Radio Test Report

for

Cambridge Consultants Limited

RCOM BCM (MOBILE PART)

Document No: TRA-016200-45-05A

Element Wireless Test Report: TRA-016200-45-05A

Applicant	**:** Cambridge Consultants Limited
Apparatus	**:** RCOM BCM (MOBILE PART)
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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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Tests performed by: K J Anderson

Report author: K J Anderson

1.2 Tests Requested By

This test report has been prepared on behalf of:

Cambridge Consultants Ltd
Science Park
Milton Road
Cambridge
CB4 0DW

1.3 Manufacturer

As above

1.4 Apparatus Assessed

The following apparatus was assessed between: 14/09/15 and 28/09/15

RCOM BS (BASE STATION)/ RCOM BCM (MOBILE PART)

The EUT is part of a point to multipoint short range radio communications system, identified as RCOM, which operates in the frequency band 5470MHz to 5725MHz. The wireless part of this system comprises of two parts,the BS – Base Station and the BCM – Bot Control Module (EUT). One Base Station can be connected to many BCMs at any one time. The purpose of this radio system is to provide a low data rate, bi-directional, wireless connection to a large number of low speed factory floor machineries which transport goods, in a controlled manner, around the facility. These machineries are unmanned and the purpose of the wireless connection is to issue commands to the machineries and relay status information back, from each of the machineries, to a central point in the factory.

Dynamic Frequency Selection (DFS) results are not contained within this report and are reported separately in Element Material Technologies test report TRA-016200-45-06A.

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 1.5 to 1.6 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	Application	47CFR15.407 Reference clause	Appendix N^{o}	Mod no.	Result
Power and Power Spectral Density limits	Antenna Port	a(2)	B1	0	Pass
Undesirable emission limits	Antenna Port	b(3) and (6)	B2	0	Pass
Transmit Power Control (TPC)	Antenna Port	h(1)	B3	0	N/A
Power Line Conducted Emissions	Power Port	b (6)	B4	0	Pass

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 1.6 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

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Section 2: Measurement Uncertainty

2.1 Measurement Uncertainty Values

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

The following measurement uncertainty was calculated:

Test type	Quantity	Quantity frequency range	Uncertainty
Radiated electric field emissions 3m alternative test site Effective Radiated Power 3m alternative test site	Amplitude	30MHz to 300MHz Horizontal	±4.6dB
		30MHz to 300MHz Vertical	±5.1dB
		300MHz to 1000MHz Horizontal	±5.2dB
		300MHz to 1000MHz Vertical	±5.5dB
		1GHz to 26.5GHz Horizontal and Vertical	±4.1dB
Conducted emissions		N/A	±0.9 dB
Absolute RF power (via antenna connector)		N/A	±0.9 dB
PSD		N/A	±0.9 dB
Frequency Range	Frequency	9kHz to 26.5GHz	3.611kHz

Section 3: Modifications

3.1 Modifications Performed During Assessment

No modifications were performed during the assessment

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 dBuV/m at the regulatory distance, using:

$$FS = PR + AF + CL - PA + KG + DC - CF \text{ (dBuV/m)}$$

Where:

PR is the power recorded on receiver / spectrum analyzer (dBuV),
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: 5.150GHz to 5.350GHz Formal Emission Test Results

The EUT does not operate in this Sub-Band therefore no results are presented in this appendix.

Appendix B: 5.470GHz to 5.725GHz Formal Test Results

B1 Power and Power Spectral density limits

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

Test Details: Transmiter Power	
Regulation	Part15 Subpart (c) 15.407(a)(2), RSS-247 Section 6.2.3 (1)
Measurement standard	ANSI C63.10 and KDB No 789033 D02
EUT sample number	S59
Modification state	0
SE in test environment	None
SE isolated from EUT	S54
EUT set up	Refer to Appendix D

Narrowband

Channel Frequency (MHz)	Conducted Peak Carrier Power (dBm)	26 dB Bandwidth (MHz)	Declared antenna Gain (dB)	Limit (dBm)	Result
5482.5	3.8	9.519	<6.0	20.8	Pass
5602.5	8.5	9.679	<6.0	20.9	Pass
5712.5	7.7	9.583	<6.0	20.8	Pass

Wideband

Channel Frequency (MHz)	Conducted Peak Carrier Power (dBm)	26 dB Bandwidth (MHz)	Declared antenna Gain (dB)	Limit (dBm)	Result
5482.5	14.0	10.096	<6.0	21.0	Pass
5602.5	15.0	10.128	<6.0	21.1	Pass
5712.5	15.1	10.128	<6.0	21.1	Pass

Test Details: Power Spectral Density	
Regulation	Part15 Subpart (c) 15.407(a)(2), RSS-247 Section 6.2.3 (1)
Measurement standard	ANSI C63.10 and KDB No 789033 D02
EUT sample number	S59
Modification state	0
SE in test environment	None
SE isolated from EUT	S52 and S54
EUT set up	Refer to Appendix D

Narrowband

Channel Frequency (MHz)	Conducted Power Spectral Density(dBm)	Declared antenna Gain (dB)	Limit (dBm)	Result
5482.5	2.3	<6.0	11.0	Pass
5602.5	2.8	<6.0	11.0	Pass
5712.5	2.8	<6.0	11.0	Pass

Narrowband

Channel Frequency (MHz)	Conducted Power Spectral Density(dBm)	Declared antenna Gain (dB)	Limit (dBm)	Result
5482.5	6.2	<6.0	11.0	Pass
5602.5	6.8	<6.0	11.0	Pass
5712.5	7.1	<6.0	11.0	Pass

Notes:

Conducted Measurement

Measurements as per KDB No 789033 D02 General UNII Test Procedures New Rules v01

Limits
For the 5.25–5.35 GHz and 5.47–5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the peak power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

B2 Unwanted emissions:

Details: Tx Radiated Tests above 1GHz	
Regulation Clause	Part 15 Subpart (c) Clause 15.407(b)(3), RSS-247 Section 6.2.3 (3)
Measurement clause	ANSI C63.10, KDB Document: 789033 D02
Frequency range	30MHz to 40GHz
Application	Cabinet and Antenna
Operating band	5.470GHz to 5.725GHz band
EUT sample number	S59, S65 and S66
Modification state	0
SE in test environment	None
SE isolated from EUT	S54
EUT set up	Refer to Appendix D

Measured Values

Ref No.	Freq (MHz)	Angle. Deg	Height (cm)	Pol.	Maximum measured radiated emissions dBm (EIRP)	Spec Limit (dBm)	Margin (dB)
All emissions were a minimum of 20 dB below the test limit							

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Details: Tx Radiated Tests below 1GHz	
Regulation Clause	Part 15 Subpart (c) Clause 15.407(b)(6), RSS – GEN Section 6.1.3 and 7.1.2
Measurement clause	ANSI C63.10, KDB Document: 789033 D02
Frequency range	30MHz to 40GHz
Application	Cabinet and Antenna
Operating band	5.470GHz to 5.725GHz band
EUT sample number	S59, S65 and S66
Modification state	0
SE in test environment	None
SE isolated from EUT	S54
EUT set up	Refer to Appendix D

Measured Values

Ref No.	Freq (MHz)	Angle. Deg	Height (cm)	Pol.	Maximum measured radiated emissions (dBµV/m)	Spec Limit (dBµV/m)	Margin (dB)
All emissions were a minimum of 20 dB below the test limit							

Details: Receive Mode	
Regulation Clause	Part 15 Subpart (b) Clause 15.109, RSS – GEN Section 7.1.2
Measurement clause	ANSI C63.10, KDB Document: 789033 D02
Frequency range	30MHz to 40GHz
Application	Cabinet and Antenna
Operating band	5.470GHz to 5.725GHz band
EUT sample number	S59, S65 and S66
Modification state	0
SE in test environment	None
SE isolated from EUT	S54
EUT set up	Refer to Appendix D

Measured Values

Ref No.	Freq (MHz)	Angle. Deg	Height (cm)	Pol.	Maximum measured radiated emissions (dBµV/m)	Spec Limit (dBµV/m)	Margin (dB)
All emissions were a minimum of 20 dB below the test limit							

.**Limits**

The level of unwanted emissions shall not exceed the limits given below:

15.407 (b) Undesirable emission limits

(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 EIRP of -27 dBm/MHz.

(6) Transmitter unwanted emissions below 1 GHz and receive mode emissions must comply with the general field strength limits set forth in 15.209 detailed in the table below:

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

Notes:

Transmitter unwanted emissions– Radiated measurements

1. For frequencies below 1 GHz, formal measurements were performed using a spectrum analyser using the following settings RBW=VBW=100kHz with a video average detector with a minimum 100 sweeps.
2. For frequencies above 1 GHz, formal measurements were performed using a spectrum analyser using the following settings RBW=VBW=1MHz with a video average detector with a minimum 100 sweeps.

(a) The results displayed take into account applicable antenna factors and cable losses.:

(b) The levels may have been rounded for display purposes.

(c) The following table summarises the effect of the EUT operating mode, internal configuration and arrangement of cables / samples on the measured emission levels :

	See (i)	See (ii)	See (iii)	See (iv)
Effect of EUT operating mode on emission levels	✓			
Effect of EUT internal configuration on emission levels		✓		
Effect of Position of EUT cables & samples on emission levels	✓			

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

B3 Transmit Power Control (TPC)

The EUT Transmit Power Control (TPC) function was not tested as a TPC mechanism is not required for systems with an e.i.r.p. of less than 500 mW.

B4 Power Line Conducted Emissions:

Details:	
Regulation	Part 15 Subpart (c) Clause 15.407(b)(6), RSS – GEN Section 8.8
Measurement clause	ANSI C63.10, KDB Document: 789033 D02
Frequency range	150kHz to 30MHz
Application	dc power port
Operating band	5.470GHz to 5.725GHz band
EUT sample number	S59
Modification state	0
SE in test environment	None
SE isolated from EUT	S54
EUT set up	Refer to Appendix D

Narrowband

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150065	46.5	15000.0	9.000	GND	L1	10.2	19.5	66.0
0.151442	46.5	15000.0	9.000	GND	L1	10.2	19.4	65.9
0.163438	45.5	15000.0	9.000	GND	N	10.1	19.8	65.3
0.185272	43.5	15000.0	9.000	GND	N	10.1	20.7	64.2
0.202124	41.5	15000.0	9.000	GND	N	10.1	22.0	63.5
0.252884	37.4	15000.0	9.000	GND	N	10.1	24.3	61.7
3.950090	34.5	15000.0	9.000	GND	N	10.1	21.5	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150065	17.7	15000.0	9.000	GND	L1	10.2	38.3	56.0
0.151442	17.6	15000.0	9.000	GND	L1	10.2	38.3	55.9
0.163438	16.7	15000.0	9.000	GND	N	10.1	38.6	55.3
0.185272	15.4	15000.0	9.000	GND	N	10.1	38.8	54.2
0.202124	14.8	15000.0	9.000	GND	N	10.1	38.7	53.5
0.252884	11.8	15000.0	9.000	GND	N	10.1	39.9	51.7
3.950090	31.0	15000.0	9.000	GND	N	10.1	15.0	46.0

Channel 0

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150408	46.6	15000.0	9.000	GND	N	10.1	19.4	66.0
0.154907	46.0	15000.0	9.000	GND	N	10.1	19.7	65.7
0.157220	46.1	15000.0	9.000	GND	L1	10.2	19.5	65.6
0.178189	44.1	15000.0	9.000	GND	N	10.1	20.5	64.6
0.236522	38.1	15000.0	9.000	GND	L1	10.2	24.1	62.2
3.950528	34.6	15000.0	9.000	GND	N	10.1	21.4	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150408	17.7	15000.0	9.000	GND	N	10.1	38.3	56.0
0.154907	17.5	15000.0	9.000	GND	N	10.1	38.3	55.7
0.157220	17.3	15000.0	9.000	GND	L1	10.2	38.3	55.6
0.178189	15.7	15000.0	9.000	GND	N	10.1	38.9	54.6
0.236522	12.6	15000.0	9.000	GND	L1	10.2	39.7	52.2
3.950528	31.1	15000.0	9.000	GND	N	10.1	14.9	46.0

Channel 12

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150547	47.0	15000.0	9.000	GND	N	10.1	19.0	66.0
0.160833	45.7	15000.0	9.000	GND	N	10.1	19.7	65.4
0.173341	44.7	15000.0	9.000	GND	N	10.1	20.1	64.8
0.202773	42.0	15000.0	9.000	GND	L1	10.2	21.5	63.5
0.256114	36.7	15000.0	9.000	GND	N	10.1	24.9	61.6
3.950894	34.2	15000.0	9.000	GND	N	10.1	21.8	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150547	18.0	15000.0	9.000	GND	N	10.1	38.0	56.0
0.160833	17.1	15000.0	9.000	GND	N	10.1	38.3	55.4
0.173341	16.1	15000.0	9.000	GND	N	10.1	38.7	54.8
0.202773	14.7	15000.0	9.000	GND	L1	10.2	38.8	53.5
0.256114	11.5	15000.0	9.000	GND	N	10.1	40.1	51.6
3.950894	31.0	15000.0	9.000	GND	N	10.1	15.0	46.0

Channel 23

Wideband

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.155000	46.2	15000.0	10.000	GND	L1	10.2	19.5	65.7
0.175000	44.3	15000.0	10.000	GND	L1	10.2	20.4	64.7
0.190000	43.2	15000.0	10.000	GND	L1	10.2	20.8	64.0
0.260000	37.5	15000.0	10.000	GND	L1	10.2	23.9	61.4
1.990000	35.8	15000.0	10.000	GND	L1	10.1	20.2	56.0
3.980000	37.8	15000.0	10.000	GND	N	10.1	18.2	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.155000	20.9	15000.0	10.000	GND	L1	10.2	34.8	55.7
0.175000	17.4	15000.0	10.000	GND	L1	10.2	37.4	54.7
0.190000	20.7	15000.0	10.000	GND	L1	10.2	33.3	54.0
0.260000	16.6	15000.0	10.000	GND	L1	10.2	34.8	51.4
1.990000	31.5	15000.0	10.000	GND	L1	10.1	14.5	46.0
3.980000	35.0	15000.0	10.000	GND	N	10.1	11.0	46.0

Channel 0

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.154791	46.0	15000.0	9.000	GND	L1	10.2	19.8	65.7
0.166907	45.2	15000.0	9.000	GND	N	10.1	19.9	65.1
0.193734	42.6	15000.0	9.000	GND	L1	10.2	21.3	63.9
0.228430	39.7	15000.0	9.000	GND	N	10.1	22.8	62.5
0.333863	33.1	15000.0	9.000	GND	N	10.1	26.3	59.4
3.977432	32.4	15000.0	9.000	GND	N	10.1	23.6	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.154791	17.4	15000.0	9.000	GND	L1	10.2	38.4	55.7
0.166907	16.5	15000.0	9.000	GND	N	10.1	38.6	55.1
0.193734	15.4	15000.0	9.000	GND	L1	10.2	38.4	53.9
0.228430	13.1	15000.0	9.000	GND	N	10.1	39.5	52.5
0.333863	9.5	15000.0	9.000	GND	N	10.1	39.9	49.4
3.977432	29.5	15000.0	9.000	GND	N	10.1	16.5	46.0

Channel 12

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.165890	45.2	15000.0	9.000	GND	L1	10.2	19.9	65.2
0.188157	43.2	15000.0	9.000	GND	N	10.1	20.9	64.1
0.230016	39.1	15000.0	9.000	GND	N	10.1	23.3	62.4
0.287869	35.0	15000.0	9.000	GND	L1	10.2	25.6	60.6
0.311675	33.9	15000.0	9.000	GND	N	10.1	26.0	59.9
3.951038	34.3	15000.0	9.000	GND	N	10.1	21.7	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.165890	16.7	15000.0	9.000	GND	L1	10.2	38.5	55.2
0.188157	15.4	15000.0	9.000	GND	N	10.1	38.7	54.1
0.230016	12.6	15000.0	9.000	GND	N	10.1	39.8	52.4
0.287869	10.5	15000.0	9.000	GND	L1	10.2	40.1	50.6
0.311675	10.1	15000.0	9.000	GND	N	10.1	39.8	49.9
3.951038	31.1	15000.0	9.000	GND	N	10.1	14.9	46.0

Channel 23

Limit 15.407 b (6)

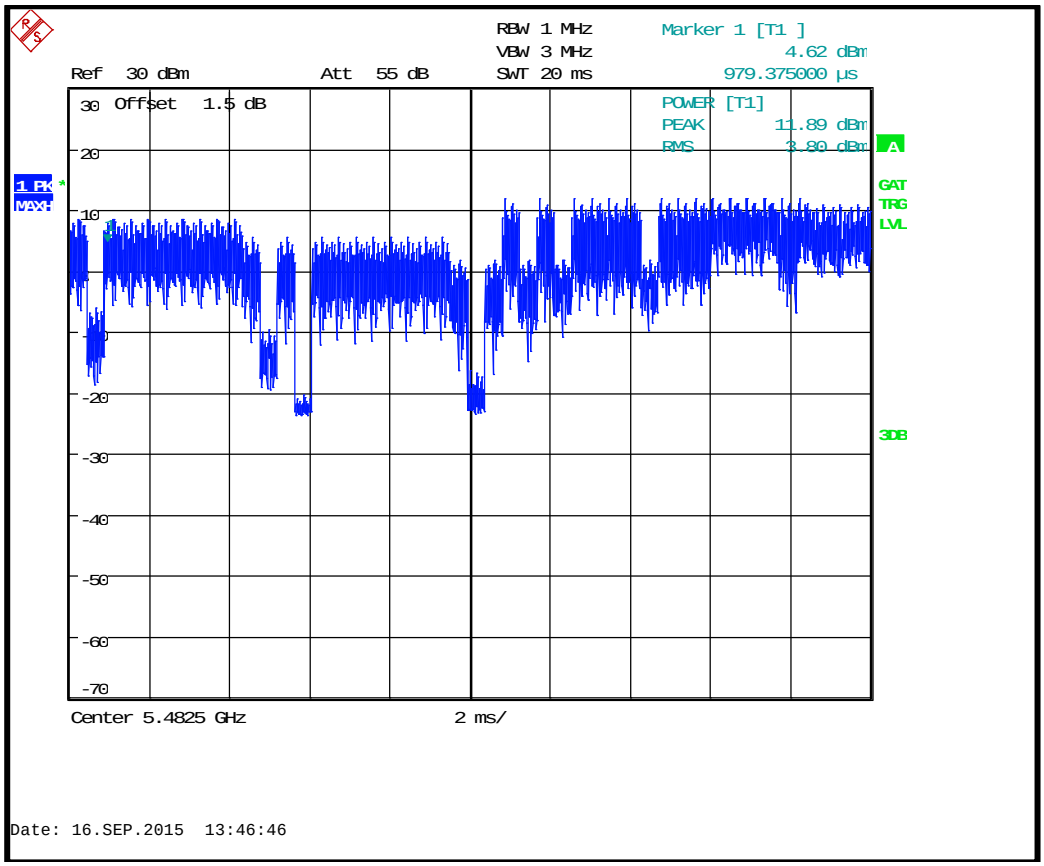
Any U-NII devices using an AC power line are required to comply with the conducted limits set forth in 15.207.

Appendix C: Supporting Graphical Data

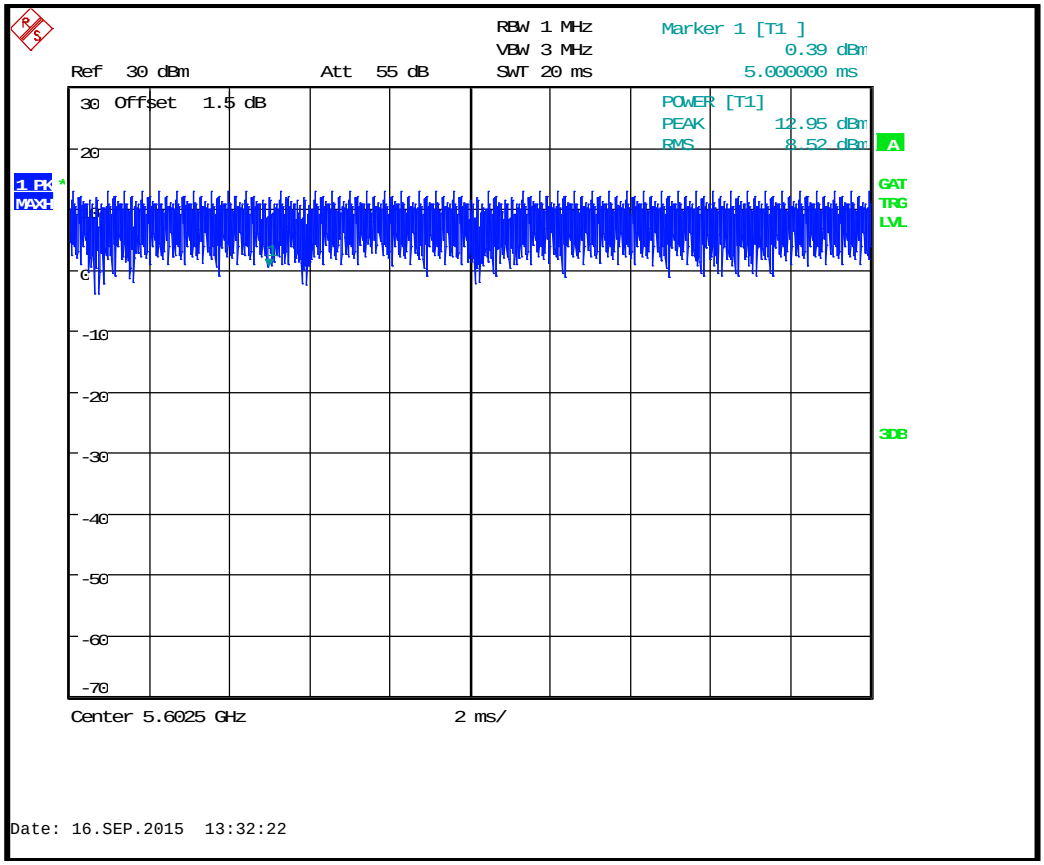
This appendix contains plots to support the results contained in Appendices A and B.

