

# TEST REPORT FROM RADIO FREQUENCY INVESTIGATION LTD.

Test Of: Mansella Ltd.  
CDP 24 Bluetooth Cordless Data Phone Handset

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

**Test Report Serial No:**  
RFI/MPTB2/RP45014JD05A

**Superseded Test Report Serial No:**  
RFI/MPTB1/RP45014JD05A

This Test Report Is Issued Under The Authority Of Richard Jacklin, Operations Director:  	Checked By:  
Tested By:  	Release Version No: PDF01
Issue Date: 30 September 2003	Test Dates: 24 June 2003 to 18 July 2003

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This report may be copied in full. The results in this report apply only to the sample(s) tested.

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**

**Operations Department**

**Test Of: Mansella Ltd.**

**CDP 24 Bluetooth Cordless Data Phone Handset**

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## **1. Client Information**

<b>Company Name:</b>	Mansella Ltd.
<b>Address:</b>	Stafford House 33-39 Station Road Aldershot Hampshire GU11 1BA UK
<b>Contact Name:</b>	Mr Wahed Dewan

## 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)

#### 2.1.1. Radiated RF Sample

<b>Brand Name:</b>	Olympia
<b>Model Name or Number:</b>	Data Phone Handset
<b>Unique Type Identification:</b>	CDP 24
<b>Serial Number:</b>	HS#04
<b>FCC ID Number:</b>	QSP-CDP24-1-01
<b>Country of Manufacture:</b>	China
<b>Date of Receipt:</b>	24 June 2003

#### 2.1.2. Conducted RF Sample

<b>Brand Name:</b>	Olympia
<b>Model Name or Number:</b>	Data Phone Handset
<b>Unique Type Identification:</b>	CDP 24
<b>Serial Number:</b>	HS#03
<b>FCC ID Number:</b>	QSP-CDP24-1-01
<b>Country of Manufacture:</b>	China
<b>Date of Receipt:</b>	24 June 2003

### 2.2. Description Of EUT

The equipment under test is a Cordless Data Phone (CDP) that is a cordless telephone with a built-in modem and USB capability. The CDP is a combined wireless voice and data product using the high power Bluetooth V1.1 wireless standard for worldwide operation.

### 2.3. Modifications Incorporated In EUT

The EUT has not been modified from what is described by the Model Number and Unique Type Identification stated above.

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**2.4. Additional Information Related To Testing**

<b>Power Supply Requirement:</b> (AC Battery Charger)	3 x 1.2V AAA NiMH Cells
<b>Intended Operating Environment:</b>	Domestic Use
<b>Equipment Category:</b>	Portable
<b>Type of Unit:</b>	Cordless Telephone
<b>Weight:</b>	140 g
<b>Dimensions:</b>	130 x 53 x 25 mm
<b>Interface Ports:</b>	Mini B USB Port
<b>Highest Declared Generated Frequency within the EUT.</b>	2.480 GHz
<b>Transmit Frequency Range Tested</b>	2.402 GHz to 2.480 GHz
<b>Receive Frequency Range Tested</b>	2.402 GHz to 2.480 GHz
<b>Maximum Measured Output Power (EIRP)</b>	18.5 dBm

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**2.5. Support Equipment**

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

<b>Description:</b>	BT RF Tester
<b>Brand Name:</b>	Agilent
<b>Model Name or Number:</b>	E1852A
<b>Serial Number:</b>	DK41300172
<b>Cable Length And Type:</b>	Not Applicable
<b>Connected to Port:</b>	50 Ω Antenna / 50 Ω SMA connector on the conducted EUT antenna port

<b>Description:</b>	Laptop PC
<b>Brand Name:</b>	Dell
<b>Model Name or Number:</b>	Latitude
<b>Serial Number:</b>	TW09C748-128-157-3888
<b>Cable Length And Type:</b>	Not Applicable
<b>Connected to Port:</b>	USB port on the EUT

<b>Description:</b>	3 m Parallel Printer Lead
<b>Brand Name:</b>	Roline
<b>Model Name or Number:</b>	Roline
<b>Serial Number:</b>	None stated by client
<b>Cable Length And Type:</b>	3 m Parallel
<b>Connected to Port:</b>	Connected to PC parallel port

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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.

### **3.2. Methods And Procedures**

The methods and procedures used were as detailed in:

FCC Code of Federal Regulations 47.  
Telecommunication. Parts 0 to 19, 2002.

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.

## **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 AC battery charger, 3 x 1.2V AAA NiMH cells.

### **5.2. Operating Modes**

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

Preliminary radiated scans were performed on the EUT with the accessories stated in section 2.1 of this report connected and then disconnected. The combination that exhibited the worse case mode of operation was then used to perform final measurements.

Bluetooth mode transmitting on top, middle or bottom channels, hopping on all channels or in receive mode.

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

The EUT was tested in the following configuration:

Configured with internal battery only.

The EUT was commanded to operate on specific channels using a Bluetooth test set.

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**6. Summary Of Test Results**

Range Of Measurements	Specification Reference	Port Type	Compliancy Status
Receiver Conducted Emissions (AC Mains)	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 Conducted Emissions (AC Mains)	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 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 Conducted Emissions	C.F.R. 47 FCC Part 15: 2002 Section 15.247(c)	Antenna Terminals	Complied
Transmitter Band Edge Radiated Emission	C.F.R. 47 FCC Part 15: 2002 Section 15.247(c) Section 15.209(a)	Antenna	Complied

## **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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**7.2. Receiver Conducted Emissions: AC Mains - Section 15.107**

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

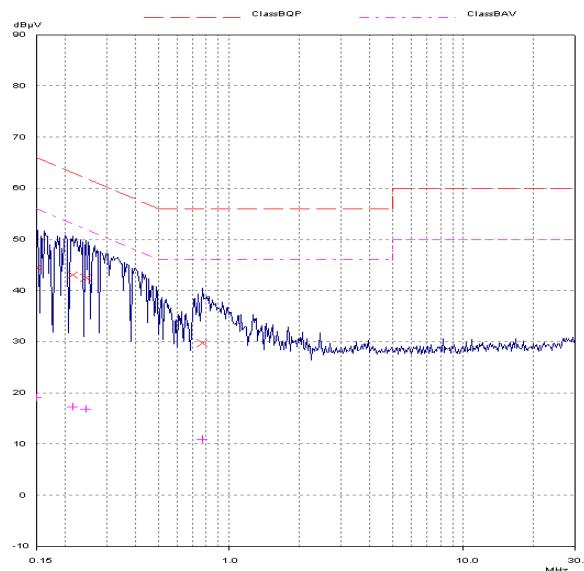
7.2.2. The following table lists frequencies at which emissions were measured using a Quasi-Peak detector:

**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
150.000	Live	44.50	66.00	21.50	Complied
213.580	Live	43.08	63.06	19.98	Complied
243.140	Live	42.47	61.99	19.52	Complied
766.810	Live	29.65	56.00	26.35	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
150.000	Live	19.08	56.00	36.92	Complied
213.580	Live	17.25	53.06	35.81	Complied
243.140	Live	16.77	51.99	35.22	Complied
766.810	Live	10.88	46.00	35.12	Complied



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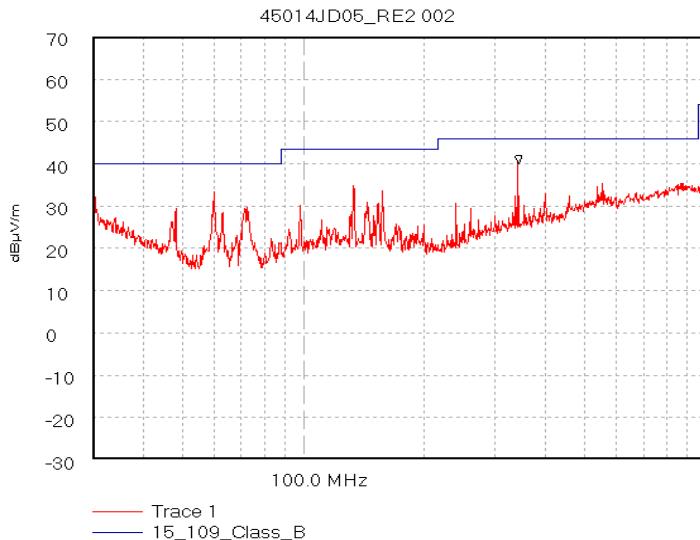
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**7.3. Receiver Radiated Emissions: Section 15.109****7.3.1. Electric Field Strength Measurements (Frequency Range: 30 to 1000 MHz)**

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

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

Frequency (MHz)	Ant. Pol.	Q-P Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
46.596	Vert.	20.0	40.0	20.0	Complied
59.816	Vert.	9.4	40.0	30.6	Complied
71.300	Vert.	22.0	40.0	18.0	Complied
133.177	Vert.	27.0	43.5	16.5	Complied
152.644	Horiz.	10.7	43.5	32.8	Complied
342.512	Horiz.	12.8	46.0	33.2	Complied



Start 30.0 MHz; Stop 1.0 GHz - Log Scale  
 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 100.0 mS  
 Peak 342.512 MHz; 39.91 dB $\mu$ V/m  
 Limit/Mask: 15\_109\_Class\_B; Limit Test Passed  
 Transducer Factors: A1037  
 30/06/2003 09:57:54

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**7.4. Receiver Radiated Emissions: Section 15.109****7.4.1. Electric Field Strength Measurements (Frequency Range: 1.0 to 12.5 GHz)**

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

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

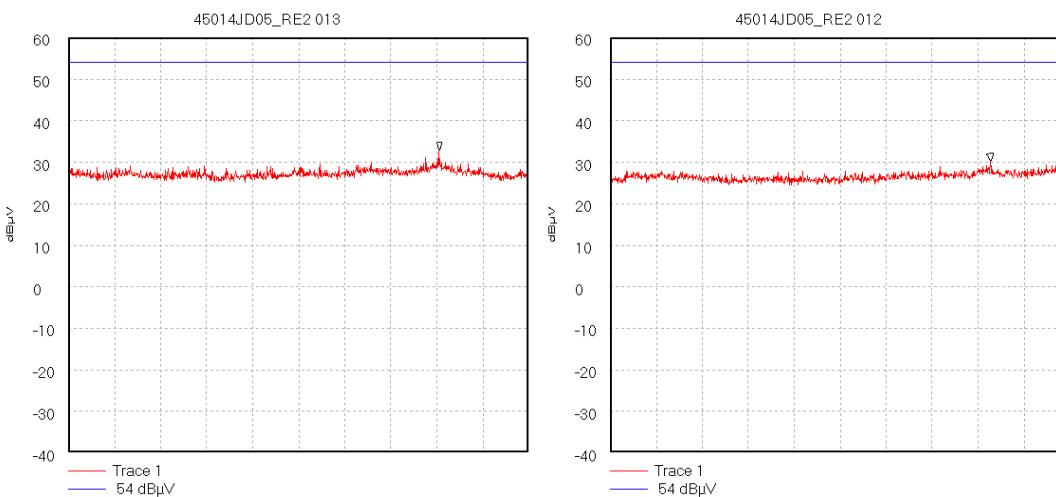
**Highest Average Level:**

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
Not recorded, No emissions were present.								

**Highest Peak 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)	Peak Limit (dB $\mu$ V/m)	Peak Margin (dB)	Result
*4.92	Vert.	9.02	24.4	1.5	34.92	74	39.08	Complied

\*Note: No spurious emissions were present, therefore the highest peak noise floor reading of the measuring receiver was recorded.



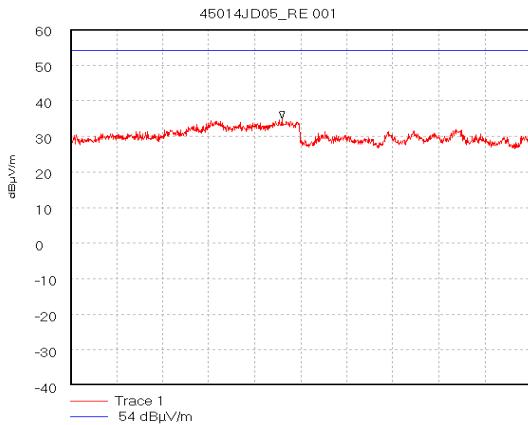
Start 1.0 GHz; Stop 2.0 GHz  
Ref 60 dB $\mu$ V; Ref Offset 0.0 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 640.0 mS  
Peak 1.806 GHz, 32.76 dB $\mu$ V  
Display Line: 54 dB $\mu$ V; ; Limit Test Passed  
30/06/2003 11:09:46

Start 2.0 GHz; Stop 4.0 GHz  
Ref 60 dB $\mu$ V; Ref Offset 0.0 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 1.28 S  
Peak 3.656 GHz, 30.29 dB $\mu$ V  
Display Line: 54 dB $\mu$ V; ; Limit Test Passed  
30/06/2003 11:06:41

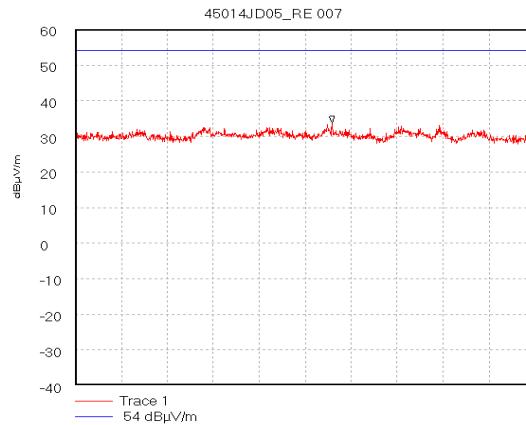
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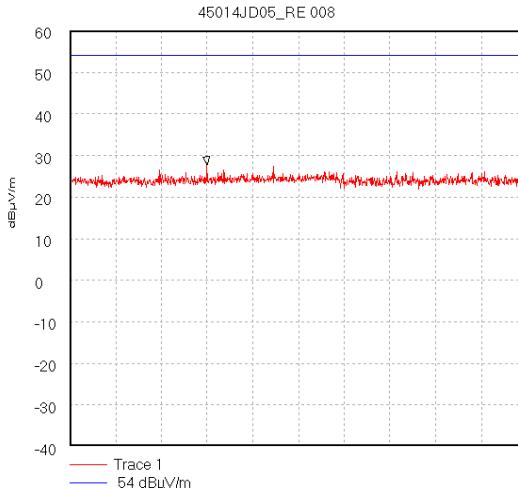
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**Receiver Radiated Emissions (Continued)**

Start 4.0 GHz; Stop 6.0 GHz  
Ref 60 dB $\mu$ V/m; Ref Offset 1.5 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 600.0 mS  
Peak 4.92 GHz, 34.92 dB $\mu$ V/m  
Display Line: 54 dB $\mu$ V/m;  
26/06/2003 09:55:34



Start 6.0 GHz; Stop 8.0 GHz  
Ref 60 dB $\mu$ V/m; Ref Offset 2.3 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 600.0 mS  
Peak 7.118 GHz, 33.75 dB $\mu$ V/m  
Display Line: 54 dB $\mu$ V/m;  
26/06/2003 11:26:19



Start 8.0 GHz; Stop 12.5 GHz  
Ref 60 dB $\mu$ V/m; Ref Offset 3.2 dB; 10 dB/div  
RBW 145.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 3.0 S  
Peak 9.35 GHz, 27.73 dB $\mu$ V/m  
Display Line: 54 dB $\mu$ V/m;  
26/06/2003 11:29:27

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**7.5. Transmitter Conducted Emissions: AC Mains - Section 15.207**

7.5.1. Preliminary conducted spurious scans were performed with the EUT set to Top, Middle, Bottom as requested in FCC Part 15.31(m).

