



TEST REPORT

Test Report No. : UL-RPT-RP11161473JD05B V2.0

Manufacturer : Apple Inc.
Model No. : A1706
FCC ID : BCGA1706
Technology : *Bluetooth – Low Energy*
Test Standard(s) : FCC Parts 15.209(a) & 15.247

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 2.0 supersedes all previous versions.

Date of Issue: 27 September 2016

Checked by:

Sarah Williams
Engineer, Radio Laboratory

Company Signatory:

Steven White
Service Lead, 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*® 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

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	5
2.4. Deviations from the Test Specification	5
3. Equipment Under Test (EUT)	6
3.1. Identification of Equipment Under Test (EUT)	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	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 Minimum 6 dB Bandwidth	11
5.2.2. Transmitter Power Spectral Density	14
5.2.3. Transmitter Maximum Peak Output Power	17
5.2.4. Transmitter Radiated Emissions	20
5.2.5. Transmitter Band Edge Radiated Emissions	26
6. Measurement Uncertainty	29
7. Report Revision History	30

1. Customer Information

Company Name:	Apple
Address:	1 Infinite Loop Cupertino, CA 95014 U.S.A

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR15.247
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Section 15.247
Specification Reference:	47CFR15.209
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Section 15.209
Site Registration:	209735
Location of Testing:	UL VS LTD, Unit 3 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, RG24 8AH, United Kingdom
Test Dates:	23 August 2016 to 08 September 2016

2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Result
Part 15.247(a)(2)	Transmitter Minimum 6 dB Bandwidth	Complied
Part 15.247(e)	Transmitter Power Spectral Density	Complied
Part 15.247(b)(3)	Transmitter Maximum Peak Output Power	Complied
Part 15.247(d)/15.209(a)	Transmitter Radiated Emissions	Complied
Part 15.247(d)/15.209(a)	Transmitter Band Edge Radiated Emissions	Complied

2.3. Methods and Procedures

Reference:	ANSI C63.10-2013
Title:	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
Reference:	KDB 558074 D01 DTS Meas Guidance v03r05 April 8, 2016
Title:	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)

Brand Name:	Apple
Model Name or Number:	A1706
Test Sample Serial Number:	C02S200EHH5Q (<i>Radiated sample</i>)
Hardware Version:	EVT
Software Version:	OS: 16B2272a BB: v234 c4096
FCC ID:	BCGA1706

Brand Name:	Apple
Model Name or Number:	A1706
Test Sample Serial Number:	C02S200FHH5Q (<i>Conducted sample with RF port #1</i>)
Hardware Version:	EVT
Software Version:	OS: 16A215 BB: v234 c4096
FCC ID:	BCGA1706

3.2. Description of EUT

The equipment under test was a Notebook PC with 2.4 GHz and 5 GHz wireless LAN and Bluetooth capabilities.

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:	<i>Bluetooth Low Energy (Digital Transmission System)</i>				
Type of Unit:	Transceiver				
Channel Spacing:	2 MHz				
Modulation:	GFSK				
Data Rate:	1 Mbps				
Power Supply Requirement(s):	Nominal	120 VAC			
Maximum Conducted Output Power:	7.0 dBm				
Antenna Gain:	2.0 dBi				
Transmit Frequency Range:	2402 MHz to 2480 MHz				
Transmit Channels Tested:	Channel ID	RF Channel	Channel Frequency (MHz)		
	Bottom	0	2402		
	Middle	19	2440		
	Top	39	2480		

3.5. Support Equipment

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

Description:	Test Laptop
Brand Name:	Apple
Model Name or Number:	MacBook Pro
Serial Number:	C2QLQ03XF9F2

Description:	AC to DC Power adaptor
Brand Name:	Apple
Model Name or Number:	A1718
Serial Number:	Not marked or stated

Description:	USB-C Charge Cable (2 m)
Brand Name:	Apple
Model Name or Number:	Not marked or stated
Serial Number:	Not marked or stated

Description:	Personal Hands Free (PHF)
Brand Name:	Apple
Model Name or Number:	Apple Ear Plugs
Serial Number:	Not marked or stated

Description:	USB-A to USB-C adaptor (x3)
Brand Name:	Apple
Model Name or Number:	A1632
Serial Number:	Not marked or stated

Description:	USB Hub
Brand Name:	Belkin
Model Name or Number:	Not marked or stated
Serial Number:	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 LE* mode with modulation, maximum possible data length available and Pseudorandom Bit Sequence 9.

4.2. Configuration and Peripherals

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

- The EUT was controlled via test commands, as supplied by the customer, sent via the terminal application on the test laptop. Channels, packet lengths and other settings were then set using this software application as required.
- The procedure to set up and control the EUT was supplied by the customer in a document titled "B40_BT_BTLE_COM_SOP_v1.1.docx" dated 22/08/2016 which is stored on the company server.
- The customer supplied an RF connector cable to facilitate a conducted RF link between the EUT and a spectrum analyser through suitable attenuation. This was taken into account for path loss calculations.
- Radiated spurious emissions were performed with the EUT in the worst case orientation/position. Tests were performed with the EUT connected to its AC charger, PHF and a USB hub. The AC charger was powered by 120 VAC 60 Hz. All ports were terminated with suitable terminations.
- The EUT radiated sample serial number C02S200EHH5Q was used for radiated spurious emissions tests.
- The EUT conducted sample with serial number C02S200FHH5Q was used for all other tests.

