

# TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: GW Pharmaceuticals plc.  
EP011 Methadone Delivery System.

To: FCC Part 22: 2004 (Subpart H) & FCC Part 24 Subpart E: 2002

**Test Report Serial No:**  
RFI\MPTE1\RP47081JD05A

**This Test Report Is Issued Under The Authority  
Of Andrew Brown, Operations Manager:**



pp

**Tested By: Steven Wong**



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**Report Copy No: PDF01**

**Checked By: Nigel Davison**



**Issue Date: 20 June 2005**

**Test Dates: 17 March 2005 to 20 April 2005**

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The results in this report apply only to the sample(s) tested.

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## **1. Client Information**

<b>Company Name:</b>	GW Pharmaceuticals Plc.
<b>Address:</b>	Porton Down Science Park Salisbury Wiltshire SP4 0JQ
<b>Contact Name:</b>	Mr Rajiv Dave

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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>	GW Pharmaceuticals
<b>Model Name or Number:</b>	EP011
<b>Unique Type Identification:</b>	Not Applicable
<b>Serial Number:</b>	012345678901231
<b>FCC ID Number:</b>	S6C102552
<b>Country of Manufacture:</b>	None Stated
<b>Date of Receipt:</b>	16 March 2005

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## **2.2. Accessories**

The following accessories were supplied with the EUT:

<b>Description:</b>	AC Charger
<b>Brand Name:</b>	Young's
<b>Model Name or Number:</b>	SPA0600800
<b>Serial Number:</b>	None Stated
<b>Cable Length and Type:</b>	2 Wire, 1.8 m
<b>Connected to Port:</b>	AC Charger Port

<b>Description:</b>	Secure Methadone Canister
<b>Brand Name:</b>	GW Pharmaceuticals
<b>Model Name or Number:</b>	101764
<b>Serial Number:</b>	101764-xx-2004
<b>Cable Length and Type:</b>	Not Applicable
<b>Connected to Port:</b>	SMC Connector Port

<b>Description:</b>	USB Key
<b>Brand Name:</b>	GW Pharmaceuticals
<b>Model Name or Number:</b>	Secure Key
<b>Serial Number:</b>	101766-xx-2004
<b>Cable Length and Type:</b>	Not Applicable
<b>Connected to Port:</b>	USB Port

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### **2.3. Description of EUT**

The equipment under test is a secure methadone delivery system, operating in the GSM 850 MHz and PCS 1900 MHz bands.

### **2.4. Modifications Incorporated in EUT**

During the course of testing the EUT was not modified.

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## **2.5. Additional Information Related to Testing**

<b>Power Supply Requirement:</b>	Nominal 115 V, 50 Hz AC Mains supply via an AC Charger & Internal battery supply of 4.2		
<b>Intended Operating Environment:</b>	Within GSM Coverage		
<b>Equipment Category:</b>	GSM 850/GSM 1900		
<b>Type of Unit:</b>	Portable (Standalone battery powered via vehicle regulated supply).		
<b>Transmit Frequency Range:</b>	824.2 MHz to 848.8 MHz and 1850.2 MHz to 1909.8 MHz		
<b>Transmit Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Bottom	128/512	824.2/1850.2
	Middle	190/660	836.6/1879.8
	Top	251/810	848.8/1909.8
<b>Receive Frequency Range:</b>	869.2 MHz to 893.8 MHz and 1930.2 MHz to 1989.8 MHz		
<b>Receive Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Bottom	128/512	869.2/1930.2
	Middle	190/660	881.6/1960.0
	Top	251/810	893.8/1989.8
<b>Maximum Power Output (ERP)</b>	25.3 dBm		

## **2.6. Support Equipment**

No support equipment was used to exercise the EUT during testing:

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### **3. Test Results**

<b>Reference:</b>	FCC Part 22: 2004 Subpart H (Cellular Radiotelephone Service)
<b>Title:</b>	Code of Federal Regulations, Part 22 (47CFR22) Personal Communication Services.

<b>Reference:</b>	FCC Part 24 Subpart E: 2004 (Broadband PCS)
<b>Title:</b>	Code of Federal Regulations, Part 24 (47CFR24) Personal Communication Services.

#### **3.1. Methods and Procedures**

The methods and procedures used were as detailed in:

ANSI/TIA-603-B-2003

Land Mobile Communications Equipment, Measurements and performance Standards

ANSI C63.2 (1987)

Title: American National Standard for Instrumentation - Electromagnetic noise and field strength.

ANSI C63.4 (2003)

Title: American National Standard Methods of Measurement of Electromagnetic Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

ANSI C63.5 (1988)

Title: American National Standard for the Calibration of antennas used for Radiated Emission measurements in Electromagnetic Interference (EMI) control.

ANSI C63.7 (1988)

Title: American National Standard Guide for Construction of Open Area Test Sites for performing Radiated Emission Measurements.

CISPR 16-1: (1999)

Title: Specification For Radio Disturbance and Immunity Measuring Apparatus and Methods. Part 1: Radio Disturbance and Immunity Measuring Apparatus.

#### **3.2. 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 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 2.5 of this report connected and then disconnected. The combination that exhibited the worst-case mode of operation was then used to perform final measurements.

In transmit mode this was found to be with the EUT connected with the USB key and AC charger.

In Idle mode this was found to be with the EUT connected with the USB key and AC charger.

Transmitter Modes:

For carrier output power, occupied bandwidth and final transmitter radiated measurements, testing was performed at full power on top, middle and bottom channels of the assigned frequency block. For frequency stability testing, measurements were performed at full power on the top and bottom channels of the assigned frequency block at -30°C through to +50°C in 10°C increments.

All transmitter radiated spurious pre-scan tests were performed at full power on the top channel of the assigned frequency block. Final measurements were then performed on the top, middle and bottom channels if an emission was identified.

Receiver/Idle Modes:

Testing was performed with the call terminated from the GSM Test Simulator and the phone left in its Idle mode.

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

The EUT was tested in the following configuration:

Configured with the USB key and as the AC charger.

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

### **6.1. FCC Part 22**

<b>Range of Measurements</b>	<b>Specification Reference</b>	<b>Port Type</b>	<b>Compliancy Status</b>
Receiver/Idle AC Conducted Spurious Emissions (150 kHz to 30 MHz)	C.F.R. 47 FCC Part 15: 2004 Section 15.107	AC Mains Input	Complied
Receiver/Idle Radiated Emissions	C.F.R. 47 FCC Part 15: 2004 Section 15.109	Enclosure	Complied
Transmitter Effective Radiated Power (ERP)	C.F.R. 47 FCC Part 22: 2004 Section 22.913(a)	Antenna	Complied
Transmitter Frequency Stability (Temperature Variation)	C.F.R. 47 FCC Part 22: 2004 Section 22.355	Antenna	Complied
Transmitter Frequency Stability (Voltage Variation)	C.F.R. 47 FCC Part 22: 2004 Section 22.355	Antenna	Complied
Transmitter Occupied Bandwidth	C.F.R. 47 FCC Part 22: 2004 Section 2.1049	Antenna	Complied
Transmitter Out of Band Radiated Emissions	C.F.R. 47 FCC Part 22: 2004 Section 2.1053/22.917(a)	Antenna	Complied
Transmitter Band Edge Radiated Emissions	C.F.R. 47 FCC Part 22: 2004 Section 2.1053/22.917(a)	Antenna	Complied

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## **6.2. FCC Part 24**

<b>Range of Measurements</b>	<b>Specification Reference</b>	<b>Port Type</b>	<b>Compliance Status</b>
Idle Mode AC Conducted Spurious Emissions (150 kHz to 30 MHz)	C.F.R. 47 FCC Part 15: 2004 Section 15.107	AC Mains Input	Complied
Idle Mode Radiated Spurious Emissions	C.F.R. 47 FCC Part 15: 2004 Section 15.109	Enclosure	Complied
Transmitter Effective Isotropic Radiated Power (EIRP)	C.F.R. 47 FCC Part 24: 2004 Section 24.232	Antenna	Complied
Transmitter Frequency Stability (Temperature Variation)	C.F.R. 47 FCC Part 24: 2004 Section 24.235	Antenna	Complied
Transmitter Frequency Stability (Voltage Variation)	C.F.R. 47 FCC Part 24: 2004 Section 24.235	Antenna	Complied
Transmitter Occupied Bandwidth	C.F.R. 47 FCC Part 24: 2004 Section 24.238	Antenna	Complied
Transmitter Out of Band Radiated Emissions	C.F.R. 47 FCC Part 24: 2004 Section 2.1053/24.238	Antenna	Complied
Transmitter Band Edge Radiated Emissions	C.F.R. 47 FCC Part 2: 2004 Section 2.1053/24.238	Antenna	Complied

## **6.3. Location of Tests**

All the measurements described in this report were performed at the premises of RFI Global Services Ltd, Ewhurst Park, Ramsdell, Basingstoke, Hampshire, RG26 5RQ, England.

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

### **7.1. General Comments**

This section contains test results only.

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to section 8 for details of measurement uncertainties.

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## **7.2. Test Results FCC Part 22**

### **7.2.1. Receiver/Idle Mode AC Conducted Spurious Emissions: Section 15.107**

The EUT was configured as for ac conducted emission measurements as described in section 9 of this report.

Tests were performed to identify the maximum emission levels on the ac mains line of the EUT.

#### **Results:**

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

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.15020	Live	35.33	65.99	30.66	Complied
0.20659	Neutral	46.78	63.34	16.56	Complied
0.22574	Neutral	27.43	62.60	35.17	Complied
0.27255	Neutral	33.14	61.04	27.90	Complied
4.22525	Live	25.27	56.00	30.73	Complied
4.51658	Neutral	24.28	56.00	31.72	Complied

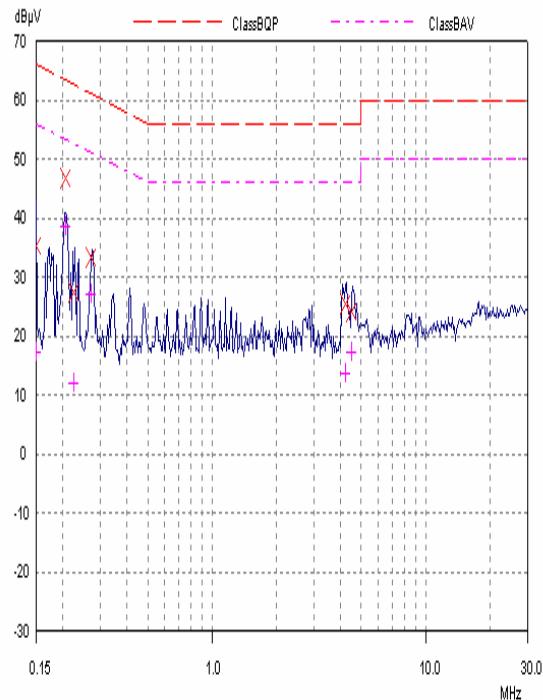
##### **Average Detector Measurements on Live and Neutral Lines**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.15020	Neutral	17.15	55.99	38.84	Complied
0.20659	Live	38.50	53.34	14.84	Complied
0.22574	Live	11.84	52.60	40.76	Complied
0.27255	Live	27.15	51.04	23.89	Complied
4.22525	Live	13.54	46.00	32.46	Complied
4.51658	Neutral	17.37	46.00	28.63	Complied

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**Receiver/Idle Mode AC Conducted Spurious Emissions: Section 15.107 (Continued)**



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

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**7.2.2. Receiver/Idle Mode Radiated Spurious Emissions: Section 15.109 - Electric Field Strength Measurements (Frequency Range: 30 to 1000 MHz)**

The EUT was configured as for radiated emission testing as described in section 9 of this report.

Tests were performed to identify the maximum receiver or standby radiated emission levels.

