

TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: Tablet PC T-C12-R1.0A-V1 C12

FCC ID: W5MTOB1IC12B

IC Certification Number: 8099A-TOB1IC12B

To: FCC Parts 15.247(b)(3), 15.247(d), 15.209(a) Industry Canada
RSS-Gen 4.8, RSS-210 A8.4(4), RSS-Gen 4.9 & RSS-210 A8.5

Test Report Serial No.:
RFI-RPT-RP80826JD10A

This Test Report Is Issued Under The Authority Of John Newell, Group Quality Manager:		
Checked By:	Sarah Williams	
Signature:		
Date of Issue:	11 July 2012	

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RFI Global Services Ltd

Pavilion A, Ashwood Park, Ashwood Way, Basingstoke, Hampshire RG23 8BG
Telephone: +44 (0)1256 312000 Facsimile: +44 (0)1256 312001
Email: info@rfi-global.com Website: www.rfi-global.com

Registered in England and Wales. Company number: 2117901

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Table of Contents

1. Customer Information	4
2. Summary of Testing	5
2.1. General Information	5
2.2. Summary of Test Results	5
2.3. Methods and Procedures	6
2.4. Deviations from the Test Specification	6
3. Equipment Under Test (EUT)	7
3.1. Identification of Equipment Under Test (EUT)	7
3.2. Description of EUT	7
3.3. Modifications Incorporated in the EUT	7
3.4. Additional Information Related to Testing	8
3.5. Support Equipment	8
4. Operation and Monitoring of the EUT during Testing	9
4.1. Operating Modes	9
4.2. Configuration and Peripherals	9
5. Measurements, Examinations and Derived Results	10
5.1. General Comments	10
5.2. Test Results	11
5.2.1. Transmitter Maximum Peak Output Power	11
5.2.2. Transmitter Radiated Emissions	20
6. Measurement Uncertainty	26
Appendix 1. Test Equipment Used	27

1. Customer Information





Company Name:	Tobii Technology AB
Address:	Karlsrovägen 2D 7th floor Danderyd 182 53 Sweden

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR15.247
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2011: Part 15 Subpart C (Intentional Radiators) - Section 15.247
Specification Reference:	47CFR15.209
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2011: Part 15 Subpart C (Intentional Radiators) - Sections 15.209
Specification Reference:	RSS-Gen Issue 3 December 2010
Specification Title:	General Requirements and Information for the Certification of Radio Apparatus
Specification Reference:	RSS-210 Issue 8 December 2010
Specification Title:	Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment.
Site Registration:	FCC: 209735, Industry Canada: 3245B-2
Location of Testing:	RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH.
Test Dates:	05 June 2012 to 10 June 2012

2.2. Summary of Test Results

FCC Reference (47CFR)	IC Reference	Measurement	Result
Part 15.247(b)(3)	RSS-Gen 4.8 RSS-210 A8.4(4)	Transmitter Maximum Peak Output Power	
Part 15.247(d)/ 15.209(a)	RSS-Gen 4.9 RSS-210 A8.5	Transmitter Radiated Emissions	
Key to Results  = Complied  = Did not comply			

2.3. Methods and Procedures

Reference:	ANSI C63.4 (2009)
Title:	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
Reference:	ANSI C63.10 (2009)
Title:	American National Standard for Testing Unlicensed Wireless Devices
Reference:	KDB 558074 D01 v01 1/18/2012
Title:	Guidance for Performing Compliance Measurements on Digital Transmission System (DTS) devices operating Under 15.247

2.4. Deviations from the Test Specification

For the measurements contained within this test report, there were no deviations from, additions to, or exclusions from the test specification identified above.

3. Equipment Under Test (EUT)

3.1. Identification of Equipment Under Test (EUT)

Brand Name:	Tobii
Model Name or Number:	T-C12-R1.0A-V1 C12
Serial Number:	MTC12-030110458195
Hardware Version Number:	Not Stated
Software Version Number:	Windows 7 Home Premium
FCC ID:	W5MTOBIIC12B
IC Certification Number:	8099A-TOBIIC12B

Brand Name:	Powerbox
Model Name or Number:	AC power adapter EXM 80 5121
Serial Number:	101201592/FC:11
Hardware Version Number:	Not Stated
Software Version Number:	Not Stated

3.2. Description of EUT

The equipment under test was a tablet PC containing a WiFi 802.11b/g/n module, a quad band GSM module and a V2.0 *Bluetooth* module. The WiFi module has an FCC ID of LR802UKN.

A 120 VAC 60 Hz to 12 VDC power supply is used to provide power.

3.3. Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

3.4. Additional Information Related to Testing

Technology Tested:	IEEE 802.11b,g,n		
Type of Unit:	Transceiver		
Modulation Type:	BPSK, QPSK, 16QAM & 64QAM		
Data Rates:	802.11b: 1 & 11 Mbps		
	802.11g: 6, 9, 18 & 48 Mbps		
	802.11n: 65 & 130 Mbps		
Power Supply Requirement(s):	Nominal	120 VAC 60 Hz	
Transmit Frequency Range:	2412 MHz to 2462 MHz		
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	1	2412
	Middle	6	2437
	Top	11	2462

3.5. Support Equipment

The following support equipment was used to exercise the EUT during testing:

Brand Name:	Not Stated
Description:	Microsoft Mouse
Model Name or Number:	P/N X08-72983PID38724-576-0441363-1

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

The EUT was tested in the following operating mode(s):

- Continuously transmitting at maximum power on the bottom, middle and top channels as required using the relevant data rate.

4.2. Configuration and Peripherals

The EUT was tested in the following configuration(s):

- Controlled using a bespoke application on the EUT. The application was used to enable continuous transmission and to select the test channels, data rate and modulation scheme as required.
- Transmitter spurious emissions were performed with the EUT transmitting with a data rate of 130 Mbps / MCS15. Measurements were performed on the highest data rate for each modulation type and 130 Mbps was found to have the highest power level and therefore deemed to be worst case. Pre-scans were performed on the top channel and if any emission seen, final measurements were carried out on bottom, middle and top channels.

