TEST REPORT

Test Report No. : UL-RPT-RP11081018JD09A

Manufacturer	:	Axis Communications AB
Model No.	:	Axis Companion Recorder
FCC ID	:	PNB-AXISS2108
Technology	:	WLAN (IEEE 802.11a & n)
Test Standard(s)	:	FCC Parts 15.207, 15.209(a) & 15.247

1. This test report shall not be reproduced in full or partial, without the written approval of UL VS LTD.
2. The results in this report apply only to the sample(s) tested.
3. The sample tested is in compliance with the above standard(s).
4. The test results in this report are traceable to the national or international standards.
5. Version 1.0.

Date of Issue: 08 April 2016

Checked by:

Ian Watch
Senior Engineer, Radio Laboratory

Company Signatory:

Steven White
Service Lead, Radio Laboratory
UL VS LTD

0644

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

UL VS LTD

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1. Customer Information

Company Name:	Axis Communications AB
Address:	Emdalavägen 14 S-223 69 Lund Sweden

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:	47CFR15.207 and 47CFR15.209
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Sections 15.207 and 15.209
Site Registration:	209735
Location of Testing:	UL VS LTD, Unit 3 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, RG24 8AH, United Kingdom
Test Dates:	23 January 2016 to 08 March 2016

2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Result
Part 15.207	Transmitter AC Conducted Emissions	✓
Part 15.247(a)(2)	Transmitter Minimum 6 dB Bandwidth	✓
Part 15.35(c)	Transmitter Duty Cycle	Note 1
Part 15.247(e)	Transmitter Power Spectral Density	✓
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 for Testing Unlicensed Wireless Devices
Reference:	KDB 174176 D01 v01r01, June 3, 2015
Title:	AC Power-Line Conducted Emissions, Frequently Asked Questions
Reference:	KDB 558074 D01 DTS Meas Guidance v03r04 January 7, 2016
Title:	Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247

2.4. Deviations from the Test Specification

For the measurements contained within this test report, there were no deviations from, additions to, or exclusions from the test specification identified above.

3. Equipment Under Test (EUT)

3.1. Identification of Equipment Under Test (EUT)

Brand Name:	Axis Communications AB
Model Name or Number:	Axis Companion Recorder
Test Sample Serial Number:	00408C1866C1
Hardware Version:	1478039 R6
Software Version:	Axis-image-nvr-s2108-20160118105735.fimage
FCC ID:	PNB-AXISS2108

Brand Name:	Axis Communications AB
Model Name or Number:	Axis Companion Recorder
Test Sample Serial Number:	ACCC8E35FB65
Hardware Version:	1478039 R10
Software Version:	Axis-image-nvr-s2108-20160118105735.fimage
FCC ID:	PNB-AXISS2108

3.2. Description of EUT

The Equipment Under Test was a network video recorder that operates as an access point. It contains a WLAN radio transceiver that operates within the 2.4 GHz band. It is powered from an AC to DC power supply and equipped with a fixed internal antenna mounted on the PCB.

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 Mbit/s
	802.11g	6, 9, 12, 18, 24, 36, 48 & 54 Mbit/s
	802.11n HT20	MCS0 to MCS7
Power Supply Requirement(s):	Nominal	48 VDC via 120 VAC 60 Hz adaptor
Maximum Conducted Output Power:	13.2 dBm	
Antenna Gain:	2.8 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:

Brand Name:	FSP GROUP INC.
Description:	Switching Power Adaptor
Model Name or Number:	FSP090-AFAN2
Serial Number:	H000000010

Brand Name:	Laptop PC
Description:	Lenovo
Model Name or Number:	L440
Serial Number:	R9-019E9Z 14/04

Brand Name:	Kingston
Description:	USB Flash Disk
Model Name or Number:	DataTraveler 100 G3
Serial Number:	Not marked or stated

Brand Name:	Ethernet cable, length 1.2 metres
Description:	Not marked or stated
Model Name or Number:	Not marked or stated
Serial Number:	Not marked or stated

Brand Name:	Hirose Electric Europe B.V.
Description:	RF cable with SMA and MS-180 series male connector (1.5 dB insertion loss and 0.1 metre length)
Model Name or Number:	MS180LH1-HRMJ-088V100
Serial Number:	Not marked or stated

Brand Name:	AXIS
Description:	Network Camera with 1.9 metres Ethernet cable
Model Name or Number:	M3006-V
Serial Number:	ACCC8E010D11

Brand Name:	AXIS
Description:	Network Camera with 1.9 metres Ethernet cable
Model Name or Number:	M3006-V
Serial Number:	ACCC8E010D72

Support Equipment (continued)

Brand Name:	AXIS
Description:	Network Camera with 1.9 metres Ethernet cable
Model Name or Number:	M3006-V
Serial Number:	ACCC8E010D64

Brand Name:	AXIS
Description:	Network Camera with 1.9 metres Ethernet cable
Model Name or Number:	M3006-V
Serial Number:	ACCC8E010D70

Brand Name:	AXIS
Description:	Network Camera with 1.9 metres Ethernet cable
Model Name or Number:	M3006-V
Serial Number:	ACCC8E010D66

Brand Name:	AXIS
Description:	Network Camera with 1.9 metres Ethernet cable
Model Name or Number:	M3006-V
Serial Number:	ACCC8E010CAC

Brand Name:	AXIS
Description:	Network Camera with 1.9 metres Ethernet cable
Model Name or Number:	M3006-V
Serial Number:	ACCC8E010D7C

Brand Name:	AXIS
Description:	Network Camera with 1.9 metres Ethernet cable
Model Name or Number:	M3006-V
Serial Number:	ACCC8E010D2D

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

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

- Continuously transmitting 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):

- Controlled using the chipset manufacturers 'wl' development tool. This was run from within the terminal application on the EUT. The application was used to enable continuous transmission, select the test channels, data rates, modulation schemes and power levels as required.
- For AC conducted emissions, radiated emissions and band edge radiated emissions the EUT's hard drive was forced to operate in a manner representative of a worst case real life operating mode. Data were streamed and stored in the EUT's hard drive. This was done using test commands via *PuTTY Release 0.63*. Test instructions were supplied by the customer in document *test_helpu4.txt*, archived on the UL VS LTD IT server. The network cameras were connected to the EUT via Ethernet cables.
- All supported modes and channel widths were initially investigated on one channel. The modes that produced the highest power and narrowest bandwidth for all bands were:
    - Highest power, power spectral density and widest occupied bandwidth
        - 802.11b – DQPSK / 2 Mbit/s
        - 802.11g – BPSK / 9 Mbit/s
        - 802.11n HT20 – BPSK / 6.5 Mbit/s / MCS0
    - Narrowest 6 dB bandwidth
        - 802.11b – DQPSK / 5.5 Mbit/s
        - 802.11g – BPSK / 9 Mbit/s
        - 802.11n HT20 – BPSK / 6.5 Mbit/s / MCS0

  Pre-scan results for all modes are archived on the UL VS LTD IT server and available for inspection if required.
- EUT was equipped with a *Hirose Electric Europe B.V. MS-180 series* RF female connector. For conducted tests, an RF cable with *SMA* and *MS-180 series RF male connector* were used to connect the EUT to a spectrum analyser.
- Transmitter spurious emissions were performed with the EUT transmitting with 802.11b / 2 Mbit/s. This was found to be the worst case modulation scheme 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.
- Transmitter radiated spurious emissions and AC conducted emissions tests, were performed with all ports terminated, employing all available accessories. Test sample with Serial Number 00408C1866C1 was used for minimum 6 dB bandwidth, duty cycle, maximum output power and power spectral density tests.
- Test sample with Serial Number ACCC8E35FB65 was used for AC conducted emissions and band edge radiated emissions tests.
- Test samples with Serial Numbers 00408C1866C1 and ACCC8E35FB65 were used for radiated emissions tests.

4.3. Power settings used during testing

The table below shows the power settings that were used during testing, in the form of q values

Wireless standard	q value
802.11b	47
802.11g	42
802.11n	40

5. Measurements, Examinations and Derived Results

5.1. General Comments

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

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

5.2. Test Results

5.2.1. Transmitter AC Conducted Spurious Emissions

Test Summary:

Test Engineer:	Georgios Vrezas	**Test Date:**	03 March 2016
Test Sample Serial Number:	ACCC8E35FB65		

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

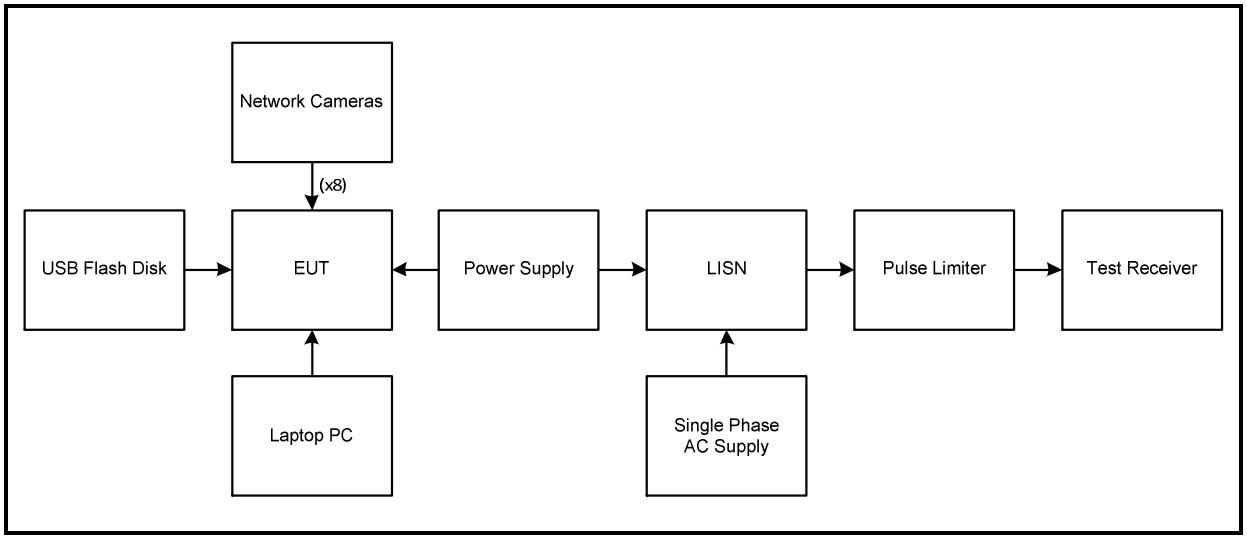
Environmental Conditions:

Temperature (°C):	22
Relative Humidity (%):	35

Note(s):

1. The EUT was connected to a power supply. The power supply was connected to 120 VAC 60 Hz single phase supply via a LISN.
2. In accordance with KDB 174176 Q4, tests were also performed with the power supply connected to a 240 VAC 60 Hz single phase supply via a LISN.
3. A pulse limiter was fitted between the LISN and the test receiver.
4. 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.

Test setup:



Transmitter AC Conducted Spurious Emissions (continued)

Results: Live / Quasi Peak / 120 VAC 60 Hz

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.272	Live	31.7	61.1	29.4	Complied
0.555	Live	27.8	56.0	28.2	Complied
2.292	Live	33.6	56.0	22.4	Complied
6.486	Live	35.7	60.0	24.3	Complied
16.076	Live	45.5	60.0	14.5	Complied
16.611	Live	48.1	60.0	11.9	Complied

Results: Live / Average / 120 VAC 60 Hz

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.348	Live	28.1	49.0	20.9	Complied
0.695	Live	23.0	46.0	23.0	Complied
2.355	Live	27.6	46.0	18.4	Complied
7.296	Live	33.5	50.0	16.5	Complied
16.071	Live	43.5	50.0	6.5	Complied
16.611	Live	45.6	50.0	4.4	Complied

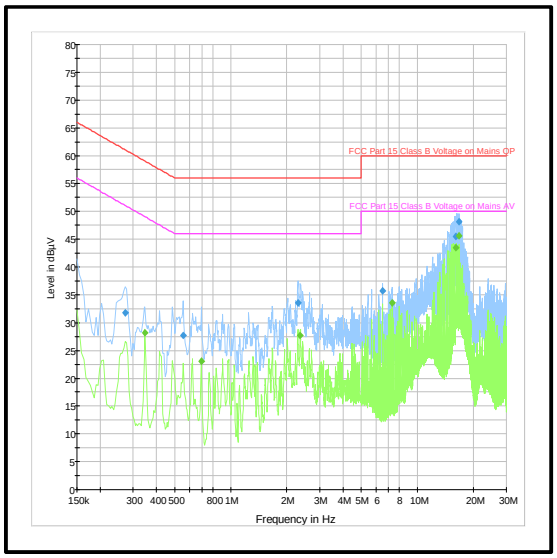
Results: Neutral / Quasi Peak / 120 VAC 60 Hz

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.276	Neutral	30.6	60.9	30.3	Complied
0.416	Neutral	27.2	57.5	30.3	Complied
2.346	Neutral	33.8	56.0	22.2	Complied
6.207	Neutral	32.2	60.0	27.8	Complied
15.513	Neutral	49.8	60.0	10.2	Complied
16.323	Neutral	51.5	60.0	8.5	Complied

