



FCC 47CFR part 15C

Test Report

For

Monitor Interface Device (MID)

MID2

Reference Standard: FCC 47CFR part 15C

Manufacturer: Serco Geografix Ltd

For type of equipment and serial number, refer to section 3

Report Number: 08-7047-4-13 Issue 02

Supersedes report no. 08-7047-4-13 Issue 01

Report Produced by: -

R.N. Electronics Ltd.

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Certificate of Test 7047-4

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:	Monitor Interface Device (MID)
Model Number:	MID2
Proposed FCC ID:	Not stated
Unique Serial Number:	916
Manufacturer:	Serco Geografix Ltd Hurricane Way Norwich NR6 6EW
Full measurement results are detailed in Report Number:	08-7047-4-13 Issue 02
Test Standards:	FCC 47CFR Part 15.249 effective date October 1st 2011 , Class DXT Intentional Radiator

DEVIATIONS:

No deviations from the standards have been applied..

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 Federal Regulations, 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 the FCC 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: 17th July 2013 – 27th August 2013

Test Engineer: Graham Blake

Approved By:
Technical Director

Customer Representative

1 Contents

1	Contents	3
2	Equipment Under Test (EUT)	4
2.1	Equipment Specification	4
2.2	EUT Configurations for testing	5
2.3	Functional Description	5
2.4	EUT Modes	5
2.5	Emissions Configuration	6
3	Summary of test results	7
4	Specifications	8
4.1	Deviations	8
4.2	Tests at Extremes of Temperature & Voltage	8
4.3	Measurement Uncertainties	8
5	Tests, Methods and Results	9
5.1	AC power line conducted emissions	9
5.2	Intentional radiator field strength	11
5.3	Radiated emissions	13
5.4	Frequency stability	16
5.5	Occupied bandwidth	17
5.6	Band Edge	18
5.7	Duty cycle	18
6	Plots and Results	19
6.1	AC power line conducted emissions plots	19
6.2	Intentional radiator field strength plots	22
6.3	Radiated emissions plots	22
6.4	20dB bandwidth bandwidth plots	30
7	Explanatory Notes	31
7.1	Explanation of Table of Signals Measured	31
7.2	Explanation of limit line calculations for radiated measurements	32
8	Photographs	33
8.1	Test set-up, spurious emissions	33
9	Signal Leads	39
10	Test Equipment Calibration list	40
11	Auxiliary equipment	41
11.1	Customer supplied Equipment	41
11.2	Supplied by RN Electronics Limited	41
12	Modifications	42
12.1	Modifications before test	42
12.2	Modifications during test	42
13	Compliance information	43
14	Description of Test Sites	44
15	Abbreviations and Units	45

2 Equipment Under Test (EUT)

2.1 Equipment Specification

Applicant	Serco Geografix Ltd Hurricane Way Norwich NR6 6EW												
Manufacturer of EUT	Serco Geografix Ltd												
Brand name of EUT	Monitor Interface Device (MID)												
Model Number of EUT	MID2												
Serial Number of EUT	916												
Date when equipment was received by RN Electronics	8th July 2013												
Date of test:	17 th July 2013 – 27 th August 2013												
Visual description of EUT:	A small plastic enclosure with a membrane push-button interface pad on the upper side. The unit is powered by an internal battery, which can be charged using the supplied mains charger. A micro USB port is provided for charging purposes only.												
Main function of the EUT:	Remote control of a 'Personal Identity Device' used in an Offender Monitoring System.												
Height	99 mm												
Width	58 mm												
Depth	21 mm												
Weight	0.065 kg												
Voltage	3.3 - 4V												
Current required from above voltage source	6 - 45mA												
EUT supplied charger:	<table border="1"><tr><td>Manufacturer</td><td>PHIHONG</td></tr><tr><td>Model number</td><td>PSB05R-050Q</td></tr><tr><td>Serial number</td><td>P12902564A3</td></tr><tr><td>Input voltage</td><td>100-240V 50-60 Hz</td></tr><tr><td>Input current</td><td>200 mA</td></tr><tr><td>Output</td><td>5 V DC 1 A</td></tr></table>	Manufacturer	PHIHONG	Model number	PSB05R-050Q	Serial number	P12902564A3	Input voltage	100-240V 50-60 Hz	Input current	200 mA	Output	5 V DC 1 A
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Model number	PSB05R-050Q												
Serial number	P12902564A3												
Input voltage	100-240V 50-60 Hz												
Input current	200 mA												
Output	5 V DC 1 A												

2.2 EUT Configurations for testing

General parameters	
EUT Normal use position	Handheld
Antenna details	Internal
Antenna port	No
Baseband Data port (yes/no)?	No
Highest Signal generated in EUT	915.15 MHz
Lowest Signal generated in EUT	32.768 kHz
TX Parameters	
Alignment range – transmitter	902 – 928 MHz
EUT Declared Modulation Parameters	FSK 4800 Baud
EUT Declared Power level	0 dBm
EUT Declared Signal Bandwidths	52.75kHz
EUT Declared Channel Spacing's	Single Channel
EUT declared Duty Cycle	Random, 45 ms transmission every 45 – 75 seconds
Unmodulated carrier available?	Yes
Declared frequency stability	+/- 30 ppm (over -20 deg. C to 70 deg. C
RX Parameters	
Alignment range – receiver	902 -928 MHz
EUT Declared RX Signal Bandwidth	101.6 kHz

2.3 Functional Description

The MID2 is a device used to communicate with 'Personal Identity Device' tags to change their settings and also to deactivate them. Data is send over a radio link operating at a single frequency of 915.15 MHz. The user interface consists of a number of membrane type push-button switches, and a single LED status light. The unit has an internal battery which is charged via a micro USB connector on the side of the unit. The USB port provides no other function to the user. The EUT is supplied with a mains powered charger.

2.4 EUT Modes

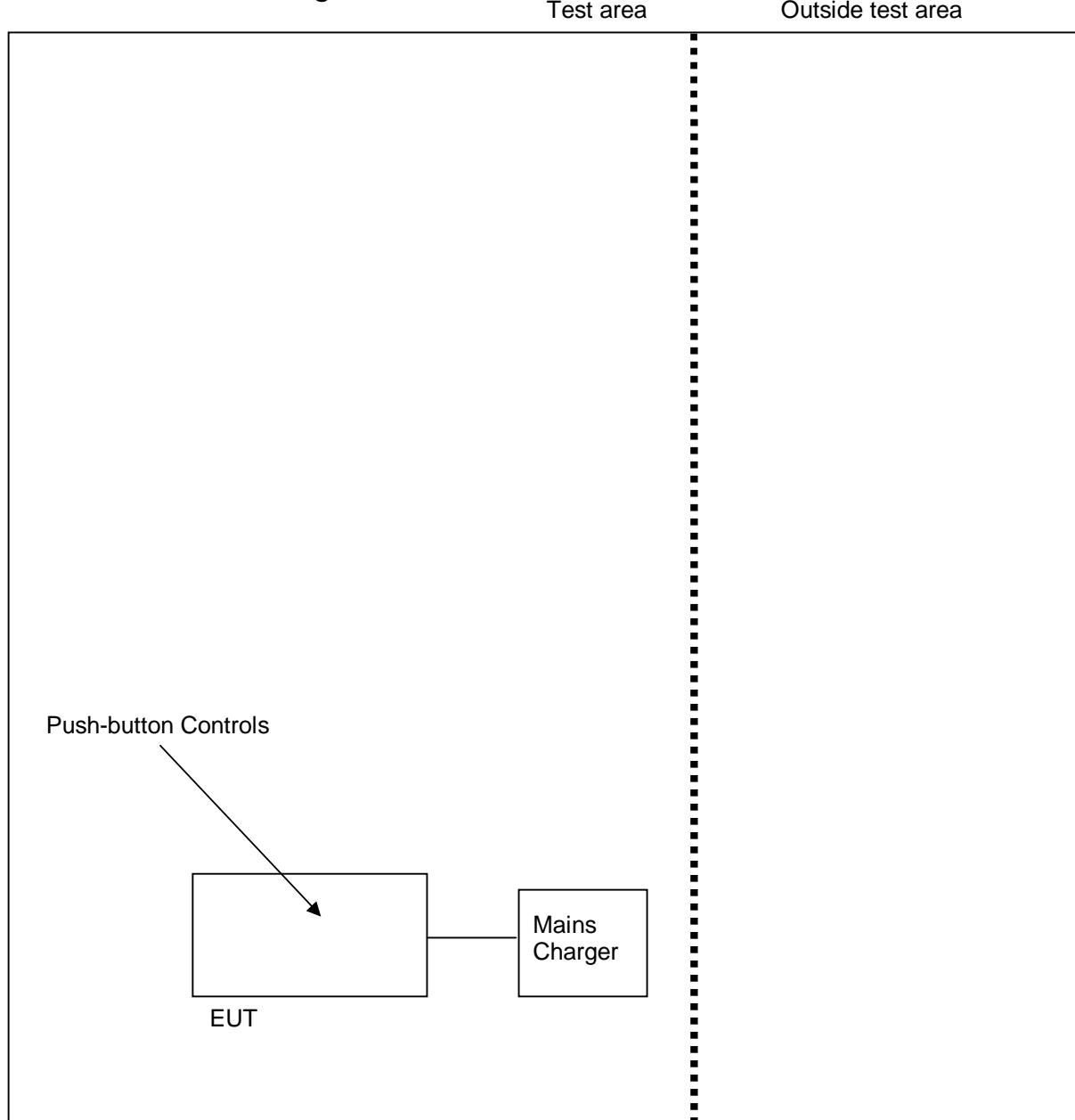
Mode Reference	Description	Used for testing
TX	Transmitting continuously	Yes

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: 15 May 2014

2.5 Emissions Configuration



The unit was powered from the dedicated mains charger as this was deemed to be the worst case. The charger was powered using a 110V AC supply. To enable faster testing, the unit was configured using the engineering software to allow the unit to transmit continuously. The RF output power was set to 0dBm as stated by the manufacturer. The transmit mode was 100% continuous with FSK modulation applied.

3 Summary of test results

The **Monitor Interface Device (MID)** was tested to the following standards: -

FCC 47CFR Part 15.249 (effective date October 1st, 2011); Class DXT 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	ANSI C63.10 §6.2.	PASSED
2. Intentional radiator field strength	ANSI C63.10 §6.10.	PASSED
3. Radiated emissions	ANSI C63.10 §6.4 – 6.6.	PASSED
4. Frequency stability	ANSI C63.10 §6.8.	NOT APPLICABLE ¹
5. Occupied bandwidth	ANSI C63.10 §6.9.	PASSED
6. Band Edge		PASSED
7. Duty cycle	ANSI C63.10 §7.5.	NOT APPLICABLE

¹ EUT is not for fixed, point-to-point operation, therefore no limits are specified.

4 Specifications

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, ANSI C63.10-2009, FCC Part 15 and those specifications incorporated by reference into 47CFR15 (e.g. ANSI C63.4-2003).

