TEST REPORT
FROM
RADIO FREQUENCY
INVESTIGATION LTD.

Test Of: Crowcon Detection Instruments Ltd.
Gasman 2

To: F.C.C. Part 15 Subpart C: 1998
(Intentional Radiators)
Section 15.231

Test Report Serial No:
RFI/EMCB1/RP40407B

This Test Report Is Issued Under The Authority Of Brian Watson Technical Director: 	**Checked By:** 
Tested By: 	**Release Version No:** **PDF01**
Issue Date: 4 February 2000	**Test Date: 21 January 2000**

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Registered Office: Ewhurst Park, Ramsdell, Basingstoke, Hampshire RG26 5RQ

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1. Client Information

Company Name:	Crowcon Detection Instruments Ltd
Address:	2 Blacklands Way Abingdon Business Park Abingdon Oxfordshire OX14 1DY
Contact Name:	Mr P Basham

2. Equipment Under Test (EUT)

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

2.1. Identification Of Equipment Under Test (EUT)

Brand Name:	Crowcon Detection Instrument Ltd
Model Name or Number:	Gasman 2 (Toxic Gas Detector)
Unique Type Identification:	None stated by client
Serial Number:	None stated by client
Country of Manufacture:	UK
FCC ID Number:	Not applicable
Date of Receipt:	12 January 2000

2.2. Description Of EUT

The equipment under test is a hand held / body worn gas detector with a low power 418 MHz transmitter.

2.3. Modifications Incorporated In EUT

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

2.4. Additional Information Related To Testing

Power Supply Requirement:	Internal battery supply of 4.5 V
Intended Operating Environment:	Light Industry and Heavy Industry
Weight:	200 grams
Dimensions:	130 mm x 56 mm x 27 mm
Interface Ports:	None

2.5. Support Equipment

No support equipment was used to exercise the EUT during testing.

3. Test Specification, Methods And Procedures

3.1. Test Specification

Reference:	FCC Part 15 Subpart C:1998 (Intentional Radiators). Section 15.231. (Periodic Operation within the Band 40.66 to 40.70 MHz and above 70 MHz).
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:

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.

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 the test the EUT was operated by an internal battery supply of 4.5 V.

5.2. Operating Modes

The EUT was tested in the following operating modes:

- Alarm Mode.
- Idle Mode.

The reason for choosing this operating mode was that it was defined by the client as being likely to be the worst case with regards EMC.

5.3. Configuration And Peripherals

The EUT was tested in the following configuration:

Standalone.

The reason for choosing this configuration was that it was defined by the client as being likely to be the worst case with regards EMC.

6. Summary Of Test Results

Range Of Measurements	Specification Reference	Compliancy Status
Transmitter Operating Time	C.F.R. 47 Part 15.231(a): 1998.	Complied
Electric Radiated Field Strength 30 MHz to 5000 MHz (Alarmed Mode)	C.F.R. 47 Part 15.231(b): 1998.	Complied
Electric Radiated Field Strength 30 MHz to 2000 MHz (Idle Mode)	C.F.R. 47 Part 15.109: 1998 Class B	Complied
Occupied Bandwidth	C.F.R. 47 Part 15.231(c): 1998.	Complied

6.1. 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.

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. The measurement uncertainties stated were calculated in accordance with the requirements of NAMAS Document NIS 81 with a confidence level of 95%. Please refer to Section 8 for details of measurement uncertainties.

7.2. Test Results For Radiated Emissions

7.2.1. Electric Field Strength Measurements: Fundamental Emission: Alarmed Mode

7.2.1.1. The client has stated that the transmitter frequency for the EUT was 418 MHz.

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

7.2.1.3. The following table lists the measurement of the fundamental emission in the worse case antenna polarisation, using an Average detector function (results incorporate antenna factors and cable losses):

Frequency (MHz)	Ant. Pol.	Av. Level (dBmV/m)	Av. Limit (dBmV/m)	Margin (dB)	Result
418.069	Vert.	76.5	80.3	3.8	Complied

7.2.2. Electric Field Strength Measurements: 30 to 1000 MHz: Alarmed Mode

7.2.2.1. The client has stated that the highest clock frequency for the EUT was 418 MHz. Therefore tests were performed up to 5000 MHz.

7.2.2.2. Radiated emission spurious limits stated in section 15.231 (b) shall not exceed a level of 20dB below the fundamental carrier limit, or the limit specified in section 15.209, whichever is the higher limit. If the frequency of the spurious emission is located in one of the Restricted Bands of operation stated in section 15.205, then the level of emissions shall not exceed the limit specified in section 15.209.

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

7.2.2.4. The following table lists frequencies at which emissions were measured using a Quasi-Peak detector (results incorporate antenna factors and cable losses):

Frequency (MHz)	Ant. Pol.	Q-P Level (dBµV/m)	Q-P Limit (dBµV/m)	Margin (dB)	Result
836.139	V	52.2	60.3	8.1	Complied

7.2.3. Electric Field Strength Measurements: 30 to 1000 MHz: Idle Mode

7.2.3.1. The client has stated that the highest clock frequency for the EUT was 418 MHz. Therefore tests were performed up to 2000 MHz.

