

FCC LISTED,  
REGISTRATION  
NUMBER: 905266

IC LISTED  
REGISTRATION  
NUMBER IC 4621



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## TEST REPORT

**Report No.: 26847RET.101**

**TEST NAME:** FCC PART 15.247 RADIO TESTING FOR BLUETOOTH DEVICE

**Product** : MEDICAL SLEEP RECORDER WITH BLUETOOTH  
**Trade Mark** : Nox T3  
**Model/type Ref.** : ASDB1  
**Manufacturer** : Jiangyin SINBON Electronics Co., Ltd  
**Requested by** : NOX MEDICAL ehf  
**Other identification of the product** : PROT-0110  
FCC ID: V5AASDB1  
IC: 1520A-LMX9838  
**Standard(s)** : USA FCC Part 15.247, 15.205, 15.209, 15.109  
CANADA RSS-210

This test report includes 3 annexes and therefore the total number of pages is 34.

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Date: 2008-04-28	Test operator J.M. Gómez 	Approved by: Date: 2008-04-28 A. Llamas RF Lab. Manager   Centro de Tecnología de las Comunicaciones, S.A.	Page: 1 of 7
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## ANNEXES

ANNEX A. TEST RESULTS

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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. Radiated Measurements for frequency hopping spread spectrum equipment (Bluetooth) operating in the 2400 MHz -2483.5 MHz band, according to FCC Part 15.247.

### 3.2 REQUIREMENTS AND METHOD

1. FCC parts 15.33, 15.35, 15.247, 15.205, 15.209, 15.109 and the document DA 00-705:"Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems".

The testing was performed according to the procedure in ANSI C63.4: 2003. 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.

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. Antenna mast EM 1072 NMT.
4. Rotating table EM 1084-4. ON.
5. Multi device controller ETS 2090.
6. Bluetooth test set Anritsu MT8852A.
7. Bilog antenna CHASE CBL6111.
8. Antenna tripod EMCO 11968C.
9. Double-ridge Guide Horn antenna 1-18 GHz HP 11966E.
10. Double-ridge Guide Horn antenna 18-40 GHz Agilent 119665J.
11. RF pre-amplifier Miteq JS4-12002600-30-5A.
12. Semianechoic Absorber Lined Chamber IR 11. BS.
13. RF pre-amplifier Miteq AFS5-04001300-15-10P-6.
14. Spectrum analyzer R&S ESIB 26.
15. Spectrum analyzer R&S ESU 40.
16. RF pre-amplifier Schaffner CPA 9231.
17. 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:** NOX MEDICAL ehf

**V.A.T.:** Not provided

**Address:** NMI, Keldnaholti

**City:** Reykjavik

**Postal code:** IS-112

**Country:** ICELAND

**Telephone:** +354 5707141

**Fax:** +354 5707111

##### 4.2 REPRESENTATIVE

**Name:** Kolbrun Ottosdottir (Quality Manager)

#### 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:** MEDICAL SLEEP RECORDER

**Trade mark:** Nox T3

**Model:** ASDB1

**HW ver:** ASDB1-0100

**SW ver:** Firmware version 0.1

**Manufacturer:** Jiangyin SINBON Electronics Co., Ltd

**Country of manufacture:** CHINA

**Other identification remarks :** PROT – 0110

**FCC ID:** V5AASDB1

**IC:** 1520A-LMX9838

**Description:** A Patient worn digital sleep recording with bluetooth.

### 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>
26847/02	Recorder with integral antenna	ASDB1	----	14/03/08

1. Sample M/01 has undergone following test(s).  
Radiated tests indicated in annex A.

#### 5.2 PERIOD OF TESTING

The performed test started on 2008-03-17 and finished on the same day.

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. = 22 °C Max. = 23 °C
Relative humidity	Min. = 48 % Max. = 49 %
Shielding effectiveness	> 100 dB
Electric insulation	> 10 k $\Omega$
Reference resistance to earth	< 0,5 $\Omega$

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

Temperature	Min. = 22 °C Max. = 23 °C
Relative humidity	Min. = 48 % Max. = 49 %
Air pressure	Min. = 1020 mbar Max. = 1020 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 k $\Omega$
Reference resistance to earth	< 0,5 $\Omega$
Normal site attenuation (NSA)	< $\pm 4$ 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).

## 6. TEST RESULTS

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

<b>P</b>	Pass
<b>F</b>	Fail
<b>NA</b>	not applicable
<b>NM</b>	not measured

FCC PART 15 PARAGRAPH	VERDICT			
	NA	P	F	NM
15.247 Subclause (a) (1). 20 dB Bandwidth and Carrier frequency separation				NM <sup>(1)</sup>
15.247 Subclause (a) (1) (iii). Number of hopping channels				NM <sup>(1)</sup>
15.247 Subclause (a) (1) (iii). Time of occupancy (Dwell Time)				NM <sup>(1)</sup>
15.247 Subclause (b). Maximum peak output power and antenna gain		P		
15.247 Subclause (c). Band-edge of conducted emissions (Transmitter)				NM <sup>(1)</sup>
15.247 Subclause (c). Emission limitations conducted (Transmitter)				NM <sup>(1)</sup>
15.247 Subclause (c). Emission limitations radiated (Transmitter)		P		
15.109. Radiated emission limits for receiver		P		

1: See point 7: "Remarks and comments".

