

TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: OWS451i

FCC ID: PVH0941

IC Certification Number: 5325A-0941

To: FCC Part 15.247: 2010 Subpart C, RSS-GEN Issue 2 December 2010
and RSS-210 Issue 7 December 2010

Test Report Serial No:
RFI-RPT-RP78718JD07A V3.0

Version 3.0 supersedes all previous versions

This Test Report Is Issued Under The Authority
Of Chris Guy, Head of Global Approvals:



Checked By:

Nigel Davison

Signature:



Date of Issue:

17 May 2011

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1. Customer Information

Company Name:	ConnectBlue AB
Address:	Norra Vallgatan 64 3V SE-211 22 Malmö Sweden

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR15.247
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2010: Part 15 Subpart C (Intentional Radiators) - Section 15.247
Specification Reference:	47CFR15.109
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2010: Part 15 Subpart B (Unintentional Radiators) - Sections 15.107 and 15.109
Specification Reference:	RSS-GEN Issue 2 December 2010
Specification Title:	General Requirements and Information for the Certification of Radio communication Equipment
Specification Reference:	RSS-210 Issue 7 December 2010
Specification Title:	Low-power Licence-exempt Radio communication Devices (All Frequency Bands): Category I Equipment.
Site Registration:	FCC: 209735; Industry Canada: 3245B-2
Location of Testing:	RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH.
Test Dates:	07 October 2010 to 11 May 2011

2.2. Summary of Test Results

Summary of Test Results

FCC Reference (47CFR)	IC Reference	Measurement	Result
Part 15.109	RSS-Gen 4.10/6.1	Receiver/Idle Mode Radiated Spurious Emissions	
Part 15.247(b)(3)	RSS-Gen 4.8 RSS-210 A8.4(4)	Transmitter Maximum Peak Output Power	
Part 15.247(d)/ 15.209(a)	RSS-Gen 4.9 RSS-210 A8.5	Transmitter Radiated Emissions	
Part 15.247(d)/ 15.209(a)	RSS-Gen 4.9 RSS-210 A8.5	Transmitter Band Edge Radiated Emissions	
Key to Results  = Complied  = Did not comply			

Note: Where FCC clause references are made within this report also read the equivalent IC reference.

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

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:	connectBlue AB
Model Name or Number:	OWS451i
Serial Number:	Not Stated
Hardware Version Number:	cB-0941-02
Software Version Number:	2.4_2.1.9_RPS / ows451_pcti_firmware_2.1.0_release.cbz
FCC ID:	PVH0941
IC Certification ID:	5325A-0941

3.2. Description of EUT

The equipment under test was a WLAN module with an integrated antenna which provides a wireless communication link using IEEE802.11b/g/n WLAN.

- Fractus FR05-S1-NO-004, gain 0 dBi (Integral Antenna)

Note: This test report only includes the test results for the FR05-S1-NO-004 antenna, please refer to RFI Test Report Serial Number RFI-RPT-RP78718JD07C for the other antenna variants.

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		
Type of Unit:	Transceiver		
Modulation Type:	BPSK; 64QAM		
Data Rate:	802.11b (DSSS): 1,2,5.5,11 Mbps 802.11g (OFDM): 6,9,12,18,24,36,48,54 Mbps 802.11n (OFDM): 6.5,13,19.5,26,39,52,58.5,65 Mbps		
Maximum Conducted Peak Power Output:	17.4 dBm		
Power Supply Requirement(s):	Nominal	5.0 V	
	Minimum	3.3V	
	Maximum	5.5V	
Transmit Frequency Range:	2412 MHz to 2462 MHz		
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	1	2412
	Middle	6	2437
	Top	11	2462
Receive Frequency Range:	2412 MHz to 2462 MHz		
Receive Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	1	2412
	Middle	6	2437
	Top	11	2462

3.5. Support Equipment

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

Brand Name:	Dell
Description:	Laptop
Model Name or Number:	Latitude D610
Serial Number:	CN-0G5152-48643-48A-4478

Brand Name:	Connect Blue AB
Description:	Development Board
Model Name or Number:	CB-0903-03
Serial Number:	0068-01-002440

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

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

- Receiver/Idle mode – the highest channel was selected and the unit placed into a receive/idle mode. The emissions profile was similar to the top, middle and bottom channels, hence final measurements were performed on the top channel only.
- Continuously transmitting at maximum power on the bottom, centre and top channels as required using the data rates the client has stated within their proposal form:
 - o 802.11b: 1,2,5.5,11 Mbps
 - o 802.11g: 6,9,12,18,24,36,48,54 Mbps
 - o 802.11n: 6.5,13,19.5,26,39,52,58.5,65 Mbps

4.2. Configuration and Peripherals

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

- Connected to a development board, which was power by a 5V DC power supply that was connected to 120V mains. The development board was then connected via a serial cable to a laptop, which contained a bespoke application which was supplied by the client. The application was used to enable continuous transmission and idle mode (enabled but not transmitting) and to select the test channels, data rates and modulation schemes as required.
- Transmitter spurious emissions were performed with the EUT transmitting with a data rate of 54Mbps, as this was found to have the highest power level and therefore deemed to be worst case.

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. Receiver/Idle Mode Radiated Spurious Emissions

Test Summary:

Test Engineer:	Andrew Edwards	Test Date:	07 October 2010
Test Sample:	ID:8		
Antenna:	RF05-S1-NO-004		

FCC/IC Part:	15.109 and RSS-Gen 4.10 / RSS-Gen 6.1
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:

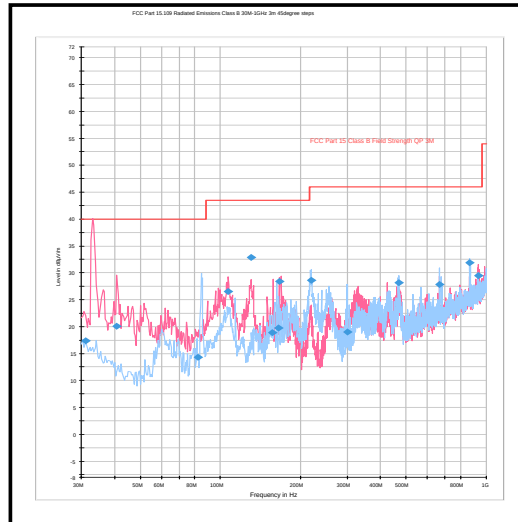
Temperature (°C):	26
Relative Humidity (%):	30

Results: Quasi Peak

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
40.680	Vertical	20.1	40.0	19.9	Complied
106.763	Vertical	26.5	43.5	17.0	Complied
130.120	Vertical	32.8	43.5	10.7	Complied
167.207	Vertical	28.3	43.5	15.2	Complied
218.933	Horizontal	28.7	46.0	17.3	Complied
467.303	Horizontal	28.1	46.0	17.9	Complied
664.956	Horizontal	27.9	46.0	18.1	Complied
867.914	Horizontal	31.9	46.0	14.0	Complied
932.420	Vertical	29.5	46.0	16.5	Complied

Note(s):

1. The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss.
2. The emission at 33MHz seen in the pre scan plot after further investigation was found to be an ambient and not coming from the EUT.
3. All other emissions shown on the pre-scan plot were investigated and found to be ambient or >20 dB below the applicable limit or below the measurement system noise floor.

Receiver/Idle Mode Radiated Spurious Emissions (continued)

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

Receiver/Idle Mode Radiated Spurious Emissions (continued)**Test Summary:**

Test Engineer:	Nick Steele	Test Date:	07 October 2010
Test Sample:	ID:8		
Antenna:	RF05-S1-NO-004		

FCC/IC Part:	15.109 and RSS-Gen 4.10 / RSS-Gen 6.1
Test Method Used:	As detailed in ANSI C63.10 Sections 6.3 and 6.6 referencing ANSI C63.4
Frequency Range:	1 GHz to 12.5 GHz

Environmental Conditions:

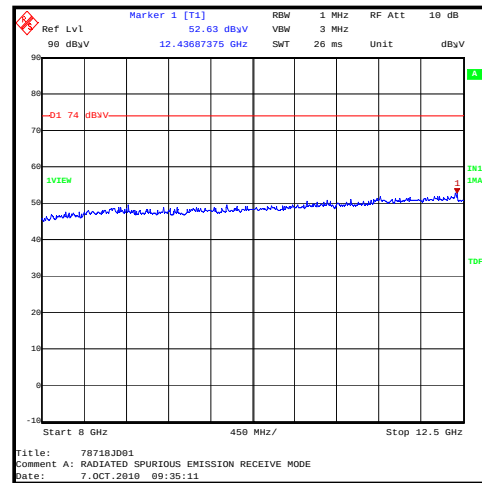
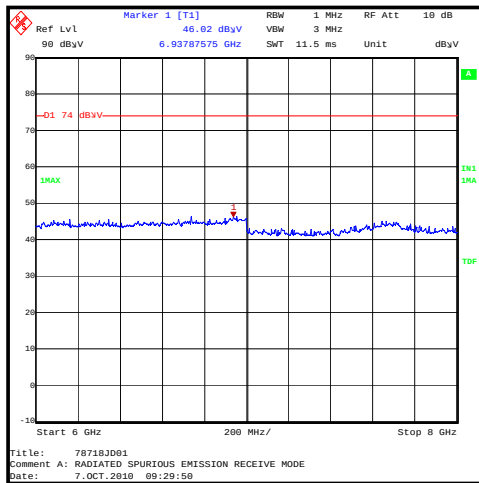
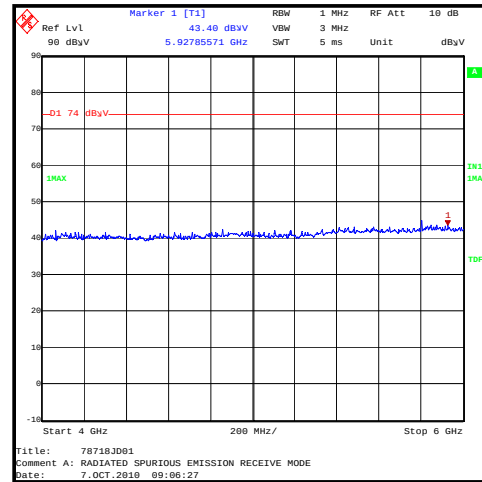
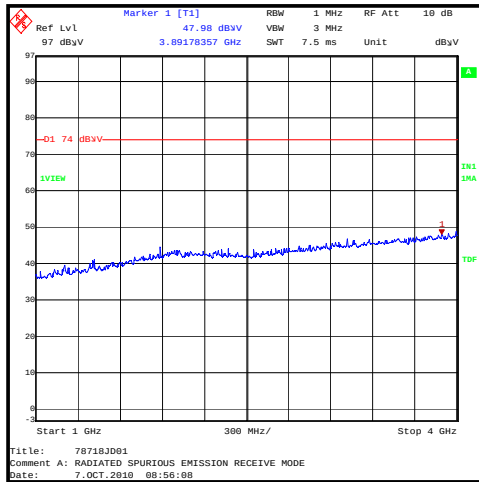
Temperature (°C):	26
Relative Humidity (%):	30

Results:

Frequency (MHz)	Antenna Polarity	Peak Level (dBμV/m)	Peak Limit (dBμV/m)	Margin (dB)	Result
12436.874	Vertical	52.6	74.0	21.4	Complied

Note(s):

1. The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss.
2. 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 table above. The peak level was compared to the average limit as opposed to being compared to the peak limit because this is the more onerous limit.

Receiver/Idle Mode Radiated Spurious Emissions (continued)

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

Test Engineer:	Dave Lakeland	Test Date:	11 May 2011
Test Sample Serial No:	ID:8		
Antenna:	FR05_S1_NO_1_004		

FCC Part:	15.247(b)(3)
Test Method Used:	As detailed in ANSI C63.10 Section 6.10.2 and Sections 6.3 and 6.6 referencing ANSI C63.4 (see note below)

Note: Test method used – Power meter

Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	29

Results: 802.11b

Channel	Frequency (MHz)	Mod Scheme	Data Rate (Mbps)	Conducted Peak Power (dBm)	Conducted Limit (dBm)	Margin (dB)	Result
Bottom	2412	BPSK	1	17.4	30	12.6	Complied
Middle	2437	BPSK	1	17.1	30	12.9	Complied
Top	2462	BPSK	1	16.3	30	13.7	Complied
Bottom	2412	QPSK	2	16.8	30	13.2	Complied
Middle	2437	QPSK	2	16.5	30	13.5	Complied
Top	2462	QPSK	2	16.2	30	13.8	Complied
Bottom	2412	QPSK	5.5	16.8	30	13.2	Complied
Middle	2437	QPSK	5.5	16.5	30	13.6	Complied
Top	2462	QPSK	5.5	16.1	30	13.9	Complied
Bottom	2412	QPSK	11	16.7	30	13.3	Complied
Middle	2437	QPSK	11	16.5	30	13.6	Complied
Top	2462	QPSK	11	16.2	30	13.9	Complied

Transmitter Maximum Peak Output Power (continued)**Results: 802.11g**

Channel	Frequency (MHz)	Mod Scheme	Data Rate (Mbps)	Conducted Peak Power (dBm)	Conducted Limit (dBm)	Margin (dB)	Result
Bottom	2412	BPSK	6	15.2	30	14.8	Complied
Middle	2437	BPSK	6	14.9	30	15.1	Complied
Top	2462	BPSK	6	14.6	30	15.4	Complied
Bottom	2412	BPSK	9	15.2	30	14.8	Complied
Middle	2437	BPSK	9	15.1	30	14.9	Complied
Top	2462	BPSK	9	15.1	30	14.9	Complied
Bottom	2412	QPSK	12	15.4	30	14.6	Complied
Middle	2437	QPSK	12	15.0	30	15.0	Complied
Top	2462	QPSK	12	14.7	30	15.3	Complied
Bottom	2412	QPSK	18	15.3	30	14.7	Complied
Middle	2437	QPSK	18	15.1	30	14.9	Complied
Top	2462	QPSK	18	14.7	30	15.3	Complied
Bottom	2412	16QAM	24	15.3	30	14.7	Complied
Middle	2437	16QAM	24	15.0	30	15.0	Complied
Top	2462	16QAM	24	14.7	30	15.3	Complied
Bottom	2412	16QAM	36	15.4	30	14.6	Complied
Middle	2437	16QAM	36	15.0	30	15.0	Complied
Top	2462	16QAM	36	14.7	30	15.3	Complied
Bottom	2412	16QAM	48	15.4	30	14.6	Complied
Middle	2437	16QAM	48	15.1	30	14.9	Complied
Top	2462	16QAM	48	14.8	30	15.3	Complied
Bottom	2412	64QAM	54	15.7	30	14.3	Complied
Middle	2437	64QAM	54	15.1	30	14.9	Complied
Top	2462	64QAM	54	14.7	30	15.3	Complied

