

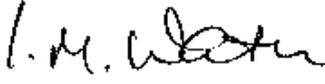
TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: DN100

FCC ID: OFD-2003DN001

To: FCC Parts 15.209(a), 15.403, 15.407(a) & 15.407(b)

Test Report Serial No.:
RFI-RPT-RP85509JD19C

This Test Report Is Issued Under The Authority Of John Newell, Group Quality Manager:		
Checked By:	Ian Watch	
Signature:		
Date of Issue:	09 August 2012	

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1. Customer Information

Company Name:	Datasat Technologies A.G.
Address:	Industriestrasse 7 Zug Switzerland

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR15.209
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2011: Part 15 Subpart C (Intentional Radiators) - Section 15.209
Specification Reference:	47CFR15.407
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2011: Part 15 Subpart E (Unlicensed National Information Infrastructure Devices) – Section 15.407
Site Registration:	FCC: 209735
Location of Testing:	RFI Global Services Ltd., Wade Road, Basingstoke, Hampshire, RG24 8AH.
Test Dates:	08 May 2012 to 17 July 2012

2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Result
Part 15.403(i)	Transmitter 26 dB Emission Bandwidth	Note 1
Part 15.407(a)(1)	Transmitter Maximum Conducted Output Power	
Part 15.407(a)(1)	Transmitter Peak Power Spectral Density	
Part 15.407(b)(1),(6),(7) & 15.209(a)	Transmitter Out of Band Emissions (Conducted)	
Part 15.407(b)(1),(6),(7) & 15.209(a)	Transmitter Out of Band Emissions (Radiated)	
Key to Results		
 = Complied  = Did not comply		

Note(s):

1. Measurements were performed for conducted power calculations and are for reference purposes only.

2.3. Methods and Procedures

Reference:	ANSI C63.4 (2009)
Title:	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
Reference:	ANSI C63.10 (2009)
Title:	American National Standard for Testing Unlicensed Wireless Devices
Reference:	FCC KDB 789033 D01 v01r01 3/5/2012
Title:	Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E
Reference:	FCC KDB 662911 D01 v01r01 10/25/2011
Title:	Emissions Testing of Transmitters with Multiple Outputs in the Same Band
Reference:	KDB 662911 D02 v01 10/25/2011
Title:	MIMO with Cross-Polarized Antennas v01 10/25/2011

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 specifications identified above.

3. Equipment Under Test (EUT)

3.1. Identification of Equipment Under Test (EUT)

Brand Name:	Datasat
Model Number:	DN100
Hardware Version:	Rev 1.0
Software Version:	Rev 1.0
Serial Number:	261320
FCC ID:	OFD-2003DN001

Description:	Power Supply 120 VAC 60 Hz to 48 VDC
Brand Name:	Mean Well
Model Name or Number:	PLN-60-48
Serial Number:	Not marked or stated

3.2. Description of EUT

The equipment under test was a dual band multi radio Wireless Network System containing two RF modules operating in accordance with IEEE 802.11a,b,g,n transmitting in the 2.4 GHz to 2.4835 GHz, 5.15 to 5.25 GHz and 5.725 to 5.85 GHz bands. The EUT has four external antenna ports, two transmit per radio module, MIMO is supported. The EUT is designed to work in various configurations and with various antenna types depending on the end user requirements.

A 120 VAC 60 Hz to 48 VDC power supply is used to provide power.

3.3. Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

3.4. Additional Information Related to Testing

Technology Tested:	IEEE 802.11a,b,g,n		
Type of Unit:	Transceiver		
Modulation:	CCK, BPSK, QPSK, 16QAM, 64QAM		
Data rates:	802.11a	6, 9, 12, 18, 24, 36 ,48 and 54 Mbps	
	802.11n 20 MHz	6.5, 13, 19.5, 26, 39, 52, 58.5, 65, 78, 104, 117, 130 Mbps	
	802.11n 40 MHz	13.5, 27, 40.5, 54, 81, 108, 121.5, 135, 162, 216, 243 & 270 Mbps	
Power Supply Requirement(s):	Nominal	48 VDC via 120 VAC 60 Hz PSU	
Channel Spacing:	20 MHz		
Transmit Frequency Band:	5150 MHz to 5250 MHz		
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	36	5180
	Middle	40	5200
	Top	48	5240
Channel Spacing:	40 MHz		
Transmit Frequency Band:	5150 MHz to 5250 MHz		
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	38	5190
	Top	46	5230

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:	D610
Serial Number:	RFI-3062

Description:	Ethernet hub
Brand Name:	Netgear
Model Name or Number:	GS605
Serial Number:	1YG19430021A1

Description:	Omnidirectional antenna (5 dBi Gain)
Brand Name:	TerraWave
Model Name or Number:	T58050R10002 (DT-OM360I-5805-RPTNC)

3.6. Antenna

The table below lists the antennas that the Customer intends to use with this product:

Type	Stated Gain (dBi)	Model	Part No.	Used for Testing	Note
Omnidirectional	3.0	390645/TWS5000W	DT-OM360I-2403-RPTNC		2
Omnidirectional	5.0	T58050R10002	DT-OM360I-5805-RPTNC	X	1
Omnidirectional	10.0	MA-WO55-10NH	DT-OM360O-5810-N		3
Sectorised	5.0	MA-WE2458-2H2	DT-ST120O-5805-N		2
Sectorised	7.5	MA-WC2458-2H	DT-ST060O-5875-N		3

X = This antenna was used for testing purposes

Note(s):

1. This antenna was used for testing as it has a gain of less than 6 dBi and therefore has the highest conducted power.
2. This antenna has an identical conducted power output level to the antenna tested. Therefore it was not tested.
3. This antenna was not used for testing as it has a gain of greater than 6 dBi and therefore the EUT transmits with a lower conducted power.

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

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

- Continuously transmitting at relevant power levels 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 a bespoke application on a laptop via the serial port. The application was used to enable continuous transmission and to select the test channels, data rates and modulation schemes as required
- The EUT supports two radio modules each containing 2 x 2 MIMO. The radio module with the highest conducted output power was used to make measurements as this was deemed to be worst case.
- All active ports were terminated during radiated spurious emissions testing. Ports stated as inactive by the Customer were not terminated.

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.

5.2. Test Results**5.2.1. Transmitter 26 dB Emission Bandwidth****Test Summary:**

Test Engineer:	Sarah Williams	Test Date:	29 May 2012
Test Sample Serial No.:	261320		

FCC Reference:	Part 15.403(i)
Test Method Used:	FCC KDB 789033 Section D)

Environmental Conditions:

Temperature (°C):	24
Relative Humidity (%):	36

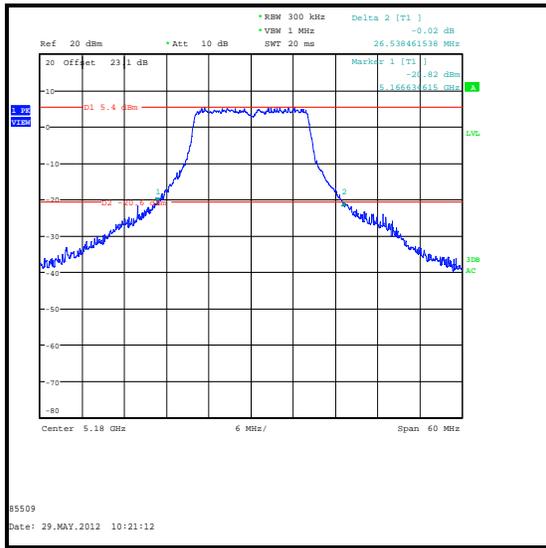
Note(s):

1. These measurements were performed for reference purposes. The measured bandwidth is used for calculations in Section 5.2.2 Maximum Conducted Output Power.

