




TEST REPORT FROM RADIO FREQUENCY INVESTIGATION LTD.

Test Of: Red-M (Communications) Ltd.
Bluetooth Module for Visor

To: F.C.C. Part 15 Subpart C: 2000
(Intentional Radiators)
Section 15.247

Test Report Serial No:
RFI/MPTB1/RP42493B

<p>This Test Report Is Issued Under The Authority Of Richard Jacklin, Operations Director:</p> 	<p>Checked By:</p> 
<p>Tested By:</p> 	<p>Release Version No: PDF01</p>
<p>Issue Date: 31 October 2001</p>	<p>Test Dates: 11 October 2001 to 18 October 2001</p>

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RADIO FREQUENCY INVESTIGATION LTD.

EMC Department

**Test Of: Red-M (Communications) Ltd.
Bluetooth Module for Visor**

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

TEST REPORT

S.No: RFI/MPTB1/RP42493B

Page 2 of 59

Issue Date: 31 October 2001

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Table of Contents

1. Client Information	4
2. Equipment Under Test (EUT).....	5
3. Test Specification, Methods And Procedures	8
4. Deviations From The Test Specification.....	10
5. Operation Of The EUT During Testing	11
6. Summary Of Test Results.....	12
7. Measurements, Examinations And Derived Results.....	13
8. Measurement Uncertainty.....	32
Appendix 1. Test Equipment Used.....	33
Appendix 2. Measurement Methods	34
Appendix 3. Test Configuration Drawings	45
Appendix 4. Graphical Test Results	50

1. Client Information

Company Name:	Red-M (Communications) Ltd.
Address:	Wexham Springs Framewood Road Wexham Slough SL3 6PJ.
Contact Name:	Mark Bailey

Test Of: Red-M (Communications) Ltd.

Bluetooth Module for Visor

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

2. Equipment Under Test (EUT)

The following information (with the exception of the Date of Receipt) has been supplied by the client:

2.1. Identification Of Equipment Under Test (EUT)

Brand Name:	Red-M
Model Name or Number:	Bluetooth Module for Visor
Unique Type Identification:	Bluetooth Module for Visor
Serial Number:	158-228-03 PCA XX (integral antenna) & PCA 40 (conducted test port)
Country of Manufacture:	UK
FCC ID Number:	None stated
Date of Receipt:	11 October 2001

2.2. Description Of EUT

The equipment under test is a plug in Bluetooth module for Handspring Visor personal digital assistants (PDAs).

2.3. Modifications Incorporated In EUT

The EUT has not been modified from what is described by the Model Name and Unique Type Identification stated above.

Test Of: Red-M (Communications) Ltd.
Bluetooth Module for Visor

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

2.4. Additional Information Related To Testing

Power Supply Requirement:	Internal battery supply of 3.3 V DC (in PDA)
Intended Operating Environment:	Commercial, Light industry
Weight:	0.1 kg
Dimensions:	50 x 55 x 5 mm
Interface Ports:	1 x 68 way PCMCIA connector (enclosed)

Test Of: Red-M (Communications) Ltd.

Bluetooth Module for Visor

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

2.5. Support Equipment

The following support equipment was used to exercise the EUT during testing:

Description:	Personal Digital Assistant
Brand Name:	Handspring
Model Name or Number:	Visor Platinum
Serial Number:	AEBEB04910939
FCC ID Number:	None
Cable Length And Type:	N/A
Connected to Port:	N/A

Description: (as used in schematic)	Radio Tester
Brand Name:	Red-M
Model Name or Number:	None given
Serial Number:	000281FF0400A8
FCC ID Number:	None
Cable Length And Type:	Mains 2.3m, 1m CAT 5 UTP
Connected to Port:	Mains input, 10/100 office LAN

Description: (as used in schematic)	Personal Computer
Brand Name:	Dell
Model Name or Number:	Lattitude CP M233XT
Serial Number:	0009321C-12800-840-2517
FCC ID Number:	None given.
Cable Length And Type:	2m power, 1m CAT 5 UTP
Connected to Port:	Power input, Ethernet port

3. Test Specification, Methods And Procedures

3.1. Test Specification

Reference:	FCC Part 15 Subpart C: 2000 (Section 15.247, 15.205 and 15.209)
Title:	Code of Federal Regulations, Part 15 (47CFR15) Radio Frequency Devices: Digital Devices.
Comments:	A description of the test facility used for this test is on file with, and has been accepted by, the Federal Communications Commission as required by Section 2.948 of Federal Rules.
Purpose of Test:	To determine whether the equipment complied with the requirements of the specification for the purposes of certification.

3.2. Methods And Procedures

The methods and procedures used were as detailed in:

FCC Code of Federal Regulations 47.

Telecommunication. Parts 0 to 19, October 2000.

ANSI C63.2 (1987)

Title: American National Standard for Instrumentation - Electromagnetic noise and field strength.

ANSI C63.4 (1992)

Title: American National Standard Methods of Measurement of Electromagnetic Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

ANSI C63.5 (1988)

Title: American National Standard for the Calibration of antennas used for Radiated Emission measurements in Electromagnetic Interference (EMI) control.

ANSI C63.7 (1988)

Title: American National Standard Guide for Construction of Open Area Test Sites for performing Radiated Emission Measurements.

CISPR 16-1: (1999)

Title: Specification For Radio Disturbance and Immunity Measuring Apparatus and Methods. Part 1: Radio Disturbance and Immunity Measuring Apparatus.

3.3. Definition Of Measurement Equipment

The measurement equipment used complied with the requirements of the standards referenced in the Methods & Procedures section above. Appendix 1 contains a list of the test equipment used.

RADIO FREQUENCY INVESTIGATION LTD.

EMC Department

Test Of: Red-M (Communications) Ltd.
Bluetooth Module for Visor

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

TEST REPORT

S.No: RFI/MPTB1/RP42493B

Page 10 of 59

Issue Date: 31 October 2001

4. Deviations From The Test Specification

None.

5. Operation Of The EUT During Testing

5.1. Operating Conditions

The EUT was tested in a normal laboratory environment.

During testing, the EUT was powered by an internal 3.3 V DC battery supply.

5.2. Operating Modes

The EUT was tested in the following operating modes:

Transmitting on the following fixed frequencies: 2402, 2441 and 2480 MHz.

The reason for choosing these modes is that they are defined in the standard.

5.3. Configuration And Peripherals

The EUT was tested in the following configuration:

Please refer to the schematic diagram shown in Appendix 3 of this report.

NB Section 2 of this report contains a full list of support equipment used.

Test Of: Red-M (Communications) Ltd.

Bluetooth Module for Visor

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

6. Summary Of Test Results

6.1. Emissions: Transmit Mode

Range Of Measurements	Specification Reference	Compliance Status
Conducted AC Mains Emissions	C.F.R. 47 FCC Part 15: 2000. Section 15.207	Complied
Conducted Antenna Port Transmit Power	C.F.R. 47 FCC Part 15: 2000. Section 15.247 (b)	Complied
Conducted Peak Power Spectral Density	C.F.R. 47 FCC Part 15: 2000. Section 15.247 (d)	Complied
Conducted Antenna Port Spurious Emissions (30 to 26000 MHz)	C.F.R. 47 FCC Part 15: 2000. Section 15.247 (c)	Complied
Modulation Requirements / Channel Spacing / Timing Requirements	C.F.R. 47 FCC Part 15: 2000. Section 15.247 (a)	Complied
Isotropic Effective Radiated Power (EIRP)	C.F.R. 47 FCC Part 15: 2000. Section 15.247 (b) (1)	Complied
Radiated Electric Field Strength Spurious Emissions (30 to 26000 MHz)	C.F.R. 47 FCC Part 15: 2000. Section 15.247 (c) (15.209)	Complied

6.2. Emissions: Receive Mode

Range Of Measurements	Specification Reference	Compliance Status
Conducted AC Mains Emissions	C.F.R. 47 FCC Part 15: 2000. Section 15.107	Complied
Radiated Electric Field Strength Spurious Emissions (30 to 26000 MHz)	C.F.R. 47 FCC Part 15: 2000. Section 15.109	Complied

6.3. Location Of Tests

All the measurements described in this report were performed at the premises of Radio Frequency Investigation Ltd, Ewhurst Park, Ramsdell, Basingstoke, Hampshire, RG26 5RQ, England.

**Test Of: Red-M (Communications) Ltd.
Bluetooth Module for Visor**

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

7. Measurements, Examinations And Derived Results

7.1. General Comments

7.1.1. This section contains test results only. Details of the test methods and procedures can be found in Appendix 2 of this report.

7.1.2. Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to Section 8 for details of measurement uncertainties.

7.1.3. Band edge compliance of RF conducted emissions was performed on the top and bottom channels as specified in FCC Public Notice DA 00-705, Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

Test Of: Red-M (Communications) Ltd.
Bluetooth Module for Visor

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

7.2. Test Results For AC Mains Conducted Emissions: Transmit Mode

7.2.1. Quasi-Peak Detector Measurements On Live And Neutral Lines

7.2.1.1. The following table indicates measured results to the limits specified in Part 15.207 (a) and (b)

7.2.1.2. Preliminary Conducted spurious scans were performed with the EUT set to Top, Middle and Bottom channels stated in section 5.2.

7.2.1.3. Plots of all the initial scans can be found in Appendix 4.

7.2.1.4. The following table lists frequencies at which emissions were measured using a Quasi-Peak detector:

Bottom Channel

Frequency (MHz)	Line	Q-P Level (dBmV)	Q-P Limit (dBmV)	Margin (dB)	Result
0.753	Live	38.6	48.0	9.4	Complied
3.974	Live	32.1	48.0	15.9	Complied
5.049	Live	40.5	48.0	7.5	Complied
5.487	Live	40.4	48.0	7.6	Complied
26.488	Live	38.4	48.0	9.6	Complied
0.753	Neutral	34.0	48.0	14.0	Complied
3.974	Neutral	32.7	48.0	15.3	Complied
5.049	Neutral	40.7	48.0	7.3	Complied
5.487	Neutral	40.4	48.0	7.6	Complied
26.488	Neutral	39.0	48.0	9.0	Complied

Test Of: Red-M (Communications) Ltd.

Bluetooth Module for Visor

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

Test Results For AC Mains Conducted Emissions: Transmit Mode (continued)**Middle Channel**

Frequency (MHz)	Line	Q-P Level (dBmV)	Q-P Limit (dBmV)	Margin (dB)	Result
0.753	Live	38.6	48.0	9.4	Complied
3.974	Live	32.1	48.0	15.9	Complied
5.049	Live	40.5	48.0	7.5	Complied
5.487	Live	40.4	48.0	7.6	Complied
26.488	Live	38.4	48.0	9.6	Complied
0.753	Neutral	34.0	48.0	14.0	Complied
3.974	Neutral	32.7	48.0	15.3	Complied
5.049	Neutral	40.7	48.0	7.3	Complied
5.487	Neutral	40.4	48.0	7.6	Complied
26.488	Neutral	39.0	48.0	9.0	Complied

Top Channel

Frequency (MHz)	Line	Q-P Level (dBmV)	Q-P Limit (dBmV)	Margin (dB)	Result
0.753	Live	38.6	48.0	9.4	Complied
3.974	Live	32.1	48.0	15.9	Complied
5.049	Live	40.5	48.0	7.5	Complied
5.487	Live	40.4	48.0	7.6	Complied
26.488	Live	38.4	48.0	9.6	Complied
0.753	Neutral	34.0	48.0	14.0	Complied
3.974	Neutral	32.7	48.0	15.3	Complied
5.049	Neutral	40.7	48.0	7.3	Complied
5.487	Neutral	40.4	48.0	7.6	Complied
26.488	Neutral	39.0	48.0	9.0	Complied

Test Of: Red-M (Communications) Ltd.

Bluetooth Module for Visor

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

7.3. Test Results For AC Mains Conducted Emissions: Receive Mode

7.3.1. Quasi-Peak Detector Measurements On Live And Neutral Lines

7.3.1.1. The following table indicates measured results to the limits specified in Part 15.207.

7.3.1.2. Plots of the initial scans can be found in Appendix 4.

7.3.1.3. The following table lists frequencies at which emissions were measured using a Quasi-Peak detector:

Frequency (MHz)	Line	Q-P Level (dBmV)	Q-P Limit (dBmV)	Margin (dB)	Result
0.753	Live	38.6	48.0	9.4	Complied
3.974	Live	32.1	48.0	15.9	Complied
5.049	Live	40.5	48.0	7.5	Complied
5.487	Live	40.4	48.0	7.6	Complied
26.488	Live	38.4	48.0	9.6	Complied
0.753	Neutral	34.0	48.0	14.0	Complied
3.974	Neutral	32.7	48.0	15.3	Complied
5.049	Neutral	40.7	48.0	7.3	Complied
5.487	Neutral	40.4	48.0	7.6	Complied
26.488	Neutral	39.0	48.0	9.0	Complied

**Test Of: Red-M (Communications) Ltd.
Bluetooth Module for Visor**

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

7.4. Test Results for Conducted Transmitter Power: Transmit Mode

7.4.1. Tests were performed to identify the maximum transmit power in accordance with FCC Part 15.247(b)(1) and FCC Public Notice DA 00-705.

7.4.2. The client has provided a temporary antenna port to allow a direct connection to be made.

7.4.3. The client has specified that the EUT employs frequency hopping with 79 hopping channels. Therefore the maximum transmitter power level under FCC Part 15.247(b)(1) is 1 Watt.

7.4.4. It can be confirmed from Plot GPH/42493/03 to GPH/42493/05 Appendix 4 that the number of hopping channels employed by the EUT was 79.

7.4.5. Results are shown for the EUT set to Top, Middle and Bottom channels as stated in FCC Part 15.31 (m) and section 5.2 of this report. Graphical measurements are shown for the transmit power levels within GPH/42493/08 to GPH/42493/10.

7.4.6. Measurements were performed on the Top, Middle and Bottom channels using a fully charged battery as specified in FCC Part 15.31(e) for battery operated devices:

Test Of: Red-M (Communications) Ltd.

Bluetooth Module for Visor

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

Test Results for Conducted Transmitter Power: Transmit Mode (continued)

Channel	Battery Input Voltage (DC)	Maximum Transmitter Output Level (Watts)	Limit (Watts)	Margin	Result
Bottom	3.6	0.000279	1.0	0.999721	Complied

Channel	Battery Input Voltage (DC)	Maximum Transmitter Output Level (Watts)	Limit (Watts)	Margin	Result
Middle	3.6	0.000279	1.0	0.999721	Complied

Channel	Battery Input Voltage (DC)	Maximum Transmitter Output Level (Watts)	Limit (Watts)	Margin	Result
Top	3.6	0.000233	1.0	0.999767	Complied

Test Of: Red-M (Communications) Ltd.

Bluetooth Module for Visor

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

7.5.Test Results for Radiated Transmitter Power: Transmit Mode**7.5.1.Effective Isotropic Radiated Power**

Channel	Input Voltage (DC)	Maximum Transmitter Output Level (Watts)	Limit (Watts)	Margin	Result
Bottom	3.6	0.000026	1.0	0.999974	Complied

Channel	Input Voltage (DC)	Maximum Transmitter Output Level (Watts)	Limit (Watts)	Margin	Result
Middle	3.6	0.000010	1.0	0.99999	Complied

Channel	Input Voltage (DC)	Maximum Transmitter Output Level (Watts)	Limit (Watts)	Margin	Result
Top	3.6	0.000023	1.0	0.999977	Complied

Test Of: Red-M (Communications) Ltd.

Bluetooth Module for Visor

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

7.6. Peak Power Spectral Density For Direct Sequence Systems

The EUT employs less than 75 channels in the acquisition mode, as such, the device must be classified as a hybrid system FCC Part 15.247(f), and must also comply with the requirements for direct sequence systems. Tests were performed to identify the maximum transmit peak power spectral density in accordance with FCC Part 15.247(d).

7.6.1. The client has provided a temporary antenna port to allow a direct connection to be made.

7.6.2. Testing was performed on the Bottom, Middle and Top channels used for the accusation mode. Spectral power density in the 3 kHz bandwidth was then measured as specified in FCC Part 15.247(d).

Channel	Battery Input Voltage (DC)	Maximum Transmitter Output Level (dBm/3kHz)	Limit (dBm/3kHz)	Margin	Result
Bottom	3.6	-14.4	8.0	22.4	Complied

Channel	Battery Input Voltage (DC)	Maximum Transmitter Output Level (dBm/3kHz)	Limit (dBm/3kHz)	Margin	Result
Middle	3.6	-12.8	8.0	20.8	Complied

Channel	Battery Input Voltage (DC)	Maximum Transmitter Output Level (dBm/3kHz)	Limit (dBm/3kHz)	Margin	Result
Top	3.6	-14.3	8.0	22.3	Complied

7.7.Band Edge Compliance of RF Conducted Emissions FCC 15.247(c)

7.7.1.The EUT and spectrum analyser was configured as for conducted antenna port measurements, And as per FCC Public Notice DA 00-705, Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

7.7.2.A temporary antenna port was provided by the applicant to allow for conducted measurements.

7.7.3.To determine band-edge compliance, the analyser bandwidth resolution bandwidth was set to =1% of the analyser span. The video bandwidth was set to be no less than the resolution bandwidth. The sweep was set to auto and the detector to peak. The trace was set to max hold and a trace was produced.

7.7.4.A plot of the upper channel and the protected band closest to the upper channel was produced. A marker was set to the peak of the highest channel and a delta marker set to the highest out of band peak. (The specification states that either the band edge level must be measured or the highest out of band emission, whichever is greater). The plots show that the emission complies with the 20 dBc limit.

7.7.5.A plot of the lower channel and the protected band closest to the lower channel was produced. A marker was set to the peak of the lowest channel and a delta marker set to the highest out of band peak. (The specification states that either the band edge level must be measured or the highest out of band emission, whichever is greater). The plots show that the emission complies with the 20 dBc limit.

7.7.6.The above procedure was then repeated with the EUT set to its hopping mode.

7.7.7.Four graphs in total were produced, two with the device set to top and bottom channels and two with the device set to its hopping mode.

7.8. Test Results For Band Edge Radiated Emissions

7.8.1. Electric Field Strength Measurements

7.8.1.1. The EUT and spectrum analyser were configured for radiated measurements as per FCC Public Notice DA 00-705, Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

7.8.1.2. A plot of the protected band closest to the upper channel was produced with frequency hopping mode turned off and the device set to transmit on the top channel. A marker was set to the peak of the highest out of band emission. (The specification states that either the band edge level must be measured or the highest out of band emission, which ever is greater).

7.8.1.3. The highest noted emission was then measured as per the requirements of FCC Part 15.209 for electric field strength measurements.

7.8.1.4. Frequency hopping was then turned on and the process repeated.

7.8.1.5. A plot of the protected band closest to the lower channel was then produced with frequency hopping turned off and the device set to transmit on the bottom channel. A marker was set to the peak of the highest out of band emission. (The specification states that either the band edge level must be measured or the highest out of band emission, which ever is greater).

7.8.1.6. The highest noted emission was then measured as per the requirements of FCC Part 15.209 for electric field strength measurements.

7.8.1.7. Frequency hopping was then turned on and the process repeated.

7.8.1.8. Four graphs were produced in total showing the responses in the limited frequency bands. The plots can be seen in appendix 1 of this report.

Test Of: Red-M (Communications) Ltd.

Bluetooth Module for Visor

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

7.8.2. Emissions in the protected band closest to the bottom channel**Highest Average Level:**

Frequency (GHz)	Antenna Polarity (H/V)	Average Detector level (dBmV)	Antenna factor (dB)	Cable loss (dB)	Actual Average Level (dBmV/m)	Average Limit (dBmV/m)	Average Margin (dB)	Result
2.333319	Vert.	25.0	17.5	1.27	43.77	54.0	10.23	Complied
2.324880	Vert	24.7	17.5	1.27	43.47	54.0	10.53	Complied

Highest Peak Level:

Frequency (GHz)	Antenna Polarity (H/V)	Peak Detector level (dBmV)	Antenna factor (dB)	Cable loss (dB)	Actual Peak Level (dBmV/m)	Peak Limit (dBmV/m)	Peak Margin (dB)	Result
2.333319	Vert.	35.0	17.5	1.27	53.77	74.0	20.23	Complied
2.324880	Vert	35.0	17.5	1.27	53.77	74.0	20.23	Complied

7.8.3. Emissions in the protected band closest to the top channel.**Highest Average Level:**

Frequency (GHz)	Antenna Polarity (H/V)	Average Detector level (dBmV)	Antenna factor (dB)	Cable loss (dB)	Actual Average Level (dBmV/m)	Average Limit (dBmV/m)	Average Margin (dB)	Result
2.483927	Ver.	24.39	17.5	1.27	43.16	54.0	10.84	Complied
2.483602	Ver	24.30	17.5	1.27	43.07	54.0	10.93	Complied

Highest Peak Level:

Frequency (GHz)	Antenna Polarity (H/V)	Peak Detector level (dBmV)	Antenna factor (dB)	Cable loss (dB)	Actual Peak Level (dBmV/m)	Peak Limit (dBmV/m)	Peak Margin (dB)	Result
2.483927	Ver.	35.0	17.5	1.27	53.77	74.0	20.23	Complied
2.483602	Ver	35.0	17.5	1.27	53.77	74.0	20.23	Complied

Test Of: Red-M (Communications) Ltd.

Bluetooth Module for Visor

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

7.9. Test Results for Conducted Antenna Port Spurious Emissions: Transmit Mode.

7.9.1. Spurious emissions tests on the antenna port were performed in accordance with FCC Part 15.247(c).

7.9.2. Section 15.247(c) specifies that all spurious emissions should be attenuated at least 20 dB below the level of the highest fundamental level measured between the range of 2400 to 2483.5 MHz.

7.9.3. Scans were performed between 30 and 26000 MHz with the EUT operating in Top, Middle and Bottom channels, as specified within clause 15.31 (m).

7.9.4. Spurious emissions that were of an amplitude of less than 20 dB below the reference level were recorded in the following tables.

7.9.5. Spurious emissions that were of an amplitude of greater 20 dB below the reference limit line were not recorded as per FCC Part 15.21(o).

7.9.6. Plots of all the initial scans can be found in Appendix 4.

Bottom Channel

Frequency (MHz)	Level (dBm))	Limit (dBm)	Margin	Result
1.200266	-37.23	-25.53	11.7	Complied

Middle Channel

Frequency (MHz)	Level (dBm))	Limit (dBm)	Margin	Result
1.221824	-36.35	-25.53	10.82	Complied

Top Channel

Frequency (MHz)	Level (dBm))	Limit (dBm)	Margin	Result
1.240741	-37.18	-25.53	11.65	Complied

Test Of: Red-M (Communications) Ltd.

Bluetooth Module for Visor

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

7.10. Test Results For Radiated Emissions: Transmit Mode**7.10.1. Electric Field Strength Measurements: 30 to 1000 MHz**

7.10.1.1. The following table specifies frequencies, which fall close to the restricted bands as specified in section FCC Part 15.205.

7.10.1.2. Preliminary Radiated spurious scans were performed with the EUT set to Top, Middle and Bottom as stated in section 5.2.

7.10.1.3. Plots of the initial scans can be found in Appendix 4.

7.10.1.4. The following table lists frequencies at which emissions were measured using a Quasi-Peak detector at a test distance of 3m (results incorporate antenna factors and cable losses):

7.10.1.5. The following results are for the EUT configured with an internal antenna connected and operating.

Bottom Channel

Frequency (MHz)	Ant. Pol.	Q-P Level (dBmV/m)	Limit (dBmV/m)	Margin (dB)	Result
81.641	Vert.	13.5	40.0	26.5	Complied
135.428	Vert.	17.4	43.5	26.1	Complied
840.753	Vert.	41.5	46.0	4.5	Complied

Middle Channel

Frequency (MHz)	Ant. Pol.	Q-P Level (dBmV/m)	Limit (dBmV/m)	Margin (dB)	Result
71.367	Vert.	20.3	40.0	19.7	Complied
81.641	Vert.	14.5	40.0	25.5	Complied
134.901	Vert.	13.5	43.5	30.0	Complied
164.511	Vert.	30.1	43.5	13.4	Complied
818.255	Horiz.	34.9	46.0	11.1	Complied

Top Channel

Frequency (MHz)	Ant. Pol.	Q-P Level (dBmV/m)	Limit (dBmV/m)	Margin (dB)	Result
81.641	Vert.	13.5	40.0	26.5	Complied

Test Of: Red-M (Communications) Ltd.

Bluetooth Module for Visor

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

7.11. Test Results For Radiated Emissions: Transmit Mode (Bottom Channel)**7.11.1. Electric Field Strength Measurements: 1.0 to 26.0 GHz**

7.11.1.1. The following table specifies frequencies, which fall within the bands as specified in section 15.205.

7.11.1.2. The client has stated that the highest clock frequency for the EUT was 2.480 GHz. Therefore tests were performed up to 26 GHz.

7.11.1.3. Preliminary Radiated spurious scans were performed with the EUT set to Bottom, Middle and Top channels as stated in section 5.2.

7.11.1.4. Due to dynamic range limitations of the measuring receiver, scans at high frequencies above 12 GHz were performed at 1 meter measurement distances, with an corrected limit line for the reduced test distance.

7.11.1.5. Plots of all the initial scans can be found in Appendix 4.

7.11.1.6. The following table lists frequencies at which emissions were measured using an Average and Peak detector, a measurement test distance of 3 meters was used for the indicated results (results incorporate antenna factors and cable losses):

7.11.1.7. The following results are for the EUT configured with an internal antenna connected and operating.

Highest Average Level:

Frequency (GHz)	Antenna Polarity (H/V)	Average Detector level (dBmV)	Antenna factor (dB)	Cable loss (dB)	Actual Average Level (dBmV/m)	Average Limit (dBmV/m)	Average Margin (dB)	Result
1.20100	Hor	28.5	21.5	0.9	50.9	54.0	3.1	Complied
4.80550	Ver	19.5	20.0	1.9	41.4	54.0	12.6	Complied

Highest Peak Level:

Frequency (GHz)	Antenna Polarity (H/V)	Peak Detector level (dBmV)	Antenna factor (dB)	Cable loss (dB)	Actual Peak Level (dBmV/m)	Peak Limit (dBmV/m)	Peak Margin (dB)	Result
1.20100	Hor	36	21.5	0.9	58.4	74.0	15.6	Complied
4.80550	Ver	29.5	20.0	1.9	51.4	74.0	22.6	Complied

Test Of: Red-M (Communications) Ltd.

Bluetooth Module for Visor

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

7.12. Test Results For Radiated Emissions: Transmit Mode (Middle Channel)**7.12.1. Electric Field Strength Measurements: 1.0 to 26.0 GHz**

7.12.1.1. The following table specifies frequencies, which fall within the bands as specified in section 15.205.

7.12.1.2. The client has stated that the highest clock frequency for the EUT was 2.480 GHz. Therefore tests were performed up to 26 GHz.

7.12.1.3. Preliminary Radiated spurious scans were performed with the EUT set to Bottom, Middle and Top channels as stated in section 5.2.

7.12.1.4. Due to dynamic range limitations of the measuring receiver, scans at high frequencies above 12 GHz were performed at 1 meter measurement distances, with an corrected limit line for the reduced test distances.

7.12.1.5. Plots of all the initial scans can be found in Appendix 4.

7.12.1.6. The following table lists frequencies at which emissions were measured using an Average and Peak detector, a measurement test distance of 3 meters was used for the indicated results (results incorporate antenna factors and cable losses):

7.12.1.7. The following results are for the EUT configured with an internal antenna connected and operating.

Highest Average Level:

Frequency (GHz)	Antenna Polarity (H/V)	Average Detector level (dBmV)	Antenna factor (dB)	Cable loss (dB)	Actual Average Level (dBmV/m)	Average Limit (dBmV/m)	Average Margin (dB)	Result
1.22060	Hor.	28.3	21.5	0.9	50.7	54.0	3.3	Complied
4.88219	Ver	20.5	20.0	1.9	42.4	54.0	11.6	Complied

Highest Peak Level:

Frequency (GHz)	Antenna Polarity (H/V)	Peak Detector level (dBmV)	Antenna factor (dB)	Cable loss (dB)	Actual Peak Level (dBmV/m)	Peak Limit (dBmV/m)	Peak Margin (dB)	Result
1.22060	Hor.	35.5	21.5	0.9	57.9	74.0	16.1	Complied
4.88219	Ver	30.5	20.0	1.9	52.4	74.0	21.6	Complied

Test Of: Red-M (Communications) Ltd.

Bluetooth Module for Visor

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

7.13. Test Results For Radiated Emissions: Transmit Mode (Top Channel)**7.13.1. Electric Field Strength Measurements: 1.0 to 26.0 GHz**

7.13.1.1. The following table specifies frequencies, which fall within the bands as specified in section 15.205.

7.13.1.2. The client has stated that the highest clock frequency for the EUT was 2.480 GHz. Therefore tests were performed up to 26 GHz.

7.13.1.3. Preliminary Radiated spurious scans were performed with the EUT set to Bottom, Middle and Top channels as stated in section 5.2.

7.13.1.4. Due to dynamic range limitations of the measuring receiver, scans at high frequencies above 12 GHz were performed at 1 meter measurement distances, with an corrected limit line for the reduced test distances.

7.13.1.5. Plots of all the initial scans can be found in Appendix 4.

7.13.1.6. The following table lists frequencies at which emissions were measured using an Average and Peak detector, a measurement test distance of 3 meters was used for the indicated results (results incorporate antenna factors and cable losses):

7.13.1.7. The following results are for the EUT configured with an internal antenna connected and operating.

Highest Average Level:

Frequency (GHz)	Antenna Polarity (H/V)	Average Detector level (dBmV)	Antenna factor (dB)	Cable loss (dB)	Actual Average Level (dBmV/m)	Average Limit (dBmV/m)	Average Margin (dB)	Result
1.24020	Hor.	29.0	21.5	0.9	51.4	54.0	2.6	Complied
4.95986	Hor.	20.9	20.0	1.9	42.8	54.0	11.2	Complied

Highest Peak Level:

Frequency (GHz)	Antenna Polarity (H/V)	Peak Detector level (dBmV)	Antenna factor (dB)	Cable loss (dB)	Actual Peak Level (dBmV/m)	Peak Limit (dBmV/m)	Peak Margin (dB)	Result
1.24020	Hor.	36.5	21.5	0.9	58.9	74.0	15.1	Complied
4.95986	Hor.	31.5	20.0	1.9	53.4	74.0	20.6	Complied

Test Of: Red-M (Communications) Ltd.

Bluetooth Module for Visor

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

7.14. Test Results For Radiated Emissions: Receive Mode

7.14.1. Electric Field Strength Measurements (Frequency Range: 30 to 1000 MHz)

7.14.1.1. The following table indicates measured results with the EUT operated in receive mode to the limits specified in Part 15.109.

7.14.1.2. Plots of the initial scans can be found in Appendix 4.

7.14.1.3. The following table lists frequencies at which emissions were measured using a Quasi-Peak detector at a test distance of 3m (results incorporate antenna factors and cable losses):

Frequency (MHz)	Ant. Pol.	Q-P Level (dBmV/m)	Limit (dBmV/m)	Margin (dB)	Result
82.842	Vert.	13.2	40.0	26.8	Complied
93.875	Vert.	18.4	43.5	25.1	Complied (Note 1)
102.172	Vert.	35.7	43.5	7.8	Complied
119.030	Vert.	25.2	43.5	18.3	Complied
134.974	Vert.	12.9	43.5	30.6	Complied
819.033	Horiz.	34.3	46.0	11.7	Complied

Note 1: Due to the presence of an ambient signal this emission was re-measured using a substitution method. At the emission frequency a high level signal was generated in the screened room used for the initial swept measurements. This measurement was then repeated on the open area test site. The difference in amplitude between the screened room measurement and free-field measurement was then used to correct the value obtained in the screened room for the test sample.

Test Of: Red-M (Communications) Ltd.

Bluetooth Module for Visor

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

Test Results For Radiated Emissions: Receive Mode (continued)**7.14.2. Electric Field Strength Measurements (Frequency Range: 1.0 to 26.0 GHz)**

7.14.2.1. The following table indicates measured results with the EUT operated in receive mode to the limits specified in Part 15.109.

7.14.2.2. Plots of all the initial scans can be found in Appendix 4.

Highest Average Level:

Frequency (GHz)	Antenna Polarity (H/V)	Average Detector level (dBmV)	Antenna factor (dB)	Cable loss (dB)	Actual Average Level (dBmV/m)	Average Limit (dBmV/m)	Average Margin (dB)	Result
1.8077	Hor	7.08	21.5	1.2	29.78	54.0	24.22	Complied

Highest Peak Level:

Frequency (GHz)	Antenna Polarity (H/V)	Peak Detector level (dBmV)	Antenna factor (dB)	Cable loss (dB)	Actual Peak Level (dBmV/m)	Peak Limit (dBmV/m)	Peak Margin (dB)	Result
1.8077	Hor	19.5	21.5	1.2	42.2	74.0	31.8	Complied

7.15. Test Results for Occupied Bandwidth, Channel Separation and Time Occupancy.

7.15.1. Tests were performed to identify the Occupied Bandwidth, Channel Separation and Time Occupancy to FCC Part 15.247.

Occupied Bandwidth and Channel Separation:

7.15.2. Section 15.247 (a)(1) specifies that the channels should be separated by at least 25 kHz or the 20 dB bandwidth of the channel, which ever is greater. Section 15.247 (a1)(ii) specifies that the maximum bandwidth of the channel should be 1 MHz.

7.15.3. A graphical plot of the characteristics of two adjacent channels was performed. The following results were noted:

20 dB Bandwidth: 877.756 kHz. (Refer to Appendix 4 Plot GPH/42493/02)

Channel Separation: 1000.000 kHz. (Refer to Appendix 4 Plot GPH/42493/01)

Time Occupancy:

7.15.4. The time occupancy of the system was tested on a single carrier. The maximum packet length was measured to be 2.887 ms and can be seen in Appendix 4 (Plot GPH/42493/07). The maximum time the carrier was used in a 30 second period was measured as 0.312 seconds and can be seen by the number of transmissions in Appendix 4 (Plot GPH/42493/06) times by the maximum packet length.

Test Of: Red-M (Communications) Ltd.

Bluetooth Module for Visor

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

8. Measurement Uncertainty

8.1. No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently, the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

8.2. The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

8.3. The uncertainty of the result may need to be taken into account when interpreting the measurement results.

8.4. The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor, such that a confidence level of approximately 95% is maintained. For the purposes of this document "approximately" is interpreted as meaning "effectively" or "for most practical purposes".

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
Conducted Emissions	0.15 MHz to 30 MHz	95%	+/- 3.25 dB
Time Occupancy	Not applicable	95%	+/- 10 %
Channel Separation	Not applicable	95%	+/- 10 %
Occupied Bandwidth	Not applicable	95%	+/- 2.5 kHz
Conducted Power	30 MHz to 1000 MHz	95%	+/- 0.6 dB
Effective Isotropic Radiated Power	1.0 GHz to 26 GHz	95%	+/- 4.0 dB
Radiated Emissions at 3.0 metres	30 MHz to 1000 MHz	95%	+/- 5.26 dB
Radiated Emissions at 3.0 metres	1 GHz to 26 GHz	95%	+/- 4.18 dB

8.5. The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty, the published guidance of the appropriate accreditation body is followed.

Test Of: Red-M (Communications) Ltd.

Bluetooth Module for Visor

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

Appendix 1. Test Equipment Used

Instrument	Manufacturer	Model	RFI No.
Horn Antenna	Eaton	9188-2	A027
2 to 4 GHz Eaton Horn Antenna	Eaton	91889-2	A031
ESH3-Z5	Rohde & Schwarz	ESH3-Z5	A1069
WG 20 Horn Antenna	Flann Microwave Ltd	20240-20	A201
20 dB Attenuator	Schaffner	6820-17-B	A243
WG 12 Microwave Horn	Flann Microwave	12240-20	A253
WG 14 Microwave Horn	Flann Microwave	14240-20	A254
WG 16 Microwave Horn	Flann Microwave	16240-20	A255
WG 18 Microwave Horn	Flann Microwave	18240-20	A256
Bilog Antenna	Chase	CBL6111	A259
SMHU Signal Generator	Rohde & Schwarz	SMHU	G013
Spectrum Monitor	Rohde & Schwarz	EZM	M003
ESMI Spectrum Analyser / Receiver	Rohde & Schwarz	ESMI	M069
Fluke 77 DVM	Fluke	77	M105
Spectrum Analyser	Rohde & Schwarz	FSEB 30	M127
Thermometer/Barometer/Hydrometer	Oregan Scientific	BA-116	M170
Thermal Power Sensor	Rohde & Schwarz	NRV-Z52	M198
Power Meter	Rohde & Schwarz	NRVS	M199
Power Control	Zen	E08	S003
Site 1	RFI	1	S201
Site 15	RFI	15	S215

NB In accordance with UKAS requirements, all the measurement equipment is on a calibration schedule.

Appendix 2. Measurement Methods

AC Mains Conducted Emissions

AC mains conducted emissions measurements were performed in accordance with the standard, against appropriate limits for each detector function.

The test was performed in a shielded enclosure with the equipment arranged as detailed in the standard on a wooden bench using the floor of the screened enclosure as the ground reference plane and with the EUT powered via a 60 Hz AC mains supply.

Initial measurements in the form of swept scans covering the entire measurement band were performed in order to identify frequencies on which the EUT was generating interference. In order to minimise the time taken for these swept measurements, a Peak detector was used in conjunction with the appropriate detector IF measuring bandwidths (see table below). Repetitive scans were performed to allow for emissions with low repetition rates, and the duty cycle of the EUT. The test configuration was the same for the initial scans as for the final measurements.

Following the initial scans, a graph was produced giving an overview of the emissions from the EUT plotted against the appropriate specification limit. A tolerance line was set 6 dB below the specification limit and levels above the tolerance line were re-tested (at individual frequencies) using the appropriate detector function.

The test equipment settings for conducted emissions measurements were as follows:

Receiver Function	Initial Scan	Final Measurements
Detector Type:	Peak	Quasi-Peak (CISPR)*
Mode:	Max Hold	Not applicable
Bandwidth:	9 kHz	9 kHz
Amplitude Range:	100 dB	20 dB
Measurement Time:	Not applicable	> 1 s
Observation Time:	Not applicable	> 15 s
Step Size:	Continuous sweep	Not applicable
Sweep Time:	Coupled	Not applicable

* In some instances an Average detector function may also have been used.

Radiated Field Strength Emissions

Radiated emissions measurements were performed in accordance with the standard, against appropriate limits for each detector function.

Initial measurements covering the entire measurement band in the form of swept scans in a shielded enclosure were performed in order to identify frequencies on which the EUT was generating interference. This determined the frequencies on which the EUT should be re-measured in full on the open area test site. In order to minimise the time taken for the swept measurements, a Peak detector was used in conjunction with the appropriate detector IF measuring bandwidth (see table below). Repetitive scans were performed to allow for emissions with low repetition rates, and for the duty cycle of the EUT. The test configuration was the same for the initial scans as for the final measurements.

The initial scans were performed using an antenna height of 1.5 m and a measurement distance of 3 m, in some circumstances at high frequencies above 12 GHz, scans were performed at 30 cm's with a corrected limit line. This was necessary due to the limited dynamic range of the measuring receiver. Following the initial scans, graphs were produced giving an overview of the emissions from the EUT plotted against the appropriate specification limit. A tolerance line was set 6 dB below the specification limit and levels above the tolerance line were re-tested on the open area test site, at the appropriate distance, using a measuring receiver with a Quasi-Peak (below 1000 MHz), Average and Peak (above 1000 MHz) detector, where applicable.

For the main (final) measurements the EUT was arranged on a non-conducting table on an open area test site, as detailed in the specification.

All measurements on the open area test site were performed using broadband antennas.

On the open area test site, at each frequency where a signal was found, the levels were maximised by initially rotating the turntable through 360°. For frequencies below 1000 MHz, the antenna was varied in height between 1 m and 4 m. For frequencies above 1000 MHz, the antenna was fixed at a height of 1.5m. At this point, any signals found to be between the limit and a level 6 dB below it were further maximised by changing the configuration of the EUT, e.g. re-routing cables to peripherals and moving peripherals with respect to the EUT.

Test Of: Red-M (Communications) Ltd.

Bluetooth Module for Visor

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

The test equipment settings for radiated emissions measurements were as follows:

Receiver Function	Initial Scan Below 1000 MHz	Final Measurements Below 1000 MHz
Detector Type:	Peak	Quasi-Peak (CISPR)
Mode:	Max Hold	Not applicable
Bandwidth:	100 kHz	120 kHz
Amplitude Range:	100 dB	20 dB
Measurement Time:	Not applicable	> 1 s
Observation Time:	Not applicable	> 15 s
Step Size:	Continuous sweep	Not applicable
Sweep Time:	Coupled	Not applicable

Receiver Function	Initial Scan Above 1000 MHz	Final Measurements Above 1000 MHz
Detector Type:	Peak	Peak/Average
Mode:	Max Hold	Not applicable
Bandwidth:	1 MHz	1 MHz
Amplitude Range:	100 dB	20 dB (typical)
Measurement Time:	Not applicable	> 1 s
Observation Time:	Not applicable	> 15 s
Step Size:	Continuous sweep	Not applicable
Sweep Time:	Coupled	Not applicable

**Test Of: Red-M (Communications) Ltd.
Bluetooth Module for Visor**

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

Conducted Antenna Port Emissions

Conducted Antenna Port Emissions measurements were performed in accordance with the standard, against appropriate limits for each detector function.

Prior to testing being performed a suitable RF attenuator and cable were calibrated for the required frequency range. For each measurement range performed, the calibrated level of the attenuator and cable were entered as an offset into the spectrum analyser to compensate for the measurement setup.

