TEST REPORT
FROM
RFI GLOBAL SERVICES LTD

Partial Test of: 511

To: FCC Part 15.247: 2008 Subpart C

Test Report Serial No:
RFI/RPT1/RP76019JD03A

This Test Report Is Issued Under The Authority Of Brian Watson, Operations Director:	pp R. Graham
Checked By:	R Graham
Signature:	R. Graham
Date of Issue:	04 December 2009

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Registered in England and Wales. Company number:2117901

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1. Customer Information

Company Name:	Ezurio Ltd
Address:	Saturn House, Mercury Park Wycome Lane Woodburn Green Bucks HP10 0HH

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR15.247
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2008: Part 15 Subpart C (Radio Frequency Devices) - Section 15.247
Specification Reference:	47CFR15.109
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2008: Part 15 Subpart B (Radio Frequency Devices) - Section 15.109
Site Registration:	FCC: 209735
Location of Testing:	RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH.
Test Dates:	17 November to 01 December 2009

2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Port Type	Result
Part 15.109	Receiver/Idle Mode Radiated Spurious Emissions	Antenna	✓
Part 15.247(b)(3)	Transmitter Maximum Peak Output Power	Antenna	✓
Part 15.247(d) & 15.209(a)	Transmitter Radiated Emissions	Antenna	✓
Part 15.247(d) & 15.209(a)	Transmitter Band Edge Radiated Emissions	Antenna	✓

Key to Results

✓ = Complied ✗ = Did not comply

2.3. Methods and Procedures

Reference:	ANSI C63.4 (2003)
Title:	American National Standard Methods of Measurement of Electromagnetic Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
Reference:	DA00-705 (2000)
Title:	Filing and Frequency Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

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.

Only tests of Idle mode radiated emissions and transmitter EIRP and radiated spurious emissions were performed at the request of the client.

3. Equipment Under Test (EUT)

3.1. Identification of Equipment Under Test (EUT)

Brand Name:	Ezurio
Model Name or Number:	511
Serial Number:	Not stated
FCC ID Number:	PI4511B

3.2. Description of EUT

The equipment under test was a *Bluetooth* Module.

3.3. Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

3.4. Additional Information Related to Testing

Tested Technology:	*Bluetooth*		
Power Supply Requirement:	Nominal	5.0 V	
Type of Unit:	Transceiver		
Mode:	Basic Rate	Enhanced Data Rate	
Modulation:	GFSK	π/4-DQPSK	8DQPSK
Packet Type: (Maximum Payload)	DH5	2DH5	3DH5
Data Rate (Mbit/s):	1	2	3
Maximum Transmit EIRP:	2.4 dBm		
Transmit Frequency Range:	2402 to 2480 MHz		
Transmit Channels Tested:	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Bottom	0	2402
	Middle	39	2441
	Top	78	2480
Receive Frequency Range:	2402 to 2480 MHz		
Receive Channels Tested:	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Bottom	0	2402
	Middle	39	2441
	Top	78	2480

3.5. Support Equipment

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

Description:	Laptop
Brand Name:	Sony
Model Name or Number:	Vaio
Serial Number:	218982505100620

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

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

- Transmit mode with Basic rate (DH5 packets) or EDR (2DH5 or 3DH5 packets) as required.
- Receive Mode: Standalone, with the Bluetooth mode active but not transmitting.

4.2. Configuration and Peripherals

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

- EUT was connected via a radio link to a Bluetooth tester in order to place the EUT into Bluetooth test mode. The laptop PC with the client's bespoke application was used to place the EUT into Bluetooth Test mode.
- For Transmitter Radiated Spurious Emissions, both EDR/Basic rate modes were compared and tests were performed with the mode that presented a worse case result.

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:

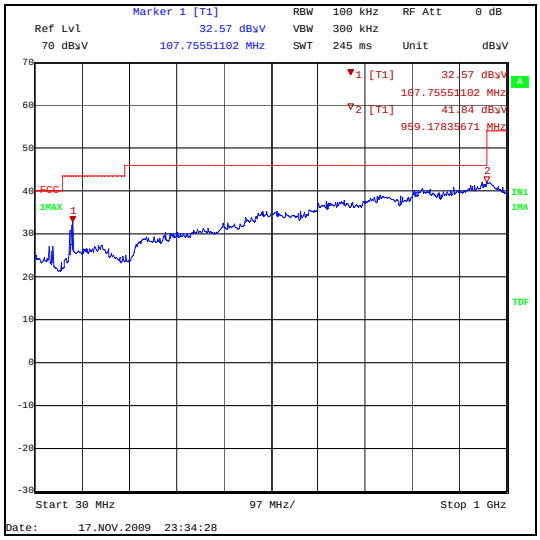
FCC Part:	15.109
Test Method Used:	As detailed in ANSI C63.4 Section 8 and relevant annexes
Frequency Range:	30 MHz to 1000 MHz

Environmental Conditions:

Temperature Range (°C):	24
Relative Humidity Range (%):	31

Results:

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
107.593	Vertical	32.6	43.5	10.9	Complied



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:

FCC Part:	15.109
Test Method Used:	As detailed in ANSI C63.4 Section 8 and relevant annexes
Frequency Range:	1 GHz to 12.75 GHz

Environmental Conditions:

Temperature (°C):	24
Relative Humidity (%):	31

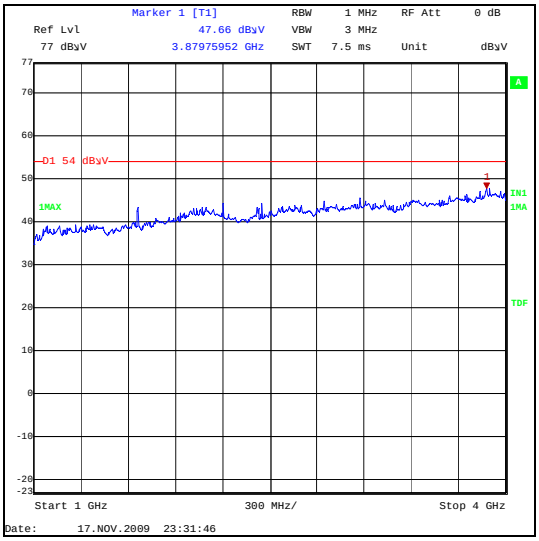
Results:

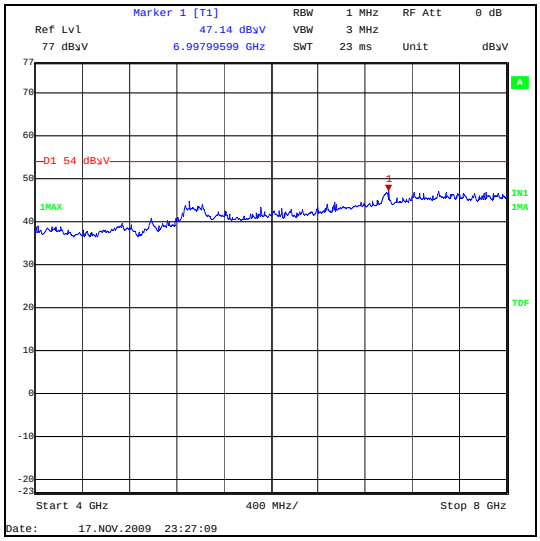
Frequency (MHz)	Antenna Polarity	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
3879.759	Horizontal	47.7	54.0	6.3	Complied

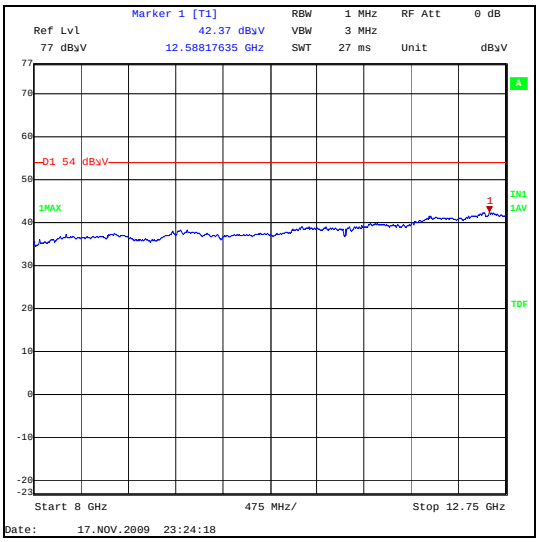
Note(s):

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 the peak limit because this is the more onerous limit.
2. All pre-scans were performed with a peak detector against the average limit apart from measurements made in the range of 8 to 12.75 GHz where pre-scans were performed with peak and average detectors and applicable limit applied. This was due to the noise floor exceeding the average limit when using a peak detector.

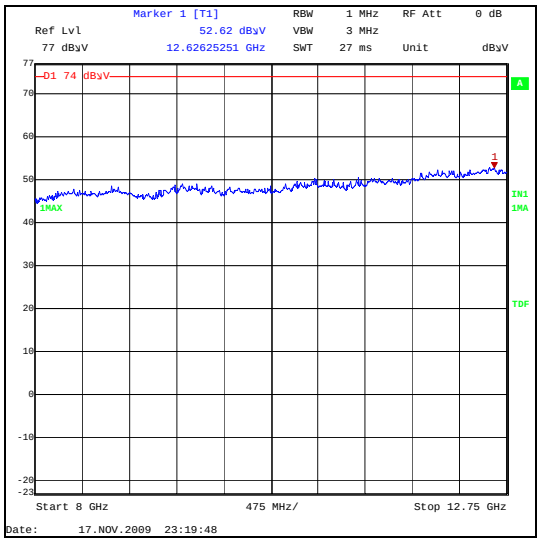
Receiver/Idle Mode Radiated Spurious Emissions (continued)







AVG DETECTOR



PEAK DETECTOR

5.2.2. Transmitter Maximum Peak Output Power (EIRP)

Test Summary:

FCC Part:	15.247(b)(3)
Test Method Used:	As detailed in Public Notice DA 00-705 (March 30, 2000), ANSI TIA-603-C-2004 and FCC CFR Part 2

Environmental Conditions:

Temperature (°C):	24
Relative Humidity (%):	31

Results: Basic Rate DH5

Channel	EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	1.7	30.0	28.3	Complied
Middle	0.4	30.0	29.6	Complied
Top	2.4	30.0	27.6	Complied

Results: EDR 2DH5

Channel	EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	1.1	21.0	19.9	Complied
Middle	0.2	21.0	20.8	Complied
Top	0.5	21.0	20.5	Complied

Results: EDR 3DH5

Channel	EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	2.1	21.0	18.9	Complied
Middle	0.5	21.0	20.5	Complied
Top	1.7	21.0	28.3	Complied

Note(s):

1. These tests were performed radiated; therefore the EUT antenna gain is encompassed in the final result and not measurable.

