



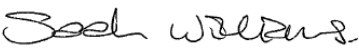
# TEST REPORT


**Test Report No. :** UL-RPT-RP10437304JD01A

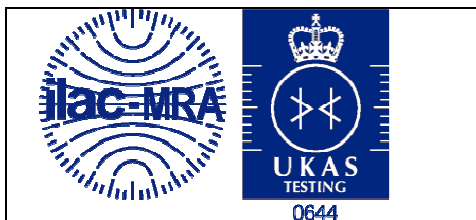
**Manufacturer** : Kontakt Micro-Location Sp. z o.o.  
**Model No.** : B220  
**FCC ID** : 2ADAOB220  
**IC Certification No.** : 12413A-B220  
**Technology** : *Bluetooth* – Low Energy  
**Test Standard(s)** : FCC Parts 15.209(a) & 15.247,  
Industry Canada RSS-210 A8.2(a), A8.2(b), A8.4(4) & A8.5 and RSS-  
Gen 4.6.1, 4.6.2, 4.8 & 4.9

1. This test report shall not be reproduced in full or partial, without the written approval of UL VS LTD.
2. The results in this report apply only to the sample(s) tested.
3. The sample tested is in compliance with the above standard(s).
4. The test results in this report are traceable to the national or international standards.
5. Version 1.0.

**Date of Issue:** 27 January 2015

**Checked by:**   
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Ian Watch  
Senior Engineer, Radio Laboratory

**Issued by :**   
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John Newell  
Quality Manager,  
UL VS LTD



This laboratory is accredited by UKAS. The tests reported herein have been performed in accordance with its terms of accreditation.

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### **1. Customer Information**








<b>Company Name:</b>	Kontakt Micro-Location Sp. z o.o.
<b>Address:</b>	Ul. Zulowska 43A 31-436 Krakow Poland

## **2. Summary of Testing**

### **2.1. General Information**

<b>Specification Reference:</b>	47CFR15.247
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Section 15.247
<b>Specification Reference:</b>	47CFR15.209
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) – Section 15.209
<b>Specification Reference:</b>	RSS-GEN Issue 3 December 2010
<b>Specification Title:</b>	General Requirements and Information for the Certification of Radio Apparatus
<b>Specification Reference:</b>	RSS-210 Issue 8 December 2010
<b>Specification Title:</b>	Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment.
<b>Site Registration:</b>	FCC: 209735; Industry Canada: 3245B-2
<b>Location of Testing:</b>	UL VS LTD, Unit 3 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, RG24 8AH, United Kingdom
<b>Test Dates:</b>	24 September 2014 to 26 September 2014

## **2.2. Summary of Test Results**

<b>FCC Reference (47CFR)</b>	<b>IC Reference</b>	<b>Measurement</b>	<b>Result</b>
Part 15.247(a)(2)	RSS-Gen 4.6.2 RSS-210 A8.2(a)	Transmitter Minimum 6 dB Bandwidth	
N/A	RSS-Gen 4.6.1	Transmitter 99% Occupied Bandwidth	
Part 15.247(e)	RSS-210 A8.2(b)	Transmitter Power Spectral Density	Note 2
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	
Part 15.247(d)/ 15.209(a)	RSS-Gen 4.9 RSS-210 A8.5	Transmitter Band Edge Radiated Emissions	
<b>Key to Results</b>			
 = Complied  = Did not comply			

### **Note(s):**

1. Tested and reported in UL Report UL-EMC-RP10437304JD02A.
2. In accordance with FCC KDB 558074 Section 10.1, PSD is not required if the maximum conducted output power is less than the PSD limit of 8 dBm / 3 kHz. The PSD level is therefore deemed to be equal to the measured total output power.

## **2.3. Methods and Procedures**

<b>Reference:</b>	ANSI C63.4 (2009)
<b>Title:</b>	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
<b>Reference:</b>	ANSI C63.10 (2009)
<b>Title:</b>	American National Standard for Testing Unlicensed Wireless Devices
<b>Reference:</b>	KDB 558074 D01 v03r02 June 5, 2014
<b>Title:</b>	Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) 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)**

<b>Brand Name:</b>	Contact Beacon
<b>Model Name or Number:</b>	Contact Beacon
<b>Test Sample Serial Number:</b>	Not marked or stated ( <i>Radiated sample</i> )
<b>Hardware Version Number:</b>	v2.2
<b>Software Version Number:</b>	v2.6
<b>FCC ID:</b>	2ADAOB220
<b>Industry Canada Certification Number:</b>	12413A-B220

<b>Brand Name:</b>	Contact Beacon
<b>Model Name or Number:</b>	Contact Beacon
<b>Test Sample Serial Number:</b>	Not marked or stated ( <i>Conducted sample with RF port</i> )
<b>Hardware Version Number:</b>	v2.2
<b>Software Version Number:</b>	v2.6
<b>FCC ID:</b>	2ADAOB220
<b>Industry Canada Certification Number:</b>	12413A-B220

#### **3.2. Description of EUT**

The Equipment Under Test was a *Bluetooth* LE beacon device. Power is supplied by a single CR2477 coin battery.

#### **3.3. Modifications Incorporated in the EUT**

No modifications were applied to the EUT during testing.

