TEST REPORT
FROM
RFI GLOBAL SERVICES LTD

Test of: t+ Medical Ltd
Ultra *Bluetooth* Cradle Mk2

To: FCC Part 15.247: 2006 (Subpart C) and
Part 15 subpart B Clause 15.109

Test Report Serial No:
RFI/RPTE2/RP49235JD08A

Supersedes Test Report Serial No:
RFI/RPTE1/RP49235JD08A

This Test Report Is Issued Under The Authority Of Michael Derby, Wireless Radio Performance Service Leader: 	
Tested By: Petr Hajek **pp** 	**Checked By: Michael Derby** 
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Issue Date: 14 June 2007	**Test Dates: 15 May 2007 to 18 May 2007**

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Registered in England and Wales. Company number:2117901

Test of: t+ Medical Ltd
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To: FCC Part 15.247: 2006 (Subpart C) and
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Executive Summary

RFI Global Services Ltd (RFI) was commissioned to perform an independent series of conformance tests to assess compliance with the FCC Part 15.247: 2006 (Subpart C) and
Part 15 subpart B Clause 15.109

Summary of Results

Range of Measurements	Clause Reference	Port Type	Compliancy Status
Idle Mode AC Conducted Emissions (150 kHz to 30 MHz)	Section 15.107	AC Mains	**Not tested ***
Idle Mode Radiated Spurious Emissions	Section 15.109	Antenna	**Complied**
Transmitter AC Conducted Emissions (150 kHz to 30 MHz)	Section 15.207	AC Mains	**Not tested ***
Transmitter 20 dB Bandwidth	Section 2.1049	Antenna	**Complied**
Transmitter Maximum Peak Output Power	Section 15.247(b)(3)	Antenna	**Complied**
Transmitter Conducted Emissions	Section 15.247 (d)	Antenna	**Complied**
Transmitter Radiated Emissions	Sections 15.247(d) & 15.209(a)	Antenna	**Complied**
Transmitter Band Edge Radiated Emissions	Sections 15.247(d) & 15.209(a)	Antenna	**Complied**

Key to Compliance Colours used in this report:

Colour	Definition
	Compliant
	Indeterminate*
	Not compliant

* Indeterminate because the measurements were within measurement uncertainty.

** AC Conducted Emissions tests were not performed because the device is battery powered only.*

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To: FCC Part 15.247: 2006 (Subpart C) and
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1. Client Information

Company Name:	t+ Medical Ltd
Address:	174 Milton Park Abingdon OX14 4SE UK
Contact Name:	Mr G Billington

2. Equipment Under Test (EUT)

The following information (with the exception of the date of receipt) has been supplied by the customer:

2.1. Description of EUT

The equipment under test is a Bluetooth Serial Cable replacement for a blood glucose meter.

2.2. Identification of Equipment Under Test (EUT)

Description:	*Bluetooth* cradle
Brand Name:	t+ Medical Ltd
Model Name or Number:	MK 2
Serial Number:	Sample B
Hardware Version Number:	UBTD
Software Version Number:	2.0
FCC ID Number:	UVCU2B
Country of Manufacture:	South Africa
Date of Receipt:	15 May 2007

2.3. Modifications Incorporated in the EUT

During the course of testing the EUT was not modified.

2.4. Accessories

No accessories were supplied with the EUT during testing.

2.5. Support Equipment

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

Description:	Portable Computer
Brand Name:	Dell
Model Name or Number:	Latitude D610
Serial Number:	CN-OD4571-48643-544-5681
Cable Length and Type:	1.5m length, multi-core
Connected to Port:	Computer serial port to EUT jack plug

Description:	PQ Meter
Brand Name:	OneTouch
Model Name or Number:	Ultra2
Serial Number:	TWT2090AY
Cable Length and Type:	5 cm length, three core
Connected to Port:	Meter jack socket to EUT jack plug

2.6. Additional Information Related to Testing

Intended Operating Environment:	Residential Light Industry		
Equipment Category:	Portable stand alone		
Type of Unit:	*Bluetooth* transceiver		
Power Supply Requirement:	3 V internal battery		
Occupied Bandwidth:	933.868 kHz (measured)		
Maximum Power Output (ERP)	-25.0 dBm (measured)		
Transmit Frequency Range:	2402 MHz 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 MHz to 2480 MHz		
Receive Channels Tested:	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Bottom	0	2402
	Middle	39	2441
	Top	78	2480

2.7. Port Identification

Port	Description
1	3.5mm stereo jack

3. Test Specification, Methods and Procedures

3.1. Test Specification

Reference:	FCC Part 15.247: 2006 Subpart C
Title:	Code of Federal Regulations, Part 15.247 (47CFR15) (Intentional Radiators operating within the band 2400 MHz to 2483.5 MHz)

3.2. 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.

3.3. 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

The FCC regulations state that the test shall be performed using a new battery. However, due to the duration of a spurious emissions test, the battery voltage would vary through the test. For this reason, spurious emissions tests were performed with a DC Power supply of 3 V, connected to the battery terminals, to simulate a new battery.

5. Operation and Configuration of the EUT during Testing

5.1. Operating Modes

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

For transmit mode tests, the EUT was set to transmit on the bottom, middle or top channel and hopping mode, as necessary.

For standby/receive mode tests, the EUT was set with the transmitter off.

5.2. Configuration and Peripherals

The EUT was tested in the following configuration:

To configure the EUT for testing, the EUT was connected to the support laptop using a serial interface cable. The computer was then disconnected during the test.

During the test, the EUT was connected to the Ultra2, PQ Meter, via a jack plug and socket, with three 5 cm cables.

The EUT was connected via a wireless link to a Bluetooth test set, listed in Appendix 1 of this report.

The EUT was connected to a DC power supply by twin core, untwisted, DC cables, non-inductively bundled to maintain a distance from the test site floor of more than 40 cm. The power supply is listed in Appendix 1 of this report.

The EUT is sold as a battery operated device but, as per section 4 of this report, the test was performed with the EUT powered from a DC supply. To gain access to the battery terminals, the EUT was removed from the plastic casing and tested as a bare circuit board.

6. Measurements, Examinations and Derived Results

6.1. 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.

The EUT is battery powered and does not include an AC adaptor or charger; therefore AC conducted emissions to parts 15.107 and 15.207 were not performed.

6.2. 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, UK.

FCC Site Registration Number: 90895

IC Site Registration Number: 3485

6.3. Test Results

Idle Mode Radiated Spurious Emissions: Section 15.109

Temperature (°C):	20	Relative Humidity (%):	53

Results:

Electric Field Strength Measurements (Frequency Range: 30 MHz to 1000 MHz)

Frequency (MHz)	Antenna Polarity	Q-P Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Note(s)
566.172	Horizontal	32.5	46.0	13.5	Note 1
958.917	Horizontal	35.1	46.0	10.9	Note 1

Note(s):

1. *No emissions were observed above the noise floor of the test site and equipment; therefore the highest levels were measured peak and are shown here compared to the quasi-peak limit.*

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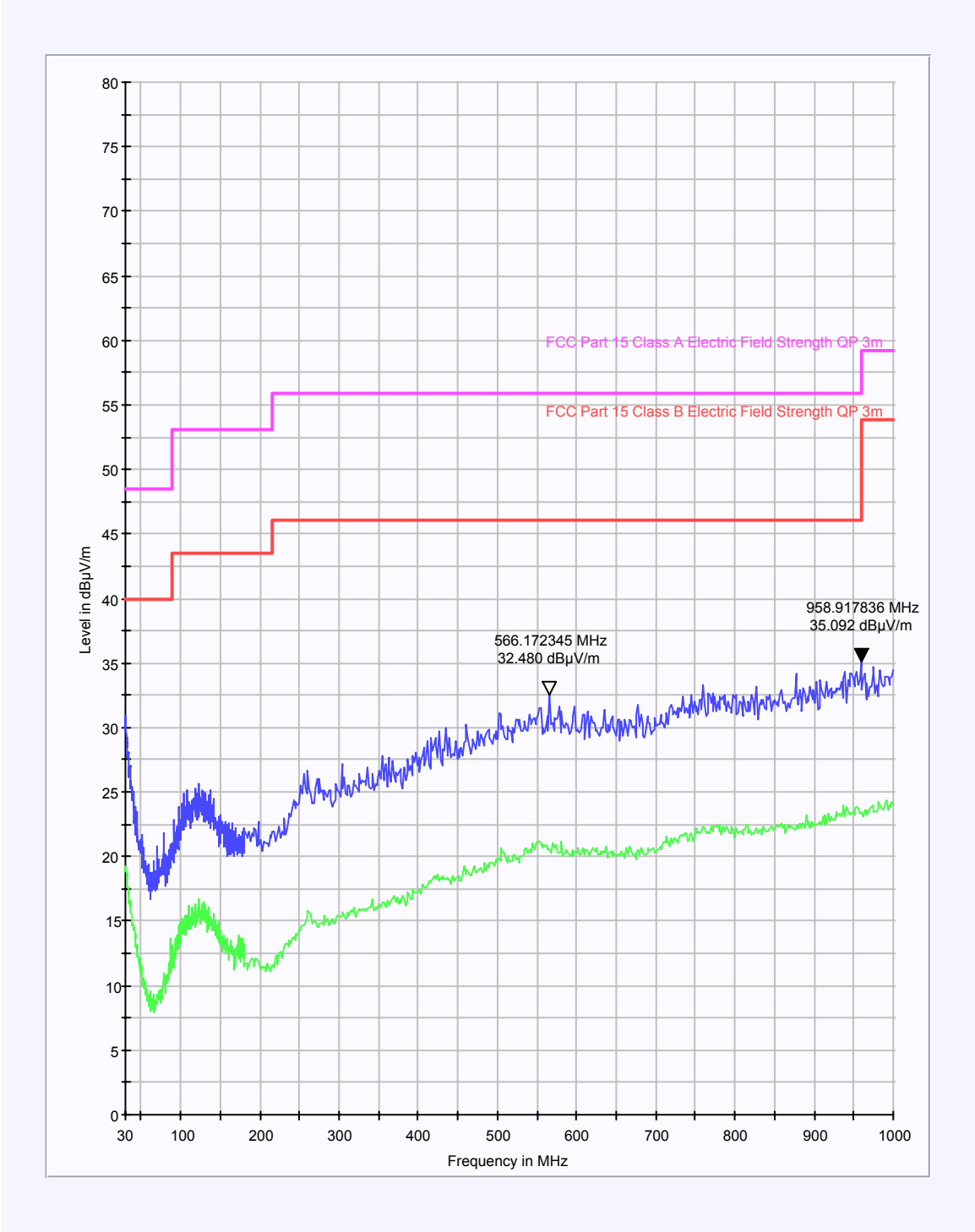
Idle Mode Radiated Spurious Emissions: Section 15.109 (Continued)