5. Measurements, Examinations and Derived Results

5.1. General Comments

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to *Section 6. Measurement Uncertainty* for details.

5.2. Test Results

5.2.1. Transmitter Maximum Peak Output Power

Test Summary:

Test Engineer:	Andrew Edwards	Test Date:	10 July 2012
Test Sample Serial No.:	MTC12-030110458195		

FCC Reference:	Part 15.247(b)(3)
Industry Canada Reference:	RSS-Gen 4.8, RSS-210 A8.4(4)
Test Method Used:	FCC KDB 558074 Section 5.2.1.2

Environmental Conditions:

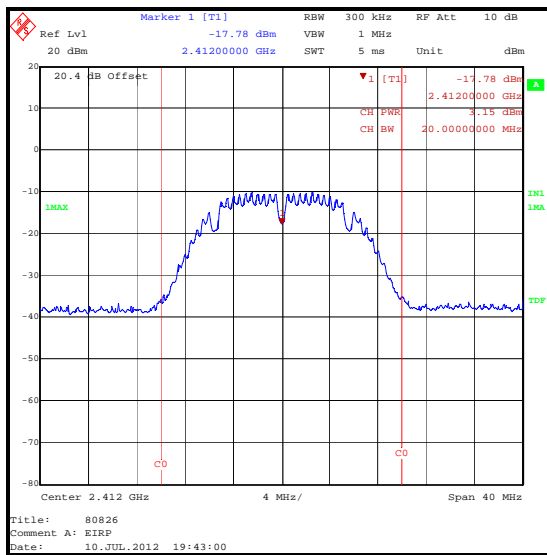
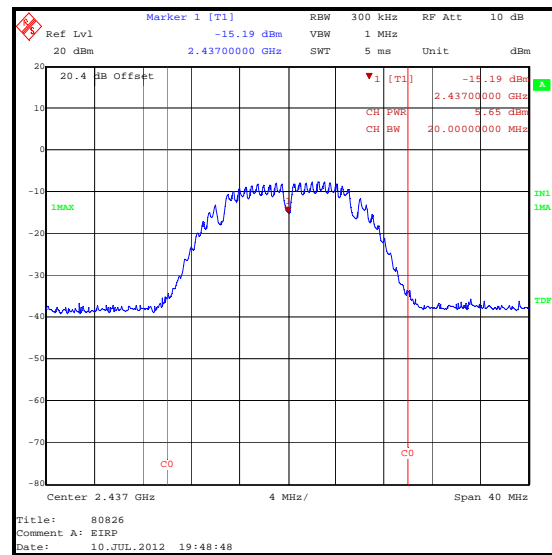
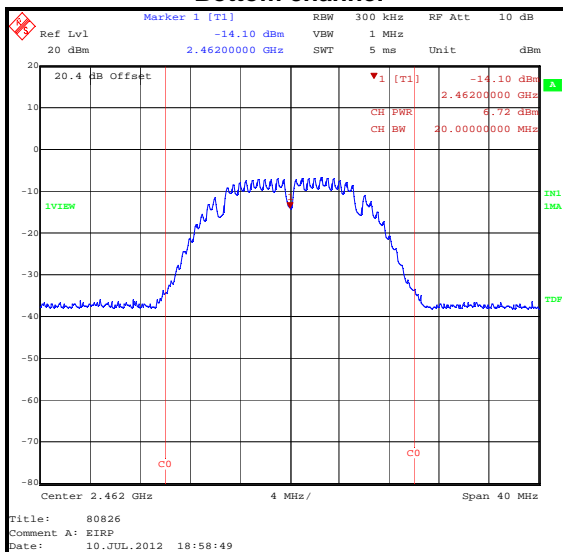
Temperature (°C):	24
Relative Humidity (%):	50

Note(s):

1. Tests were performed using a combination of the conducted test method described in ANSI C63.10 Section 6.10.2 and the test methods for radiated emissions measurements described in Sections 6.3 and 6.6 and FCC KDB 558074 Section 5.2.1.2 Measurement Procedure PK2. The EUT has an integral antenna therefore the measurements were performed radiated.
2. Each supported modulation type was tested at the highest data rate.
3. The EUT was configured to the relevant power setting using a hex value provided by the Customer. The data rates were tested using the following hex values:
 - 802.11b: 1 & 11 Mbps – hex value 04
 - 802.11g: 6, 9, 18 & 48 Mbps – hex value 0A
 - 802.11n: 65 & 130 Mbps – hex value 0B.