Initial measurements covering the entire measurement band in the form of swept scans were performed in order to identify frequencies on which the EUT was generating interference. This determined the frequencies on which measurements were performed. In order to minimise the time taken for the swept measurements, a Peak detector was used in conjunction with the appropriate detector IF measuring bandwidth (see table below). Repetitive scans were performed to allow for emissions with low repetition rates, and for the duty cycle of the EUT. The test configuration was the same for the initial scans as for the final measurements.

To determine the transmitter output power, the EUT was operated as intended with the spectrum analyser operated in a maximum hold on the bottom, middle and top channels of the EUT.

To determine spurious emissions levels, the EUT was operated as intended with the spectrum analyser operated in a maximum hold mode over selected frequency ranges between 30 MHz and 26 GHz. A reference limit line of 20dB below the maximum output of the transmitter was noted. Levels within 20dB of this limit line were then recorded.

Channel Separation FCC 15.247(1)

The EUT and spectrum analyser was configured as for conducted antenna port measurements, And as per FCC Public Notice DA 00-705, Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

To determine the bandwidth and separation of each transmission channel the analyser was configured to measure two adjacent channels.

To determine the occupied bandwidth, A resolution bandwidth of 10 kHz was used, which is greater than 1% of the 20 dB bandwidth. A video bandwidth of a least the same value was used. The analyser was set for a maximum hold scan to capture the profile of the signal. The peak level was then determined, and a reference line was drawn 20dB below the peak level. The bandwidth was determined at the points where the 20dB reference crossed the profile of the emission.

Occupied Bandwidth FCC 15.247(1)

For channel separation, the analyser was configured with a resolution bandwidth and video bandwidth of at least 1% of the frequency span set on the analyser. A setting of 50 kHz was used.

The EUT was operated as intended and the analyser set to a maximum hold mode scan to capture the profile of the signals.

The peak points on the two adjacent channels were noted and the separation between them recorded.

The channel separation was then determined as the greater of 25kHz or the 20dB bandwidth.

**Test Of: Red-M (Communications) Ltd.
Bluetooth Module for Visor**

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

Average Time of Occupancy FCC 15.247(1)(ii)

The EUT and spectrum analyser was configured as for conducted antenna port measurements

To determine the maximum packet length on any given channel, the analyser was configured in the time domain mode and the EUT was configured to operate as intended.

To determine the average occupancy time on any given channel the analyser was configured in the time domain and a 30 second sweep carried out. The number of times the channel was occupied in any 30 second period multiplied by the maximum packet length will give the total time on the given channel.

**Test Of: Red-M (Communications) Ltd.
Bluetooth Module for Visor**

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

Number Of Hopping Frequencies FCC 15.247(a)(1)(ii)

The EUT and spectrum analyser was configured as for conducted antenna port measurements, And as per FCC Public Notice DA 00-705, Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

To determine the number of hopping frequencies the EUT was set to operate in its normal mode of operation, hopping over all channels that it is intended to operate on.

The spectrum analyser had a span set to cover the frequency band of operation. The resolution bandwidth was set to $\geq 1\%$ of the span. The video bandwidth was set to be no less than the resolution bandwidth. The sweep was set to auto, the detector function to peak and trace to max hold.

Peak Output Power FCC 15.247(b)

The EUT and spectrum analyser was configured as for conducted antenna port measurements, And as per FCC Public Notice DA 00-705, Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

A temporary antenna port was provided by the applicant to allow for conducted measurements.

As the frequency range of operation was greater than 10 MHz, The test was performed on the BOTTOM, MIDDLE and TOP channels as per FCC 15.31(m).

The tests were performed with a fully charged battery as specified in FCC Part 15.31(e) for battery operated devices:

The analyser was setup as per FCC Public Notice DA 00-705.

Test Of: Red-M (Communications) Ltd.

Bluetooth Module for Visor

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

Peak Power Spectral Density For Direct Sequence Systems FCC Part 15.247(d)..

The EUT and spectrum analyser was configured as for conducted antenna port measurements.

A temporary antenna port was provided by the applicant to allow for conducted measurements.

As the frequency range of operation was greater than 10 MHz, The test was performed on the BOTTOM, MIDDLE and TOP channels as per FCC 15.31(m).

The tests were performed with a fully charged battery as specified in FCC Part 15.31(e) for battery operated devices:

Testing was performed on the Bottom, Middle and Top channels used for the accusation mode. Spectral power density in the 3 kHz bandwidth was then measured as specified in FCC Part 15.247(d).

Band Edge Compliance of RF Conducted Emissions FCC 15.247(c)

The EUT and spectrum analyser was configured as for conducted antenna port measurements, And as per FCC Public Notice DA 00-705, Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

A temporary antenna port was provided by the applicant to allow for conducted measurements.

To determine band-edge compliance, the analyser bandwidth resolution bandwidth was set to $\geq 1\%$ of the analyser span. The video bandwidth was set to be no less than the resolution bandwidth. The sweep was set to auto and the detector to peak. The trace was set to max hold and a trace was produced.

A Plot of the upper channel and the protected band closest to the upper channel was produced. A marker was set to the peak of the highest channel and a delta marker set to the highest out of band peak. (The specification states that either the band edge level must be measured or the highest out of band emission. Which ever is greater). The plots show that the emission complies with the 20 dBc limit.

A Plot of the lower channel and the protected band closest to the lower channel was produced. A marker was set to the peak of the lowest channel and a delta marker set to the highest out of band peak. (The specification states that either the band edge level must be measured or the highest out of band emission. Which ever is greater). The plots show that the emission complies with the 20 dBc limit.

Appendix 3. Test Configuration Drawings

This appendix contains the following drawings:

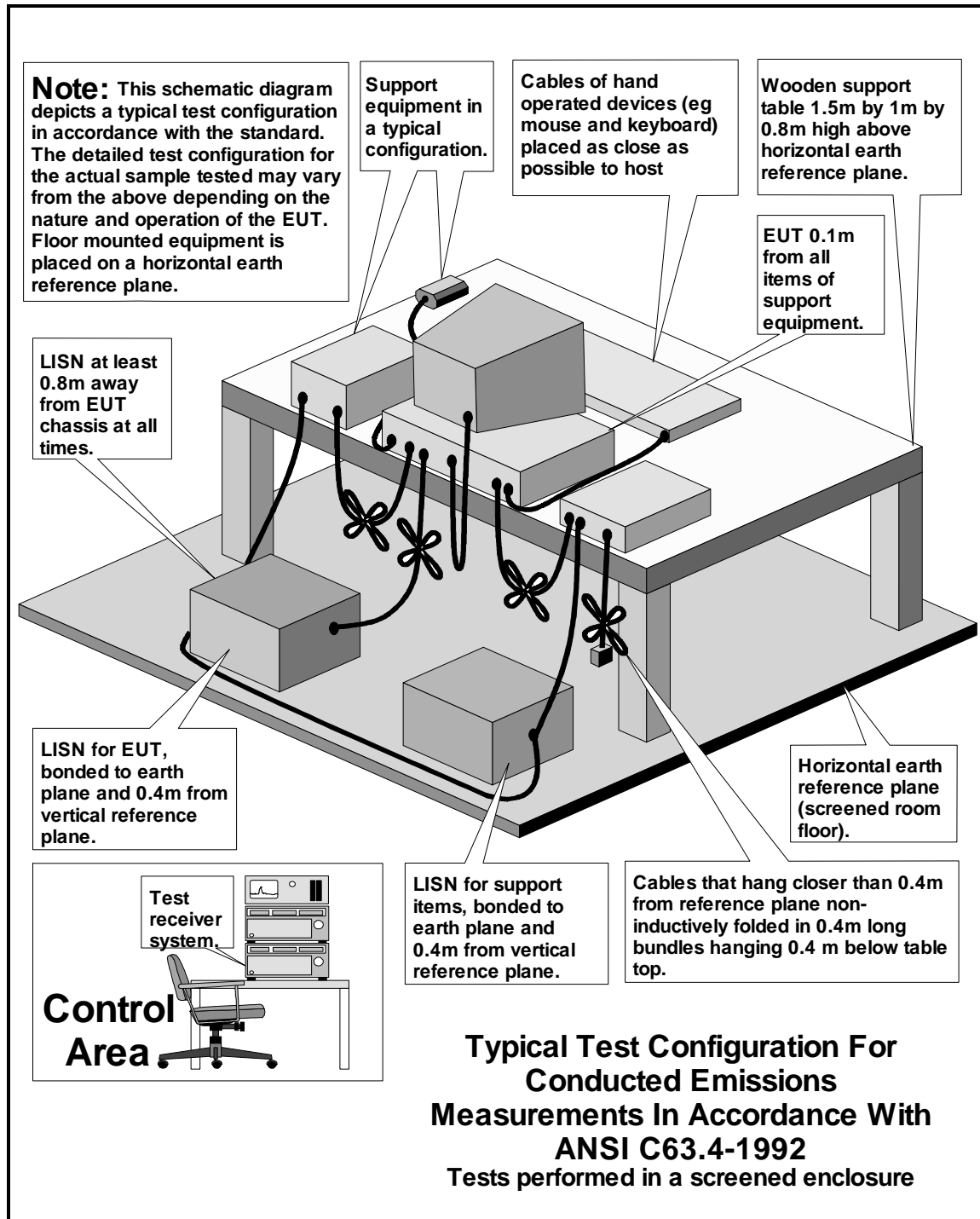
Drawing Reference Number	Title
DRG\42493JD02\EMICON	Test configuration for measurement of conducted emissions
DRG\42493JD02\EMIRAD	Test configuration for measurement of radiated emissions
DRG\42493JD02\001	Test configuration for Conducted RF Antenna Port
DRG\42493JD02\002	Schematic diagram of the EUT, support equipment and interconnecting cables used for the test

Test Of: Red-M (Communications) Ltd.

Bluetooth Module for Visor

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

DRG42493JD02\EMICON

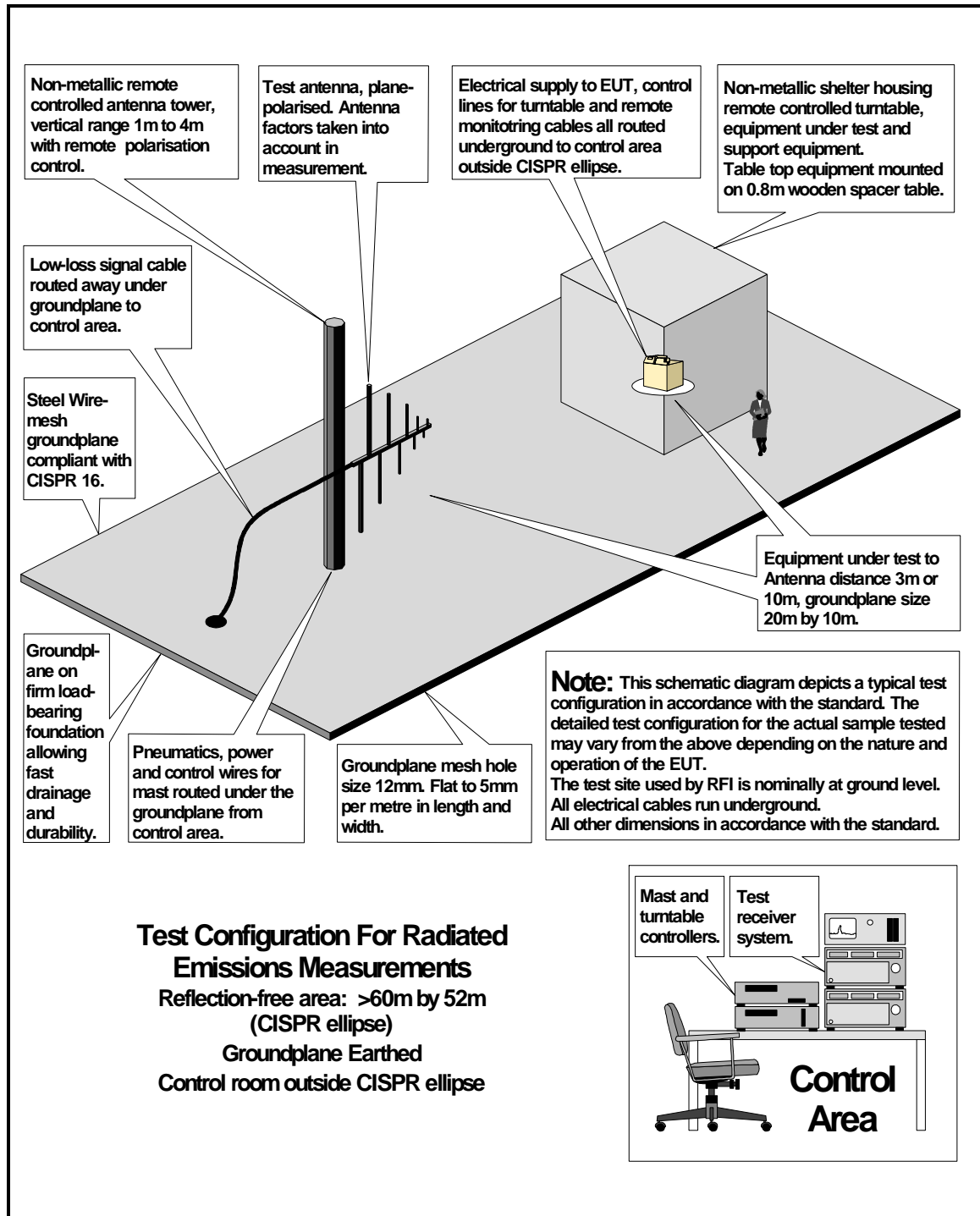


Test Of: Red-M (Communications) Ltd.

Bluetooth Module for Visor

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

DRG42493JD02\EMIRAD



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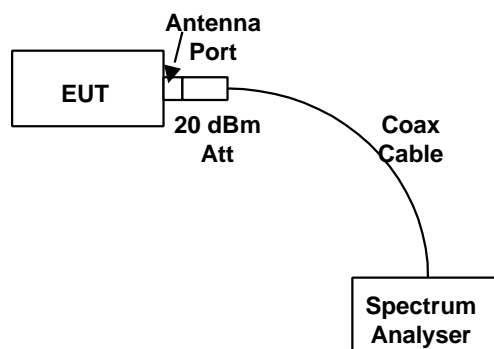
Bluetooth Module for Visor

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

DRG\42493JD02\001

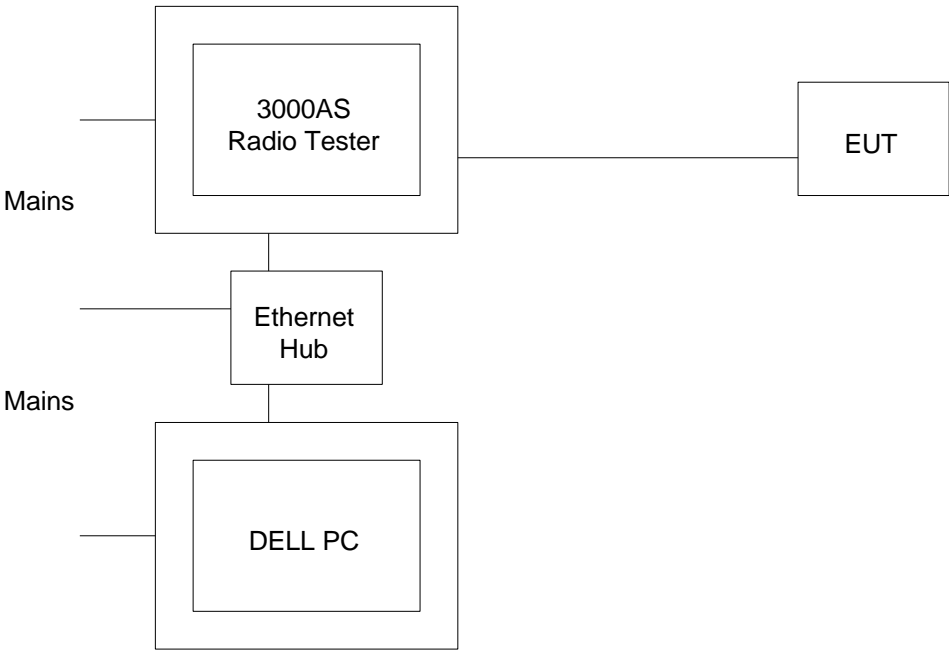
Conducted RF Antenna Port Configuration

Antenna Port
Emissions



DRG\42493JD02\002

Configuration of EUT and Local Support Equipment



Test Of: Red-M (Communications) Ltd.

Bluetooth Module for Visor

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

Appendix 4. Graphical Test Results

This appendix contains the following graphs:

Graph Reference Number	Title
GPH\42493\13\13\008	Spurious Radiated Emissions Transmit Mode, Top Channel (1 to 2 GHz) FCC Part 15.209
GPH\42493\13\13\012	Spurious Radiated Emissions Transmit Mode, Top Channel (2 to 4 GHz) FCC Part 15.209
GPH\42493\13\13\016	Spurious Radiated Emissions Transmit Mode, Top Channel (4 to 5 GHz) FCC Part 15.209
GPH\42493\13\13\020	Spurious Radiated Emissions Transmit Mode, Top Channel (5 to 6 GHz) FCC Part 15.209
GPH\42493\13\13\024	Spurious Radiated Emissions Transmit Mode, Top Channel (6 to 8.2 GHz) FCC Part 15.209
GPH\42493\13\13\025	Spurious Radiated Emissions Transmit Mode, Top Channel (8.2 to 12.4 GHz) FCC Part 15.209
GPH\42493\13\13\032	Spurious Radiated Emissions Transmit Mode, Top Channel (12.4 to 18 GHz) FCC Part 15.209
GPH\42493\13\13\033	Spurious Radiated Emissions Transmit Mode, Top Channel (18 to 26.5 GHz) FCC Part 15.209
GPH\42493\13\13\007	Spurious Radiated Emissions Transmit Mode, Middle Channel (1 to 2 GHz) FCC Part 15.209
GPH\42493\13\13\011	Spurious Radiated Emissions Transmit Mode, Middle Channel (2 to 4 GHz) FCC Part 15.209
GPH\42493\13\13\015	Spurious Radiated Emissions Transmit Mode, Middle Channel (4 to 5 GHz) FCC Part 15.209
GPH\42493\13\13\023	Spurious Radiated Emissions Transmit Mode, Middle Channel (6 to 8.2 GHz) FCC Part 15.209
GPH\42493\13\13\026	Spurious Radiated Emissions Transmit Mode, Middle Channel (8.2 to 12.4 GHz) FCC Part 15.209
GPH\42493\13\13\031	Spurious Radiated Emissions Transmit Mode, Middle Channel (12.4 to 18 GHz) FCC Part 15.209
GPH\42493\13\13\034	Spurious Radiated Emissions Transmit Mode, Middle Channel (18 to 26.5 GHz) FCC Part 15.209

These pages are not included in the total number of pages for this report.

Test Of: Red-M (Communications) Ltd.

Bluetooth Module for Visor

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

Graphical Test Results (continued)

Graph Reference Number	Title
GPH\42493\13\13\005	Spurious Radiated Emissions Receive Mode (1 to 2 GHz) FCC Part 15.109
GPH\42493\13\13\009	Spurious Radiated Emissions Receive Mode (2 to 4 GHz) FCC Part 15. 109
GPH\42493\13\13\013	Spurious Radiated Emissions Receive Mode (4 to 5 GHz) FCC Part 15. 109
GPH\42493\13\13\017	Spurious Radiated Emissions Receive Mode (5 to 6 GHz) FCC Part 15. 109
GPH\42493\13\13\021	Spurious Radiated Emissions Receive Mode (6 to 8.2 GHz) FCC Part 15. 109
GPH\42493\13\13\028	Spurious Radiated Emissions Receive Mode (8.2 to 12.4 GHz) FCC Part 15. 109
GPH\42493\13\13\029	Spurious Radiated Emissions Receive Mode (12.4 to 18 GHz) FCC Part 15. 109
GPH\42493\13\13\036	Spurious Radiated Emissions Receive Mode (18 to 26.5 GHz) FCC Part 15. 109
GPH\42493\13\13\006	Spurious Radiated Emissions Transmit Mode, Lower Channel (1 to 2 GHz) FCC Part 15. 209
GPH\42493\13\13\010	Spurious Radiated Emissions Transmit Mode, Lower Channel (2 to 4 GHz) FCC Part 15. 209
GPH\42493\13\13\014	Spurious Radiated Emissions Transmit Mode, Lower Channel (4 to 5 GHz) FCC Part 15. 209
GPH\42493\13\13\018	Spurious Radiated Emissions Transmit Mode, Lower Channel (5 to 6 GHz) FCC Part 15. 209
GPH\42493\13\13\022	Spurious Radiated Emissions Transmit Mode, Lower Channel (6 to 8.2 GHz) FCC Part 15. 209
GPH\42493\13\13\027	Spurious Radiated Emissions Transmit Mode, Lower Channel (8.2 to 12.4 GHz) FCC Part 15. 209
GPH\42493\13\13\030	Spurious Radiated Emissions Transmit Mode, Lower Channel (12.4 to 18 GHz) FCC Part 15. 209
GPH\42493\13\13\035	Spurious Radiated Emissions Transmit Mode, Lower Channel (18 to 26.5 GHz) FCC Part 15. 209
GPH\42493\015	Spurious RF Conducted Emissions, Lower Channel (30 MHz to 2.356544777 GHz) FCC Part 15.247

These pages are not included in the total number of pages for this report.

Test Of: Red-M (Communications) Ltd.

Bluetooth Module for Visor

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

Graphical Test Results (continued)

Graph Reference Number	Title
GPH\42493\016	Spurious RF Conducted Emissions, Lower Channel (2.39 GHz to 2.49 GHz) FCC Part 15.247
GPH\42493\017	Spurious RF Conducted Emissions, Lower Channel (2.49 GHz to 5 GHz) FCC Part 15.247
GPH\42493\020	Spurious RF Conducted Emissions, Middle Channel (30 MHz to 2.39 GHz) FCC Part 15.247
GPH\42493\019	Spurious RF Conducted Emissions, Middle Channel (2.39 GHz to 2.49 GHz) FCC Part 15.247
GPH\42493\018	Spurious RF Conducted Emissions, Middle Channel (2.49 GHz to 5 GHz) FCC Part 15.247
GPH\42493\021	Spurious RF Conducted Emissions, Top Channel (30 MHz to 2.39 GHz) FCC Part 15.247
GPH\42493\022	Spurious RF Conducted Emissions, Top Channel (2.39 GHz to 2.49 GHz) FCC Part 15.247
GPH\42493\023	Spurious RF Conducted Emissions, Top Channel (2.49 GHz to 5 GHz) FCC Part 15.247
GPH\42493\024	Spurious RF Conducted Emissions, Top Channel (5 GHz to 30 GHz) FCC Part 15.247
GPH\42493\025	Spurious RF Conducted Emissions, Middle Channel (5 GHz to 30 GHz) FCC Part 15.247
GPH\42493\026	Spurious RF Conducted Emissions, Lower Channel (5 GHz to 30 GHz) FCC Part 15.247
GPH\42493\014	Band Edge Compliance, Bottom Channel (2.305 GHz to 2.40747348 GHz) FCC Part 15.247
GPH\42493\013	Band Edge Compliance, Hopping all Channels (2.305 GHz to 2.40747348 GHz) FCC Part 15.247
GPH\42493\012	Band Edge Compliance, Hopping all Channels (2.489166607 GHz to 22.55565802 GHz) FCC Part 15.247
GPH\42493\011	Band Edge Compliance, Top Channel (2.489166607 GHz to 22.55565802 GHz) FCC Part 15.247
GPH\42493\13\13\038	Band Edge Compliance, Transmit Mode, Lower Channel (2.31 GHz to 2.405 GHz) FCC Part 15.247

These pages are not included in the total number of pages for this report.

Test Of: Red-M (Communications) Ltd.

Bluetooth Module for Visor

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

Graphical Test Results (continued)

Graph Reference Number	Title
GPH\42493\13\13\039	Band Edge Compliance, Hopping Lower Channel (2.31 GHz to 2.405 GHz) FCC Part 15.247
GPH\42493\13\13\040	Band Edge Compliance, Hopping Top Channel (2.4778 GHz to 2.505 GHz) FCC Part 15.247
GPH\42493\13\13\037	Band Edge Compliance, Transmit Mode, Top Channel (2.4778 GHz to 2.505 GHz) FCC Part 15.247
GPH\42493\JD12\107	AC Conducted Emissions, Receive Mode, Both Lines (450 kHz to 30 MHz) FCC Part 15.107
GPH\42493\JD12\106	AC Conducted Emissions, Transmit Mode, Top Channel, Neutral Line (450 kHz to 30 MHz) FCC Part 15.107
GPH\42493\JD12\105	AC Conducted Emissions, Transmit Mode, Top Channel, Live Line (450 kHz to 30 MHz) FCC Part 15.107
GPH\42493\JD12\104	AC Conducted Emissions, Transmit Mode, Middle Channel, Live Line (450 kHz to 30 MHz) FCC Part 15.107
GPH\42493\JD12\103	AC Conducted Emissions, Transmit Mode, Middle Channel, Neutral Line (450 kHz to 30 MHz) FCC Part 15.107
GPH\42493\JD12\102	AC Conducted Emissions, Transmit Mode, Bottom Channel, Neutral Line (450 kHz to 30 MHz) FCC Part 15.107
GPH\42493\JD12\101	AC Conducted Emissions, Transmit Mode, Bottom Channel, Live Line (450 kHz to 30 MHz) FCC Part 15.107
GPH\42493\003	Modulation Test, Hopping all Channels (2.395705252 GHz to 2.43 GHz) FCC Part 15.247
GPH\42493\004	Modulation Test, Hopping all Channels (2.42678664 GHz to 2.456411198 GHz) FCC Part 15.247
GPH\42493\005	Modulation Test, Hopping all Channels (2.453516436 GHz to 2.487492586 GHz) FCC Part 15.247
GPH\42493\001	Modulation Test, Hopping all Channels FCC Part 15.247
GPH\42493\002	Modulation Test, Hopping all Channels FCC Part 15.247
GPH\42493\003	Modulation Test, Hopping all Channels FCC Part 15.247

These pages are not included in the total number of pages for this report.

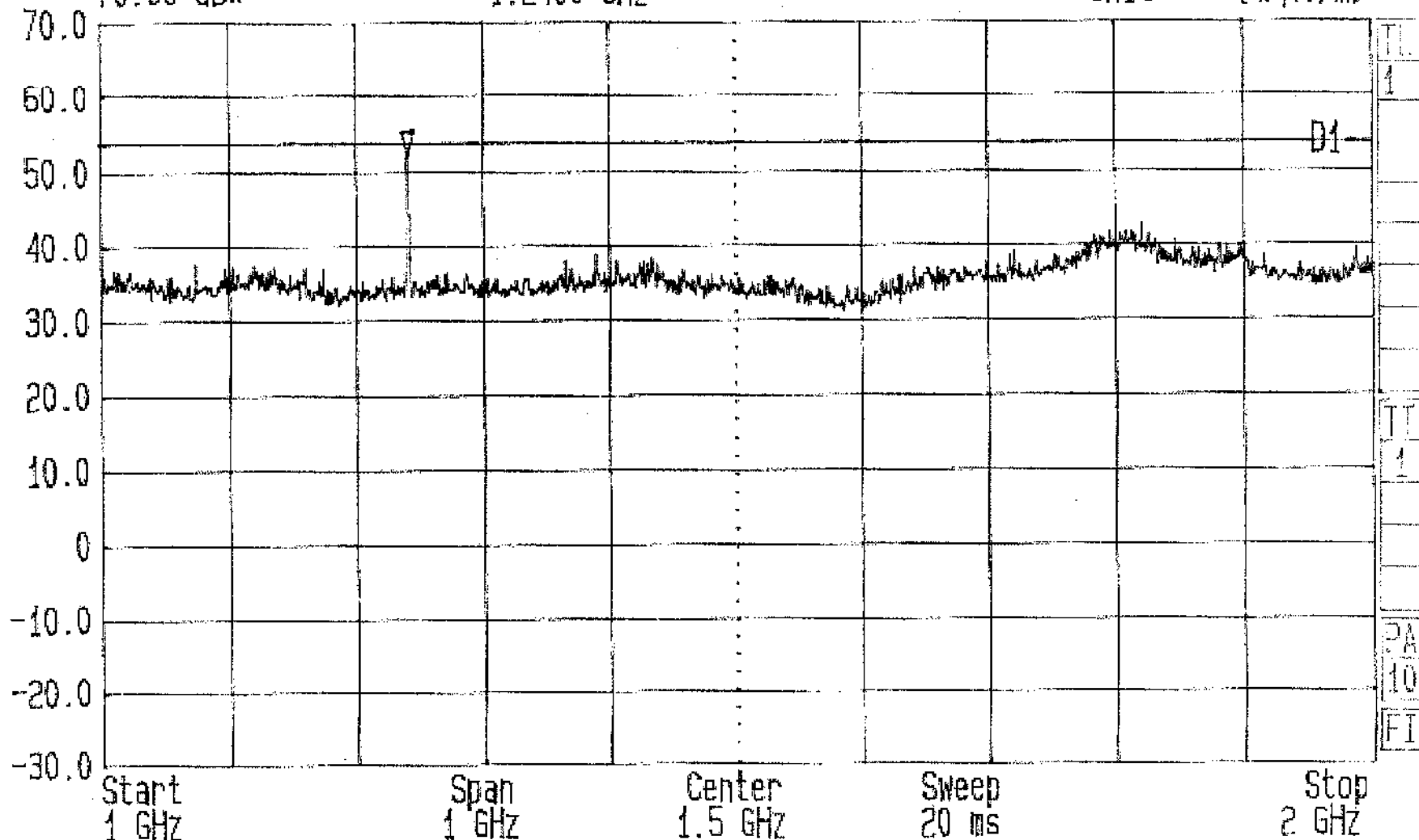
Graphical Test Results (continued)

Graph Reference Number	Title
GPH\42493\007	Modulation Test, Hopping all Channels FCC Part 15.247
GPH\42493\008	Peak Output Power, Lower Channel FCC Part 15.247
GPH\42493\009	Peak Output Power, Middle Channel FCC Part 15.247
GPH\42493\010	Peak Output Power, Top Channel FCC Part 15.247

These pages are not included in the total number of pages for this report.

LVLOFF
 Date 11.Oct.'01 Time 20:41:58
 Ref.Lvl 70.00 dB*
 Marker 52.28 dB*
 1.2400 GHz

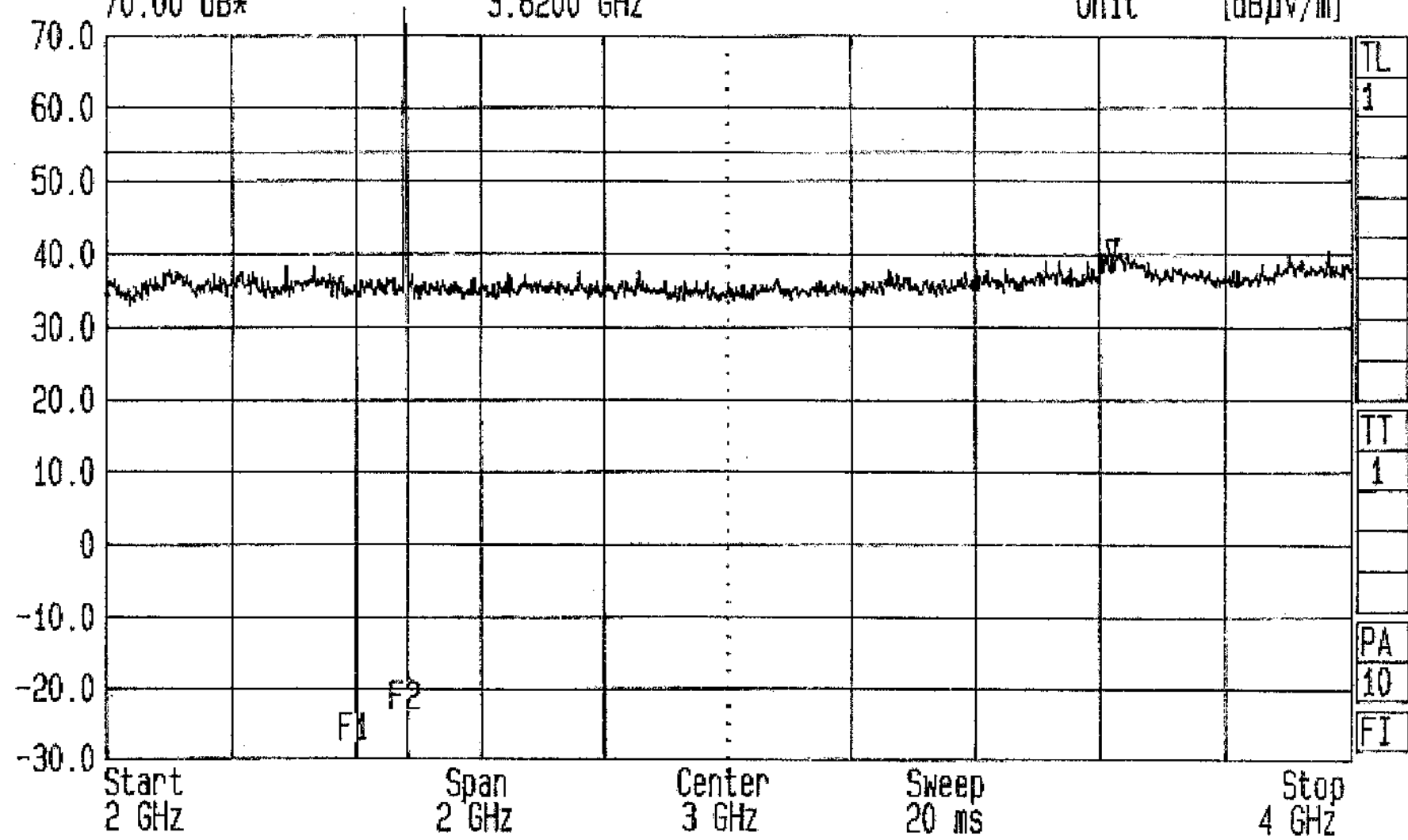
Res.Bw 1 MHz [imp]
 IG.Lvl off
 CF.Stp 100.000 MHz
 Vid.Bw 1 MHz
 RF.Att 0 dB
 Unit [dBμV/m]



Spurious Radiated Emissions Test for Red-M By RFI Ltd.
 FCC Part 15.209 ENG: AMT EUT: Bluetooth Module for Visor

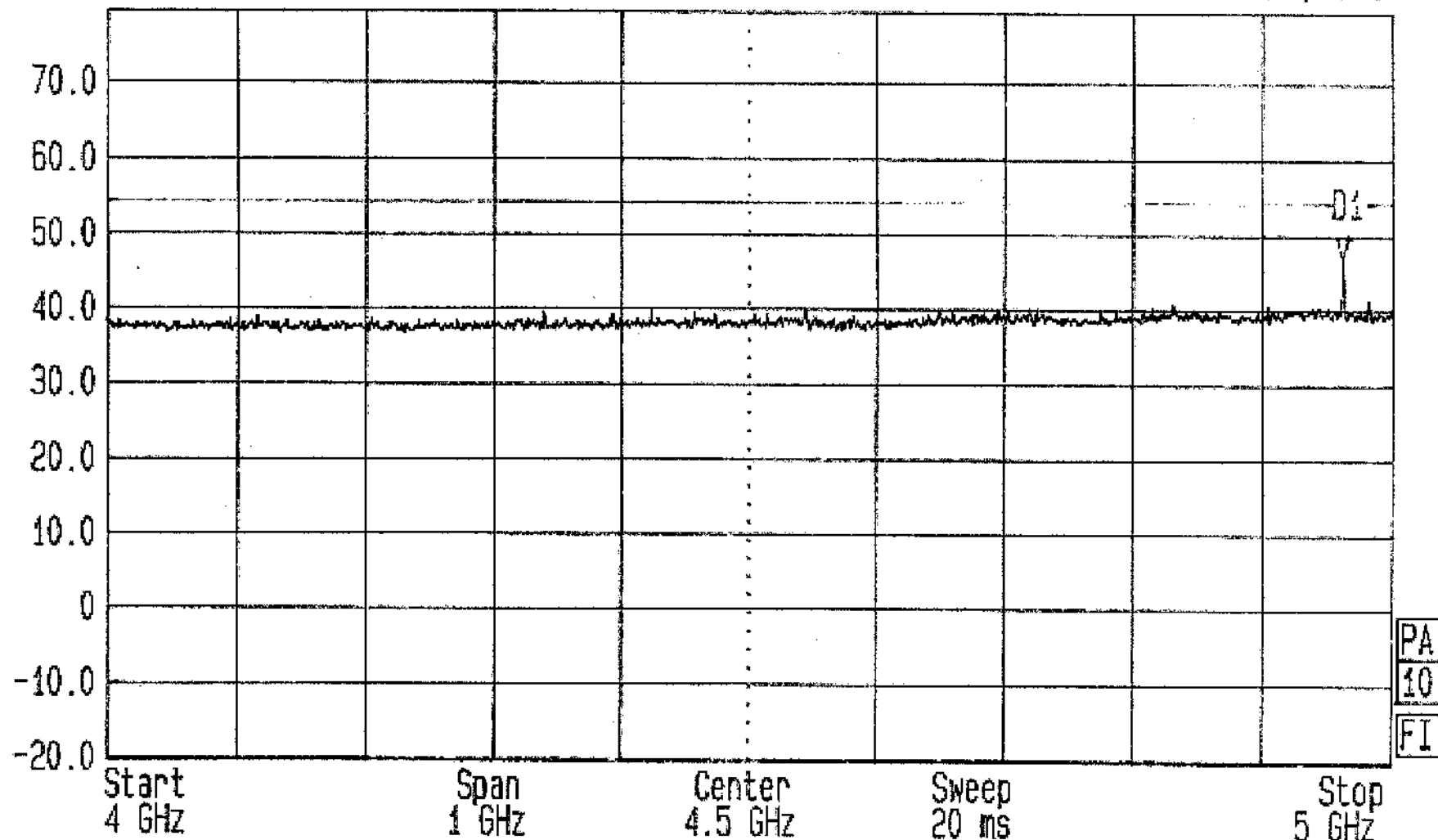
OPCOND : TX TOP CH
 GPH/42493/13/13/008

LVLOFF
 Date 11.Oct.'01 Time 21:54:30
 Ref.Lvl 70.00 dB* Marker 39.10 dB*
 Res.Bw 1 MHz [imp] TG.Lvl off
 CF.Stp 200.000 MHz Vid.Bw 1 MHz
 RF.Att 0 dB
 Unit [dBμV/m]



Spurious Radiated Emissions Test for Red-N By RFI Ltd.
 FCC Part 15.209 ENG:AMT EUT:Bluetooth Module for Visor
 OPCOND : TX TOP CH
 GPH/42493/13/13/012

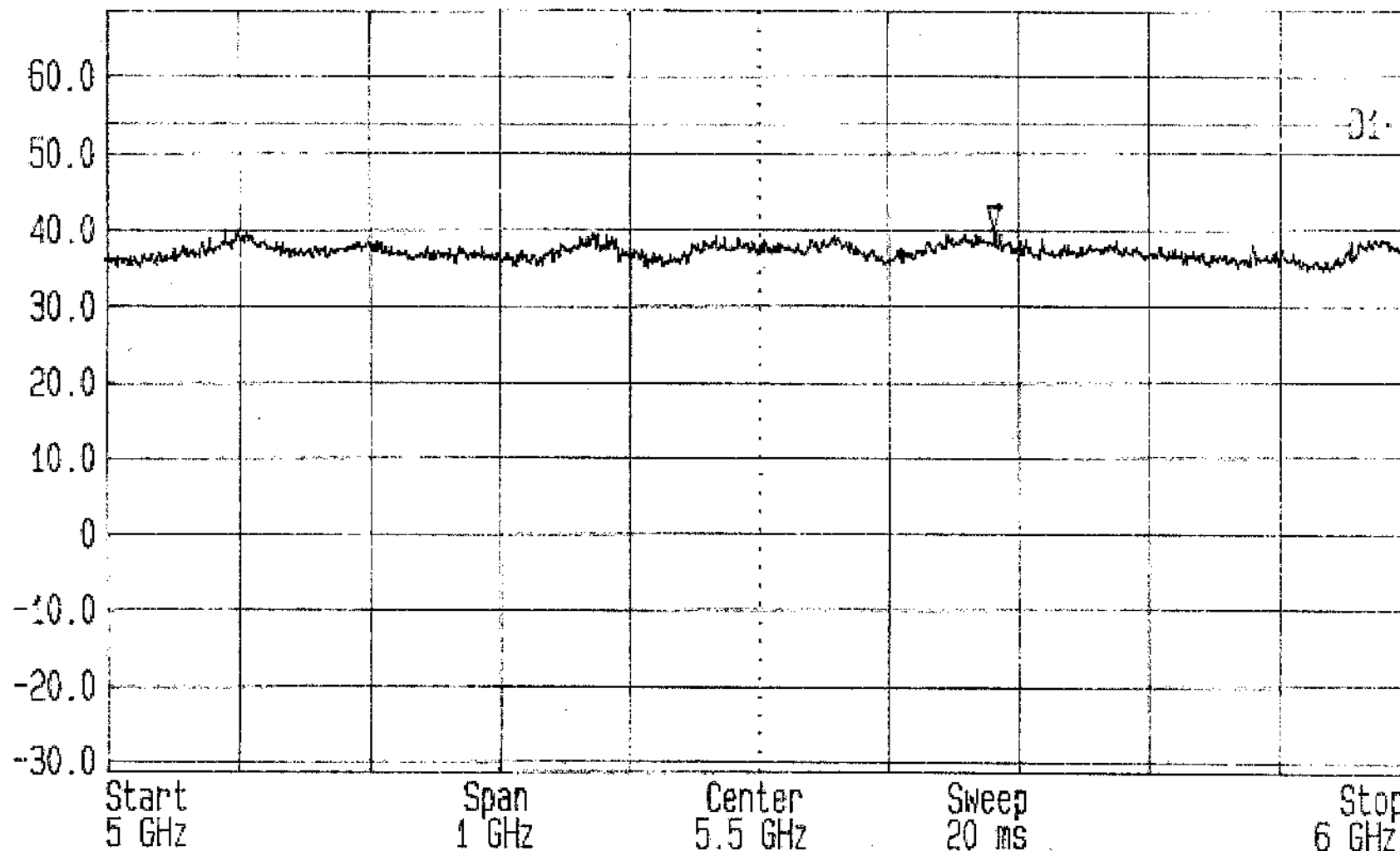
LVLOFF
 Date 11.Oct.'01 Time 23:06:52
 Ref.Lvl 79.50 dBx
 Marker 46.59 dB*
 4.9622 GHz
 Res.Bw 1 MHz [imp]
 TG.Lvl off
 CF.Stp 100.000 MHz
 Vid.Bw 1 MHz
 RF.Att 0 dB
 Unit [dBμV/m]