5.2.3. Transmitter Radiated Emissions

Test Summary:

FCC Part:	15.247(d) & 15.209(a)
Test Method Used:	As detailed in ANSI C63.4 Section 8 and Public Notice DA 00-705 (March 30, 2000)
Frequency Range	30 MHz to 1000 MHz

Environmental Conditions:

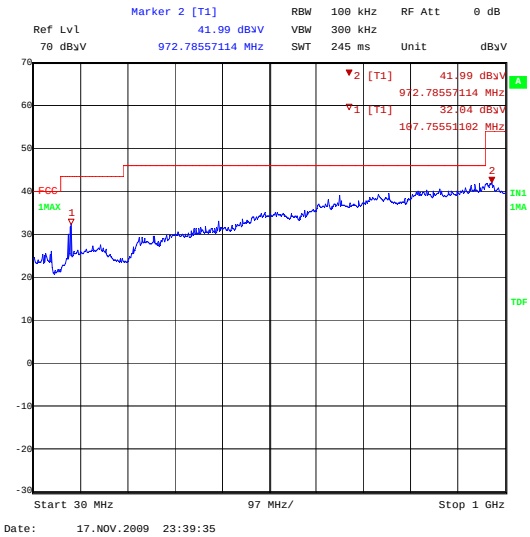
Temperature (°C):	24
Relative Humidity (%):	31

Results: Top Channel - Top Channel DH5

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
107.499	Vertical	32.6	43.5	10.9	Complied
973.839	Vertical	41.3	54.0	12.7	Complied

Note(s):

1. 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.



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

5.2.4. Transmitter Radiated Emissions

Test Summary:

FCC Part:	15.247(d) & 15.209(a)
Test Method Used:	As detailed in ANSI C63.4 Section 8 and Public Notice DA 00-705 (March 30, 2000)
Frequency Range	1 GHz to 26.5 GHz

Environmental Conditions:

Temperature (°C):	24
Relative Humidity (%):	31

Results: Highest Peak Level. Bottom Channel - DH5

Frequency (GHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Actual Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
4804.609	Horizontal	58.5	-1.2	59.7	74.0	14.3	Complied

Results: Highest Average Level. Bottom Channel - DH5

Frequency (GHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Actual Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
4803.858	Horizontal	50.8	-1.2	52.0	54.0	2.0	Complied

Results: Highest Peak Level. Middle Channel - DH5

Frequency (GHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Actual Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
4881.764	Horizontal	56.2	-1.2	57.8	74.0	16.2	Complied

Results: Highest Average Level. Middle Channel - DH5

Frequency (GHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Actual Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
4882.264	Horizontal	46.8	-1.2	48.0	54.0	6.0	Complied

Results: Highest Peak Level. Top Channel - DH5

Frequency (GHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Actual Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
4959.669	Horizontal	51.1	-1.2	52.3	74.0	21.7	Complied

Results: Highest Average Level. Top Channel - DH5

Frequency (GHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Actual Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
4960.170	Horizontal	48.8	-1.2	50.0	54.0	4.0	Complied

Transmitter Radiated Emissions (continued)

Results: Highest Peak Level. Hopping Mode - DH5

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
4881.592	Horizontal	56.3	-1.2	57.5	74.0	16.5	Complied

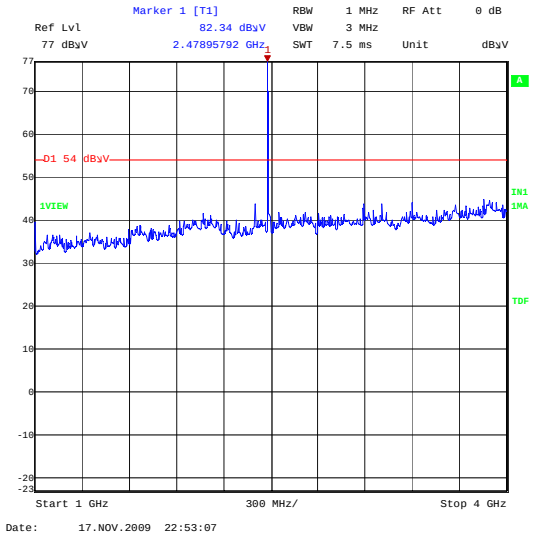
Results: Highest Average Level. Hopping Mode - DH5

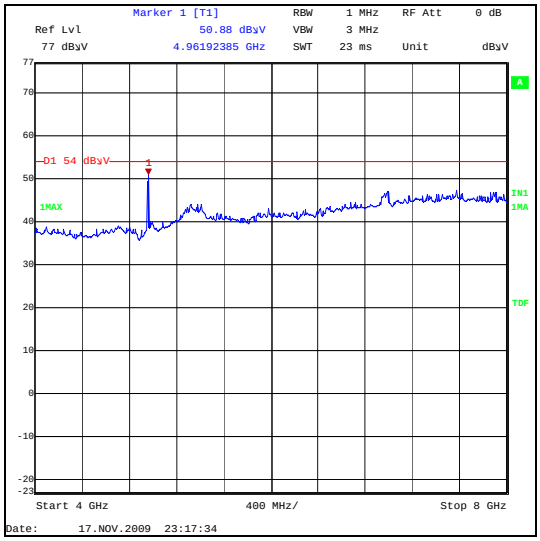
Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
4804.112	Horizontal	46.9	-1.2	48.1	54.0	5.9	Complied

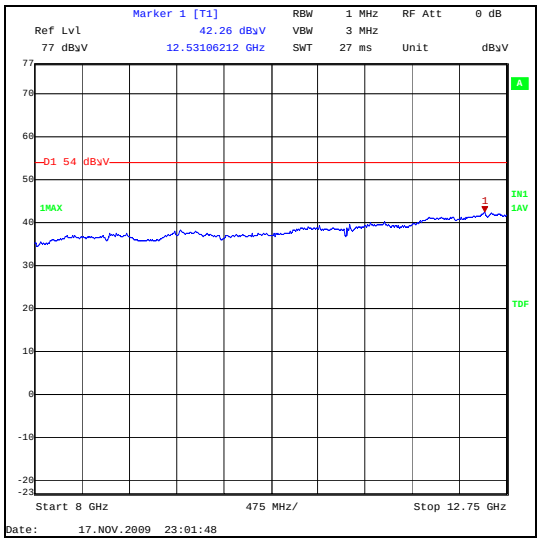
Note(s):

1. All pre-scans were performed with a peak detector against average limits apart from measurements made in the range 8 GHz to 26.5 GHz where pre-scans were performed with peak and average detectors and the applicable limit applied. This was due to the noise floor exceeding the average limit when using a peak detector.
2. The emission shown on the 1 GHz to 4 GHz plots is the fundamental transmit frequency at 2480 MHz.

