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NUMBER: IC 4621

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

Parque Tecnológico de Andalucía,
c/Severo Ochoa nº 2
29590 Campanillas/ Málaga/ España
Tel. 952 61 91 00 - Fax 952 61 91 13
MÁLAGA, C.I.F. A29 507 456
Registro Mercantil Tomo 1169 Libro 82
Folio 133 Hoja MA3729

TEST REPORT

Report No.: 21893RET.101

TEST NAME: FCC PART 15.247 TESTING FOR BLUETOOTH RADIO DEVICE

Product : Logitech io2 Digital Pen with Bluetooth
Trade Mark : Logitech
Model/type Ref. : P-RUE9
Manufacturer : SUZHOU LOGITECH ELECTRONIC Co., LTD
Requested by : LOGITECH INC.
Other identification of the product : FCC ID: DZL201938
Industry Canada (IC): 1807B-201938
P/N of digital Pen: 866142 S/N: LZ503S00146, LZ503S00137
P/N of the Cradle: 866143 S/N: LZ503S00111
Standard(s) : USA FCC Part 15.247, 15.205, 15.209, 15.109, 15.207
CANADA RSS-210

This test report includes 2 annexes and therefore the total number of pages is 60.

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Date: 2005-05-04	Test operator	Revised by:	Approved by:	Page: 1 of 8 AGY 735524-0000.A0
	A. Llamas 	Date: 20-05-05 J. C. Soler Consultant 	Date: 20-May-2005 A. Rojas Technical Director 	

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ANNEXES

ANNEX A. TEST RESULTS

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1. COMPETENCE AND GUARANTEES

Centro de Tecnología de las Comunicaciones (CETECOM), 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 (CETECOM), 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, CETECOM has a calibration and maintenance programme for its measuring equipment.

CETECOM 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 CETECOM at the time of execution of the test.

CETECOM 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 CETECOM.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written approval of CETECOM and the Accreditation Bodies.

3. CHARACTERISTICS OF THE TEST

3.1 TEST REQUESTED

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

3.2 REQUIREMENTS AND METHOD

The test has been carried out according to FCC parts 15.33, 15.35, 15.109, 15.207, 15.205, 15.209, 15.247 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. Radiated testing was performed in Cetecom'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.

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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 FSM.
16. Transient limiter. HP 11947A.
17. Line Impedance Stabilization Network (L.I.S.N.) R&S. ESH2-Z5.

4. IDENTIFICATION DATA SUPPLIED BY THE APPLICANT

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

4.1 APPLICANT

Name or Company: Logitech INC

V.A.T.: -----

Address: 6505 Kaiser Drive

City: Fremont (California)

Postal code: 94555

Country: USA

Telephone: +1 510 7958500

Fax: +1 510 7928901

4.2 REPRESENTATIVE

Name: Bharat Shah

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4.3 TEST SAMPLES SUPPLIER

Name or Company: Logitech Europe, S.A.

V.A.T.: ----

Address: ZI Moulin du Choc

City: Romanel Sur Morges

Postal code: 1122

Country: Switzerland

Telephone: +41 (0)21 863 50 67

Fax: +41 (0)21 863 53 33

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

4.4 IDENTIFICATION OF ITEM/ITEMS TESTED

Product: Logitech io2 Digital Pen with Bluetooth

Trade mark: Logitech

Model: P-RUE9

Manufacturer: SUZHOU LOGITECH ELECTRONIC Co., LTD

Country of manufacture: P.R.C.

Manufacture site: No. 168, Bin He Rd, Standard Plant, 215011 SUZHOU City

Description: A digital pen allowing to write on specific paper, encode written information, store this information in an internal memory and transfer it later to a host system either via a USB or Bluetooth.

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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>
21893/04	Digital Pen with Bluetooth	P-RUE9	LZ503S00146	07/04/05

Sample M/02 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>
21893/11	Digital Pen with Bluetooth and with connector	P-RUE9	---	07/04/05

Sample S/01 is composed of the following elements:

<u>Control No.</u>	<u>Description</u>	<u>Model</u>	<u>Serial No.</u>	<u>Date of reception</u>
21893/01	Digital Pen with Bluetooth	P-RUE9	LZ503S00137	07/04/05
21893/08	Cradle + USB ext. cable	P-RUE9	LZ503500111	07/04/05

During the tests the next ancillary equipment were used:

<u>Control No.</u>	<u>Description</u>	<u>Model</u>	<u>Serial No.</u>	<u>Date of reception</u>
21893/--	Portable PC	Toshiba PS610E- NGYSC-SP	13123012G	---
21893/--	AC/DC adapter	Toshiba PA3283U-1ACA	G71C0002T410	---

Sample S/02 is composed of the following elements:

<u>Control No.</u>	<u>Description</u>	<u>Model</u>	<u>Serial No.</u>	<u>Date of reception</u>
21893/01	Digital Pen with Bluetooth	P-RUE9	LZ503S00137	07/04/05
21893/08	Cradle + USB ext. cable	P-RUE9	LZ503500111	07/04/05
21893/14	AC/DC adapter	PSC03R-050	I42502927A3	07/04/05

- Sample M/01 has undergone following test(s).
Radiated measurements indicated in annex A.
- Sample M/02 has undergone following test(s).
Conducted measurements indicated in annex A.
- Samples S/01 and S/02 has undergone to the following test(s):
AC Line continuous conducted emission, power leads in annex A.

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5.2 PERIOD OF TESTING

The performed test started on 2005-04-14 and finished on 2005-04-19.

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

5.3 ENVIROMENTAL CONDITIONS

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

Temperature	Min. = 20 °C Max. = 21 °C
Relative humidity	Min. = 62 % Max. = 63 %
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 no exceeded during the test.

Temperature	Min. = 23 °C Max. = 23 °C
Relative humidity	Min. = 57 % Max. = 57 %
Air pressure	Min. = 1010 mbar Max. = 1012 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 no exceeded during the test:

Temperature	Min. = 24 °C Max. = 25 °C
Relative humidity	Min. = 56 % Max. = 57 %
Air pressure	Min. = 1010 mbar Max. = 1013 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 15 PARAGRAPH	VERDICT			
	NA	P	F	NM
15.247 Subclause (a) (1). 20 dB Bandwidth and Carrier frequency separation		P		
15.247 Subclause (a) (1) (iii). Number of hopping channels		P		
15.247 Subclause (a) (1) (iii). Time of occupancy (Dwell Time)		P		
15.247 Subclause (b). Maximum peak output power and antenna gain		P		
15.247 Subclause (d). Band-edge of conducted emissions (Transmitter)		P		
15.247 Subclause (d). Emission limitations conducted (Transmitter)		P		
15.247 Subclause (d). Emission limitations radiated (Transmitter)		P		
15.207. Continuous Conducted 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

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Annex A
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TEST CONDITIONS

Power supply (V):

$$V_{\text{nominal}} = 3.7 \text{ Vdc}$$

Type of power supply = DC Voltage from rechargeable battery

Type of antenna = Integral antenna

Maximum Declared Gain for antenna= -12 dBi

Operating Temperature Range (°C):

$$T_n = -15 \text{ to } +55$$

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.

CONDUCTED MEASUREMENTS

The equipment under test was set up in a shielded room and it is connected to a Bluetooth signalling unit (Bluetooth test set) and to the spectrum analyser using a 6 dB power splitter and low loss RF cables with sma type connectors. The reading in the spectrum analyser is corrected taking into account the power splitter and cable loss.

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.

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Section 15.247 Subclause (a) (1). 20 dB Bandwidth and Carrier frequency separation**SPECIFICATION**

Frequency hopping system shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

RESULTS

20 dB Bandwidth (see next 3 plots).

	Lowest frequency 2402 MHz	Middle frequency 2441 MHz	Highest frequency 2480 MHz
20 dB Spectrum bandwidth (kHz)	925.85	929.86	925.85
Measurement uncertainty (kHz)	± 11		

20 dB BANDWIDTH.

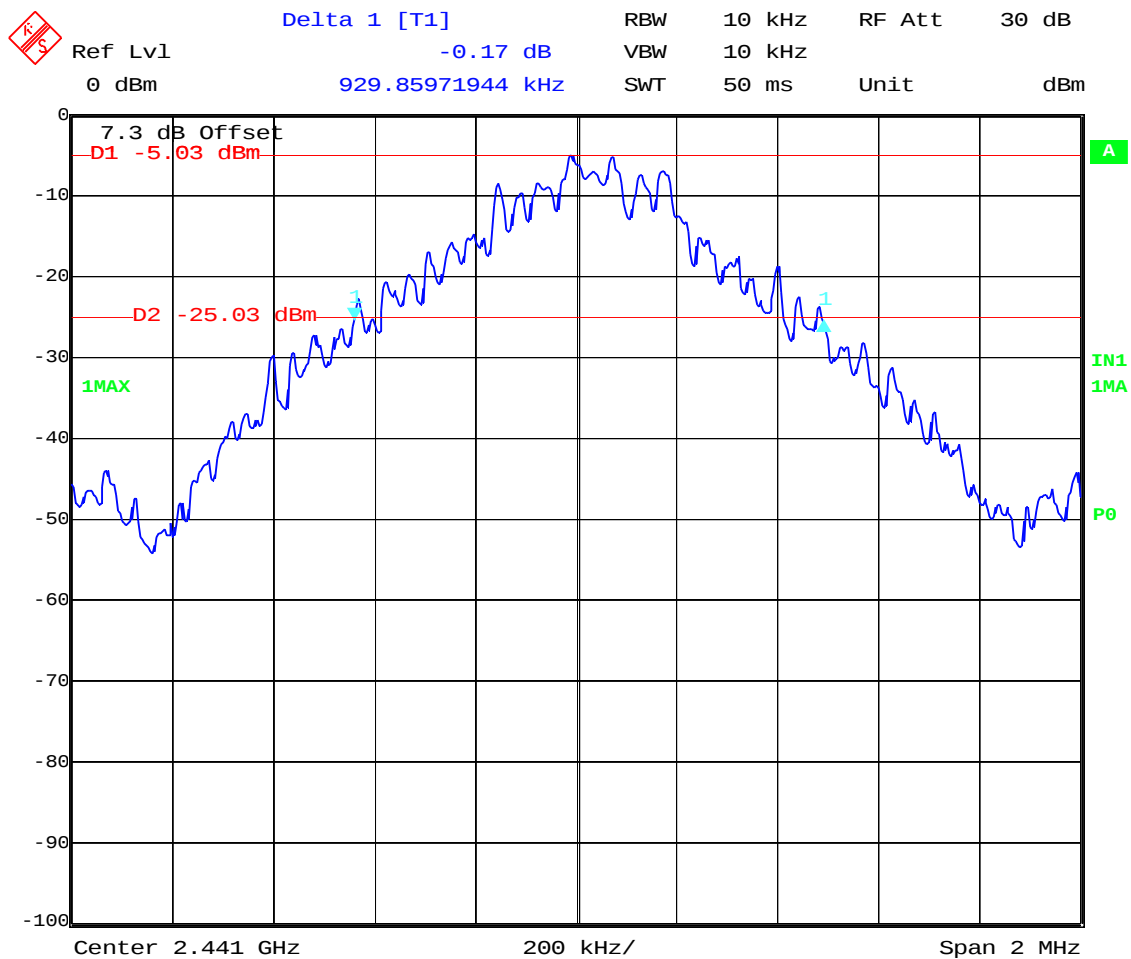
Lowest Channel: 2402 MHz.



Date: 13.APR.2005 15:28:54

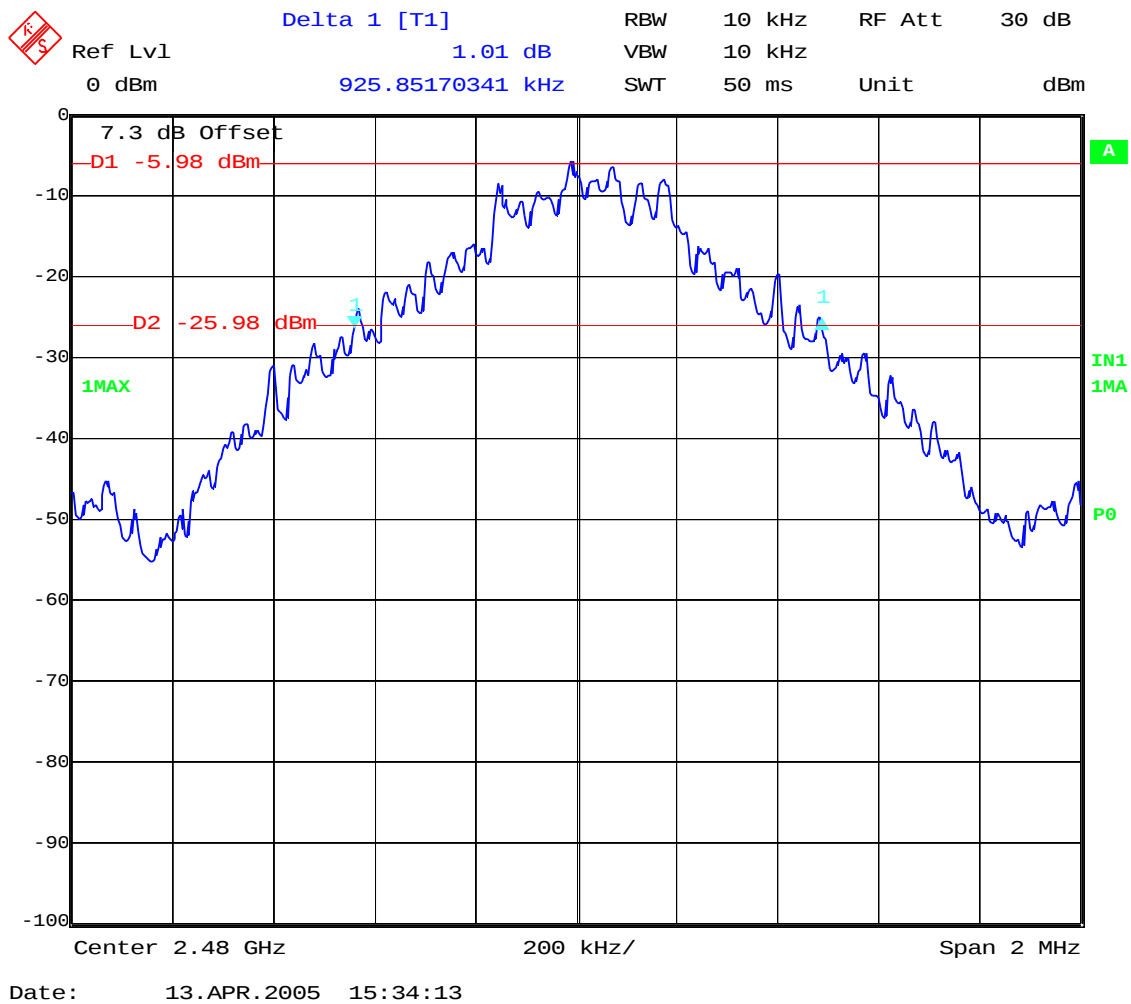
20 dB BANDWIDTH.

Middle Channel: 2441 MHz.

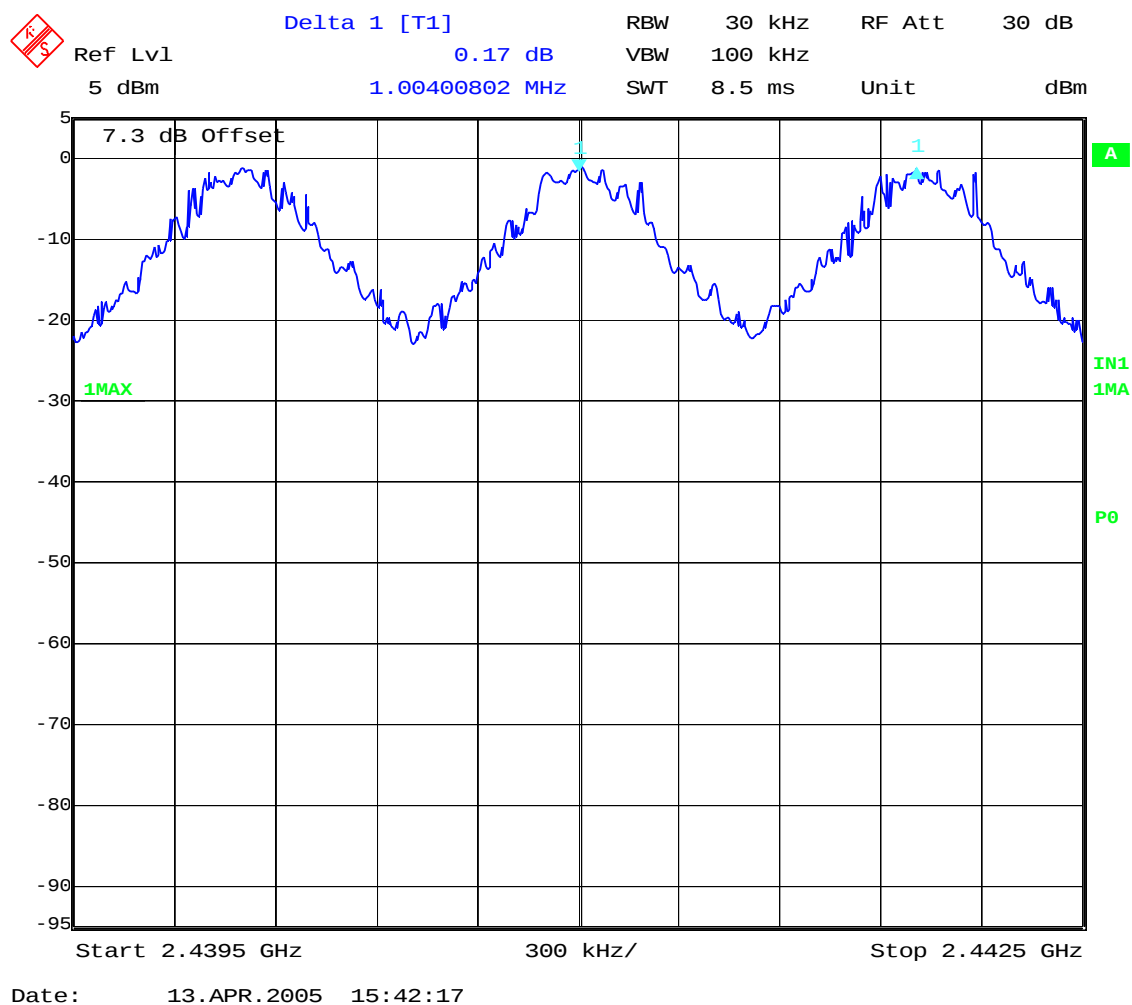


Date: 13.APR.2005 15:31:53

20 dB BANDWIDTH.
Highest Channel: 2480 MHz.