**3.4. Additional Information Related to Testing**

<b>Technology Tested:</b>	<i>Bluetooth</i> Low Energy (Digital Transmission System)		
<b>Type of Unit:</b>	Transceiver		
<b>Channel Spacing:</b>	2 MHz		
<b>Modulation:</b>	GFSK		
<b>Data Rate:</b>	1 Mbit/s		
<b>Power Supply Requirement(s):</b>	Nominal	3.0 VDC	
<b>Maximum Conducted Output Power:</b>	1.4 dBm		
<b>Antenna Gain:</b>	3.1 dBi		
<b>Transmit Frequency Range:</b>	2402 MHz to 2480 MHz		
<b>Transmit Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Bottom	0	2402
	Middle	19	2440
	Top	39	2480
<b>Receive Frequency Range:</b>	2402 MHz to 2480 MHz		
<b>Receive Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Bottom	0	2402
	Top	39	2480

**3.5. Support Equipment**

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

<b>Description:</b>	Laptop PC
<b>Brand Name:</b>	Dell
<b>Model Name or Number:</b>	E5400
<b>Serial Number:</b>	01160

<b>Description:</b>	UART to USB converter
<b>Brand Name:</b>	LC Technology
<b>Model Name or Number:</b>	Not marked or stated
<b>Serial Number:</b>	Not marked or stated



## **4. Operation and Monitoring of the EUT during Testing**

### **4.1. Operating Modes**

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

- Transmitting at maximum power in *Bluetooth* mode with modulation, maximum possible data length available, with a pay load set to set Pseudorandom Bit Sequence 9.

### **4.2. Configuration and Peripherals**

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

- Controlled using the software application 'Docklight' on the test laptop PC. The application was used to enable continuous transmission and receive mode (all circuits active but not transmitting) and to select the test channels as required.
- Powered by a fully charged CR2477 battery. The battery voltage was monitored throughout testing.

## **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.

In accordance with UKAS requirements all the measurement equipment is on a calibration schedule. All equipment was within the calibration period on the date of testing.

## **5.2. Test Results**

### **5.2.1. Transmitter Minimum 6 dB Bandwidth**

#### **Test Summary:**

<b>Test Engineer:</b>	David Doyle	<b>Test Date:</b>	24 September 2014
<b>Test Sample Serial Number:</b>	Conducted sample		

<b>FCC Reference:</b>	Part 15.247(a)(2)
<b>Industry Canada Reference:</b>	RSS-Gen 4.6.2, RSS-210 A8.2(a)
<b>Test Method Used:</b>	As detailed in FCC KDB 558074 Section 8.1 Option 1

#### **Environmental Conditions:**

<b>Temperature (°C):</b>	23
<b>Relative Humidity (%):</b>	42

#### **Note(s):**

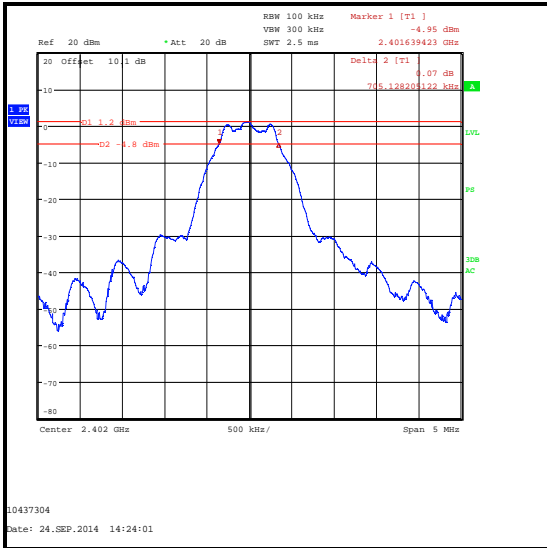
1. 6 dB DTS bandwidth tests were performed using a spectrum analyser in accordance with FCC KDB 558074 Section 8.1 Option 1 measurement procedure.
2. The test receiver resolution bandwidth was set to 100 kHz and video bandwidth 300 kHz. A peak detector was used, sweep time was set to auto and the trace mode was Max Hold. The span was set to 5 MHz. Normal and delta markers were placed 6 dB down from the peak of the carrier. The results are recorded in the table below.
3. The test receiver was connected to the RF port on the EUT using suitable attenuation and RF cable.

#### **Results:**

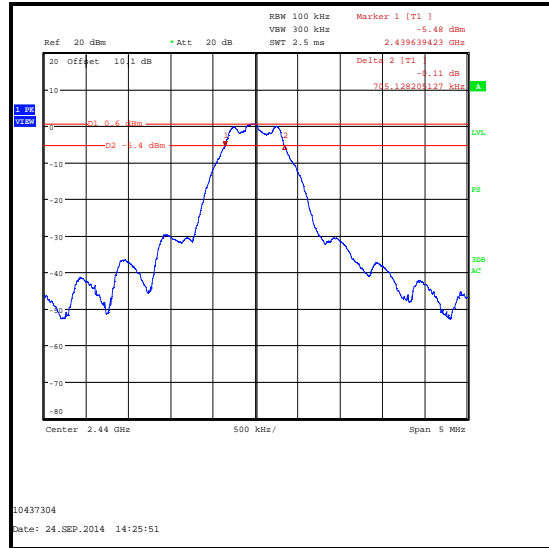
<b>Channel</b>	<b>6 dB Bandwidth (kHz)</b>	<b>Limit (kHz)</b>	<b>Margin (kHz)</b>	<b>Result</b>
Bottom	705.128	≥500	205.128	Complied
Middle	705.128	≥500	205.128	Complied
Top	697.115	≥500	197.115	Complied

