



# TEST REPORT

**Test Report No. : UL-RPT-RP-12321064-216 FCC**

**Applicant** : Ava AG  
**Model No.** : Ava Fertility Tracker 2.0  
**FCC ID** : 2APV7-AVA02  
**Technology** : Bluetooth – Low Energy  
**Test Standard(s)** : FCC Parts 15.207, 15.209 & 15.247

For details of applied tests refer to test result summary

1. This test report shall not be reproduced in full or partial, without the written approval of UL International Germany GmbH.
2. The results in this report apply only to the sample tested.
3. The test results in this report are traceable to the national or international standards.
4. Test Report Version 1.0
5. Result of the tested sample: **PASS**

Prepared by: Abdoufataou Salifou  
Title: Laboratory Engineer  
Date: 31.July.2018

Approved by: Ajit, Phadtare  
Title: Lead Test Engineer  
Date: 31.July.2018



Deutsche  
Akkreditierungsstelle  
D-PL-19381-02-00

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The tests reported herein have been performed in  
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## **1. Customer Information**

### **1.1.Applicant Information**

<b>Company Name:</b>	Ava AG
<b>Company Address:</b>	Gutstrasse 73, 8055 Zürich, Switzerland
<b>Contact Person:</b>	Kaspar Wolfrum
<b>Contact E-Mail Address:</b>	kaspar.wolfrum@avawomen.com
<b>Contact Phone No.:</b>	+41787221502

### **1.2.Manufacturer Information**

<b>Company Name:</b>	Ava AG
<b>Company Address:</b>	Gutstrasse 73, 8055 Zürich, Switzerland
<b>Contact Person:</b>	Kaspar Wolfrum
<b>Contact E-Mail Address:</b>	kaspar.wolfrum@avawomen.com
<b>Contact Phone No.:</b>	+41787221502

## **2. Summary of Testing**

### **2.1. General Information**

#### **Applied Standards**

<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>Test Firm Registration:</b>	399704

#### **Location**

<b>Location of Testing:</b>	UL International Germany GmbH Hedelfinger Str. 61 70327 Stuttgart Germany
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#### **Date information**

<b>Order Date:</b>	24 May 2018
<b>EUT arrived:</b>	22 June 2018
<b>Test Dates:</b>	17 July 2018 to 20 July 2018
<b>EUT returned:</b>	-/-

## 2.2. Summary of Test Results

Clause	Measurement	Complied	Did not comply	Not performed	Not applicable
Part 15.207	Transmitter AC Conducted Emissions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Part 15.247(a)(2)	Transmitter Minimum 6 dB Bandwidth	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Part 15.247(e)	Transmitter Power Spectral Density <sup>(Note 1)</sup>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Part 15.247(b)(3)	Transmitter Maximum Peak Output Power	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Part 15.247(d)/15.209(a)	Transmitter Radiated Emissions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Part 15.247(d)/15.209(a)	Transmitter Band Edge Radiated Emissions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### Note:

1. 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

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 v04 April 5, 2017
Title:	Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247
Reference:	KDB 174176 D01 Line Conducted FAQ v01r01 June 3, 2015
Title:	AC Power-Line Conducted Emissions Frequently Asked Questions

## 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>	Ava Fertility Tracker
<b>Model Name or Number:</b>	Ava Fertility Tracker 2.0
<b>Serial Number:</b>	HW2_48 (Test Sample for Conducted Measurements)
<b>FCC ID:</b>	2APV7-AVA02
<b>Hardware Version Number:</b>	2
<b>Software Version Number:</b>	N/A
<b>Firmware Version Number:</b>	N/A

<b>Brand Name:</b>	Ava Fertility Tracker
<b>Model Name or Number:</b>	Ava Fertility Tracker 2.0
<b>Serial Number:</b>	HW2_32 (Test Sample for Radiated & AC Conducted Measurements)
<b>FCC ID:</b>	2APV7-AVA02
<b>Hardware Version Number:</b>	2
<b>Software Version Number:</b>	N/A
<b>Firmware Version Number:</b>	N/A

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

The equipment under test was a Fertility Tracker with sensor technology worn by women overnight (wrist). This device has an integrated Bluetooth Low-energy integrated in it.

#### **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:	Bluetooth Low Energy (Digital Transmission System)		
Type of Unit:	Transceiver		
Channel Spacing:	2 MHz		
Modulation:	GFSK		
Data Rate:	1 Mbps		
Power Supply Requirement(s):	Nominal	3.7 V DC   80 mA ( Internal Battery)	
Measured Conducted Output Power:	0.5 dBm		
Maximum Peak Antenna Gain:	1.0 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:

#### A. Support Equipment (In-house)

Item	Description	Brand Name	Model Name or Number	Serial Number
1	Laptop PC	HP	HP Probook 650 G1	5CG6143YWB
2	Laptop PC	HP	HP Probook 650 G1	5CG614419V
3	USB-AC/DC Adapter	Samsung	EP-TA20EWE	R37J62G2F64DK3

#### B. Support Equipment (Manufacturer supplied)

Item	Description	Brand Name	Model Name or Number	Serial Number
4	Bluetooth Tester Device	Arendi Bluetooth Tester (ABT)	HW v1.0	--
5	USB-USB 2.0 Type B Cable 1.5 m	ABT Tester	AWM 2725	--
6	USB-USB 3.0 Type C Cable 1.0 m	--	AWM E352563	--
7	USB-Serial Cable 1.2 m	QCTECH	AWM 24AWG VW-1	--



## **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

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

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

- The test modes were activated using "AVA0002\_Manual for testing EMC\_ESD, RF\_BLE - 20180608.pdf" supplied by applicant.
- The EUT was powered via a USB-Serial Cable for all conducted tests. The EUT was powered via a USB-AC/DC Adapter & USB-Type C cable for all radiated tests.
- Test Channels & modulated carrier were activated using "Arendi Approval Test.exe" test tool supplied by applicant. This test tool & relevant test drivers were installed on test laptop.
- In order to activate test modes with maximum output power on EUT, it was connected to Arendi Bluetooth Tester (ABT) over Bluetooth wireless connection.
- During testing Bluetooth Tester (ABT) was placed at closer distance to EUT so that it transmits maximum power levels.
- Radiated spurious emissions were performed with the EUT positioned on the turn table and rotating 360 degrees while the antenna height varies from 1 to 4 m over the measurement frequency range.
- All accessories/peripheral supplied were employed during spurious emissions testing.
- EMC32 V10.1.0 Software was used for the Radiated spurious emission measurement.
- EMC32 V10.30 Software was used for the all Conducted measurements.

## **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 DAkkS 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>	Asim Shahzad	<b>Test Date:</b>	20 July 2018
<b>Test Sample Serial Number:</b>	HW2_32		
<b>Test Site Identification</b>	SR 7/8		

<b>Clause:</b>	Part 15.207
<b>Test Method:</b>	ANSI C63.10 Section 6.2 / FCC KDB 174176 and notes below

#### **Environmental Conditions:**

<b>Temperature (°C):</b>	23
<b>Relative Humidity (%):</b>	36

#### **Settings of the Instrument**

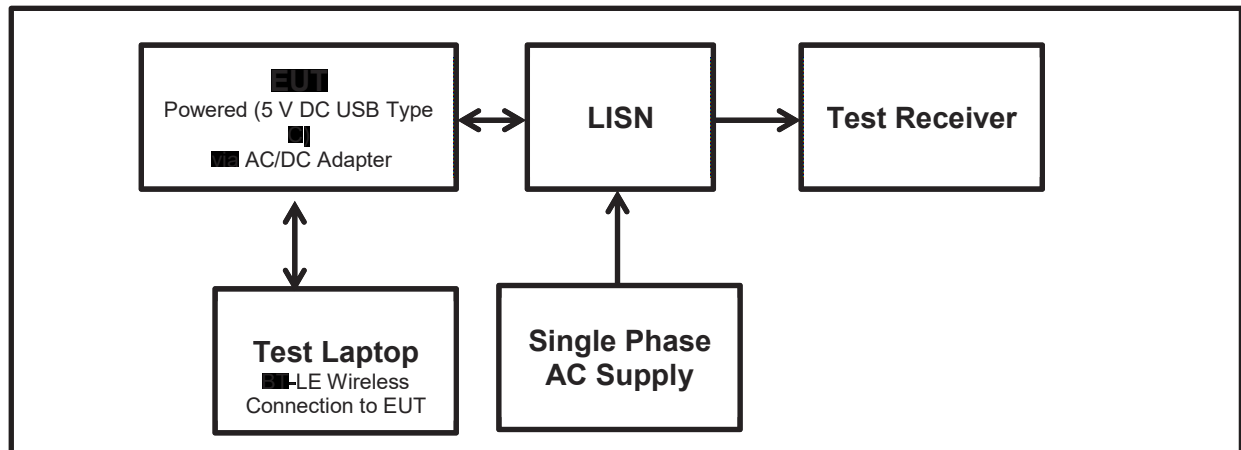
<b>Detector</b>	Quasi Peak/ Average Peak
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#### **Note(s):**

1. The EUT was plugged to a USB Type C Power cable which was connected to a USB-AC/DC Adapter. The USB-AC/DC Adapter was connected to 120 VAC 60 Hz single phase supply via a LISN.
2. Pre-scans were performed and markers placed on the highest live and neutral measured levels. Final measurements were performed on the marker frequencies and the results entered into the tables below.
3. The tests were performed with Bluetooth Low Energy Middle Channel.