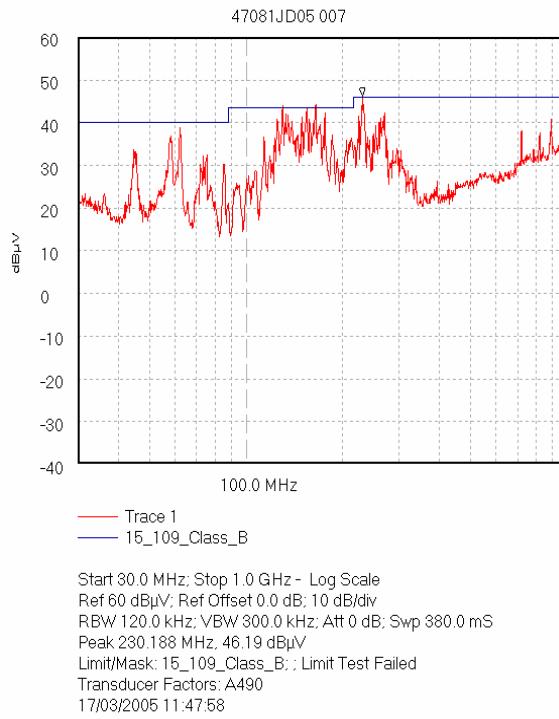
**Results:**

Frequency (MHz)	Antenna Polarity	Quasi Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
44.880	Vert	25.6	40.0	14.4	Complied
57.770	Vert	26.6	40.0	13.4	Complied
62.210	Vert	19.9	40.0	20.1	Complied
118.249	Vert	25.1	43.5	18.4	Complied
130.183	Vert	27.7	43.5	15.8	Complied
153.546	Vert	27.6	43.5	15.9	Complied
164.211	Vert	22.3	43.5	21.2	Complied
176.677	Vert	19.2	43.5	24.3	Complied
233.040	Vert	15.4	46.0	30.6	Complied
720.880	Vert	27.7	46.0	18.3	Complied

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**Receiver/Idle Mode Radiated Spurious Emissions: Section 15.109 - Electric Field Strength Measurements (Frequency Range: 30 to 1000 MHz) (Continued)**



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

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**7.2.3. Receiver/Idle Mode Radiated Spurious Emissions: Section 15.109 - Electric Field Strength Measurements (Frequency Range: 1 to 10 GHz)**

**Results:**

**Highest Peak Level**

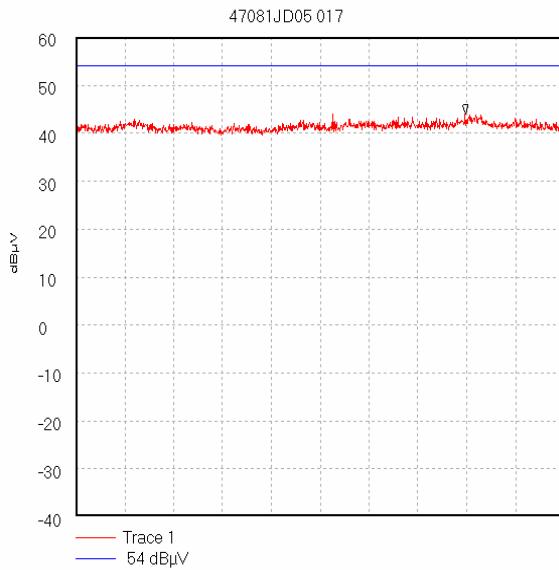
Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
7.547094	Vert	17.4	26.9	1.7	46.0	54.0	8.0	Complied

**Note(s):**

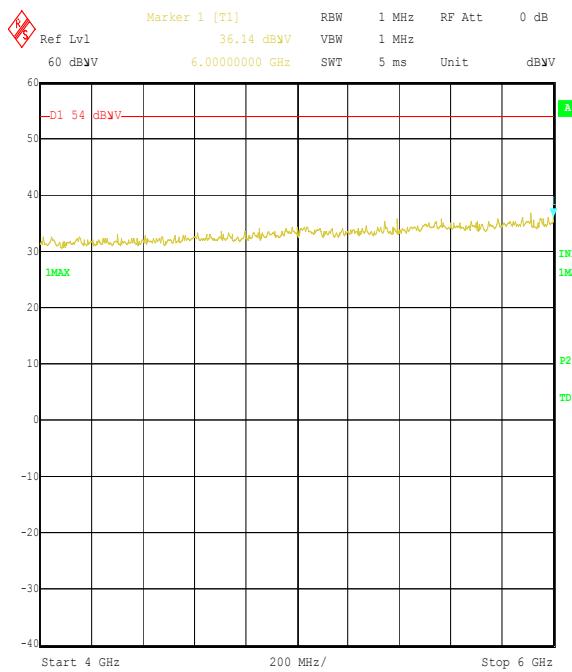
1. *No spurious emissions were detected above the noise floor of the measuring receiver; therefore, the highest peack noise floor reading of the measuring receiver was recorded as shown in the table above.*
2. *The peak level was compared to the average limit as opposes to being compared to the peak limit as this is the more onerous limit.*

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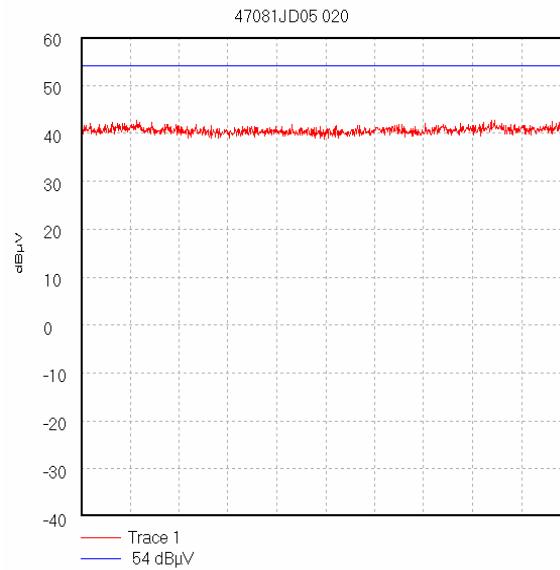
**Receiver/Idle Mode Radiated Spurious Emissions: Section 15.109 - Electric Field Strength Measurements (Frequency Range: 1 to 10 GHz) (Continued)**



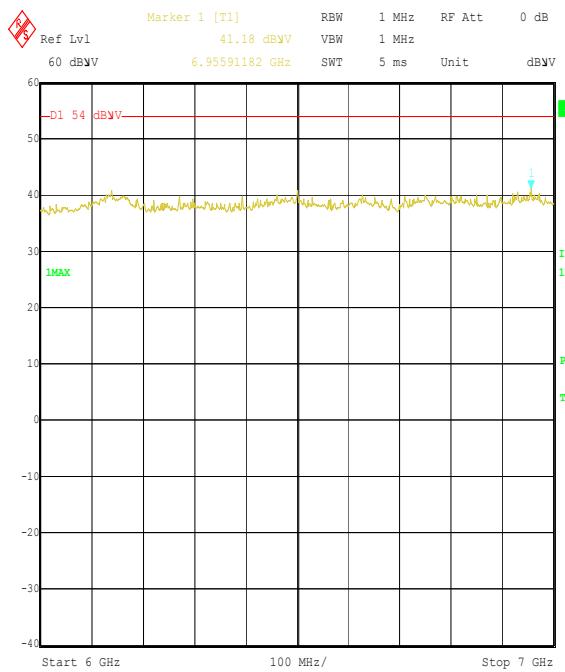
Start 1.0 GHz; Stop 2.0 GHz  
Ref 60 dB $\mu$ V; Ref Offset 0.0 dB; 10 dB/div  
RBW 1000.0 kHz; VBW 3.0 MHz; Att 0 dB; Swp 20.0 mS  
Peak 1.79778 GHz, 44.08 dB $\mu$ V  
Display Line: 54 dB $\mu$ V; Limit Test Passed  
17/03/2005 13:36:42



Title: GW Pharmaceutical EUT: EP011 FCC P22/24. Radiated Emissions  
Comment A: 47081JD05 Idle Mode (GSM 850)  
Date: 18.MAR.2005 11:17:14



Start 2.0 GHz; Stop 4.0 GHz  
Ref 60 dB $\mu$ V; Ref Offset 0.0 dB; 10 dB/div  
RBW 1000.0 kHz; VBW 3.0 MHz; Att 0 dB; Swp 20.0 mS  
Peak 4.0 GHz, 43.4 dB $\mu$ V  
Display Line: 54 dB $\mu$ V; Limit Test Passed  
17/03/2005 13:46:15

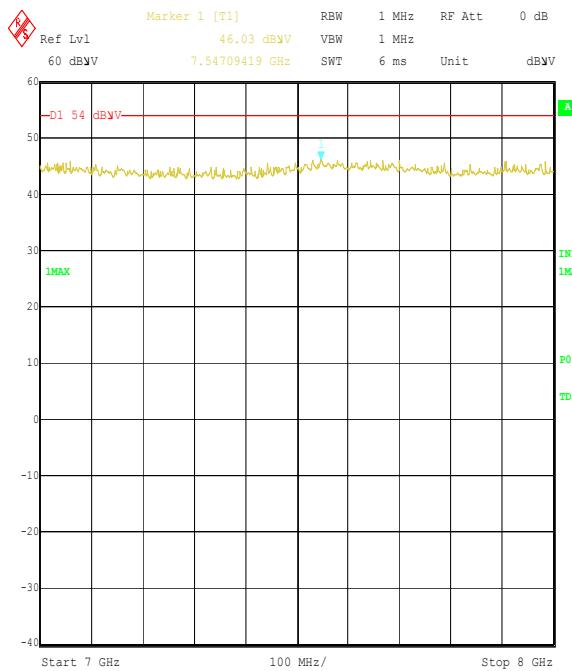


Title: GW Pharmaceutical EUT: EP011 FCC P22/24. Radiated Emissions  
Comment A: 47081JD05 Idle Mode (GSM 850)  
Date: 18.MAR.2005 11:47:25

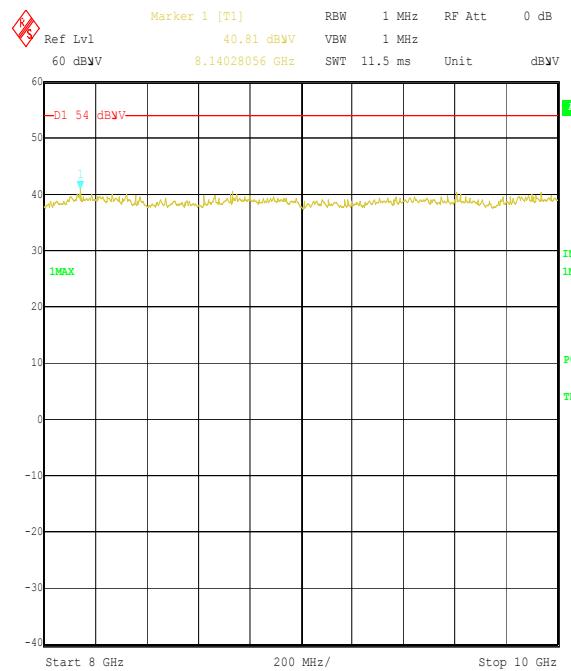
*Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.*

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**Receiver/Idle Mode Radiated Spurious Emissions: Section 15.109 - Electric Field Strength Measurements (Frequency Range: 1 to 10 GHz) (Continued)**



Title: GW Pharmaceutical EUT: EP011 FCC P22/24. Radiated Emissions  
 Comment A: 47081JD05 Idle Mode (GSM 850)  
 Date: 18.MAR.2005 11:46:54



Title: GW Pharmaceutical EUT: EP011 FCC P22/24. Radiated Emissions  
 Comment A: 47081JD05 Idle Mode (GSM 850)  
 Date: 18.MAR.2005 11:50:58

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

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#### **7.2.4. Transmitter Effective Radiated Power (ERP): Section 22.913(a)**

The EUT was configured as for effective radiated power as described in section 9 of this report.

Tests were performed to identify the maximum effective radiated power (ERP).

#### **Results:**

Channel	Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	824.2	11.6	38.4	26.8	Complied
Middle	836.6	14.1	38.4	24.3	Complied
Top	848.8	14.8	38.4	23.6	Complied

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**7.2.5. Transmitter Frequency Stability (Temperature Variation): Section 22.355**

The EUT was configured as for frequency stability measurements as described in section 9 of this report.

Tests were performed to identify the maximum frequency error of the EUT with variations in ambient temperature.

**Results:**

**Bottom Channel (824.2 MHz)**

Temperature (°C)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
-30	824.200033	33	0.04	2.5	2.46	Complied
-20	824.200030	30	0.04	2.5	2.46	Complied
-10	824.199974	-26	0.03	2.5	2.47	Complied
0	824.199965	-35	0.04	2.5	2.46	Complied
10	824.199967	-33	0.04	2.5	2.46	Complied
20	824.200012	12	0.01	2.5	2.49	Complied
30	824.199980	-20	0.02	2.5	2.48	Complied
40	824.200023	23	0.03	2.5	2.47	Complied
50	824.200029	29	0.04	2.5	2.46	Complied

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**Transmitter Frequency Stability (Temperature Variation): Section 22.355 (Continued)**

**Results:**

**Top Channel (848.8 MHz)**

Temperature (°C)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
-30	848.800029	29	0.03	2.5	2.47	Complied
-20	848.800027	27	0.03	2.5	2.47	Complied
-10	848.800015	15	0.02	2.5	2.48	Complied
0	848.799966	-34	0.04	2.5	2.46	Complied
10	848.799979	-21	0.02	2.5	2.48	Complied
20	848.799970	-30	0.04	2.5	2.46	Complied
30	848.799982	-18	0.02	2.5	2.48	Complied
40	848.799979	-21	0.02	2.5	2.48	Complied
50	848.799980	-20	0.02	2.5	2.48	Complied

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**7.2.6. Transmitter Frequency Stability (Voltage Variation): Section 22.355**

The EUT was configured as for frequency stability measurements as described in section 9 of this report.

Tests were performed to identify the maximum frequency error of the EUT with variations in nominal operating voltage.

**Results:**

**Bottom Channel (824.2 MHz)**

Supply Voltage (V)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
4.2	824.200012	12	0.01	2.5	2.49	Complied
3.3	824.200162	162	0.20	2.5	2.30	Complied

**Top Channel (848.8 MHz)**

Supply Voltage (V)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
4.2	848.799970	-30	0.04	2.5	2.46	Complied
3.3	848.800142	142	0.17	2.5	2.33	Complied

**Test of:** **GW Pharmaceuticals plc.**  
**EP011 Methadone Delivery System.**  
**To:** **FCC Part 22: 2004 (Subpart H) & FCC Part 24 Subpart E: 2002**

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#### **7.2.7. Transmitter Occupied Bandwidth: Section 2.1049**

The EUT was configured as for occupied bandwidth measurements as described in section 9 of this report.

Tests were performed to identify the maximum bandwidth occupied by the fundamental frequency of the EUT.