Power Limits

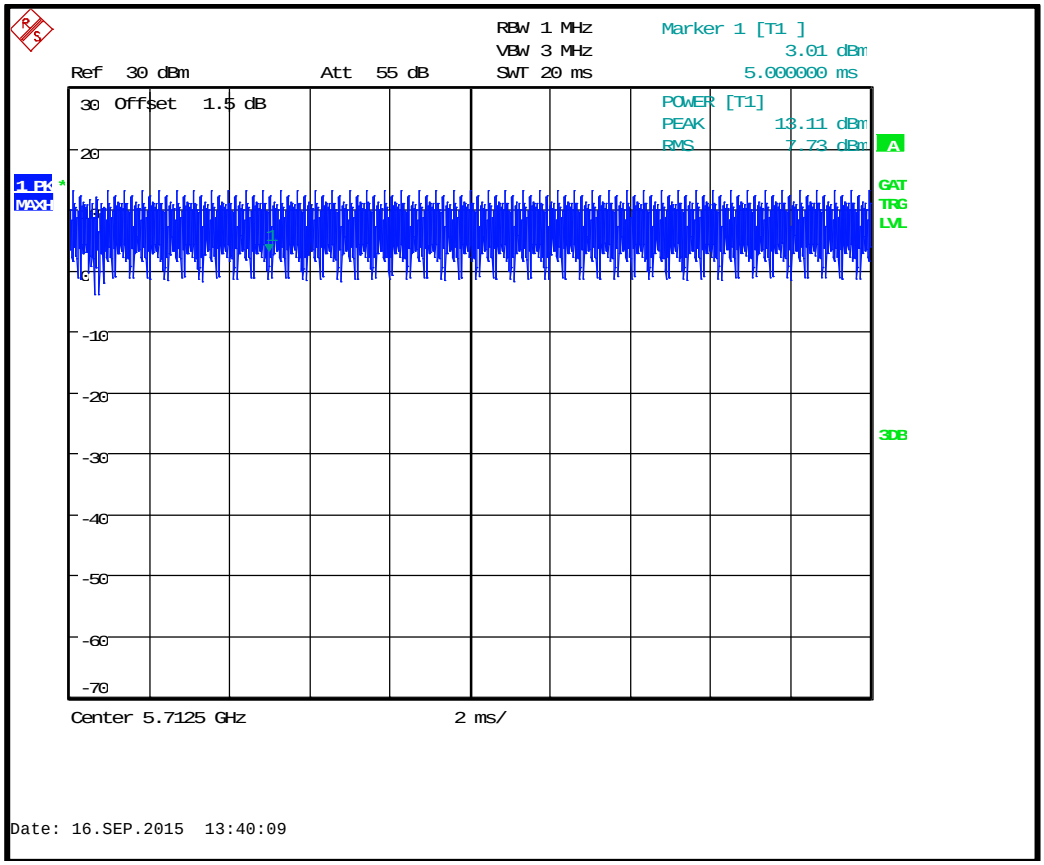
Narrowband



Channel 0

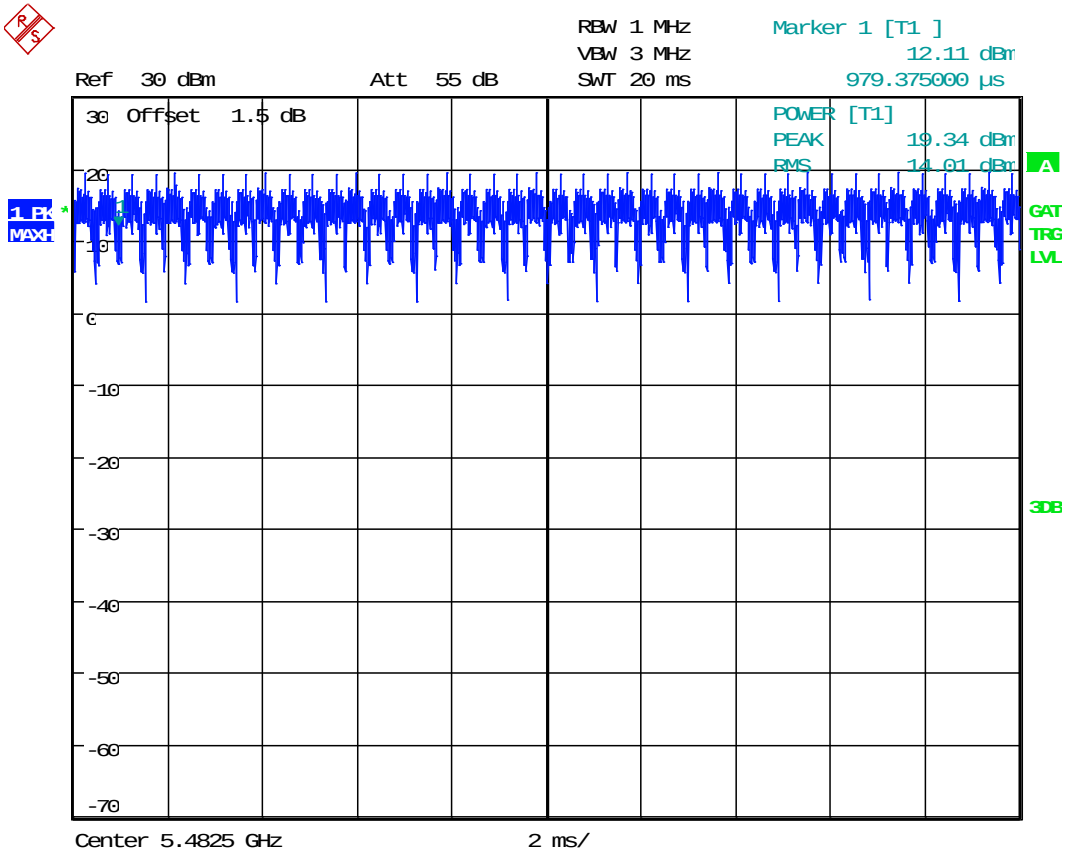


Channel 12



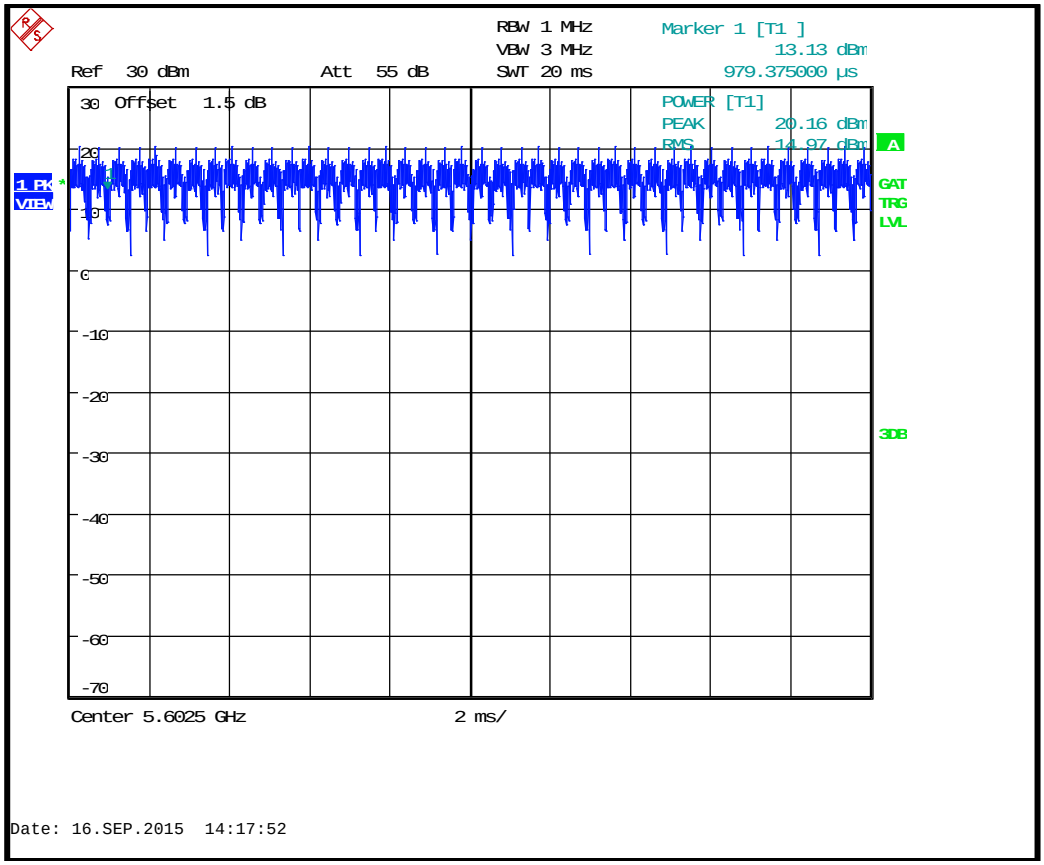
Channel 23

Wideband

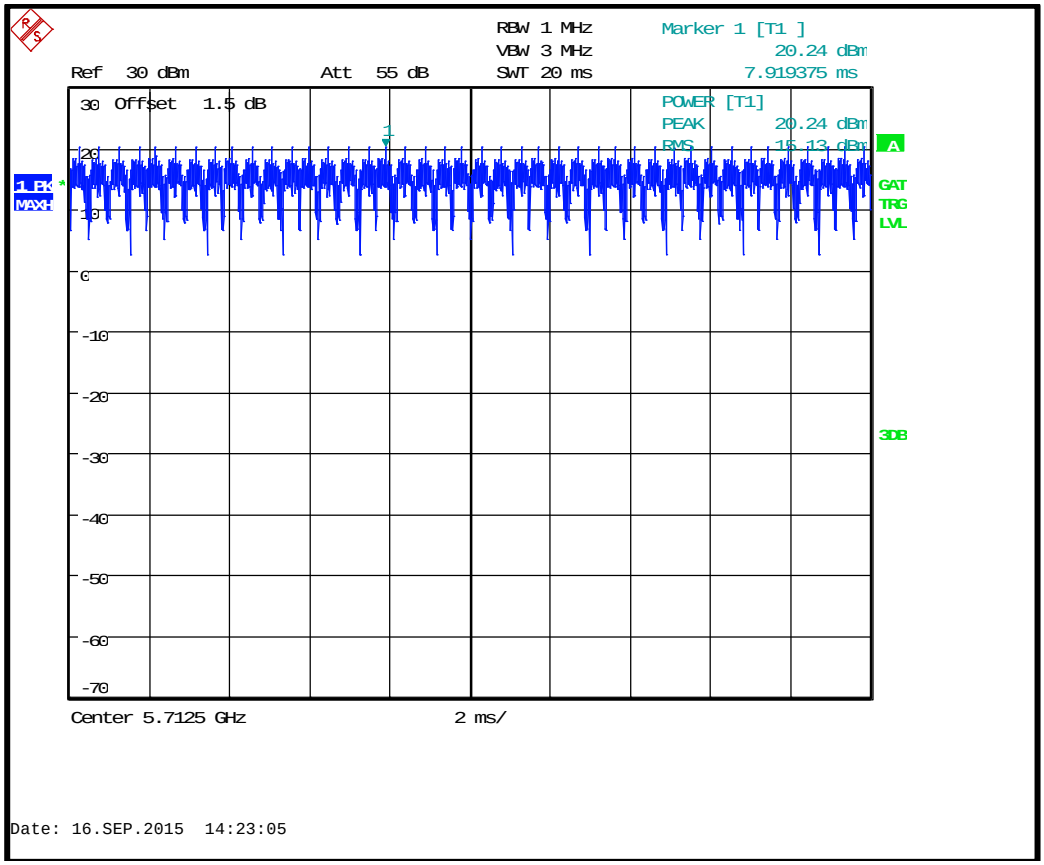


Date: 16.SEP.2015 14:12:29

Channel 0



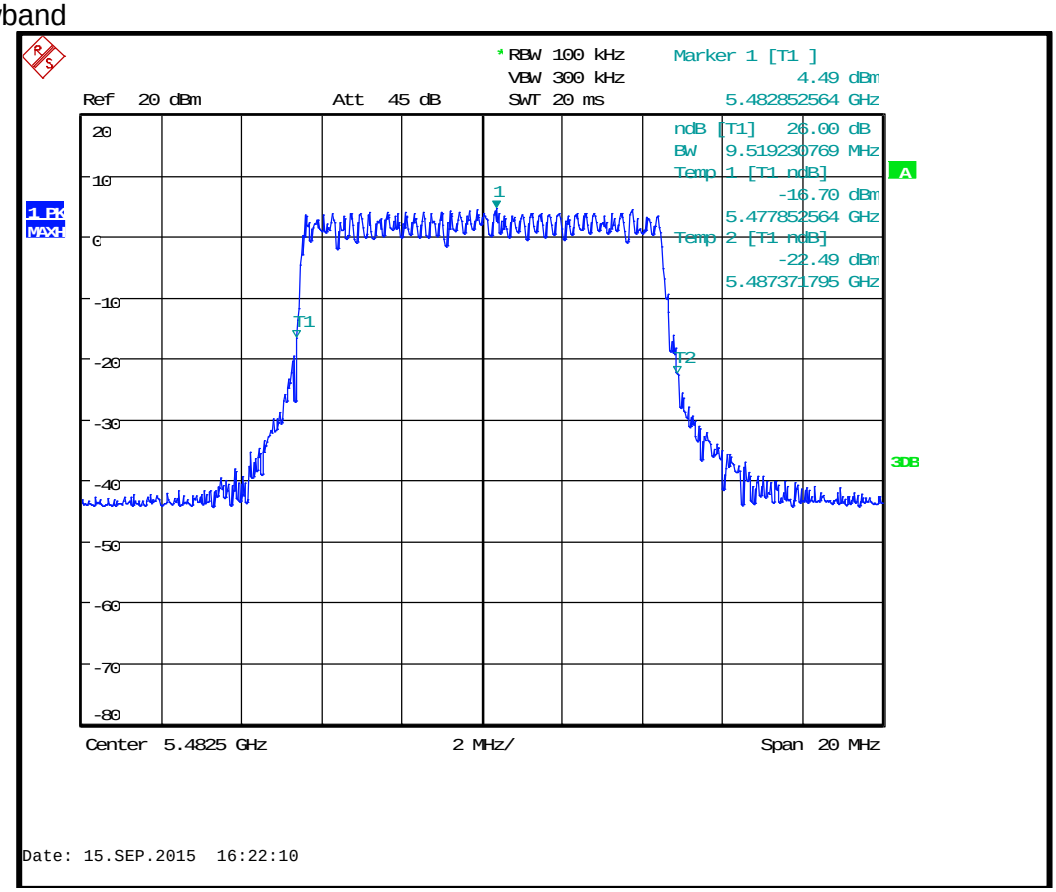
Channel 12



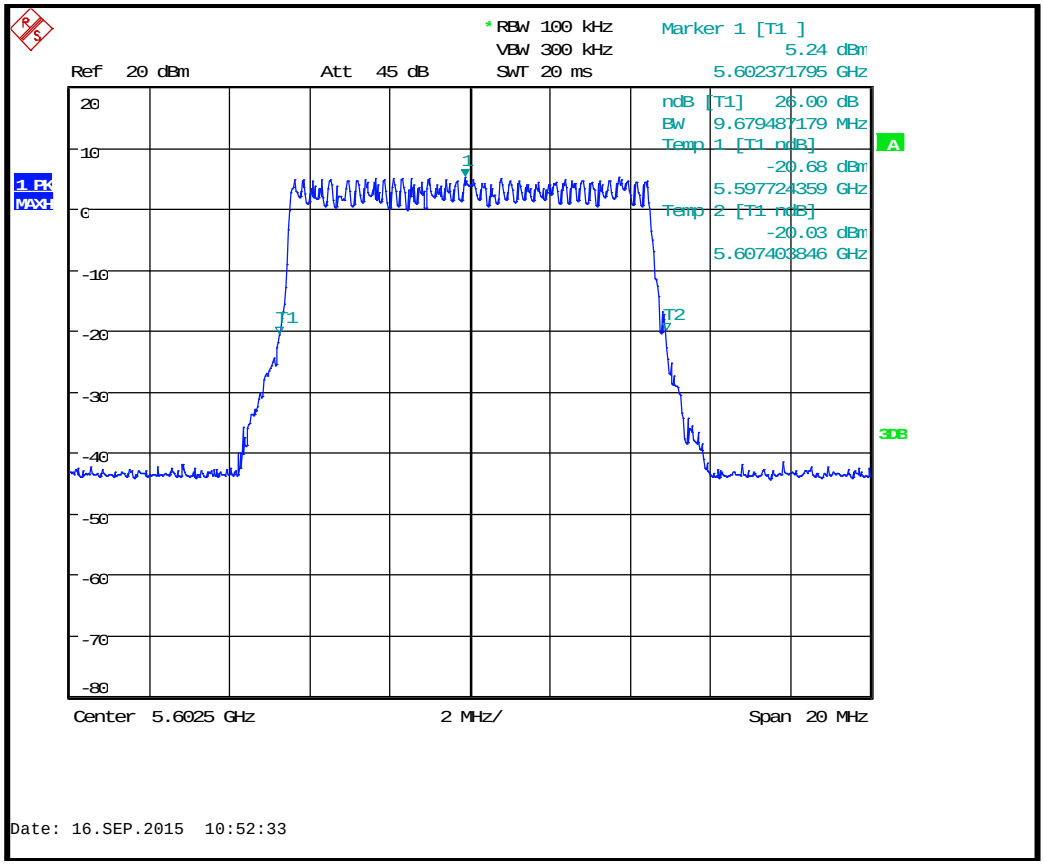
Channel 23

-26 dB Bandwidth

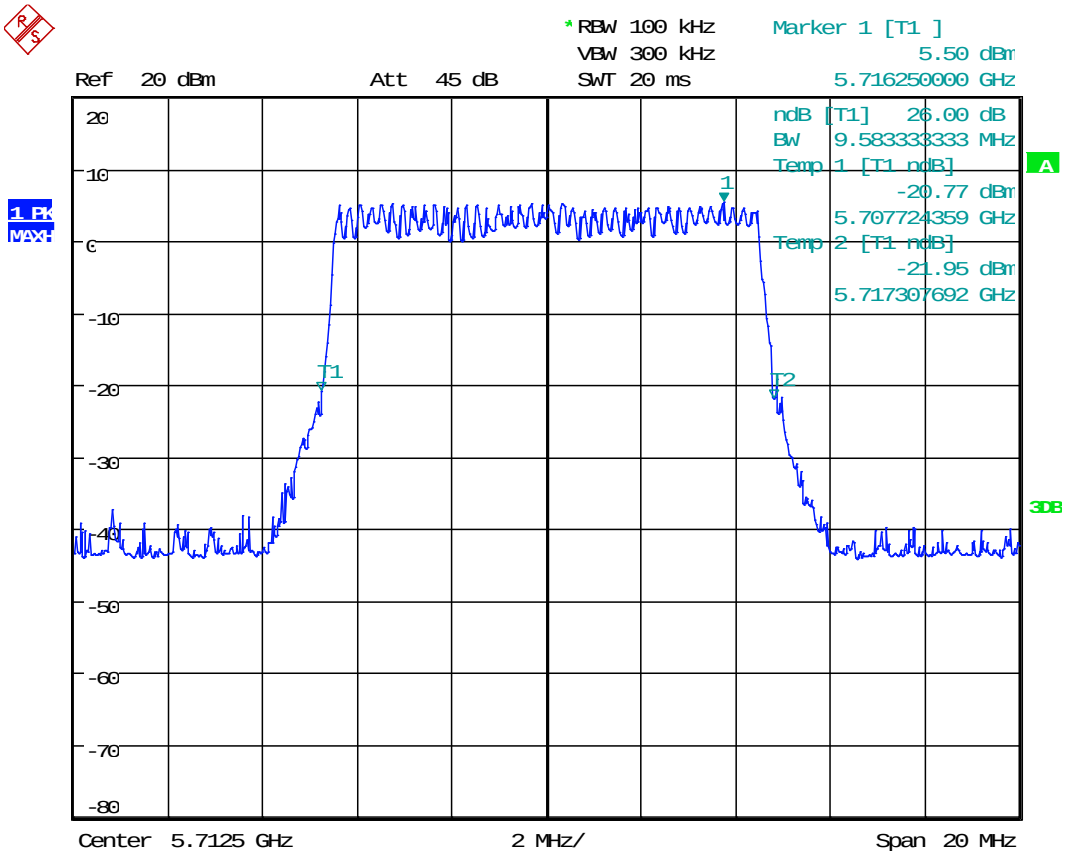
Narrowband



Channel 0

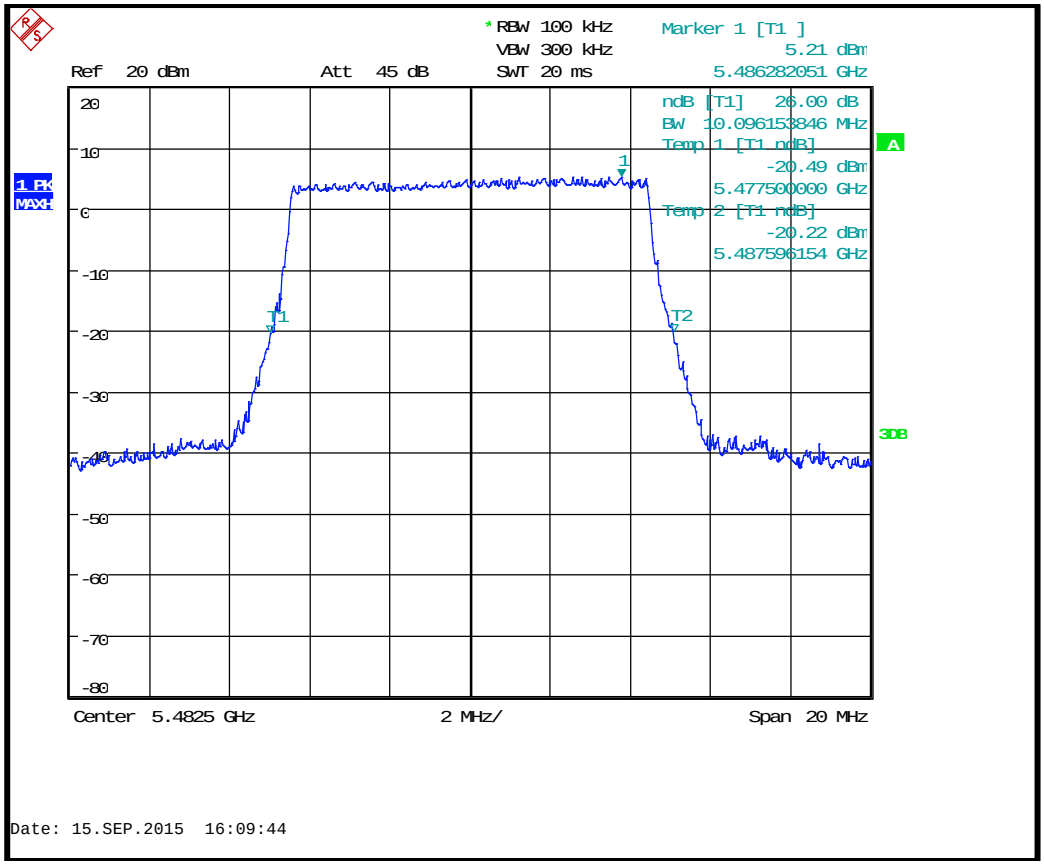

RBW 100 kHz
VBW 300 kHz
SWT 20 ms
Marker 1 [T1]
5.24 dBm
5.602371795 GHz
Ref 20 dBm
Att 45 dB
ndB [T1] 26.00 dB
BW 9.679487179 MHz
Temp 1 [T1 ndB]
-20.68 dBm
5.597724359 GHz
Temp 2 [T1 ndB]
-20.03 dBm
5.607403846 GHz
1 PK
MAXH
A
3DB
T1
T2
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 5.6025 GHz
2 MHz/
Span 20 MHz
Date: 16.SEP.2015 10:52:33

Channel 12

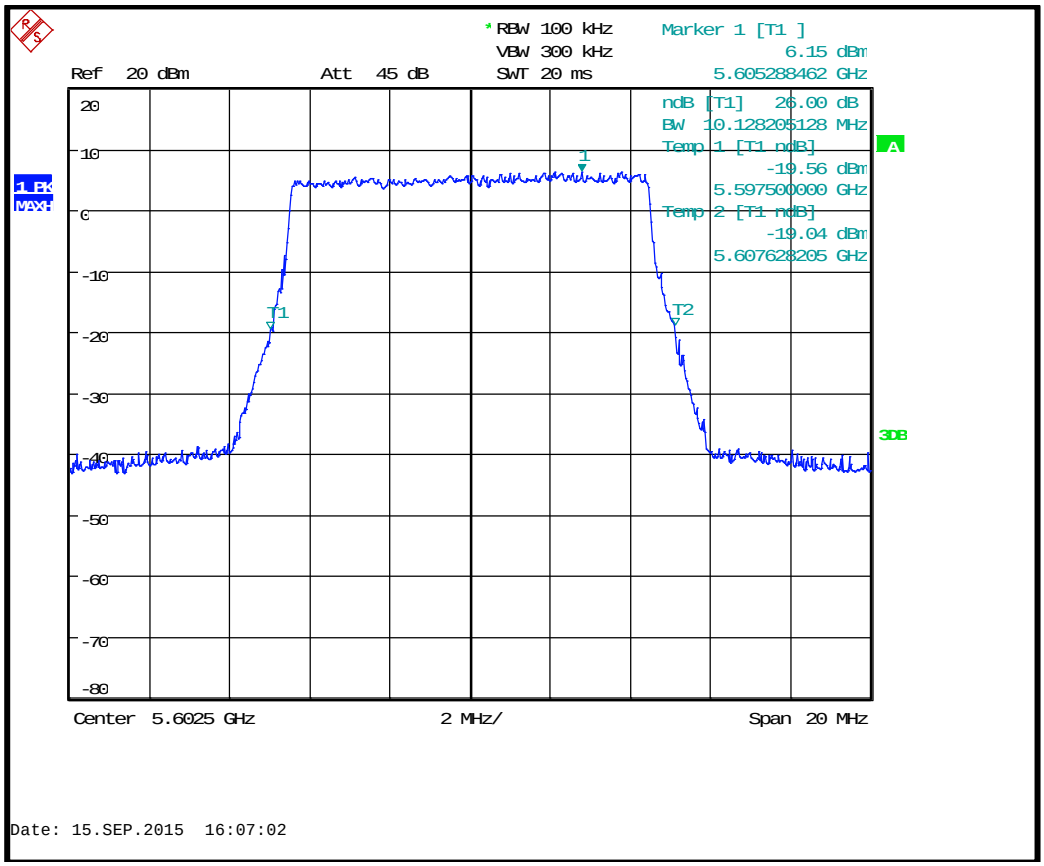


Channel 23

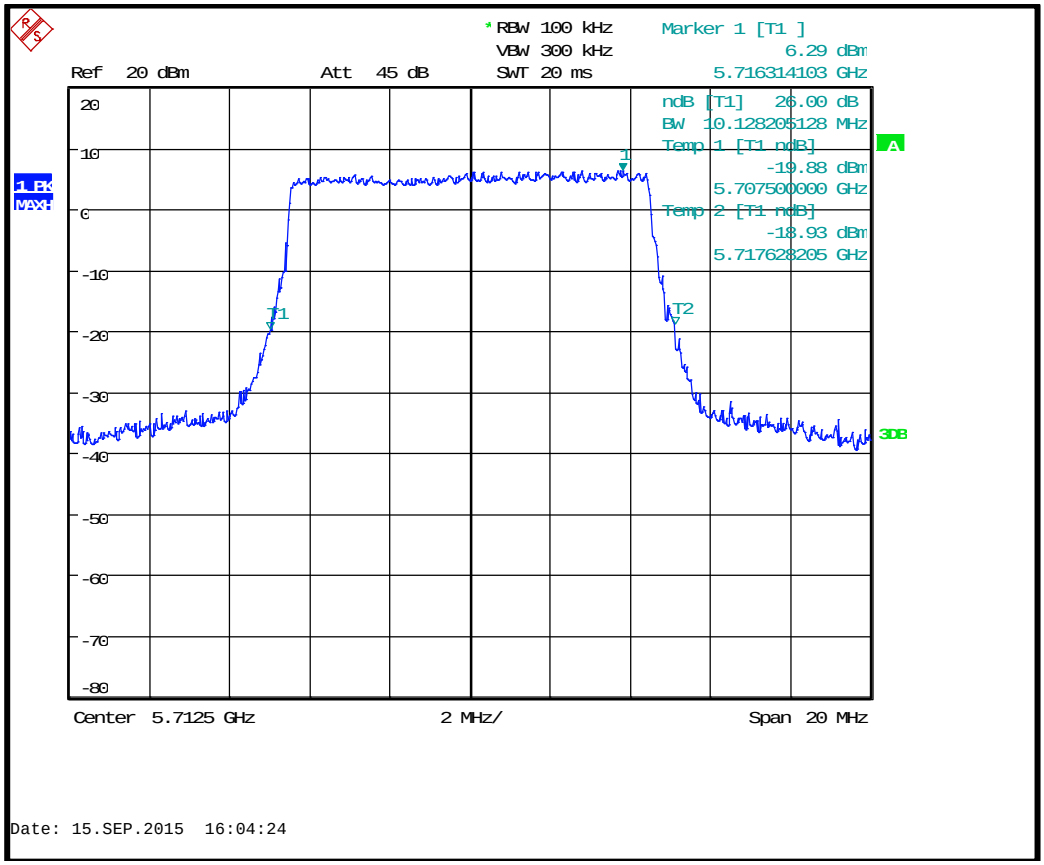
Wideband


*RBW 100 kHz
VBW 300 kHz
SWT 20 ms
Marker 1 [T1]
5.21 dBm
5.486282051 GHz
Ref 20 dBm
Att 45 dB
ndB [T1] 26.00 dB
BW 10.096153846 MHz
Temp 1 [T1 ndB]
-20.49 dBm
5.477500000 GHz
Temp 2 [T1 ndB]
-20.22 dBm
5.487596154 GHz
1 PK MAXH
A
3DB
Center 5.4825 GHz
2 MHz/
Span 20 MHz
Date: 15.SEP.2015 16:09:44