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

4.1 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.

4.2 Tests at Extremes of Temperature & Voltage

Not required

4.3 Measurement Uncertainties

Parameter	Uncertainty
Transmitter Tests	
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
Conducted spurious emissions	± 2.8 dB
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

Test Method:

FCC Part 15C, Reference (15.207)
ANSI C63.10, Reference (6.2.)

5.1.2 Configuration of EUT

The EUT was placed on a wooden table 0.8m above the ground plane and the mains charger was connected to a LISN via a 1m mains cable. The mains charger was powered using 110VAC.

The EUT was operated in TX mode.

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

See Section 10 for more details.

5.1.5 Test results

Ambient conditions.

Ambient conditions:
Temperature: 25 °C

Relative humidity: 48 %

Analyser plots for the Quasi-Peak / Average values as applicable can be found in Section 6.1 of this report.

Table of signals measured.

Quasi-Peak and Average Live (Mains)

Signal No.	Freq (MHz)	Peak Amp (dBuV)	QP Amp (dBuV)	QP - Lim1 (dB)	AV Amp (dBuV)	AV - Lim1 (dB)
1	0.168	44.4	42.1	-23.0	31.0	-24.1
2	0.585	38.3	36.5	-19.5	31.8	-14.2
3	0.930	23.4	24.3	-31.7	12.7	-33.3
4	2.734	27.0	18.7	-37.3	14.6	-31.4

Table of signals measured.

Quasi-Peak and Average Neutral (Mains)

Signal No.	Freq (MHz)	Peak Amp (dBuV)	QP Amp (dBuV)	QP - Lim1 (dB)	AV Amp (dBuV)	AV - Lim1 (dB)
1	0.261	34.3	32.4	-29.0	25.8	-25.6
2	0.586	36.0	34.0	-22.0	29.1	-16.9
3	0.869	20.4	16.5	-39.5	11.7	-34.3

Plot reference tables

Frequency range	Plot reference
150kHz to 30MHz	7047-1 Cond 1 AC Live 150k-30M Average
150kHz to 30MHz	7047-1 Cond 1 AC Live 150k-30M Quasi-Peak
150kHz to 30MHz	7047-1 Cond 1 AC Neutral 150k-30M Average
150kHz to 30MHz	7047-1 Cond 1 AC Neutral 150k-30M Quasi-Peak

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

5.2 Intentional radiator field strength

5.2.1 Test Methods

Test Requirements	FCC Part 15C, Reference (15.249 a)
Test Method:	ANSI C63.10, Reference (6.3 / 6.5)

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 rotated in all three orthogonal planes to maximise the emission. Final measurements were taken at 3m. The EUT was operated in TX mode for this test. The RF output power of the EUT was set to 0dBm, as per the manufacturer.

5.2.3 Test Procedure

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

Measurements were made in an OATS. This site is listed with the FCC.

Both the equipment and the antenna were rotated 360° to record the maximised emission.

Tests were performed using Test Site OATS.

5.2.4 Test Equipment used

TMS903, E226

See Section 10 for more details

5.2.5 Test results

Ambient conditions.

Temperature: 24°C

Relative humidity: 50 %

Pressure: 102 kPa

Radio Parameter 1

Band	902-928 MHz
Power level	0 dBm
Channel spacing	n/a
Mod scheme	FSK
Low channel	915.15 MHz

Duty Cycle Table relating to Radio Parameters 1

	Low
Duty Cycle (%)	100
Duty Cycle correction	0

Results relating to Radio Parameters 1

	Low
QP Level (dBμV/m)	86.7
Plot reference	J7047-1 MID2 OATS ERP Horizontal EUT vert
Antenna Polarisation	Horizontal
EUT Polarisation	Vertical

	Low
QP Level (dBμV/m)	85.0
Plot reference	J7047-1 MID2 OATS ERP Vertical EUT upright
Antenna Polarisation	Vertical
EUT Polarisation	Upright

Any Analyser plots can be found in Section 6.2 of this report.

LIMITS:

15.249(a) 50 mV/m @ 3m (94 dB μ V/m @ 3m).

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

5.3 Radiated emissions

Radiated emissions 30MHz-1GHz
Radiated emissions above 1GHz

5.3.1 Test Methods

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

5.3.2 Configuration of EUT

The EUT was placed on a 0.8 metres high turntable. The EUT was measured at a distance of 3 metres. Radiated Emissions testing was performed with the mains charger connected as this was deemed to be the worst case. The mains charger was powered using 110VAC. The RF output power of the EUT was set to 0dBm, as per the manufacturer. The EUT was operated in TX mode.

5.3.3 Test Procedure

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

30MHz - 1GHz, pre-scans were made in a semi anechoic chamber, followed by final measurements on a site registered with 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.

The EUT was investigated in three orthogonal planes.

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 30MHz-1GHz – Tests were performed using Test Site B and OATS.

Radiated emissions above 1 GHz – Tests were performed using Test Site B.

5.3.4 Test Equipment used

Radiated emissions 30MHz - 1GHz – TMS903, E226, E533, E534, E535, E555.
Radiated emissions above 1 GHz – E428, E533, E534, E535, TMS82, E497, E555.

See Section 10 for more details.

5.3.5 Test results

Ambient conditions (Radiated emissions 30MHz-1GHz)
Temperature: 21 °C Relative humidity: 59 %

Ambient conditions (Radiated emissions above 1 GHz)
Temperature: 21 °C Relative humidity: 59 %

Analyser plots showing Peak values can be found in Section 6.3 of this report.

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

5.3.5.1 Below 30MHz.

Not applicable.

5.3.5.2 30MHz - 1GHz.

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

Frequency Range	Antenna Polarisation	Plot reference
30 – 300 MHz	Horizontal	7047-1 VHF Horiz
30 – 300 MHz	Vertical	7047-1 VHF Vert
300 – 1000 MHz	Horizontal	7047-1 UHF Horiz
300 – 1000 MHz	Vertical	7047-1 UHF Vert

Signal No.	Freq (MHz)	Peak Amp (dBuV)	QP Amp (dBuV)	QP - Lim1 (dB)
1	44.767	28.3	22.4	-17.6
2	49.476	30.5	26.0	-14.0
3	52.510	30.4	25.9	-14.1
4	61.304	22.6	16.3	-23.7
5	70.227	26.3	21.6	-18.4
6	81.720	26.9	22.5	-17.5

5.3.5.3 Above 1GHz.

Radio Parameters 1

Band	902-928 MHz
Power level	0 dBm
Channel spacing	n/a
Mod scheme	FSK
Bottom channel	915.15 MHz

Results relating to Radio Parameters 1

Spurious Frequency (MHz)	Measured Peak Level (dB μ V/m)	Difference to Peak Limit (dB)	Measured Average Level (dB μ V/m)	Difference to Average Limit (dB)	Antenna Polarisation	EUT Polarisation
1830.3	49.47	-24.53	48.08	-5.92	Vertical	Upright
3660.6	43.24	-10.76	33.99	-20.01	Vertical	Upright
5490.9	46.34	-27.66	38.31	-15.69	Vertical	Upright
1830.3	47.79	-26.21	46.33	-7.67	Horizontal	Flat
3660.6	43.71	-10.29	34.42	-19.58	Horizontal	Flat
5490.9	45.21	-28.79	35.96	-18.04	Horizontal	Flat
8236.35	50.1	-3.9	41.9	-12.1	Horizontal	Flat

Plot reference table

Frequency Range	Antenna Polarisation	Plot reference
1GHz - 3GHz	Horizontal	J7047-1 MID916, 1-3GHz Horizontal
1GHz - 3GHz	Vertical	J7047-1 MID916, 1-3GHz Vertical
3GHz - 5GHz	Horizontal	J7047-1 MID916, 3-5GHz Horizontal
3GHz - 5GHz	Vertical	J7047-1 MID916, 3-5GHz Vertical
5GHz - 6GHz	Horizontal	J7047-1 MID916, 5-6GHz Horizontal
5GHz - 6GHz	Vertical	J7047-1 MID916, 5-6GHz Vertical
6GHz - 7.8GHz	Horizontal	J7047-1 MID916, 6-7.8GHz Horizontal
6GHz - 7.8GHz	Vertical	J7047-1 MID916, 6-7.8GHz Vertical
7.8GHz - 10GHz	Horizontal	J7047-1 MID916, 7.8-10GHz Horizontal
7.8GHz - 10GHz	Vertical	J7047-1 MID916, 7.8-10GHz Vertical

LIMITS:

15.209 limits are applicable in the restricted bands of 15.205 with the relevant detector.

15.249(a) harmonics must not exceed 500 / 2500 (54 / 68 dB) μ V/m @ 3m.

15.249(d) other emissions, outside the intentional band, must be attenuated by at least 50dB 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.

5.4 Frequency stability

NOT APPLICABLE: The EUT is not for fixed, point-to-point operation, therefore no limits are specified.

5.5 Occupied bandwidth

5.5.1 Test Methods

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

5.5.2 Configuration of EUT

The EUT was placed on a 0.8 metres high turntable, and was measured at a distance of 3 metres. The EUT was operated in TX mode. The RF output power of the EUT was set to 0dBm, as per the manufacturer.

5.5.3 Test Procedure

Tests were performed using Test Site OATS.

Tests were made in accordance with FCC Part 15 using the measuring equipment noted below. A 10kHz RBW, 3x VBW, auto sweep time and max hold settings were used for the 20dB bandwidth.

5.5.4 Test Equipment used

TMS903, E226

See Section 10 for more details.

5.5.5 Test results

Ambient conditions.

Temperature: 24 °C

Relative humidity: 50 %

Pressure: 102 kPa

Analyser plots for the 20dB bandwidth can be found in Section 6.4 of this report.

Radio Parameter 1

Band	902-928 MHz
Power level	0 dBm
Channel spacing	n/a
Mod scheme	FSK
Low channel	915.15 MHz

Results relating to Radio Parameters 1

	Low
20dB BW (MHz)	0.04361
Plot reference	J7047-1 MID 20dB OBW Horizontal EUT vert

LIMITS:

15.215(c) The 20dB bandwidth of the emission must be contained within the designated frequency band.
The restricted band edges closest to the EUT frequency of 915.15 MHz are 614 & 960MHz.

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

5.6 Band Edge

Please refer to the bandwidth plots shown in section 6.4

LIMITS:

The emissions should remain within the band.

