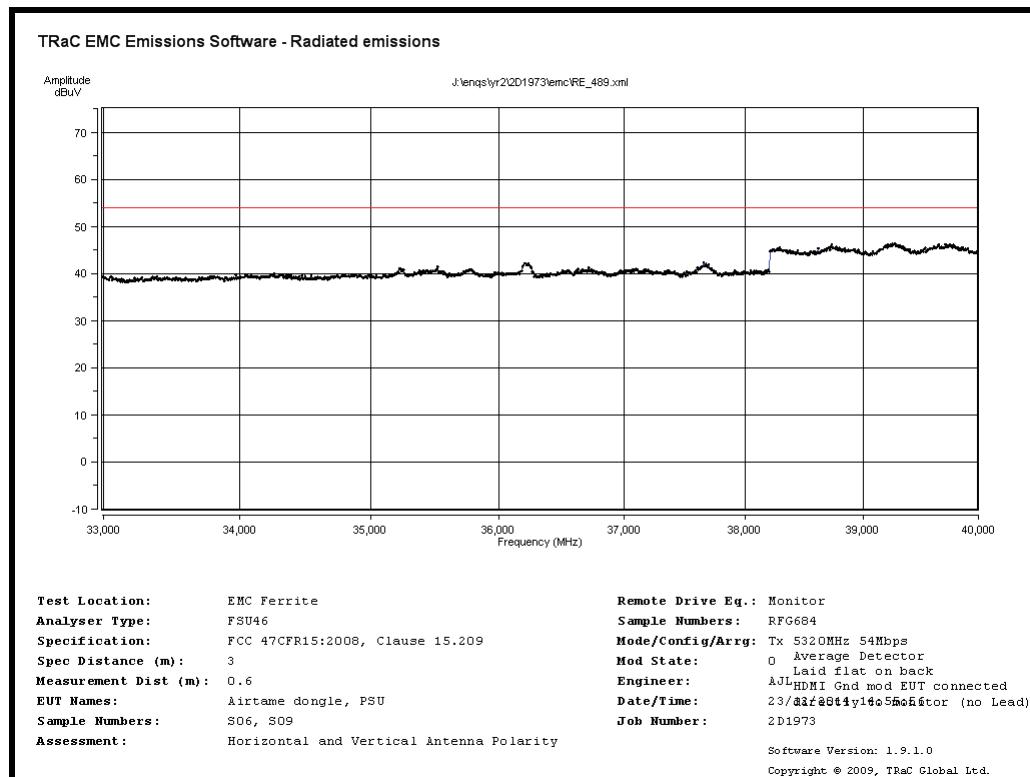
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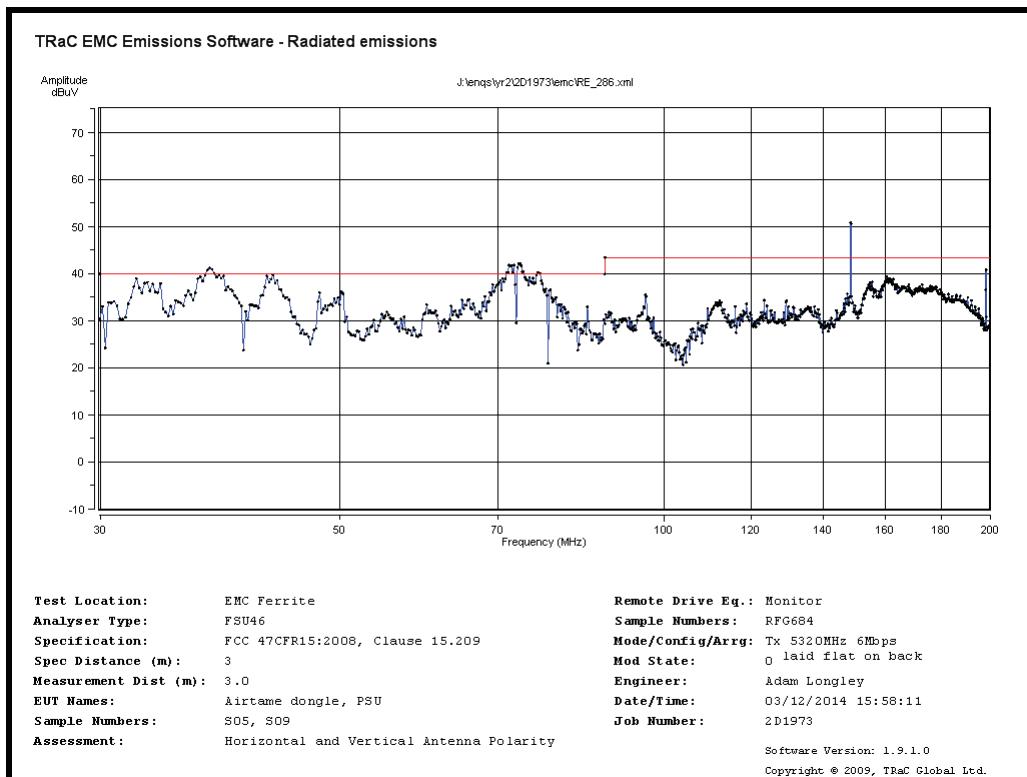
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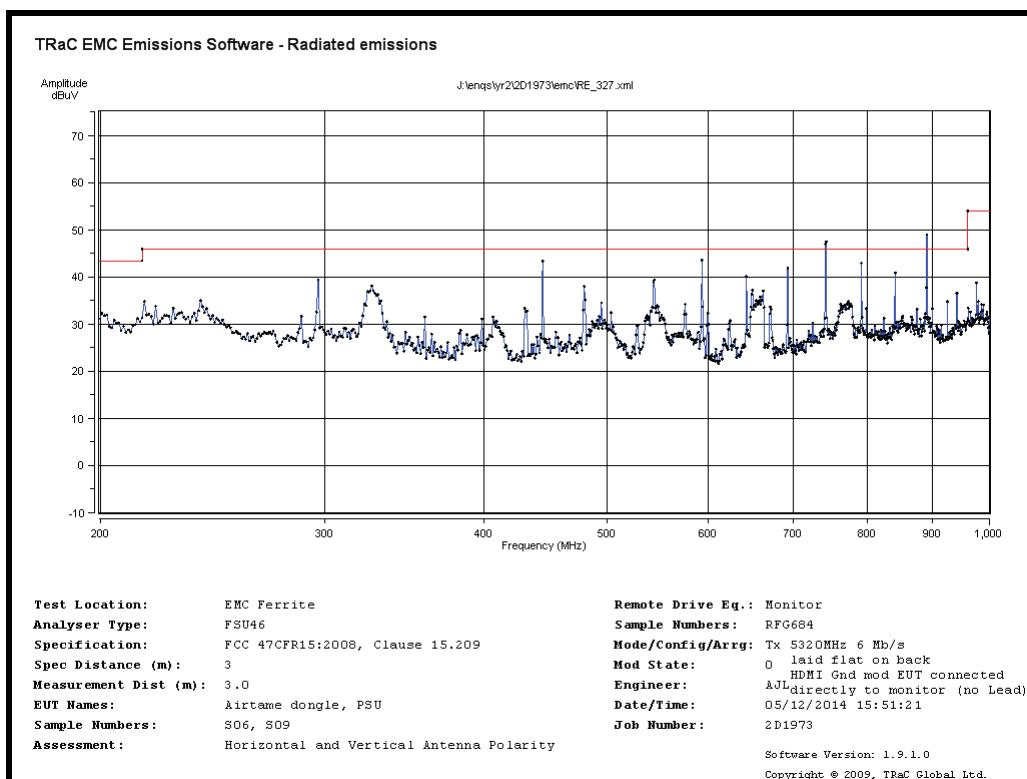
### Radiated Spurious emissions 26.5GHz to 33GHz – 5320MHz 54Mb/s



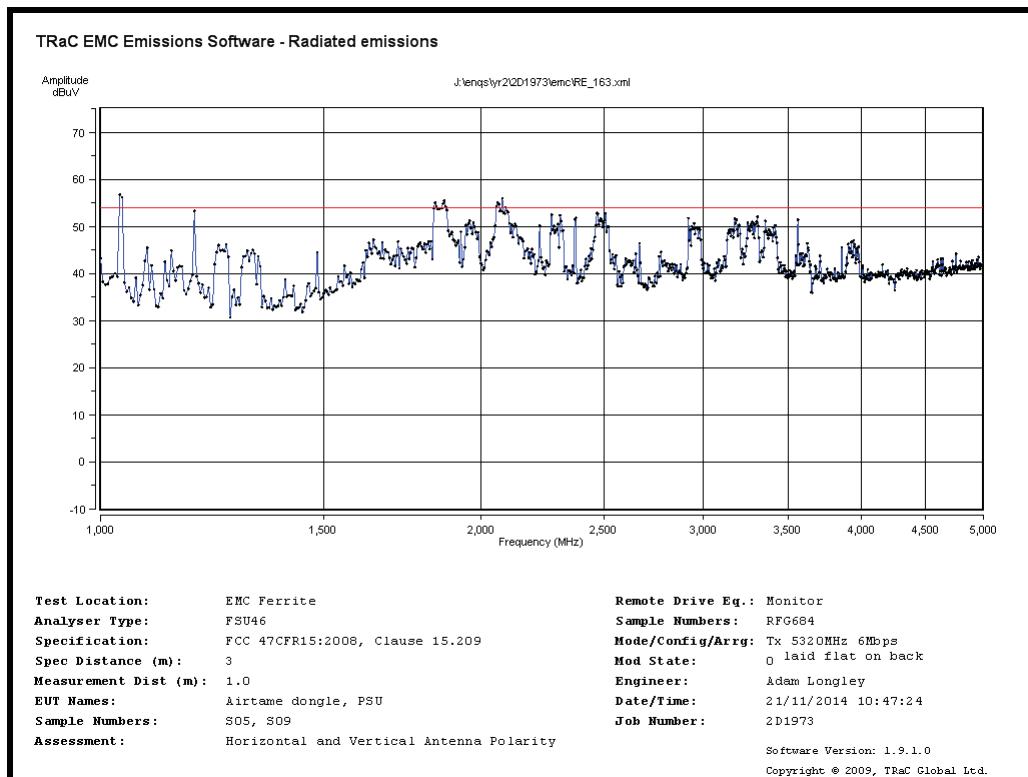
Radiated Spurious emissions 33GHz to 40GHz – 5320MHz 54Mb/s



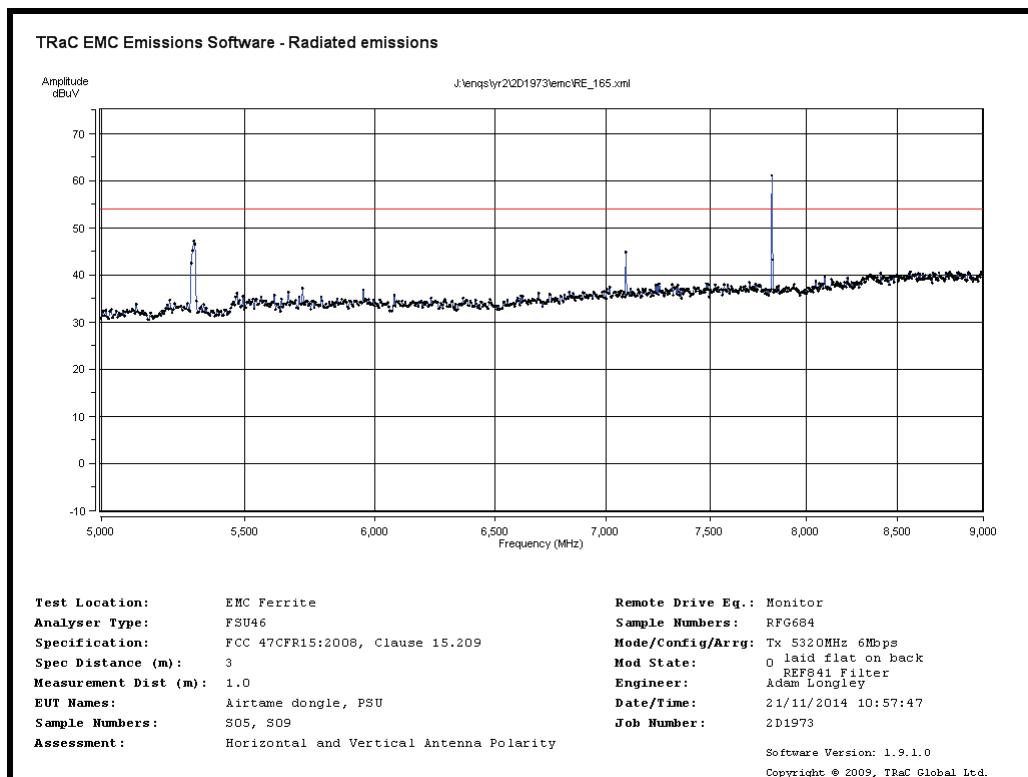
Radiated Spurious emissions 30MHz to 200MHz – 5320MHz 6Mb/s



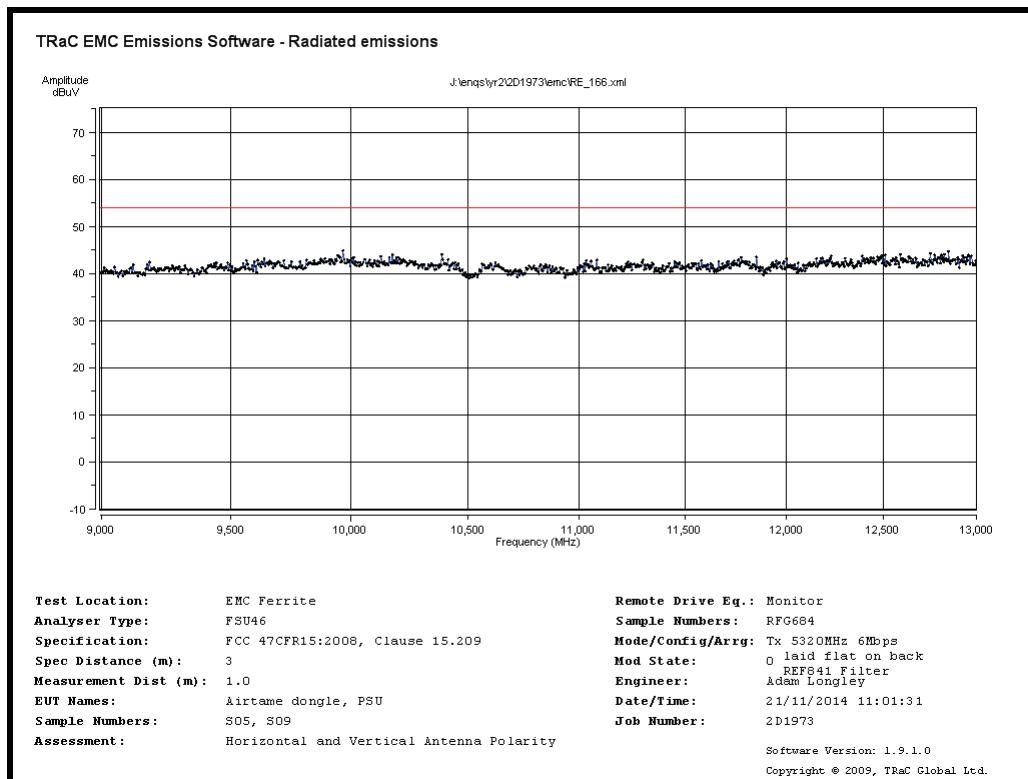
Radiated Spurious emissions 200MHz to 1GHz – 5320MHz 6Mb/s



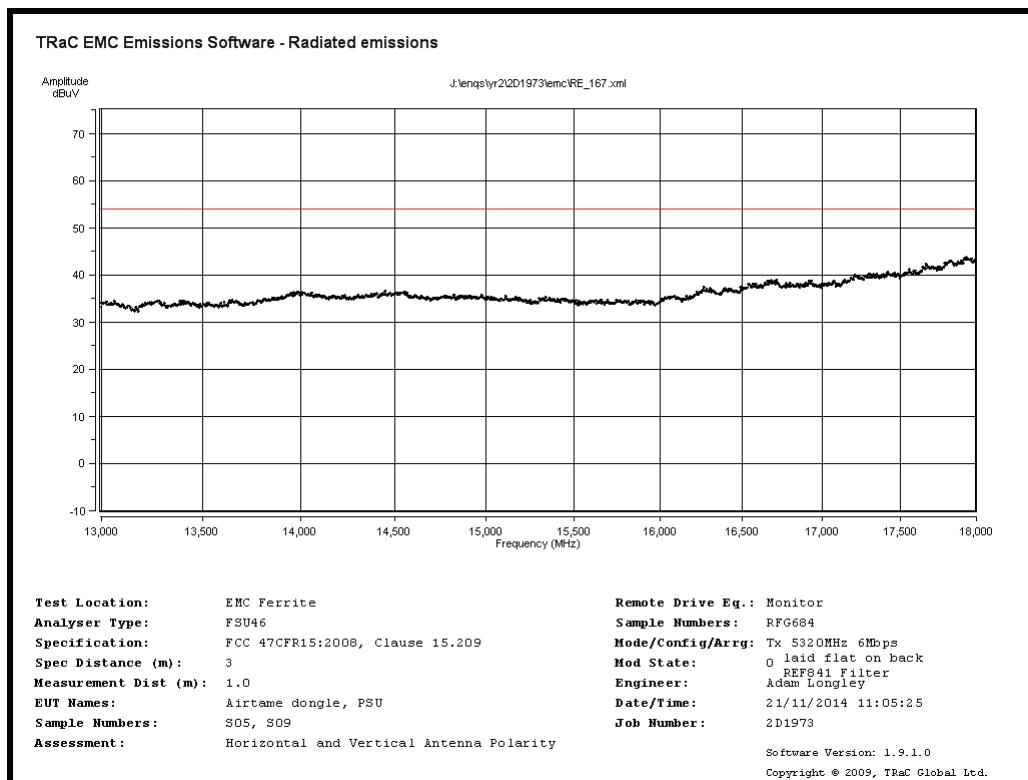
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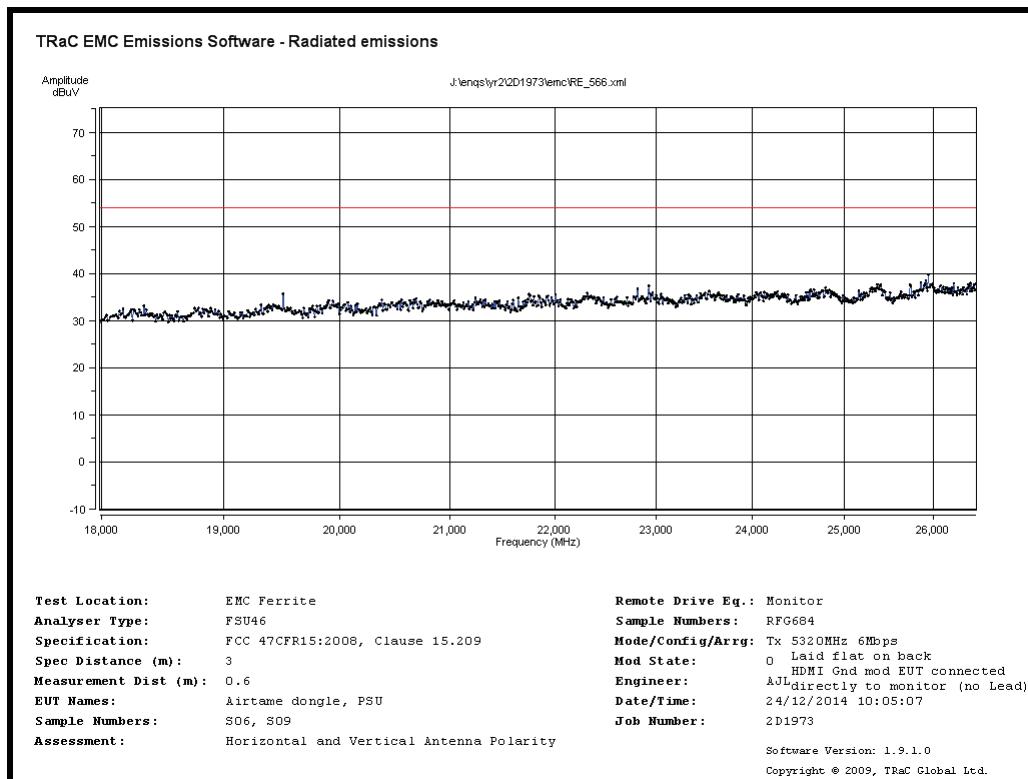
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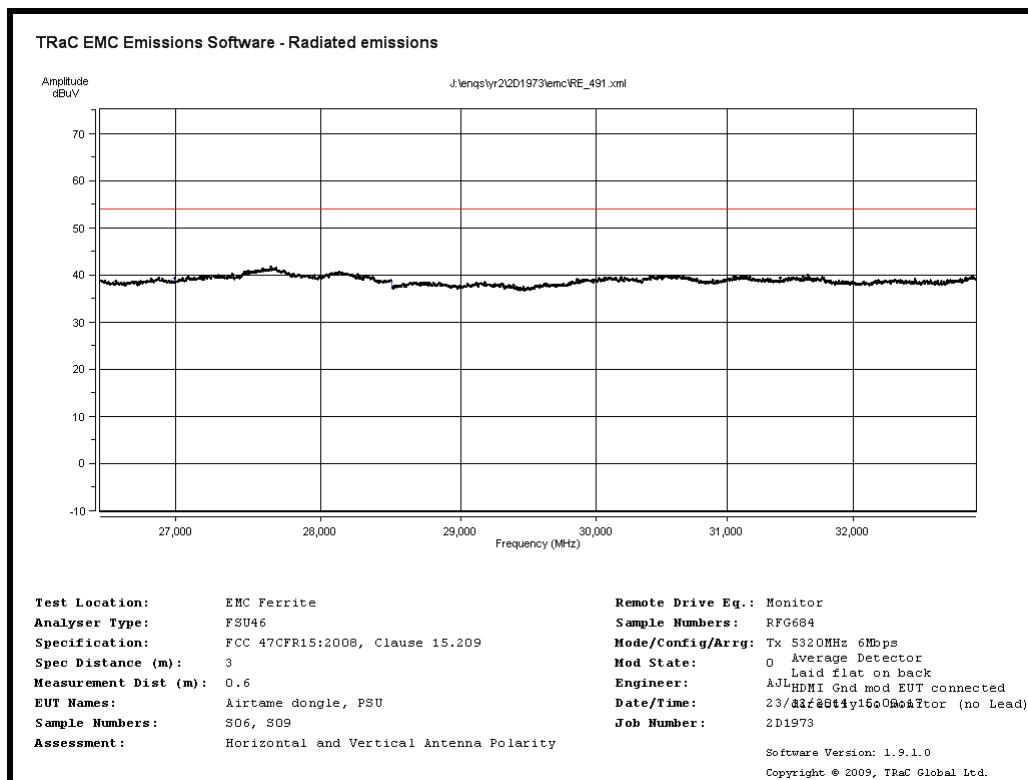
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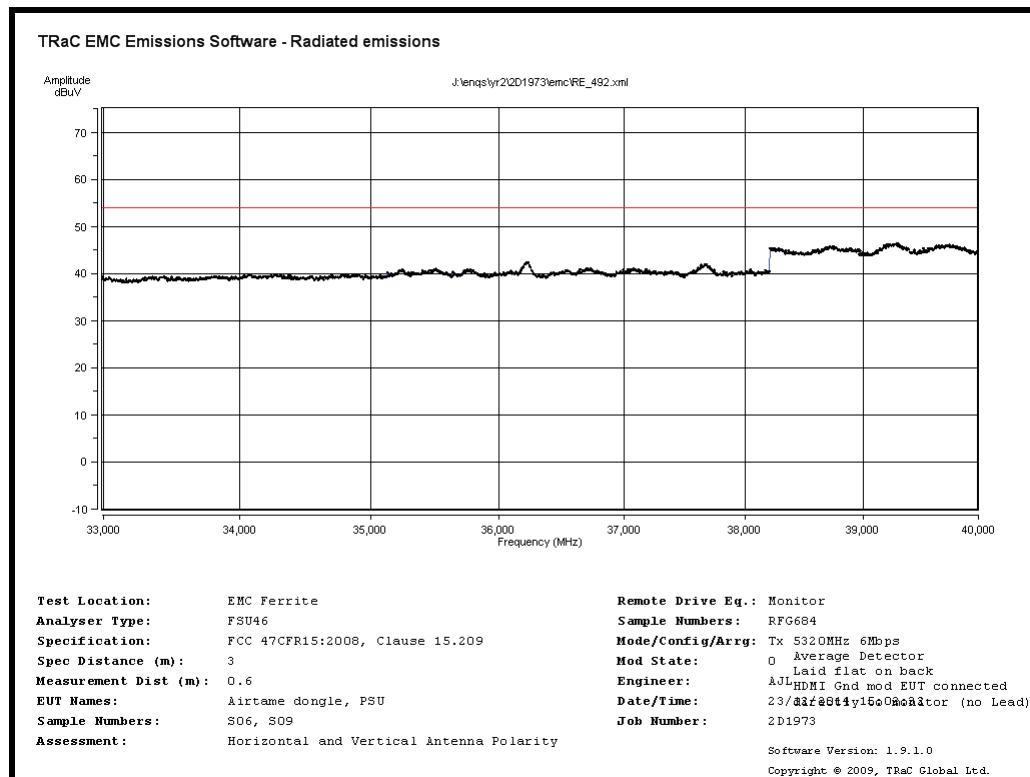
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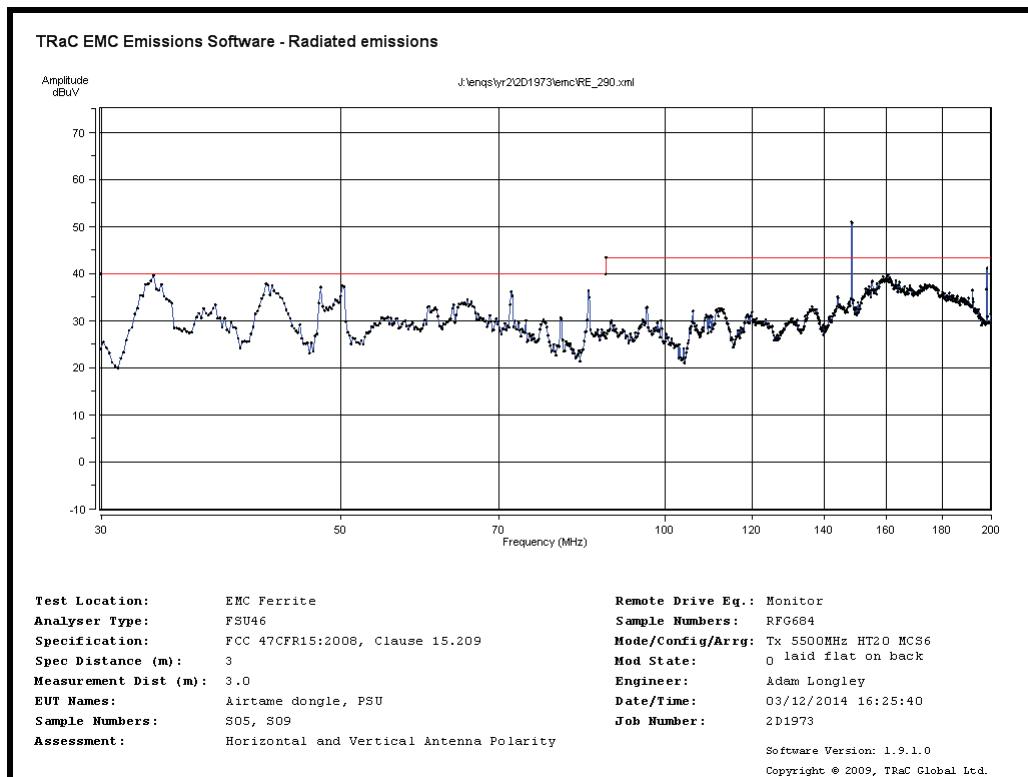
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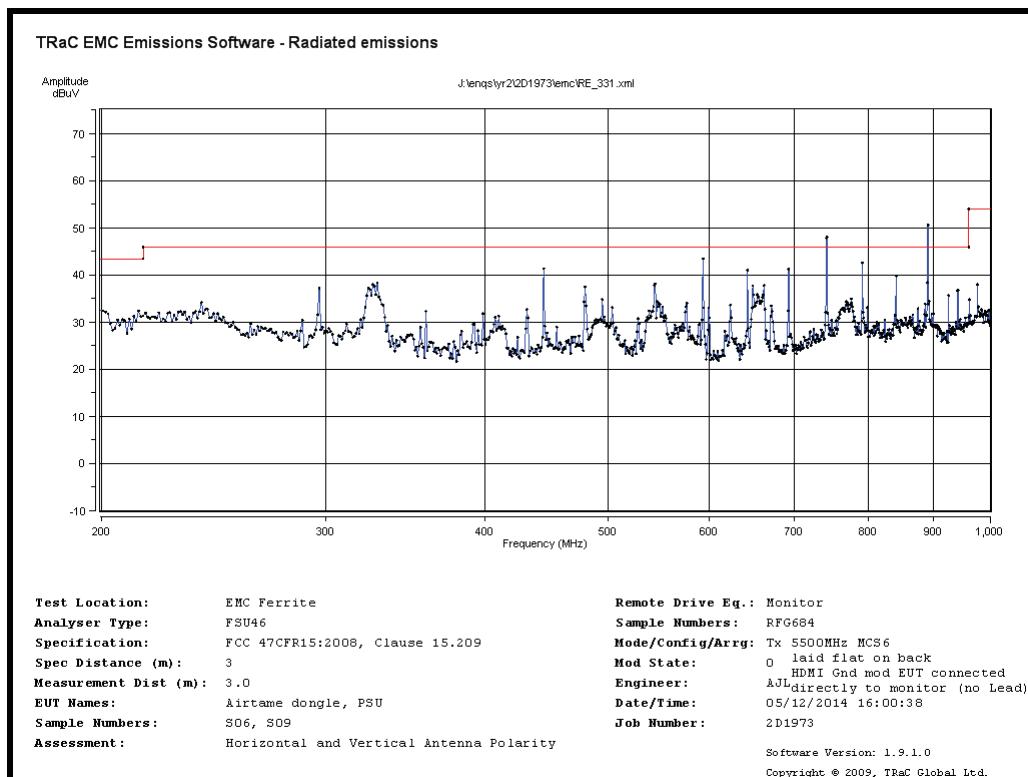
### Radiated Spurious emissions 26.5GHz to 33GHz – 5320MHz 6Mb/s



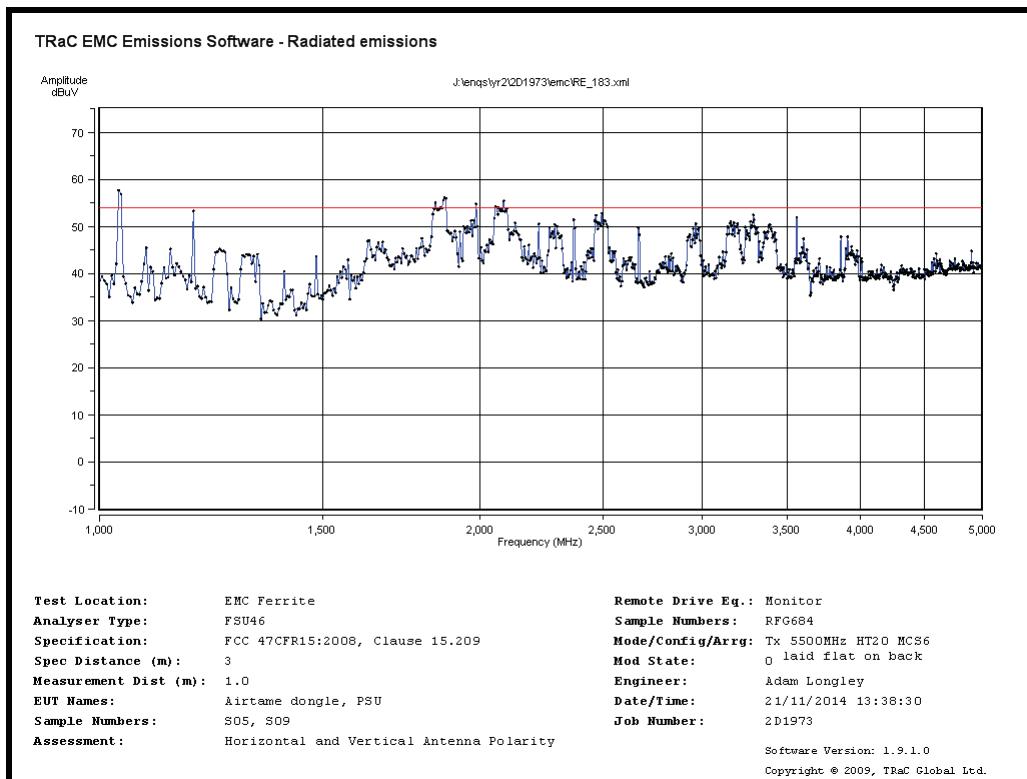
Radiated Spurious emissions 33GHz to 40GHz – 5320MHz 6Mb/s



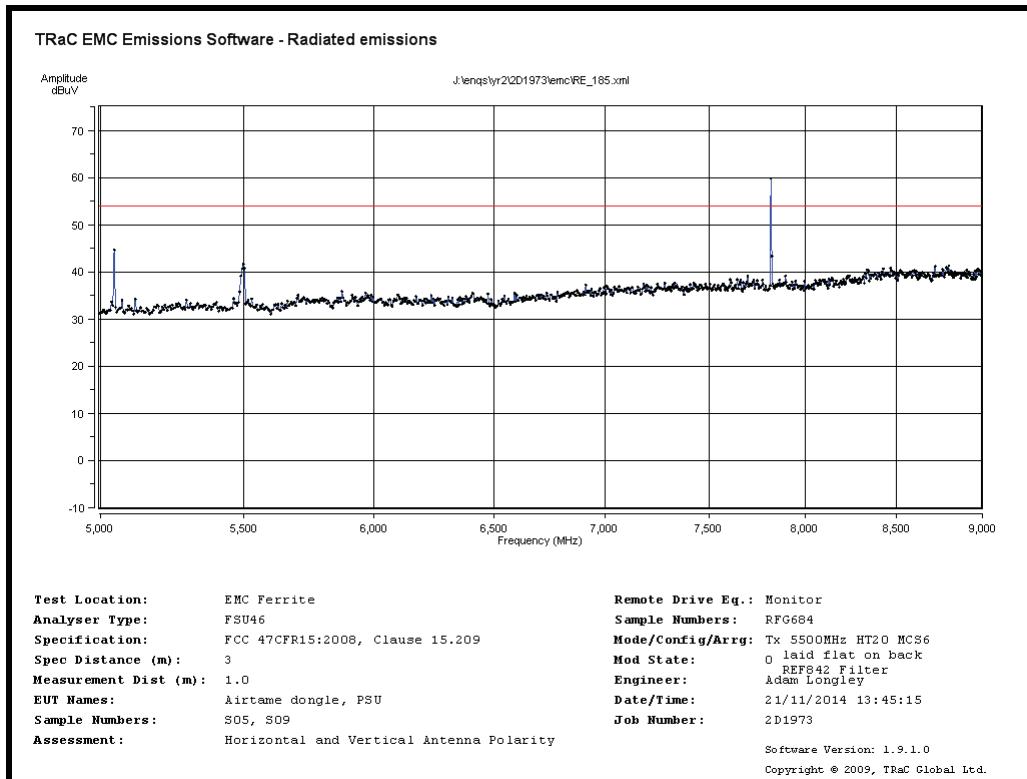
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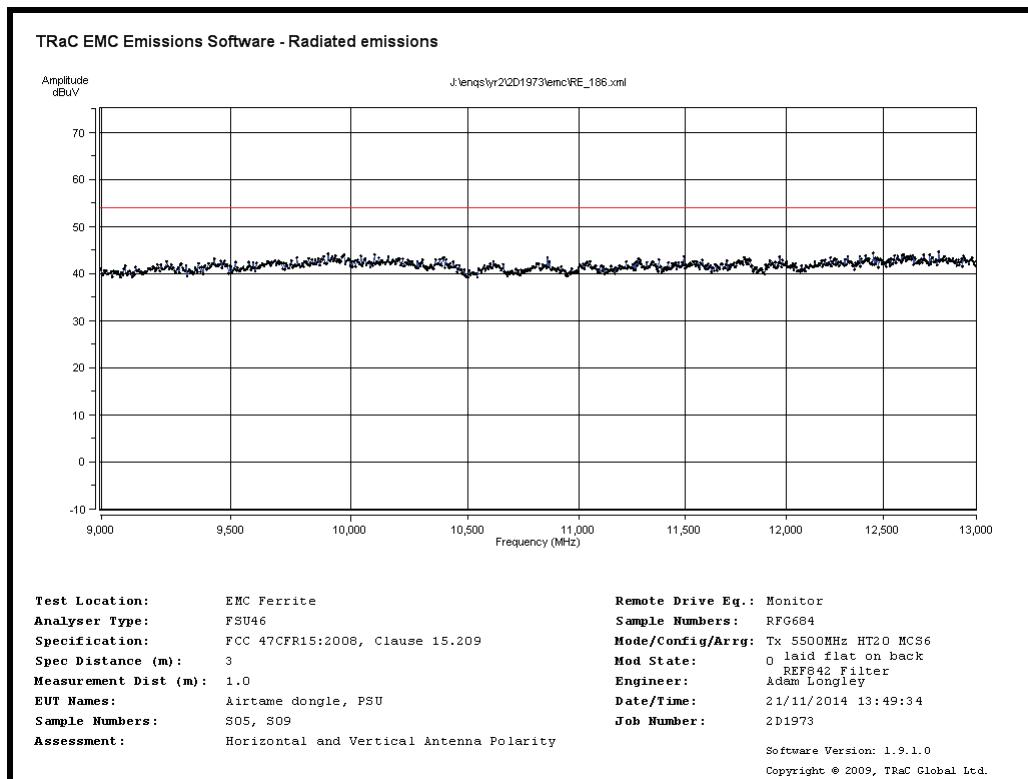
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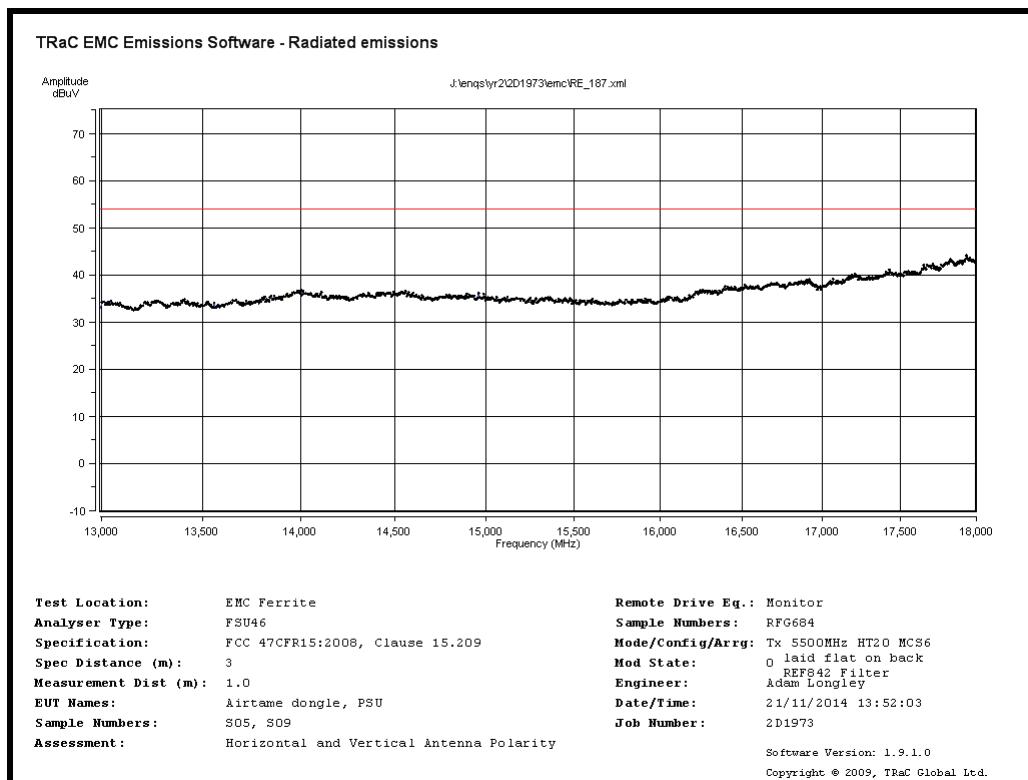
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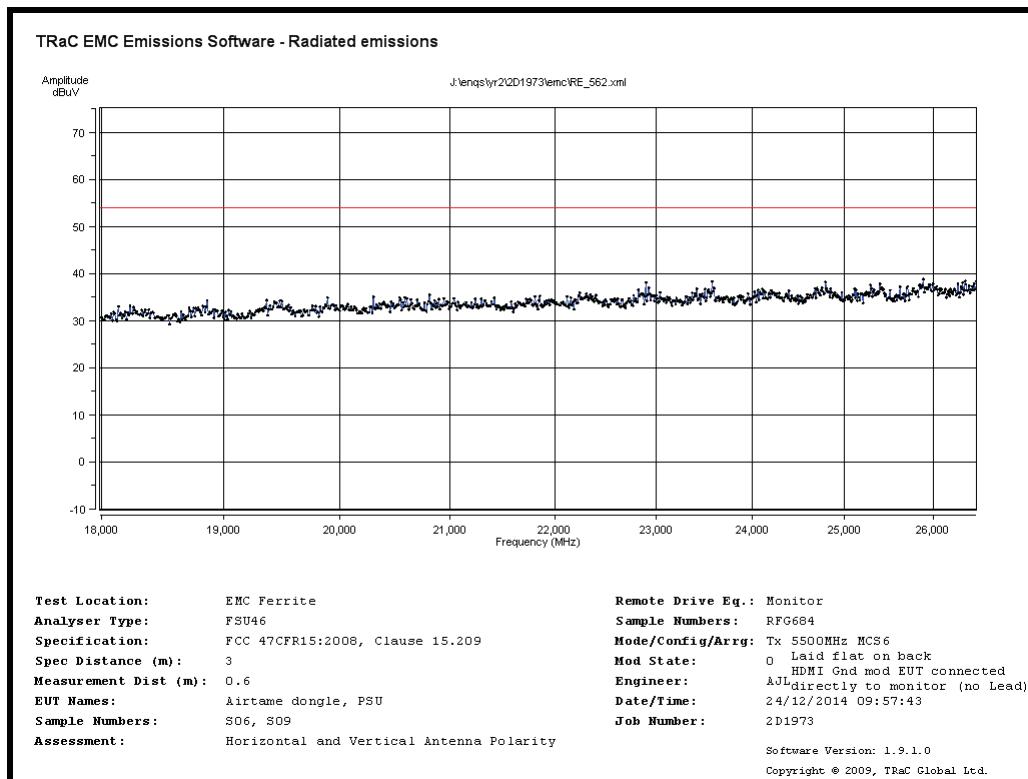
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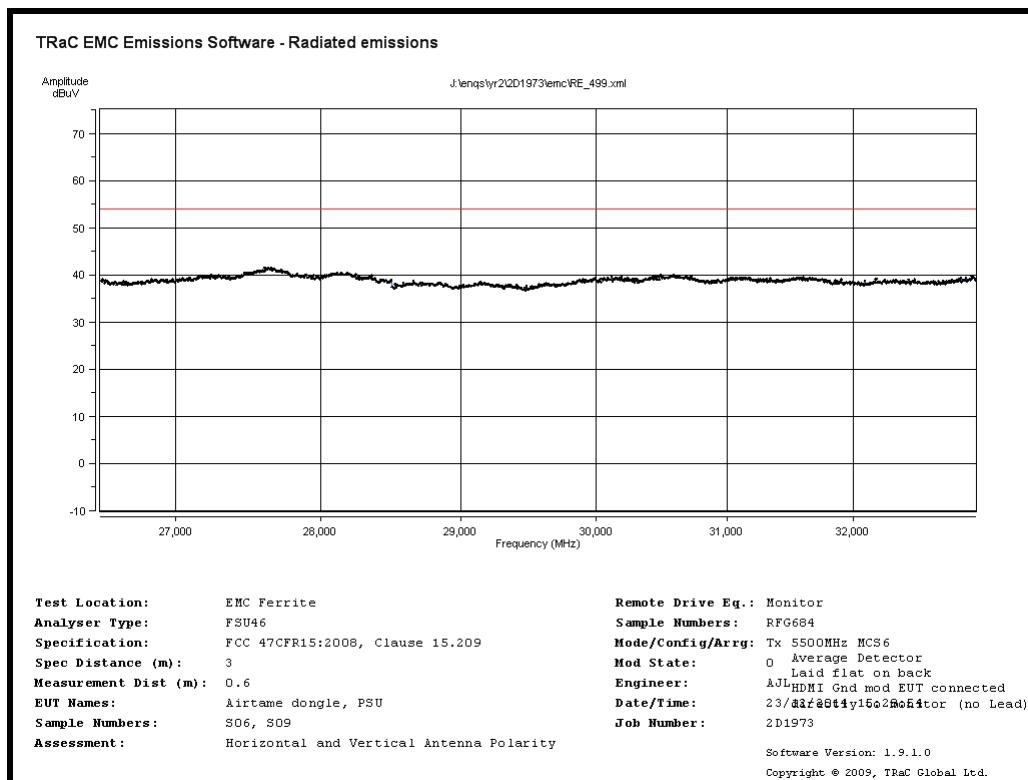
### Radiated Spurious emissions 9GHz to 13GHz – 5500MHz MCS6



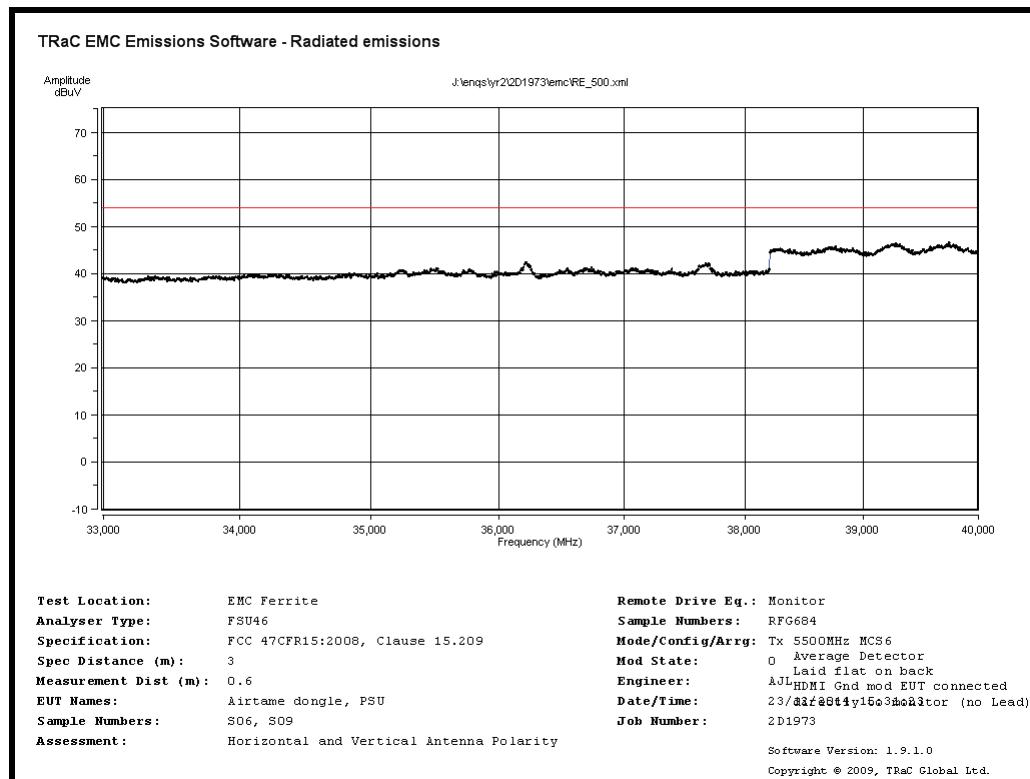
### Radiated Spurious emissions 13GHz to 18GHz – 5500MHz MCS6



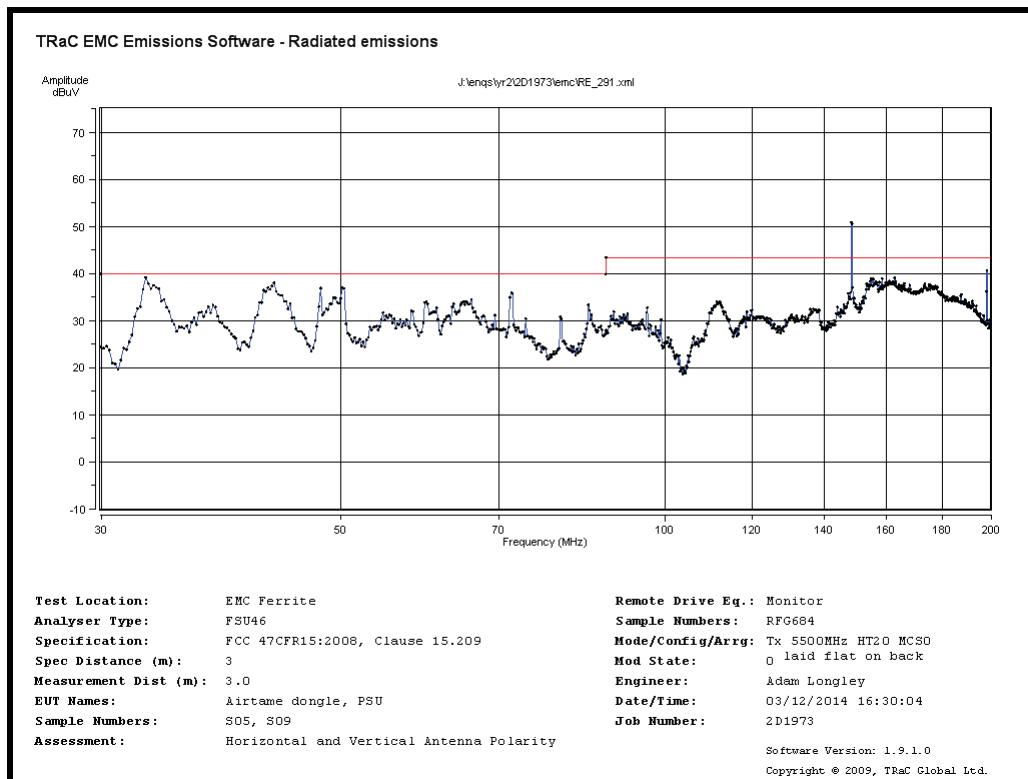
### Radiated Spurious emissions 18GHz to 26.5GHz – 5500MHz MCS6



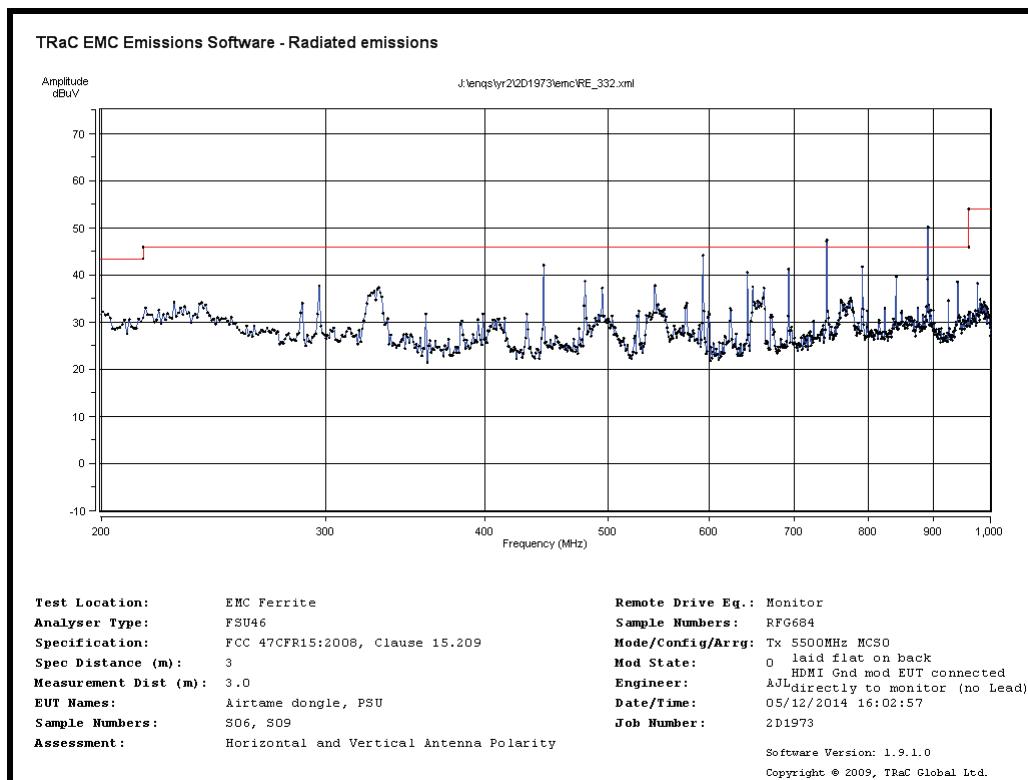
### Radiated Spurious emissions 26.5GHz to 33GHz – 5500MHz MCS6



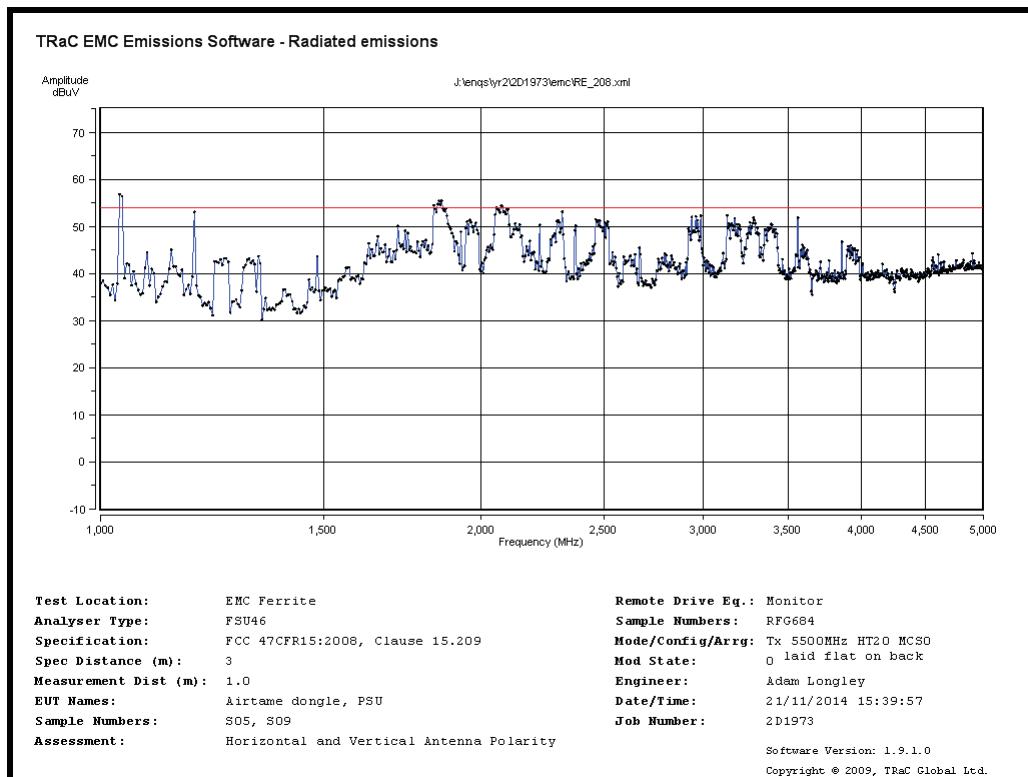
Radiated Spurious emissions 33GHz to 40GHz – 5500MHz MCS6



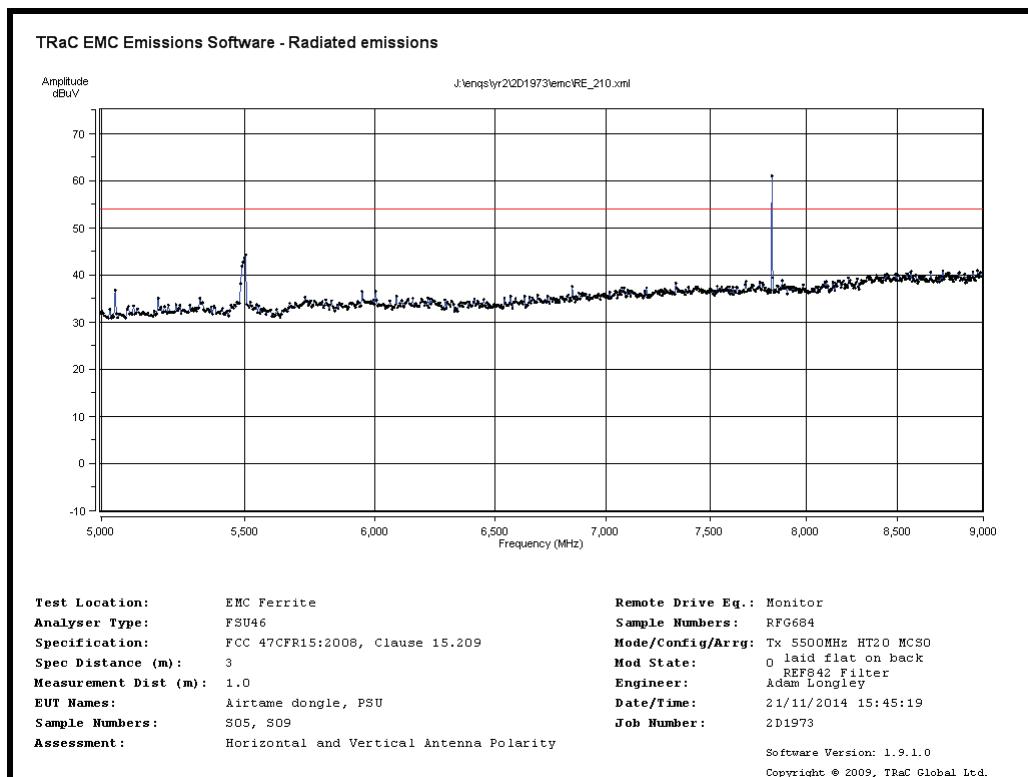
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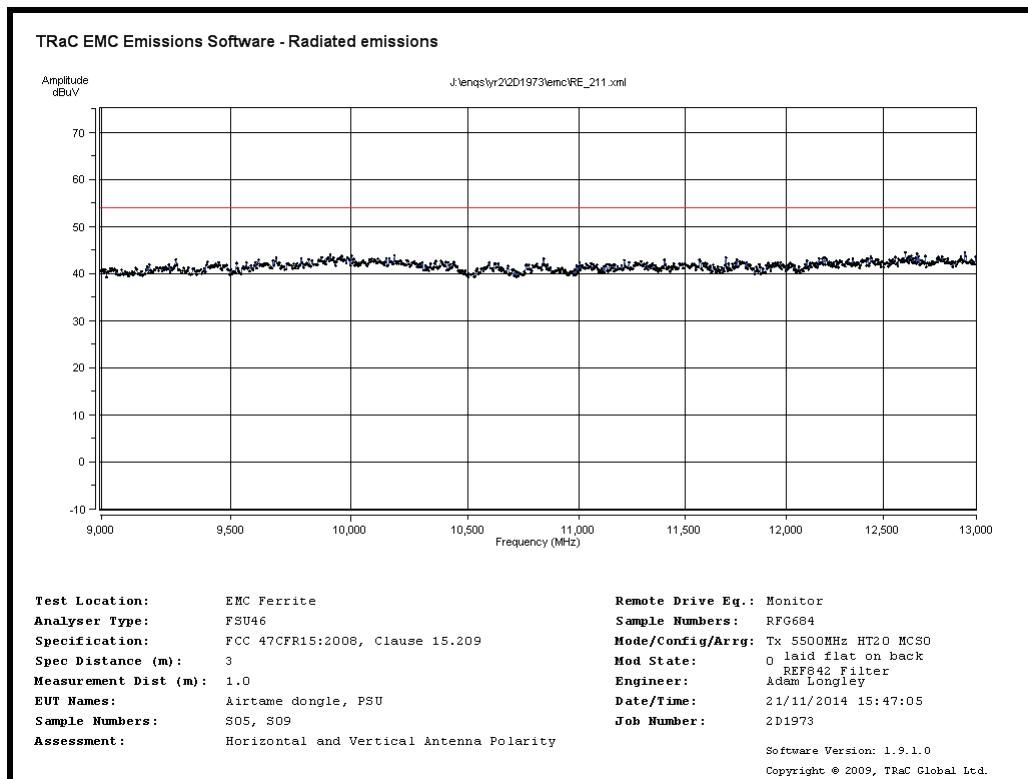
### Radiated Spurious emissions 200MHz to 1GHz – 5500MHz MCS0



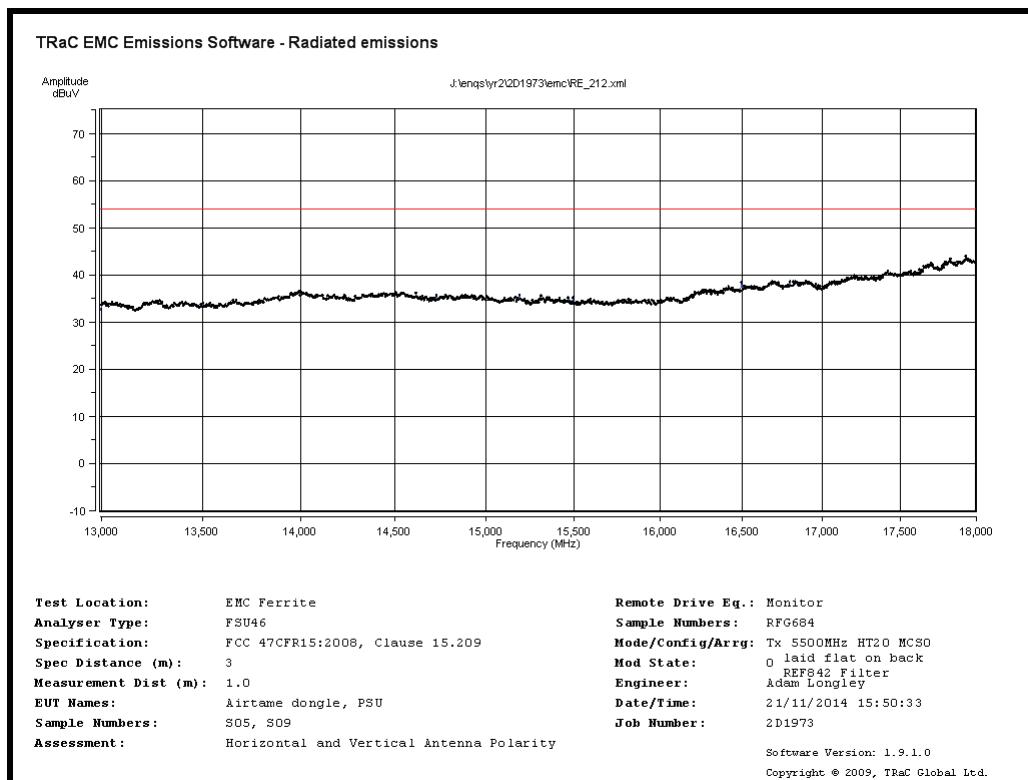
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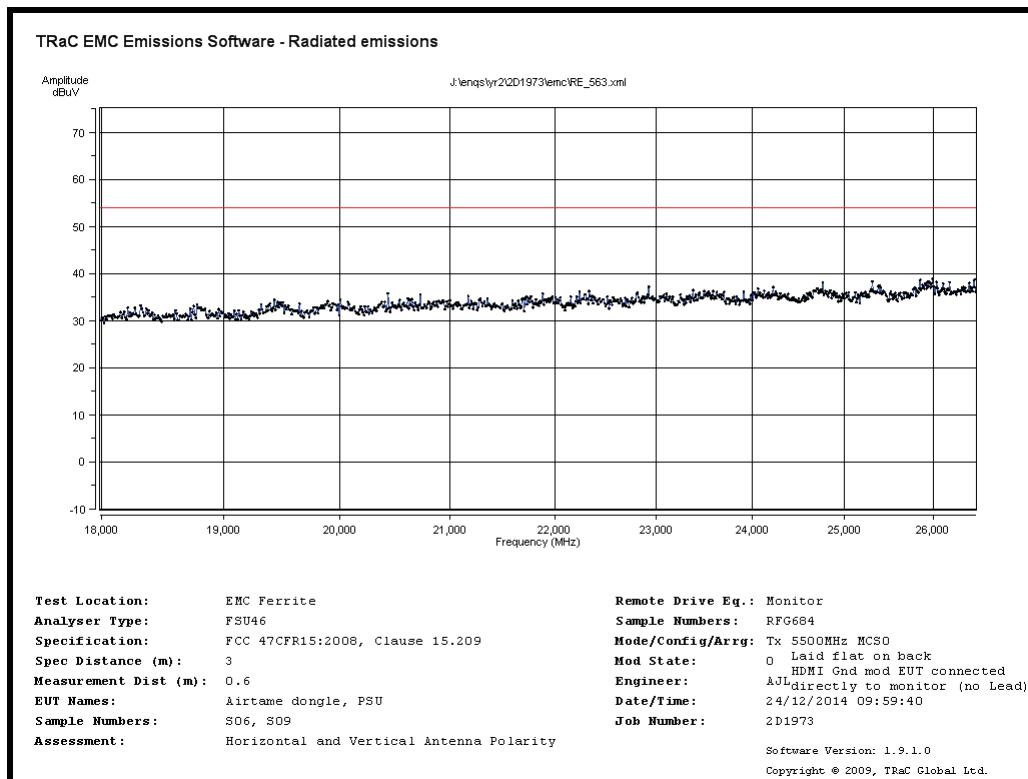
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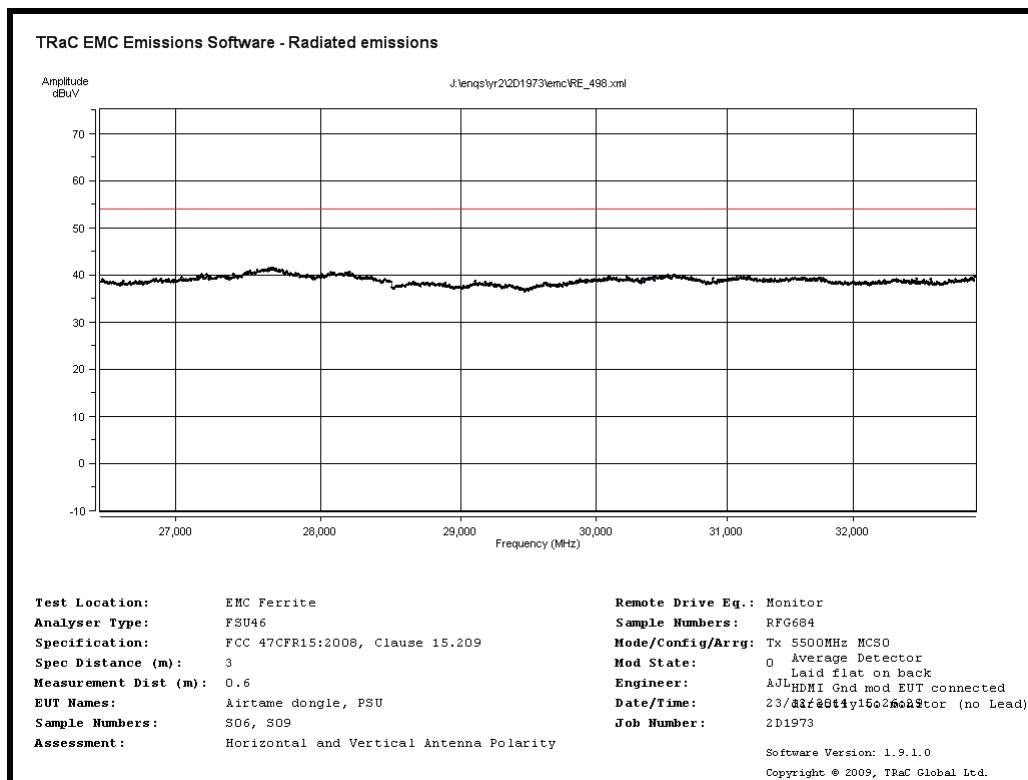
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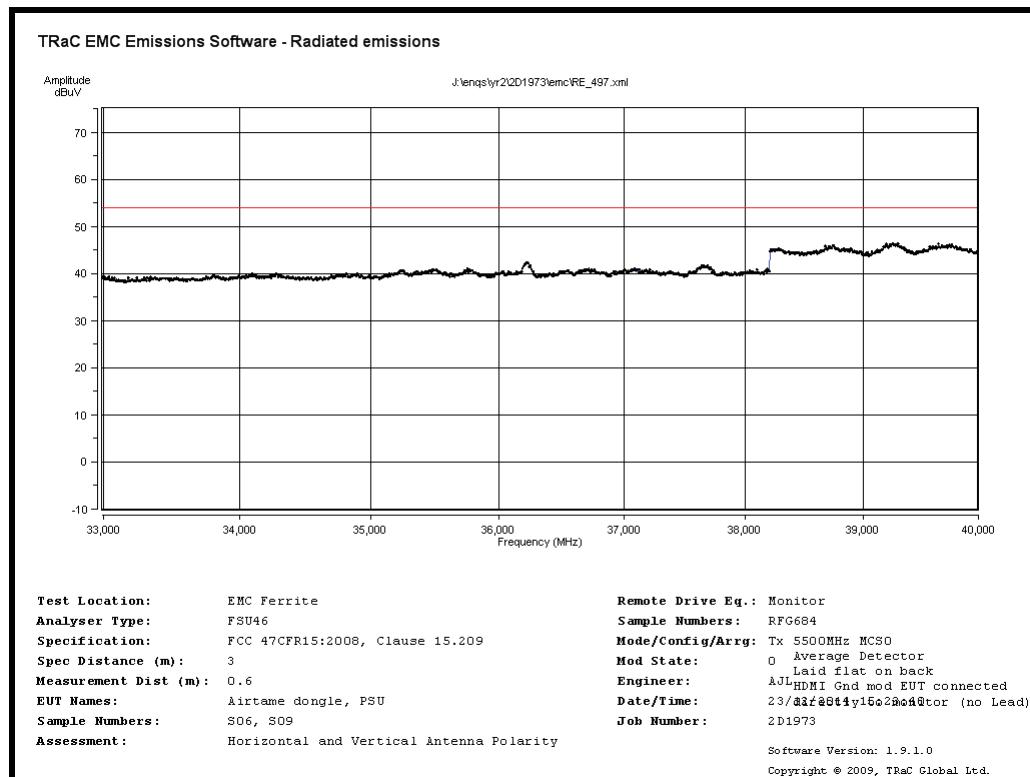
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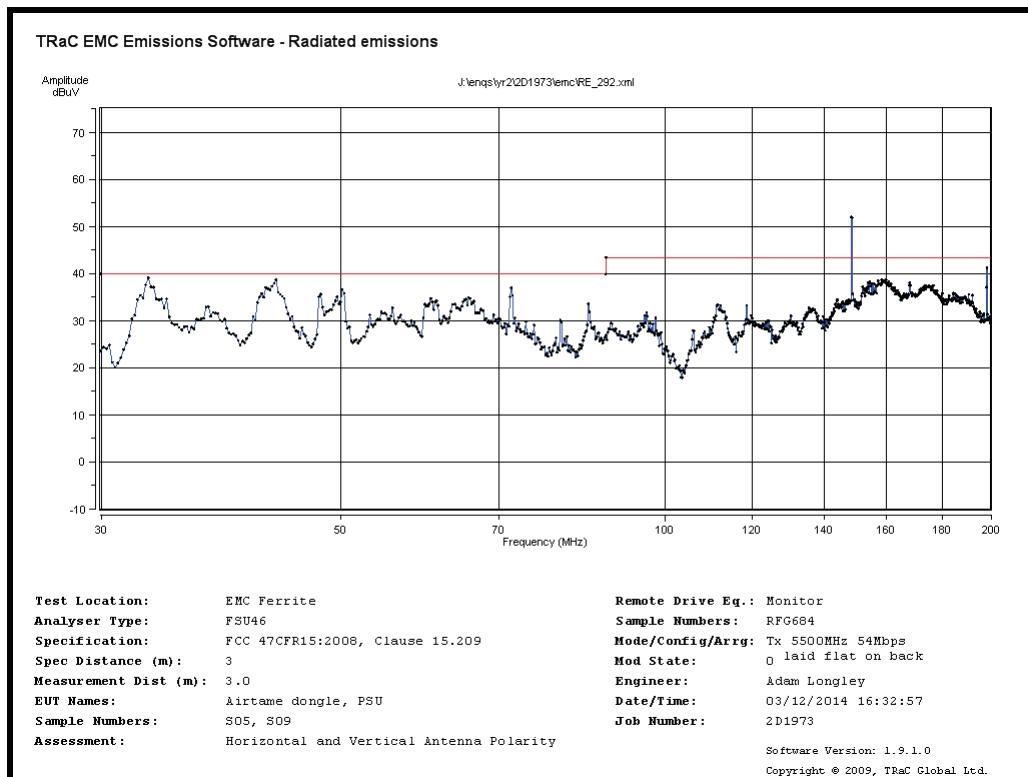
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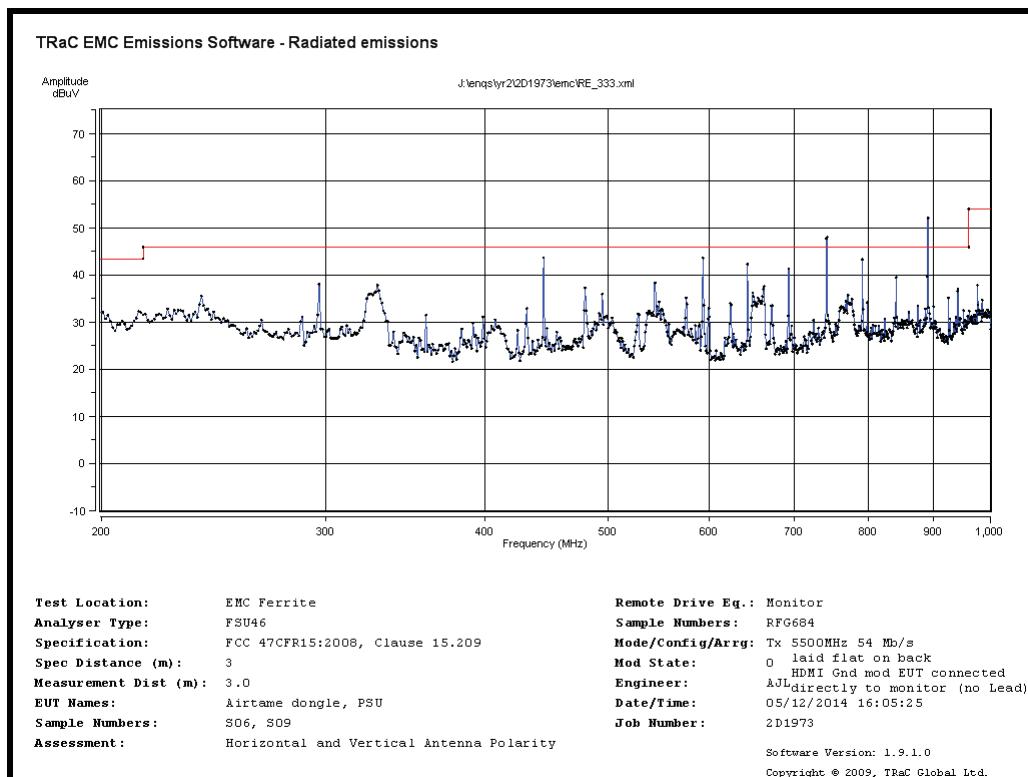
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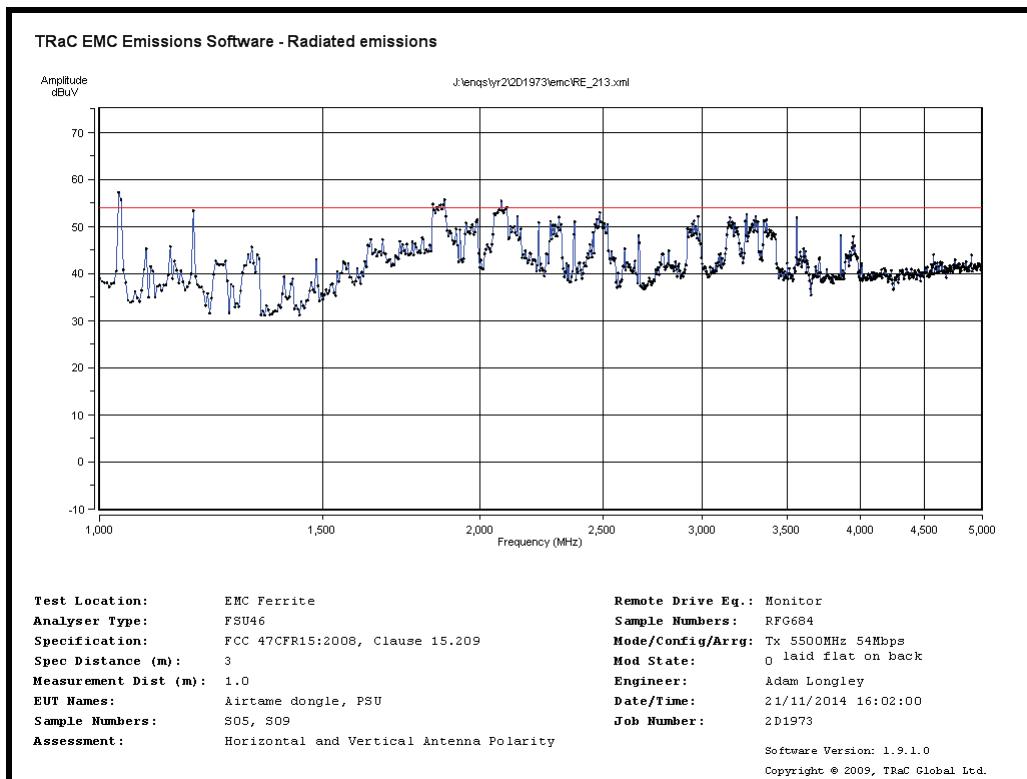
Radiated Spurious emissions 33GHz to 40GHz – 5500MHz MCS0



