
REPORT ON

Limited FCC CFR 47: Parts 15 B & C Testing in Support of an
Application for Grant of Equipment Authorisation
of a Symbol 4121CDMA Handheld Data Terminal

FCC ID: H9P4121CDMA

Report No OR613597/001 Issue 1

April 2005



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26th April 2005

DISTRIBUTION

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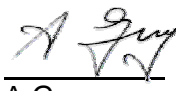
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ENGINEERING STATEMENT


The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC CFR 47: Parts 15 B & C. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineers;


S Hartley


A Guy




G Lawler

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SECTION 1

REPORT SUMMARY

Limited FCC CFR 47: Parts 15 B & C Testing in Support of an
Application for Grant of Equipment Authorisation
of a Symbol 4121CDMA Handheld Data Terminal

1.1 STATUS

EQUIPMENT UNDER TEST	Handheld Data Terminal
OBJECTIVE	To undertake measurements to determine the Equipment Under Test's (EUT's) compliance with the specification.
NAME AND ADDRESS OF CLIENT	Symbol Technologies Inc One Symbol Plaza Holtsville 11742-1300, New York United States of America
TYPE NUMBER	4121CDMA
PART NUMBER	4121CDMA0
SERIAL NUMBER	4MES0022
HARDWARE VERSION	Rev 5 (To be released as Rev A)
DECLARED VARIANTS	None
TEST SPECIFICATION ISSUE/DATE	FCC CFR 47: Part 15, Subparts B and C October 2003
NUMBER OF ITEMS TESTED	One
SECURITY CLASSIFICATION OF EUT	Commercial In Confidence
INCOMING RELEASE DATE	Declaration of Build Status 24 March 2005
DISPOSAL REFERENCE NUMBER DATE	Held pending disposal Not Applicable Not Applicable
ORDER NUMBER DATE	4500405504 29 November 2004
START OF TEST	14 March 2005
FINISH OF TEST	1 April 2005
RELATED DOCUMENTS	ANSI C63.4 2001. Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz. FCC Public Notice document (DA 00-705 released 30 March 2000). FCC Public Notice document FCC 04-165 (ET Docket No 03-201 released 12 July 2004)

1.2 INTRODUCTION

The information contained within this report is intended to show limited verification of compliance of the Symbol Technologies Inc 4121CDMA Handheld Data Terminal to the requirements of FCC Specification Parts 15 B & C.

Testing was carried out in support of an application for Grant of Equipment Authorisation in the name of Symbol Technologies Inc.

Testing of the Motorola C18 module for 850MHz can be found in BABT Test Report Number OR613597/02.

Testing of the Motorola C18 module for 1900MHz can be found in BABT Test Report Number OR613597/03.

The Symbol Compact Flash 802.11b RLAN radio card integrated in this terminal is not designed to operate simultaneously with the Motorola C18 module or 21-64831 Symbol Bluetooth module and therefore these modules are tested independently, but are co-located.

The Symbol 21-64831 Symbol Bluetooth module and Motorola C18 module integrated in this terminal are designed to operate simultaneously and therefore these are tested in Simultaneous transmit mode. This testing can be found in BABT Test Report Numbers OR613597/04 and OR613597/05

In accordance with Part 15.207(c), Conducted Emissions testing has been performed as the EUT is battery powered and is capable of operation whilst connected to the AC Power Lines. For the Symbol Compact Flash 802.11b RLAN radio card the Conducted Emissions were performed and is recorded in this test report. Testing for the Motorola C18 module and 21-64831 Symbol Bluetooth module testing was performed in the worst case Simultaneous Transmit modes. The test results can be found in BABT Test Report Number OR613597/04 and OR613597/05.



1.3 PRODUCT INFORMATION

1.3.1 Technical Description

The Equipment Under Test (EUT) was a 4121CDMA Handheld Data Terminal, which offers CDMA 800/1900, 802.11b Wireless LAN and Bluetooth connectivity.

The terminal utilizes the approved Motorola C18 module to offer CDMA functionality. Also included in the terminal is the approved LA-4137 Symbol Compact Flash 802.11b RLAN radio card and the 21-64831 Symbol Bluetooth module.

1.3.2 Modes of Operation

Modes of operation of the EUT during testing were as follows:

Applicable testing was carried out with the EUT transmitting at maximum power or receiving as detailed in Section 1.3.3 "Test Configuration".

1.3.3 Test Configuration

1.3.3.1 RLAN Mode (11Mb/s modulation rate)

RLAN Transmitting on the following channels and frequencies;

Channel 1: 2412MHz

Channel 6: 2437MHz

Channel 11: 2462MHz

The Output Power level (controlled by application software) was set to maximum

RLAN Receiving on the following channels and frequencies;

Channel 1: 2412MHz

Channel 6: 2437MHz

Channel 11: 2462MHz

1.3.3.2 Bluetooth Mode (DH5 modulation)

Bluetooth Transmitting on the following channels and frequencies;

Channel 0: 2402MHz

Channel 39: 2441MHz

Channel 78: 2480MHz

The Output Power level (controlled by application software) was set to maximum

Bluetooth Receiving on the following channels and frequencies;

Channel 0: 2402MHz


Channel 39: 2441MHz

Channel 78: 2480MHz

1.3.4 DECLARATION OF BUILD STATUS

MAIN EUT			
MANUFACTURING DESCRIPTION	Handheld Data Terminal		
MANUFACTURER	Symbol Technologies Inc.		
TYPE	4121CDMA		
PART NUMBER	4121CDMA0		
SERIAL NUMBER	4XEQ0155,4XEQ0156, 4MES0022		
HARDWARE VERSION	Rev 5 (to be released as Rev A)		
FCC ID	H9P4121CDMA		
INDUSTRY CANADA ID	1549D-4121CDMA		
TECHNICAL DESCRIPTION	The 4121CDMA is a Handheld Data Terminal, which offers CDMA 800/1900, 802.11b Wireless LAN and Bluetooth connectivity. The terminal utilizes the approved Motorola C18 module to offer CDMA functionality. Also included in the terminal is the approved LA-4137 Symbol Compact Flash 802.11b RLAN radio card and the 21-64831 Symbol Bluetooth module.		
BATTERY/POWER SUPPLY			
MANUFACTURING DESCRIPTION	Internal Lithium Ion Battery (Li ion)		
PART NUMBER	31-57157-01		
HARDWARE VERSION	Rev B		
VOLTAGE	7.2V		
MODULE			
MANUFACTURING DESCRIPTION	RLAN Module	Bluetooth Module	CDMA Module
MANUFACTURER	Symbol Technologies Inc	Symbol Technologies Inc	Motorola Inc.
TYPE	LA4137	21-64381	C18
ITU DESIGNATION OF EMISSION	11M0F1D	1M00F1D	1M25F9W
TRANSMITTER POWER	100mW	100mW (restricted in this terminal integration to 1 mW)	CDMA800: 0.32W CDMA1900: 0.32W
TRANSMITTER OPERATING BAND	2400-2483.5 MHz	2400-2483.5 MHz	824.7 to 848.31MHz 1851.25 to 1908.75MHz
RECEIVER OPERATING BAND	2400-2483.5 MHz	2400-2483.5 MHz	869.7 to 893.31MHz 1931.25 to 1988.75MHz
DHSS/FHSS/COMBINED OR OTHER	DSSS	FHSS	CDMA (1XRTT)
FCC ID	H9PLA4137	H9P2164381	IHDT56CW1
INDUSTRY CANADA ID	1549104431A	1549D-2164381	109O-CW1
ANCILLARIES			
MANUFACTURING DESCRIPTION	Belt Clip		
PART NUMBER	UPS-BC5000		
HARDWARE VERSION	Rev A		

Signature



Date
D of B S Serial No

24th March 2005
OS613957

The unit used for the internal photographs in this report was not the EUT, but was supplied as an identical unit for photographs only. It is declared as being the same build status as the EUT.

BABT formally certifies that the manufacturer's declaration as reproduced in this report, is a true and accurate record of the original received from the applicant.

1.4 BRIEF SUMMARY OF RESULTS

This report relates only to the actual item/items tested.

A brief summary of the tests carried out is shown below.

