TEST REPORT
FROM
RFI GLOBAL SERVICES LTD

Test of: DN100

FCC ID: OFD-2003DN001

To: FCC Parts 15.209, 15.247(b), 15.247(d), 15.247(e)

Test Report Serial No.:
RFI-RPT-RP85509JD19B V2.0

Version 2.0 Supersedes All Previous Versions

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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Registered in England and Wales. Company number:2117901

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Table of Contents

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) - Sections 15.209
Specification Reference:	47CFR15.247
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2011: Part 15 Subpart C (Intentional Radiators) - Section 15.247
Site Registration:	FCC: 209735
Location of Testing:	RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH.
Test Dates:	18 May 2012 to 17 July 2012

2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Result
Part 15.247(e)	Transmitter Power Spectral Density	✓
Part 15.247(b)(3)	Transmitter Maximum Peak Output Power	✓
Part 15.247(d)	Transmitter Conducted Emissions	✓
Part 15.247(d)/ 15.209(a)	Transmitter Radiated Emissions	✓

Key to Results

✓ = Complied ✗ = Did not comply

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:	KDB 558074 D01 v01 1/18/2012
Title:	Guidance for Performing Compliance Measurements on Digital Transmission System (DTS) devices operating Under 15.247
Reference:	KDB 662911 D01 v01r01 10/25/2011
Title:	Multiple Transmitter Output
Reference:	KDB 662911 D02 v01 10/25/2011
Title:	MIMO with Cross-Polarized Antennas

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:	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 Range:	5745 MHz to 5825 MHz		
Transmit Channels Tested:	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Bottom	149	5745
	Middle	157	5785
	Top	165	5825
Channel Spacing:	40 MHz		
Transmit Frequency Range:	5755 MHz to 5795 MHz		
Transmit Channels Tested:	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Bottom	151	5755
	Top	159	5795

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 Global Services Ltd 00062

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:	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
Sectorised	20.0	5G-20-90	DT-ST090O-5820-RSMA		3
Point to Point	29.0	MA-WA56-DP28B	DT-PT004O-5829-N		3
Point to Point	34.0	RD-5G-34	DT-PT004O-5834-RSMA		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 maximum power with >99% duty cycle in test mode on the bottom, middle and top channels as required using the supported data rates.

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 Power Spectral Density

Test Summary:

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

FCC Reference:	Part 15.247(e)
Test Method Used:	KDB 558074 Section 5.3.1

Environmental Conditions:

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

Note(s):

1. Transmitter Power Spectral Density tests in all bands were performed using a spectrum analyser in accordance with FCC KDB 558074 Section 5.3.1 Measurement Procedure PKPSD.
2. The EUT has two radio modules with two RF ports on each module. Initial measurements were performed on one channel on all four ports to find the radio module with the highest power. Radio module 1 had the highest power. The module ports are numbered Port 0 and Port 1. Power from both ports was measured from the RF ports and combined using the measure-and-sum method stated in FCC KDB 662911 D01. A 20 dB attenuator and RF cable were used to connect the measurement equipment to the EUT. The combined cable and attenuator loss was measured prior to performing the measurements and the loss incorporated into the measurement results.
3. Preliminary tests were made on one frequency for all supported data rates and modulation types to determine worst-case operation. Data rates of 54 Mbps for 802.11a, MCS15 for both 802.11n 20 MHz and 40 MHz channel bandwidths had the highest PSD levels.
4. The EUT was configured using a power setting of 24.0.
5. In accordance with FCC KDB 558074 Section 5.3.1, the measurements were performed using a 100 kHz resolution bandwidth. A Band Width Correction Factor of 15.2 dB was then subtracted from the combined results to convert from a level measured in 100 kHz bandwidth as the limit is specified in a 3 kHz bandwidth. The correction factor (BWCF) was calculated as shown below:

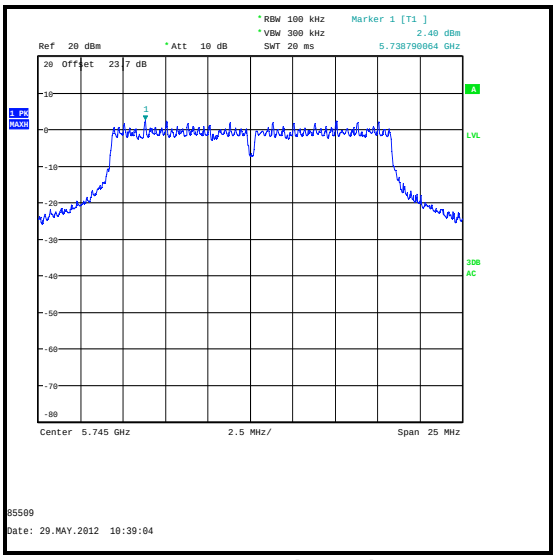
$$10 \log_{10} (3 \text{ kHz} / 100 \text{ kHz}) = -15.2 \text{ dB}.$$

Transmitter Power Spectral Density (continued)

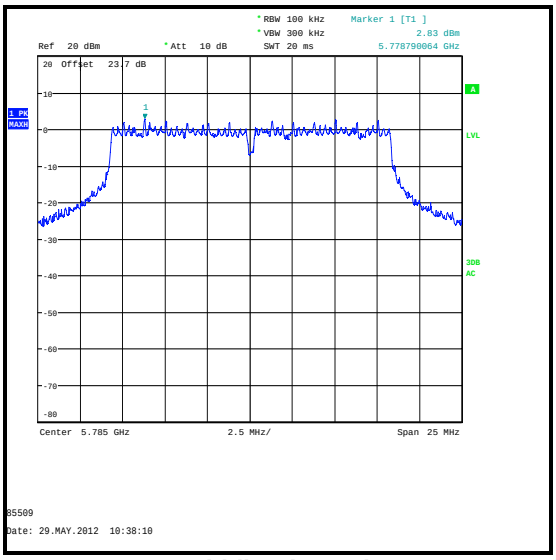
Results: 802.11a / 20 MHz / 54 Mbps / BPSK

Channel	PSD at Port 0 (dBm / 100 kHz)	PSD at Port 1 (dBm / 100 kHz)	Combined PSD (dBm / 100 kHz)	Combined PSD (dBm / 3 kHz)	Limit (dBm / 3 kHz)	Margin (dB)	Result
Bottom	2.4	3.4	5.9	-9.3	8.0	17.3	Complied
Middle	2.8	3.5	6.2	-9.0	8.0	17.0	Complied
Top	3.1	3.8	6.5	-8.7	8.0	16.7	Complied

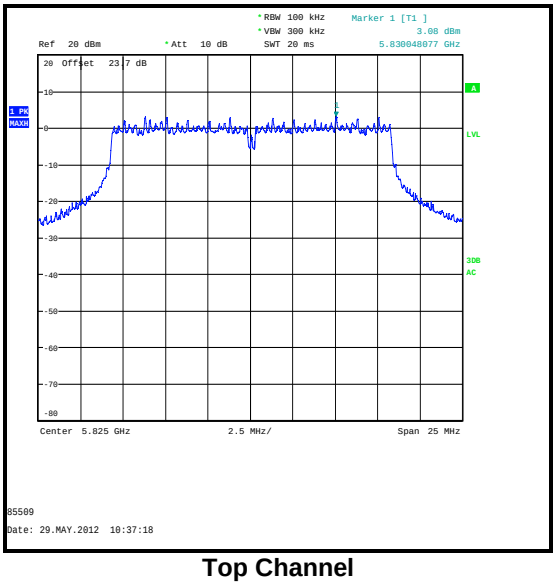
Results: 802.11a / 20 MHz / 54 Mbps / BPSK / Port 0