7.2.3.2. Radiated emissions performed in this mode of operation were performed to Section 15.109 Class B.

7.2.3.3. Radiated emission preliminary scans were performed in idle mode. These scans showed levels, which were greater than 10dB below the reference limit line. Therefore final radiated emission measurements were not performed.

7.2.4. Electric Field Strength Measurements (1000 to 5000 MHz): Alarmed Mode

7.2.4.1. The client has stated that the highest clock frequency for the EUT was 418 MHz. Therefore tests were performed up to 5000 MHz.

7.2.4.2. Radiated emission spurious limits stated in section 15.231 (b) shall not exceed a level of 20dB below the fundamental carrier limit, or the limit specified in section 15.209, whichever is the higher limit. If the frequency of the spurious emission is located in one of the Restricted Bands of operation stated in section 15.205, then the level of emissions shall not exceed the limit specified in section 15.209.

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

7.2.4.4. The following table lists frequencies at which emissions were measured using an Average and Peak detector function.

Average Levels

Frequency (GHz)	Antenna Polarity (H/V)	Average Level (dBmV)	Antenna Factor (dB)	Cable Loss (dB)	Average Level (dBmV/m)	Average Limit (dBmV/m)	Average Margin (dB)	Result
2.0900	Vert.	19.4	22.0	1.4	42.8	60.3	17.5	Complied
2.5080	Vert.	23.8	21.7	1.2	46.7	60.3	13.6	Complied
2.9270	Vert.	23.2	21.5	1.5	46.2	60.3	14.1	Complied
3.3450	Vert.	24.8	21.2	2.2	48.2	60.3	12.1	Complied
3.7630	Vert.	19.1	21.1	2.3	42.5	54.0	11.5	Complied
4.1807	Vert.	18.4	24.1	2.4	44.9	54.0	9.1	Complied

Peak Levels

Frequency (GHz)	Antenna Polarity (H/V)	Peak Level (dBmV)	Antenna Factor (dB)	Cable Loss (dB)	Peak Level (dBmV/m)	Peak Limit (dBmV/m)	Peak Margin (dB)	Result
2.0900	Vert.	30.9	22.0	1.4	54.3	80.3	26.0	Complied
2.5080	Vert.	35.0	21.7	1.2	57.9	80.3	22.4	Complied
2.9270	Vert.	34.2	21.5	1.5	57.2	80.3	23.1	Complied
3.3450	Vert.	36.0	21.2	2.2	59.4	80.3	20.9	Complied
3.7630	Vert.	30.1	21.1	2.3	53.5	74.0	20.5	Complied
4.1807	Vert.	28.7	24.1	2.4	55.2	74.0	18.8	Complied

7.2.5. Electric Field Strength Measurements (1000 to 2000 MHz): Idle Mode

7.2.5.1. The client has stated that the highest clock frequency for the EUT was 418 MHz. Therefore tests were performed up to 2000 MHz.

7.2.5.2. Radiated emissions performed in this mode of operation were performed to Section 15.109 Class B.

7.2.5.3. Radiated emission preliminary scans were performed in idle mode. These scans showed levels, which were greater than 10dB below the reference limit line. Therefore final radiated emission measurements were not performed.

7.3. Transmitter Operation Time

7.3.1. The client has stated, that when the EUT is initially switched on, the transmitter is activated, before automatically switching off to a standard idle mode. Therefore the EUT was tested to the limits specified in Section 15.231 (a(2)) for this mode of operation.

7.3.2. A plot showing the timing characteristics of the EUT can be seen in Appendix 4 of this test report.

Results

Overall Transmission Time (Seconds)	Limit (Seconds)	Result
4.277	5.0	Complied

7.3.3. The client has stated that the EUT transmits only during an alarm condition, when 'gas' is detected. Therefore in accordance with Section 15.231 (a(4)), no limits concerning the transmission time are specified, as it is considered that that the EUT operates only during the pendency of the alarm condition.

7.4. Occupied Bandwidth

7.4.1. The EUT was tested to the limits specified in Section 15.231 (c).

7.4.2. For a transmitter operating above 70 MHz and below 900 MHz, the bandwidth of the emission shall be no wider than 0.25% of the centre frequency. The bandwidth is determined at the points 20 dB down from the Peak of the modulated carrier.

7.4.3. A plot showing the occupied bandwidth of the EUT can be seen in Appendix 4 of this test report.

Results

Measured Bandwidth (kHz)	Limit (kHz)	Result
30.18272	1045.0	Complied

8. Measurement Uncertainty

8.1. Company Policy, as based on the NAMAS Accreditation Standard, M10, paragraph 12.11 (o), states that Test Reports shall include estimated uncertainty of the calibration or test result (this information need only appear in test reports and test certificates where it is relevant to the validity or application of the test result, where a client's instructions so require or where uncertainty affects compliance to a specification or limit).

8.2. The global uncertainties have been calculated in accordance with NAMAS NIS 81 (Edition 1, May 1994) as follows:

Measurement Type	Range	Confidence Level	Calculated Uncertainty
Radiated Electric Field Strength Emissions	30 MHz to 1000 MHz	95%	+/- 4.9 dB
Radiated Electric Field Strength Emissions	1000 MHz to 5000 MHz	95%	+/- 4.4 dB
Transmission Time and Occupied Bandwidth	418 MHz	95%	+/- 0.12 %

8.3. Measurement uncertainties have been applied in accordance with NAMAS document NIS 81 (edition 1, May 1994), and in the absence of any specification criteria, guidance, or code of practice, compliance has been judged on the basis of shared risk.