Channel 0


*RBW 100 kHz
VBW 300 kHz
SWT 20 ms
Marker 1 [T1]
6.15 dBm
5.605288462 GHz
Ref 20 dBm
Att 45 dB
ndB [T1] 26.00 dB
BW 10.128205128 MHz
Temp 1 [T1 ndB]
-19.56 dBm
5.597500000 GHz
Temp 2 [T1 ndB]
-19.04 dBm
5.607628205 GHz
1 PK MAXH
A
3DB
Center 5.6025 GHz
2 MHz/
Span 20 MHz
Date: 15.SEP.2015 16:07:02

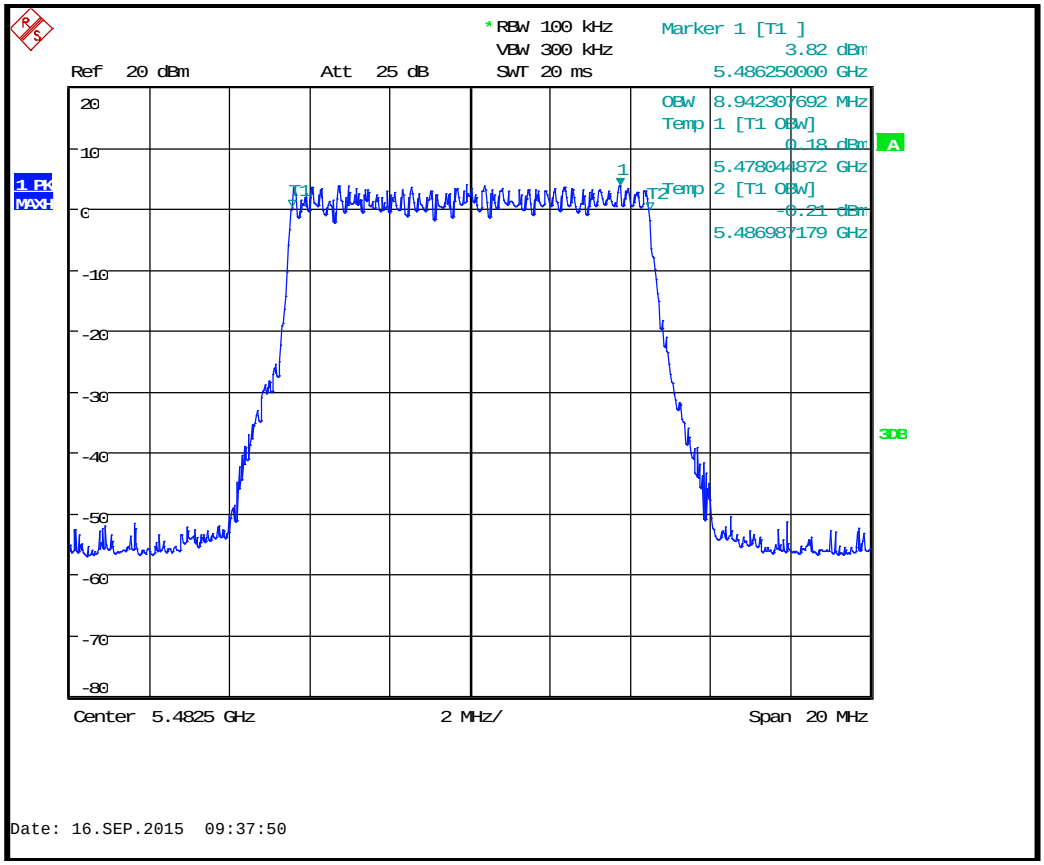
Channel 12



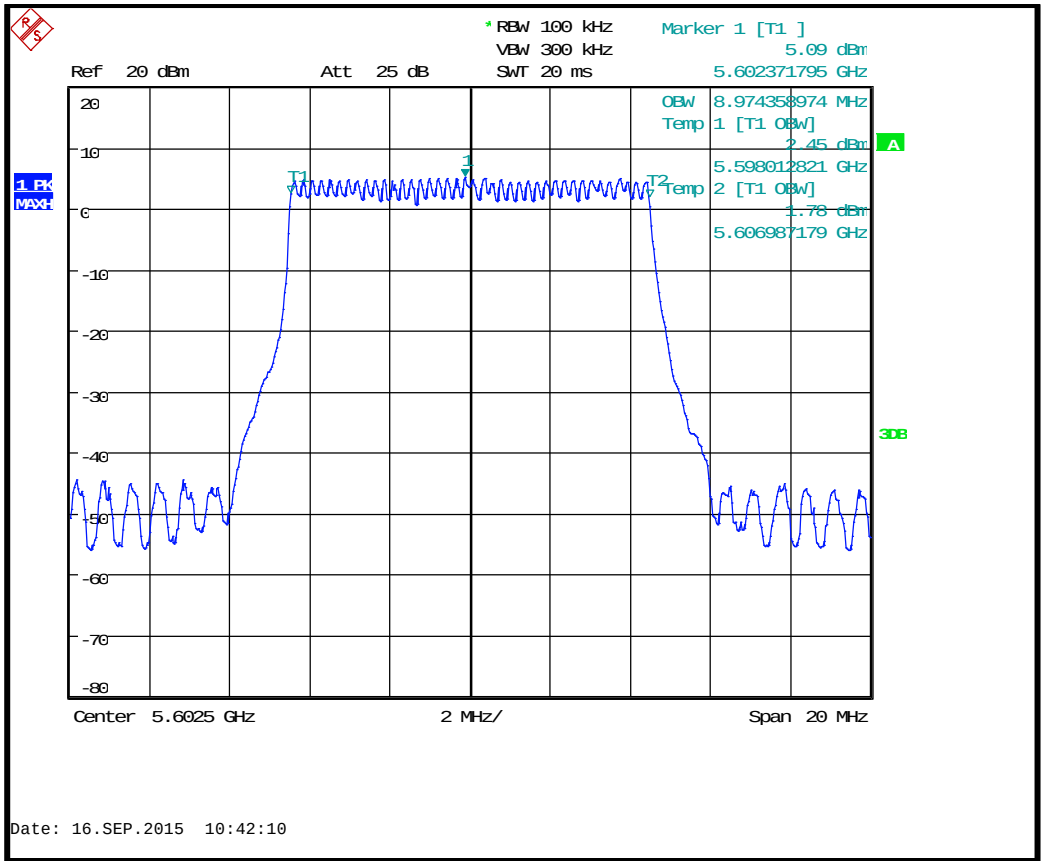
Channel 23

99% Bandwidth

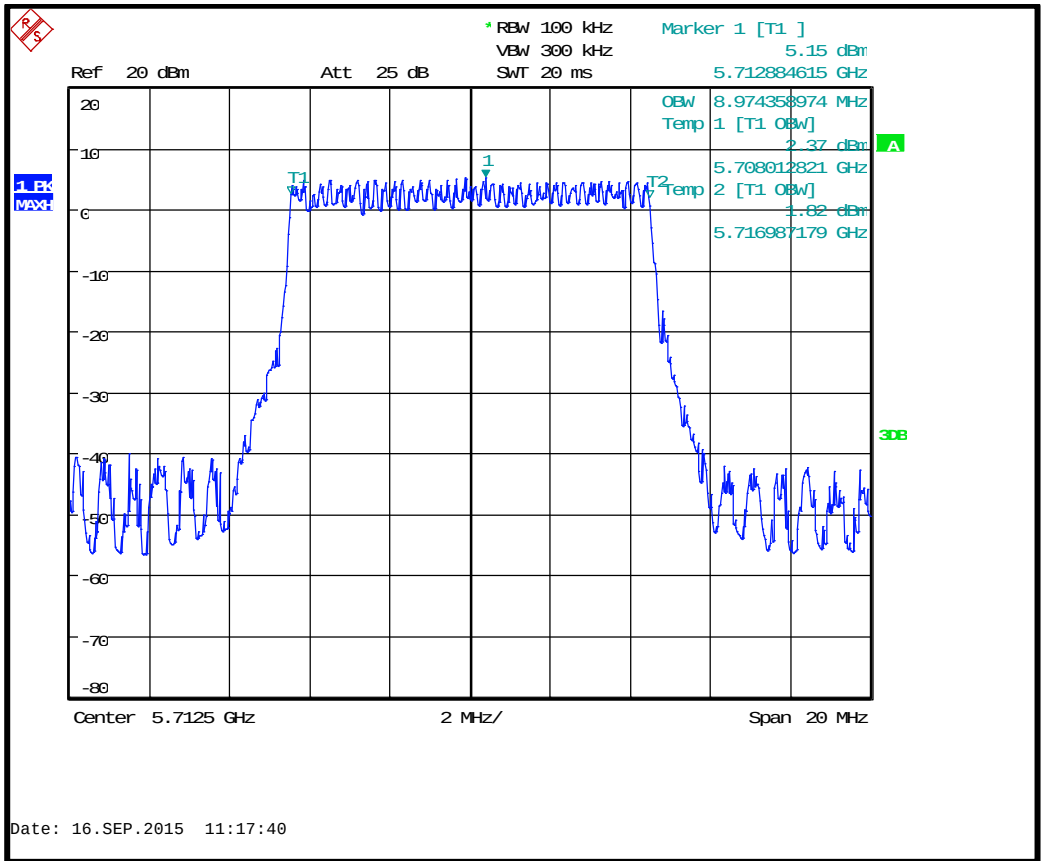
Narrowband



Channel 0

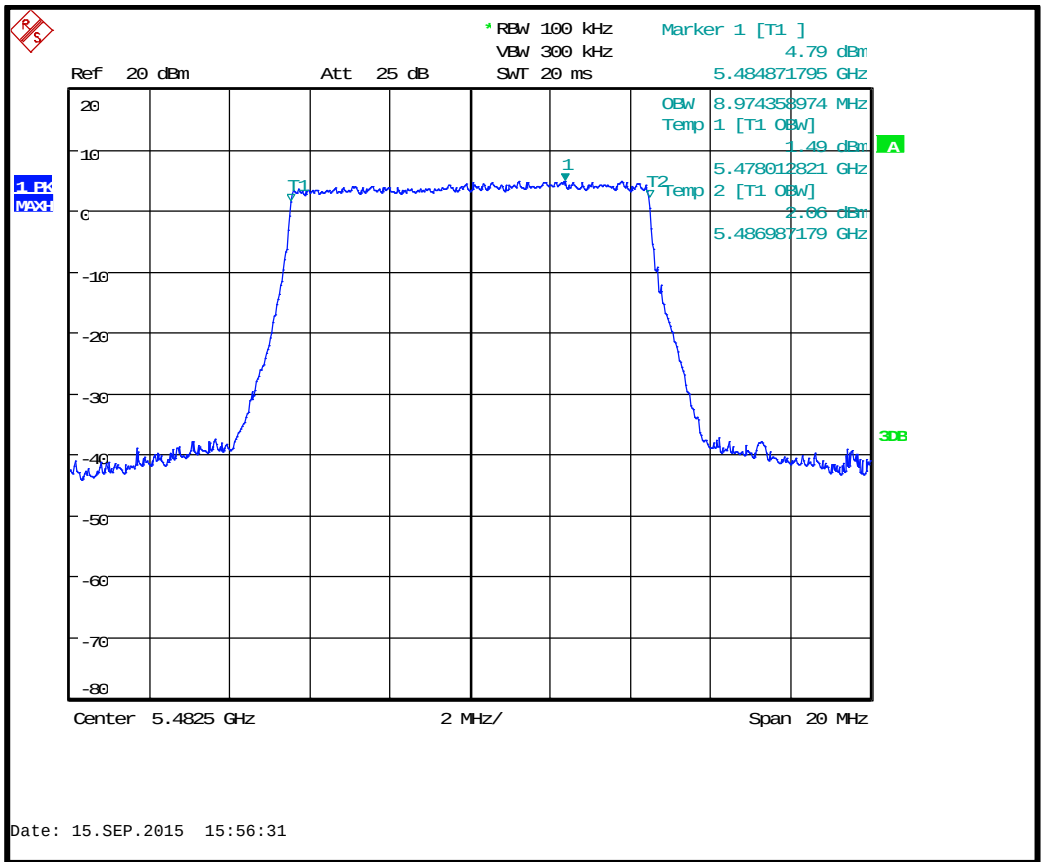


Channel 12

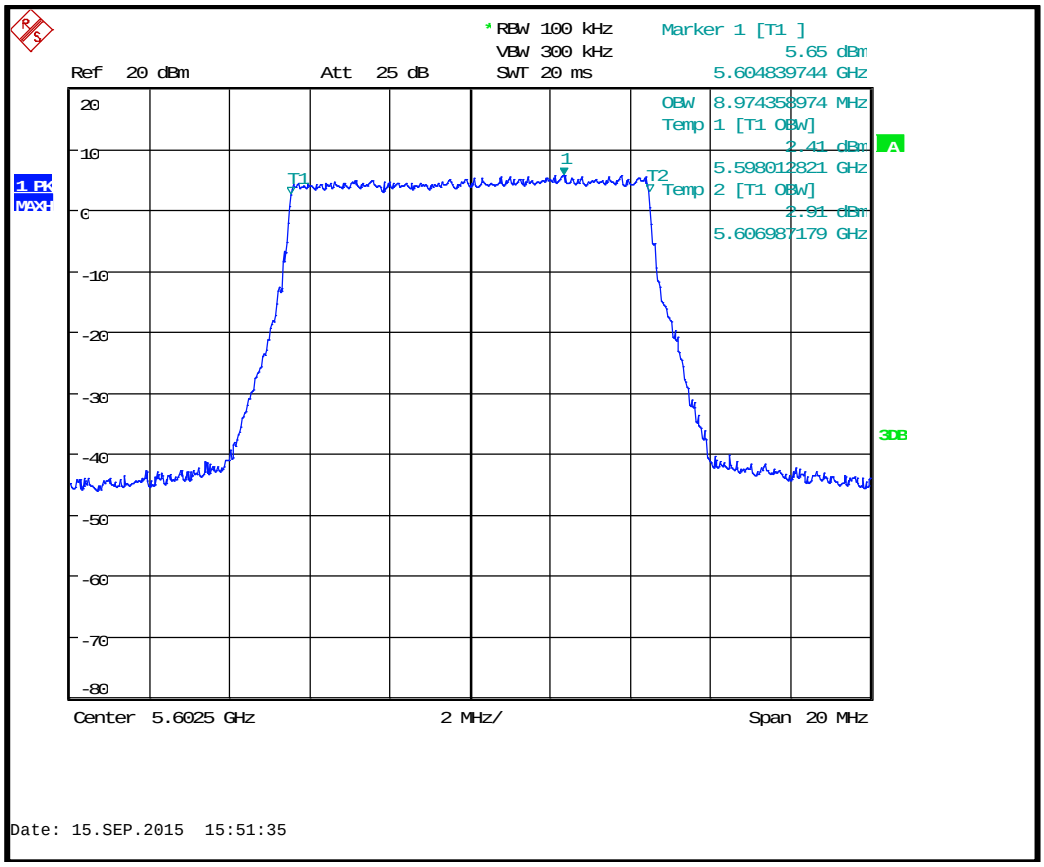


Channel 23

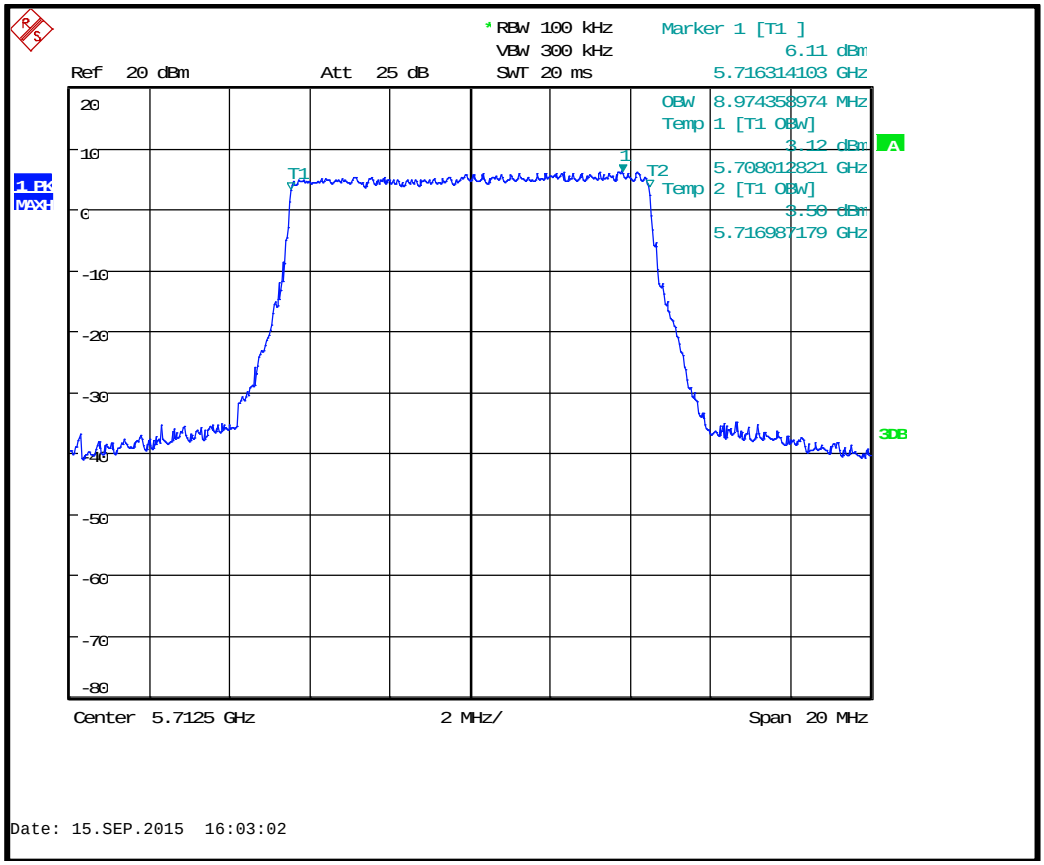
Wideband



Channel 0



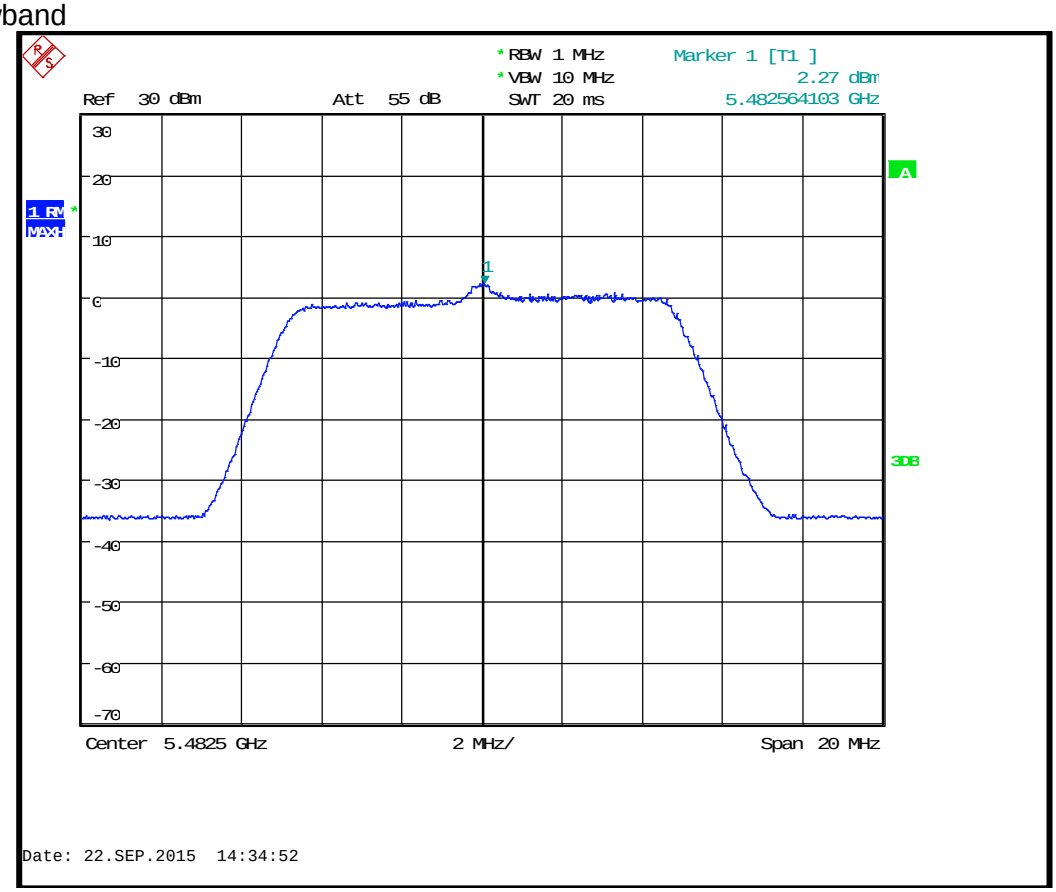
Channel 12



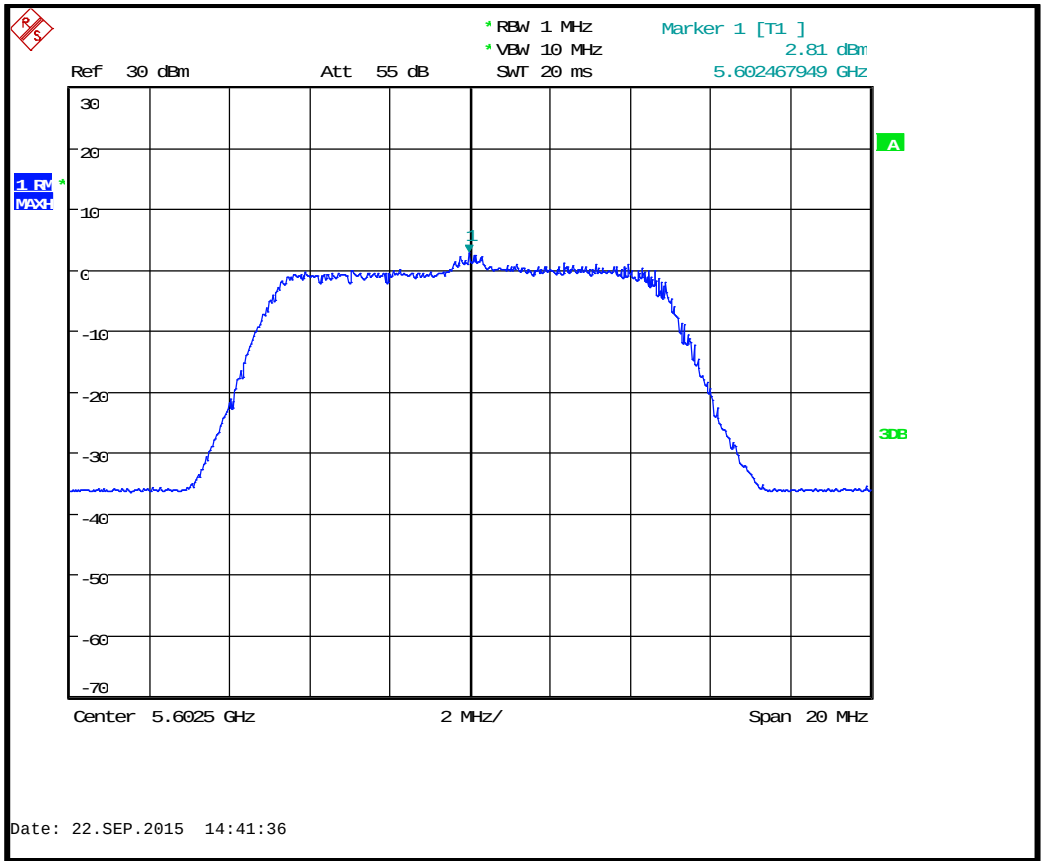
Channel 23

Power Spectral Density

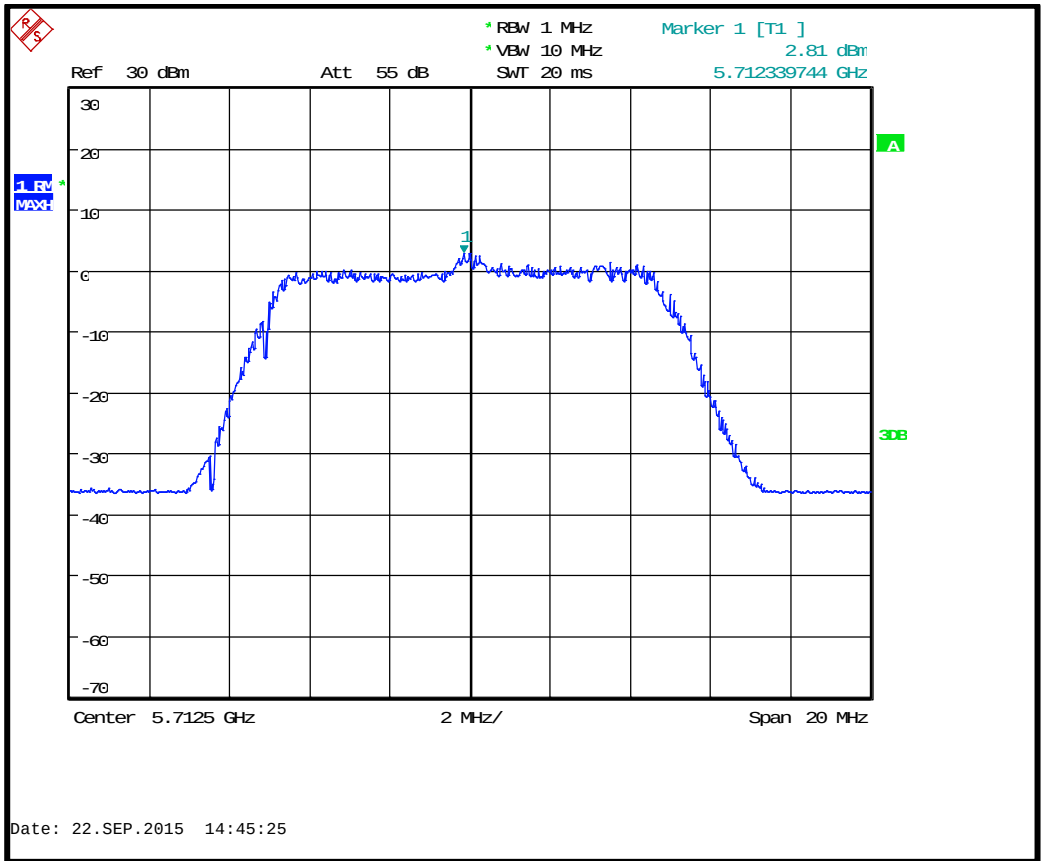
Narrowband



Channel 0

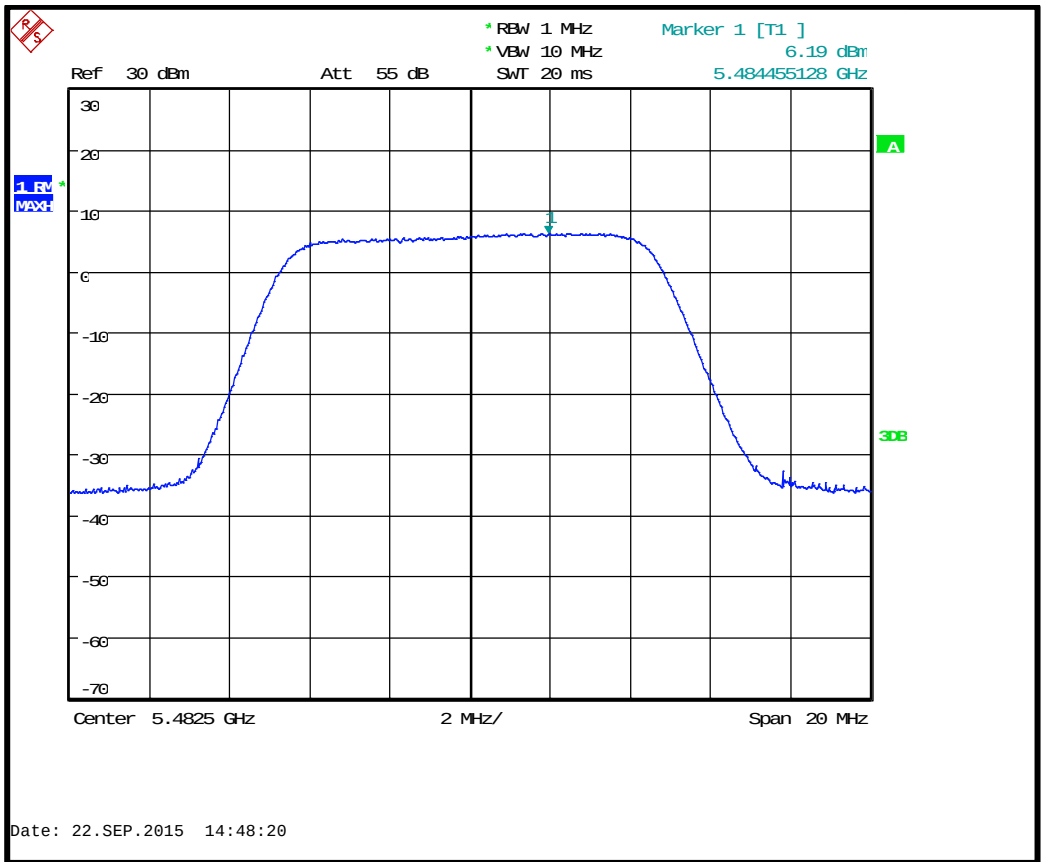


Channel 12

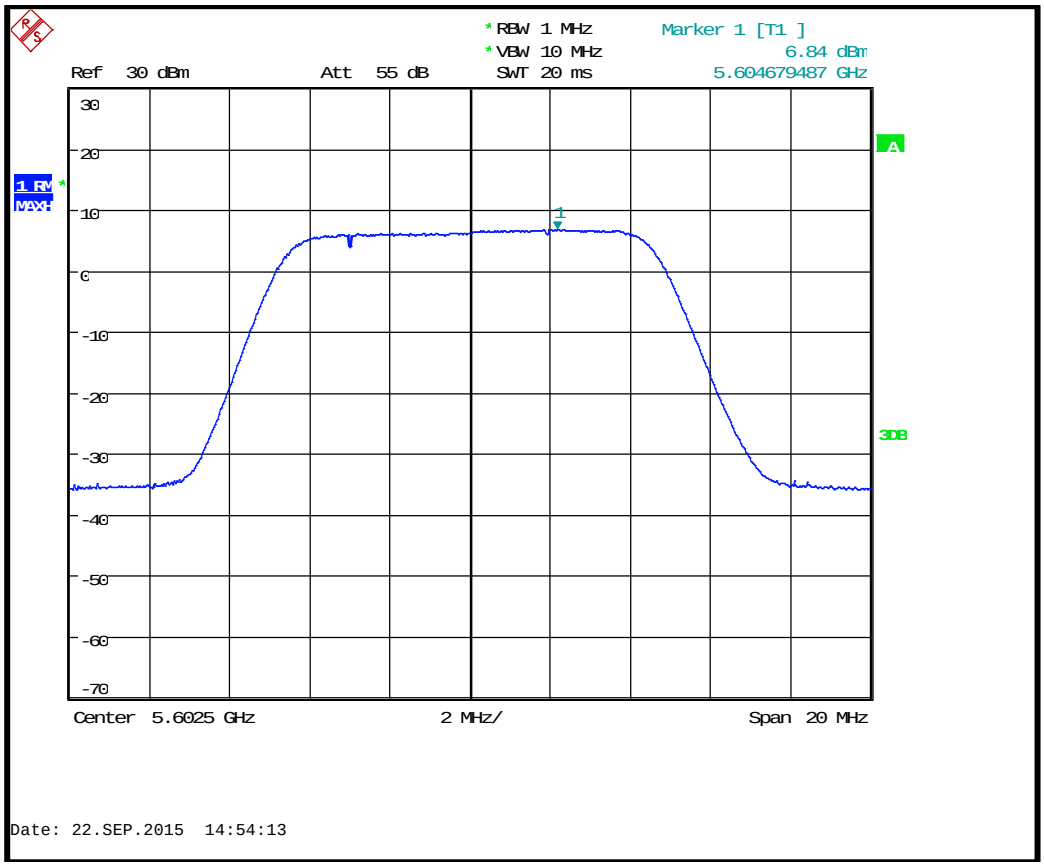


Channel 23

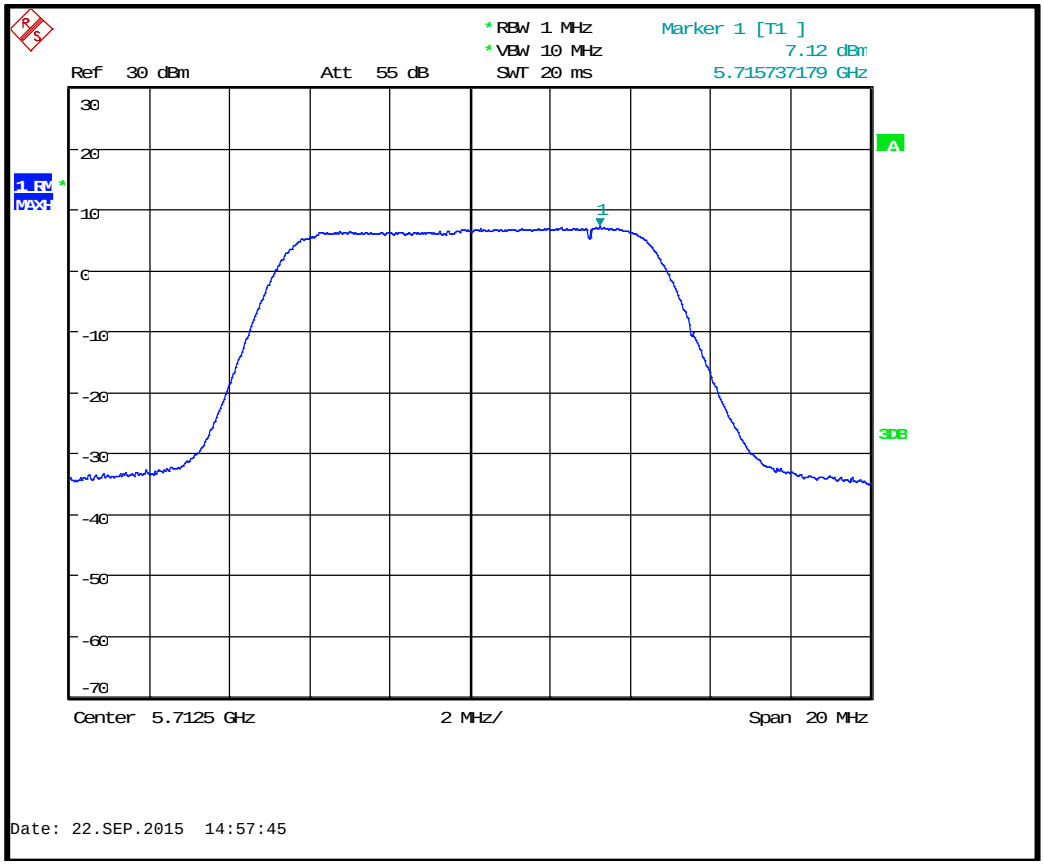
Wideband



Channel 0



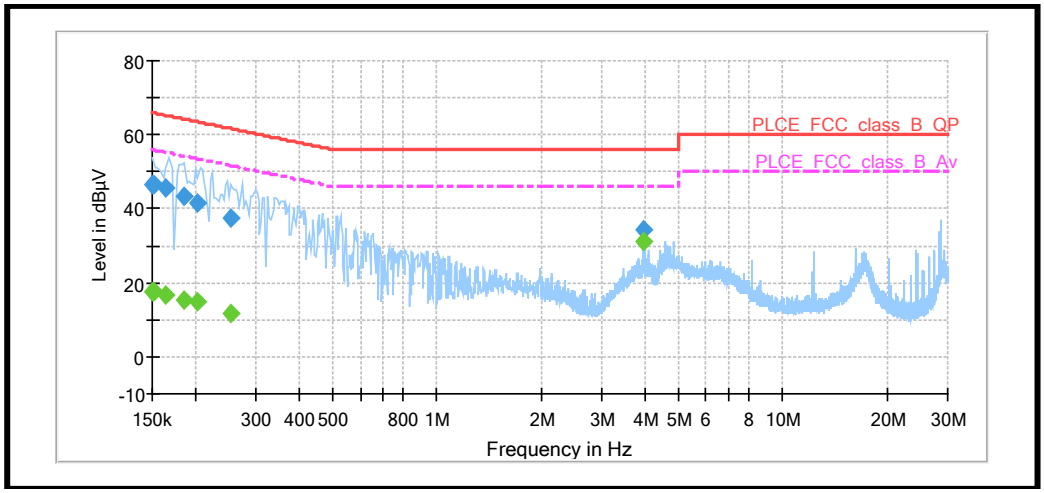
Channel 12



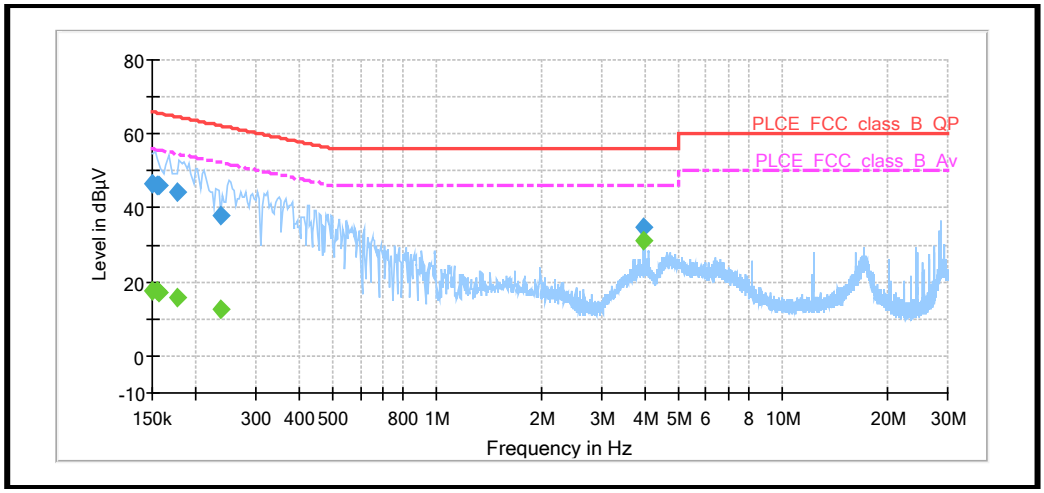
Channel 23

Power Line Conducted Emissions

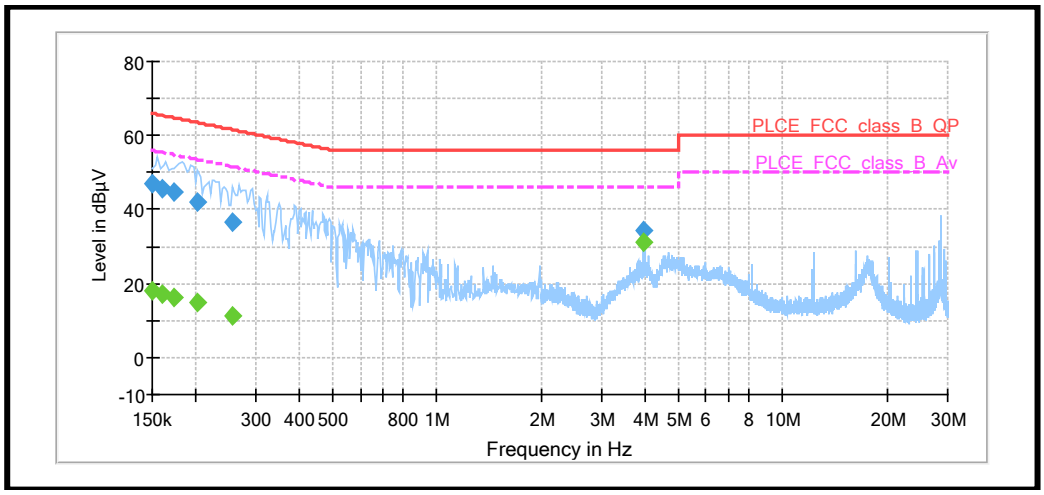
Narrowband



Channel 0

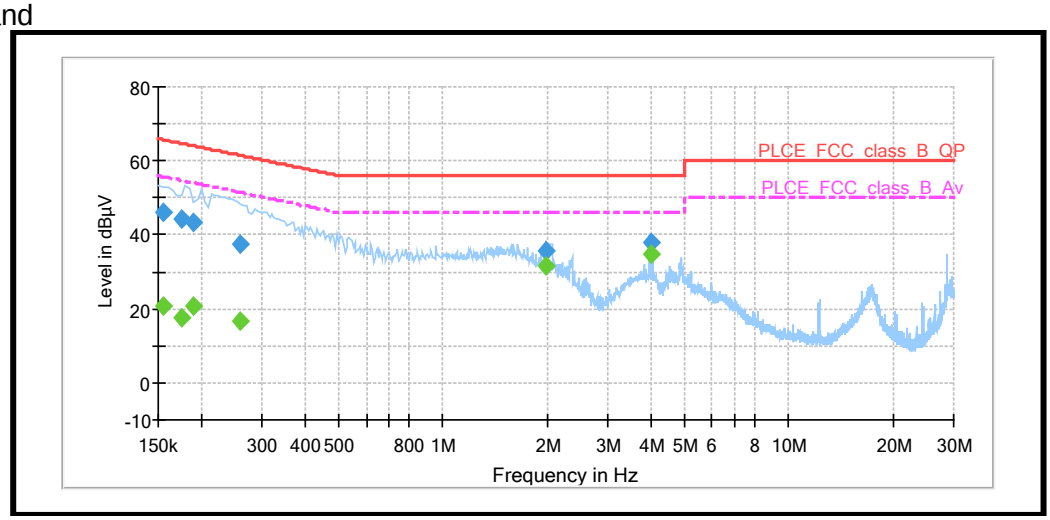


Channel 12

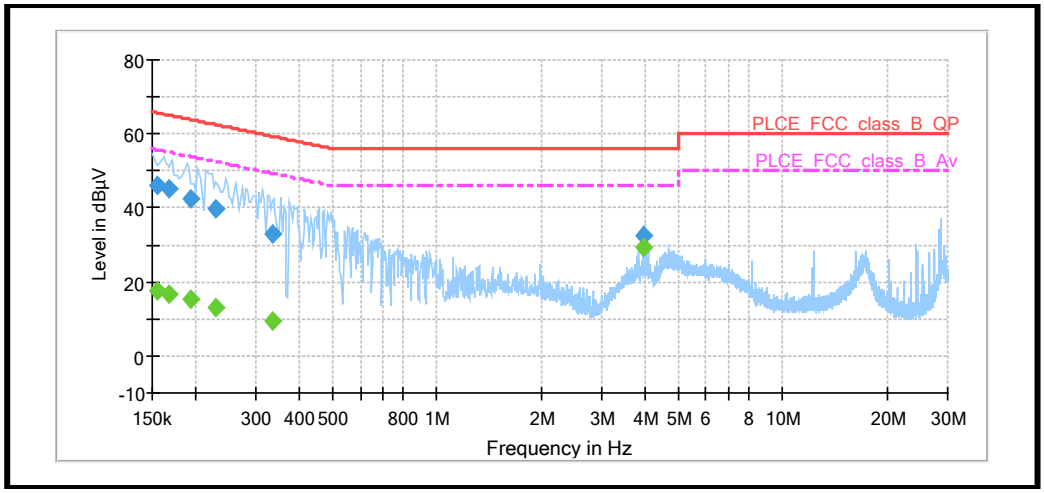


Channel 23

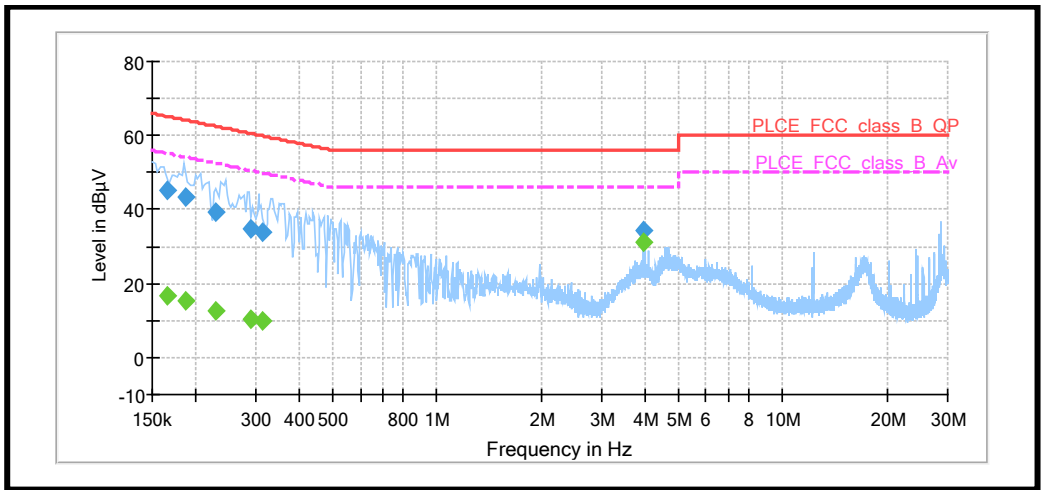
Wideband



Channel 0



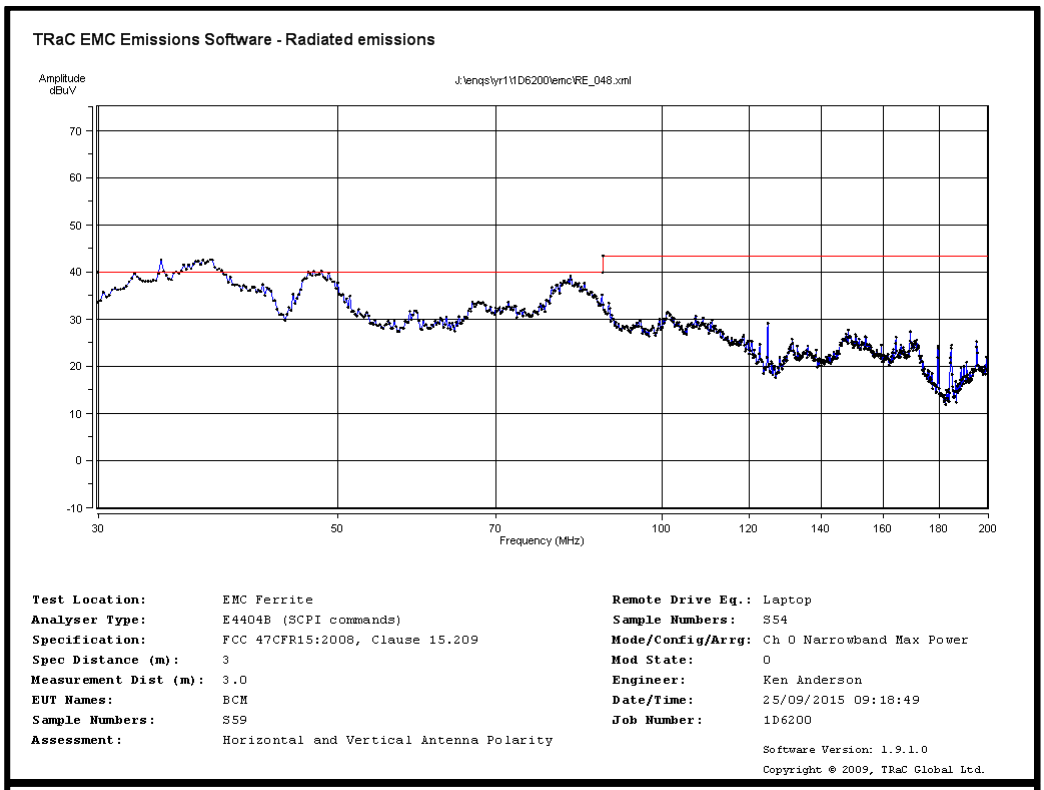
Channel 12

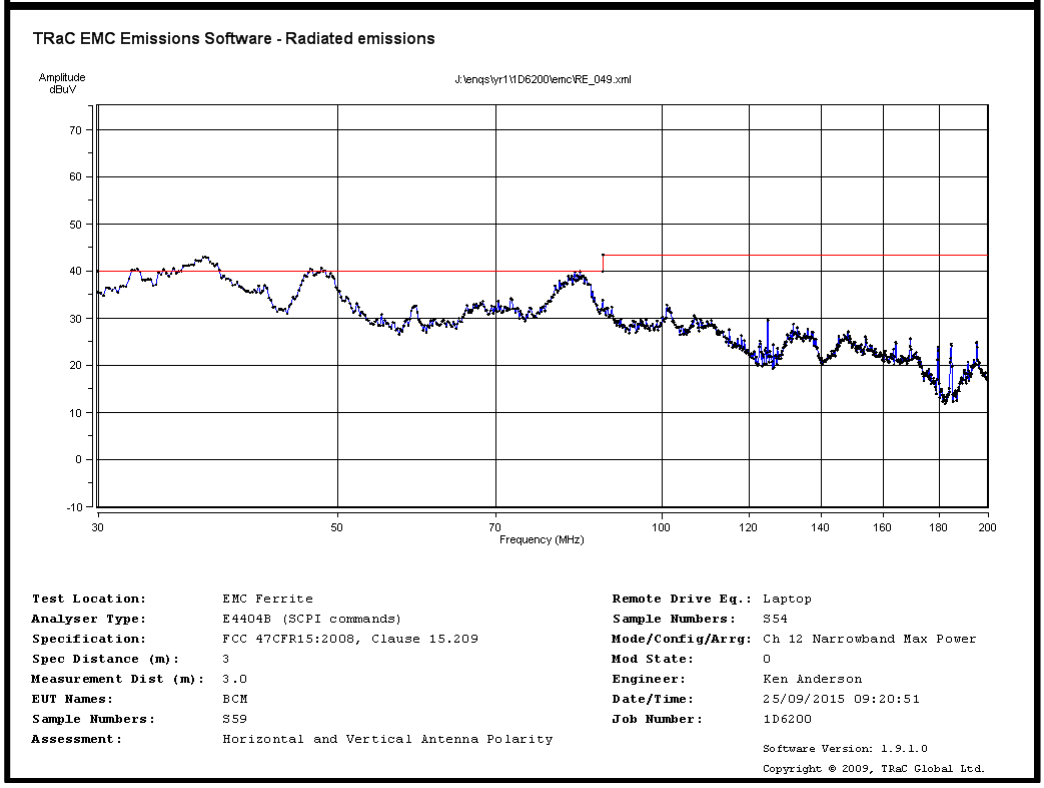


Channel 23

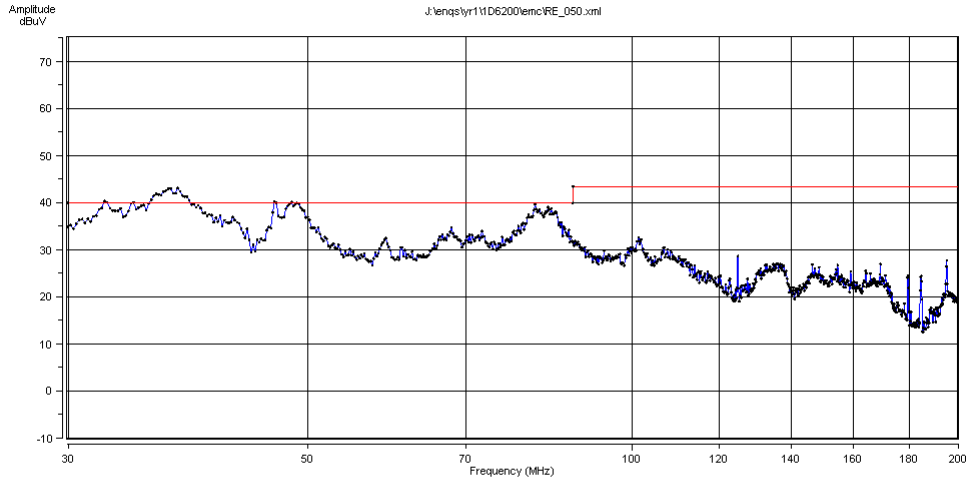
Radiated Spurious Emissions

E-Field Tx Mode < 1GHz and RX Mode





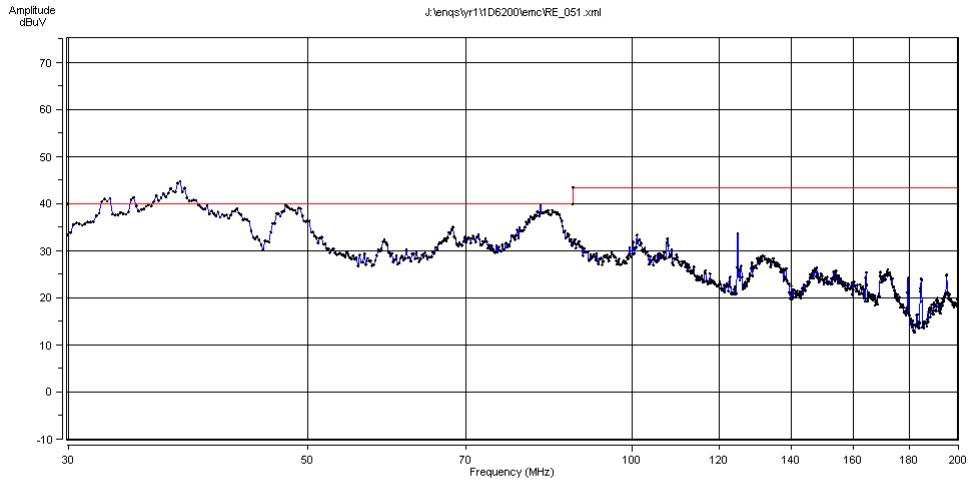
TRaC EMC Emissions Software - Radiated emissions



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	FCC 47CFR15:2008, Clause 15.209	**Mode/Config/Arrg:**	Ch 23 Narrowband Max Power
Spec Distance (m):	3	**Mod State:**	0
Measurement Dist (m):	3.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 09:28:42
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

