FCC LISTED,
REGISTRATION
NUMBER: 905266

IC LISTED
REGISTRATION
NUMBER IC 4621

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TEST REPORT

Report No.: 20183RET.104

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

Product	:	Bluetooth WirelessHub
Trade Mark	:	Logitech
Model/type Ref.	:	C-BQ16A
Manufacturer	:	SUZHOU LOGITECH ELECTRONIC Co., LTD
Requested by	:	LOGITECH INC.
Other identification of the product	:	FCC ID: DZL201657A Unique Product Number (UPN): 1807B-201657A Serial number: PB2-029
Standard(s)	:	USA FCC Part 15.247, 15.205, 15.209, 15.109 CANADA RSS-210

This test report includes 2 annexes and therefore the total number of pages is 33

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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 conjuction 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

Radiated measurements of spurious emissions (Emission limitations for transmitter and radiated emissions limits for receiver) for frequency hopping spread spectrum equipment (Bluetooth) operating in the 2400 MHz -2483.5 MHz band, according to FCC Part 15.247.

The equipment incorporates the same RF Bluetooth module as model C-BM16A: P/N: 830879-0XXX which results are shown in report number 18605RET.105 dated 2003-07-30.

3.2 REQUIREMENTS AND METHOD

The test has been carried out according to FCC parts 15.33, 15.35, 15.109, 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.

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 HP 8566 B.
4. RF Preselector HP 85685A.
5. Quasi-peak adaptor HP 85650A.
6. RF linear amplifier HP 8447.F
7. Antenna mast EM 1072 NMT.
8. Rotating table EM 1084-4. ON.
9. Mast controller EM 1053-22.
10. Rotating table controller EM 1064-4023.
11. Process controller HP 98581C.
12. Harddisk HP 9153.
13. Peripheral unit HP 9153 C.
14. Measurement software HP 85879A.
15. 3 dB attenuator HP 8491A.
16. Bilog antenna CHASE CBL6111.
17. Bilog antenna CHASE CBL6111.
18. Antenna tripod EMCO 11968C.
19. Double-ridge Guide Horn antenna 1-18 GHz HP 11966E.
20. Double-ridge Guide Horn antenna 18-40 GHz Agilent 119665J.
21. Switch Unit with RF pre-amplifiers R&S TS8930SU.
22. RF pre-amplifier Miteq JS4-12002600-30-5A.
23. EMI Test Receiver R&S ESIB26.

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

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: Bluetooth WirelessHub

Trade mark: Logitech **Model:** C-BQ16A

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: Wireless Hub for cordless Keyboard, Numpad and Mouse and using Bluetooth technology.

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

5.1 USAGE OF SAMPLES

Sample M/01 is formed by the following elements:

Control No.	Description	Model	Serial No.	Date of reception
20183/22	Bluetooth WirelessHub	C-BQ16A	PB2-029	08/07/04
---	Lap-top computer DELL	PP01L	CN-04P240-48643-31L-4117	---

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

   All tests indicated in annex A.

5.2 PERIOD OF TESTING

The performed test started on 2004-07-20 and finished on the same day.

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. = 24 ºC Max. = 25 ºC
Relative humidity	Min. = 47 % Max. = 48 %
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. = 26 ºC Max. = 26 ºC
Relative humidity	Min. = 52 % Max. = 52 %
Air pressure	Min. = 1018 mbar Max. = 1020 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 0,5 Ω
Normal site attenuation (NSA)	< ±4 dB at 10 m distance between item under test and receiver antenna, (30 MHz to 1000 MHz)
Field homogenousity	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:

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				NM[1]
15.247 Subclause (a) (1) (iii). Number of hopping channels				NM[1]
15.247 Subclause (a) (1) (iii). Time of occupancy (Dwell Time)				NM[1]
15.247 Subclause (b). Maximum peak output power and antenna gain				NM[1]
15.247 Subclause (c). Band-edge of conducted emissions (Transmitter)				NM[1]
15.247 Subclause (c). Emission limitations conducted (Transmitter)				NM[1]
15.247 Subclause (c). Emission limitations radiated (Transmitter)		P		
15.207. Conducted limits	NA			
15.109. Radiated emission limits for receiver		P		

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

7. REMARKS AND COMMENTS

1: Test not requested (see point 3.1. "Test 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”.

ANNEX A

TEST RESULTS

Report No: 20183RET.104

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TEST CONDITIONS

Power supply (V):

$V_{nominal}$ = 5.0 Vdc

Type of power supply = DC Voltage from USB port

Type of antenna = Integral antenna

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

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 360º 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.

Section 15.247 Subclause (c). 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 (µV/m)	Field strength (dBµV/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:

For performing the equipment was connected to a USB port of a lap-top computer DELL model PP01L

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.

The measured spurious signals are the same when transmitting in the lowest, middle or in the highest channels.

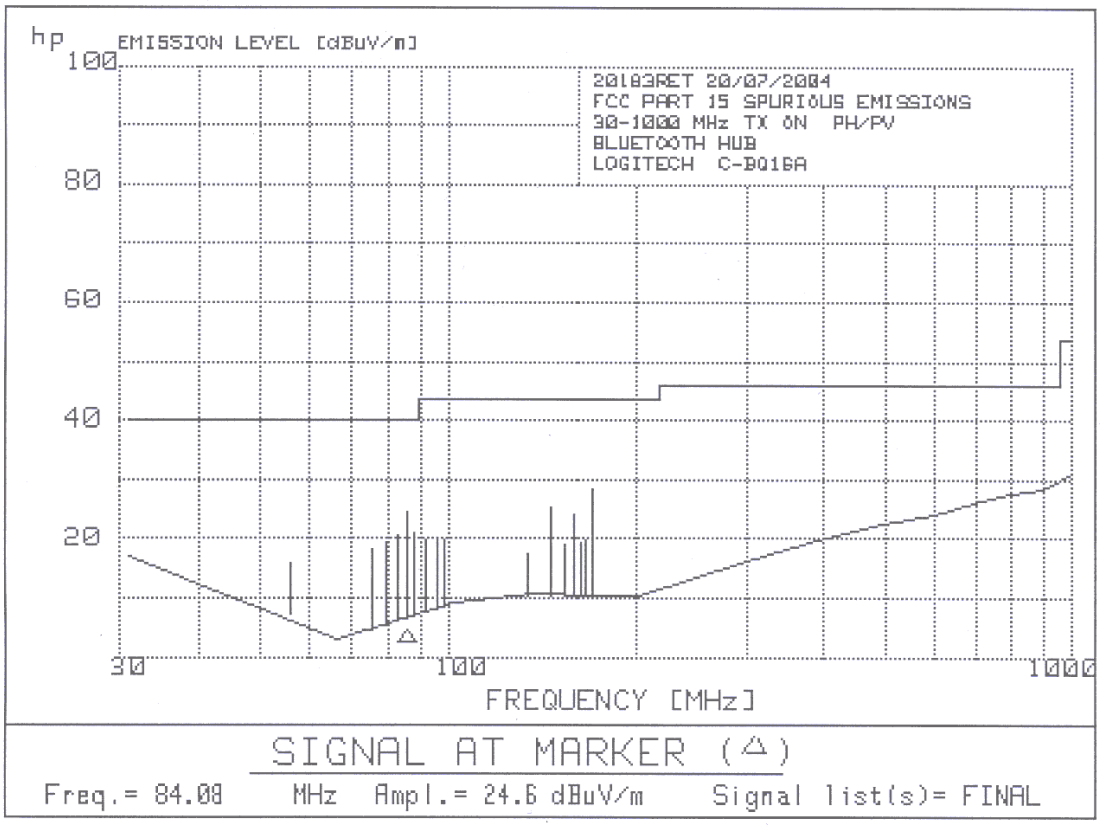
Frequency range 30 MHz-1000 MHz.