8.4. In the case of emissions tests, the measured value of the disturbance from the product sample shall be compared directly with the limits. If the measured value is equal to or less than the limit the product is deemed to pass the test.

8.5. In the case of immunity tests, the equipment is deemed to pass the test if it fulfils the stated performance criteria at the required or a higher severity level. The measurement uncertainty has been taken into account in the calibration procedures stated in the relevant basic standard.

8.6. The methods used to calculate the above uncertainties are in line with those used for calibration laboratories contained in NAMAS document NIS 3003 Edition 8 “The Expression of Uncertainty and Confidence in Measurement” May 1995, which align with international recommendations “Guide to the Expression of Uncertainty in Measurement” ISO/IEC/OIML/BIPM (Prepared by ISO/TAG 4: January 1993).

Appendix 1. Test Equipment Used

Instrument	Manufacturer	Model	RFI No.
Horn Antenna (1 to 2 GHz)	Eaton Limited	9188-2	A027
Horn Antenna (2 to 4 GHz)	Eaton Limited	91889-2	A031
OATS Positioning Controller	R & S	HCC	A276
Horn Antenna (4 to 6 GHz)	Flann	12240-20	A428
Bilog Antenna	Chase	CBL6111A	A490
Antenna	Chase	CBL6111B	A1039
Cable	Rosenberger	UFA 210A-1-0788-50x50	C322
Cable	RFI	None	C409
Receiver	R & S	ESVP	M002
Spectrum Monitor	R & S	EZM	M003
Turntable Controller	R.H.Electrical Services	RH351	M173
Receiver	R & S	ESBI	M090

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

Appendix 2. Measurement Methods

A2.1. Radiated Emissions: FCC Part 15

A2.1.1. Radiated emissions measurements were performed in accordance with the standard, against appropriate limits for each detector function.

A2.1.2. 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.

A2.1.3. The initial scans were performed using an antenna height of 1.5 m and a measurement distance of 3 m. 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 receivers with a Quasi-Peak or Average detector (below 1000 MHz) where applicable, for measurements above 1000 MHz average and peak detectors were used.

A2.1.4. 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.

A2.1.5. All measurements on the open area test site were performed using broadband antennas.

A2.1.6. 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.

A2.1.7. 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) or Average
Mode:	Max Hold	Not applicable
Bandwidth:	100 kHz	120 kHz
Amplitude Range:	60 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:	60 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

With the EUT operated in an alarmed mode, spurious radiated emissions were measured against the limits specified in Section 15.209 of C.F.R. 47 Part 15 Subpart C - Intentional Radiators OR those of Section 15.231(b) depending upon whichever permitted a higher field strength. Unless otherwise stated, the limits given in this report correspond to those specified in Section 15.209 as these are the most stringent.

With the EUT operated in an idle mode, spurious radiated emissions were measured against the limits specified in Section 15.109 Class B.

A2.2. Occupied Bandwidth

A2.2.1. Measurements were performed to determine the occupied bandwidth of the fundamental frequency of the EUT as specified in section 15.231(c).

A2.2.2. The EUT was set to operate in an alarm condition with a transmitted modulated output.

A2.2.3. A peak, max hold scan was produced of the emission, and the bandwidth was determined at the points 20dB down from the peak level of the transmission.

A2.3. Transmitter Operation Time

A2.3.1. Measurements were performed to determine the transmitter operation time as specified in section 15.231(a(2)).

A2.3.2. For measurements concerning the transmitter operation time, the EUT was set to operate in a normal mode of operation at all times. The EUT was activated in each alarm condition and a scan of the time incurred was produced to show the deactivation time of the transmission.

A2.3.3. For measurements concerning the automatic time limiting, the EUT was set to operate in a normal mode of operation at all times. For this measurement the EUT was set to idle mode. The test receiver was set to display any spurious emission transmitted by the EUT. A scan of any spurious transmissions was produced.

