TEST REPORT
FROM
RFI GLOBAL SERVICES LTD

Test of: Ezurio Limited.
'The Intelligent Bluetooth Serial Module, Version II'

To: Partial Test of FCC Part 15.247: 2004 (Subpart C)

Test Report Serial No:
RFI/MPTE1/RP47077JD09A

This Test Report Is Issued Under The Authority Of Andrew Brown, Operations Manager: 	
Tested By: Steve Wong 	**Checked By: Michael Derby** 
Report Copy No: PDF01	
Issue Date: 16 August 2005	**Test Dates: 16 June to 30 June 2005**

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Test of: Ezurio Limited.
'The Intelligent Bluetooth Serial Module, Version II'
To: Partial Test of FCC Part 15.247: 2004 (Subpart C)

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1. Client Information

Company Name:	Ezurio Limited
Address:	Unit 2 126 Colindale Avenue London NW9 5HD`
Contact Name:	Mr S. Yitayew

2. Equipment Under Test (EUT)

The following information (with the exception of the Date of Receipt) has been supplied by the client:

2.1. Identification of Equipment Under Test (EUT)

Brand Name:	Ezurio Limited
Model Name or Number:	"The Intelligent Bluetooth Serial Module, Version II"
Unique Type Identification:	None Stated
Software Version:	Not stated
Serial Number:	None stated
FCC ID Number:	PI401B
Country of Manufacture:	Not stated
Date of Receipt:	22 April 2005
Note:	EUT, with integral antenna

2.2. Description of EUT

The equipment under test was a fully integrated Class 1 Bluetooth Module.

2.3. Modifications Incorporated in EUT

The EUT had a connector added, to connect it to the USB cable.

2.4. Additional Information Related to Testing

Power Supply Requirement:	The EUT has an on-board regulator, supplying 3.3 V DC to the module. For the purpose of this test, the EUT received its supply from the controlling laptop, via the USB cable.		
Intended Operating Environment:	Residential, Commercial and Light Industry		
Equipment Category:	Short Range (Low Power), Bluetooth.		
Type of Unit:	Base Station (Fixed Use), Mobile and Portable.		
Declared Channel Separation:	1 MHz		
Transmit Frequency Range:	2402 MHz to 2480 MHz		
Transmit Channels Tested:	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Bottom	1	2402
	Middle	40	2441
	Top	79	2480
Receive Frequency Range:	2402 MHz to 2480 MHz		
Receive Channels Tested:	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Bottom	1	2402
	Middle	40	2441
	Top	79	2480
Declared Radiated Output Power:	+6.0 dBm		

2.5. Port Identification

Port	Description	Type/Length	Applicable
1	5 Pin Connector	0.5m USB	N/A

2.6. Support Equipment

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

Description:	Laptop
Brand Name:	Dell
Model Name or Number:	Latitude C840
Serial Number:	CN-03J010-12961-2AQ-5411
Cable Length and Type:	0.5m, Shielded USB
Connected to Port:	5 Pin Connector on EUT

3. Test Results

Reference:	FCC Part 15.247: 2004 Subpart C
Title:	Code of Federal Regulations, Part 15.247 (47CFR15) (Intentional Radiators operating within the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz)

3.1. Methods and Procedures

The methods and procedures used were as detailed in:

ANSI C63.2 (1987)
Title: American National Standard for Instrumentation - Electromagnetic noise and field strength.

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.

ANSI C63.5 (1988)
Title: American National Standard for the Calibration of antennas used for Radiated Emission measurements in Electromagnetic Interference (EMI) control.

ANSI C63.7 (1988)
Title: American National Standard Guide for Construction of Open Area Test Sites for performing Radiated Emission Measurements.

CISPR 16-1: (1999)
Title: Specification For Radio Disturbance and Immunity Measuring Apparatus and Methods. Part 1: Radio Disturbance and Immunity Measuring Apparatus.

DA00-705 (2000)
Title: Filing and Frequency Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

3.2. Definition of Measurement Equipment

The measurement equipment used complied with the requirements of the standards referenced in the methods & procedures section above. Appendix 1 contains a list of the test equipment used.

4. Deviations from the Test Specification

At the request of the client, this was only partial testing of the FCC requirements.

A similar version of the module has been previously approved under RFI job number 47077JD03. The only difference in EUT declared by the client is the physical size of the module, therefore the client requested emissions measurements only to be done, in accordance with the request of their TCB.

5. Operation of the EUT during Testing

5.1. Operating Modes

The EUT was tested in the following operating modes, unless otherwise stated.

The EUT was controlled using BlueTest software. Transmit and Receive mode tests were performed with the EUT hopping on bottom, middle or top channels, or hopping over all channels, as per the specific requirements of each test case.

5.2. Configuration and Peripherals

The EUT was tested in the following configuration:

The EUT was tested as a module.
For the purpose of controlling, the EUT was connected via USB cable to a controlling laptop.

6. Summary of Test Results

Range of Measurements	Specification Reference	Port Type	Compliancy Status
Idle Mode Radiated Spurious Emissions	C.F.R. 47 FCC Part 15: 2004 Section 15.109	Antenna	Complied
Transmitter Radiated Emissions	C.F.R. 47 FCC Part 15: 2004 Sections 15.247(d) & 15.209(a)	Antenna	Complied
Transmitter Band Edge Radiated Emissions	C.F.R. 47 FCC Part 15: 2004 Sections 15.247(d) & 15.209(a)	Antenna	Complied

6.1. Location of Tests

All the measurements described in this report were performed at the premises of
RFI Global Services Ltd, Ewhurst Park, Ramsdell, Basingstoke, Hampshire, RG26 5RQ, England.

7. Measurements, Examinations and Derived Results

7.1. General Comments

This section contains test results only.

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 8 for details of measurement uncertainties.

7.2. Test Results

7.2.1. Idle Mode Radiated Spurious Emissions: Section 15.109 - Electric Field Strength Measurements (Frequency Range: 30 to 1000 MHz)

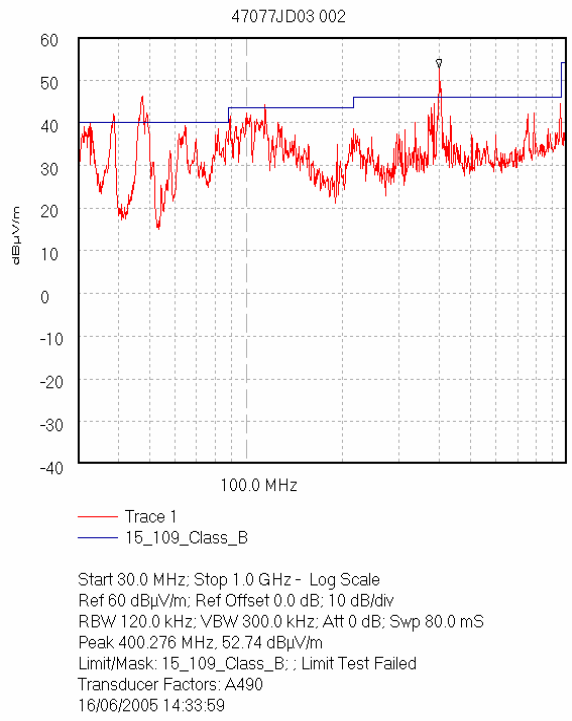
The EUT was configured for radiated emission testing, as described in section 9 of this report.

