



**FCC LISTED,  
REGISTRATION  
NUMBER: 905266**

**CENTRO DE  
TECNOLOGÍA DE LAS  
COMUNICACIONES, S.A.**

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## TEST REPORT

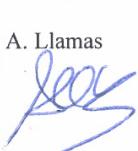
**Report No.: 26213RET**

**TEST NAME:** FCC PART 22, PART 24 Radiated testing

<b>Product</b>	:	GSM/GPRS FLEET MANAGEMENT SYSTEM
<b>Trade Mark</b>	:	CIRCON
<b>Model/type Ref.</b>	:	RADIOLINK V410
<b>Manufacturer</b>	:	Umndeni Circon (Pty) Ltd.
<b>Requested by</b>	:	Umndeni Circon (Pty) Ltd.
<b>Other identification of the product</b>	:	FCC ID: VDPRLV410JN2122
<b>Standard(s)</b>	:	FCC Part 22 & 24

This test report includes 3 annexes and therefore the total number of pages is 35.

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Date: 2007-09-14	Test operator A. Llamas 	Approved by: Date: 2007-09-14 J.C. Soler Consultant  Centro de Tecnología de las Comunicaciones, S.A.	Page: 1 of 7
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FDT08\_04

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## ANNEXES

- ANNEX A. TEST RESULTS FOR FCC PART 22
- ANNEX B. TEST RESULTS FOR FCC PART 24
- ANNEX C. PHOTOGRAPHS

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## 1. COMPETENCE AND GUARANTEES

Centro de Tecnología de las Comunicaciones (AT4 WIRELESS), S.A. is a laboratory with a measurement facility in compliance with the requirements of Section 2.948 of the FCC rules and has been added to the list of facilities whose measurements data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Registration Number: 905266.

In order to assure the traceability to other national and international laboratories, AT4 WIRELESS has a calibration and maintenance programme for its measuring equipment.

AT4 WIRELESS guarantees the reliability of the data presented in this report, which is the result of measurements and tests performed to the item under test on the date and under the conditions stated on the report and is based on the knowledge and technical facilities available at AT4 WIRELESS at the time of execution of the test.

AT4 WIRELESS is liable to the client for the maintenance by its personnel of the confidentiality of all information related to the item under test and the results of the test.

## 2. GENERAL CONDITIONS

1. This report only refers to the item that has undergone the test.
2. This report does not constitute or imply by its own an approval of the product by the Certification Bodies or competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without written approval of AT4 WIRELESS.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written approval of AT4 WIRELESS and the Accreditation Bodies.

## 3. CHARACTERISTICS OF THE TEST

### 3.1 TEST REQUESTED

1. Measurements for PCS 850 and PCS 1900 devices according to FCC parts 22 and 24:
  - Radiated RF output power.
  - Radiated emissions.

### 3.2 REQUIREMENTS AND METHOD

The test has been carried out according to the following documents and standards:

1. FCC part 22.
2. FCC part 24.

Radiated testing was performed in AT4 WIRELESS' semi-anechoic chamber. This site has been fully described in a report submitted to the FCC and was accepted in a letter dated July 25, 2002. Radiated measurements were made in accordance with the general procedures of ANSI C63.4: 2003 and substitution method according to TIA/EIA 603-C: 2004.

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Uncertainty (factor k=2) was calculated according to the following AT4 WIRELESS' internal documents:

1. PODT000: Procedimiento para el cálculo de incertidumbres de medida

The instrumentation used to perform the testing is listed below:

1. Semianechoic Absorber Lined Chamber IR 11. BS.
2. Control Chamber IR 12.BC.
3. Spectrum Analyzer Agilent E4440A.
4. Bilog antenna CHASE CBL6111.
5. Antenna tripod EMCO 11968C.
6. Antenna mast EM 1072 NMT.
7. Rotating table EM 1084-4. ON.
8. Double-ridge Guide Horn antenna 1-18 GHz HP 11966E.
9. Double-ridge Guide Horn antenna 18-40 GHz Agilent 119665J.
10. RF pre-amplifier Miteq AFS5-04001300-15-10P-6.
11. RF pre-amplifier Miteq JS4-12002600-30-5A.
12. EMI Test Receiver R&S ESIB26.
13. Universal Radio communication Tester R&S CMU200.
14. 10 dB attenuator HP 8491B.
15. Multi Device Controller EMCO 2090.
16. DC Power supply R & S NGPE 40/40.

## 4. IDENTIFICATION DATA SUPPLIED BY THE APPLICANT

Identification data in this section has been supplied by the client.

### 4.1 APPLICANT

**Name or Company:** Umndeni Circon (Pty) Ltd.

**V.A.T.:** 4230188783

**Address:** 136 Main Reef Road

**City:** Boksburg North

**Postal code:** 1459

**Country:** SOUTH AFRICA

**Telephone:** +2711 8980240

**Fax:** +2711 8980232

### 4.2 REPRESENTATIVE

**Name:** Pieter Erasmus

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#### 4.3 TEST SAMPLES SUPPLIER

**Name or Company:** Umndeni Circon (Pty) Ltd.

**Address:** Same as indicated in point 4.1.

Samples undergoing test have been selected by: **the client**.

#### 4.4 IDENTIFICATION OF ITEM/ITEMS TESTED

**Product:** GSM/GPRS FLEET MANAGEMENT SYSTEM

**Trade mark:** CIRCON                    **Model:** RADIOLINK V410

**Manufacturer:** Umndeni Circon (Pty) Ltd.

**Country of manufacture:** SOUTH AFRICA

**Description:** This unit is a GSM/GPRS terminal with an embedded configurable software application. The device concept is targeted for direct implementation as a mobile client in a wide ranges of high volume, low-cost, flexible system solutions eg fleet management, vehicle security and recovery.

### 5. USAGE OF SAMPLES, PERIOD OF TESTING AND ENVIRONMENTAL CONDITIONS

#### 5.1 USAGE OF SAMPLES

**Sample M/01 is formed by the following elements:**

<b>Control No.</b>	<b>Description</b>	<b>Model</b>	<b>Serial No.</b>	<b>Date of reception</b>
26213/04	GSM/GPRS system	RADIOLINK V410	358485000373358	23/05/07
---	Antenna with sma connector	---	---	23/05/07

1. Sample M/01 has undergone the following test(s).

Radiated measurements indicated in annex A and B.

#### 5.2 PERIOD OF TESTING

The performed test started on 2007-06-15 and finished on the same day.

The tests as detailed in this report have been performed at AT4 WIRELESS.

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### 5.3 ENVIRONMENTAL CONDITIONS

In the control chamber the following limits were not exceeded during the test:

Temperature	Min. = 24 °C Max. = 24 °C
Relative humidity	Min. = 52 % Max. = 52 %
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 0,5 Ω

In the semianechoic chamber (21 meters x 11 meters x 8 meters) the following limits were not exceeded during the test.

Temperature	Min. = 25 °C Max. = 25 °C
Relative humidity	Min. = 53 % Max. = 53 %
Air pressure	Min. = 1020 mbar Max. = 1020 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 0,5 Ω
Normal site attenuation (NSA)	< ±4 dB at 10 m distance between item under test and receiver antenna, (30 MHz to 1000 MHz)
Field homogeneity	More than 75% of illuminated surface is between 0 and 6 dB (26 MHz to 1000 MHz).

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## 6. TEST RESULTS

Abbreviations used in the VERDICT column of the following tables are:

- P** Pass
- F** Fail
- NA** not applicable
- NM** not measured

FCC PART 22 PARAGRAPH	VERDICT			
	NA	P	F	NM
Clause 22.913: RF output power	P			
Clause 22.917: Radiated emissions	P			

FCC PART 24 PARAGRAPH	VERDICT			
	NA	P	F	NM
Clause 24.232: RF output power	P			
Clause 24.238: Radiated emissions	P			

## 7. REMARKS AND COMMENTS

None.

## 8. SUMMARY

Based on the results of the performed test, stated in annex A the item under test is **IN COMPLIANCE** with the specifications listed in section 3.1 “TEST REQUESTED”.

NOTE: The results presented in this Test Report apply only to the particular item under test declared in section 4.4 “IDENTIFICATION OF ITEM/ITEMS TESTED” of this document, as presented for test on the date(s) declared in section 5, “USAGE OF SAMPLES, PERIOD OF TESTING AND ENVIRONMENTAL CONDITIONS”.