## 7. REMARKS AND COMMENTS

1. As the equipment is based on a previously approved Bluetooth module, only radiated tests were requested.

## 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**

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## TEST CONDITIONS

Power supply (V):

$$V_{\text{nominal}} = 1.5 \text{ Vdc}$$

Type of power supply = Type AA battery

Type of antenna = Integral antenna

Declared antenna gain = -1.48 dBi

Operating Temperature Range (°C):

$$T_n = +15 \text{ to } +35$$

## TEST FREQUENCIES:

Lowest channel: 2402 MHz

Middle channel: 2441 MHz

Highest channel: 2480 MHz

The test set-up was made in accordance to the general provisions of ANSI C63.4: 2003.

## RADIATED MEASUREMENTS

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at a distance of 3 m for the frequency range 30 MHz-1000 MHz (30 MHz-1000 MHz Bilog antenna) and at a distance of 1m for the frequency range 1 GHz-25 GHz (1 GHz-18 GHz Double ridge horn antenna and 18 GHz-40 GHz horn antenna).

For radiated emissions in the range 1 GHz-25 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

The equipment under test was set up on a non-conductive (wooden) platform one meter above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

An additional horn antenna is used to control the equipment under test with the Bluetooth signalling unit (Bluetooth test set).

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## Section 15.247 Subclause (b). Maximum peak output power and antenna gain

### SPECIFICATION

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels: 1 watt (30 dBm).

### RESULTS

MAXIMUM PEAK OUTPUT POWER (RADIATED).

	Lowest frequency 2402 MHz	Middle frequency 2441 MHz	Highest frequency 2480 MHz
Correction Factor (dB)	35.00	35.10	35.20
Maximum EIRP peak power (dBm)	-25.06	-21.23	-19.44
Measurement uncertainty (dB)	$\pm 4.0$		

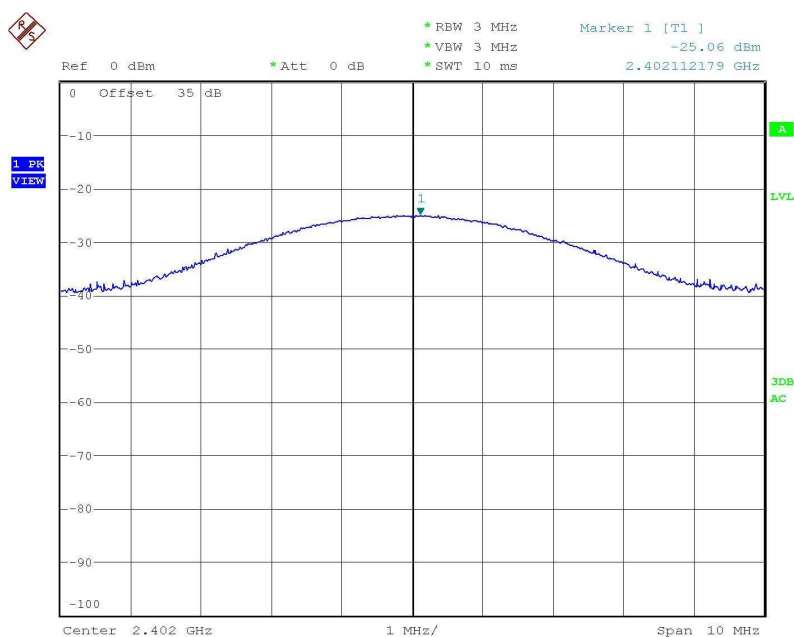
Declared peak gain: -1.48 dBi

The maximum directional gain of the antenna is less than 6 dBi and therefore the maximum output power is not required to be reduced from the stated values.

Verdict: PASS

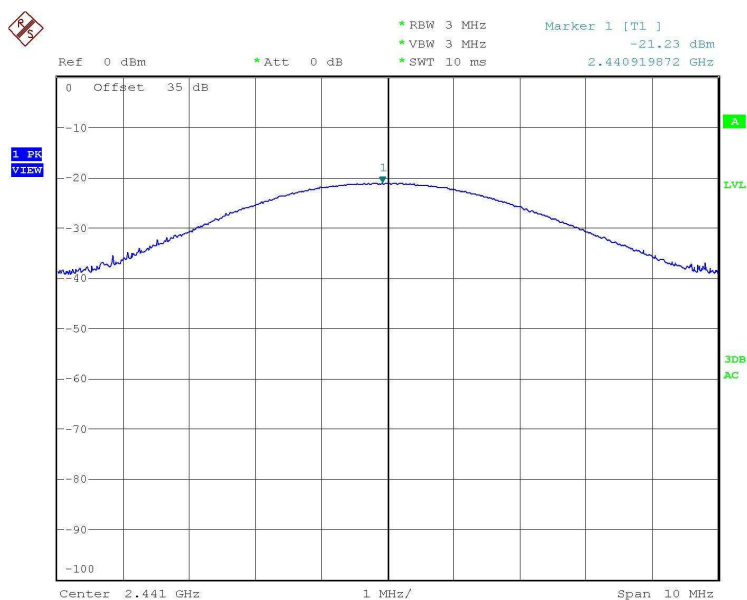
# PEAK OUTPUT POWER (RADIATED).

Lowest Channel: 2402 MHz.



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Middle Channel: 2441 MHz.