Bottom Channel



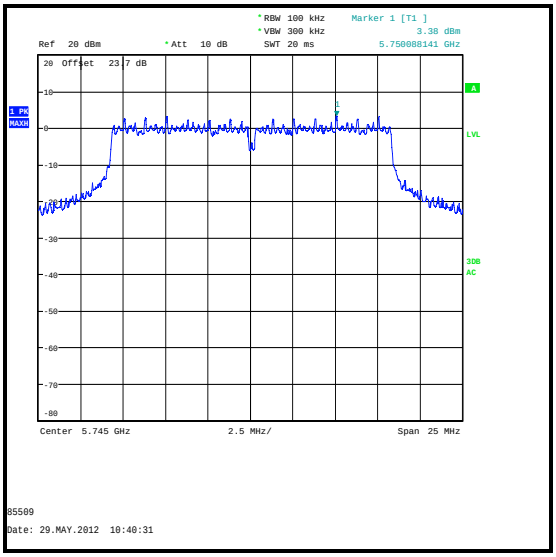
Middle Channel



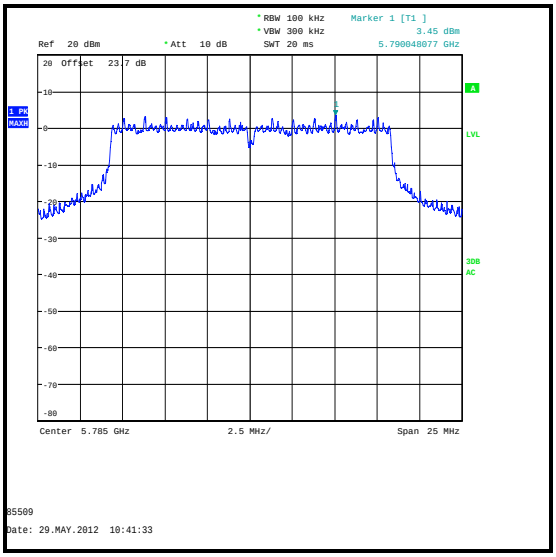
Top Channel

Transmitter Power Spectral Density (continued)

Results: 802.11a / 20 MHz / 54 Mbps / BPSK / Port 1



Bottom Channel



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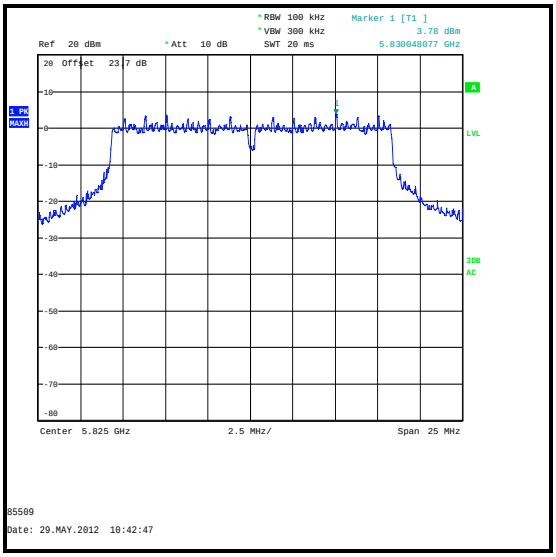


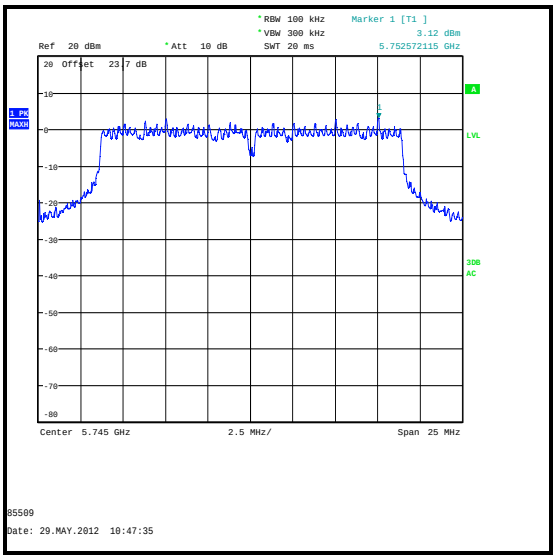
Top Channel

Transmitter Power Spectral Density (continued)

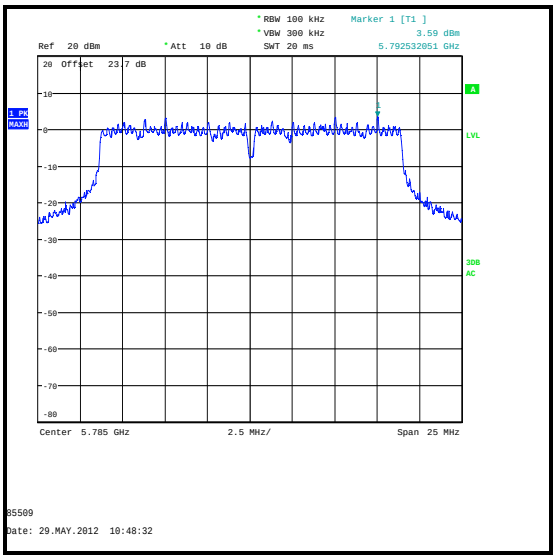
Results: 802.11n / 20 MHz / 130 Mbps / 64QAM / MCS15

Channel	PSD at Port 0 (dBm / 100 kHz)	PSD at Port 1 (dBm / 100 kHz)	Combined PSD (dBm / 100 kHz)	Combined PSD (dBm / 3 kHz)	Limit (dBm / 3 kHz)	Margin (dB)	Result
Bottom	3.1	3.7	6.4	-8.8	8.0	16.8	Complied
Middle	3.6	3.5	6.6	-8.6	8.0	16.6	Complied
Top	4.2	4.0	7.1	-8.1	8.0	16.1	Complied

Results: 802.11n / 20 MHz / 130 Mbps / 64QAM / MCS15 / Port 0



Bottom Channel



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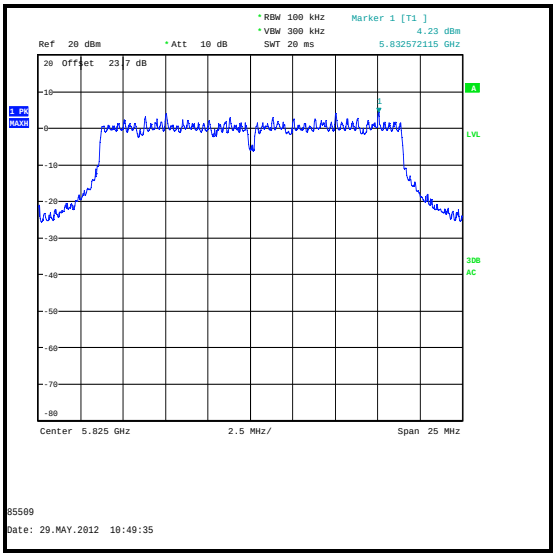
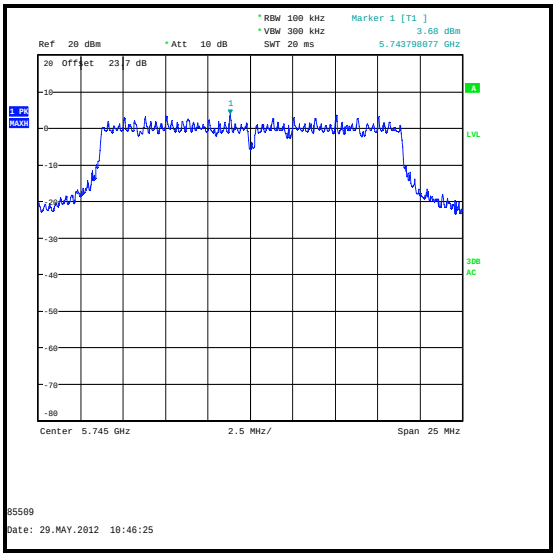


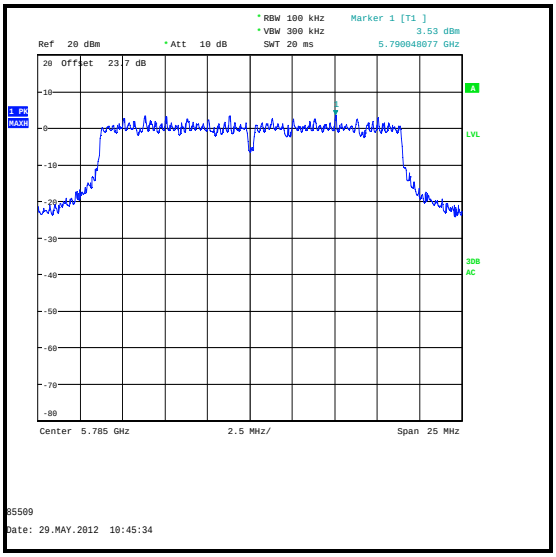
Top Channel

Transmitter Power Spectral Density (continued)