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**ANNEX A**  
**TEST RESULTS FOR FCC PART 22**

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Radiated emissions .....	5

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## TEST CONDITIONS

Power supply (V):

$$V_{\text{nom}} = 12 \text{ Vdc}$$

Type of power supply = External DC voltage

Type of antenna = External connectable antenna

## TEST FREQUENCIES:

Lowest channel (128): 824.2 MHz

Middle channel (190): 836.6 MHz

Highest channel (251): 848.8 MHz

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## RF Output Power (E.R.P.)

### SPECIFICATION

§2.1046 and 22.913

The Effective Radiated Power (E.R.P.) of mobile transmitter and auxiliary test transmitter must not exceed 7 Watts (38.45 dBm).

### METHOD

For radiated measurements the EUT was placed on a 1 m high non-conductive stand inside an anechoic chamber. The measuring antenna was placed at 3 m distance and the maximum field strength was measured for the three channels. The EUT was controlled via the Universal Radio Communication tester R&S CMU200 selecting maximum transmission power of the EUT and GMSK modulated signal.

The Effective Radiated Power (E.R.P.) is obtained by using the Substitution Method according to ANSI/TIA/EIA-603-C: 2004.

### RESULTS

MAXIMUM EFFECTIVE RADIATED POWER E.R.P. (RADIATED).

Channel	Lowest	Middle	Highest
Maximum peak power (dBm)	26.13	25.52	27.44
Maximum peak power (W)	0.41	0.36	0.55
Measurement uncertainty (dB)	± 3.8		

Verdict: PASS

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## Radiated emissions

### SPECIFICATION

§ 22.917

### METHOD

The measurement was performed with the EUT inside an anechoic chamber. The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment.

The EUT was placed on a 1 meter high non-conductive stand at a 3 meter distance from the measuring antenna for measurements below 1 GHz and at 1 m distance for measurements above 1 GHz.

Detected emissions were maximized at each frequency by rotating the EUT and adjusting the measuring antenna height and polarization. The maximum meter reading was recorded. The radiated emissions were measured with peak detector and 1 MHz bandwidth.

Each detected emissions were substituted by the Substitution method, in accordance with the ANSI/TIA/EIA-603-C: 2004.

### Measurement Limit:

According to specification, the power of emissions shall be attenuated below the transmitter power (P) by a factor of at least  $43 + 10 \log (P)$  dB, P in watts.

At  $P_o$  transmitting power, the specified minimum attenuation becomes  $43 + 10 \log (P_o)$ , and the level in dBm relative  $P_o$  becomes:

$$P_o \text{ (dBm)} - [43 + 10 \log (P_o \text{ in mwatts}) - 30] = -13 \text{ dBm}$$

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## RESULTS

### **Frequency range 30 MHz-1000 MHz.**

No spurious signals found in the three channels.

### **Frequency range 1 GHz-12.75 GHz.**

#### 1. CHANNEL: LOWEST (824.2MHz).

Carrier level (dBm) = 26.13

Spurious frequency (MHz)	Level (dBm)	Polarization	Attenuation below carrier (dBc)
1648.263	-34.31	Horizontal	60.44

#### 2. CHANNEL: MIDDLE (836.6 MHz).

Carrier level (dBm) = 25.52

Spurious frequency (MHz)	Level (dBm)	Polarization	Attenuation below carrier (dBc)
1673.186	-33.89	Horizontal	59.41

#### 3. CHANNEL: HIGHEST (848.8 MHz).

Carrier level (dBm) = 27.44

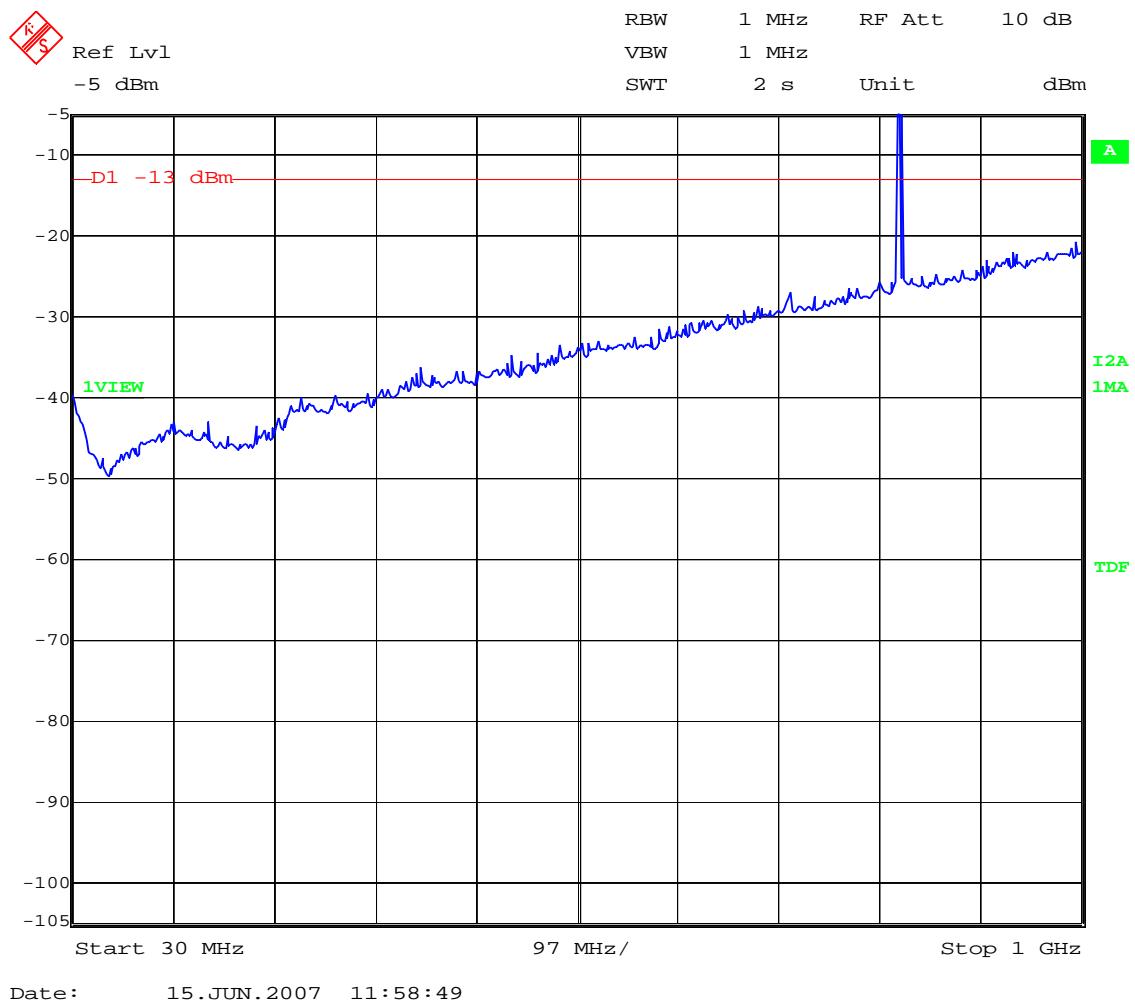
Spurious frequency (MHz)	Level (dBm)	Polarization	Attenuation below carrier (dBc)
1697.573	-30.61	Horizontal	58.05

Verdict: PASS

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FREQUENCY RANGE 30 MHz-1000 MHz.