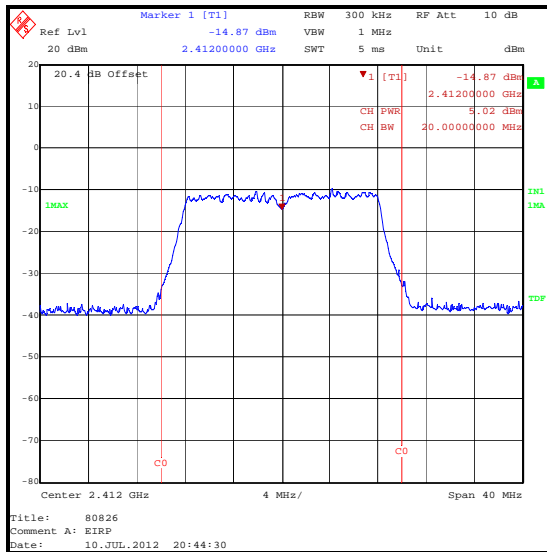
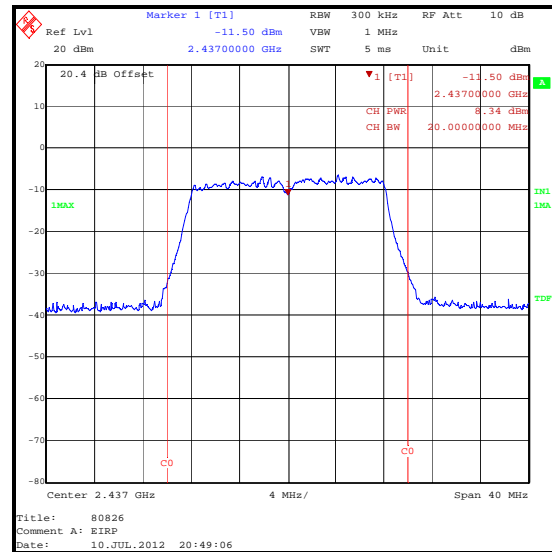
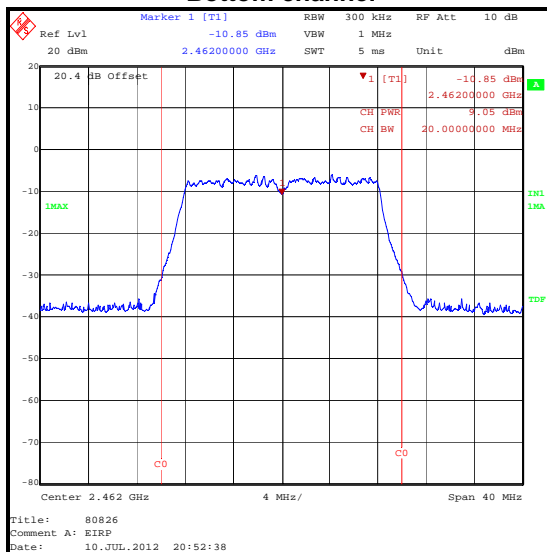
Transmitter Maximum Peak Output Power (continued)**Results: 1 Mbps**

Channel	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	3.2	36.0	32.8	Complied
Middle	5.7	36.0	30.3	Complied
Top	6.7	36.0	29.3	Complied

**Bottom channel****Middle channel****Top channel**

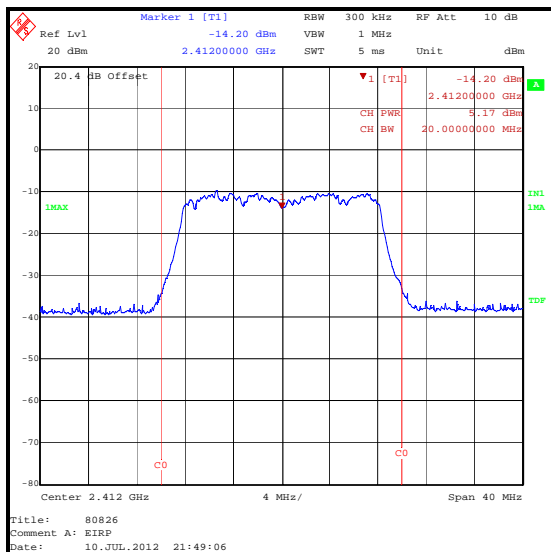
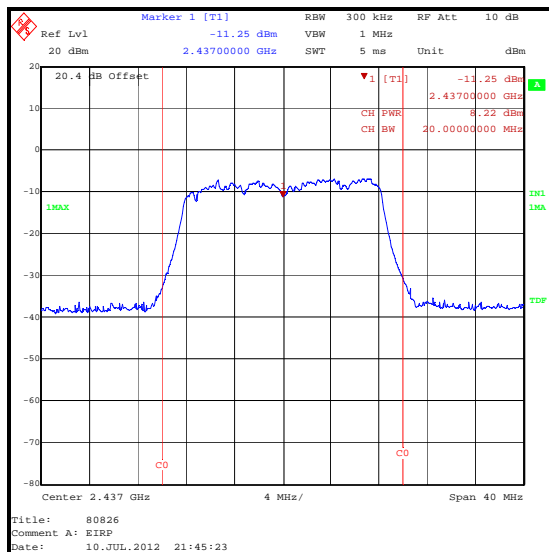
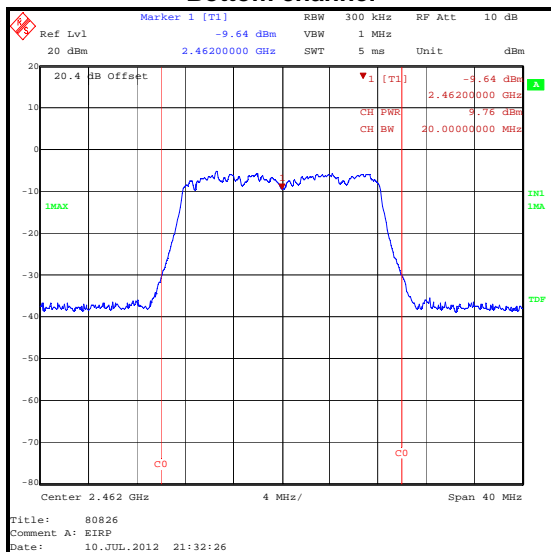
Transmitter Maximum Peak Output Power (continued)**Results: 6 Mbps**

Channel	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	5.0	36.0	31.0	Complied
Middle	8.3	36.0	27.7	Complied
Top	9.1	36.0	26.9	Complied