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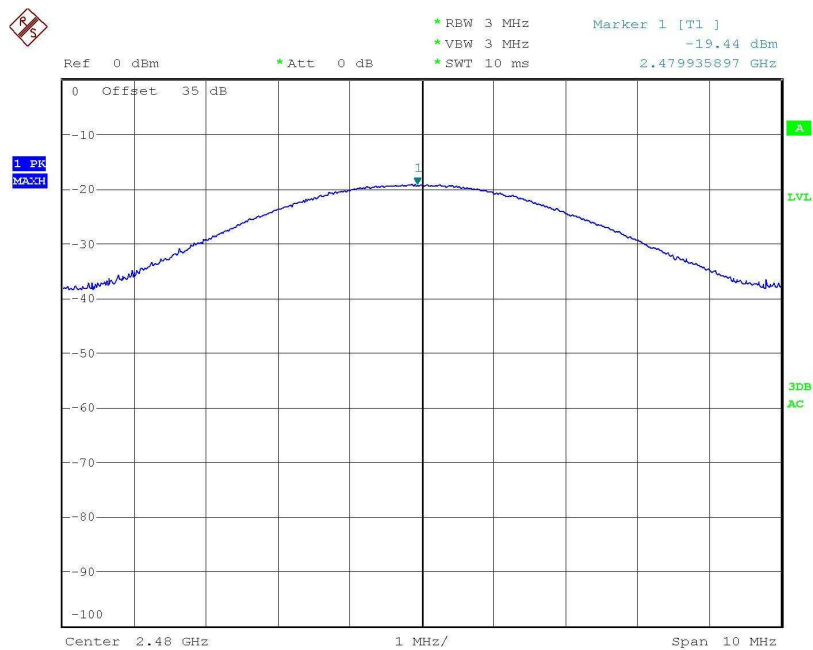
Date: 2008-04-28

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Highest Channel: 2480 MHz.



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## Section 15.247 Subclause (d). Emission limitations radiated (Transmitter)

### SPECIFICATION

Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)):

Frequency Range (MHz)	Field strength ( $\mu\text{V/m}$ )	Field strength ( $\text{dB}\mu\text{V/m}$ )	Measurement distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	300
1.705 - 30.0	30	-	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
960 - 25000	500	54	3

The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

### RESULTS:

The situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

All tests were performed in a semi-anechoic chamber at a distance of 3 m for the frequency range 30 MHz-1000 MHz and at distance of 1m for the frequency range 1 GHz-25 GHz.

The field strength is calculated by adding correction factor to the measured level from the spectrum analyser. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

The equipment transmits continuously in the selected channel so it is not necessary a duty cycle correction factor.

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### Frequency range 30 MHz-1000 MHz.

No spurious signals found in all operating channels.

### Frequency range 1 GHz-25 GHz

### Frequency range 1 GHz-25 GHz.

1. CHANNEL: LOWEST (2402 MHz).

#### Spurious levels (radiated).

Spurious frequency (MHz)	Polarization	Detector	Emission Level (dBμV/m)	Measurement Uncertainty (dB)
4796.875	H	Peak	40.8	± 4.0
4796.875	H	Average	26.4	± 4.0
7203.125	V	Peak	43.6	± 4.0
7203.125	V	Average	30.2	± 4.0

Additionally, no spurious signals were found inside the restricted bands 2310-2390 MHz and 2483.5-2500 MHz.

2. CHANNEL: MIDDLE (2441 MHz).

#### Spurious levels (radiated).

Spurious frequency (MHz)	Polarization	Detector	Emission Level (dBμV/m)	Measurement Uncertainty (dB)
4881.971	H	Peak	30.19	± 4.0
4881.971	H	Average	28.41	± 4.0
7328.125	V	Peak	42.8	± 4.0
7328.125	V	Average	36.7	± 4.0

Additionally, no spurious signals were found inside the restricted bands 2310-2390 MHz and 2483.5-2500 MHz.

3. CHANNEL: HIGHEST (2480 MHz).

**Spurious levels (radiated).**

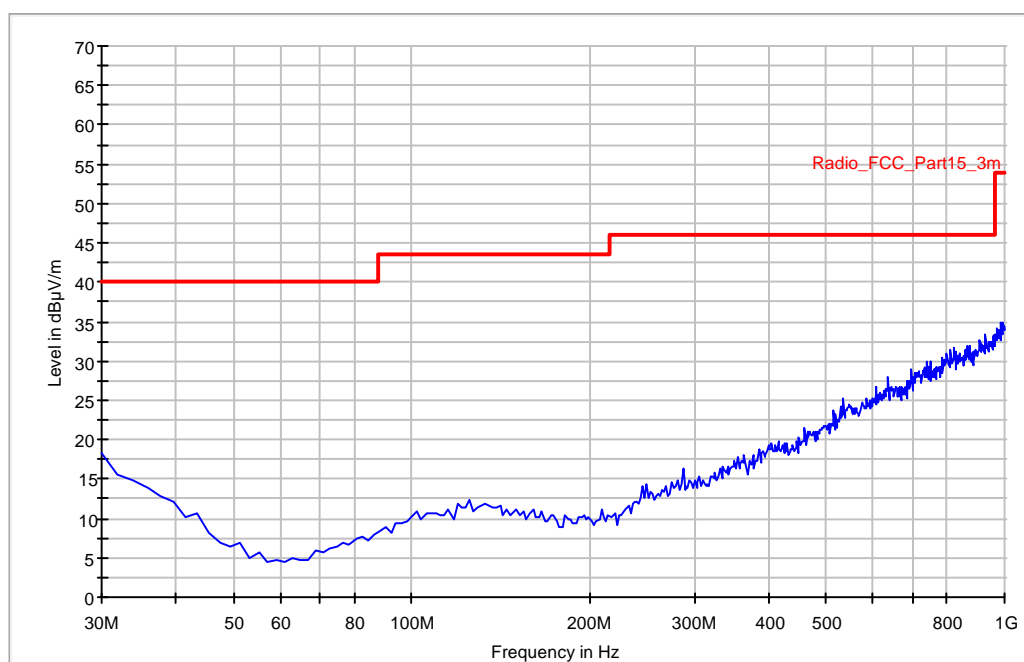
Spurious frequency (MHz)	Polarization	Detector	Emission Level (dBμV/m)	Measurement Uncertainty (dB)
4953.125	H	Peak	43.0	± 4.0
4953.125	H	Average	27.7	± 4.0
7437.500	V	Peak	44.8	± 4.0
7437.500	V	Average	30.3	± 4.0