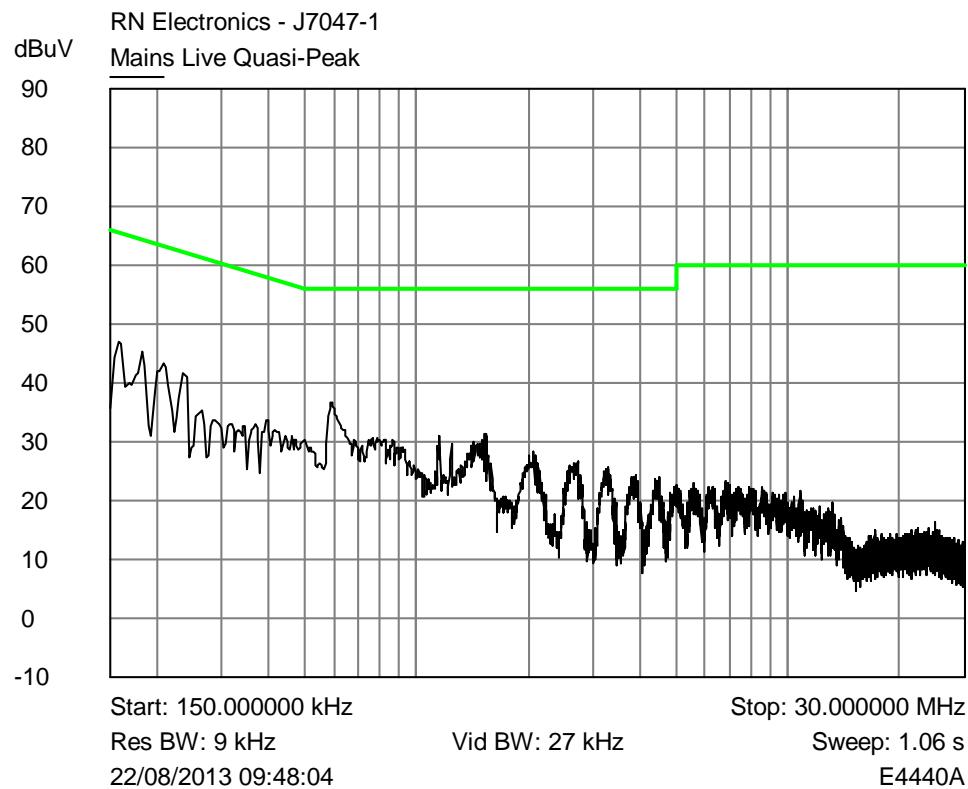
These results show that the EUT has **PASSED** this test.

5.7 Duty cycle

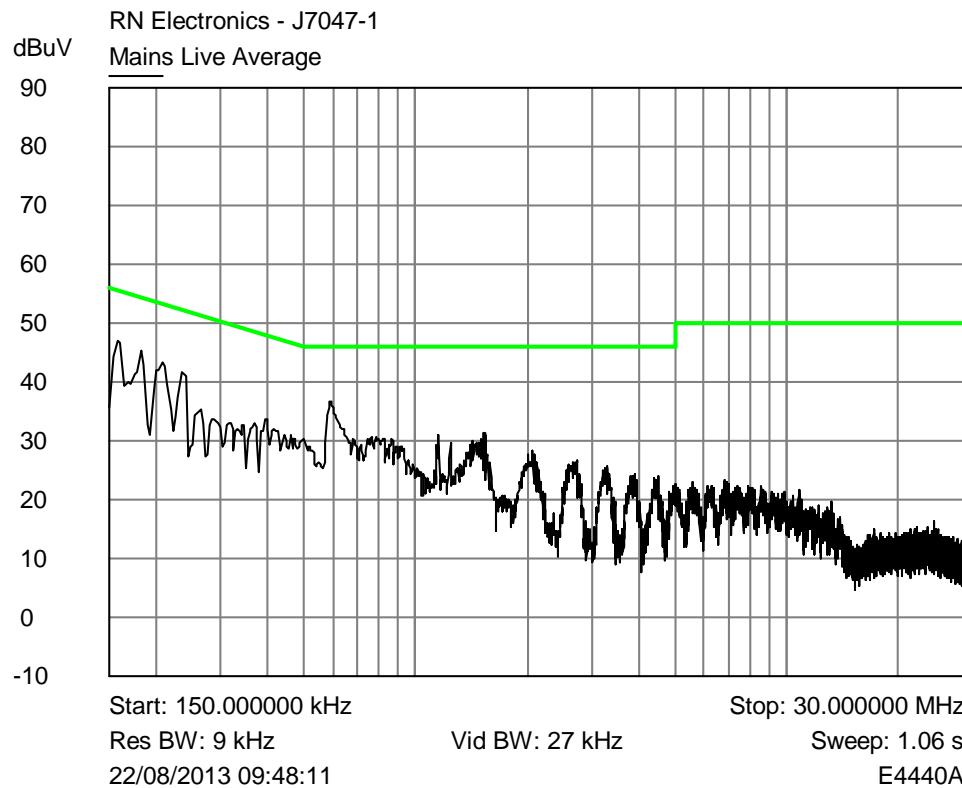
Not applicable

6 Plots and Results

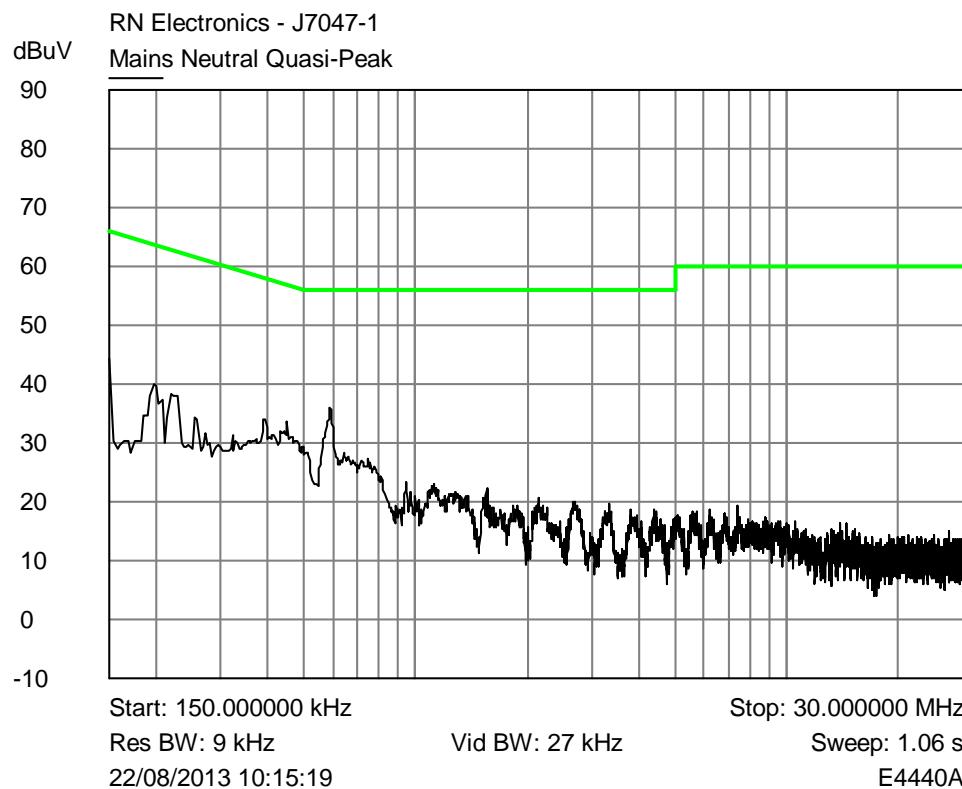
6.1 AC power line conducted emissions plots



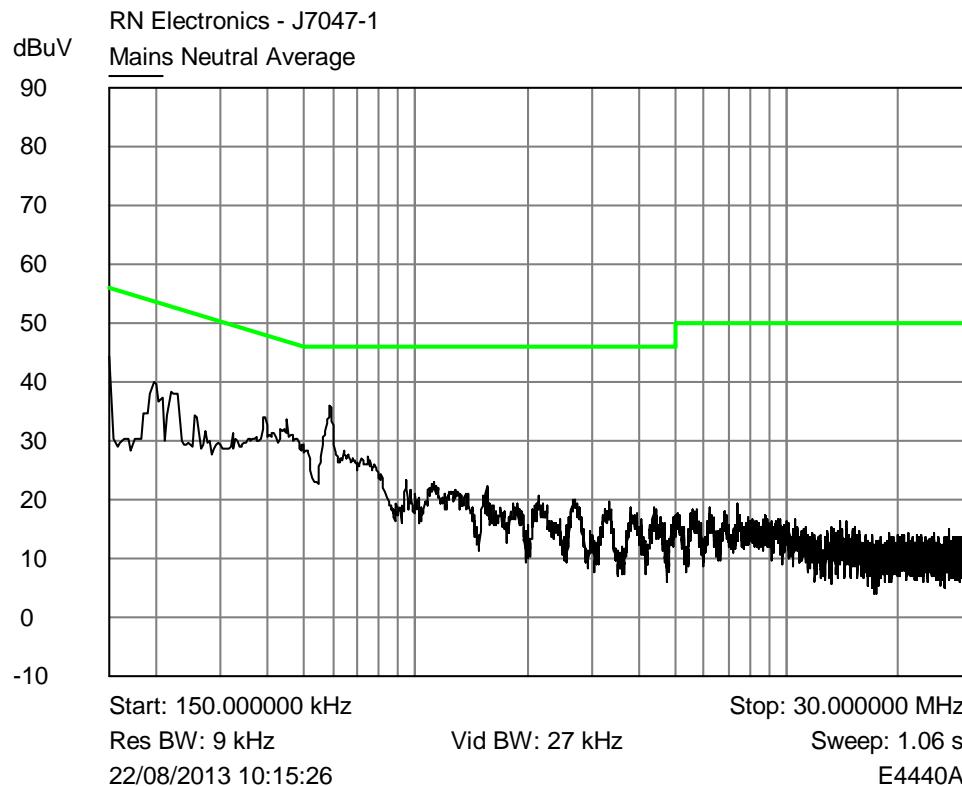
**Plot of peak emissions 150kHz - 30MHz on the Mains live terminal
against the quasi-peak limit line.**



