



**FCC LISTED,  
REGISTRATION  
NUMBER: 905266**

**IC LISTED,  
REGISTRATION  
NUMBER: IC 4621**

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## TEST REPORT

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**Report No.: 26826RET**

**TEST NAME:** FCC PART 22, PART 24 RADIO TESTING

**Product** : Quad-Band GSM/GPRS module  
**Trade Mark** : Telit  
**Model/type Ref.** : GE863-PRO3  
**Manufacturer** : TELIT Communications S.p.A.  
**Requested by** : TELIT Communications S.p.A.  
**Other identification of the product** : FCC ID: RI7863P3  
IC: 5131A-863P3  
IMEI: 35725101999902  
**Standard(s)** : FCC Part 22 & 24

This test report includes 3 annexes and therefore the total number of pages is 68

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Date: 2007-11-23	Test operator A. Llamas 	Approved by: Date: 2007.11.23 J.C. Soler Consultant 	Page: 1 of 7
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**INDEX**

1. COMPETENCE AND GUARANTEES .....3

2. GENERAL CONDITIONS .....3

3. CHARACTERISTICS OF THE TEST .....3

    3.1 TEST REQUESTED.....3

    3.2 REQUIREMENTS AND METHOD .....3

4. IDENTIFICATION DATA SUPPLIED BY THE APPLICANT .....4

    4.1 APPLICANT.....4

    4.2 REPRESENTATIVE .....5

    4.3 TEST SAMPLES SUPPLIER.....5

    4.4 IDENTIFICATION OF ITEM/ITEMS TESTED .....5

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

    5.1 USAGE OF SAMPLES .....5

    5.2 PERIOD OF TESTING .....5

    5.3 ENVIROMENTAL CONDITIONS.....6

6. TEST RESULTS .....7

7. REMARKS AND COMMENTS.....7

8. SUMMARY.....7

ANNEXES

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

Report No.: 26826RET  Date: 2007-11-23		Page: 2 of 7
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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.

Centro de Tecnología de las Comunicaciones (AT4 WIRELESS), S.A. is a laboratory with a measurement site in compliance with the requirements of RSS 212, Issue 1 (Provisional) and has been added to the list of filed sites of the Canadian Certification and Engineering Bureau. Reference File Number: IC 4621.

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.

### 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's 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.

Uncertainty (factor k=2) was calculated according to the following AT4 WIRELESS's 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.
17. 10 dB attenuator Weinschel 75A-10-11.
18. 6 dB power splitter Picosecond 5333-104.

#### **4. IDENTIFICATION DATA SUPPLIED BY THE APPLICANT**

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

##### **4.1 APPLICANT**

**Name or Company:** TELIT Communications S.p.A.

**V.A.T.:** 03711600266

**Address:** Via Stazione di Prosecco 5/b

**City:** Trieste

**Postal code:** 34010

**Country:** ITALY

**Telephone:** +39 040 4192111

**Fax:** +39 040 4192 383

Report No.:  
26826RET

Date: 2007-11-23

Page: 4 of 7

#### 4.2 REPRESENTATIVE

**Name:** Andrea Fragiacomò.

#### 4.3 TEST SAMPLES SUPPLIER

**Name or Company:** Same as indicated in point 4.1.

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

#### 4.4 IDENTIFICATION OF ITEM/ITEMS TESTED

**Product:** Quad-Band GSM/GPRS module

**Trade mark:** Telit

**Model:** GE863-PRO3

**HW version:** 0

**SW version:** 07.02.003

**Manufacturer:** TELIT Communications S.p.A.

**Country of manufacture:** ITALY

**Description:** GSM/GPRS class 10 module, 850/900/1800/1900 MHz

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

#### 5.1 USAGE OF SAMPLES

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

<u>Control No.</u>	<u>Description</u>	<u>Model</u>	<u>Serial No.</u>	<u>Date of reception</u>
26745/02	GSM Module with evaluation board	GE863-PRO3	35725101999902	04/10/07
26213/14	Antenna with sma type connector	AT308	---	18/06/07

1. Sample M/01 has undergone following test(s).  
All tests indicated in annexes A and B.

#### 5.2 PERIOD OF TESTING

The performed test started on 2007-10-24 and finished on 2007-11-15.

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

### 5.3 ENVIROMENTAL CONDITIONS

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

Temperature	Min. = 23 °C Max. = 23 °C
Relative humidity	Min. = 51 % Max. = 51 %
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. = 24 °C Max. = 24 °C
Relative humidity	Min. = 52 % Max. = 52 %
Air pressure	Min. = 1010 mbar Max. = 1010 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).

In the chamber for conducted measurements the following limits were not exceeded during the test:

Temperature	Min. = 24 °C Max. = 24 °C
Relative humidity	Min. = 51 % Max. = 51 %
Air pressure	Min. = 1010 mbar Max. = 1010 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 0,5 Ω

## 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 2.1055: Frequency stability		P		
Clause 22.917: Spurious emissions at antenna terminals		P		
Clause 22.917: Radiated emissions		P		

FCC PART 24 PARAGRAPH	VERDICT			
	NA	P	F	NM
Clause 24.232: RF output power		P		
Clause 24.235: Frequency stability		P		
Clause 24.238: Spurious emissions at antenna terminals		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".

Report No.: 26826RET		Page: 7 of 7
Date: 2007-11-23		

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

**Report No: 26826RET**

Report No:  
26826RET

Date: 2007-11-23

FET45\_00.DOC

Page: 1 of 27

Annex A



## INDEX

	Page
TEST CONDITIONS .....	3
RF Output Power (conducted and E.R.P.).....	4
Modulation Characteristics.....	7
Frequency Stability.....	8
Occupied Bandwidth .....	10
Spurious emissions at antenna terminals.....	15
Spurious emissions at antenna terminals at Block Edges.....	18
Radiated emissions .....	20

Report No: 26826RET		Page: 2 of 27  Annex A
Date: 2007-11-23		

## TEST CONDITIONS

Power supply (V):

$$V_{\text{nom}} = 4.0 \text{ Vdc}$$

$$V_{\text{max}} = 4.2 \text{ Vdc}$$

$$V_{\text{min}} = 3.4 \text{ Vdc}$$

The subscripts nom, min and max indicates voltage test conditions (nominal, minimum and maximum respectively, as declared by the applicant).

Type of power supply = DC Voltage from external power supply

Type of antenna = Attachable antenna with sma type connector

## TEST FREQUENCIES:

Lowest channel (128): 824.2 MHz

Middle channel (190): 836.6 MHz

Highest channel (251): 848.8 MHz

Report No: 26826RET		Page: 3 of 27
Date: 2007-11-23		Annex A

## RF Output Power (conducted and 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

The conducted RF output power measurements were made at the RF output terminals of the EUT using an attenuator, power splitter and spectrum analyser. The EUT was controlled via the Universal Radio Communication tester R&S CMU200 selecting maximum transmission power of the EUT and GMSK modulated signal.

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 OUTPUT POWER (CONDUCTED). See plots in next pages.

Channel	Lowest	Middle	Highest
Maximum peak power (dBm)	32.62	31.92	32.67
Maximum peak power (W)	1.83	1.56	1.85
Measurement uncertainty (dB)	±1.5		

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

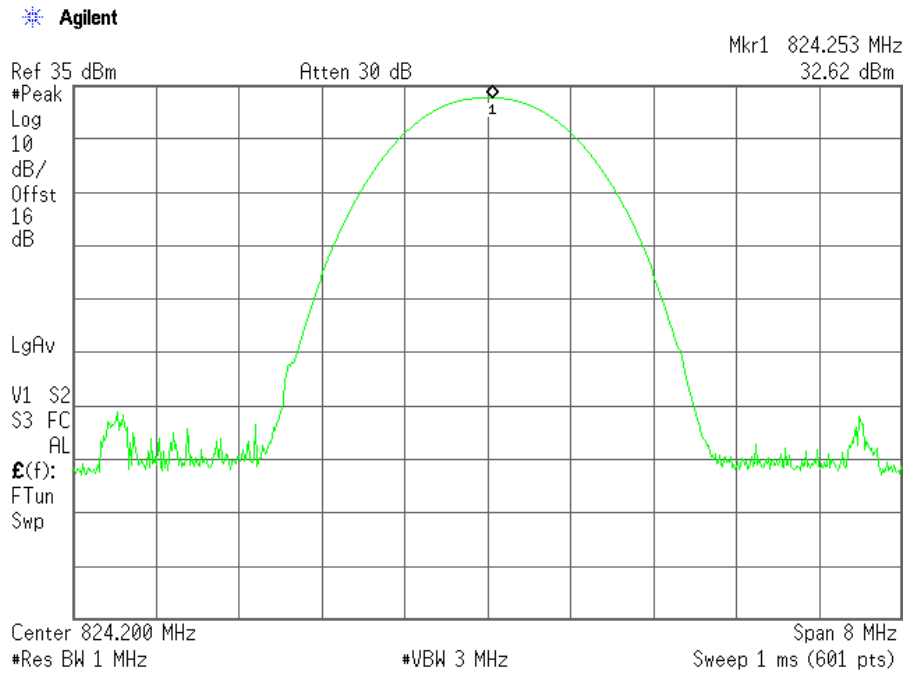
Channel	Lowest	Middle	Highest
Maximum peak power (dBm)	31.73	30.56	30.47
Maximum peak power (W)	1.49	1.14	1.11
Measurement uncertainty (dB)	± 3.8		

Verdict: PASS

Report No: 26826RET		Page: 4 of 27
Date: 2007-11-23		Annex A

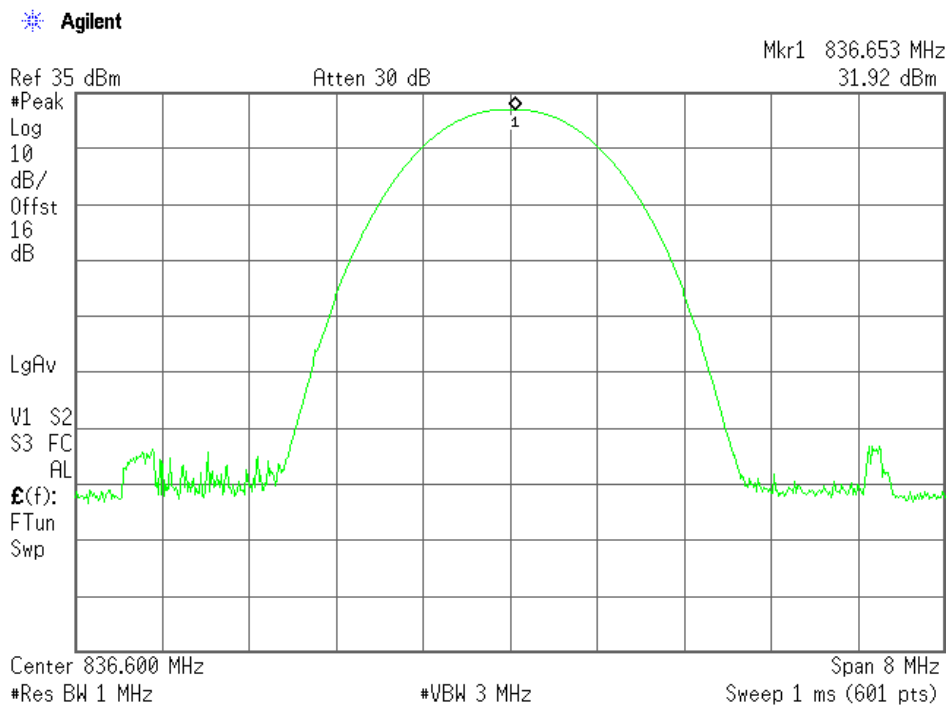
PEAK OUTPUT POWER (CONDUCTED).

Lowest Channel: 824.2 MHz.



PEAK OUTPUT POWER (CONDUCTED).

Middle Channel: 836.6 MHz.



Report No:  
26826RET

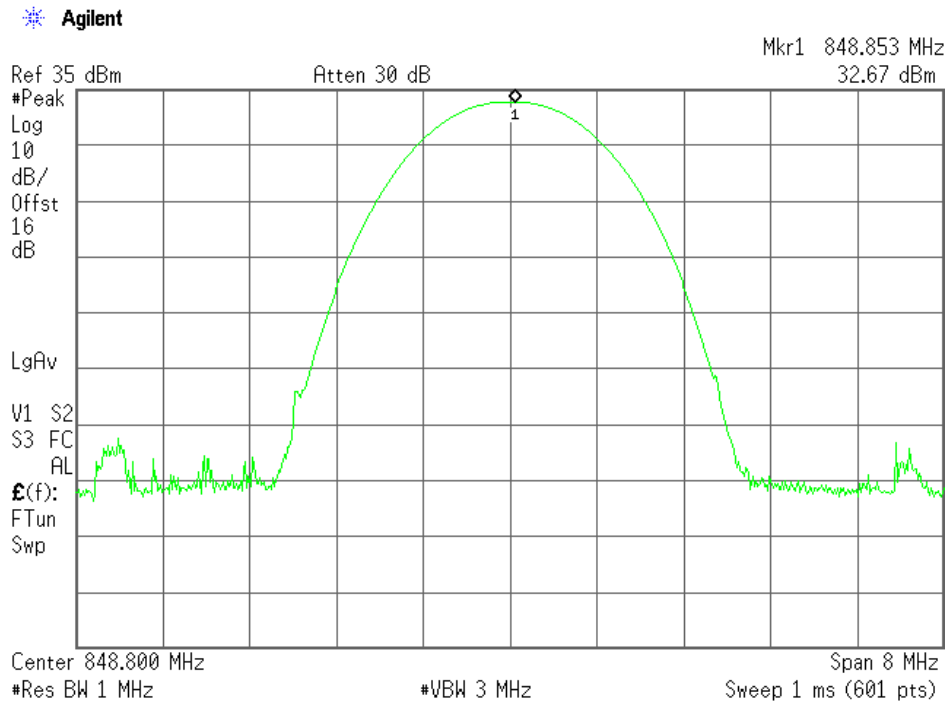
Page: 5 of 27

Date: 2007-11-23

Annex A

PEAK OUTPUT POWER (CONDUCTED).

Highest Channel: 848.8 MHz.



Report No:  
26826RET

Date: 2007-11-23

Page: 6 of 27

Annex A

## Modulation Characteristics

### SPECIFICATION

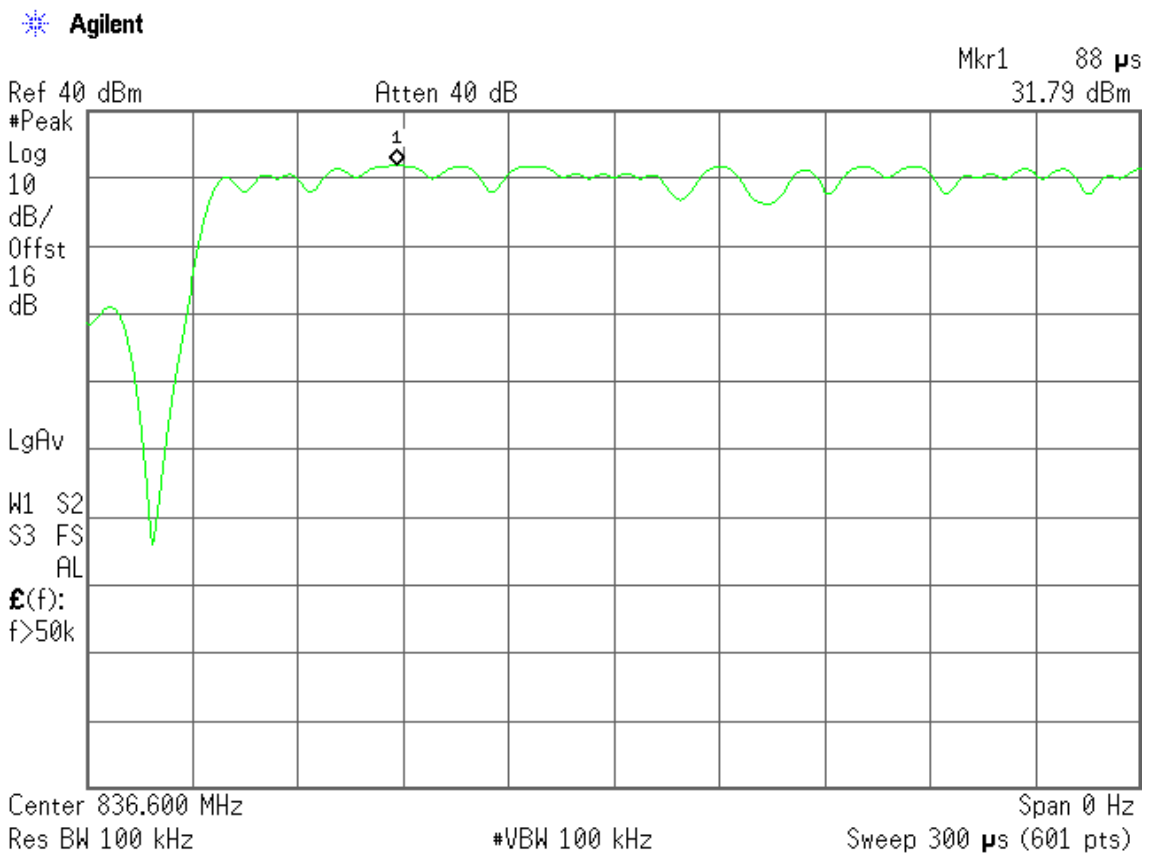
§2.1047

### METHOD

The EUT uses GMSK modulation, in which voice or data information is digitized and coded into a bit stream. The bits are conveyed through precise phase changes in the carrier.

### RESULTS

The following plot shows the modulation scheme (GMSK) in the EUT.



Report No:  
26826RET

Date: 2007-11-23

Page: 7 of 27

Annex A

## Frequency Stability

### SPECIFICATION

§2.1055

### METHOD

The frequency tolerance measurements over temperature variations were made over the temperature range of  $-30^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$ . The EUT was placed inside a climatic chamber and the temperature was raised hourly in  $10^{\circ}\text{C}$  steps from  $-30^{\circ}\text{C}$  up to  $+50^{\circ}\text{C}$ .

The frequency tolerance measurements over voltage variations were made at room temperature and at the  $V_{\text{max}}$  and  $V_{\text{min}}$  supply voltages as declared by the applicant.

The EUT was set in “call mode” in the middle channel 190 (836.6 MHz) using the Universal Radio Communication tester R&S CMU200, and the maximum frequency error was measured using the frequency meter of CMU200.

### RESULTS

Frequency stability over temperature variations.