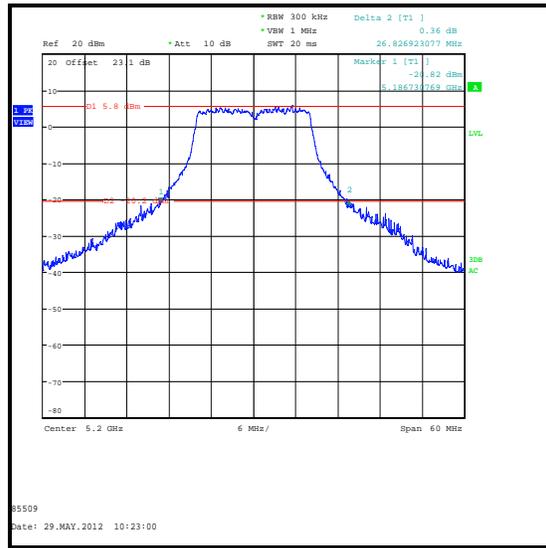
Transmitter 26 dB Emission Bandwidth (continued)

Results: 802.11a / 20 MHz / 5.15-5.25 GHz band (Reference plots)

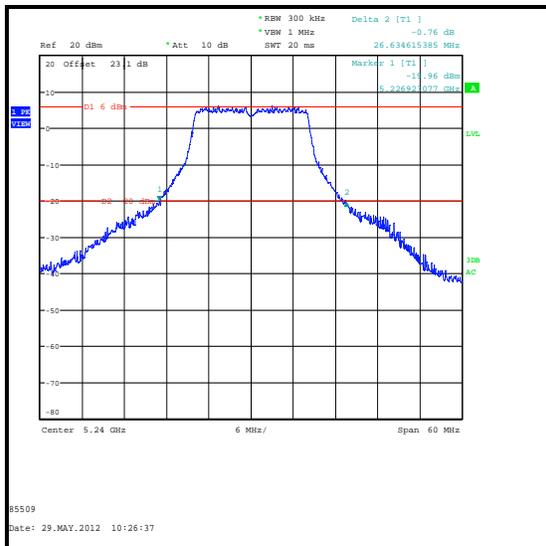
Channel	Frequency (MHz)	Modulation scheme	Data Rate Mbps	26 dB Emission Bandwidth (MHz)
Bottom	5180	BPSK	6	26.538
Middle	5200	BPSK	6	26.827
Top	5240	BPSK	6	26.635



Bottom Channel



Middle Channel

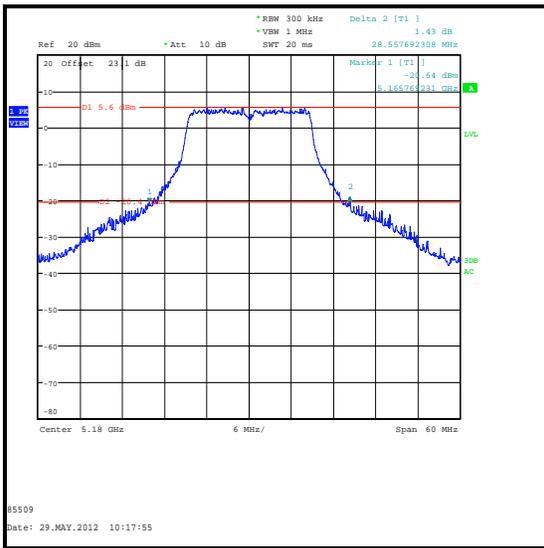


Top Channel

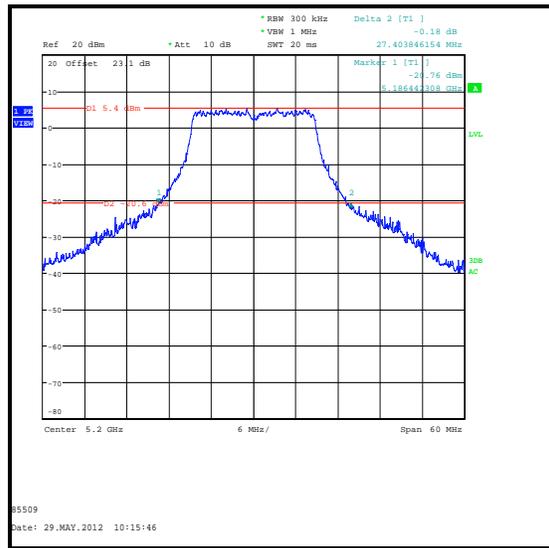
Transmitter 26 dB Emission Bandwidth (continued)

Results: 802.11n / 20 MHz / 5.15-5.25 GHz band (Reference plots)

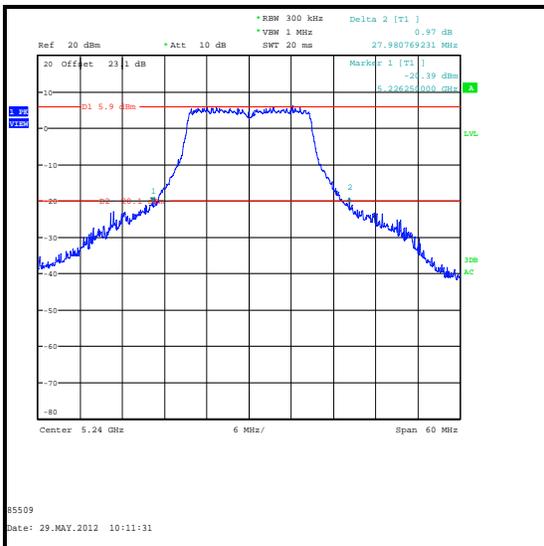
Channel	Frequency (MHz)	Modulation scheme	Data Rate Mbps / MCS	26 dB Emission Bandwidth (MHz)
Bottom	5180	BPSK	6.5 / 0	28.558
Middle	5200	BPSK	6.5 / 0	27.404
Top	5240	BPSK	6.5 / 0	27.981



Bottom Channel



Middle Channel

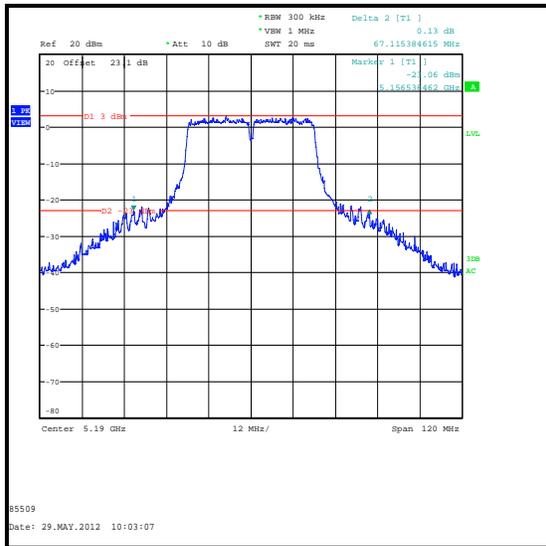


Top Channel

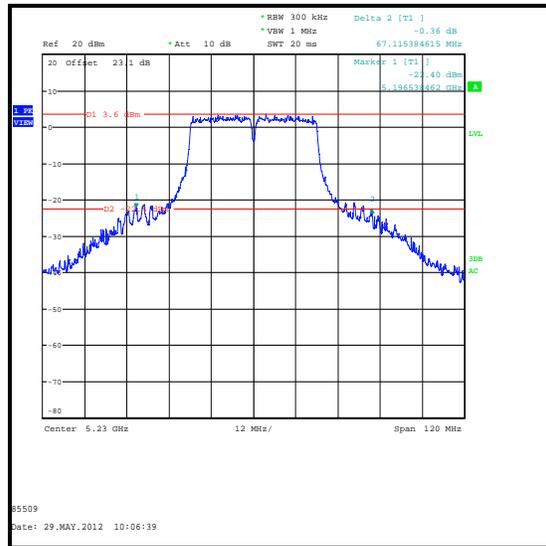
Transmitter 26 dB Emission Bandwidth (continued)

Results: 802.11n / 40 MHz / 5.15-5.25 GHz band (Reference plots)

Channel	Frequency (MHz)	Modulation scheme	Data Rate Mbps / MCS	26 dB Emission Bandwidth (MHz)
Bottom	5190	BPSK	13.5 / 0	67.115
Top	5230	BPSK	13.5 / 0	67.115



Bottom Channel



Top Channel

5.2.2. Transmitter Maximum Conducted Output Power**Test Summary:**

Test Engineer:	Sarah Williams	Test Date:	29 May 2012
Test Sample Serial No.:	261320		

FCC Reference:	Part 15.407(a)(1)
Test Method Used:	FCC KDB 789033 D01 Section C)3)b) & FCC KDB 662911 D01

Environmental Conditions:

Temperature (°C):	22
Relative Humidity (%):	40

Note(s):