Spurious frequency (MHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
54.67	Vertical	Quasi-peak	15.9	± 3.8
73.77	Vertical	Quasi-peak	18.4	± 3.8
77.71	Vertical	Quasi-peak	19.6	± 3.8
81.36	Vertical	Quasi-peak	20.7	± 3.8
84.08	Vertical	Quasi-peak	24.6	± 3.8
86.52	Vertical	Quasi-peak	20.8	± 3.8
90.17	Vertical	Quasi-peak	20.0	± 3.8
93.78	Vertical	Quasi-peak	19.9	± 3.8
96.25	Vertical	Quasi-peak	19.8	± 3.8
132.08	Horizontal	Quasi-peak	17.7	± 3.8
144.06	Horizontal	Quasi-peak	25.1	± 3.8
151.15	Horizontal	Quasi-peak	19.0	± 3.8
156.09	Horizontal	Quasi-peak	24.1	± 3.8
161.28	Horizontal	Quasi-peak	19.4	± 3.8
163.68	Horizontal	Quasi-peak	19.8	± 3.8
168.08	Horizontal	Quasi-peak	28.5	± 3.8

Frequency range 1 GHz-25 GHz.

No spurious signals found in the lowest, middle and highest channels.
No spurious signals found at the harmonics frequencies and inside the restricted bands 2310-2390 MHz and 2483.5-2500 MHz.

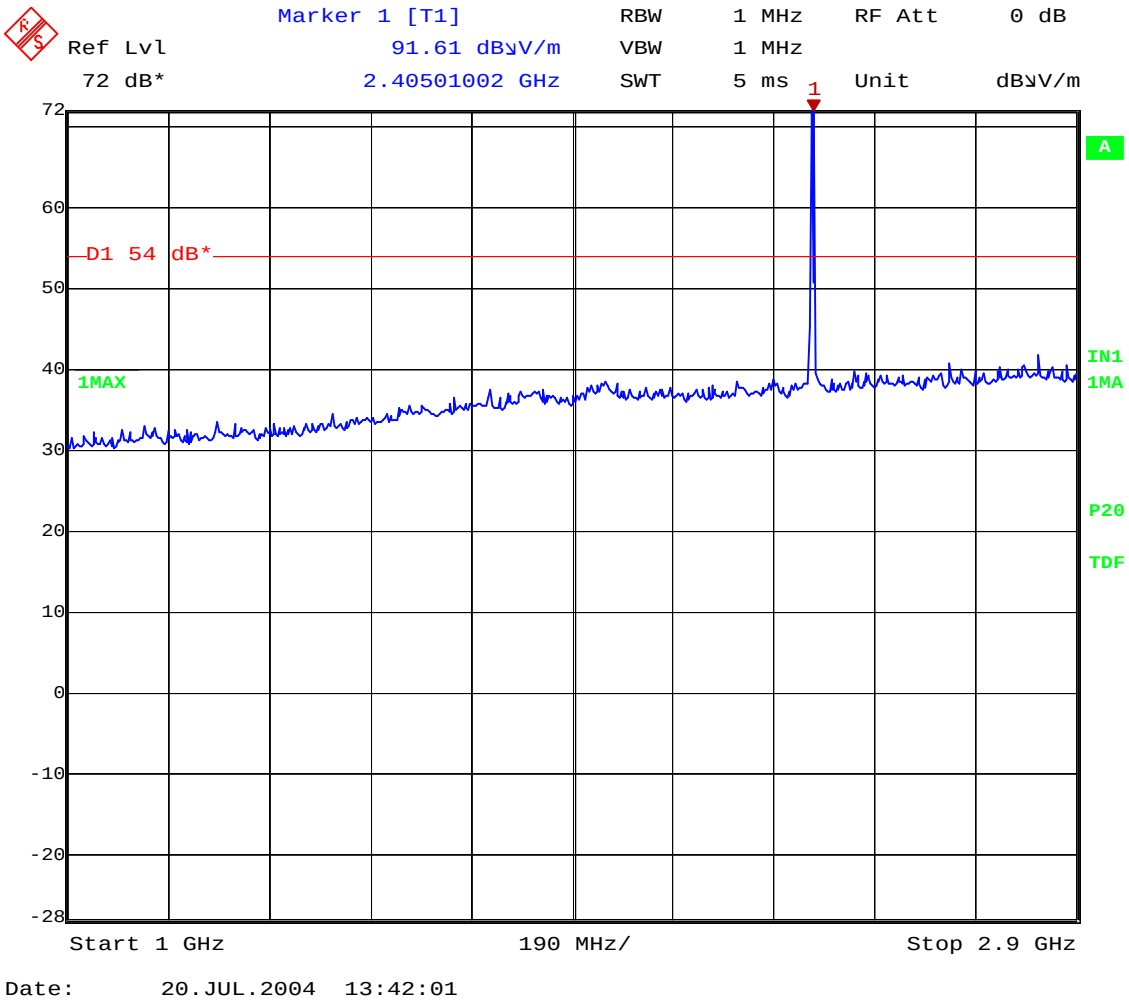
FREQUENCY RANGE 30 MHz-1000 MHz.



Resolution bandwidth = 100 kHz.
Video bandwidth = 100 kHz.