**Bottom channel****Middle channel****Top channel**

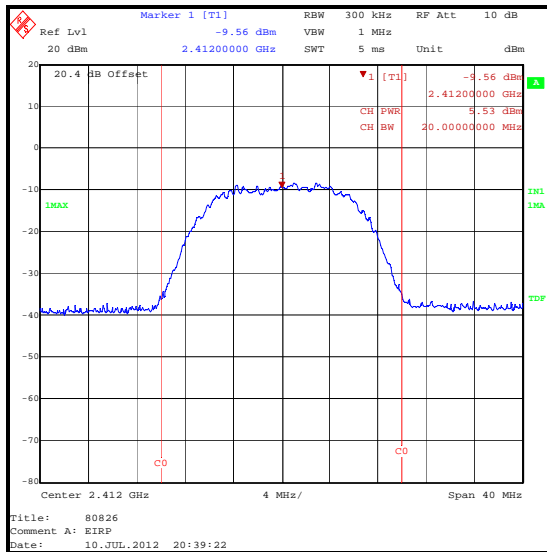
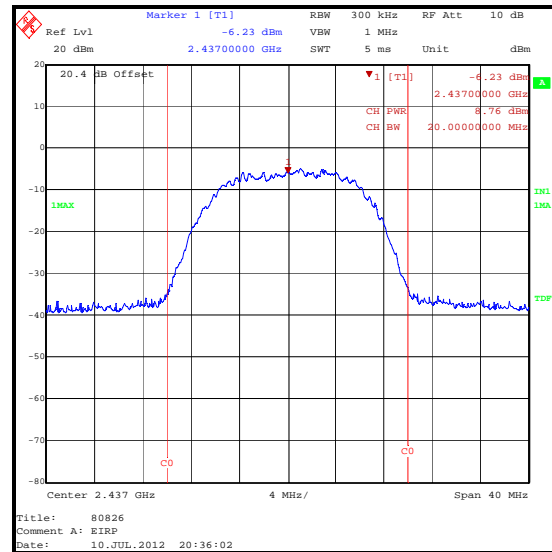
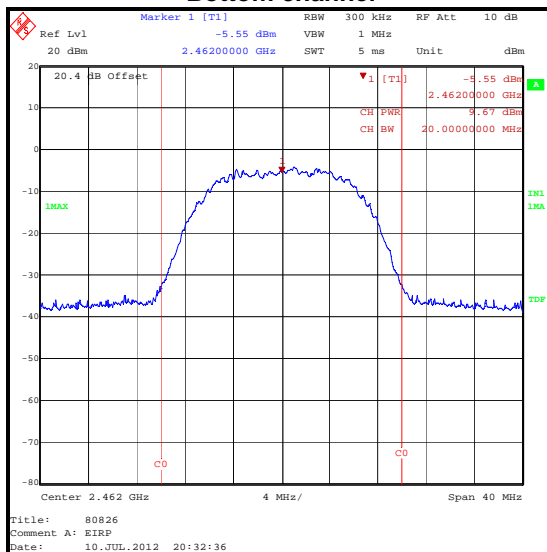
Transmitter Maximum Peak Output Power (continued)**Results: 9 Mbps**

Channel	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	5.2	36.0	30.8	Complied
Middle	8.2	36.0	27.8	Complied
Top	9.8	36.0	26.2	Complied

**Bottom channel****Middle channel****Top channel**

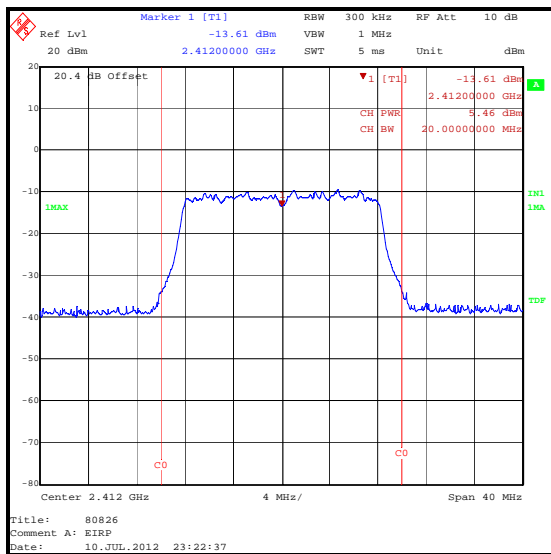
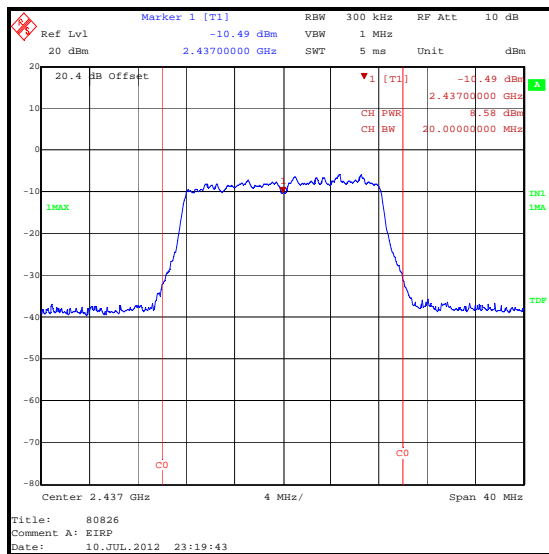
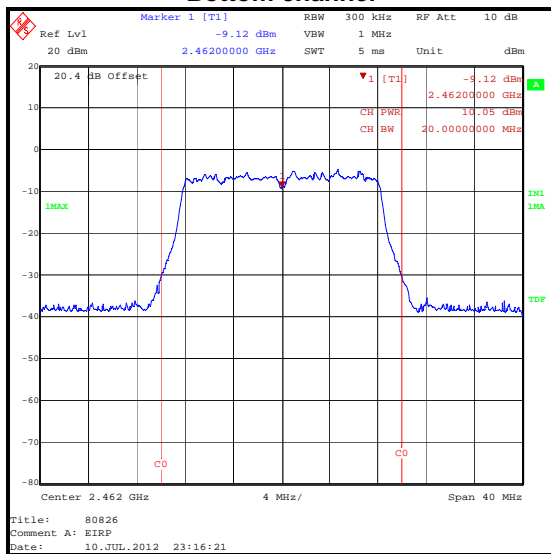
Transmitter Maximum Peak Output Power (continued)**Results: 11 Mbps**