Temperature ( $^{\circ}\text{C}$ )	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
+50	-5	-0.0060	-0.00000060
+40	-6	-0.0072	-0.00000072
+30	-4	-0.0048	-0.00000048
+20	1	0.0012	0.00000012
+10	-5	-0.0060	-0.00000060
0	1	0.0012	0.00000012
-10	6	0.0072	0.00000072
-20	4	0.0048	0.00000048
-30	3	0.0036	0.00000036

Report No: 26826RET		Page: 8 of 27
Date: 2007-11-23		Annex A

Frequency stability over voltage variations.

<b>Battery Supply voltage</b>	<b>Voltage (V)</b>	<b>Frequency Error (Hz)</b>	<b>Frequency Error (ppm)</b>	<b>Frequency Error (%)</b>
Vmax	4.2	-8	-0.0096	-0.00000096
Vmin	3.4	6	0.0072	0.00000072



## Occupied Bandwidth

### SPECIFICATION

§2.1049

### METHOD

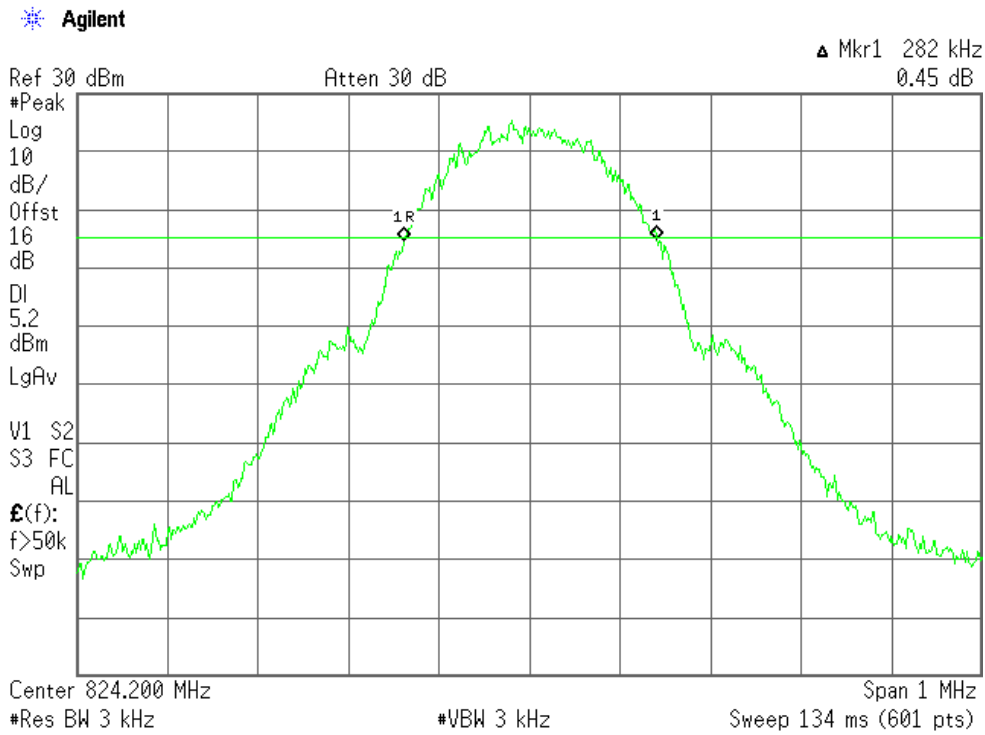
The EUT was configured to transmit a GMSK modulated carrier signal. An IF bandwidth of 3 kHz was used to determine the occupied bandwidth of the modulated emission.

### RESULTS

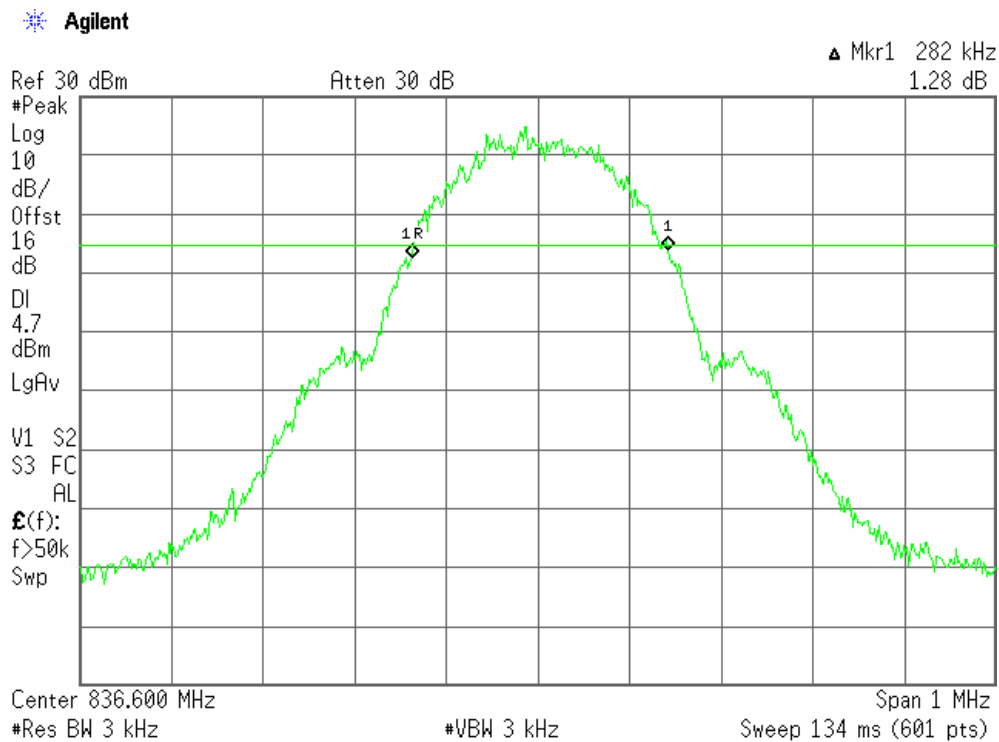
Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	282	282	286
-26 dBc bandwidth (kHz)	319	314	318
Measurement uncertainty (Hz)	<±40		

99% OCCUPIED BANDWIDTH

Lowest Channel: 824.2 MHz.



Middle Channel: 836.6 MHz.



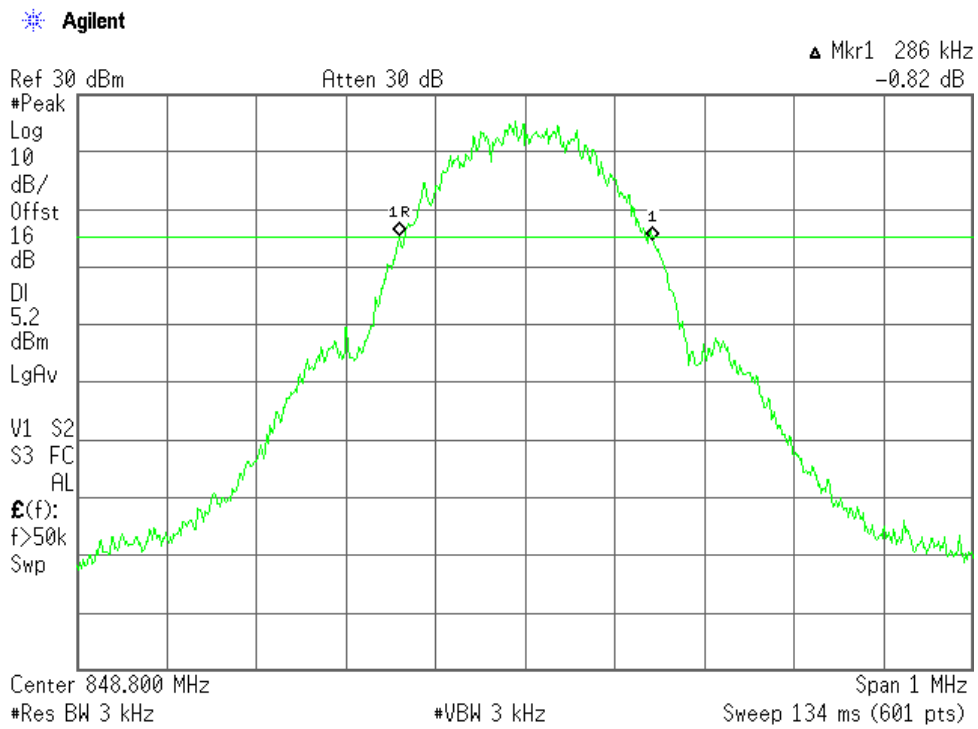
Report No:  
26826RET

Page: 11 of 27

Date: 2007-11-23

Annex A

Highest Channel: 848.8 MHz.



Report No:  
26826RET

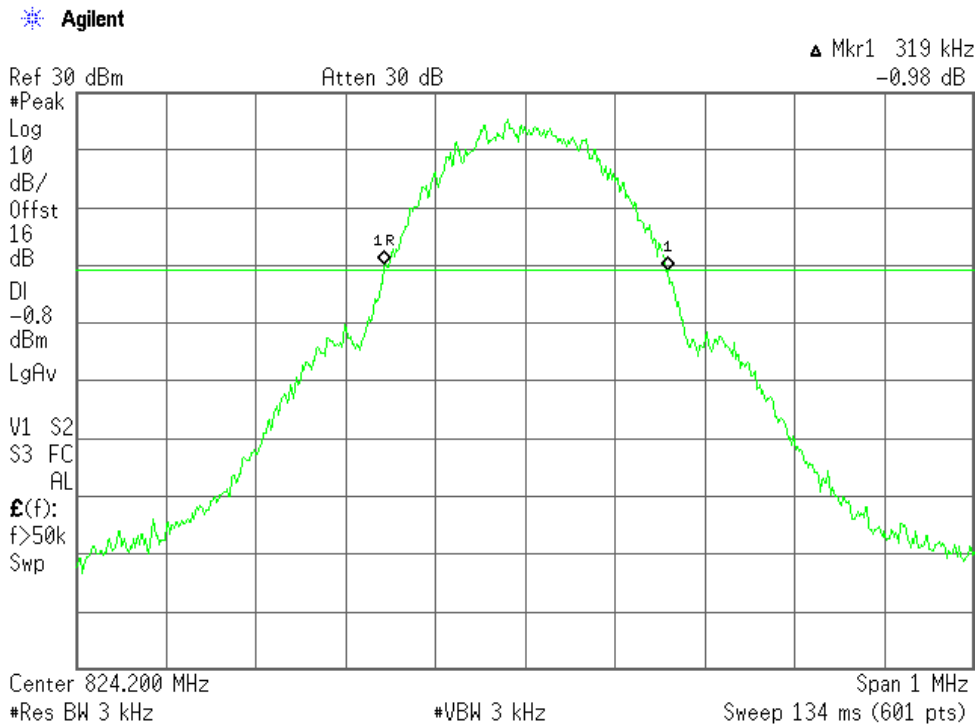
Page: 12 of 27

Date: 2007-11-23

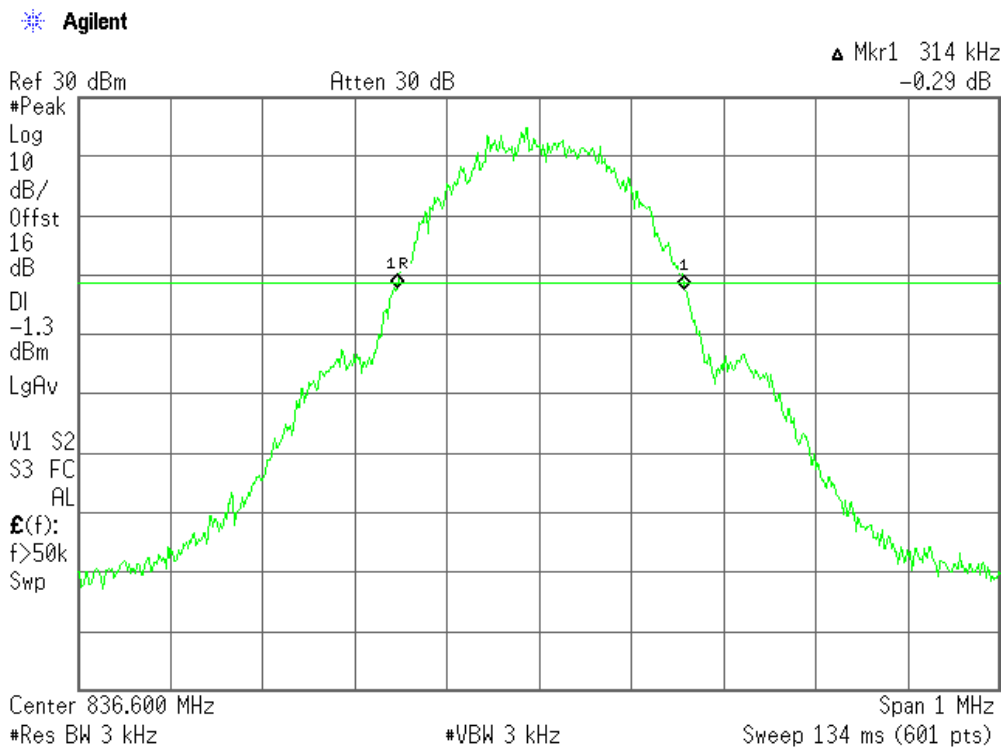
Annex A

-26 dBc BANDWIDTH

Lowest Channel: 824.2 MHz.



Middle Channel: 836.6 MHz.



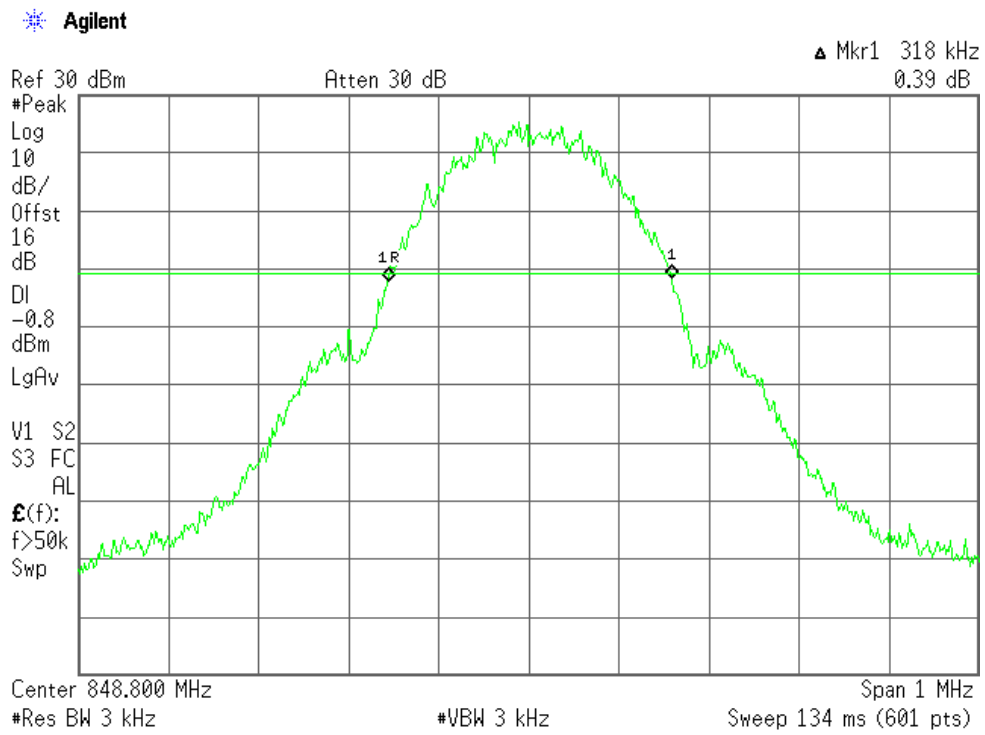
Report No:  
26826RET

Page: 13 of 27

Date: 2007-11-23

Annex A

Highest Channel: 848.8 MHz.



Report No:  
26826RET

Page: 14 of 27

Date: 2007-11-23

Annex A

## Spurious emissions at antenna terminals

### SPECIFICATION

§2.1051 and §22.917

### METHOD

The EUT RF output connector was connected to an spectrum analyser using an 50 ohm attenuator and the resolution bandwidth of the spectrum analyser was set to 100 kHz. The spectrum was investigated from 30 MHz to 10 GHz.

The reading of the spectrum analyser is corrected with the attenuation loss of connection between output terminal of EUT and input of the spectrum analyser.

#### 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:

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

### RESULTS (see plots in next pages)

1. CHANNEL: LOWEST (824.2 MHz).

No spurious signals were found in all the range.

2. CHANNEL: MIDDLE (836.6 MHz).

No spurious signals were found in all the range.

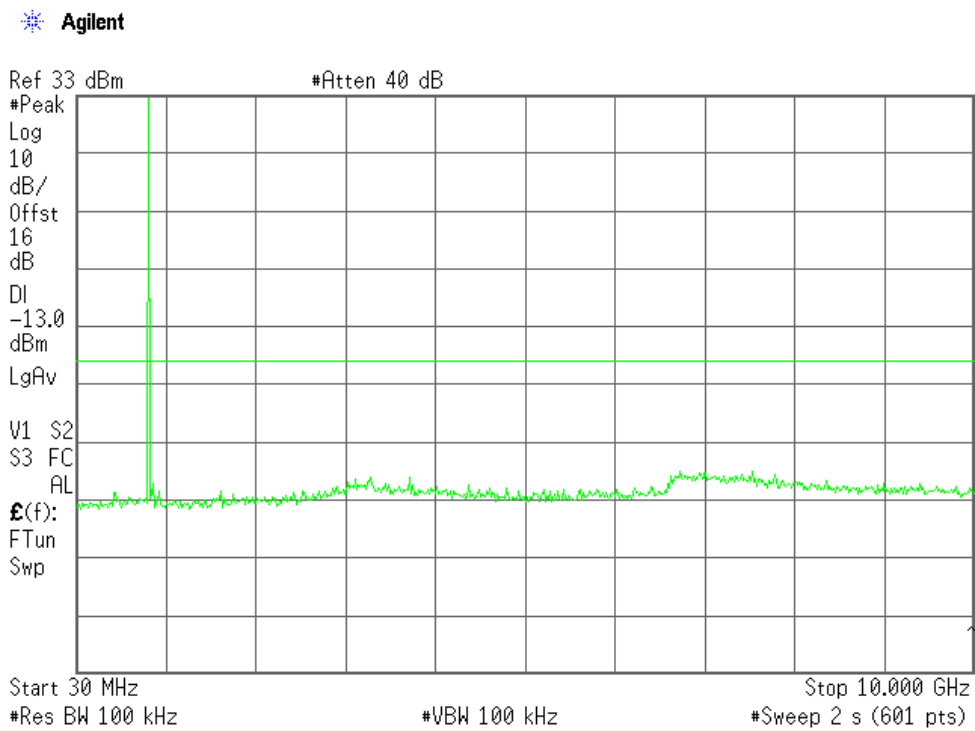
3. CHANNEL: HIGHEST (848.8 MHz).

