FCC 47CFR part 15C
Test Report
For
IoT Gateway
JN5168-RD6040

Reference Standard: FCC 47CFR part 15C
Manufacturer: NXP Laboratories UK Ltd
For type of equipment and serial number, refer to section 3
Report Number: 08-6964-5-13 Issue 01
Report Produced by: -

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Certificate of Test 6964-5

The unit noted below has been tested by **R.N. Electronics Limited** and, where appropriate, conforms to the relevant subpart of FCC 47CFR Part 15. This is a certificate of test only and should not be confused with an equipment authorisation. Other standards may also apply.

Equipment:	IoT Gateway
Model Number:	JN5168-RD6040
Proposed FCC ID:	TYOJN5168IT00
Unique Serial Number:	034
Manufacturer:	NXP Laboratories UK Ltd Furnival Street Sheffield S1 4QT
Full measurement results are detailed in Report Number:	08-6964-5-13 Issue 01
Test Standards:	FCC 47CFR Part 15.247 effective date **October 1st 2012,** Class DTS Intentional Radiator

NOTE:
Certain tests were not performed based upon manufacturer's declarations. Certain other requirements are subject to manufacturer declaration only and have not been tested/verified. For details refer to section 3 of this report.

DEVIATIONS:
Deviations from the standards have been applied. For details refer to section 4.2 of this report.

This certificate relates only to the unit tested as identified by a unique serial number and in the condition at the time it was tested. It does not relate to any other similar equipment and performance of the product before or after the test cannot be guaranteed. Whilst every effort is made to assure quality of testing, type tests are not exhaustive and although no non-conformances may be found, this doesn't exclude the possibility of unit not meeting the intentions of the standard or the requirements of the Directive, particularly under different conditions to those during testing. Any compliance statements are made reliant on (a) the application of the product and use of the assigned band being acceptable to one or more national authorities within the EU and (b) the modes of operation as instructed to us by the Customer based on their specific knowledge of the application and functionality of the EUT. Statements of compliance, where measurements were made, do not include the measurement uncertainty. The measurement uncertainty, where stated, is the expanded uncertainty based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

Date of Test: 2nd to 7th August, 2013

Test Engineer: Digitally signed by: Daniel Sims
DN: CN = Daniel Sims C = GB O = RN Electronics
Date: 2013.09.09 16:33:33 Z

Approved By
Technical Director

Customer Representative:

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2 Equipment Under Test (EUT)

2.1 Equipment Specification

Applicant	NXP Laboratories UK Ltd Furnival Street Sheffield S1 4QT
Manufacturer of EUT	NXP Laboratories UK Ltd
Brand name of EUT	IoT Gateway
Model Number of EUT	JN5168-RD6040
Serial Number of EUT	034
Date when equipment was received by RN Electronics	26th July 2013
Date of test:	2nd to 7th August, 2013
Visual description of EUT:	Small plastic enclosure with two push buttons and 6 LEDs on one side. On the opposite side are 4 ports. A DC input port, USB port, Ethernet Port and a reverse SMA 50 ohm antenna port. The unit comes with a dedicated AC/DC adapter. The Antenna is an Aveslink E-2410-GC 2dBi vertical type.
Main function of the EUT:	IEEE 802.15.4/ JenNet IP Ethernet Gateway
Height	24 mm
Width	22 mm
Depth	73 mm
Weight	0.11 kg
Voltage	100-240V AC
Current required from above voltage source	0.6A
EUT supplied PSU:	
Manufacturer	Stontronics
Model number	3A-183WP12
Serial number	N/A
Voltage input	100-240V AC
Current required from above voltage source	0.6A
Output	12V DC @ 1.5A

2.2 EUT Configurations for testing

General parameters	
EUT Normal use position	Desktop / mobile
Choice of model(s) for type tests	Single variant
Antenna details	Aveslink E-2410-GC 2dBi vertical
Antenna port	RP-SMA
Data port (yes/no)?	yes
Highest Signal generated in EUT	2480 MHz (High Channel)
Lowest Signal generated in EUT	32 MHz (Clock)

TX Parameters	
Alignment range – transmitter	2405 - 2480 MHz
EUT Declared Modulation Parameters	250kbps OQPSK
EUT Declared Power level	+2dBm
EUT Declared Signal Bandwidths	1.725MHz
EUT Declared Channel Spacing's	5MHz
EUT declared Duty Cycle	Typical 802.15.4 real world application of 10% Max.
Unmodulated carrier available?	yes
Declared frequency stability	<40ppm
RX Parameters	
Alignment range – receiver	2405 - 2480 MHz
EUT Declared RX Signal Bandwidth	2MHz

2.3 Functional Description

The IoT Gateway enables the control of wireless nodes in a WPAN from a variety of IP-connected devices in a LAN or WAN (e.g. smart phones, tablets and laptops). It allows the use of a conventional IP router to interface the LAN/WAN and WPAN domains. The gateway is designed around the NXP LPC3240 microcontroller, which provides a Linux-capable processing platform for the LAN/WAN interface, and the NXP JN5168 wireless microcontroller, which provides the processing platform for the WPAN interface as well as 2.4-GHz radio communication with the WPAN.

The figure below shows the single ended radio architecture and frequency generating scheme used in the JN5168 chip:

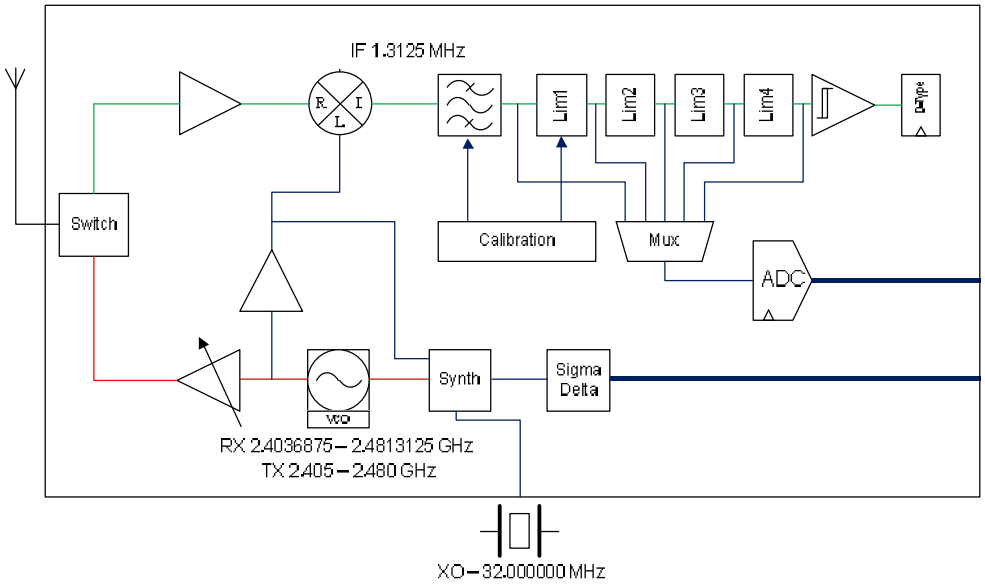


Figure 1: Radio Architecture

The radio comprises a low-IF receive path and a direct modulation transmit path, which converge at the TX/RX switch. The switch connects to the external single ended matching network, which consists of two inductors and a capacitor, this arrangement creates a 50Ω port and removes the need for a balun. A 50Ω single ended antenna can be connected directly to this port.

The 32MHz crystal oscillator feeds a divider, which provides the frequency synthesiser with a reference frequency. The synthesiser contains programmable feedback dividers, phase detector, charge pump and internal Voltage Controlled Oscillator (VCO). The VCO has no external

components, and includes calibration circuitry to compensate for differences in internal component values due to process and temperature variations. The VCO is controlled by a Phase Locked Loop (PLL) that has an internal loop filter. A programmable charge pump is also used to tune the loop characteristic.

The receiver chain starts with the low noise amplifier/mixer combination whose outputs are passed to a low pass filter, which provides the channel definition. The signal is then passed to a series of amplifier blocks forming a limiting strip. The signal is converted to a digital signal before being passed to the Modem. The gain control for the RX path is derived in the automatic gain control (AGC) block within the Modem, which samples the signal level at various points down the RX chain. To improve the performance and reduce current consumption, automatic calibration is applied to various blocks in the RX path.

In the transmit direction, the digital stream from the Modem is passed to a digital sigma-delta modulator which controls the feedback dividers in the synthesiser, (dual point modulation). The VCO frequency now tracks the applied modulation. The 2.4 GHz signal from the VCO is then passed to the RF Power Amplifier (PA), whose power control can be selected from one of four settings.

2.4 EUT Modes

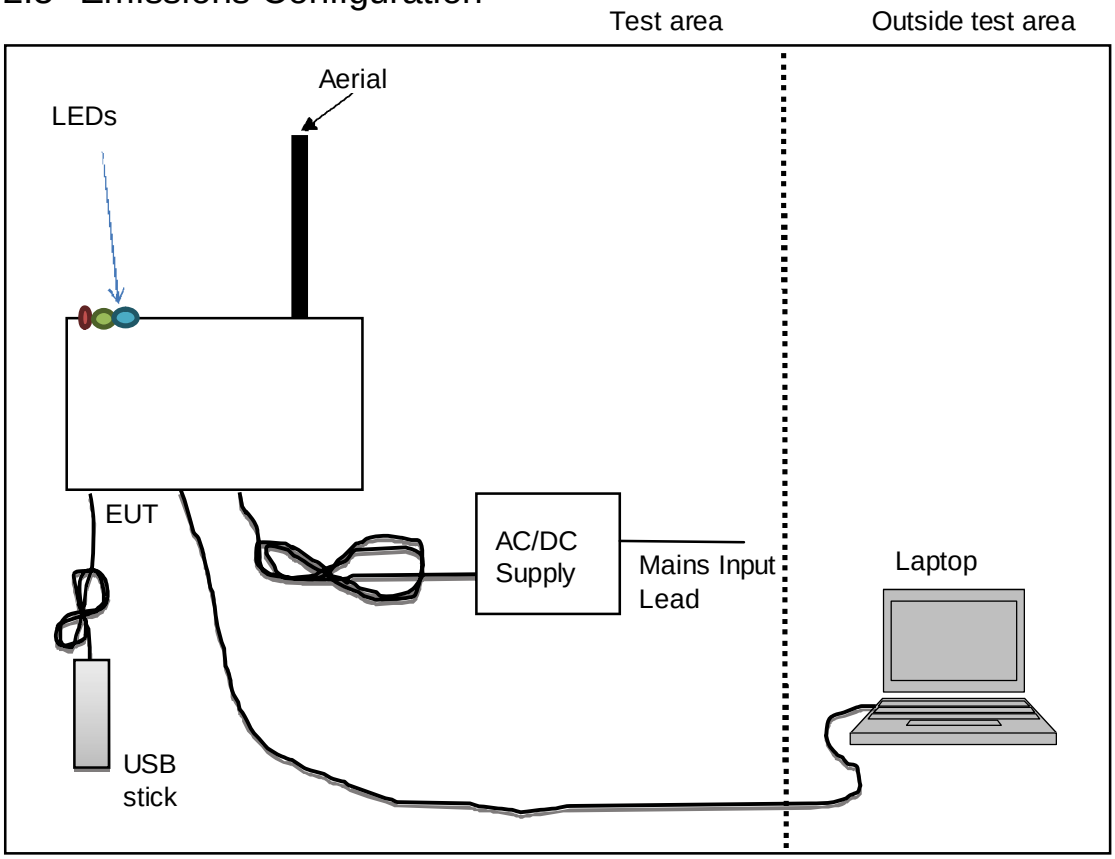
Mode Reference	Description	Used for testing
TX Low Channel	EUT constantly transmitting at 2.405MHz Modulated	Yes
TX Mid Channel	EUT constantly transmitting at 2.440MHz Modulated	Yes
TX High Channel	EUT constantly transmitting at 2.480MHz Modulated	Yes
Duty Variation	EUT duty cycle settable to 1%, 100%	Yes
Normal	EUT Transmitting and receiving data over an RF link	No

Description of ancillary equipment connected to the equipment under test, for the purpose of tests, can be found in Section 10.

Any modifications made to the EUT, whilst under test, can be found in Section 11.

This report was printed on: 09 September 2013

2.5 Emissions Configuration



The unit was powered from the dedicated AC/DC adapter supplied with the unit. For conducted tests the supplied antenna was removed and the test equipment connected to the antenna port via a suitable attenuator. The unit was configured with an engineering menu in software to allow permanent transmit and receive modes of device on the top, middle and bottom channels as stated within section 2.4 of this report. The transmit mode was 100% continuous with modulation and the power settings for each channel were Left on the default setting of 3. The manufacturer declared this setting to be worst case / maximum.

For radiated and conducted emissions tests the unit was populated with typical leads, a USB stick and a connection to a laptop via an Ethernet cable. The AC/DC adapter was also placed on to the test table along with the main enclosure of the EUT. The same unit was used for both Radiated and Conducted tests.

3 Summary of test results

The **IoT Gateway** was tested to the following standards: -

FCC 47CFR Part 15.247 (effective date October 1st, 2012);
Class DTS Intentional Radiator

Any compliance statements are made reliant on the modes of operation as instructed to us by the Manufacturer based on their specific knowledge of the application and functionality of the equipment tested. Whilst every effort is made to assure quality of testing, type tests are not exhaustive and although no non-conformances may be found, this doesn't exclude the possibility of equipment not meeting the intentions of the standard, particularly under different conditions to those during testing.

Title	Reference	Results
1. AC power line conducted emissions	FCC Part 15C §15.207	PASSED
2. Radiated emissions	FCC Part 15C §15.205, §15.209 and §15.247(d)	PASSED
3. Antenna power Conducted emissions	FCC Part 15.111	NOT APPLICABLE[1]
4. Occupied bandwidth	FCC Part 15C §15.215(c), §15.247(a)(2)	PASSED
5. Maximum Peak conducted output power	FCC Part 15C §15.247(b) Peak Average	PASSED NOT APPLICABLE[5]
6. Effective radiated power field strength	FCC Part 15C §15.247(b)	PASSED
7. Duty cycle	FCC Part 15C §15.35(c)	NOT APPLICABLE[3]
8. Power Spectral Density	FCC Part 15C §15.247(e)	PASSED
9. Band edge compliance	FCC Part 15C §15.205, §15.209 and §15.247	PASSED
10. FHSS parameters	FCC Part 15C §15.247(a)(1) Dwell time and Number of hopping channels Frequency separation	 NOT APPLICABLE[4] NOT APPLICABLE[4]
11. Frequency stability	ANSI C63.10 §6.8.	NOT APPLICABLE[2]

[1] EUT's radiated emissions were performed with the dedicated supplied antenna in place.
[2] No limits apply, however the requirement to contain the designated bandwidth of the emission within the specified frequency band includes the frequency stability of the transmitter over expected variations in temperature and supply voltage.
[3] No limits apply, however duty cycle was observed to be 100% in the constant Transmit modes
[4] EUT does not employ FHSS technology.
[5] Alternative method not required as peak power measured.

4 Specifications

4.1 Relevant Standards

The tests were performed by an RN Electronics Engineer who set up the tests, the test equipment, and operated it in accordance with the ***R.N. Electronics Ltd*** procedures manual and the basic standards listed below.

R.N. Electronics Ltd sites M and OATS are listed with the FCC. Registration Number 293246

Reference	Standard Number	Year	Description
4.1.1	FCC 47CFR15	2012	Electromagnetic compatibility and radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements
4.1.2	ANSI C63.10	2009	American National Standard for Testing Unlicensed Wireless Devices
4.1.3	ANSI C63.4	2003	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
4.1.4	KDB558074	2013	Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247

4.2 Deviations

ANSI C63-10-2009 deviations:
The reference standard ANSI C63.4-2003 was used, not the latest ANSI C63.4-2009

FCC Part 15 deviations:
None.

4.3 Tests at Extremes of Temperature & Voltage

Not Required.

4.4 Measurement Uncertainties

Parameter	Uncertainty
Transmitter Tests	
Conducted RF power	<± 1.0 dB
Occupied bandwidth	± 1.9 %
Radiated RF power	± 3.5 dB
Radiated spurious emissions	30MHz - 1000MHz ±5.1dB 1000MHz - 2000MHz ±4.5dB 1 – 18 GHz ±3.5dB 18 – 26.5 GHz ±3.9dB
AC power line conducted emissions	(For LISN) 150kHz to 30MHz ±3.6dB

5 Tests, Methods and Results

5.1 AC power line conducted emissions

5.1.1 Test Methods

Test Requirements FCC Part 15C, Reference (15.207)
Test Method: ANSI C63.10, Reference (6.2.)

5.1.2 Configuration of EUT

The EUT and its AC/DC adapter were placed on a wooden table 0.8m above the ground plane and connected to a LISN via a 1m mains cable.

Details of the Peripheral and Ancillary Equipment connected for this test is listed in section 11.

During the initial scan, no discernible difference was noted in emissions between channel modes (refer to section 2.4) therefore; the EUT was operated in mode TX Mid Channel for final test.

5.1.3 Test Procedure

Tests were made in accordance with FCC Part 15 using the measuring equipment noted in the 'Test Equipment' Section. Measurements were made on the live and neutral conductors using both average and quasi-peak detection.
At least 6 signals within 20dB and/or all signals within 10dB of the limit were investigated.

Tests were performed in Test Site F.

5.1.4 Test Equipment used

E150, E035, E410, E411, E412, E010, E186, E465

See Section 10 for more details.

5.1.5 Test results

Ambient conditions.
Temperature: 21 °C Relative humidity: 56 %

Analyser plots showing Peak values can be found in Section 6.1 of this report.

Table of signals measured.

Quasi-Peak and Average Live (AC_DC Input)

Signal No.	Freq (MHz)	Peak Amp (dBuV)	QP Amp (dBuV)	QP - Lim1 (dB)	AV Amp (dBuV)	AV - Lim1 (dB)
1	0.176	40.6	38.6	-26.1	31.0	-23.7
2	0.185	45.1	38.8	-25.5	31.9	-22.4
3	0.245	38.2	36.3	-25.6	27.2	-24.7
4	0.260	38.9	36.1	-25.3	23.0	-28.4
5	0.291	34.9	32.1	-28.4	19.9	-30.6
6	0.302	37.7	33.8	-26.4	23.5	-26.7
7	0.383	42.3	39.7	-18.5	28.2	-20.0

Signal No.	Freq (MHz)	Peak Amp (dBuV)	QP Amp (dBuV)	QP - Lim1 (dB)	AV Amp (dBuV)	AV - Lim1 (dB)
8	0.389	42.6	40.2	-17.9	25.4	-22.7
9	0.408	42.6	40.3	-17.4	25.3	-22.4
10	0.700	33.3	30.3	-25.7	18.8	-27.2
11	0.704	33.6	30.9	-25.1	20.1	-25.9
12	4.142	31.3	23.9	-32.1	13.6	-32.4
13	23.650	29.8	25.8	-34.2	18.6	-31.4
14	25.000	31.4	29.3	-30.7	24.9	-25.1

Table of signals measured.

Quasi-Peak and Average Neutral (AC_DC Input)

Signal No.	Freq (MHz)	Peak Amp (dBuV)	QP Amp (dBuV)	QP - Lim1 (dB)	AV Amp (dBuV)	AV - Lim1 (dB)
1	0.182	44.9	42.6	-21.8	36.1	-18.3
2	0.248	46.2	44.0	-17.8	33.2	-18.6
3	0.294	40.4	37.8	-22.6	27.2	-23.2
4	0.389	45.2	43.9	-14.2	28.8	-19.3
5	0.415	46.4	44.6	-12.9	33.1	-14.4
6	0.706	31.9	29.7	-26.3	19.8	-26.2
7	1.084	29.9	26.4	-29.6	15.6	-30.4
8	3.717	31.0	23.7	-32.3	14.7	-31.3
9	3.906	28.3	23.6	-32.4	14.3	-31.7
10	4.105	30.0	24.3	-31.7	14.9	-31.1
11	4.181	31.3	25.6	-30.4	15.9	-30.1
12	4.327	30.8	25.7	-30.3	15.8	-30.2

These results show that the **EUT** has **PASSED** this test.

5.2 Radiated emissions

5.2.1 Test Methods

Test Requirements: FCC Part 15C, Reference (15.209)
Test Method: ANSI C63.10, Reference (6.4 – 6.6.)

5.2.2 Configuration of EUT

The EUT was placed on a 0.8 metres high turntable. The front edge of the EUT was initially positioned facing the antenna. The EUT was measured at a distance of 3 metres. The EUT was rotated in all three orthogonal planes.

The EUT was operated in TX Low Channel, TX Mid Channel and TX High Channel mode.

5.2.3 Test Procedure

Tests were made in accordance with FCC Part 15 using the measuring equipment noted below.

30MHz - 1GHz, measurements were made on a site listed with the FCC. The equipment was rotated 360° and the antenna scanned 1 – 4 metres in both horizontal and vertical polarisations to record the worst case emissions.

Above 1GHz, measurements were made in a semi-anechoic chamber with appropriate absorbing material for use in this range. Horn antennas were used at heights where the whole of the EUT was contained within the main beam. The EUT was rotated through 360° to record the worst case emissions.

At least 6 signals within 20dB and all signals within 10dB of the limit were investigated.

Radiated emissions tests were performed using Test Site M**.**

5.2.4 Test Equipment used

E268, E410, E411, E412, E429**,** TMS78, TMS79, TMS82, TMS933, N240.

See Section 10 for more details

5.2.5 Test results

Ambient conditions Temperature: 20-25 °C Relative humidity: 48-58 %

Analyser plots showing Peak values can be found in Section 6.2 of this report.

Note: EUT tested in a continuous transmit mode for ease of test.

No discernible difference was noted in emissions between channel settings in the test range 30-1000MHz (exploratory measurements); therefore final measurements are presented for **TX mid channel** mode only for this test range.

5.2.5.1 Below 30MHz.

Not applicable, Lowest clock stated 32MHz.

5.2.5.2 30MHz - 1GHz.

Plot references for Radiated emissions measurements (30-1000MHz)

Frequency Range	Antenna Polarisation	Plot reference
30 – 300 MHz	Horizontal	6964-5 Rad 1 VHF Horiz
30 – 300 MHz	Vertical	6964-5 Rad 1 VHF Vert
300 – 1000 MHz	Horizontal	6964-5 Rad 1 UHF Horiz
300 – 1000 MHz	Vertical	6964-5 Rad 1 UHF Vert

Table of signals measured (TX Mid Channel)

Horizontal

Signal No.	Freq (MHz)	Peak Amp (dBuV)	QP Amp (dBuV)	QP - Lim1 (dB)
1	288.017	40.0	39.2	-6.8
2	349.997	33.8	31.8	-14.2
3	374.995	36.8	35.4	-10.6
4	399.997	42.1	41.1	-4.9
5	424.994	33.1	30.5	-15.5
6	480.028	39.9	38.5	-7.5

Vertical

Signal No.	Freq (MHz)	Peak Amp (dBuV)	QP Amp (dBuV)	QP - Lim1 (dB)
1	33.164	35.2	30.1	-9.9
2	33.170	35.4	30.2	-9.8
3	43.803	34.8	33.1	-6.9
4	51.029	34.0	28.8	-11.2
5	51.787	35.1	31.2	-8.8
6	53.903	35.0	29.4	-10.6
7	288.017	33.1	31.4	-14.6
8	399.997	38.8	37.1	-8.9
9	480.028	36.4	34.4	-11.6

5.2.5.3 Above 1GHz.

Note: Whilst Low, Mid and High channels were tested, plots are for illustrative purposes only and only **Mid channel** plots are shown in this report.

