



TEST REPORT

Test Report No. : UL-RPT-RP11456397JD13A

Manufacturer : Neeo AG
Model No. : 6336-REMOTE
FCC ID : 2AKK7-RM633601
Technology : WLAN
Test Standard(s) : FCC Parts 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 1.0.

Date of Issue: 23 March 2017

Checked by:

Ian Watch
Senior Engineer, Radio Laboratory

Company Signatory:

Sarah Williams
Senior Engineer, Radio Laboratory
UL VS LTD



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

UL VS LTD

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

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1. Customer Information

Company Name:	Neeo AG
Address:	Ritterquai 8 4500 Solothurn Switzerland

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR15.247
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Section 15.247
Specification Reference:	47CFR15.209
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Sections 15.207 and 15.209
Site Registration:	209735
Location of Testing:	UL VS LTD, Unit 3 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, RG24 8AH, United Kingdom
Test Dates:	21 December 2016 to 01 March 2017

2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Result
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	
Part 15.247(b)(3)	Transmitter Maximum (Average) Output Power	
Part 15.247(d) & 15.209(a)	Transmitter Radiated Emissions	
Part 15.247(d) & 15.209(a)	Transmitter Band Edge Radiated Emissions	
Key to Results  = Complied  = Did not comply		

Note(s):

1. The measurement was performed to assist in the calculation of the level of maximum conducted output power, power spectral density and emissions. The EUT cannot transmit continuously and sweep triggering/signal gating cannot be implemented.

2.3. Methods and Procedures

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

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:	Neoo
Model Number:	6336-REMOTE
Test Sample Serial Number:	Not marked or stated (<i>Radiated sample</i>)
Hardware Version:	Hardware Rev. 10
Software Version:	0.18.5
FCC ID:	2AKK7-RM633601

Brand Name:	Neoo
Model Number:	6336-REMOTE
Test Sample Serial Number:	Not marked or stated (<i>Conducted sample with RF port</i>)
Hardware Version:	Hardware Rev. 10
Software Version:	0.18.5
FCC ID:	2AKK7-RM633601

3.2. Description of EUT

The Equipment Under Test was a Thinking Remote for home automation. It contains IEEE 802.15.4 and WLAN transceivers. It is powered from a 3.7 Volt rechargeable battery.

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:	WLAN (IEEE 802.11b,g,n) / Digital Transmission System	
Type of Unit:	Transceiver	
Modulation Type:	DBPSK, DQPSK, BPSK, QPSK, 16QAM & 64QAM	
Data Rates:	802.11b	1, 2, 5.5 & 11 Mbps
	802.11g	6, 9, 12, 18, 24, 36, 48 & 54 Mbps
	802.11n HT20	MCS0 to MCS7
Power Supply Requirement(s):	Nominal	3.7 VDC
Declared Maximum Antenna Gain:	-3.3 dBi	
Channel Spacing:	20 MHz	
Transmit Frequency Range:	2412 MHz to 2462 MHz	
Transmit Channels Tested:	Channel Number	Channel Frequency (MHz)
	1	2412
	6	2437
	11	2462

3.5. Support Equipment

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

Description:	Laptop PC
Brand Name:	Dell
Model Name or Number:	E5400
Serial Number:	01160

Description:	USB to TTL Serial Cable (3.3V). Length 1.8 metres
Brand Name:	FTDI Chip
Model Name or Number:	TTL-232RG
Serial Number:	Not marked or stated

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

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

- Transmitting with a modulated carrier at maximum power on the bottom, middle and top channels as required using the supported data rates/modulation types.

4.2. Configuration and Peripherals

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

- The EUT was powered by a fully charged 3.7 VDC internal battery.
- A laptop PC with an open source terminal application Tera Term V4.83 was used to place the EUT into test mode. The laptop PC was connected to the EUT via the USB to TTL serial cable. The procedures to set up and control the EUT were supplied by the customer in documents titled 'userManual-Radio.pdf' dated 12/12/2016 and 'wifi-instructions.pdf' dated 12/12/2016.
- All supported modes and channel widths were initially investigated on one channel. The modes that produced the highest power and widest bandwidth were:
 - o Highest power
 - o 802.11b – DQPSK / 2 Mbps
 - o 802.11g – BPSK / 9 Mbps
 - o 802.11n HT20 – QPSK / 19.5 Mbps / MCS2
 - o Highest power spectral density
 - o 802.11b – DBPSK / 1 Mbps
 - o 802.11g – BPSK / 6 Mbps
 - o 802.11n HT20 – BPSK / 6.5 Mbps / MCS0
 - o Widest bandwidth
 - o 802.11b – DQPSK / 11 Mbps
 - o 802.11g – BPSK / 9 Mbps
 - o 802.11n HT20 – BPSK / 6.5 Mbps / MCS0
- Transmitter spurious emissions tests were performed with the EUT transmitting a data rate of 2 Mbps. This was found to be the worst data rate with regards to emissions after preliminary investigations and, as this mode emits the highest output power level, it was deemed to be the worst case.
- Radiated spurious emissions were performed with the EUT in the worst case orientation/position. All ports were terminated with suitable terminations.
- The radiated sample was used for radiated spurious emissions tests.
- The conducted sample with RF port was used for all other tests.

5. Measurements, Examinations and Derived Results

5.1. General Comments

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to *Section 6. Measurement Uncertainty* for details.

In accordance with UKAS requirements all the measurement equipment is on a calibration schedule. All equipment was within the calibration period on the date of testing.

5.2. Test Results

5.2.1. Transmitter Minimum 6 dB Bandwidth

Test Summary:

Test Engineer:	David Doyle	Test Date:	21 December 2016
Test Sample Serial Number:	Not marked or stated <i>(Conducted sample with RF port)</i>		

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

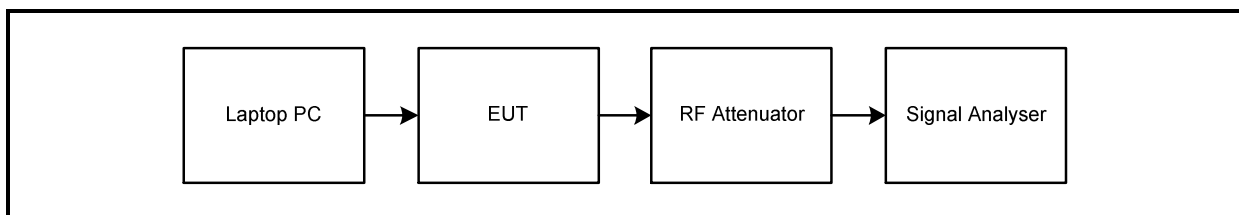
Environmental Conditions:

Temperature (°C):	23
Relative Humidity (%):	33

Note(s):

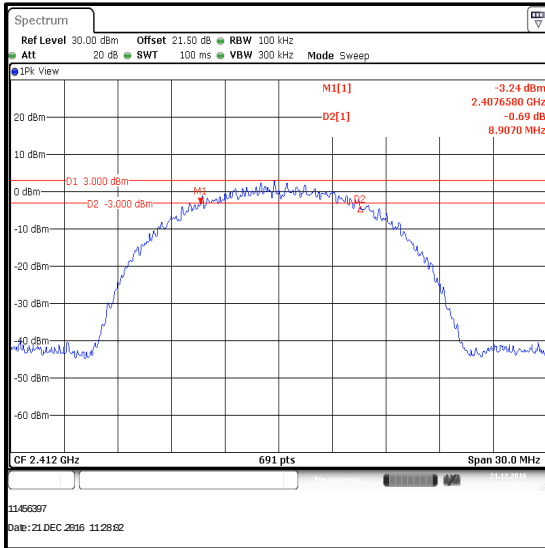
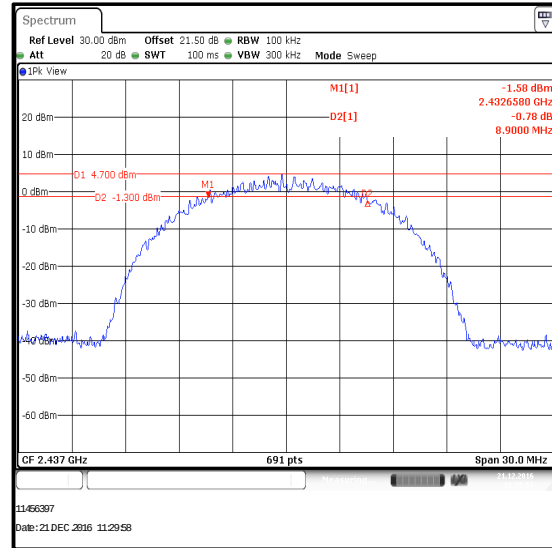
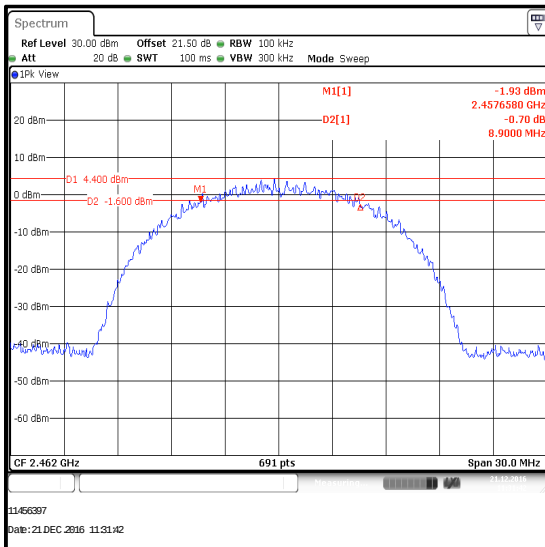
1. All configurations supported by the EUT were investigated on one channel in accordance with KDB 558074 Section 8.1 Option 1 measurement procedure. The signal analyser resolution bandwidth was set to 100 kHz and video bandwidth 300 kHz. A peak detector was used, sweep time was set to auto and the trace mode was Max Hold. The span was set to 30 MHz. The DTS bandwidth was measured at 6 dB down from the peak of the signal. The data rates that produced the narrowest bandwidth and therefore deemed worst case were:
 - o 802.11b – DQPSK / 11 Mbps
 - o 802.11g – BPSK / 9 Mbps
 - o 802.11n HT20 – BPSK / 6.5 Mbps / MCS0
2. Final measurements were performed using the above configurations on the bottom, middle and top channels in accordance with KDB 558074 Section 8.1 Option 1 measurement procedure.
3. Plots for all data rates are archived on the UL VS LTD IT server and available for inspection upon request.
4. The signal analyser was connected to the RF port on the EUT using suitable attenuation and RF cable.

Test setup:



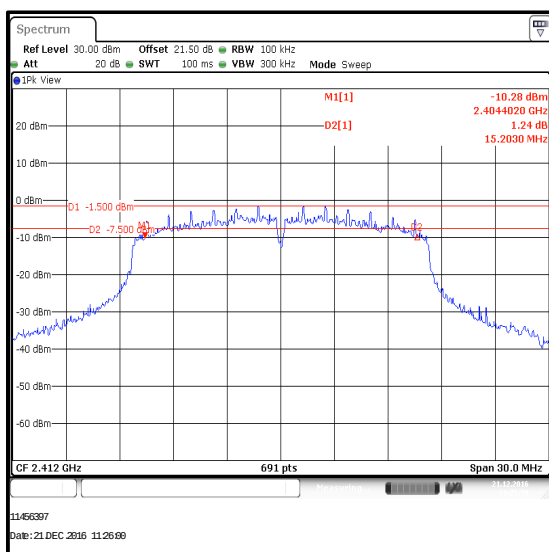
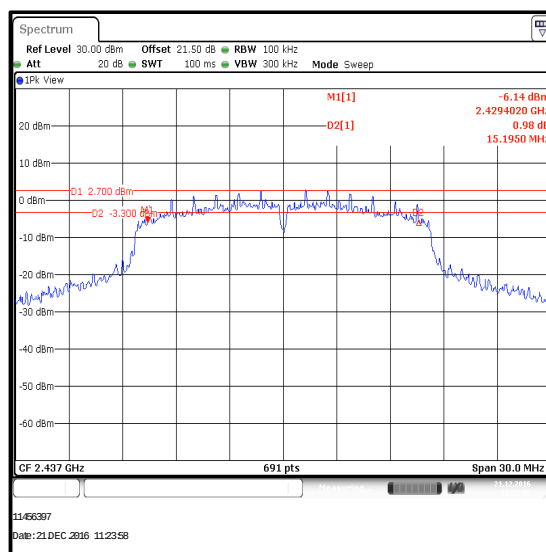
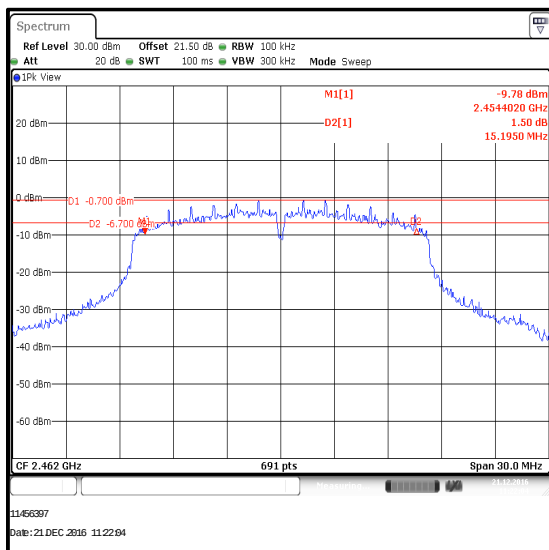
Transmitter Minimum 6 dB Bandwidth (continued)**Results: 802.11b / 20 MHz / DQPSK / 11 Mbps**

Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	8907.000	≥500	8407.000	Complied
Middle	8900.000	≥500	8400.000	Complied
Top	8900.000	≥500	8400.000	Complied