Tests were performed to identify the maximum receiver or standby radiated emission levels.

Results:

Frequency (MHz)	Antenna Polarity	Q-P Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
32.594	Vert.	25.1	40.0	14.9	Complied
38.433	Vert.	26.2	40.0	13.8	Complied
47.366	Horiz.	30.1	40.0	9.9	Complied
64.322	Vert.	20.2	40.0	19.8	Complied
114.266	Vert.	33.0	43.5	10.5	Complied
215.954	Vert.	28.7	43.5	14.8	Complied
399.850	Vert.	21.5	46.0	24.5	Complied
755.727	Vert.	30.2	46.0	15.8	Complied
786.462	Horiz.	37.7	46.0	8.3	Complied
953.336	Vert.	41.2	46.0	4.8	Complied

Idle Mode Radiated Spurious Emissions: Section 15.109 - Electric Field Strength Measurements (Frequency Range: 30 to 1000 MHz) (Continued)



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

7.2.2. Idle Mode Radiated Spurious Emissions: Section 15.109 - Electric Field Strength Measurements (Frequency Range: 1 to 12.5 GHz)

Results:

Highest Peak Level:

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
1.196	Vert.	19.1	20.8	6.7	46.6	74.0	27.4	Complied
1.331	Vert.	15.8	20.9	7.4	44.1	74.0	29.9	Complied
1.491	Vert.	16.4	21.1	7.6	45.1	74.0	28.9	Complied
2.485	Vert.	29.7	21.1	10.0	60.8	74.0	13.2	Complied

Highest Average Level:

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
1.196	Vert.	3.3	20.8	6.7	30.8	54.0	23.2	Complied
1.331	Vert.	2.3	20.9	7.4	30.6	54.0	23.4	Complied
1.491	Vert.	1.8	21.1	7.6	30.5	54.0	23.5	Complied
2.485	Vert.	6.5	21.1	10.0	37.6	54.0	16.4	Complied

Test of: **Ezurio Limited.**
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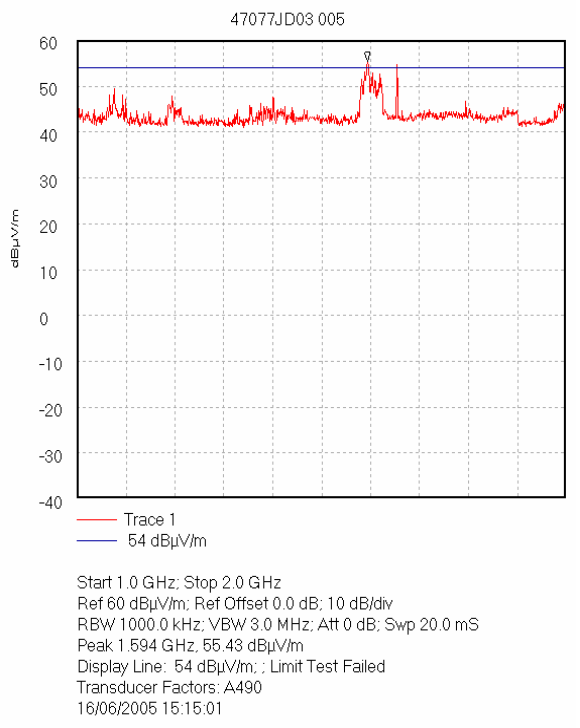
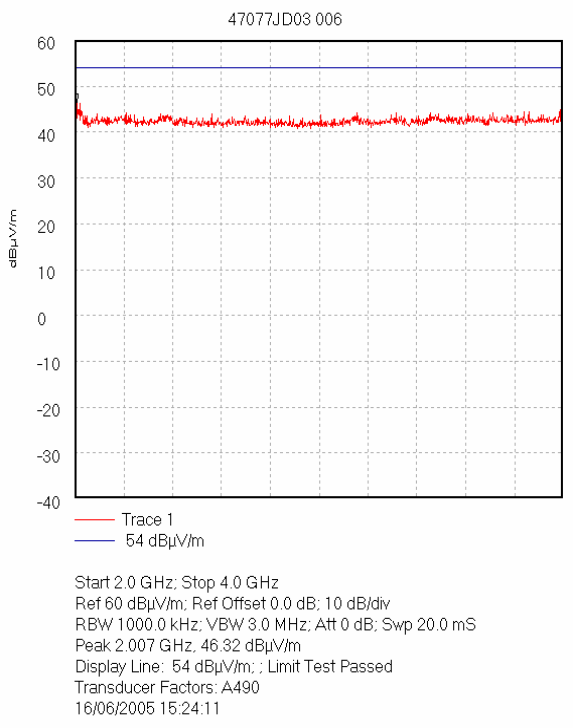
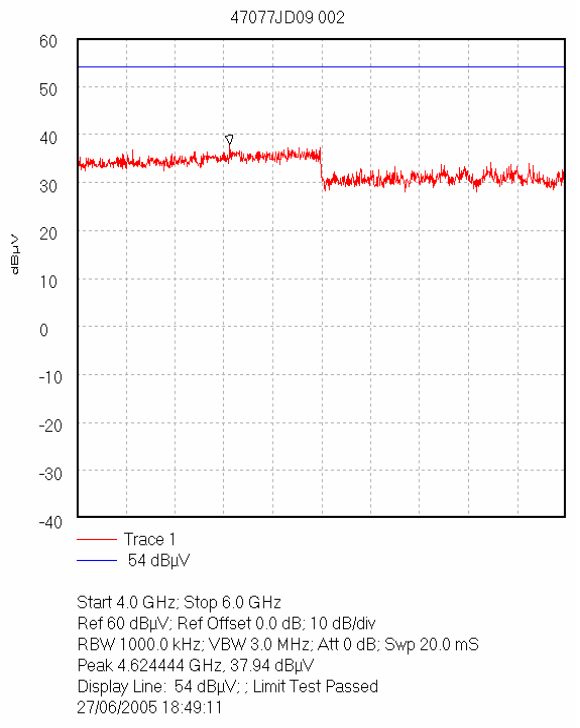
Idle Mode Radiated Spurious Emissions: Section 15.109 - Electric Field Strength Measurements (Frequency Range: 1 to 12.5 GHz) (Continued)