Plot references for Radiated emissions measurements (above 1GHz)

Frequency Range	Antenna Polarisation	Plot reference
1-2GHz	Vertical	6964-5 1-2 GHz vert Mid channel TX
1-2GHz	Horizontal	6964-5 1-2 GHz Horiz Mid channel TX
2-3GHz	Vertical	6964-5 2-3 GHz Vert Mid channel TX
2-3GHz	Horizontal	6964-5 2-3 GHz Horiz Mid channel TX
3-4GHz	Vertical	6964-5 3-4 GHz Vert Mid channel TX
3-4GHz	Horizontal	6964-5 3-4 GHz Horiz Mid channel TX
4-6GHz	Vertical	6964-5 4-6 GHz Vert Mid channel TX
4-6GHz	Horizontal	6964-5 4-6 GHz Horiz Mid channel TX
6-7.8GHz	Vertical	6964-5 6-7.8 GHz Vert Mid channel TX
6-7.8GHz	Horizontal	6964-5 6-7.8 GHz Horiz Mid channel TX
7.8-10GHz	Vertical	6964-5 7.8-10 GHz Vert Mid channel TX
7.8-10GHz	Horizontal	6964-5 7.8-10 GHz Horiz Mid channel TX
10-12.5GHz	Vertical	6964-5 10-12.5 GHz Vert Mid channel TX
10-12.5GHz	Horizontal	6964-5 10-12.5 GHz Horiz Mid channel TX

Frequency Range	Antenna Polarisation	Plot reference
12-15GHz	Vertical	6964-5 12-15 GHz Vert Mid channel TX
12-15GHz	Horizontal	6964-5 12-15 GHz Horiz Mid channel TX
15-18GHz	Vertical	6964-5 15-18 GHz Vert Mid channel TX
15-18GHz	Horizontal	6964-5 15-18 GHz Horiz Mid channel TX
18-20GHz	Vertical	6964-5 18-20 GHz Vert Mid channel TX
18-20GHz	Horizontal	6964-5 18-20 GHz Horiz Mid channel TX
20-22.5GHz	Vertical	6964-5 20-22.5 GHz Vert Mid channel TX
20-22.5GHz	Horizontal	6964-5 20-22.5 GHz Horiz Mid channel TX
22.5-25GHz	Vertical	6964-5 22.5-25 GHz Vert Mid channel TX
22.5-25GHz	Horizontal	6964-5 22.5-25 GHz Horiz Mid channel TX

Radio Parameters 1

Band	2400-2483.5 MHz
Power level	2 dBm
Channel spacing	5 MHz
Mod scheme	250 KBPS OQPSK
Bottom channel	2405 MHz

Results relating to Radio Parameters 1

Spurious Frequency (MHz)	Measured Peak Level (dBµV/m)	Difference to Peak Limit (dB)	Measured Average Level (dBµV/m)	Difference to Average Limit (dB)	Antenna Polarisation	EUT Polarisation
2372.93	45.3	-28.7	39.6	-14.4	Vertical	normal use (flat)
2436.36	45.9	-28.1	37.3	-16.7	Vertical	normal use (flat)
4810	55.4	-18.6	47.6	-6.4	Vertical	normal use (flat)
7215	50.2	-23.8	40.9	-13.1	Vertical	normal use (flat)
7215	47.6	-26.4	37.6	-16.4	Horizontal	normal use (flat)

Radio Parameters 2

Band	2400-2483.5 MHz
Power level	2 dBm
Channel spacing	5 MHz
Mod scheme	250 KBPS OQPSK
Middle channel	2440 MHz

Results relating to Radio Parameters 2

Spurious Frequency (MHz)	Measured Peak Level (dBµV/m)	Difference to Peak Limit (dB)	Measured Average Level (dBµV/m)	Difference to Average Limit (dB)	Antenna Polarisation	EUT Polarisation
2407.927	45.5	-28.5	39.9	-14.1	Vertical	normal use (flat)
2471.64	44.8	-29.2	37.5	-16.5	Vertical	normal use (flat)
4880	56.4	-17.6	48.8	-5.2	Vertical	normal use (flat)
7320	48.7	-25.3	38.8	-15.2	Vertical	normal use (flat)

Radio Parameters 3

Band	2400-2483.5 MHz
Power level	2 dBm
Channel spacing	5 MHz
Mod scheme	250 KBPS OQPSK
Top channel	2480 MHz

Results relating to Radio Parameters 3

Spurious Frequency (MHz)	Measured Peak Level (dBµV/m)	Difference to Peak Limit (dB)	Measured Average Level (dBµV/m)	Difference to Average Limit (dB)	Antenna Polarisation	EUT Polarisation
2447.495	46.9	-27.1	39.1	-14.9	Vertical	normal use (flat)
2511.712	45.8	-28.2	39.7	-14.3	Vertical	normal use (flat)
4960	56.3	-17.7	48.7	-5.3	Vertical	normal use (flat)
7440	47.4	-26.6	36.7	-17.3	Vertical	normal use (flat)

LIMITS:
15.209 limits are applicable in the restricted bands of 15.205 with the relevant detector.
15.247(d) other emissions, outside the intentional band, must be attenuated by at least 20dB from the level of the fundamental / meet the general limits of 15.209.

n.b. the general limits of 15.209 are as drawn on the respective plots.

These show that the **EUT** has **PASSED** this test.

5.3 Antenna power conducted emissions

NOT APPLICABLE: Radiated emissions tests performed with the supplied antenna in place.

5.4 Occupied bandwidth

5.4.1 Test Methods

Test Requirements**:** FCC Part 15C, Reference (15.215)
Test Method: ANSI C63.10, Reference (6.9)

5.4.2 Configuration of EUT

The EUT was tested on a bench. The EUT was tested whilst connected to the AC power. The EUT was configured for maximised emissions. The EUT was operated in TX Low Channel, TX Mid Channel and TX High Channel modes.

5.4.3 Test Procedure

Tests were performed using Test Site A.
Tests were made in accordance with FCC Part 15 using the measuring equipment noted below. A 100kHz RBW, 3x VBW, auto sweep time and max hold settings were used for the 6dB bandwidth.

5.4.4 Test Equipment used

E252, E533, E534, E535

See Section 10 for more details.

5.4.5 Test results

Ambient conditions.
Temperature: 23 °C Relative humidity: 50 % Pressure: 101 mbar

Analyser plots for the 6dB bandwidth can be found in Section 6.4 of this report.

Radio Parameter 1

Band	2400-2483.5 MHz
Power level	2 dBm
Channel spacing	5 MHz
Mod scheme	250 KBPS OQPSK
Low channel	2405 MHz
Mid channel	2440 MHz
Top channel	2480 MHz

Results relating to Radio Parameters 1

	Low	Mid	High
6dB BW (MHz)	1.45	1.54	1.58
Plot reference	J6964-5 Low Channel DTS Bandwidth (6dB)	J6964-5 Mid Channel DTS Bandwidth (6dB)	J6964-5 High Channel DTS Bandwidth (6dB)

LIMITS:

15.247(a)(2) The minimum 6dB bandwidth shall be at least 500kHz.

These results show that the EUT has **PASSED** this test.

5.5 Maximum peak conducted output power

5.5.1 Test Methods

Test Requirements FCC Part 15C, Reference (15.247)
Test Method: ANSI C63.10, Reference (6.10.2.1 a))

5.5.2 Configuration of EUT

The EUT was measured on a bench using a spectrum analyser connected to the external RF port.

The EUT was operated in TX Low Channel, TX Mid Channel and TX High Channel modes for this test.

The EUT was set to each mode and test signal in turn (see section 2.4) and highest power levels recorded.

5.5.3 Test Procedure

Tests were made in accordance with FCC Part 15 using the measuring equipment noted below.
Peak stated reading is maximum power observed using a spectrum analyser RBW > 6dB BW of the EUT.

Measurements were made on a test bench in site A.

5.5.4 Test Equipment used

E533, E534, E535, E252

See Section 10 for more details

5.5.5 Test results

Ambient conditions.
Temperature: 23 °C Relative humidity: 34 % Pressure: 101 mbar

Radio Parameters 1

Band	2400-2483.5 MHz
Power level	2 dBm
Channel spacing	5 MHz
Mod scheme	250 KBPS OQPSK
Low channel	2405 MHz
Mid channel	2440 MHz
Top channel	2480 MHz

Results relating to Radio Parameters 1

Test conditions		**Carrier Power (mW)**		
		Low	**Mid**	**High**
Temp Ambient	**Volts Nominal**	1.41	1.31	1.15
Maximum TX Power observed (mW)		1.41		

LIMITS:
15.247(b)(3)
For systems using digital modulation in the 902-928, 2400-2483.5 or 5725-5850 MHz bands 1 Watt.

These results show that the EUT has **PASSED** this test.

5.6 Effective radiated power field strength

5.6.1 Test Methods

Test Requirements FCC Part 15C, Reference (15.247)
Test Method: ANSI C63.10 Reference (6.3.1))

5.6.2 Configuration of EUT

The EUT and AC/DC adapter were placed on a 0.8 metres high turntable. The front edge of the EUT was initially positioned facing the antenna. The EUT was rotated in all three orthogonal planes to maximise emissions. Final measurements were taken at 3m. The EUT was operated in TX Low Channel, TX Mid Channel and TX High Channel modes for this test.

5.6.3 Test Procedure

Tests were made in accordance with the Test Method noted above using the measuring equipment noted in the 'Test Equipment used' section at Site M. The power stated is Peak field strength.

5.6.4 Test Equipment used

E268, E410, E411, E412, TMS82

See Section 9 for more details

5.6.5 Test results

Ambient conditions.
Temperature: 23°C Relative humidity: 48 % Pressure: 101 mbar

Radio Parameters 1

Band	2400-2483.5 MHz
Power level	2 dBm
Channel spacing	5 MHz
Mod scheme	250KBPS OQPSK
Low channel	2405 MHz
Mid channel	2440 MHz
Top channel	2480 MHz

Results relating to Radio Parameters 1

	Low	Mid	High
Peak Level (dBµV/m)	97.8	97.5	98.1
Conversion to mW	1.81	1.69	1.94
Plot reference	J6964-5 ERP Vertical Low channel 3MHz RBW	J6964-5 ERP Vertical Mid channel 3MHz RBW	J6964-5 ERP Vertical High channel 3MHz RBW
Antenna Polarisation	Vertical	Vertical	Vertical
EUT Polarisation	Flat with antenna upright vertical	Flat with antenna upright vertical	Flat with antenna upright vertical

LIMITS:
The maximum output power in all cases is 30dBm/ 1watt.

These results show that the EUT has **PASSED** this test.

5.7 Duty cycle

NOT APPLICABLE: No requirement to test, however, test mode of 100% TX confirmed and 1% duty plotted for reference.

5.7.1 Test Methods

Test Requirements: FCC Part 15C, Reference (15.35)
Test Method: ANSI C63.10, Reference (7.5)

5.7.2 Configuration of EUT

The EUT was configured for maximum output power and measured at the antenna port. The EUT was operated in **TX Mid channel and 1% duty cycle** modes.

5.7.3 Test Procedure

Tests were made in accordance with FCC part 15 using the measuring equipment noted below. The centre frequency of the analyser was set to that of the transmitter, and the span set to zero. The sweep time was adjusted so that either the pulse width or the periodic operation could be observed

5.7.4 Test Equipment used

E410, E411, E412

5.7.5 Test results

State	Result (ms)	Plot reference
TX on 100ms period (transmit low mode)	100	N/A
TX on 10ms period (transmit 1% duty cycle mode)	0.089	J6964-5 TX duty 1% setting TX on
Repetition rate (transmit 1% duty cycle mode)	8.14	J6964-5 TX duty 1% setting period

Duty cycle measured in **Tx Mid Channel** mode is 100%.
Duty cycle measured in **Transmit 1% duty cycle** mode is 12.28*0.089 = 1.093%

LIMITS: Not applicable

Measurements were only taken to demonstrate the validity of the constantly on and 1% duty cycle modes.

See section 6.6 for any analyser plots

5.8 Maximum power spectral density

5.8.1 Test Methods

Test Requirements**:** FCC Part 15C, Reference (15.247)
Test Method: KDB558074, PSD Option 1

5.8.2 Configuration of EUT

The EUT was configured as for the peak conducted power test. The EUT was operated in TX Low Channel, TX Mid Channel and TX High Channel modes for this test.

5.8.3 Test Procedure

Tests were performed using Test Site A**.**
Tests were made in accordance with FCC Part 15 using the measuring equipment noted below. The emission from the EUT was maximised before taking any plots. PEP was recorded in the required span and bandwidth. Measurements & plots were taken with the span set to 1.5 times the measured DTS bandwidth for each modulation scheme setting.

5.8.4 Test Equipment used

E252, E533, E534, E535

See Section 10 for more details.

5.8.5 Test results

Ambient conditions.
Temperature: 21°C Relative humidity: 37% Pressure: 101mbar

Radio Parameter 1

Band	2400-2483.5 MHz
Power level	2 dBm
Channel spacing	5 MHz
Mod scheme	250 KBPS OQPSK
Low channel	2405 MHz
Mid channel	2440 MHz
Top channel	2480 MHz

Results relating to Radio Parameters 1

	Low	Mid	High
Antenna Gain (dB)	1.80	1.1	2.26
Duty Cycle (%)	100	100	100
dBm per 3kHz	-10.300	-10.500	-11.300
Plot reference	J6964-5 PK PSD Low channel	J6964-5 PK PSD Mid channel	J6964-5 PK PSD High channel

LIMITS:
15.247(e) +8dBm/3kHz.

Any Analyser plots can be found in Section 6.7 of this report.

These results show that the EUT has **PASSED** this test.

5.9 Band edge compliance

5.9.1 Test Methods

Test Requirements: FCC Part 15C, Reference (15.215 and 15.247)
Test Method: ANSI C63.10-2009, Reference clause 6.9.3

5.9.2 Configuration of EUT

The EUT and AC/DC adapter were placed on a 0.8 metres high turntable. The front edge of the EUT was initially positioned facing the antenna. The EUT was measured at a distance of 3 metres.

The EUT was operated in TX Low Channel and TX High Channel modes.

5.9.3 Test Procedure

Tests were made in accordance with FCC Part 15 using the measuring equipment noted below. The emission from the EUT was maximised before taking the plots..

Tests were performed using Test Site **M**.

5.9.4 Test Equipment used

E268, E410, E411, E412, TMS82

See Section 10 for more details.

5.9.5 Test results

Ambient conditions.
Temperature: 23 °C Relative humidity: 48 % Pressure: 101 mbar

Analyser plots for the Band Edge Compliance can be found in Section 6.6 of this report. These show the 20dBc requirement of 15.247(d) are met at the band edges of 2400 and 2483.5 MHz. Restricted band edge plots are also shown in section 6.6.

The following tables list the field strengths observed in the adjacent restricted bands, which are required to meet the tighter 15.209 limits:

Radio Parameter 1

Band	2400-2483.5 MHz
Power level	2 dBm
Channel spacing	5 MHz
Mod scheme	250 KBPS OQPSK
Low channel	2405 MHz
Top channel	2480 MHz

Restricted Band Edge Results relating to Radio Parameters 1

	Low	High
Peak Level (dBµV/m)	42.5	65.6
Peak Plot reference	J6964-5 Res Band edge PK Vertical Low channel 1MHz RBW	J6964-5 Res Band edge PK Vertical High channel 1MHz RBW
Average Level (dBµV/m)	36.4	53.8
Average Plot reference	J6964-5 Res Band edge AV Vertical Low channel 1MHz RBW, 10Hz VBW	J6964-5 Res Band edge AV Vertical High channel 1MHz RBW, 10Hz VBW

Band Edge Results relating to Radio Parameters 1

	Low	High
Plot reference	J6964-5 Band edge PK Vertical Low channel 100kHz RBW, 3x VBW	J6964-5 Band edge PK Vertical high channel 100kHz RBW, 3x VBW

The band edge readings were performed with a peak detector (max held plot) and with the EUT set in a constant 100% transmit state.

Limits: AV = 54dBuV/m at band edges
PK = 74dBuV/m at band edges

The restricted band edges closest to the EUT frequency of 2400-2483.5MHz are 2390 & 2483.5MHz.

Further wider span plots have been taken to show the fact that there are no spurious emissions above the restricted limits of 15.209.

These results show that the **EUT** has **PASSED** this test.

5.10 FHSS parameters

5.10.1 Carrier frequency separation

NOT APPLICABLE: EUT does not employ FHSS technology

5.10.2 Number of hopping frequencies and Chanel Occupancy (Dwell time)

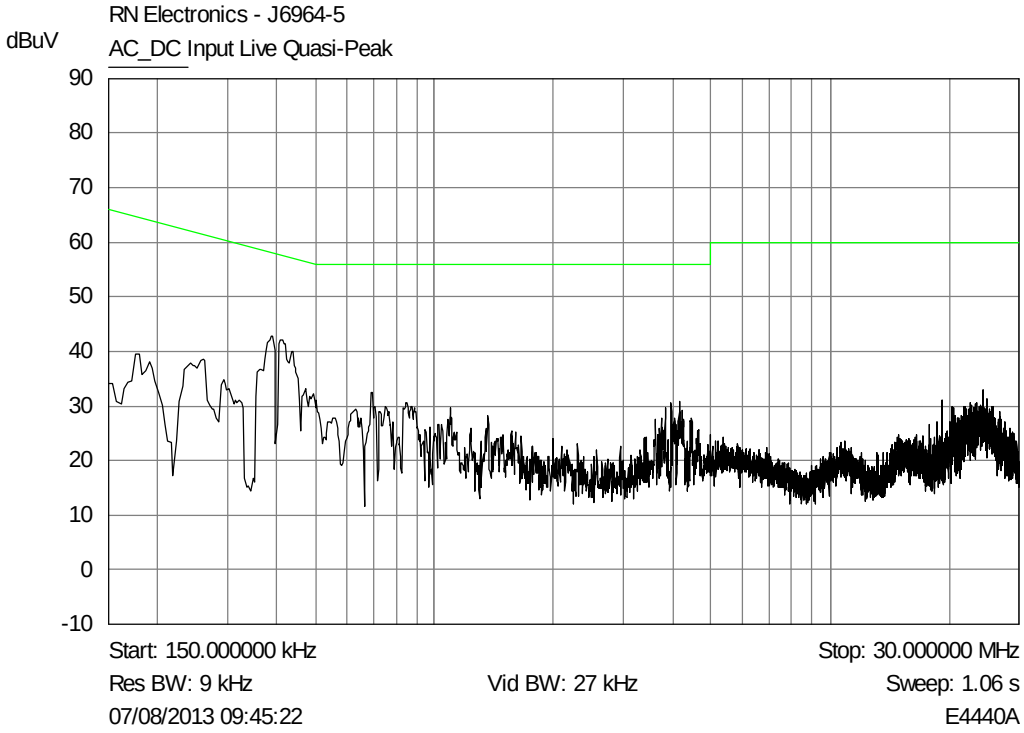
NOT APPLICABLE: EUT does not employ FHSS technology

5.11 Frequency stability

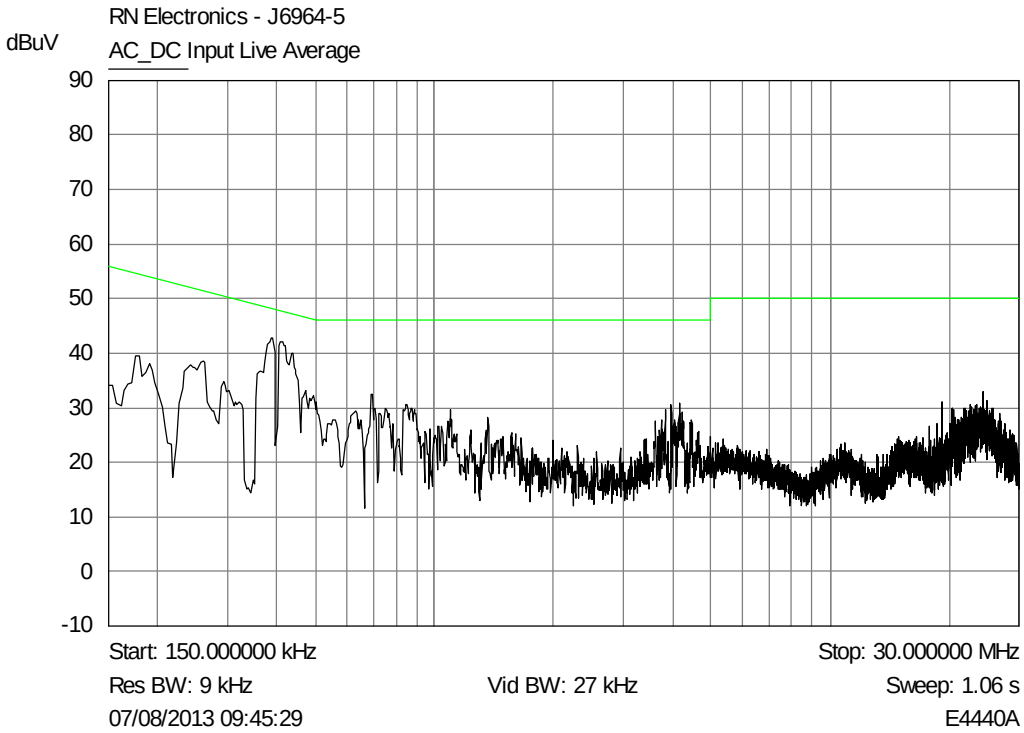
NOT APPLICABLE: No limits apply, however the requirement to contain the designated bandwidth of the emission within the specified frequency band includes the frequency stability of the transmitter over expected variations in temperature and supply voltage.

6 Plots and Results

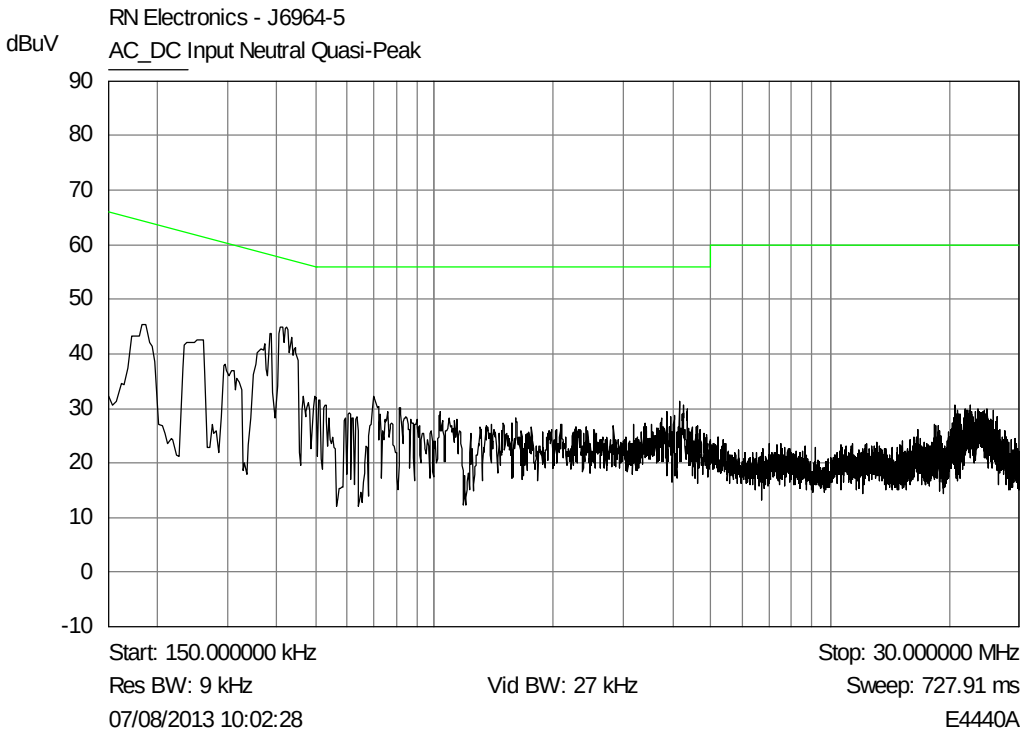
6.1 AC power line conducted emissions plots



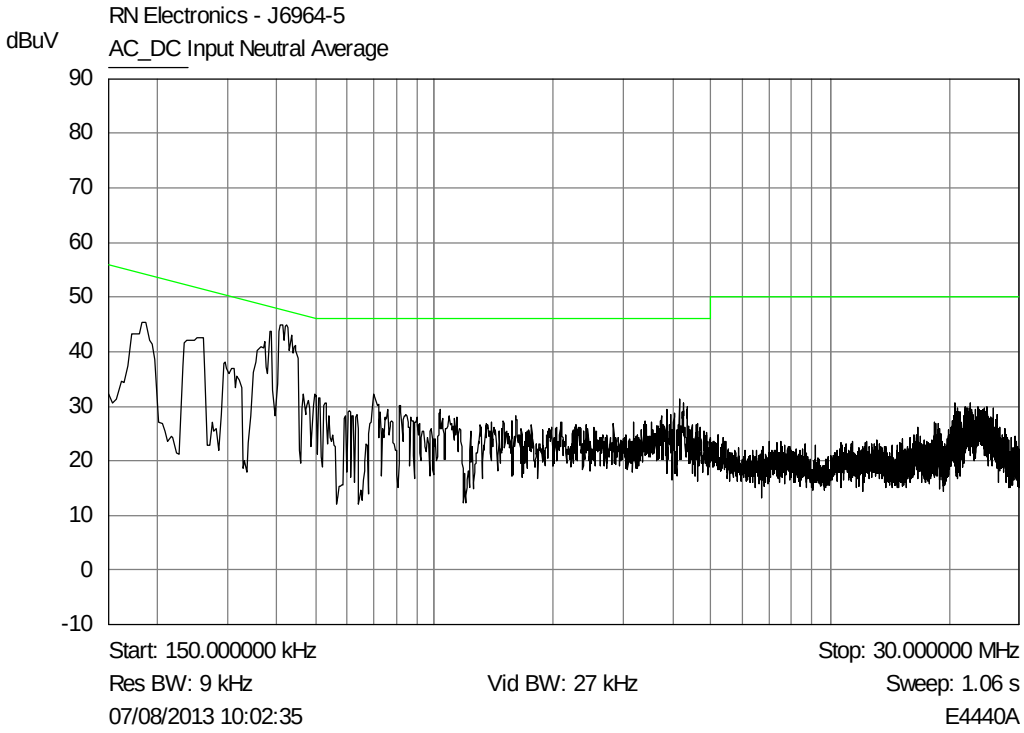
Plot of peak emissions 150kHz - 30MHz on the AC_DC Input live terminal against the quasi-peak limit line.



