

# TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: Stilo srl  
STILO BT Module EI0001

To: FCC Part 15.247: 2007 (Subpart C)

**Test Report Serial No:**  
RFI/RPTE4/RP48855JD06A

**Supersedes Test Report Serial No:**  
RFI/RPTE3/RP48855JD06A

**This Test Report Is Issued Under The  
Authority Of Steve Flooks, Service Leader:**

pp



Checked By: Steve Flooks	Report Copy No: PDF01
Issue Date: 28 November 2008	Test Dates: 25 March 2008 to 10 April 2008 and 26 November 2008

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Registered in England and Wales. Company number: 2117901

**RFI GLOBAL SERVICES LTD**

**Test Report**

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## **1. Customer Information**

<b>Company Name:</b>	Stilo srl
<b>Address:</b>	Via Piave 41/3 Treviolo (Bg) 24048
<b>Contact Name:</b>	Mr. A. Piccioli

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## **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 was a Bluetooth® module class 2.

### **2.2. Identification of Equipment Under Test (EUT)**

#### **1<sup>st</sup> Sample (consisting of the following)**

<b>Description:</b>	Stilo Bluetooth module class 2
<b>Brand Name:</b>	Stilo
<b>Model Name or Number:</b>	EI0001
<b>Serial Number:</b>	47/07 (from PCB)
<b>FCC ID Number:</b>	WAWEI0001
<b>Country of Manufacture:</b>	Italy
<b>Date of Receipt:</b>	25 March 2008

<b>Description:</b>	Battery
<b>Brand Name:</b>	Stilo
<b>Model Name or Number:</b>	LI-ION Battery 3.7V 650mAh
<b>Serial Number:</b>	B001001
<b>Country of Manufacture:</b>	Italy
<b>Date of Receipt:</b>	25 March 2008

<b>Description:</b>	Microphone
<b>Country of Manufacture:</b>	Italy
<b>Date of Receipt:</b>	25 March 2008

<b>Description:</b>	Stereo Headphones
<b>Country of Manufacture:</b>	Italy
<b>Date of Receipt:</b>	25 March 2008

<b>Description:</b>	On/Off and Volume Control
<b>Country of Manufacture:</b>	Italy
<b>Date of Receipt:</b>	25 March 2008

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<b>Description:</b>	Charger
<b>Brand Name:</b>	Stilo
<b>Model Name or Number:</b>	0H-1048A0500300U-VDE
<b>Serial Number:</b>	None stated
<b>Country of Manufacture:</b>	China

#### 2<sup>nd</sup> Sample

<b>Description:</b>	WRC Moto Helmet
<b>Brand Name:</b>	Stilo
<b>Model Name or Number:</b>	FA0200AA1L
<b>Serial Number:</b>	None stated
<b>Country of Manufacture:</b>	Italy
<b>Date of Receipt:</b>	14 August 2008

#### **2.3. Modifications Incorporated in the EUT**

During the course of testing the EUT was not modified.

#### **2.4. Support Equipment**

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

<b>Description:</b>	Laptop
<b>Brand Name:</b>	Dell
<b>Model Name or Number:</b>	Latitude D610
<b>Serial Number:</b>	PC371NT
<b>Cable Length and Type:</b>	1 meter, Serial 9 Pin
<b>Connected to Port:</b>	Serial

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## 2.5. Additional Information Related to Testing

<b>Intended Operating Environment:</b>	Commercial/Residential		
<b>Equipment Category:</b>	Bluetooth		
<b>Type of Unit:</b>	Portable (Transceiver), battery powered		
<b>Power Supply Requirement:</b>	Internal battery Supply of: 3.7 V 650 mAh		
<b>Transmit Frequency Range:</b>	2402 MHz to 2480 MHz		
<b>Transmit Channels Tested:</b>	<b>Channel Description</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Bottom	0	2402
	Middle	39	2441
	Top	78	2480
<b>Receive Frequency Range:</b>	2402 MHz to 2480 MHz		
<b>Receive Channels Tested:</b>	<b>Channel Description</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Bottom	0	2402
	Middle	39	2441
	Top	78	2480

## 2.6. Port Identification

Port	Description	Type/Length
1	Serial Port (modified sample only)	9 Pin D-Connector / 1 meter
2	Headphone	4 wire, <1m
3	Microphone	2 wire, <1m
4	On/Off and Volume Control	Flexi cable, <1m
5	Charge Port	Twin, <1m

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### **3. Test Specification, Methods and Procedures**

#### **3.1. Test Specification**

Reference:	FCC Part 15.247: 2007 Subpart C
Title:	Code of Federal Regulations, Part 15.247 (47CFR15)

Reference:	FCC Part 15.107: 2007 Subpart B
Title:	Code of Federal Regulations, Part 15 (47CFR15)

Reference:	FCC Part 15.109: 2007 Subpart B
Title:	Code of Federal Regulations, Part 15 (47CFR15)

#### **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.

#### **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.

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#### **4. Deviations from the Test Specification**

There were no deviations from the test specification.

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## **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:

- Transceiver mode (for transmitter tests) – The device was configured in *Bluetooth* Test Mode to allow control of the test channel. (The EUT only operates in basic rate *Bluetooth* mode with a maximum packet size of DH3).
- Idle Mode – EUT in a standby mode with no *Bluetooth* link enabled.

### **5.2. Configuration and Peripherals**

The EUT was tested in the following configuration:

- The EUT was supplied outside of the standard helmet enclosure, (modified sample), to enable connection for setting up *Bluetooth* test mode. This configuration was evaluated as being worst case with regards to radiated spurious emissions.
- The EUT was tested in its standard configuration with a microphone, stereo ear phones and standard battery fitted.

Notes:

1. Additional Radiated Spurious pre-scans were performed on a standard helmet, (refer to 2<sup>nd</sup> sample in section 2.2), to determine that the configuration described above was worst case.

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## **6. Summary of Test Results**

Range of Measurements	FCC Part 15 Reference	Port Type	Result
Idle Mode AC Conducted Emissions	Section 15.107	Antenna	Complied
Idle Mode Radiated Spurious Emissions	Section 15.109	Antenna	Complied
Transmitter 20 dB Bandwidth	Section 2.1049	Antenna	Complied
Transmitter Carrier Frequency Separation	Section 15.247(a)(1)	Antenna	Complied
Transmitter Average Time of Occupancy	Section 15.247(a)(1)(iii)	Antenna	Complied
Transmitter Maximum Peak Output Power	15.247(b)(3)	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

### **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, except AC Conducted Emissions which were performed at RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH.

- FCC Site Registration Number: 90895 (Ewhurst Park)
- FCC Site Registration Number: 209735 (Wade Road)

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## **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.

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## **7.2. Test Results**

### **7.2.1. Idle Mode Conducted Emissions**

### **7.2.2. Quasi Peak Detector Measurements**

#### **Test Summary:**

<b>Port:</b>	AC Mains
<b>Basic Standard:</b>	FCC Part 15.107
<b>Test Method:</b>	ANSI C63.4 Section 7

#### **Environmental Conditions:**

<b>Temperature Variation (°C):</b>	24 to 24
<b>Relative Humidity Variation (%):</b>	33 to 33
<b>Atmospheric Pressure Variation (mb):</b>	1016 to 1016

#### **Results:**

Frequency (MHz)	Line	Quasi Peak Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Note(s)	Result
0.177000	Live 1	43.8	64.6	20.8	-	Complied
0.415500	Neutral	41.8	57.5	15.7	-	Complied
0.474000	Live 1	40.8	56.4	15.6	-	Complied
0.649500	Neutral	37.9	56.0	18.1	-	Complied
1.005000	Neutral	37.7	56.0	18.3	-	Complied
1.423500	Neutral	35.2	56.0	20.8	-	Complied
1.779000	Neutral	35.1	56.0	20.9	-	Complied
2.193000	Neutral	34.7	56.0	21.3	-	Complied
2.607000	Neutral	34.2	56.0	21.8	-	Complied

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### **7.2.3. Average Detector Measurements**

Following the initial scans and quasi peak measurements, further measurements were made at the relevant frequencies using an average detector. The measured levels were as follows:

**Test Summary:**

<b>Port:</b>	AC Mains
<b>Basic Standard:</b>	FCC Part 15.107
<b>Test Method:</b>	ANSI C63.4 Section 7

**Environmental Conditions:**

<b>Temperature Variation (°C):</b>	24 to 24
<b>Relative Humidity Variation (%):</b>	33 to 33
<b>Atmospheric Pressure Variation (mb):</b>	1016 to 1016