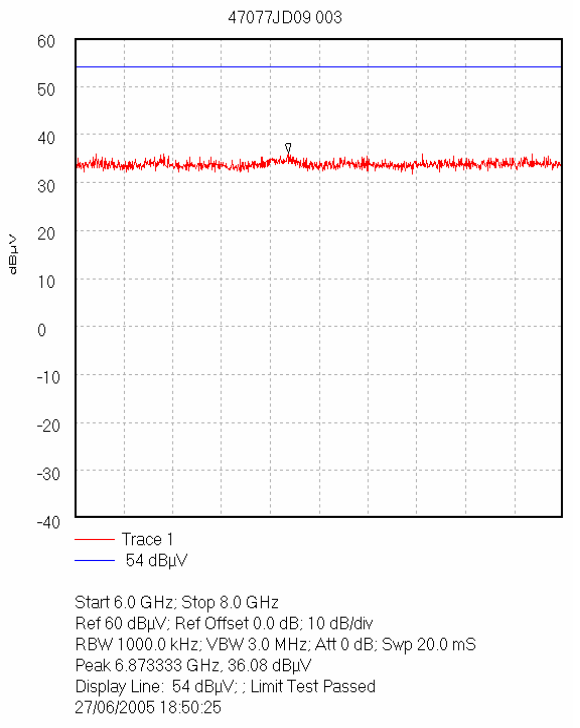
Start 1.0 GHz; Stop 2.0 GHz
Ref 60 dBµV/m; Ref Offset 0.0 dB; 10 dB/div
RBW 1000.0 kHz; VBW 3.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 1.594 GHz, 55.43 dBµV/m
Display Line: 54 dBµV/m; ; Limit Test Failed
Transducer Factors: A490
16/06/2005 15:15:01



Start 2.0 GHz; Stop 4.0 GHz
Ref 60 dBµV/m; Ref Offset 0.0 dB; 10 dB/div
RBW 1000.0 kHz; VBW 3.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 2.007 GHz, 46.32 dBµV/m
Display Line: 54 dBµV/m; ; Limit Test Passed
Transducer Factors: A490
16/06/2005 15:24:11

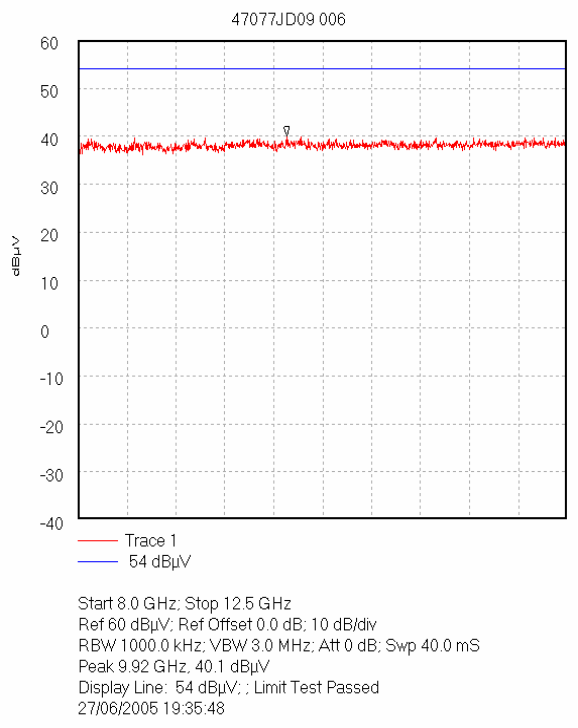


Start 4.0 GHz; Stop 6.0 GHz
Ref 60 dBµV; Ref Offset 0.0 dB; 10 dB/div
RBW 1000.0 kHz; VBW 3.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 4.624444 GHz, 37.94 dBµV
Display Line: 54 dBµV; ; Limit Test Passed
27/06/2005 18:49:11



Start 6.0 GHz; Stop 8.0 GHz
Ref 60 dBµV; Ref Offset 0.0 dB; 10 dB/div
RBW 1000.0 kHz; VBW 3.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 6.873333 GHz, 36.08 dBµV
Display Line: 54 dBµV; ; Limit Test Passed
27/06/2005 18:50:25

Idle Mode Radiated Spurious Emissions: Section 15.109 - Electric Field Strength Measurements (Frequency Range: 1 to 12.5 GHz) (Continued)



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

7.2.3. Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a) - Electric Field Strength Measurements: 30 to 1000 MHz

The EUT was configured for radiated emission testing as described in section 9 of this report.

Tests were performed to identify the maximum transmitter radiated emission levels.

Results:

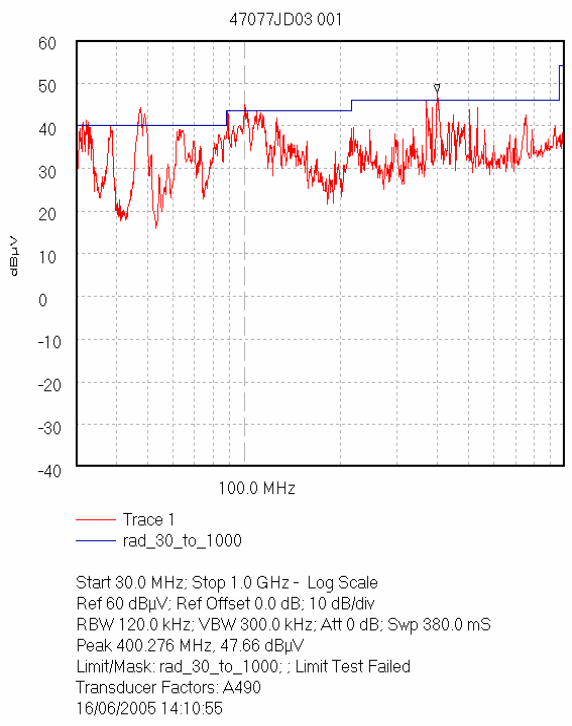
Top Channel

Frequency (MHz)	Antenna Polarity	Q-P Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
38.147	Vert.	25.8	40.0	14.2	Complied
108.438	Vert.	28.9	43.5	14.6	Complied
125.350	Vert.	27.7	43.5	15.8	Complied
245.769	Horiz.	26.2	46.0	19.8	Complied
401.490	Horiz.	20.7	46.0	25.3	Complied

Note(s):

1. *The preliminary scans below 1 GHz showed similar emission levels irrespective of EUT channel selection, therefore final radiated emissions measurements were performed with the EUT set to the top channel only.*

7.2.4. Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a) - Electric Field Strength Measurements: 30 to 1000 MHz (emissions occurring in the restricted bands) (Continued)



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

7.2.5. Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a) - Electric Field Strength Measurements (Frequency Range: 1 to 25.0 GHz) (emissions occurring in the restricted bands)

The EUT was configured for radiated emission testing, as described in section 9 of this report.

Tests were performed to identify the maximum transmitter radiated emission levels.

