



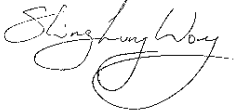



# TEST REPORT FROM RADIO FREQUENCY INVESTIGATION LTD.

Test of: Giant Electronics Ltd.  
OSSO8 Bluetooth Headset

To: FCC Part 15 Subpart C: 2002  
(Intentional Radiators)  
Section 15.247

**Test Report Serial No:**  
RFI/MPTB1/RP44802JD01A

<b>This Test Report Is Issued Under The Authority Of Richard Jacklin, Operations Director:</b>  	<b>Checked By: Alan McHale</b>  
<b>Tested By:</b>  	<b>Release Version No: PDF01</b>
<b>Issue Date: 07October 2003</b>	<b>Test Dates: 03 June 2003 to 27 June 2003</b>

Radio Frequency Investigation Ltd, Ewhurst Park, Ramsdell, Basingstoke, Hampshire, RG26 5RQ, ENGLAND. Tel: +44 (0) 1256 851193 Fax: +44 (0) 1256 851192	Registered in England, No. 211 7901. Registered Office: Ewhurst Park, Ramsdell, Basingstoke, Hampshire RG26 5RQ	
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**RADIO FREQUENCY INVESTIGATION LTD**

**TEST REPORT**

**Operations Department**

**S.No. RFI/MPTB1/RP44802JD01A**

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**Issue Date: 07October 2003**

**Test Of: Giant Electronics Ltd.**

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## 1. Client Information

<b>Company Name:</b>	Giant Electronics Ltd.
<b>Address:</b>	7/F, Elite Industrial Building 135-137 Hoi Bun Road Kwun Tong Kowloon Hong Kong
<b>Contact Name:</b>	Mr Machi Ma

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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 client:

**2.1. Identification Of Equipment Under Test (EUT)**

<b>Brand Name:</b>	Giant Electronics
<b>Model Name or Number:</b>	Bluetooth Headset
<b>Serial Number:</b>	OSSO8
<b>FCC ID</b>	K7GOSSO8
<b>Country of Manufacture:</b>	Not stated
<b>Date of Receipt:</b>	03 June 2003

<b>Brand Name:</b>	Sino American
<b>Model Name or Number:</b>	SA105A-1204B-T AC Charger Adapter
<b>Serial Number:</b>	Not stated
<b>FCC ID</b>	Not stated
<b>Country of Manufacture:</b>	Taiwan
<b>Date of Receipt:</b>	03 June 2003

**2.2. Description Of EUT**

The equipment under test is a Bluetooth Headset.

**2.3. Modifications Incorporated In EUT**

The EUT has not been modified from the Model Name and Number stated above.

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**2.4. Additional Information Related To Testing**

<b>Power Supply Requirement: (Internal, lithium ion battery)</b>	3.9 V DC		
<b>Power Supply Requirement: (AC Battery Charger)</b>	Nominal 115 V 60 Hz AC Mains supply		
<b>Intended Operating Environment:</b>	Domestic and Commercial		
<b>Equipment Category:</b>	Portable		
<b>Type of Unit:</b>	Headset		
<b>Weight Approx:</b>	30 g		
<b>Dimensions Approx ( LxWxH):</b>	95 x 70 x 30 mm		
<b>Interface Ports:</b>	Charger Connection		
<b>Highest Fundamental Frequency</b>	2480 MHz		
<b>Transmit Frequency Range</b>	2402 MHz to 2480 MHz		
<b>Transmit Channels Tested</b>	<b>Channel ID</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Bottom	1	2402
	Middle	39	2441
	Top	79	2480
<b>Receive Frequency Range</b>	2402 MHz to 2480 MHz		
<b>Receive Channels Tested</b>	<b>Channel ID</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Bottom	1	2402
	Middle	39	2441
	Top	79	2480
<b>Occupied Bandwidth</b>	731.11 kHz		
<b>Antenna Gain</b>	0 dBi		
<b>Maximum Power Output (EIRP)</b>	3.5 dBm		

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## **2.5. Support Equipment**

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

<b>Description:</b>	Anritsu Bluetooth test set
<b>Brand Name:</b>	Anritsu
<b>Model Name or Number:</b>	MT8850A
<b>Serial Number:</b>	6K00000244

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

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

<b>Reference:</b>	FCC Part 15 Subpart C: 2002 (Section 15.247)
<b>Title:</b>	Code of Federal Regulations, Part 15 (47CFR15) Radio Frequency Devices: Intentional Radiators
<b>Comments:</b>	A description of the test facility used for this test is on file with, and has been accepted by, the Federal Communications Commission as required by Section 2.948 of Federal Rules.
<b>Purpose of Test:</b>	To determine whether the equipment complied with the requirements of the specification for the purposes of certification.

<b>Reference:</b>	FCC Part 15 Subpart B: 2002 (Section 15.107 and 15.109)
<b>Title:</b>	Code of Federal Regulations, Part 15 (47CFR15) Radio Frequency Devices: Unintentional Radiators.
<b>Comments:</b>	A description of the test facility used for this test is on file with, and has been accepted by, the Federal Communications Commission as required by Section 2.948 of Federal Rules.
<b>Purpose of Test:</b>	To determine whether the equipment complied with the requirements of the specification for the purposes of certification.



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### **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 (2001)

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.

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#### **4. Deviations From The Test Specification**

None.

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## **5. Operation Of The EUT During Testing**

### **5.1. Operating Conditions**

The EUT was tested in a normal laboratory environment.

During testing, the EUT was powered by an internal battery.

AC Conducted emissions were performed with the EUT on charge.

### **5.2. Operating Modes**

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

Standby Mode. Transmitting on top, middle and bottom channels or hopping on all Channels.

### **5.3. Configuration And Peripherals**

The EUT was tested in the following configuration:

Standalone for all tests except AC conducted emissions when the EUT was connected to an AC battery charger.

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## **6. Summary Of Test Results**

<b>Range Of Measurements</b>	<b>Specification Reference</b>	<b>Port Type</b>	<b>Compliance Status</b>
Receiver AC Conducted Emissions	C.F.R. 47 FCC Part 15: 2002 Section 15.107	AC Mains Terminals	Complied
Receiver Radiated Emissions	C.F.R. 47 FCC Part 15: 2002 Section 15.109	Antenna	Complied
Transmitter AC Conducted Emissions	C.F.R. 47 FCC Part 15: 2002 Section 15.207	AC Mains Terminals	Complied
Transmitter 20 dB Bandwidth	C.F.R. 47 FCC Part 15: 2002 Section 15.247(a)(1)	Antenna Terminals	Complied
Transmitter Carrier Frequency Separation	C.F.R. 47 FCC Part 15: 2002 Section 15.247(a)(1)	Antenna Terminals	Complied
Transmitter Average Time of Occupancy	C.F.R. 47 FCC Part 15: 2002 Section 15.247(a)(1)(iii)	Antenna Terminals	Complied
Transmitter Number of Hopping Frequencies	C.F.R. 47 FCC Part 15: 2002 Section 15.247(a)(1)(iii)	Antenna Terminals	Complied
Transmitter Maximum Peak Output Power	C.F.R. 47 FCC Part 15: 2002 Section 15.247(b)(1)	Antenna Terminals	Complied
Transmitter Conducted Emissions	C.F.R. 47 FCC Part 15: 2002 Section 15.247 (c)	Antenna Terminals	Complied
Transmitter Radiated Emissions	C.F.R. 47 FCC Part 15: 2002 Section 15.247(c) Section 15.209(a)	Antenna	Complied
Transmitter Band-edge Compliance of RF Conducted Emissions	C.F.R. 47 FCC Part 15: 2002 Section 15.247(c)	Antenna Terminals	Complied

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## **7. Measurements, Examinations And Derived Results**

### **7.1. General Comments**

7.1.1. This section contains test results only. Details of the test methods and procedures can be found in Appendix 2 of this report.

7.1.2. 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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## 8. Test Results

### 8.1. Receiver Conducted Emissions AC Mains: Section 15.107

8.1.1. The EUT was configured as for AC conducted emissions measurements as described in Appendix 2 of this report.

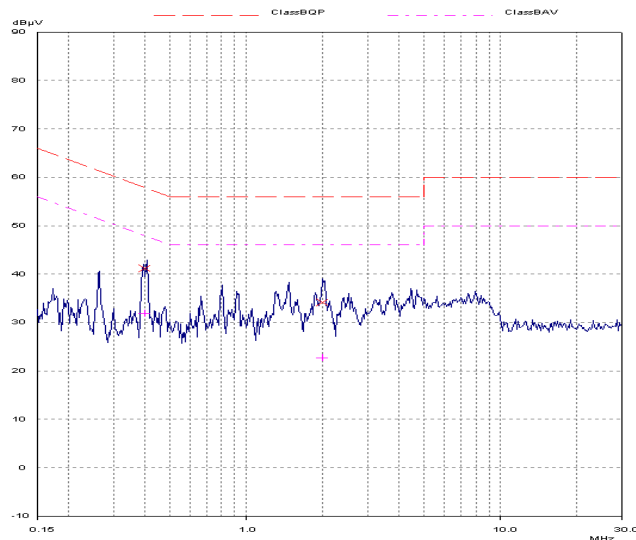
8.1.2. Tests were performed to identify the maximum emissions levels on the AC mains line of the EUT.

#### Quasi-Peak Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Q-P Level (dB $\mu$ V)	Q-P Limit (dB $\mu$ V)	Margin (dB)	Result
0.39691	Neutral	41.17	57.92	16.75	Complied
1.99296	Live	34.21	56.00	21.79	Complied

#### Average Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Avg Level (dB $\mu$ V)	Avg Limit (dB $\mu$ V)	Margin (dB)	Result
0.39691	Neutral	31.92	47.92	16.00	Complied
1.99296	Live	22.71	46.00	23.29	Complied



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**8.2. Receiver Radiated Emissions: Section 15.109**

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

8.2.1.1. The EUT was configured as for radiated emissions testing as described in Appendix 2 of this report.

8.2.1.2. Tests were performed to identify the maximum radiated spurious emissions levels.

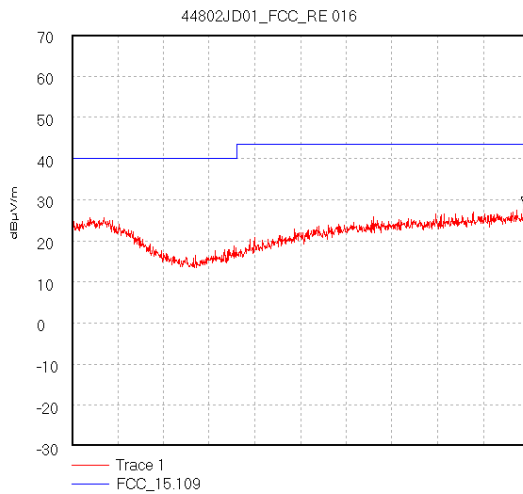
**Result.**

Frequency (MHz)	Ant. Pol.	Q-P Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
923.324	Horiz	33.8	46.0	12.2	Complied

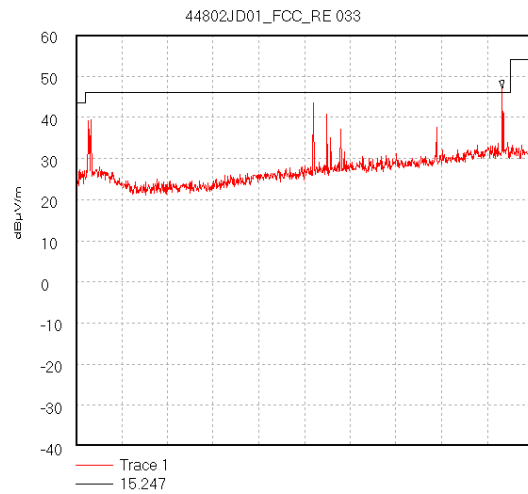
**Note 1.** As there were no EUT emissions present in the scans, the highest noise floor value was recorded.

**Note 2.** The following plots show background ambient signals. It was found through power cycling that these signals were not associated with the EUT.

