



TEST REPORT

Test Report No. : UL-RPT-RP-12198692-616-FCC

Applicant : Paxton Access Limited
Model No. : 477-600
FCC ID : USE477500
Technology : ZigBee (IEEE 802.15.4)
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: Segun I. Adeniji
Title: Engineer
Date: 29.June.2018

Approved by: Ajit, Phadtare
Title: Lead Test Engineer
Date: 29.June.2018



Deutsche
Akkreditierungsstelle
D-PL-19381-02-00

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

This page has been left intentionally blank.

Table of Contents

1. Customer Information.....	4
1.1.Applicant Information	4
1.2.Manufacturer Information	4
2. Summary of Testing	5
2.1. General Information	5
Applied Standards	5
Location	5
Date information	5
2.2. Summary of Test Results	6
2.3. Methods and Procedures	6
2.4. Deviations from the Test Specification	6
3. Equipment Under Test (EUT)	7
3.1. Identification of Equipment Under Test (EUT)	7
3.2. Description of EUT	7
3.3. Modifications Incorporated in the EUT	7
3.4. Additional Information Related to Testing	8
3.5. Support Equipment	8
A. Support Equipment (In-house)	8
B. Support Equipment (Manufacturer supplied)	9
4. Operation and Monitoring of the EUT during Testing	10
4.1. Operating Modes	10
4.2. Configuration and Peripherals	10
5. Measurements, Examinations and Derived Results.....	11
5.1. General Comments	11
5.2. Test Results	12
5.2.1. Transmitter AC Conducted Spurious Emissions	12
5.2.2. Transmitter Duty Cycle	15
5.2.3. Transmitter Radiated Emissions	17
5.2.4. Transmitter Band Edge Radiated Emissions	27
6. Used equipment.....	32
7. Report Revision History	34

1. Customer Information

1.1.Applicant Information

Company Name:	Paxton Access Limited
Company Address:	Paxton House, Home Farm Road, Brighton, East Sussex, BN1 9HU, United Kingdom
Company Phone No.:	--
Company E-Mail:	--
Contact Person:	Walter Riche
Contact E-Mail Address:	Walter.Riche@paxton.co.uk
Contact Phone No.:	+44 1273 811011

1.2.Manufacturer Information

Company Name:	Paxton Access Limited
Company Address:	53 Brampton Road, Eastbourne, East Sussex, BN22 9AF, United Kingdom
Company Phone No.:	--
Company E-Mail:	--
Contact Person:	Austin Georgeson
Contact E-Mail Address:	Austin Georgeson@paxton.co.uk
Contact Phone No.:	+44 1273 811055

2. Summary of Testing

2.1. General Information

Applied Standards

Specification Reference:	47CFR15.247
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Section 15.247
Specification Reference:	47CFR15.207 and 47CFR15.209
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Sections 15.207 and 15.209
Test Firm Registration:	399704

Location

Location of Testing:	UL International Germany GmbH Hedelfinger Str. 61 70327 Stuttgart Germany
-----------------------------	--

Date information

Order Date:	01 March 2018
EUT arrived:	22 May 2018
Test Dates:	15 June 2018 to 22 June 2018
EUT returned:	N/A

2.2. Summary of Test Results

Clause	Measurement	Complied	Did not comply	Not performed	Not applicable
Part 15.207	Transmitter AC Conducted Emissions ⁽¹⁾	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Part 15.247(a)(2)	Transmitter Minimum 6 dB Bandwidth	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Part 15.35(c)	Transmitter Duty Cycle	Note 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Part 15.247(e)	Transmitter Power Spectral Density	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Part 15.247(b)(3)	Transmitter Maximum Peak Output Power	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Part 15.247(d)/15.209	Transmitter Radiated Emissions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Part 15.247(d)/15.209	Transmitter Band Edge Radiated Emissions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Note(s):

1. Partial Testing of 15.247 only the above measurements were ordered by customer.
2. The measurement was performed to assist with the calculation of the level of average radiated emissions

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)

Brand Name:	Net2Air Bridge
Model Name or Number:	477-600
Test Sample Serial Number:	3805862
Hardware Version Number:	477-600
Software Version Number:	1.12
FCC ID:	USE477500

3.2. Description of EUT

The Equipment Under Test was Access Control Equipment containing an IEEE 802.15.4 transmitter. The EUT is powered from a PoE (Power over Ethernet) Injector.

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:	IEEE 802.15.4 (Digital Transmission System)		
Type of Unit:	Transmitter		
Transmit Frequency Range:	2405 MHz to 2475 MHz		
Power Levels:	10 dBm		
Channel Spacing:	5 MHz		
Modulation:	O-QPSK		
Data Rate:	250 kbit/s		
Power Supply Requirement(s):	Nominal	48 VDC from 120 VAC 60 Hz via PoE	
Transmit Channels Tested:	Channel ID	RF Channel Number	Channel Frequency (MHz)
	Bottom	11	2405
	Middle	18	2440
	Top	25	2475
Supported Antenna Type:	PCB Chip Antenna		
Antenna Part Designation:	ANT 2.45-CHP-T		
Antenna Type:	OMNI-DIRECTIONAL		
Antenna Gain:	0.5 dBi		

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	Decoupling Clamp	Elektronik-Feinmechanik A6	FTC 40X15 E	5187
2	Decoupling Clamp	Elektronik-Feinmechanik A6	FTC 40X15 E	5188
3	RJ45 Ethernet Cable 1.5 m	--	GIGABIT CAT.6	--
4	RJ45 Ethernet Cable 1.5 m	--	GIGABIT CAT.6	--
5	RJ45 Ethernet Cable 3 m	TELEGARTNER	GIGABIT CAT.7 600 MHz PATCH Cable	--

B. Support Equipment (Manufacturer supplied)

Item	Description	Brand Name	Model Name or Number	Serial Number
1	RJ45 Ethernet Cable 1.5 m	--	CAT 5e	--
2	RJ45 Ethernet Cable 0.8 m	--	CAT 5e	--
3	PoE Injector- 8-Port 10/100 Mbps Desktop PoE Switch (with AC/DC Power Adapter)	TP-LINK	TL-SF1008P	12692900306
4	Test Laptop with Test Software (with Charger)	DELL Precision M6-600	TTYFJ A00	FZK9362

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

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

- Test mode: Transmitting at maximum power with a modulated carrier and worst-case duty cycle.

4.2. Configuration and Peripherals

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

- The EUT was powered from a PoE injector via Ethernet.
- Radiated emission tests: The test laptop and PoE injector were placed inside the floor of the anechoic chamber and connected to the EUT using a 3m Ethernet cable. The test laptop was connected to the PoE injector by a 1.5 m Ethernet cable.
- Continuous transmit tests: Controlled using a 'Paxton Net2Air Bridge' test application on the laptop PC following operating instructions contained in the 'Air Bridge EMC Test Instructions 16 May 2018' document. The application was used to enable continuous transmissions to select the test channels and power levels as required.
- In 'Paxton Net2Air Bridge' test application Test mode was set to Continuous Tx 80bytes/25ms
- All testing was performed with the EUT configured with a power setting of 10 dBm.
- Duty cycle measurements were performed with above test mode representing EUT in its worst case (longest transmitter on time).

