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# FCC Measurement/Technical Report on GPRS Phone with Bluetooth RTX3371 Telehealth Monitor

**Report Reference:** MDE\_RTX\_0801\_FCCcolo\_b

FCC ID: R3ZRTX3371

**Test Laboratory:**

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DAT-P-192/99-01

**Note:**

The following test results relate only to the devices specified in this document. This report shall not be reproduced in parts without the written approval of the testing laboratory.

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## **0 Summary**

### **0.1 Technical Report Summary**

#### **Type of Authorization**

Certification for a GSM cellular radiotelephone device

#### **Applicable FCC Rules**

Prepared in accordance with the requirements of FCC Rules and Regulations as listed in 47 CFR Ch.1 Parts 0 to 19 and Parts 20 to 69 (10-1-08 Edition). The following subparts are applicable to the results in this test report.

##### Part 2

##### Subpart J - Equipment Authorization Procedures, Certification

- § 2.1046 Measurement required: RF power output
- § 2.1049 Measurement required: Occupied bandwidth
- § 2.1051 Measurement required: Spurious emissions at antenna terminals
- § 2.1053 Measurement required: Field strength of spurious radiation
- § 2.1055 Measurement required: Frequency stability
- § 2.1057 Frequency spectrum to be investigated

##### Part 22

##### Subpart C – Operational and Technical Requirements

- § 22.355 Frequency tolerance

##### Subpart H – Cellular Radiotelephone Service

- § 22.913 Effective radiated power limits
- § 22.917 Emission limitations for cellular equipment

##### Part 24

##### Subpart E - Broadband PCS

- § 24.232 Power and antenna height limits
- § 24.235 Frequency stability
- § 24.236 Field strength limits
- § 24.238 Emission limitations for Broadband PCS equipment

#### **Summary Test Results:**

**The EUT complied with all performed tests as listed in chapter 0.2 Measurement Summary.**

## 0.2 Measurement Summary

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### Field strength of spurious radiation

The measurement was performed according to FCC §2.1053			10-1-08
<b>OP-Mode</b>	<b>Setup</b>	<b>Port</b>	<b>Final Result</b>
op-mode 1	Setup_a02	enclosure	passed

The measurement was performed according to FCC §2.1053			10-1-08
<b>OP-Mode</b>	<b>Setup</b>	<b>Port</b>	<b>Final Result</b>
op-mode 2	Setup_a02	enclosure	passed

The purpose of the test case and operating mode selection is evaluating of co-location effects.

This test report replaces the test report MDE\_RTX\_0801\_FCCcolo.



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Responsible for  
Accreditation Scope:



Responsible  
for Test Report:





## **1 Administrative Data**

### **1.1 Testing Laboratory**

Company Name:	7 Layers AG
Address	Borsigstr. 11 40880 Ratingen Germany

This facility has been fully described in a report submitted to the FCC and accepted under the registration number 96716 .

The test facility is also accredited by the following accreditation organisation:  
- Deutscher Akkreditierungs Rat      DAR-Registration no. DAT-P-192/99-01

Responsible for Accreditation Scope:	Dipl.-Ing. Bernhard Retka Dipl.-Ing. Robert Machulec Dipl.-Ing. Thomas Hoell Dipl.-Ing. Andreas Petz
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Report Template Version:	2009-02-06
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### **1.2 Project Data**

Responsible for testing and report:	Dipl.-Ing. Carsten Steinroeder
Receipt of EUT:	2009-01-29
Date of Test(s):	2009-01-29
Date of Report:	2009-05-20

### **1.3 Applicant Data**

Company Name:	Tunstall Healthcare A/S
Address:	Stroemmen 6 9400 Noerresundby Danmark
Contact Person:	Mr. Søren Vester

### **1.4 Manufacturer Data**

Company Name:	please see applicant data
Address:	
Contact Person:	



## 2 Testobject Data

### 2.1 General EUT Description

<b>Equipment under Test:</b>	GSM mobile station
<b>Type Designation:</b>	RTX3371 Telehealth Monitor
<b>Kind of Device:</b> <b>(optional)</b>	GSM-GPRS 850/900/1800/1900 with Bluetooth
<b>Voltage Type:</b>	AC
<b>Nominal Voltage:</b>	115 V

#### General product description:

The Equipment Under Test (EUT) is a GSM-GPRS 850/900/1800/1900 phone with Bluetooth used to send medical data from the client to the server.