#### **Results:**

Channel	Frequency (MHz)	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (kHz)
Bottom	824.2	3.0	10.0	236.874
Middle	836.6	3.0	10.0	236.874
Top	848.8	3.0	10.0	236.874

**Test of:** **GW Pharmaceuticals plc.**  
**EP011 Methadone Delivery System.**  
**To:** **FCC Part 22: 2004 (Subpart H) & FCC Part 24 Subpart E: 2002**

**Transmitter Occupied Bandwidth: Section 2.1049 (Continued)**



Title: GW Pharmaceutical EUT: EP011. FCC P22/24. 20dB Bandwidth  
Comment A: 47081JD05 Bottom Channel (GSM 850)  
Date: 18.MAR.2005 15:56:43



Title: GW Pharmaceutical EUT: EP011. FCC P22/24. 20dB Bandwidth  
Comment A: 47081JD05 Top Channel (GSM 850)  
Date: 18.MAR.2005 15:58:14



Title: GW Pharmaceutical EUT: EP011. FCC P22/24. 20dB Bandwidth  
Comment A: 47081JD05 Middle Channel (GSM 850)  
Date: 18.MAR.2005 15:55:28

**Note:** The occupied bandwidth is measured using the internal OBW function of the measurement analyser. The analyser automatically configures the measurement bandwidths to make an accurate measurement. The results can be observed in the right hand corner of the graphs.

Test of: **GW Pharmaceuticals plc.**  
**EP011 Methadone Delivery System.**  
To: **FCC Part 22: 2004 (Subpart H) & FCC Part 24 Subpart E: 2002**

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#### **7.2.8. Transmitter Out of Band Radiated Emissions: Section 2.1053 & 22.917**

The EUT was configured as for transmitter radiated emission testing as described in section 9 of this report.

Tests were performed to identify the maximum transmitter radiated emission levels.

#### **Results:**

##### **Bottom Channel**

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1648.513	-42.3	-13.0	29.3	Complied

##### **Middle Channel**

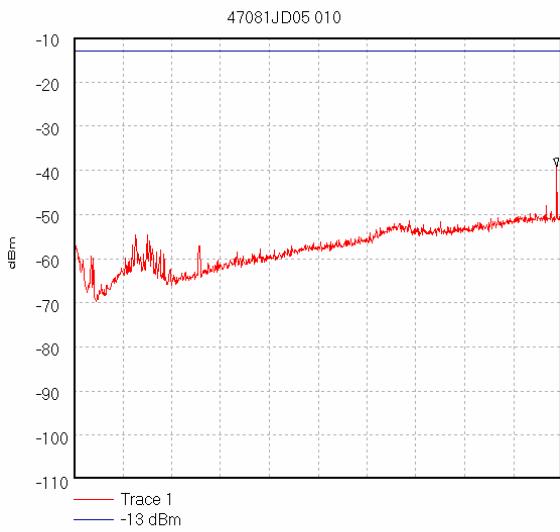
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1673.335	-40.7	-13.0	27.7	Complied

##### **Top Channel**

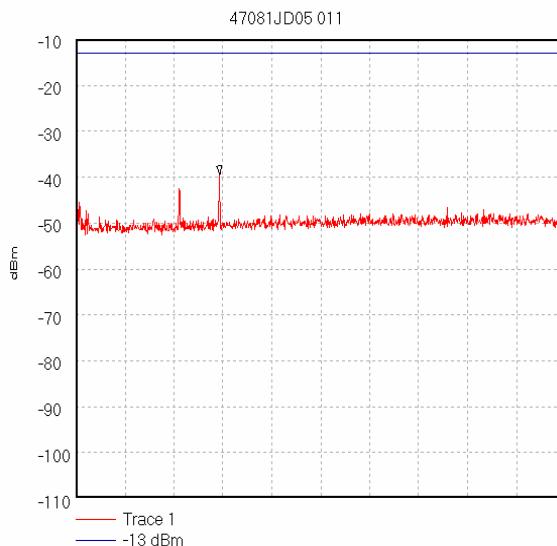
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1697.454	-42.6	-13.0	29.6	Complied

**Test of:** **GW Pharmaceuticals plc.**  
**EP011 Methadone Delivery System.**  
**To:** **FCC Part 22: 2004 (Subpart H) & FCC Part 24 Subpart E: 2002**

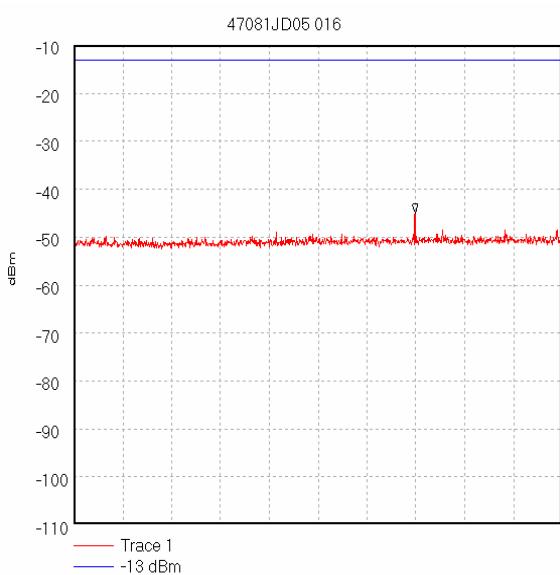
**Transmitter Out of Band Radiated Emissions: Section 2.1053 & 22.917 (Continued)**



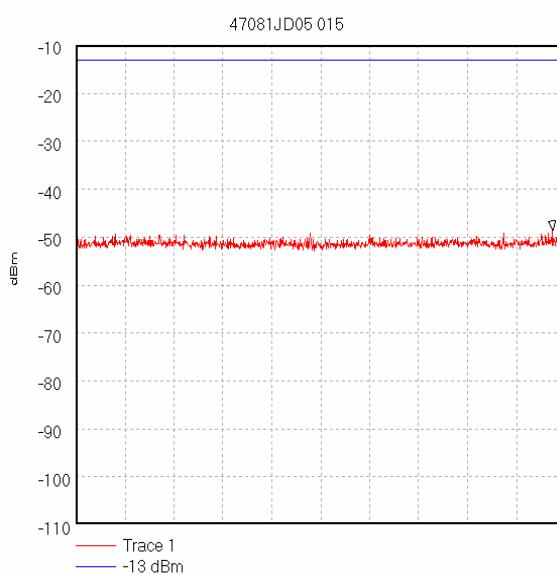
Start 30.0 MHz; Stop 824.0 MHz  
Ref -10 dBm; Ref Offset 9.6 dB; 10 dB/div  
RBW 100.0 kHz; VBW 300.0 kHz; Att 10 dB; Swp 520.0 mS  
Peak 815.178 MHz, -39.15 dBm  
Display Line: -13 dBm; Limit Test Passed  
Transducer Factors: A490  
17/03/2005 12:04:06



Start 850.0 MHz; Stop 1.0 GHz  
Ref -10 dBm; Ref Offset 9.6 dB; 10 dB/div  
RBW 100.0 kHz; VBW 300.0 kHz; Att 10 dB; Swp 100.0 mS  
Peak 894.0 MHz, -39.35 dBm  
Display Line: -13 dBm; Limit Test Passed  
Transducer Factors: A490  
17/03/2005 12:05:18



Start 1.0 GHz; Stop 2.0 GHz  
Ref -10 dBm; Ref Offset 9.6 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 300.0 mS  
Peak 1.699 GHz, -44.99 dBm  
Display Line: -13 dBm;  
17/03/2005 13:29:08

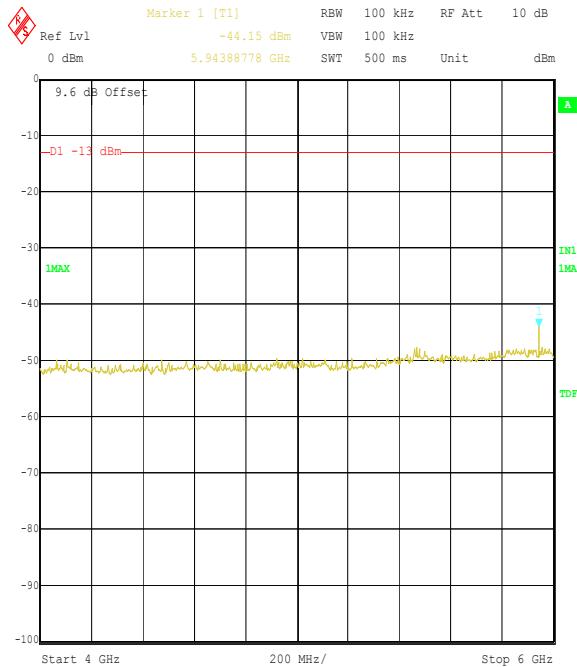


Start 2.0 GHz; Stop 4.0 GHz  
Ref -10 dBm; Ref Offset 9.6 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 600.0 mS  
Peak 3.949 GHz, -48.62 dBm  
Display Line: -13 dBm;  
17/03/2005 13:23:22

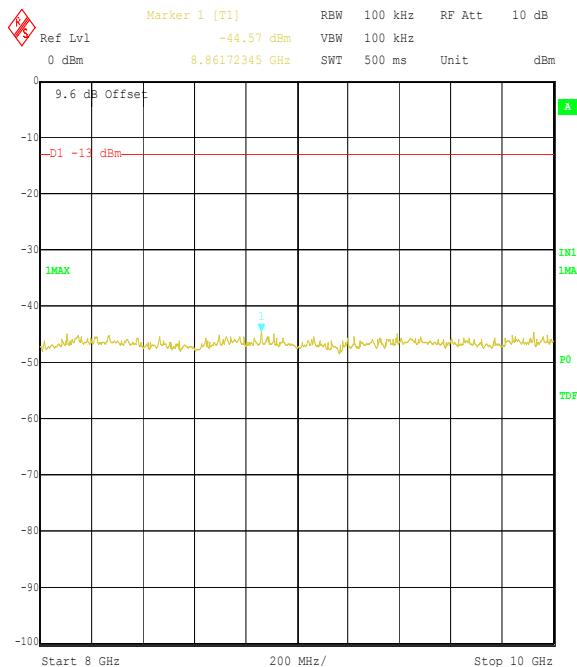
*Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying*

**Test of:** **GW Pharmaceuticals plc.**  
**EP011 Methadone Delivery System.**  
**To:** **FCC Part 22: 2004 (Subpart H) & FCC Part 24 Subpart E: 2002**

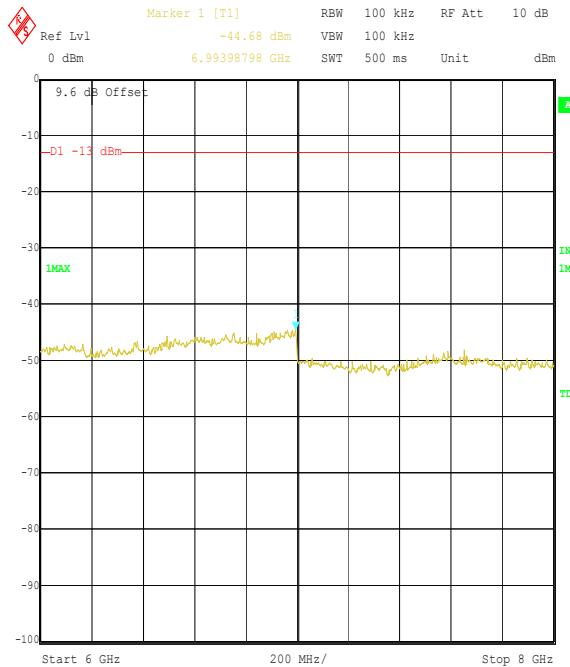
**Transmitter Out of Band Radiated Emissions: Section 2.1053 & 22.917 (Continued)**



Title: GW Pharmaceutical EUT: EP011 FCC P22/24. Radiated Emissions  
Comment A: 47081JD05 Top Channel (GSM 850)  
Date: 18.MAR.2005 11:29:38



Title: GW Pharmaceutical EUT: EP011 FCC P22/24. Radiated Emissions  
Comment A: 47081JD05 Top Channel (GSM 850)  
Date: 18.MAR.2005 12:01:25



Title: GW Pharmaceutical EUT: EP011 FCC P22/24. Radiated Emissions  
Comment A: 47081JD05 Top Channel (GSM 850)  
Date: 18.MAR.2005 11:31:39

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

**Test of:** **GW Pharmaceuticals plc.**  
**EP011 Methadone Delivery System.**  
**To:** **FCC Part 22: 2004 (Subpart H) & FCC Part 24 Subpart E: 2002**

### **7.2.9. Transmitter Radiated Emissions at Band Edges: Section 2.1053/22.917**

The EUT was configured as for transmitter radiated emission testing described in section 9 of this report.

Tests were performed to identify the maximum emission level at the band edges of the frequency block that the EUT will operate over.