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:

Test Engineer:	M. Fawad Khan	Test Date:	20 June 2018
Test Sample Serial Number:	3805862		
Test Site Identification	SR 7/8		

FCC Reference:	Part 15.207
Test Method Used:	ANSI C63.10 Section 6.2 / FCC KDB 174176

Environmental Conditions:

Temperature (°C):	23
Relative Humidity (%):	31

Settings of the Instrument

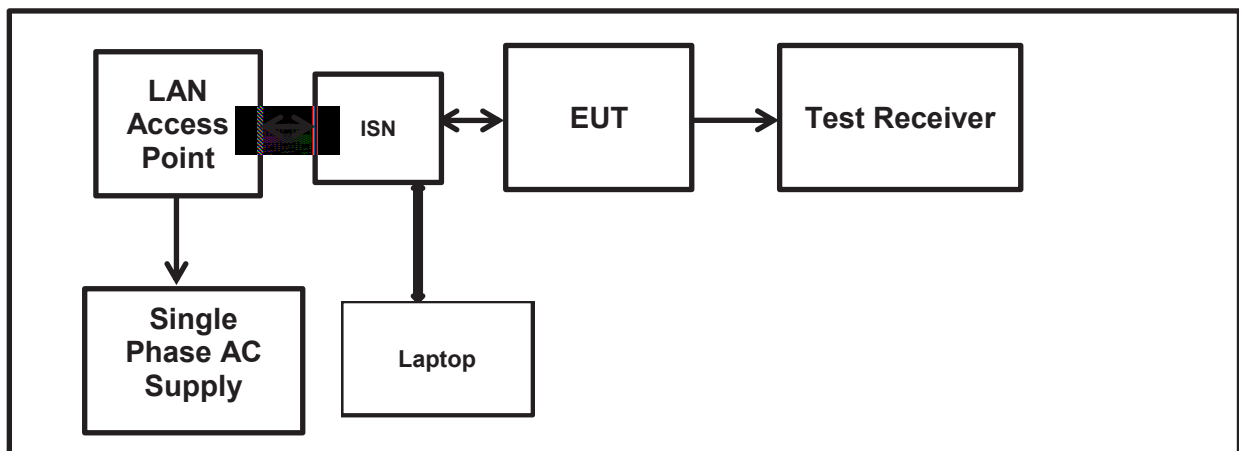
Detector	Quasi Peak/ Average Peak
-----------------	--------------------------

Note(s):

1. The LAN access point was connected to an AC 120 VAC 60 Hz single phase supply via a LISN. The length of power cable is 80cm.
2. The EUT was connected to the PoE injector via LAN Cable.
3. ISN was connected between EUT and LAN access point.
4. Laptop was connected to LAN access point for the configuration of EUT.
5. 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.

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	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.1596	Live	40	65.5	25.5	Complied
0.34823	Live	41	59	18	Complied
7.9229	Live	47	60	13	Complied
10.7946	Live	47	60	13	Complied
16.22931	Live	51.2	60	8.8	Complied
17.69396	Live	50.6	60	9.4	Complied

Results: Live / Average / 120 VAC 60 Hz

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.1596	Live	24.5	55.5	31	Complied
0.34823	Live	36.4	49	12.6	Complied
7.9229	Live	43.7	50	6.3	Complied
10.7946	Live	43.6	50	6.4	Complied
16.22931	Live	47.9	50	2.1	Complied
17.69396	Live	47.1	50	2.9	Complied

Results: Neutral / Quasi Peak / 120 VAC 60 Hz

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.15576	Neutral	41.4	65.7	24.3	Complied
0.17267	Neutral	40.2	64.8	24.6	Complied
10.24567	Neutral	46.4	60	13.6	Complied
13.42009	Neutral	47.9	60	12.1	Complied
16.22831	Neutral	51.7	60	8.3	Complied
17.69469	Neutral	50.4	60	9.6	Complied

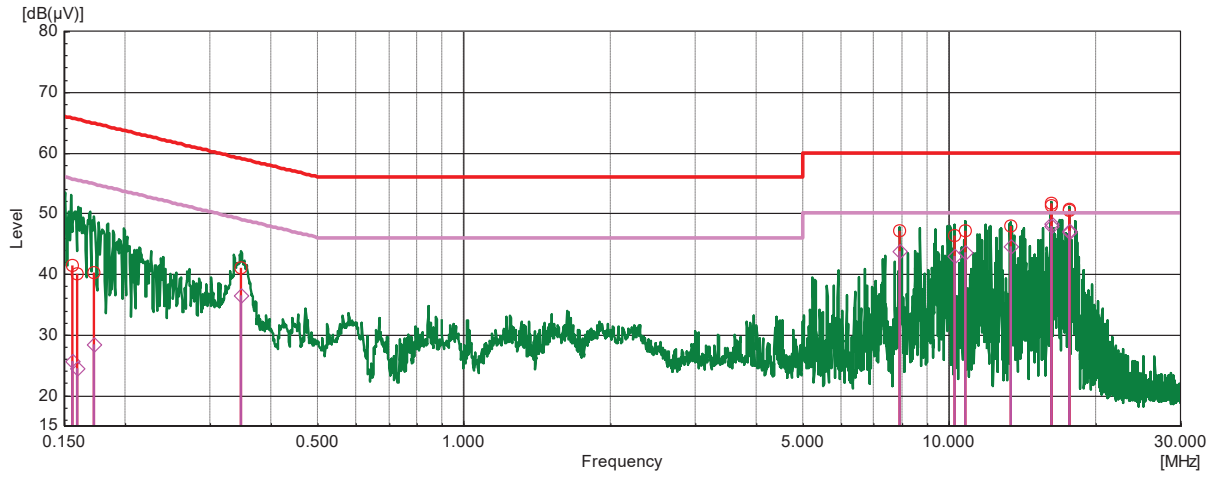
Results: Neutral / Average / 120 VAC 60 Hz

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.15576	Neutral	25.6	55.7	30.1	Complied
0.17267	Neutral	28.5	54.8	26.3	Complied
10.24567	Neutral	43	50	7	Complied
13.42009	Neutral	44.5	50	5.5	Complied
16.22831	Neutral	48.3	50	1.7	Complied
17.69469	Neutral	46.9	50	3.1	Complied

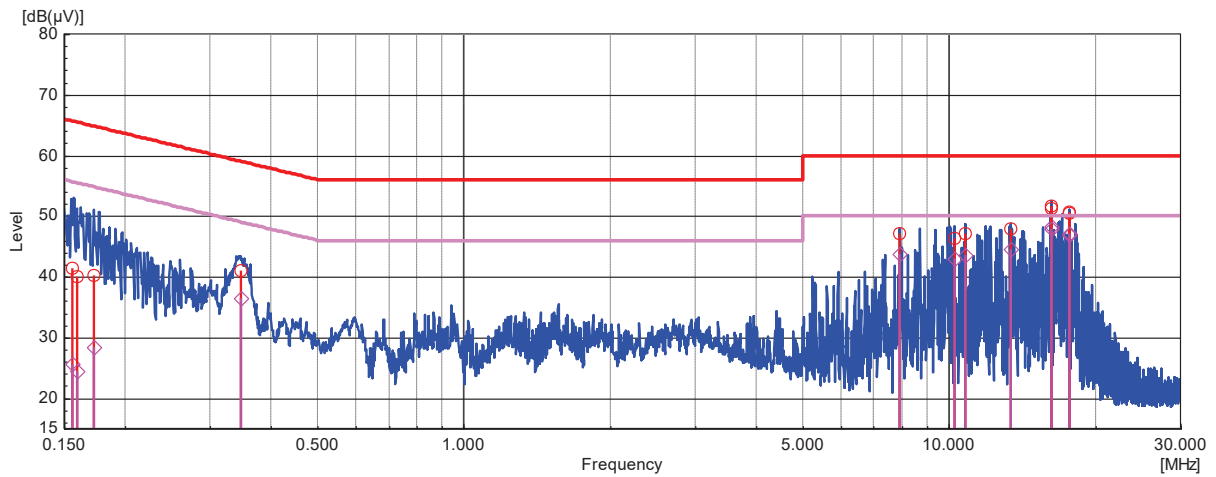
Result: Pass

Plot: Live and Neutral Line

Live



Neutral



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

5.2.2. Transmitter Duty Cycle

Test Summary:

Test Engineer:	Segun I. Adeniji	Test Date:	18 June 2018
Test Sample Serial Number:	3805862		
Test Site Identification	SR 1/2		

FCC Reference:	Part 15.35(c)
Test Method Used:	ANSI C63.10 Section 7.5

Environmental Conditions:

Temperature (°C):	24
Relative Humidity (%):	33

Note(s):