Graph(s):



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

Test of: t+ Medical Ltd
Ultra Bluetooth Cradle Mk2

To: FCC Part 15.247: 2006 (Subpart C) and
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Idle Mode Radiated Spurious Emissions: Section 15.109 (Continued)

Temperature (°C):	16	Relative Humidity (%):	64

Results:

Electric Field Strength Measurements (Frequency Range: 1 GHz to 12.5 GHz)

Highest Peak Level:

Frequency (GHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Actual Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Note(s)
10.687825	Horizontal	53.7	3.8	57.5	74.0	16.5	Note 1

Highest Average Level:

Frequency (GHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Actual Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Note(s)
10.687825	Horizontal	31.8	3.8	35.6	54.0	18.4	Note 1

Note(s):

1. *The emission listed was found to be an ambient signal on the open area test site. This was confirmed by re-measuring the signal with the EUT removed from the test site.*
   The value and margin are included here to demonstrate the amplitude of the highest emission level observed on a plot.

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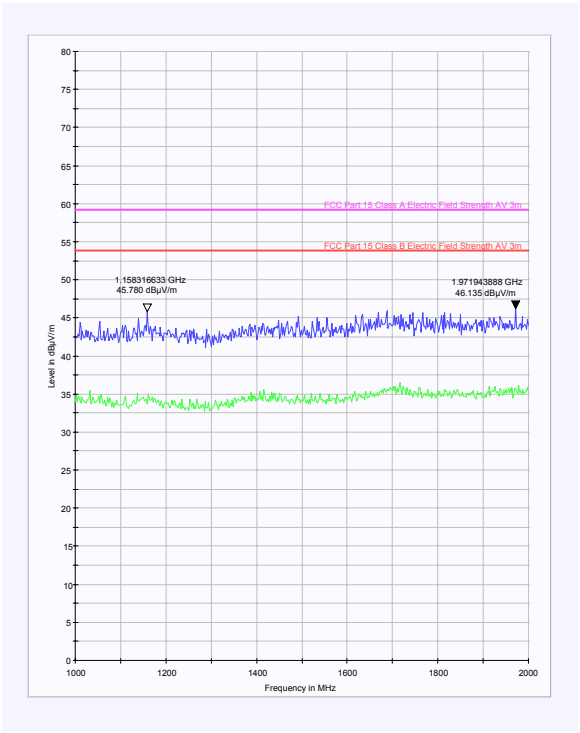
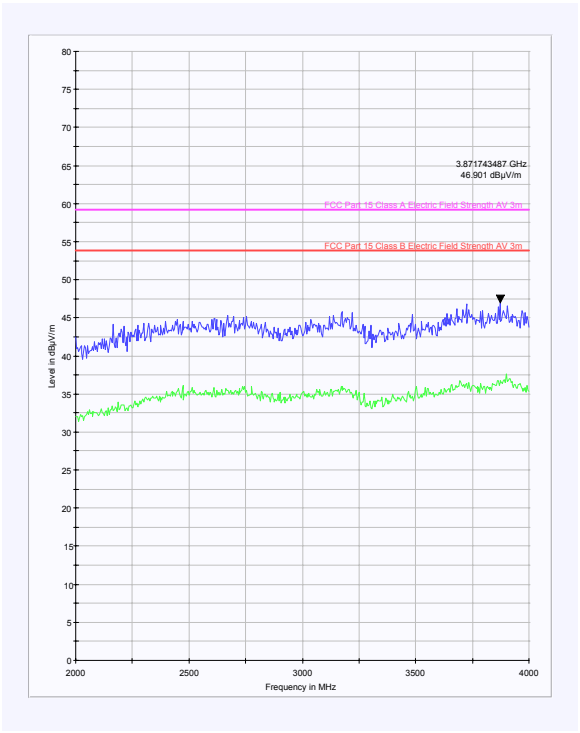
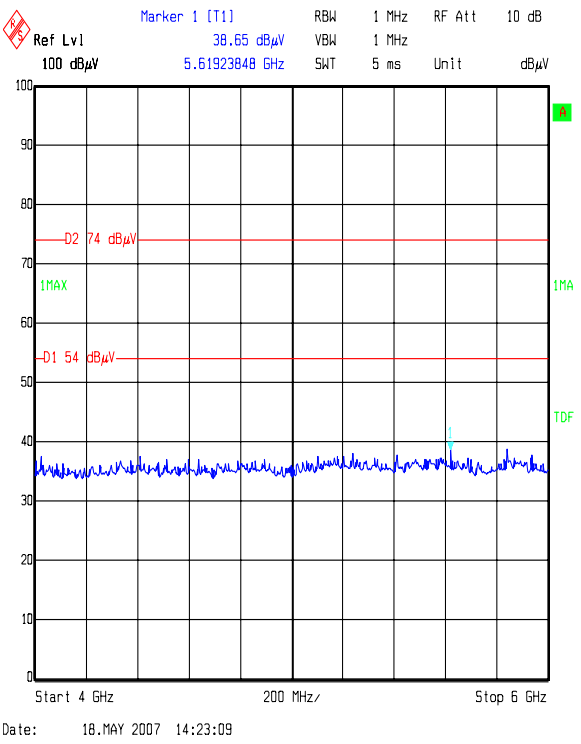
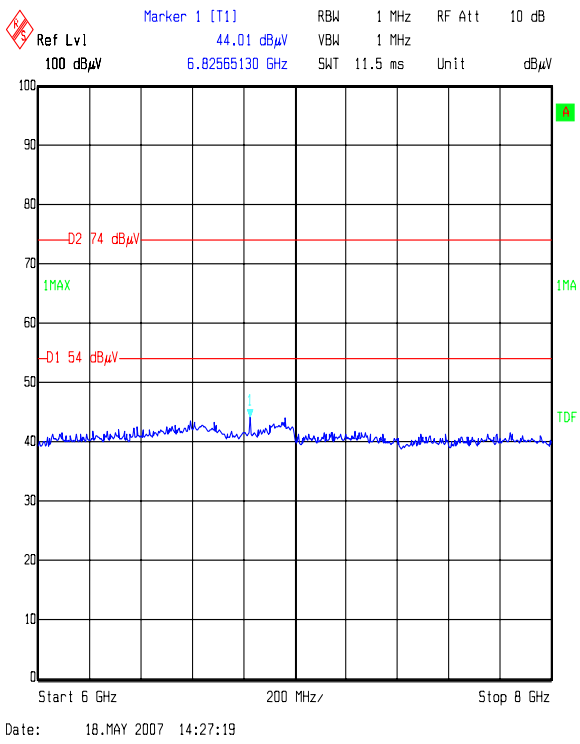
Idle Mode Radiated Spurious Emissions: Section 15.109 (Continued)

Graph(s):









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

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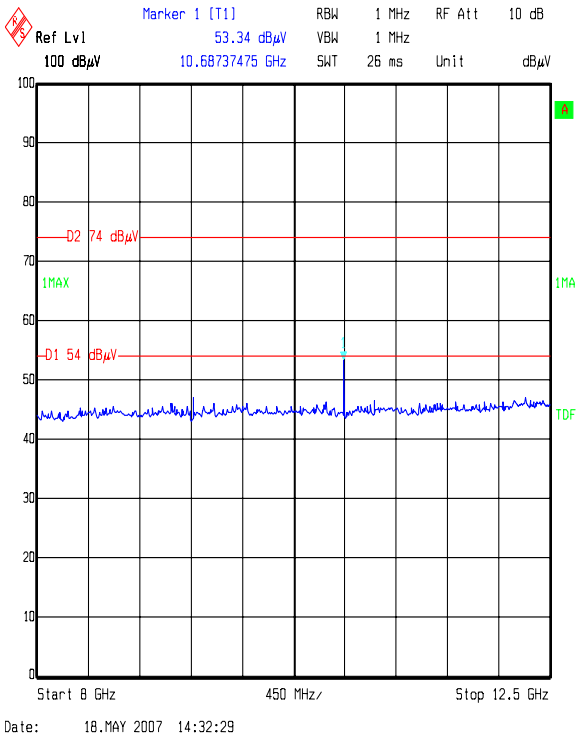
Idle Mode Radiated Spurious Emissions: Section 15.109 (Continued)