No spurious signals were found in all the range.

Verdict: PASS

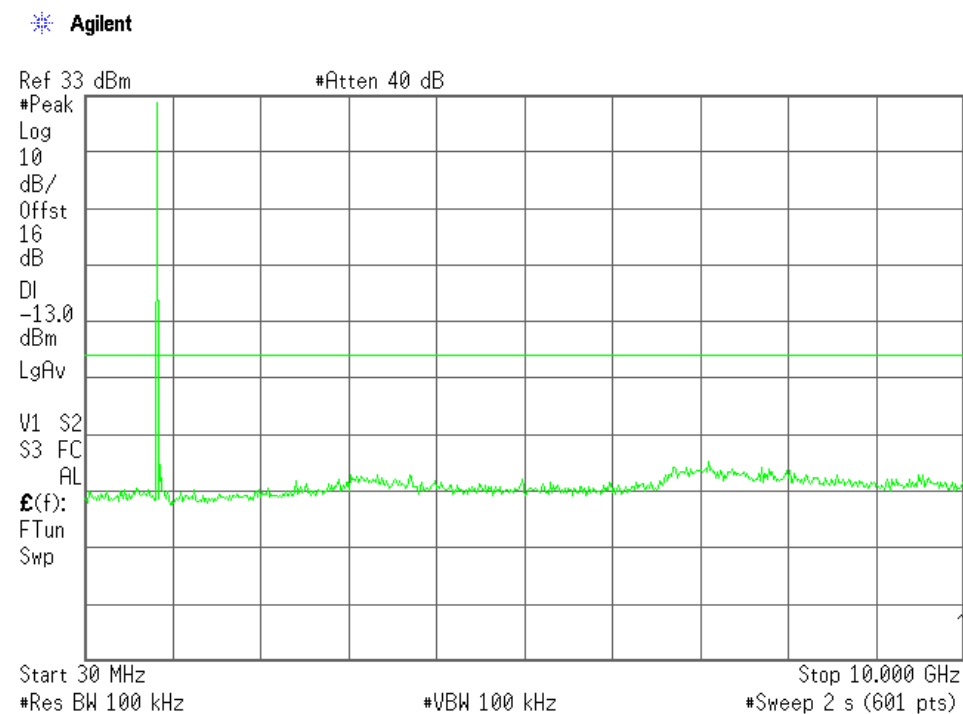
Report No: 26826RET		Page: 15 of 27
Date: 2007-11-23		Annex A

1. CHANNEL: LOWEST (824.2 MHz).



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

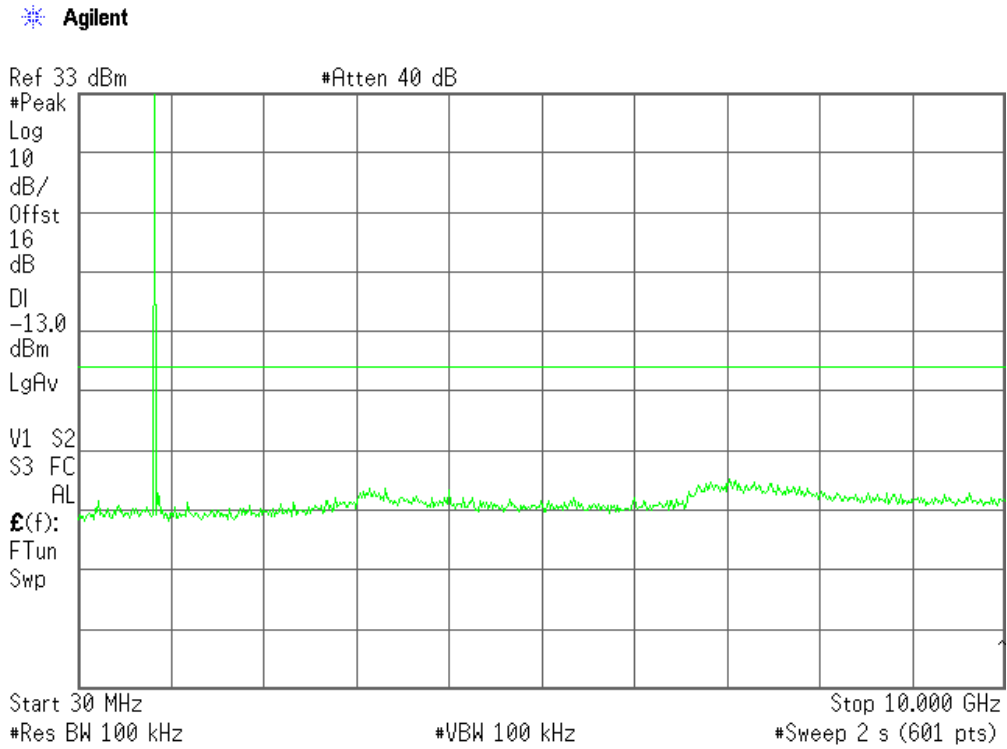
2. CHANNEL: MIDDLE (836.6 MHz).



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

Report No: 26826RET  Date: 2007-11-23		Page: 16 of 27  Annex A
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3. CHANNEL: HIGHEST (848.8 MHz).



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



## Spurious emissions at antenna terminals at Block Edges

### SPECIFICATION

§2.1051 and §22.917

### METHOD

As indicated in FCC part 22, 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 resolution bandwidth of 3.3 kHz was used.

#### 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.

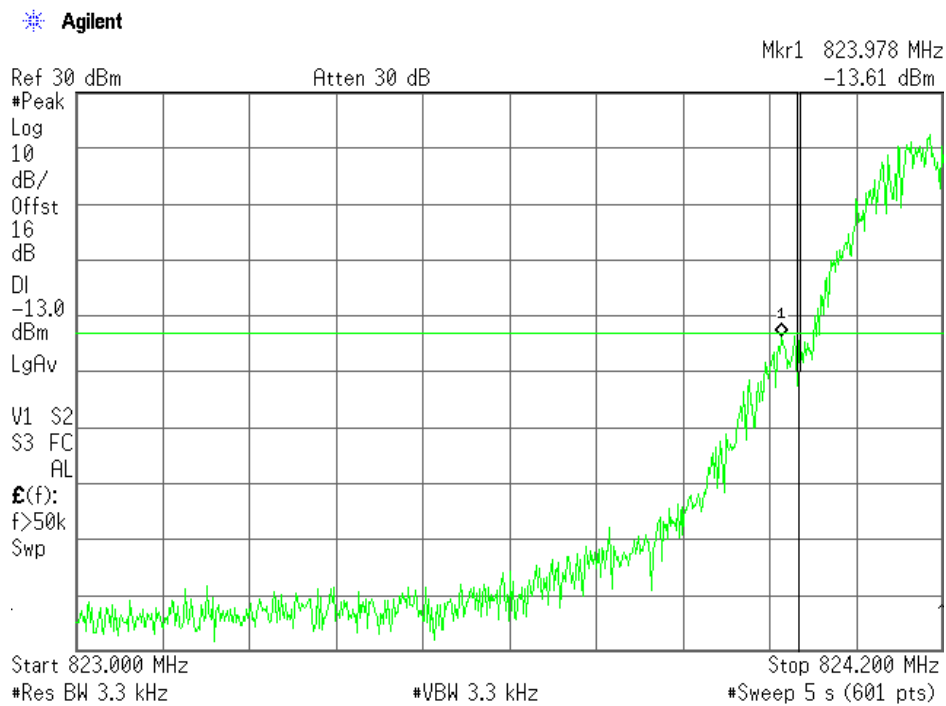
At  $P_o$  transmitting power, the specified minimum attenuation becomes  $43+10\log (P_o)$ , and the level in dBm relative  $P_o$  becomes:

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

### RESULTS (see plots in next pages)

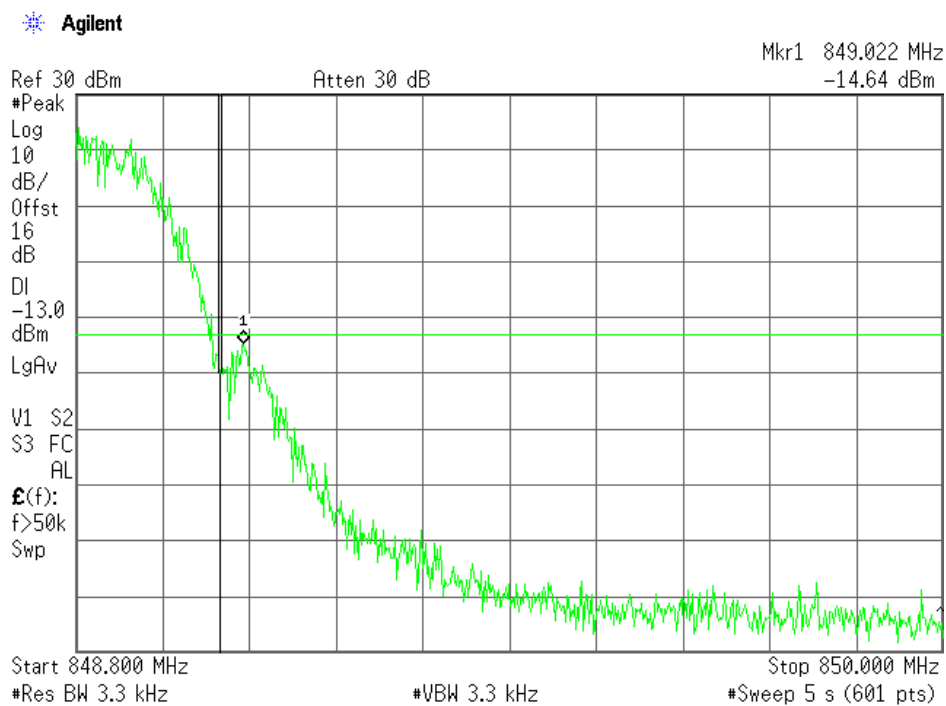
Report No: 26826RET		Page: 18 of 27
Date: 2007-11-23		Annex A

**BLOCK A. CHANNEL LOWEST (824.2 MHz).**



NOTE: The equipment transmits at the maximum output power (PCL= 5).

**BLOCK B. CHANNEL HIGHEST (848.8 MHz).**



NOTE: The equipment transmits at the maximum output power (PCL= 5).

Verdict: PASS

Report No: 26826RET  Date: 2007-11-23		Page: 19 of 27  Annex A
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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:

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

Report No: 26826RET		Page: 20 of 27
Date: 2007-11-23		Annex A

RESULTS

1. CHANNEL: LOWEST (824.2MHz).

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

No spurious signals were found in all the range.

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

Spurious frequency (MHz)	Level (dBm)	Polarization	Measurement uncertainty (dB)
1648.450	-29.24	Vertical	± 4.0
2472.733	-24.62	Vertical	± 4.0

2. CHANNEL: MIDDLE (836.6 MHz).

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

No spurious signals were found in all the range.

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

Spurious frequency (MHz)	Level (dBm)	Polarization	Measurement uncertainty (dB)
1673.187	-38.10	Vertical	± 4.0

3. CHANNEL: HIGHEST (848.8 MHz).

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

No spurious signals were found in all the range.

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

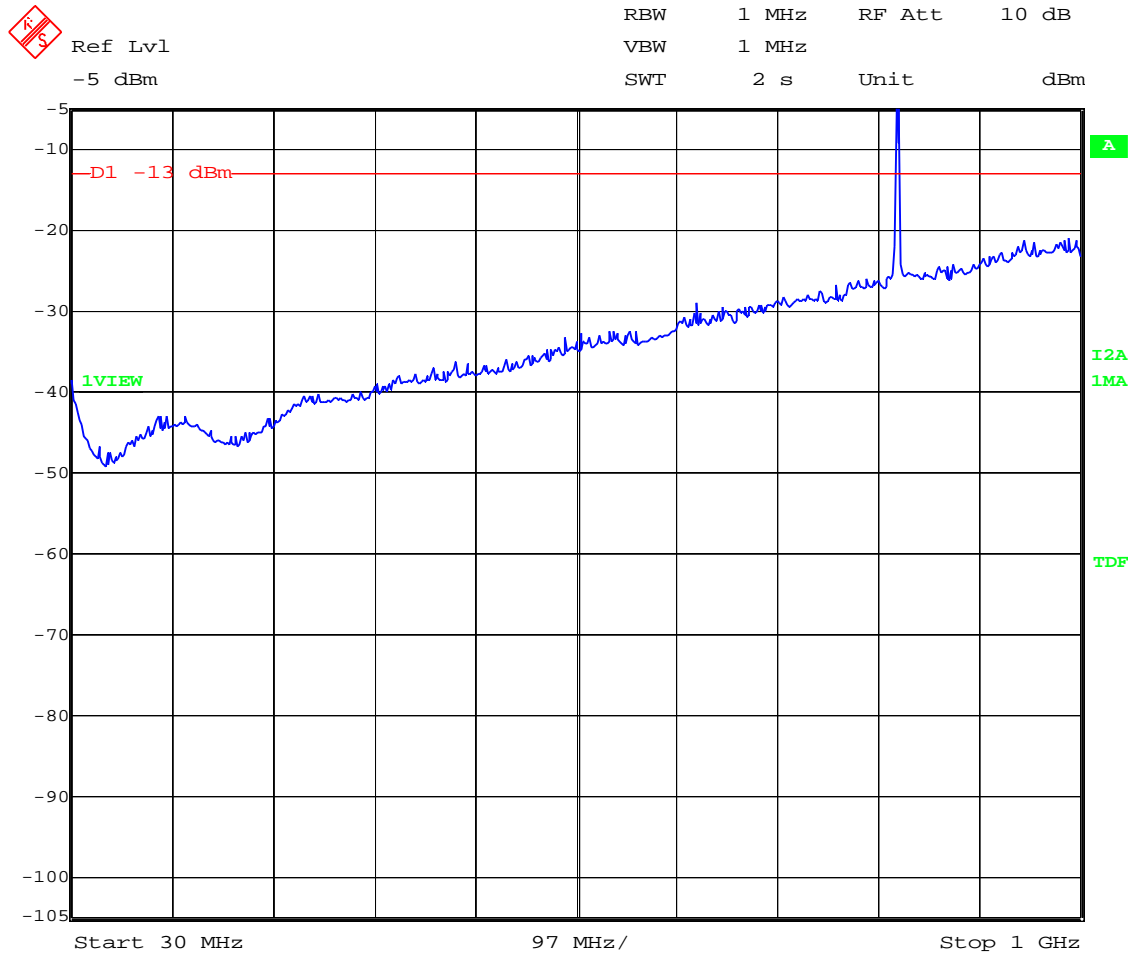
No spurious signals were found in all the range.

Verdict: PASS

Report No: 26826RET		Page: 21 of 27
Date: 2007-11-23		Annex A

FREQUENCY RANGE 30 MHz-1000 MHz.

CHANNEL: LOWEST (824.2 MHz)

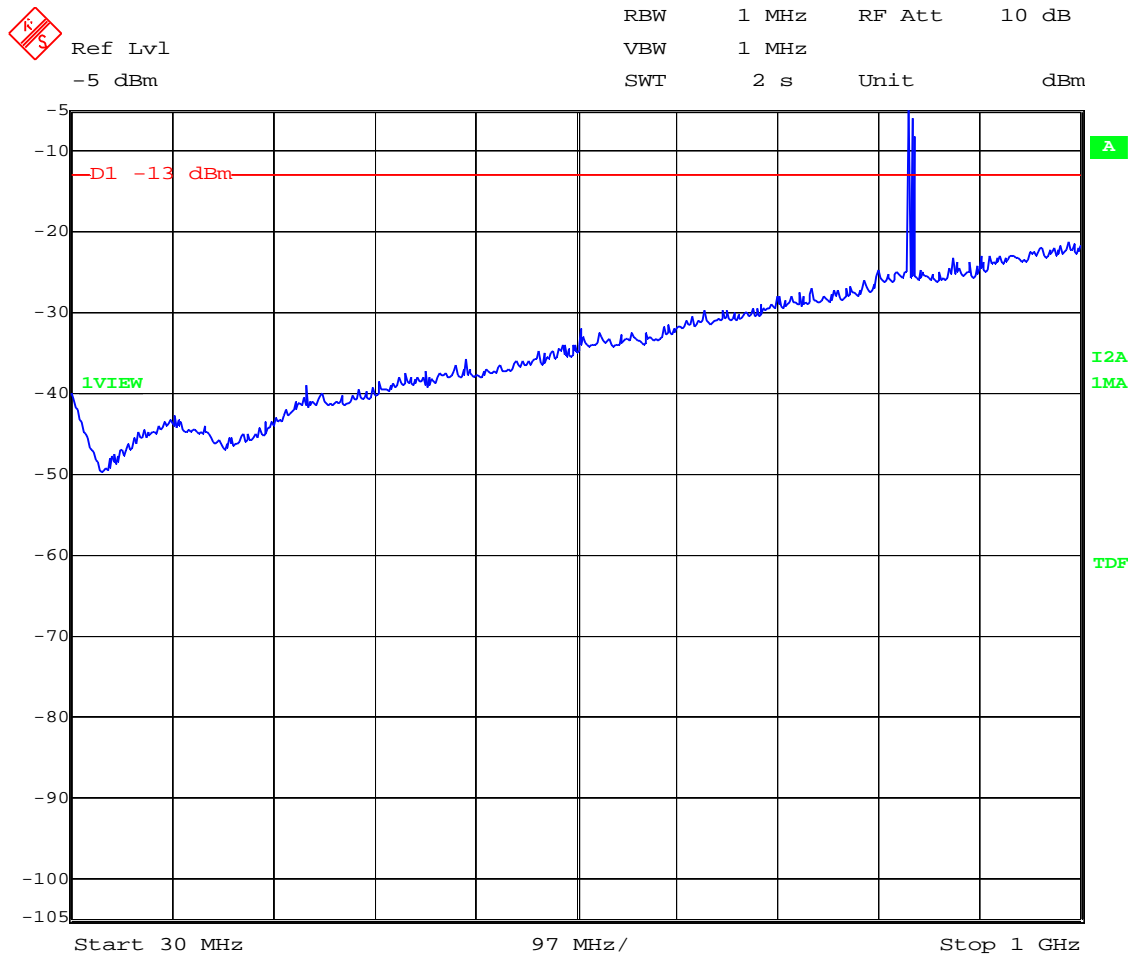


Date: 24.OCT.2007 12:35:36

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

Report No: 26826RET		Page: 22 of 27
Date: 2007-11-23		Annex A

CHANNEL: MIDDLE (836.6 MHz)