Spurious Radiated Emissions Test for Red-M By RFI Ltd.
 FCC Part 15.209 ENG:AMT EUT:Bluetooth Module for Visor

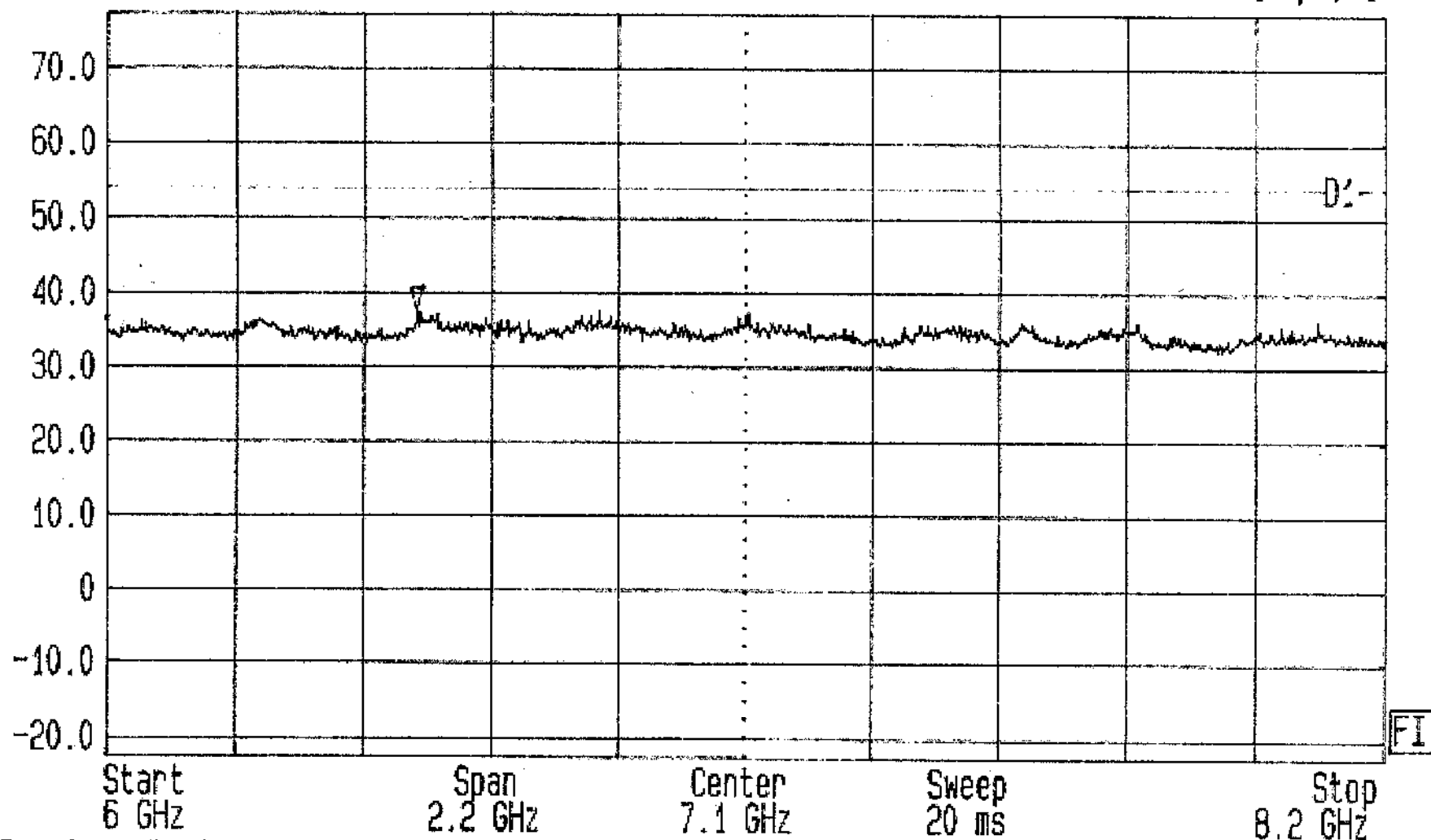
OPCOND : TX TOP CH
 GPH/42493/13/13/016

LVLOFF
 Date 11.Oct.'01 Time 17:18:43
 Ref.Lvl 68.50 dB* Marker 39.94 dB*
 Res.Bw 1 MHz [imp] TG.Lvl off
 CF.Stp 100.000 MHz RF.Att 0 dB
 Unit [dBμV/m]



Spurious Radiated Emissions Test for RED-K by RFI Ltd.
 FCC Part 15.209 ENG: AMT EUT: Bluetooth Module for Visor
 OPCOND: TX TOP CH
 GPH/42493/13/13/020

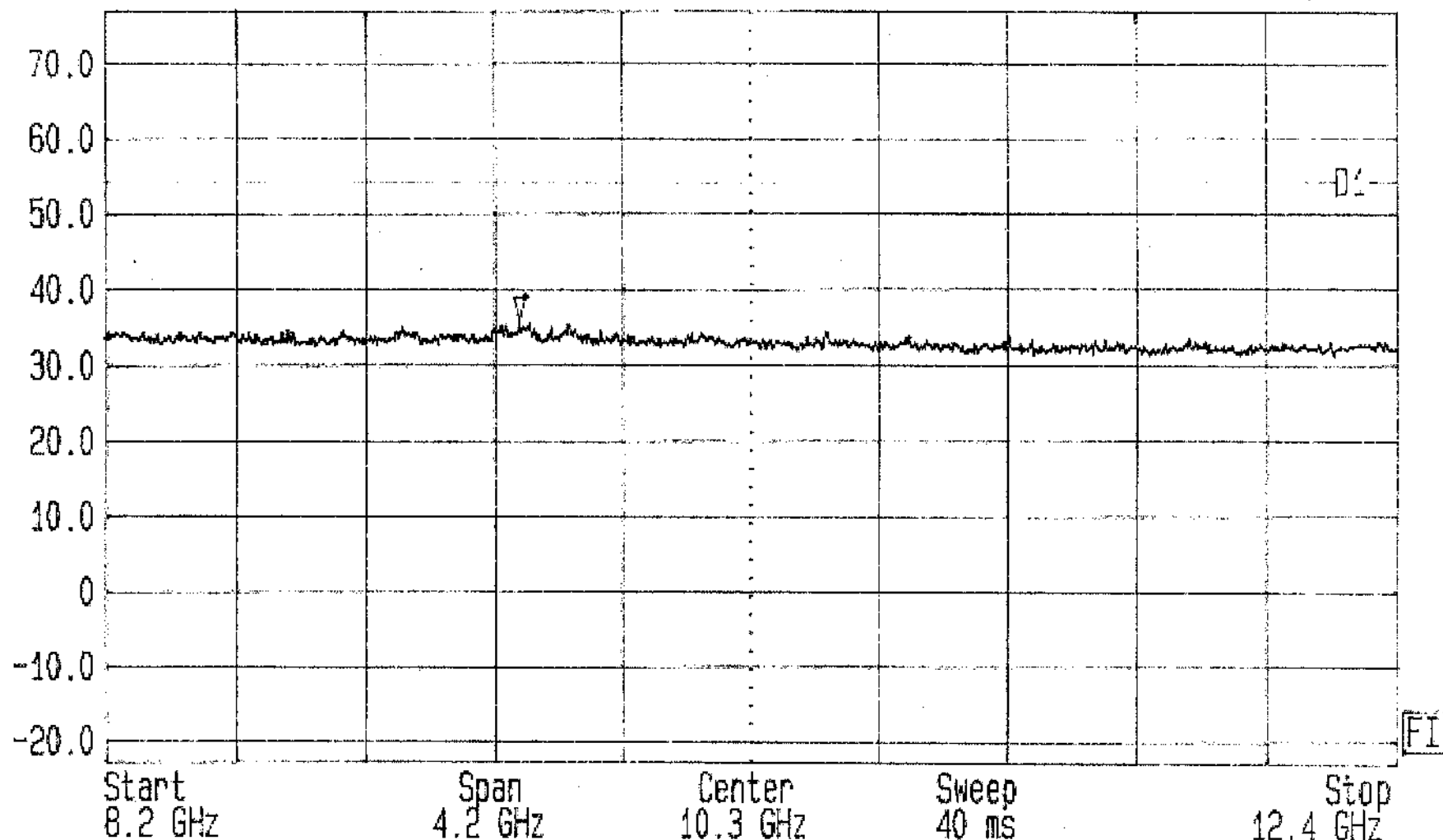
LVLOFF
 Date 12.Oct.'01 Time 14:24:50
 Ref.Lvl 77.50 dB* Marker 37.56 dB*
 Res.Bw 1 MHz [imp] off
 TG.Lvl
 CF.Stp 220.000 MHz
 Vid.Bw 1 MHz
 RF.Att 0 dB
 Unit [dBμV/m]



Spurious Radiated Emissions Test for RED-M by RFI Ltd.
 FCC Part 15.209 ENG: AMT EUT: Bluetooth Module for Visor

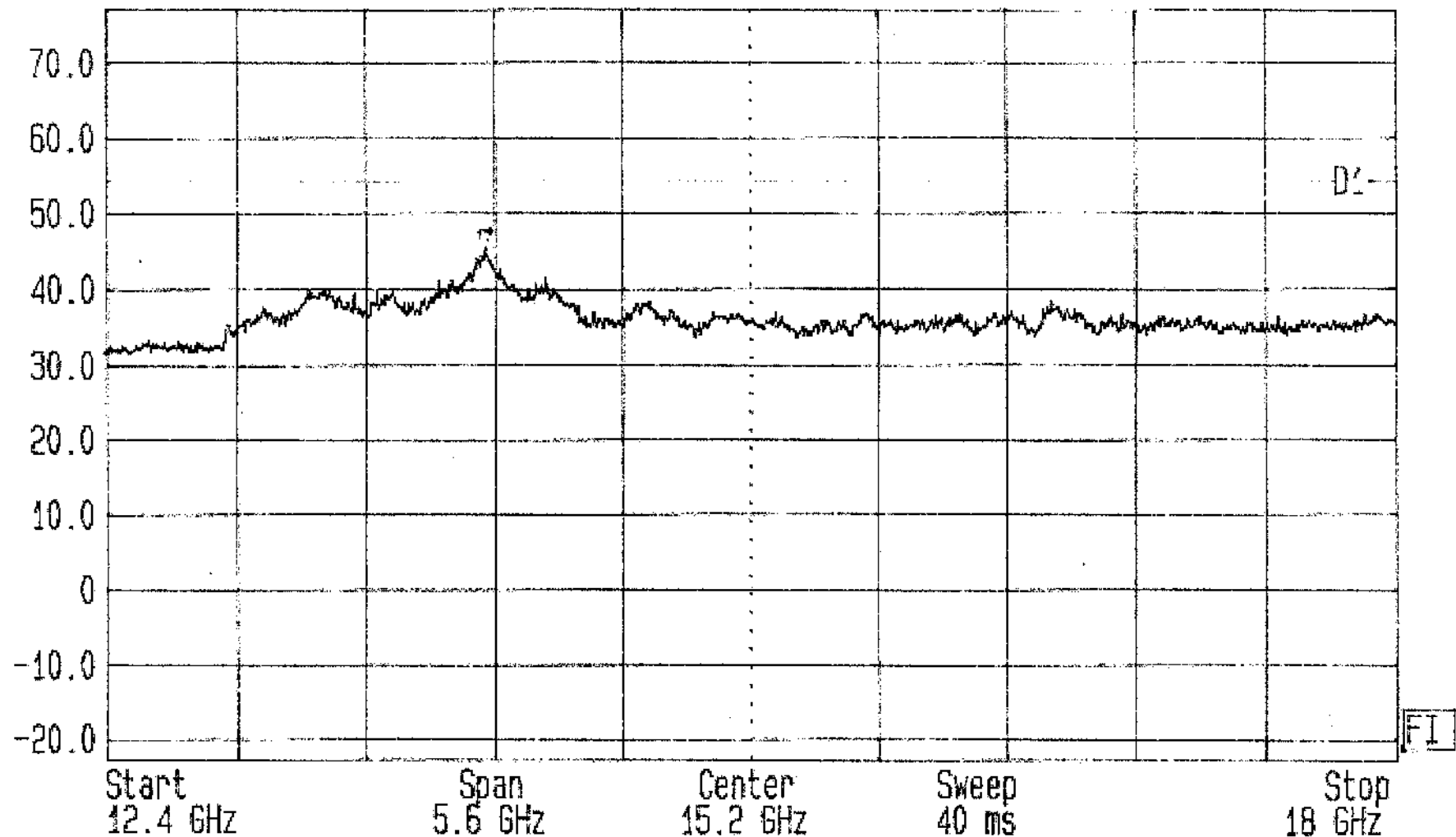
OPCOND: TX TOP CH
 GPH/42493/13/13/024

LVLOFF
 Date 12.Oct.'01 Time 14:31:03
 Ref.Lvl 77.00 dB*
 Marker 35.64 dB*
 9.5440 GHz
 Res.Bw 1 MHz [imp]
 TG.Lvl off
 CF.Stp 420.000 MHz
 Vid.Bw 1 MHz
 RF.Att 0 dB
 Unit [dBpV/m]



Source Radiated Emissions Test for RED-M byRFI Ltd.
 FCC Part 15.209 ENG : AMT EUT : Bluetooth Module for Disc: JCN2 : 11 TOP CH
 Date: 42493, 13/13/025

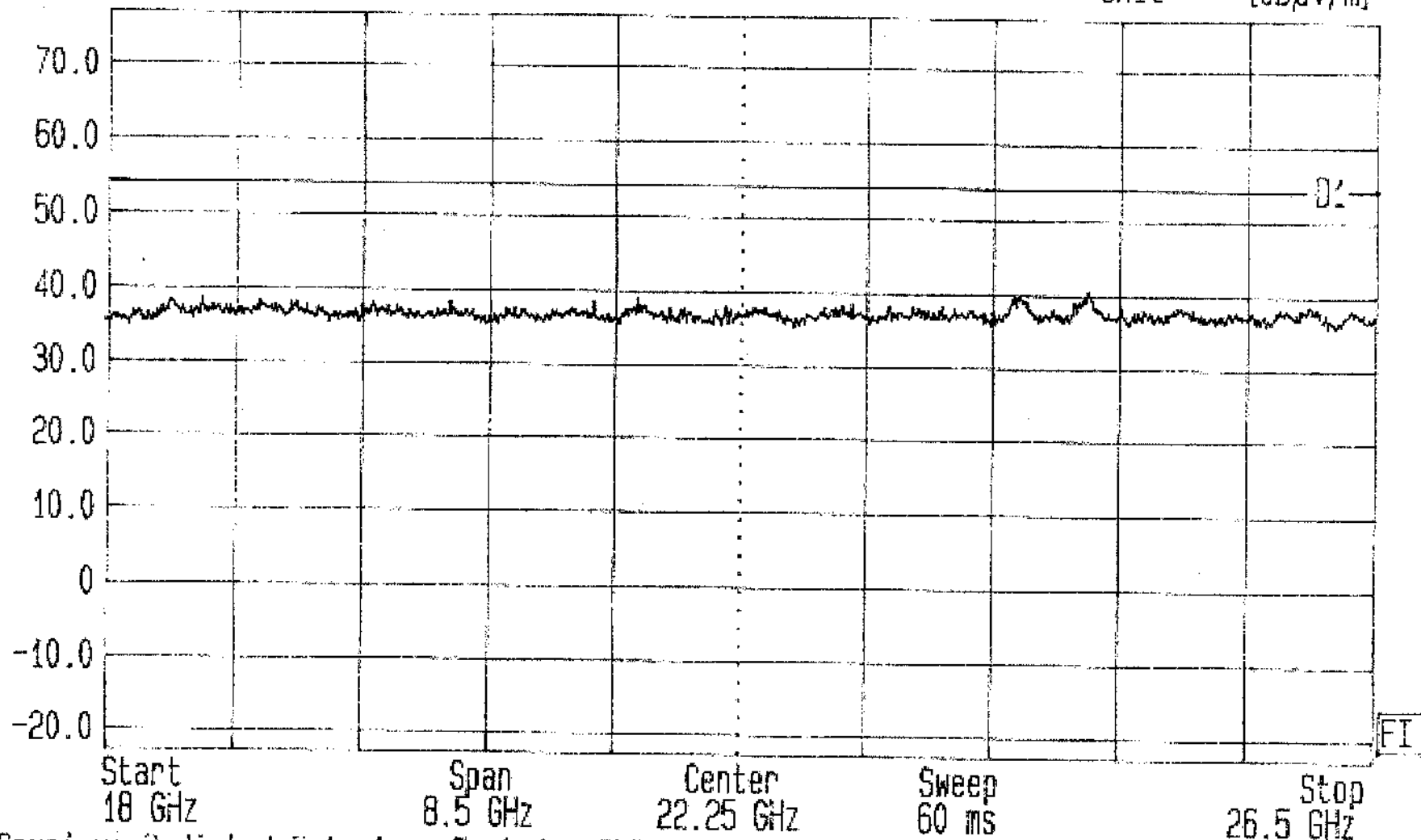
LVLOFF
 Date 12.Oct.'01 Time 15:10:59
 Ref.Lvl 77.00 dB*
 Marker 44.27 dB*
 14.0426 GHz
 Res.Bw 1 MHz [imp]
 IG.Lvl off
 CF.Stp 560.000 MHz
 Vid.Bw 1 MHz
 RF.Att 0 dB
 Unit [dBμV/m]



Spurious Radiated Emissions Test for RED-M by RFI Ltd.
 FCC Part 15.209 ENG: AMT EUT: Bluetooth Module for Visor

OPCOND: TX TOP C1
 GPH/42493/13/13/032

LVLOFF
 Date 12.Oct.'01 Time 15:22:54 Res.Bw 1 MHz [imp] Vid.Bw 1 MHz
 Ref.Lvl 77.00 dB* Marker 40.39 dB* TG.Lvl off
 CF.Stp 24.5922 GHz 850.000 MHz RF.Att 0 dB
 Unit [dBμV/m]



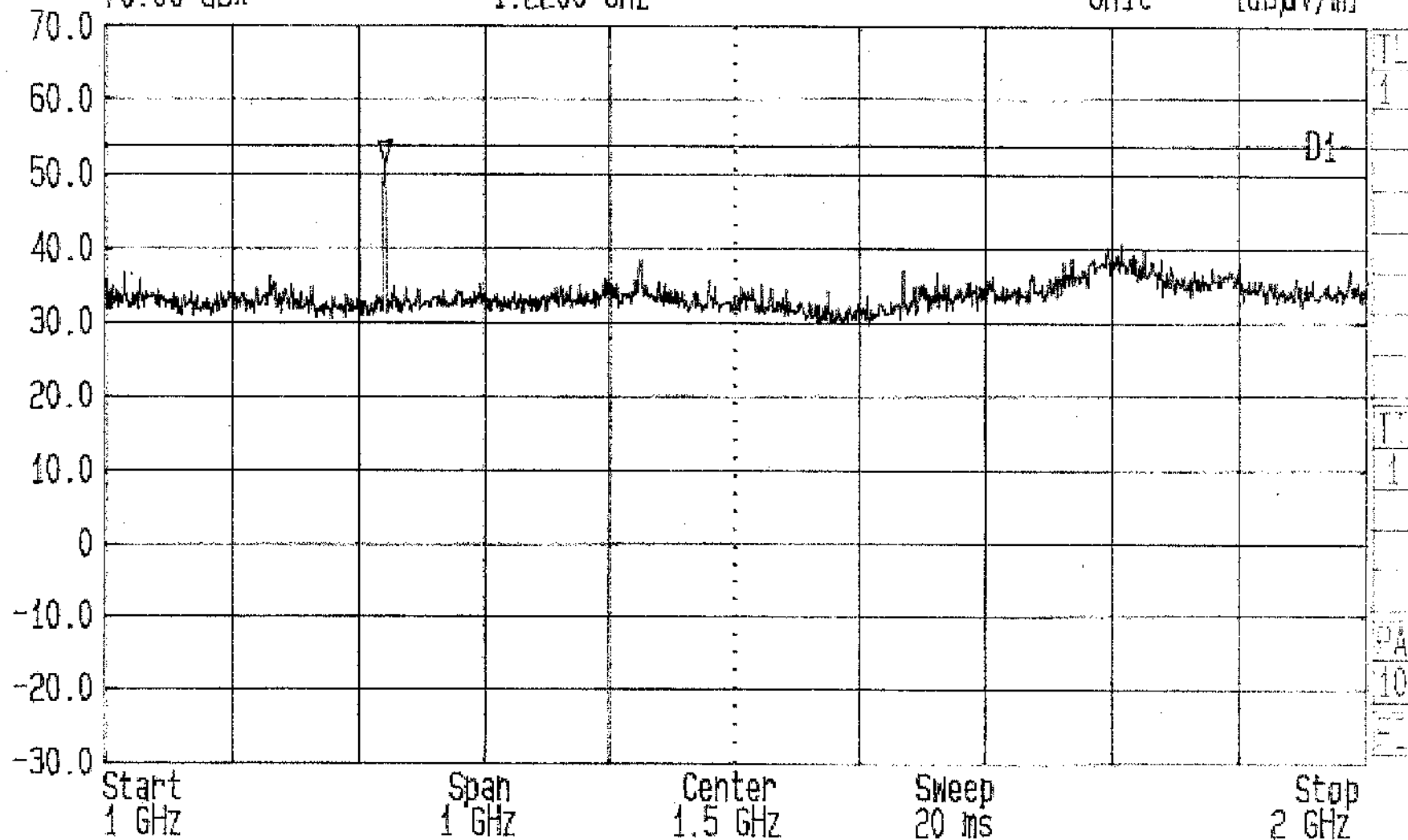
Spurious Radiated Emissions Test for RED-M by RFI Ltd.

FCC Part 15.209 ENG: AMT EUT: Bluetooth Module for Visor

OPCOND: TX TOP CH
 GRN: 42493, 13, 13, 033

LVLOFF
Date 11.Oct.'01 Time 20:35:39
Ref.Lvl 70.00 dBx
Marker 51.19 dBx
1.2200 GHz

Res.Bw 1 MHz [imp]
TG.Lvl off
CF.Stp 100.000 MHz
Vid.Bw 1 MHz
RF.Att 0 dB
Unit [dBμV/m]

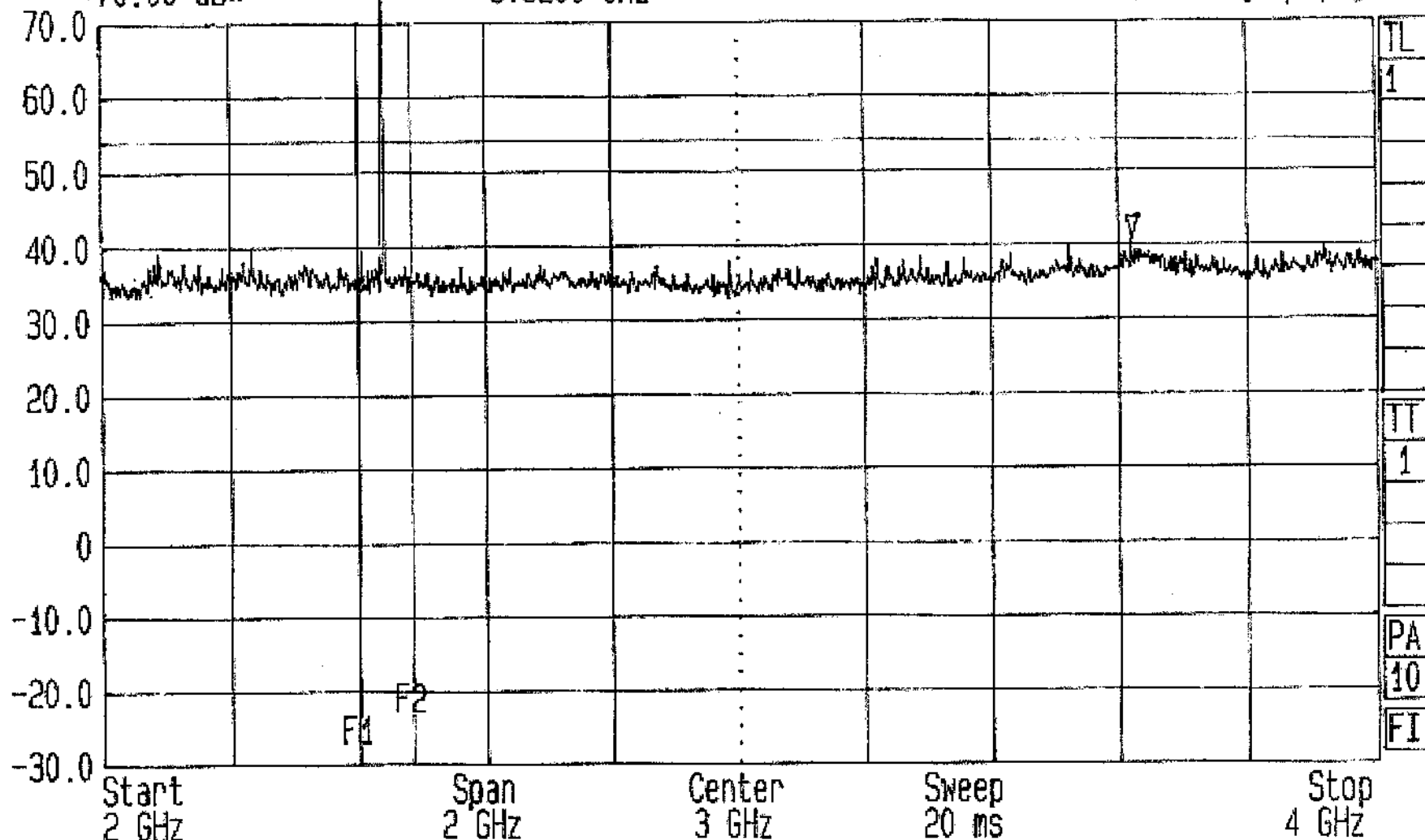


Spurious Radiated Emissions Test for Red-M By RFI Ltd.
FCC Part 15.209 ENG: AMT EUT: Bluetooth Module for Visor

OPCOND : TX MIDDLE CH
GPH/42493/13/13/007

LVLOFF
 Date 11.Oct.'01 Time 21:48:58
 Ref.Lvl 70.00 dB*
 Marker 40.60 dB*
 3.6200 GHz

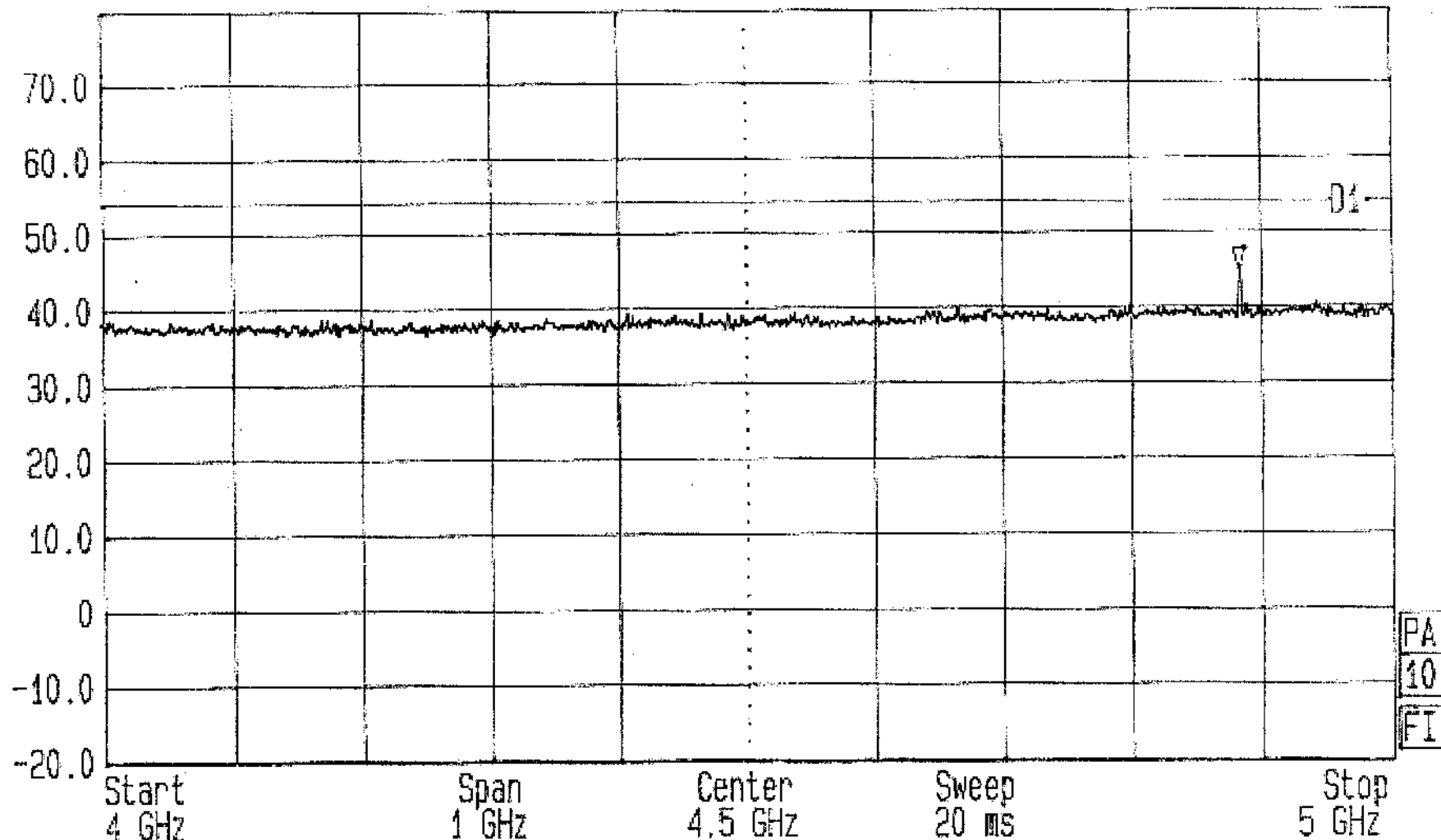
Res.Bw 1 MHz [imp]
 TG.Lvl off
 CF.Stp 200.000 MHz
 Vid.Bw 1 MHz
 RF.Att 0 dB
 Unit [dBμV/m]



Spurious Radiated Emissions Test for Red-M By RFI Ltd.
 FCC Part 15.209 ENG:AMT EUT:Bluetooth Module for Visor

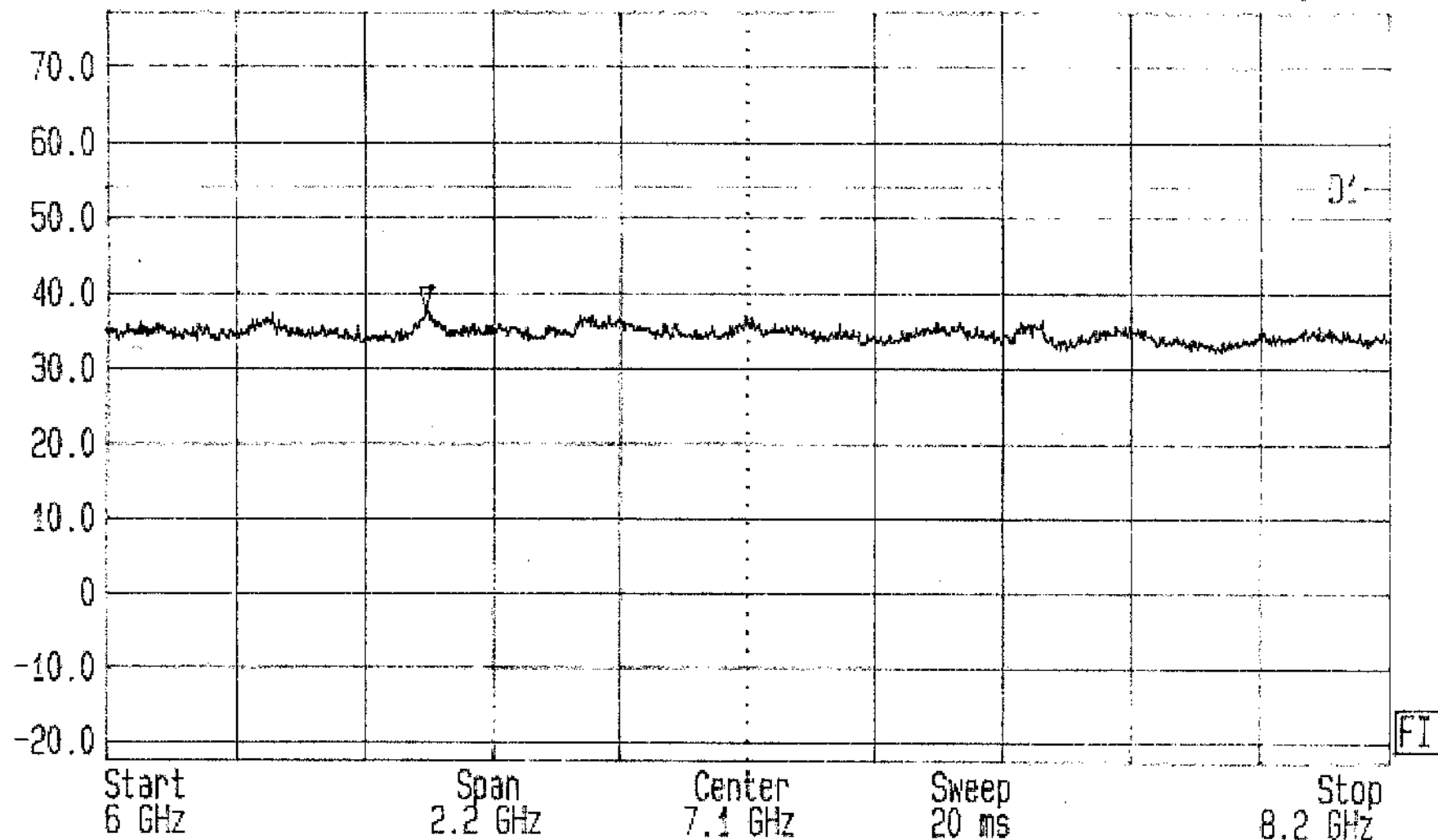
OPCOND : TX MIDDLE CH
 GPH/42493/13/13/011

LVLOFF
 Date 11.Oct.'01 Time 22:52:57
 Ref.Lvl 79.50 dB*
 Marker 44.72 dB*
 4.8833 GHz
 Res.Bw 1 MHz [imp]
 TG.Lvl off
 CF.Stp 100.000 MHz
 Vid.Bw 1 MHz
 RF.Att 0 dB
 Unit [dBμV/m]



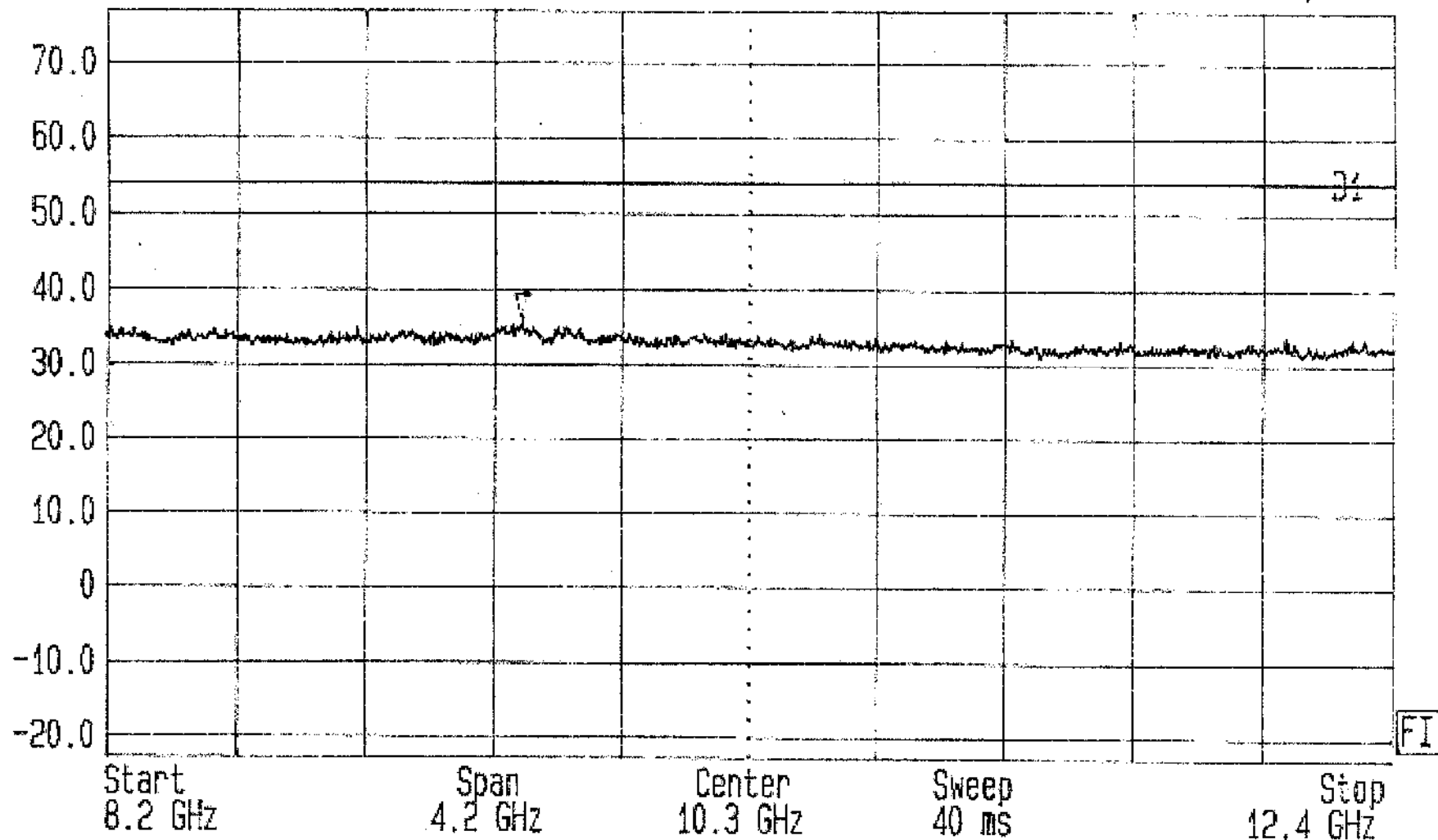
Spurious Radiated Emissions Test for Red-M By RFI Ltd.
 FCC Part 15.209 ENG: AMT EUT: Bluetooth Module for Visor
 OPCOND : TX MIDDLE CH
 GPH/42493/13/13/015

LVLOFF
 Date 12.Oct.'01 Time 14:19:10
 Ref.Lvl 77.50 dB* Marker 37.76 dB*
 6.5451 GHz
 Res.Bw 1 MHz [imp]
 TG.Lvl off
 CF.Stp 220.000 MHz
 Vid.Bw 1 MHz
 RF.Att 0 dB
 Unit [dBμV/m]



Spurious Radiated Emissions Test for RED-M by RFI Ltd.
 FCC Part 15.209 ENG : AMT EUT : Bluetooth Module for Visor
 OPCOND : TX MIDDLE CH
 GPV/42493/13/13/023