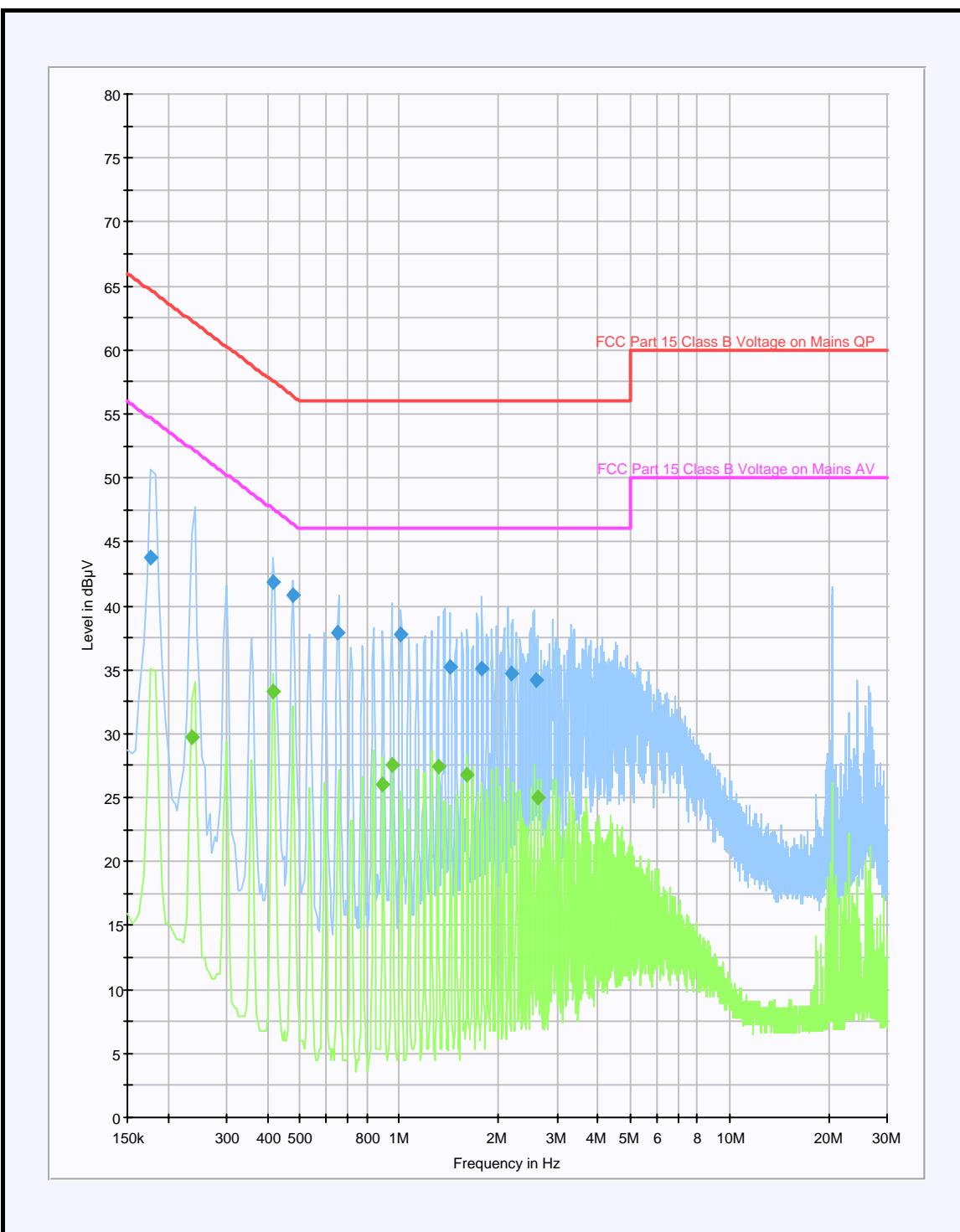
**Results:**

Frequency (MHz)	Line	Average Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Note(s)	Result
0.235500	Live 1	29.8	52.3	22.5	-	Complied
0.415500	Live 1	33.3	47.5	14.2	-	Complied
0.892500	Live 1	26.1	46.0	19.9	-	Complied
0.951000	Live 1	27.5	46.0	18.5	-	Complied
1.306500	Live 1	27.5	46.0	18.5	-	Complied
1.603500	Live 1	26.8	46.0	19.2	-	Complied
2.611500	Live 1	25.0	46.0	21.0	-	Complied

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Conducted Emissions (continued)



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#### 7.2.4. Idle Mode Radiated Spurious Emissions

Tests were performed using the test methods detailed in ANSI C63.4 Section 8, and Public Notice DA 00-705 (March 30, 2000).

#### Results:

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

Frequency (MHz)	Antenna Polarity	Q-P Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
60.661323	Vertical	16.5	40.0	23.5	Complied
71.482966	Vertical	17.3	40.0	22.7	Complied
81.703407	Vertical	14.0	40.0	26.0	Complied
142.124248	Horizontal	30.9	43.5	12.6	Complied
174.589178	Horizontal	18.9	43.5	24.6	Complied

#### Note(s):

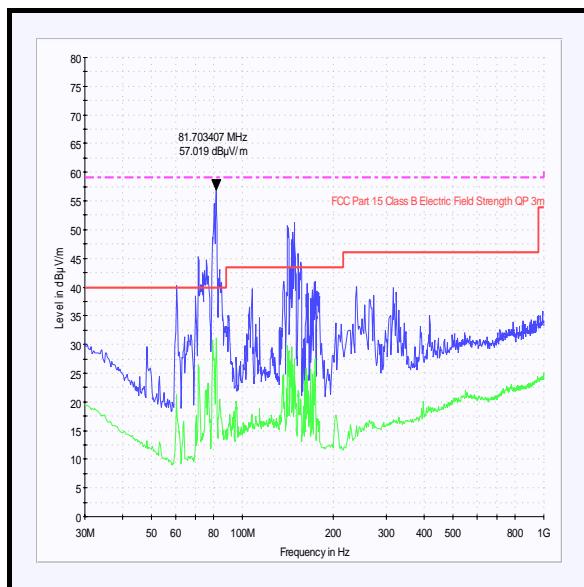
1. *The preliminary scans showed similar emission levels for bottom and middle channels below 1 GHz, therefore final radiated emissions measurements were performed with the EUT set to the top channel only.*

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### Idle Mode Radiated Spurious Emissions (Continued)



Idle Mode; 30 MHz to 1 GHz

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

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**7.2.5. Idle Mode Radiated Spurious Emissions (Continued)**

**Results:**

**Electric Field Strength Measurements (Frequency Range: 1 to 13 GHz)**

**Highest Peak Level: Top Channel**

**Highest Average Level:**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Average Limit (dB $\mu$ V/m)	Margin (dB)	Result
1.707415	Vertical	52.4	-6.5	45.9	54.0	8.4	Complied
3.895792	Vertical	53.4	-6.1	47.3	54.0	6.7	Complied
5.434870	Vertical	42.8	-3.2	39.6	54.0	14.4	Complied
6.509018	Vertical	42.9	0.4	43.3	54.0	10.7	Complied
13.438878	Vertical	36.7	8.7	45.4	54.0	8.6	Complied

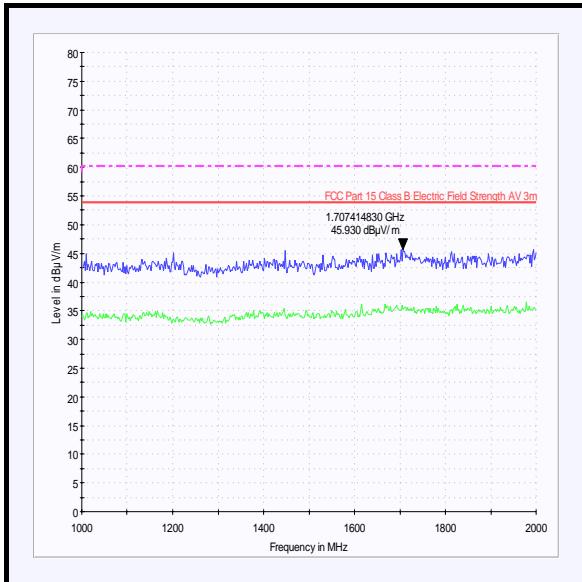
**Note(s):**

1. No spurious emission were detected above the noise floor of the measuring receiver, therefore the highest peak noise floor reading of the measuring receiver was recorded as shown in each plots below. The peak value in each plot was compared with the average limit which is 20dB below the peak limit.
2. The preliminary scans showed similar emission levels for bottom and middle channels above 1 GHz, therefore final radiated emissions measurements were performed with the EUT set to the top channel only.