**30 MHz to 1 GHz Pre-Scan Plots.**



Start 25.0 MHz; Stop 200.0 MHz  
Ref 70 dB $\mu$ V/m; Ref Offset 0.0 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 60.0 mS  
Peak 198.25 MHz, 28.64 dB $\mu$ V/m  
Limit/Mask: FCC\_15.109;  
Transducer Factors: Radio\_Bicon  
04/06/2003 10:09:32



Start 200.0 MHz; Stop 1.0 GHz  
Ref 60 dB $\mu$ V/m; Ref Offset 1.6 dB; 10 dB/div  
RBW 145.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 520.0 mS  
Peak 946.667 MHz, 47.03 dB $\mu$ V/m  
Limit/Mask: 15.247;  
Transducer Factors: Radio\_Log\_Spiral  
04/06/2003 11:44:33

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**8.3. Receiver Radiated Emissions: Section 15.109****8.3.1. Electric Field Strength Measurements (Frequency Range: 1.0 to 12.5 GHz)**

8.3.1.1. The EUT was configured as for radiated emissions testing as described in Appendix 2 of this report.

8.3.1.2. Tests were performed to identify the maximum radiated spurious emissions levels.

**Highest Average Level:**

Frequency (GHz)	Antenna Polarity (H/V)	Peak* Detector level (dB $\mu$ V)	Antenna factor (dB)	Cable loss (dB)	Actual Peak* Level (dB $\mu$ V/m)	Average Limit (dB $\mu$ V/m)	Peak to Average Margin (dB)	Result
7.496667	Vert.	25.4	26.1	1.7	53.2	54.0	0.8	Complied

**\*Note 1.** No spurious emissions were present during final measurement. It is assumed that there may be spurious emissions masked by the system noise floor. As such, the highest peak noise floor reading of the measuring receiver was recorded and compared against the average limit.

**Note 2.** The following plots show background ambient signals. It was found through power cycling that these signals were not associated with the EUT.



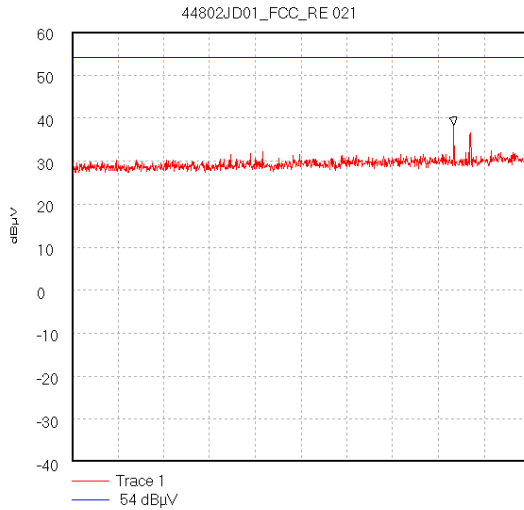
Test Of: Giant Electronics Ltd.

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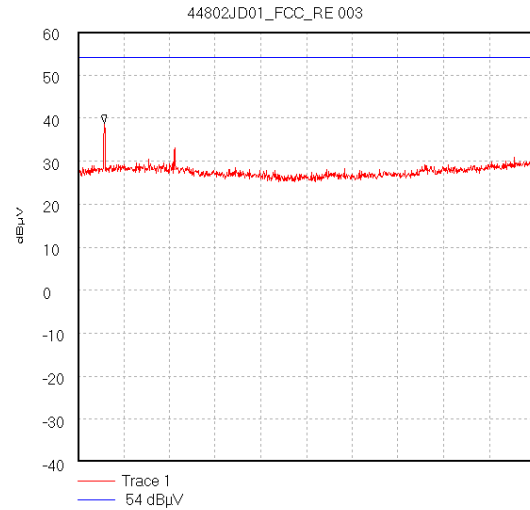
To: FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247

**Receiver Radiated Emissions: Section 15.109 (Continued).**

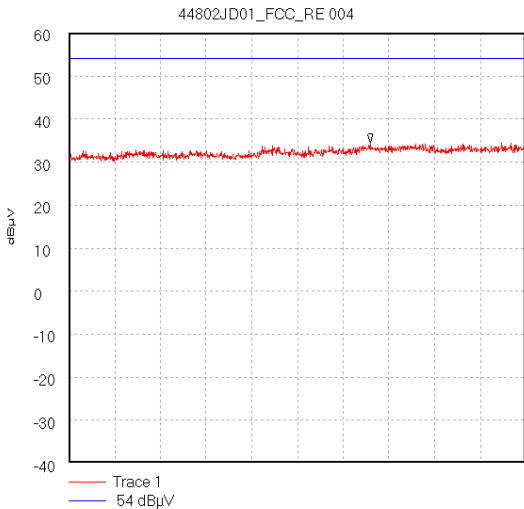
**1 GHz to 12.5 GHz Pre-Scan Plots.**



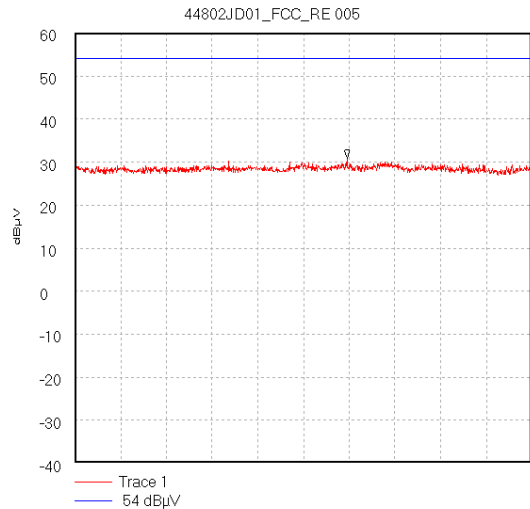
Start 1.0 GHz; Stop 2.0 GHz  
Ref 60 dBµV; Ref Offset 1.6 dB; 10 dB/div  
RBW 145.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 640.0 mS  
Peak 1.834 GHz, 38.29 dBµV  
Display Line: 54 dBµV;  
04/06/2003 10:34:40



Start 2.0 GHz; Stop 4.0 GHz  
Ref 60 dBµV; Ref Offset 0.0 dB; 10 dB/div  
RBW 1.45 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS  
Peak 2.115556 GHz, 38.7 dBµV  
Display Line: 54 dBµV;  
03/06/2003 11:20:08



Start 4.0 GHz; Stop 5.0 GHz  
Ref 60 dBµV; Ref Offset 0.0 dB; 10 dB/div  
RBW 1.45 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS  
Peak 4.66 GHz, 34.48 dBµV  
Display Line: 54 dBµV;  
03/06/2003 11:33:05



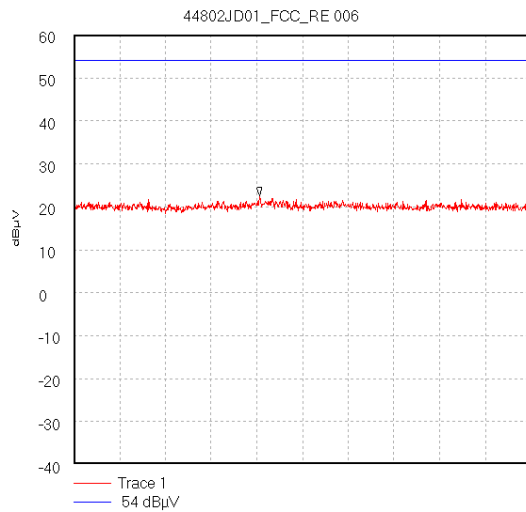
Start 5.0 GHz; Stop 6.0 GHz  
Ref 60 dBµV; Ref Offset 0.0 dB; 10 dB/div  
RBW 1.45 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS  
Peak 5.595556 GHz, 30.93 dBµV  
Display Line: 54 dBµV;  
03/06/2003 11:36:24

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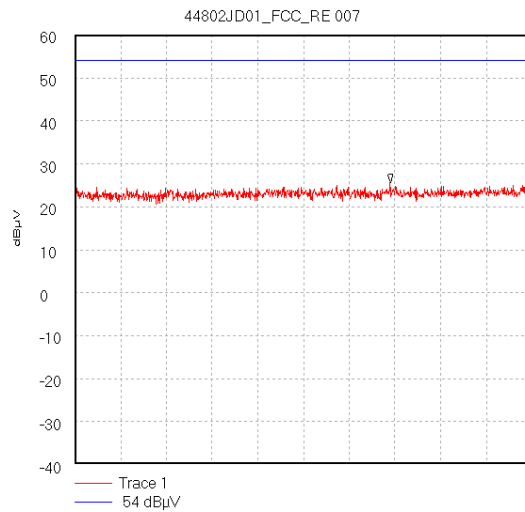
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To: FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247

**Receiver Radiated Emissions: Section 15.109 (Continued).**



Start 6.0 GHz; Stop 8.0 GHz  
Ref 60 dBµV; Ref Offset 0.0 dB; 10 dB/div  
RBW 1.45 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS  
Peak 6.813333 GHz, 22.57 dBµV  
Display Line: 54 dBµV;  
03/06/2003 11:43:35



Start 8.0 GHz; Stop 12.5 GHz  
Ref 60 dBµV; Ref Offset 0.0 dB; 10 dB/div  
RBW 1.45 MHz; VBW 1.0 MHz; Att 0 dB; Swp 40.0 mS  
Peak 11.105 GHz, 25.62 dBµV  
Display Line: 54 dBµV;  
03/06/2003 11:54:15

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**8.4. Transmitter Conducted Emissions AC Mains: Section 15.207**

8.4.1. The EUT was configured as for AC conducted emissions measurements as described in Appendix 2 of this report.

8.4.2. Tests were performed to identify the maximum emissions levels on the AC mains line of the EUT.

**Quasi-Peak Detector Measurements on Live and Neutral Lines**

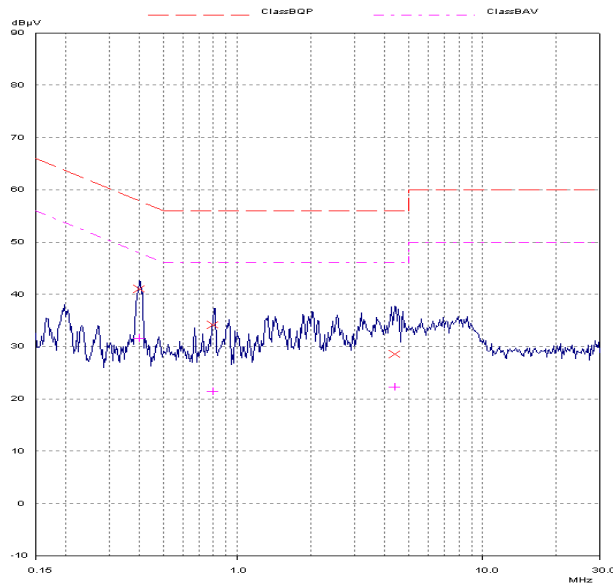
**Middle Channel**

Frequency (MHz)	Line	Q-P Level (dBµV)	Q-P Limit (dBµV)	Margin (dB)	Result
0.39798	Neutral	41.09	57.90	16.81	Complied
0.79709	Live	34.21	56.00	21.79	Complied
4.36249	Neutral	28.57	56.00	27.43	Complied

**Average Detector Measurements on Live and Neutral Lines**

**Middle Channel**

Frequency (MHz)	Line	Avg Level (dBµV)	Avg Limit (dBµV)	Margin (dB)	Result
0.39798	Neutral	31.52	47.90	16.38	Complied
0.79709	Live	21.33	46.00	24.67	Complied
4.36249	Neutral	22.27	46.00	23.73	Complied



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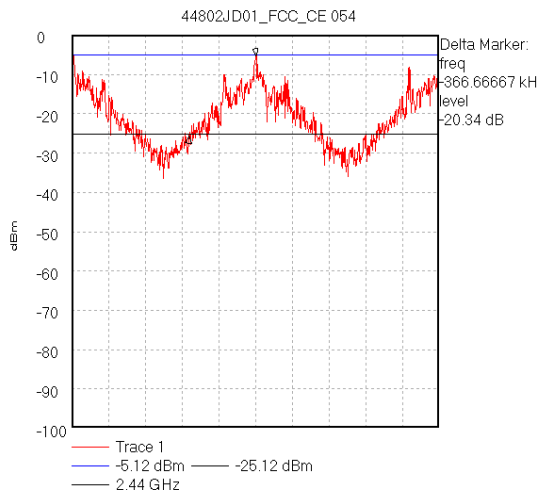
**8.5. Transmitter 20 dB Bandwidth: Section 15.247(a)(1)**

8.5. The EUT was configured as for carrier frequency separation / 20 dB bandwidth measurements as described in Appendix 2 of this report.

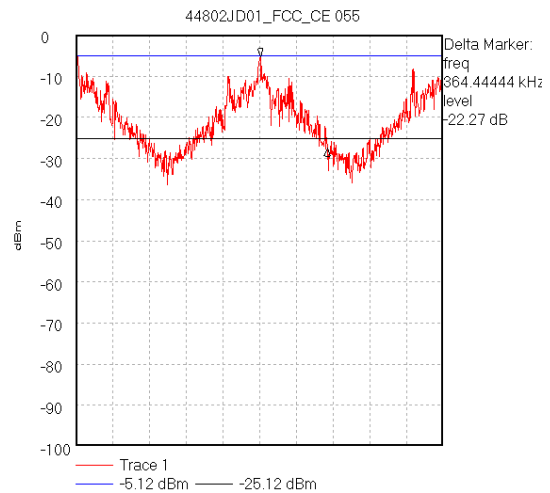
8.5.1. Tests were performed to identify the 20 dB bandwidth as per FCC Part 15.247(a)(1).

