



# TEST REPORT

**Test Report No. :** UL-RPT-RP10895533JD04C V3.0

**Manufacturer** : Bang & Olufsen a/s  
**Model No.** : WUS-AC08V  
**FCC ID** : TTUWUSAC08V  
**Technology** : *Bluetooth* – Basic Rate & EDR  
**Test Standard(s)** : FCC Parts 15.209(a) & 15.247(d)

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 3.0 supersedes all previous versions.

**Date of Issue:** 20 December 2016

**Checked by:**

Sarah Williams  
Engineer, Radio Laboratory

**Company Signatory:**

Ian Watch  
Senior Engineer, Radio Laboratory  
UL VS LTD



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

The *Bluetooth*<sup>®</sup> word mark and logos are owned by the *Bluetooth* SIG, Inc. and any use of such marks by UL VS LTD is under licence. Other trademarks and trade names are those of their respective owners.

---

## UL VS LTD

Pavilion A, Ashwood Park, Ashwood Way, Basingstoke, Hampshire, RG23 8BG, UK  
Telephone: +44 (0)1256 312000  
Facsimile: +44 (0)1256 312001

This page has been left intentionally blank.

**Table of Contents**

<b>1. Customer Information.....</b>	<b>4</b>
<b>2. Summary of Testing.....</b>	<b>5</b>
2.1. General Information	5
2.2. Summary of Test Results	5
2.3. Methods and Procedures	5
2.4. Deviations from the Test Specification	5
<b>3. Equipment Under Test (EUT) .....</b>	<b>6</b>
3.1. Identification of Equipment Under Test (EUT)	6
3.1.1 Host Product Details	6
3.2. Description of EUT	6
3.3. Modifications Incorporated in the EUT	6
3.4. Additional Information Related to Testing	7
3.5. Support Equipment	7
<b>4. Operation and Monitoring of the EUT during Testing .....</b>	<b>11</b>
4.1. Operating Modes	11
4.2. Configuration and Peripherals	11
<b>5. Measurements, Examinations and Derived Results.....</b>	<b>12</b>
5.1. General Comments	12
5.2. Test Results	13
5.2.1. Transmitter Radiated Emissions	13
5.2.2. Transmitter Band Edge Radiated Emissions	21
<b>6. Measurement Uncertainty .....</b>	<b>31</b>
<b>7. Report Revision History .....</b>	<b>32</b>

**1. Customer Information**





<b>Company Name:</b>	Bang & Olufsen A/S
<b>Address:</b>	Peter Bangs Vej 15 7600 Struer Denmark

## **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>Site Registration:</b>	209735
<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>	05 April 2016 to 13 April 2016

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

<b>FCC Reference (47CFR)</b>	<b>Measurement</b>	<b>Result</b>
Part 15.247(d) & 15.209(a)	Transmitter Radiated Emissions	
Part 15.247(d) & 15.209(a)	Transmitter Band Edge Radiated Emissions	
<b>Key to Results</b>  = Complied  = Did not comply		

### **2.3. Methods and Procedures**

<b>Reference:</b>	ANSI C63.10-2013
<b>Title:</b>	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

### **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:	WUS-AC08V
Model Name or Number:	WUS-AC08V
Test Sample MAC address:	542AA22F8F19 ( <i>Conducted sample</i> )
Hardware Version:	A1G
Software Version:	4.2.3.5
FCC ID:	TTUWUSAC08V

##### **3.1.1 Host Product Details**

Brand Name:	BeoVision 14-55
Model Name or Number:	BeoVision 14-55
Test Sample Serial Number:	92875 ( <i>Radiated sample</i> )
Hardware Version:	8009004
Software Version:	7.77

Description:	AC power cable
Brand Name:	Not marked or stated
Model Name or Number:	Not marked or stated
Serial Number:	Not marked or stated

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

The equipment under test was a *Bluetooth* Basic Rate + EDR, *Bluetooth* Low Energy, IEEE 802.11a,b,g,n,ac WLAN module operating in the 2.4 GHz and 5 GHz bands, which was incorporated into a 55" Television. The EUT has two external antenna ports with two transmit chains and MIMO is supported. For 802.11a/g/n/ac operation the device uses two by two MIMO transmitters. Depending on the 802.11 data rate, the device transmits 1 or 2 spatial stream. The device uses spatial multiplexing and from an RF point of view the streams are correlated.

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

No modifications were applied to the EUT during testing.

**3.4. Additional Information Related to Testing**

Tested Technology:	Bluetooth		
Power Supply Requirement:	Nominal	120 VAC 60 Hz	
Type of Unit:	Transceiver		
Channel Spacing:	1 MHz		
Mode:	Basic Rate	Enhanced Data Rate	
Modulation:	GFSK	$\pi/4$ -DQPSK	8DPSK
Packet Type: (Maximum Payload):	DH5	2DH5	3DH5
Data Rate (Mbps):	1	2	3
Transmit Frequency Range:	2402 MHz to 2480 MHz		
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	0	2402
	Middle	39	2441
	Top	78	2480

**3.5. Support Equipment**

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

<b>Description:</b>	Remote control
<b>Brand Name:</b>	Bang & Olufsen a/s
<b>Model Name or Number:</b>	BeoRemote One T30
<b>Serial Number:</b>	25143484

<b>Description:</b>	BTLE box
<b>Brand Name:</b>	Alpha Network
<b>Model Name or Number:</b>	WUS-AC08V
<b>Serial Number:</b>	H11145216

<b>Description:</b>	HDMI cable. Quantity 3. Length 2m
<b>Brand Name:</b>	Not marked or stated
<b>Model Name or Number:</b>	Not marked or stated
<b>Serial Number:</b>	Not marked or stated

<b>Description:</b>	HDMI cable. Quantity 1. Length 3m
<b>Brand Name:</b>	Not marked or stated
<b>Model Name or Number:</b>	Not marked or stated
<b>Serial Number:</b>	Not marked or stated

**Support Equipment (continued)**

<b>Description:</b>	Now TV set top box
<b>Brand Name:</b>	Sky
<b>Model Name or Number:</b>	2400SK
<b>Serial Number:</b>	1MM4DE006281

<b>Description:</b>	Now TV set top box
<b>Brand Name:</b>	Sky
<b>Model Name or Number:</b>	2400SK
<b>Serial Number:</b>	1MM552038807

<b>Description:</b>	Now TV set top box
<b>Brand Name:</b>	Sky
<b>Model Name or Number:</b>	2400SK
<b>Serial Number:</b>	1MM4D8006255

<b>Description:</b>	HDMI media player
<b>Brand Name:</b>	SUMVISION
<b>Model Name or Number:</b>	Cyclone Micro
<b>Serial Number:</b>	SUM091104017

<b>Description:</b>	Ethernet cable. Quantity 3. Length 2m
<b>Brand Name:</b>	Not marked or stated
<b>Model Name or Number:</b>	Not marked or stated
<b>Serial Number:</b>	Not marked or stated