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

**Test setup:**



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

#### **Results: Live / Quasi Peak / 120 VAC 60 Hz**

Frequency (MHz)	Line	QP Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.16952	Live	26.6	65	38.4	Complied
0.79459	Live	27.6	56	28.4	Complied
1.44684	Live	23.7	56	32.3	Complied
3.42523	Live	21.4	56	34.6	Complied
9.58763	Live	18.9	60	41.1	Complied
13.38903	Live	22.6	60	37.4	Complied

#### **Results: Live / Average / 120 VAC 60 Hz**

Frequency (MHz)	Line	AV Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.16952	Live	13.3	55	41.7	Complied
0.79459	Live	11.3	46	34.7	Complied
1.44684	Live	8.9	46	37.1	Complied
3.42523	Live	9.9	46	36.1	Complied
9.58763	Live	7.4	50	42.6	Complied
13.38903	Live	8.6	50	41.4	Complied

#### **Results: Neutral / Quasi Peak / 120 VAC 60 Hz**

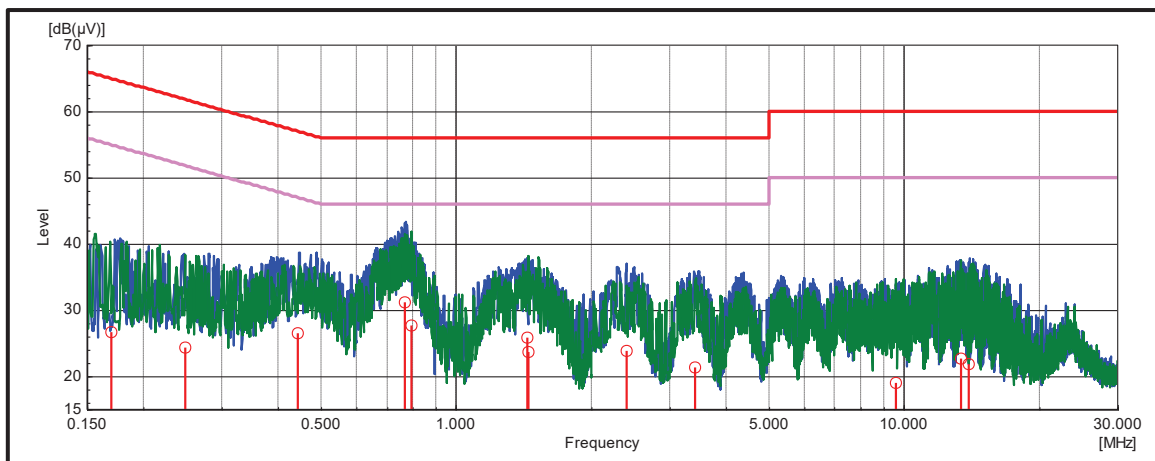
Frequency (MHz)	Line	QP Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.24868	Neutral	24.3	61.8	37.5	Complied
0.44373	Neutral	26.5	57	30.5	Complied
0.76891	Neutral	31.1	56	24.9	Complied
1.44532	Neutral	25.8	56	30.2	Complied
2.39649	Neutral	23.8	56	32.2	Complied
13.97971	Neutral	21.8	60	38.2	Complied

#### **Results: Neutral / Average / 120 VAC 60 Hz**

Frequency (MHz)	Line	AV Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.24868	Neutral	12.5	51.8	39.3	Complied
0.44373	Neutral	10.8	47	36.2	Complied
0.76891	Neutral	13.4	46	32.6	Complied
1.44532	Neutral	9.4	46	36.6	Complied
2.39649	Neutral	8.4	46	37.6	Complied
13.97971	Neutral	6.8	50	43.2	Complied

**Result: Pass**

**Plot: Live and Neutral Line**



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

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

#### **Test Summary:**

<b>Test Engineer:</b>	Abdoufataou Salifou	<b>Test Date:</b>	18 July 2018
<b>Test Sample Serial Number:</b>	HW2_48		
<b>Test Site Identification</b>	SR 9		