Additionally, no spurious signals were found inside the restricted bands 2310-2390 MHz and 2483.5-2500 MHz.

Verdict: PASS



FREQUENCY RANGE 30 MHz-1000 MHz.

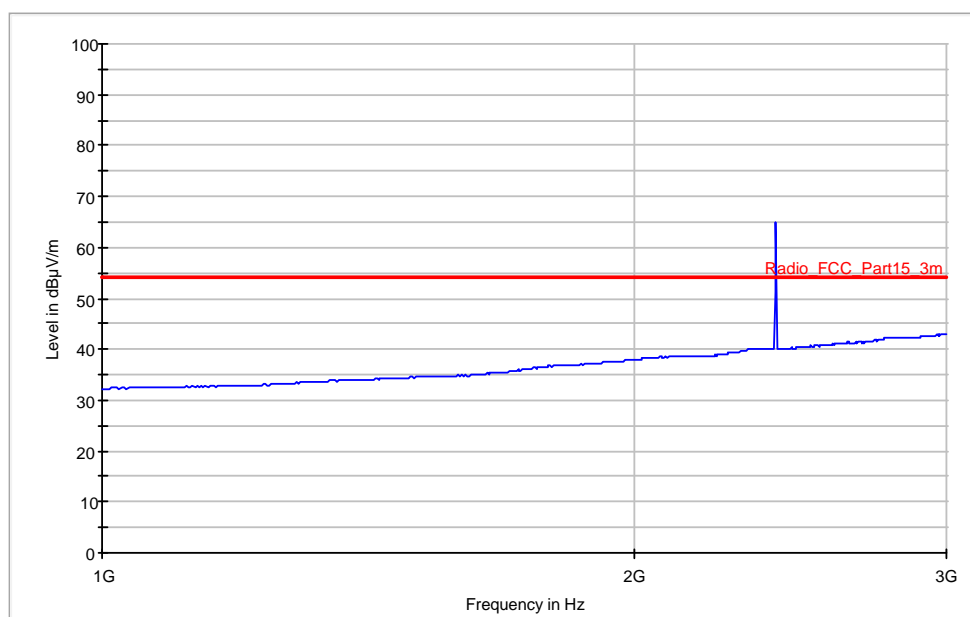


RBW = VBW = 100 kHz

(This plot is valid for all three channels).

FREQUENCY RANGE 1 GHz to 3 GHz.