Graph(s):



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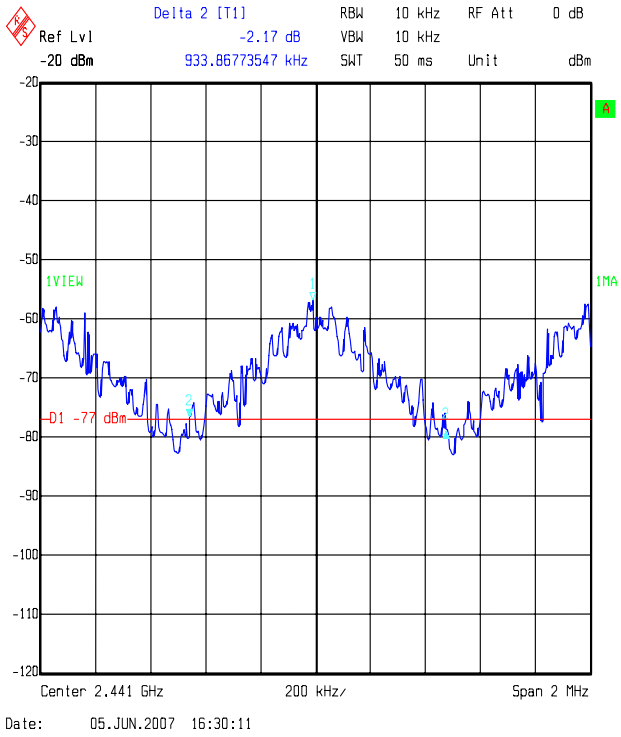
Transmitter 20 dB Bandwidth: Section 15.247(a)(1)

Temperature (°C):	16	Relative Humidity (%):	64

Results:

Transmitter 20 dB Bandwidth (kHz)	Limit (kHz)
933.868	None specified

Graph(s):



Test of: t+ Medical Ltd
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To: FCC Part 15.247: 2006 (Subpart C) and
Part 15 subpart B Clause 15.109

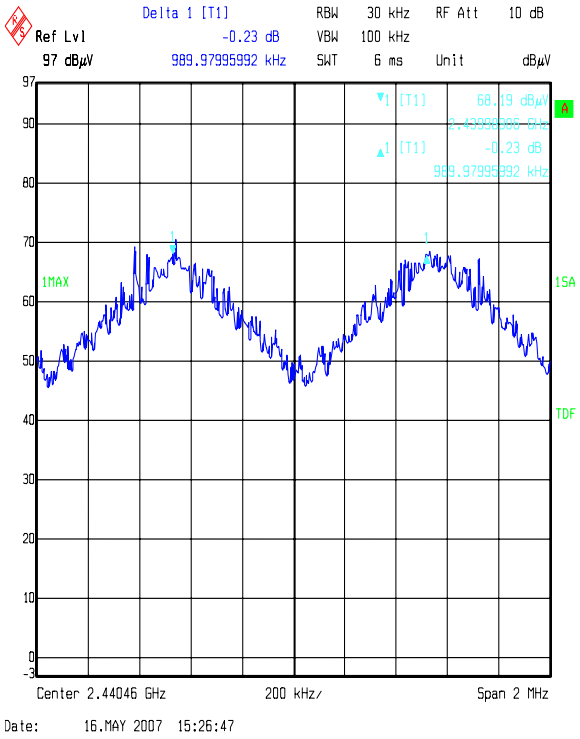
Transmitter Carrier Frequency Separation: Section 15.247(a)(1)

Temperature (°C):	16	Relative Humidity (%):	64

Results:

Transmitter Carrier Frequency Separation (kHz)	Limit (> $^2/_3$ of 20 dB BW) (kHz)	Margin (kHz)	Note(s)
989.980	622.578	367.402	-

Graph(s):



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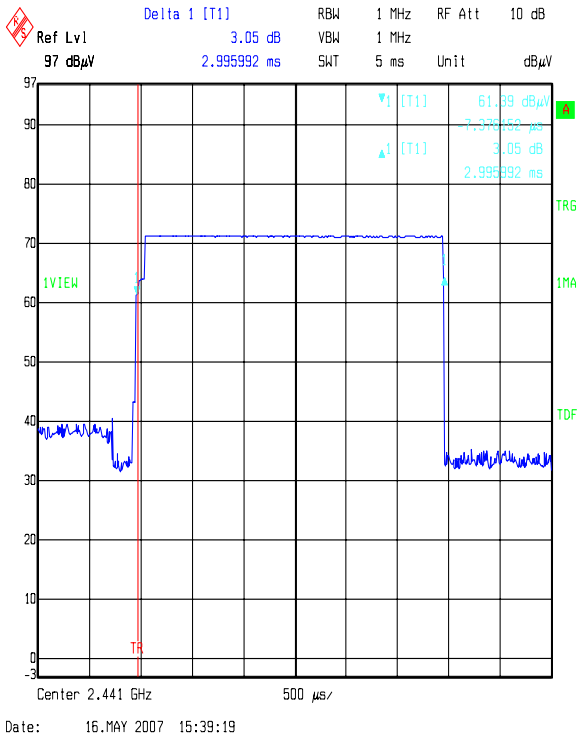
Transmitter Average Time of Occupancy: Section 15.247(a)(1)(iii)

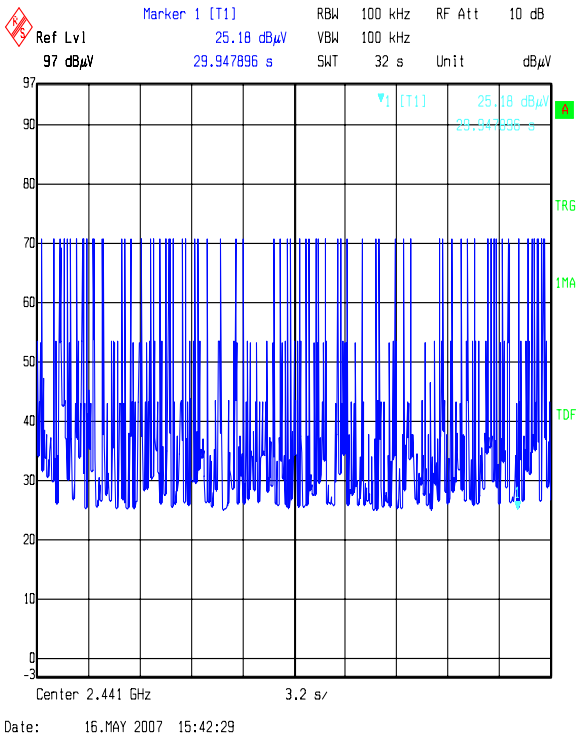
Temperature (°C):	16	Relative Humidity (%):	64

Results:

Emission Width (μs)	Number of Hops in 31.6 Seconds	Average Time of Occupancy (s)	Limit (s)	Margin (s)	Note(s)
2995.992	75	0.225	0.4	0.175	-

Graph(s):





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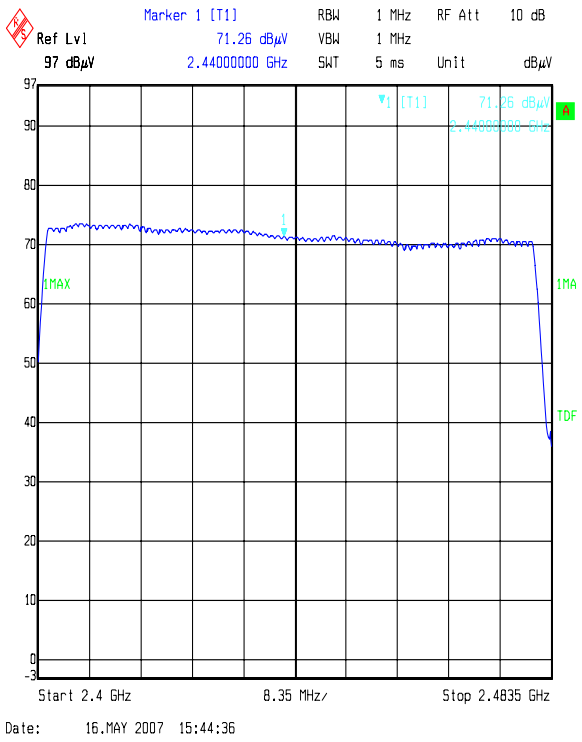
Transmitter Average Time of Occupancy: Section 15.247(a)(1)(iii) (Continued)



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Transmitter Maximum Peak Output Power: (EIRP) Section 15.247(b)(1)

Temperature (°C):	16	Relative Humidity (%):	64

Results:

Battery Powered Devices

Channel	EIRP (dBm)	Limit (dBm)	Margin (dB)	Note(s)
Bottom	-25.0	30.0	55.0	-
Middle	-25.5	30.0	55.5	-
Top	-25.3	30.0	55.3	-

Note(s):

