




# TEST REPORT


**Test Report No. : UL-RPT-RP10407435JD02A V2.0**

**Manufacturer** : Apple Inc.  
**Model No.** : A1601  
**FCC ID** : BCGA1601  
**Technology** : *Bluetooth* – Low Energy  
**Test Standard(s)** : FCC Parts 15.207, 15.209(a) & 15.247

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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:** 14 September 2014

**Checked by:**   
Sarah Williams  
Engineer, Radio Laboratory

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



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The tests reported herein have been  
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**1. Customer Information**








<b>Company Name:</b>	Apple Inc.
<b>Address:</b>	1 Infinite Loop Cupertino, CA 95014 U.S.A

## **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>	47CFR15.207 and 47CFR15.209
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Sections 15.207 and 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>	11 August 2014 to 12 September 2014

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

<b>FCC Reference (47CFR)</b>	<b>Measurement</b>	<b>Result</b>
Part 15.207	Transmitter AC Conducted Emissions	
Part 15.247(a)(2)	Transmitter Minimum 6 dB Bandwidth	
Part 15.35(c)	Transmitter Duty Cycle	Note 1
Part 15.247(e)	Transmitter Power Spectral Density	Note 2
Part 15.247(b)(3)	Transmitter Maximum Peak Output Power	
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		

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

1. This measurement was performed to assist in the calculation of the level in any emissions.
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 DTS Meas Guidance 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>	Apple
<b>Model Name or Number:</b>	A1601
<b>Test Sample IMEI:</b>	352025060501666 ( <i>Radiated Sample</i> )
<b>Hardware Version Number:</b>	REV 1.0
<b>Software Version Number:</b>	iOS 12A314 BB:3.08.08
<b>FCC ID:</b>	BCGA1601

<b>Brand Name:</b>	Apple
<b>Model Name or Number:</b>	A1601
<b>Test Sample IMEI:</b>	352025060506475 ( <i>Conducted Sample</i> )
<b>Hardware Version Number:</b>	REV 1.0
<b>Software Version Number:</b>	iOS 12A314 BB:3.08.08
<b>FCC ID:</b>	BCGA1601

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

The Equipment Under Test was a tablet with GSM/GPRS/EGPRS/UMTS and LTE. It also supports IEEE 802.11 a/b/g/n (MIMO 2x2) and Bluetooth®. The rechargeable battery is not user accessible.

#### **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 Mbps		
<b>Power Supply Requirement(s):</b>	Nominal	3.8 VDC	
<b>Maximum Conducted Output Power:</b>	7.5 dBm		
<b>Antenna Gain:</b>	0.8 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



### **3.5. Support Equipment**

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

<b>Brand Name:</b>	Dell
<b>Description:</b>	Laptop PC
<b>Model Name or Number:</b>	Latutide E5400
<b>Serial Number:</b>	00788

<b>Brand Name:</b>	Not stated
<b>Description:</b>	USB Diagnostic cable
<b>Model Name or Number:</b>	Not stated
<b>Serial Number:</b>	Not stated

<b>Brand Name:</b>	Apple
<b>Description:</b>	USB Cable
<b>Model Name or Number:</b>	A1480
<b>Serial Number:</b>	Not stated

<b>Brand Name:</b>	Apple
<b>Description:</b>	USB Charger
<b>Model Name or Number:</b>	A1399
<b>Serial Number:</b>	Not stated

<b>Brand Name:</b>	Apple
<b>Description:</b>	PHF
<b>Model Name or Number:</b>	Apple Ear Plugs
<b>Serial Number:</b>	Not 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 in *Bluetooth* mode with modulation, 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 a software application on the laptop PC supplied by the customer. The application was used to enable continuous transmission and to select the test channels as required.
- Transmitter radiated spurious emissions and AC conducted emissions tests were performed with the AC Charger, USB cable and PHF connected to the EUT as this was found to be the worst case during pre-scans. All the accessories were individually connected and measurements made during the pre-scans to determine the worst case combination.
- The conducted sample with IMEI 352025060506475 was used for minimum 6 dB bandwidth, duty cycle and maximum output power.
- The radiated sample with IMEI 352025060501666 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 AC Conducted Spurious Emissions****Test Summary:**

<b>Test Engineer:</b>	Keith Tucker	<b>Test Date:</b>	19 August 2014
<b>Test Sample IMEI:</b>	352025060501666		

<b>FCC Reference:</b>	Part 15.207
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Section 6.2 referencing ANSI C63.4

**Environmental Conditions:**

<b>Temperature (°C):</b>	22
<b>Relative Humidity (%):</b>	43

**Results: Live / Quasi Peak**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.272	Live	34.8	61.1	26.3	Complied
0.411	Live	32.0	57.6	25.6	Complied
0.843	Live	30.4	56.0	25.6	Complied
1.761	Live	27.3	56.0	28.7	Complied
3.273	Live	26.7	56.0	29.3	Complied
28.437	Live	28.7	60.0	31.3	Complied