Transmitter Maximum Peak Output Power (continued)**Results: 802.11n**

Channel	Frequency (MHz)	Mod Scheme	Data Rate (Mbps)	Conducted Peak Power (dBm)	Conducted Limit (dBm)	Margin (dB)	Result
Bottom	2412	BPSK	6.5	15.6	30	14.4	Complied
Middle	2437	BPSK	6.5	15.3	30	14.7	Complied
Top	2462	BPSK	6.5	15.0	30	15.0	Complied
Bottom	2412	QPSK	13	15.5	30	14.6	Complied
Middle	2437	QPSK	13	15.2	30	14.8	Complied
Top	2462	QPSK	13	14.9	30	15.1	Complied
Bottom	2412	QPSK	19.5	15.4	30	14.6	Complied
Middle	2437	QPSK	19.5	14.9	30	15.1	Complied
Top	2462	QPSK	19.5	14.8	30	15.3	Complied
Bottom	2412	16QAM	26	15.3	30	14.7	Complied
Middle	2437	16QAM	26	15.1	30	14.9	Complied
Top	2462	16QAM	26	14.8	30	15.2	Complied
Bottom	2412	16QAM	39	15.6	30	14.4	Complied
Middle	2437	16QAM	39	15.6	30	14.4	Complied
Top	2462	16QAM	39	14.9	30	15.1	Complied
Bottom	2412	64QAM	52	15.4	30	14.6	Complied
Middle	2437	64QAM	52	15.2	30	14.8	Complied
Top	2462	64QAM	52	15.6	30	14.4	Complied
Bottom	2412	64QAM	58.5	16.3	30	13.7	Complied
Middle	2437	64QAM	58.5	15.4	30	14.6	Complied
Top	2462	64QAM	58.5	15.0	30	15.1	Complied
Bottom	2412	64QAM	65	16.0	30	14.0	Complied
Middle	2437	64QAM	65	15.4	30	14.6	Complied
Top	2462	64QAM	65	16.1	30	13.9	Complied

Note(s):

1. These tests were performed radiated; therefore the EUT antenna gain is encompassed in the final result and not measurable.
2. As the EUT has an integral antenna, in order to obtain the conducted peak power (into the antenna) the declared antenna gain was subtracted from the measured ERP.
3. Tests were performed using a combination of the conducted test method described in ANSI C63.10 Section 6.10.1 and the test methods for radiated emissions measurements described in Sections 6.3 and 6.6. The reason for this being that the measurements were performed radiated as the EUT has an integral antenna and does not have an external antenna port.

5.2.3. Transmitter Maximum Equivalent Isotropically Radiated Power (EIRP)

FCC Part:	15.247(b)(3)
Test Method Used:	As detailed in ANSI C63.10 Section 6.10.2 and Sections 6.3 and 6.6 referencing ANSI C63.4 (see note below)

Results: 802.11b

Channel	Mod Scheme	Data Rate (Mbps)	Antenna Gain (dBi)	Conducted Peak Power (dBm)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	BPSK	1	0	17.4	17.4	36.0	18.6	Complied
Middle	BPSK	1	0	17.1	17.1	36.0	18.9	Complied
Top	BPSK	1	0	16.3	16.3	36.0	19.7	Complied
Bottom	QPSK	2	0	16.8	16.8	36.0	19.2	Complied
Middle	QPSK	2	0	16.5	16.5	36.0	19.5	Complied
Top	QPSK	2	0	16.2	16.2	36.0	19.8	Complied
Bottom	QPSK	5.5	0	16.8	16.8	36.0	19.2	Complied
Middle	QPSK	5.5	0	16.5	16.5	36.0	19.5	Complied
Top	QPSK	5.5	0	16.1	16.1	36.0	19.9	Complied
Bottom	QPSK	11	0	16.7	16.7	36.0	19.3	Complied
Middle	QPSK	11	0	16.5	16.5	36.0	19.5	Complied
Top	QPSK	11	0	16.2	16.2	36.0	19.8	Complied

Transmitter Maximum Equivalent Isotropically Radiated Power (EIRP) (Continued)**Results: 802.11g**

Channel	Mod Scheme	Data Rate (Mbps)	Antenna Gain (dBi)	Conducted Peak Power (dBm)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	BPSK	6	0	15.2	15.2	36.0	20.8	Complied
Middle	BPSK	6	0	14.9	14.9	36.0	21.1	Complied
Top	BPSK	6	0	14.6	14.6	36.0	21.4	Complied
Bottom	BPSK	9	0	15.2	15.2	36.0	20.8	Complied
Middle	BPSK	9	0	15.1	15.1	36.0	20.9	Complied
Top	BPSK	9	0	15.1	15.1	36.0	20.9	Complied
Bottom	QPSK	12	0	15.4	15.4	36.0	20.6	Complied
Middle	QPSK	12	0	15.0	15.0	36.0	21.0	Complied
Top	QPSK	12	0	14.7	14.7	36.0	21.3	Complied
Bottom	QPSK	18	0	15.3	15.3	36.0	20.7	Complied
Middle	QPSK	18	0	15.1	15.1	36.0	20.9	Complied
Top	QPSK	18	0	14.7	14.7	36.0	21.3	Complied
Bottom	16QAM	24	0	15.3	15.3	36.0	20.7	Complied
Middle	16QAM	24	0	15.0	15.0	36.0	21.0	Complied
Top	16QAM	24	0	14.7	14.7	36.0	21.3	Complied
Bottom	16QAM	36	0	15.4	15.4	36.0	20.6	Complied
Middle	16QAM	36	0	15.0	15.0	36.0	21.0	Complied
Top	16QAM	36	0	14.7	14.7	36.0	21.3	Complied
Bottom	16QAM	48	0	15.4	15.4	36.0	20.6	Complied
Middle	16QAM	48	0	15.1	15.1	36.0	20.9	Complied
Top	16QAM	48	0	14.8	14.8	36.0	21.2	Complied
Bottom	64QAM	54	0	15.7	15.7	36.0	20.3	Complied
Middle	64QAM	54	0	15.1	15.1	36.0	20.9	Complied
Top	64QAM	54	0	14.7	14.7	36.0	21.3	Complied

Transmitter Maximum Equivalent Isotropically Radiated Power (EIRP) (Continued)**Results: 802.11n**

Channel	Mod Scheme	Data Rate (Mbps)	Antenna Gain (dBi)	Conducted Peak Power (dBm)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	BPSK	6.5	0	15.6	15.6	36.0	20.4	Complied
Middle	BPSK	6.5	0	15.3	15.3	36.0	20.7	Complied
Top	BPSK	6.5	0	15.0	15.0	36.0	21.0	Complied
Bottom	QPSK	13	0	15.5	15.5	36.0	20.5	Complied
Middle	QPSK	13	0	15.2	15.2	36.0	20.8	Complied
Top	QPSK	13	0	14.9	14.9	36.0	21.1	Complied
Bottom	QPSK	19.5	0	15.4	15.4	36.0	20.6	Complied
Middle	QPSK	19.5	0	14.9	14.9	36.0	21.1	Complied
Top	QPSK	19.5	0	14.8	14.8	36.0	21.2	Complied
Bottom	16QAM	26	0	15.3	15.3	36.0	20.7	Complied
Middle	16QAM	26	0	15.1	15.1	36.0	20.9	Complied
Top	16QAM	26	0	14.8	14.8	36.0	21.2	Complied
Bottom	16QAM	39	0	15.6	15.6	36.0	20.4	Complied
Middle	16QAM	39	0	15.6	15.6	36.0	20.4	Complied
Top	16QAM	39	0	14.9	14.9	36.0	21.1	Complied
Bottom	64QAM	52	0	15.4	15.4	36.0	20.6	Complied
Middle	64QAM	52	0	15.2	15.2	36.0	20.8	Complied
Top	64QAM	52	0	15.6	15.6	36.0	20.4	Complied
Bottom	64QAM	58.5	0	16.3	16.3	36.0	19.7	Complied
Middle	64QAM	58.5	0	15.4	15.4	36.0	20.6	Complied
Top	64QAM	58.5	0	15.0	15.0	36.0	21.0	Complied
Bottom	64QAM	65	0	16.0	16.0	36.0	20.0	Complied
Middle	64QAM	65	0	15.4	15.4	36.0	20.6	Complied
Top	64QAM	65	0	16.1	16.1	36.0	19.9	Complied

Note(s):

1. These tests were performed radiated; therefore the EUT antenna gain is encompassed in the final result and not measurable.
2. As the EUT has an integral antenna, in order to obtain the conducted peak power (into the antenna) the declared antenna gain was subtracted from the measured ERP.
3. Tests were performed using a combination of the conducted test method described in ANSI C63.10 Section 6.10.1 and the test methods for radiated emissions measurements described in Sections 6.3 and 6.6. The reason for this being that the measurements were performed radiated as the EUT has an integral antenna and does have not an external antenna port.

5.2.4. Transmitter Mode Radiated Spurious Emissions**Test Summary:**

Test Engineer:	Andy Edwards	Test Date:	07 October 2010
Test Sample:	ID:8		
Antenna:	FR05_S1_NO_1_004		

FCC/IC Part:	15.247(d), 15.209(a), RSS-Gen 4.9 and RSS-210 A8.5
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:

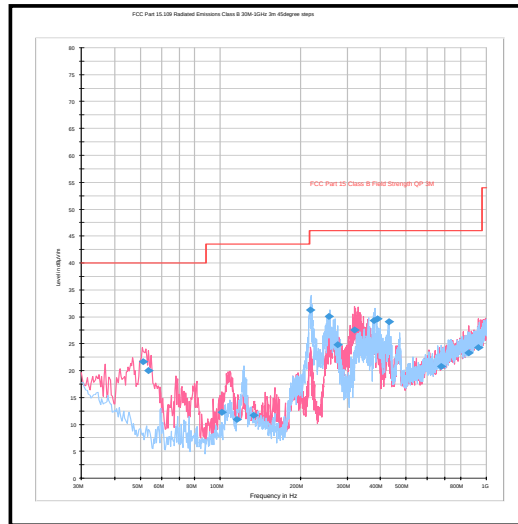
Temperature (°C):	26
Relative Humidity (%):	30

Results: Top Channel

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
51.298	Vertical	21.7	40.0	18.3	Complied
53.868	Vertical	20.0	40.0	20.0	Complied
217.439	Horizontal	31.3	46.0	14.7	Complied
256.063	Horizontal	30.1	46.0	15.9	Complied
319.939	Vertical	27.5	46.0	18.5	Complied
377.660	Horizontal	29.3	46.0	16.7	Complied
389.740	Horizontal	29.6	46.0	16.4	Complied
429.291	Horizontal	29.1	46.0	16.9	Complied

Note(s):

1. The final measured value, for the given emission, in the table above 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 top channel only.
3. All other emissions were at least 20 dB below the appropriate limit or below the noise floor of the measurement system.

Transmitter Radiated Emissions (continued)

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

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

Test Engineer:	Nick Steele	Test Date:	07 October 2010 & 22 November 2010
Test Sample Serial No:	ID:8		
Antenna:	FR05_S1_NO_1_004		

FCC/IC Part:	15.247(d), 15.209(a), RSS-Gen 4.9 and RSS-210 A8.5
Test Method Used:	As detailed in ANSI C63.10 Sections 6.3 and 6.6 referencing ANSI C63.4
Frequency Range	1 GHz to 25 GHz

Environmental Conditions:

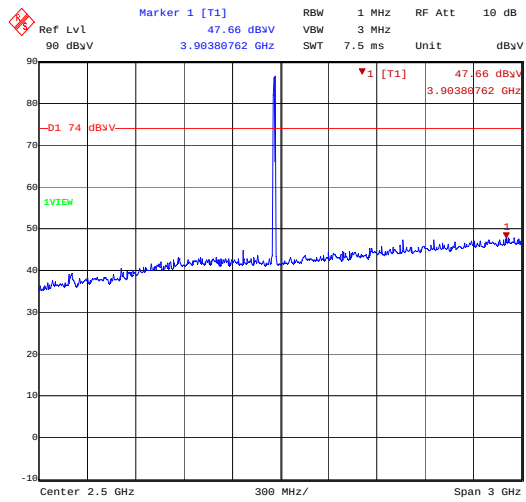
Temperature (°C):	26
Relative Humidity (%):	30

Results:

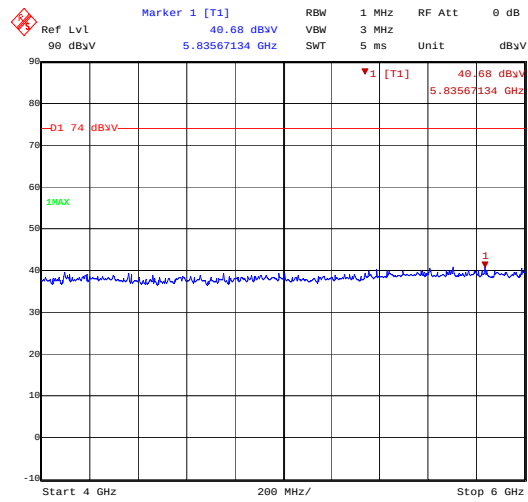
Frequency (GHz)	Antenna Polarity	Peak Level (dBμV/m)	Peak Limit (dBμV/m)	Margin (dB)	Result
25.0	Vertical	49.8	74.0	24.2	Complied

Note(s):

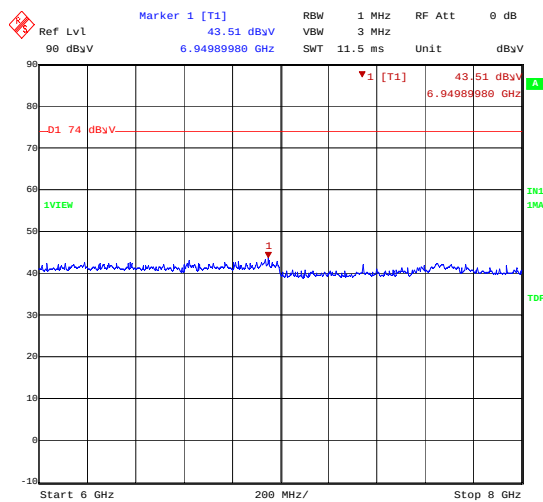
1. No spurious emissions were detected above the noise floor of the measuring receiver therefore the highest peak noise floor reading of the measuring receiver was recorded as shown in the table above. The peak level was compared to the average limit as opposed to being compared to the peak limit because this is the more onerous limit.
2. The emission shown on the 1 GHz to 4 GHz plot is the EUT fundamental.