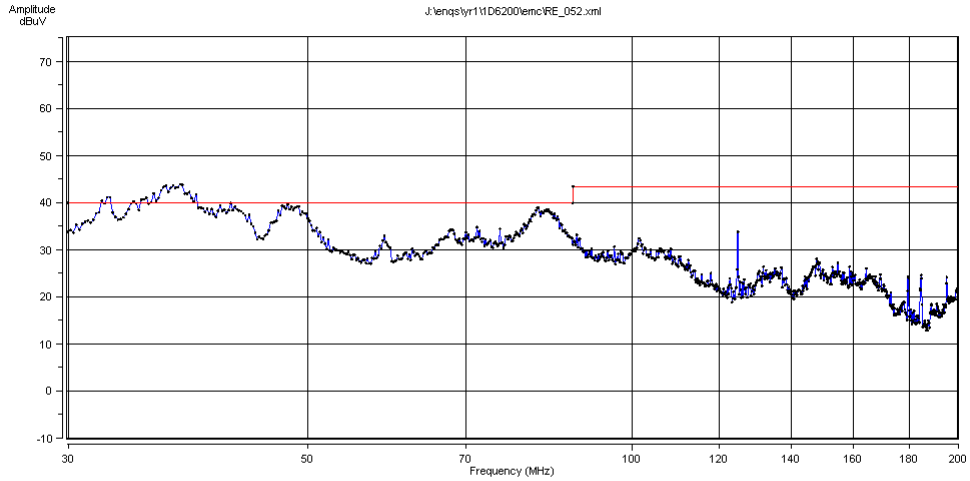
TRaC EMC Emissions Software - Radiated emissions



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	FCC 47CFR15:2008, Clause 15.209	**Mode/Config/Arrg:**	Ch 23 Wideband Max Power
Spec Distance (m):	3	**Mod State:**	0
Measurement Dist (m):	3.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 09:36:54
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

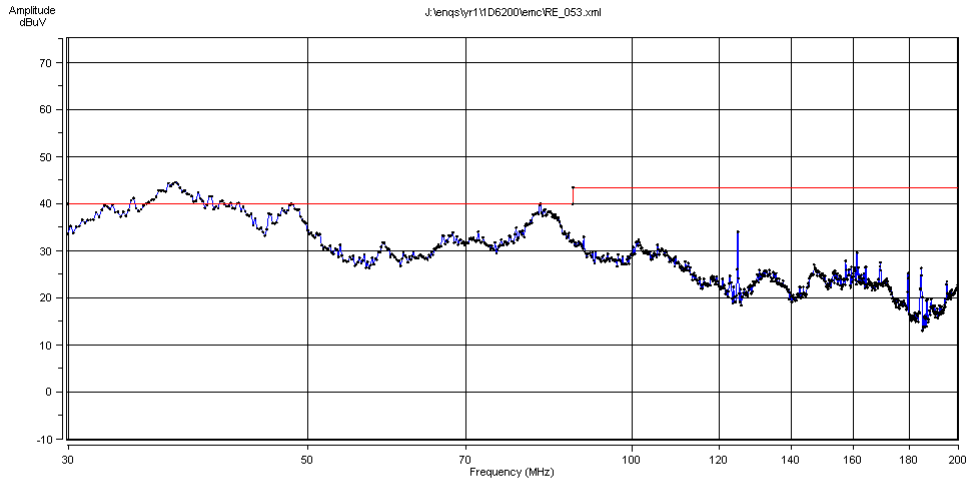
TRaC EMC Emissions Software - Radiated emissions



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	FCC 47CFR15:2008, Clause 15.209	**Mode/Config/Arrg:**	Ch 12 Wideband Max Power
Spec Distance (m):	3	**Mod State:**	0
Measurement Dist (m):	3.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 09:39:09
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

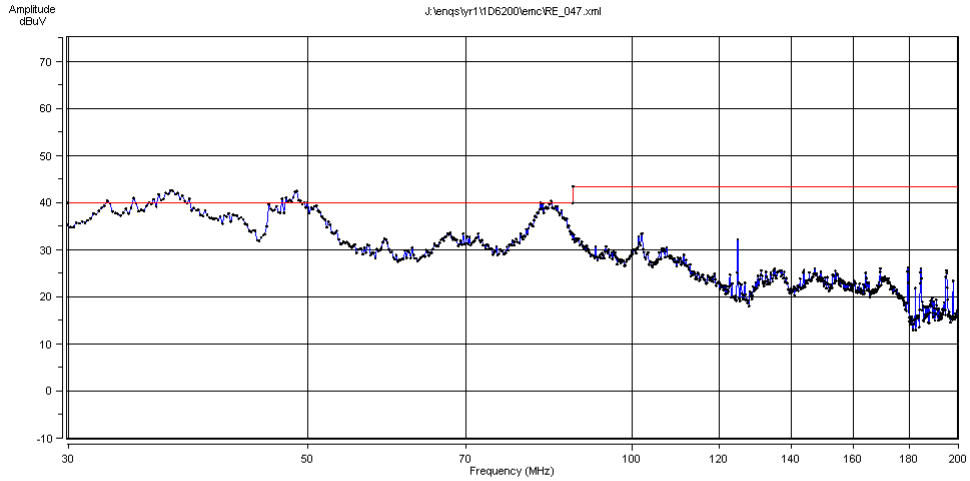
TRaC EMC Emissions Software - Radiated emissions



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	FCC 47CFR15:2008, Clause 15.209	**Mode/Config/Arrg:**	Ch 0 Wideband Max Power
Spec Distance (m):	3	**Mod State:**	0
Measurement Dist (m):	3.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 09:42:25
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

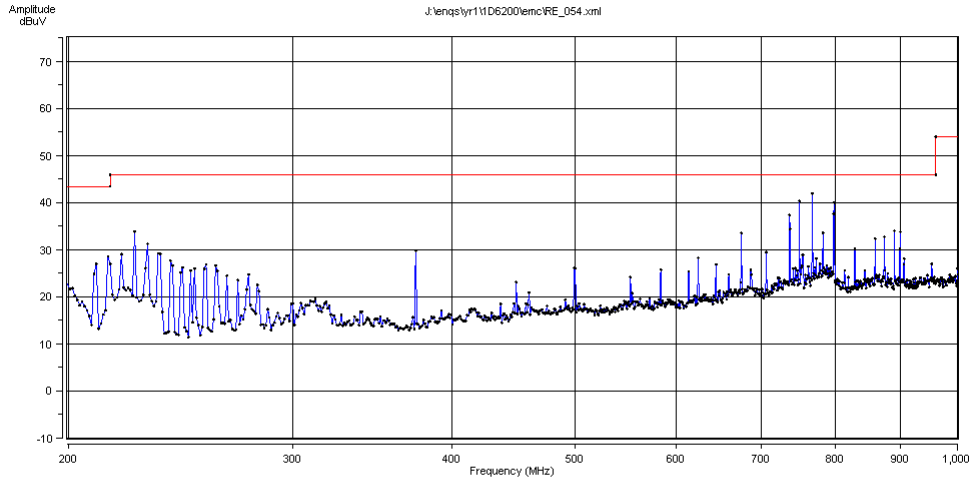
TRaC EMC Emissions Software - Radiated emissions



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	FCC 47CFR15:2008, Clause 15.209	**Mode/Config/Arrg:**	Rx Mode
Spec Distance (m):	3	**Mod State:**	0
Measurement Dist (m):	3.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 09:07:42
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

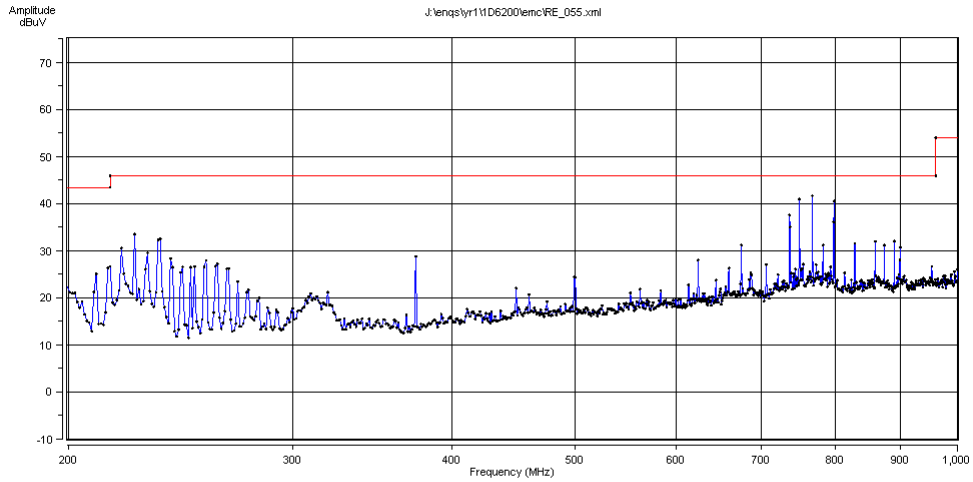
TRaC EMC Emissions Software - Radiated emissions



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	FCC 47CFR15:2008, Clause 15.209	**Mode/Config/Arrg:**	Ch 0 Wideband Max Power
Spec Distance (m):	3	**Mod State:**	0
Measurement Dist (m):	3.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 09:52:36
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

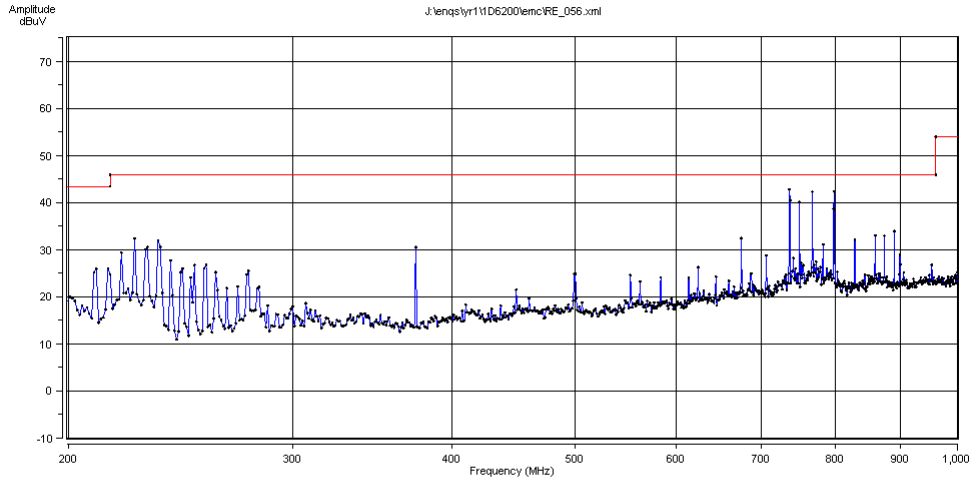