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

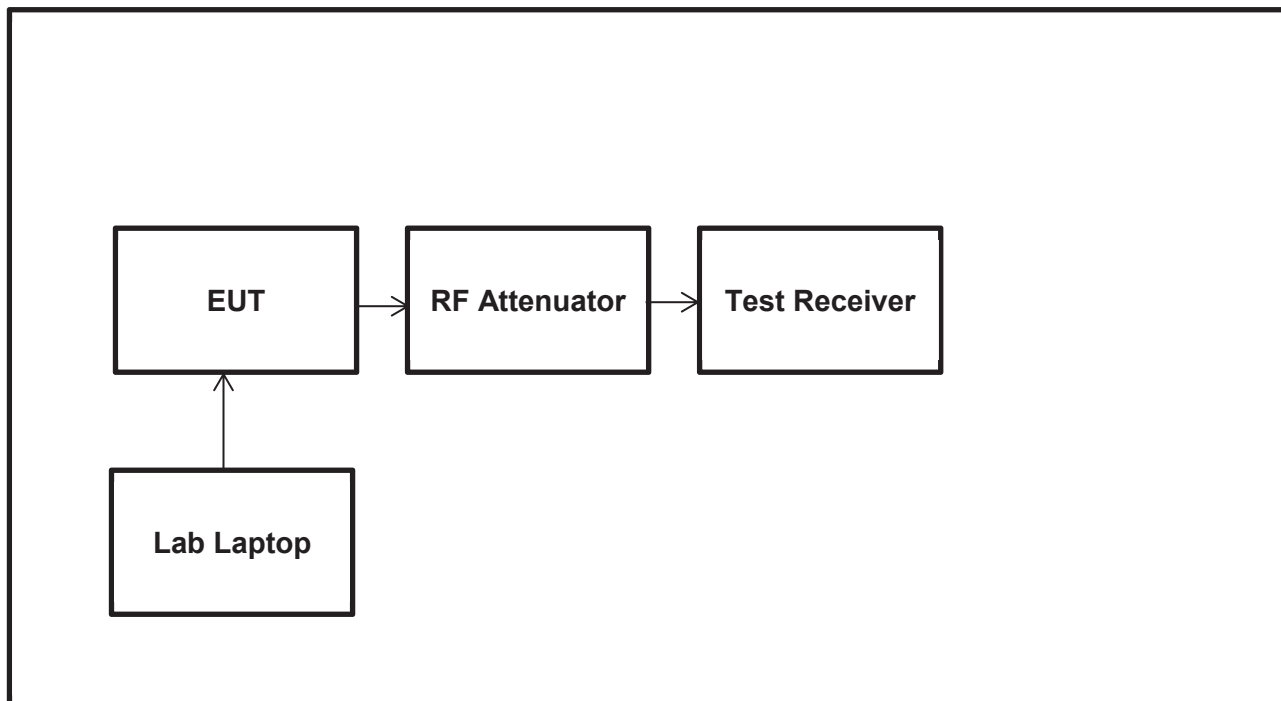
#### **Environmental Conditions:**

<b>Temperature (°C):</b>	24.2
<b>Relative Humidity (%):</b>	38

#### **Notes:**

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

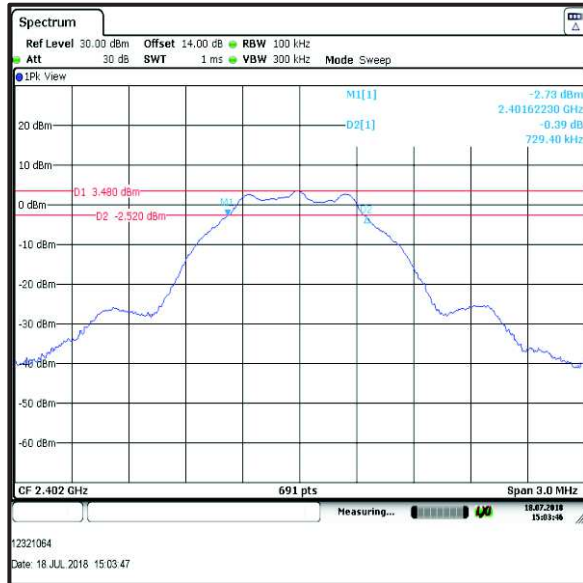
#### **Test setup:**



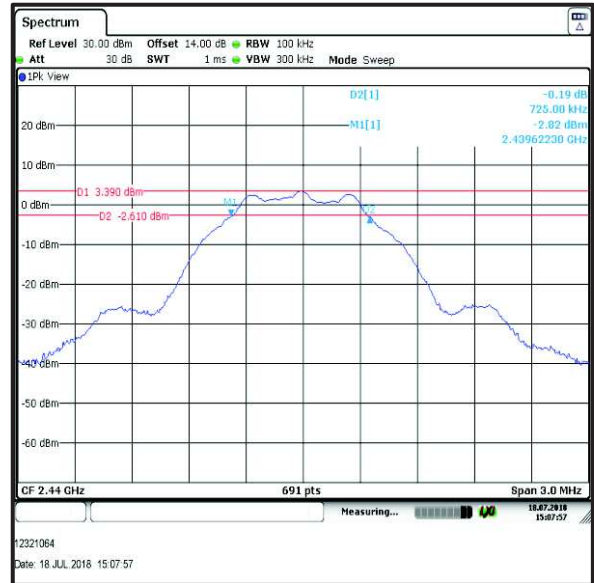
## Transmitter Minimum 6 dB Bandwidth (continued)

### Results:

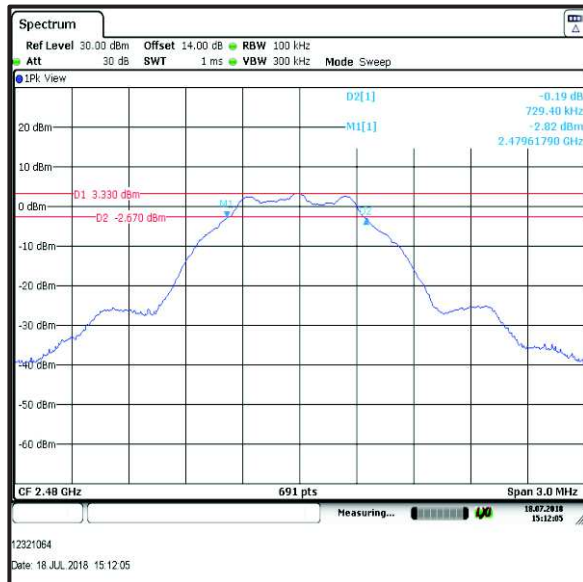
Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	729.400	≥500	229.400	Complied
Middle	725.000	≥500	225.000	Complied
Top	729.400	≥500	229.400	Complied



Bottom Channel



Middle Channel



Top Channel

Result: **Pass**



### 5.2.3. Transmitter Duty Cycle

#### Test Summary:

Test Engineer:	Abdoufataou Salifou	Test Date:	18 July 2018
Test Sample Serial Number:	HW2_48		
Test Site Identification	SR 9		

FCC Reference:	Part 15.35(c)
Test Method Used:	FCC KDB 558074 Section 6.0

#### Environmental Conditions:

Temperature (°C):	24.4
Relative Humidity (%):	39

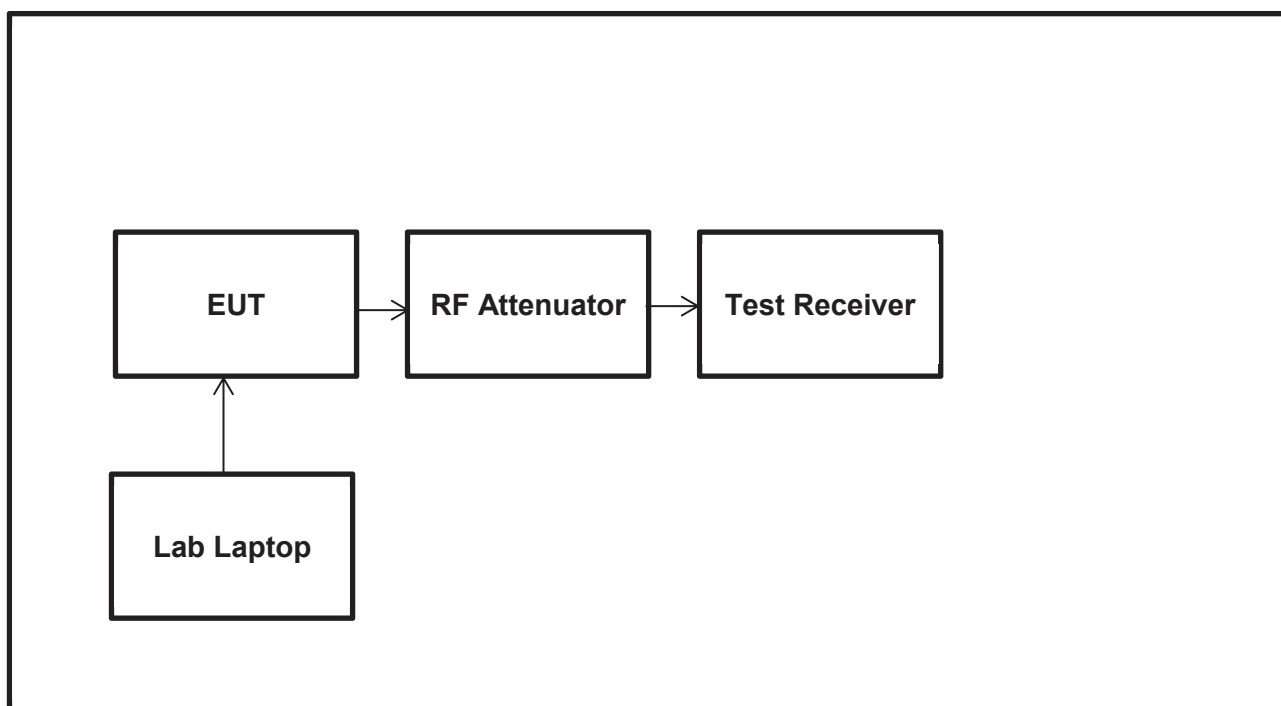
#### Note:

The transmitter duty cycle was measured using a spectrum analyser in the time domain and calculated by using the following calculation:

$10 \log (1 / (\text{On Time} / [\text{Period or } 100 \text{ ms whichever is the lesser}] ) )$ .