**Transmitter Minimum 6 dB Bandwidth (continued)**

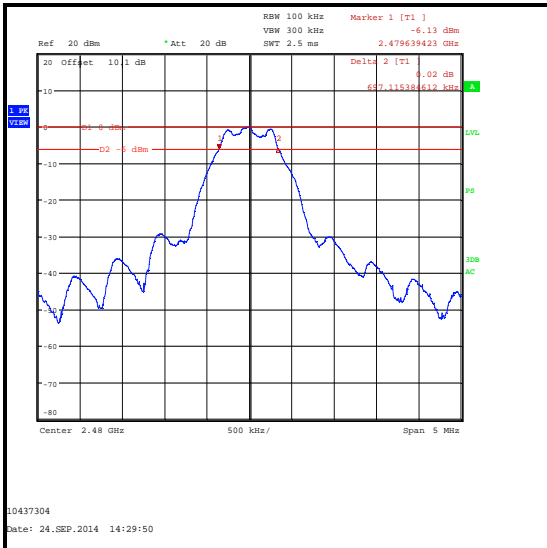
**Results:**



**Bottom Channel**



**Middle Channel**



**Top Channel**

**Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1656	Thermohyrometer	JM Handelpunkt	30.5015.13	None stated	14 Mar 2015	12
M1874	Test Receiver	Rohde & Schwarz	ESU26	100553	13 May 2015	12
A2506	Attenuator	AtlanTecRF	AN18-10	821846#1	Calibrated before use	-
M1886	Test Receiver	Rohde & Schwarz	ESU26	100554	09 May 2015	12
G0607	Signal Generator	Rohde & Schwarz	SMU200A	100943	18 Jul 2016	36

**5.2.2. Transmitter 99% Occupied Bandwidth****Test Summary:**

<b>Test Engineer:</b>	David Doyle	<b>Test Date:</b>	24 September 2014
<b>Test Sample Serial Number:</b>	Conducted sample		

<b>Industry Canada Reference:</b>	RSS-Gen 4.6.1
<b>Test Method Used:</b>	RSS-Gen 4.6.1 and Notes below

**Environmental Conditions:**

<b>Temperature (°C):</b>	23
<b>Relative Humidity (%):</b>	42

**Note(s):**

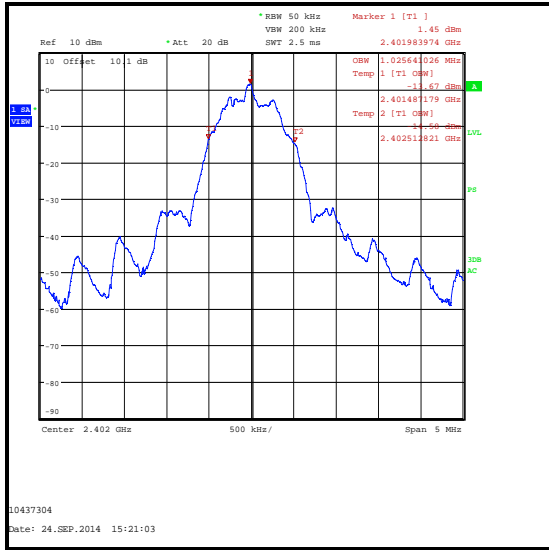
1. The 99% occupied bandwidth was measured using the test receiver occupied bandwidth function. The span was wide enough to cover all possible emission skirts. The resolution bandwidth was set to 1% of the span and the video bandwidth set to 3 times the resolution bandwidth.
2. The test receiver resolution bandwidth was set to 50 kHz and video bandwidth 200 kHz. A sample detector was used, sweep time was set to auto and the trace mode was Max Hold. The span was set to 5 MHz. The spectrum analyser function set the measurements to be made at 99% of the emission bandwidth. The results are given in the tables below.
3. The test receiver was connected to the RF port on the EUT using suitable attenuation and RF cable.

**Results:**

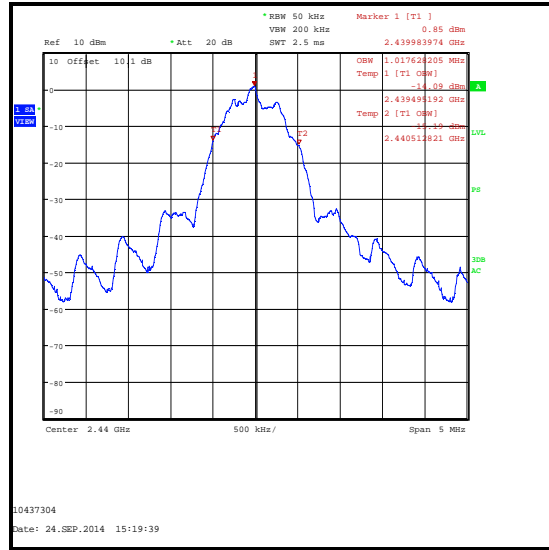
<b>Channel</b>	<b>99% Occupied Bandwidth (MHz)</b>
Bottom	1.026
Middle	1.018
Top	1.034

**Transmitter 99% Occupied Bandwidth (continued)**

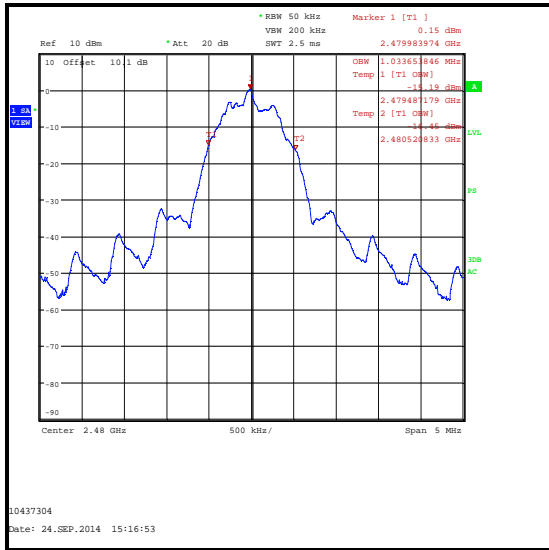
**Results:**



**Bottom Channel**



**Middle Channel**



**Top Channel**

**Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1656	Thermohyrometer	JM Handelpunkt	30.5015.13	None stated	14 Mar 2015	12
M1874	Test Receiver	Rohde & Schwarz	ESU26	100553	13 May 2015	12
A2506	Attenuator	AtlanTecRF	AN18-10	821846#1	Calibrated before use	-
M1886	Test Receiver	Rohde & Schwarz	ESU26	100554	09 May 2015	12
G0607	Signal Generator	Rohde & Schwarz	SMU200A	100943	18 Jul 2016	36