In GSM 850 mode the EUT operates in channel blocks A and B from 824.2 MHz (lowest channel = 128) to 848.8 MHz (highest channel = 251).

In PCS1900 mode the EUT operates in blocks A through F from 1850.2 MHz (lowest channel = 512) to 1909.8 MHz (highest channel = 810).

Bluetooth is a short-range radio link intended to be a cable replacement between portable and/or fixed electronic devices.

Bluetooth operates in the unlicensed ISM Band at 2.4 GHz. In the US a band of 83.5 MHz width is available. In this band, the Bluetooth technology defines 79 RF channels spaced 1 MHz (2402 - 2480 MHz). The actual RF channel is chosen from a pseudo-random hopping sequence through the 79 channels. A channel is occupied for a defined amount of time slots, with a nominal slot length of 625  $\mu$ s. The maximum dwell time on one channel is defined by the packet type and is 0.625 ms for DH1 packets, 1.875 ms for DH3 and 3.125 ms for DH5. The nominal hop rate is 1600 hops/s for DH1, 1600/3 for DH3 and 1600/5 for DH5. All frequencies are equally used. The maximum nominal average time of occupancy is 0.4 s within a period of 79\*0.4 seconds.

#### The EUT provides the following ports:

##### Ports

antenna  
enclosure

**The main components of the EUT are listed and described in Chapter 2.2**

## 2.2 EUT Main components

### Type, S/N, Short Descriptions etc. used in this Test Report

Short Description	Equipment under Test	Type Designation	Serial No.	HW Status	SW Status	Date of Receipt
EUT A (Code: 26060g01)	GPRS Telehealth Monitor	RTX3371	RTX337100 00038	Version 2 revision A	Version 4.3	2009-01-29

**NOTE:** The short description is used to simplify the identification of the EUT in this test report.

## 2.3 Ancillary Equipment

For the purposes of this test report, ancillary equipment is defined as equipment which is used in conjunction with the EUT to provide operational and control features to the EUT. It is necessary to configure the system in a typical fashion, as a customer would normally use it. But nevertheless Ancillary Equipment can influence the test results.

Short Description	Equipment under Test	P/N	Model	HW Status	SW Status	Serial no.
AE1	AC/DC power supply	WR9QB1000 CCp-N-MED	GTM41076- 0606	-	-	-

## 2.4 EUT Setups

This chapter describes the combination of EUT's and ancillary equipment used for testing.

Setup No.	Combination of EUTs	Description
setup_a02	EUT + AE1	setup for radiated spurious emissions tests

## 2.5 Operating Modes

This chapter describes the operating modes of the EUT's used for testing.

Op. Mode	Description of Operating Modes	Remarks
op-mode 1	Call established on Traffic Channel (TCH) 190, carrier frequency 836.6 MHz and Bluetooth connection at the channel 39 carrier frequency 2441 MHz	190 is a mid channel of the full GSM band. 39 is a mid channel of the full Bluetooth band
op-mode 2	Call established on Traffic Channel (TCH) 661, Carrier Frequency 1880 MHz and Bluetooth connection at the channel 39 carrier frequency 2441 MHz	661 is a mid channel of the full PCS band. 39 is a mid channel of the full Bluetooth band

## 3 Test Results

### 3.1 Field strength of spurious radiation

**Standard**      FCC Part 22, 10-1-08 Subpart H  
                      FCC Part 24, 10-1-08 Subpart E

The test was performed according to: FCC §2.1053, 10-1-08

#### 3.1.1 Test Description

1) The EUT was placed inside an anechoic chamber. Refer to chapter "Setup Drawings". The EUT was coupled to the R&S CMU200 Digital Communication Tester which was located outside the chamber via coaxial cable.

2) A call was established on a Traffic Channel (TCH) between the EUT and the base station simulator (R&S CMU200 Digital Communication Tester).

Important Settings:

- Discontinuous Transmission: OFF
- Modulation Signal: PSR16-1 (Pseudo Random Sequence)
- Output Power: Maximum
- Channel : Varied during measurements

3) A pre-calibration procedure is used so that the readings from the spectrum analyser are corrected and represent directly the equivalent radiated power (related to a  $\lambda/2$  dipole).

4) All spurious radiation measurements were made with spectrum analyser and the appropriate calibrated antennas for the frequency range of 30 MHz to 10 GHz (up to the 10th harmonic of the transmit frequency).