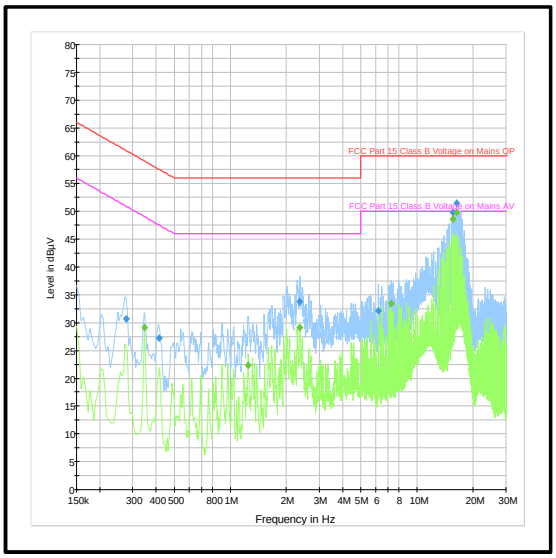
Results: Neutral / Average / 120 VAC 60 Hz

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.348	Neutral	29.1	49.0	19.9	Complied
1.248	Neutral	22.3	46.0	23.7	Complied
2.351	Neutral	29.1	46.0	16.9	Complied
7.283	Neutral	33.5	50.0	16.5	Complied
15.513	Neutral	48.6	50.0	1.4	Complied
16.323	Neutral	49.8	50.0	0.2	Complied

Transmitter AC Conducted Spurious Emissions (continued)



Live / 120 VAC 60 Hz



Neutral / 120 VAC 60 Hz

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

Transmitter AC Conducted Spurious Emissions (continued)

Results: Live / Quasi Peak / 240 VAC 60 Hz

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.366	Live	37.9	58.6	20.7	Complied
0.528	Live	33.1	56.0	22.9	Complied
0.722	Live	34.4	56.0	21.6	Complied
15.765	Live	49.3	60.0	10.7	Complied
16.575	Live	49.6	60.0	10.4	Complied
17.381	Live	47.7	60.0	12.3	Complied

Results: Live / Average / 240 VAC 60 Hz

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.290	Live	32.9	50.5	17.6	Complied
0.366	Live	33.7	48.6	14.9	Complied
0.717	Live	29.5	46.0	16.5	Complied
15.765	Live	46.9	50.0	3.1	Complied
16.035	Live	46.5	50.0	3.5	Complied
16.575	Live	46.3	50.0	3.7	Complied

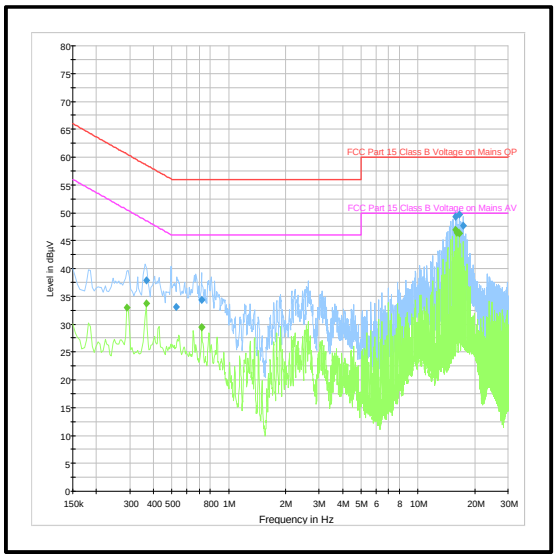
Results: Neutral / Quasi Peak / 240 VAC 60 Hz

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.366	Neutral	38.3	58.6	20.3	Complied
0.650	Neutral	33.1	56.0	22.9	Complied
3.044	Neutral	33.9	56.0	22.1	Complied
16.296	Neutral	47.1	60.0	12.9	Complied
16.566	Neutral	50.5	60.0	9.5	Complied
16.836	Neutral	48.3	60.0	11.7	Complied

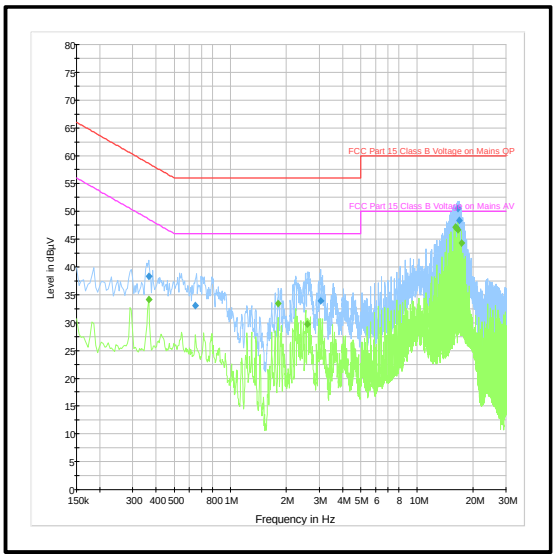
Results: Neutral / Average / 240 VAC 60 Hz

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.366	Neutral	34.2	48.6	14.4	Complied
1.793	Neutral	33.4	46.0	12.6	Complied
2.576	Neutral	29.7	46.0	16.3	Complied
16.031	Neutral	47.2	50.0	2.8	Complied
16.571	Neutral	46.7	50.0	3.3	Complied
17.376	Neutral	44.3	50.0	5.7	Complied

Transmitter AC Conducted Spurious Emissions (continued)



Live / 240 VAC 60 Hz



Neutral / 240 VAC 60 Hz

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

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1625	Thermohygrometer	JM Handelspunkt	890603/002	None stated	11 Jan 2017	12
A067	LISN	Rohde & Schwarz	ESH3-Z5	890603/002	27 Aug 2016	12
A1829	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100671	26 Mar 2016	12
M1263	Test Receiver	Rohde & Schwarz	ESIB7	100265	16 Oct 2016	12
S0539	Variable AC Power Supply	Kikusui	PCR 1000L	13010170	Calibrated before use	-
M1229	Multimeter	Fluke	179	87640015	23 Apr 2016	12

5.2.2. Transmitter Minimum 6 dB Bandwidth

Test Summary:

Test Engineer:	Georgios Vrezas	**Test Date:**	24 February 2016
Test Sample Serial Number:	00408C1866C1		

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

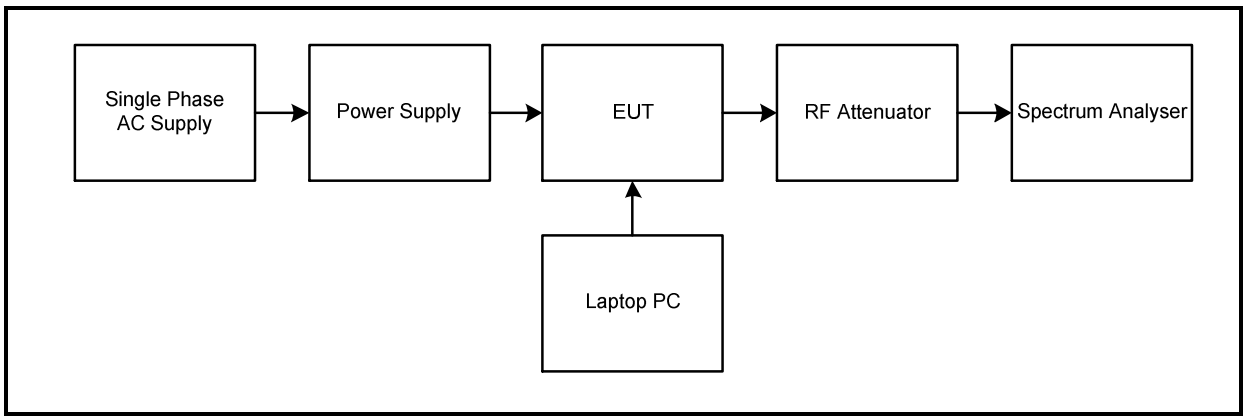
Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	22

Note(s):

1. All supported modes and channel widths were initially investigated on one channel. The modes that produced the narrowest bandwidth were:
    - 802.11b – DQPSK / 5.5 Mbit/s
    - 802.11g – BPSK / 9 Mbit/s
    - 802.11n HT20 – BPSK / 6.5 Mbit/s / 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 cables.

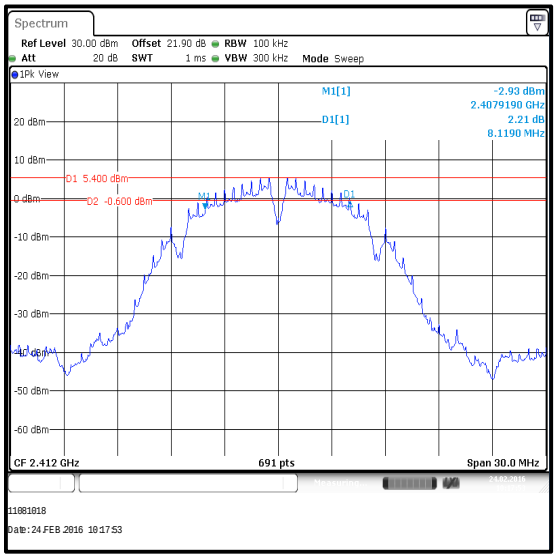
Test setup:



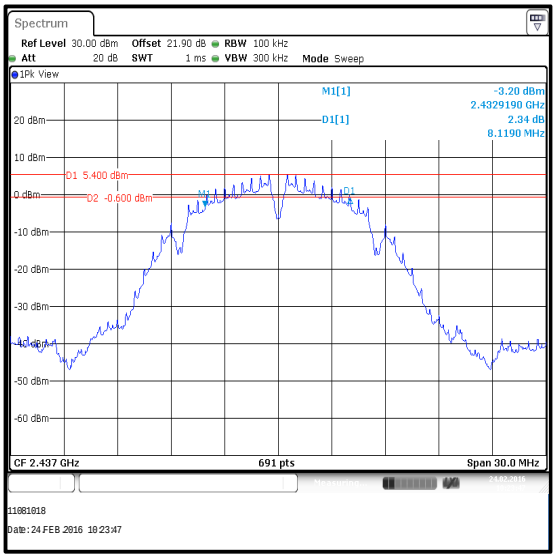
Transmitter Minimum 6 dB Bandwidth (continued)

Results: 802.11b / 20 MHz / DQPSK / 5.5 Mbit/s

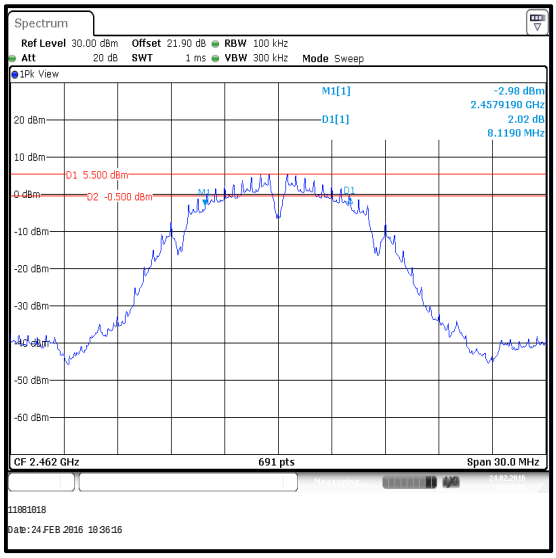
Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	8119	≥500	7619	Complied
Middle	8119	≥500	7619	Complied
Top	8119	≥500	7619	Complied



Bottom Channel



Middle Channel

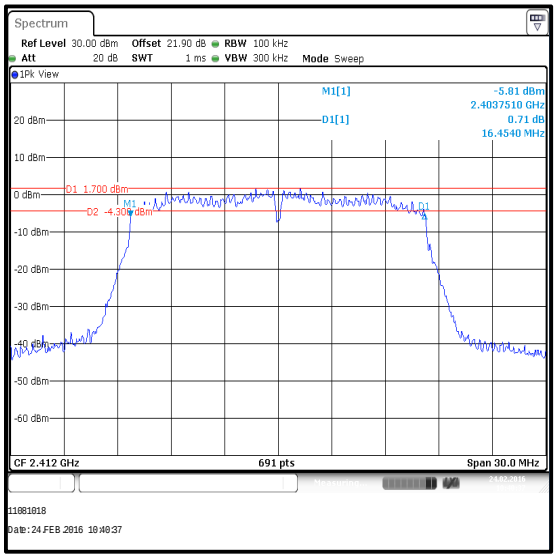


Top Channel

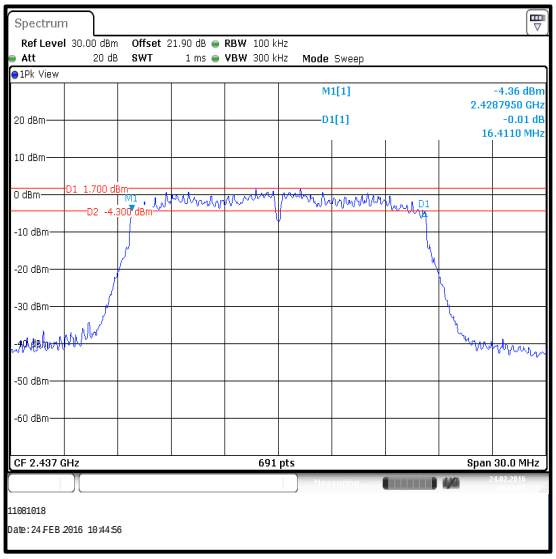
Transmitter Minimum 6 dB Bandwidth (continued)