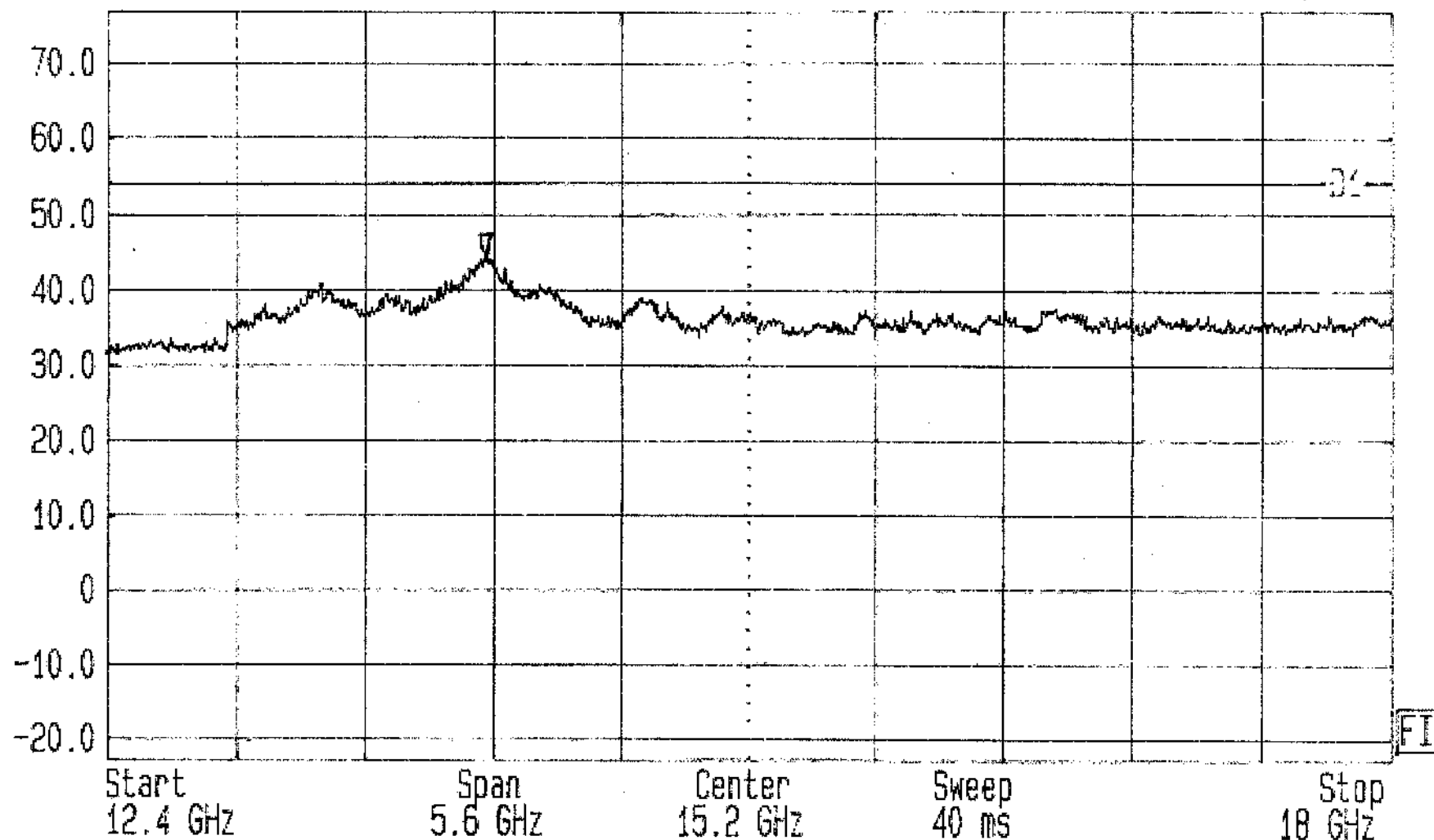
LVLOFF
 Date 12.Oct.'01 Time 14:35:47
 Ref.Lvl 77.00 dB*
 Marker 36.38 dB*
 9.5533 GHz
 Res.Bw 1 MHz [imp]
 TG.Lvl off
 CF.Stp 420.000 MHz
 Vid.Bw 1 MHz
 RF.Att 0 dB
 Unit [dBμV/m]



Spurious Radiated Emissions Test for RED-M by RFI Ltd.
 FCC Part 15.209 ENG : AMT EUT : Bluetooth Module for Visor

OPCOND : TX MIDDLE CH
 GPR 42493, 13/13/026

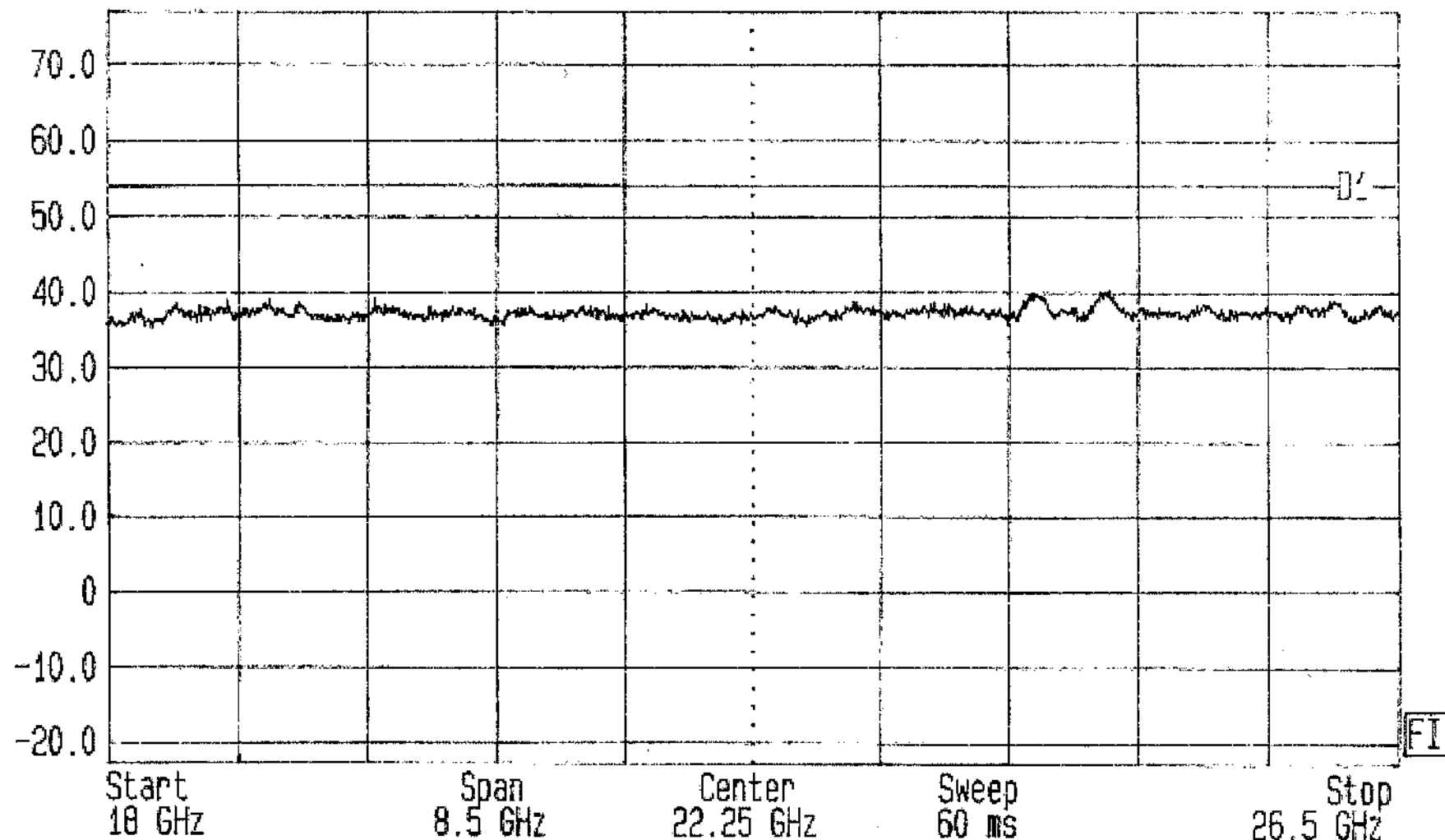
LVLOFF
 Date 12.Oct.'01 Time 15:06:32
 Ref.Lvl 77.00 dBx
 Marker 44.09 dBx
 14.0426 GHz
 Res.Bw 1 MHz [imp]
 TG.Lvl off
 CF.Stp 560.000 MHz
 Vid.Bw 1 MHz
 RF.Att 0 dB
 Unit [dBμV/m]



Spurious Radiated Emissions Test for RED-X by RFI Ltd.
 FCC Part 15.209 EMI : ANT EUT : Bluetooth Module for Visor

OPCOND : TX MIDDLE CH
 0.45/42493/13/13/031

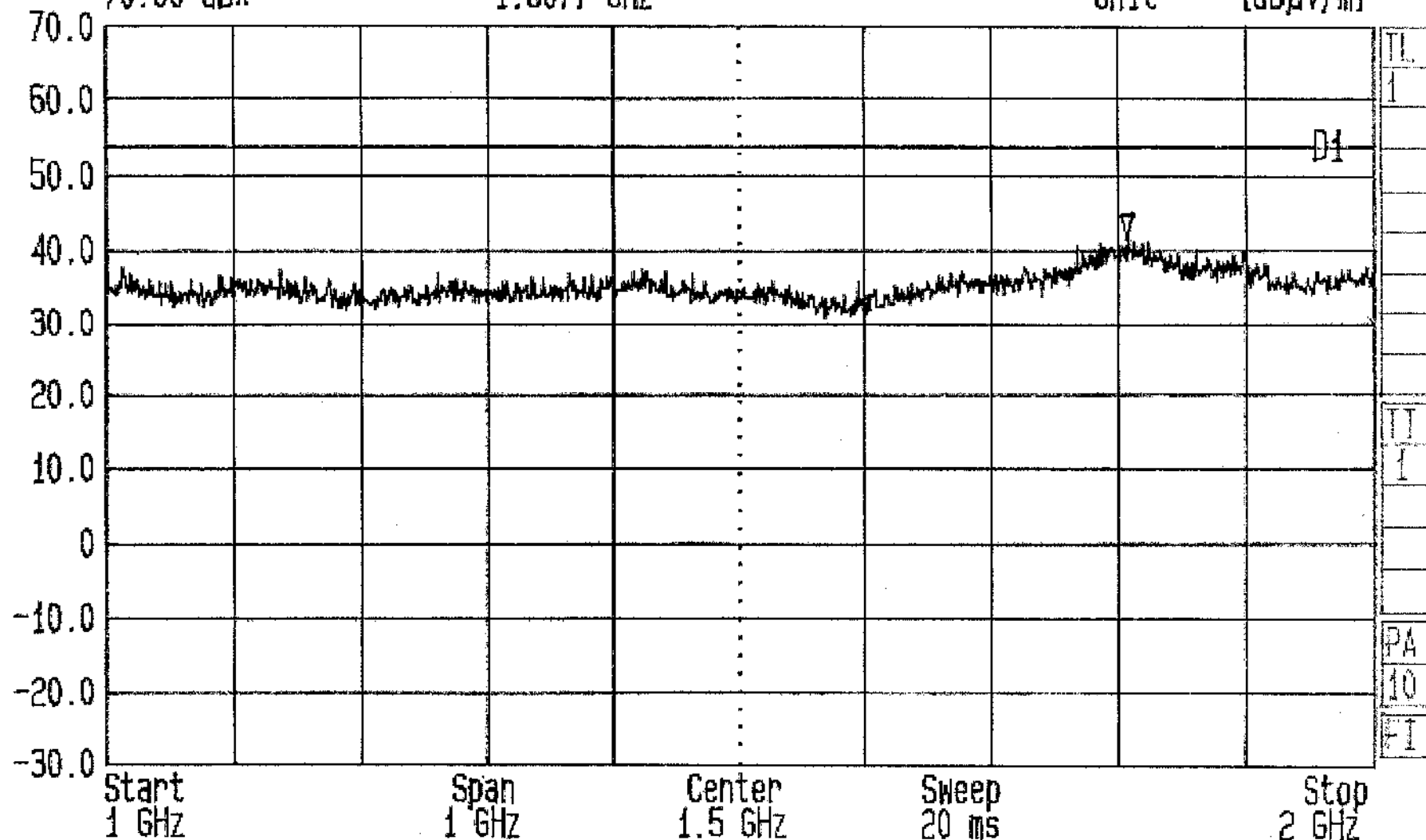
LVLOFF
 Date 12.Oct.'01 Time 15:38:18
 Ref.Lvl 77.00 dB*
 Marker 39.63 dB*
 24.5827 GHz
 Res.Bw 1 MHz [imp]
 TG.Lvl off
 CF.Stp 850.000 MHz
 Vid.Bw 1 MHz
 RF.Att 0 dB
 Unit [dBμV/m]



Spurious Radiated Emissions Test for Red-M By RFI Ltd.
 FCC Part 15.209 ENG: AMT EUT: Bluetooth Module for Visor
 OPCOND : TX MIDDLE CH
 GPH/42493/13/13/034

LVLOFF
Date 11.Oct.'01 Time 20:54:08
Ref.Lvl 70.00 dBx
Marker 41.77 dB*
1.8077 GHz

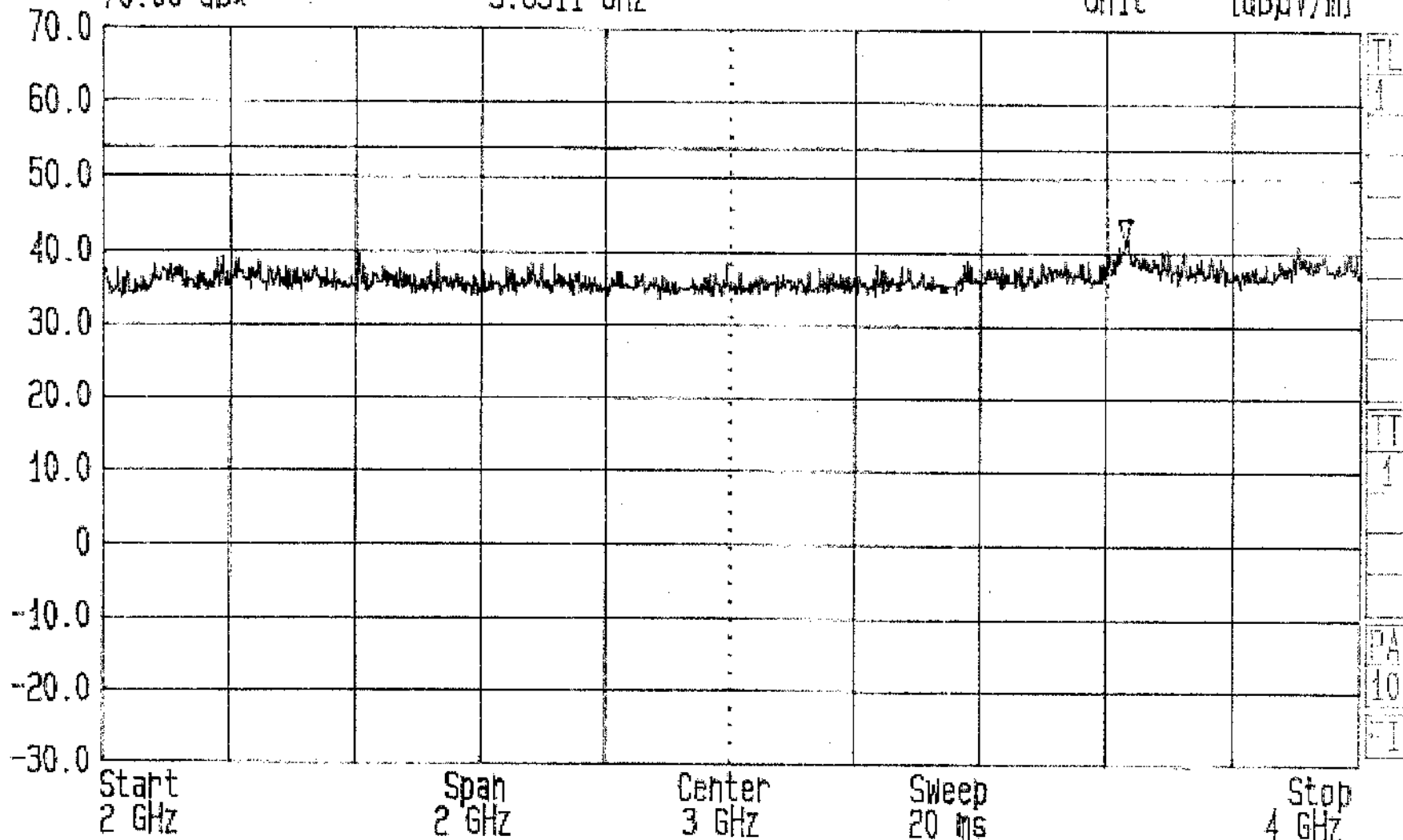
Res.BW 1 MHz [imp]
TG.Lvl off
CF.Stp 100.000 MHz
Vid.BW 1 MHz
RF.Att 0 dB
Unit [dBμV/m]



Spurious Radiated Emissions Test for Red-M By RFI Ltd.
FCC Part 15.109 ENG: AMT EUT: Bluetooth Module for Visor

OPCOND : RX Mode
GPH/42493/13/13/005

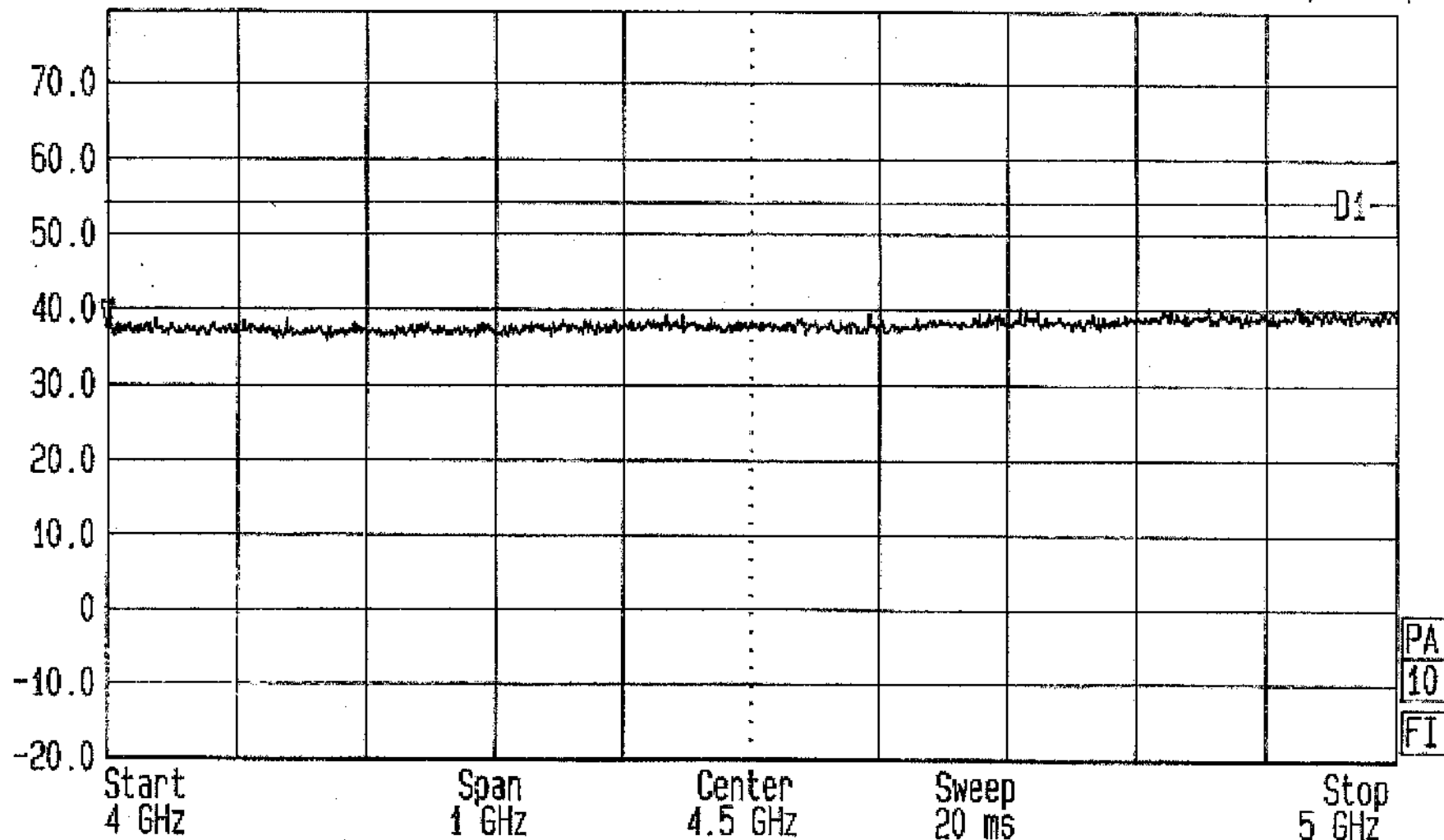
LVLOFF
 Date 11.Oct.'01 Time 21:03:13
 Ref.Lvl 70.00 dBx
 Marker 41.34 dBx
 3.6311 GHz
 Res.Bw 1 MHz [imp]
 TG.Lvl off
 CF.Stp 200.000 MHz
 Vid.Bw 1 MHz
 RF.Att 0 dB
 Unit [dBμV/m]



Spurious Radiated Emissions Test for Red-M By RFI Ltd.
 FCC Part 15.109 ENG: AMT EUT: Bluetooth Module for Visor

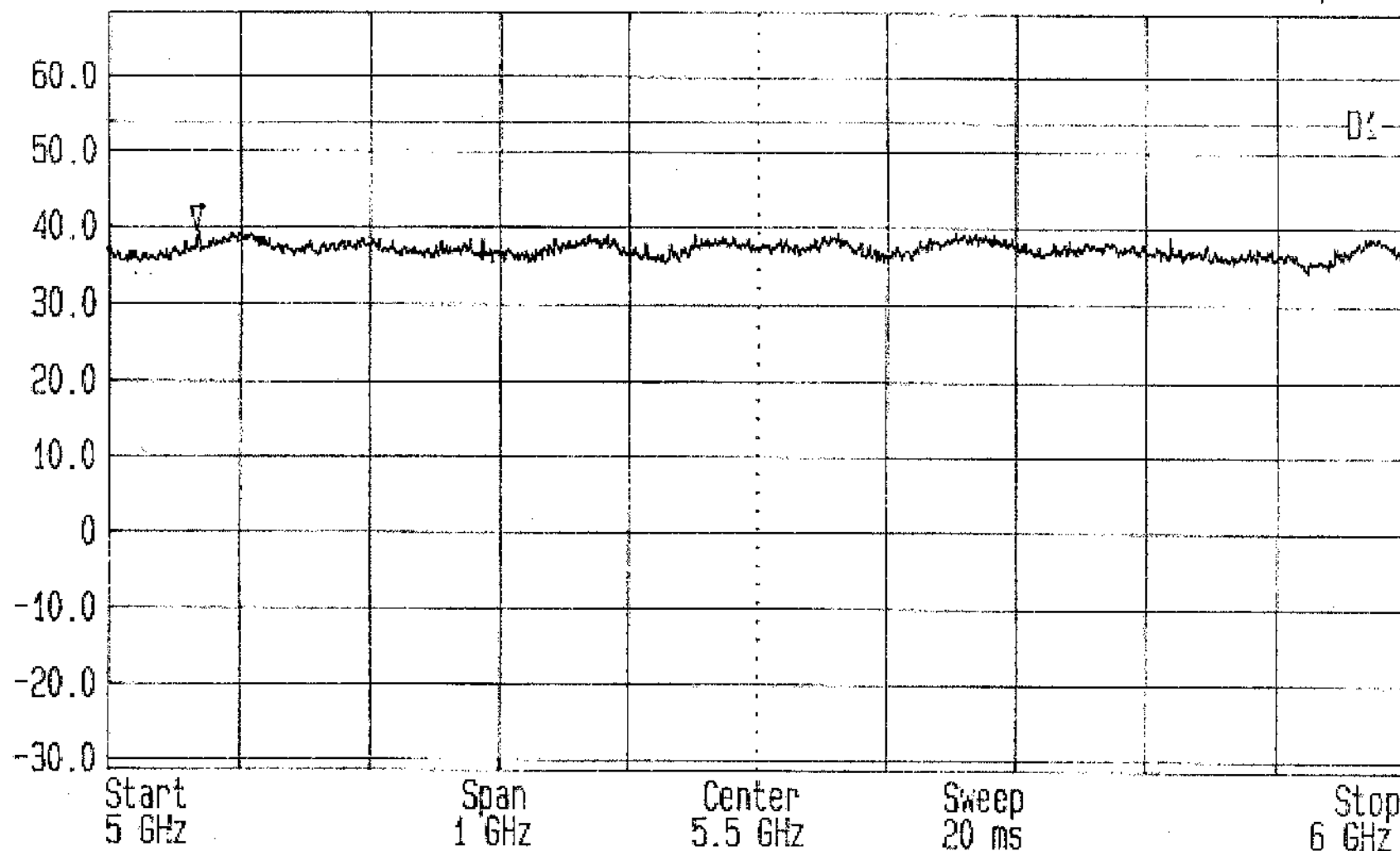
OPCOND : RX Mode
 GPH/42493/13/13/009

LVLOFF
 Date 11.Oct.'01 Time 22:34:14
 Ref.Lvl 79.50 dB*
 Marker 37.61 dB*
 4.0000 GHz
 Res.Bw 1 MHz [imp]
 TG.Lvl off
 CF.Stp 100.000 MHz
 Vid.Bw 1 MHz
 RF.Att 0 dB
 Unit [dBμV/m]



Spurious Radiated Emissions Test for Red-M By RFI Ltd.
 FCC Part 15.109 ENG: AMT EUT: Bluetooth Module for Visor
 OPCOND : RECIEVE MODE
 GPH/42493/13/13/013

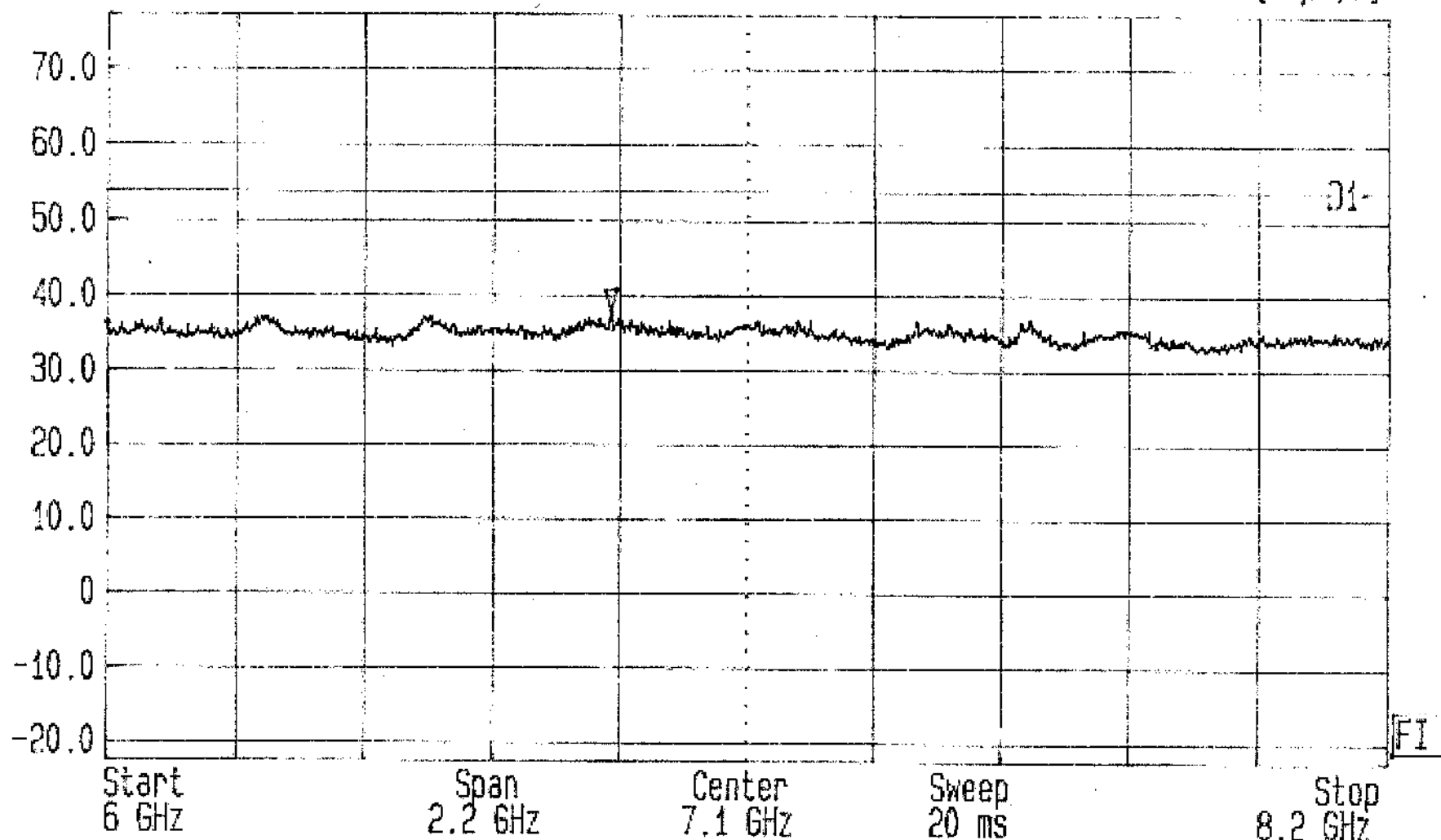
LVLOFF
 Date 11.Oct.'01 Time 17:02:06
 Ref.Lvl 68.50 dBx
 Marker 39.48 dBx
 5.0677 GHz
 Res.Bw 1 MHz [imp]
 TG.Lvl off
 CF.Stp 100.000 MHz
 Vid.Bw 1 MHz
 RF.Att 0 dB
 Unit [dBμV/m]



Spurious Radiated Emissions Test for RED-M by RFI Ltd.
 FCC Part 15.109 ENG: AMT EUT: Bluetooth Module for Visor
 OPCOND: RX MODE
 GPH/42493/13/13/017

LVLOFF
Date 12.Oct.'01 Time 14:05:04
Ref.Lvl 77.50 dB*
Marker 37.97 dB*
6.8653 GHz

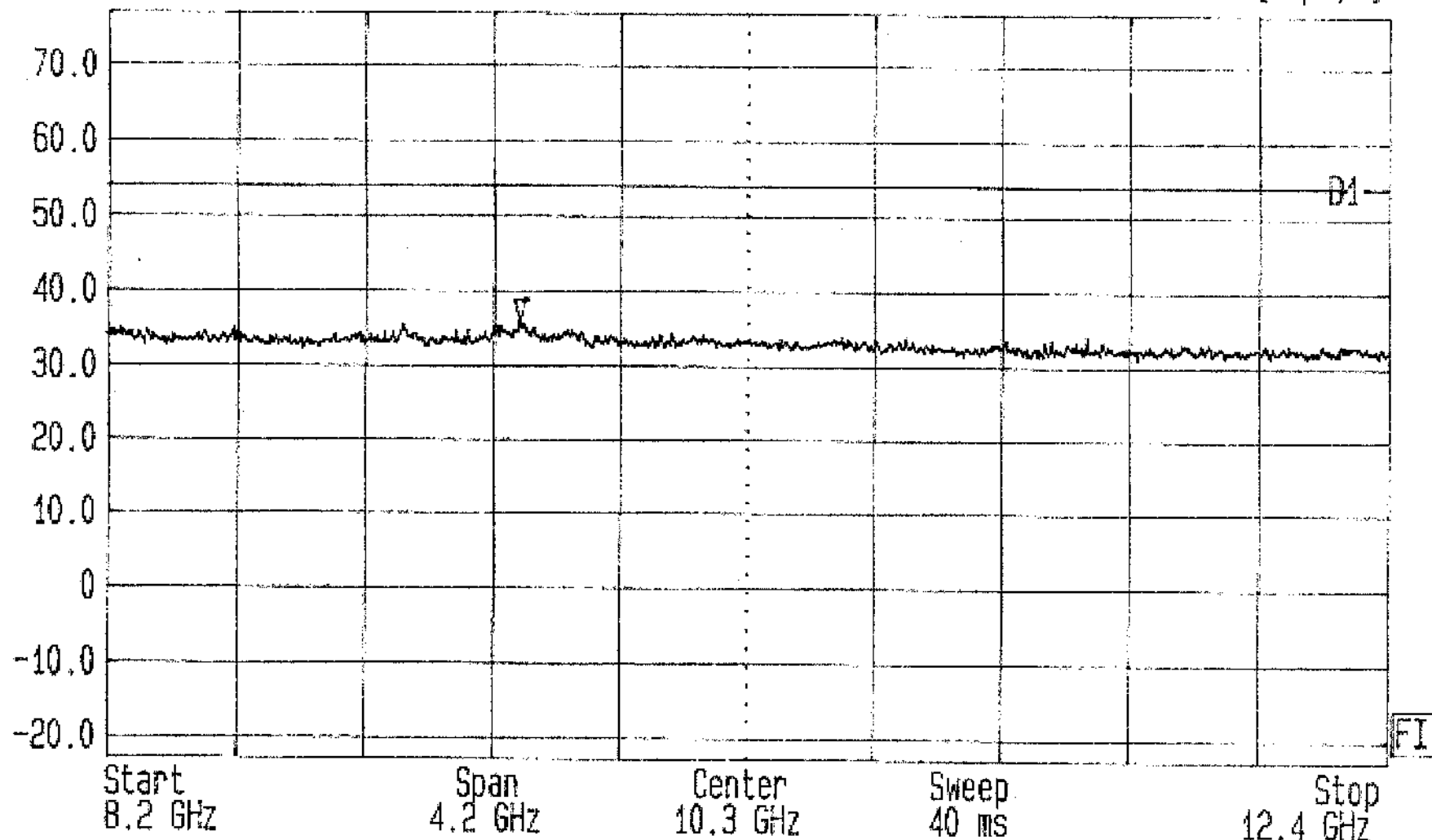
Res.Bw 1 MHz [imp]
Vid.Bw 1 MHz
off
CF.Stp 220.000 MHz
RF.Att 0 dB
Unit [dBμV/m]



Spurious Radiated Emissions Test for RED-M byRFI Ltd.
FCC Part15.109 ENG : AMT EUT : Bluetooth Module for Visor

OPCOND : RX MODE
GPH/42493/13/13/021

LVLOFF
 Date 12.Oct.'01 Time 14:47:53
 Ref.Lvl 77.00 dB* Marker 35.77 dB*
 Res.Bw 1 MHz [imp] TG.Lvl off
 CF.Stp 420.000 MHz Vid.Bw 1 MHz
 RF.Att 0 dB
 Unit [dBμV/m]

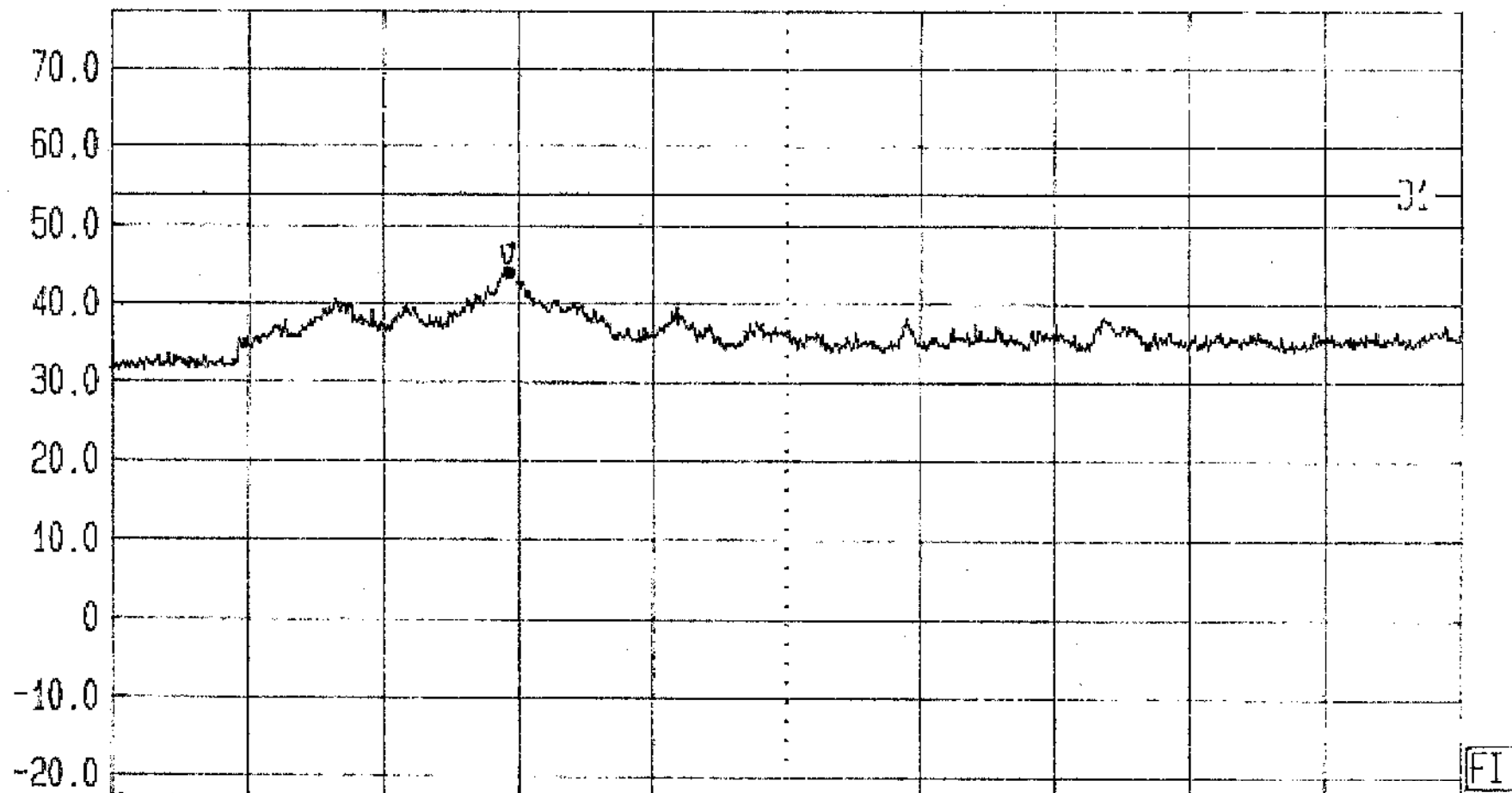


Spurious Radiated Emissions Test for RED-W by RFI Ltd.
 FCC Part15.109 ENG : AMT EUT : Bluetooth Module for Visor

OPCOND : RX MODE
 GPH/42493/13/13/028

LVLOFF
 Date 12.Oct.'01 Time 14:53:28
 Ref.Lvl 77.00 dBx
 Marker 44.50 dBx
 14.0302 GHz

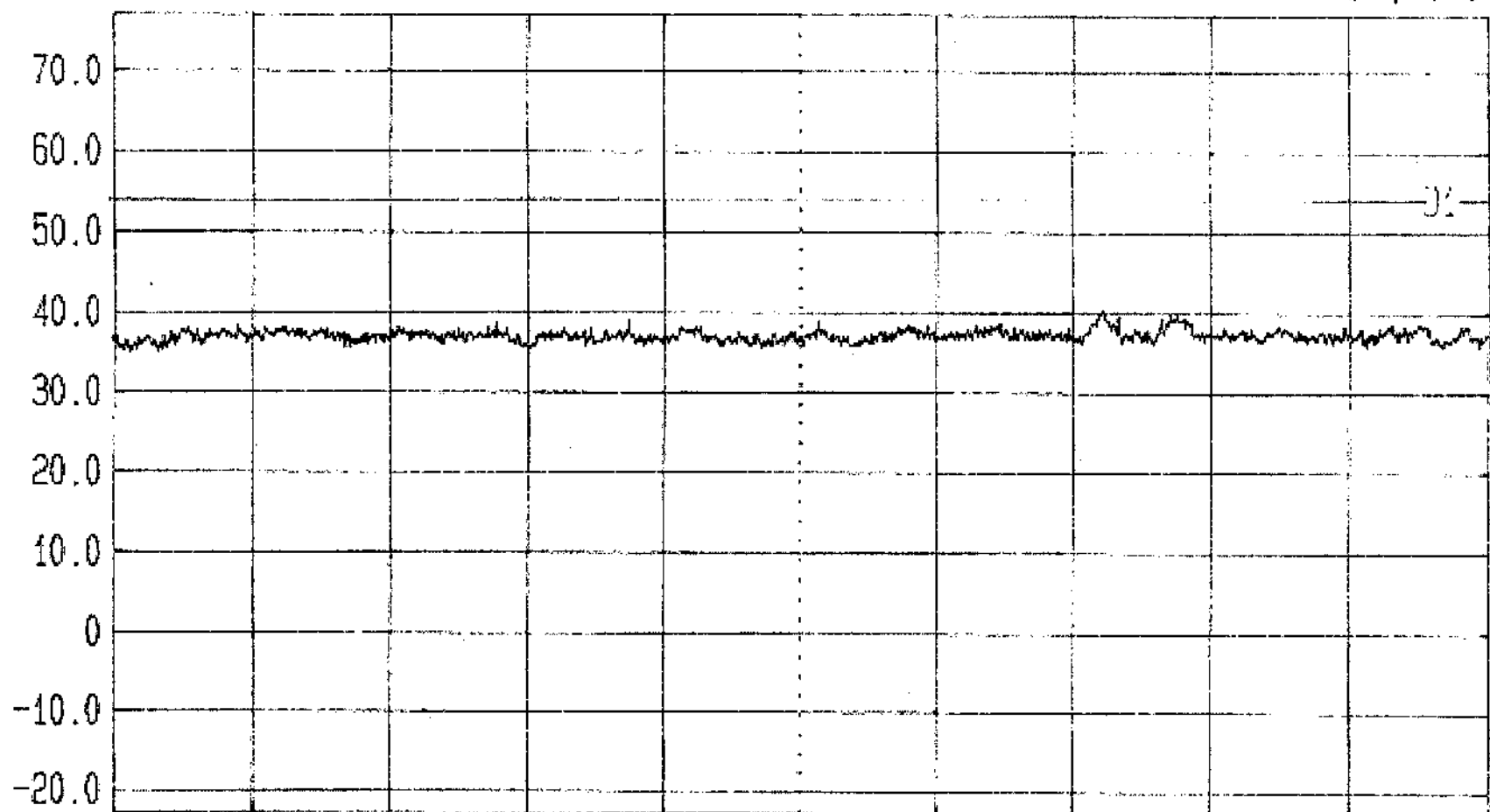
Res.Bw 1 MHz [imp]
 T6.Lvl off
 CF.Stp 560.000 MHz
 Vid.Bw 1 MHz
 RF.Att 0 dB
 Unit [dBμV/m]