Carrier frequency separation (see next plot).



The hopping channel carrier frequencies are separated by a minimum of the 20 dB bandwidth of the hopping channel.

Verdict: PASS

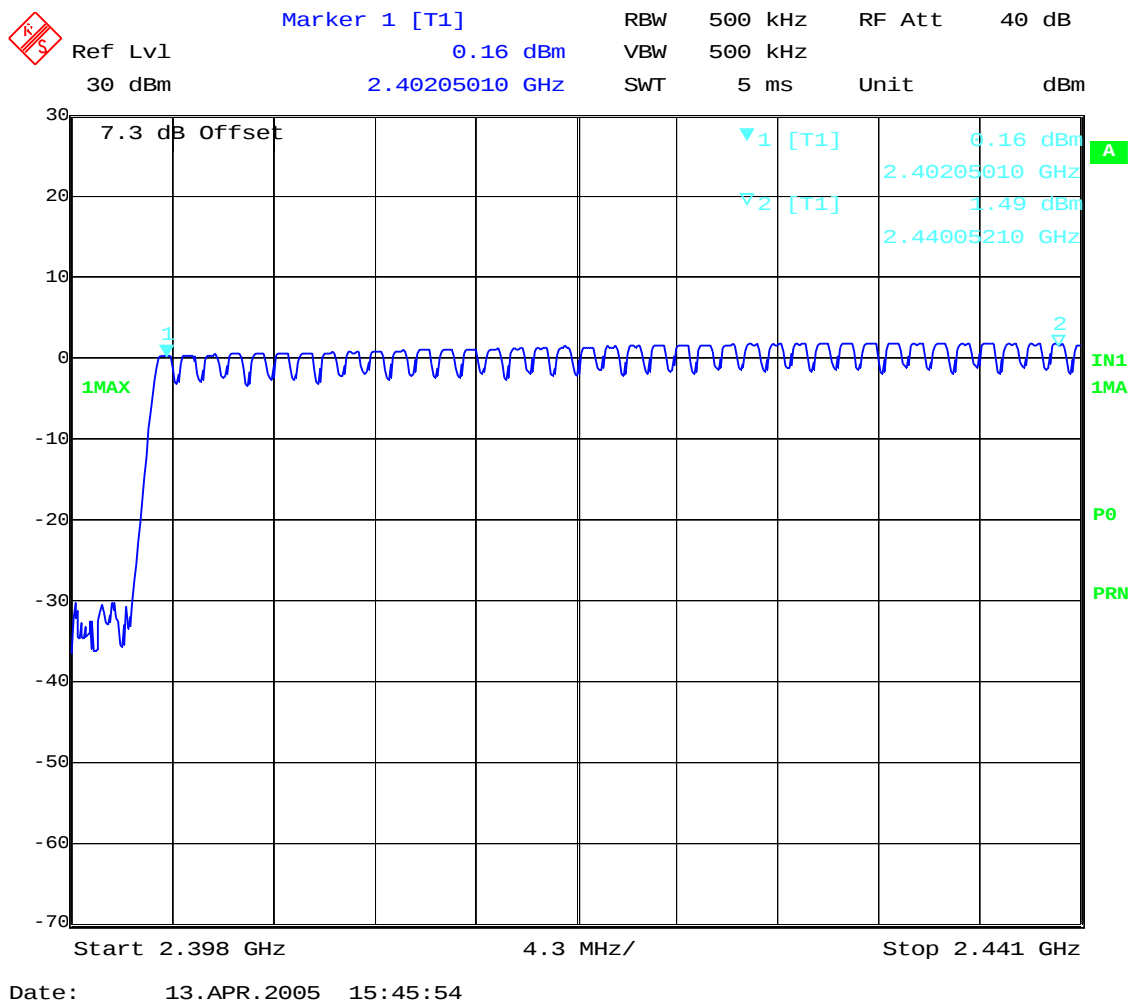
Section 15.247 Subclause (a) (1) (iii). Number of hopping channels

SPECIFICATION

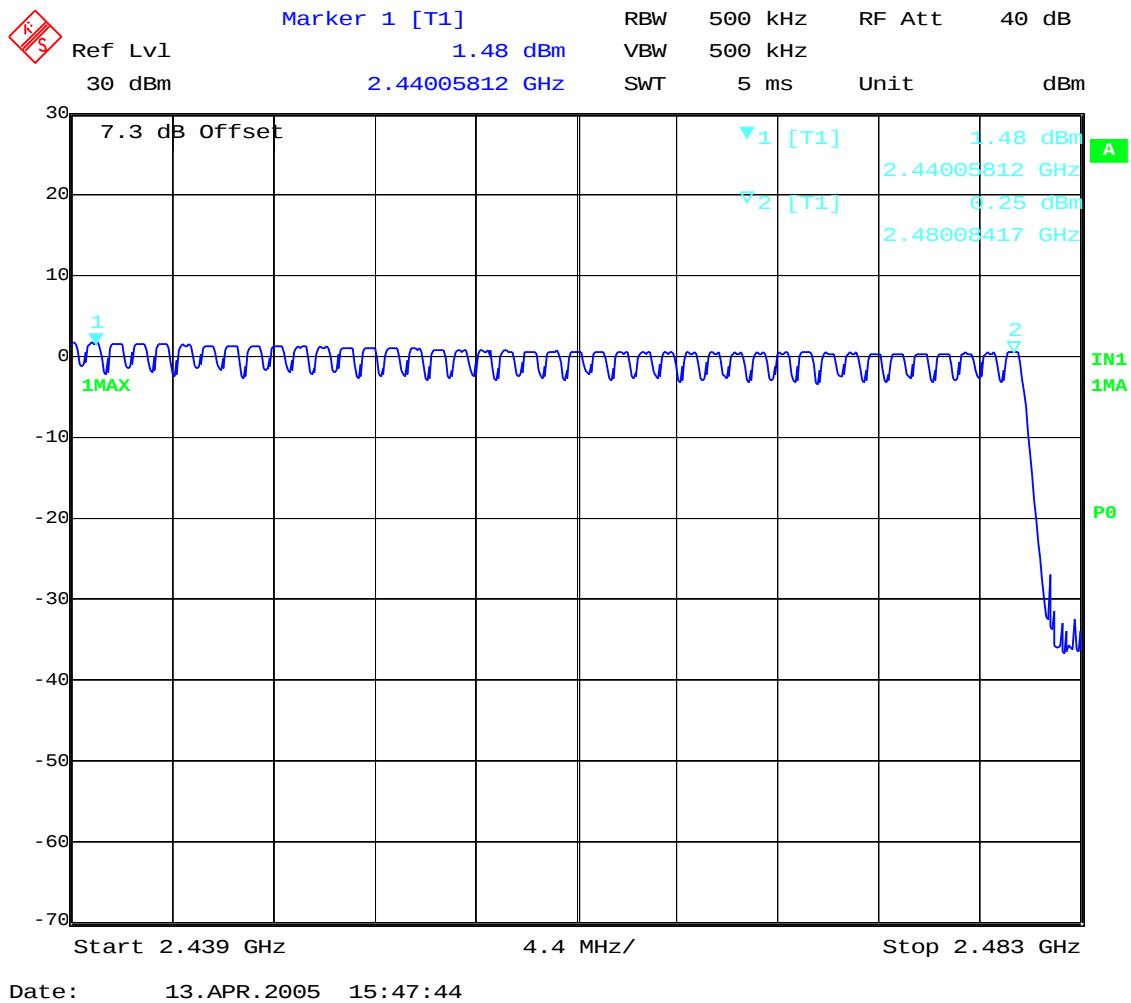
Frequency hopping system in the 2400-2483.5 MHz band shall use at least 15 non-overlapping channels.

RESULTS

The number of hopping channels is 79 (see next two plots).



Number of hopping frequencies: 39



Number of hopping frequencies: 40

Total number of hopping frequencies: 79

Verdict: PASS

Section 15.247 Subclause (a) (1) (iii). Time of occupancy (Dwell Time)

SPECIFICATION

The average time of occupancy on any channel shall not be greater than 0.4 seconds (400 ms) within a period of 0.4 seconds multiplied by the number of hopping channels employed = $0.4 \times 79 = 31.6$ seconds.

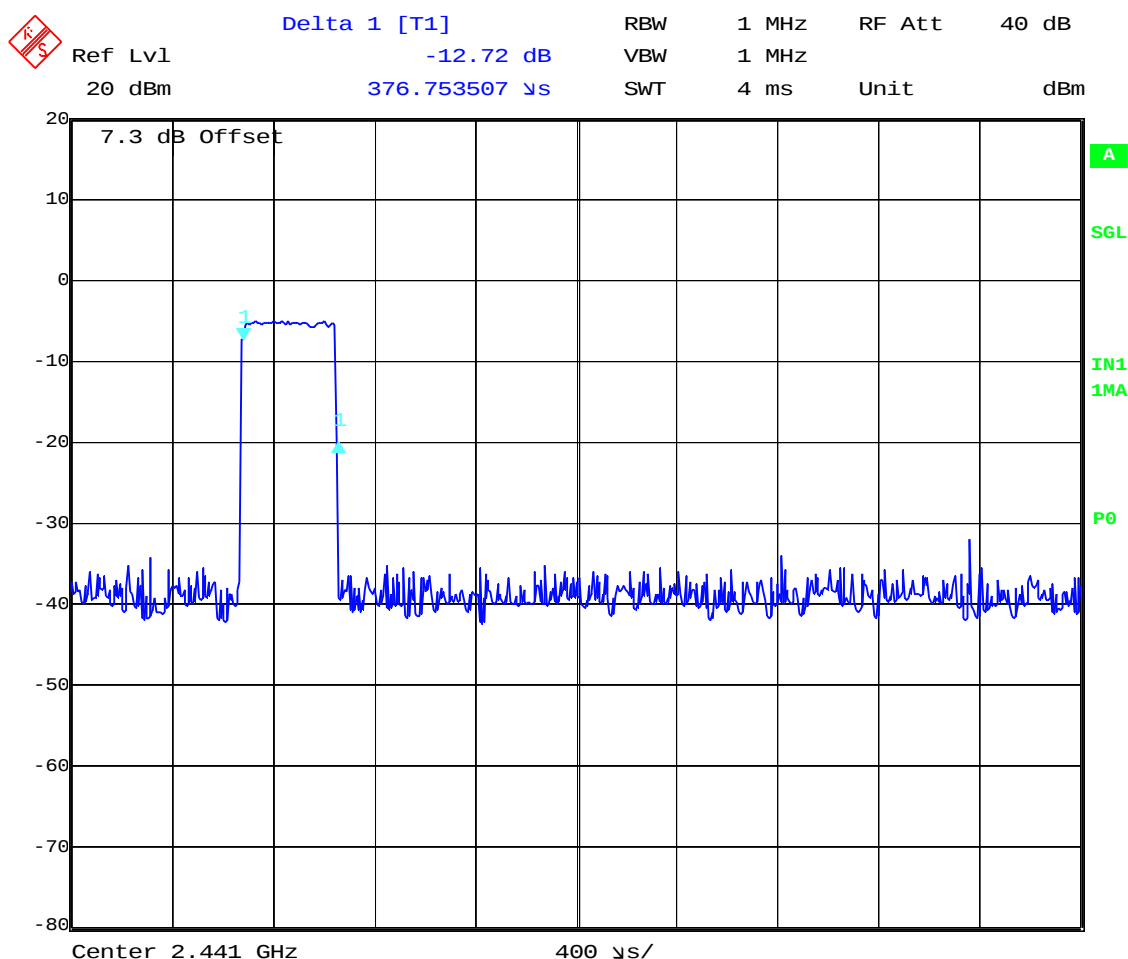
RESULTS

1. TIME OF OCCUPANCY (DWEELL TIME) FOR PACKET TYPE DH1.

The system makes worst case 1600 hops per second or 1 time slot has a length of $625\mu\text{s}$ with 79 channels. A DH1 Packet need 1 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case $1600/2 = 800$ hops per second with 79 channels. So you have each channel $800/79 = 10.13$ times per second and so for a period of $0.4 \times 79 = 31.6$ seconds you have $10.13 \times 31.6 = 320.11$ times of appearance .

Each Tx-time per appearance is $376.75\mu\text{s}$ (see next plot).

So we have $320.11 \times 376.75\mu\text{s} = 120.60\text{ ms}$ per 31.6 seconds.



Date: 13.APR.2005 15:52:12

Verdict: PASS

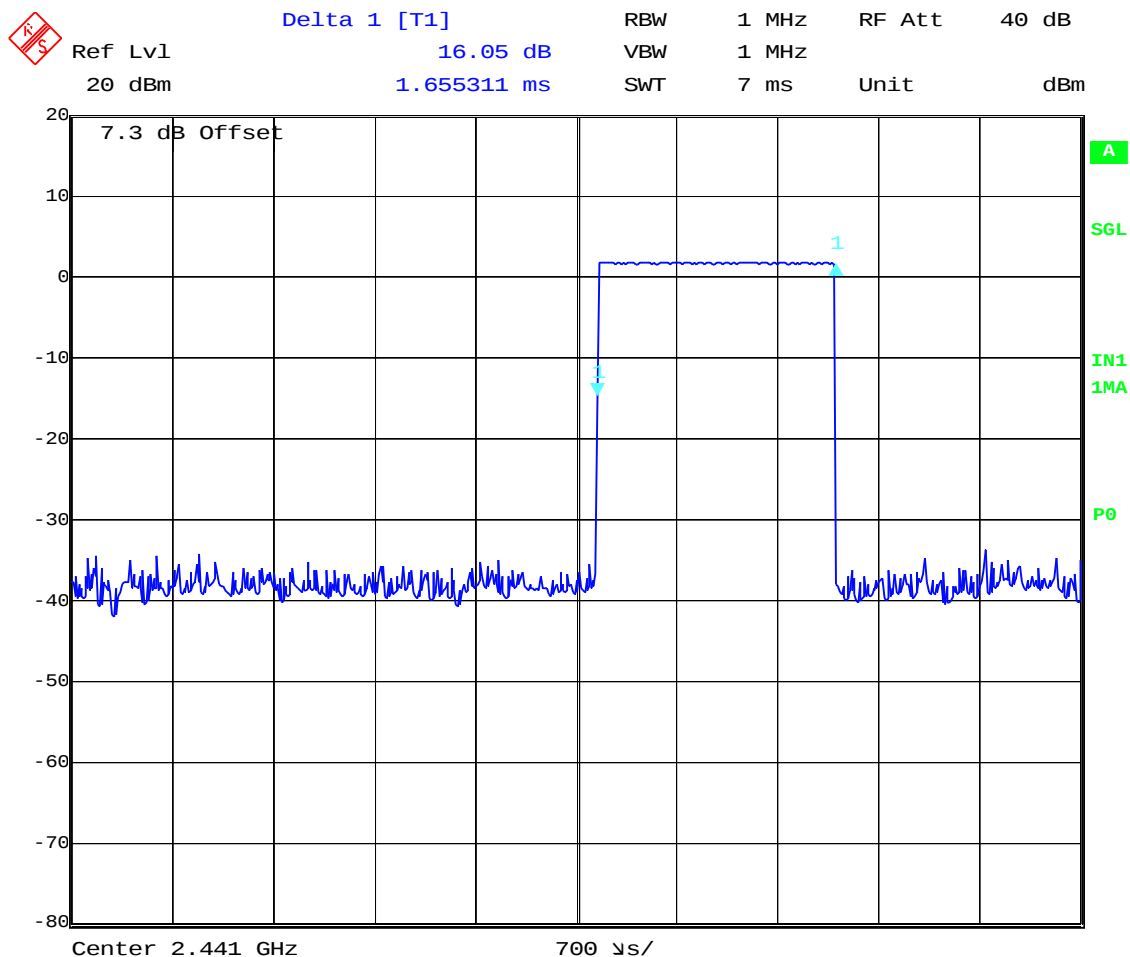
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2. TIME OF OCCUPANCY (DWELL TIME) FOR PACKET TYPE DH3.

A DH3 Packet need 3 time slots for transmitting and 1 time slot for receiving. Then the system makes worst case $1600/4 = 400$ hops per second with 79 channels. So you have each channel $400/79 = 5.1$ times per second and so for a period of $0.4 \times 79 = 31.6$ seconds you have $5.1 \times 31.6 = 161.16$ times of appearance .

Each Tx-time per appearance is 1.65 ms (see next plot).

So we have $161.16 \times 1.65 \text{ ms} = 265.91 \text{ ms}$ per 31.6 seconds.