Transmitter Radiated Emissions (continued)

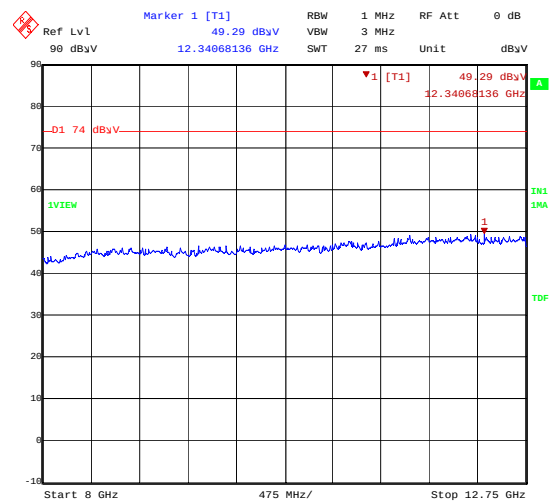
Title: 78718JD01
Comment A: RADIATED SPURIOUS EMISSION TRANSMIT MODE
Date: 7.OCT.2010 10:35:22



Title: 78718JD01
Comment A: RADIATED SPURIOUS EMISSION TRANSMIT MODE
Date: 7.OCT.2010 10:45:37

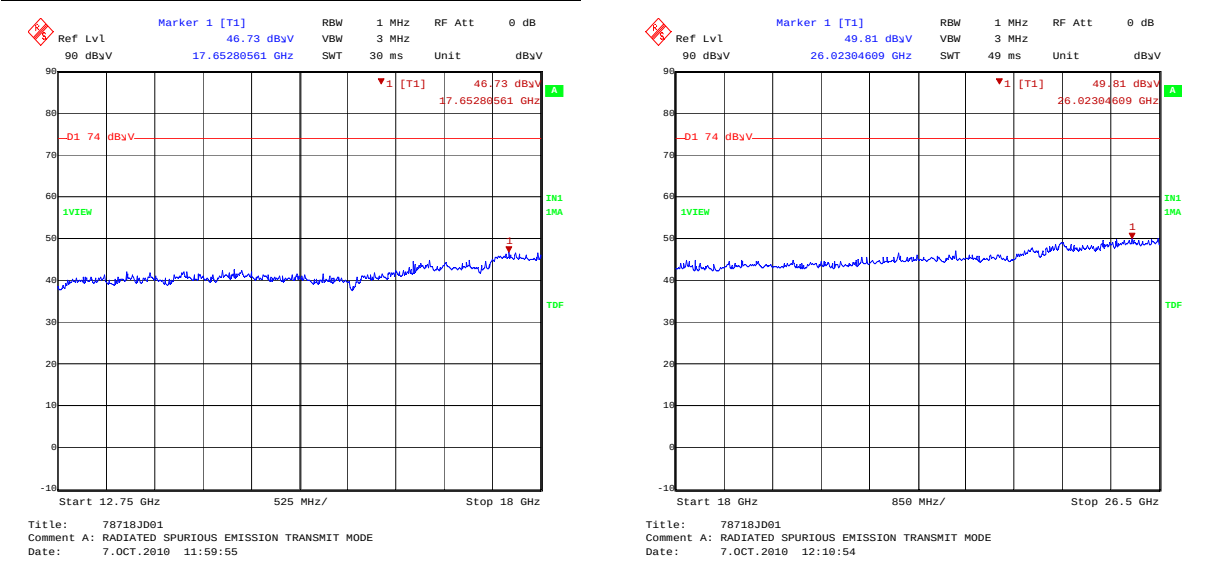


Title: 78718JD01
Comment A: RADIATED SPURIOUS EMISSION TRANSMIT MODE
Date: 7.OCT.2010 11:22:15



Title: 78718JD01
Comment A: RADIATED SPURIOUS EMISSION TRANSMIT MODE
Date: 7.OCT.2010 11:30:53

Transmitter Radiated Emissions (continued)



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

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

Test Engineer:	Nick Steele	Test Date:	21 December 2010 & 31 December 2010
Test Sample Serial No:	ID:8		
Antenna:	FR05_S1_NO_1_004		

FCC/IC Part:	15.247(d), 15.209(a), RSS-Gen 4.9 and RSS-210 A8.5
Test Method Used:	As detailed in ANSI C63.10 Section 6.9.2

Environmental Conditions:

Temperature (°C):	29
Relative Humidity (%):	32

Results: Peak and Average 802.11b

Frequency (MHz)	Data Rate Mbps	Modulation Type	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2400.0	1	BPSK	43.4	*64.5	21.1	Complied
2483.5	1	BPSK	33.3	74.0	40.7	Complied
2483.5	1	BPSK	23.5	54.0	30.5	Complied
2400.0	2	QPSK	43.1	*64.3	21.2	Complied
2483.5	2	QPSK	33.1	74.0	40.9	Complied
2483.5	2	QPSK	23.5	54.0	30.5	Complied
2400.0	5.5	CCK	36.7	*64.6	27.9	Complied
2483.5	5.5	CCK	33.4	74.0	40.6	Complied
2483.5	5.5	CCK	22.5	54.0	31.5	Complied
2400.0	11	CCK	40.5	*64.2	23.7	Complied
2483.5	11	CCK	31.8	74.0	42.2	Complied
2483.5	11	CCK	22.5	54.0	31.5	Complied

Transmitter Band Edge Radiated Emissions (continued)**Results: Peak and Average 802.11g**

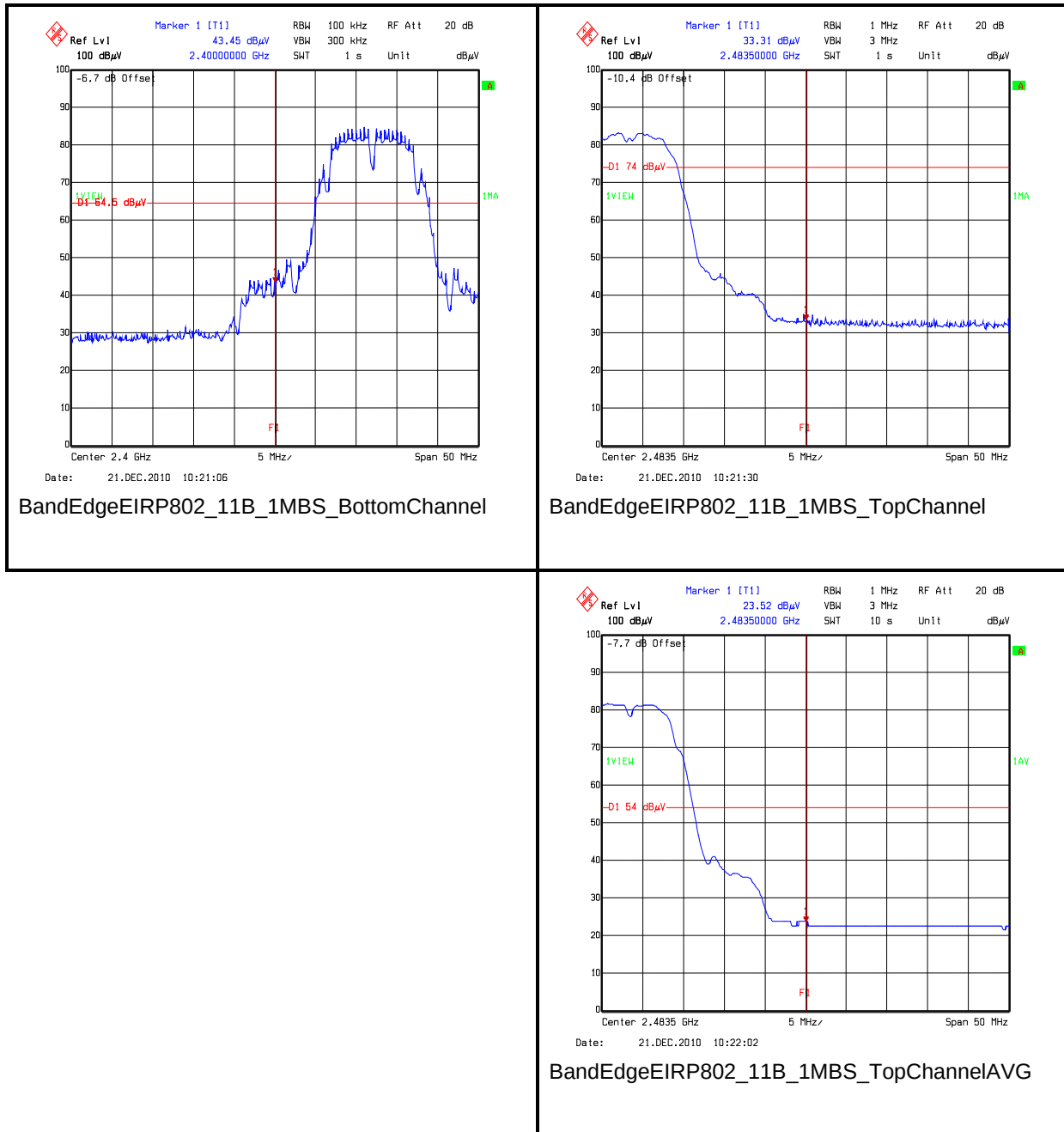
Frequency (MHz)	Data Rate Mbps	Modulation Type	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
2400.0	6	BPSK	49.6	*58.4	8.8	Complied
2483.5	6	BPSK	43.8	74.0	30.2	Complied
2483.5	6	BPSK	29.0	54.0	25.0	Complied
2400.0	9	BPSK	51.7	*58.4	6.7	Complied
2483.5	9	BPSK	42.1	74.0	31.9	Complied
2483.5	9	BPSK	29.0	54.0	25.0	Complied
2400.0	12	QPSK	49.0	*59.1	10.1	Complied
2483.5	12	QPSK	41.3	74.0	32.7	Complied
2483.5	12	QPSK	29.0	54.0	25.0	Complied
2400.0	18	QPSK	50.7	*58.7	8.0	Complied
2483.5	18	QPSK	41.5	74.0	32.5	Complied
2483.5	18	QPSK	29.0	54.0	25.0	Complied
2400.0	24	16QAM	50.0	*59.5	9.5	Complied
2483.5	24	16QAM	39.8	74.0	34.2	Complied
2483.5	24	16QAM	29.0	54.0	25.0	Complied
2400.0	36	16QAM	49.3	*59.5	10.2	Complied
2483.5	36	16QAM	41.2	74.0	32.8	Complied
2483.5	36	16QAM	29.0	54.0	25.0	Complied
2400.0	48	64QAM	49.0	*60.6	11.6	Complied
2483.5	48	64QAM	42.3	74.0	31.7	Complied
2483.5	48	64QAM	28.5	54.0	25.5	Complied
2400.0	54	64QAM	52.0	*60.8	8.8	Complied
2483.5	54	64QAM	43.7	74.0	30.3	Complied
2483.5	54	64QAM	29.5	54.0	24.5	Complied

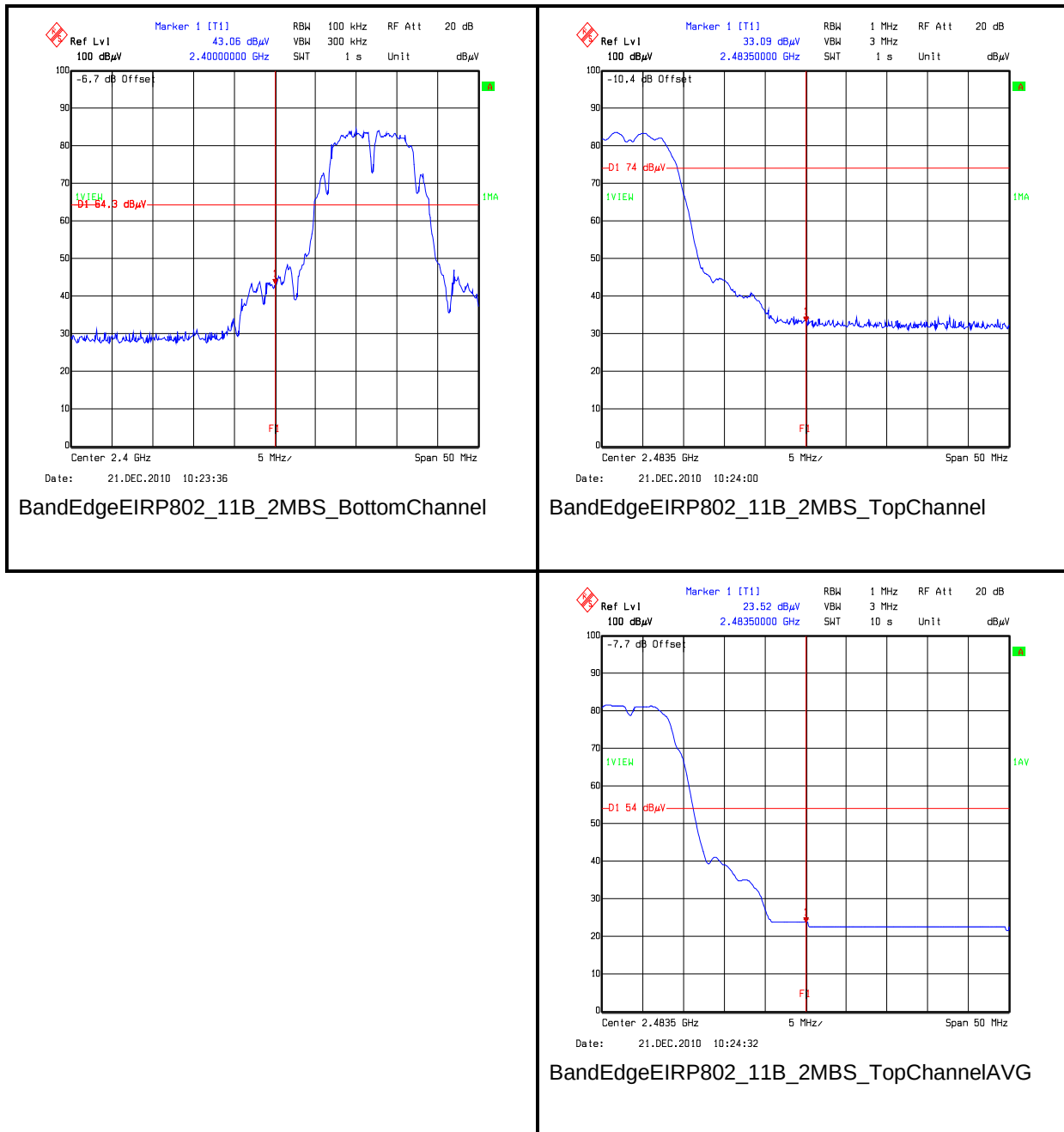
Transmitter Band Edge Radiated Emissions (continued)**Results: Peak and Average 802.11n**