<b>Description:</b>	Ethernet cable. Quantity 3. Length 3m
<b>Brand Name:</b>	Not marked or stated
<b>Model Name or Number:</b>	Not marked or stated
<b>Serial Number:</b>	Not marked or stated

<b>Description:</b>	Ethernet cable. Quantity 1. Length 5m
<b>Brand Name:</b>	Not marked or stated
<b>Model Name or Number:</b>	Not marked or stated
<b>Serial Number:</b>	Not marked or stated



**Support Equipment (continued)**

<b>Description:</b>	Ethernet cable. Quantity 1. Length 10m
<b>Brand Name:</b>	Not marked or stated
<b>Model Name or Number:</b>	Not marked or stated
<b>Serial Number:</b>	Not marked or stated

<b>Description:</b>	ADSL2+ Modem Router
<b>Brand Name:</b>	Netgear
<b>Model Name or Number:</b>	DG834 v4
<b>Serial Number:</b>	1PL596BD001A4

<b>Description:</b>	ADSL Modem Router
<b>Brand Name:</b>	Linksys
<b>Model Name or Number:</b>	WAG54G
<b>Serial Number:</b>	CF610E100799

<b>Description:</b>	USB cable type A male to type A male. Quantity 3. Length 3m
<b>Brand Name:</b>	Not marked or stated
<b>Model Name or Number:</b>	Not marked or stated
<b>Serial Number:</b>	Not marked or stated

<b>Description:</b>	Audio cable 3.5mm male to 3.5mm male. Quantity 1. Length 3m
<b>Brand Name:</b>	Not marked or stated
<b>Model Name or Number:</b>	Not marked or stated
<b>Serial Number:</b>	Not marked or stated

<b>Description:</b>	Aerial cable. Quantity 1. Length 2m
<b>Brand Name:</b>	Belkin
<b>Model Name or Number:</b>	Not marked or stated
<b>Serial Number:</b>	Not marked or stated

<b>Description:</b>	Freeview Set Top Box
<b>Brand Name:</b>	Sagem
<b>Model Name or Number:</b>	251657024
<b>Serial Number:</b>	441901036882

**Support Equipment (continued)**

<b>Description:</b>	USB cable type A male to type B male. Quantity 1. Length 3m with 3 FAIR-RITE V0 ferrites and 1 unmarked or stated ferrite
<b>Brand Name:</b>	Not marked or stated
<b>Model Name or Number:</b>	Not marked or stated
<b>Serial Number:</b>	Not marked or stated

<b>Description:</b>	Laptop PC
<b>Brand Name:</b>	Lenovo
<b>Model Name or Number:</b>	T61
<b>Serial Number:</b>	L3E7586

<b>Description:</b>	USB Hub
<b>Brand Name:</b>	Belkin
<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):

- Continuously transmitting at maximum power on bottom, middle, top and hopping channels in Basic Rate (DH5 packets) or EDR (2DH5 or 3DH5 packets) as required.

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

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

- Controlled using a test application, WCN Combo Tool (version 2.1434.00, build Aug 18, 2014) by MediaTek Inc, supplied by the customer. The relevant instructions for using the tool on the EUT were contained within the document MT7662 BT tool user manual v0\_20141204.pdf.
- Transmit tests: The EUT was placed into *RF Test* mode using a laptop PC and the Combo Tool application. *Pattern* was set to Tx PRBS, *Packet type* was set to DH5, 2DH5 or 3DH5 as required. *Data length* was the default maximum allowed for each packet type. The EUT was set to a particular single test channel, or hopping mode, as required.
- Transmit tests: The continuous transmit power level was set on the test application. *Tx Power Level* was set to 5 for all tests, at the request of the customer.
- Radiated measurements: In order to operate the EUT the TV needed to be enabled. This was done by turning on the TV and pairing it with T30 remote control with the external BTLE box which was connected to the TV. The external BTLE box has 0.83m cable with a USB type A male connector. Once the TV was enabled, the EUT could be controlled using the MT7662U application. This was connected between the TV and laptop by the means of a 2m USB cable (type A to type B) with four ferrites on it.
- Once the EUT was in transmit mode, the T30 remote control and external BTLE box were removed from the chamber before testing commenced.
- For all radiated tests the support equipment was used to terminate all active ports.

## **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 Radiated Emissions**

#### **Test Summary:**

<b>Test Engineer:</b>	David Doyle	<b>Test Date:</b>	13 April 2016
<b>Test Sample Serial Number:</b>	92875		

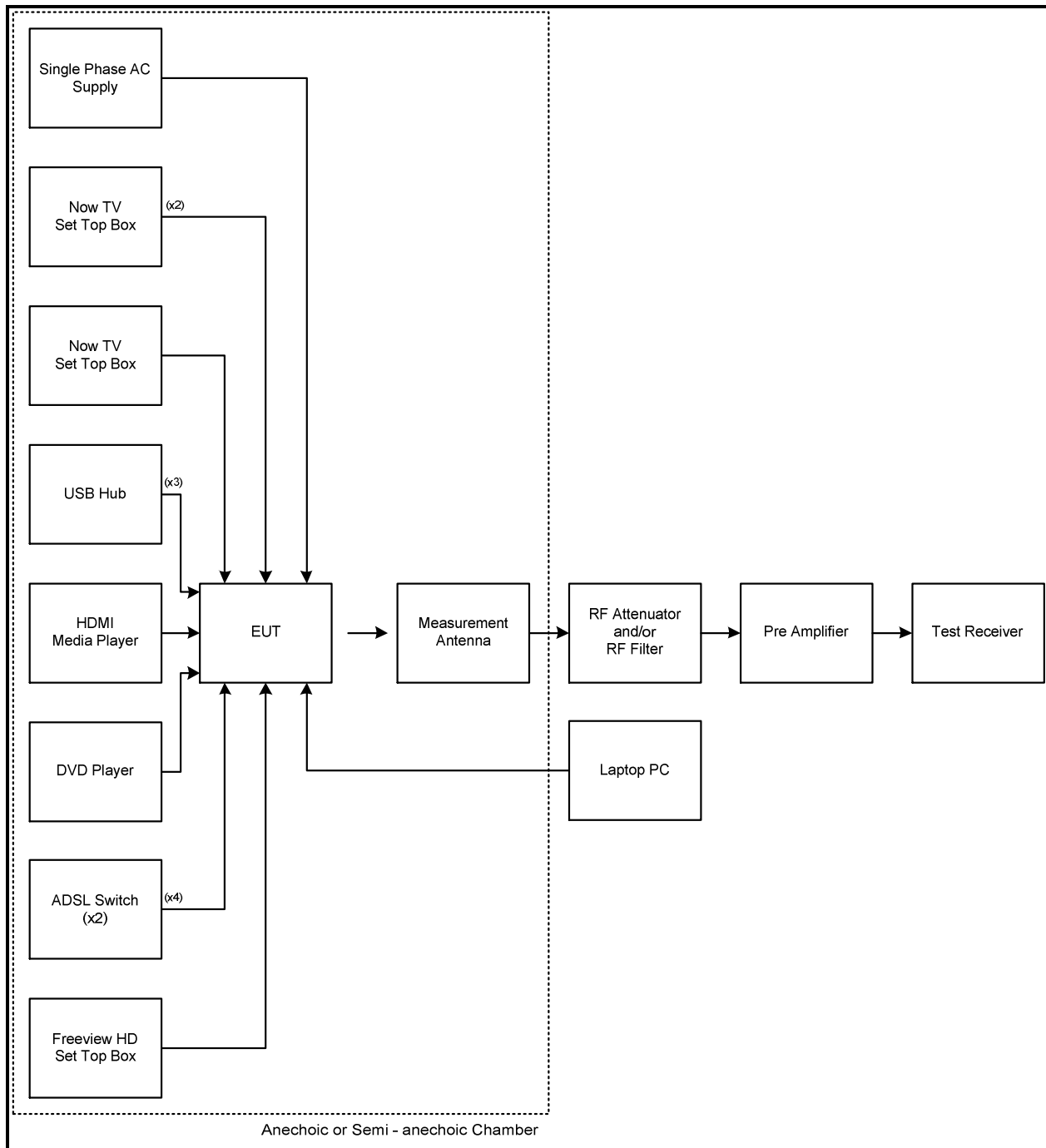
<b>FCC Reference:</b>	Parts 15.247(d) & 15.209(a)
<b>Test Method Used:</b>	ANSI C63.10 Sections 6.3 and 6.5
<b>Frequency Range</b>	30 MHz to 1000 MHz