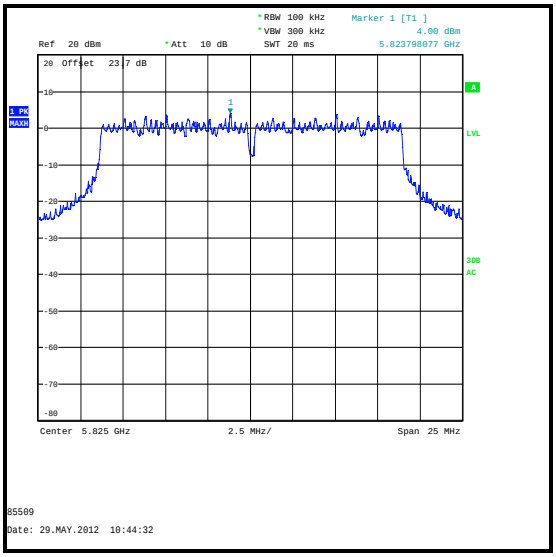
Results: 802.11n / 20 MHz / 130 Mbps / 64QAM / MCS15 / Port 1



Bottom Channel



Middle Channel



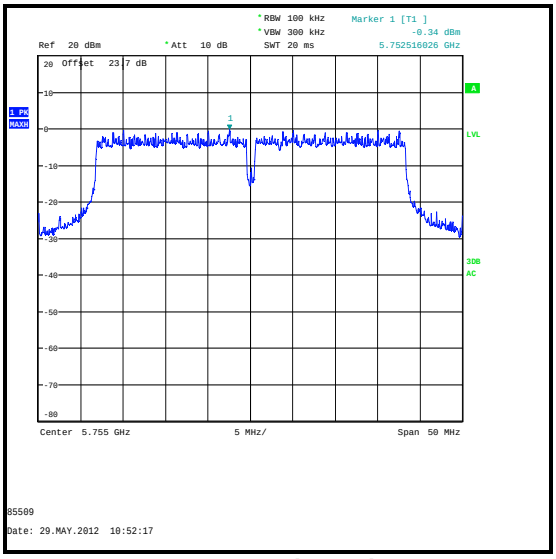
Top Channel

Transmitter Power Spectral Density (continued)

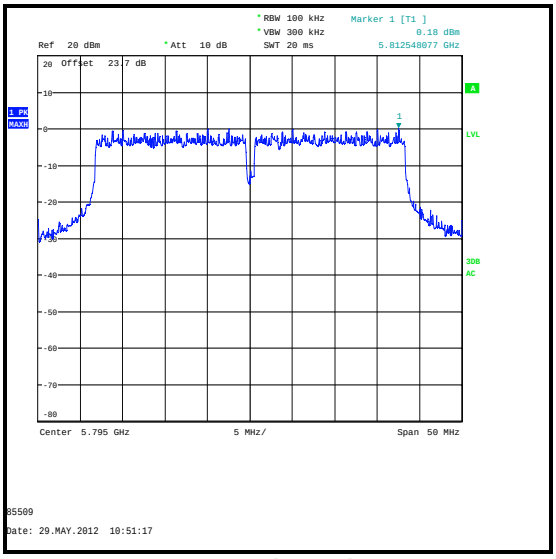
Results: 802.11n / 40 MHz / 270 Mbps / 64QAM / MCS15

Channel	PSD at Port 0 (dBm / 100 kHz)	PSD at Port 1 (dBm / 100 kHz)	Combined PSD (dBm / 100 kHz)	Combined PSD (dBm / 3 kHz)	Limit (dBm / 3 kHz)	Margin (dB)	Result
Bottom	-0.3	0.4	3.1	-12.1	8.0	20.1	Complied
Top	0.2	0.7	3.5	-11.7	8.0	19.7	Complied

Results: 802.11n / 40 MHz / 270 Mbps / 64QAM / MCS15 / Port 0

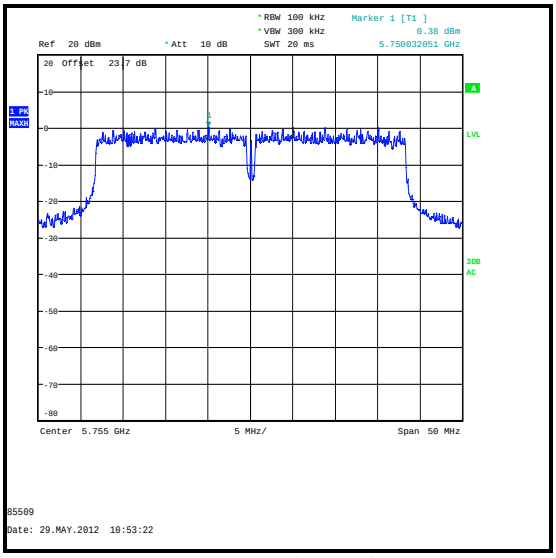


Bottom Channel

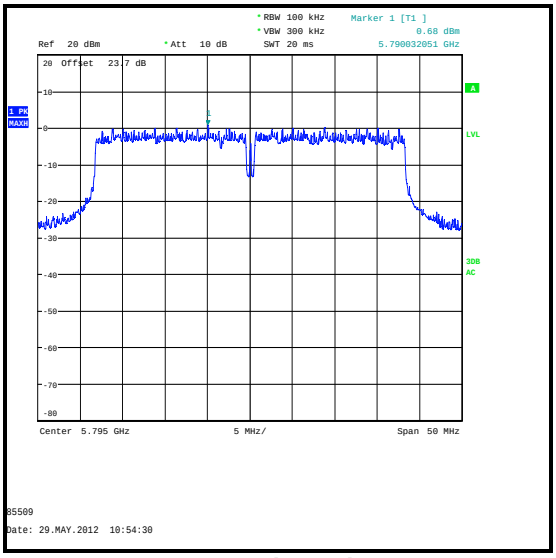


Top Channel

Results: 802.11n / 40 MHz / 270 Mbps / 64QAM / MCS 15 / Port 1



Bottom Channel



Top Channel

5.2.2. Transmitter Maximum Peak Output Power

Test Summary:

Test Engineer:	Sarah Williams	**Test Date:**	28 May 2012
Test Sample Serial No:	261320		

FCC Reference:	Part 15.247(b)(3)
Test Method Used:	KDB 558074 Section 5.2.1.2

Environmental Conditions:

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

Note(s):

1. Conducted power tests in all bands were performed using a spectrum analyser in accordance with FCC KDB 558074 Section 5.2.1.2 Measurement Procedure PK2.
2. The EUT has two radio modules with two RF ports on each module. Initial measurements were performed on one channel on all four 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. The Customer stated that the MIMO signals are uncorrelated with all antenna types.
3. Preliminary tests were made on one frequency for all supported data rates and modulation types to determine worst-case operation. Data rates of 54 Mbps for 802.11a, MCS15 for both 802.11n 20 MHz and 40 MHz channel bandwidths had the highest levels.
4. The EUT has various antennas of several different types with differing gains that can be used. The Customer supplied a suitably terminated RF cable, 2.1 metres in length and with a measured loss of 2.7 dB across the 5727-5850 MHz band. The cable loss was added to the antenna gain. The net gain was added to the combined and conducted power from both ports and compared to the EIRP limits.
5. 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 30 dBm with an EIRP limit of 4 Watts (36 dBm). The EUT was configured with a power setting of 24.0. The RF cable loss of 2.7 dB was taken into account during calculations.