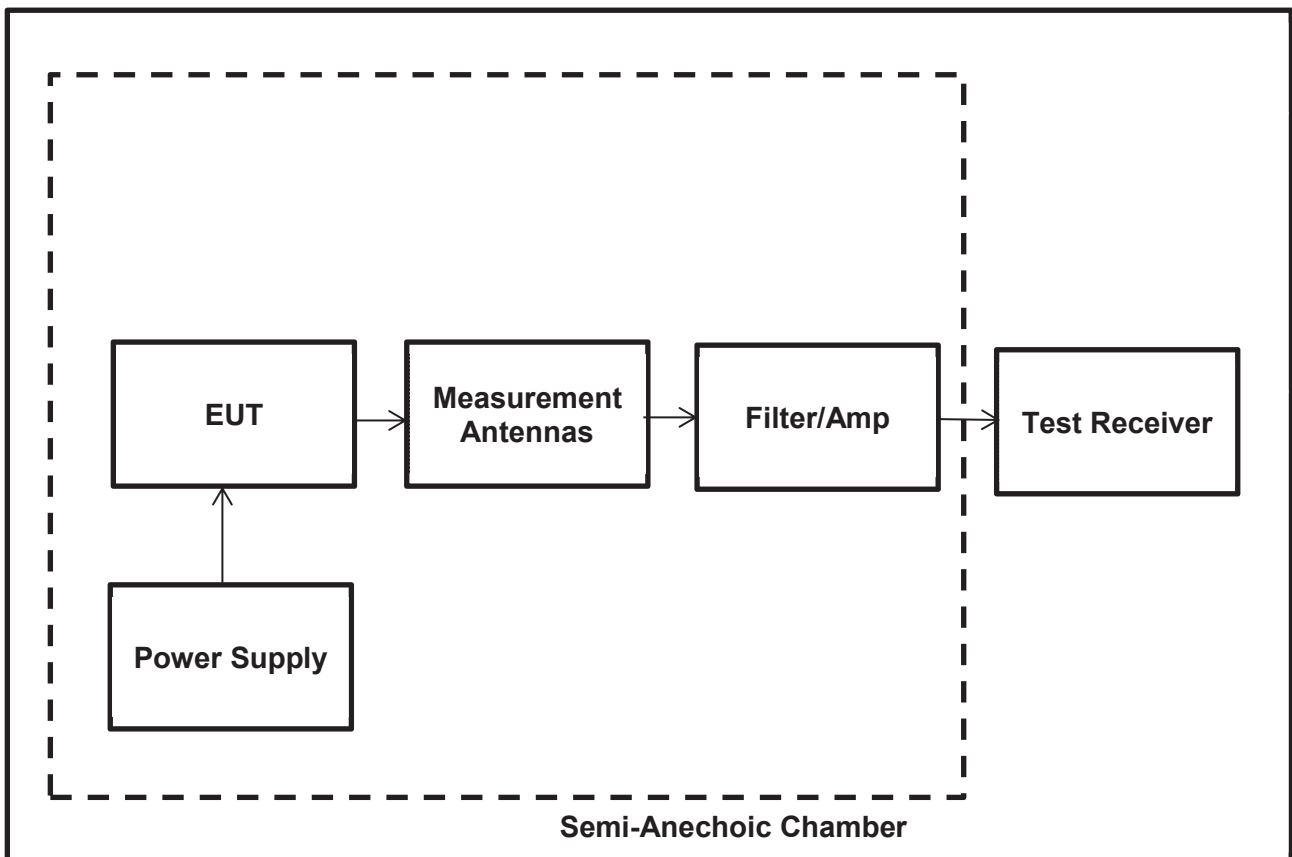
1. In order to assist with the determination of the average level of spurious emissions field strength, radiated measurements were made of duty cycle to determine the transmission duration and the silent period time of the transmitter. Four pulses of 3.525641 ms duration occurred within a 100 ms period, therefore the total transmitter on time is 14.1025 ms. The transmitter on time was measured using a test receiver in the time domain and duty cycle calculated as follows:

$$\delta \text{ dB} = 20\log \left[\frac{\sum (nt_1 + mt_2)}{T} \right]$$

$$\delta \text{ dB} = 20\log \left[\frac{\sum (4 \cdot 3.525641 \text{ ms})}{100 \text{ ms}} \right] = 20\log \left[\frac{\sum (14.1025 \text{ ms})}{100 \text{ ms}} \right]$$

$$\delta \text{ dB} = 20\log \left[\sum (0.1410) \right] = \delta \text{ dB} = 20\log \left[\sum (0.1410) \right] = 17.01 \text{ dB}$$

Test Setup:

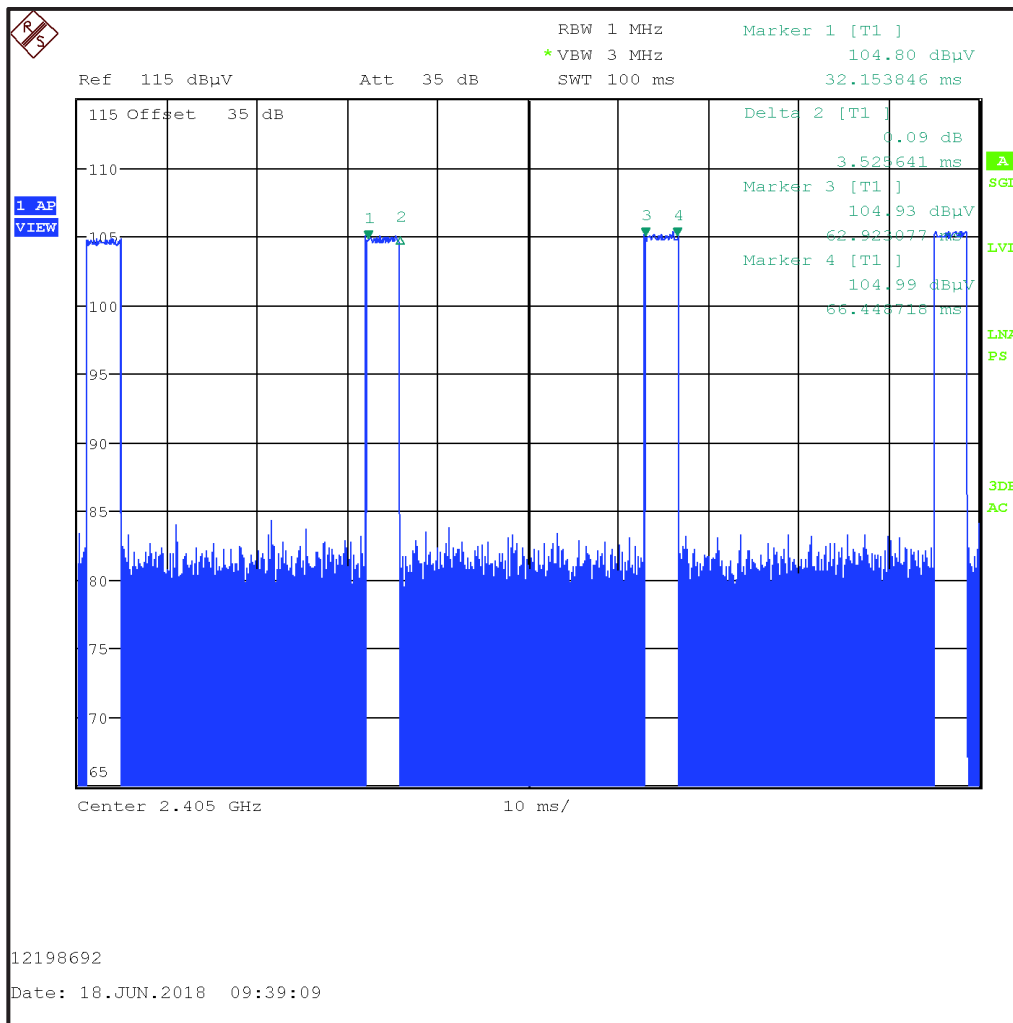


Transmitter Duty Cycle (continued)

Results:

Total Pulse Duration (ms)	Duty Cycle (dB)
14.1025	17.01

Sub pulse	Duration (ms)	Number of pulses in 100 ms	Total on time (ms)
1	3.525641	4	14.1025



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

Test Engineer:	Segun I. Adeniji	Test Date:	15 June 2018
Test Sample Serial Number:	3805862		
Test Site Identification	SR 1/2		