- All conducted power tests were performed using a spectrum analyser accordance with FCC KDB 789033 D01 C)3)b) Method SA-1.
- The EUT has 2 radio modules with two RF ports each. Initial measurements were performed on one channel on all 4 ports to find the radio module with the highest output power. For this EUT, radio module 1 had the highest power. The ports are numbered Port 0 and Port 1. Power from both ports was measured and combined using the measure-and-sum method stated in FCC KDB 662911 D01. The Customer stated that the MIMO signals are uncorrelated with all antenna types.
- All supported modes and channel widths were initially investigated on one channel. The modes that produced the highest power and therefore the worst case were 6 Mbps for 802.11a, BPSK / 6.5 Mbps / MCS0 for 802.11n 20 MHz channel bandwidth and BPSK / 13.5 Mbps / MCS0 for 802.11n 40 MHz channel bandwidth. Measurements were then performed on the relevant mode on bottom, middle and top channels on both ports.
- The Part 15.407(a)(1) limit is the lesser of 50 mW (17.0 dBm) or $4 \text{ dBm} + 10 \log_{10} B$, where B is the previously measured 26 dB emission bandwidth in MHz. The limit for each channel was calculated as below:

$$\begin{aligned}
 &802.11a \text{ 20 MHz channel width / Bottom channel} = 4 \text{ dBm} + 10 \log_{10} 26.5 = 18.2 \text{ dBm} \\
 &802.11a \text{ 20 MHz channel width / Middle channel} = 4 \text{ dBm} + 10 \log_{10} 25.8 = 18.1 \text{ dBm} \\
 &802.11a \text{ 20 MHz channel width / Top channel} = 4 \text{ dBm} + 10 \log_{10} 26.6 = 18.2 \text{ dBm} \\
 &802.11n \text{ 20 MHz channel width / Bottom channel} = 4 \text{ dBm} + 10 \log_{10} 28.6 = 18.6 \text{ dBm} \\
 &802.11n \text{ 20 MHz channel width / Middle channel} = 4 \text{ dBm} + 10 \log_{10} 27.4 = 18.4 \text{ dBm} \\
 &802.11n \text{ 20 MHz channel width / Top channel} = 4 \text{ dBm} + 10 \log_{10} 28.0 = 18.5 \text{ dBm} \\
 &802.11n \text{ 40 MHz channel width / Bottom channel} = 4 \text{ dBm} + 10 \log_{10} 67.1 = 22.3 \text{ dBm} \\
 &802.11n \text{ 40 MHz channel width / Top channel} = 4 \text{ dBm} + 10 \log_{10} 67.1 = 22.3 \text{ dBm}
 \end{aligned}$$

Therefore the lesser of the two limits is the fixed limit of 50 mW (17 dBm). This was applied to the results.

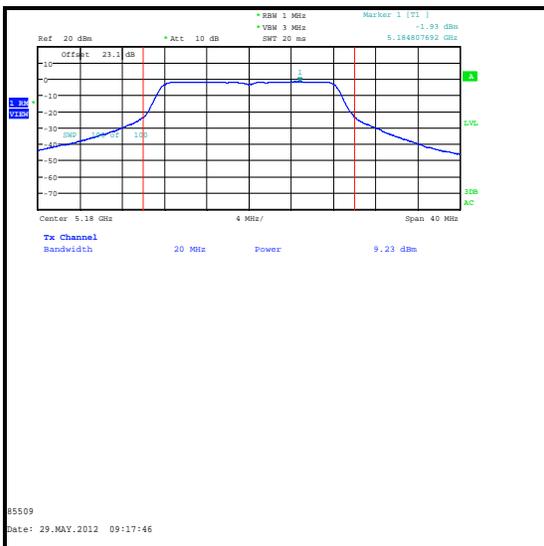
- Conducted measurements were performed for the highest conducted output power and lowest gain antenna declared by the Customer.
- Various antennas have gains of less than 6 dBi. Tests were performed and results calculated based on the 5 dBi gain omnidirectional antenna. The conducted power limit is therefore the fixed limit of 17 dBm as calculated above. The EUT was configured with a power setting of 13.0.

Transmitter Maximum Conducted Output Power (Continued)

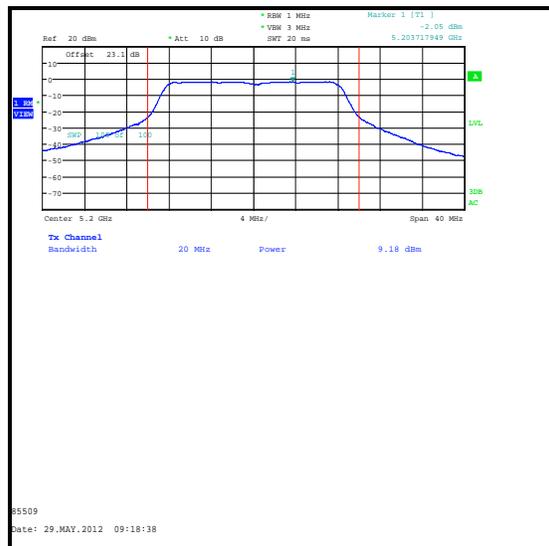
Results: 802.11a / 20 MHz / 6 Mbps / BPSK / 5 dBi omnidirectional antenna

Channel	Frequency (MHz)	Port 0 Power (dBm)	Port 1 Power (dBm)	Combined Power (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	5180	9.2	7.4	11.4	17.0	5.6	Complied
Middle	5200	9.2	7.6	11.5	17.0	5.5	Complied
Top	5240	9.8	8.2	12.1	17.0	4.9	Complied

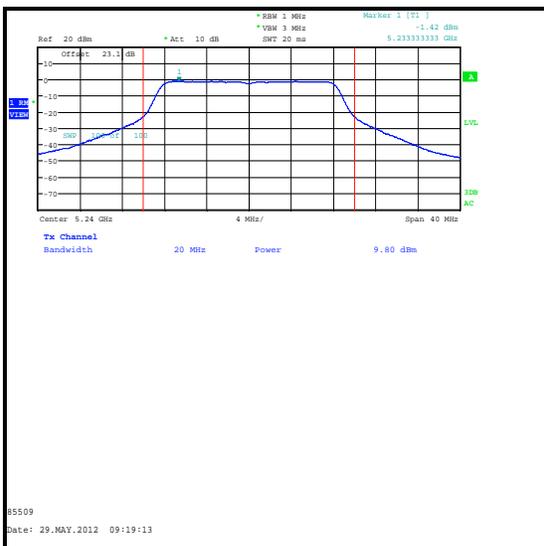
Results: 802.11a / 20 MHz / 6 Mbps / BPSK / Port 0 / 5 dBi omnidirectional antenna



Bottom Channel



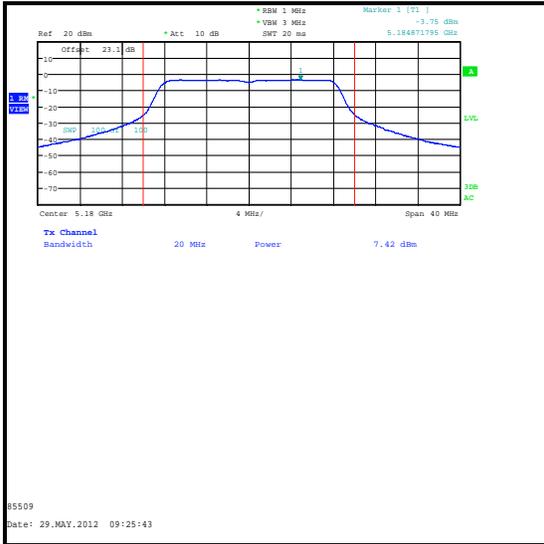
Middle Channel



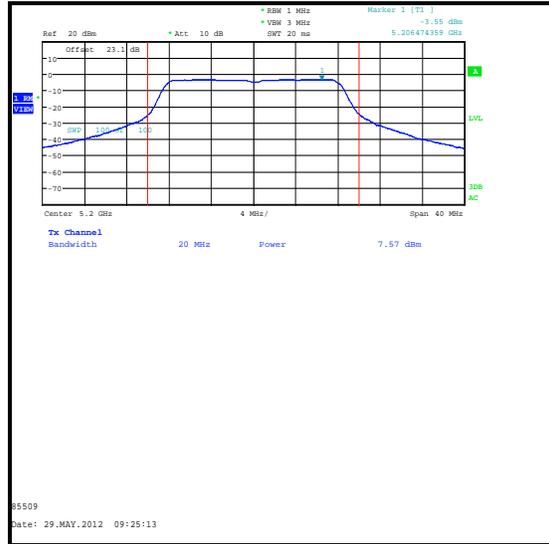
Top Channel

Transmitter Maximum Conducted Output Power (continued)