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:

Test Engineer:	David Doyle	Test Date:	23 August 2016
Test Sample Serial Number:	C02S200FHH5Q		

FCC Reference:	Part 15.247(a)(2)
Test Method Used:	FCC KDB 558074 Section 8.1 Option 2

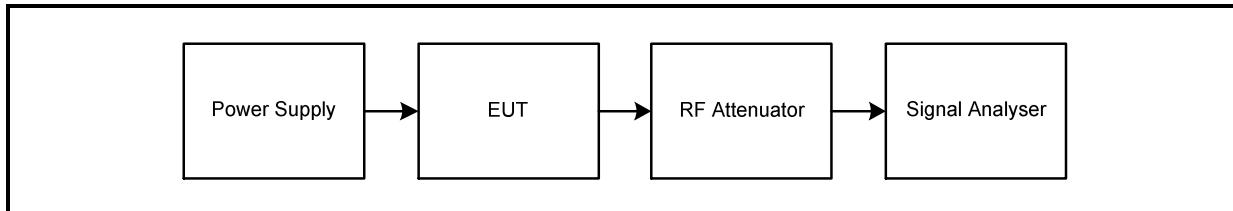
Environmental Conditions:

Temperature (°C):	24
Relative Humidity (%):	44

Note(s):

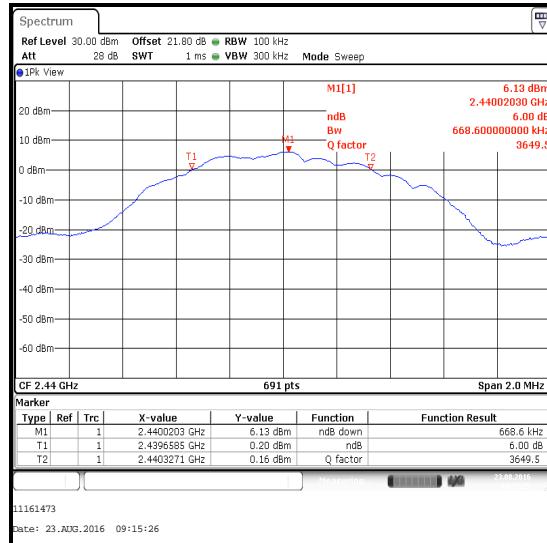
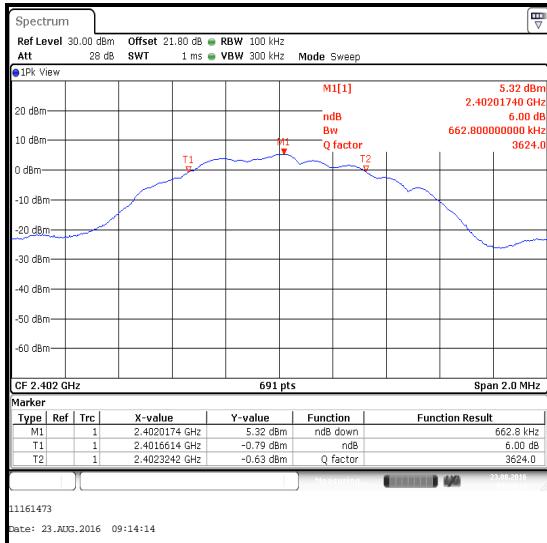
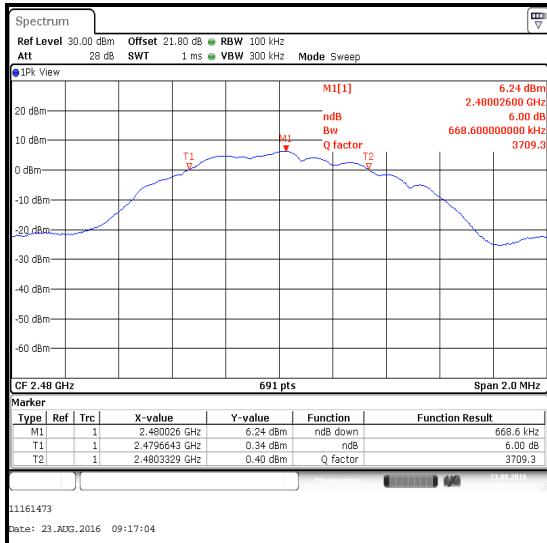
1. 6 dB DTS bandwidth tests were performed using a signal analyser in accordance with FCC KDB 558074 Section 8.1 Option 2 measurement procedure. The signal analyser resolution bandwidth was set to 100 kHz and video bandwidth 300 kHz. A peak detector was used, sweep time was set to auto and the trace mode was Max Hold. The DTS bandwidth was measured at 6 dB down from the peak of the signal.
2. The signal analyser was connected to the RF port on the EUT using suitable attenuation and RF cable.