Results: 802.11g / 20 MHz / BPSK / 9 Mbit/s

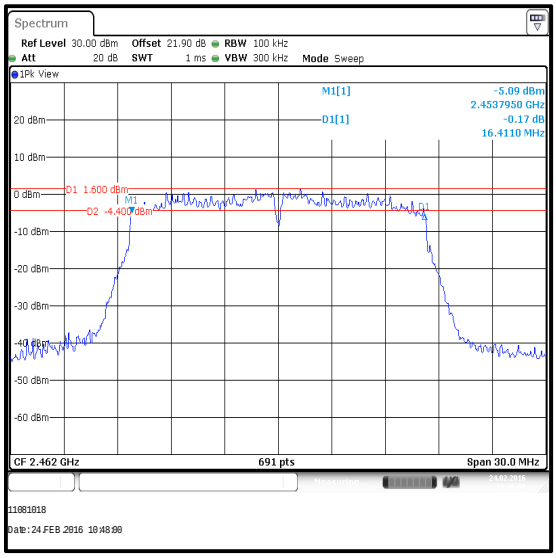
Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	16454	≥500	15954	Complied
Middle	16411	≥500	15911	Complied
Top	16411	≥500	15911	Complied



Bottom Channel



Middle Channel

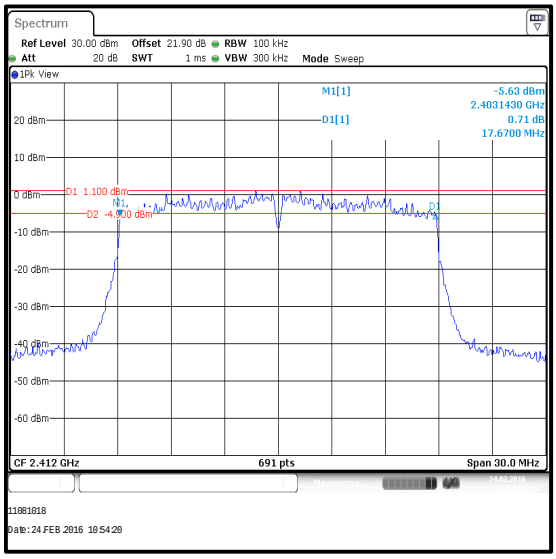


Top Channel

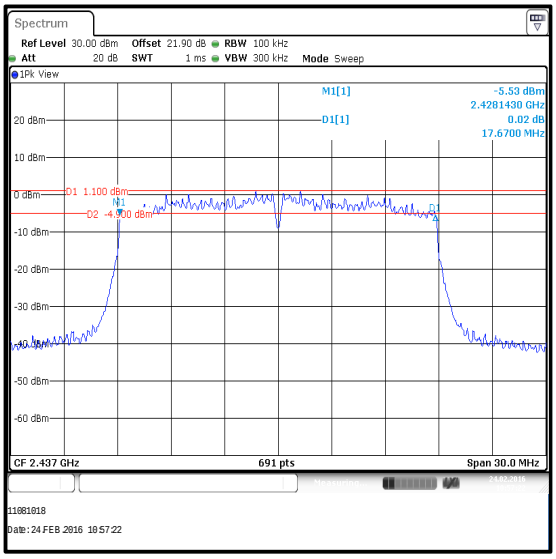
Transmitter Minimum 6 dB Bandwidth (continued)

Results: 802.11n / HT20 / BPSK / MCS0

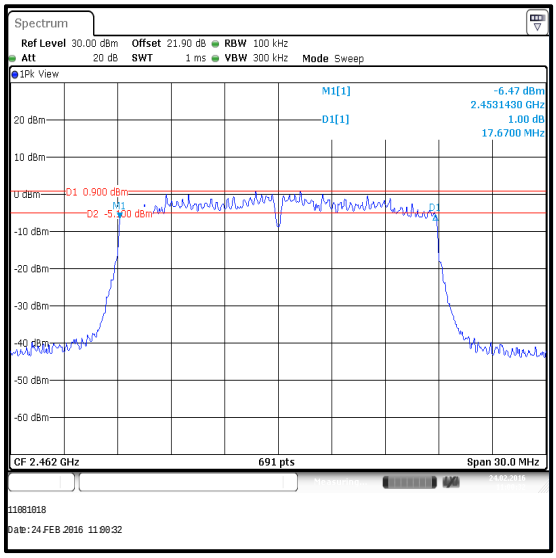
Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	17670	≥500	17170	Complied
Middle	17670	≥500	17170	Complied
Top	17670	≥500	17170	Complied



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)
M1785	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	23 Apr 2016	12
M1873	Signal Analyser	Rohde & Schwarz	FSV30	103074	03 Jul 2016	12
A1999	Attenuator	Huber + Suhner AG	6820.17.B	07101	Calibrated before use	-
M1252	Signal Generator	Hewlett Packard	83640A	3119A00489	26 Oct 2017	24

5.2.3. Transmitter Duty Cycle

Test Summary:

Test Engineer:	Georgios Vrezas	**Test Date:**	24 February 2016
Test Sample Serial Number:	00408C1866C1		

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

Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	22

Note(s):

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

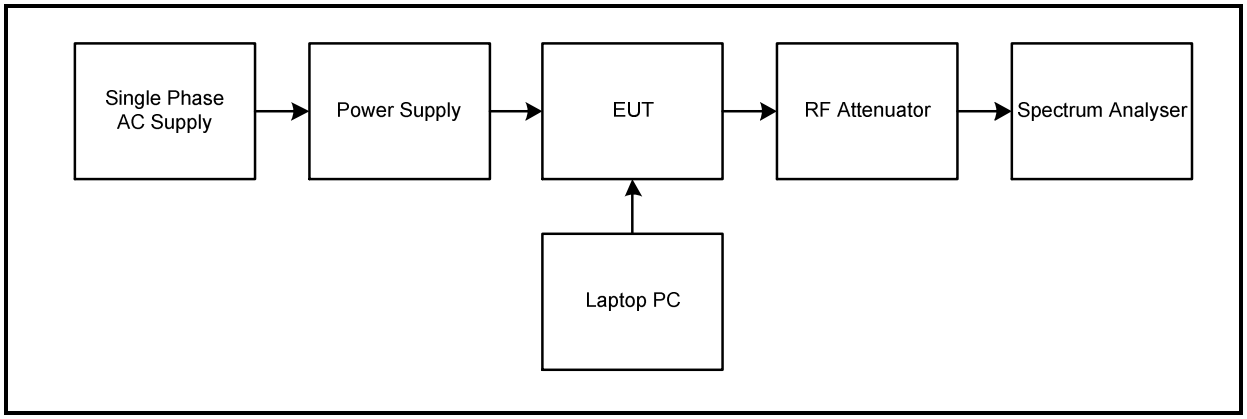
   10 log (1 / (On Time / [Period or 100 ms whichever is the lesser])).

   802.11g / 20 MHz / 9 Mbit/s duty cycle 10 log (1 / (956.520/1010.870)) = 0.2 dB

   802.11n / HT20 / MCS0 duty cycle: 10 log (1 / (1333.333/1387.680)) = 0.2 dB

2. For 802.11b, the duty cycle was measured and calculated to be greater than 98%.

Test setup:

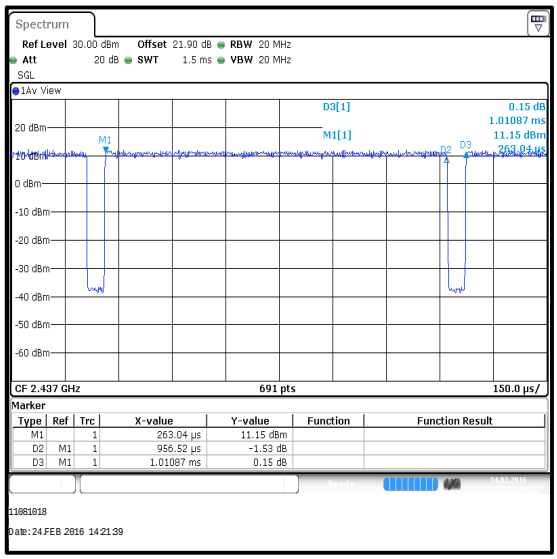


Transmitter Duty Cycle (continued)

Results: 802.11g / 20 MHz / 9 Mbit/s

Pulse Duration (µs)	Duty Cycle (dB)
956.520	0.2

Period (µs)
1010.870

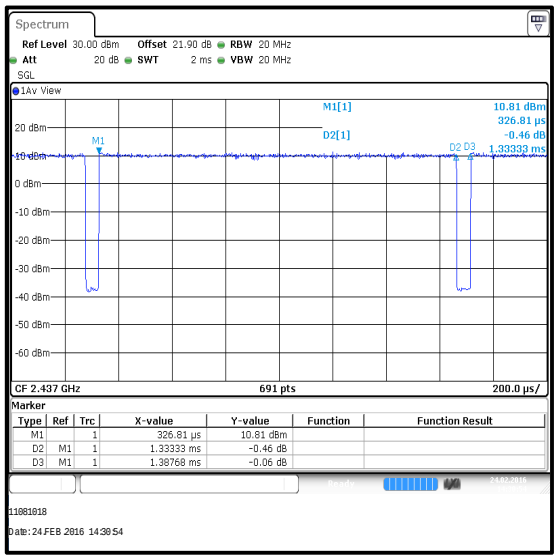


Transmitter Duty Cycle (continued)

Results: 802.11n / HT20 / MCS0

Pulse Duration (µs)	Duty Cycle (dB)
1333.333	0.2

Period (µs)
1387.680



Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1785	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	23 Apr 2016	12
M1873	Signal Analyser	Rohde & Schwarz	FSV30	103074	03 Jul 2016	12
A1999	Attenuator	Huber + Suhner AG	6820.17.B	07101	Calibrated before use	-
M1252	Signal Generator	Hewlett Packard	83640A	3119A00489	26 Oct 2017	24

5.2.4. Transmitter Power Spectral Density

Test Summary:

Test Engineer:	Georgios Vrezas	**Test Date:**	23 February 2016
Test Sample Serial Number:	00408C1866C1		

FCC Reference:	Part 15.247(e)
Test Method Used:	FCC KDB 558074 Sections 10.3 &10.5

Environmental Conditions:

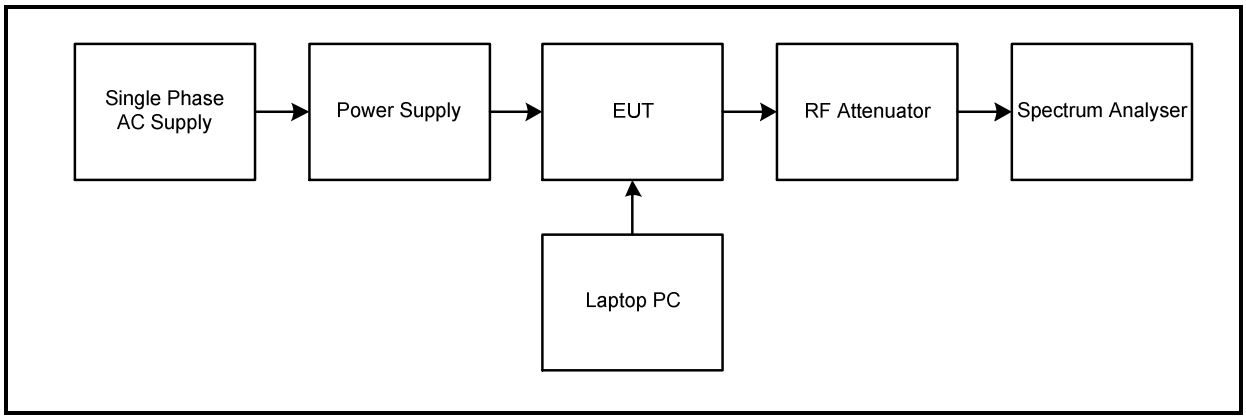
Temperature (°C):	25
Relative Humidity (%):	28

Note(s):

1. All supported modes and channel widths were initially investigated on one channel. The modes that produced the highest power spectral density were:
    - 802.11b – DQPSK / 2 Mbit/s
    - 802.11g – BPSK / 9 Mbit/s
    - 802.11n HT20 – BPSK / 6.5 Mbit/s / MCS0
2. Final measurements were performed using the above configurations on the bottom, middle and top channels.
3. For 802.11b, the EUT was transmitting at 100% duty cycle and testing was performed in accordance with KDB 558074 Section 10.3 Method AVGPSD-1. 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 30 MHz. The highest peak of the measured signal was recorded.
4. For 802.11g and 802.11n, the EUT was transmitting at <98% duty cycle and testing was performed in accordance with KDB 558074 Section 10.5 Method AVGPSD-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 30 MHz. The highest peak of the measured signal was recorded. The duty cycle calculated in Section 5.2.3 of this test report was added to the measured average power spectral density in order to compute the average power spectral density during the actual transmission time.
5. 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 cables.
6. Plots for all data rates are archived on the UL VS LTD IT server and available for inspection upon request.