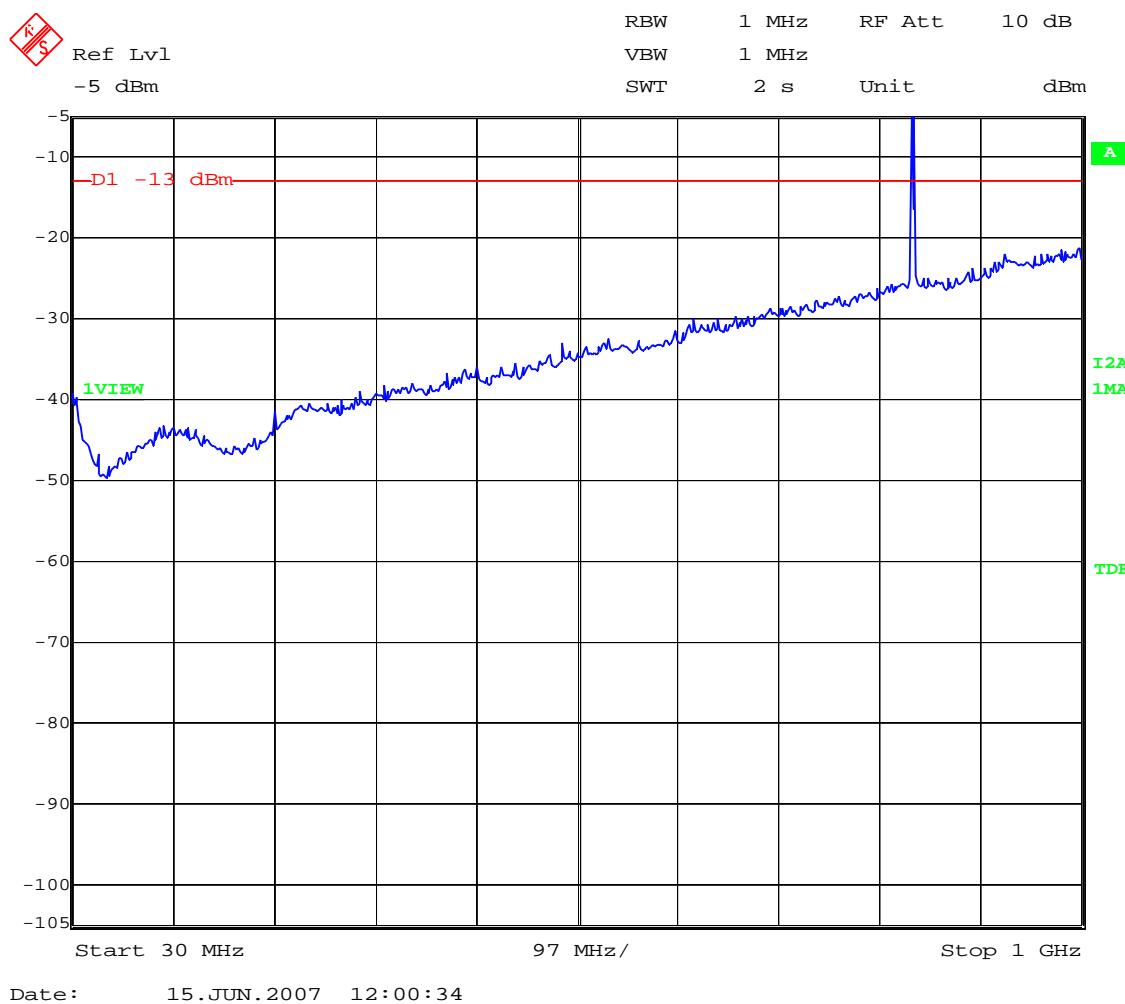
CHANNEL: LOWEST (824.2 MHz)



Note: The peak above the limit is the carrier frequency.

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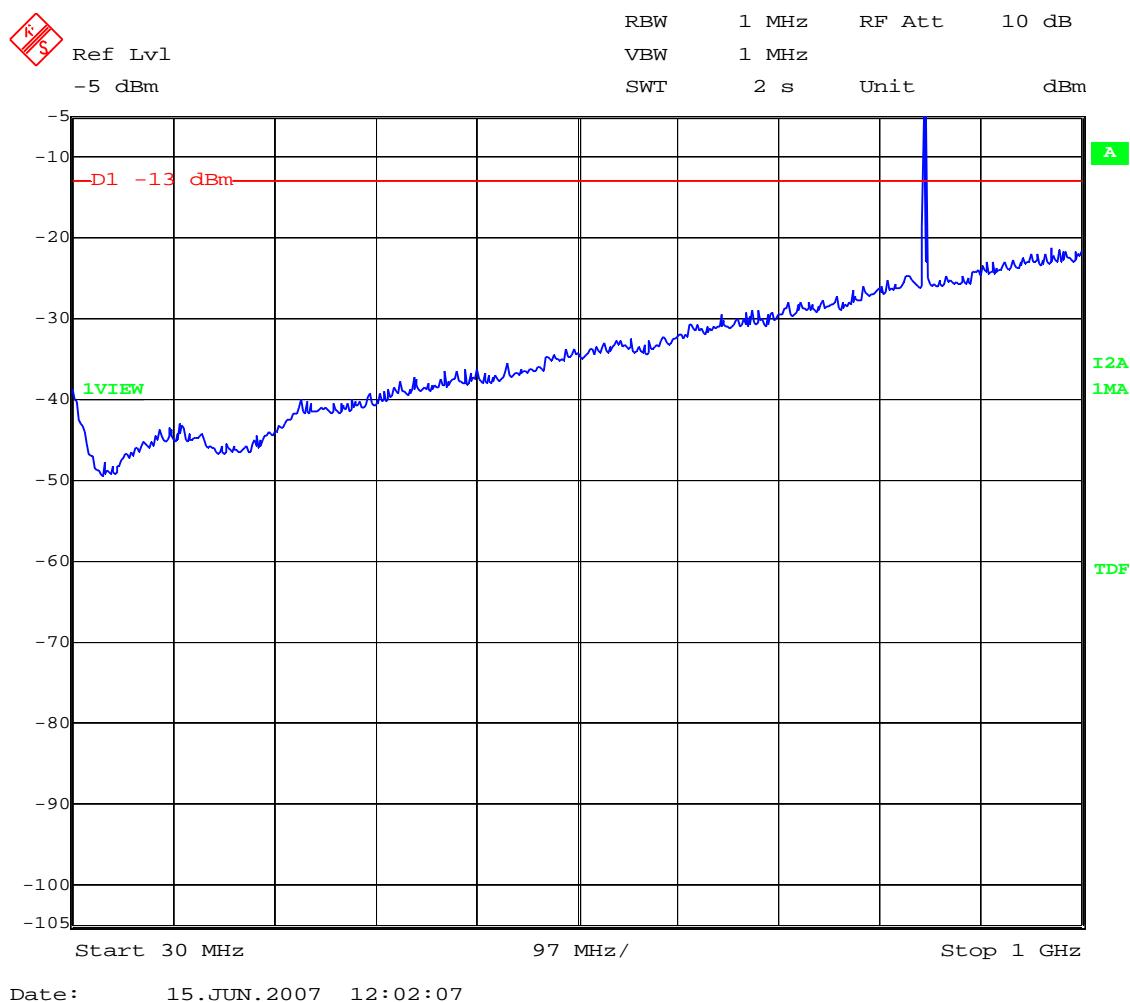
CHANNEL: MIDDLE (836.6 MHz)



Note: The peak above the limit is the carrier frequency.

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CHANNEL: HIGHEST (848.8 MHz)



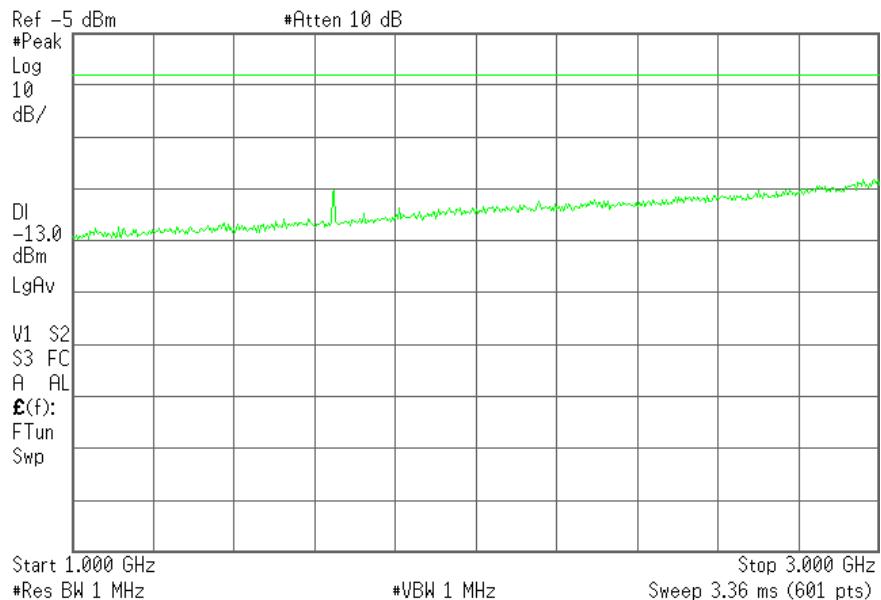
Note: The peak above the limit is the carrier frequency.