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

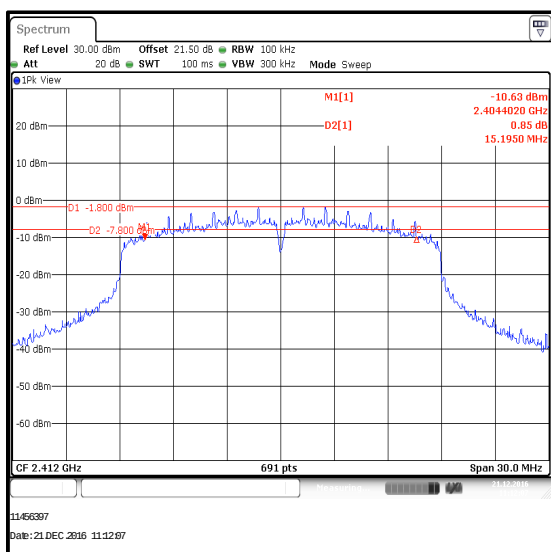
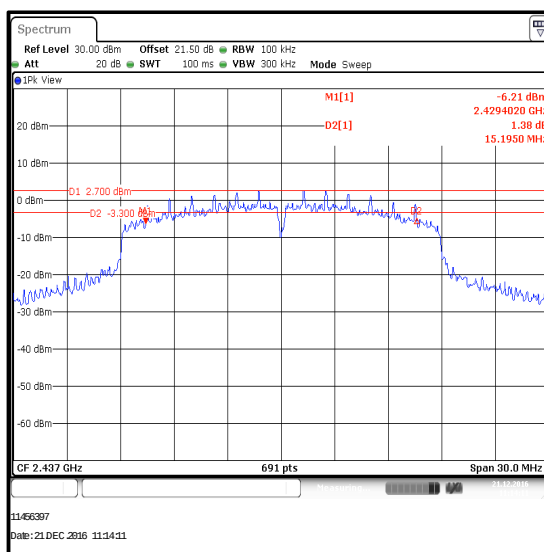
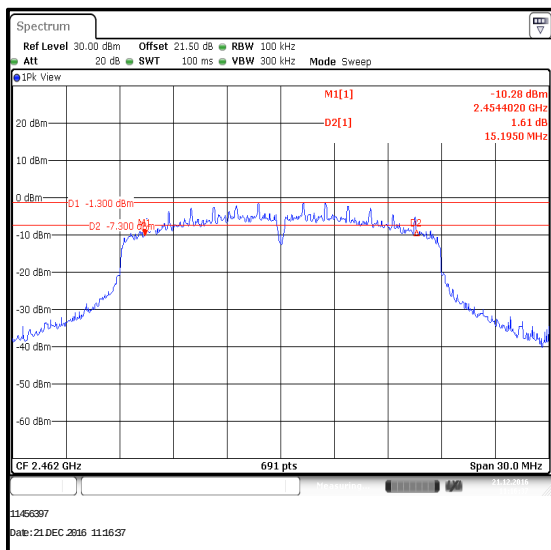
Transmitter Minimum 6 dB Bandwidth (continued)**Results: 802.11g / 20 MHz / BPSK / 9 Mbps**

Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	15203.000	≥500	14703.000	Complied
Middle	15195.000	≥500	14695.000	Complied
Top	15195.000	≥500	14695.000	Complied

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

Transmitter Minimum 6 dB Bandwidth (continued)**Results: 802.11n / HT20 / BPSK / 6.5 Mbps / MCS0**

Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	15195.000	≥500	14695.000	Complied
Middle	15195.000	≥500	14695.000	Complied
Top	15195.000	≥500	14695.000	Complied

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

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

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1659	Thermohygrometer	JM Handelspunkt	30.5015.13	Not stated	02 Apr 2017	12
M1835	Signal Analyser	Rohde & Schwarz	FSV30	103050	26 Feb 2017	12
A2526	Attenuator	AtlanTecRF	AN18W5-20	832828#1	Calibrated before use	-
M260	Signal Generator	Rohde & Schwarz	SMP02	829076/008	09 May 2017	12
M199	Power Meter	Rohde & Schwarz	NRVS	827023/075	11 Apr 2018	24
M1267	Power Sensor	Rohde & Schwarz	NRV-Z52	100155	15 Apr 2018	24

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

Test Engineer:	David Doyle	Test Date:	21 December 2016
Test Sample Serial Number:	Not marked or stated <i>(Conducted sample with RF port)</i>		

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

Environmental Conditions:

Temperature (°C):	23
Relative Humidity (%):	43

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 signal analyser in the time domain and calculated as shown below:

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

$$802.11b / 1 \text{ Mbps duty cycle } 10 \log (1 / (11.413 \text{ ms} / 11.812 \text{ ms})) = 0.1 \text{ dB}$$

$$802.11b / 2 \text{ Mbps duty cycle } 10 \log (1 / (5.804 \text{ ms} / 6.181 \text{ ms})) = 0.3 \text{ dB}$$

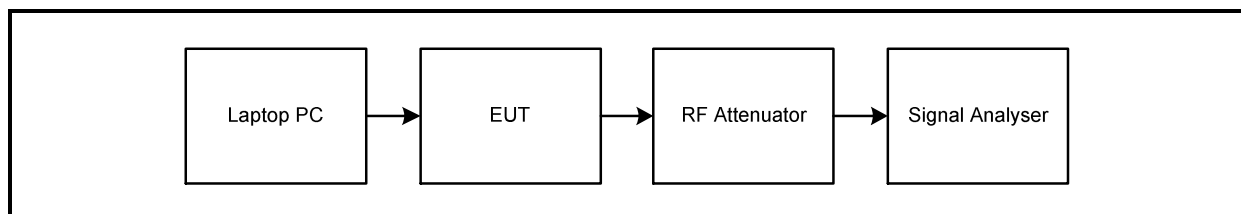
$$802.11b / 11 \text{ Mbps duty cycle } 10 \log (1 / (1.212 \text{ ms} / 1.526 \text{ ms})) = 1.0 \text{ dB}$$

$$802.11g / 6 \text{ Mbps duty cycle: } 10 \log (1 / (1.889 \text{ ms} / 2.126 \text{ ms})) = 0.5 \text{ dB}$$

$$802.11g / 9 \text{ Mbps duty cycle: } 10 \log (1 / (1.272 \text{ ms} / 1.476 \text{ ms})) = 0.6 \text{ dB}$$

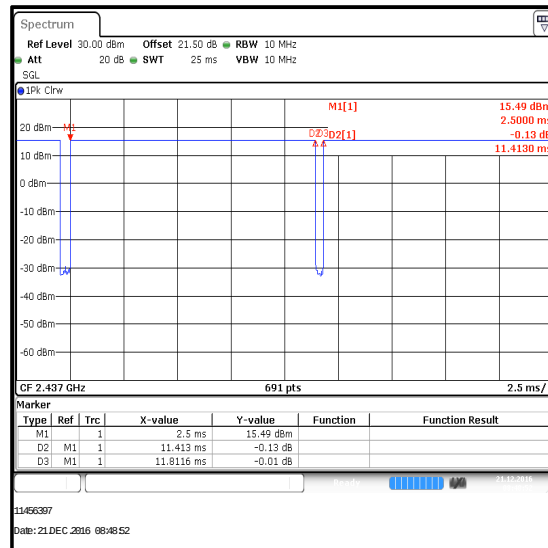
$$802.11n / \text{HT20} / \text{MCS0 duty cycle: } 10 \log (1 / (1.763 \text{ ms} / 1.873 \text{ ms})) = 0.3 \text{ dB}$$

$$802.11n / \text{HT20} / \text{MCS2 duty cycle: } 10 \log (1 / (0.611 \text{ ms} / 0.800 \text{ ms})) = 1.2 \text{ dB}$$

Test setup:

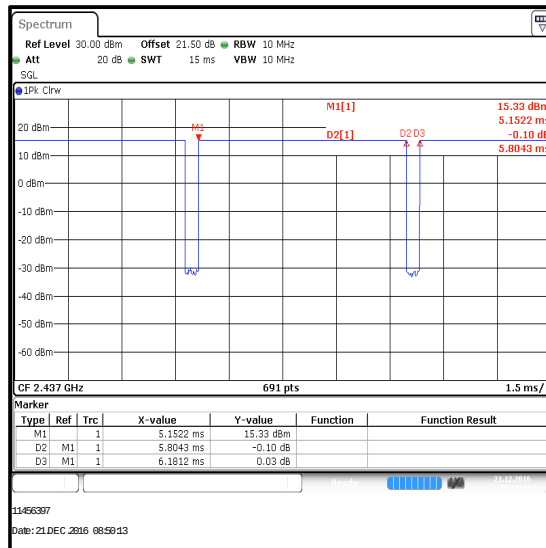
Transmitter Duty Cycle (continued)**Results: 802.11b / 20 MHz / 1 Mbps**

Pulse Duration (ms)	Period (ms)	Duty Cycle (dB)
11.413	11.812	0.1



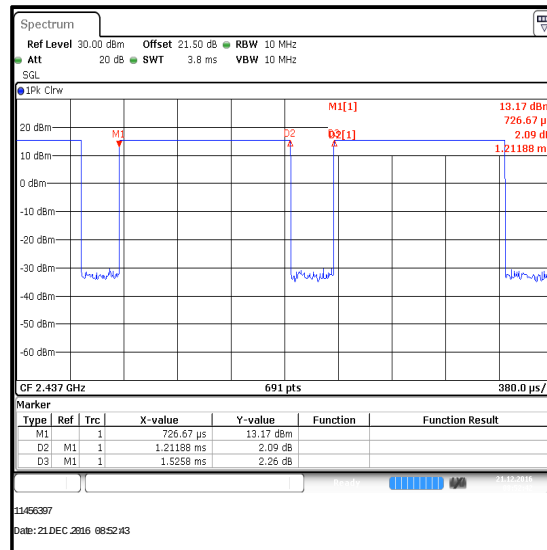
Transmitter Duty Cycle (continued)**Results: 802.11b / 20 MHz / 2 Mbps**

Pulse Duration (ms)	Period (ms)	Duty Cycle (dB)
5.804	6.181	0.3



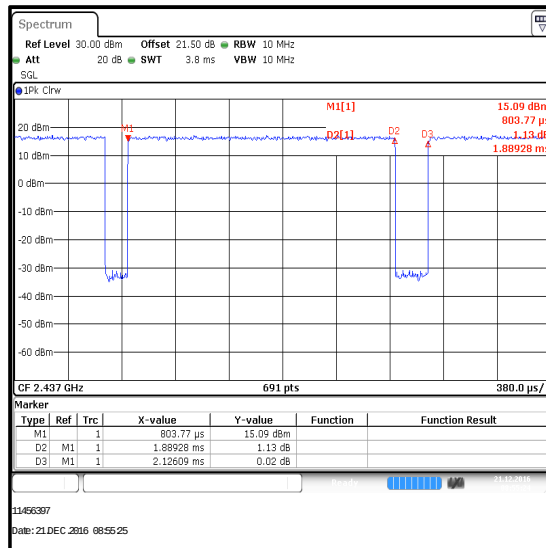
Transmitter Duty Cycle (continued)**Results: 802.11b / 20 MHz / 11 Mbps**

Pulse Duration (ms)	Period (ms)	Duty Cycle (dB)
1.212	1.526	1.0



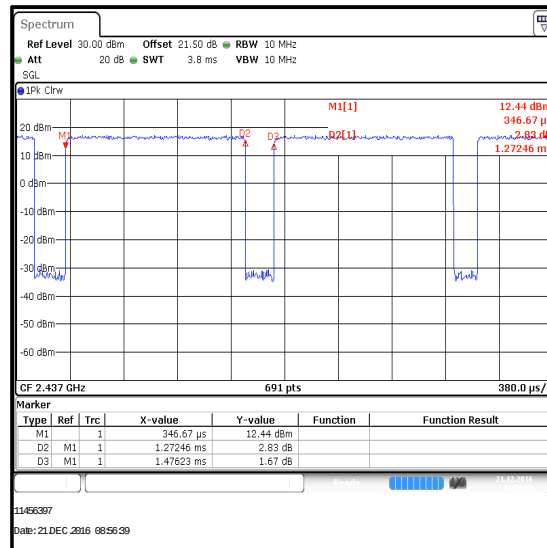
Transmitter Duty Cycle (continued)**Results: 802.11g / HT20 / 6 Mbps**

Pulse Duration (ms)	Period (ms)	Duty Cycle (dB)
1.889	2.126	0.5



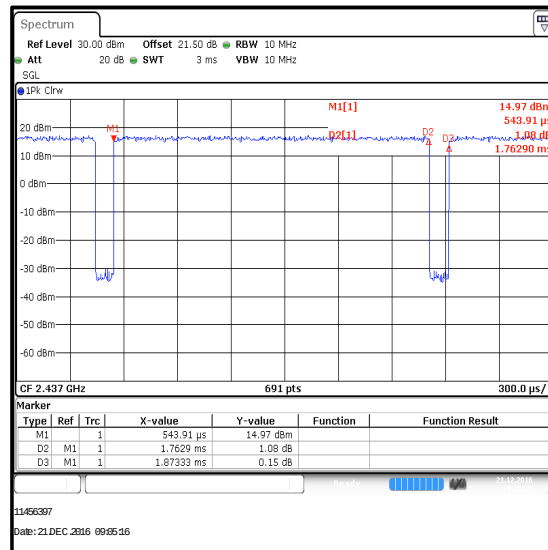
Transmitter Duty Cycle (continued)**Results: 802.11g / HT20 / 9 Mbps**

Pulse Duration (ms)	Period (ms)	Duty Cycle (dB)
1.272	1.476	0.6



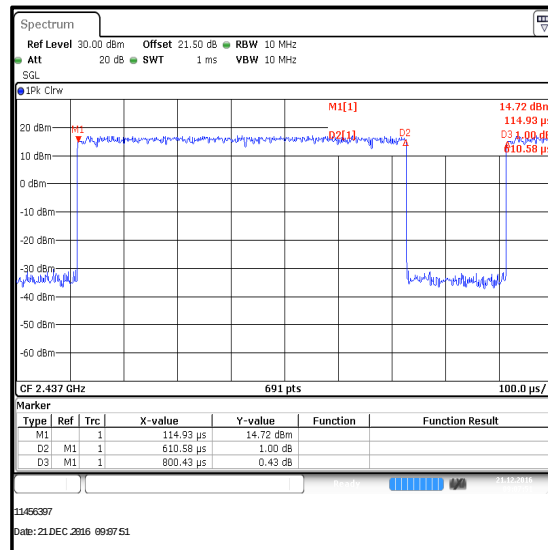
Transmitter Duty Cycle (continued)**Results: 802.11n / HT20 / BPSK / MCS0**