Start 12.4 GHz Span 5.6 GHz Center 15.2 GHz Sweep 40 ms Stop 18 GHz
 Spurious Radiated Emissions Test for R&D by HFI Ltd.
 ACC Part 15.109 H5: APT EUT: Bluetooth Module for Visor
 SPCONS: HX Mode
 Date: 12.10.01, 13.10.01, 13.10.02

FI

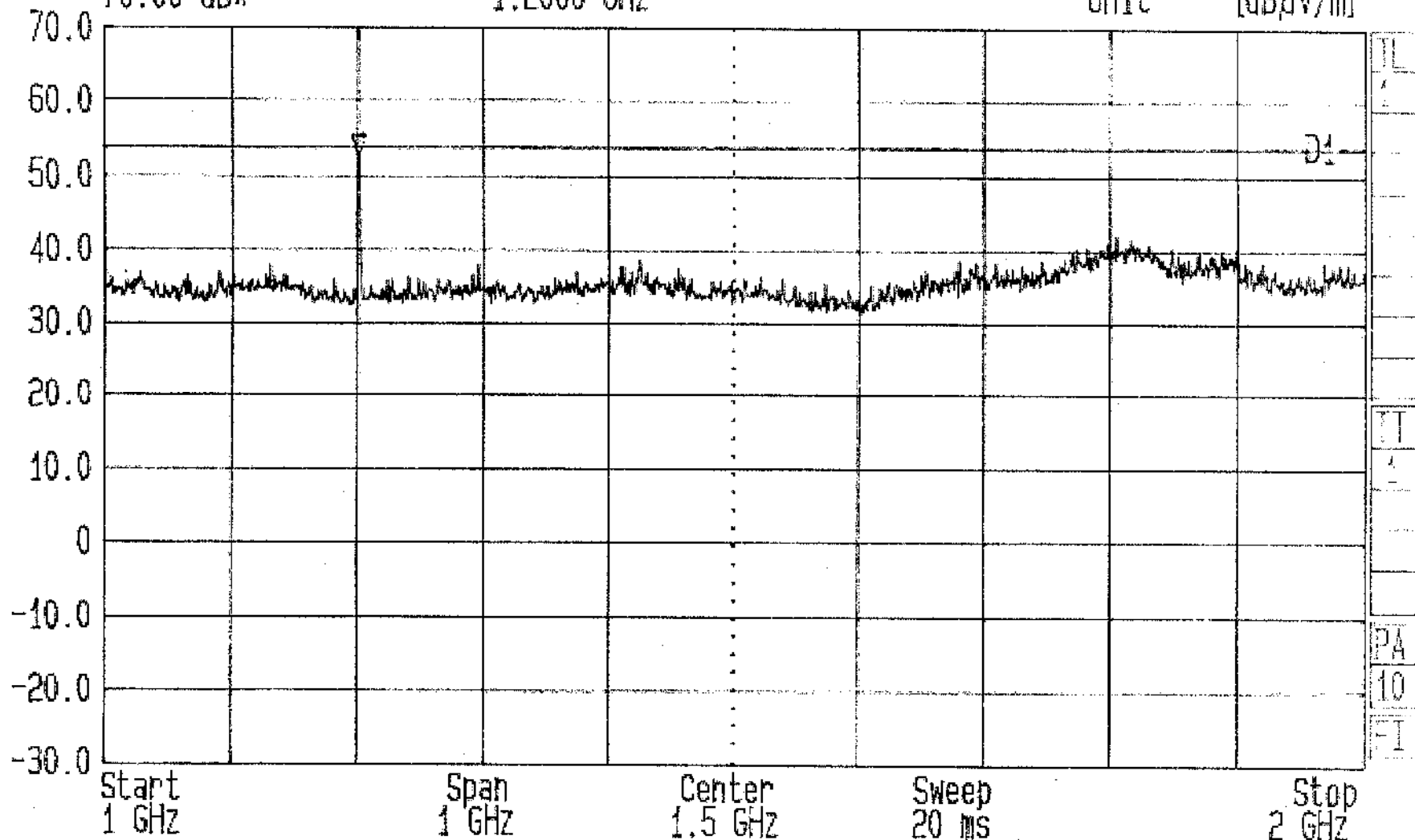
LVLOFF 12.0dB*01 Time 15:41:22 Res.Bw 1 MHz [imp] Vid.Bw 1 MHz
 Ref.Lvl 77.00 dB* Marker 40.29 dB* TG.Lvl off CF.Stp 850.000 MHz RF.Att 0 dB
 Unit [dBμV/m]



Start 18 GHz Span 8.5 GHz Center 22.25 GHz Sweep 60 ms Stop 26.5 GHz

Spurious Radiated Emissions Test for RED-K by RFI Ltd. OPCOND : RX MODE
 FCC Part 15.249 ENG : ANT EUT : Bluetooth Module for Visor GPH/42493/13/13/036

LVLOFF
 Date 11.Oct.'01 Time 20:23:49
 Ref.Lvl 70.00 dB* Marker 52.38 dB*
 Res.Bw 1 MHz [imp] TG.Lvl off
 CF.Stp 100.000 MHz RF.Att 0 dB
 Unit [dBuV/m]

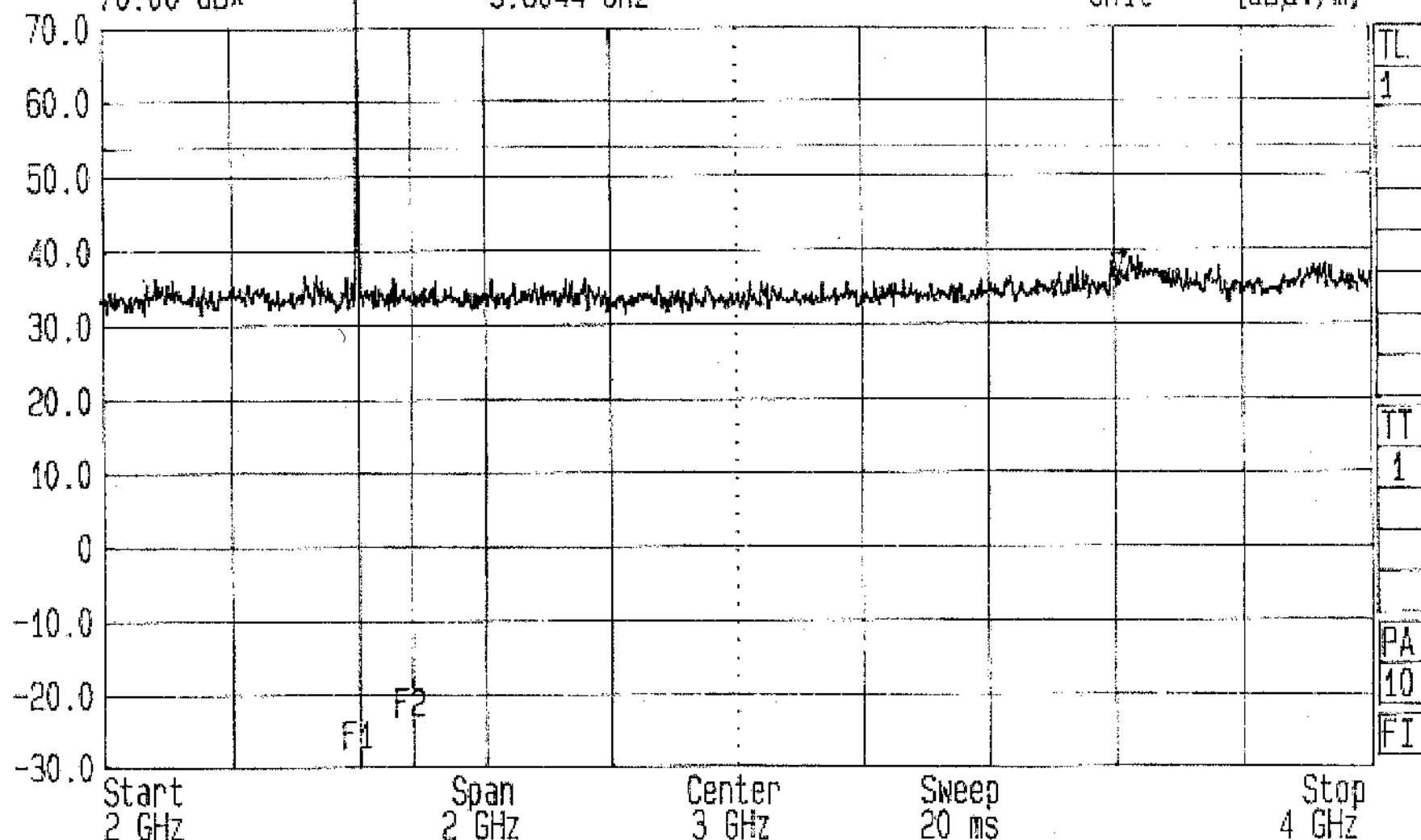


Spurious Radiated Emissions Test for Red-M By RFI Ltd.
 FCC Part 15.209 ENG: AMT EUT: Bluetooth Module for Visor

OPCOND : TX LOWER CH
 GPH/42493/13/13/006

LVLOFF
Date 11.Oct.'01 Time 21:44:46
Ref.Lvl 70.00 dB*
Marker 36.43 dB*
3.6044 GHz

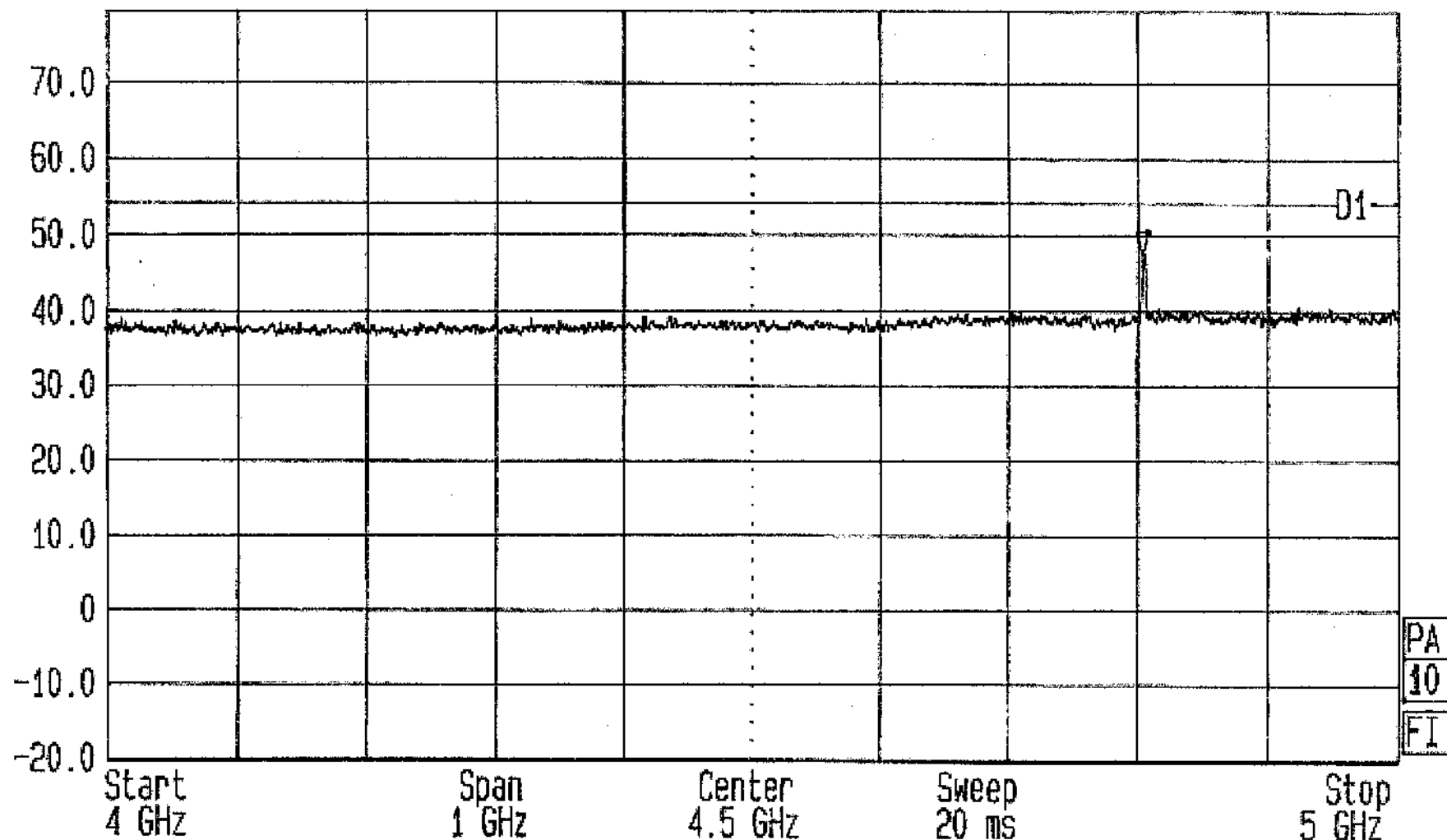
Res.Bw 1 MHz [imp]
T6.Lvl off
CF.Stp 200.000 MHz
Vid.Bw 1 MHz
RF.Att 0 dB
Unit [dBμV/m]



Spurious Radiated Emissions Test for Red-M By RFI Ltd.
FCC Part 15.209 ENG:AMT EUT:Bluetooth Module for Visor

OPCOND: TX LOW CH
GPH/42493/13/13/010

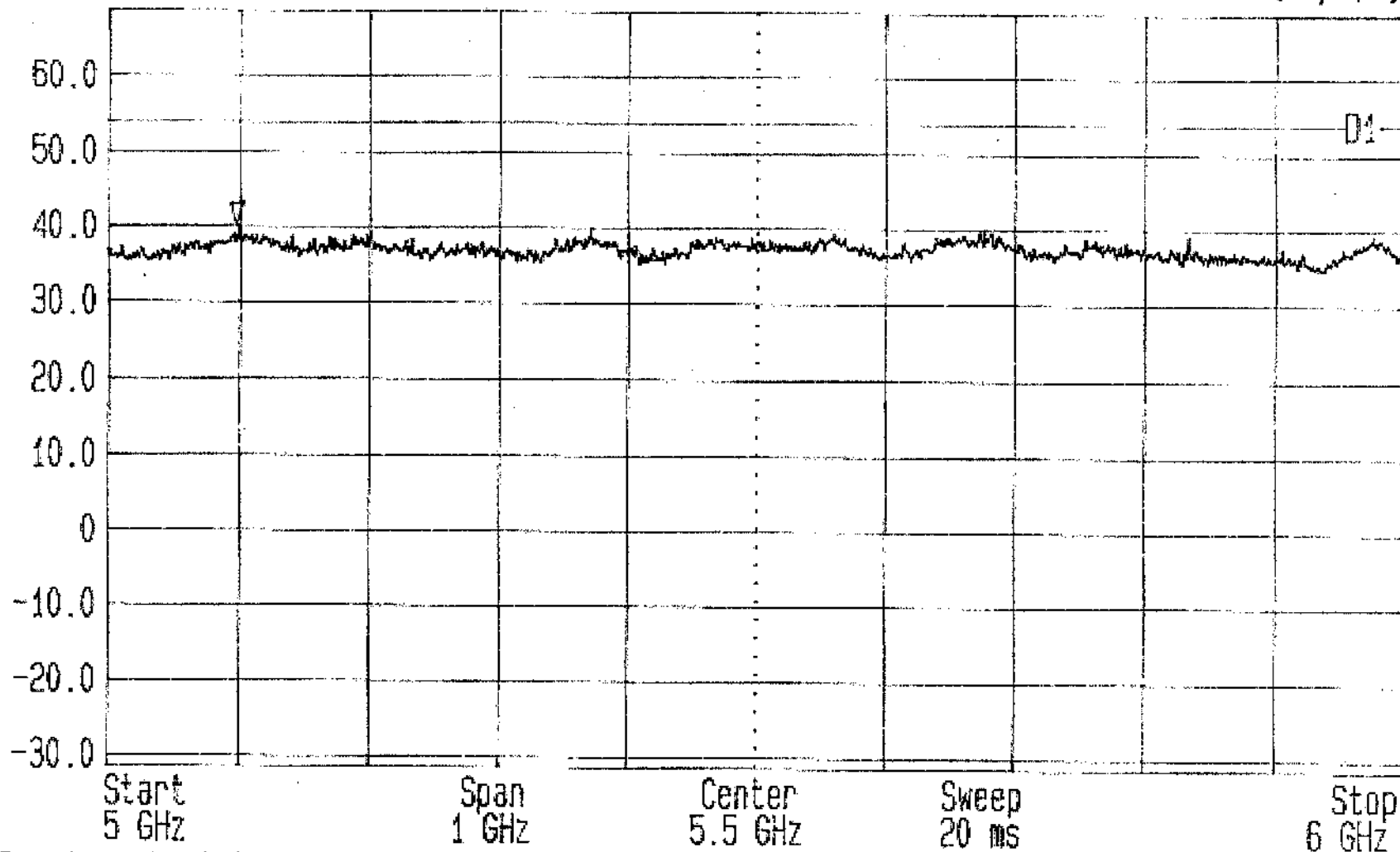
LVLOFF
 Date 11.Oct.'01 Time 22:42:06
 Ref.Lvl 79.50 dB*
 Marker 47.46 dB*
 4.8055 GHz
 Res.Bw 1 MHz [imp]
 TG.Lvl off
 CF.Stp 100.000 MHz
 Vid.Bw 1 MHz
 RF.Att 0 dB
 Unit [dBμV/m]



Spurious Radiated Emissions Test for Red-M By RFI Ltd.
 FCC Part 15.209 ENG: AMT EUT: Bluetooth Module for Visor

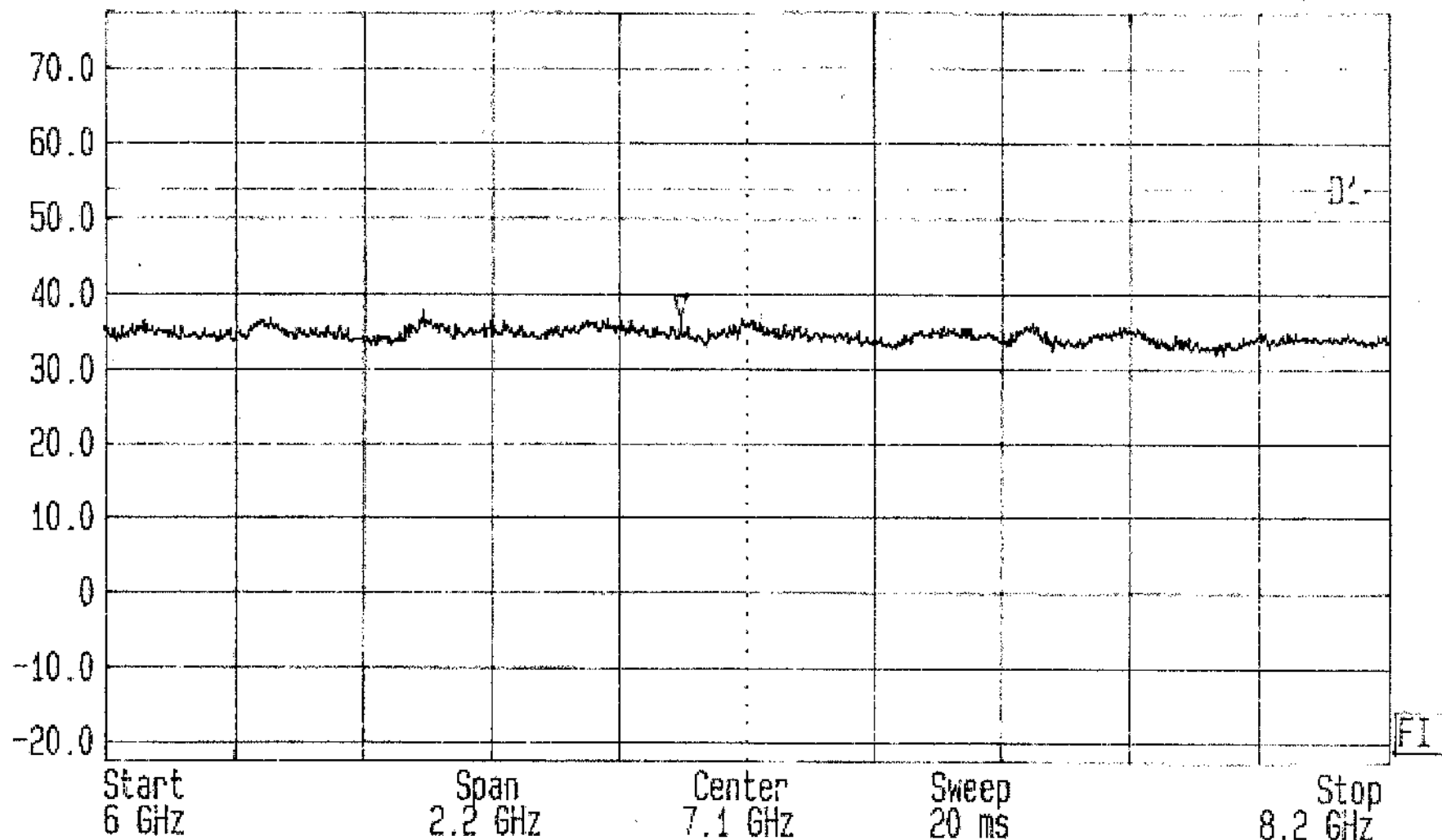
OPCOND : TX LOW CH
 GPH/42493/13/13/014

LVLOFF
 Date 11.Oct.'01 Time 17:09:34
 Ref.Lvl 68.50 dB*
 Marker 39.96 dB*
 5.0988 GHz
 Res.Bw 1 MHz [imp]
 TG.Lvl off
 CF.Stp 100.000 MHz
 Vid.Bw 1 MHz
 RF.Att 0 dB
 Unit [dB μ V/m]



Spurious Radiated Emissions Test for RED-M by RFI Ltd.
 FCC Part 15.209 ENG : AMT EUT : Bluetooth Module for Visor
 OPCOND : TX LOWER CH
 GPH/42493/13/13/018

LVLOFF
 Date 12.Oct.'01 Time 14:16:39
 Ref.Lvl 77.50 dB* Marker 36.90 dB*
 Res.Bw 1 MHz [imp] TG.Lvl off
 CF.Stp 220.000 MHz Vid.Bw 1 MHz
 RF.Att 0 dB
 Unit [dBμV/m]

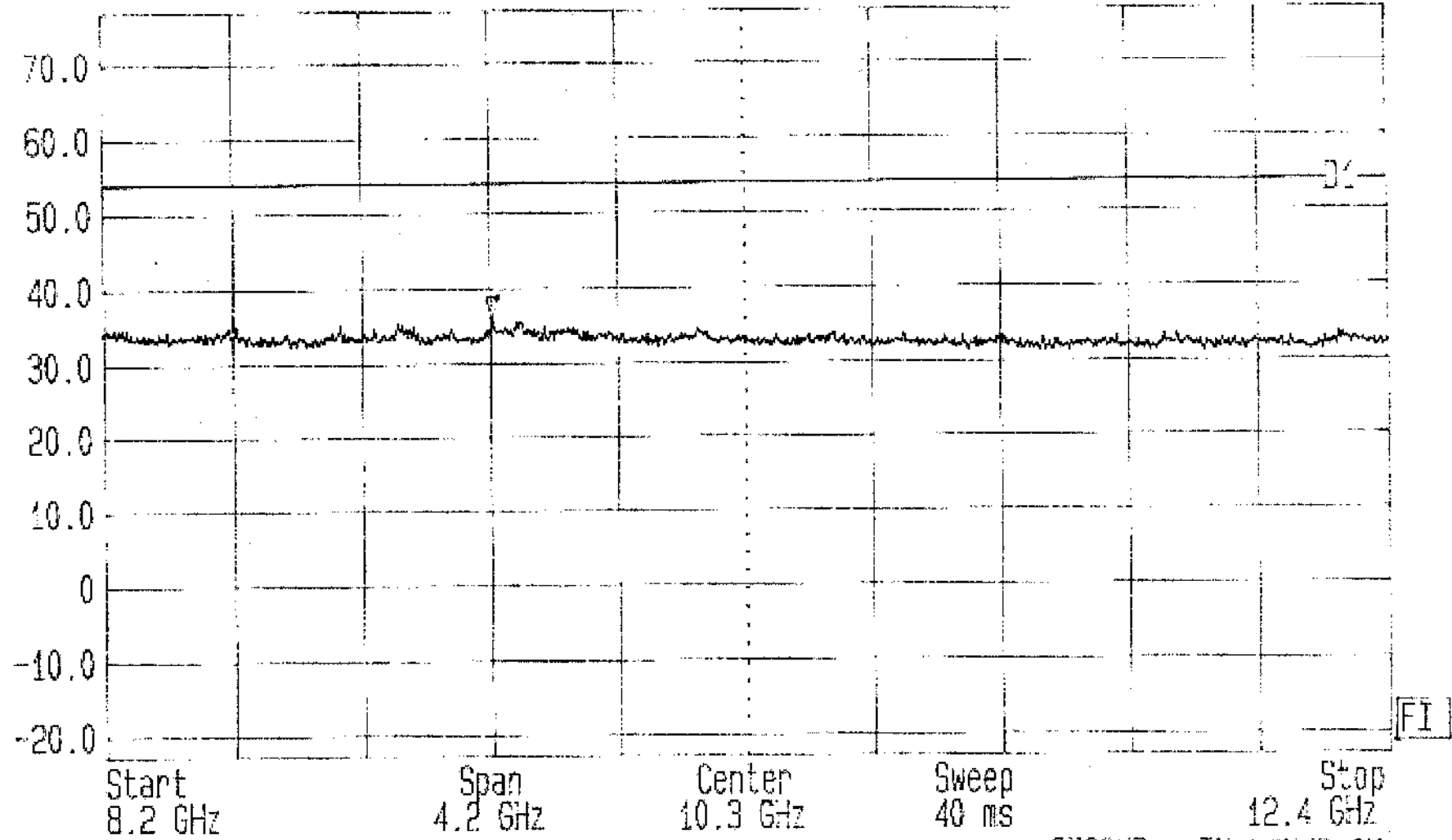


Spurious Radiated Emissions Test for RED-M byRFI Ltd.
 FCC Part15.209 ENG: AMT EUT: Bluetooth Module for Visor

OPCOND: TX LOWER CH
 GPN/42493/13/13/022

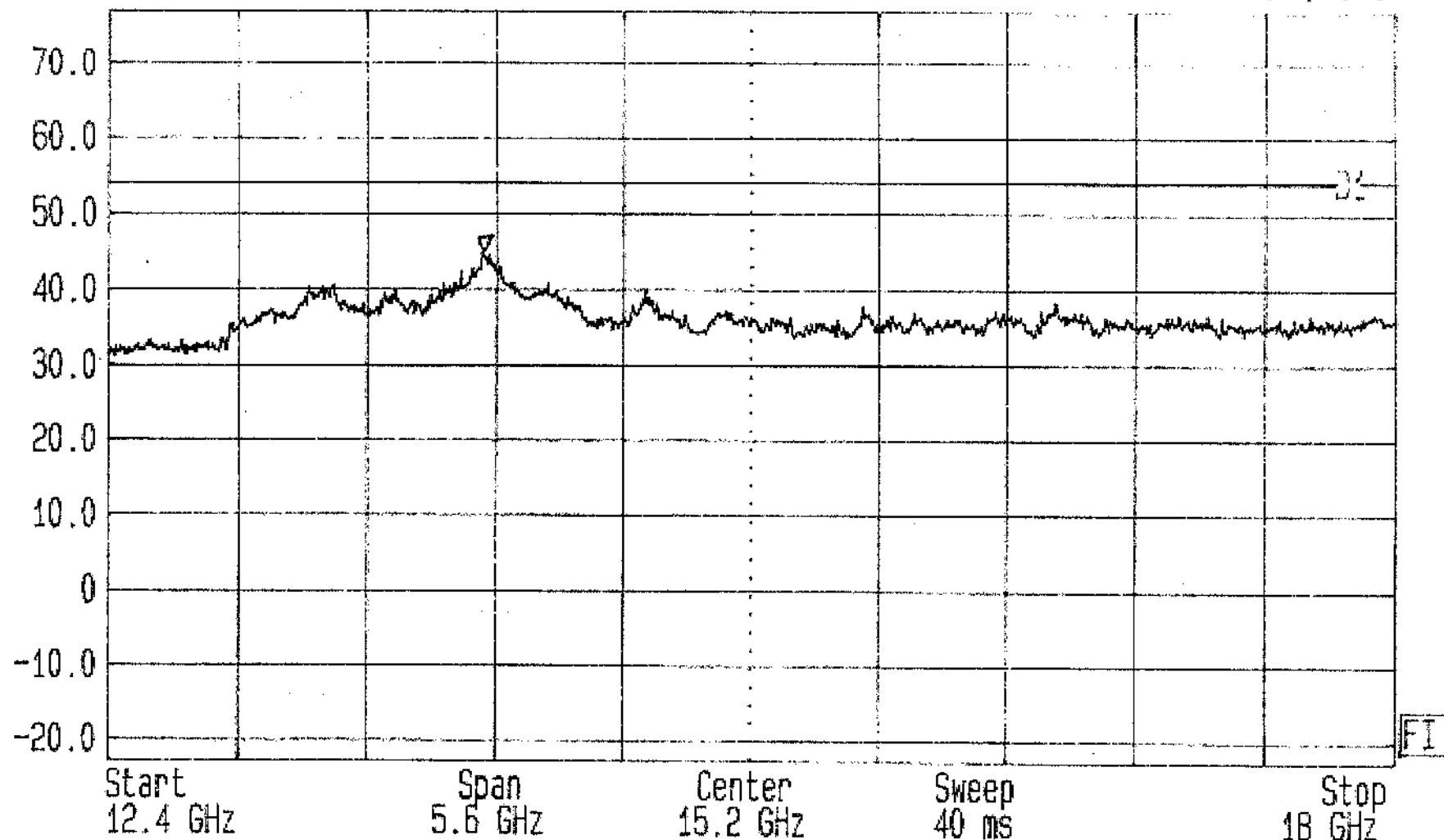
LVLOFF
 Date 12 Oct '01 Time 14:43:45
 Ref.Lvl 77.00 dB*
 Marker 35.64 dB*
 9.4693 GHz

Res.Bw 1 MHz [imp]
 TG.Lvl off
 CF.Stp 420.000 MHz
 Vid.Bw 1 MHz
 RF.Att 0 dB
 Unit [dBμV/m]



Spurious Radiated Emissions Test for HED-W by RFI Ltd.
 FCC Part 15.209 EMI: ANT EUT: Bluetooth Module for Visor
 OPCOND: TX POWER CH
 G24/42483, 13, 13, 02

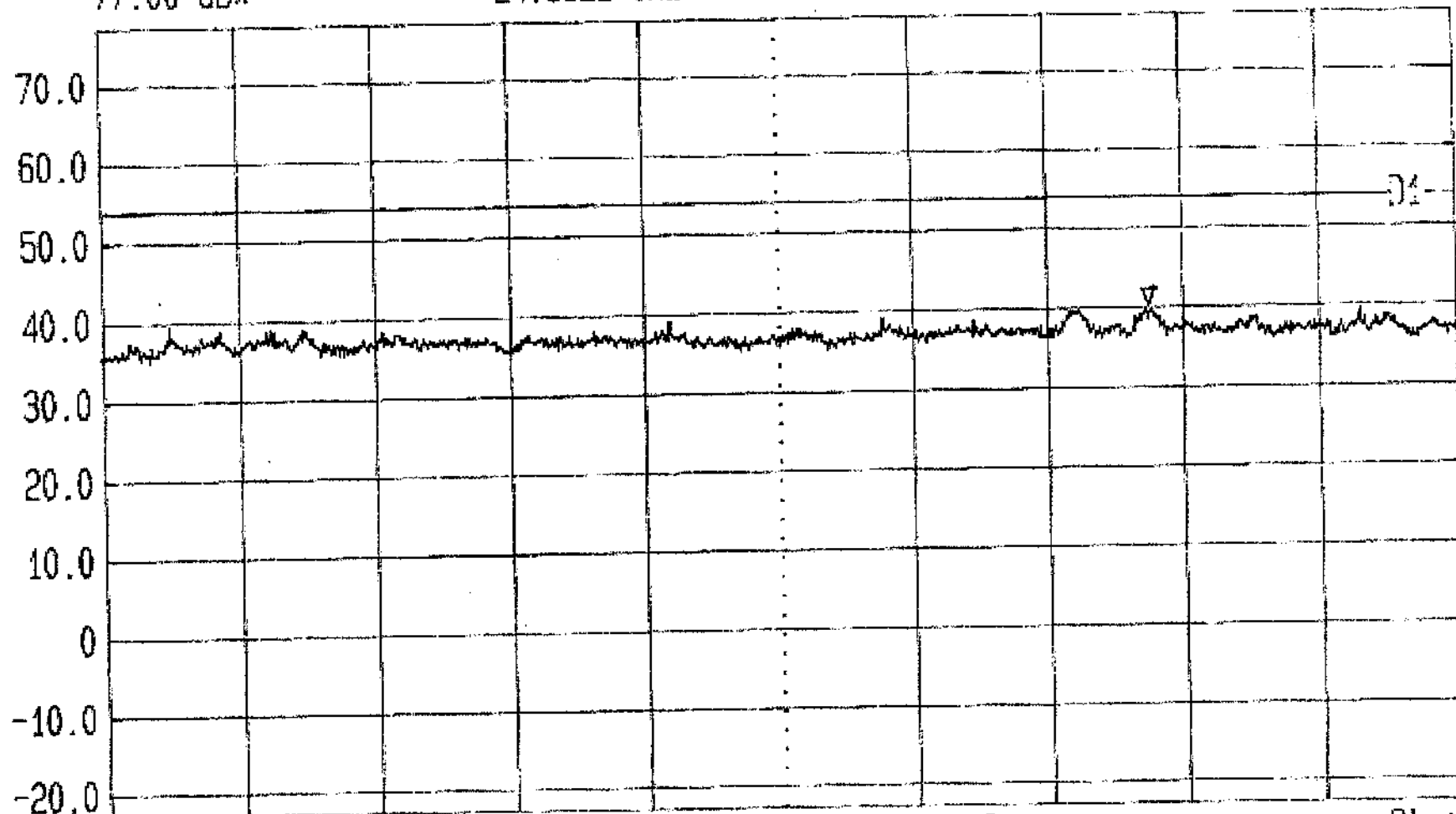
LVLOFF
 Date 12.Oct.'01 Time 14:58:45
 Ref.Lvl 77.00 dB*
 Marker 43.92 dB*
 14.0302 GHz
 Res.Bw 1 MHz [imp]
 TG.Lvl off
 CF.Stp 560.000 MHz
 Vid.Bw 1 MHz
 RF.Att 0 dB
 Unit [dBμV/m]



Spurious Radiated Emissions Test for RED-M by RFI Ltd.
 FCC Part 15.209 ENG : AMT EUT : Bluetooth Module for Visor

OPCOND : TX LOWER CH
 CME 42493, 13/13/030

LVLOFF
 Date 12.Oct.'01 Time 15:34:51
 Ref.Lvl 77.00 dBx
 Marker 39.42 dBx
 24.5922 GHz
 Res.Bw 1 MHz [imp]
 TG.Lvl off
 CF.Stp 850.000 MHz
 Vid.Bw 1 MHz
 RF.Att 0 dB
 Unit [dBμV/m]

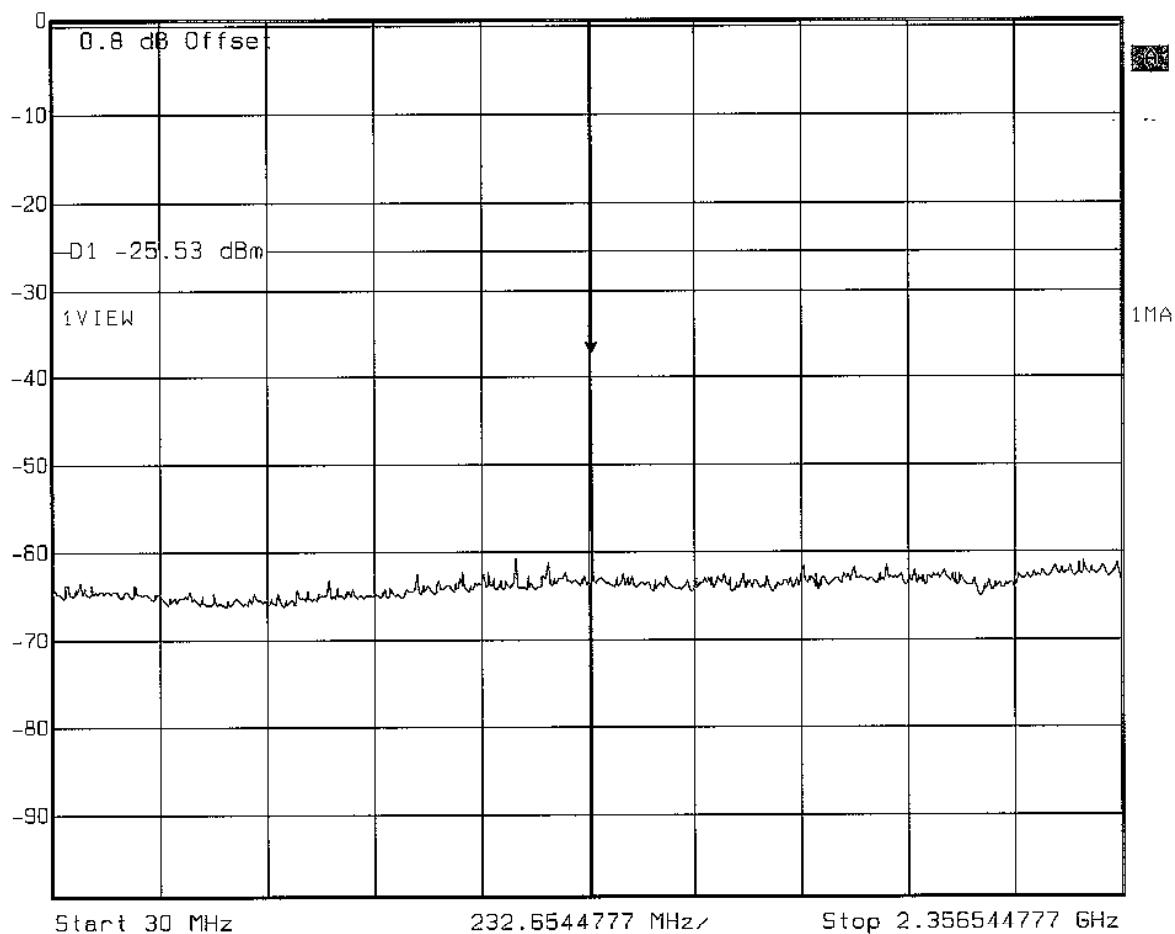


FI

Start 18 GHz Span 8.5 GHz Center 22.25 GHz Sweep 60 ms Stop 26.5 GHz
 Spurious Radiated Emissions Test for RED-M by RFI Ltd.
 FCC Part 15.209 ENG : ANT EUT : Bluetooth Module for Visor OPCOND : TX LOWER CH
 GRN/42493/13/13/035



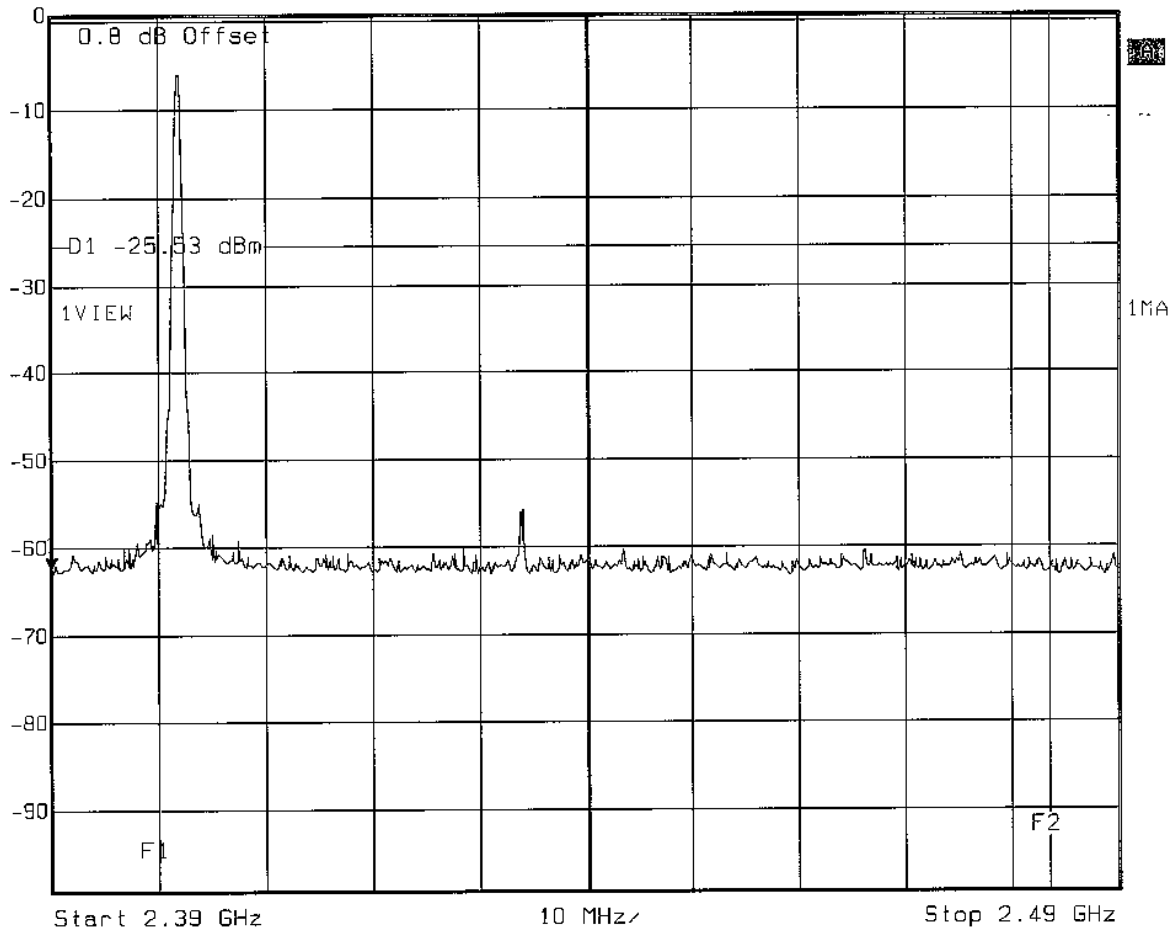
Marker 1 [T1] RBW 100 kHz RF Att 30 dB
Ref Lvl -37.23 dBm VBW 100 kHz
0.8 dBm 1.20026601 GHz SWT 600 ms Unit dBm