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

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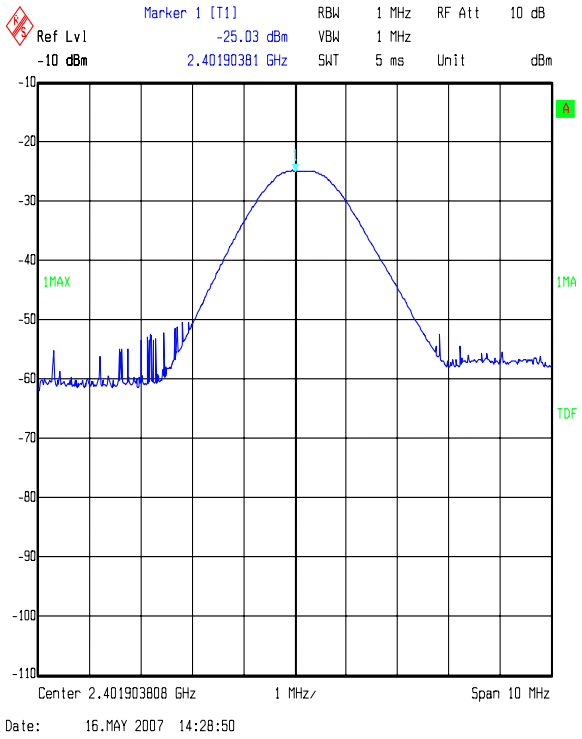
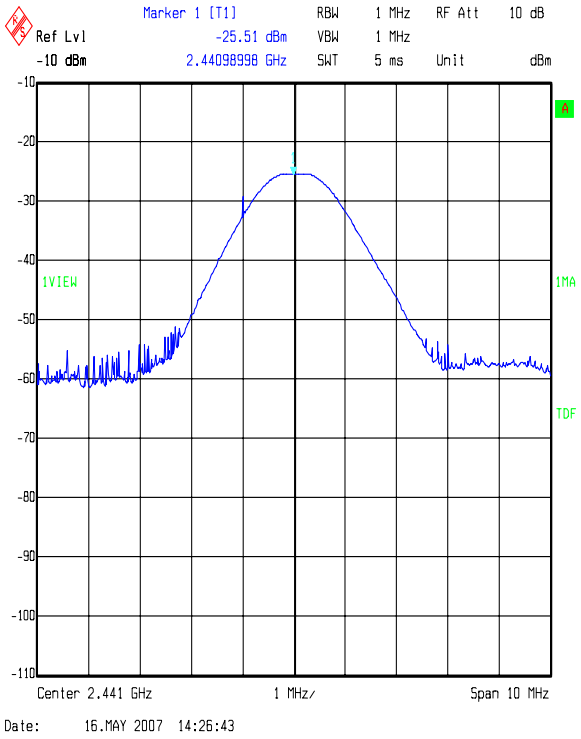
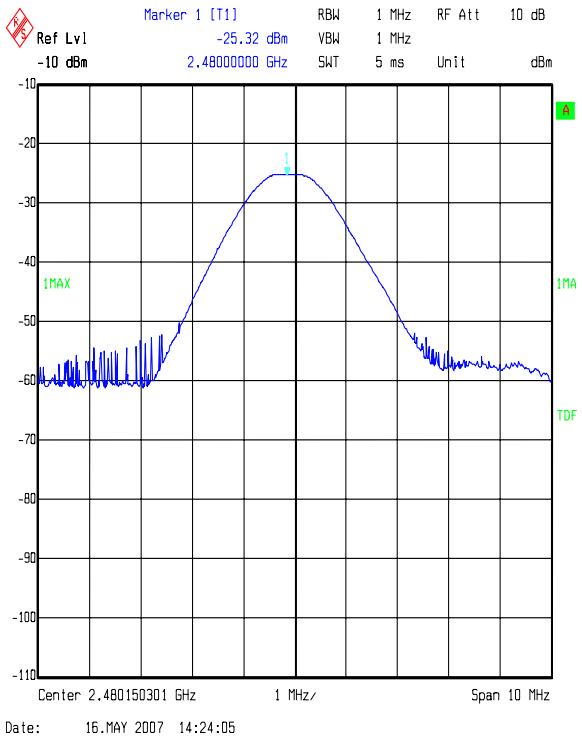
Transmitter Maximum Peak Output Power: (EIRP) Section 15.247(b)(1)(Continued)

Graph(s):







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Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a)

Temperature (°C):	18.4	Relative Humidity (%):	50

Results:

Electric Field Strength Measurements: 30 MHz to 1000 MHz
(emissions occurring in the restricted bands)

Top Channel

Frequency (MHz)	Antenna Polarity	Q-P Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Note(s)
113.321	Horizontal	37.8	43.5	5.7	1 & 2
133.331	Horizontal	33.7	43.5	9.8	1 & 2

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.*
2. *The emissions listed were found to come from the support equipment Bluetooth test set and DC power supply. This was confirmed by re-measuring the signal with the EUT removed from the test site. The value and margin are included here to demonstrate the amplitude of the highest emission levels observed on a plot.*

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To: FCC Part 15.247: 2006 (Subpart C) and
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Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a)

Temperature (°C):	18.4	Relative Humidity (%):	50

Results:

Electric Field Strength Measurements: 30 MHz to 1000 MHz (emissions outside the restricted bands)

Top Channel

Frequency (MHz)	Antenna Polarity	Peak Level (dBμV/m)	-20 dBc Limit (dBμV/m)	Margin (dB)	Note(s)
46.703	Vertical	29.1	40	10.9	1 & 2
53.341	Vertical	30.5	40	9.5	1 & 2
79.974	Vertical	32.9	40	7.1	1 & 2
146.668	Vertical	36.5	43.5	7.0	1 & 2

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.*
2. *The emissions listed were found to come from the support equipment Bluetooth test set and DC power supply. This was confirmed by re-measuring the signal with the EUT removed from the test site. The value and margin are included here to demonstrate the amplitude of the highest emission levels observed on a plot.*

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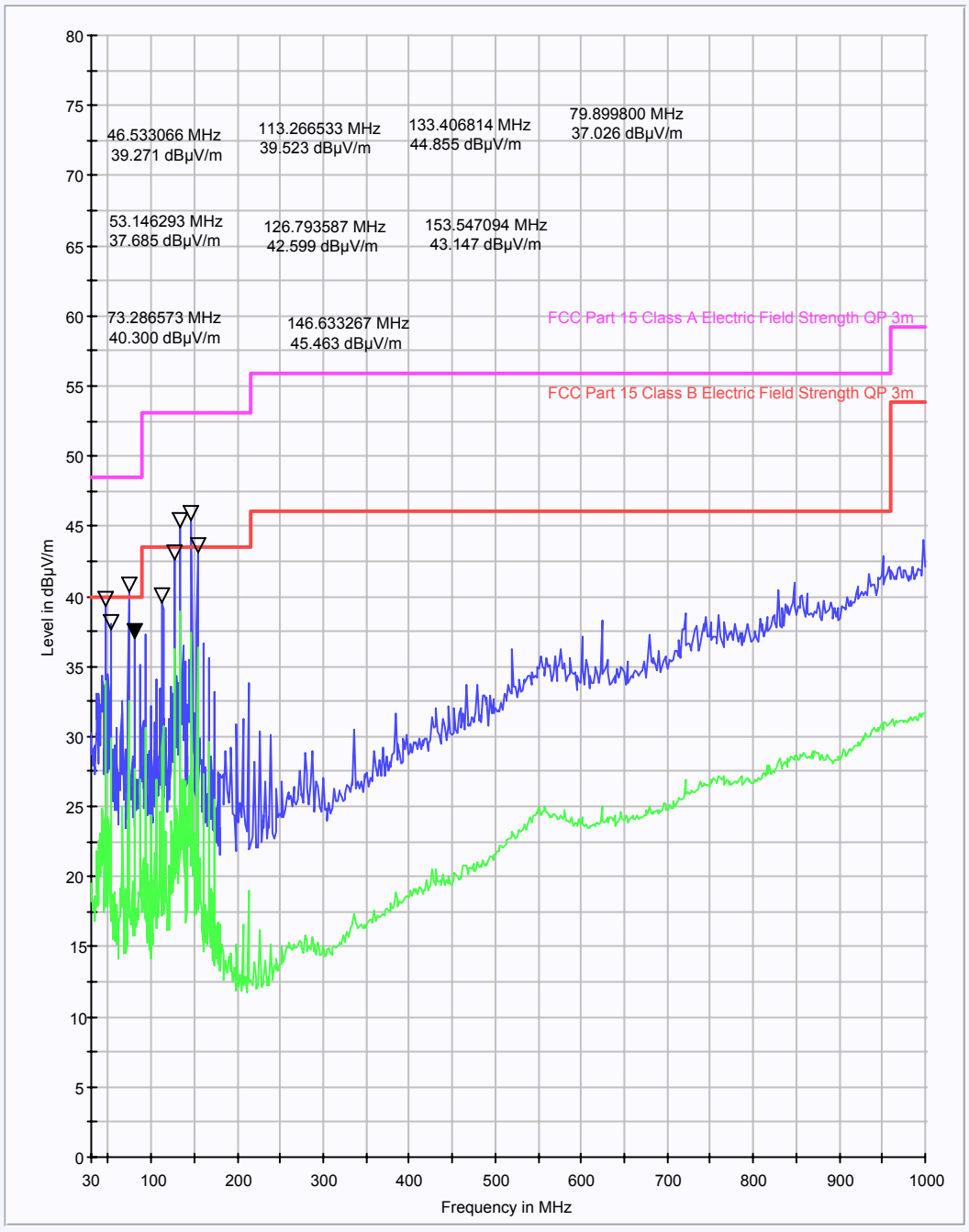
Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a) (Continued)