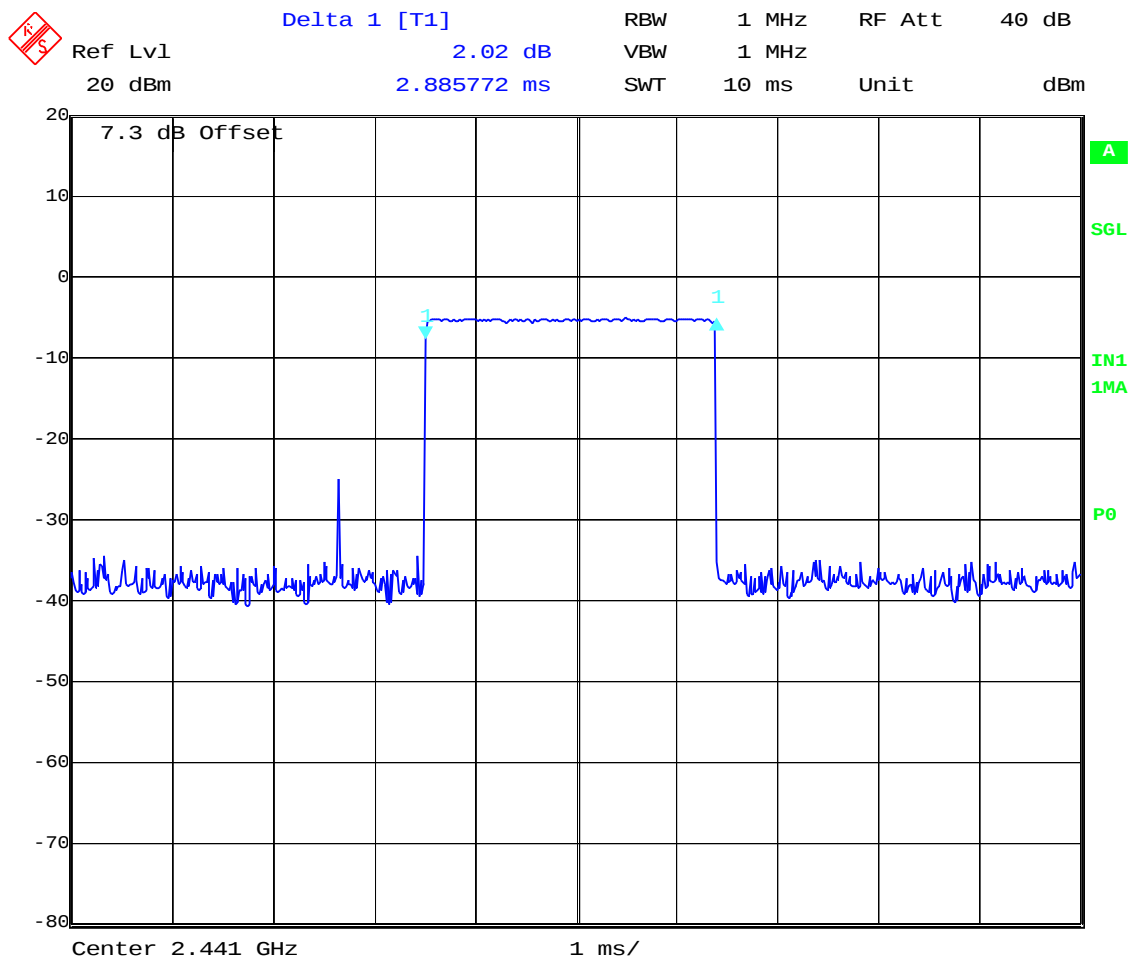
Verdict: PASS

3. TIME OF OCCUPANCY (DWEELL TIME) FOR PACKET TYPE DH5.

A DH5 Packet need 5 time slots for transmitting and 1 time slot for receiving. Then the system makes worst case $1600/6 = 266.67$ hops per second with 79 channels. So you have each channel $266.67/79 = 3.37$ times per second and so for a period of $0.4 \times 79 = 31.6$ seconds you have $3.37 \times 31.6 = 106.49$ times of appearance .

Each Tx-time per appearance is 2.88 ms (see next plot).

So we have $106.49 \times 2.88 \text{ ms} = 306.69 \text{ ms}$ per 31.6 seconds.



Date: 13.APR.2005 15:54:57

Verdict: PASS

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 (CONDUCTED). See next plots.

	Lowest frequency 2402 MHz	Middle frequency 2441 MHz	Highest frequency 2480 MHz
Maximum peak power (dBm)	0.72	1.94	0.78
Measurement uncertainty (dB)	±1.5		

The maximum declared antenna gain for this device is -12 dBi, therefore the maximum theoretical peak radiated power (EIRP) in the three measurement channels for this device is -10.06 dBm or 0.1 mW.

The actual peak radiated power (EIRP) was measured for the lowest, middle and highest frequency (see next plots):

MAXIMUM PEAK OUTPUT POWER (RADIATED).

	Lowest frequency 2402 MHz	Middle frequency 2441 MHz	Highest frequency 2480 MHz
Maximum EIRP peak power (dBm)	-6.52	-6.96	-8.76
Measurement uncertainty (dB)	±4.0		

The antenna is integral type.

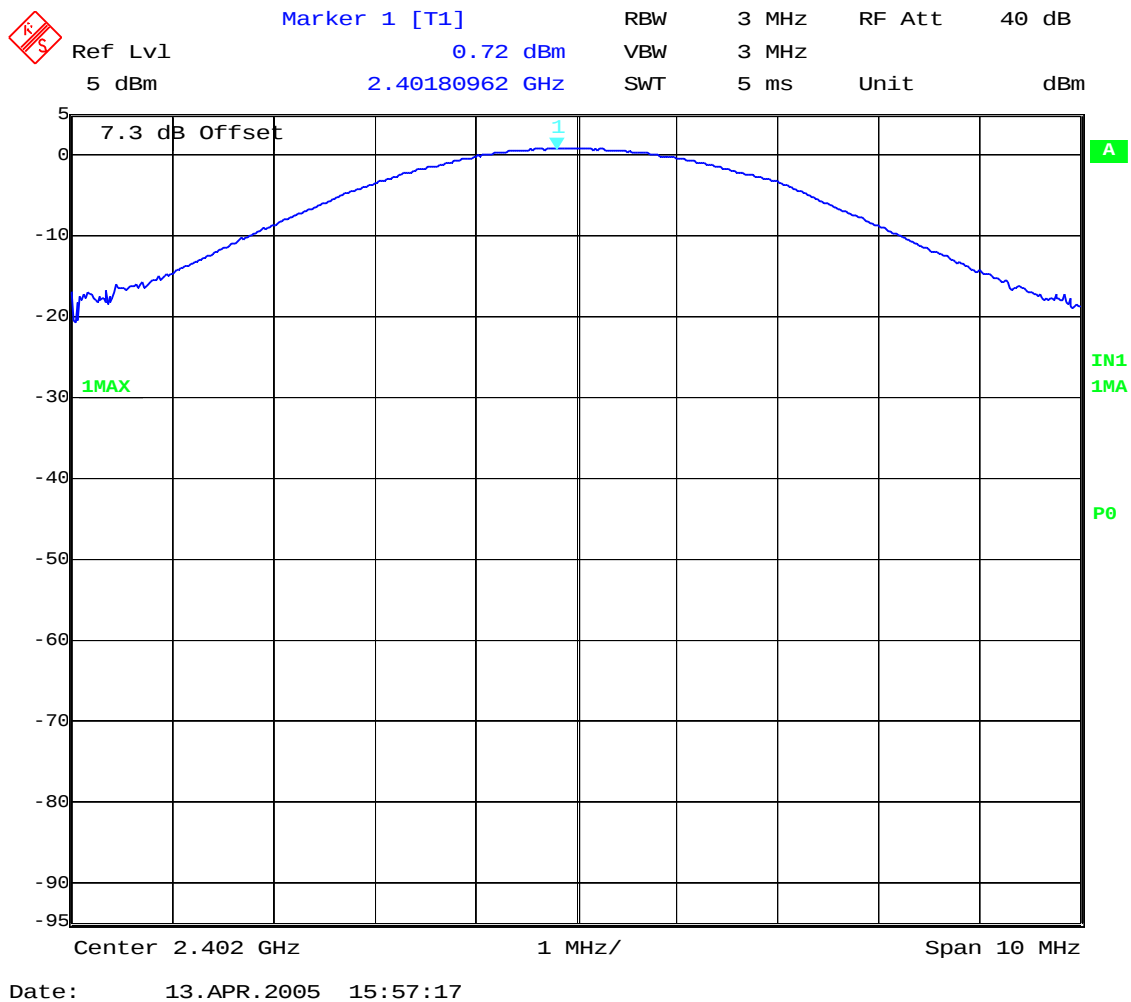
Declared peak gain: -12 dBi

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

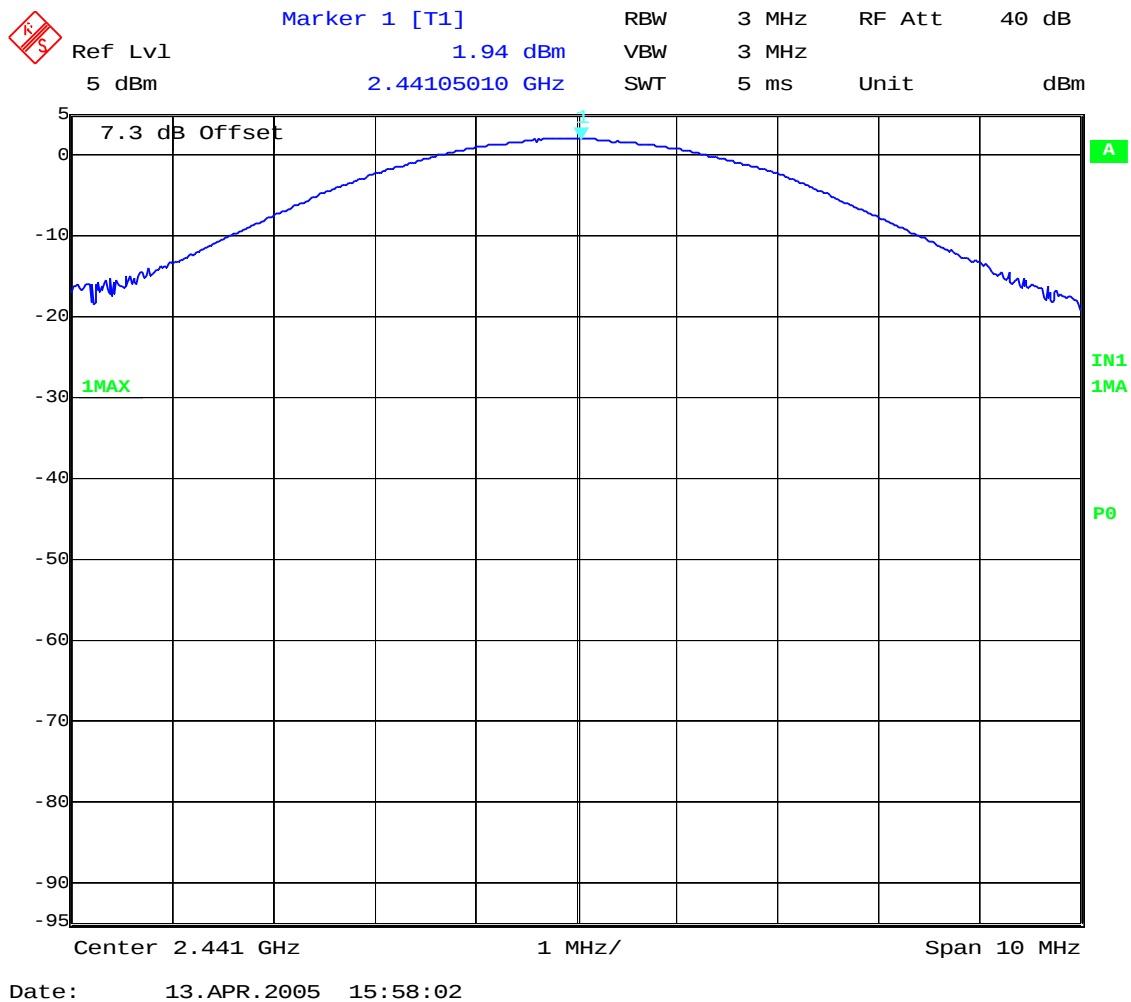
PEAK OUTPUT POWER (CONDUCTED).

Lowest Channel: 2402 MHz.



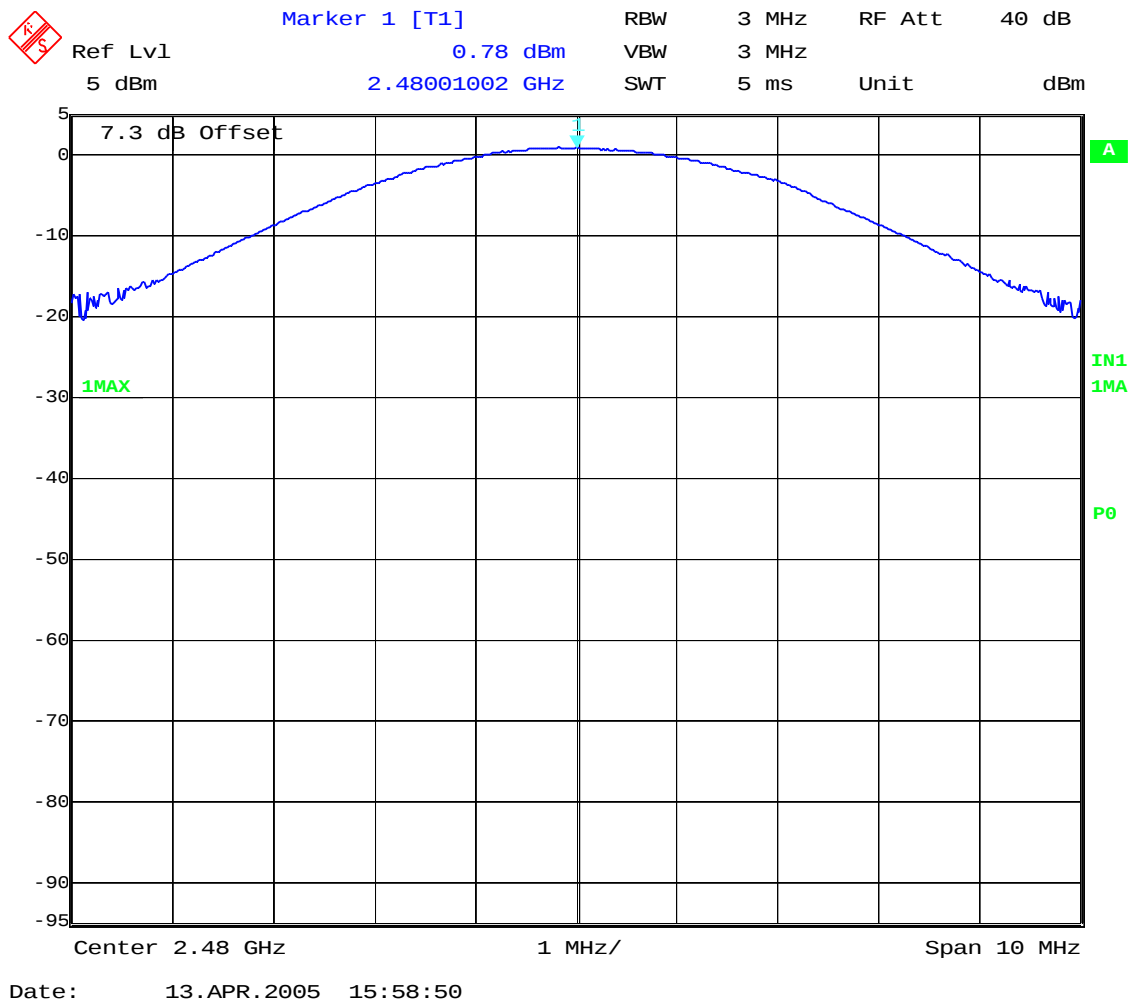
PEAK OUTPUT POWER (CONDUCTED).

Middle Channel: 2441 MHz.



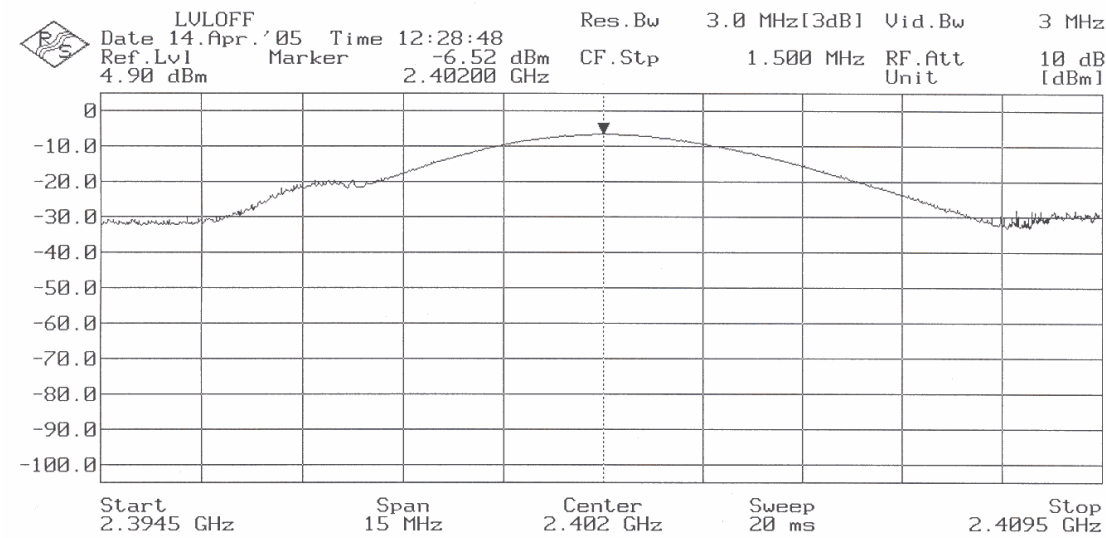
PEAK OUTPUT POWER (CONDUCTED).

Highest Channel: 2480 MHz.



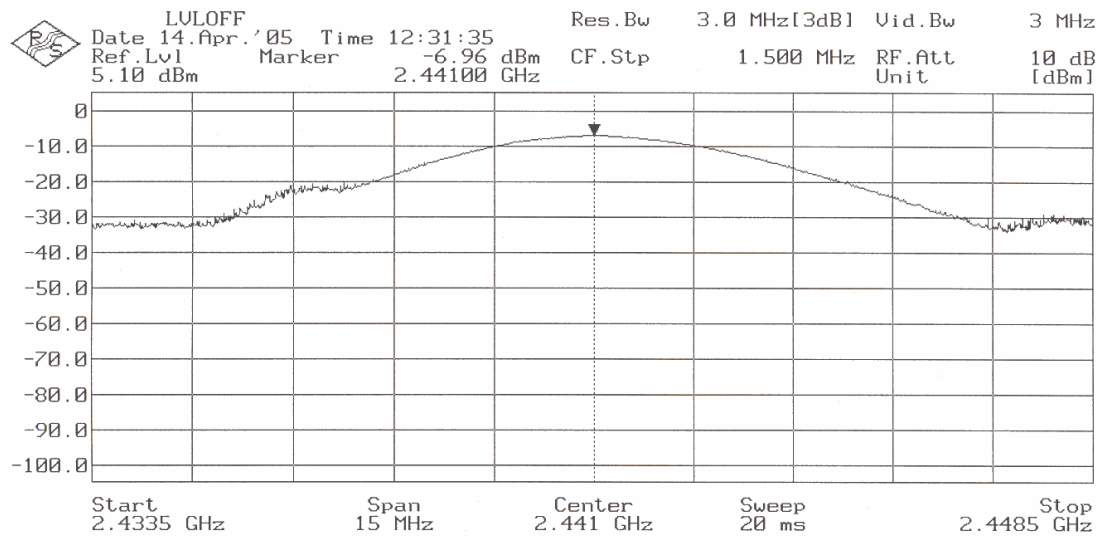
PEAK OUTPUT POWER (RADIATED).