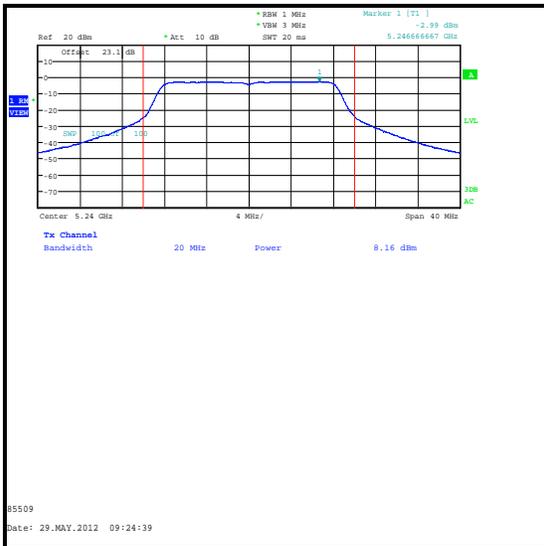
Results: 802.11a / 20 MHz / 6 Mbps / BPSK / Port 1 / 5 dBi omnidirectional antenna



Bottom Channel



Middle Channel



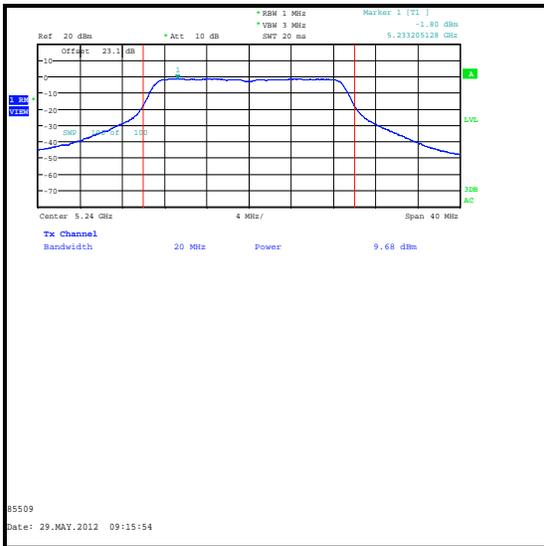
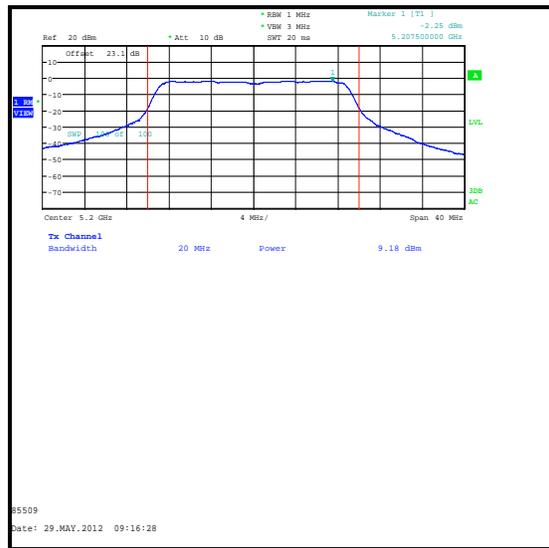
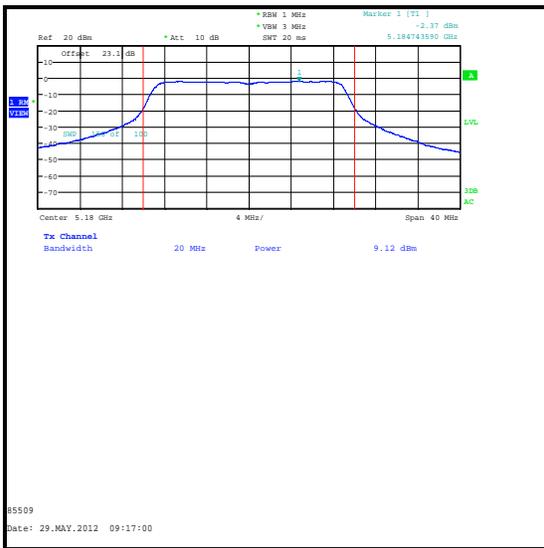
Top Channel

Transmitter Maximum Conducted Output Power (continued)

Results: 802.11n / 20 MHz / 6.5 Mbps / BPSK / MCS0 / 5 dBi omnidirectional antenna

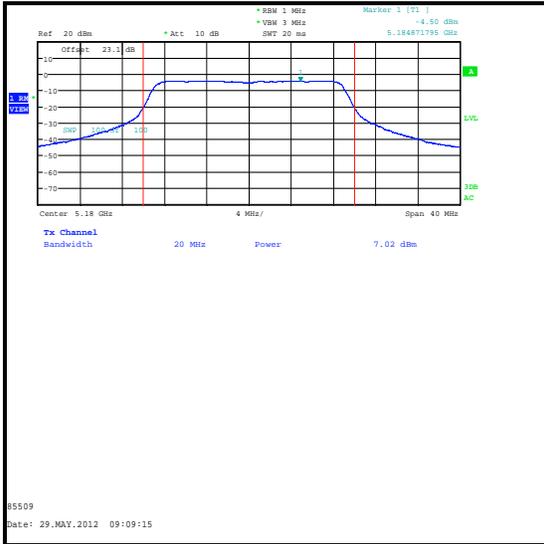
Channel	Frequency (MHz)	Port 0 Power (dBm)	Port 1 Power (dBm)	Combined Power (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	5180	9.1	7.0	11.2	17.0	5.8	Complied
Middle	5200	9.2	7.2	11.3	17.0	5.7	Complied
Top	5240	9.7	8.0	11.9	17.0	5.1	Complied

Results: 802.11n / 20 MHz / 6.5 Mbps / BPSK / MCS0 / Port 0 / 5 dBi omnidirectional antenna

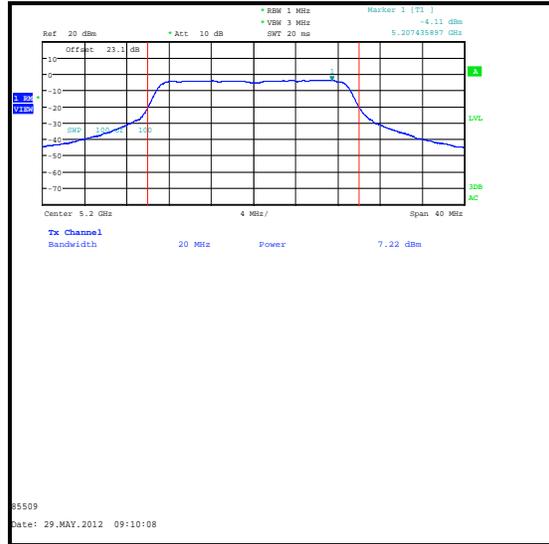


Transmitter Maximum Conducted Output Power (continued)

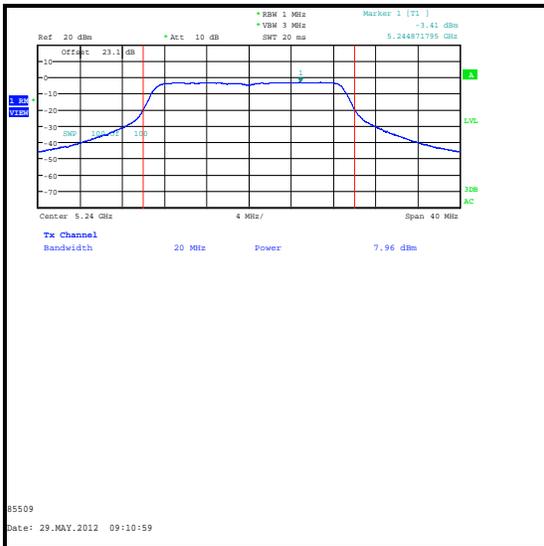
Results: 802.11n / 20 MHz / 6.5 Mbps / BPSK / MCS0 / Port 1 / 5 dBi omnidirectional antenna