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FREQUENCY RANGE 1 GHz to 3 GHz.

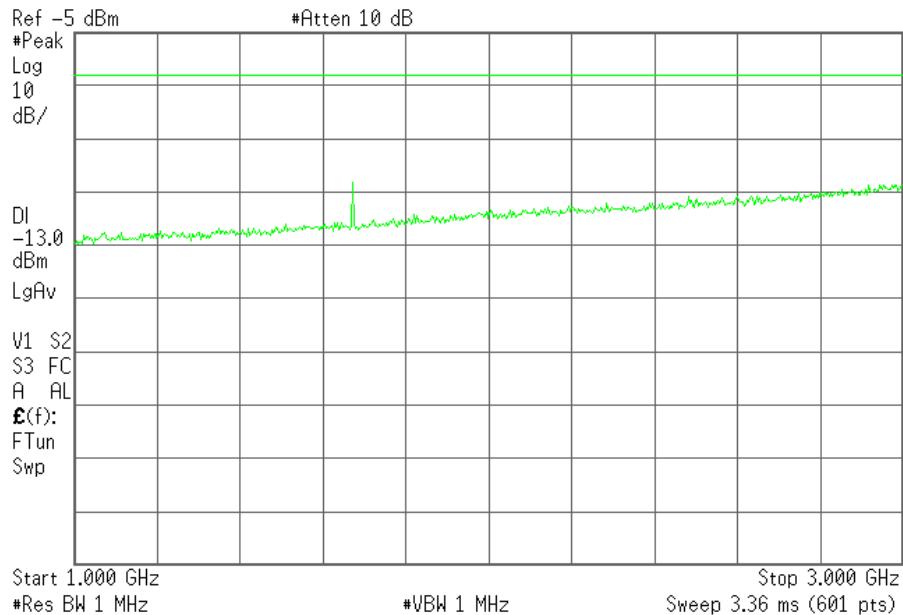
CHANNEL: LOWEST (824.2 MHz)

\* Agilent



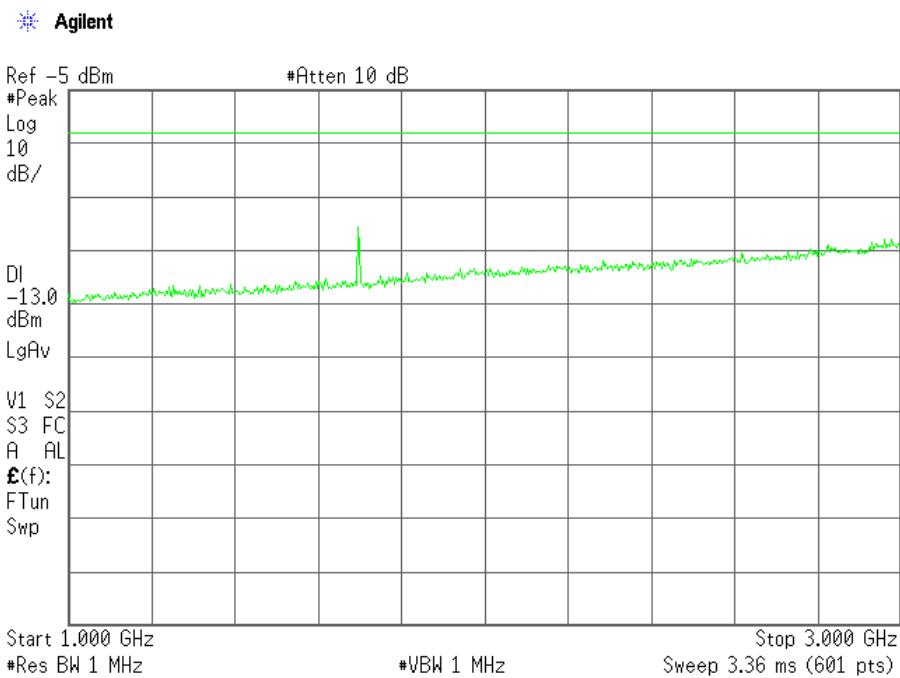
CHANNEL: MIDDLE (836.6 MHz)

\* Agilent



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CHANNEL: HIGHEST (848.8 MHz)



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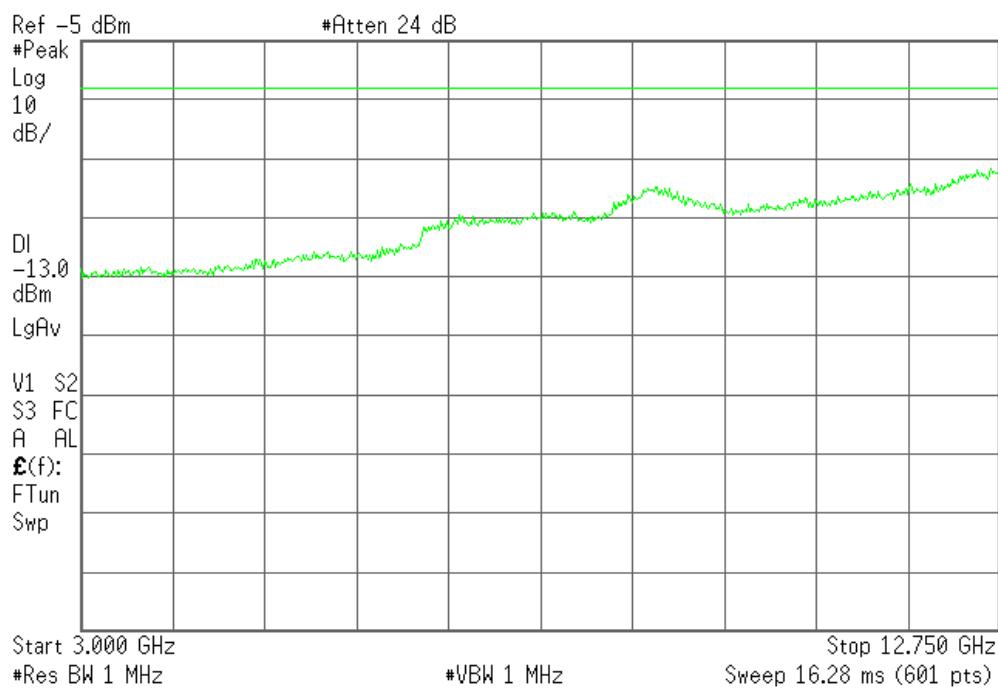
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Annex A

FREQUENCY RANGE 3 GHz to 12.75 GHz.

Agilent



(This plot is valid for all three channels).

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**ANNEX B**  
**TEST RESULTS FOR FCC PART 24**

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## TEST CONDITIONS

Power supply (V):

$$V_{\text{nom}} = 12 \text{ Vdc}$$

Type of power supply = External DC voltage

Type of antenna = External connectable antenna

## TEST FREQUENCIES:

Lowest channel (512): 1850.2 MHz

Middle channel (662): 1880.2 MHz

Highest channel (810): 1909.8 MHz

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## RF Output Power (E.I.R.P.)

### SPECIFICATION

§2.1046 and 24.232

Mobile/portable stations are limited to 2 Watts (33 dBm) Effective Isotropic Radiated Power (E.I.R.P.) peak power.

### METHOD

For radiated measurements the EUT was placed on a 1 m high non-conductive stand inside an anechoic chamber. The measuring antenna was placed at 1 m distance and the maximum field strength was measured for the three channels. The EUT was controlled via the Universal Radio Communication tester R&S CMU200 selecting maximum transmission power of the EUT and GMSK modulated signal.

The Effective Isotropic Radiated Power (E.I.R.P.) is obtained by using the Substitution Method according to ANSI/TIA/EIA-603-C: 2004.

### RESULTS

#### MAXIMUM EQUIVALENT ISOTROPIC RADIATED POWER E.I.R.P. (RADIATED).

Channel	Lowest	Middle	Highest
Maximum peak power (dBm)	13.98	15.21	14.84
Maximum peak power (W)	0.025	0.033	0.030
Measurement uncertainty (dB)	± 4.0		

Verdict: PASS

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## Radiated emissions

### SPECIFICATION

§ 24.238

### METHOD

The measurement was performed with the EUT inside an anechoic chamber. The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment.