Pulse Duration (ms)	Period (ms)	Duty Cycle (dB)
1.763	1.873	0.3



Transmitter Duty Cycle (continued)**Results: 802.11n / HT20 / QPSK / MCS2**

Pulse Duration (ms)	Period (ms)	Duty Cycle (dB)
0.611	0.800	1.2



Transmitter Duty Cycle (continued)**Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1659	Thermohygrometer	JM Handelspunkt	30.5015.13	Not stated	02 Apr 2017	12
M1835	Signal Analyser	Rohde & Schwarz	FSV30	103050	26 Feb 2017	12
A2526	Attenuator	AtlanTecRF	AN18W5-20	832828#1	Calibrated before use	-
M260	Signal Generator	Rohde & Schwarz	SMP02	829076/008	09 May 2017	12
M199	Power Meter	Rohde & Schwarz	NRVS	827023/075	11 Apr 2018	24
M1267	Power Sensor	Rohde & Schwarz	NRV-Z52	100155	15 Apr 2018	24

5.2.3. Transmitter Power Spectral Density**Test Summary:**

Test Engineer:	David Doyle	Test Date:	19 January 2017
Test Sample Serial Number:	Not marked or stated <i>(Conducted sample with RF port)</i>		

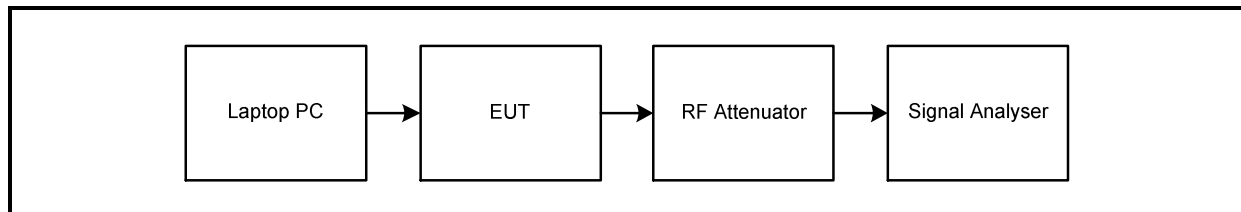
FCC Reference:	Part 15.247(e)
Test Method Used:	FCC KDB 558074 Sections 10.5 and Notes below

Environmental Conditions:

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

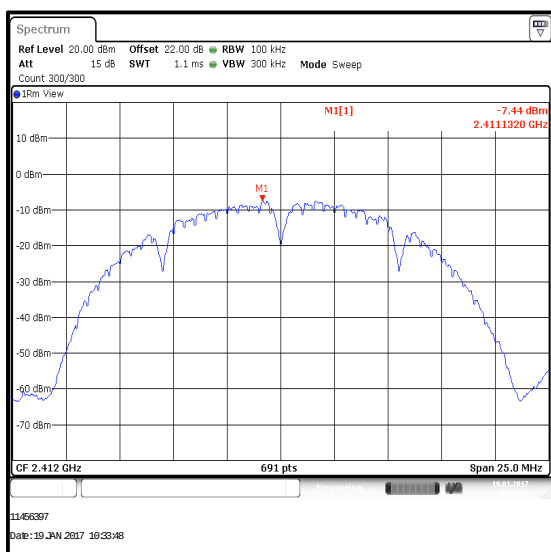
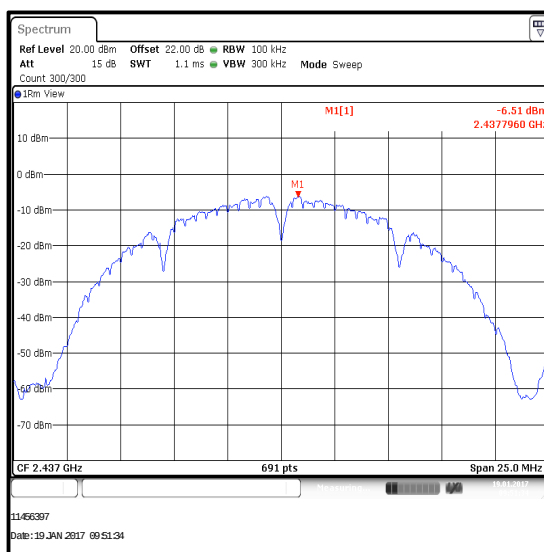
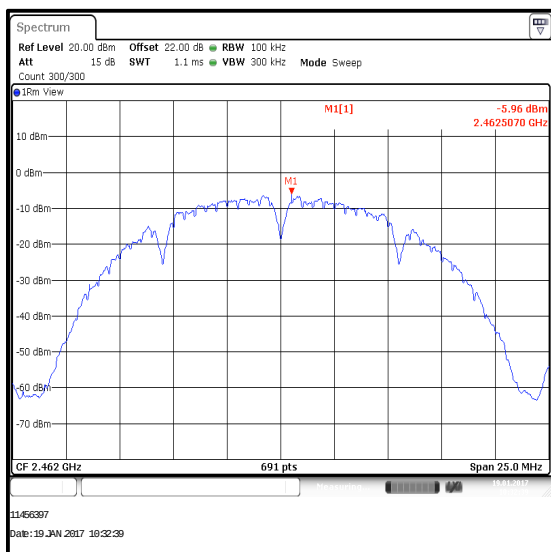
Note(s):

1. All supported modes and channel widths were initially investigated on one channel. The modes that produced the highest power were:
 - o 802.11b – DBPSK / 1 Mbps
 - o 802.11g – BPSK / 6 Mbps
 - o 802.11n HT20 – BPSK / 6.5 Mbps / MCS0
2. Final measurements were performed using the above configurations on the bottom, middle and top channels.
3. For all data rates, the EUT was transmitting at <98% duty cycle and testing was performed in accordance with KDB 558074 Section 10.5 Method AVGPDS-2. The signal analyser resolution bandwidth was set to 100 kHz and video bandwidth 300 kHz. An RMS detector was used and sweep time set manually to perform trace averaging over 300 traces. The span was set to at least 1.5 times the 99% occupied emission bandwidth. The highest peak of the measured signal was recorded. The calculated duty cycle in Section 5.2.2 of this report was added to the measured average power spectral density in order to compute the average power spectral density during the actual transmission time.
4. The signal analyser was connected to the RF port on the EUT using suitable attenuation and RF cable. An RF level offset was entered on the signal analyser to compensate for the loss of the attenuator and RF cable.

Test setup:

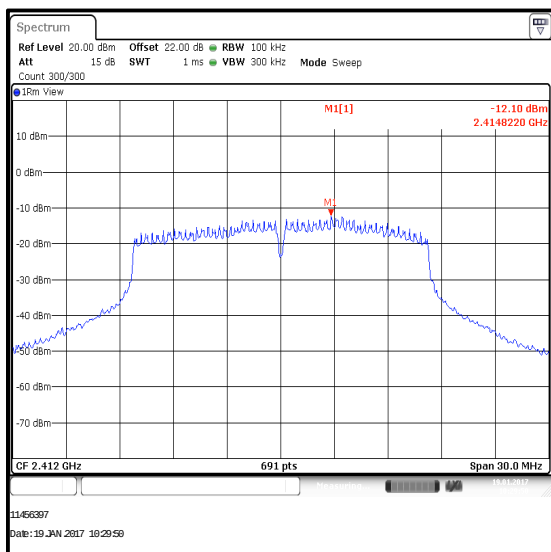
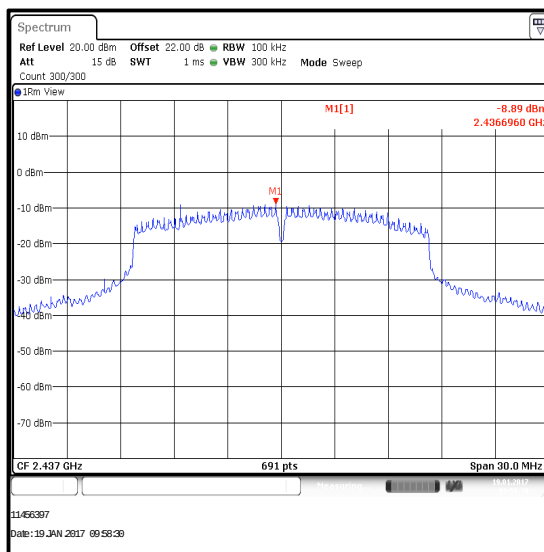
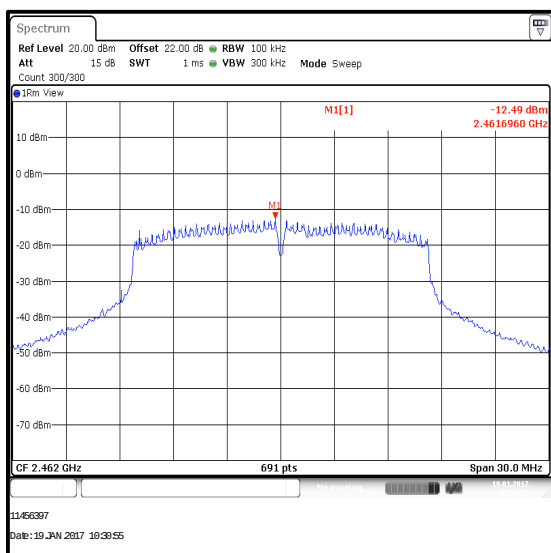
Transmitter Power Spectral Density (continued)**Results: 802.11b / 20 MHz / DBPSK / 1 Mbps**

Channel	Output Power (dBm / 100 kHz)	Duty Cycle Correction (dB)	Corrected Output Power (dBm / 100 kHz)	Limit (dBm / 3 kHz)	Margin (dB)	Result
Bottom	-7.4	0.1	-7.3	8.0	15.3	Complied
Middle	-6.5	0.1	-6.4	8.0	14.4	Complied
Top	-6.0	0.1	-5.9	8.0	13.9	Complied

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

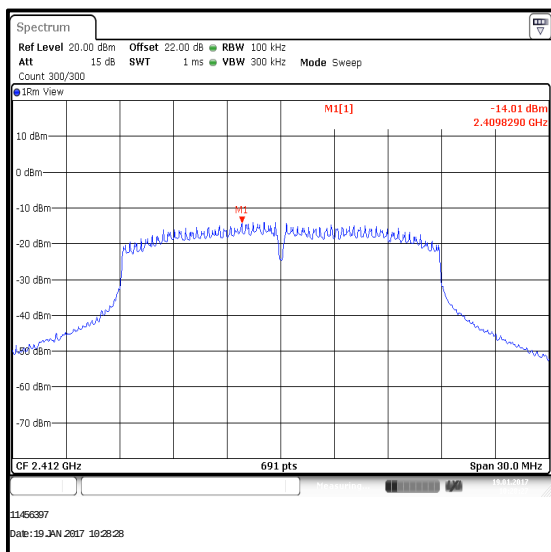
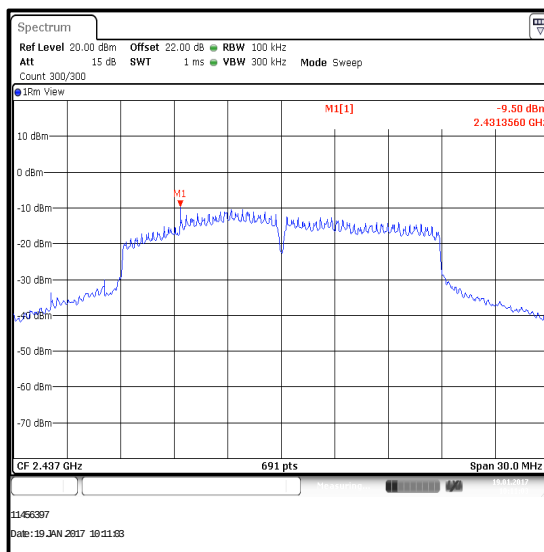
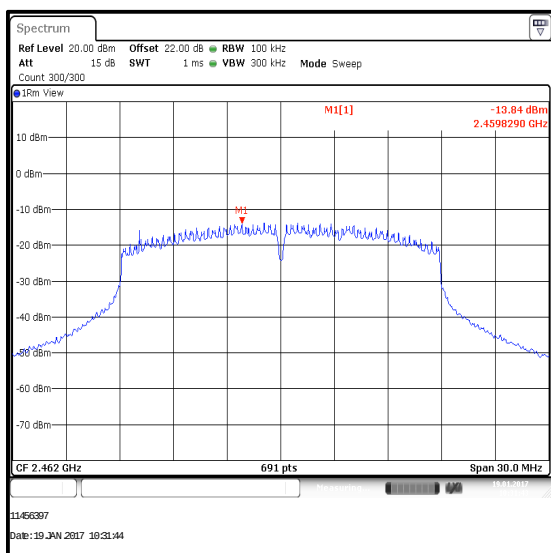
Transmitter Power Spectral Density (continued)**Results: 802.11g / 20 MHz / BPSK / 6 Mbps**

Channel	Output Power (dBm / 100 kHz)	Duty Cycle Correction (dB)	Corrected Output Power (dBm / 100 kHz)	Limit (dBm / 3 kHz)	Margin (dB)	Result
Bottom	-12.1	0.5	-11.6	8.0	19.6	Complied
Middle	-8.9	0.5	-8.4	8.0	16.4	Complied
Top	-12.5	0.5	-12.0	8.0	20.0	Complied

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

Transmitter Power Spectral Density (continued)**Results: 802.11n / HT20 / BPSK / MCS0**

Channel	Output Power (dBm / 100 kHz)	Duty Cycle Correction (dB)	Corrected Output Power (dBm / 100 kHz)	Limit (dBm / 3 kHz)	Margin (dB)	Result
Bottom	-14.0	0.3	-13.7	8.0	21.7	Complied
Middle	-9.5	0.3	-9.2	8.0	17.2	Complied
Top	-13.8	0.3	-13.5	8.0	21.5	Complied

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

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

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1659	Thermohygrometer	JM Handelspunkt	30.5015.13	Not stated	02 Apr 2017	12
M1835	Signal Analyser	Rohde & Schwarz	FSV30	103050	26 Feb 2017	12
A2526	Attenuator	AtlanTecRF	AN18W5-20	832828#1	Calibrated before use	-
M260	Signal Generator	Rohde & Schwarz	SMP02	829076/008	09 May 2017	12
M199	Power Meter	Rohde & Schwarz	NRVS	827023/075	11 Apr 2018	24
M1267	Power Sensor	Rohde & Schwarz	NRV-Z52	100155	15 Apr 2018	24

5.2.4. Transmitter Maximum (Average) Output Power**Test Summary:**

Test Engineer:	David Doyle	Test Dates:	19 January 2017 & 01 March 2017
Test Sample Serial Number:	Not marked or stated <i>(Conducted sample with RF port)</i>		