**5.2.3. Transmitter Maximum Peak Conducted Output Power****Test Summary:**

<b>Test Engineer:</b>	David Doyle	<b>Test Date:</b>	24 September 2014
<b>Test Sample Serial Number:</b>	Conducted sample		

<b>FCC Reference:</b>	Part 15.247(b)(3)
<b>Industry Canada Reference:</b>	RSS-Gen 4.8, RSS-210 A8.4(4)
<b>Test Method Used:</b>	As detailed in FCC KDB 558074 Section 9.1.1

**Environmental Conditions:**

<b>Temperature (°C):</b>	23
<b>Relative Humidity (%):</b>	42

**Note(s):**

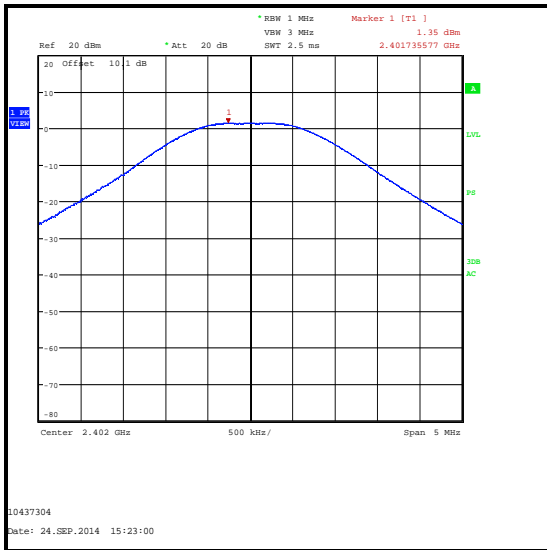
1. Conducted power tests were performed using a test receiver in accordance with FCC KDB 558074 Section 9.1.1 with the RBW > DTS bandwidth. The resolution bandwidth was set to 1 MHz and video bandwidth 3 MHz. A peak detector was used, sweep time set to auto and trace mode was Max Hold. The span was set to 5 MHz.
2. The test receiver was connected to the RF port on the EUT using a suitable RF attenuator and RF cable. An RF level offset of 11.3 dB was entered on the spectrum analyser to compensate for the loss of the attenuator and RF cable.
3. The conducted power was added to the declared antenna gain to obtain the EIRP.

**Results:**

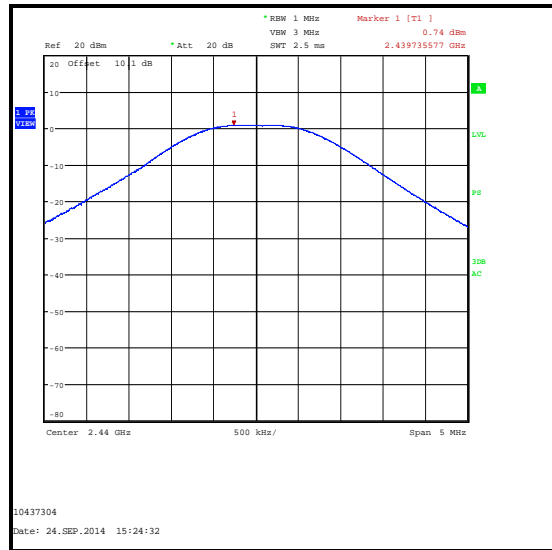
Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	1.4	30.0	28.6	Complied
Middle	0.7	30.0	29.3	Complied
Top	0.1	30.0	29.9	Complied

Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	1.4	3.1	4.5	36.0	31.5	Complied
Middle	0.7	3.1	3.8	36.0	32.2	Complied
Top	0.1	3.1	3.2	36.0	32.8	Complied

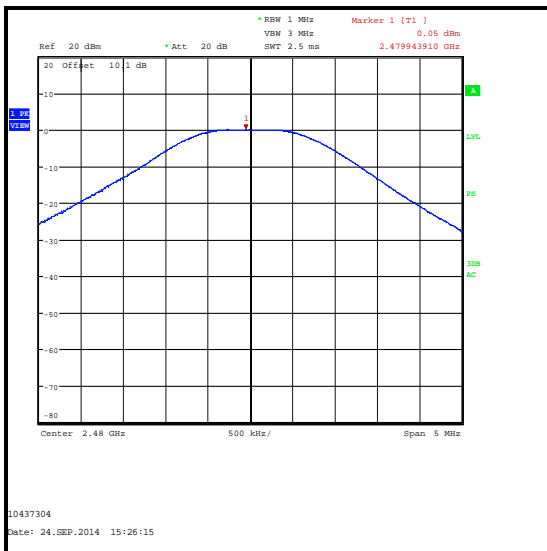
**Transmitter Maximum Peak Output Power (continued)**



**Bottom Channel**



**Middle Channel**



**Top Channel**

**Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1656	Thermohygrometer	JM Handelpunkt	30.5015.13	None stated	14 Mar 2015	12
M1874	Test Receiver	Rohde & Schwarz	ESU26	100553	13 May 2015	12
A2506	Attenuator	AtlanTecRF	AN18-10	821846#1	Calibrated before use	-
M1886	Test Receiver	Rohde & Schwarz	ESU26	100554	09 May 2015	12
G0607	Signal Generator	Rohde & Schwarz	SMU200A	100943	18 Jul 2016	36