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



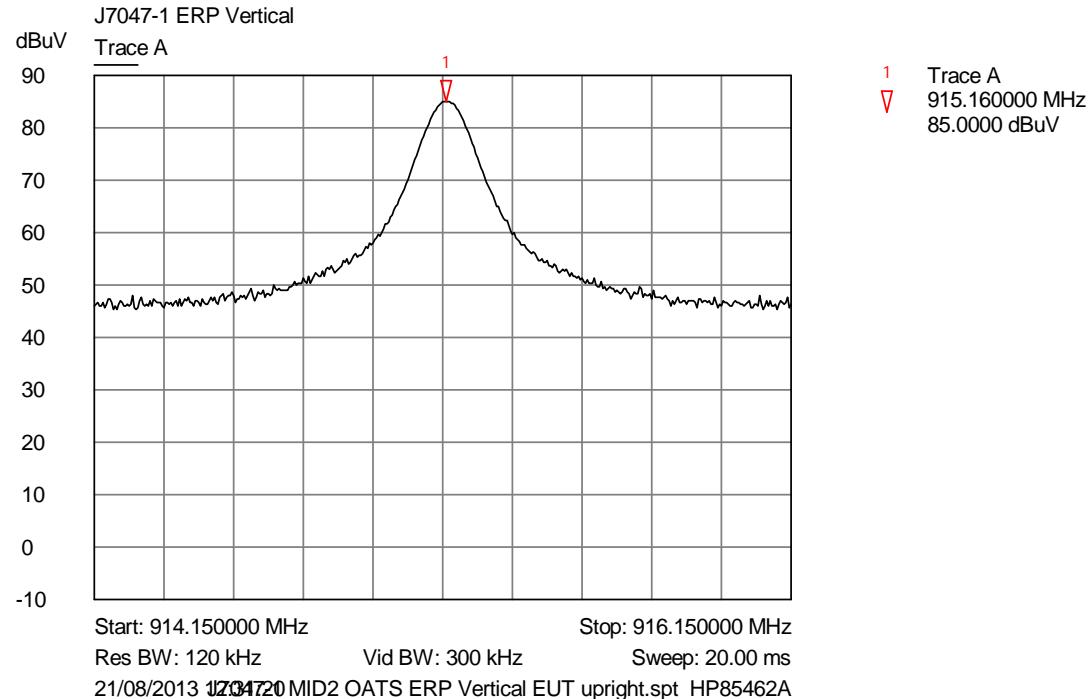
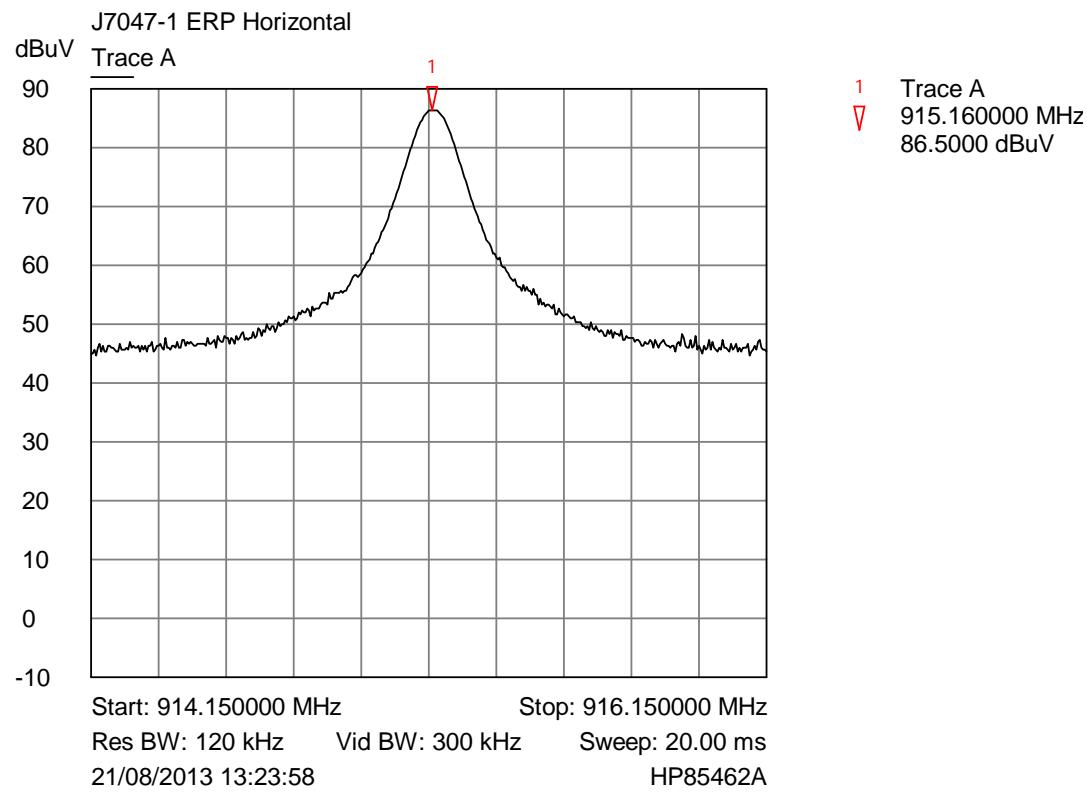
Plot of peak emissions 150kHz - 30MHz on the Mains neutral terminal against the quasi-peak limit line.



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

6.2 Intentional radiator field strength plots

6.2.1 Plots for Band 902-928 MHz, Power 0 dBm and FSK Modulation



6.3 Radiated emissions plots

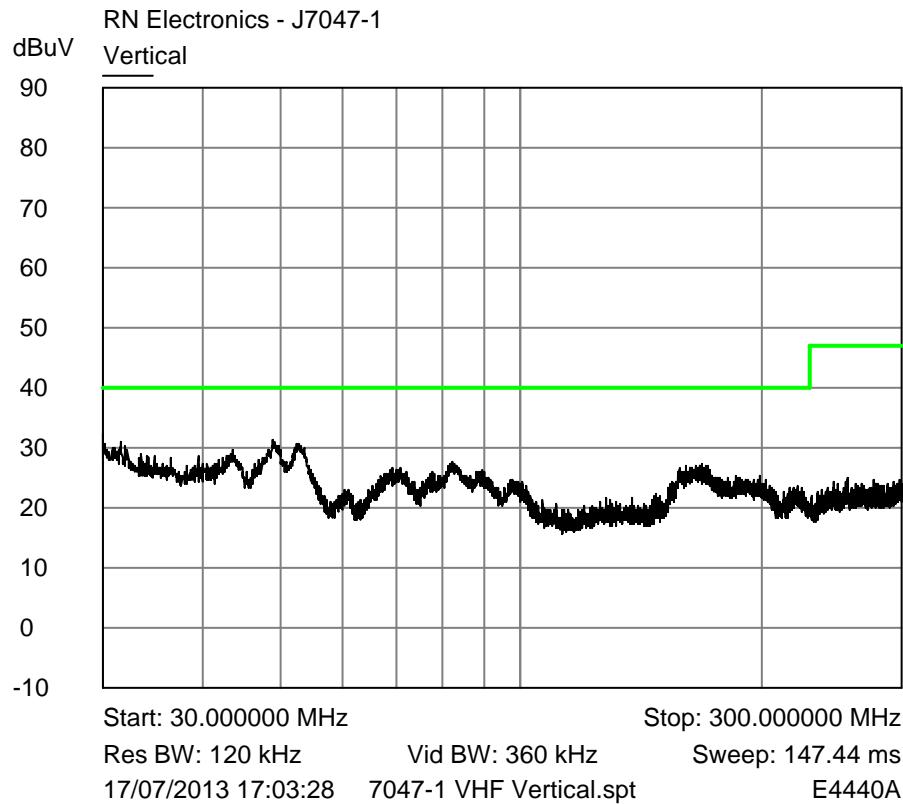
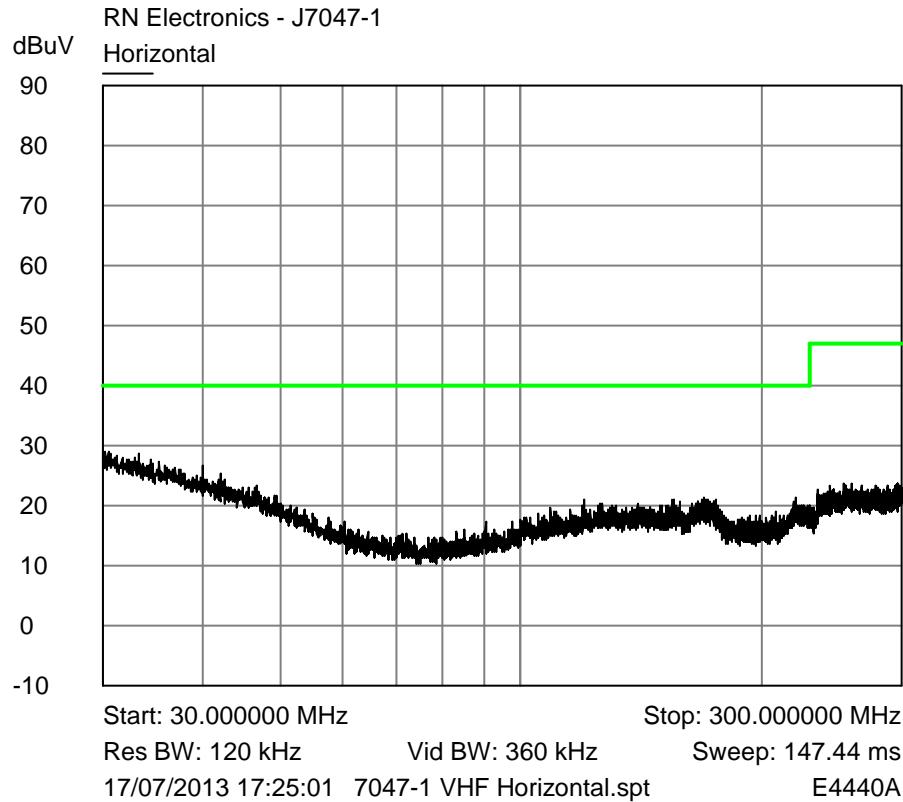
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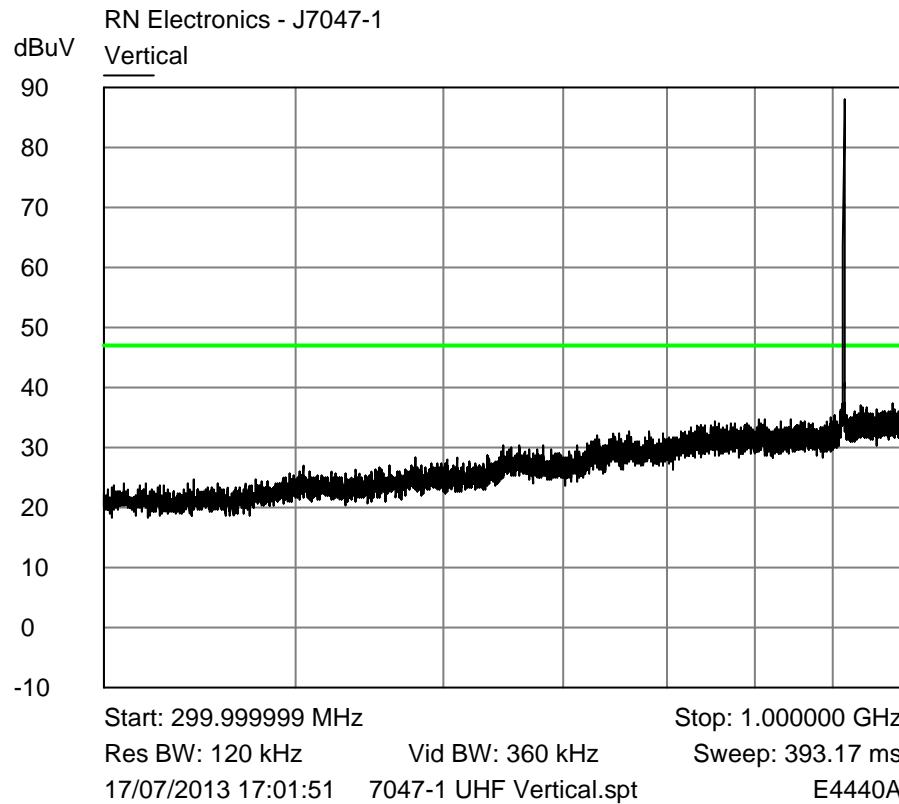
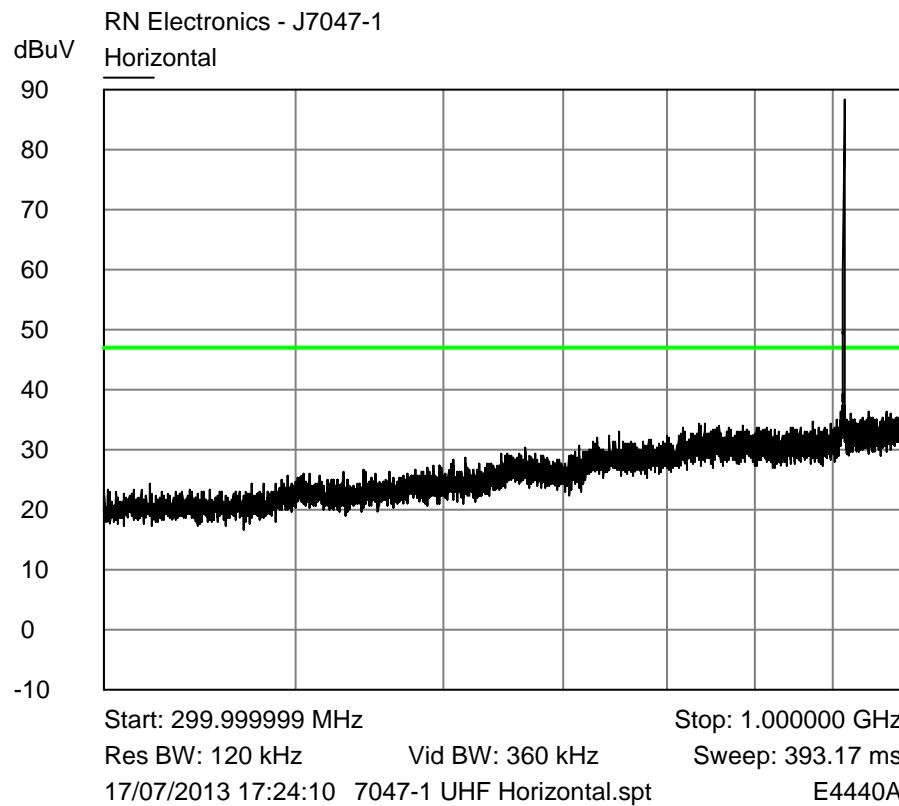
The contents of this report, apart from the referenced ANSI C63.4-2003, are beyond the scope of UKAS Testing Laboratory No. 2360 accreditation.