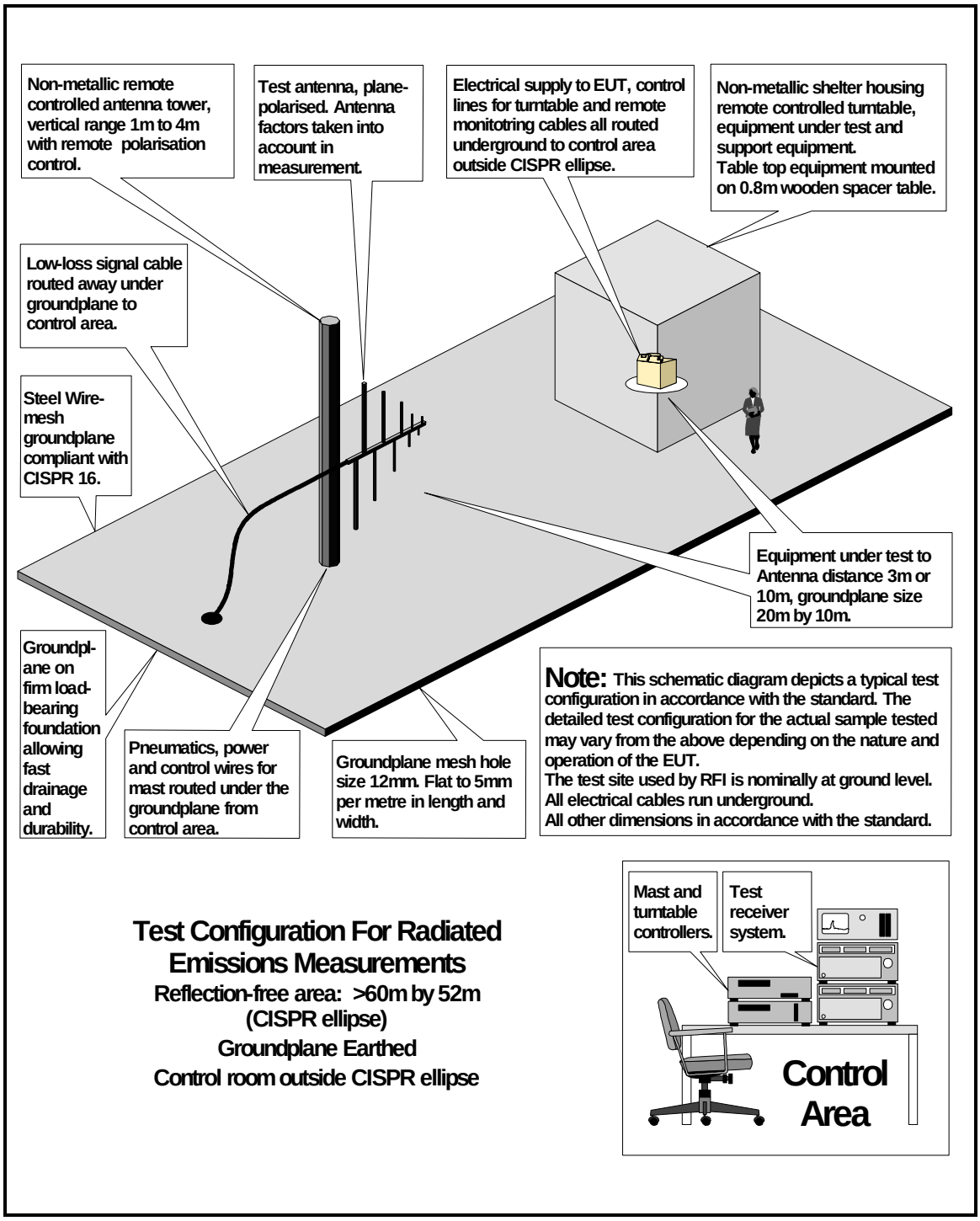
Appendix 3. Test Configuration Drawings

This appendix contains the following drawings:

Drawing Reference Number	Title
DRG\40407ETF02\EMIRAD	Test configuration for measurement of radiated emissions
DRG\40407ETF02\001	Schematic diagram of the EUT, support equipment and interconnecting cables used for the test

Test Of: **Crowcon Detection Instruments Ltd. Gasman 2**
To: **F.C.C. Part 15: 1998 Subpart C (Intentional Radiators) Section 15.231**

DRG\40407ETF02\EMIRAD

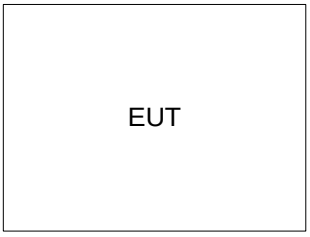


Test Configuration For Radiated Emissions Measurements
Reflection-free area: >60m by 52m (CISPR ellipse)
Groundplane Earthed
Control room outside CISPR ellipse

Test Of: **Crowcon Detection Instruments Ltd. Gasman 2**
To: **F.C.C. Part 15: 1998 Subpart C (Intentional Radiators) Section 15.231**