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

<b>Test Engineer:</b>	David Doyle	<b>Test Date:</b>	26 September 2014
<b>Test Sample Serial Number:</b>	Radiated sample		

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

**Environmental Conditions:**

<b>Temperature (°C):</b>	24
<b>Relative Humidity (%):</b>	33

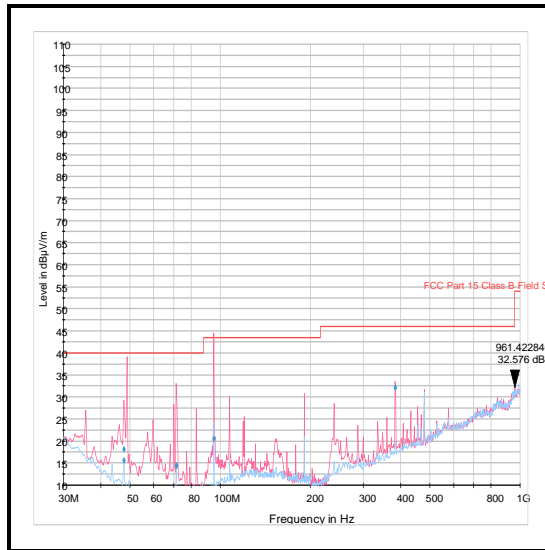
**Note(s):**

1. The final measured value, for the given emission, in the table below 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 emissions shown on the pre-scan plots were investigated and found to be >20 dB below the applicable limit or below the measurement system noise floor. The highest level emission is recorded in the table below.
4. Measurements below 1 GHz were performed in a semi-anechoic chamber (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.
5. Pre-scans were performed and markers placed on the highest measured levels. The test receiver resolution bandwidth was set to 100 kHz and video bandwidth 300 kHz. The sweep time was set to auto. A peak detector was used, sweep time was set to auto and trace mode was Max Hold.
6. Final measurements were performed on the marker frequencies and the results entered into the table below. The test receiver resolution bandwidth was set to 120 kHz, using a CISPR quasi-peak detector and span wide enough to see the whole emission.

**Results: Top Channel**

<b>Frequency (MHz)</b>	<b>Antenna Polarity</b>	<b>Level (dB<math>\mu</math>V/m)</b>	<b>Limit (dB<math>\mu</math>V/m)</b>	<b>Margin (dB)</b>	<b>Result</b>
383.908	Vertical	32.6	75.4	42.8	Complied

**Transmitter Radiated Emissions (continued)**



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

**Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1622	Thermohygrometer	JM Handelpunkt	30.5015.06	None stated	31 Dec 2014	12
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	26 Nov 2014	12
G0543	Amplifier	Sonoma	310N	230801	20 Nov 2014	3
M1273	Test Receiver	Rohde & Schwarz	ESIB 26	100275	15 Feb 2015	12
A490	Antenna	Chase	CBL6111A	1590	29 Apr 2015	12
A1834	Attenuator	Hewlett Packard	8491B	10444	15 Nov 2014	12

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

<b>Test Engineer:</b>	David Doyle	<b>Test Date:</b>	25 September 2014
<b>Test Sample Serial Number:</b>	Radiated sample		

<b>FCC Reference:</b>	Parts 15.247(d) & 15.209(a)
<b>Industry Canada Reference:</b>	RSS-Gen 4.9, RSS-210 A8.5
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Sections 6.3 and 6.6 referencing ANSI C63.4
<b>Frequency Range</b>	1 GHz to 25 GHz

**Environmental Conditions:**

<b>Temperature (°C):</b>	23
<b>Relative Humidity (%):</b>	42

**Note(s):**

1. The final measured value, for the given emission, in the table below 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 emission shown on the 1 GHz to 4 GHz plot is the EUT fundamental.
4. \*In accordance with ANSI C63.10 Section 6.6.4.2, if the peak measured value complies with the average limit, it is unnecessary to perform an average measurement.
5. The reference level for the emission in the non-restricted band was established by following KDB 558074 Section 11.2 procedure.
6. \*\*-20 dBc limit applies in non-restricted bands as the conducted output power measurements were performed using a peak detector.
7. Pre-scans above 1 GHz were performed in a fully anechoic chamber (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 (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.
8. Pre-scans were performed and a marker placed on the highest measured level of the appropriate plot. The test receiver resolution bandwidth was set to 1 MHz and video bandwidth 3 MHz. The sweep time was set to auto.

**Transmitter Radiated Emissions (continued)****Results: Peak / Bottom Channel**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
4804.455	Vertical	47.7	54.0*	6.3	Complied
7205.934	Vertical	56.0	75.9**	19.9	Complied

**Results: Peak / Middle Channel**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
4880.281	Vertical	47.8	54.0*	6.2	Complied
7319.167	Vertical	56.2	74.0	17.8	Complied

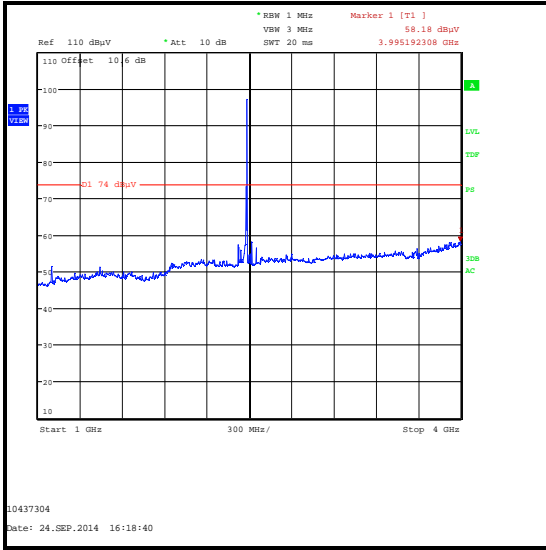
**Results: Average / Middle Channel**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
7319.921	Vertical	43.4	54.0	10.6	Complied