Bottom Channel



Middle Channel



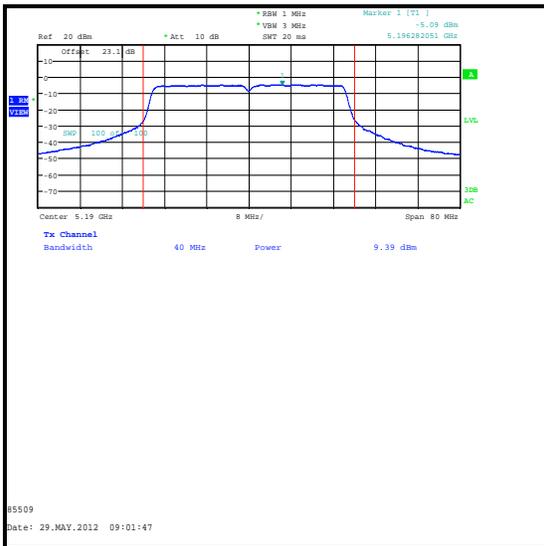
Top Channel

Transmitter Maximum Conducted Output Power (continued)

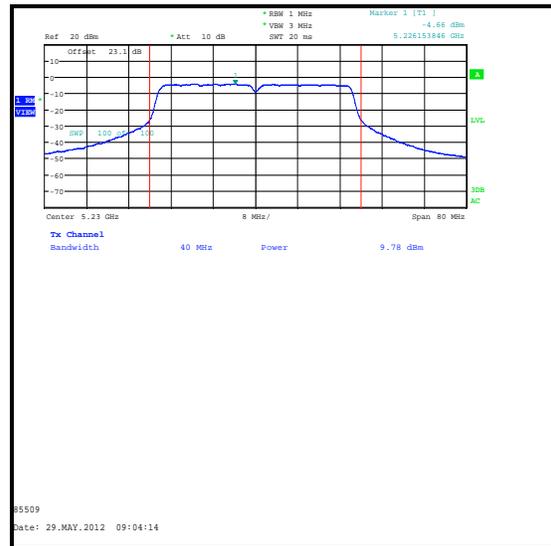
Results: 802.11n / 40 MHz / 13.5 Mbps / BPSK / MCS0 / 5 dBi omnidirectional antenna

Channel	Frequency (MHz)	Port 0 Power (dBm)	Port 1 Power (dBm)	Combined Power (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	5190	9.4	8.0	11.8	17.0	5.2	Complied
Top	5230	9.8	8.3	12.1	17.0	4.9	Complied

Results: 802.11n / 40 MHz / 13.5 Mbps / BPSK / MCS0 / Port 0 / 5 dBi omnidirectional antenna

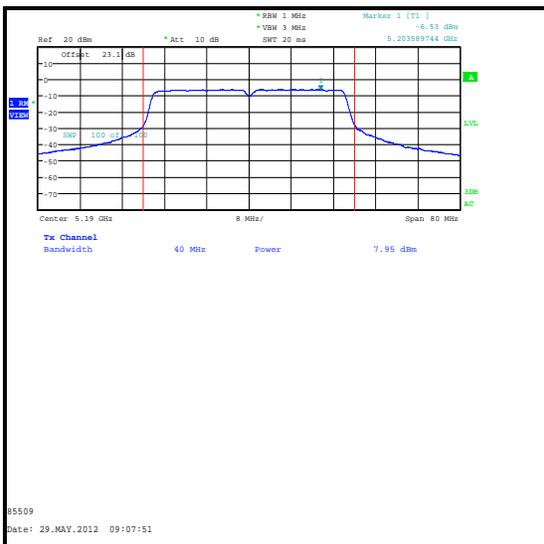


Bottom Channel

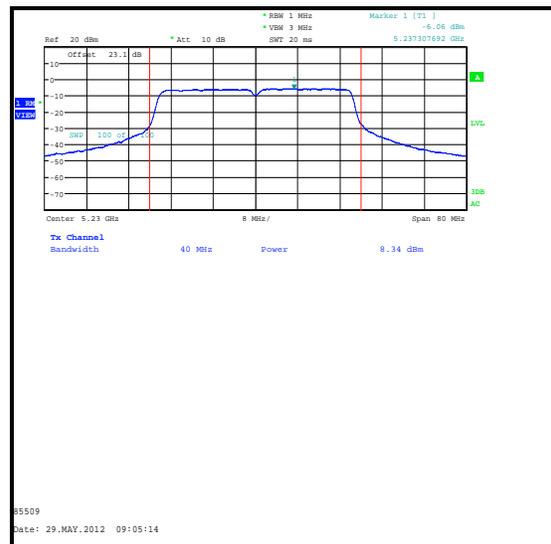


Top Channel

Results: 802.11n / 40 MHz / 13.5 Mbps / BPSK / MCS0 / Port 1 / 5 dBi omnidirectional antenna



Bottom Channel



Top Channel

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

Test Engineer:	Sarah Williams	Test Date:	29 May 2012
Test Sample Serial No.:	261320		

FCC Reference:	Part 15.407(a)(1)
Test Method Used:	FCC KDB 789033 E) referencing KDB 789033 C)3)b), Method SA-1

Environmental Conditions:

Temperature (°C):	24
Relative Humidity (%):	39

Note(s):

1. Transmitter Peak Power Spectral Density tests were performed using a spectrum analyser in accordance with FCC KDB 789033 D01 C)3)b) Method SA-1.
2. Both conducted output power and Peak power spectral density were previously measured with the same measurement method of SA-1 and therefore plots with PPSD results can be found in the conducted output power section of this report.
3. The EUT has 2 radio modules with two RF ports on each module. Initial measurements were performed on one channel on all 4 ports to find the radio module with the highest power. For this EUT, radio module 1 had the highest power. The ports are numbered Port 0 and Port 1. Power from both ports was measured and combined using the measure-and-sum method stated in FCC KDB 662911 D01.
4. All supported modes and channel widths were initially investigated on one channel. The modes that produced the highest PPSD for 20 MHz channels (BPSK / 6.5 Mbps / MCS0) and 40 MHz channels (BPSK / 13.5 Mbps / MCS0) were found to be worst case. Measurements were then performed in these modes on bottom, middle and top channels on both ports for 20 MHz channel width and bottom and top channels for 40 MHz channel width.
5. Conducted measurements were performed for the highest conducted power and lowest antenna gain declared by the Customer.

Various antennas have gains of less than 6 dBi. Tests were performed and results calculated based on the 5 dBi gain omnidirectional antenna. The peak power spectral density limit is 4 dBm in any 1 MHz band. The EUT was configured with a power setting of 13.0.

Transmitter Peak Power Spectral Density (continued)**Results: 802.11n / 20 MHz / 6.5 Mbps / BPSK / MCS0 / 5 dBi omnidirectional antenna**

Channel	Frequency (MHz)	PPSD Port 0 (dBm /MHz)	PPSD Port 1 (dBm /MHz)	Combined PPSD (dBm /MHz)	Limit (dBm /MHz)	Margin (dB)	Result
Bottom	5180	-2.4	-4.5	-0.3	4.0	4.3	Complied
Middle	5200	-2.3	-4.1	-0.1	4.0	4.1	Complied
Top	5240	-1.8	-3.4	0.5	4.0	3.5	Complied

Results: 802.11n / 40 MHz / 13.5 Mbps / BPSK / MCS0 / 5 dBi omnidirectional antenna

Channel	Frequency (MHz)	PPSD Port 0 (dBm /MHz)	PPSD Port 1 (dBm /MHz)	Combined PPSD (dBm /MHz)	Limit (dBm /MHz)	Margin (dB)	Result
Bottom	5190	-5.1	-6.5	-2.7	4.0	6.7	Complied
Top	5230	-4.7	-6.1	-2.3	4.0	6.3	Complied

5.2.4. Transmitter Out of Band Emissions (Conducted)**Test Summary:**

Test Engineer:	Sarah Williams	Test Date:	25 May 2012
Test Sample Serial No.:	261365		

FCC Reference:	Parts 15.407(b)(1),(6),(7) & 15.209(a)
Test Method Used:	FCC KDB 789033 G) & ANSI C63.10 Sections 6.3 and 6.6
Frequency Range:	30 MHz to 40 GHz

Environmental Conditions:

Temperature (°C):	23
Relative Humidity (%):	45

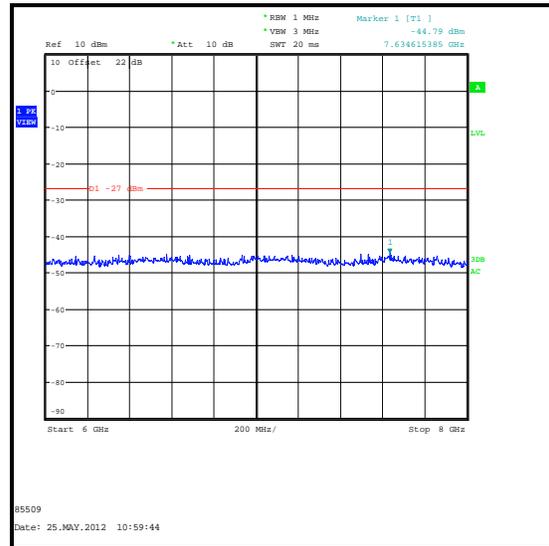
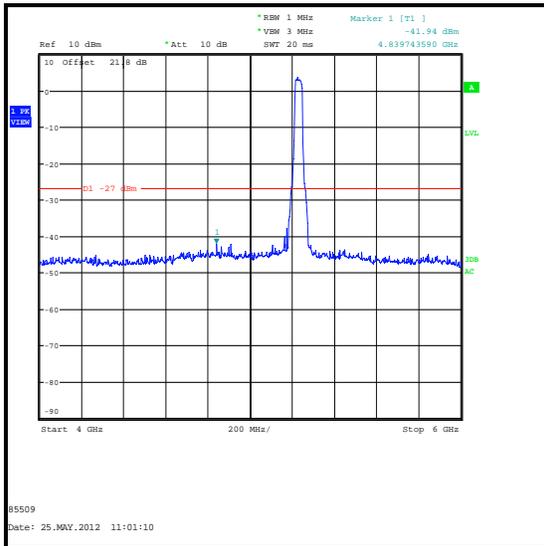
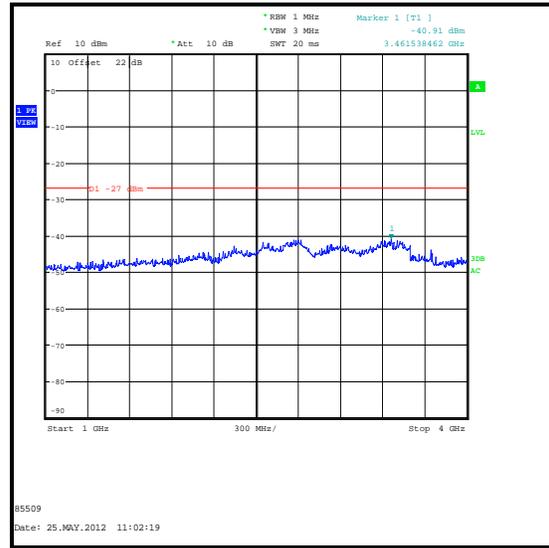
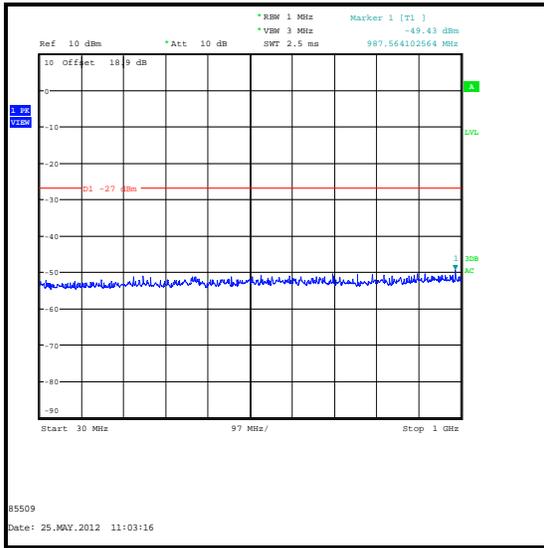
Note(s):

1. FCC Part 15.407(b)(1) states for devices operating in the 5.15 to 5.25 GHz band, all emissions outside the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz. Part 15.407(b)(7) states the provisions of 15.205 apply, e.g. restricted bands of operation.
2. Measurements were performed with the EUT transmitting MCS0 / 40 MHz channel width / Port 0 as all configurations were previously measured and this combination produced the highest output power. Pre-scans were performed with the EUT transmitting at >99% duty cycle on the top channel. The EUT was set to a power setting of 13.0.
3. The emission at approximately 5230 MHz on the 4 GHz to 6 GHz plot is the EUT fundamental.
4. No spurious emissions were detected above the noise floor of the measuring receiver therefore the highest peak noise floor reading of the measuring receiver was recorded as shown in the results table.
5. As antenna port conducted emissions test were performed, cabinet emissions test were also performed as required in FCC KDB 789033 Section G)3)b).

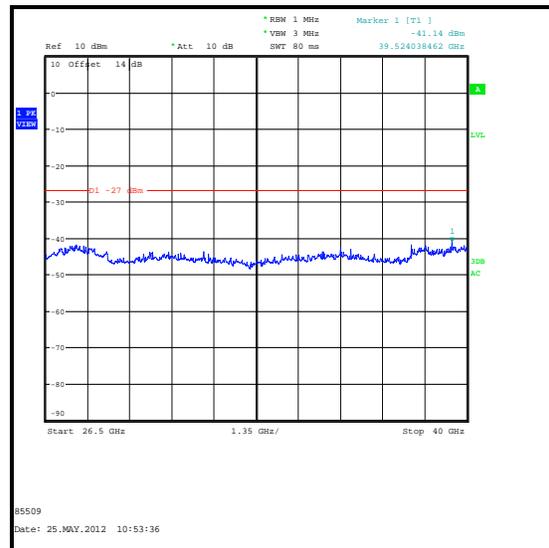
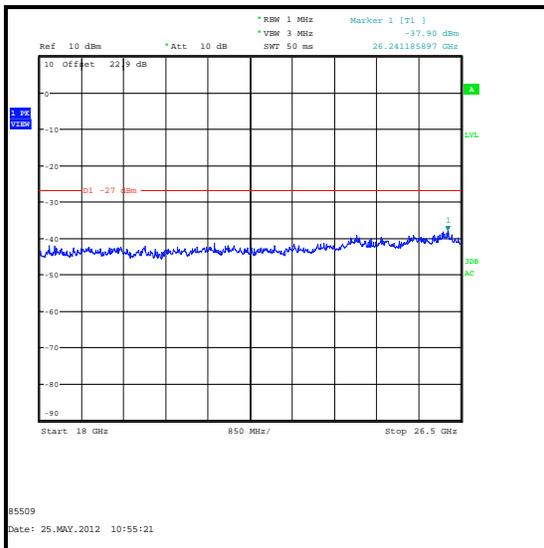
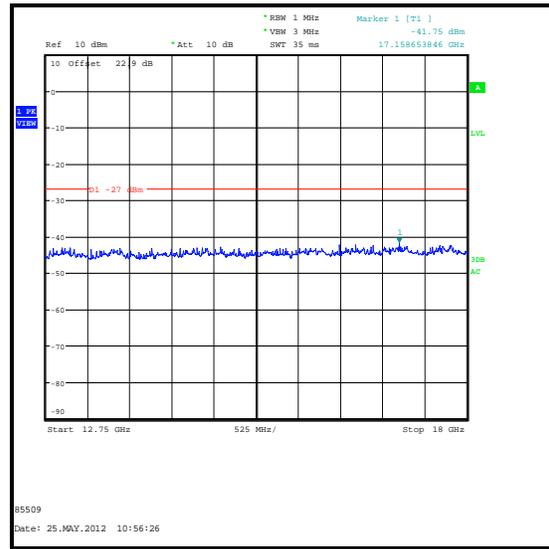
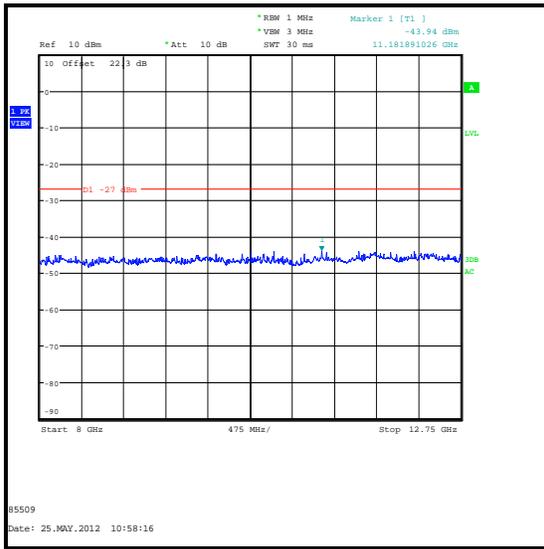
Results: MCS0 / 40 MHz Top Channel