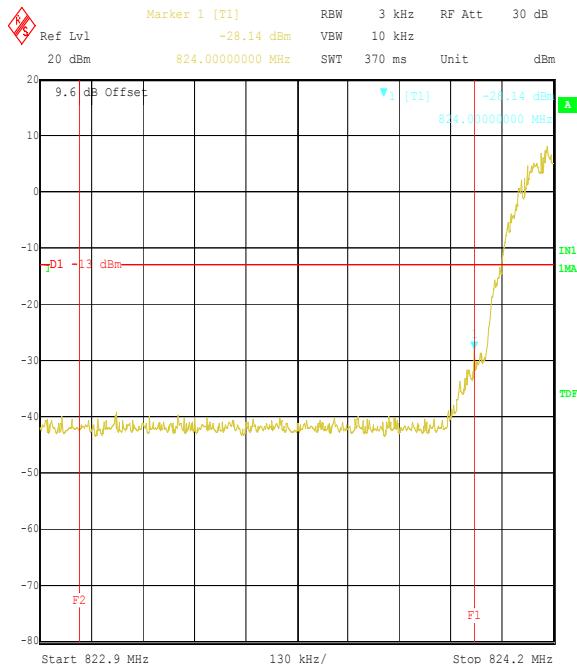
#### **Results:**

##### **Bottom Band Edge**

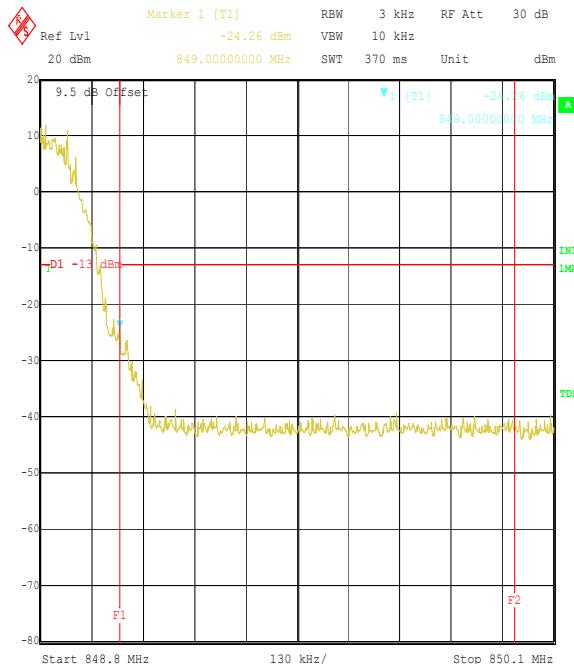
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
824	-28.1	-13.0	15.1	Complied

##### **Top Band Edge**

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
849	-24.3	-13.0	11.3	Complied



Title: GW Pharmaceutical EUT: EP011. FCC P22/24. Radiated Emissions  
Comment A: 47081JD05 Bottom Channel (GSM 850) BandEdge  
Date: 18.MAR.2005 15:43:47



Title: GW Pharmaceutical EUT: EP011. FCC P22/24. Radiated Emissions  
Comment A: 47081JD05 Top Channel (GSM 850) BandEdge  
Date: 18.MAR.2005 16:31:24

**Test of:** **GW Pharmaceuticals plc.**  
**EP011 Methadone Delivery System.**  
**To:** **FCC Part 22: 2004 (Subpart H) & FCC Part 24 Subpart E: 2002**

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### **7.3. Test Results FCC Part 24**

#### **7.3.1. Receiver/Idle Mode AC Conducted Spurious Emissions: Section 15.107**

The EUT was configured as for ac conducted emission measurements as described in section 9 of this report.

Tests were performed to identify the maximum emission levels on the ac mains line of the EUT.

#### **Results:**

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

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.15228	Neutral	35.86	65.87	30.01	Complied
0.20697	Neutral	46.42	63.33	16.91	Complied
0.22561	Neutral	28.14	62.61	34.47	Complied
0.27475	Neutral	34.13	60.97	26.84	Complied
4.31229	Neutral	25.37	56.00	30.63	Complied
4.78859	Neutral	24.94	56.00	31.06	Complied

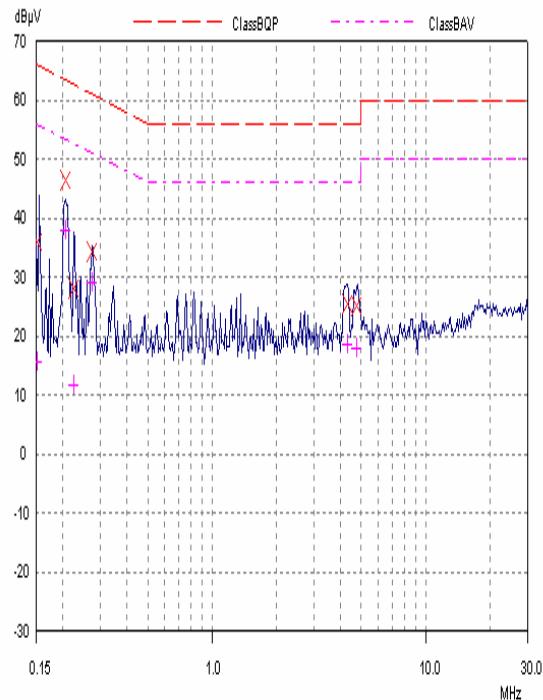
##### **Average Detector Measurements on Live and Neutral Lines**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.15228	Live	15.67	55.87	40.20	Complied
0.20697	Live	37.94	53.33	15.39	Complied
0.22561	Neutral	11.66	52.61	40.95	Complied
0.27475	Live	29.13	50.97	21.84	Complied
4.31229	Neutral	18.57	46.00	27.43	Complied
4.78859	Neutral	17.96	46.00	28.04	Complied

Test of: **GW Pharmaceuticals plc.**  
**EP011 Methadone Delivery System.**  
To: **FCC Part 22: 2004 (Subpart H) & FCC Part 24 Subpart E: 2002**

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**Receiver/Idle Mode AC Conducted Spurious Emissions: Section 15.107 (Continued)**



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

Test of: **GW Pharmaceuticals plc.**  
**EP011 Methadone Delivery System.**  
To: **FCC Part 22: 2004 (Subpart H) & FCC Part 24 Subpart E: 2002**

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**7.3.2. Receiver/Idle Mode Radiated Spurious Emissions: Section 15.109 - Electric Field Strength Measurements (Frequency Range: 30 to 1000 MHz)**

The EUT was configured as for radiated emission testing as described in section 9 of this report.

Tests were performed to identify the maximum receiver or standby radiated emission levels.

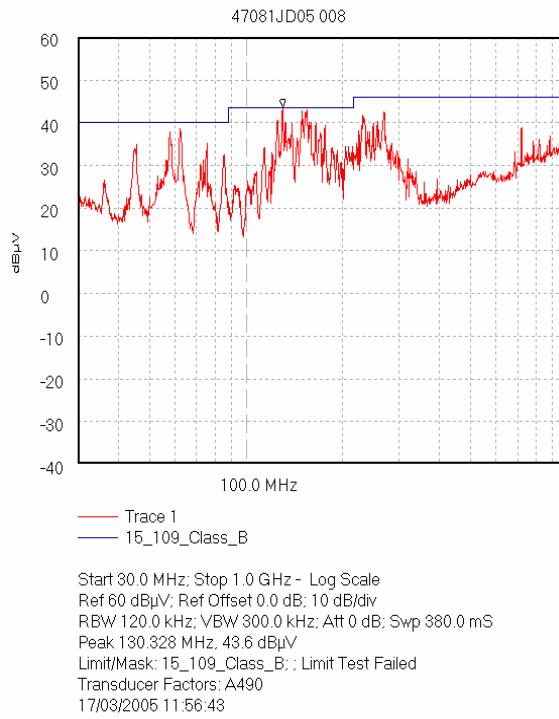
**Results:**

Frequency (MHz)	Antenna Polarity	Quasi Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
44.880	Vert	25.5	40.0	14.5	Complied
57.770	Vert	26.6	40.0	13.4	Complied
62.210	Vert	19.9	40.0	20.1	Complied
118.249	Vert	25.0	43.5	18.5	Complied
130.183	Vert	27.7	43.5	15.8	Complied
153.546	Vert	27.6	43.5	15.9	Complied
164.211	Vert	22.2	43.5	21.3	Complied
176.677	Vert	19.2	43.5	24.3	Complied
233.040	Vert	15.4	46.0	30.6	Complied
720.880	Vert	27.7	46.0	18.3	Complied

Test of: **GW Pharmaceuticals plc.**  
**EP011 Methadone Delivery System.**  
To: **FCC Part 22: 2004 (Subpart H) & FCC Part 24 Subpart E: 2002**

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**Receiver/Idle Mode Radiated Spurious Emissions: Section 15.109 - Electric Field Strength Measurements (Frequency Range: 30 to 1000 MHz) (Continued)**



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

Test of: **GW Pharmaceuticals plc.**  
**EP011 Methadone Delivery System.**  
To: **FCC Part 22: 2004 (Subpart H) & FCC Part 24 Subpart E: 2002**

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**7.3.3. Receiver/Idle Mode Radiated Spurious Emissions: Section 15.109 - Electric Field Strength Measurements (Frequency Range: 1 to 10 GHz)**

**Results:**

**Highest Peak Level**

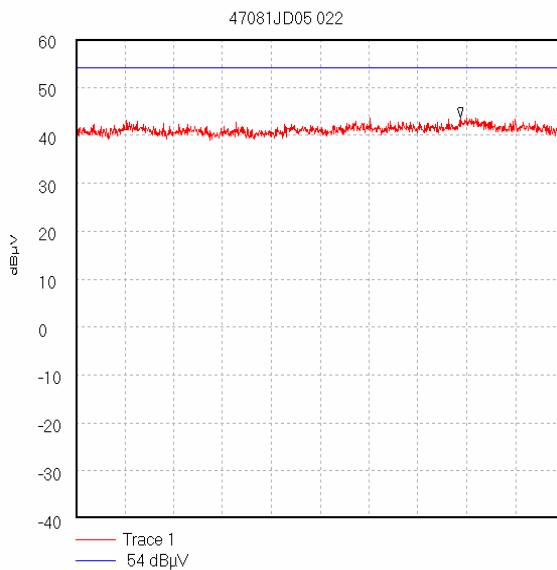
Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
7.555110	Vert	17.7	26.9	1.7	46.3	54.0	7.7	Complied

**Note(s):**

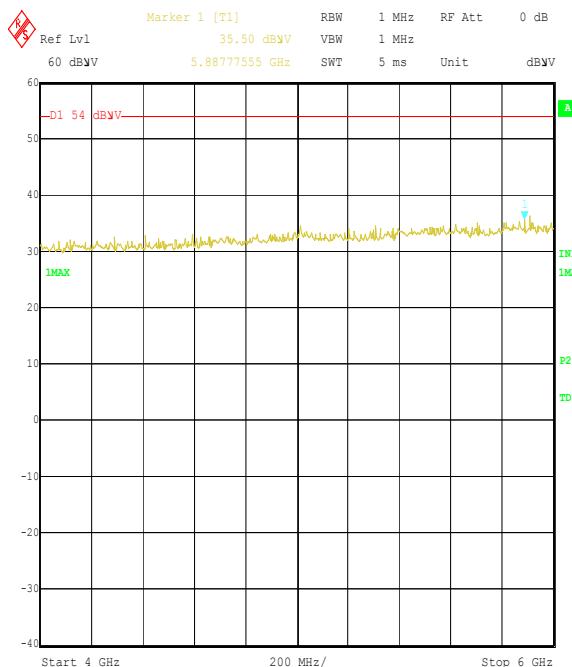
1. No spurious emissions were detected above the noise floor of the measuring receiver; therefore, the highest peak noise floor reading of the measuring receiver was recorded as shown in the table above.
2. The peak level was compared to the average limit as opposed to being compared to the peak limit because this is the more onerous limit.

**Test of:** **GW Pharmaceuticals plc.**  
**EP011 Methadone Delivery System.**  
**To:** **FCC Part 22: 2004 (Subpart H) & FCC Part 24 Subpart E: 2002**

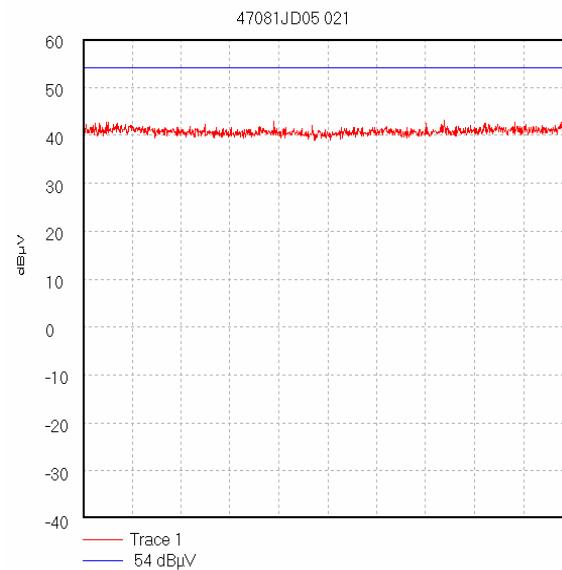
**Receiver/Idle Mode Radiated Spurious Emissions: Section 15.109 - Electric Field Strength Measurements (Frequency Range: 1 to 10 GHz) (Continued)**



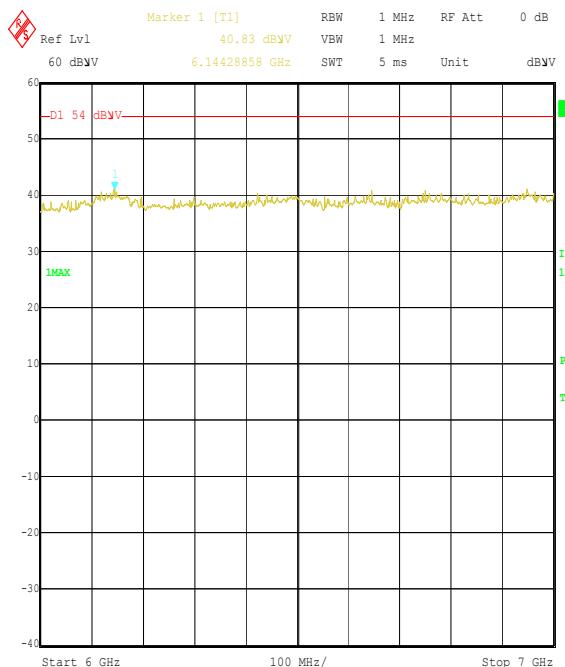
Start 1.0 GHz; Stop 2.0 GHz  
Ref 60 dB $\mu$ V; Ref Offset 0.0 dB; 10 dB/div  
RBW 1000.0 kHz; VBW 3.0 MHz; Att 0 dB; Swp 20.0 mS  
Peak 1.78778 GHz, 43.68 dB $\mu$ V  
Display Line: 54 dB $\mu$ V; ; Limit Test Passed  
17/03/2005 13:50:24