Results:

Highest Peak Level: Bottom Channel

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
1.4909	Vert.	15.3	21.1	7.6	44.0	74.0	30.0	Complied
4.8039	Vert.	30.7	24.2	1.8	56.7	74.0	17.3	Complied

Highest Average Level: Bottom Channel

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
1.4909	Vert.	2.8	21.1	7.6	31.5	54.0	22.5	Complied
4.8039	Vert.	21.3	24.2	1.8	47.3	54.0	6.7	Complied

Highest Peak Level: Middle Channel

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
1.4909	Vert.	15.8	21.1	7.6	44.5	74.0	29.5	Complied
4.8818	Vert.	30.2	24.2	1.8	56.2	74.0	17.8	Complied

Highest Average Level: Middle Channel

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
1.4909	Vert.	2.8	21.1	7.6	31.5	54.0	22.5	Complied
4.8818	Vert.	21.3	24.2	1.8	47.3	54.0	6.7	Complied

Test of: **Ezurio Limited.**
'The Intelligent Bluetooth Serial Module, Version II'
To: **Partial Test of FCC Part 15.247: 2004 (Subpart C)**

Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a) - Electric Field Strength Measurements (Frequency Range: 1 to 25.0 GHz) (emissions occurring in the restricted bands) (Continued)

Highest Peak Level: Top Channel

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
1.4909	Vert.	15.9	21.1	7.6	44.6	74.0	29.4	Complied
4.9599	Vert.	29.7	24.2	1.8	55.7	74.0	18.3	Complied

Highest Average Level: Top Channel

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
1.4909	Vert.	2.8	21.1	7.6	31.5	54.0	22.5	Complied
4.9599	Vert.	20.6	24.2	1.8	46.6	54.0	7.4	Complied

Highest Peak Level: Hopping Mode

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
1.4909	Vert.	15.3	21.1	7.6	44.0	74.0	30.0	Complied
4.9379	Vert.	31.1	24.2	1.8	57.1	74.0	16.9	Complied

Highest Average Level: Hopping Mode

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
1.4909	Vert.	2.8	21.1	7.6	31.5	54.0	22.5	Complied
4.9379	Vert.	22.3	24.2	1.8	48.3	54.0	5.7	Complied

7.2.6. Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a) - Electric Field Strength Measurements (Frequency Range: 1 to 25.0 GHz) (emissions occurring in the restricted bands)

The EUT was configured for radiated emission testing, as described in section 9 of this report.

Tests were performed to identify the maximum transmitter radiated emission levels.

Results:

Highest Peak Level: Bottom Channel

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dBμV/m)	-20 dBc Limit (dBμV/m)	Margin (dB)	Result
9.6074	Vert.	7.1	30.6	2.6	40.3	82.5	42.2	Complied

Highest Average Level: Middle Channel

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dBμV/m)	-20 dBc Limit (dBμV/m)	Margin (dB)	Result
9.7637	Vert.	7.9	30.6	2.6	41.1	82.5	41.4	Complied

Highest Peak Level: Top Channel

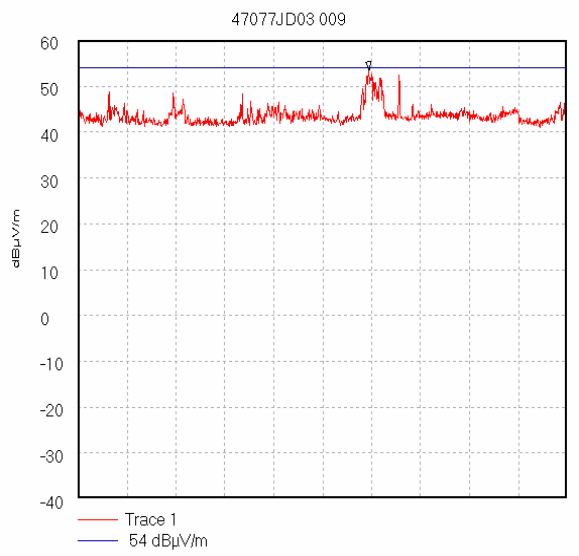
Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dBμV/m)	-20 dBc Limit (dBμV/m)	Margin (dB)	Result
9.9200	Vert.	12.1	30.6	2.6	45.3	82.5	37.2	Complied

Highest Peak Level: Hoping Mode

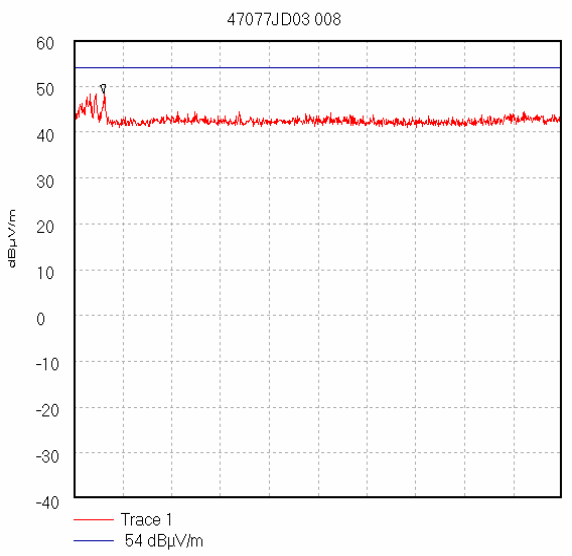
Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dBμV/m)	-20 dBc Limit (dBμV/m)	Margin (dB)	Result
9.8999	Vert.	12.4	30.6	2.6	45.6	82.5	36.9	Complied

Test of: **Ezurio Limited.**
'The Intelligent Bluetooth Serial Module, Version II'
To: **Partial Test of FCC Part 15.247: 2004 (Subpart C)**

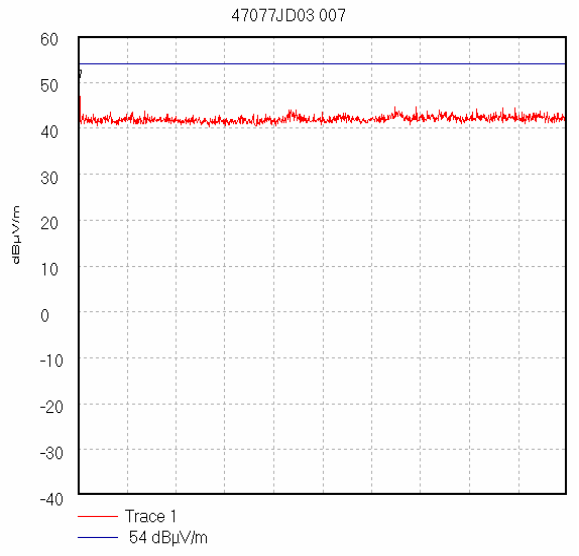
Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a) - Electric Field Strength Measurements (Frequency Range: 1 to 25.0 GHz) (emissions occurring in the restricted bands) (Continued)



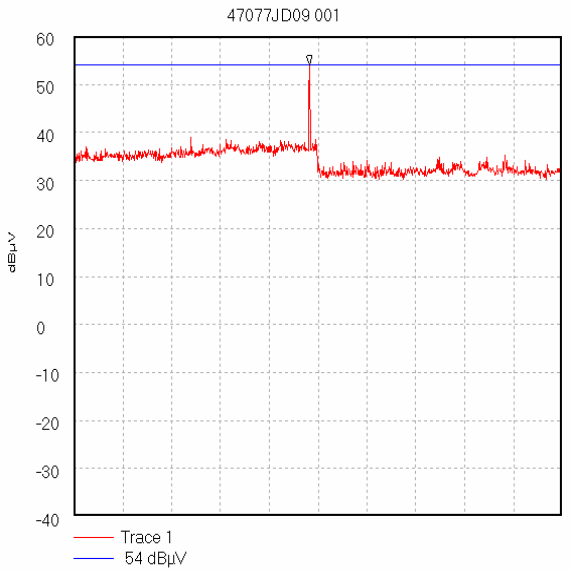
Start 1.0 GHz; Stop 2.0 GHz
Ref 60 dBµV/m; Ref Offset 0.0 dB; 10 dB/div
RBW 1000.0 kHz; VBW 3.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 1.594444 GHz, 53.5 dBµV/m
Display Line: 54 dBµV/m; ; Limit Test Passed
Transducer Factors: A490
16/06/2005 15:36:59