Channel	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	5.5	36.0	30.5	Complied
Middle	8.8	36.0	27.2	Complied
Top	9.7	36.0	26.3	Complied

**Bottom channel****Middle channel****Top channel**

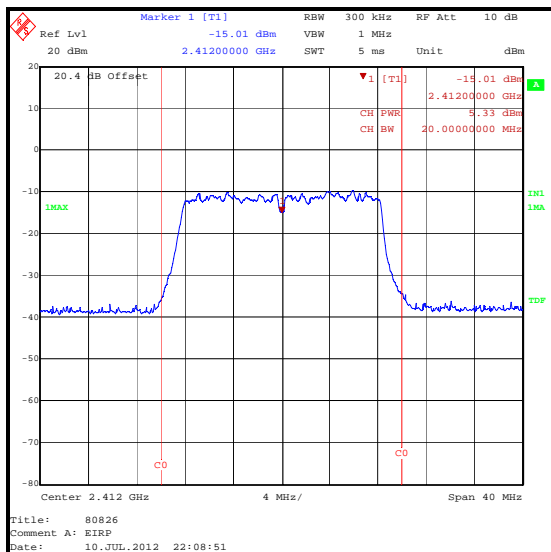
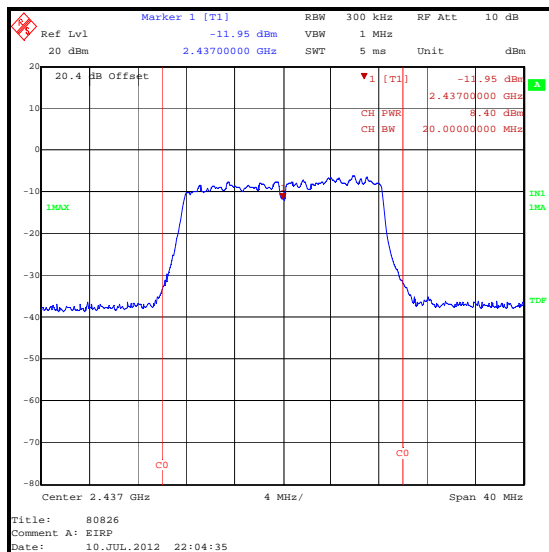
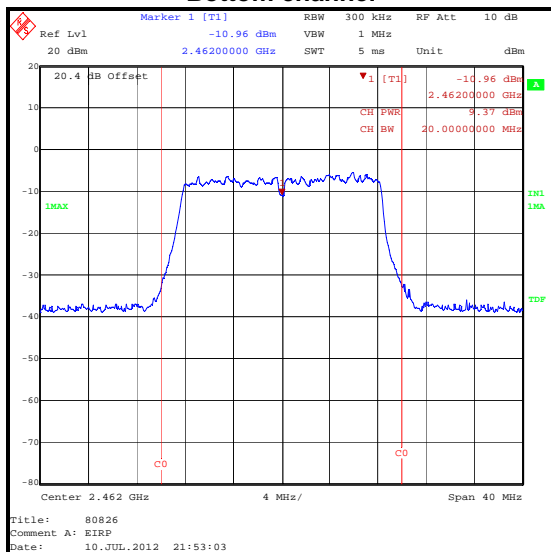
Transmitter Maximum Peak Output Power (continued)**Results: 18 Mbps**

Channel	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	5.5	36.0	30.5	Complied
Middle	8.6	36.0	27.4	Complied
Top	10.1	36.0	25.9	Complied

**Bottom channel****Middle channel****Top channel**

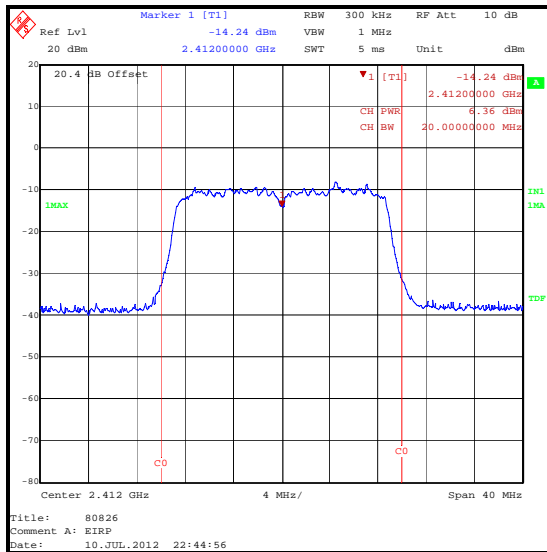
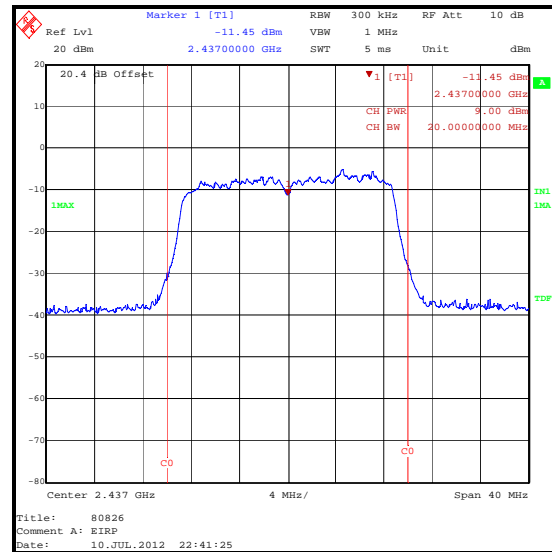
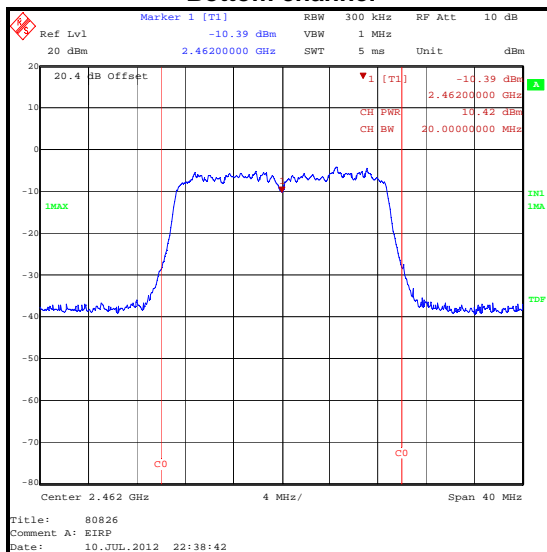
Transmitter Maximum Peak Output Power (continued)**Results: 48 Mbps**