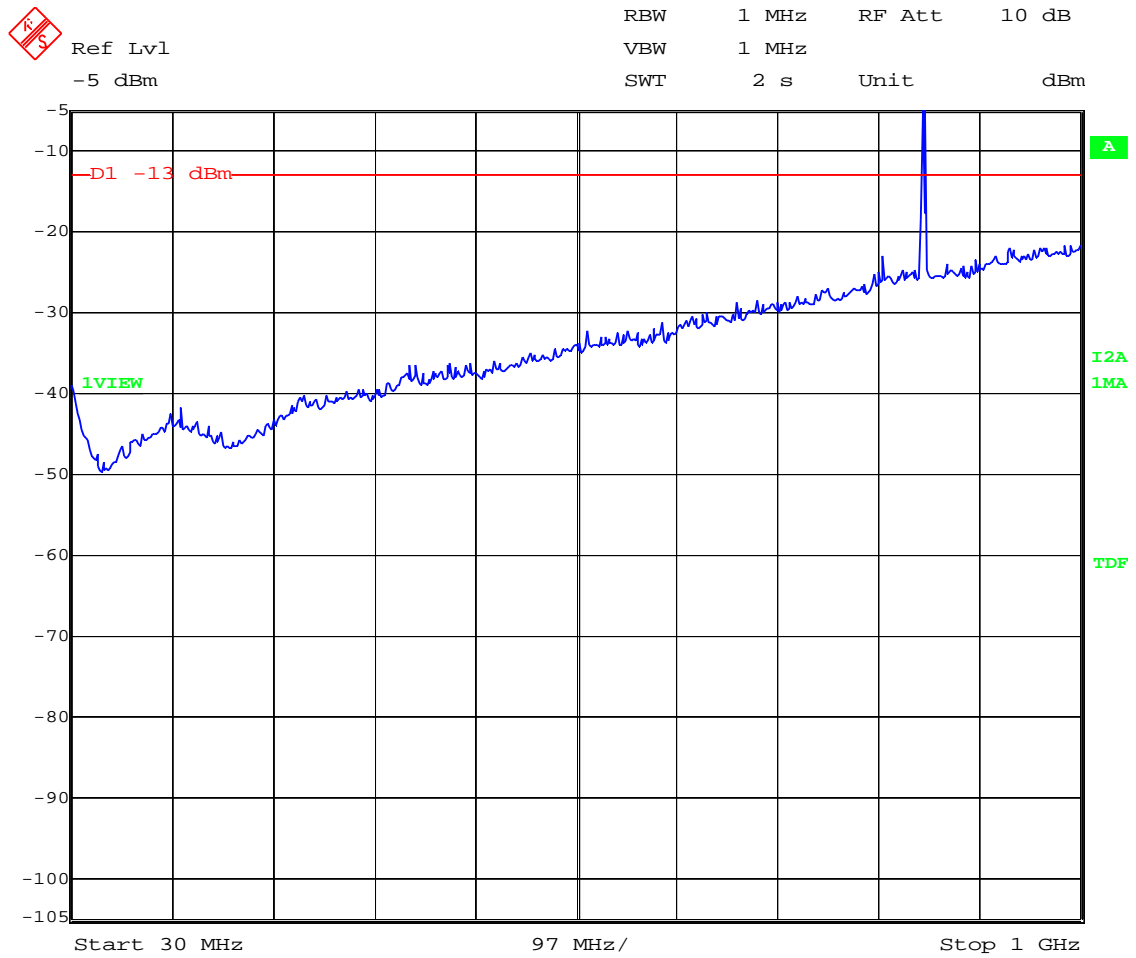


Date: 24.OCT.2007 12:37:34

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

Report No: 26826RET  Date: 2007-11-23		Page: 23 of 27  Annex A
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CHANNEL: HIGHEST (848.8 MHz)



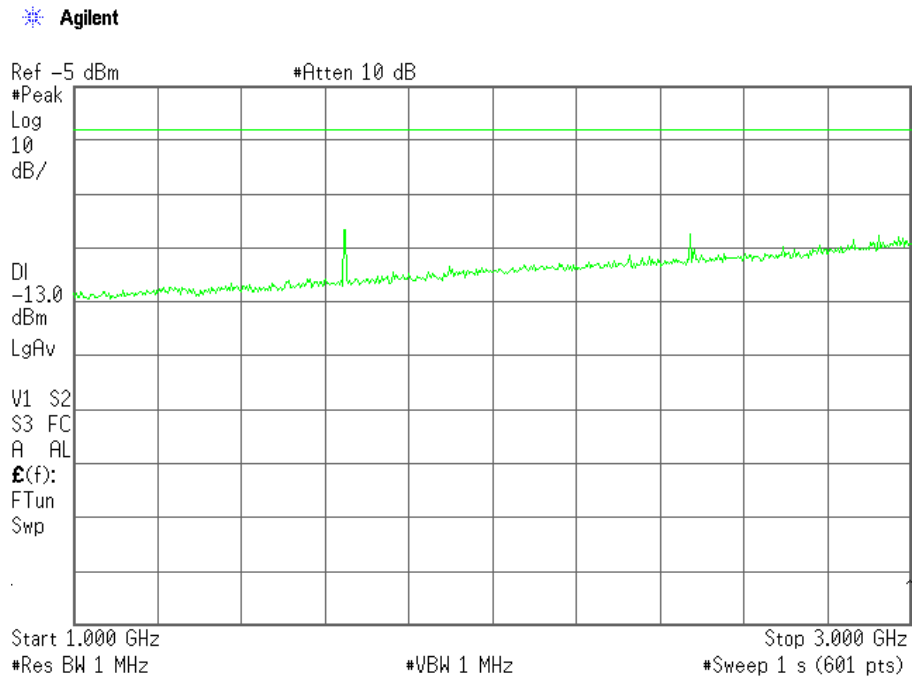
Date: 24.OCT.2007 12:39:22

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

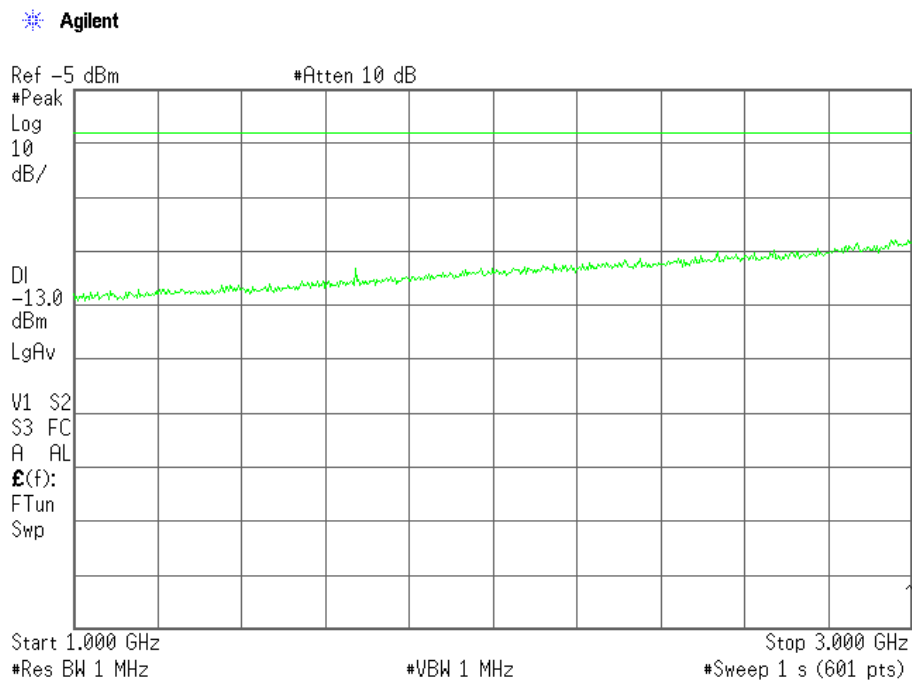
<p>Report No: 26826RET</p> <p>Date: 2007-11-23</p>		<p>Page: 24 of 27</p> <p>Annex A</p>
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FREQUENCY RANGE 1 GHz to 3 GHz.

CHANNEL: LOWEST (824.2 MHz)



CHANNEL: MIDDLE (836.6 MHz)



Report No:  
26826RET

Page: 25 of 27

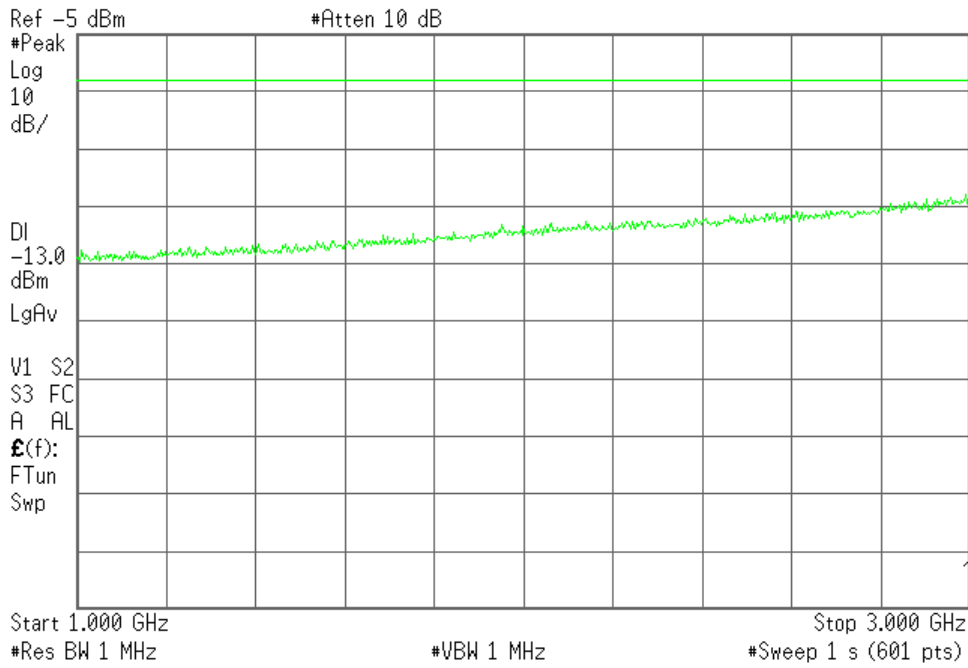
Date: 2007-11-23

Annex A



CHANNEL: HIGHEST (848.8 MHz)

✧ Agilent



Report No:  
26826RET

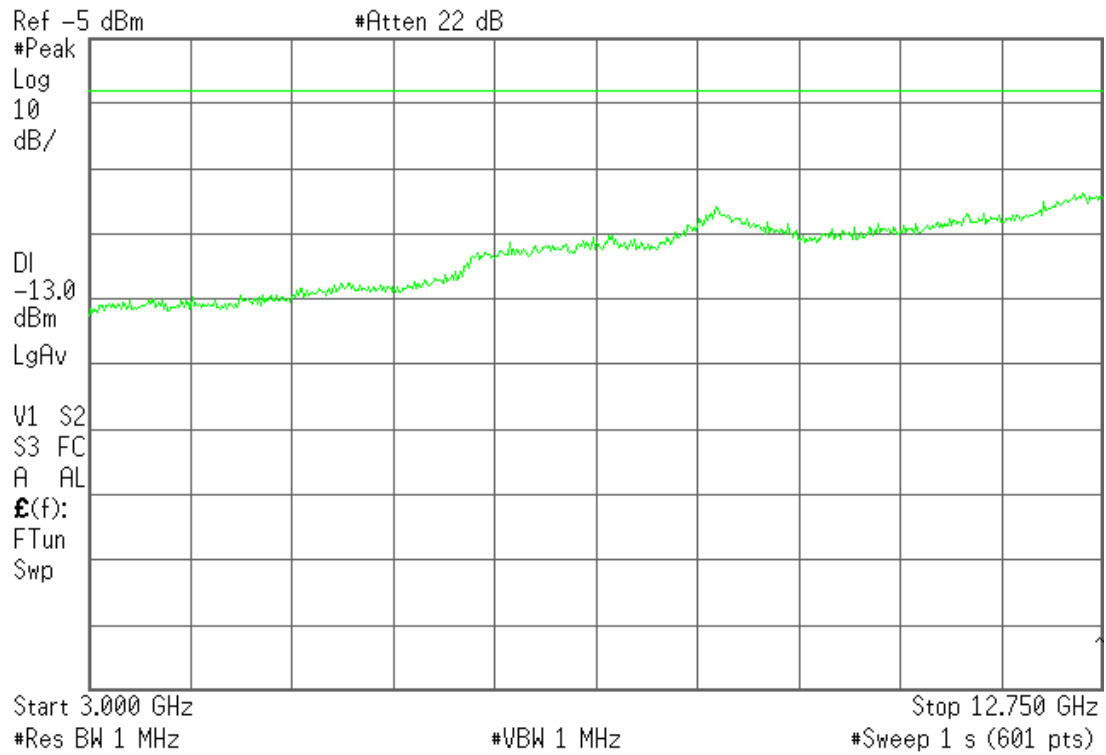
Date: 2007-11-23

Page: 26 of 27

Annex A

FREQUENCY RANGE 3 GHz to 12.75 GHz.

✦ Agilent



(This plot is valid for all three channels).

Report No:  
26826RET

Date: 2007-11-23

Page: 27 of 27

Annex A

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

**Report No: 26826RET**

Report No:  
26826RET

Date: 2007-11-23

FET45\_00.DOC

Page: 1 of 26

Annex B

## INDEX

	Page
TEST CONDITIONS .....	3
RF Output Power (conducted and E.I.R.P.) .....	4
Modulation Characteristics.....	7
Frequency Stability.....	8
Occupied Bandwidth .....	10
Spurious emissions at antenna terminals.....	15
Spurious emissions at antenna terminals at Block Edges.....	18
Radiated emissions .....	20

Report No:  
26826RET

Date: 2007-11-23

Page: 2 of 26

Annex B

## TEST CONDITIONS

Power supply (V):

$$V_{\text{nom}} = 4.0 \text{ Vdc}$$

$$V_{\text{max}} = 4.2 \text{ Vdc}$$

$$V_{\text{min}} = 3.4 \text{ Vdc}$$

The subscripts nom, min and max indicates voltage test conditions (nominal, minimum and maximum respectively, as declared by the applicant).

Type of power supply = DC Voltage from external power supply

Type of antenna = Attachable antenna with sma type connector

## TEST FREQUENCIES:

Lowest channel (512): 1850.2 MHz

Middle channel (662): 1880.2 MHz

Highest channel (810): 1909.8 MHz

Report No: 26826RET		Page: 3 of 26
Date: 2007-11-23		Annex B

## RF Output Power (conducted and 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

The conducted RF output power measurements were made at the RF output terminals of the EUT using an attenuator, power splitter and spectrum analyser. The EUT was controlled via the Universal Radio Communication tester R&S CMU200 selecting maximum transmission power of the EUT and GMSK modulated signal.

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 OUTPUT POWER (CONDUCTED). See plots in next pages.

Channel	Lowest	Middle	Highest
Maximum peak power (dBm)	29.75	29.52	29.77
Maximum peak power (W)	0.94	0.89	0.95
Measurement uncertainty (dB)	±1.5		

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

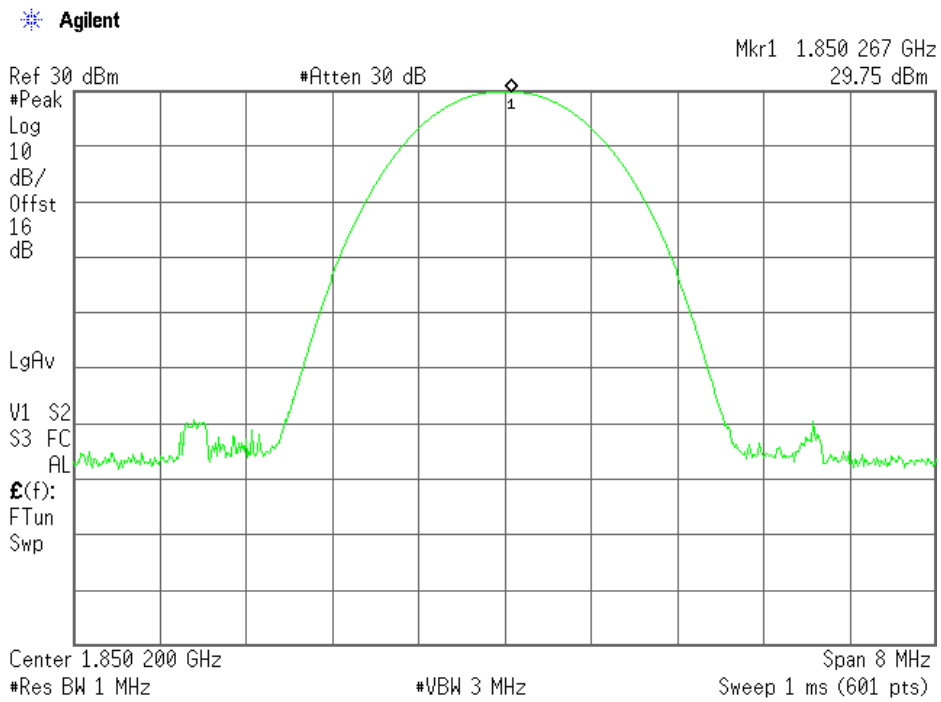
Channel	Lowest	Middle	Highest
Maximum peak power (dBm)	27.40	28.52	29.20
Maximum peak power (W)	0.55	0.71	0.83
Measurement uncertainty (dB)	± 4.0		

Verdict: PASS

Report No: 26826RET		Page: 4 of 26
Date: 2007-11-23		Annex B

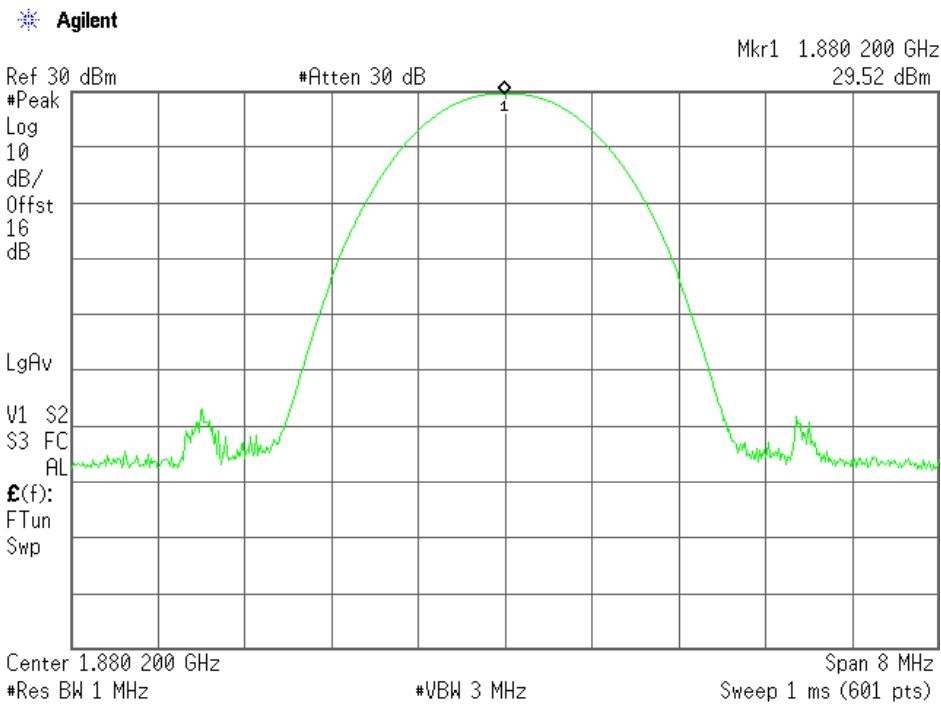
PEAK OUTPUT POWER (CONDUCTED).