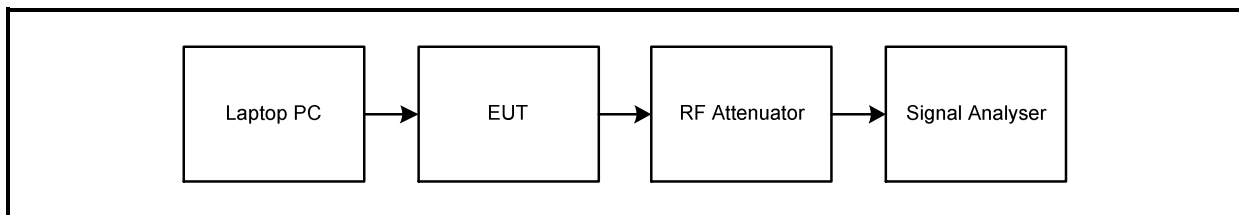
FCC Reference:	Part 15.247(b)(3)
Test Method Used:	FCC KDB 558074 Sections 9.2.2.4 and Notes below

Environmental Conditions:

Temperature (°C):	21 to 22
Relative Humidity (%):	32 to 36

Note(s):

1. All configurations supported by the EUT were investigated. The configurations that produced the highest power and therefore deemed worst-case were:
 - o 802.11b - DQPSK / 2 Mbps
 - o 802.11g - BPSK / 9 Mbps
 - o 802.11n HT20 - QPSK / 19.5 Mbps / MCS2
2. For all data rates, the EUT was transmitting at <98% duty cycle and testing was performed in accordance with KDB 558074 Section 9.2.2.4 Method AVGSA-2. The signal analyser's integration function was used to integrate across the 99% occupied bandwidth. The signal analyser resolution bandwidth was set to 200 kHz and video bandwidth 1 MHz. An RMS detector was used and sweep time set manually to perform trace averaging over 300 traces. The span was set to at least 1.5 times the 99% occupied emission bandwidth. The calculated duty cycle shown in Section 5.2.2 of this report was added to the measured power in order to compute the average power during the actual transmission time.
3. The signal analyser was connected to the RF port on the EUT using suitable attenuation and RF cable. An RF level offset was entered on the signal analyser to compensate for the loss of the attenuator and RF cable.

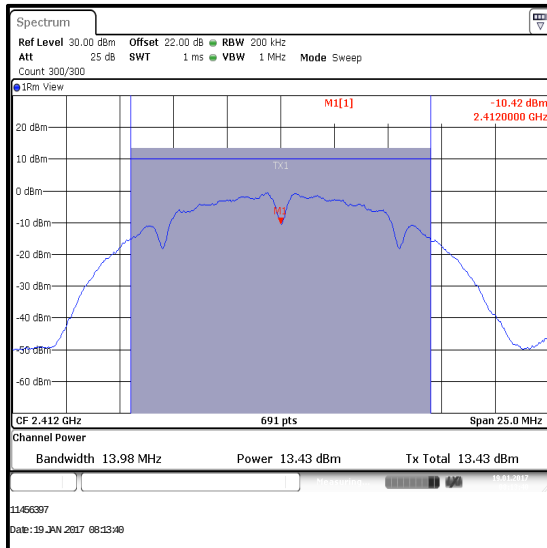
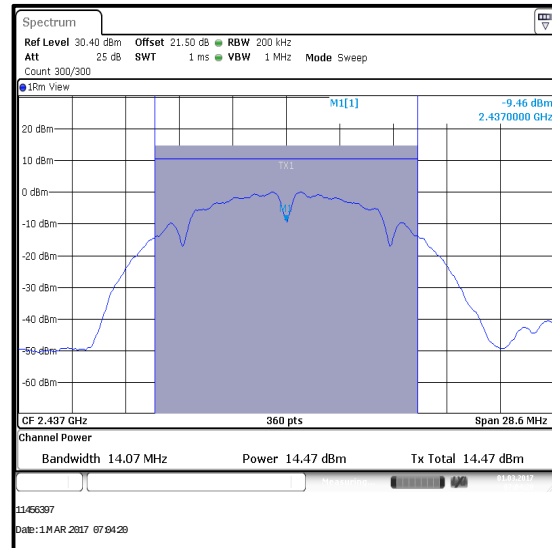
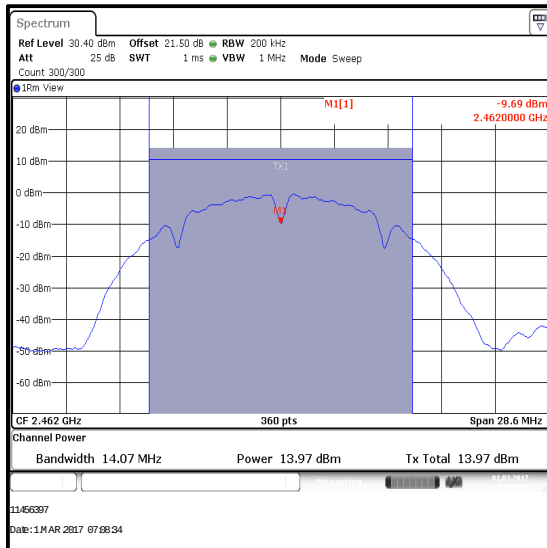
Test setup:

Transmitter Maximum (Average) Output Power (continued)**Results: 802.11b / 20 MHz / DQPSK / 2 Mbps****Conducted Peak Limit Comparison**

Channel	Conducted Power (dBm)	Duty Cycle Correction (dB)	Corrected Conducted Power (dBm)	Conducted Power Limit (dBm)	Margin (dB)	Result
Bottom	13.4	0.3	13.7	30.0	16.3	Complied
Middle	14.5	0.3	14.8	30.0	15.2	Complied
Top	14.0	0.3	14.3	30.0	15.7	Complied

De Facto EIRP Limit Comparison

Channel	Conducted Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	13.7	-3.3	10.4	36.0	25.6	Complied
Middle	14.8	-3.3	11.5	36.0	24.5	Complied
Top	14.3	-3.3	11.0	36.0	25.0	Complied

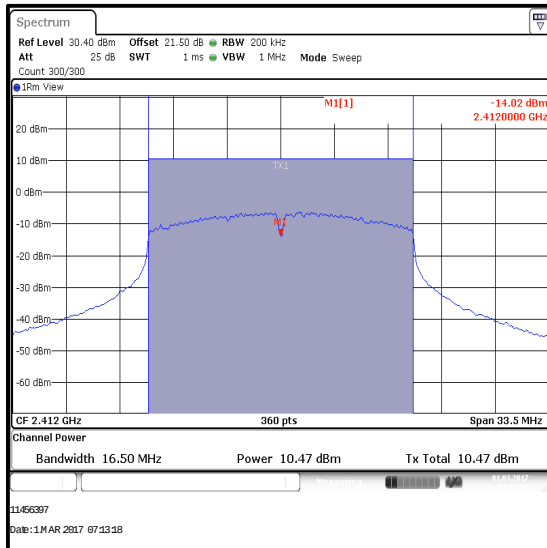
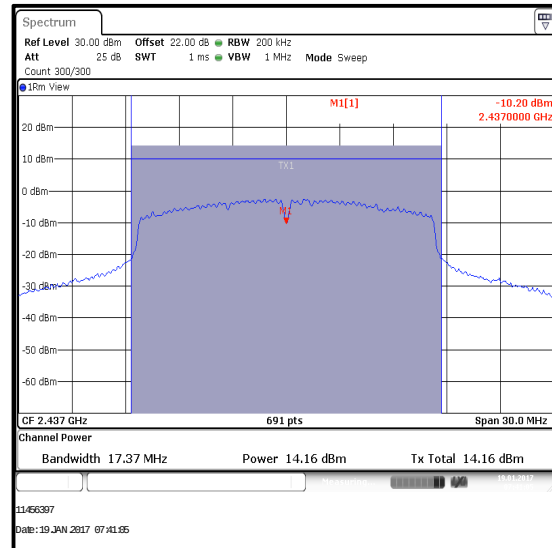
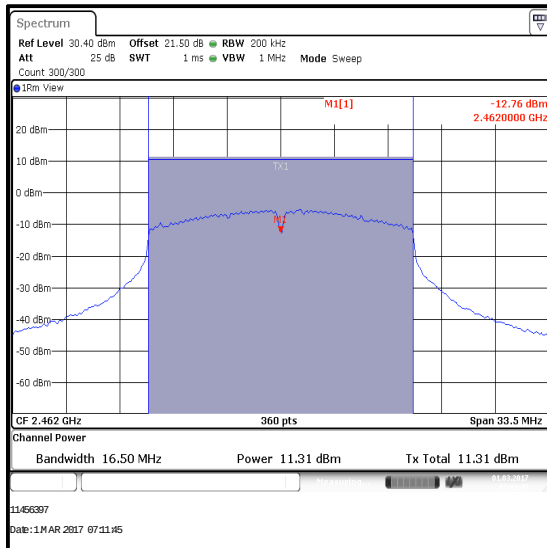
Transmitter Maximum Output Power (continued)**Results: 802.11b / 20 MHz / DQPSK / 2 Mbps****Bottom Channel****Middle Channel****Top Channel**

Transmitter Maximum Output Power (continued)**Results: 802.11g / 20 MHz / BPSK / 9 Mbps****Conducted Peak Limit Comparison**

Channel	Conducted Power (dBm)	Duty Cycle Correction (dB)	Corrected Conducted Power (dBm)	Conducted Power Limit (dBm)	Margin (dB)	Result
Bottom	10.5	0.6	11.1	30.0	18.9	Complied
Middle	14.2	0.6	14.8	30.0	15.2	Complied
Top	11.3	0.6	11.9	30.0	18.1	Complied

De Facto EIRP Limit Comparison

Channel	Corrected Conducted Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	11.1	-3.3	7.8	36.0	28.2	Complied
Middle	14.8	-3.3	11.5	36.0	24.5	Complied
Top	11.9	-3.3	8.6	36.0	27.4	Complied

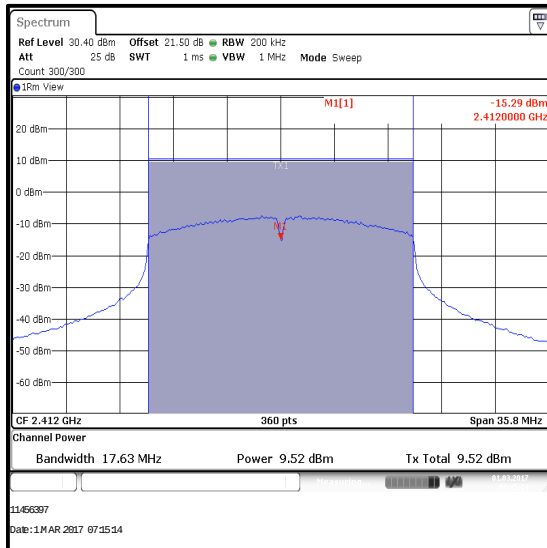
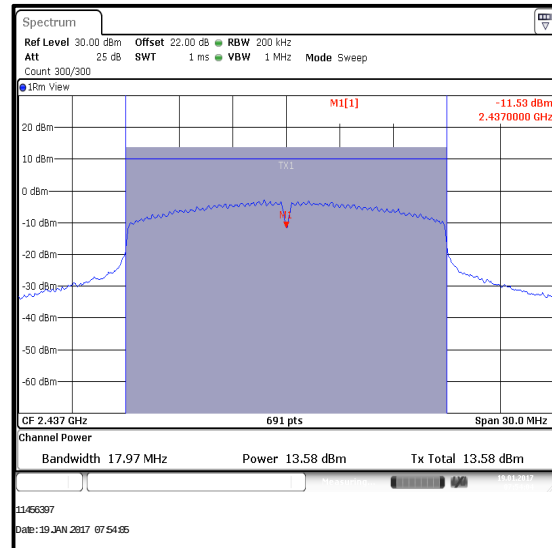
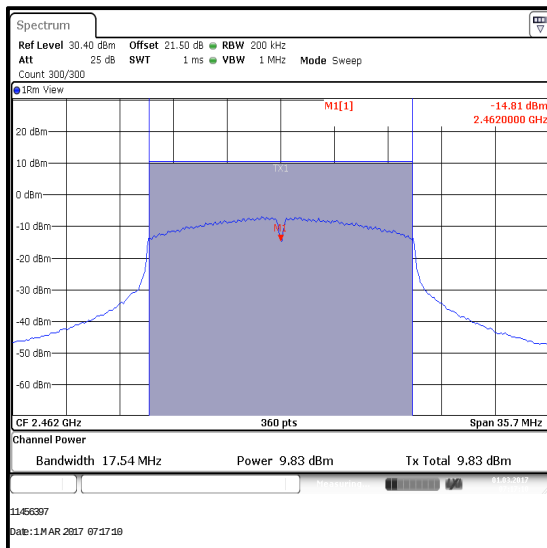
Transmitter Maximum Output Power (continued)**Results: 802.11g / 20 MHz / BPSK / 9 Mbps****Bottom Channel****Middle Channel****Top Channel**

Transmitter Maximum Output Power (continued)**Results: 802.11n / HT20 / QPSK / MCS2****Conducted Peak Limit Comparison**

Channel	Conducted Power (dBm)	Duty Cycle Correction (dB)	Corrected Conducted Power (dBm)	Conducted Power Limit (dBm)	Margin (dB)	Result
Bottom	9.5	1.2	10.7	30.0	19.3	Complied
Middle	13.6	1.2	14.8	30.0	15.2	Complied
Top	9.8	1.2	11.0	30.0	19.0	Complied

De Facto EIRP Limit Comparison

Channel	Corrected Conducted Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	10.7	-3.3	7.4	36.0	28.6	Complied
Middle	14.8	-3.3	11.5	36.0	24.5	Complied
Top	11.0	-3.3	7.7	36.0	28.3	Complied

Transmitter Maximum Output Power (continued)**Results: 802.11n / HT20 / QPSK / MCS2****Bottom Channel****Middle Channel****Top Channel**

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

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1659	Thermohygrometer	JM Handelspunkt	30.5015.13	Not stated	02 Apr 2017	12
M1835	Signal Analyser	Rohde & Schwarz	FSV30	103050	26 Feb 2017	12
M1873	Signal Analyser	Rohde & Schwarz	FSV30	103074	27 Jun 2017	12
A2526	Attenuator	AtlanTecRF	AN18W5-20	832828#1	Calibrated before use	-
A2520	Attenuator	AtlanTecRF	AN18-20	832797#1	Calibrated before use	-
M260	Signal Generator	Rohde & Schwarz	SMP02	829076/008	09 May 2017	12
M199	Power Meter	Rohde & Schwarz	NRVS	827023/075	11 Apr 2018	24
M1267	Power Sensor	Rohde & Schwarz	NRV-Z52	100155	15 Apr 2018	24