QMF21J – 4; 47CFR15.249, RNE ISSUE 01 AUG 2013

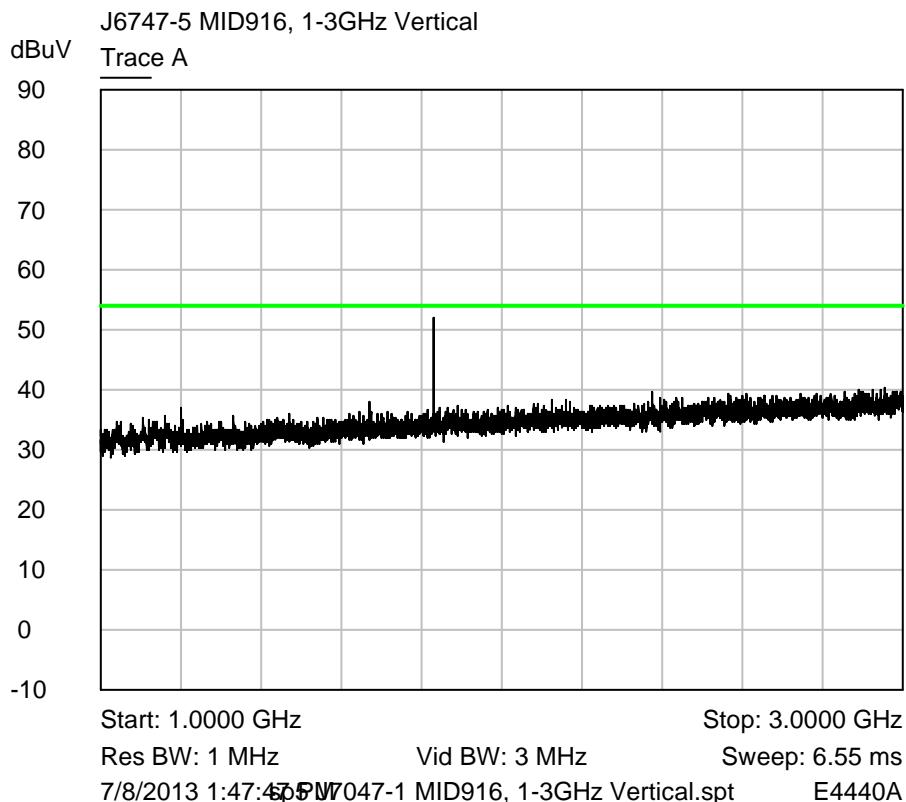
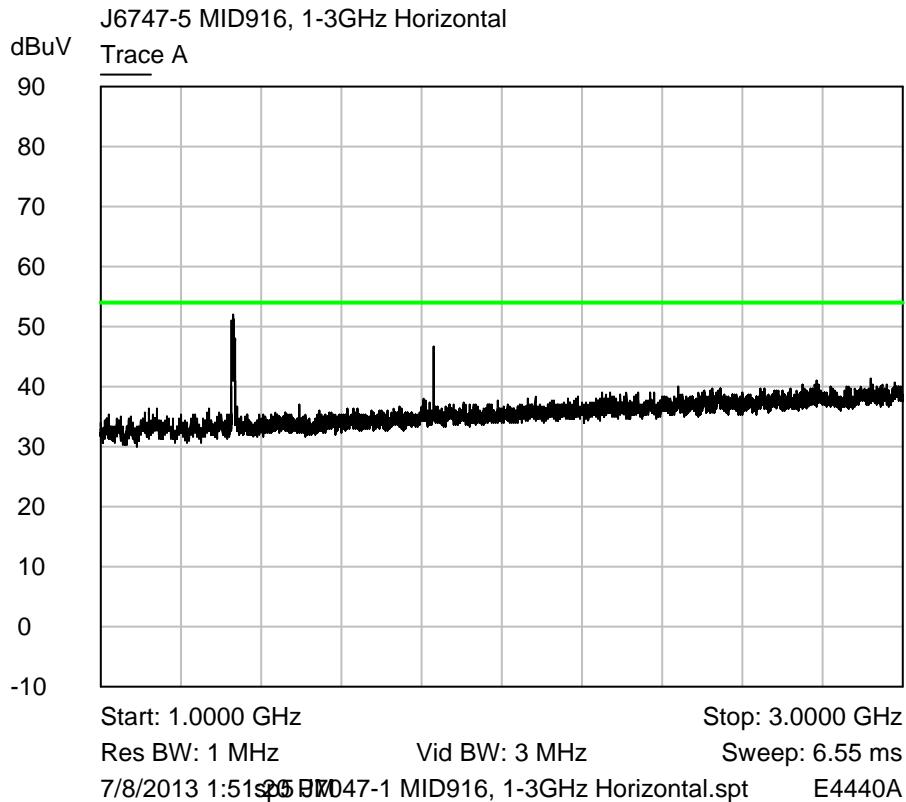
PAGE 22 OF 45

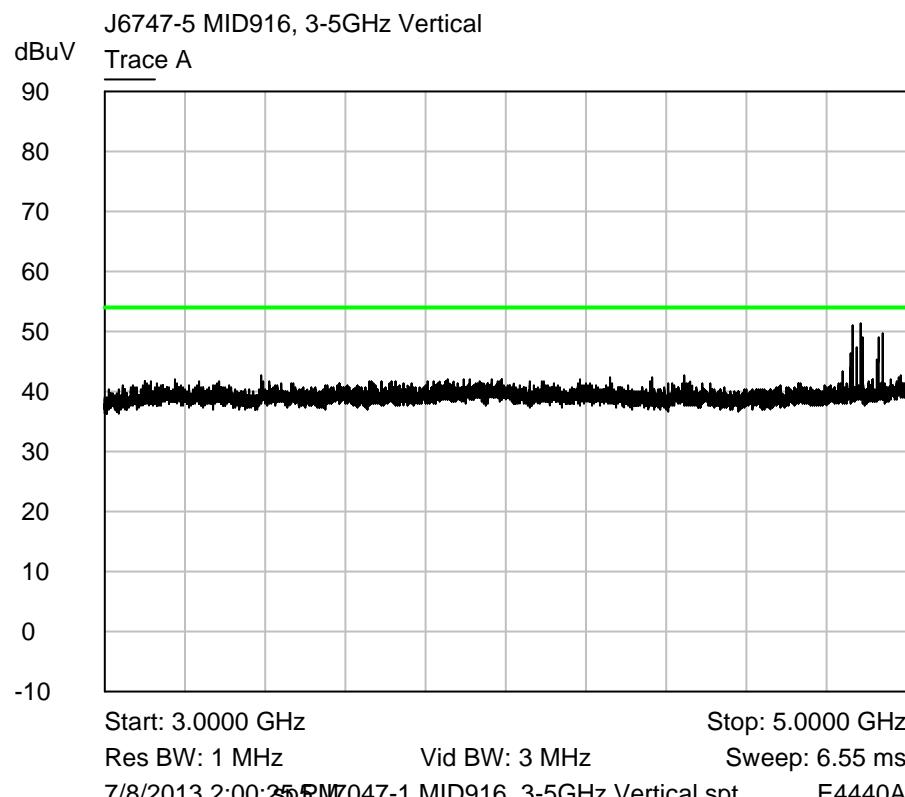
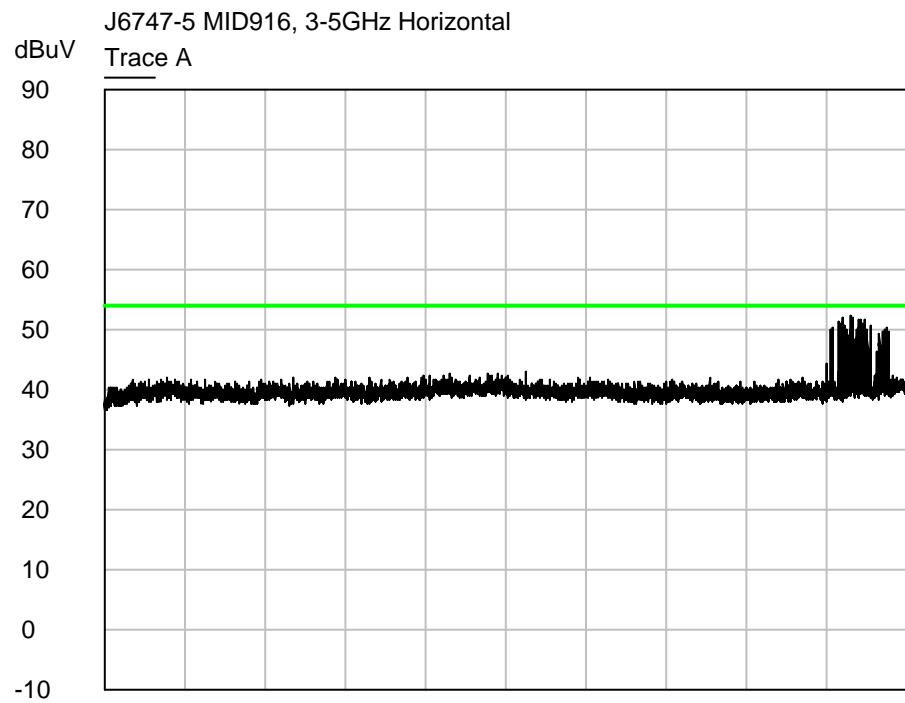
6.3.1 Radiated emissions - 30MHz - 1GHz