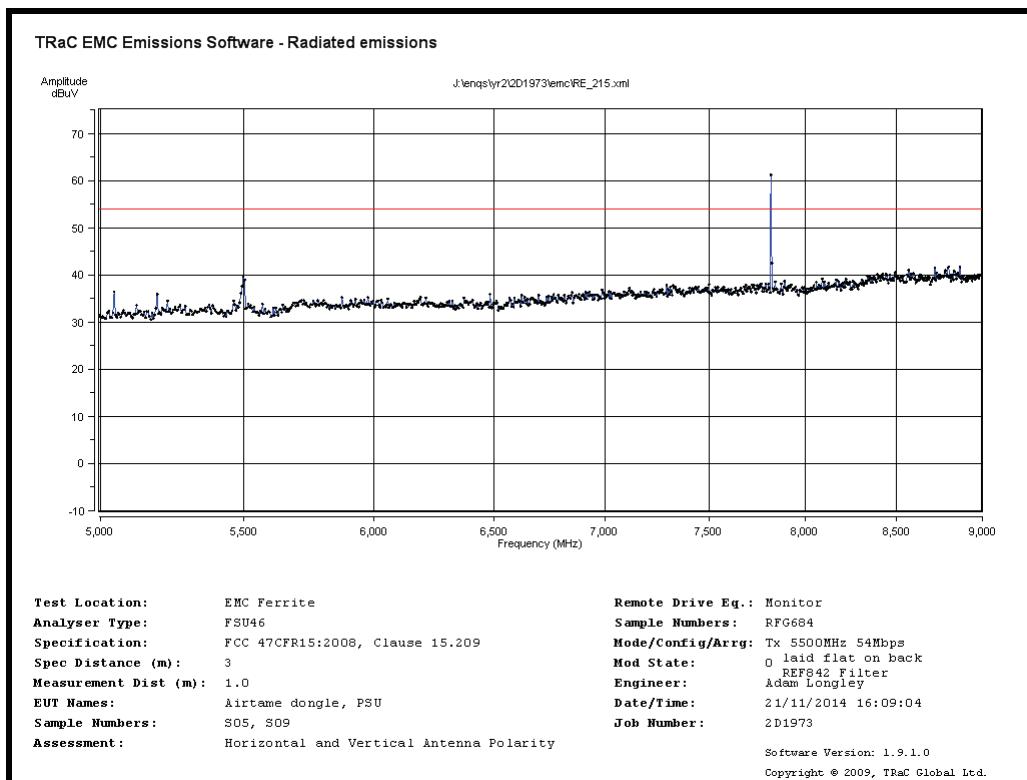
### Radiated Spurious emissions 30MHz to 200MHz – 5500MHz 54Mb/s



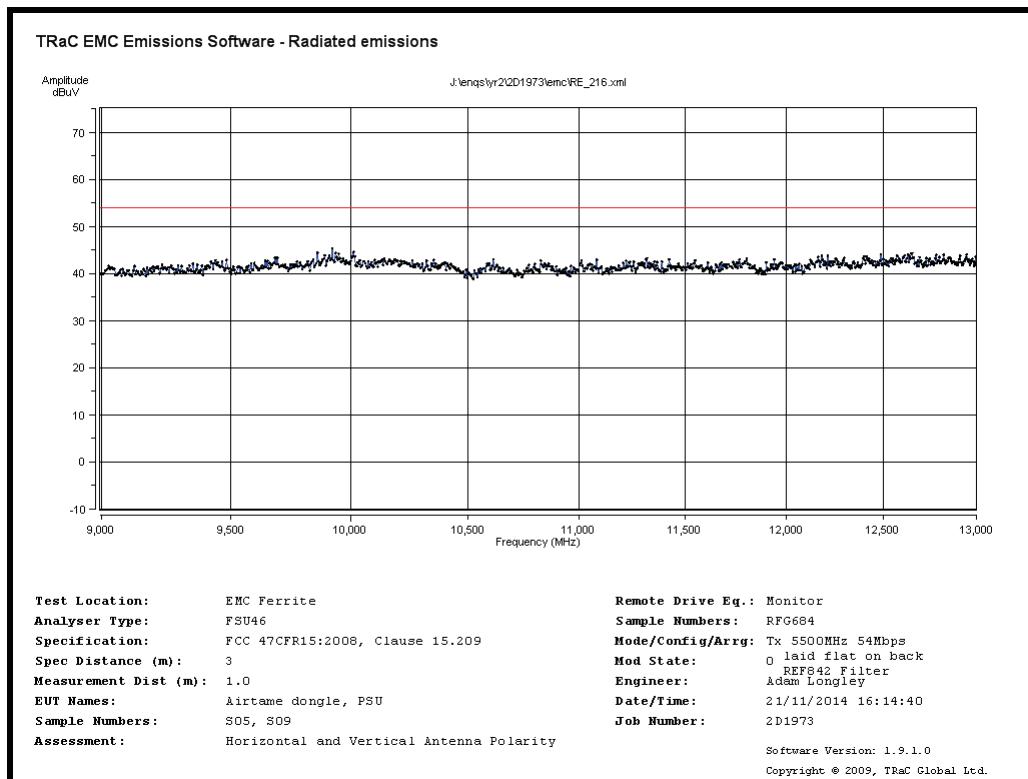
### Radiated Spurious emissions 200MHz to 1GHz – 5500MHz 54Mb/s



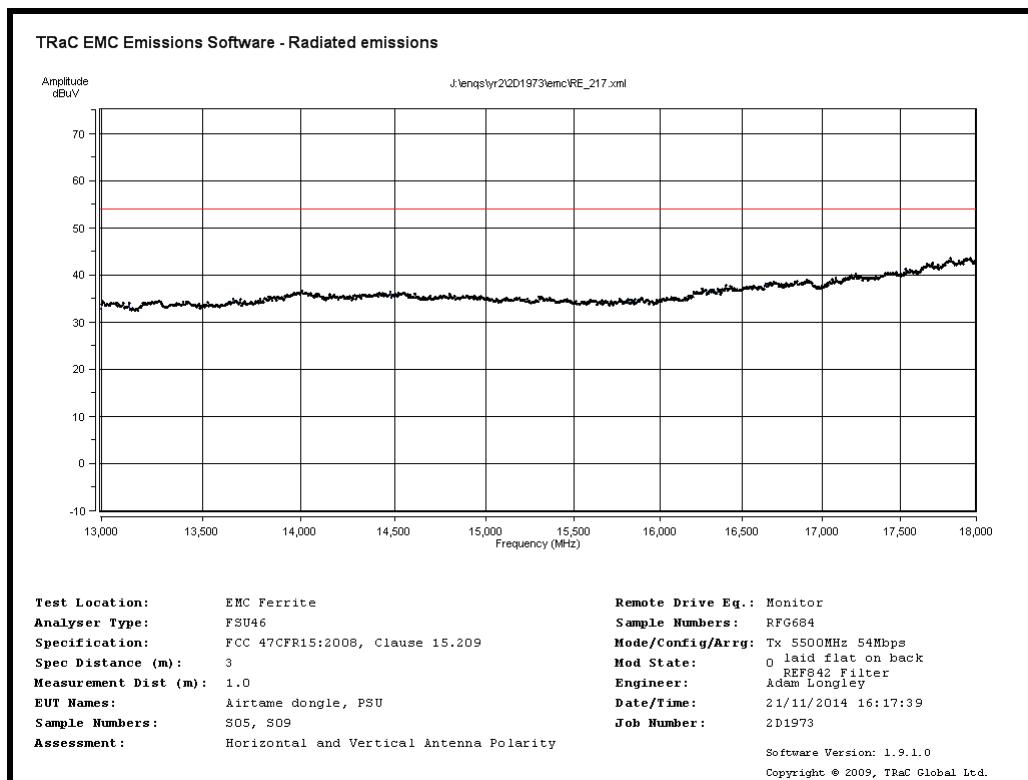
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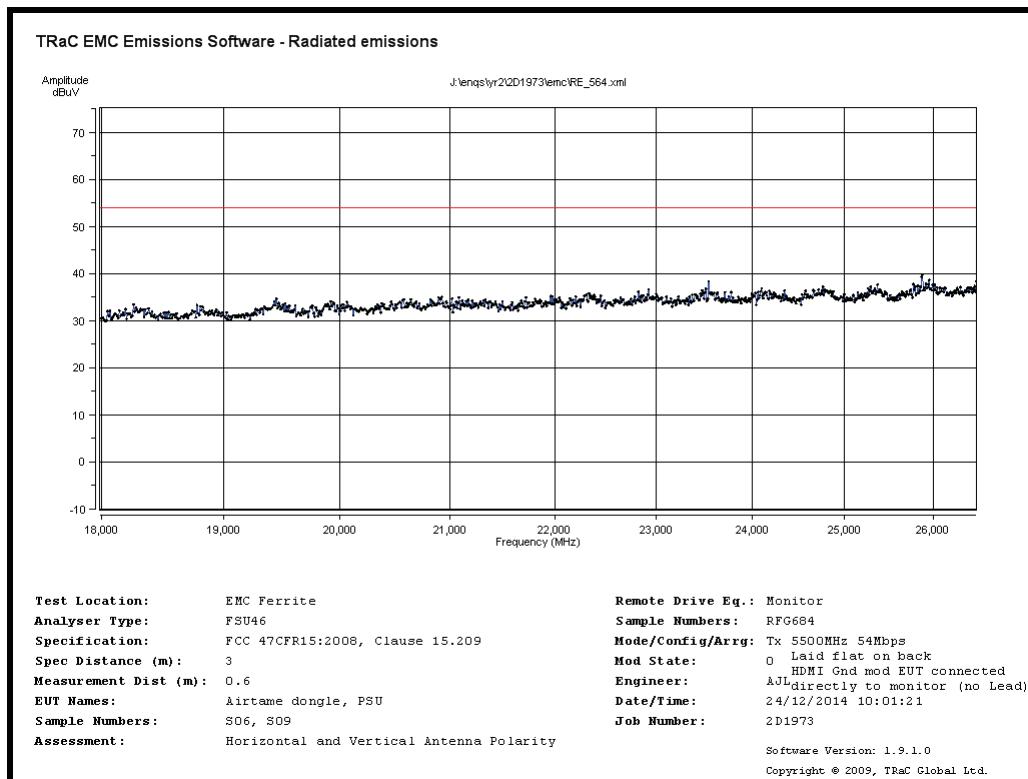
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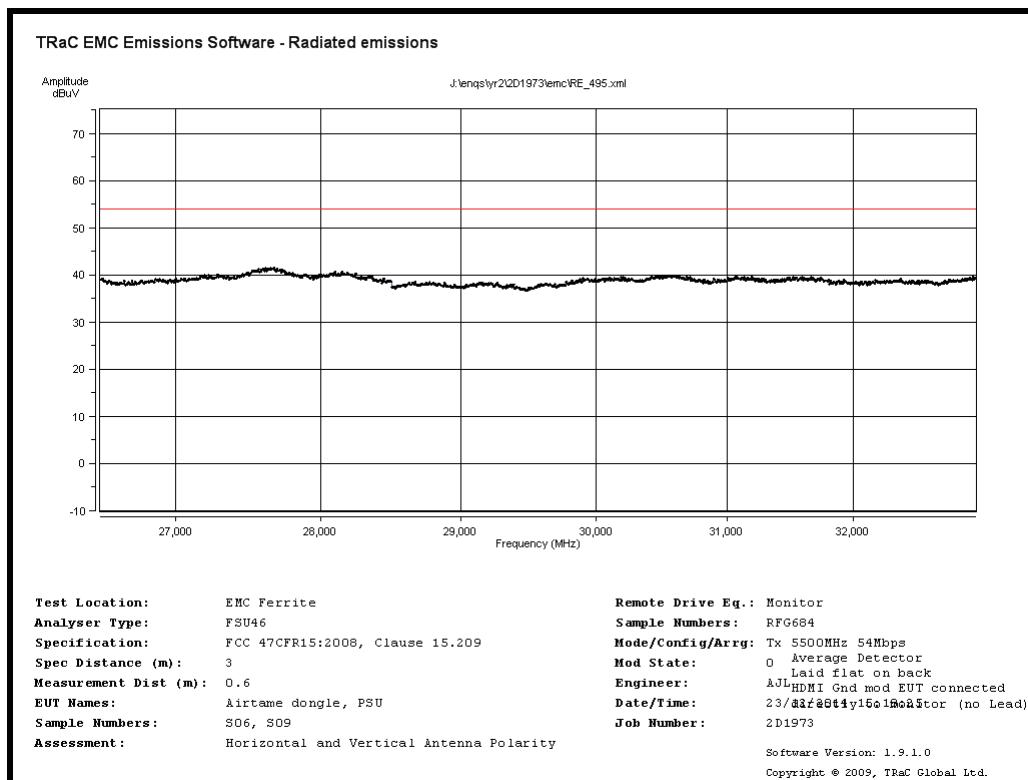
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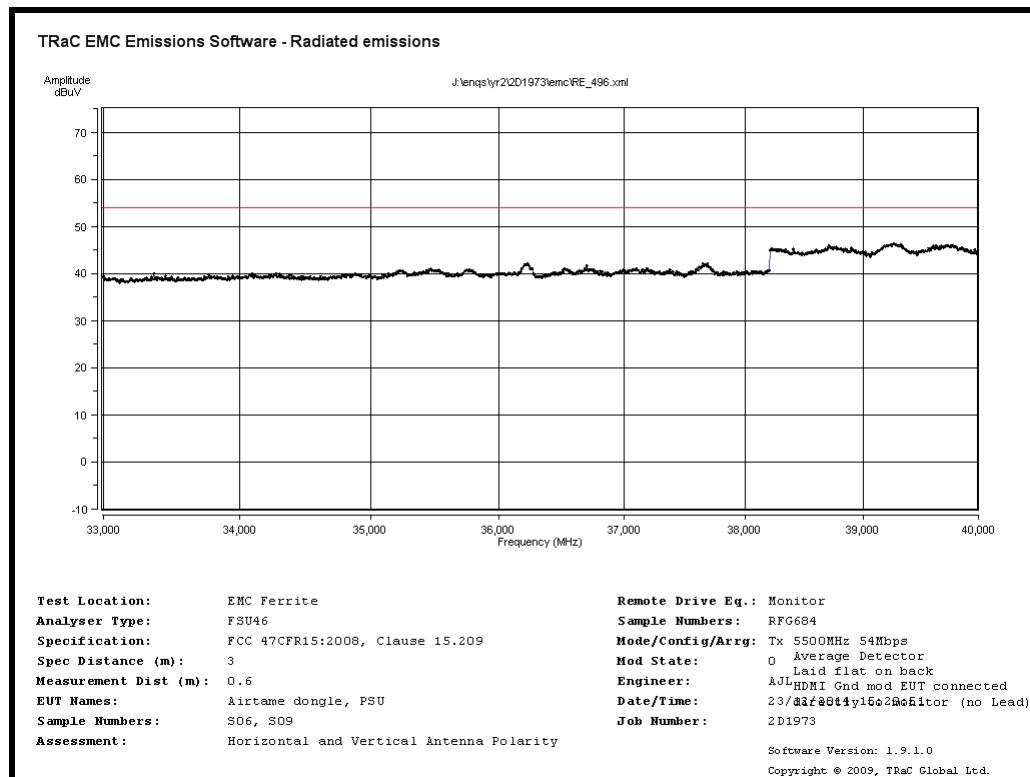
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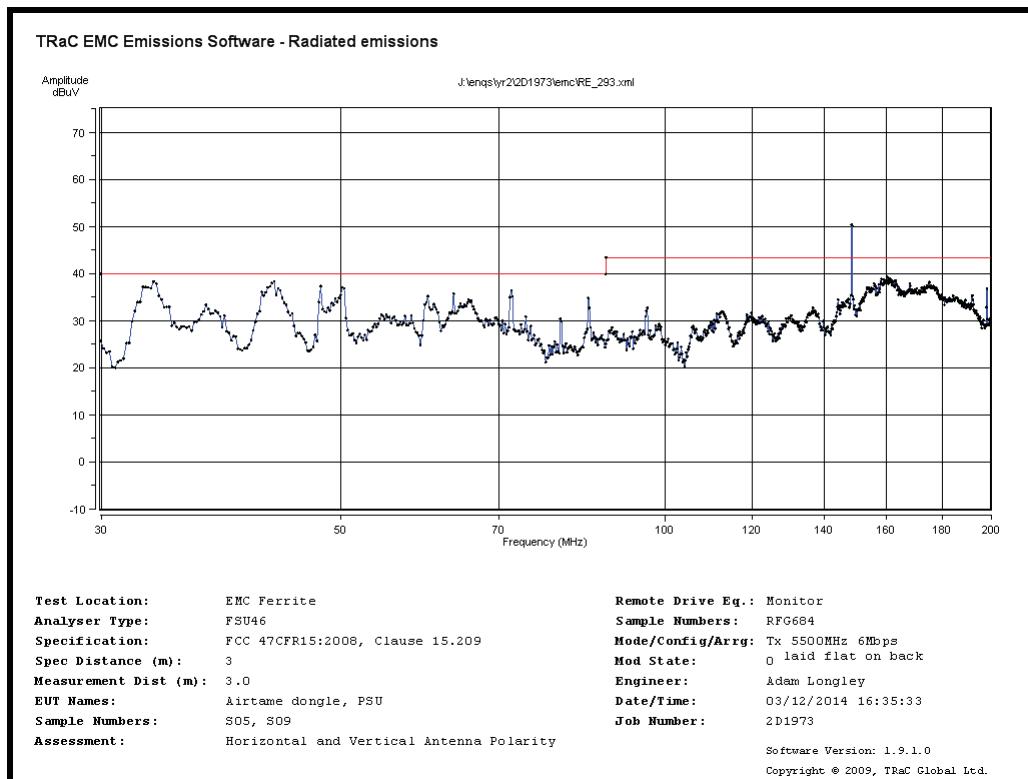
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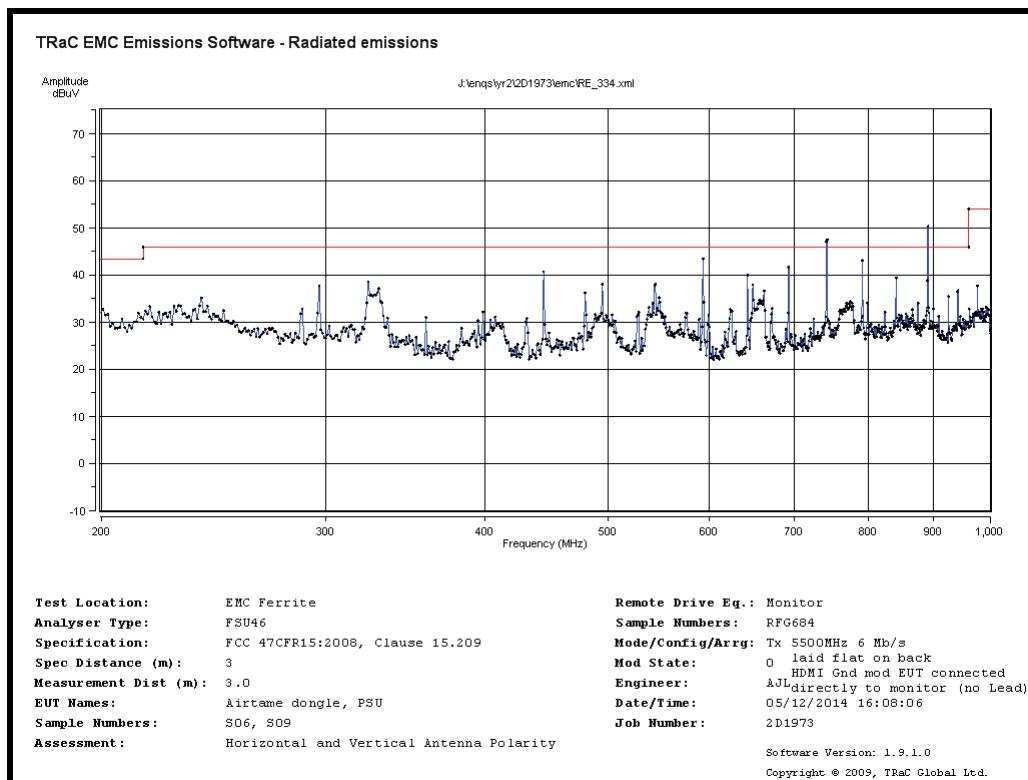
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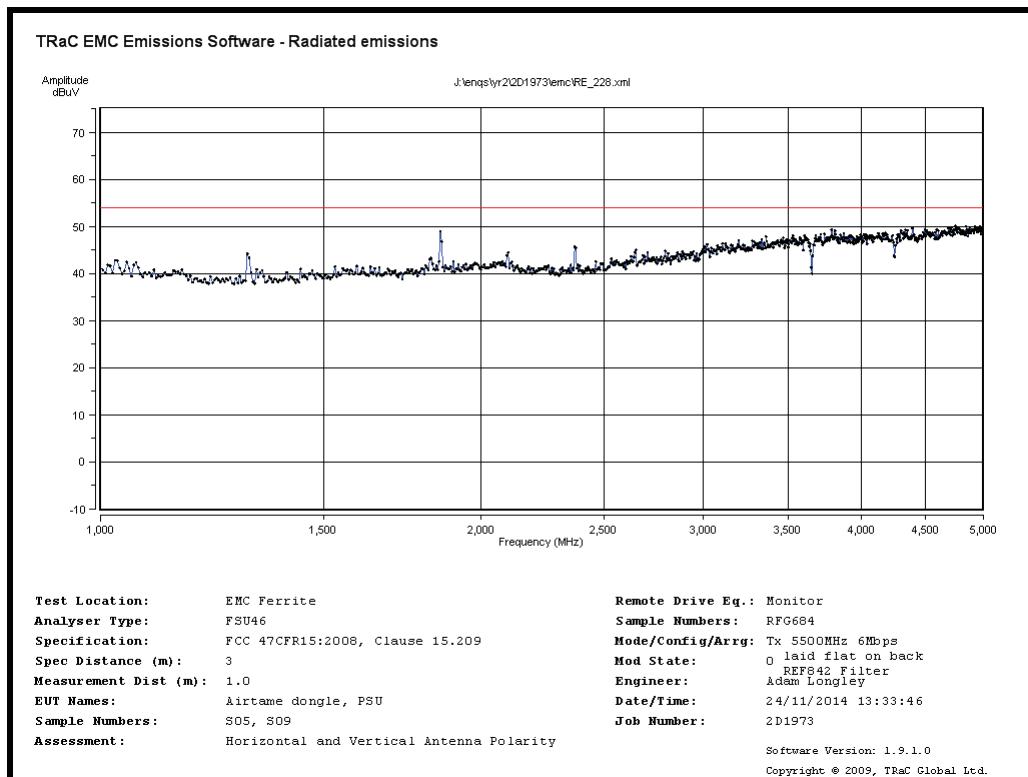
Radiated Spurious emissions 33GHz to 40GHz – 5500MHz 54Mb/s



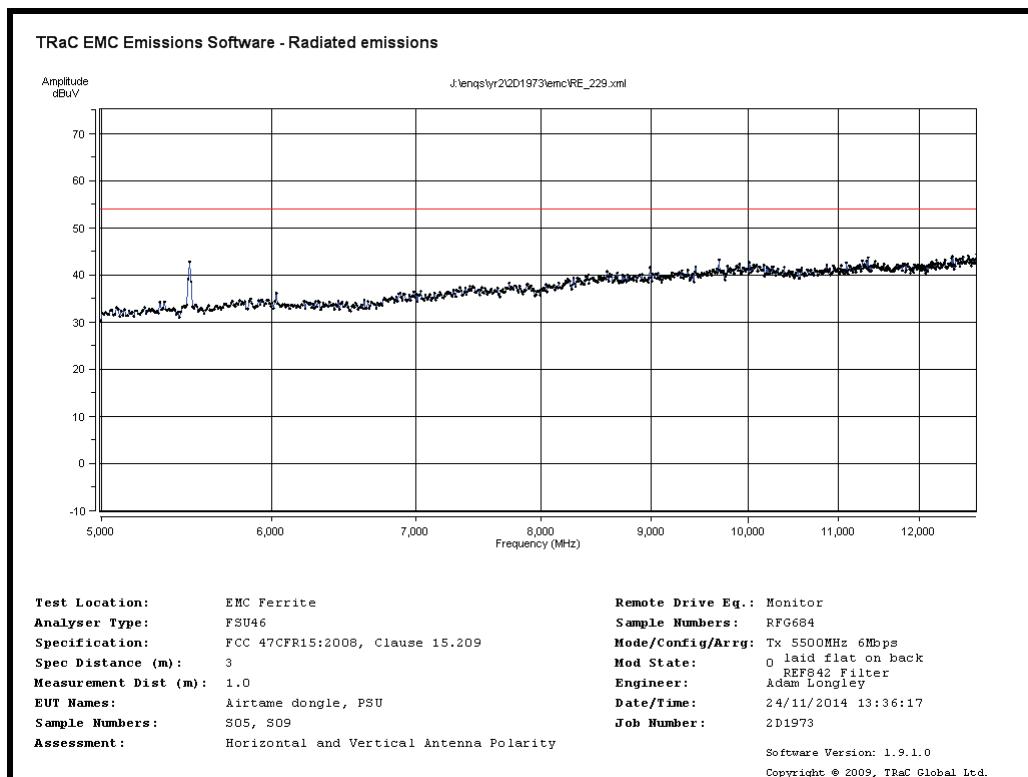
Radiated Spurious emissions 30MHz to 200MHz – 5500MHz 6Mb/s



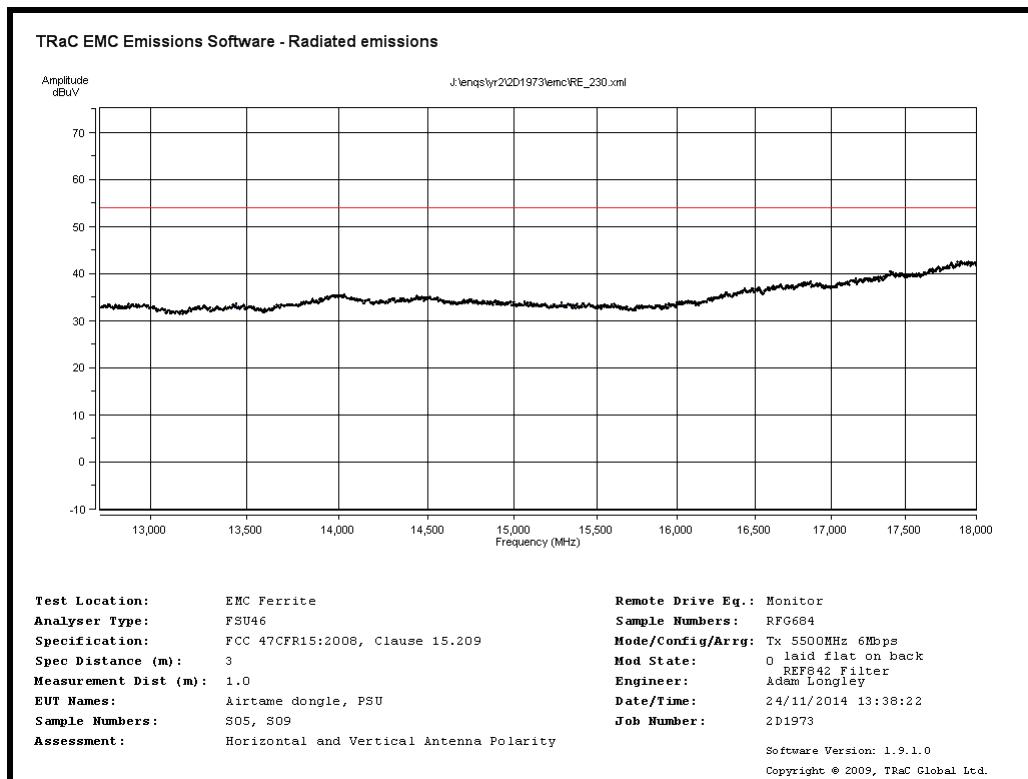
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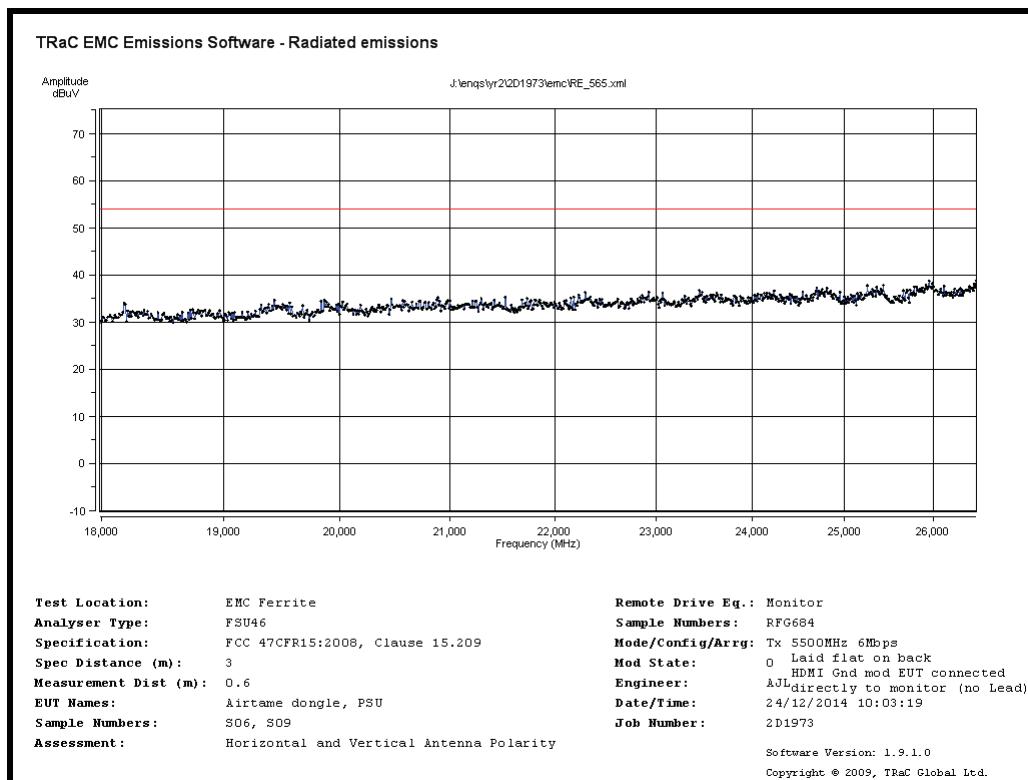
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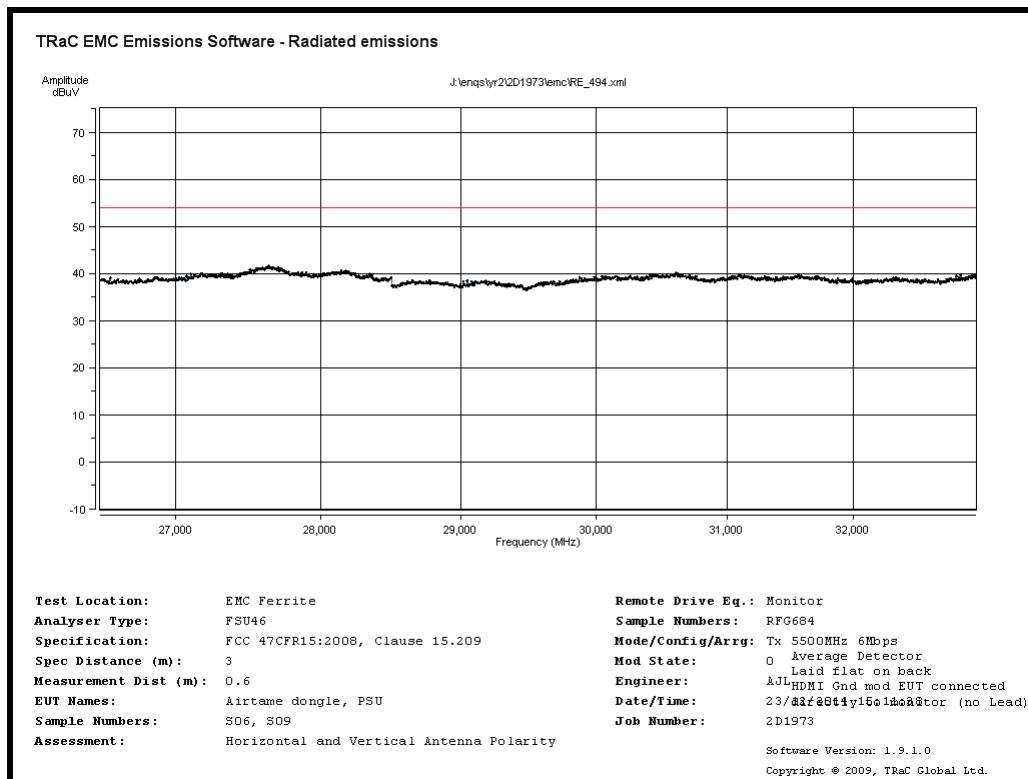
### Radiated Spurious emissions 5GHz to 12.5GHz – 5500MHz 6Mb/s



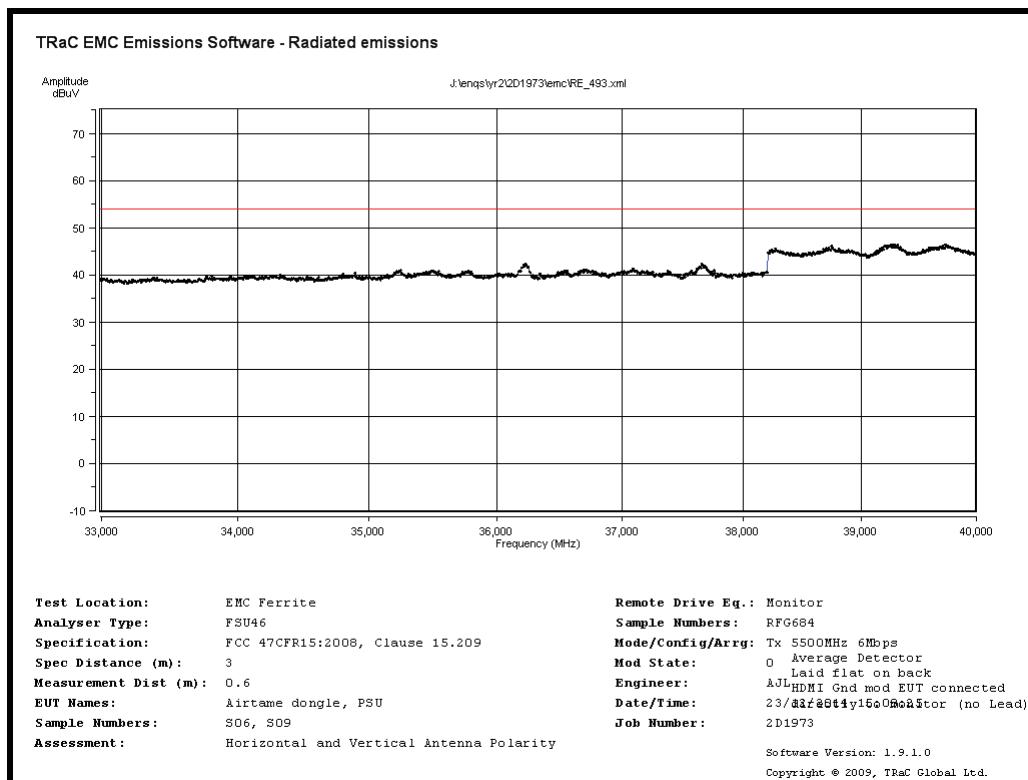
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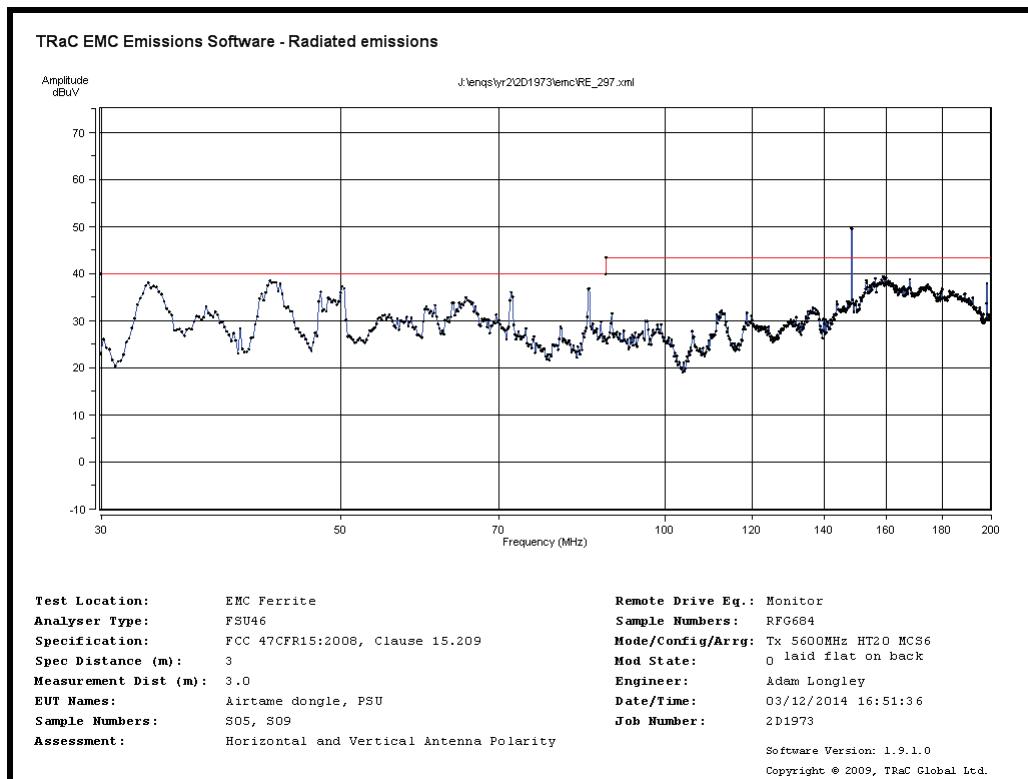
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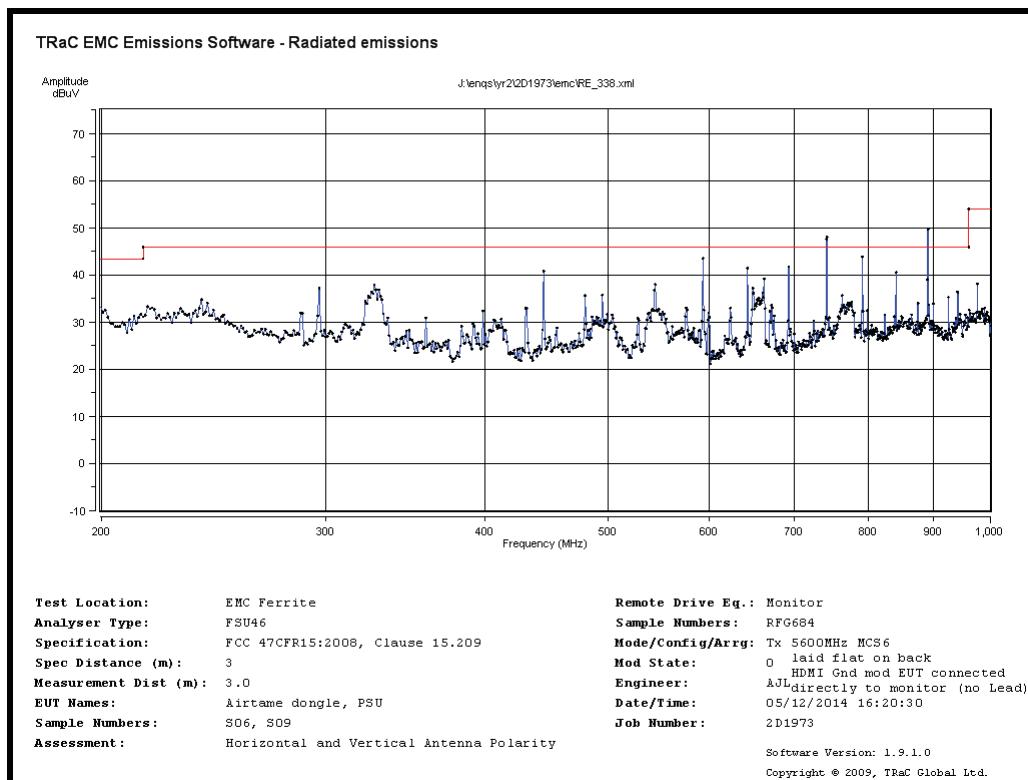
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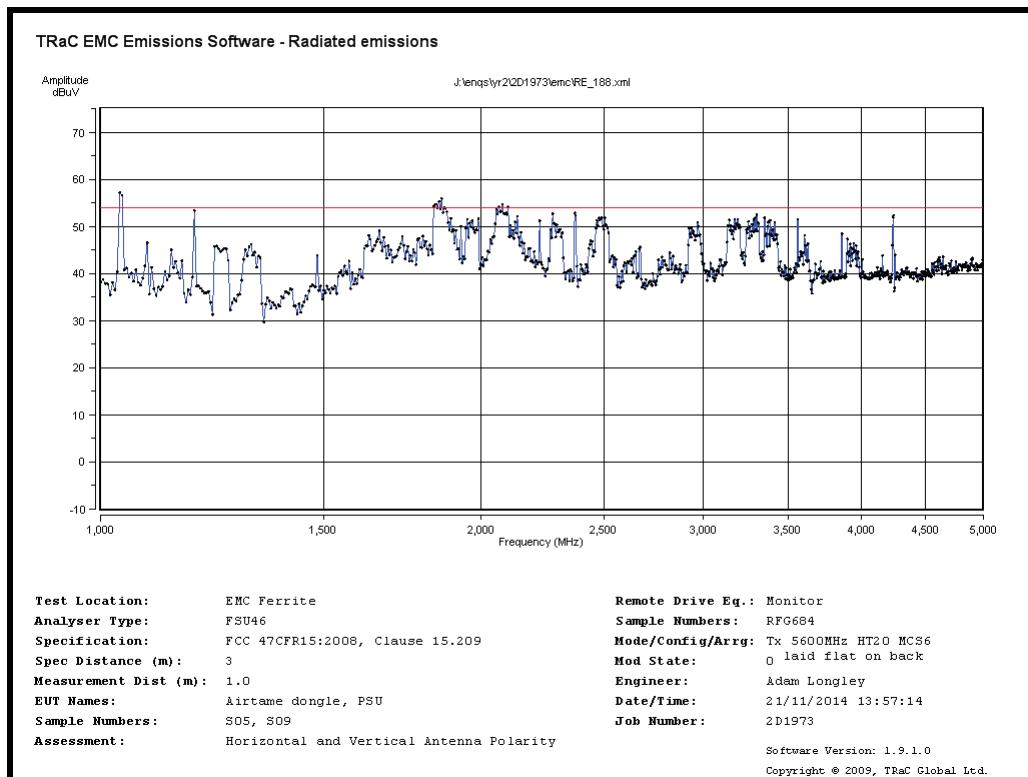
### Radiated Spurious emissions 33GHz to 40GHz – 5500MHz 6Mb/s



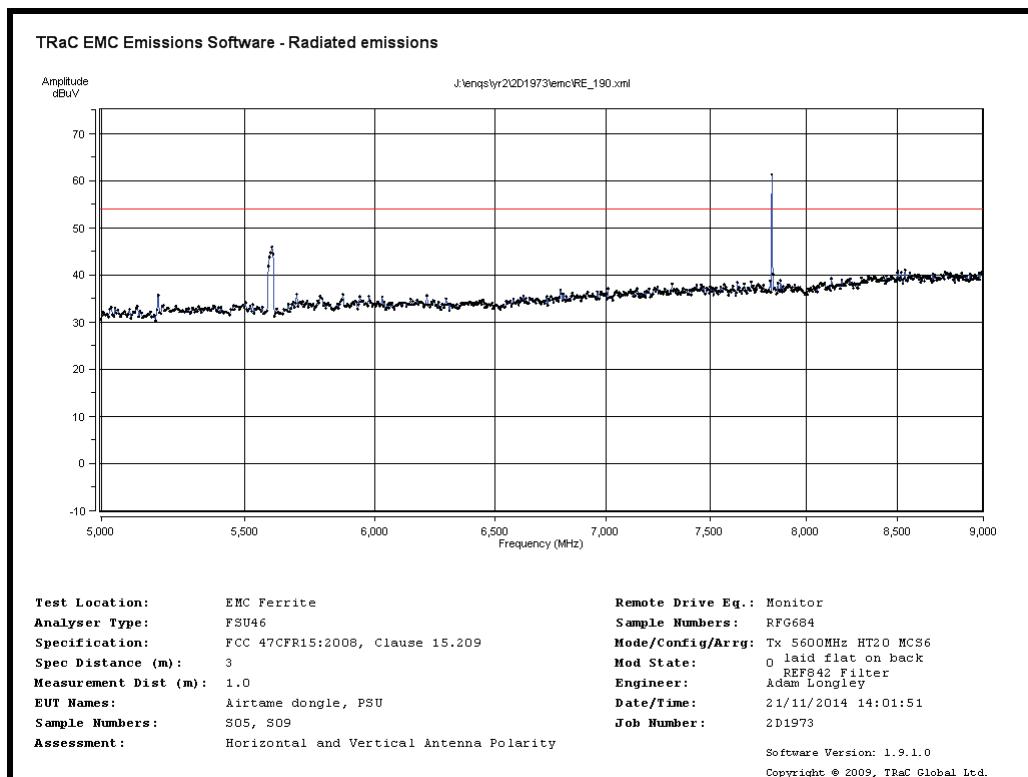
### Radiated Spurious emissions 30MHz to 200MHz – 5600MHz MCS6



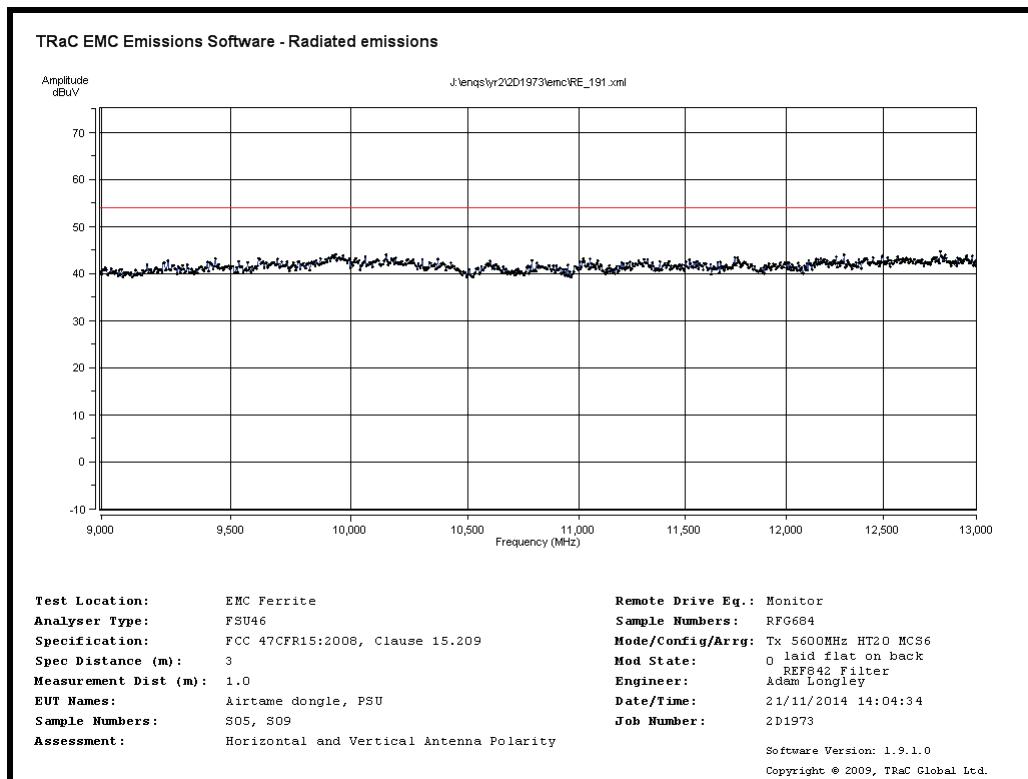
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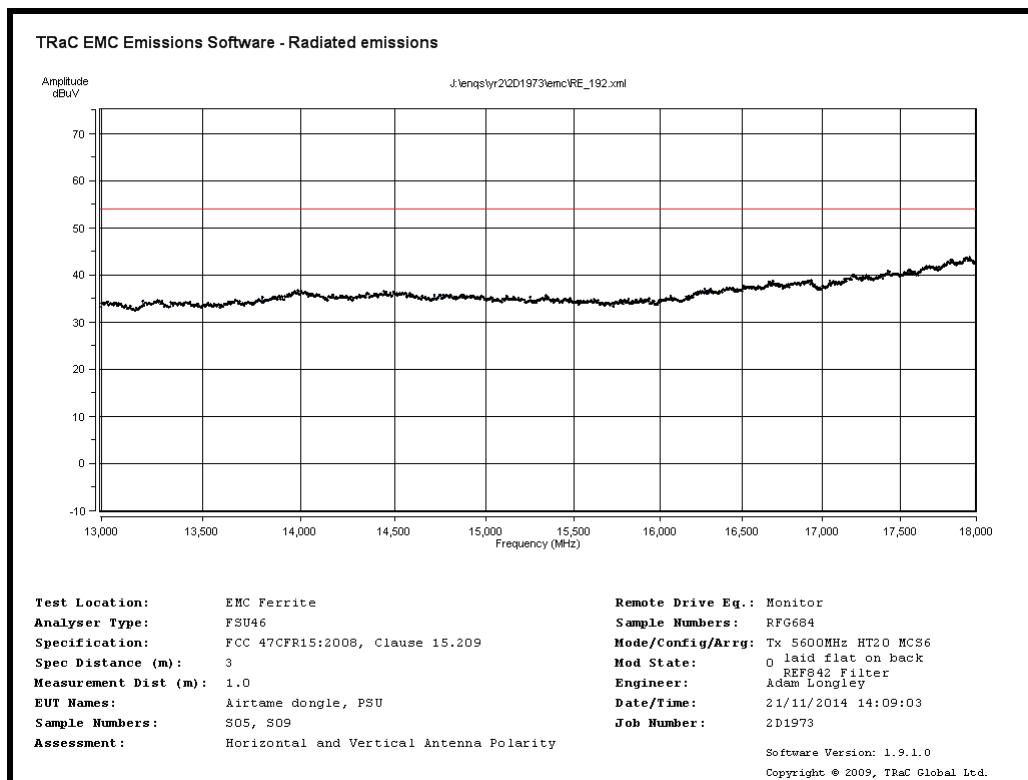
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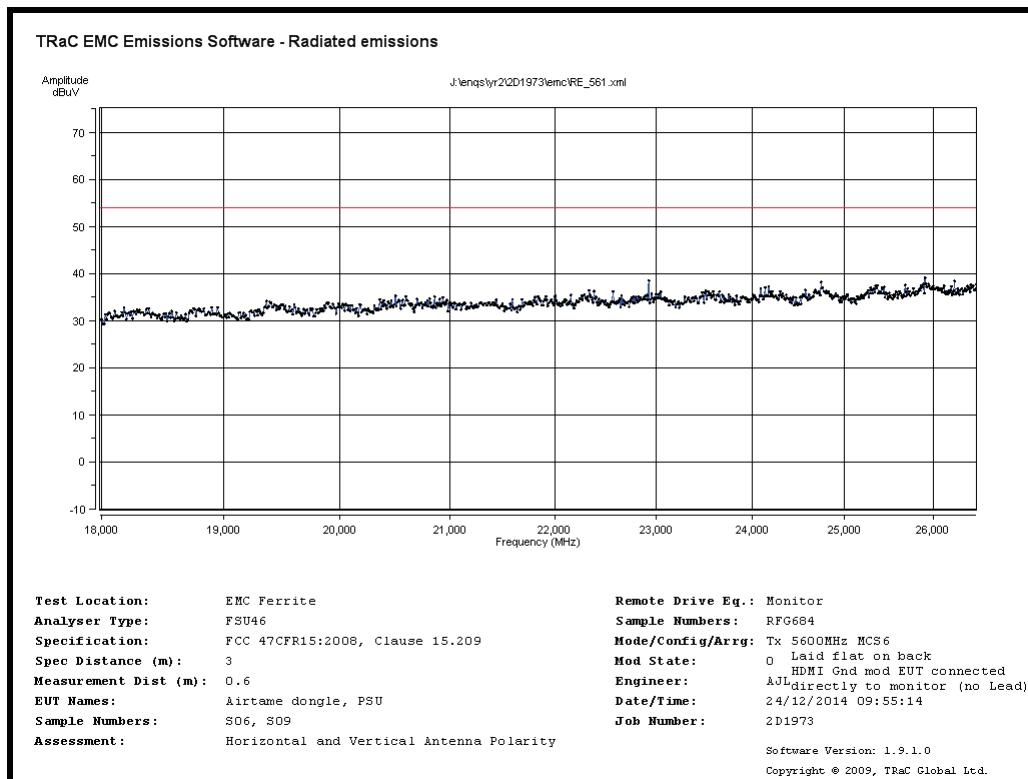
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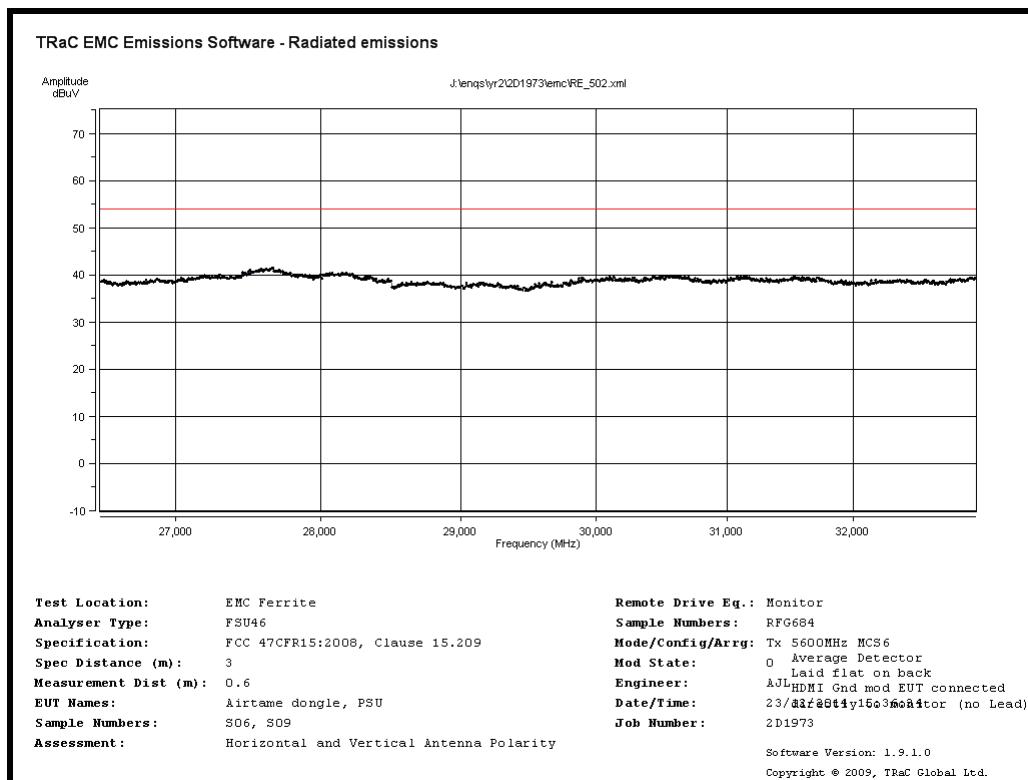
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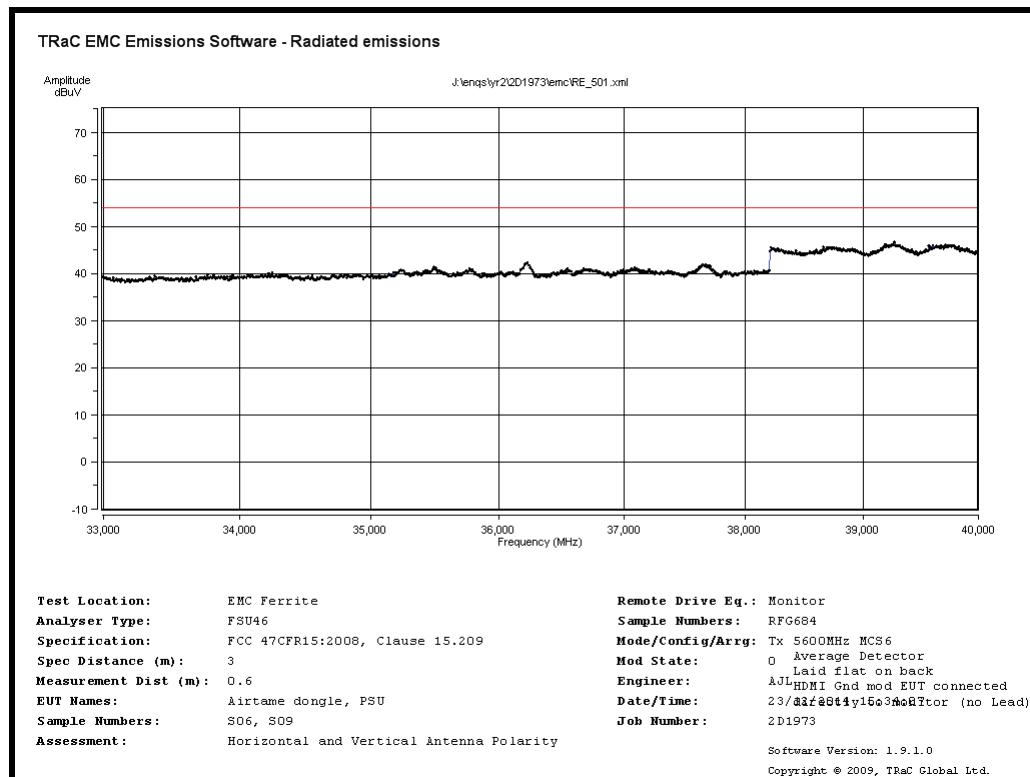
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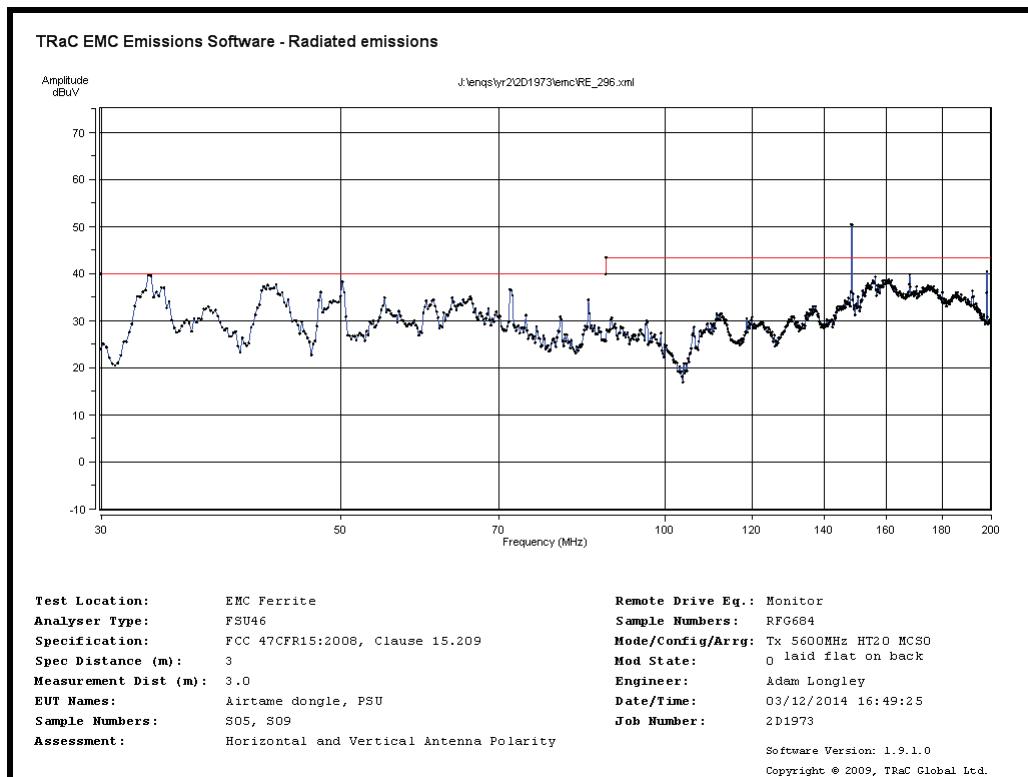
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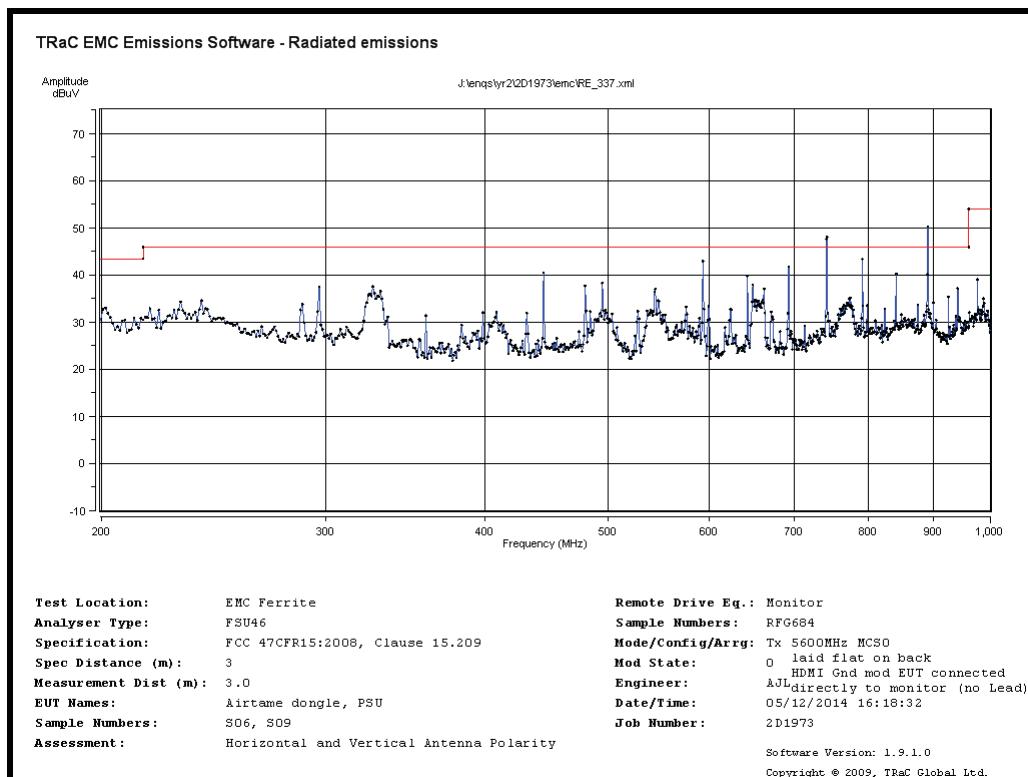
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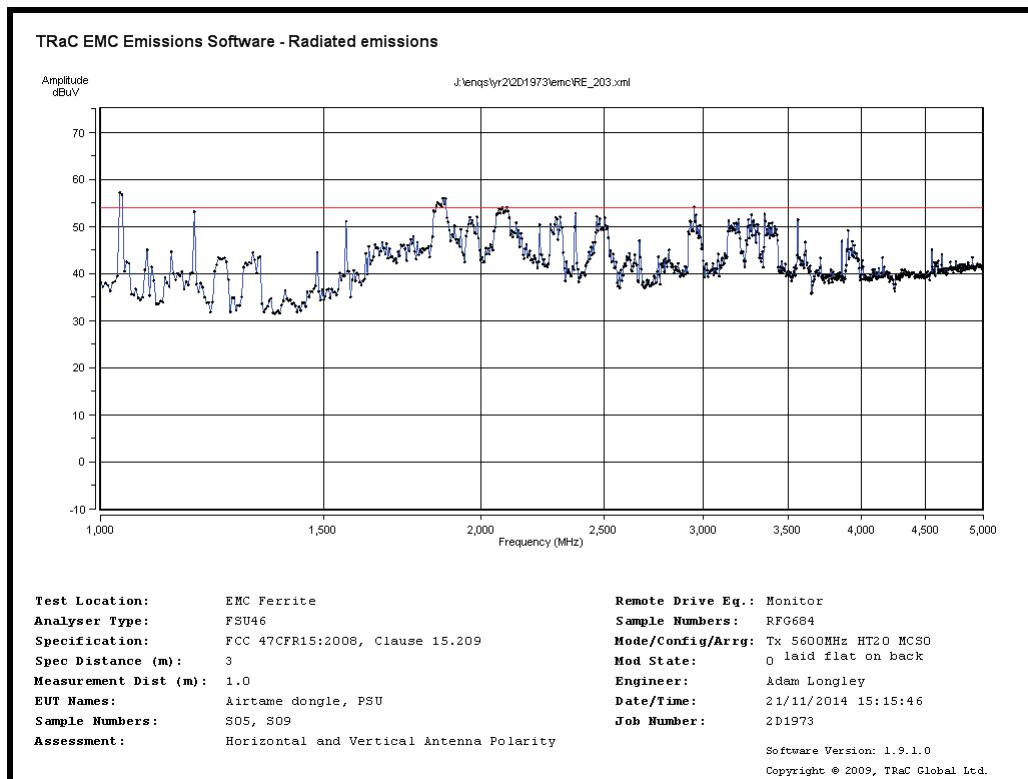
Radiated Spurious emissions 33GHz to 40GHz – 5600MHz MCS6