Test setup:



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

Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	662.800	≥500	162.800	Complied
Middle	668.600	≥500	168.600	Complied
Top	668.600	≥500	168.600	Complied

**Bottom Channel****Top Channel****Middle Channel**

Transmitter Minimum 6 dB Bandwidth (continued)**Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2002	Thermohygrometer	Testo	608-H1	45041825	02 Apr 2017	12
M1996	Signal Analyser	Rohde & Schwarz	FSV13	100975	02 Mar 2017	12
A2526	Attenuator	AtlanTecRF	AN18W5-20	832828#1	Calibrated before use	-
M199	Power Meter	Rohde & Schwarz	NRVS	827023/075	11 Apr 2018	24
M1267	Power Sensor	Rohde & Schwarz	NRV-Z52	100155	15 Apr 2018	24
G0607	Signal Generator	Rohde & Schwarz	SMU200A	100943	10 May 2019	36

5.2.2. Transmitter Power Spectral Density

Test Summary:

Test Engineer:	David Doyle	Test Date:	23 August 2016
Test Sample Serial Number:	C02S200FHH5Q		

FCC Reference:	Part 15.247(e)
Test Method Used:	FCC KDB 558074 Section 10.2

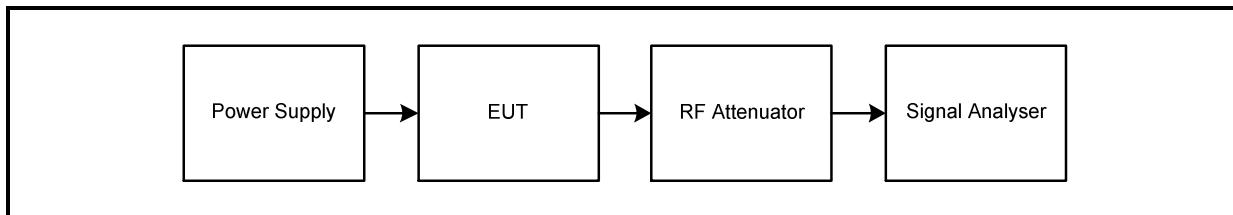
Environmental Conditions:

Temperature (°C):	24
Relative Humidity (%):	44

Note(s):

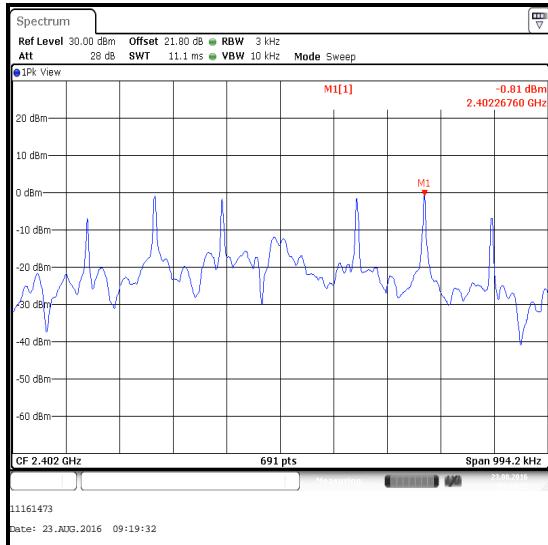
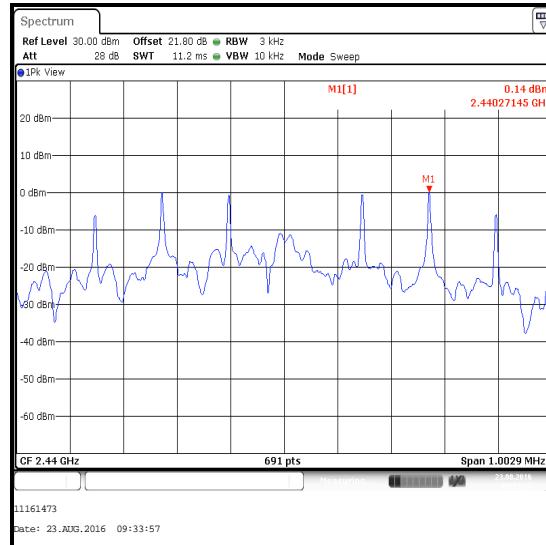
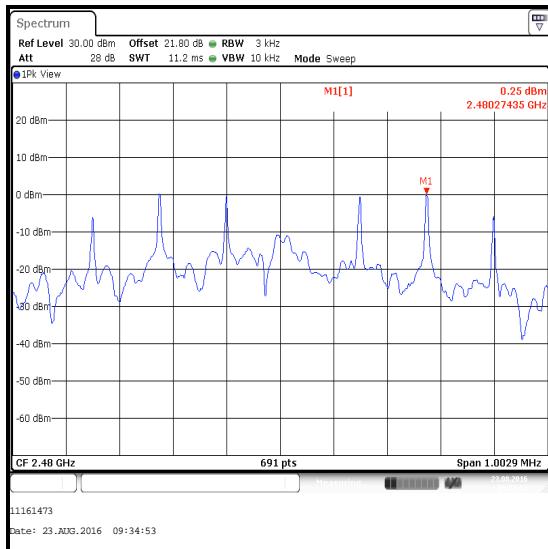
1. Transmitter Power Spectral Density tests in all bands were performed using a signal analyser in accordance with FCC KDB 558074 Section 10.2.
2. The signal analyser resolution bandwidth was set to 3 kHz and video bandwidth of 10 kHz. A peak detector was used, sweep time was set to auto and trace mode was Max Hold. The span was set to 1.5 times the measured DTS bandwidth. A marker was placed at the peak of the signal and the results recorded in the table below.
3. The signal analyser was connected to the RF port on the EUT using suitable attenuation and RF cable. An RF level offset was entered on the signal analyser to compensate for the loss of the attenuator and RF cable.