Transmitter Power Spectral Density (continued)

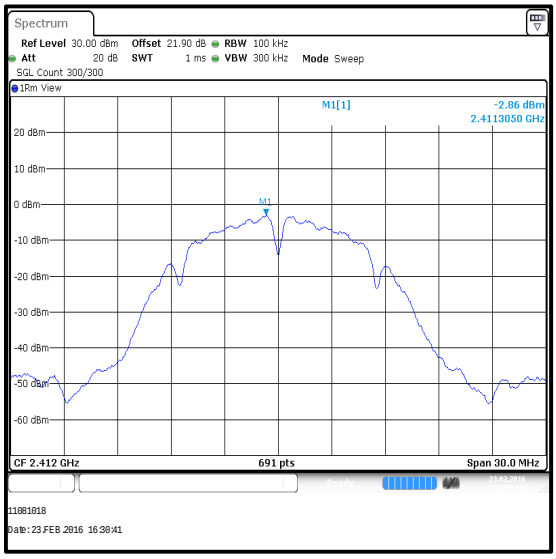
Test setup:



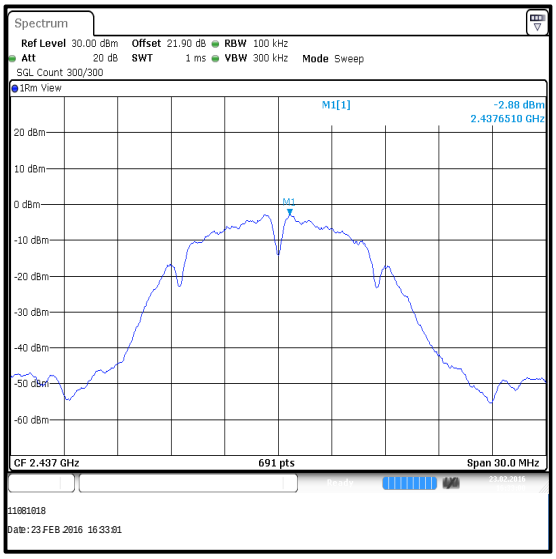
Transmitter Power Spectral Density (continued)

Results: 802.11b / 20 MHz / DQPSK / 2 Mbit/s

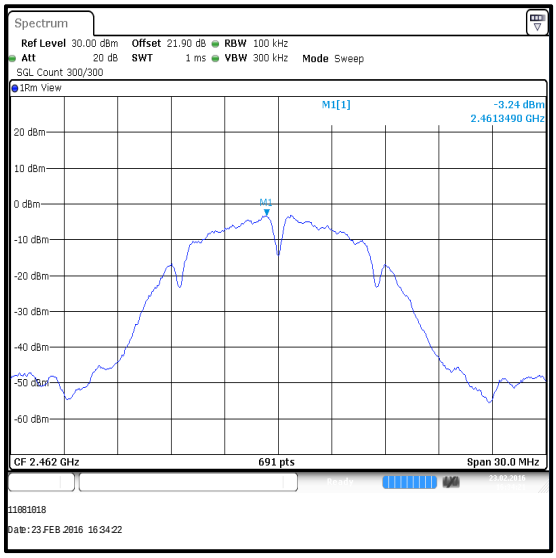
Channel	Output Power (dBm/3 kHz)	Limit (dBm/3kHz)	Margin (dB)	Result
Bottom	-2.9	8.0	10.9	Complied
Middle	-2.9	8.0	10.9	Complied
Top	-3.2	8.0	11.2	Complied



Bottom Channel



Middle Channel

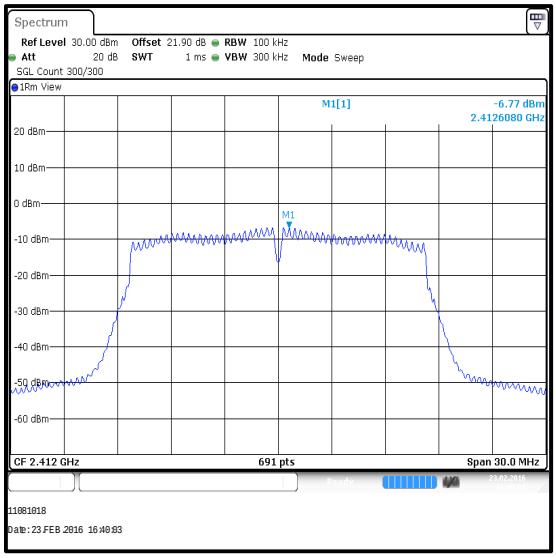


Top Channel

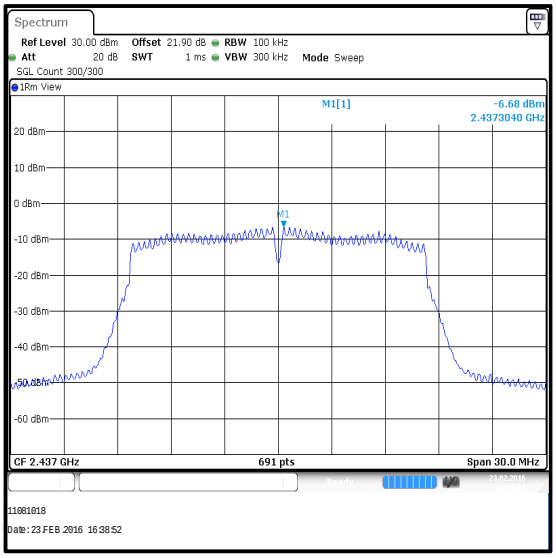
Transmitter Power Spectral Density (continued)

Results: 802.11g / 20 MHz / BPSK / 9 Mbit/s

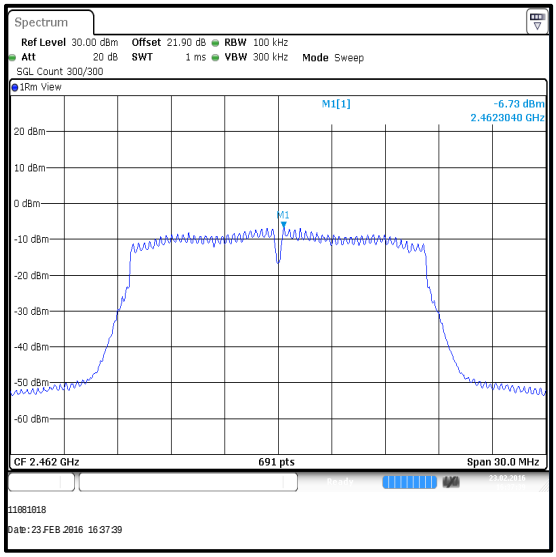
Channel	Output Power (dBm/3 kHz)	Duty Cycle Correction (dB)	Corrected Output Power (dBm/3 kHz)	Limit (dBm/3 kHz)	Margin (dB)	Result
Bottom	-6.8	0.2	-6.6	8.0	14.6	Complied
Middle	-6.7	0.2	-6.5	8.0	14.5	Complied
Top	-6.7	0.2	-6.5	8.0	14.5	Complied



Bottom Channel



Middle Channel

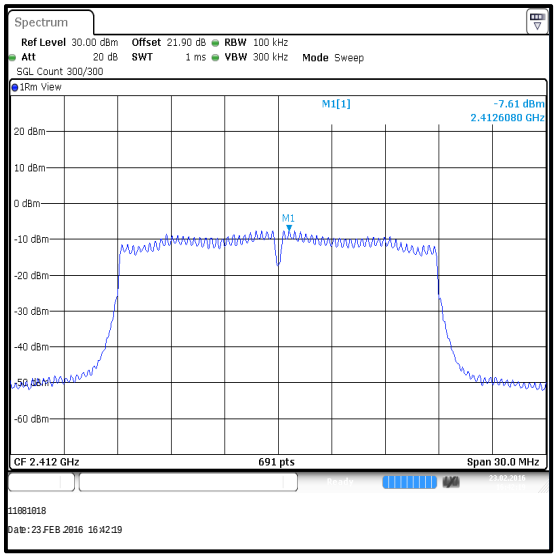


Top Channel

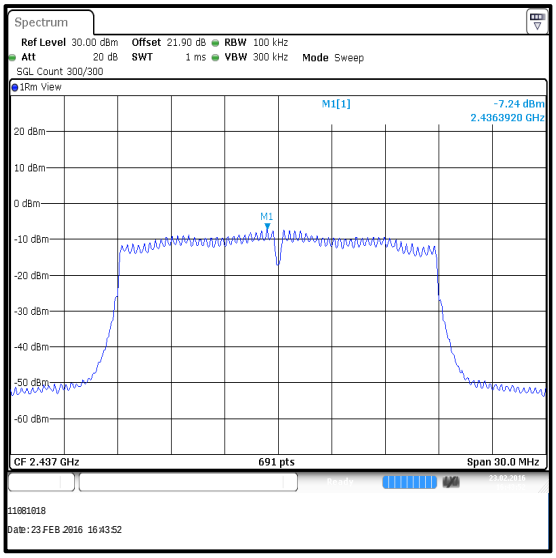
Transmitter Power Spectral Density (continued)

Results: 802.11n / HT20 / BPSK / MCS0

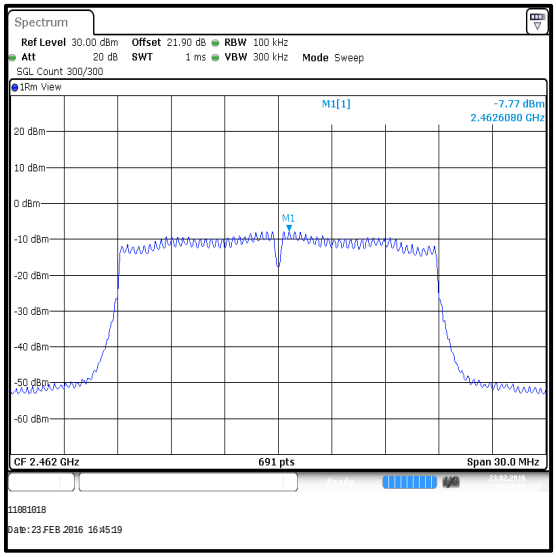
Channel	Output Power (dBm/3 kHz)	Duty Cycle Correction (dB)	Corrected Output Power (dBm/3 kHz)	Limit (dBm/3kHz)	Margin (dB)	Result
Bottom	-7.6	0.2	-7.4	8.0	15.4	Complied
Middle	-7.2	0.2	-7.0	8.0	15.0	Complied
Top	-7.8	0.2	-7.6	8.0	15.6	Complied



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)
M1785	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	23 Apr 2016	12
M1873	Signal Analyser	Rohde & Schwarz	FSV30	103074	03 Jul 2016	12
A1999	Attenuator	Huber + Suhner AG	6820.17.B	07101	Calibrated before use	-
M1252	Signal Generator	Hewlett Packard	83640A	3119A00489	26 Oct 2017	24

5.2.5. Transmitter Maximum (Average) Output Power

Test Summary:

Test Engineer:	Georgios Vrezas	**Test Date:**	23 February 2016
Test Sample Serial Number:	00408C1866C1		

FCC Reference:	Part 15.247(b)(3)
Test Method Used:	FCC KDB 558074 Sections 9.2.2.2 & 9.2.2.4

Environmental Conditions:

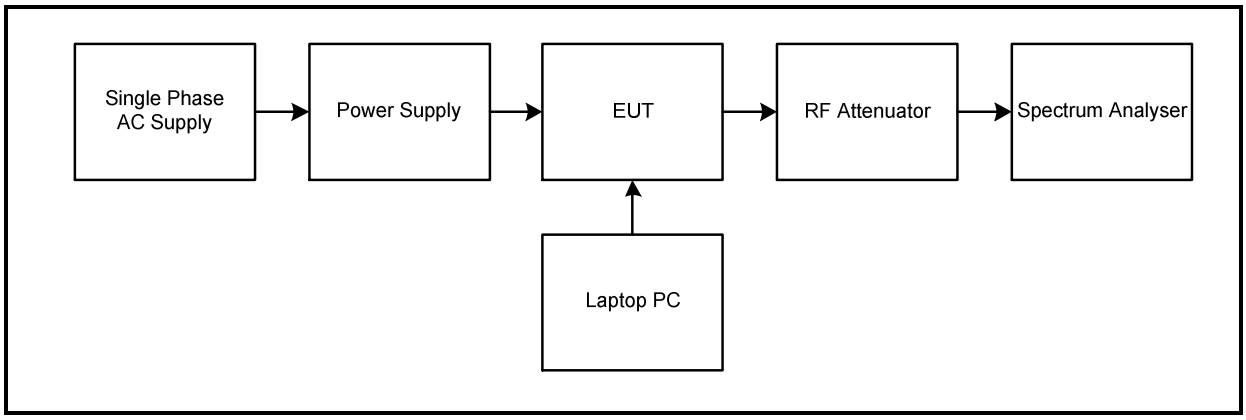
Temperature (°C):	25
Relative Humidity (%):	28

Note(s):

1. All supported modes and channel widths were initially investigated on one channel. The modes that produced the highest power spectral density were:
    - 802.11b – DQPSK / 2 Mbit/s
    - 802.11g – BPSK / 9 Mbit/s
    - 802.11n HT20 – BPSK / 6.5 Mbit/s / MCS0
2. Final measurements were performed using the above configurations on the bottom, middle and top channels. The power has been integrated over the 99% emission bandwidth. Plots for the occupied bandwidth are archived on the UL VS LTD IT server and available for inspection upon request.
3. For 802.11b, the EUT was transmitting at 100% duty cycle and testing was performed in accordance with KDB 558074 Section 9.2.2.2 Method AVGSA-1. The signal analyser's channel power function was used to integrate across the 99% occupied bandwidth. The signal analyser resolution bandwidth was set to 300 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 30 MHz.
4. For 802.11g and 802.11n, 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 300 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 30 MHz. The duty cycle calculated in Section 5.2.3 of this test report was added to the measured power in order to compute the average power during the actual transmission time.
5. 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 cables.
6. Plots for all data rates are archived on the UL VS LTD IT server and available for inspection upon request.