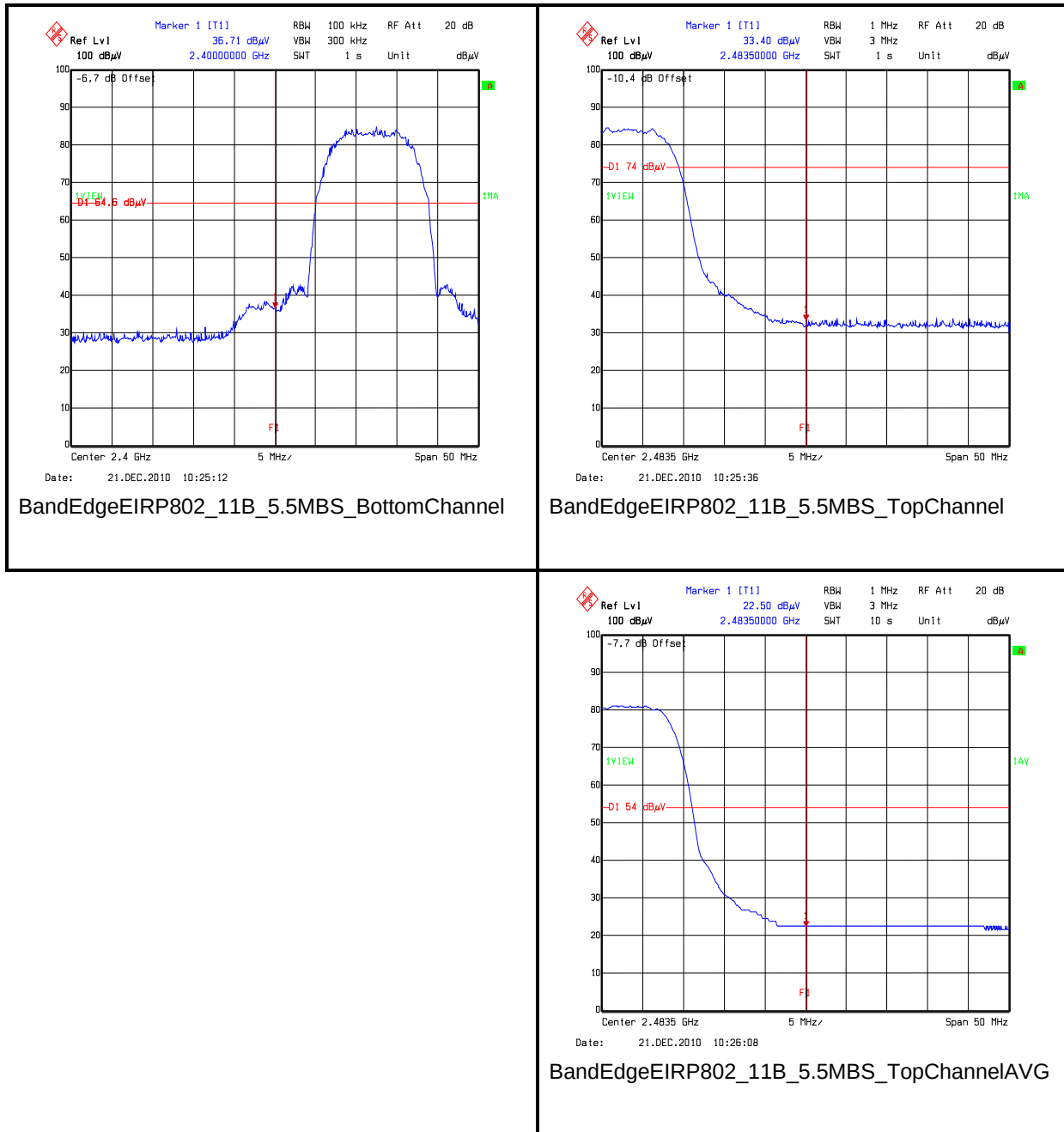
Frequency (MHz)	Data Rate Mbps	Modulation Type	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
2400.0	6.5	BPSK	49.5	*63.7	14.2	Complied
2483.5	6.5	BPSK	53.5	74.0	20.5	Complied
2483.5	6.5	BPSK	40.8	54.0	13.2	Complied
2400.0	13	BPSK	48.4	*63.9	15.5	Complied
2483.5	13	BPSK	53.2	74.0	20.8	Complied
2483.5	13	BPSK	40.8	54.0	13.2	Complied
2400.0	19.5	QPSK	50.0	*63.5	13.5	Complied
2483.5	19.5	QPSK	52.1	74.0	21.9	Complied
2483.5	19.5	QPSK	40.8	54.0	13.2	Complied
2400.0	26	QPSK	49.2	*64.8	15.6	Complied
2483.5	26	QPSK	52.9	74.0	21.1	Complied
2483.5	26	QPSK	40.8	54.0	13.2	Complied
2400.0	39	16QAM	49.2	*64.3	15.1	Complied
2483.5	39	16QAM	53.2	74.0	20.8	Complied
2483.5	39	16QAM	40.8	54.0	13.2	Complied
2400.0	52	16QAM	49.7	*64.9	15.2	Complied
2483.5	52	16QAM	53.0	74.0	21.0	Complied
2483.5	52	16QAM	40.8	54.0	13.2	Complied
2400.0	58.5	64QAM	50.0	*65.2	15.2	Complied
2483.5	58.5	64QAM	52.3	74.0	21.7	Complied
2483.5	58.5	64QAM	40.8	54.0	13.2	Complied
2400.0	65	64QAM	50.5	*64.8	14.3	Complied
2483.5	65	64QAM	54.7	74.0	19.3	Complied
2483.5	65	64QAM	40.8	54.0	13.2	Complied

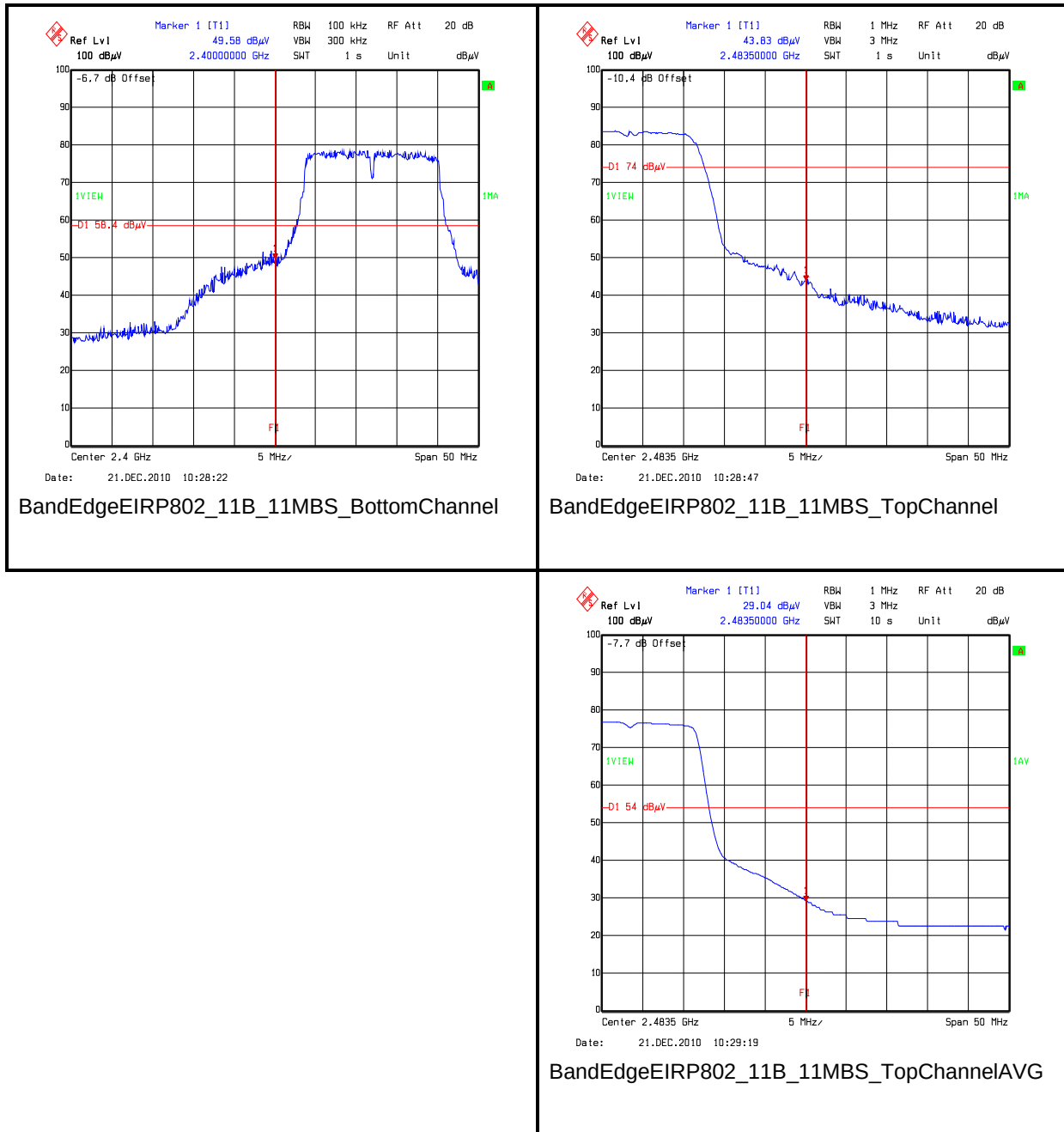
Note(s):

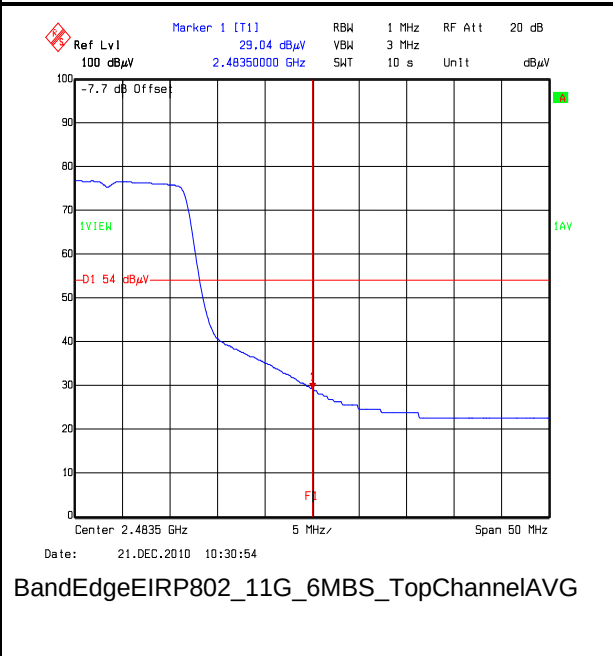
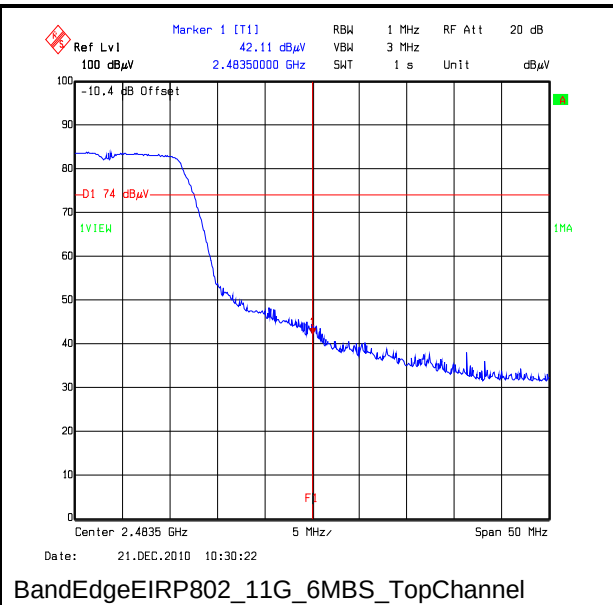
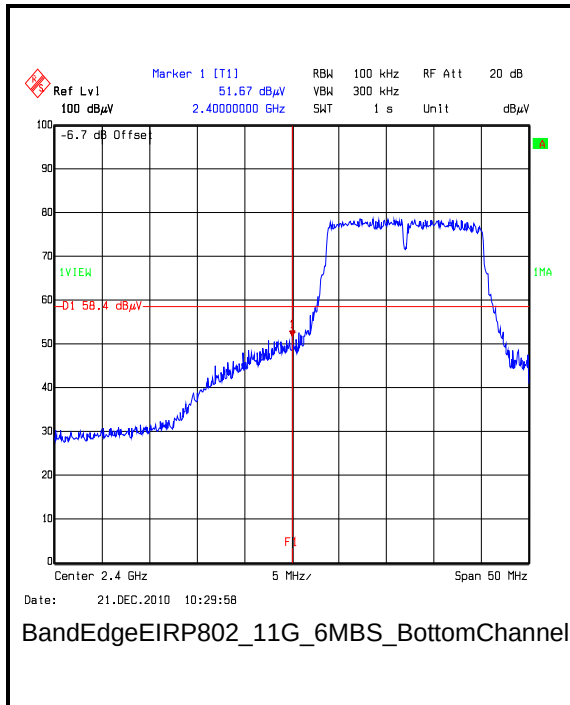
1. The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss.
2. * -20 dBc limit.