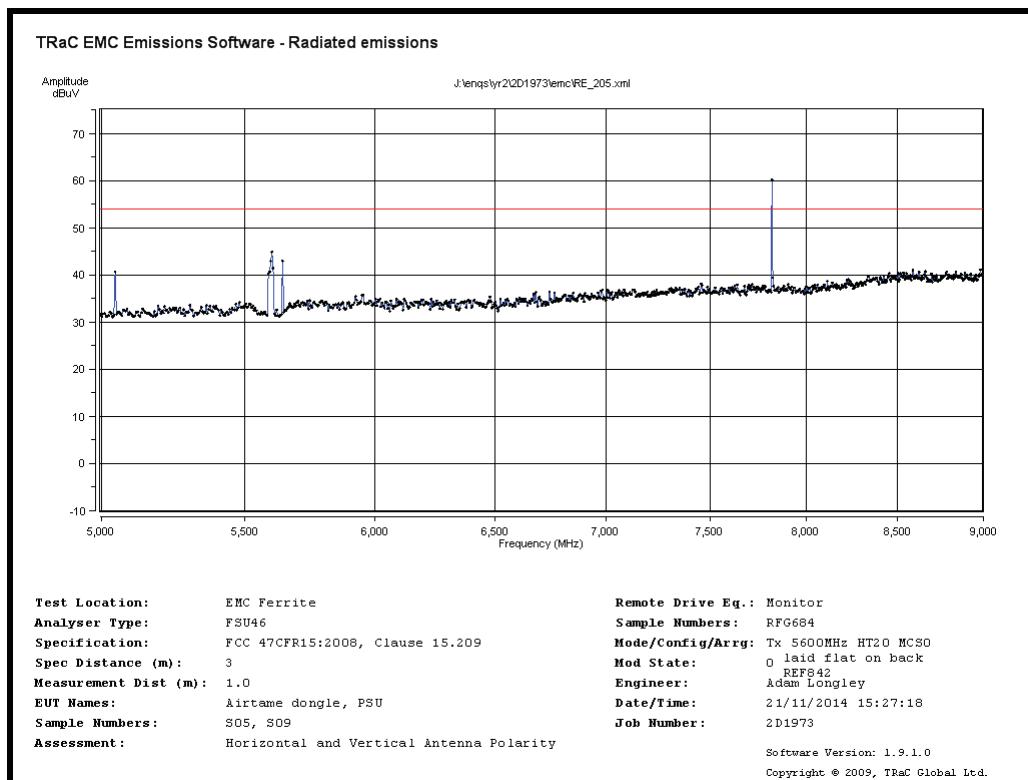
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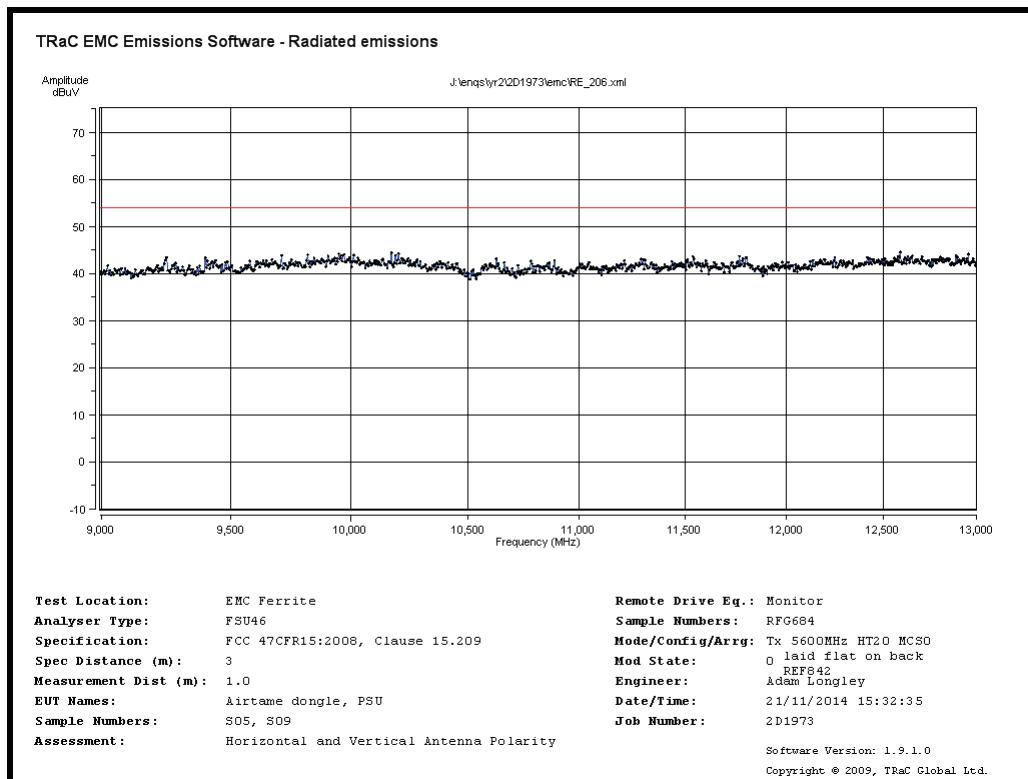
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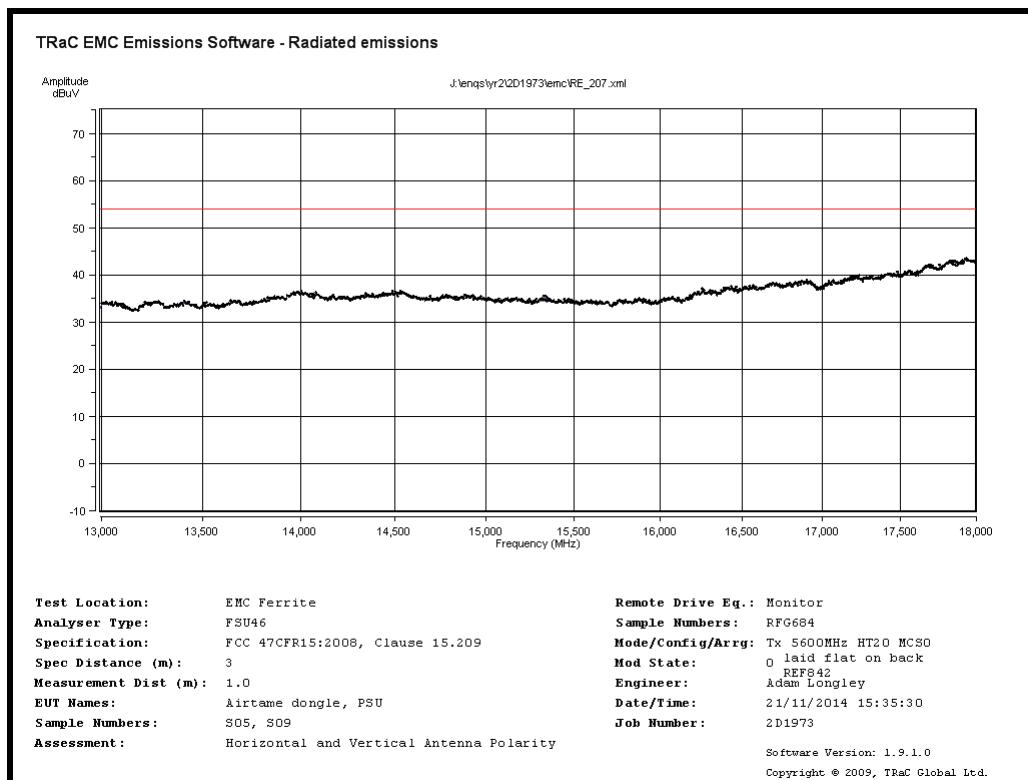
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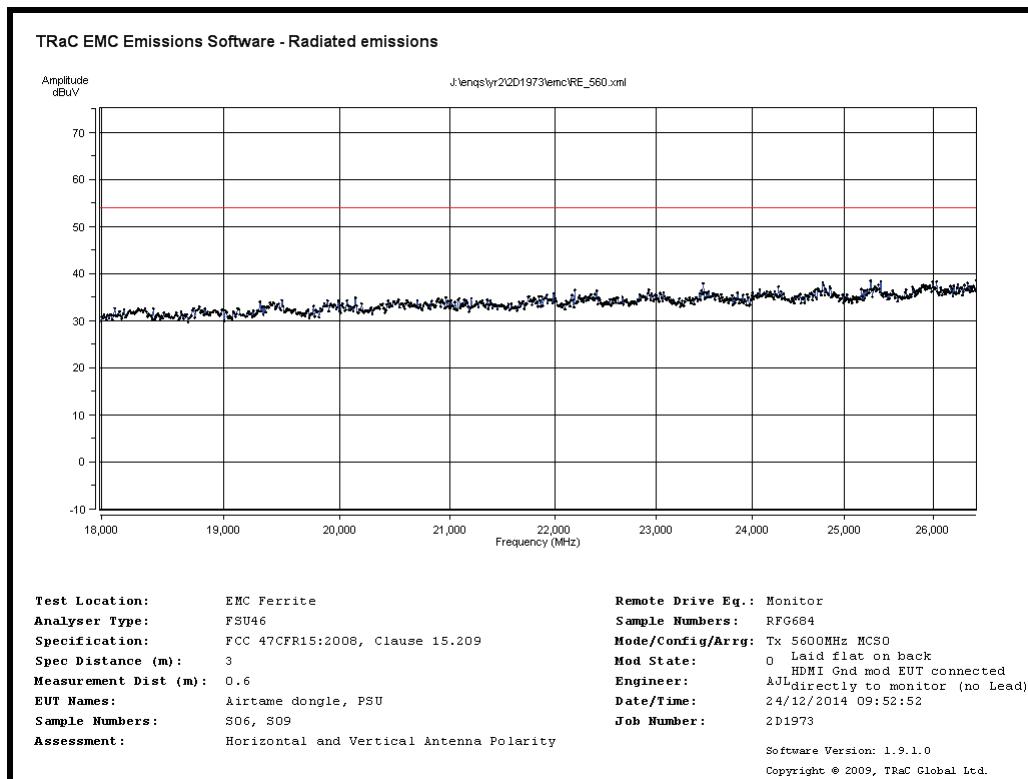
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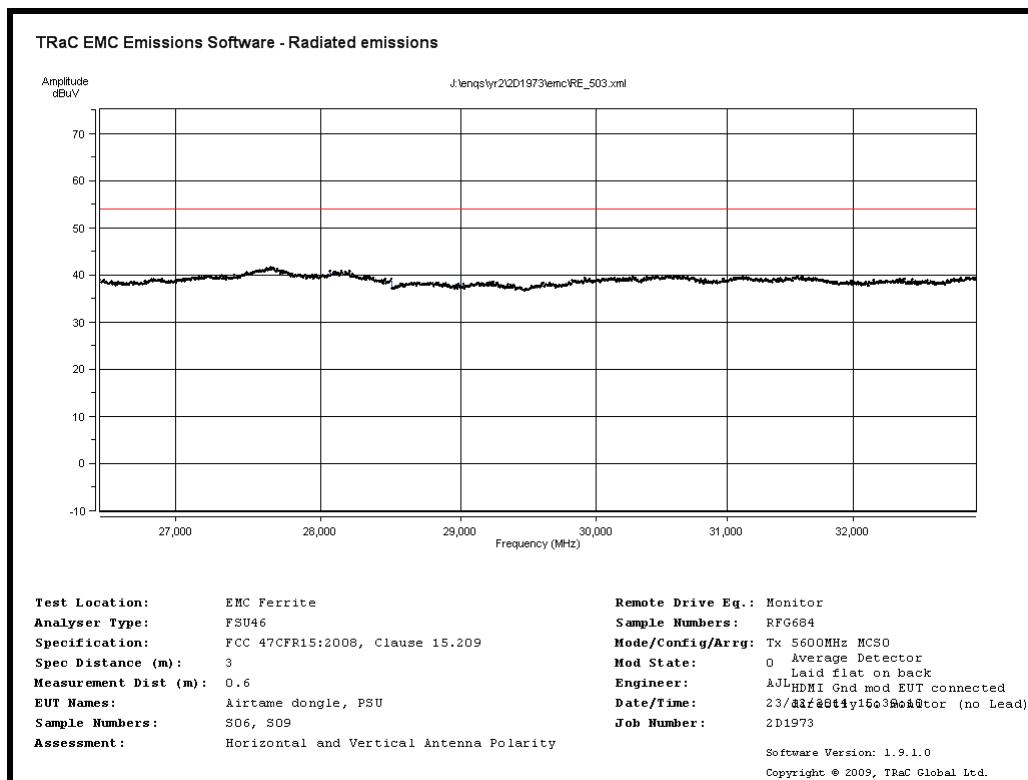
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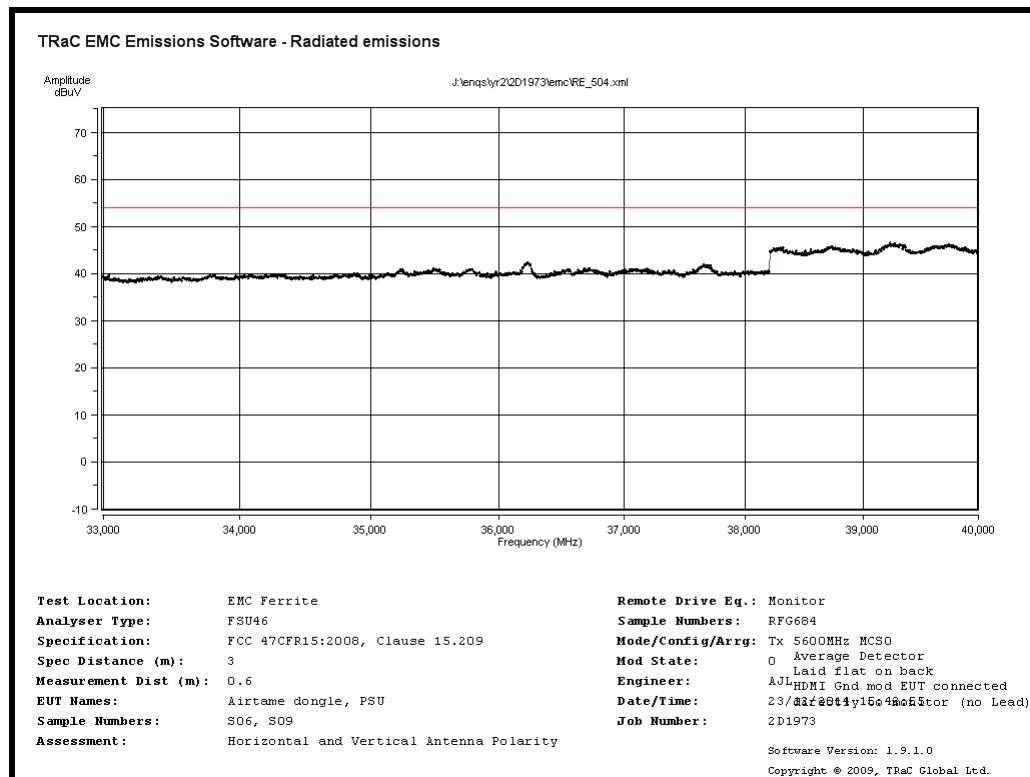
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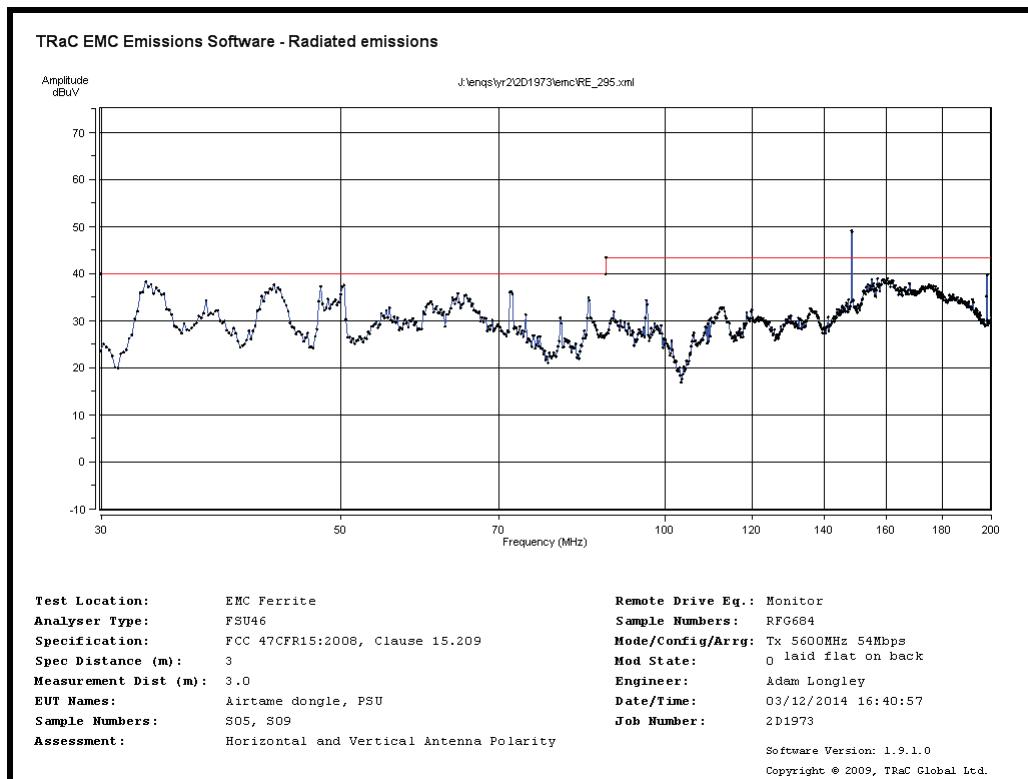
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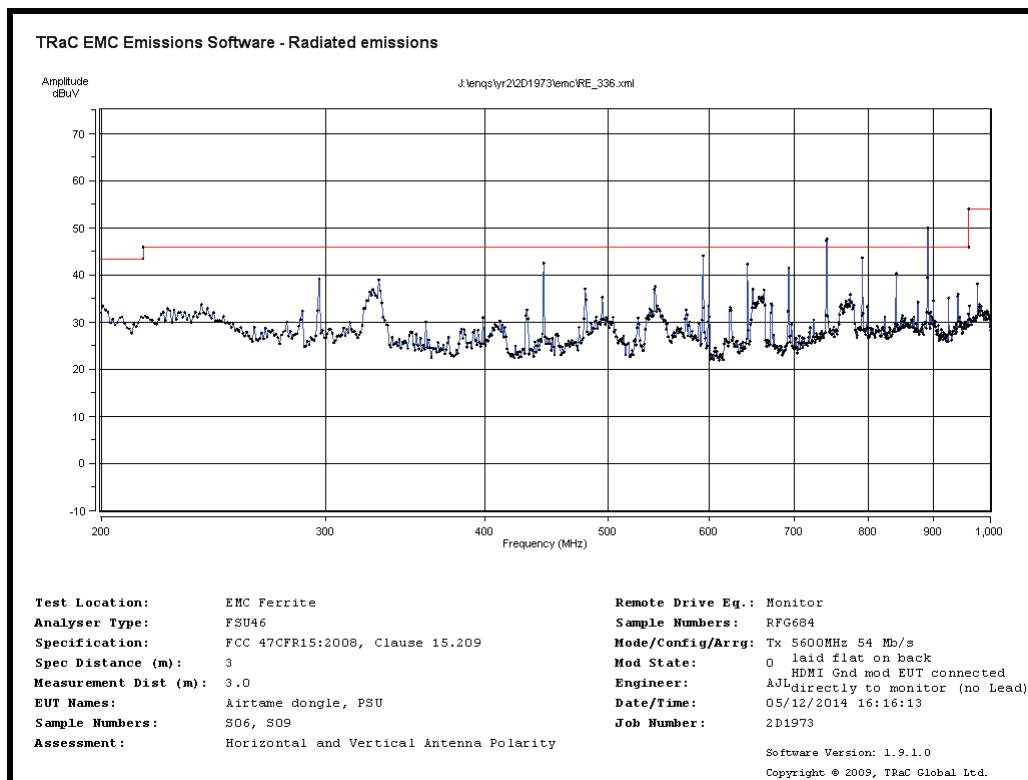
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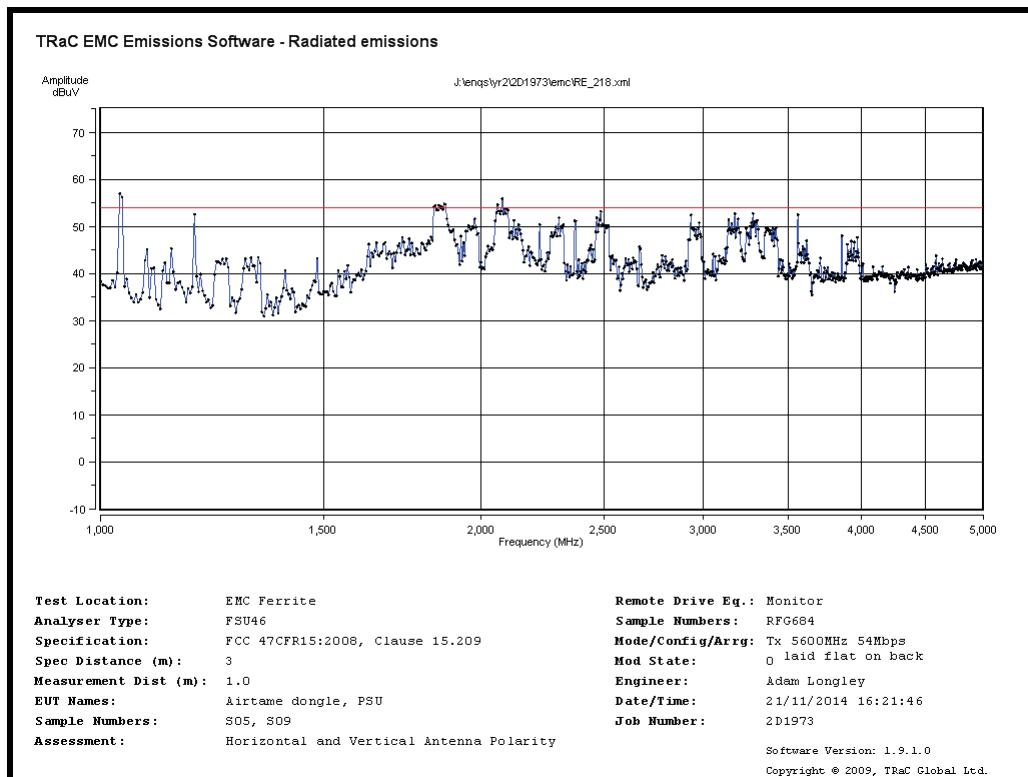
Radiated Spurious emissions 33GHz to 40GHz – 5600MHz MCS0



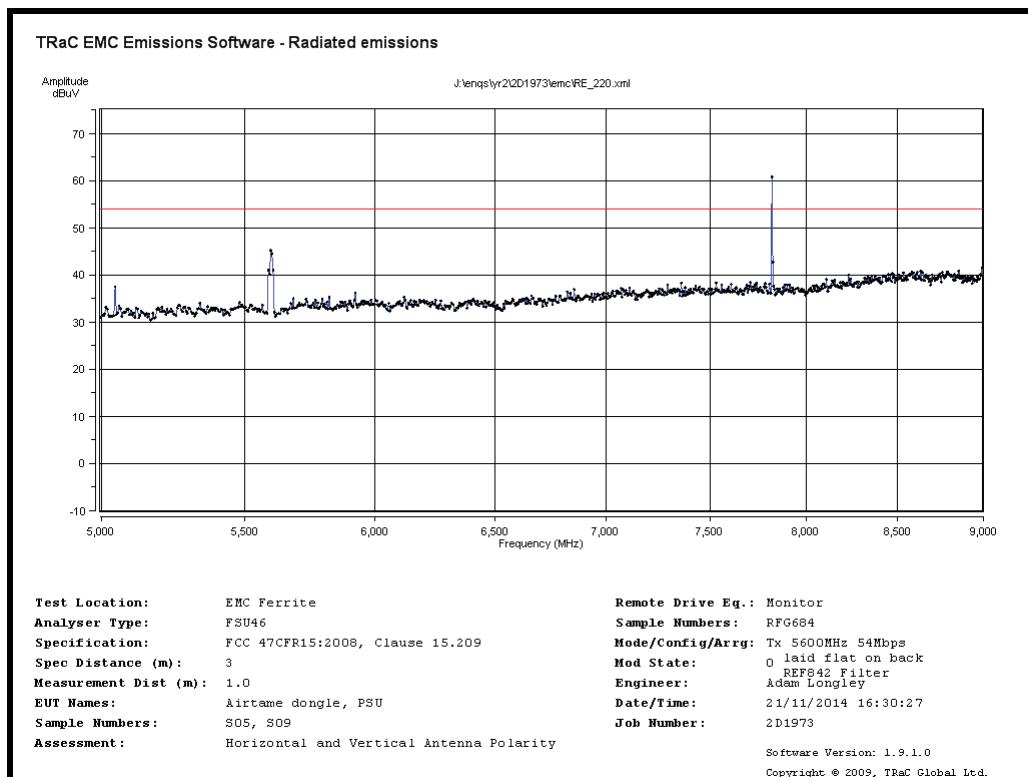
### Radiated Spurious emissions 30MHz to 200MHz – 5600MHz 54Mb/s



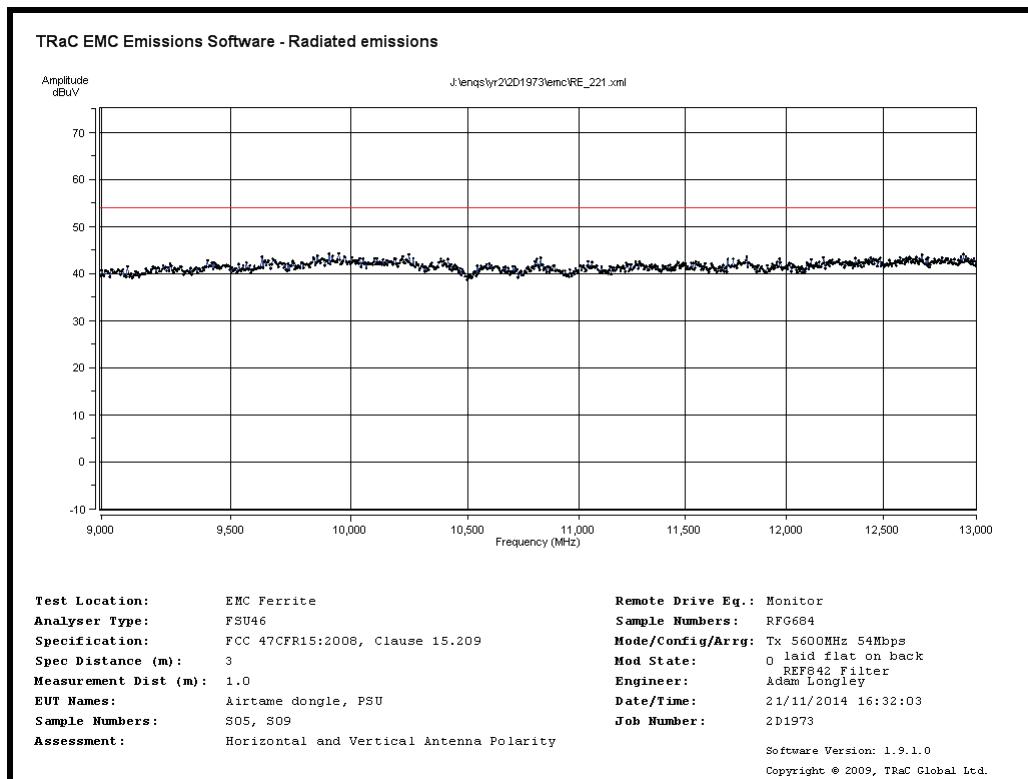
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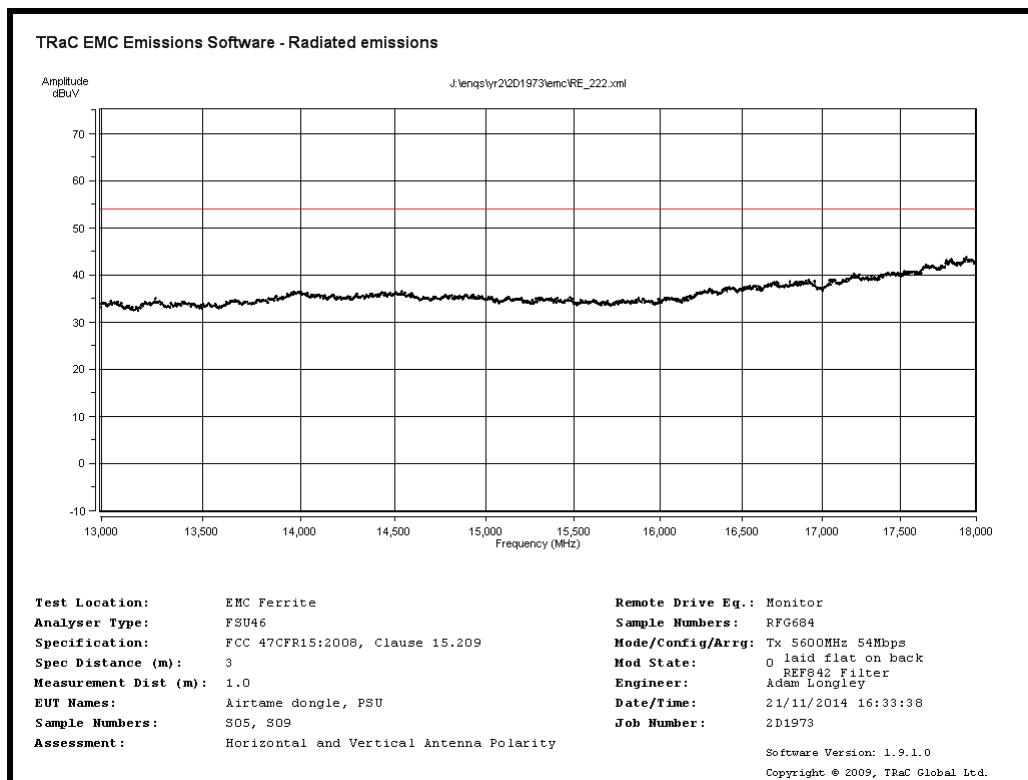
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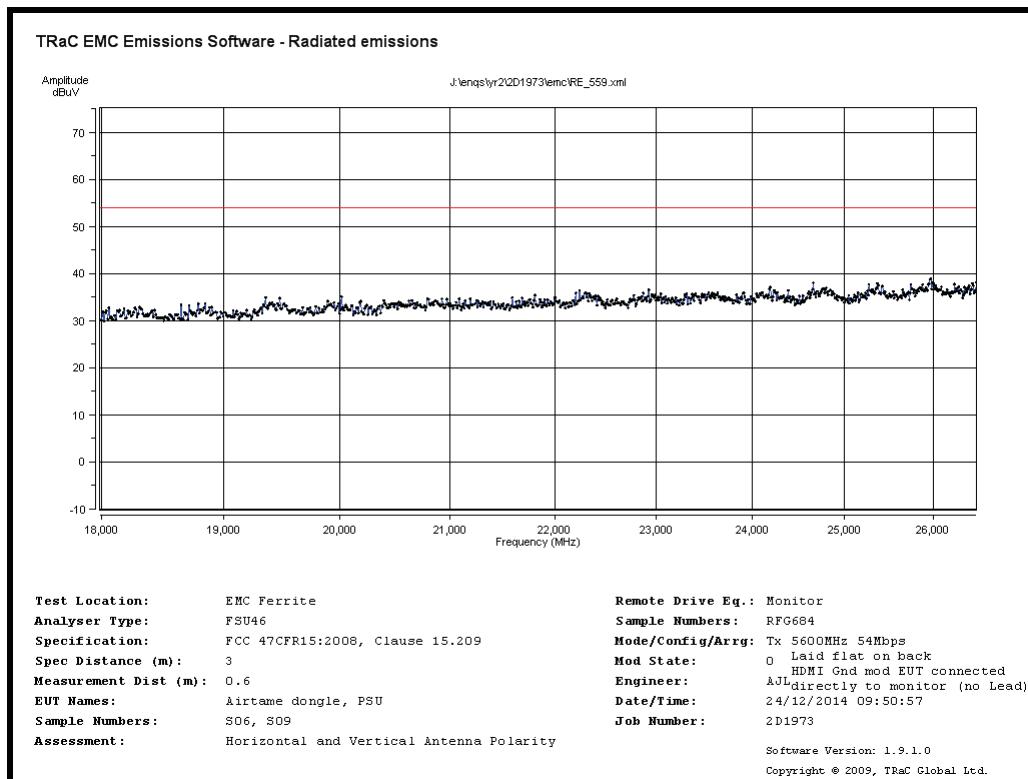
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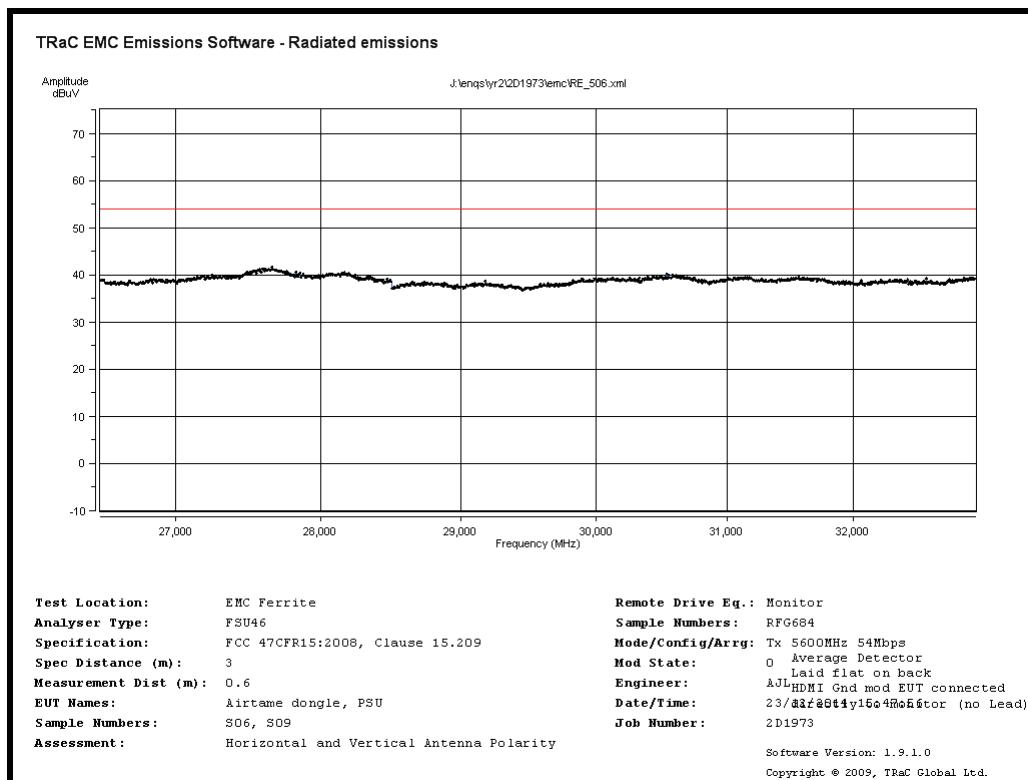
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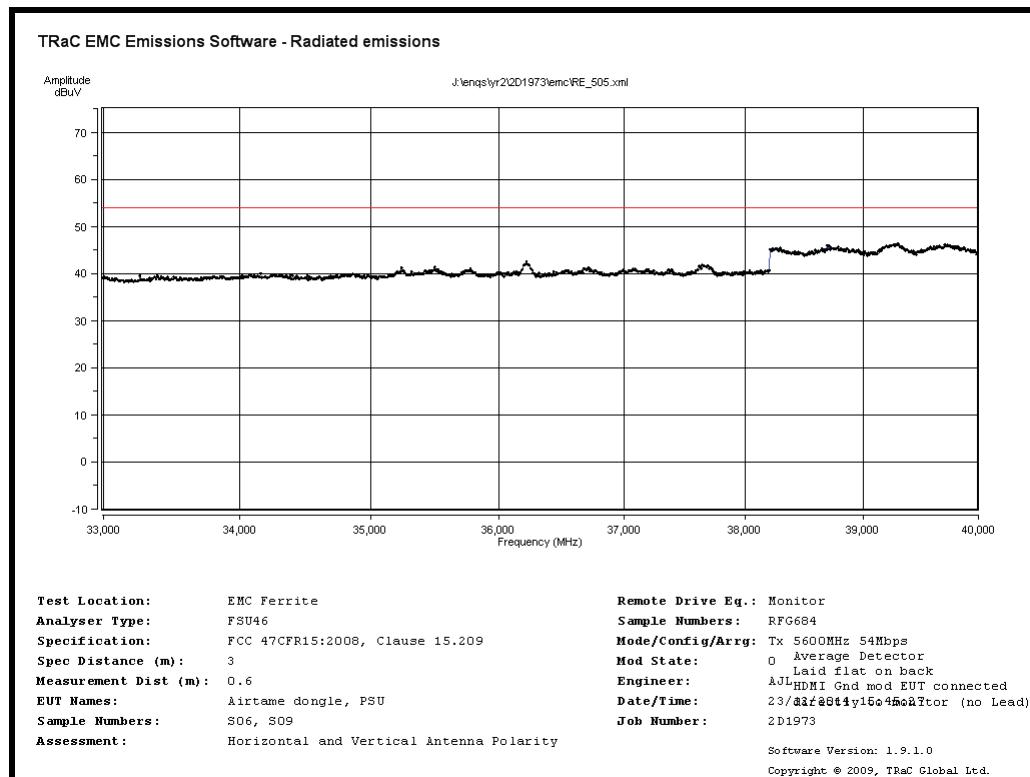
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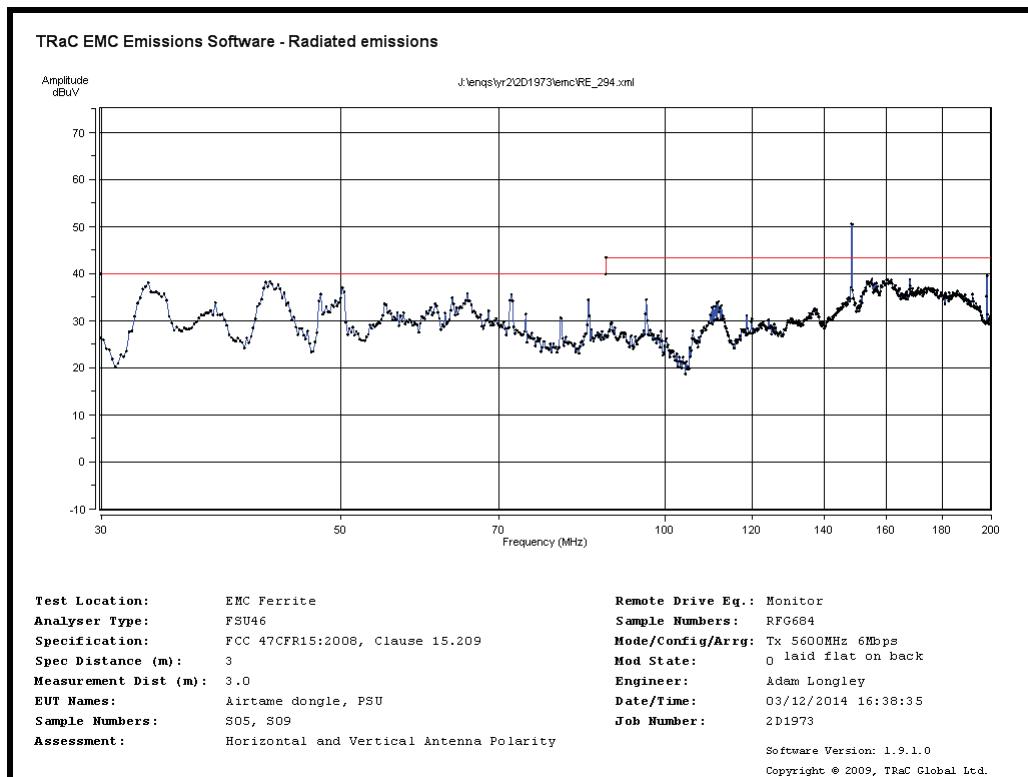
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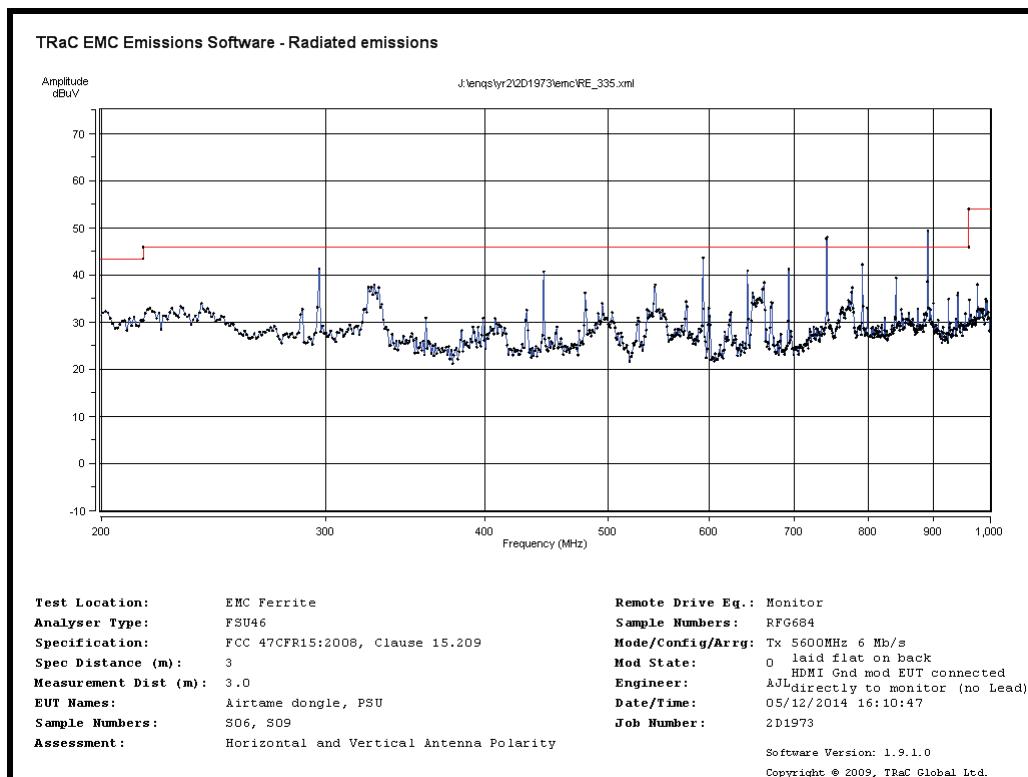
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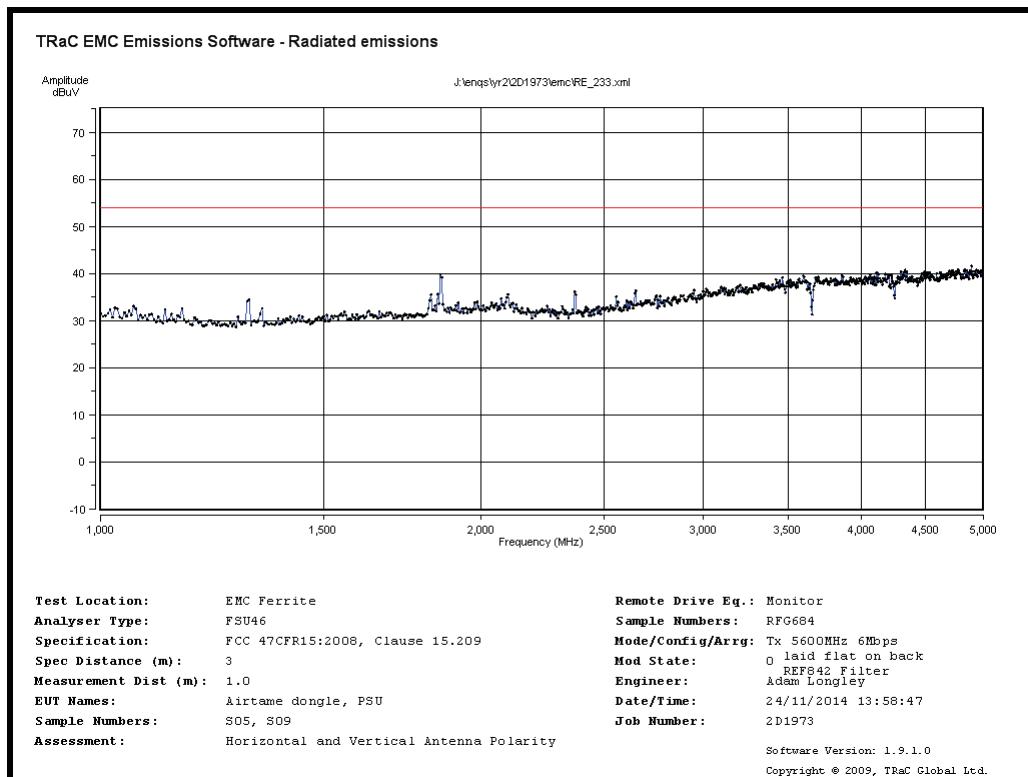
Radiated Spurious emissions 33GHz to 40GHz – 5600MHz 54Mb/s



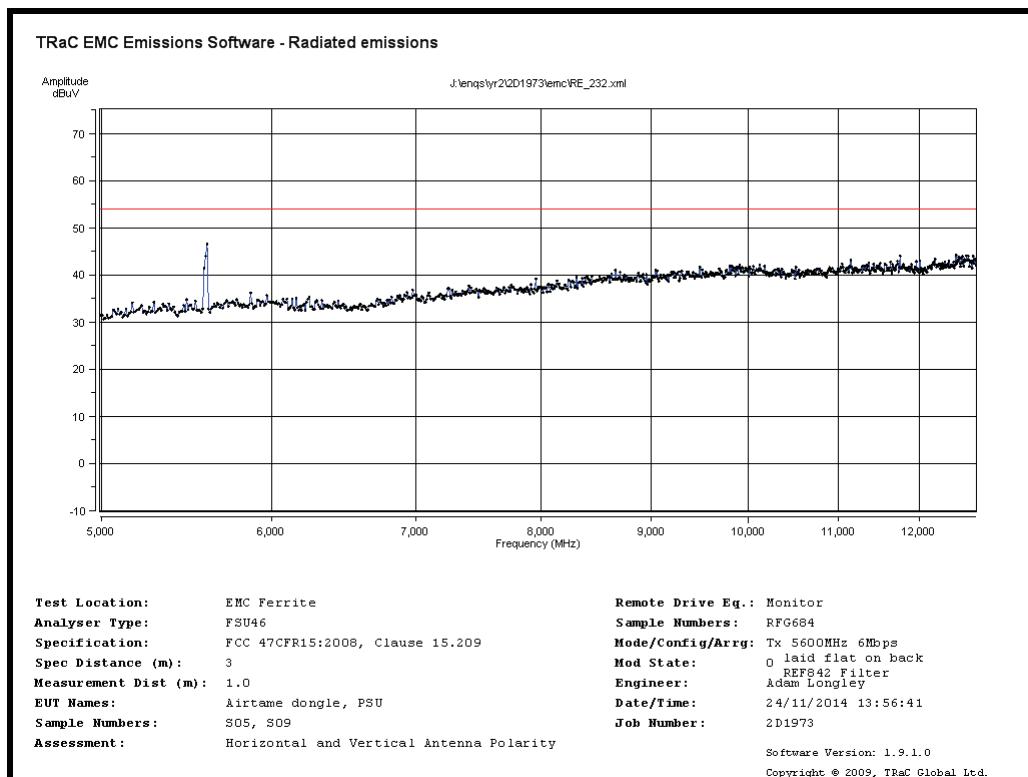
Radiated Spurious emissions 30MHz to 200MHz – 5600MHz 6Mb/s



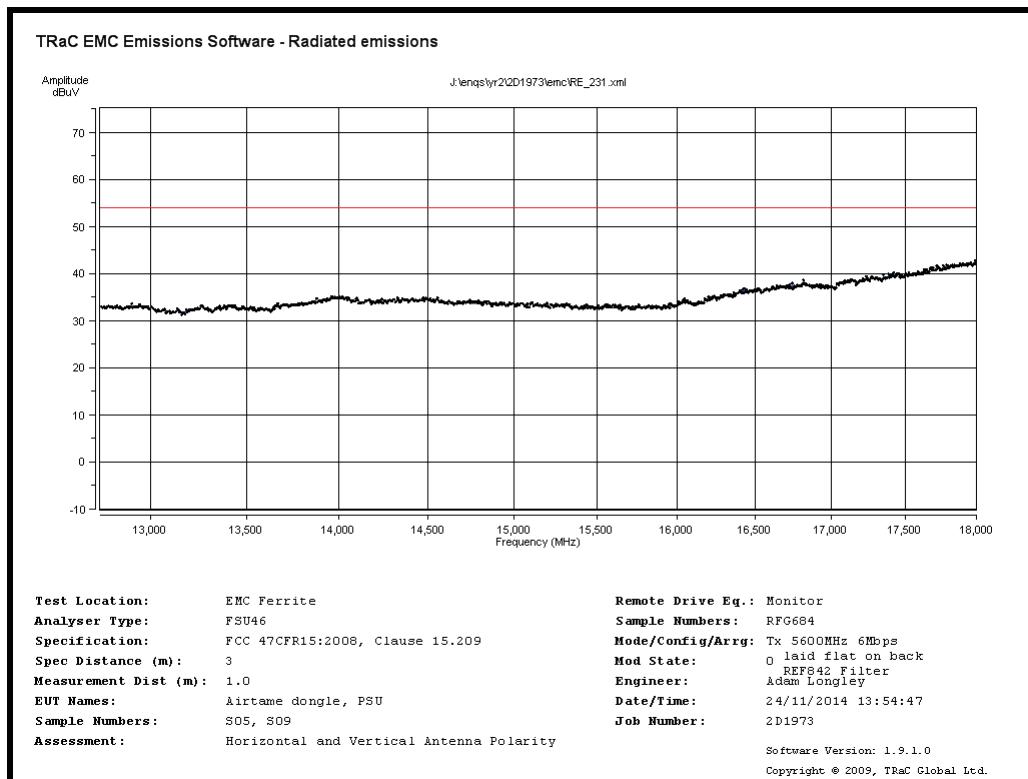
Radiated Spurious emissions 200MHz to 1GHz – 5600MHz 6Mb/s



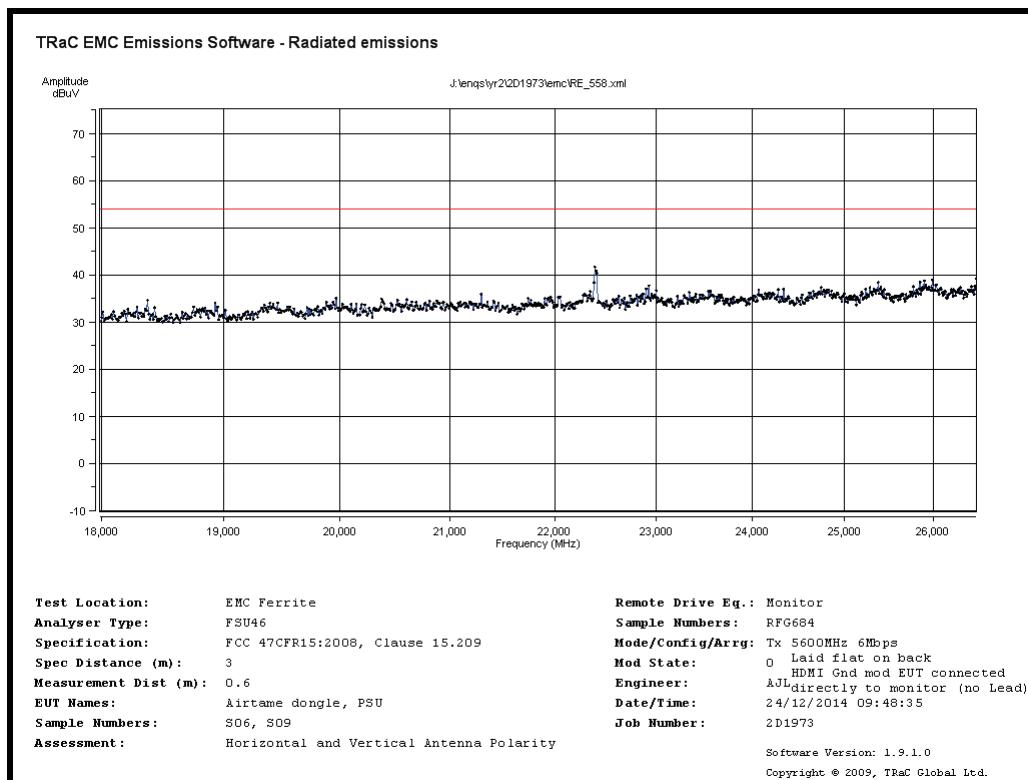
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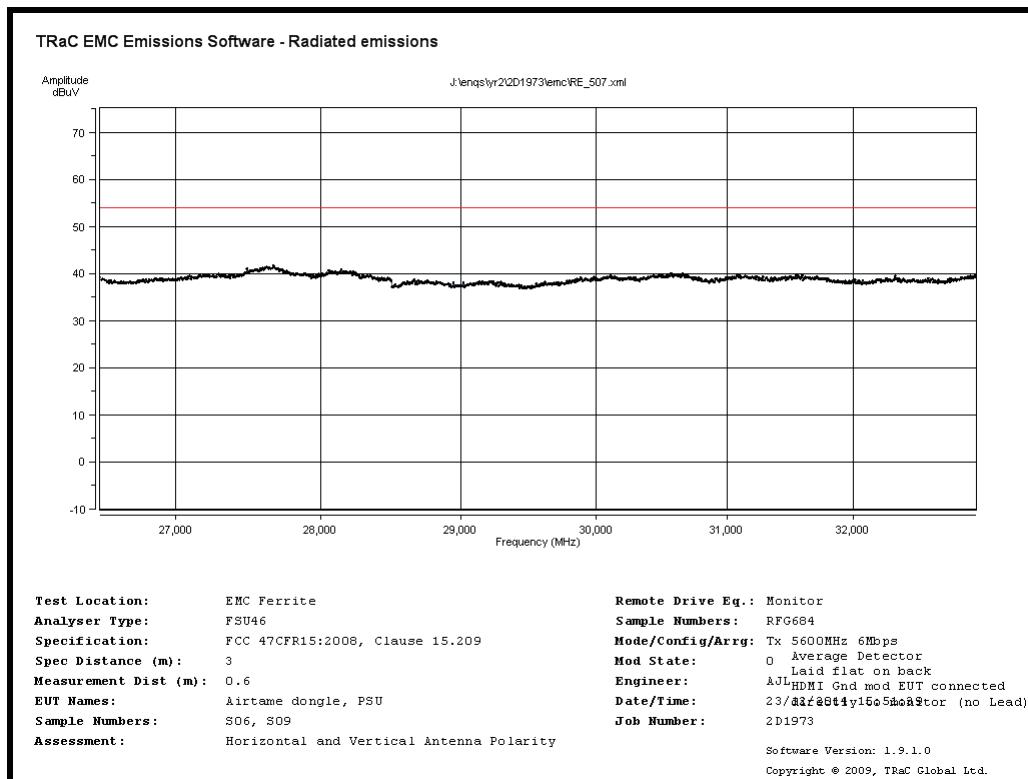
### Radiated Spurious emissions 5GHz to 12.5GHz – 5600MHz 6Mb/s



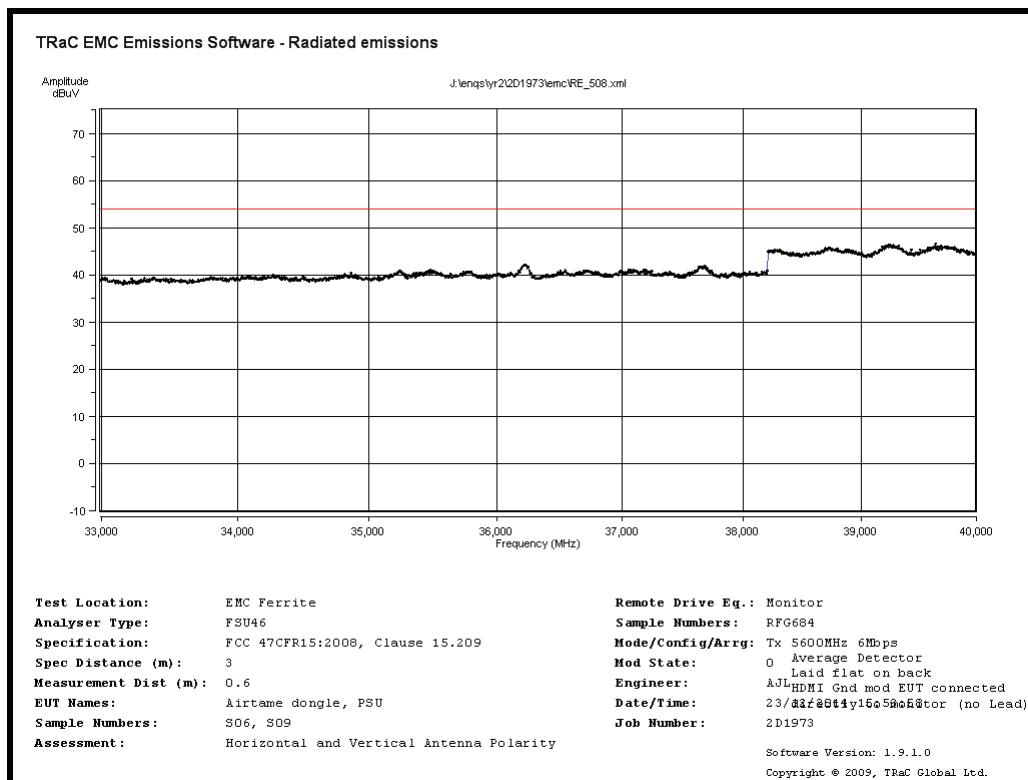
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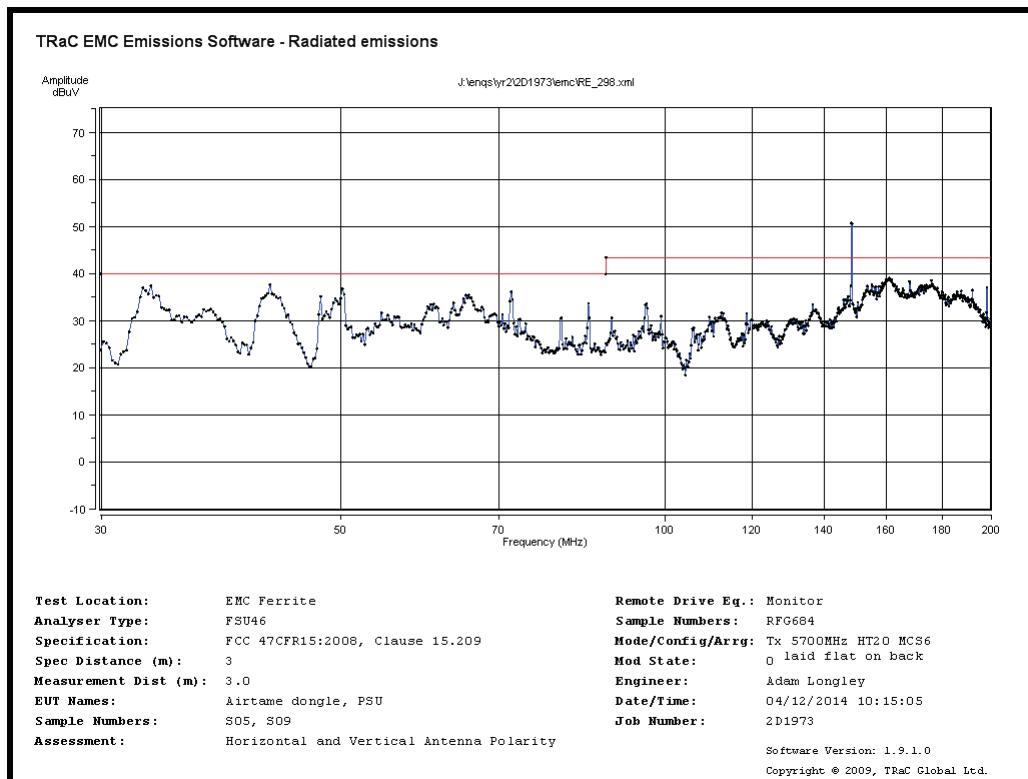
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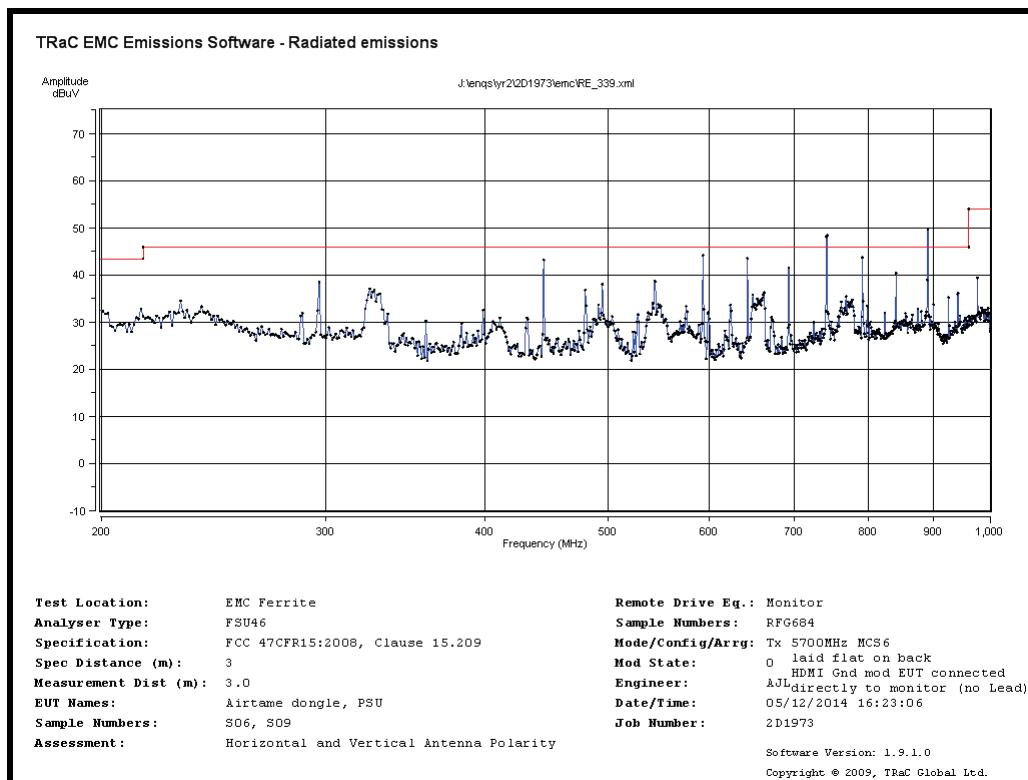
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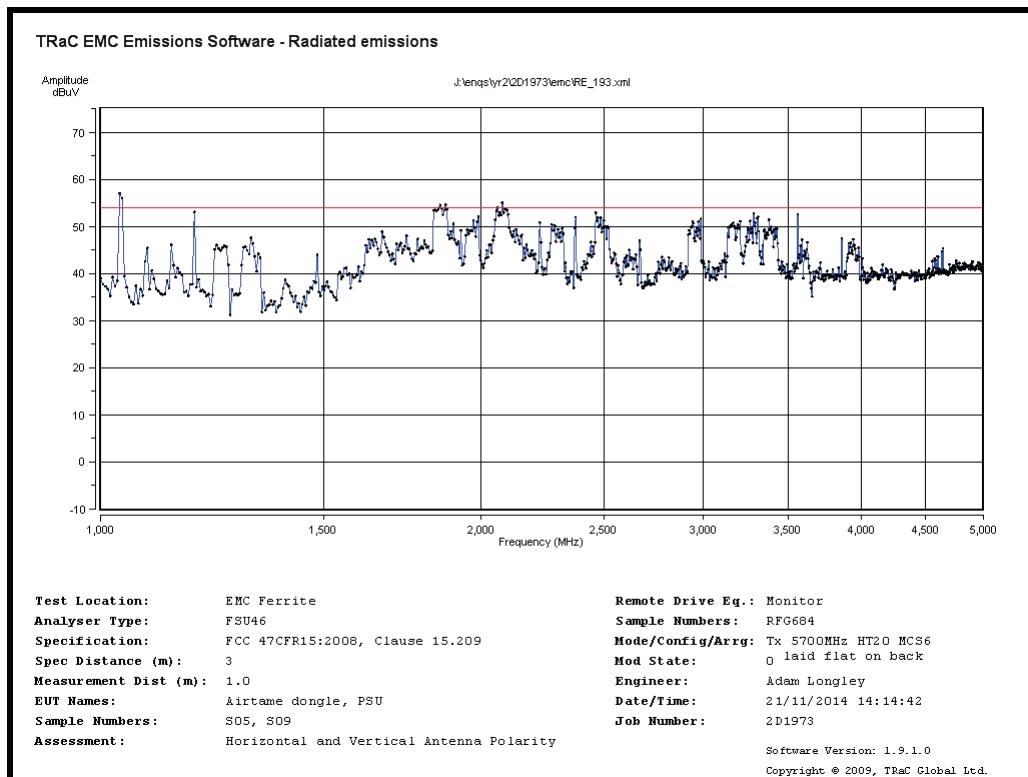
### Radiated Spurious emissions 33GHz to 40GHz – 5600MHz 6Mb/s



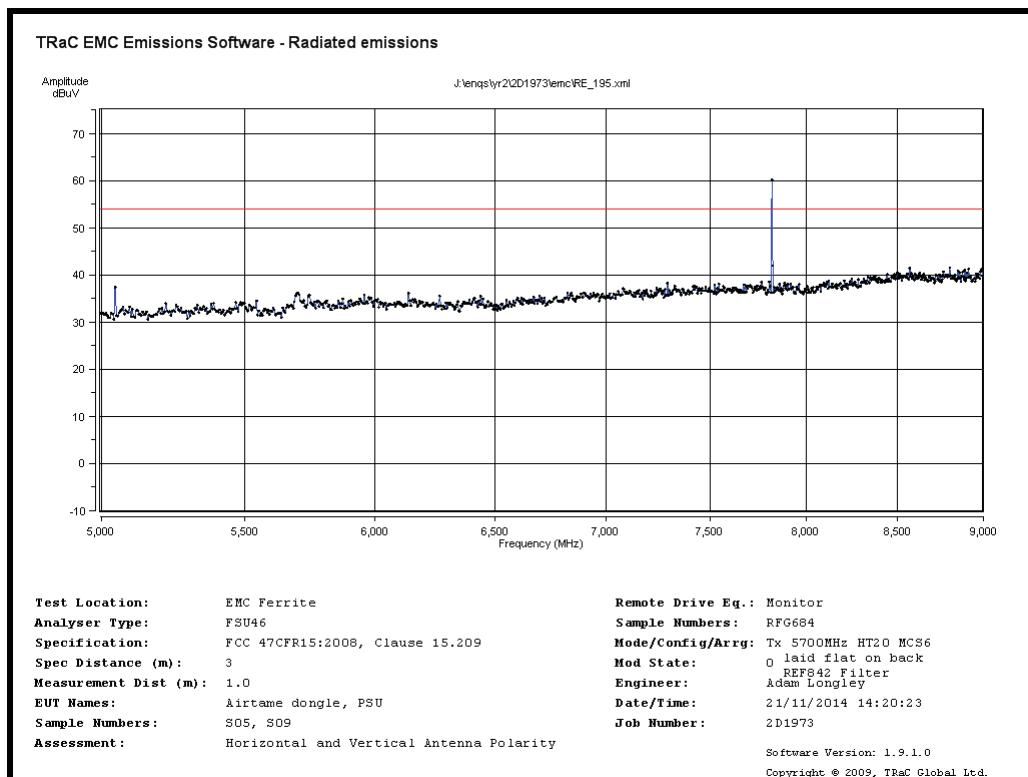
### Radiated Spurious emissions 30MHz to 200MHz – 5700MHz MCS6