Transmitter Maximum (Average) Output Power (continued)

Test setup:



Transmitter Maximum (Average) Output Power (continued)

Results: 802.11b / 20 MHz / DQPSK / 2 Mbit/s

Conducted Peak Limit Comparison

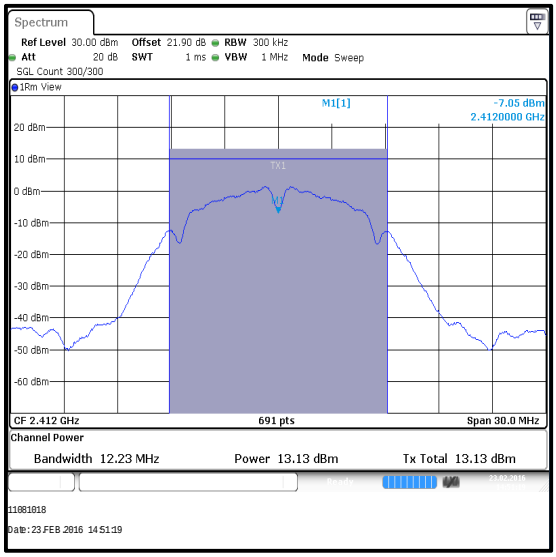
Channel	Conducted Power (dBm)	Conducted Power Limit (dBm)	Margin (dB)	Result
Bottom	13.1	30.0	16.9	Complied
Middle	13.2	30.0	16.8	Complied
Top	13.0	30.0	17.0	Complied

De Facto EIRP Limit Comparison

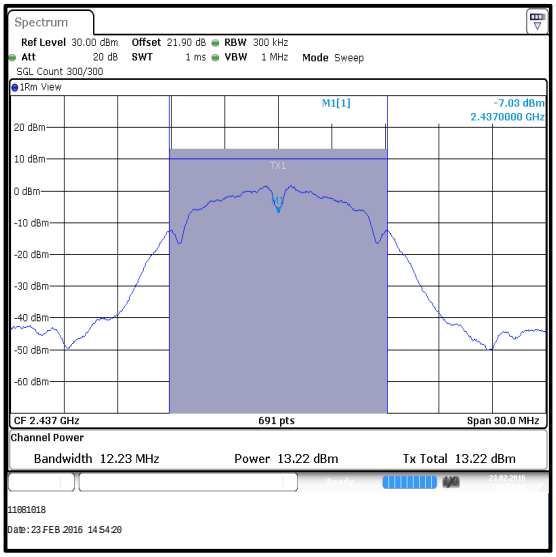
Channel	Conducted Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	13.1	2.8	15.9	36.0	20.1	Complied
Middle	13.2	2.8	16.0	36.0	20.0	Complied
Top	13.0	2.8	15.8	36.0	20.2	Complied

Transmitter Maximum (Average) Output Power (continued)

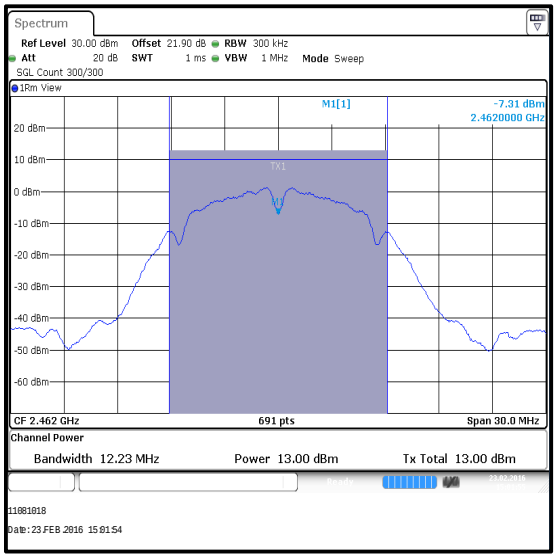
Results: 802.11b / 20 MHz / DQPSK / 2 Mbit/s



Bottom Channel



Middle Channel



Top Channel

Transmitter Maximum (Average) Output Power (continued)

Results: 802.11g / 20 MHz / BPSK / 9 Mbit/s

Conducted Peak Limit Comparison

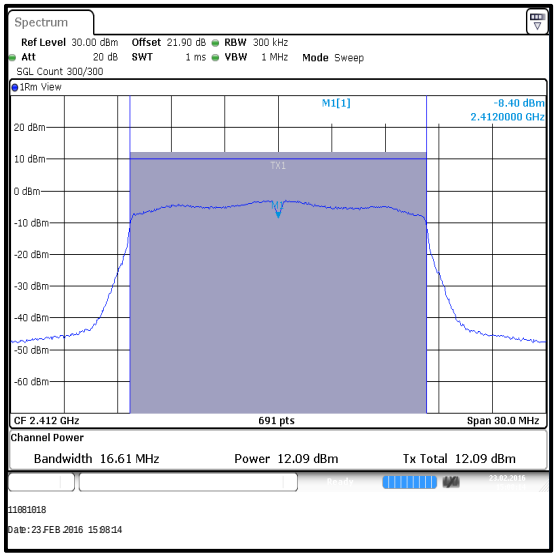
Channel	Conducted Power (dBm)	Duty Cycle Correction (dB)	Corrected Conducted Power (dBm)	Conducted Power Limit (dBm)	Margin (dB)	Result
Bottom	12.1	0.2	12.3	30.0	17.7	Complied
Middle	12.0	0.2	12.2	30.0	17.8	Complied
Top	11.9	0.2	12.1	30.0	17.9	Complied

De Facto EIRP Limit Comparison

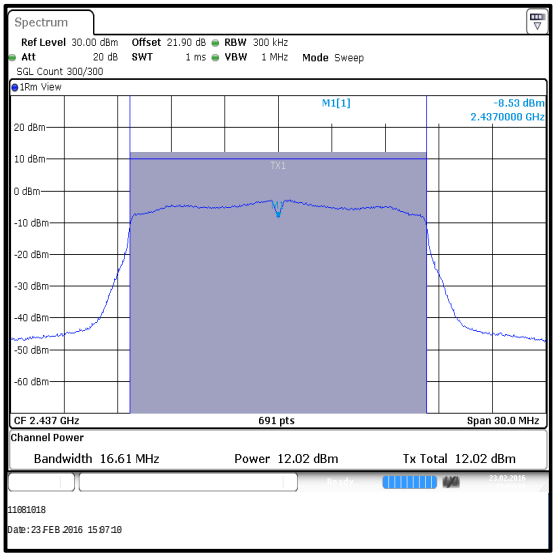
Channel	Corrected Conducted Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	12.3	2.8	15.1	36.0	20.9	Complied
Middle	12.2	2.8	15.0	36.0	21.0	Complied
Top	12.1	2.8	14.9	36.0	21.1	Complied

Transmitter Maximum (Average) Output Power (continued)

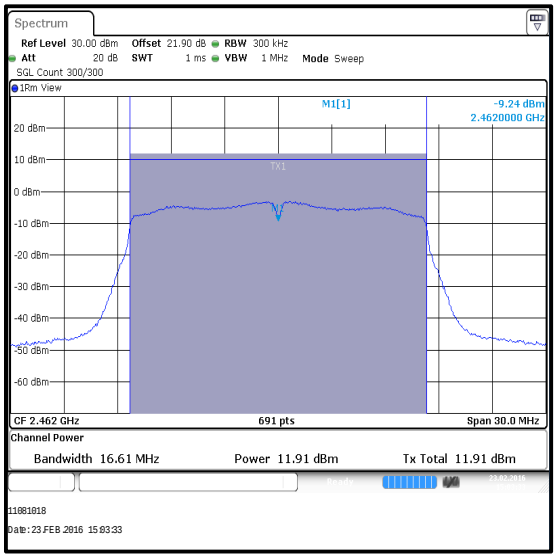
Results: 802.11g / 20 MHz / BPSK / 9 Mbit/s



Bottom Channel



Middle Channel



Top Channel

Transmitter Maximum (Average) Output Power (continued)

Results: 802.11n / HT20 / BPSK / MCS0

Conducted Peak Limit Comparison

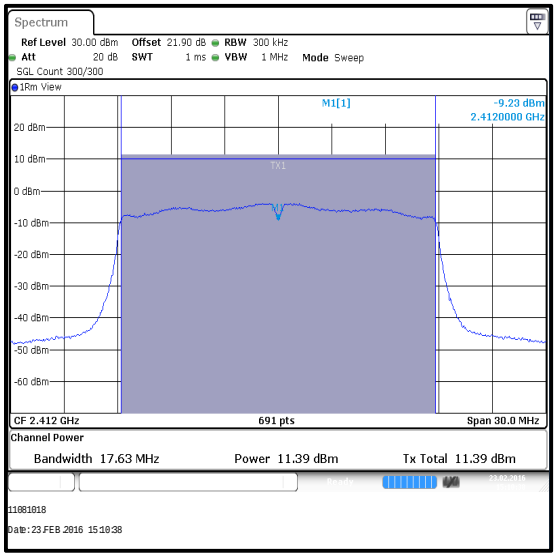
Channel	Conducted Power (dBm)	Duty Cycle Correction (dB)	Corrected Conducted Power (dBm)	Conducted Power Limit (dBm)	Margin (dB)	Result
Bottom	11.4	0.2	11.6	30.0	18.4	Complied
Middle	11.4	0.2	11.6	30.0	18.4	Complied
Top	11.3	0.2	11.5	30.0	18.5	Complied

De Facto EIRP Limit Comparison

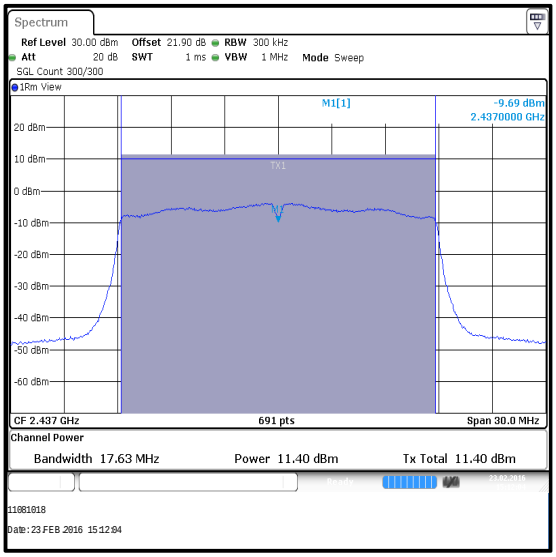
Channel	Corrected Conducted Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	11.6	2.8	14.4	36.0	21.6	Complied
Middle	11.6	2.8	14.4	36.0	21.6	Complied
Top	11.5	2.8	14.3	36.0	21.7	Complied

Transmitter Maximum (Average) Output Power (continued)

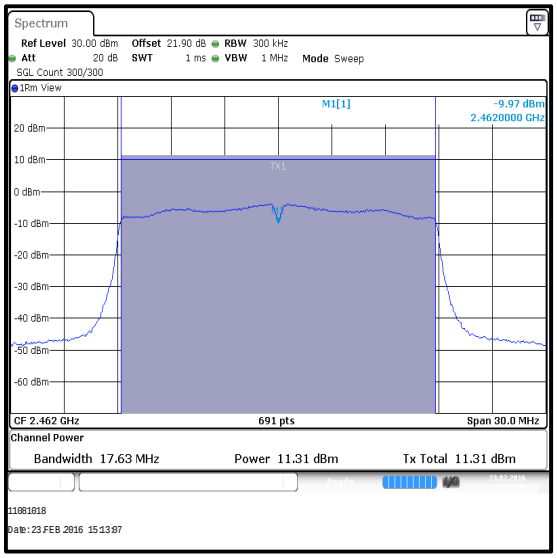
Results: 802.11n / HT20 / BPSK / MCS0



Bottom Channel



Middle Channel



Top Channel

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1785	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	23 Apr 2016	12
M1873	Signal Analyser	Rohde & Schwarz	FSV30	103074	03 Jul 2016	12
A1999	Attenuator	Huber + Suhner AG	6820.17.B	07101	Calibrated before use	-
M1252	Signal Generator	Hewlett Packard	83640A	3119A00489	26 Oct 2017	24

5.2.6. Transmitter Radiated Emissions

Test Summary:

Test Engineer:	David Doyle	**Test Date:**	08 March 2016
Test Sample Serial Number:	ACCC8E35FB65		

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:

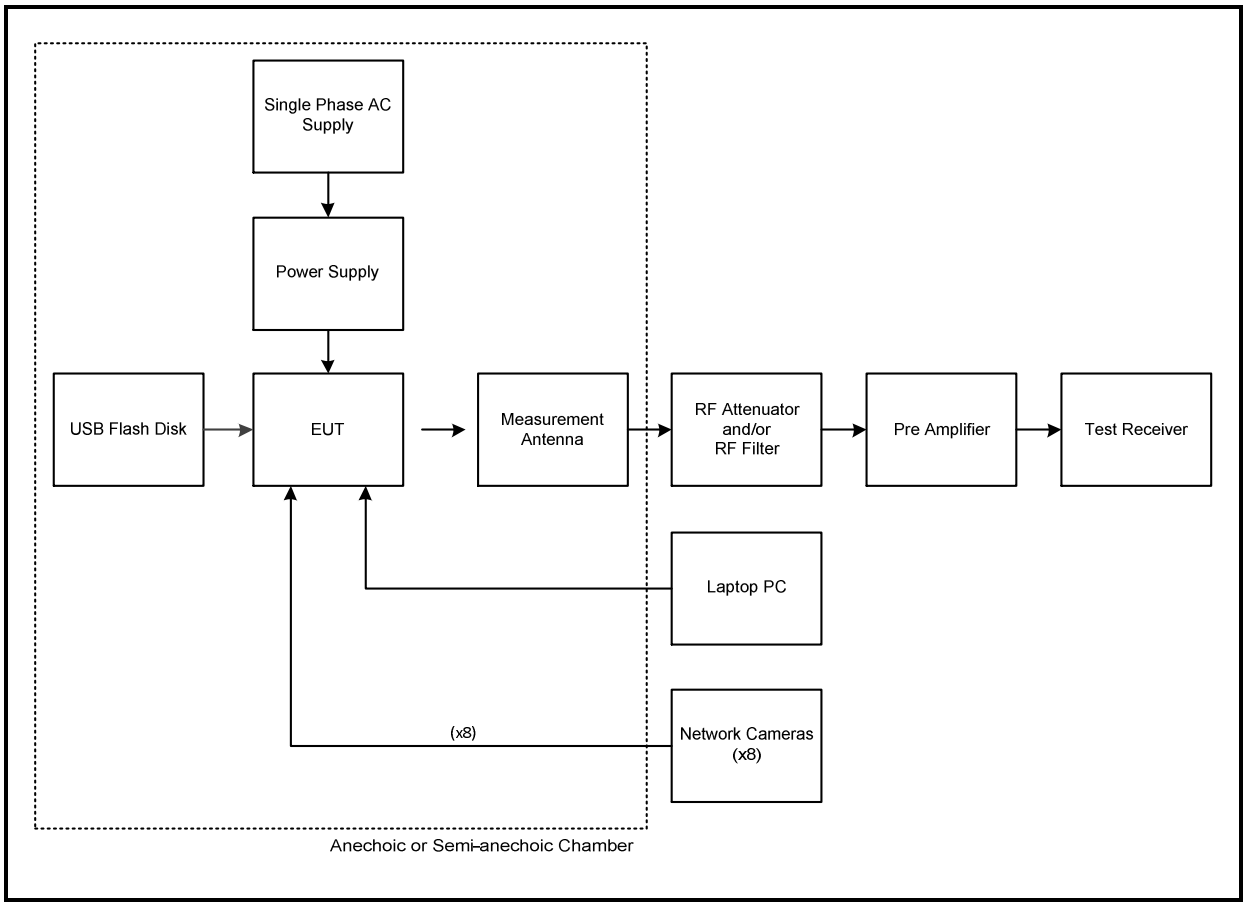
Temperature (°C):	19
Relative Humidity (%):	31