#### **Environmental Conditions:**

<b>Temperature (°C):</b>	21
<b>Relative Humidity (%):</b>	32

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

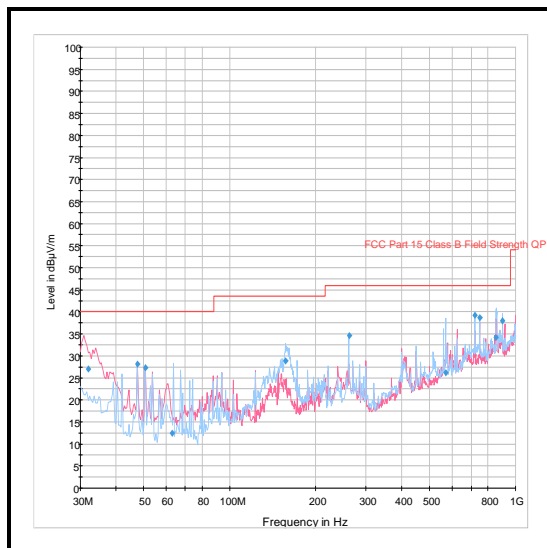
1. Transmitter radiated spurious emissions tests were performed with the EUT transmitting in DH5 mode as this was found to transmit the highest power and therefore deemed worst case.
2. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
3. 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 middle channel only.
4. 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.
5. 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.
6. 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.
7. 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 big enough to see the whole emission.

**Transmitter Radiated Emissions (continued)****Test setup for radiated measurements:**

*Note: The number in brackets relates to the quantity of cables which were connected between the TV and the support equipment.*

**Transmitter Radiated Emissions (continued)****Results: Quasi-Peak / DH5**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
262.142	Horizontal	34.7	46.0	11.3	Complied



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)
M1627	Thermohygrometer	JM Handelspunkt	30.5015.10	None stated	11 Jan 2017	12
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	12 Jan 2017	12
G0543	Amplifier	Sonoma	310N	230801	29 May 2016	3
M1124	Test Receiver	Rohde & Schwarz	ESIB26	100046	18 Nov 2016	12
A259	Antenna	Chase	CBL6111	1513	19 Jul 2016	12
A1834	Attenuator	Hewlett Packard	8491B	10444	30 Mar 2017	12

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

<b>Test Engineers:</b>	Andrew Edwards & David Doyle	<b>Test Dates:</b>	05 April 2016 & 11 April 2016
<b>Test Sample Serial Number:</b>	92875		

<b>FCC Reference:</b>	Parts 15.247(d) & 15.209(a)
<b>Test Method Used:</b>	ANSI C63.10 Sections 6.3 and 6.6
<b>Frequency Range</b>	1 GHz to 25 GHz

**Environmental Conditions:**

<b>Temperature (°C):</b>	23 to 24
<b>Relative Humidity (%):</b>	33 to 35

**Note(s):**

1. Transmitter radiated spurious emissions tests were performed with the EUT transmitting in DH5 mode as this was found to transmit the highest power and therefore deemed worst case.
2. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
3. All other emissions shown on the pre-scans were investigated and found to be ambient, or > 20 dB below the appropriate limit or below the noise floor of the measurement system.
4. The emission shown on the 1 GHz to 4 GHz plot is the EUT fundamental at 2441 MHz.
5. 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 1.5 m 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.
6. 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. Peak and average measurements were performed with their own appropriate detectors during the pre-scan measurements.
7. \*In accordance with ANSI C63.10 Section 6.6.4.3, Note 1, if the peak measured value complies with the average limit, it is unnecessary to perform an average measurement.
8. \*\* -20 dBc limit applies in non-restricted band as the conducted output power measurements were performed using a peak detector.
9. The six highest spurious emissions relative to the limit were recorded in table below, as stated in ANSI C63.10 Section 6.6.4.3.



**Transmitter Radiated Emissions (continued)****Results: Peak / Bottom Channel / DH5**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
1145.192	Vertical	54.6	74.0	19.4	Complied
1499.984	Vertical	52.4	54.0*	1.6	Complied
1745.682	Horizontal	60.5	72.9**	12.4	Complied
2251.086	Horizontal	50.1	54.0*	3.9	Complied
2700.286	Vertical	52.4	54.0*	1.6	Complied
2854.487	Vertical	58.9	74.0	15.1	Complied

**Results: Average / Bottom Channel / DH5**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
1145.192	Vertical	51.2	54.0	2.8	Complied
2854.487	Horizontal	48.1	54.0	5.9	Complied

**Results: Peak / Middle Channel / DH5**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
1145.192	Vertical	54.6	74.0	19.4	Complied
1499.984	Vertical	52.4	54.0*	1.6	Complied
1745.682	Horizontal	60.5	73.7**	13.2	Complied
2251.086	Horizontal	50.1	54.0*	3.9	Complied
2700.286	Vertical	52.4	54.0*	1.6	Complied
2854.487	Vertical	58.9	74.0	15.1	Complied

**Results: Average / Middle Channel / DH5**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
1145.192	Vertical	51.2	54.0	2.8	Complied
2854.487	Horizontal	48.1	54.0	5.9	Complied