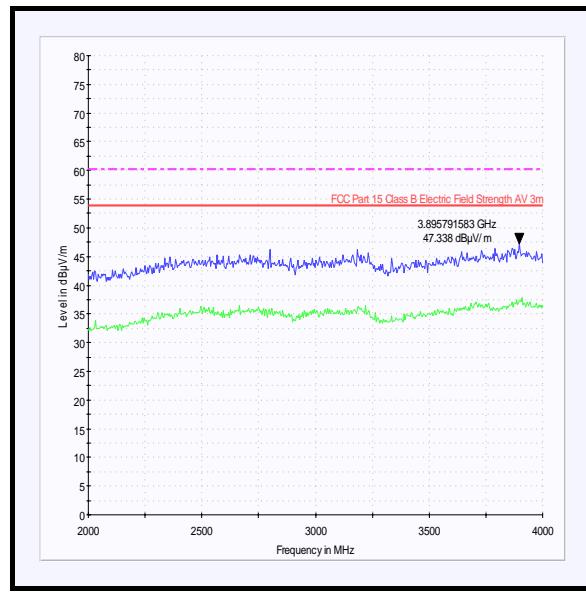
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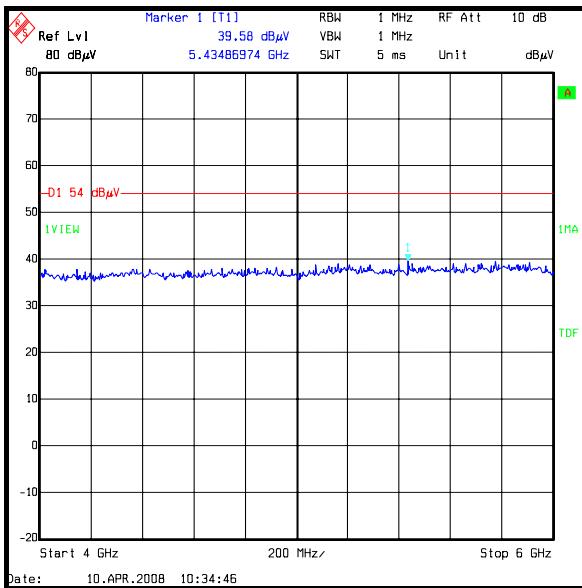
### Idle Mode Radiated Spurious Emissions (Continued)



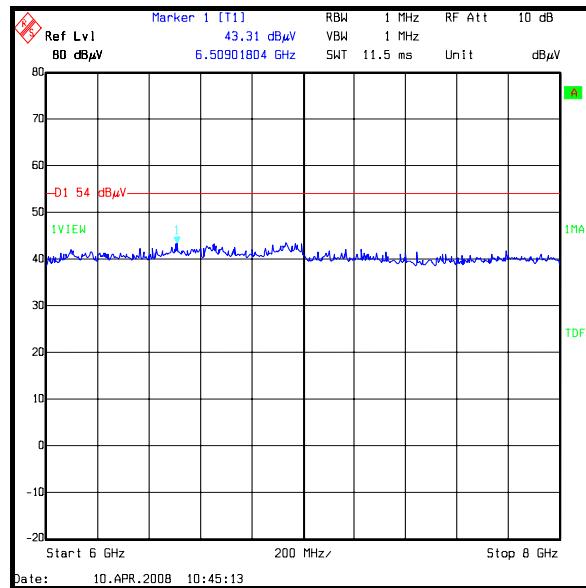
Idle Mode; 1 GHz to 2 GHz



Idle Mode; 2 GHz to 4 GHz



Idle Mode; 4 GHz to 6 GHz



Idle Mode; 6 GHz to 8 GHz

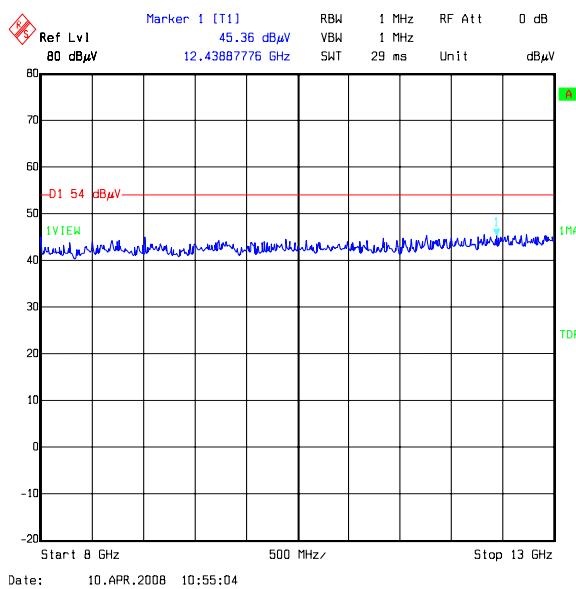
Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying tables.

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### Idle Mode Radiated Spurious Emissions (Continued)



#### **Idle Mode; 8 GHz to 13 GHz**

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

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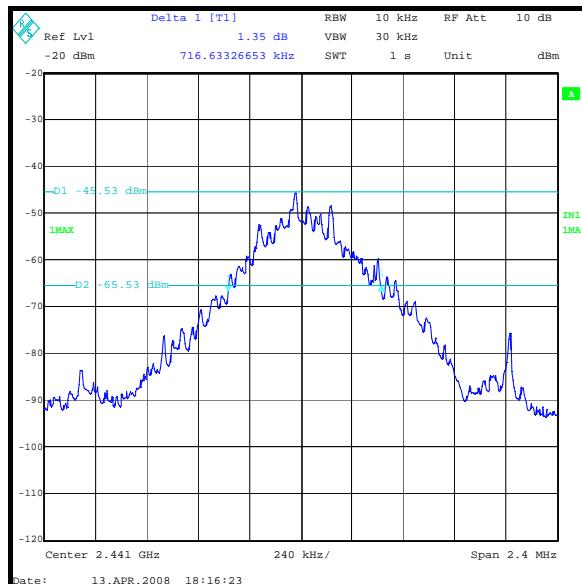
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### **7.2.6. Transmitter 20 dB Bandwidth**

Tests were performed using the test methods detailed in Public Notice DA 00-705 (March 30, 2000)

#### **Results:**

Transmitter 20 dB Bandwidth (kHz)	Limit (kHz)
716.63326653	None specified



**TX mode: 20 bB BW, Basic Rate**

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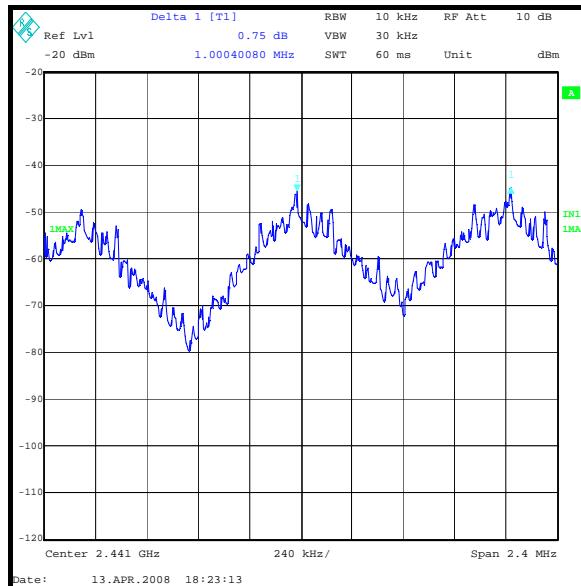
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### **7.2.7. Transmitter Carrier Frequency Separation**

Tests were performed using the test methods detailed in Public Notice DA 00-705 (March 30, 2000)

#### **Results:**

Transmitter Carrier Frequency Separation (kHz)	Limit $\frac{2}{3}$ of 20 dB BW (kHz)	Margin (kHz)	Result
1000.40080	477.7555	522.6453	Complied