<b>Transmitter 20 dB Bandwidth (kHz)</b>
731.11

**Lower -20 dBc Plot**



**Upper -20 dBc Plot**



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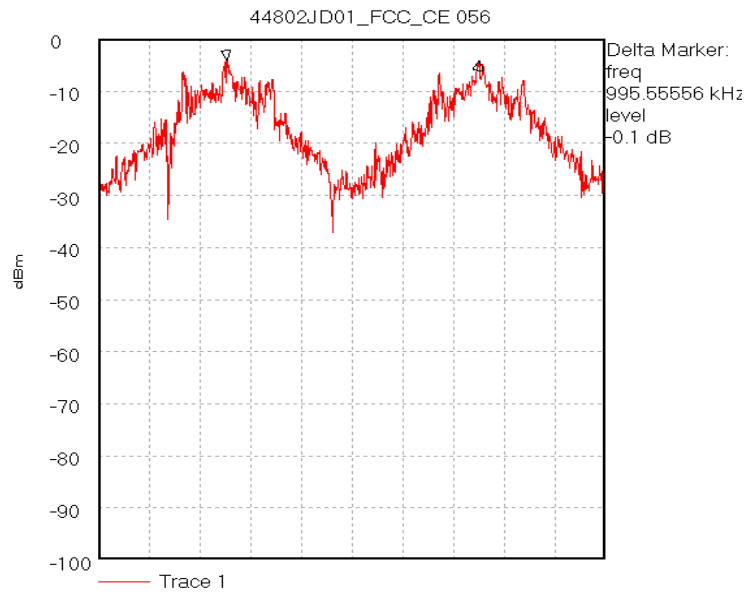
To: FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247

**8.6. Transmitter Carrier Frequency Separation: Section 15.247(a)(1)**

8.6.1. The EUT was configured as for carrier frequency separation measurements as described in Appendix 2 of this report.

8.6.2. Tests were performed to identify the carrier frequency separation.

Transmitter Carrier Frequency Separation (kHz)	Limit (25 kHz or 20 dB BW whichever is greater) (kHz)	Margin (kHz)	Result
995.56	731.11	264.45	Complied



Start 2.4105 GHz; Stop 2.4125 GHz  
 Ref 0 dBm; Ref Offset 21.5 dB; 10 dB/div  
 RBW 30.0 kHz; VBW 30.0 kHz; Att 0 dB; Swp 20.0 mS  
 Marker 2.411007 GHz, -4.03 dBm  
 Delta 2.412002 GHz, -4.13 dBm  
 04/06/2003 18:24:44

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

8.7.1. The EUT was configured as for average time of occupancy measurements as described in Section 9 of this report.

8.7.2. Tests were performed to identify the average time of occupancy in number of channels (79) x 0.4 seconds. The calculated period is 31.6 seconds.

Emission Width ( $\mu$ s)	Number of Hops in 31.6 seconds	Average Time of Occupancy (s)	Limit (s)	Margin (s)	Result
2.925852	93	0.272104	0.4	0.127896	Complied

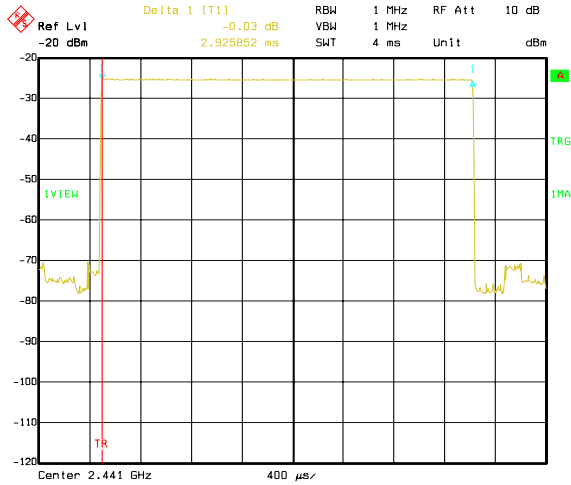
Operations Department

Test Of: Giant Electronics Ltd.

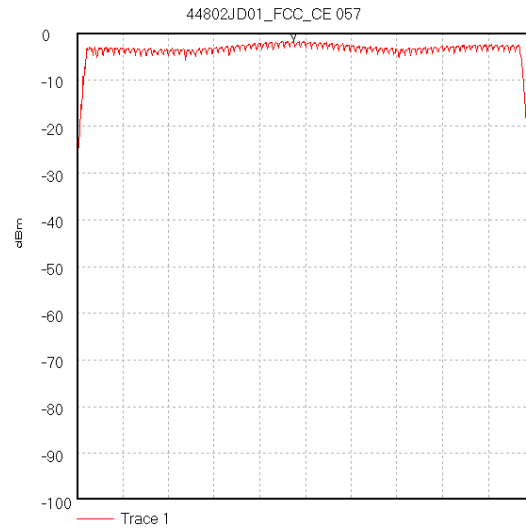
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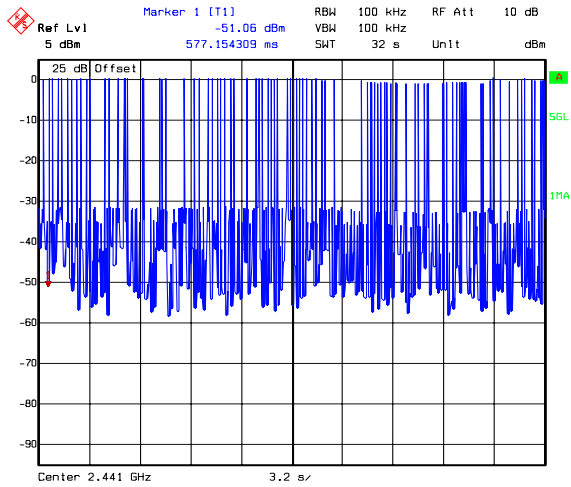
**Transmitter Average Time of Occupancy: Section 15.247(a)(1)(iii)**



Title: Giant Electronics EUT: 05508, FCC P15.247, Time Occupancy.  
 Comment A: 44802JD01\_FCC\_P15-247\_Time\_Occupancy\_DH5\_001  
 Date: 1.OCT.2003 20:35:40



Start 2.4 GHz; Stop 2.4835 GHz  
 Ref 0 dBm; Ref Offset 21.5 dB; 10 dB/div  
 RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS  
 Peak 2.439616 GHz, -1.67 dBm  
 04/06/2003 18:33:35



Title: Giant Electronics EUT: 05508, FCC P15.247, Time Occupancy.  
 Comment A: 44802JD01\_FCC\_P15-247\_Time\_Occupancy\_DH5\_003  
 Date: 1.OCT.2003 20:44:30

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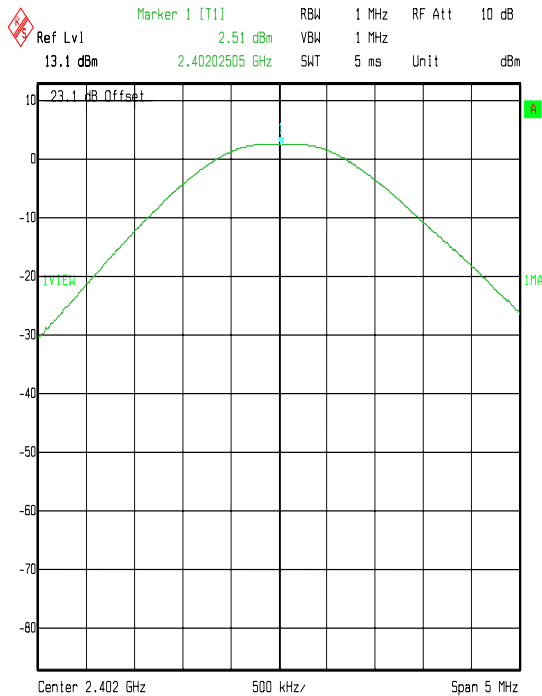
**8.8. Transmitter Peak Output Power: Section 15.247(b)(1)**

8.8.1. The EUT was configured as for Effective Isotropic Radiated Power measurements as described in Appendix 2 of this report.

8.8.2. Tests were performed to identify the maximum transmitter output power (EIRP) of the EUT.

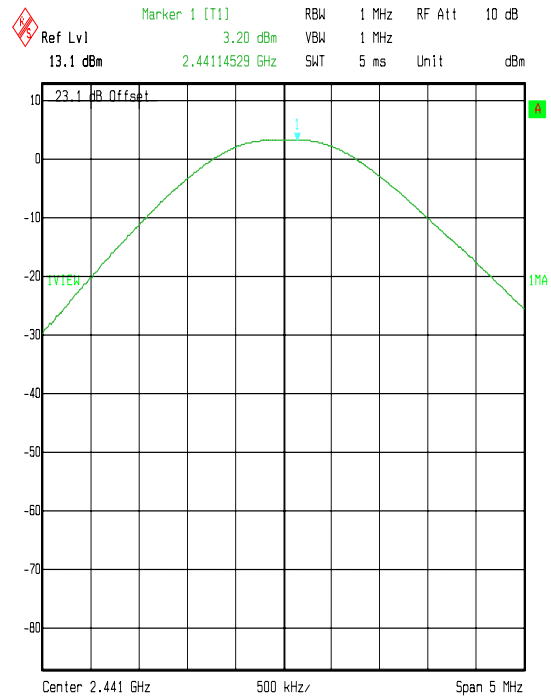
Channel	Input Voltage (DC)	Output Level (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	3.9	2.5	0.0	2.5	30.0	27.5	Complied
Middle	3.9	3.2	0.0	3.2	30.0	26.8	Complied
Top	3.9	3.5	0.0	3.5	30.0	26.5	Complied

**Bottom Channel**



Comment A: EUT:Giant OSSO8  
 Peak Output Power Bottom Channel\EGPH\44802JD01\POP01  
 Date: 27.JUN.2003 12:49:54

**Middle Channel**



Comment A: EUT:Giant OSSO8  
 Peak Output Power Middle Channel\EGPH\44802JD01\POP02  
 Date: 27.JUN.2003 12:52:01



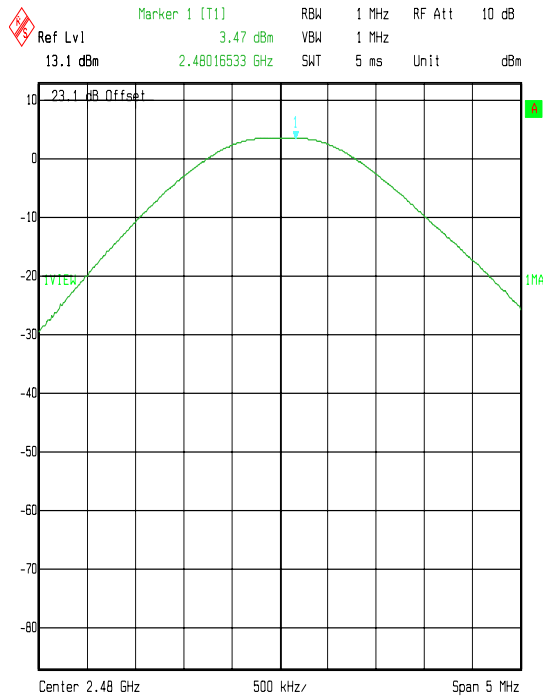
Test Of: Giant Electronics Ltd.

OSSO8 Bluetooth Headset

To: FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247

**Transmitter Peak Output Power (Continued)**

**Top Channel**



Comment A: EUT:Giant OSS08  
Peak Output Power Top Channel 186PH/44802JD01/POP03  
Date: 27.JUN.2003 12:53:54

Test Of: Giant Electronics Ltd.  
OSSO8 Bluetooth Headset

To: FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247

**8.9. Transmitter Conducted Emissions: Section 15.247(c) – 30 MHz to 26.5 GHz**

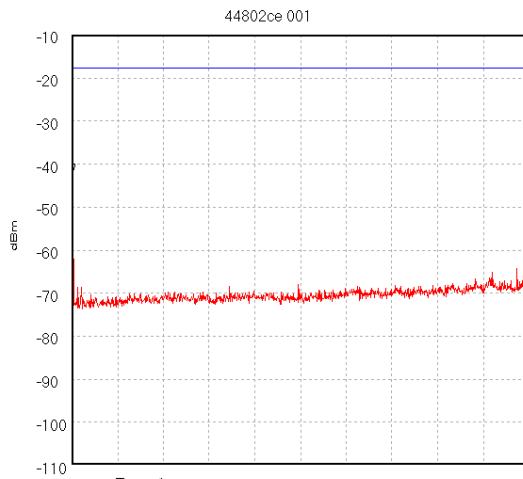
8.9.1. The EUT was configured as for conducted emissions measurements as described in Appendix 2 of this report.