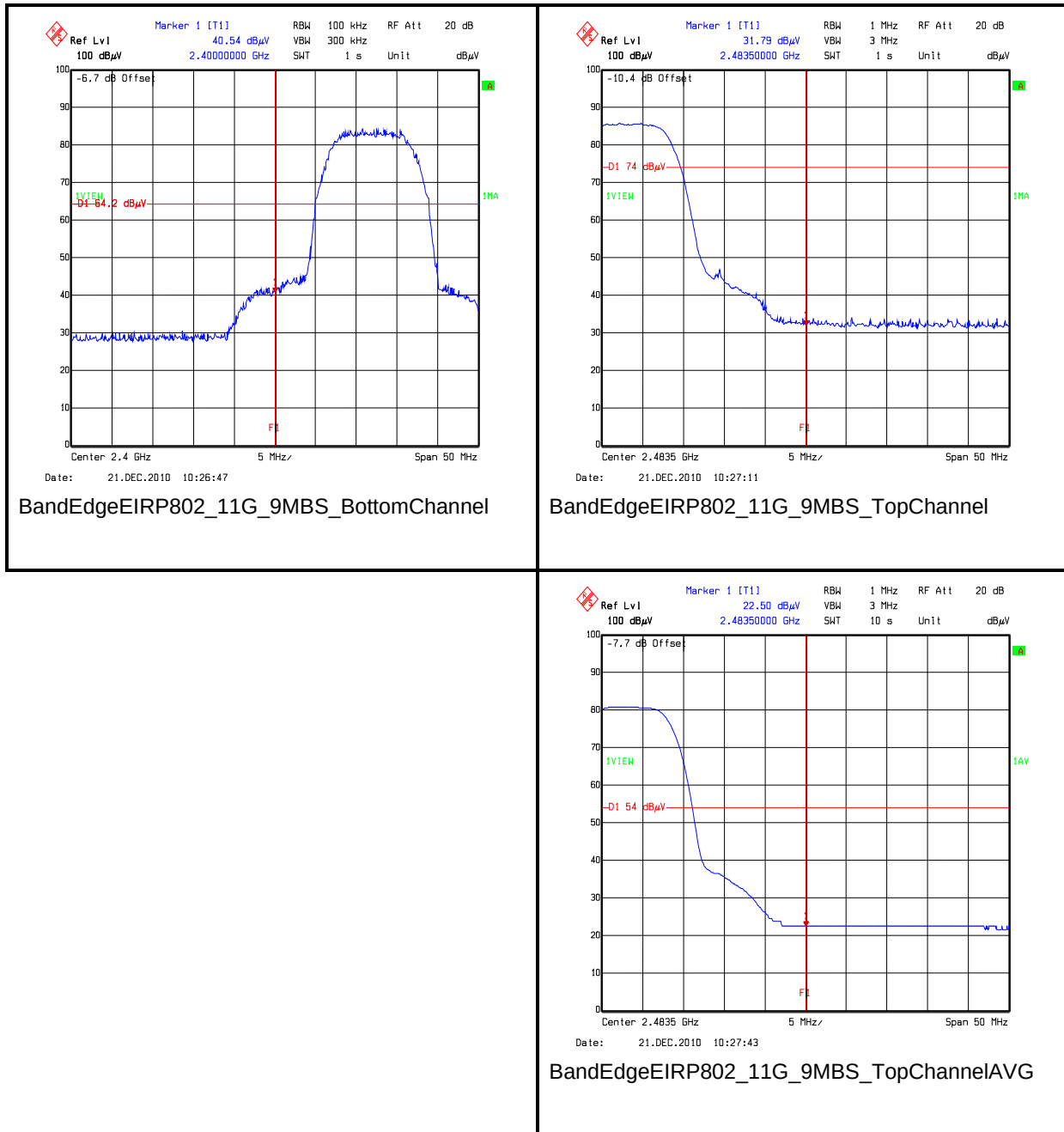
Transmitter Band Edge Radiated Emissions (continued)

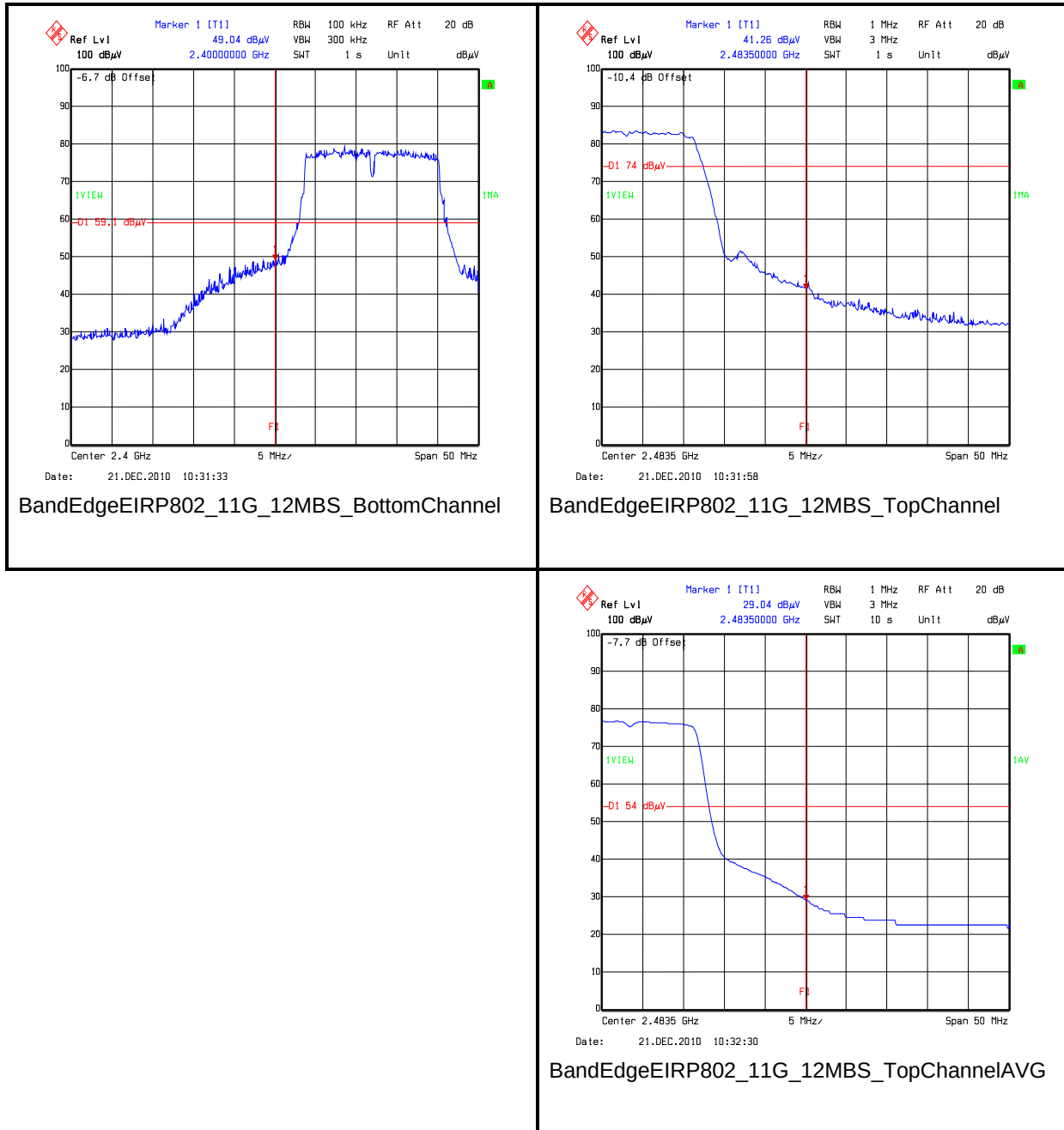
Transmitter Band Edge Radiated Emissions (continued)

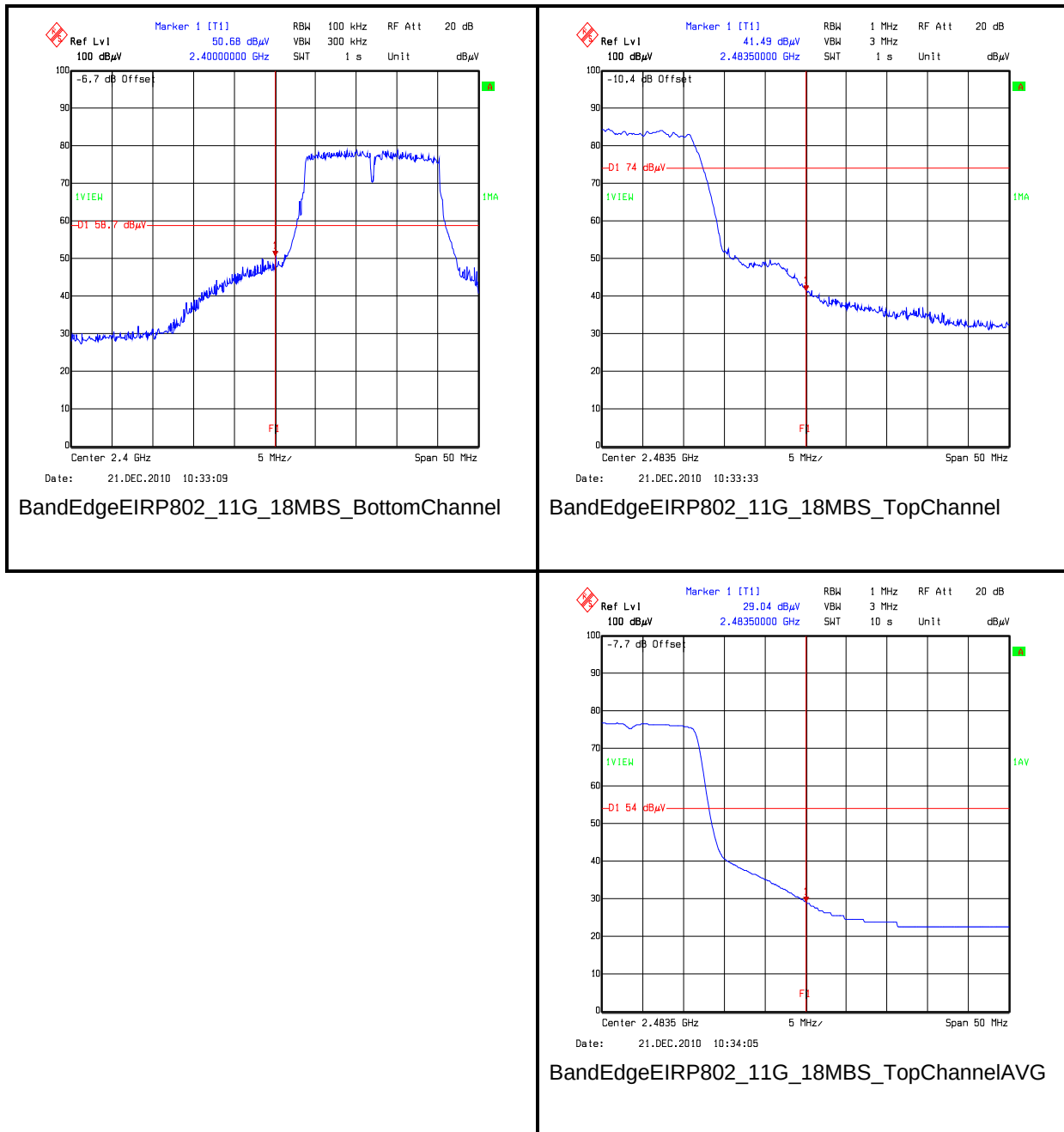
Transmitter Band Edge Radiated Emissions (continued)

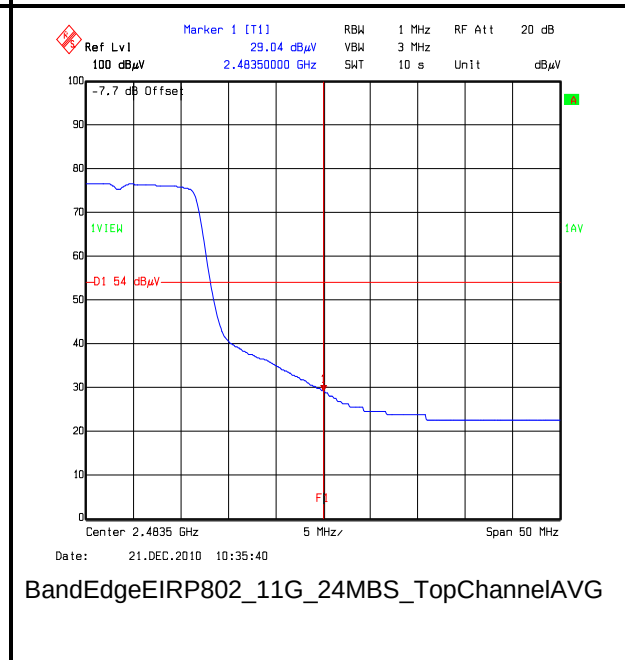
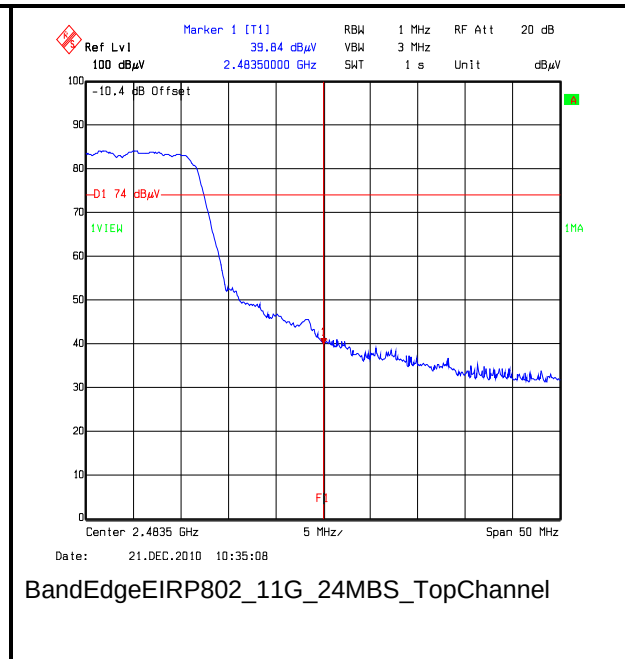
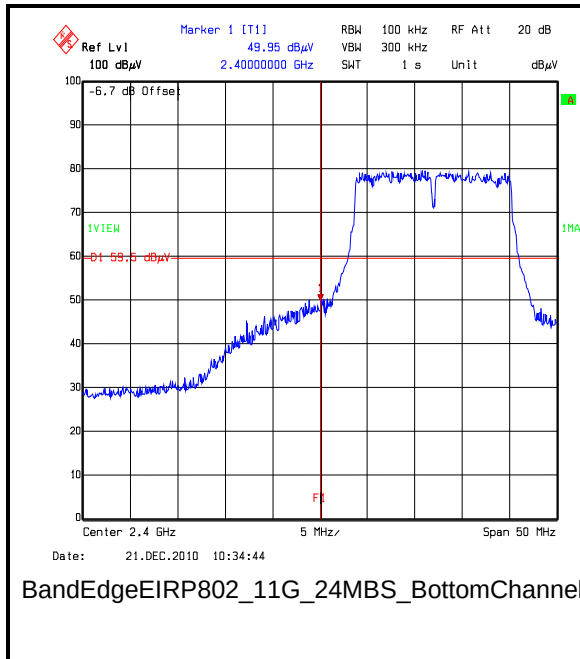
Transmitter Band Edge Radiated Emissions (continued)