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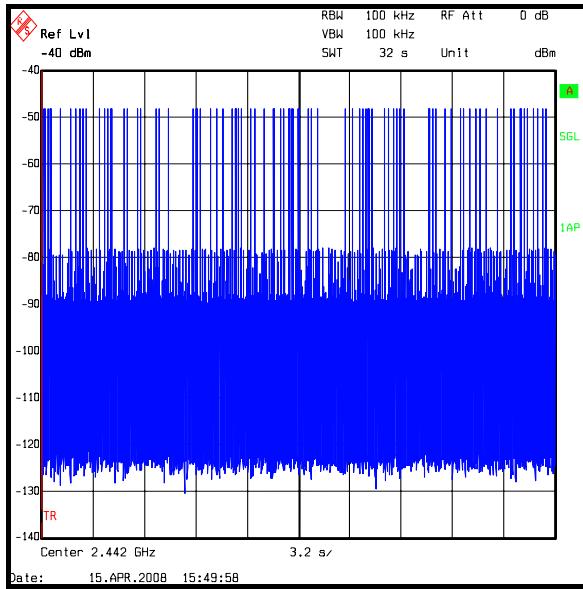
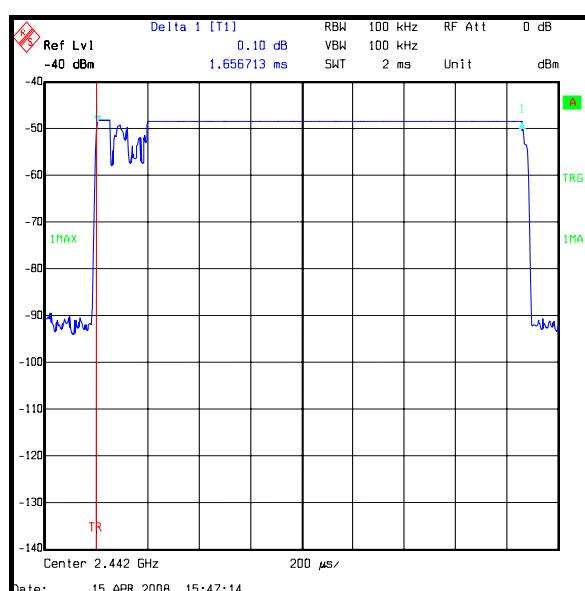
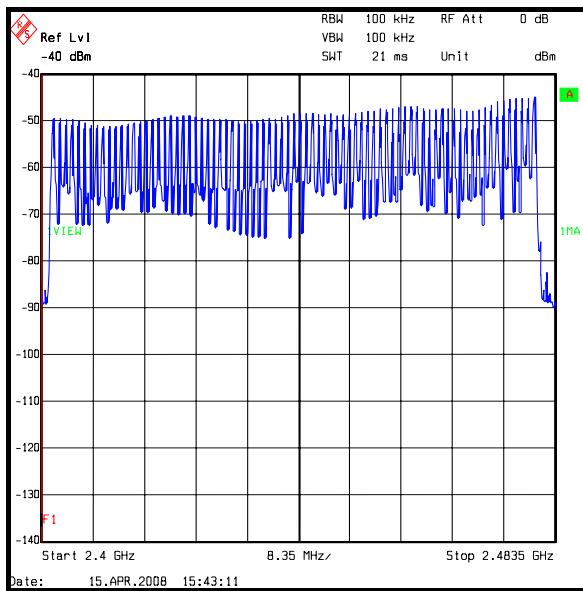
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### 7.2.8. Transmitter Average Time of Occupancy

Tests were performed using the test methods detailed in Public Notice DA 00-705 (March 30, 2000)

#### Results:

Emission Width (μs)	Number of Hops in 31.6 Seconds	Average Time of Occupancy (s)	Limit (s)	Margin (s)	Result
1656.713	85	0.141	0.4	0.259	Complied



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### **7.2.9. Transmitter Maximum Peak Output Power**

Tests were performed using the test methods detailed in Public Notice DA 00-705 (March 30, 2000), ANSI TIA-603-C-2004 and FCC CFR Part 2.

#### **Results:**

#### **Battery Powered Devices**

Channel	Conducted RF O/P Power (dBm)	Stated Antenna Gain (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	-3.0	4.1	1.1	30.0	28.9	Complied
Middle	-3.1	4.1	1.0	30.0	29.0	Complied
Top	-3.8	4.1	-0.3	30.0	30.3	Complied

#### **Note(s):**

1. As per the requirements of Public Notice DA 00-705, the stated antenna gain of the EUT is 4.1dBi which, when added to the highest (worst case) measured conducted peak output power of -3.0dBm (from the table above) gives a de facto EIRP of 1.1dBm. This is in compliance with the requirements of Section 15.247(b)(1) for de facto EIRP limitation i.e. 1 Watt (30dBm).

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### **7.2.10. Transmitter Radiated Emissions**

Tests were performed using the test methods detailed in ANSI C63.4 Section 8 and Public Notice DA 00-705 (March 30, 2000).

#### **Results:**

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

##### **Top Channel**

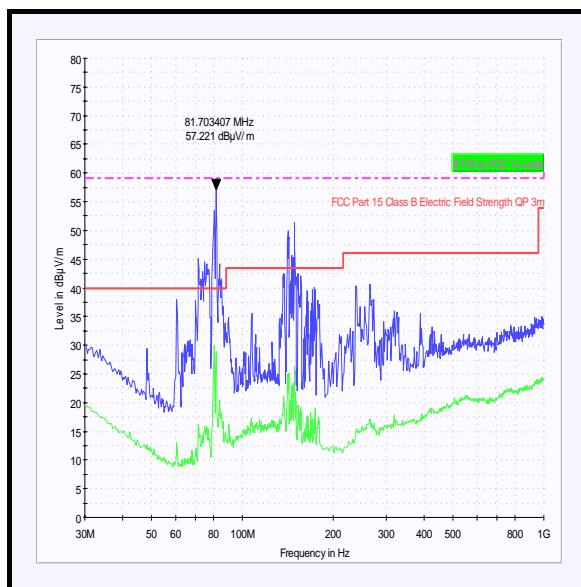
Frequency (MHz)	Antenna Polarity	Q-P Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
60.661323	Vertical	17.1	40.0	22.9	Complied
71.482966	Vertical	16.7	40.0	23.3	Complied
81.703407	Vertical	14.9	40.0	25.1	Complied
141.523046	Horizontal	29.4	43.5	14.1	Complied
148.737475	Horizontal	32.1	43.5	11.4	Complied
174.889780	Horizontal	19.2	43.5	24.3	Complied

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**Transmitter Radiated Emissions (Continued)**



***TX Mode: 30 MHz to 1 GHz***

*The pre-scan plot is shown above. The final measurements were carried out with both antennas as supplied by the client.*

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**Transmitter Radiated Emissions (Continued)**

**Results:**

**Electric Field Strength Measurements (Frequency Range: 1 to 26.5GHz) (emissions occurring in the restricted bands)**

**Highest Peak Level: Bottom Channel**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
4.804023	Vertical	59.6	-3.3	56.3	74.0	17.7	Complied

**Highest Average Level: Bottom Channel**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
4.804023	Vertical	51.8	-3.3	48.5	54.0	5.5	Complied

**Highest Peak Level: Middle Channel**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
4.882010	Vertical	60.5	-3.3	57.2	74.0	16.8	Complied

**Highest Average Level: Middle Channel**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
4.882010	Vertical	51.3	-3.3	48.0	54.0	6.0	Complied

**Test of: Stilo srl**  
**STILO BT Module EI0001**

**To: FCC Part 15.247: 2007 (Subpart C)**

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**Transmitter Radiated Emissions (Continued)**

**Results:**

**Highest Peak Level: Top Channel**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
4.959563	Vertical	57.8	-3.3	54.5	74.0	19.5	Complied

**Highest Average Level: Top Channel**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
4.959563	Vertical	49.9	-3.3	46.3	54.0	7.7	Complied

**Highest Peak Level: Hopping Mode**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
4.911710	Vertical	60.3	-3.3	57.0	74.0	17.0	Complied

**Highest Average Level: Hopping Mode**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
4.911710	Vertical	35.2	-3.3	31.9	54.0	22.1	Complied

**Test of: Stilo srl**  
**STILO BT Module EI0001**

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**Transmitter Radiated Emissions (Continued)**

**Results:**

**Electric Field Strength Measurements (Frequency Range: 1 to 26.5GHz) (emissions outside the restricted bands)**

**Highest Peak Level: Bottom Channel**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	-20 dBc Limit (dB $\mu$ V/m)	Margin (dB)	Result
9.608000	Vertical	37.3	3.1	40.4	55.0	14.6	Complied