Title: Red M. Bluetooth Module for Visor. FCC Part 15.247
Comment A: Spurious RF Conducted Emissions. Bottom Channel. GPH/42493/015
Date: 15.OCT.2001 15:09:47



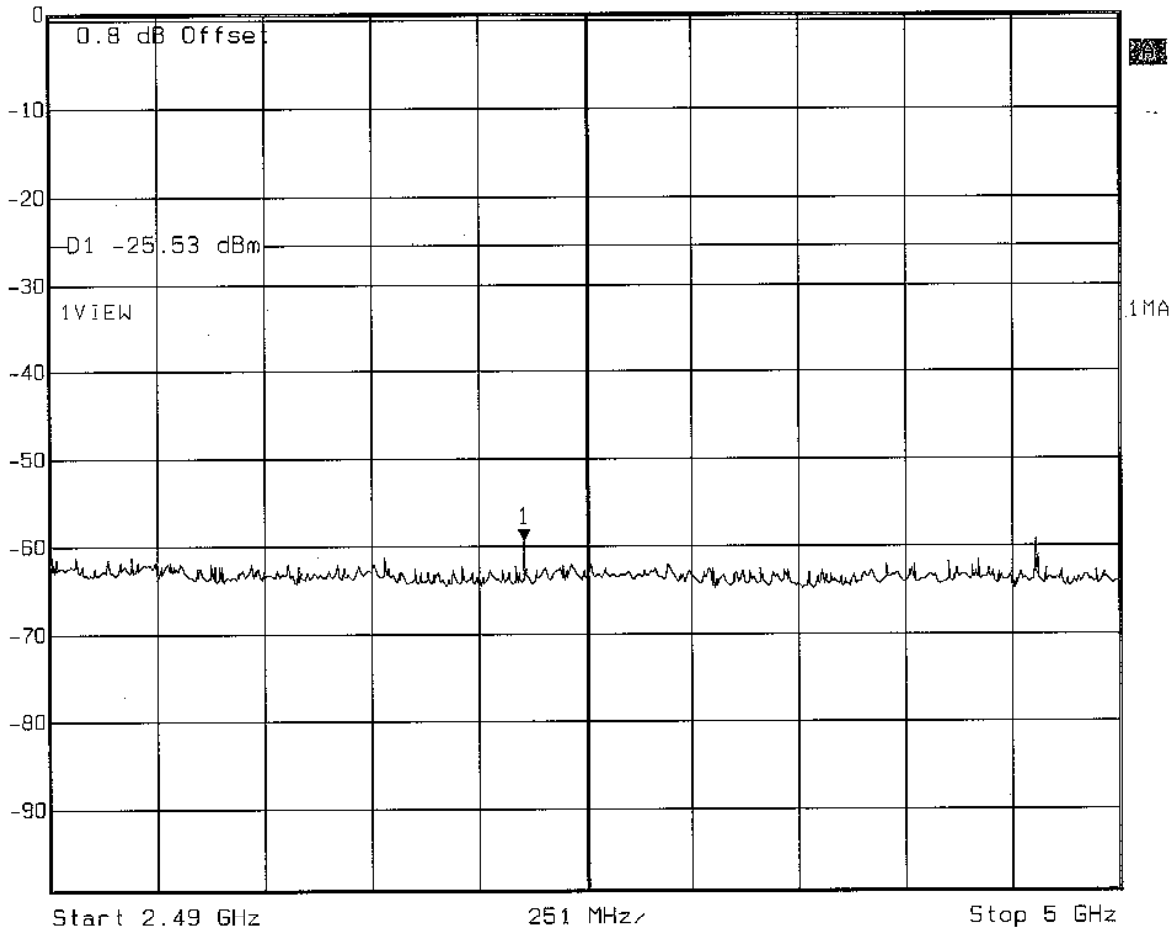
Marker 1 [T1] RBW 100 kHz RF Att 30 dB
Ref Lvl -62.42 dBm VBW 100 kHz
0.8 dBm 2.39000000 GHz SWT 25 ms Unit dBm



Title: Red M. Bluetooth Module for Visor. FCC Part 15.247
Comment A: Spurious RF Conducted Emissions. Bottom Channel. GPH/42493/016
Date: 15.OCT.2001 15:11:10



Marker 1 [T1] RBW 100 kHz RF Att 30 dB
Ref Lvl -59.37 dBm VBW 100 kHz
0.8 dBm 3.60164329 GHz SWT 640 ms Unit dBm



Title: Red M. Bluetooth Module for Visor. FCC Part 15.247
Comment A: Spurious RF Conducted Emissions. Bottom Channel. GPH/42493/017
Date: 15.OCT.2001 15:13:39



Marker 1 [T1]

RBW 100 kHz RF Att 30 dB

Ref Lvl -35.35 dBm

VBW 100 kHz

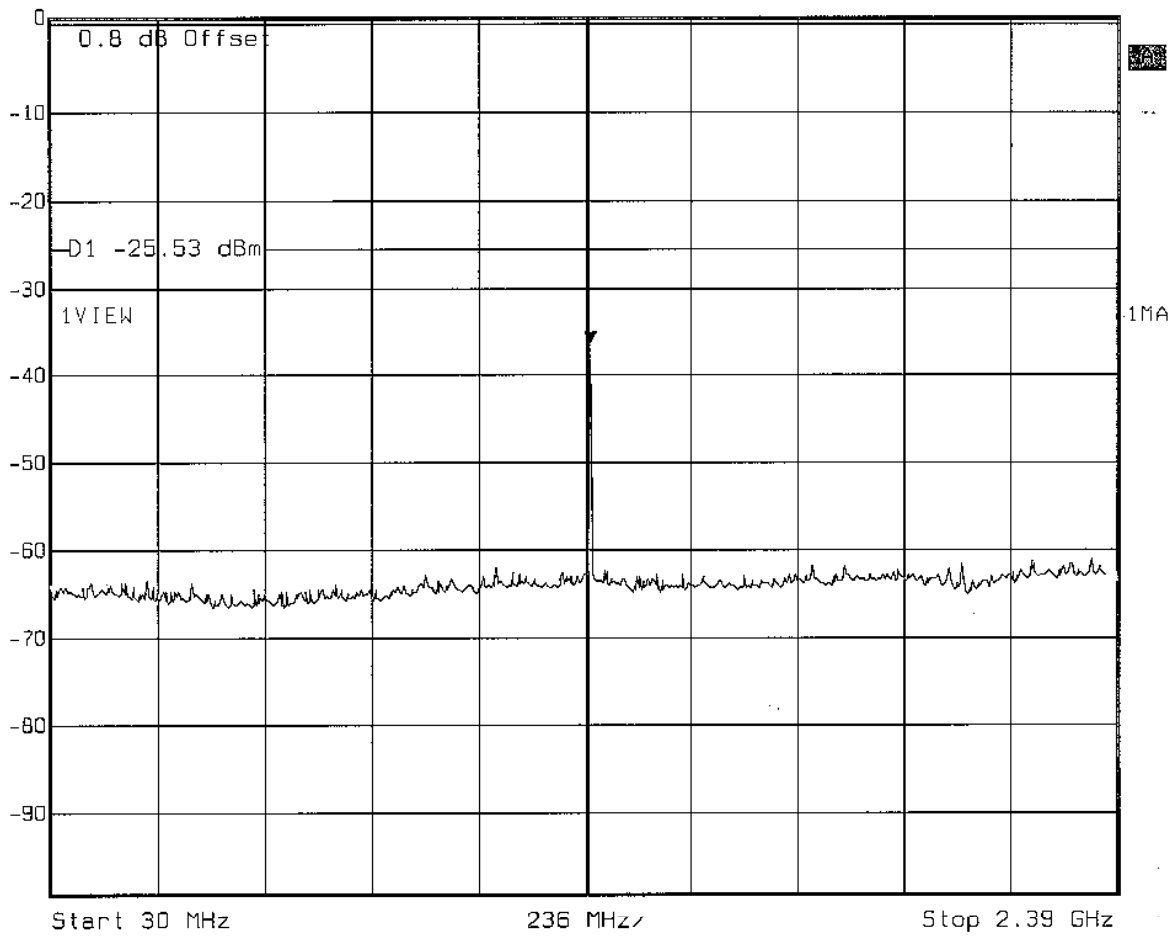
0.8 dBm

1.22182365 GHz

SWT 600 ms

Unit

dBm



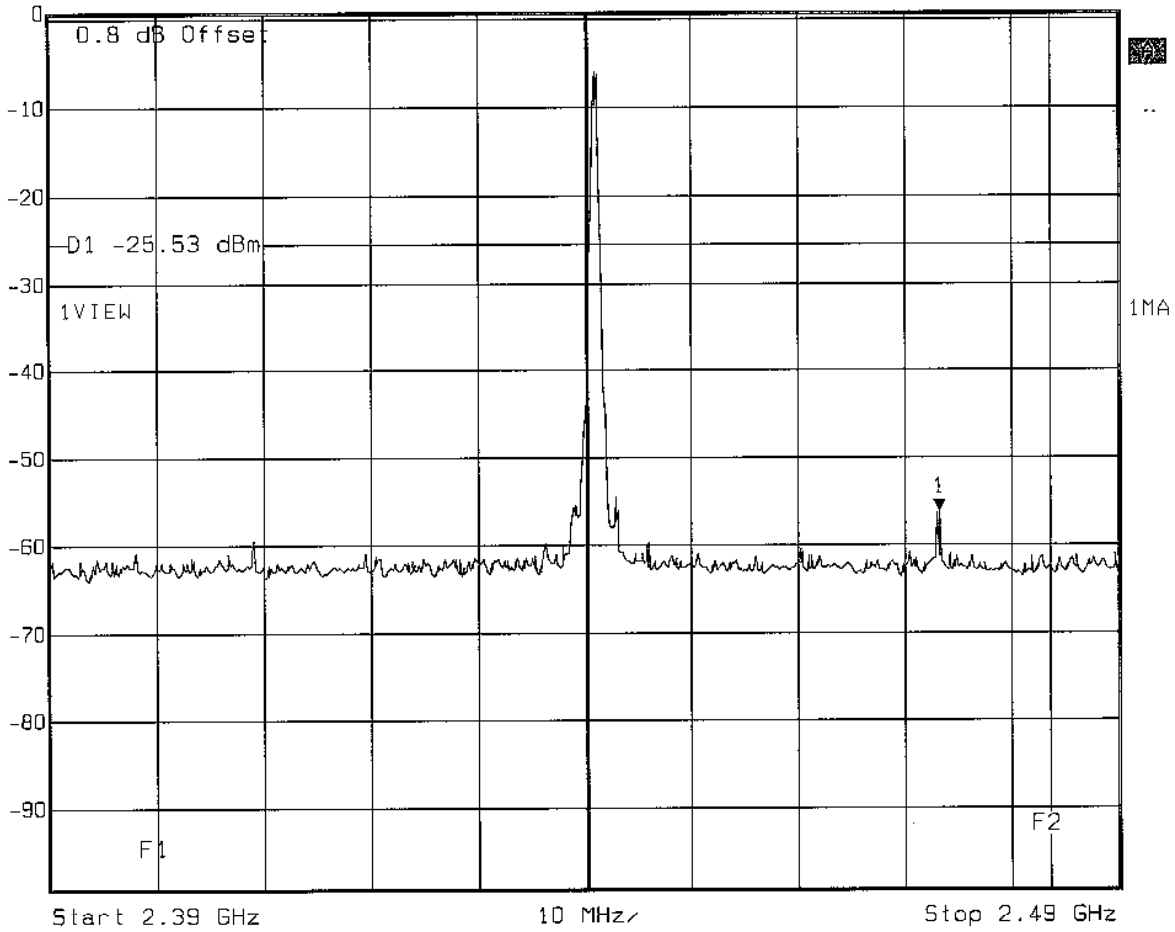
Title: Red M. Bluetooth Module for Visor. FCC Part 15.247

Comment A: Spurious RF Conducted Emissions. Middle Channel. GPH/42493/020

Date: 15.OCT.2001 15:17:02



Marker 1 [T1] RBW 100 kHz RF Att 30 dB
Ref Lvl -56.10 dBm VBW 100 kHz
0.8 dBm 2.47316633 GHz SWT 25 ms Unit dBm



Title: Red M. Bluetooth Module for Visor. FCC Part 15.247
Comment A: Spurious RF Conducted Emissions. Middle Channel. GPH/42493/019
Date: 15.OCT.2001 15:16:02



Marker 1 [T1]

RBW 100 kHz RF Att 30 dB

Ref Lvl -58.51 dBm

VBW 100 kHz

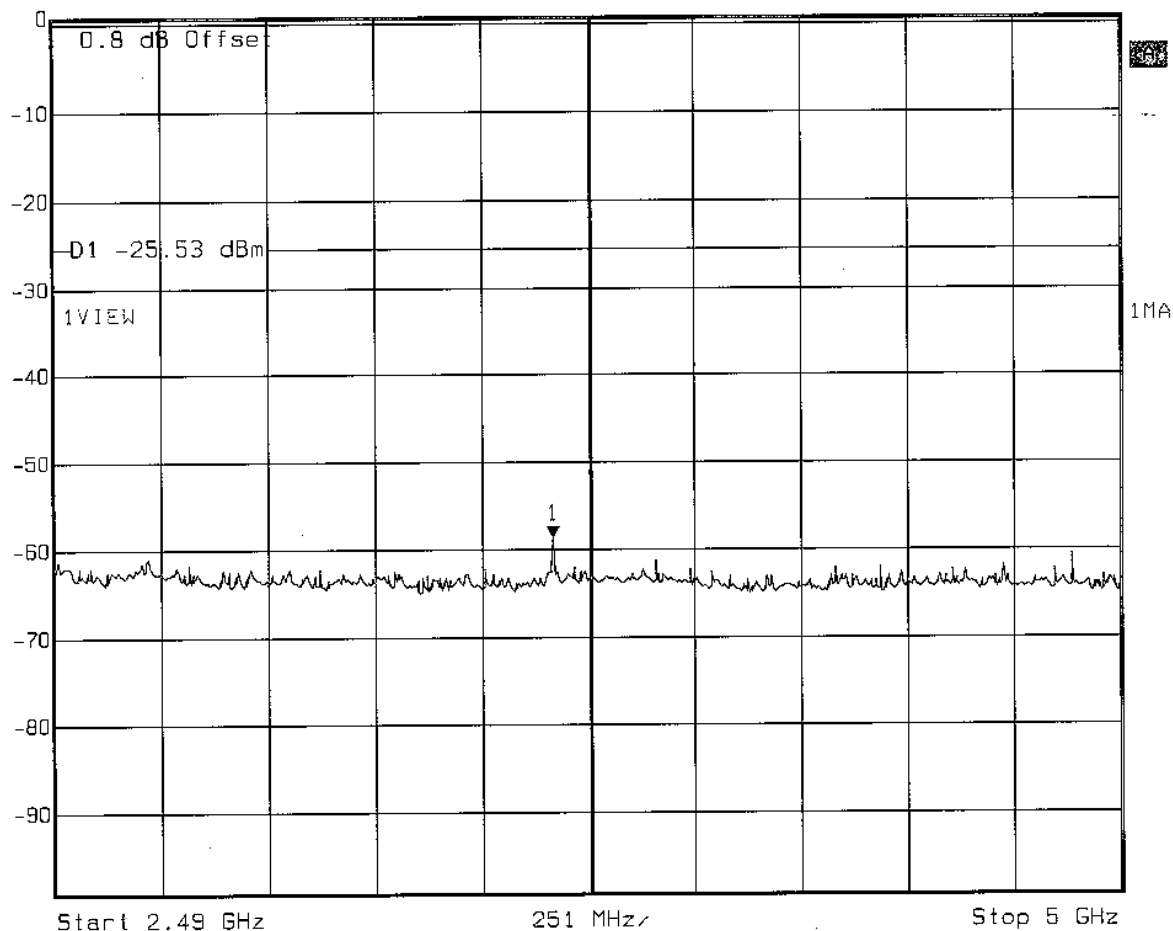
0.8 dBm

3.66200401 GHz

SWT 640 ms

Unit

dBm



Title: Red M. Bluetooth Module for Visor. FCC Part 15.247
Comment A: Spurious RF Conducted Emissions. Middle Channel. GPH/42493/018
Date: 15.OCT.2001 15:14:29



Marker 1 [T1]

RBW 100 kHz RF Att 30 dB

Ref Lvl -37.18 dBm

VBW 100 kHz

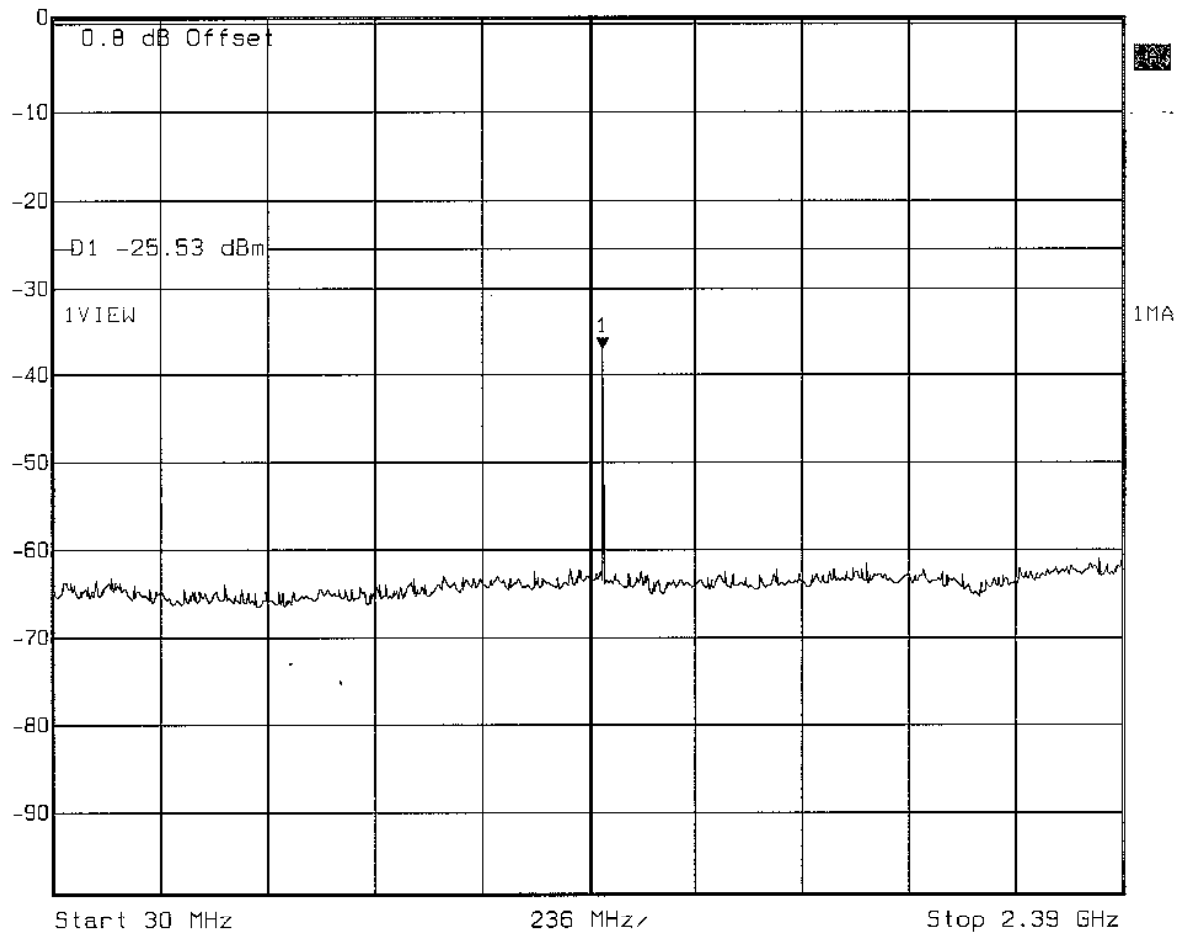
0.8 dBm

1.24074148 GHz

SWT 600 ms

Unit

dBm



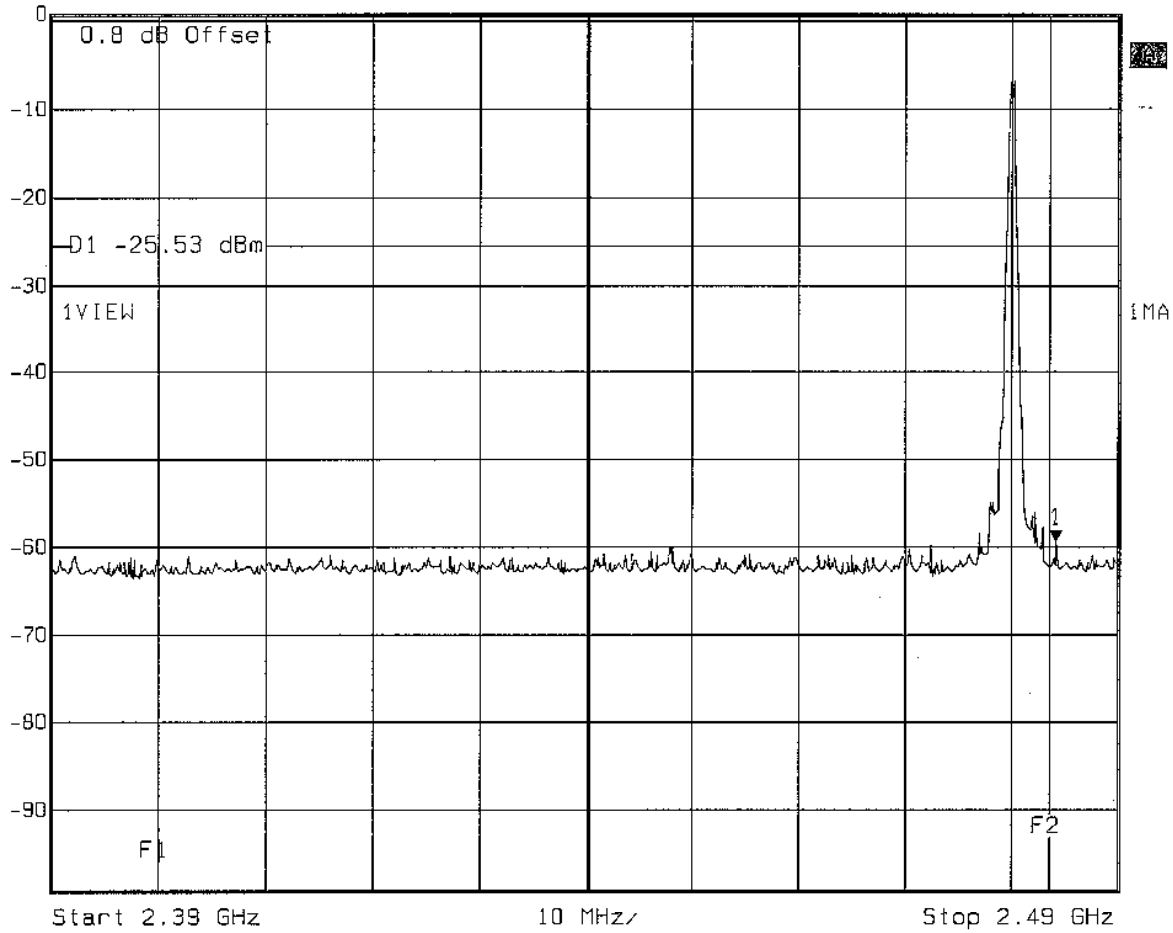
Title: Red M. Bluetooth Module for Visor, FCC Part 15.247

Comment A: Spurious RF Conducted Emissions, Top Channel, GPH/42493/021

Date: 15.OCT.2001 15:18:06



Marker 1 [T1] RBW 100 kHz RF Att 30 dB
Ref Lvl -59.36 dBm VBW 100 kHz
0.8 dBm 2.48418838 GHz SWT 25 ms Unit dBm



Title: Red M. Bluetooth Module for Visor. FCC Part 15.247
Comment A: Spurious RF Conducted Emissions. Top Channel. GPH/42493/022
Date: 15.OCT.2001 15:19:51



Marker 1 [T1]

RBW 100 kHz RF Att 30 dB

Ref Lvl -59.17 dBm

VBW 100 kHz

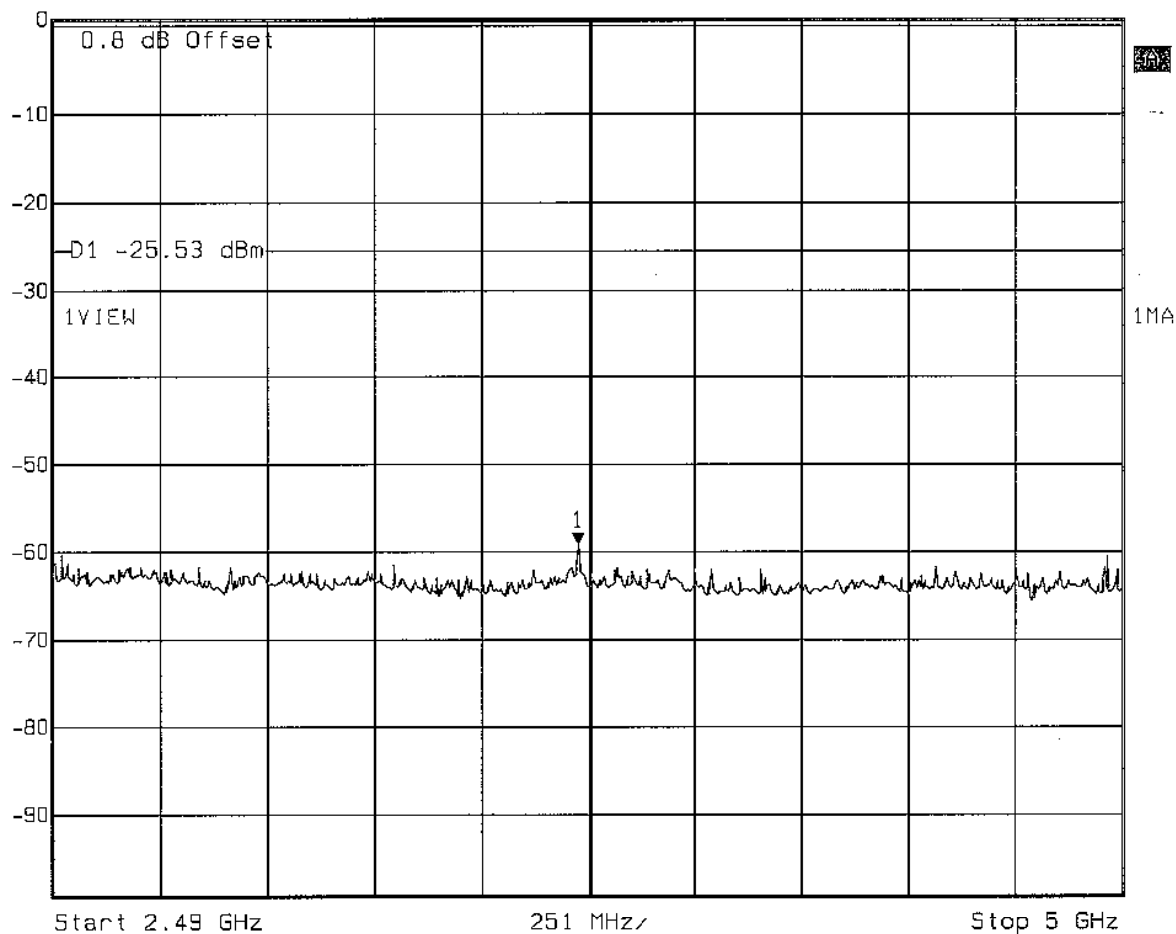
0.8 dBm

3.72236473 GHz

SWT 640 ms

Unit

dBm



Title: Red M. Bluetooth Module for Visor. FCC Part 15.247

Comment A: Spurious RF Conducted Emissions. Top Channel. GPH/42493/023

Date: 15.OCT.2001 15:20:40

ATTEN 10dB

MARK 00.00dBm

RL -7.0dBm

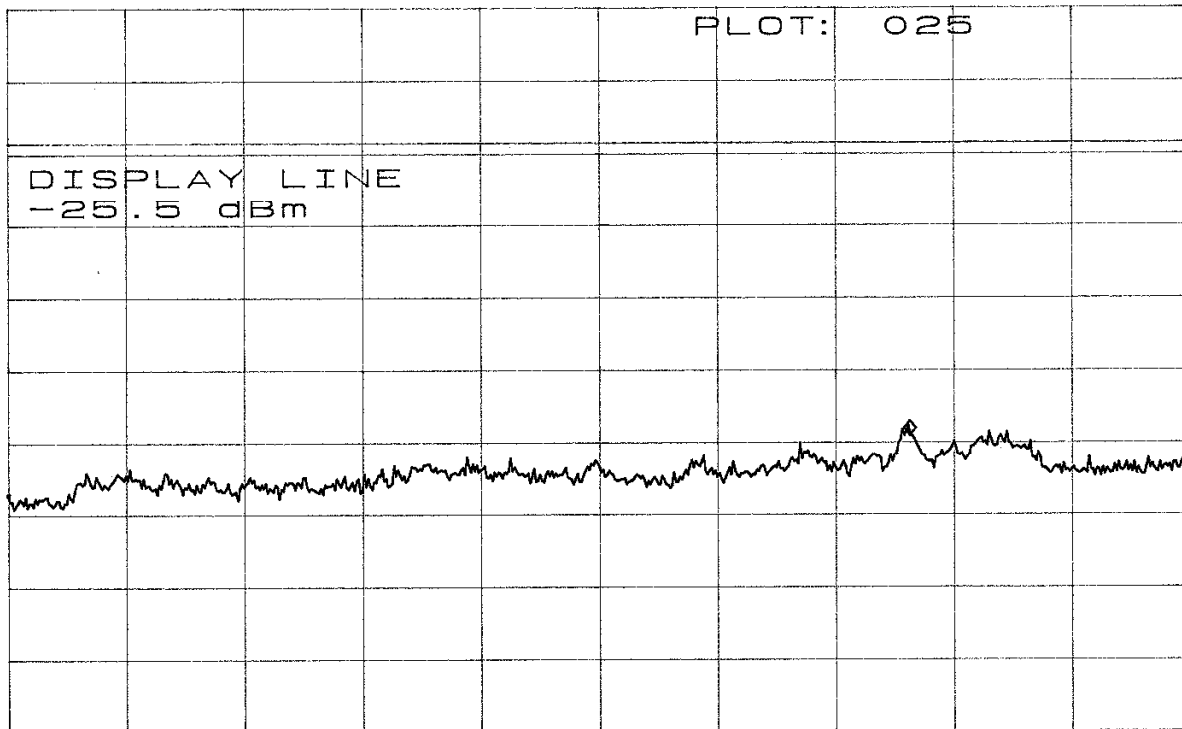
10dB/

24.08GHz

PLOT: 025

DISPLAY LINE
-25.5 dBm

R



START 5.00GHz

STOP 30.00GHz

*RBW 100kHz

VBW 100kHz

SWP 6.30sec

ATTEN 10dB

MARK -64.50dBm

RL -7.0dBm

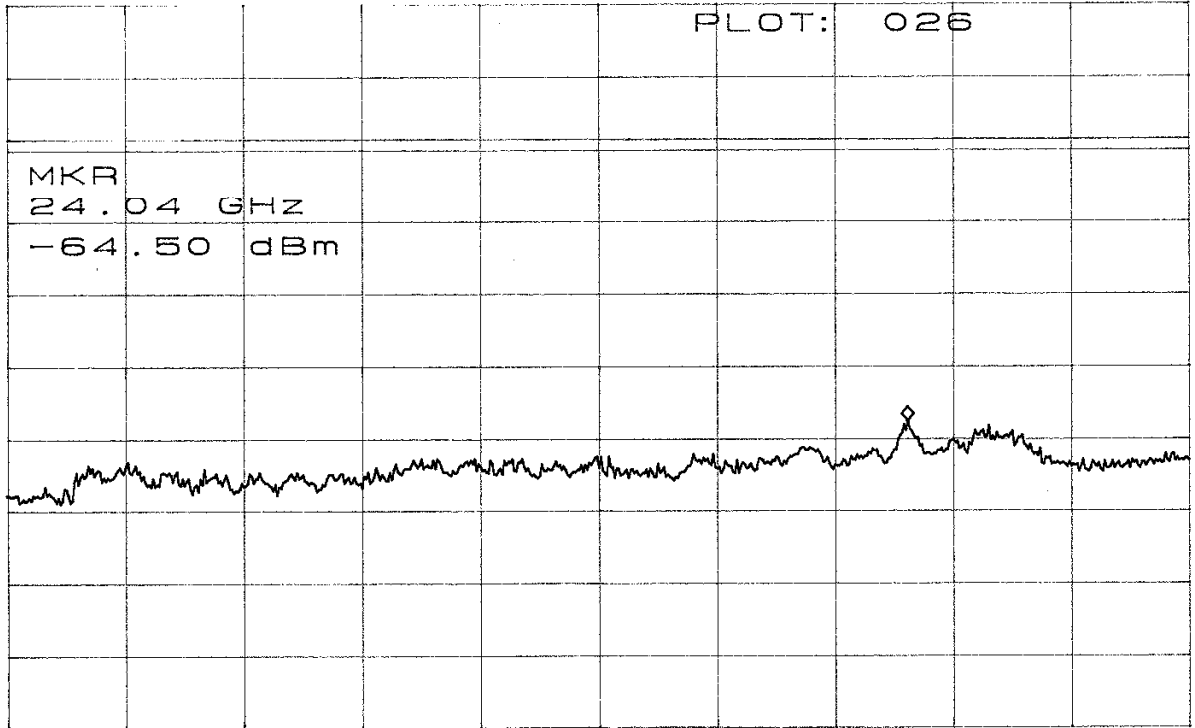
10dB/

24.04GHz

PLOT: 026

MKR
24.04 GHz
-64.50 dBm

R



START 5.00GHz

STOP 30.00GHz

*RBW 100KHz

VBW 100KHz

SWP 6.30sec

ATTEN 10dB

MARK -65.50dBm

RL -7.0dBm

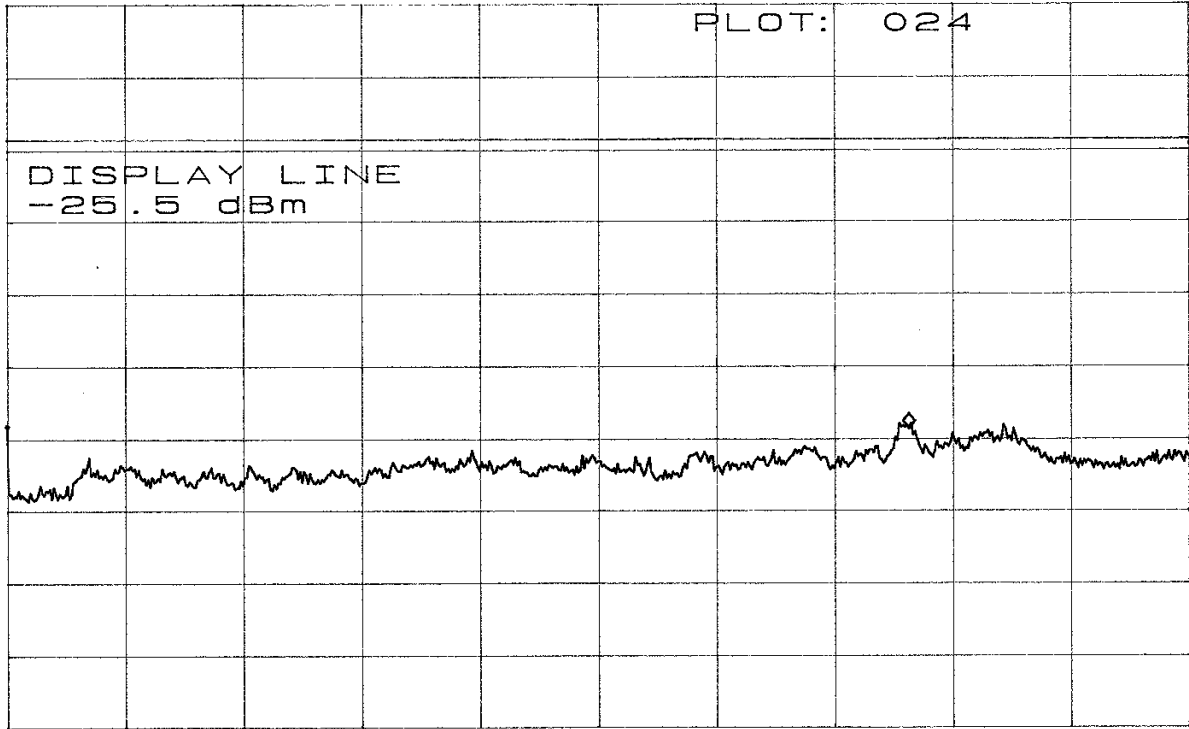
10dB/

24.08GHz

PLOT: 024

DISPLAY LINE
-25.5 dBm

R



START 5.00GHz

STOP 30.00GHz

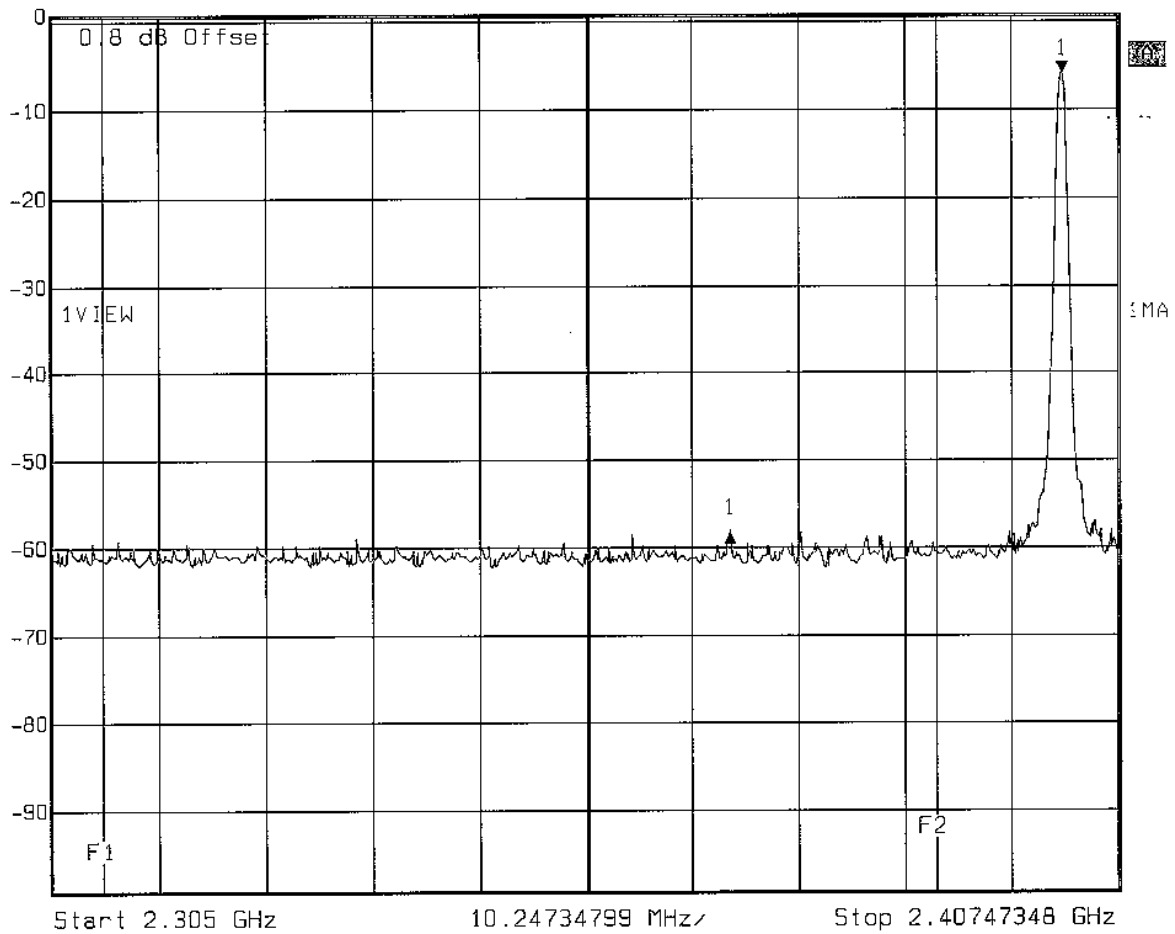
*RBW 100KHz

VBW 100KHz

SWP 6.30sec



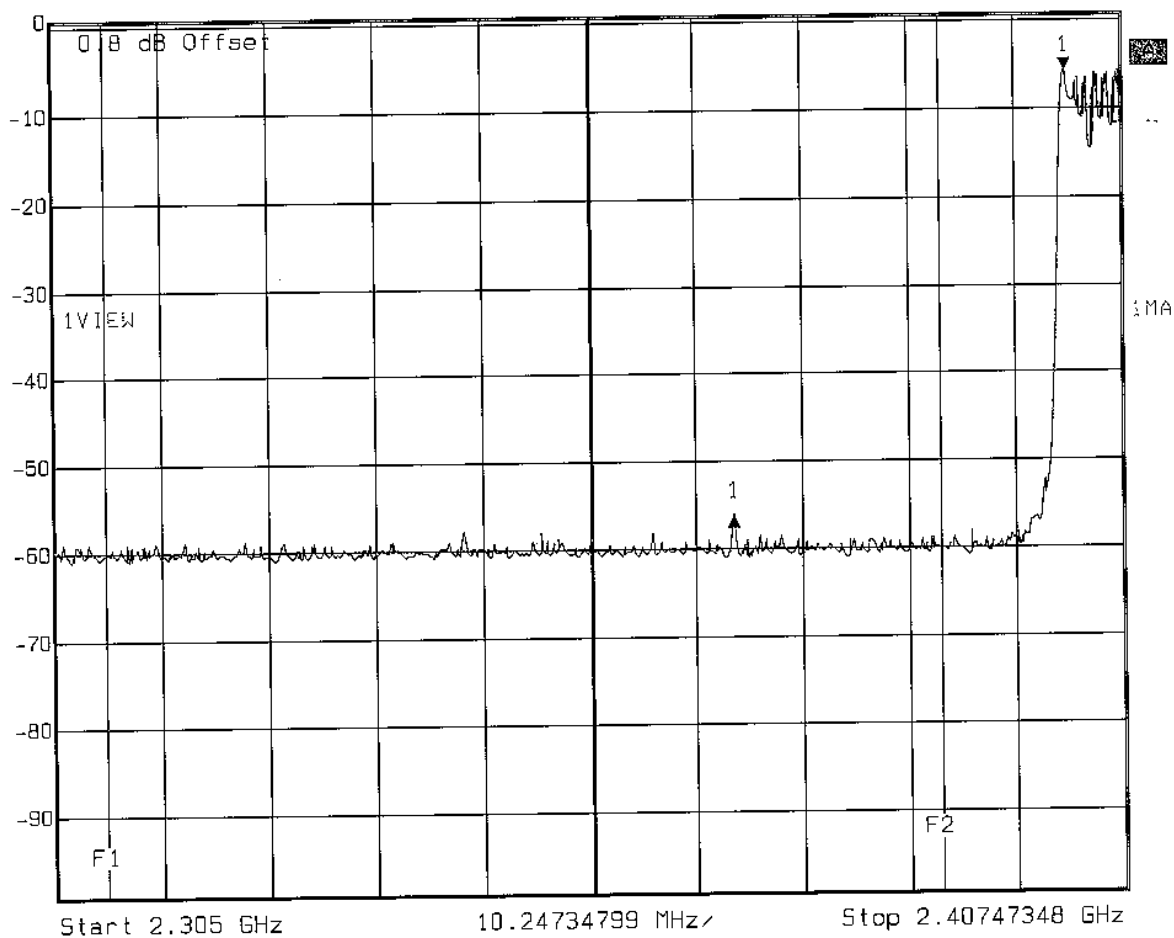
Delta 1 [T1] RBW 300 kHz RF Att 30 dB
Ref Lvl -52.20 dB VBW 300 kHz
0.8 dBm -32.03579732 MHz SWT 5 ms Unit dBm