8.9.2. Tests were performed to identify the maximum conducted spurious emissions.

**Highest Peak Level: Bottom Channel**

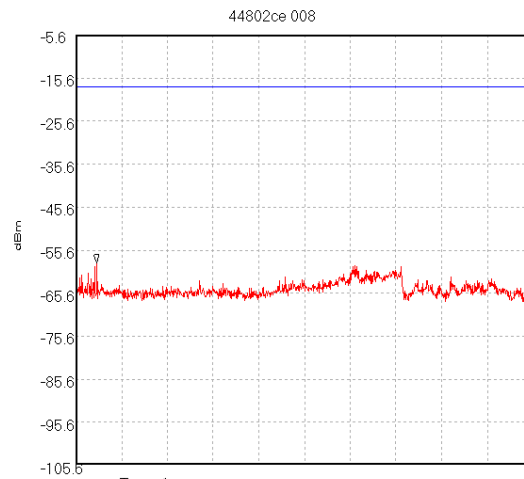
Frequency (GHz)	Peak Detector Level (dBm)	Peak Limit (dBm)	Peak Margin (dB)	Result
7.206	-51.8	-17.5	34.3	Complied

**Note.** The following plots use a limit line that is built based on the lowest measured EIRP for all three channels. This method ensures that the tightest limit possible is used and thus ensuring total emission capture.



Trace 1  
-17.6 dBm

Start 30.0 MHz; Stop 2.4 GHz  
Ref -10 dBm; Ref Offset 24.3 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 720.0 mS  
Peak 32.633 MHz, -41.89 dBm  
Display Line: -17.6 dBm;  
27/06/2003 16:22:10



Trace 1  
-17.6 dBm

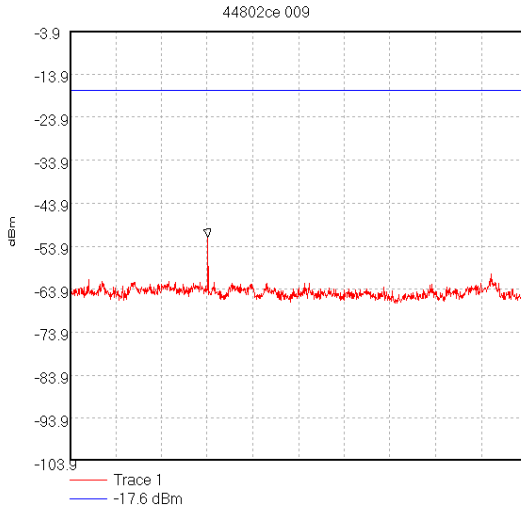
Start 2.484 GHz; Stop 6.0 GHz  
Ref -5.6 dBm; Ref Offset 23.7 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 1.06 S  
Peak 2.644 GHz, -58.57 dBm  
Display Line: -17.6 dBm;  
27/06/2003 16:31:16

Test Of: Giant Electronics Ltd.

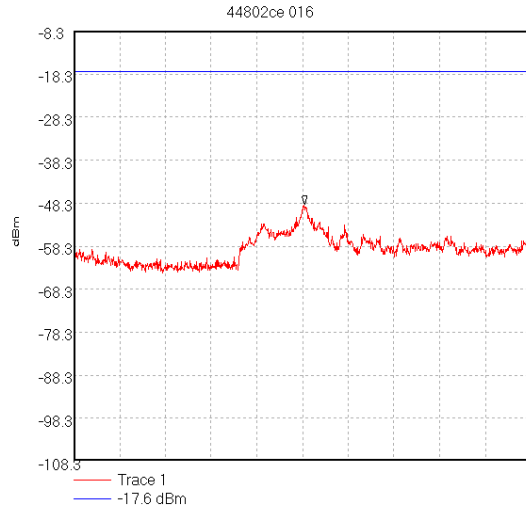
OSSO8 Bluetooth Headset

To: FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247

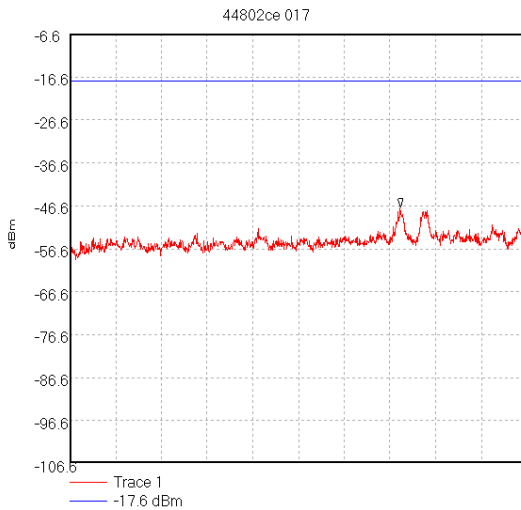
**Transmitter Conducted Emissions: Section 15.247(c) – 30 MHz to 26.5 GHz (Continued)**



Start 6.0 GHz; Stop 10.0 GHz  
Ref -3.9 dBm; Ref Offset 30.4 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 1.2 S  
Peak 7.209 GHz; -51.84 dBm  
Display Line: -17.6 dBm;  
27/06/2003 16:32:49



Start 10.0 GHz; Stop 18.0 GHz  
Ref -8.3 dBm; Ref Offset 36.0 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 2.4 S  
Peak 14.036 GHz; -48.7 dBm  
Display Line: -17.6 dBm;  
27/06/2003 16:42:11



Start 18.0 GHz; Stop 26.5 GHz  
Ref -6.6 dBm; Ref Offset 37.7 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 2.6 S  
Peak 24.148 GHz; -46.97 dBm  
Display Line: -17.6 dBm;  
27/06/2003 16:45:05

Test Of: Giant Electronics Ltd.

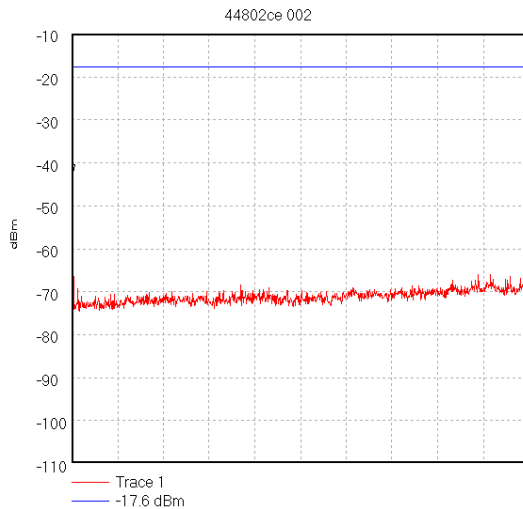
OSSO8 Bluetooth Headset

To: FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247

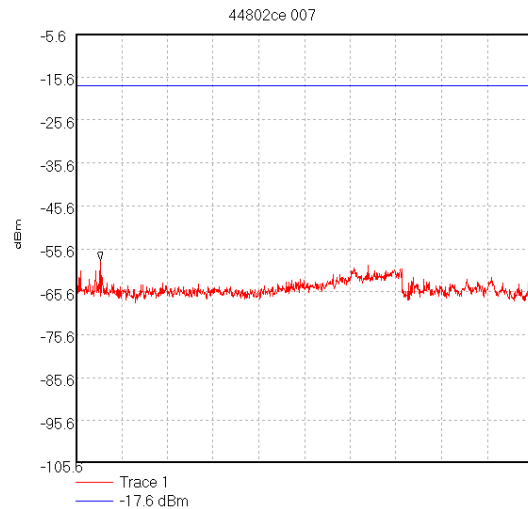
**Highest Peak Level: Middle Channel**

Frequency (GHz)	Peak Detector Level (dBm)	Peak Limit (dBm)	Peak Margin (dB)	Result
7.323	-48.5	-16.8	31.7	Complied

**Note.** The following plots use a limit line that is built based on the lowest measured EIRP for all three channels. This method ensures that the tightest limit possible is used and thus ensuring total emission capture.



Start 30.0 MHz; Stop 2.4 GHz  
 Ref -10 dBm; Ref Offset 24.3 dB; 10 dB/div  
 RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 720.0 mS  
 Peak 32.633 MHz, -42.5 dBm  
 Display Line: -17.6 dBm;  
 27/06/2003 16:24:45



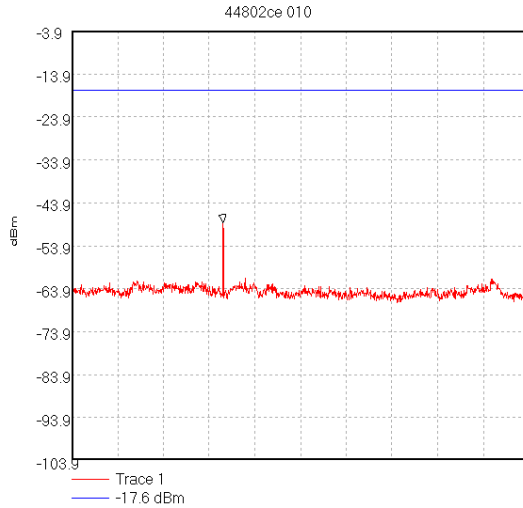
Start 2.484 GHz; Stop 6.0 GHz  
 Ref -5.6 dBm; Ref Offset 28.7 dB; 10 dB/div  
 RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 1.06 S  
 Peak 2.671 GHz, -58.39 dBm  
 Display Line: -17.6 dBm;  
 27/06/2003 16:30:47

Test Of: Giant Electronics Ltd.

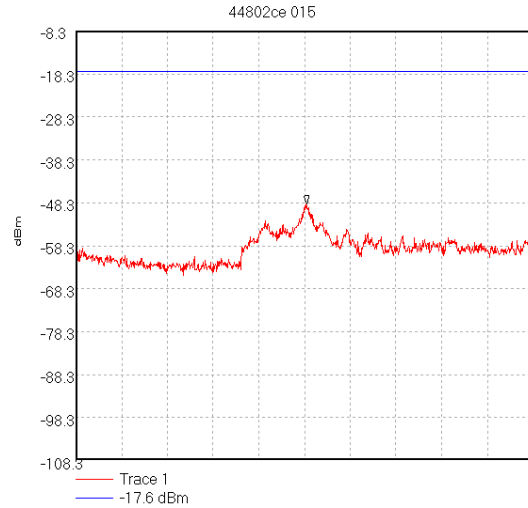
OSSO8 Bluetooth Headset

To: FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247

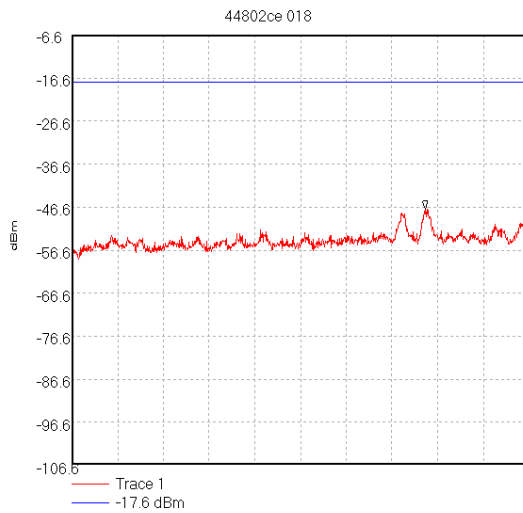
**Transmitter Conducted Emissions: Section 15.247(c) – 30 MHz to 26.5 GHz (Continued)**



Start 6.0 GHz; Stop 10.0 GHz  
Ref -3.9 dBm; Ref Offset 30.4 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 1.2 S  
Peak 7.324 GHz; -48.56 dBm  
Display Line: -17.6 dBm;  
27/06/2003 16:33:43



Start 10.0 GHz; Stop 18.0 GHz  
Ref -3.3 dBm; Ref Offset 36.0 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 2.4 S  
Peak 14.036 GHz; -48.59 dBm  
Display Line: -17.6 dBm;  
27/06/2003 16:41:24



Start 18.0 GHz; Stop 26.5 GHz  
Ref -6.6 dBm; Ref Offset 37.7 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 2.6 S  
Peak 24.573 GHz; -47.1 dBm  
Display Line: -17.6 dBm;  
27/06/2003 16:45:50

Test Of: Giant Electronics Ltd.