**Transmitter Radiated Emissions (continued)****Results: Peak / Top Channel / DH5**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
1145.192	Vertical	54.6	74.0	19.4	Complied
1499.984	Vertical	52.4	54.0*	1.6	Complied
1745.682	Horizontal	60.5	74.9**	14.4	Complied
2251.086	Horizontal	50.1	54.0*	3.9	Complied
2700.286	Vertical	52.4	54.0*	1.6	Complied
2854.487	Vertical	58.9	74.0	15.1	Complied

**Results: Average / Top Channel / DH5**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
1145.192	Vertical	51.2	54.0	2.8	Complied
2854.487	Horizontal	48.1	54.0	5.9	Complied

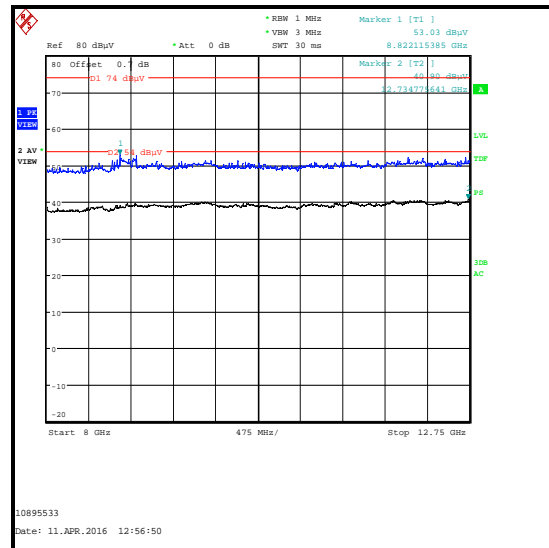
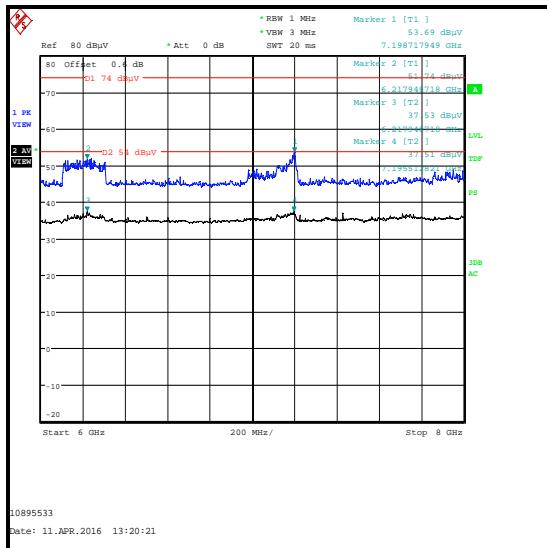
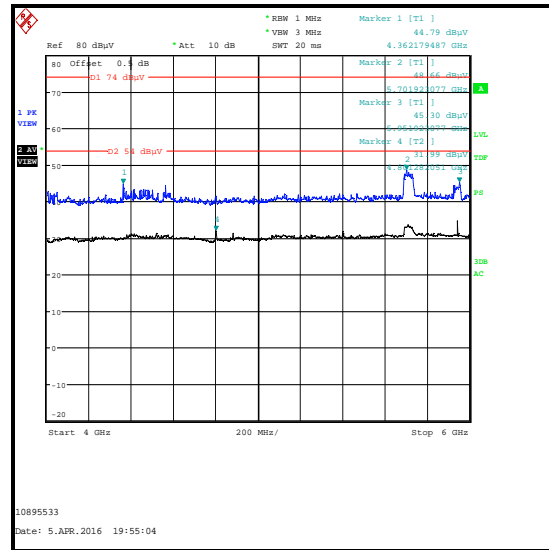
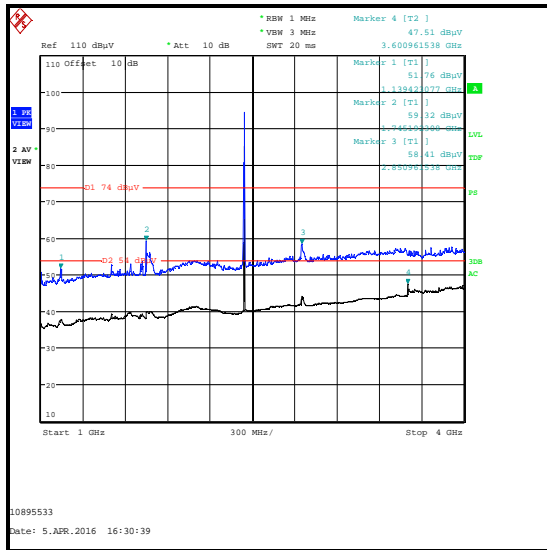
**Results: Peak / Hopping Mode / DH5**

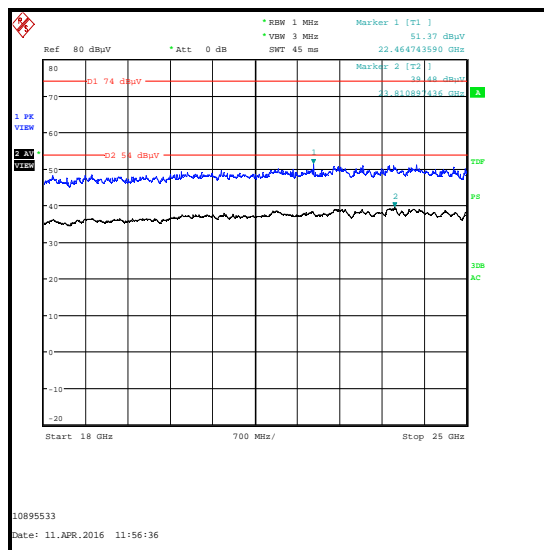
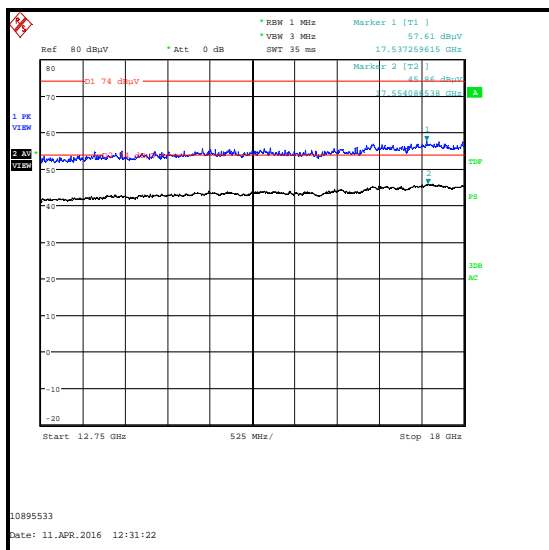
Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
1145.192	Vertical	54.6	74.0	19.4	Complied
1499.984	Vertical	52.4	54.0*	1.6	Complied
1745.682	Horizontal	60.5	74.8**	14.3	Complied
2251.086	Horizontal	50.1	54.0*	3.9	Complied
2700.286	Vertical	52.4	54.0*	1.6	Complied
2854.487	Vertical	58.9	74.0	15.1	Complied