Channel	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	5.3	36.0	30.7	Complied
Middle	8.4	36.0	27.6	Complied
Top	9.4	36.0	26.6	Complied

**Bottom channel****Middle channel****Top channel**

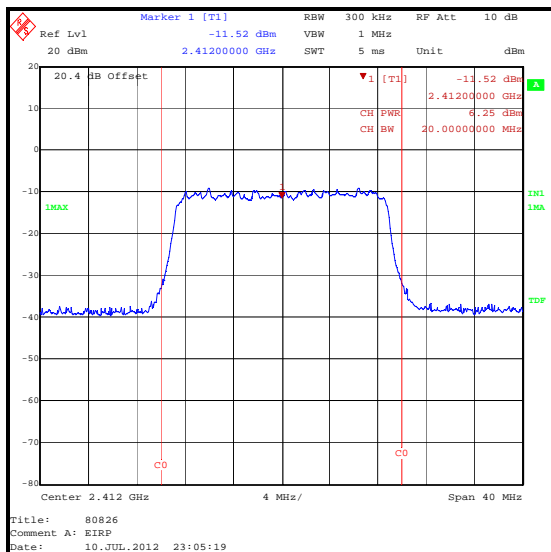
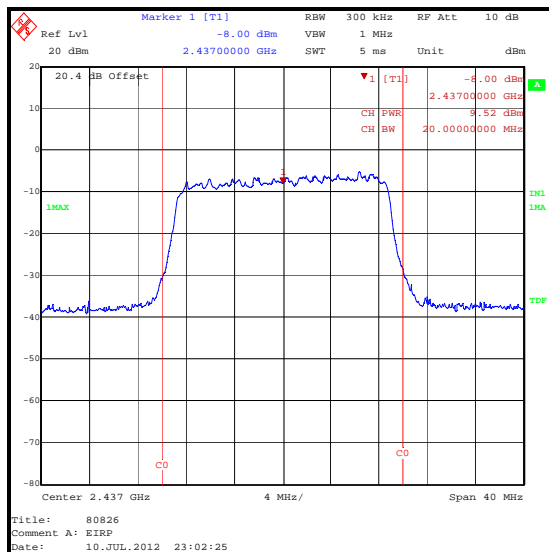
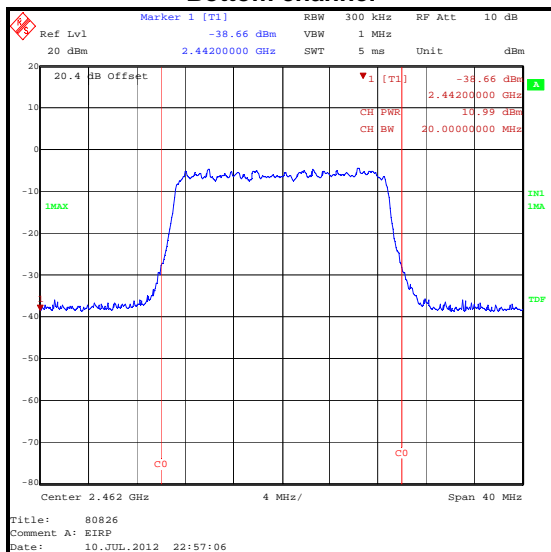
Transmitter Maximum Peak Output Power (continued)**Results: 65 Mbps**

Channel	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	6.4	36.0	29.6	Complied
Middle	9.0	36.0	27.0	Complied
Top	10.4	36.0	25.6	Complied

**Bottom channel****Middle channel****Top channel**

Transmitter Maximum Peak Output Power (continued)**Results: 130 Mbps**

Channel	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	6.3	36.0	29.7	Complied
Middle	9.5	36.0	26.5	Complied
Top	11.0	36.0	25.0	Complied

**Bottom channel****Middle channel****Top channel**

5.2.2. Transmitter Radiated Emissions**Test Summary:**

Test Engineer:	Andrew Edwards	Test Date:	05 July 2012
Test Sample Serial No.:	MTC12-030110458195		

FCC Reference:	Parts 15.247(d) & 15.209(a)
Industry Canada Reference:	RSS-Gen 4.9, RSS-210 A8.5
Test Method Used:	As detailed in ANSI C63.10 Sections 6.3 and 6.5 referencing ANSI C63.4
Frequency Range	30 MHz to 1000 MHz

Environmental Conditions:

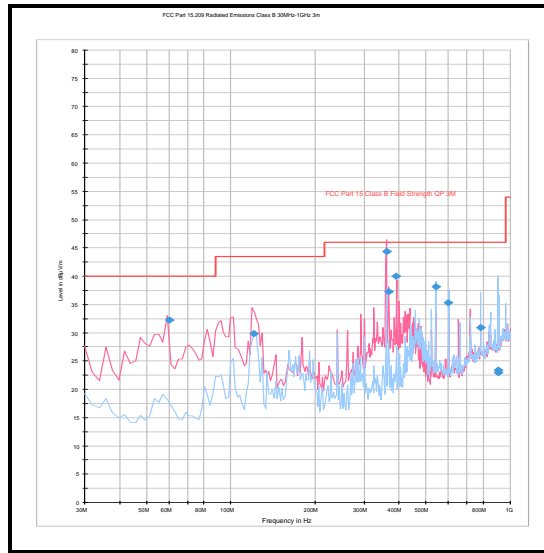
Temperature (°C):	25
Relative Humidity (%):	50

Results: Top Channel

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
120.780	Vertical	29.8	43.5	13.7	Complied

Note(s):

1. The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss
2. The preliminary scans showed similar emission levels below 1 GHz, for each channel of operation. Therefore final radiated emissions measurements were performed with the EUT set to the top channel only.
3. All other emissions were at least 20 dB below the appropriate limit or below the noise floor of the measurement system.
4. Measurements below 1 GHz were performed in a semi-anechoic chamber (RFI Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.