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

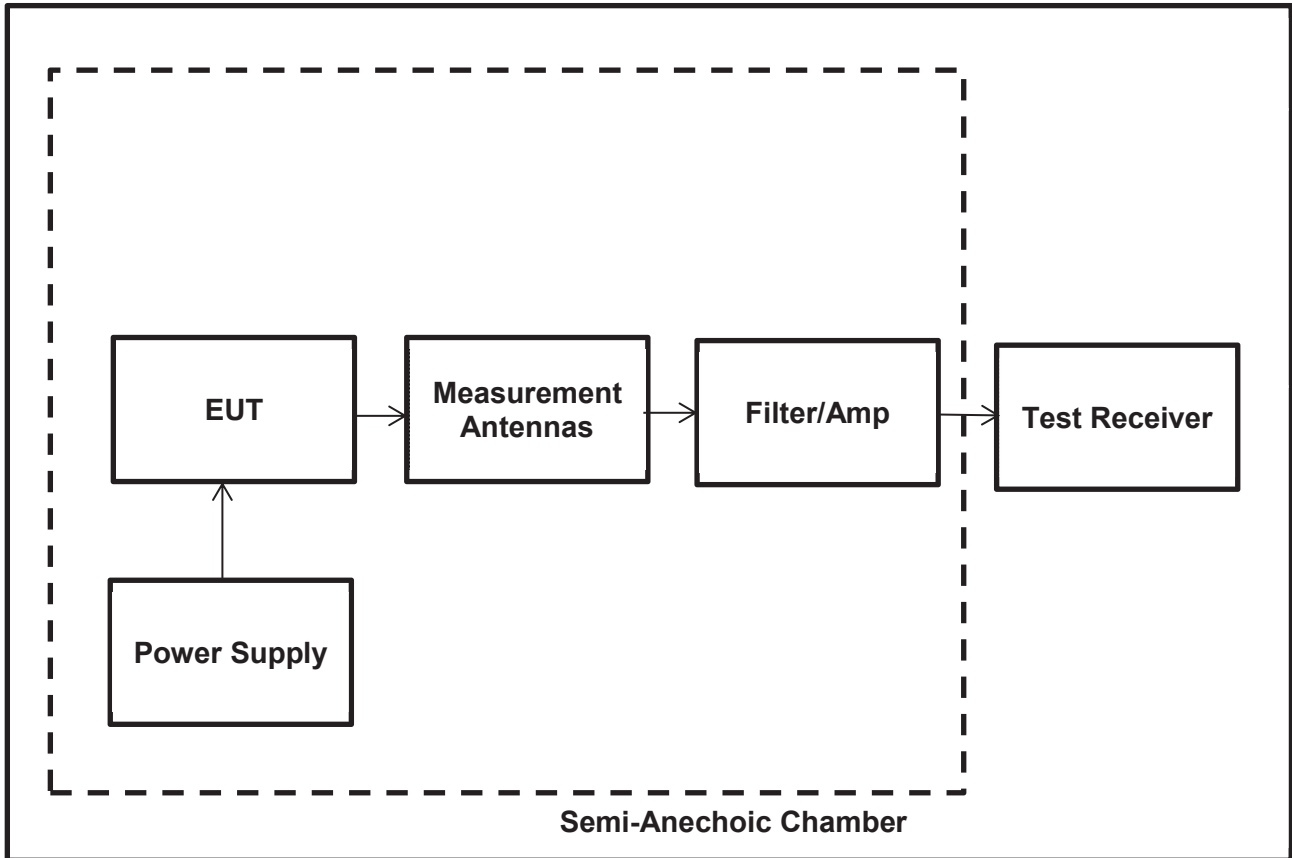
Environmental Conditions:

Temperature (°C):	24
Relative Humidity (%):	33

Note(s):

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. The preliminary scans showed similar emission levels below 1 GHz, for each channel of operation. Therefore final radiated emissions measurements were performed with the EUT set to the bottom 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. Final measurements were performed on the marker frequencies and the results entered into the table below. The test receiver resolution bandwidth was set to 120 kHz, using a CISPR quasi-peak detector and span big enough to see the whole emission.

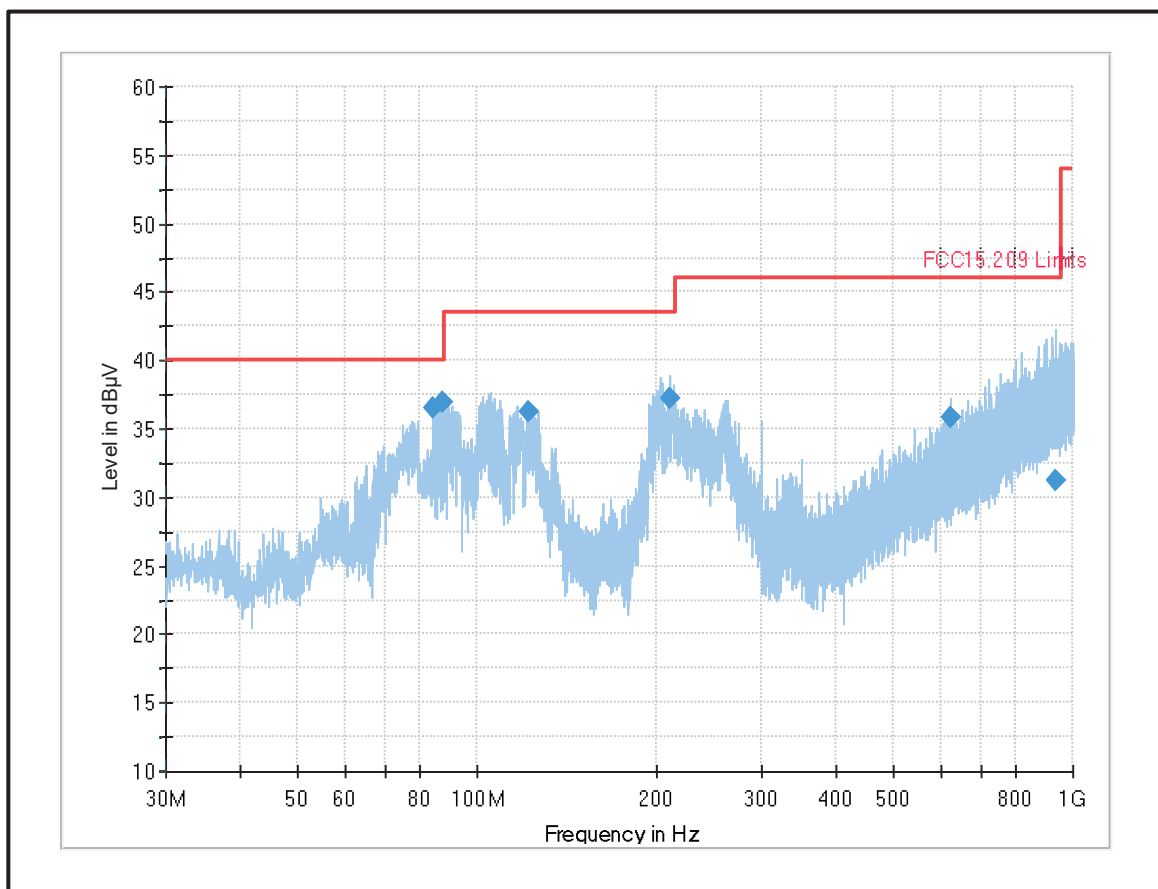
Test Setup:



Results: Bottom Channel/Peak

Frequency (MHz)	Antenna Polarization	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
84.585	V	36.54	40.0	3.46	Complied
87.510	V	36.89	40.0	3.11	Complied
121.980	V	36.31	43.50	7.19	Complied
210.810	V	37.17	43.50	6.33	Complied
625.000	H	35.90	46.00	10.10	Complied
937.250	H	31.28	46.00	14.72	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

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

Test Engineer:	Segun I. Adeniji	Test Date:	18, 22 June 2018
Test Sample Serial Number:	3805862		
Test Site Identification	SR 1/2 & SR 9		

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):	22
Relative Humidity (%):	35

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 bottom channel plot was included in the report as similar result were obtained on both middle 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 12.2.5.2 procedure.
8. *Duty cycle correction can be applied to a peak measurement in order to calculate the average emission level. Duty cycle was measured as 17.0 dB. Therefore 17.0 dB has been subtracted from the measured peak levels in order to obtain the average emission levels stated in the result tables below.