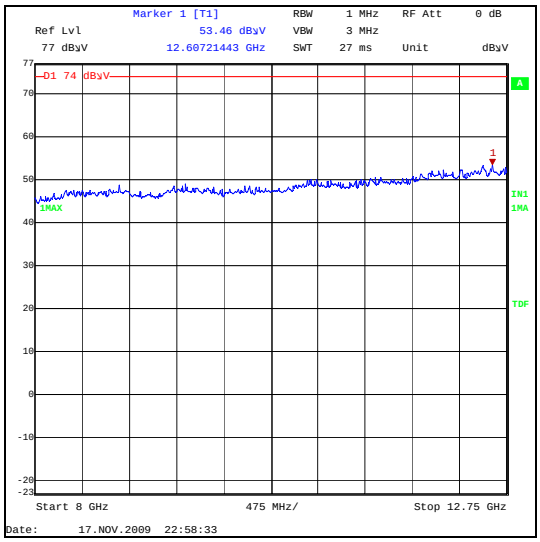
Transmitter Radiated Emissions (continued)



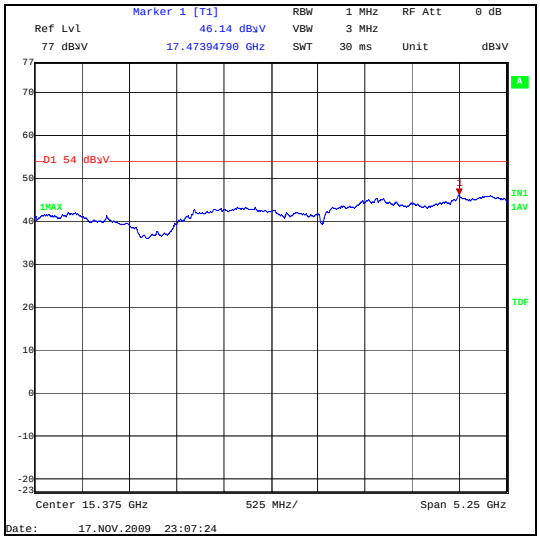




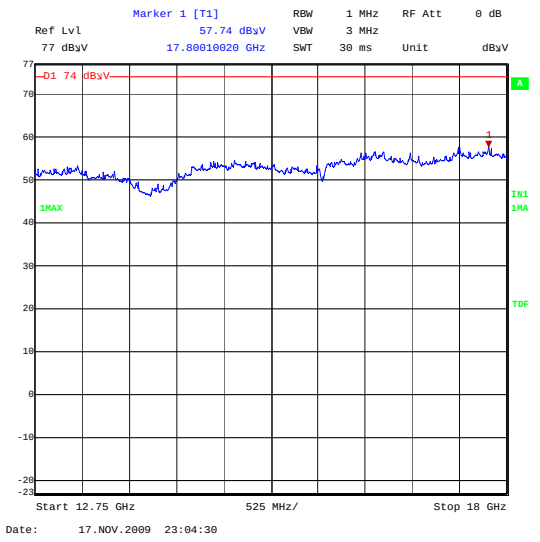
AVG DETECTOR



PEAK DETECTOR



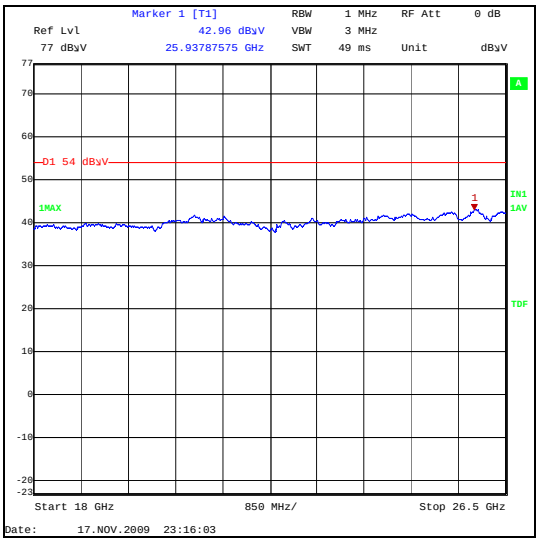
12.75 GHZ to 18 GHz AVG DETECTOR



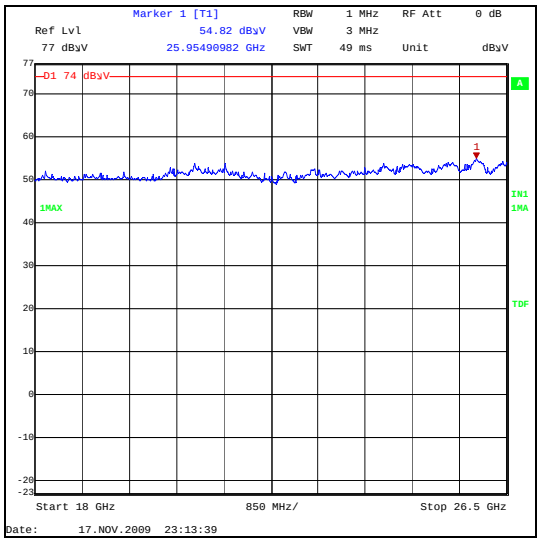
PEAK DETECTOR

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

Transmitter Radiated Emissions (continued)