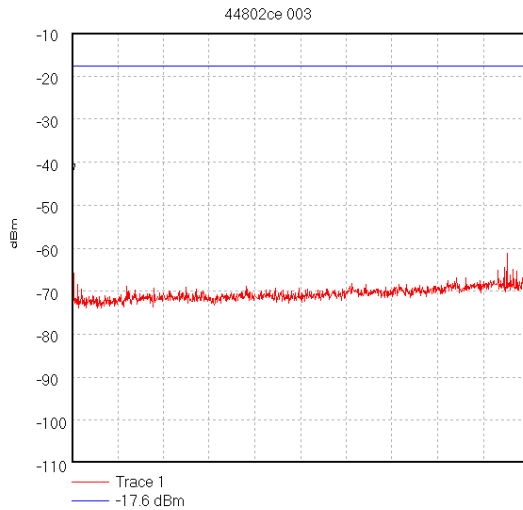
OSSO8 Bluetooth Headset

To: FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247

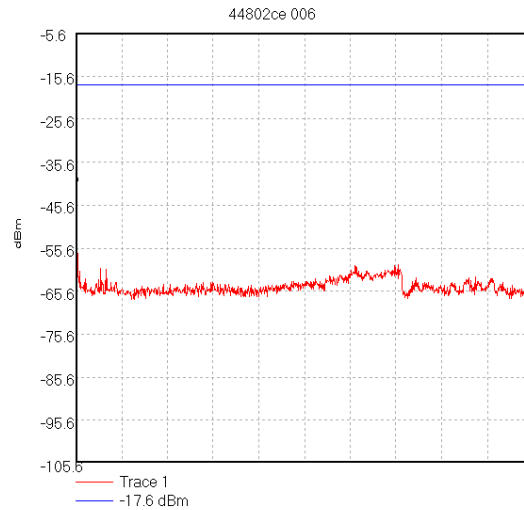
**Highest Peak Level: Top Channel**

Frequency (GHz)	Peak Detector Level (dBm)	Peak Limit (dBm)	Peak Margin (dB)	Result
7.440	-55.2	-16.5	38.7	Complied

**Note.** The following plots use a limit line that is built based on the lowest measured EIRP for all three channels. This method ensures that the tightest limit possible is used and thus ensuring total emission capture.



Start 30.0 MHz; Stop 2.4 GHz  
 Ref -10 dBm; Ref Offset 24.3 dB; 10 dB/div  
 RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 720.0 mS  
 Peak 32.633 MHz; -42.37 dBm  
 Display Line: -17.6 dBm;  
 27/06/2003 16:25:25



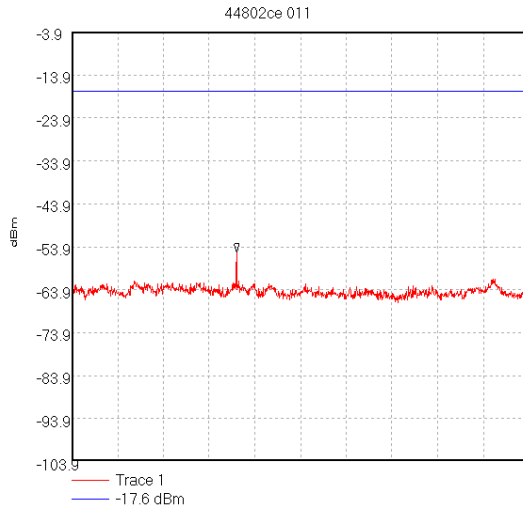
Start 2.484 GHz; Stop 6.0 GHz  
 Ref -5.6 dBm; Ref Offset 23.7 dB; 10 dB/div  
 RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 1.06 S  
 Peak 2.484 GHz; -41.2 dBm  
 Display Line: -17.6 dBm;  
 27/06/2003 16:30:04

Test Of: Giant Electronics Ltd.

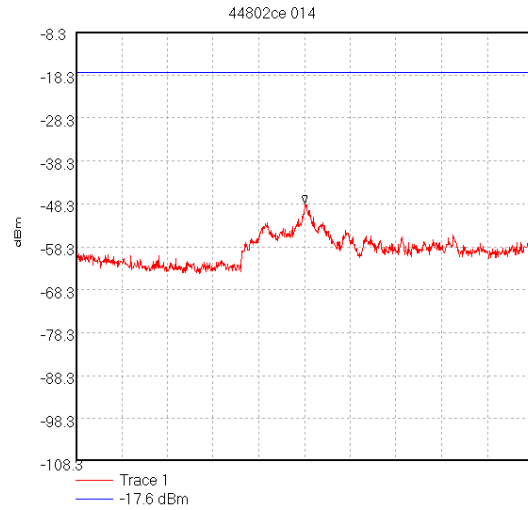
OSSO8 Bluetooth Headset

To: FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247

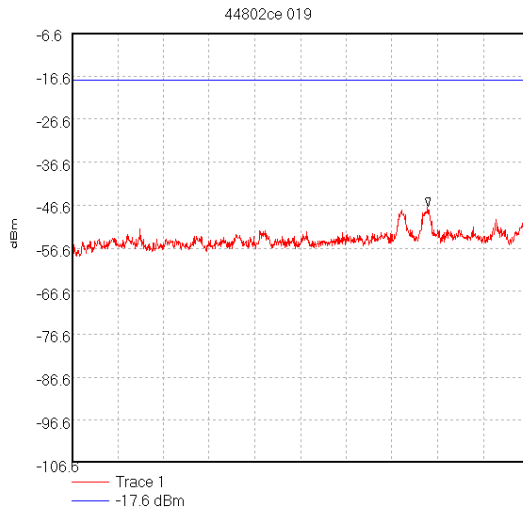
**Transmitter Conducted Emissions: Section 15.247(c) – 30 MHz to 26.5 GHz (Continued)**



Start 6.0 GHz; Stop 10.0 GHz  
Ref -3.9 dBm; Ref Offset 30.4 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 1.2 S  
Peak 7.444 GHz; -55.24 dBm  
Display Line: -17.6 dBm;  
27/06/2003 16:34:45



Start 10.0 GHz; Stop 18.0 GHz  
Ref -8.3 dBm; Ref Offset 36.0 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 2.4 S  
Peak 14.009 GHz; -48.29 dBm  
Display Line: -17.6 dBm;  
27/06/2003 16:40:40



Start 18.0 GHz; Stop 26.5 GHz  
Ref -6.6 dBm; Ref Offset 37.7 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 2.6 S  
Peak 24.621 GHz; -47.0 dBm  
Display Line: -17.6 dBm;  
27/06/2003 16:46:23

Test Of: Giant Electronics Ltd.

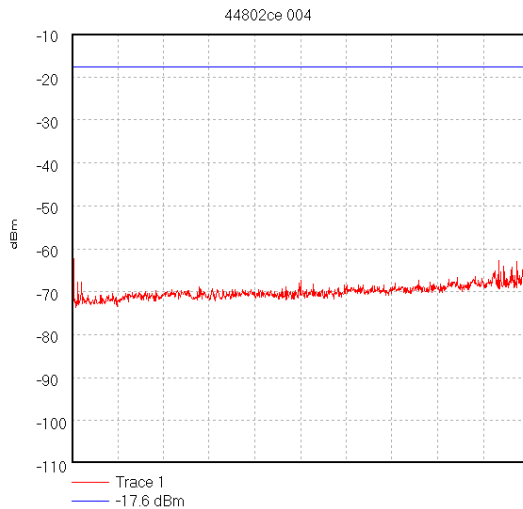
OSSO8 Bluetooth Headset

To: FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247

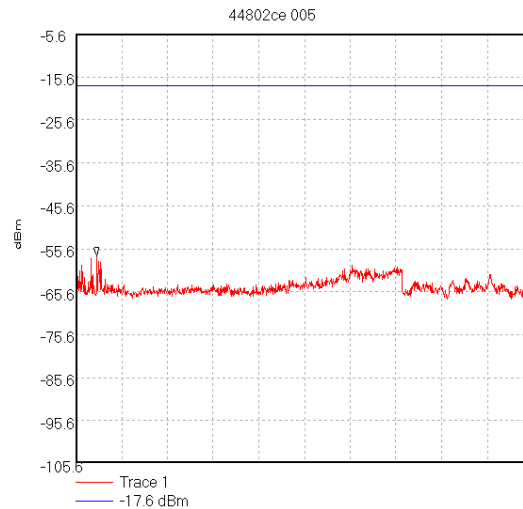
**Highest Peak Level: Hopping All Channels**

Frequency (GHz)	Peak Detector Level (dBm)	Peak Limit (dBm)	Peak Margin (dB)	Result
7.28	-49.5	-17.5	32.0	Complied

**Note.** The following plots use a limit line that is built based on the lowest measured EIRP for all three channels. This method ensures that the tightest limit possible is used and thus ensuring total emission capture.



Start 30.0 MHz; Stop 2.4 GHz  
 Ref -10 dBm; Ref Offset 24.3 dB; 10 dB/div  
 RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 720.0 mS  
 Peak 2.4 GHz, -40.19 dBm  
 Display Line: -17.6 dBm;  
 27/06/2003 16:26:49



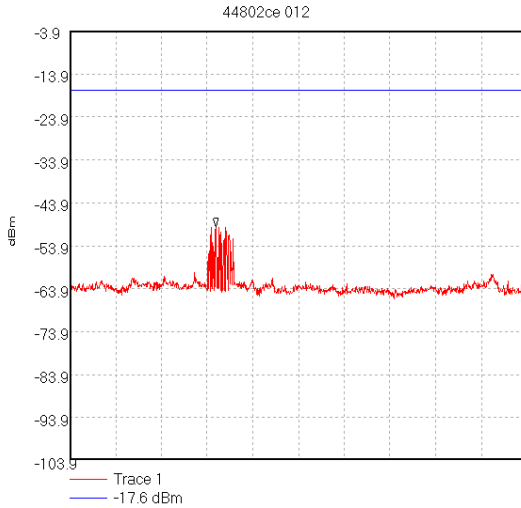
Start 2.484 GHz; Stop 6.0 GHz  
 Ref -5.6 dBm; Ref Offset 28.7 dB; 10 dB/div  
 RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 1.06 S  
 Peak 2.644 GHz, -57.27 dBm  
 Display Line: -17.6 dBm;  
 27/06/2003 16:28:26



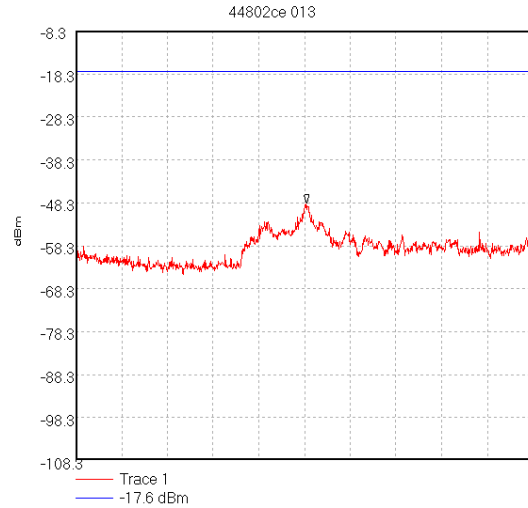
Test Of: Giant Electronics Ltd.  
OSSO8 Bluetooth Headset

To: FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247

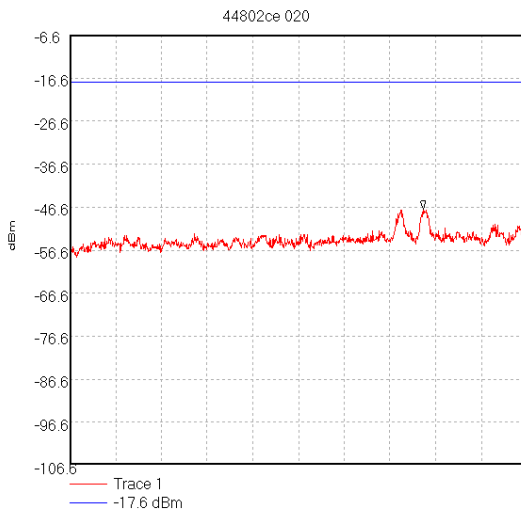
**Transmitter Conducted Emissions: Section 15.247(c) – 30 MHz to 26.5 GHz (Continued)**



Start 6.0 GHz; Stop 10.0 GHz  
Ref -3.9 dBm; Ref Offset 30.4 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 1.2 S  
Peak 7.28 GHz, -49.5 dBm  
Display Line: -17.6 dBm;  
27/06/2003 16:38:02



Start 10.0 GHz; Stop 18.0 GHz  
Ref -3.3 dBm; Ref Offset 36.0 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 2.4 S  
Peak 14.036 GHz, -48.47 dBm  
Display Line: -17.6 dBm;  
27/06/2003 16:39:51



Start 18.0 GHz; Stop 26.5 GHz  
Ref -6.6 dBm; Ref Offset 37.7 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 2.6 S  
Peak 24.573 GHz, -47.05 dBm  
Display Line: -17.6 dBm;  
27/06/2003 16:47:13

Test Of: Giant Electronics Ltd.  
OSSO8 Bluetooth Headset

To: FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247

**8.10. Transmitter Radiated Emissions: Section 15.247(c) and 15.209(a)**

**8.10.1. Electric Field Strength Measurements: 30 to 1000 MHz.**

8.10.1.1. The EUT was configured as for radiated field strength measurements as described in Appendix 2 of this report.

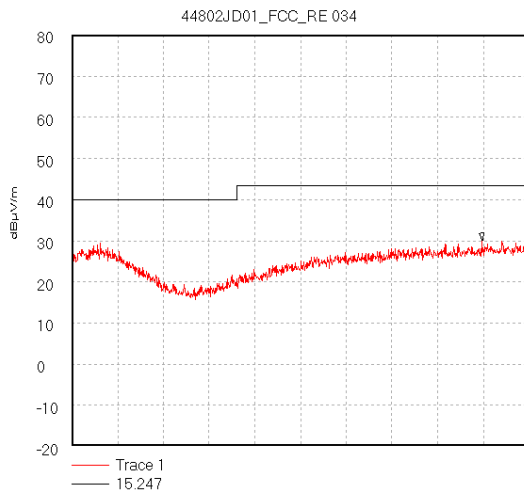
8.10.1.2. Tests were performed to identify the maximum radiated emissions levels.