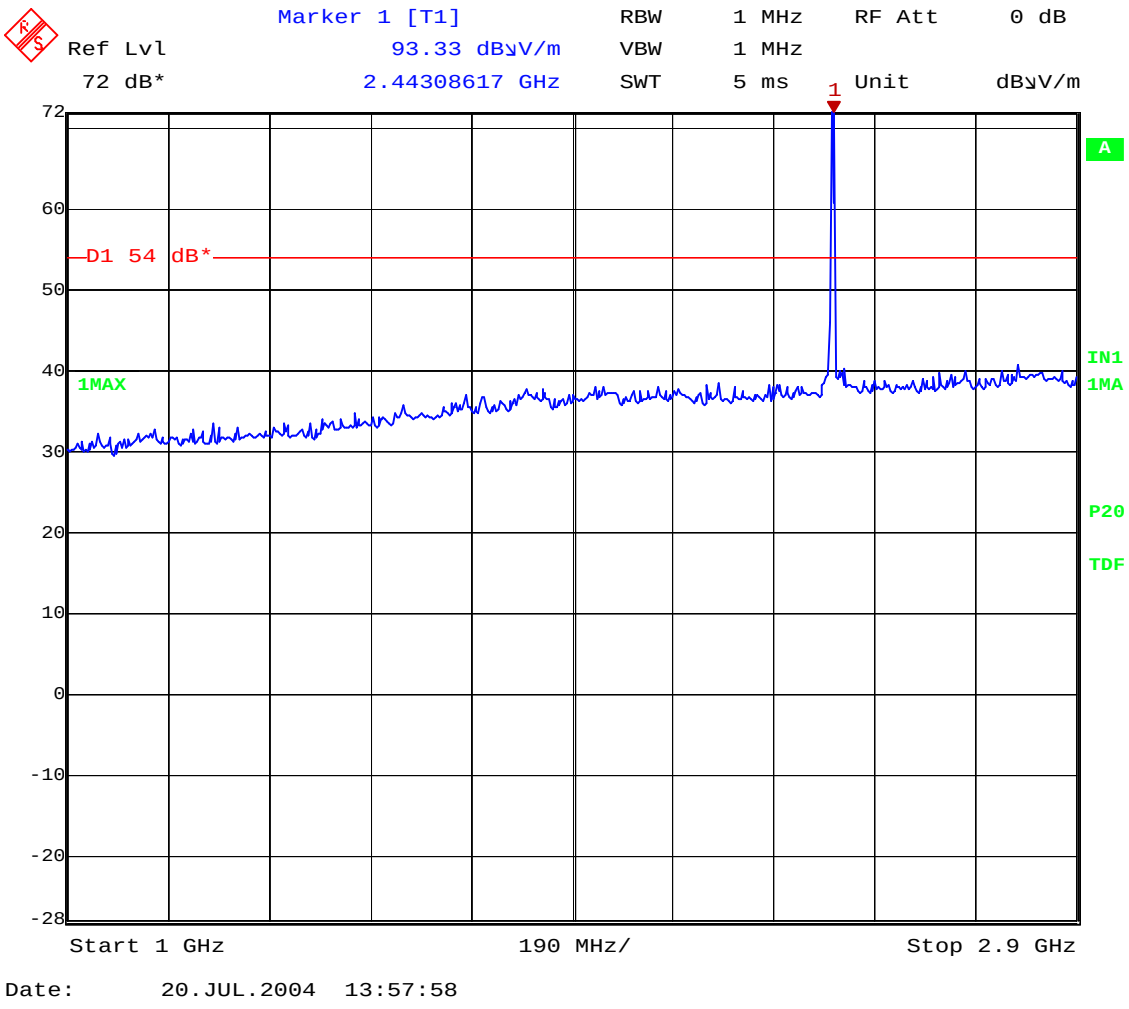
FREQUENCY RANGE 1 GHz to 2.9 GHz.

CHANNEL: Lowest (2402 MHz).



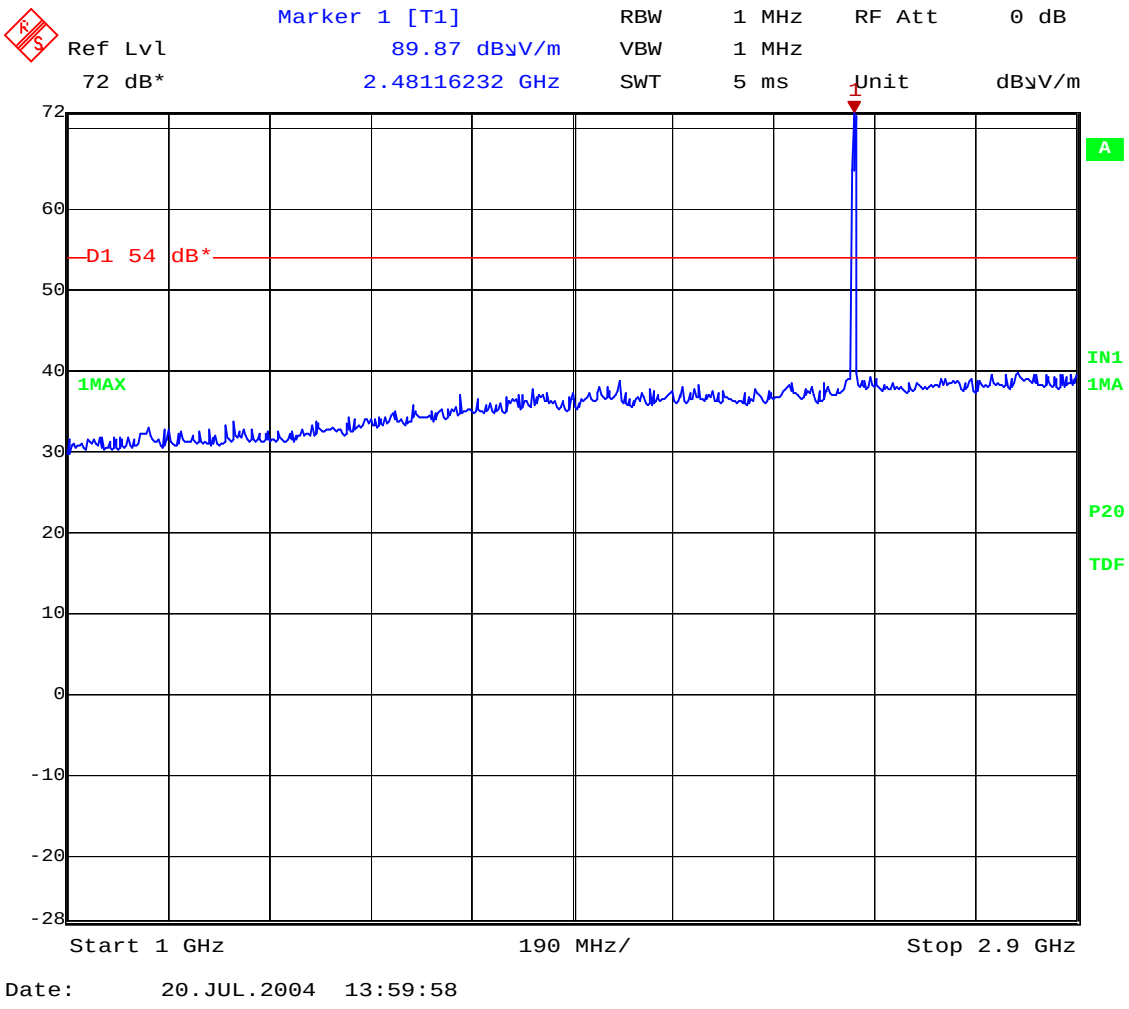
Note: The peak above the limit is the carrier frequency.

CHANNEL: Middle (2441 MHz).