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

Test Engineer:	David Doyle	Test Date:	18 January 2017
Test Sample Serial Number:	Not marked or stated (<i>Radiated sample</i>)		

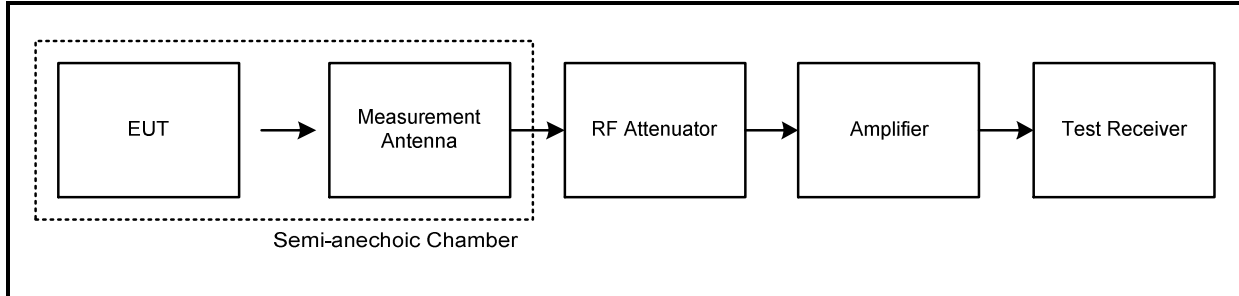
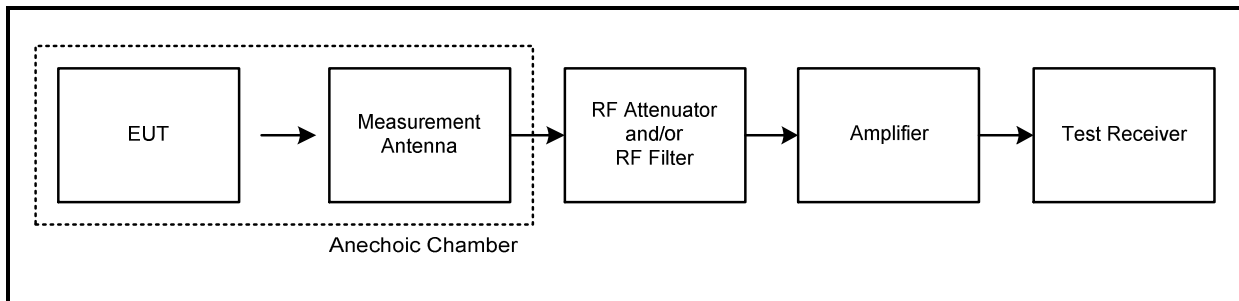
FCC Reference:	Parts 15.247(d) & 15.209(a)
Test Method Used:	ANSI C63.10 Sections 6.3 and 6.5
Frequency Range	30 MHz to 1000 MHz

Environmental Conditions:

Temperature (°C):	22
Relative Humidity (%):	30

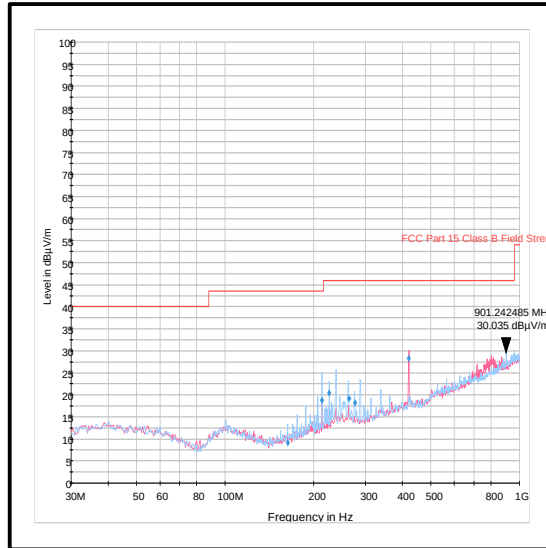
Note(s):

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. Transmitter spurious emissions tests were performed with the EUT transmitting a data rate of 2 Mbps. This was found to be the worst data rate with regards to emissions after preliminary investigations and, as this mode emits the highest output power level, it was deemed to be the worst case.
3. The preliminary scans showed similar emission levels below 1 GHz, for each channel of operation. Therefore final radiated emissions measurements were performed with the EUT set to the middle channel only.
4. All emissions shown on the pre-scan plots 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.
5. Measurements below 1 GHz were performed in a semi-anechoic chamber (Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.
6. Pre-scans were performed and markers placed on the highest measured levels. The test receiver resolution bandwidth was set to 100 kHz and video bandwidth 300 kHz. A peak detector was used, sweep time was set to auto and trace mode was Max Hold.

Transmitter Radiated Emissions (continued)**Test setup for radiated measurements:****Semi-anechoic chamber****Anechoic chamber**

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

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
901.242	Horizontal	30.0	46.0	16.0	Complied

**Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2014	Thermohygrometer	Testo	608 H1	45046246	10 Jun 2017	12
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	07 Dec 2017	12
M1273	Test Receiver	Rohde & Schwarz	ESIB26	100275	11 Apr 2017	12
A2959	Antenna	Schwarzbeck	VULB 9163	9163-967	08 Sep 2017	12
G0543	Amplifier	Sonoma	310N	230801	09 Jun 2017	6
A1834	Attenuator	Hewlett Packard	8491B	10444	30 Mar 2017	12

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

Test Engineer:	David Doyle	Test Dates:	11 January 2017 & 12 January 2017
Test Sample Serial Number:	Not marked or stated (<i>Radiated sample</i>)		

FCC Reference:	Parts 15.247(d) & 15.209(a)
Test Method Used:	ANSI C63.10 Sections 6.3 and 6.6 & FCC KDB 558074 Sections 11, 12.2.4 & 12.2.5.2
Frequency Range	1 GHz to 25 GHz

Environmental Conditions:

Temperature (°C):	23
Relative Humidity (%):	33 to 34

Note(s):

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. Transmitter spurious emissions tests were performed with the EUT transmitting a data rate of 2 Mbps. This was found to be the worst data rate with regards to emissions after preliminary investigations and, as this mode emits the highest output power level, it was deemed to be the worst case.
3. All other emissions shown on the pre-scan plots were investigated and found to be ambient or >20 dB below the appropriate limit or below the measurement system noise floor.
4. The emission shown approximately at 2437 MHz on the 1 GHz to 3 GHz plot is the EUT fundamental.
5. Measurements 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. The EUT was positioned in the X, Y and Z planes to maximise the emission levels.
6. Pre-scans were performed and a marker placed on the highest measured level of the appropriate plot. The test receiver resolution bandwidth was set to 1 MHz and video bandwidth 3 MHz. The sweep time was set to auto.
7. *In accordance with ANSI C63.10 Section 6.6.4.3, Note 1, if the peak measured value complies with the average limit, it is unnecessary to perform an average measurement.
8. **-30 dBc limit applies in non-restricted bands as the conducted average output power was measured.
9. The reference level for emissions in non-restricted bands was established by following ANSI C63.10 Section 11.11.2 procedure.

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

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
3216.043	Vertical	53.6	61.7**	8.1	Complied
4018.635	Vertical	54.1	74.0	19.9	Complied
4824.064	Horizontal	44.0	54.0*	10.0	Complied
6432.077	Horizontal	49.7	61.7**	12.0	Complied
7234.714	Vertical	50.8	61.7**	10.9	Complied
19296.386	Horizontal	51.3	54.0*	2.7	Complied

Results: Average / Bottom Channel

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Correction Factor (dB)	Corrected Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
4021.263	Vertical	48.7	0.3	49.0	54.0	5.0	Complied

Results: Peak / Middle Channel

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
3249.370	Vertical	53.0	61.7**	8.7	Complied
4063.269	Vertical	56.6	74.0	17.4	Complied
4873.976	Horizontal	46.4	54.0*	7.6	Complied
6498.737	Horizontal	49.9	61.7**	11.8	Complied
7312.543	Vertical	52.6	54.0*	1.4	Complied
19496.150	Horizontal	50.9	54.0*	2.1	Complied

Results: Average / Middle Channel

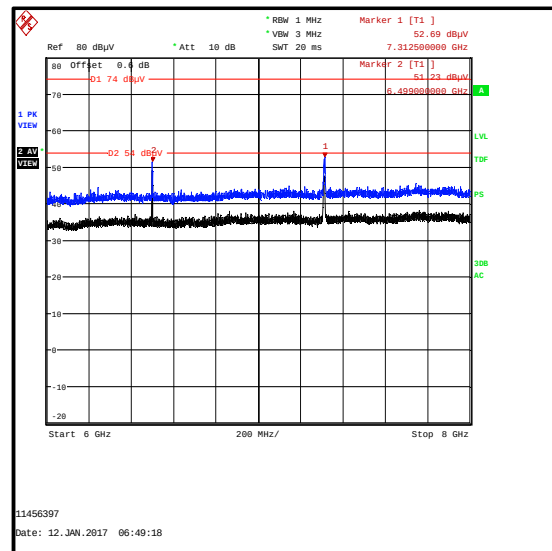
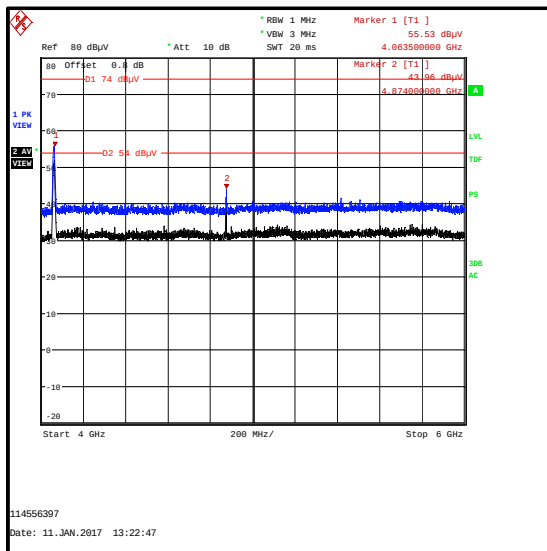
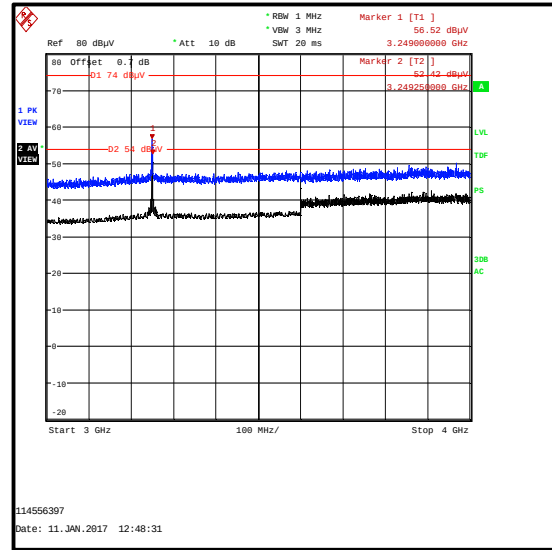
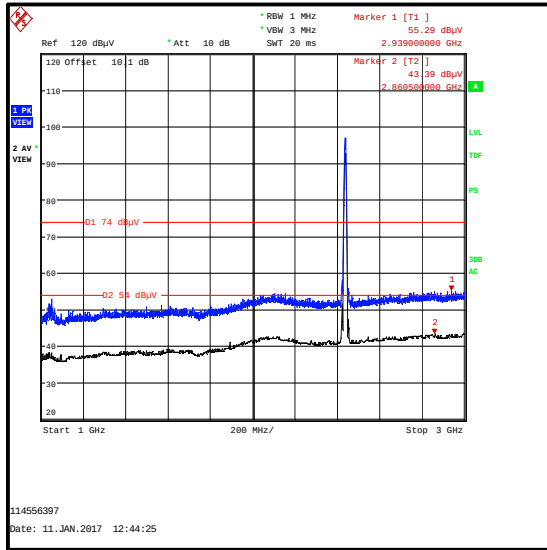
Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Correction Factor (dB)	Corrected Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
4062.756	Vertical	51.2	0.3	51.5	54.0	2.5	Complied

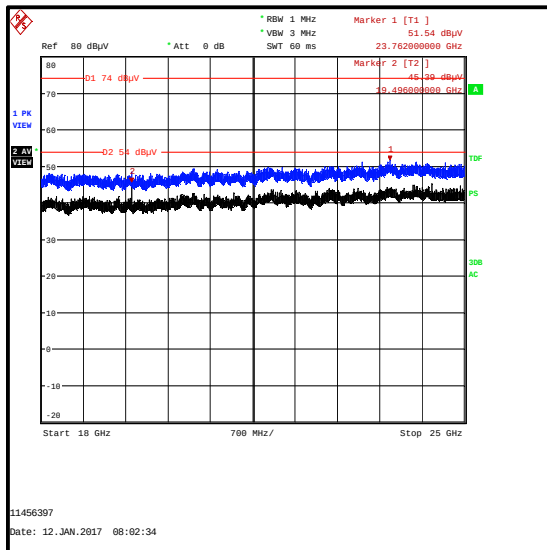
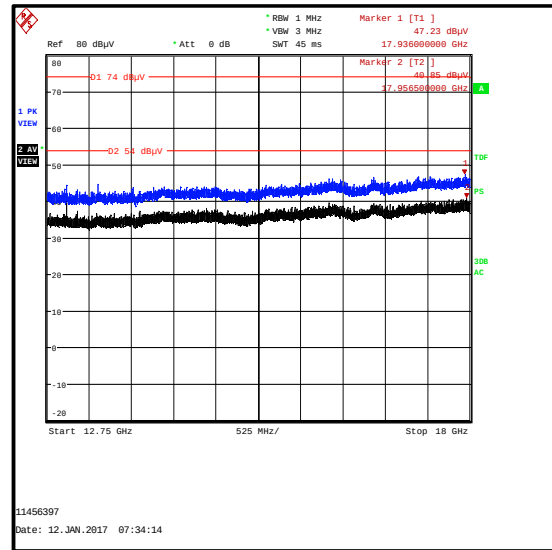
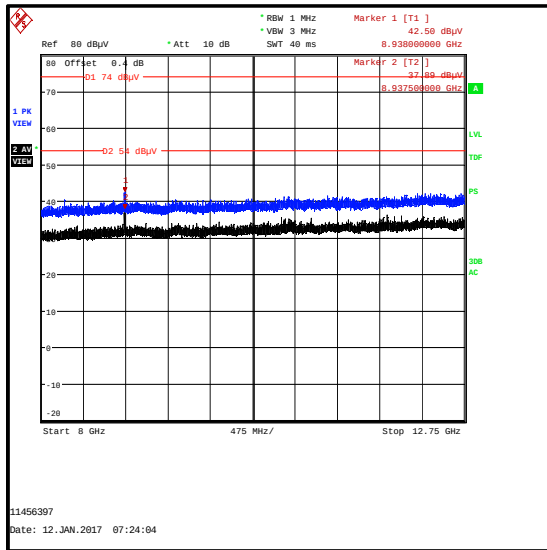
Transmitter Radiated Emissions (continued)**Results: Peak / Top Channel**