Test setup:



Transmitter Power Spectral Density (continued)**Results:**

Channel	Output Power (dBm / 3 kHz)	Limit (dBm / 3 kHz)	Margin (dB)	Result
Bottom	-0.8	8.0	8.8	Complied
Middle	0.1	8.0	7.9	Complied
Top	0.3	8.0	7.7	Complied

**Bottom Channel****Middle Channel****Top Channel**

Transmitter Power Spectral Density (continued)**Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2002	Thermohygrometer	Testo	608-H1	45041825	02 Apr 2017	12
M1996	Signal Analyser	Rohde & Schwarz	FSV13	100975	02 Mar 2017	12
A2526	Attenuator	AtlanTecRF	AN18W5-20	832828#1	Calibrated before use	-
M199	Power Meter	Rohde & Schwarz	NRVS	827023/075	11 Apr 2018	24
M1267	Power Sensor	Rohde & Schwarz	NRV-Z52	100155	15 Apr 2018	24
G0607	Signal Generator	Rohde & Schwarz	SMU200A	100943	10 May 2019	36

5.2.3. Transmitter Maximum Peak Output Power

Test Summary:

Test Engineer:	David Doyle	Test Date:	23 August 2016
Test Sample Serial Number:	C02S200FHH5Q		

FCC Reference:	Part 15.247(b)(3)
Test Method Used:	FCC KDB 558074 Section 9.1.1

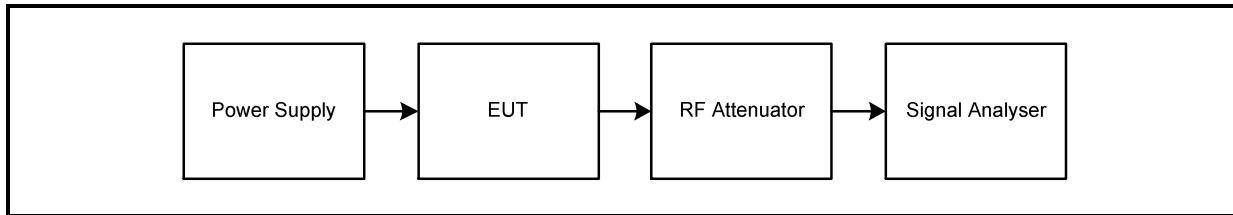
Environmental Conditions:

Temperature (°C):	24
Relative Humidity (%):	44

Note(s):

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

Test setup:

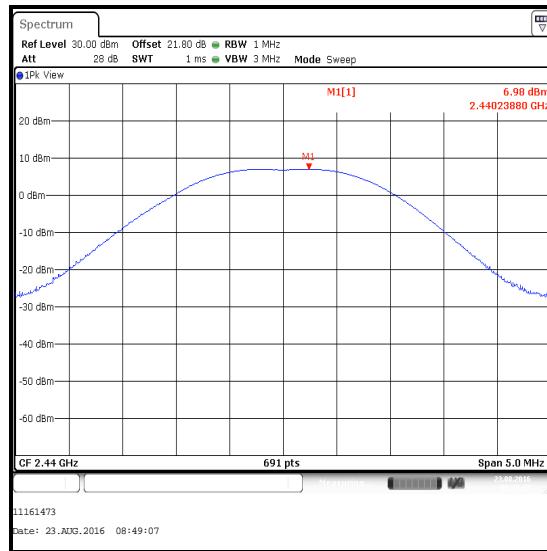
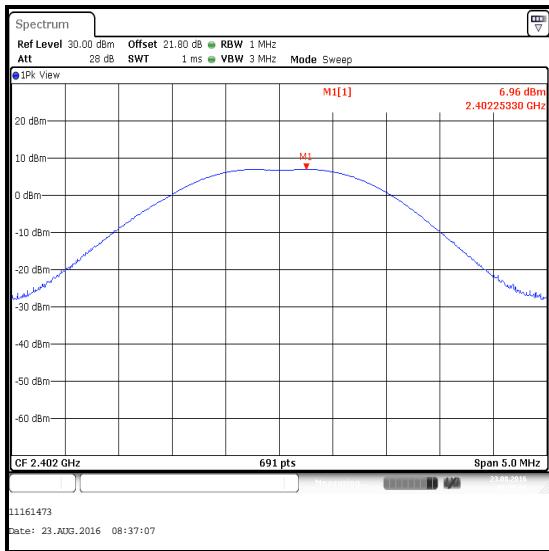


Transmitter Maximum Peak Output Power (continued)**Results:**

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	7.0	30.0	23.0	Complied
Middle	7.0	30.0	23.0	Complied
Top	7.0	30.0	23.0	Complied