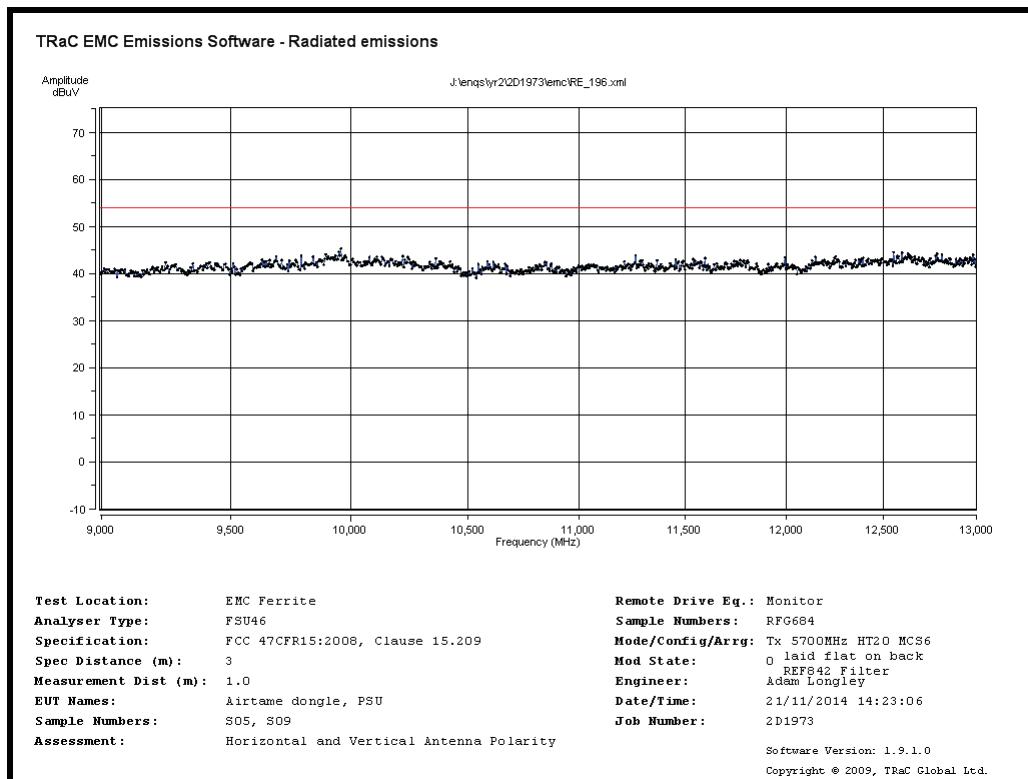
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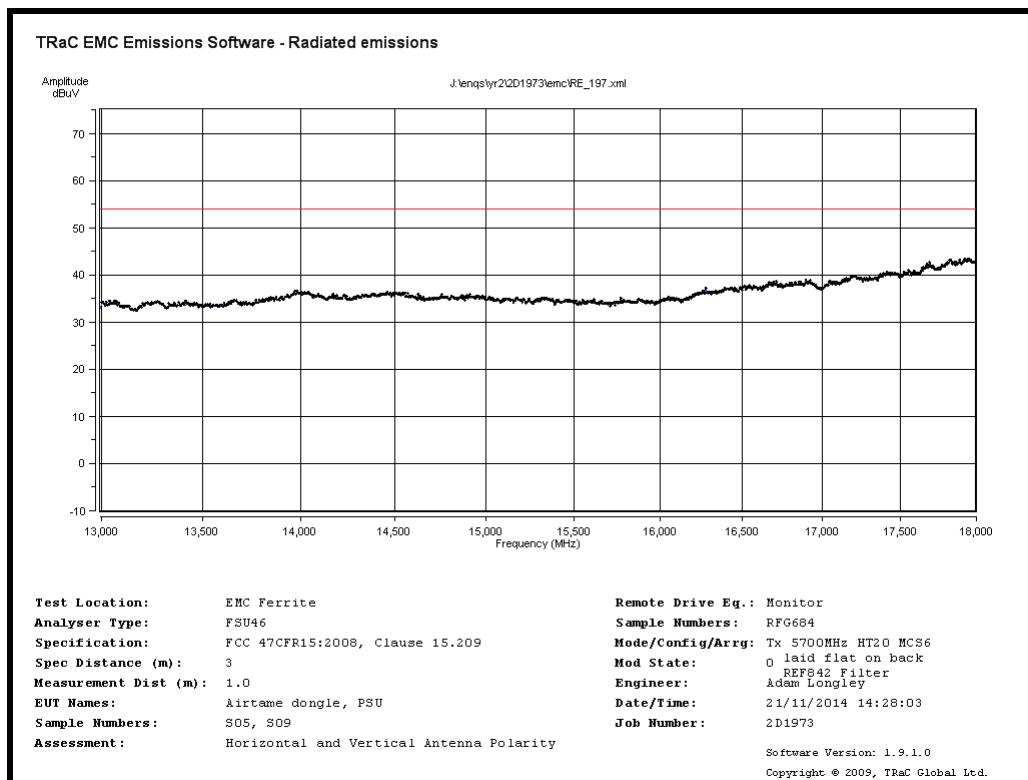
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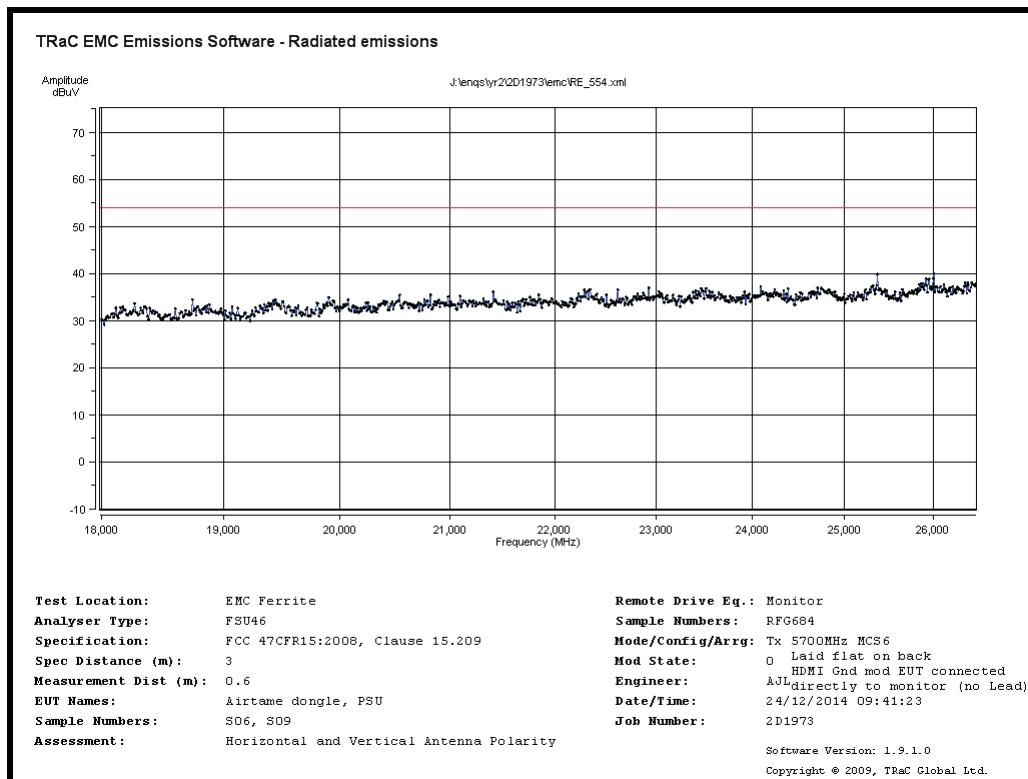
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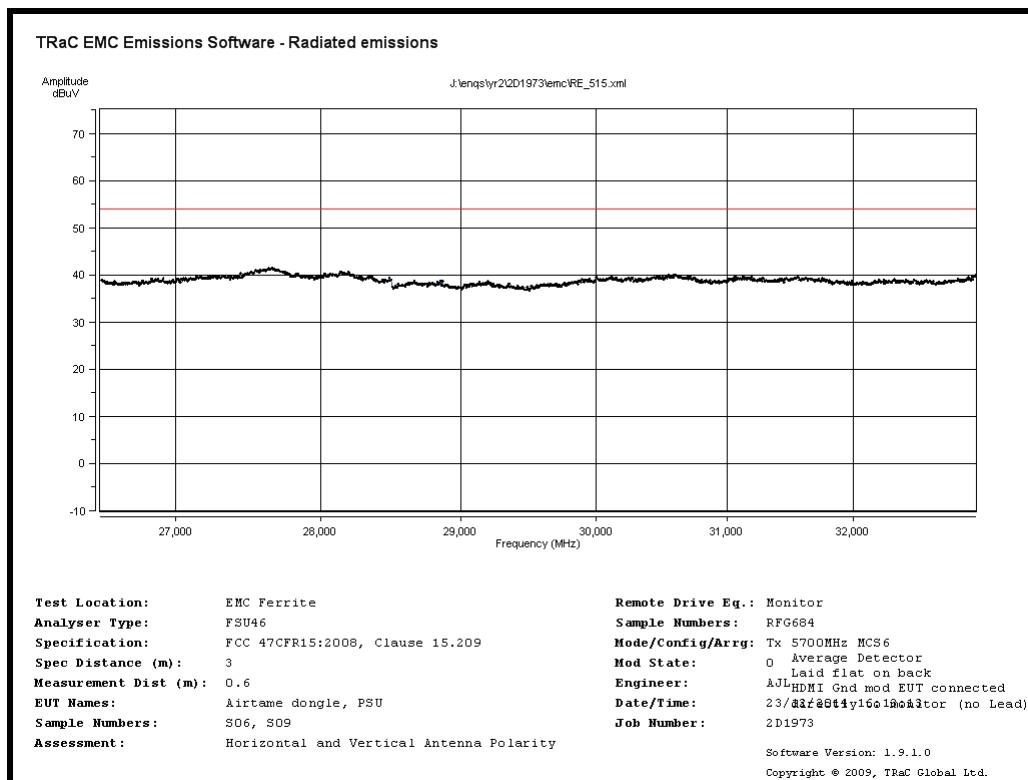
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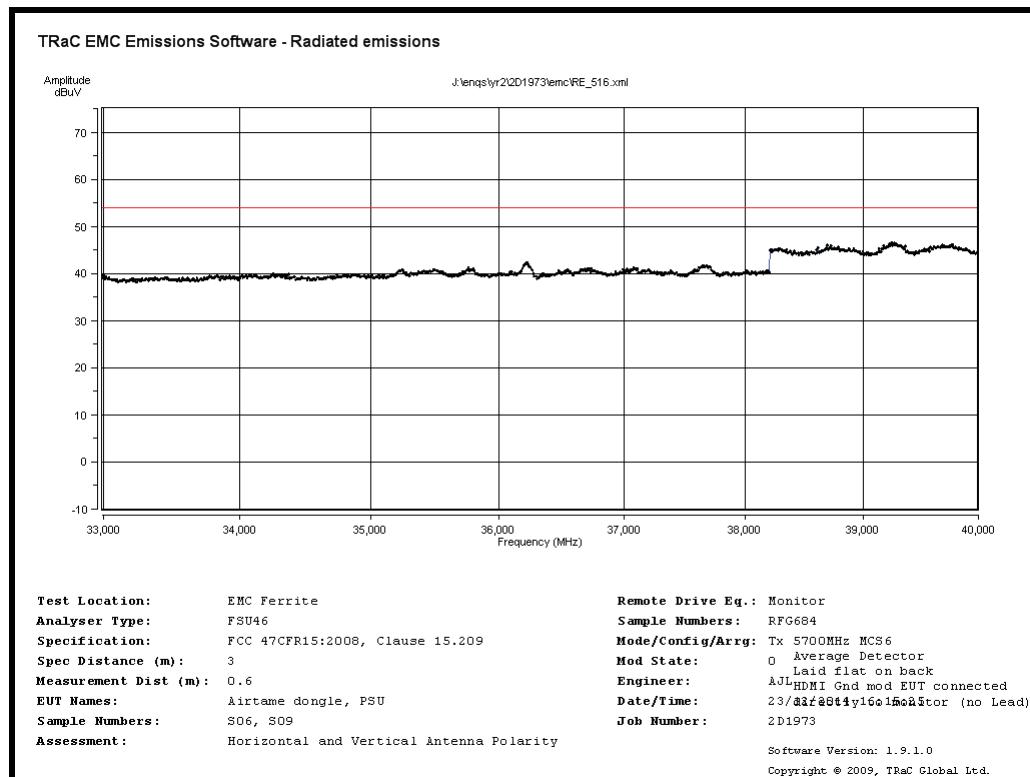
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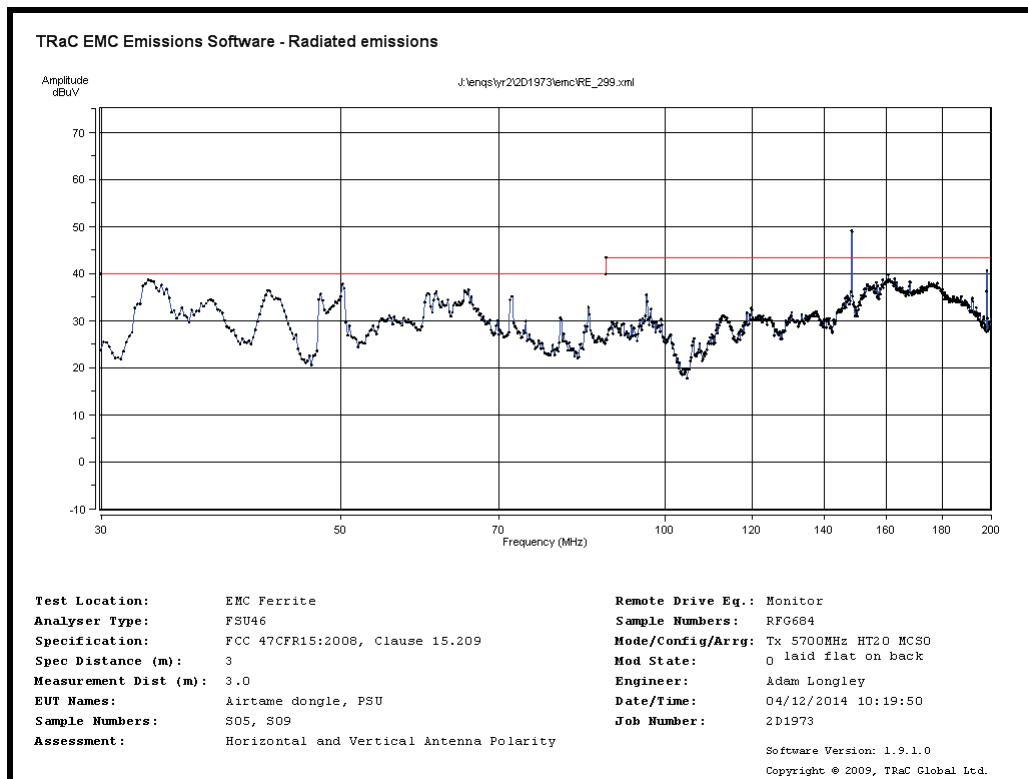
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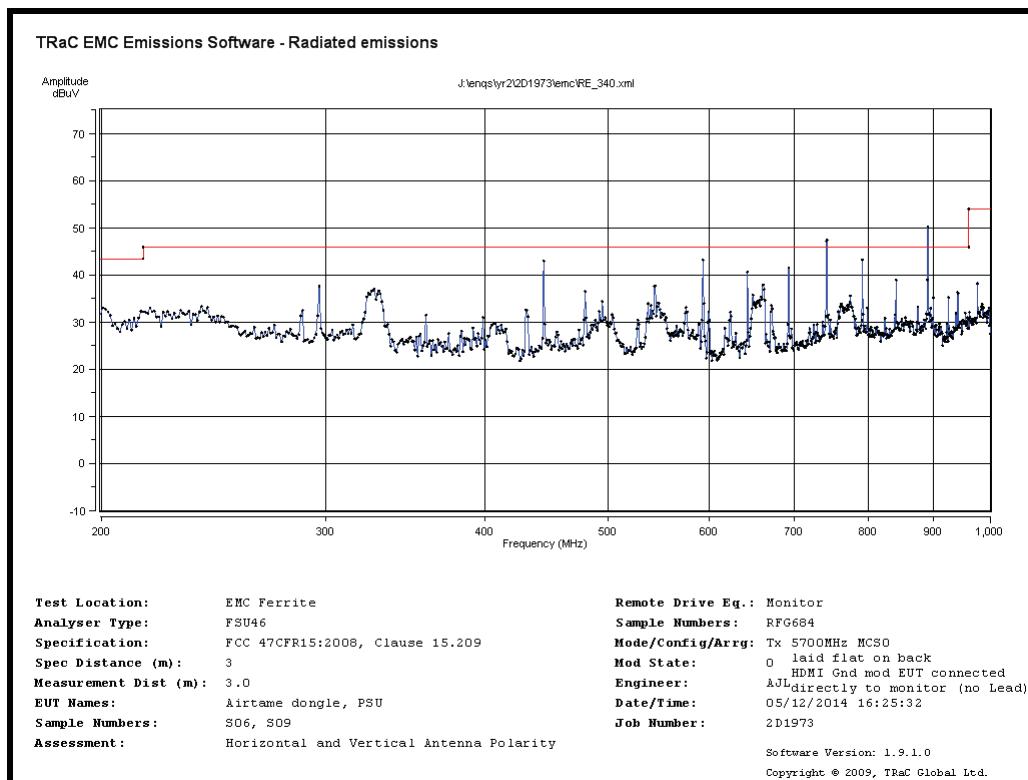
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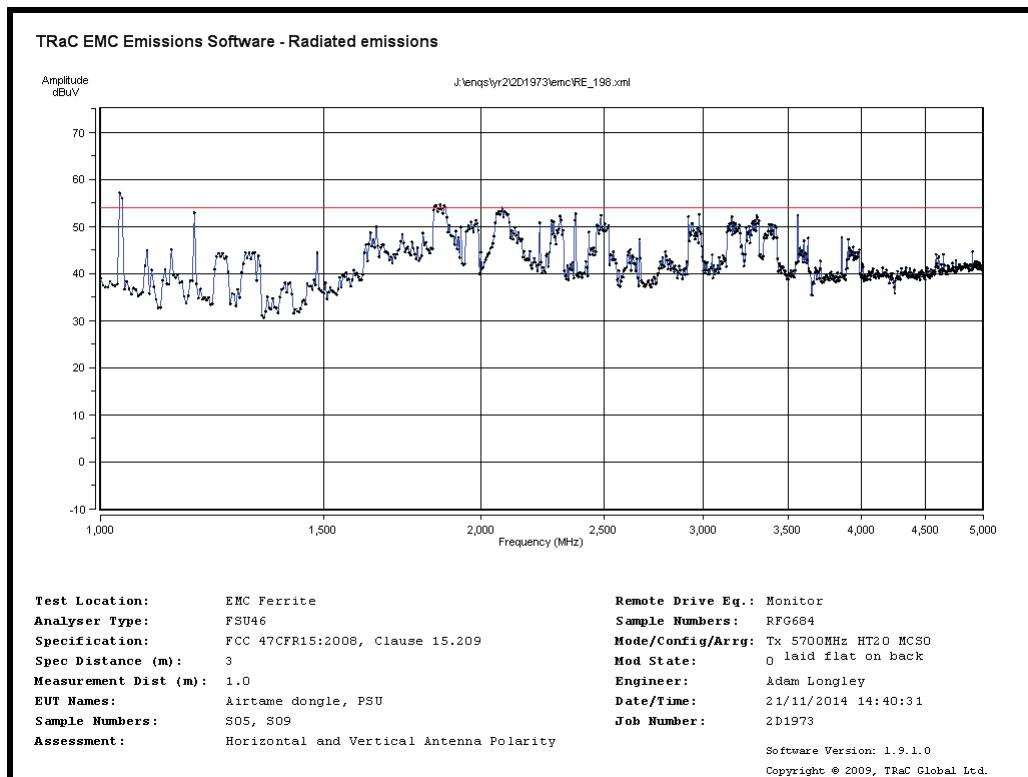
Radiated Spurious emissions 33GHz to 40GHz – 5700MHz MCS6



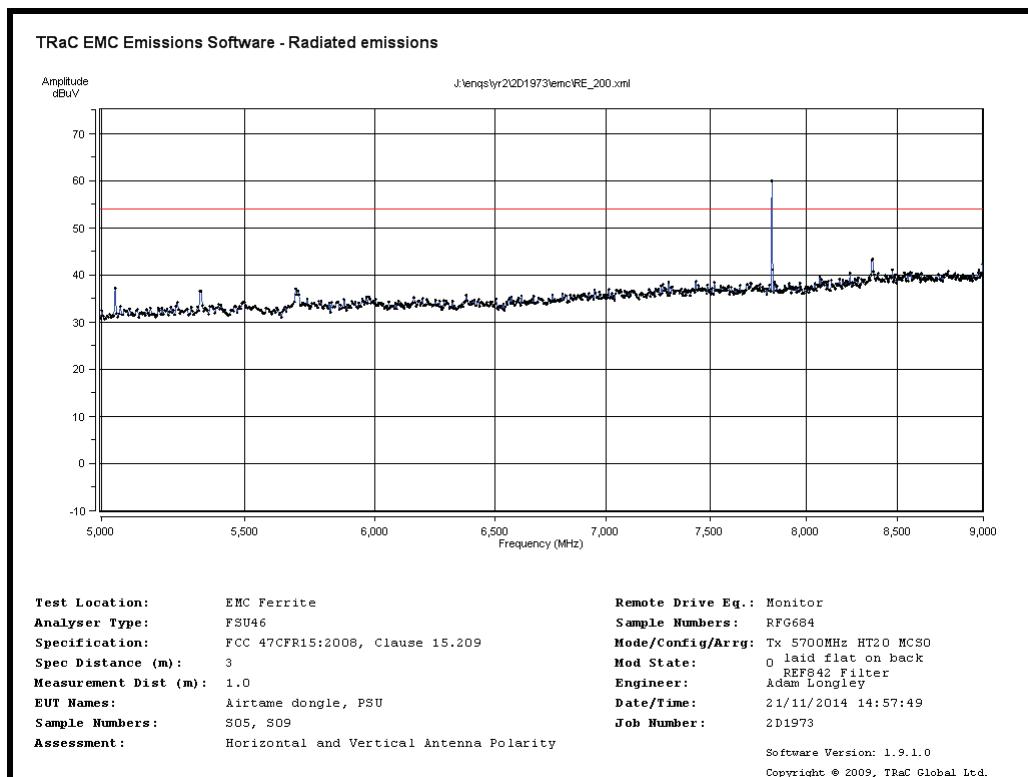
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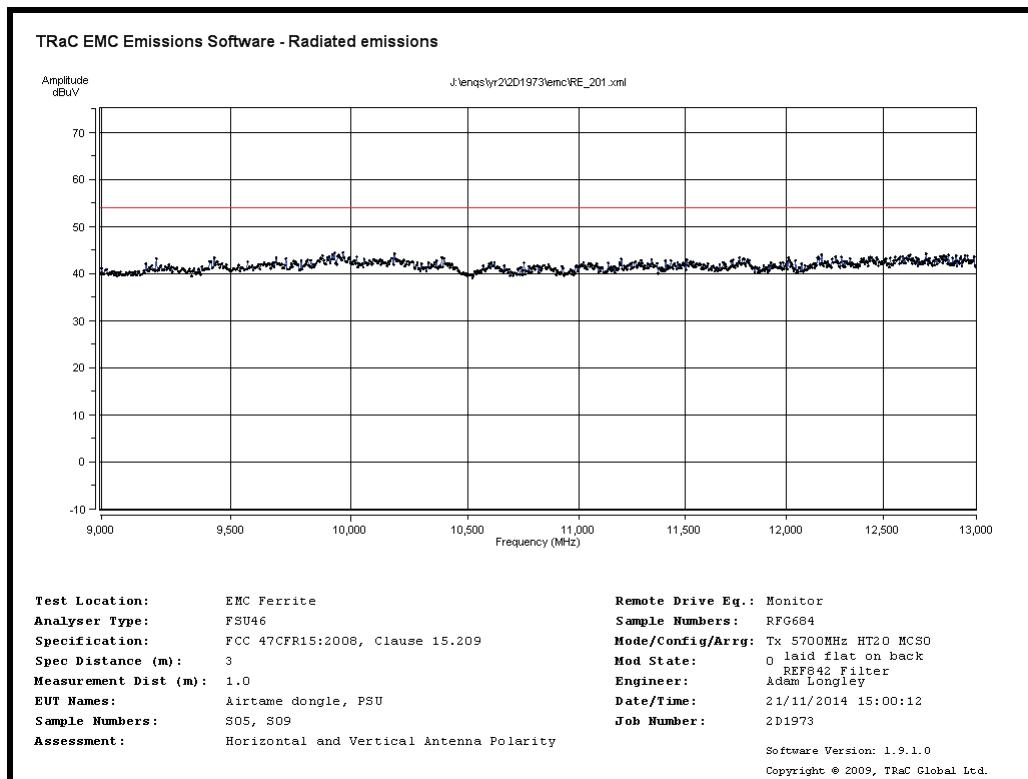
### Radiated Spurious emissions 200MHz to 1GHz – 5700MHz MCS0



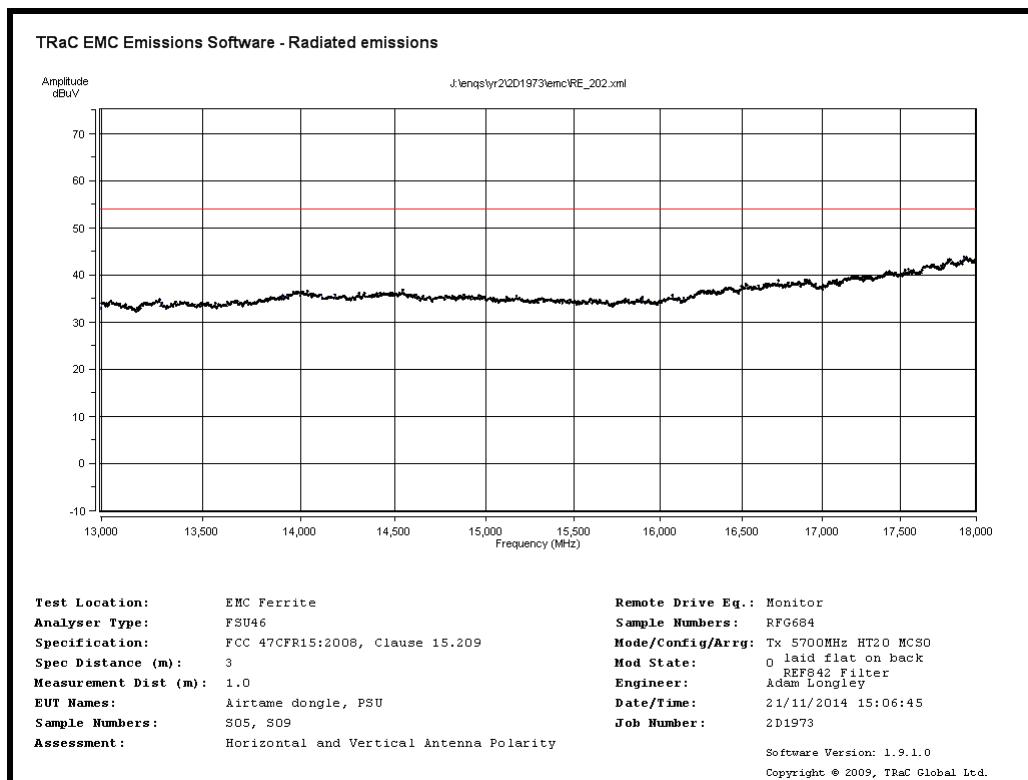
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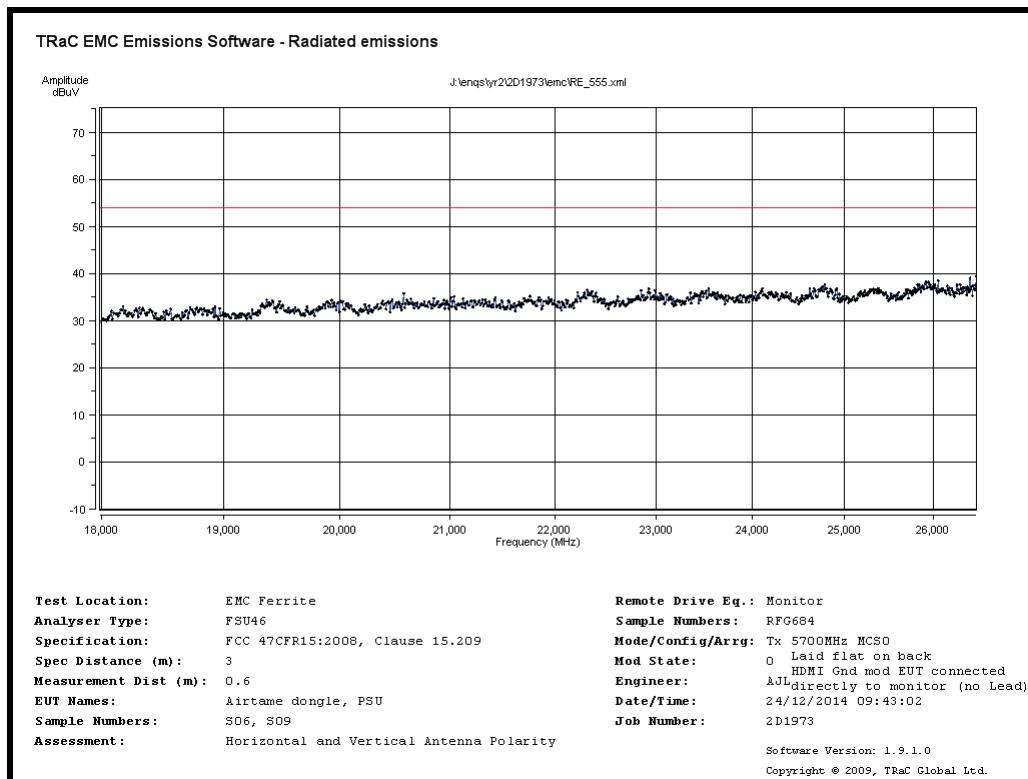
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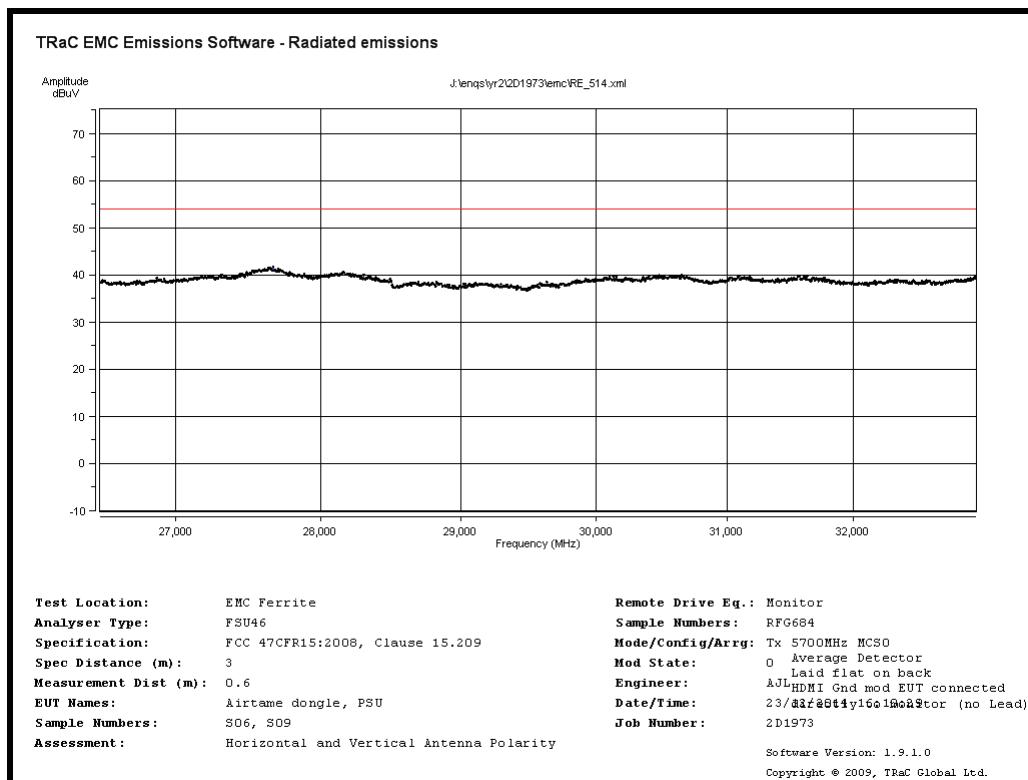
### Radiated Spurious emissions 9GHz to 13GHz – 5700MHz MCS0



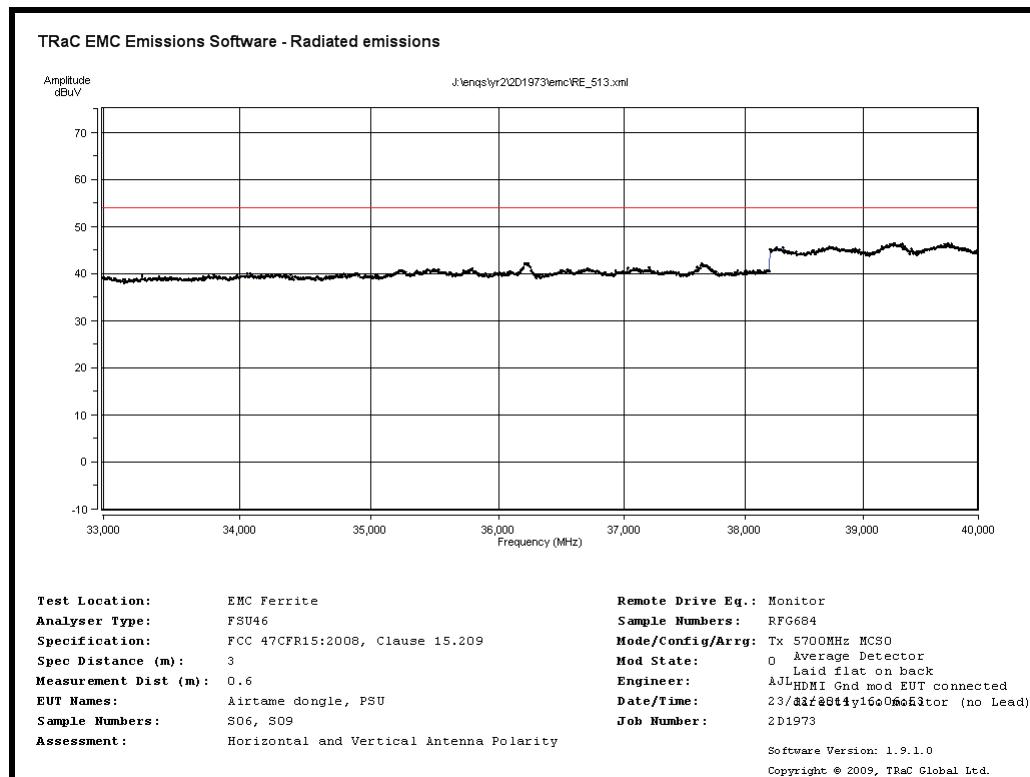
### Radiated Spurious emissions 13GHz to 18GHz – 5700MHz MCS0



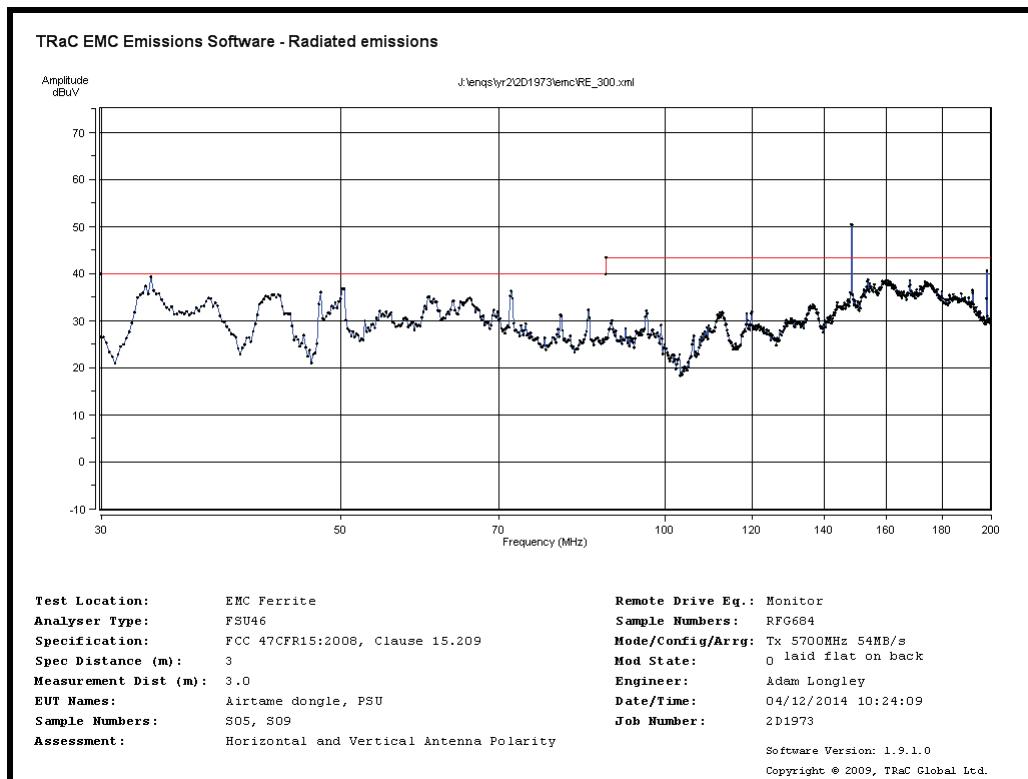
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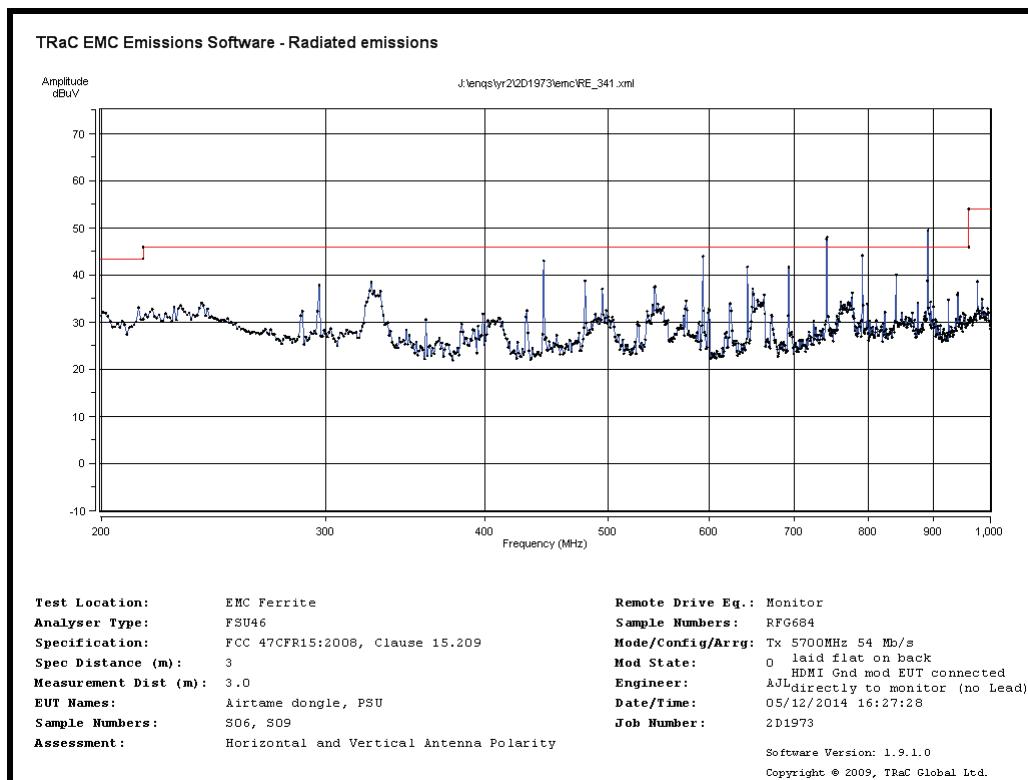
### Radiated Spurious emissions 26.5GHz to 33GHz – 5700MHz MCS0



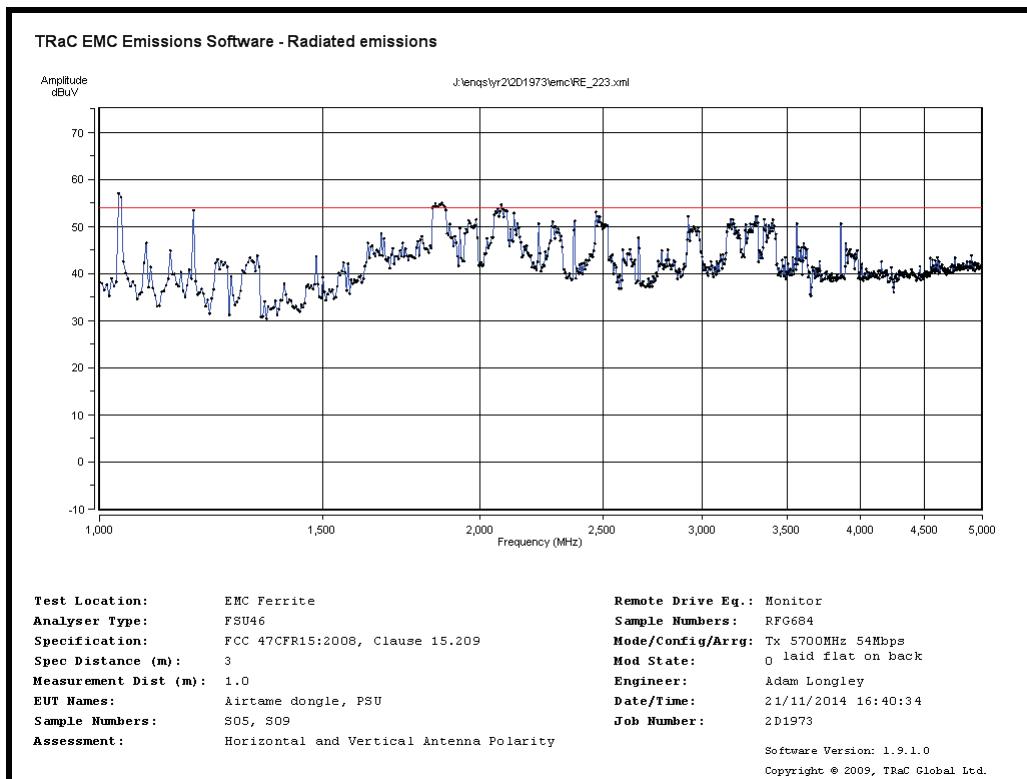
Radiated Spurious emissions 33GHz to 40GHz – 5700MHz MCS0



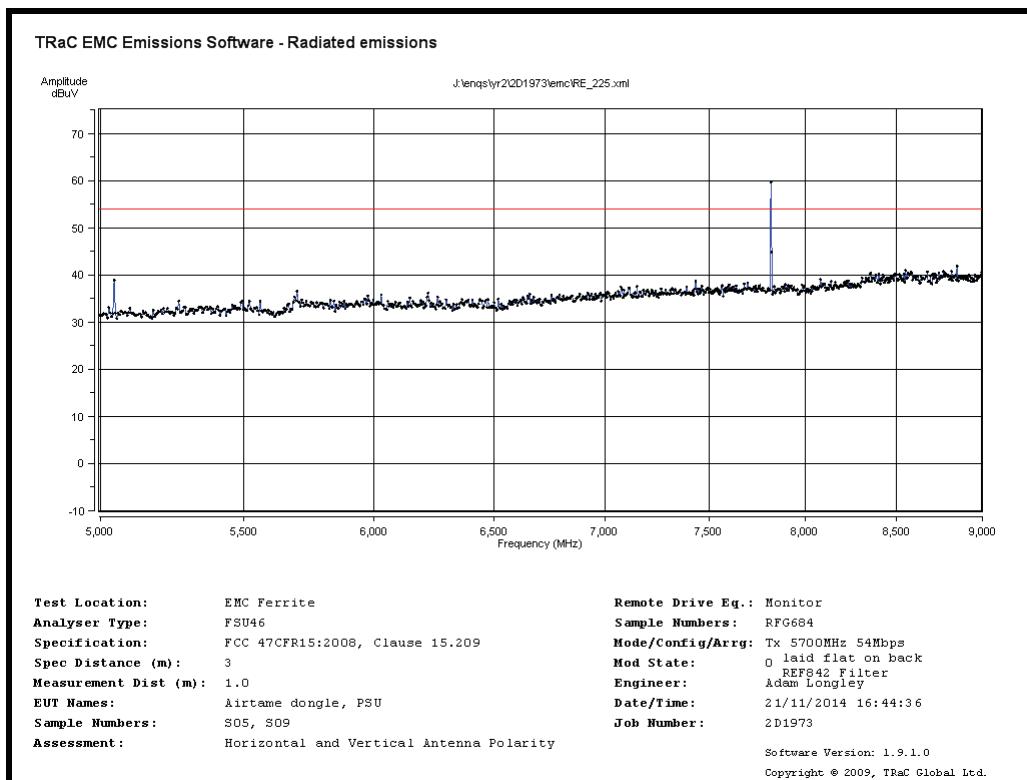
### Radiated Spurious emissions 30MHz to 200MHz – 5700MHz 54Mb/s



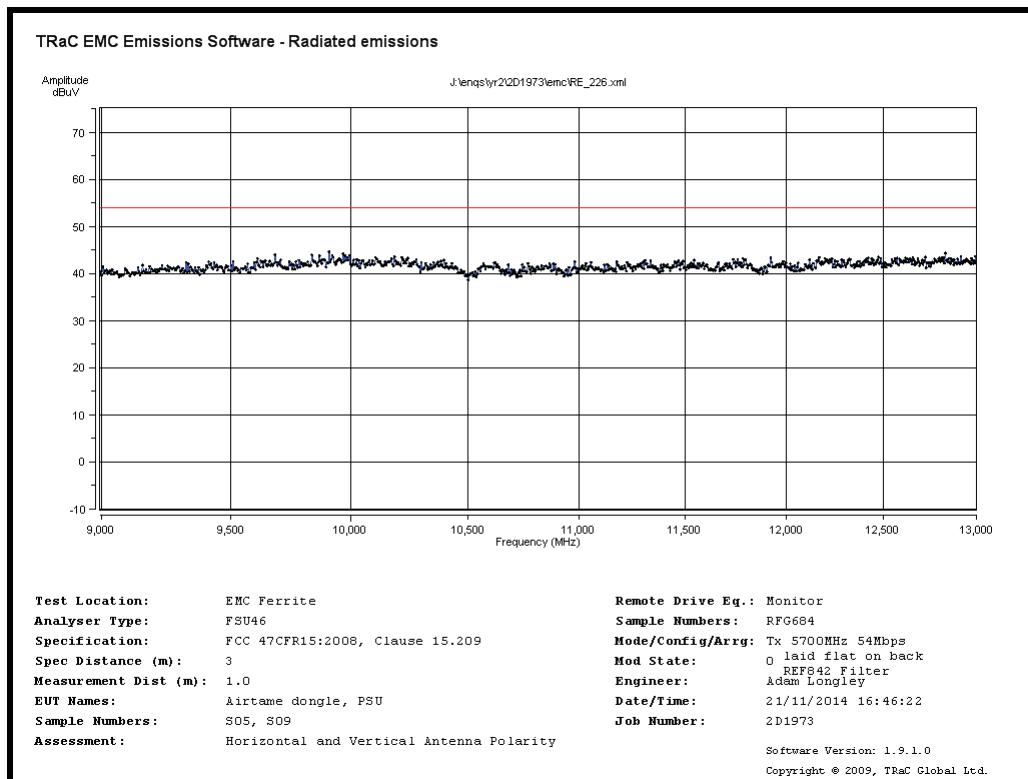
### Radiated Spurious emissions 200MHz to 1GHz – 5700MHz 54Mb/s



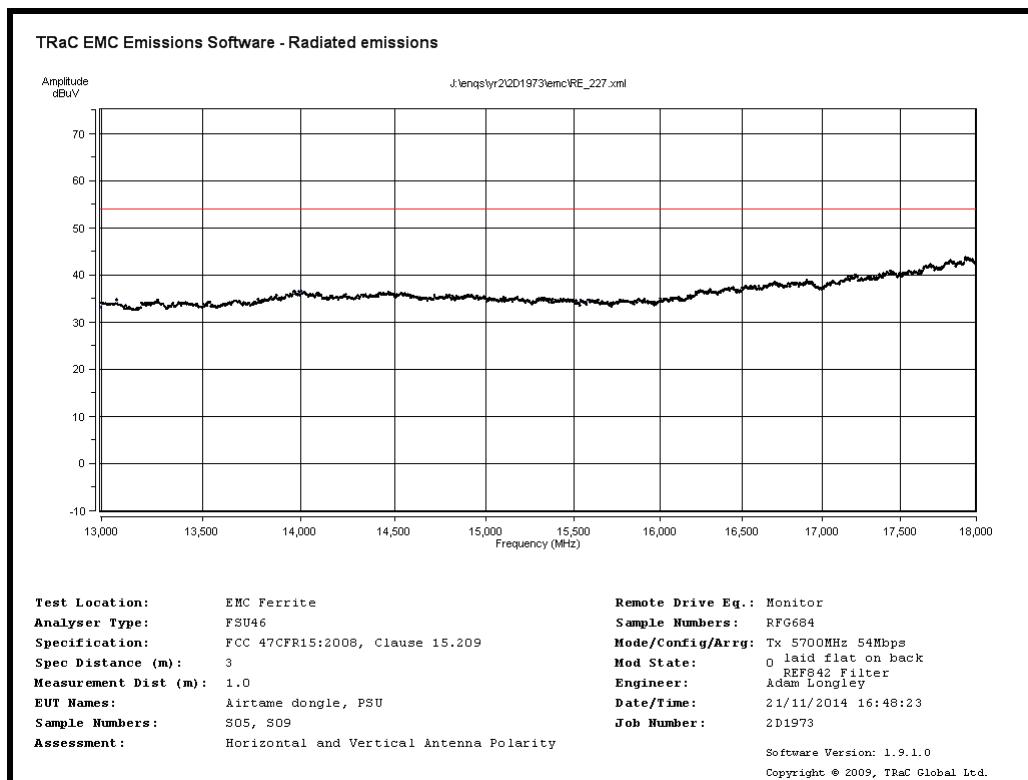
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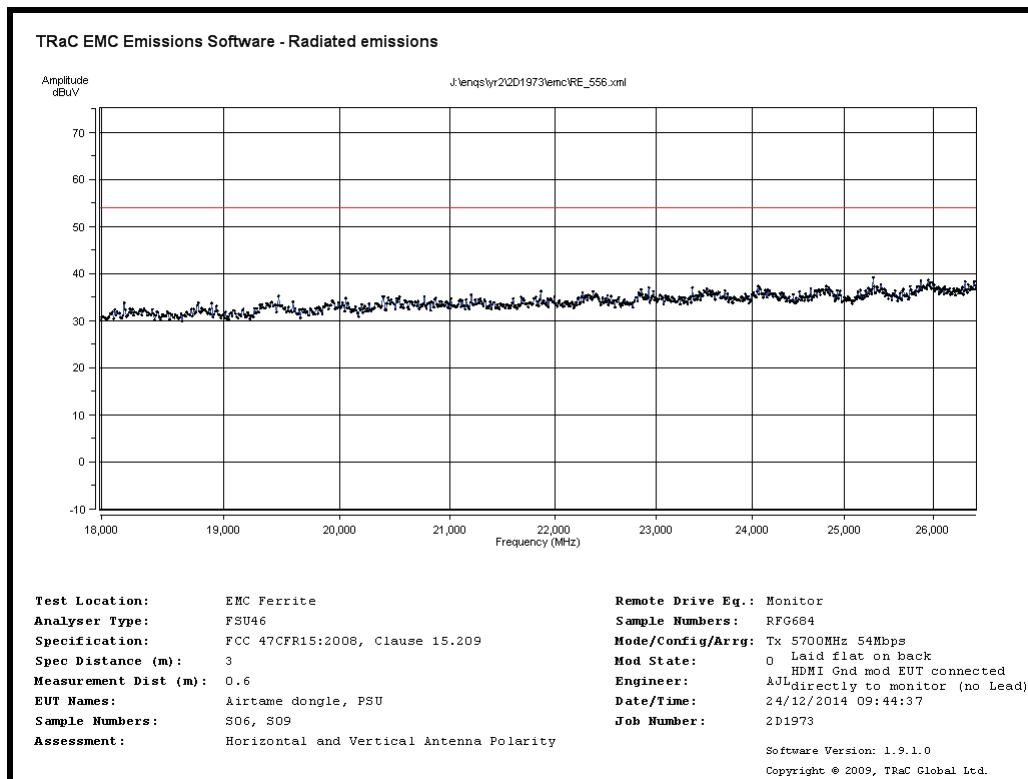
### Radiated Spurious emissions 5GHz to 9GHz – 5700MHz 54Mb/s



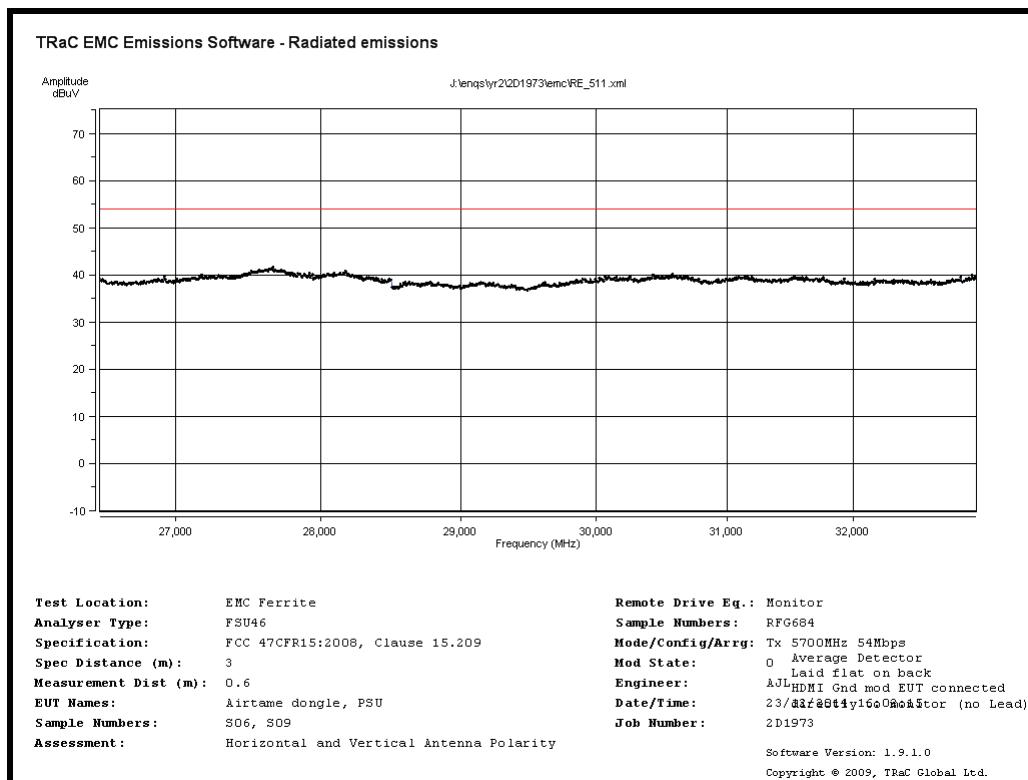
### Radiated Spurious emissions 9GHz to 13GHz – 5700MHz 54Mb/s



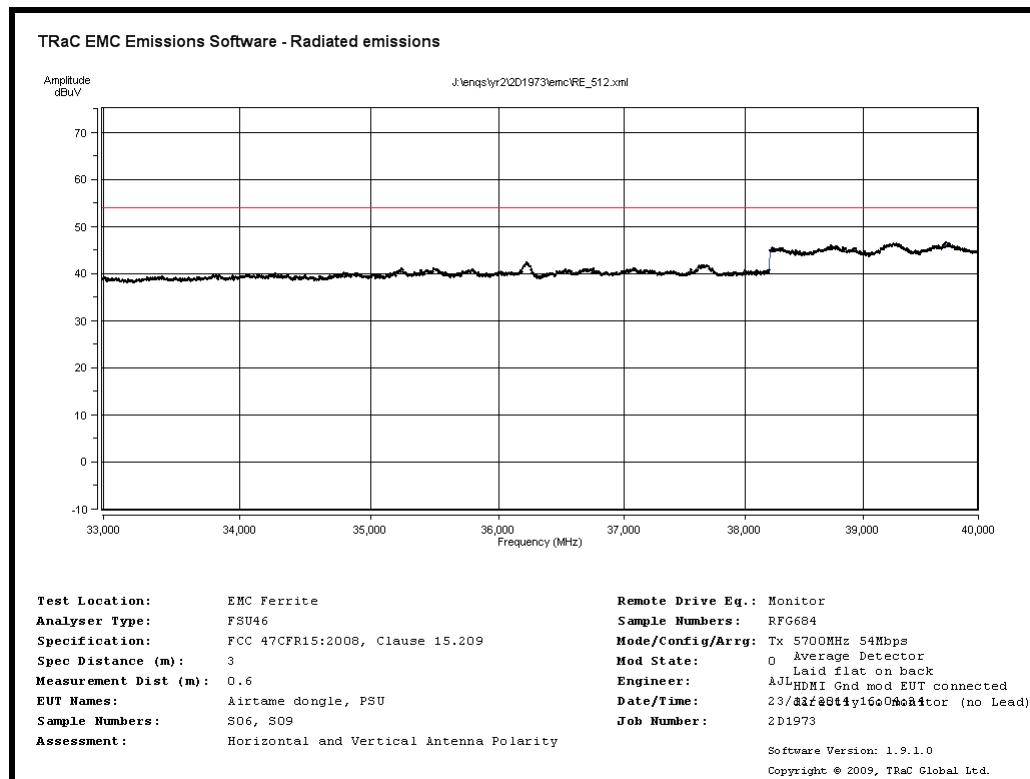
### Radiated Spurious emissions 13GHz to 18GHz – 5700MHz 54Mb/s



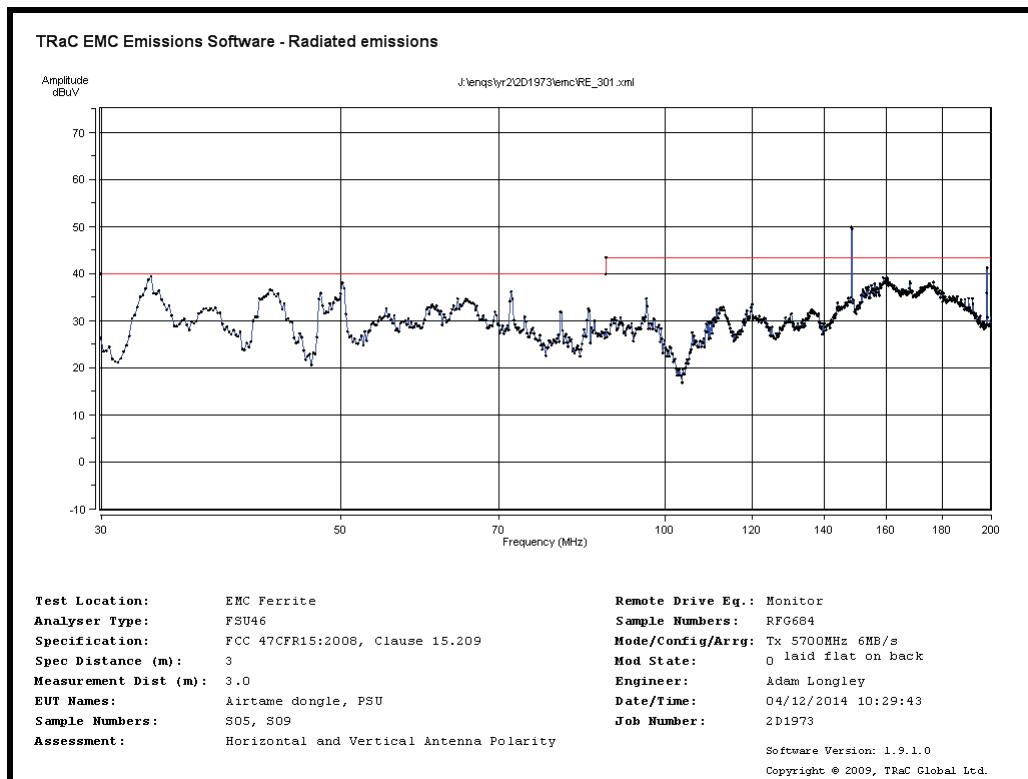
### Radiated Spurious emissions 18GHz to 26.5GHz – 5700MHz 54Mb/s



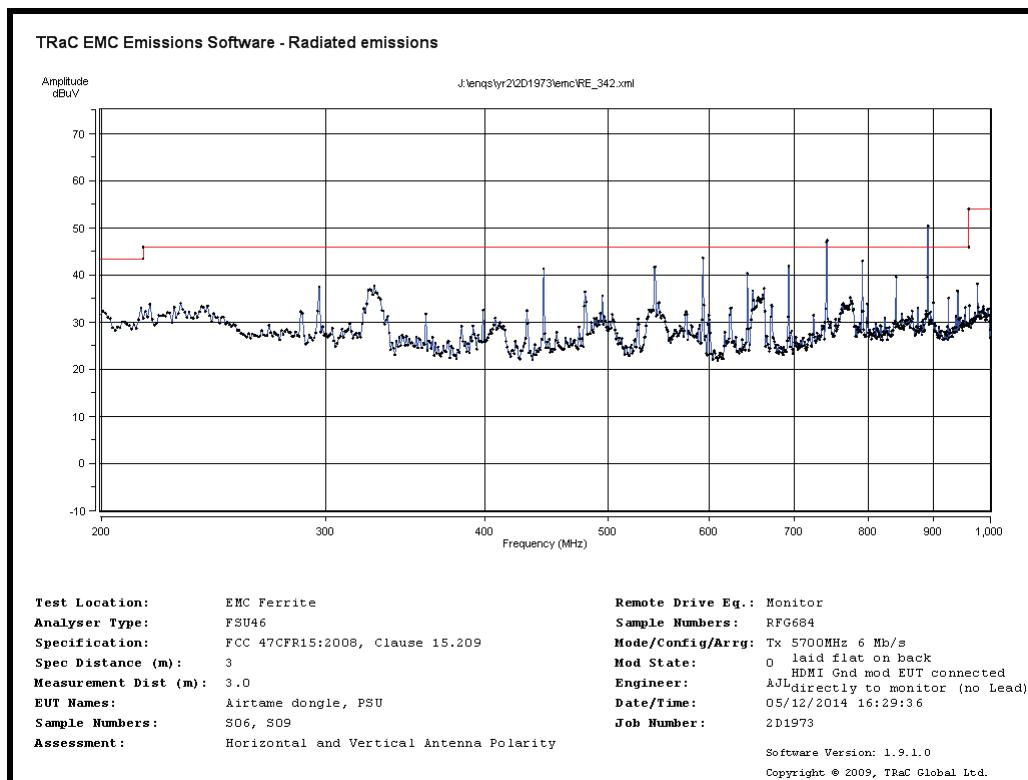
### Radiated Spurious emissions 26.5GHz to 33GHz – 5700MHz 54Mb/s



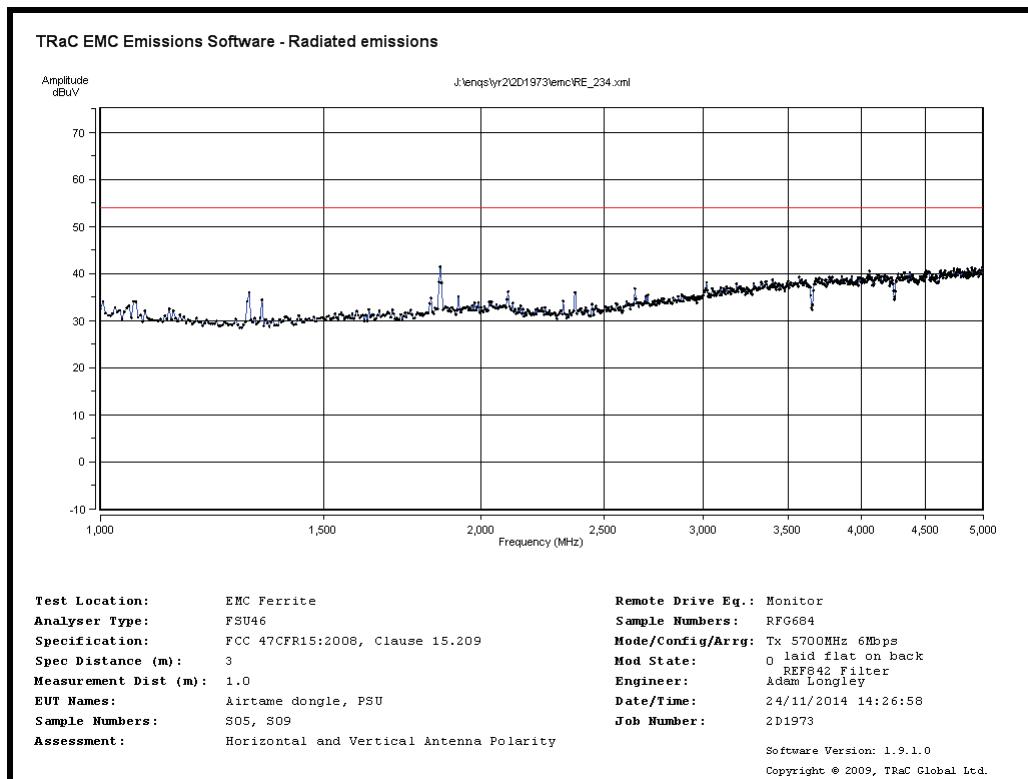
Radiated Spurious emissions 33GHz to 40GHz – 5700MHz 54Mb/s



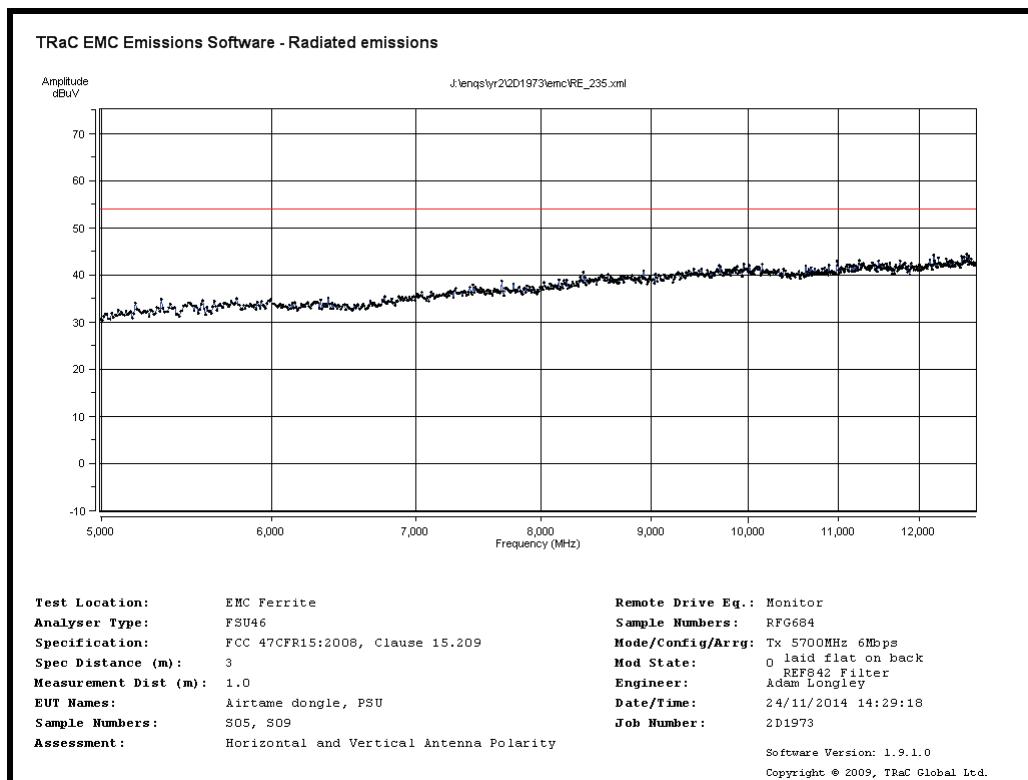
Radiated Spurious emissions 30MHz to 200MHz – 5700MHz 6Mb/s



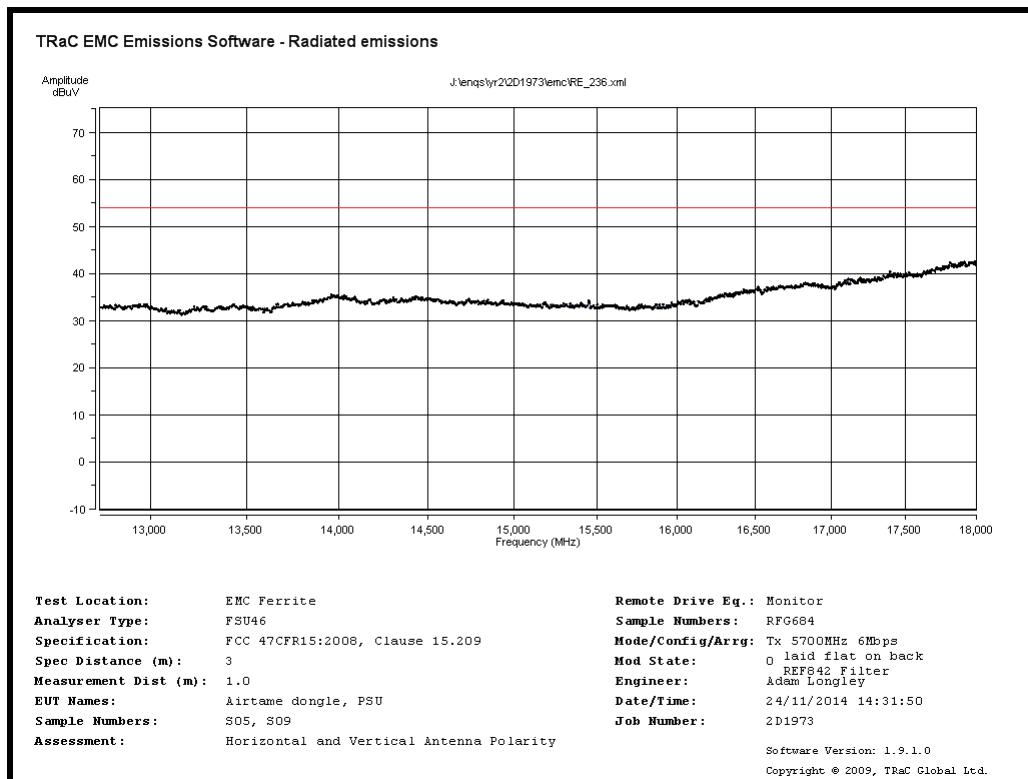
Radiated Spurious emissions 200MHz to 1GHz – 5700MHz 6Mb/s



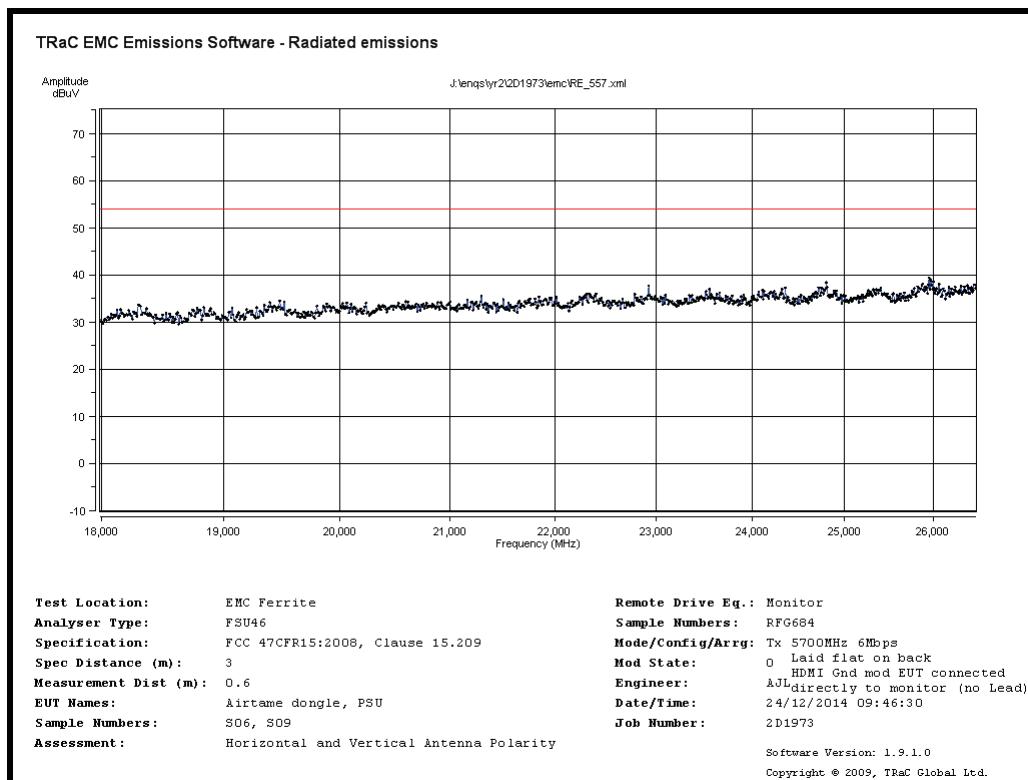
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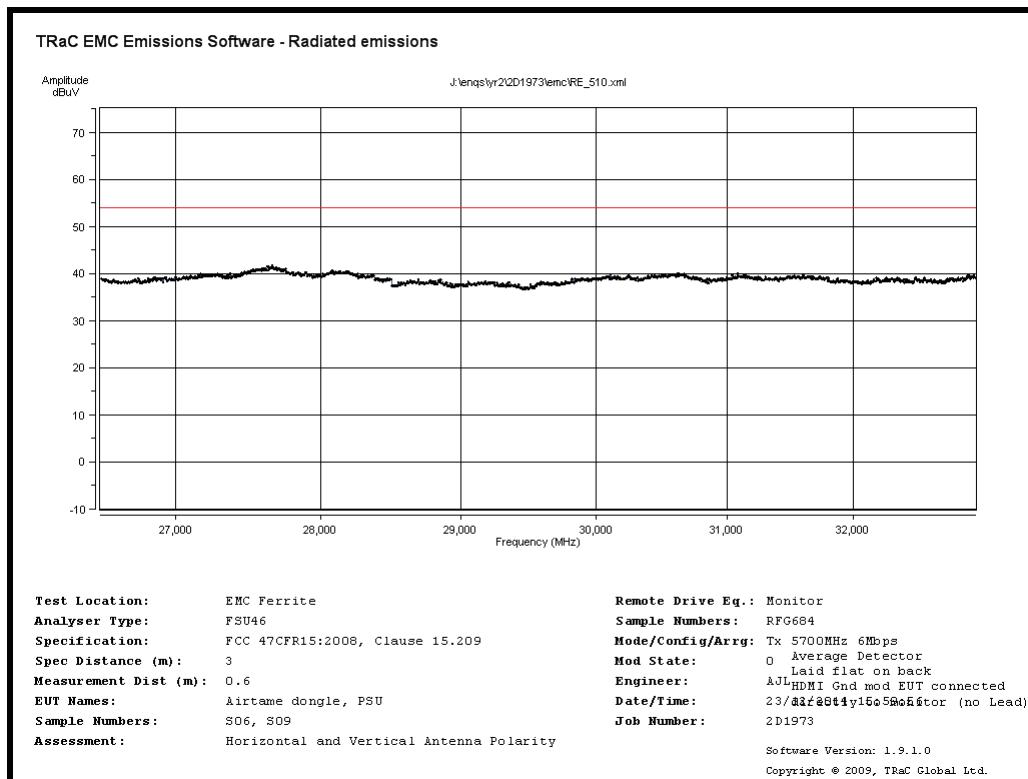
### Radiated Spurious emissions 5GHz to 12.5GHz – 5700MHz 6Mb/s