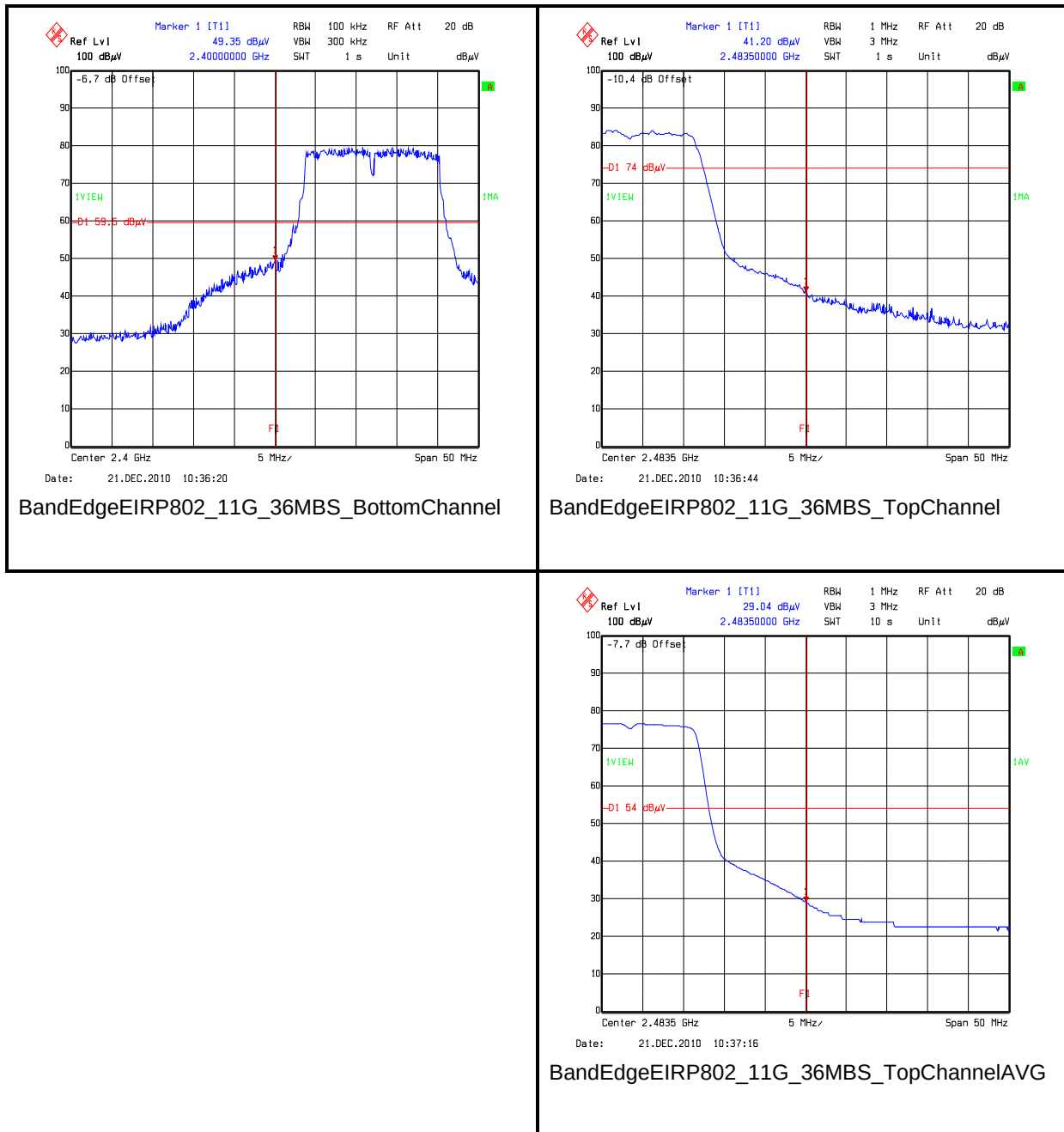
Transmitter Band Edge Radiated Emissions (continued)

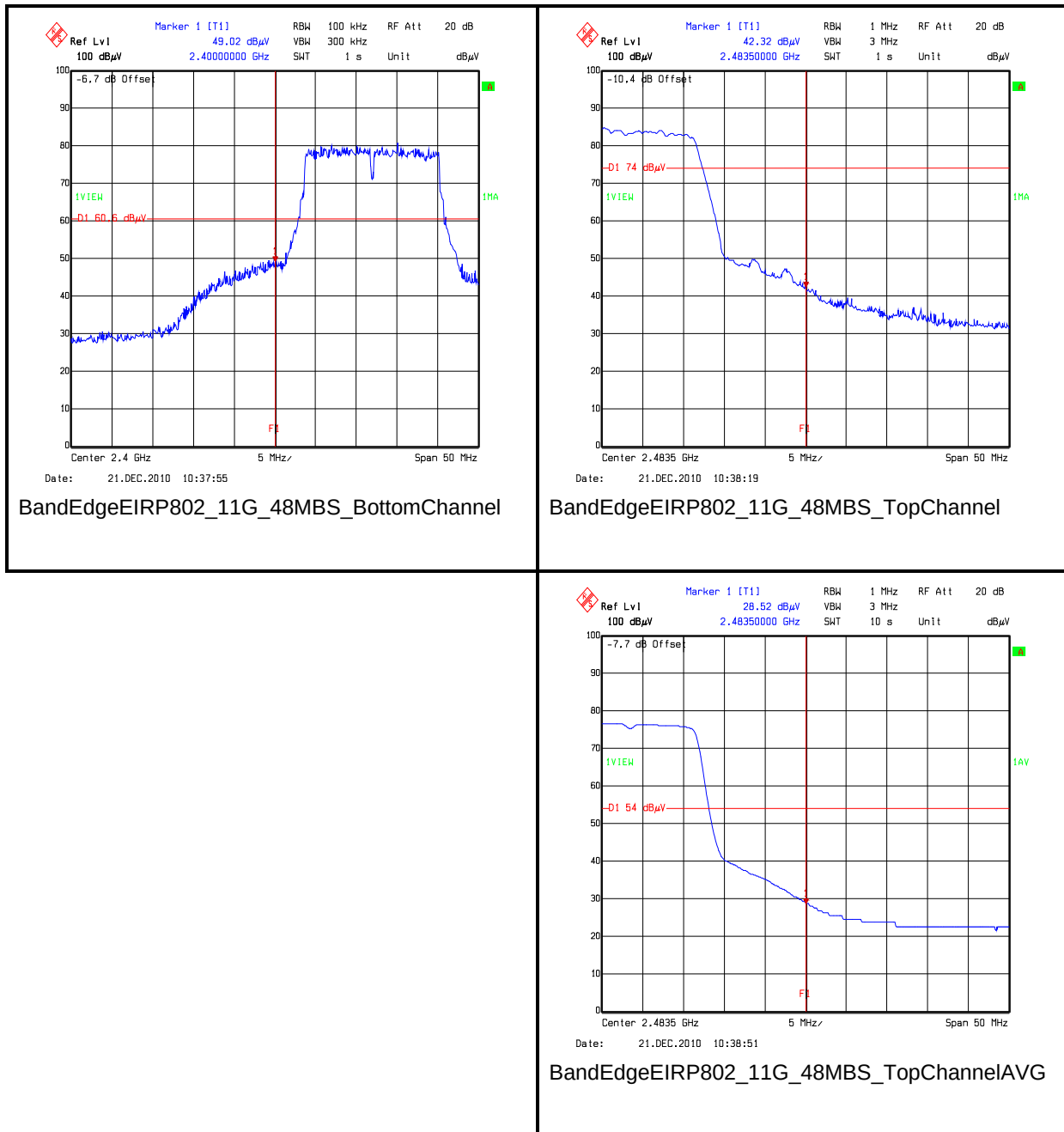
Transmitter Band Edge Radiated Emissions (continued)

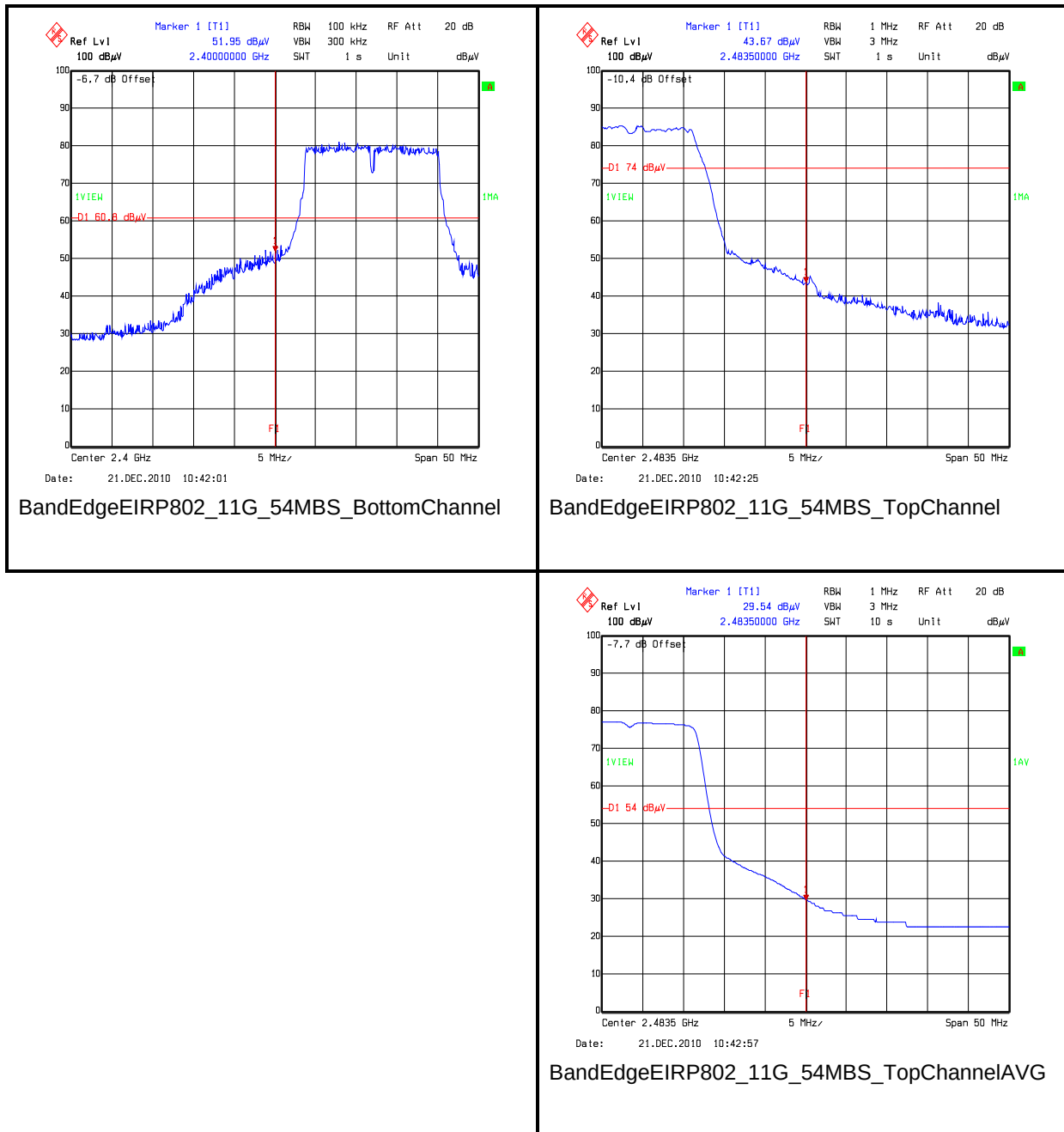
Transmitter Band Edge Radiated Emissions (continued)