TRaC EMC Emissions Software - Radiated emissions



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	FCC 47CFR15:2008, Clause 15.209	**Mode/Config/Arrg:**	Ch 12 Wideband Max Power
Spec Distance (m):	3	**Mod State:**	0
Measurement Dist (m):	3.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 09:55:04
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

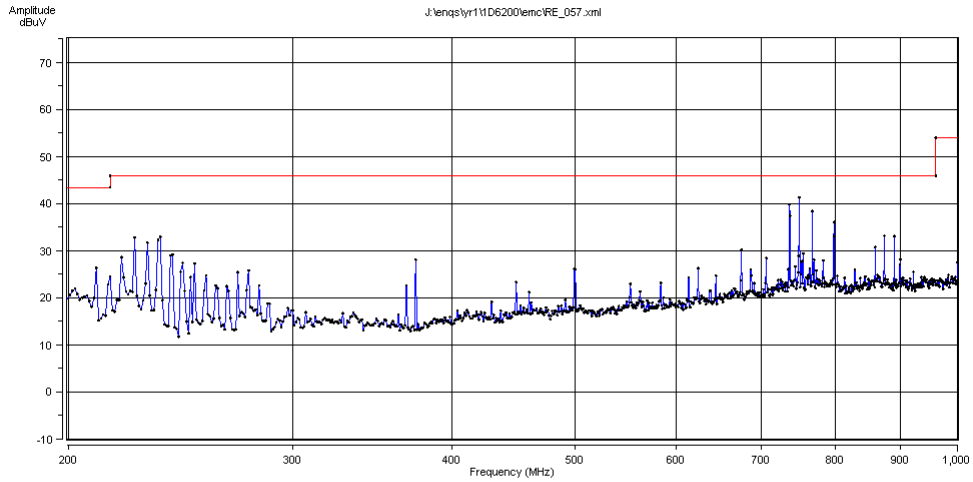
TRaC EMC Emissions Software - Radiated emissions



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	FCC 47CFR15:2008, Clause 15.209	**Mode/Config/Arrg:**	Ch 23 Wideband Max Power
Spec Distance (m):	3	**Mod State:**	0
Measurement Dist (m):	3.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 10:01:00
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

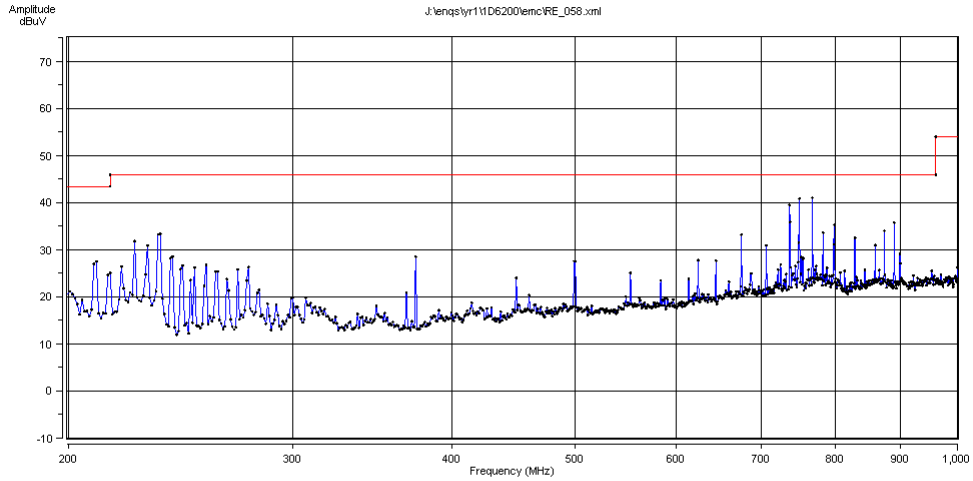
TRaC EMC Emissions Software - Radiated emissions



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	FCC 47CFR15:2008, Clause 15.209	**Mode/Config/Arrg:**	Ch 23 Narrowband Max Power
Spec Distance (m):	3	**Mod State:**	0
Measurement Dist (m):	3.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 10:06:27
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

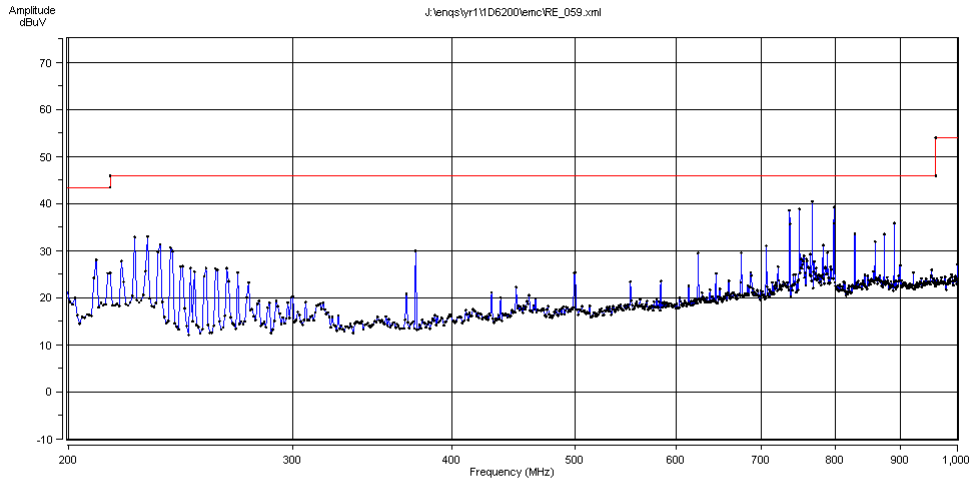
TRaC EMC Emissions Software - Radiated emissions



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	FCC 47CFR15:2008, Clause 15.209	**Mode/Config/Arrg:**	Ch 12 Narrowband Max Power
Spec Distance (m):	3	**Mod State:**	0
Measurement Dist (m):	3.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 10:10:37
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

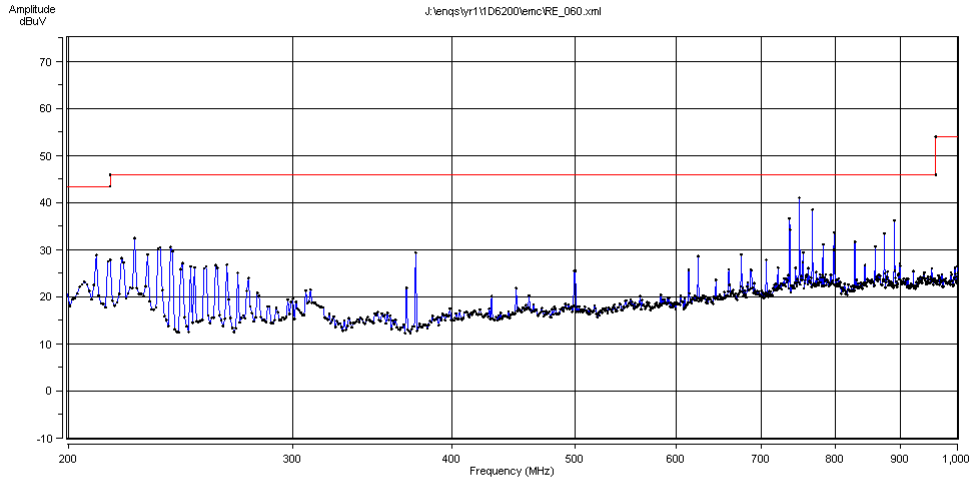
TRaC EMC Emissions Software - Radiated emissions



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	FCC 47CFR15:2008, Clause 15.209	**Mode/Config/Arrg:**	Ch 0 Narrowband Max Power
Spec Distance (m):	3	**Mod State:**	0
Measurement Dist (m):	3.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 10:17:46
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

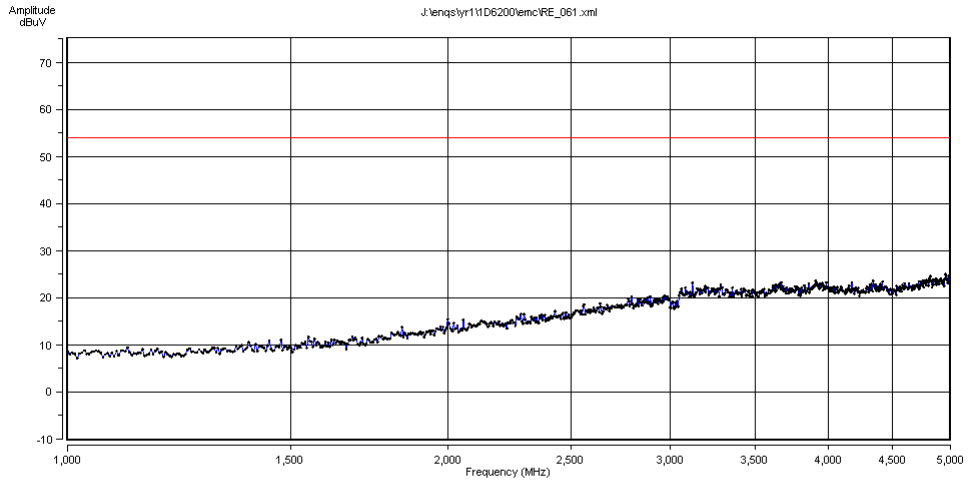
TRaC EMC Emissions Software - Radiated emissions