BLE duty cycle:  $10 \log (1 / (392.75 \mu\text{s} / 627.54 \mu\text{s})) = 2.035 \text{ dB}$

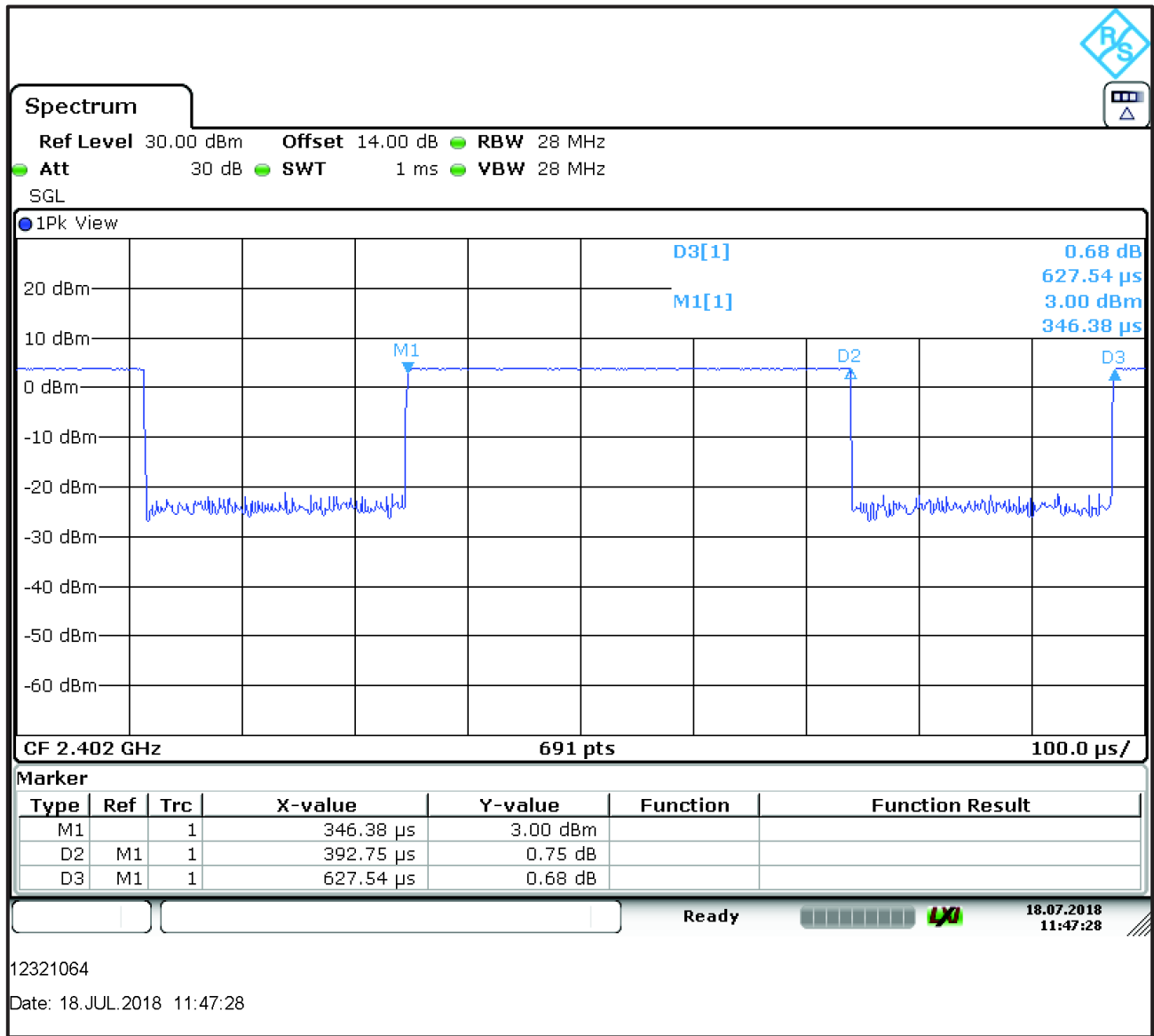
#### Test setup:



## Transmitter Duty Cycle continued

### Results:

Pulse Duration (µs)	Period (µs)	Duty Cycle Correction (dB)
392.75	627.54	2.035



#### **5.2.4. Transmitter Maximum Peak Output Power**

##### **Test Summary:**

<b>Test Engineer:</b>	Abdoufataou Salifou	<b>Test Date:</b>	18 July 2018
<b>Test Sample Serial Number:</b>	HW2_48		
<b>Test Site Identification</b>	SR 9		

<b>FCC Reference:</b>	Part 15.247(b)(3)
<b>Test Method Used:</b>	FCC KDB 558074 Section 9.1.1 and Notes below

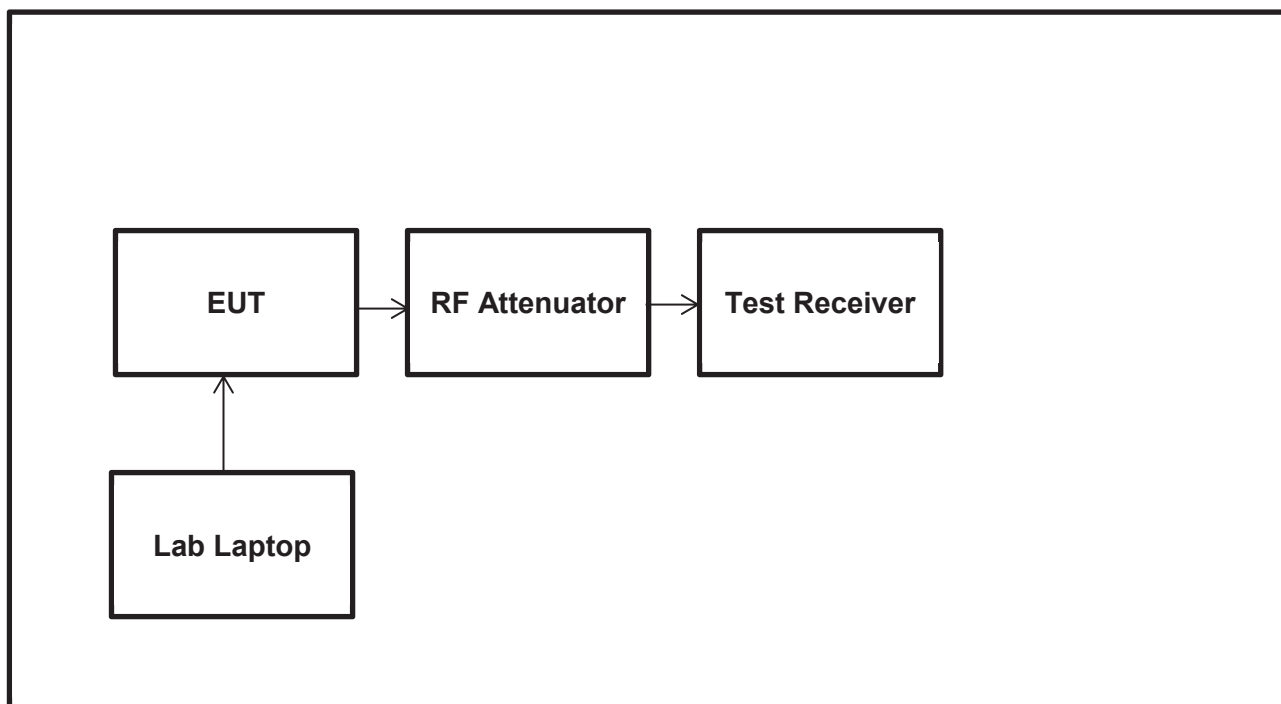
##### **Environmental Conditions:**

<b>Temperature (°C):</b>	24.3
<b>Relative Humidity (%):</b>	37

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

1. Tests were performed using a combination of the conducted test method described in FCC KDB 558074 Section 9.1.1 with the RBW > *DTS bandwidth* procedure.
2. The signal analyser resolution bandwidth was set to 3 MHz and video bandwidth of 10 MHz. A peak detector was used, sweep time was set to auto and trace mode was Max Hold. The span was set to 9 MHz. A marker was placed at the peak of the signal and the results recorded in the table below.
3. 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.
4. The declared antenna gain was added to measured conducted power to obtain the EIRP.