Test	Spec Clause	Test Description	Result	Levels/ Comments
2.1	15.109	Spurious Radiated Emissions	Pass	RLAN
2.2	15.205	Measurement at Band Edge	Pass	RLAN
2.3	15.207	Conducted Emissions on Power Lines	Pass	RLAN
2.4	15.247(b)(2)	Maximum Peak Output Power (Radiated)	Pass	RLAN
2.5	15.247(c)	Spurious Radiated Emissions	Pass	RLAN
2.6	15.109	Spurious Radiated Emissions	Pass	Bluetooth
2.7	15.205	Measurement at Band Edge	Pass	Bluetooth
2.8	15.247(b)(2)	Maximum Peak Output Power (Radiated)	Pass	Bluetooth
2.9	15.247(c)	Spurious Radiated Emissions	Pass	Bluetooth

1.5 OPINIONS AND INTERPRETATIONS

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

1.6 TEST CONDITIONS

The EUT was set-up simulating a typical user installation and was tested in accordance with the applicable specification.

For all tests, the Symbol 4121CDMA Handheld Data Terminal was powered by its own internal battery, with the exception of Conducted Emissions where the EUT was placed in a Symbol single slot charger using a Symbol 50-24000-006 120V, 60Hz AC Power Supply Unit.

1.7 DEVIATIONS FROM THE STANDARD

Limited tests were applied in accordance with Symbol requirements.

1.8 MODIFICATION RECORD

Not Applicable.

1.9 ALTERNATIVE TEST SITE

No alternative test site was utilised.

SECTION 2

TEST DETAILS RLAN

Limited FCC CFR 47: Part 15 B Testing in Support of an
Application for Grant of Equipment Authorisation
of a Symbol 4121CDMA Handheld Data Terminal

2.1 SPURIOUS RADIATED EMISSIONS

2.1.1 Specification Reference

FCC CFR 47: Part 15 Subpart B, Section 15.109

2.1.2 Equipment Under Test

4121CDMA Handheld Data Terminal

2.1.3 Date of Test

14 March 2005

2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified as "Section 2.1" within the Test Equipment Used table shown in Section 3.1.

2.1.5 Test Procedure

Test Performed in accordance with ANSI C63.4.

A preliminary profile of the Spurious Radiated Emissions was obtained by operating the EUT on a remotely controlled turntable within the anechoic chamber. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

Using the information from the preliminary profiling of the EUT. The list of emissions was then confirmed or updated under Anechoic Chamber (3 metres) conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

Emissions identified within the range 30MHz – 1GHz were then formally measured using a CISPR Quasi-Peak detector.

The measurements were performed at a 3m distance unless otherwise stated.

Relative measurements were performed to establish the worst case position of the EUT, by comparing the relative field strength measurements for top, middle and bottom channels in RLAN mode it was determined that the worst case orientation was with the EUT in an upright position.

2.1 SPURIOUS RADIATED EMISSIONS - continued

2.1.6 Test Results

Equipment Designation: Unintentional Radiator.

The EUT met the requirements of FCC CFR 47: Part 15 Subpart B, Section 15.109 for Spurious Radiated Emissions (30MHz – 1GHz).

Measurements were made with the EUT in RLAN Receiving Mode (see Section 1.3.3 for details).

EUT Rx on Middle Channel

The levels of the six highest emissions measured in accordance with the specification are presented below: -

Emission Frequency	Polarisation	Height	Azimuth	Field Strength		Limit	
MHz	Horizontal/ Vertical	cm	degree	dBµV/m	µV/m	dBµV/m	µV/m
335.4	H	100	254	38.8	87.1	46.0	200.0
383.4	H	100	077	31.6	38.0	46.0	200.0
431.3	V	140	306	31.2	36.3	46.0	200.0
431.3	H	100	251	31.0	35.5	46.0	200.0
527.2	V	100	338	31.0	35.5	46.0	200.0
623.0	V	100	188	31.7	38.5	46.0	200.0

SECTION 2

TEST DETAILS RLAN

Limited FCC CFR 47: Part 15 C Testing in Support of an
Application for Grant of Equipment Authorisation
of a Symbol 4121CDMA Handheld Data Terminal

2.2 MEASUREMENT AT THE BAND EDGE (MARKER DELTA METHOD)

2.2.1 Specification Reference

FCC CFR 47: Part 15 Subpart C, Section 15.205

2.2.2 Equipment Under Test

4121CDMA Handheld Data Terminal

2.2.3 Date of Test

1 April 2005

2.2.4 Test Equipment Used

The major items of test equipment used for the above tests are identified as "Section 2.2" within the Test Equipment Used table shown in Section 3.1.

2.2.5 Test Procedure

Test Performed in accordance with FCC Public Notice document (DA 00-705 released 30 March 2000).

Test Performed in accordance with ANSI C63.4.

The measurements were performed at a 3m distance unless otherwise stated.

2.2 MEASUREMENT AT THE BAND EDGE (MARKER DELTA METHOD) - continued

2.2.6 Test Results

The EUT met the requirements of FCC CFR 47: Part 15 Subpart C, Section 15.205 for Band Edge Measurements.

Measurements were made with the EUT in RLAN Transmitter Mode (see Section 1.3.3 for details).

Step 1

Bottom Channel Fundamental Field Strength Measurement.

Peak measurements performed utilising a Resolution Bandwidth and Video Bandwidth of 1MHz.
Average measurements performed utilising a Resolution Bandwidth of 1MHz and Video Bandwidth of 10Hz.

Frequency	Antenna Polarisation	Height	Azimuth	Peak Field Strength	Average Field Strength
MHz	H/V	cm	deg	dBµV/m	dBµV/m
2412	H	116	050	112.5	103.3

Step 2

Determine Marker delta amplitude between 2412MHz (the fundamental) and 2390MHz (the Band Edge under investigation).

Using a span of 30MHz with Resolution Bandwidth and Video Bandwidth of 300kHz.

Marker Delta Amplitude = 52.6dB

Step 3

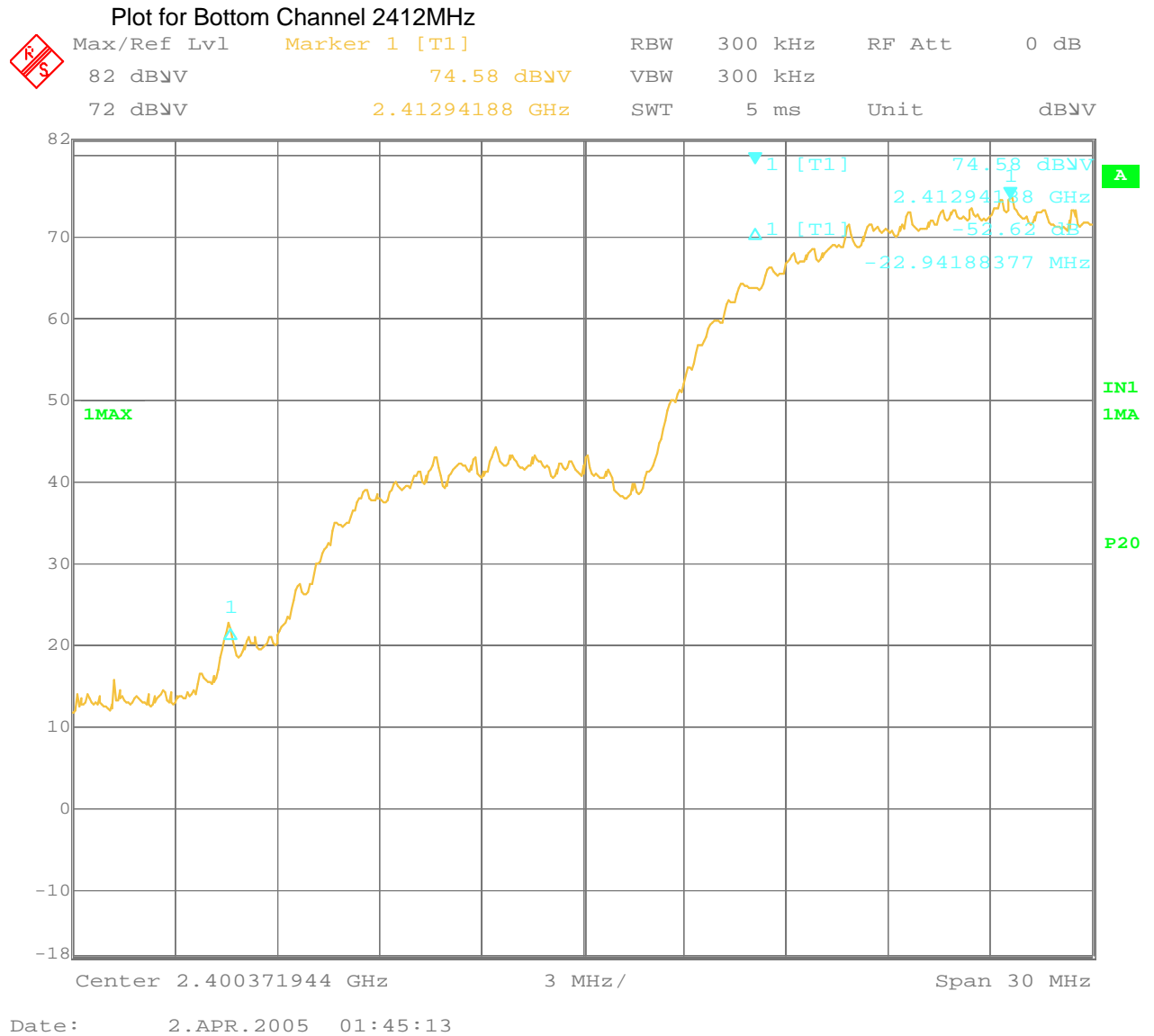
Subtracting the Marker Delta obtained from Step 2 from the 2412MHz Field Strength measurement from Step 1, gives following Result:

Peak of 59.9dBµV/m (Limit is 74.0dBµV/m)

Average of 50.7dBµV/m (Limit is 54.0dBµV/m)

2.2 MEASUREMENT AT THE BAND EDGE (MARKER DELTA METHOD) - continued

2.2.6 Test Results - continued



2.2 MEASUREMENT AT THE BAND EDGE (MARKER DELTA METHOD) - continued

2.2.6 Test Results - continued

The EUT met the requirements of FCC CFR 47: Part 15 Subpart C, Section 15.205 for Band Edge Measurements.

Measurements were made with the EUT in RLAN Mode (see Section 1.3.3 for details).

Peak measurements performed utilising a Resolution Bandwidth and Video Bandwidth of 1MHz.
Average measurements performed utilising a Resolution Bandwidth of 1MHz and Video Bandwidth of 10Hz.

Frequency	Antenna Polarisation	Height	Azimuth	Peak Field Strength	Average Field Strength
MHz	H/V	cm	deg	dB μ V/m	dB μ V/m
2462	H	113	049	112.0	102.6

Step 2

Determine Marker delta amplitude between 2462MHz (the fundamental) and 2483.5MHz (the Band Edge under investigation).

Using a span of 30MHz with Resolution Bandwidth and Video Bandwidth of 300kHz.

Marker Delta Amplitude = 58.3dB

Step 3

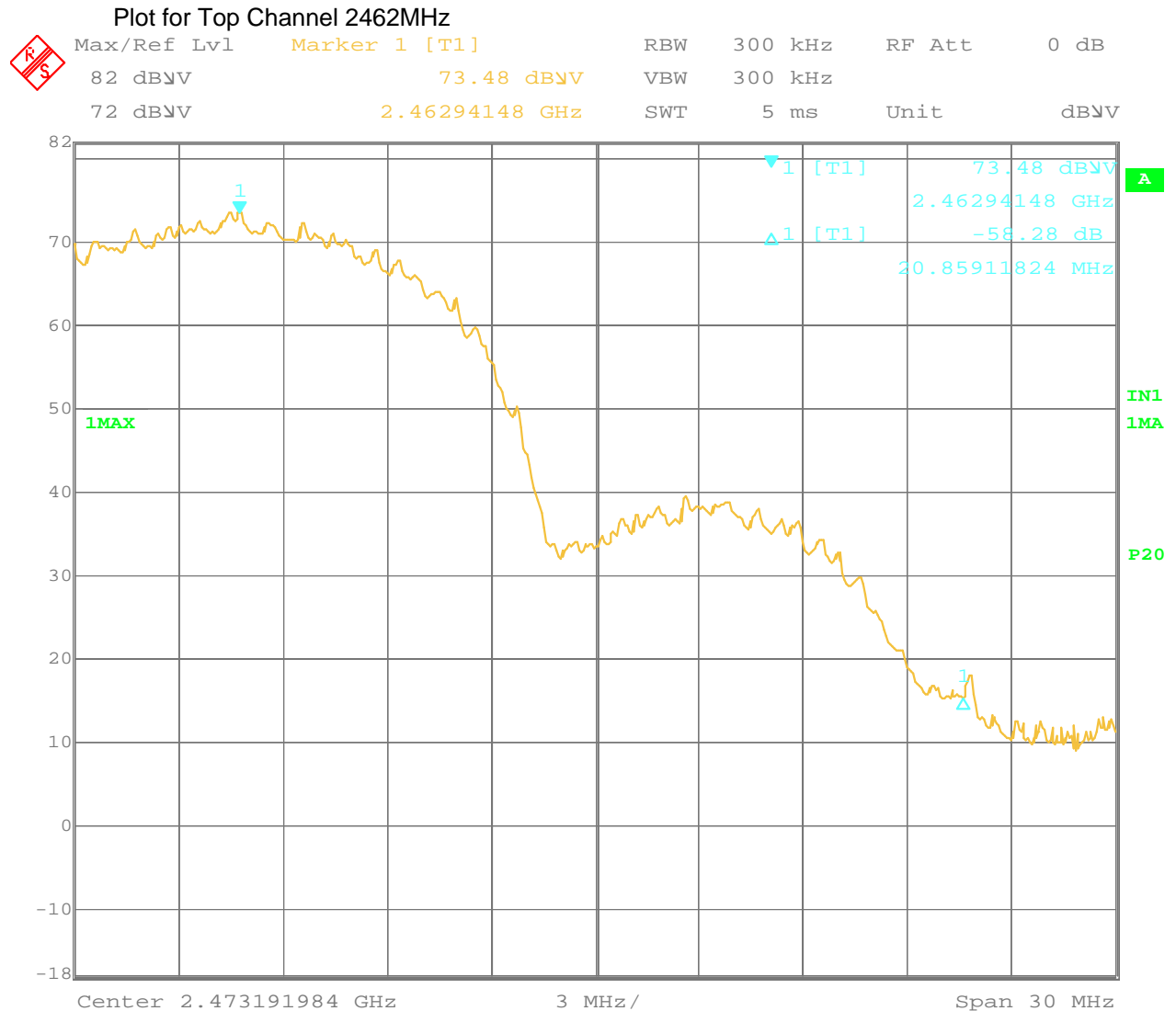
Subtracting the Marker Delta obtained from Step 2 from the 2483.5MHz Field Strength measurement from Step 1, gives following Result

Peak of 53.7dB μ V/m (Limit is 74.0dB μ V/m)

Average of 44.3dB μ V/m (Limit is 54.0dB μ V/m)

2.2 MEASUREMENT AT THE BAND EDGE (MARKER DELTA METHOD) - continued

2.2.6 Test Results - continued



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2.3 CONDUCTED EMISSIONS ON POWER LINES

2.3.1 Specification Reference

FCC CFR 47: Part 15 Subpart C, Section 15.207

2.3.2 Equipment Under Test

4121CDMA Handheld Data Terminal

2.3.3 Date of Test

1 April 2005

2.3.4 Test Equipment Used

The major items of test equipment used for the above tests are identified as "Section 2.3" within the Test Equipment Used table shown in Section 3.1.

2.3.5 Test Procedure

Test performed in accordance with ANSI C63.4.

Conducted Emission Measurements were undertaken within the semi-anechoic chamber. Emissions were measured on the Live and Neutral Lines in turn.

Emissions were formally measured using a Quasi-Peak and Average Detectors, which meet the CISPR requirements. The details of the worst-case emissions for the Live and Neutral Lines are presented in the following tables.

The EUT was supplied from a 120V, 60Hz supply.

2.3 CONDUCTED EMISSIONS ON POWER LINES - continued

2.3.6 Test Results

The EUT met the Class B requirements of FCC CFR 47: Part 15 Subpart C, Section 15.207 for Conducted Emissions on the Live and Neutral Lines.

Measurements were made with the EUT in RLAN Mode (see Section 1.3.3 for details).

EUT Tx on Bottom Channel (2412MHz) – Live Line

Emission Frequency (MHz)	Average Level (dBμV)	Quasi-Peak Level (dBμV)	Average Limit (dBμV)	Quasi-Peak Limit (dBμV)
0.1500	43.2	54.0	56.0	66.0
0.1848	37.5	48.3	54.3	64.3
0.2211	35.1	43.6	52.8	62.8
0.2581	29.8	39.8	51.5	61.5
0.3317	29.4	33.3	49.4	59.4
2.1374	27.9	30.0	46.0	56.0

The margin between the specification requirements and all other emissions were 21.6dB or more below the specified Quasi-Peak limit and 21.7dB or more below the Average limit.