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	FCC 47CFR15:2008, Clause 15.209	**Mode/Config/Arrg:**	Rx Mode
Spec Distance (m):	3	**Mod State:**	0
Measurement Dist (m):	3.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 10:22:10
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

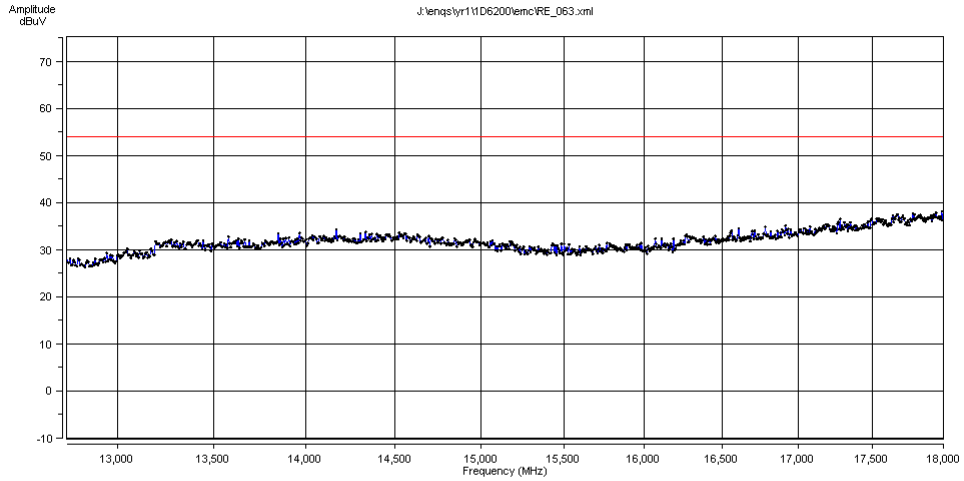
TRaC EMC Emissions Software - Radiated emissions



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	FCC 47CFR15:2008, Clause 15.209	**Mode/Config/Arrg:**	Rx Mode
Spec Distance (m):	3	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 11:11:03
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

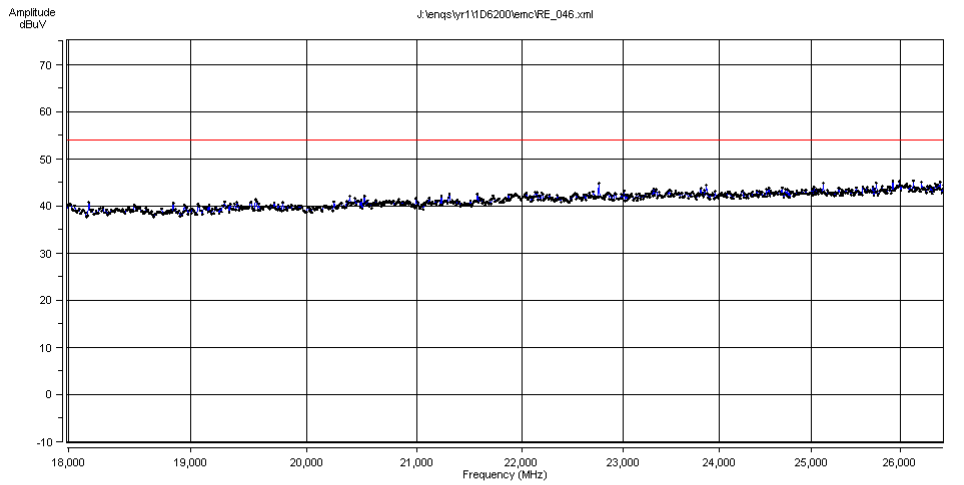
TRaC EMC Emissions Software - Radiated emissions



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	FCC 47CFR15:2008, Clause 15.209	**Mode/Config/Arrg:**	Rx Mode
Spec Distance (m):	3	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 11:25:02
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

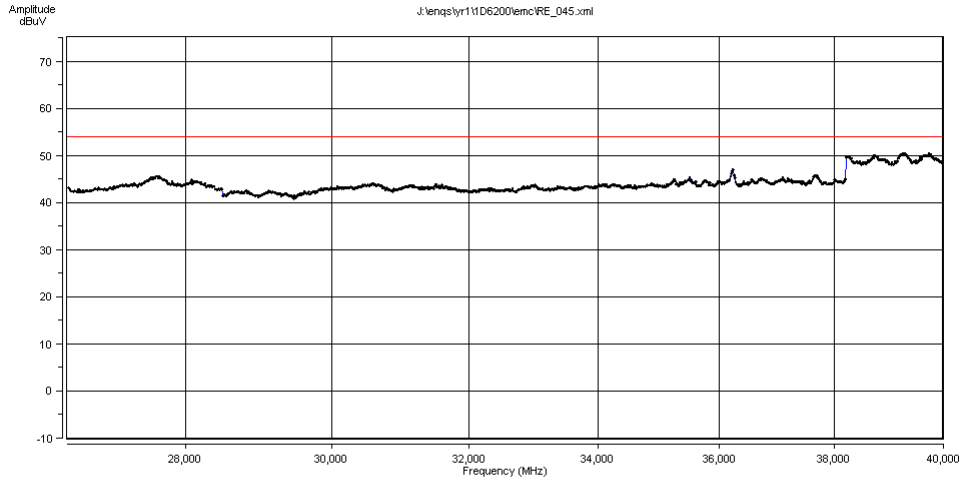
TRaC EMC Emissions Software - Radiated emissions



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	FSU46	**Sample Numbers:**	S54
Specification:	FCC 47CFR15:2008, Clause 15.209	**Mode/Config/Arrg:**	Ch 23 Narrowband Max Power
Spec Distance (m):	3	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	24/09/2015 15:12:00
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

TRaC EMC Emissions Software - Radiated emissions

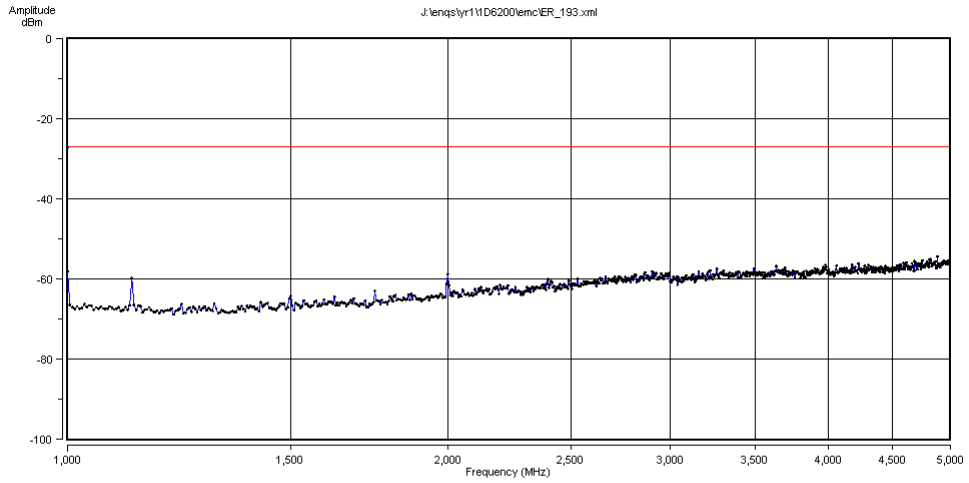


Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	FSU46	**Sample Numbers:**	S54
Specification:	FCC 47CFR15:2008, Clause 15.209	**Mode/Config/Arrg:**	Rx Mode
Spec Distance (m):	3	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	24/09/2015 14:26:56
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

EIRP- Tx Mode >1GHz

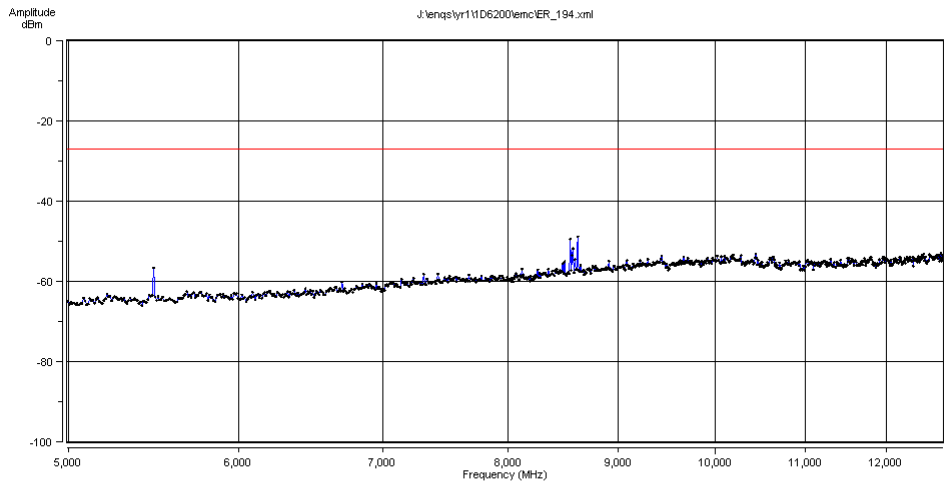
TRaC EMC Emissions Software - ERP



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	47CFR 15.407 Tx Spurious EIRP	**Mode/Config/Arrg:**	Ch 0 Narrowband Max Power
Spec Distance (m):	3.0	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 11:37:04
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

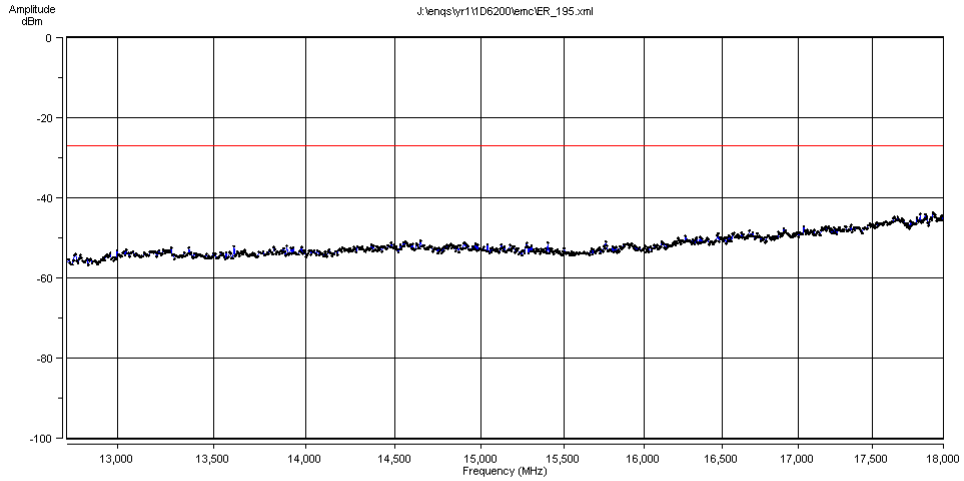
TRaC EMC Emissions Software - ERP



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	47CFR 15.407 Tx Spurious EIRP	**Mode/Config/Arrg:**	Ch 0 Narrowband Max Power
Spec Distance (m):	3.0	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 11:41:17
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

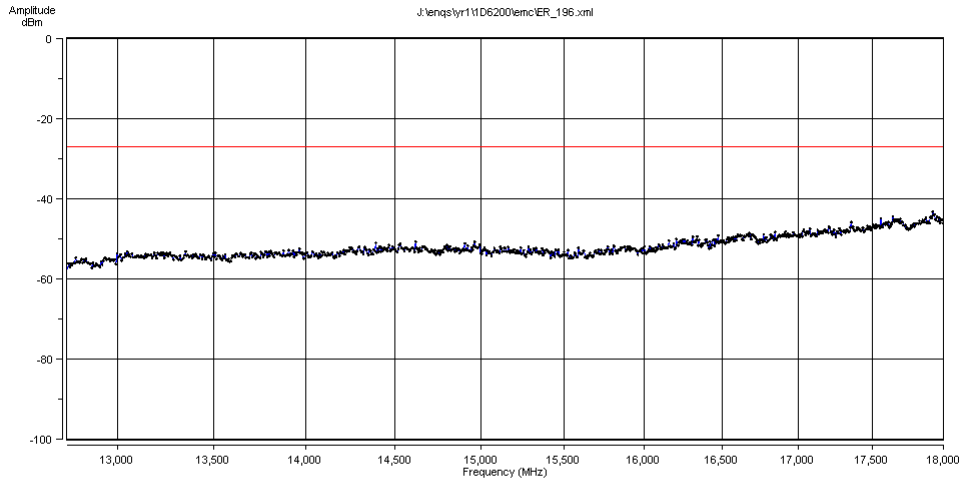
TRaC EMC Emissions Software - ERP



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	47CFR 15.407 Tx Spurious EIRP	**Mode/Config/Arrg:**	Ch 0 Narrowband Max Power
Spec Distance (m):	3.0	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 11:44:14
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

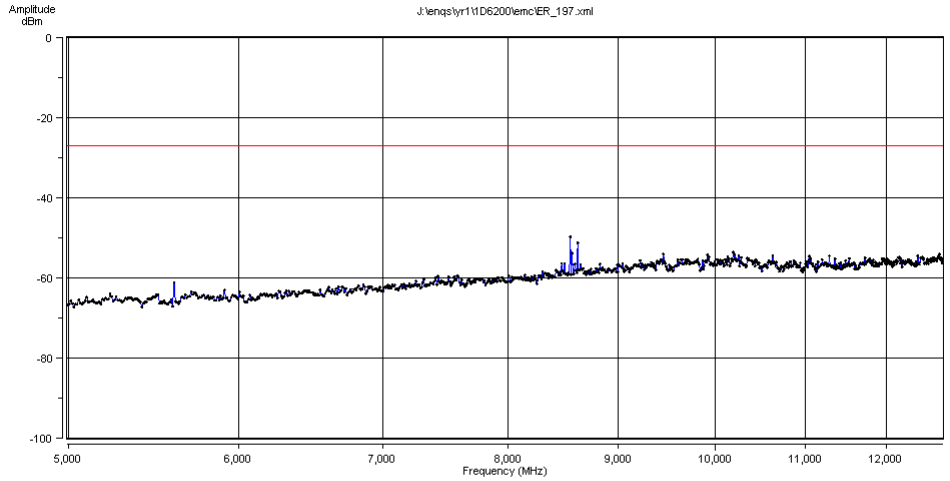
TRaC EMC Emissions Software - ERP



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	47CFR 15.407 Tx Spurious EIRP	**Mode/Config/Arrg:**	Ch 12 Narrowband Max Power
Spec Distance (m):	3.0	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 11:48:14
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

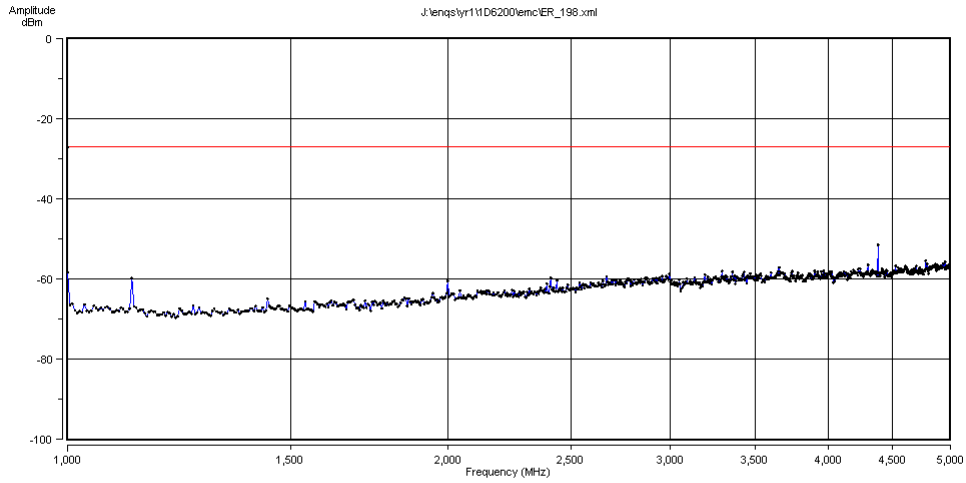
TRaC EMC Emissions Software - ERP



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	47CFR 15.407 Tx Spurious EIRP	**Mode/Config/Arrg:**	Ch 12 Narrowband Max Power
Spec Distance (m):	3.0	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 11:52:11
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

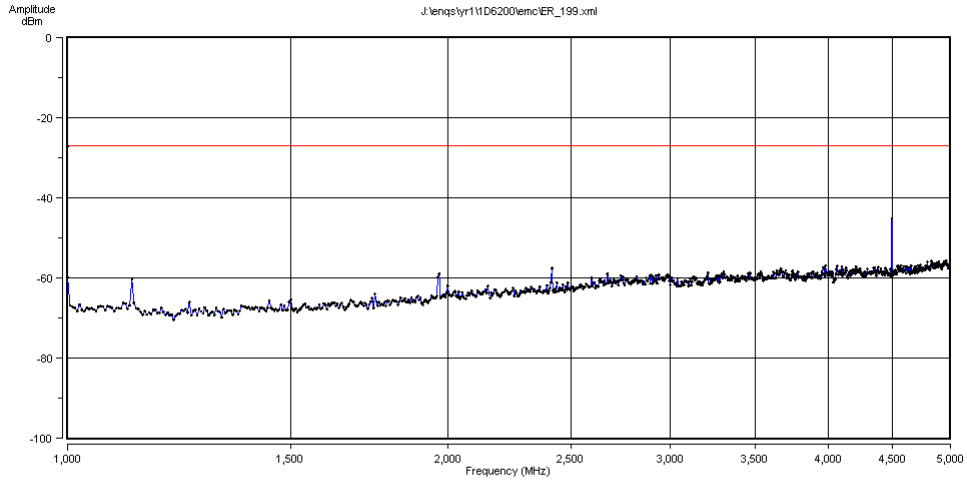
TRaC EMC Emissions Software - ERP



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	47CFR 15.407 Tx Spurious EIRP	**Mode/Config/Arrg:**	Ch 12 Narrowband Max Power
Spec Distance (m):	3.0	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 11:55:04
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

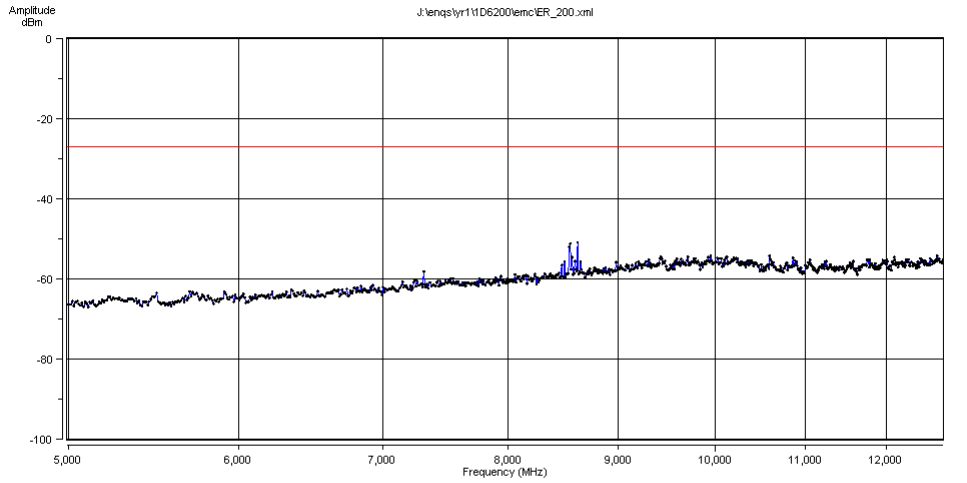
TRaC EMC Emissions Software - ERP



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	47CFR 15.407 Tx Spurious EIRP	**Mode/Config/Arrg:**	Ch 23 Narrowband Max Power
Spec Distance (m):	3.0	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 11:59:54
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

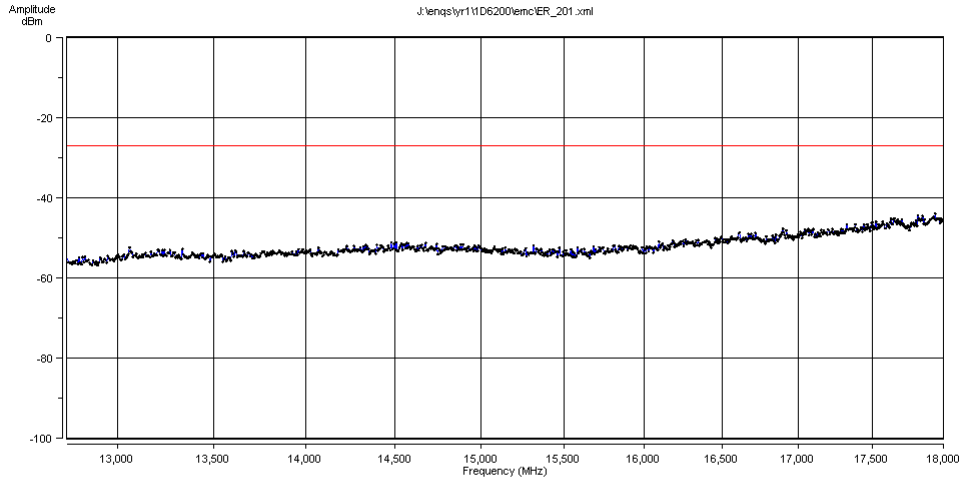
TRaC EMC Emissions Software - ERP



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	47CFR 15.407 Tx Spurious EIRP	**Mode/Config/Arrg:**	Ch 23 Narrowband Max Power
Spec Distance (m):	3.0	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 12:04:20
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

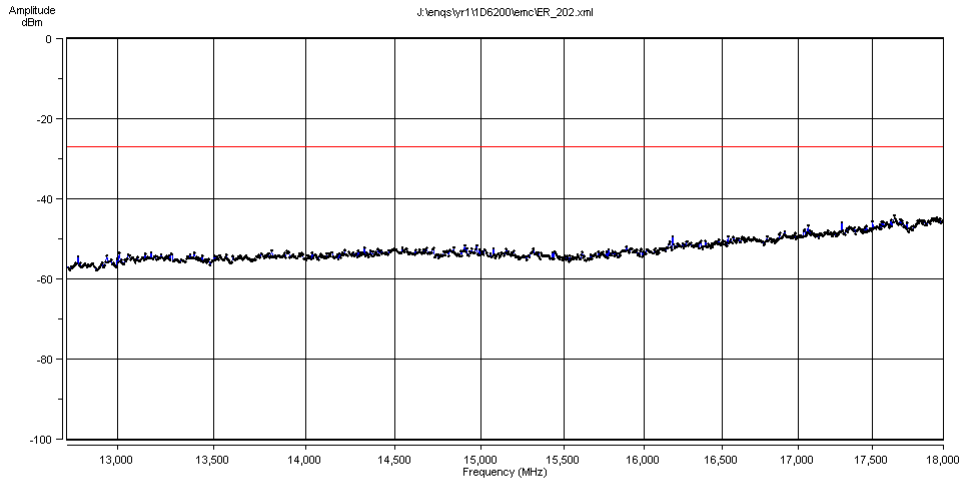
TRaC EMC Emissions Software - ERP



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	47CFR 15.407 Tx Spurious EIRP	**Mode/Config/Arrg:**	Ch 23 Narrowband Max Power
Spec Distance (m):	3.0	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 12:09:05
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

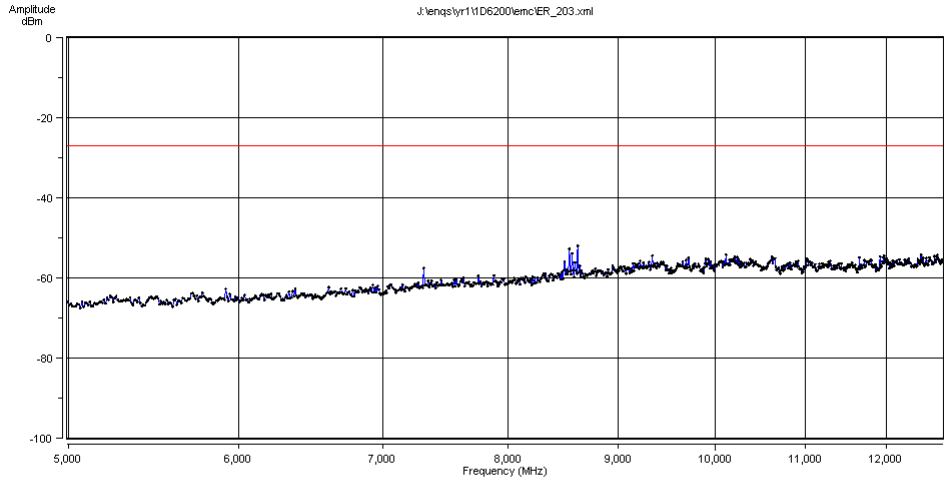
TRaC EMC Emissions Software - ERP



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	47CFR 15.407 Tx Spurious EIRP	**Mode/Config/Arrg:**	Ch 23 Wideband Max Power
Spec Distance (m):	3.0	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 13:04:14
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