**Highest Peak Level: Middle Channel**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	-20 dBc Limit (dB $\mu$ V/m)	Margin (dB)	Result
9.764000	Vertical	36.0	3.1	39.1	55.0	15.9	Complied

**Highest Peak Level: Top Channel**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	-20 dBc Limit (dB $\mu$ V/m)	Margin (dB)	Result
9.920002	Vertical	38.6	3.7	42.3	55.0	12.7	Complied

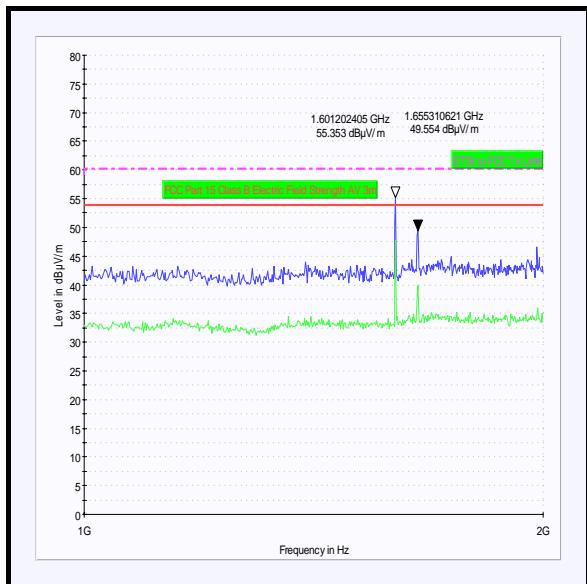
**Highest Peak Level: Hopping Mode**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	-20 dBc Limit (dB $\mu$ V/m)	Margin (dB)	Result
9.910767	Vertical	38.0	3.7	41.7	55.0	13.3	Complied

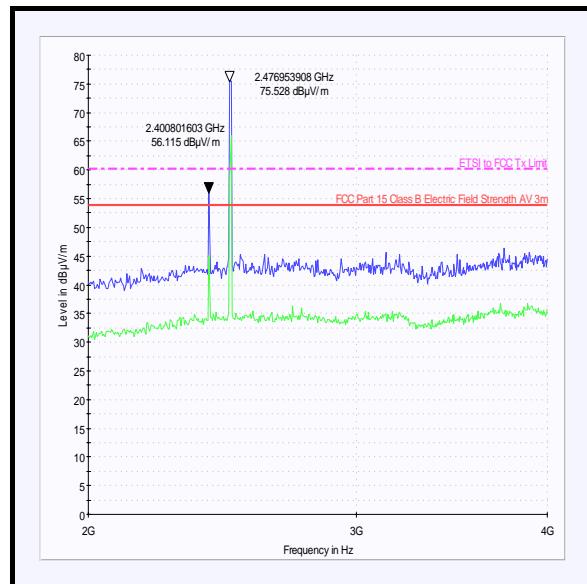
**Test of: Stilo srl**  
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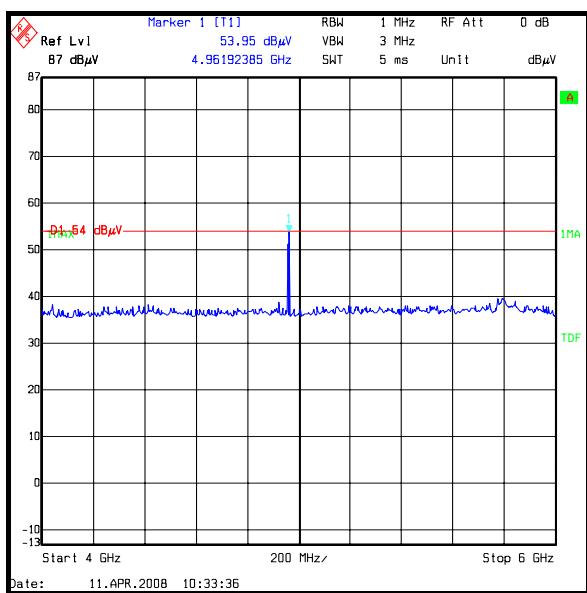
**Transmitter Radiated Emissions (Continued)**



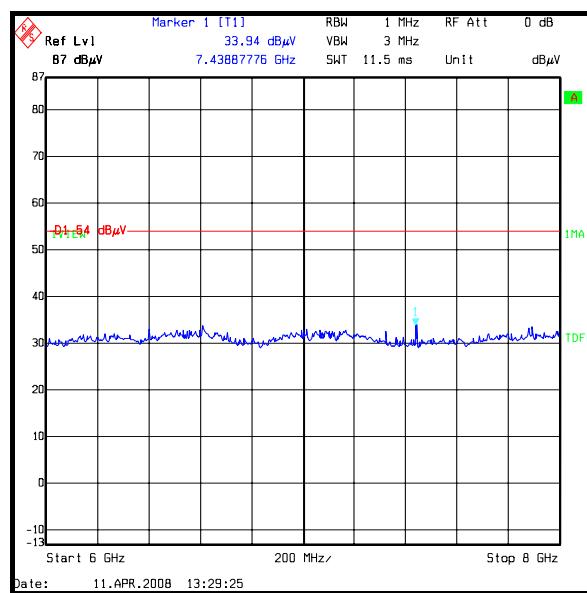
**TX Mode: 1 GHz to 2 GHz**



**TX Mode: 2 GHz to 4 GHz**



**TX Mode: 4 GHz to 6 GHz**



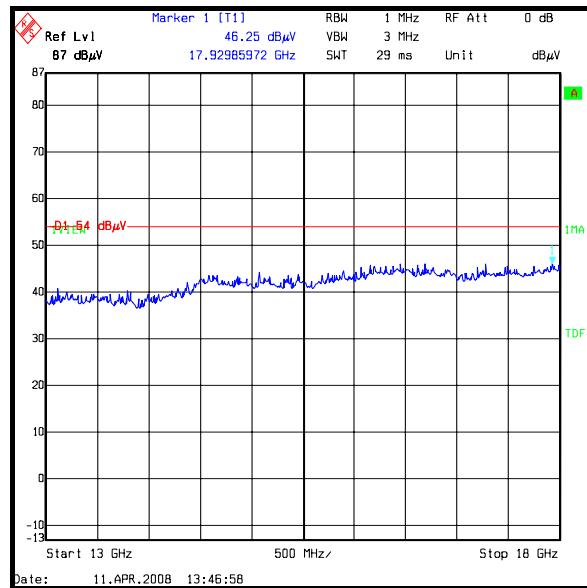
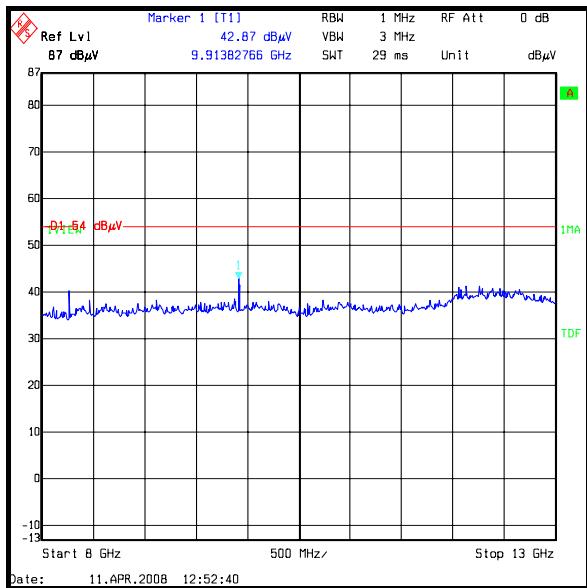
**TX Mode: 6 GHz to 8 GHz**

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

**Test of: Stilo srl**  
**STILO BT Module EI0001**

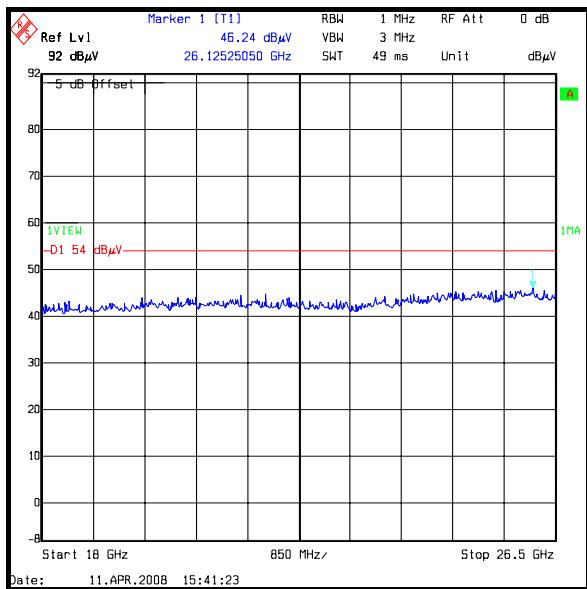
**To: FCC Part 15.247: 2007 (Subpart C)**