**Results: Live / Average**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.411	Live	22.5	47.6	25.1	Complied
0.753	Live	25.5	46.0	20.5	Complied
0.830	Live	25.5	46.0	20.5	Complied
1.761	Live	25.4	46.0	20.6	Complied
3.269	Live	24.6	46.0	21.4	Complied
28.433	Live	23.9	50.0	26.1	Complied

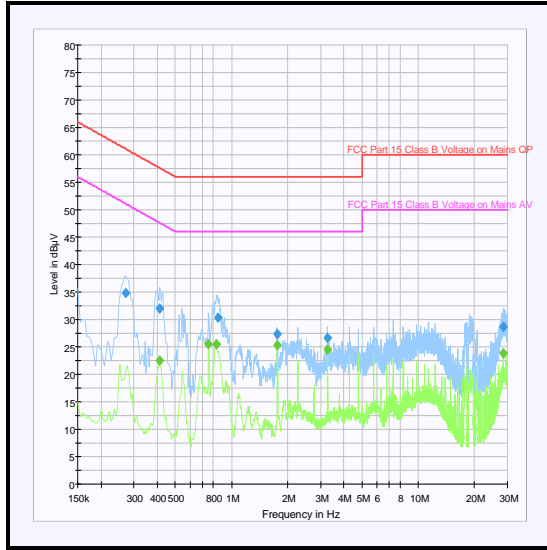
**Transmitter AC Conducted Spurious Emissions (continued)****Results: Neutral / Quasi Peak**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.276	Neutral	34.6	60.9	26.3	Complied
0.402	Neutral	32.1	57.8	25.7	Complied
0.528	Neutral	25.3	56.0	30.7	Complied
0.839	Neutral	27.7	56.0	28.3	Complied
2.252	Neutral	18.1	56.0	37.9	Complied
14.654	Neutral	12.3	60.0	47.7	Complied

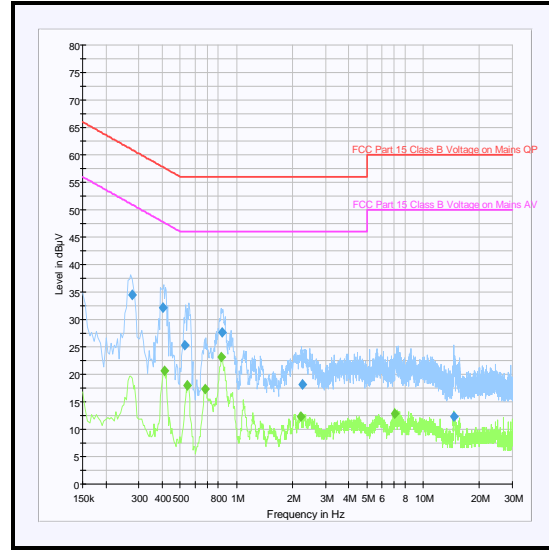
**Results: Neutral / Average**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.411	Neutral	20.7	47.6	26.9	Complied
0.546	Neutral	18.1	46.0	27.9	Complied
0.681	Neutral	17.3	46.0	28.7	Complied
0.830	Neutral	23.1	46.0	22.9	Complied
2.198	Neutral	12.3	46.0	33.7	Complied
7.049	Neutral	12.8	50.0	37.2	Complied

**Transmitter AC Conducted Spurious Emissions (continued)**



**Live**



**Neutral**

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)
M1625	Thermohygrometer	JM Handelpunkt	30.5015.06	None stated	31 Dec 2014	12
A004	LISN	Rohde & Schwarz	ESH3-Z5	890604/027	18 Nov 2014	12
A1830	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100668	27 Feb 2015	12
M1263	Test Receiver	Rohde & Schwarz	ESIB 7	100265	14 Oct 2014	12

**5.2.2. Transmitter Minimum 6 dB Bandwidth****Test Summary:**

<b>Test Engineer:</b>	Georgios Vrezas	<b>Test Date:</b>	11 August 2014
<b>Test Sample IMEI:</b>	352025060506475		

<b>FCC Reference:</b>	Part 15.247(a)(2)
<b>Test Method Used:</b>	As detailed in FCC KDB 558074 Section 8.1 Option 1

**Environmental Conditions:**

<b>Temperature (°C):</b>	24
<b>Relative Humidity (%):</b>	40

**Note(s):**

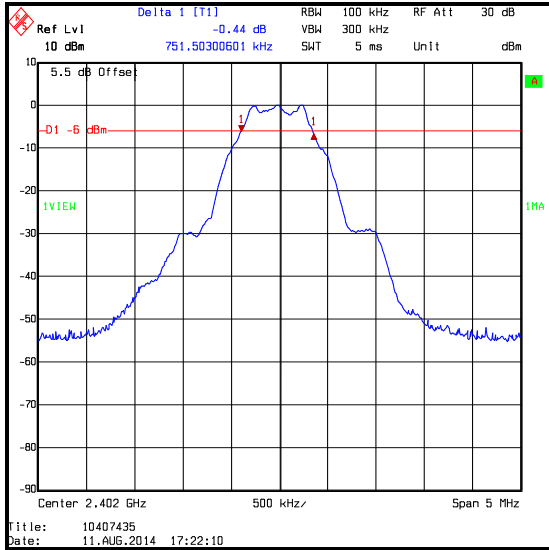
- 6 dB DTS bandwidth tests were performed using a spectrum analyser in accordance with FCC KDB 558074 Section 8.1 Option 1 measurement procedure.
- The spectrum analyser was connected to the RF port on the EUT using suitable attenuation and RF cable.