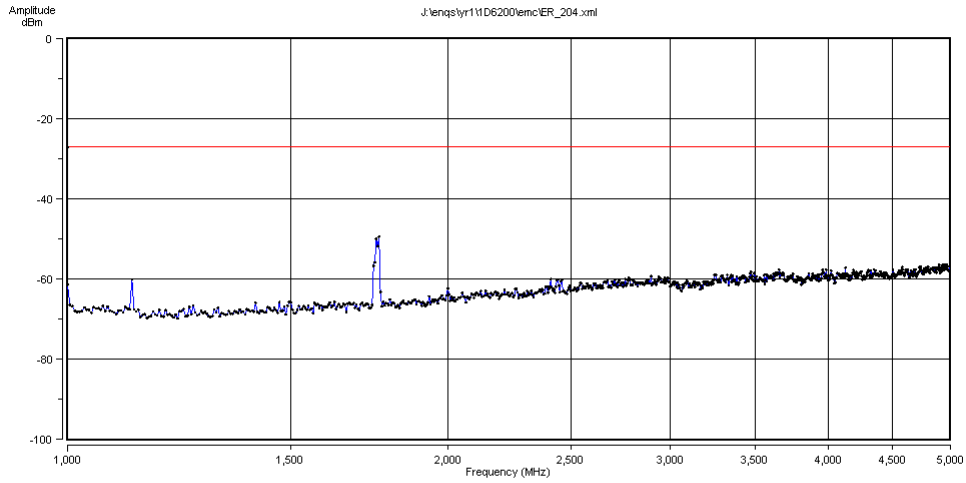
TRaC EMC Emissions Software - ERP



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	47CFR 15.407 Tx Spurious EIRP	**Mode/Config/Arrg:**	Ch 23 Wideband Max Power
Spec Distance (m):	3.0	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 13:06:16
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

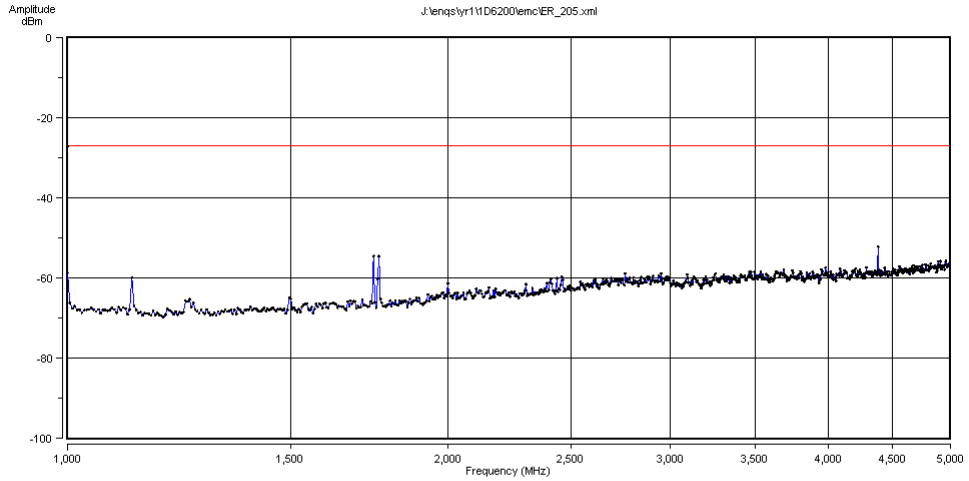
TRaC EMC Emissions Software - ERP



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	47CFR 15.407 Tx Spurious EIRP	**Mode/Config/Arrg:**	Ch 23 Wideband Max Power
Spec Distance (m):	3.0	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 13:08:21
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

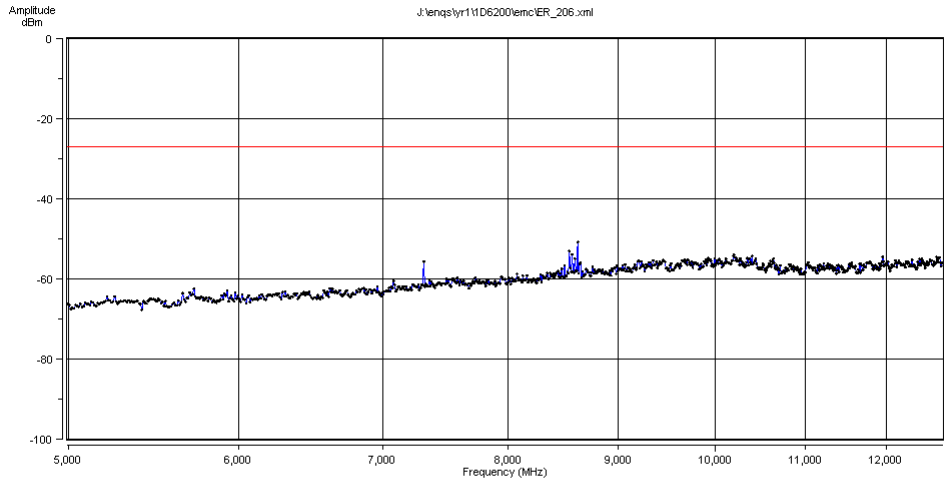
TRaC EMC Emissions Software - ERP



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	47CFR 15.407 Tx Spurious EIRP	**Mode/Config/Arrg:**	Ch 12 Wideband Max Power
Spec Distance (m):	3.0	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 13:20:40
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

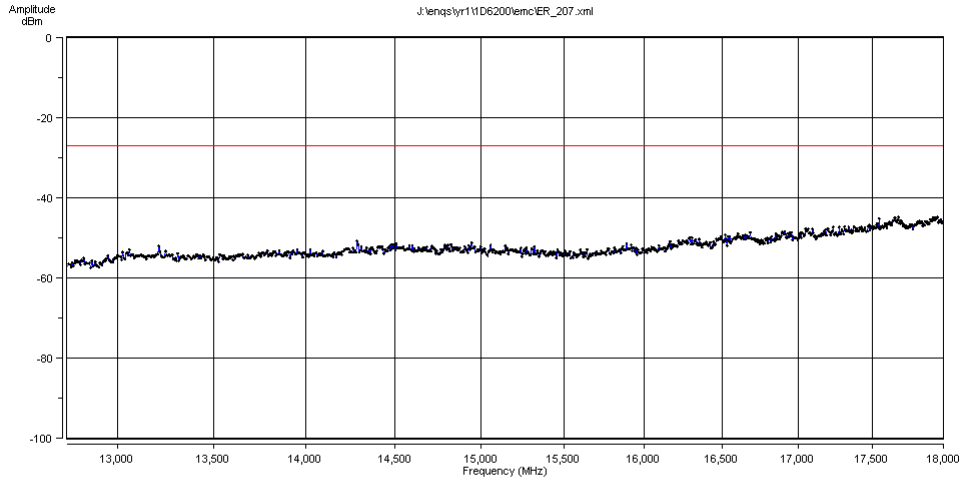
TRaC EMC Emissions Software - ERP



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	47CFR 15.407 Tx Spurious EIRP	**Mode/Config/Arrg:**	Ch 12 Wideband Max Power
Spec Distance (m):	3.0	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 13:23:25
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

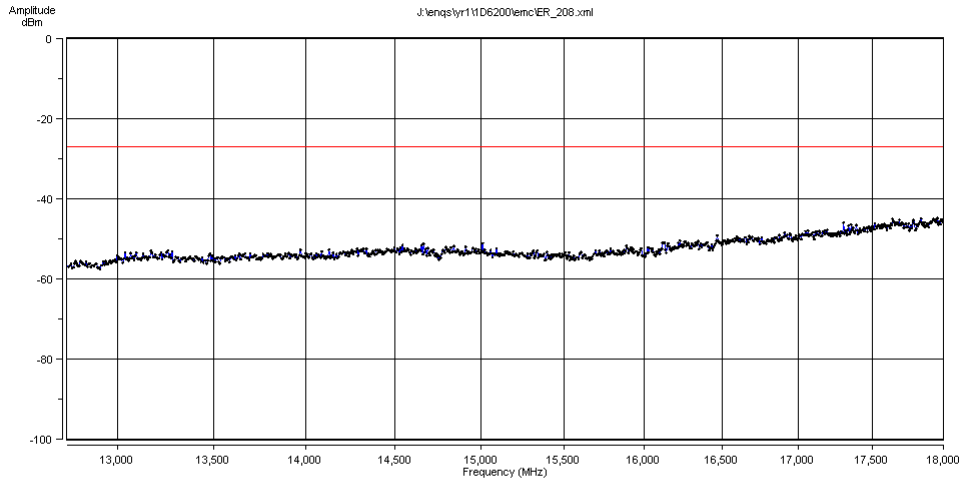
TRaC EMC Emissions Software - ERP



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	47CFR 15.407 Tx Spurious EIRP	**Mode/Config/Arrg:**	Ch 12 Wideband Max Power
Spec Distance (m):	3.0	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 13:27:49
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

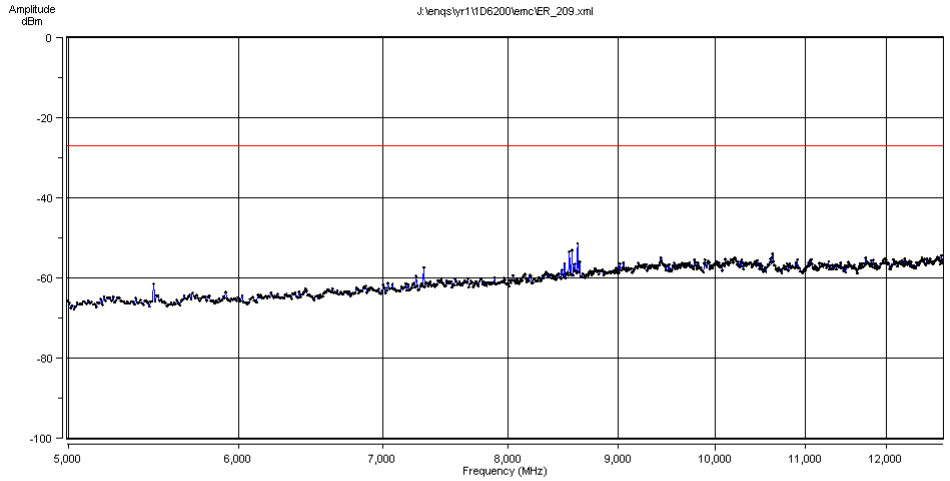
TRaC EMC Emissions Software - ERP



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	47CFR 15.407 Tx Spurious EIRP	**Mode/Config/Arrg:**	Ch 0 Wideband Max Power
Spec Distance (m):	3.0	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 13:36:00
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

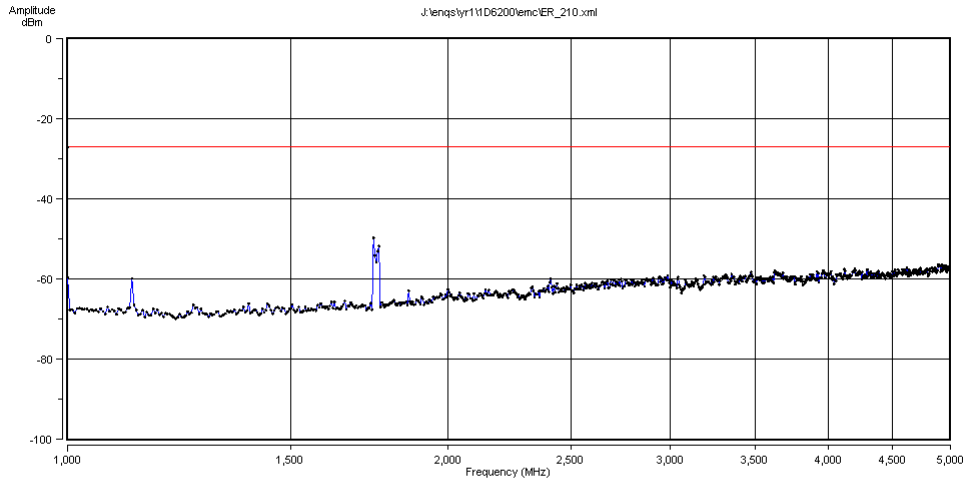
TRaC EMC Emissions Software - ERP



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	47CFR 15.407 Tx Spurious EIRP	**Mode/Config/Arrg:**	Ch 0 Wideband Max Power
Spec Distance (m):	3.0	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 13:38:11
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

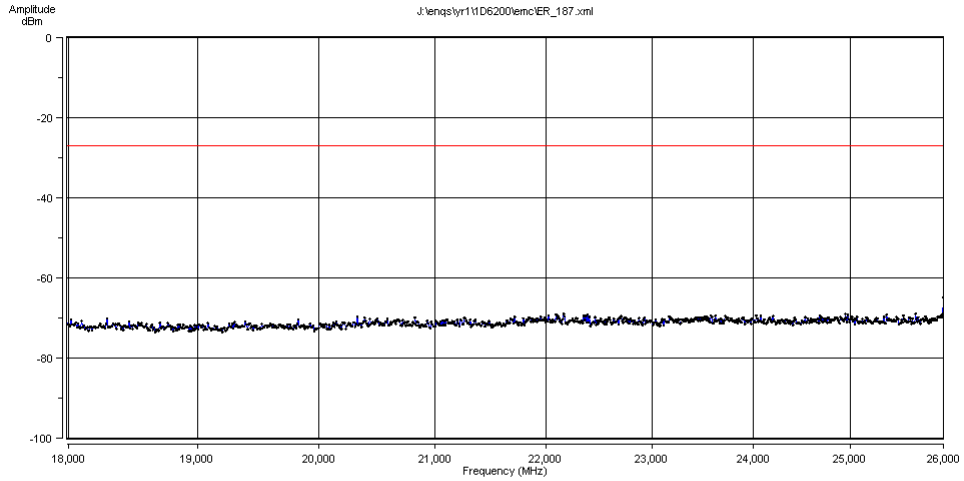
TRaC EMC Emissions Software - ERP



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	47CFR 15.407 Tx Spurious EIRP	**Mode/Config/Arrg:**	Ch 0 Wideband Max Power
Spec Distance (m):	3.0	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 13:41:49
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

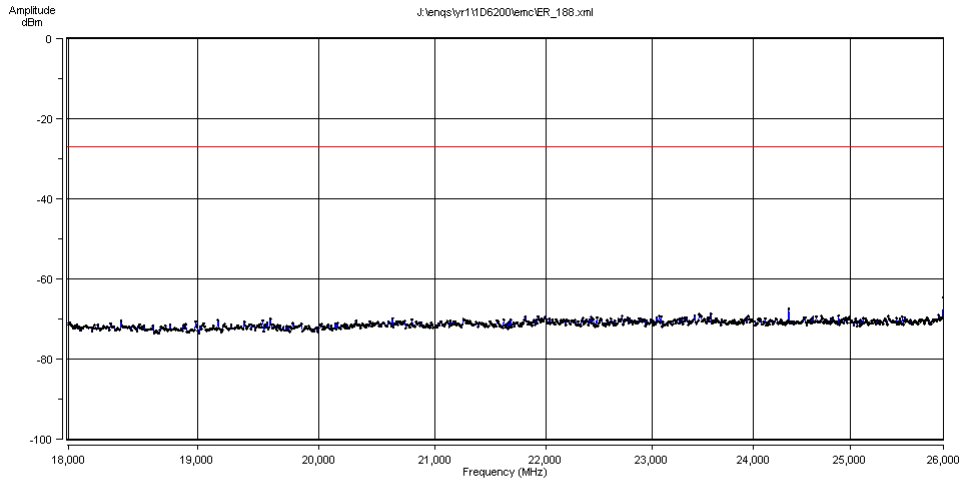
TRaC EMC Emissions Software - ERP



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	FSU46	**Sample Numbers:**	S54
Specification:	47CFR 15.407 Tx Spurious EIRP	**Mode/Config/Arrg:**	Ch 23 Wideband Max Power
Spec Distance (m):	3.0	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	24/09/2015 14:55:36
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

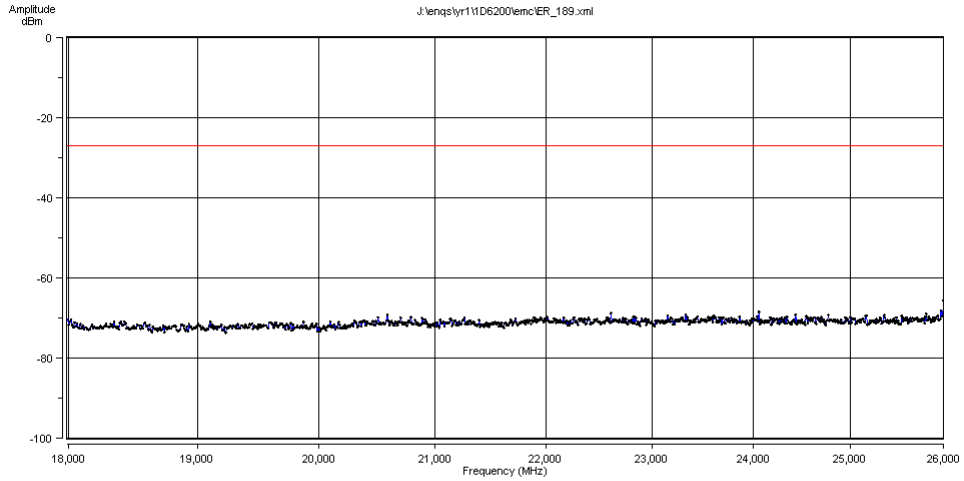
TRaC EMC Emissions Software - ERP



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	FSU46	**Sample Numbers:**	S54
Specification:	47CFR 15.407 Tx Spurious EIRP	**Mode/Config/Arrg:**	Ch 12 Wideband Max Power
Spec Distance (m):	3.0	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	24/09/2015 14:58:48
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

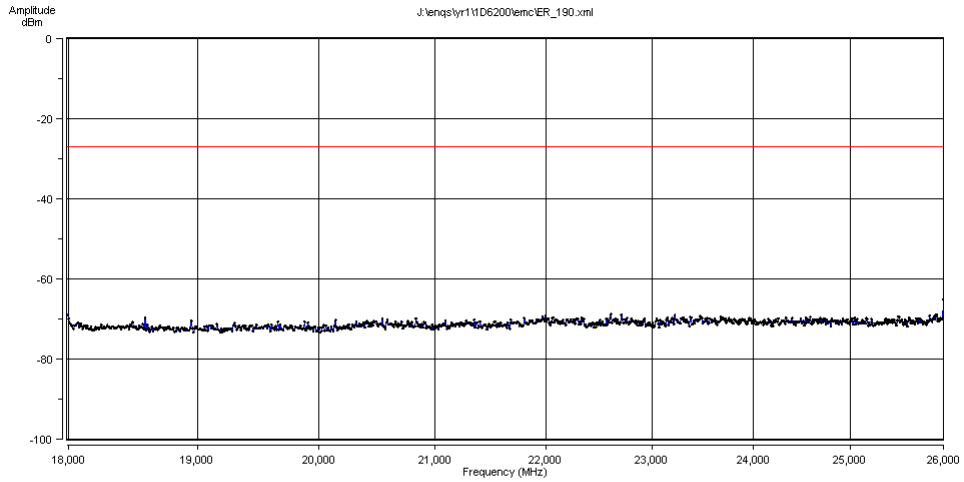
TRaC EMC Emissions Software - ERP



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	FSU46	**Sample Numbers:**	S54
Specification:	47CFR 15.407 Tx Spurious EIRP	**Mode/Config/Arrg:**	Ch 0 Wideband Max Power
Spec Distance (m):	3.0	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	24/09/2015 15:01:59
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

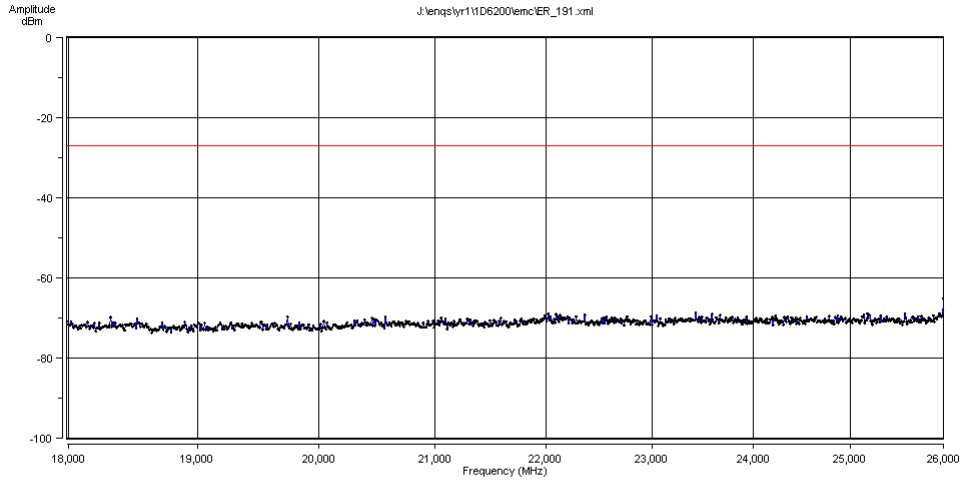
TRaC EMC Emissions Software - ERP



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	FSU46	**Sample Numbers:**	S54
Specification:	47CFR 15.407 Tx Spurious EIRP	**Mode/Config/Arrg:**	Ch 0 Narrowband Max Power
Spec Distance (m):	3.0	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	24/09/2015 15:03:57
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

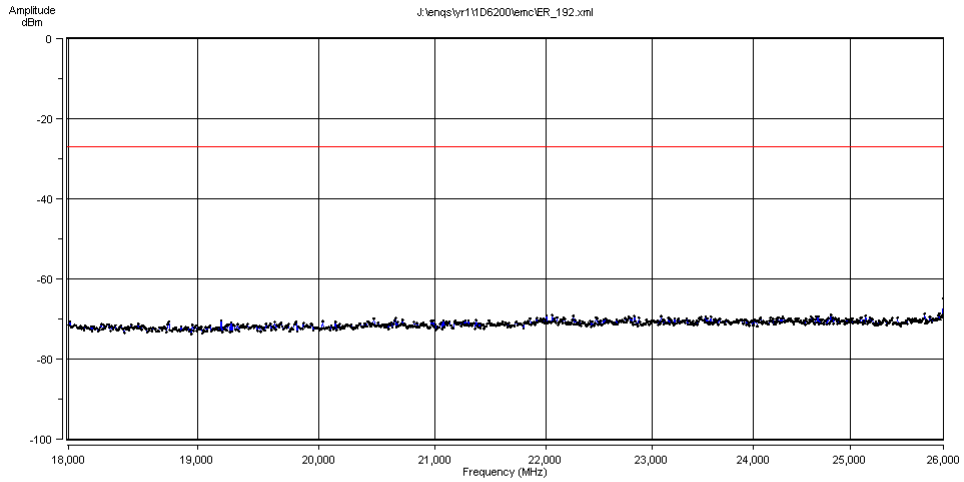
TRaC EMC Emissions Software - ERP



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	FSU46	**Sample Numbers:**	S54
Specification:	47CFR 15.407 Tx Spurious EIRP	**Mode/Config/Arrg:**	Ch 12 Narrowband Max Power
Spec Distance (m):	3.0	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	24/09/2015 15:06:02
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

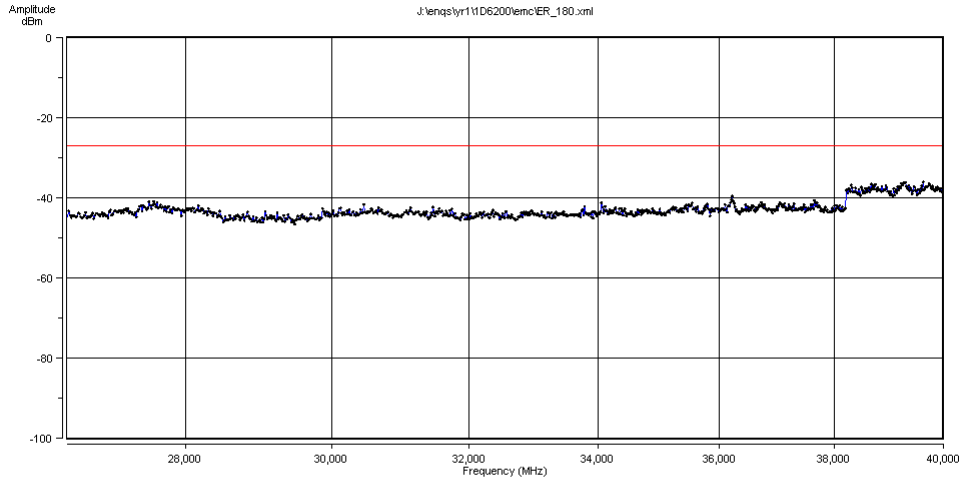
TRaC EMC Emissions Software - ERP



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	FSU46	**Sample Numbers:**	S54
Specification:	47CFR 15.407 Tx Spurious EIRP	**Mode/Config/Arrg:**	Ch 23 Narrowband Max Power
Spec Distance (m):	3.0	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	24/09/2015 15:08:05
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