##### **Test setup:**



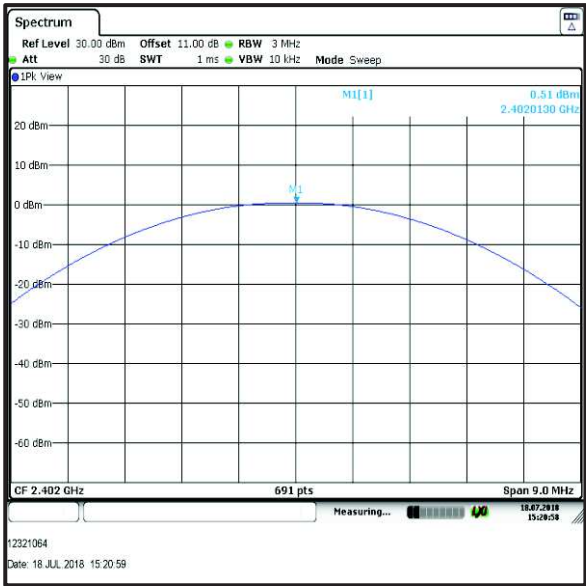
**Transmitter Maximum Peak Output Power (continued)**

**Results:**

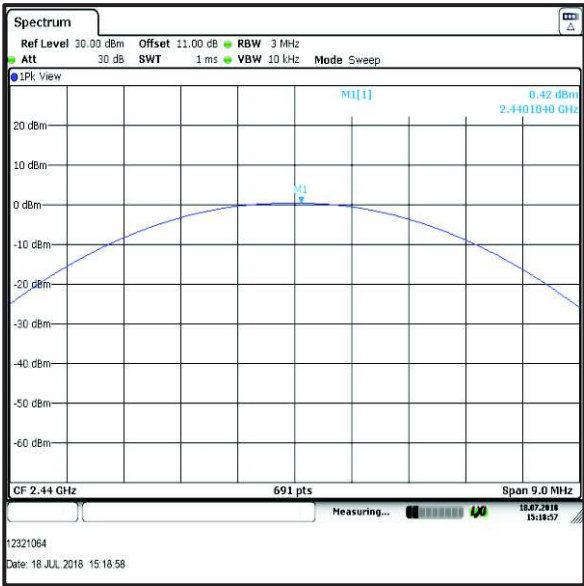
Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	0.3	30.0	29.7	Complied
Middle	0.4	30.0	29.6	Complied
Top	0.5	30.0	29.5	Complied

Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	0.3	1.0	1.3	36.0	34.7	Complied
Middle	0.4	1.0	1.4	36.0	34.6	Complied
Top	0.5	1.0	1.5	36.0	34.5	Complied

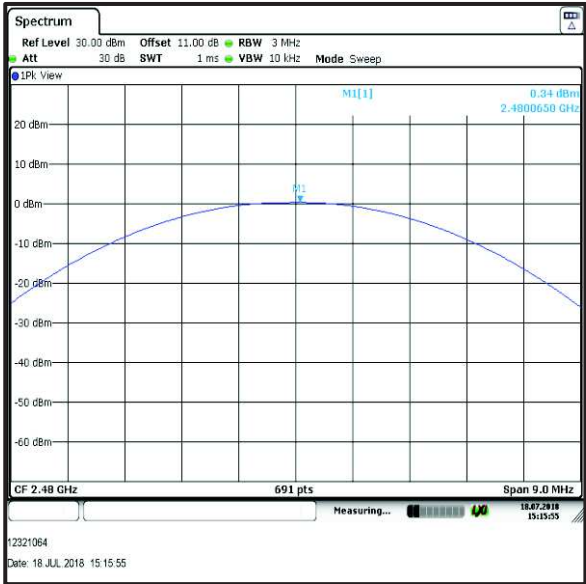
Transmitter Maximum Peak Output Power (continued)



Bottom Channel



Middle Channel



Top Channel

Result: Pass

### **5.2.5. Transmitter Radiated Emissions**

#### **Test Summary:**

<b>Test Engineer:</b>	Segun I. Adeniji	<b>Test Date:</b>	17 July 2018
<b>Test Sample Serial Number:</b>	HW2_32		
<b>Test Site Identification</b>	SR 1/2		

<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

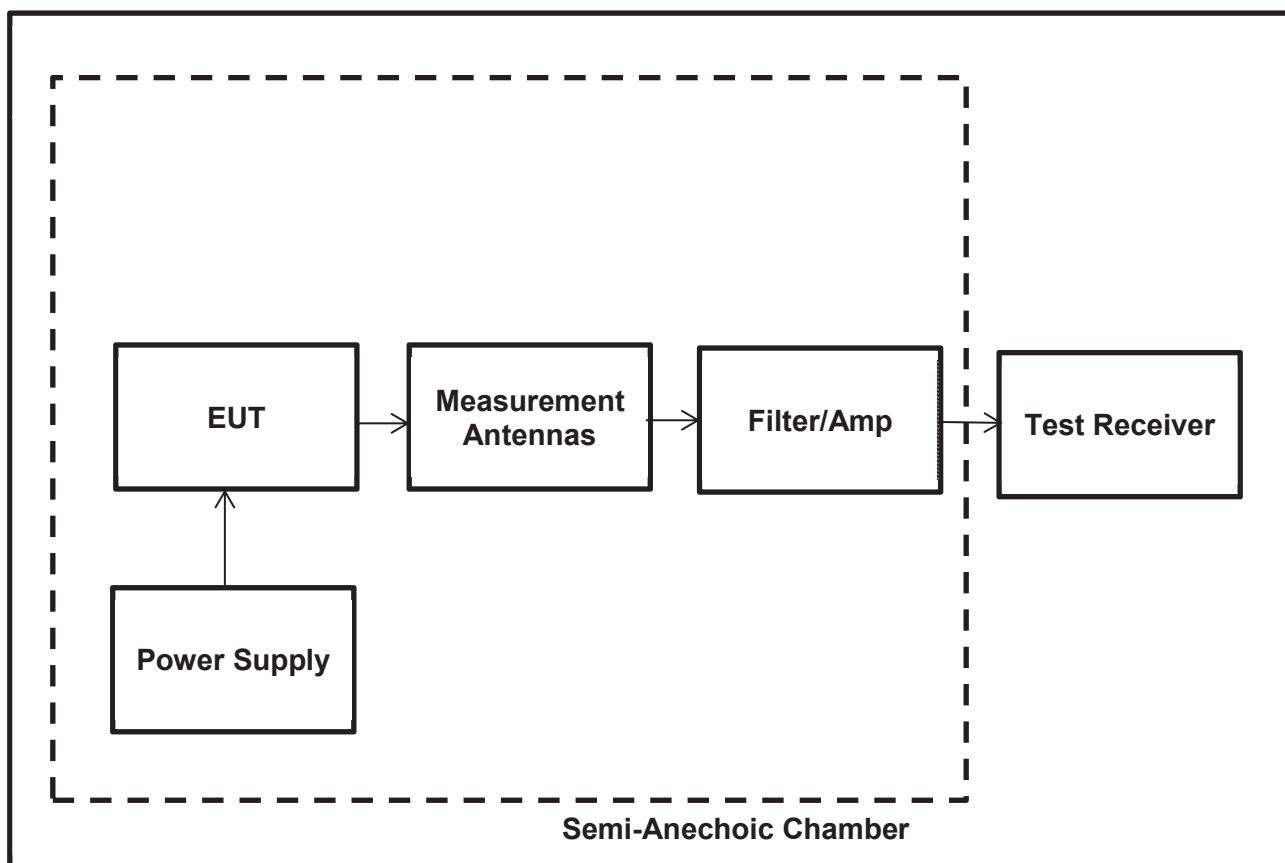
#### **Environmental Conditions:**

<b>Temperature (°C):</b>	23
<b>Relative Humidity (%):</b>	37

#### **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. Measurements below 1 GHz were performed in a semi-anechoic chamber 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.
4. 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.
5. As the Peak measurement result is below the Quasi-Peak hence, no Quasi-Peak detector measurement is required.