Transmitter Maximum Peak Output Power (continued)

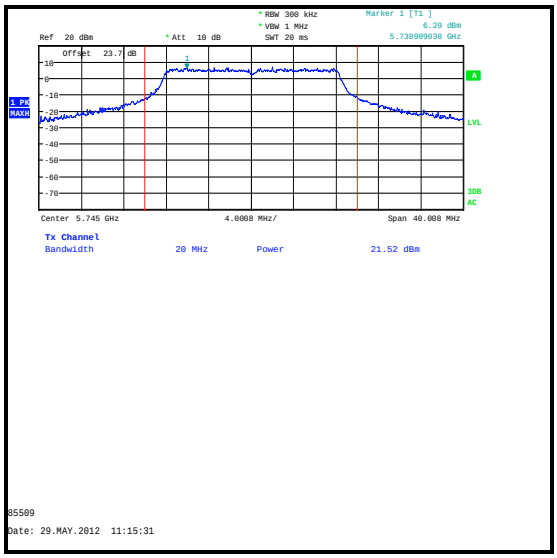
Results: 802.11a / 20 MHz / 54 Mbps / 64QAM / 5 dBi omnidirectional antenna

Channel	Conducted Peak Power at Port 0 (dBm)	Conducted Peak Power at Port 1 (dBm)	Combined Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	21.5	22.6	25.1	30.0	4.9	Complied
Middle	21.9	22.7	25.3	30.0	4.7	Complied
Top	22.4	22.9	25.7	30.0	4.3	Complied

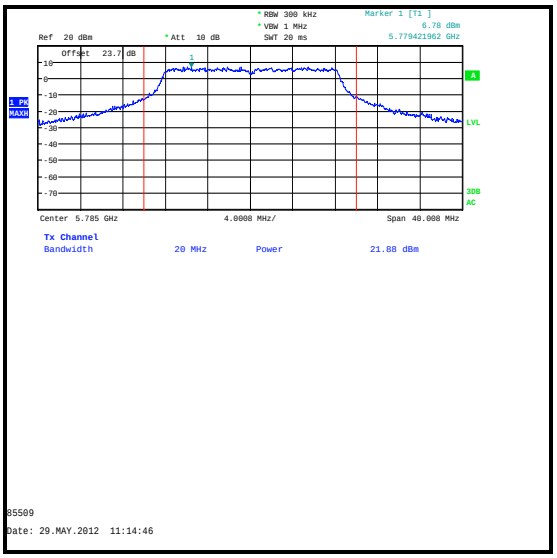
Channel	Combined Conducted Peak Power (dBm)	Declared Antenna Gain + cable loss (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	25.1	2.3	27.4	36.0	8.6	Complied
Middle	25.3	2.3	27.6	36.0	8.4	Complied
Top	25.7	2.3	28.0	36.0	8.0	Complied

Transmitter Maximum Peak Output Power (continued)

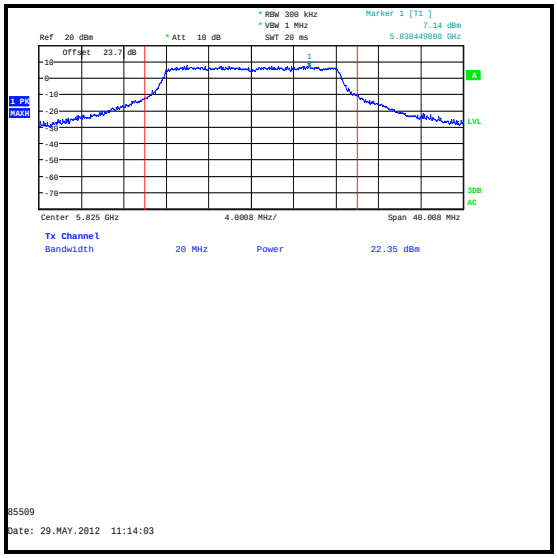
Results: 802.11a / 20 MHz / 54 Mbps / 64QAM / Port 0 / 5 dBi omnidirectional antenna



Bottom Channel



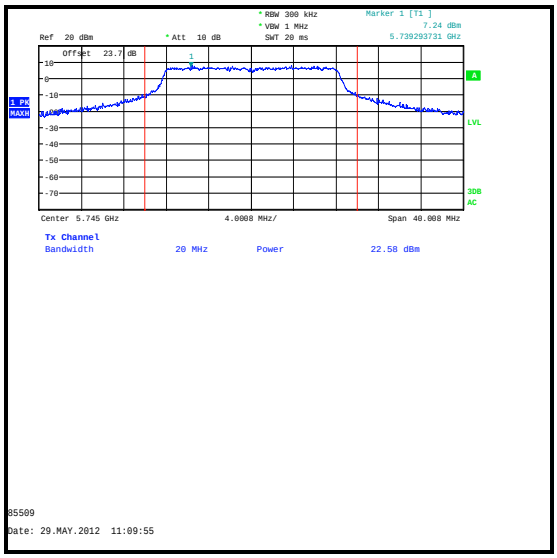
Middle Channel



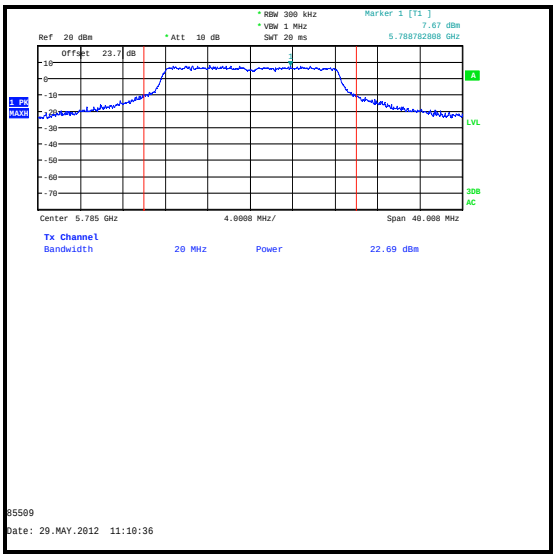
Top Channel

Transmitter Maximum Peak Output Power (continued)

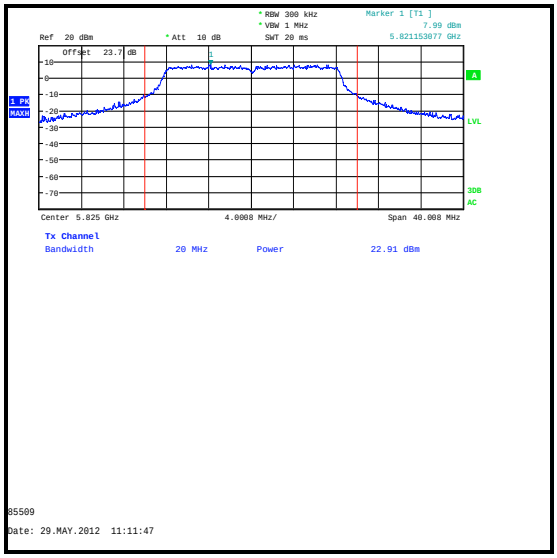
Results: 802.11a / 20 MHz / 54 Mbps / 64QAM / Port 1 / 5 dBi omnidirectional antenna a



Bottom Channel



Middle Channel



Top Channel

Transmitter Maximum Peak Output Power (continued)

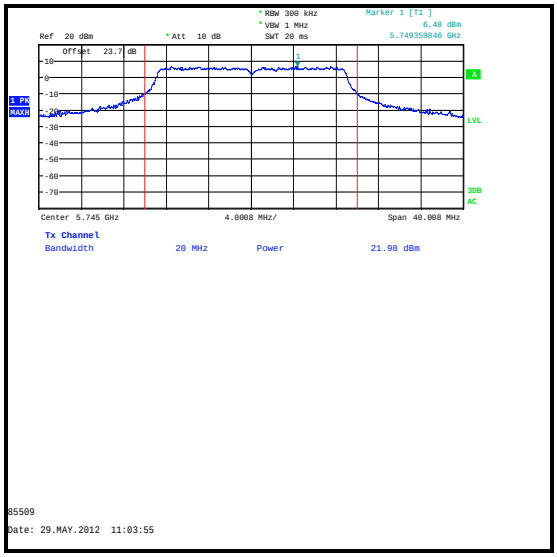
Results: 802.11n / 20 MHz / 130 Mbps / 64QAM / MCS15 / 5 dBi omnidirectional antenna

Channel	Conducted Peak Power at Port 0 (dBm)	Conducted Peak Power at Port 1 (dBm)	Combined Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	22.0	22.9	25.5	30.0	4.5	Complied
Middle	22.4	23.0	25.7	30.0	4.3	Complied
Top	22.8	23.1	26.0	30.0	4.0	Complied

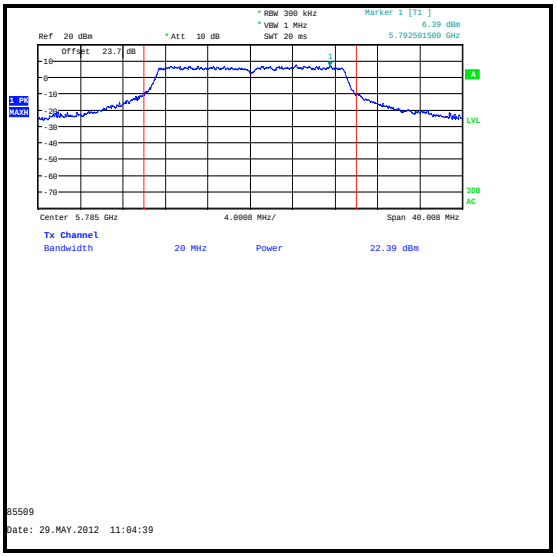
Channel	Combined Conducted Peak Power (dBm)	Declared Antenna Gain + cable loss (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	25.5	2.3	27.8	36.0	8.2	Complied
Middle	25.7	2.3	28.0	36.0	8.0	Complied
Top	26.0	2.3	28.3	36.0	7.7	Complied