Start 2.0 GHz; Stop 2.4 GHz
Ref 60 dBµV/m; Ref Offset 0.0 dB; 10 dB/div
RBW 1000.0 kHz; VBW 3.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 2.024444 GHz, 48.43 dBµV/m
Display Line: 54 dBµV/m; ; Limit Test Passed
Transducer Factors: A490
16/06/2005 15:32:47



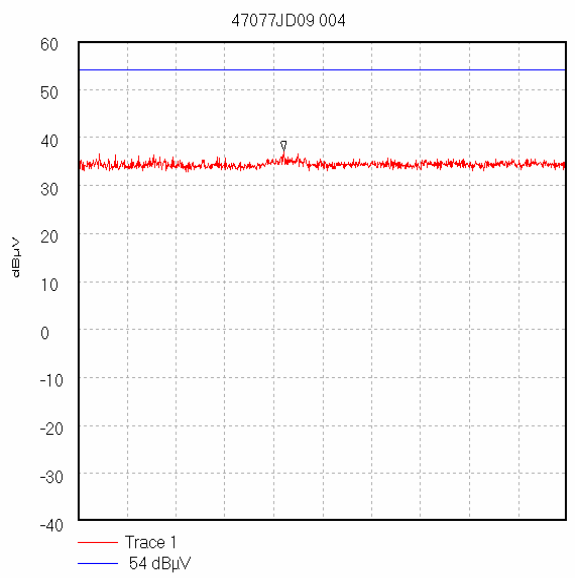
Start 2.4835 GHz; Stop 4.0 GHz
Ref 60 dBµV/m; Ref Offset 0.0 dB; 10 dB/div
RBW 1000.0 kHz; VBW 3.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 2.48687 GHz, 50.61 dBµV/m
Display Line: 54 dBµV/m; ; Limit Test Passed
Transducer Factors: A490
16/06/2005 15:29:28



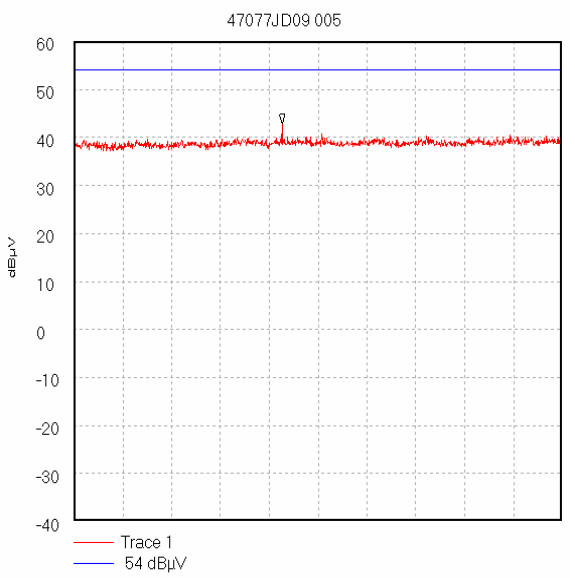
Start 4.0 GHz; Stop 6.0 GHz
Ref 60 dBµV; Ref Offset 0.0 dB; 10 dB/div
RBW 1000.0 kHz; VBW 3.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 4.964444 GHz, 54.11 dBµV
Display Line: 54 dBµV; ; Limit Test Failed
27/06/2005 18:35:36

Test of: **Ezurio Limited.**
'The Intelligent Bluetooth Serial Module, Version II'
To: **Partial Test of FCC Part 15.247: 2004 (Subpart C)**

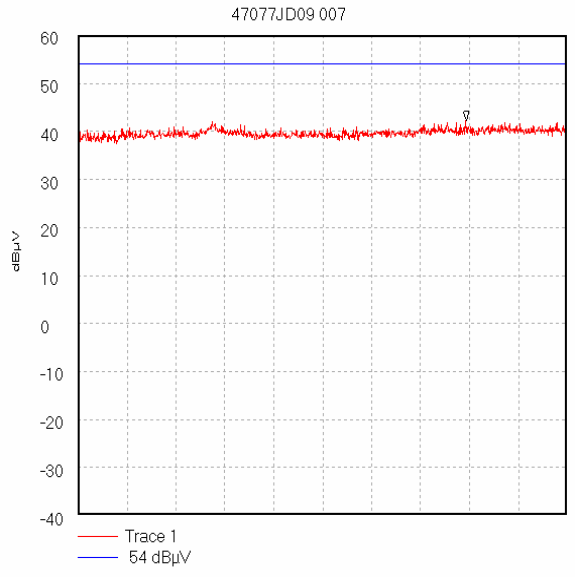
Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a) - Electric Field Strength Measurements (Frequency Range: 1 to 25.0 GHz) (emissions occurring in the restricted bands) (Continued)



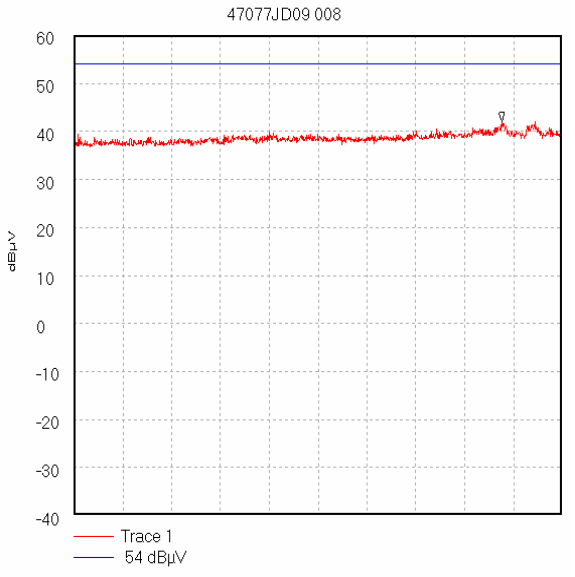
Start 6.0 GHz; Stop 8.0 GHz
Ref 60 dBµV; Ref Offset 0.0 dB; 10 dB/div
RBW 1000.0 kHz; VBW 3.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 6.842222 GHz, 37.2 dBµV
Display Line: 54 dBµV; ; Limit Test Passed
27/06/2005 18:54:59



Start 8.0 GHz; Stop 12.5 GHz
Ref 60 dBµV; Ref Offset 0.0 dB; 10 dB/div
RBW 1000.0 kHz; VBW 3.0 MHz; Att 0 dB; Swp 40.0 mS
Peak 9.92 GHz, 42.81 dBµV
Display Line: 54 dBµV; ; Limit Test Passed
27/06/2005 18:57:48



Start 12.5 GHz; Stop 18.0 GHz
Ref 60 dBµV; Ref Offset 0.0 dB; 10 dB/div
RBW 1000.0 kHz; VBW 3.0 MHz; Att 0 dB; Swp 40.0 mS
Peak 16.863333 GHz, 42.25 dBµV
Display Line: 54 dBµV; ; Limit Test Passed
27/06/2005 19:40:38



Start 18.0 GHz; Stop 25.0 GHz
Ref 60 dBµV; Ref Offset 0.0 dB; 10 dB/div
RBW 1000.0 kHz; VBW 3.0 MHz; Att 0 dB; Swp 60.0 mS
Peak 24.136667 GHz, 42.08 dBµV
Display Line: 54 dBµV; ; Limit Test Passed
27/06/2005 19:44:28

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

7.2.7. Transmitter Band Edge Radiated Emissions: Section 15.247(d) & 15.209(a)

The EUT was configured for band edge compliance of radiated emission measurements as described in section 9 of this report.