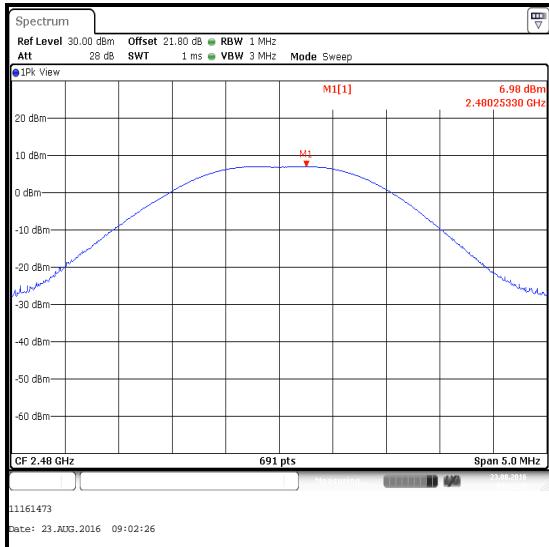
Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	7.0	2.0	9.0	36.0	27.0	Complied
Middle	7.0	2.0	9.0	36.0	27.0	Complied
Top	7.0	2.0	9.0	36.0	27.0	Complied

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)
M2002	Thermohygrometer	Testo	608-H1	45041825	02 Apr 2017	12
M1996	Signal Analyser	Rohde & Schwarz	FSV13	100975	02 Mar 2017	12
A2526	Attenuator	AtlanTecRF	AN18W5-20	832828#1	Calibrated before use	-
M199	Power Meter	Rohde & Schwarz	NRVS	827023/075	11 Apr 2018	24
M1267	Power Sensor	Rohde & Schwarz	NRV-Z52	100155	15 Apr 2018	24
G0607	Signal Generator	Rohde & Schwarz	SMU200A	100943	10 May 2019	36

5.2.4. Transmitter Radiated Emissions

Test Summary:

Test Engineers:	Stuart Martin & Shahbaz Qureshi	Test Dates:	05 September 2016 & 08 September 2016
Test Sample Serial Number:	C02S200EHH5Q		

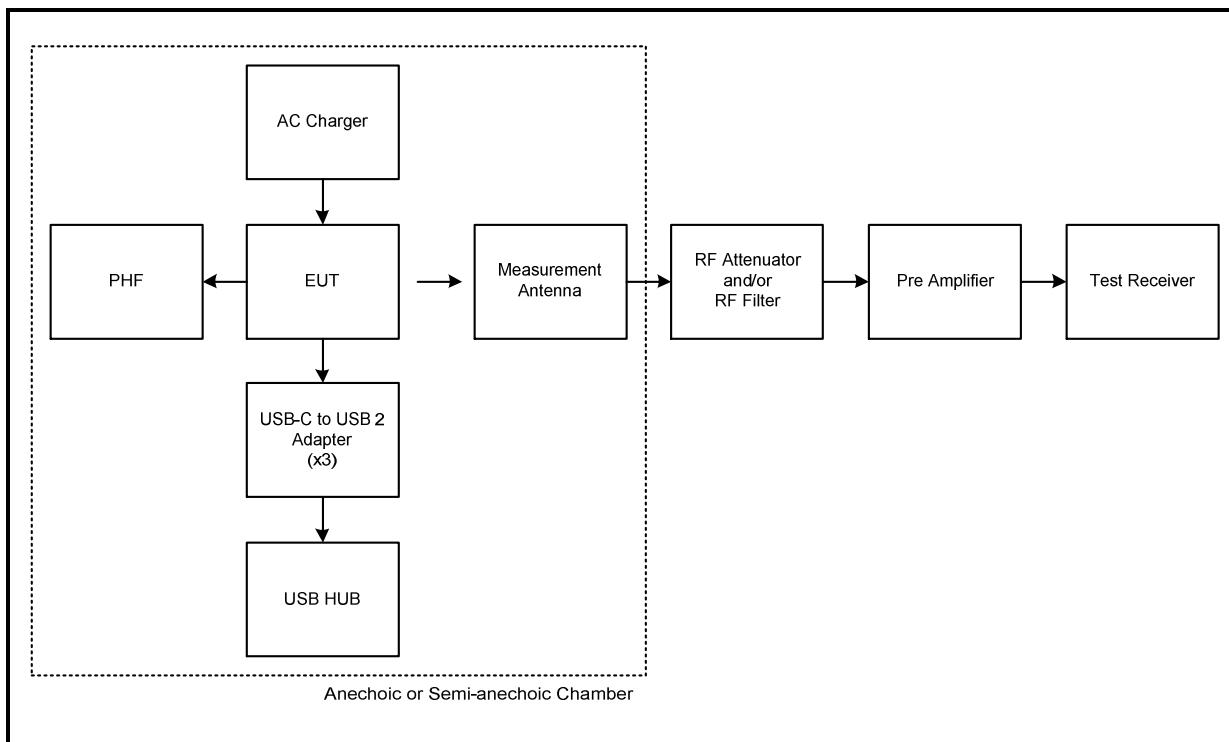
FCC Reference:	Parts 15.247(d) & 15.209(a)
Test Method Used:	ANSI C63.10 Sections 6.3 and 6.5
Frequency Range	30 MHz to 1000 MHz

Environmental Conditions:

Temperature (°C):	25 to 26
Relative Humidity (%):	42 to 48

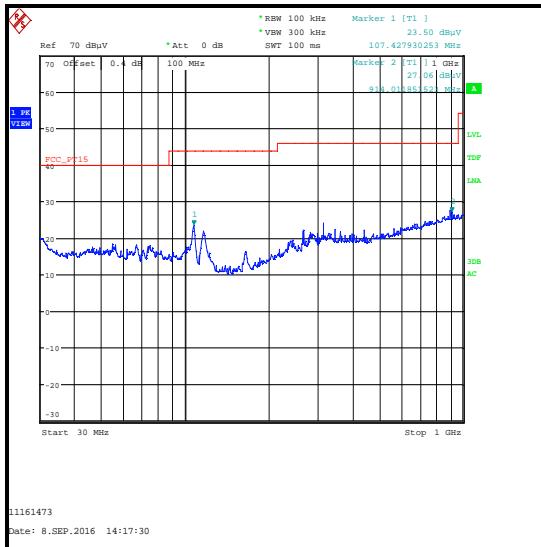
Note(s):

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 middle channel only.
3. All 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. Therefore the highest peak noise floor reading of the measuring receiver was recorded in the table below.
4. Middle channel results are recorded in this report and are representative of bottom and top channel results which are held on the UL IT server and available for inspection on request.
5. Measurements below 1 GHz were performed in a semi-anechoic chamber (Asset Number K0017) 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. 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. 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:**

Transmitter Radiated Emissions (continued)**Results: Middle Channel**

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
914.012	Vertical	27.1	46.0	18.9	Complied

**Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2003	Thermohygrometer	Testo	608-H1	45046641	22 Apr 2017	12
K0017	3m RSE Chamber	Rainford EMC	N/A	N/A	17 May 2017	12
M1995	Test Receiver	Rohde & Schwarz	ESU40	100428	21 Mar 2017	12
A2888	Antenna	Schwarzbeck	VULB 9163	9163-941	07 Apr 2017	12
A2175	Low Pass Filter	AtlanTecRF	AFL-01000	800976	30 Apr 2017	12

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

Test Engineer:	David Doyle	Test Dates:	01 September 2016 & 02 September 2016
Test Sample Serial Number:	C02S200EHH5Q		

FCC Reference:	Parts 15.247(d) & 15.209(a)
Test Method Used:	FCC KDB 558074 Sections 11 & 12 referencing ANSI C63.10 Sections 6.3 and 6.6
Frequency Range	1 GHz to 25 GHz

Environmental Conditions:

Temperature (°C):	24 to 26
Relative Humidity (%):	42 to 44

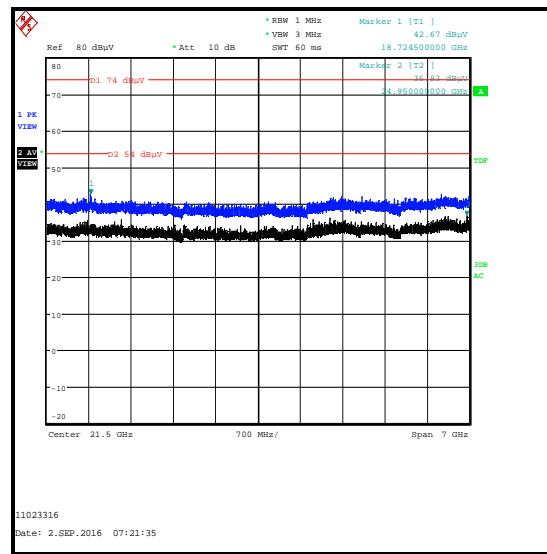
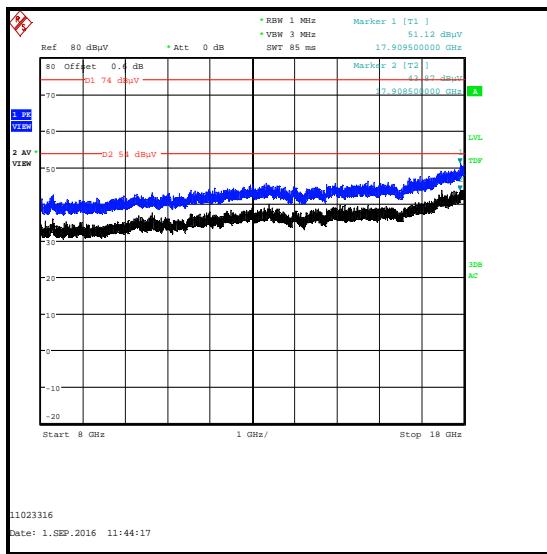
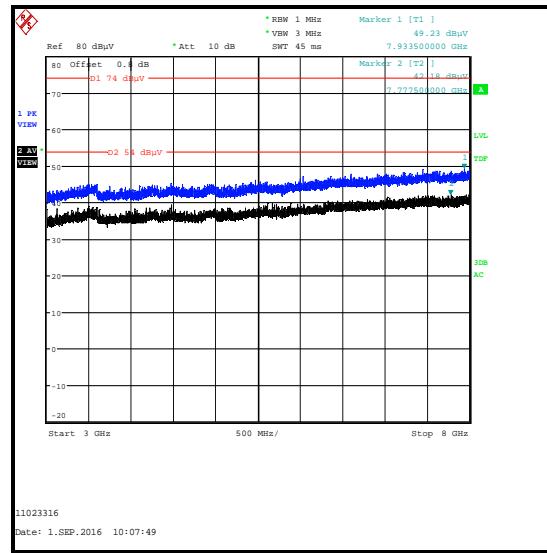
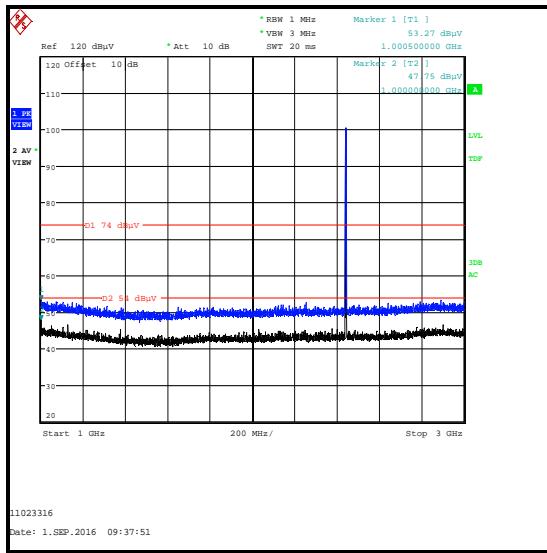
Note(s):