Lowest Channel: 2402 MHz.



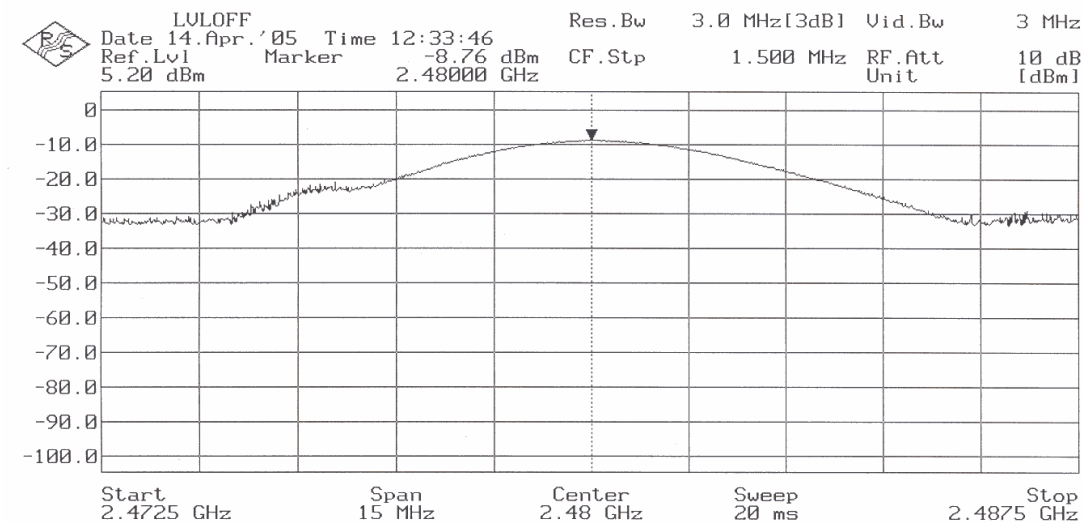
PEAK OUTPUT POWER (RADIATED).

Middle Channel: 2441 MHz.



PEAK OUTPUT POWER (RADIATED).

Highest Channel: 2480 MHz.



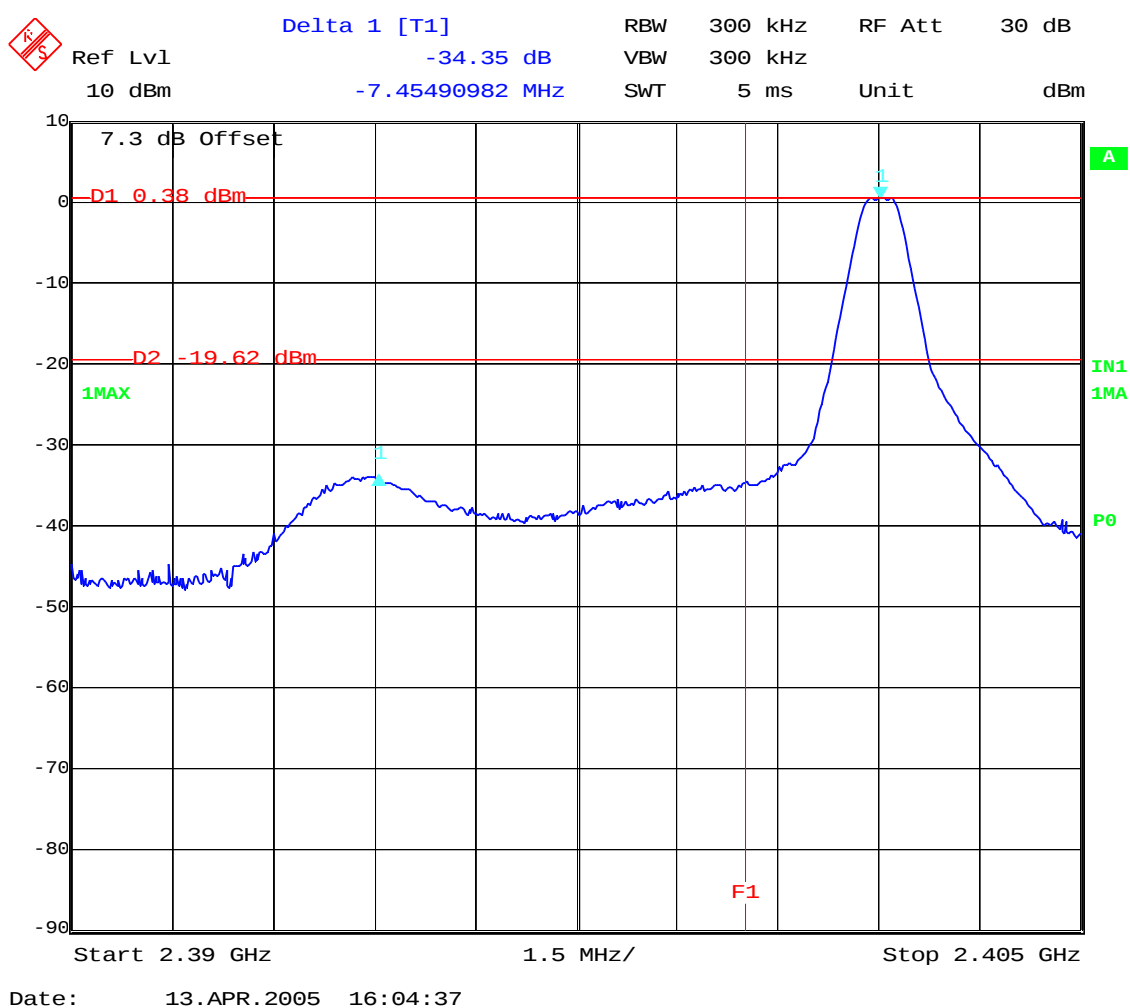
Section 15.247 Subclause (d). Band-edge of conducted emissions (Transmitter)

SPECIFICATION

Emissions outside the frequency band in which the intentional radiator is operating shall be at least 20dB below the highest level of the desired power.

RESULTS:

1. LOW FREQUENCY SECTION 2402 MHz (HOPPING OFF). See next plot.



Verdict: PASS

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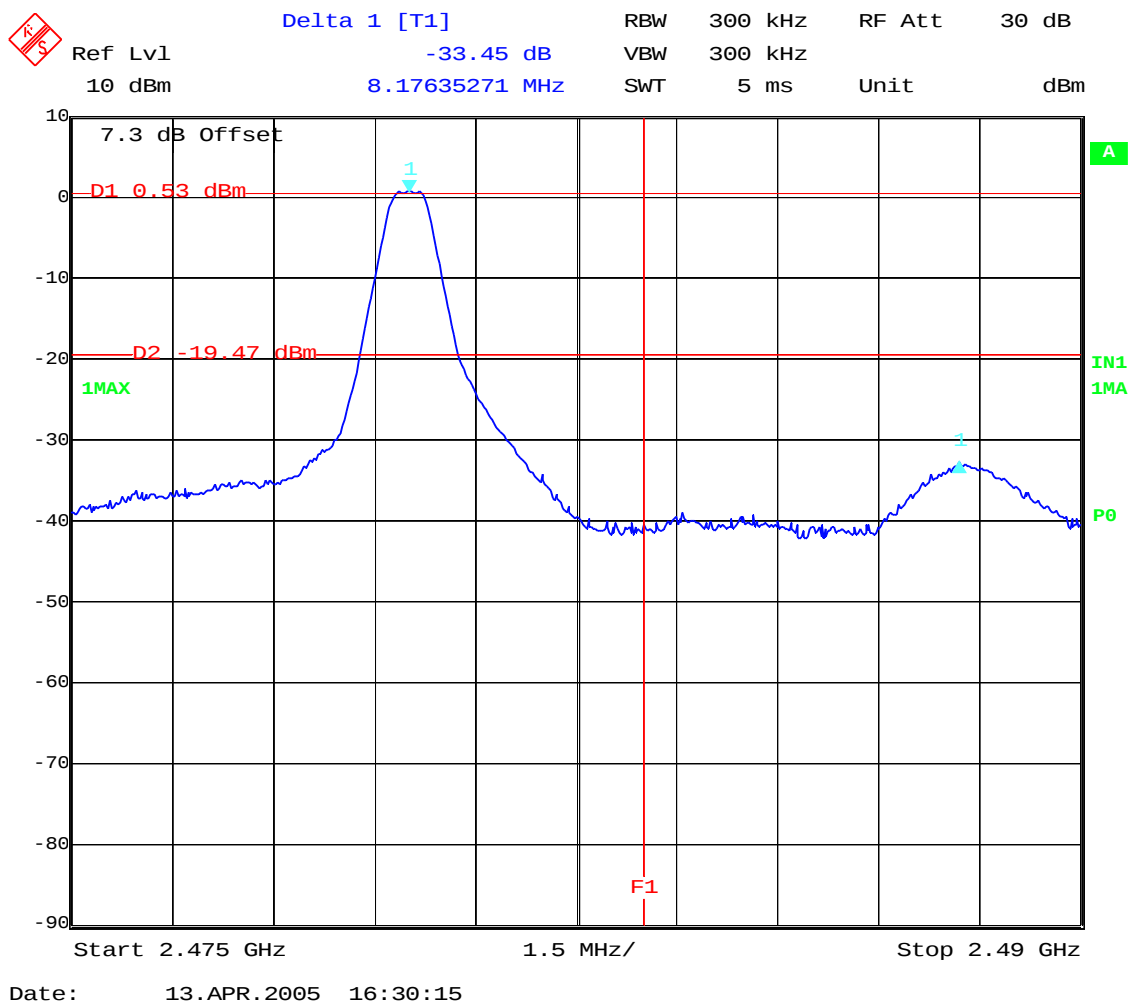
Date: 2005-05-04

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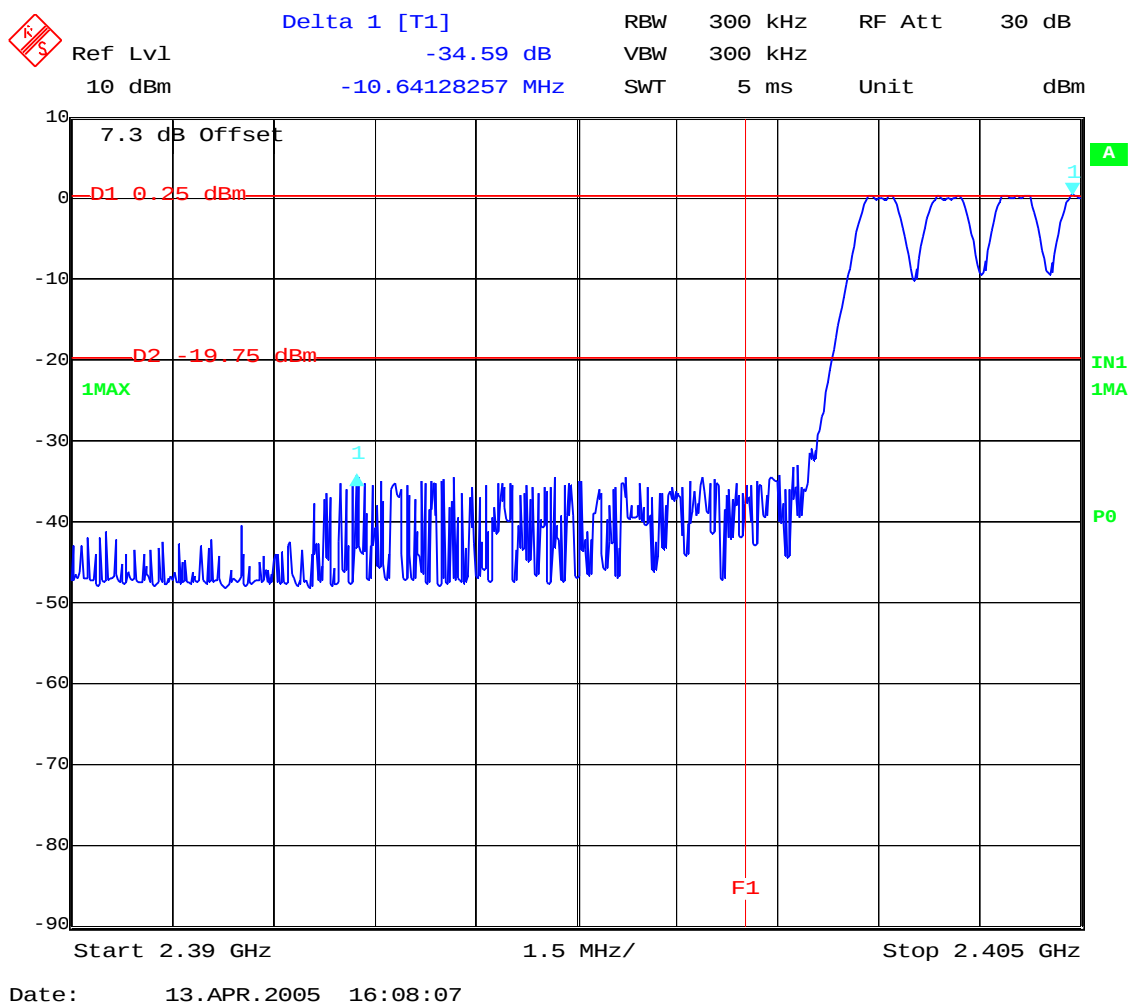
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2. HIGH FREQUENCY SECTION 2480 MHz (HOPPING OFF). See next plot.