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

7.5.3. The following tables list frequencies at which emissions were measured using a Quasi-Peak and Average detector:

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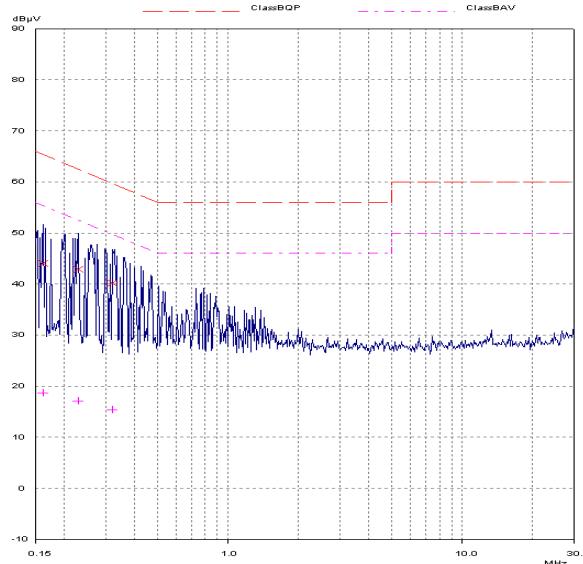
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**Transmitter Conducted Emissions: AC Mains - Section 15.207 (continued)****Quasi-Peak Detector Measurements on Live and Neutral Lines****Bottom Channel**

Frequency (MHz)	Line	Q-P Level (dB $\mu$ V)	Q-P Limit (dB $\mu$ V)	Margin (dB)	Result
160.980	Live	44.07	65.41	21.34	Complied
227.880	Live	42.90	62.53	19.63	Complied
318.800	Live	40.16	59.74	19.58	Complied

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

Frequency (MHz)	Line	Avg Level (dB $\mu$ V)	Avg Limit (dB $\mu$ V)	Margin (dB)	Result
160.980	Live	18.63	55.41	36.78	Complied
227.880	Live	17.03	52.53	35.50	Complied
318.800	Live	15.30	49.74	34.44	Complied



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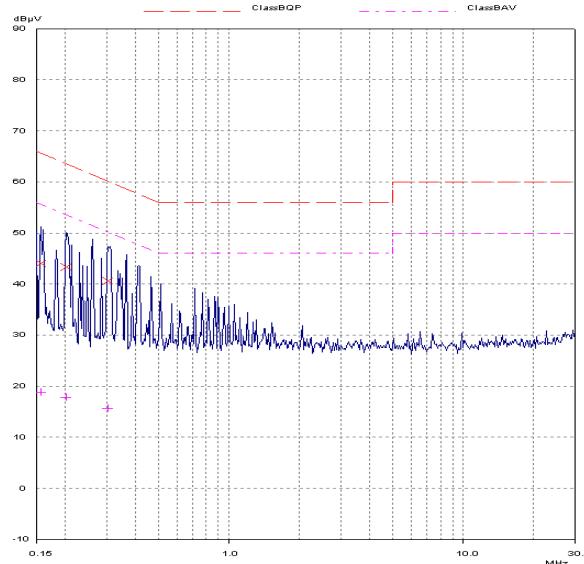
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**Transmitter Conducted Emissions: AC Mains - Section 15.207 (continued)****Quasi-Peak Detector Measurements on Live and Neutral Lines****Middle Channel**

Frequency (MHz)	Line	Q-P Level (dB $\mu$ V)	Q-P Limit (dB $\mu$ V)	Margin (dB)	Result
156.310	Live	43.99	65.66	21.67	Complied
201.370	Live	43.36	63.55	20.19	Complied
304.130	Live	40.57	60.13	19.56	Complied

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

Frequency (MHz)	Line	Avg Level (dB $\mu$ V)	Avg Limit (dB $\mu$ V)	Margin (dB)	Result
156.310	Live	18.75	55.66	36.91	Complied
201.370	Live	17.76	53.55	35.79	Complied
304.130	Live	15.70	50.13	34.43	Complied



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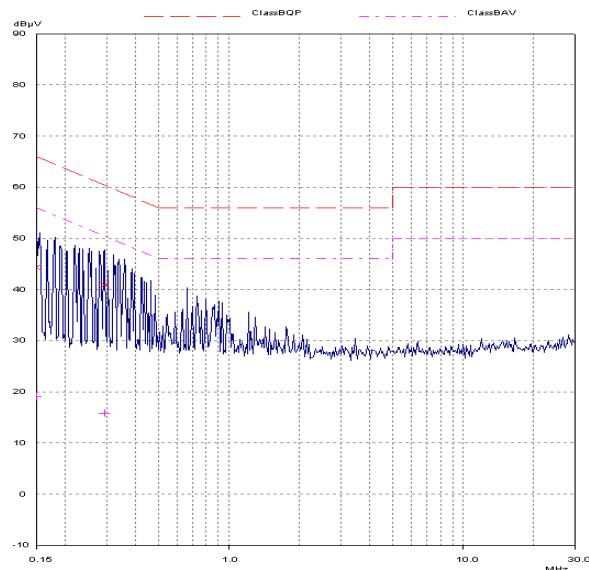
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**Transmitter Conducted Emissions: AC Mains - Section 15.207 (continued)****Quasi-Peak Detector Measurements on Live and Neutral Lines****Top Channel**

Frequency (MHz)	Line	Q-P Level (dB $\mu$ V)	Q-P Limit (dB $\mu$ V)	Margin (dB)	Result
150.000	Live	44.35	66.00	21.65	Complied
291.840	Live	40.87	60.47	19.60	Complied

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

Frequency (MHz)	Line	Avg Level (dB $\mu$ V)	Avg Limit (dB $\mu$ V)	Margin (dB)	Result
150.000	Live	19.16	56.00	36.84	Complied
291.840	Live	15.73	50.47	34.74	Complied



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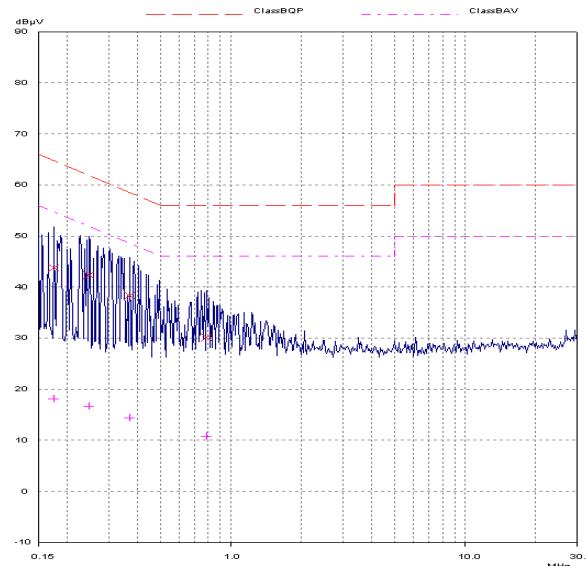
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**Transmitter Conducted Emissions: AC Mains - Section 15.207 (continued)****Quasi-Peak Detector Measurements on Live and Neutral Lines****Hopping All Channels**

Frequency (MHz)	Line	Q-P Level (dB $\mu$ V)	Q-P Limit (dB $\mu$ V)	Margin (dB)	Result
173.790	Live	43.71	64.78	21.07	Complied
247.470	Live	42.27	61.84	19.57	Complied
367.210	Live	38.38	58.56	20.18	Complied
780.480	Live	30.20	56.00	25.80	Complied

**Average Detector Measurements on Live and Neutral Lines****Hopping All Channels**

Frequency (MHz)	Line	Avg Level (dB $\mu$ V)	Avg Limit (dB $\mu$ V)	Margin (dB)	Result
173.790	Live	18.12	54.78	36.66	Complied
247.470	Live	16.59	51.84	35.25	Complied
367.210	Live	14.38	48.56	34.18	Complied
780.480	Live	10.83	46.00	35.17	Complied



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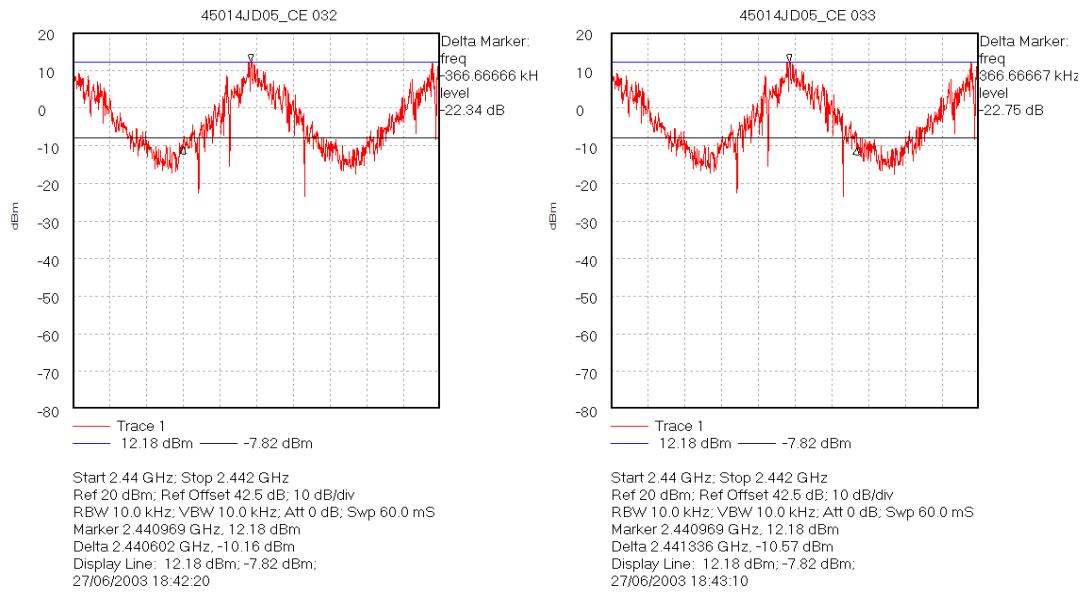
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**7.6. Transmitter 20 dB Bandwidth: Section 15.247(a)(1)**

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

Transmitter 20dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
733.333	None Specified	N/A	N/A



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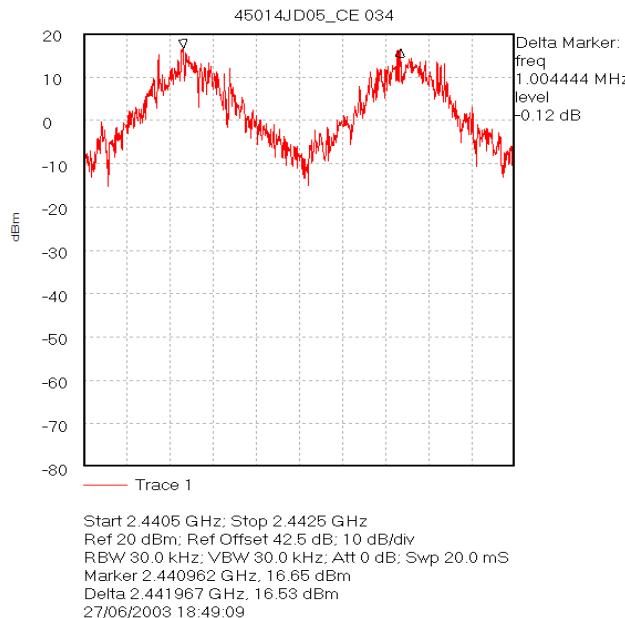
**7.7. Transmitter Carrier Frequency Separation: Section 15.247(a)(1)**

7.7.1. Tests were performed to identify the carrier frequency separation as per FCC Part 15.247(a)(1).

7.7.2. Section 15.247(a)(1) specifies that at least 25 kHz or the 20 dB bandwidth of the channel should separate the channels.

7.7.3. A graphical plot of the characteristics of two adjacent channels was obtained. The following results were noted:

Transmitter Carrier Frequency Separation (kHz)	Limit (25 kHz or 20 dB BW whichever is greater) (kHz)	Margin (kHz)	Result
1004.444	733.333	271.111	Complied



Test Of: Mansella Ltd.

CDP 24 Bluetooth Cordless Data Phone Handset

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

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

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

7.8.2. 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.

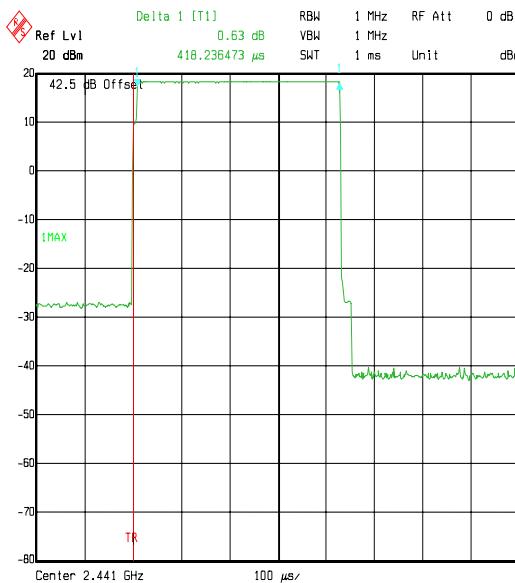
Emission Width (μs)	Number of Hops in 31.6 seconds	Average Time of Occupancy (s)	Limit (s)	Margin (s)	Result
418.236473	262	0.109578	0.4	0.290422	Complied

Test Of: Mansella Ltd.