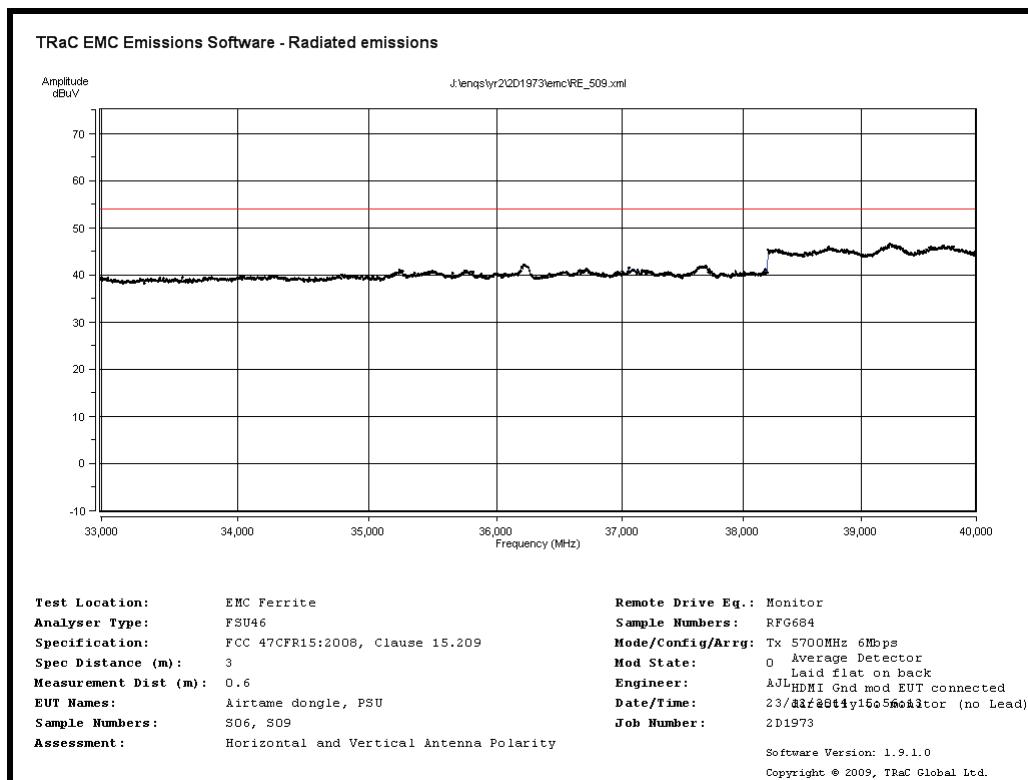
### Radiated Spurious emissions 12.5GHz to 18GHz – 5700MHz 6Mb/s



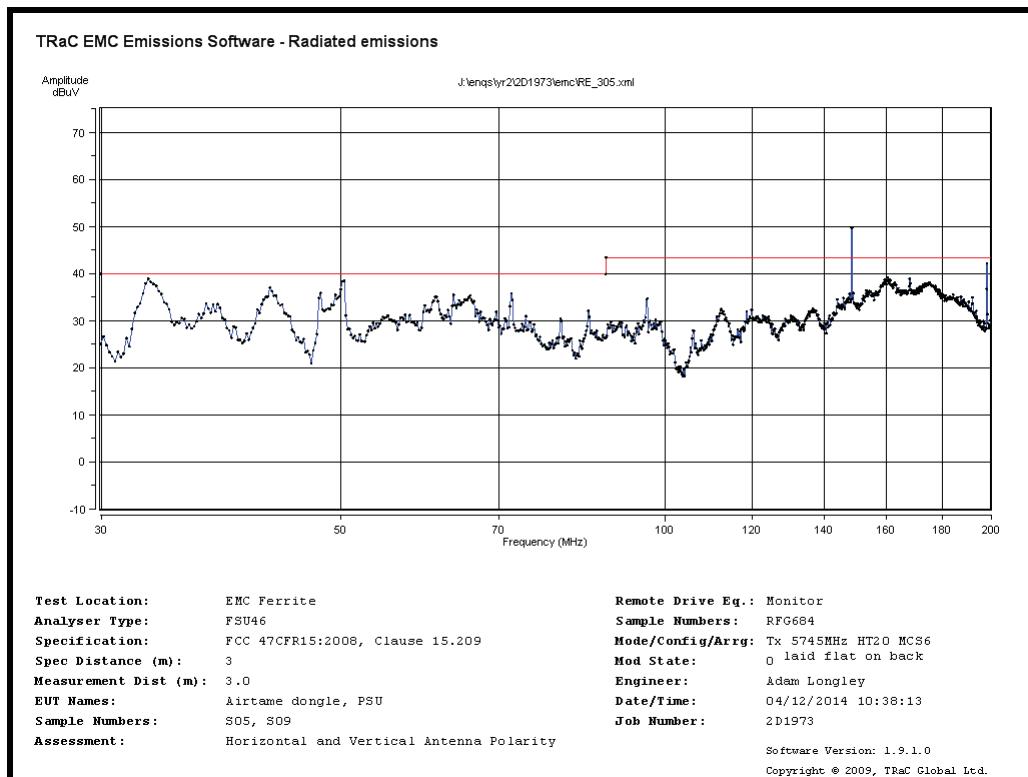
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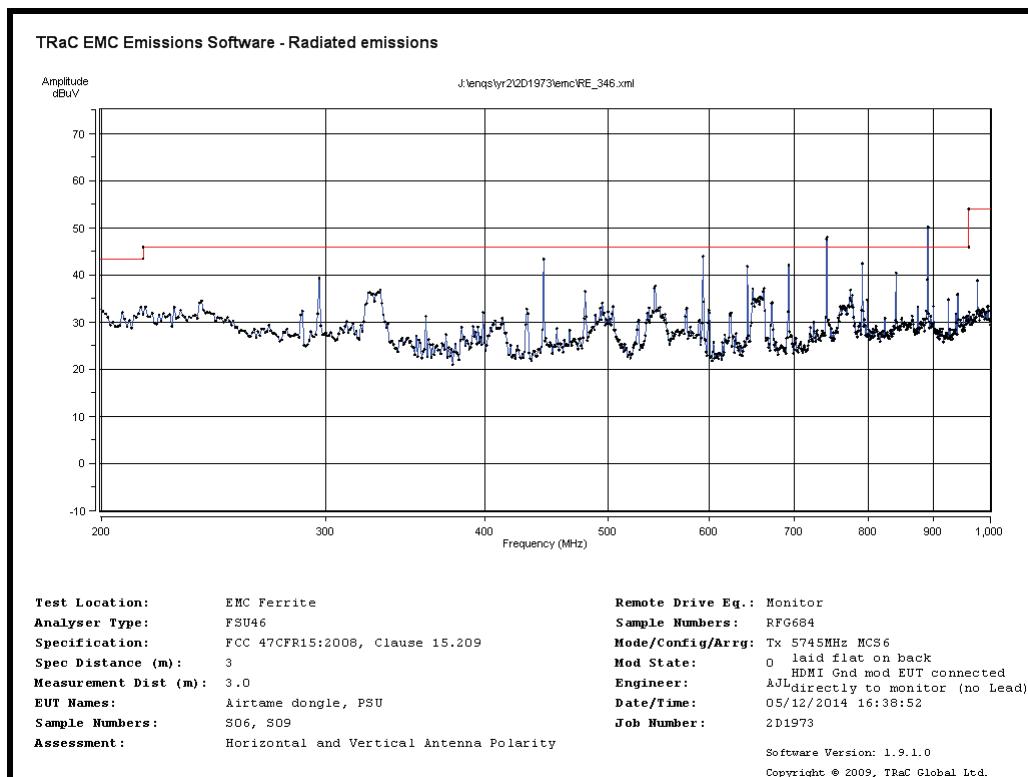
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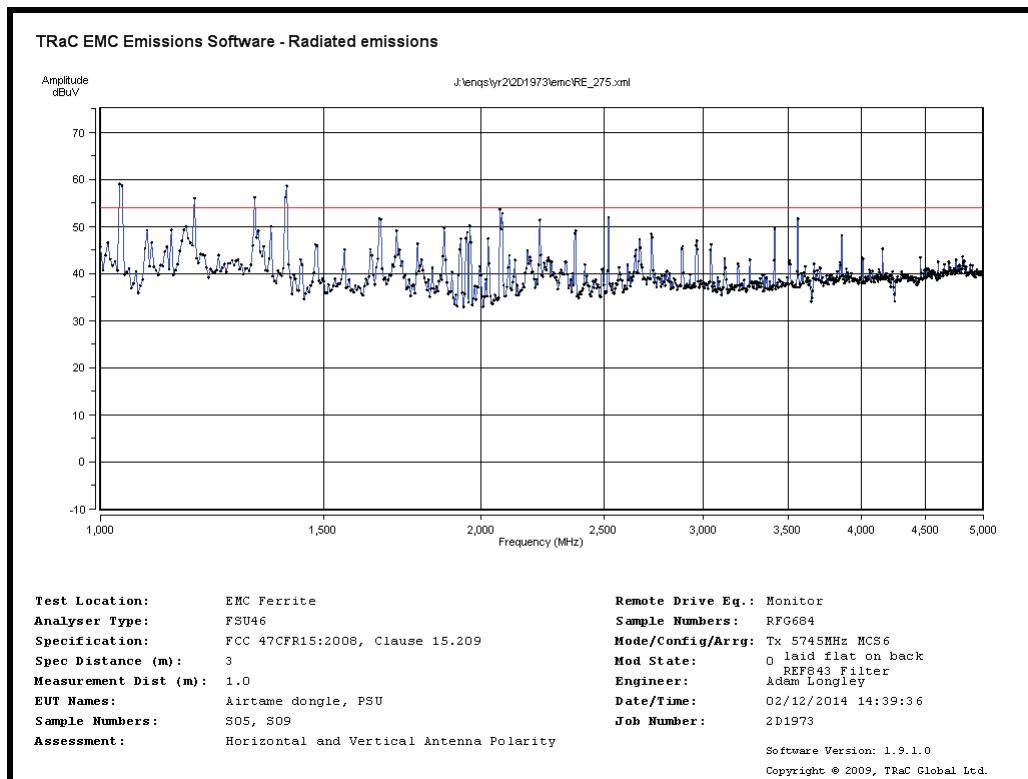
### Radiated Spurious emissions 33GHz to 40GHz – 5700MHz 6Mb/s



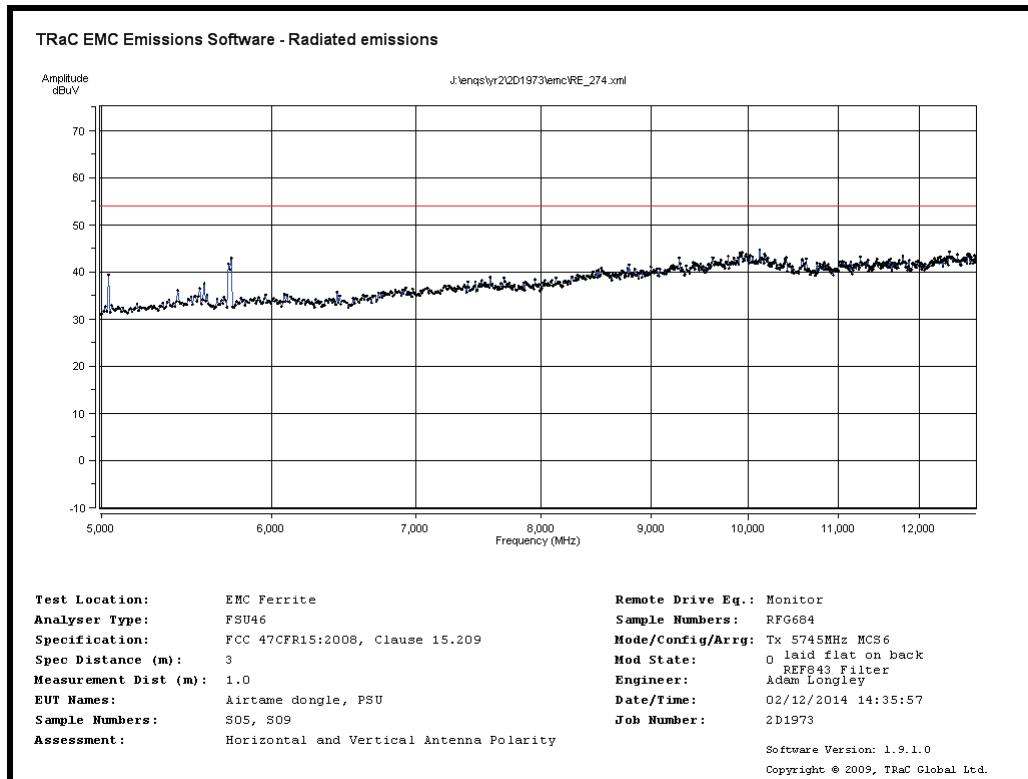
### Radiated Spurious emissions 30MHz to 200MHz – 5745MHz MCS6



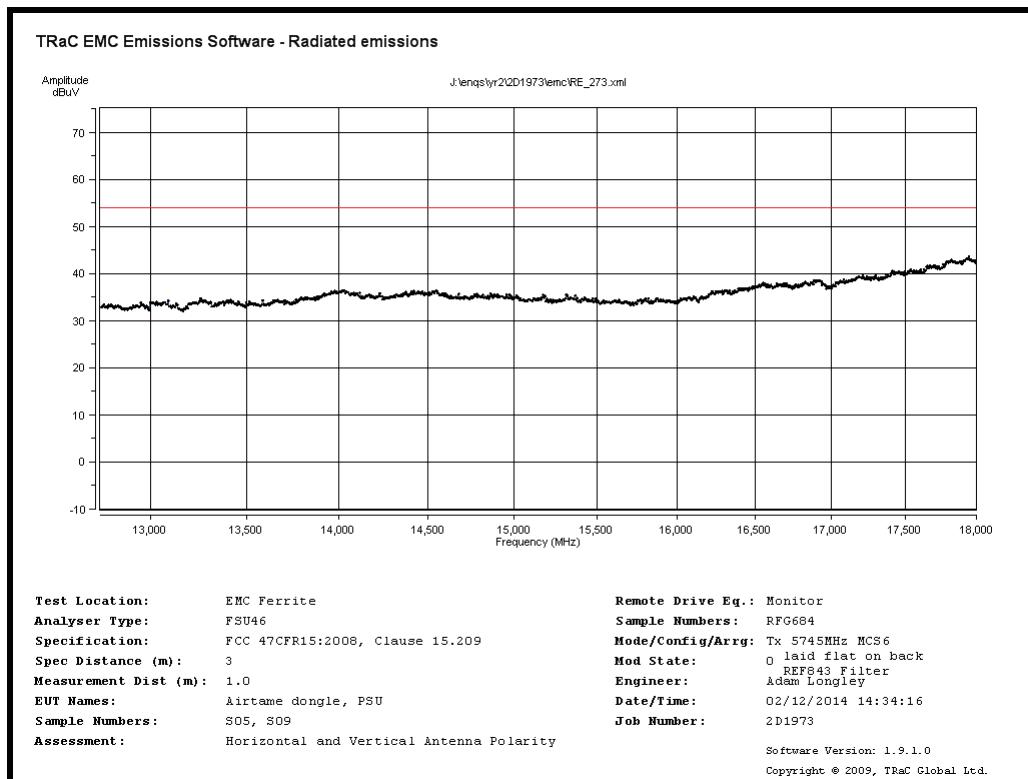
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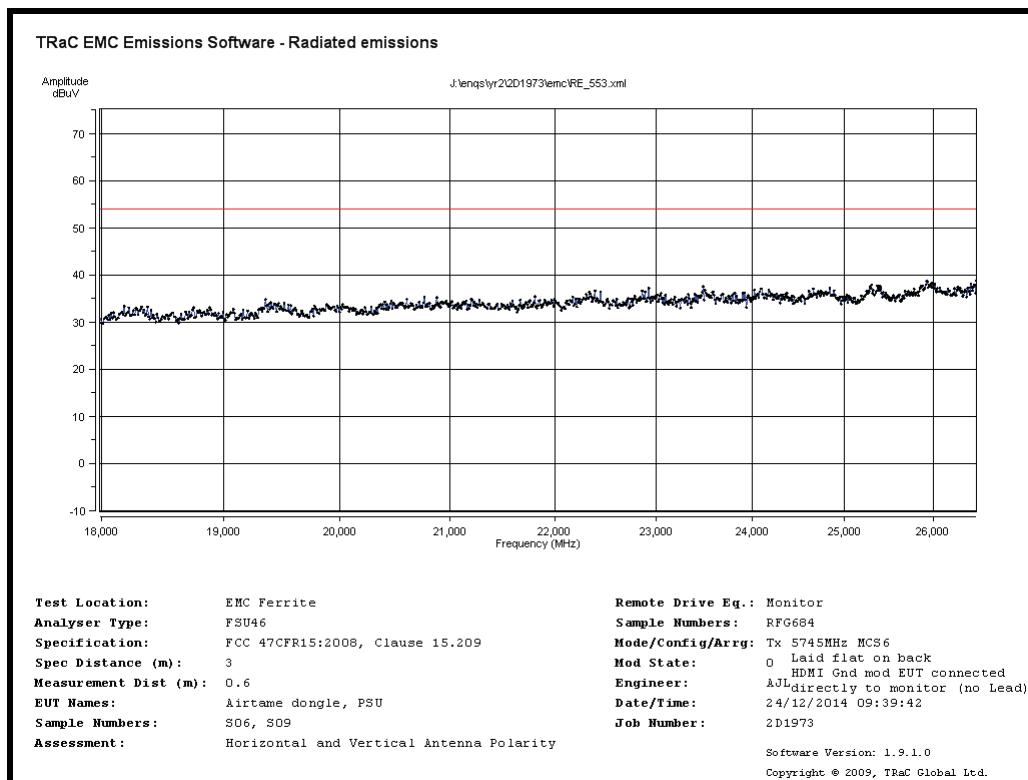
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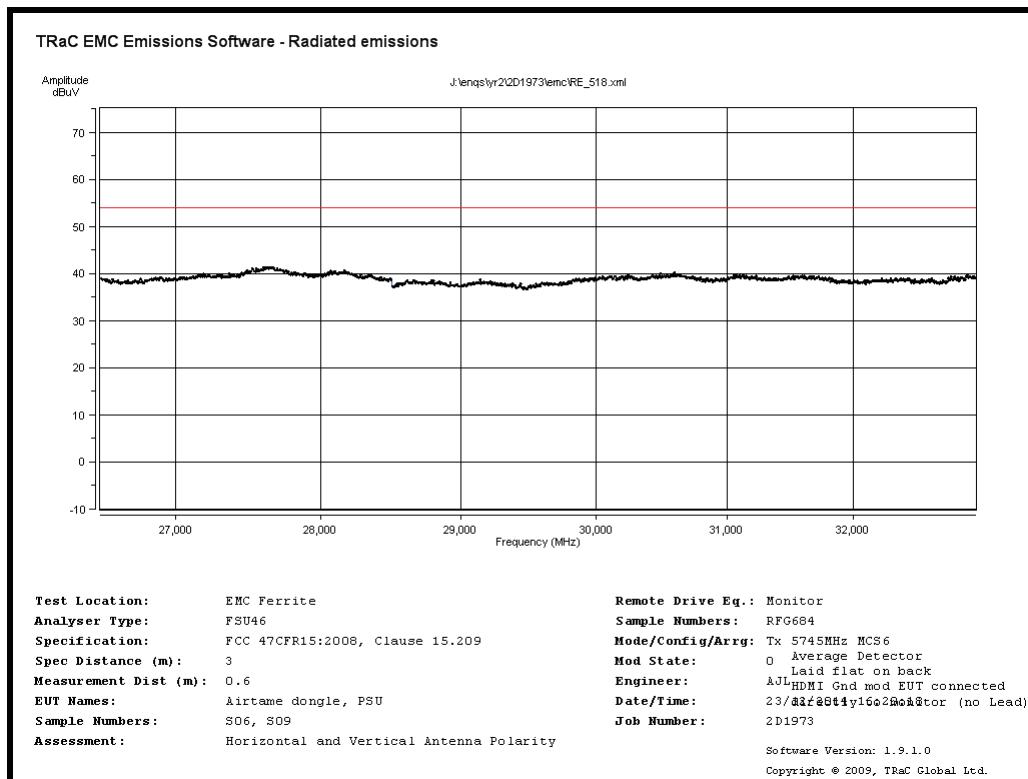
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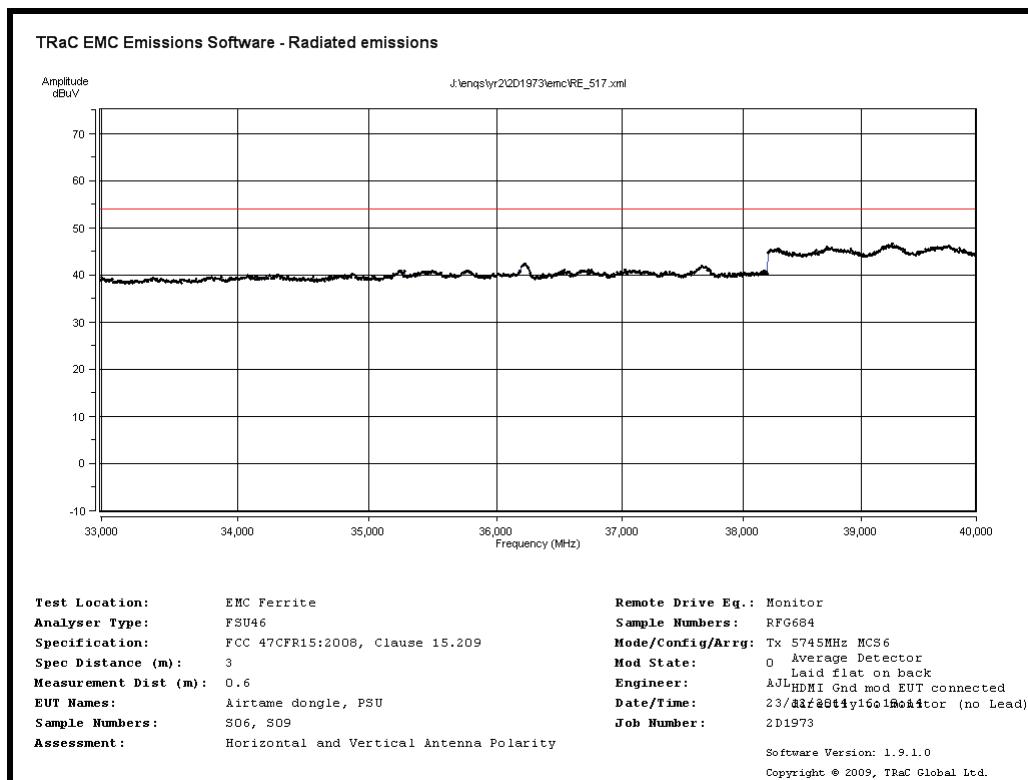
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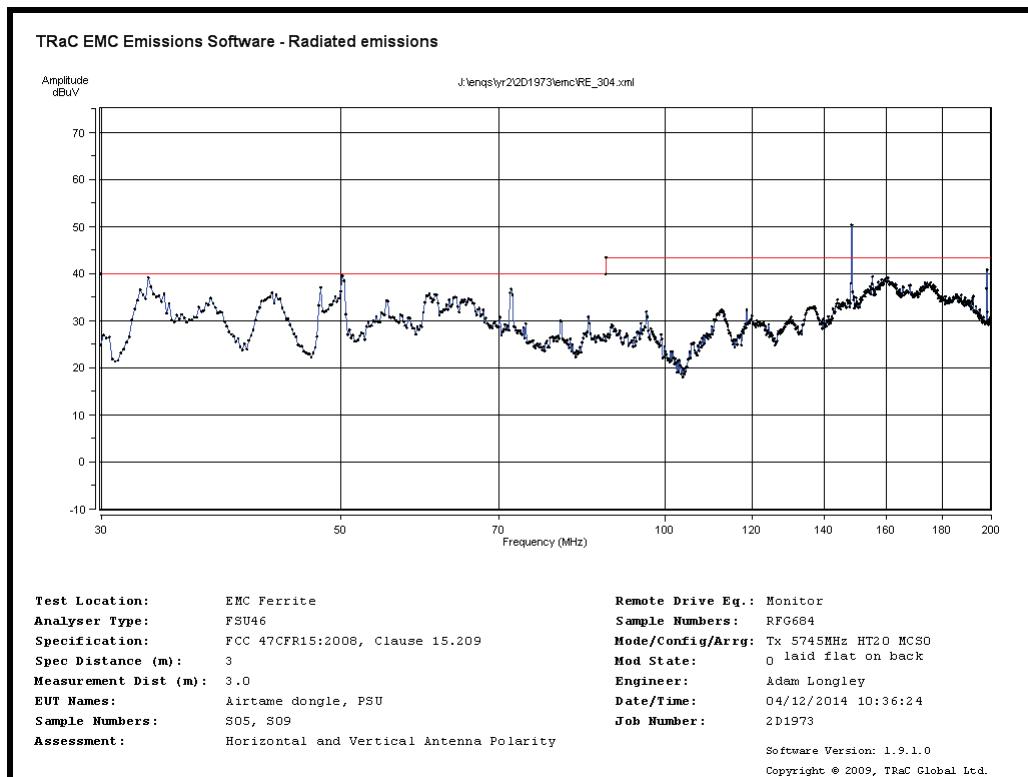
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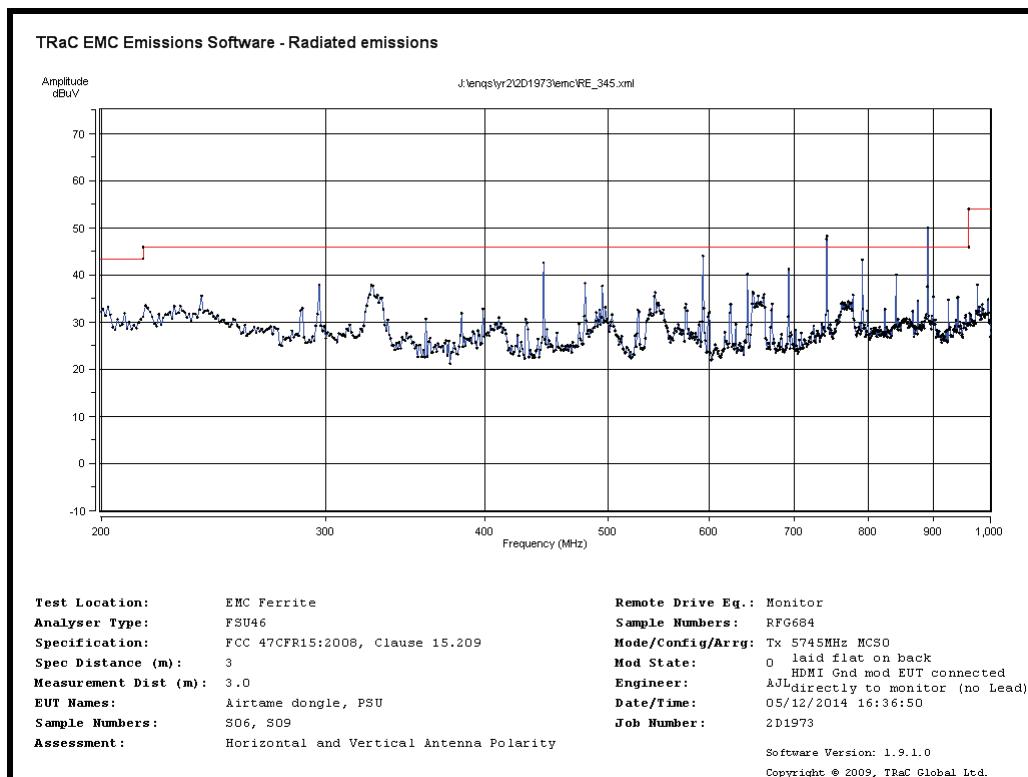
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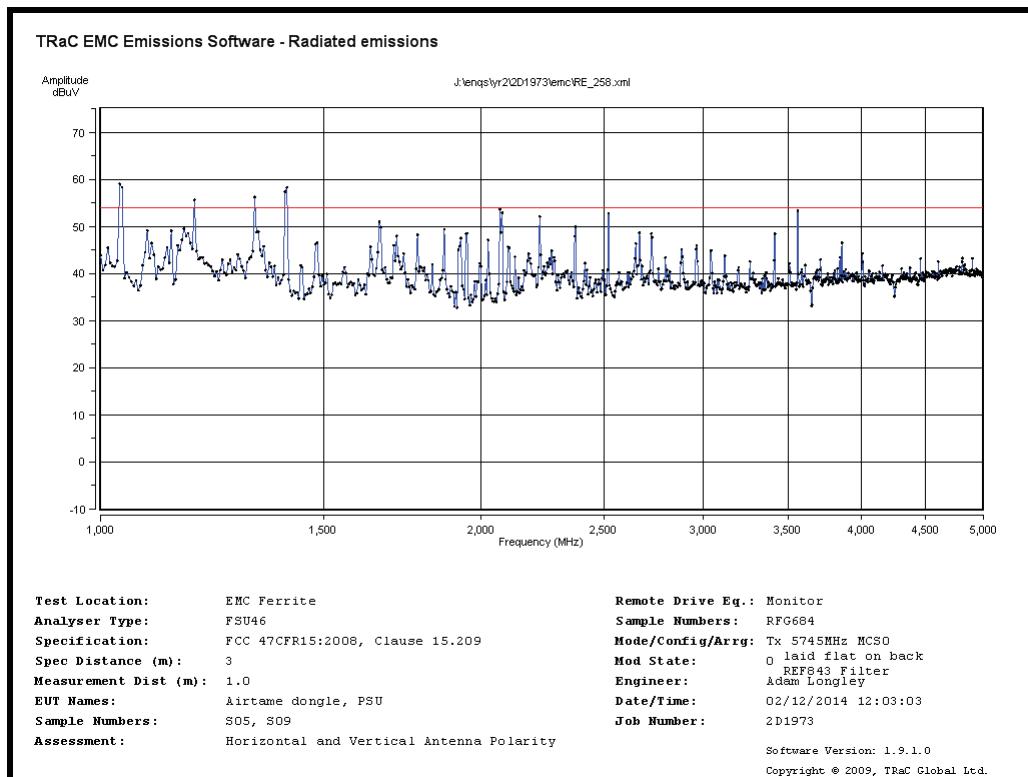
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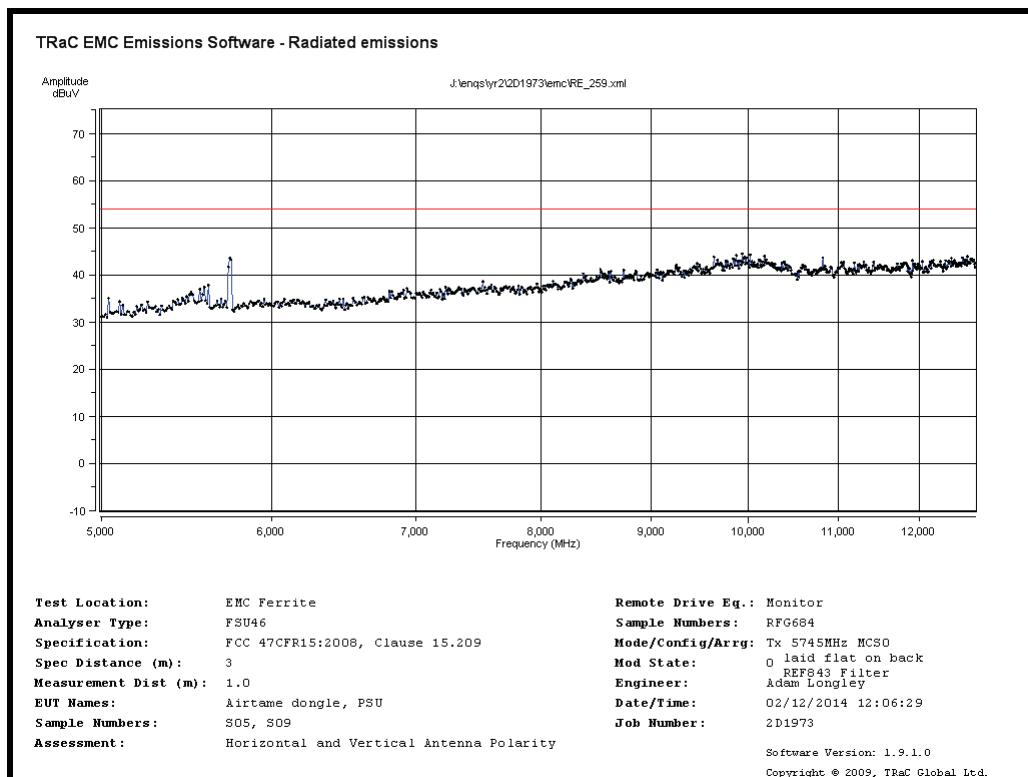
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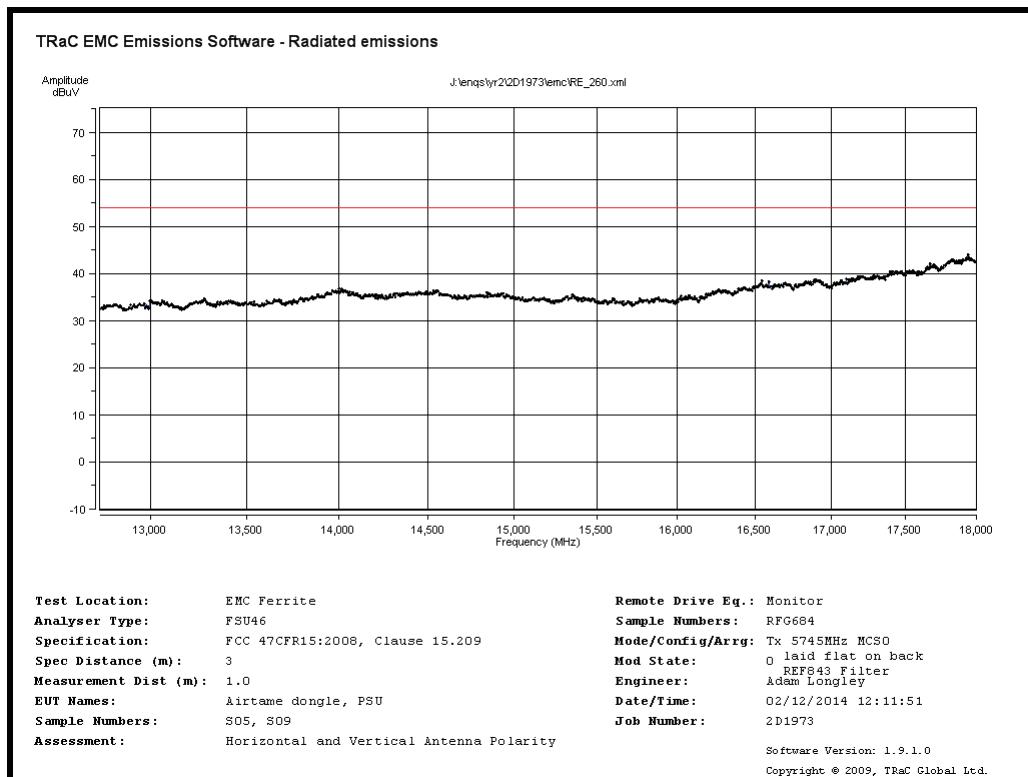
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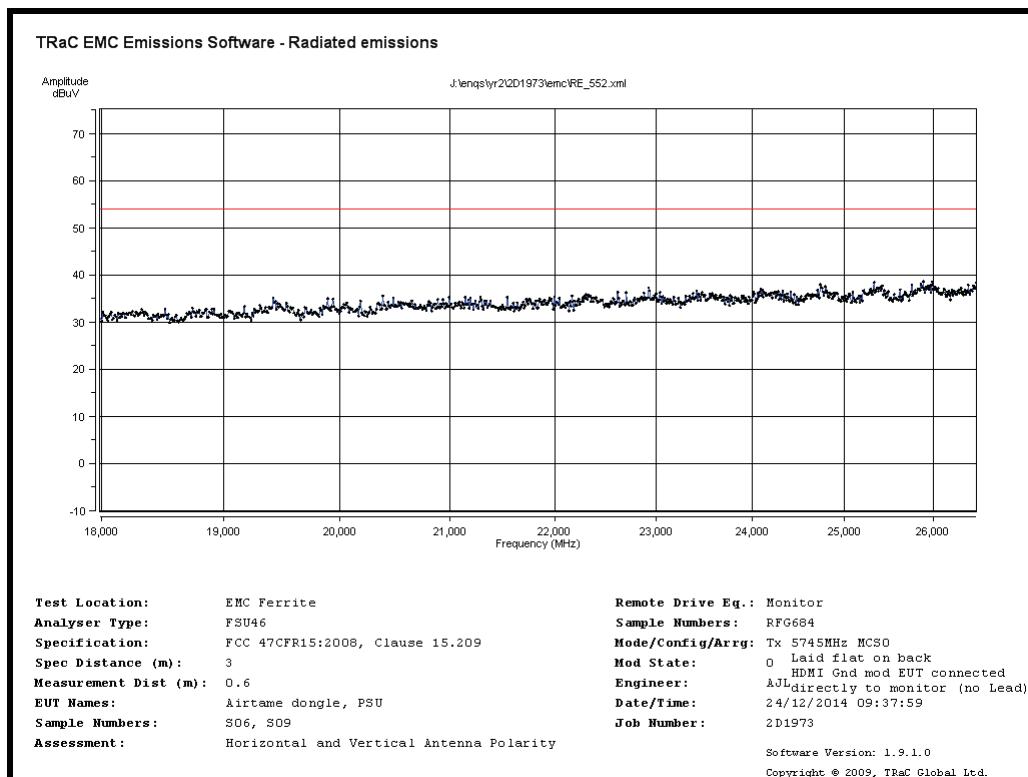
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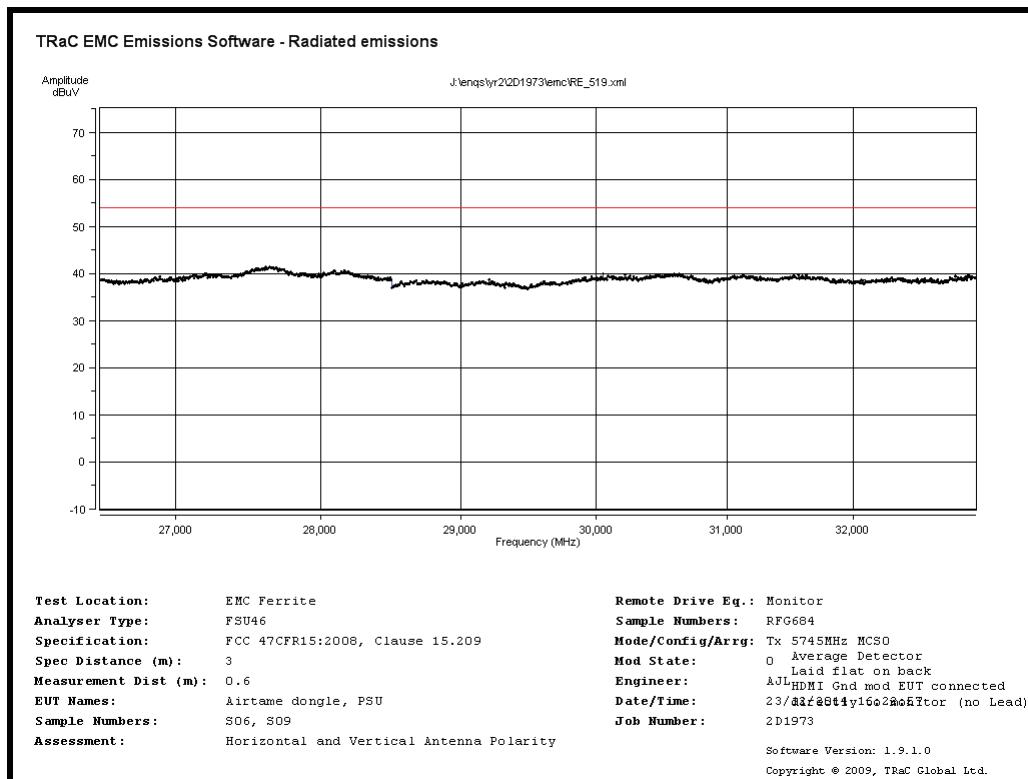
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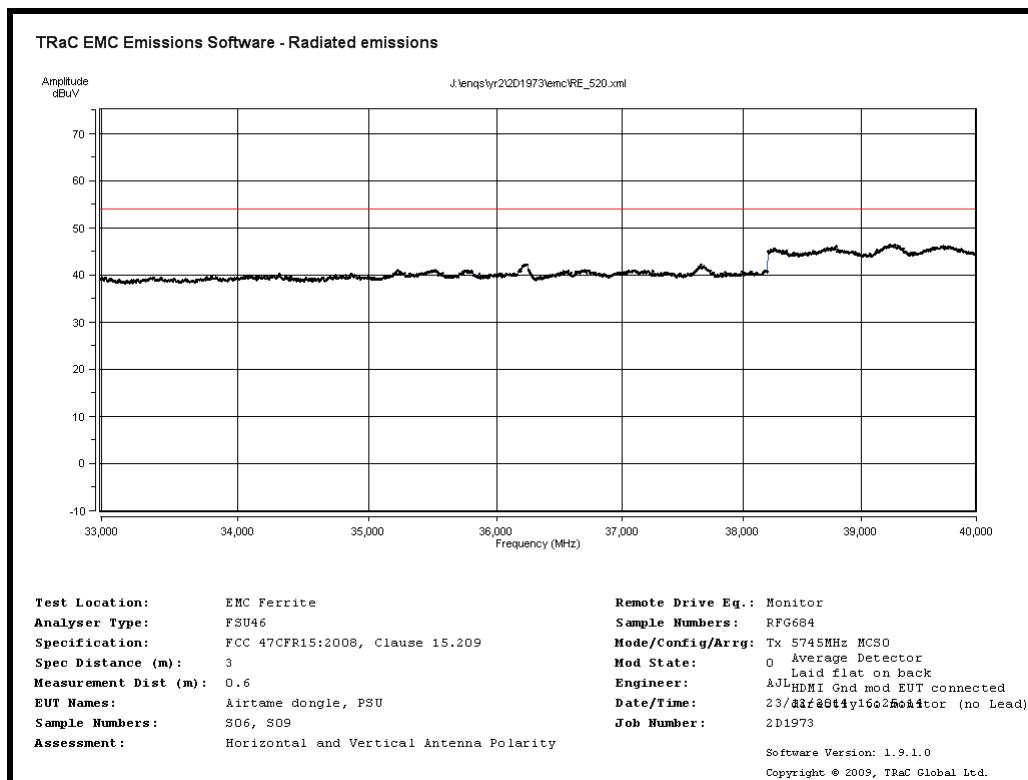
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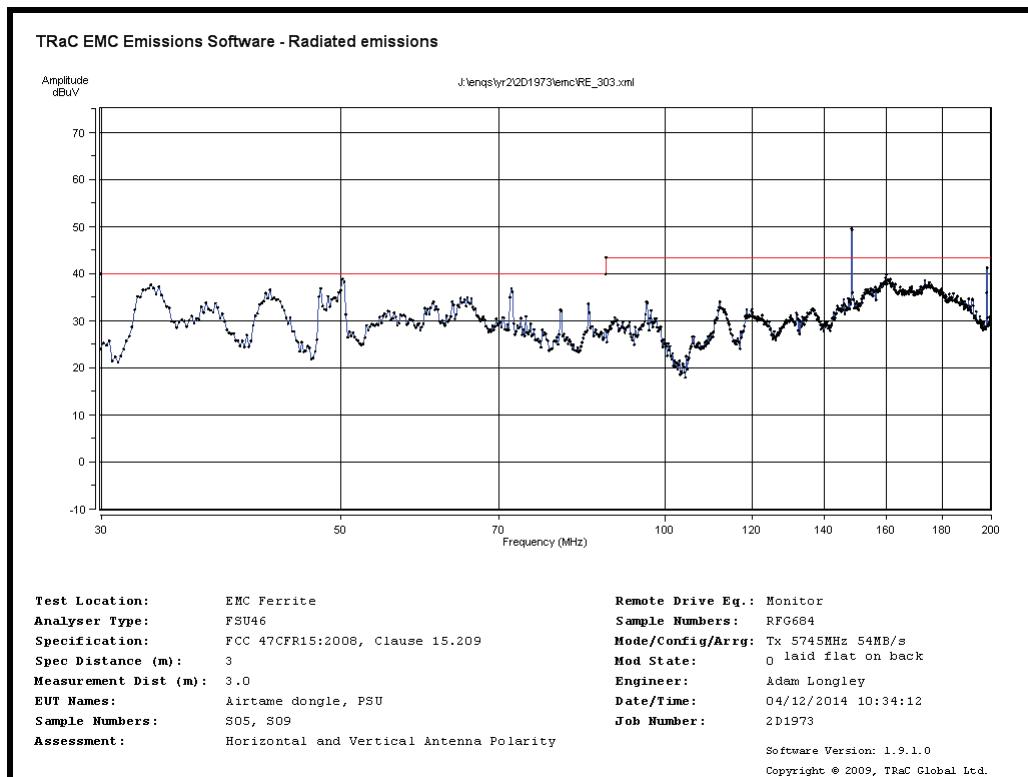
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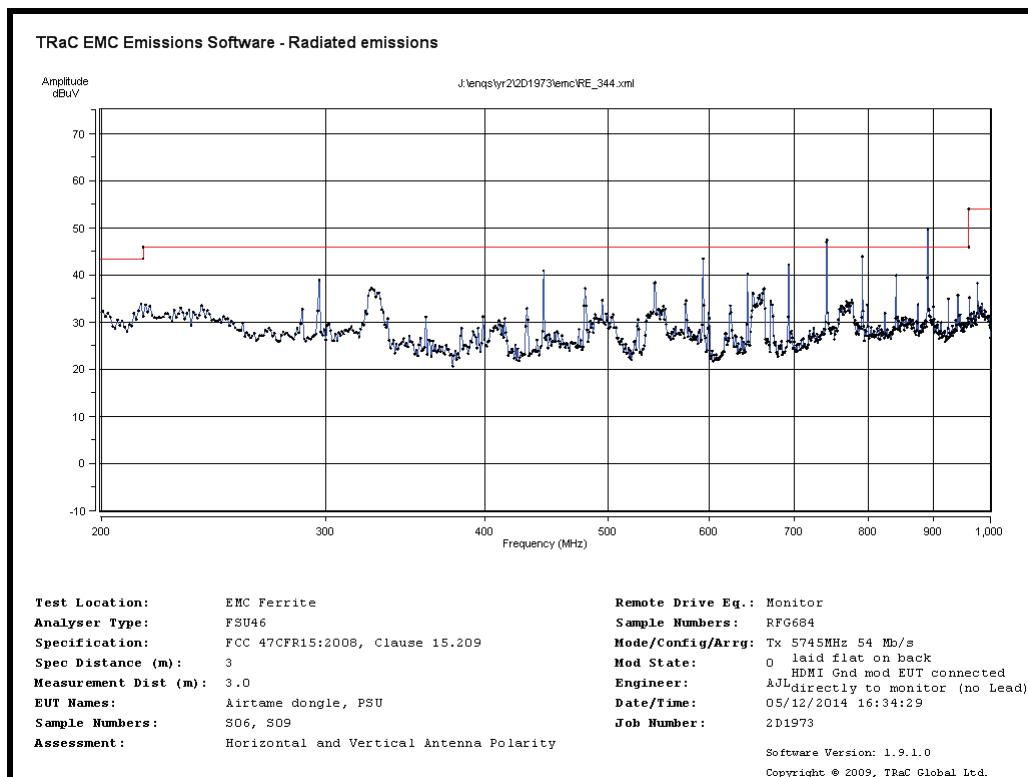
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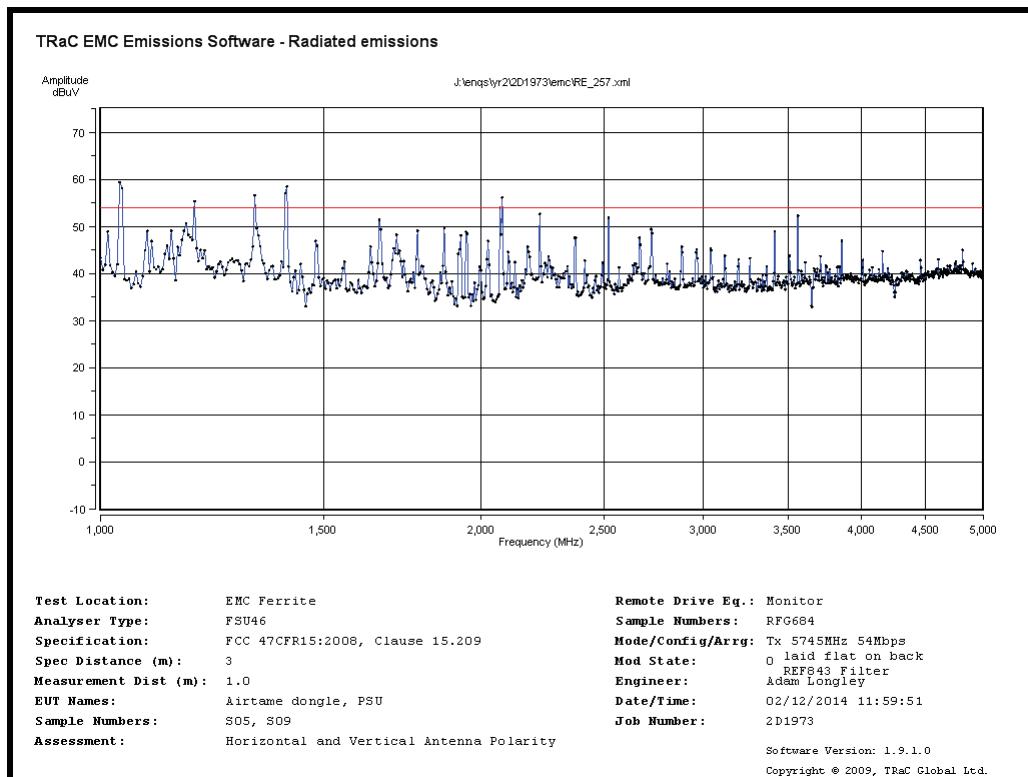
### Radiated Spurious emissions 33GHz to 40GHz – 5745MHz MCS0



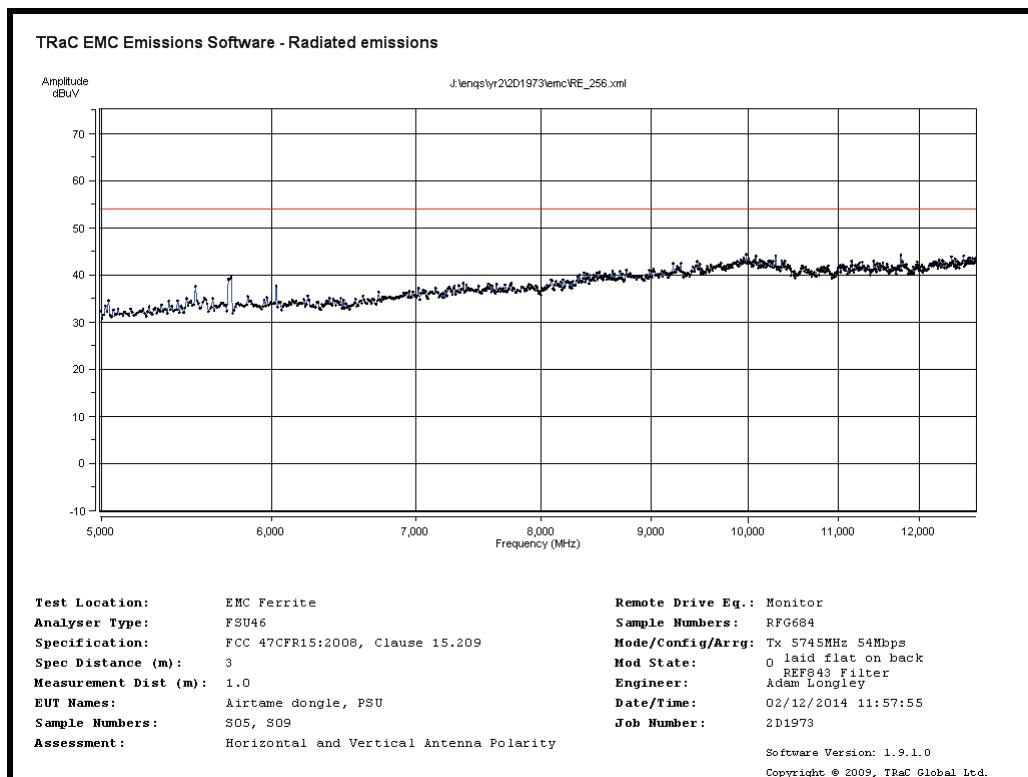
### Radiated Spurious emissions 30MHz to 200MHz – 5745MHz 54Mb/s



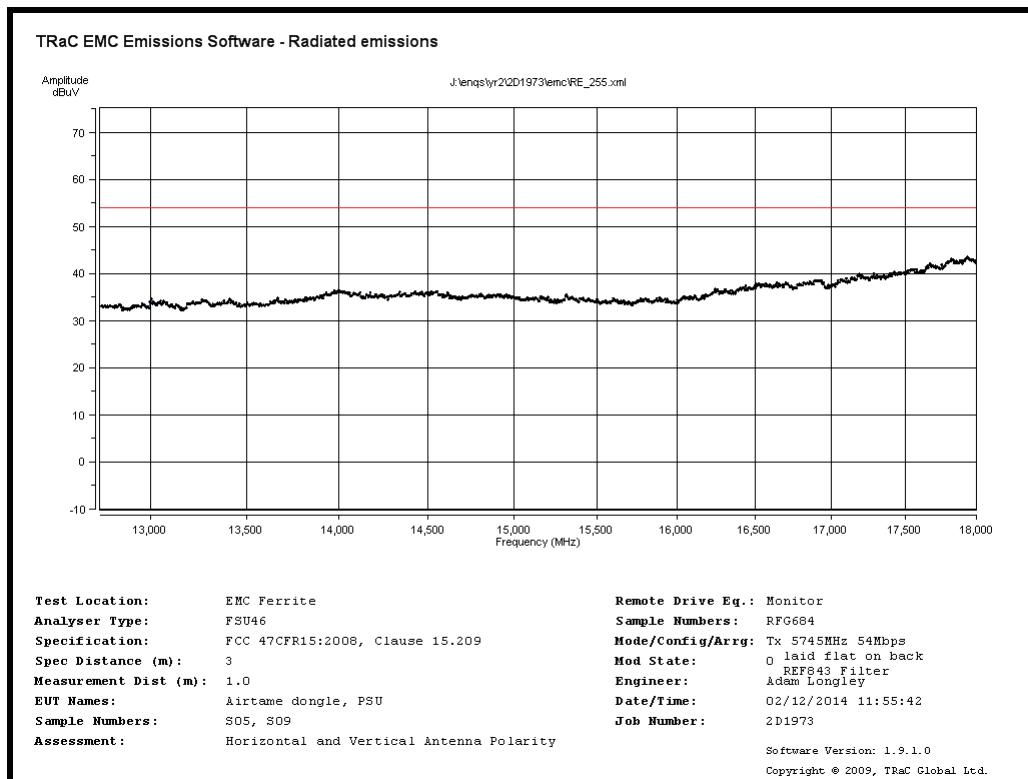
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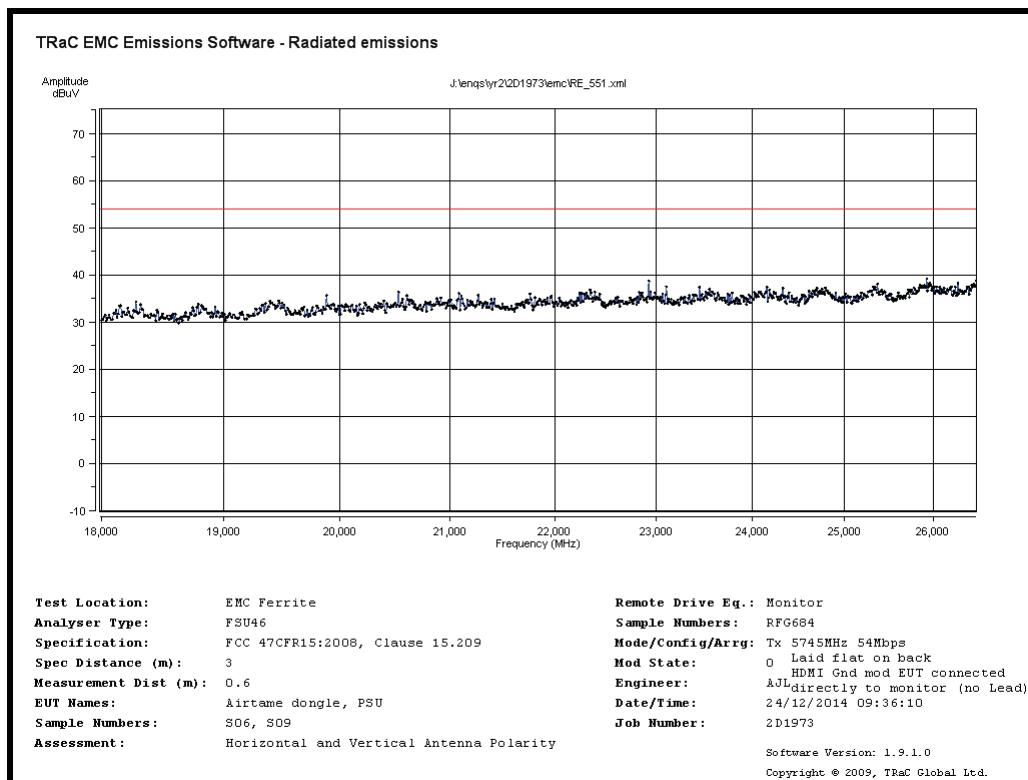
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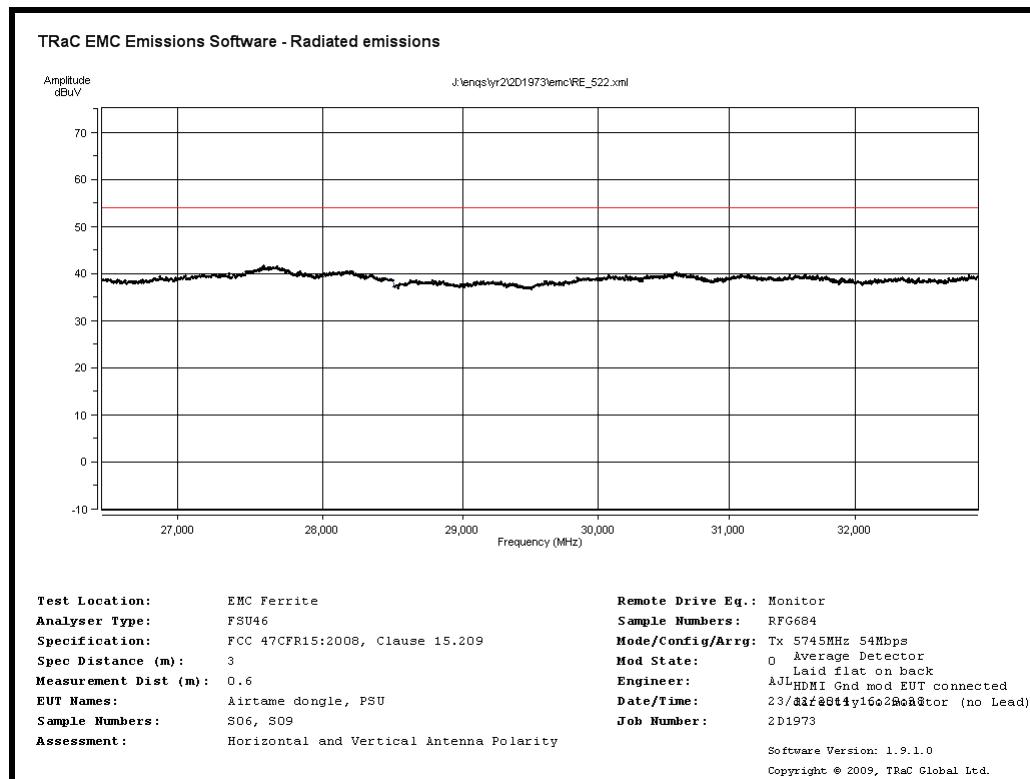
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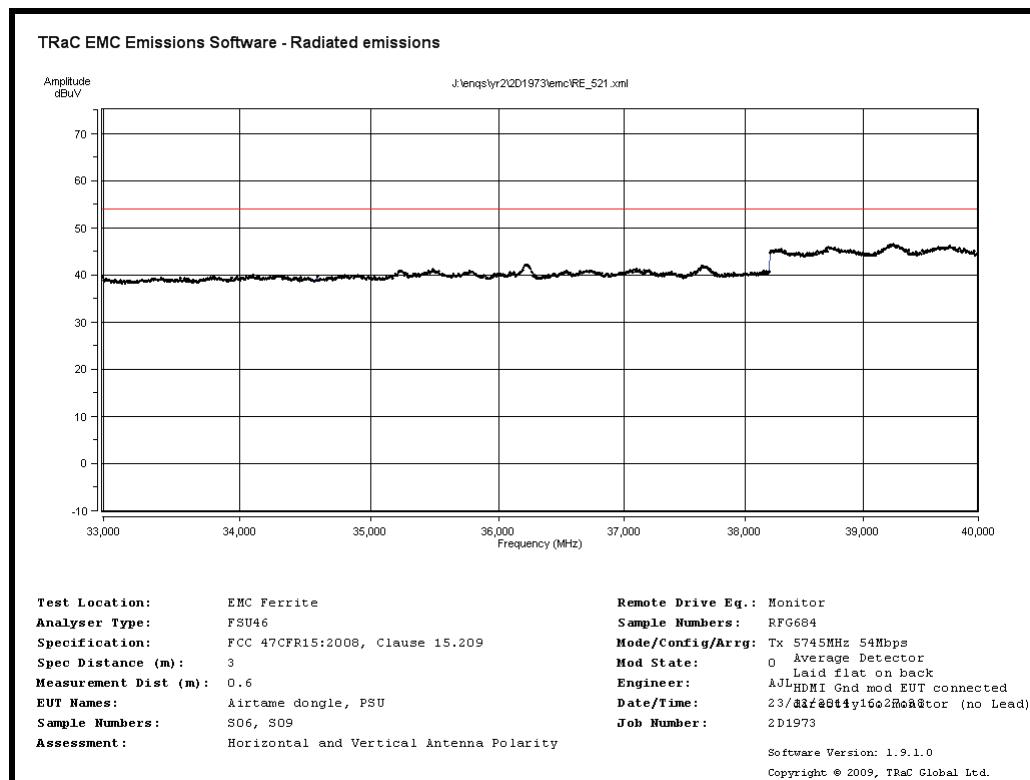
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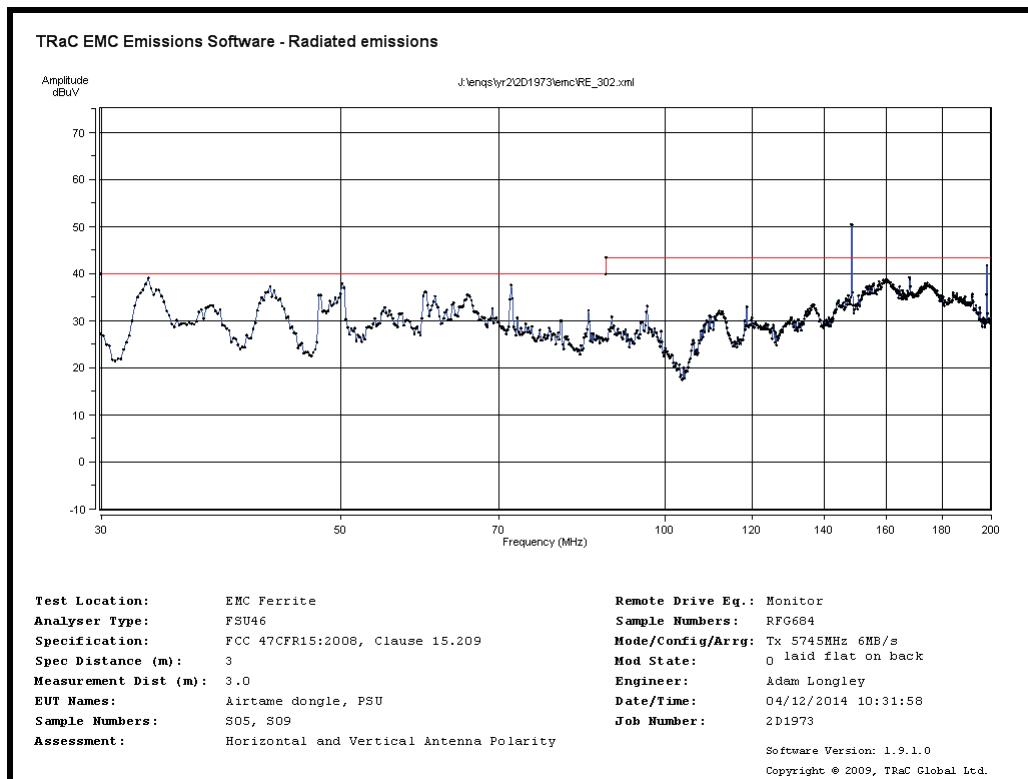
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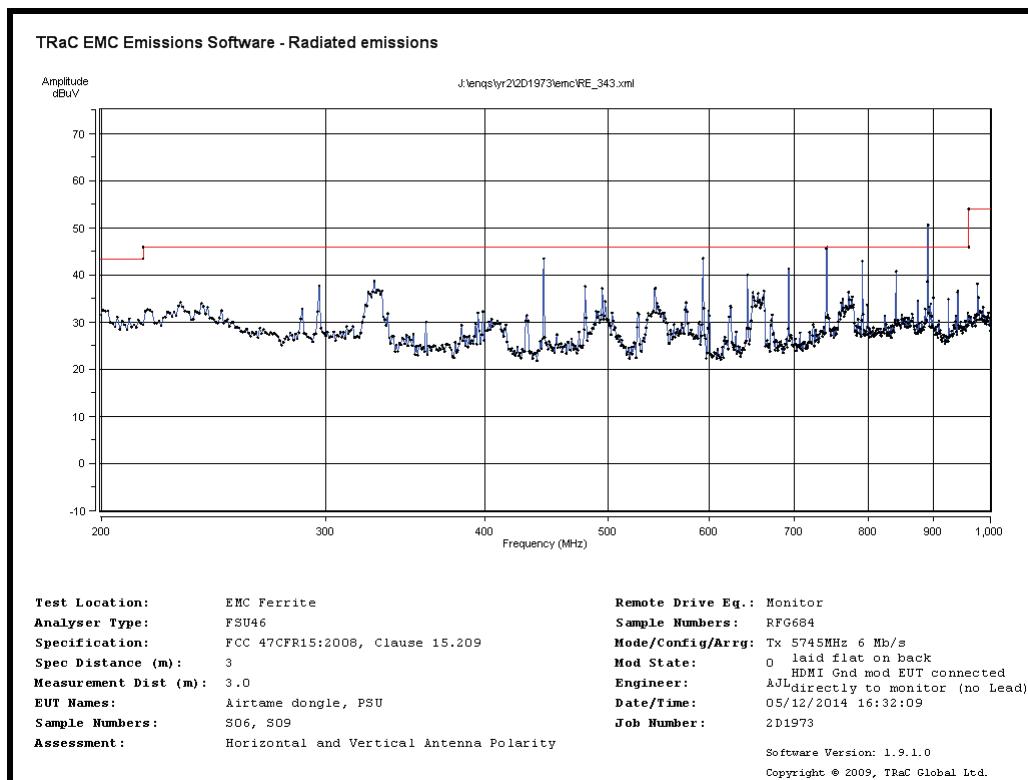
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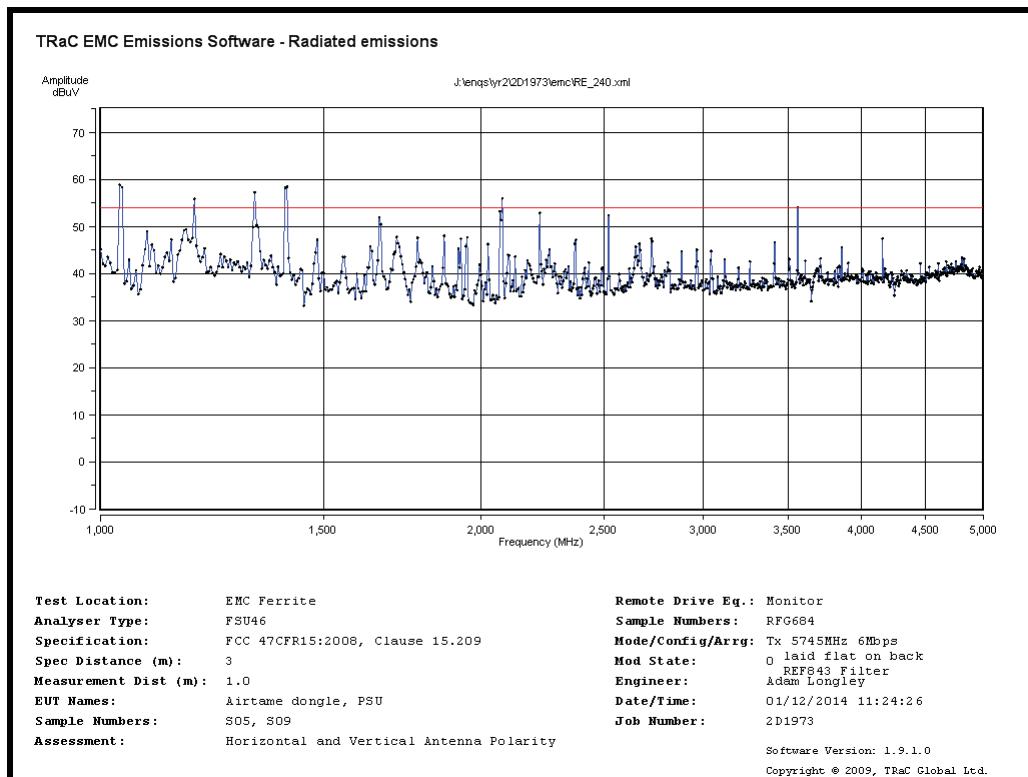
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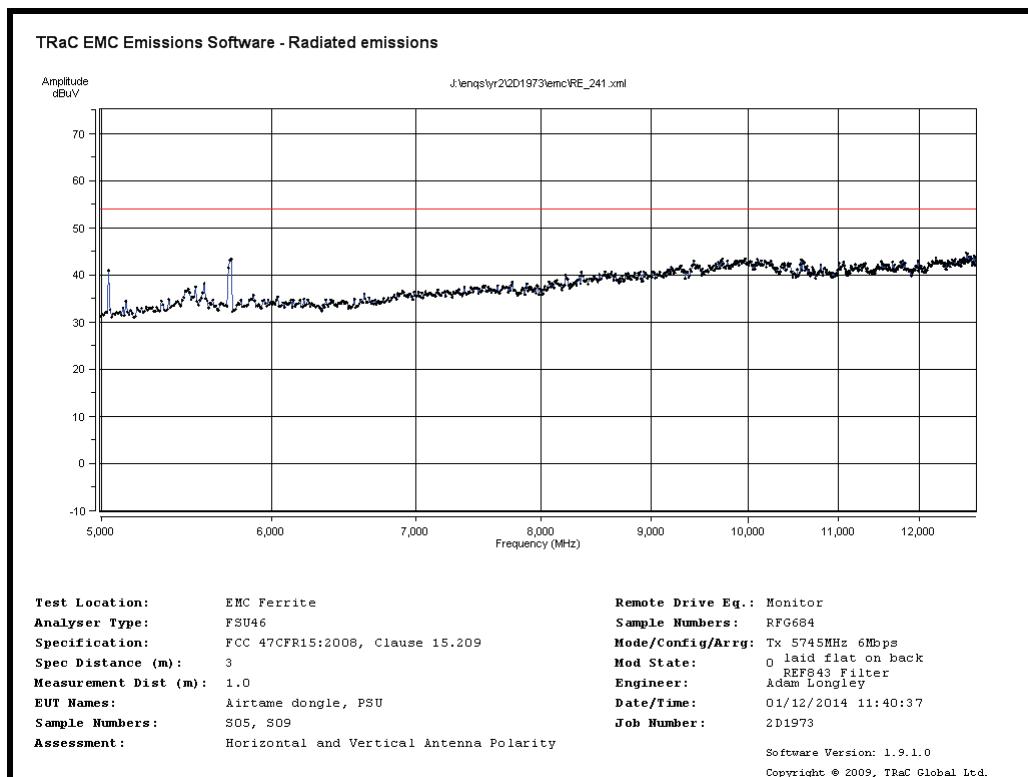
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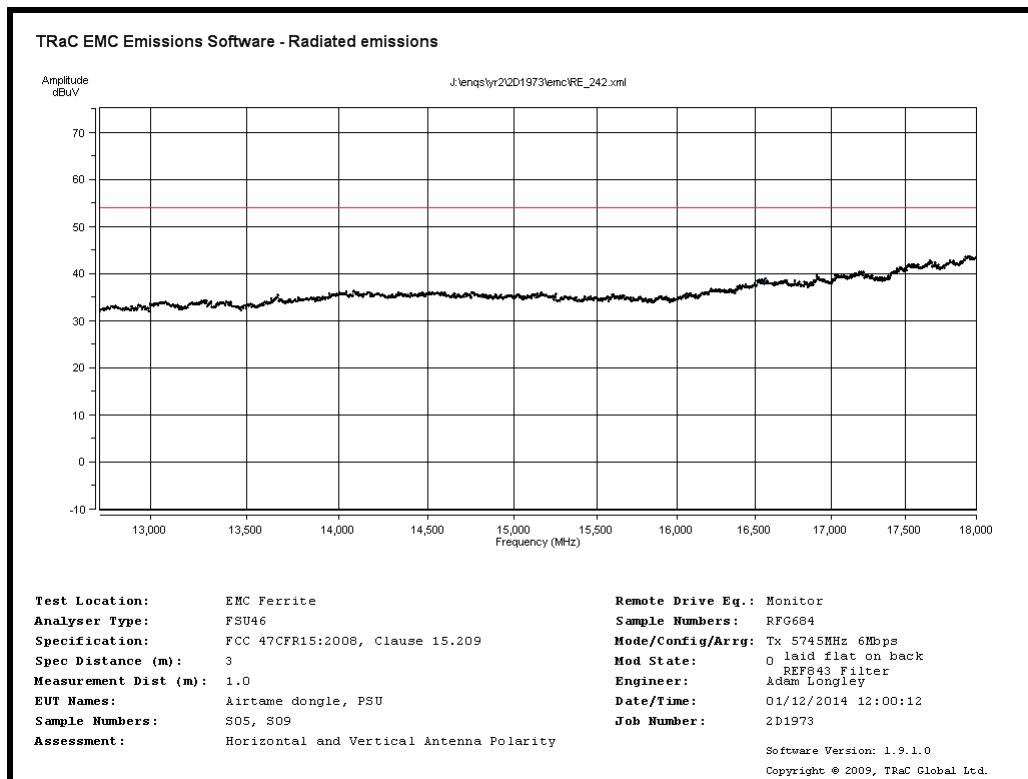
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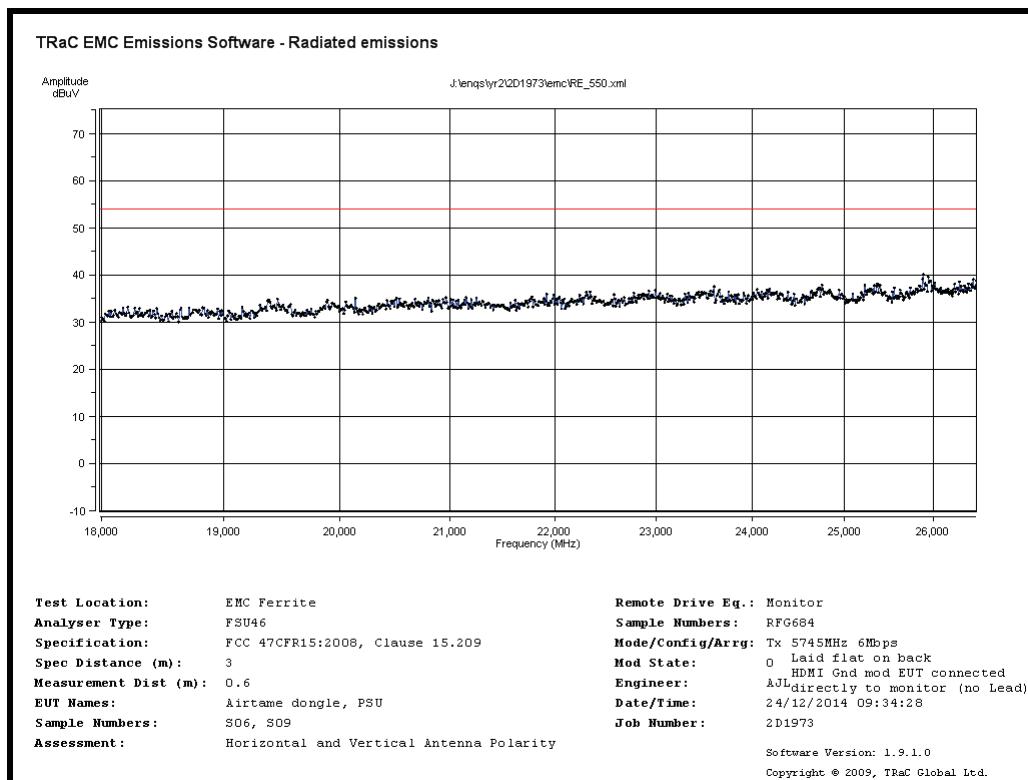
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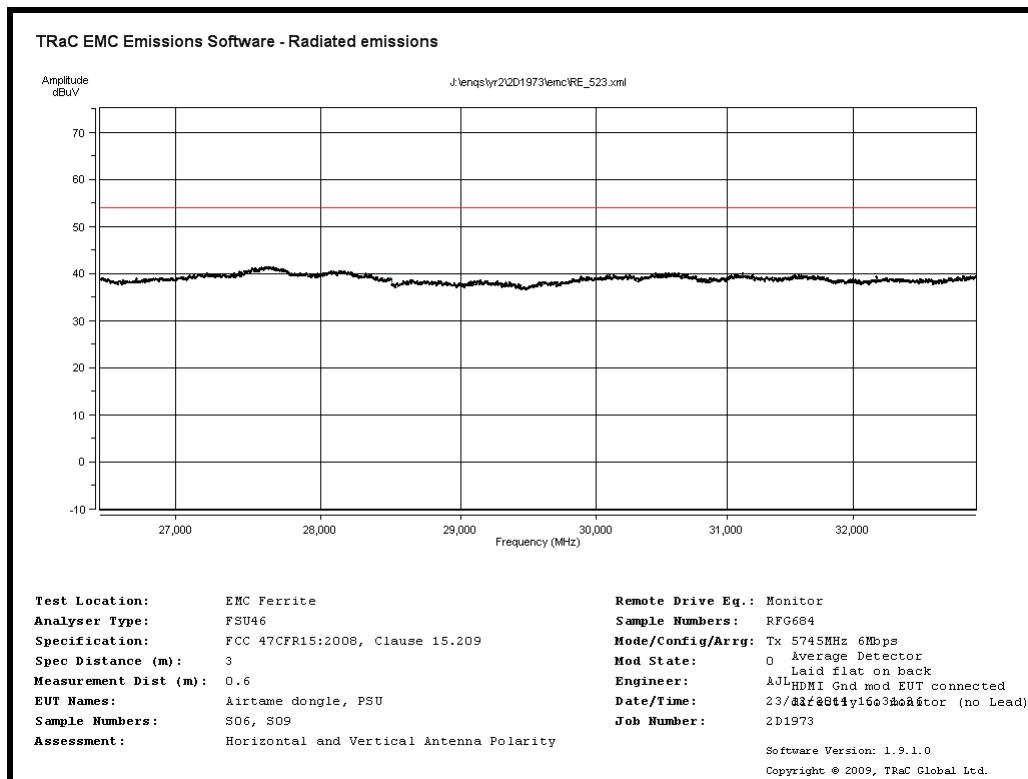
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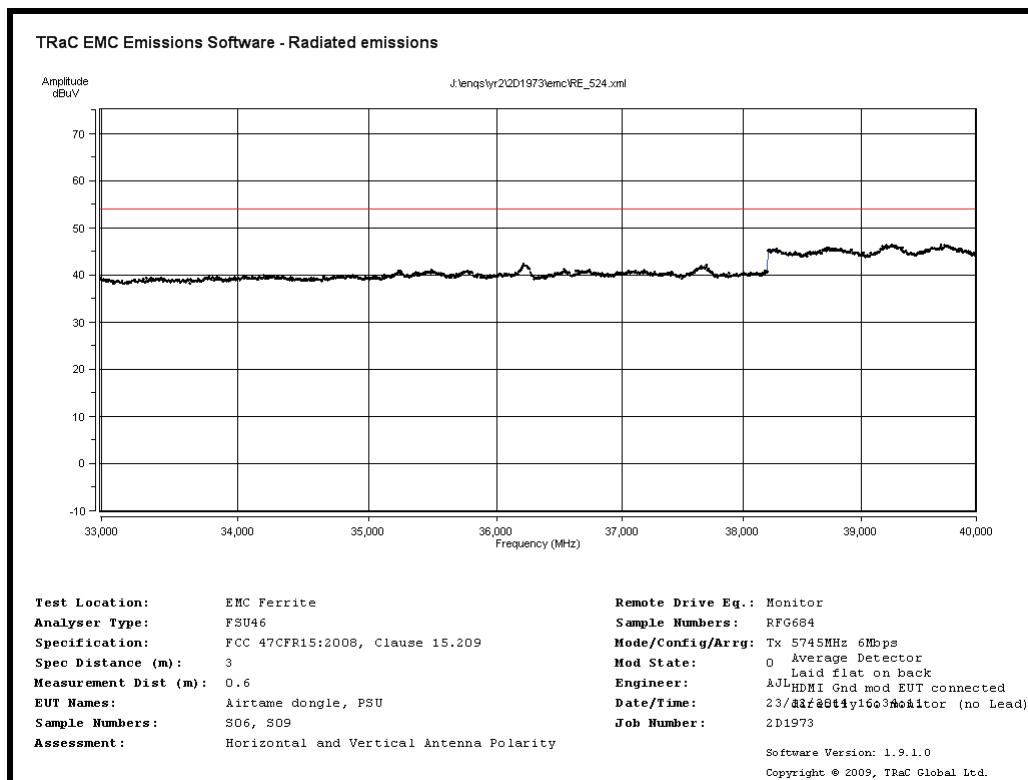
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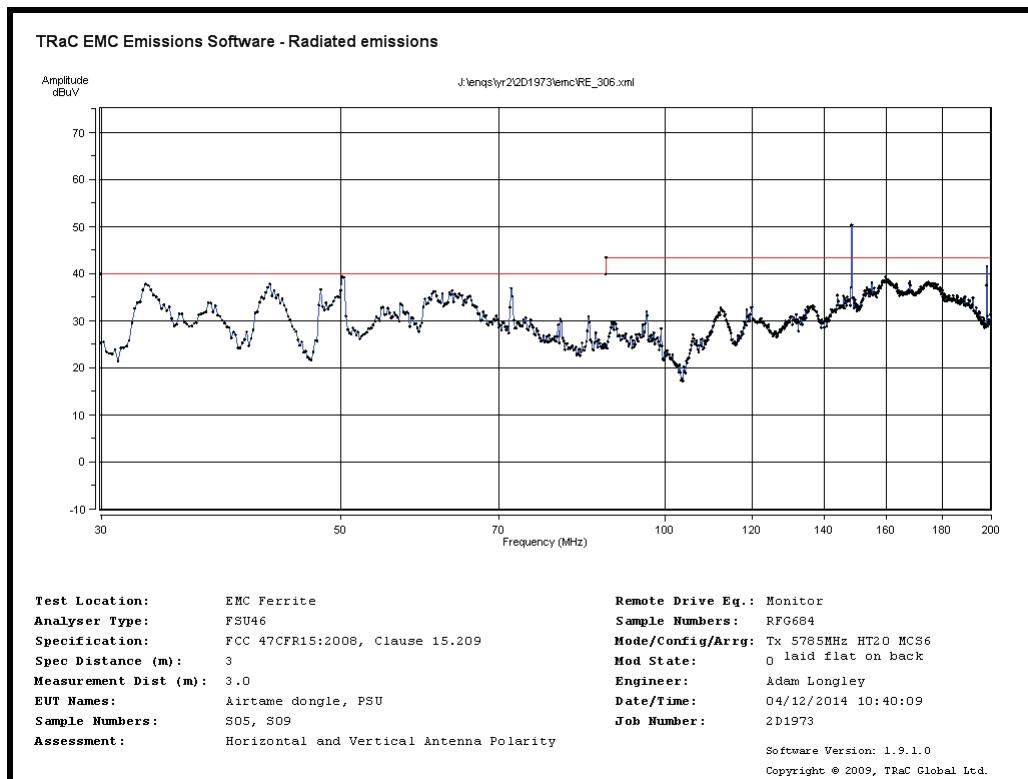
### Radiated Spurious emissions 18GHz to 26.5GHz – 5745MHz 6Mb/s