Plot of peak emissions 150kHz - 30MHz on the AC_DC Input live terminal against the average limit line.



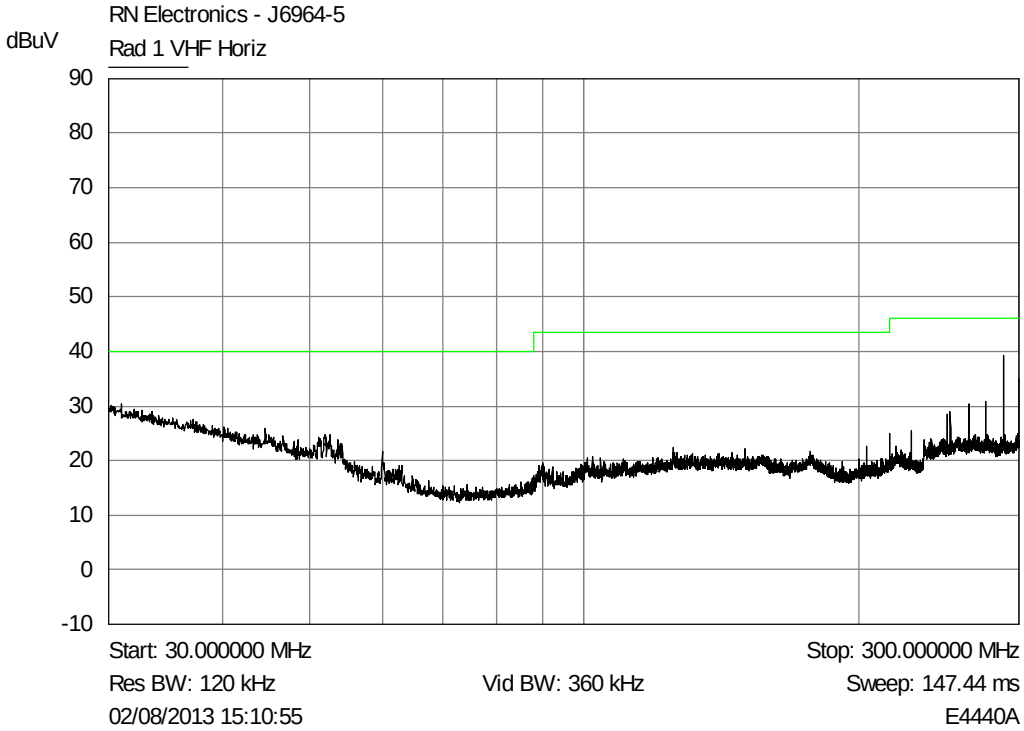
Plot of peak emissions 150kHz - 30MHz on the AC_DC Input neutral terminal against the quasi-peak limit line.



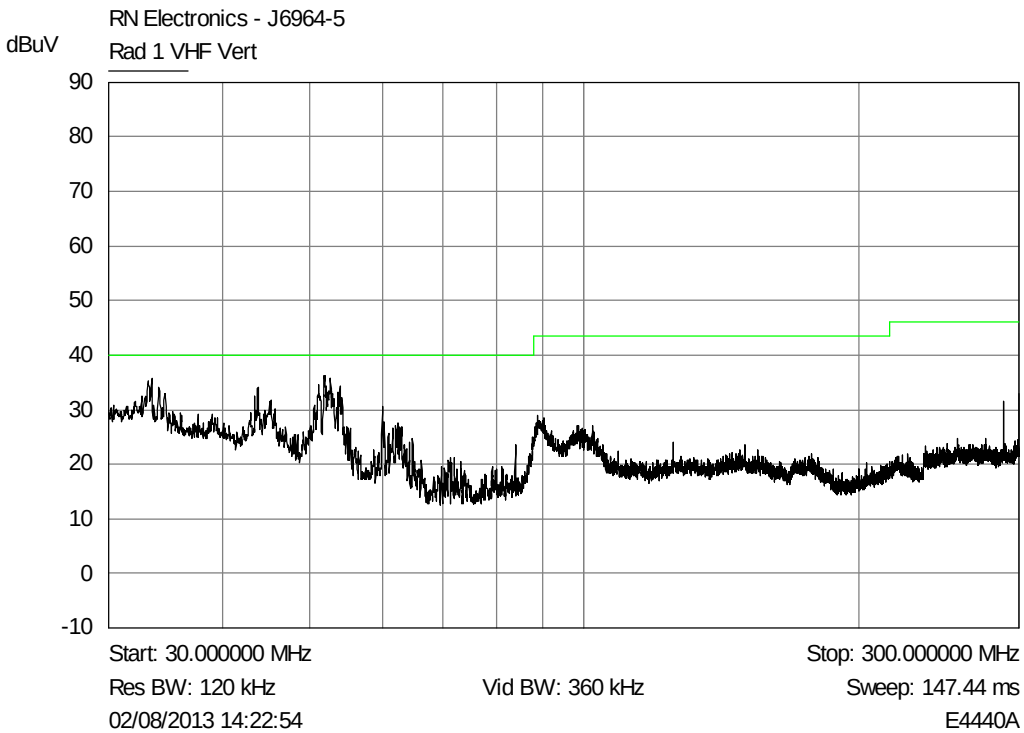
Plot of peak emissions 150kHz - 30MHz on the AC_DC Input neutral terminal against the average limit line.

6.2 Radiated emissions plots

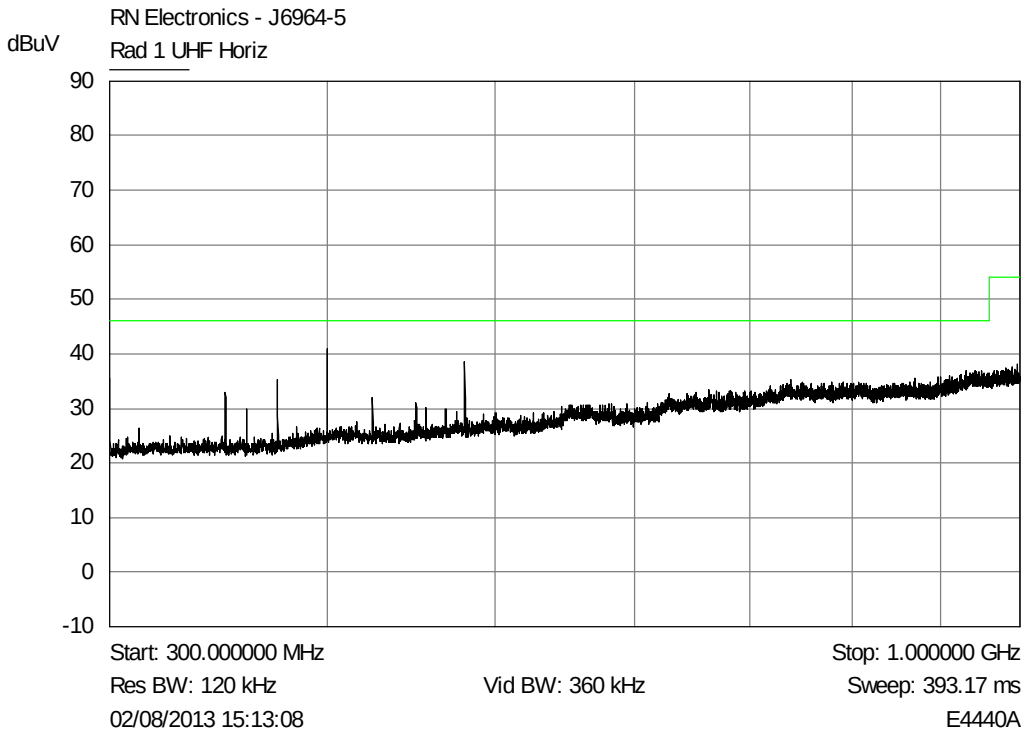
6.2.1 Radiated emissions - 30MHz - 1GHz



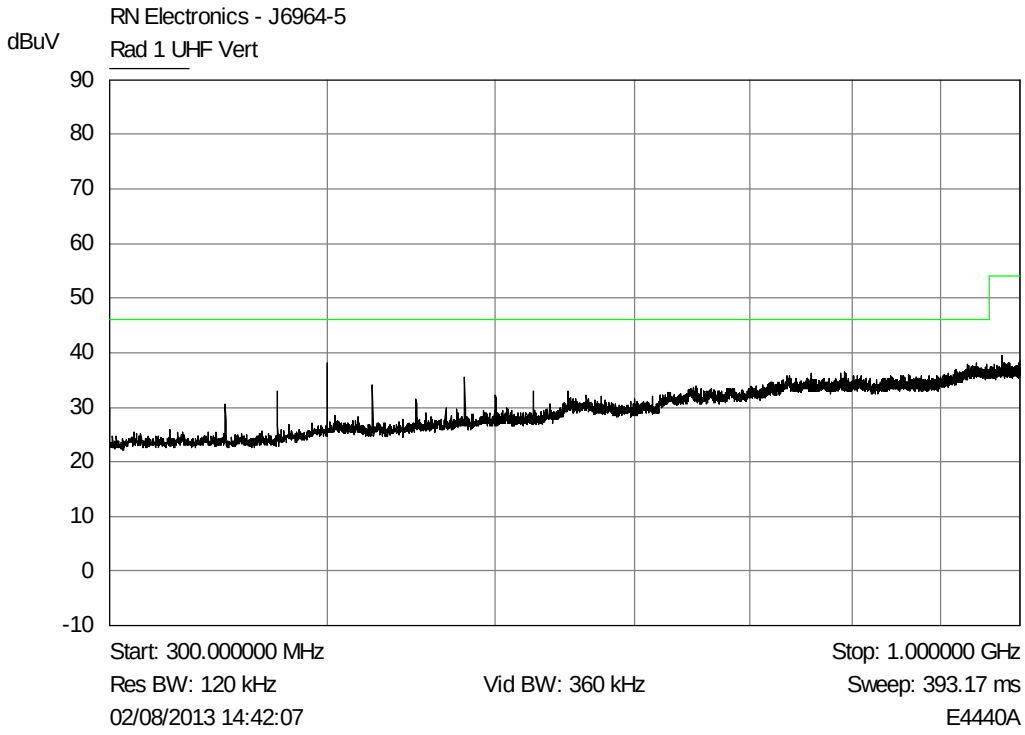
TX Mid Channel: Plot of peak horizontal emissions 30MHz - 300MHz against the quasi-peak limit line.



TX Mid Channel: Plot of peak vertical emissions 30MHz - 300MHz against the quasi-peak limit line.

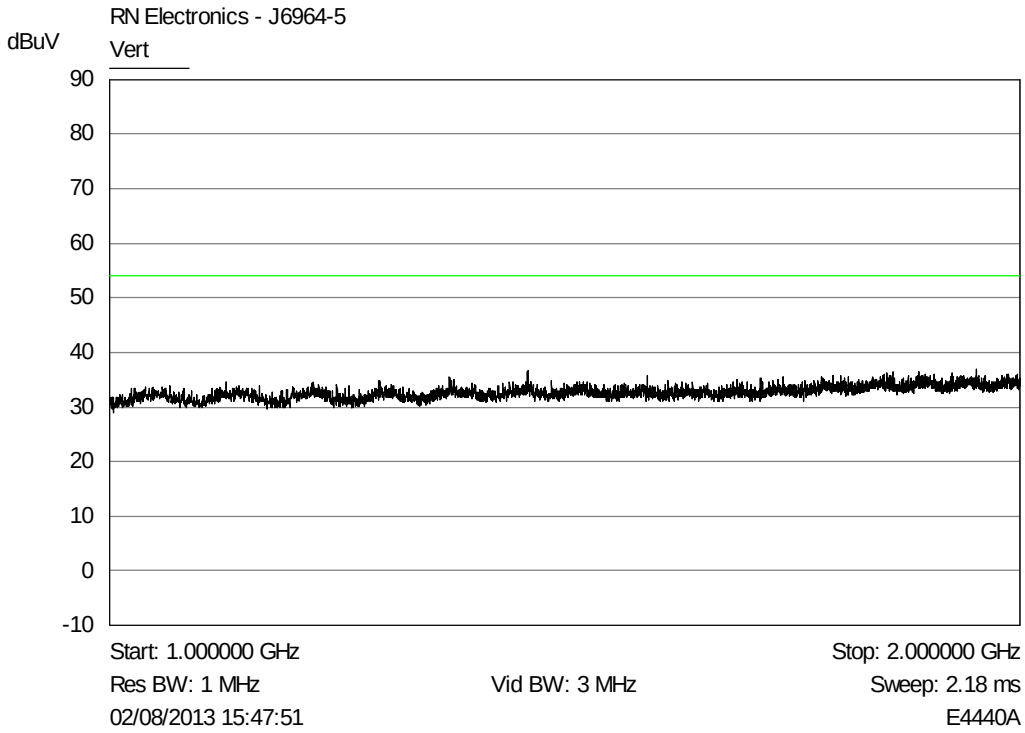


TX Mid Channel: Plot of peak horizontal emissions 300MHz - 1GHz against the quasi-peak limit line.

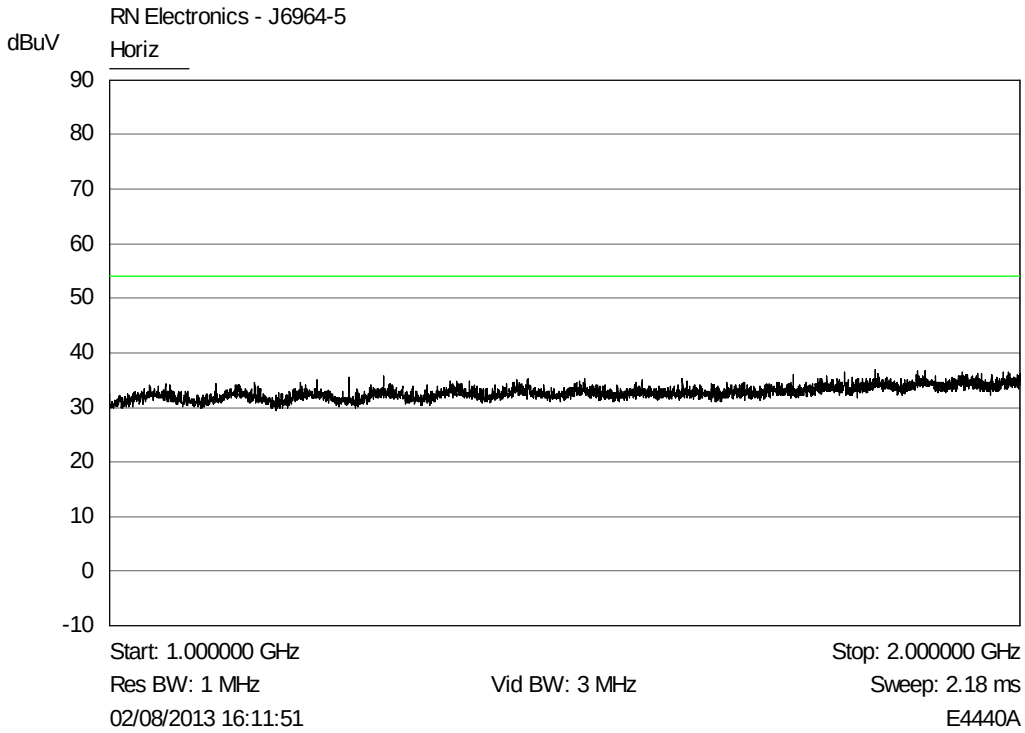


TX Mid Channel: Plot of peak vertical emissions 300MHz - 1GHz against the quasi-peak limit line.

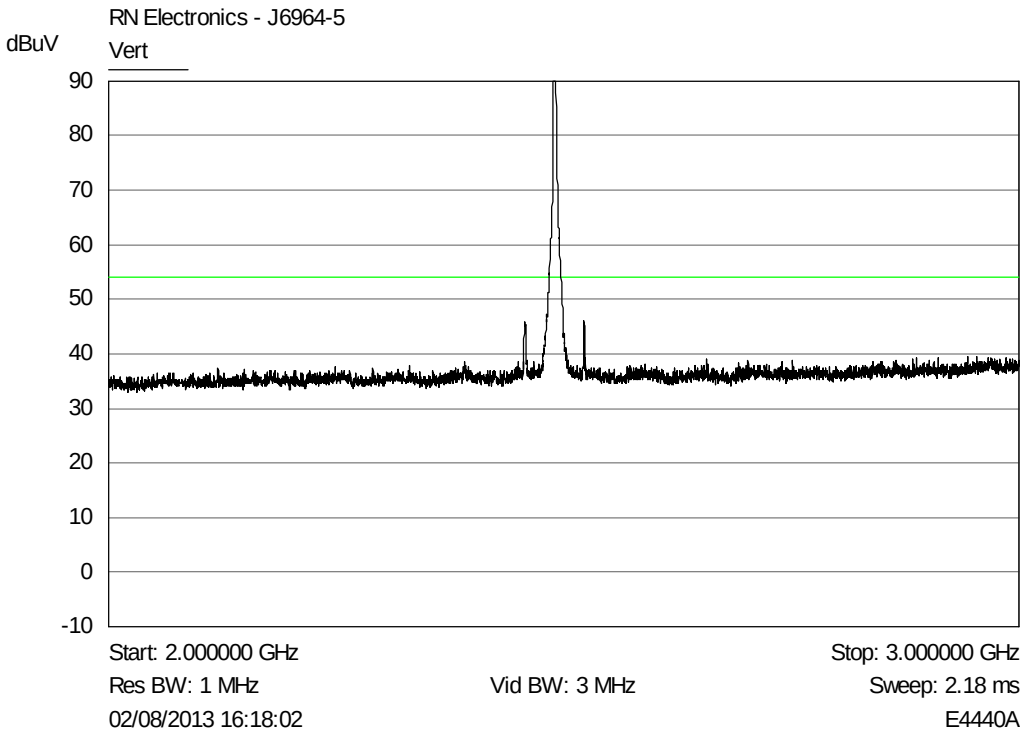
6.2.2 Radiated emissions Plots above 1GHz



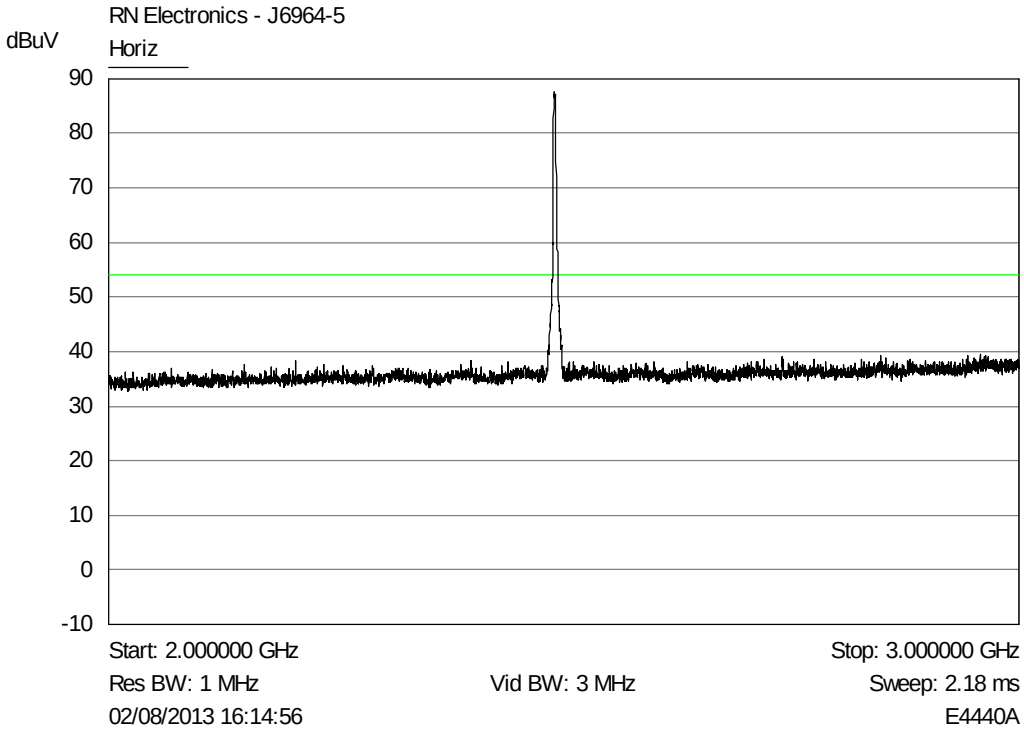
Middle channel (2440 MHz) - 1-2GHz - Vertical



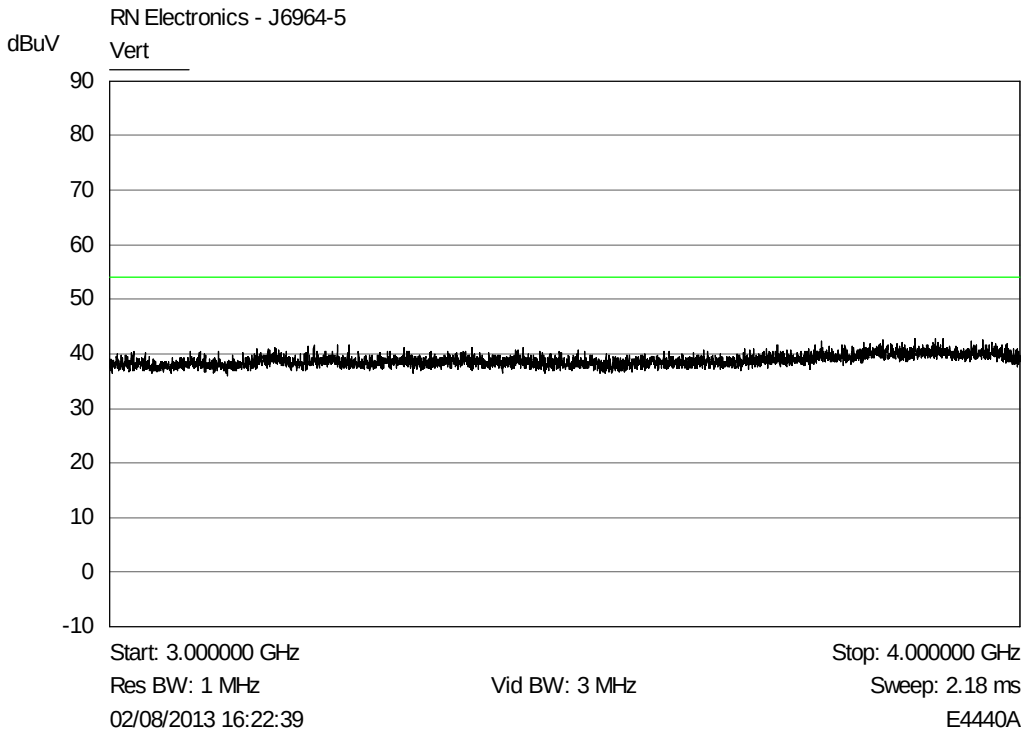
Middle channel (2440 MHz) - 1-2GHz - Horizontal