Title: GW Pharmaceutical EUT: EP011 FCC P22/24. Radiated Emissions  
Comment A: 47081JD05 Idle Mode (PCS 1900)  
Date: 18.MAR.2005 11:20:00



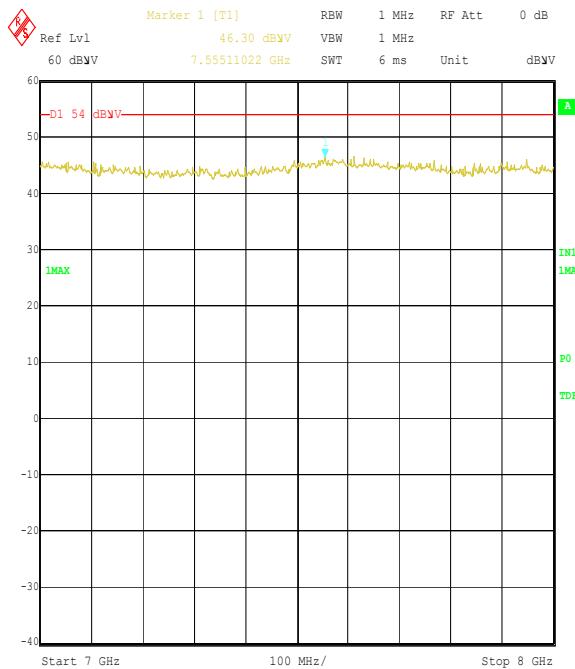
Start 2.0 GHz; Stop 4.0 GHz  
Ref 60 dB $\mu$ V; Ref Offset 0.0 dB; 10 dB/div  
RBW 1000.0 kHz; VBW 3.0 MHz; Att 0 dB; Swp 20.0 mS  
Peak 3.982222 GHz, 43.62 dB $\mu$ V  
Display Line: 54 dB $\mu$ V; ; Limit Test Passed  
17/03/2005 13:47:51



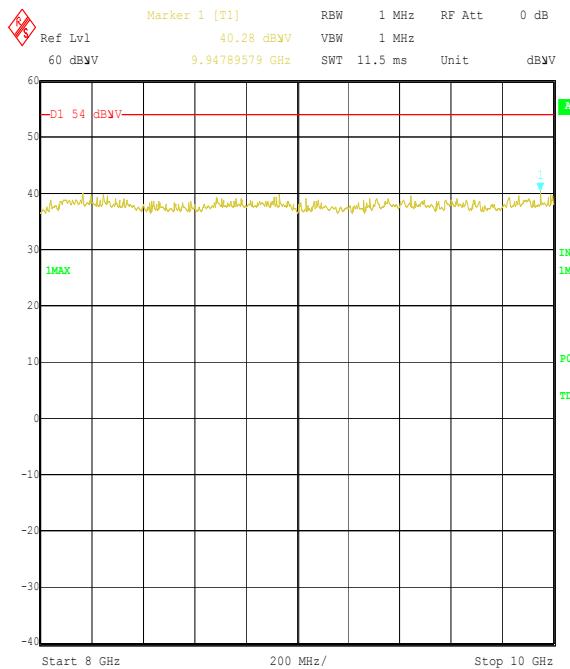
Title: GW Pharmaceutical EUT: EP011 FCC P22/24. Radiated Emissions  
Comment A: 47081JD05 Idle Mode (PCS 1900)  
Date: 18.MAR.2005 11:42:22

**Test of:** **GW Pharmaceuticals plc.**  
**EP011 Methadone Delivery System.**  
**To:** **FCC Part 22: 2004 (Subpart H) & FCC Part 24 Subpart E: 2002**

**Receiver/Idle Mode Radiated Spurious Emissions: Section 15.109 - Electric Field Strength Measurements (Frequency Range: 1 to 10 GHz) (Continued)**



Title: GW Pharmaceutical EUT: EP011 FCC P22/24. Radiated Emissions  
Comment A: 47081JD05 Idle Mode (PCS 1900)  
Date: 18.MAR.2005 11:44:08



Title: GW Pharmaceutical EUT: EP011 FCC P22/24. Radiated Emissions  
Comment A: 47081JD05 Idle Mode (PCS 1900)  
Date: 18.MAR.2005 11:52:21

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

Test of: **GW Pharmaceuticals plc.**  
**EP011 Methadone Delivery System.**  
To: **FCC Part 22: 2004 (Subpart H) & FCC Part 24 Subpart E: 2002**

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#### **7.3.4. Transmitter Effective Isotropic Radiated Power (EIRP): Section 24.232**

The EUT was configured as for effective isotropic radiated power as described in section 9 of this report.

Tests were performed to identify the maximum effective isotropic radiated power (EIRP).

#### **Results:**

Channel	Measured Frequency (MHz)	Antenna Polarity	Maximum Transmitter EIRP (dBm)	Limit EIRP (dBm)	Margin (dB)	Result
Bottom	1850.2	Horiz	24.9	33.0	8.1	Complied
Middle	1879.8	Horiz	25.3	33.0	7.7	Complied
Top	1909.8	Horiz	24.7	33.0	8.3	Complied

Test of: **GW Pharmaceuticals plc.**  
**EP011 Methadone Delivery System.**  
To: **FCC Part 22: 2004 (Subpart H) & FCC Part 24 Subpart E: 2002**

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### **7.3.5. Transmitter Frequency Stability (Temperature Variation): Section 24.235**

The EUT was configured as for frequency stability measurements as described in section 9 of this report.

Tests were performed to identify the maximum frequency error of the EUT with variations in ambient temperature.

#### **Results:**

##### **Bottom Channel (1850.2 MHz)**

Temperature (°C)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
-30	243	1850.200243	1850	0.200243	Complied
-20	237	1850.200237	1850	0.200237	Complied
-10	228	1850.200228	1850	0.200228	Complied
0	216	1850.200216	1850	0.200216	Complied
10	193	1850.200193	1850	0.200193	Complied
20	177	1850.200177	1850	0.200177	Complied
30	169	1850.200169	1850	0.200169	Complied
40	138	1850.200138	1850	0.200138	Complied
50	114	1850.200114	1850	0.200114	Complied

Test of: **GW Pharmaceuticals plc.**  
**EP011 Methadone Delivery System.**  
To: **FCC Part 22: 2004 (Subpart H) & FCC Part 24 Subpart E: 2002**

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**Transmitter Frequency Stability (Temperature Variation): Section 24.235 (Continued)**

**Results:**

**Top Channel (1909.8 MHz)**

Temperature (°C)	Frequency Error (Hz)	Measured Frequency (MHz)	Upper Band Edge Limit (MHz)	Margin (MHz)	Result
-30	226	1909.800226	1910	0.199774	Complied
-20	234	1909.800234	1910	0.199766	Complied
-10	202	1909.800202	1910	0.199798	Complied
0	205	1909.800205	1910	0.199795	Complied
10	182	1909.800182	1910	0.199818	Complied
20	163	1909.800163	1910	0.199837	Complied
30	154	1909.800154	1910	0.199846	Complied
40	136	1909.800136	1910	0.199864	Complied
50	121	1909.800121	1910	0.199879	Complied

**Test of:** **GW Pharmaceuticals plc.**  
**EP011 Methadone Delivery System.**  
**To:** **FCC Part 22: 2004 (Subpart H) & FCC Part 24 Subpart E: 2002**

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**7.3.6. Transmitter Frequency Stability (Voltage Variation): Section 24.235**

The EUT was configured as for frequency stability measurements as described in section 9 of this report.

Tests were performed to identify the maximum frequency error of the EUT with variations in nominal operating voltage.

**Results:**

**Bottom Channel (1850.2 MHz)**

Supply Voltage (V)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
4.2	177	1850.200177	1850	0.200177	Complied
3.3	173	1850.200173	1850	0.200173	Complied

**Top Channel (1909.8 MHz)**

Supply Voltage (V)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
4.2	163	1909.800163	1910	0.199837	Complied
3.3	148	1909.800148	1910	0.199852	Complied

Test of: **GW Pharmaceuticals plc.**  
**EP011 Methadone Delivery System.**  
To: **FCC Part 22: 2004 (Subpart H) & FCC Part 24 Subpart E: 2002**

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### **7.3.7. Transmitter Occupied Bandwidth: Section 24.238**

The EUT was configured as for occupied bandwidth measurements as described in section 9 of this report.

Tests were performed to identify the maximum bandwidth occupied by the fundamental frequency of the EUT.

#### **Results:**

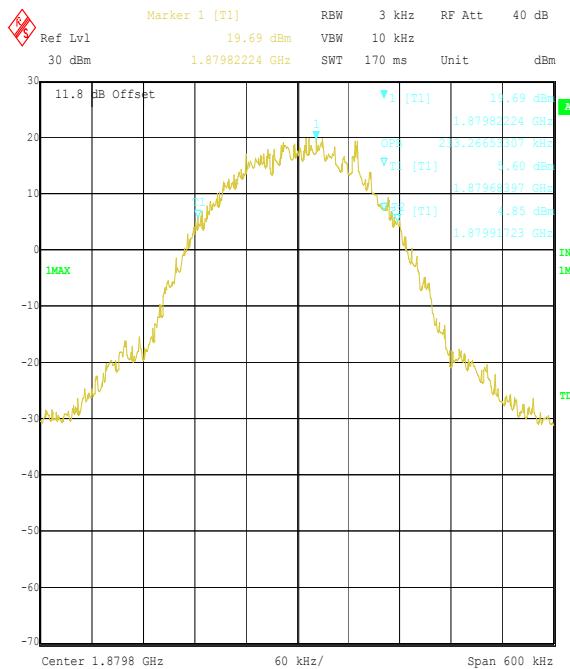
Channel	Frequency (MHz)	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (kHz)
Bottom	1850.2	3.0	10.0	235.671
Middle	1879.8	3.0	10.0	233.267
Top	1909.8	3.0	10.0	233.267

**Test of:** **GW Pharmaceuticals plc.**  
**EP011 Methadone Delivery System.**  
**To:** **FCC Part 22: 2004 (Subpart H) & FCC Part 24 Subpart E: 2002**

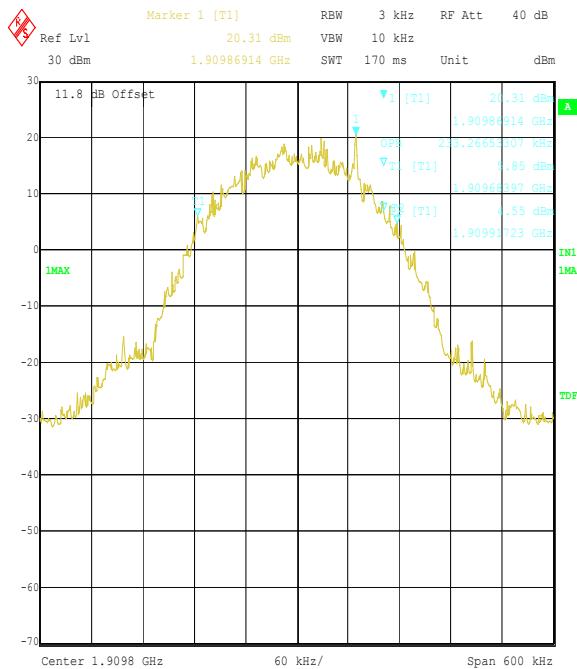
**Transmitter Occupied Bandwidth: Section 24.238 (Continued)**



Title: GW Pharmaceutical EUT: EP011. FCC P22/24. 20dB Bandwidth  
Comment A: 47081JD05 Bottom Channel (PCS 1900)  
Date: 18.MAR.2005 15:06:17



Title: GW Pharmaceutical EUT: EP011. FCC P22/24. 20dB Bandwidth  
Comment A: 47081JD05 Middle Channel (PCS 1900)  
Date: 18.MAR.2005 15:03:49



Title: GW Pharmaceutical EUT: EP011. FCC P22/24. 20dB Bandwidth  
Comment A: 47081JD05 Top Channel (PCS 1900)  
Date: 18.MAR.2005 15:02:18

**Note:** The occupied bandwidth is measured using the internal OBW function of the measurement analyser. The analyser automatically configures the measurement bandwidths to make an accurate measurement. The results can be observed in the right hand corner of the graphs.

**Test of:** **GW Pharmaceuticals plc.**  
**EP011 Methadone Delivery System.**  
**To:** **FCC Part 22: 2004 (Subpart H) & FCC Part 24 Subpart E: 2002**

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### **7.3.8. Transmitter Out of Band Radiated Emissions: Section 2.1053 & 24.238**

The EUT was configured as for transmitter radiated emission testing as described in section 9 of this report.

Tests were performed to identify the maximum transmitter radiated emission levels.