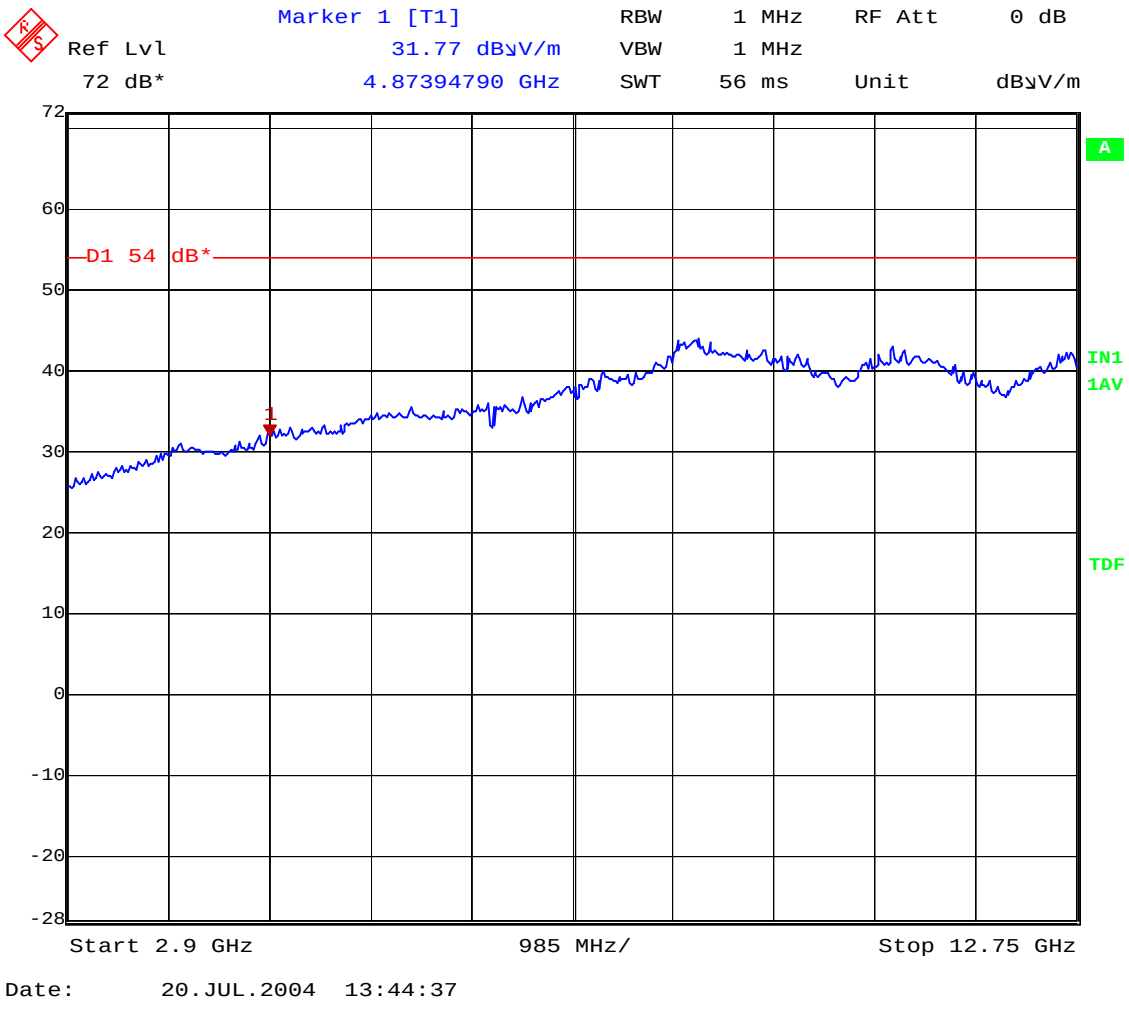
Note: The peak above the limit is the carrier frequency.

CHANNEL: Highest (2480 MHz).



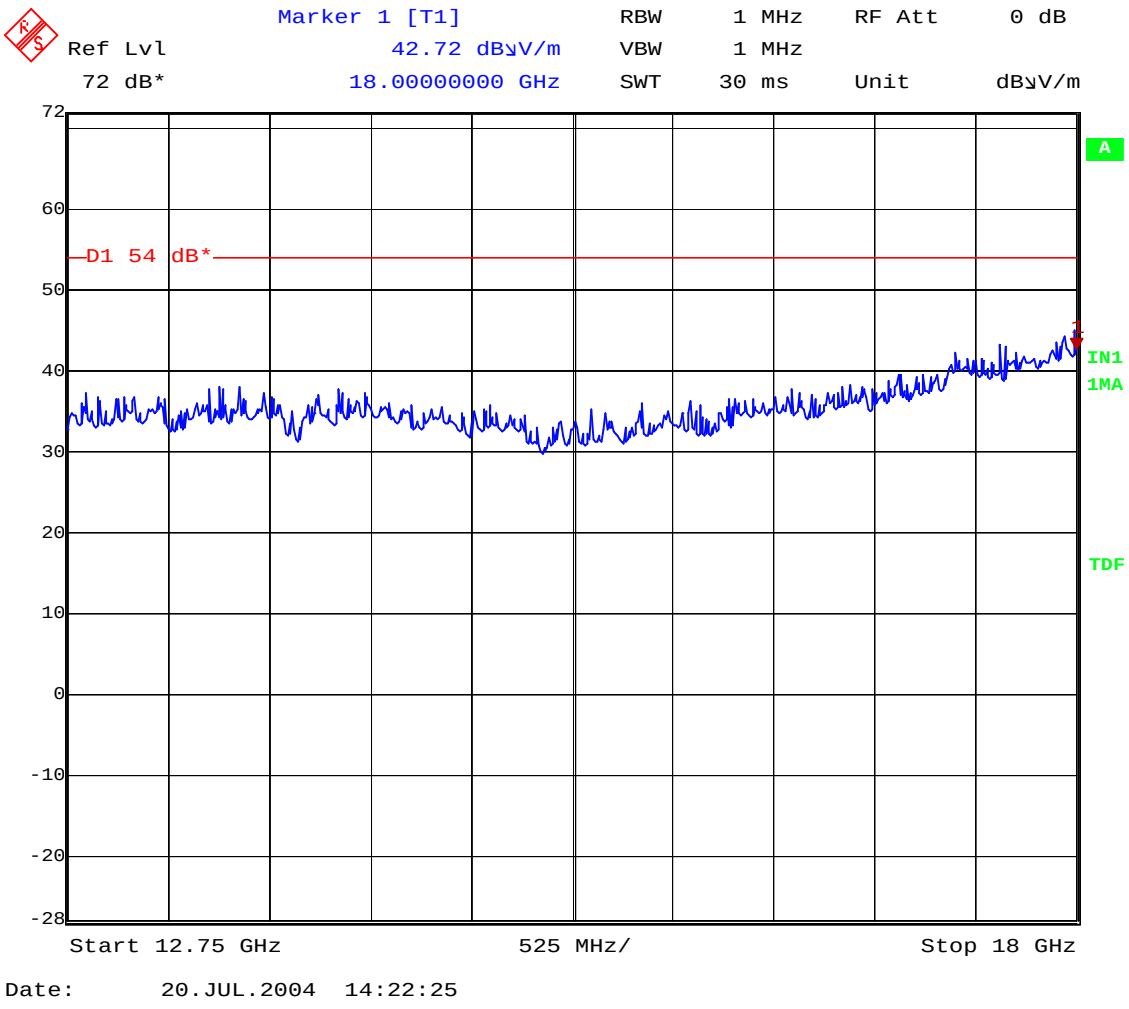
Note: The peak above the limit is the carrier frequency.

FREQUENCY RANGE 2.9 GHz to 12.75 GHz.