Lowest Channel: 1850.2 MHz.



PEAK OUTPUT POWER (CONDUCTED).

Middle Channel: 1880.2 MHz.



Report No:  
26826RET

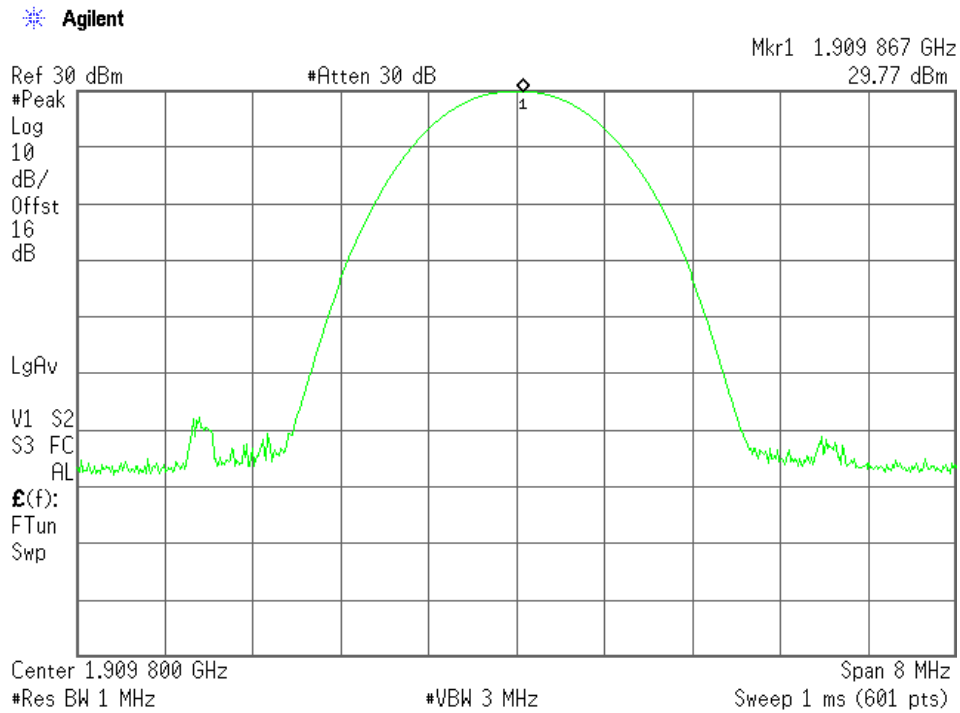
Page: 5 of 26

Date: 2007-11-23

Annex B

PEAK OUTPUT POWER (CONDUCTED).

Highest Channel: 1909.8 MHz.



Report No:  
26826RET

Date: 2007-11-23

Page: 6 of 26

Annex B



## Modulation Characteristics

### SPECIFICATION

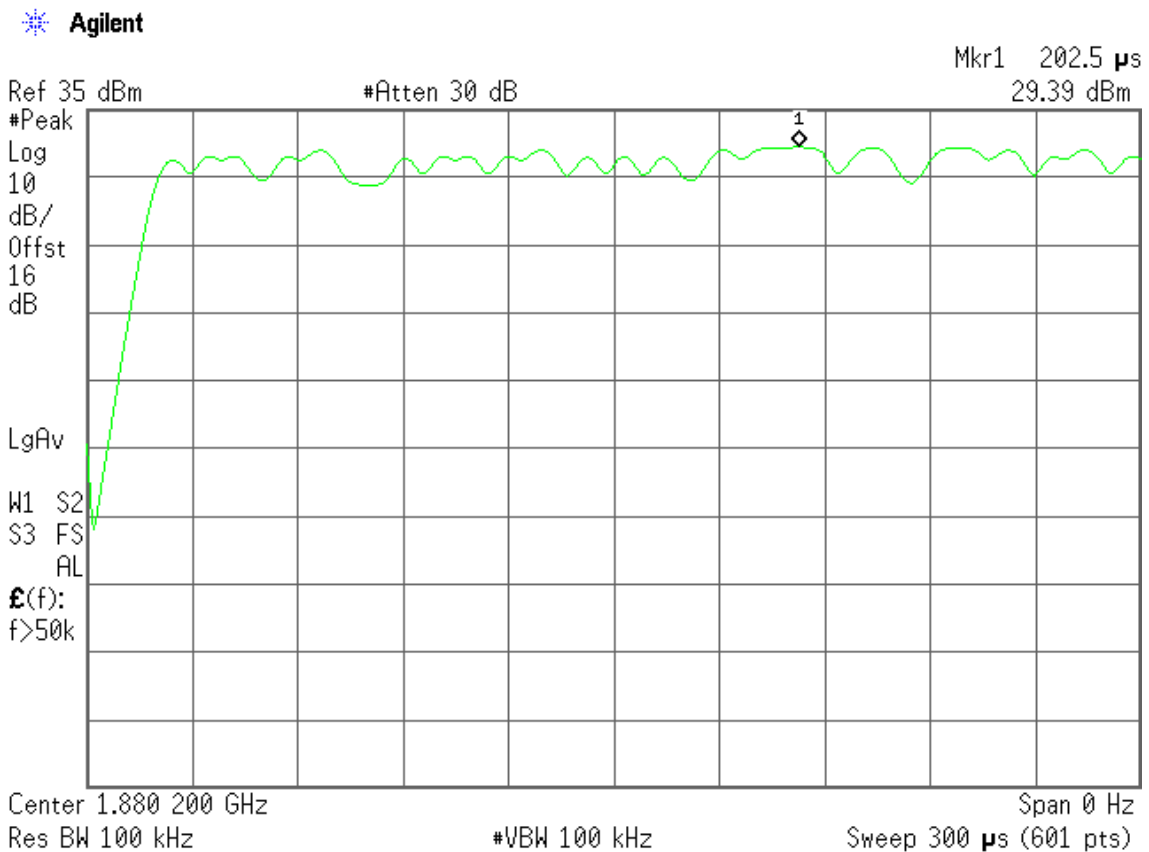
§2.1047

### METHOD

The EUT uses GMSK modulation, in which voice or data information is digitized and coded into a bit stream. The bits are conveyed through precise phase changes in the carrier.

### RESULTS

The following plot shows the modulation scheme (GMSK) in the EUT.



Report No:  
26826RET

Date: 2007-11-23

Page: 7 of 26

Annex B

## Frequency Stability

### SPECIFICATION

§2.1055 and 24.235

### METHOD

The frequency tolerance measurements over temperature variations were made over the temperature range of  $-30^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$ . The EUT was placed inside a climatic chamber and the temperature was raised hourly in  $10^{\circ}\text{C}$  steps from  $-30^{\circ}\text{C}$  up to  $+50^{\circ}\text{C}$ .

The frequency tolerance measurements over voltage variations were made at room temperature and at the  $V_{\text{max}}$  and  $V_{\text{min}}$  supply voltages as declared by the applicant.

The EUT was set in “call mode” in the middle channel 662 (1880.2 MHz) using the Universal Radio Communication tester R&S CMU200, and the maximum frequency error was measured using the frequency meter of CMU200.

### RESULTS

Frequency stability over temperature variations.

Temperature ( $^{\circ}\text{C}$ )	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
+50	-14	-0.0074	-0.00000074
+40	-20	-0.0106	-0.00000106
+30	-11	-0.0059	-0.00000059
+20	-6	-0.0032	-0.00000032
+10	-8	-0.0043	-0.00000043
0	-11	-0.0059	-0.00000059
-10	-2	-0.0011	-0.00000011
-20	-9	-0.0048	-0.00000048
-30	-13	-0.0069	-0.00000069

Report No: 26826RET		Page: 8 of 26
Date: 2007-11-23		Annex B

Frequency stability over voltage variations.

<b>Battery Supply voltage</b>	<b>Voltage (V)</b>	<b>Frequency Error (Hz)</b>	<b>Frequency Error (ppm)</b>	<b>Frequency Error (%)</b>
Vmax	4.2	-16	-0.0085	-0.00000085
Vmin	3.4	-8	-0.0043	-0.00000043

## Occupied Bandwidth

### SPECIFICATION

§2.1049

### METHOD

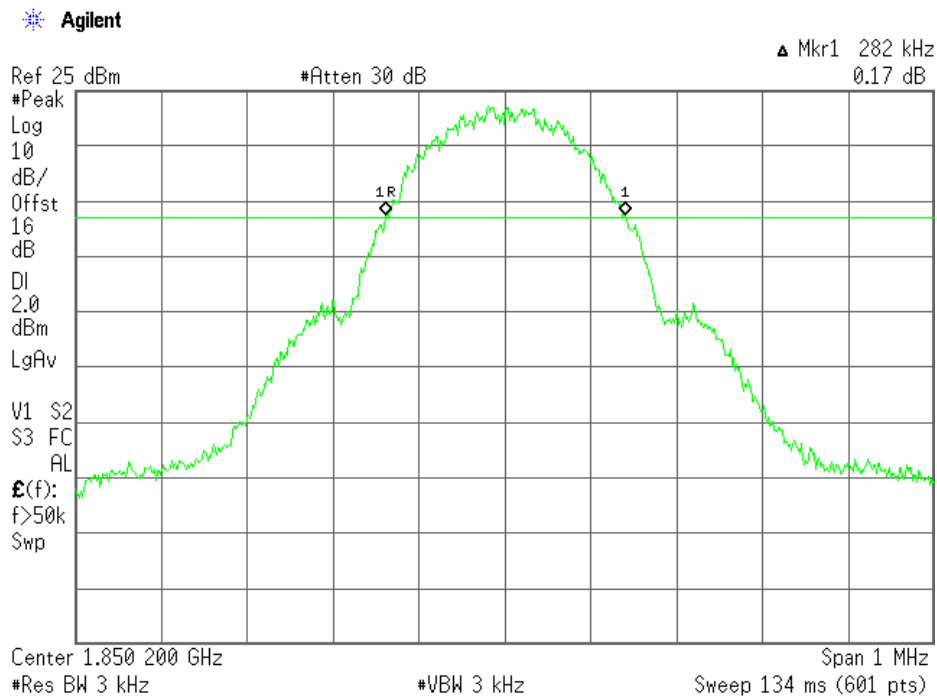
The EUT was configured to transmit a GMSK modulated carrier signal. An IF bandwidth of 3 kHz was used to determine the occupied bandwidth of the modulated emission.

### RESULTS

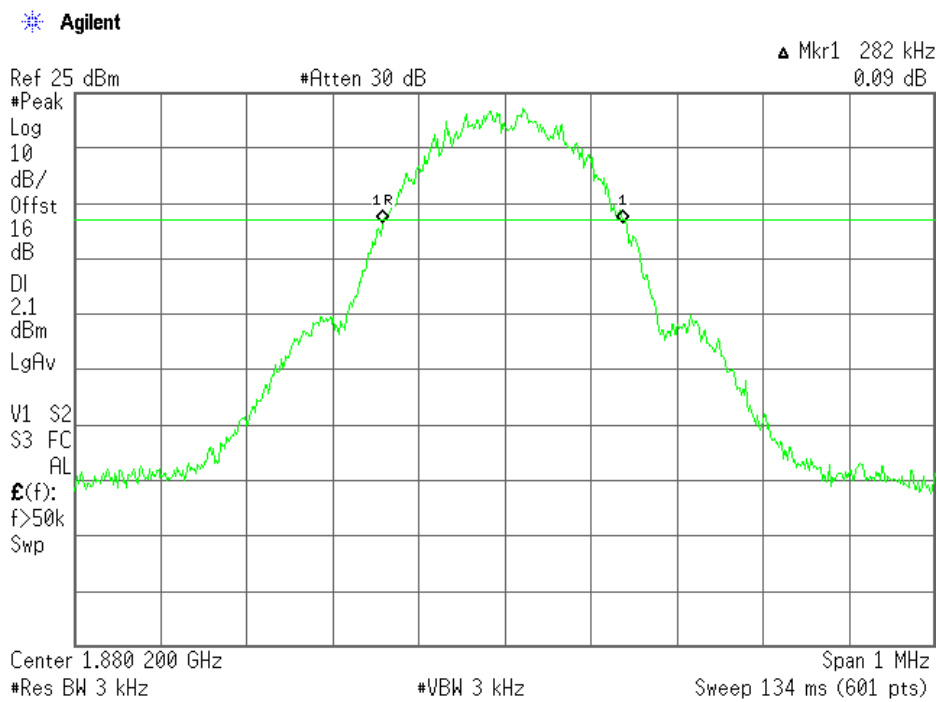
Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	282	282	282
-26 dBc bandwidth (kHz)	321	319	319
Measurement uncertainty (Hz)	<±40		

### 99% OCCUPIED BANDWIDTH

Lowest Channel: 1850.2 MHz.

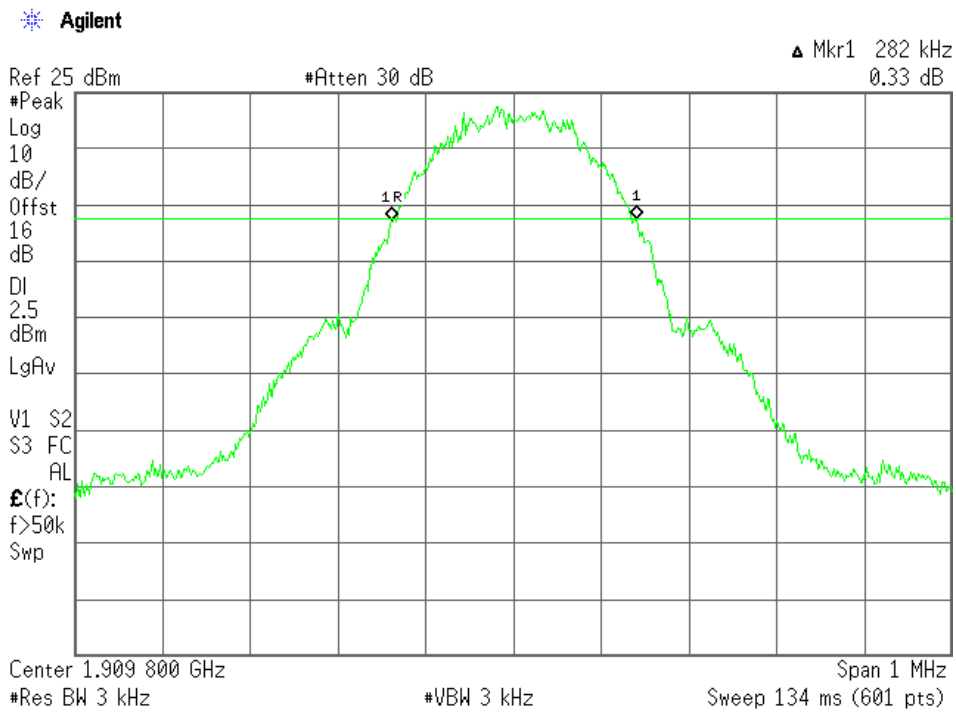


Middle Channel: 1880.2 MHz.



<p>Report No: 26826RET</p> <p>Date: 2007-11-23</p>		<p>Page: 11 of 26</p> <p>Annex B</p>
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Highest Channel: 1909.8 MHz.