#### **Results:**

##### **Bottom Channel**

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3700.656	-31.1	-13.0	18.1	Complied
5550.415	-23.9	-13.0	10.9	Complied
7400.805	-29.4	-13.0	16.4	Complied

##### **Middle Channel**

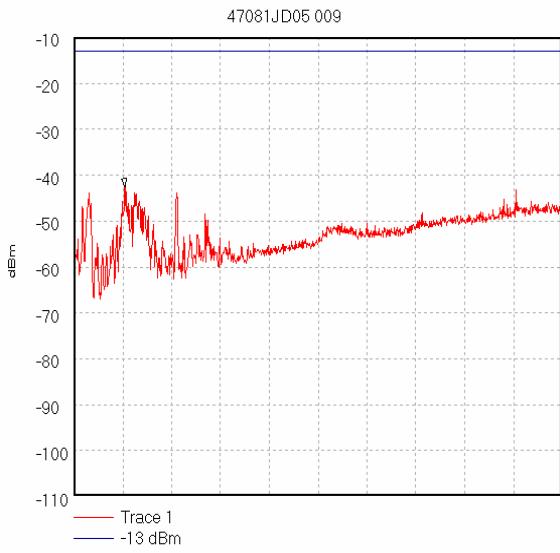
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3759.765	-27.9	-13.0	14.9	Complied
5639.225	-19.1	-13.0	6.1	Complied
7519.255	-27.8	-13.0	14.8	Complied

##### **Top Channel**

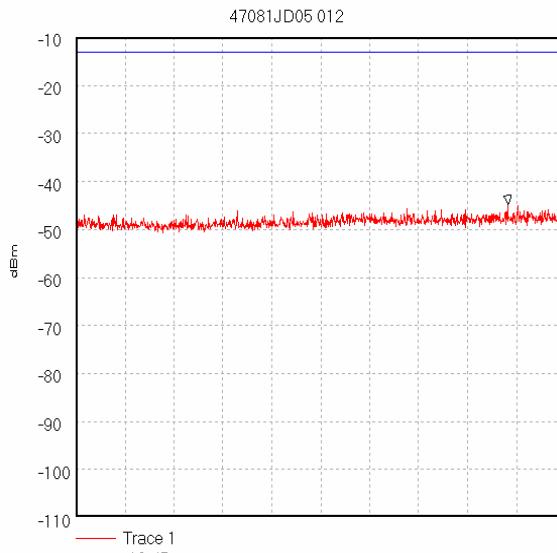
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3819.624	-25.8	-13.0	12.8	Complied
5729.684	-18.0	-13.0	5.0	Complied
7639.213	-26.1	-13.0	13.1	Complied

**Test of:** **GW Pharmaceuticals plc.**  
**EP011 Methadone Delivery System.**  
**To:** **FCC Part 22: 2004 (Subpart H) & FCC Part 24 Subpart E: 2002**

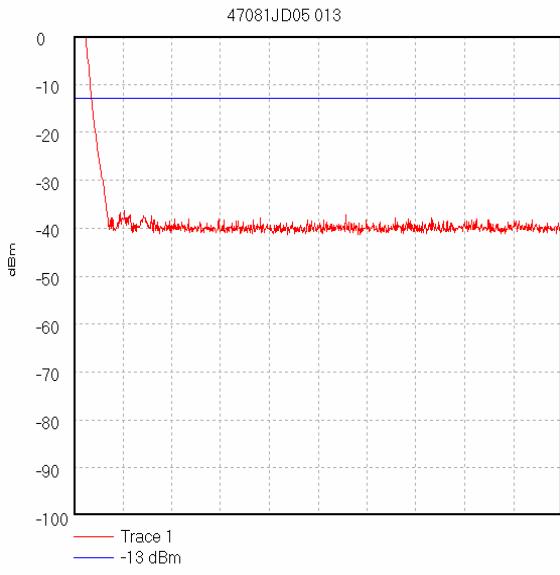
**Transmitter Out of Band Radiated Emissions: Section 2.1053 & 24.238 (Continued)**



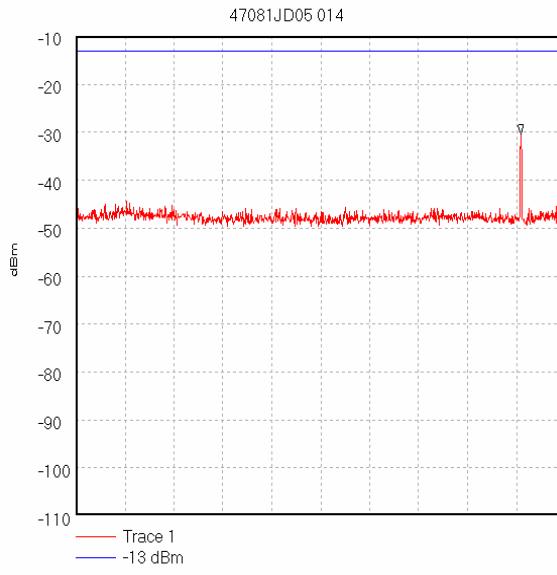
Start 30.0 MHz; Stop 1.0 GHz  
Ref -10 dBm; Ref Offset 11.8 dB; 10 dB/div  
RBW 1000.0 kHz; VBW 3.0 MHz; Att 0 dB; Swp 20.0 mS  
Peak 131.311 MHz, -42.65 dBm  
Display Line: -13 dBm; Limit Test Passed  
Transducer Factors: A490  
17/03/2005 12:01:11



Start 1.0 GHz; Stop 1.85 GHz  
Ref -10 dBm; Ref Offset 11.8 dB; 10 dB/div  
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS  
Peak 1.751 GHz, -44.86 dBm  
Display Line: -13 dBm;  
17/03/2005 13:11:22



Start 1.91 GHz; Stop 2.0 GHz  
Ref 0 dBm; Ref Offset 11.8 dB; 10 dB/div  
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS  
Peak 1.911 GHz, 3.98 dBm  
Display Line: -13 dBm;  
17/03/2005 13:13:07

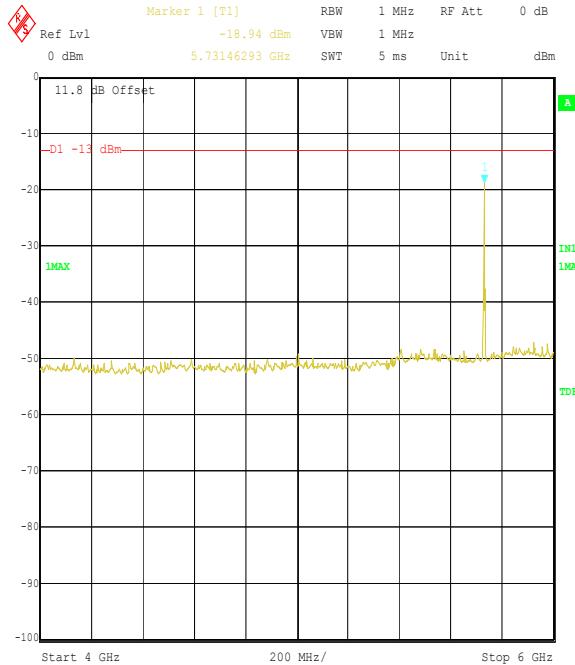


Start 2.0 GHz; Stop 4.0 GHz  
Ref -10 dBm; Ref Offset 11.8 dB; 10 dB/div  
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS  
Peak 3.82 GHz, -30.31 dBm  
Display Line: -13 dBm;  
17/03/2005 13:20:40

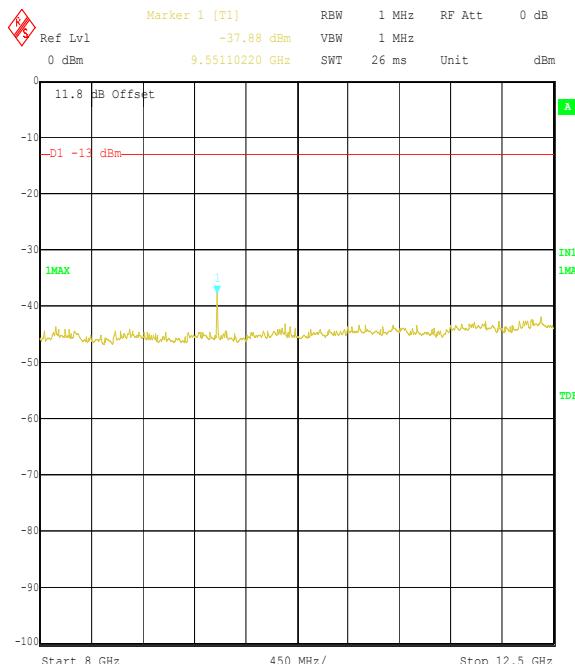
*Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.*

**Test of:** **GW Pharmaceuticals plc.**  
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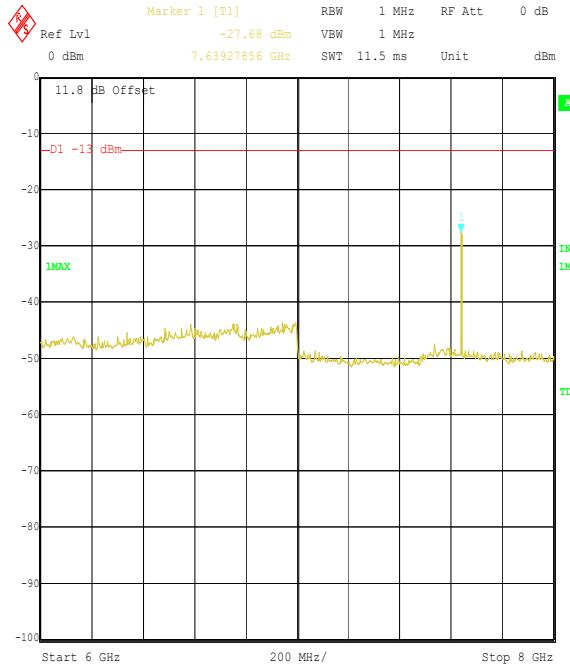
**Transmitter Out of Band Radiated Emissions: Section 2.1053 & 24.238 (Continued)**



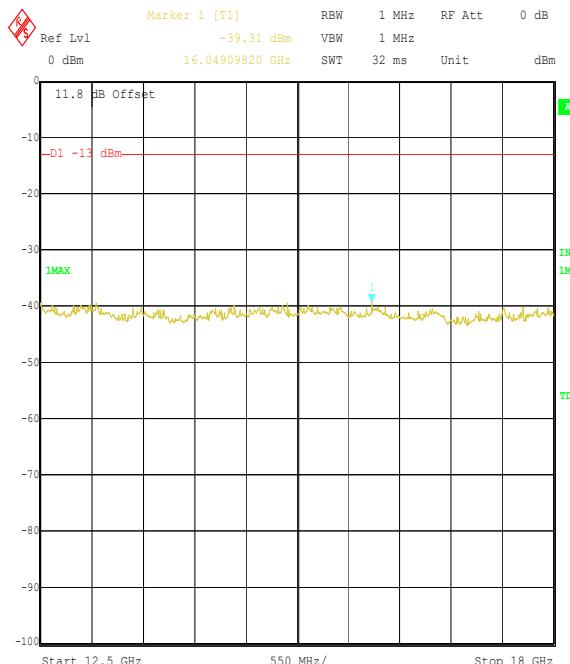
Title: GW Pharmaceutical EUT: EP011 FCC P22/24. Radiated Emissions  
Comment A: 47081JD05 Top Channel (PCS 1900)  
Date: 18.MAR.2005 11:25:01



Title: GW Pharmaceutical EUT: EP011 FCC P22/24. Radiated Emissions  
Comment A: 47081JD05 Top Channel (PCS 1900)  
Date: 18.MAR.2005 12:03:23



Title: GW Pharmaceutical EUT: EP011 FCC P22/24. Radiated Emissions  
Comment A: 47081JD05 Top Channel (PCS 1900)  
Date: 18.MAR.2005 11:33:29



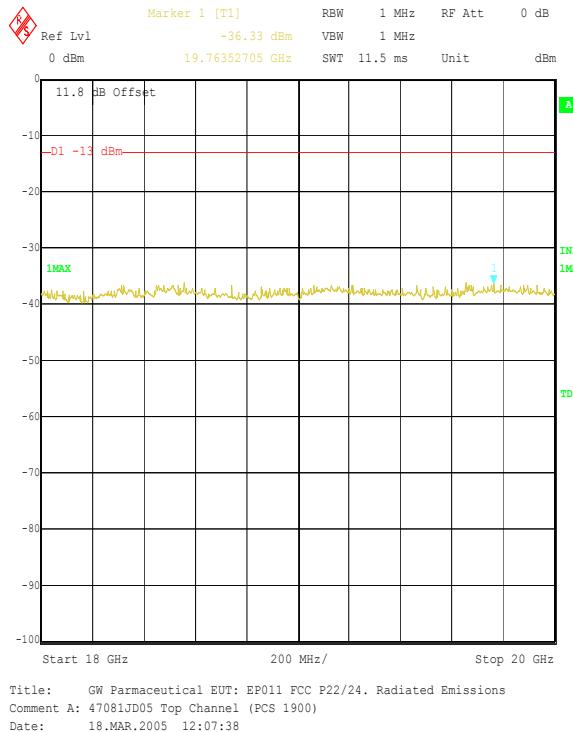
Title: GW Pharmaceutical EUT: EP011 FCC P22/24. Radiated Emissions  
Comment A: 47081JD05 Top Channel (PCS 1900)  
Date: 18.MAR.2005 12:05:36

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

**Test of:** **GW Pharmaceuticals plc.**  
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**Transmitter Out of Band Radiated Emissions: Section 2.1053 & 24.238 (Continued)**



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

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**Transmitter Out of Band Radiated Emissions: Section 2.1053 & 24.238 (Continued)**