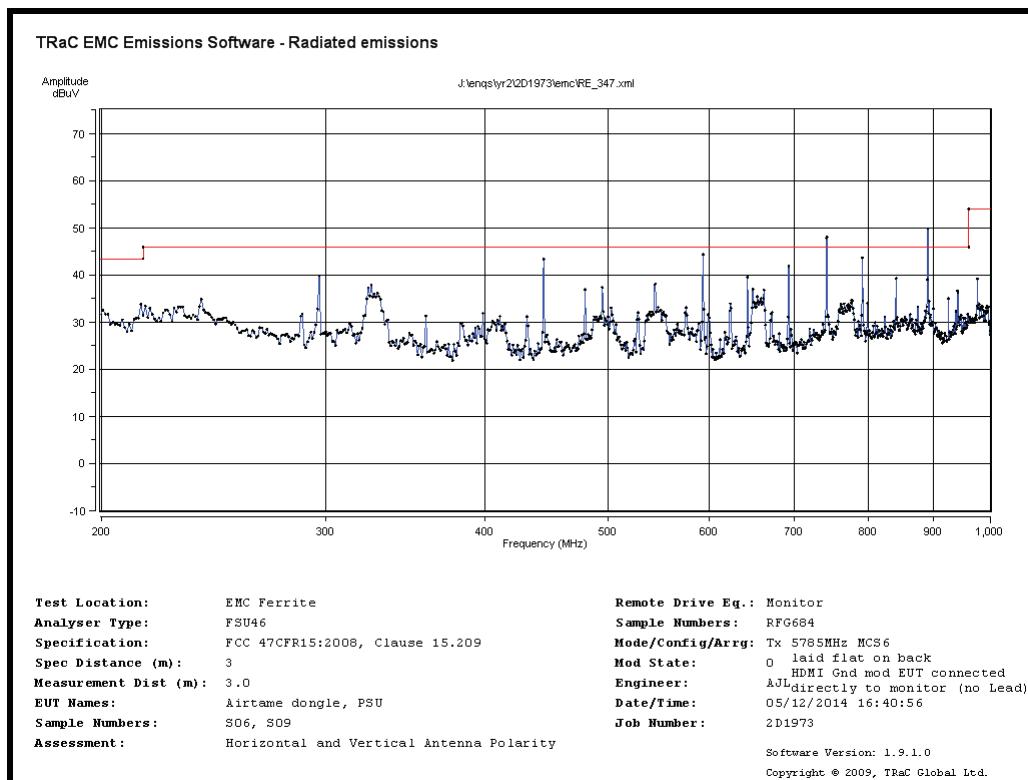
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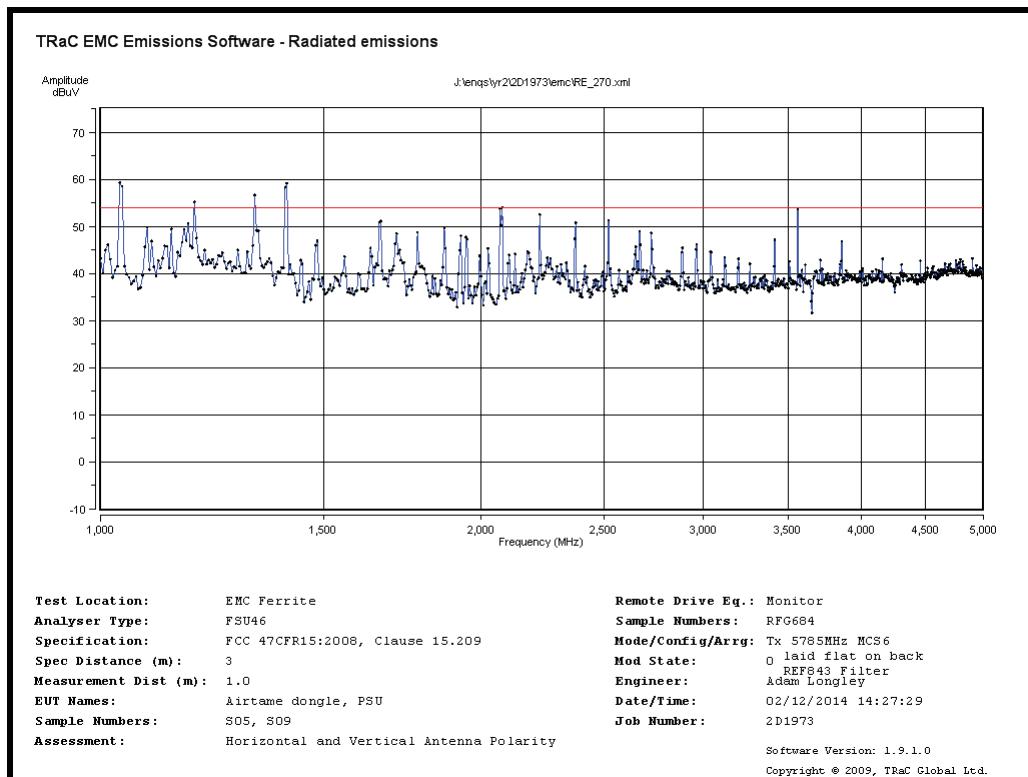
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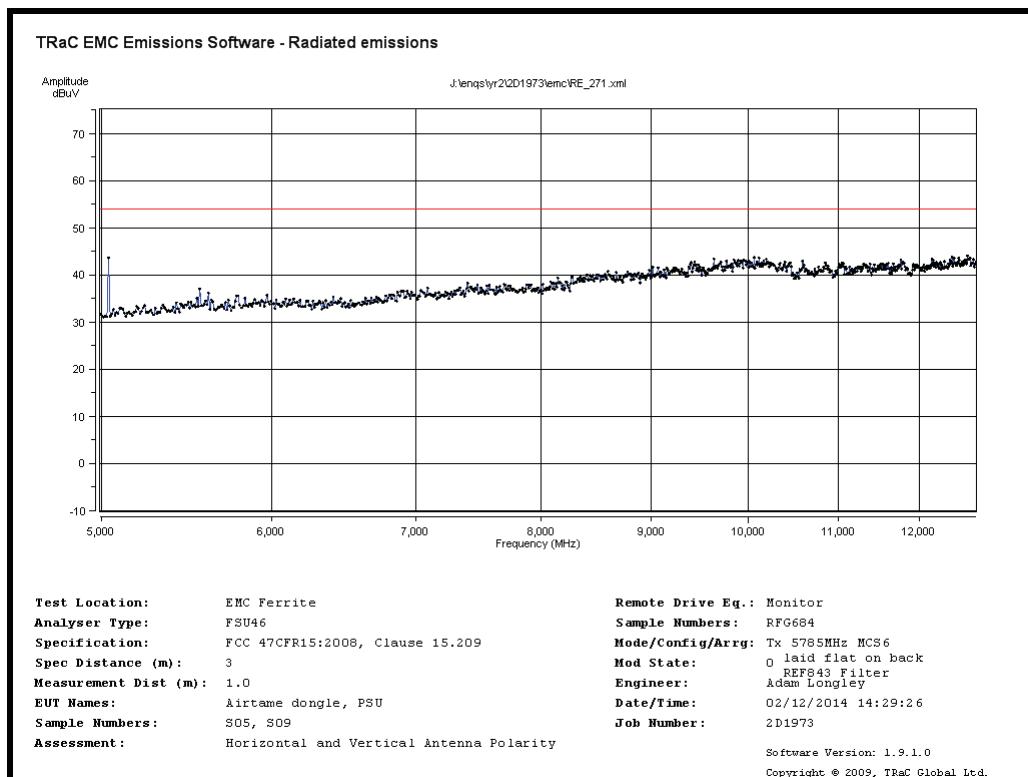
### Radiated Spurious emissions 30MHz to 200MHz – 5785MHz MCS6



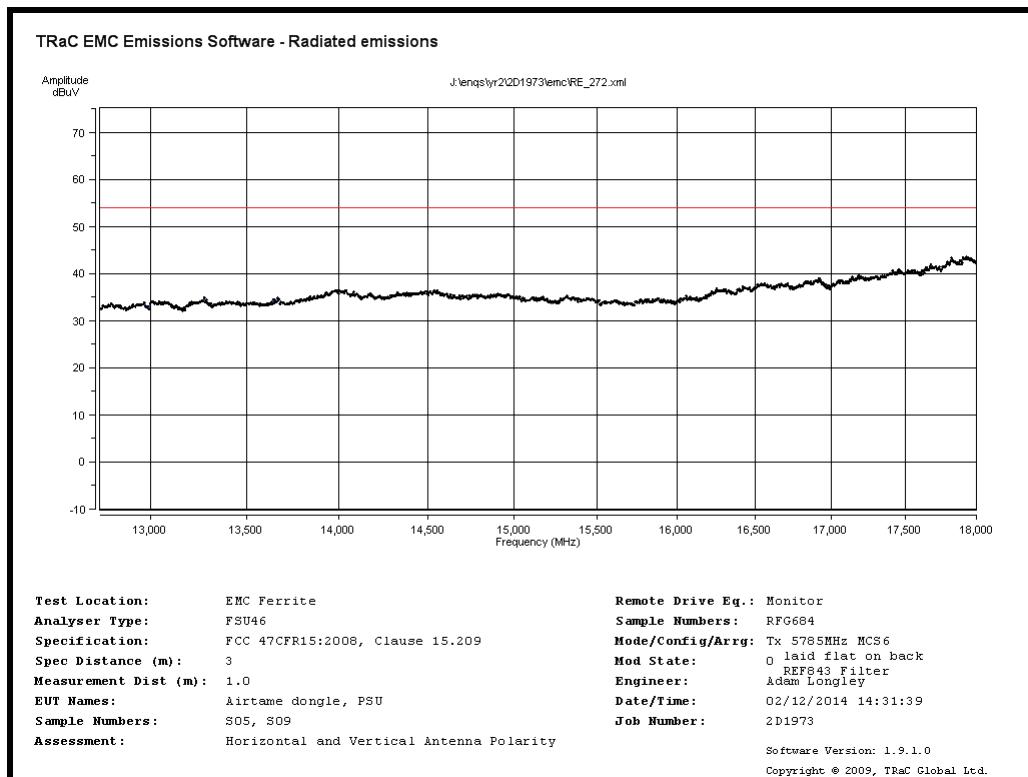
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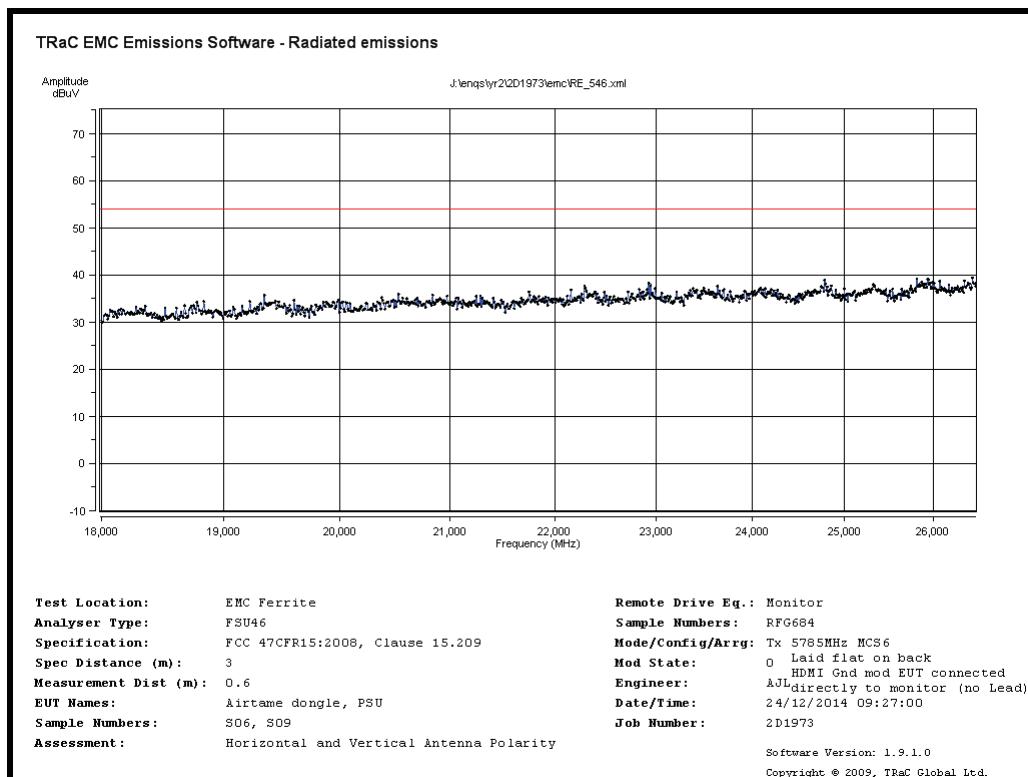
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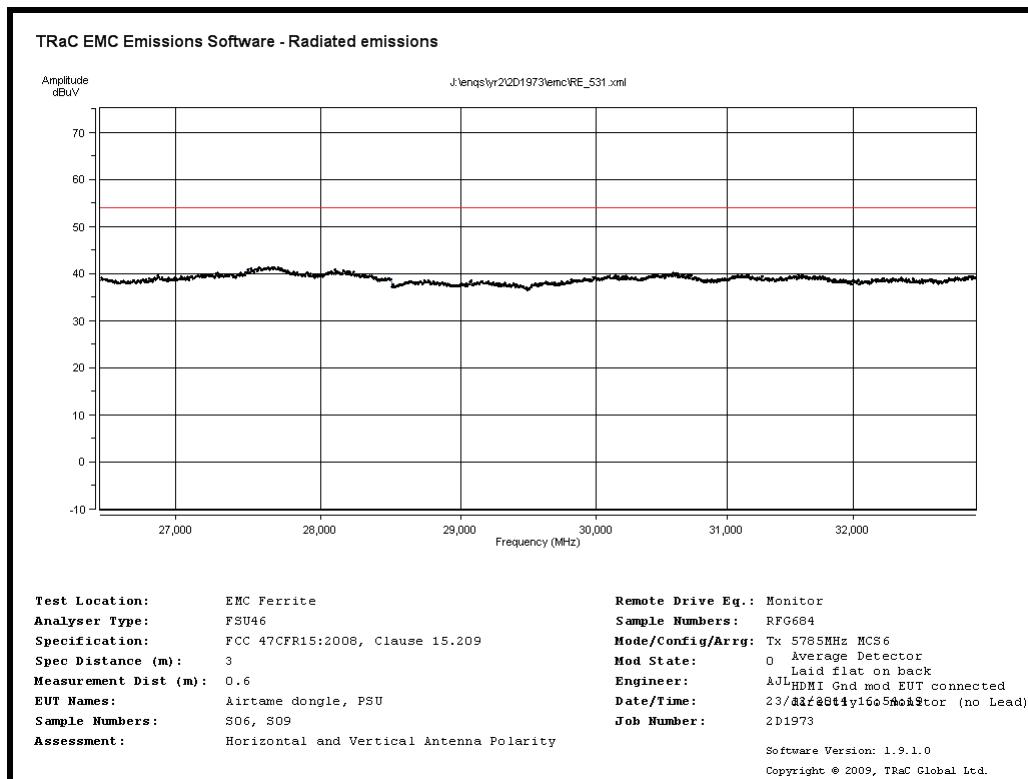
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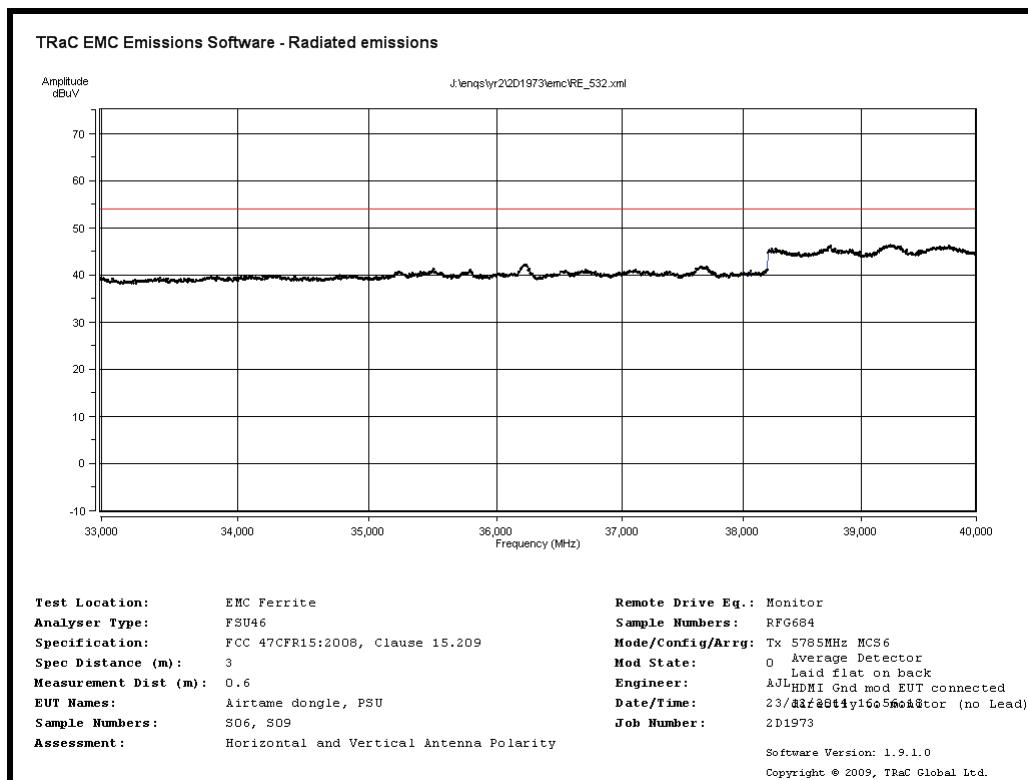
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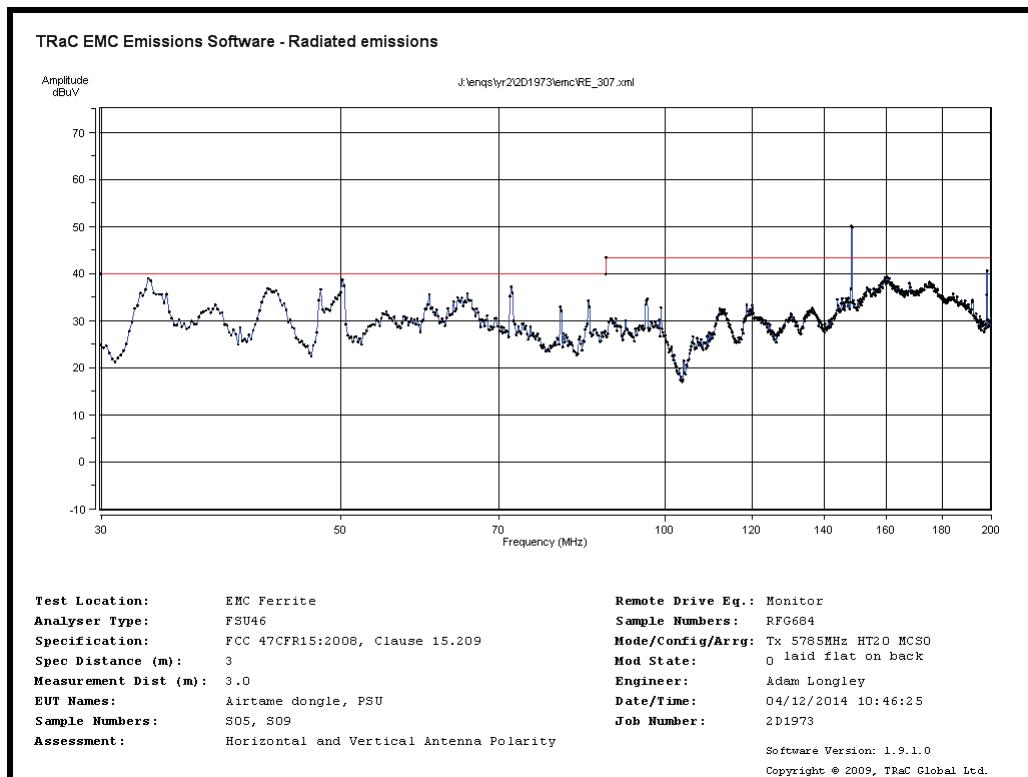
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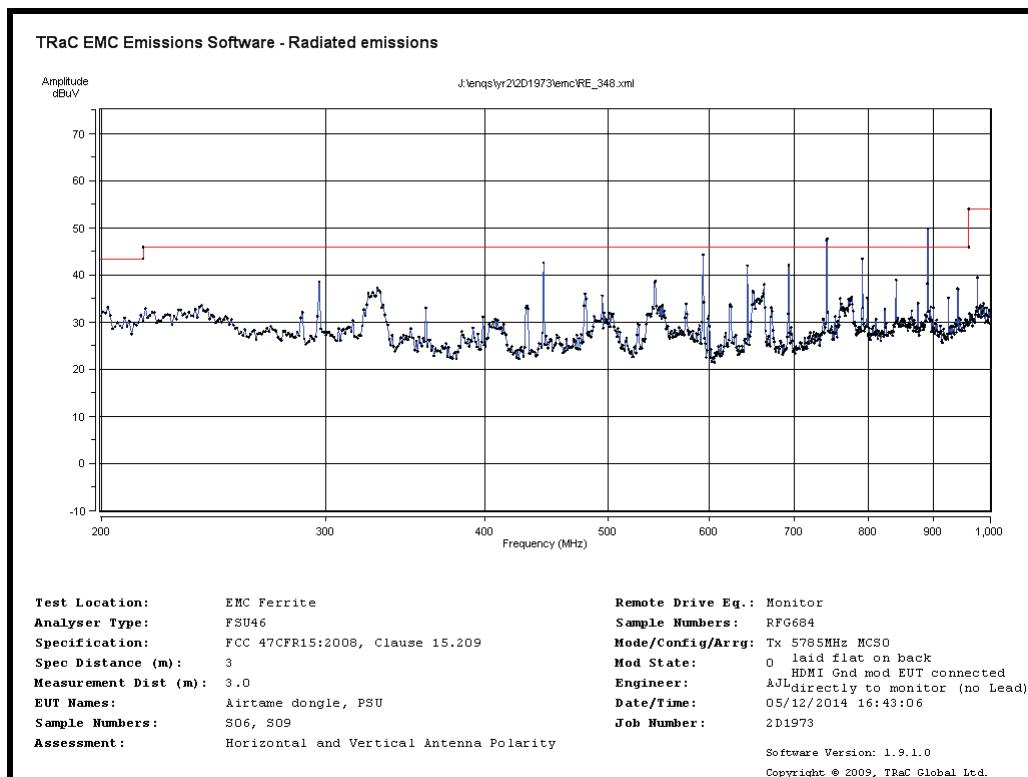
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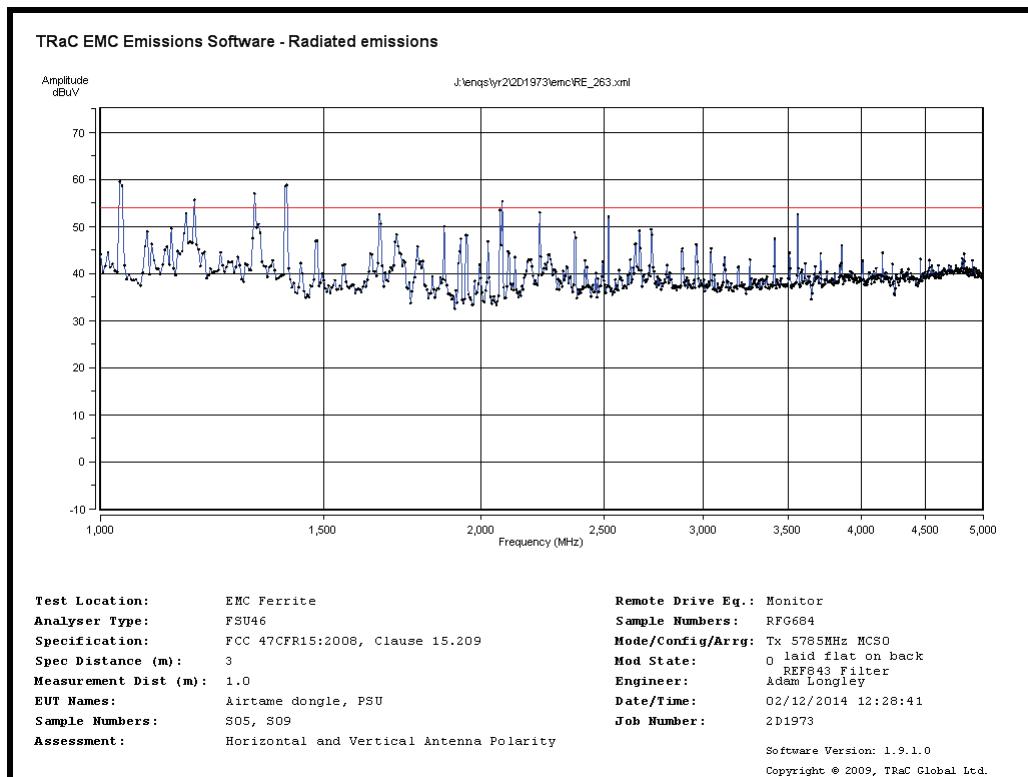
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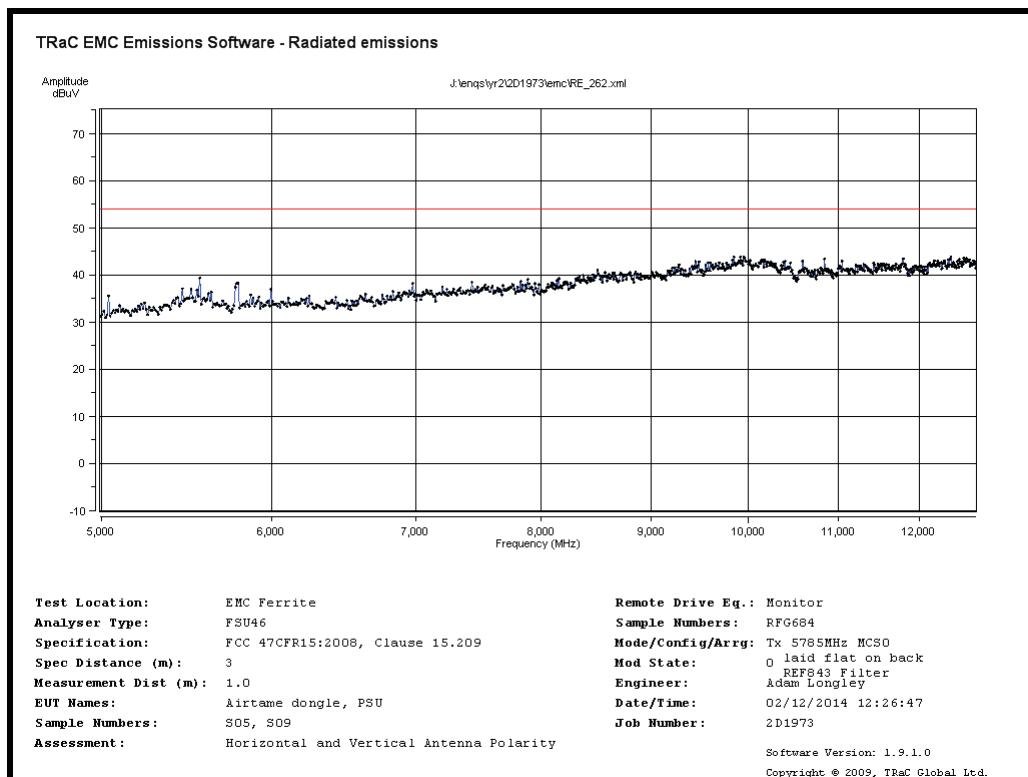
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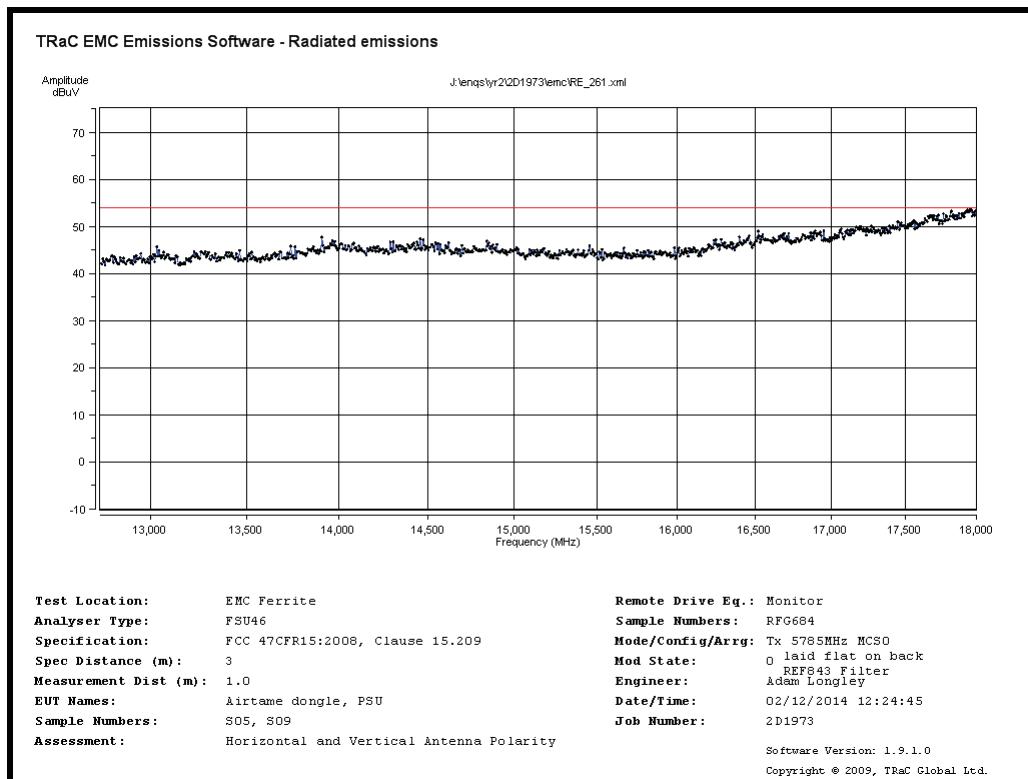
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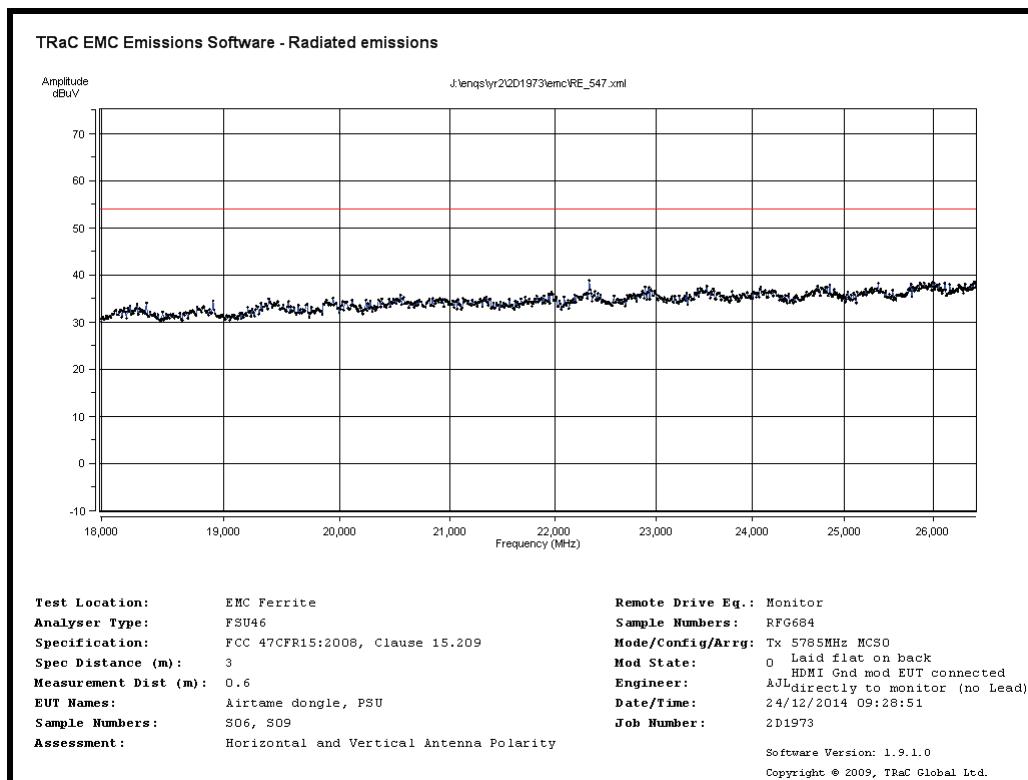
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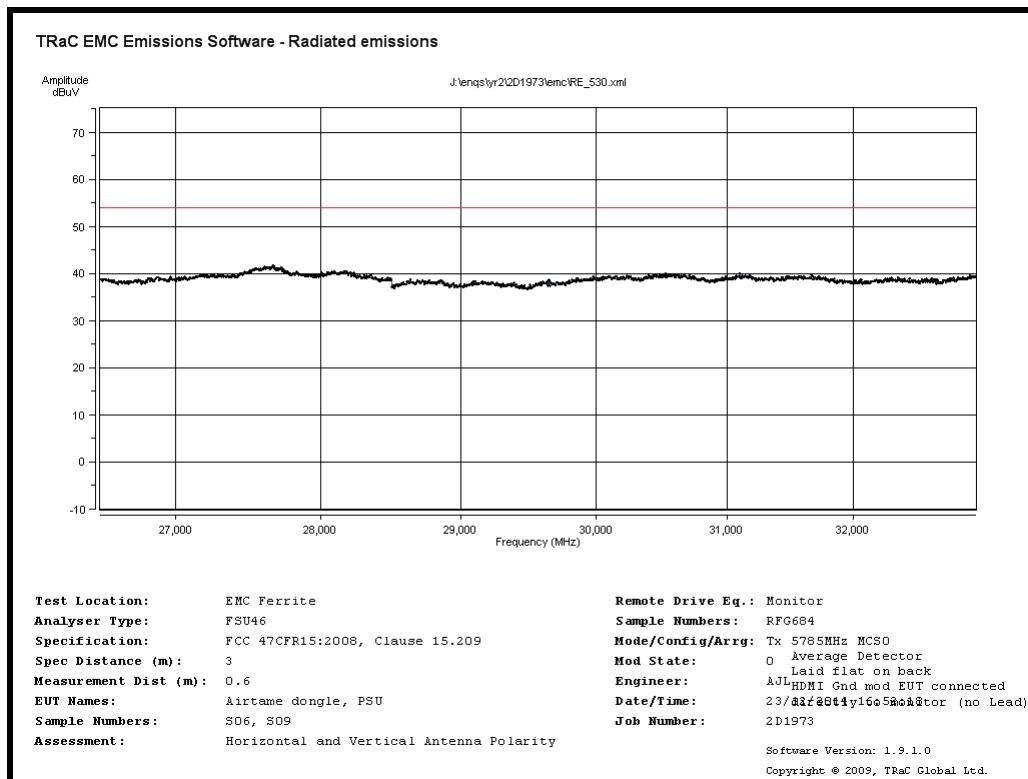
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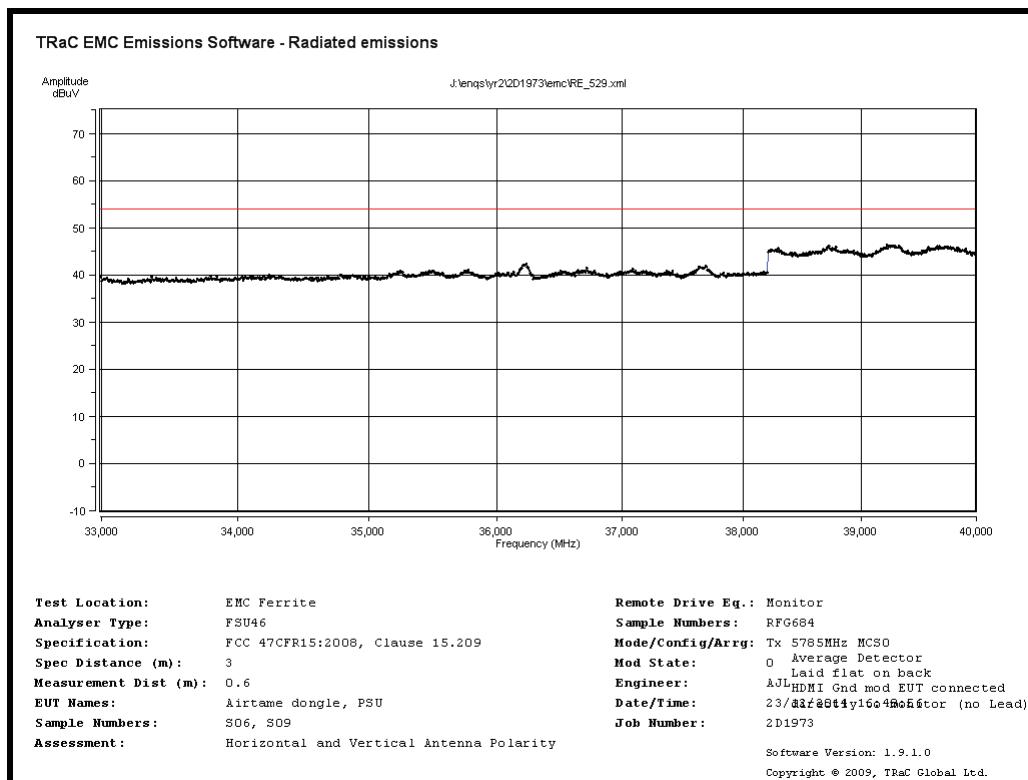
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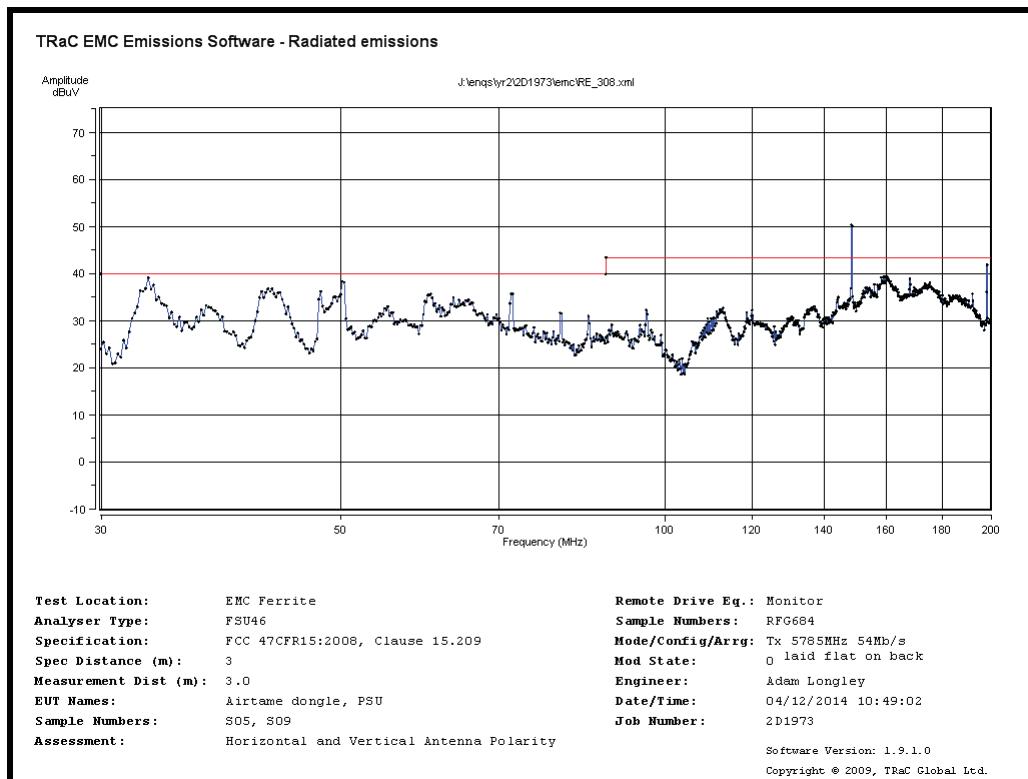
### Radiated Spurious emissions 18GHz to 26.5GHz – 5785MHz MCS0



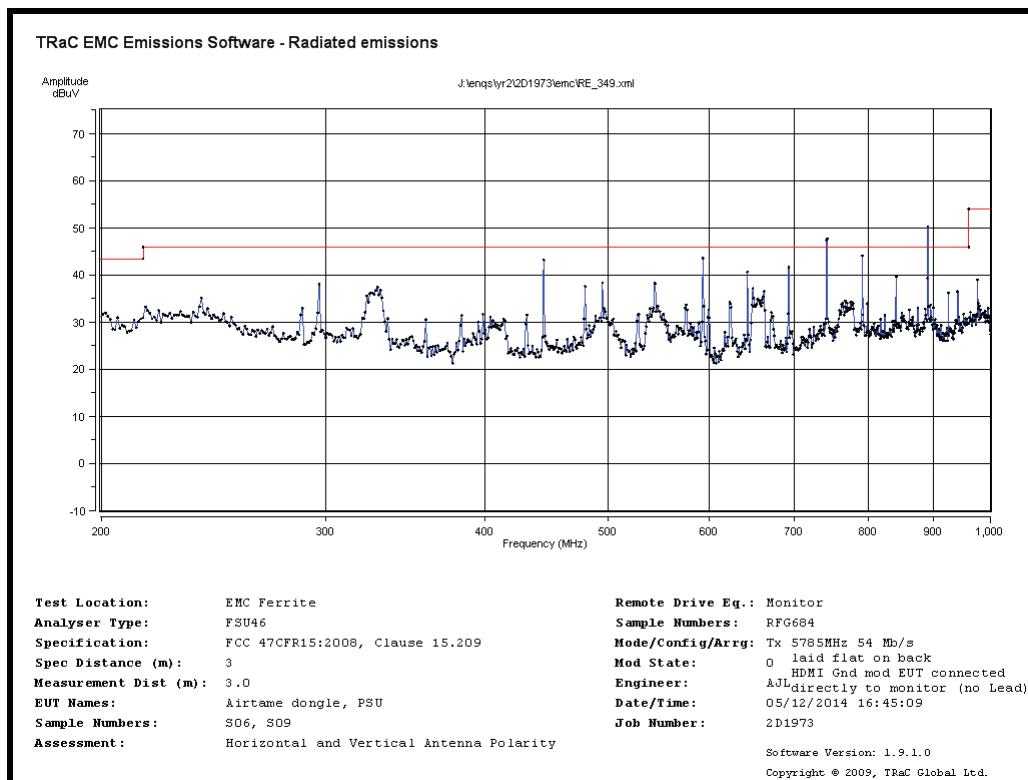
### Radiated Spurious emissions 26.5GHz to 33GHz – 5785MHz MCS0



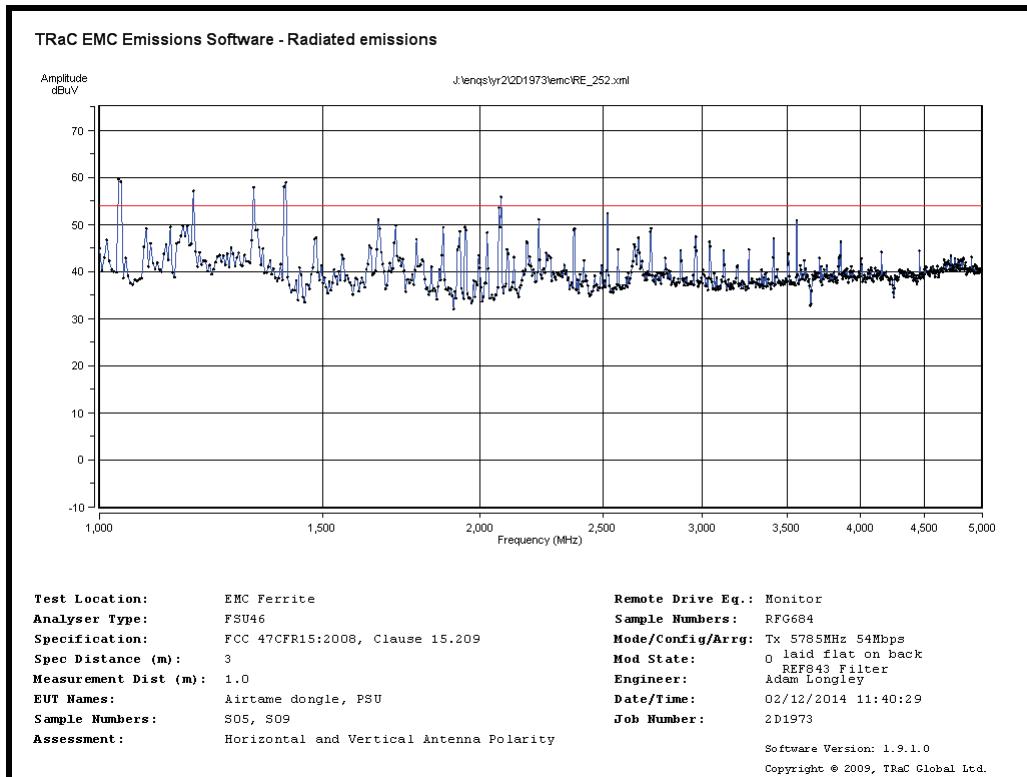
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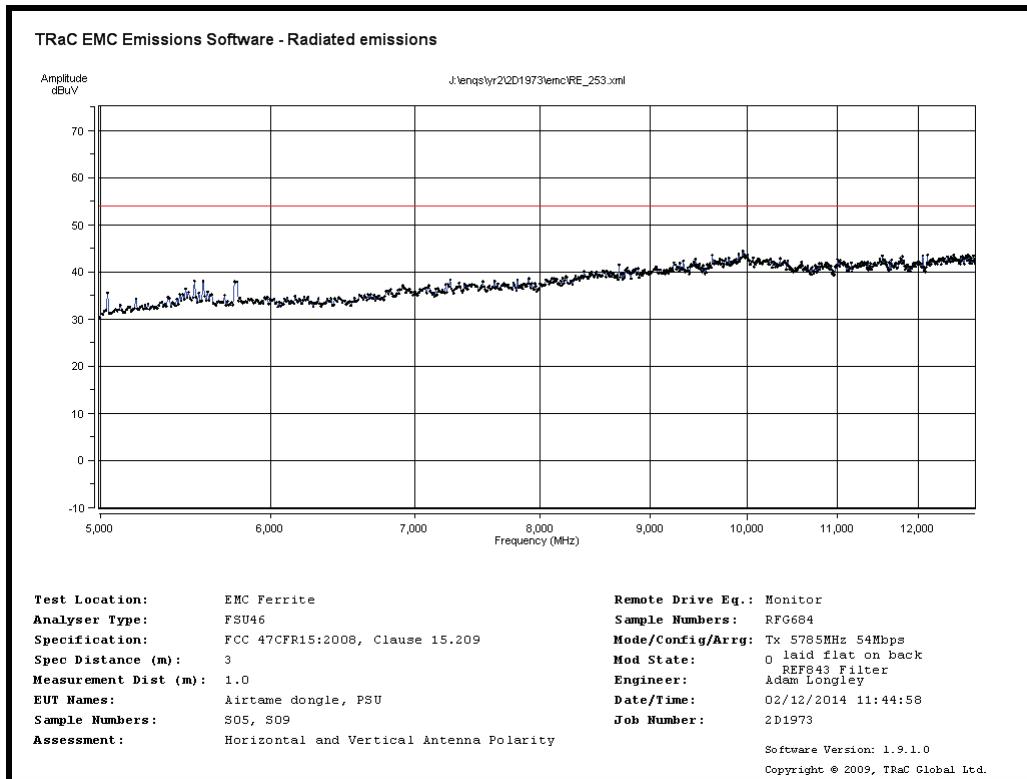
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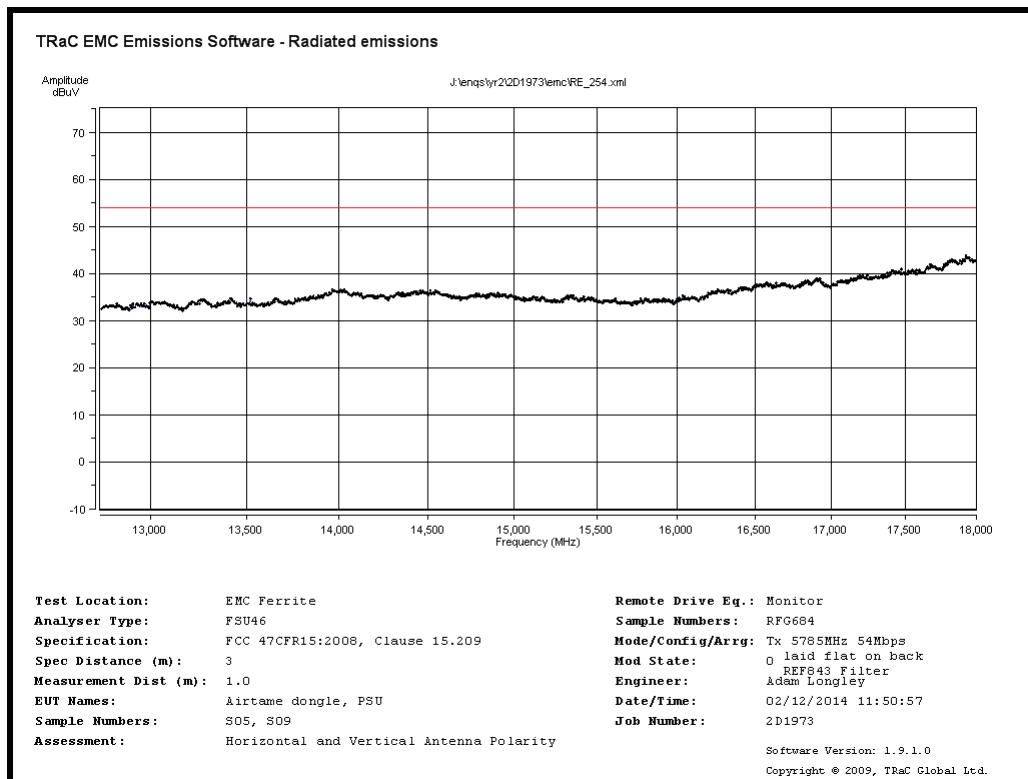
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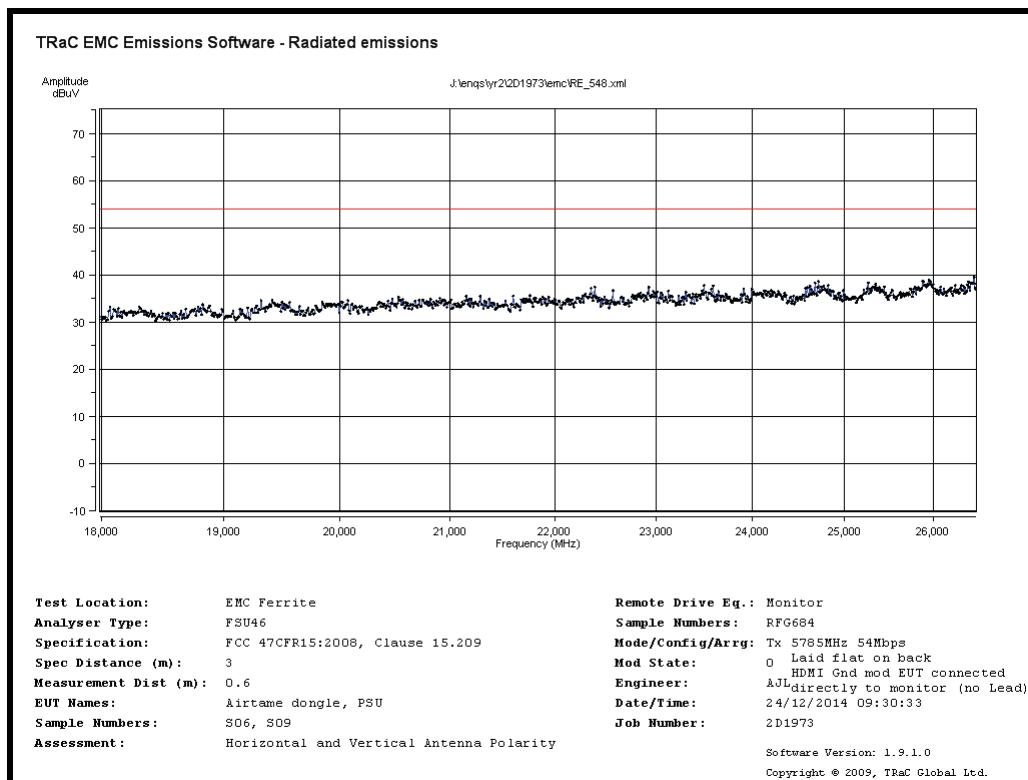
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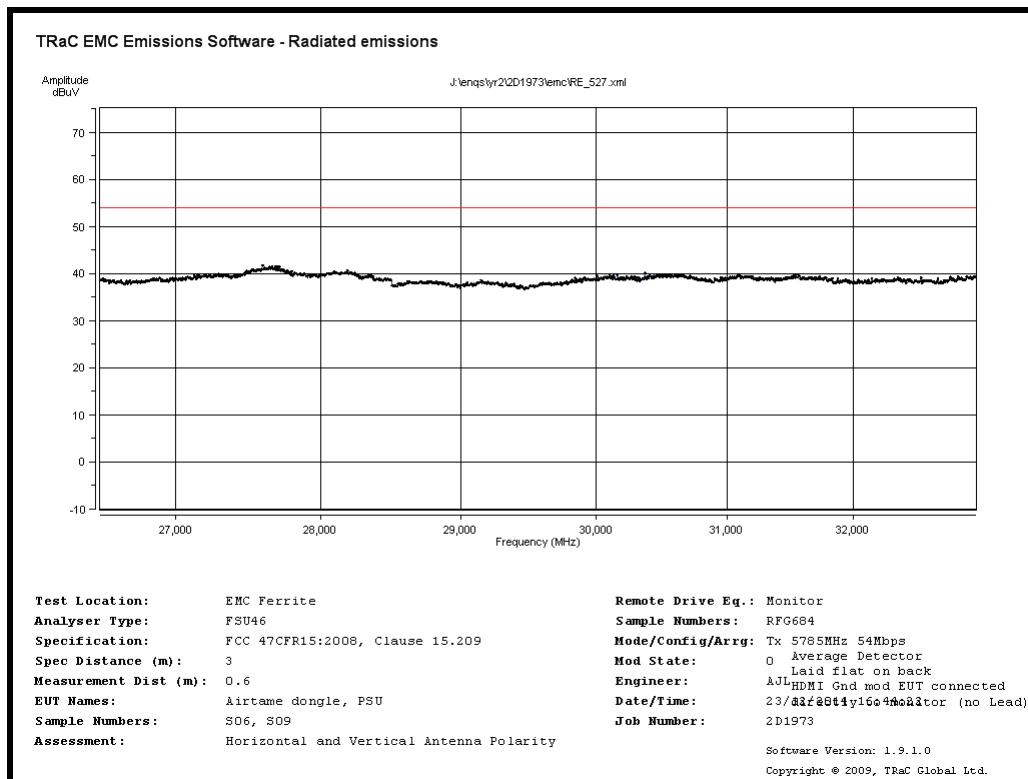
### Radiated Spurious emissions 5GHz to 12.5GHz – 5785MHz 54Mb/s