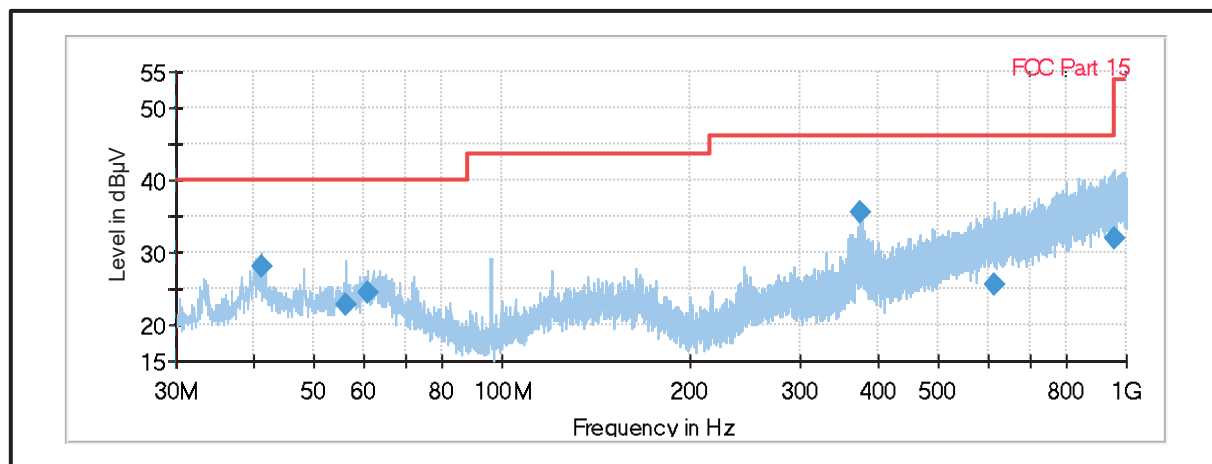
**Test Setup:**



### Results: Middle Channel

Frequency (MHz)	Antenna Polarization	MaxPeak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
41.295000	V	28.19	40.00	11.81	Complied
56.280000	V	22.82	40.00	17.18	Complied
60.780000	V	24.31	40.00	15.69	Complied
375.066667	V	35.53	46.00	10.47	Complied
613.041667	V	25.62	46.00	20.38	Complied
957.416667	H	31.87	46.00	14.13	Complied

### Plot: 30 MHz – 1GHz



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

Result: **Pass**



### **Test Summary:**

<b>Test Engineer:</b>	Segun I. Adeniji	<b>Test Date:</b>	17 July 2018
<b>Test Sample Serial Number:</b>	HW2_32		
<b>Test Site Identification</b>	SR 1/2		

<b>FCC Reference:</b>	Parts 15.247(d) & 15.209(a)
<b>Test Method Used:</b>	FCC KDB 558074 Sections 11 & 12 referencing 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
<b>Relative Humidity (%):</b>	37

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

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. All the spurious emissions detected were re-investigated and re-measured with an average detector and in this case the emission was compared to the peak limit. For frequency range between 18 GHz and 25 GHz, no critical emission was found so only the measurement receiver noise floor level has been measured and recorded in the table 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. Only the middle channel plot was included in the report as similar result was obtained on both bottom and top channels.
3. The emission shown around the 2.4 GHz is the EUT fundamental.
4. Measurements above 1 GHz were performed in a semi-anechoic chamber 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.
5. 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.
6. \*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.
7. The reference level for the emission in the non-restricted band was established by following KDB 558074 Section 11.2 procedure.

**Results:**

**Results: Peak / Bottom Channel**

Frequency (MHz)	Antenna Polarization	Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
13885.0	Horizontal	53.33	54.0	0.67	Complied

**Results: Peak / Middle Channel**

Frequency (MHz)	Antenna Polarization	Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
13881.3	Horizontal	51.93	54.0	2.07	Complied

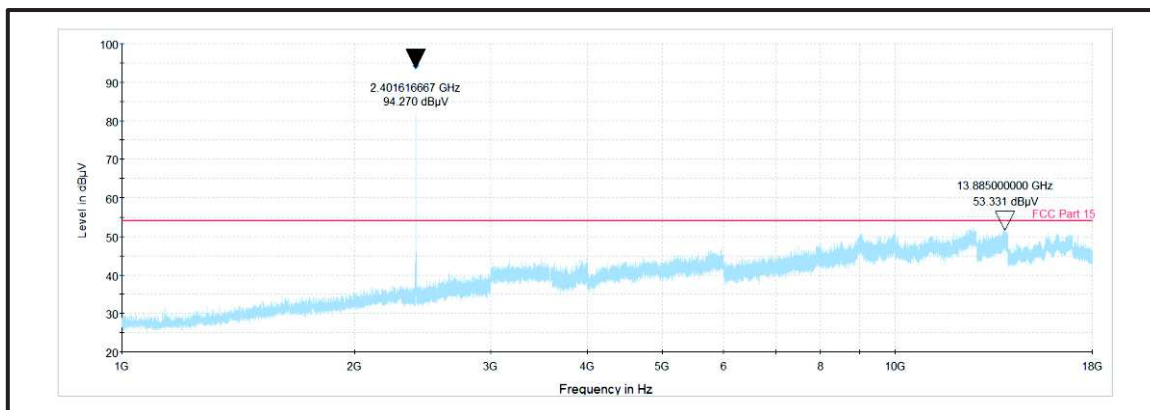
**Results: Peak / Top Channel**

Frequency (MHz)	Antenna Polarization	Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
13875.0	Horizontal	52.35	54.0	1.65	Complied

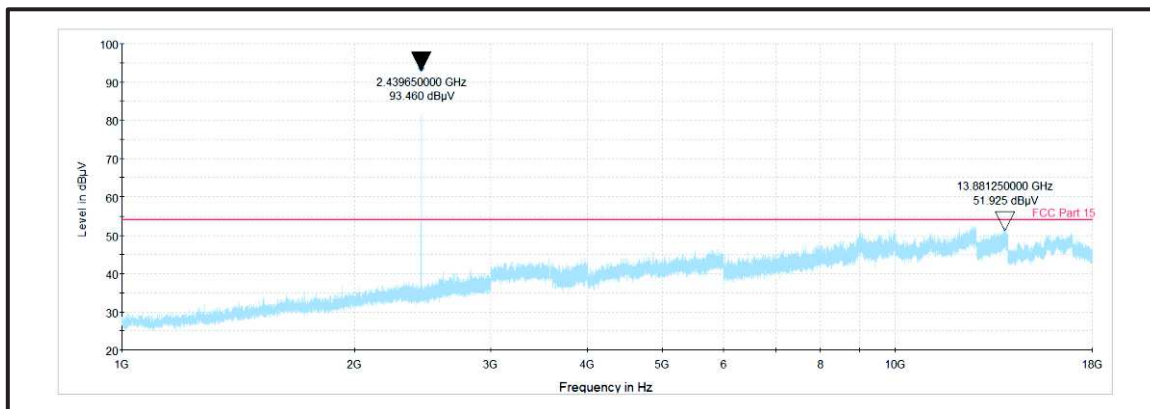
**Result: Pass**

### Transmitter Radiated Emissions (continued)

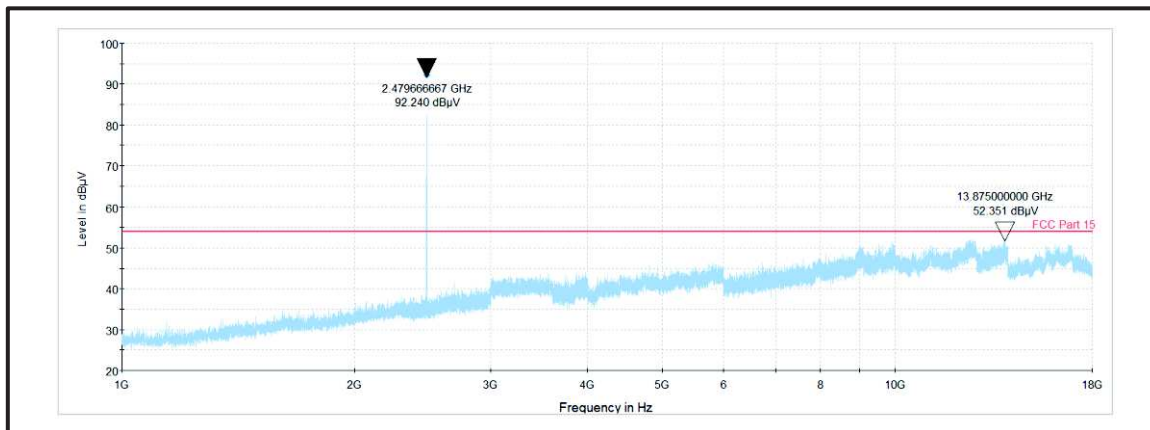
Plot: 1 GHz – 18GHz (Bottom channel) with Peak detector