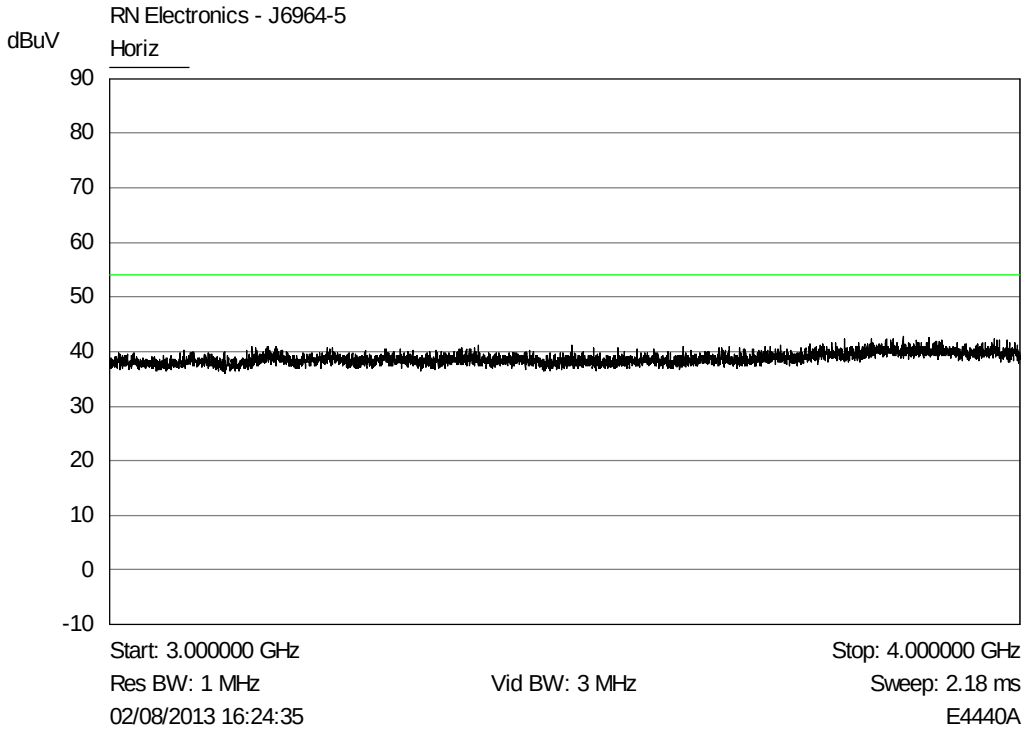
Middle channel (2440 MHz) - 2-3GHz - Vertical



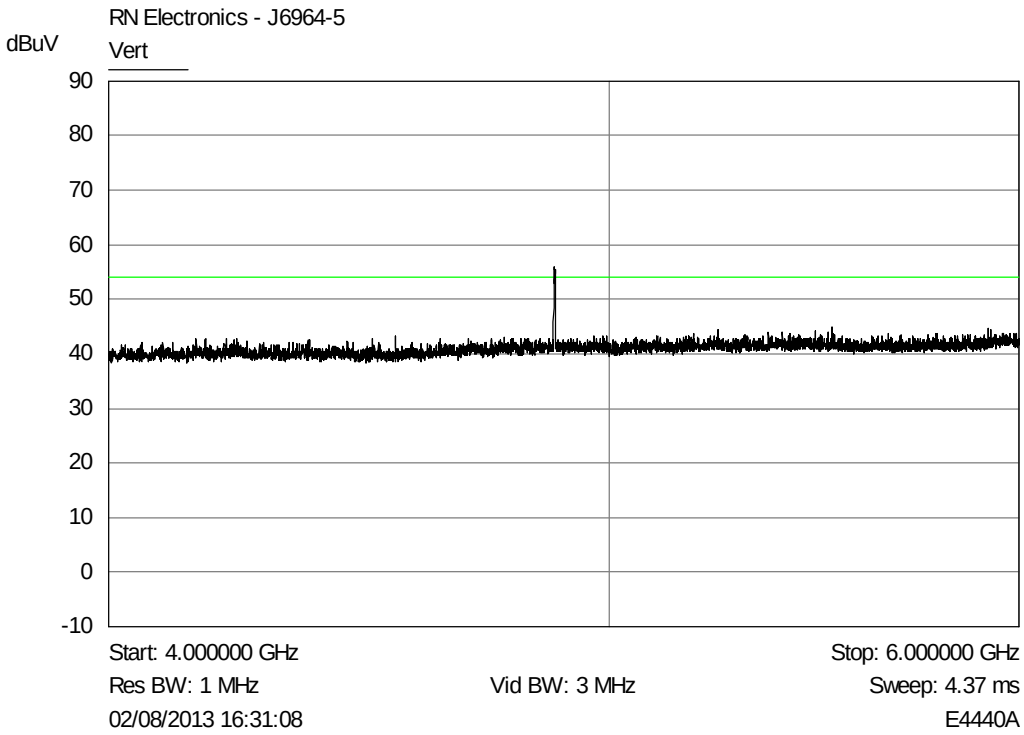
Middle channel (2440 MHz) - 2-3GHz - Horizontal



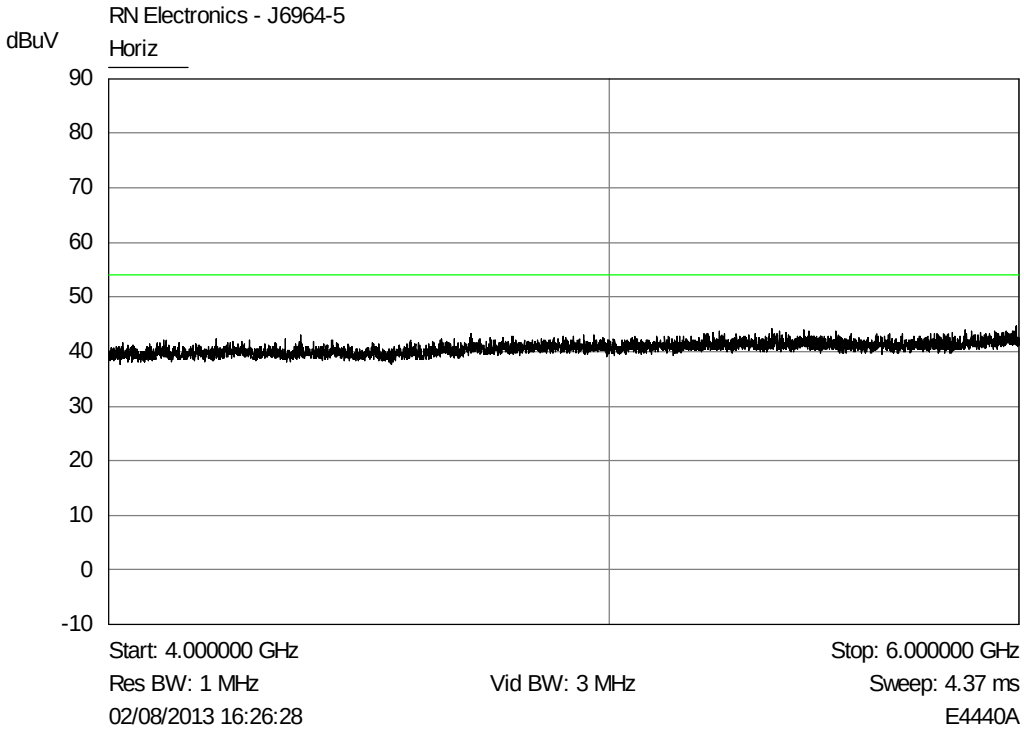
Middle channel (2440 MHz) - 3-4GHz - Vertical



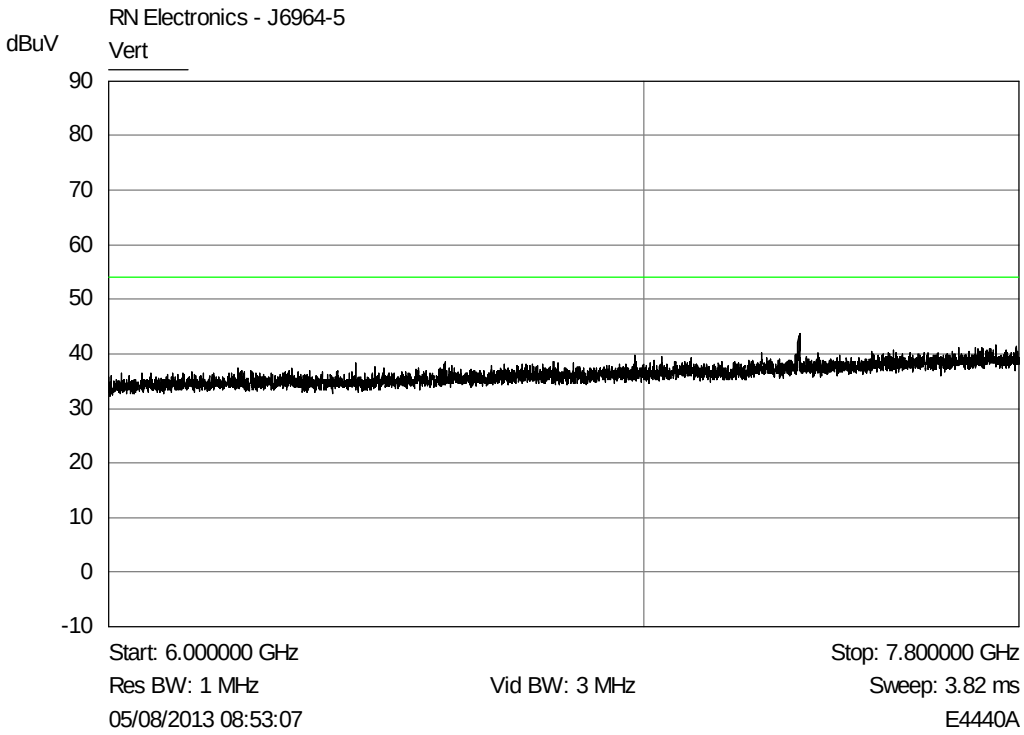
Middle channel (2440 MHz) - 3-4GHz - Horizontal



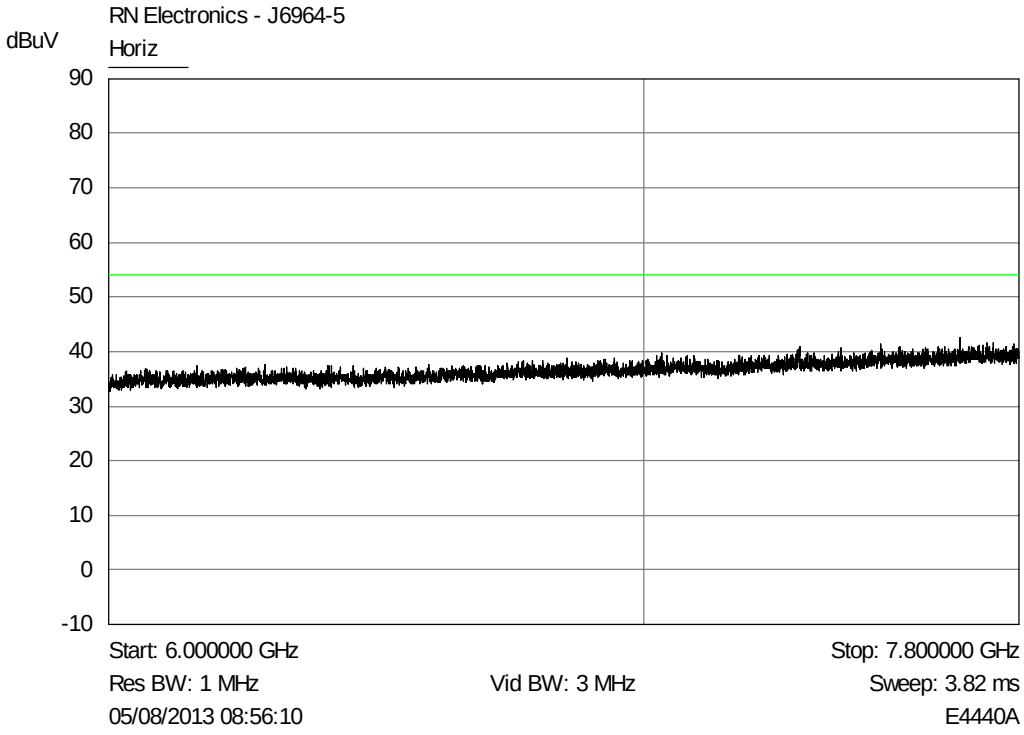
Middle channel (2440 MHz) - 4-6GHz - Vertical



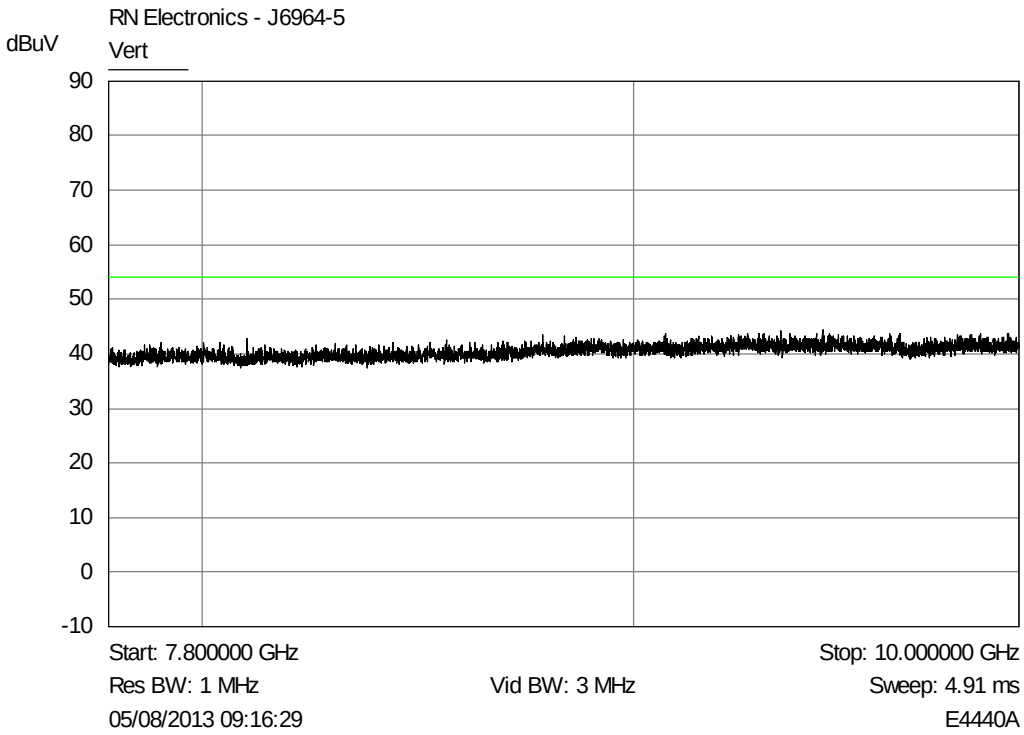
Middle channel (2440 MHz) - 4-6GHz - Horizontal



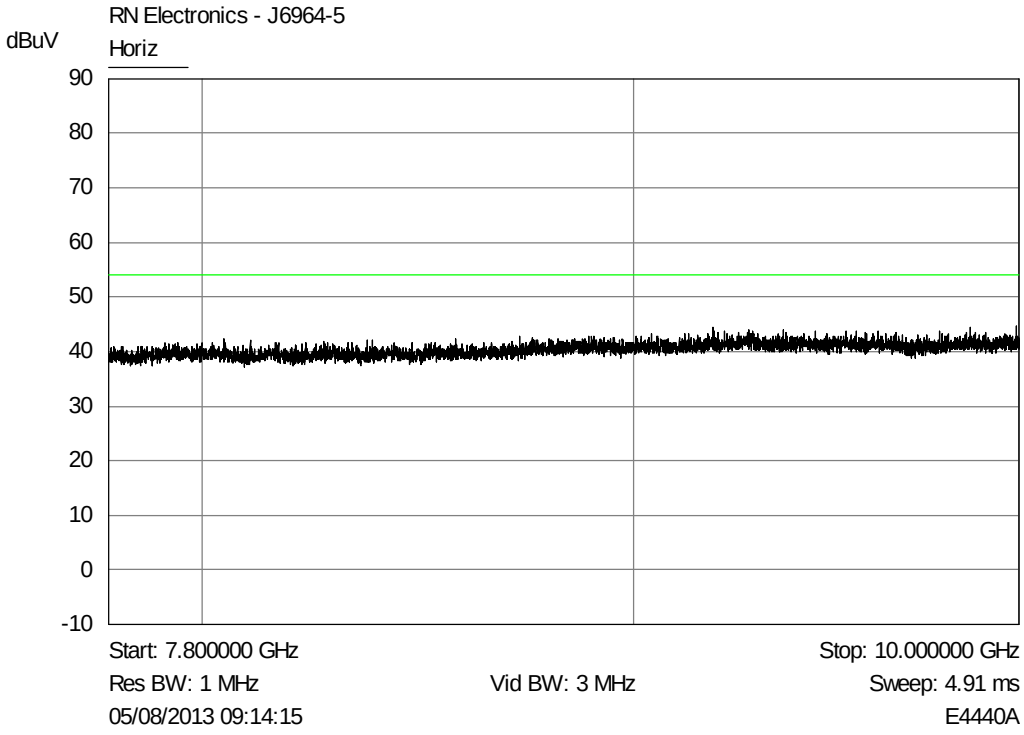
Middle channel (2440 MHz) - 6-7.8GHz – Vertical



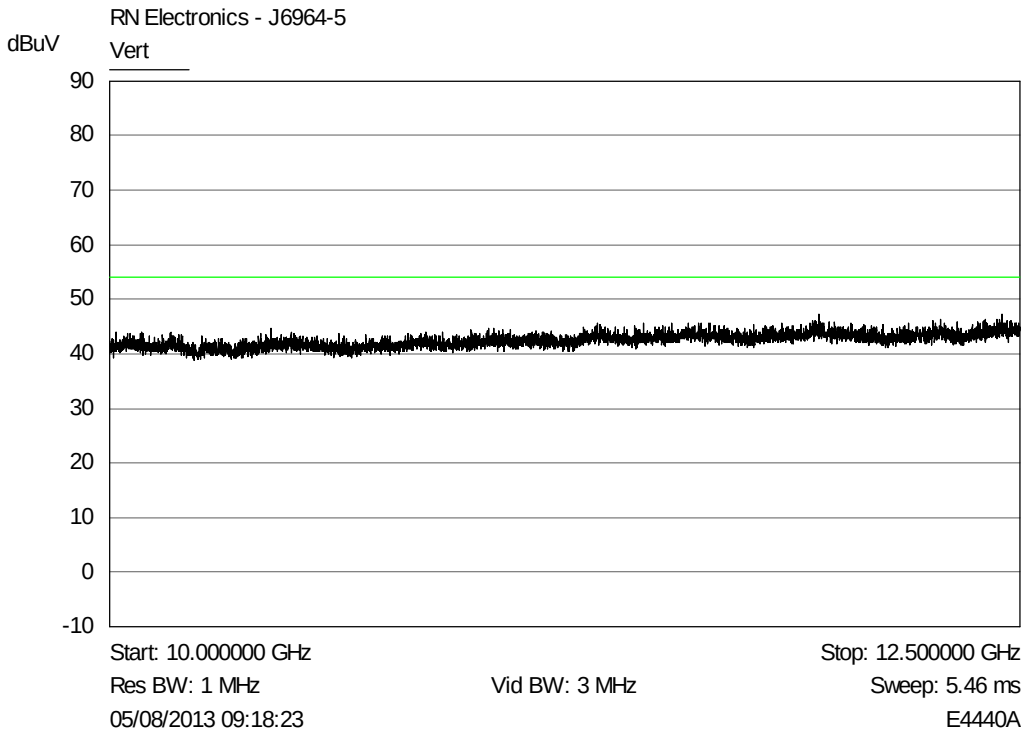
Middle channel (2440 MHz) - 6-7.8GHz - Horizontal



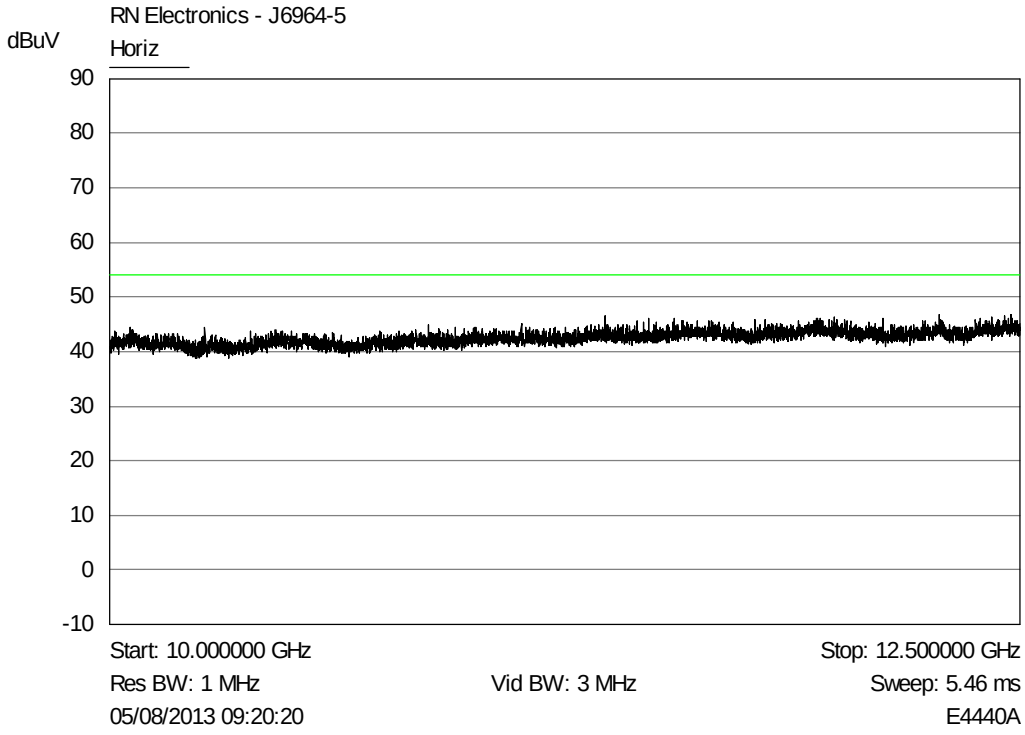
Middle channel (2440 MHz) - 7.8-10GHz – Vertical