Tests were performed to identify the average radiated band edge emissions.

Results:

Peak Power Level Static Mode:

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2.4000	Horiz.	43.8	21.5	1.4	66.7	82.5*	15.8	Complied
2.4835	Horiz.	36.0	21.1	1.4	58.5	74.0	15.5	Complied

Average Power Level Static Mode:

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2.4835	Horiz.	23.9	21.1	1.4	46.4	54.0	7.6	Complied

Note(s):

1. **-20 dBc limit.*
2. *This test was performed using the Radiated test method, on the EUT with an integral antenna.*
3. *Note: Plots 47077JD09 016 and 47077JD09 014 incorrectly show the Resolution Bandwidth (RBW) to be 1.45 kHz and 1.45 MHz. This is due to the software used to transpose the on-screen image on the spectrum analyser to the PC holding the soft copy of the plot. It is confirmed that the measurements were made using a Resolution Bandwidth of 100 kHz and 1 MHz respectively.*

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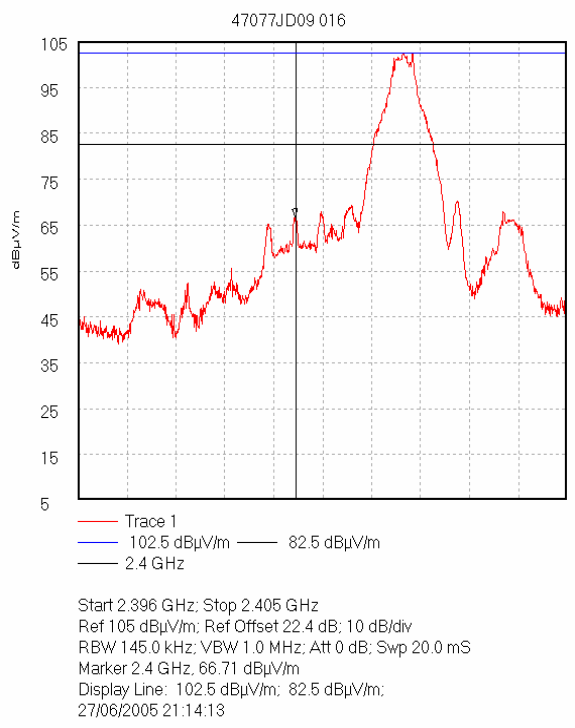
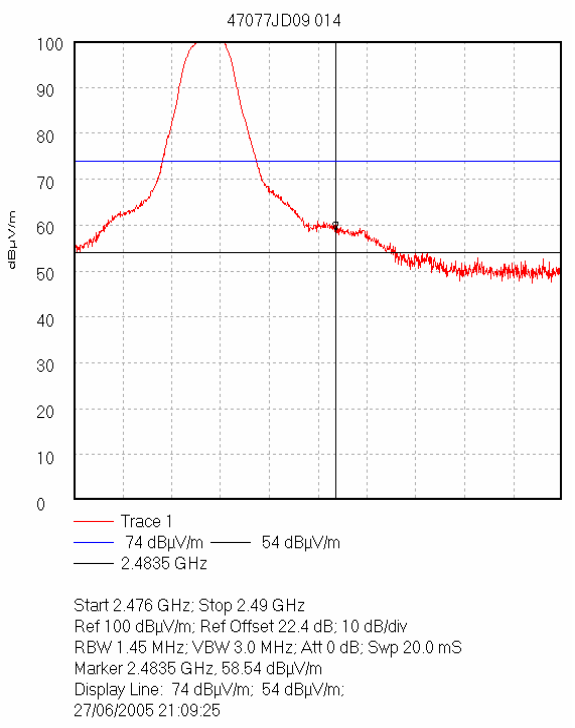
Transmitter Band Edge Radiated Emissions: Section 15.247(d) & 15.209(a) (Continued)



Start 2.396 GHz; Stop 2.405 GHz
Ref 105 dBµV/m; Ref Offset 22.4 dB; 10 dB/div
RBW 145.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Marker 2.4 GHz, 66.71 dBµV/m
Display Line: 102.5 dBµV/m; 82.5 dBµV/m;
27/06/2005 21:14:13



Start 2.476 GHz; Stop 2.49 GHz
Ref 100 dBµV/m; Ref Offset 22.4 dB; 10 dB/div
RBW 1.45 MHz; VBW 3.0 MHz; Att 0 dB; Swp 20.0 mS
Marker 2.4835 GHz, 58.54 dBµV/m
Display Line: 74 dBµV/m; 54 dBµV/m;
27/06/2005 21:09:25

7.2.8. Transmitter Band Edge Radiated Emissions: Section 15.247(d) & 15.209(a) - Electric Field Strength Measurements

The EUT was configured for band edge compliance of radiated emission measurements, as described in section 9 of this report.

Tests were performed to identify the maximum radiated band edge emissions.

Results:

Peak Power Level Hopping Mode:

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2.4000	Horiz.	39.8	21.5	1.4	62.7	82.8*	20.1	Complied
2.4835	Horiz.	35.7	21.1	1.4	58.2	74.0	15.8	Complied

Average Power Level Hopping Mode:

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2.4835	Horiz.	23.3	21.1	1.4	45.8	54.0	8.2	Complied

Note(s):

1. **-20 dBc limit.*
2. *This test was performed using the Radiated test method, on the EUT with an integral antenna.*
3. *Note: Plots 47077JD09 017 and 47077JD09 013 incorrectly show the Resolution Bandwidth (RBW) to be 1.45 kHz and 1.45 MHz. This is due to the software used to transpose the on-screen image on the spectrum analyser to the PC holding the soft copy of the plot. It is confirmed that the measurements were made using a Resolution Bandwidth of 100 kHz and 1 MHz respectively.*