Report No:  
26826RET

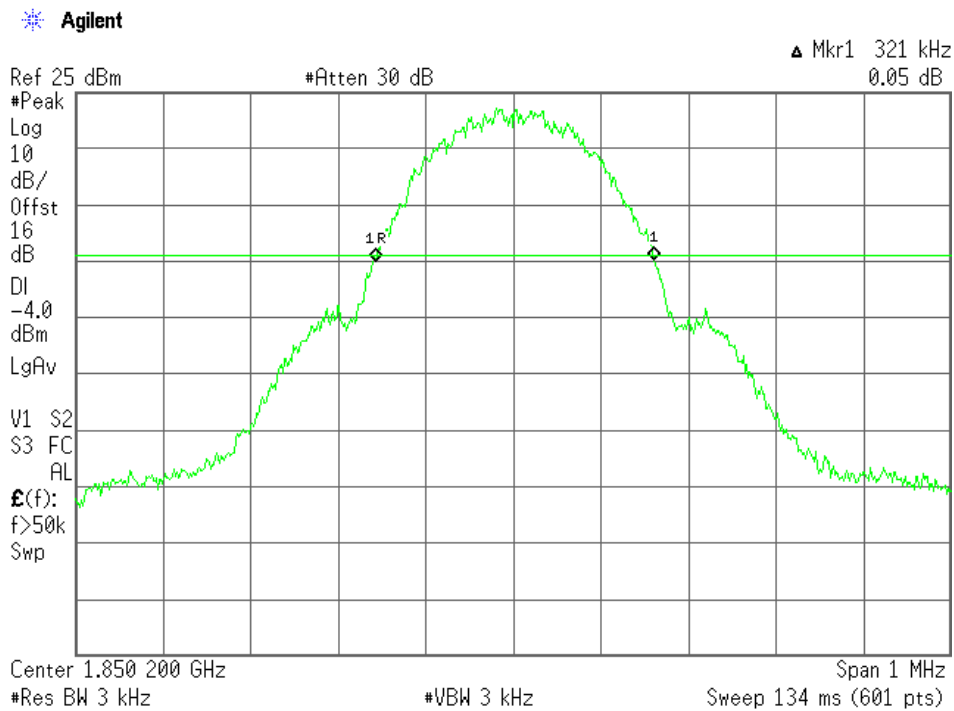
Page: 12 of 26

Date: 2007-11-23

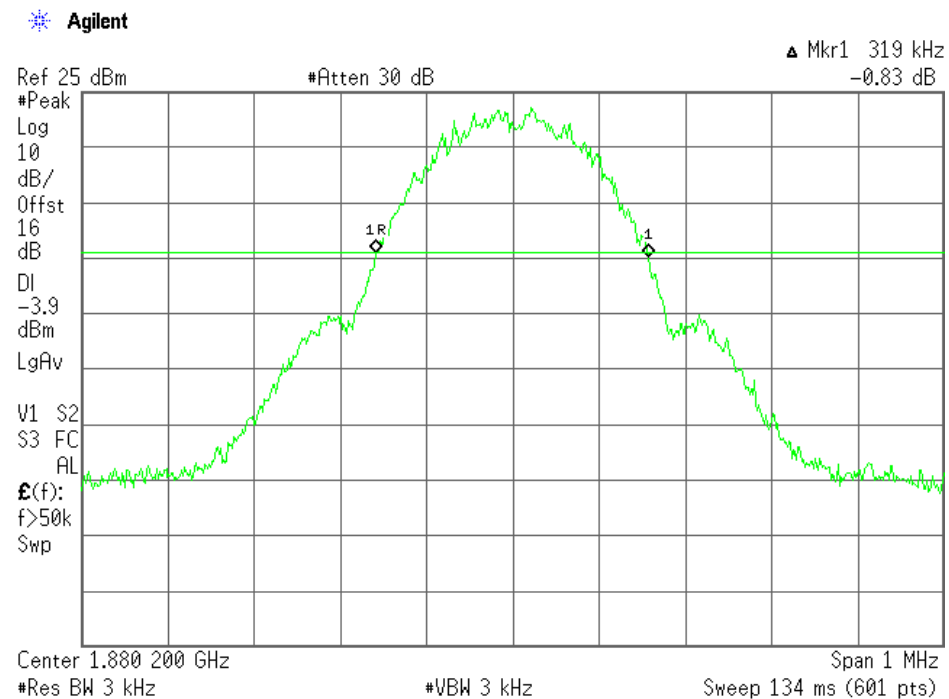
Annex B

-26 dBc BANDWIDTH

Lowest Channel: 1850.2 MHz.



Middle Channel: 1880.2 MHz.



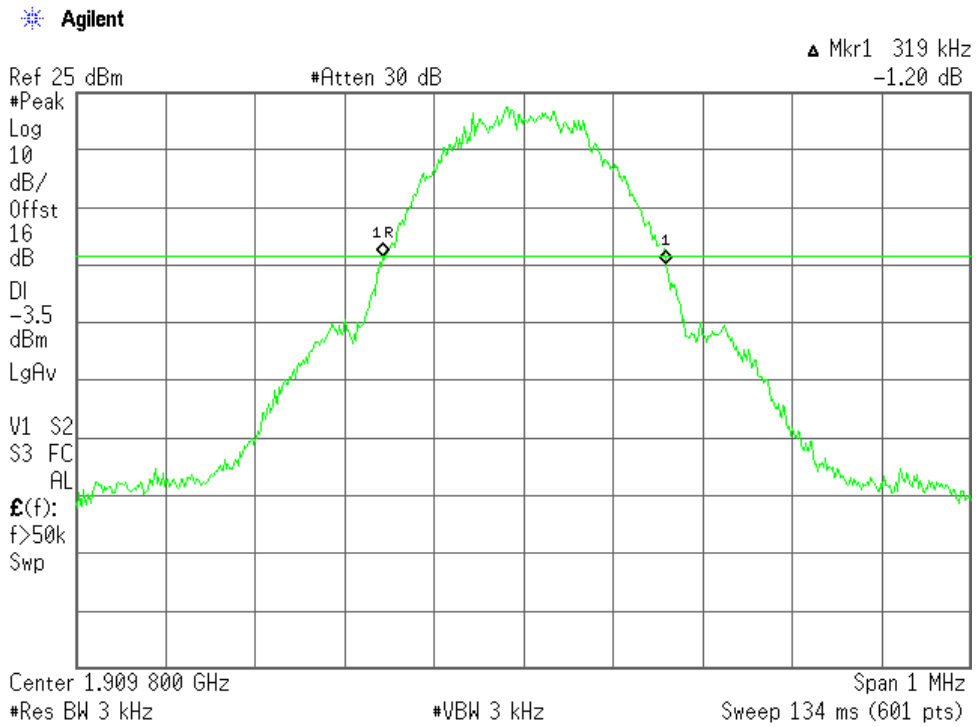
Report No:  
26826RET

Page: 13 of 26

Date: 2007-11-23

Annex B

Highest Channel: 1909.8 MHz.



Report No:  
26826RET

Page: 14 of 26

Date: 2007-11-23

Annex B



## Spurious emissions at antenna terminals

### SPECIFICATION

§2.1051 and §24.238

### METHOD

The EUT RF output connector was connected to an spectrum analyser using an 50 ohm attenuator and the resolution bandwidth of the spectrum analyser was set to 1 MHz. The spectrum was investigated from 30 MHz to 20 GHz.

The reading of the spectrum analyser is corrected with the attenuation loss of connection between output terminal of EUT and input of the spectrum analyser.

#### 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:

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

### RESULTS (see plots in next pages)

1. CHANNEL: LOWEST (1850.2 MHz).

No spurious signals were found in all the range.

2. CHANNEL: MIDDLE (1880.2 MHz).

No spurious signals were found in all the range.

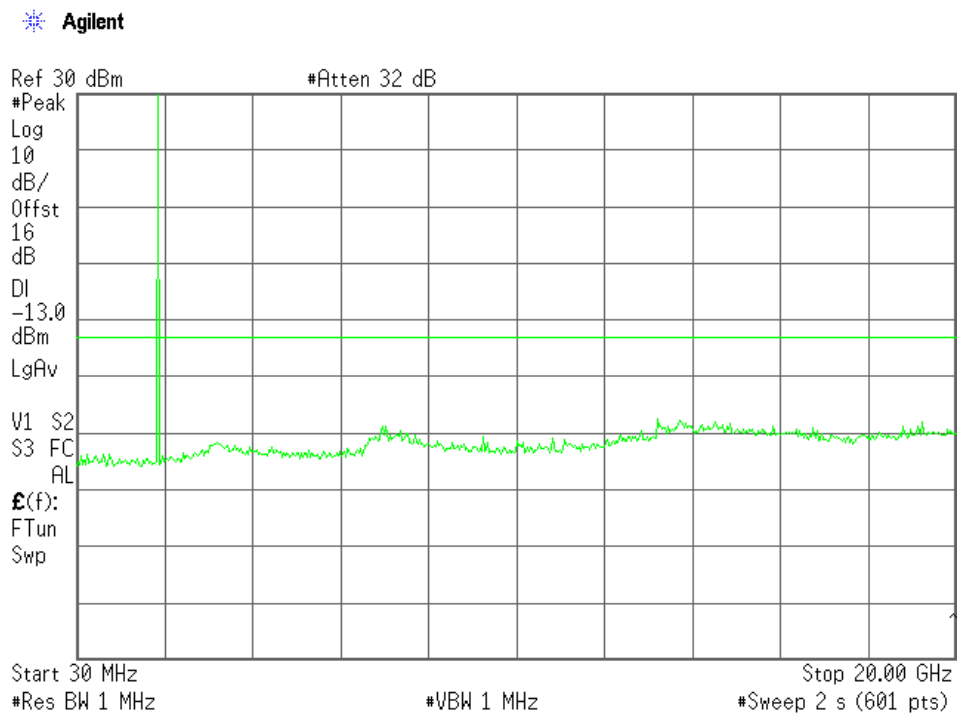
3. CHANNEL: HIGHEST (1909.8 MHz).

No spurious signals were found in all the range.

Verdict: PASS

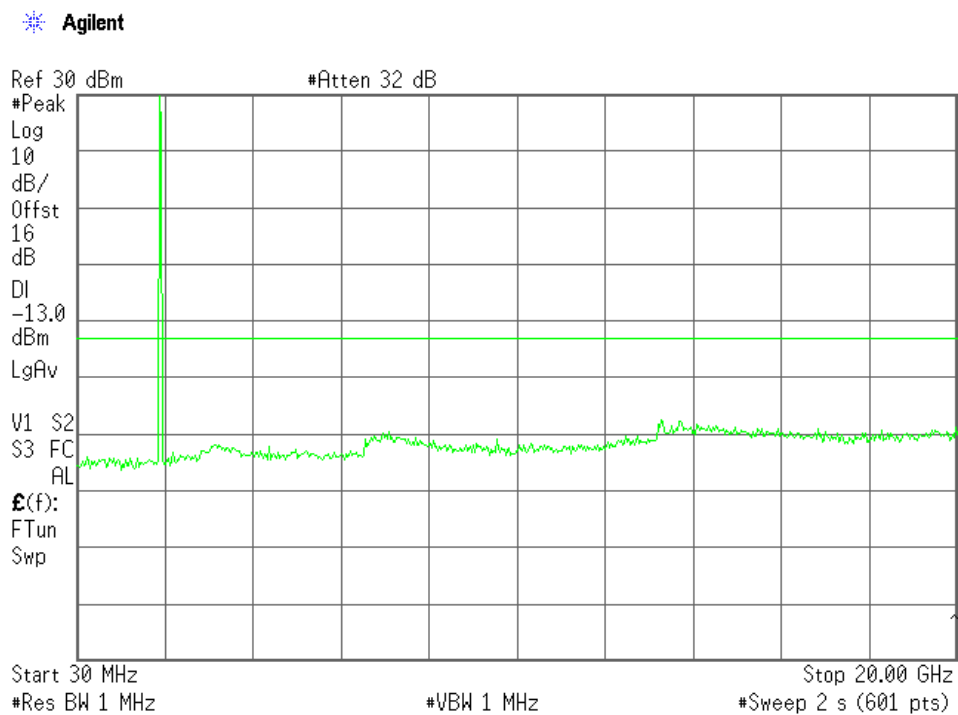
Report No: 26826RET		Page: 15 of 26
Date: 2007-11-23		Annex B

1. CHANNEL: LOWEST (1850.2 MHz).



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

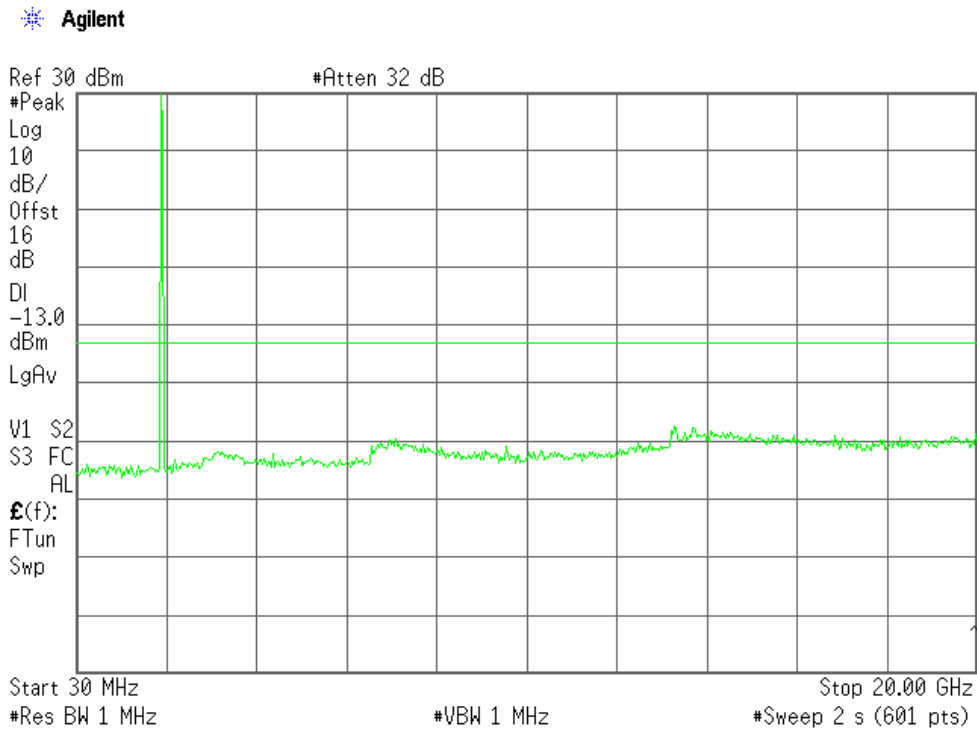
2. CHANNEL: MIDDLE (1880.2 MHz).



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

<p>Report No: 26826RET</p> <p>Date: 2007-11-23</p>		<p>Page: 16 of 26</p> <p>Annex B</p>
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3. CHANNEL: HIGHEST (1909.8 MHz).



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

## Spurious emissions at antenna terminals at Block Edges

### SPECIFICATION

§2.1051 and §24.238

### METHOD

As indicated in FCC part 24, 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 resolution bandwidth of 3.3 kHz was used.

#### 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.

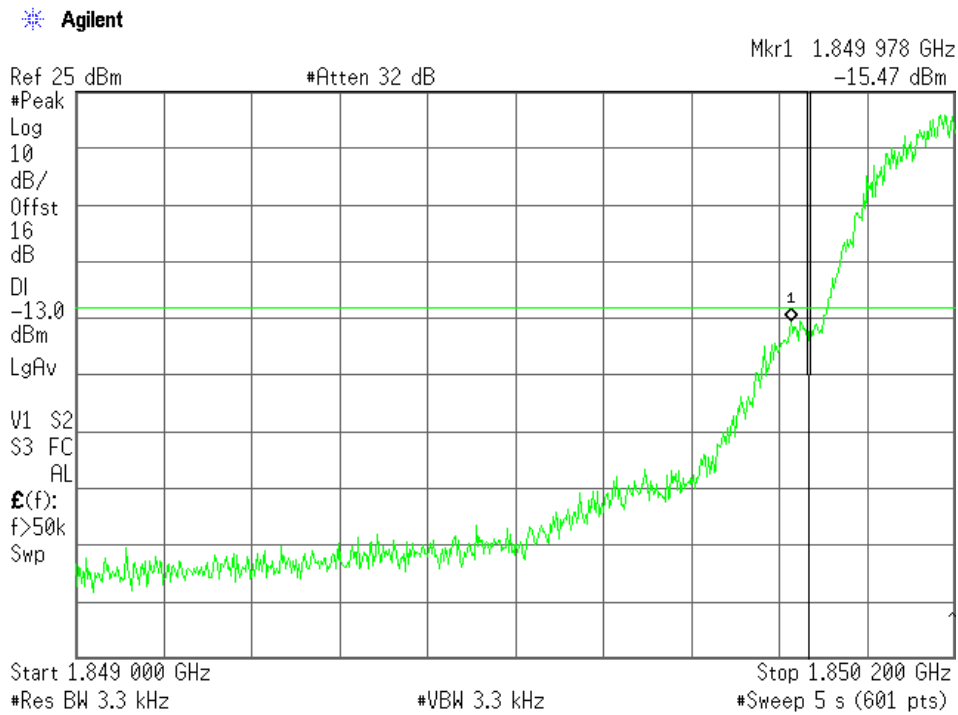
At  $P_o$  transmitting power, the specified minimum attenuation becomes  $43+10\log (P_o)$ , and the level in dBm relative  $P_o$  becomes:

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

### RESULTS (see plots in next pages)

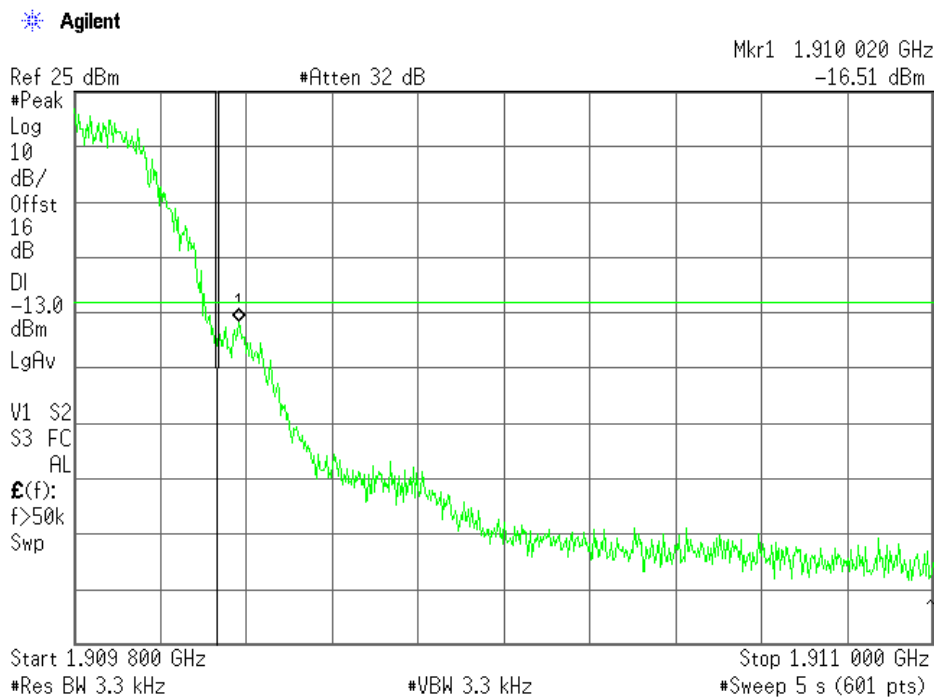
Report No: 26826RET		Page: 18 of 26
Date: 2007-11-23		Annex B

BLOCK A. CHANNEL LOWEST (1850.2 MHz).



NOTE: The equipment transmits at the maximum output power (PCL = 0).

BLOCK C. CHANNEL HIGHEST (1909.8 MHz).



NOTE: The equipment transmits at the maximum output power (PCL = 0).

Verdict: PASS

Report No: 26826RET  Date: 2007-11-23		Page: 19 of 26  Annex B
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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:

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

Report No: 26826RET		Page: 20 of 26
Date: 2007-11-23		Annex B

RESULTS

1. CHANNEL: LOWEST (1850.2MHz).

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

No spurious signals were found in all the range.

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

No spurious signals were found in all the range.

2. CHANNEL: MIDDLE (1880.2 MHz).

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

No spurious signals were found in all the range.

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

No spurious signals were found in all the range.

3. CHANNEL: HIGHEST (1909.8 MHz).

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

No spurious signals were found in all the range.

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

No spurious signals were found in all the range.