**Results:**

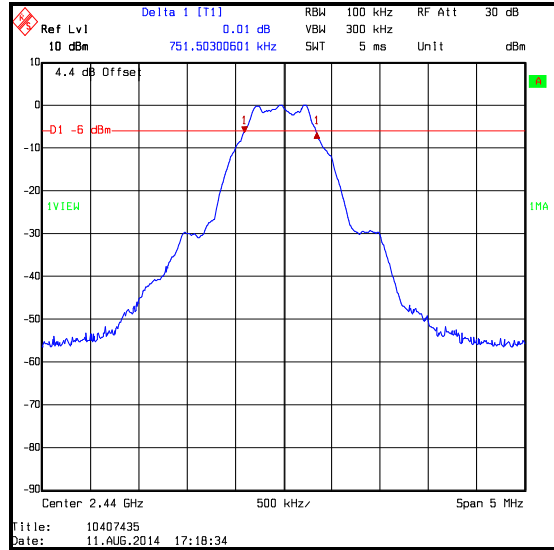
Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	751.503	≥500	251.503	Complied
Middle	751.503	≥500	251.503	Complied
Top	751.503	≥500	251.503	Complied

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

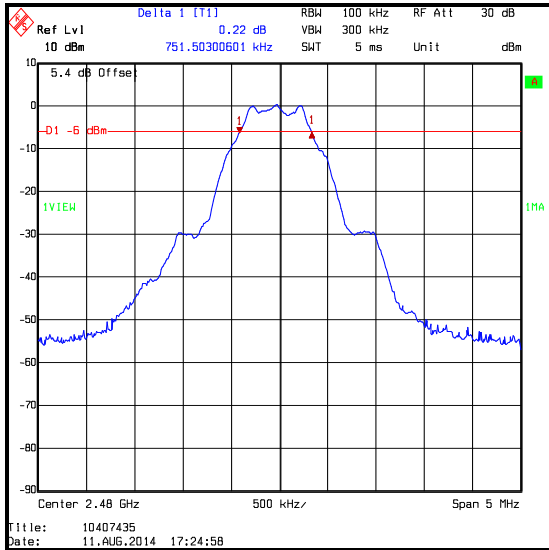
**Results:**



**Bottom Channel**



**Middle Channel**



**Top Channel**

**Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1658	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	14 Mar 2015	12
M127	Spectrum Analyser	Rohde & Schwarz	FSEB 30	842 659/016	19 Aug 2014	12
A1998	Attenuator	Huber & Suhner	6820.17.B	07101	Calibrated before use	-
S0558	DC Power Supply	TTI	EL 303R	395825	Calibrated before use	-
M1251	Multimeter	Fluke	175	89170179	19 May 2015	12



**5.2.3. Transmitter Duty Cycle****Test Summary:**

<b>Test Engineer:</b>	Georgios Vrezas	<b>Test Date:</b>	11 August 2014
<b>Test Sample IMEI:</b>	352025060506475		

<b>FCC Reference:</b>	Part 15.35(c)
<b>Test Method Used:</b>	As detailed in FCC KDB 558074 Section 6.0

**Environmental Conditions:**

<b>Temperature (°C):</b>	24
<b>Relative Humidity (%):</b>	40

**Note(s):**

1. In order to assist with the determination of the average level of fundamental and spurious emissions field strength, measurements were made of duty cycle to determine the transmission duration and the silent period time of the transmitter. The transmitter duty cycle was measured using a spectrum analyser in the time domain and calculated by using the following calculation:

$$10 \log (1 / (\text{On Time} / \text{Period}))$$

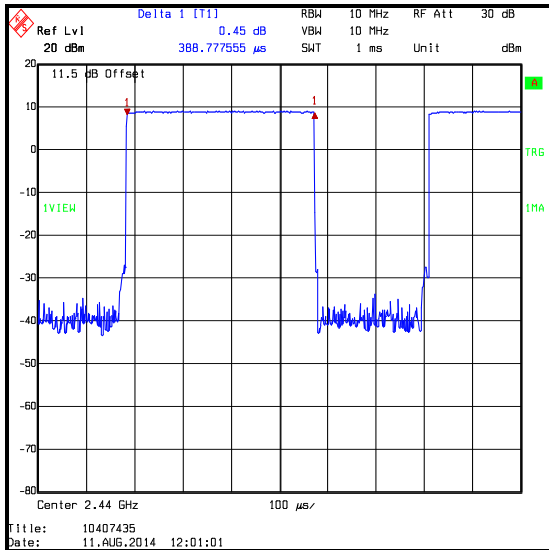
$$10 \log (1 / (388.778 \mu\text{s} / 625.251 \mu\text{s})) = 2.1 \text{ dB}$$