DRG\40407ETF02\001

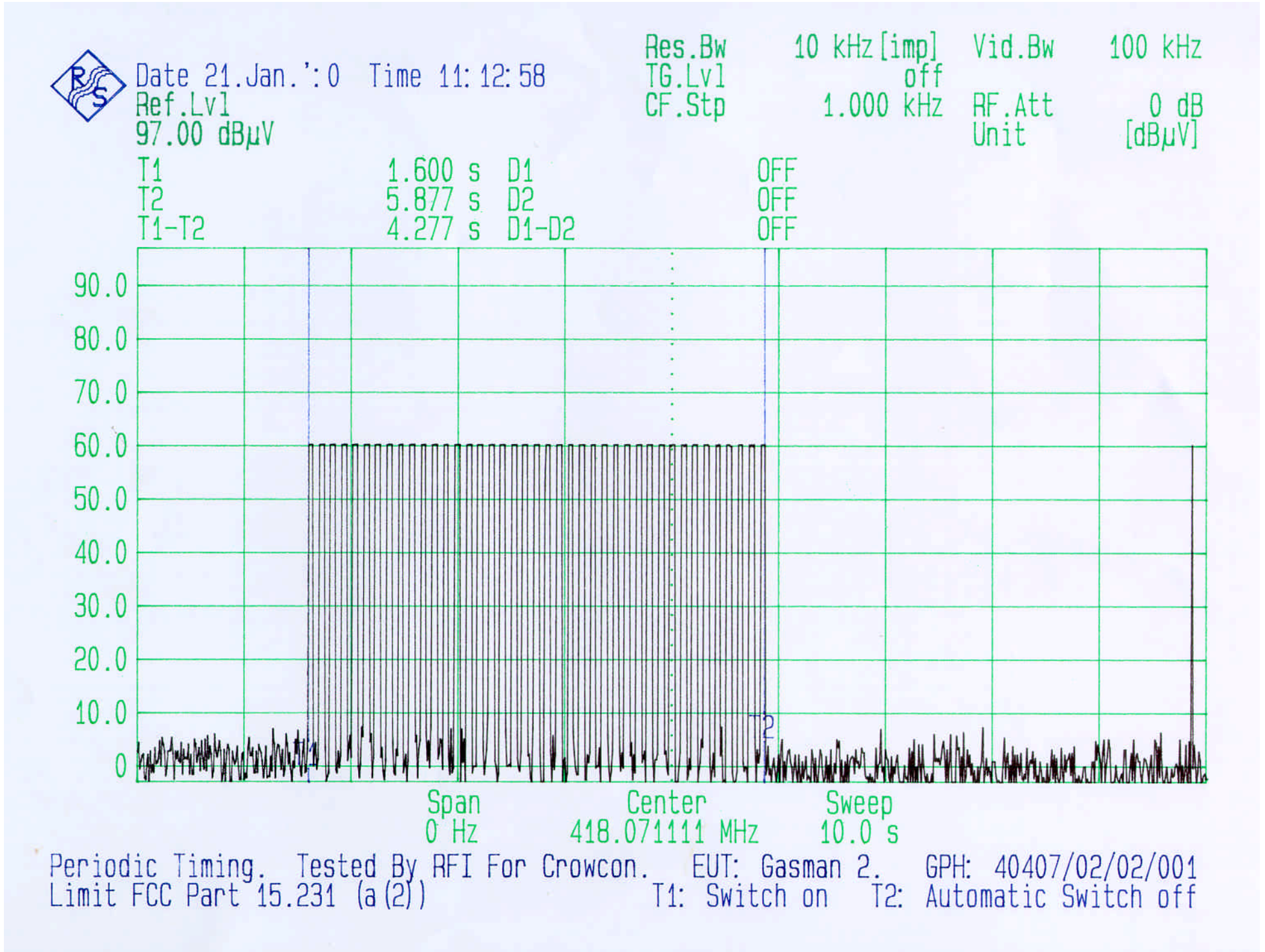
Configuration of EUT

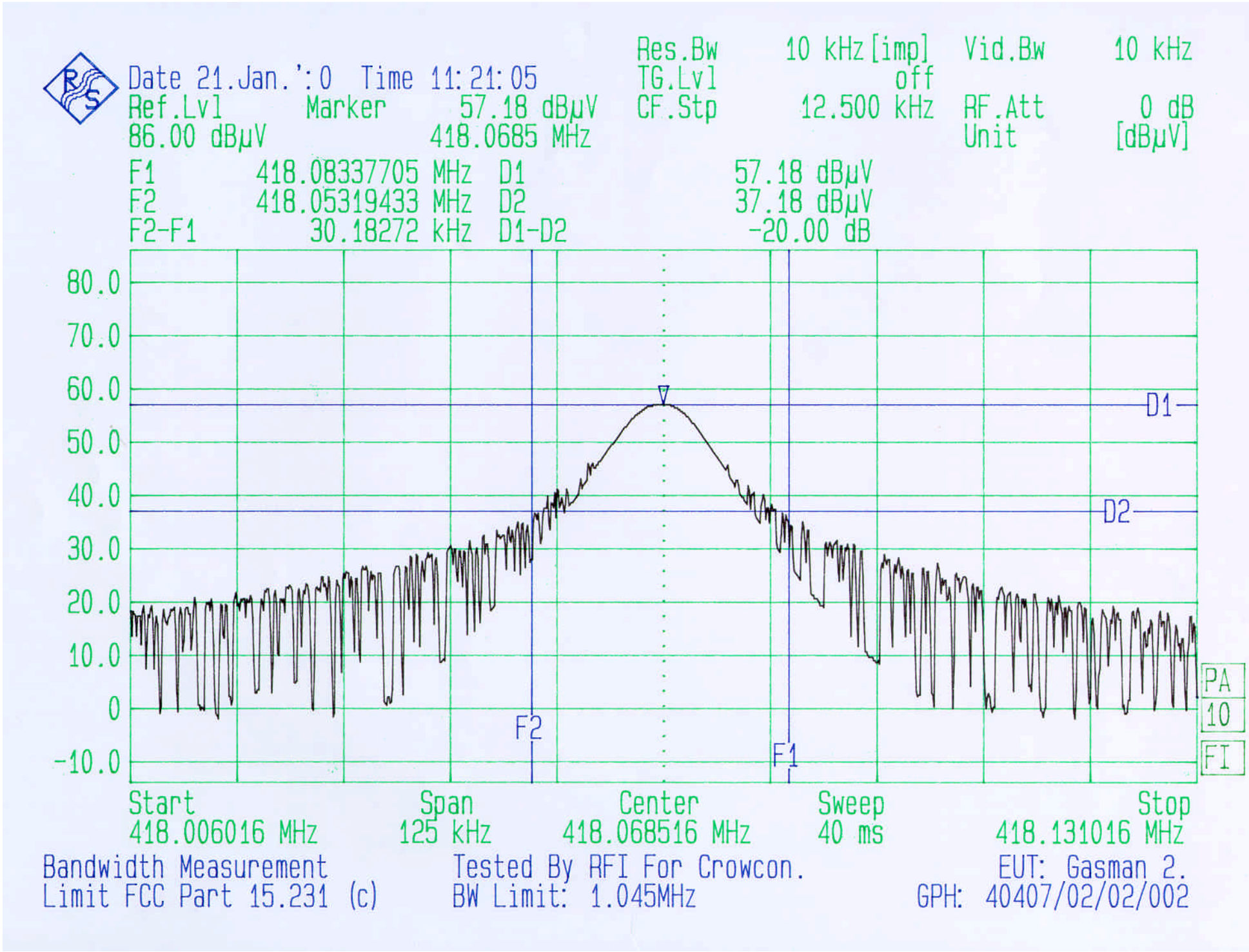


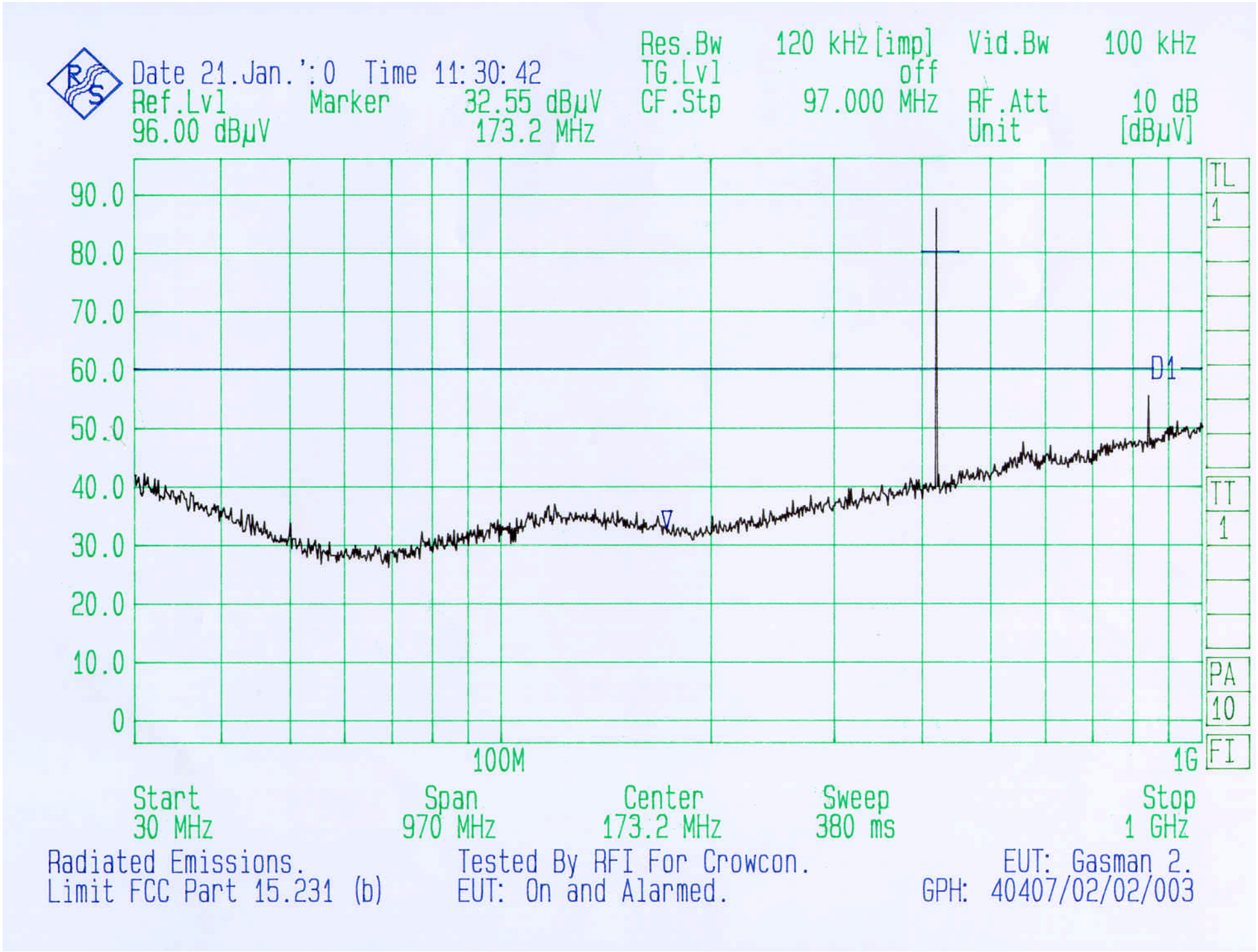
Appendix 4. Graphical Test Results

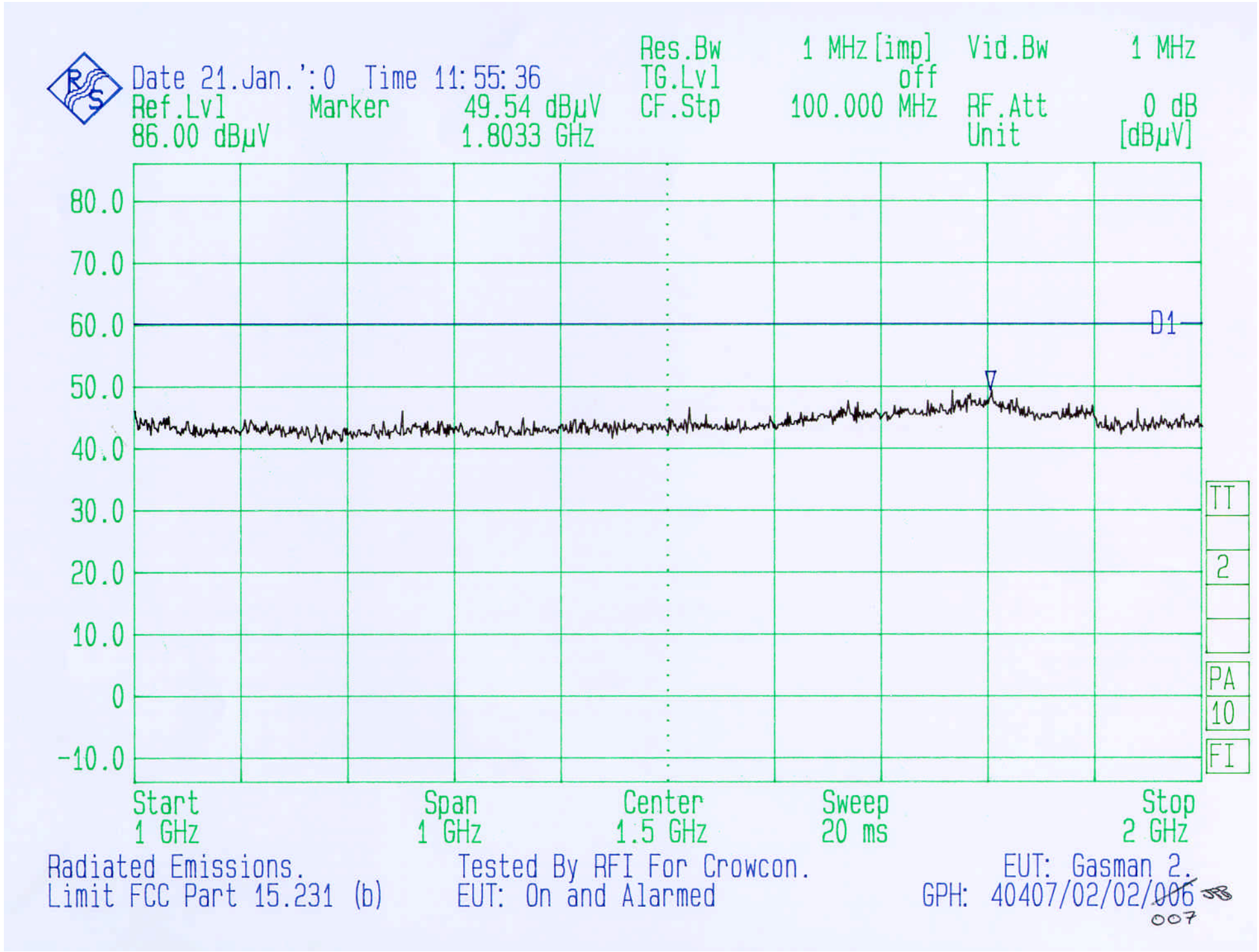
This appendix contains the following graphs:

Graph Reference Number	Title
GPH\40407\02\02\001	Transmitter Operating Time. 418.071 MHz
GPH\40407\02\02\002	Occupied Bandwidth. 418.068 MHz