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Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a) (Continued)

Temperature (°C):	16	Relative Humidity (%):	64

Results:

Electric Field Strength Measurements (Frequency Range: 1 GHz to 25 GHz)
(emissions occurring in the restricted bands)

Highest Peak Level: Bottom Channel

Frequency (GHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Actual Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Note(s)
4.804258	Horizontal	50.4	-3.3	47.1	74.0	26.9	-
10.687825	Horizontal	53.7	3.8	57.5	74.0	16.5	1

Highest Average Level: Bottom Channel

Frequency (GHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Actual Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Note(s)
4.804258	Horizontal	41.4	-3.3	38.1	54.0	15.9	-
10.687825	Horizontal	31.8	3.8	35.6	54.0	18.4	1

Highest Peak Level: Middle Channel

Frequency (GHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Actual Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Note(s)
4.881633	Horizontal	49.6	-3.5	46.1	74.0	27.9	-
10.687825	Horizontal	53.7	3.8	57.5	74.0	16.5	1

Highest Average Level: Middle Channel

Frequency (GHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Actual Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Note(s)
4.881633	Horizontal	40.9	-3.5	37.4	54.0	16.6	-
10.687825	Horizontal	53.7	3.8	57.5	74.0	16.5	1

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Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a) (Continued)

Results:

Highest Peak Level: Top Channel

Frequency (GHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Actual Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Note(s)
4.881633	Horizontal	48.9	-3.8	45.1	74.0	28.9	-
10.687825	Horizontal	53.7	3.8	57.5	74.0	16.5	1

Highest Average Level: Top Channel

Frequency (GHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Actual Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Note(s)
4.881633	Horizontal	40.8	-3.8	37.0	54.0	17.0	-
10.687825	Horizontal	53.7	3.8	57.5	74.0	16.5	1

Highest Peak Level: Hopping Mode

Frequency (GHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Actual Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Note(s)
4.805921	Horizontal	49.7	-3.3	46.4	74.0	27.6	-
10.687825	Horizontal	53.7	3.8	57.5	74.0	16.5	1

Highest Average Level: Hopping Mode

Frequency (GHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Actual Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Note(s)
4.805921	Horizontal	29.6	-3.3	26.3	54.0	27.7	-
10.687825	Horizontal	53.7	3.8	57.5	74.0	16.5	1

Note(s):

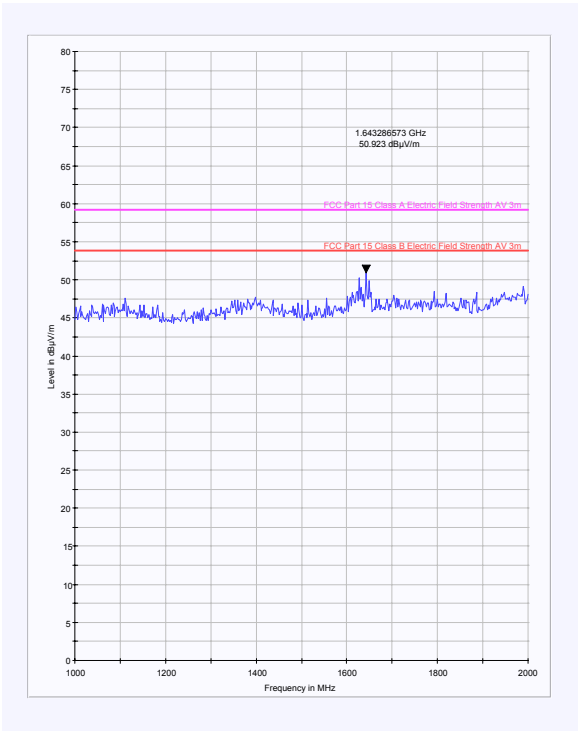
1. *The emission at 10.687825 GHz was found to be an ambient signal on the open area test site. This was confirmed by re-measuring the signal with the EUT removed from the test site.*
   The value and margin are included here to demonstrate the amplitude of a high emission level observed on a plot.

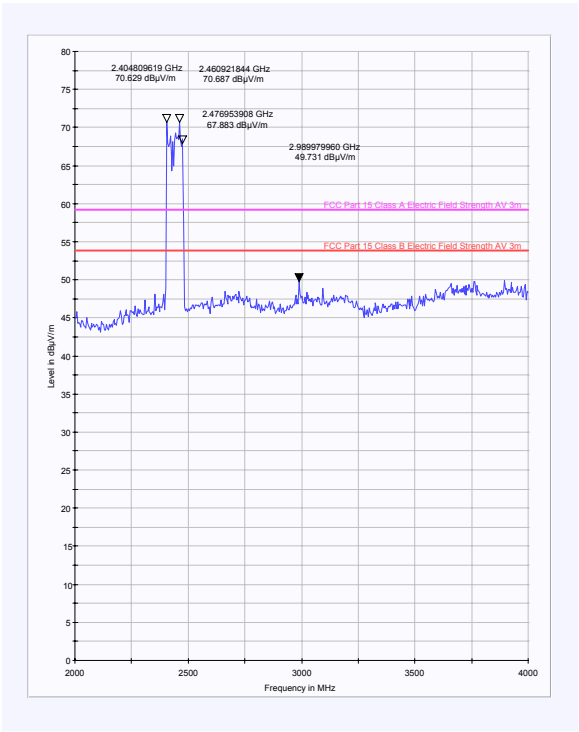
Test of: t+ Medical Ltd
Ultra Bluetooth Cradle Mk2

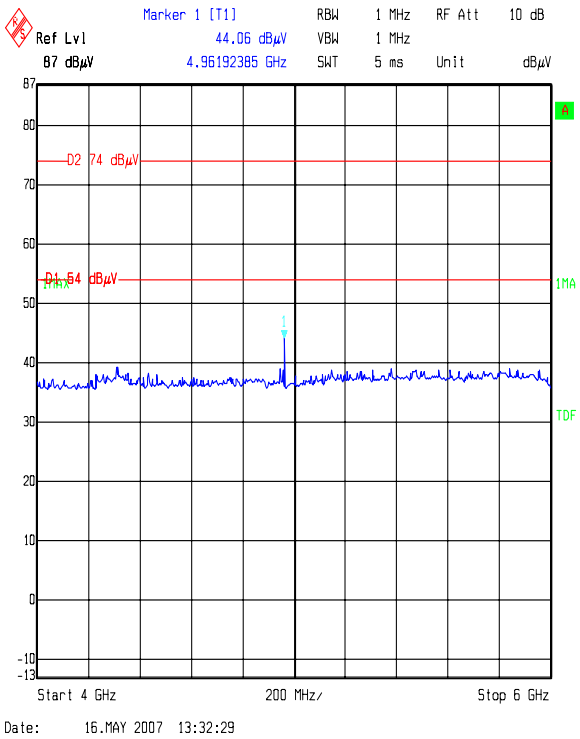
To: FCC Part 15.247: 2006 (Subpart C) and
Part 15 subpart B Clause 15.109

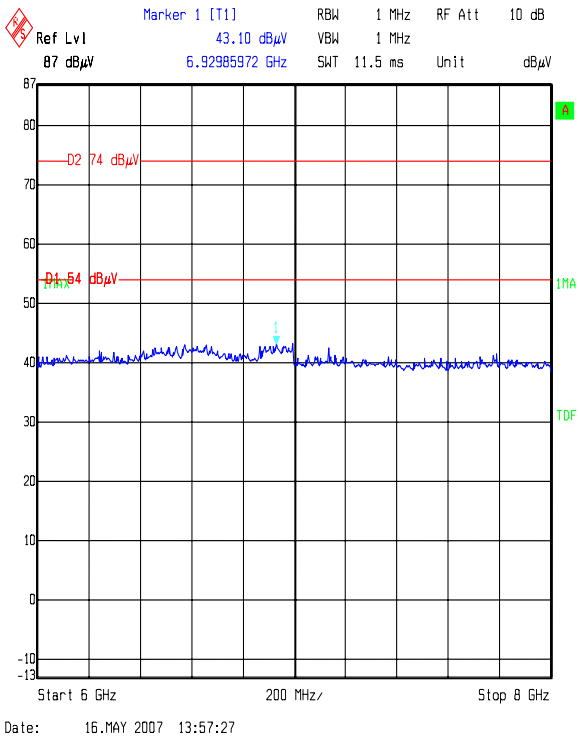
Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a) (Continued)

Graph(s):