The EUT was placed on a 1 meter high non-conductive stand at a 3 meter distance from the measuring antenna for measurements below 1 GHz and at 1 m distance for measurements above 1 GHz.

Detected emissions were maximized at each frequency by rotating the EUT and adjusting the measuring antenna height and polarization. The maximum meter reading was recorded. The radiated emissions were measured with peak detector and 1 MHz bandwidth.

Each detected emissions were substituted by the Substitution method, in accordance with the ANSI/TIA/EIA-603-C: 2004.

#### Measurement Limit:

According to specification, the power of emissions shall be attenuated below the transmitter power (P) by a factor of at least  $43 + 10 \log (P)$  dB, P in watts.

At  $P_o$  transmitting power, the specified minimum attenuation becomes  $43 + 10 \log (P_o)$ , and the level in dBm relative  $P_o$  becomes:

$$P_o \text{ (dBm)} - [43 + 10 \log (P_o \text{ in mwatts}) - 30] = -13 \text{ dBm}$$

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## RESULTS

### **Frequency range 30 MHz-1000 MHz.**

No spurious signals found in the three channels.

### **Frequency range 1 GHz-20 GHz.**

#### 1. CHANNEL: LOWEST (1850.2MHz).

No spurious signals were found in all the range.

#### 2. CHANNEL: MIDDLE (1880.2 MHz).

No spurious signals were found in all the range.

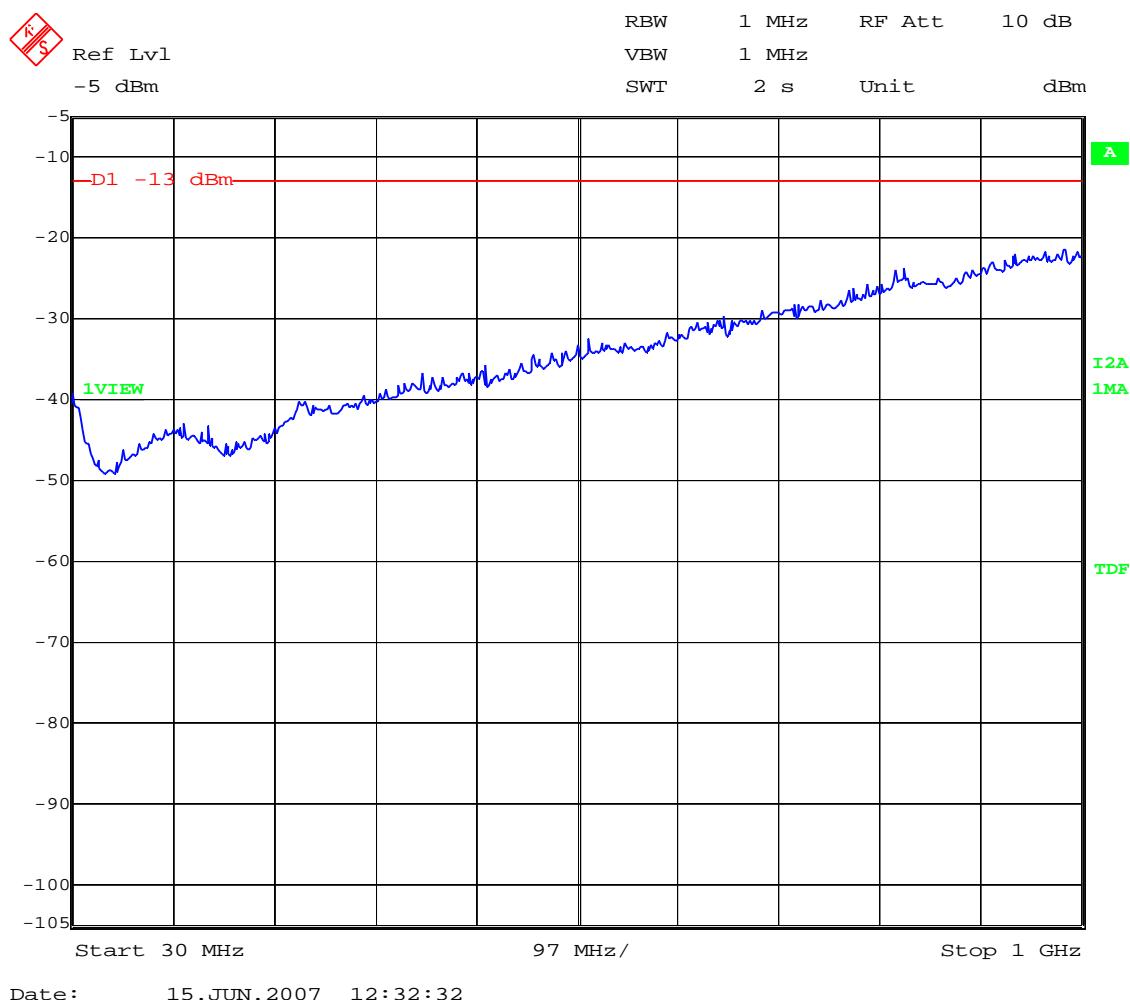
#### 3. CHANNEL: HIGHEST (1909.8 MHz).

No spurious signals were found in all the range.

Verdict: PASS

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FREQUENCY RANGE 30 MHz-1000 MHz.



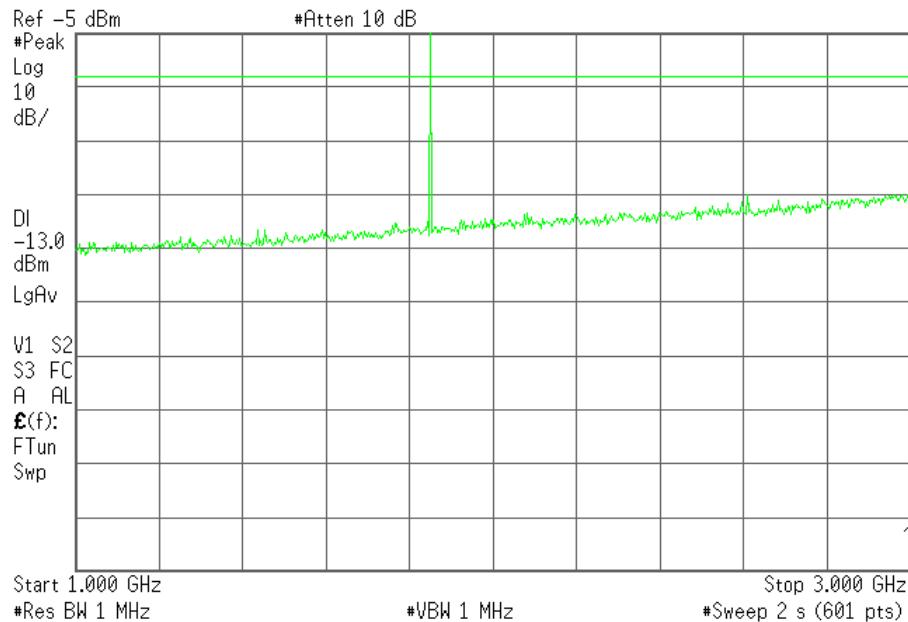
(This plot is valid for all three channels).

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FREQUENCY RANGE 1 GHz to 3 GHz.

CHANNEL: LOWEST (1850.2 MHz)

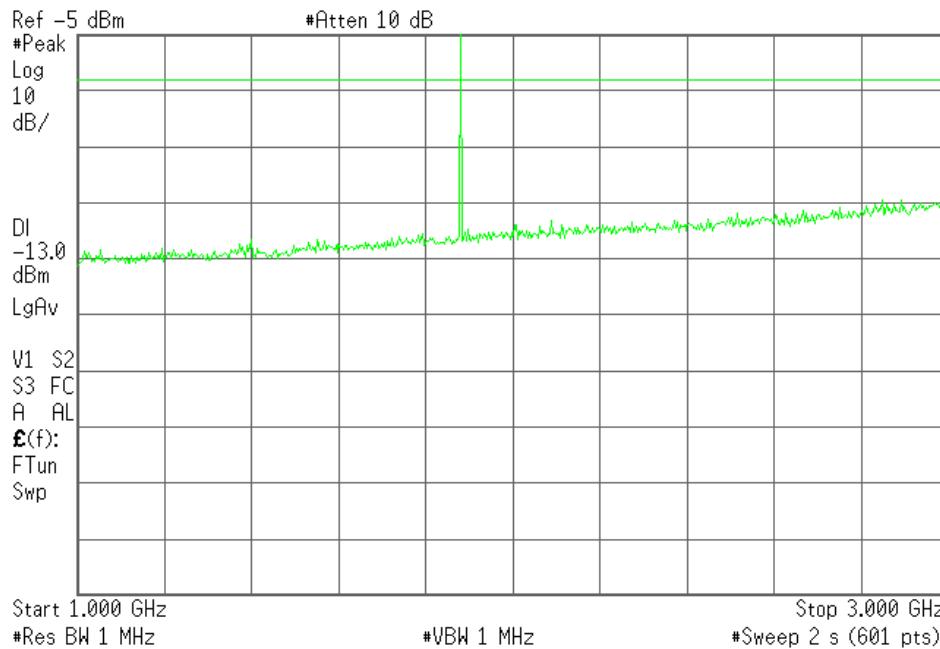
 Agilent



Note: The peak above the limit is the carrier frequency.