Transmitter Maximum Peak Output Power (continued)

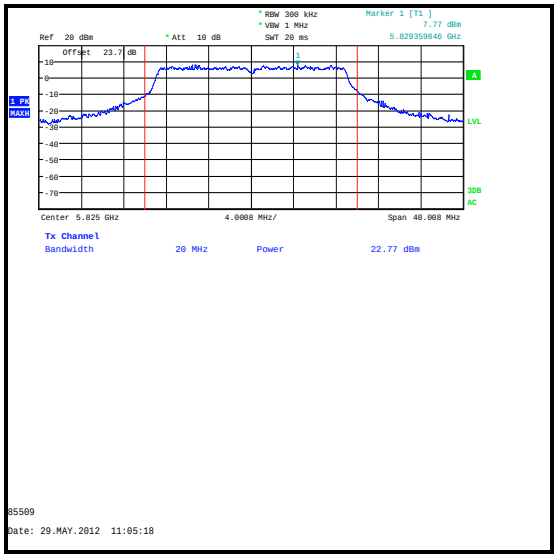
Results: 802.11n / 20 MHz / 130 Mbps / 64QAM / MCS15 / Port 0 / 5 dBi sector/omnidirectional antenna



Bottom Channel



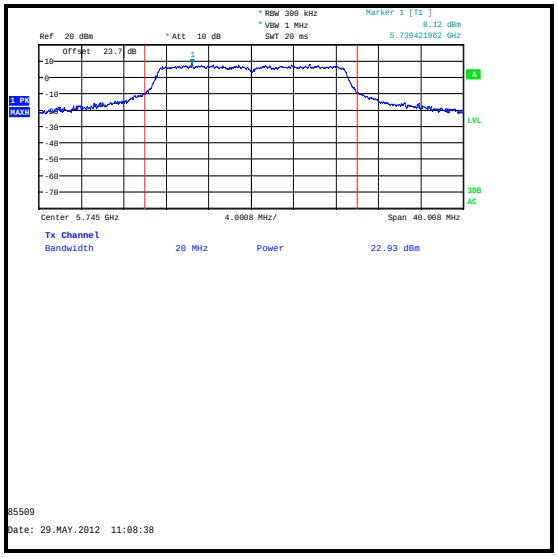
Middle Channel



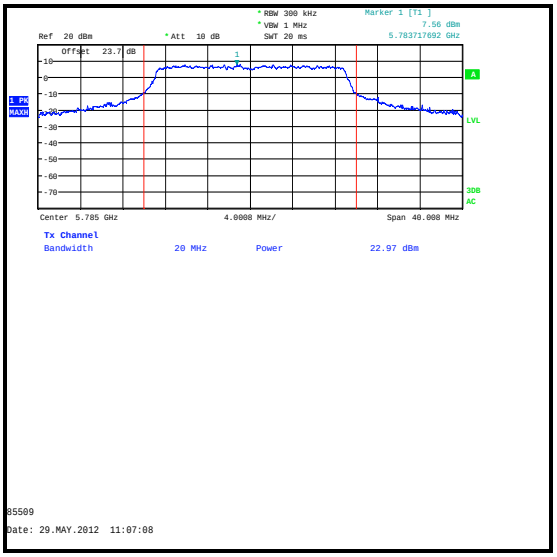
Top Channel

Transmitter Maximum Peak Output Power (continued)

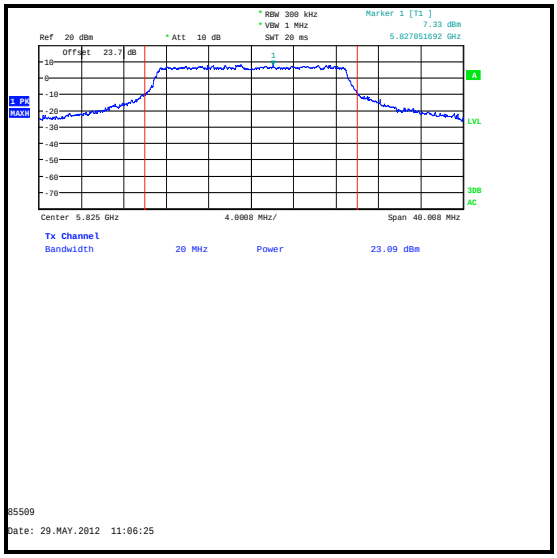
Results: 802.11n / 20 MHz / 130 Mbps / 64QAM / MCS15 / Port 1 / 5 dBi sector/omnidirectional antenna



Bottom Channel



Middle Channel



Top Channel

Transmitter Maximum Peak Output Power (continued)

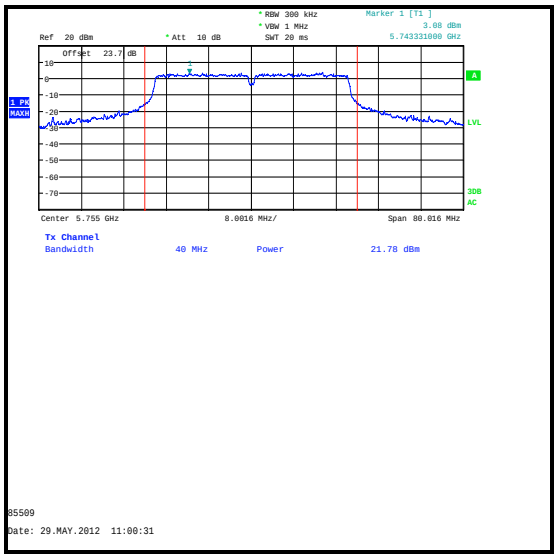
Results: 802.11n / 40 MHz / 270 Mbps / 64QAM / MCS15 / 5 dBi omnidirectional antenna

Channel	Conducted Peak Power at Port 0 (dBm)	Conducted Peak Power at Port 1 (dBm)	Combined Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	21.8	22.9	25.4	30.0	4.6	Complied
Top	22.4	23.0	25.7	30.0	4.3	Complied

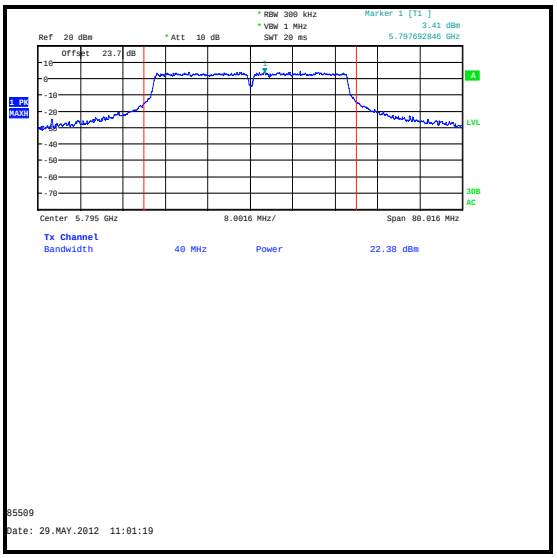
Channel	Combined Conducted Peak Power (dBm)	Declared Antenna Gain + cable loss (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	25.4	2.3	27.7	36.0	8.3	Complied
Top	25.7	2.3	28.0	36.0	8.0	Complied

Transmitter Maximum Peak Output Power (continued)

Results: 802.11n / 40 MHz / 270 Mbps / 64QAM / Port 0 / 5 dBi omnidirectional antenna