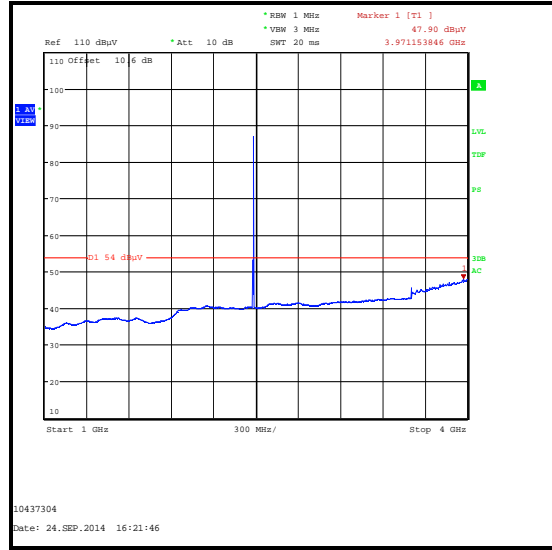
**Results: Peak / Top Channel**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
4960.144	Vertical	46.6	54.0*	7.4	Complied
7440.306	Vertical	53.5	54.0*	0.5	Complied

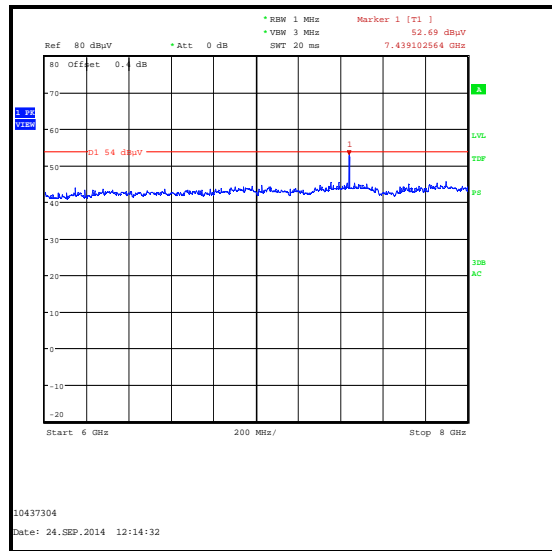
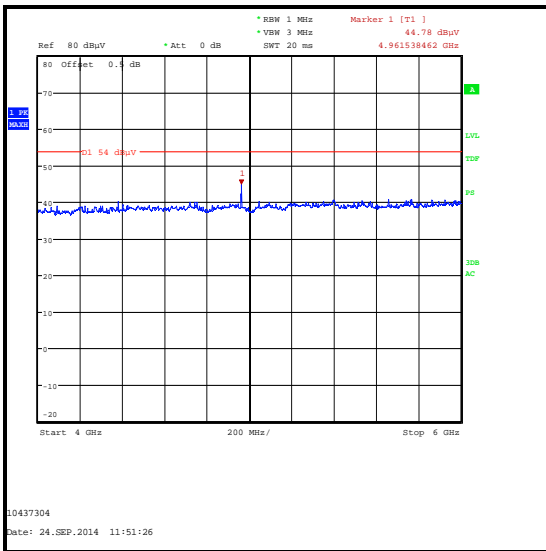
**Transmitter Radiated Emissions (continued)**



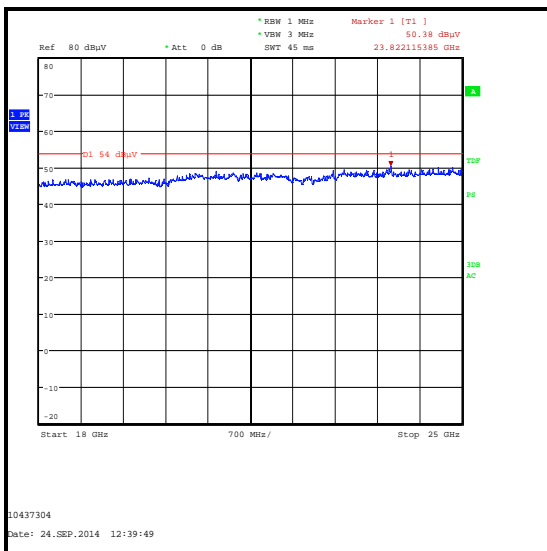
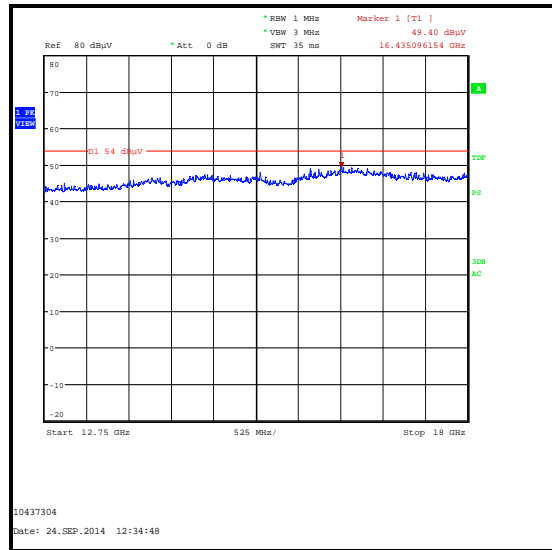
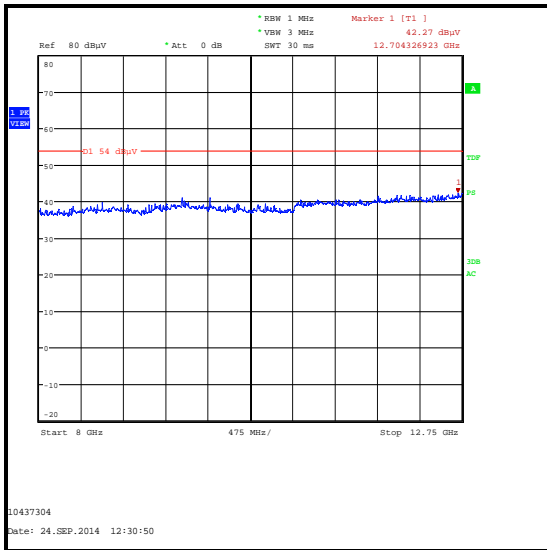
**Peak detector / Peak limit**