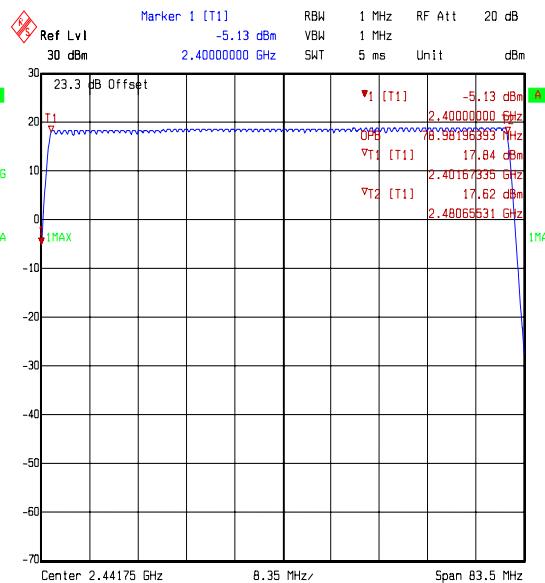
CDP 24 Bluetooth Cordless Data Phone Handset

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

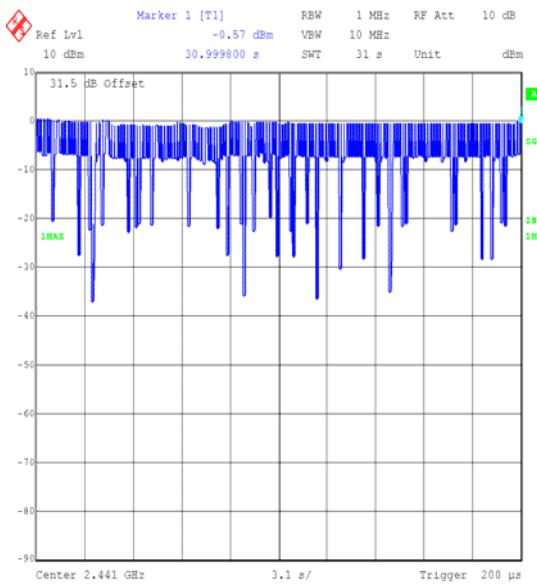
## Transmitter Average Time of Occupancy: Section 15.247(a)(1)(iii) (Continued)



Title: 45014JD05 Mansella EUT: Data Phone Handset.  
Comment A: GPH/45014JD05/001  
Date: 27.JUN.2003 18:28:49



Title: 45014JD05 Mansella EUT: Data Phone Handset. FCC Part 15.247  
Comment A: 45014JD05 FCC\_001  
Date: 18.JUL.2003 17:45:16



Title: FCC Part 15.247. Mansella. Time of Occupancy  
Comment A: 45014JD05\_FCC\_Data.Phone.Handset  
Date: 27.JUN.2003 18:56:34

Test Of: Mansella Ltd.

CDP 24 Bluetooth Cordless Data Phone Handset

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

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

7.9.1. Tests were performed to identify the maximum transmit power in accordance with FCC Part 15.247(b)(1).

7.9.2. The client has provided a temporary antenna port to allow a direct connection to be made.

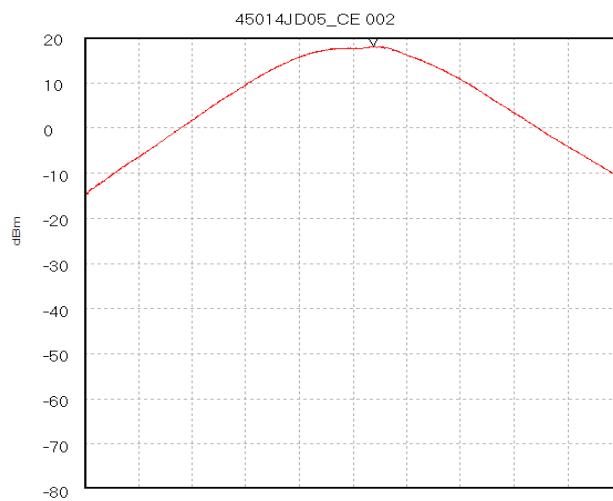
7.9.3. The client has specified that the EUT employs frequency hopping with 79 hopping channels. Therefore the maximum transmitter power level under FCC Part 15.247(b)(1) is 1 Watt.

7.9.4. Results are shown for the EUT set to Top, Middle and Bottom channels as stated in FCC Part 15.31 (m) and section 5.2 of this report.

7.9.5. Measurements were performed on the Top, Middle and Bottom channels for the specified extremes of input voltages:

Channel	Input Voltage (DC)	Output Level (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	3.9	17.97	0	17.97	30	12.03	Complied

*As per the requirements of Public Notice DA 00-705, the stated antenna gain of the EUT is 0 dBi which, when added to the measured conducted peak output power of 17.97 dBm (from the table above) gives a de facto EIRP of 17.97 dBm. This is in compliance with the requirements of Section 15.247(b)(1) for de facto EIRP limitation i.e. 1 Watt (30 dBm).*



Start 2.3995 GHz; Stop 2.4045 GHz  
 Ref 20 dBm; Ref Offset 42.5 dB; 10 dB/div  
 RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS  
 Peak 2.402194 GHz, 17.97 dBm  
 27/06/2003 17:47:20

Test Of: Mansella Ltd.

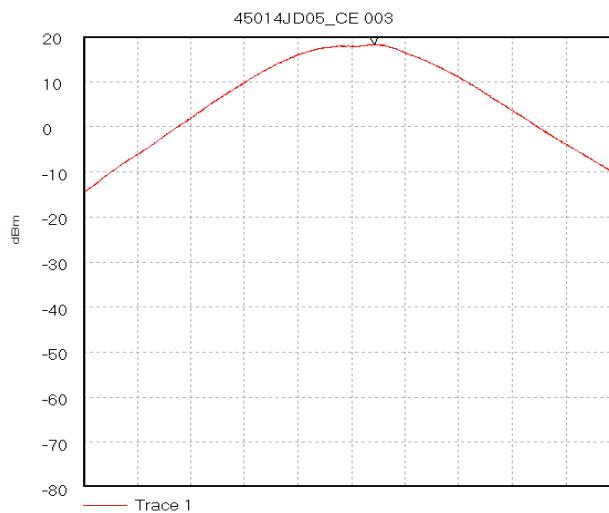
CDP 24 Bluetooth Cordless Data Phone Handset

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

Transmitter Peak Output Power: Section 15.247(b)(1) (continued)

Channel	Input Voltage (DC)	Output Level (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Middle	3.9	18.13	0	18.13	30	11.87	Complied

As per the requirements of Public Notice DA 00-705, the stated antenna gain of the EUT is 0 dBi which, when added to the measured conducted peak output power of 18.13 dBm (from the table above) gives a de facto EIRP of 18.13 dBm. This is in compliance with the requirements of Section 15.247(b)(1) for de facto EIRP limitation i.e. 1 Watt (30 dBm).



Test Of: Mansella Ltd.

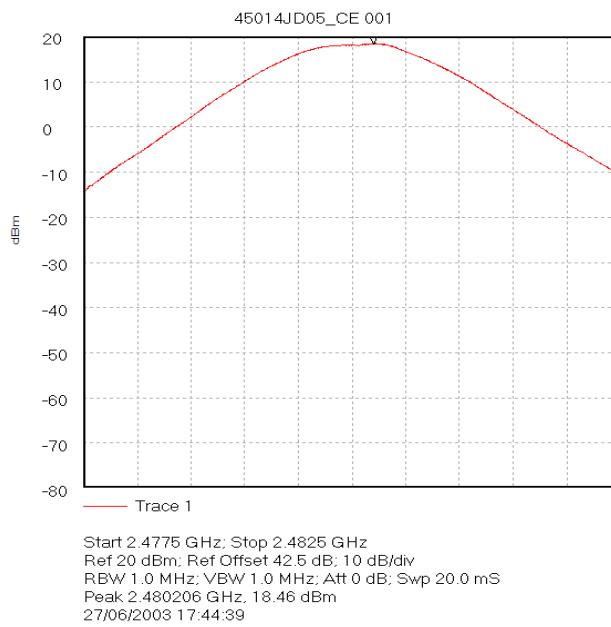
CDP 24 Bluetooth Cordless Data Phone Handset

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

Transmitter Peak Output Power: Section 15.247(b)(1) (continued)

Channel	Input Voltage (DC)	Output Level (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Top	3.9	18.46	0	18.46	30	11.54	Complied

As per the requirements of Public Notice DA 00-705, the stated antenna gain of the EUT is 0 dBi which, when added to the measured conducted peak output power of 18.46 dBm (from the table above) gives a de facto EIRP of 18.46 dBm. This is in compliance with the requirements of Section 15.247(b)(1) for de facto EIRP limitation i.e. 1 Watt (30 dBm).



Test Of: Mansella Ltd.

CDP 24 Bluetooth Cordless Data Phone Handset

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

**7.10. Transmitter Conducted Emissions: Section 15.247(c)**

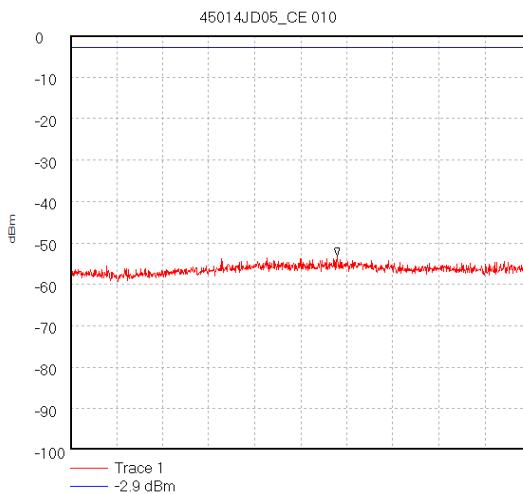
7.10.1. Spurious emissions tests on the antenna port were performed in accordance with FCC Part 15.247(c).

7.10.2. Section 15.247(c) specifies that all spurious emissions measured within a 100 kHz bandwidth shall be attenuated by at least 20 dB below the level of the highest fundamental level measured in a 100 kHz bandwidth.

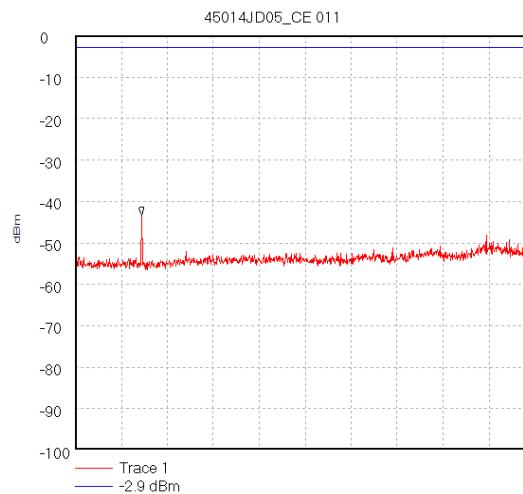
7.10.3. Conducted spurious emission scans were performed between 30 to 26500MHz with the EUT operating at the Top, Middle, Bottom channels and hopping on all channels as specified within clause 15.31(m).

**Highest Peak Level: Bottom Channel**

Frequency (GHz)	Peak Detector Level (dBm)	Peak Limit (dBm)	Peak Margin (dB)	Result
2.553403	-37.68	-2.9	34.78	Complied



Start 30.0 MHz; Stop 1.0 GHz  
Ref 0 dBm; Ref Offset 41.5 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 300.0 mS  
Peak 592.6 MHz, -53.17 dBm  
Display Line: -2.9 dBm;  
27/06/2003 18:00:49

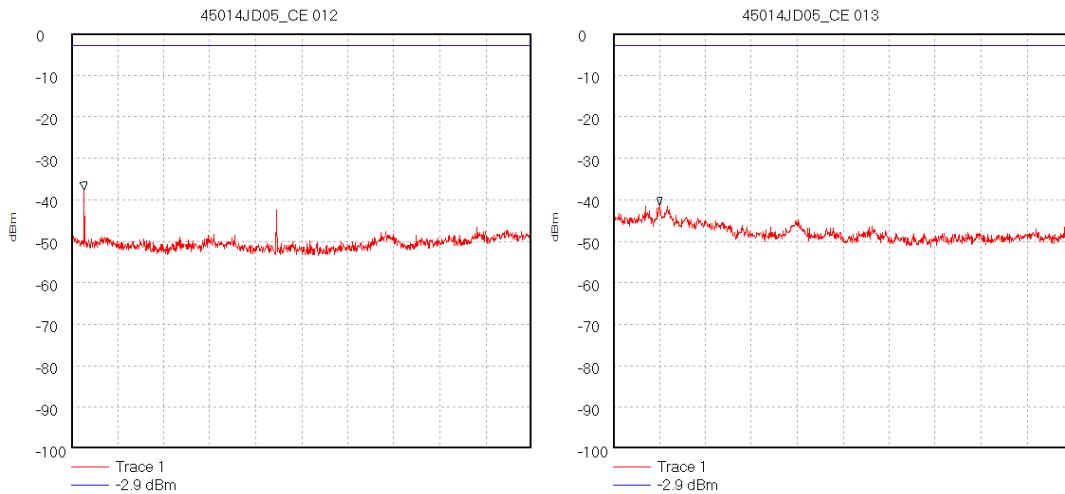


Start 1.0 GHz; Stop 2.4 GHz  
Ref 0 dBm; Ref Offset 42.5 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 420.0 mS  
Peak 1.202222 GHz, -43.27 dBm  
Display Line: -2.9 dBm;  
27/06/2003 18:01:39

Test Of: Mansella Ltd.

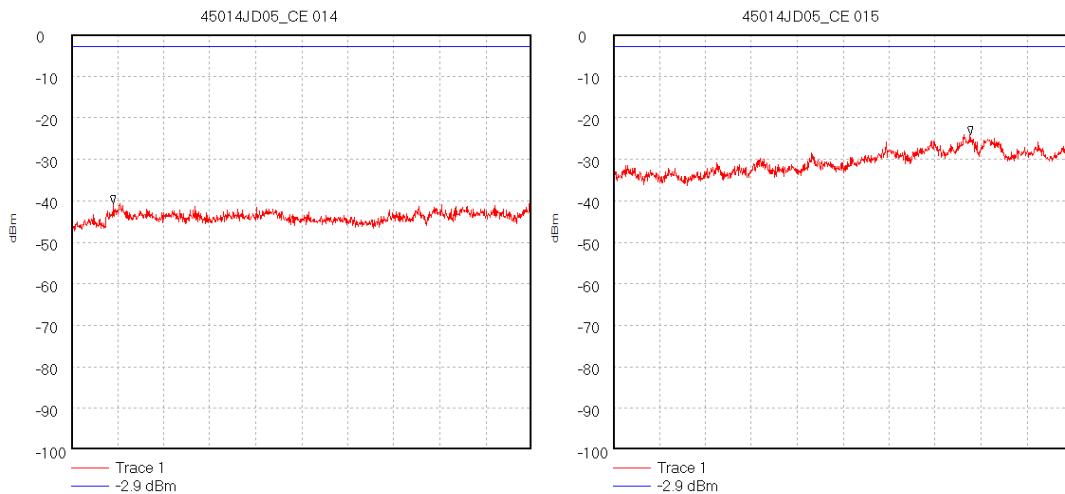
CDP 24 Bluetooth Cordless Data Phone Handset

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

**Transmitter Conducted Emissions: Section 15.247(c) (Continued)**

Start 2.4835 GHz; Stop 5.0 GHz  
 Ref 0 dBm; Ref Offset 43.6 dB; 10 dB/div  
 RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 760.0 mS  
 Peak 2.553403 GHz, -37.68 dBm  
 Display Line: -2.9 dBm;  
 27/06/2003 18:02:25

Start 5.0 GHz; Stop 12.5 GHz  
 Ref 0 dBm; Ref Offset 46.5 dB; 10 dB/div  
 RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 2.4 S  
 Peak 5.758333 GHz, -41.49 dBm  
 Display Line: -2.9 dBm;  
 27/06/2003 18:03:01



Start 12.5 GHz; Stop 18.0 GHz  
 Ref 0 dBm; Ref Offset 48.2 dB; 10 dB/div  
 RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 1.66 S  
 Peak 13.001111 GHz, -40.73 dBm  
 Display Line: -2.9 dBm;  
 27/06/2003 18:03:31

Start 18.0 GHz; Stop 26.5 GHz  
 Ref 0 dBm; Ref Offset 57.3 dB; 10 dB/div  
 RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 2.6 S  
 Peak 24.601667 GHz, -24.09 dBm  
 Display Line: -2.9 dBm;  
 27/06/2003 18:04:10

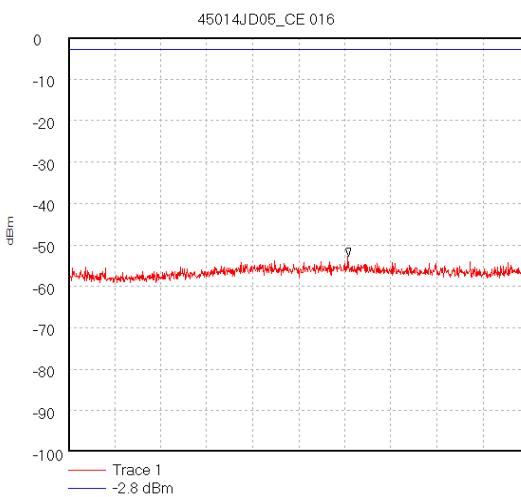
Test Of: Mansella Ltd.