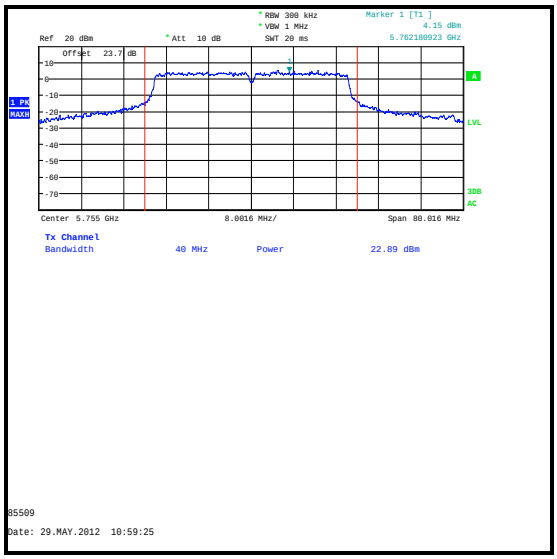


Bottom Channel

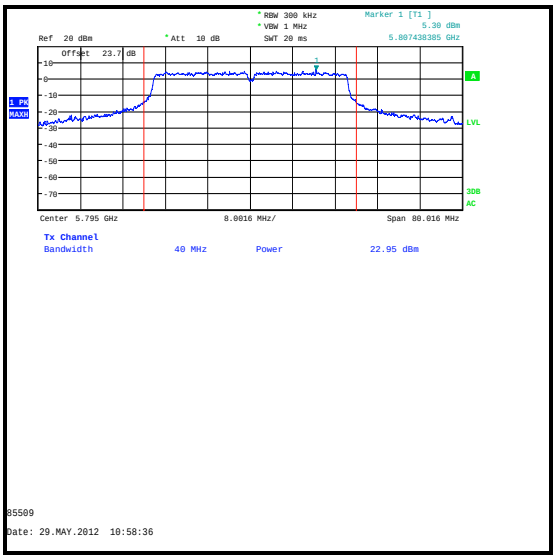


Top Channel

Results: 802.11n / 40 MHz / 270 Mbps / 64QAM / Port 1 / 5 dBi omnidirectional antenna



Bottom Channel



Top Channel

5.2.3. Transmitter Conducted Emissions

Test Summary:

Test Engineer:	Andrew Edwards	**Test Date:**	21 May 2012
Test Sample Serial No:	261320		

FCC Reference:	Part 15.247(d)
Test Method Used:	FCC KDB 558074 Section 5.4
Frequency Range	30 MHz to 40 GHz

Environmental Conditions:

Temperature (°C):	24
Relative Humidity (%):	41

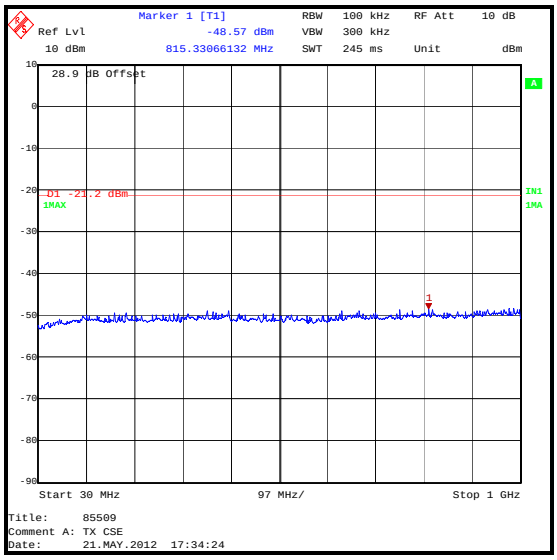
Note(s):

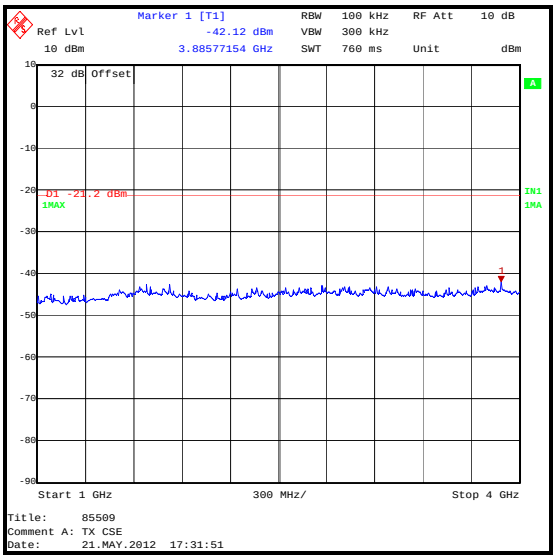
1. Measurements were performed with the EUT transmitting MCS15 / 130 Mbps / 20 MHz Channel width / Port 0 as all configurations were previously measured and this combination produced the highest output power. Pre-scans were performed with the EUT transmitting at >99% duty cycle on the top channel. The EUT was set to Power Level 24.0.
2. The spectrum analyser was connected to the EUT antenna port via suitable RF cables and attenuators. The RF path loss was calibrated before measurements took place. The path loss appears on the plot as an RF level offset.
3. In accordance with FCC KDB 558074 Section 5.4.1, spurious emissions pre-scans were performed with a peak detector as the in-band PSD was previously measured using a peak detector. The -21.2dBm limit lines shown on the plots is the restricted band peak limit of 74 dBµV/m (field strength) at 3 metres converted to dBm using a conversion factor of 95.2 dB (74.0 - 95.2 = -21.2 dBm conducted).
4. The emission at approximately 5825 MHz shown on the 4 GHz to 6 GHz plot is the EUT fundamental.
5. 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.
6. As antenna port conducted emissions test were performed, cabinet emissions test were also performed as required in FCC KDB 558074 Section 5.4.2.1

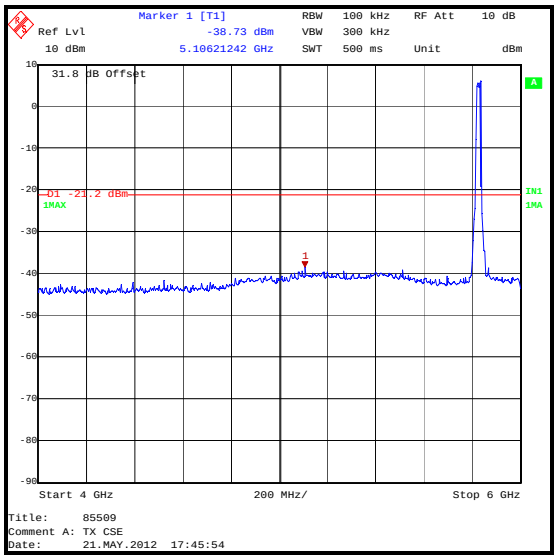
Results: 802.11n / 20 MHz channel / 130 Mbps / MCS15 / Top Channel

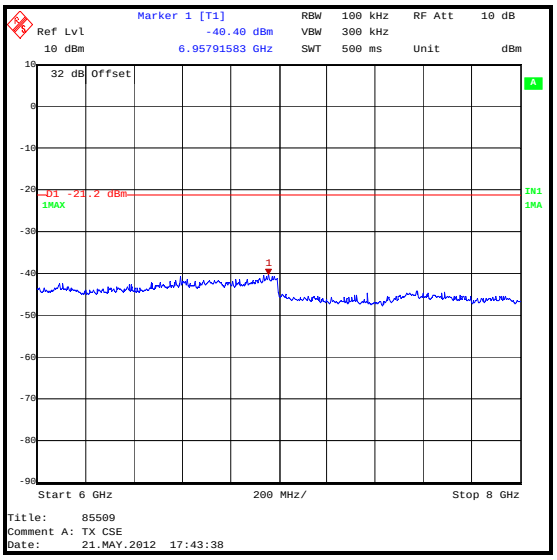
Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
36212.425	-30.4	-20.0	10.4	Complied

Transmitter Conducted Emissions (Continued)