Transmitter Radiated Emissions (continued)

Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying table.

Transmitter Radiated Emissions (continued)**Test Summary:**

Test Engineer:	Andrew Edwards	Test Date:	05 July 2012
Test Sample Serial No.:	MTC12-030110458195		

FCC Reference:	Parts 15.247(d) & 15.209(a)
Industry Canada Reference:	RSS-Gen 4.9, RSS-210 A8.5
Test Method Used:	FCC KDB 558074 D01 Section 5.4 & ANSI C63.10 Sections 6.3 and 6.6
Frequency Range	1 GHz to 25 GHz

Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	50

Results: Peak Bottom Channel

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
1600.375	Vertical	51.3	74.0	22.7	Complied

Results: Average Bottom Channel

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
1600.304	Vertical	51.3	54.0	2.7	Complied

Results: Peak Middle Channel

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
1600.116	Vertical	53.7	74.0	20.3	Complied

Results: Average Middle Channel

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
1600.210	Vertical	52.2	54.0	1.8	Complied

Transmitter Radiated Emissions (continued)**Results: Peak Top Channel**

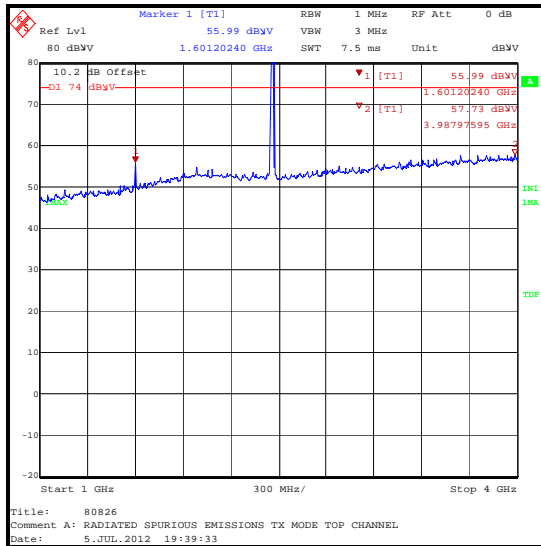
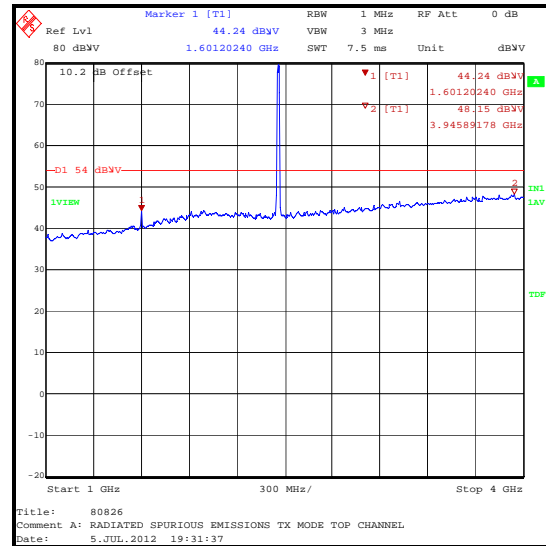
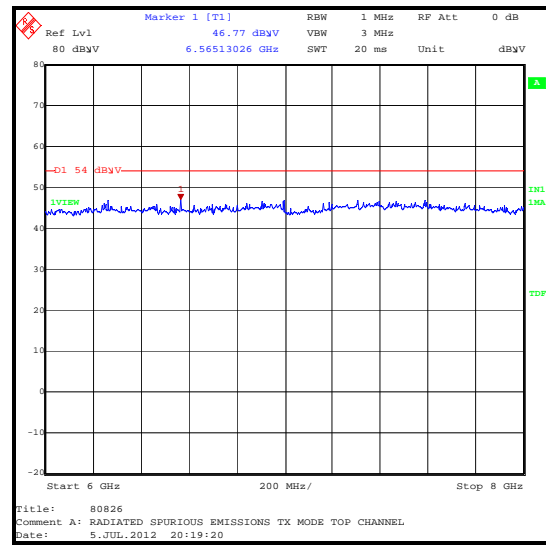
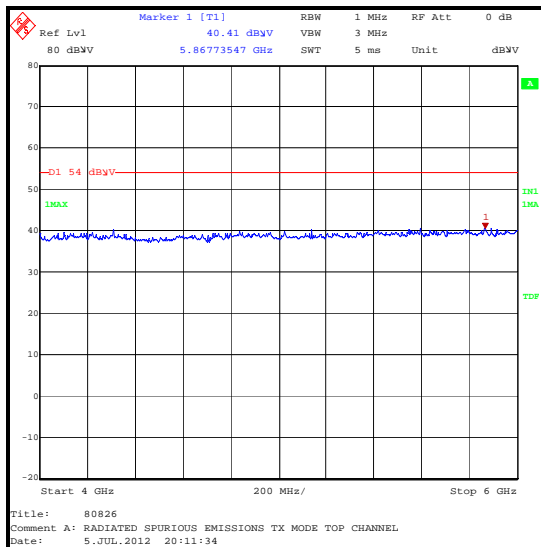
Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
1600.175	Vertical	53.7	74.0	20.3	Complied