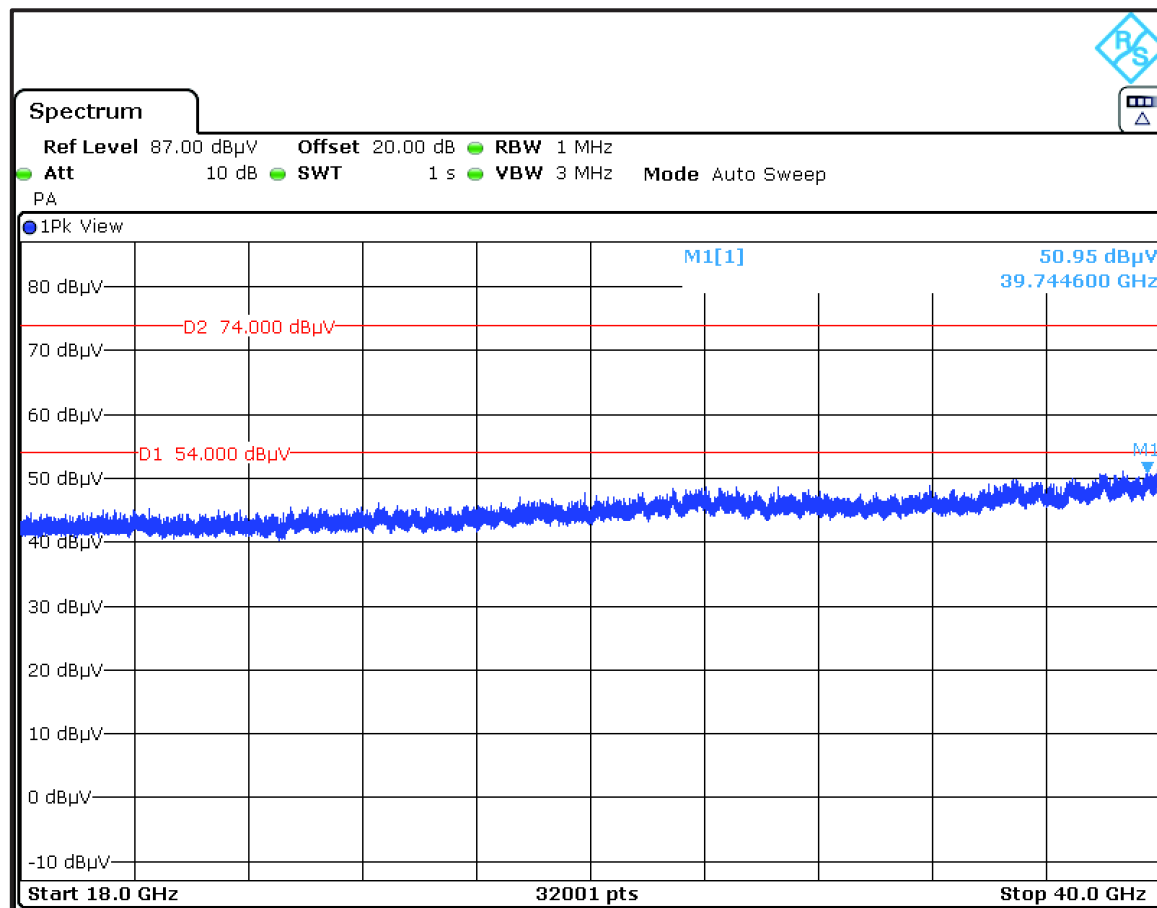
Plot: 1 GHz – 18GHz (Middle channel) with Peak detector



Plot: 1 GHz – 18GHz (Top channel) with Peak detector



**Plot: 18 GHz – 40GHz (Middle channel) with Peak detector**



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

## 5.2.6. Transmitter Band Edge Radiated Emissions

### Test Summary:

Test Engineer:	Segun I. Adeniji	Test Date:	17 July 2018
Test Sample Serial Number:	HW2_32		
Test Site Identification	SR 1/2		

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

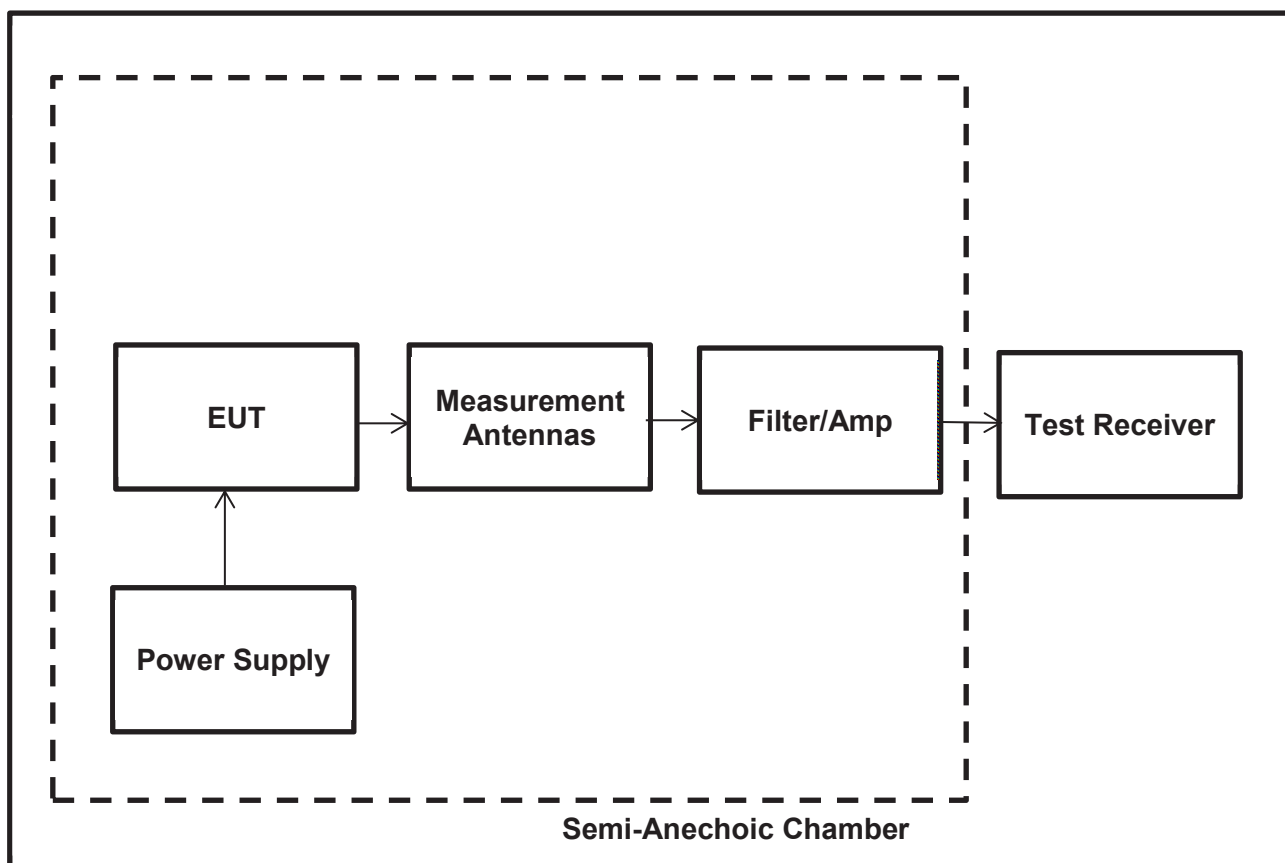
### Environmental Conditions:

Temperature (°C):	23
Relative Humidity (%):	37

### Note(s):

1. As the lower band edges fall within non-restricted bands, 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. As the maximum peak conducted output power was measured using a peak detector in accordance with FCC KDB 558074 Section 9.1.1 an out-of-band limit line was placed 20 dB below the peak level (FCC KDB 558074 Section 11.1(a)). 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.
2. 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. For peak measurements the test receiver resolution bandwidth was set to 1 MHz and the video bandwidth 3 MHz. A peak detector was used, sweep time was set to auto and trace mode was Max Hold. For average measurements the test receiver resolution bandwidth was set to 1 MHz and the video bandwidth 3 MHz. An average 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 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.
3. 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.
4. \*Emissions in restricted bands: In accordance with C63.10 Section 6.6.4.3, Note 1, where the peak detected amplitude was shown to comply with the average limit, an average measurement was not performed.