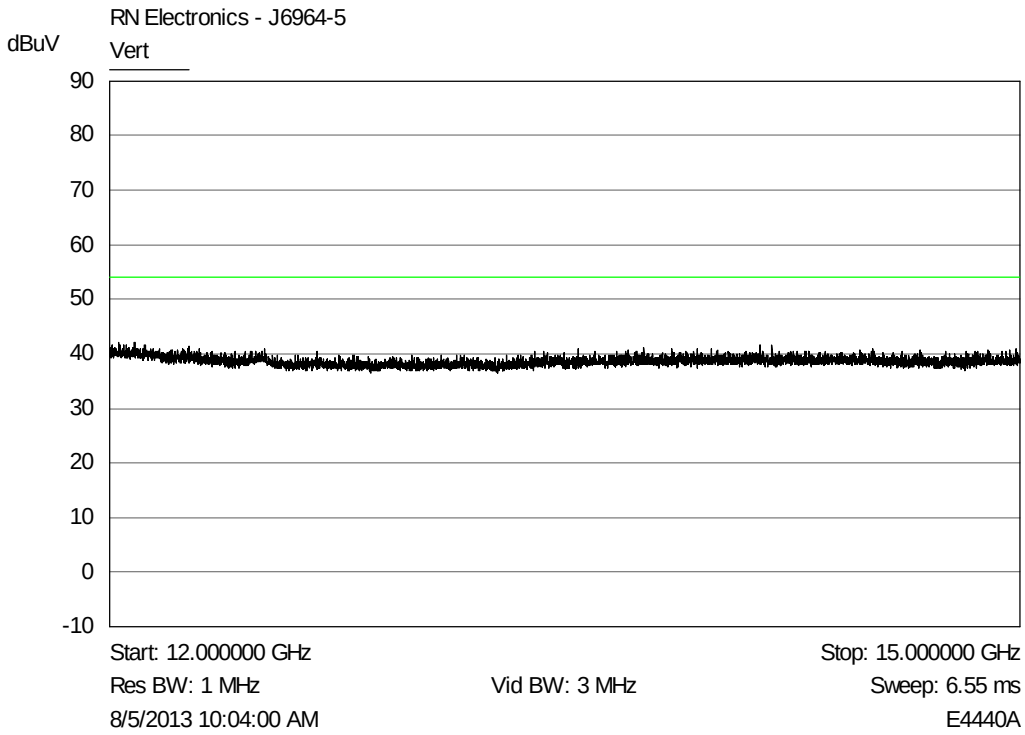
Middle channel (2440 MHz) - 7.8-10GHz - Horizontal



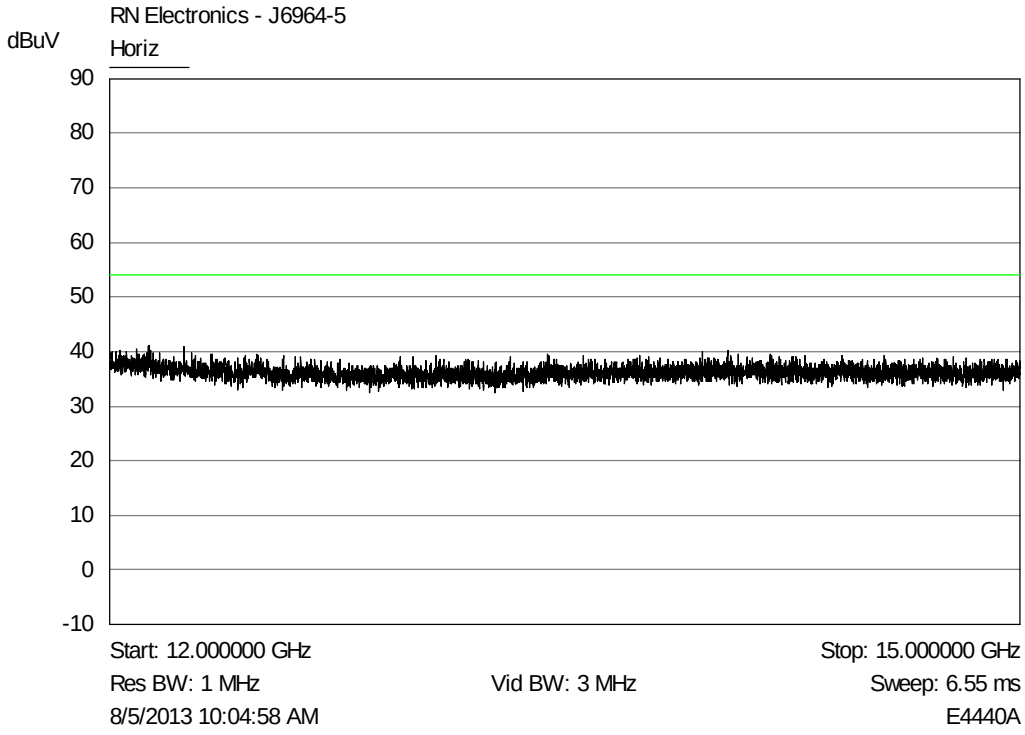
Middle channel (2440 MHz) - 10-12.5GHz – Vertical



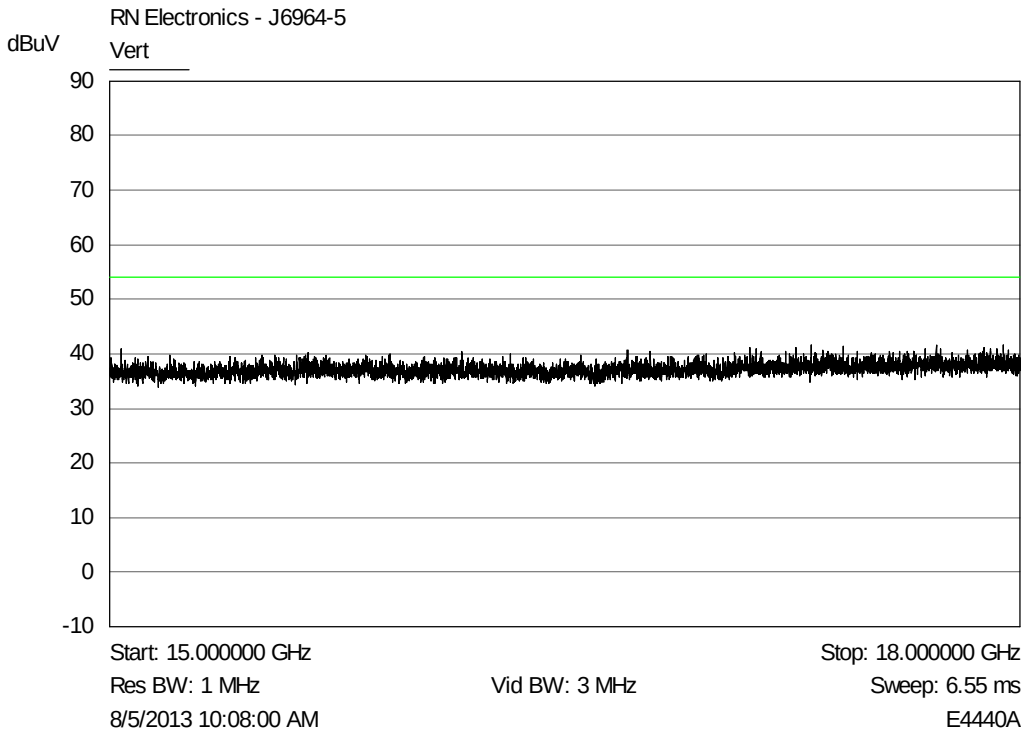
Middle channel (2440 MHz) - 10-12.5GHz - Horizontal



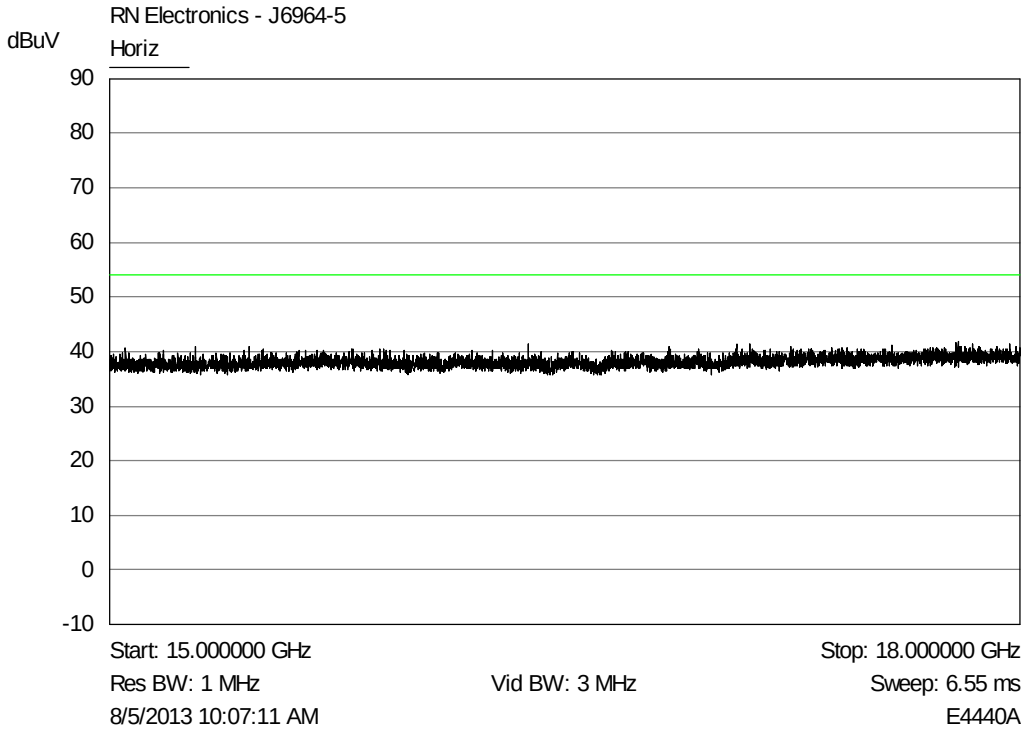
Middle channel (2440 MHz) - 12-15GHz – Vertical



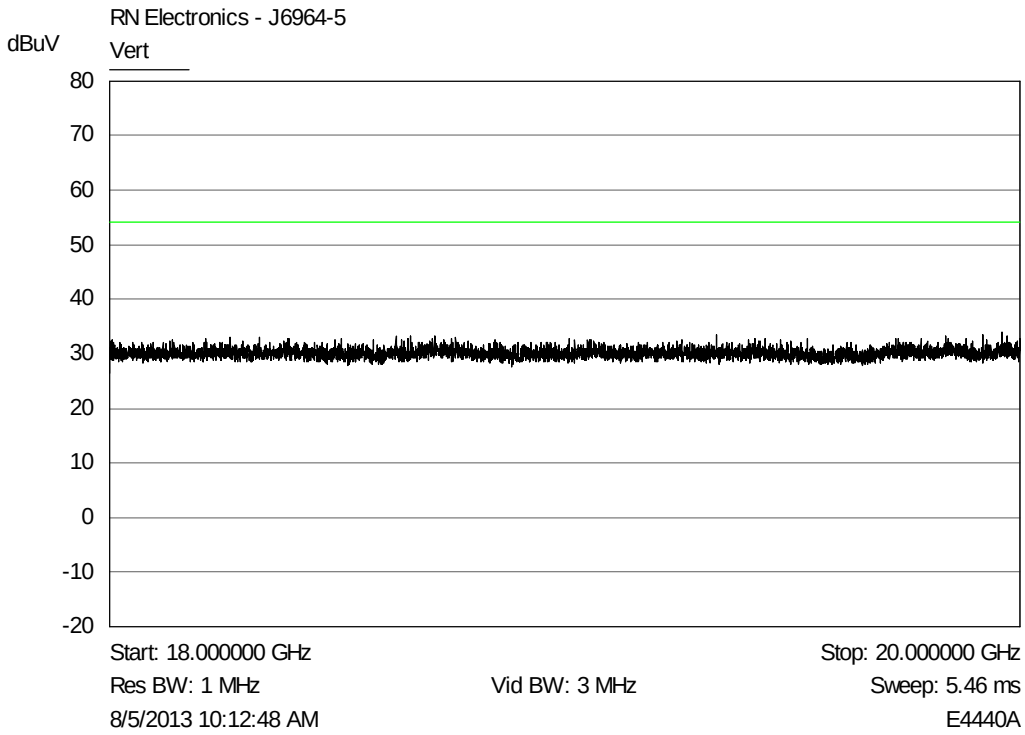
Middle channel (2440 MHz) - 12-15GHz - Horizontal



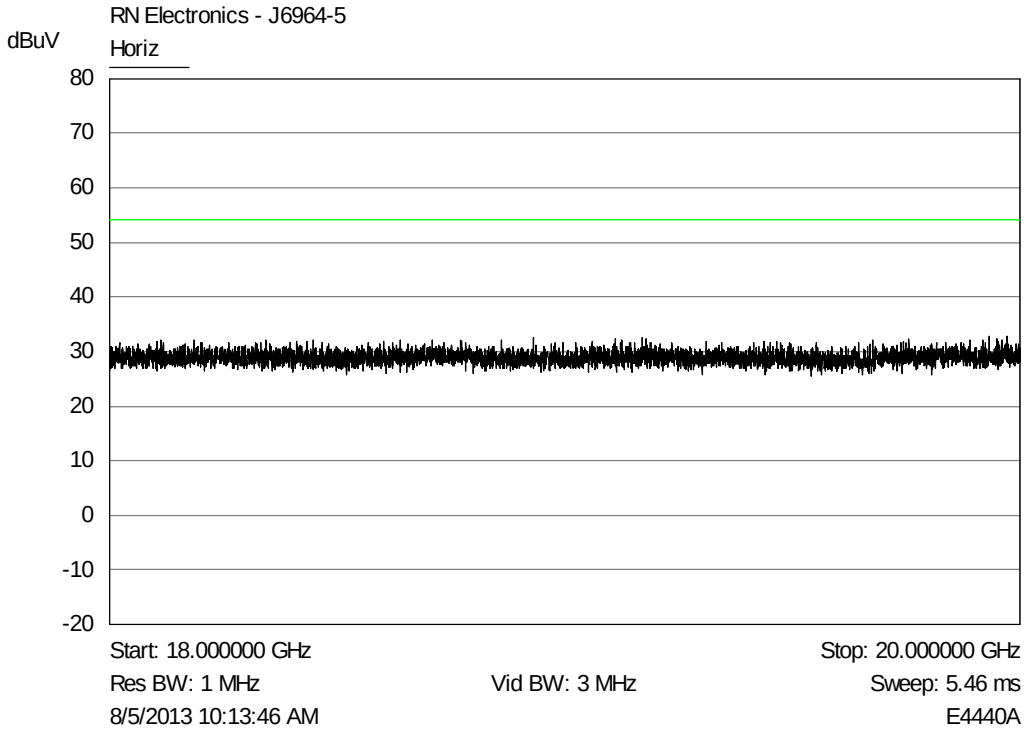
Middle channel (2440 MHz) - 15-18GHz – Vertical



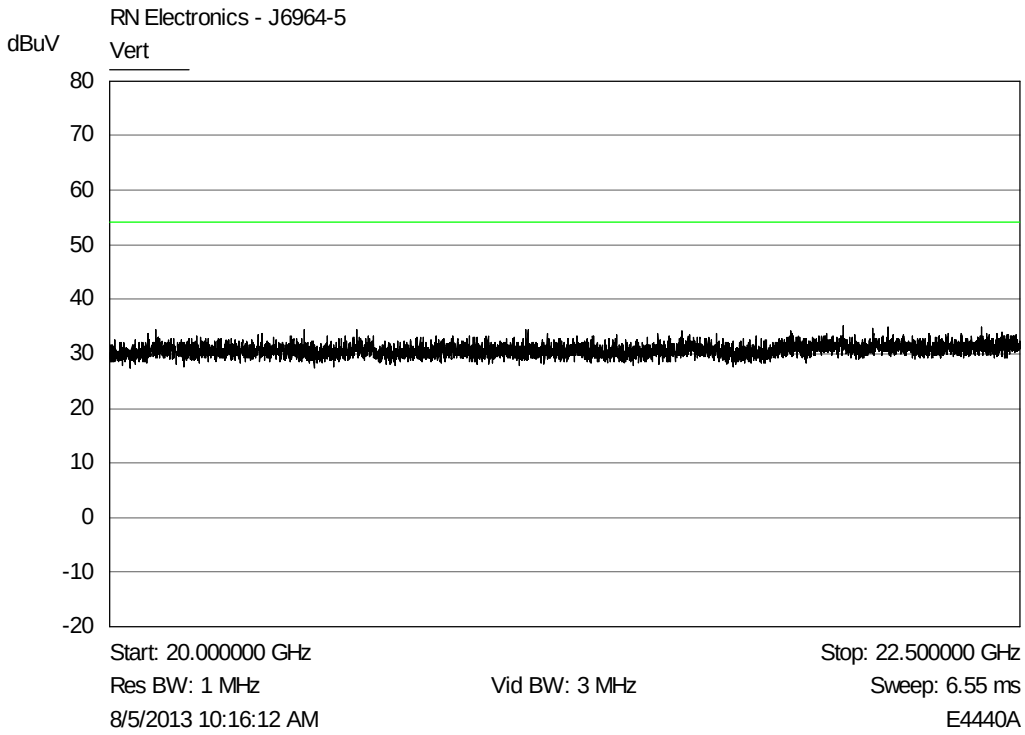
Middle channel (2440 MHz) - 15-18GHz - Horizontal



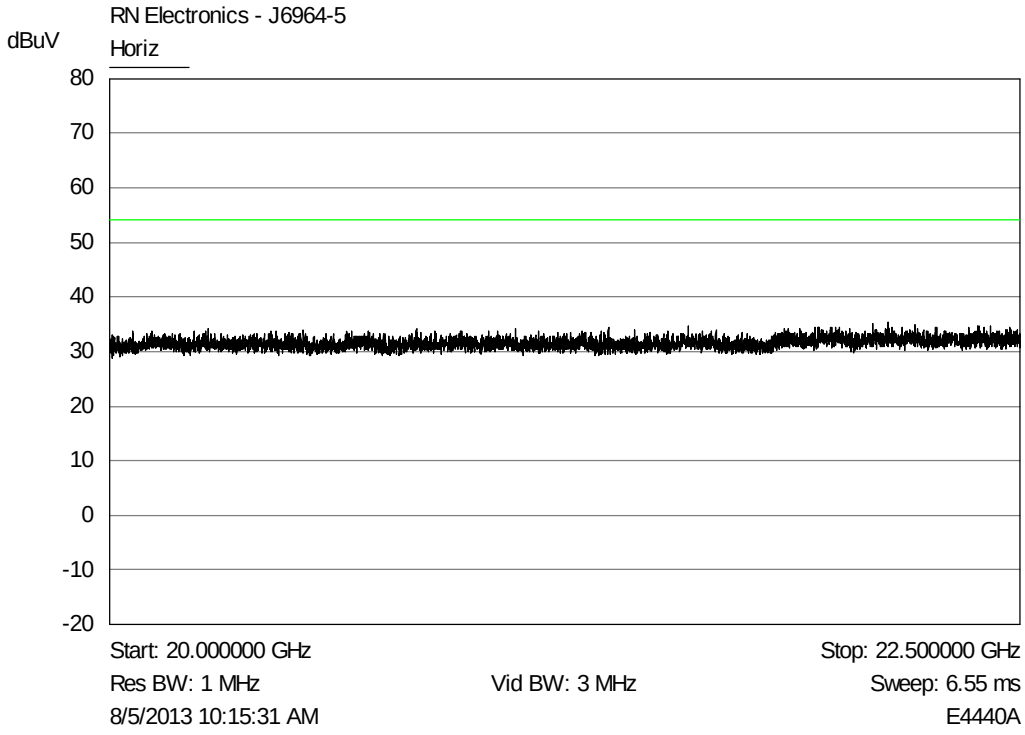
Middle channel (2440 MHz) - 18-20GHz – Vertical



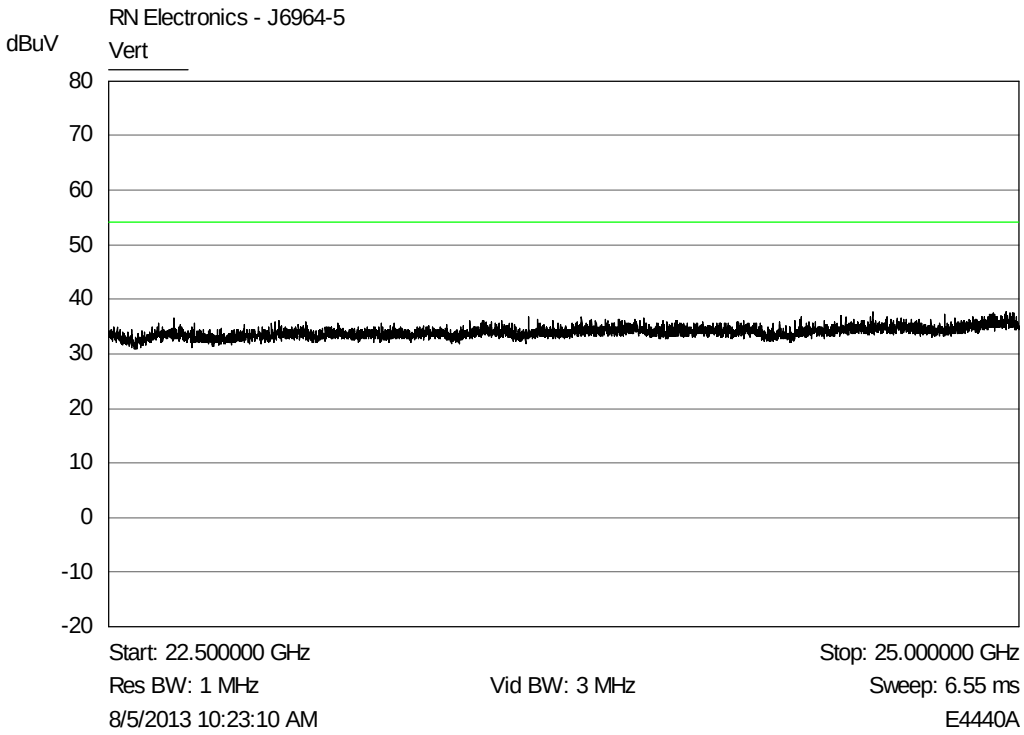
Middle channel (2440 MHz) - 18-20GHz - Horizontal



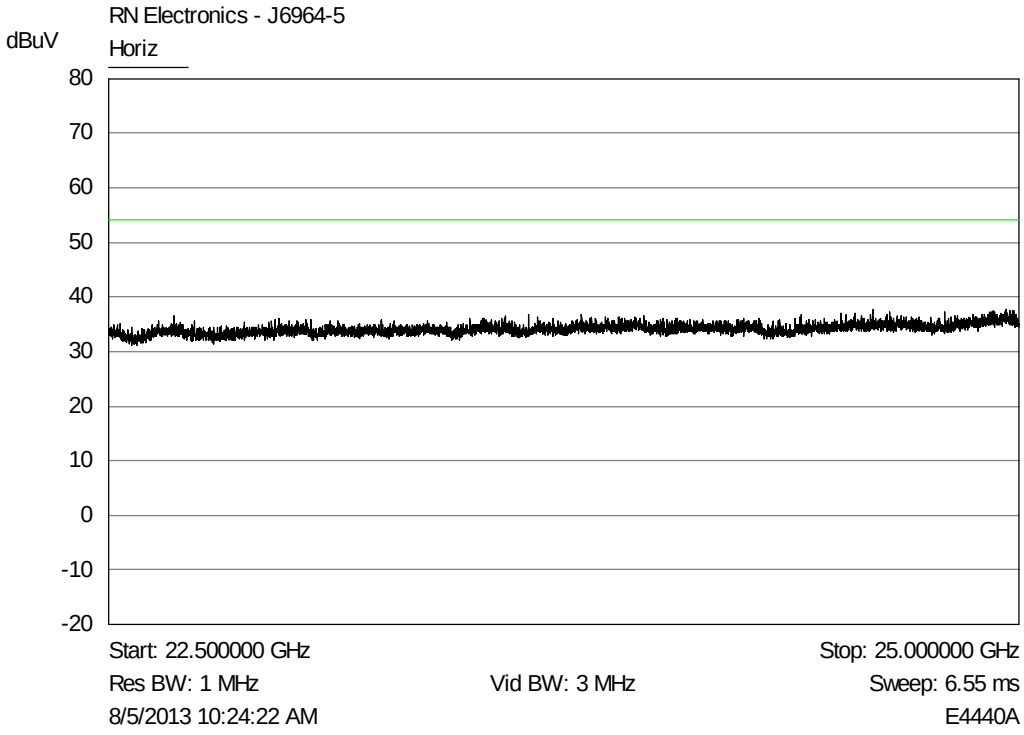
Middle channel (2440 MHz) - 20-22.5GHz – Vertical