5) Important Analyser Settings

- [Resolution Bandwidth / Video Bandwidth]:

a) [3 kHz / 10 kHz] in the Span of 1 MHz directly below and above the GSM-Band,

b) [10 kHz / 30 kHz] in case the curve of the analyser IF-Filter leads to an exceeding of the limit, in this case a worst case correction factor of 20 dB (1 MHz  $\rightarrow$  10 kHz) was used

c) [1 MHz / 3 MHz] otherwise

- Sweep Time: Calculated by using a formula given in the Product Standard "GSM 11.10-1 edition 4" for spurious emissions measurements (depending on the transmitting signal, the span and the resolution bandwidth)

6) The spurious emissions (peak) were measured in both vertical and horizontal antenna polarisation during the call is established on the lowest channel, mid channel and on the highest channel.

#### 3.1.2 Test Requirements / Limits

§ 2.1053 Measurements required: Field strength of spurious radiation.

Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be



supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of Sec. 2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required, with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from halfwave dipole antennas.

(b) The measurements specified in paragraph (a) of this section shall be made for the following equipment:

(2) All equipment operating on frequencies higher than 25 MHz.

#### § 2.1057 Frequency spectrum to be investigated.

(a) In all of the measurements set forth in Secs. 2.1051 and 2.1053, the spectrum shall be investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to at least the frequency shown below:

(1) If the equipment operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

(b) Particular attention should be paid to harmonics and subharmonics of the carrier frequency as well as to those frequencies removed from the carrier by multiples of the oscillator frequency. Radiation at the frequencies of multiplier stages should also be checked.

(c) The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported.

(d) Unless otherwise specified, measurements above 40 GHz shall be performed using a minimum resolution bandwidth of 1 MHz.

#### § 22.917 Emission limitations for cellular equipment

(a) The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

This is calculated to be -13 dBm (effective radiated power) which corresponds to 84.6 dBµV/m (field strength) in a distance of 3 m.

(b) Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (*i.e.* 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(c) Licensees in this service may establish an alternative out of band emission limit to be used at specified band edge(s) in specified geographical areas [...].

(d) If any emission from a transmitter operating in this service results in interference to users of another radio service, the FCC may require a greater attenuation of that emission than specified in this section.

## § 24.238 Emission limitations for Broadband PCS equipment

(a) The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

This is calculated to be -13 dBm (effective radiated power) which corresponds to 84.6 dBµV/m (field strength) in a distance of 3 m.

(b) Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(c) Licensees in this service may establish an alternative out of band emission limit to be used at specified band edge(s) in specified geographical areas [...].

(d) If any emission from a transmitter operating in this service results in interference to users of another radio service, the FCC may require a greater attenuation of that emission than specified in this section.

### 3.1.3 Test Protocol

Temperature: 23 °C  
Air Pressure: 1018 hPa  
Humidity: 35 %

Op. Mode	Setup	Port
op-mode 1	setup_a02	enclosure

Frequency MHz	Antenna Polarisation	Bandwidth kHz	Measured Level dBm	Limit dBm
-	-	-	-	-13.0

Remark: No (further) spurious emissions were found in the range 20 dB below the limit taken from FCC Part 22.

Op. Mode	Setup	Port
op-mode 2	setup_a02	enclosure

Frequency MHz	Antenna Polarisation	Bandwidth kHz	Measured Level dBm	Limit dBm
-	-	-	-	-13.0

Remark: No (further) spurious emissions were found in the range 20 dB below the limit taken from FCC Part 24.

### 3.1.4 Test result: Field strength of spurious radiation

Op. Mode	Result
op-mode 1	passed
op-mode 2	passed

## 4 Test Equipment

### *EUT Digital Signalling System*

Equipment	Type	Serial No.	Manufacturer	Cal data	Next cal
Digital Radio Communication Tester	CMD 55	831050/020	Rohde & Schwarz	07.10.08	07.10.11
Signalling Unit for Bluetooth	PTW60	100004	Rohde & Schwarz	-	-
Universal Radio Communication Tester	CMU200	102366	Rohde & Schwarz	22.09.07	22.09.09
Universal Radio Communication Tester	CMU200	837983/052	Rohde & Schwarz	22.09.07	22.09.09
Signalling Unit for Bluetooth	CBT	100302	Rohde & Schwarz	22.09.06	N/A – only used for signalling