EUT Tx on Bottom Channel (2412MHz) – Neutral Line

Emission Frequency (MHz)	Average Level (dBμV)	Quasi-Peak Level (dBμV)	Average Limit (dBμV)	Quasi-Peak Limit (dBμV)
0.1500	45.2	56.2	56.0	66.0
0.1847	39.5	49.6	54.3	64.3
0.2215	37.8	46.4	52.7	62.7
0.2584	32.6	41.8	51.5	61.5
0.3321	31.6	37.1	49.4	59.4
2.5094	28.3	32.1	46.0	56.0

The margin between the specification requirements and all other emissions were 22.9dB or more below the specified Quasi-peak limit and 19.2dB or more below the specified Average limit.

2.3 CONDUCTED EMISSIONS ON POWER LINES - continued

2.3.6 Test Results - continued

EUT Tx on Middle Channel (2437MHz) – Live Line

Emission Frequency (MHz)	Average Level (dBμV)	Quasi-Peak Level (dBμV)	Average Limit (dBμV)	Quasi-Peak Limit (dBμV)
0.1500	42.3	52.8	56.0	66.0
0.1843	36.8	47.4	54.3	64.3
0.2209	34.6	42.9	52.8	62.8
0.2577	29.3	39.1	51.5	61.5
0.2945	29.4	36.8	50.4	60.4
1.7308	28.0	29.6	46.0	56.0

The margin between the specification requirements and all other emissions were 26.2dB or more below the specified Quasi-Peak limit and 22.2dB or more below the Average limit.

EUT Tx on Middle Channel (2437MHz) – Neutral Line

Emission Frequency (MHz)	Average Level (dBμV)	Quasi-Peak Level (dBμV)	Average Limit (dBμV)	Quasi-Peak Limit (dBμV)
0.1500	42.7	53.2	56.0	66.0
0.1844	37.6	47.2	54.3	64.3
0.2210	36.7	44.7	52.8	62.8
0.2579	31.2	39.9	51.5	61.5
0.3315	31.3	36.2	49.4	59.4
2.8730	28.4	32.0	46.0	56.0

The margin between the specification requirements and all other emissions were 23.8dB or more below the specified Quasi-peak limit and 20.3dB or more below the specified Average limit.

2.3 CONDUCTED EMISSIONS ON POWER LINES - continued

2.3.6 Test Results - continued

EUT Tx on Top Channel (2462MHz) – Live Line

Emission Frequency (MHz)	Average Level (dBμV)	Quasi-Peak Level (dBμV)	Average Limit (dBμV)	Quasi-Peak Limit (dBμV)
0.1500	42.1	52.7	56.0	66.0
0.1844	36.8	47.2	54.3	64.3
0.2210	34.6	42.8	52.8	62.8
0.2579	29.2	39.1	51.5	61.5
0.2945	29.3	36.7	50.4	60.4
2.5036	25.2	29.1	46.0	56.0

The margin between the specification requirements and all other emissions were 26.7dB or more below the specified Quasi-Peak limit and 22.3dB or more below the Average limit.

EUT Tx on Top Channel (2462MHz) – Neutral Line

Emission Frequency (MHz)	Average Level (dBμV)	Quasi-Peak Level (dBμV)	Average Limit (dBμV)	Quasi-Peak Limit (dBμV)
0.1500	42.5	52.7	56.0	66.0
0.1842	37.5	46.9	54.3	64.3
0.2210	36.5	44.5	52.8	62.8
0.2577	31.2	39.8	51.5	61.5
0.3313	31.4	36.0	49.4	59.4
2.4301	28.5	31.6	46.0	56.0

The margin between the specification requirements and all other emissions were 24.2dB or more below the specified Quasi-peak limit and 20.3dB or more below the specified Average limit.

2.4 MAXIMUM PEAK OUTPUT POWER (Radiated Method)

2.4.1 Specification Reference

FCC CFR 47: Part 15 Subpart C, Section 15.247(b)(2)

2.4.2 Equipment Under Test

4121CDMA Handheld Data Terminal

2.4.3 Date of Test

1 April 2005

2.4.4 Test Equipment Used

The major items of test equipment used for the above tests are identified as "Section 2.4" within the Test Equipment Used table shown in Section 3.1.

2.4.5 Test Procedure

Test Performed in accordance with ANSI C63.4.

The EUT contains an integral antenna and therefore the Maximum Peak Output Power was made using the EIRP method.

The Spectrum Analyser was tuned to the test frequency. The device Output Power setting was controlled as specified in the Product Information, Section 1.5 of this document. The device was then rotated through 360 degrees until the highest power level was observed in both horizontal and vertical polarisation. The device was then replaced with a substitution antenna, whose input signal level into the antenna was adjusted until the received level matched that of the previously detected emission.

2.4 MAXIMUM PEAK OUTPUT POWER (Radiated Method) - continued

2.4.6 Test Results - continued

The EUT met the requirements of FCC CFR 47: Part 15 Subpart C, Section 15.247(b) (2) for Maximum Peak Output Power.

Measurements were made with the EUT in RLAN Transmitter Mode (see Section 1.3.3 for details).

The measurements were performed with the EUT upright and the measuring antenna in a horizontal position, as this was found to be the worst case position.

Frequency (MHz)	Raw Result (dBm)	Substitution Level (dBm)	Substitution Antenna Gain (dB)	Result EIRP (dBm)	Result EIRP (mW)	Limit EIRP (dBm)	Limit EIRP (mW)
2412	-39.7	5.3	9.1	17.2	52.4	30.0	1000
2437	-40.4	4.9	9.1	18.0	63.1	30.0	1000
2462	-40.4	4.6	9.1	18.5	70.8	30.0	1000

2.5 SPURIOUS RADIATED EMISSIONS

2.5.1 Specification Reference

FCC CFR 47: Part 15 Subpart C, Section 15.247(c)

2.5.2 Equipment Under Test

4121CDMA Handheld Data Terminal

2.5.3 Date of Test

14 March 2005

2.5.4 Test Equipment Used

The major items of test equipment used for the above tests are identified as "Section 2.5" within the Test Equipment Used table shown in Section 3.1.

2.5.5 Test Procedure

Test Performed in accordance with ANSI C63.4.

FCC CFR 47: Part 15 Subpart C, Section 15.247(c), for Radiated Emissions also requires Sections 15.205 and 15.209 to be applied.

A preliminary profile of the Spurious Radiated Emissions was obtained by operating the EUT on a remotely controlled turntable within the anechoic chamber. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

Using the information from the preliminary profiling of the EUT. The list of emissions was then confirmed or updated under Anechoic Chamber (3 metres) conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

Emissions identified within the range 30MHz – 1GHz were then formally measured using a CISPR Quasi-Peak detector.

Emissions identified within the range 1GHz – 25GHz were then formally measured using Peak and Average Detectors, as appropriate.

The measurements were performed at a 3m distance unless otherwise stated.

2.5 SPURIOUS RADIATED EMISSIONS - continued

2.5.5 Test Procedure - continued

The limits for Spurious Emissions Outside the Restricted Bands have been measured and calculated as shown in the table below:

Test Mode	Carrier Frequency GHz	Carrier Field Strength dBμV/m	Limit for Spurious Outside Restricted Band (Carrier F S -20dB) dBμV/m
Mode 1 (RLAN)	2412	99.9	79.9
Mode 1 (RLAN)	2437	100.5	80.5
Mode 1 (RLAN)	2462	99.5	79.5

The limits for Spurious Emissions Inside the Restricted Bands are in accordance with 15.205(a) & (b), which call up the limits in 15.209 (a)

Frequency Range MHz	Field Strength μV/m	Quasi Peak Field Strength dBμV/m	
30-88	100	40.0	
88-216	150	43.5	
216-960	200	46.0	
960-1000	500	54.0	
Above 1000	500	Average Field Strength dBμV/m	Peak Field Strength dBμV/m
		54.0	74.0

2.5 SPURIOUS RADIATED EMISSIONS - continued

2.5.6 Test Results

30MHz - 1GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC CFR 47: Part 15 Subpart C, Section 15.247(c), 15.205 and 15.209 for Radiated Emissions (30MHz – 1GHz).

Measurements were made with the EUT in RLAN Transmitter Mode (see Section 1.3.3 for details).