Middle channel (2440 MHz) - 20-22.5GHz - Horizontal



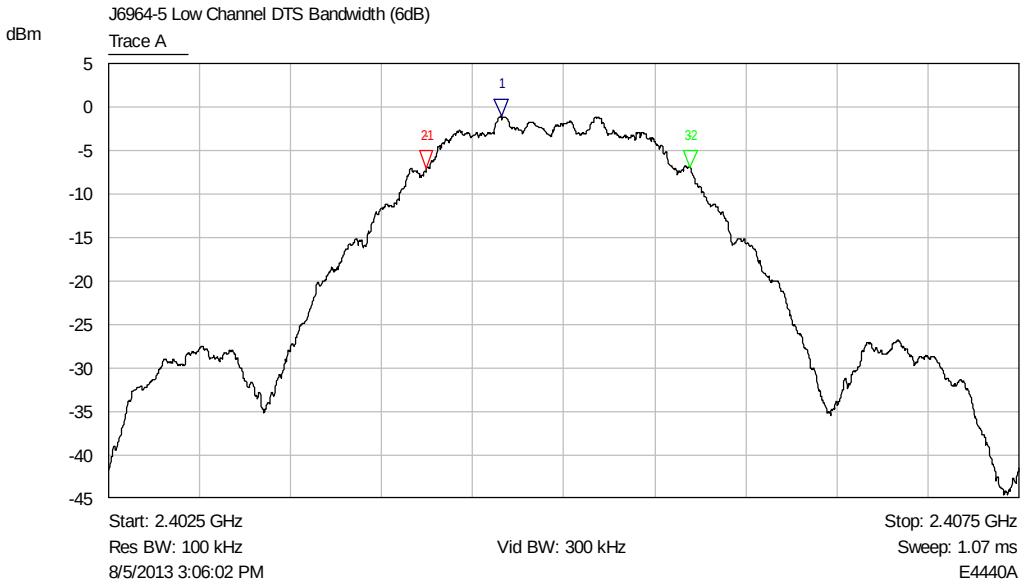
Middle channel (2440 MHz) - 22.5-25GHz – Vertical



Middle channel (2440 MHz) - 22.5-25GHz - Horizontal

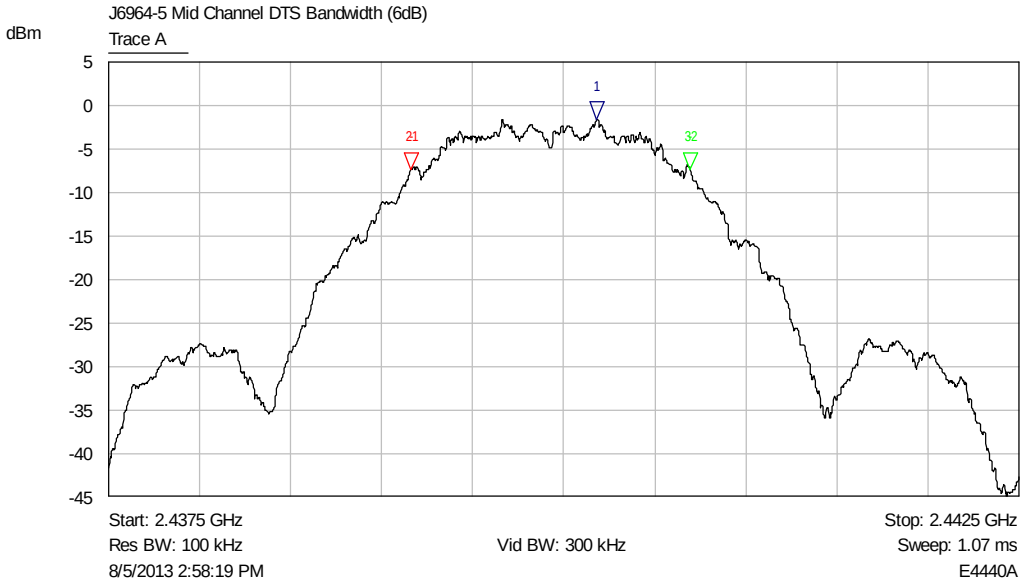
6.3 20dB bandwidth / occupied bandwidth plots

6.3.1 Plots for Band 2400-2483.5 MHz, Power 2 dBm, Spacing 5 MHz, and Modulation 250 KBPS OQPSK



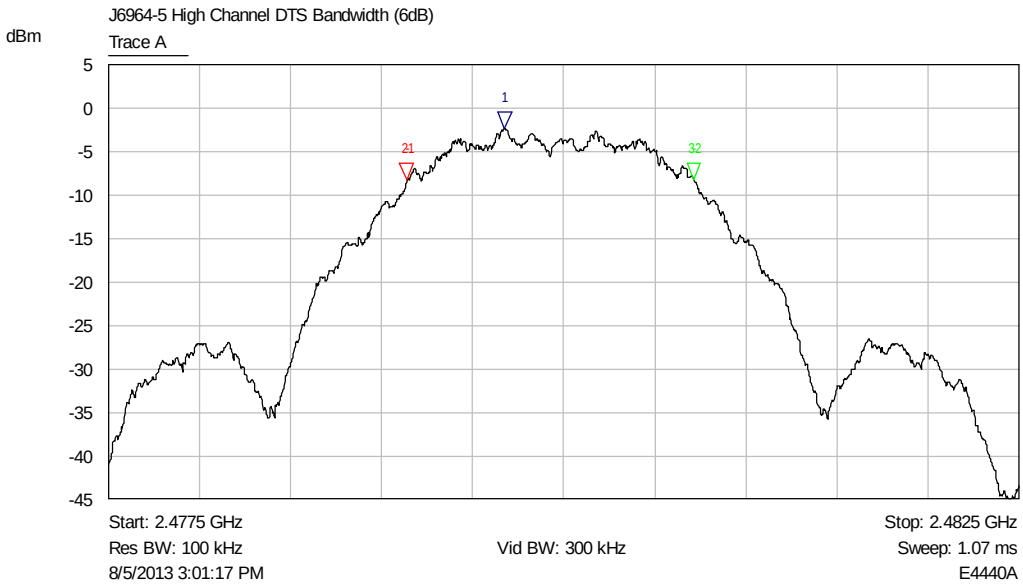
Mkr	Trace	X-Axis	Value	Notes
1	Trace A	2.4047 GHz	-1.04 dBm	
21	Trace A	-407.7039 kHz	-6.00 dB	
32	Trace A	1.4507 MHz	0.06 dB	

Low channel



Mkr	Trace	X-Axis	Value	Notes
1	Trace A	2.4402 GHz	-1.62 dBm	
21	Trace A	-1.0230 MHz	-5.83 dB	
32	Trace A	1.5358 MHz	0.06 dB	

Mid channel

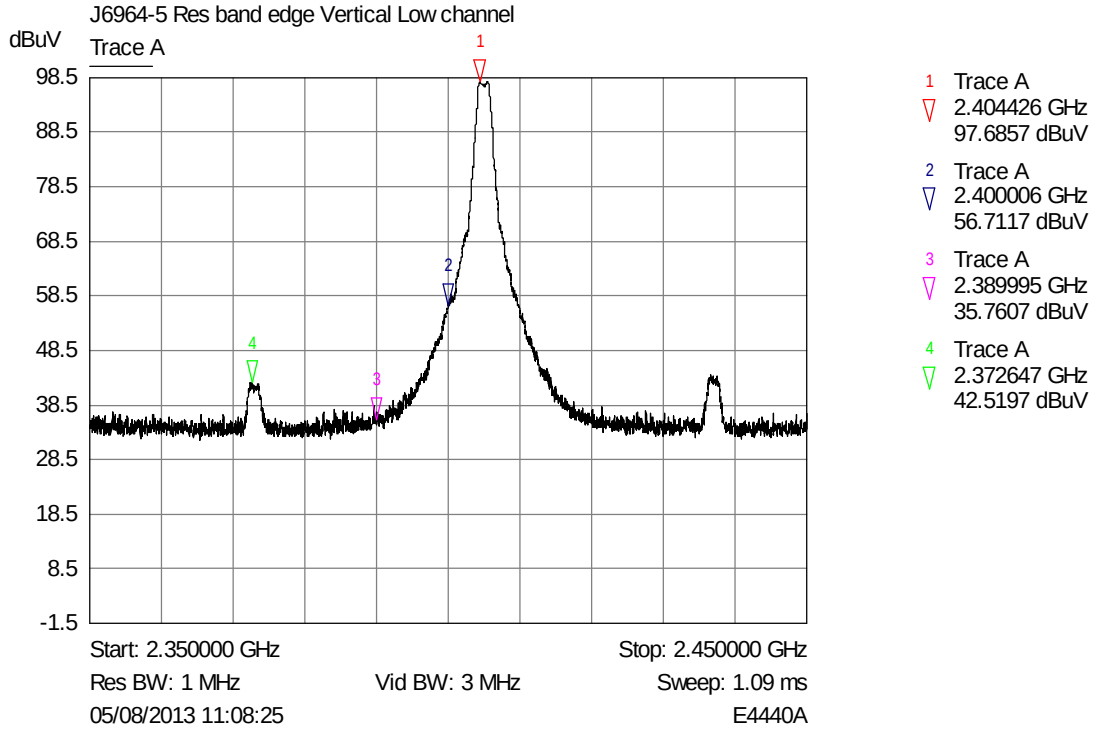


Mkr	Trace	X-Axis	Value	Notes
1	Trace A	2.4797 GHz	-2.38 dBm	
21	Trace A	-537.7689 kHz	-5.96 dB	
32	Trace A	1.5758 MHz	0.04 dB	

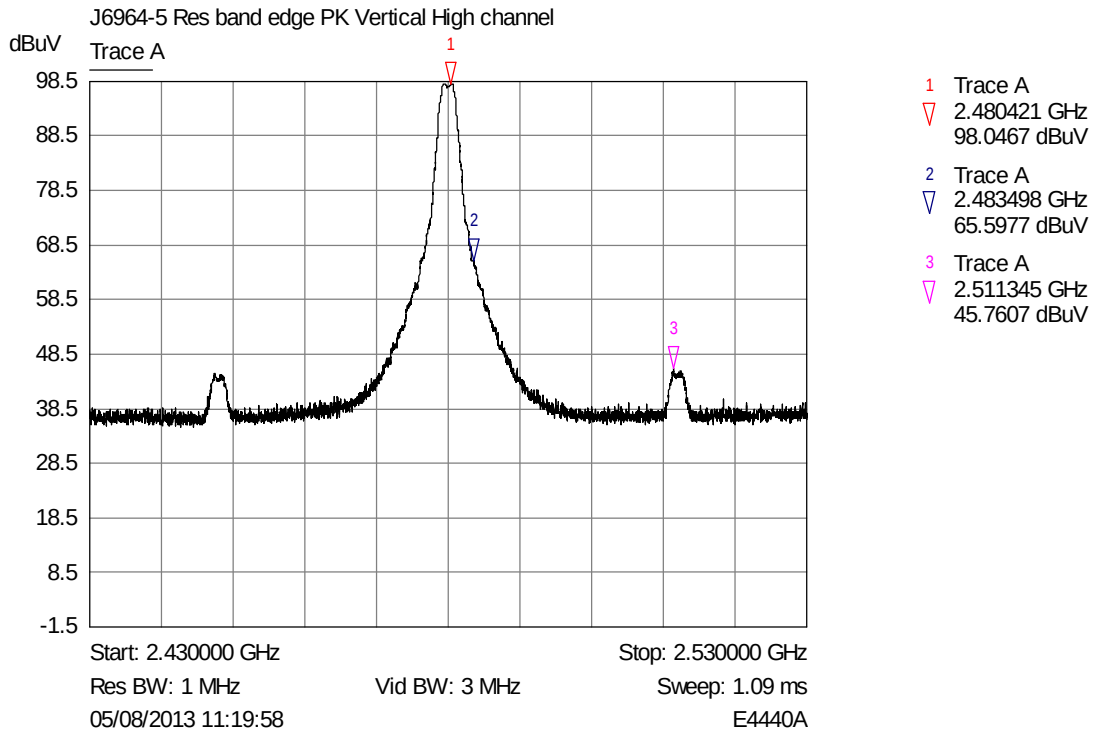
High channel

6.4 Band edge compliance plots

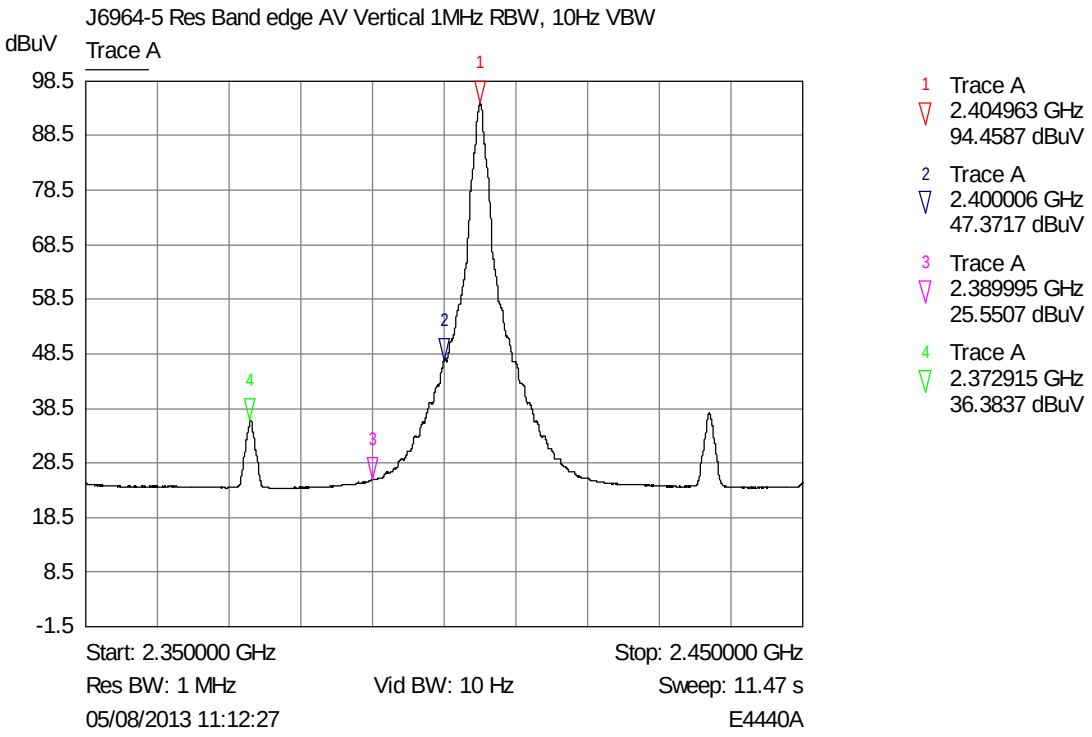
6.4.1 Plots for Band 2400-2483.5 MHz, Power 2 dBm, Spacing 5 MHz, and Modulation 250 KBPS OQPSK



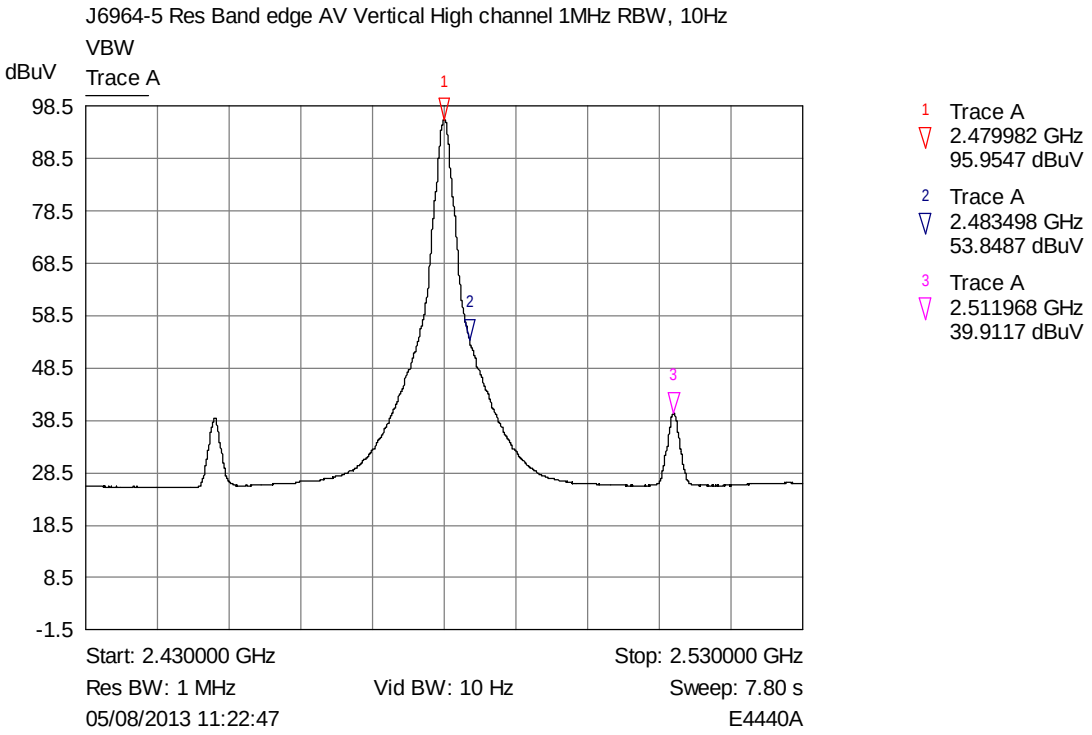
Restricted Band: Low channel Peak Plot



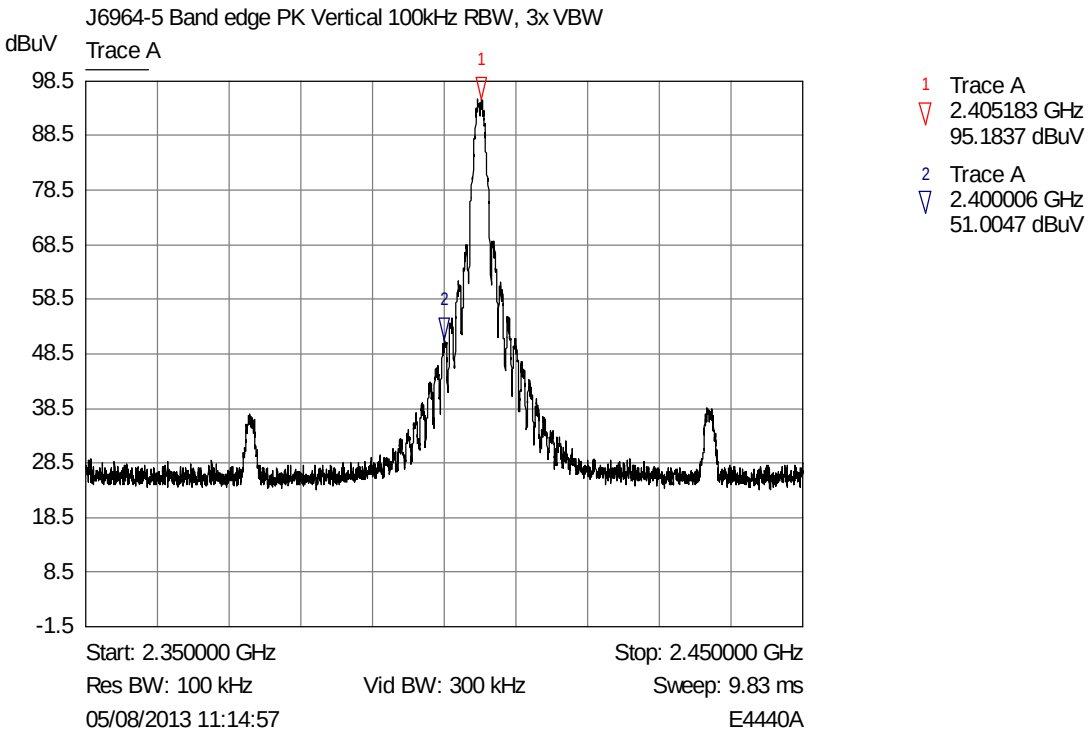
Restricted Band: High channel Peak Plot



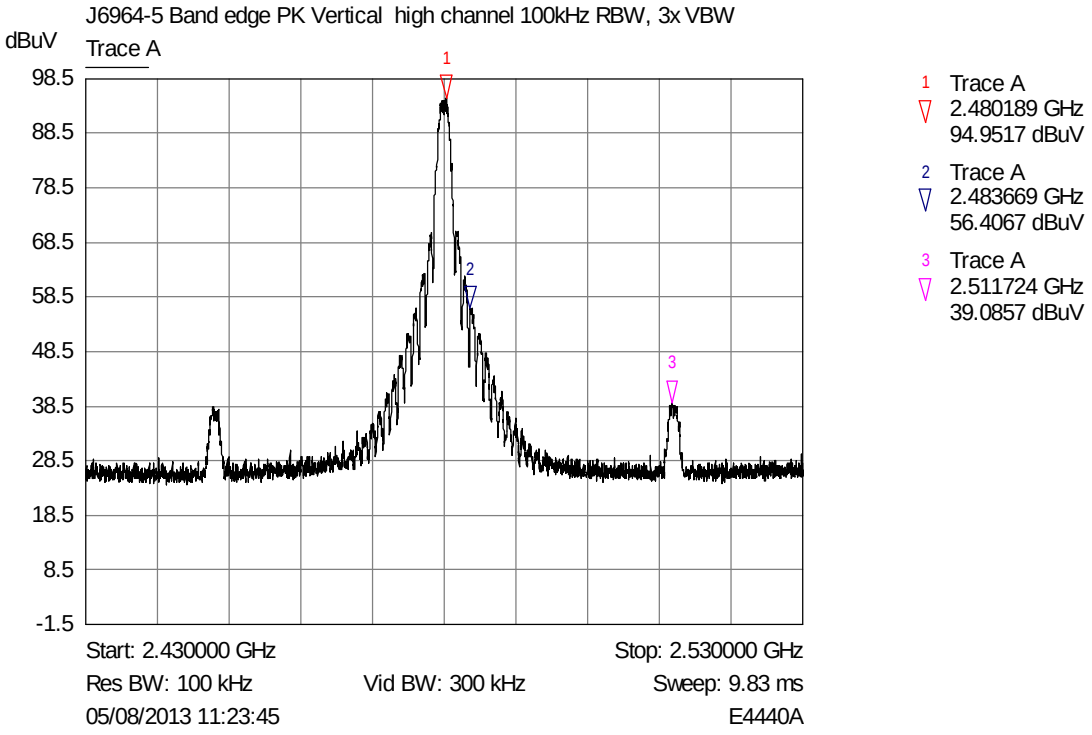
Restricted Band: Low channel Average Plot