CDP 24 Bluetooth Cordless Data Phone Handset

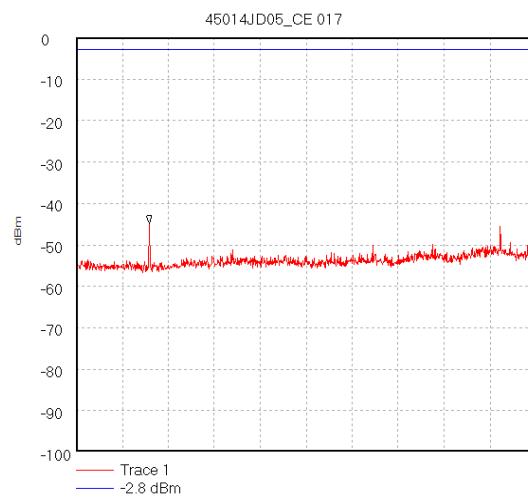
To: FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247

**Transmitter Conducted Emissions: Section 15.247(c) (continued)****Highest Peak Level: Middle Channel**

Frequency (GHz)	Peak Detector Level (dBm)	Peak Limit (dBm)	Peak Margin (dB)	Result
1.222444	-44.79	-2.8	41.99	Complied



Start 30.0 MHz; Stop 1.0 GHz  
 Ref 0 dBm; Ref Offset 41.5 dB; 10 dB/div  
 RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 300.0 mS  
 Peak 619.544444 MHz, -52.71 dBm  
 Display Line: -2.8 dBm;  
 27/06/2003 18:05:05

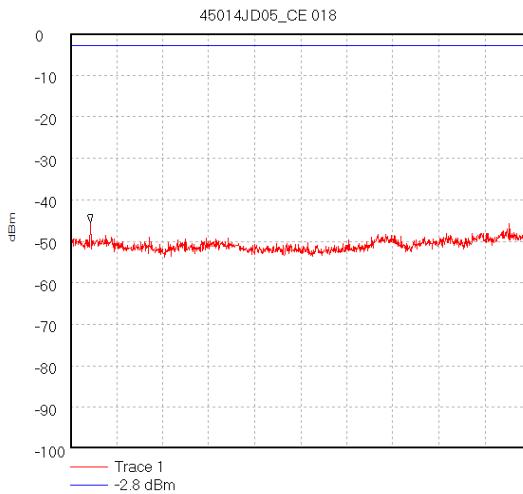


Start 1.0 GHz; Stop 2.4 GHz  
 Ref 0 dBm; Ref Offset 42.5 dB; 10 dB/div  
 RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 420.0 mS  
 Peak 1.222444 GHz, -44.79 dBm  
 Display Line: -2.8 dBm;  
 27/06/2003 18:05:37

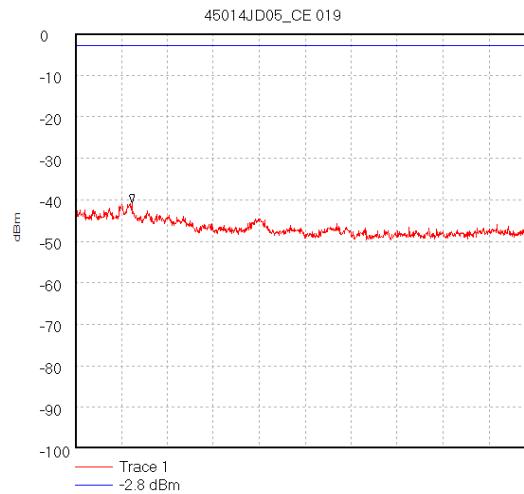
Test Of: Mansella Ltd.

CDP 24 Bluetooth Cordless Data Phone Handset

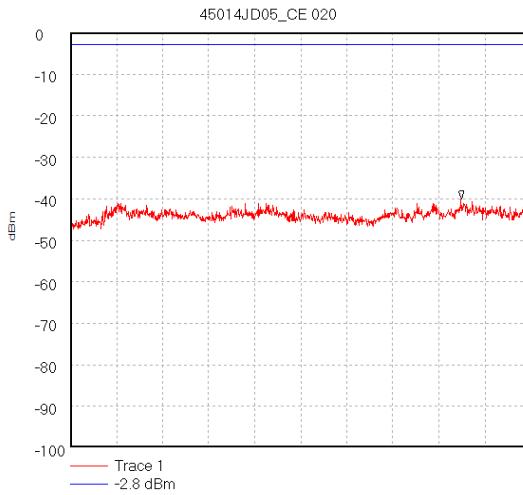
To: FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247

**Transmitter Conducted Emissions: Section 15.247(c) (Continued)**

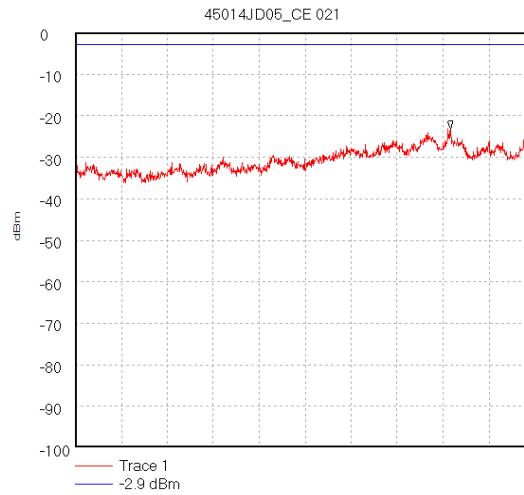
Start 2.4835 GHz; Stop 5.0 GHz  
Ref 0 dBm; Ref Offset 43.6 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 760.0 mS  
Peak 2.592548 GHz, -45.53 dBm  
Display Line: -2.8 dBm;  
27/06/2003 18:06:11



Start 5.0 GHz; Stop 12.5 GHz  
Ref 0 dBm; Ref Offset 46.5 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 2.4 S  
Peak 5.925 GHz, -40.83 dBm  
Display Line: -2.8 dBm;  
27/06/2003 18:08:49



Start 12.5 GHz; Stop 18.0 GHz  
Ref 0 dBm; Ref Offset 48.2 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 1.66 S  
Peak 17.168889 GHz, -40.02 dBm  
Display Line: -2.8 dBm;  
27/06/2003 18:09:22



Start 18.0 GHz; Stop 26.5 GHz  
Ref 0 dBm; Ref Offset 57.3 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 2.6 S  
Peak 24.941667 GHz, -23.2 dBm  
Display Line: -2.9 dBm;  
27/06/2003 18:09:51

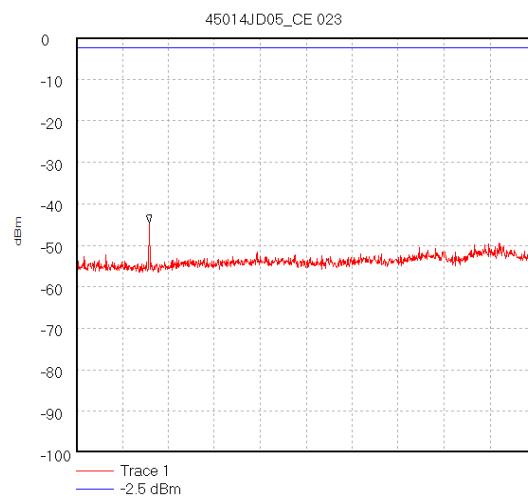
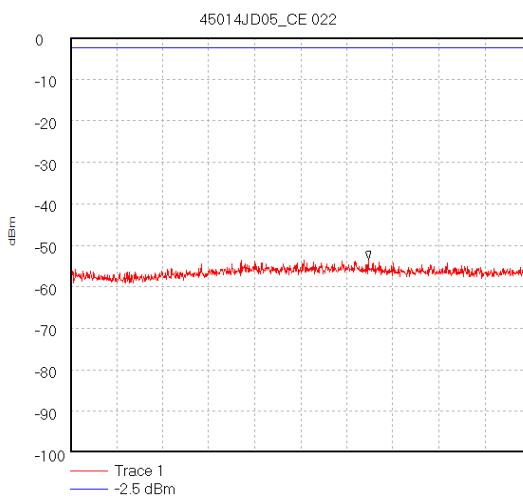
Test Of: Mansella Ltd.

CDP 24 Bluetooth Cordless Data Phone Handset

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

**Transmitter Conducted Emissions: Section 15.247(c) (continued)****Highest Peak Level: Top Channel**

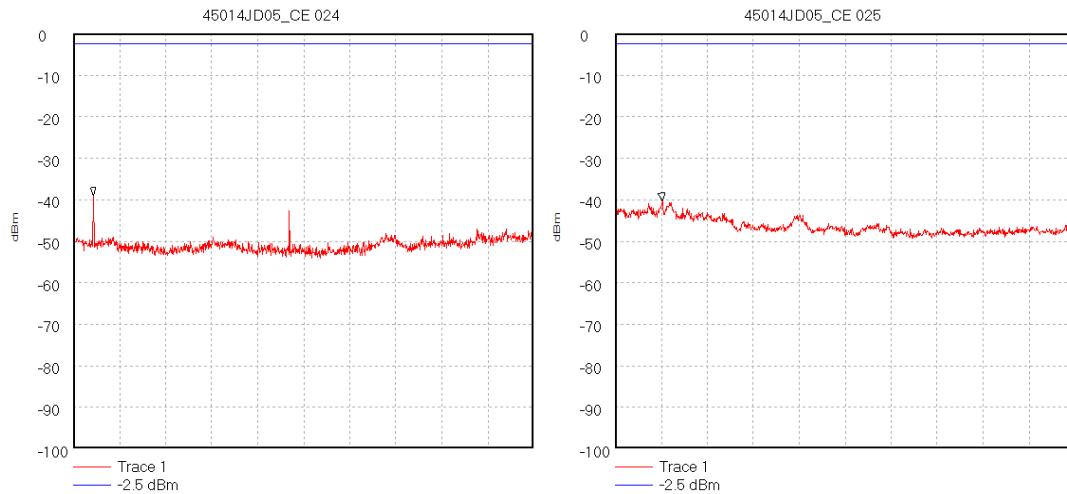
Frequency (GHz)	Peak Detector Level (dBm)	Peak Limit (dBm)	Peak Margin (dB)	Result
2.592548	-39.08	-2.5	36.58	Complied



Test Of: Mansella Ltd.

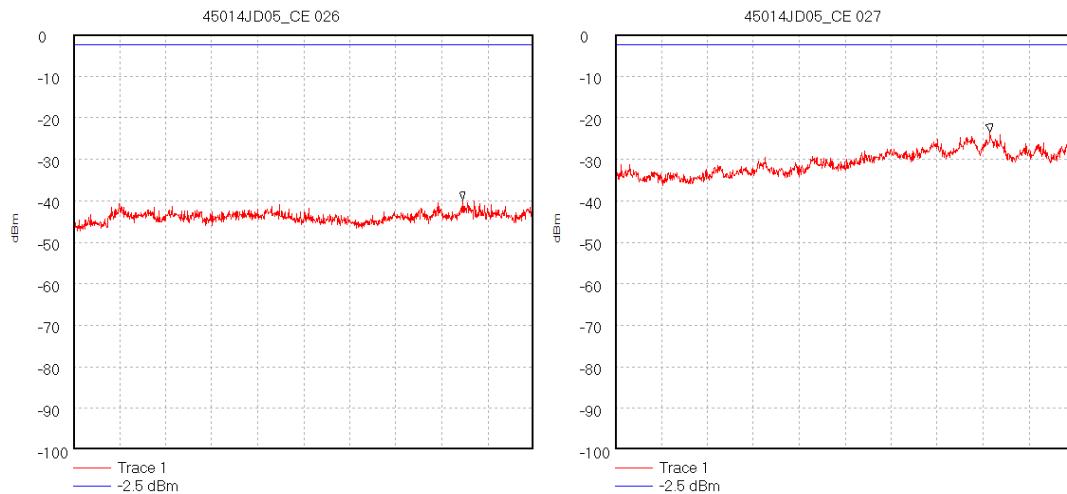
CDP 24 Bluetooth Cordless Data Phone Handset

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

**Transmitter Conducted Emissions: Section 15.247(c) (Continued)**

Start 2.4835 GHz; Stop 5.0 GHz  
 Ref 0 dBm; Ref Offset 43.6 dB; 10 dB/div  
 RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 760.0 mS  
 Peak 2.592548 GHz, -39.08 dBm  
 Display Line: -2.5 dBm;  
 27/06/2003 18:11:40

Start 5.0 GHz; Stop 12.5 GHz  
 Ref 0 dBm; Ref Offset 46.5 dB; 10 dB/div  
 RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 2.4 S  
 Peak 5.766667 GHz, -40.29 dBm  
 Display Line: -2.5 dBm;  
 27/06/2003 18:19:12



Start 12.5 GHz; Stop 18.0 GHz  
 Ref 0 dBm; Ref Offset 48.2 dB; 10 dB/div  
 RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 1.66 S  
 Peak 17.150556 GHz, -39.81 dBm  
 Display Line: -2.5 dBm;  
 27/06/2003 18:20:12

Start 18.0 GHz; Stop 26.5 GHz  
 Ref 0 dBm; Ref Offset 57.3 dB; 10 dB/div  
 RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 2.6 S  
 Peak 24.932222 GHz, -23.46 dBm  
 Display Line: -2.5 dBm;  
 27/06/2003 18:21:03

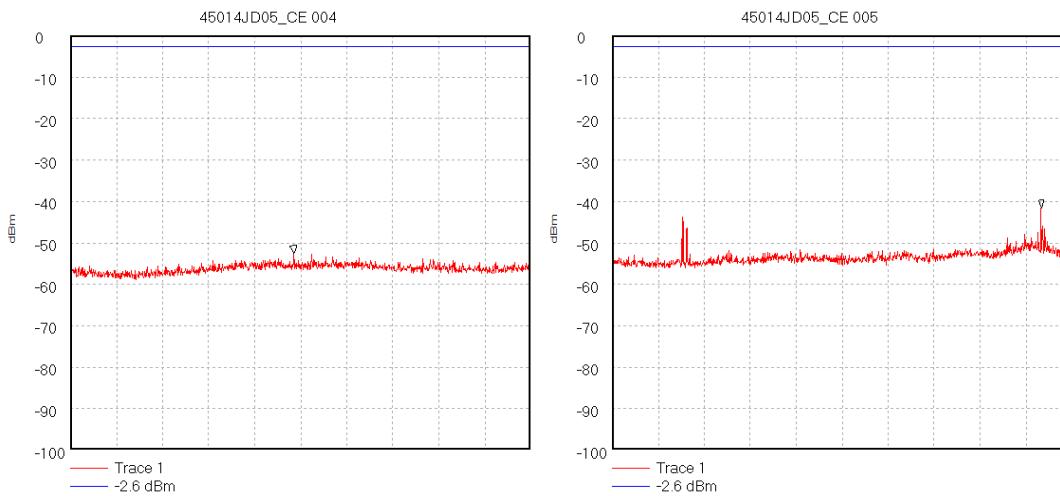
Test Of: Mansella Ltd.