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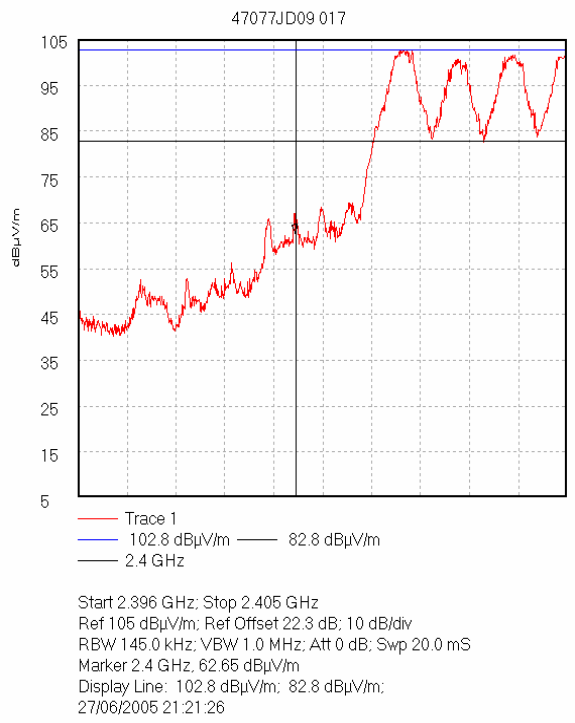
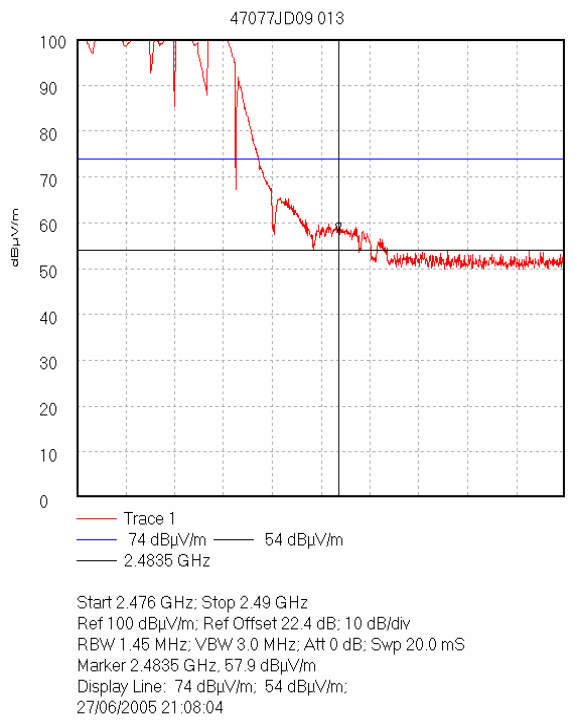
Transmitter Band Edge Radiated Emissions: Section 15.247(d) & 15.209(a) - Electric Field Strength Measurements (Continued)



Start 2.396 GHz; Stop 2.405 GHz
Ref 105 dBµV/m; Ref Offset 22.3 dB; 10 dB/div
RBW 145.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Marker 2.4 GHz, 62.65 dBµV/m
Display Line: 102.8 dBµV/m; 82.8 dBµV/m;
27/06/2005 21:21:26



Start 2.476 GHz; Stop 2.49 GHz
Ref 100 dBµV/m; Ref Offset 22.4 dB; 10 dB/div
RBW 1.45 MHz; VBW 3.0 MHz; Att 0 dB; Swp 20.0 mS
Marker 2.4835 GHz, 57.9 dBµV/m
Display Line: 74 dBµV/m; 54 dBµV/m;
27/06/2005 21:08:04

8. 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
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	± 5.26 dB
Radiated Spurious Emissions	1 GHz to 40 GHz	95%	± 3.03 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.

9. Measurement Methods

9.1. Radiated Emissions

Radiated emissions measurements were performed in accordance with the standard, against appropriate limits for each detector function.

Initial measurements covering the entire measurement band in the form of swept scans in a shielded enclosure were performed in order to identify frequencies on which the EUT was generating interference. This determined the frequencies on which the EUT should be re-measured in full on the open area test site. In order to minimise the time taken for the swept measurements, a peak detector was used in conjunction with the appropriate detector IF measuring bandwidth (see table below). Repetitive scans were performed to allow for emissions with low repetition rates.

The initial scans were performed using an antenna height of 1.5 m and a measurement distance of 3 m. Following the initial scans, graphs were produced giving an overview of the emissions from the EUT plotted against the appropriate specification limit. Any emission within 20 dB of the limit were then measured on the open area test site, except in cases where the noise floor was within 20 dB of the limit, in these cases the highest point of the noise floor was measured.

Where an emission fell inside a restricted band, measurements were made at the appropriate test distance using a measuring receiver with a quasi peak detector for measurements below 1000 MHz and an average and peak detector for measurements above 1000 MHz. A peak detector was used for all other measurements.

For the final measurements the EUT was arranged on a non-conducting turn table on a standard test site compliant with ANSI C63.4 – 2003 Clause 5.4.

All measurements on the open area test site were performed using broadband antennas in both vertical and horizontal polarisations.

On the open area test site, at each frequency where a signal was to be measured, the trace was maximised by rotating a turntable through 360°. The angle at which the maximum signal was observed was locked out. For frequencies below 1000 MHz the test antenna was varied in height between 1 m and 4 m in order to further maximise the target emission.

For frequencies above 1000 MHz where a horn antenna was used, height searching was performed to locate the optimal height of the horn with respect to the EUT. At this point the horn was locked off and the turntable was again rotated through 360° to maximise the target signal. It should be noted that the received signal from the EUT would diminish very quickly after it exits the beam width of the horn antenna, for this reason it may not be necessary to fully height search with the horns.

Radiated Emissions (Continued)

At this point, any signals found to be between the limit and a level 6 dB below it were further maximised by changing the configuration of the EUT, e.g. re-routing cables to peripherals and moving peripherals with respect to the EUT.

Scans were performed to the upper frequency limits as stated in section 15.33

The final field strength was determined as the indicated level in dBμV plus cable loss and antenna factor.

The test equipment settings for radiated emissions measurements were as follows:

Receiver Function	Initial Scan	Final Measurements <1 GHz	Final Measurements ≥1 GHz
Detector Type:	Peak	Quasi-Peak (CISPR)	Peak / Average
Mode:	Max Hold	Not applicable	Max Hold
Bandwidth:	(120 kHz <1 GHz) (1 MHz ≥1 GHz)	120 kHz	1 MHz
Amplitude Range:	100 dB	100 dB	100 dB
Step Size:	Continuous sweep	Not applicable	Not applicable
Sweep Time:	Coupled	Not applicable	Not applicable

9.2. Band Edge Compliance of RF Radiated Emissions

The EUT and spectrum analyser were configured as for radiated measurements and as per FCC Public Notice DA 00-705, Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

To determine band edge compliance, the analyser resolution bandwidth was set to >= 1% of the analyser span. The video bandwidth was set to be ≥ to the resolution bandwidth. The sweep was set to auto and the detector to peak. The trace was set to max hold and a trace was produced.

A plot of the lower band edge of the allocated frequency band was produced. A marker was set to the level of the highest in band emission with a limit line set to 20 dB below this. The marker was then placed on the highest out of band emission (the specification states that either the band edge level must be measured or the highest out of band emission, whichever is the greater). The plots show that the highest out of band emission complies with the -20 dBc limit.