**Bottom, Middle, Top and Hopping All Channels**

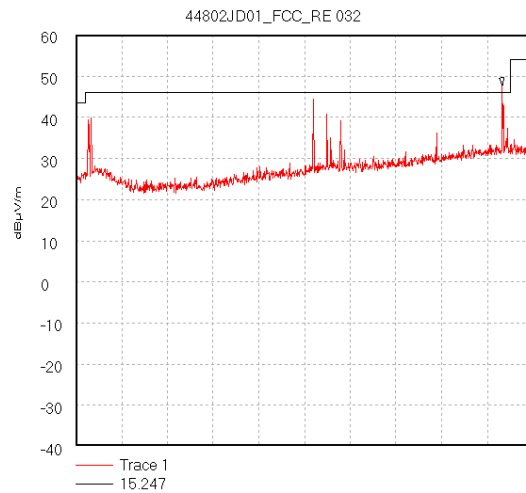
Frequency (MHz)	Ant. Pol.	Q-P Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
856.6	Vert.	33.6	46.0	12.4	Complied

**Note 1.** As there were no EUT emissions present in the scans, the highest noise floor value was recorded.

**Note 2.** The following plots show background ambient signals. It was found through power cycling that these signals were not associated with the EUT.



Start 25.0 MHz; Stop 200.0 MHz  
Ref 80 dBµV/m; Ref Offset 0.0 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 60.0 mS  
Peak 182.111 MHz, 29.98 dBµV/m  
Limit/Mask: 15.247;  
Transducer Factors: Radio\_Bicon  
04/06/2003 11:50:12



Start 200.0 MHz; Stop 1.0 GHz  
Ref 60 dBµV/m; Ref Offset 1.6 dB; 10 dB/div  
RBW 145.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 520.0 mS  
Peak 946.667 MHz, 47.79 dBµV/m  
Limit/Mask: 15.247;  
Transducer Factors: Radio\_Log\_Spiral  
04/06/2003 11:44:11

Test Of: Giant Electronics Ltd.

OSSO8 Bluetooth Headset

To: FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247

**Transmitter Radiated Emissions: Section 15.247(c) and 15.209(a) (continued)****8.10.2. Electric Field Strength Measurements: 1.0 to 26.5 GHz****Highest Peak Level: Bottom Channel**

Frequency (GHz)	Antenna Polarity (H/V)	Peak* Detector level (dB $\mu$ V)	Antenna factor (dB)	Cable loss (dB)	Actual Peak* Level (dB $\mu$ V/m)	Average Limit (dB $\mu$ V/m)	Peak to Average Margin (dB)	Result
1.08001	Vert.	8.7	21.5	0.5	30.7	54.0	23.3	Complied
24.16618	Vert.	4.1	37.2	4.8	46.1	54.0	7.9	Complied

**Highest Peak Level: Middle Channel**

Frequency (GHz)	Antenna Polarity (H/V)	Peak* Detector level (dB $\mu$ V)	Antenna factor (dB)	Cable loss (dB)	Actual Peak* Level (dB $\mu$ V/m)	Average Limit (dB $\mu$ V/m)	Peak to Average Margin (dB)	Result
1.08057	Vert.	8.9	21.5	0.5	30.9	54.0	23.1	Complied
24.16353	Vert.	4.3	37.2	4.8	46.3	54.0	7.7	Complied

**Highest Peak Level: Top Channel**

Frequency (GHz)	Antenna Polarity (H/V)	Peak* Detector level (dB $\mu$ V)	Antenna factor (dB)	Cable loss (dB)	Actual Peak* Level (dB $\mu$ V/m)	Average Limit (dB $\mu$ V/m)	Peak to Average Margin (dB)	Result
1.08129	Vert.	9.6	21.5	0.5	31.6	54.0	22.4	Complied
24.157	Vert.	4.7	37.2	4.8	46.7	54.0	7.3	Complied

**Highest Peak Level: Hoping All Channels**

Frequency (GHz)	Antenna Polarity (H/V)	Peak* Detector level (dB $\mu$ V)	Antenna factor (dB)	Cable loss (dB)	Actual Peak* Level (dB $\mu$ V/m)	Average Limit (dB $\mu$ V/m)	Peak to Average Margin (dB)	Result
1.07933	Vert.	8.6	21.5	0.5	30.6	54.0	23.4	Complied
24.15868	Vert.	4.5	37.2	4.8	46.5	54.0	7.5	Complied

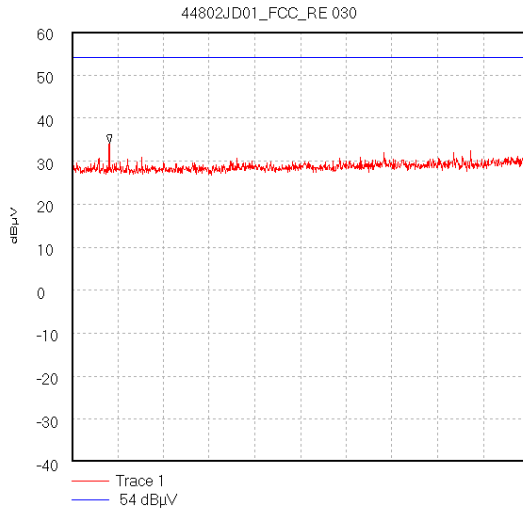
**\*Note.** No spurious emissions were present during final measurement. It is assumed that there may be spurious emissions masked by the system noise floor. As such, the highest peak noise floor reading of the measuring receiver was recorded and compared against the average limit.

Test Of: Giant Electronics Ltd.

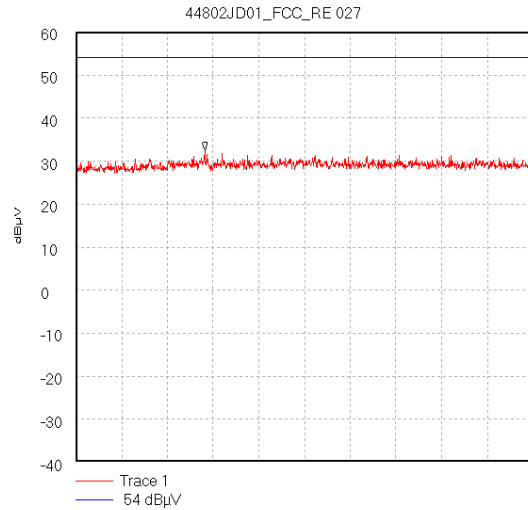
OSSO8 Bluetooth Headset

To: FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247

**Transmitter Radiated Emissions: Section 15.247(c) and 15.209(a) (continued)**



Start 1.0 GHz; Stop 2.0 GHz  
Ref 60 dBµV; Ref Offset 1.6 dB; 10 dB/div  
RBW 1.45 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS  
Peak 1.082 GHz; 34.23 dBµV  
Display Line: 54 dBµV;  
04/06/2003 11:32:14



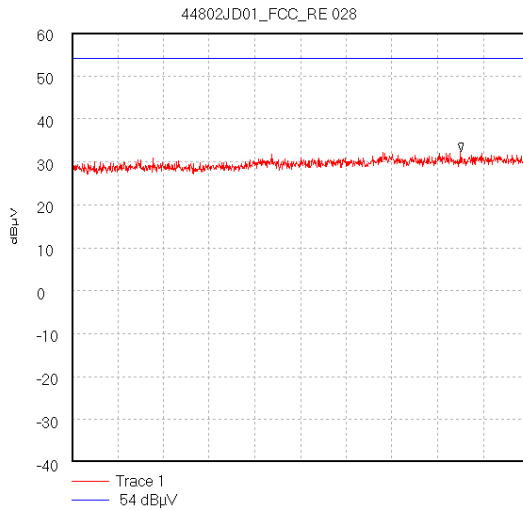
Start 2.0 GHz; Stop 2.4 GHz  
Ref 60 dBµV; Ref Offset 1.6 dB; 10 dB/div  
RBW 1.45 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS  
Peak 2.113 GHz; 32.48 dBµV  
Display Line: 54 dBµV;  
04/06/2003 11:26:09

Test Of: Giant Electronics Ltd.

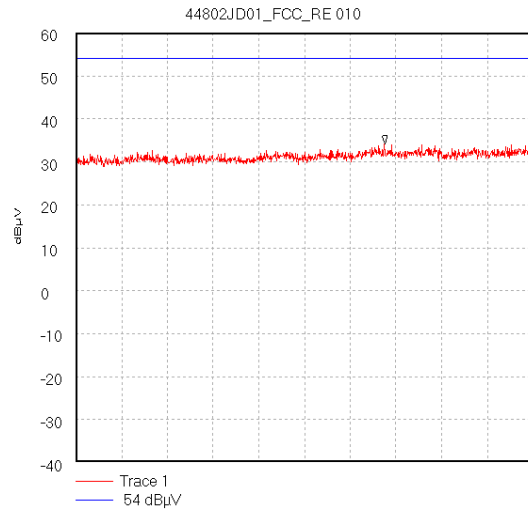
OSSO8 Bluetooth Headset

To: FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247

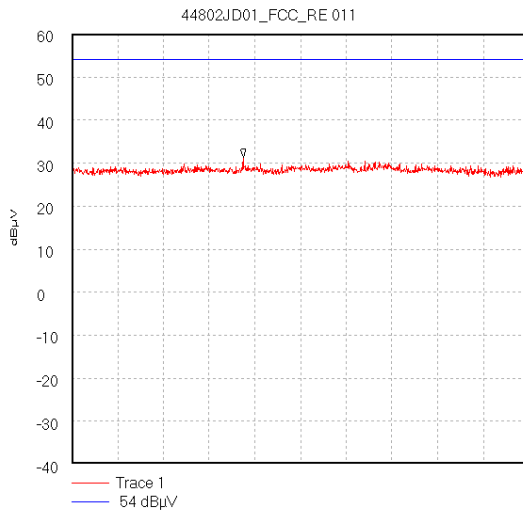
**Transmitter Radiated Emissions: Section 15.247(c) and 15.209(a) (continued)**



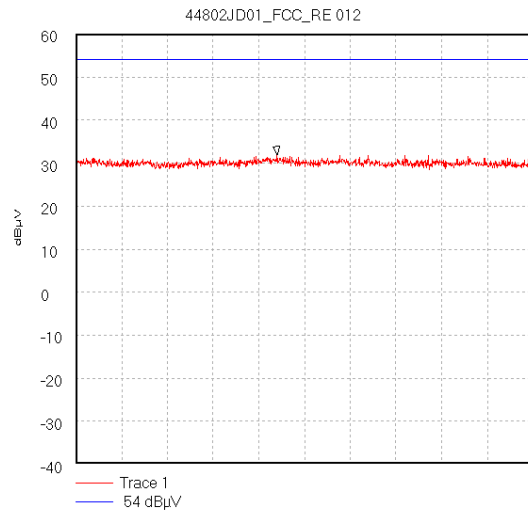
Start 2.484 GHz; Stop 4.0 GHz  
Ref 60 dBµV; Ref Offset 1.6 dB; 10 dB/div  
RBW 1.45 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS  
Peak 3.774 GHz; 32.4 dBµV  
Display Line: 54 dBµV;  
04/06/2003 11:26:57



Start 4.0 GHz; Stop 5.0 GHz  
Ref 60 dBµV; Ref Offset 0.0 dB; 10 dB/div  
RBW 1.45 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS  
Peak 4.675556 GHz; 34.15 dBµV  
Display Line: 54 dBµV;  
03/06/2003 17:15:59



Start 5.0 GHz; Stop 6.0 GHz  
Ref 60 dBµV; Ref Offset 0.0 dB; 10 dB/div  
RBW 1.45 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS  
Peak 5.375556 GHz; 31.36 dBµV  
Display Line: 54 dBµV;  
03/06/2003 17:18:06



Start 6.0 GHz; Stop 8.0 GHz  
Ref 60 dBµV; Ref Offset 0.0 dB; 10 dB/div  
RBW 1.45 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS  
Peak 6.88 GHz; 31.87 dBµV  
Display Line: 54 dBµV;  
03/06/2003 17:21:46