CDP 24 Bluetooth Cordless Data Phone Handset

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

**Transmitter Conducted Emissions: Section 15.247(c) (continued)****Highest Peak Level: Hopping All Channels**

Frequency (GHz)	Peak Detector Level (dBm)	Peak Limit (dBm)	Peak Margin (dB)	Result
2.306667	-41.56	-2.6	38.96	Complied



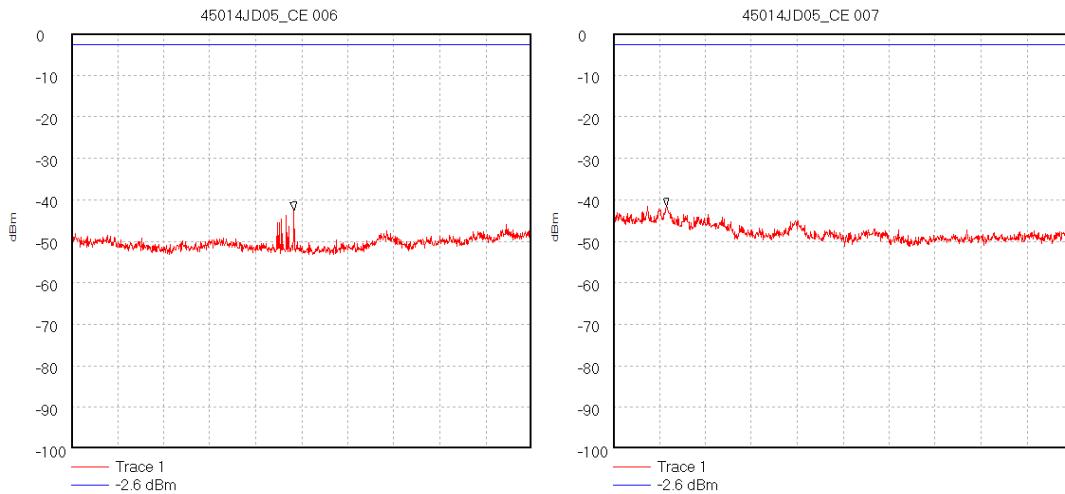
Start 30.0 MHz; Stop 1.0 GHz  
 Ref 0 dBm; Ref Offset 41.5 dB; 10 dB/div  
 RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 300.0 mS  
 Peak 500.988889 MHz, -52.51 dBm  
 Display Line: -2.6 dBm;  
 27/06/2003 17:55:17

Start 1.0 GHz; Stop 2.4 GHz  
 Ref 0 dBm; Ref Offset 42.5 dB; 10 dB/div  
 RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 420.0 mS  
 Peak 2.306667 GHz, -41.56 dBm  
 Display Line: -2.6 dBm;  
 27/06/2003 17:57:05

Test Of: Mansella Ltd.

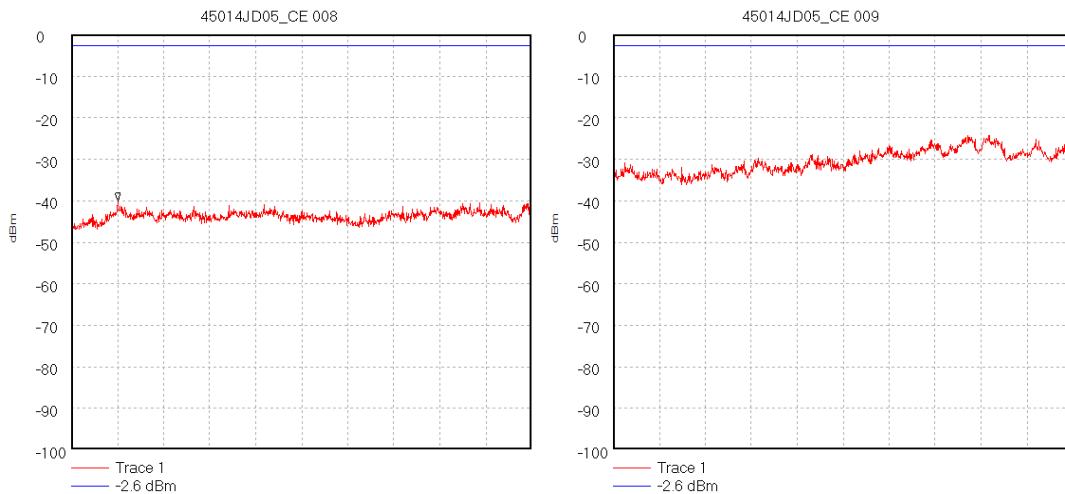
CDP 24 Bluetooth Cordless Data Phone Handset

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

**Transmitter Conducted Emissions: Section 15.247(c) (Continued)**

Start 2.4835 GHz; Stop 5.0 GHz  
 Ref 0 dBm; Ref Offset 43.6 dB; 10 dB/div  
 RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 760.0 mS  
 Peak 3.699808 GHz, -42.55 dBm  
 Display Line: -2.6 dBm;  
 27/06/2003 17:57:50

Start 5.0 GHz; Stop 12.5 GHz  
 Ref 0 dBm; Ref Offset 46.5 dB; 10 dB/div  
 RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 2.4 S  
 Peak 5.866667 GHz, -41.54 dBm  
 Display Line: -2.6 dBm;  
 27/06/2003 17:58:31



Start 12.5 GHz; Stop 18.0 GHz  
 Ref 0 dBm; Ref Offset 48.2 dB; 10 dB/div  
 RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 1.66 S  
 Peak 13.056111 GHz, -40.07 dBm  
 Display Line: -2.6 dBm;  
 27/06/2003 17:59:09

Start 18.0 GHz; Stop 26.5 GHz  
 Ref 0 dBm; Ref Offset 57.3 dB; 10 dB/div  
 RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 2.6 S  
 Peak 26.490556 GHz, -23.76 dBm  
 Display Line: -2.6 dBm;  
 27/06/2003 17:59:43

Test Of: Mansella Ltd.

CDP 24 Bluetooth Cordless Data Phone Handset

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

**7.11. Transmitter Radiated Emissions: Section 15.247(c) and 15.209(a)****7.11.1. Electric Field Strength Measurements: 30 to 1000 MHz.**

7.11.1.1. The following table specifies frequencies, which fall close to the restricted bands as specified in section 15.205(a).

7.11.1.2. Preliminary radiated spurious scans were performed with the EUT set to Top, Middle and Bottom channels.

7.11.1.3. Due to dynamic range limitations of the measuring receiver, scans at high frequencies above 12 GHz were performed at a 1 m measurement distance. The measured value was then corrected by 9.5 dB using the formula  $20\log(D1/D2)$  Where D1 was 3 m and D2 was 1 m.

7.11.1.4. The following table lists frequencies at which emissions were measured using a Quasi-Peak detector at a test distance of 3 m (results incorporate antenna factors and cable losses):

7.11.1.5. The following results are for the EUT configured with an internal antenna connected and operating.

**Middle Channel**

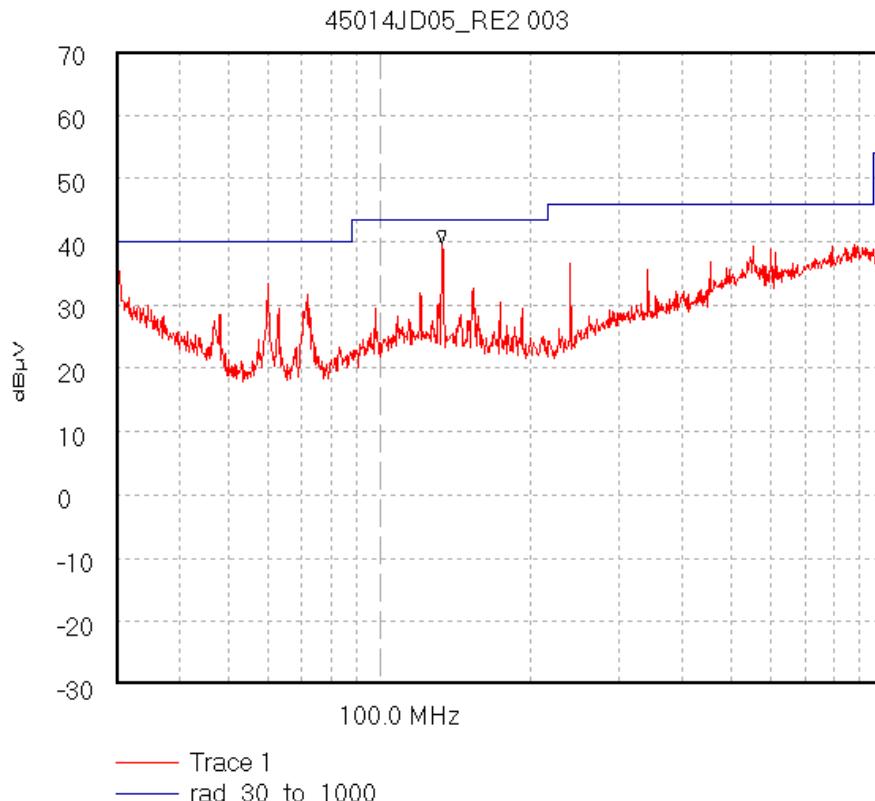
Frequency (MHz)	Ant. Pol.	Q-P Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
46.91	Vert.	20.0	40.0	20.0	Complied
59.82	Vert.	22.0	40.0	18.0	Complied
71.30	Vert.	21.0	40.0	19.0	Complied
133.28	Horiz.	36.2	43.5	7.3	Complied
152.64	Horiz.	16.0	43.5	27.5	Complied
240.00	Vert.	26.2	46.0	19.8	Complied
342.75	Horiz.	37.8	46.0	8.2	Complied
552.02	Horiz.	24.1	46.0	21.9	Complied
606.52	Horiz.	22.6	46.0	23.4	Complied

**Note:** The preliminary scans showed similar emission levels for each mode below 1 GHz, therefore final radiated emissions measurements were performed with the EUT set to the Middle channel only.

Test Of: Mansella Ltd.

CDP 24 Bluetooth Cordless Data Phone Handset

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 30.0 MHz; Stop 1.0 GHz - Log Scale

Ref 70 dB $\mu$ V; Ref Offset 0.0 dB; 10 dB/div

RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 540.0 mS

Peak 132.892 MHz, 39.63 dB $\mu$ V

Limit/Mask: rad\_30\_to\_1000; ; Limit Test Passed

Transducer Factors: A1037

30/06/2003 10:15:25

Test Of: Mansella Ltd.

CDP 24 Bluetooth Cordless Data Phone Handset

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

**7.12. Transmitter Radiated Emissions: Section 15.247(c) and 15.209(a)****7.12.1. Electric Field Strength Measurements: 1.0 to 26.5 GHz****Highest Average Level: Bottom Channel**

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
1.2011	Horiz	9.51	22.0	0.8	32.31	54.0	21.7	Complied
2.2524	Horiz	10.42	23.4	1.6	35.42	54.0	18.6	Complied
2.2821	Vert	10.47	23.4	1.6	35.47	54.0	18.5	Complied
2.8912	Horiz	9.71	23.4	1.6	34.71	54.0	19.3	Complied
3.6025	Vert	10.93	23.4	1.6	35.93	54.0	18.1	Complied
4.8043	Horiz	16.33	24.4	2.0	42.73	54.0	11.3	Complied

**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)	Peak Limit (dB $\mu$ V/m)	Peak Margin (dB)	Result
1.2011	Horiz	22.92	22.0	0.8	45.72	74.0	28.3	Complied
2.2524	Horiz	32.16	23.4	1.6	57.16	74.0	16.8	Complied
2.2821	Vert	25.51	23.4	1.6	50.51	74.0	23.5	Complied
2.8912	Horiz	26.09	23.4	1.6	51.09	74.0	22.9	Complied
3.6025	Vert	28.35	23.4	1.6	53.35	74.0	20.7	Complied
4.8043	Horiz	40.25	24.4	2.0	66.65	74.0	7.3	Complied

Test Of: Mansella Ltd.

CDP 24 Bluetooth Cordless Data Phone Handset

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

**Transmitter Radiated Emissions: Section 15.247(c) and 15.209(a) (continued)****Highest Average Level: Middle Channel**

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
1.2211	Horiz	9.01	22.0	0.8	31.81	54.0	22.2	Complied
2.2893	Horiz	10.60	23.4	1.6	35.60	54.0	18.4	Complied
2.3208	Horiz	10.30	23.4	1.6	35.30	54.0	18.7	Complied
2.8912	Horiz	9.54	23.4	1.6	34.54	54.0	19.5	Complied
3.6623	Vert	10.22	23.4	1.6	35.22	54.0	18.8	Complied
4.8822	Horiz	12.82	24.4	2.0	39.22	54.0	14.8	Complied
7.3224	Horiz	7.10	26.9	2.3	36.30	54.0	17.7	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)	Peak Limit (dB $\mu$ V/m)	Peak Margin (dB)	Result
1.2211	Horiz	23.56	22.0	0.8	46.36	74.0	27.6	Complied
2.2893	Horiz	32.95	23.4	1.6	57.95	74.0	16.1	Complied
2.3208	Horiz	25.36	23.4	1.6	50.36	74.0	23.6	Complied
2.8912	Horiz	24.64	23.4	1.6	49.64	74.0	24.4	Complied
3.6623	Vert	26.32	23.4	1.6	51.32	74.0	22.7	Complied
4.8822	Horiz	38.55	24.4	2.0	64.95	74.0	9.1	Complied
7.3224	Horiz	27.47	26.9	2.3	56.67	74.0	17.3	Complied

Test Of: Mansella Ltd.