EUT Tx on Bottom Channel (2412MHz)

The levels of the six highest emissions measured in accordance with the specification are presented below: -

Emission Frequency	Polarisation	Height	Azimuth	Field Strength		Limit	
MHz	Horizontal/ Vertical	cm	degree	dBµV/m	µV/m	dBµV/m	µV/m
497.7	V	100	189	26.7	21.6	46.0	200.0
527.0	V	100	172	28.5	26.6	46.0	200.0
616.0	V	101	172	30.9	35.1	46.0	200.0
622.9	V	100	168	28.8	27.5	46.0	200.0
704.0	V	151	181	34.1	50.7	46.0	200.0
792.0	H	100	229	31.8	38.9	46.0	200.0

EUT Tx on Middle Channel (2437MHz)

The levels of the six highest emissions measured in accordance with the specification are presented below: -

Emission Frequency	Polarisation	Height	Azimuth	Field Strength		Limit	
MHz	Horizontal/ Vertical	cm	degree	dBµV/m	µV/m	dBµV/m	µV/m
497.7	V	100	168	30.0	31.6	46.0	200.0
527.2	V	100	190	29.7	30.5	46.0	200.0
616.0	V	100	183	31.4	37.2	46.0	200.0
622.7	V	100	164	29.3	29.2	46.0	200.0
704.0	V	150	179	34.8	55.0	46.0	200.0
792.0	H	100	241	33.5	47.3	46.0	200.0

2.5 SPURIOUS RADIATED EMISSIONS - continued

2.12.6 Test Results – continued

30MHz - 1GHz Frequency Range

EUT Tx on Top Channel (2462MHz)

Emission Frequency	Polarisation	Height	Azimuth	Field Strength		Limit	
MHz	Horizontal/ Vertical	cm	degree	dBμV/m	μV/m	dBμV/m	μV/m
497.6	V	100	170	30.2	32.4	46.0	200.0
527.2	V	100	199	30.0	31.6	46.0	200.0
616.0	V	100	180	31.2	36.3	46.0	200.0
622.7	V	100	160	29.9	31.3	46.0	200.0
704.0	V	151	177	35.5	59.6	46.0	200.0
792.0	H	100	239	33.3	46.2	46.0	200.0

2.5 SPURIOUS RADIATED EMISSIONS - continued

2.5.6 Test Results - continued

1GHz - 25GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC CFR 47: Part 15 Subpart C, Section 15.247(c), 15.205 and 15.209 for Radiated Emissions (1GHz – 25GHz).

Measurements were made with the EUT in RLAN Transmitting Mode (see Section 1.3.3 for details).

EUT Tx on Bottom Channel (2412MHz)

Frequency	Antenna		Turntable	Peak Field Strength	Peak Limit	Average Field Strength	Average Limit
	Pol	Height	Azimuth				
GHz	H/V	cm	deg	dBμV/m	dBμV/m	dBμV/m	dBμV/m
2.390	V	110	056	55.5	74.0	43.2	54.0
4.076	H	102	146	48.8	74.0	46.2	54.0
4.824	V	118	123	53.8	74.0	39.5	54.0
6.114	V	115	147	48.5	79.9	N/A	N/A
9.648	V	100	076	52.0	74.0	44.0	54.0

EUT Tx on Middle Channel (2437MHz)

Frequency	Antenna		Turntable	Peak Field Strength	Peak Limit	Average Field Strength	Average Limit
	Pol	Height	Azimuth				
GHz	H/V	cm	deg	dBμV/m	dBμV/m	dBμV/m	dBμV/m
4.125	V	102	181	51.7	74.0	49.6	54.0
4.874	V	103	122	50.0	74.0	35.5	54.0
6.189	V	100	145	51.4	80.5	N/A	N/A

Note: The Measurements in the above tables marked N/A are Not Applicable because the frequency does not fall within the Restricted Band (15.205) and hence Average Measurements are not required.

* Any emissions which are related to the EUT's transmitter circuitry, that are outside of the Restricted Band of Operation, table (15.205) are compared against the Carrier F S –20dB limit as shown in 12.2.5.

2.5 SPURIOUS RADIATED EMISSIONS - continued

2.5.6 Test Results - continued

1GHz - 25GHz Frequency Range - continued

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC CFR 47: Part 15 Subpart C, Section 15.247(c), 15.205 and 15.209 for Radiated Emissions (1GHz – 25GHz).

EUT Tx on Top Channel (2462MHz)

Frequency	Antenna		Turntable	Peak Field Strength	Peak Limit	Average Field Strength	Average Limit
	Pol	Height	Azimuth				
GHz	H/V	cm	deg	dBµV/m	dBµV/m	dBµV/m	dBµV/m
2.484	H	114	113	54.1	74.0	41.9	54.0
4.176	V	105	263	53.9	74.0	52.6	54.0
7.388	V	111	062	56.3	74.0	43.9	54.0
8.352	V	100	138	46.8	74.0	37.4	54.0

Note: The Measurements in the above tables marked N/A are Not Applicable because the frequency does not fall within the Restricted Band (15.205) and hence Average Measurements are not required.

* Any emissions which are related to the EUT's transmitter circuitry, that are outside of the Restricted Band of Operation, table (15.205) are compared against the Carrier F S –20dB limit as shown in 12.2.5.

ABBREVIATIONS FOR ABOVE TABLES

H Horizontal Polarisation
Pol Polarisation

V Vertical Polarisation
deg degree

SECTION 2

TEST DETAILS BLUETOOTH

Limited FCC CFR 47: Part 15 B Testing in Support of an
Application for Grant of Equipment Authorisation
of a Symbol 4121CDMA Handheld Data Terminal

2.6 SPURIOUS RADIATED EMISSIONS

2.6.1 Specification Reference

FCC CFR 47: Part 15 Subpart B, Section 15.109

2.6.2 Equipment Under Test

4121CDMA Handheld Data Terminal

2.6.3 Date of Test

14 March 2005

2.6.4 Test Equipment Used

The major items of test equipment used for the above tests are identified as "Section 2.6" within the Test Equipment Used table shown in Section 3.1.

2.6.5 Test Procedure

Test Performed in accordance with ANSI C63.4.

A preliminary profile of the Spurious Radiated Emissions was obtained by operating the EUT on a remotely controlled turntable within the anechoic chamber. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

Using the information from the preliminary profiling of the EUT. The list of emissions was then confirmed or updated under Anechoic Chamber (3 metres) conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

Emissions identified within the range 30MHz – 1GHz were then formally measured using a CISPR Quasi-Peak detector.

The measurements were performed at a 3m distance unless otherwise stated.

Relative measurements were performed to establish the worst case position of the EUT, by comparing the relative field strength measurements for top, middle and bottom channels in RLAN mode it was determined that the worst case orientation was with the EUT in an upright position.

2.6 SPURIOUS RADIATED EMISSIONS - continued

2.6.6 Test Results

Equipment Designation: Unintentional Radiator.

The EUT met the requirements of FCC CFR 47: Part 15 Subpart B, Section 15.109 for Spurious Radiated Emissions (30MHz – 1GHz).

Measurements were made with the EUT in Bluetooth Receiving Mode (see Section 1.3.3 for details).

EUT Rx on Middle Channel

The levels of the six highest emissions measured in accordance with the specification are presented below: -

Emission Frequency	Polarisation	Height	Azimuth	Field Strength		Limit	
MHz	Horizontal/ Vertical	cm	degree	dBµV/m	µV/m	dBµV/m	µV/m
335.4	H	100	254	38.8	87.1	46.0	200.0
383.4	H	100	077	31.6	38.0	46.0	200.0
431.3	V	140	306	31.2	36.3	46.0	200.0
431.3	H	100	251	31.0	35.5	46.0	200.0
527.2	V	100	338	31.0	35.5	46.0	200.0
623.0	V	100	188	31.7	38.5	46.0	200.0

SECTION 2

TEST DETAILS BLUETOOTH

Limited FCC CFR 47: Part 15 C Testing in Support of an
Application for Grant of Equipment Authorisation
of a Symbol 4121CDMA Handheld Data Terminal

2.7 MEASUREMENT AT THE BAND EDGE (MARKER DELTA METHOD)

2.7.1 Specification Reference

FCC CFR 47: Part 15 Subpart C, Section 15.205

2.7.2 Equipment Under Test

4121CDMA Handheld Data Terminal

2.7.3 Date of Test

17 March 2005

2.7.4 Test Equipment Used

The major items of test equipment used for the above tests are identified as "Section 2.7" within the Test Equipment Used table shown in Section 3.1.

2.7.5 Test Procedure

Test Performed in accordance with FCC Public Notice document (DA 00-705 released 30 March 2000).

Test Performed in accordance with ANSI C63.4.

The measurements were performed at a 3m distance unless otherwise stated.

2.7 MEASUREMENT AT THE BAND EDGE (MARKER DELTA METHOD) - continued

2.7.6 Test Results

The EUT met the requirements of FCC CFR 47: Part 15 Subpart C, Section 15.205 for Band Edge Measurements.