**Average detector / Average limit**



### Transmitter Radiated Emissions (continued)



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

**Transmitter Radiated Emissions (continued)****Test Equipment Used:**

<b>Asset No.</b>	<b>Instrument</b>	<b>Manufacturer</b>	<b>Type No.</b>	<b>Serial No.</b>	<b>Date Calibration Due</b>	<b>Cal. Interval (Months)</b>
M1656	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	14 Mar 2015	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	14 Nov 2014	12
M1874	Test Receiver	Rohde & Schwarz	ESU26	100553	13 May 2015	12
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	18 May 2015	12
A1975	High Pass Filter	AtlanTecRF	AFH-03000	090424010	12 Apr 2015	12
A1818	Antenna	EMCO	3115	00075692	14 Nov 2014	12
A253	Antenna	Flann	12240-20	128	14 Nov 2014	12
A254	Antenna	Flann	14240-20	139	14 Nov 2014	12
A255	Antenna	Flann	16240-20	519	14 Nov 2014	12
A256	Antenna	Flann	18240-20	400	14 Nov 2014	12
A436	Antenna	Flann	20240-20	330	14 Nov 2014	12

**5.2.5. Transmitter Band Edge Radiated Emissions****Test Summary:**

<b>Test Engineer:</b>	David Doyle	<b>Test Dates:</b>	24 September 2014 & 26 September 2014
<b>Test Sample Serial Number:</b>	Radiated sample		

<b>FCC Reference:</b>	Parts 15.247(d) & 15.209(a)
<b>Industry Canada Reference:</b>	RSS-Gen 4.9, RSS-210 A8.5
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Section 6.9.2 & FCC KDB 558074 Section 11

**Environmental Conditions:**

<b>Temperature (°C):</b>	23 to 24
<b>Relative Humidity (%):</b>	42 to 43

**Note(s):**

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. The maximum peak conducted output power was previously measured. In accordance with FCC KDB 558074 Section 11.1(a), the lower band edge measurement was performed with a peak detector and the -20 dBc limit applied.
3. There is a restricted band 10 MHz below the lower band edge. The test receiver was set up as follows: a RBW set to 1 MHz, the VBW set to 3, with the sweep time set to auto couple. Peak and average measurements were performed with their own appropriate detectors. Markers were placed on the highest point on each trace.
4. \* -20 dBc limit.

**Results: Peak**

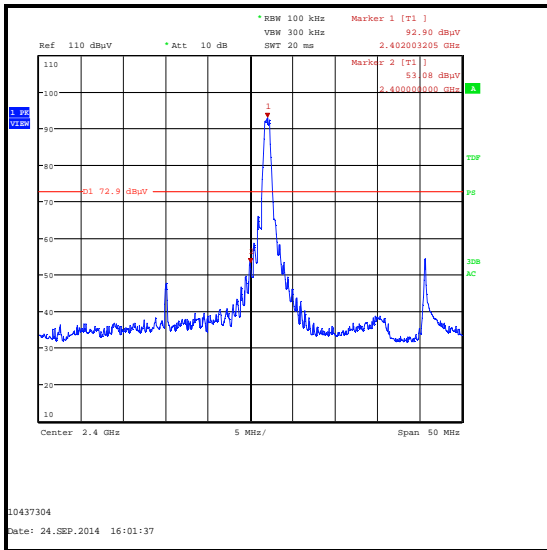
Frequency (MHz)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2361.282	54.4	74.0	19.6	Complied
2400.0	53.1	72.9*	19.8	Complied
2483.5	56.0	74.0	18.0	Complied

**Results: Average**

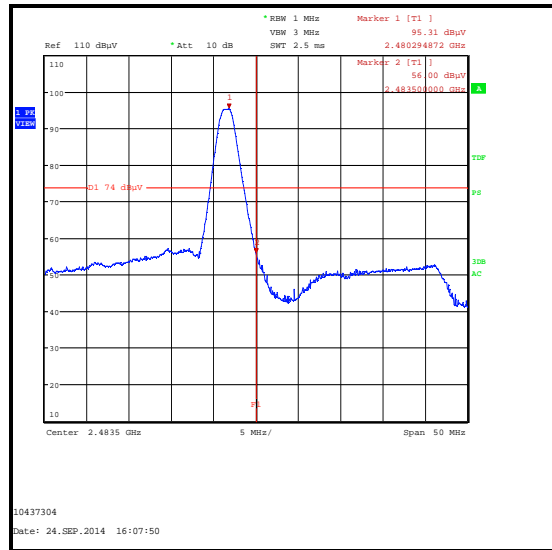
Frequency (MHz)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2389.872	43.6	54.0	10.4	Complied
2483.5	43.1	54.0	10.9	Complied