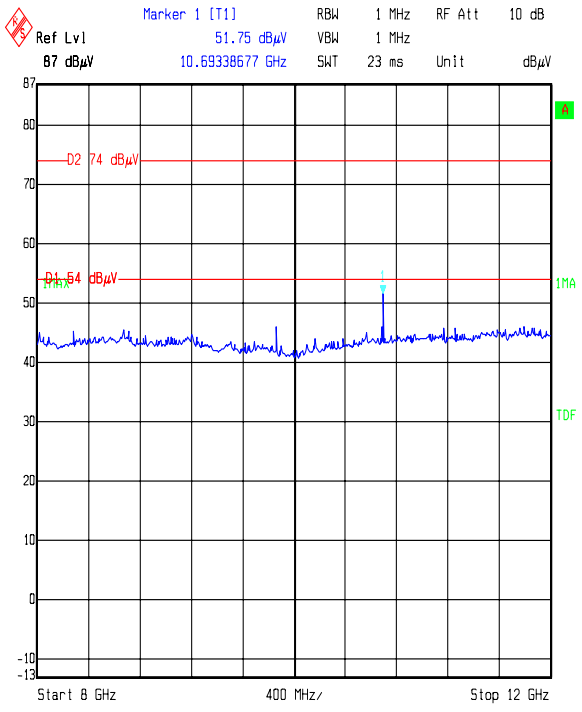


These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

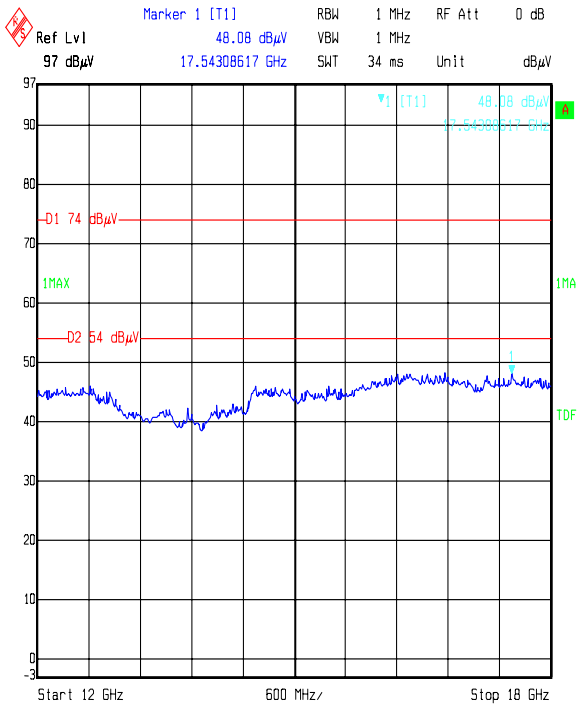
Test of: t+ Medical Ltd
Ultra Bluetooth Cradle Mk2

To: FCC Part 15.247: 2006 (Subpart C) and
Part 15 subpart B Clause 15.109

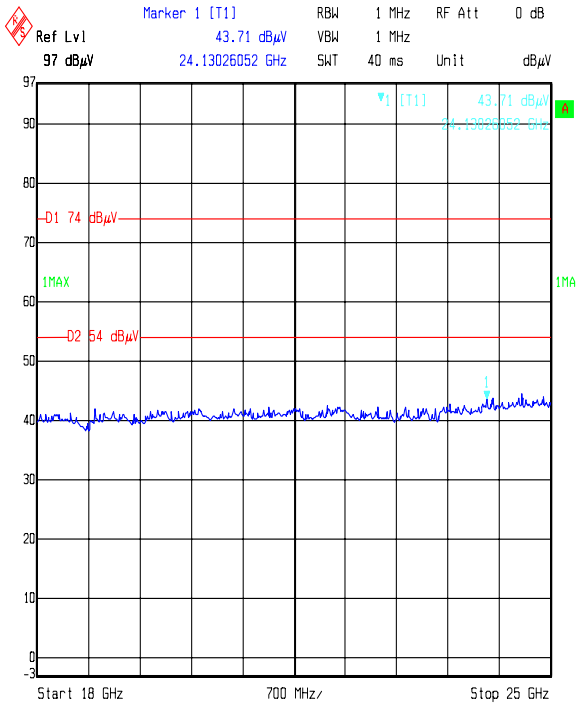
Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a) (Continued)



Date: 16.MAY 2007 14:04:44



Date: 16.MAY 2007 16:08:17



Date: 16.MAY 2007 16:16:21

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

Test of: t+ Medical Ltd
Ultra Bluetooth Cradle Mk2

To: FCC Part 15.247: 2006 (Subpart C) and
Part 15 subpart B Clause 15.109

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

Temperature (°C):	16	Relative Humidity (%):	64

Results:

Electric Field Strength Measurements

Peak Power Level Hopping Mode:

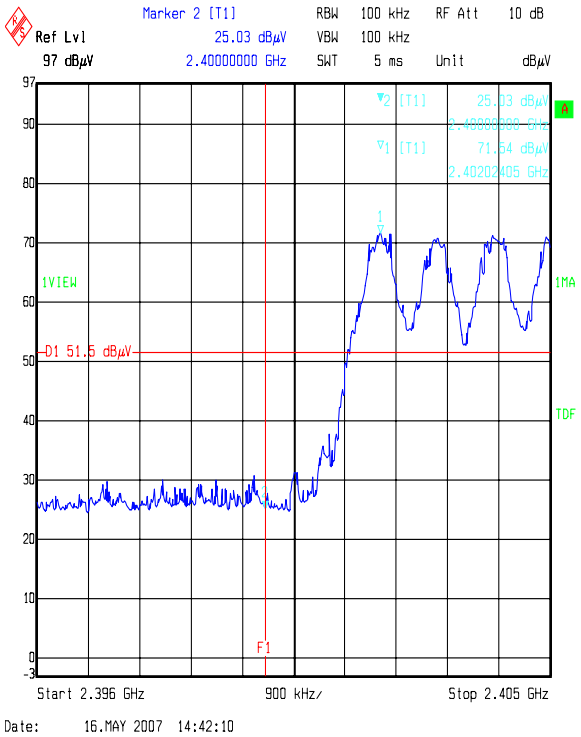
Frequency (GHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Actual Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Note(s)
2.4000	Vertical	31.5	-6.5	25.0	51.5*	26.5	-
2.4835	Vertical	45.2	-8.2	37.0	74.0	37.0	-

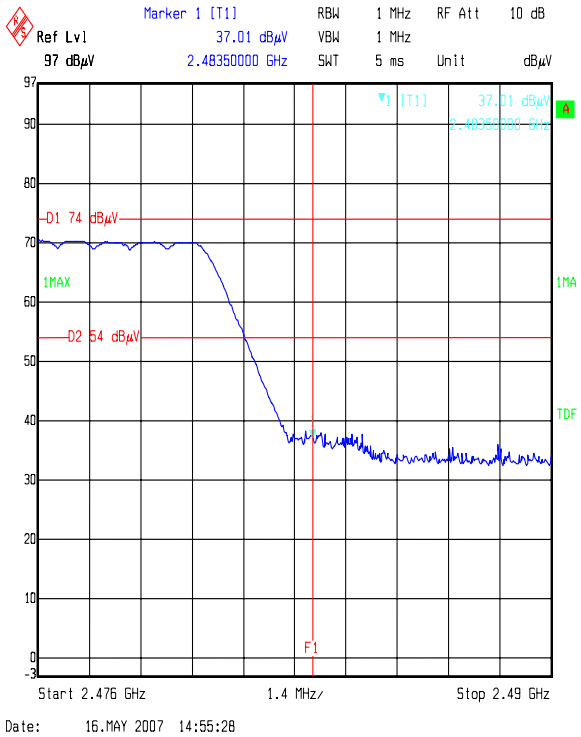
***Note:** -20 dBc limit*

Average Power Level Hopping Mode:

Frequency (GHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Actual Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Note(s)
2.4835	Vertical	31.5	-8.2	23.3	54.0	30.7	-

Graph(s):





Test of: t+ Medical Ltd
Ultra Bluetooth Cradle Mk2

To: FCC Part 15.247: 2006 (Subpart C) and
Part 15 subpart B Clause 15.109

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

Date of Test:	16.5.2007	Engineer:	PXH
Temperature (°C):	16	Relative Humidity (%):	64

Results:

Peak Power Level Static Mode:

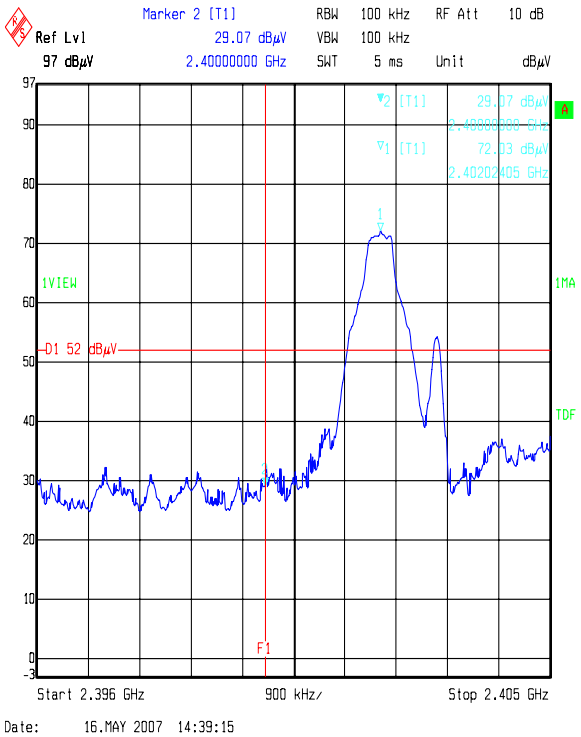
Frequency (GHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Actual Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Note(s)
2.4000	Vertical	35.6	-6.5	29.1	52.0*	22.9	-
2.4835	Vertical	46.7	-8.2	38.5	74.0	35.5	-