CDP 24 Bluetooth Cordless Data Phone Handset

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

**Transmitter Radiated Emissions: Section 15.247(c) and 15.209(a) (continued)****Highest Average Level: Top Channel**

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
1.2400	Horiz	9.64	22.0	0.8	32.44	54.0	21.6	Complied
2.2471	Vert	10.25	23.4	1.6	35.25	54.0	18.8	Complied
2.2960	Horiz	10.30	23.4	1.6	35.30	54.0	18.7	Complied
2.3248	Horiz	10.20	23.4	1.6	35.20	54.0	18.8	Complied
3.7203	Vert	10.55	23.4	1.6	35.55	54.0	18.5	Complied
4.9603	Horiz	12.81	24.4	2.0	39.21	54.0	14.8	Complied
7.4403	Horiz	8.20	26.9	2.3	37.40	54.0	16.6	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)	Peak Limit (dB $\mu$ V/m)	Peak Margin (dB)	Result
1.2400	Horiz	23.73	22.0	0.8	46.53	74.0	27.5	Complied
2.2471	Vert	25.18	23.4	1.6	50.18	74.0	23.8	Complied
2.2960	Horiz	25.81	23.4	1.6	50.81	74.0	23.2	Complied
2.3248	Horiz	32.47	23.4	1.6	57.47	74.0	16.5	Complied
3.7203	Vert	25.13	23.4	1.6	50.13	74.0	23.9	Complied
4.9603	Horiz	37.61	24.4	2.0	64.01	74.0	10.0	Complied
7.4403	Horiz	28.23	26.9	2.3	57.43	74.0	16.6	Complied

Test Of: Mansella Ltd.

CDP 24 Bluetooth Cordless Data Phone Handset

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

**Transmitter Radiated Emissions: Section 15.247(c) and 15.209(a) (continued)****Highest Average Level: Hopping All Channel**

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
1.2333	Horiz	7.94	22.0	0.8	30.74	54.0	23.6	Complied
2.3222	Horiz	9.99	23.4	1.6	34.99	54.0	19.0	Complied
2.2702	Horiz	10.37	23.4	1.6	35.37	54.0	18.6	Complied
3.6057	Vert	9.33	23.4	1.6	34.33	54.0	19.7	Complied
4.8043	Horiz	8.50	24.4	2.0	35.90	54.0	18.1	Complied
4.8824	Horiz	9.39	24.4	2.0	35.79	54.0	18.2	Complied
4.9582	Horiz	9.14	24.4	2.0	35.54	54.0	18.5	Complied
7.3193	Horiz	3.91	26.9	2.3	33.11	54.0	20.9	Complied
7.4404	Horiz	4.54	26.9	2.3	33.74	54.0	20.3	Complied

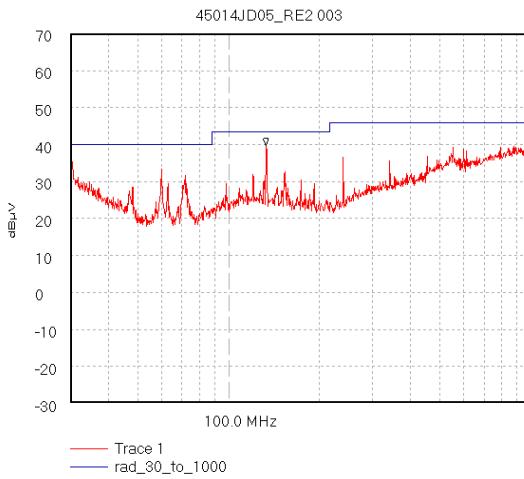
**Highest Peak Level: Hopping All Channel**

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)	Peak Limit (dB $\mu$ V/m)	Peak Margin (dB)	Result
1.2333	Horiz	22.79	22.0	0.8	45.59	74.0	28.4	Complied
2.3222	Horiz	31.75	23.4	1.6	56.75	74.0	17.3	Complied
2.2702	Horiz	30.00	23.4	1.6	55.00	74.0	19.0	Complied
3.6057	Vert	26.80	23.4	1.6	51.80	74.0	22.2	Complied
4.8043	Horiz	39.92	24.4	2.0	66.32	74.0	7.7	Complied
4.8824	Horiz	38.44	24.4	2.0	64.84	74.0	9.2	Complied
4.9582	Horiz	36.96	24.4	2.0	63.35	74.0	10.7	Complied
7.3193	Horiz	25.94	26.9	2.3	55.14	74.0	18.9	Complied
7.4404	Horiz	28.28	26.9	2.3	57.48	74.0	16.5	Complied

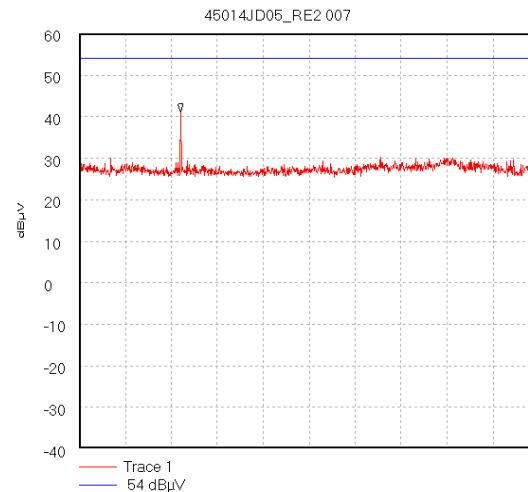
Test Of: Mansella Ltd.

CDP 24 Bluetooth Cordless Data Phone Handset

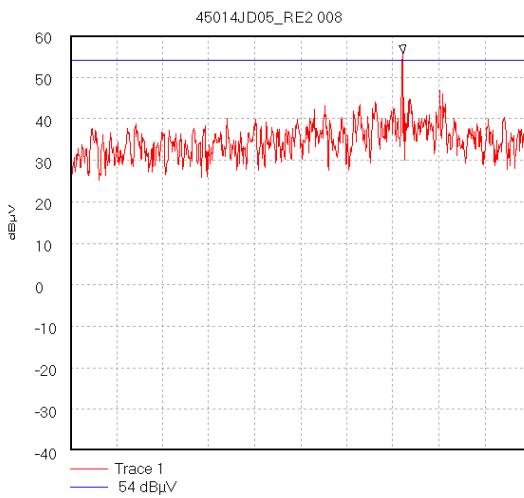
To: FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247

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

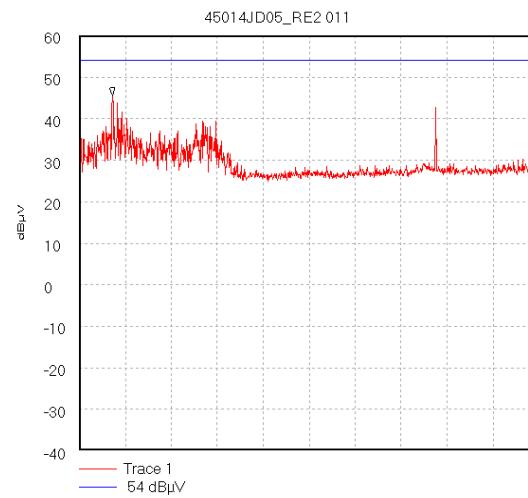
Start 30.0 MHz; Stop 1.0 GHz - Log Scale  
 Ref 70 dB $\mu$ V; Ref Offset 0.0 dB; 10 dB/div  
 RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 540.0 mS  
 Peak 132.892 MHz; 39.63 dB $\mu$ V  
 Limit/Mask: rad\_30\_to\_1000; ; Limit Test Passed  
 Transducer Factors: A1037  
 30/06/2003 10:15:25



Start 1.0 GHz; Stop 2.0 GHz  
 Ref 60 dB $\mu$ V; Ref Offset 0.0 dB; 10 dB/div  
 RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 640.0 mS  
 Peak 1.221 GHz; 41.06 dB $\mu$ V  
 Display Line: 54 dB $\mu$ V; ; Limit Test Passed  
 30/06/2003 10:43:13



Start 2.0 GHz; Stop 2.4 GHz  
 Ref 60 dB $\mu$ V; Ref Offset 0.0 dB; 10 dB/div  
 RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 260.0 mS  
 Peak 2.289 GHz; 55.76 dB $\mu$ V  
 Display Line: 54 dB $\mu$ V; ; Limit Test Failed  
 30/06/2003 10:48:56

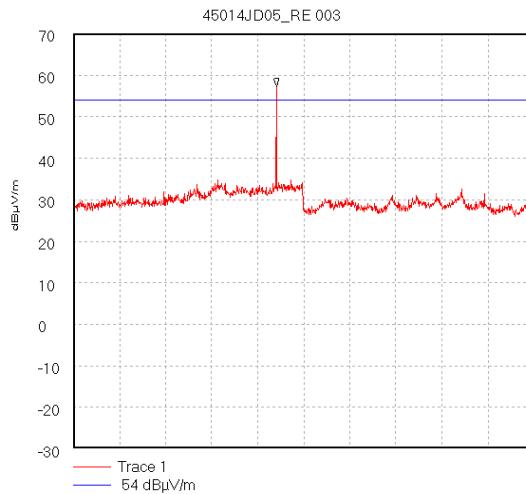


Start 2.484 GHz; Stop 4.0 GHz  
 Ref 60 dB $\mu$ V; Ref Offset 0.0 dB; 10 dB/div  
 RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 960.0 mS  
 Peak 2.593 GHz; 45.56 dB $\mu$ V  
 Display Line: 54 dB $\mu$ V; ; Limit Test Passed  
 30/06/2003 10:58:52

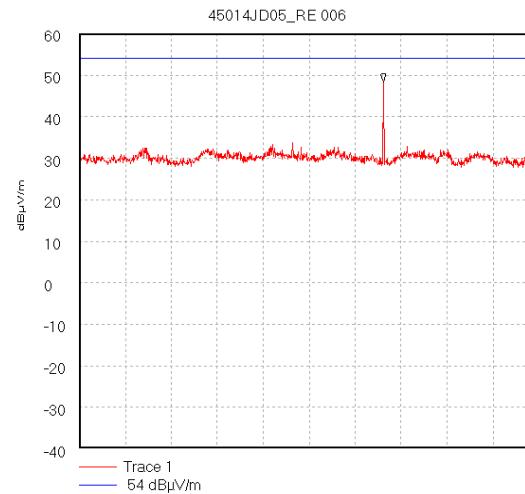
Test Of: Mansella Ltd.

CDP 24 Bluetooth Cordless Data Phone Handset

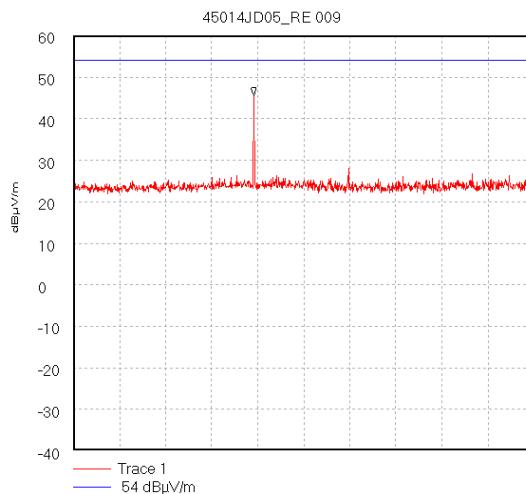
To: FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247

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

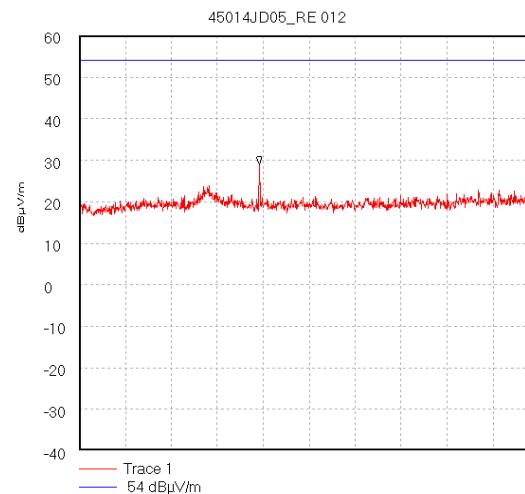
Start 4.0 GHz; Stop 6.0 GHz  
Ref 70 dB $\mu$ V/m; Ref Offset 1.5 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 600.0 mS  
Peak 4.882 GHz, 57.31 dB $\mu$ V/m  
Display Line: 54 dB $\mu$ V/m;  
26/06/2003 10:37:53



Start 6.0 GHz; Stop 8.0 GHz  
Ref 60 dB $\mu$ V/m; Ref Offset 2.3 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 600.0 mS  
Peak 7.324 GHz, 48.87 dB $\mu$ V/m  
Display Line: 54 dB $\mu$ V/m;  
26/06/2003 11:15:00



Start 8.0 GHz; Stop 12.5 GHz  
Ref 60 dB $\mu$ V/m; Ref Offset 3.2 dB; 10 dB/div  
RBW 145.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 3.0 S  
Peak 9.765 GHz, 45.56 dB $\mu$ V/m  
Display Line: 54 dB $\mu$ V/m;  
26/06/2003 11:50:24



Start 12.5 GHz; Stop 18.0 GHz  
Ref 60 dB $\mu$ V/m; Ref Offset 3.6 dB; 10 dB/div  
RBW 145.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 3.6 S  
Peak 14.657 GHz, 28.97 dB $\mu$ V/m  
Display Line: 54 dB $\mu$ V/m;  
26/06/2003 12:16:53

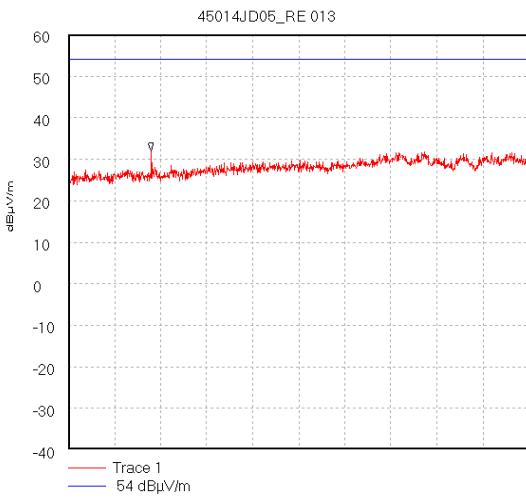
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CDP 24 Bluetooth Cordless Data Phone Handset

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



Start 18.0 GHz; Stop 26.5 GHz  
Ref 60 dBµV/m; Ref Offset 5.0 dB; 10 dB/div  
RBW 145.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 5.4 S  
Peak 19.53 GHz, 31.92 dBµV/m  
Display Line: 54 dBµV/m;  
26/06/2003 12:25:34

**7.13. Transmitter Band Edge Conducted Emissions FCC 15.247(c)**

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

7.13.2. The applicant to allow for conducted measurements provided a temporary antenna port.

7.13.3. A plot of the upper channel and the protected band closest to the upper channel was produced. A marker was set to the peak of the highest channel and a delta marker set to the highest out of band peak. (The specification states that either the band edge level must be measured or the highest out of band emission, whichever is greater). The plots show that the emission complies with the 20 dBc limit.