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. No spurious emissions were detected above the noise floor of the measuring receiver therefore the highest peak noise floor reading of the measuring receiver was recorded as shown in the table below. 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.
3. The emission shown on the 1 GHz to 3 GHz plot is the EUT fundamental.
4. Middle channel results are recorded in this report and are representative of bottom and top channel results which are held on the UL IT server and available for inspection on request.
5. Measurements were performed in an anechoic chamber (Asset Number K0017) at a distance of 3 metres. The EUT was placed at a height of 1.5 metres 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.

Results:

Frequency (MHz)	Antenna Polarity	Peak Level (dB μ V/m)	Average Limit (dB μ V/m)	Margin (dB)	Result
1000.500	Vertical	53.3	54.0	0.7	Complied

Transmitter Radiated Emissions (continued)



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

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2003	Thermohygrometer	Testo	608-H1	45046641	22 Apr 2017	12
K0017	3m RSE Chamber	Rainford EMC	N/A	N/A	17 May 2017	12
M1995	Test Receiver	Rohde & Schwarz	ESU40	100428	21 Mar 2017	12
A2889	Antenna	Schwarzbeck	BBHA 9120 B	BBHA 9120 B	07 Apr 2017	12
A2890	Antenna	Schwarzbeck	HWRD 750	014	06 May 2017	12
A2892	Antenna	Schwarzbeck	BBHA 9170	9170-727	07 Apr 2017	12
A2863	Pre-Amplifier	Agilent	8449B	3008A02100	07 Jan 2017	12
A2891	Pre-Amplifier	Schwarzbeck	BBV 9718	9718-306	07 Apr 2017	12
A2893	Pre-Amplifier	Schwarzbeck	BBV 9721	9721-021	07 Apr 2017	12
A2914	High Pass Filter	AtlanTecRF	AFH-03000	2155	19 May 2017	12
A2947	High Pass Filter	AtlanTecRF	AFH-07000	1601900001	01 Jun 2017	12
A2916	Attenuator	AtlanTecRF	AN185W-10	832827#1	19 May 2017	12

5.2.5. Transmitter Band Edge Radiated Emissions

Test Summary:

Test Engineer:	Mark Perry	Test Date:	29 August 2016
Test Sample Serial Number:	C02S200EHH5Q		

FCC Reference:	Parts 15.247(d) & 15.209(a)
Test Method Used:	ANSI C63.10 Sections 6.10.4, 6.10.5 & KDB 558074 Section 11

Environmental Conditions:

Temperature (°C):	26
Relative Humidity (%):	44

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. As the lower band edge falls within a non-restricted band, only peak measurements are required. In accordance with FCC KDB 558074 Section 11.1, the test method in Section 11.3 was followed: 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 non-restricted band of operation (where a higher level emission was present). Marker frequencies and levels were recorded.
4. As the upper band edge falls within a restricted band both peak and average measurements were recorded by placing a marker at the edge of the band. The test receiver resolution bandwidth was set to 1 MHz and the video bandwidth 3 MHz. Peak and Average detectors were 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 was placed on the band edge spot frequencies and a second marker placed on the highest emission level in the adjacent restricted band of operation (where a higher level emission was present). Marker frequencies and levels were recorded.
5. 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.
6. * -20 dBc limit.
7. The reference level was set to 120 dB μ V in order to achieve sufficient headroom.