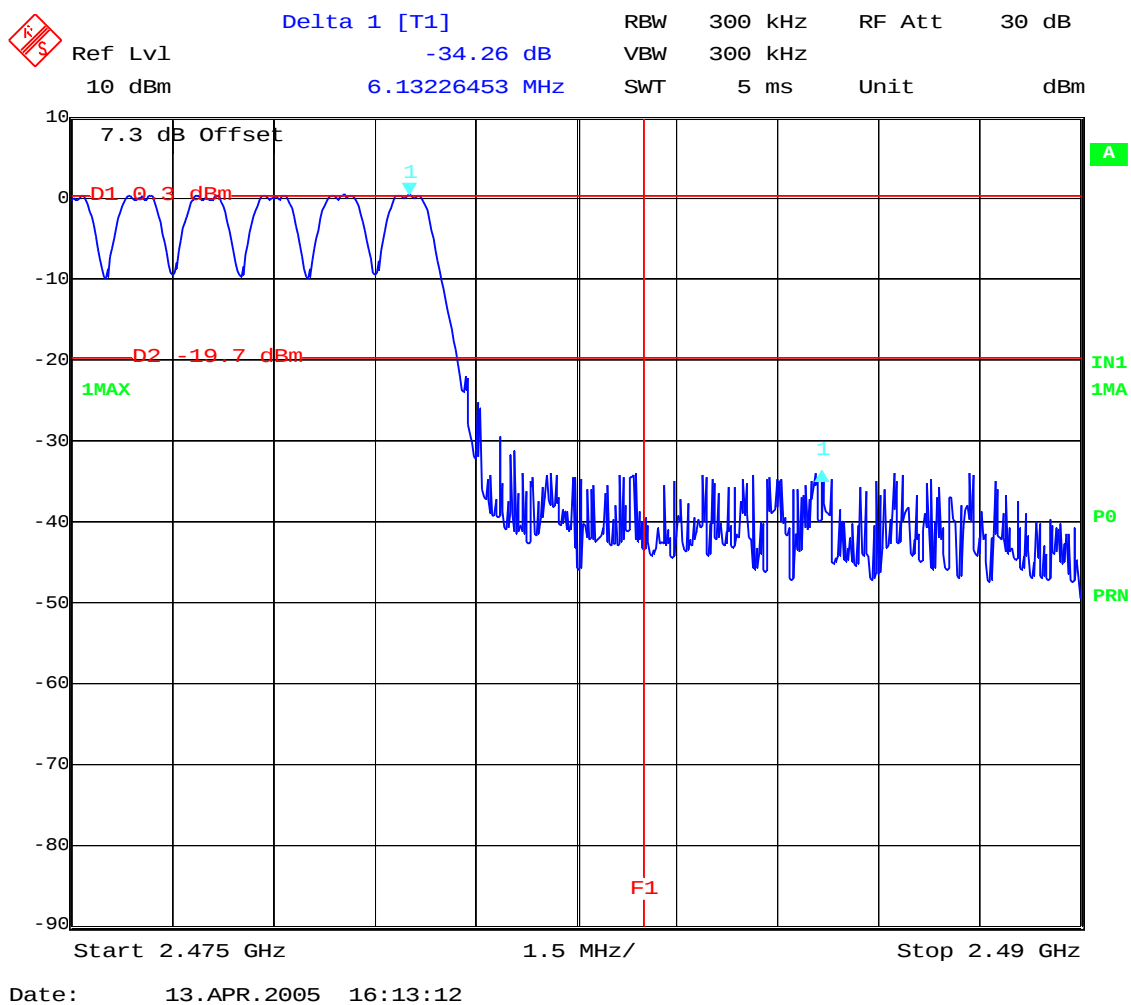
Verdict: PASS

3. LOW FREQUENCY SECTION (HOPPING ON). See next plot.



Verdict: PASS

4. HIGH FREQUENCY SECTION (HOPPING ON). See next plot.



Verdict: PASS

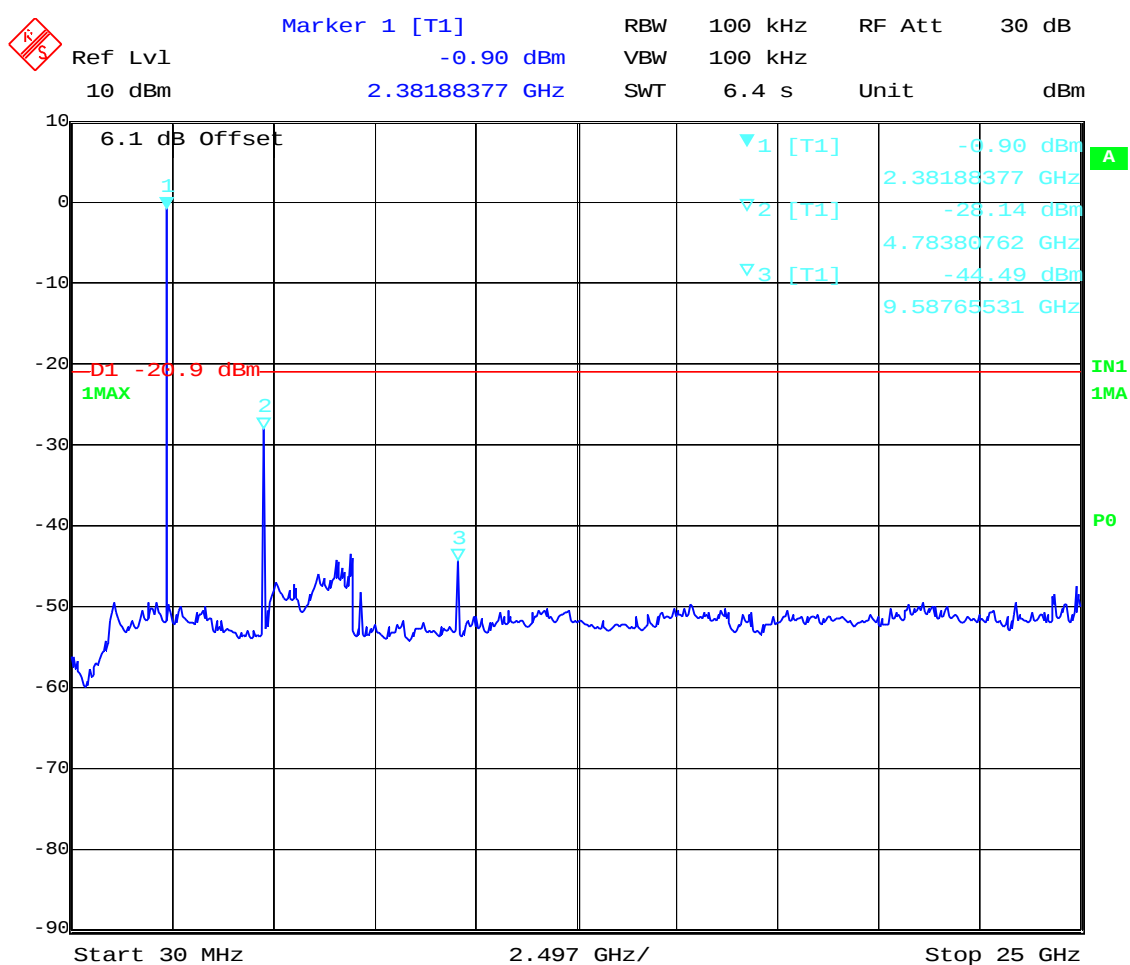
Section 15.247 Subclause (d). Emission limitations conducted (Transmitter)

SPECIFICATION

In any 100 kHz bandwidth outside the frequency band in which the intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.

RESULTS:

1. LOWEST CHANNEL (2402 MHz): 30 MHz-25 GHz (see next plot).



Date: 13.APR.2005 16:40:25

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

Verdict: PASS

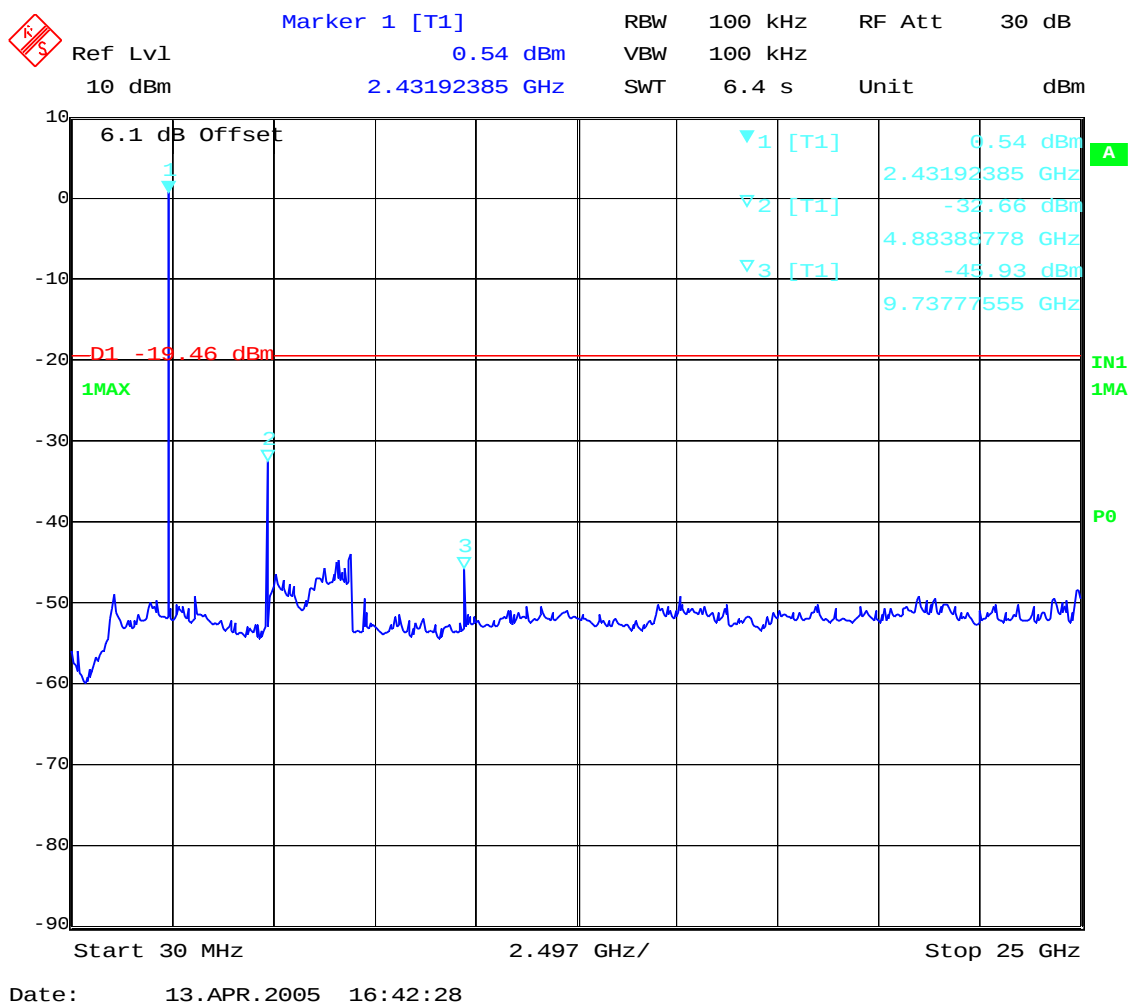
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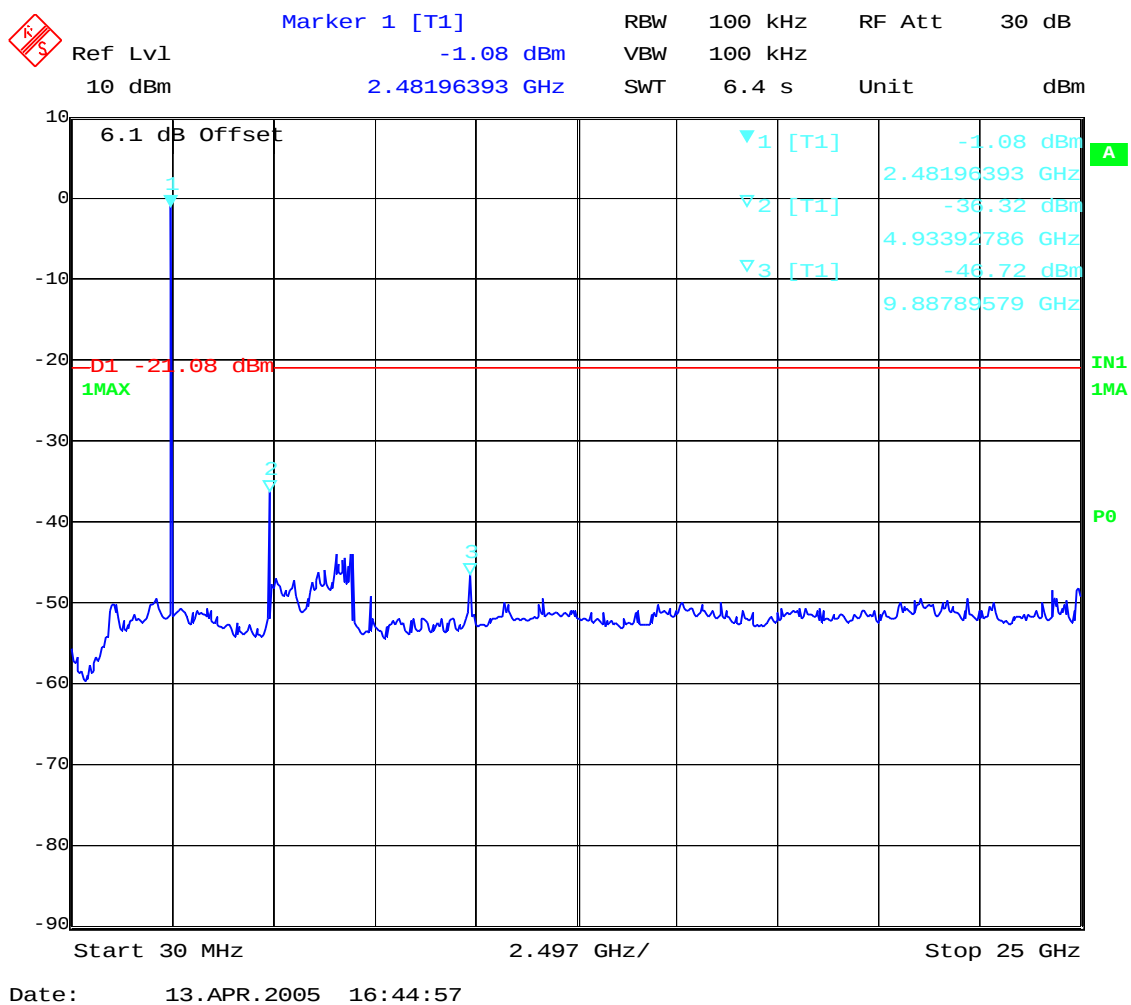
2. MIDDLE CHANNEL (2441 MHz): 30 MHz-25 GHz (see next plot).



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

Verdict: PASS

3. HIGH CHANNEL (2480 MHz): 30 MHz-25 GHz (see next plot).



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 (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 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.

1. TRANSMITTER OPERATING IN CHANNEL: LOWEST (2402 MHz).**Frequency range 30 MHz-1000 MHz.**

Spurious frequency (MHz)	Polarization	Detector	Emission Level (dB μ V/m)	Measurement Uncertainty (dB)
624.8296593	Vertical	Quasi-peak	32.94	± 3.8

Frequency range 1 GHz-25 GHz.

Spurious frequency (MHz)	Polarization	Detector	Emission Level (dB μ V/m)	Measurement Uncertainty (dB)
4804.0260	Vertical	Peak	42.46	± 4.0
4804.0260	Vertical	Average	39.22	± 4.0

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

Verdict: PASS.

2. TRANSMITTER OPERATING IN CHANNEL: MIDDLE (2441 MHz).**Frequency range 30 MHz-1000 MHz.**

Spurious frequency (MHz)	Polarization	Detector	Emission Level (dB μ V/m)	Measurement Uncertainty (dB)
624.8296593	Vertical	Quasi-peak	31.79	± 3.8

Frequency range 1 GHz-25 GHz.

No spurious signals found.

No spurious signals were found inside the restricted bands 2310-2390 MHz and 2483.5-2500 MHz and at the harmonic frequencies.

Verdict: PASS.

3. TRANSMITTER OPERATING IN CHANNEL: HIGHEST (2480 MHz).**Frequency range 30 MHz-1000 MHz.**

Spurious frequency (MHz)	Polarization	Detector	Emission Level (dB μ V/m)	Measurement Uncertainty (dB)
624.8296593	Vertical	Quasi-peak	32.31	± 3.8

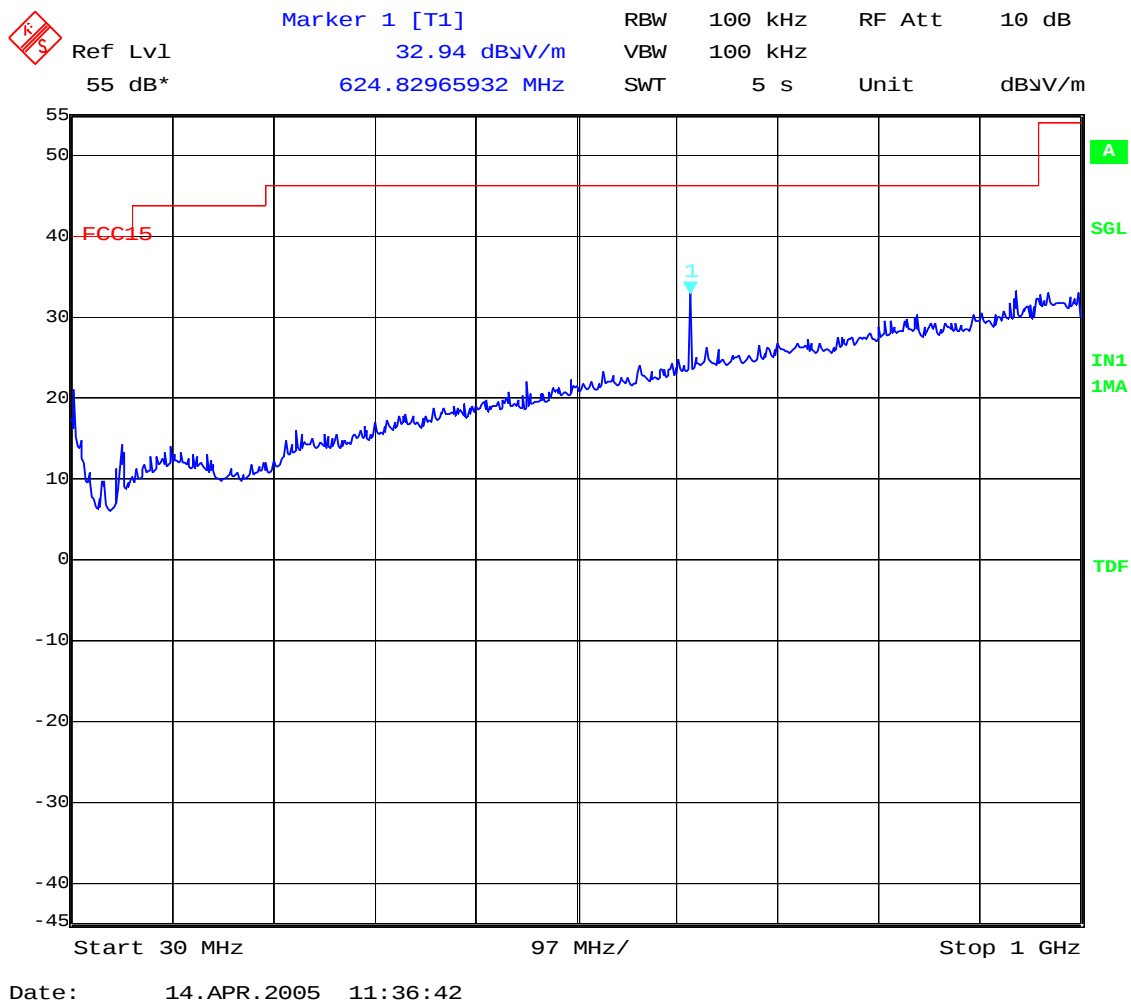
Frequency range 1 GHz-25 GHz.

No spurious signals found.

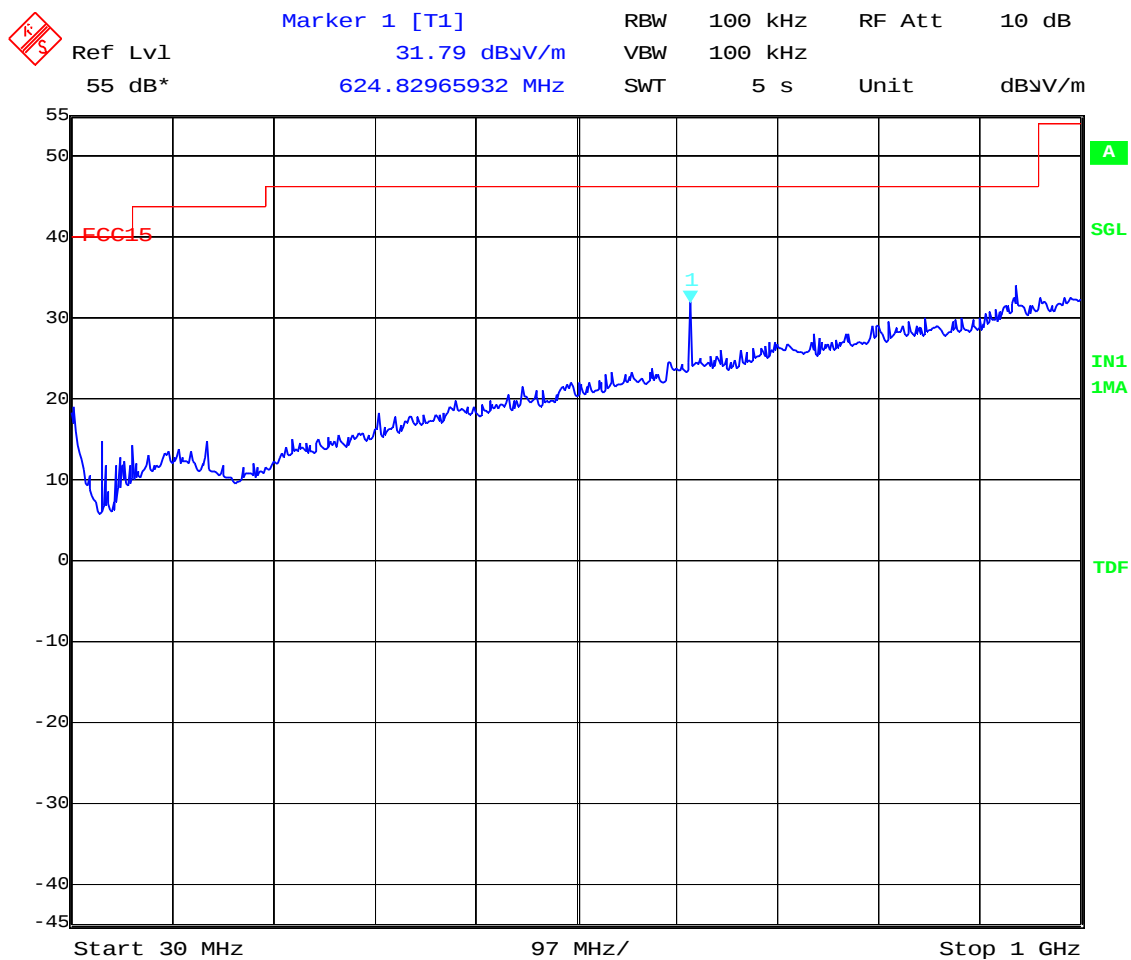
No spurious signals found inside the restricted bands 2310-2390 MHz and 2483.5-2500 MHz and at the harmonic frequencies.