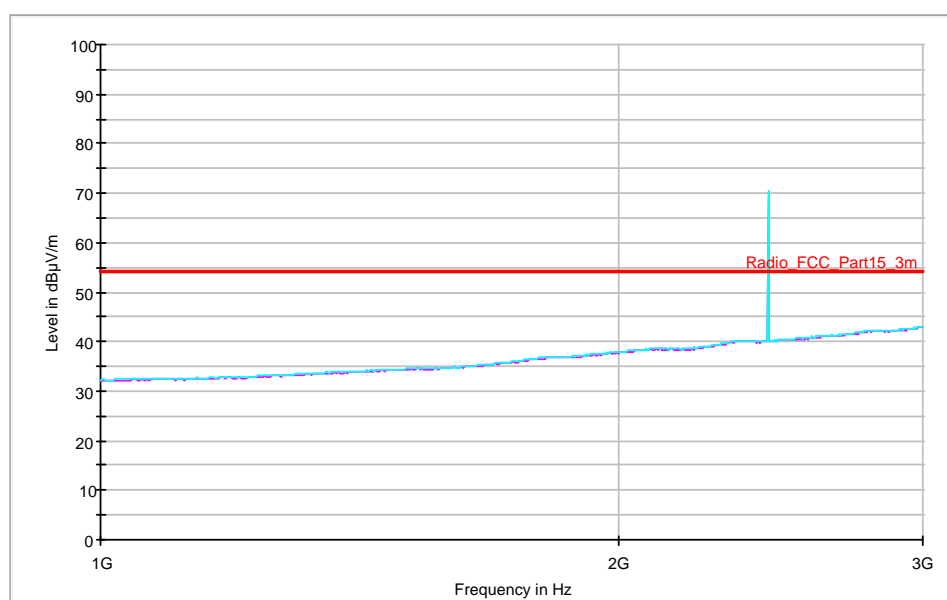
**CHANNEL: Lowest (2402 MHz).**



RBW = VBW = 1 MHz

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

**CHANNEL: Middle (2441 MHz).**

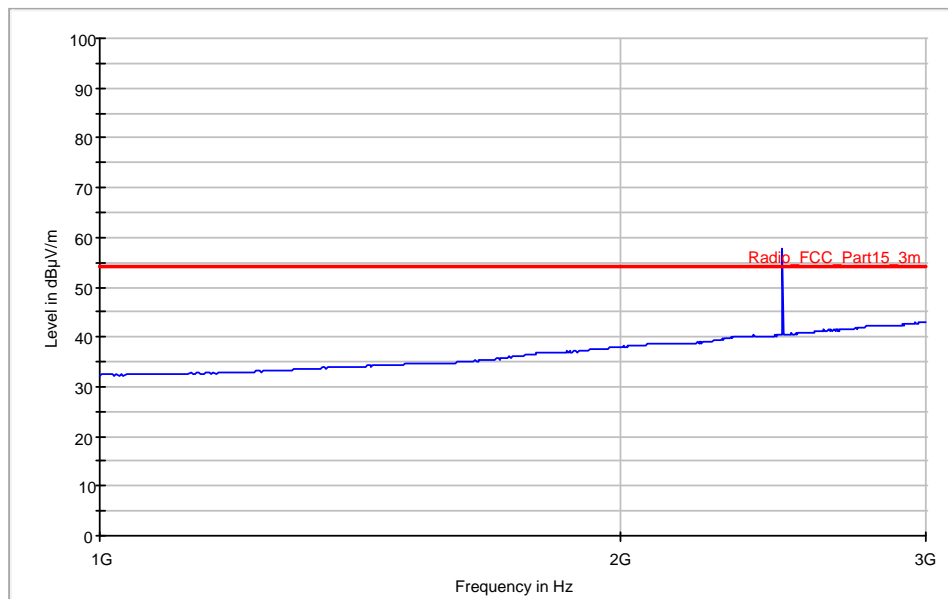


RBW = VBW = 1 MHz

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

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**CHANNEL: Highest (2480 MHz).**

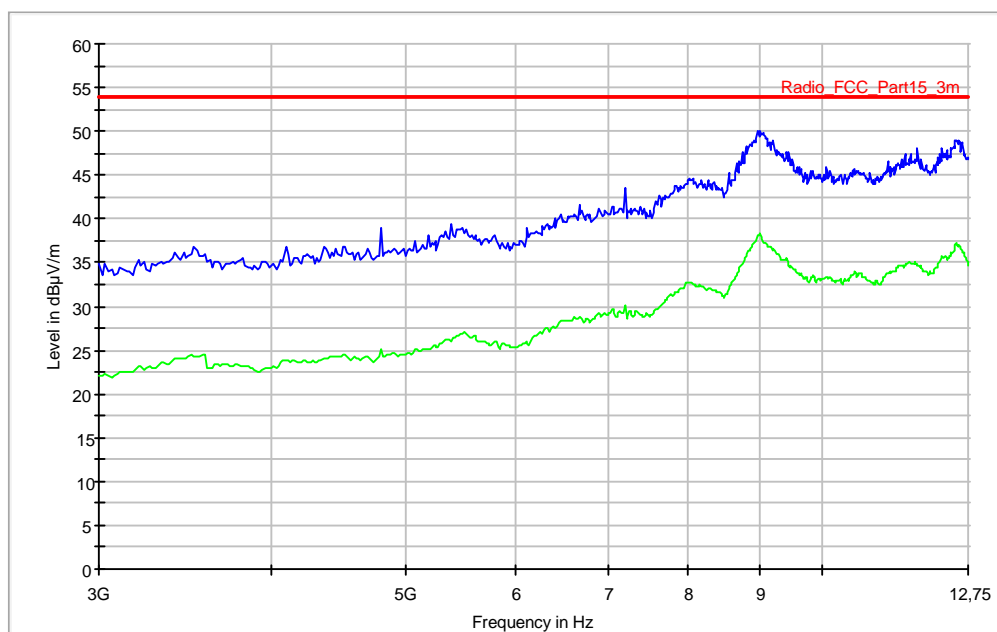


RBW = VBW = 1 MHz

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

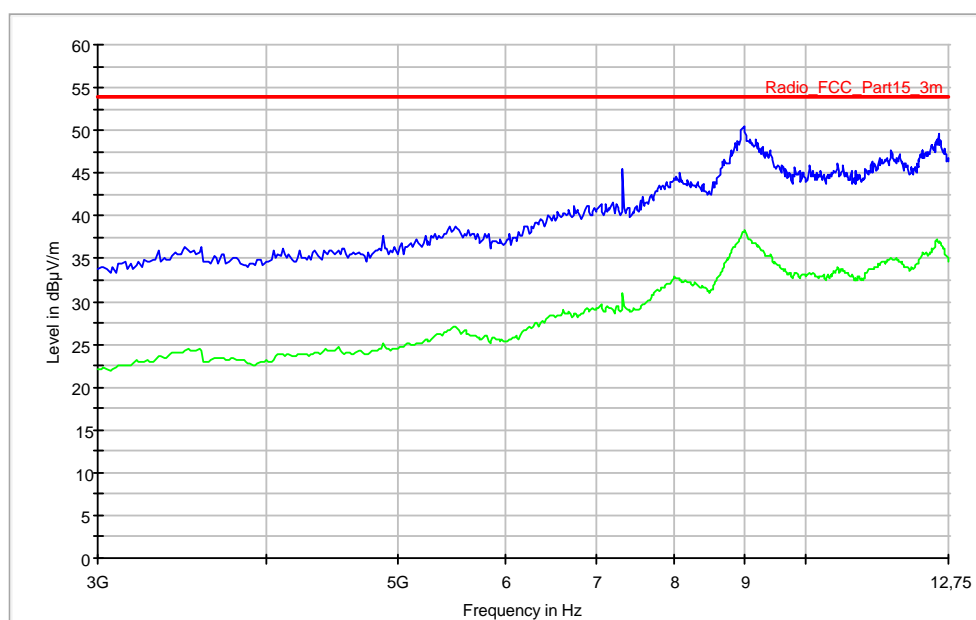
FREQUENCY RANGE 3 GHz to 12.75 GHz.