**Transmitter Duty Cycle (continued)**

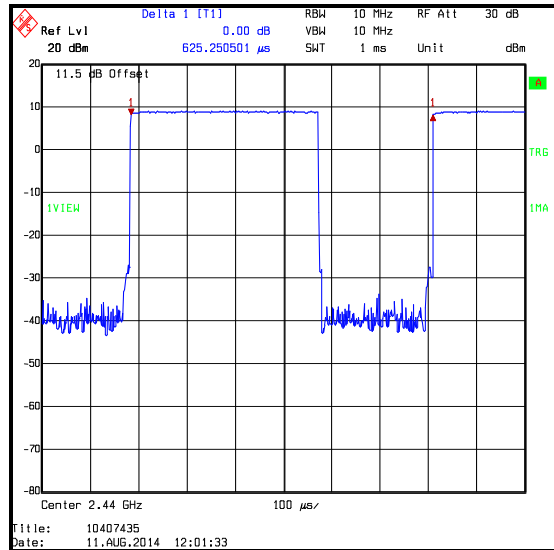
**Results:**

<b>Pulse Duration (<math>\mu</math>s)</b>	<b>Duty Cycle Correction (dB)</b>
388.778	2.1

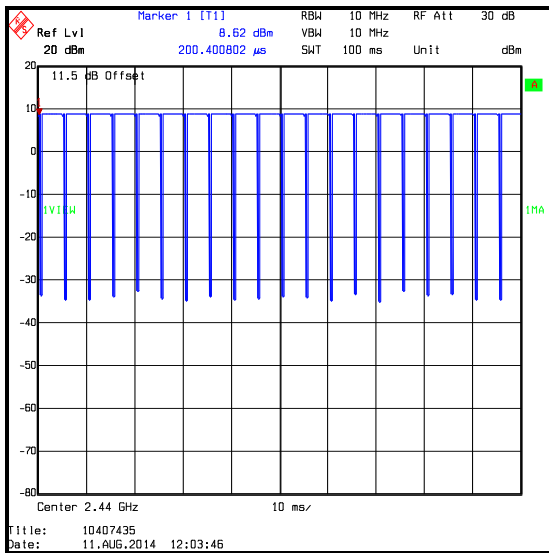
<b>Period (<math>\mu</math>s)</b>
625.251



**TX on time**



**TX on + off time / period**



**100 ms**

**Transmitter Duty Cycle (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>
M1658	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	14 Mar 2015	12
M127	Spectrum Analyser	Rohde & Schwarz	FSEB 30	842 659/016	19 Aug 2014	12
A1998	Attenuator	Huber & Suhner	6820.17.B	07101	Calibrated before use	-
S0558	DC Power Supply	TTI	EL 303R	395825	Calibrated before use	-
M1251	Multimeter	Fluke	175	89170179	19 May 2015	12

**5.2.4. Transmitter Maximum Peak Output Power****Test Summary:**

<b>Test Engineer:</b>	Georgios Vrezas	<b>Test Dates:</b>	11 August 2014 & 12 August 2014
<b>Test Sample IMEI:</b>	352025060506475		

<b>FCC Reference:</b>	Part 15.247(b)(3)
<b>Test Method Used:</b>	As detailed in FCC KDB 558074 Section 9.1.1

**Environmental Conditions:**

<b>Temperature (°C):</b>	24 to 25
<b>Relative Humidity (%):</b>	40 to 41

**Note(s):**

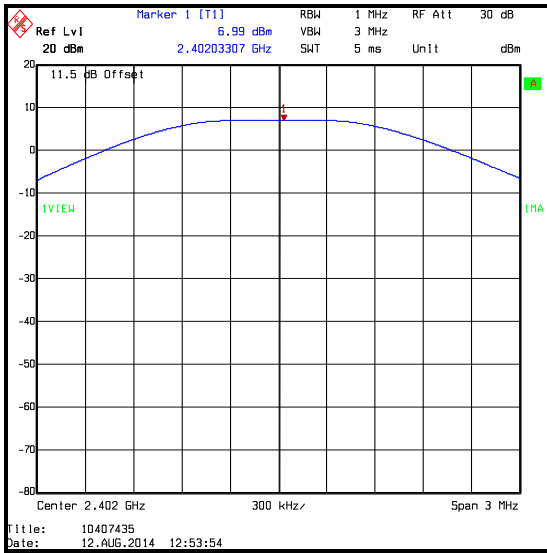
1. Conducted power tests were performed using a test receiver in accordance with FCC KDB 558074 Section 9.1.1 Measurement Procedure Method RBW  $\geq$  *DTS bandwidth*.
2. The spectrum analyser was connected to the RF port on the EUT using suitable attenuation and RF cable. An RF level offset was entered on the spectrum analyser to compensate for the loss of the attenuator and RF cable.