**Test Setup:**



**Results: Lower Band Edge/Peak**

Frequency (MHz)	Level (dB $\mu$ V/m)	-20 dBc Limit (dB $\mu$ V/m)	Margin (dB)	Result
2400.0	51.25	74.08	22.83	Complied
2396.5	53.58	74.08	20.50	Complied

**Results: Upper Band Edge / Restricted Band / Peak**

Frequency (MHz)	Peak Level (dB $\mu$ V/m)	Peak Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.5	55.79	74.0	18.21	Complied

**Results: Upper Band Edge / Restricted Band / Average**

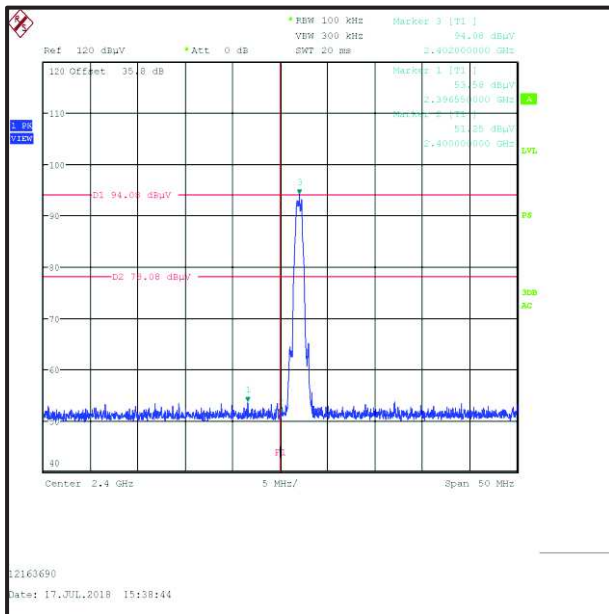
Frequency (MHz)	Average Level (dB $\mu$ V/m)	Average Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.5	48.81	54.0	5.19	Complied

**Results: 2310 to 2390 MHz Restricted Band / Peak**

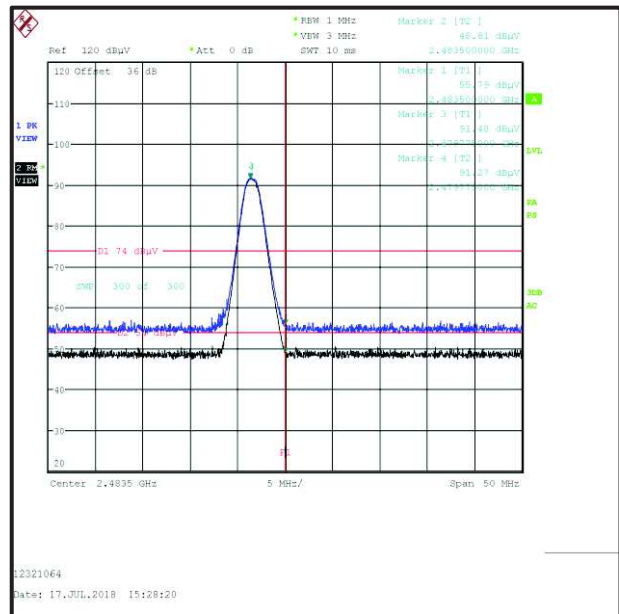
Frequency (MHz)	Peak Level (dB $\mu$ V/m)	Peak Limit (dB $\mu$ V/m)	Margin (dB)	Result
2362.31	57.30	74.0	16.7	Complied

**Results: 2310 to 2390 MHz Restricted Band / Average**

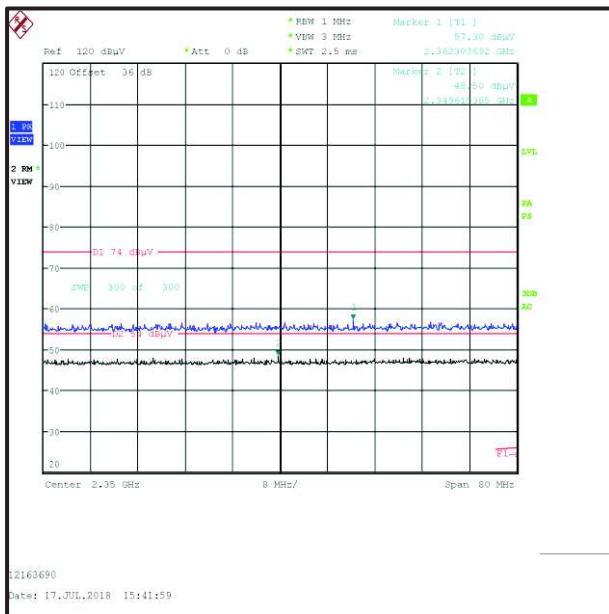
Frequency (MHz)	Average Level (dB $\mu$ V/m)	Average Limit (dB $\mu$ V/m)	Margin (dB)	Result
2349.62	48.50	54.0	5.5	Complied



### Lower Band Edge Peak Measurement



### Upper Band Edge Peak-Average Measurement



### 2310 MHz to 2390 MHz Restricted Band Plot



## 6. Measurement Uncertainty

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	Confidence Level (%)	Calculated Uncertainty
AC Conducted Spurious Emissions	95%	±2.49 dB
Conducted Maximum Peak Output Power	95%	±0.59 dB
Radiated Spurious Emissions	95%	±3.10 dB
Band Edge Radiated Emissions	95%	±3.10 dB
Minimum 6 dB Bandwidth	95%	±0.87 %
Spectral Power Density	95%	±0.59 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. Used equipment

### Test site: SR 1/2

ID	Manufacturer	Type	Model	Serial No.	Calibration Date	Cal. Cycle
350	Rohde & Schwarz	Receiver, EMI Test	ESIB7	836697/014	7/12/2018	12
377	Bonn Elektronik	Amplifier, Low Noise Pre	BLMA 0118-1A	025294B	7/12/2018	12
423	Bonn Elektronik	Amplifier, Low Noise Pre	BLMA 1840-1A	055929	7/12/2018	12
460	Deisl	Turntable	DT 4250 S		n/a	n/a
465	Schwarzbeck	Antenna, Trilog Broadband	VULB 9168	9168-240	8/8/2016	36
496	Rohde & Schwarz	Antenna, log. - periodical	HL050	100297	7/20/2016	24
587	Maturo	antenna mast, tilting	TAM 4.0-E	011/7180311	n/a	n/a
588	Maturo	Controller	NCD	029/7180311	n/a	n/a
591	Rohde & Schwarz	Receiver	ESU 40	100244/040	7/12/2018	12
608	Rohde & Schwarz	Switch Matrix	OSP 120	101227	4/8/2014	60
614	Wainwright Instruments	Highpass Filter 3GHz	WHKX10-	1	Lab verification	n/a
615	Wainwright Instruments	Highpass Filter 1GHz	WHKX12-	3	Lab verification	n/a
620	Bonn Elektronik	pre-amplifier	BLNA 0110-01N	1510111	7/12/2017	24
628	Maturo	Antenna mast	CAM 4.0-P	224/19590716	n/a	n/a
629	Maturo	Kipheinrichtung	KE 2.5-R-M	MAT002	n/a	n/a

### Test site: SR 9

ID	Manufacturer	Type	Model	Serial No.	Calibration Date	Cal. Cycle
424	EMCO	Antenna, Horn	EMCO 3116	00046537	7/28/2016	24
634	Rohde & Schwarz	Wireless Devices Test System	TS8997		7/12/2018	12
636	Rohde & Schwarz	switching unit	OSP120	101698	7/12/2018	12
637	Rohde & Schwarz	Spectrum Analyzer	FSV40	101587	7/11/2018	12
195	SPS	Power Supply	TOE8842-24	51455	Verified by Multimeter	12
216	Agilent	Multimeter	34401A	US36017458	7/11/2017	24

### Test site: SR 7/8

ID	Manufacturer	Type	Model	Serial No.	Calibration Date	Cal. Cycle
22	Rohde & Schwarz	Artificial Mains	50 Ohm// 50uH	831767/014	7/11/2018	12
215	Rohde & Schwarz	Artificial Mains Network	9 kHz - 30 MHz; 3 phase	879675/002	7/11/2018	12
349	Rohde & Schwarz	Receiver, EMI Test	20 Hz - 7 GHz	836697/009	7/10/2018	12
616	Rohde & Schwarz	ISN	8 wire ISN for CAT6	101656	7/12/2018	12

## 8. Report Revision History

Version Number	Revision Details		
	Page No(s)	Clause	Details
1.0	35	-	Initial Version