### *EMI Test System*

Equipment	Type	Serial No.	Manufacturer	Cal data	Next cal
Comparison Noise Emitter	CNE III	99/016	York	-	-
EMI Analyzer	ESI 26	830482/004	Rohde & Schwarz	06.12.07	06.12.09
Signal Generator	SMR 20	846834/008	Rohde & Schwarz	05.12.07	05.12.09
AC Power Source	6404	64040000B04	Croma ATE INC.	01.06.08	01.06.11

### *EMI Radiated Auxiliary Equipment*

Equipment	Type	Serial No.	Manufacturer	Cal data	Next cal
Antenna mast 4m	MA 240	240/492	HD GmbH H. Deisel	-	-
Biconical dipole	VUBA 9117	9117108	Schwarzbeck	27.10.08	27.10.13
Broadband Amplifier 18MHz-26GHz	JS4-18002600-32	849785	Miteq	12.11.08	11.05.09
Broadband Amplifier 30MHz-18GHz	JS4-00101800-35	896037	Miteq	12.11.08	11.05.09
Broadband Amplifier 45MHz-27GHz	JS4-00102600-42	619368	Miteq	12.11.08	11.05.09
Cable "ESI to EMI Antenna"	EcoFlex10	W18.01-2 W38.01-2	Kabel Kusch	12.11.08	11.05.09
Cable "ESI to Horn Antenna"	UFB311A UFB293C	W18.02-2 W38.02-2	Rosenberger-Microcoax	12.11.08	11.05.09
Double-ridged horn	HF 906	357357/002	Rohde & Schwarz	12.05.06	12.05.09
Double-ridged horn	HF 906	357357/001	Rohde & Schwarz	20.01.04	N/A – spare antenna
High Pass Filter	5HC3500/12750-1.2-KK	200035008	Trilithic	12.11.08	11.05.09
High Pass Filter	5HC2700/12750-1.5-KK	9942012	Trilithic	12.11.08	11.05.09
High Pass Filter	4HC1600/12750-1.5-KK	9942011	Trilithic	12.11.08	11.05.09
Log.-per. Antenna	HL 562 Ultralog	830547/003	Rohde & Schwarz	17.05.06	17.05.09
Loop Antenna	HFH2-Z2	829324/006	Rohde & Schwarz	19.08.02	N/A – only used for pre-testing
Pyramidal Horn Antenna 26.5 GHz	Model 3160-09	9910-1184	EMCO	28.02.08	N/A (Stand. Gain Horn)
Pyramidal Horn Antenna 40GHz	Model 3160-10	00086675	EMCO	18.12.07	N/A (Stand. Gain Horn)

### EMI Conducted Auxiliary Equipment

Equipment	Type	Serial No.	Manufacturer	Cal data	Next cal
Cable "LISN to ESI"	RG214	W18.03+W48.03	Huber+Suhner	12.11.08	11.05.09
Two-Line V-Network	ESH 3-Z5	828304/029	Rohde & Schwarz	13.10.08	12.10.11
Two-Line V-Network	ESH 3-Z5	829996/002	Rohde & Schwarz	-	-

### Auxiliary Test Equipment – calibration not applicable; spare equipment

Equipment	Type	Serial No.	Manufacturer	Cal data	Next cal
Broadband Resist. Power Divider N	1506A / 93459	LM390	Weinschel	-	-
Broadband Resist. Power Divider SMA	1515 / 93459	LN673	Weinschel	-	-
Digital Multimeter 01	Voltcraft M-3860M	IJ096055	Conrad	-	-
Digital Multimeter 02	Voltcraft M-3860M	IJ095955	Conrad	-	-
Digital Oscilloscope	TDS 784C	B021311	Tektronix	-	-
Fibre optic link Satellite	FO RS232 Link	181-018	Pontis	-	-
Fibre optic link Transceiver	FO RS232 Link	182-018	Pontis	-	-
I/Q Modulation Generator	AMIQ-B1	832085/018	Rohde & Schwarz	-	-
Notch Filter ultra stable	WRCA800 /960-6E	24	Wainwright	-	-
Temperature Chamber	VT 4002	58566002150010	Vötsch	-	-
Temperature Chamber	KWP 120/70	59226012190010	Weiss	-	-
ThermoHygro Datalogger 03	Opus10 THI (8152.00)	7482	Lufft Mess- und Regeltechnik GmbH	-	-
Spectrum Analyzer 9 kHz to 3 GHz	FSP3	838164/004	Rohde & Schwarz	06.10.08	06.10.11
Signal Analyzer 20 Hz to 26.5 GHz	FSIQ26	840061/005	Rohde & Schwarz	02.10.08	02.10.11