**Results:**

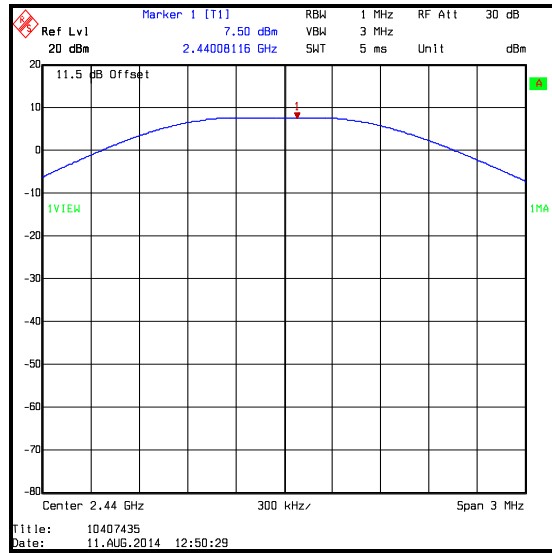
Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	7.0	30.0	23.0	Complied
Middle	7.5	30.0	22.5	Complied
Top	5.7	30.0	24.3	Complied

Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	7.0	0.8	7.8	36.0	28.2	Complied
Middle	7.5	0.8	8.3	36.0	27.7	Complied
Top	5.7	0.8	6.5	36.0	29.5	Complied

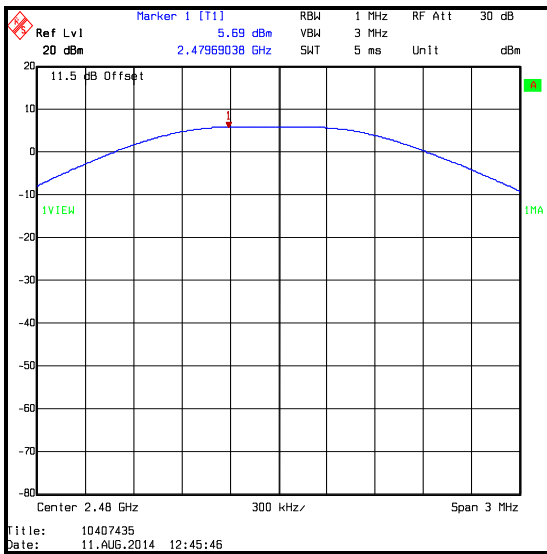
**Transmitter Maximum Peak Output Power (continued)**



**Bottom Channel**



**Middle Channel**



**Top Channel**

**Transmitter Maximum Peak Output Power (continued)****Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1658	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	14 Mar 2015	12
M127	Spectrum Analyser	Rohde & Schwarz	FSEB 30	842 659/016	19 Aug 2014	12
A1998	Attenuator	Huber & Suhner	6820.17.B	07101	Calibrated before use	-
S0558	DC Power Supply	TTI	EL 303R	395825	Calibrated before use	-
M1251	Multimeter	Fluke	175	89170179	19 May 2015	12
M260	Signal Generator	Rohde & Schwarz	SMP02	829076/008	24 Apr 2015	12
M1009	RF Power Meter	Hewlett Packard	437B	3125U13706	04 Feb 2015	12
M1592	Power Sensor	Hewlett Packard	8487A	3318A02094	28 Aug 2014	12

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

<b>Test Engineer:</b>	Georgios Vrezas	<b>Test Date:</b>	12 August 2014
<b>Test Sample IMEI:</b>	352025060501666		

<b>FCC Reference:</b>	Parts 15.247(d) & 15.209(a)
<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>	25
<b>Relative Humidity (%):</b>	32

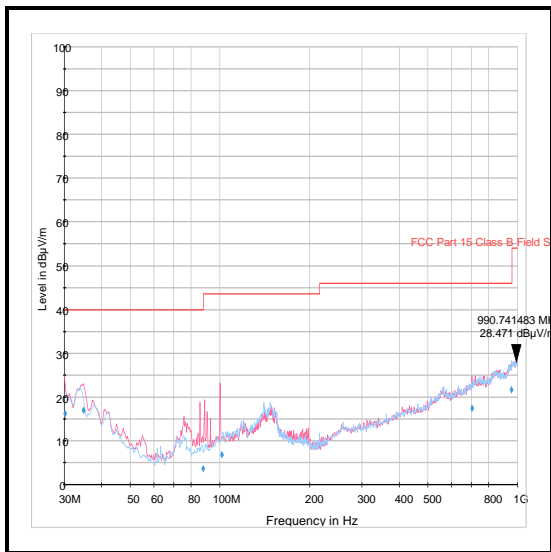
**Note(s):**

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 plot below were investigated and found to be ambient, or >20 dB below the applicable limit or below the measurement system noise floor. Therefore the highest peak noise floor reading of the measuring receiver was 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.