**Results: Average / Hopping Channel / DH5**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
1145.192	Vertical	51.2	54.0	2.8	Complied
2854.487	Horizontal	48.1	54.0	5.9	Complied

## Transmitter Radiated Emissions (continued)



**Transmitter Radiated Emissions (continued)**

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

**Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1656	Thermohygrometer	JM Handelspunkt	30.5015.13	Not stated	23 Apr 2016	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	21 Dec 2016	12
M1886	Test Receiver	Rohde & Schwarz	ESU26	100554	21 Mar 2017	12
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	19 Dec 2016	12
A1818	Antenna	EMCO	3115	00075692	17 Dec 2016	12
A253	Antenna	Flann Microwave	12240-20	128	17 Dec 2016	12
A254	Antenna	Flann Microwave	14240-20	139	17 Dec 2016	12
A255	Antenna	Flann Microwave	16240-20	519	17 Dec 2016	12
A256	Antenna	Flann Microwave	18240-20	400	17 Dec 2016	12
A436	Antenna	Flann Microwave	20240-20	330	19 Dec 2016	12
A239	Attenuator	Huber & Suhner	6806.17.B	Not stated	05 May 2016	12
A1975	High Pass Filter	AtlanTecRF	AFH-03000	090424010	17 Apr 2016	12
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	12 Jan 2017	12
M1124	Test Receiver	Rohde & Schwarz	ESIB26	100046	18 Nov 2016	12
M1945	Thermohygrometer	JM Handelspunkt	30.5015.01	None stated	23 Apr 2016	12

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

<b>Test Engineer:</b>	David Doyle	<b>Test Date:</b>	05 April 2016
<b>Test Sample Serial Number:</b>	92875		

<b>FCC Reference:</b>	Parts 15.247(d) & 15.209(a)
<b>Test Method Used:</b>	ANSI C63.10 Sections 6.10.4 & 6.10.5

**Environmental Conditions:**

<b>Temperature (°C):</b>	23
<b>Relative Humidity (%):</b>	31

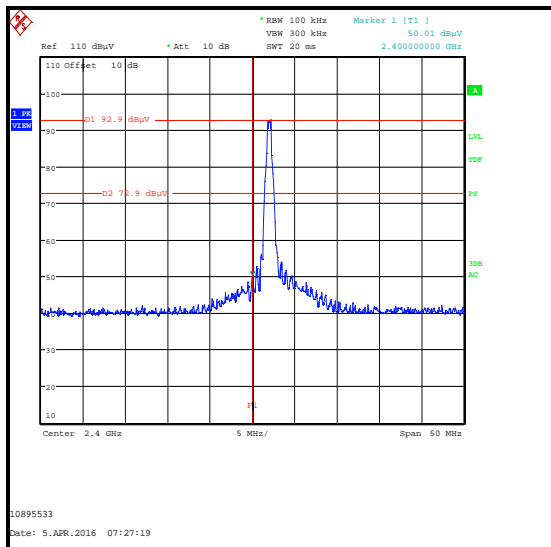
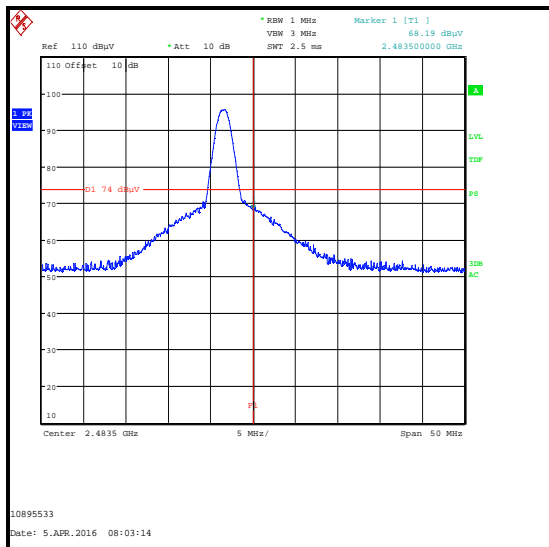
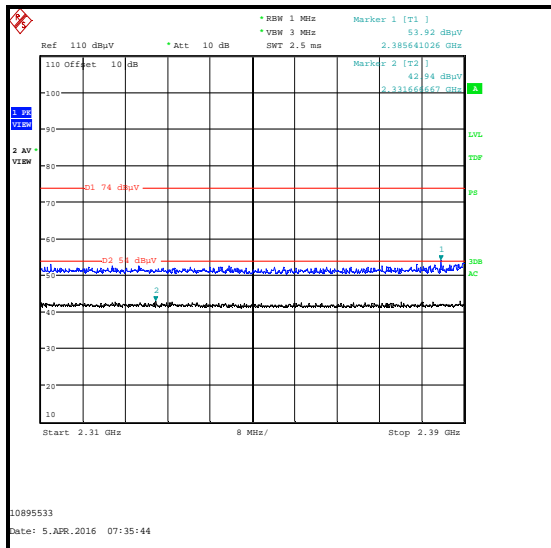
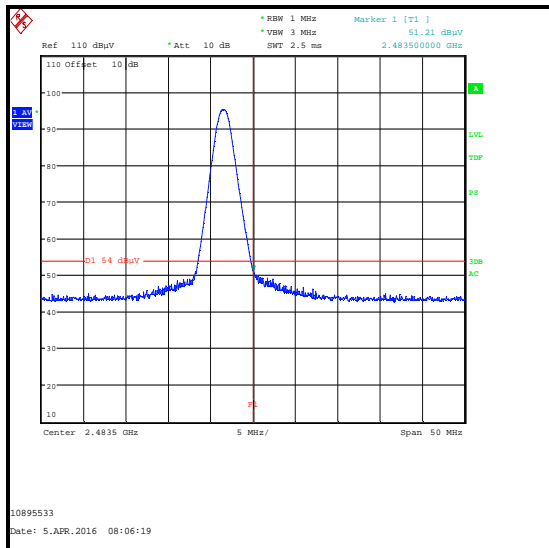
**Note(s):**

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. The lower band edge falls within a non-restricted band. 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 trace mode was Max Hold. The test receiver was left to sweep for a sufficient length of time in order to maximise the carrier level and out-of-band emissions. A marker and corresponding reference level line were placed on the peak of the carrier. A marker was placed on the band edge spot frequencies and a second marker placed on the highest emission level in the adjacent band (where a higher level emission was present). Marker frequencies and levels were recorded.
3. The upper band edge falls within a restricted band. The test receiver resolution bandwidth was set to 1 MHz and video bandwidth 3 MHz. Peak and average measurements were performed with their respective detectors, sweep time was set to auto and trace mode was Max Hold. The test receiver was left to sweep for a sufficient length of time in order to maximise the carrier level and out-of-band emissions. A marker was placed on the band edge spot frequencies and a second marker placed on the highest emission level in the adjacent band (where a higher level emission was present). Marker frequencies and levels were recorded.
4. There is a restricted band 10 MHz below the lower band edge. The test receiver was set up as follows: the RBW set to 1 MHz, the VBW set to 3 MHz, with the sweep time set to auto couple. Peak and average measurements were performed with their respective detectors. Markers were placed on the highest point on each trace.
5. The restricted band plot for 2310 MHz to 2390 MHz can be found under the results for DH5 static as this mode had the highest output power and was therefore deemed worst case.
6. \* -20 dBc limit.