CHANNEL: MIDDLE (1880.2 MHz)

 Agilent

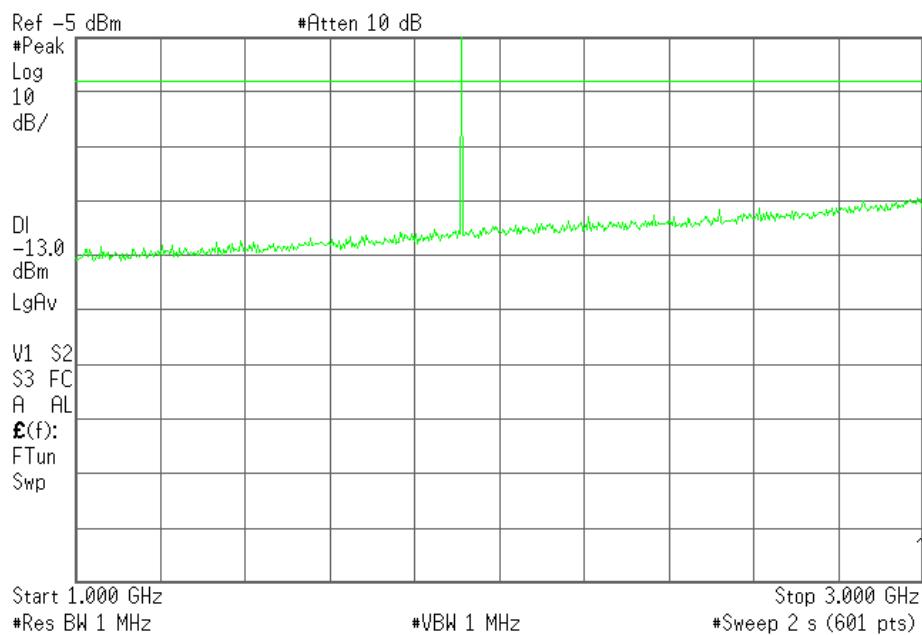


Note: The peak above the limit is the carrier frequency.

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CHANNEL: HIGHEST (1909.8 MHz)

Agilent



Note: The peak above the limit is the carrier frequency.

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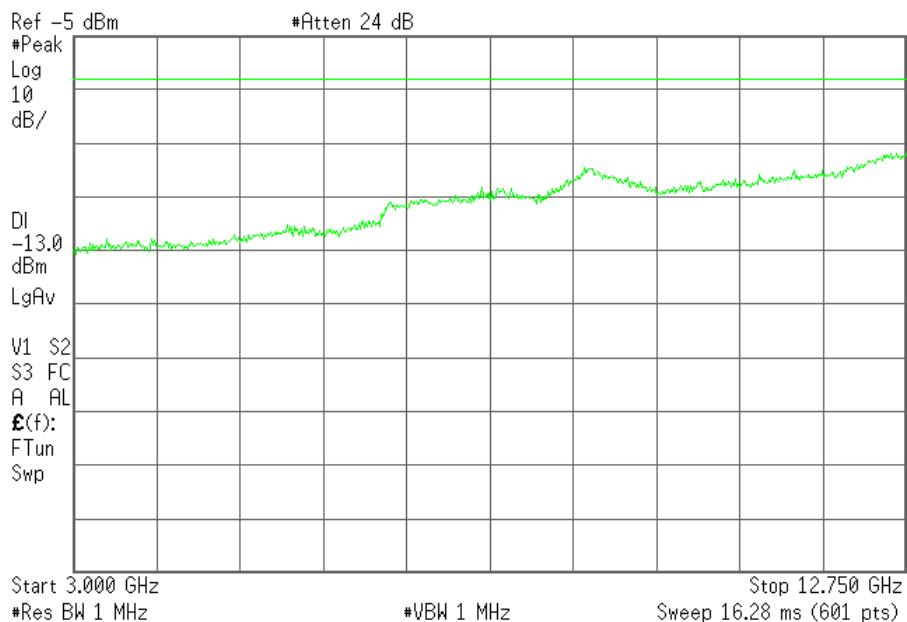
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FREQUENCY RANGE 3 GHz to 12.75 GHz.

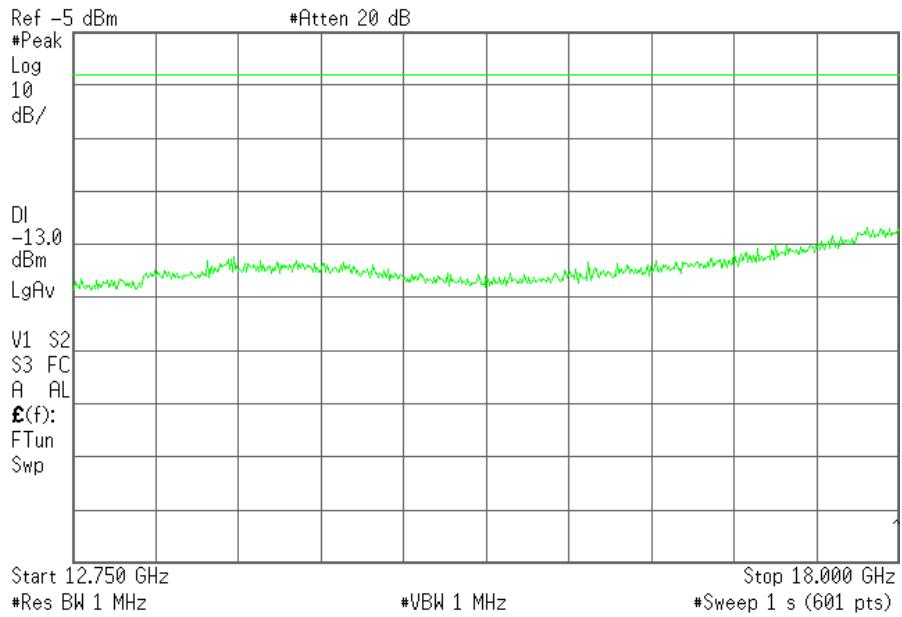
Agilent



(This plot is valid for all three channels).

FREQUENCY RANGE 12.75 GHz TO 18 GHz.

Agilent

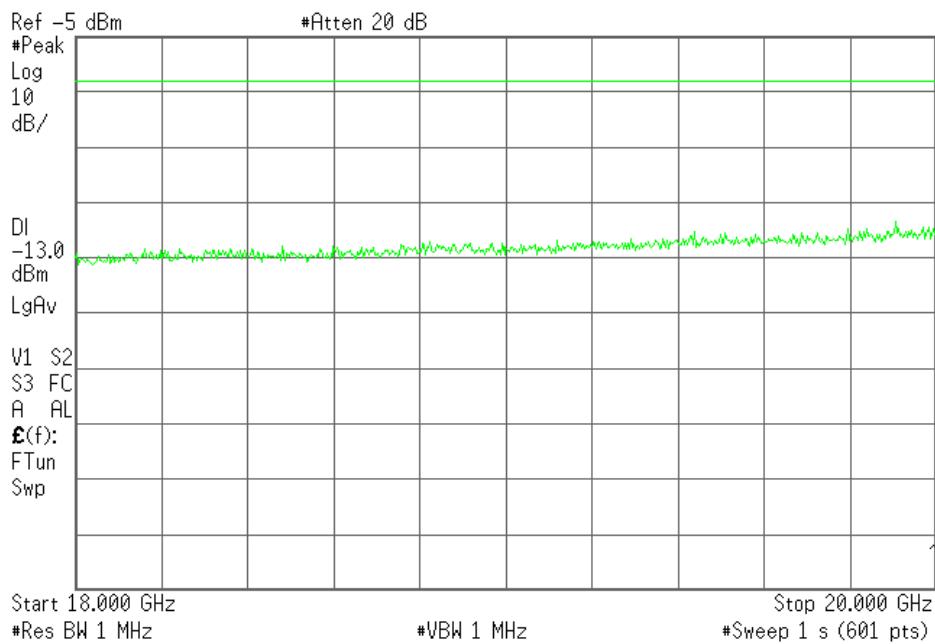


(This plot is valid for all three channels).