**CHANNEL: Lowest (2402 MHz).**



RBW = VBW = 1 MHz

**CHANNEL: Middle (2441 MHz).**



RBW = VBW = 1 MHz

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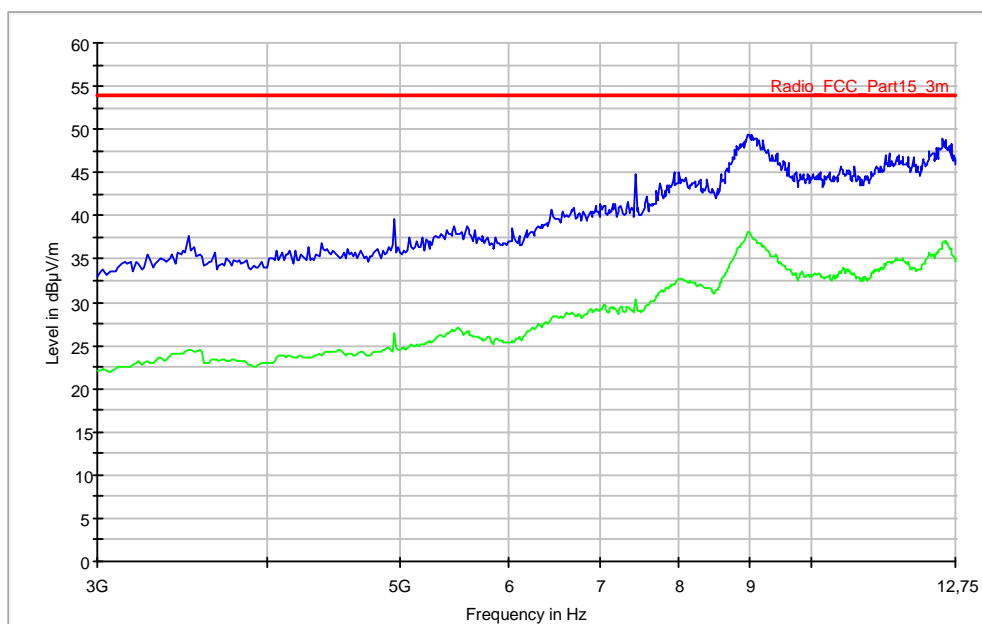
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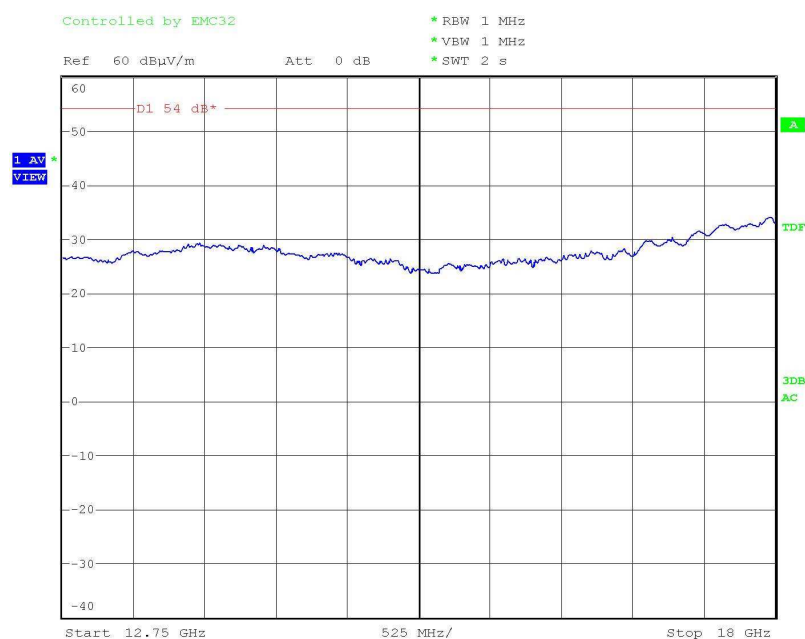
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**CHANNEL: Highest (2480 MHz).**



RBW = VBW = 1 MHz

FREQUENCY RANGE 12.75 GHz to 18 GHz.