Results: Peak / Bottom Channel

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Peak Limit (dB μ V/m)	Margin (dB)	Result
4809.10	H	63.43	74.0	10.57	Complied
7368.33	H	58.01	74.0	15.99	Complied
9024.66	V	62.59	74.0	11.41	Complied

Results: Average / Bottom Channel

Frequency (MHz)	Antenna Polarization	Peak Level (dB μ V/m)	Duty cycle correction (dB)	Corrected Average Level (dB μ V/m)	Average Limit (dB μ V/m)	Margin (dB)	Result
4809.10	H	63.43	17.0	46.43*	54.0	7.57	Complied
7368.33	H	58.01	17.0	41.01*	54.0	12.99	Complied
9024.66	V	62.59	17.0	45.59*	54.0	8.41	Complied

Results: Peak / Middle Channel

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Peak Limit (dB μ V/m)	Margin (dB)	Result
4879.02	H	60.45	74.0	13.55	Complied
5400.00	V	53.66	74.0	20.34	Complied
7300.66	H	57.52	74.0	16.48	Complied
9985.66	H	61.69	74.0	12.31	Complied

Results: Average / Middle Channel

Frequency (MHz)	Antenna Polarization	Peak Level (dB μ V/m)	Duty cycle correction (dB)	Corrected Average Level (dB μ V/m)	Average Limit (dB μ V/m)	Margin (dB)	Result
4879.02	H	60.45	17.0	43.45*	54.0	10.55	Complied
7300.66	H	57.52	17.0	40.52*	54.0	13.48	Complied
9985.66	H	61.69	17.0	44.69*	54.0	9.31	Complied

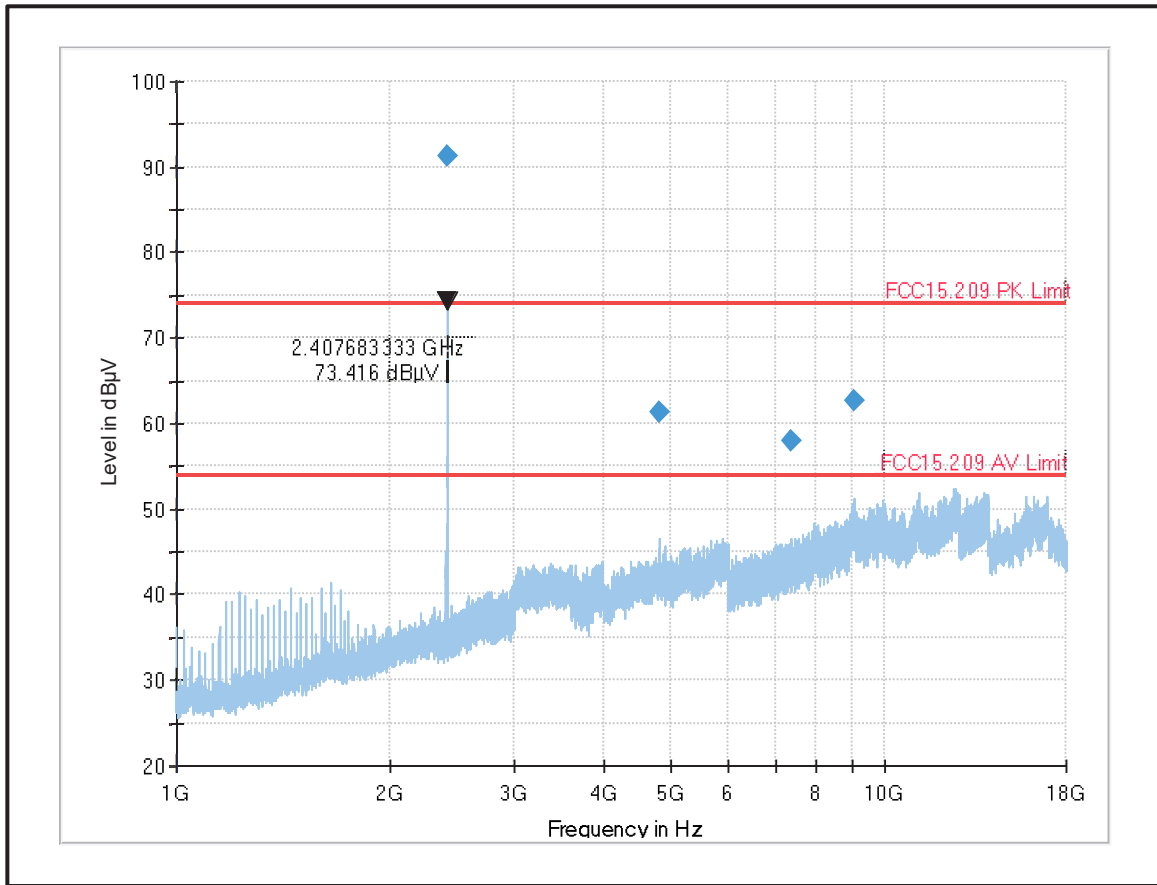
Results: Peak / Top Channel

Frequency (MHz)	Antenna Polarization	Level (dB μ V/m)	Peak Limit (dB μ V/m)	Margin (dB)	Result
4951.02	H	58.10	74.0	15.90	Complied
5102.00	V	53.56	74.0	20.44	Complied
5839.33	V	54.64	74.0	19.36	Complied
9023.66	V	62.89	74.0	11.11	Complied

Results: Average / Top Channel

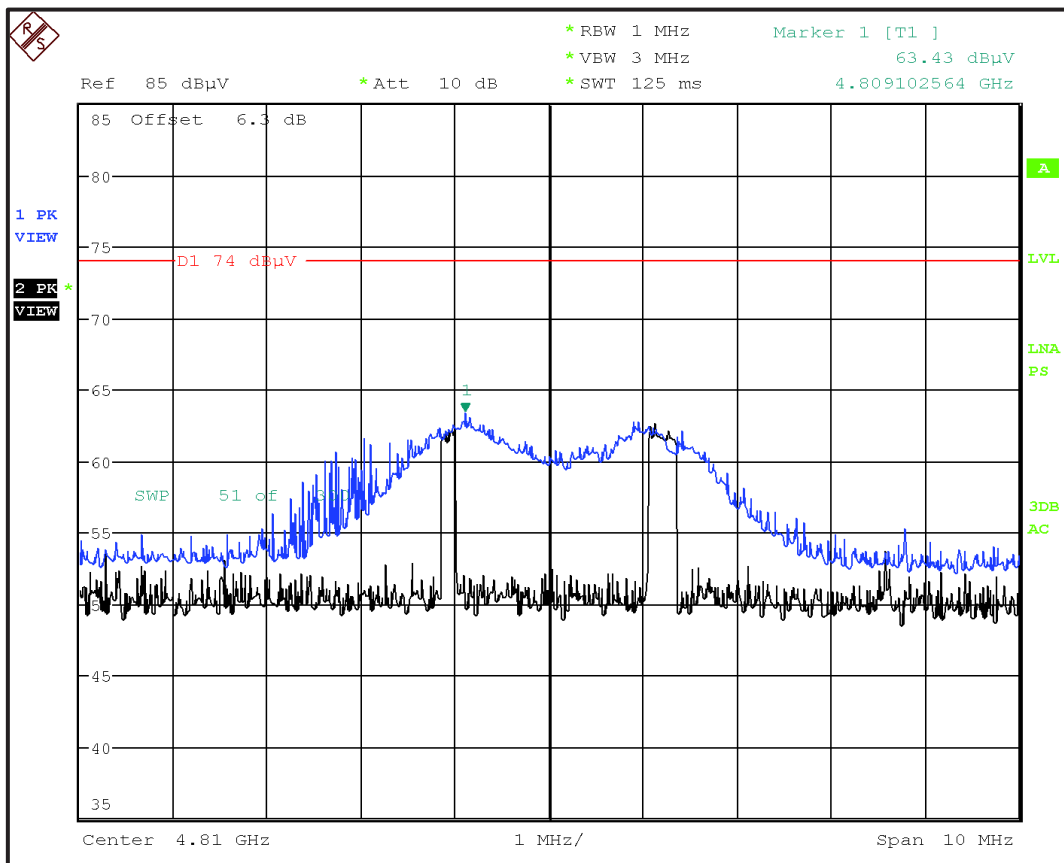
Frequency (MHz)	Antenna Polarization	Peak Level (dB μ V/m)	Duty cycle correction (dB)	Corrected Average Level (dB μ V/m)	Average Limit (dB μ V/m)	Margin (dB)	Result
4951.02	H	58.10	17.0	41.10*	54.0	12.90	Complied
5839.33	V	54.64	17.0	37.64*	54.0	16.36	Complied
9023.66	V	62.89	17.0	45.89*	54.0	8.11	Complied