Verdict: PASS.

FREQUENCY RANGE 30 MHz-1000 MHz.
CHANNEL: Lowest (2402 MHz).



CHANNEL: Middle (2441 MHz).



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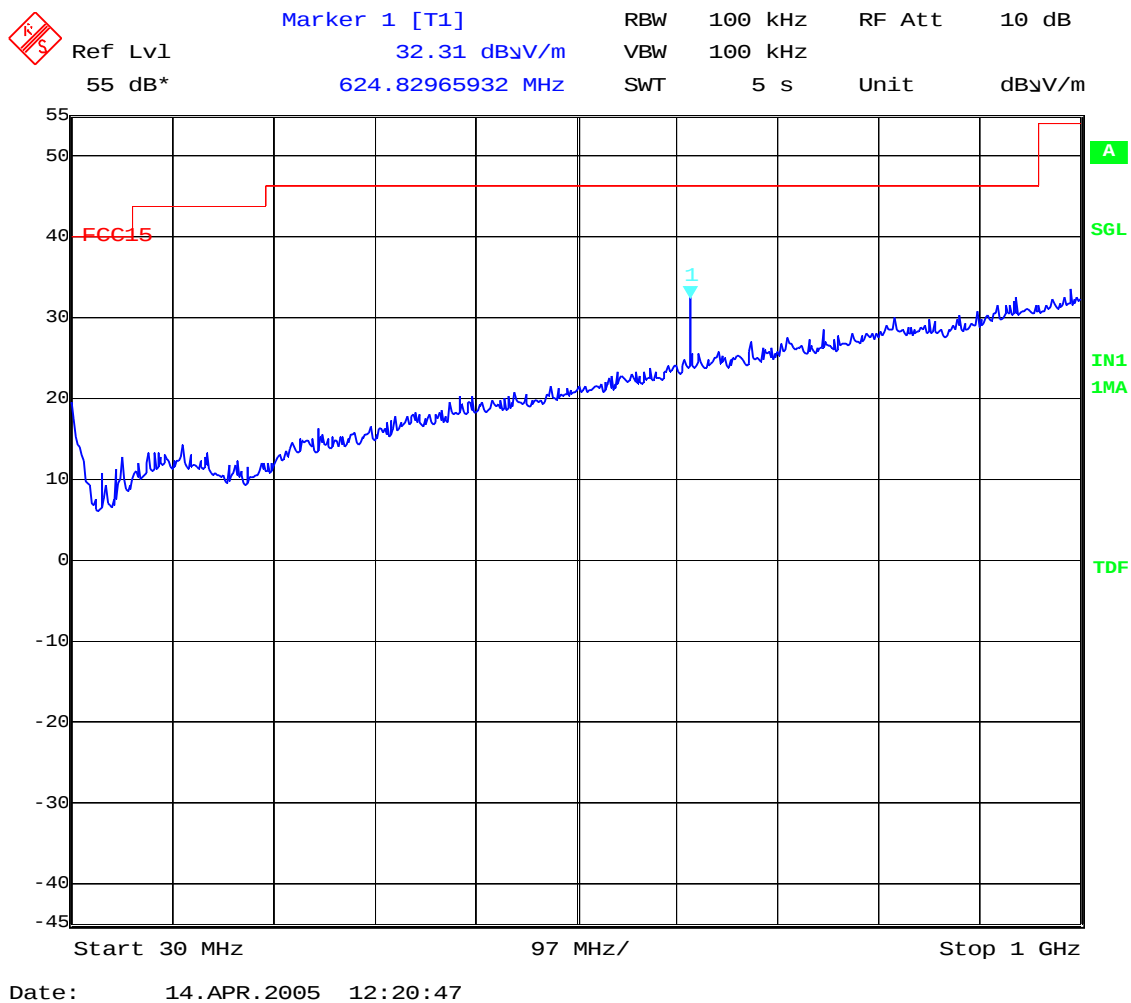
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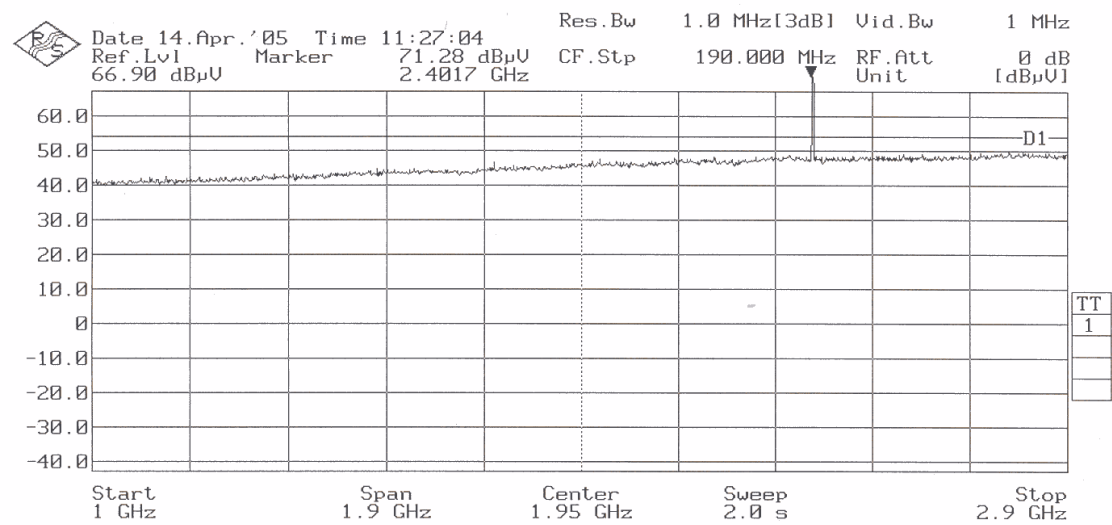
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CHANNEL: Highest (2480 MHz).



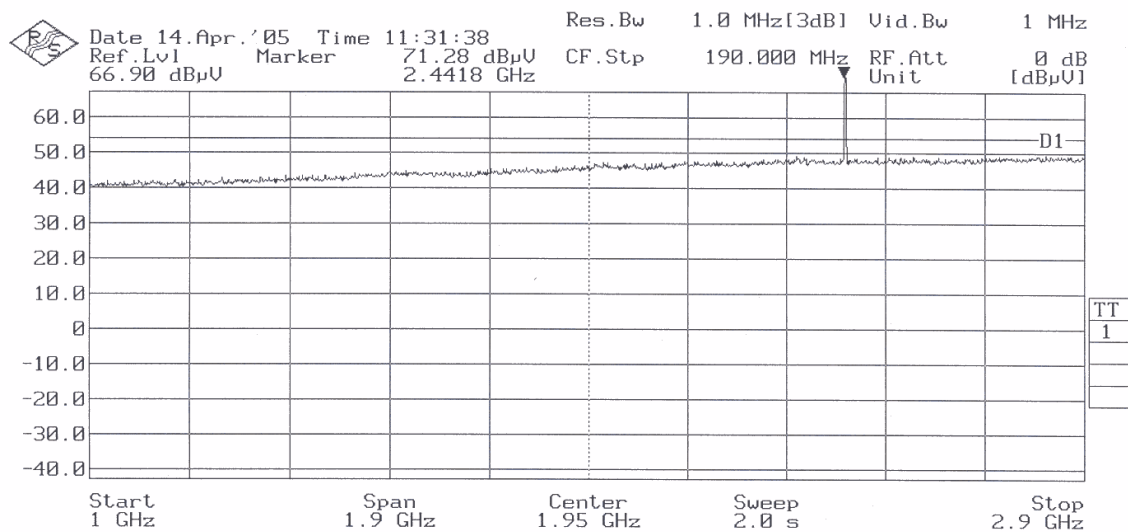
FREQUENCY RANGE 1 GHz to 2.9 GHz.

CHANNEL: Lowest (2402 MHz).



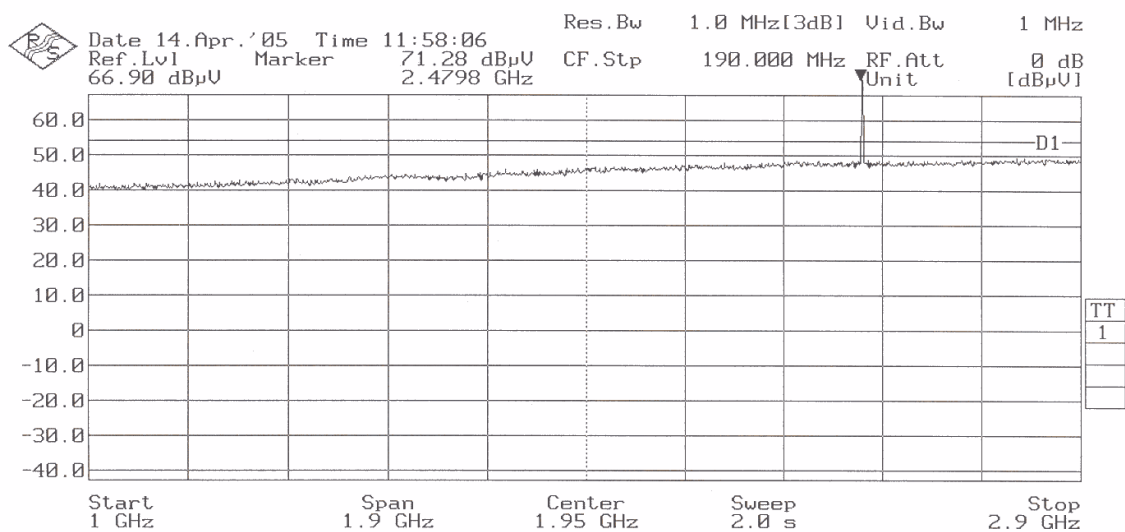
Note: The peak above the limit is the carrier frequency.

CHANNEL: Middle (2441 MHz).



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

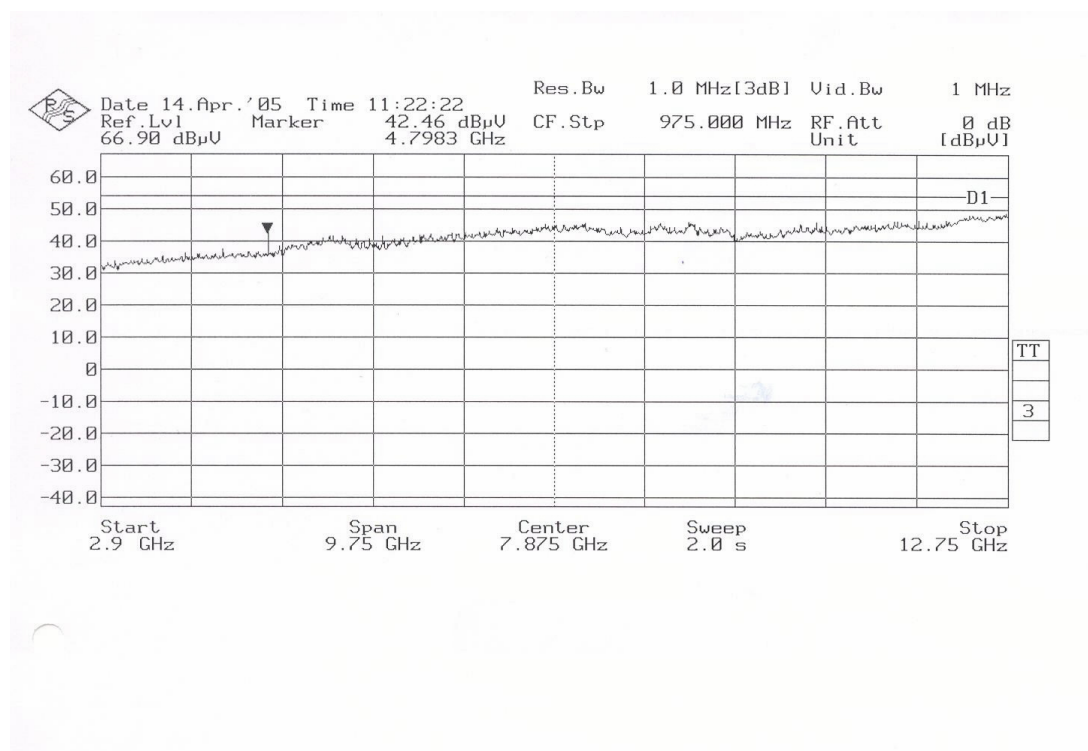
CHANNEL: Highest (2480 MHz).



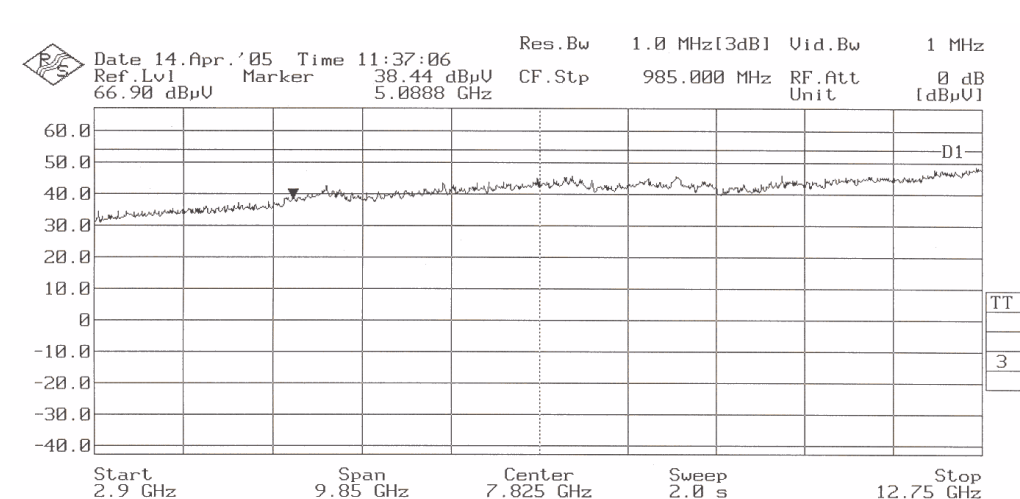
Note: The peak above the limit is the carrier frequency.

FREQUENCY RANGE 2.9 GHz to 12.75 GHz.

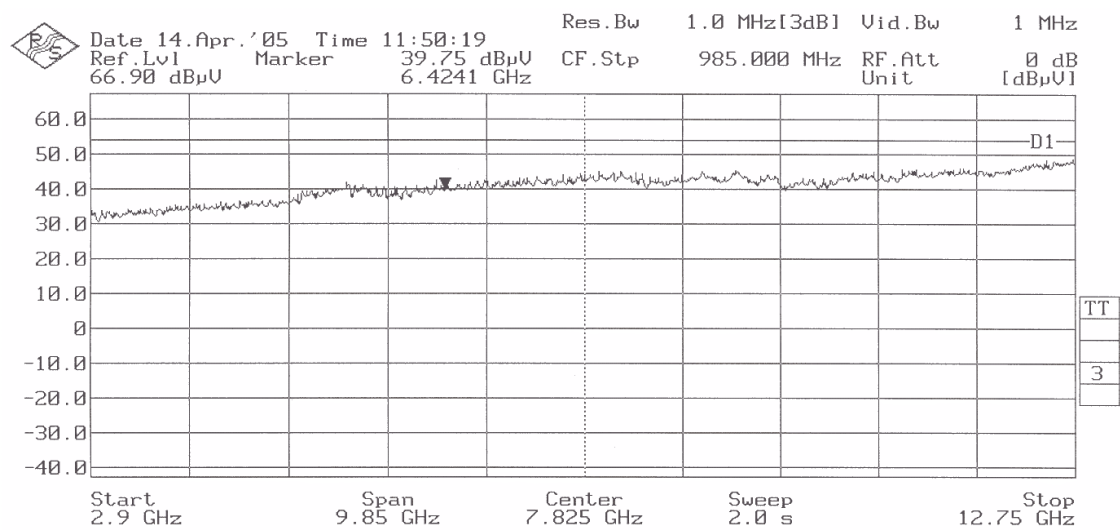
CHANNEL: Lowest (2402 MHz).