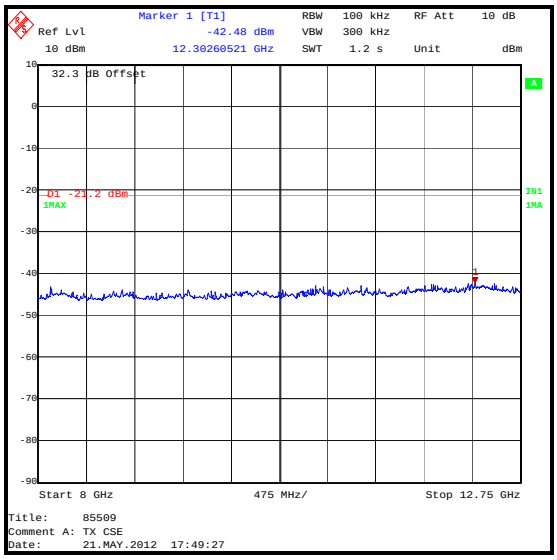


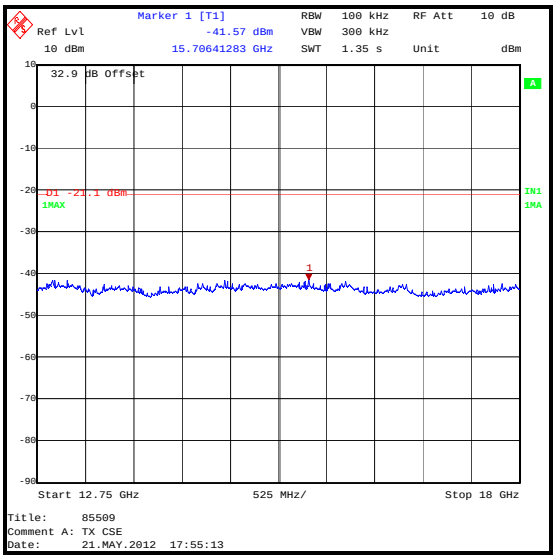


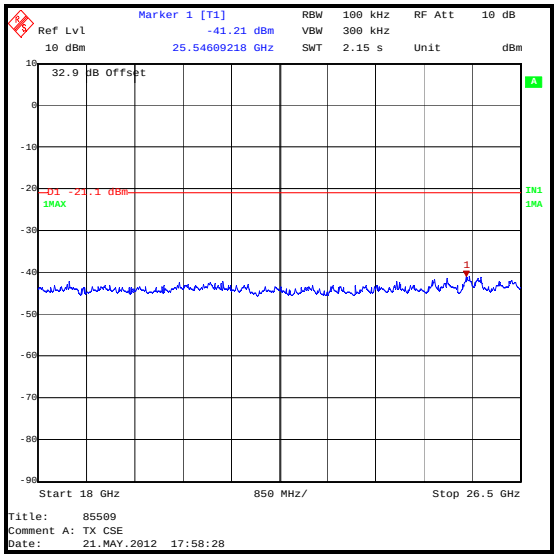


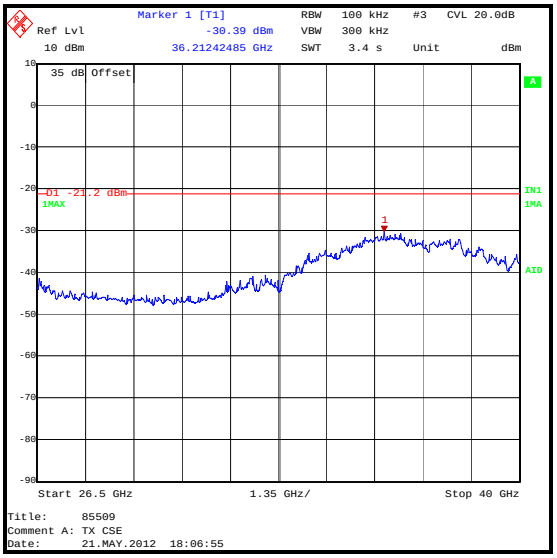


Transmitter Conducted Emissions (Continued)









5.2.4. Transmitter Radiated Emissions

Test Summary:

Test Engineer:	Andrew Edwards	**Test Date:**	18 May 2012
Test Sample Serial No:	261320		

FCC Reference:	Parts 15.247(d) & 15.209(a)
Test Method Used:	As detailed in ANSI C63.10 Sections 6.3 and 6.5 referencing ANSI C63.4
Frequency Range	30 MHz to 1000 MHz

Environmental Conditions:

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

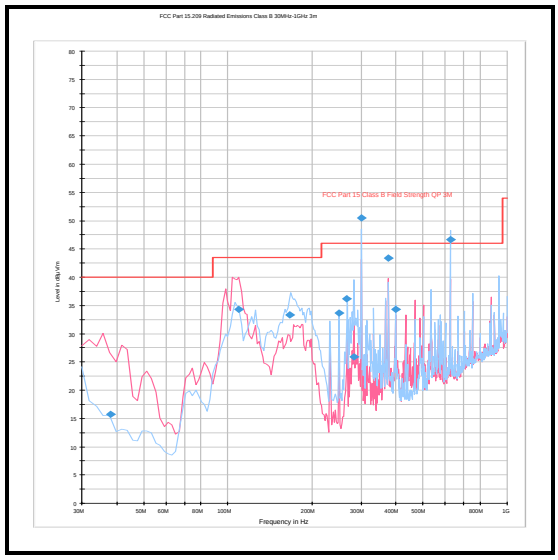
Results: 802.11n / 20 MHz / 64QAM / MCS15 / 130 Mbps

Frequency (MHz)	Antenna Polarity	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
37.982	Vertical	15.7	40.0	24.3	Complied
109.608	Vertical	34.3	43.5	9.2	Complied
166.616	Horizontal	33.3	43.5	10.2	Complied
250.001	Horizontal	33.7	46.0	12.3	Complied
266.659	Horizontal	36.2	46.0	9.8	Complied
283.326	Horizontal	25.8	46.0	20.2	Complied
400.007	Horizontal	34.3	46.0	11.7	Complied

Note(s):

1. Measurements were performed with the EUT transmitting MCS15 / 130 Mbps / 20 MHz channel width / top channel at the Power Level setting 24.0. All configurations were previously measured during pre-scans and this combination produced the highest radiated emission levels.
2. All antenna ports were terminated using 50 Ohm loads.
3. The final measured value for the given emissions in the results table, incorporates the calibrated antenna factor and cable loss
4. 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.
5. All other emissions were at least 20 dB below the appropriate limit or below the noise floor of the measurement system.
6. 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 Radiated Emissions (continued)



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

Transmitter Radiated Emissions (continued)

Test Summary:

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

FCC Reference:	Parts 15.247(d) & 15.209(a)
Test Method Used:	FCC KDB 558074 D01 Section 5.4 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. Measurements were performed with the EUT transmitting MCS15 / 20 MHz channel width / 64QAM / 130 Mbps / top channel at the Power Level setting 24.0 as all configurations were previously measured and this combination produced the highest output power.
2. All antenna ports were terminated with 50 Ohm loads.
3. The final measured value for the given emissions in the results tables, incorporates the calibrated antenna factor and cable loss
4. *-20 dBc limit
5. The emission shown at approximately 5825 MHz on the 4 GHz to 6 GHz plot is the EUT fundamental.
6. 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.
7. Pre-scans above 1 GHz were performed in a fully anechoic chamber (RFI 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 (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 Radiated Emissions (continued)

Results: Bottom Channel / 20 MHz / MCS15 / 130 Mbps / Peak / High power setting

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
11492.224	Vertical	64.2	74.0	9.8	Complied
17232.595	Horizontal	50.0	56.3*	6.3	Complied

Results: Bottom Channel / 20 MHz / MCS15 / 130 Mbps / Average / High power setting

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
11492.224	Vertical	47.7	54.0	6.3	Complied

Results: Middle Channel / 20 MHz / MCS15 / 130 Mbps / Peak / High power setting

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
11570.062	Vertical	65.2	74.0	8.8	Complied
17351.385	Horizontal	46.6	54.2*	7.6	Complied

Results: Middle Channel / 20 MHz / MCS15 / 130 Mbps / Average / High power setting

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
11570.062	Vertical	50.7	54.0	3.3	Complied

Results: Top Channel / 20 MHz / MCS15 / 130 Mbps / Peak / High power setting

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
11650.060	Vertical	65.0	74.0	9.0	Complied
17475.090	Vertical	52.0	53.8*	1.8	Complied

Transmitter Radiated Emissions (continued)

Results: Top Channel / 20 MHz / MCS15 / 130 Mbps / Average / High power setting

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
11650.060	Vertical	49.8	54.0	4.2	Complied

Results: Bottom Channel / 40 MHz / MCS15 / 270 Mbps / Peak / High power setting

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
11509.524	Vertical	61.8	74.0	12.2	Complied
17275.160	Vertical	48.3	54.6*	6.3	Complied

Results: Bottom Channel / 40 MHz / MCS15 / 270 Mbps / Average / High power setting

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
11509.524	Vertical	45.7	54.0	8.3	Complied

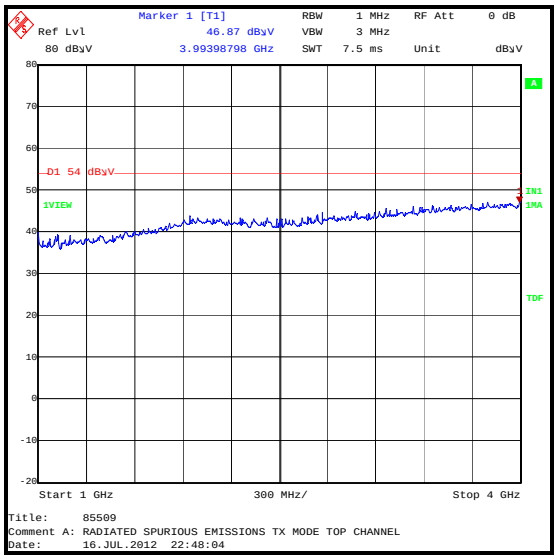
Results: Top Channel / 40 MHz / MCS15 / 270 Mbps / Peak / High power setting