Measurements were made with the EUT in Bluetooth Transmitter Mode (see Section 1.3.3 for details).

Step 1

Bottom Channel Fundamental Field Strength Measurement.

Peak measurements performed utilising a Resolution Bandwidth and Video Bandwidth of 1MHz. Average measurements performed utilising a Resolution Bandwidth of 1MHz and Video Bandwidth of 10Hz.

Frequency	Antenna Polarisation	Height	Azimuth	Peak Field Strength	Average Field Strength
MHz	H/V	cm	deg	dB μ V/m	dB μ V/m
2402	V	100	102	94.4	81.5

Step 2

Determine Marker delta amplitude between 2402MHz (the fundamental) and 2390MHz (the Band Edge under investigation).

Using a span of 30MHz with Resolution Bandwidth and Video Bandwidth of 300kHz.

Marker Delta Amplitude = 48.1dB

Step 3

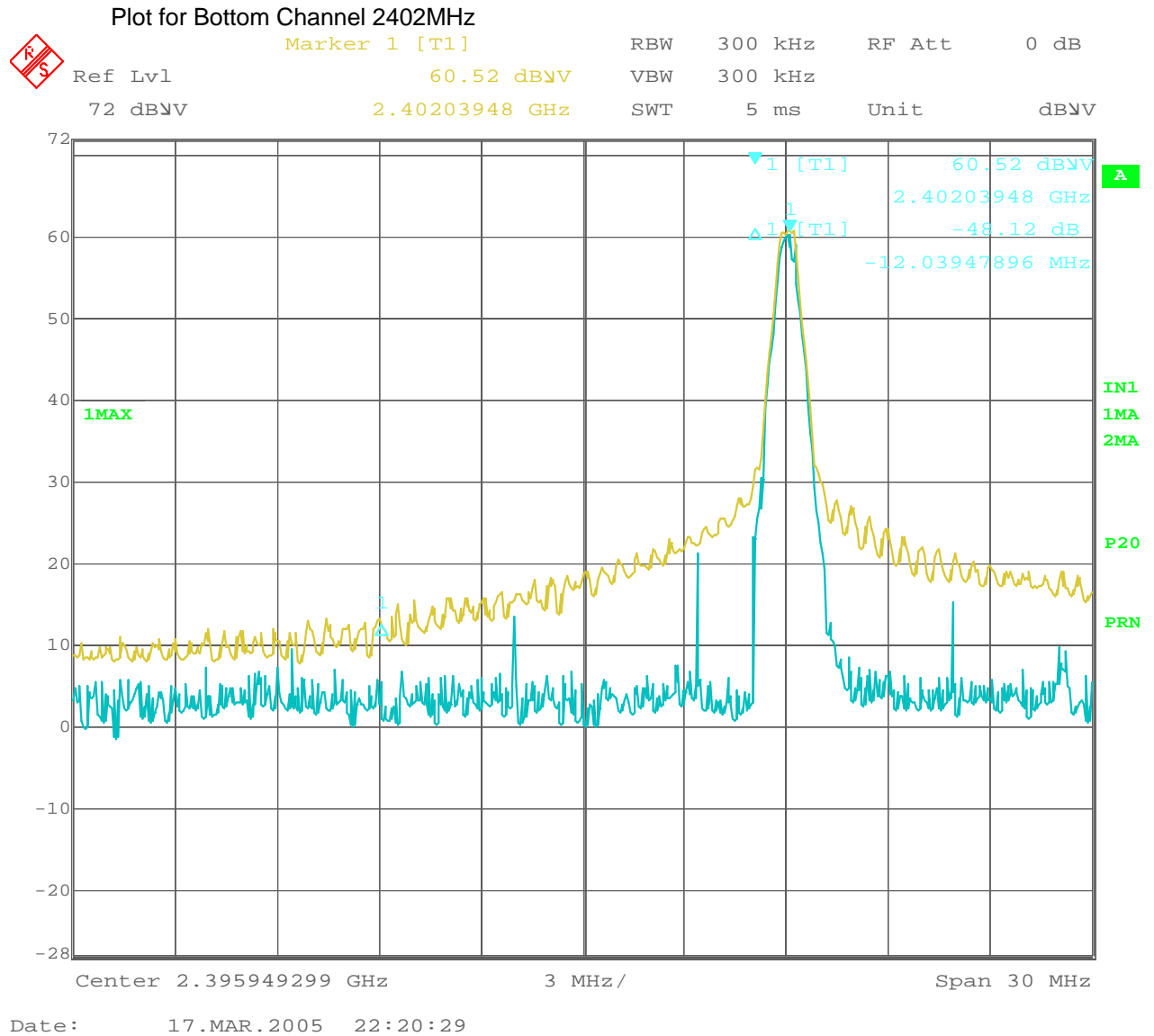
Subtracting the Marker Delta obtained from Step 2 from the 2412MHz Field Strength measurement from Step 1, gives following Result:

Peak of 46.3dB μ V/m (Limit is 74.0dB μ V/m)

Average of 33.4dB μ V/m (Limit is 54.0dB μ V/m)

2.7 MEASUREMENT AT THE BAND EDGE (MARKER DELTA METHOD) - continued

2.7.6 Test Results - continued



2.7 MEASUREMENT AT THE BAND EDGE (MARKER DELTA METHOD) - continued

2.7.6 Test Results - continued

The EUT met the requirements of FCC CFR 47: Part 15 Subpart C, Section 15.205 for Band Edge Measurements.

Measurements were made with the EUT in Bluetooth Mode (see Section 1.3.3 for details).

Peak measurements performed utilising a Resolution Bandwidth and Video Bandwidth of 1MHz.
Average measurements performed utilising a Resolution Bandwidth of 1MHz and Video Bandwidth of 10Hz.

Frequency	Antenna Polarisation	Height	Azimuth	Peak Field Strength	Average Field Strength
MHz	H/V	cm	deg	dB μ V/m	dB μ V/m
2480	V	100	018	93.7	81.1

Step 2

Determine Marker delta amplitude between 2480MHz (the fundamental) and 2483.5MHz (the Band Edge under investigation).

Using a span of 30MHz with Resolution Bandwidth and Video Bandwidth of 300kHz.

Marker Delta Amplitude = 38.2dB

Step 3

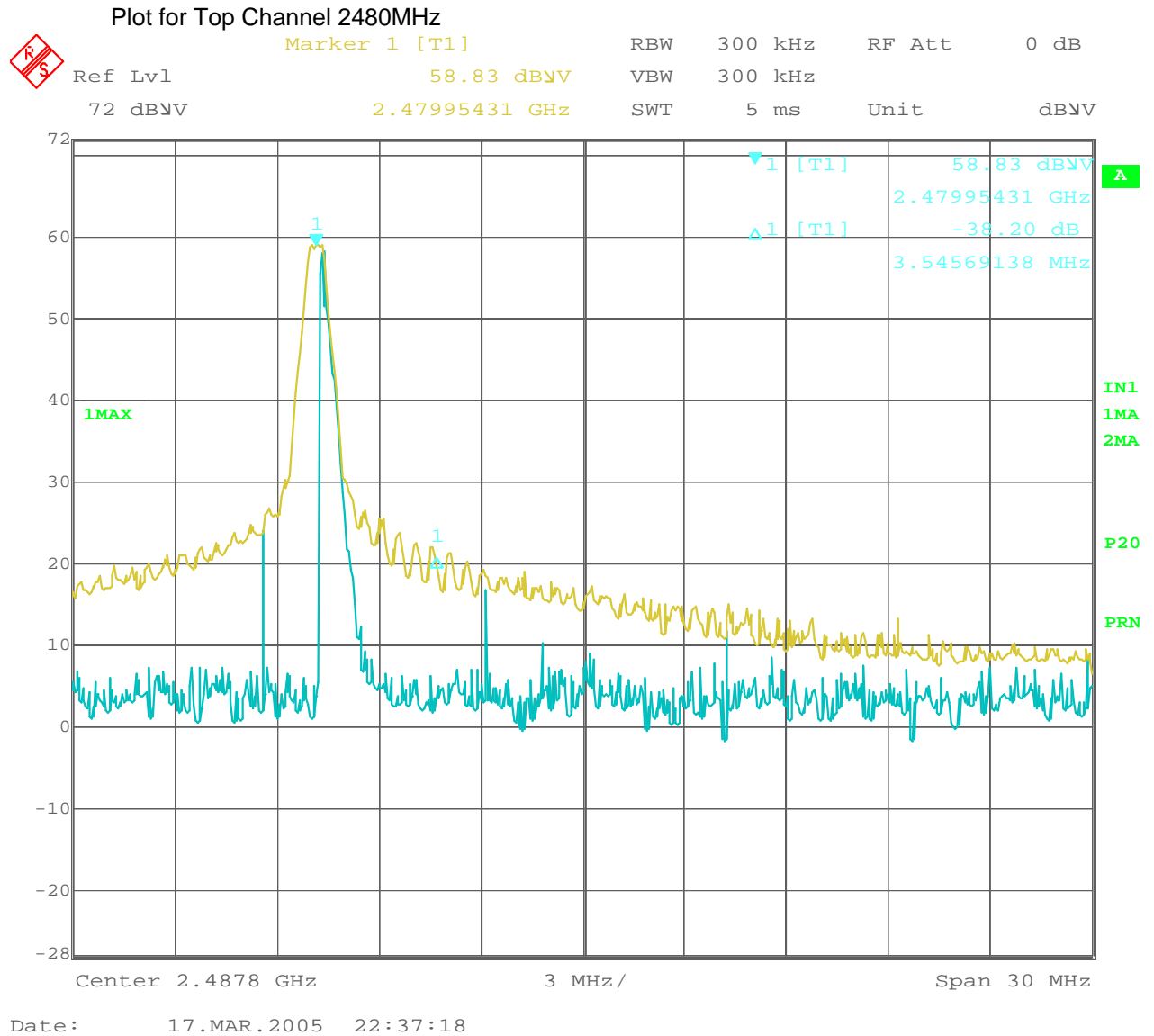
Subtracting the Marker Delta obtained from Step 2 from the 2483.5MHz Field Strength measurement from Step 1, gives following Result