**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>
990.741	Vertical	28.5	54.0	25.5	Complied

**Transmitter Radiated Emissions (continued)**



**Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1622	Thermohygrometer	JM Handelspunkt	30.5015.06	None stated	31 Dec 2014	12
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	26 Nov 2014	12
A1834	Attenuator	Hewlett Packard	8491B	10444	15 Nov 2014	12
G0543	Amplifier	Sonoma	310N	230801	19 Aug 2014	3
M1273	Test Receiver	Rohde & Schwarz	ESIB 26	100275	15 Feb 2015	12
A490	Antenna	Chase	CBL6111A	1590	29 Apr 2015	12



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

<b>Test Engineer:</b>	Georgios Vrezas	<b>Test Date:</b>	11 August 2014
<b>Test Sample IMEI:</b>	352025060501666		

<b>FCC Reference:</b>	Parts 15.247(d) & 15.209(a)
<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>	22
<b>Relative Humidity (%):</b>	54

**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 and average noise floor readings of the measuring receiver were recorded as shown in the tables below.
3. The emission shown on the 1 GHz to 4 GHz plot is the EUT fundamental.
4. 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.

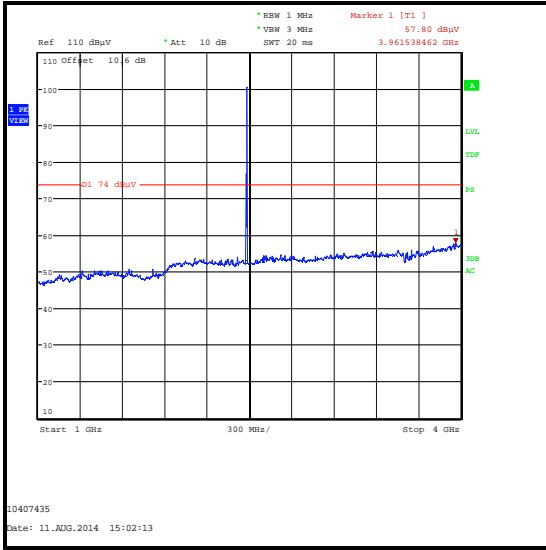
**Results: Peak**

Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	Peak Limit (dB $\mu$ V/m)	Margin (dB)	Result
3961.538	Horizontal	57.8	74.0	16.2	Complied

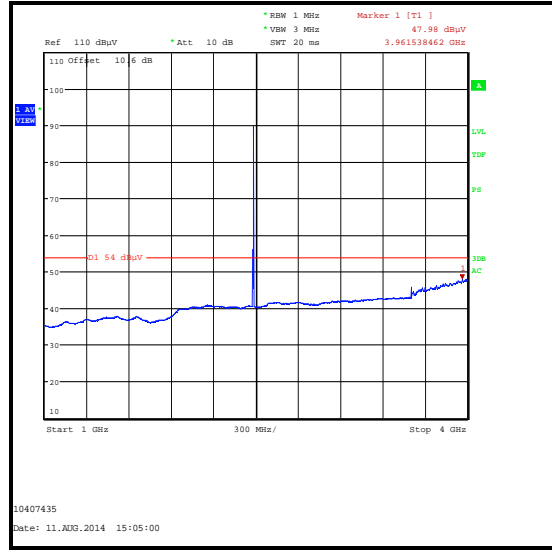
**Results: Average**

Frequency (MHz)	Antenna Polarity	Average Level (dB $\mu$ V/m)	Average Limit (dB $\mu$ V/m)	Margin (dB)	Result
3961.538	Horizontal	48.0	54.0	6.0	Complied

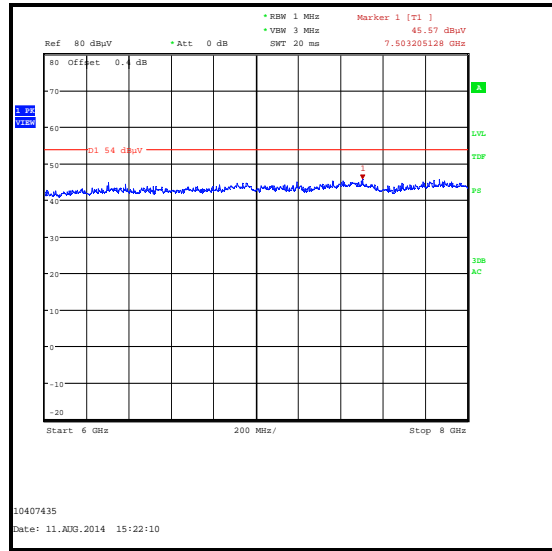
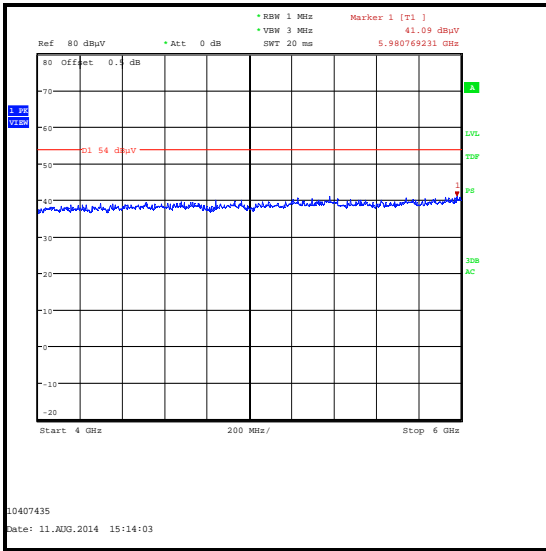
**Transmitter Radiated Emissions (continued)**