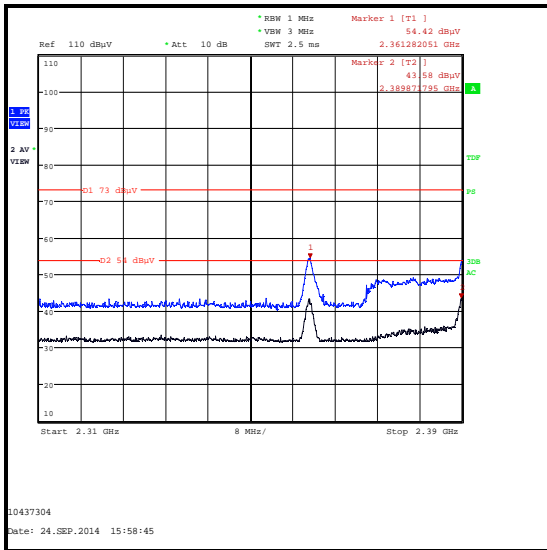
**Transmitter Band Edge Radiated Emissions (continued)**



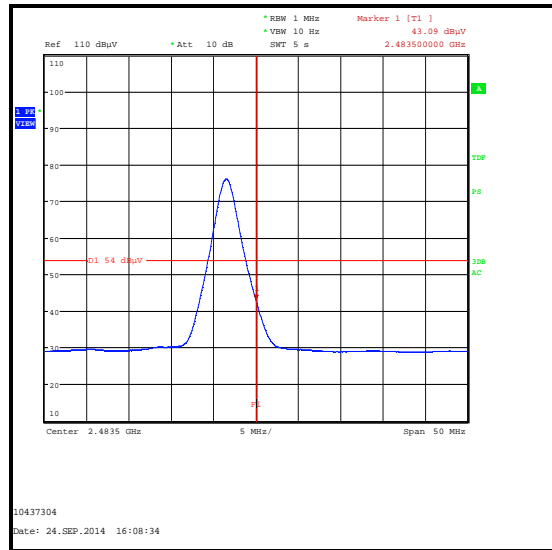
**Lower Band Edge Peak Measurement**



**Upper Band Edge Peak Measurement**



**2310-2390 MHz Restricted Band Measurement**

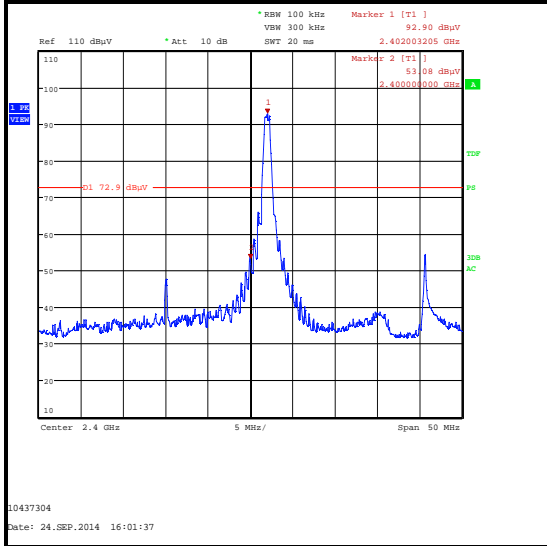


**Upper Band Edge Average Measurement**

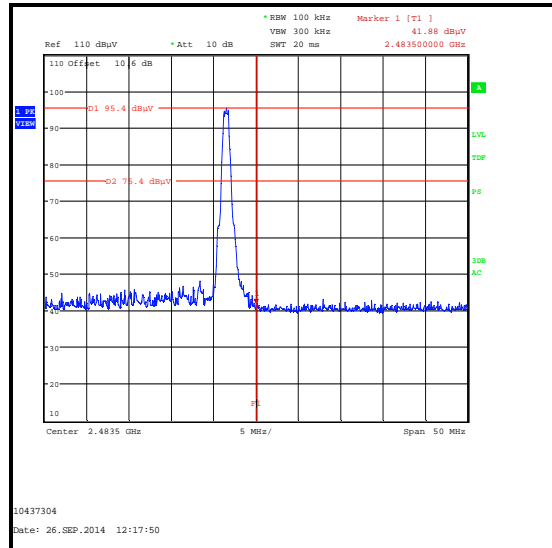
**Transmitter Band Edge Radiated Emissions (continued)**

**Industry Canada Results:**

Frequency (MHz)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2400.0	53.1	72.9*	19.8	Complied
2483.5	41.9	75.4*	33.5	Complied



**Lower Band Edge Peak Measurement**



**Upper Band Edge Peak Measurement**

**Transmitter Band Edge Radiated Emissions (continued)****Test Equipment Used:**

<b>Asset No.</b>	<b>Instrument</b>	<b>Manufacturer</b>	<b>Type No.</b>	<b>Serial No.</b>	<b>Date Calibration Due</b>	<b>Cal. Interval (Months)</b>
M1656	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	14 Mar 2015	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	14 Nov 2014	12
M1874	Test Receiver	Rohde & Schwarz	ESU26	100553	13 May 2015	12
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	18 May 2015	12
A1818	Antenna	EMCO	3115	00075692	14 Nov 2014	12

## **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 measured (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".

<b>Measurement Type</b>	<b>Range</b>	<b>Confidence Level (%)</b>	<b>Calculated Uncertainty</b>
Conducted Maximum Output Power	2.4 GHz to 2.4835 GHz	95%	±1.13 dB
Minimum 6 dB Bandwidth	2.4 GHz to 2.4835 GHz	95%	±3.92%
99% Occupied Bandwidth	2.4 GHz to 2.4835 GHz	95%	±3.92%
Radiated Spurious Emissions	30 MHz to 1 GHz	95%	±5.65 dB
Radiated Spurious Emissions	1 GHz to 26.5 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.

## **7. Report Revision History**

Version Number	Revision Details		
	Page No(s)	Clause	Details
1.0	-	-	Initial Version

---END OF REPORT---