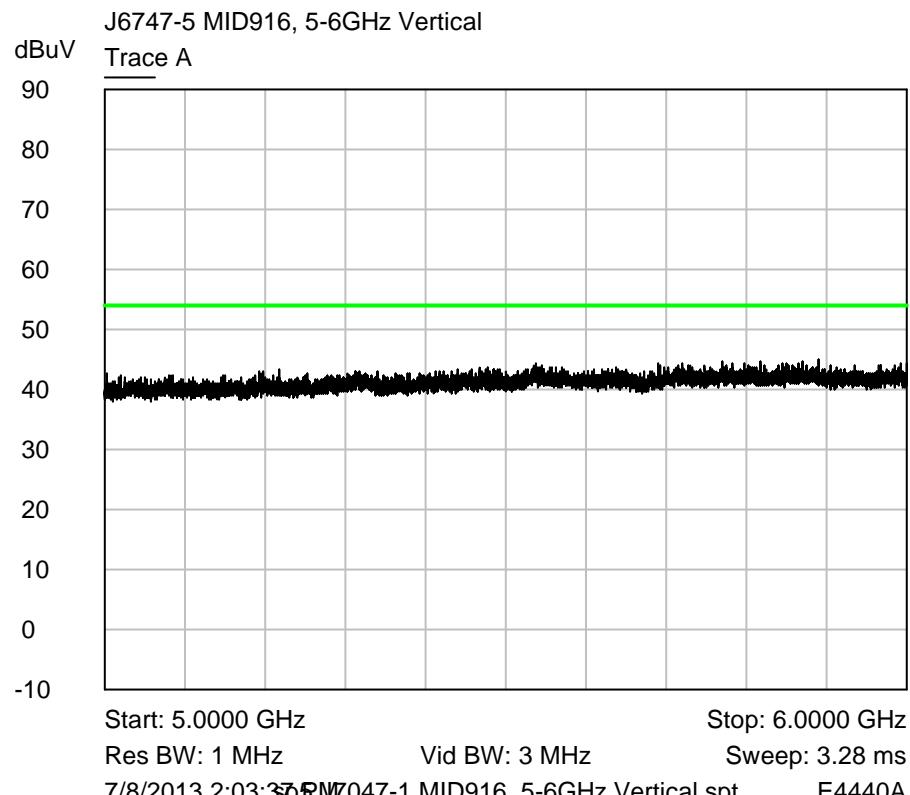
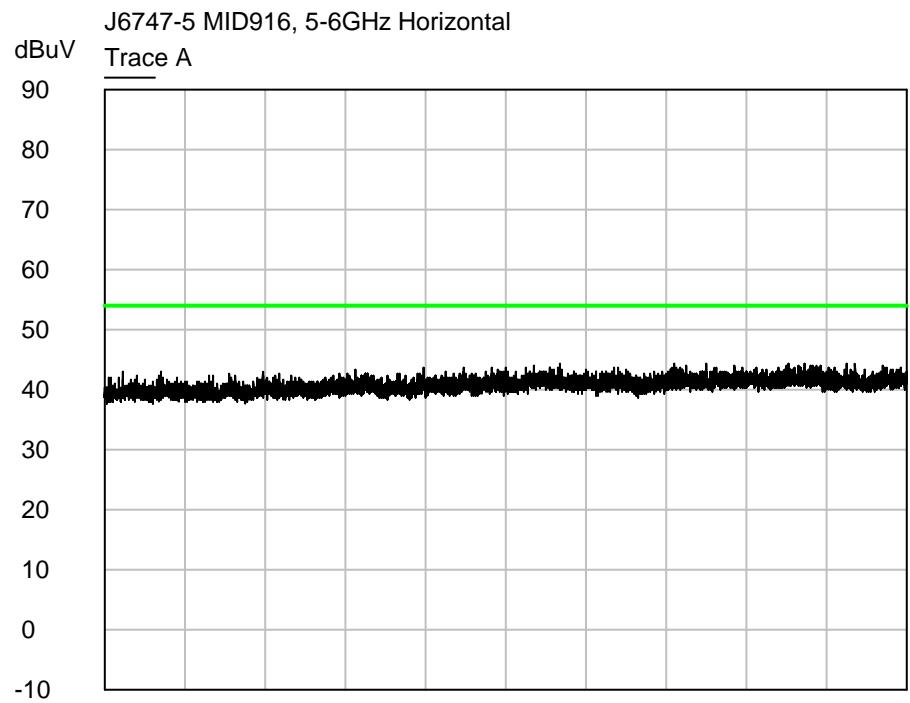


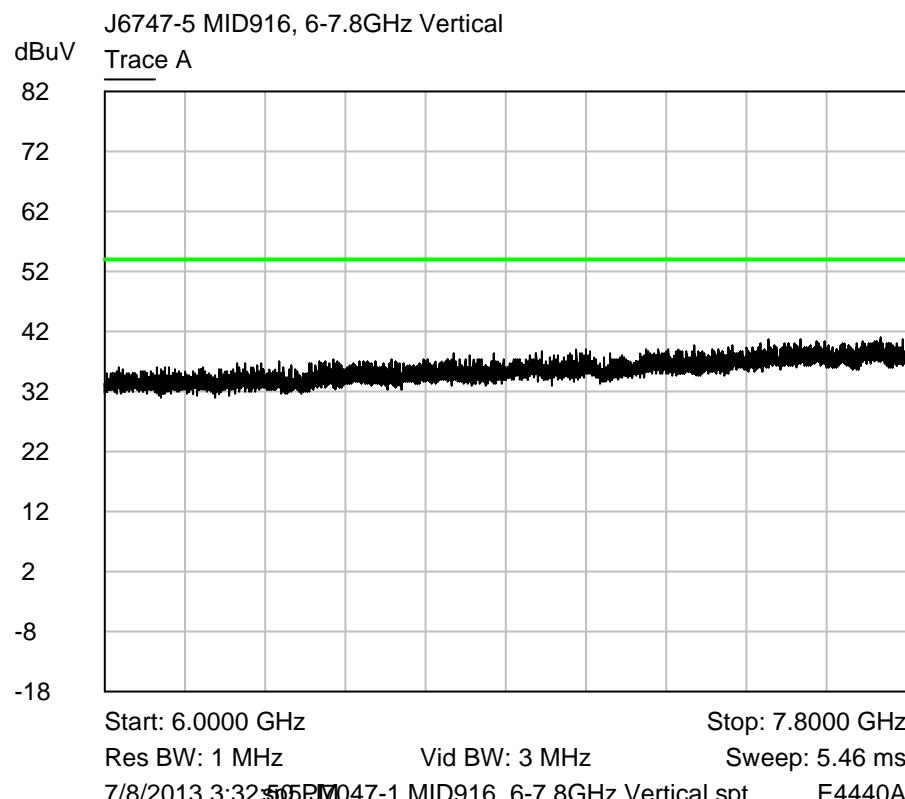
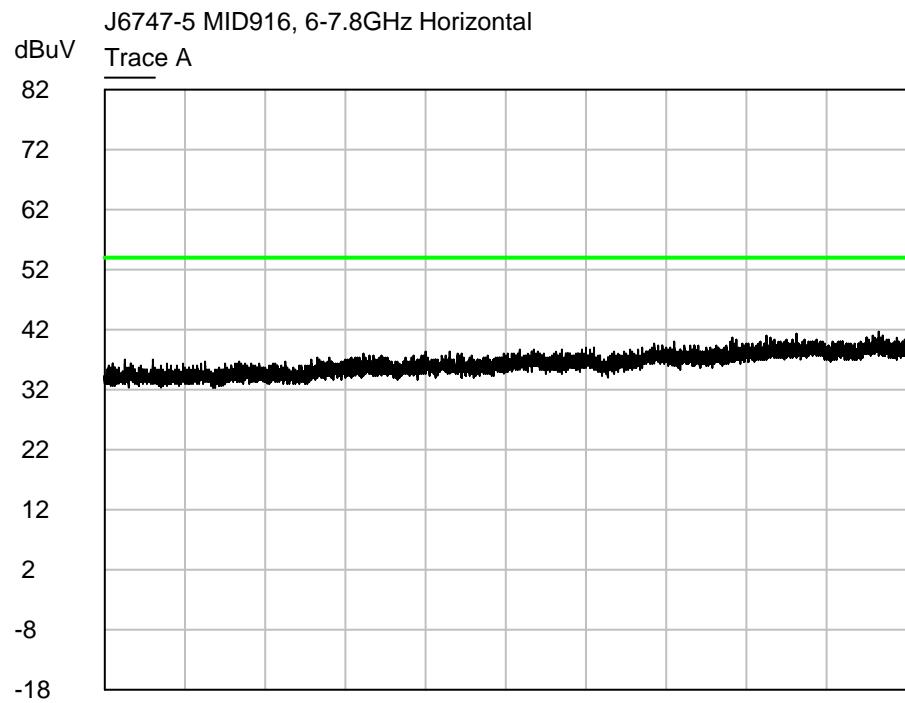