Result: Pass



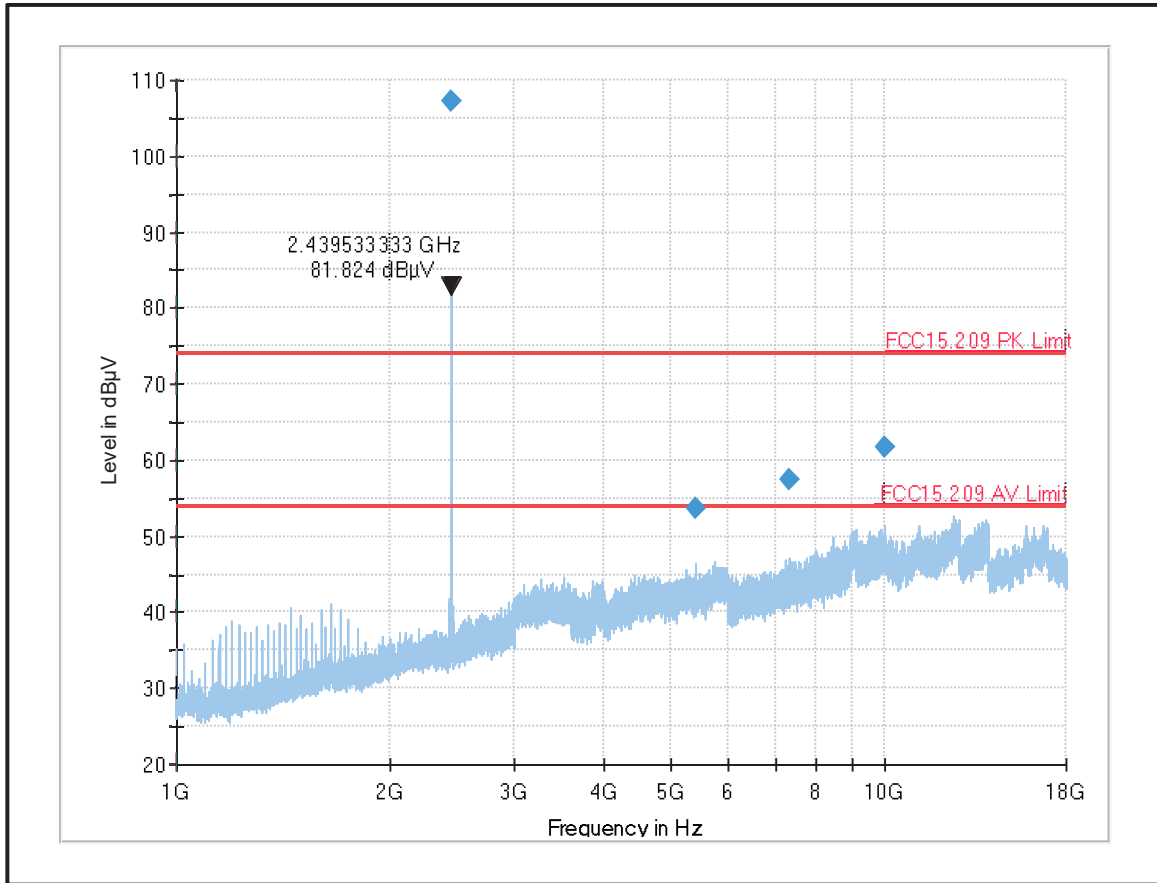
Plot: 1 GHz – 18GHz (Bottom channel) measured with peak detector

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



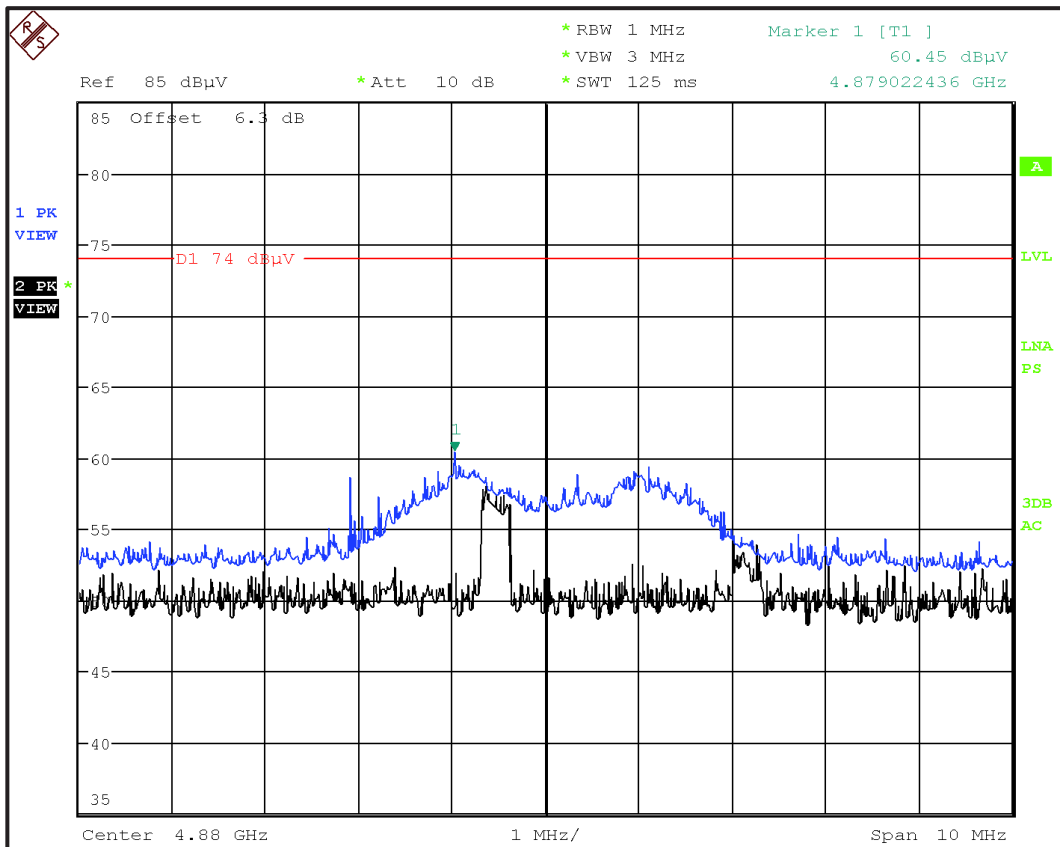
Plot: 4.809 GHz (Bottom channel) measured with peak detector