Restricted Band: High channel Average Plot



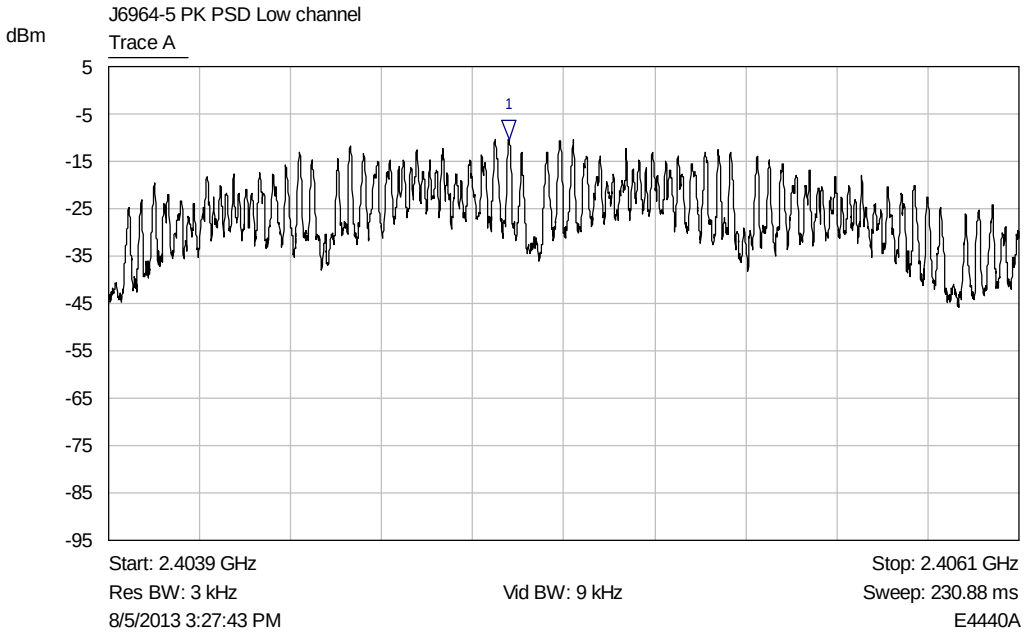
Band Edge: Low channel



Band Edge: High channel

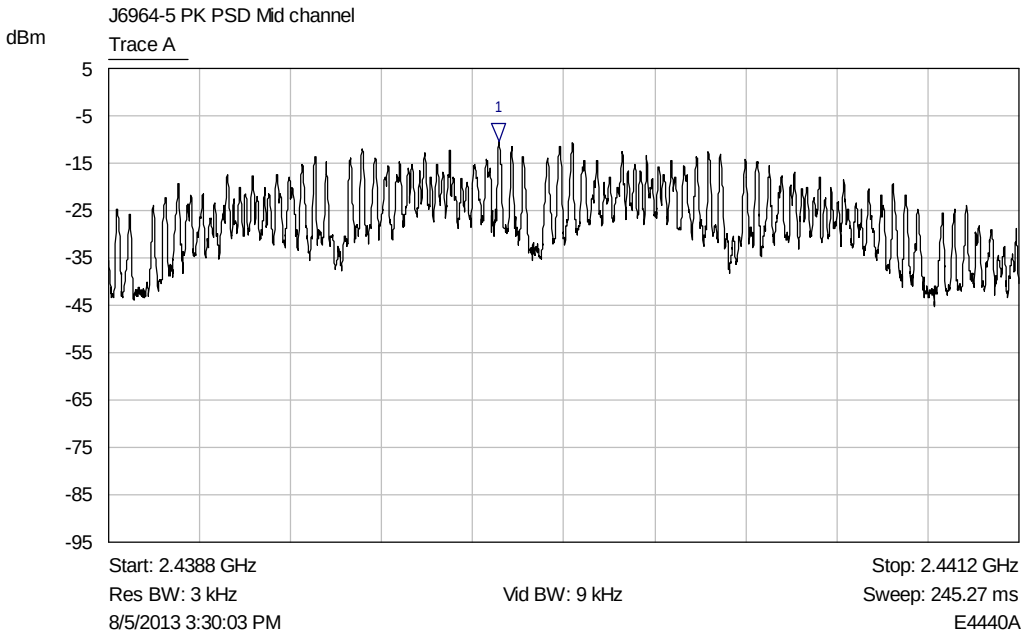
6.5 Power spectral density plots

6.5.1 Plots for Band 2400-2483.5 MHz, Power 2 dBm, Spacing 5 MHz, and Modulation 250 KBPS OQPSK



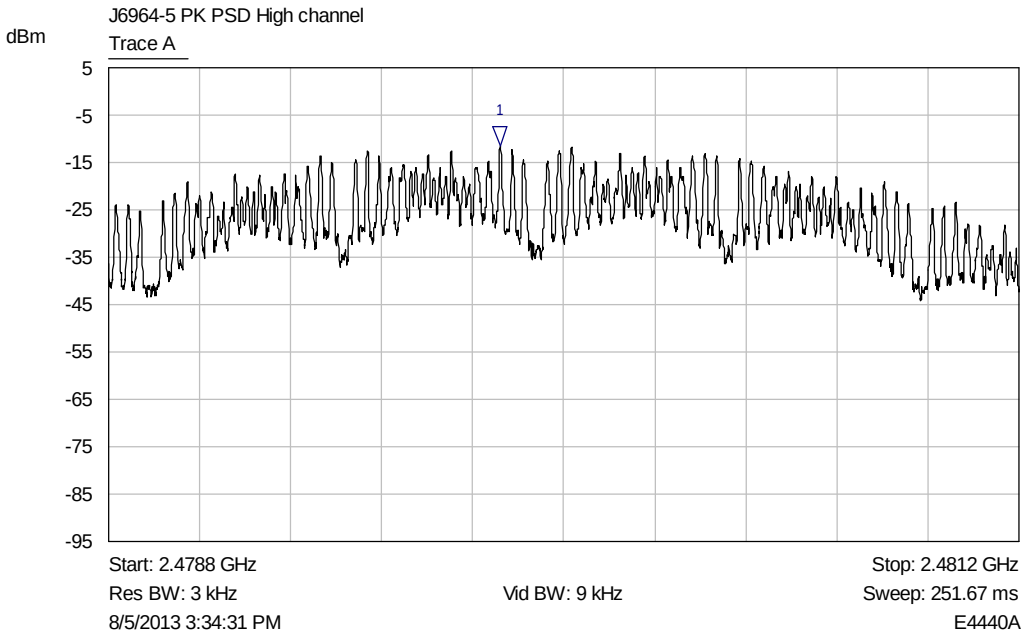
Mkr	Trace	X-Axis	Value	Notes
1 ▽	Trace A	2.4049 GHz	-10.30 dBm	

Low channel



Mkr	Trace	X-Axis	Value	Notes
1 ▽	Trace A	2.4398 GHz	-10.55 dBm	

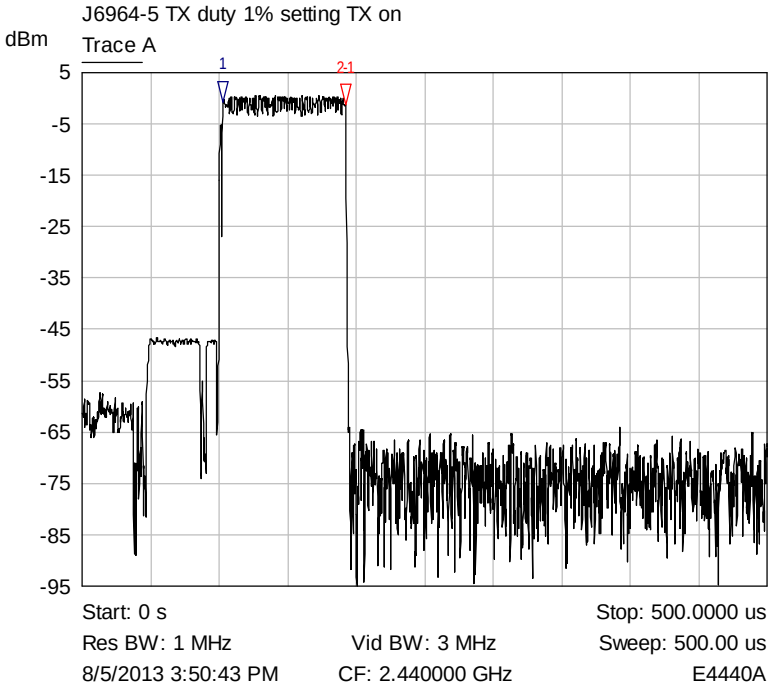
Mid channel



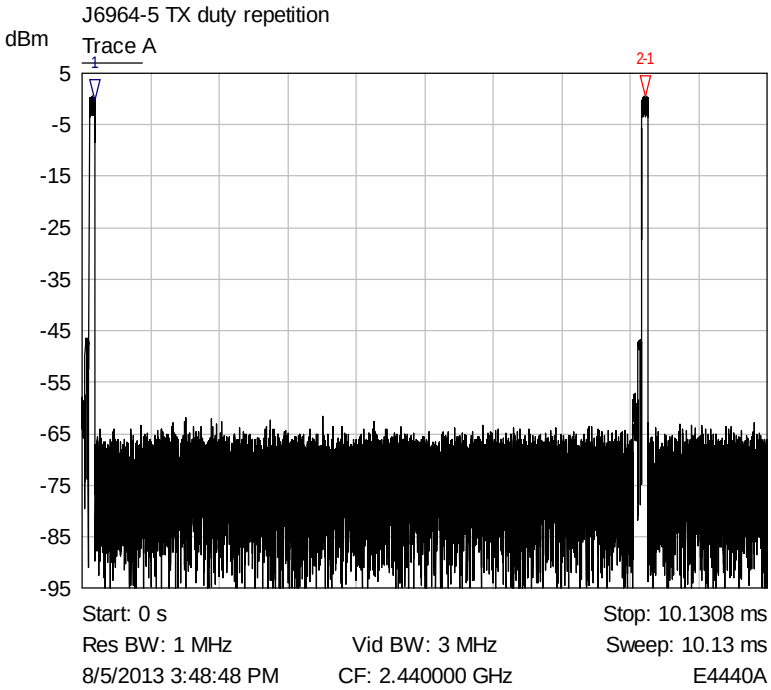
Mkr	Trace	X-Axis	Value	Notes
1 ▽	Trace A	2.4798 GHz	-11.31 dBm	

High channel

6.6 Duty cycle plots



Mkr	Trace	X-Axis	Value	Notes
1	Trace A	102.5256 us	-0.59 dBm	
2-1	Trace A	89.2723 us	-0.82 dB	



Mkr	Trace	X-Axis	Value	Notes
1	Trace A	187.4667 us	-0.29 dBm	
2-1	Trace A	8.1421 ms	0.74 dB	

7 Explanatory Notes

7.1 Explanation of Table of Signals Measured

Measurements are made as required by the standard. These measurements are made and recorded using detectors, either peak, quasi peak or average dependant on the test. A table of results has been given following the relevant plots. This table looks similar to the one illustrated below dependant on the measurements required by the test: -

Signal No.	Freq (MHz)	Peak Amp (dBuV)	Pk – Lim 1 (dB)	QP Amp (dBuV)	QP - Lim1 (dB)	Av Amp (dBuV)	Av - Lim1 (dB)
1	12345	54.9	-10.5	48.0	-12.6	37.6	-14.4

Column One - Labelled Signal No. is an incremental number that the receiver has given to each signal that has been measured.

Column Two - Labelled Freq (MHz) is the approximate frequency of the signal received.

Column Three - Labelled Peak Amp (dBμV) is the level of received signal that was measured in dB above 1μV using the peak detector.

Column Four - Labelled Pk - Lim1 (dB) is the difference in level from the peak signal given to the active limit line. If this column appears in the table the peak detector measurement is required by the standard for this test. The results entered in this column indicate the signal level relative to the compliance limit required. Negative numbers indicate that the product is compliant.

Column Five - Labelled QP Amp (dBμV) is the level of received signal that was measured in dB above 1μV using the quasi-peak detector.

Column Six - Labelled QP - Lim1 (dB) is the difference in level from the quasi-peak signal given to the active limit line. If this column appears in the table the quasi-peak detector measurement is required by the standard for this test. The results entered in this column indicate the signal level relative to the compliance limit required. Negative numbers indicate that the product is compliant.

Column Seven - Labelled Av Amp (dBμV) is the level of received signal that was measured in dB above 1μV using the average detector.

Column Eight - Labelled Av - Lim1 (dB) is the difference in level from the average signal given to the active limit line. If this column appears in the table the average detector measurement is required by the standard for this test. The results entered in this column indicate the signal level relative to the compliance limit required. Negative numbers indicate that the product is compliant.

Only signals highlighted in red are deemed to exceed the limit of the detector required.

7.2 Explanation of limit line calculations for radiated measurements

The limits given in the test standard are normally expressed as absolute values (e.g. in µV/m at a specified distance), whereas the measured values are expressed as peak, quasi peak or average values in dBµV/m referenced to the measuring instrument inputs. RN Electronics calibrate the test set-up to account for any path losses, antenna gains, etc. so that the value read at the receiver relates directly to the absolute value required, except that it is expressed in dB relative to one microVolt and may need to take account of any alternative measuring distance used. Examples:

(a) limit of 500 µV/m equates to 20.log (500) = 54 dB µV/m.

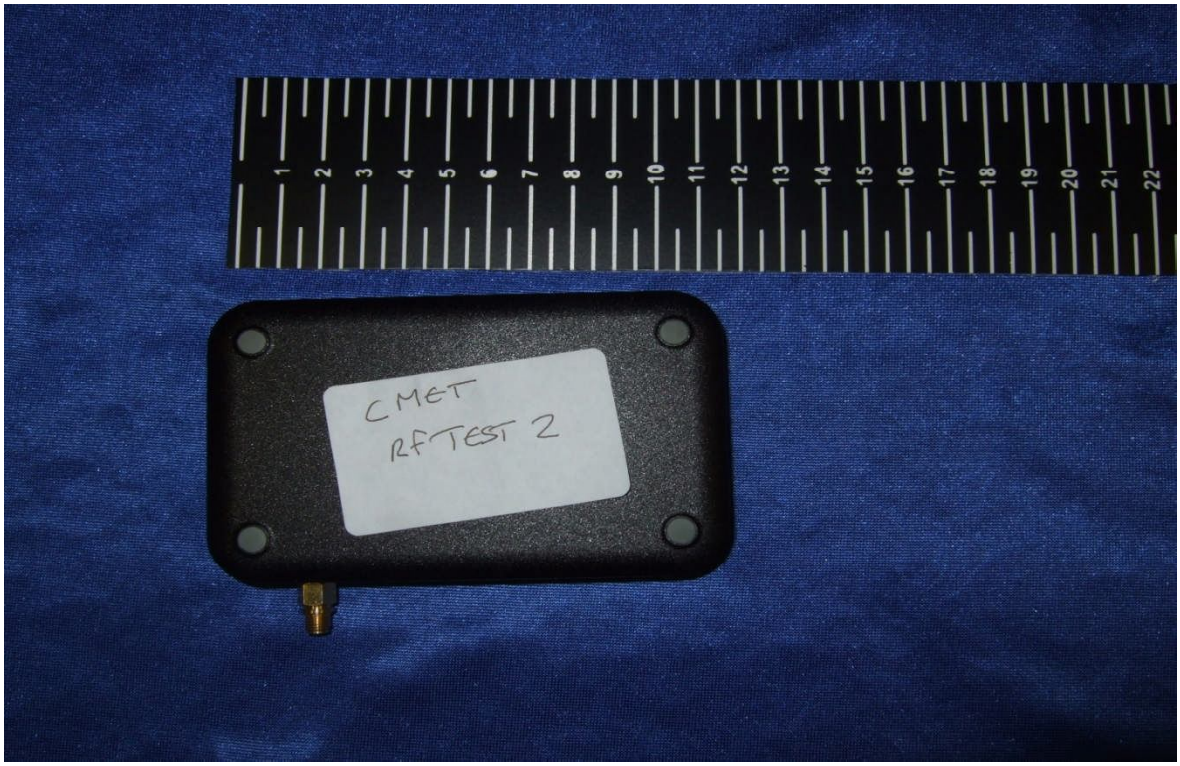
(b) limit of 300 µV/m at 10m equates to 20.log (300 . 10/3) = 60 dB µV/m at 3m

(c) limit of 30 µV/m at 30m, but below 30MHz, equates to 20.log(30) + 40.log(30/3) = 69.5 dBµV/m at 3m, as extrapolation factor below 30MHz is 40dB/decade per 15.31(f)(2).