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FREQUENCY RANGE 18 GHz TO 20 GHz.

 Agilent



(This plot is valid for all three channels).

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## ANNEX C

### PHOTOGRAPHS (Number of photographs: 5)

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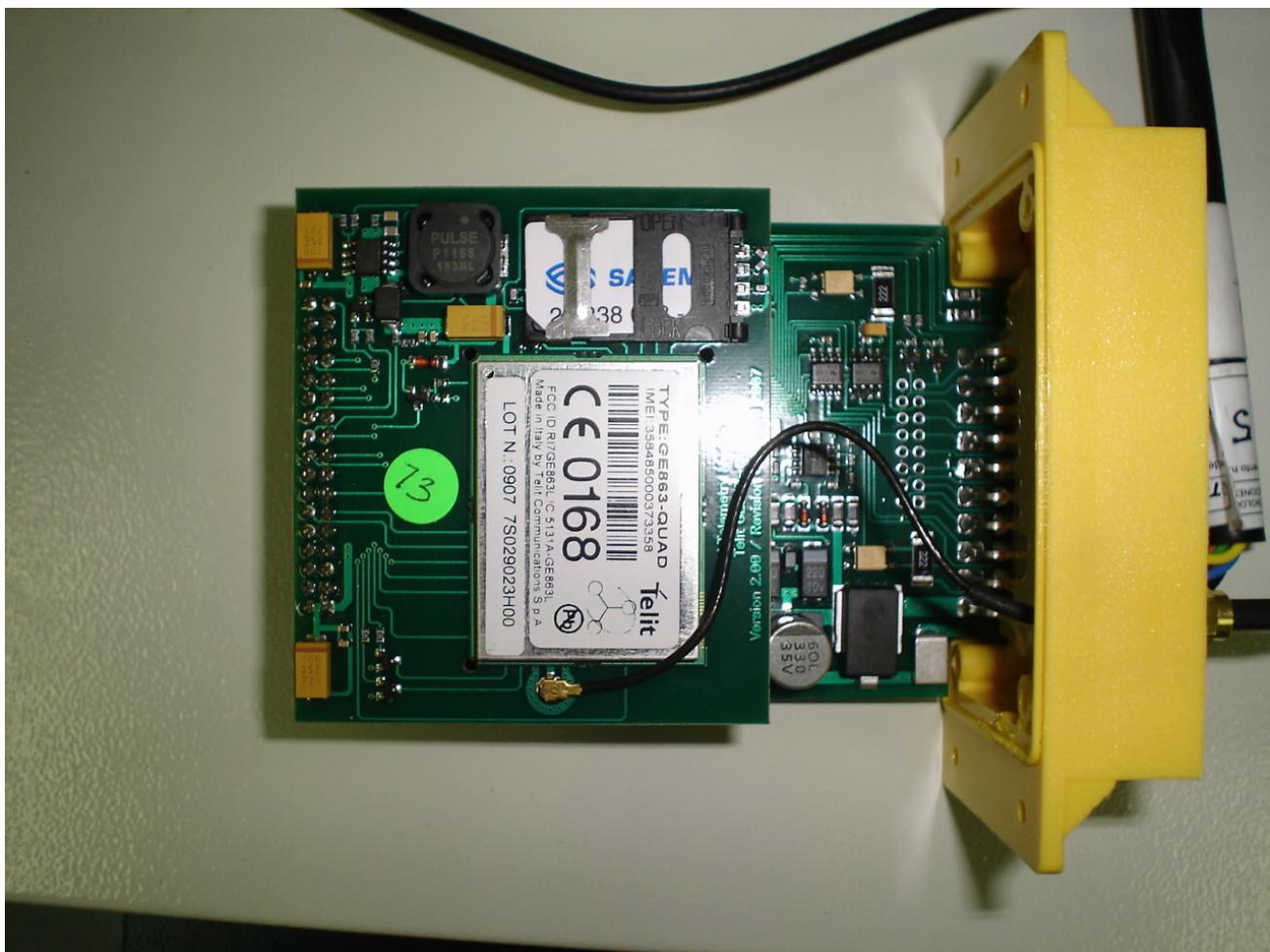
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1. Equipment (external view)



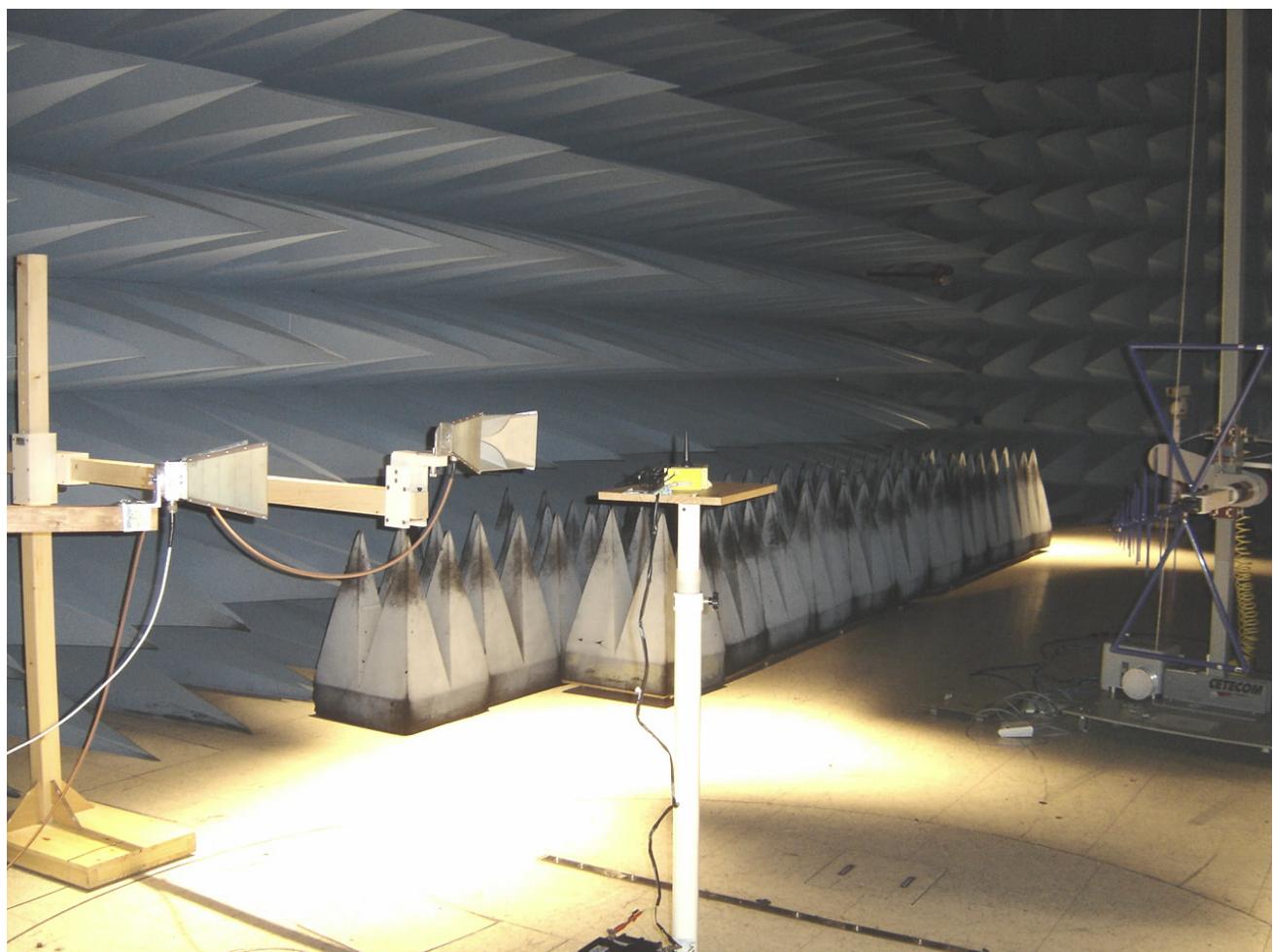
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2. Equipment (internal view)



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3. General test set-up for radiated measurements.