**Transmitter Radiated Emissions (Continued)**



**TX Mode: 8 GHz to 13 GHz**

**TX Mode: 13 GHz to 18 GHz**



**TX Mode: 18 GHz to 26.5 GHz**

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

**Test of: Stilo srl**  
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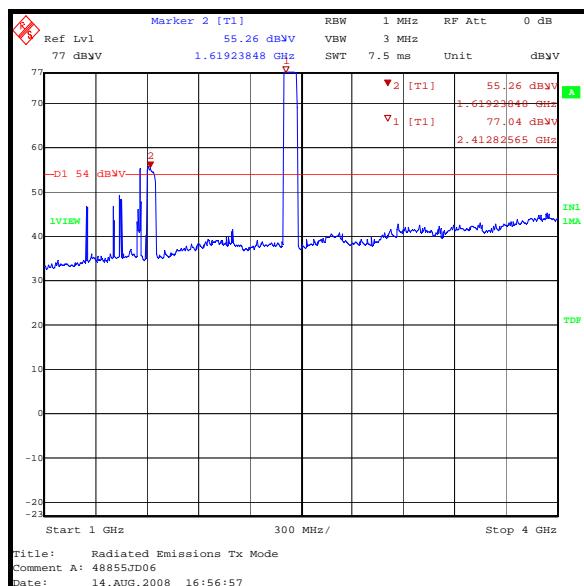
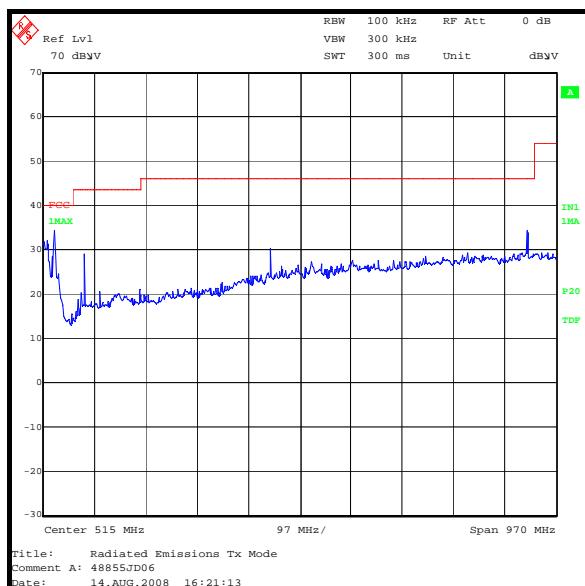
**To: FCC Part 15.247: 2007 (Subpart C)**

### **7.3. Transmitter Radiated Emissions – Comparative Scans**

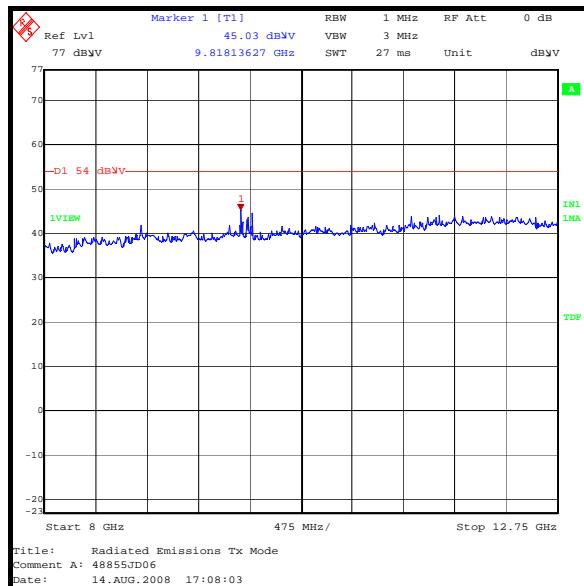
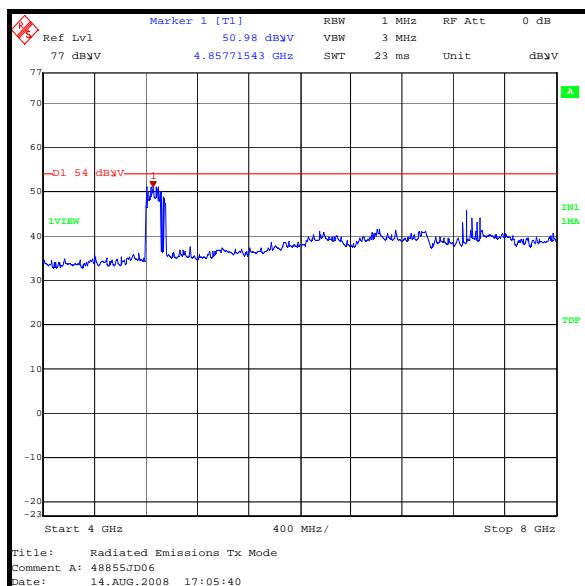
#### **7.3.1. Results**

The following scans were performed on a standard helmet enclosure with standard firmware. The purpose of this comparative test was to show that the measurements performed under section 7.2 were worst case when compared to the standard helmet configuration.

The standard helmet was connected to a Bluetooth test set without BT test mode enabled therefore it was operating in DH3 packet mode with 78 channel hopping enabled, (it was not possible to enable test mode on a standard helmet configuration without modification to the enclosure).



#### **TX Mode: 30 MHz to 1000 MHz**

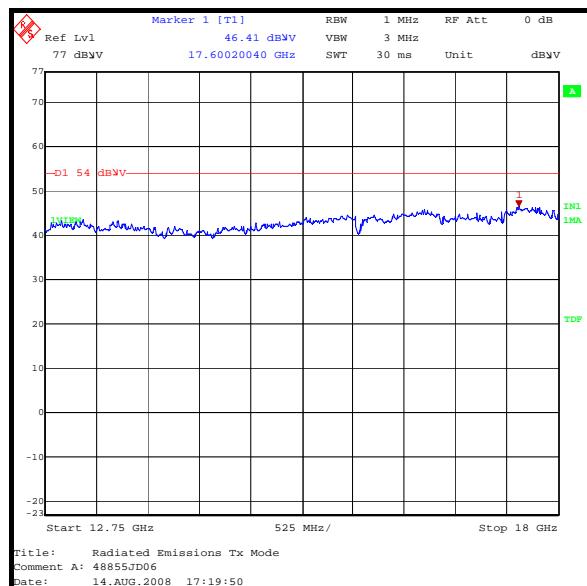


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**TX Mode: 4 GHz to 8 GHz**

**TX Mode: 8 GHz to 12.75 GHz**



**TX Mode: 12.75 GHz to 18 GHz**

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

**Test of: Stilo srl**  
**STILO BT Module EI0001**

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#### **7.4. Transmitter Band Edge Radiated Emissions**

Tests were performed using the test methods detailed in ANSI C63.4 Section 8 and Public Notice DA 00-705 (March 30, 2000).