8 Photographs

8.1 EUT Front View

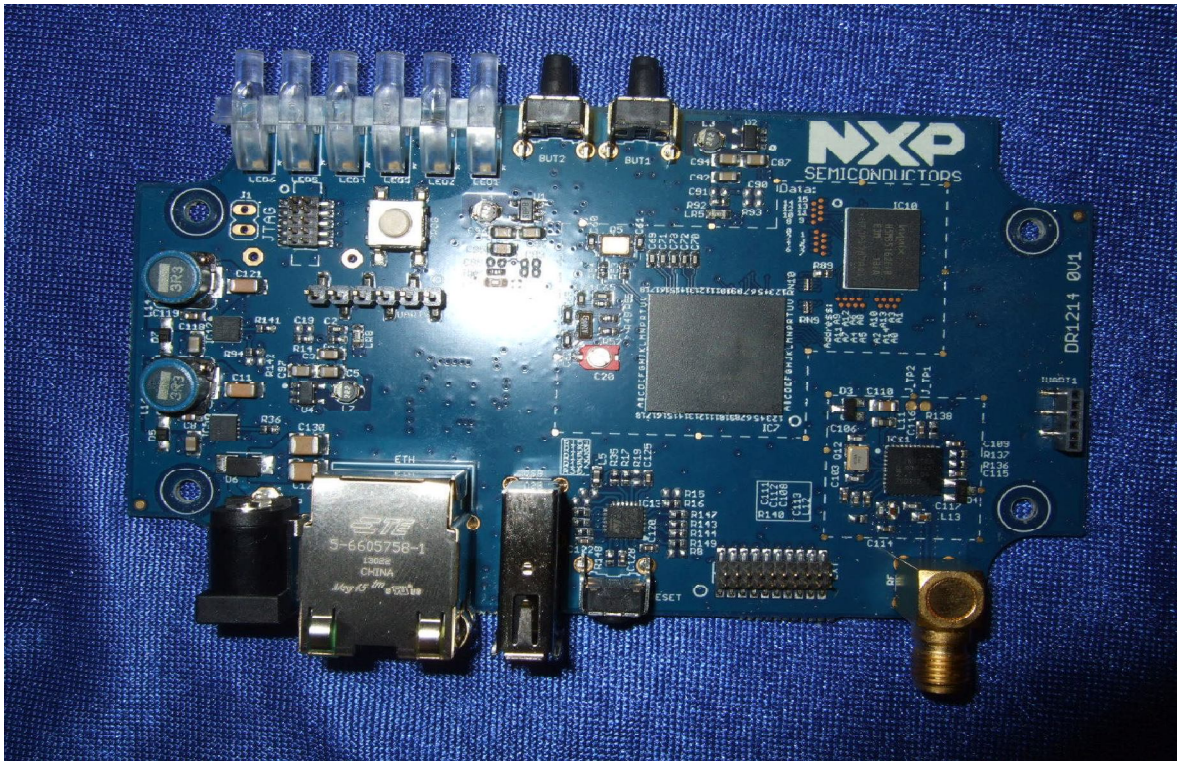
8.2 EUT Reverse Angle

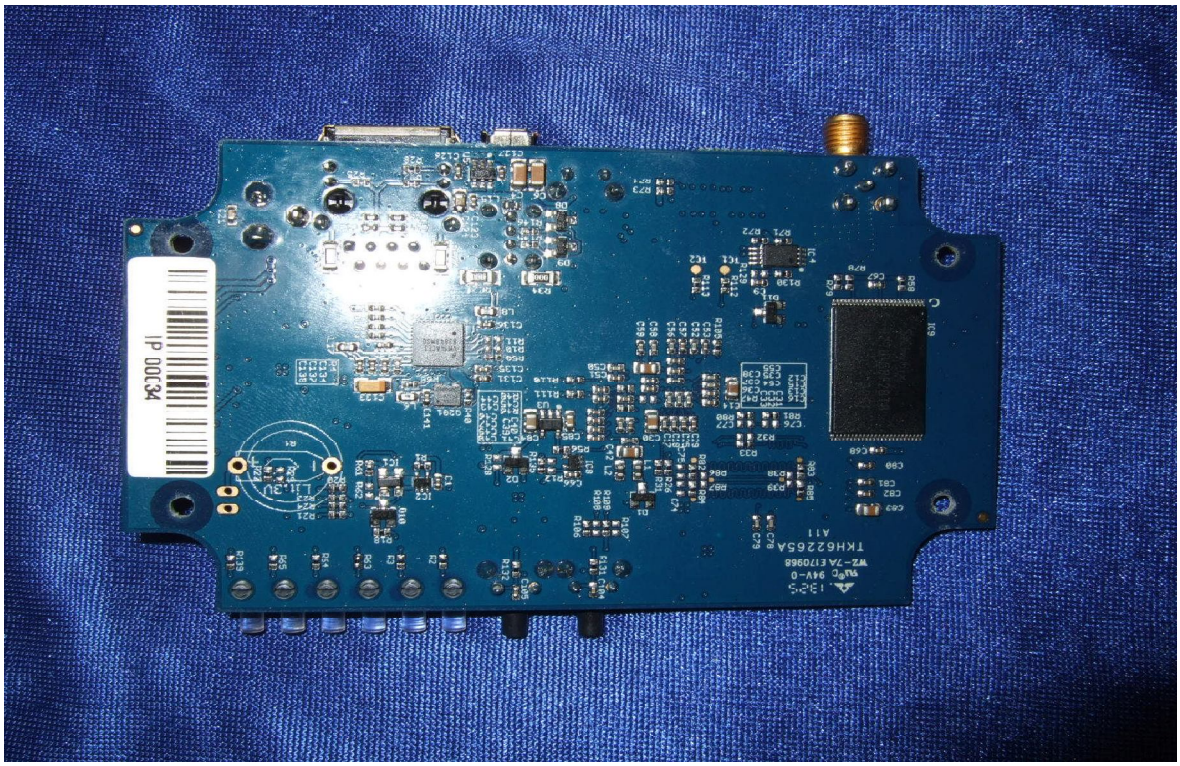


8.3 EUT Antenna Connector Port

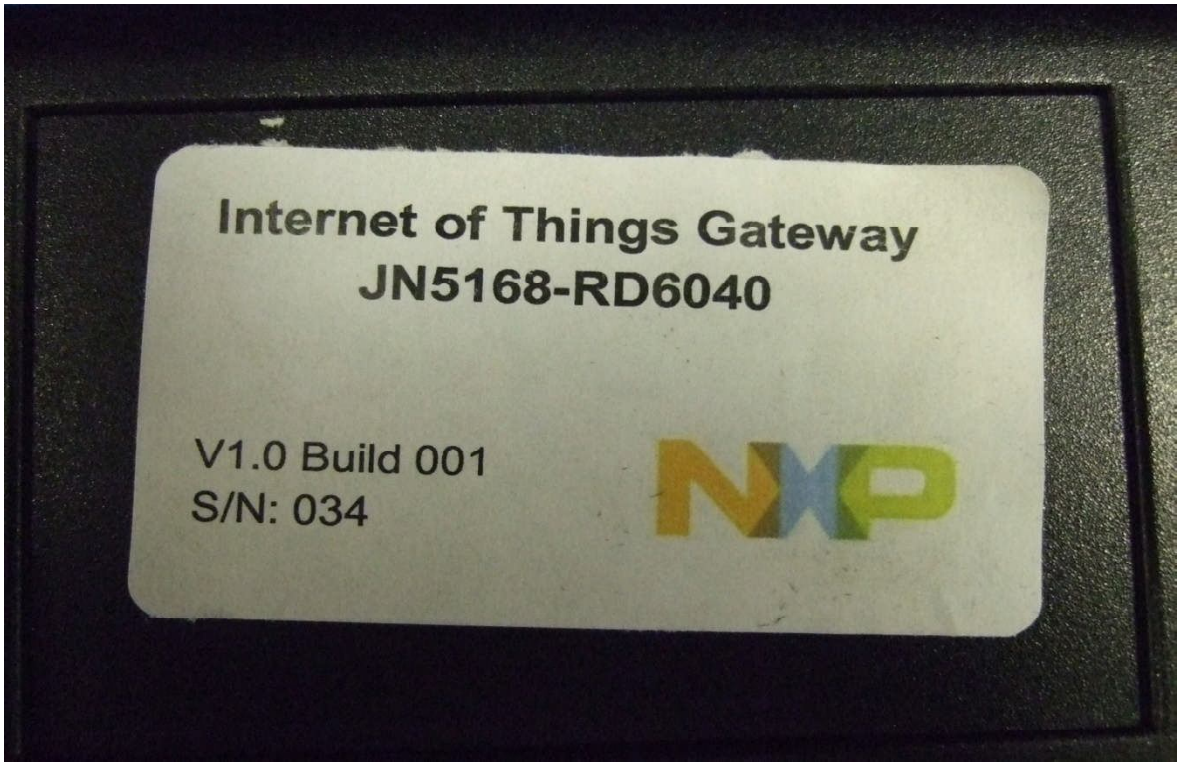
8.4 EUT Display / Controls

8.5 EUT Internal Construction

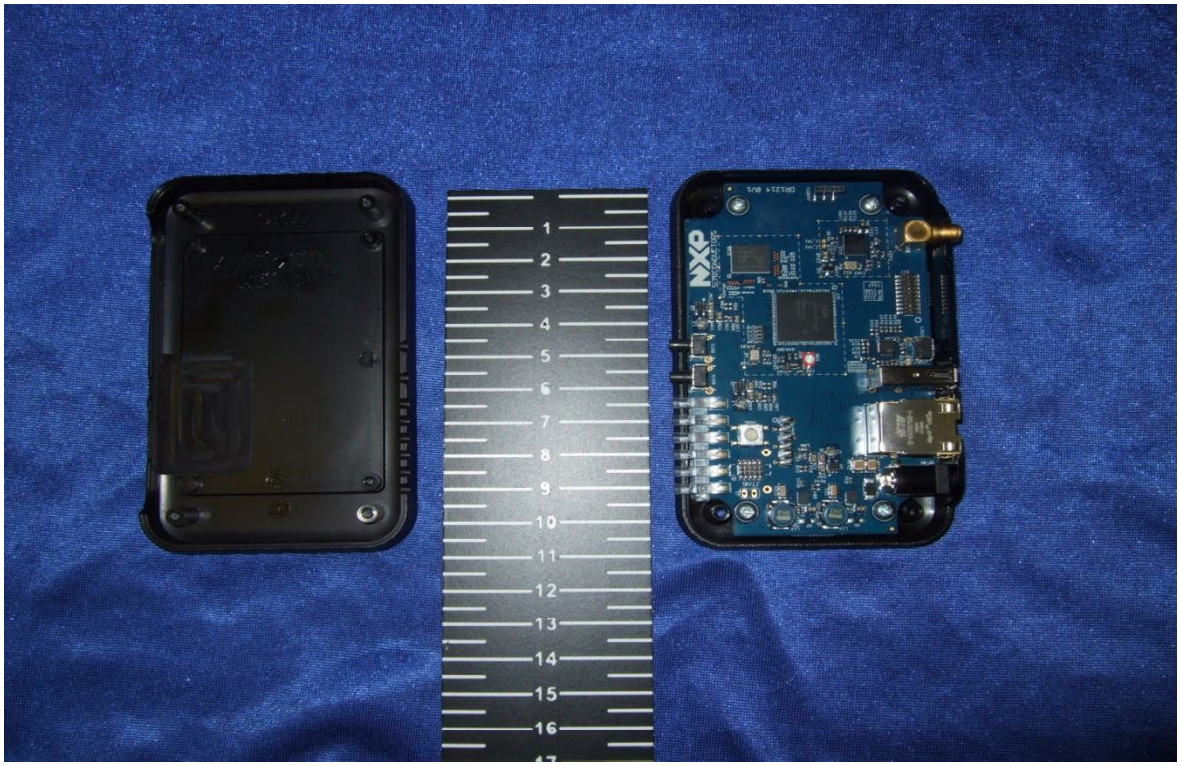




8.6 EUT Identification Label

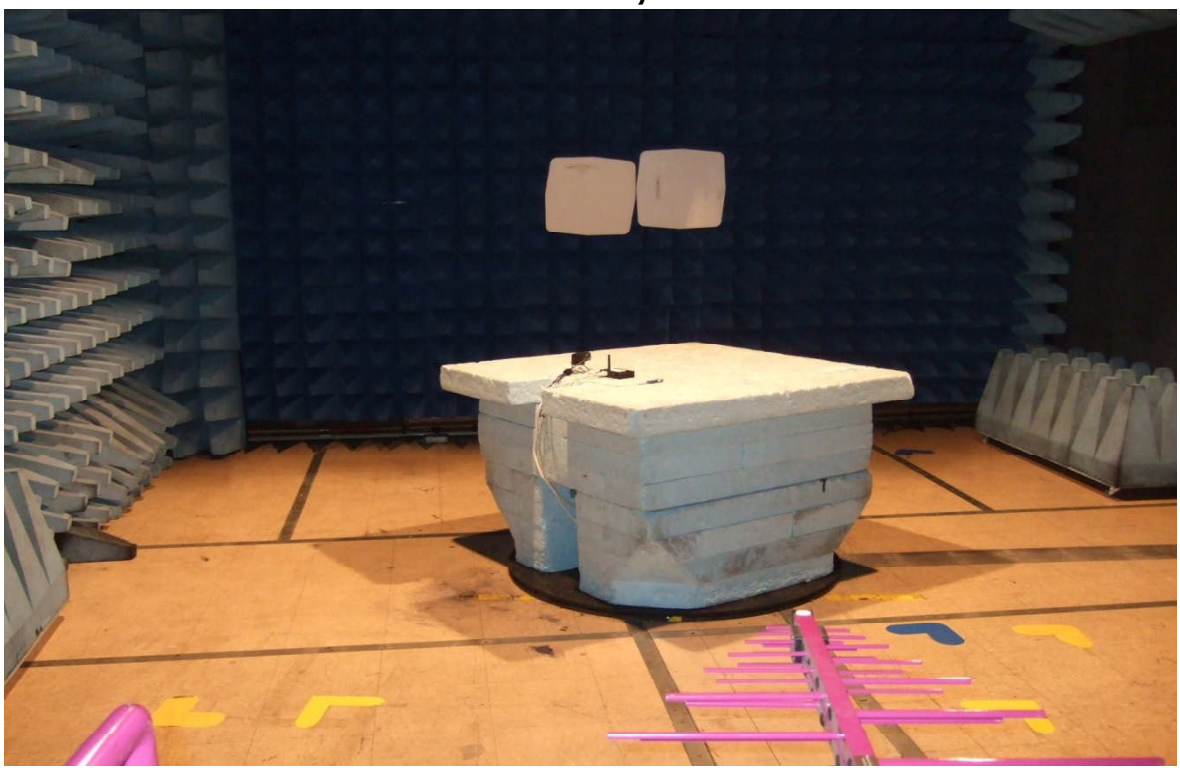


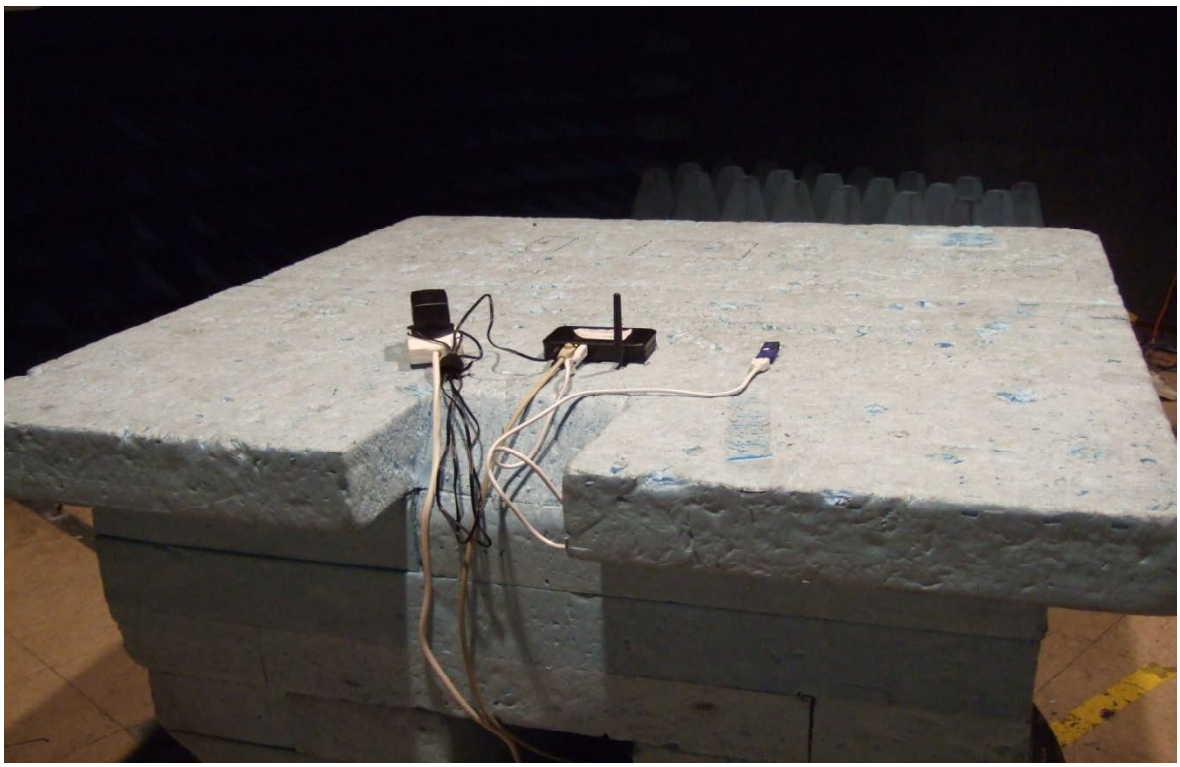
8.7 EUT Chassis

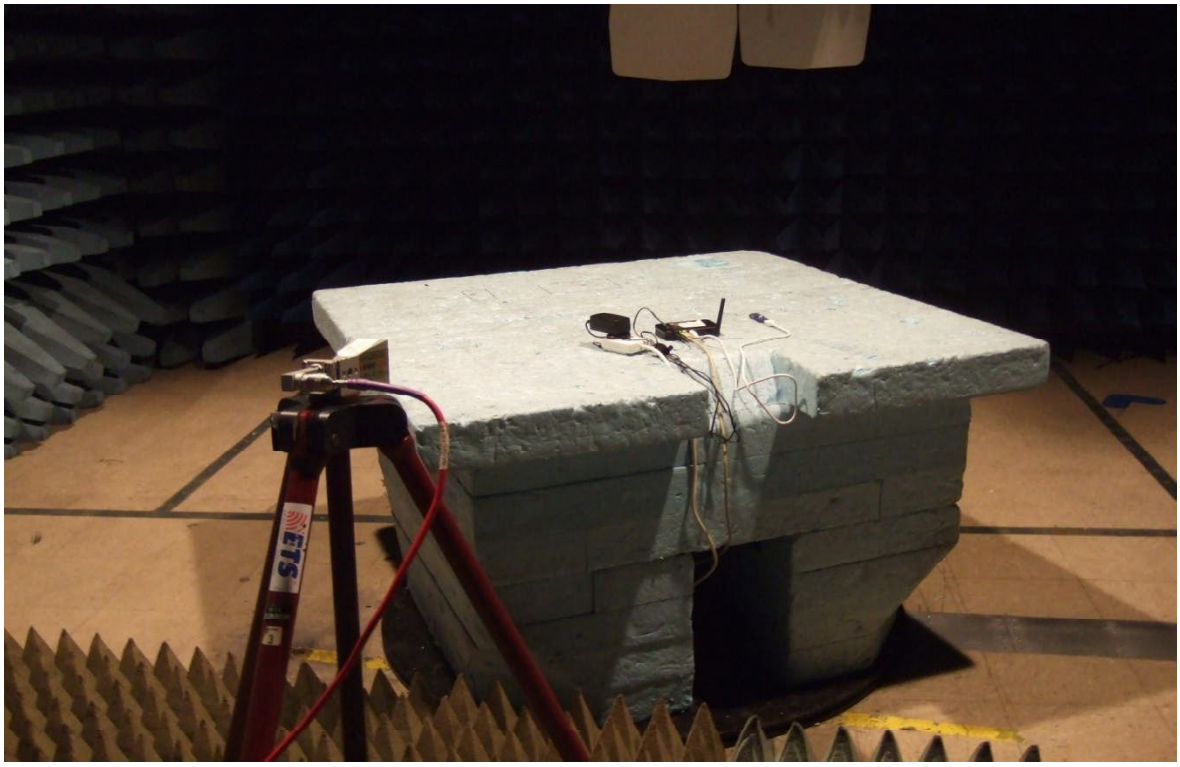


8.8 Test set-up, spurious emissions

Photographs of the EUT as viewed from in front of the antenna, site M.






ETS

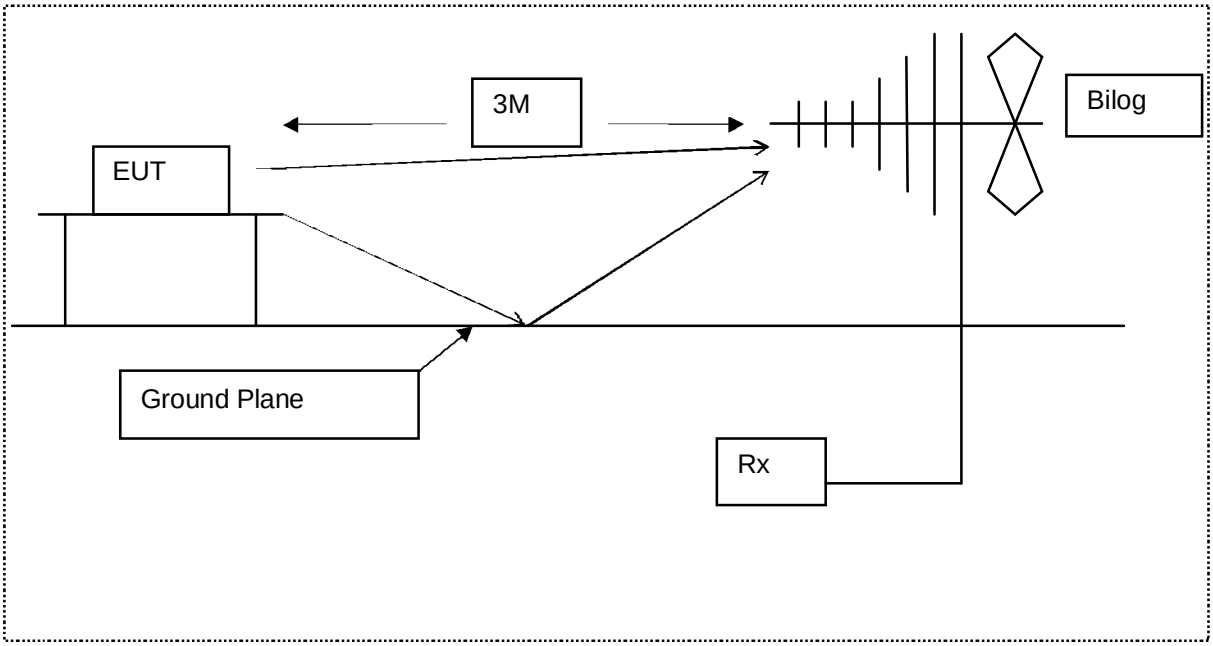
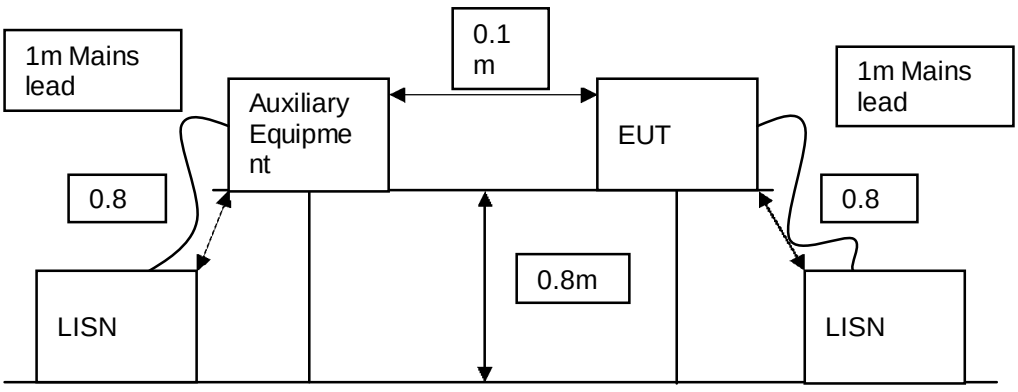


Diagram of the radiated emissions test setup 30-1000MHz.

8.9 Test set-up, AC power line conducted emissions

Photograph of the EUT as viewed from screened room (AC power line conducted emissions)

Diagram of the AC power line conducted emissions test setup.



9 Signal Leads

Port Name	Cable Type	Connected
AC/DC adapter	AC plug to DC 2 core	Yes
Ethernet	Cat5 Screened	Yes
USB flash	Standard USB screened	Yes
Antenna	RP SMA Antenna	Yes

10 Test Equipment Calibration list

The following table lists the test equipment used, last calibration date and calibration interval. All test equipment used has been maintained within the calibration requirements of ***R.N. Electronics Ltd.*** test facility quality system. Calibration intervals are regularly reviewed dependent on equipment manufacturer's recommendations and actual usage of the equipment.

RN No.	Model	Description	Manufacturer	Calibration date	Cal period
E010	MN2050	LISN 13A	Chase	02-Oct-2012	12 months
E035	HP11947A	Transient Limiter + 10dB Atten.	Hewlett Packard	19-Aug-2013*	6 months
E150	MN2050	LISN 13A	Chase	02-Oct-2012	12 months
E186	11593A	50 Ohm Load	Hewlett Packard	15-Jan-2013	12 months
E252	6810.19.A	10 dB Attenuator	Suhner	09-May-2013	12 months
E268	BHA 9118	1-18 GHz Horn Antenna	Schaffner	14-Apr-2013	24 months
E410	N5181A	3 GHz MXG Signal Generator	Agilent Technologies	26-Oct-2011	36 months
E411	N9039A	9 kHz - 1 GHz RF Filter Section	Agilent Technologies	18-Oct-2012	12 months
E412	E4440A	3 Hz - 26.5 GHz PSA	Agilent Technologies	18-Oct-2012	12 months
E429	-	5 Switch Filter Box 0.91 GHz - 16.3 GHz	RN Electronics	20-Nov-2012	12 months
E465	PCR2000LA	AC Power Supply	KIKUSUI	09-May-2013	12 months
E533	N5182A	6 GHz MXG Signal Generator	Agilent Technologies	26-Feb-2013	36 months
E534	E4440A	3 Hz - 26.5 GHz PSA	Agilent Technologies	22-Feb-2013	12 months
E535	N9039A	9 kHz - 1 GHz RF Filter Section	Agilent Technologies	22-Feb-2013	12 months
N240	CRT700/3/2C	100v Transformer	N/A	N/A	N/A
TMS78	3160-08	Std Gain Horn Antenna 12.4-18 GHz	ETS Systems	07-Jun-2013	24 months
TMS79	3160-09	Std Gain Horn Antenna 18-26.5 GHz	ETS Systems	07-Jun-2013	24 months
TMS82	8449B	Pre Amplifier 1 - 26 GHz	Agilent	19-Nov-2012	12 months
TMS933	CBL6141A	Bilog Antenna 30MHz - 2GHz	York EMC	12-Jun-2013	36 months

*Equipment was in calibration for tests and has been calibrated since date of tests.

11 Auxiliary equipment

11.1 Customer supplied Equipment

Auxiliary equipment used for the purpose of test supplied by the above has been listed below

No customer supplied equipment was used

11.2 Supplied by RN Electronics Limited

Auxiliary equipment used for the purpose of test supplied by the above has been listed below

RN No.	Model No.	Description	Manufacturer	Serial No
I214	Vostro 1000	Laptop	DELL	(01) 07898349892140
-	-	USB memory stick	-	-

12 Modifications

In order for the EUT to produce the results shown within this report the following modifications, if any, were implemented.

12.1 Modifications before test

There were no modifications made by R.N. Electronics Ltd before testing commenced.

12.2 Modifications during test

There were no modifications made by R.N. Electronics Ltd during testing.

13 Compliance information

Products subject to the Declaration of Conformity procedure are required to be supplied with a compliance information statement. A copy of this statement may be included here:

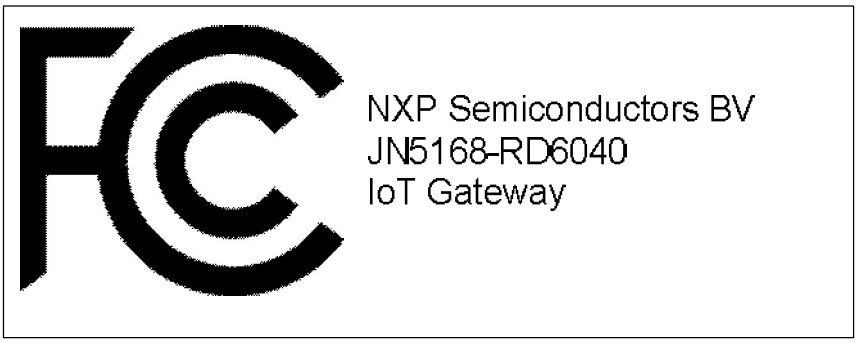
FCC COMPLIANCE INFORMATION STATEMENT
DECLARATION OF CONFORMITY

NXP LABORATORIES (UK) LTD
FURNIVAL STREET
SHEFFIELD
S1 4QT
UNITED KINGDOM
TELEPHONE: +44 (0) 114 281 2655
FACSIMILE: +44 (0) 114 281 2951
E MAIL: info@jennic.c

Manufacturer:	NXP Semiconductors Netherlands B.V
Responsible Party in the USA:	Niel P Smith NXP Semiconductors 411 E. Plumeria Drive San Jose CA 95134 USA Tel 001 408-518 5302
Product:	JN5168-RD6040 IoT Gateway
Authorisation Procedure:	Declaration of Conformity

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

We, NXP Laboratories (UK) Ltd, have determined that the above named equipment has been shown to comply with the applicable technical standards. Furthermore, we warrant that each unit of equipment marketed is identical to the unit tested and found acceptable with the standards. The records maintained continue to reflect the equipment being produced within the variation that can be expected due to quantity production and testing on a statistical basis.



Sheffield, August 2nd, 2013

CONRAD FARLOW, SENIOR RF HARDWARE ENGINEER, NXP LABORATORIES LTD

14 Description of Test Sites

Site A	Radio / Calibration Laboratory and anechoic chamber
Site B	Semi-anechoic chamber
Site B1	Control Room for Site B
Site C	Transient Laboratory
Site D	Screened Room (Conducted Immunity)
Site E	Screened Room (Control Room for Site D)
Site F	Screened Room (AC power line conducted Emissions) VCCI Registration No. C-2823
Site G	Screened Room (Control Room for Site H)
Site H	3m Semi-anechoic chamber (indoor OATS)
Site J	Screened Room
Site K	Screened Room (Control Room for Site M)
Site M	3m Semi-anechoic chamber (indoor OATS) FCC Registration No. 293246
Site Q	Fully-anechoic chamber
Site OATS	3m and 10m Open Area Test Site FCC Registration No. 293246 IC Registration No. 5612A-1 VCCI Registration No. R-2580
Site R	Screened Room (Conducted Immunity)
Site S	Safety Laboratory
Site T	Transient Laboratory

15 Abbreviations and Units

%	Percent
µV	microVolts
µW	microWatts
AC	Alternating Current
ALSE	Absorber Lined Screened Enclosure
AM	Amplitude Modulation
Amb	Ambient
ANSI	American National Standards Institute
ºC	Degrees Celsius
CFR	Code of Federal Regulations
CS	Channel Spacing
CW	Continuous Wave
dB	deciBels
dBµV	deciBels relative to 1µV
dBc	deciBels relative to Carrier
dBm	deciBels relative to 1mW
DC	Direct Current
EIRP	Equivalent Isotropic Radiated Power
ERP	Effective Radiated Power
EUT	Equipment Under Test
FCC	Federal Communications Commission
FM	Frequency Modulation
FSK	Frequency Shift Keying
g	Grams
GHz	GigaHertz
Hz	Hertz
IF	Intermediate Frequency
kHz	kiloHertz
LO	Local Oscillator
mA	milliAmps
max	maximum
mbar	milliBars
MHz	Megahertz
min	minimum
mm	millimetres
ms	milliseconds
mW	milliWatts
NA	Not Applicable
nom	Nominal
nW	nanoWatt
OATS	Open Area Test Site
OFDM	Orthogonal Frequency Division Multiplexing
ppm	Parts per million
QAM	Quadrature Amplitude Modulation
QPSK	Quadrature Phase Shift Keying
Ref	Reference
RF	Radio Frequency
RTP	Room Temperature and Pressure
s	Seconds
Tx	Transmitter
V	Volts