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
26241.186	-37.9	-27.0	10.9	Complied

Transmitter Out of Band Conducted Emissions (continued)



Transmitter Out of Band Conducted Emissions (continued)



5.2.5. Transmitter Out of Band Emissions (Radiated)**Test Summary:**

Test Engineer:	Andrew Edwards	Test Date:	08 May 2012
Test Sample Serial No.:	261320		

FCC Reference:	Parts 15.407(b)(1),(6),(7) & 15.209(a)
Test Method Used:	FCC KDB 789033 G) & ANSI C63.10 Sections 6.3 and 6.5
Frequency Range:	30 MHz to 1000 MHz

Environmental Conditions:

Temperature (°C):	23
Relative Humidity (%):	44

Note(s):

1. Pre-scans with the EUT transmitting on the top channel were measured according to FCC Part 15.407(b)(1). This states that for transmitters operating in the band 5.15 to 5.25 GHz: all emissions outside of the 5.15-5.35 GHz band will not exceed an EIRP of -27 dBm/MHz. Part 15.407(b)(6) states unwanted emissions below 1 GHz must comply with the general field strength limits set forth in 15.209. Part 15.407(b)(7) states the provisions of 15.205 apply, e.g. restricted bands of operation.
2. The final measured value, for the given emission in the field strength result tables, incorporates the calibrated antenna factor and cable loss.
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 top channel only.
4. All other emissions were at least 20 dB below the appropriate limit or below the noise floor of the measurement system.
5. Measurements below 1 GHz were performed in a semi-anechoic chamber (RFI 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.

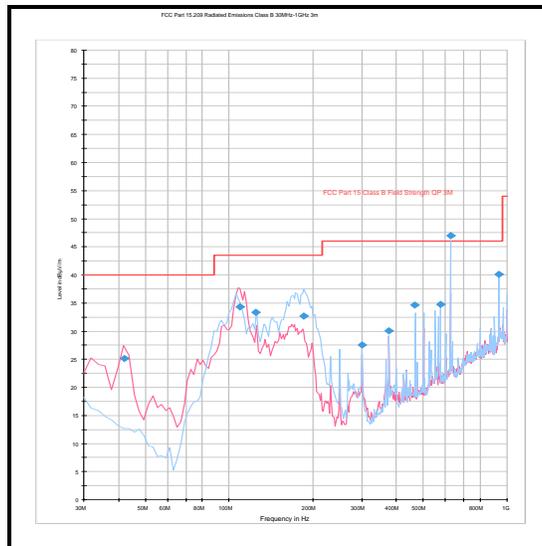
Transmitter Out of Band Emissions (Radiated) (continued)

Results: Top Channel / Field Strength

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
109.011	Vertical	34.3	43.5	9.2	Complied
125.024	Horizontal	33.4	43.5	10.1	Complied
933.335	Horizontal	40.1	46.0	5.9	Complied

Results: Top Channel / EIRP

Frequency (MHz)	Antenna Polarity	Level (dBm)	Limit (dBm)	Margin (dB)	Result
109.011	Vertical	-60.9	-27.0	33.9	Complied
125.024	Horizontal	-61.8	-27.0	34.8	Complied
933.335	Horizontal	-55.1	-27.0	28.1	Complied



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

Transmitter Out of Band Emissions (Radiated) (continued)**Test Summary:**

Test Engineer:	Andrew Edwards	Test Dates:	16 July 2012 & 17 July 2012
Test Sample Serial No.:	261320		

FCC Reference:	Parts 15.407(b)(1),(7) & 15.209(a)
Test Method Used:	FCC KDB 789033 G) & ANSI C63.10 Sections 6.3 and 6.6
Frequency Range:	1 GHz to 40 GHz

Environmental Conditions:

Temperature (°C):	23
Relative Humidity (%):	53

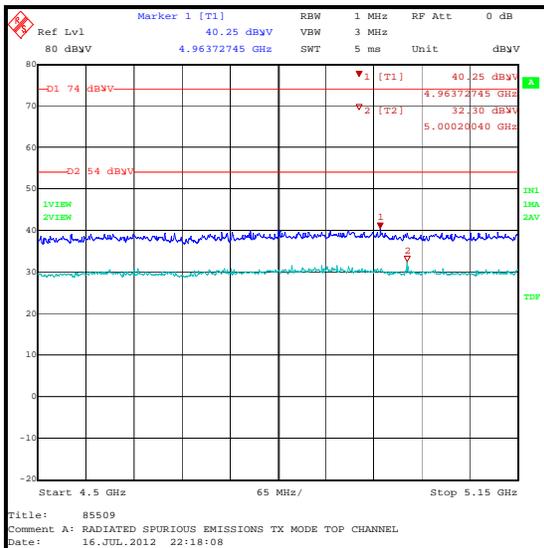
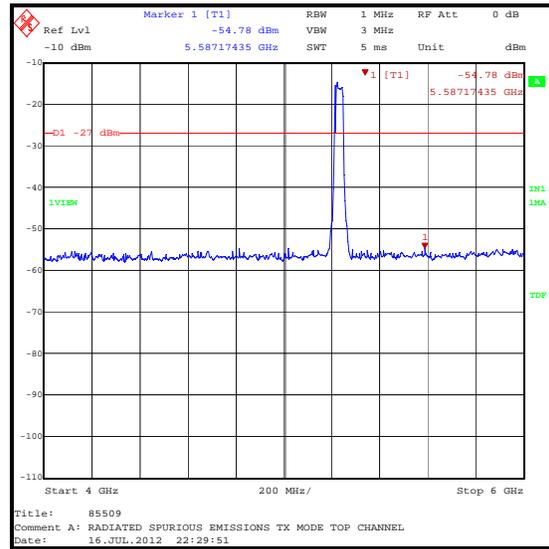
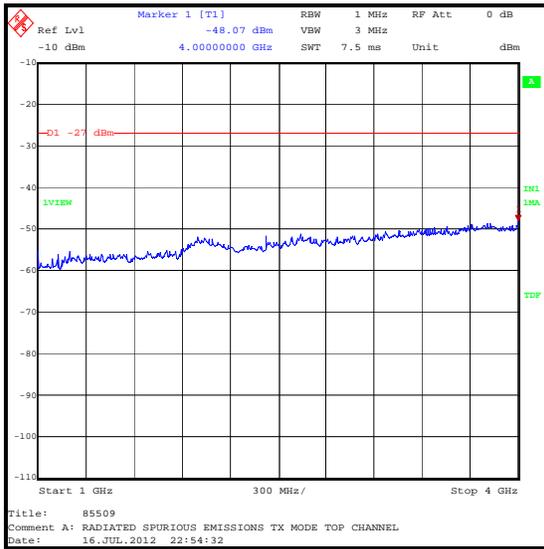
Note(s):

1. FCC Part 15.407(b)(1) states for devices operating in the 5.15 to 5.25 GHz band, all emissions outside the 5.15-5.35 GHz band shall not exceed and EIRP of -27 dBm/MHz. Part 15.407(b)(7) states the provisions of 15.205 apply, eg restricted bands of operation.
2. Measurements were performed with the EUT transmitting 13.5 Mbps/ MCS0 / 40 MHz channel width as all configurations were previously measured and this combination produced the highest output power. Pre-scans were performed with the EUT transmitting on the top channel.
3. The emission shown at approximately 5230 MHz on the 4 GHz to 6 GHz plot is the EUT fundamental.
4. The final measured value, for the given emission in the field strength result table, incorporates the calibrated antenna factor and cable loss.
5. Final measurements above 1 GHz were performed in a semi-anechoic chamber (RFI Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.