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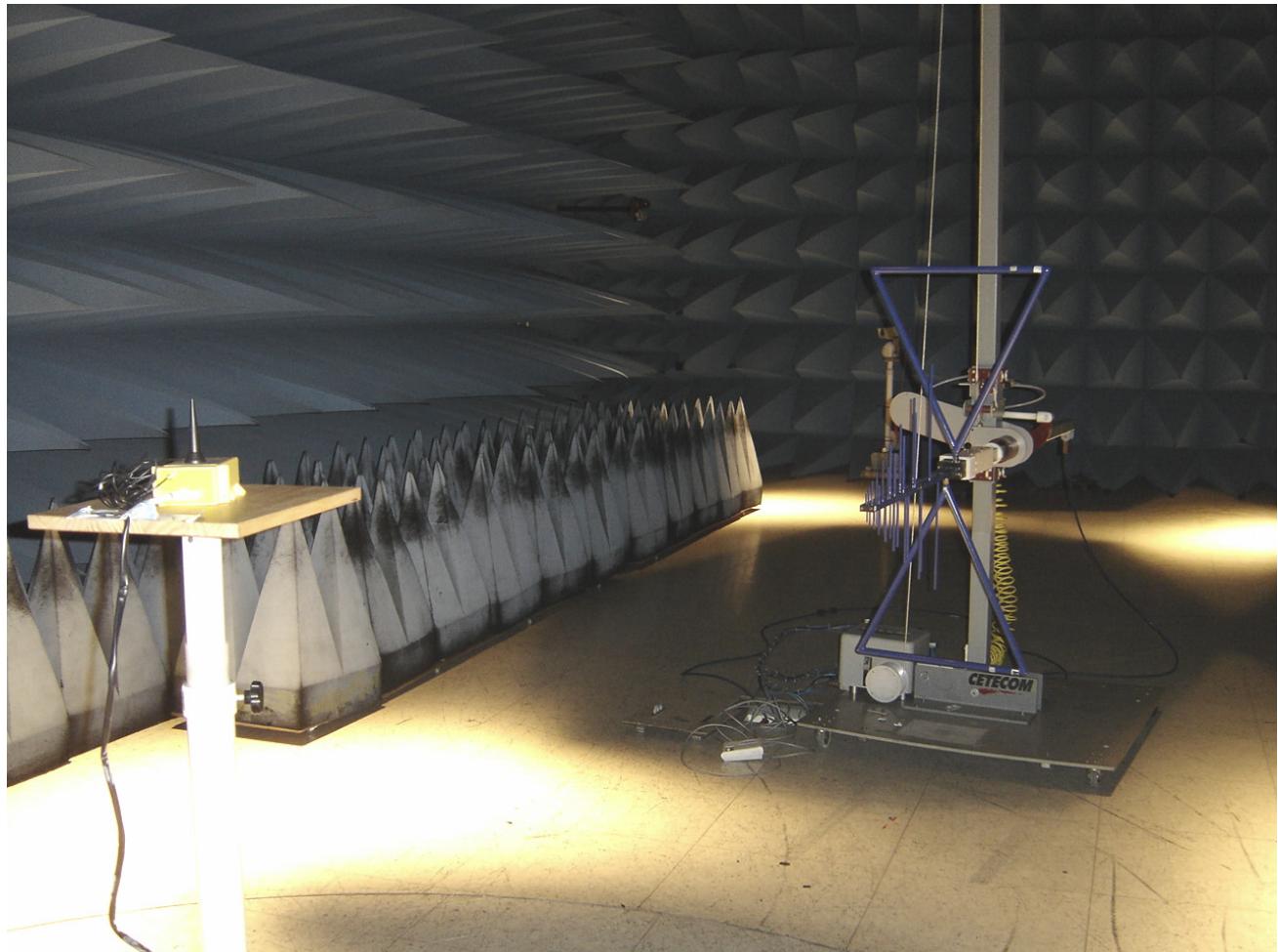
Date: 2007-09-14

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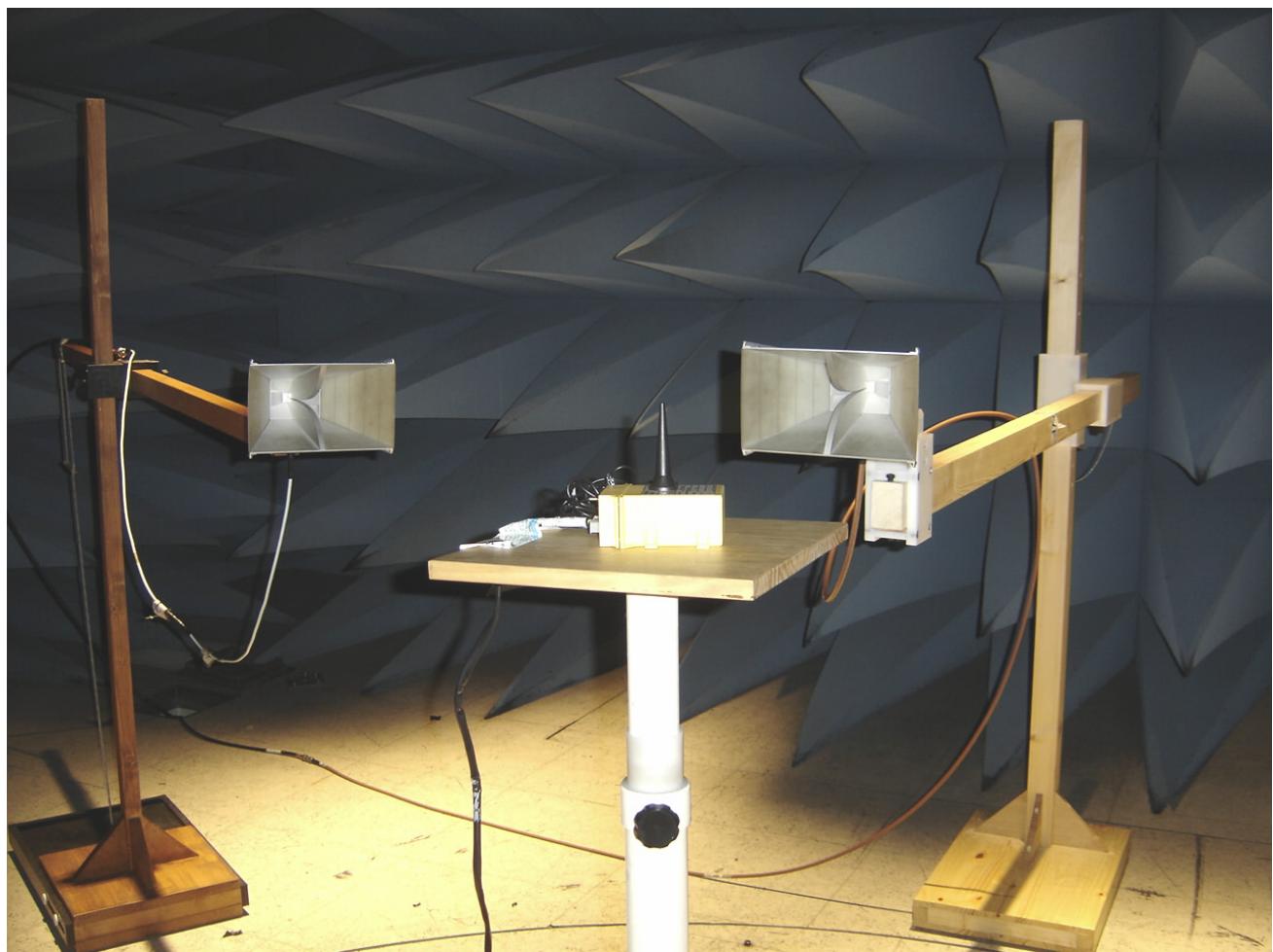
Annex C

4. Test set-up for radiated measurements below 1 GHz.



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5. Test set-up for radiated measurements above 1 GHz.



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