**Integrated Power Over 1 MHz Strip Band: 1911 to 1912 MHz**

1<sup>st</sup> 1 MHz block immediately outside adjacent frequency block

100 kHz Strip Number	Peak Power (nW/100 kHz)	100 kHz Strip Number	Peak Power (nW/100 kHz)
1	225.080	6	140.271
2	183.517	7	106.212
3	160.065	8	127.615
4	109.848	9	106.964
5	113.139	10	92.512
<b>Total Peak Power:</b>	1365.223 nW/MHz		

**Integrated Power Over 1 MHz Strip Band: 1912 to 1913 MHz**

2<sup>nd</sup> 1 MHz block immediately outside adjacent frequency block

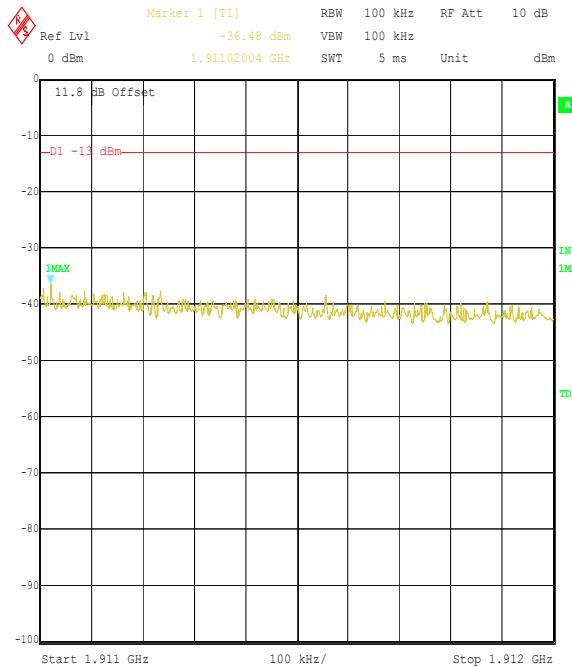
100 kHz Strip Number	Peak Power (nW/100 kHz)	100 kHz Strip Number	Peak Power (nW/100 kHz)
1	125.898	6	129.255
2	106.717	7	89.119
3	91.395	8	81.229
4	79.978	9	101.420
5	76.464	10	86.940
<b>Total Peak Power:</b>	968.415 nW/MHz		

**Results:**

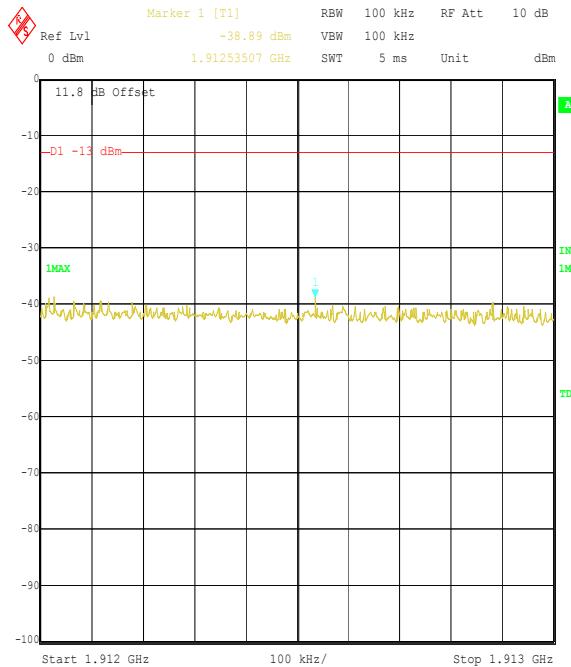
Band (MHz)	Peak Power (nW/MHz)	Peak Power (dBm/MHz)	Limit (dBm/MHz)	Margin (dB)	Status
1911 to 1912	1365.223	-28.6	-13.0	15.6	Complied
1912 to 1913	968.415	-30.1	-13.0	17.1	Complied

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**Transmitter Out of Band Radiated Emissions: Section 2.1053 & 24.238 (Continued)**



Title: GW Pharmaceutical EUT: EP011. FCC P22/24. Radiated Emissions  
 Comment A: 47081JD05 Top Channel (PCS 1900) Band Strip 1911-1912 MHz  
 Date: 18.MAR.2005 14:43:05



Title: GW Pharmaceutical EUT: EP011. FCC P22/24. Radiated Emissions  
 Comment A: 47081JD05 Top Channel (PCS 1900) Band Strip 1912-1913 MHz  
 Date: 18.MAR.2005 14:47:27

**Test of:** **GW Pharmaceuticals plc.**  
**EP011 Methadone Delivery System.**  
**To:** **FCC Part 22: 2004 (Subpart H) & FCC Part 24 Subpart E: 2002**

### **7.3.9. Transmitter Radiated Emissions at Band Edges: Section 2.1053 & 24.238**

The EUT was configured as for transmitter radiated emissions testing described in section 9 of this report.

Tests were performed to identify the maximum emissions level at the band edges of the frequency block that the EUT will operate over.

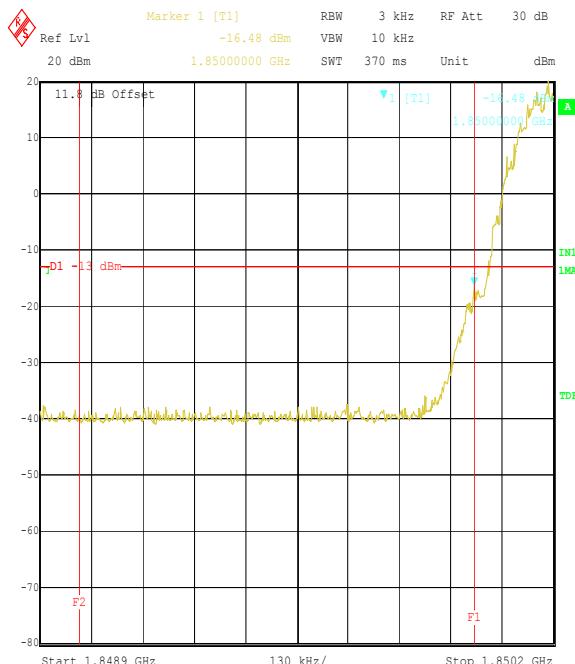
#### **Results:**

##### **Bottom Band Edge**

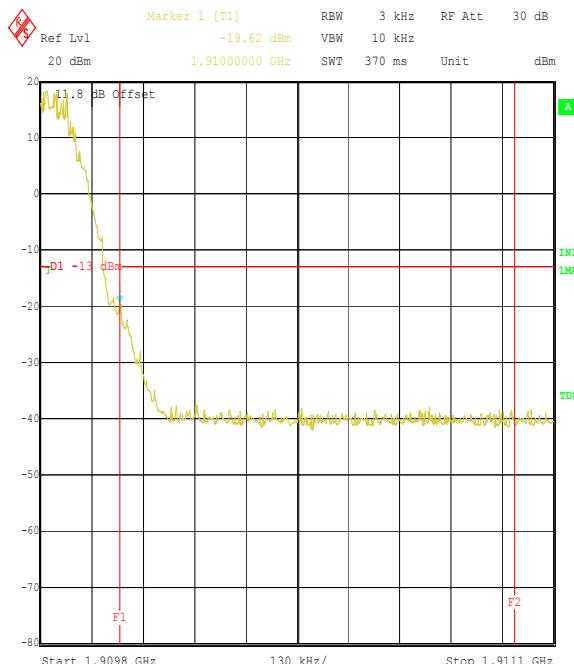
Frequency (MHz)	Spurious Emission (dBm)	Limit (dBm)	Margin (dB)	Result
1850	-16.5	-13.0	3.5	Complied

##### **Top Band Edge**

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1910	-19.6	-13.0	6.6	Complied



Title: GW Pharmaceutical EUT: EP011. FCC P22/24. Radiated Emissions  
Comment A: 47081JD05 Bottom Channel (PCS 1900) BandEdge  
Date: 18.MAR.2005 15:10:18



Title: GW Pharmaceutical EUT: EP011. FCC P22/24. Radiated Emissions  
Comment A: 47081JD05 Top Channel (PCS 1900) BandEdge  
Date: 18.MAR.2005 14:55:57

**Test of:** **GW Pharmaceuticals plc.**  
**EP011 Methadone Delivery System.**  
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## **8. Measurement Uncertainty**

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently, the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

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

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

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor, such that a confidence level of approximately 95% is maintained. For the purposes of this document “approximately” is interpreted as meaning “effectively” or “for most practical purposes”.

<b>Measurement Type</b>	<b>Range</b>	<b>Confidence Level (%)</b>	<b>Calculated Uncertainty</b>
AC Conducted Spurious Emissions	0.15 MHz to 30 MHz	95%	±3.25 dB
Effective Radiated Power (ERP)	Not applicable	95%	±1.78 dB
Effective Radiated Power (EIRP)	Not applicable	95%	±1.78 dB
Frequency Stability	Not applicable	95%	±20 Hz
Minimum Bandwidth	Not applicable	95%	±0.12%
Occupied Bandwidth	850 to 1910 MHz	95%	± 0.12%
Occupied Bandwidth	1850 to 1910 MHz	95%	± 0.12%
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	±5.26 dB
Radiated Spurious Emissions	1 GHz to 26 GHz	95%	±1.78 dB

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty, the published guidance of the appropriate accreditation body is followed.

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## **9. Measurement Methods**

### **9.1. Effective Radiated Power (ERP)**

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

The ERP was measured with the EUT arranged on a non-conducting turntable on a standard test site compliant with ANSI C63.4 – 2003 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 ERP 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 was observed. The turntable was then rotated through 360 degrees and the maximum peak reading obtained. The height search was then repeated to take into consideration the new angular position of the turntable. The maximum reading observed was then recorded. This procedure was then repeated with the EUT oriented in the Y and Z planes. The highest reading taken in all 3 planes was recorded. The entire procedure was then repeated with the test antenna set in the vertical polarity.

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

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

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

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**Effective Radiated Power (ERP) (Continued)**

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

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

Where :

EUT = spectrum analyser indicated EUT raw level

SG = spectrum analyser indicated signal generator raw level

The signal generator actual ERP is calculated as:

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

The EUT ERP is calculated as:

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

The test equipment settings for ERP measurements were as follows:

<b>Receiver Function</b>	<b>Setting</b>
Detector Type:	Peak
Mode:	Not applicable
Bandwidth:	$\geq$ Emission Bandwidth
Amplitude Range:	100 dB
Sweep Time:	Coupled

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## **9.2. Effective Isotropic Radiated Power (EIRP)**

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

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

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

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

Once the final amplitude (maximised) had been obtained, the EUT was substituted with a substitution antenna. For EIRP measurements a Horn antenna whose gain was based on an isotropic antenna was used, ERP measurements were done using a dipole. The centre of the substitution antenna was set to approximately the same centre location as the EUT. The substitution antenna was set to the horizontal polarity. The substitution antenna was matched into a signal generator using a 6 dB or greater attenuator. The signal generator was tuned to the EUT's frequency under test.

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

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

All measurements were performed using broadband Horn antennas.

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

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

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

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:

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

The test equipment settings for EIRP measurements were as follows:

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

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### **9.3. FCC Part 2.1055: Frequency Stability**

The EUT was situated within an environmental test chamber and connected directly to the GSM test set via an access port.

Measurements were performed with the EUT operating under extremes of temperature in 10 degree increments within the range -30 to 50 °C.

Measurements were also performed at voltage extremes between the declared nominal supply voltage and at the declared endpoint voltage (for hand carried battery operated equipment) or by varying the primary supply voltage from 85% to 115% of the nominal value for all other equipment types.

The requirement was to determine the frequency stability of the device under specified environmental operating conditions.

Measurements were made on the top and bottom channels.

The EUT was switched off for a minimum of 30 minutes between each stage of testing while the environmental chamber stabilised at the next temperature within the stated temperature range.

The frequency error measured was converted to an error in ppm using the following formula as defined by TIA\_EIA\_603A :-

$$\text{ppm error} = \left( \frac{MCF_{MHz}}{ACF_{MHz}} - 1 \right) * 10^6$$

where  $MCF_{MHz}$  is the measured carrier frequency in MHz  
 $ACF_{MHz}$  is the assigned carrier frequency in MHz

The measured ppm had to be less than the relevant limits in order to comply.

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#### **9.4. Occupied Bandwidth**

The EUT was connected to a spectrum analyser enabled with an occupied bandwidth function and a GSM test set via a bi-directional coupler to its antenna port.

Measurements were performed to determine the occupied bandwidth in accordance with FCC Part 2.1049. The occupied bandwidth was measured from the fundamental emission at the bottom, middle and top channels.

As the EUT is a PCS phone, no modulation input port was available. A call was thus set up using the PCS/GSM simulator and using normal modulation. The Occupied Bandwidth was measured in this configuration.

The occupied bandwidth was measured using the built in occupied bandwidth function of the Rohde and Schwarz FSEB or ESIB spectrum analyser. It was set to measure the bandwidth where 99% of the signal power was contained. The analyser settings were set as per those outlined in the spectrum analyser user manual for this measurement, i.e.,  $RBW \geq 1\%$  of occupied bandwidth. A value of 3 kHz was used.

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### **9.5. AC Mains Conducted Emissions**

AC mains conducted emission 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 was 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 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)/Average
Mode:	Max Hold	Not applicable
Bandwidth:	10 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

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## **9.6. Transmitter Radiated Emissions**

Radiated emission 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 10 times the highest fundamental frequency. The 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. Repetitive scans were performed to allow for emissions with low repetition rates, and for the duty cycle of the EUT.