#### **Results:**

##### **Electric Field Strength Measurements**

###### **Peak Power Level Hopping Mode:**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2.4000	Vertical	32.5	23.0	55.5	78.0*	22.5	Complied
2.4835	Vertical	36.5	23.0	59.5	74.0	14.5	Complied

###### **Average Power Level Hopping Mode:**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2.4835	Vertical	23.3	23.0	46.3	54.0	7.7	Complied

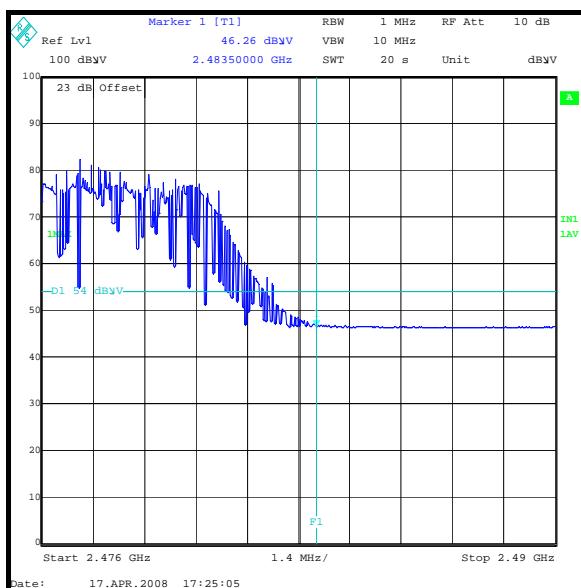
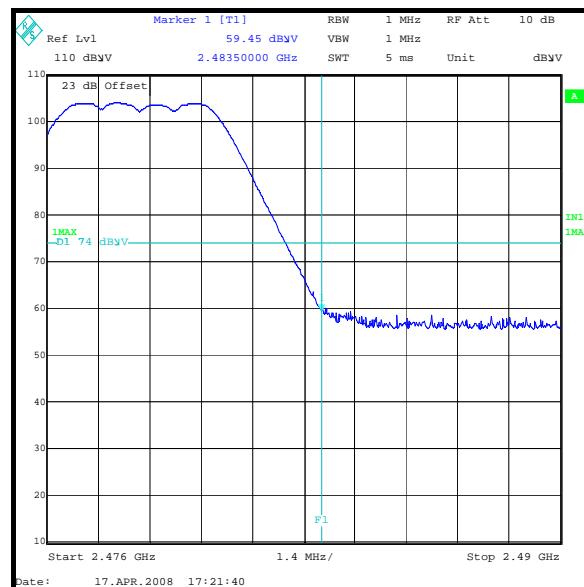
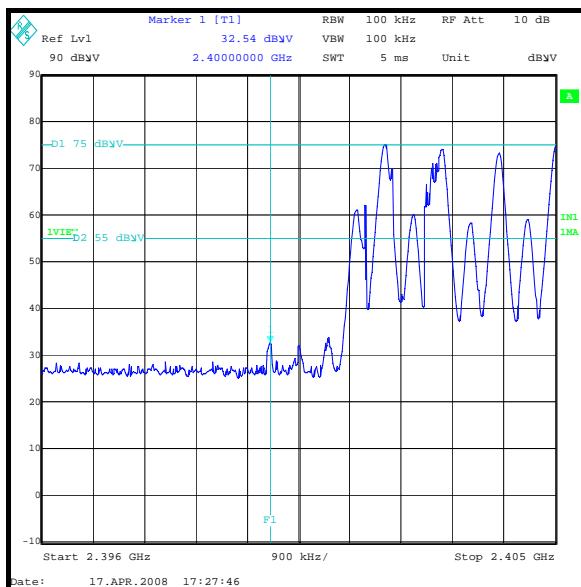
#### **Note(s):**

1. \* -20 dBc limit.
2. The 2400MHz plot does not show the correct absolute level as the transducer factor was not entered. It does however show the correct relative levels. The table above has been corrected with the correct transducer factor to show the absolute level for consistency.

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**Transmitter Band Edge Radiated Emissions (Continued)**



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**Transmitter Band Edge Radiated Emissions (Continued)**

**Results:**

**Peak Power Level Static Mode:**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2.4000	Vertical	35.3	23.0	58.3	78.7*	20.4	Complied
2.4835	Vertical	39.9	23.0	62.9	74.0	11.1	Complied

**Average Power Level Static Mode:**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2.4835	Vertical	49.3	23.0	52.3	54.0	1.7	Complied

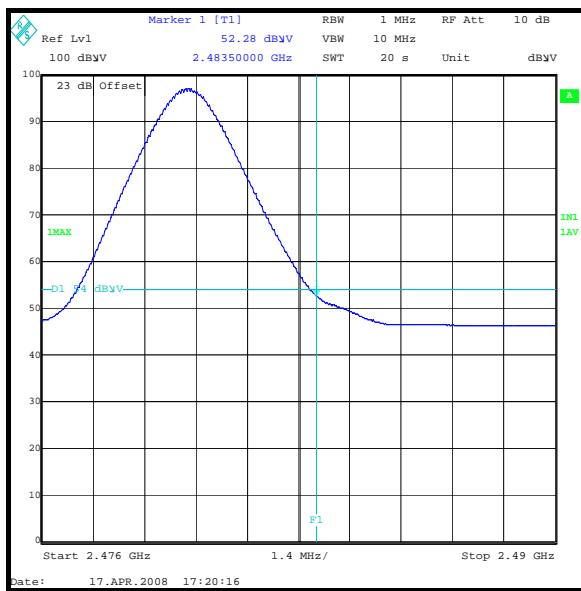
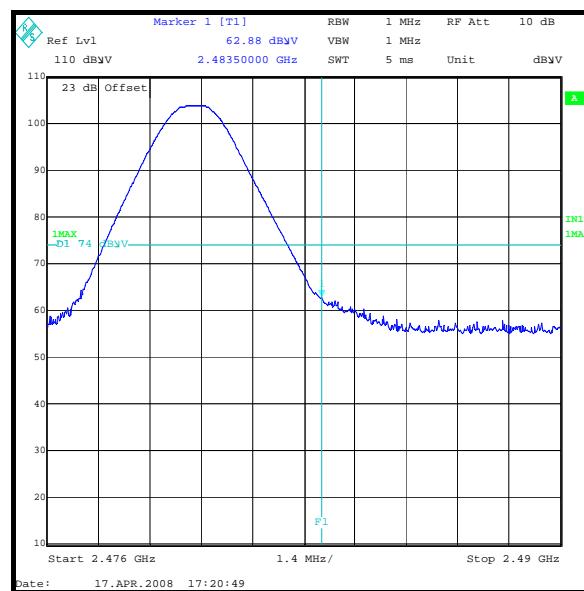
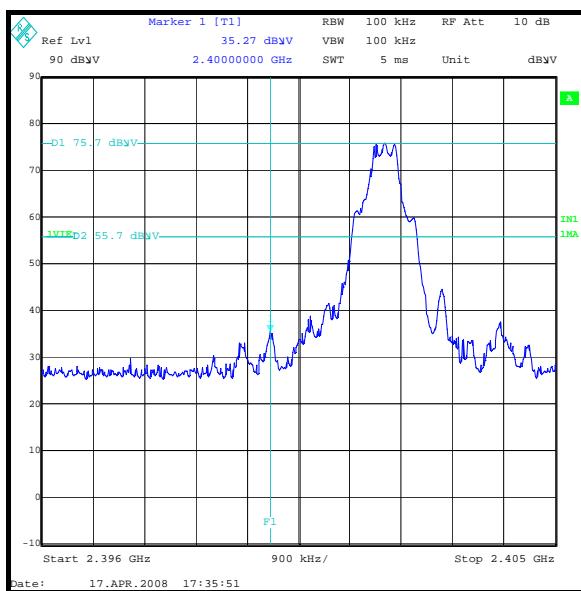
**Note(s):**

1. \* -20 dBc limit.
2. The 2400MHz plot does not show the correct absolute level as the transducer factor was not entered. It does however show the correct relative levels. The table above has been corrected with the correct transducer factor to show the absolute level for consistency.

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**Transmitter Band Edge Radiated Emissions (Continued)**



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## **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
AC Conducted Emissions	150 kHz to 30 MHz	95%	± 3.72 dB
Transmitter Maximum Peak Output Power	Not applicable	95%	+/- 2.94 dB
Conducted Emissions Antenna Port	30 MHz to 40 GHz	95%	+/- 2.62 dB
Transmitter Carrier Frequency Separation	Not applicable	95%	+/- 0.01 ppm
Transmitter Average Time of Occupancy	Not applicable	95%	+/- 10 %
20 dB Bandwidth	Not applicable	95%	+/- 0.12 %
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	+/- 5.26 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.