The above procedure was then repeated for the upper band edge except that, as the upper band edge fell on a restricted band edge (as defined in section 15.205(a)), the limit for the restricted band was applied instead of the -20 dBc limit, i.e. the general limits defined in section 15.209(a).

Final measurements were performed on the worst-case configuration as described in Part 15.31(i).

Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.
A027	Horn Antenna	Eaton	9188-2	301
A031	2 to 4 GHz Eaton Horn Antenna	Eaton	91889-2	557
A254	WG 14 Microwave Horn	Flann Microwave	14240-20	139
A259	Bilog Antenna	Chase	CBL6111	1513
A276	OATS Positioning Controller	Rohde & Schwarz	HCC	None
A392	3 dB attenuator (9)	Suhner	6803.17.B	None
A428	WG 12 horn	Flann	12240-20	134
A429	WG 16 horn	Flann	16240-20	561
A430	WG 18 horn	Flann	18240-20	425
A436	WG 20 horn	Flann	20240-20	330
A490	Bilog Antenna	Chase	CBL6111A	1590
A553	Bi-log Antenna	Chase	CBL6111A	1593
C160	Cables	Rosenberger	UFA210A-1-1181-70x70	None
C202	Rosenberger cable	Rosenberger	UFA 210A-1-1180-70X70	1543
C468	N-Type Coaxial Cable	Rosenberger	UFA210A-1-3937-504504	98L0440
C573	C573-N-N-2	Rosenberger	UFA210A-1-788-50x50	97E0936
M003	Spectrum Monitor	Rohde & Schwarz	EZM	883 580/008
M023	ESVP Receiver	Rohde & Schwarz	ESVP	872 991/027
M028	FSB Spectrum Analyser	Rohde & Schwarz	FSB	860 001/009 (RF), 860 161/007 (Display)
M044	ESVP Receiver	Rohde & Schwarz	ESVP	891 845/026
M069	ESMI Spectrum Analyser / Receiver	Rohde & Schwarz	ESMI	829 808/007 (DU) / 827 063/008 (RU)

Test Equipment Used (Continued)

RFI No.	Instrument	Manufacturer	Type No.	Serial No.
M088	Receiver / Spectrum Analyser System	Rohde & Schwarz	ESBI	DU:835862/018 RU:835387/006
M114	Temperature/ Humidity Meter	RS Components	212-146	None
M173	Turntable Controller	R.H.Electrical Services	RH351	3510020
S201	Site 1	RFI	1	None
S202	Site 2	RFI	2	S202-15011990
S212	Site 12	RFI	12	None

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

Appendix 2. Test Configuration Drawings

This appendix contains the following drawings:

Drawing Reference Number	Title
DRG\47077JD09\EMIRAD	Test configuration for measurement of radiated emissions.

Test of: Ezurio Limited.
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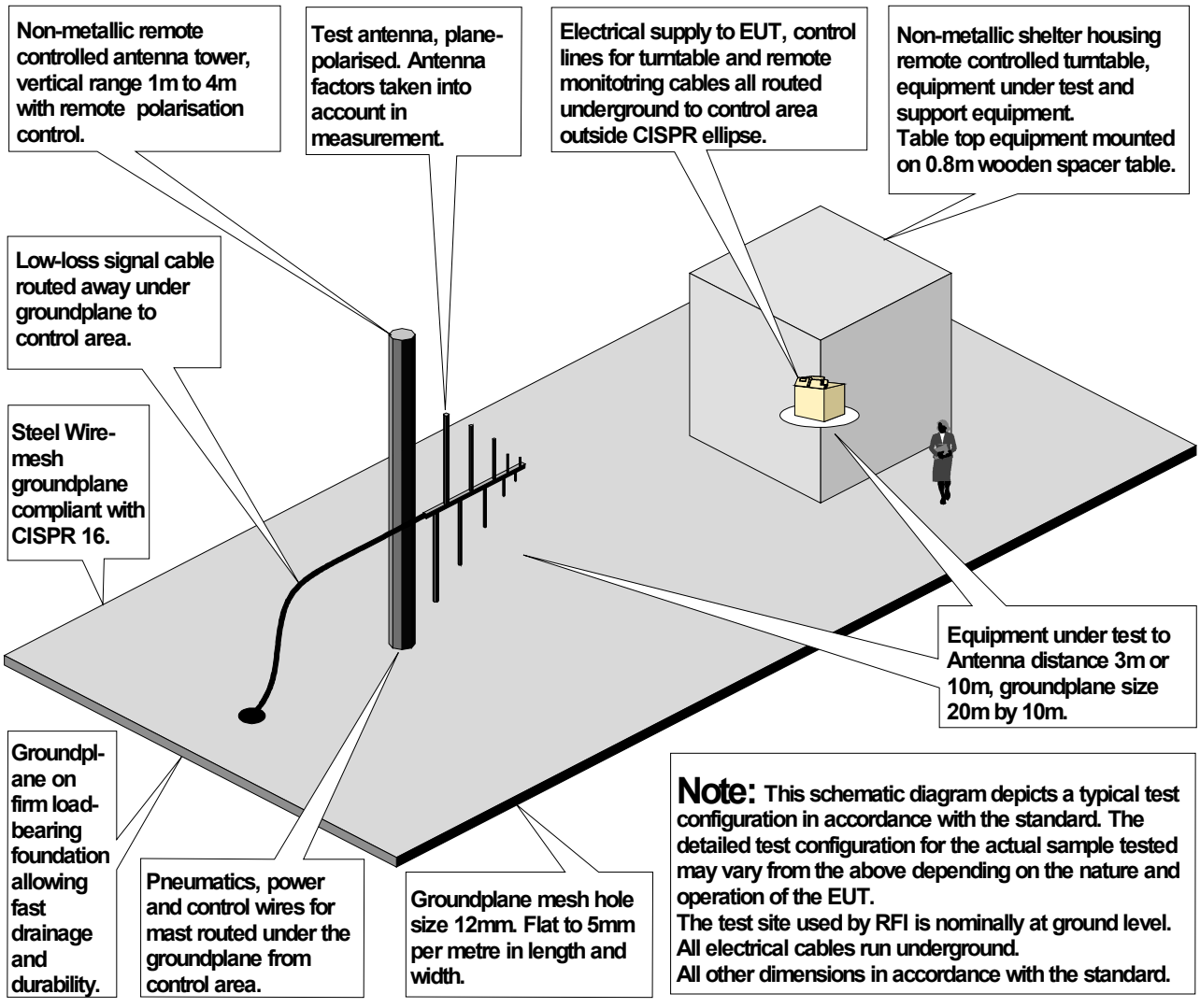
DRG\47077JD09\EMIRAD



Note: This schematic diagram depicts a typical test configuration in accordance with the standard. The detailed test configuration for the actual sample tested may vary from the above depending on the nature and operation of the EUT.
The test site used by RFI is nominally at ground level.
All electrical cables run underground.
All other dimensions in accordance with the standard.

Test Configuration For Radiated Emissions Measurements

Reflection-free area: >60m by 52m
(CISPR ellipse)
Groundplane Earthed
Control room outside CISPR ellipse