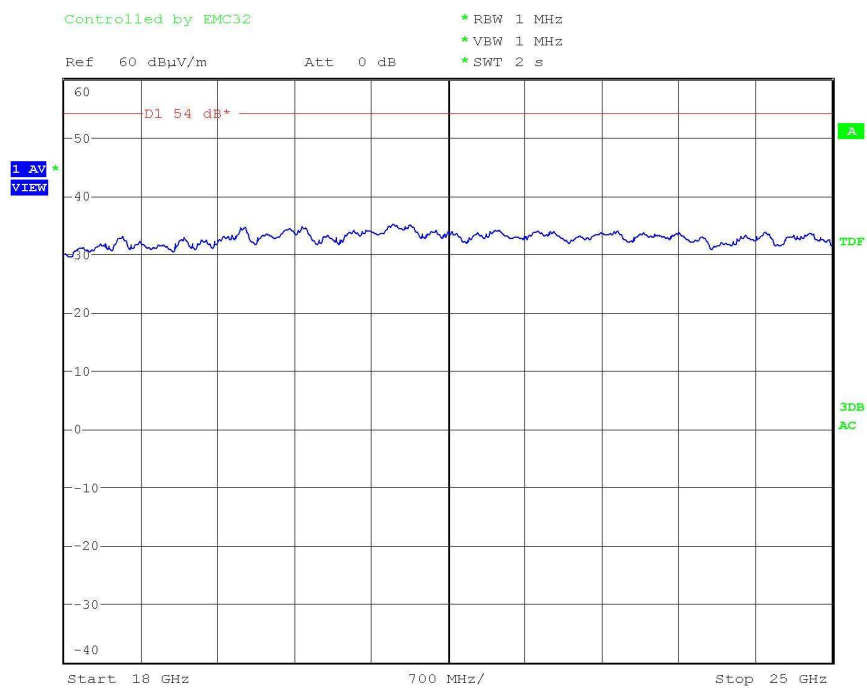


Date: 17.MAR.2008 14:38:07

(This plot is valid for all three channels).

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FREQUENCY RANGE 18 GHz to 25 GHz.



Date: 17.MAR.2008 14:39:55

(This plot is valid for all three channels).

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## Section 15.109. Receiver spurious radiation

### SPECIFICATION

The field strength shall not exceed the following values:

Frequency Range (MHz)	Field strength ( $\mu\text{V/m}$ )	Field strength ( $\text{dB}\mu\text{V/m}$ )	Measurement distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	300
1.705 - 30.0	30	-	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
960 - 25000	500	54	3

The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

### RESULTS:

The situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

All tests were performed in a semi-anechoic chamber at a distance of 3 m for the frequency range 30 MHz-1000 MHz and at distance of 1m for the frequency range 1 GHz-25 GHz.

The field strength is calculated by adding correction factor to the measured level from the spectrum analyser. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

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It is not possible to select individual receiving channels in the equipment under test. The equipment under test is set in inquiry scan mode with the receiver open and scanning through receiving channels.

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

No spurious signals found.

**Frequency range 1 GHz-25 GHz.**

No spurious signals found.

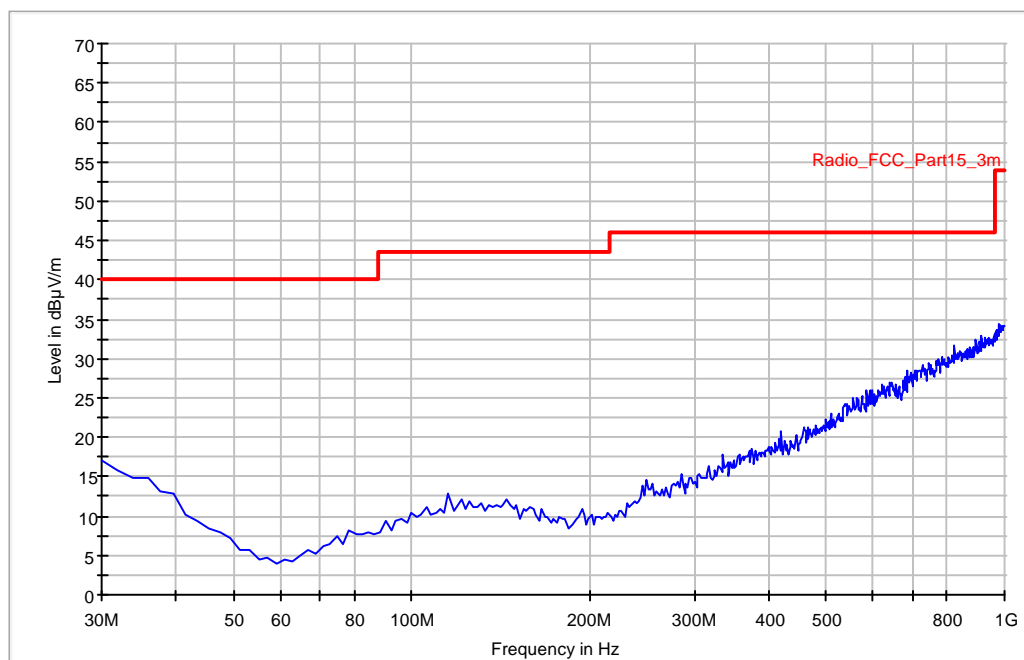
Additionally, no spurious signals were found inside the restricted bands 2310-2390 MHz and 2483.5-2500 MHz.

Verdict: PASS.