Verdict: PASS

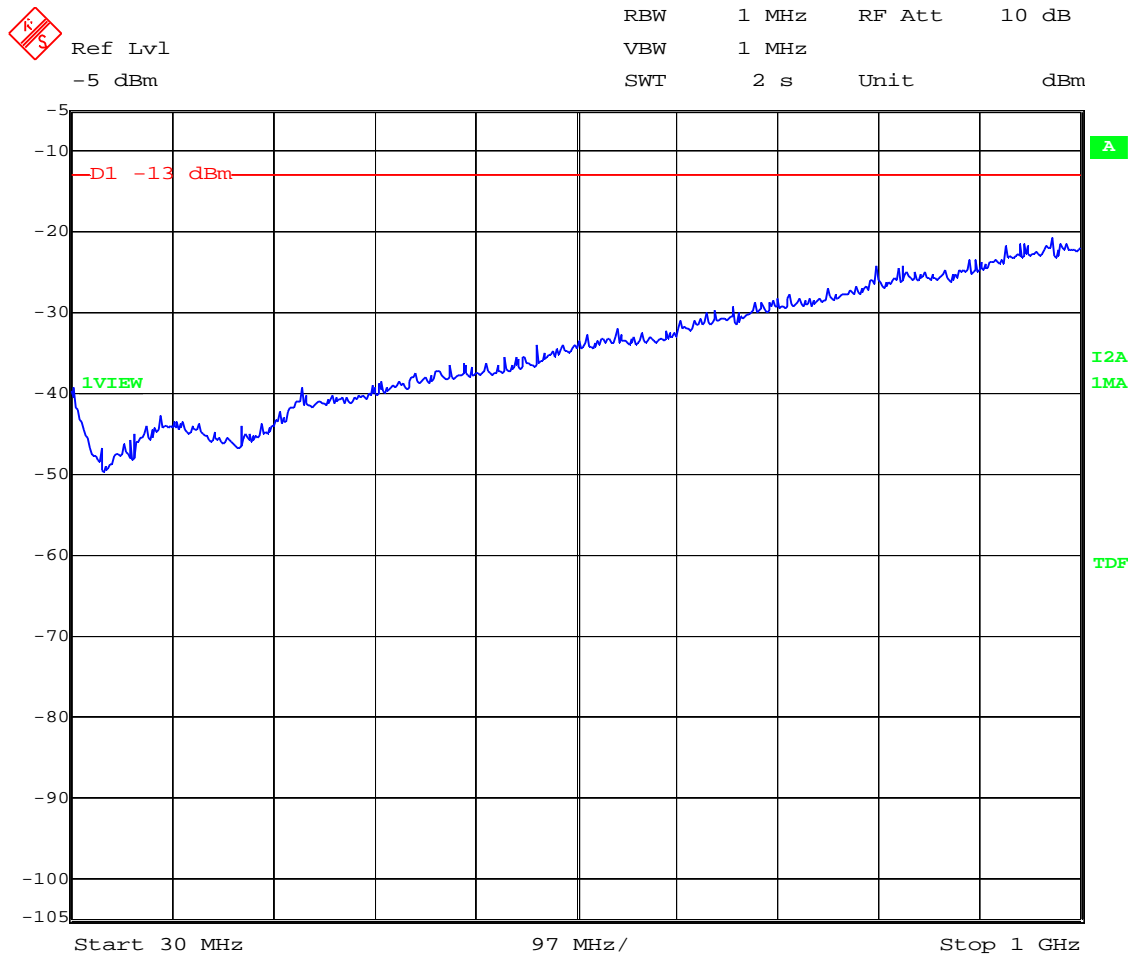
Report No:  
26826RET

Date: 2007-11-23

Page: 21 of 26

Annex B

FREQUENCY RANGE 30 MHz-1000 MHz.



Date: 25.OCT.2007 07:54:34

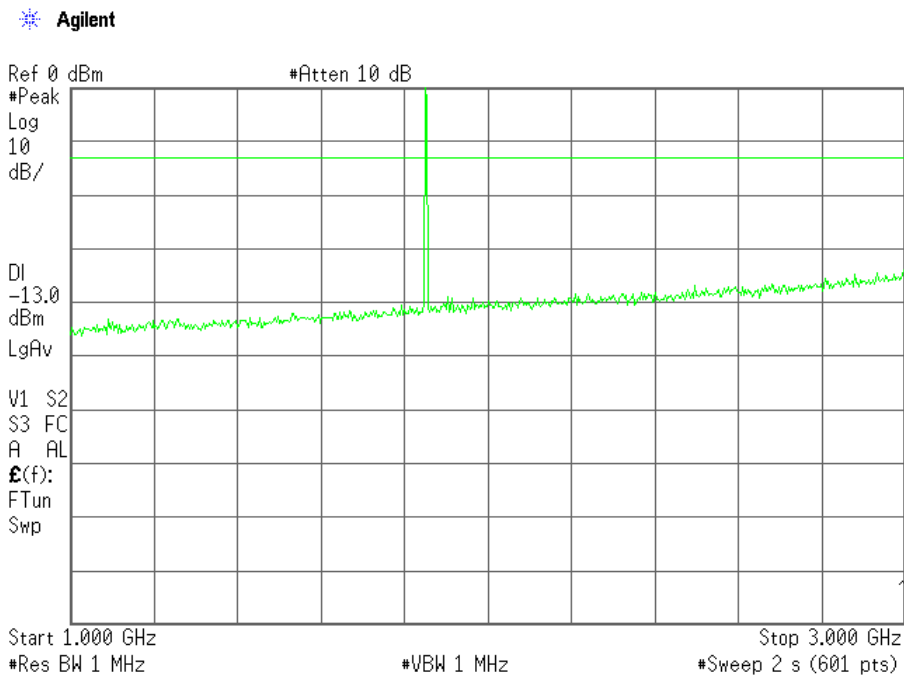
(This plot is valid for all three channels).

Report No: 26826RET		Page: 22 of 26
Date: 2007-11-23		Annex B



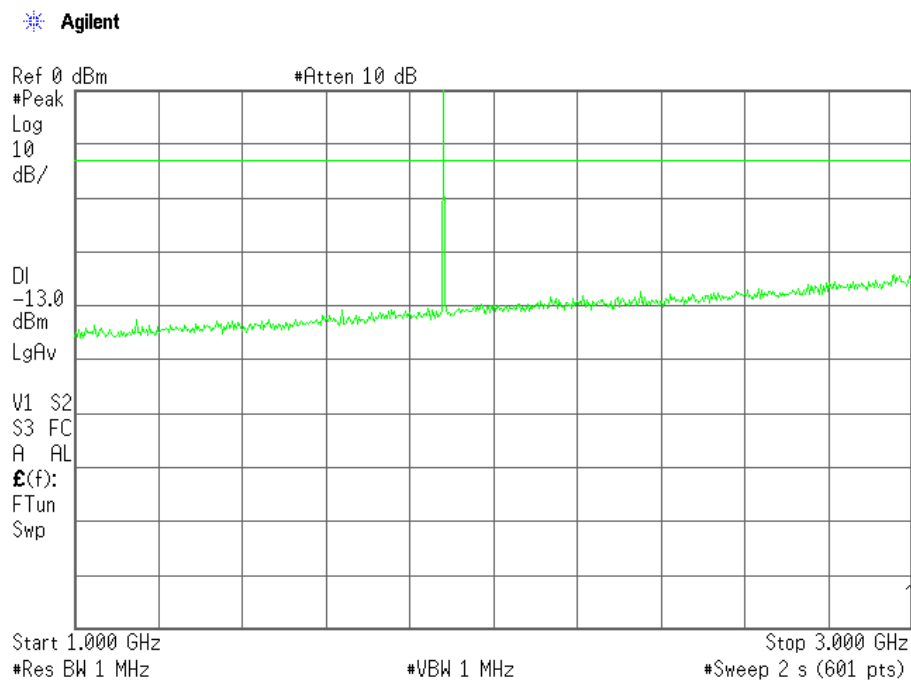
FREQUENCY RANGE 1 GHz to 3 GHz.

CHANNEL: LOWEST (1850.2 MHz)



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

CHANNEL: MIDDLE (1880.2 MHz)



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

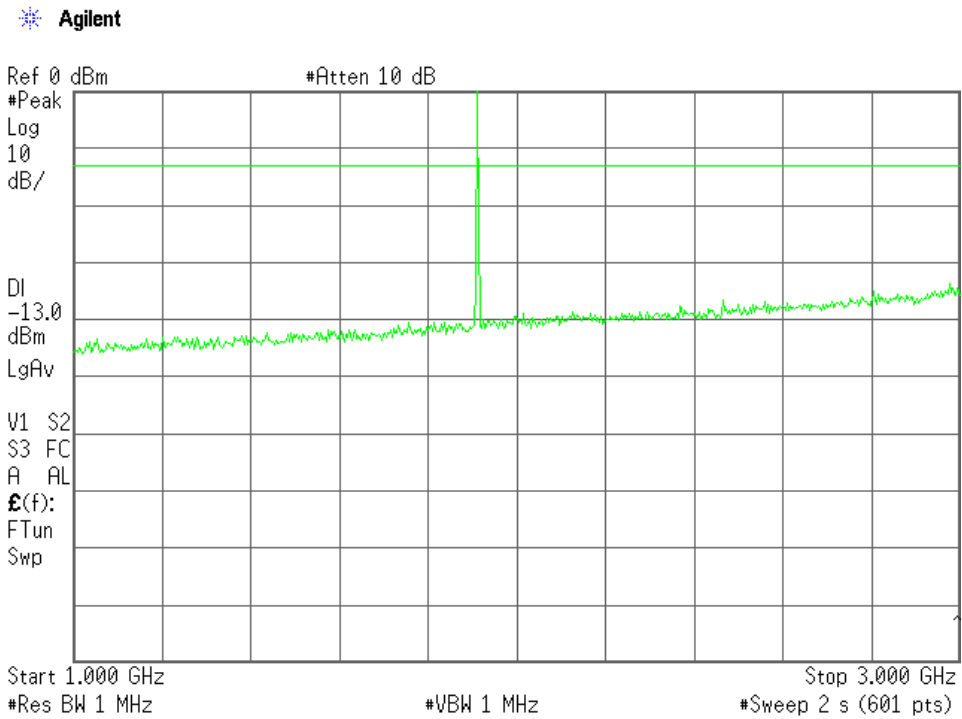
Report No:  
26826RET

Page: 23 of 26

Date: 2007-11-23

Annex B

CHANNEL: HIGHEST (1909.8 MHz)



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

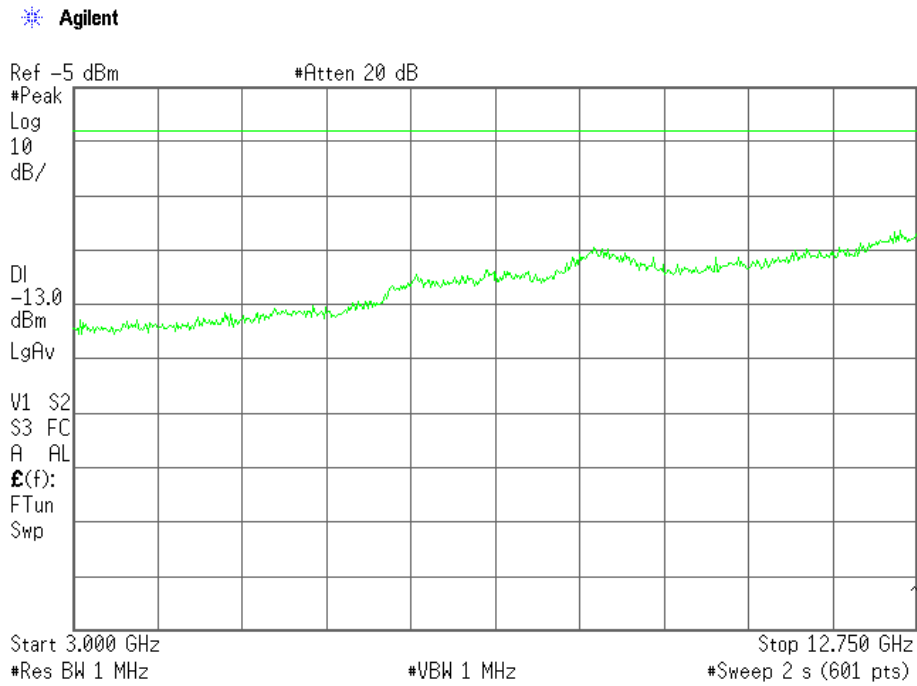
Report No:  
26826RET

Date: 2007-11-23

Page: 24 of 26

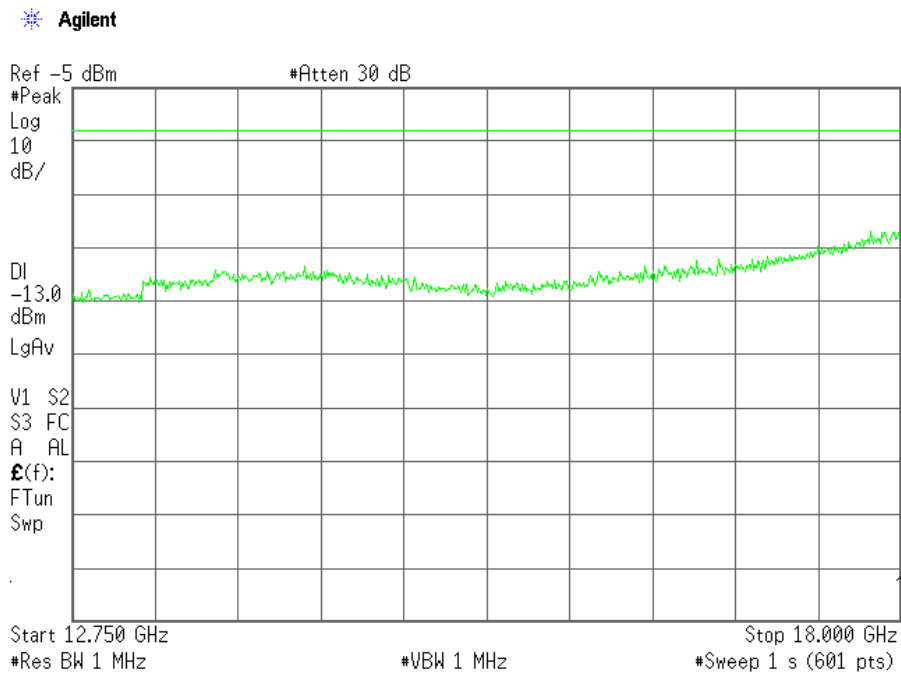
Annex B

FREQUENCY RANGE 3 GHz to 12.75 GHz.



(This plot is valid for all three channels).

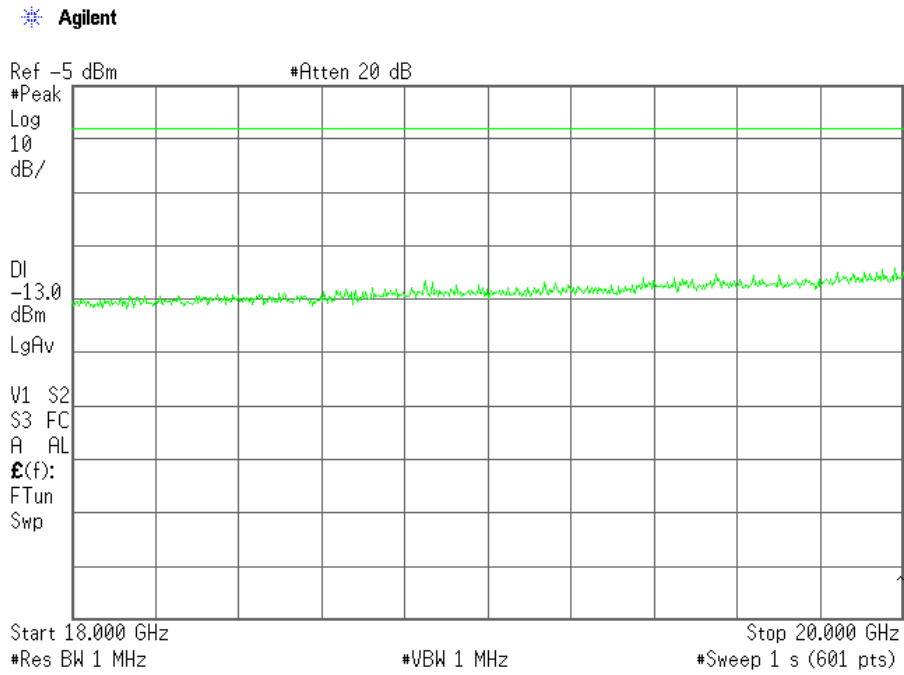
FREQUENCY RANGE 12.75 GHz TO 18 GHz.



(This plot is valid for all three channels).

Report No: 26826RET  Date: 2007-11-23		Page: 25 of 26  Annex B
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FREQUENCY RANGE 18 GHz TO 20 GHz.



(This plot is valid for all three channels).