GPH\40407\02\02\003	Radiated Electric Field. 30 to 1000 MHz. Alarmed Mode
GPH\40407\02\02\007	Radiated Electric Field. 1000 to 2000 MHz. Alarmed Mode
GPH\40407\02\02\008	Radiated Electric Field. 2000 to 4000 MHz. Alarmed Mode
GPH\40407\02\02\009	Radiated Electric Field. 4000 to 5000 MHz. Alarmed Mode
GPH\40407\02\02\101	Radiated Electric Field. 30 to 1000 MHz. Idle Mode
GPH\40407\02\02\102	Radiated Electric Field. 1000 to 2000 MHz. Idle Mode


Date 21.Jan.':0 Time 11:12:58
Ref.Lvl
97.00 dBµV
Res.Bw 10 kHz [imp]
TG.Lvl off
CF.Stp 1.000 kHz
Vid.Bw 100 kHz
RF.Att 0 dB
Unit [dBµV]
T1 1.600 s D1 OFF
T2 5.877 s D2 OFF
T1-T2 4.277 s D1-D2 OFF
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
T1
T2
Span 0 Hz
Center 418.071111 MHz
Sweep 10.0 s
Periodic Timing. Tested By RFI For Crowcon. EUT: Gasman 2. GPH: 40407/02/02/001
Limit FCC Part 15.231 (a(2)) T1: Switch on T2: Automatic Switch off