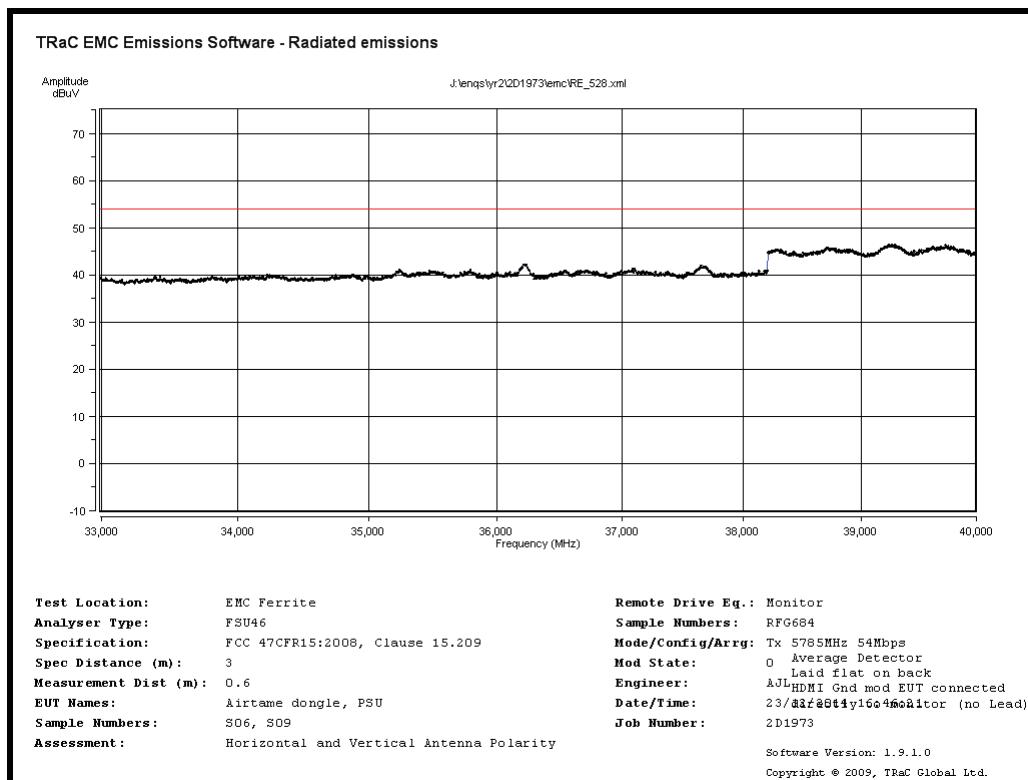
### Radiated Spurious emissions 12.5GHz to 18GHz – 5785MHz 54Mb/s



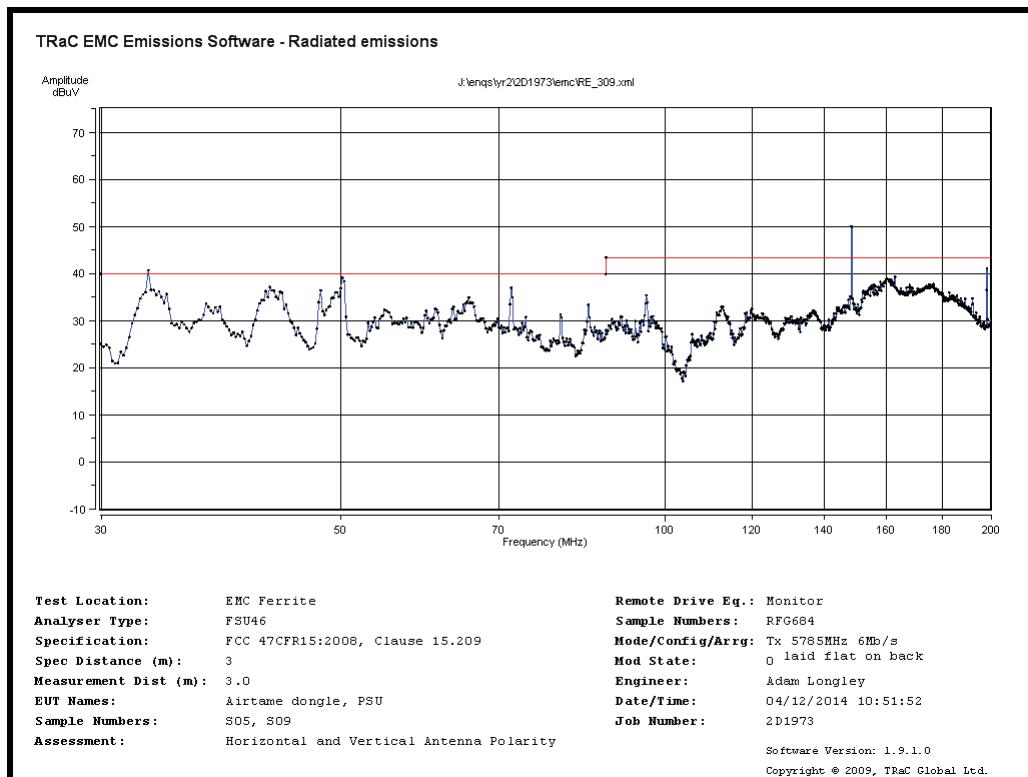
### Radiated Spurious emissions 18GHz to 26.5GHz – 5785MHz 54Mb/s



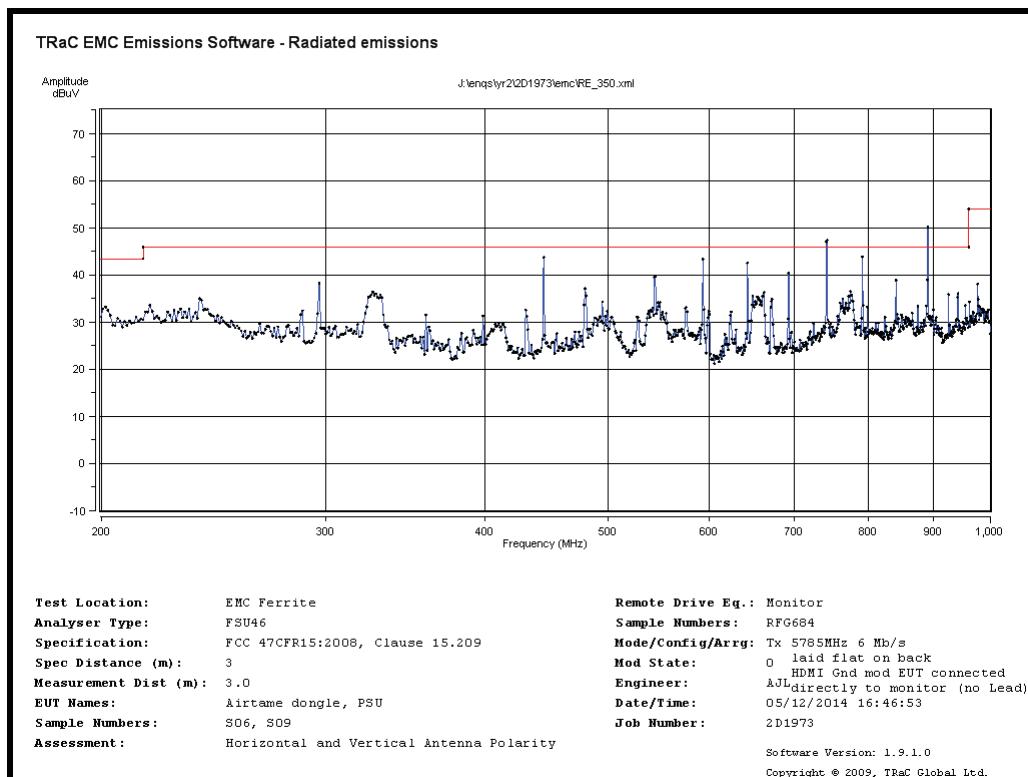
### Radiated Spurious emissions 26.5GHz to 33GHz – 5785MHz 54Mb/s



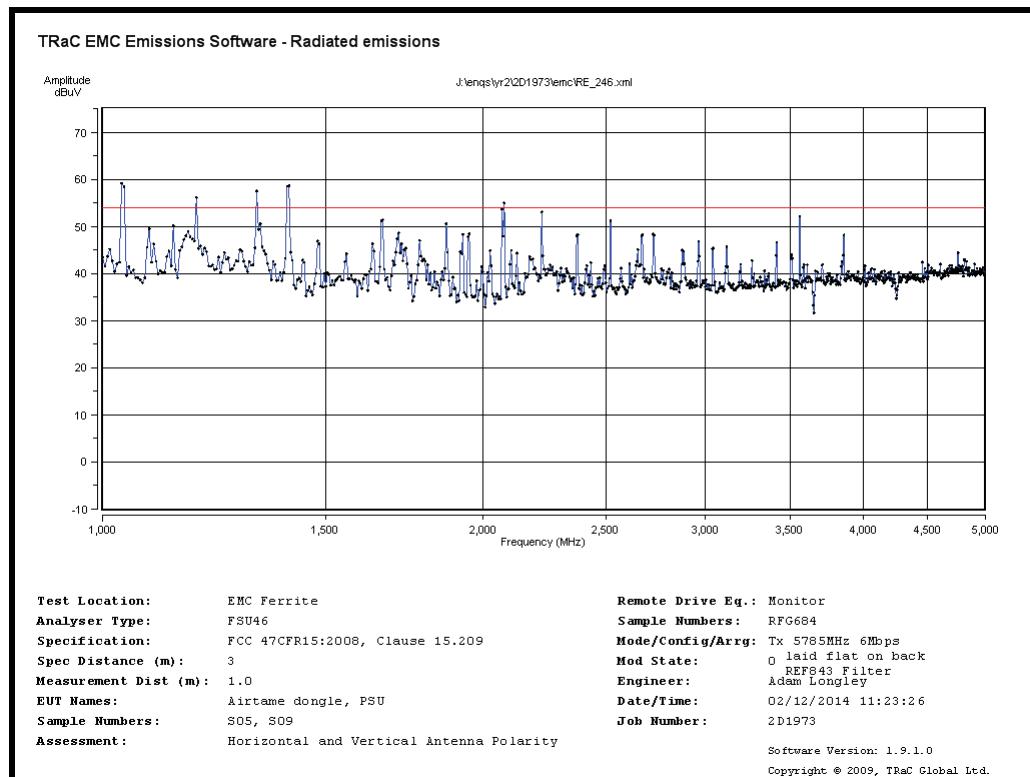
### Radiated Spurious emissions 33GHz to 40GHz – 5785MHz 54Mb/s



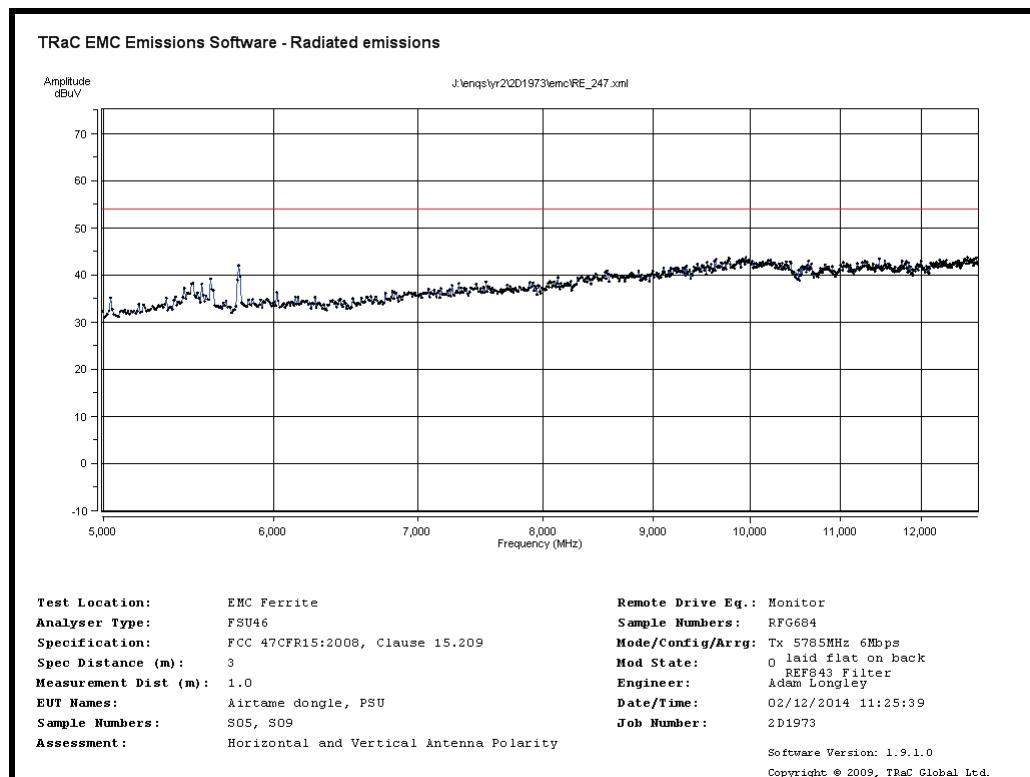
Radiated Spurious emissions 30MHz to 200MHz – 5785MHz 6Mb/s



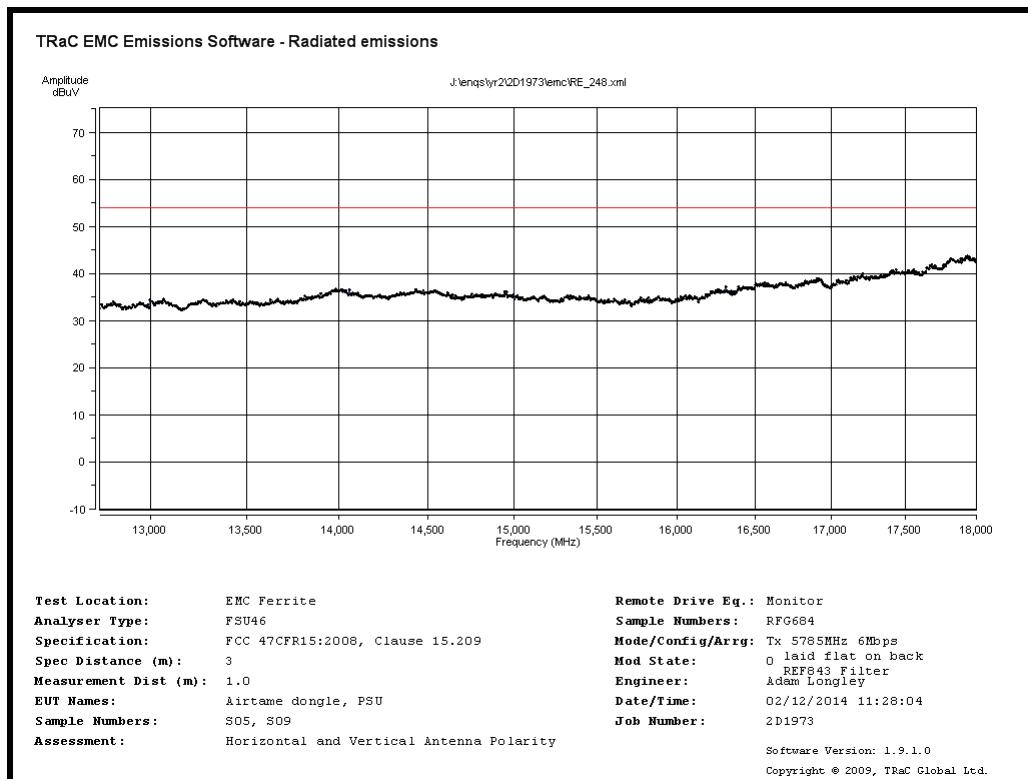
Radiated Spurious emissions 200MHz to 1GHz – 5785MHz 6Mb/s



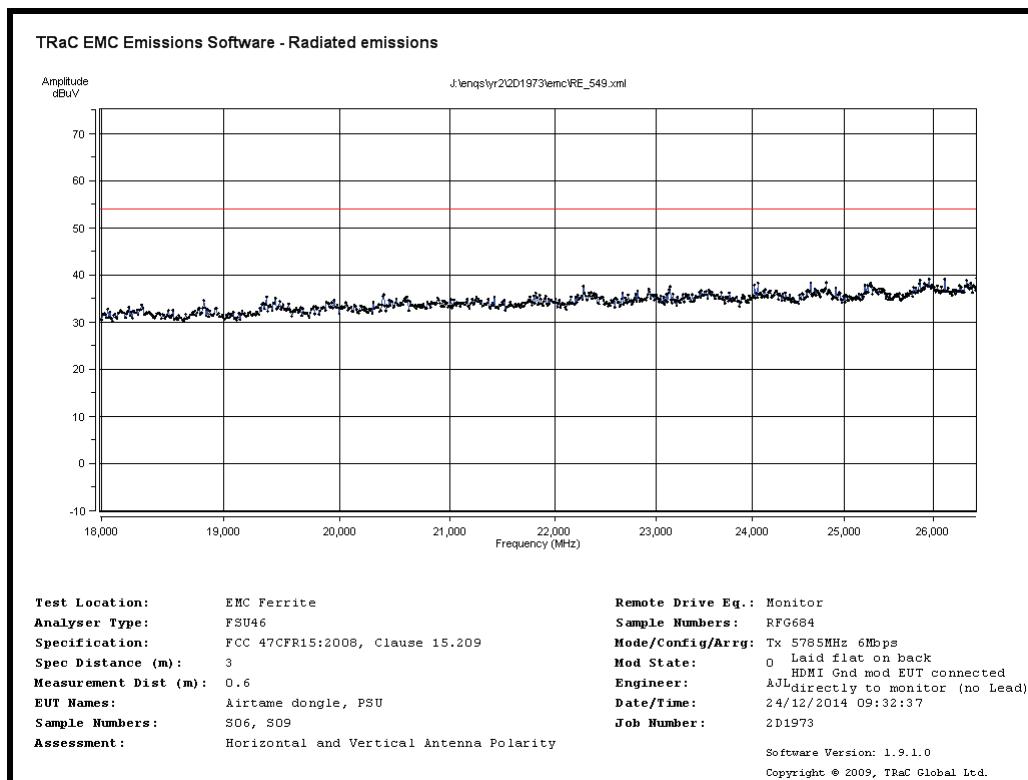
### Radiated Spurious emissions 1GHz to 5GHz – 5785MHz 6Mb/s



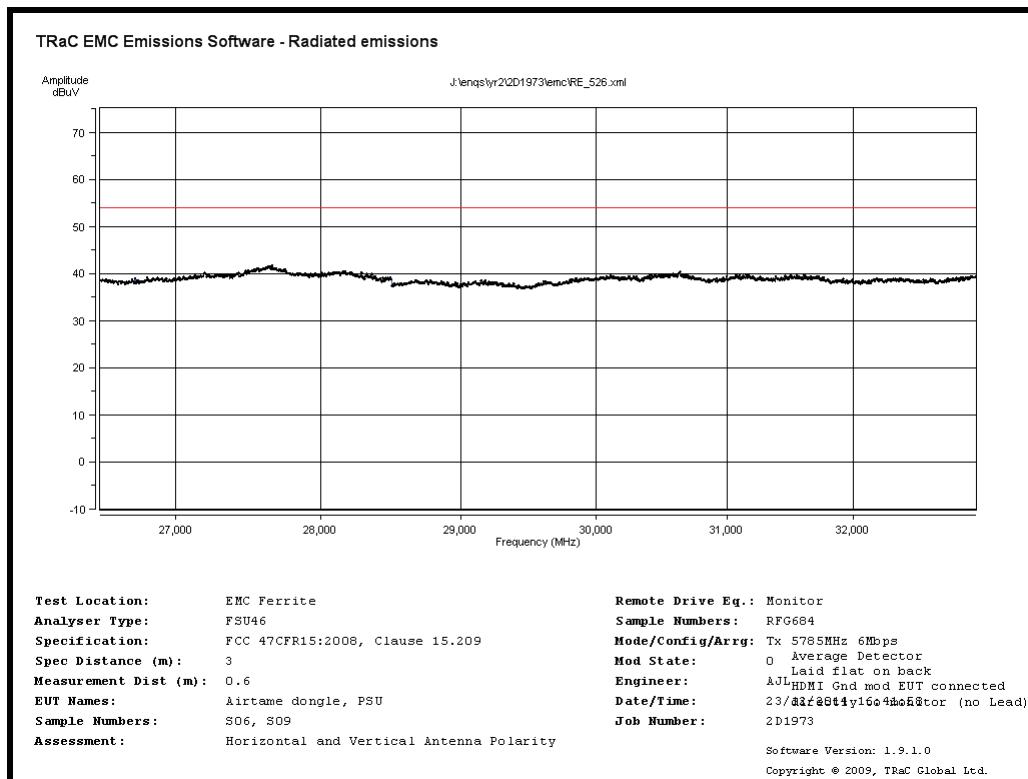
### Radiated Spurious emissions 5GHz to 12.5GHz – 5785MHz 6Mb/s



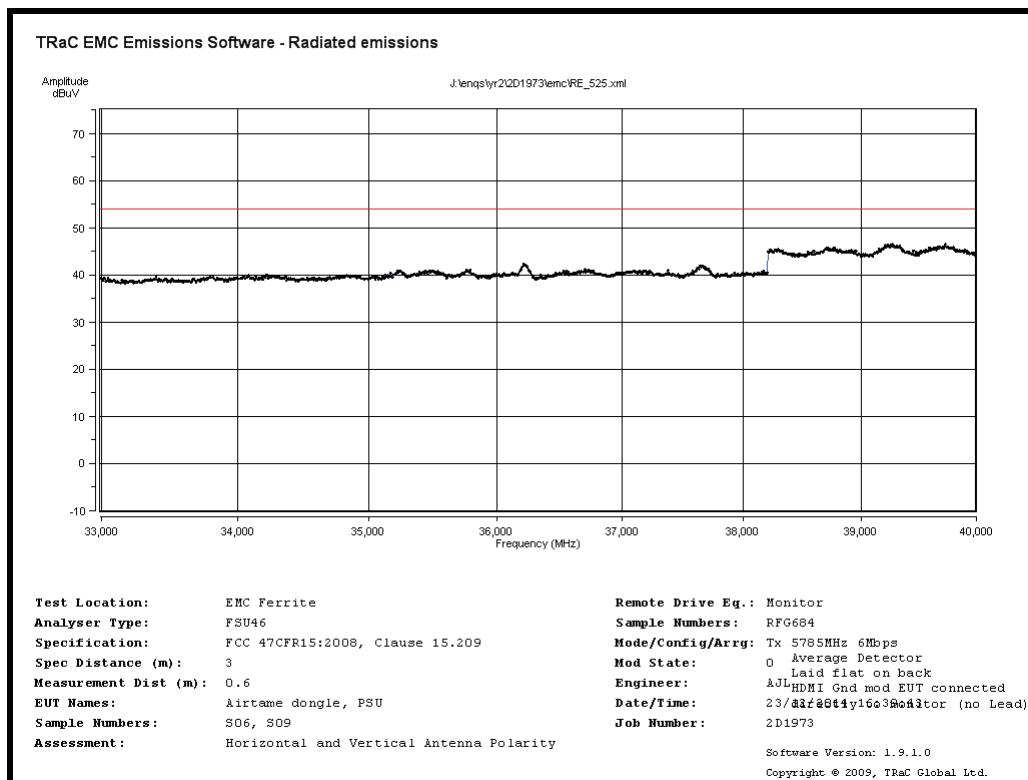
### Radiated Spurious emissions 12.5GHz to 18GHz – 5785MHz 6Mb/s



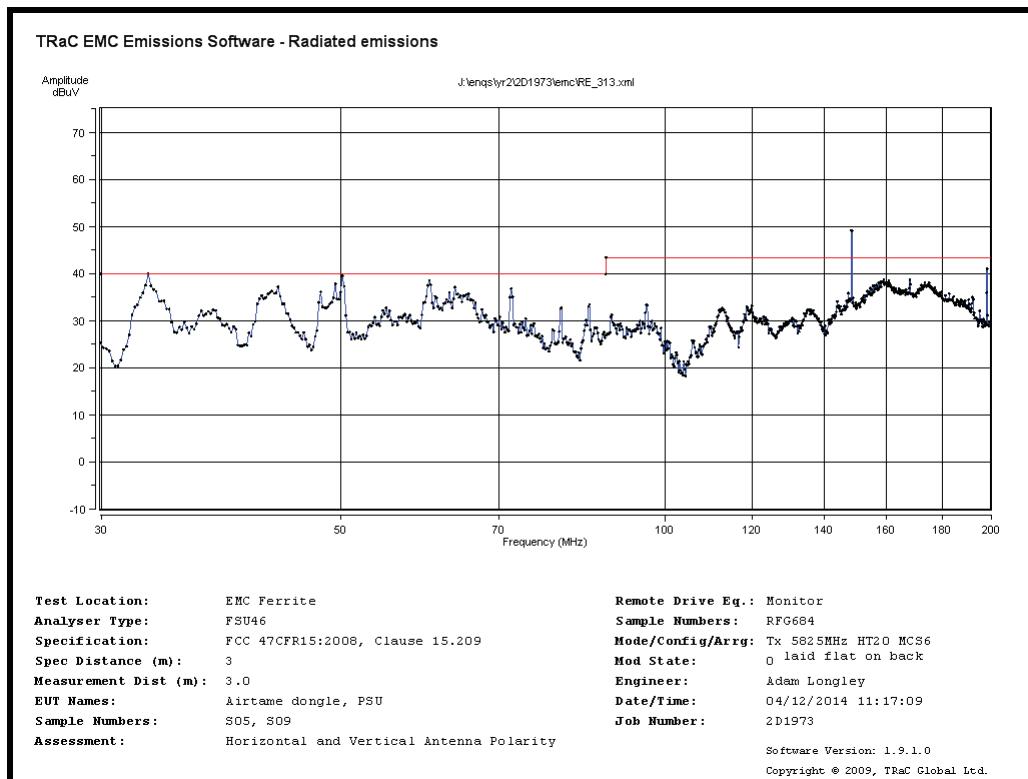
### Radiated Spurious emissions 18GHz to 26.5GHz – 5785MHz 6Mb/s



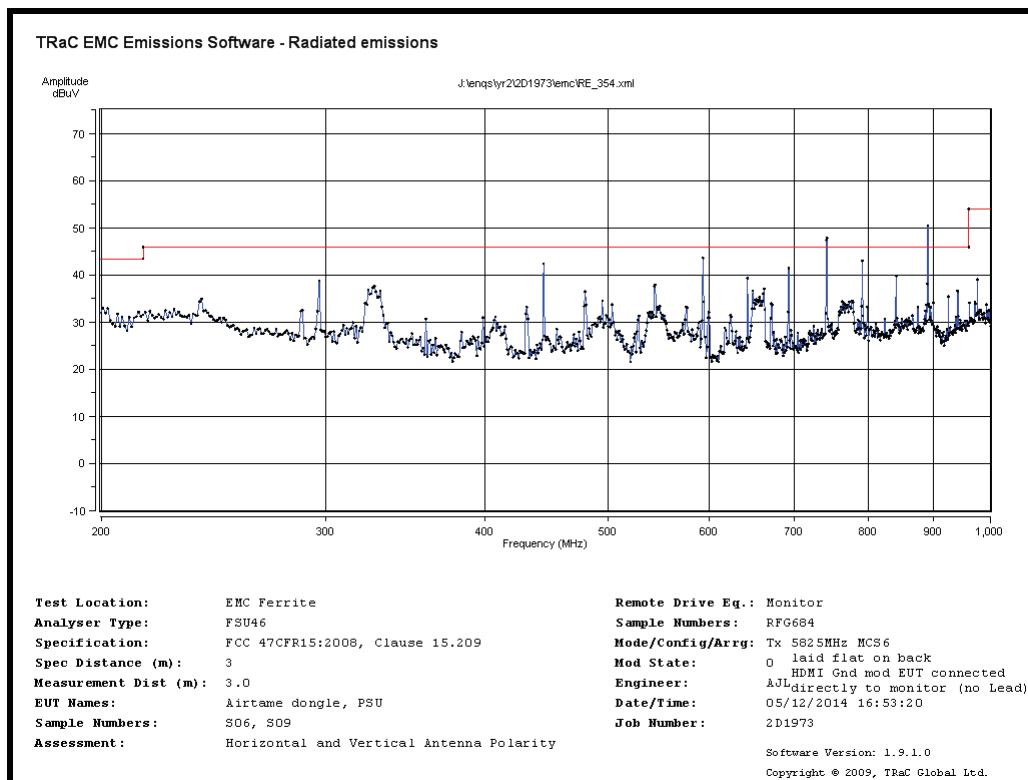
### Radiated Spurious emissions 26.5GHz to 33GHz – 5785MHz 6Mb/s



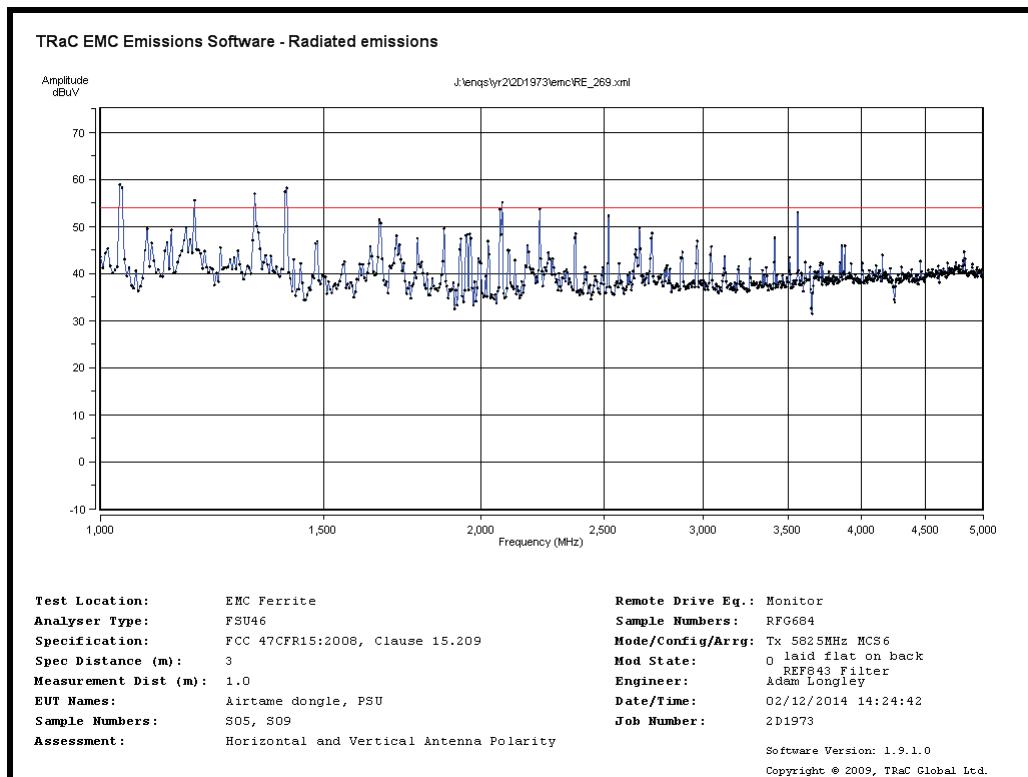
### Radiated Spurious emissions 33GHz to 40GHz – 5785MHz 6Mb/s



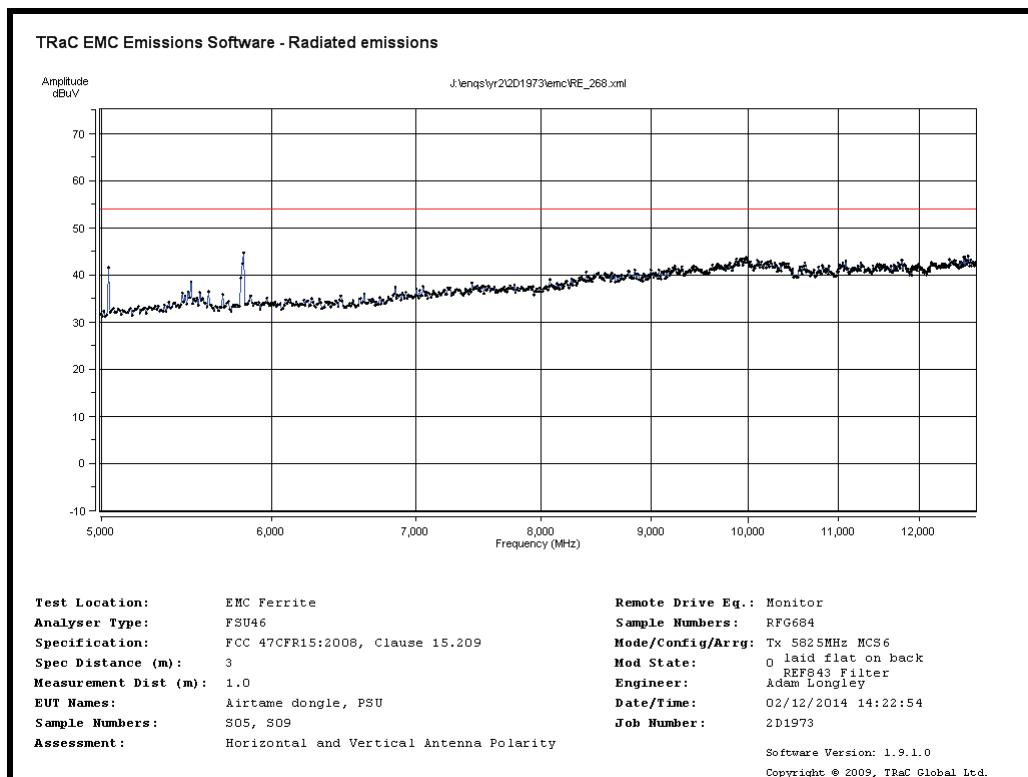
### Radiated Spurious emissions 30MHz to 200MHz – 5825MHz MCS6



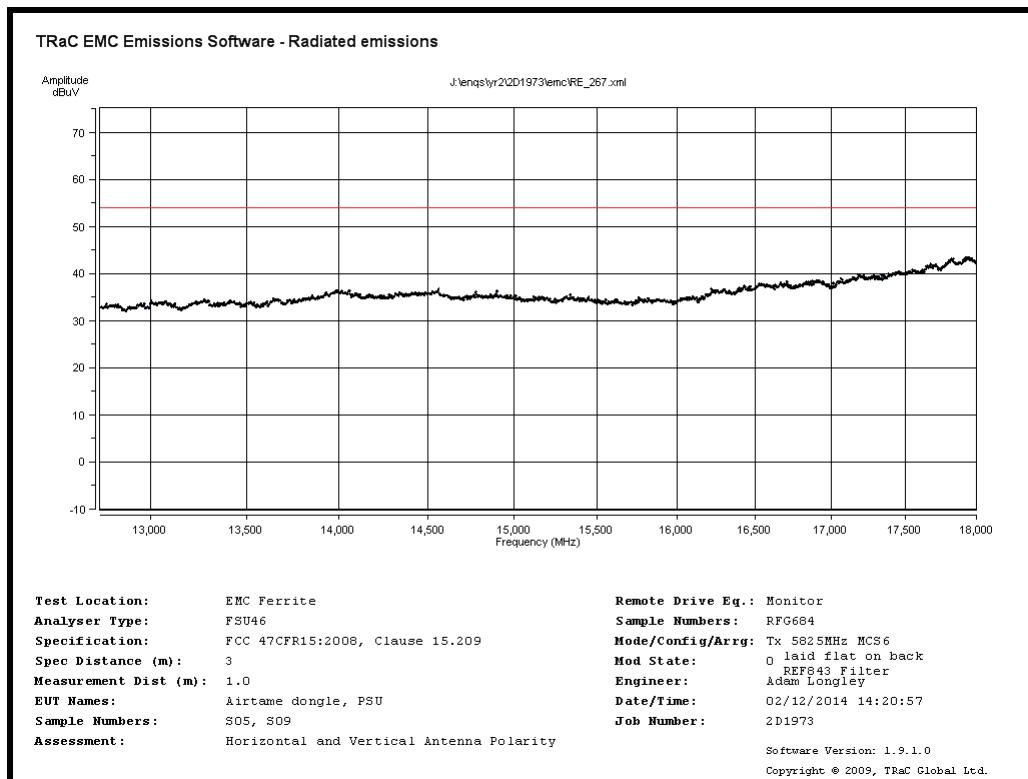
### Radiated Spurious emissions 200MHz to 1GHz – 5825MHz MCS6



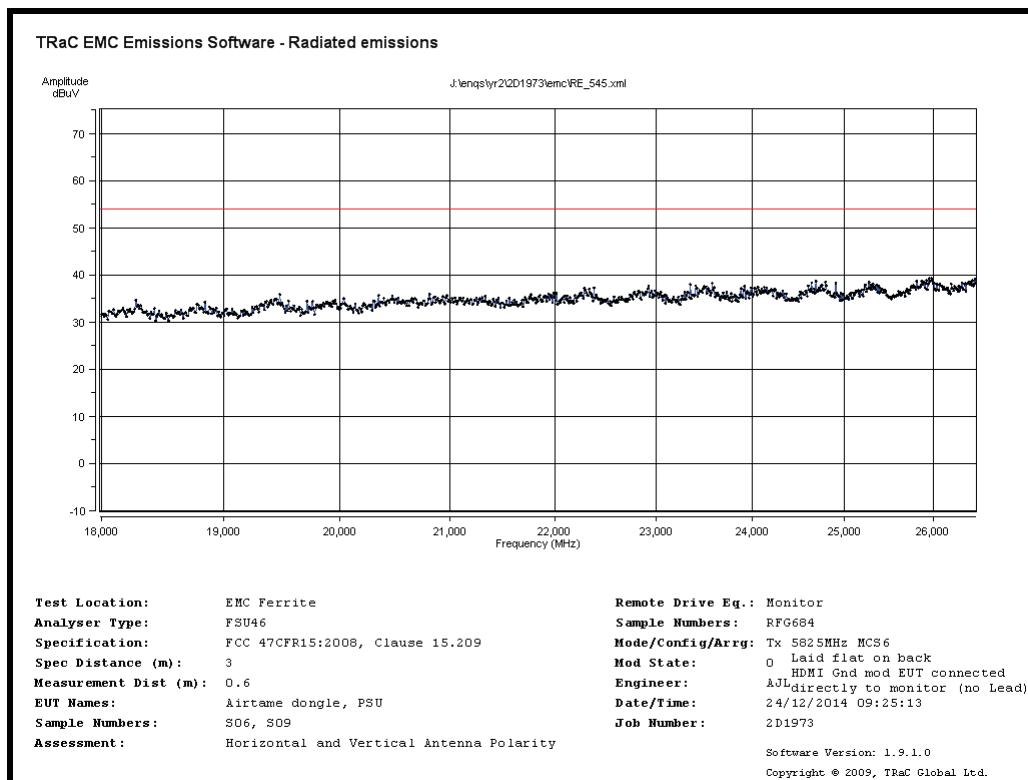
### Radiated Spurious emissions 1GHz to 5GHz – 5825MHz MCS6



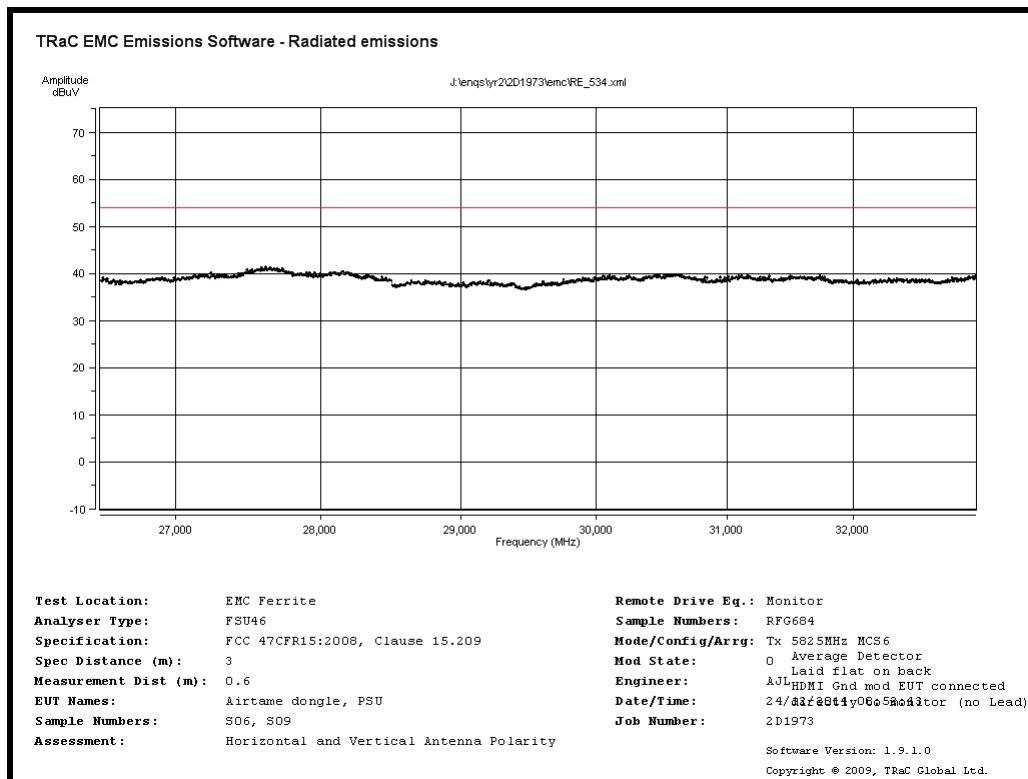
### Radiated Spurious emissions 5GHz to 12.5GHz – 5825MHz MCS6



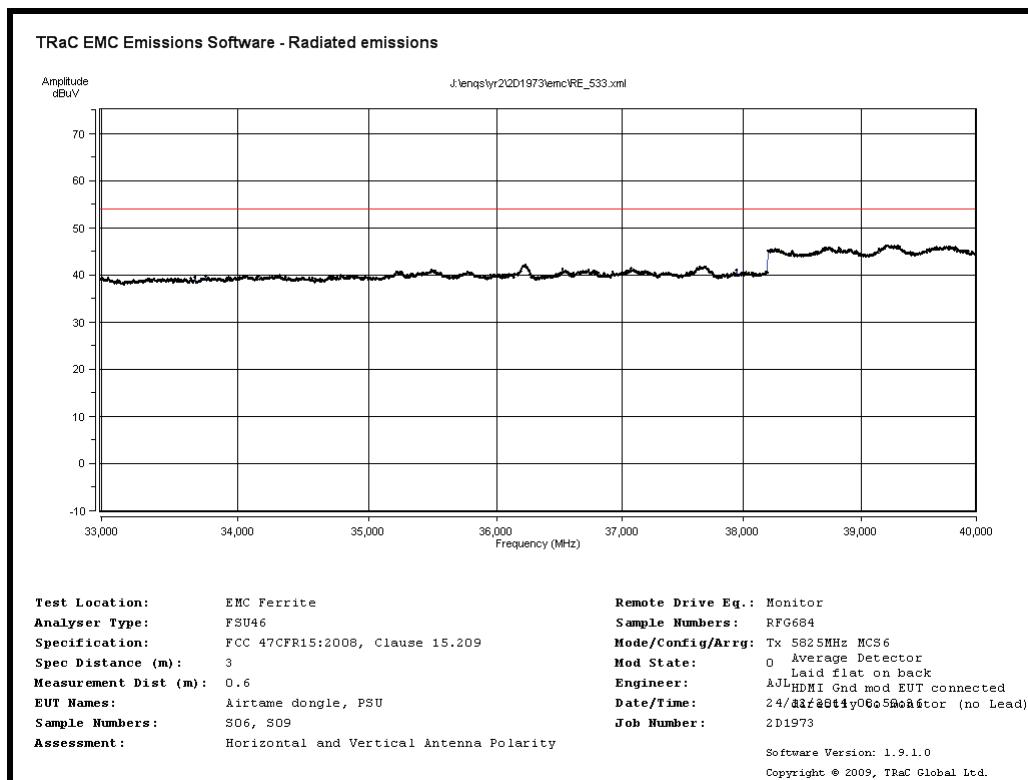
### Radiated Spurious emissions 12.5GHz to 18GHz – 5825MHz MCS6



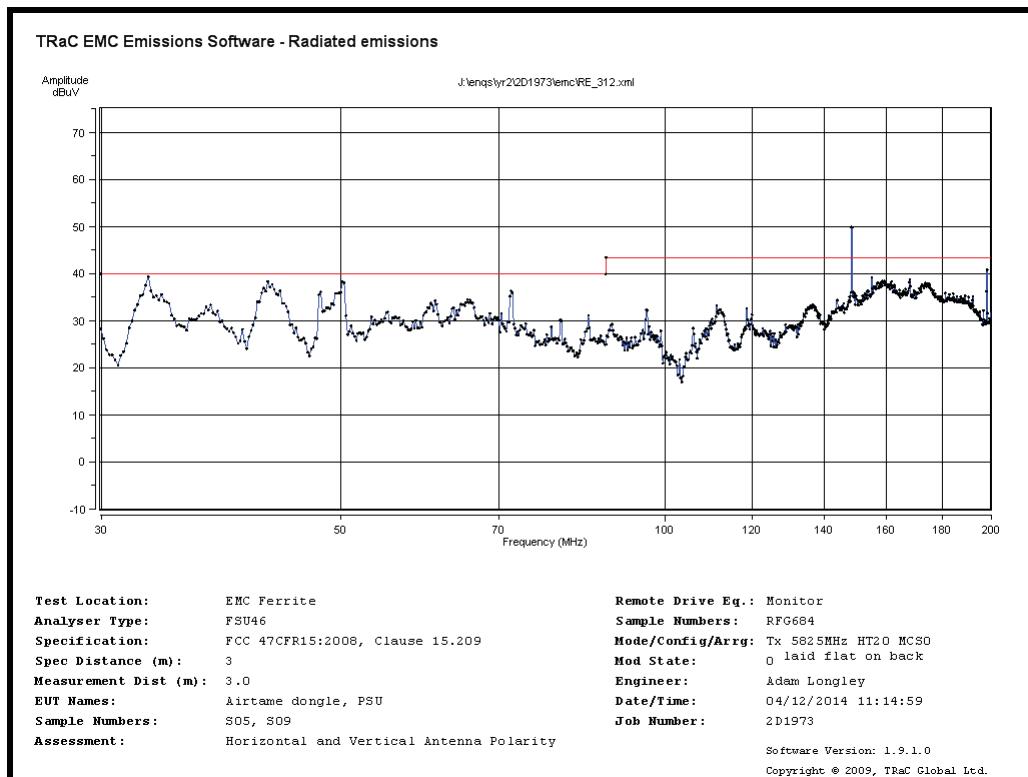
### Radiated Spurious emissions 18GHz to 26.5GHz – 5825MHz MCS6



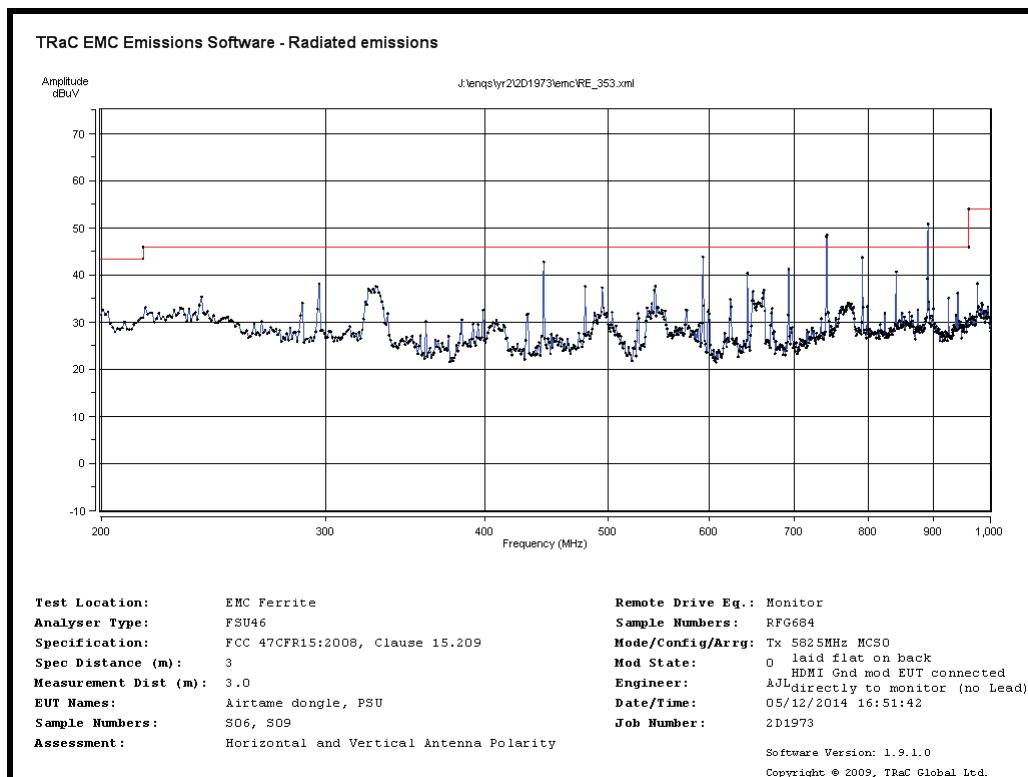
### Radiated Spurious emissions 26.5GHz to 33GHz – 5825MHz MCS6



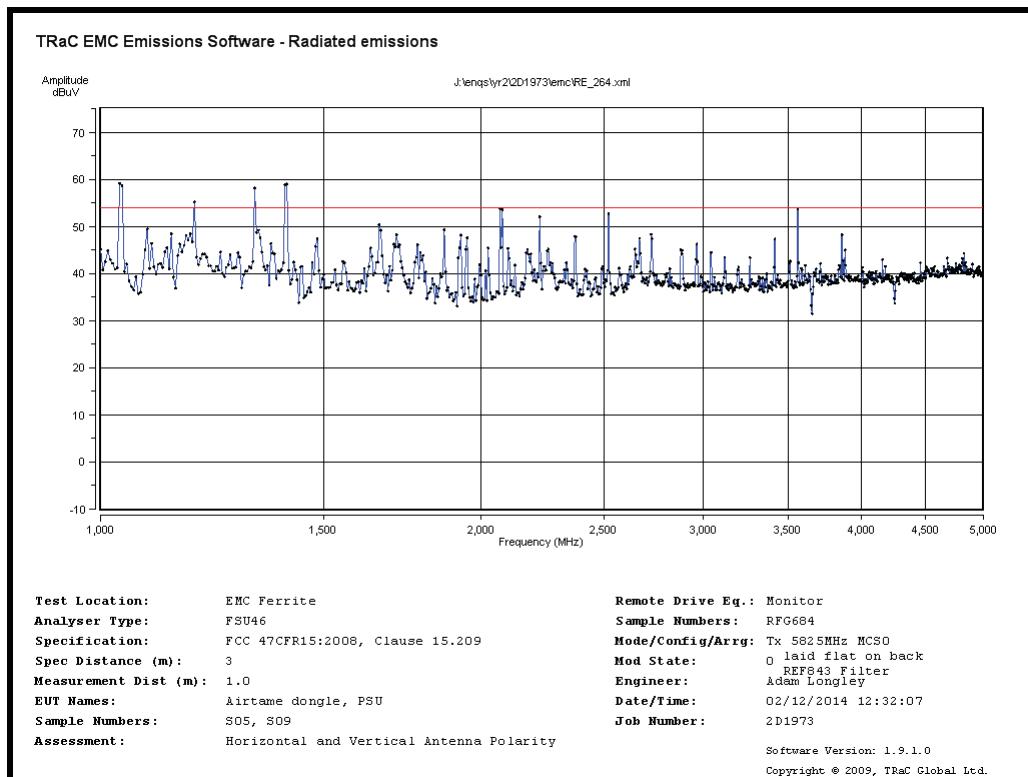
### Radiated Spurious emissions 33GHz to 40GHz – 5825MHz MCS6



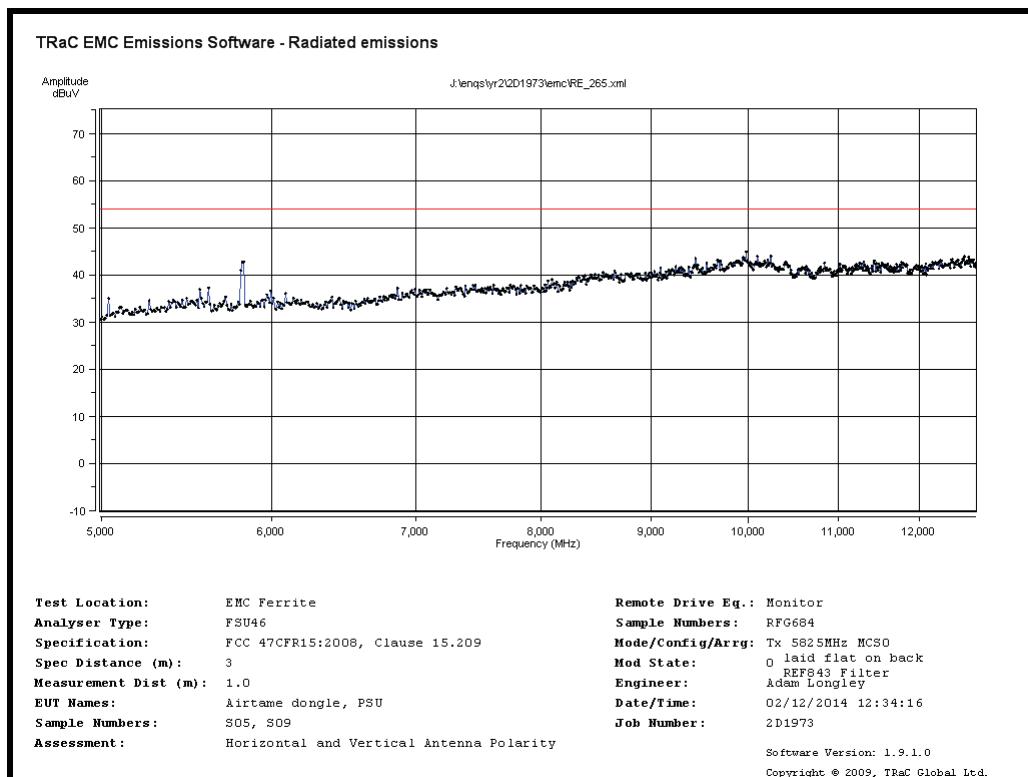
### Radiated Spurious emissions 30MHz to 200MHz – 5825MHz MCS0



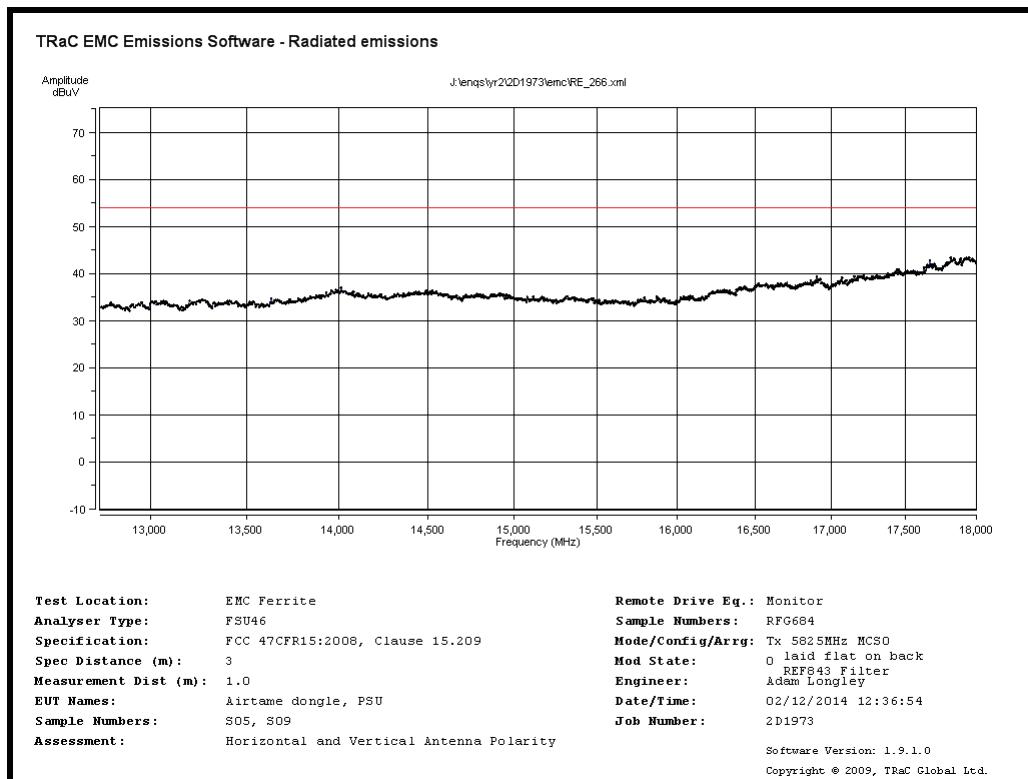
### Radiated Spurious emissions 200MHz to 1GHz – 5825MHz MCS0



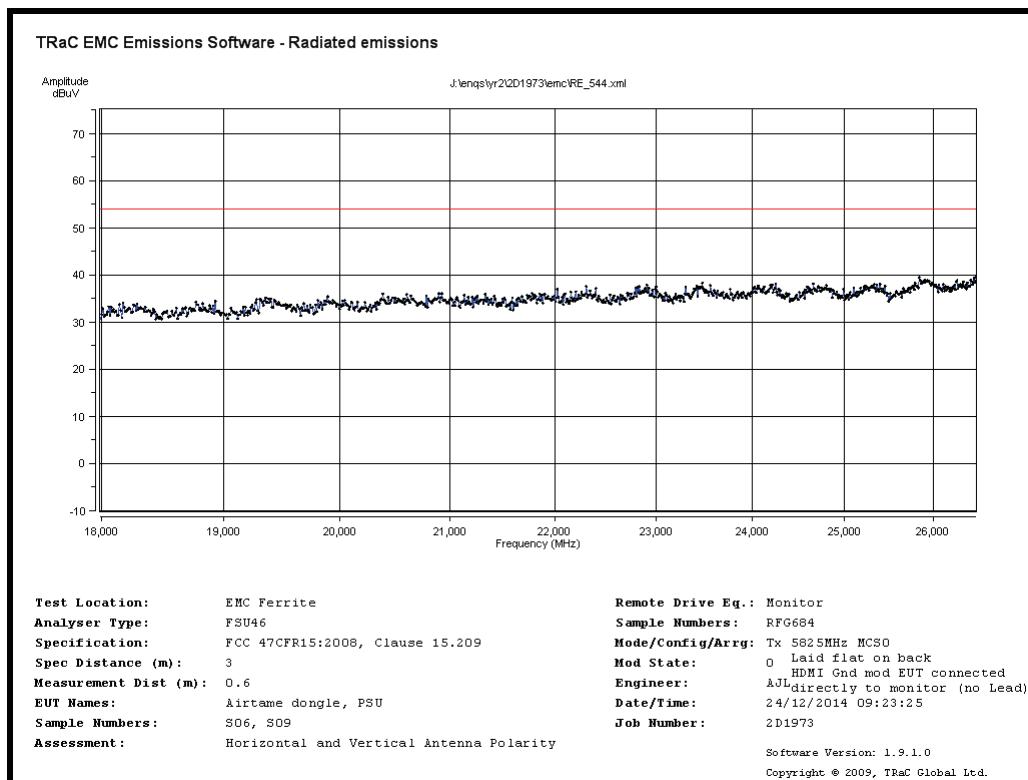
### Radiated Spurious emissions 1GHz to 5GHz – 5825MHz MCS0



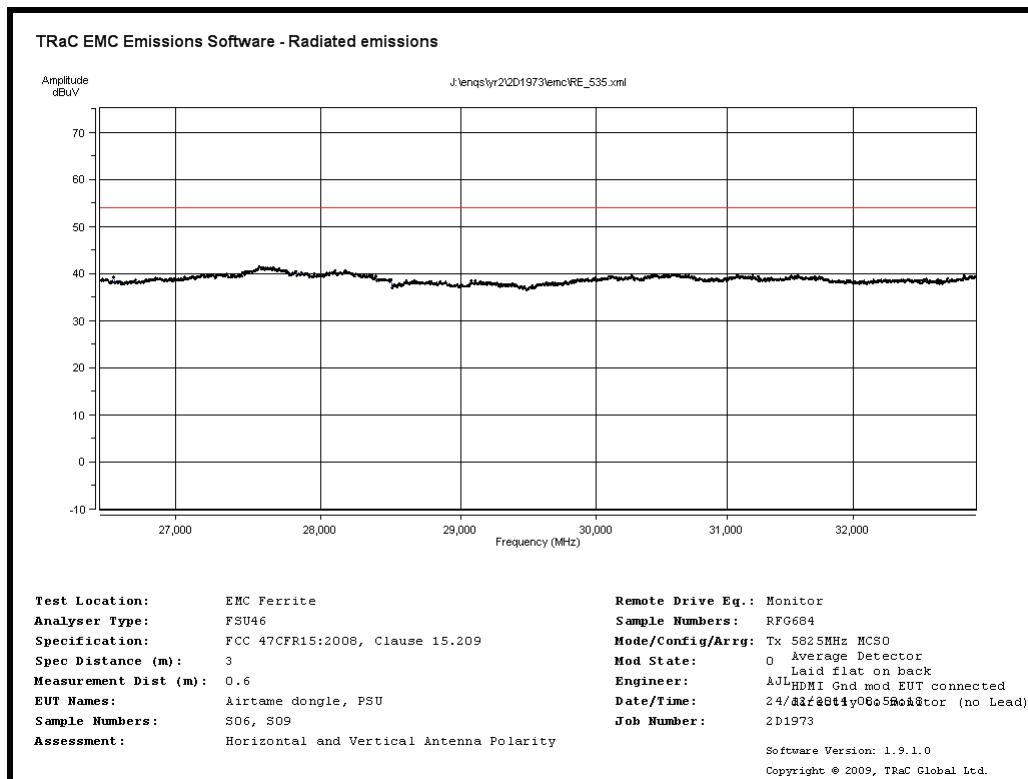
### Radiated Spurious emissions 5GHz to 12.5GHz – 5825MHz MCS0



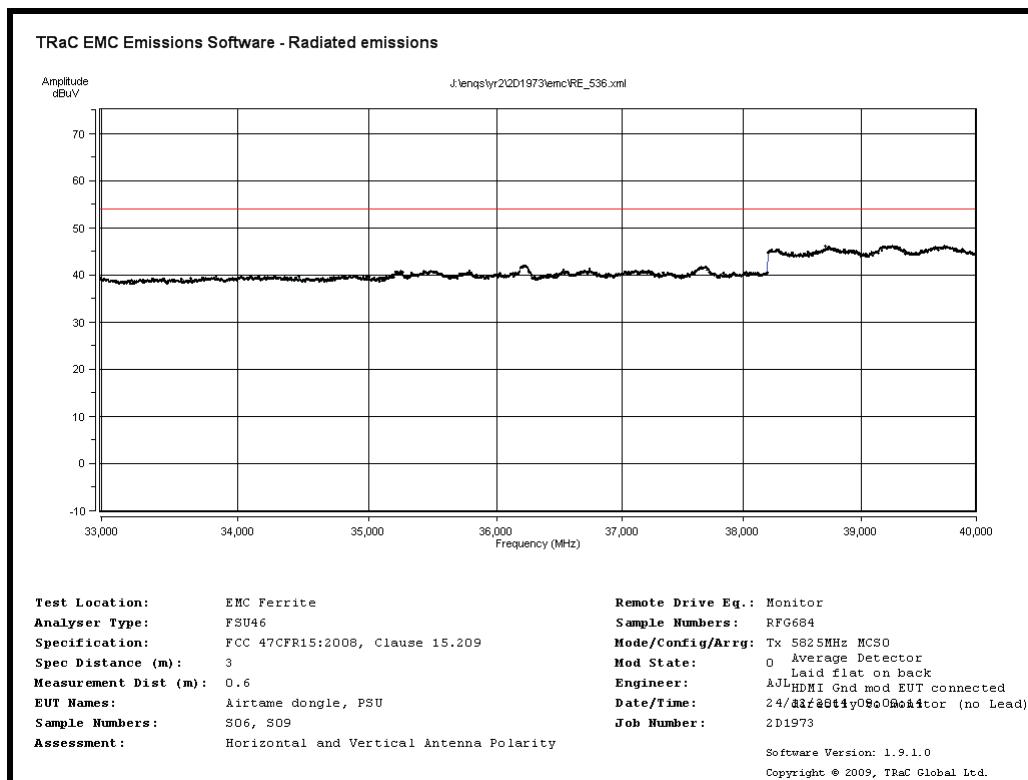
### Radiated Spurious emissions 12.5GHz to 18GHz – 5825MHz MCS0



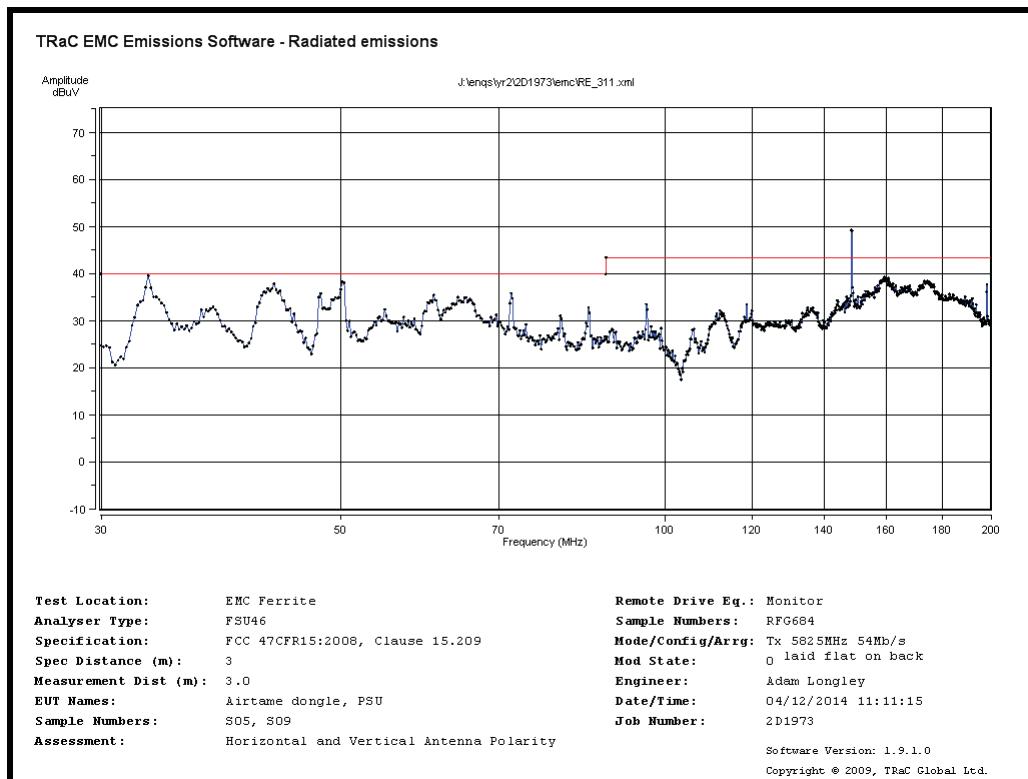
### Radiated Spurious emissions 18GHz to 26.5GHz – 5825MHz MCS0



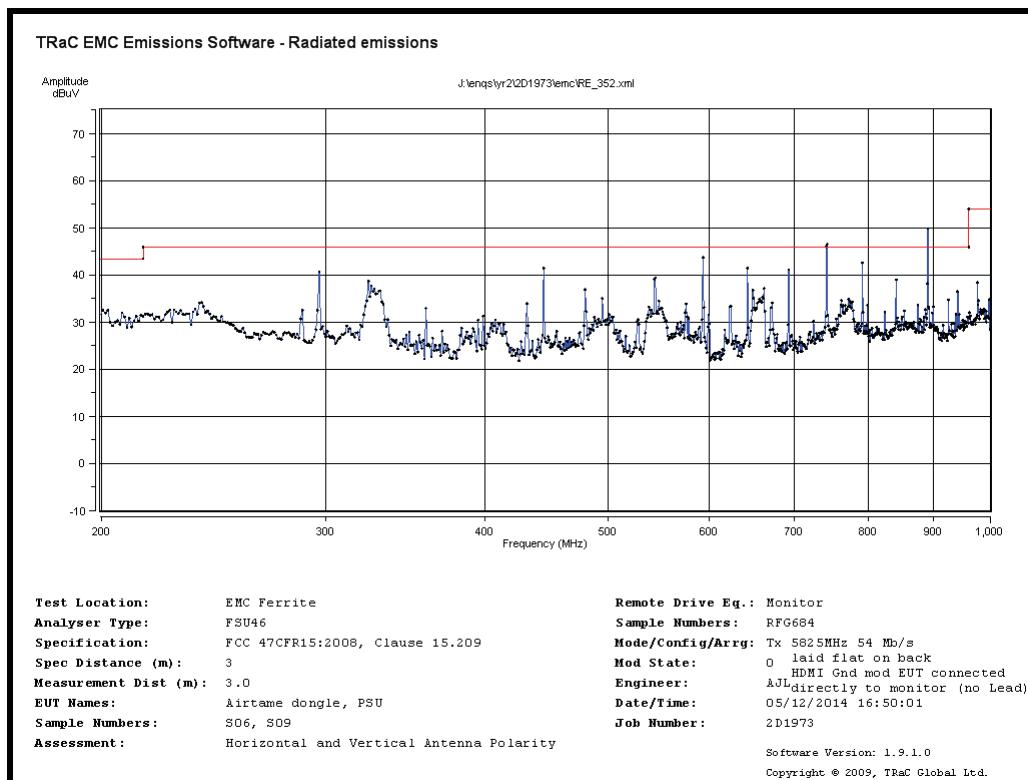
### Radiated Spurious emissions 26.5GHz to 33GHz – 5825MHz MCS0



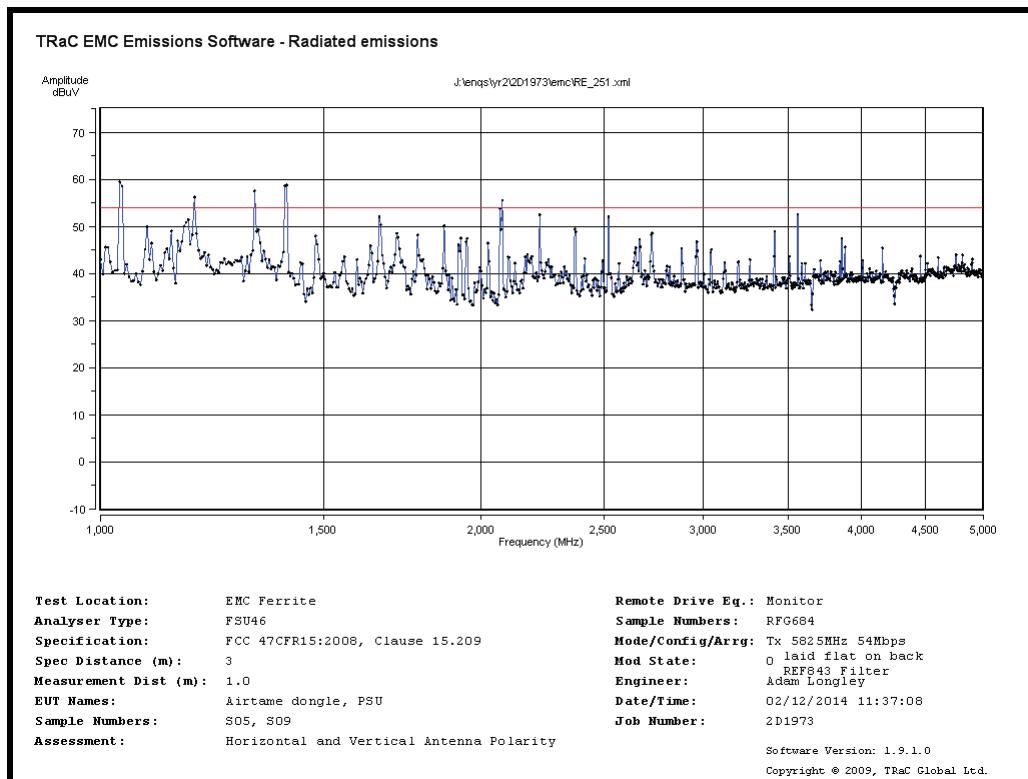
### Radiated Spurious emissions 33GHz to 40GHz – 5825MHz MCS0