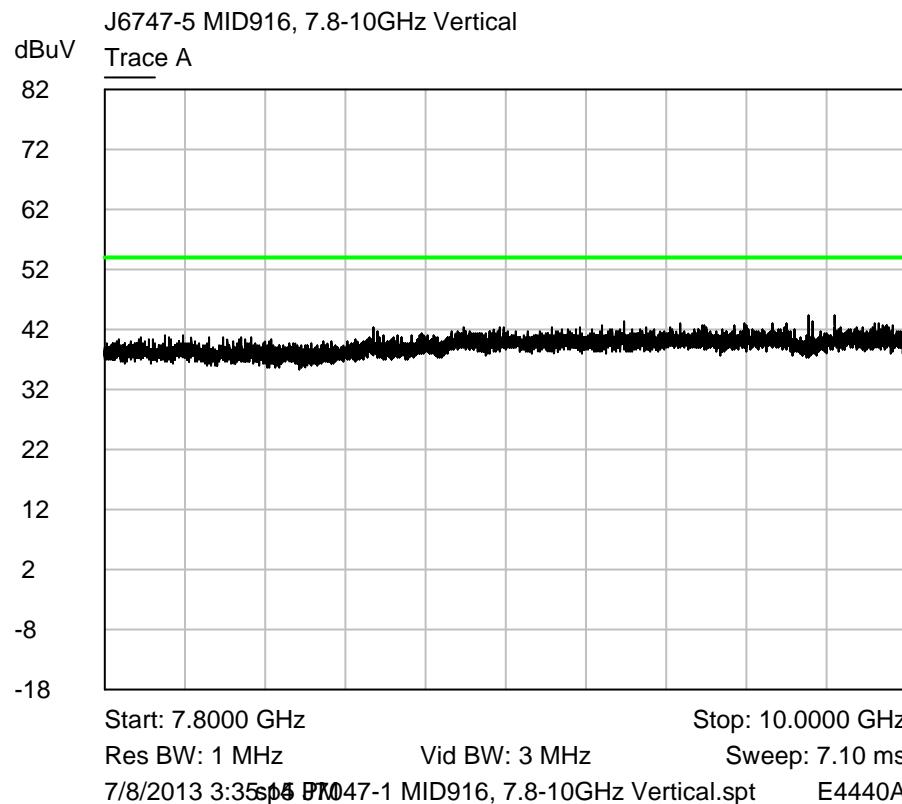
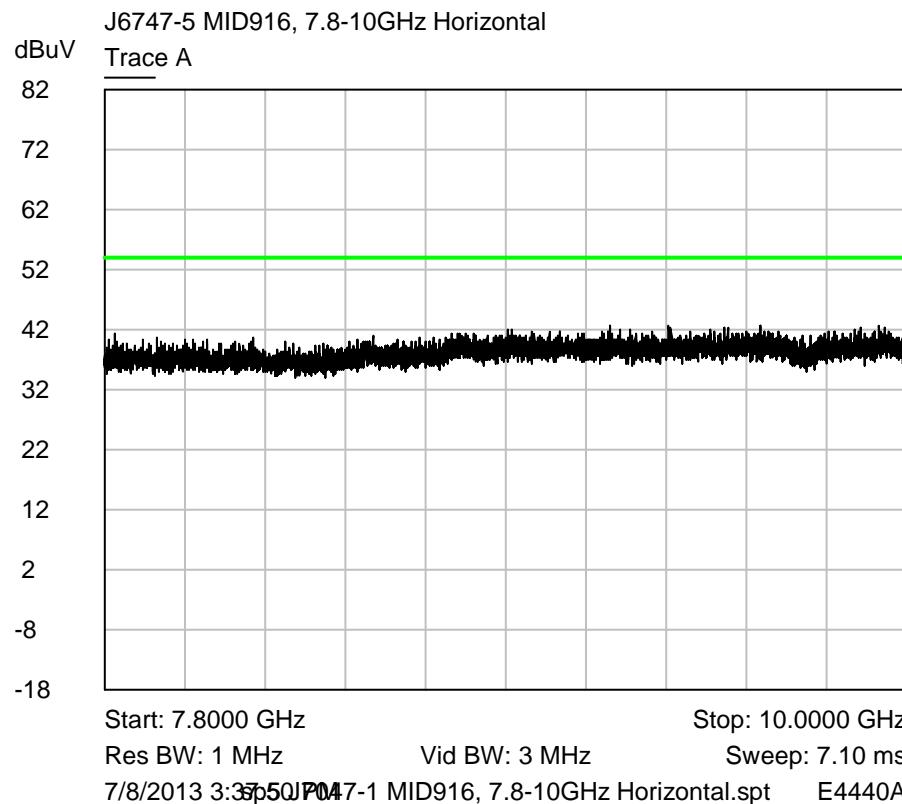
6.3.2 Radiated emissions Plots above 1GHz





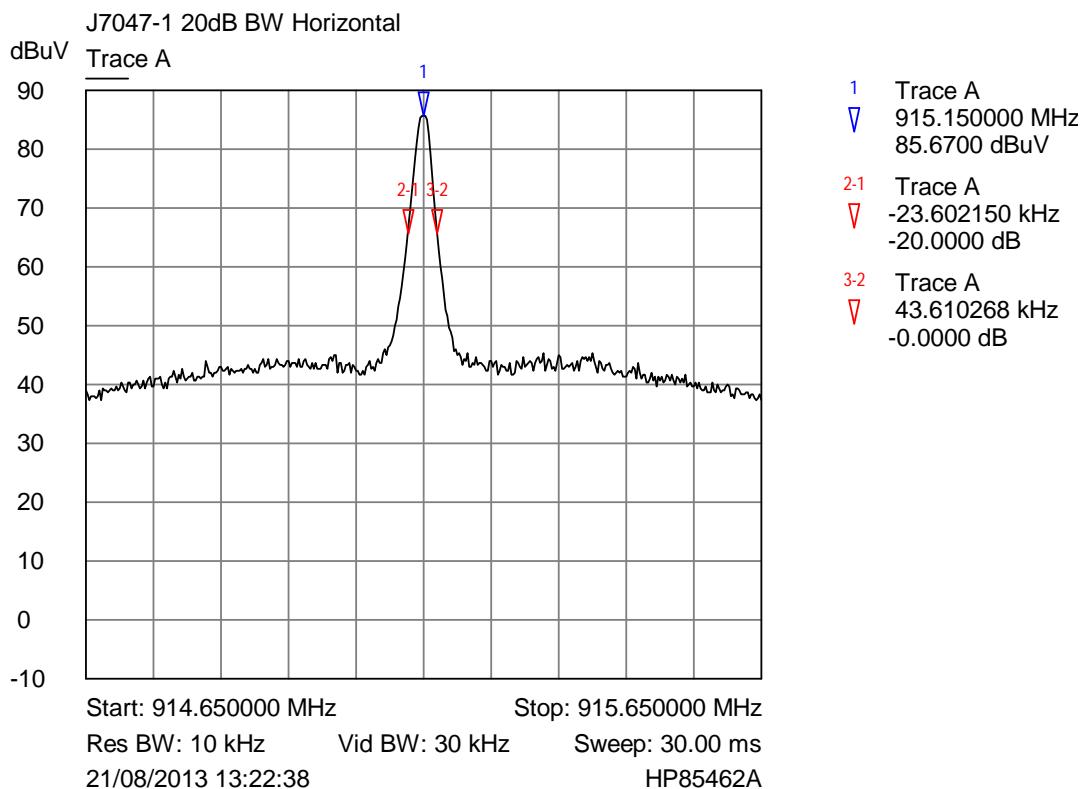






6.4 20dB bandwidth bandwidth plots

6.4.1 Plots for Band 902-928 MHz, Power 0 dBm and FSK Modulation



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 (dB μ V)	Pk - Lim 1 (dB)	QP Amp (dB μ V)	QP - Lim1 (dB)	Av Amp (dB μ V)	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 (dB μ V) is the level of received signal that was measured in dB above 1 μ V 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 (dB μ V) is the level of received signal that was measured in dB above 1 μ V 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 (dB μ V) is the level of received signal that was measured in dB above 1 μ V 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.

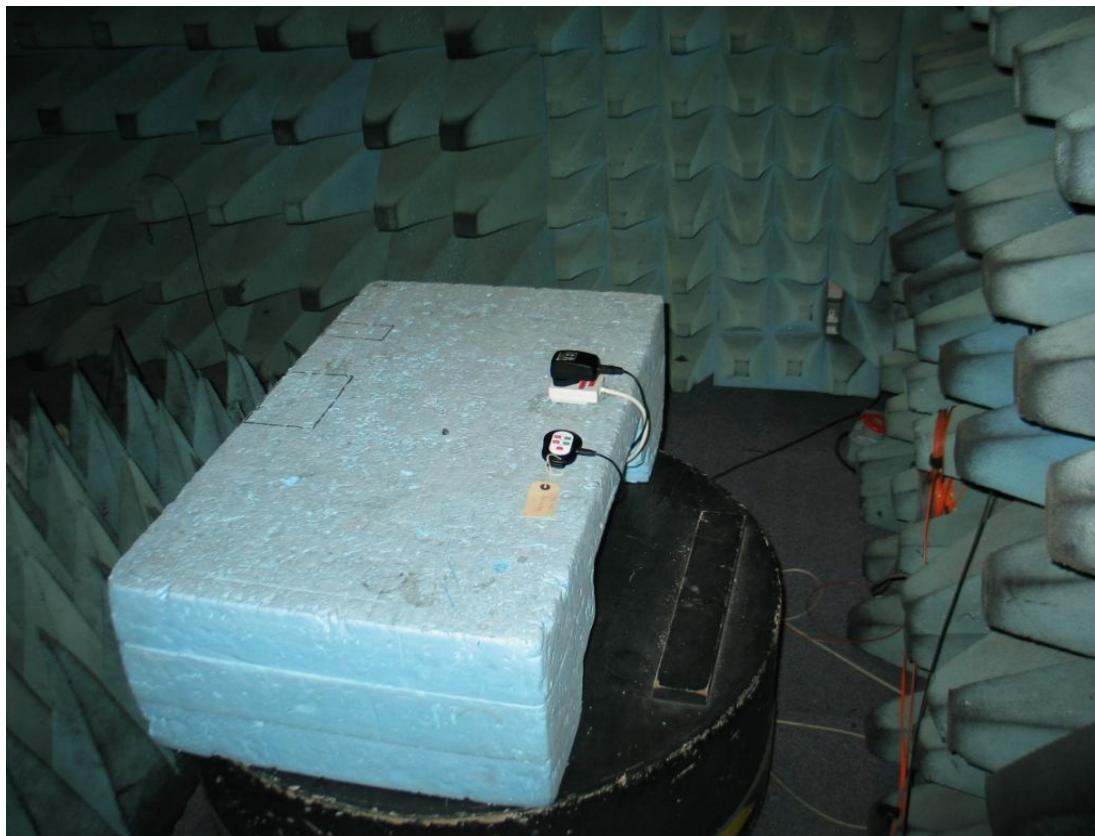
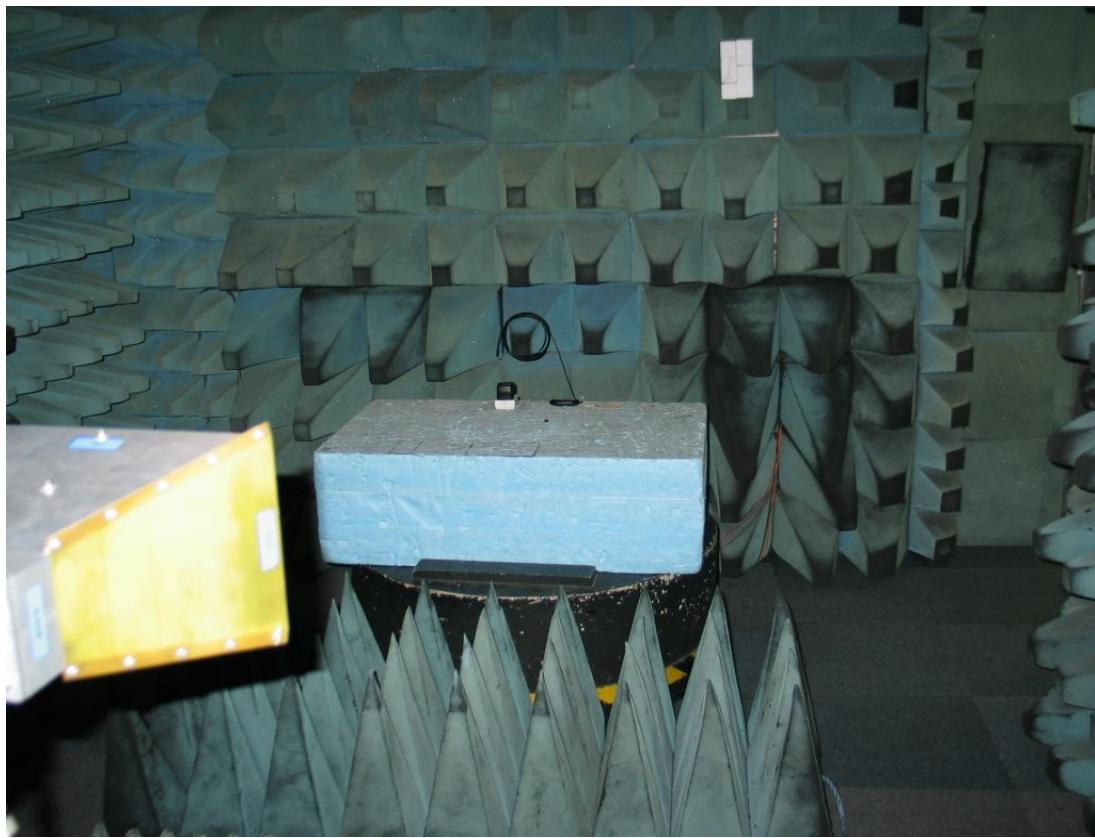
7.2 Explanation of limit line calculations for radiated measurements