Note(s):

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. The preliminary scans showed similar emission levels below 1 GHz, for each channel of operation. Therefore final radiated emissions measurements were performed with the EUT set to the middle channel only.
3. All other 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.
4. Measurements below 1 GHz were performed in a semi-anechoic chamber (Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.
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 wide enough to see the whole emission.

Transmitter Radiated Emissions (continued)

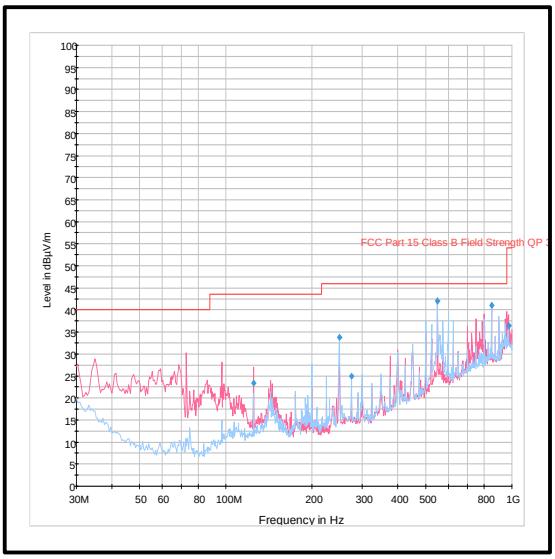
Test setup for radiated measurements:



Transmitter Radiated Emissions (continued)

Results: Middle Channel

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
249.977	Horizontal	33.7	46.0	12.3	Complied
974.708	Vertical	36.4	54.0	17.6	Complied



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

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1958	Thermohygrometer	JM Handelspunkt	30.5015.10	None stated	11 Jan 2017	12
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	12 Jan 2017	12
M1273	Test Receiver	Rohde & Schwarz	ESIB 26	100275	19 Mar 2016	12
G0543	Amplifier	Sonoma	310N	230801	29 May 2016	3
A259	Antenna	Chase	CBL6111A	1513	09 Apr 2016	12
A1834	Attenuator	Hewlett Packard	8491B	10444	Calibrated before use	-
M1124	Test Receiver	Rohde & Schwarz	ESIB 26	100046	18 Nov 2016	12
M1252	Signal Generator	Hewlett Packard	83640A	3119A00489	26 Oct 2017	24

Transmitter Radiated Emissions (continued)

Test Summary:

Test Engineers:	Georgios Vrezas & Andrew Edwards	**Test Dates:**	23 January 2016 to 29 February 2016
Test Sample Serial Numbers:	00408C1866C1 & ACCC8E35FB65		

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

Environmental Conditions:

Temperature (°C):	22 to 24
Relative Humidity (%):	30 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. In accordance with ANSI C63.10 Section 6.6.4.3, the frequency and amplitude of the six highest spurious emissions relative to the limit were recorded in the result tables.
3. The emission shown at approximately 2437 MHz on the 1 GHz to 4 GHz plot is the EUT fundamental.
4. Pre-scans above 1 GHz were performed in a fully anechoic chamber (Asset Number K0002) at a distance of 3 metres. The EUT was placed at a height of 1.5 metres above the test chamber floor in the centre of the chamber turntable. All measurement antennas were placed at a fixed height of 1.5 metres above the test chamber floor, in line with the EUT. Final measurements above 1 GHz were performed in a semi-anechoic chamber (Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 1.5 metres above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.
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. * 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.
7. ** -30 dBc limit applies in non-restricted bands as the output power measurements were performed using average methods.

Transmitter Radiated Emissions (continued)

Results: Bottom Channel / Peak

Frequency (MHz)	Antenna Polarity	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
1201.650	Horizontal	49.4	54.0*	4.6	Complied
1500.260	Horizontal	54.8	74.0	19.2	Complied
1555.998	Horizontal	55.0	74.0	19.0	Complied
1624.919	Horizontal	49.9	54.0*	4.1	Complied
1799.999	Horizontal	51.3	70.2**	18.9	Complied
2999.999	Vertical	50.9	70.2**	19.3	Complied

Results: Bottom Channel / Average

Frequency (MHz)	Antenna Polarity	Average Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
1500.125	Horizontal	49.7	54.0	4.3	Complied
1556.318	Horizontal	48.9	54.0	5.1	Complied

Results: Middle Channel / Peak

Frequency (MHz)	Antenna Polarity	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
1201.800	Horizontal	50.0	54.0*	4.0	Complied
1500.248	Horizontal	55.4	74.0	18.6	Complied
1555.973	Horizontal	54.8	74.0	19.2	Complied
1625.014	Horizontal	49.9	54.0*	4.1	Complied
1799.999	Horizontal	50.2	71.2**	21.0	Complied
2999.990	Vertical	50.5	71.2**	20.7	Complied

Results: Middle Channel / Average

Frequency (MHz)	Antenna Polarity	Average Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
1500.000	Horizontal	50.1	54.0	3.9	Complied
1556.493	Horizontal	48.7	54.0	5.3	Complied

Transmitter Radiated Emissions (continued)

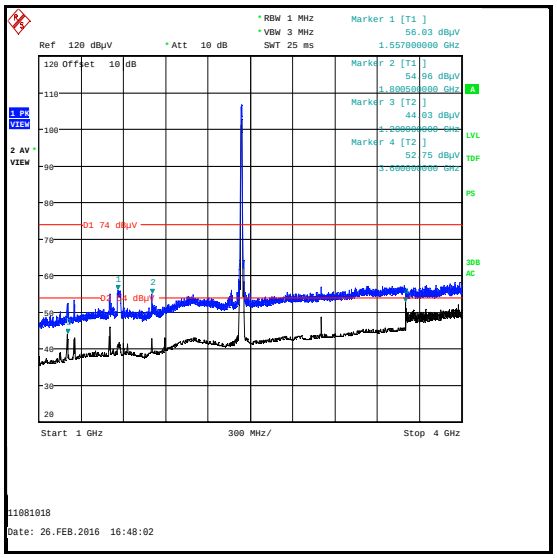
Results: Top Channel / Peak

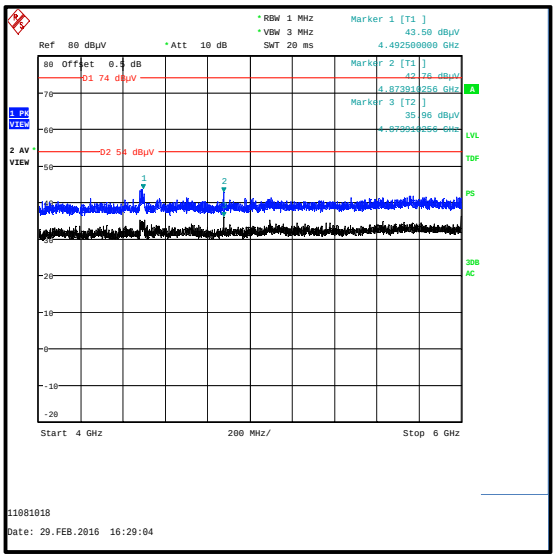
Frequency (MHz)	Antenna Polarity	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
1199.830	Horizontal	49.9	54.0*	4.1	Complied
1499.890	Horizontal	55.0	74.0	19.0	Complied
1560.189	Horizontal	54.9	74.0	19.1	Complied
1625.068	Horizontal	50.8	54.0*	3.2	Complied
1799.999	Horizontal	51.1	70.2**	19.1	Complied
2999.975	Vertical	50.8	70.2**	19.4	Complied

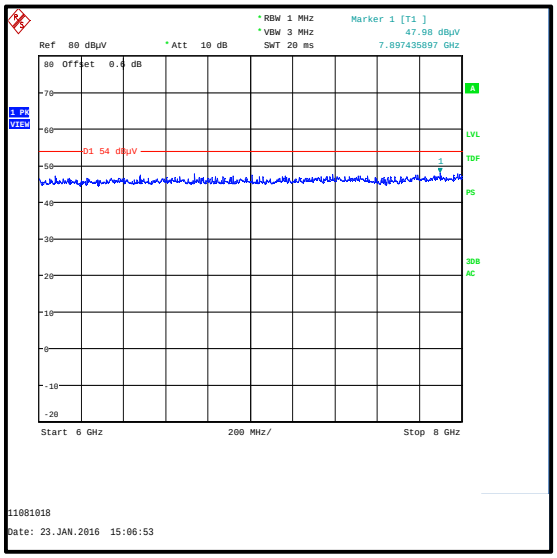
Results: Top Channel / Average

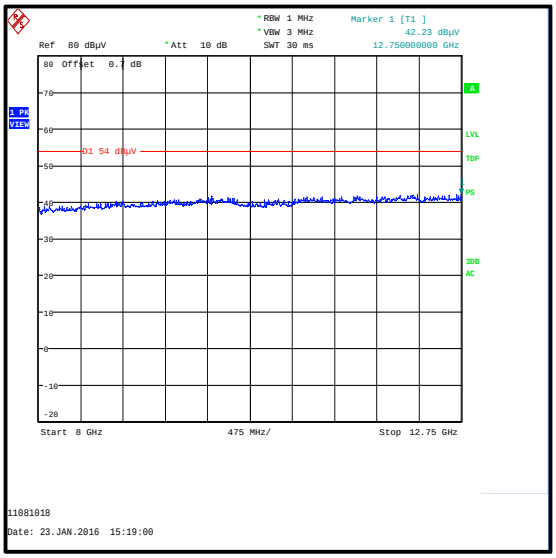
Frequency (MHz)	Antenna Polarity	Average Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
1499.960	Horizontal	50.0	54.0	4.0	Complied
1556.389	Horizontal	48.8	54.0	5.2	Complied

Transmitter Radiated Emissions (continued)

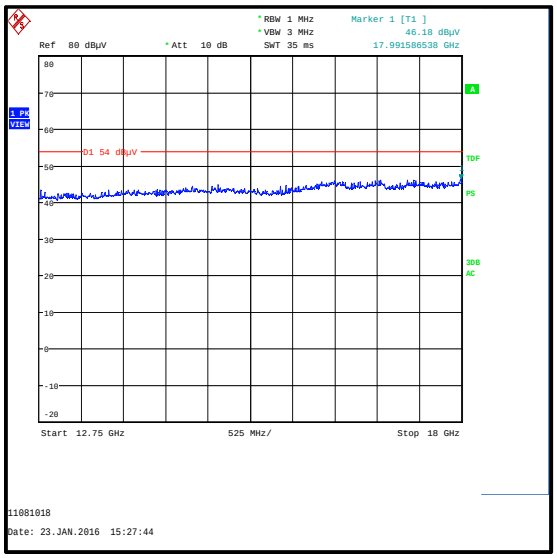


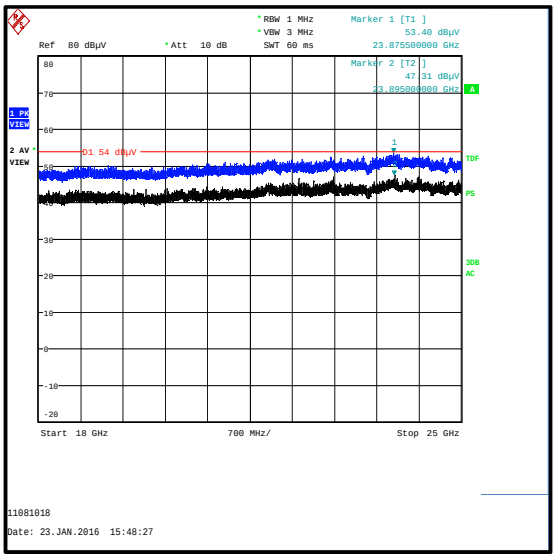






Transmitter Radiated Emissions (continued)