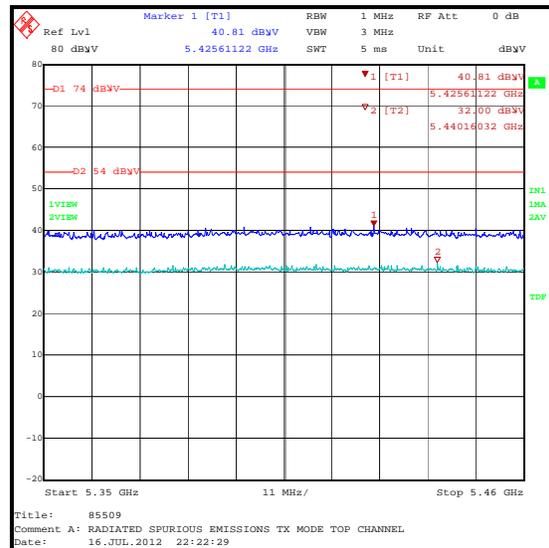
Results: Bottom Channel / EIRP

Frequency (MHz)	Antenna Polarity	Level (dBm)	Limit (dBm)	Margin (dB)	Result
26210.421	Vertical	-44.0	-27.0	17.0	Complied

Transmitter Out of Band Emissions (Radiated) (continued)

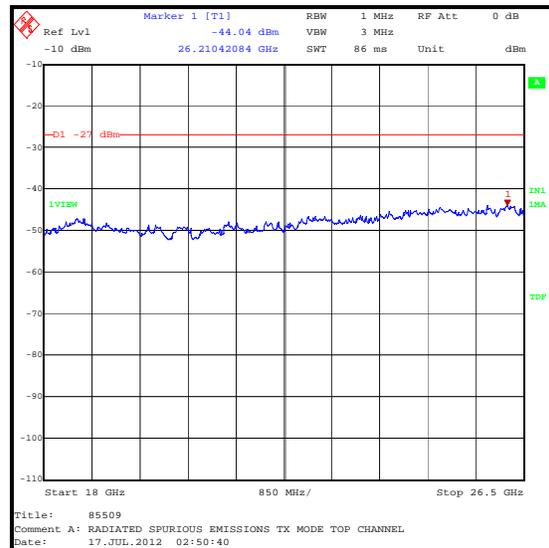
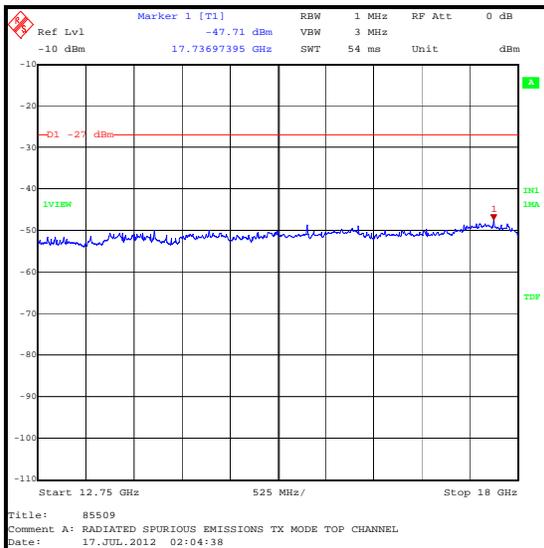
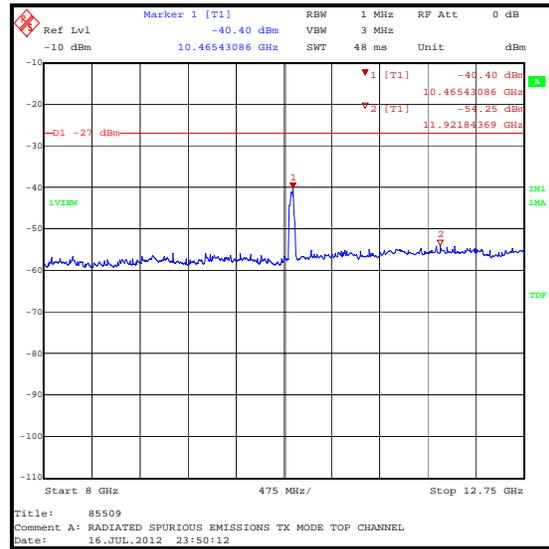
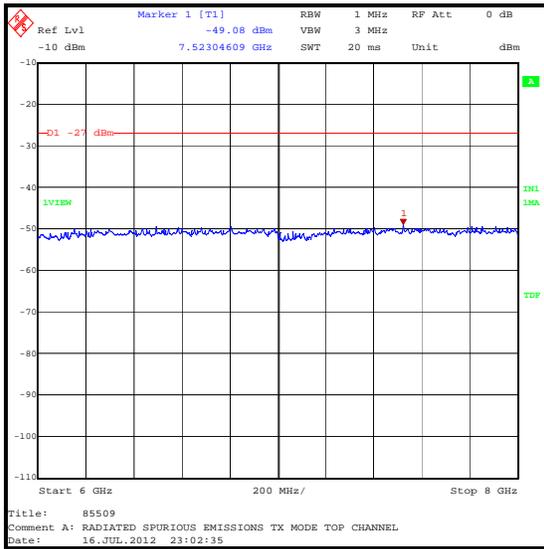


Restricted Band 4.5 GHz to 5.15 GHz

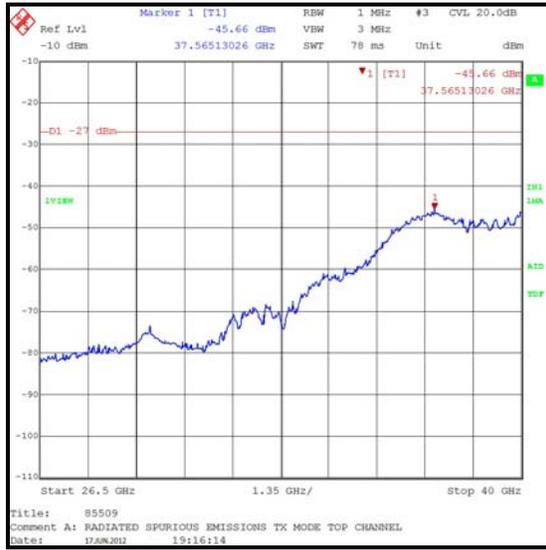


Restricted Band 5.35 GHz to 5.46 GHz

Transmitter Out of Band Emissions (Radiated) (continued)



Transmitter Out of Band Emissions (Radiated) (continued)



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
Maximum Conducted Output Power	5.15 GHz to 5.25 GHz	95%	±0.28 dB
Peak Power Spectral Density	5.15 GHz to 5.25 GHz	95%	±0.28 dB
26 dB Emission Bandwidth	5.15 GHz to 5.25 GHz	95%	±0.92 ppm
Conducted Spurious Emissions	30 MHz to 40 GHz	95%	±2.62 dB
Radiated Spurious Emissions	30 MHz to 40 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.

Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (months)
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	09 Oct 2012	12
A1738	Attenuator	Atlantic Microwave	BBS40-10	R1379	Calibrated before use	N/A
A1818	Antenna	EMCO	3115	00075692	09 Oct 2012	12
A1834	Attenuator	Hewlett Packard	8491B	10444	29 Jan 2013	12
A1980	High Pass Filter	AtlanTecRF	AFH-06000	09110900303	15 Mar 2013	12
A1999	Attenuator	Huber & Suhner	6820.17.B	07101	03 Apr 2013	12
A2055	Attenuator	Atlantic Microwave	WA-54-10-12	A2055	15 Jun 2012	12
A2056	Attenuator	Atlantic Microwave	WA-54-10-12	A2056	15 Jun 2012	12
A2130	High Pass Filter	Atlan TecRF	AFH-08000	80rJFBD06-002	25 Apr 2013	12
A253	Antenna	Flann Microwave	12240-20	128	09 Oct 2012	12
A254	Antenna	Flann Microwave	14240-20	139	09 Oct 2012	12
A255	Antenna	Flann Microwave	16240-20	519	09 Oct 2012	12
A256	Antenna	Flann Microwave	18240-20	400	09 Oct 2012	12
A436	Antenna	Flann	20240-20	330	09 Oct 2012	12
A553	Antenna	Chase	CBL6111A	1593	15 Feb 2013	12
G0543	Amplifier	Sonoma	310N	230801	13 Jul 2012	3
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	29 Aug 2012	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	09 Oct 2012	12
L1067	Test Receiver	Rohde & Schwarz	ESIB 40	100262	29 May 2013	12
M1273	Test Receiver	Rohde & Schwarz	ESIB 26	100275	03 Feb 2013	12
M1630	Test Receiver	Rohde & Schwarz	ESU40	100233	06 Feb 2013	12

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