**Transmitter Band Edge Radiated Emissions (continued)****Results: Static Mode / DH5**

Frequency (MHz)	Antenna Polarity	Peak Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2385.641	Horizontal	53.9	74.0	20.1	Complied
2400.0	Horizontal	50.0	72.9*	22.9	Complied
2483.5	Horizontal	68.2	74.0	5.8	Complied

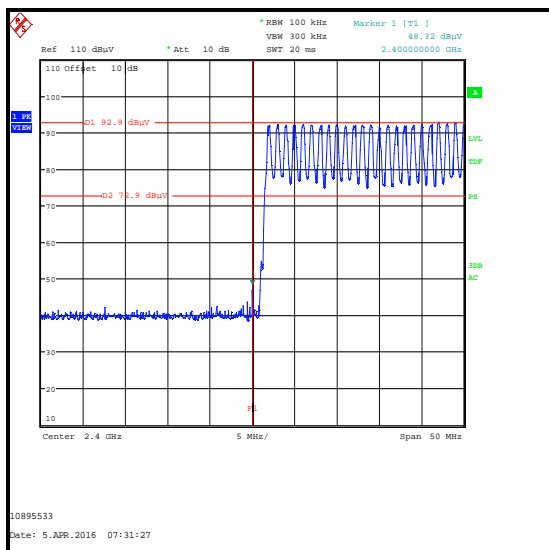
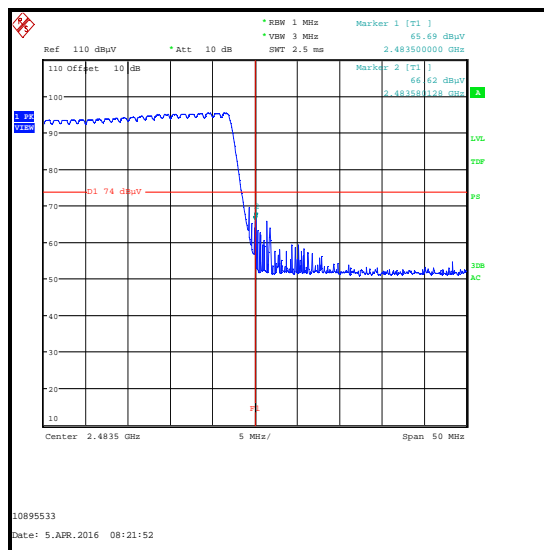
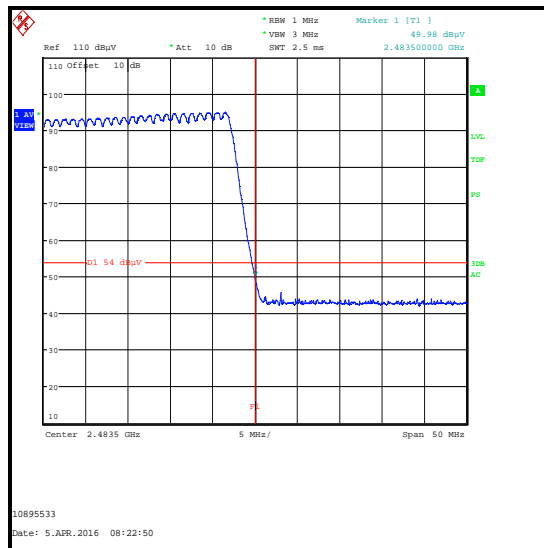
Frequency (MHz)	Antenna Polarity	Average Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2331.667	Horizontal	42.9	54.0	11.1	Complied
2483.5	Horizontal	51.2	54.0	2.8	Complied

**Transmitter Band Edge Radiated Emissions (continued)****Results: Static Mode / DH5****Lower Band Edge Peak Static****Upper Band Edge Peak Static****2310 MHz to 2390 MHz Restricted Band Plot****Upper Band Edge Average Static**

**Transmitter Band Edge Radiated Emissions (continued)****Results: Hopping Mode / DH5**

Frequency (MHz)	Antenna Polarity	Peak Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2400.0	Horizontal	48.3	72.9*	24.6	Complied
2483.5	Horizontal	65.7	74.0	8.3	Complied
2483.580	Horizontal	66.6	74.0	7.4	Complied

Frequency (MHz)	Antenna Polarity	Average Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2483.5	Horizontal	50.0	54.0	4.0	Complied

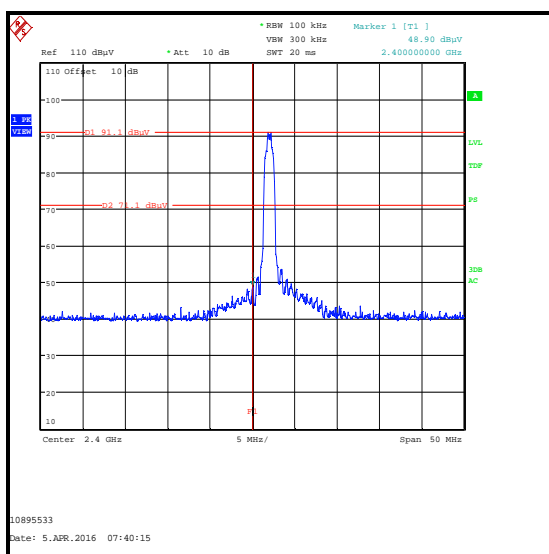
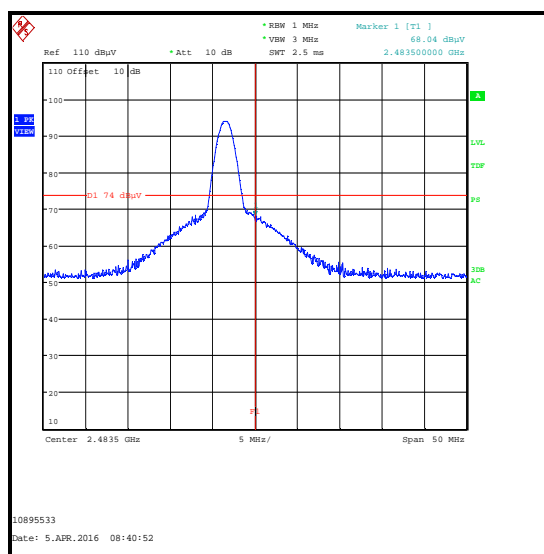
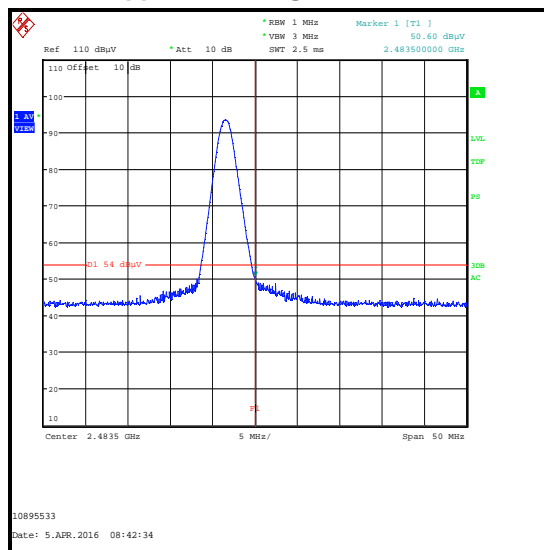
**Lower Band Edge Peak Hopping****Upper Band Edge Peak Hopping****Upper Band Edge Average Hopping**