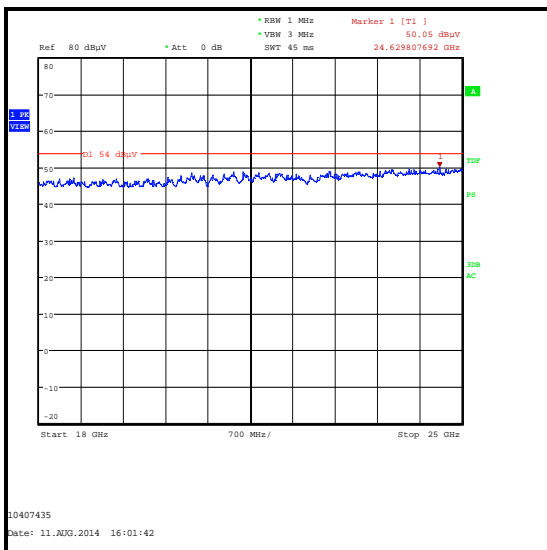
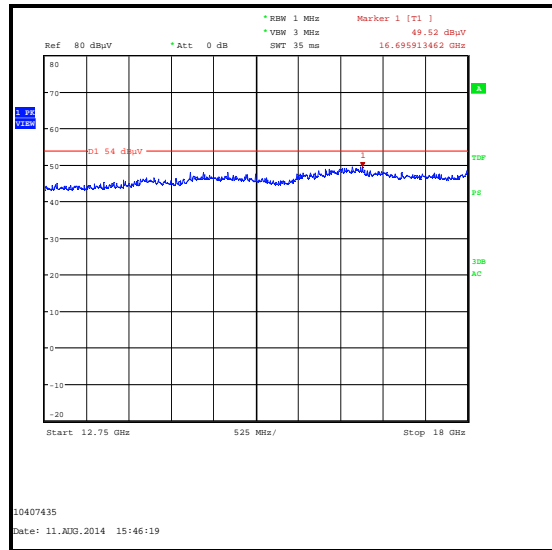
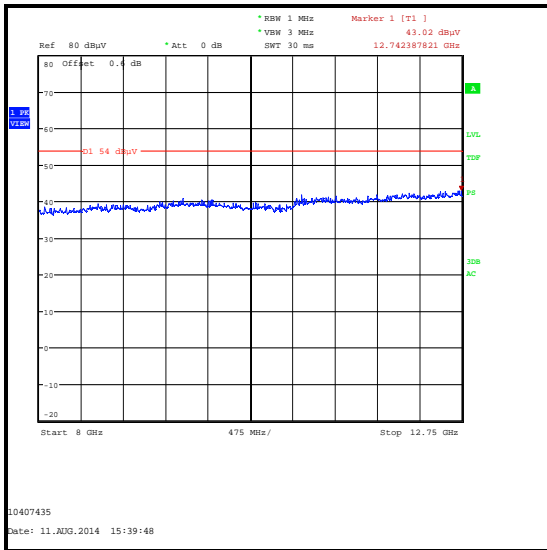
*Peak detector*



*Average detector*



**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)
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
A253	Antenna	Flann Microwave	12240-20	128	14 Nov 2014	12
A254	Antenna	Flann Microwave	14240-20	139	14 Nov 2014	12
A255	Antenna	Flann Microwave	16240-20	519	14 Nov 2014	12
A256	Antenna	Flann Microwave	18240-20	400	14 Nov 2014	12
A436	Antenna	Flann Microwave	20240-20	330	14 Nov 2014	12
A1396	Attenuator	Huber & Suhner	6810.17.B	757987	02 May 2015	12
A1975	High Pass Filter	AtlanTecRF	AFH-03000	090424010	12 Apr 2015	12
A2176	High Pass Filter	AtlanTecRF	AFH-07000	800980	12 Apr 2015	12

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

<b>Test Engineers:</b>	Georgios Vrezas & David Doyle	<b>Test Dates:</b>	11 August 2014 & 12 September 2014
<b>Test Sample IMEI:</b>	352025060501666		

<b>FCC Reference:</b>	Parts 15.247(d) & 15.209(a)
<b>Test Method Used:</b>	ANSI C63.10 Section 6.9.2 & FCC KDB 558074 Section 11

**Environmental Conditions:**

<b>Temperature (°C):</b>	22 to 23
<b>Relative Humidity (%):</b>	40 to 54

**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 should be performed with a peak detector and the -20 dBc limit applied.
3. \* 20 dBc limit.