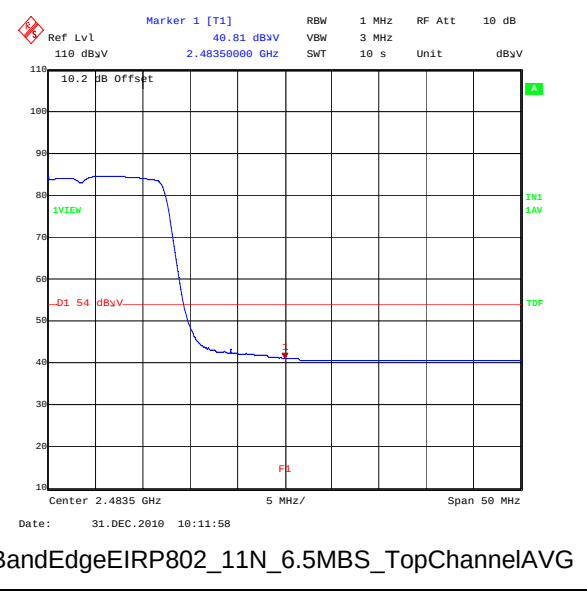
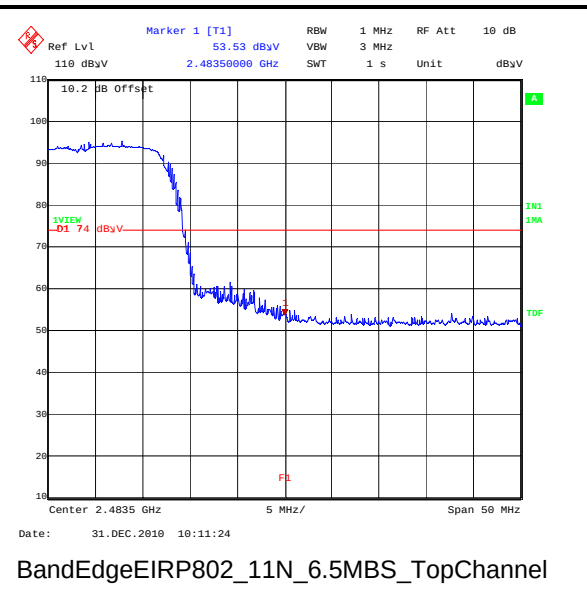
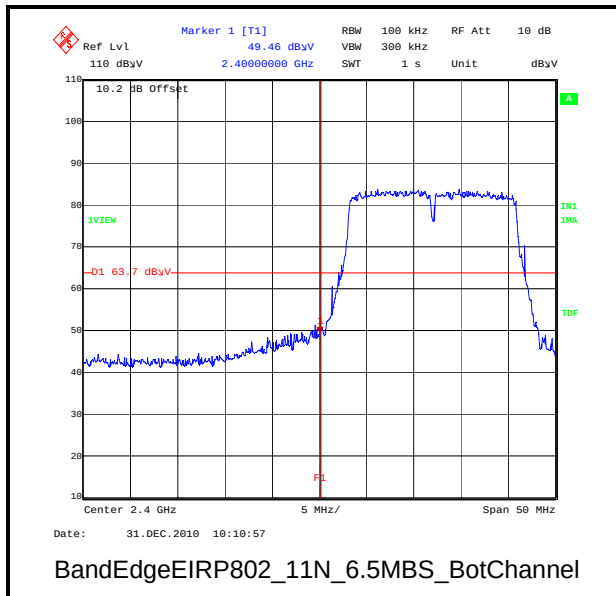
Transmitter Band Edge Radiated Emissions (continued)

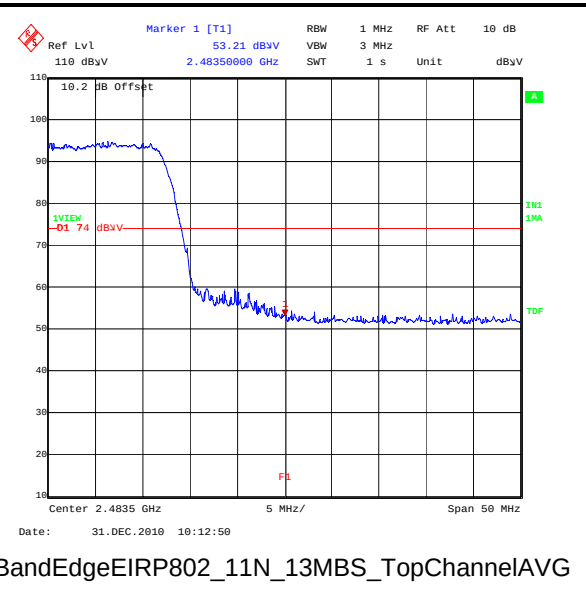
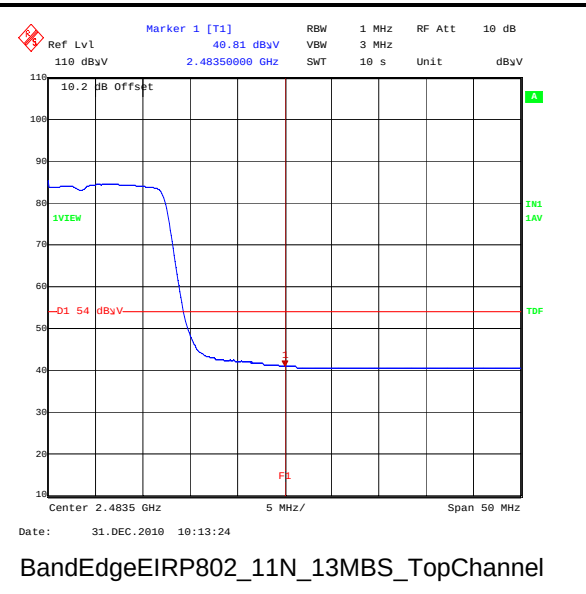
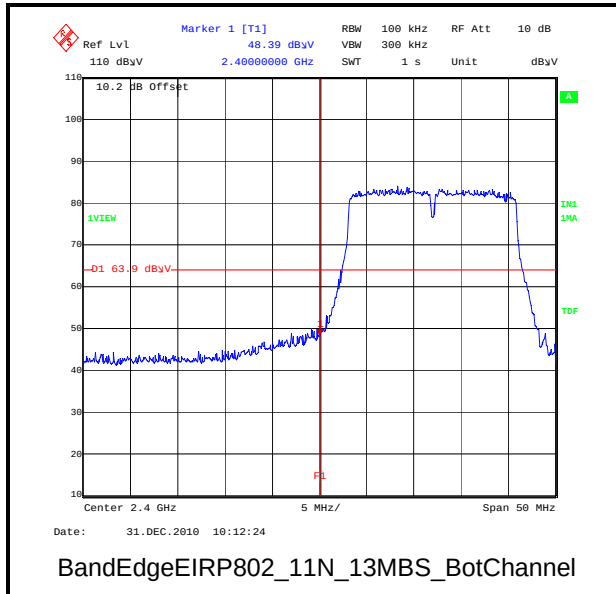
Transmitter Band Edge Radiated Emissions (continued)

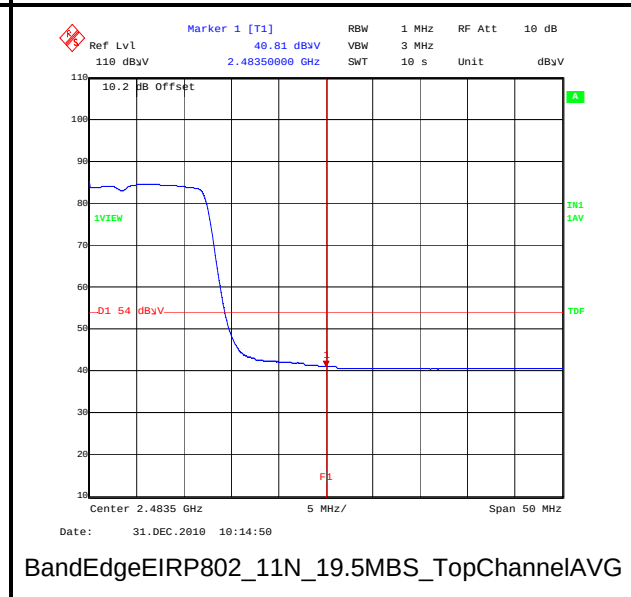
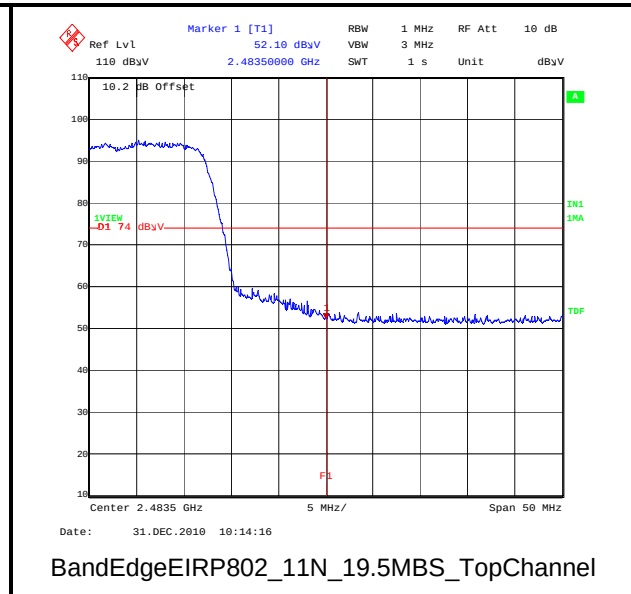
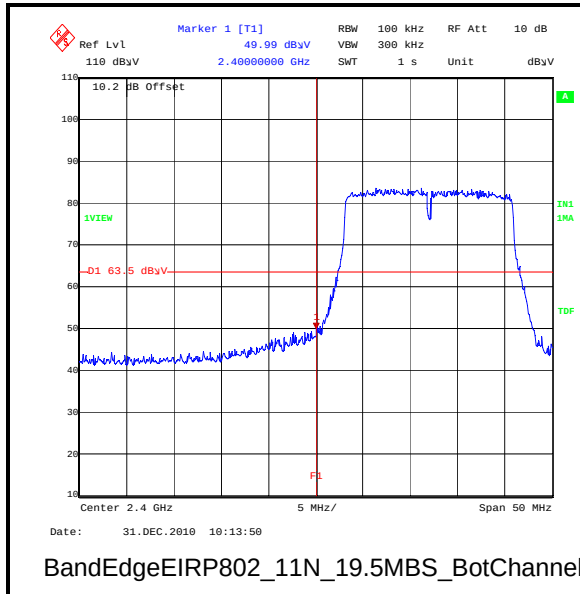
Transmitter Band Edge Radiated Emissions (continued)

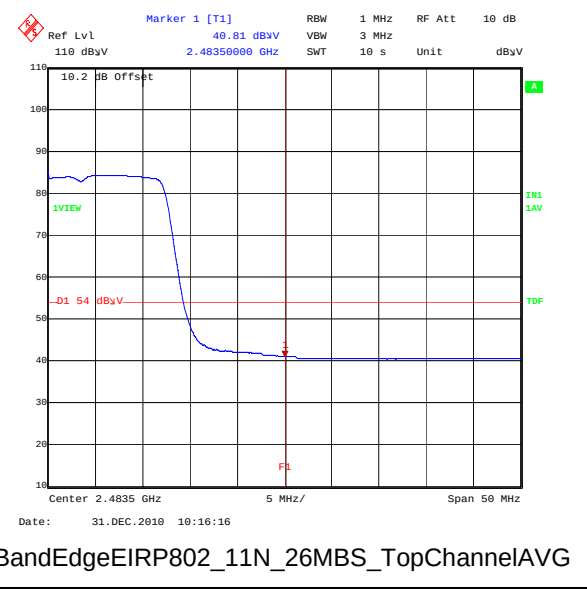
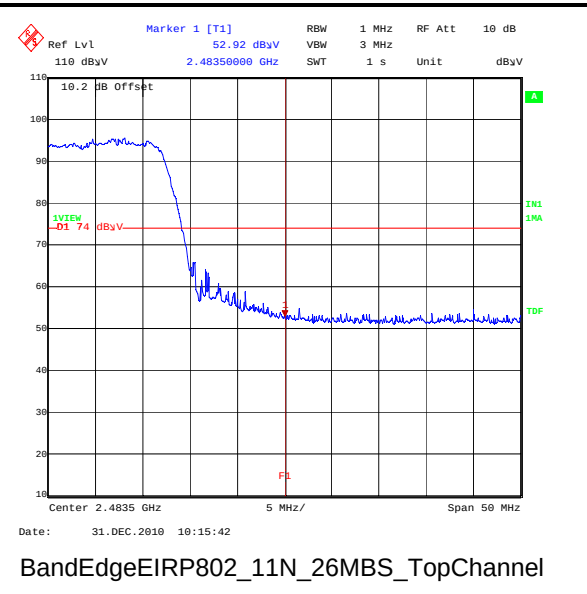
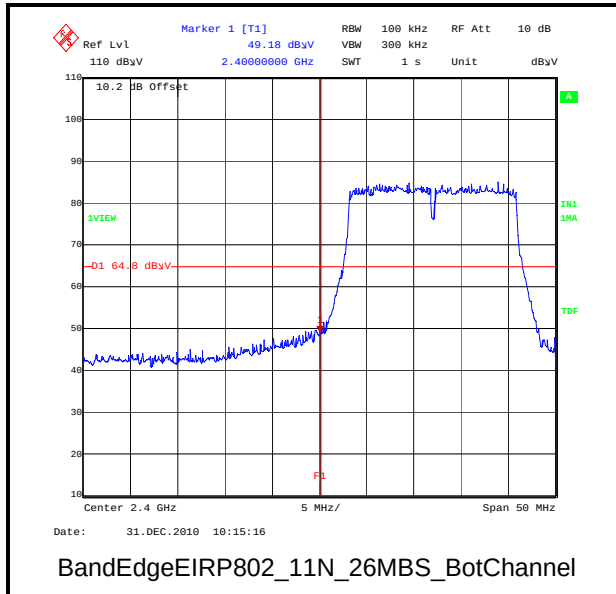
Transmitter Band Edge Radiated Emissions (continued)

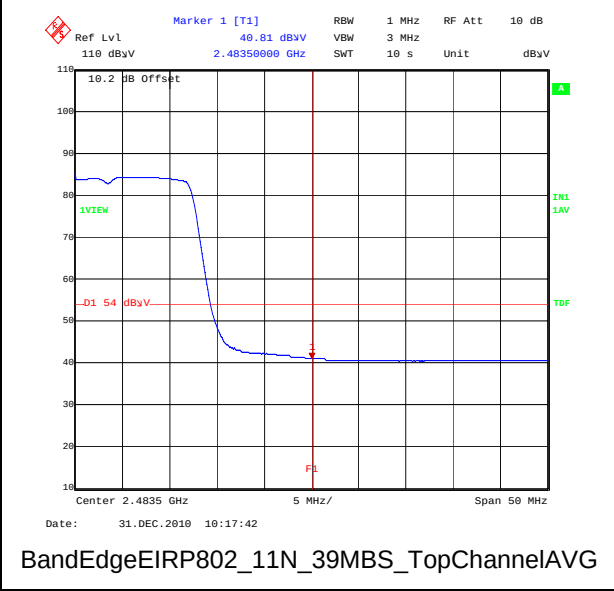
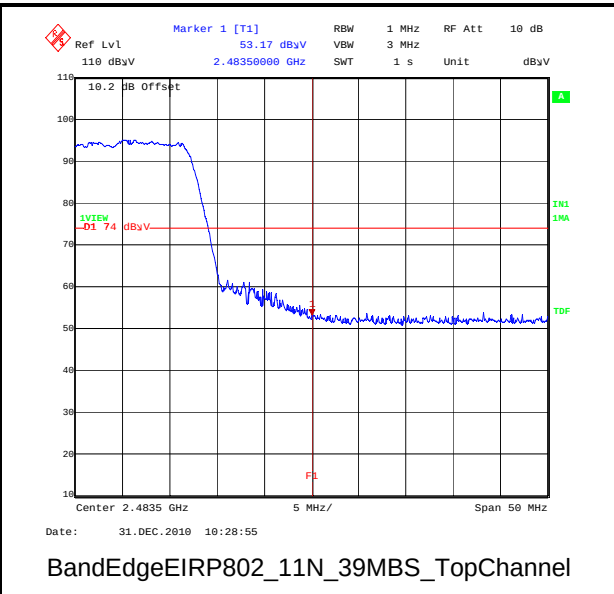
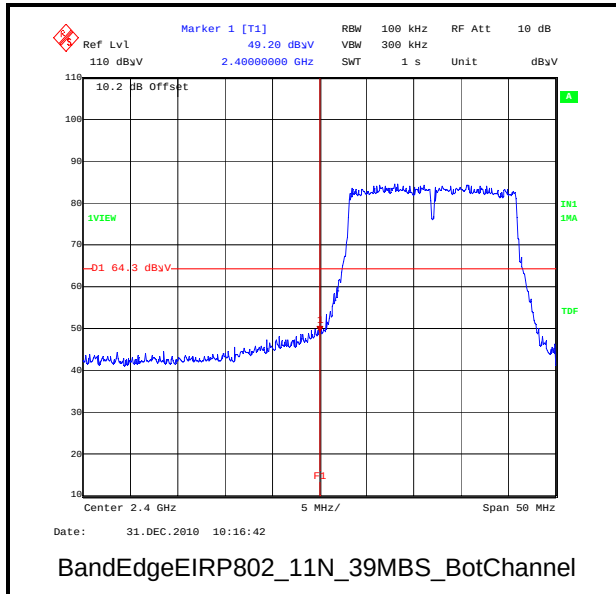
Transmitter Band Edge Radiated Emissions (continued)