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	23 Apr 2016	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	21 Dec 2016	12
M1886	Test Receiver	Rohde & Schwarz	ESU26	100554	21 May 2016	12
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	19 Dec 2016	12
A1818	Antenna	EMCO	3115	00075692	17 Dec 2016	12
A1818	Antenna	EMCO	3115	00075692	17 Dec 2016	12
A253	Antenna	Flann Microwave	12240-20	128	17 Dec 2016	12
A254	Antenna	Flann Microwave	14240-20	139	17 Dec 2016	12
A255	Antenna	Flann Microwave	16240-20	519	17 Dec 2016	12
A256	Antenna	Flann Microwave	18240-20	400	17 Dec 2016	12
A1396	Attenuator	Huber & Suhner	6810.17.B	757987	05 May 2016	12
A1975	High Pass Filter	AtlanTecRF	AFH-03000	090424010	17 Apr 2016	12

5.2.7. Transmitter Band Edge Radiated Emissions

Test Summary:

Test Engineer:	Andrew Edwards	**Test Dates:**	10 February 2016 & 22 February 2016
Test Sample Serial Number:	ACCC8E35FB65		

FCC Reference:	Parts 15.247(d) & 15.209(a)
Test Method Used:	ANSI C63.10 Section 6.10 & FCC KDB 558074 Section 11 & 13

Environmental Conditions:

Temperature (°C):	22 to 23
Relative Humidity (%):	29 to 35

Transmitter Band Edge Radiated Emissions (continued)

Note(s):

1. Tests were performed in the following modes as they produced the highest power, power spectral density and widest occupied bandwidth:
    - 802.11b – DQPSK / 2 Mbit/s
    - 802.11g – BPSK / 9 Mbit/s
    - 802.11n HT20 – BPSK / 6.5 Mbit/s / MCS0
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 falls within a non-restricted band, only peak measurements are required. In accordance with FCC KDB 558074 Section 11.1, the test method in Section 11.3 was followed: the test receiver resolution bandwidth was set to 100 kHz and video bandwidth 300 kHz. A peak detector was used, sweep time was set to auto and trace mode was Max Hold. The test receiver was left to sweep for a sufficient length of time in order to maximise the carrier level and out-of-band emissions. A marker and corresponding reference level line were placed on the peak of the carrier. As the maximum conducted (average) output power was measured using an RMS detector in accordance with FCC KDB 558074 Sections 9.2.2.2 & 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 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. 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.
6. *The integration method was used in accordance with FCC KDB 558074 Section 13.3.2, in order to meet the average limit when transmitting in 802.11g and 802.11n modes. As the EUT had a duty cycle < 98% the duty cycle correction factor has been applied to the band edge results. The corrected levels are shown below:

Integration method result + duty cycle = Corrected band edge level

802.11g / 9 Mbit/s at 2483.5 MHz : 46.2 + 0.2 = 46.4

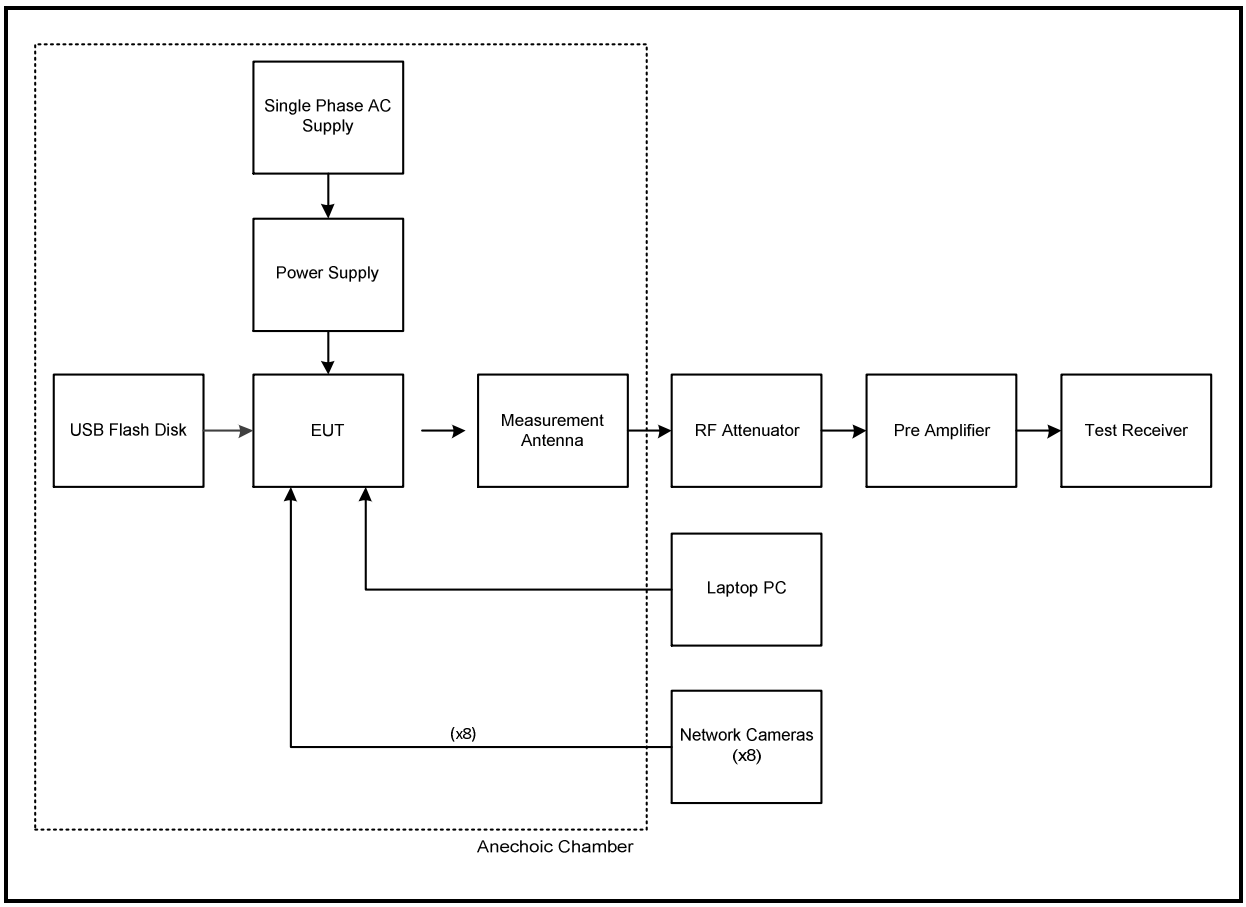
802.11g / 9 Mbit/s at 2484.221 MHz : 45.2 + 0.2 = 45.4

802.11n / 6.5 Mbit/s at 2483.5 MHz : 47.6 + 0.2 = 47.8

802.11n / 6.5 Mbit/s at 2484.381 MHz : 44.8 + 0.2 = 45.0

Transmitter Band Edge Radiated Emissions (continued)

Test setup:



Transmitter Band Edge Radiated Emissions (continued)

Results: Peak / 802.11b / 20 MHz / DQPSK / 2 Mbit/s

Results: Lower Band Edge

Frequency (MHz)	Level (dBµV/m)	-30 dBc Limit (dBµV/m)	Margin (dB)	Result
2397.756	56.2	70.2	14.0	Complied
2400	50.5	70.2	19.7	Complied

Results: Lower Band Edge / Restricted Band / Peak

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2389.872	61.3	74.0	12.7	Complied

Results: Lower Band Edge / Restricted Band / Average

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2389.487	45.6	54.0	8.4	Complied

Results: Upper Band Edge / Restricted Band / Peak

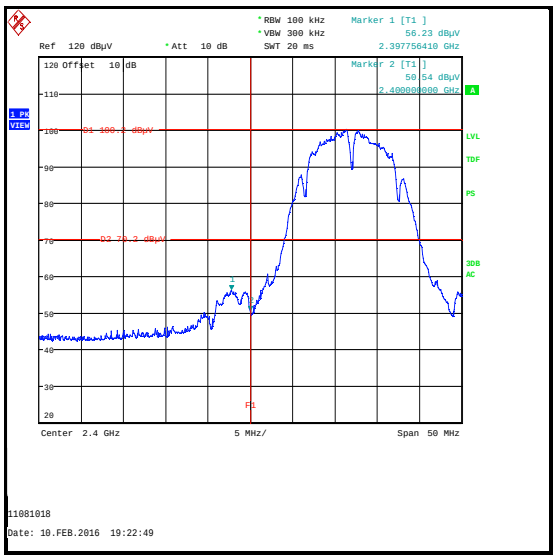
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2483.5	60.6	74.0	13.4	Complied
2484.381	61.0	74.0	13.0	Complied

Results: Upper Band Edge / Restricted Band / Average

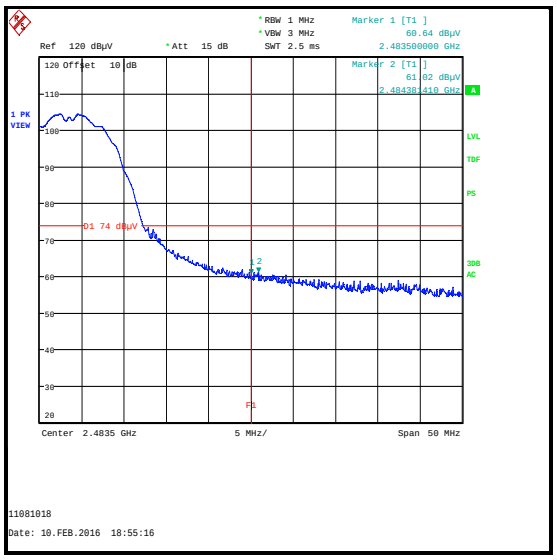
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2483.5	46.2	54.0	7.8	Complied
2487.827	46.4	54.0	7.6	Complied

Transmitter Band Edge Radiated Emissions (continued)

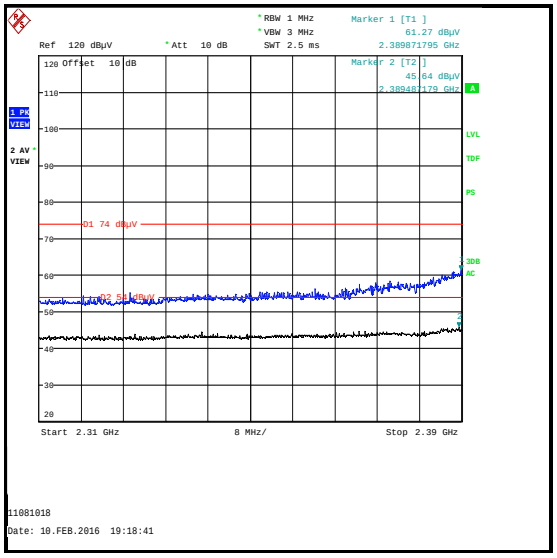
Results: Peak / 802.11b / 20 MHz / DQPSK / 2 Mbit/s



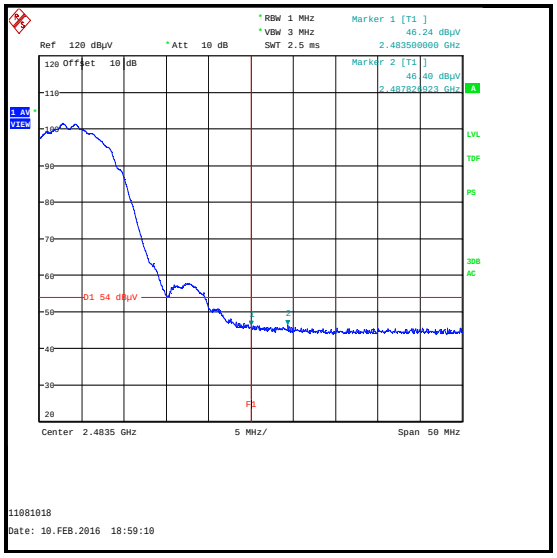
Lower Band Edge Peak Measurement



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 Mbit/s

Results: Lower Band Edge

Frequency (MHz)	Level (dBµV/m)	-30 dBc Limit (dBµV/m)	Margin (dB)	Result
2399.112	56.5	65.7	9.2	Complied
2400	52.5	65.7	13.2	Complied

Results: Lower Band Edge / Restricted Band / Peak

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2390.00	68.2	74.0	5.8	Complied

Results: Lower Band Edge / Restricted Band / Average

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2389.872	53.5	54.0	0.5	Complied

Results: Upper Band Edge / Restricted Band / Peak

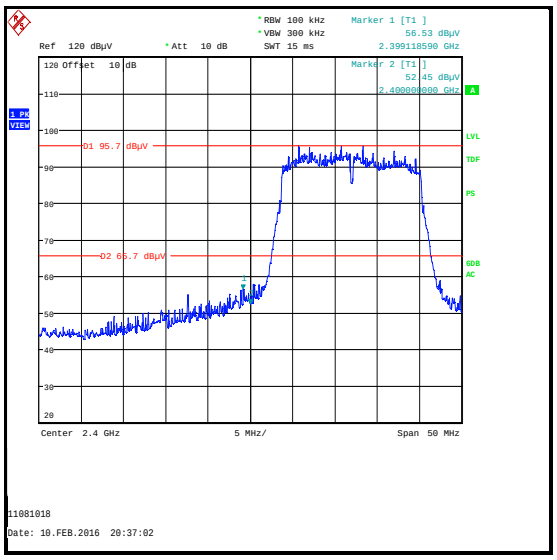
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2483.5	67.3	74.0	6.7	Complied
2483.981	67.4	74.0	6.6	Complied