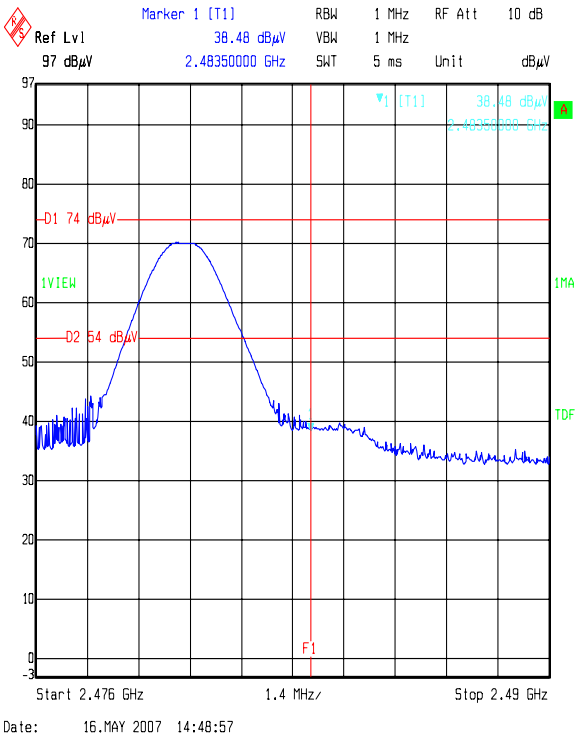
***Note:** -20 dBc limit*

Average Power Level Static Mode:

Frequency (GHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Actual Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Note(s)
2.4835	Vertical	35.5	-8.2	27.3	54.0	26.7	-

Graph(s):





7. 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
Transmitter Carrier Frequency Separation	Not Applicable	95%	±11.4 ppm
Transmitter Average Time of Occupancy	Not Applicable	95%	±0.3 ns
20 dB Bandwidth	Not Applicable	95%	± 11.4 ppm
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.

8. Measurement Methods

8.1. 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 horn antennas.

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

8.2. Carrier Frequency Separation / 20 dB Bandwidth

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

To determine the bandwidth and separation of each transmission channel the measurement analyser was configured to measure two adjacent channels whilst the EUT was in hopping mode. The spectrum analyser was configured with a resolution bandwidth and video bandwidth greater than 1% of the frequency span.

The analyser was set for a maximum hold scan to capture the profile of the signal. The peak points on the two adjacent channels were noted and the separation between them recorded.

To determine the occupied bandwidth, a resolution bandwidth of 10 kHz was used, which is greater than 1% of the 20 dB bandwidth. A video bandwidth of at least the same value was used.

The analyser was set for a maximum hold scan to capture the profile of the signal. The peak level was then determined, and a reference line was drawn 20 dB below the peak level.

The bandwidth was determined at the points where the 20 dB reference line intercepted the power envelope of the emission.

8.3. Average Time of Occupancy

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

First the maximum packet length was determined on the centre channel.

The measurement analyser was configured to the time domain mode by setting the span to zero with a sweep time sufficiently wide enough to measure one pulse.

The EUT was configured to operate in normal mode of operation. The pulse width of one transmission was then recorded. The measurement analyser was then configured in zero span (in the time domain) and the sweep time was set to 32 seconds (the closest allowable setting to 31.6 seconds). This 32 second period was determined by multiplying the number of channels the device operates over (79) by 0.4 seconds.

The number of transmissions within this period was noted and multiplied by the pulse width recorded earlier. This gives the maximum occupancy over 31.6 seconds.

8.4. Peak Output Power

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

Prior to testing being performed a suitable RF attenuator and cable were calibrated for the required frequencies. For each frequency to be measured, the calibrated level of the attenuator and cable were entered as an offset into a spectrum analyser to compensate for the measurement set up.

To determine the transmitter output power, the EUT was operated at maximum power and a result was obtained from the spectrum analyser using peak detector and trace Max Hold.

8.5. Effective Isotropic Radiated Power (EIRP)

EIRP measurements were performed in accordance with the standard, against appropriate limits.

The EIRP was measured with the EUT arranged on a non-conducting turn table on a standard test site compliant with ANSI C63.4 – 2003 Clause 5.4. The transmitter was fitted with an integral antenna; therefore all radiated tests were performed with the unit operating into the integral antenna.

The level of the EIRP was measured using a spectrum analyser.

The test antenna was positioned in the horizontal polarity. The EUT was oriented in the X plane. The test antenna was then raised and lowered until a maximum peak was observed. The turntable was then rotated through 360 degrees and the maximum peak reading obtained. The height search was then repeated to take into consideration the new angular position of the turntable. The maximum reading observed was then recorded. This procedure was then repeated with the EUT oriented in the Y and Z planes. The highest reading taken in all 3 planes was recorded. The entire procedure was then repeated with the test antenna set in the vertical polarity.

Once the final amplitude (maximised) had been obtained, the EUT was substituted with a horn antenna. The centre of the substitution antenna was set to approximately the same centre location as the EUT. The substitution antenna was set to the horizontal polarity. The substitution antenna was matched into a signal generator using a 6 dB or greater attenuator. The signal generator was tuned to the EUT's frequency under test.

The test antenna was then raised and lowered to obtain a maximum reading on the spectrum analyser. The level of the signal generator output was then adjusted until the maximum recorded EUT level was observed. The signal generator level was noted. This procedure was repeated with both test antenna and substitution antenna vertically polarised. The EIRP was calculated as:-

EIRP = Signal Generator Level - Cable Loss + Antenna Gain

Effective Isotropic Radiated Power (EIRP) (Continued)

Circumstances where the signal generator could not produce the desired a power substitution was performed with the signal generator set to 0 dBm. The radiated signal was maximised as previously described. The level indicated on the measuring receiver was noted. The delta between this level and the maximum level for the EUT was calculated and also noted. The EIRP of the signal generator was calculated using the above formulae. The recorded delta was added to the calculated EIRP to obtain the substituted EUT EIRP.

Delta (dB) = EUT – SG

where :

EUT = spectrum analyser indicated EUT raw level

SG = spectrum analyser indicated signal generator raw level

The signal generator actual EIRP is calculated as:

EIRP SG= Signal Generator Level - Cable Loss + Antenna Gain

The EUT EIRP is calculated as:

EIRP EUT = EIRP SG + Delta.

The test equipment settings for EIRP measurements were as follows:

Receiver Function	Setting
Detector Type:	Peak
Mode:	Not applicable
Bandwidth:	1 MHz
Amplitude Range:	100 dB
Sweep Time:	Coupled

8.6. 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.	Date Last Calibrated	Cal. Interval (Months)
A028	9188-2 Horn Antenna 1-2 GHz	Eaton	91888-2	304	08 Jun 2006	36
A031	2 to 4 GHz Eaton Horn Antenna	Eaton	91889-2	557	08 Jun 2006	36
A1037	Green Bilog Antenna	Chase EMC Ltd	CBL6112B	2413	20 Sep 2006	12
A1515	1.0 to 4.4 GHz Horn Antenna	Stoddart Aircraft Radio Co., Inc	92341-1	0436	17 Nov 2006	12
A1534	Preamplifier 1-26.5 GHz	Hewlett Packard	8449B OPT H02	3008A00405	Cal before use	-
A253	WG 12 Microwave Horn	Flann Microwave	12240-20	128	17 Nov 2006	36
A254	WG 14 Microwave Horn	Flann Microwave	14240-20	139	17 Nov 2006	36
A255	WG 16 Microwave Horn	Flann Microwave	16240-20	519	17 Nov 2006	36
A256	WG 18 Microwave Horn	Flann Microwave	18240-20	400	17 Nov 2006	36
A259	Bilog Antenna	Chase	CBL6111	1513	13 Mar 2007	12
A436	WG 20 Microwave Horn Antenna	Flann	20240-20	330	24 Apr 2006	36
C1037	SAU RF Cable	Anite Telecoms	C1037-6042	6042 3/D	Cal before use	-
C1081	UFA210A Rosenberger Cable	Rosenberger	FA210A1020M 5050	28463-2	Cal before use	-
C1083	Cable	Rosenberger	001	2799	Cal before use	-
C1167	3m N-Type Cable	Rosenberger Micro-Coax	FA210A103000 7070	43190-01	Cal before use	-
C1195	1 mtr 40 GHz coax cable	Utiflex	FA147A1015M 2020	3502 27138-02	Cal before use	-
C341	3m site cable	Andrews	None	None	Cal before use	-

Test Equipment Used (Continued)

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
C461	DC to 18GHz Rosenberger	Rosenberger	UFA210A-1-1182-704704	98H0305	Cal before use	-
C574	50 ohm co-ax	Rosenberger	UFA210A-1-788-50x50	97E0937	Cal before use	-
M024	EZM Spectrum Monitor	Rohde & Schwarz	EZM	873 952/006	Not calibrated	-
M044	ESVP Receiver	Rohde & Schwarz	ESVP	891 845/026	06 Mar 2007	12
M1242	Spectrum Analyser	Rohde & Schwarz, Inc.	FSEM30	845986_022	08 Sep 2006	12
M1379	ESIB 7 Test Receiver	Rohde and Schwarz	ESIB7	100330	03 Jul 2007	12
M1149	Bluetooth Test Set	Anritsu	MT8852A	6K00001529	Not calibrated	-
S0520	Power Supply	GW instek	GPC-3030	E835141	Cal before use	-
S201	3m & 10m OATS	RFI	1		18 Jul 2006	12
S202	3m OATS	RFI	2	S202-15011990	17 Nov 2006	12
S209	Emissions Screened Room	RFI	9		29 May 2006	12