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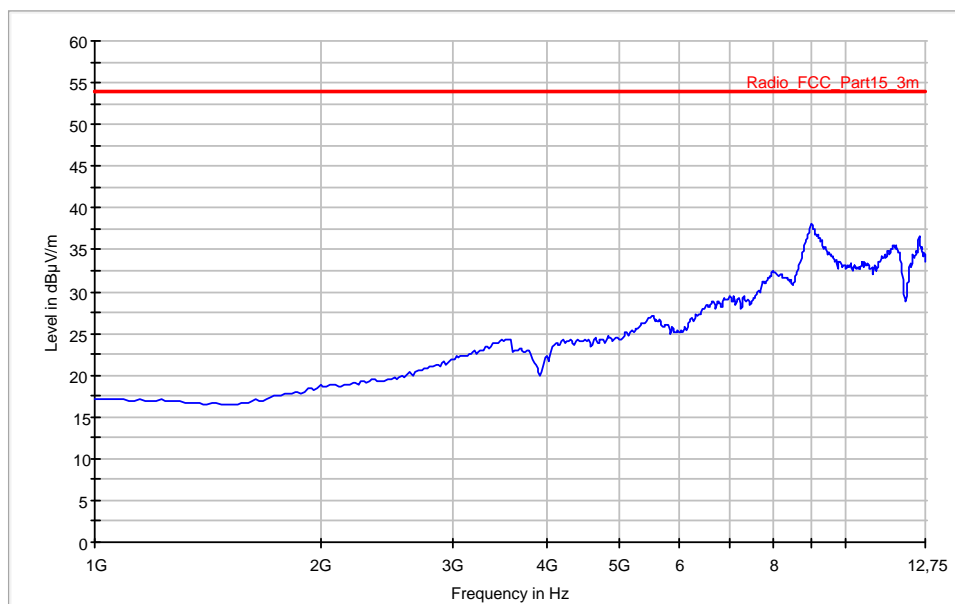
FREQUENCY RANGE 30 MHz-1000 MHz.



RBW = VBW = 100 kHz

(This plot is valid for all three channels).

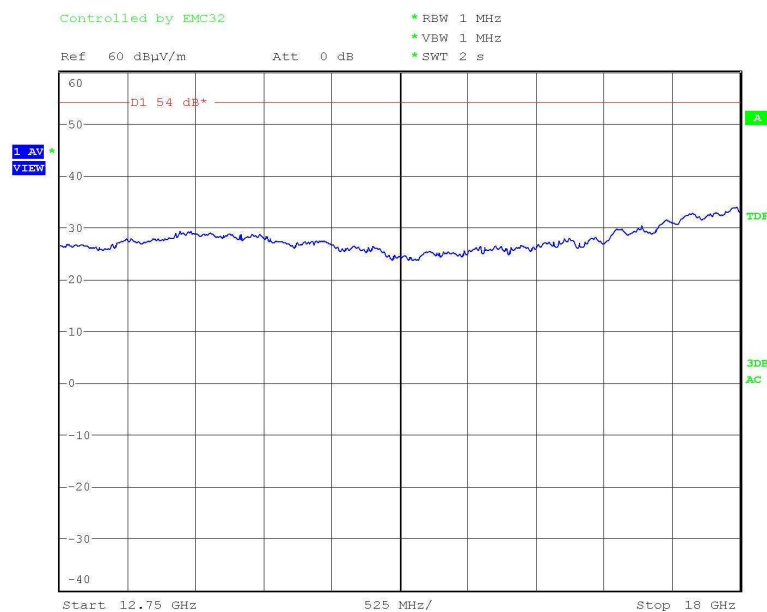
FREQUENCY RANGE 1 GHz-12.75 GHz.



RBW = VBW = 1 MHz

(This plot is valid for all three channels).

FREQUENCY RANGE 12.75 GHz-18 GHz.

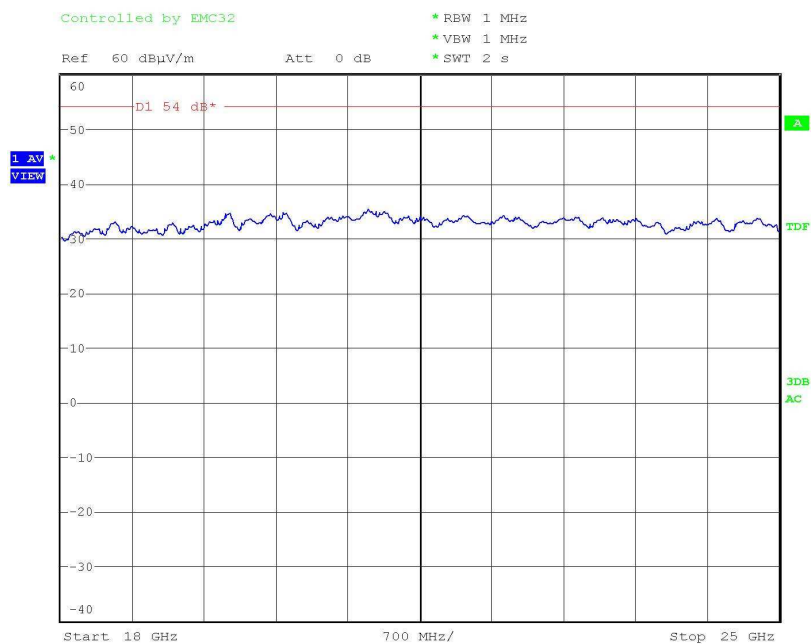


Date: 17.MAR.2008 14:38:48

(This plot is valid for all three channels).

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FREQUENCY RANGE 18 GHz-25 GHz.



Date: 17.MAR.2008 14:40:27

(This plot is valid for all three channels).

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