AVG DETECTOR



PEAK DETECTOR

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:

FCC Part:	15.247(d) & 15.209(a)
Test Method Used:	As detailed in ANSI C63.4 Section 8 and Public Notice DA 00-705 (March 30, 2000)

Environmental Conditions:

Temperature (°C):	24
Relative Humidity (%):	31

Results: Peak Power Level Hopping Mode DH5

Frequency (MHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Actual Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2.4000	Horizontal	52.6	-0.2	52.4	76.9*	24.5	Complied
2.4835	Horizontal	57.2	-0.3	56.9	74.0	17.1	Complied

Results: Average Power Level Hopping Mode DH5:

Frequency (MHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Actual Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2.4835	Horizontal	44.9	-0.3	44.6	54.0	9.4	Complied

Results: Peak Power Level Hopping Mode 2DH5:

Frequency (MHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Actual Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2.4000	Horizontal	49.5	-0.2	49.3	76.3*	27.0	Complied
2.4835	Horizontal	56.1	-0.3	55.8	74.0	18.2	Complied

Results: Average Power Level Hopping Mode 2DH5:

Frequency (MHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Actual Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2.4835	Horizontal	43.4	-0.3	43.1	54.0	10.9	Complied

Results: Peak Power Level Hopping Mode 3DH5:

Frequency (MHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Actual Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2.4000	Horizontal	50.4	-0.2	50.2	77.3*	27.1	Complied
2.4835	Horizontal	57.0	-0.3	56.7	74.0	17.3	complied

Transmitter Band Edge Radiated Emissions (continued)

Results: Average Power Level Hopping Mode 3DH5:

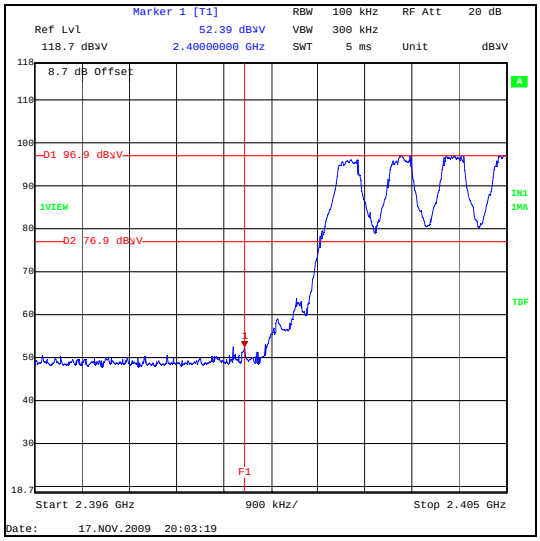
Frequency (MHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2.4835	Horizontal	44.0	-0.3	43.7	54.0	10.3	Complied

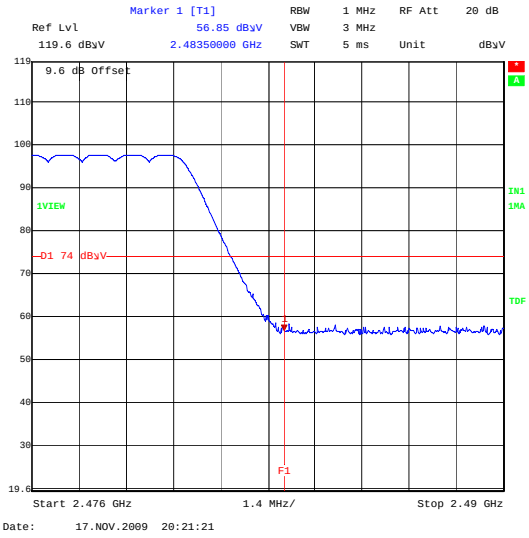
Note(s):

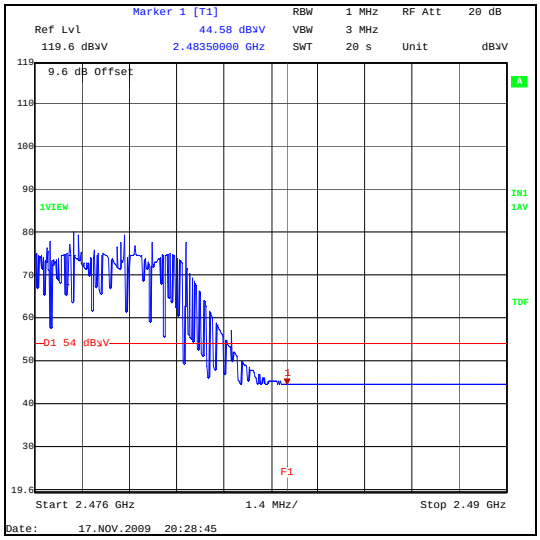
1. * -20 dBc limit

Transmitter Band Edge Radiated Emissions (continued)

DH5:

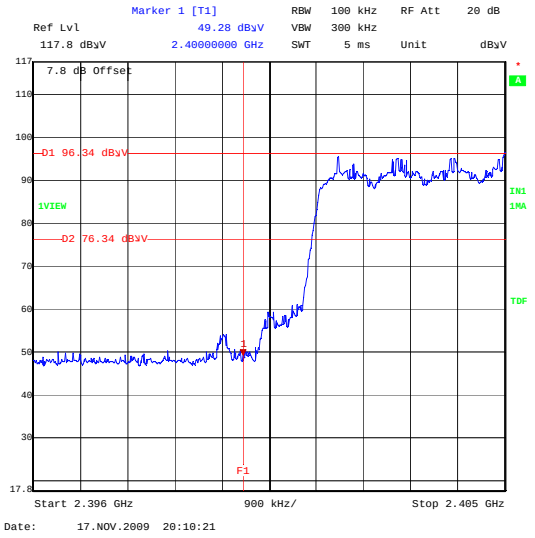


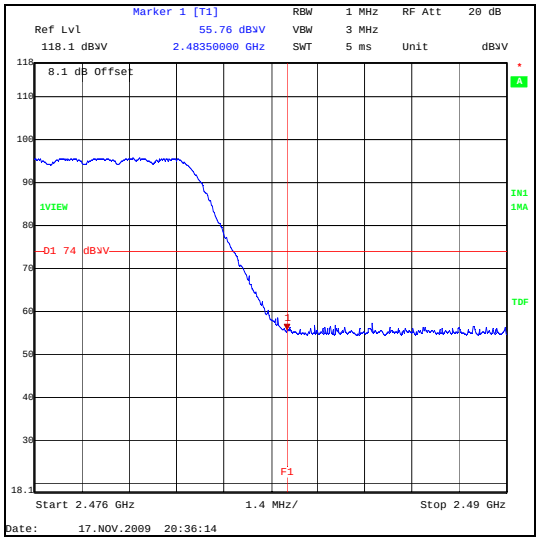


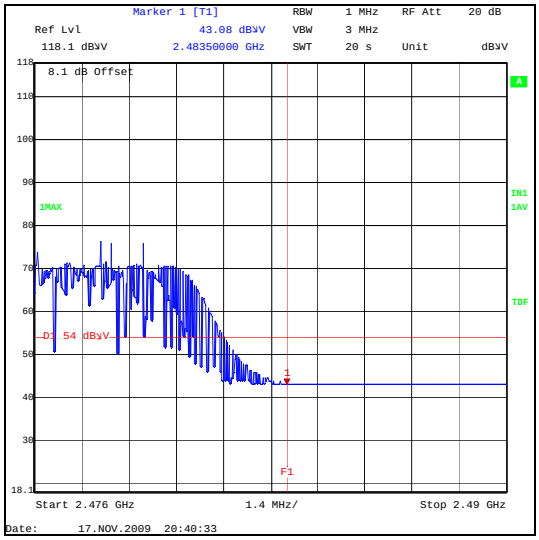


Transmitter Band Edge Radiated Emissions (continued)

2DH5

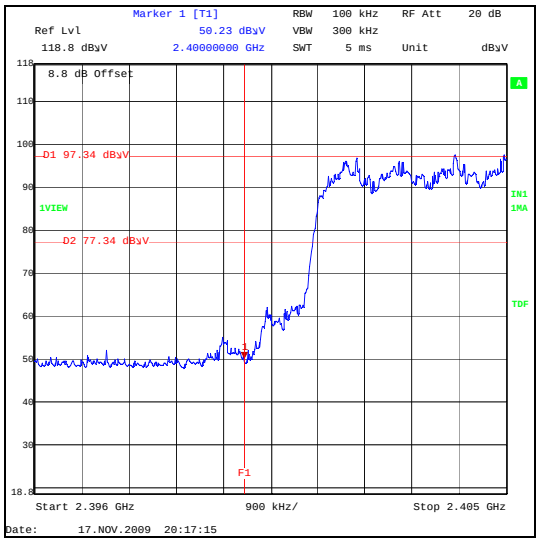


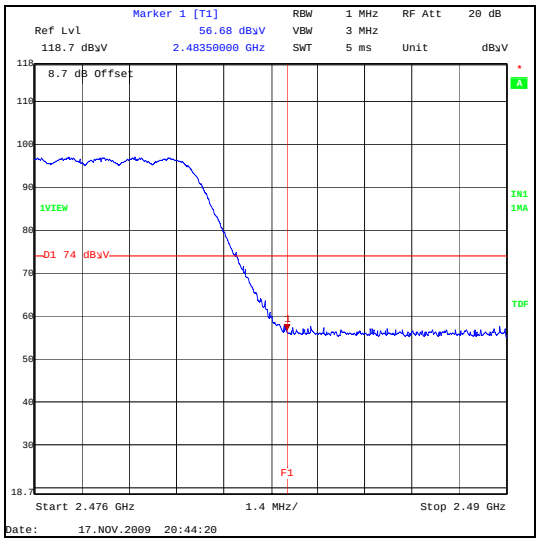


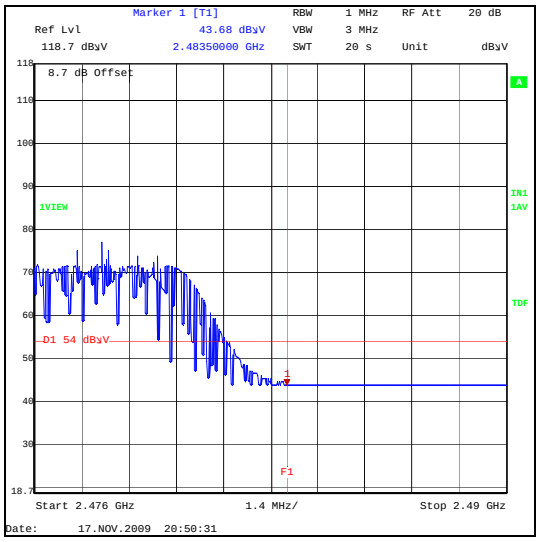


Transmitter Band Edge Radiated Emissions (continued)

3DH5







Transmitter Band Edge Radiated Emissions (continued)