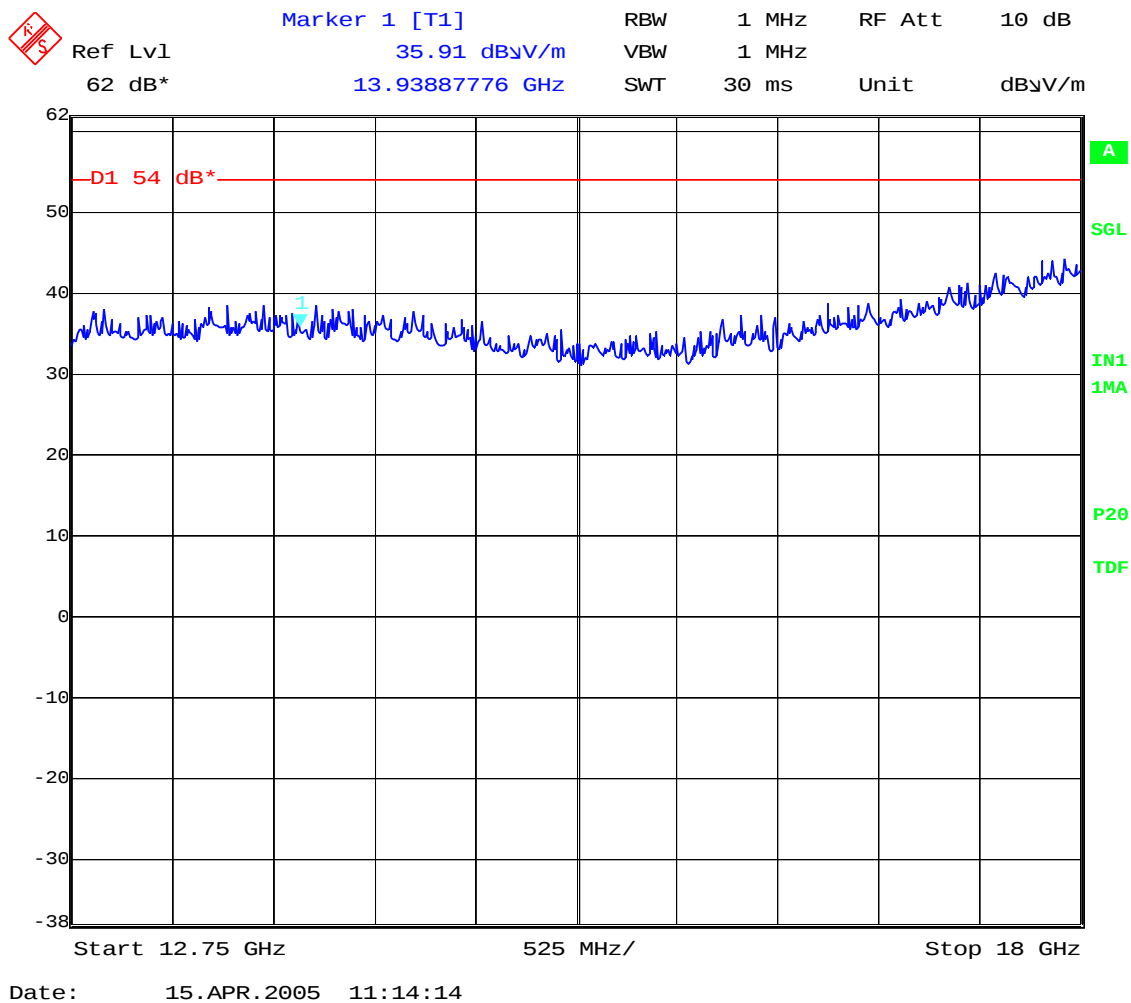
CHANNEL: Middle (2441 MHz).



CHANNEL: Highest (2480 MHz).

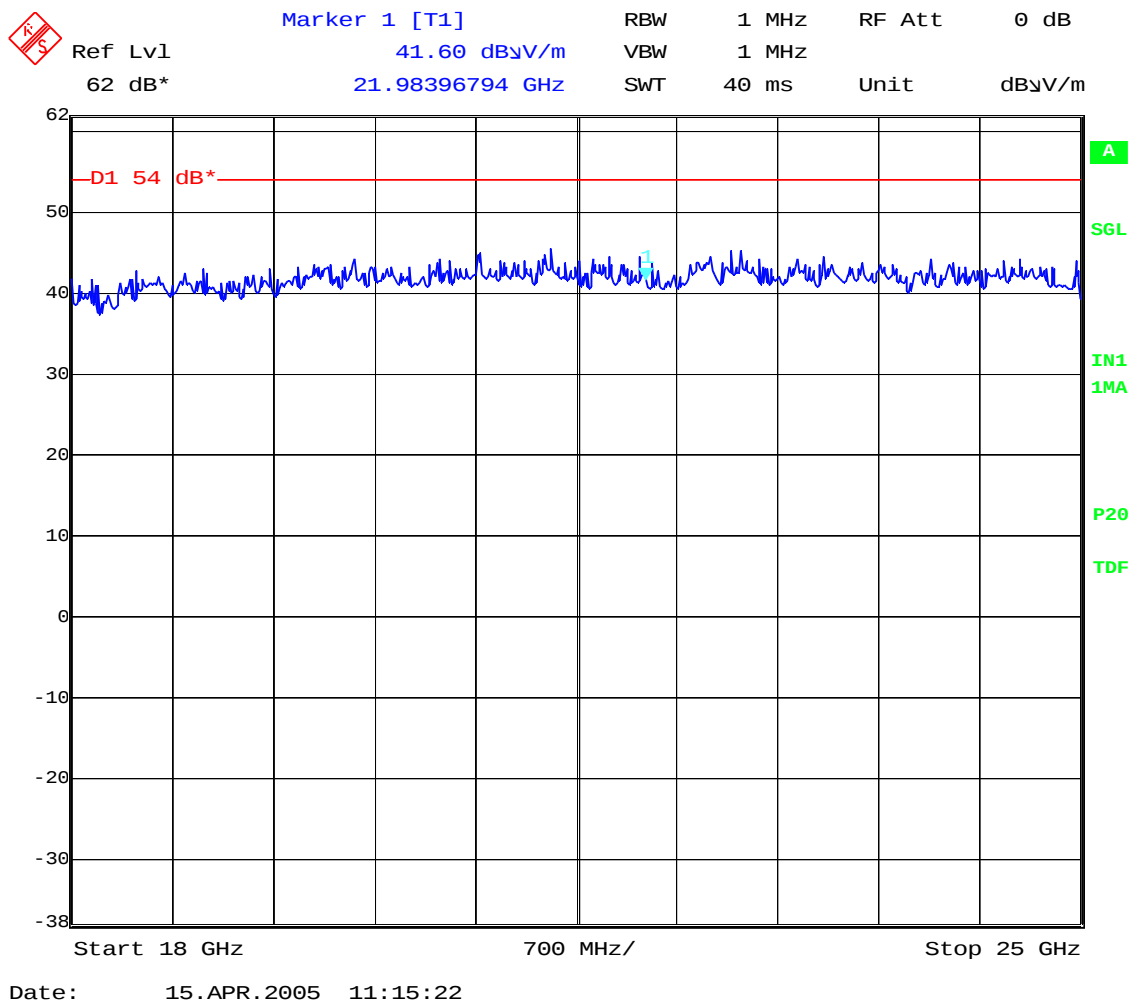


FREQUENCY RANGE 12.75 GHz to 18 GHz.



(This plot is valid for all three channels).

FREQUENCY RANGE 18 GHz to 25 GHz.



(This plot is valid for all three channels).

Section 15.207. Continuous Conducted Emission**SPECIFICATION**

The radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table:

Frequency range (MHz)	Limit (dB μ V)	
	Quasi-peak	Average
0,15 to 0,5	66-56	56-46
0,5 to 5	56	46
5 to 30	60	50

OPERATING MODES OF EUT**Different tested operating modes (OM)**

- OM#01: EUT ON. Charging batteries to the base and transferring by Bluetooth.

TEST RESULTS

CCmmnnxx: CC, Conduction condition^o; mm: sample number; nn: operation mode; xx: wire.

On the sample S/01:

- OM#01.

CDmmnnxx	Description	Result
CC01010N	Interference voltage on N wire	PASS
CC0101L1	Interference voltage on L1 wire	PASS

On the sample S/02:

- OM#01.

CDmmnnxx	Description	Result
CC02010N	Interference voltage on N wire	PASS
CC0201L1	Interference voltage on L1 wire	PASS

GRAPH RESULTS

See next pages.

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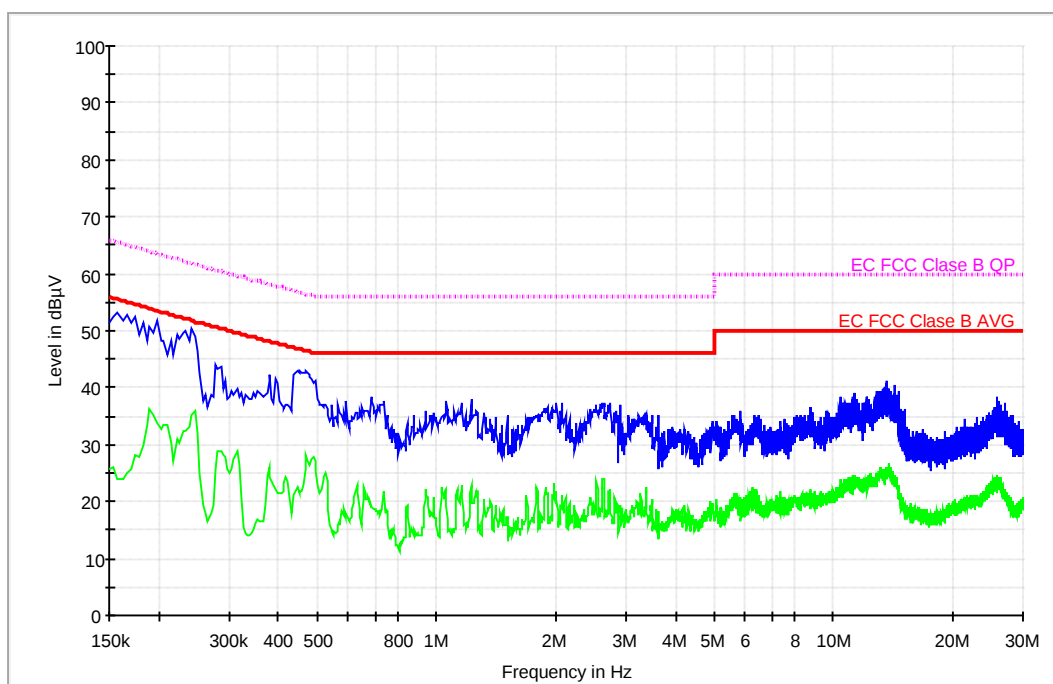
Continuous conducted emission: CC01010N (Peak and average)

EMC32 Report

Test Information

Proyecto:	21893iem.001
Empresa:	LOGITECH
Muestra:	M/01
Modo operacion:	MO#01
Fecha:	2005-04-19 15:41
Setup:	EMI conducted
Description	EUT ON. Charging battery. Neutral noise.

EC FCC Clase B ESIB26 CC



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DataReduction Detector1

Frequency (MHz)	MaxPeak- ClearWrite (dBµV)	Average- ClearWrite (dBµV)
0.158000	53.3	23.8
0.278000	44.0	25.2
0.470000	43.0	28.3
1.222000	38.1	23.0
1.506000	35.2	17.3
2.066000	37.4	21.1
2.750000	37.4	20.6
2.898000	36.8	17.7
3.382000	35.7	22.5
3.606000	35.2	18.4
3.698000	32.1	16.3
3.946000	33.1	18.6
5.078000	34.0	19.0
5.822000	36.0	20.3
6.490000	35.2	18.8
7.566000	34.4	20.6
8.774000	36.6	22.1
10.466000	38.3	23.9
11.286000	39.2	24.5
13.558000	40.8	24.7
13.666000	41.1	25.9
14.234000	40.6	24.2
14.754000	36.2	20.0
14.862000	36.0	20.6
15.046000	36.2	19.7
19.022000	32.3	18.1
21.458000	34.6	20.3
22.926000	34.9	20.4
25.806000	38.2	24.4
26.042000	37.7	23.3
27.454000	36.1	20.1
28.462000	35.3	18.8
29.222000	34.1	18.7

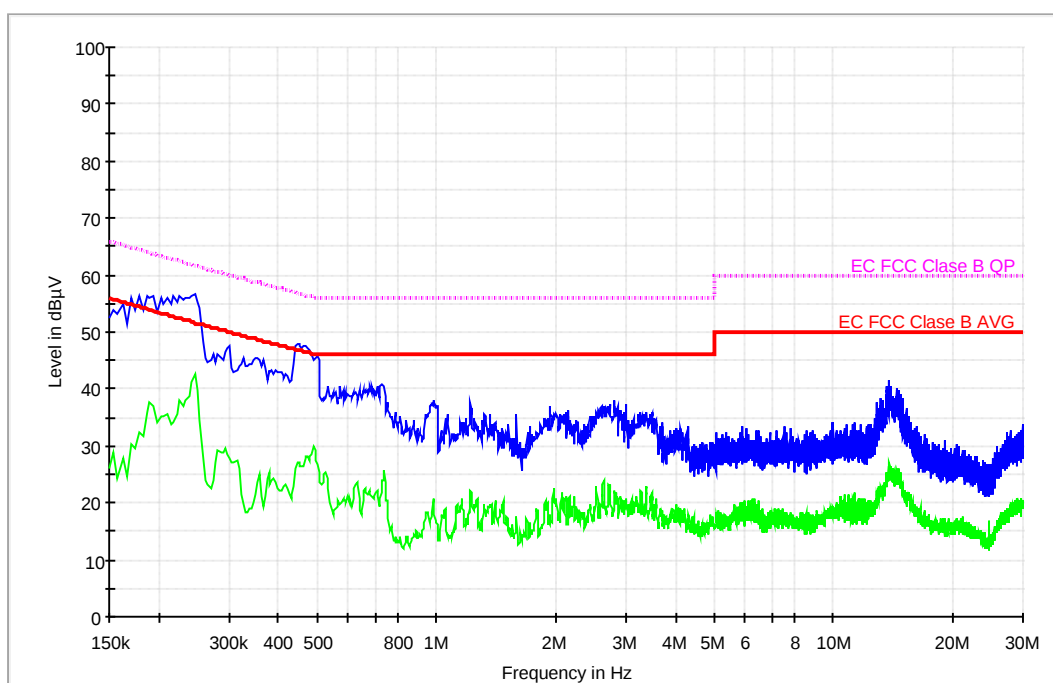
Continuous conducted emission: CC0101L1 (Peak and average)

EMC32 Report

Test Information

Proyecto:	21893iem.001
Empresa:	LOGITECH
Muestra:	M/01
Modo operacion:	MO#01
Fecha:	2005-04-19 15:31
Setup:	EMI conducted
Description	EUT ON. Charging battery. Phase noise.

EC FCC Clase B ESIB26 CC



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DataReduction Detector1

Frequency (MHz)	MaxPeak- ClearWrite (dBµV)	Average- ClearWrite (dBµV)
0.246000	56.7	42.8
0.446000	47.9	27.3
0.986000	37.9	20.5
1.218000	37.7	22.0
1.594000	35.6	17.5
1.934000	36.8	17.5
2.810000	38.0	22.3
3.002000	37.4	20.7
3.386000	36.0	23.0
4.326000	33.3	18.1
4.690000	30.7	16.5
5.346000	32.3	17.7
5.918000	33.6	18.3
6.066000	33.2	19.1
6.438000	32.7	17.4
7.206000	32.8	17.9
7.506000	33.5	18.1
7.758000	33.2	18.3
8.050000	31.5	17.2
8.490000	31.9	17.0
8.534000	32.7	17.2
8.774000	32.3	17.4
8.898000	32.6	16.3
9.962000	34.2	18.8
10.006000	34.0	19.5
10.830000	33.6	19.0
11.278000	34.2	18.2
11.650000	33.6	20.7
12.058000	33.0	18.5
12.346000	33.8	19.2
12.674000	35.0	19.7
12.906000	37.7	22.2
13.818000	41.6	25.7
14.510000	40.1	25.5
14.842000	39.2	23.3
15.246000	36.7	22.0
16.182000	33.6	18.6
16.466000	32.0	18.9
17.010000	32.1	17.3
17.122000	31.4	17.1
17.818000	30.7	15.7
18.990000	30.9	15.5
20.454000	30.3	16.5
27.438000	32.3	19.2
27.918000	32.7	18.3
29.830000	33.7	20.1

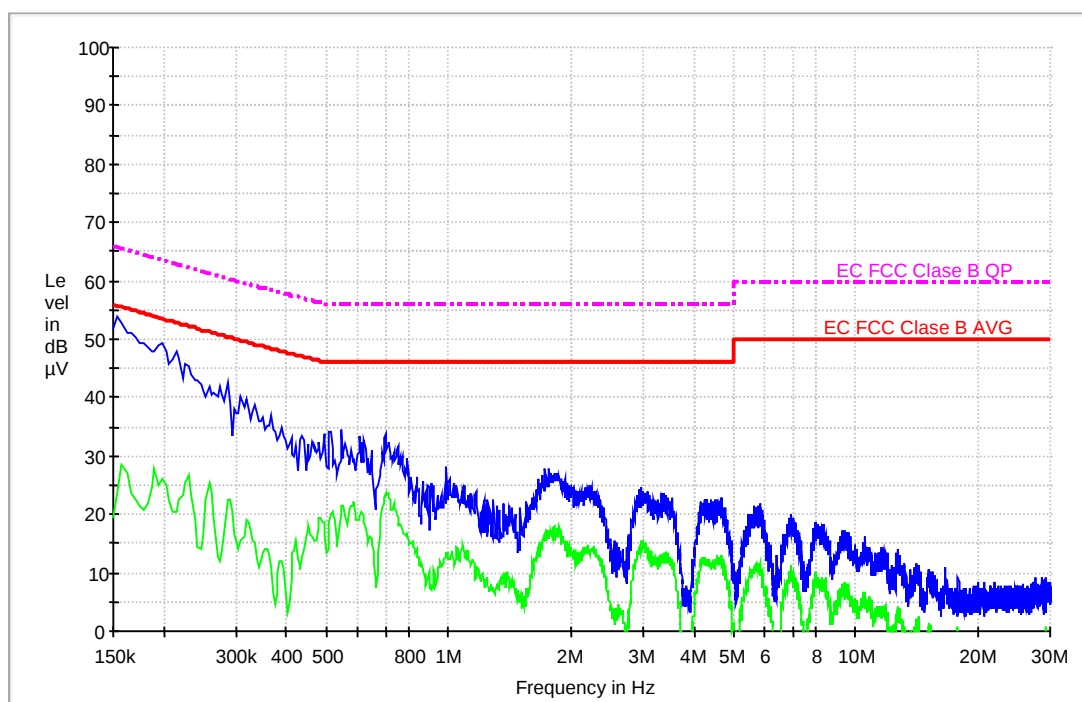
Continuous conducted emission: CC02010N (Peak and average)

EMC32 Report

Test Information

Proyecto:	21893IEM.001
Empresa:	LOGITECH
Muestra:	M/02
Modo operacion:	MO#01
Fecha:	2005-04-19 12:28
Setup:	EMI conducted
Description	EBP ON. RUIDO EN NEUTRO

EC EMI 55022 Clase B ESIB26 CC



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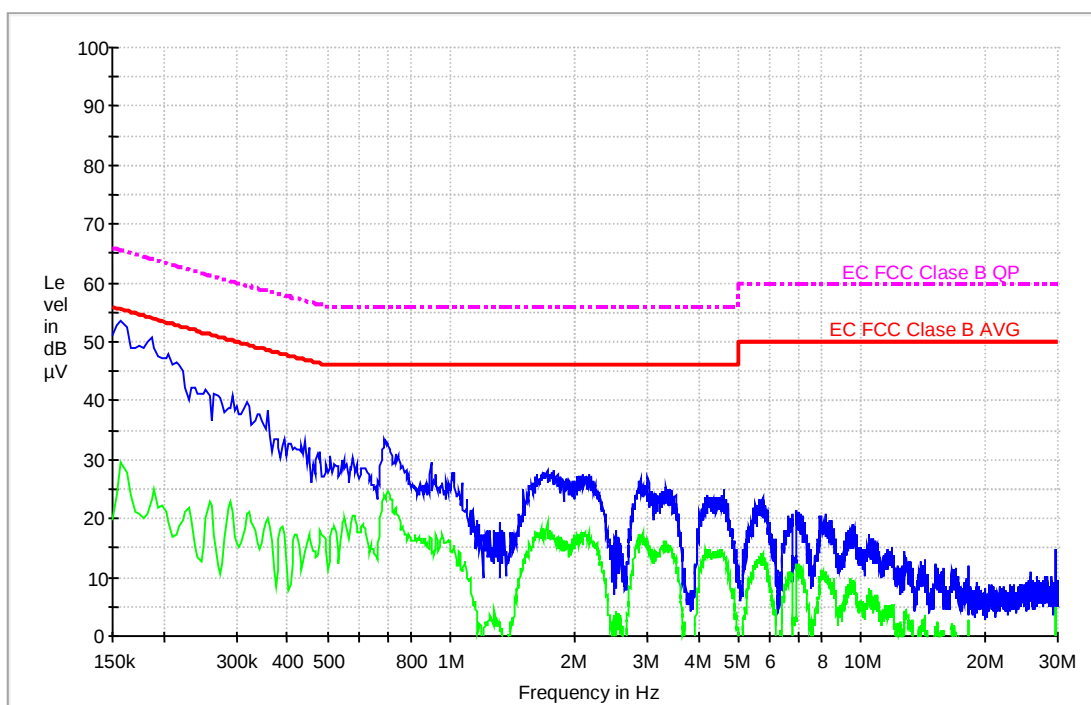
Continuous conducted emission: CC0201L1 (Peak and average)

EMC32 Report

Test Information

Proyecto:	21893IEM001
Empresa:	LOGITECH
Muestra:	M/02
Modo operacion:	MO#01
Fecha:	2005-04-19 12:34
Setup:	EMI conducted
Description	EBP ON. RUIDO EN FASE.