## **ANNEX C**

### **PHOTOGRAPHS (Number of photographs: 7)**

**Report No.: 26826RET**

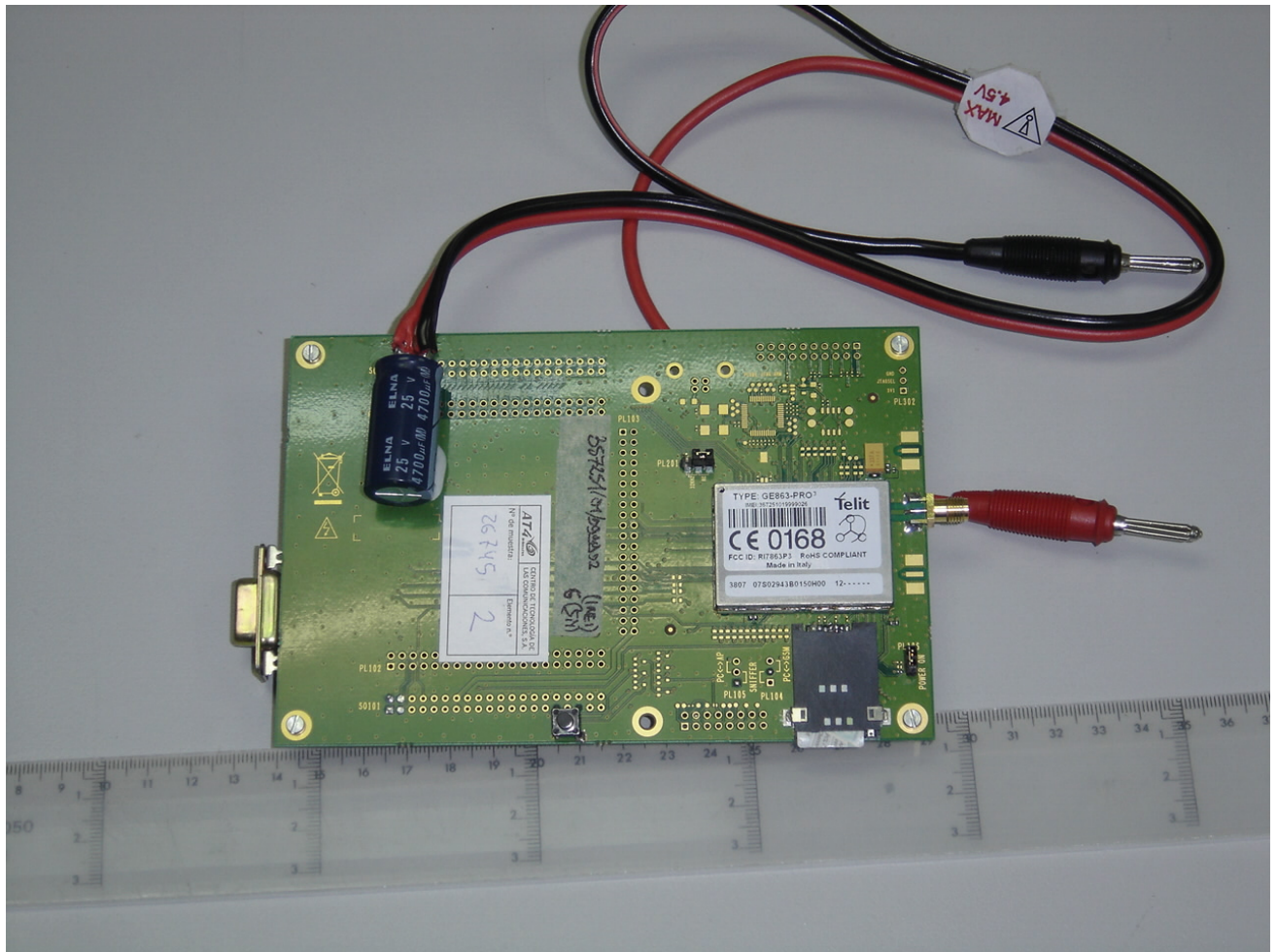
Report No.:  
26826RET

Date: 2007-11-23

Page: 1 of 8

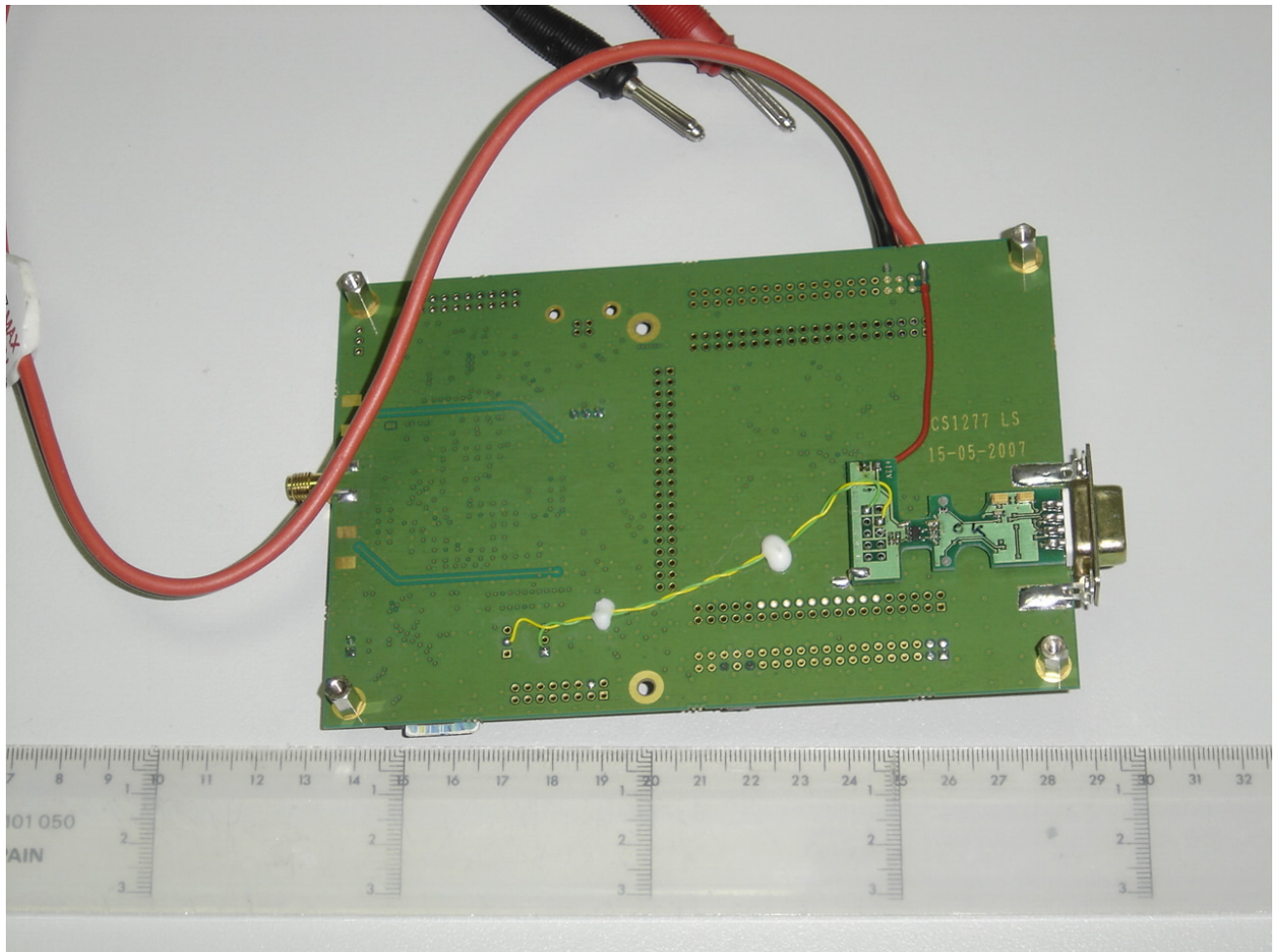
Annex C

1. Equipment (front view)



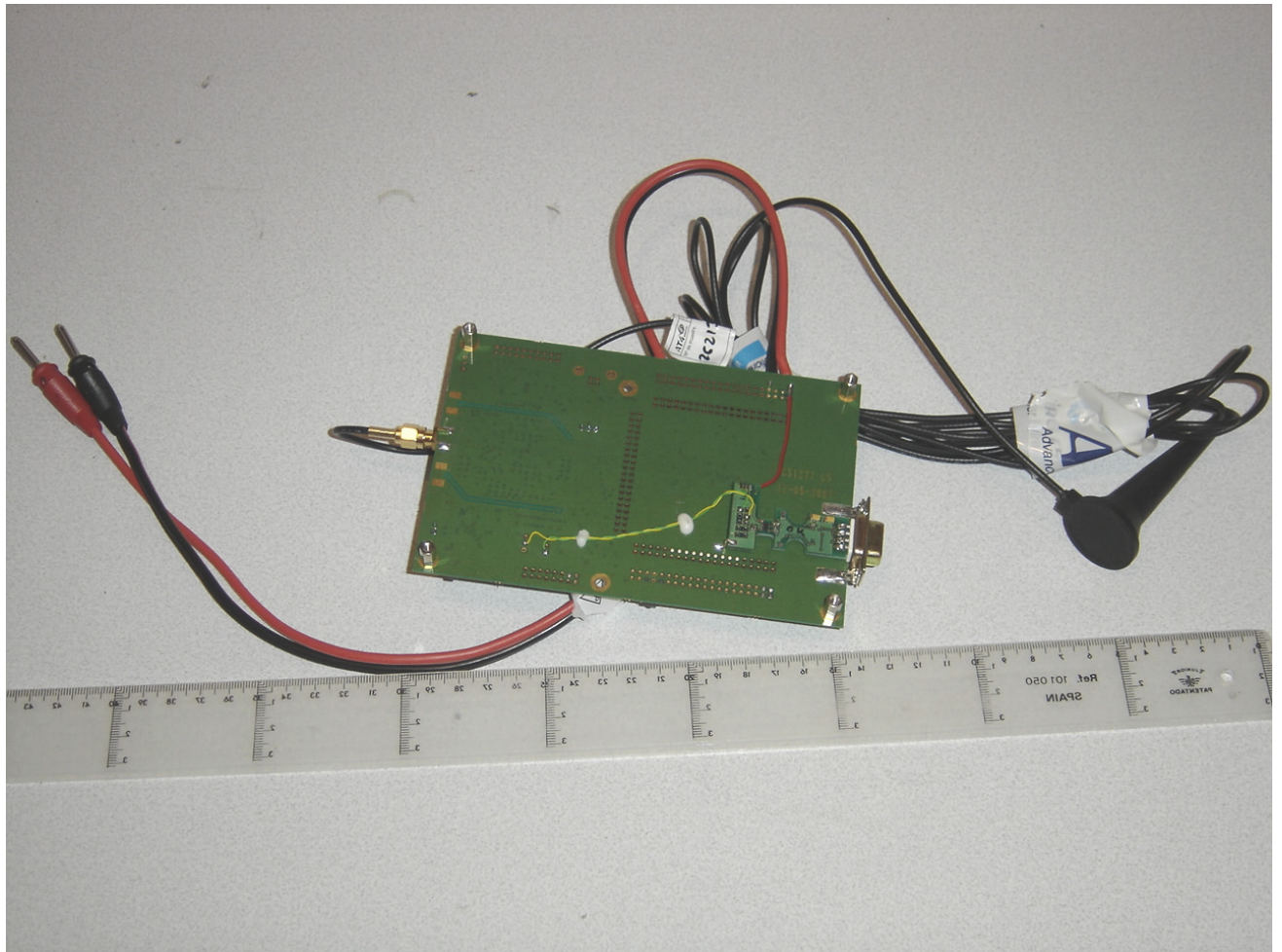
Report No.: 26826RET		Page: 2 of 8
Date: 2007-11-23		Annex C

2. Equipment (back view)



Report No.: 26826RET		Page: 3 of 8
Date: 2007-11-23		Annex C

### 3. Equipment for radiated measurements



Report No.:  
26826RET

Date: 2007-11-23

FET18\_00.DOC

Page: 4 of 8

Annex C



4. General test set-up for radiated measurements.



Report No.:  
26826RET

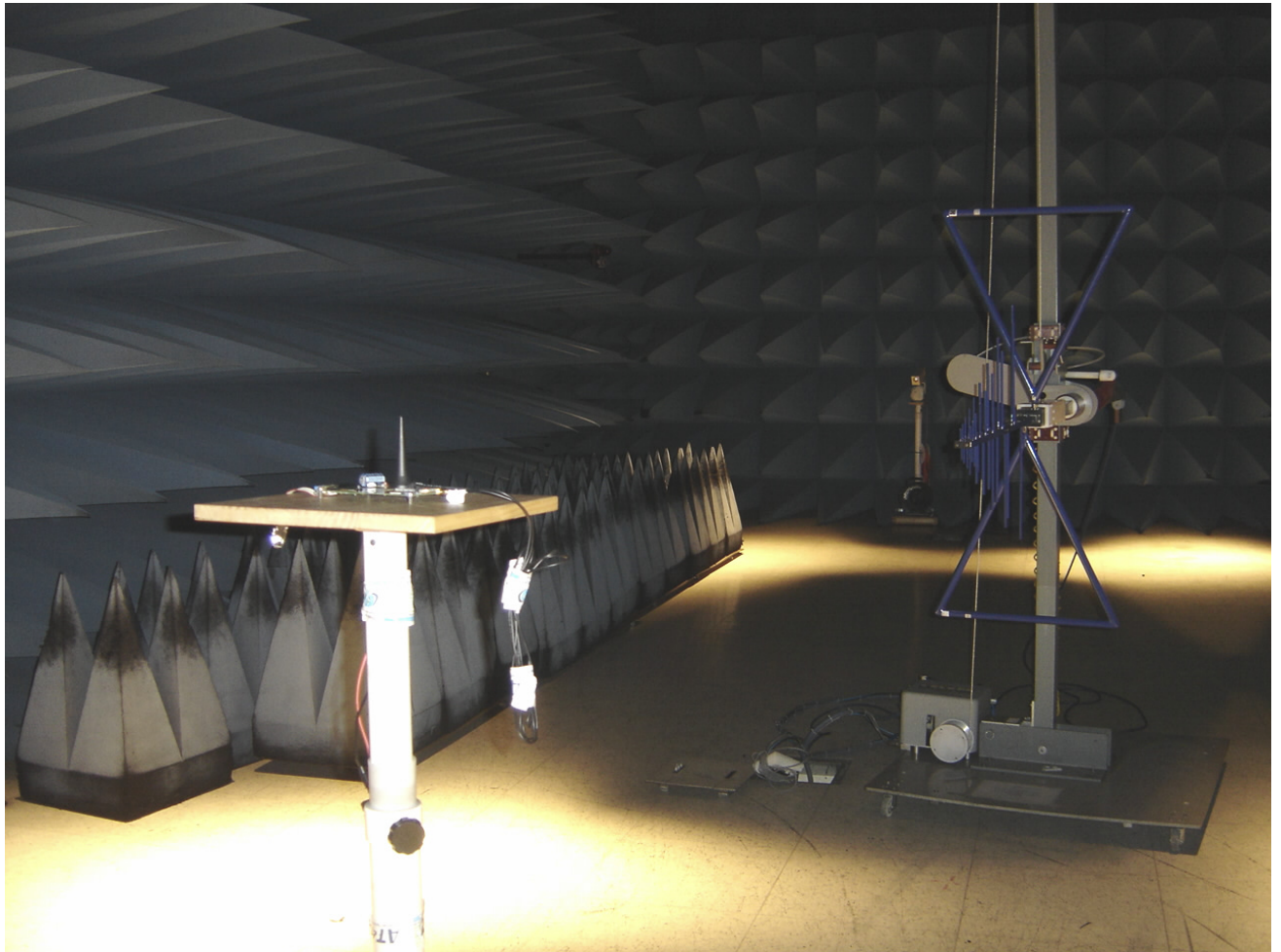
Date: 2007-11-23

FET18\_00.DOC

Page: 5 of 8

Annex C

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



Report No.:  
26826RET

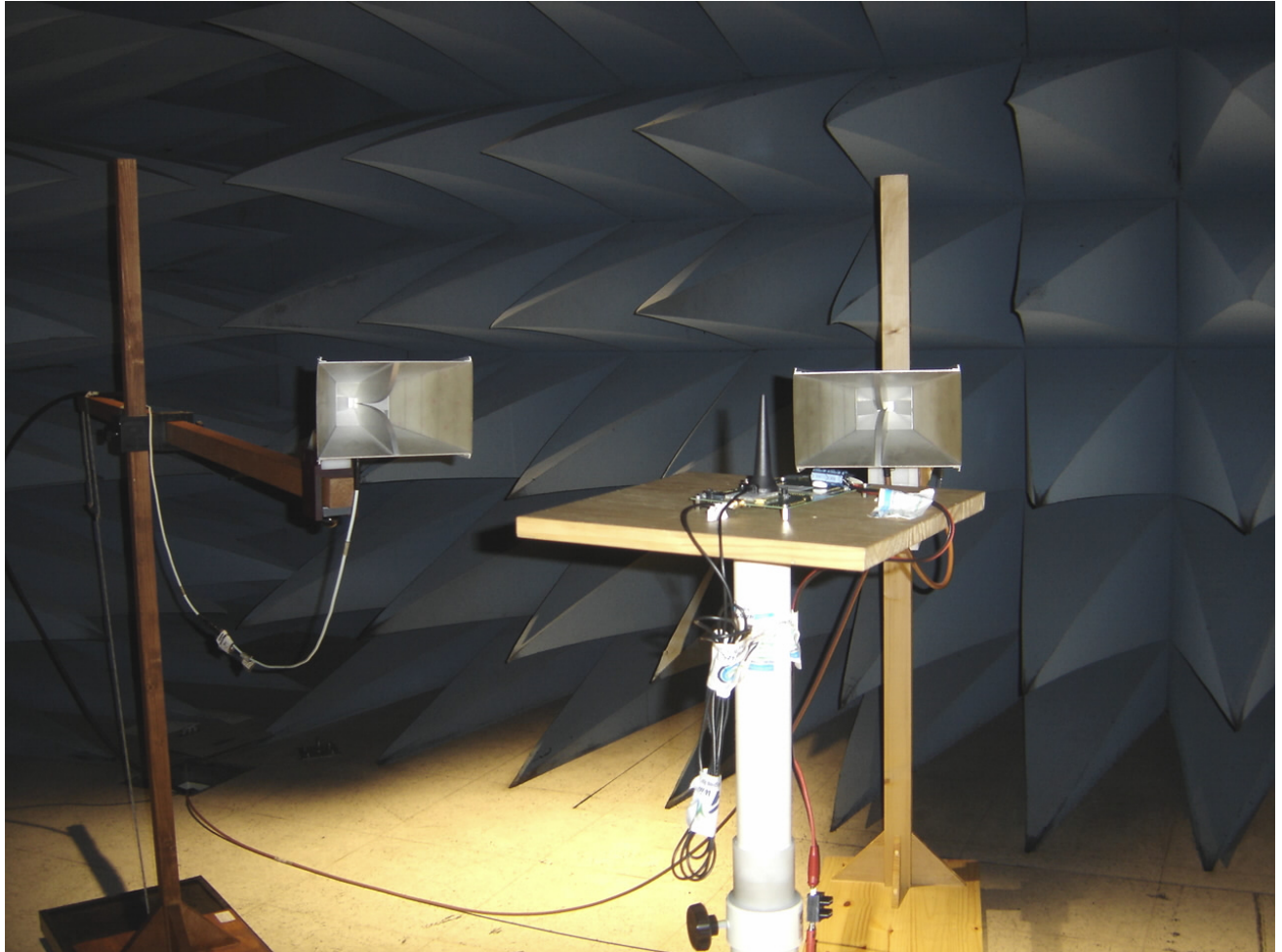
Date: 2007-11-23

FET18\_00.DOC

Page: 6 of 8

Annex C

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



Report No.:  
26826RET

Date: 2007-11-23

FET18\_00.DOC

Page: 7 of 8

Annex C

7. Test set-up for conducted measurements.



Report No.:  
26826RET

Date: 2007-11-23

FET18\_00.DOC

Page: 8 of 8

Annex C