**Transmitter Band Edge Radiated Emissions (continued)****Results: Static Mode / 2DH5**

Frequency (MHz)	Antenna Polarity	Peak Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2400.0	Horizontal	48.9	71.1*	22.2	Complied
2483.5	Horizontal	68.0	74.0	6.0	Complied

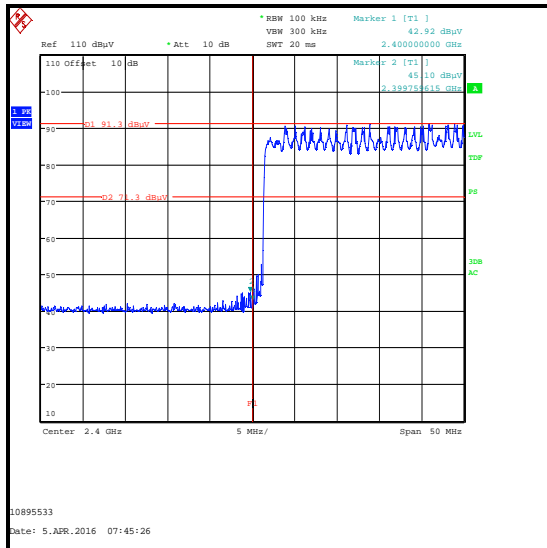
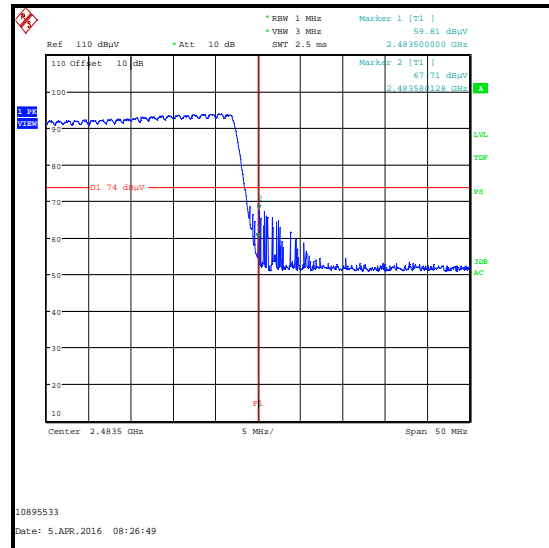
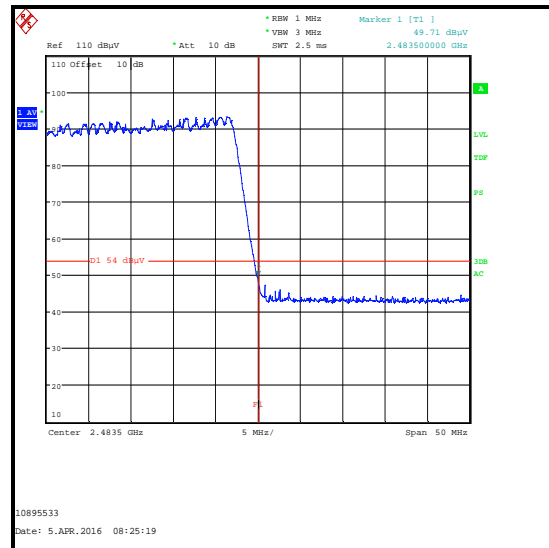
Frequency (MHz)	Antenna Polarity	Average Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2483.5	Horizontal	50.6	54.0	3.4	Complied

**Lower Band Edge Peak Static****Upper Band Edge Peak Static****Upper Band Edge Average Static**

**Transmitter Band Edge Radiated Emissions (continued)****Results: Hopping Mode / 2DH5**

Frequency (MHz)	Antenna Polarity	Peak Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2399.760	Horizontal	45.1	71.3*	26.2	Complied
2400.0	Horizontal	42.9	71.3*	28.4	Complied
2483.5	Horizontal	59.8	74.0	14.2	Complied
2483.580	Horizontal	67.7	74.0	6.3	Complied