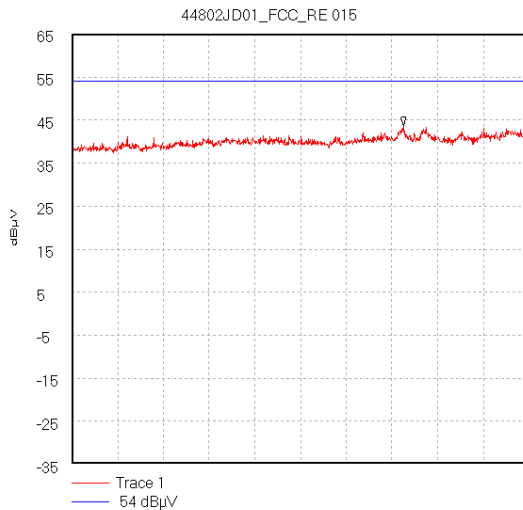
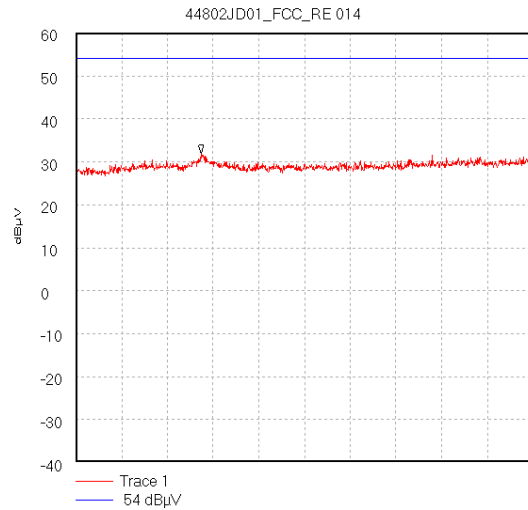
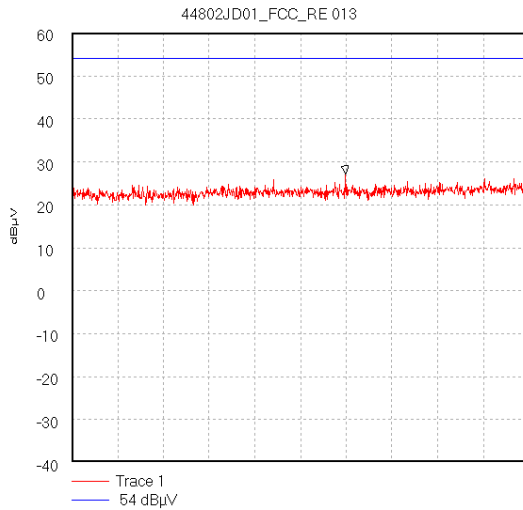
Operations Department

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**Transmitter Radiated Emissions: Section 15.247(c) and 15.209(a) (continued)**



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**8.11. Transmitter Band Edge Radiated Emissions: Section 15.247(c) & 15.209(a)****8.11.1. Electric Field Strength Measurements**

8.11.1.1. The EUT was configured as for band edge compliance of radiated emissions measurements as described in Section 9 of this report.

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

**Peak Power Level Static Mode:**

Frequency (GHz)	Antenna Polarity (H/V)	Peak Level (dBm)	Peak Limit (dBm)	Peak Margin (dB)	Result
2.399517	V	-37.6	-17.3	20.3	Complied

**Peak Power Level Static Mode:**

Frequency (GHz)	Antenna Polarity (H/V)	Peak Detector level (dB $\mu$ V)	Antenna factor (dB)	Cable loss (dB)	Actual Peak Level (dB $\mu$ V/m)	Peak Limit (dB $\mu$ V/m)	Peak Margin (dB)	Result
2.484818	V	38.4	21.4	1.6	61.4	74.0	12.6	Complied

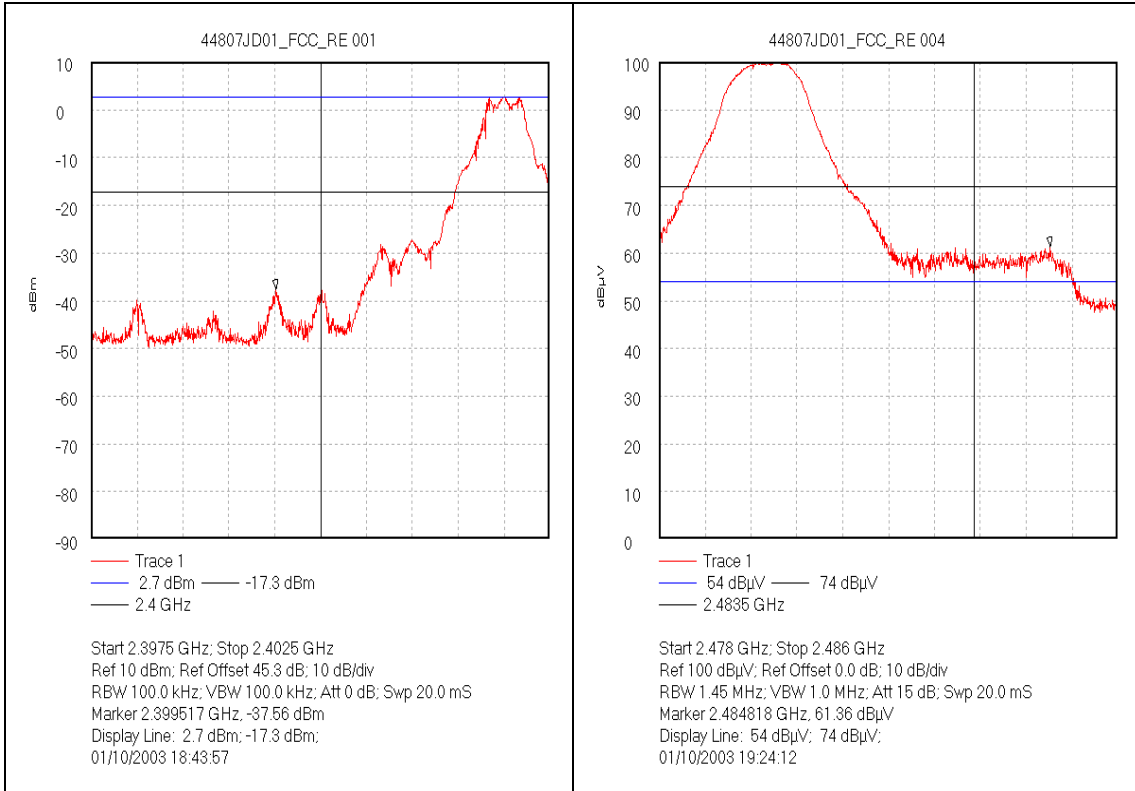
**Average Power Level Static Mode:**

Frequency (GHz)	Antenna Polarity (H/V)	Average Detector level (dB $\mu$ V)	Antenna factor (dB)	Cable loss (dB)	Actual Average Level (dB $\mu$ V/m)	Average Limit (dB $\mu$ V/m)	Average Margin (dB)	Result
2.484818	V	14.7	21.4	1.6	37.7	54.0	16.3	Complied

**Note.** The RBW was set to  $\geq$  the selected span as described in Public Notice DA 00-705

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**Peak Power Level Hopping Mode:**

Frequency (GHz)	Antenna Polarity (H/V)	Peak Level (dBm)	Peak Limit (dBm)	Peak Margin (dB)	Result
2.398517	V	-36.0	-17.5	18.5	Complied

**Peak Power Level Hopping Mode:**

Frequency (GHz)	Antenna Polarity (H/V)	Peak Detector level (dB $\mu$ V)	Antenna factor (dB)	Cable loss (dB)	Actual Peak Level (dB $\mu$ V/m)	Peak Limit (dB $\mu$ V/m)	Peak Margin (dB)	Result
2.48377	V	37.3	21.4	1.6	60.3	74.0	13.7	Complied

**Average Power Level Hopping Mode:**

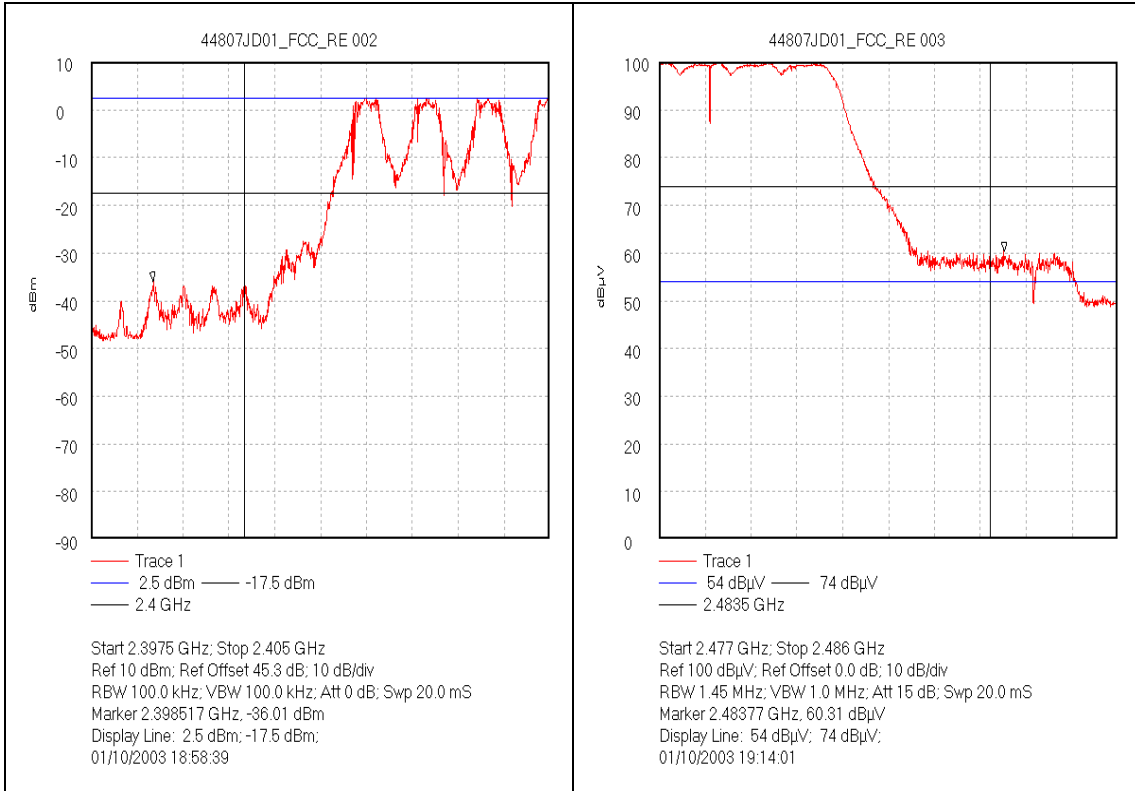
Frequency (GHz)	Antenna Polarity (H/V)	Average Detector level (dB $\mu$ V)	Antenna factor (dB)	Cable loss (dB)	Actual Average Level (dB $\mu$ V/m)	Average Limit (dB $\mu$ V/m)	Average Margin (dB)	Result
2.48377	V	13.5	21.4	1.6	36.5	54.0	17.5	Complied

**Note.** The RBW was set to  $\geq$  the selected span as described in Public Notice DA 00-705

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## **9. Measurement Methods**

### **9.1. AC Mains Conducted Emissions**

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

The test was performed in a shielded enclosure with the equipment arranged as detailed in the standard on a wooden bench using the floor of the screened enclosure as the ground reference plane. The EUT powered with 115V 60 Hz AC mains supplied via a Line Impedance Stabilisation Network (LISN)

Initial measurements in the form of swept scans covering the entire measurement band were performed in order to identify frequencies on which the EUT was generating interference. In order to minimise the time taken for these swept measurements, a Peak detector was used in conjunction with the appropriate detector IF measuring bandwidths (see table below). Repetitive scans were performed to allow for emissions with low repetition rates, and the duty cycle of the EUT. The test configuration was the same for the initial scans as for the final measurements.

Following the initial scans, a graph was produced giving an overview of the emissions from the EUT plotted against the appropriate specification limit. A tolerance line was set 6 dB below the specification limit and levels above the tolerance line were re-tested (at individual frequencies) using the appropriate detector function.

The EUT was configured in accordance with section 5.2 of this report.

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

<b>Receiver Function</b>	<b>Initial Scan</b>	<b>Final Measurements</b>
Detector Type:	Peak	Quasi-Peak (CISPR)*
Mode:	Max Hold	Not applicable
Bandwidth:	9 kHz	9 kHz
Amplitude Range:	100 dB	20 dB
Measurement Time:	Not applicable	> 1 s
Observation Time:	Not applicable	> 15 s
Step Size:	Continuous sweep	Not applicable
Sweep Time:	Coupled	Not applicable

\* In some instances an Average detector function may also have been used, where this was the case it would have been documented in the relevant section.