Peak of 55.5dB μ V/m (Limit is 74.0dB μ V/m)

Average of 42.9dB μ V/m (Limit is 54.0dB μ V/m)

2.7 MEASUREMENT AT THE BAND EDGE (MARKER DELTA METHOD) - continued

2.7.6 Test Results - continued



2.8 MAXIMUM PEAK OUTPUT POWER (Radiated Method)

2.8.1 Specification Reference

FCC CFR 47: Part 15 Subpart C, Section 15.247(b) (2)

2.8.2 Equipment Under Test

4121CDMA Handheld Data Terminal

2.8.3 Date of Test

1 April 2005

2.8.4 Test Equipment Used

The major items of test equipment used for the above tests are identified as "Section 2.8" within the Test Equipment Used table shown in Section 3.1.

2.8.5 Test Procedure

Test Performed in accordance with ANSI C63.4.

The EUT contains an integral antenna and therefore the Maximum Peak Output Power was made using the EIRP method.

The Spectrum Analyser was tuned to the test frequency. The device Output Power setting was controlled as specified in the Product Information, Section 1.5 of this document. The device was then rotated through 360 degrees until the highest power level was observed in both horizontal and vertical polarisation. The device was then replaced with a substitution antenna, whose input signal level into the antenna was adjusted until the received level matched that of the previously detected emission.

2.8 MAXIMUM PEAK OUTPUT POWER (Radiated Method) - continued

2.8.6 Test Results - continued

The EUT met the requirements of FCC CFR 47: Part 15 Subpart C, Section 15.247(b) (2) for Maximum Peak Output Power.

Measurements were made with the EUT in RLAN Transmitter Mode (see Section 1.3.3 for details).

The measurements were performed with the EUT lying down and the measuring antenna in a horizontal position, as this was found to be the worst case position.

Frequency (MHz)	Raw Result (dBm)	Substitution Level (dBm)	Substitution Antenna Gain (dB)	Result EIRP (dBm)	Result EIRP (mW)	Limit EIRP (dBm)	Limit EIRP (mW)
2402	-56.0	-10.9	9.1	-1.8	0.7	30.0	1000
2441	-57.4	-12.1	9.1	-3.0	0.5	30.0	1000
2480	-58.3	-11.8	9.1	-2.7	0.5	30.0	1000

2.9 SPURIOUS RADIATED EMISSIONS

2.9.1 Specification Reference

FCC CFR 47: Part 15 Subpart C, Section 15.247(c)

2.9.2 Equipment Under Test

4121CDMA Handheld Data Terminal

2.9.3 Date of Test

15 March 2005

2.9.4 Test Equipment Used

The major items of test equipment used for the above tests are identified as "Section 2.9" within the Test Equipment Used table shown in Section 3.1.

2.9.5 Test Procedure

Test Performed in accordance with ANSI C63.4.

FCC CFR 47: Part 15 Subpart C, Section 15.247(c), for Radiated Emissions also requires Sections 15.205 and 15.209 to be applied.

A preliminary profile of the Spurious Radiated Emissions was obtained by operating the EUT on a remotely controlled turntable within the anechoic chamber. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

Using the information from the preliminary profiling of the EUT. The list of emissions was then confirmed or updated under Anechoic Chamber (3 metres) conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

Emissions identified within the range 30MHz – 1GHz were then formally measured using a CISPR Quasi-Peak detector.

Emissions identified within the range 1GHz – 25GHz were then formally measured using Peak and Average Detectors, as appropriate.

The measurements were performed at a 3m distance unless otherwise stated.

2.9 SPURIOUS RADIATED EMISSIONS - continued

2.9.5 Test Procedure - continued

The limits for Spurious Emissions Outside the Restricted Bands have been measured and calculated as shown in the table below:

Test Mode	Carrier Frequency GHz	Carrier Field Strength dBμV/m	Limit for Spurious Outside Restricted Band (Carrier F S -20dB) dBμV/m
Bluetooth Transmit	2402	94.0	74.0
Bluetooth Transmit	2441	93.8	73.8
Bluetooth Transmit	2480	92.5	72.5

The limits for Spurious Emissions Inside the Restricted Bands are in accordance with 15.205(a) & (b), which call up the limits in 15.209 (a)

Frequency Range MHz	Field Strength μV/m	Quasi Peak Field Strength dBμV/m	
30-88	100	40.0	
88-216	150	43.5	
216-960	200	46.0	
960-1000	500	54.0	
Above 1000	500	Average Field Strength dBμV/m	Peak Field Strength dBμV/m
		54.0	74.0

In accordance with FCC Public Notice DA 00-705, Released 30th March 2000, Section 15.247(c) Spurious Radiated Emissions "If the dwell time per channel of the hopping signal is less than 100ms, then the reading obtained with the 10Hz VBW may be further adjusted by a "duty cycle correction factor", derived from $20\log(\text{dwell time}/100\text{ms})$, in an effort to demonstrate compliance with the 15.209 limit the following adjustment has been calculated for use with Average Measurements only;

Dwell Time = 5.81ms this is derived from;

Total slot time per time slot for DH5 packet

$$625\mu\text{s} \times 5 = 3.125\text{ms}$$

Actual transmit time during this time slot is 2.905ms and the reply time slot after each DH5 packet is 625μs.

Total time slot length per channel

$$3.125 + 0.625 = 3.75\text{ms}.$$

Multiply Total time slot length per channel by 32 channels per hop sequence

$$32 \times 3.75 = 120\text{ms}$$

It is therefore possible to have a maximum of two hop sequences in any given 100ms period, a single channel could occur twice within any 100ms time window.

$$2 \times 2.905 = 5.81\text{ms}$$

Therefore; the Bluetooth Duty Cycle Correction Factor for the EUT is $20 \log (5.81/100) = -24.7\text{dB}$

2.9 SPURIOUS RADIATED EMISSIONS - continued

2.9.6 Test Results

30MHz - 1GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC CFR 47: Part 15 Subpart C, Section 15.247(c), 15.205 and 15.209 for Radiated Emissions (30MHz – 1GHz).

Measurements were made with the EUT in Bluetooth Transmitter Mode (see Section 1.3.3 for details).