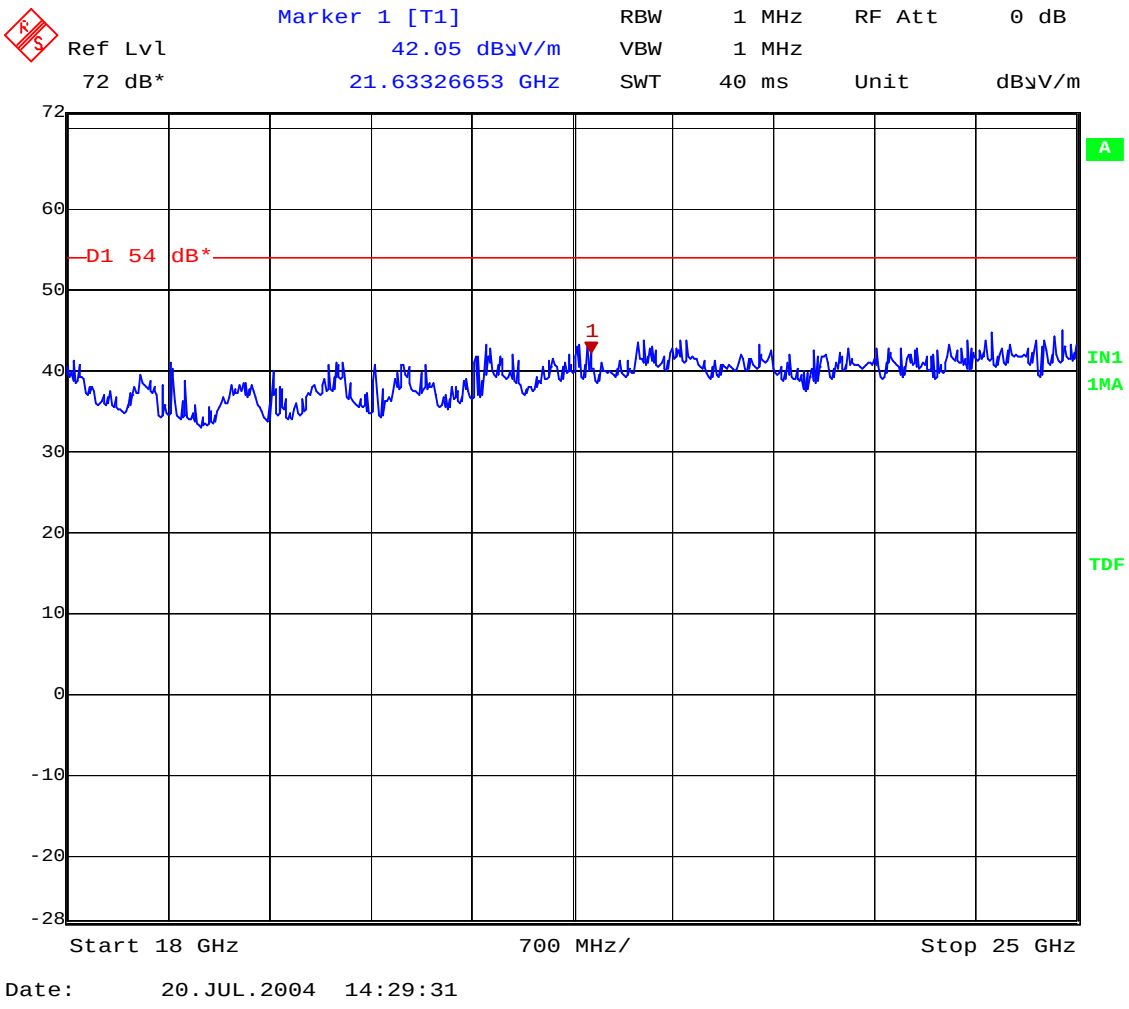
(This plot is valid for all three channels).

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 15.109. Receiver spurious radiation

SPECIFICATION

The field strength shall not exceed the following values:

Frequency Range (MHz)	Field strength (µV/m)	Field strength (dBµV/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:

For performing the equipment was connected to a USB port of a lap-top computer DELL model PP01L.

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 measured spurious signals are the same when receiving in the lowest, middle or in the highest channels.

Frequency range 30 MHz-1000 MHz.

Spurious frequency (MHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
72.23	Vertical	Quasi-peak	17.7	± 3.8
73.77	Vertical	Quasi-peak	18.5	± 3.8
74.99	Horizontal	Quasi-peak	18.4	± 3.8
78.64	Vertical	Quasi-peak	21.7	± 3.8
79.82	Horizontal	Quasi-peak	20.4	± 3.8
80.47	Horizontal	Quasi-peak	20.6	± 3.8
81.07	Horizontal	Quasi-peak	21.3	± 3.8
81.36	Vertical	Quasi-peak	21.5	± 3.8
82.58	Vertical	Quasi-peak	20.7	± 3.8
82.90	Horizontal	Quasi-peak	20.9	± 3.8
84.08	Horizontal	Quasi-peak	24.2	± 3.8
86.23	Horizontal	Quasi-peak	20.7	± 3.8
86.55	Vertical	Quasi-peak	22.0	± 3.8
88.02	Vertical	Quasi-peak	20.9	± 3.8
88.99	Vertical	Quasi-peak	21.3	± 3.8
89.85	Vertical	Quasi-peak	22.4	± 3.8
90.81	Vertical	Quasi-peak	22.4	± 3.8
91.67	Horizontal	Quasi-peak	20.8	± 3.8
92.32	Vertical	Quasi-peak	21.8	± 3.8
92.64	Horizontal	Quasi-peak	21.4	± 3.8
92.92	Vertical	Quasi-peak	21.4	± 3.8
95.07	Vertical	Quasi-peak	21.9	± 3.8
95.36	Horizontal	Quasi-peak	21.7	± 3.8
95.93	Horizontal	Quasi-peak	22.3	± 3.8
96.22	Vertical	Quasi-peak	22.9	± 3.8
98.65	Horizontal	Quasi-peak	23.4	± 3.8
104.40	Vertical	Quasi-peak	25.1	± 3.8
111.35	Vertical	Quasi-peak	21.1	± 3.8
168.08	Horizontal	Quasi-peak	20.4	± 3.8