### Anechoic Chamber – calibration not applicable

Equipment	Type	Serial No.	Manufacturer	Cal data	Next cal
Air Compressor (pneumatic)			Atlas Copco	-	-
Controller	CO 2000	CO2000/328/1 2470406/L	Innco innovative constructions GmbH	-	-
EMC Camera	CE-CAM/1		CE-SYS	-	-
EMC Camera for observation of EUT	CCD-400E	0005033	Mitsubishi	-	-
Filter ISDN	B84312-C110-E1		Siemens & Matsushita	-	-
Filter telephone systems / modem	B84312-C40-B1		Siemens & Matsushita	-	-
Filter Universal 1A	B84312-C30-H3		Siemens & Matsushita	-	-
Fully/Semi AE Chamber	10.58x6.3 8x6		Frankonia	-	-
Turntable	DS 420S	420/573/99	HD GmbH, H.Deisel	-	-
Valve Control Unit (pneum.)	VE 615P	615/348/99	HD GmbH, H.Deisel	-	-

## 5 Photo Report



**Photo 1:** EUT (front side)



**Photo 2:** EUT (rear side)

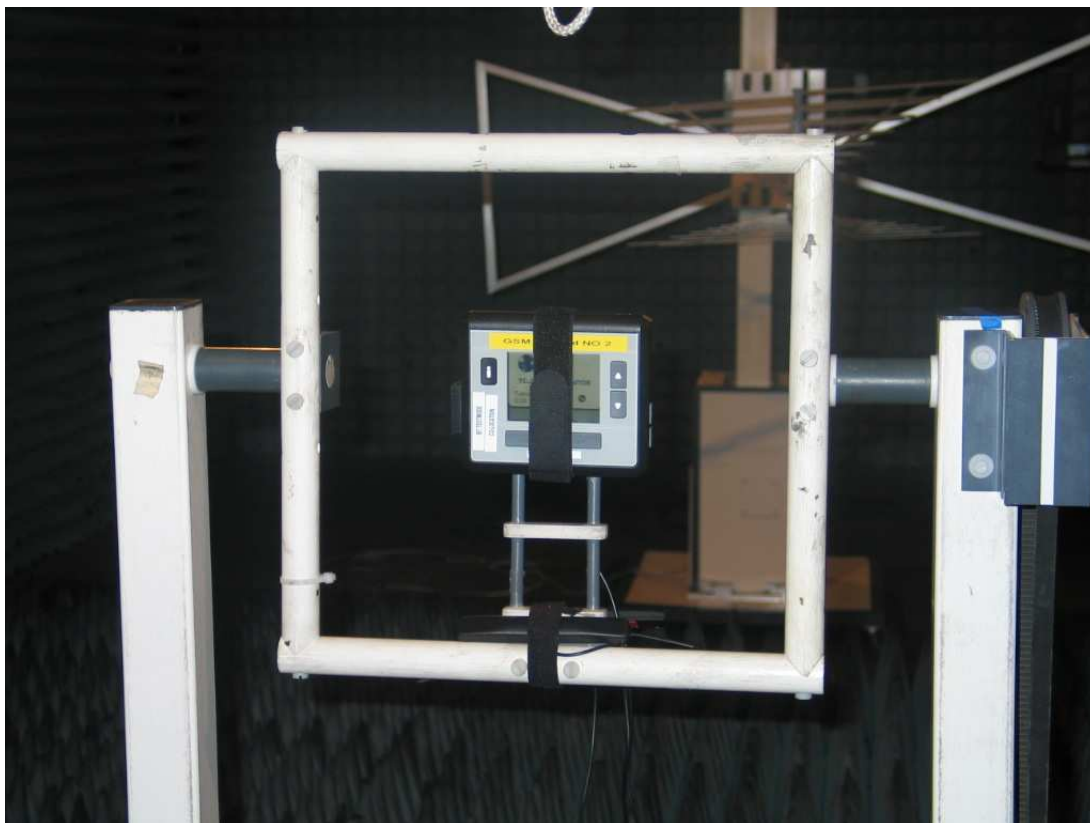


**Photo 3:** EUT (right side)



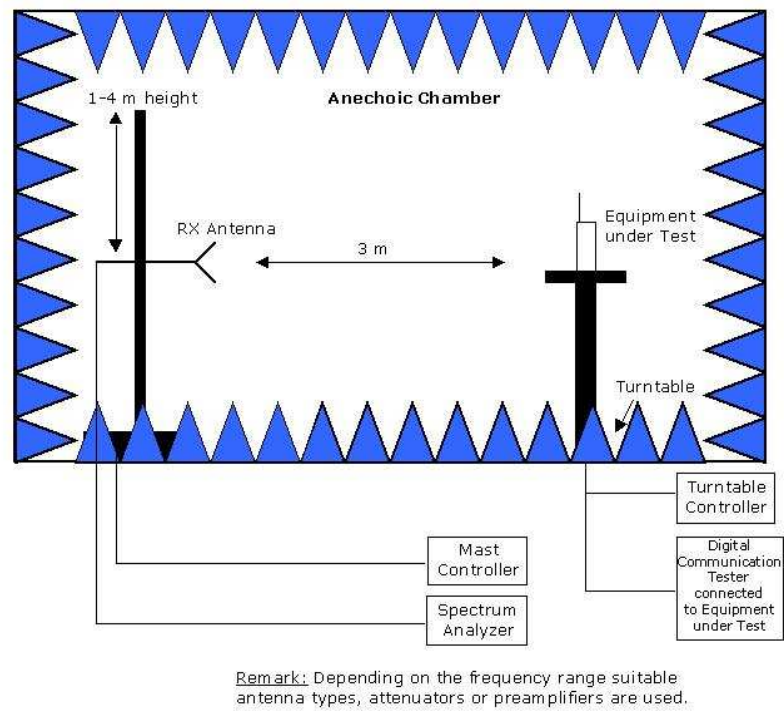
**Photo 4:** AC/DC power supply





**Photo 5:** Test setup

## 6 Setup Drawings



**Drawing 1:** Principle setup for radiated measurements.

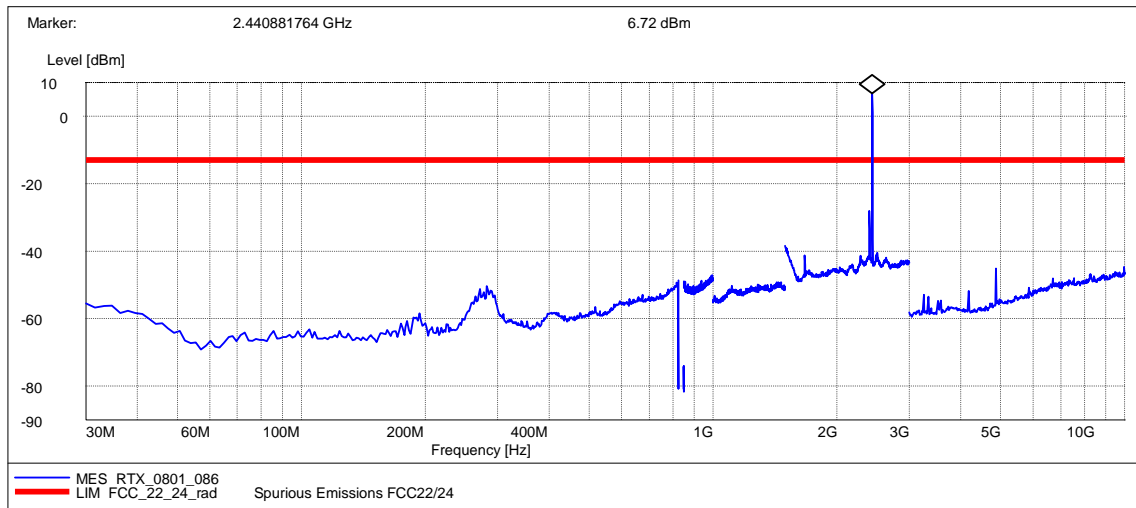


## 7 Annex

### Measurement plots Field strength of spurious radiation

#### Op. Mode

op-mode 1 GSM 850 and Bluetooth worst case



## Op. Mode

op-mode 2 GSM 1900 and Bluetooth worst case