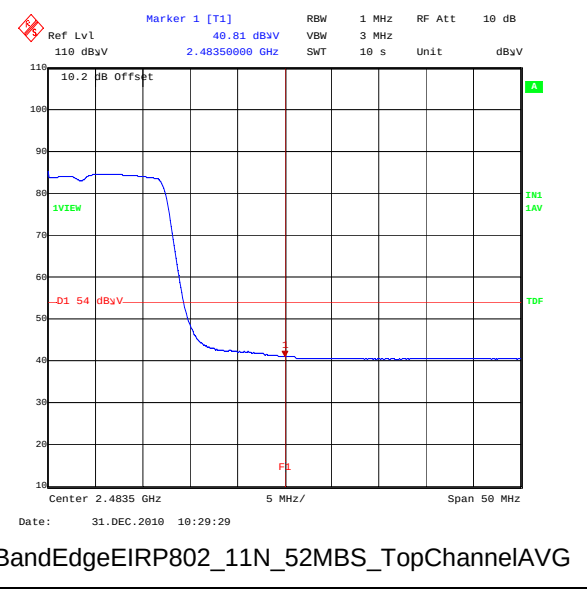
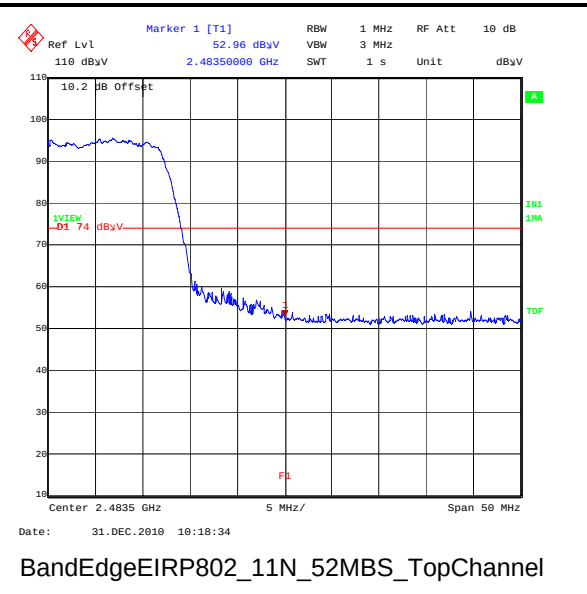
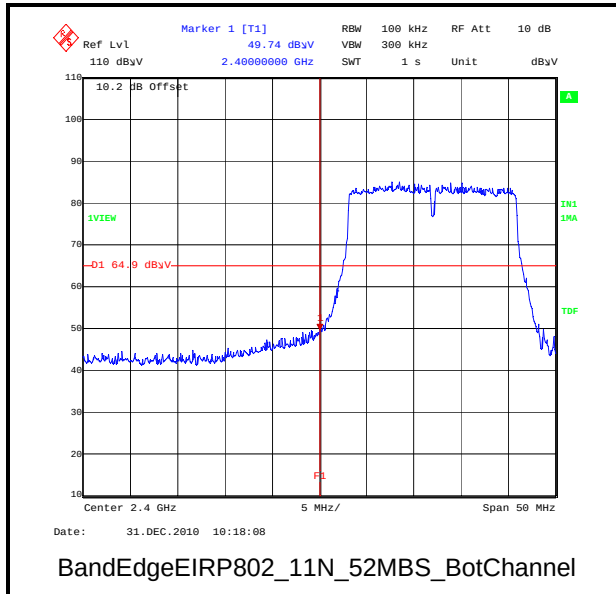
Transmitter Band Edge Radiated Emissions (continued)

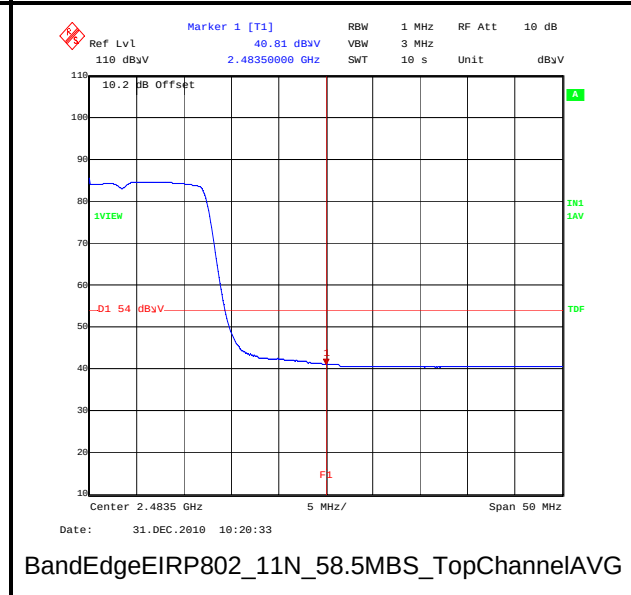
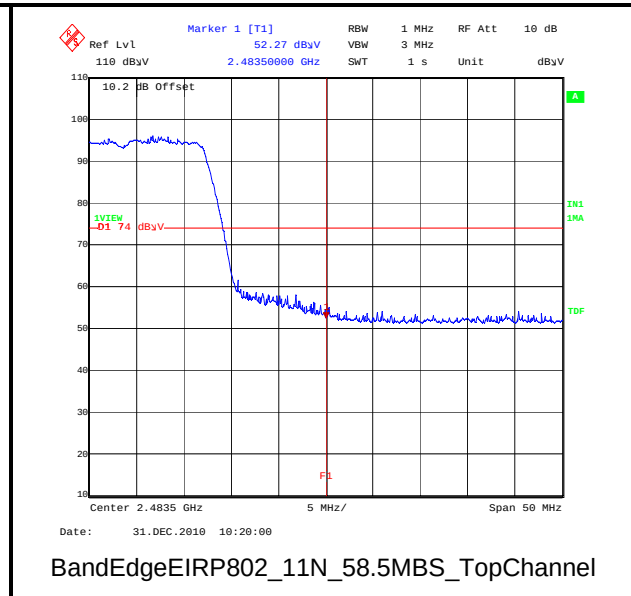
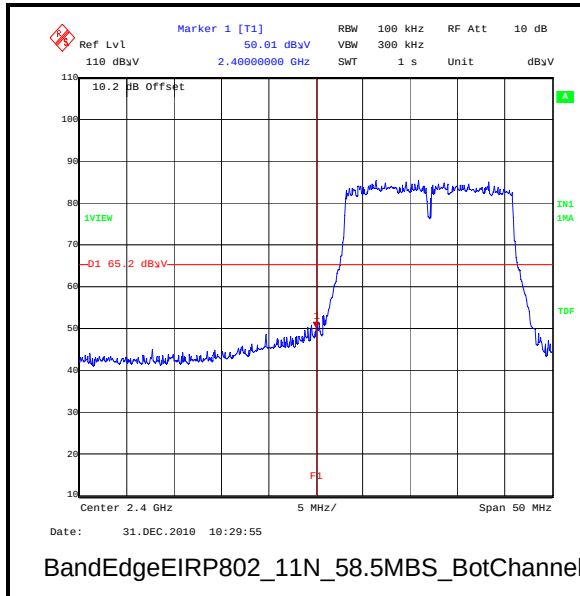
Transmitter Band Edge Radiated Emissions (continued)

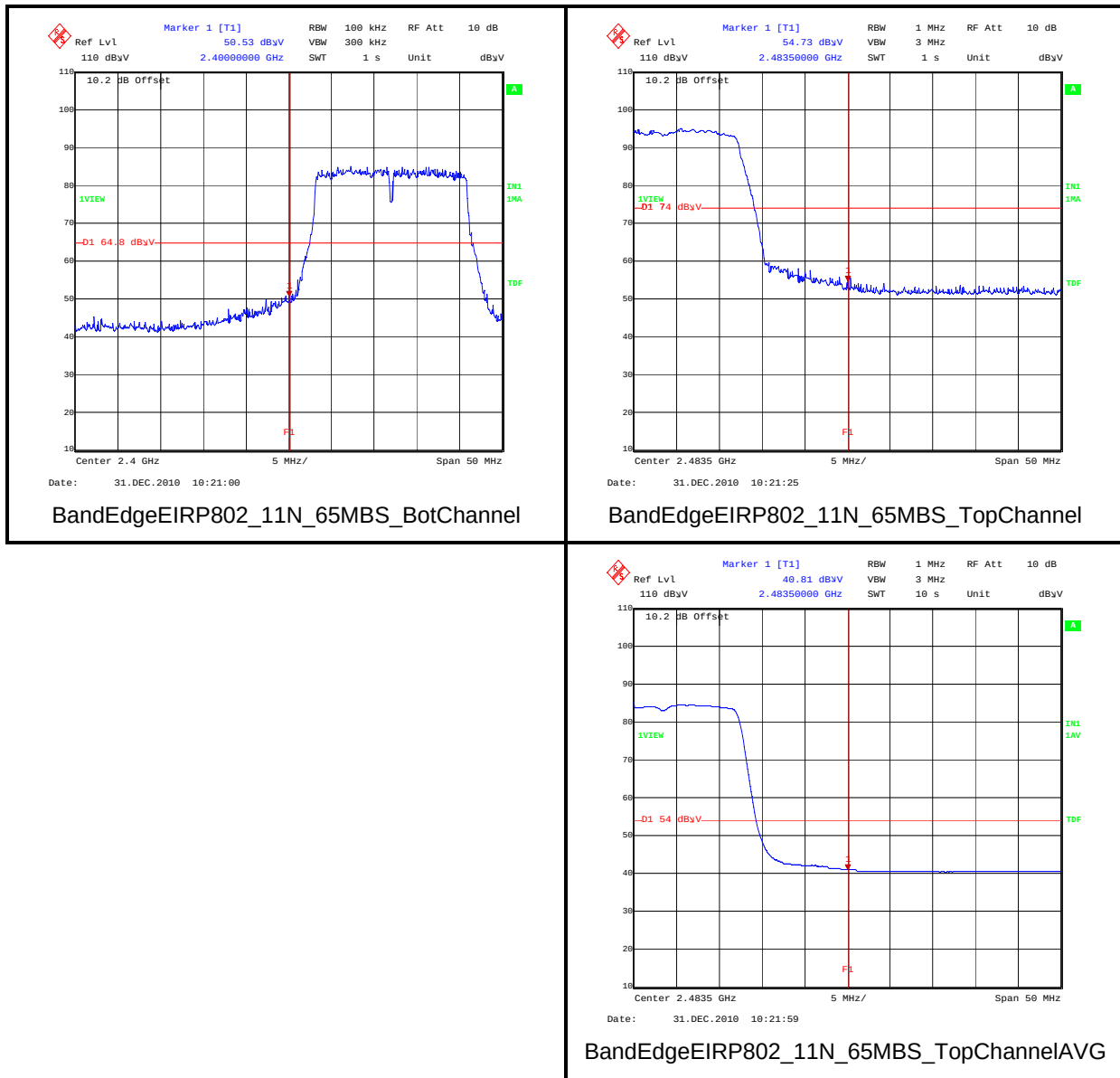
Transmitter Band Edge Radiated Emissions (continued)

Transmitter Band Edge Radiated Emissions (continued)

Transmitter Band Edge Radiated Emissions (continued)

Transmitter Band Edge Radiated Emissions (continued)

Transmitter Band Edge Radiated Emissions (continued)

Transmitter Band Edge Radiated Emissions (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 Peak Output Power	2.4 GHz to 2.4835 GHz	95%	±0.27 dB
Radiated Spurious Emissions	30 MHz to 25 GHz	95%	±4.68 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	06 Jun 2011	12
A1818	Antenna	EMCO	3115	00075692	05 Sep 2011	12
A253	Antenna	Flann Microwave	12240-20	128	05 Sep 2011	12
A254	Antenna	Flann Microwave	14240-20	139	05 Sep 2011	12
A255	Antenna	Flann Microwave	16240-20	519	05 Sep 2011	12
A256	Antenna	Flann Microwave	18240-20	400	05 Sep 2011	12
A288	Antenna	Chase	CBL6111A	1589	05 Sep 2011	12
A436	Antenna	Flann	20240-20	330	05 Sep 2011	12
K0001	5m Semi-Anechoic Chamber	Rainford EMC	N/A	N/A	25 Apr 2011	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	05 Sep 2011	12
M1124	Spectrum Analyser	Rohde & Schwarz	ESI26	100046K	22 Apr 2011	12
M127	Spectrum Analyser	Rohde & Schwarz	FSEB 30	842 659/016	15 Sep 2011	12

Asset Numbers A553, K0001, L1001 and M1124 was in calibration during testing

NB In accordance with UKAS requirements all the measurement equipment is on a calibration schedule.