The limits given in the test standard are normally expressed as absolute values (e.g. in $\mu\text{V}/\text{m}$ at a specified distance), whereas the measured values are expressed as peak, quasi peak or average values in $\text{dB}\mu\text{V}/\text{m}$ 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 $\mu\text{V}/\text{m}$ equates to $20.\log(500) = 54 \text{ dB } \mu\text{V}/\text{m}$.
- (b) limit of 300 $\mu\text{V}/\text{m}$ at 10m equates to $20.\log(300 \cdot 10/3) = 60 \text{ dB } \mu\text{V}/\text{m}$ at 3m
- (c) limit of 30 $\mu\text{V}/\text{m}$ at 30m, but below 30MHz, equates to $20.\log(30) + 40.\log(30/3) = 69.5 \text{ dB}\mu\text{V}/\text{m}$ at 3m, as extrapolation factor below 30MHz is 40dB/decade per 15.31(f)(2).

8 Photographs

8.1 Test set-up, spurious emissions



Test set-up, spurious emissions OATS.



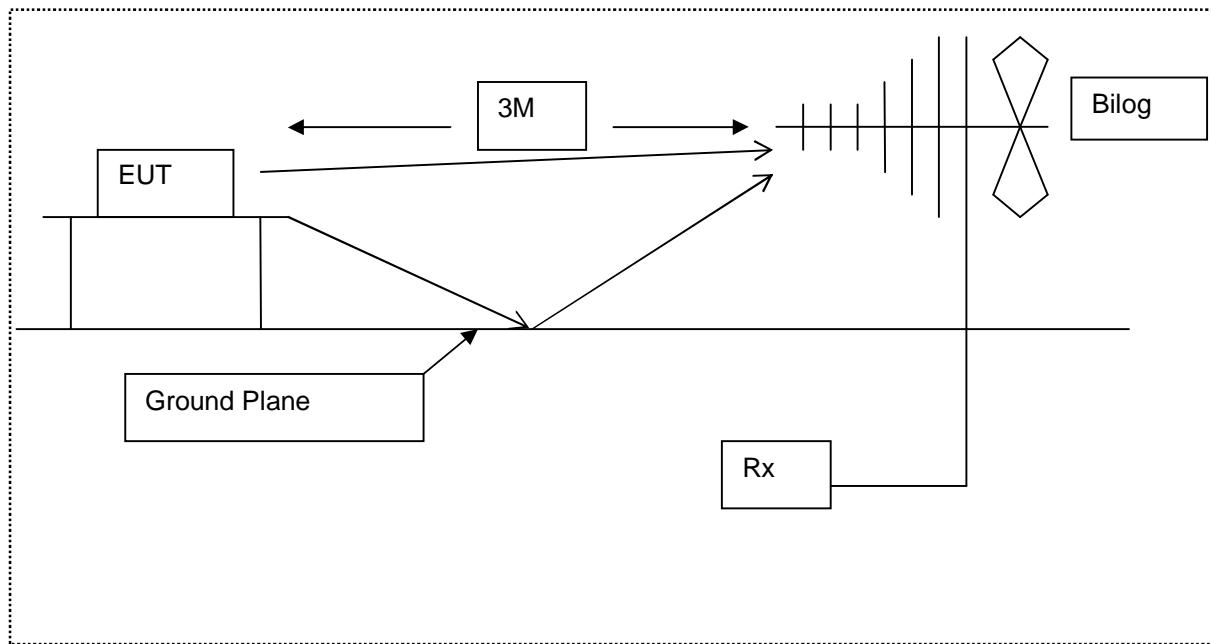


Diagram of the radiated emissions test setup.



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

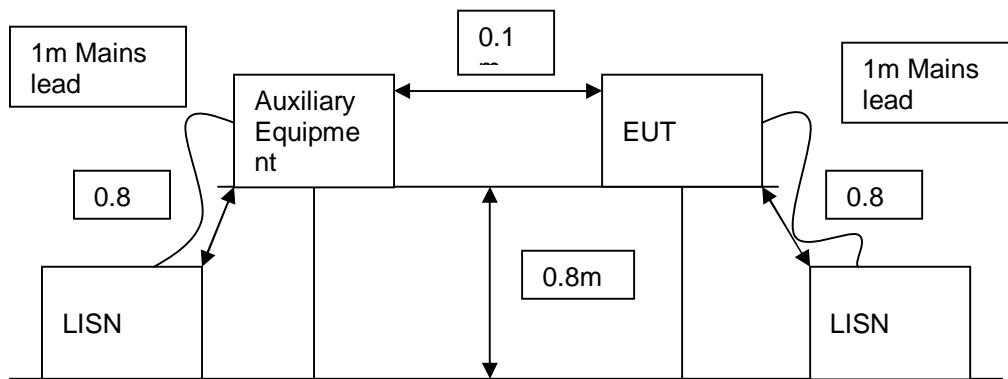


Diagram of the conducted emissions test setup.

Identifying Photograph of the EUT



9 Signal Leads

No signal leads were connected to EUT during test.

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
E035	HP11947A	Transient Limiter + 10dB Atten.	Hewlett Packard	19-Aug-13*	6 months
E150	MN2050	LISN 13A	Chase	03-Oct-13*	12 months
E226	8546A	EMI Receiver	Hewlett Packard	18-Jun-13	12 months
E410	N5181A	3 GHz MXG Signal Generator	Agilent Technologies	26-Oct-11	36 months
E411	N9039A	9 kHz - 1 GHz RF Filter Section	Agilent Technologies	18-Oct-13*	12 months
E412	E4440A	3 Hz - 26.5 GHz PSA	Agilent Technologies	18-Oct-13*	12 months
E428	HF906	1-18 GHz Horn Antenna	Rhode & Schwarz	25-Nov-11	36 months
E465	PCR2000LA	AC Power Supply	KIKUSUI	09-May-13	12 months
E533	N5182A	6 GHz MXG Signal Generator	Agilent Technologies	26-Feb-13	36 months
E534	E4440A	3 Hz - 26.5 GHz PSA	Agilent Technologies	22-Feb-13	36 months
E535	N9039A	9 kHz - 1 GHz RF Filter Section	Agilent Technologies	22-Feb-13	36 months
TMS82	8449B	Pre Amplifier 1 - 26 GHz	Agilent	26-Nov-13*	12 months
TMS903	CBL6111A	Bilog Antenna 30MHz - 1GHz	Chase	04-Jun-13	36 months

*The equipment listed above was 'in calibration' at the time of test. The equipment has since been recalibrated prior to the generation of this report.

11 Auxiliary equipment

11.1 Customer supplied Equipment

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

Item No.	Model No.	Description	Manufacturer	Serial No.
1	Compaq NC6400	Laptop PC	HP	s/n CND6512VJ3

11.2 Supplied by RN Electronics Limited

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

No RN Electronics supplied equipment was used.

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

No modifications were made before test by RN Electronics Ltd.

12.2 Modifications during test

No modifications were made during test by RN Electronics Ltd.

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:

CERTIFIED equipment – DoC not required.

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 (Conducted Emissions) VCCI Registration No. C-2823
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	Hz	Hertz
µV	microVolts	IF	Intermediate Frequency
µW	microWatts	kHz	kiloHertz
AC	Alternating Current	LO	Local Oscillator
ALSE	Absorber Lined Screened Enclosure	mA	milliAmps
AM	Amplitude Modulation	max	maximum
Amb	Ambient	kPa	milliBars
ANSI	American National Standards Institute	MHz	MegaHertz
°C	Degrees Celsius	min	minimum
CFR	Code of Federal Regulations	mm	milliMetres
CS	Channel Spacing	ms	milliSeconds
CW	Continuous Wave	mW	milliWatts
dB	deciBels	NA	Not Applicable
dBµV	deciBels relative to 1µV	OATS	Open Area Test Site
dBc	deciBels relative to Carrier	OFDM	Orthogonal Frequency Division Multiplexing
dBm	deciBels relative to 1mW	ppm	Parts per million
DC	Direct Current	QAM	Quadrature Amplitude Modulation
EIRP	Equivalent Isotropic Radiated Power	QPSK	Quadrature Phase Shift Keying
ERP	Effective Radiated Power	Ref	Reference
EUT	Equipment Under Test	RF	Radio Frequency
FCC	Federal Communications Commission	RTP	Room Temperature and Pressure
FM	Frequency Modulation	s	Seconds
FSK	Frequency Shift Keying	Tx	Transmitter
g	Grams	V	Volts
GHz	GigaHertz		