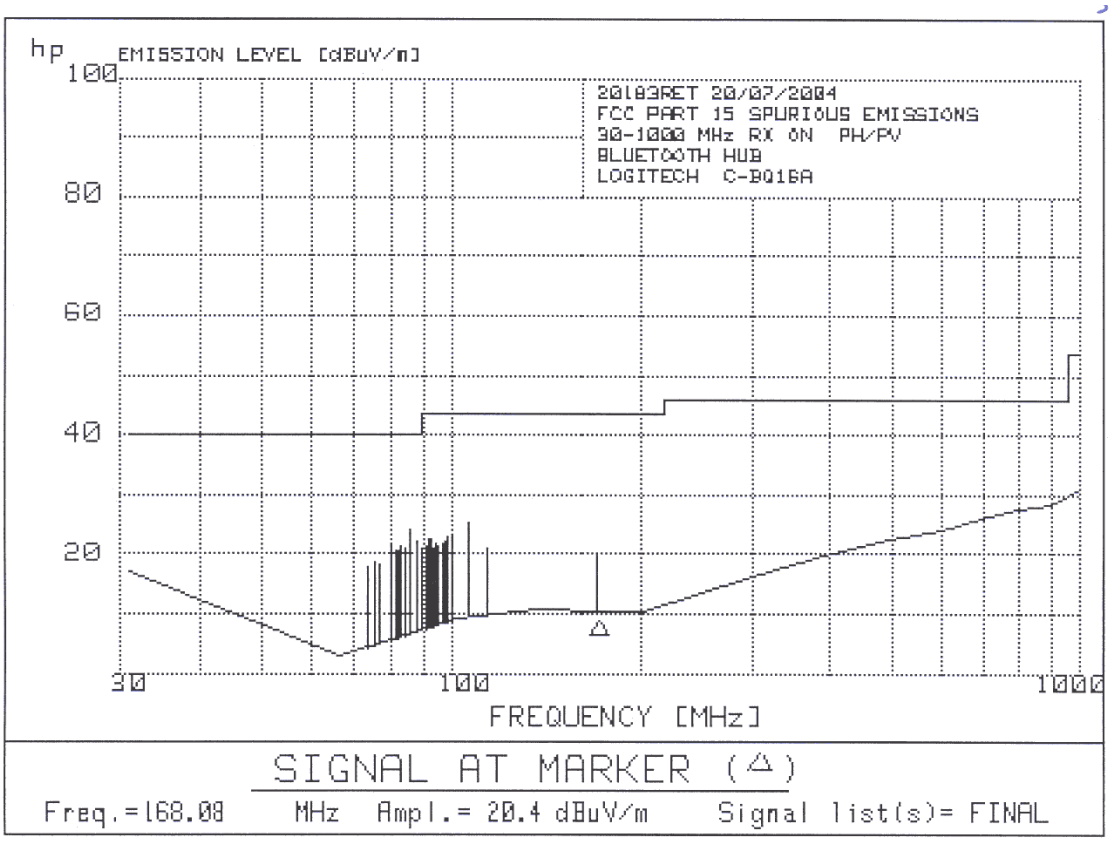
Frequency range 1 GHz-25 GHz.

No spurious signals found in the lowest, middle and highest channels.

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

Verdict: PASS

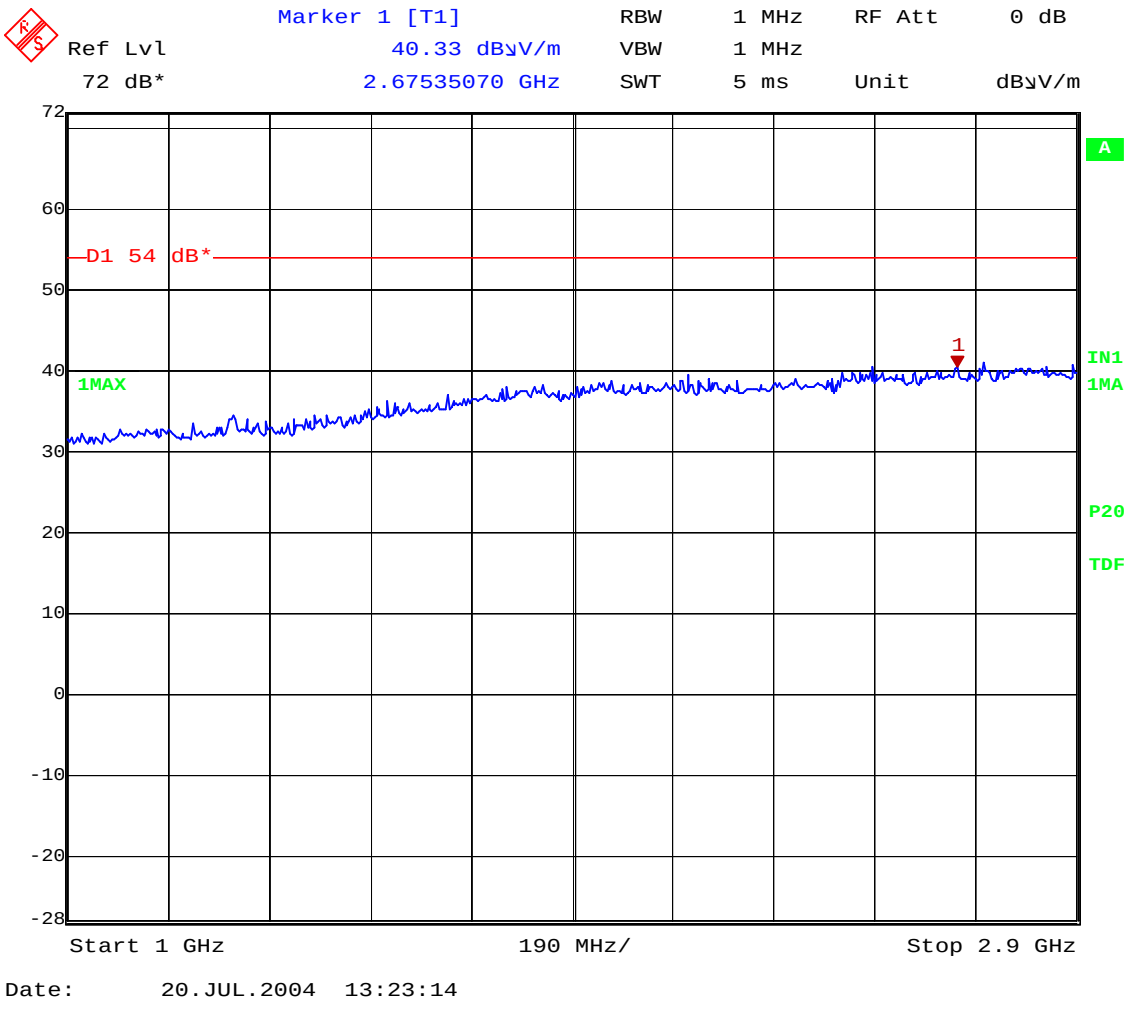
FREQUENCY RANGE 30 MHz-1000 MHz.



Resolution bandwidth = 100 kHz.
Video bandwidth = 100 kHz.