Title: Red M. Bluetooth Module for Visor, FCC Part 15.247
Comment A: Band Edge Compliance, Bottom Channel, GPH/42493/014
Date: 15.OCT.2001 14:59:48



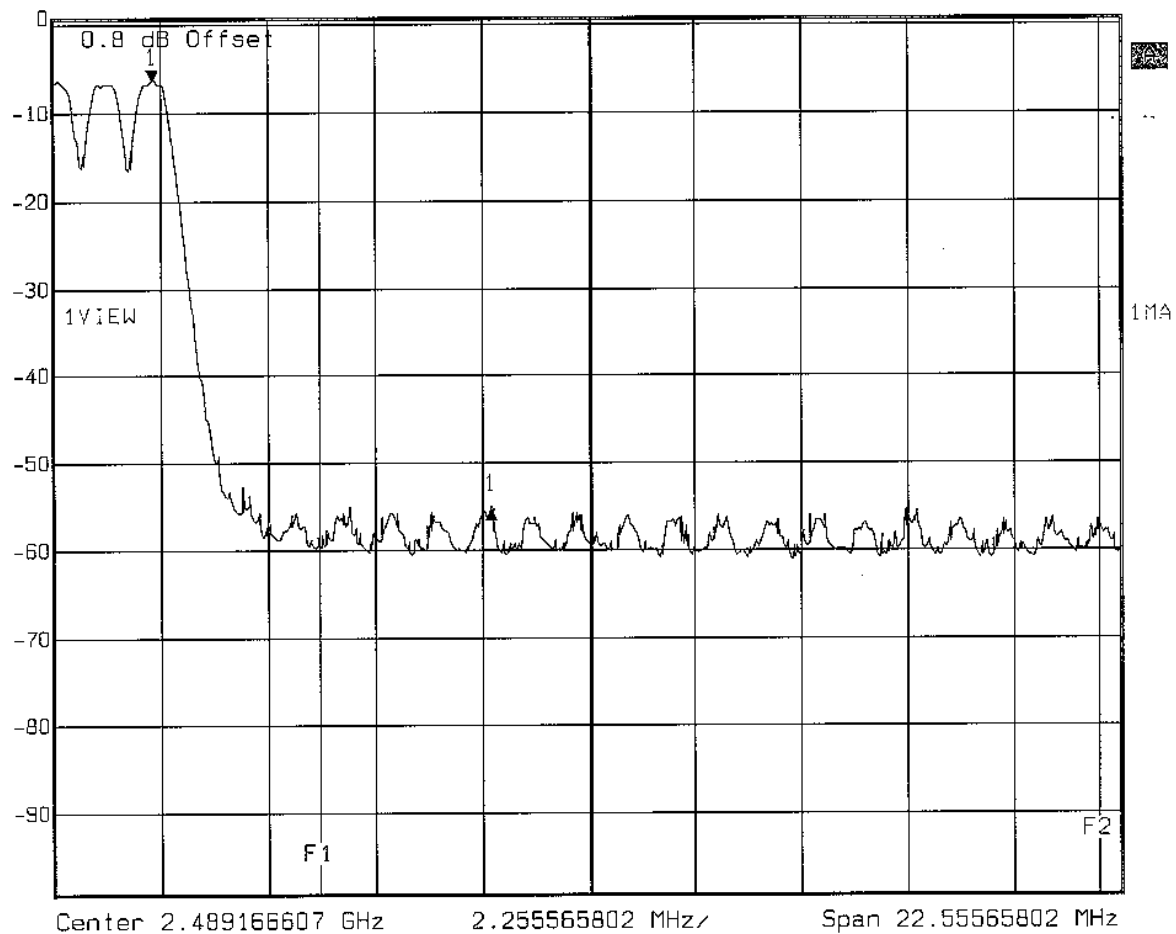
Delta 1 [T1] RBW 300 kHz RF Att 30 dB
Ref Lvl -50.35 dB VBW 300 kHz
0.8 dBm -32.03579732 MHz SWT 5 ms Unit dBm



Title: Red M. Bluetooth Module for Visor. FCC Part 15.247
Comment A: Band Edge Compliance. Hopping All Channels. GPH/42493/013
Date: 15.OCT.2001 14:58:55



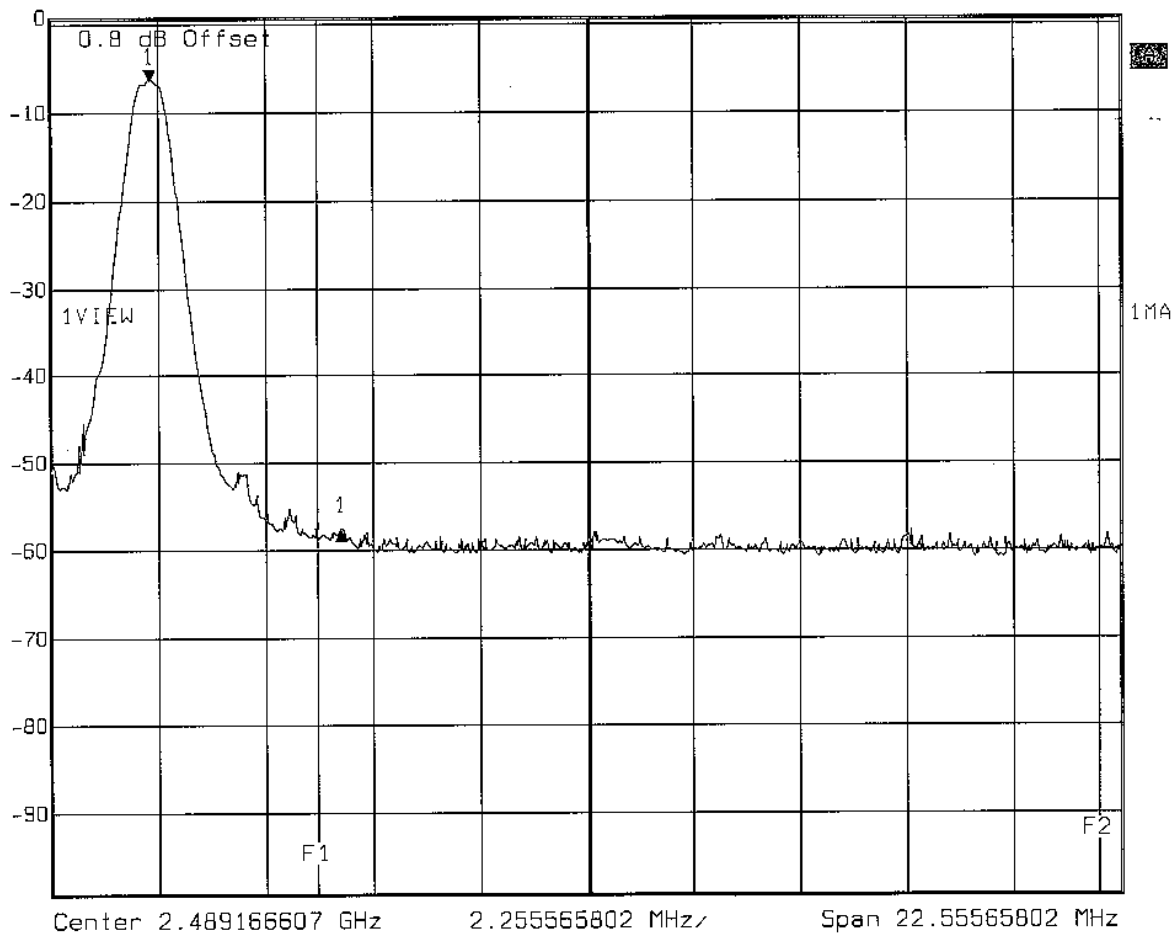
Delta 1 [T1] RBW 300 kHz RF Att 30 dB
Ref Lvl -48.75 dB VBW 300 kHz
0.8 dBm 7.14187168 MHz SWT 5 ms Unit dBm



Title: Red M. Bluetooth Module for Visor. FCC Part 15.247
Comment A: Band Edge Compliance. Hopping All Channels. GPH/42493/012
Date: 15.OCT.2001 14:54:51



Delta 1 [T1] RBW 300 kHz RF Att 30 dB
Ref Lvl -51.33 dB VBW 300 kHz
0.8 dBm 4.02295303 MHz SWT 5 ms Unit dBm



Title: Red M. Bluetooth Module for Visor, FCC Part 15.247
Comment A: Band Edge Compliance, Top Channel, GPH/42493/011
Date: 15.OCT.2001 14:51:43

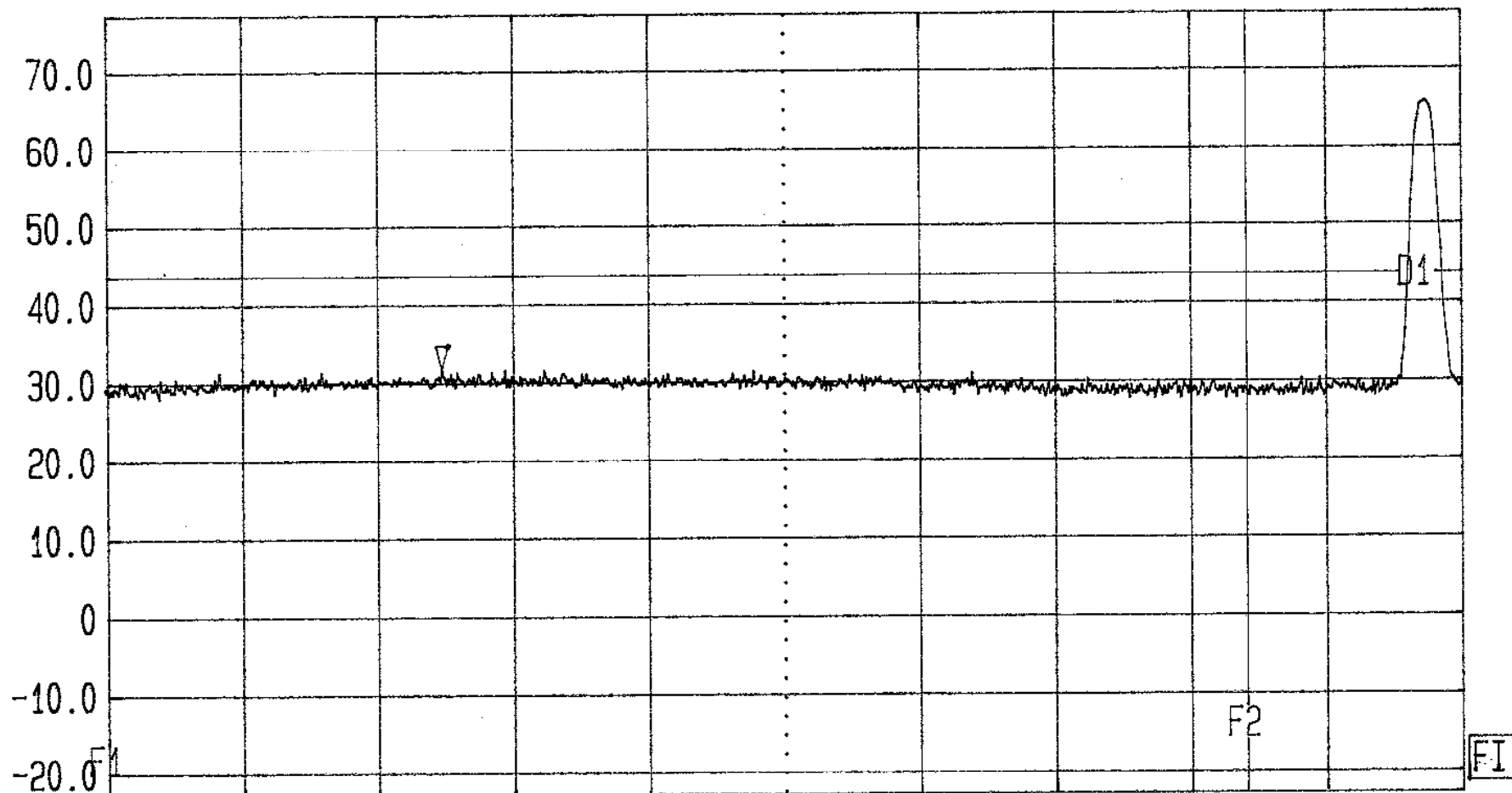
Date 12.Oct.'01 Time 16:34:29
Ref.Lvl 77.00 dB*
Marker 31.63 dB*
2.33353 GHz

Res.Bw
TG.Lvl
CF.Stp

1 MHz [imp]
off
9.500 MHz

Vid.Bw
RF.Att
Unit

1 MHz
0 dB
[dBμV/m]



Start 2.31 GHz Span 95 MHz Center 2.3575 GHz Sweep 20 ms Stop 2.405 GHz
Band Edge Test for RED-M by RFI Ltd. OPCOND : TX LOWER CH
FCC Part 15.247 ENG : AMT EUT : Bluetooth Module for Visor GPH/42493/13/13/038

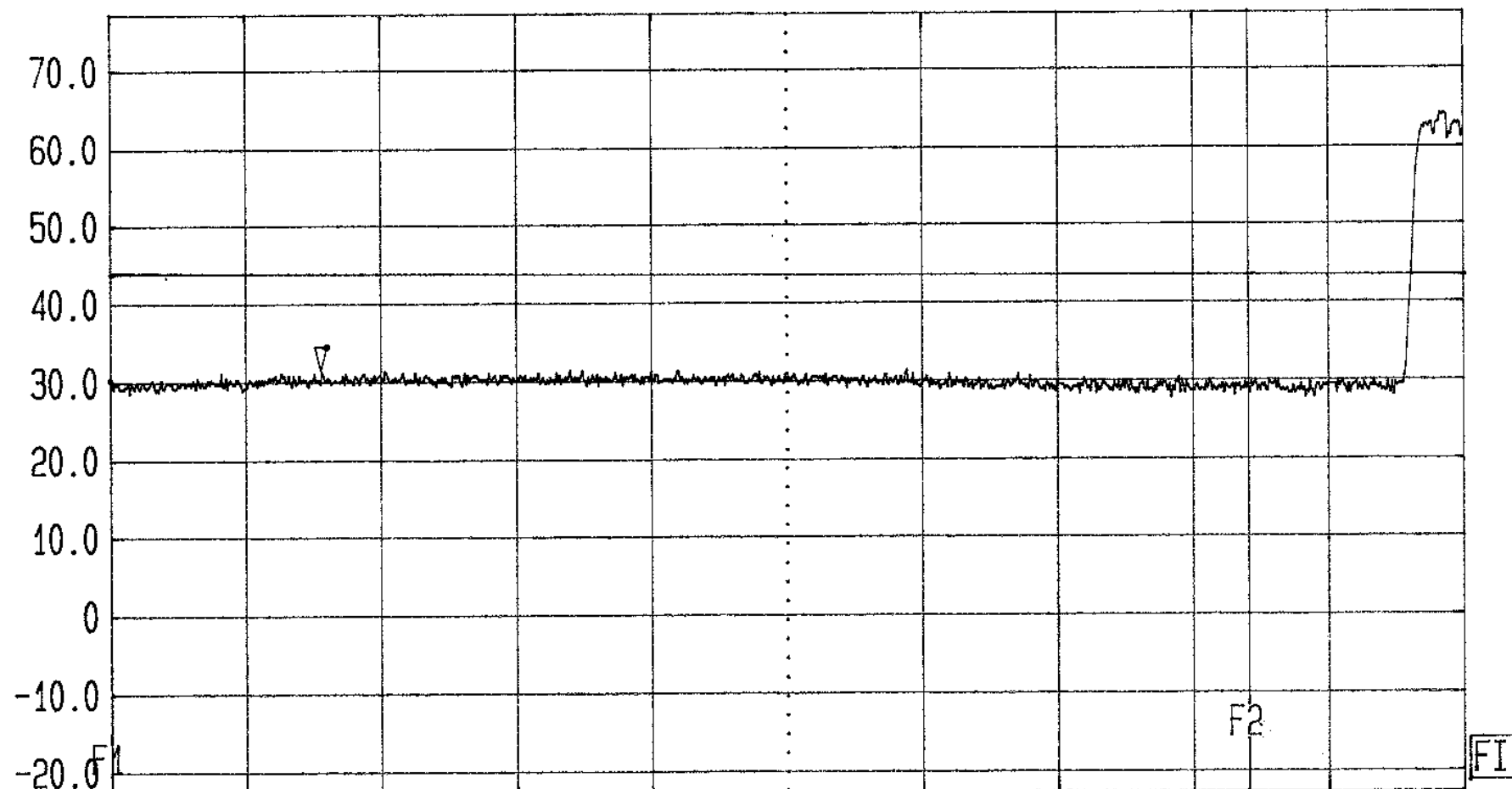
Date 12.Oct.'01 Time 16:49:50
Ref.Lvl 77.00 dBx
Marker 31.40 dBx
2.32488 GHz

Res.Bw
TG.Lvl
CF.Stp

1 MHz [imp]
off
9.500 MHz

Vid.Bw
RF.Att
Unit

1 MHz
0 dB
[dBμV/m]



Start 2.31 GHz Span 95 MHz Center 2.3575 GHz Sweep 20 ms Stop 2.405 GHz
Band Edge Test for RED-M by RFI Ltd. OPCOND : HOPPING LOWER BAND
FCC Part15.247 ENG : AMT EUT : Bluetooth Module for Visor GPH/42493/13/13/039

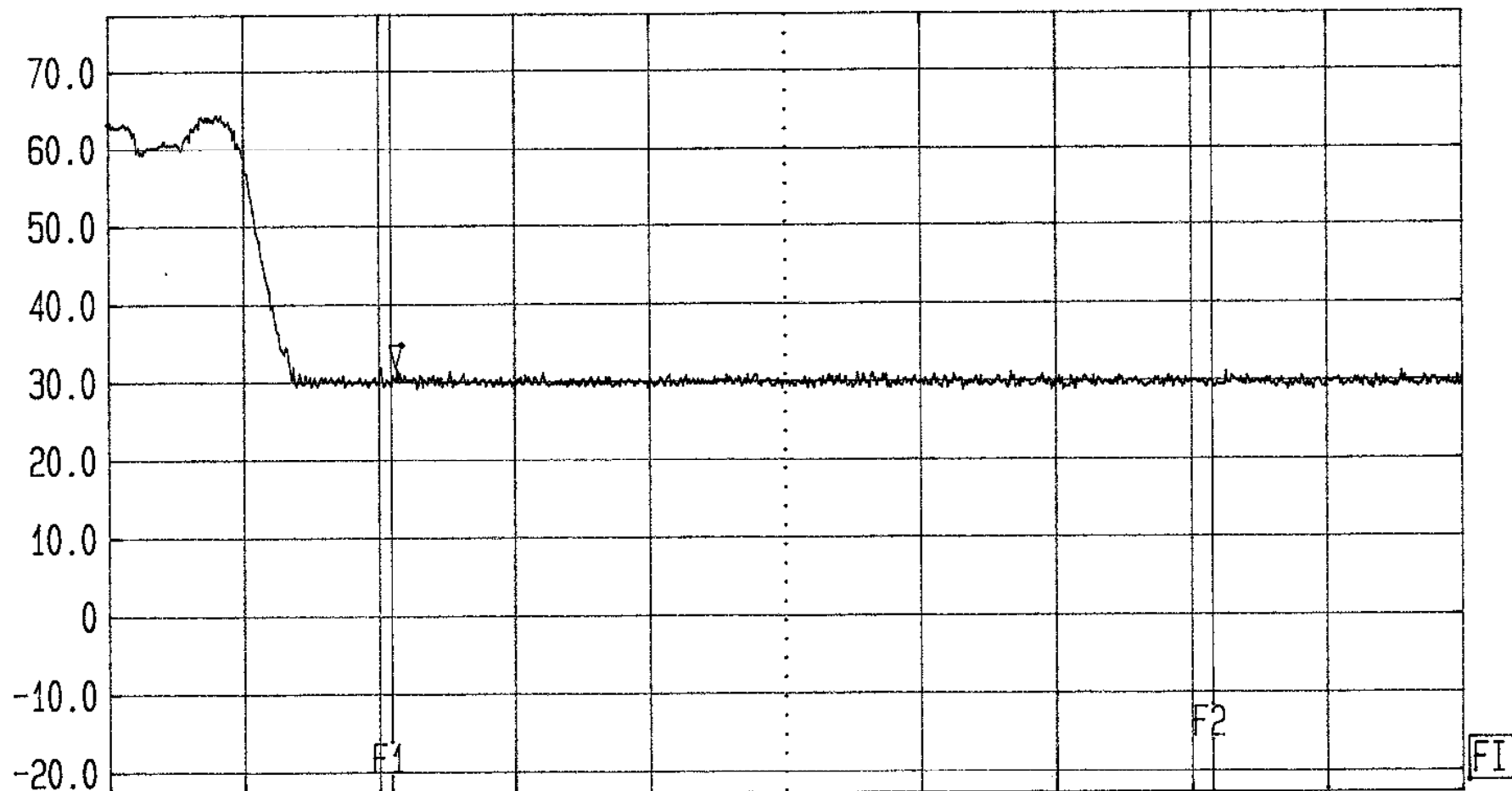
Date 12.Oct.'01 Time 16:58:35
Ref.Lvl 77.00 dB* Marker 31.63 dB*
2.48360 GHz

Res.Bw
TG.Lvl
CF.Stp

1 MHz [imp]
off
2.720 MHz

Vid.Bw
RF.Att
Unit

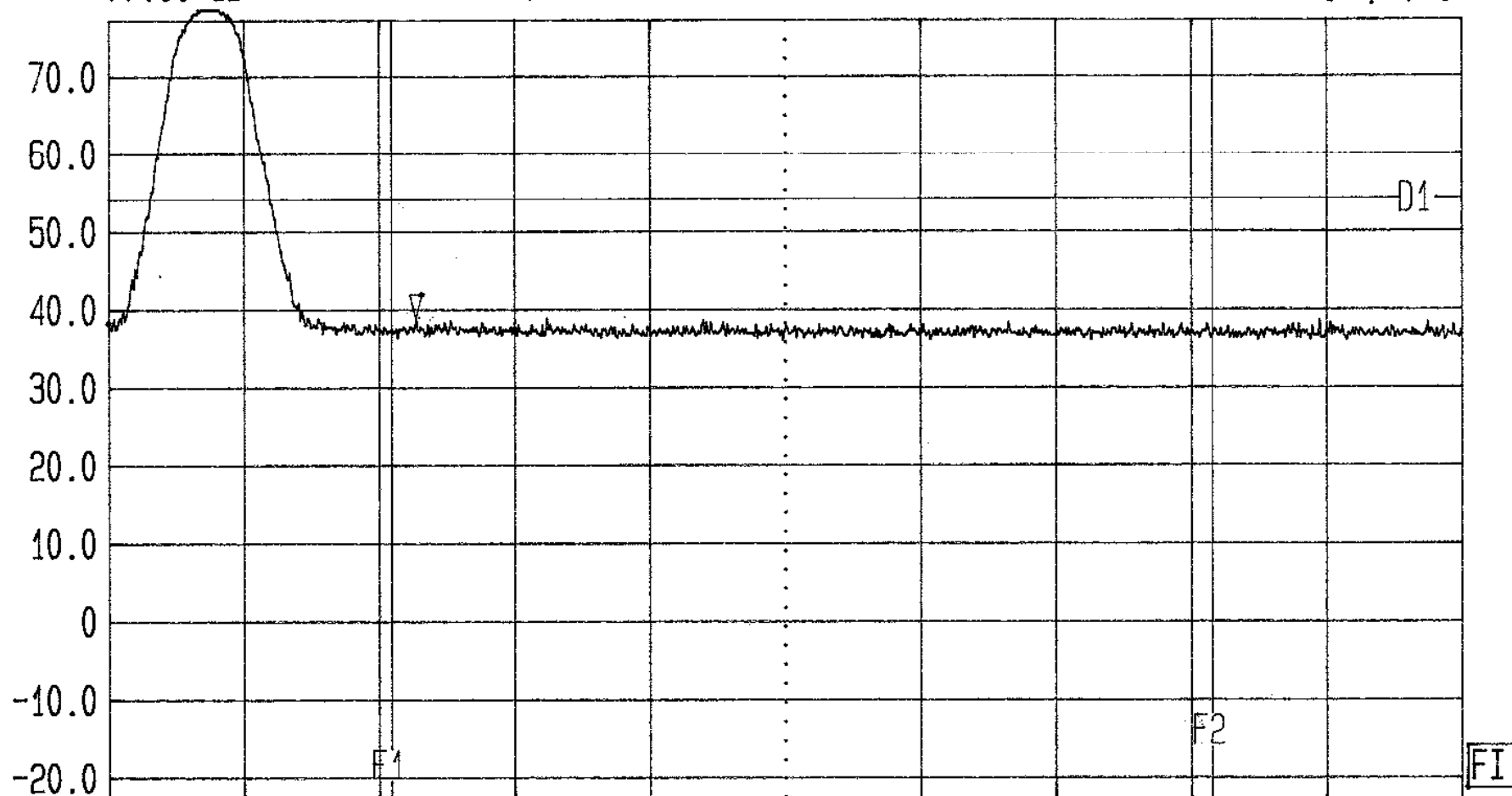
1 MHz
0 dB
[dBμV/m]



Start 2.4778 GHz Span 27.2 MHz Center 2.4914 GHz Sweep 20 ms Stop 2.505 GHz
Band Edge Test for RED-M by RFI Ltd. OPCOND : HOPPING UPPER BAND
FCC Part15.247 ENG : AMT EUT : Bluetooth Module for Visor GPH/42493/13/13/040

LVLOFF
Date 12.Oct.'01 Time 16:22:08
Ref.Lvl 77.00 dB*
Marker 38.94 dB*
2.48399 GHz

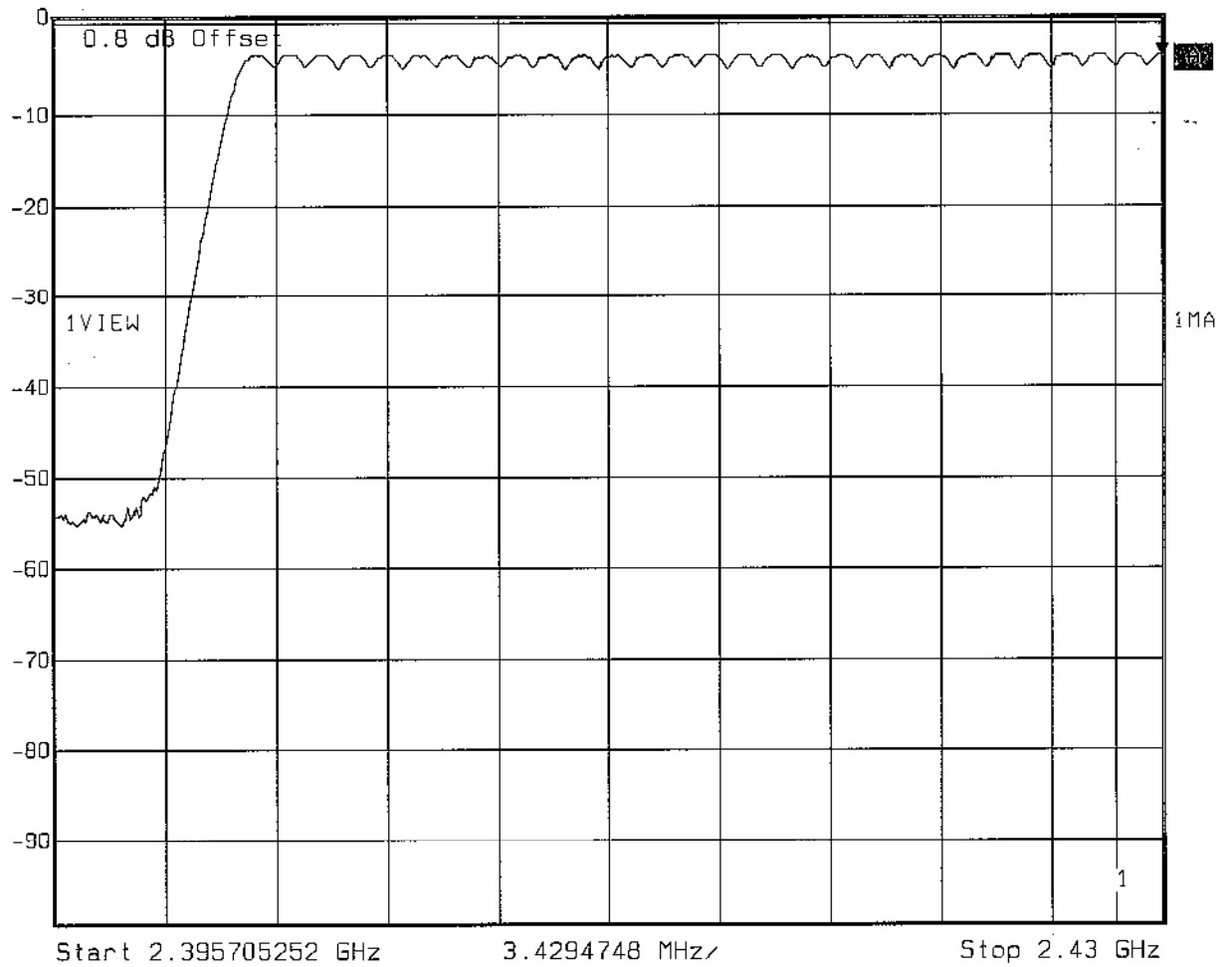
Res.Bw 1 MHz [imp]
TG.Lvl off
CF.Stp 2.720 MHz
Vid.Bw 1 MHz
RF.Att 0 dB
Unit [dBμV/m]



Start 2.4778 GHz Span 27.2 MHz Center 2.4914 GHz Sweep 20 ms Stop 2.505 GHz
Band Edge Test for RED-M by RFI Ltd. OPCOND : TX TOP CH
FCC Part15.247 ENG : AMT EUT : Bluetooth Module for Visor GPH/42493/13/13/037



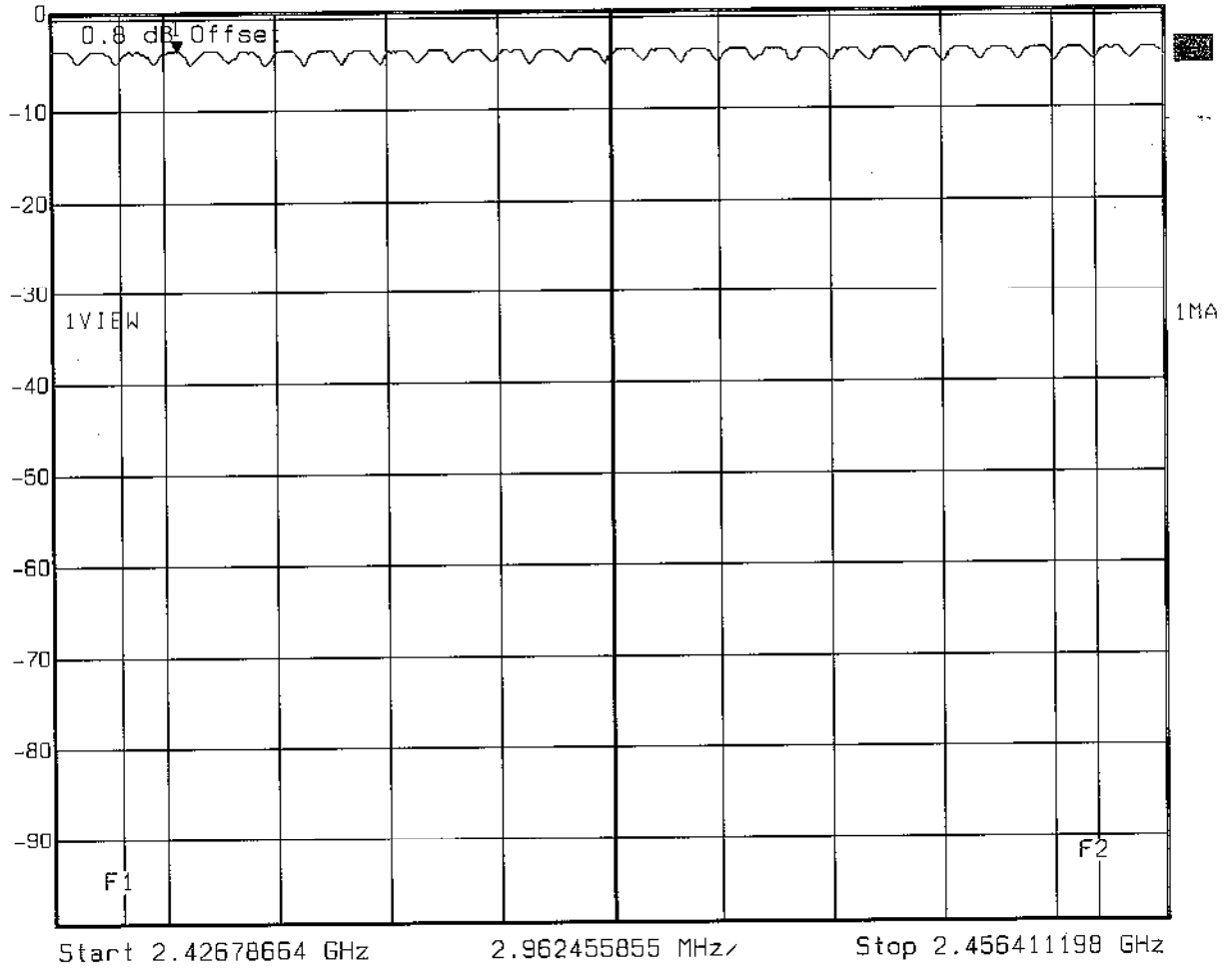
Marker 1 [T1] RBW 1 MHz RF Att 30 dB
Ref Lvl -3.56 dBm VBW 1 MHz
0.8 dBm 2.43000000 GHz SWT 5 ms Unit dBm



Title: Red M. Bluetooth Module for Visor. FCC Part 15.247
Comment A: Number Of Hopping Frequencies. Hopping All Channels.GPH/42493/003
Date: 15.OCT.2001 13:56:24



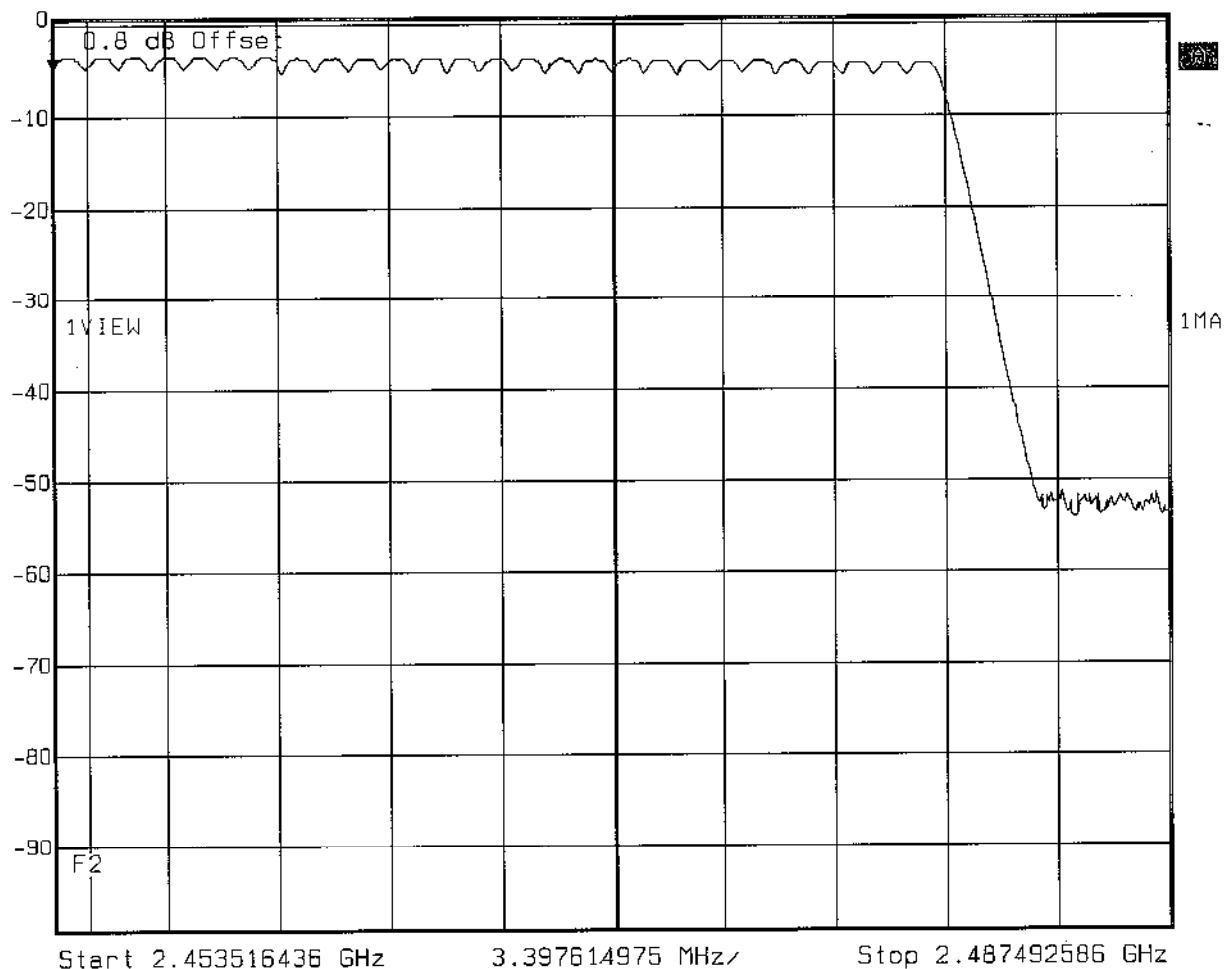
Marker 1 [T1] RBW 1 MHz RF Att 30 dB
Ref Lvl -3.61 dBm VBW 1 MHz
0.8 dBm 2.43012550 GHz SWT 5 ms Unit dBm