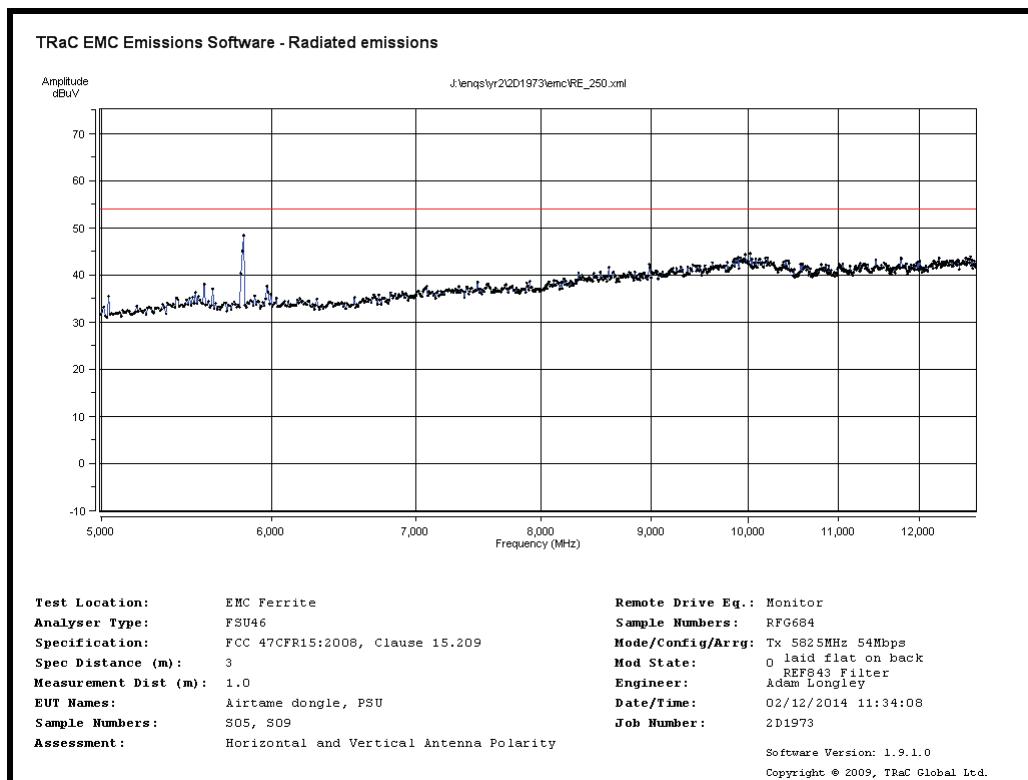
### Radiated Spurious emissions 30MHz to 200MHz – 5825MHz 54Mb/s



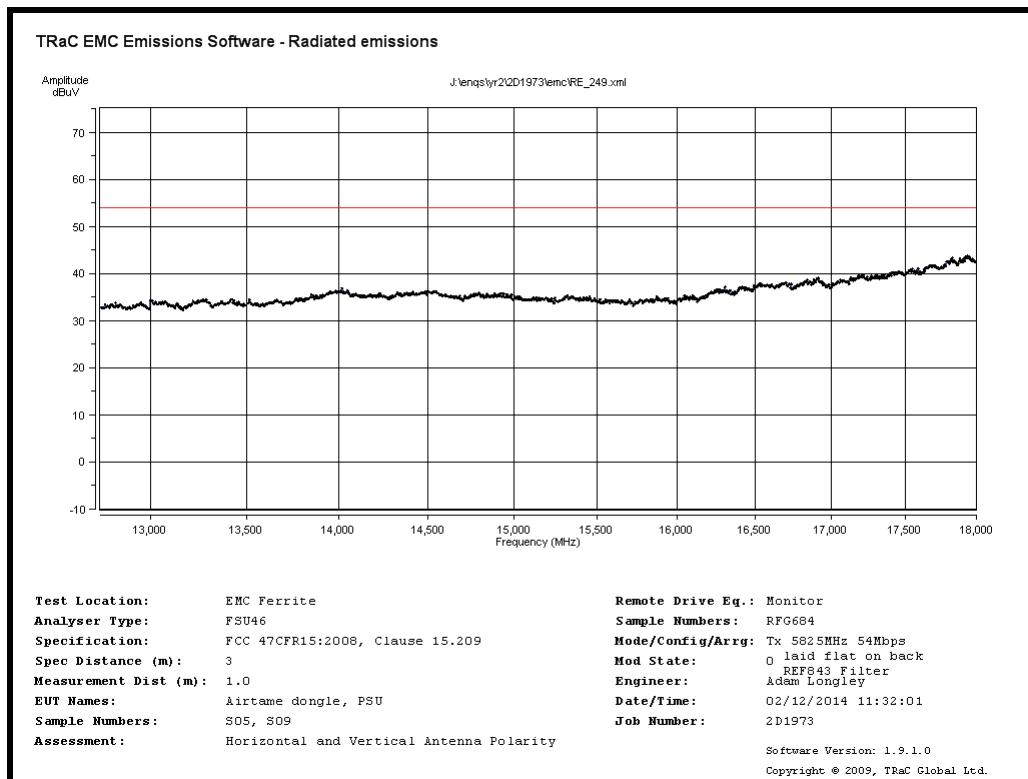
### Radiated Spurious emissions 200MHz to 1GHz – 5825MHz 54Mb/s



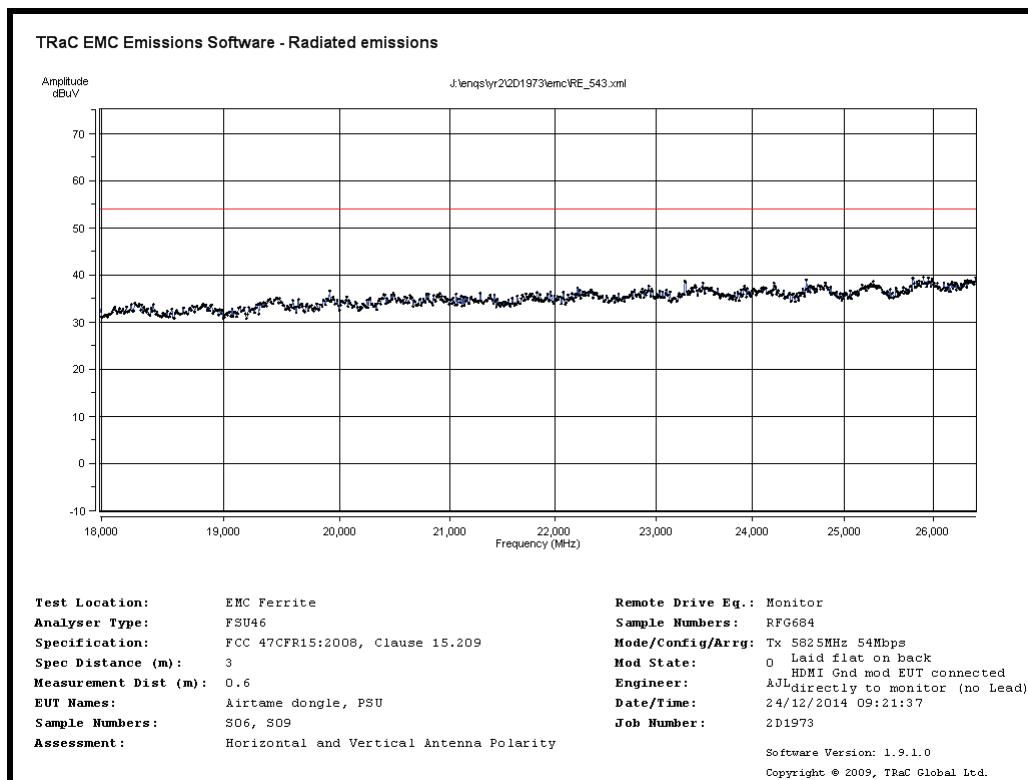
### Radiated Spurious emissions 1GHz to 5GHz – 5825MHz 54Mb/s



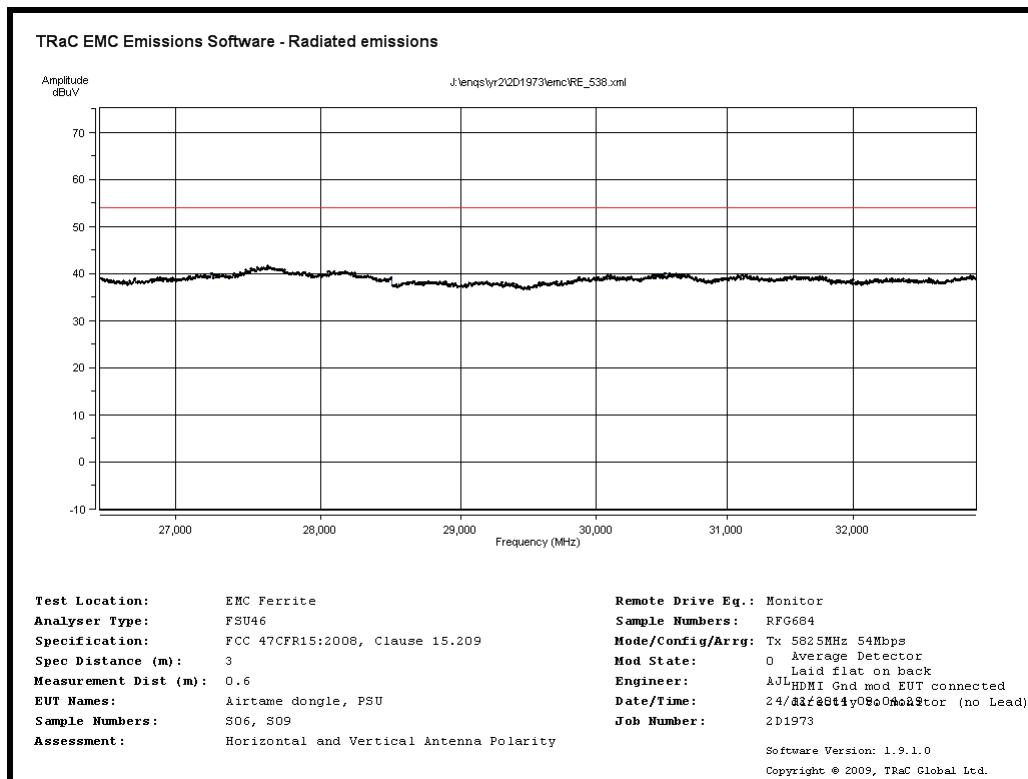
### Radiated Spurious emissions 5GHz to 12.5GHz – 5825MHz 54Mb/s



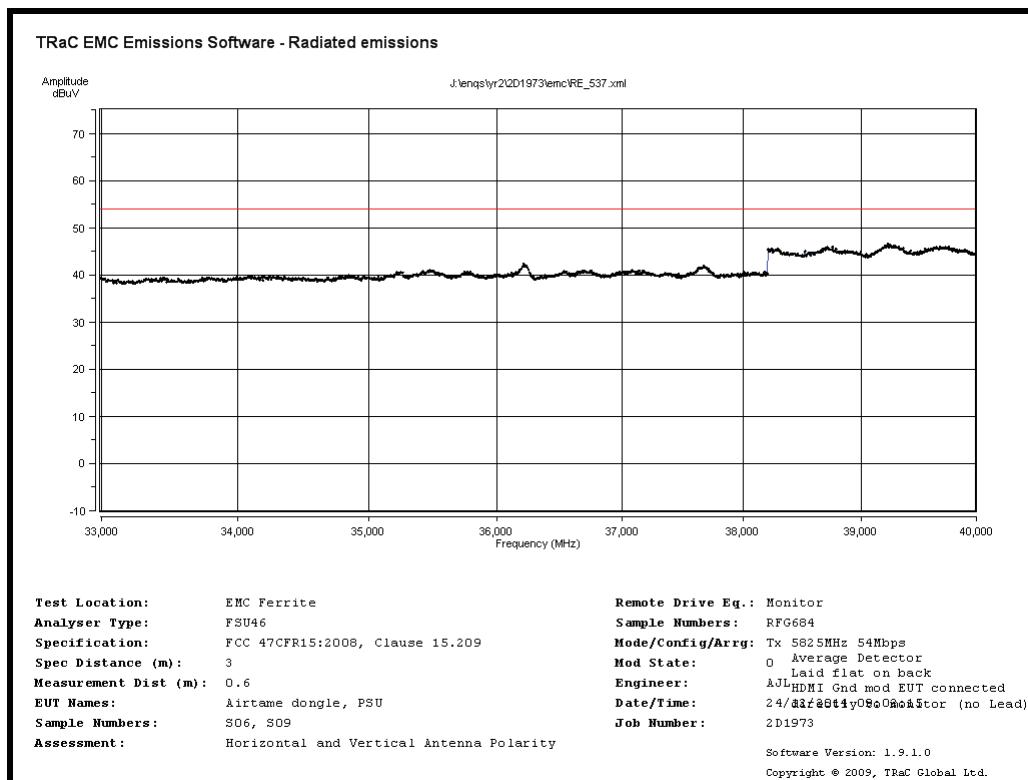
### Radiated Spurious emissions 12.5GHz to 18GHz – 5825MHz 54Mb/s



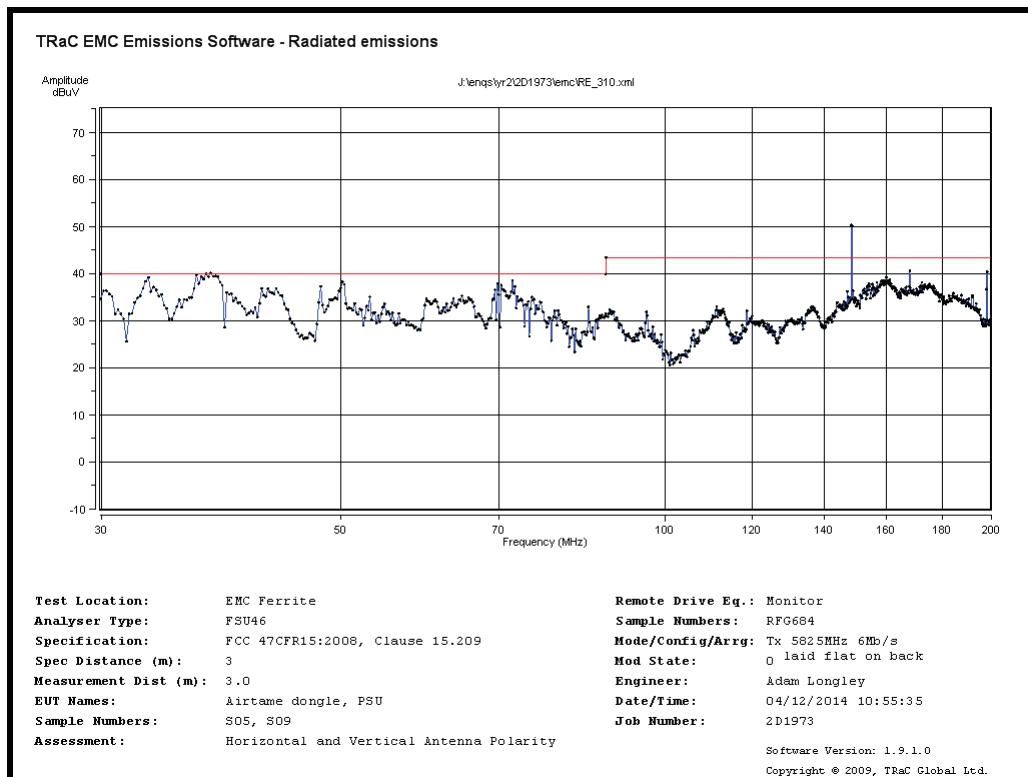
### Radiated Spurious emissions 18GHz to 26.5GHz – 5825MHz 54Mb/s



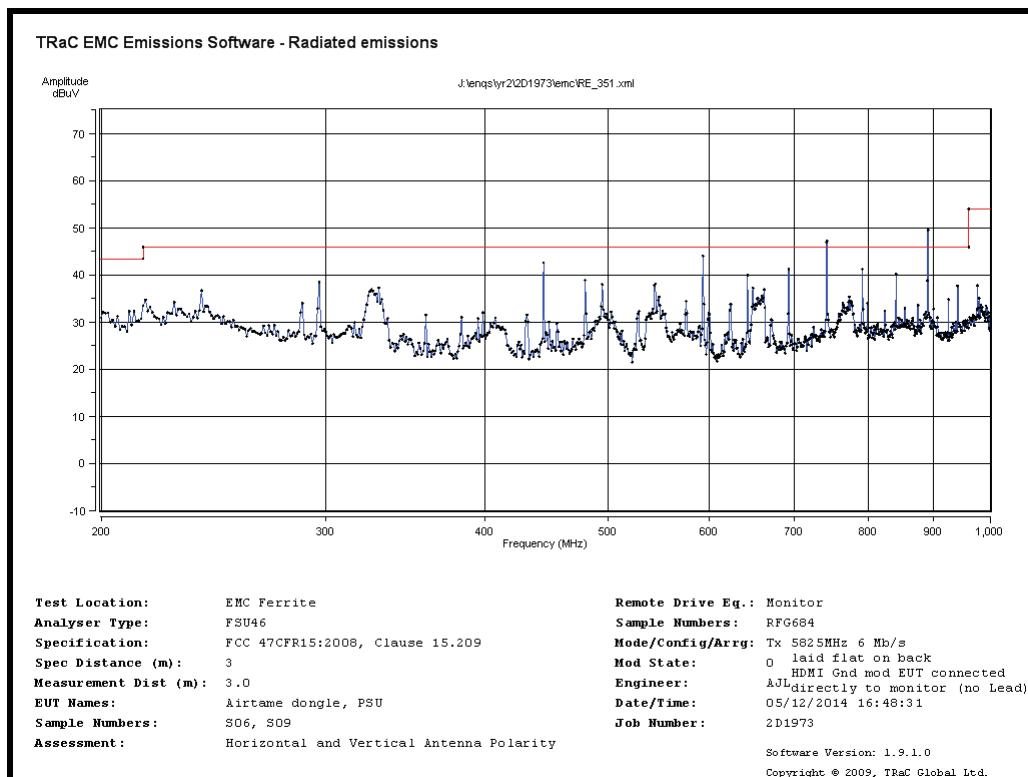
### Radiated Spurious emissions 26.5GHz to 33GHz – 5825MHz 54Mb/s



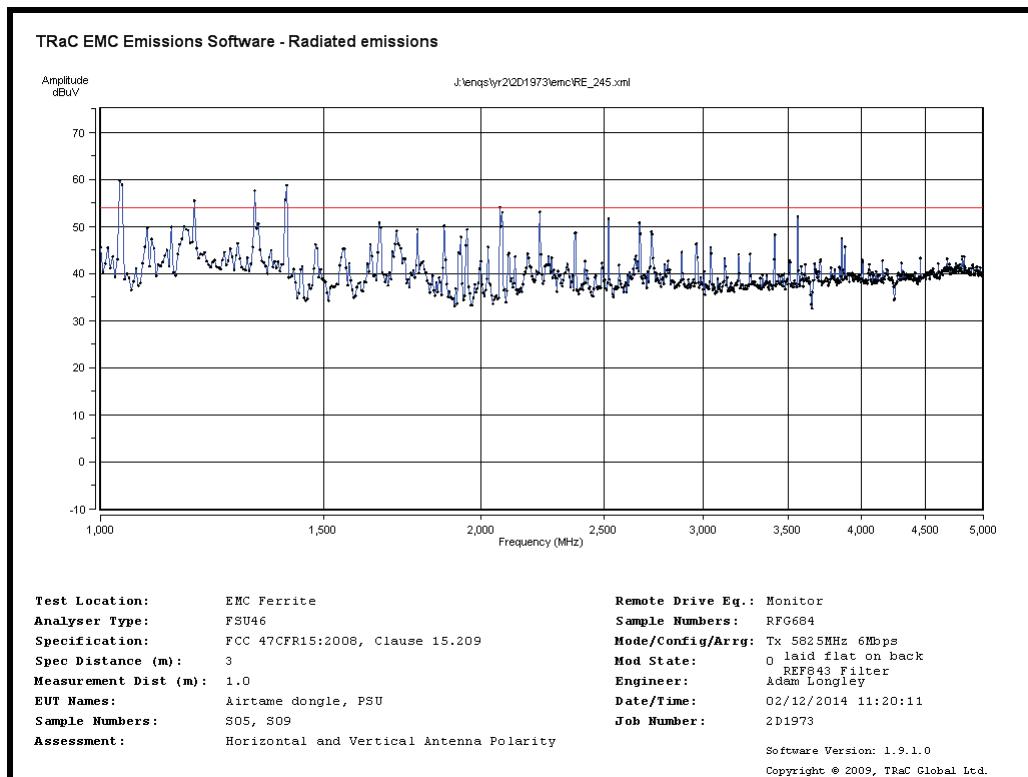
### Radiated Spurious emissions 33GHz to 40GHz – 5825MHz 54Mb/s



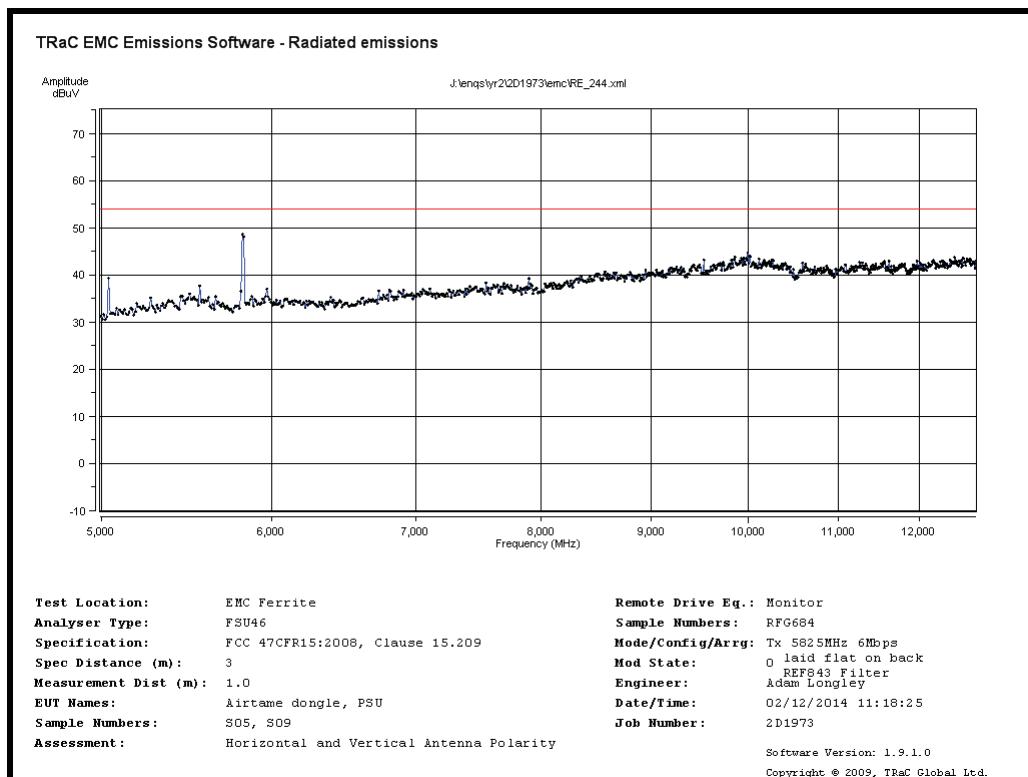
Radiated Spurious emissions 30MHz to 200MHz – 5825MHz 6Mb/s



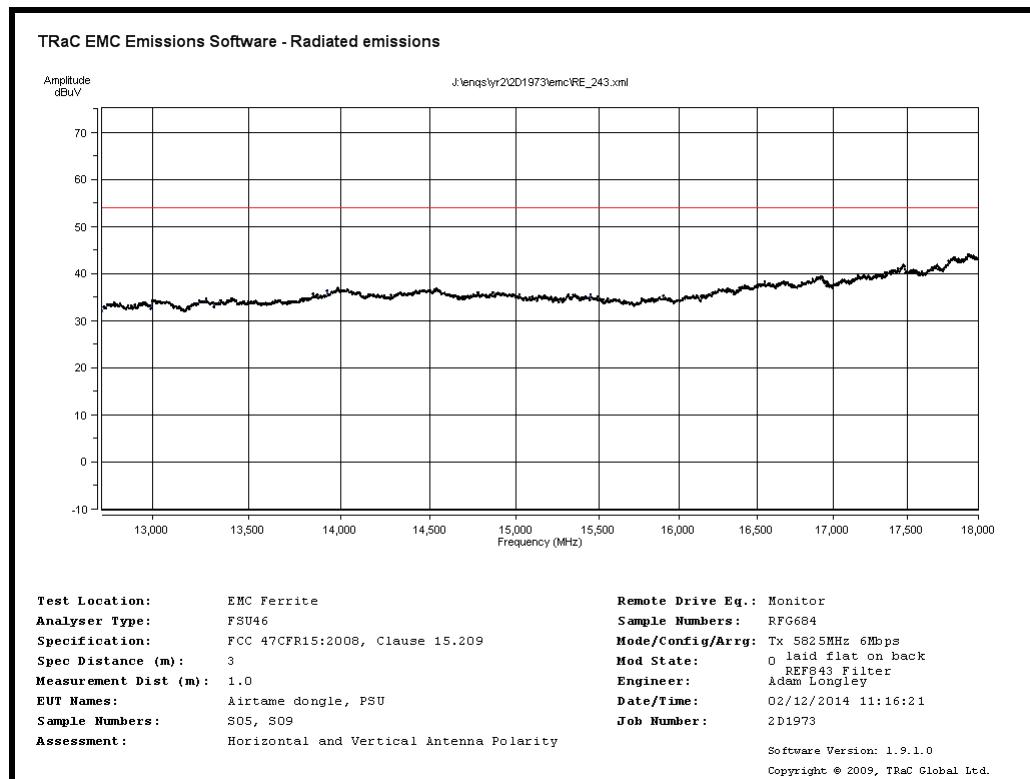
Radiated Spurious emissions 200MHz to 1GHz – 5825MHz 6Mb/s



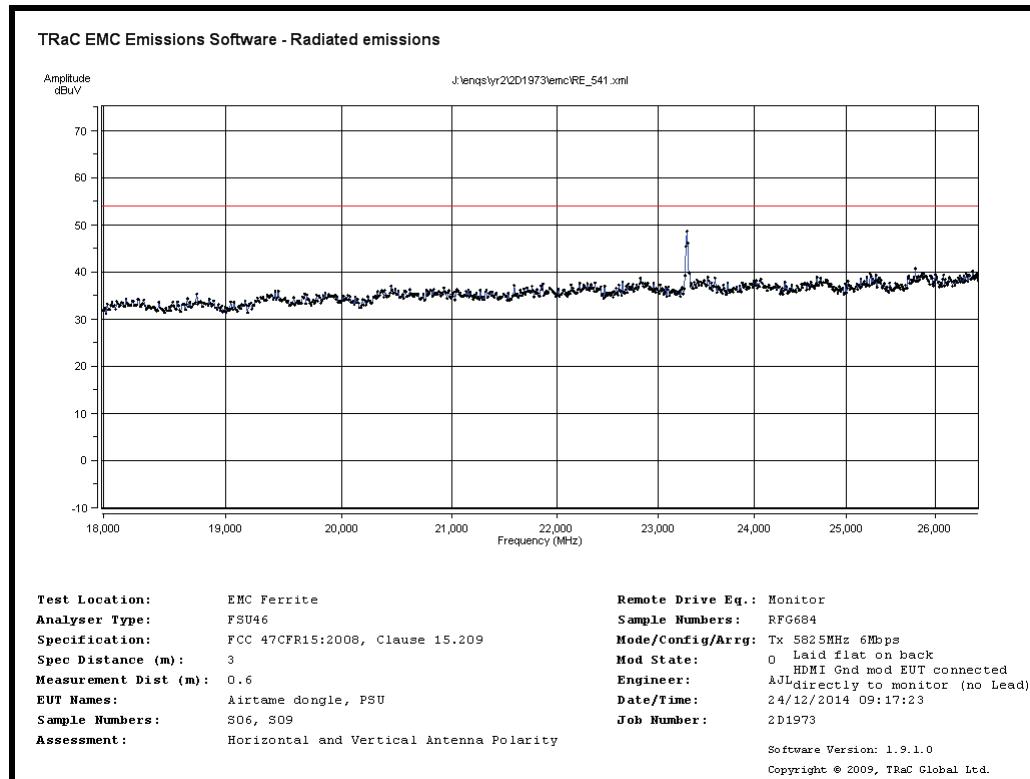
### Radiated Spurious emissions 1GHz to 5GHz – 5825MHz 6Mb/s



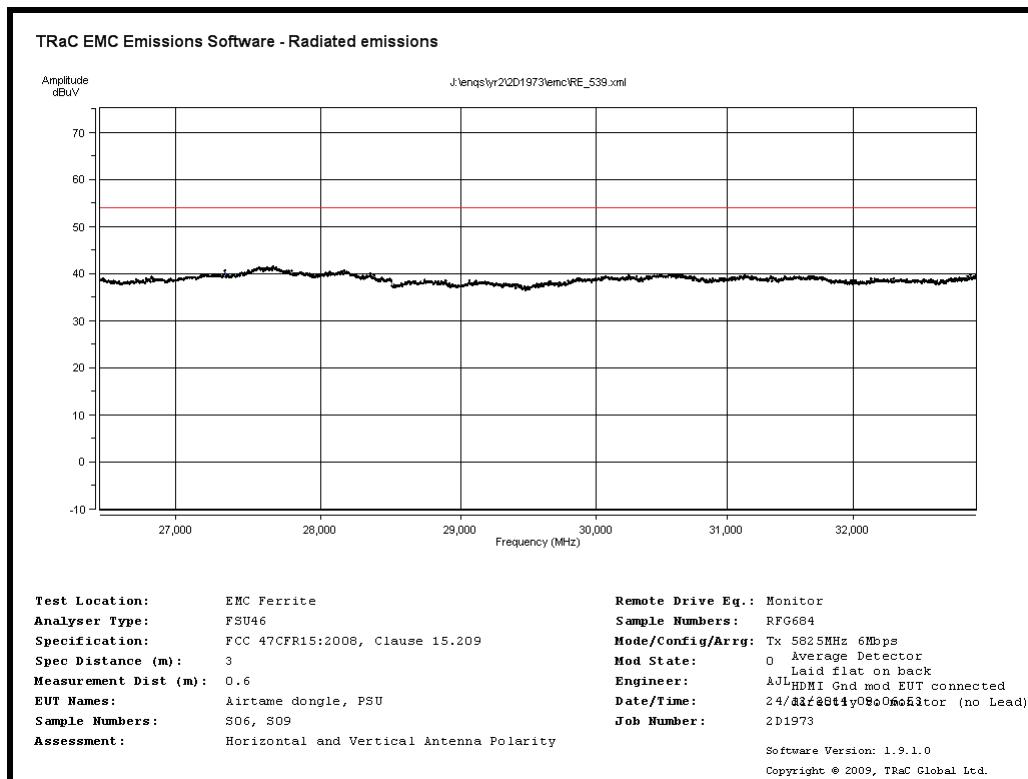
### Radiated Spurious emissions 5GHz to 12.5GHz – 5825MHz 6Mb/s



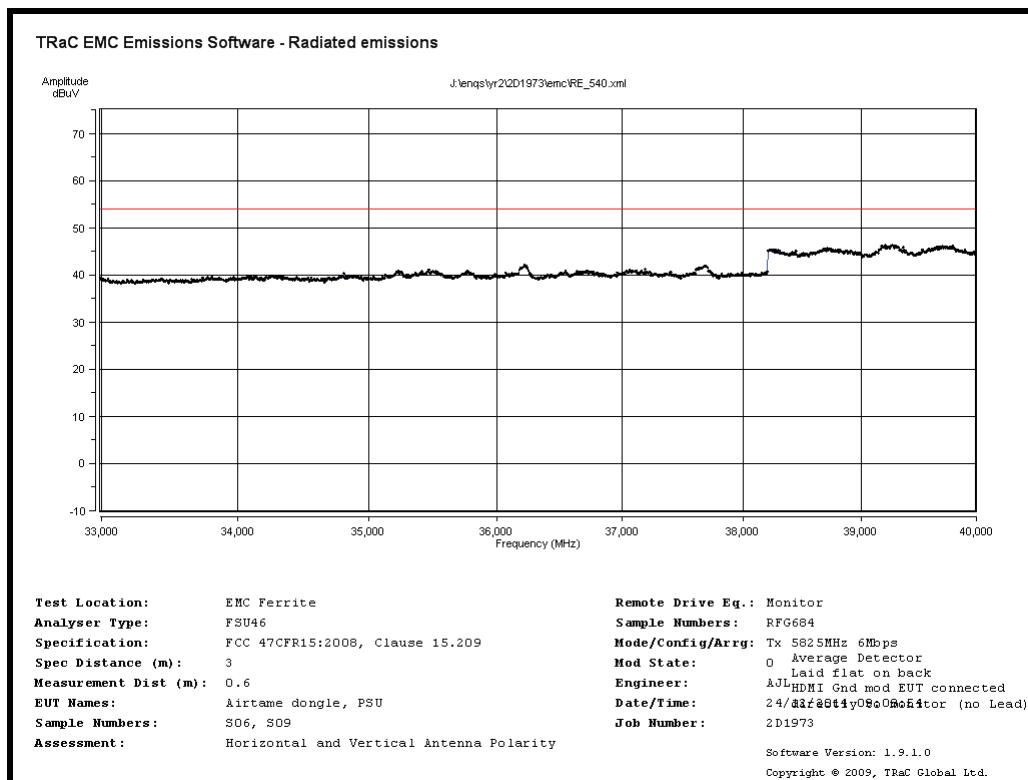
### Radiated Spurious emissions 12.5GHz to 18GHz – 5825MHz 6Mb/s



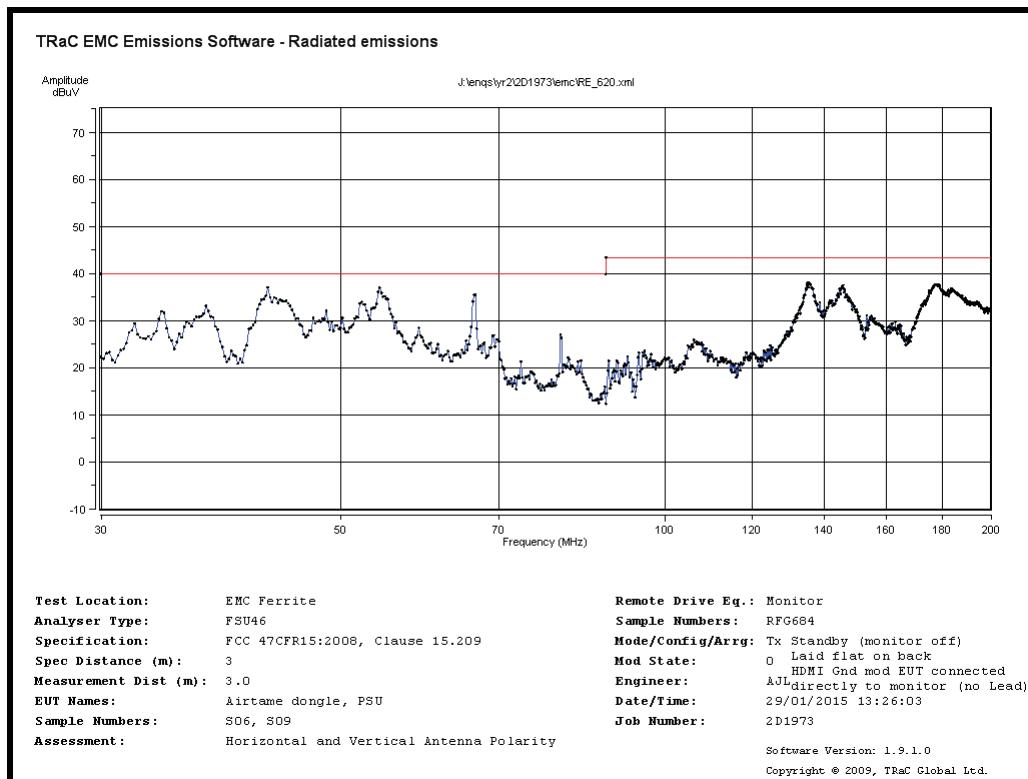
### Radiated Spurious emissions 18GHz to 26.5GHz – 5825MHz 6Mb/s



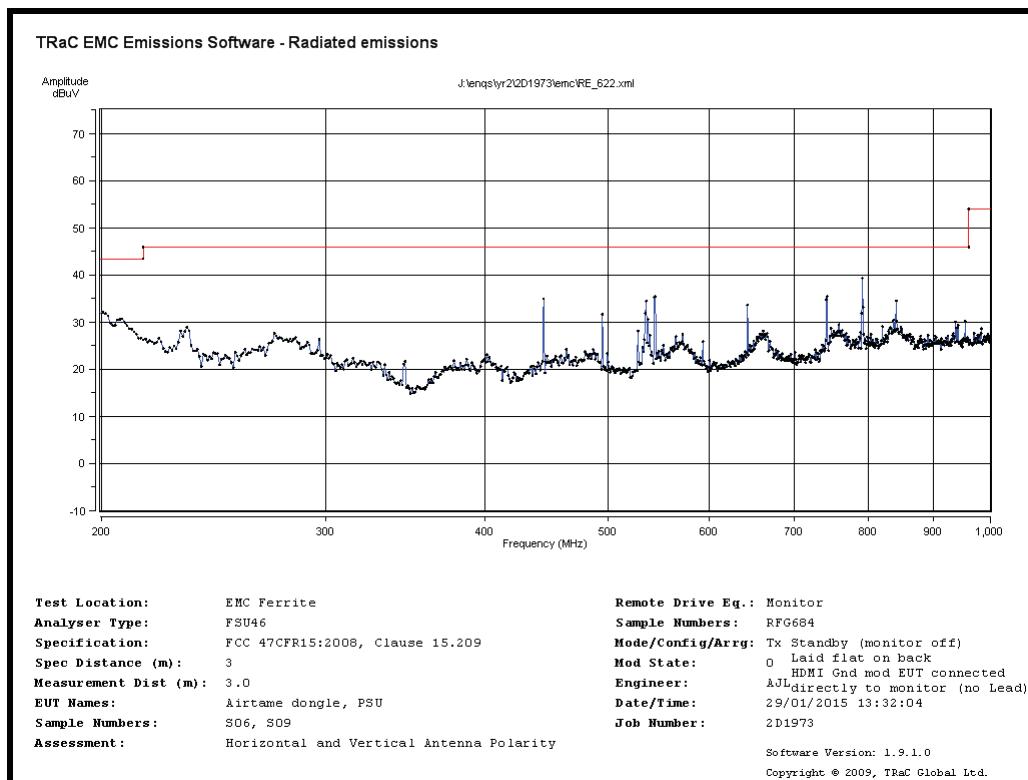
### Radiated Spurious emissions 26.5GHz to 33GHz – 5825MHz 6Mb/s



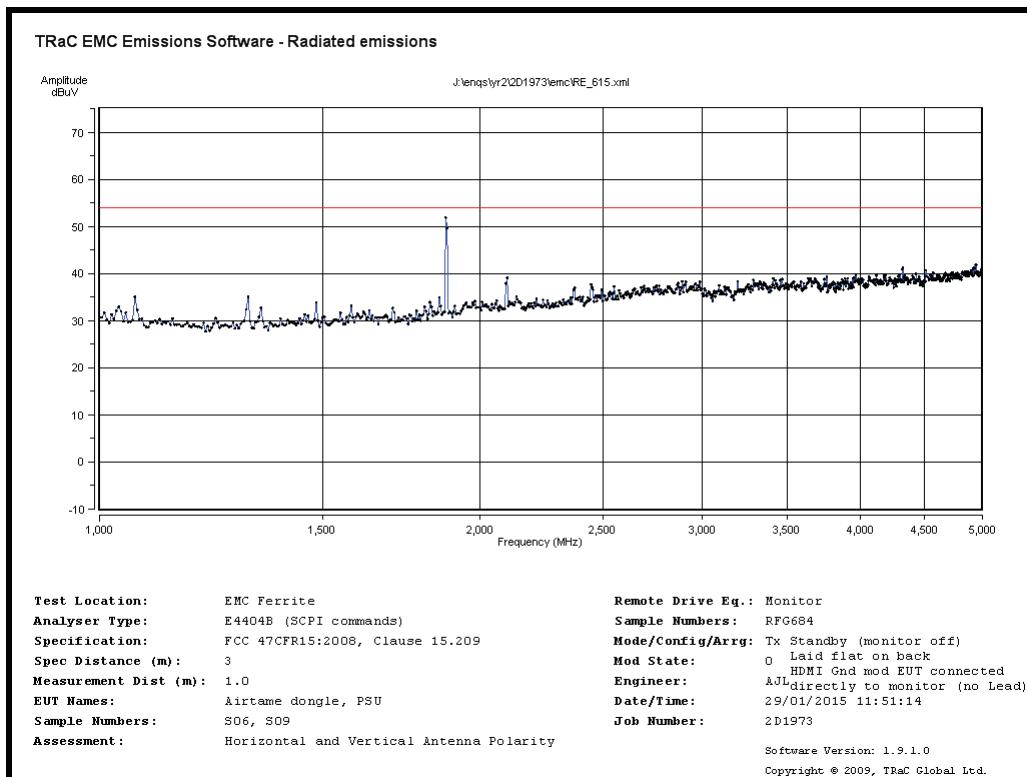
### Radiated Spurious emissions 33GHz to 40GHz – 5825MHz 6Mb/s



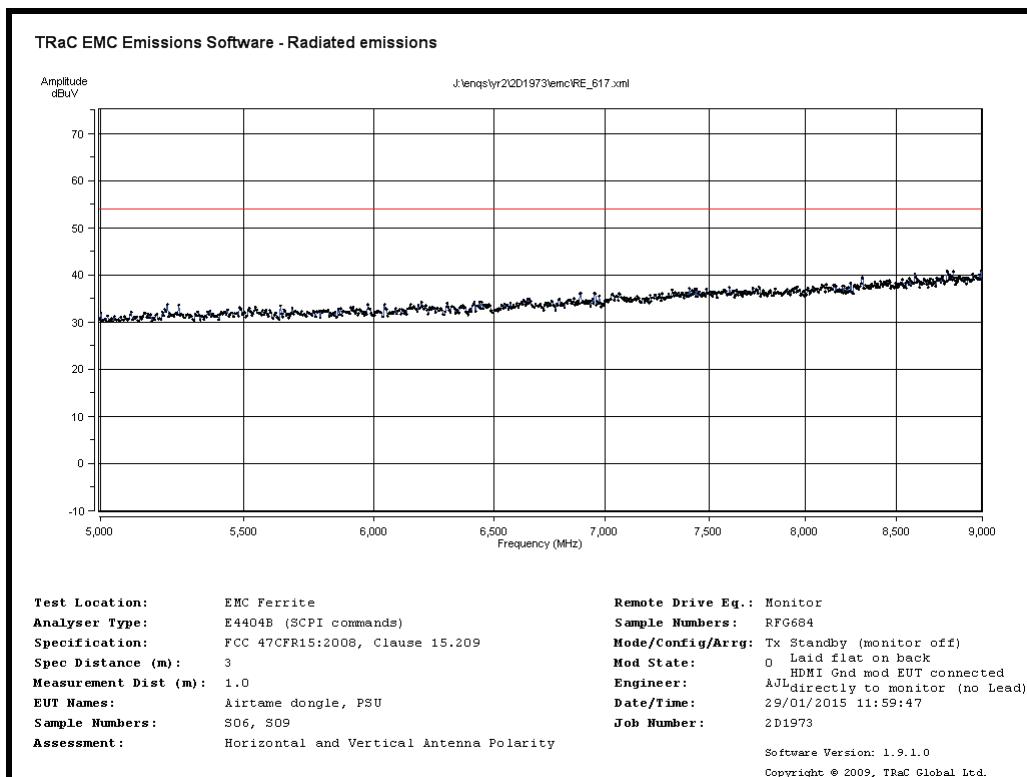
### Radiated Spurious emissions 30MHz to 200MHz – Rx



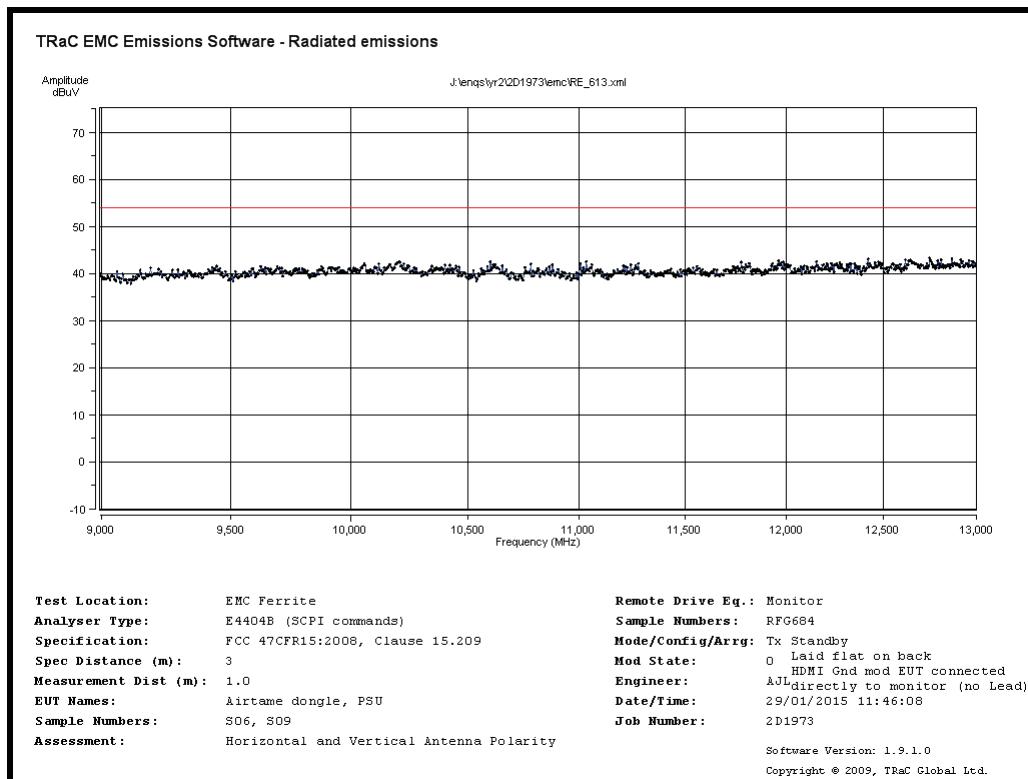
### Radiated Spurious emissions 200MHz to 1GHz – Rx



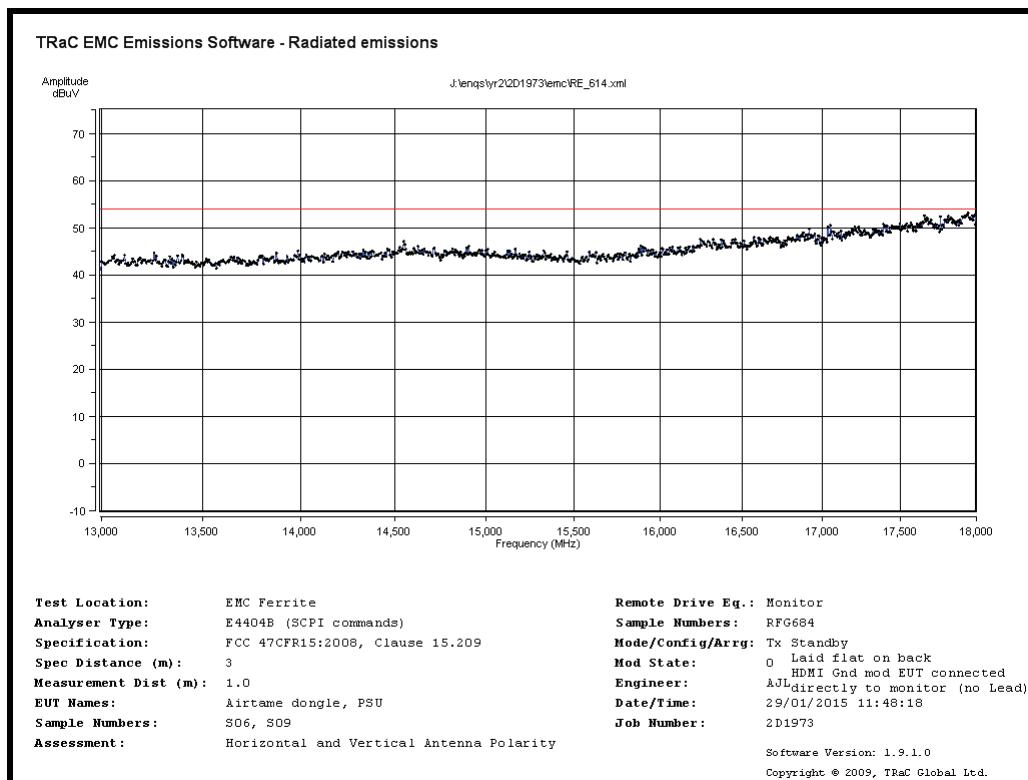
### Radiated Spurious emissions 1GHz to 5GHz – Rx



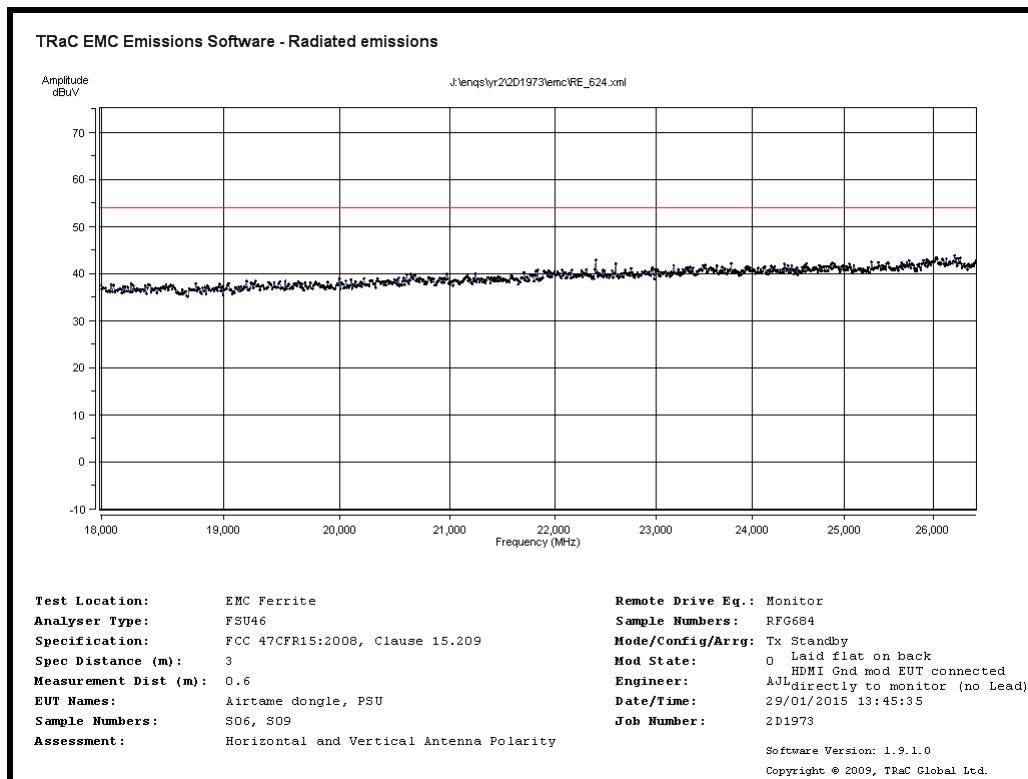
### Radiated Spurious emissions 5GHz to 9GHz – Rx



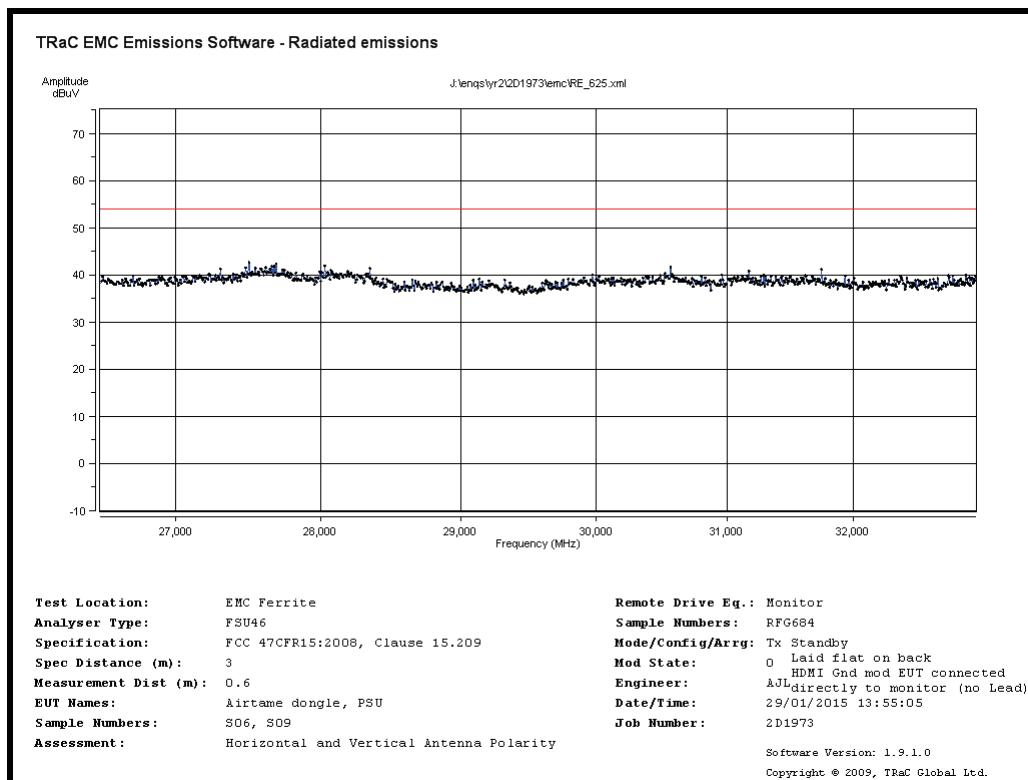
### Radiated Spurious emissions 9GHz to 13GHz – Rx



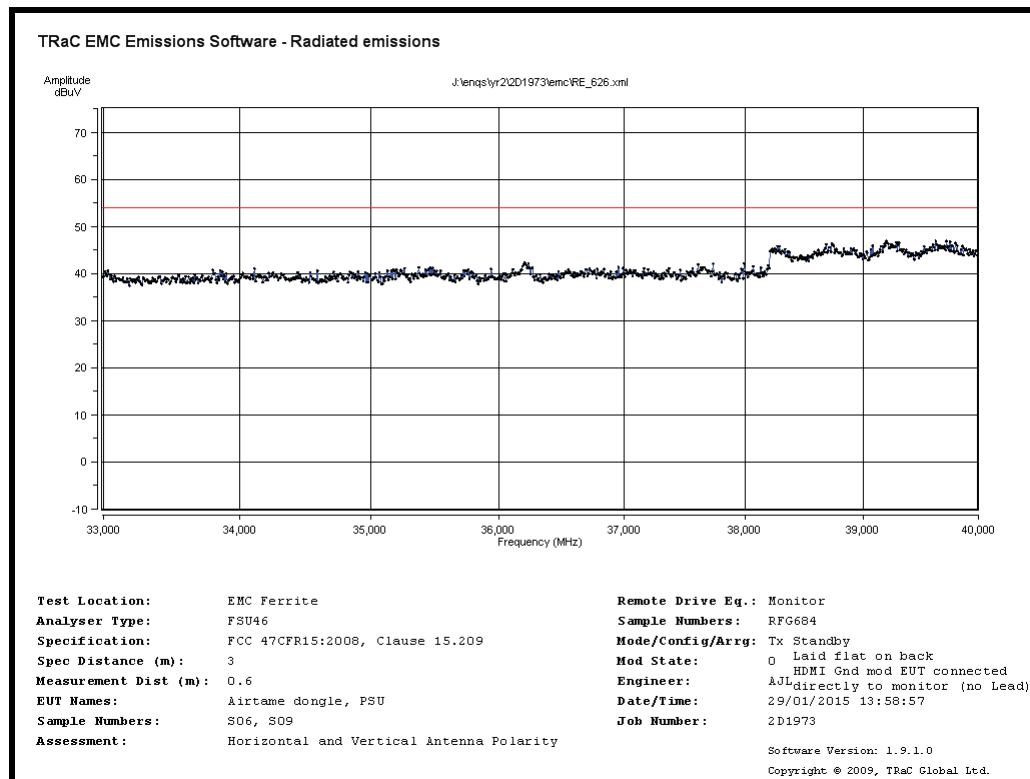
### Radiated Spurious emissions 13GHz to 18GHz – Rx



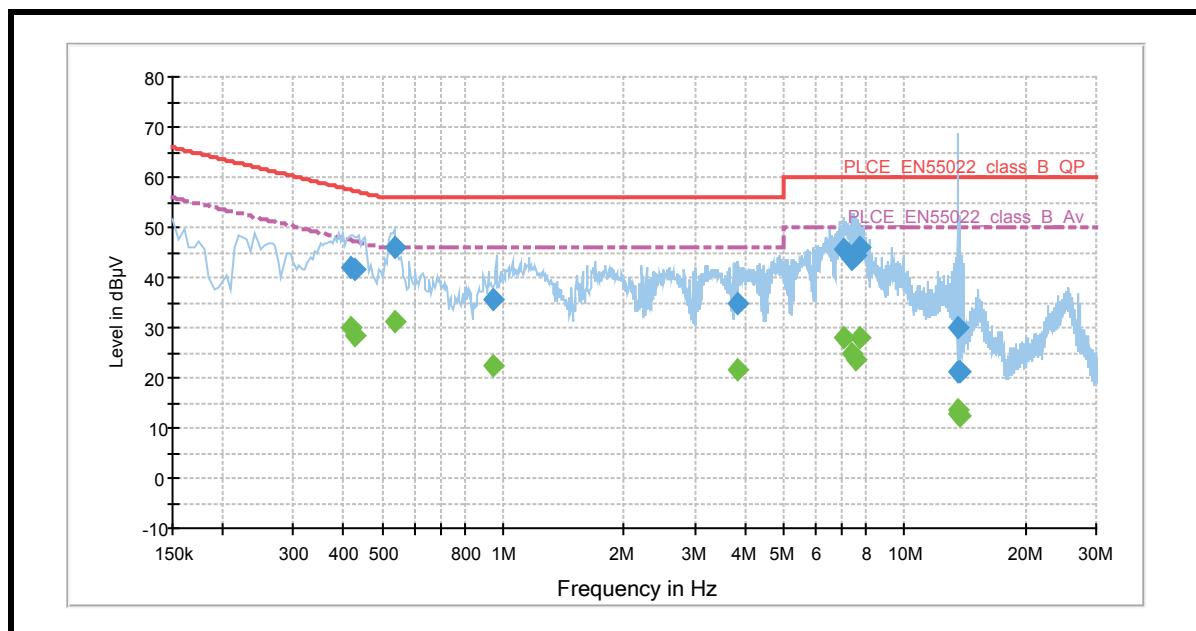
### Radiated Spurious emissions 18GHz to 26.5GHz – Rx



### Radiated Spurious emissions 26.5GHz to 33GHz – Rx



Radiated Spurious emissions 33GHz to 40GHz – Rx



Power Line Conducted Emissions

**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 its 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
S01	Airtame HDMI Dongle	
S03	Airtame HDMI Dongle (RF Conducted Sample)	RF1
S06	Airtame HDMI Dongle	RF4
S07	Plug-top USB PSU (used with S03)	Model: ADS-12BA-06B 05075G
S08	Plug-top USB PSU (used with S01)	Model: ADS-12BA-06B 05075G
S09	Plug-top USB PSU (used with S06)	Model: ADS-12BA-06B 05075G

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

Identification	Description
RFG684	Panasonic TV
TRaC Laptop	Compaq 6720s Laptop PC

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

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

Test	Description of Operating Mode
All tests detailed in this report	<p>2.4GHz IEEE 802.11 WiFi transmitting on frequency and operating mode selected using the client's test script installed on the EUT as appropriate to the test requirements.</p> <p>Using the command line:  <code>athtestcmd -tx tx99 -txfreq xxxx -txrate yy -txpwr zz</code></p> <p>Where:</p> <p>xxxx = Required channel frequency in MHz  yy = 18 (MCS6), 12 (MCS0), 11 (54Mb/s), 4 (6Mb/s)  zz = 18 (unless otherwise noted in the main body of this report).</p>

Test	Description of Operating Mode:
Receiver conducted and radiated (ERP) spurious emissions	EUT active but non-transmitting.

Test	Description of Operating Mode:
PLCE	EUT active and transmitting on 2.4GHz and 5GHz bands.

MCS6 and MCS0 modes are 802.11n  
54Mb/s and 6 Mb/s modes are 802.11a

**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 : S03  
 Tests : Conducted

Port	Description of Cable Attached	Cable length	Equipment Connected
HDMI	None	-	None
Micro USB	USB A to micro USB cable	1m	USB PSU
USB Programming	USB A to 6-way header cable	2m	TRaC Laptop
SMA RF port	SMA – SMA coaxial rf cable	1m	Test Instruments

Sample : S06  
 Tests : Radiated Emissions

Port	Description of Cable Attached	Cable length	Equipment Connected
HDMI	None (direct connection)	-	RFG684 TV
Micro USB	USB A to micro USB cable	1m	USB PSU
USB Programming	USB A to 6-way header cable	2m	TRaC Laptop

Sample : S01  
 Tests : Power Line Conducted Emissions

Port	Description of Cable Attached	Cable length	Equipment Connected
HDMI	None (direct connection)	-	RFG684 TV
Micro USB	USB A to micro USB cable	1m	USB PSU
USB Programming	USB A to 6-way header cable	2m	TRaC Laptop

## C5 Details of Equipment Used

For Radiated Measurements:

TRAC REF/RFG No.	Type	Description	Manufacturer	Date Calibrated.	Calibration Due
REF886	ATS	Ferrite Lined Chamber	TRaC	21/07/14	21/07/15
095		Biconical Antenna	EMCO	09/05/13	09/05/16
191		Log Periodic Antenna	EMCO	09/05/13	09/05/16
129	3115	Horn Antenna	EMCO	05/02/14	05/02/16
RFG629		Horn Antenna	Q-Par	19/09/13	19/09/15
REF927	310	Pre-Amp (9kHz – 1GHz)	Sonoma	01/07/14	01/07/16
REF913	8449B	Pre-Amp (1 – 26.5GHz)	Agilent	05/02/14	05/02/15
RFG450		SMA RF coaxial cable		03/07/13	03/07/15
REF881		N-Type RF coaxial cable		06/10/14	06/10/15
REF882		N-Type RF coaxial cable		06/10/14	06/10/15
REF884		N-Type RF coaxial cable		06/10/14	06/10/15
REF885		N-Type RF coaxial cable		06/10/14	06/10/15
RFG832		K-Type RF coaxial cable	Teledyne	17/07/14	17/07/15
RFG919		K-Type RF coaxial cable	Teledyne	17/07/14	17/07/15
REF910	FSU	Spectrum Analyser	Rhode & Schwarz	31/03/14	31/03/15
REF837	E4440A	Spectrum Analyser	Agilent	19/05/14	19/05/15

For Conducted RF Measurements:

TRAC REF/RFG No.	Type	Description	Manufacturer	Date Calibrated.	Calibration Due
REF910	FSU	Spectrum Analyser	Rhode & Schwarz	31/03/14	31/03/15
REF837	E4440A	Spectrum Analyser	Agilent	19/05/14	19/05/15
REF2112	RPR3006W	Power Meter	Dare	10/03/14	10/03/15

For Power Line Conducted Measurements:

TRAC REF/RFG No.	Type	Description	Manufacturer	Date Calibrated.	Calibration Due
RFG680	ESH3-Z2	Pulse Limiter	R & S	01/07/14	01/07/15
RFG295	-	BNC coaxial cable	-	24/12/13	24/12/14
RFG299	-	BNC coaxial cable	-	24/12/13	24/12/14
RFG189	ESH3-Z5	LISN	R & S	04/09/14	04/09/15
RFG125	ESHS10	Measuring Receiver	R & S	24/04/14	24/04/15

Power Line Conducted Emissions testing was performed on the 29<sup>th</sup> October 2014.

**Appendix D:**

**Additional Information**

No additional information is included within this test report.

**Appendix E:**

**Calculation of the duty cycle correction factor**

No duty cycle correction has been applied to the results in this report.

**Appendix F:**

**Photographs and Figures**

The following photographs were taken of the test samples:

1. Radiated electric field emissions arrangement: front view.
2. Radiated electric field emissions arrangement: rear view.
3. Radiated electric field emissions arrangement: rear view close up.



Photograph 1



Photograph 2



Photograph 3

**Appendix G:****General SAR test reduction and exclusion guidance****KDB 447498**

## Section 4.3 General SAR test reduction and exclusion guidance

For Standalone SAR exclusion consideration, when SAR Exclusion Threshold requirement in KDB 447498 is satisfied, standalone SAR evaluation for general population exposure conditions by measurement or numerical simulation is not required.

In the frequency range below 100 MHz to 6 GHz and test separation distance of 50mm, the SAR Test Exclusion Threshold for operation in the 5150 – 5350 MHz band will be determined as follows

## SAR Exclusion Threshold

$$NT = \{ [ (MP/TSD) * \sqrt{f_{GHz}} ] + (TSD - 50mm) * 10 \}$$

Where:

NT	=	Numeric Threshold (3.0 for 1-g SAR and 7.5 for 10-g SAR)
MP	=	Max Power of channel (mW) (inc tune up)
TSD	=	Min Test separation Distance (mm) = 50
$f_{GHz}$	=	Transmit frequency (or 100MHz if lower)

We can transpose this formula to allow us to find the maximum power of a channel allowed and compare this to the measured maximum power.

$$MP = \{ [ (NT \times TSD) / \sqrt{f_{GHz}} ] + (TSD - 50) * 10 \}$$

**Operating Frequency 5.180 GHz**

$$\begin{aligned} MP &= \{ [ (3.0 \times 50) / \sqrt{5.180} ] + (50 - 50) * 10 \} \\ MP &= \{ [150 / 2.28 ] + (0 * 10) \} \\ MP &= 65.79 \text{mW} \end{aligned}$$

**Operating Frequency 5.260 GHz**

$$\begin{aligned} MP &= \{ [ (3.0 \times 50) / \sqrt{5.260} ] + (50 - 50) * 10 \} \\ MP &= \{ [150 / 2.29 ] + (0 * 10) \} \\ MP &= 65.50 \text{mW} \end{aligned}$$

**Operating Frequency 5.320 GHz**

$$\begin{aligned} MP &= \{ [ (3.0 \times 50) / \sqrt{5.320} ] + (50 - 50) * 10 \} \\ MP &= \{ [150 / 2.31 ] + (0 * 10) \} \\ MP &= 64.94 \text{mW} \end{aligned}$$

Channel Frequency (MHz)	EIRP (mW)	SAR Exclusion Threshold	SAR Evaluation
5180	10.00	65.79	Not Required
5260	10.72	65.50	Not Required
5320	14.13	64.94	Not Required

Therefore standalone SAR evaluation for general population exposure conditions by measurement or numerical simulation is not required.

In the frequency range below 100 MHz to 6 GHz and test separation distance of 50mm, the SAR Test Exclusion Threshold for operation in the 5470 – 5725 MHz band will be determined as follows

#### SAR Exclusion Threshold

$$NT = \{ [ (MP/TSD) * \sqrt{f_{GHz}} ] + (TSD - 50mm) * 10 \}$$

Where:

NT	=	Numeric Threshold (3.0 for 1-g SAR and 7.5 for 10-g SAR)
MP	=	Max Power of channel (mW) (inc tune up)
TSD	=	Min Test separation Distance (mm) = 50
$f_{GHz}$	=	Transmit frequency (or 100MHz if lower)

We can transpose this formula to allow us to find the maximum power of a channel allowed and compare this to the measured maximum power.

$$MP = \{ [ (NT \times TSD) / \sqrt{f_{GHz}} ] + (TSD - 50) * 10 \}$$

#### Operating Frequency 5.500 GHz

$$\begin{aligned} MP &= \{ [ (3.0 \times 50) / \sqrt{5.500} ] + (50 - 50) * 10 \} \\ MP &= \{ [150 / 2.35 ] + (0 * 10) \} \\ MP &= 63.83 \text{mW} \end{aligned}$$

#### Operating Frequency 5.600 GHz

$$\begin{aligned} MP &= \{ [ (3.0 \times 50) / \sqrt{5.600} ] + (50 - 50) * 10 \} \\ MP &= \{ [150 / 2.37 ] + (0 * 10) \} \\ MP &= 63.29 \text{mW} \end{aligned}$$

#### Operating Frequency 5.700 GHz

$$\begin{aligned} MP &= \{ [ (3.0 \times 50) / \sqrt{5.700} ] + (50 - 50) * 10 \} \\ MP &= \{ [150 / 2.39 ] + (0 * 10) \} \\ MP &= 62.76 \text{mW} \end{aligned}$$

Channel Frequency (MHz)	EIRP (mW)	SAR Exclusion Threshold	SAR Evaluation
5500	12.88	63.83	Not Required
5600	14.45	63.29	Not Required
5700	9.55	62.76	Not Required

Therefore standalone SAR evaluation for general population exposure conditions by measurement or numerical simulation is not required.

In the frequency range below 100 MHz to 6 GHz and test separation distance of 50mm, the SAR Test Exclusion Threshold for operation in the 5725 – 5850 MHz band will be determined as follows

#### SAR Exclusion Threshold

$$NT = \{ [ (MP/TSD) * \sqrt{f_{GHz}} ] + (TSD - 50mm) * 10 \}$$

Where:

NT	=	Numeric Threshold (3.0 for 1-g SAR and 7.5 for 10-g SAR)
MP	=	Max Power of channel (mW) (inc tune up)
TSD	=	Min Test separation Distance (mm) = 50
$f_{GHz}$	=	Transmit frequency (or 100MHz if lower)

We can transpose this formula to allow us to find the maximum power of a channel allowed and compare this to the measured maximum power.

$$MP = \{ [ (NT \times TSD) / \sqrt{f_{GHz}} ] + (TSD - 50) * 10 \}$$

#### Operating Frequency 5.745 GHz

$$\begin{aligned} MP &= \{ [ (3.0 \times 50) / \sqrt{5.745} ] + (50 - 50) * 10 \} \\ MP &= \{ [150 / 2.39 ] + (0 * 10) \} \\ MP &= 62.76 \text{mW} \end{aligned}$$

#### Operating Frequency 5.785 GHz

$$\begin{aligned} MP &= \{ [ (3.0 \times 50) / \sqrt{5.785} ] + (50 - 50) * 10 \} \\ MP &= \{ [150 / 2.41 ] + (0 * 10) \} \\ MP &= 62.24 \text{mW} \end{aligned}$$

#### Operating Frequency 5.825 GHz

$$\begin{aligned} MP &= \{ [ (3.0 \times 50) / \sqrt{5.825} ] + (50 - 50) * 10 \} \\ MP &= \{ [150 / 2.41 ] + (0 * 10) \} \\ MP &= 62.24 \text{mW} \end{aligned}$$

Channel Frequency (MHz)	EIRP (mW)	SAR Exclusion Threshold	SAR Evaluation
5745	8.51	62.78	Not Required
5785	12.88	62.24	Not Required
5825	15.14	62.24	Not Required

Therefore standalone SAR evaluation for general population exposure conditions by measurement or numerical simulation is not required.

**Appendix H:****MPE exclusion calculation****As per KDB 447498****47 CFR §§1.1307 and 2.1091**

2.1091 Radio frequency radiation exposure evaluation: Portable 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 KDB 447498 D01

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

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> (cm)
5180	10.00	0.6	1.5
5260	10.72	0.6	1.5
5320	14.13	0.6	1.8

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> (cm)
5500	12.88	0.6	1.7
5600	14.45	0.6	1.8
5700	9.55	0.6	1.4

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> (cm)
5745	8.51	0.6	1.4
5785	12.88	0.6	1.7
5825	15.14	0.6	1.8

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