Results: Peak Power Level Static Mode DH5:

Frequency (MHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2.4000	Horizontal	56.4	-0.2	56.2	76.9*	20.5	Complied
2.4835	Horizontal	58.8	-0.3	58.5	74.0	15.5	Complied

Results: Average Power Level Static Mode DH5:

Frequency (MHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2.4835	Horizontal	46.2	-0.3	45.9	54.0	8.1	Complied

Results: Peak Power Level Static Mode 2DH5:

Frequency (MHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2.4000	Horizontal	53.3	-0.2	53.1	76.3*	23.2	Complied
2.4835	Horizontal	56.6	-0.3	56.3	74.0	17.3	Complied

Results: Average Power Level Static Mode 2DH5:

Frequency (MHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2.4835	Horizontal	45.2	-0.3	44.9	54.0	9.1	Complied

Results: Peak Power Level Static Mode 3DH5:

Frequency (MHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2.4000	Horizontal	52.0	-0.2	51.8	77.3*	25.5	Complied
2.4835	Horizontal	58.8	-0.3	58.5	74.0	15.5	Complied

Results: Average Power Level Static Mode 3DH5:

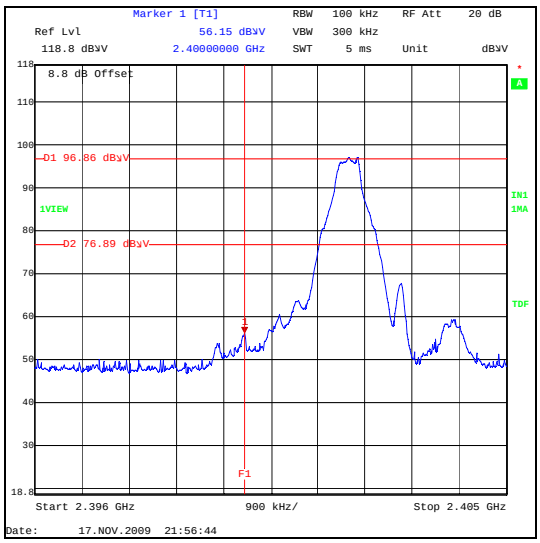
Frequency (MHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2.4835	Horizontal	45.3	-0.3	45.0	54.0	9.0	Complied

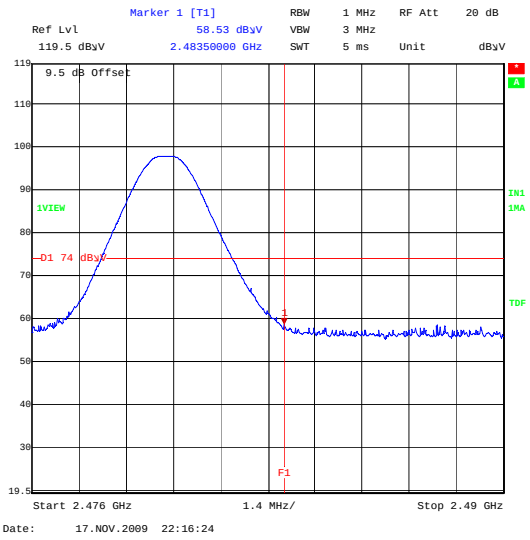
Note(s):

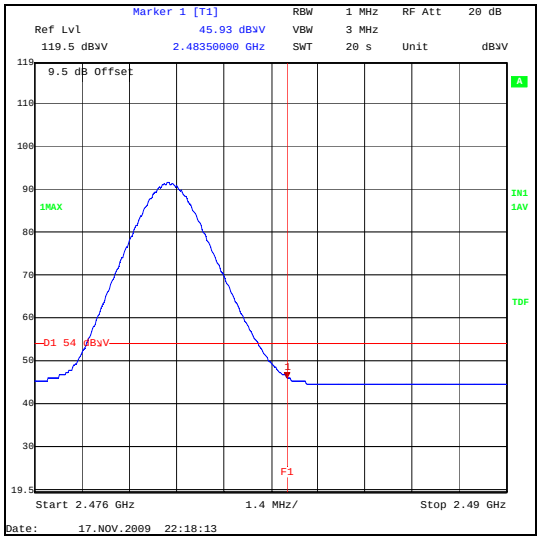
1. * -20 dBc limit

Transmitter Band Edge Radiated Emissions (continued)

DH5:

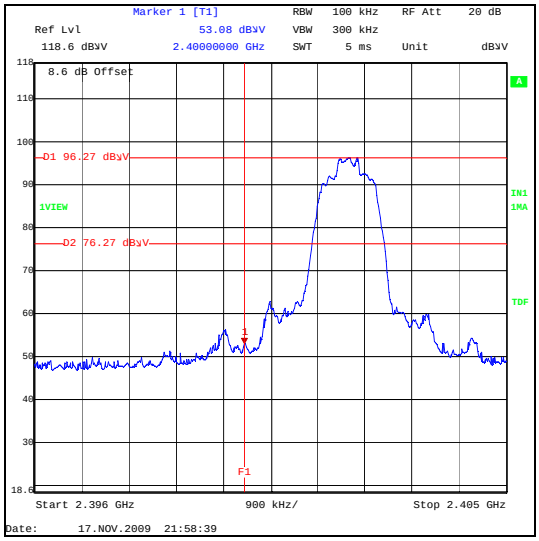


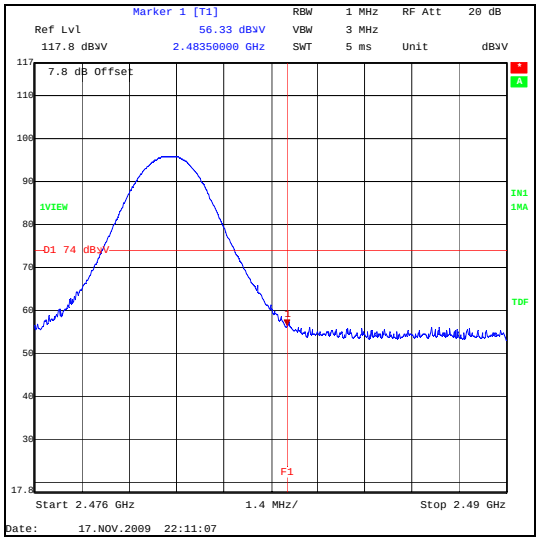


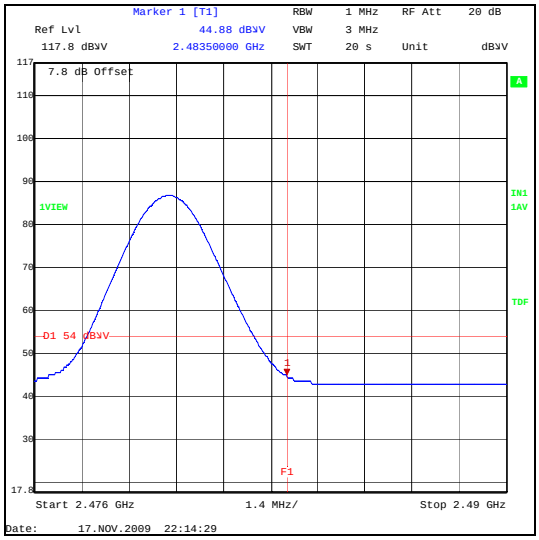


Transmitter Band Edge Radiated Emissions (continued)

2DH5:

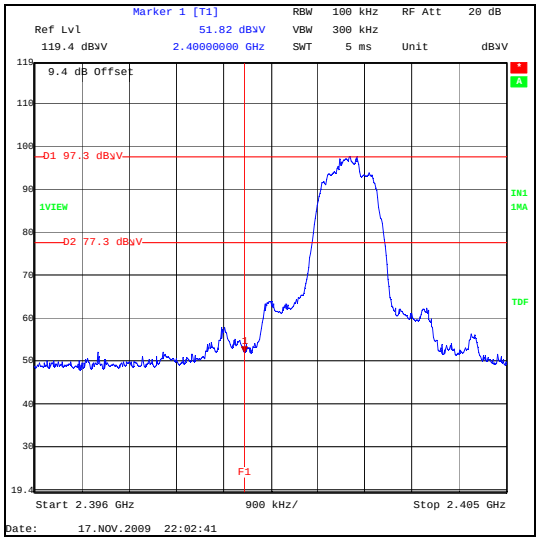


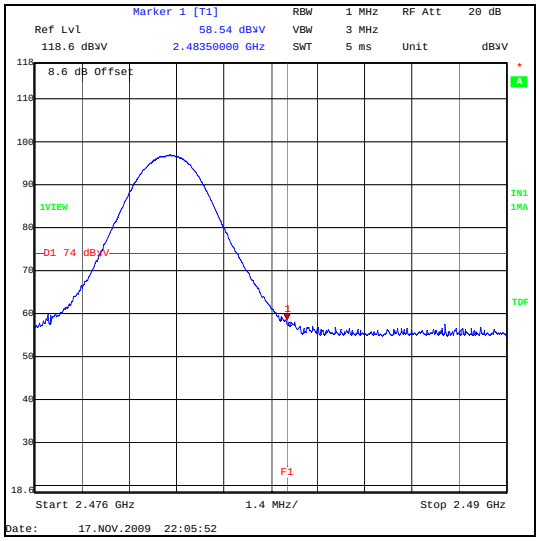


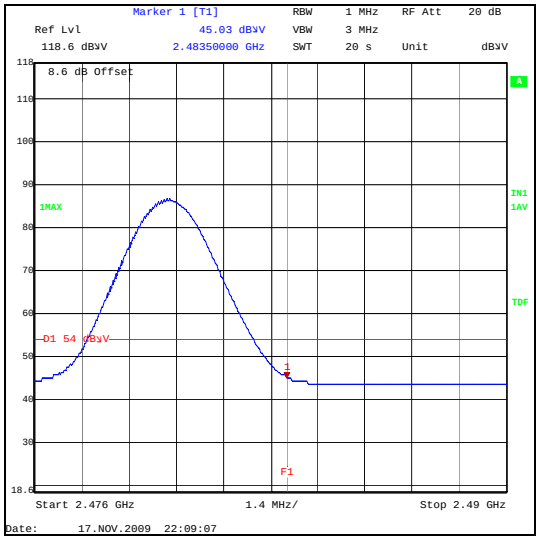


Transmitter Band Edge Radiated Emissions (continued)

3DH5:







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
Transmitter Maximum Peak Output Power	Not Applicable	95%	±2.94 dB
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	±4.64 dB
Radiated Spurious Emissions	1 GHz 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 Last Calibrated	Cal. Interval
A1534	Pre Amplifier	Hewlett Packard	8449B OPT H02	3008A00405	Calibrated before use	-
A1818	Antenna	EMCO	3115	00075692	27 Nov 2009	12
A288	Antenna	Chase	CBL6111A	1589	13 Mar 2009	12
A436	Antenna	Flann	20240-20	330	24 Apr 2009	36
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	01 Sep 2009	12
M1124	Spectrum Analyser	Rohde & Schwarz	ESIB26	100046K	09 Mar 2009	12
M1447	Bluetooth Tester	Rohde & Schwarz	CBT	100329	19 Jan 2009	12

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