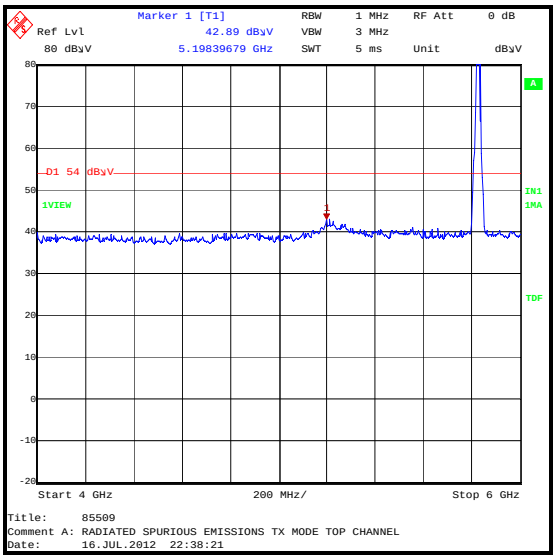
Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
11589.549	Vertical	65.8	74.0	8.2	Complied
17392.635	Horizontal	47.4	53.2*	5.8	Complied

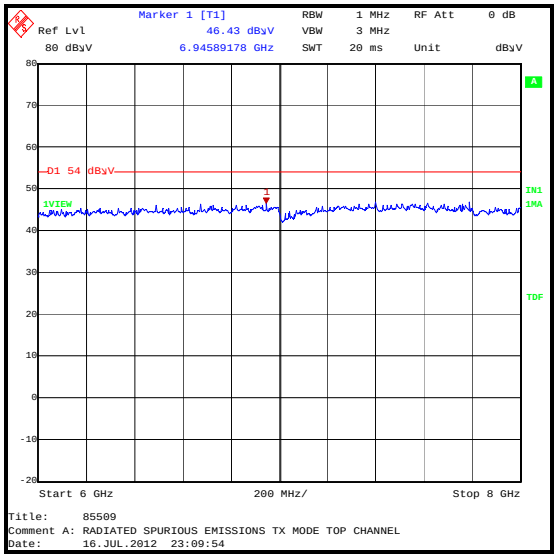
Results: Top Channel / 40 MHz / MCS15 / 270 Mbps / Average / High power setting

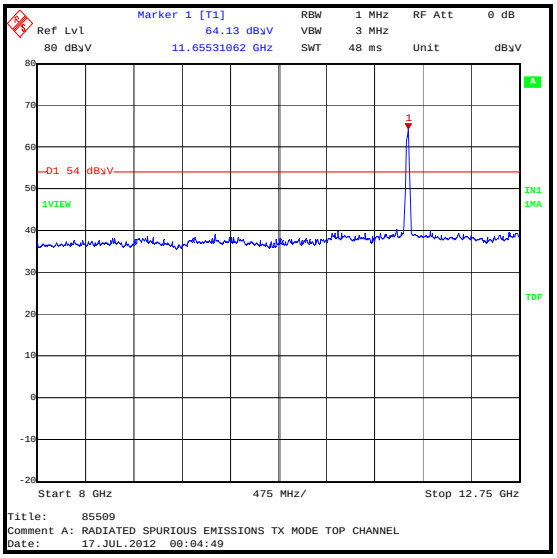
Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
11589.549	Vertical	49.5	54.0	4.5	Complied

Transmitter Radiated Emissions (continued)

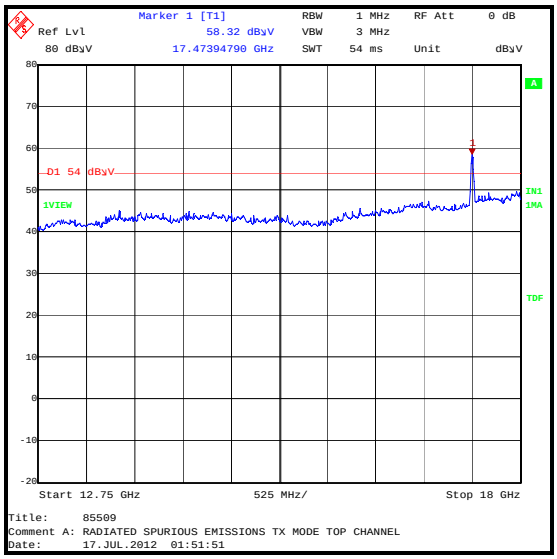


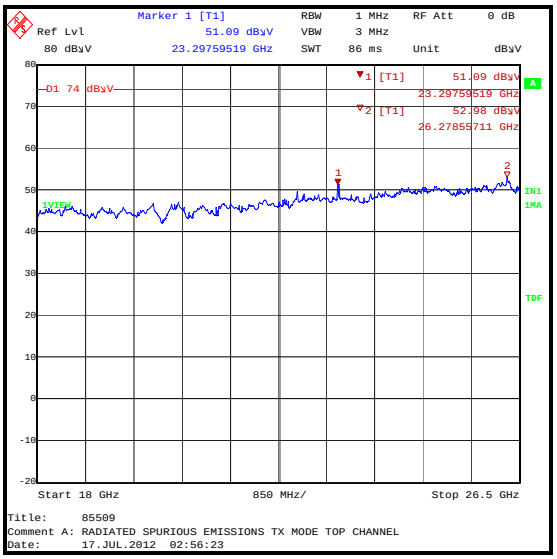




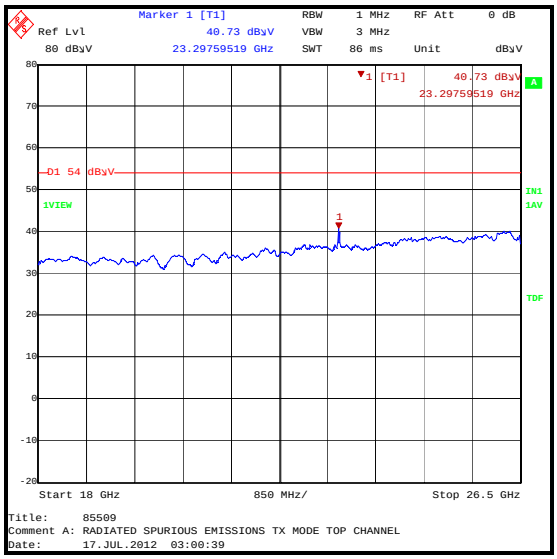


Transmitter Radiated Emissions (continued)

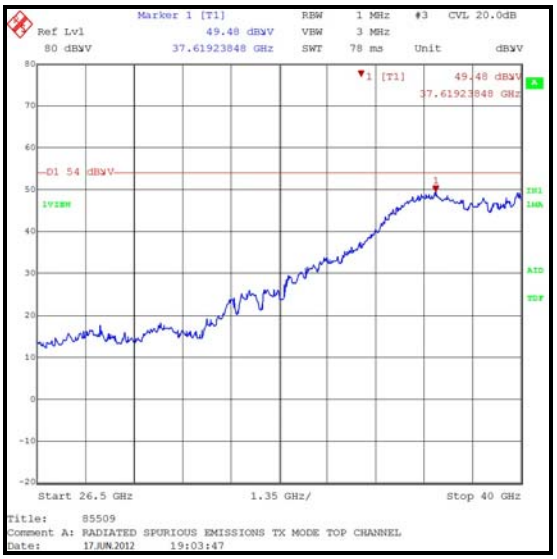




Peak detector



Average detector



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

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
Conducted Maximum Peak Output Power	5725 MHz to 5850 MHz	95%	±0.28 dB
Spectral Power Density	5725 MHz to 5850 MHz	95%	±2.94 dB
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
A1999	Attenuator	Huber & Suhner	6820.17.B	07101	03 Apr 2013	12
A203	Antenna	Flann Microwave	22240-20	343	11 May 2013	36
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	RF Filter	AtlanTecRF	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 Microwave	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	31 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	ESU 40	100233	13 Jan 2012	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.