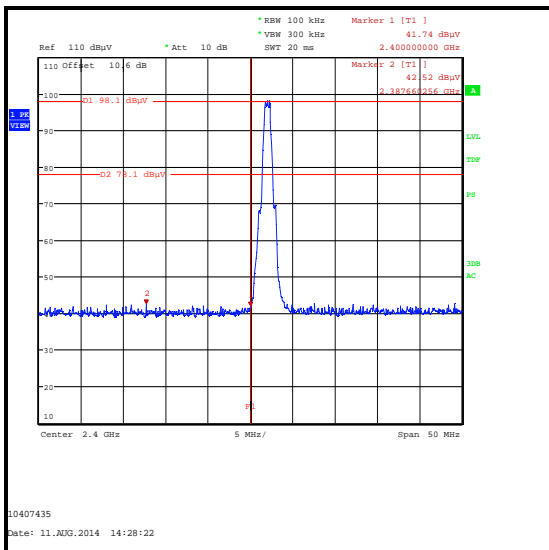
**Results: Peak**

Frequency (MHz)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2370.128	54.5	74.0	19.5	Complied
2387.660	42.5	78.1*	35.6	Complied
2400.0	41.7	78.1*	36.4	Complied
2483.5	59.8	74.0	14.2	Complied

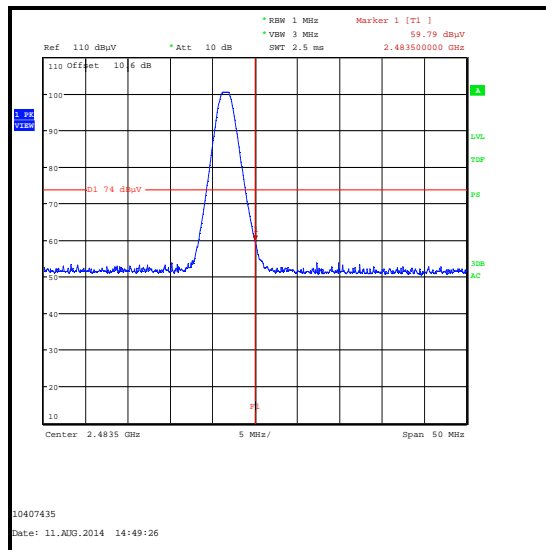
**Results: Average**

Frequency (MHz)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2374.744	48.3	54.0	5.7	Complied
2483.5	48.9	54.0	5.1	Complied

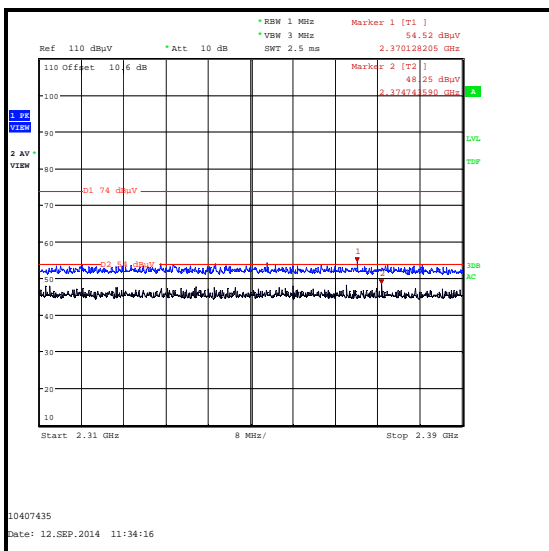
**Transmitter Band Edge Radiated Emissions (continued)**



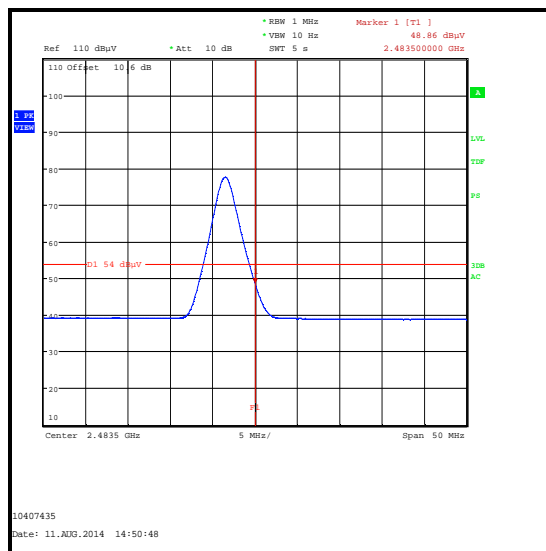
**Lower Band Edge Peak Measurement**



**Upper Band Edge Peak Measurement**



**2310-2390 MHz Restricted Band Measurement**



**Upper Band Edge Average Measurement**

**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	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
A1396	Attenuator	Huber & Suhner	6810.17.B	757987	02 May 2015	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>
AC Conducted Spurious Emissions	0.15 MHz to 30 MHz	95%	±4.69 dB
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%	±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
Duty Cycle	2.4 GHz to 2.4835 GHz	95%	±1.14%

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	-	-	Admin updates & Band edge restricted band plot added

--- END OF REPORT ---