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
3282.706	Vertical	53.7	61.7**	8.0	Complied
4104.981	Vertical	57.2	74.0	16.8	Complied
4924.024	Horizontal	46.3	54.0*	7.7	Complied
6565.412	Horizontal	48.9	61.7**	12.8	Complied
7387.571	Vertical	51.3	54.0*	2.7	Complied
19696.386	Horizontal	50.5	54.0*	3.5	Complied

Results: Average / Top Channel

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Correction Factor (dB)	Corrected Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
4104.308	Vertical	51.9	0.3	52.2	54.0	1.8	Complied

Transmitter Radiated Emissions (continued)

Transmitter Radiated Emissions (continued)

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

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	Not stated	02 Apr 2017	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	16 Nov 2017	12
M1886	Test Receiver	Rohde & Schwarz	ESU26	100554	21 May 2017	12
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	09 Nov 2017	12
A1818	Antenna	EMCO	3115	00075692	08 Nov 2017	12
A253	Antenna	Flann Microwave	12240-20	128	08 Nov 2017	12
A254	Antenna	Flann Microwave	14240-20	139	08 Nov 2017	12
A255	Antenna	Flann Microwave	16240-20	519	08 Nov 2017	12
A256	Antenna	Flann Microwave	18240-20	400	08 Nov 2017	12
A436	Antenna	Flann Microwave	20240-20	330	07 Nov 2017	12
A1396	Attenuator	Huber & Suhner	6810.17.B	757987	26 Apr 2017	12
A1975	High Pass Filter	AtlanTecRF	AFH-03000	090424010	26 Apr 2017	12

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

Test Engineer:	David Doyle	Test Dates:	11 January 2017 & 17 February 2017
Test Sample Serial Number:	Not marked or stated (<i>Radiated sample</i>)		

FCC Reference:	Parts 15.247(d) & 15.209(a)
Test Method Used:	ANSI C63.10 Section 6.10 & FCC KDB 558074 Sections 11.3, 12.2.4 & 12.2.5.2

Environmental Conditions:

Temperature (°C):	21 to 23
Relative Humidity (%):	34 to 35

Note(s):

1. Tests were performed in the following modes as they produced the highest power, highest power spectral density, and widest occupied bandwidth:
 - o 802.11b – DBPSK / 1 Mbps
 - o 802.11b – DQPSK / 2 Mbps
 - o 802.11b – DQPSK / 11 Mbps
 - o 802.11g – BPSK / 6 Mbps
 - o 802.11g – BPSK / 9 Mbps
 - o 802.11n HT20 - BPSK / MCS0
 - o 802.11n HT20 - QPSK / MCS2
2. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
3. The maximum conducted (average) output power was previously measured. In accordance with FCC KDB 558074 Section 11.1(b), the lower band edge measurement should be performed with a peak detector and the -30 dBc limit applied.
4. As the lower band edge is adjacent to a non-restricted band, only peak measurements are required. In accordance with FCC KDB 558074 Section 11.1, the test method in Section 11.3 was followed: the test receiver resolution bandwidth was set to 100 kHz and video bandwidth 300 kHz. A peak detector was used, sweep time was set to auto and trace mode was Max Hold. The test receiver was left to sweep for a sufficient length of time in order to maximise the carrier level and out-of-band emissions. A marker and corresponding reference level line were placed on the peak of the carrier. As the maximum conducted (average) output power was measured using an RMS detector in accordance with FCC KDB 558074 Section 9.2.2.4 an out-of-band limit line was placed 30 dB (FCC KDB 558074 Section 11.1(b)) below the peak level. 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.
5. As the upper band edge is adjacent to 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 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 signal analyser resolution bandwidth was set to 1 MHz and the video bandwidth 3 MHz. An RMS detector was used, sweep time was set to auto and trace mode was trace averaging over 300 sweeps. 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.

Transmitter Band Edge Radiated Emissions (continued)**Results: Peak / 802.11b / 20 MHz / DBPSK / 1 Mbps****Results: Lower Band Edge**

Frequency (MHz)	Level (dBμV/m)	-30 dBc Limit (dBμV/m)	Margin (dB)	Result
2397.516	50.2	61.7	11.5	Complied
2400.000	43.4	61.7	18.3	Complied

Results: Upper Band Edge / Peak

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2483.500	52.7	74.0	21.3	Complied
2484.141	53.9	74.0	20.1	Complied

Results: Upper Band Edge / Average

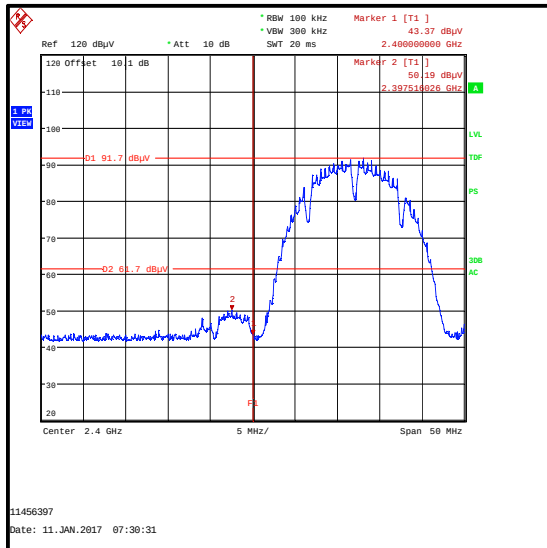
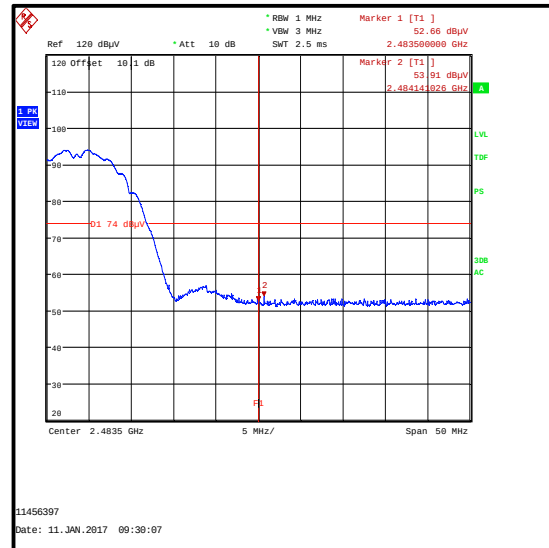
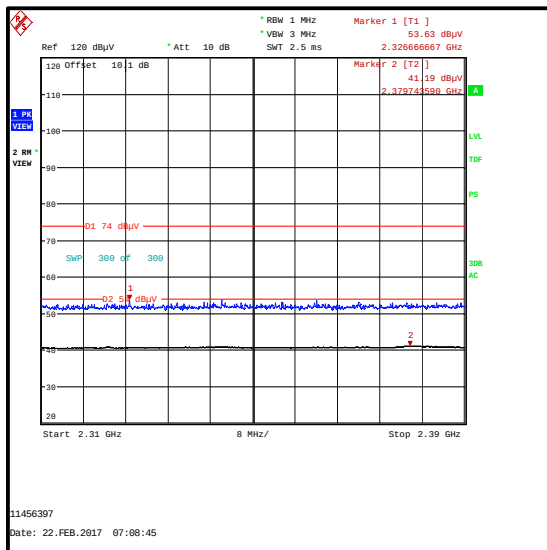
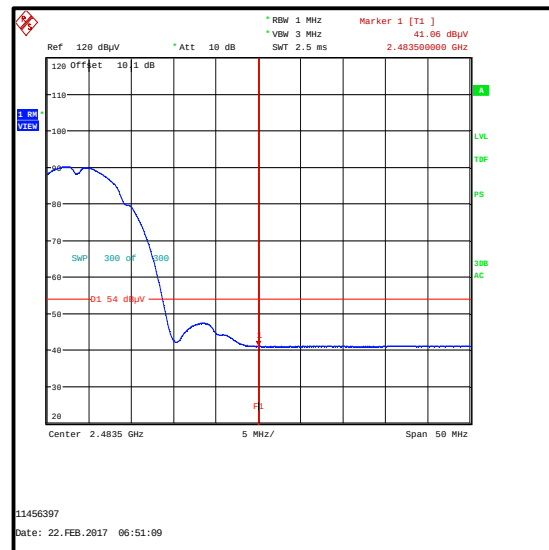
Frequency (MHz)	Level (dBμV/m)	Duty Cycle Correction (dB)	Corrected Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2483.500	41.1	0.1	41.2	54.0	12.8	Complied

Results: 2310 MHz to 2390 MHz Restricted Band / Peak

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2326.667	53.6	74.0	20.4	Complied

Results: 2310 MHz to 2390 MHz Restricted Band / Average

Frequency (MHz)	Level (dBμV/m)	Duty Cycle Correction (dB)	Corrected Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2379.744	41.2	0.1	41.3	54.0	12.7	Complied

Transmitter Band Edge Radiated Emissions (continued)**Results: Peak / 802.11b / 20 MHz / DBPSK / 1 Mbps****Lower Band Edge Peak Measurement****Upper Band Edge Peak Measurement****2310 MHz to 2390 MHz Restricted Band****Upper Band Edge Average Measurement**

Transmitter Band Edge Radiated Emissions (continued)**Results: Peak / 802.11b / 20 MHz / DQPSK / 2 Mbps****Results: Lower Band Edge**

Frequency (MHz)	Level (dBμV/m)	-30 dBc Limit (dBμV/m)	Margin (dB)	Result
2396.955	49.6	61.4	11.8	Complied
2400.000	46.3	61.4	15.1	Complied

Results: Upper Band Edge / Peak

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2483.500	52.3	74.0	21.7	Complied

Results: Upper Band Edge / Average

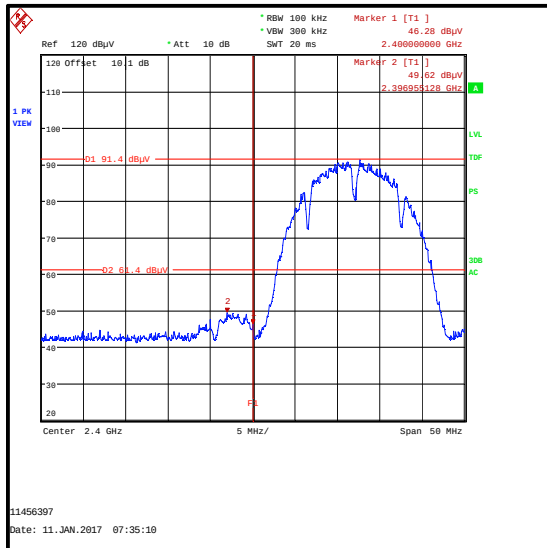
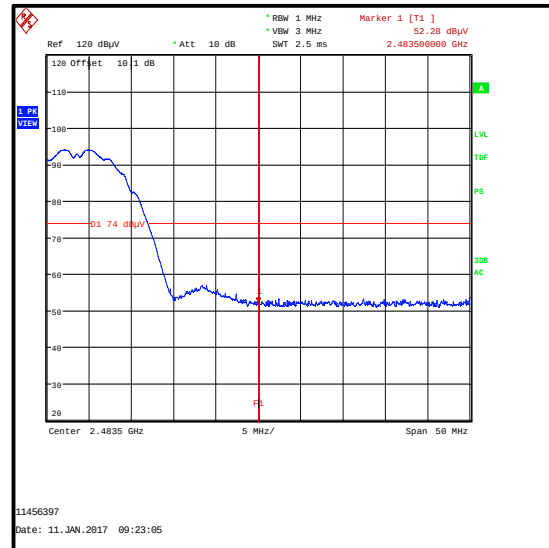
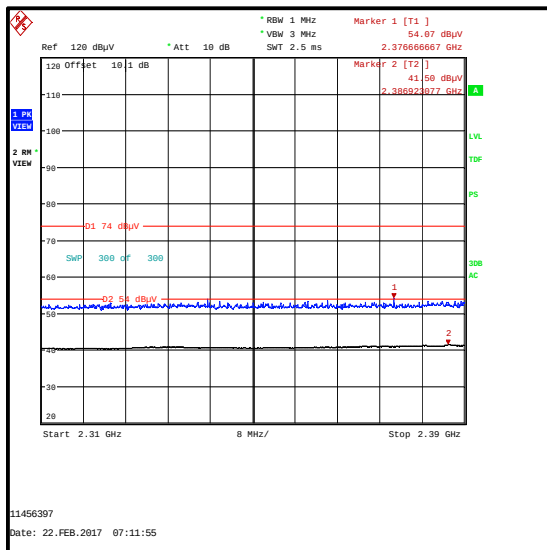
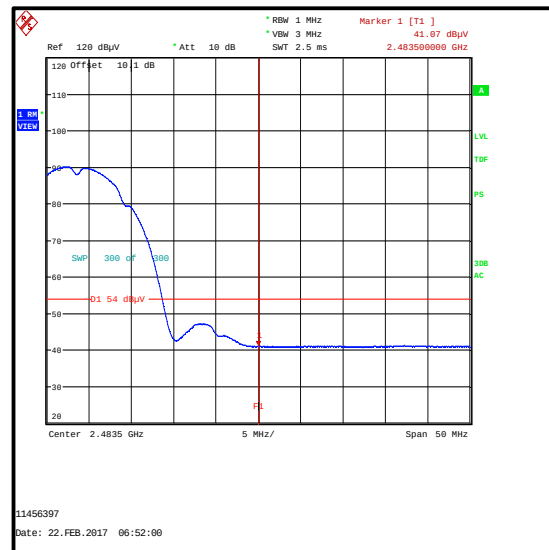
Frequency (MHz)	Level (dBμV/m)	Duty Cycle Correction (dB)	Corrected Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2483.500	41.1	0.3	41.4	54.0	12.6	Complied