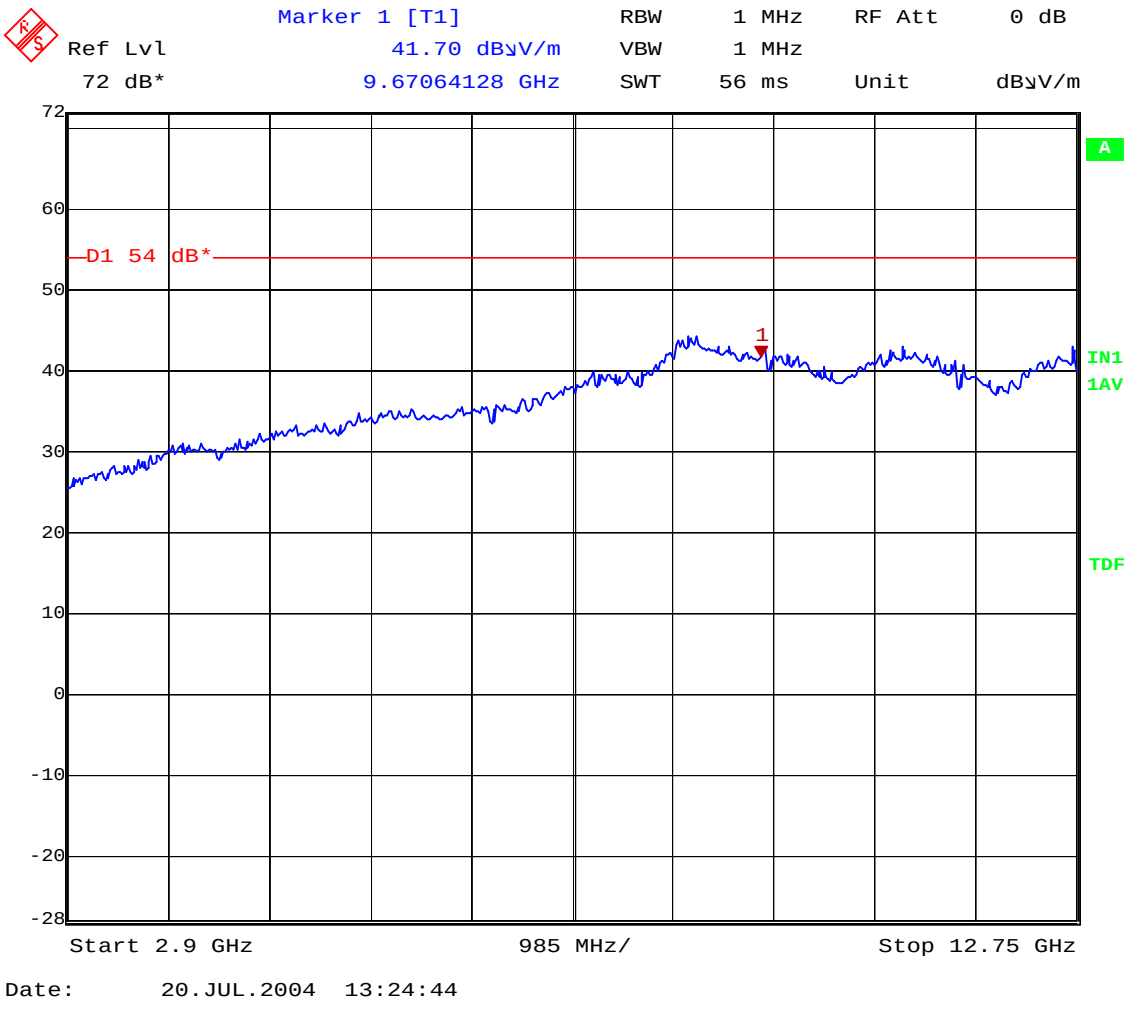
(This plot is valid for all three channels).

FREQUENCY RANGE 1 GHz-2.9 GHz.



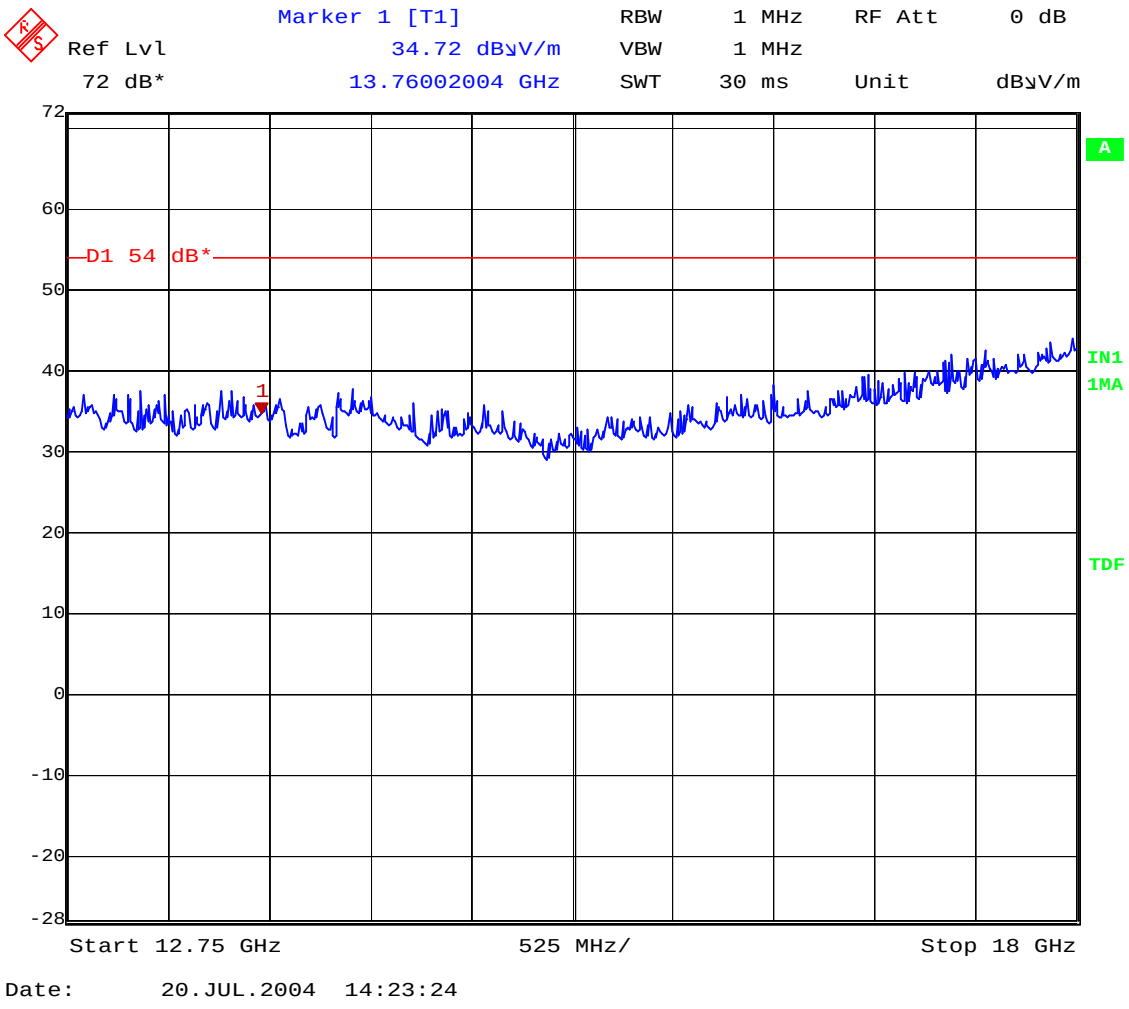
(This plot is valid for all three channels).

FREQUENCY RANGE 2.9 GHz-12.75 GHz.