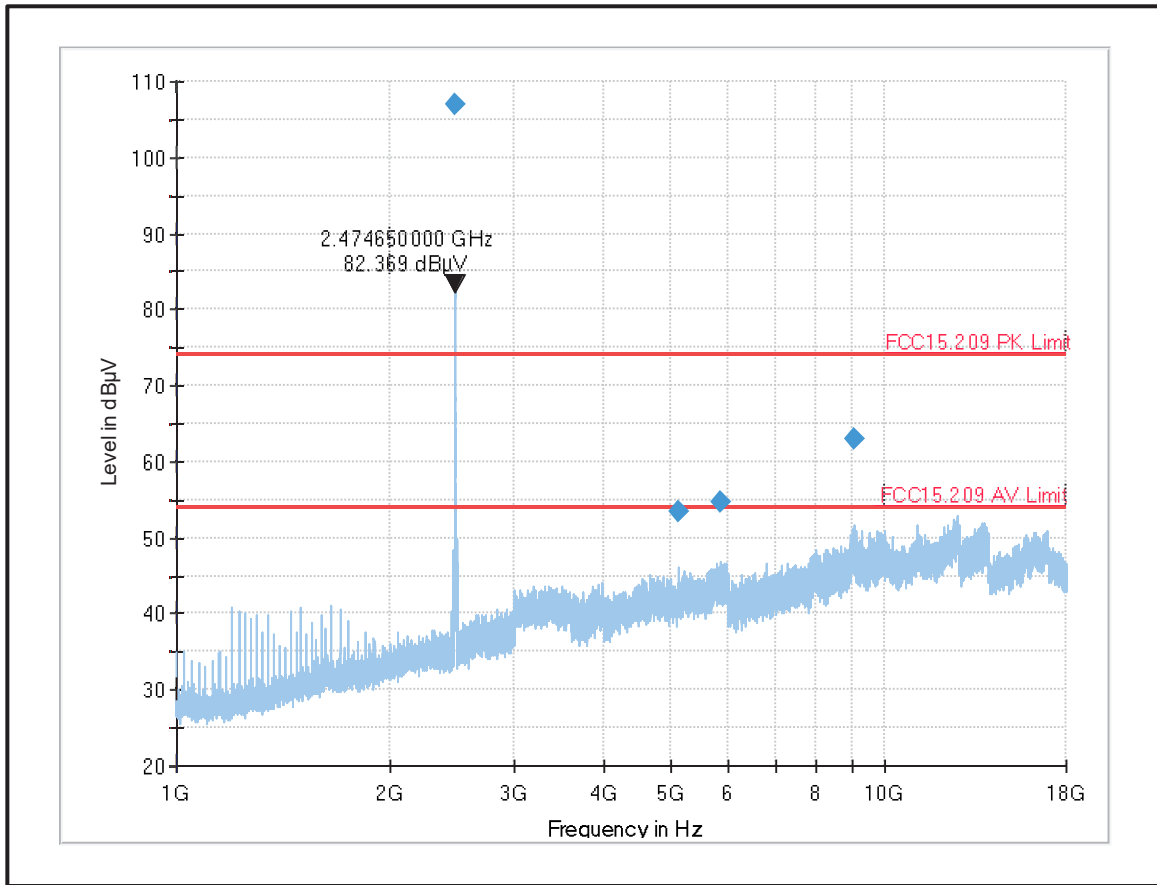


Plot: 1 GHz – 18GHz (Middle channel) measured with peak detector

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

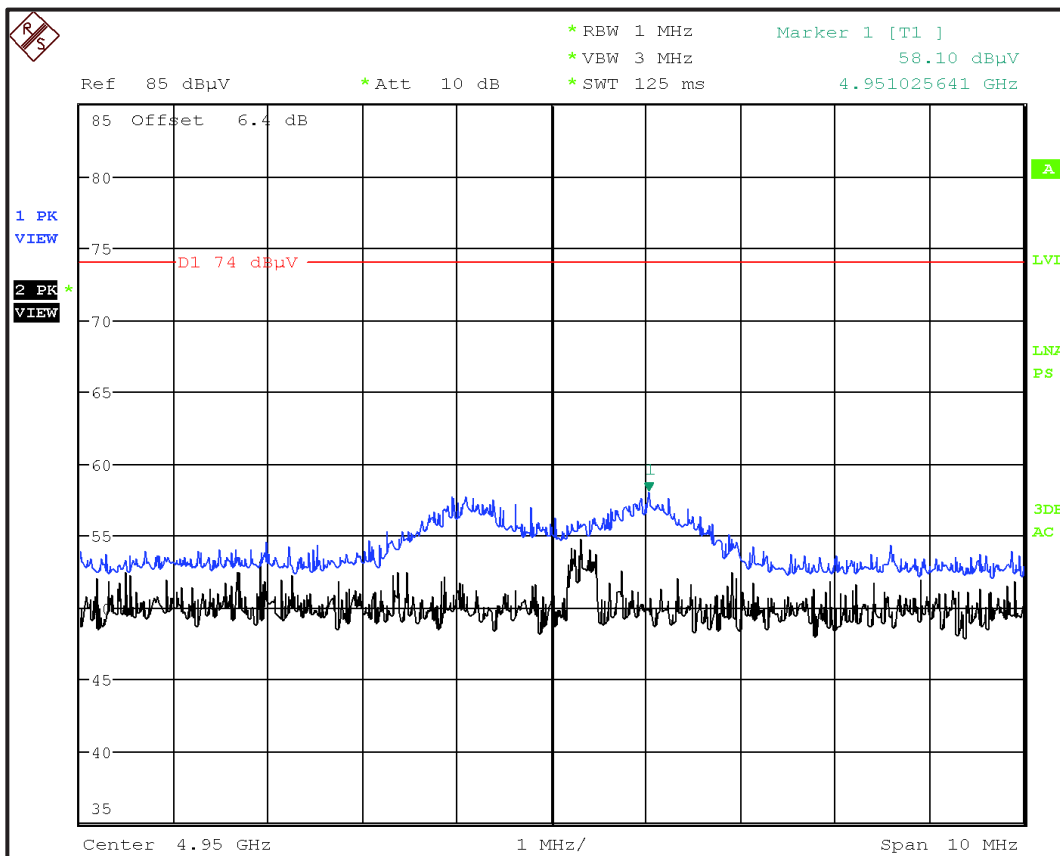


Plot: 4.879 GHz (Middle channel) measured with peak detector

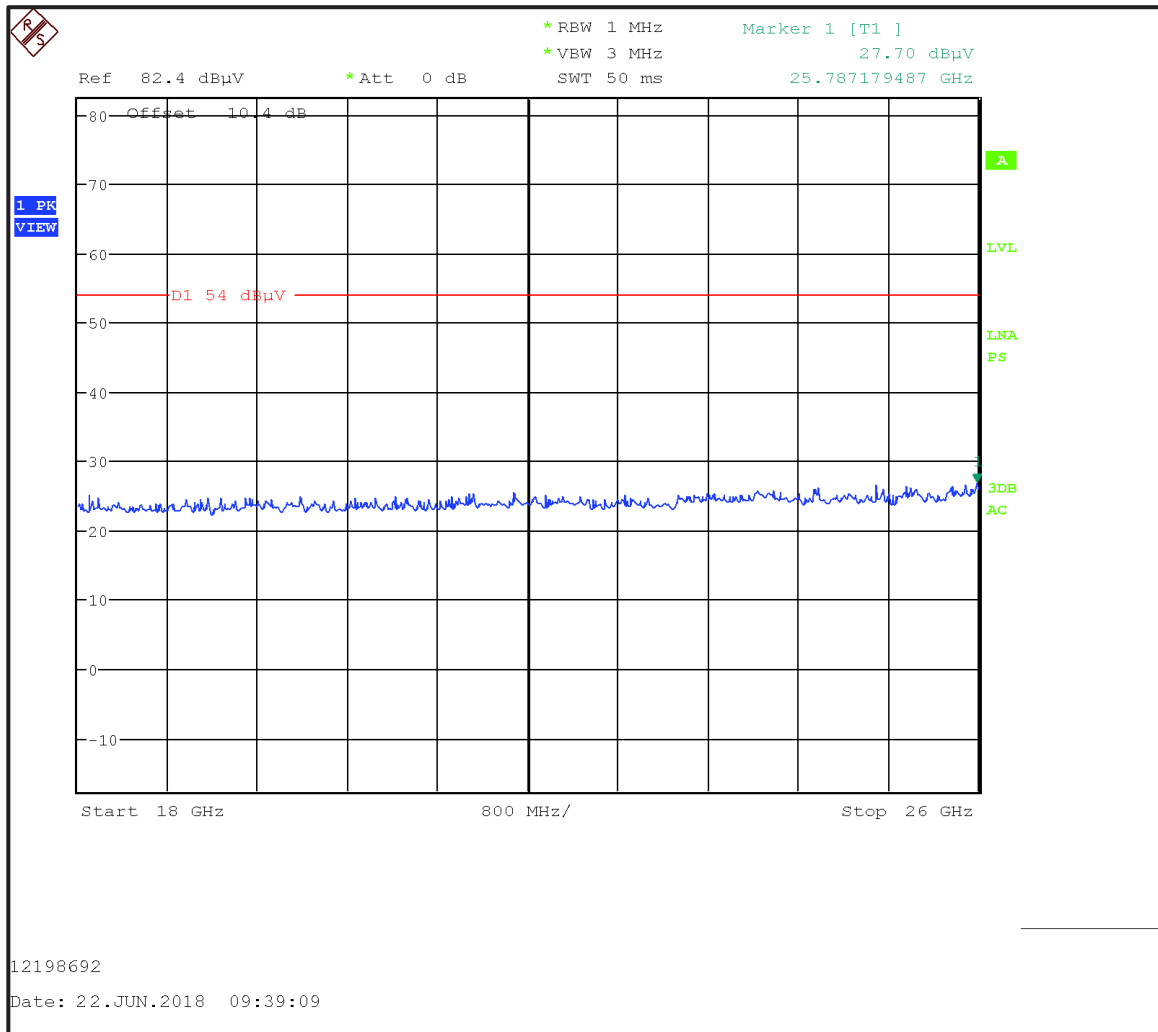


Plot: 1 GHz – 18GHz (Top channel) measured with peak detector

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



Plot: 4.951 GHz (Top channel) measured with peak detector



Plot: 18 GHz – 25GHz (Bottom Channel) measured with peak detector

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

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

Test Engineer:	Segun I. Adeniji	Test Date:	18 June 2018
Test Sample Serial Number:	3805862		
Test Site Identification	SR 1/2		