Results: 2310 MHz to 2390 MHz Restricted Band / Peak

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2376.667	54.1	74.0	19.9	Complied

Results: 2310 MHz to 2390 MHz Restricted Band / Average

Frequency (MHz)	Level (dBμV/m)	Duty Cycle Correction (dB)	Corrected Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2386.923	41.5	0.3	41.8	54.0	12.2	Complied

Transmitter Band Edge Radiated Emissions (continued)**Results: Peak / 802.11b / 20 MHz / DQPSK / 2 Mbps****Lower Band Edge Peak Measurement****Upper Band Edge Peak Measurement****2310 MHz to 2390 MHz Restricted Band****Upper Band Edge Average Measurement**

Transmitter Band Edge Radiated Emissions (continued)**Results: Peak / 802.11b / 20 MHz / DQPSK / 11 Mbps****Results: Lower Band Edge**

Frequency (MHz)	Level (dBμV/m)	-30 dBc Limit (dBμV/m)	Margin (dB)	Result
2397.516	46.4	61.6	15.2	Complied
2400.000	46.1	61.6	15.5	Complied

Results: Upper Band Edge / Peak

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2483.500	52.5	74.0	21.5	Complied
2489.750	54.4	74.0	19.6	Complied

Results: Upper Band Edge / Average

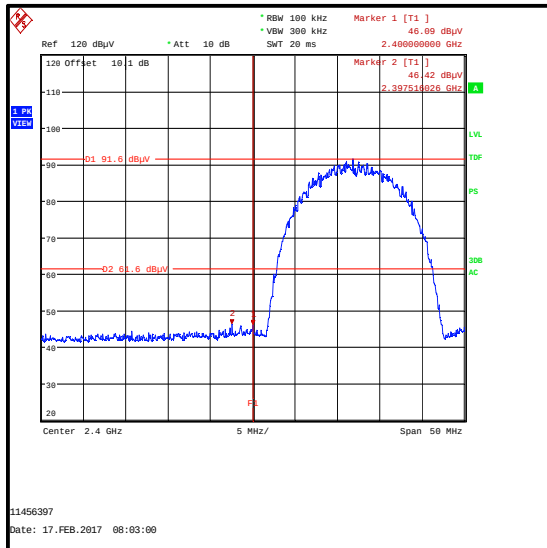
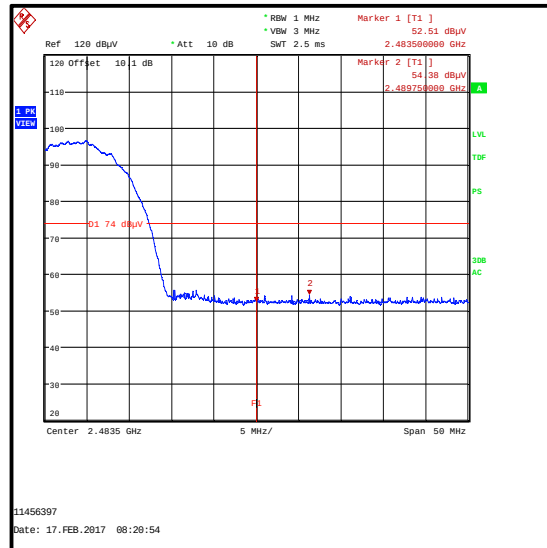
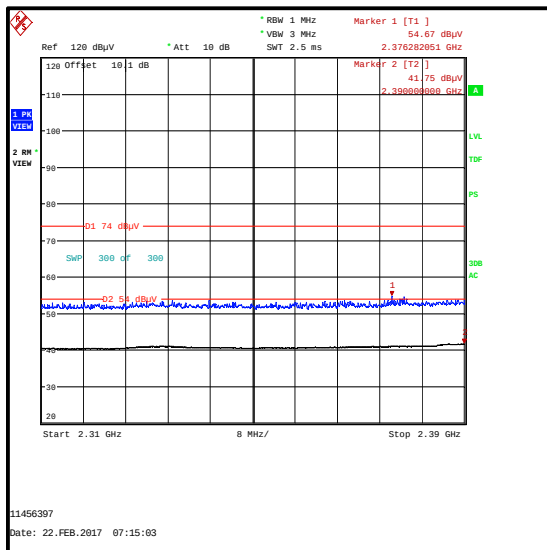
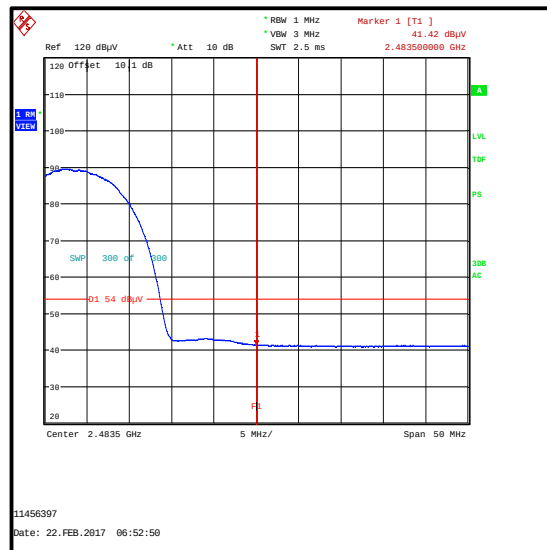
Frequency (MHz)	Level (dBμV/m)	Duty Cycle Correction (dB)	Corrected Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2483.500	41.4	1.0	42.4	54.0	11.6	Complied

Results: 2310 MHz to 2390 MHz Restricted Band / Peak

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2376.282	54.7	74.0	19.3	Complied

Results: 2310 MHz to 2390 MHz Restricted Band / Average

Frequency (MHz)	Level (dBμV/m)	Duty Cycle Correction (dB)	Corrected Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2390.000	41.8	1.0	42.8	54.0	11.2	Complied

Transmitter Band Edge Radiated Emissions (continued)**Results: Peak / 802.11b / 20 MHz / DQPSK / 11 Mbps****Lower Band Edge Peak Measurement****Upper Band Edge Peak Measurement****2310 MHz to 2390 MHz Restricted Band****Upper Band Edge Average Measurement**

Transmitter Band Edge Radiated Emissions (continued)**Results: Peak / 802.11g / 20 MHz / BPSK / 6 Mbps****Results: Lower Band Edge**

Frequency (MHz)	Level (dBμV/m)	-30 dBc Limit (dBμV/m)	Margin (dB)	Result
2399.840	57.0	57.9	0.9	Complied
2400.000	56.1	57.9	1.8	Complied

Results: Upper Band Edge / Peak

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2483.500	54.5	74.0	19.5	Complied
2484.301	55.6	74.0	18.4	Complied

Results: Upper Band Edge / Average

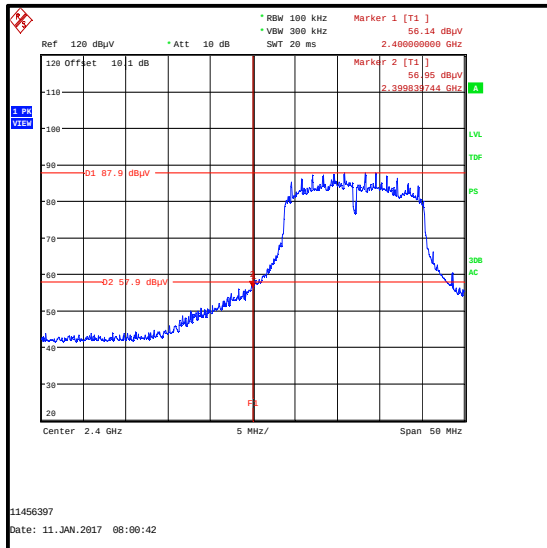
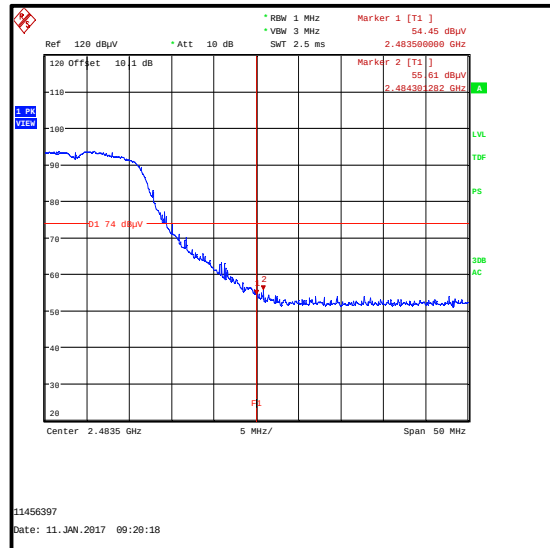
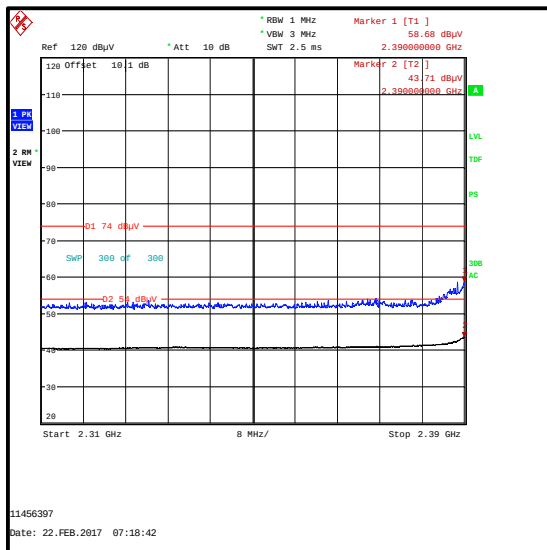
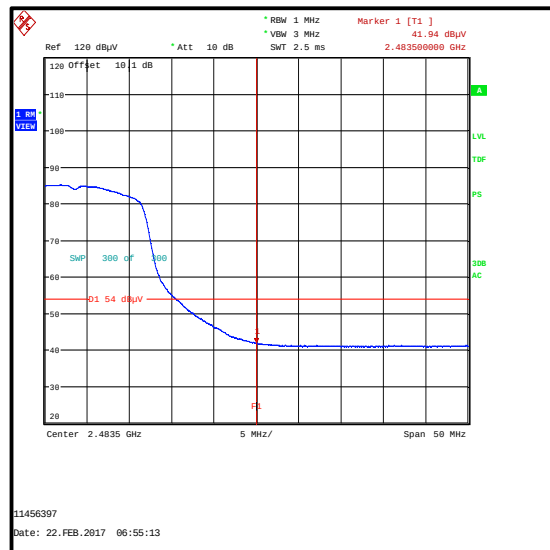
Frequency (MHz)	Level (dBμV/m)	Duty Cycle Correction (dB)	Corrected Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2483.500	41.9	0.5	42.4	54.0	11.6	Complied

Results: 2310 MHz to 2390 MHz Restricted Band / Peak

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2390.000	58.7	74.0	15.3	Complied

Results: 2310 MHz to 2390 MHz Restricted Band / Average

Frequency (MHz)	Level (dBμV/m)	Duty Cycle Correction (dB)	Corrected Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2390.000	43.7	0.5	44.2	54.0	9.8	Complied

Transmitter Band Edge Radiated Emissions (continued)**Results: Peak / 802.11g / 20 MHz / BPSK / 6 Mbps****Lower Band Edge Peak Measurement****Upper Band Edge Peak Measurement****2310 MHz to 2390 MHz Restricted Band****Upper Band Edge Average Measurement**

Transmitter Band Edge Radiated Emissions (continued)**Results: Peak / 802.11g / 20 MHz / BPSK / 9 Mbps****Results: Lower Band Edge**

Frequency (MHz)	Level (dBμV/m)	-30 dBc Limit (dBμV/m)	Margin (dB)	Result
2399.920	57.1	58.1	1.0	Complied
2400.000	56.3	58.1	1.8	Complied

Results: Upper Band Edge / Peak

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2483.500	56.0	74.0	18.0	Complied

Results: Upper Band Edge / Average

Frequency (MHz)	Level (dBμV/m)	Duty Cycle Correction (dB)	Corrected Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2483.500	41.9	0.6	42.5	54.0	11.5	Complied

Results: 2310 MHz to 2390 MHz Restricted Band / Peak

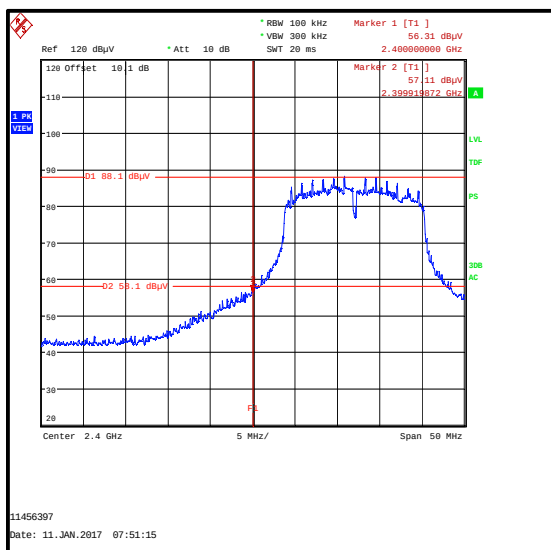
Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2389.872	60.3	74.0	13.7	Complied

Results: 2310 MHz to 2390 MHz Restricted Band / Average

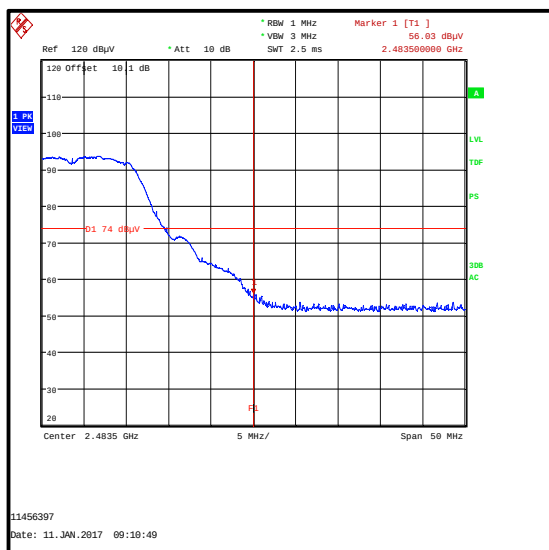
Frequency (MHz)	Level (dBμV/m)	Duty Cycle Correction (dB)	Corrected Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2390.000	43.7	0.6	44.3	54.0	9.7	Complied