Results: Upper Band Edge / Restricted Band / Average

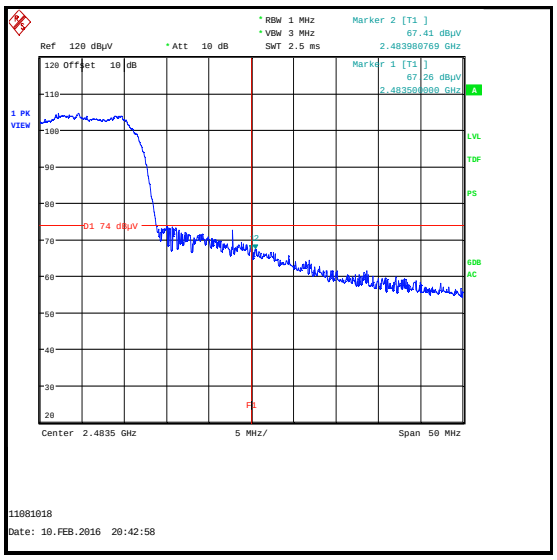
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2483.5	46.4*	54.0	7.6	Complied
2484.221	45.4*	54.0	8.6	Complied

Transmitter Band Edge Radiated Emissions (continued)

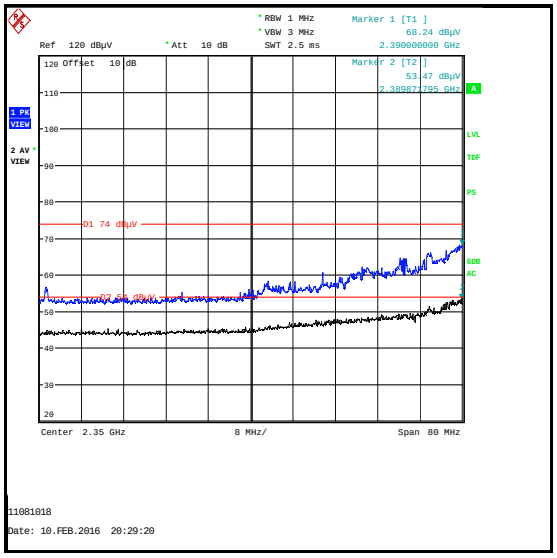
Results: Peak / 802.11g / 20 MHz / BPSK / 9 Mbit/s



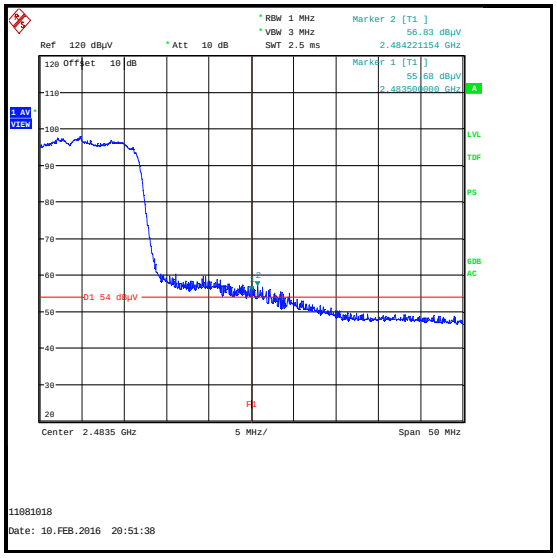
Lower Band Edge Peak Measurement



Upper Band Edge Peak Measurement



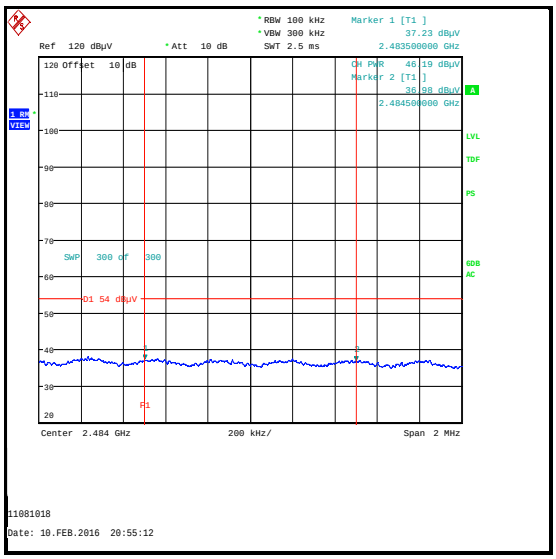
2310 MHz to 2390 MHz Restricted Band



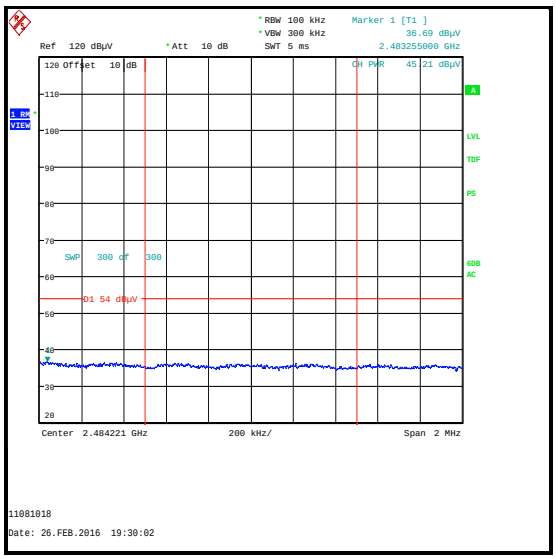
Upper Band Edge Average Measurement

Transmitter Band Edge Radiated Emissions (continued)

Results: Peak / 802.11g / 20 MHz / BPSK / 9 Mbit/s



Upper Band Edge
Average Measurement / Integration Method



Unwanted Emission at 2484.221 MHz
Average Measurement / Integration Method

Transmitter Band Edge Radiated Emissions (continued)

Results: Peak / 802.11n HT20 / BPSK / 6.5 Mbit/s / MCS0

Results: Lower Band Edge

Frequency (MHz)	Level (dBµV/m)	-30 dBc Limit (dBµV/m)	Margin (dB)	Result
2399.760	58.1	66.8	8.7	Complied
2400	55.7	66.8	11.1	Complied

Results: Lower Band Edge / Restricted Band / Peak

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2389.744	69.0	74.0	5.0	Complied

Results: Lower Band Edge / Restricted Band / Average

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2389.103	53.8	54.0	0.2	Complied

Results: Upper Band Edge / Restricted Band / Peak

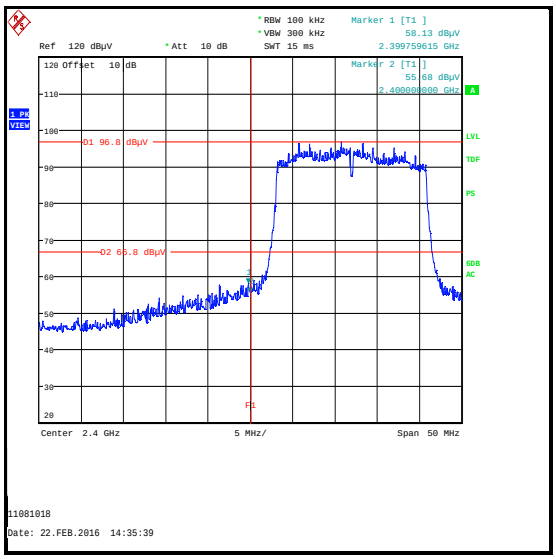
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2483.5	67.3	74.0	6.7	Complied
2483.558	68.1	74.0	5.9	Complied

Results: Upper Band Edge / Restricted Band / Average

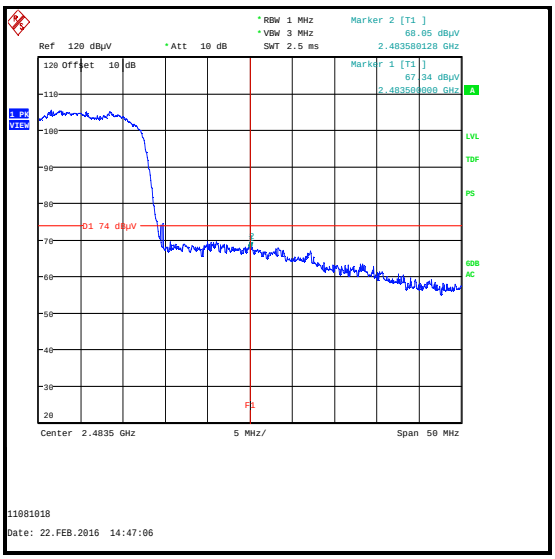
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2483.5	47.8*	54.0	6.2	Complied
2484.381	45.0*	54.0	9.0	Complied

Transmitter Band Edge Radiated Emissions (continued)

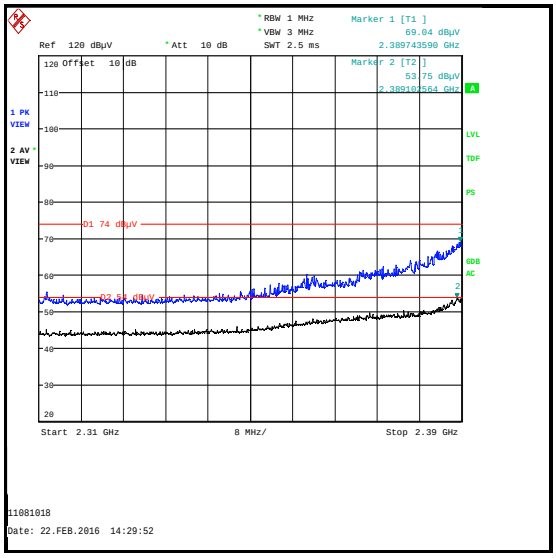
Results: Peak / 802.11n HT20 / BPSK / 6.5 Mbit/s / MCS0



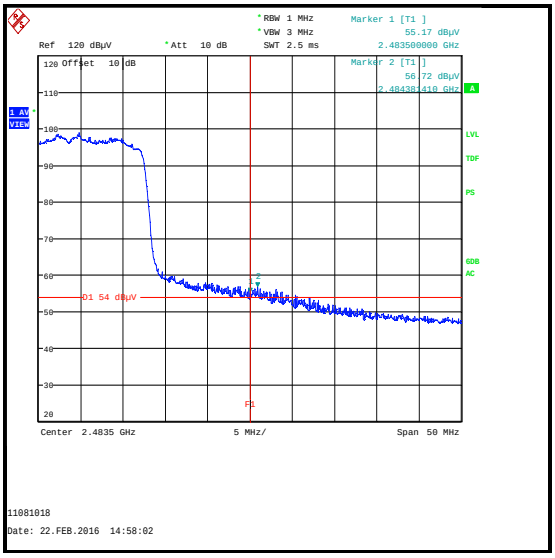
Lower Band Edge Peak Measurement



Upper Band Edge Peak Measurement



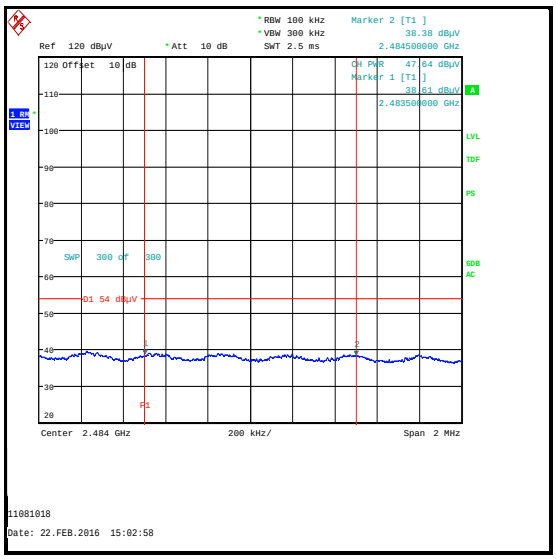
2310 MHz to 2390 MHz Restricted Band



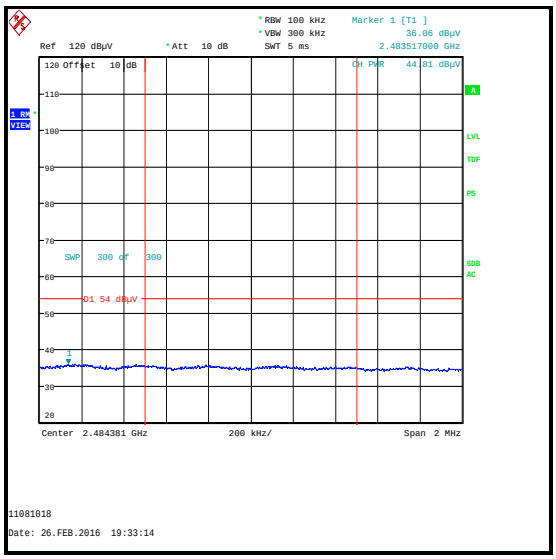
Upper Band Edge Average Measurement

Transmitter Band Edge Radiated Emissions (continued)

Results: Peak / 802.11n HT20 / BPSK / 6.5 Mbit/s / MCS0



Upper Band Edge
Average Measurement / Integration Method



Unwanted Emission at 2484.381 MHz
Average Measurement / Integration Method

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	23 Apr 2016	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	21 Dec 2016	12
M1886	Test Receiver	Rohde & Schwarz	ESU26	100554	21 May 2016	12
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	19 Dec 2016	12
A1818	Antenna	EMCO	3115	00075692	17 Dec 2016	12
A1396	Attenuator	Huber & Suhner	6810.17.B	757987	05 May 2016	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
AC Conducted Spurious Emissions	0.15 MHz to 30 MHz	95%	±4.69 dB
Minimum 6 dB Bandwidth	2.4 GHz to 2.4835 GHz	95%	±3.92%
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 ---