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

Appendix 2. Test Configuration Drawings

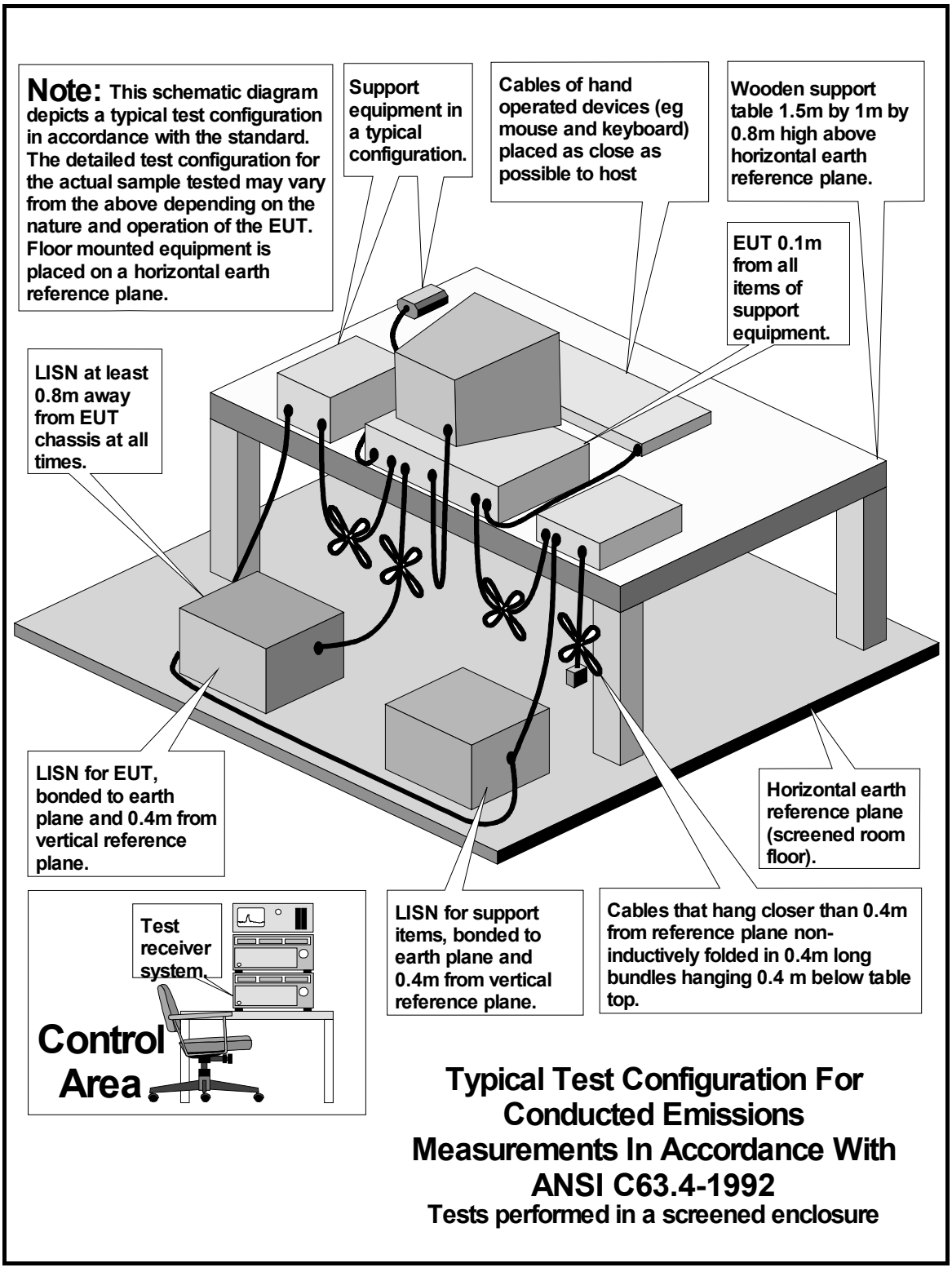
This appendix contains the following drawings:

Drawing Reference Number	Title
DRG\49235JD08A\EMICON	Test configuration for measurement of conducted emissions.
DRG\49235JD08A\EMIRAD	Test configuration for measurement of radiated emissions.

Test of: t+ Medical Ltd
Ultra Bluetooth Cradle Mk2

To: FCC Part 15.247: 2006 (Subpart C) and Part 15 subpart B Clause 15.109

DRG\49235JD08A\EMICON

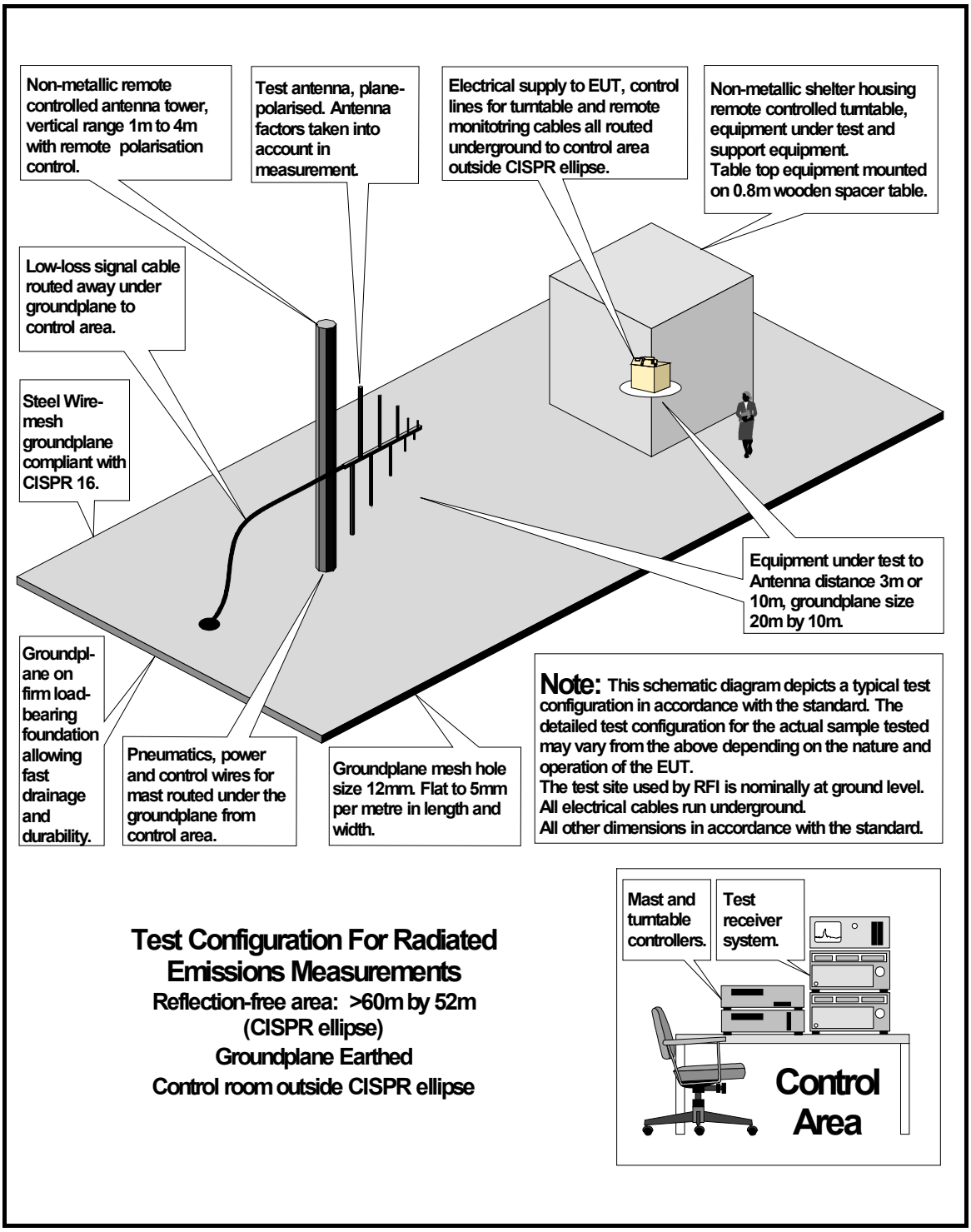


Typical Test Configuration For Conducted Emissions Measurements In Accordance With ANSI C63.4-1992
Tests performed in a screened enclosure

Test of: t+ Medical Ltd
Ultra Bluetooth Cradle Mk2

To: FCC Part 15.247: 2006 (Subpart C) and Part 15 subpart B Clause 15.109

DRG\49235JD08A\EMIRAD



Test Configuration For Radiated Emissions Measurements
Reflection-free area: >60m by 52m (CISPR ellipse)
Groundplane Earthed
Control room outside CISPR ellipse