Transmitter Band Edge Radiated Emissions (continued)

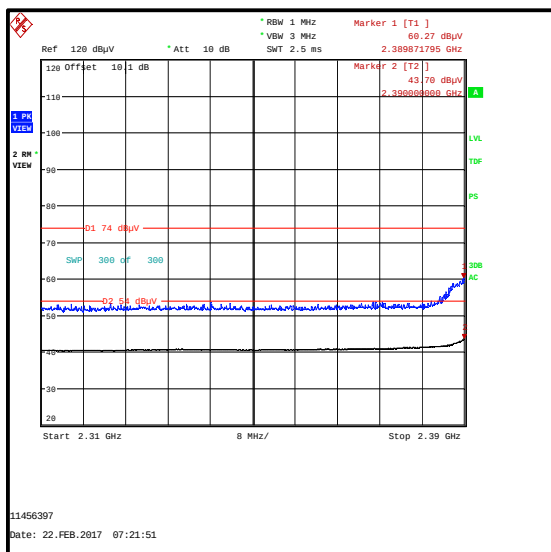
Results: Peak / 802.11g / 20 MHz / BPSK / 9 Mbps



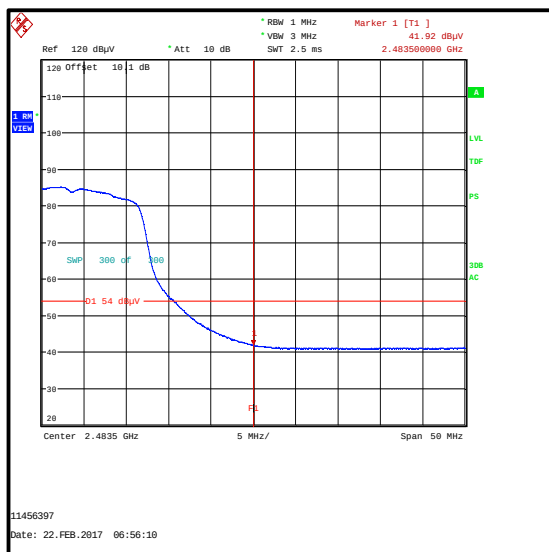
Lower Band Edge Peak Measurement



Upper Band Edge Peak Measurement



2310 MHz to 2390 MHz Restricted Band



Upper Band Edge Average Measurement

Transmitter Band Edge Radiated Emissions (continued)**Results: Peak / 802.11n HT20 / BPSK / MCS0****Results: Lower Band Edge**

Frequency (MHz)	Level (dBμV/m)	-30 dBc Limit (dBμV/m)	Margin (dB)	Result
2400.000	55.4	57.2	1.8	Complied

Results: Upper Band Edge / Peak

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2483.500	55.0	74.0	19.0	Complied
2483.981	56.3	74.0	17.7	Complied

Results: Upper Band Edge / Average

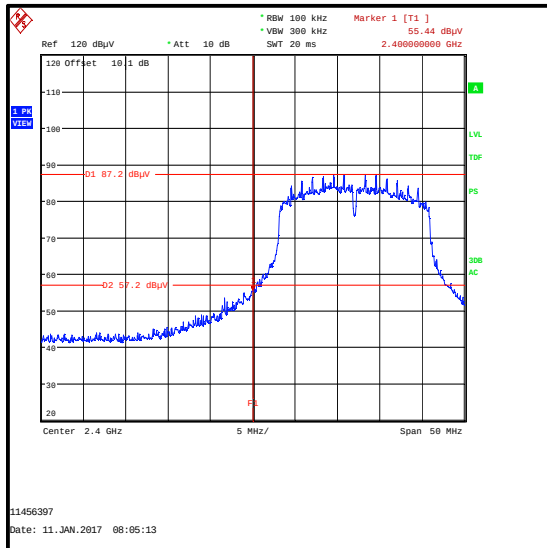
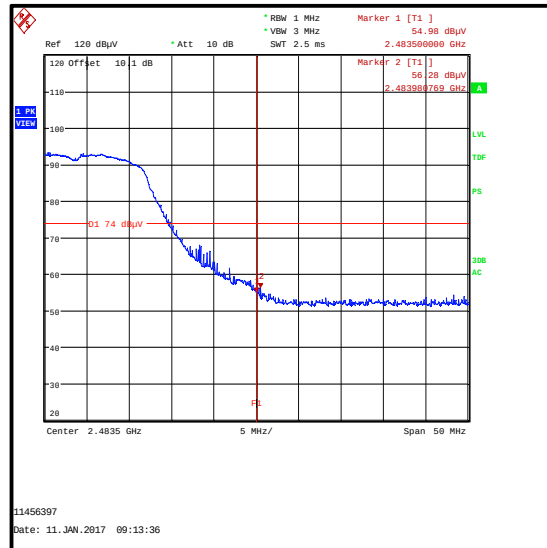
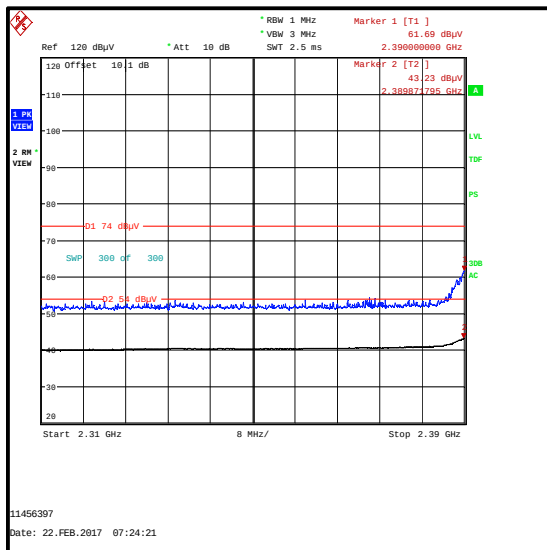
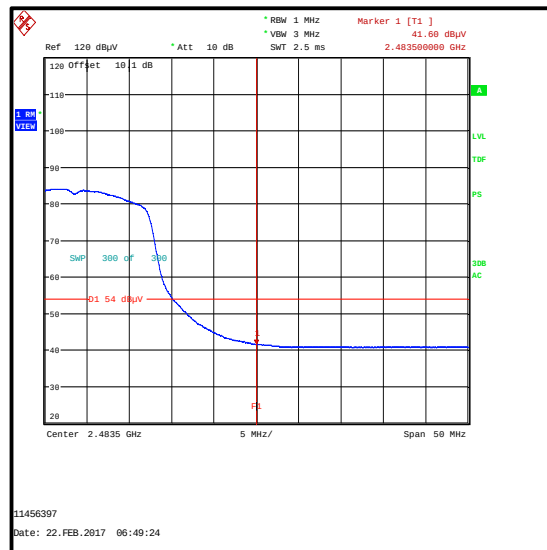
Frequency (MHz)	Level (dBμV/m)	Duty Cycle Correction (dB)	Corrected Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2483.500	41.6	0.3	41.9	54.0	12.1	Complied

Results: 2310 MHz to 2390 MHz Restricted Band / Peak

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2390.000	61.7	74.0	12.3	Complied

Results: 2310 MHz to 2390 MHz Restricted Band / Average

Frequency (MHz)	Level (dBμV/m)	Duty Cycle Correction (dB)	Corrected Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2389.872	43.2	0.3	43.5	54.0	10.5	Complied

Transmitter Band Edge Radiated Emissions (continued)**Results: Peak / 802.11n HT20 / BPSK / MCS0****Lower Band Edge Peak Measurement****Upper Band Edge Peak Measurement****2310 MHz to 2390 MHz Restricted Band****Upper Band Edge Average Measurement**

Transmitter Band Edge Radiated Emissions (continued)**Results: Peak / 802.11n HT20 / QPSK / MCS2****Results: Lower Band Edge**

Frequency (MHz)	Level (dBμV/m)	-30 dBc Limit (dBμV/m)	Margin (dB)	Result
2400.000	56.9	57.3	0.4	Complied

Results: Upper Band Edge / Restricted Band / Peak

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2483.500	53.9	74.0	20.1	Complied
2492.474	54.2	74.0	19.8	Complied

Results: Upper Band Edge / Restricted Band / Average

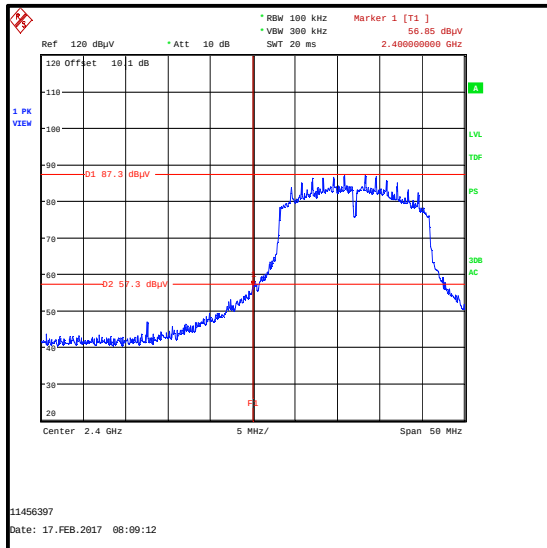
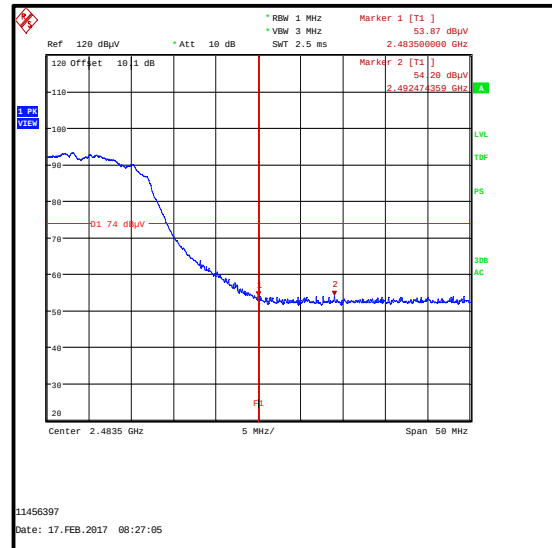
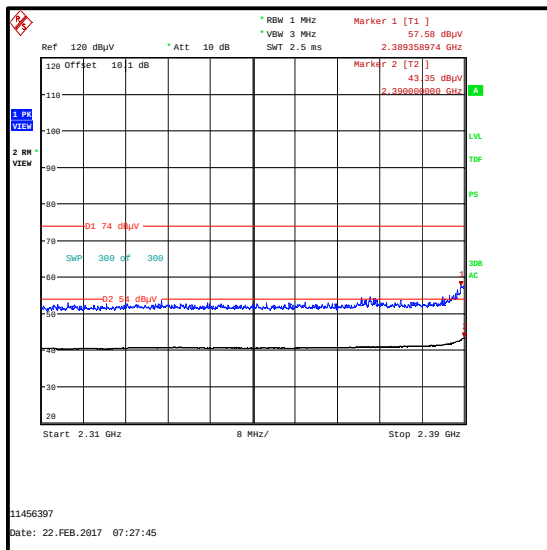
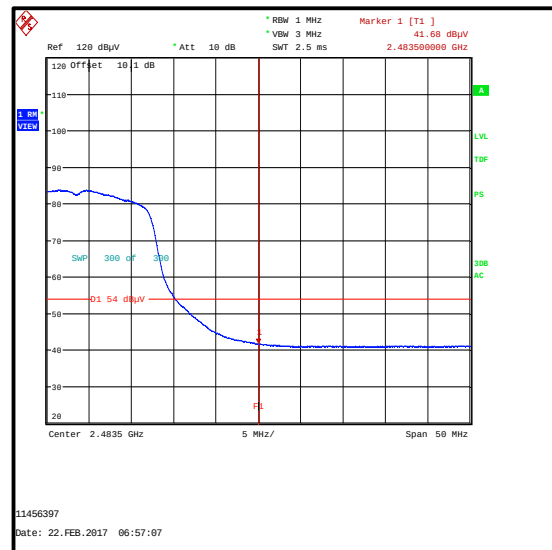
Frequency (MHz)	Level (dBμV/m)	Duty Cycle Correction (dB)	Corrected Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2483.500	41.7	1.2	42.9	54.0	11.1	Complied

Results: 2310 MHz to 2390 MHz Restricted Band / Peak

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2389.359	57.6	74.0	16.4	Complied

Results: 2310 MHz to 2390 MHz Restricted Band / Average

Frequency (MHz)	Level (dBμV/m)	Duty Cycle Correction (dB)	Corrected Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2390.000	43.4	1.2	44.6	54.0	9.4	Complied

Transmitter Band Edge Radiated Emissions (continued)**Results: Peak / 802.11n HT20 / QPSK / MCS2****Lower Band Edge Peak Measurement****Upper Band Edge Peak Measurement****2310 MHz to 2390 MHz Restricted Band****Upper Band Edge Average Measurement**

Transmitter Band Edge 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	02 Apr 2017	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	16 Nov 2017	12
M1886	Test Receiver	Rohde & Schwarz	ESU26	100554	21 Mar 2017	12
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	09 Nov 2017	12
A1818	Antenna	EMCO	3115	00075692	08 Nov 2017	12
A1396	Attenuator	Huber & Suhner	6810.17.B	757987	26 Apr 2017	12

6. Measurement Uncertainty

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor such that a confidence level of approximately 95% is maintained. For the purposes of this document "approximately" is interpreted as meaning "effectively" or "for most practical purposes".

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
Minimum 6 dB Bandwidth	2.4 GHz to 2.4835 GHz	95%	±4.59 %
Duty Cycle	2.4 GHz to 2.4835 GHz	95%	±1.14 %
Spectral Power Density	2.4 GHz to 2.4835 GHz	95%	±1.13 dB
Conducted Maximum Output Power	2.4 GHz to 2.4835 GHz	95%	±1.13 dB
Radiated Spurious Emissions	30 MHz to 1 GHz	95%	±5.65 dB
Radiated Spurious Emissions	1 GHz to 25 GHz	95%	±2.94 dB

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty the published guidance of the appropriate accreditation body is followed.

7. Report Revision History

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

--- END OF REPORT ---