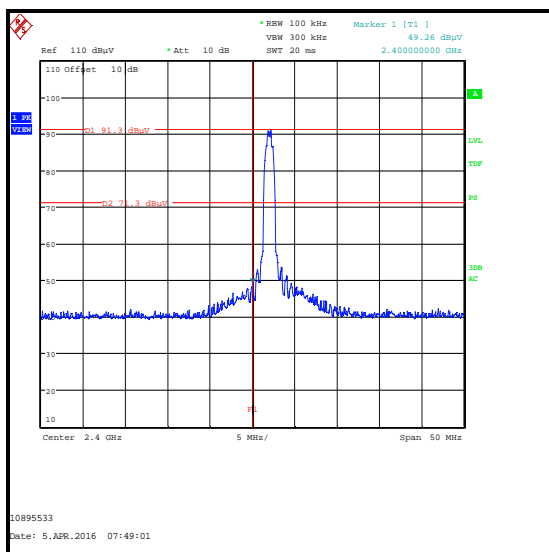
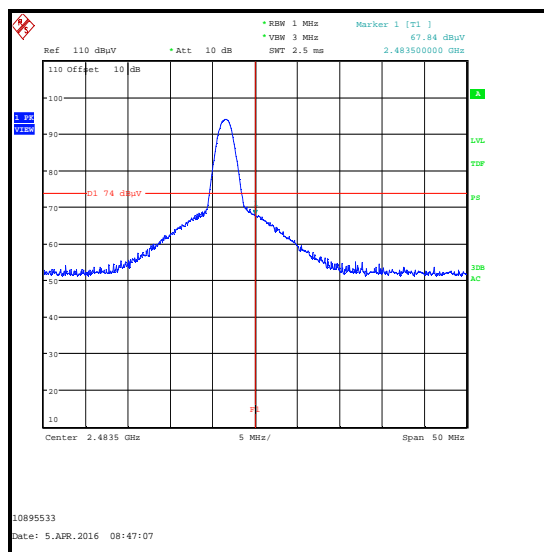
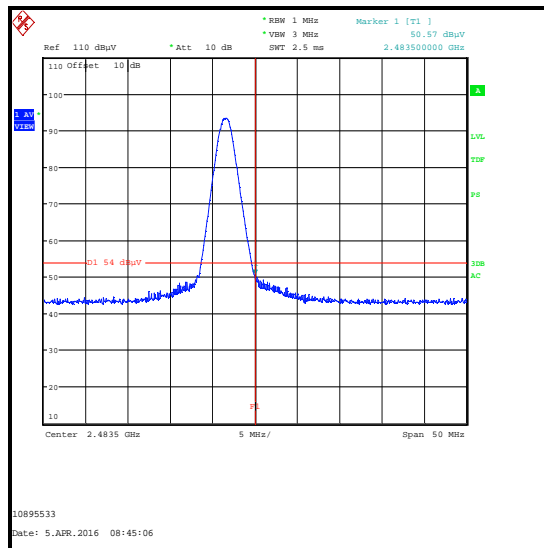
Frequency (MHz)	Antenna Polarity	Average Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2483.5	Horizontal	49.7	54.0	4.3	Complied

**Transmitter Band Edge Radiated Emissions (continued)****Results: Hopping Mode / 2DH5****Lower Band Edge Peak Hopping****Upper Band Edge Peak Hopping****Upper Band Edge Average Hopping**

**Transmitter Band Edge Radiated Emissions (continued)****Results: Static Mode / 3DH5**

Frequency (MHz)	Antenna Polarity	Peak Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2400.0	Horizontal	49.3	71.3*	22.0	Complied
2483.5	Horizontal	67.8	74.0	6.2	Complied

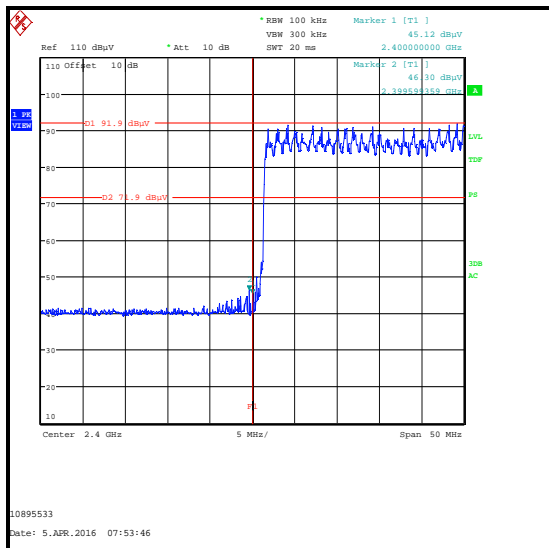
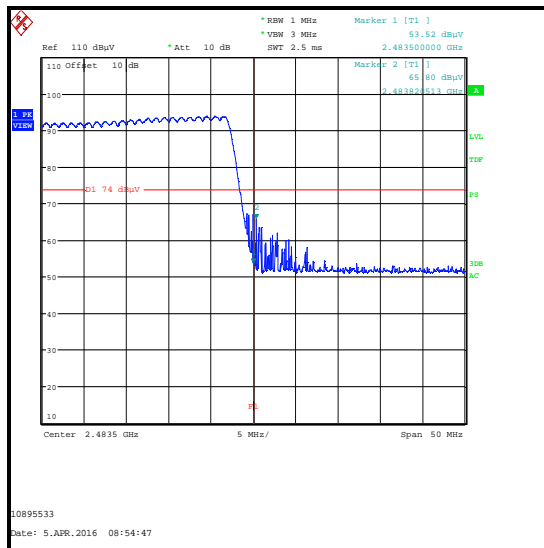
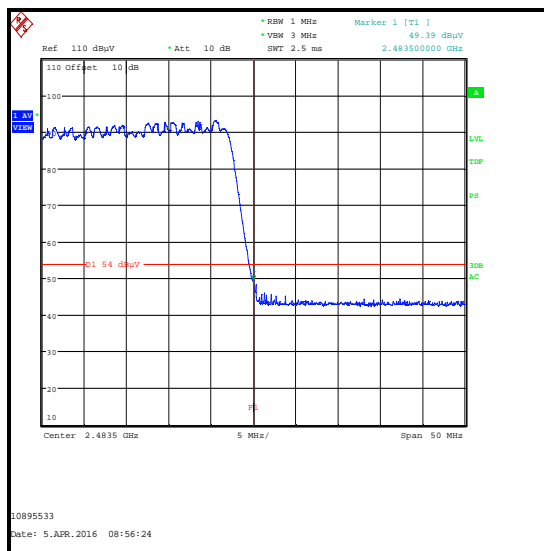
Frequency (MHz)	Antenna Polarity	Average Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2483.5	Horizontal	50.6	54.0	3.4	Complied

**Lower Band Edge Peak Static****Upper Band Edge Peak Static****Upper Band Edge Average Static**

**Transmitter Band Edge Radiated Emissions (continued)****Results: Hopping Mode / 3DH5**

Frequency (MHz)	Antenna Polarity	Peak Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2399.599	Horizontal	46.3	71.9*	25.6	Complied
2400.0	Horizontal	45.1	71.9*	26.8	Complied
2483.5	Horizontal	53.5	74.0	20.5	Complied
2483.821	Horizontal	65.8	74.0	8.2	Complied

Frequency (MHz)	Antenna Polarity	Average Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2483.5	Horizontal	49.4	54.0	4.6	Complied

**Transmitter Band Edge Radiated Emissions (continued)****Lower Band Edge Peak Hopping****Upper Band Edge Peak Hopping****Upper Band Edge Average Hopping****Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1656	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	23 Apr 2016	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	21 Dec 2016	12
M1886	Test Receiver	Rohde & Schwarz	ESU26	100554	21 Mar 2017	12
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	19 Dec 2016	12
A1818	Antenna	EMCO	3115	00075692	17 Dec 2016	12
A1396	Attenuator	Huber & Suhner	6810.17.B	757987	05 May 2016	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 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
Radiated Spurious Emissions	30 MHz to 1 GHz	95%	$\pm 5.65$ dB
Radiated Spurious Emissions	1 GHz to 26.5 GHz	95%	$\pm 2.94$ 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
2.0	-	-	FCC ID updated
3.0	-	-	Model Number updated, Sections 3.1 and 3.2 updated

--- END OF REPORT ---