Title: Red M. Bluetooth Module for Visor. FCC Part 15.247
Comment A: Number Of Hopping Frequencies. Hopping All Channels. GPH/42493/004
Date: 15.OCT.2001 14:00:46



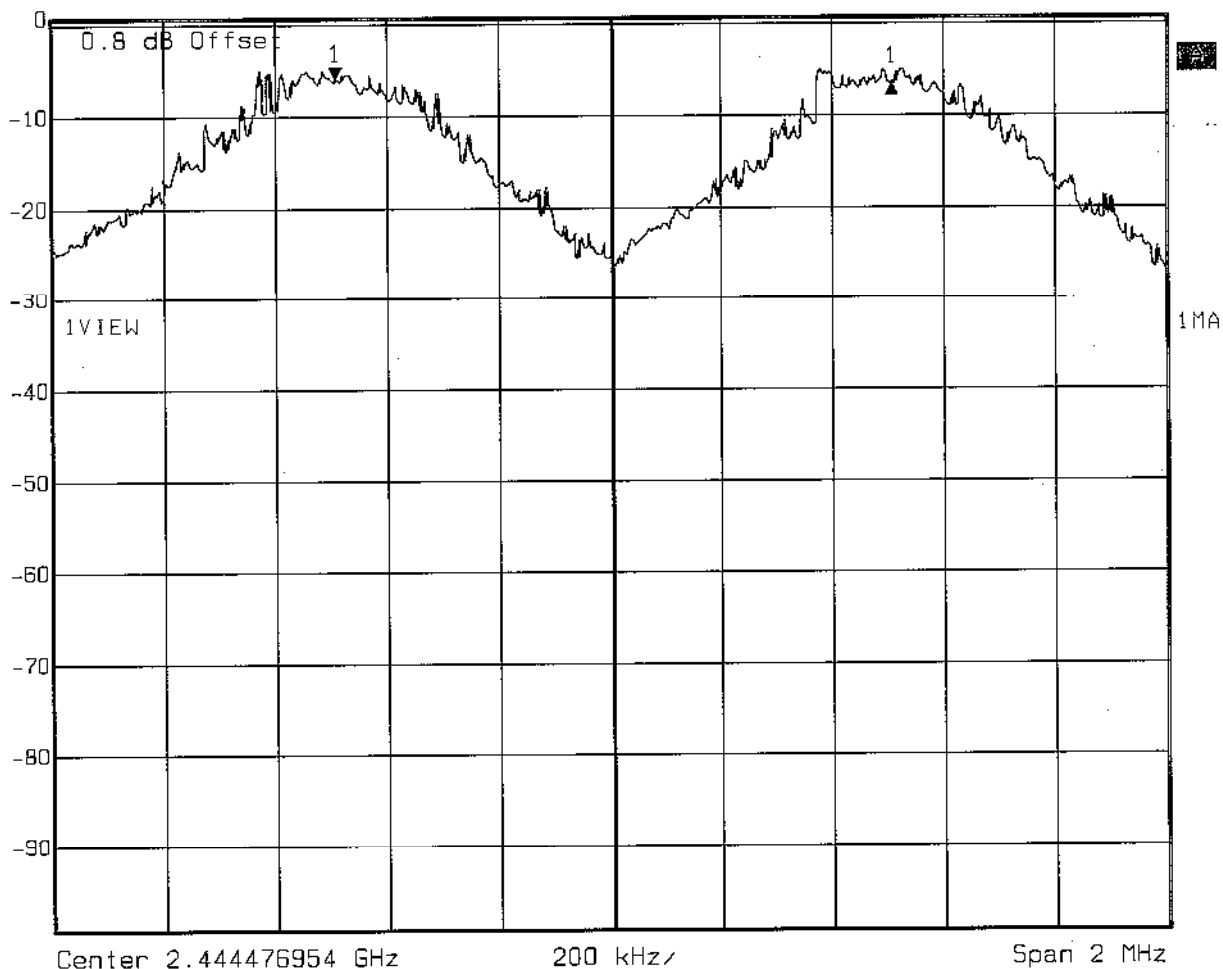
Marker 1 [T1] RBW 1 MHz RF Att 30 dB
Ref Lvl -4.81 dBm VBW 1 MHz
0.8 dBm 2.45351644 GHz SWT 5 ms Unit dBm



Title: Red M. Bluetooth Module for Visor. FCC Part 15.247
Comment A: Number Of Hopping Frequencies. Hopping All Channels.GPH/42493/005
Date: 15.OCT.2001 14:03:45



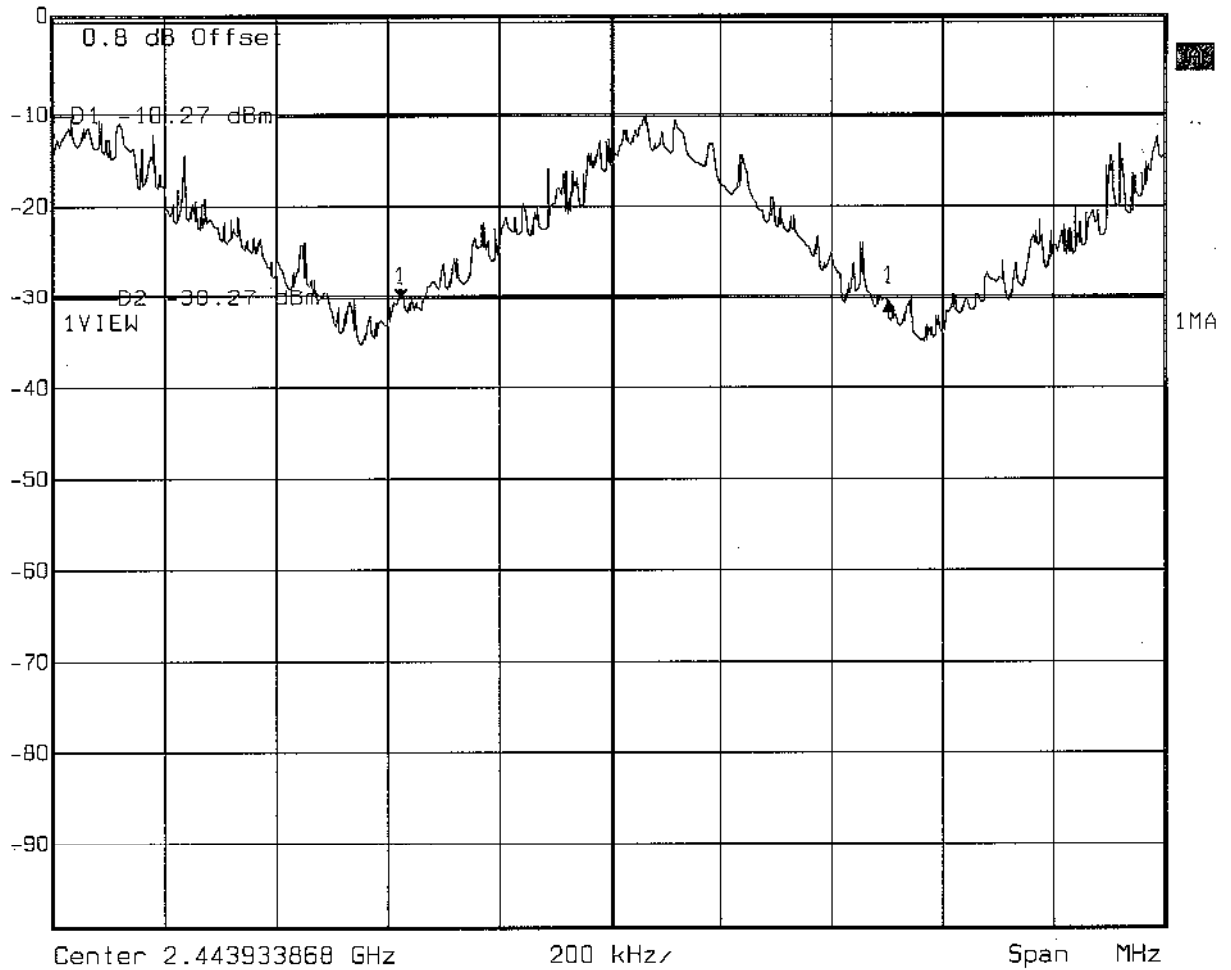
Delta 1 [T1] RBW 50 kHz RF Att 30 dB
Ref Lvl -0.65 dB VBW 50 kHz
0.8 dBm 1.00000000 MHz SWT 5 ms Unit dBm



Title: Red M. Bluetooth Module for Visor. FCC Part 15.247
Comment A: Channel Separation. Hopping All Channels. GPH/42493/001
Date: 15.OCT.2001 13:39:27



Delta 1 [T1] RBW 10 kHz RF Att 30 dB
Ref Lvl 0.00 dB VBW 10 kHz
0.8 dBm 877.75551102 kHz SWT 50 ms Unit dBm

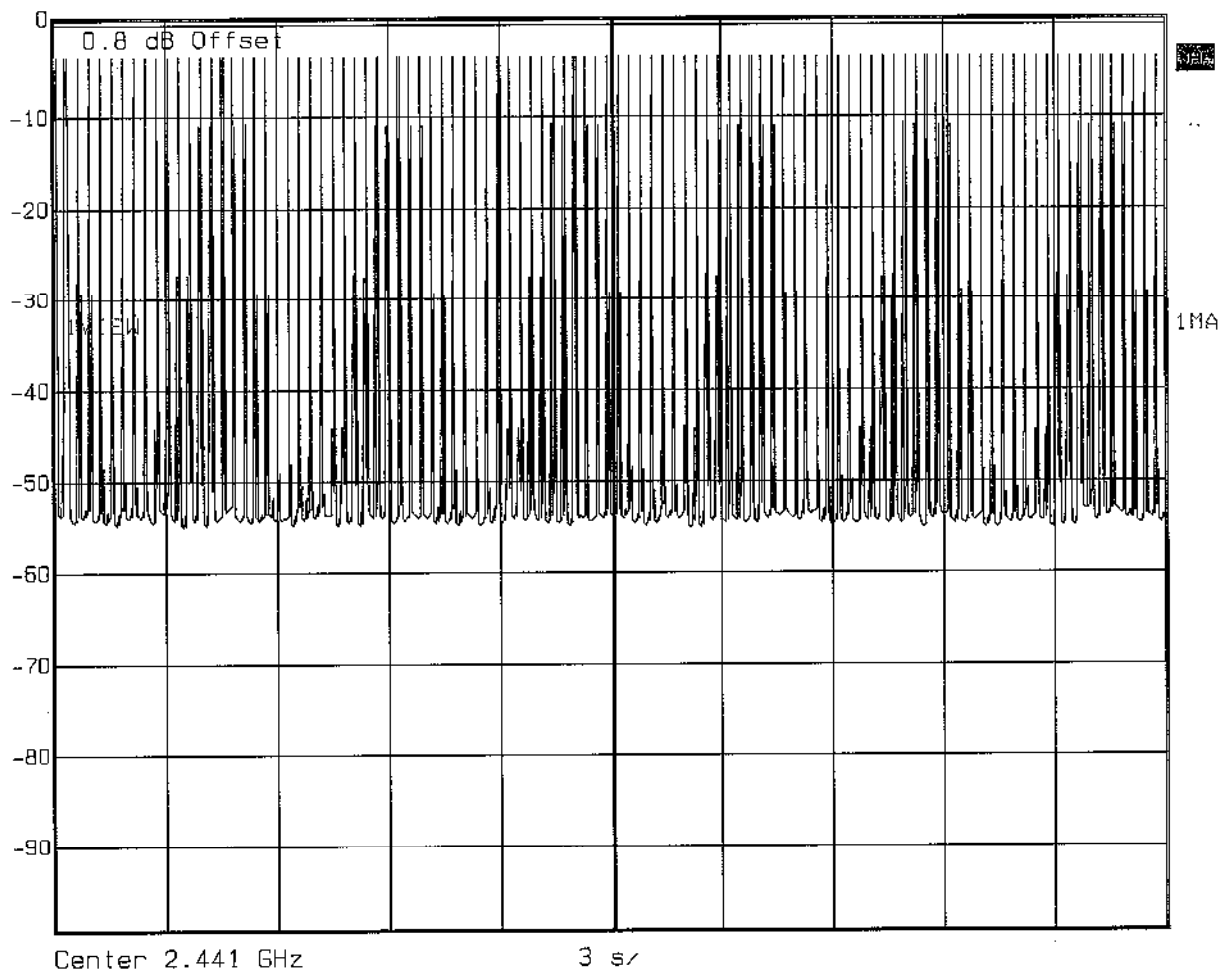


Title: Red M. Bluetooth Module for Visor. FCC Part 15.247
Comment A: 20dB Bandwidth. Hopping All Channels. GPH/42493/002
Date: 15.OCT.2001 13:49:29



Ref Lvl
0.8 dBm

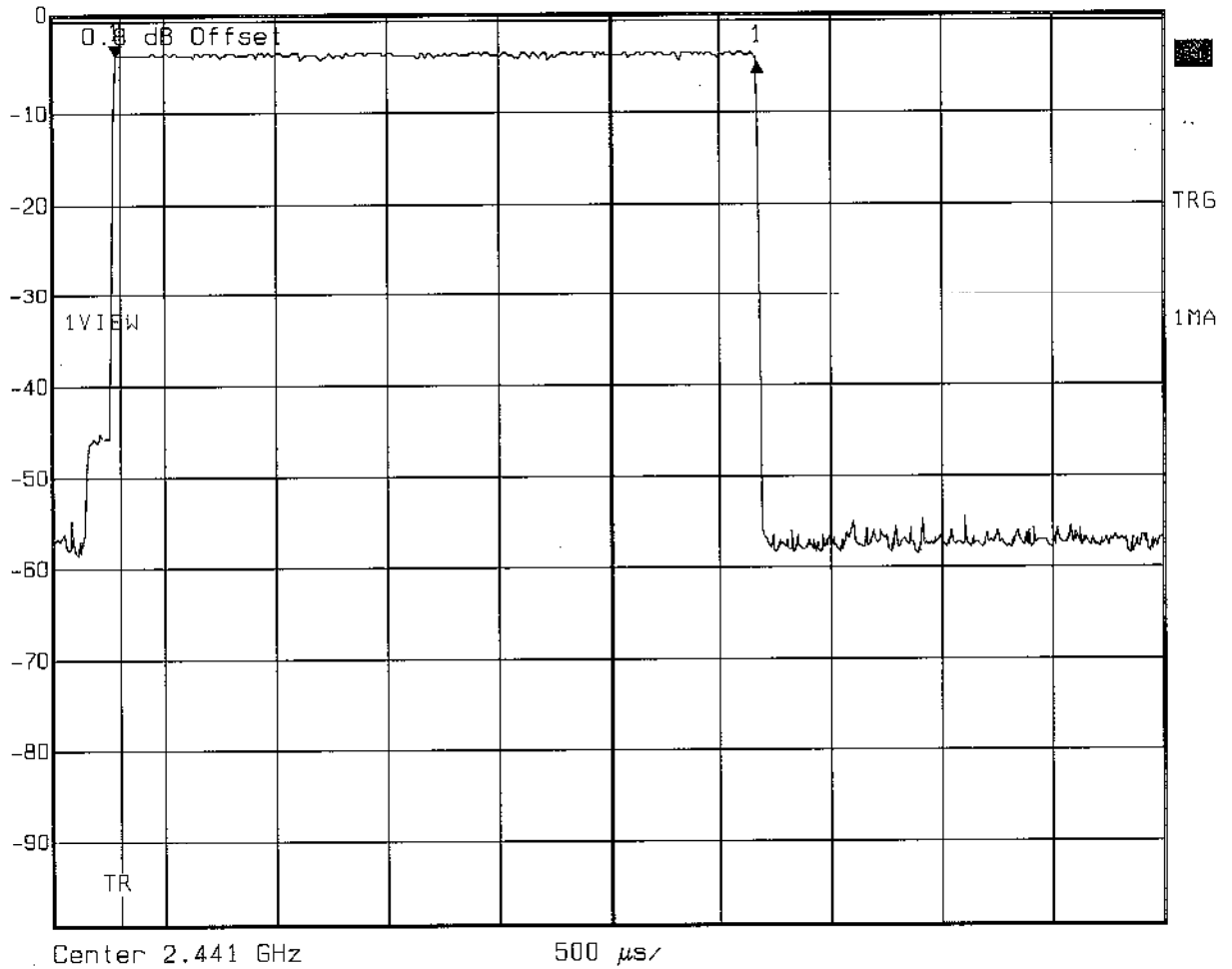
RBW 1 MHz RF Att 30 dB
VBW 1 MHz
SWT 30 s Unit dBm



Title: Red M. Bluetooth Module for Visor. FCC Part 15.247
Comment A: Number Of Hopping Frequencies. Hopping All Channels. GPH/42493/006
Date: 15.OCT.2001 14:18:44



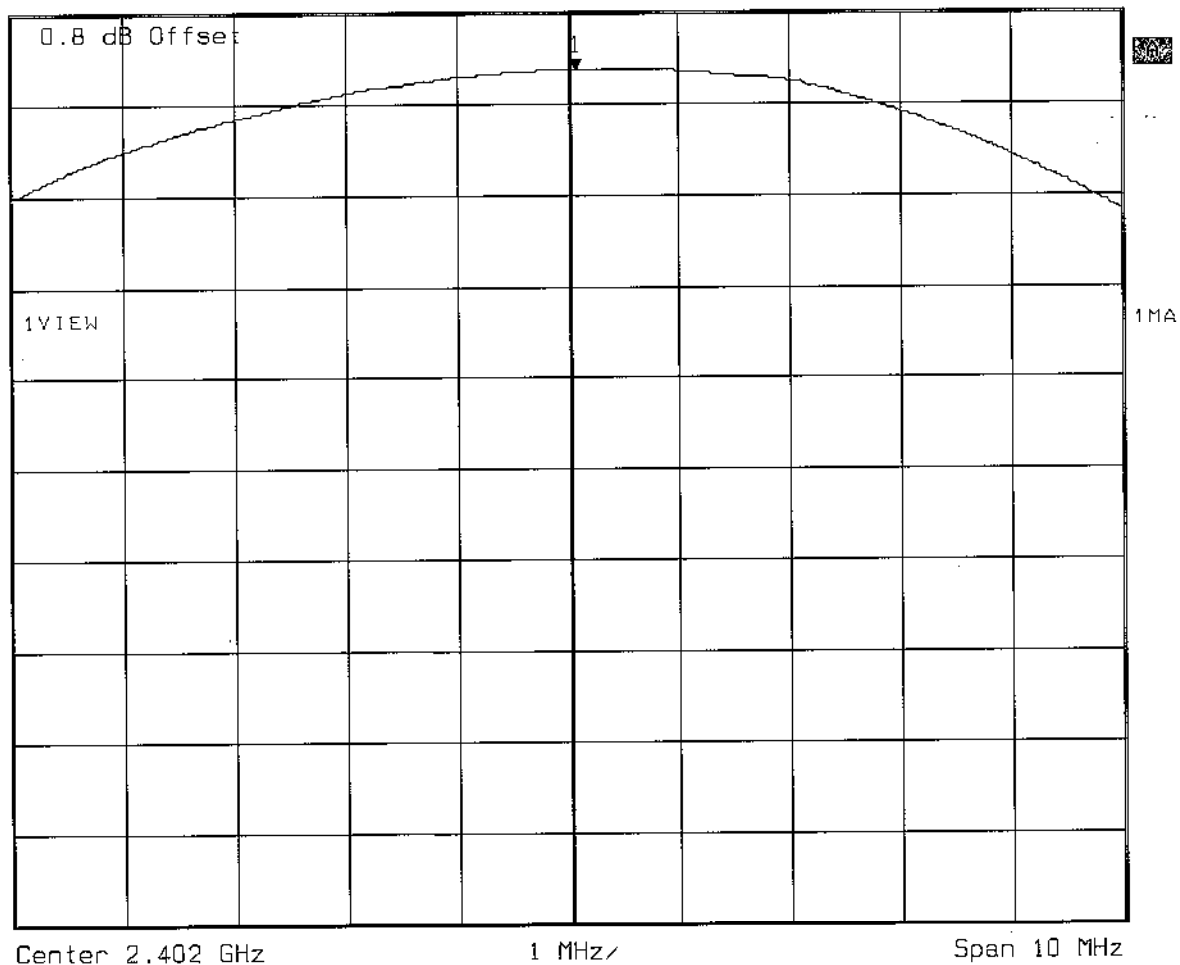
Delta 1 [T1] RBW 1 MHz RF Att 30 dB
Ref Lvl -0.47 dB VBW 1 MHz
0.8 dBm 2.887393 ms SWT 5 ms Unit dBm



Title: Red M. Bluetooth Module for Visor. FCC Part 15.247
Comment A: Time Of Occupancy (Dwell Time). GPH/42493/007
Date: 15.OCT.2001 14:28:39



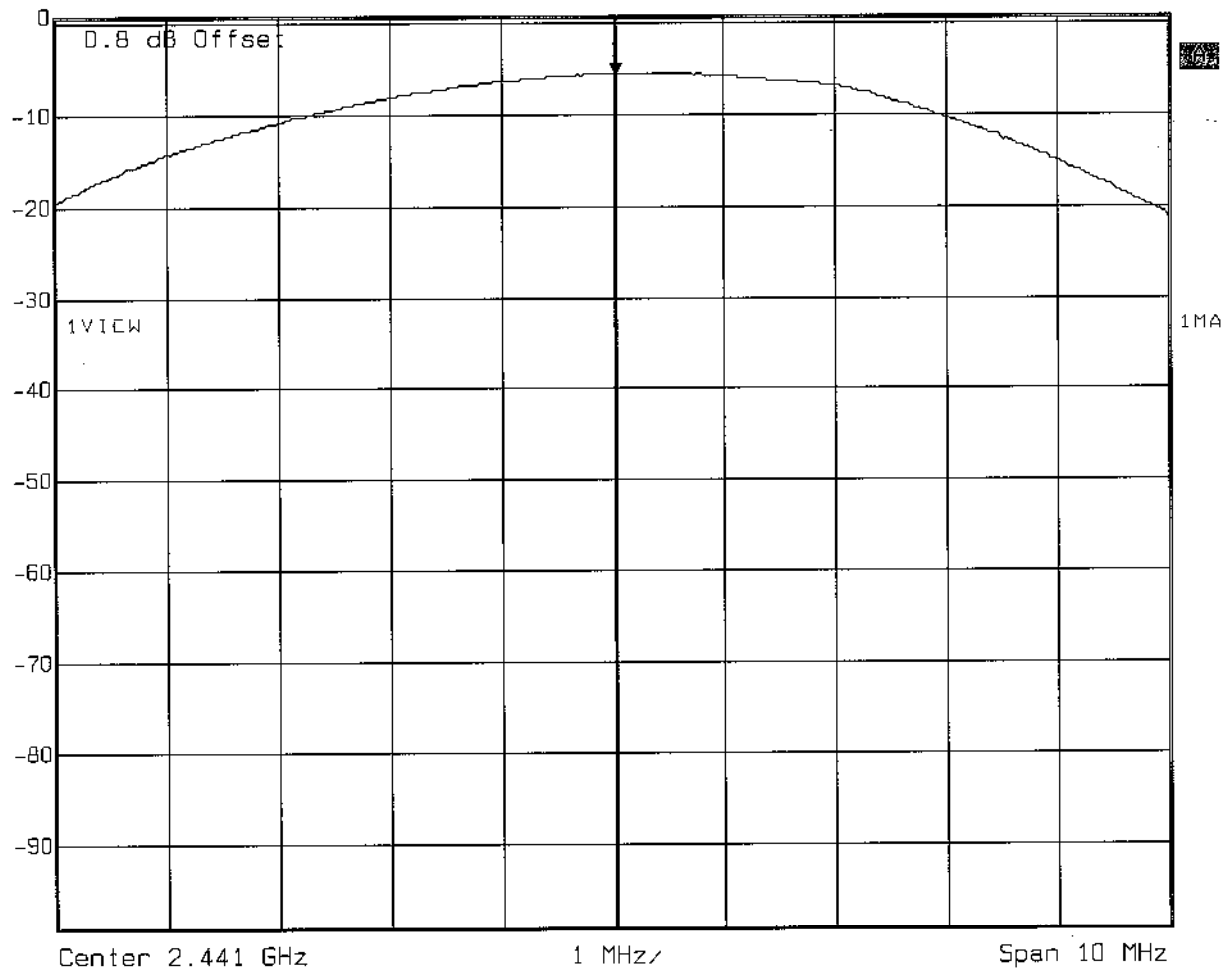
Marker 1 [T1] RBW 5 MHz RF Att 30 dB
Ref Lvl 279.831 μ W VBW 5 MHz
1.202 mW 2.40207014 GHz SWT 5 ms Unit W



Title: Red M. Bluetooth Module for Visor. FCC Part 15.247
Comment A: Peak Output Power. Bottom Channel. GPH/42493/008
Date: 15.OCT.2001 14:38:55



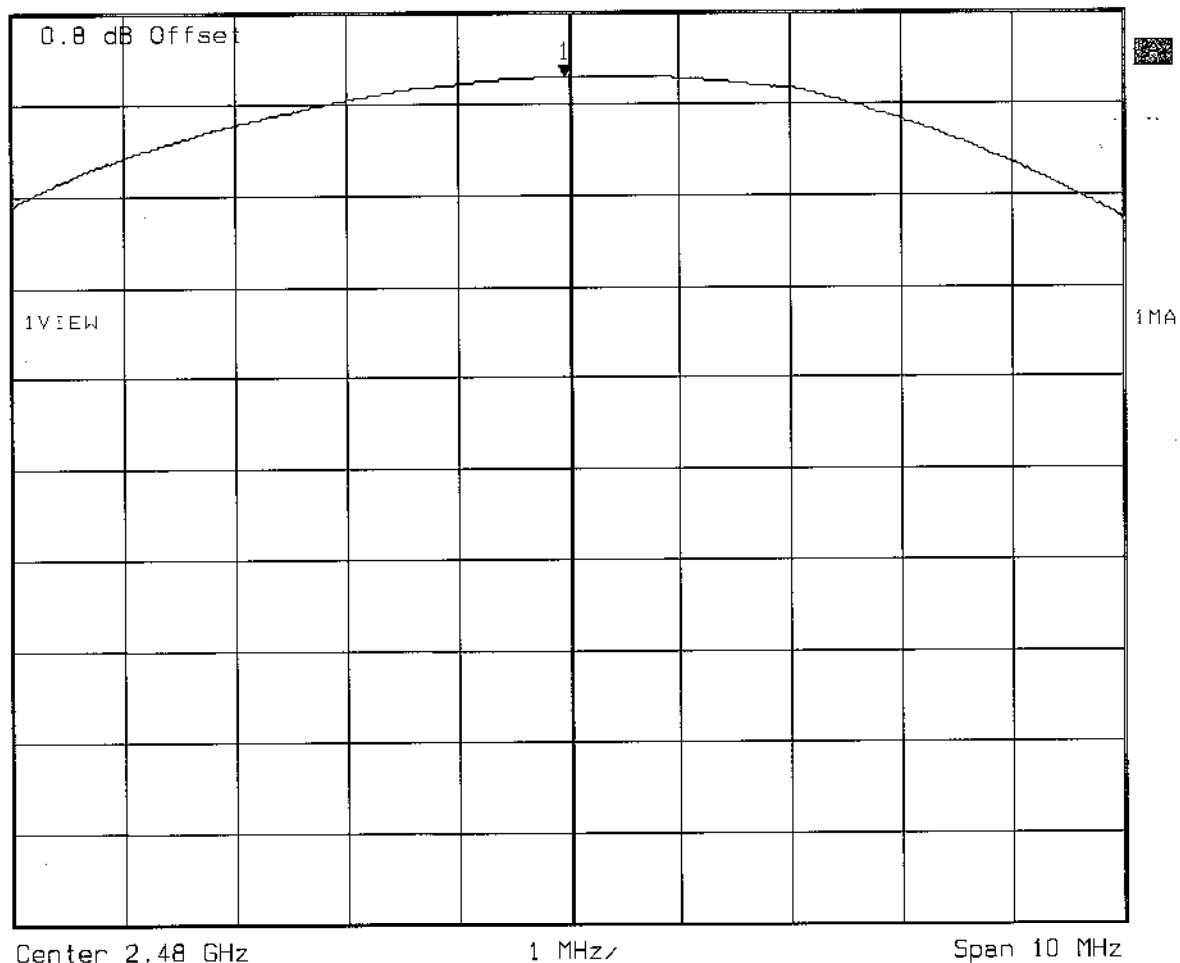
Marker 1 [T1] RBW 5 MHz RF Att 30 dB
Ref Lvl -5.53 dBm VBW 5 MHz
0.8 dBm 2.44103006 GHz SWT 5 ms Unit dBm



Title: Red M. Bluetooth Module for Visor. FCC Part 15.247
Comment A: Peak Output Power. Middle Channel. GPH/42493/009
Date: 15.OCT.2001 14:41:09



Marker 1 [T1] RBW 5 MHz RF Att 30 dB
Ref Lvl 233.448 μ W VBW 5 MHz
1.202 mW 2.47996994 GHz SWT 5 ms Unit W



Title: Red M. Bluetooth Module for Visor. FCC Part 15.247
Comment A: Peak Output Power. Top Channel. GPH/42493/010
Date: 15.OCT.2001 14:43:11

Graphical Test Results (continued)

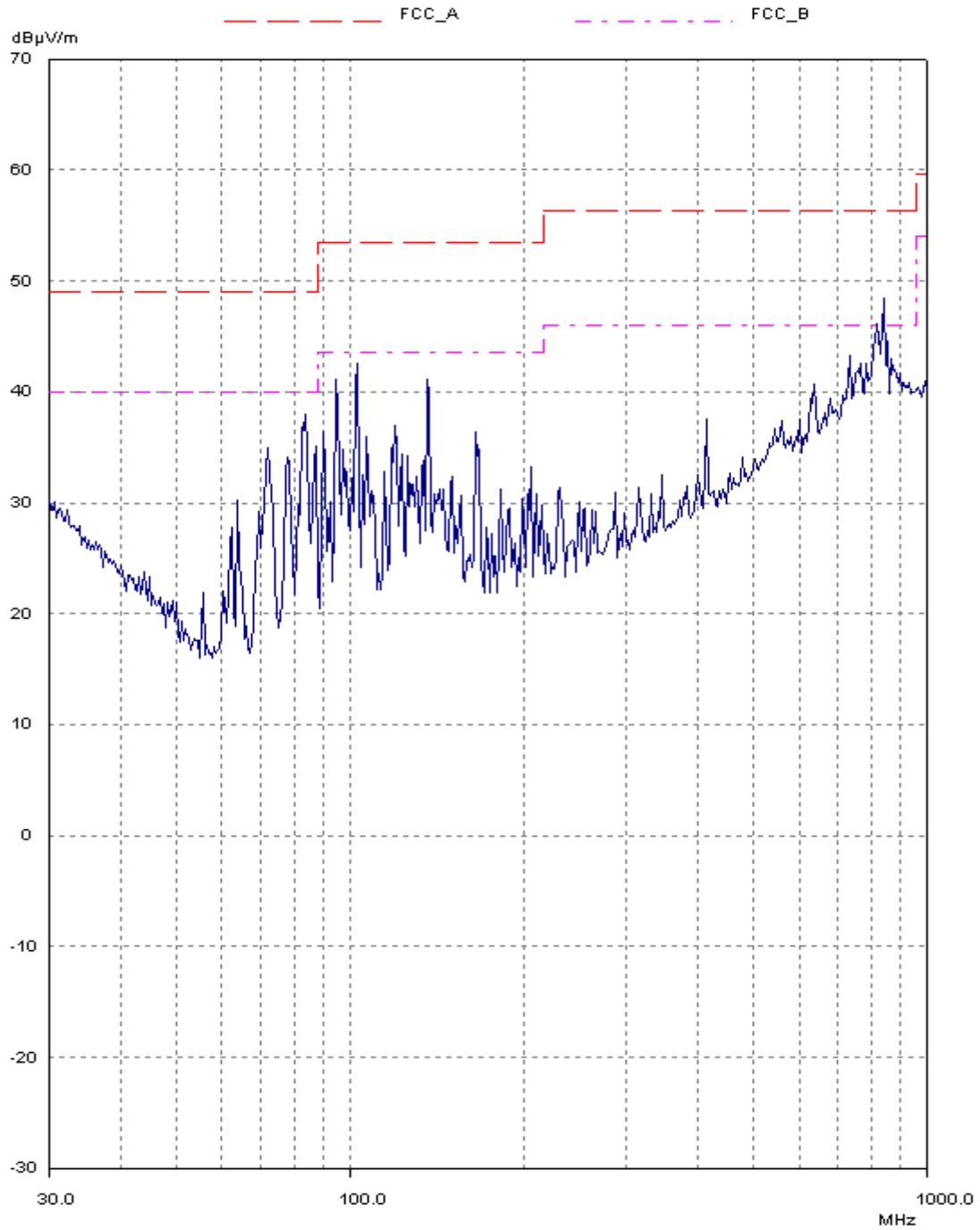
Graph Reference Number	Title
GPH\42493\13\13\001	Radiated Emissions, Transmit Mode, Lower Channel (30 MHz to 1000 MHz)
GPH\42493\13\13\002	Radiated Emissions, Transmit Mode, Middle Channel (30 MHz to 1000 MHz)
GPH\42493\13\13\003	Radiated Emissions, Transmit Mode, Upper Channel (30 MHz to 1000 MHz)
GPH\42493\13\13\004	Radiated Emissions, Receive Mode (30 MHz to 1000 MHz)

Test Of: Red-M (Communications) Ltd.

Bluetooth Module for Visor

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

GPH\42493\13\13\001

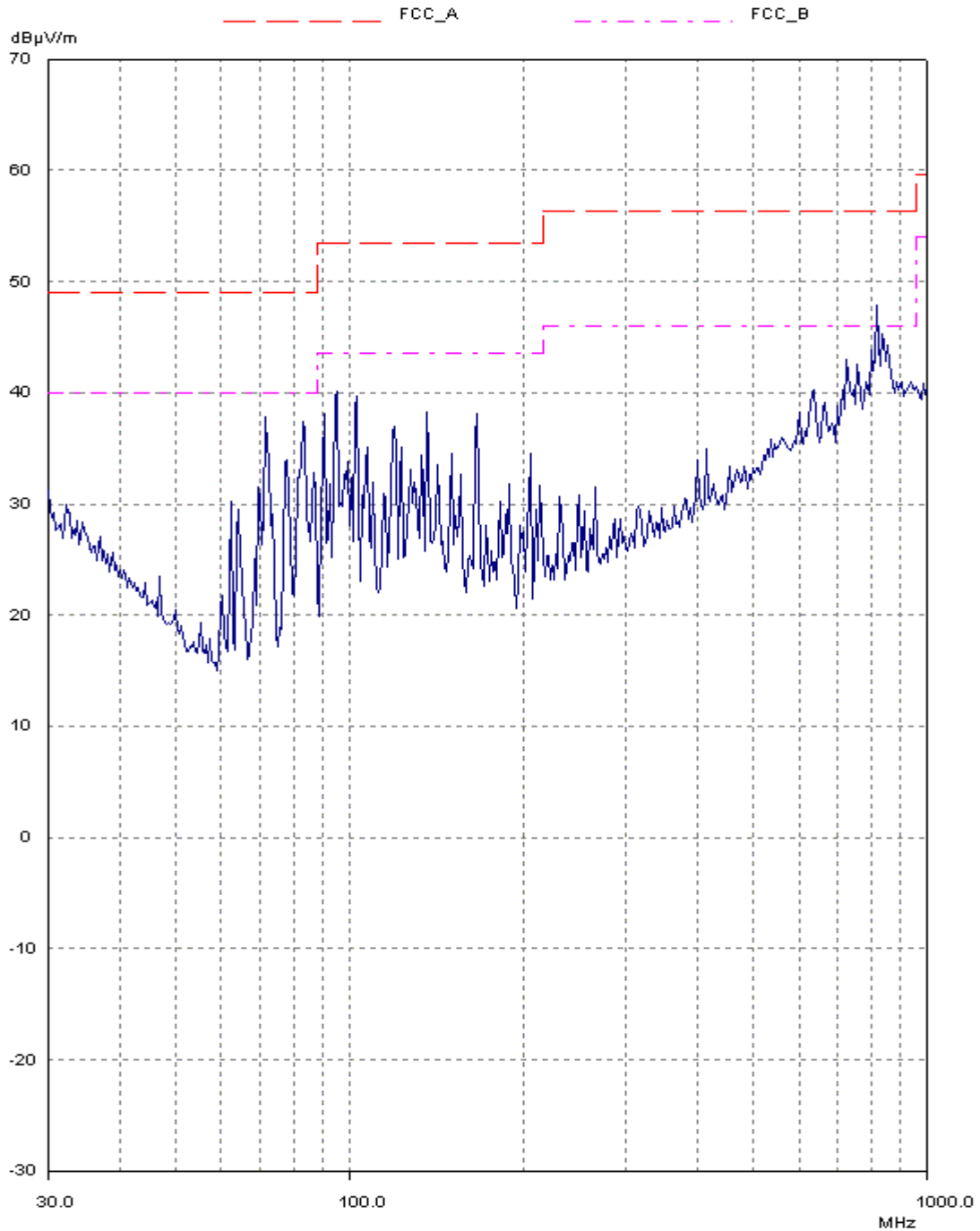


Test Of: Red-M (Communications) Ltd.

Bluetooth Module for Visor

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

GPH\42493\13\13\002

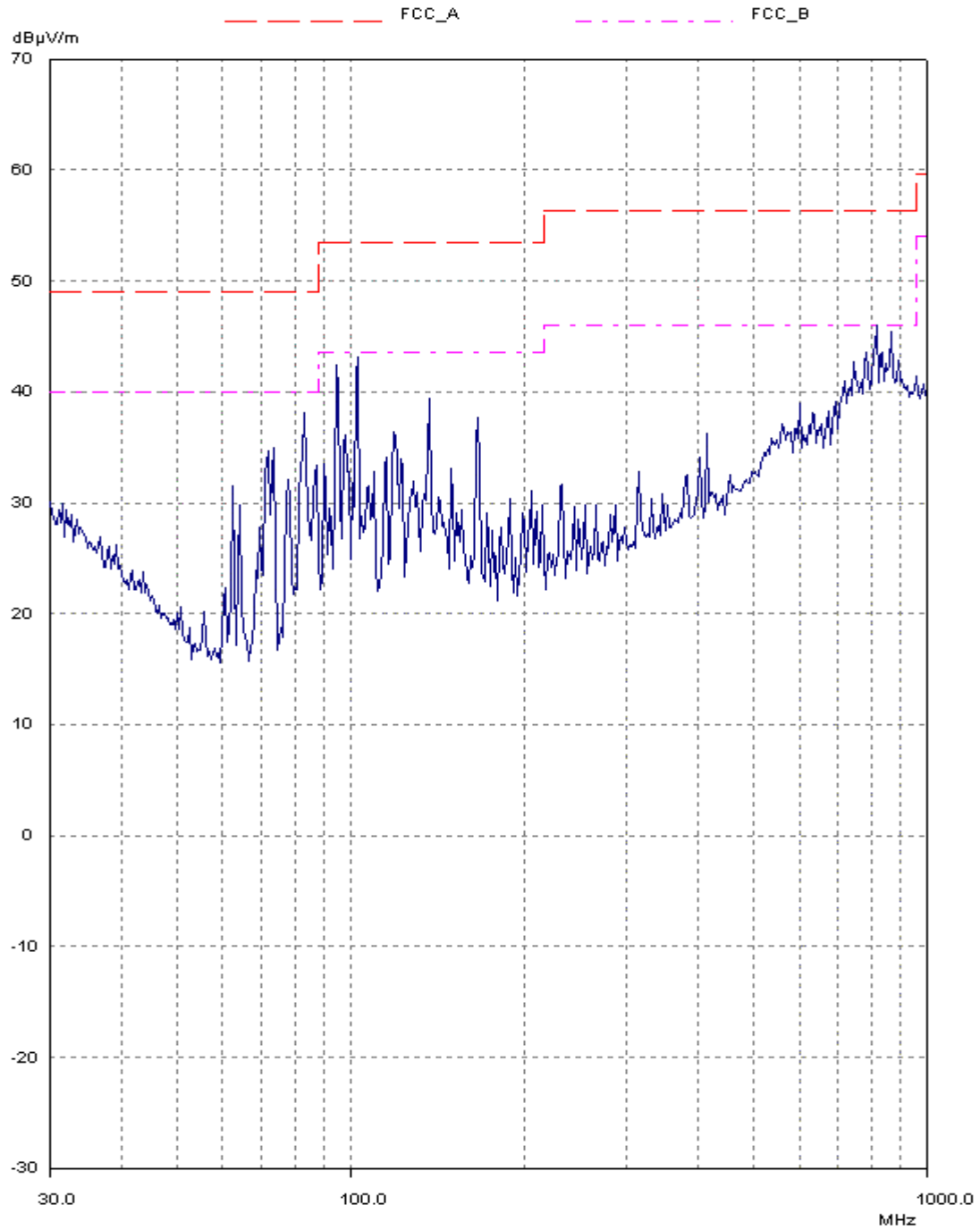


Test Of: Red-M (Communications) Ltd.

Bluetooth Module for Visor

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

GPH\42493\13\13\003



Test Of: Red-M (Communications) Ltd.

Bluetooth Module for Visor

To: F.C.C. Part 15 Subpart C: 1998 (Intentional Radiators) Section 15.247

GPH\42493\13\13\004