The initial scans were performed using an antenna height of 1.5 m and 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 20 dB of this limit were measured where possible, on occasion; the receiver noise floor came within the 20 dB boundary. On these occasions, the system noise floor may have been recorded.

An open area test site using the appropriate test distance and measuring receiver with a peak detector was used for final measurements at each frequency recorded in the screen room.

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 procedure was repeated for the horizontal polarisation.

Once the final amplitude (maximised) had been obtained, the EUT was substituted with a substitution antenna. For EIRP measurements a horn antenna whose gain was based on an isotropic antenna was used, ERP measurements were done using a dipole. The centre of the substitution antenna was set to approximately the same centre location as the EUT. The substitution antenna was set to the horizontal polarity. The substitution antenna was matched into a signal generator using a 6 dB or greater attenuator. The signal generator was tuned to the EUT's frequency under test.

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

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

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**Transmitter Radiated Emissions (Continued)**

The limit in the standard states that emissions shall be attenuated by at least  $43 + 10 \log (P)$  dB below the transmitter power (P), where (P) is the maximum measured fundamental power for the channel under test. This limit always reduces to -13dBm therefore, the limit line presented on the accompanying plots is set to -13dBm.

Any spurious measured were then compared to the -13dBm limit. The requirement is for the emission to be less than -13dBm. The margin between emission and limit is recorded and should always be positive to indicate compliance.

It should be noted that FCC Part 22.917 states that the 1<sup>st</sup> MHz band immediately adjacent to the applicants declared frequency block may be measured using a resolution bandwidth of at least 1% of the emission bandwidth. This bandwidth was found by calculating 1% of the bandwidth measured in the transmitter occupied bandwidth section of this report. The next largest available bandwidth above this calculated figure was, therefore, used i.e. 3 kHz.

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## **9.7. Receiver Radiated 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 the upper frequency detailed in Section 15.33(b) were performed within a screened chamber in order to identify frequencies on which the EUT was generating interference. This determined the frequencies from the EUT, which required further examination. In order to minimise the time taken for the swept measurements, a peak detector was used in conjunction with the appropriate detector 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 initial scans were performed using an antenna height of 1.5 m and a measurement distance of 3 m. A limit line was set to the specification limit. 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 using the appropriate test distance and measuring receiver with a quasi peak detector was used for measurements below 1000 MHz, for measurements above 1000 MHz average and peak detectors were used.

For the final measurements the EUT was arranged on a non-conducting turn table on a standard test site compliant with ANSI C63.4 – 2003 Clause 5.4.

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° and then varying the antenna height between 1 m and 4 m in the horizontal 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 procedure was repeated for the vertical polarisation.

The final field strength was determined as the indicated level in dB $\mu$ V plus cable loss and antenna factor.

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

<b>Receiver Function</b>	<b>Initial Scan</b>	<b>Final Measurements &lt;1GHz</b>	<b>Final Measurements <math>\geq 1</math> GHz</b>
Detector Type:	Peak	Quasi-Peak (CISPR)	Peak/Average
Mode:	Max Hold	Not applicable	Not applicable
Bandwidth:	(120 kHz <1GHz) (1MHz $\geq$ 1GHz)	120 kHz	1 MHz (If applicable)
Amplitude Range:	60 dB	20 dB	20 dB (typical)
Step Size:	Continuous sweep	Not applicable	Not applicable
Sweep Time:	Coupled	Not applicable	Not applicable

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

RFI No.	Instrument	Manufacturer	Type No.	Serial No.
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
A091	EMCO 3110 Biconical Antenna	EMCO	3110	9008-1182
A1069	ESH3-Z5	Rohde & Schwarz	ESH3-Z5	837469/012
A1361	ESH3-Z2 Pulse Limiter	Rohde & Schwarz	ESH3-Z2	A1361-20112003
A253	WG 12 Microwave Horn	Flann Microwave	12240-20	128
A427	WG 14 horn	Flann	14240-20	150
A429	WG 16 horn	Flann	16240-20	561
A430	WG 18 horn	Flann	18240-20	425
A436	WG 20 horn	Flann	20240-20	330
A490	Bilog Antenna	Chase	CBL6111A	1590
C1065	Rosenberger	Rosenberger	UFA210-1-7872	0985

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**Test Equipment Used (Continued)**

RFI No.	Instrument	Manufacturer	Type No.	Serial No.
C1078	Rosenberger 3m Cable	Rosenberger	FA210A1030M5050	28464-2
C1082	Rosenberger Cable 2m	Rosenberger	FA210A1020M5050	28463-1
C363	BNC Cable	Rosenberger	RG142	None
C374	Cable	Rosenberger	RG400	None
C460	Cable	Rosenberger	UFA210A-1-1182-704704	98H0304
C565	C565-N-3	Rosenberger	UFA 210A-1-1181-70x70	96 L 0703
C573	C573-N-N-2	Rosenberger	UFA210A-1-788-50x50	97E0936
E013	PCN Environmental Chamber	Sanyo	ATMOS chamber	None
M028	FSB Spectrum Analyser	Rohde & Schwarz	FSB	860 001/009 (RF), 860 161/007 (Display)
M1093	Will tek	Will tek	4202S	0513018
M1124	Rohde & Schwarz	Rohde & Schwarz	ESIB26	100046K
M128	Fluke 76 DVM	Fluke	76	65340273
M505	Analyser Display Unit	Rohde & Schwarz	ESAI-D	825316/010
M506	RF unit	Rohde & Schwarz	ESBI-RF	827060/004
S011	D.C. PSU	INSTEK	PR-3010H	9401270
S202	Site 2	RFI	2	S202-15011990
S209	Site 9	RFI	9	

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

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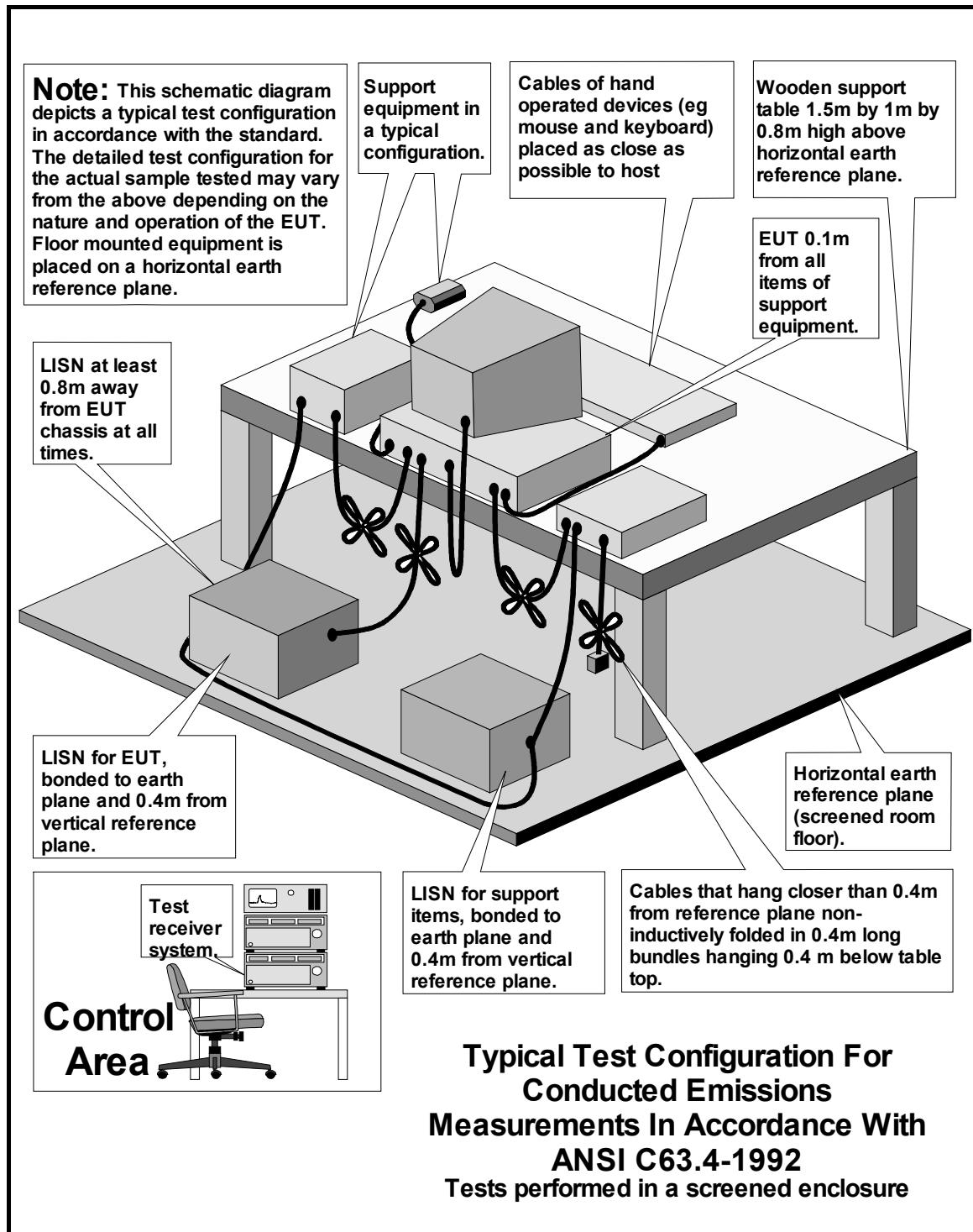
## Appendix 2. Test Configuration Drawings

This appendix contains the following drawings:

Drawing Reference Number	Title
DRG\47081JD05\EMICON	Test configuration for measurement of conducted emissions.
DRG\47081JD05\EMIRAD	Test configuration for measurement of radiated emissions.

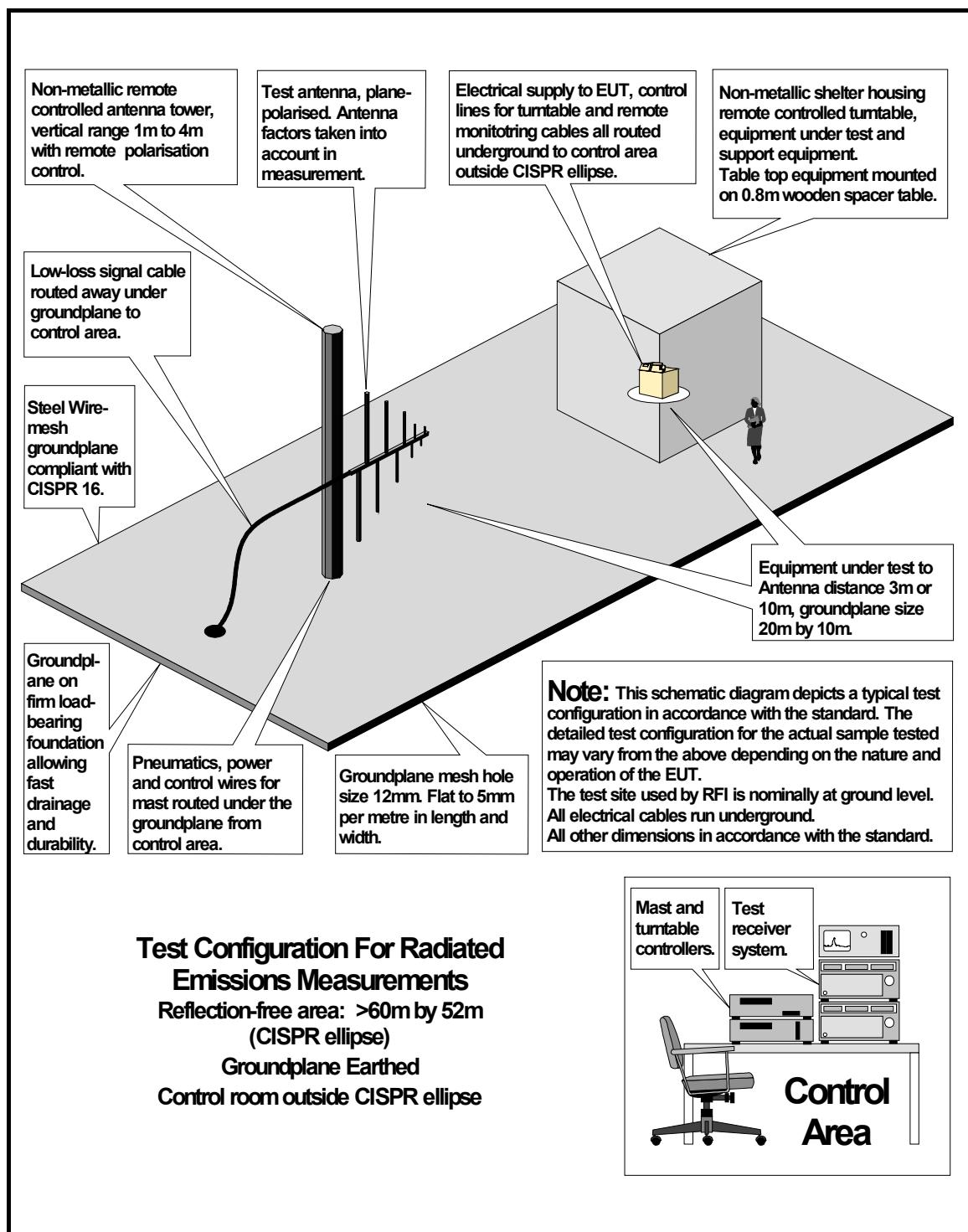
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DRG\47081JD05\EMICON



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DRG\47081JD05\EMIRAD



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