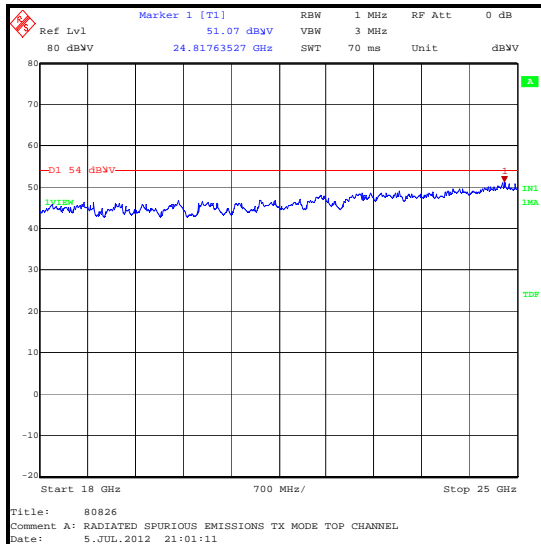
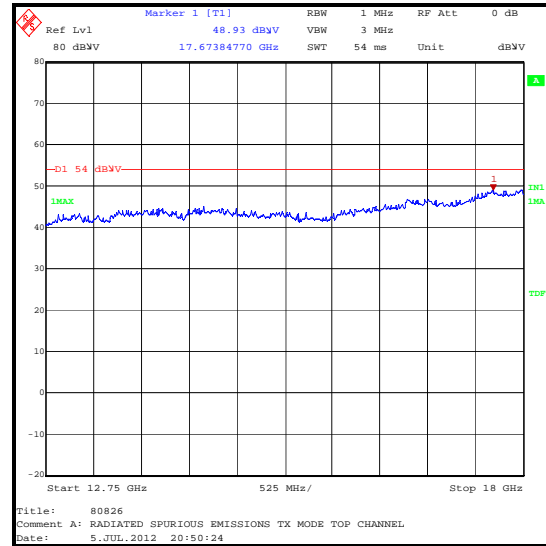
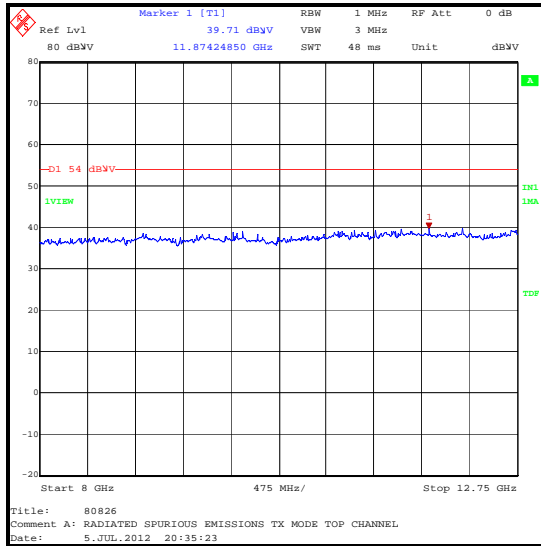
Results: Average Top Channel

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
1600.116	Vertical	53.2	54.0	0.8	Complied

Note(s):

1. The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss.
2. All other emissions shown on the pre-scan plot were investigated and found to be ambient or >20 dB below the applicable limit or below the measurement system noise floor.
3. The peak level was compared to the average limit as opposed to being compared to the peak limit because this is the more onerous limit.
4. The emission shown at 2462 MHz on the 1 GHz to 4 GHz plot is the EUT fundamental.
5. Pre-scans above 1 GHz were performed in a fully anechoic chamber (RFI Asset Number K0002) at a distance of 3 metres. The EUT was placed at a height of 1.5 metres above the test chamber floor in the centre of the chamber turntable. All measurement antennas were placed at a fixed height of 1.5 metres above the test chamber floor, in line with the EUT. Final measurements above 1 GHz were performed in a semi-anechoic chamber (RFI Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.

Transmitter Radiated Emissions (continued)**Peak Detector****Average Detector**

Transmitter Radiated Emissions (continued)

Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

6. Measurement Uncertainty

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor such that a confidence level of approximately 95% is maintained. For the purposes of this document “approximately” is interpreted as meaning “effectively” or “for most practical purposes”.

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
Maximum Peak Output Power	2.4 GHz to 2483.5 GHz	95%	±2.94 dB
Radiated Spurious Emissions	30 MHz to 25 GHz	95%	±2.94 dB

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty the published guidance of the appropriate accreditation body is followed.

Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (months)
A1396	Attenuator	Huber & Suhner	6810.17.B	757987	06 Jul 2013	12
A1393	Attenuator	Huber & Suhner	6820.17.B	757456	06 Jul 2013	12
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	09 Oct 2012	12
A1818	Antenna	EMCO	3115	00075692	09 Oct 2012	12
A1834	Attenuator	Hewlett Packard	8491B	10444	29 Jan 2013	12
A1975	High Pass Filter	AtlanTecRF	AFH-03000	090424010	15 Mar 2013	12
A253	Antenna	Flann Microwave	12240-20	128	09 Oct 2012	12
A254	Antenna	Flann Microwave	14240-20	139	09 Oct 2012	12
A255	Antenna	Flann Microwave	16240-20	519	09 Oct 2012	12
A256	Antenna	Flann Microwave	18240-20	400	09 Oct 2012	12
A436	Antenna	Flann	20240-20	330	09 Oct 2012	12
A553	Antenna	Chase	CBL6111A	1593	15 Feb 2013	12
G0543	Amplifier	Sonoma	310N	230801	13 Jul 2012	3
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	31 Aug 2012	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	09 Oct 2012	12
L1067	Test Receiver	Rohde & Schwarz	ESIB 40	100262	29 May 2013	12
M1590	Test Receiver	Rohde & Schwarz	ESU26	100239	06 Jun 2013	12

NB In accordance with UKAS requirements all the measurement equipment is on a calibration schedule.