7.13.4. A plot of the lower channel and the protected band closest to the lower channel was produced. A marker was set to the peak of the lowest channel and a delta marker set to the highest out of band peak. (The specification states that either the band edge level must be measured or the highest out of band emission, whichever is greater). The plots show that the emission complies with the 20 dBc limit.

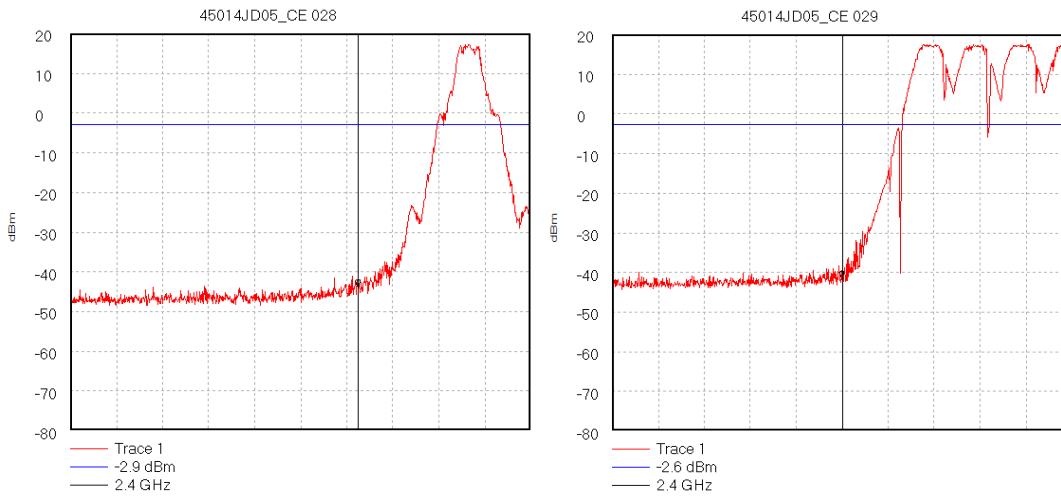
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**Highest Peak Level Lower Band Edge**

Frequency (GHz)	Mode	Peak Detector Level (dBm)	Peak Limit (dBm)	Peak Margin (dB)	Result
2.4000	Static	-44.09	-2.9	41.19	Complied
2.4000	Hopping	-41.70	-2.6	39.10	Complied

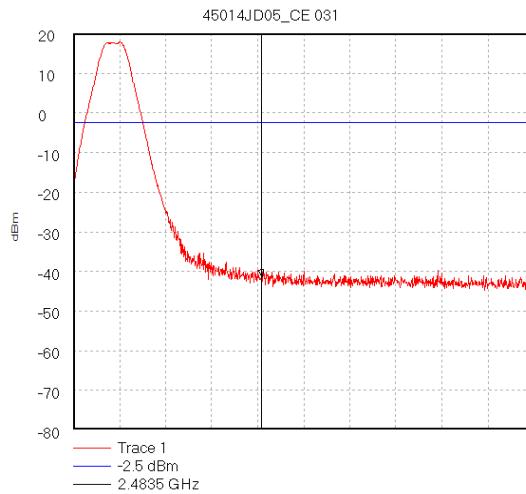


Start 2.395 GHz; Stop 2.403 GHz  
 Ref 20 dBm; Ref Offset 42.5 dB; 10 dB/div  
 RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 20.0 mS  
 Marker 2.4 GHz, -44.09 dBm  
 Display Line: -2.9 dBm;  
 27/06/2003 18:23:29

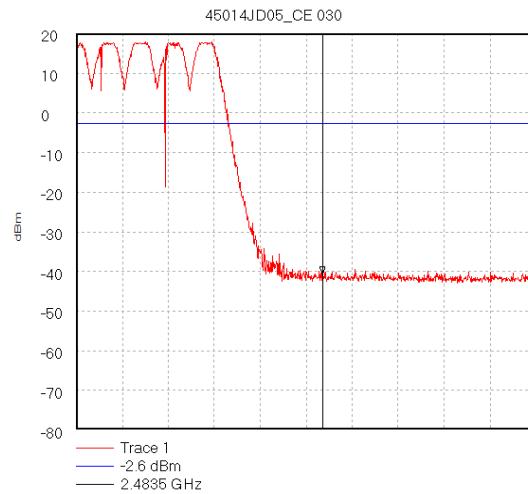
Start 2.395 GHz; Stop 2.405 GHz  
 Ref 20 dBm; Ref Offset 42.5 dB; 10 dB/div  
 RBW 300.0 kHz; VBW 300.0 kHz; Att 0 dB; Swp 20.0 mS  
 Marker 2.4 GHz, -41.7 dBm  
 Display Line: -2.6 dBm;  
 27/06/2003 18:26:48

**RADIO FREQUENCY INVESTIGATION LTD****Operations Department****TEST REPORT****S.No. RFI/MPTB2/RP45014JD05A****Page 49 of 70****Issue Date: 30 September 2003****Test Of: Mansella Ltd.****CDP 24 Bluetooth Cordless Data Phone Handset****To: FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247****Highest Peak Level Upper Band Edge**

Frequency (GHz)	Mode	Peak Detector Level (dBm)	Peak Limit (dBm)	Peak Margin (dB)	Result
2.4835	Static	-41.60	-2.5	39.10	Complied
2.4835	Hopping	-40.71	-2.6	38.11	Complied



Start 2.479 GHz; Stop 2.49 GHz  
Ref 20 dBm; Ref Offset 42.5 dB; 10 dB/div  
RBW 300.0 kHz; VBW 300.0 kHz; Att 0 dB; Swp 20.0 mS  
Marker 2.4835 GHz; -41.6 dBm  
Display Line: -2.5 dBm;  
27/06/2003 18:32:03



Start 2.476 GHz; Stop 2.49 GHz  
Ref 20 dBm; Ref Offset 42.5 dB; 10 dB/div  
RBW 300.0 kHz; VBW 300.0 kHz; Att 0 dB; Swp 20.0 mS  
Marker 2.4835 GHz; -40.71 dBm  
Display Line: -2.6 dBm;  
27/06/2003 18:30:44

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**7.14. Transmitter Band Edge Radiated Emissions: Section 15.247(c) & 15.209(a)****7.14.1. Electric Field Strength Measurements**

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

**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
2.4000	Horiz.	51.9	21.1	2.0	75.0	105.9	30.9	Complied
2.4835	Horiz.	22.7	21.1	2.0	45.8	74.0	28.2	Complied

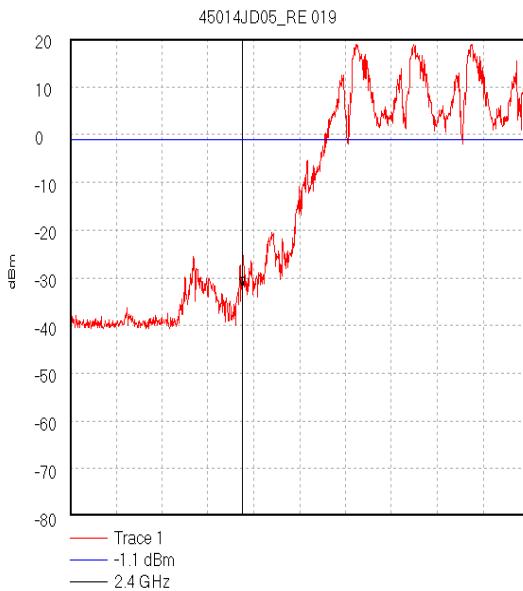
**Average Power Level Hopping Mode:**

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
2.4835	Horiz.	6.3	21.1	2.0	29.4	54.0	24.6	Complied

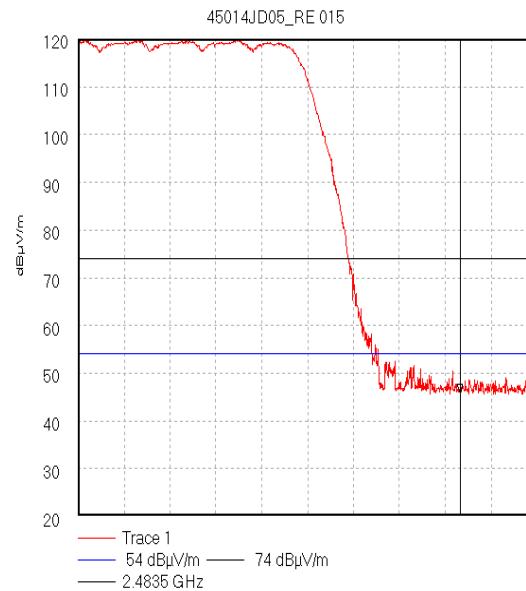
Test Of: Mansella Ltd.

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

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

Start 2.397 GHz; Stop 2.405 GHz  
 Ref 20 dBm; Ref Offset 39.6 dB; 10 dB/div  
 RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 20.0 mS  
 Marker 2.4 GHz, -31.98 dBm  
 Display Line: -1.1 dBm; ; Limit Test Failed  
 26/06/2003 13:09:07



Start 2.476 GHz; Stop 2.485 GHz  
 Ref 120 dB $\mu$ V/m; Ref Offset 2.0 dB; 10 dB/div  
 RBW 1000.0 kHz; VBW 1.0 MHz; Att 35 dB; Swp 20.0 mS  
 Marker 2.4835 GHz, 45.75 dB $\mu$ V/m  
 Display Line: 54 dB $\mu$ V/m; 74 dB $\mu$ V/m; ; Limit Test Failed  
 26/06/2003 12:30:53

Test Of: Mansella Ltd.

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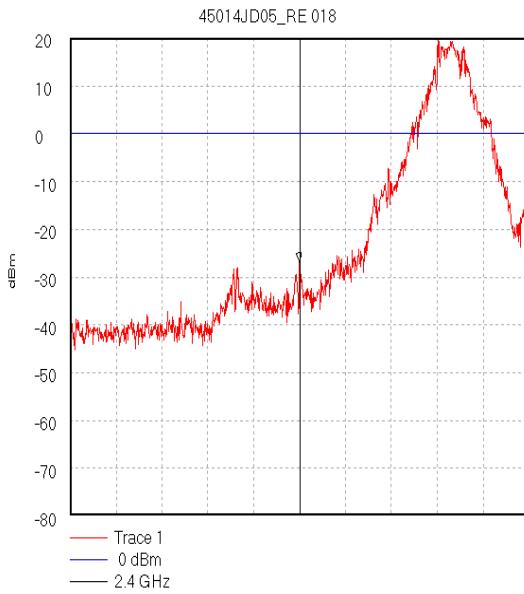
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**Transmitter Band Edge Radiated Emissions: Section 15.247(c) & 15.209(a) (Continued)****Peak Power Static Mode:**

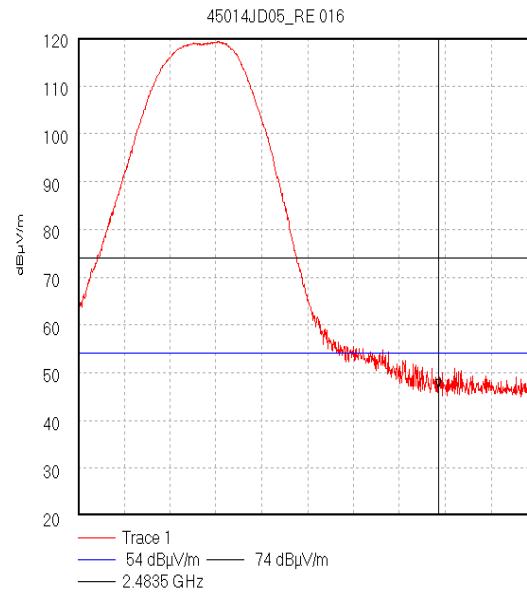
Frequency (GHz)	Antenna Polarity (H/V)	Peak Detector level (dB $\mu$ V)	Antenna factor (dB)	Cable loss (dB)	Actual Peak Level (dB $\mu$ V/m)	Peak Limit (dB $\mu$ V/m)	Peak Margin (dB)	Result
2.4000	Horiz.	57.0	21.1	2.0	80.1	107.0	26.9	Complied
2.4835	Horiz.	23.6	21.1	2.0	46.7	74.0	27.3	Complied

**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
2.4835	Horiz.	7.1	21.1	2.0	30.2	54.0	23.8	Complied

**RADIO FREQUENCY INVESTIGATION LTD****Operations Department****Test Of: Mansella Ltd.****CDP 24 Bluetooth Cordless Data Phone Handset****To: FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247****TEST REPORT****S.No. RFI/MPTB2/RP45014JD05A****Page 53 of 70****Issue Date: 30 September 2003****Transmitter Band Edge Radiated Emissions: Section 15.247(c) & 15.209(a) (Continued)**

Start 2.397 GHz; Stop 2.403 GHz  
Ref 20 dBm; Ref Offset 39.6 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 20.0 mS  
Marker 2.4 GHz, -26.92 dBm  
Display Line: 0 dBm; Limit Test Failed  
26/06/2003 12:43:41



Start 2.478 GHz; Stop 2.485 GHz  
Ref 120 dB $\mu$ V/m; Ref Offset 2.0 dB; 10 dB/div  
RBW 1000.0 kHz; VBW 1.0 MHz; Att 35 dB; Swp 20.0 mS  
Marker 2.4835 GHz, 46.69 dB $\mu$ V/m  
Display Line: 54 dB $\mu$ V/m; 74 dB $\mu$ V/m; Limit Test Failed  
26/06/2003 12:34:04

## 8. Measurement Uncertainty

8.1. 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.

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

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

8.4. 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".

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
Conducted Emissions AC Mains	0.15 MHz to 30 MHz	95%	+/- 3.25 dB
Time Occupancy	Not applicable	95%	+/- 10 %
Channel Separation	Not applicable	95%	+/- 10 %
Occupied Bandwidth	Not applicable	95%	+/- 0.12 %
Effective Isotropic Radiated Power	1.0 GHz to 26.5 GHz	95%	+/- 1.78 dB
Radiated Emissions at 3.0 m	30 MHz to 1000 MHz	95%	+/- 5.26 dB
Conducted Emissions Antenna Port	0.009 kHz to 26.5 GHz	95%	+/- 1.2 dB
Radiated Emissions at 3.0 m	1 GHz to 26.5 GHz	95%	+/- 1.78 dB

8.5. 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.

Test Of: Mansella Ltd.