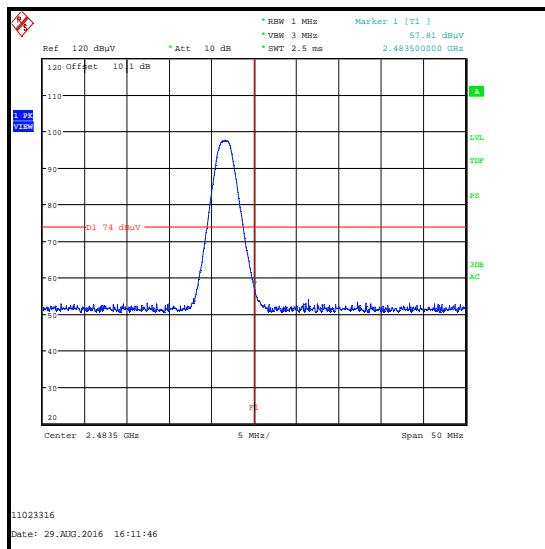
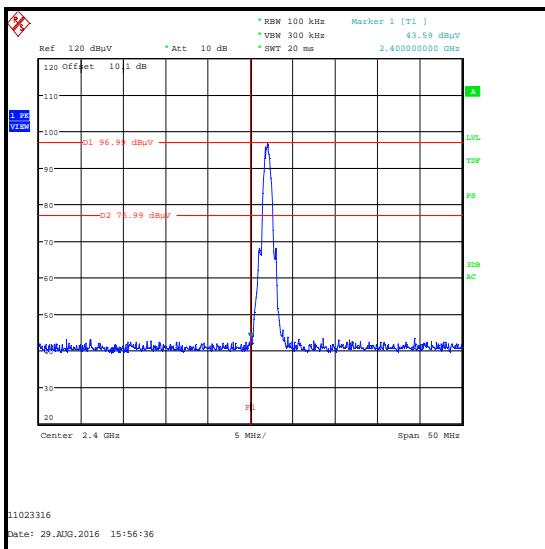
Transmitter Band Edge Radiated Emissions (continued)**Results: Peak**

Frequency (MHz)	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
2341.410	53.4	74.0	20.6	Complied
2400.0	43.6	77.0*	33.4	Complied
2483.5	57.8	74.0	16.2	Complied

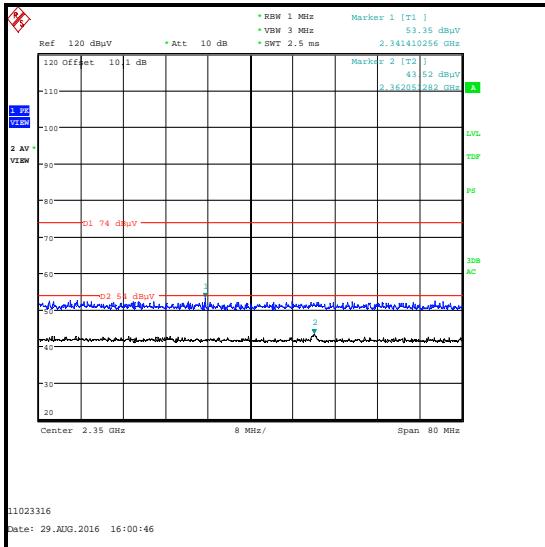
Results: Average

Frequency (MHz)	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
2362.051	43.5	54.0	10.5	Complied
2483.5	43.9	54.0	10.1	Complied
2505.535	45.2	54.0	8.8	Complied

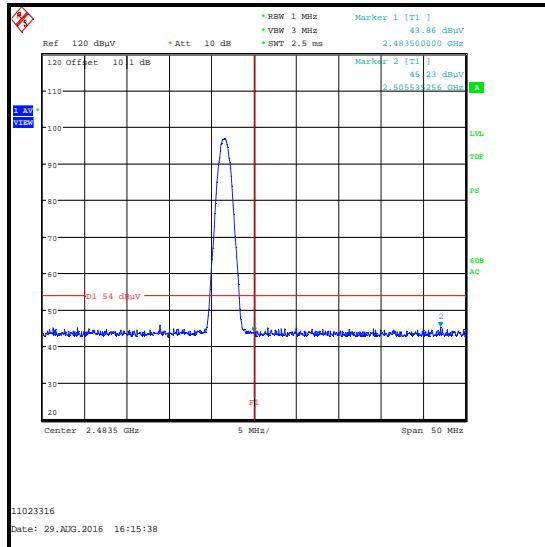
Transmitter Band Edge Radiated Emissions (continued)



Lower Band Edge Peak Measurement



Upper Band Edge Peak Measurement



2310 MHz to 2390 MHz Restricted Band Plot

Upper Band Edge Average Measurement

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2003	Thermohygrometer	Testo	608-H1	45046641	22 Apr 2017	12
K0017	3m RSE Chamber	Rainford EMC	N/A	N/A	17 May 2017	12
M1995	Test Receiver	Rohde & Schwarz	ESU40	100428	21 Mar 2017	12
A2863	Pre-Amplifier	Agilent	8449B	3008A02100	07 Jan 2017	12
A2888	Antenna	Schwarzbeck	VULB 9163	9163-941	07 Apr 2017	12
A2916	Attenuator	AtlanTecRF	AN185W-10	832827#1	19 May 2017	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".

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
Conducted Maximum Peak Output Power	2.4 GHz to 2.4835 GHz	95%	±1.13 dB
Spectral Power Density	2.4 GHz to 2.4835 GHz	95%	±1.13 dB
Minimum 6 dB Bandwidth	2.4 GHz to 2.4835 GHz	95%	±4.59 %
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
2.0	-	-	Sections 3.1 & 3.5 updated

--- END OF REPORT ---