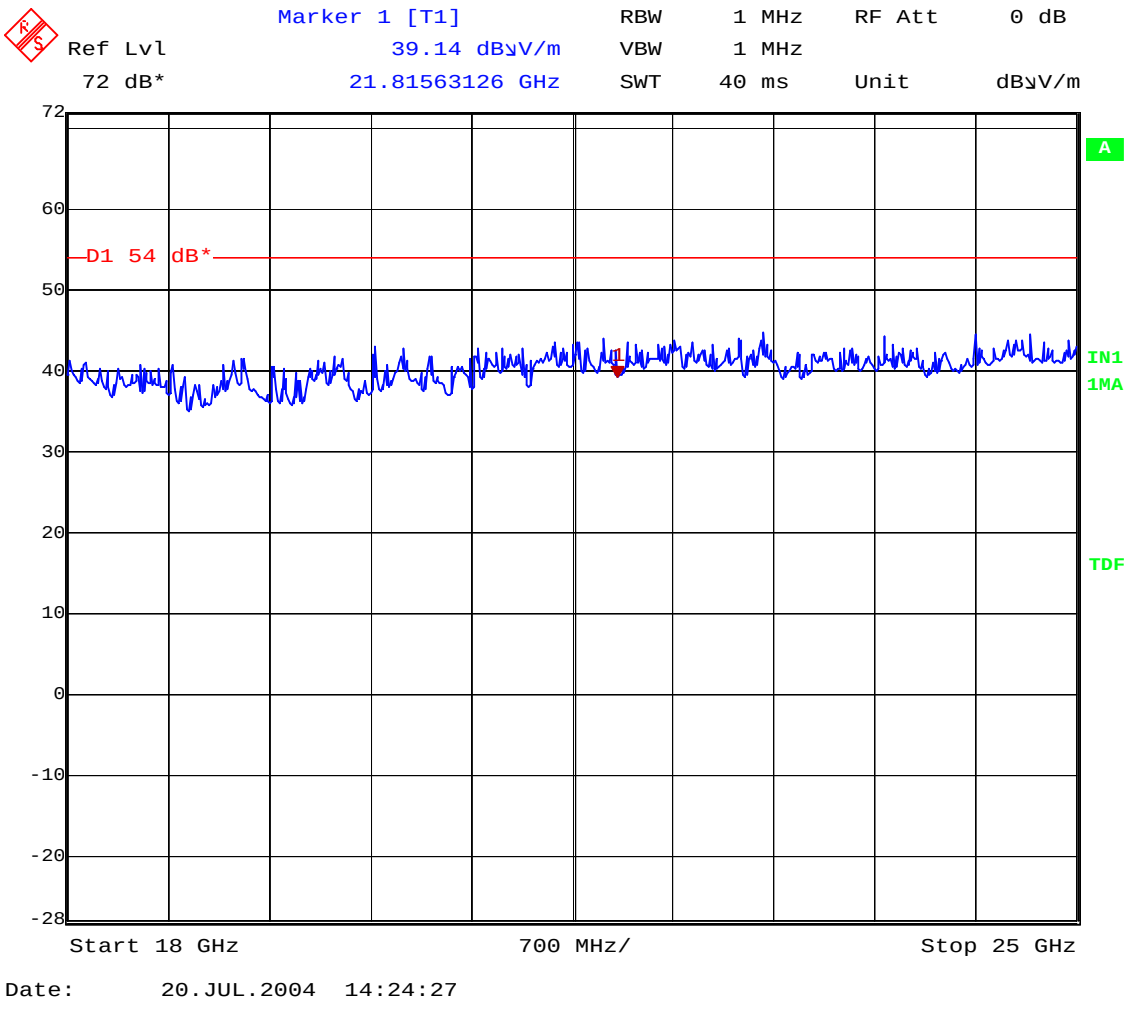
(This plot is valid for all three channels).

FREQUENCY RANGE 12.75 GHz-18 GHz.



(This plot is valid for all three channels).

FREQUENCY RANGE 18 GHz-25 GHz.



(This plot is valid for all three channels).

ANNEX B

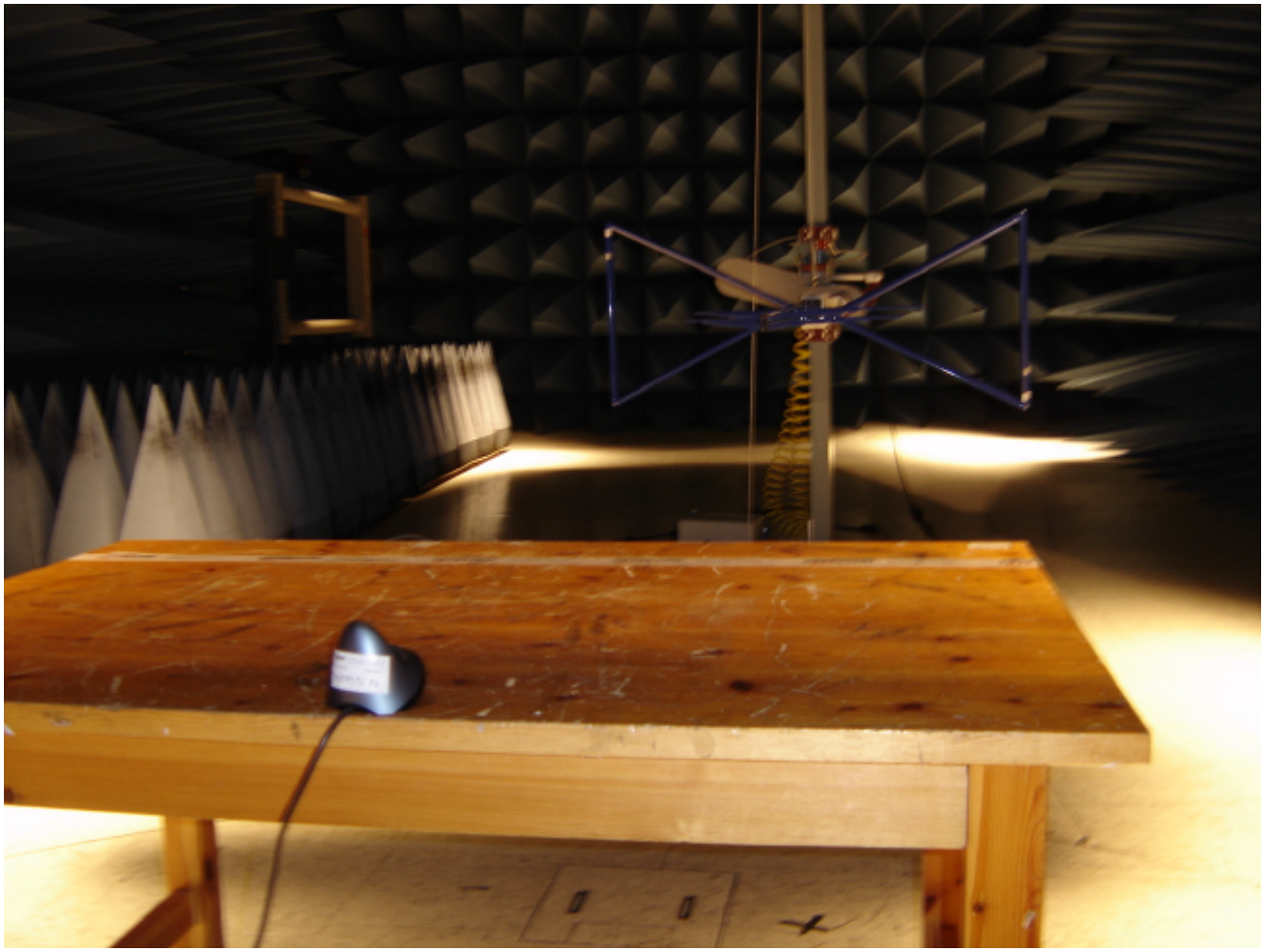
PHOTOGRAPHS
(Number of photographs: 4)

Report No.: 20183RET.104

1. Equipment (front view)

2. General test set-up for radiated measurements.

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



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