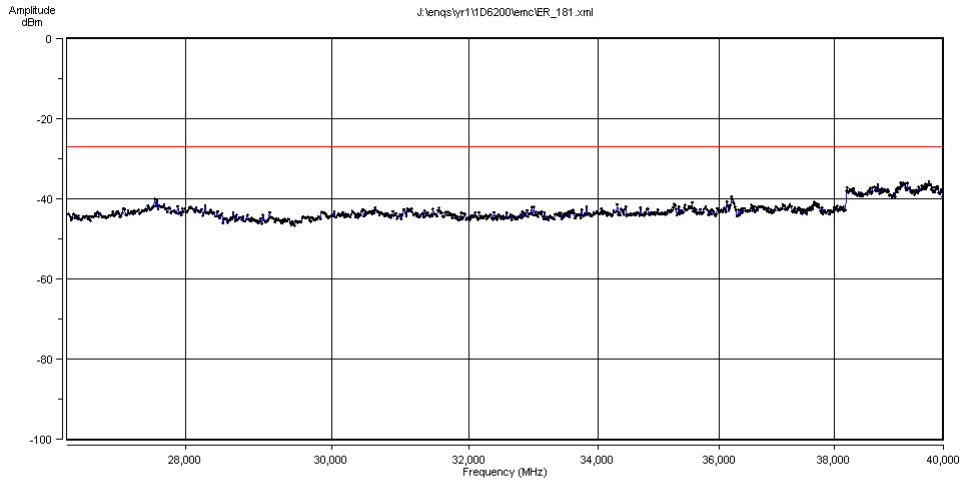
TRaC EMC Emissions Software - ERP



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	FSU46	**Sample Numbers:**	S54
Specification:	47CFR 15.407 Tx Spurious EIRP	**Mode/Config/Arrg:**	Ch 23 Narrowband Max Power
Spec Distance (m):	3.0	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	24/09/2015 14:30:46
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

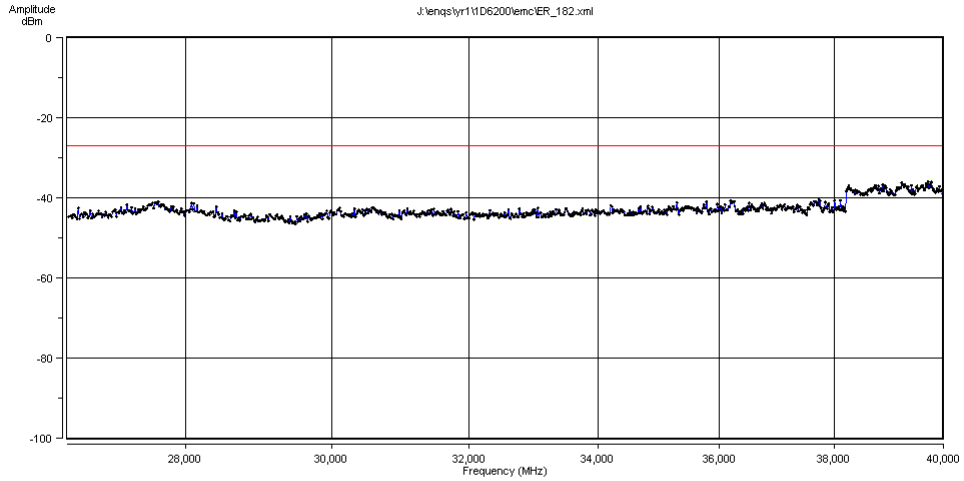
TRaC EMC Emissions Software - ERP



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	FSU46	**Sample Numbers:**	S54
Specification:	47CFR 15.407 Tx Spurious EIRP	**Mode/Config/Arrg:**	Ch 12 Narrowband Max Power
Spec Distance (m):	3.0	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	24/09/2015 14:32:59
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

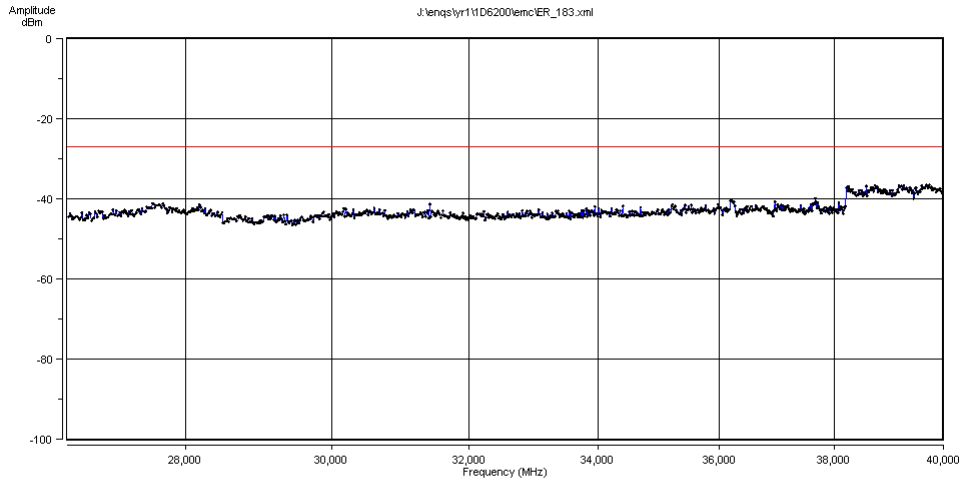
TRaC EMC Emissions Software - ERP



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	FSU46	**Sample Numbers:**	S54
Specification:	47CFR 15.407 Tx Spurious EIRP	**Mode/Config/Arrg:**	Ch 0 Narrowband Max Power
Spec Distance (m):	3.0	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	24/09/2015 14:34:48
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

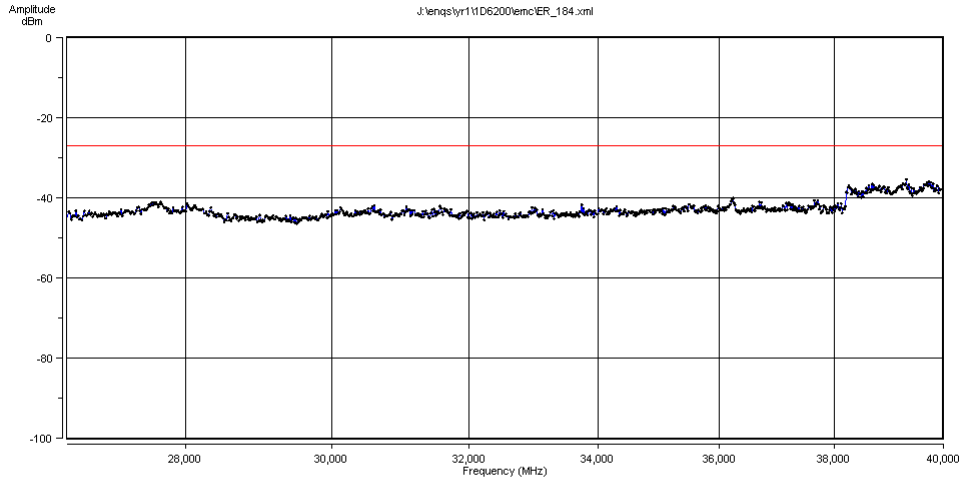
TRaC EMC Emissions Software - ERP



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	FSU46	**Sample Numbers:**	S54
Specification:	47CFR 15.407 Tx Spurious EIRP	**Mode/Config/Arrg:**	Ch 0 Wideband Max Power
Spec Distance (m):	3.0	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	24/09/2015 14:38:11
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

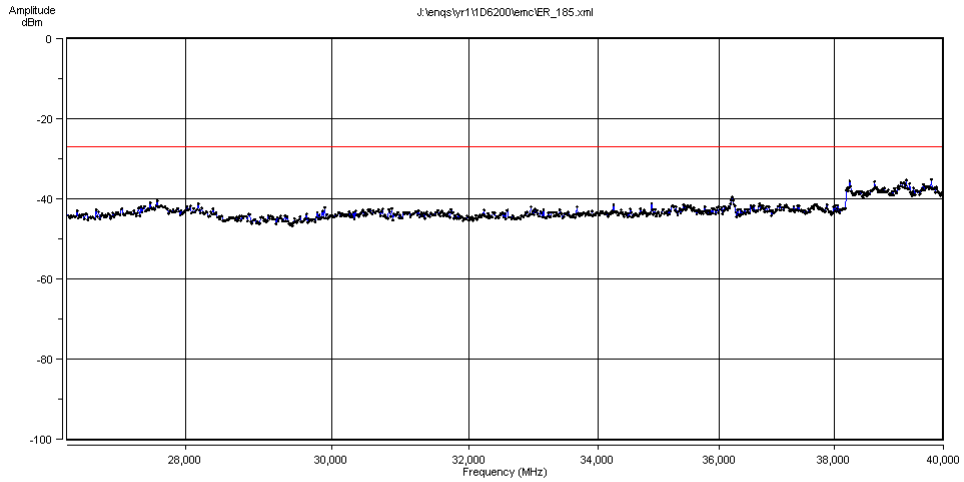
TRaC EMC Emissions Software - ERP



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	FSU46	**Sample Numbers:**	S54
Specification:	47CFR 15.407 Tx Spurious EIRP	**Mode/Config/Arrg:**	Ch 12 Wideband Max Power
Spec Distance (m):	3.0	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	24/09/2015 14:41:16
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

TRaC EMC Emissions Software - ERP

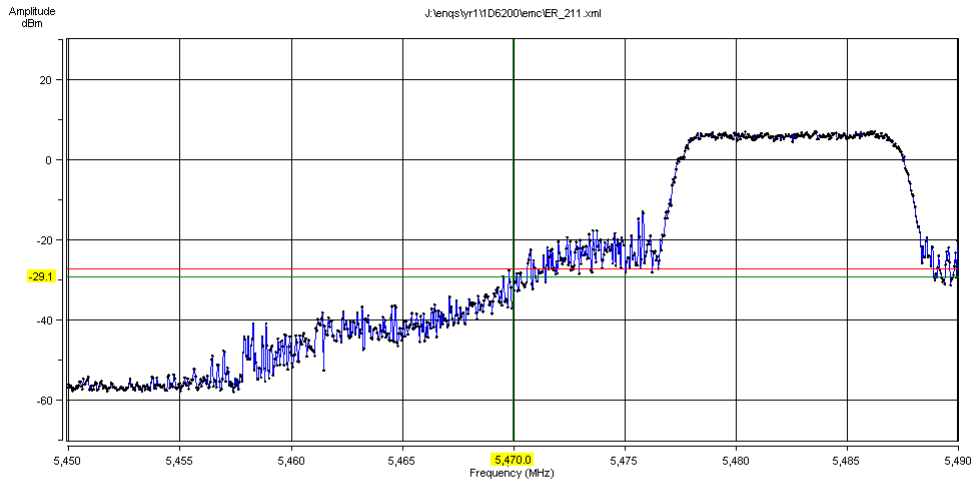


Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	FSU46	**Sample Numbers:**	S54
Specification:	47CFR 15.407 Tx Spurious EIRP	**Mode/Config/Arrg:**	Ch 23 Wideband Max Power
Spec Distance (m):	3.0	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	24/09/2015 14:47:23
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

Band Edge Plots

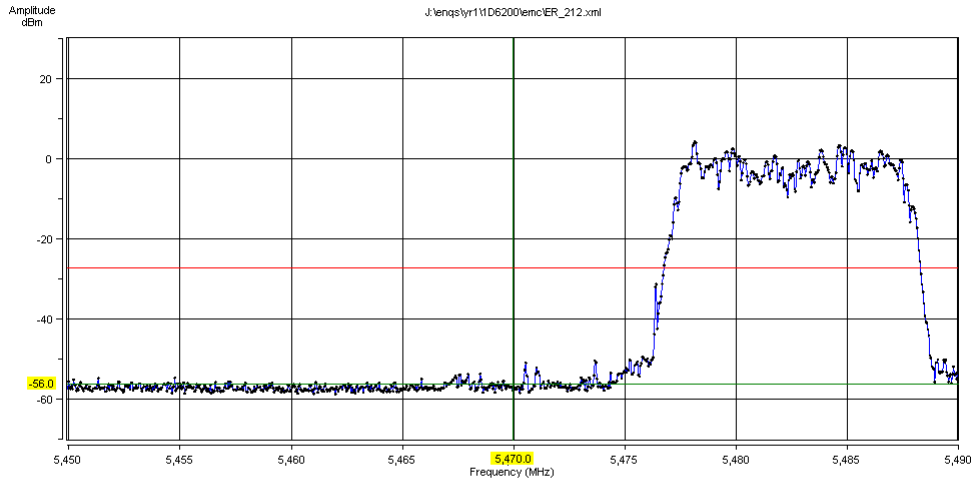
TRaC EMC Emissions Software - ERP



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	47CFR 15.407 Tx Spurious EIRP	**Mode/Config/Arrg:**	Ch 0 Wideband Max Power Band Edge
Spec Distance (m):	3.0	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 13:44:59
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

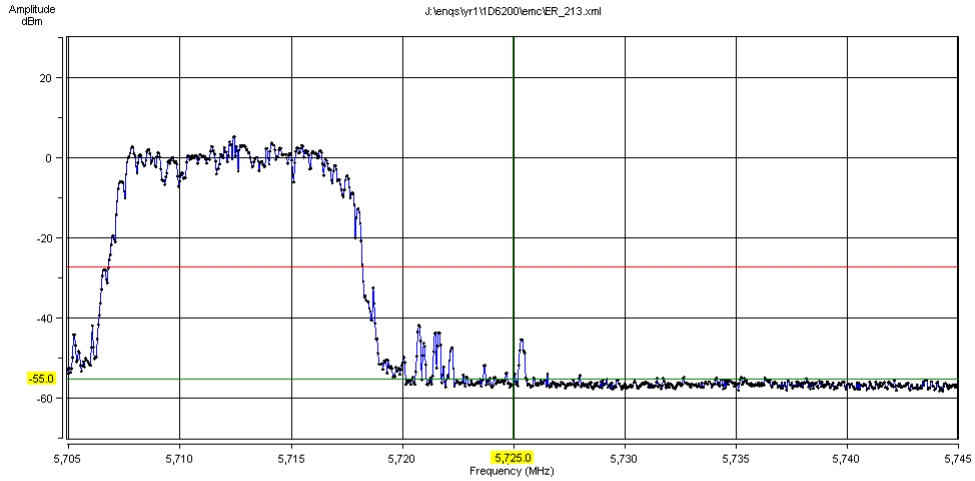
TRaC EMC Emissions Software - ERP



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	47CFR 15.407 Tx Spurious EIRP	**Mode/Config/Arrg:**	Ch 0 Narrowband Max Power Band Ed
Spec Distance (m):	3.0	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 14:03:00
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

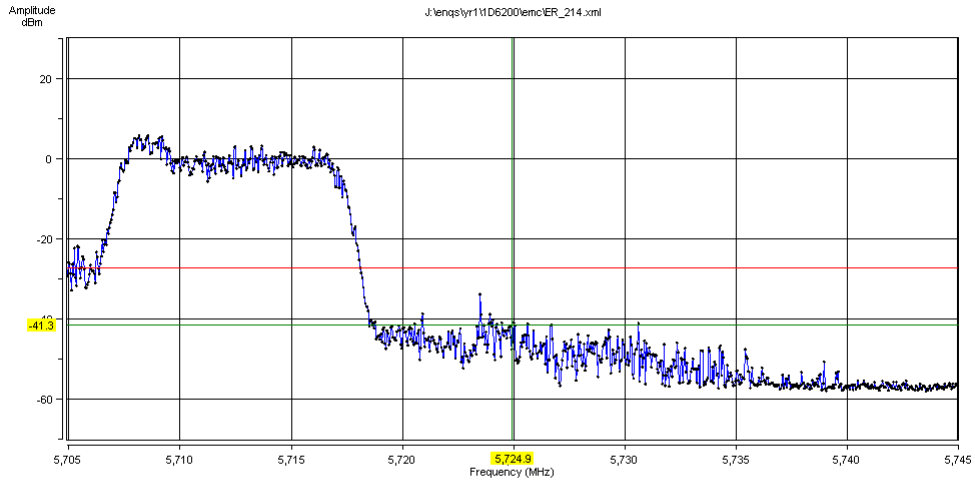
TRaC EMC Emissions Software - ERP



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	47CFR 15.407 Tx Spurious EIRP	**Mode/Config/Arrg:**	Ch 23 Narrowband Max Power Band E
Spec Distance (m):	3.0	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 14:10:44
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

TRaC EMC Emissions Software - ERP



Test Location:	EMC Ferrite	**Remote Drive Eq.:**	Laptop
Analyser Type:	E4404B (SCPI commands)	**Sample Numbers:**	S54
Specification:	47CFR 15.407 Tx Spurious EIRP	**Mode/Config/Arrg:**	Ch 23 Wideband Max Power Band Edg
Spec Distance (m):	3.0	**Mod State:**	0
Measurement Dist (m):	1.0	**Engineer:**	Ken Anderson
EUT Names:	BCM	**Date/Time:**	25/09/2015 14:21:15
Sample Numbers:	S59	**Job Number:**	1D6200
Assessment:	Horizontal and Vertical Antenna Polarity		

Software Version: 1.9.1.0

Appendix D: Additional Test and Sample Details

This appendix contains details of:

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

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

Sample No: Sxx Mod w

where:

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

The following terminology is used throughout the test report:

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

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

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

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

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

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

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

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

D1 Test samples

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

Sample No.	Description	Identification
S59	RCOM BCM (MOBILE STATION)	P1838-GR-205
S65	Mobile station antenna and cable assembly	None
S66	Mobile station antenna and cable assembly	None

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

Sample No.	Description
S54	Lenovo Thinkpad x61s

D2 EUT operating mode during testing

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

Test	Description of Operating Mode
All tests detailed in this report excluding: RX emissions	The EUT was transmitting on maximum or minimum power using the following operating modes : Narrowband 5 thin pipes Wideband 100 thin pipes, 1 fat pipe
RX emissions	The EUT was in continuous Receive mode

.

D3 EUT Configuration Information

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

D4 List of EUT Ports

The tables below describe the termination of EUT ports:

Sample : S59
Tests : All Conducted Tests

Port	Description of Cable Attached	Cable length	Equipment Connected
dc Power	Twisted pair Unscreened	2.65m	PSU
Bot-PC	CAT 5 UTP	2.0m	S20
Bot-RTC	None	N/A	N/A
Antenna A (Tx/Rx)	Coaxial	1.5m	Test equipment
Antenna B (Rx)	None (50Ω Termination)	N/A	N/A

Sample : S59
Tests : All Radiated Tests

Port	Description of Cable Attached	Cable length	Equipment Connected
dc Power	Twisted pair Unscreened	2.65m	PSU
Bot-PC	CAT 5 UTP	2.0m	S20
Bot-RTC	None	N/A	N/A
Antenna A (Tx/Rx)	50Ω Coaxial		S65
Antenna B (Rx)	50Ω Coaxial		S66

D5 Details of Equipment Used

For Radiated Measurements:

REF/RFG No.	Type	Description	Manufacturer	Date Calibrated.	Calibration Due
REF886	ATS	Ferrite Lined Chamber		21/07/14	21/07/16
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	19/09/16
REF927	310	Pre-Amp (9kHz – 1GHz)	Sonoma	01/07/14	01/07/16
REF913	8449B	Pre-Amp (1 – 26.5GHz)	Agilent	05/02/14	05/02/16
RFG450		SMA RF coaxial cable		11/07/15	11/07/16
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	Teleydyne	17/07/15	17/07/16
RFG919		K-Type RF coaxial cable	Teleydyne	17/07/15	17/07/16
REF910	FSU	Spectrum Analyser	Rhode & Schwarz	28/05/15	28/05/16
REF837	E4440A	Spectrum Analyser	Agilent	20/05/15	19/05/16

For Conducted RF Measurements:

REF/RFG No.	Type	Description	Manufacturer	Date Calibrated.	Calibration Due
REF910	FSU	Spectrum Analyser	Rhode & Schwarz	28/05/15	28/05/16
RFG832		RF coaxial cable	Atlantic Microwave	02/0215	02/02/16

Appendix E: Additional Information

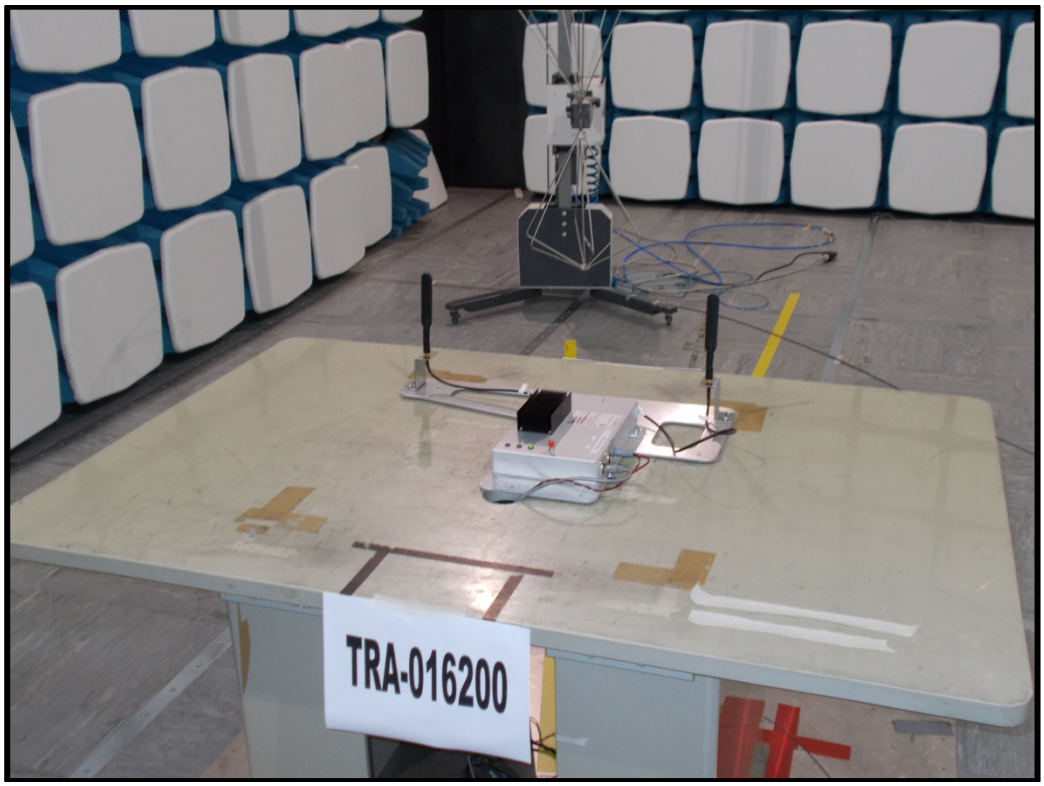
No additional information, is included within this test report.

Appendix F: Photographs and Figures

The following photographs were taken of the test samples:

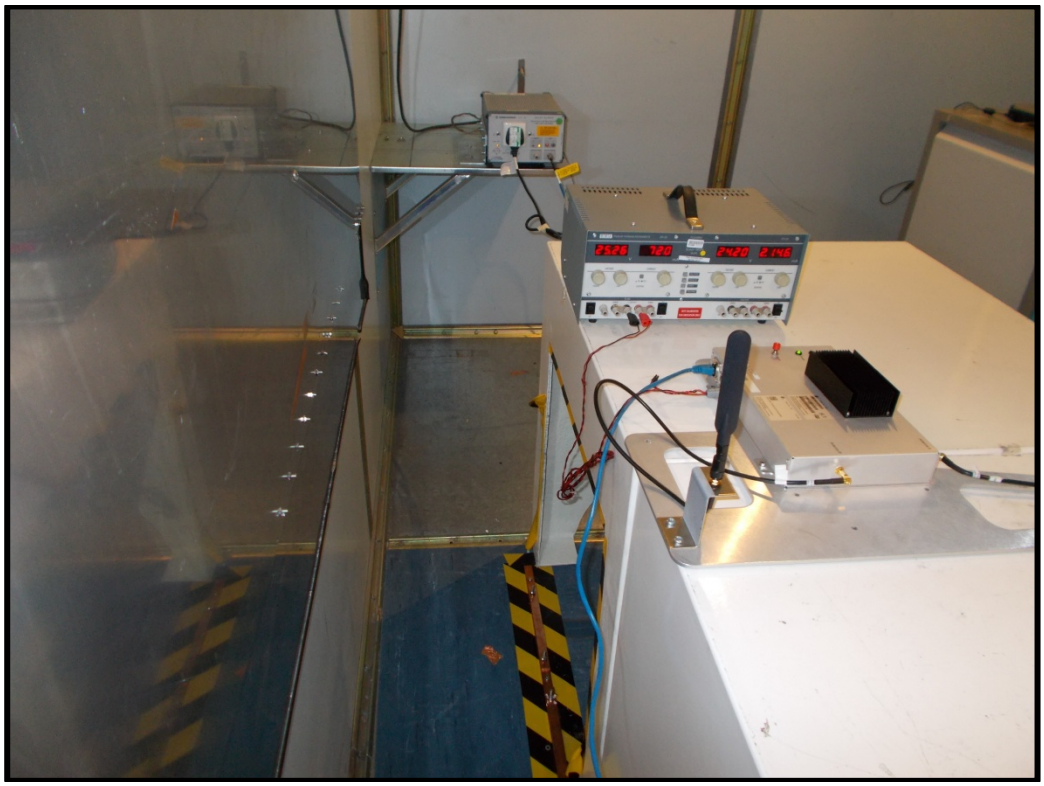
1. Radiated spurious emissions setup (front view)
2. Radiated spurious emissions setup (rear view)
3. Power line conducted emissions (front view)
4. Power line conducted emissions (side view)

Photograph 1



Photograph 2

Photograph 3



Photograph 4