EC EMI 55022 Clase B ESIB26 CC



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ANNEX B

PHOTOGRAPHS **(Number of photographs: 5)**

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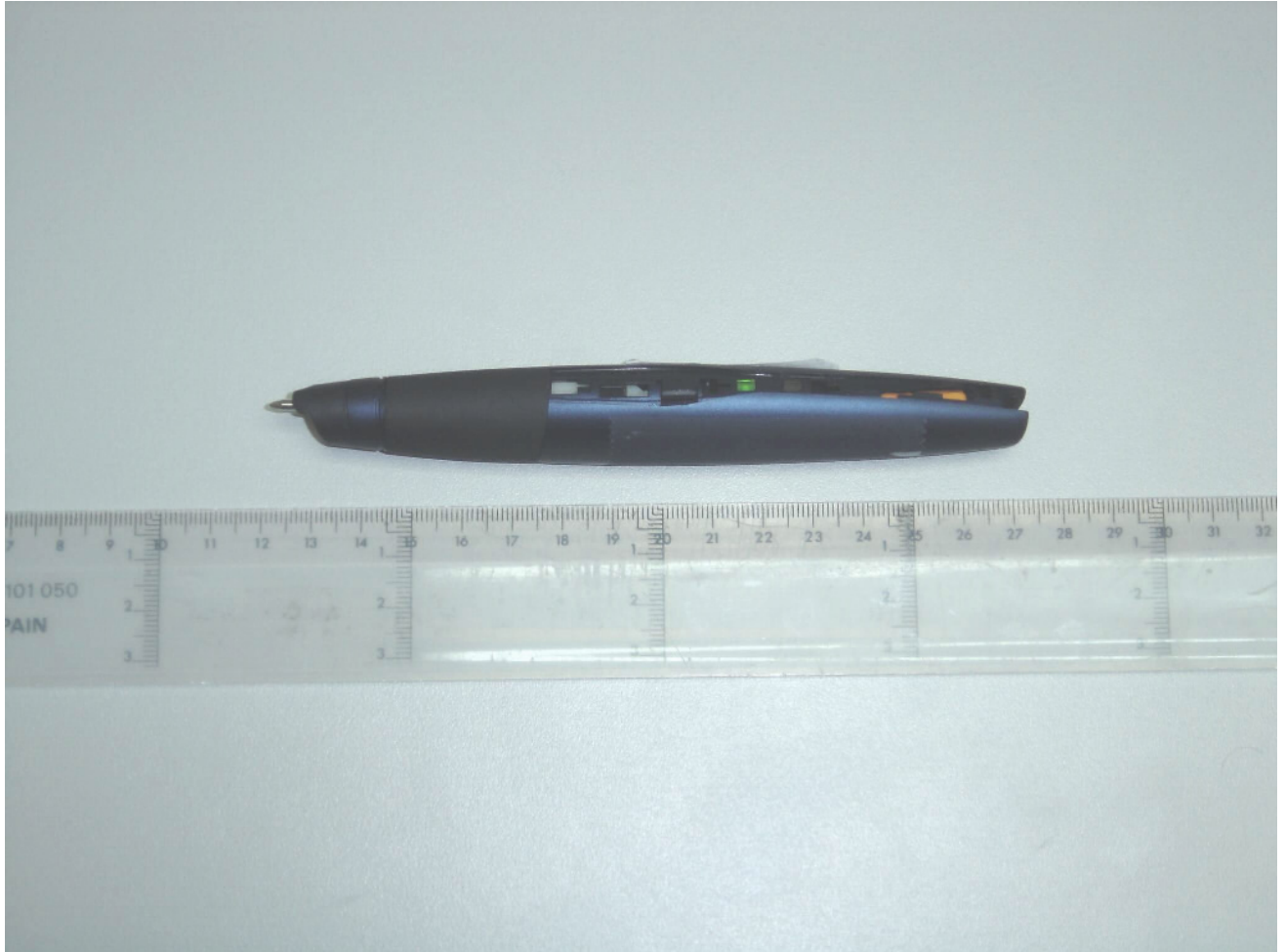
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1. Equipment (external view)



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2. General test set-up for radiated measurements.



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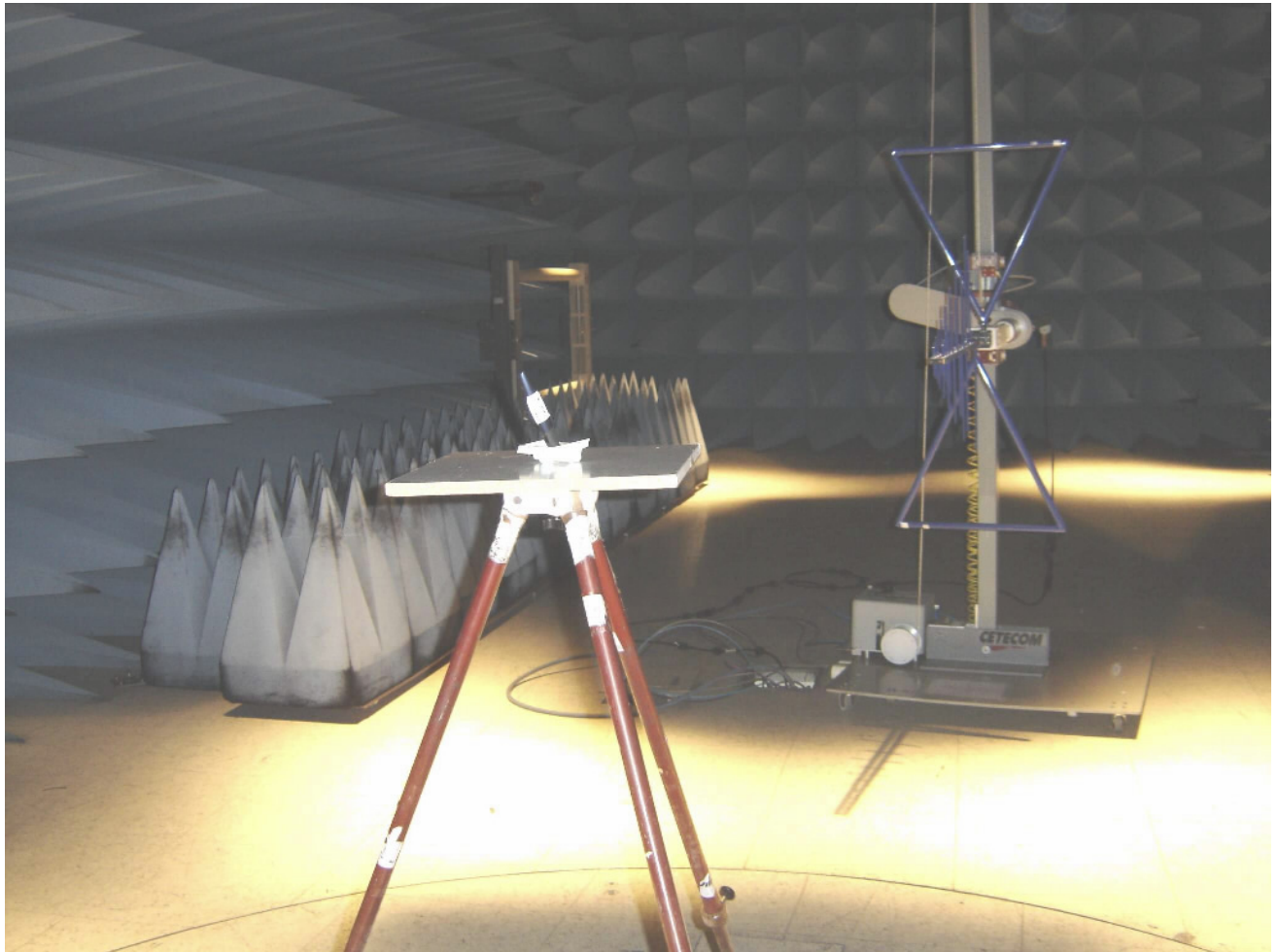
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3. Test set-up for radiated measurements below 1 GHz.



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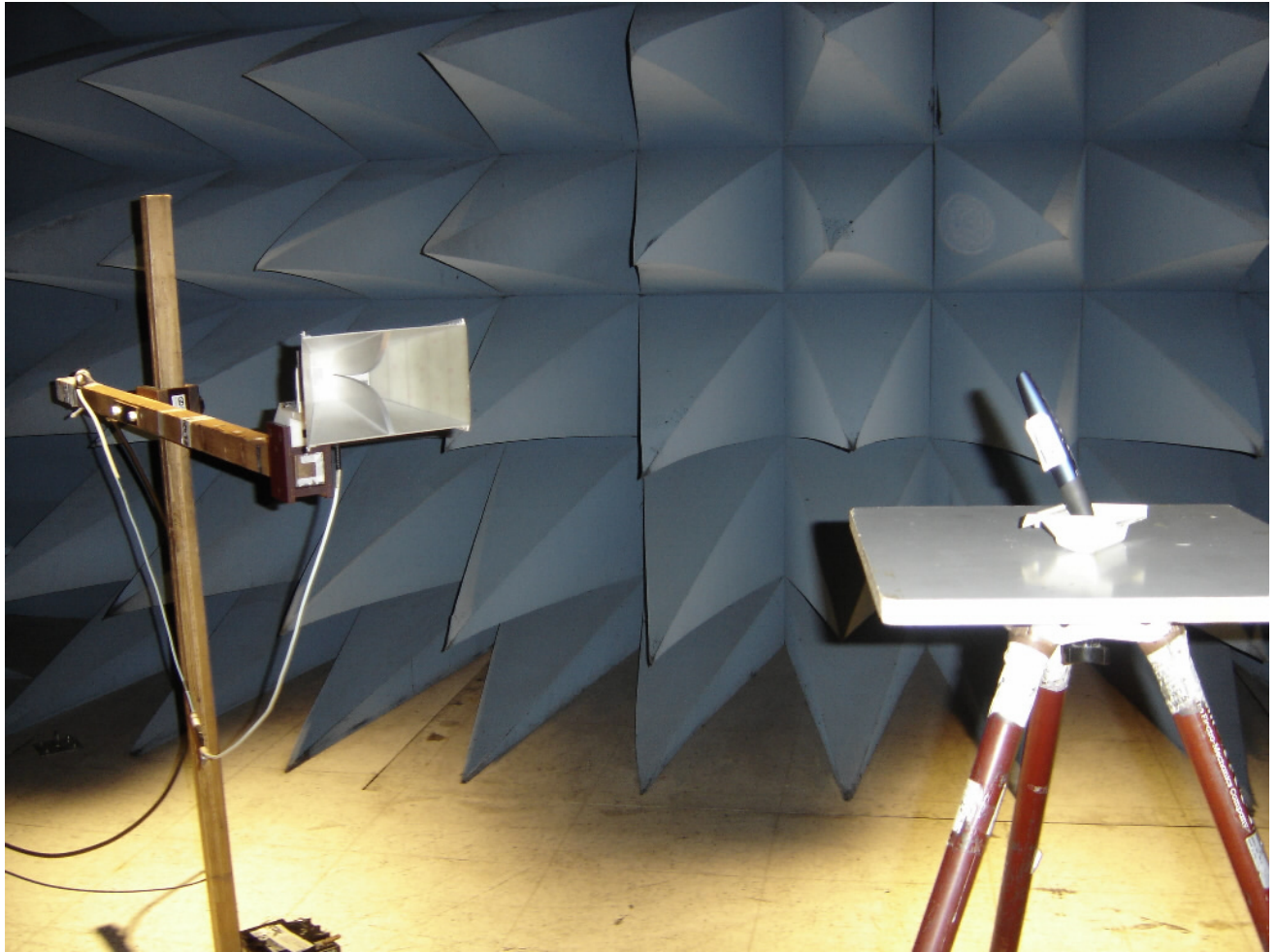
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4. Test set-up for radiated measurements above 1 GHz.



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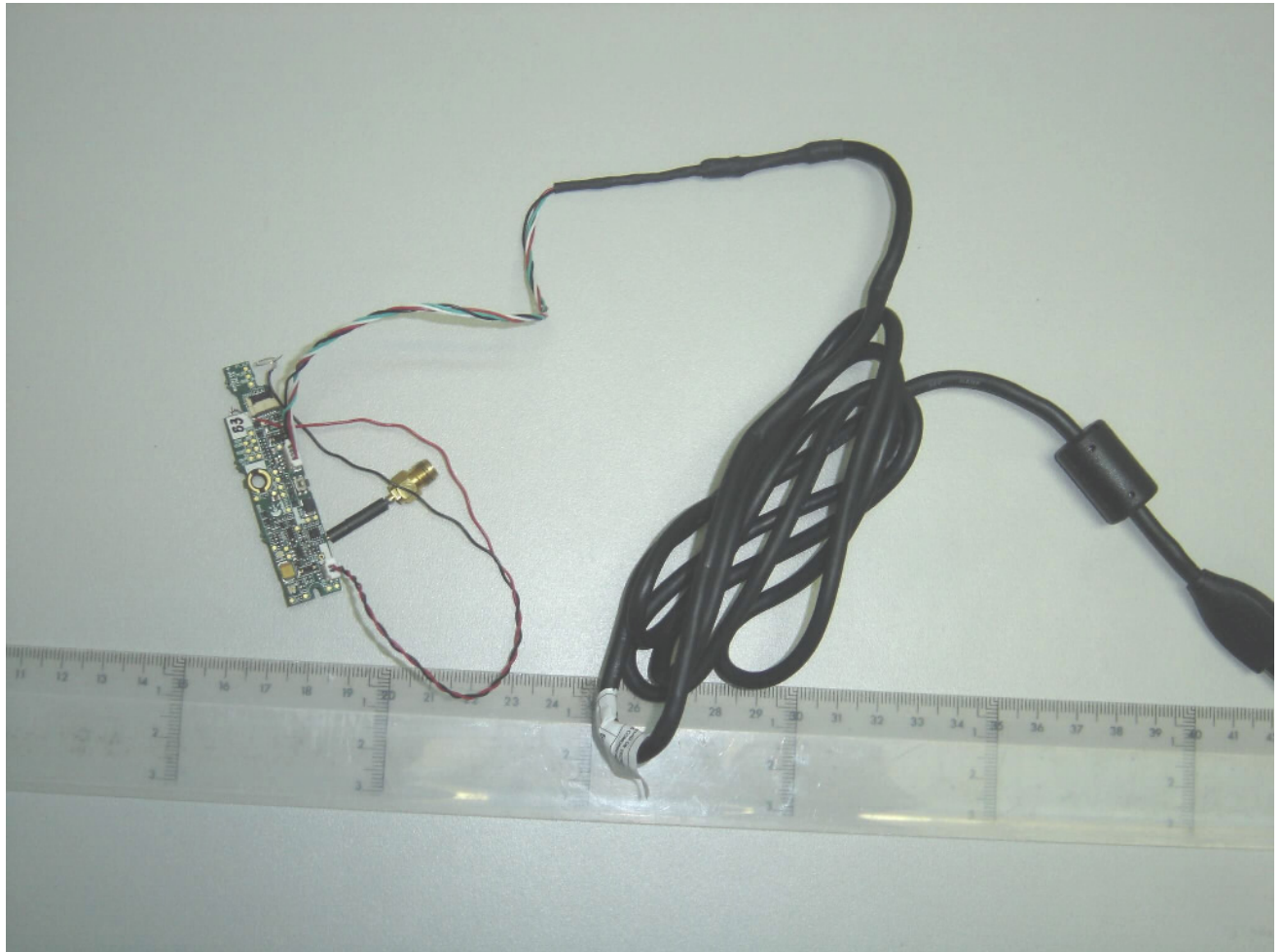
Date: 2005-05-04

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5. Test sample for RF conducted measurements.



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