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**Appendix 1. Test Equipment Used**

RFI No.	Instrument	Manufacturer	Type No.	Serial No.
A017	3121 Dipole Set	EMCO	3121	0233
A027	Horn Antenna	Eaton	9188-2	301
A031	2 to 4 GHz Eaton Horn Antenna	Eaton	91889-2	557
A059	3146 Log Periodic Antenna	EMCO	3146	8902-2378
A072	Adjustable Dipole Antenna Set	EMCO	3121C	9004-552
A091	Biconical Antenna	EMCO	3110	9008-1182
A1069	ESH3-Z5	Rohde & Schwarz	ESH3-Z5	837469/012
A145	10 dB Attenuator	Narda	NONE	NONE
A201	WG 20 Horn Antenna	Flann Microwave	20240-20	266
A244	20 dB Attenuator	Schaffner	6820-17-B	None
A253	WG 12 Microwave Horn	Flann Microwave	12240-20	128
A254	WG 14 Microwave Horn	Flann Microwave	14240-20	139
A255	WG 16 Microwave Horn	Flann Microwave	16240-20	519
A256	WG 18 Microwave Horn	Flann Microwave	18240-20	400
A259	Bilog Antenna	Chase	CBL6111	1513
A392	3 dB attenuator (9)	Suhner	6803.17.B	None
A429	WG 16 horn	Flann	16240-20	561
A436	WG 20 horn	Flann	20240-20	330
A438	WG 18 horn	Narda	439	8508
A451	Log Spiral Antenna	EMCO	3101	3751
A458	HP RF Limiter	Hewlett Packard	11867A	04421
A559	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	357881052
C341	Cable	Andrews	None	None
C362	Cable	Rosenberger	UFA210A-1-1181-70x70	1925
C364	BNC Cable	Rosenberger	RG142	None

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**Test Equipment Used (continued)**

RFI No.	Instrument	Manufacturer	Type No.	Serial No.
C453	Cable	Rosenberger	RG142XX-001-RFIB	C453-10081998
C468	N-Type Coaxial Cable	Rosenberger	UFA210A-1-3937-504504	98L0440
E005	12x8 Enclosure	KEENE	81R	R3380
G013	SMHU Signal Generator	Rohde & Schwarz	SMHU	894 055/003
L0665	ESIB26 EMI Test Receiver	Rohde & Schwartz	ESIB	100087/026
M003	Spectrum Monitor	Rohde & Schwarz	EZM	883 580/008
M044	ESVP Receiver	Rohde & Schwarz	ESVP	891 845/026
M069	ESMI Spectrum Analyser / Receiver	Rohde & Schwarz	ESMI	829 808/007 (DU) / 827 063/008 (RU)
M090	Receiver / Spectrum Analyser System	Rohde & Schwarz	ESBI	DU:838494/005 RU:836833/001
M127	Spectrum Analyser	Rohde & Schwarz	FSEB 30	842 659/016
M133	Temperature/Humidity/Pressure Meter	RS Components	None	None
M139	Digital Multimeter	Fluke	11	65830028
M209	Thermo/hygro meter	RS Components	RS212-124	M209-RS212-124
S011	D.C. PSU	INSTEK	PR-3010H	9401270
S201	Site 1	RFI	1	
S202	Site 2	RFI	2	S202-15011990

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

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## Appendix 2. Measurement Methods

### 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 and with the EUT powered via a 60 Hz AC mains supply.

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 test equipment settings for conducted emissions measurements were as follows:

Receiver Function	Initial Scan	Final Measurements
Detector Type:	Peak	Quasi-Peak (CISPR)*
Mode:	Max Hold	Not applicable
Bandwidth:	9 kHz	9 kHz
Amplitude Range:	60 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.

### **Radiated Field Strength Emissions**

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

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

The initial scans were performed using an antenna height of 1.5 m and a measurement distance of 3 m. Following the initial scans, graphs were produced giving an overview of the emissions from the EUT plotted against the appropriate specification limit. A tolerance line was set 6 dB below the specification limit and levels above the tolerance line were re-tested on the open area test site, at the appropriate distance, using a measuring receiver with a Quasi-Peak (below 1000 MHz), Average and Peak (above 1000 MHz) detector, where applicable.

For the main (final) measurements the EUT was arranged on a non-conducting table on an open area test site, as detailed in the specification.

All measurements on the open area test site were performed using broadband antennas.

On the open area test site, at each frequency where a signal was found, the levels were maximised by initially rotating the turntable through 360°. For frequencies below 1000 MHz, the antenna was varied in height between 1 m and 4 m. For frequencies above 1000 MHz, the antenna was fixed at a height of 1.5 m. 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.

Once the signal amplitude is determined the EUT is replaced with a substitution antenna. A signal generator is connected to the antenna and its level adjusted in order to obtain the same indicated level as that which was observed from the EUT. The receive antenna is then adjusted in height until the signal measured has peaked. The signal generator level is then re-adjusted to regain the original reading. The level on the signal generator – cable losses plus the antenna gain is the recorded ERP.

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**Radiated Field Strength Emissions (Continued)**

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:	60 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

Receiver Function	Initial Scan Above 1000 MHz	Final Measurements Above 1000 MHz
Detector Type:	Peak	Peak/Average
Mode:	Max Hold	Not applicable
Bandwidth:	1 MHz	1 MHz
Amplitude Range:	60 dB	20 dB (typical)
Measurement Time:	Not applicable	> 1 s
Observation Time:	Not applicable	> 15 s
Step Size:	Continuous sweep	Not applicable
Sweep Time:	Coupled	Not applicable

**Conducted Antenna Port Emissions**

Conducted Antenna Port Emissions measurements were performed in accordance with the standard, against appropriate limits for each detector function.

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

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

Due to the design of the EUT, conducted antenna port measurements were common for both the internal and external antenna connection.

To determine the transmitter output power, the EUT was operated as intended with the spectrum analyser operated in a maximum hold mode over the full operating frequency range of the EUT to identify the highest emission within the band.

To determine spurious emissions levels, the EUT was operated as intended with the spectrum analyser operated in a maximum hold mode over selected frequency ranges between 30 MHz and 26.5 GHz. A reference limit line of 20 dB below the maximum output of the transmitter was noted. Levels within 20 dB of this limit line were then recorded.

**Channel Separation and Occupied Bandwidth**

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

To determine the separation of each transmission channel the analyser was configured to measure two adjacent channels. The analyser was configured with a resolution bandwidth and video bandwidth of at least 1% of the frequency span set on the analyser. The EUT was operated as intended and the analyser set to a maximum hold mode scan to capture the profile of the signals.

The peak points on the two adjacent channels were noted and the separation between them recorded.

To determine the occupied bandwidth, a resolution bandwidth of 10 kHz was used, which is greater than 1% of the 20 dB bandwidth. A video bandwidth of 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 established 20 dB below the peak level. The bandwidth was determined at the points where the 20 dB reference crossed the profile of the emission.

The channel separation was then determined as the greater of 25 kHz or the 20 dB bandwidth.

**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.

**Number Of Hopping Frequencies**

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

To determine the number of hopping frequencies the EUT was set to operate in its normal mode of operation, hopping over all channels that it is intended to operate on.

The spectrum analyser had a span set to cover the frequency band of operation. The resolution bandwidth was set to  $\geq 1\%$  of the span. The video bandwidth was set to be no less than the resolution bandwidth. The sweep was set to auto, the detector function to peak and trace to max hold. This test was also performed with the span set to the lower half the operating frequency range and then to the upper half of the operating frequency range for better resolution.

**Peak Output Power**

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

The applicant to allow for conducted measurements provided a temporary antenna port.

As the frequency range of operation was greater than 10 MHz, the test was performed on the bottom, middle and top channels as per FCC 15.31(m).

The tests were performed at extremes of voltage declared by the applicant.

**Band Edge Compliance of RF Conducted Emissions**

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

A temporary antenna port was provided by the applicant to allow for conducted measurements.

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 in both static and hopping modes of operation. 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.

**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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Operations Department

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### Appendix 3. Test Configuration Drawings

This appendix contains the following drawings:

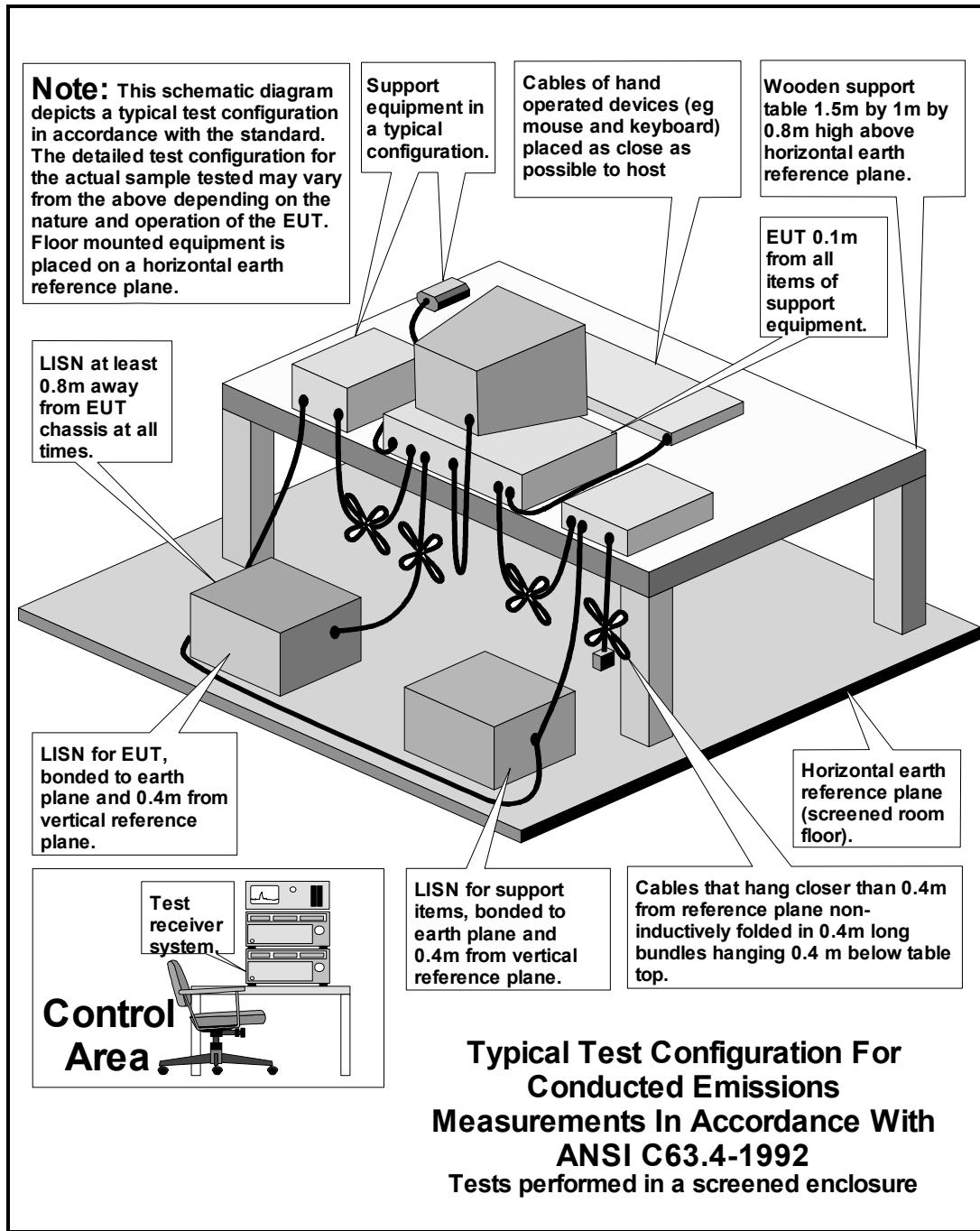
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DRG\45014JD05\EMIRAD	Test configuration for measurement of radiated emissions

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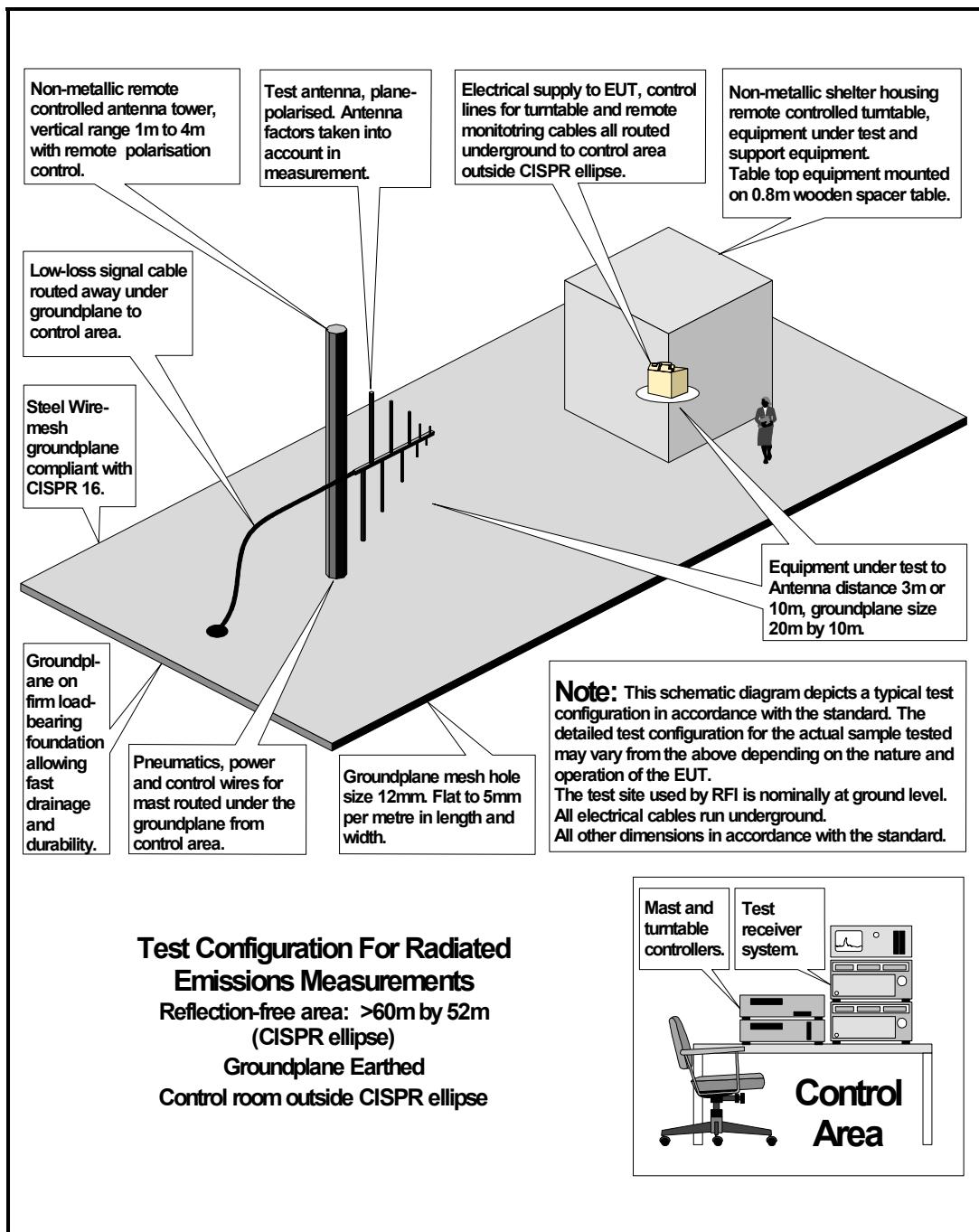


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