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## **9.2. Radiated Field Strength Emissions**

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

Initial pre-scans covering the entire measurement band from the lowest generated frequency declared up to 'n' times the highest fundamental frequency stated in section 2.5 of this report where 'n' is either 5 or 10 dependant upon whether the emission was produced via a transmitter/receiver or idle mode.

The pre-scans were performed within a screened chamber in order to identify frequencies on which the EUT was generating spurious.

This procedure identified the frequencies from the EUT, which required further examination.

The initial scans were performed using an antenna height of 1.5 m and at a measurement distance of 3 m.

A limit line was set to the specification limit by characterising the screen room using a known signal source set at exactly the same location as the EUT.

The signal source was derived from either a horn antenna or a dipole dependant on the frequency band under investigation.

Any levels within 20dB of this limit were measured where possible, on occasion; the receiver noise floor came within the 20dB boundary. On these occasions, the system noise floor may have been recorded.

An open area test site was then used with the EUT being set to the appropriate test distance.

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.

The levels were maximised by initially rotating the turntable through 360° and then varying the antenna height between 1 m and 4 m in the vertical polarisation.

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.

The above procedure was repeated for the horizontal polarisation.

The final result was calculated as:-

$$E \text{ dBuV/m} = L_vL + AF + CL$$

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**Radiated Field Strength Emissions (Continued)**

Where:

E dBuV/m = Final field strength recorded.

LvL = Raw level indicate on measuring receiver.

AF = Antenna factor of test antenna.

CL = Cable loss.

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

Receiver Function	Initial Scan Below 1000 MHz	Final Measurements Below 1000 MHz
Detector Type:	Peak	Quasi-Peak (CISPR)
Mode:	Max Hold	Not applicable
Bandwidth:	100 kHz	120 kHz
Amplitude Range:	100 dB	100 dB
Measurement Time:	Not applicable	> 1 s
Observation Time:	Not applicable	> 15 s
Step Size:	Continuous sweep	Not applicable
Sweep Time:	Coupled	Not applicable

Receiver Function	Initial Scan Above 1000 MHz	Final Measurements Above 1000 MHz
Detector Type:	Peak	Peak/Average
Mode:	Max Hold	Max Hold where applicable
Bandwidth:	100 kHz	1 MHz
Amplitude Range:	100 dB	100 dB
Measurement Time:	Not applicable	> 1 s
Observation Time:	Not applicable	> 15 s
Step Size:	Continuous sweep	Not applicable
Sweep Time:	Coupled	Not applicable

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### **9.3. Carrier Frequency Separation/20dB Bandwidth**

The EUT and spectrum analyser was 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 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.

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 a 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 20dB below the peak level.

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

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#### **9.4. Average Time of Occupancy**

The EUT and spectrum analyser was configured as 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 0 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 0 span with the time domain and a 31.6 second sweep time. This 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.

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### **9.5. 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 – 2001 Clause 5.4.

The transmitter was fitted with an integral antenna; as such 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 plane.

The EUT was oriented in the X plane.

The test antenna was then raised and lowered until a maximum peak level 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 maximum amplitude 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 6dB or greater PAD.

The signal generator was tuned to the EUT's frequency under test.



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### Effective Isotropic Radiated Power (EIRP) (Continued)

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:-

$$\text{EIRP} = \text{Signal Generator Level} - \text{Cable Loss} + \text{Antenna Gain}$$

Circumstances where the signal generator could not produce the desired power level, 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.

$$\text{Delta (dB)} = \text{EUT} - \text{SG}$$

Where :

EUT = spectrum analyser indicated EUT raw level

SG = spectrum analyser indicated signal generator raw level

The signal generator actual EIRP is calculated as:

$$\text{EIRP SG} = \text{Signal Generator Level} - \text{Cable Loss} + \text{Antenna Gain}$$

The EUT EIRP is calculated as:

$$\text{EIRP EUT} = \text{EIRP SG} + \text{Delta.}$$

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### **9.6. 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  $\geq 1\%$  of the analyser span. The video bandwidth was set to be no less than 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 upper band edge of the allocated frequency band was produced. A limit line was set to the level of the highest in-band emission with a further limit line set to 20 dB below this. A 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 lower band edge.

If the upper or lower band edges fell on a restricted band edge then the limit set for the restricted band would be applied instead of the 20 dBc limit.

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

The EUT was configured in accordance with section 5.2 of this report

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## **10. Measurement Uncertainty**

10.1. 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.

10.2. The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

10.3. The uncertainty of the result may need to be taken into account when interpreting the measurement results.

10.4. 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”.

<b>Measurement Type</b>	<b>Range</b>	<b>Confidence Level (%)</b>	<b>Calculated Uncertainty</b>
AC Conducted Spurious Emissions	0.15 MHz to 30.0 MHz	95%	+/- 3.25 dB
Effective Isotropic Radiated Power (EIRP)	Not applicable	95%	+/- 1.78 dB
Transmitter Maximum Peak Output Power	Not applicable	95%	+/- 0.46 dB
Transmitter Carrier Frequency Separation	Not applicable	95%	+/- 0.01 ppm
20dB Bandwidth	1850 to 1910 MHz	95%	+/- 0.12 %
Transmitter Average Time of Occupancy	Not applicable	95%	+/- 10.00 %
Radiated Spurious Emissions	30.0 MHz to 1000.0 MHz	95%	+/- 5.26 dB
Radiated Spurious Emissions	1.0 GHz to 26.0 GHz	95%	+/- 1.78 dB

10.5. 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**

RFI No.	Instrument	Manufacturer	Type No.	Serial No.
A003	ESH3-Z2 Pulse Limiter	Rohde & Schwarz	ESH3-Z2	357 881/052
A027	Horn Antenna	Eaton	9188-2	301
A031	2 to 4 GHz Eaton Horn Antenna	Eaton	91889-2	557
A067	LISN	Rohde & Schwarz	ESH3-Z5	890603/002
A090	Narda Step Attenuator 0-60dB	Narda	743-60	01057
A1037	Chase Bilog Antenna	Chase EMC Ltd	CBL6112B	2413
A1141	HP 11691D	Hewlett Packerd	11691D	1212A02494
A197	Site 2 Controller SC144	Unknown	SC144	150720
A248	60 dB Variable Attenuator	Narda	743-60	01411
A254	WG 14 Microwave Horn	Flann Microwave	14240-20	139
A255	WG 16 Microwave Horn	Flann Microwave	16240-20	519
A259	Bilog Antenna	Chase	CBL6111	1513
A276	OATS Positioning Controller	Rohde & Schwarz	HCC	
A392	3 dB attenuator (9)	Suhner	6803.17.B	None
A428	WG 12 horn	Flann	12240-20	134
A430	WG 18 horn	Flann	18240-20	425
A433	WG 27 Straight	Flann	27441	None
C1001	Cable	Rosenberger	FA210A1020M30309	003
C1071	3m Cable	Rosenberger	FA21A1030M5050	Not Stated
C1077	1m Cable	Rosenberger	FA210A1010M5050	28462-2
C1079	1m Cable	Rosenberger	FA210A1010M5050	28462-1
C1082	Cable 2m	Rosenberger	FA210A1020M5050	28463-1
C202	Cable	Rosenberger	UFA 210A-1-1180-70X70	1543
C453	Cable	Rosenberger	RG142XX-001-RFIB	C453-10081998
C457	Cable	Rosenberger	RG142XX-002-RFIB	C457-10081998

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**Test Equipment Used (Continued)**

RFI No.	Instrument	Manufacturer	Type No.	Serial No.
C461	Cable	Rosenberger	UFA210A-1-1182-704704	98H0305
C499	Cable	Rosenberger	FA210A1020M30309	001
C564	C564-N-2	Rosenberger	UFA 210A-1-0787-70x70	96L0226
G085	Generator	Hewlett Packard	83650L	3614A00104
M003	Spectrum Monitor	Rohde & Schwarz	EZM	883 580/008
M023	ESVP Receiver	Rohde & Schwarz	ESVP	872 991/027
M072	FSM Spectrum Analyser	Rohde & Schwarz	FSM	862 967/010 (RF) & 863 912/048 (Display)
M080	TestLab DMM	METEX	M8181B	AA163868
M115	Temperature / Humidity Meter	RS Components	212-146	None
M127	Spectrum Analyser	Rohde & Schwarz	FSEB 30	842 659/016
M139	Digital Multimeter	Fluke	11	65830028
M141	Power Meter	Boonton	4220	33402BE
M150	Power Sensor	Boonton	51072	28473
M173	Turntable Controller	R.H.Electrical Services	RH351	3510020
S009	D.C. PSU	Farnell	PDD3502A	174
S201	Site 1	RFI	1	
S202	Site 2	RFI	2	S202-15011990
S207	Site 7	RFI	7	S202-15011990
S212	Site 12	RFI	12	

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

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## **Appendix 2. Test Configuration Drawings**

This appendix contains the following drawings:

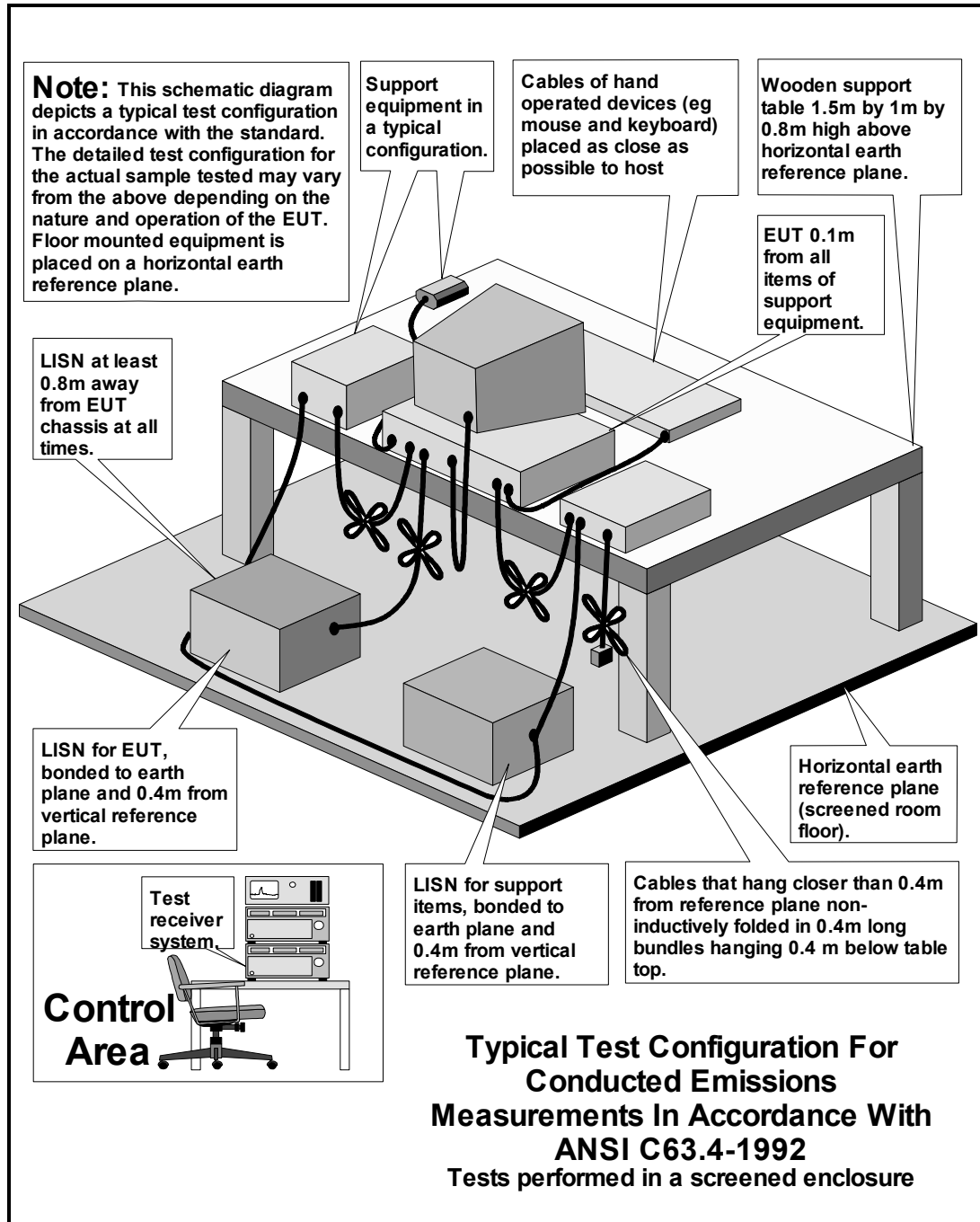
<b>Drawing Reference Number</b>	<b>Title</b>
DRG\44802JD01\EMICON	Test configuration for measurement of conducted emissions
DRG\44802JD01\EMIRAD	Test configuration for measurement of radiated emissions

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DRG\44802JD01\EMICON



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DRG\44802JD01\EMIRAD