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## **Appendix 1. Test Equipment Used**

### **Testing Performed at Ewhurst Park**

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
A004	Line Impedance Stabilization Network	Rohde & Schwarz	ESH3-Z5	890 604/027	23 Apr 2007	12
A028	Antenna	Eaton	91888-2	304	08 Jun 2006	36
A031	Antenna	Eaton	91889-2	557	08 Jun 2006	36
A1037	Antenna	Chase EMC Ltd	CBL6112B	2413	13 Feb 2008	12
A1534	Pre Amplifier	Hewlett Packard	8449B OPT H02	3008A00405	Calibrated before use	-
A1830	Pulse Limiter	Rhode & Schwarz	ESH3-Z2	100668	16 Jan 2008	12
A253	Antenna	Flann Microwave	12240-20	128	17 Nov 2006	36
A254	Antenna	Flann Microwave	14240-20	139	17 Nov 2006	36
A255	Antenna	Flann Microwave	16240-20	519	17 Nov 2006	36
A256	Antenna	Flann Microwave	18240-20	400	17 Nov 2006	36
A436	Antenna	Flann	20240-20	330	24 Apr 2006	36
A512	Antenna	EMCO	3115	3993	Calibration not required – used for link setup only	-
C1025	Cable	Rosenberger	FA210A-1-020m	FA00B 7564	Calibrated before use	-
C1065	Cable	Rosenberger	UFA210-1-7872	0985	Calibrated before use	-
C1070	Cable	Rosenberger	FA210A1030M 5050	Not Stated	Calibrated before use	-
C1072	Cable	Rosenberger	FA210a1030M5 050	Not Stated	Calibrated before use	-
C1164	Cable	Rosenberger Micro-Coax	FA210A101500 7070	43188-1	Calibrated before use	-

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RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
C1167	Cable	Rosenberger Micro-Coax	FA210A103000 7070	43190-01	Calibrated before use	-
C1268	Cable	Rosenberger	FA210A007500 8080	49356-1	Calibrated before use	-
C151	Cable	Rosenberger	UFA210A-1-1181-70x70	None	Calibrated before use	-
C160	Cable	Rosenberger	UFA210A-1-1181-70x70	None	Calibrated before use	-
C172	Cable	Rosenberger	UFA210A-1-1181-70x70	None	Calibrated before use	-
C341	Cable	Andrews	None	None	Calibrated before use	-
C348	Cable	Rosenberger	UFA210A-1-1181-70x70	2993	Calibrated before use	-
C363	Cable	Rosenberger	RG142	None	Calibrated before use	-
C468	Cable	Rosenberger	UFA210A-1-3937-504504	98L0440	Calibrated before use	-
E0511	VTM 7004	Votsch Industrietechnik	VTM 7004	585660877000 10	Calibrated before use	-
G088	Power Supply Unit	Thurlby Thandar	CPX200	100700	Calibrated before use	-
M023	Test Receiver	Rohde & Schwarz	ESVP	872 991/027	24 Apr 2007	12
M024	Spectrum Monitor	Rohde & Schwarz	EZM	873 952/006	Calibrated before use	-
M244	Thermometer/Barometer/Hygrometer	Oregan Scientific	BA 116	None	18 Jun 2008	12
M1093	Communications Test Set	Will tek	4202S	0513018	29 August 2003 (Communication purpose only)	-
M1242	Spectrum Analyser	Rohde & Schwarz, Inc.	FSEM30	845986/022	29 Nov 2007	12
M1229	Digital Multimeter	Fluke	179	87640015	20 Apr 2007	12
M1263	Test Receiver	Rohde & Schwarz	ESIB7	100265	06 Feb 2008	12
M127	Spectrum Analyser	Rohde & Schwarz	FSEB 30	842 659/016	15 Aug 2007	12

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RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
M1379	Test Receiver	Rohde and Schwarz	ESIB7	100330	02 Aug 2007	12
M1447	CBT	Rohde and Schwarz	1153.9000.35	100329	24 Jan 2008	12
S201	Open Area Test Site	RFI	1	-	25 May 2007	12
S202	Site 2	RFI	2	S202-15011990	28 Jan 2008	12
S503	Antenna Mast	EMCO	1051-25	9205 1670	Calibration not required	-

**Testing Performed at Wade Road - 26 November 2008**

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
A004	Line Impedance Stabilization Network	Rohde & Schwarz	ESH3-Z5	890 604/027	19 May 2008	12
A1830	Pulse Limiter	Rhode & Schwarz	ESH3-Z2	100668	16 Jan 2008	12
C363	Cable	Rosenberger	RG142	None	Calibrated before use	-
K0008	Site Reference 4422	RFI Global Services Ltd	N/A	N/A	26 August 2008	12
M1263	Test Receiver	Rohde & Schwarz	ESIB7	100265	06 Feb 2008	12
M244	Thermometer/ Barometer/ Hygrometer	Oregon Scientific	BA 116	None	18 Jun 2008	12

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

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## **Appendix 2. Test Configuration Drawing**

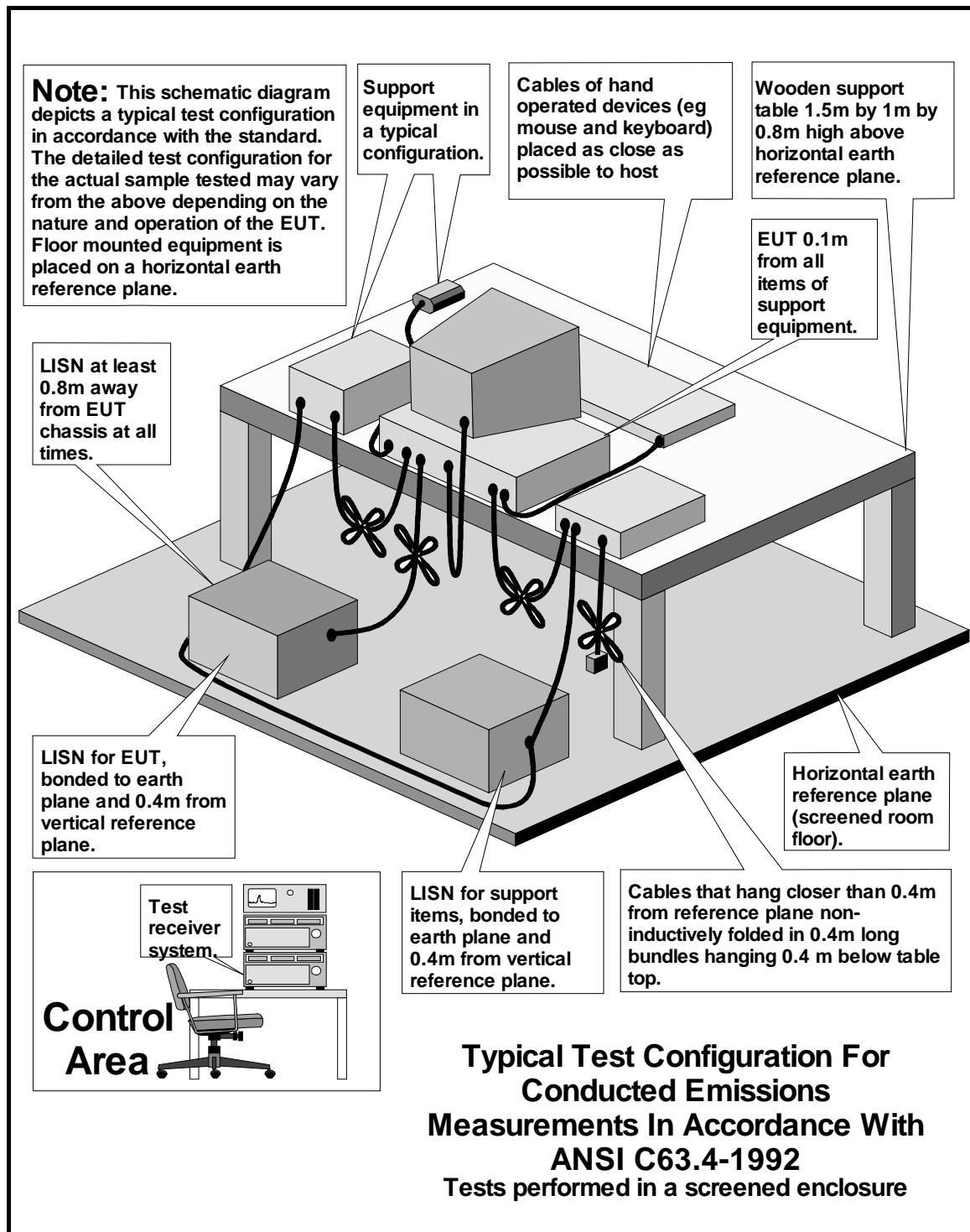
This appendix contains the following drawings:

<b>Drawing Reference Number</b>	<b>Title</b>
DRG\48855JD06\EMICON	Test configuration for measurement of conducted emissions.
DRG\48855JD06\EMIRAD	Test configuration for measurement of radiated emissions.

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DRG\48855JD06\EMICON



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DRG\48855JD06\EMIRAD