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

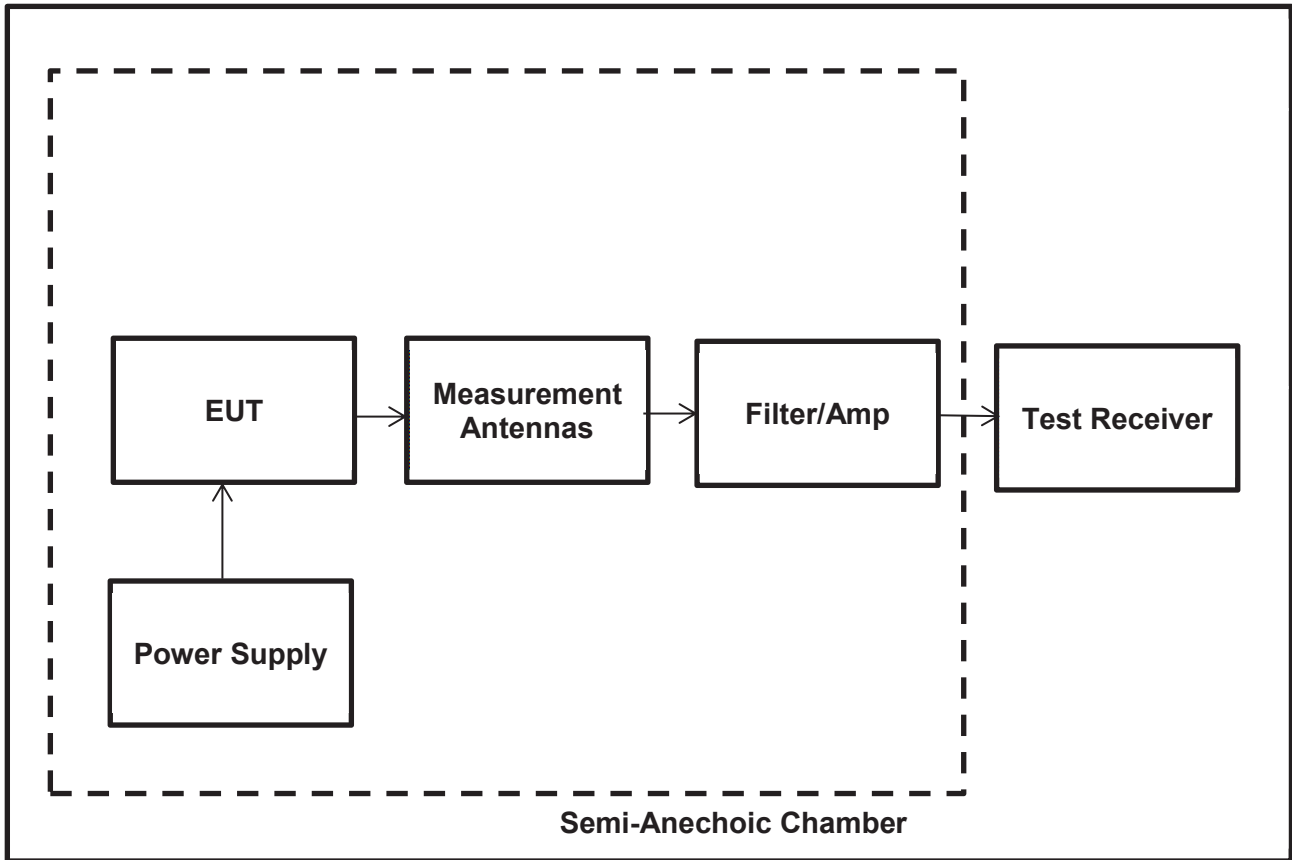
Environmental Conditions:

Temperature (°C):	22
Relative Humidity (%):	32

Note(s):

- 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.
- * Lower Band Edge -20 dBc limit (with Peak Detector).
- 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.
- 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.
- **The final upper band edge average measurement was performed using the integration method stated in FCC KDB 558074 Section 13.3.1 and the result was compliant.

Test Setup:



Results: 2310 to 2390 MHz Restricted Band / Bottom Channel / Peak

Frequency (MHz)	Peak Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
2389.743	72.38	74.0	1.62	Complied

Results: 2310 to 2390 MHz Restricted Band / Bottom Channel / Average

Frequency (MHz)	Average Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
2388.461	36.57	54.0	17.43	Complied

Results: Lower Band Edge/ Bottom Channel / Peak

Frequency (MHz)	Level (dB μ V/m)	-20 dBc Limit (dB μ V/m)	Margin (dB)	Result
2400.000	63.56	85.21*	21.65	Complied

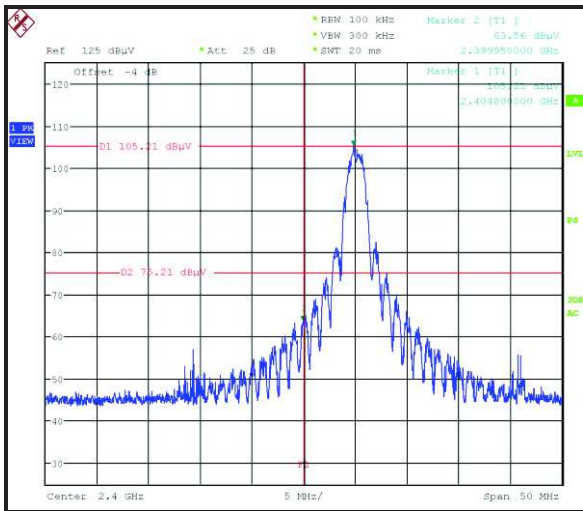
Results: Upper Band Edge / Top Channel / Restricted Band / Peak

Frequency (MHz)	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
2484.125	70.63	74.0	3.37	Complied

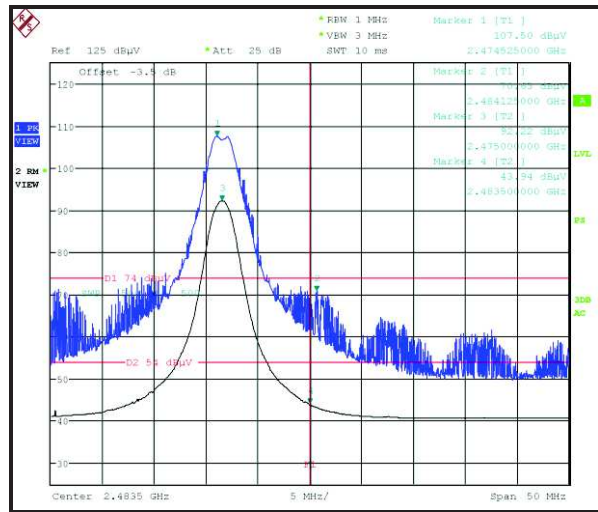
Results: Upper Band Edge / Top Channel / Restricted Band / Average

Frequency (MHz)	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
2483.500	43.94	54.0	10.06	Complied

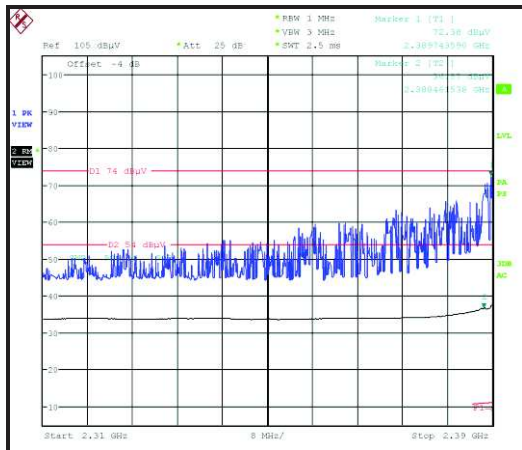
Results: Band Edge



Lower Band Edge Peak Measurement



Upper Band Edge Measurement



2310 MHz to 2390 MHz Restricted Band Plot

5.2.4.1. 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
Radiated Spurious Emissions	95%	±3.10 dB
Band Edge Radiated Emissions	95%	±3.10 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.

6. 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	7/13/2017	12
377	Bonn Elektronik	Amplifier, Low Noise Pre	BLMA 0118-1A	025294B	7/11/2017	12
423	Bonn Elektronik	Amplifier, Low Noise Pre	BLMA 1840-1A	055929	7/12/2017	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	7/12/2017	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		7/11/2017	12
636	Rohde & Schwarz	switching unit	OSP120	101698	7/14/2017	12
637	Rohde & Schwarz	Spectrum Analyzer	FSV40	101587	7/11/2017	12

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	7/12/2017	12
215	Rohde & Schwarz	Artificial Mains Network	9 kHz - 30 MHz; 3 phase	879675/002	7/12/2017	12
350	Rohde & Schwarz	Receiver, EMI Test	20 Hz - 7 GHz	836697/014	7/13/2017	12
616	Rohde & Schwarz	ISN	ENY81-CA6	101656	7/13/2017	12

7. Report Revision History

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