EUT Tx on Bottom Channel (2402MHz)

The levels of the six highest emissions measured in accordance with the specification are presented below: -

Emission Frequency	Polarisation	Height	Azimuth	Field Strength		Limit	
MHz	Horizontal/ Vertical	cm	degree	dBµV/m	µV/m	dBµV/m	µV/m
335.5	V	168	231	36.4	66.1	46.0	200.0
335.5	H	100	021	29.5	29.9	46.0	200.0
431.3	V	120	183	33.7	48.4	46.0	200.0
527.1	V	100	199	35.5	59.6	46.0	200.0
623.0	V	100	176	34.3	51.9	46.0	200.0
670.9	V	173	180	30.5	33.5	46.0	200.0

EUT Tx on Middle Channel (2441MHz)

The levels of the six highest emissions measured in accordance with the specification are presented below: -

Emission Frequency	Polarisation	Height	Azimuth	Field Strength		Limit	
MHz	Horizontal/ Vertical	cm	degree	dBµV/m	µV/m	dBµV/m	µV/m
335.5	V	163	176	36.8	69.2	46.0	200.0
431.3	V	115	183	33.6	47.9	46.0	200.0
479.3	V	100	198	26.6	21.4	46.0	200.0
527.1	V	100	190	34.8	55.0	46.0	200.0
623.0	V	100	183	33.4	46.8	46.0	200.0
670.9	V	170	194	29.5	29.9	46.0	200.0

2.9 SPURIOUS RADIATED EMISSIONS - continued

2.9.6 Test Results – continued

30MHz - 1GHz Frequency Range

EUT Tx on Top Channel (2480MHz)

Emission Frequency	Polarisation	Height	Azimuth	Field Strength		Limit	
MHz	Horizontal/ Vertical	cm	degree	dBµV/m	µV/m	dBµV/m	µV/m
335.5	V	160	175	37.7	76.7	46.0	200.0
431.3	V	121	185	32.9	44.2	46.0	200.0
479.3	V	100	200	27.4	23.4	46.0	200.0
527.1	V	100	209	34.2	51.3	46.0	200.0
623.0	V	100	180	33.2	45.7	46.0	200.0
670.9	V	167	188	30.4	33.1	46.0	200.0

2.9 SPURIOUS RADIATED EMISSIONS - continued

2.9.6 Test Results - continued

1GHz - 25GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC CFR 47: Part 15 Subpart C, Section 15.247(c), 15.205 and 15.209 for Radiated Emissions (1GHz – 25GHz).

Measurements were made with the EUT in Bluetooth Transmitting Mode (see Section 1.3.3 for details).

EUT Tx on Bottom Channel (2402MHz)

Frequency	Antenna		Turntable	Peak Field Strength	Peak Limit	Average Field Strength	Average Limit
	Pol	Height	Azimuth				
GHz	H/V	cm	deg	dBμV/m	dBμV/m	dBμV/m	dBμV/m
3.202	H	100	191	39.7	74.0	N/A	N/A
4.802	V	155	182	43.1	74.0	9.7*	54.0

EUT Tx on Middle Channel (2441MHz)

Frequency	Antenna		Turntable	Peak Field Strength	Peak Limit	Average Field Strength	Average Limit
	Pol	Height	Azimuth				
GHz	H/V	cm	deg	dBμV/m	dBμV/m	dBμV/m	dBμV/m
3.254	H	100	192	40.6	73.8	N/A	N/A
4.882	V	100	192	42.9	74.0	7.6*	54.0

Note: The Measurements in the above tables marked N/A are Not Applicable because the frequency does not fall within the Restricted Band (15.205) and hence Average Measurements are not required.

* Note these results have been corrected using the Bluetooth Duty Cycle Correction Factor for the EUT, as calculated on page 44 of this report.

2.9 SPURIOUS RADIATED EMISSIONS - continued

2.9.6 Test Results - continued

1GHz - 25GHz Frequency Range - continued

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC CFR 47: Part 15 Subpart C, Section 15.247(c), 15.205 and 15.209 for Radiated Emissions (1GHz – 25GHz).

EUT Tx on Top Channel (2480MHz)

Frequency	Antenna		Turntable	Peak Field Strength	Peak Limit	Average Field Strength	Average Limit
	Pol	Height	Azimuth				
GHz	H/V	cm	deg	dBµV/m	dBµV/m	dBµV/m	dBµV/m
3.306	H	100	158	40.4	72.5	N/A	N/A
4.959	V	100	170	44.0	74.0	10.7*	54.0

Note: The Measurements in the above tables marked N/A are Not Applicable because the frequency does not fall within the Restricted Band (15.205) and hence Average Measurements are not required.

* Note these results have been corrected using the Bluetooth Duty Cycle Correction Factor for the EUT, as calculated on page 21 of this report.(use if using Bluetooth Duty Cycle Correction Factor)

ABBREVIATIONS FOR ABOVE TABLES

H Horizontal Polarisation
Pol Polarisation

V Vertical Polarisation
deg degree

SECTION 3

TEST EQUIPMENT USED

3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No	EMC / INV No	Cal. Due
CDMA Test Set	Agilent	9860 Series 10	Not Applicable	TU
Sections 2.1 & 2.6				
Spectrum Analyser	Hewlett Packard	8542E	2286	08/01/2006
Bilog Antenna	Schaffner	CBL6143	2965	12/09/2005
Antenna Mast	Emco	1051-2	2182	TU
Sections 2.2 & 2.7				
Drg Horn Antenna	Emco	3115	2297	07/07/2005
Signal Generator	Hewlett Packard	8672A	411	TU
Peak Power Ana	Hewlett Packard	8990A	1670	24/08/2005
Power Sensor	Hewlett Packard	84812A	1662	24/08/2005
Section 2.3				
Test Receiver	Rohde & Schwarz	ESH3	1020	24/09/2005
Spectrum Analyser	Rohde & Schwarz	EZM	1416	TU
Artificial Mains LISN	Rohde & Schwarz	ESH2-Z5	1915	28/04/2005
Transient Limiter	Hewlett Packard	11947A	2271	19/08/2005
Sections 2.4 & 2.8				
Drg Horn Antenna	Emco	3115	2297	07/07/2005
Emi Test Receiver	Rohde & Schwarz	ESIB40	2917	07/03/2006
Signal Generator	Hewlett Packard	8672A	411	TU
Peak Power Ana	Hewlett Packard	8990A	1670	24/08/2005
Power Sensor	Hewlett Packard	84812A	1662	24/08/2005
Bilog Antenna	Schaffner	CBL6143	2965	12/09/2005
Sections 2.5 & 2.9				
Spectrum Analyser	Hewlett Packard	8542E	2286	08/01/2006
Bilog Antenna	Schaffner	CBL6143	2965	12/09/2005
Antenna Mast	Emco	1051-2	2182	TU
Emi Test Receiver	Rohde & Schwarz	ESIB40	2917	07/03/2006
Low Noise Amplifier	Miteq	AMF-3d-001080-18-13P	2457	TU
Solid State Amplifier	Avantek	AWT-18036	1081	26/06/2005
Signal Amplifier	Avantek	AMT-26177-33	2072	25/06/2005
Drg Horn Antenna	Emco	3115	2297	07/07/2005
Signal Generator	Hewlett Packard	8672A	411	02/03/2005
Signal Generator	Marconi	2031	1768	01/09/2005
3GHz High Pass Filter	RLC Electronics	F-100-3000-5-R	4969	TU
Peak Power Analyser	Hewlett Packard	8990A	1670	24/08/2005
Power Sensor	Hewlett Packard	84812A	1662	24/08/2005

3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are: -

Test Discipline	Frequency / Parameter	MU
Maximum Output Power	Not Applicable	±0.5dB
Radiated Emissions, Bilog Antenna, AOATS	30MHz to 1GHz Amplitude	5.1dB*
Radiated Emissions, Horn Antenna, AOATS	1GHz to 40GHz Amplitude	6.3dB*
Conducted Emissions, LISN	150kHz to 30MHz Amplitude	3.2dB*
Substitution Antenna, Radiated Field	30MHz to 18GHz Amplitude	2.6dB

Worst case error for both Time and Frequency measurement 12 parts in 10^6 .

* In accordance with CISPR 16-4

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA
(Not UKAS Accredited).

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APPENDIX A

TITCHFIELD FCC SITE COMPLIANCE LETTER



FEDERAL COMMUNICATIONS COMMISSION

**Laboratory Division
7435 Oakland Mills Road
Columbia, MD 21046**

October 18, 2002

Registration Number: 90987

TUV Product Service Ltd
Segensworth Road
Titchfield
Fareham, Hampshire, PO15 5RH
United Kingdom
Attention: Kevan Adsetts

Re: Measurement facility located at Titchfield
Anechoic chamber (3 meters) and 3 & 10 meter OATS
Date of Listing: October 18, 2002

Gentlemen:

Your request for registration of the subject measurement facility has been reviewed and found to be in compliance with the requirements of Section 2.948 of the FCC rules. The information has, therefore, been placed on file and the name of your organization added to the list of facilities whose measurement data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Please note that the file must be updated for any changes made to the facility and the registration must be renewed at least every three years.

Measurement facilities that have indicated that they are available to the public to perform measurement services on a fee basis may be found on the FCC website www.fcc.gov under E-Filing, OET Equipment Authorization Electronic Filing, Test Firms.

Sincerely,

A handwritten signature in black ink that reads "Thomas W. Phillips".

Thomas W Phillips
Electronics Engineer