Date 21.Jan.':0 Time 11:21:05
Ref.Lvl
86.00 dBµV
Marker
57.18 dBµV
418.0685 MHz
Res.Bw 10 kHz [imp]
TG.Lvl off
CF.Stp 12.500 kHz
Vid.Bw 10 kHz
RF.Att 0 dB
Unit [dBµV]
F1 418.08337705 MHz D1 57.18 dBµV
F2 418.05319433 MHz D2 37.18 dBµV
F2-F1 30.18272 kHz D1-D2 -20.00 dB
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
-10.0
D1
D2
F2
F1
PA
10
FI
Start
418.006016 MHz
Span
125 kHz
Center
418.068516 MHz
Sweep
40 ms
Stop
418.131016 MHz
Bandwidth Measurement
Limit FCC Part 15.231 (c)
Tested By RFI For Crowcon.
BW Limit: 1.045MHz
EUT: Gasman 2.
GPH: 40407/02/02/002


Date 21.Jan.': 0 Time 11: 30: 42
Ref.Lvl
96.00 dBµV
Marker
32.55 dBµV
173.2 MHz
Res.Bw 120 kHz [imp]
TG.Lvl off
CF.Stp 97.000 MHz
Vid.Bw 100 kHz
RF.Att 10 dB
Unit [dBµV]
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
D1
TL
1
TT
1
PA
10
FI
100M
1G
Start
30 MHz
Span
970 MHz
Center
173.2 MHz
Sweep
380 ms
Stop
1 GHz
Radiated Emissions.
Limit FCC Part 15.231 (b)
Tested By RFI For Crowcon.
EUT: On and Alarmed.
EUT: Gasman 2.
GPH: 40407/02/02/003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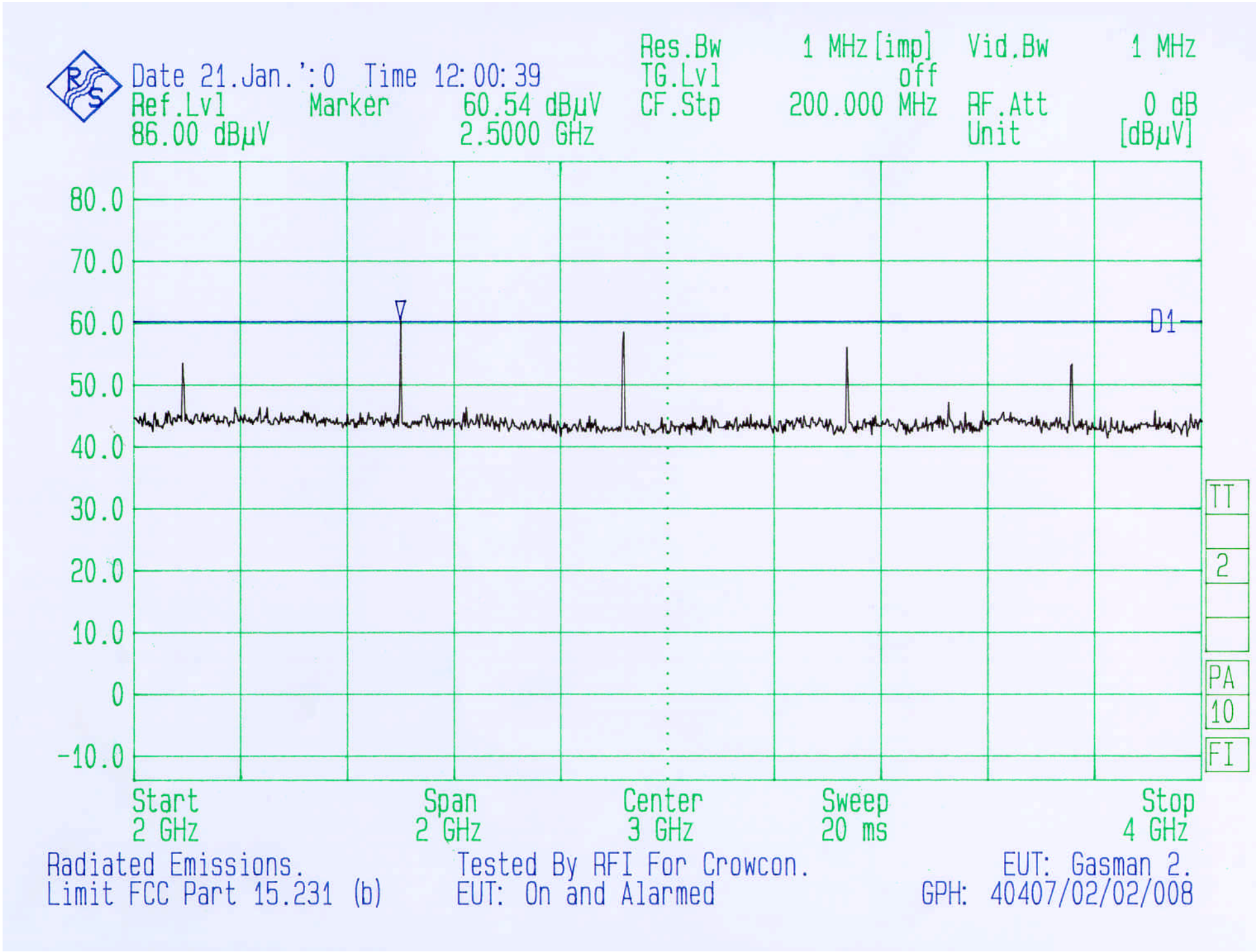
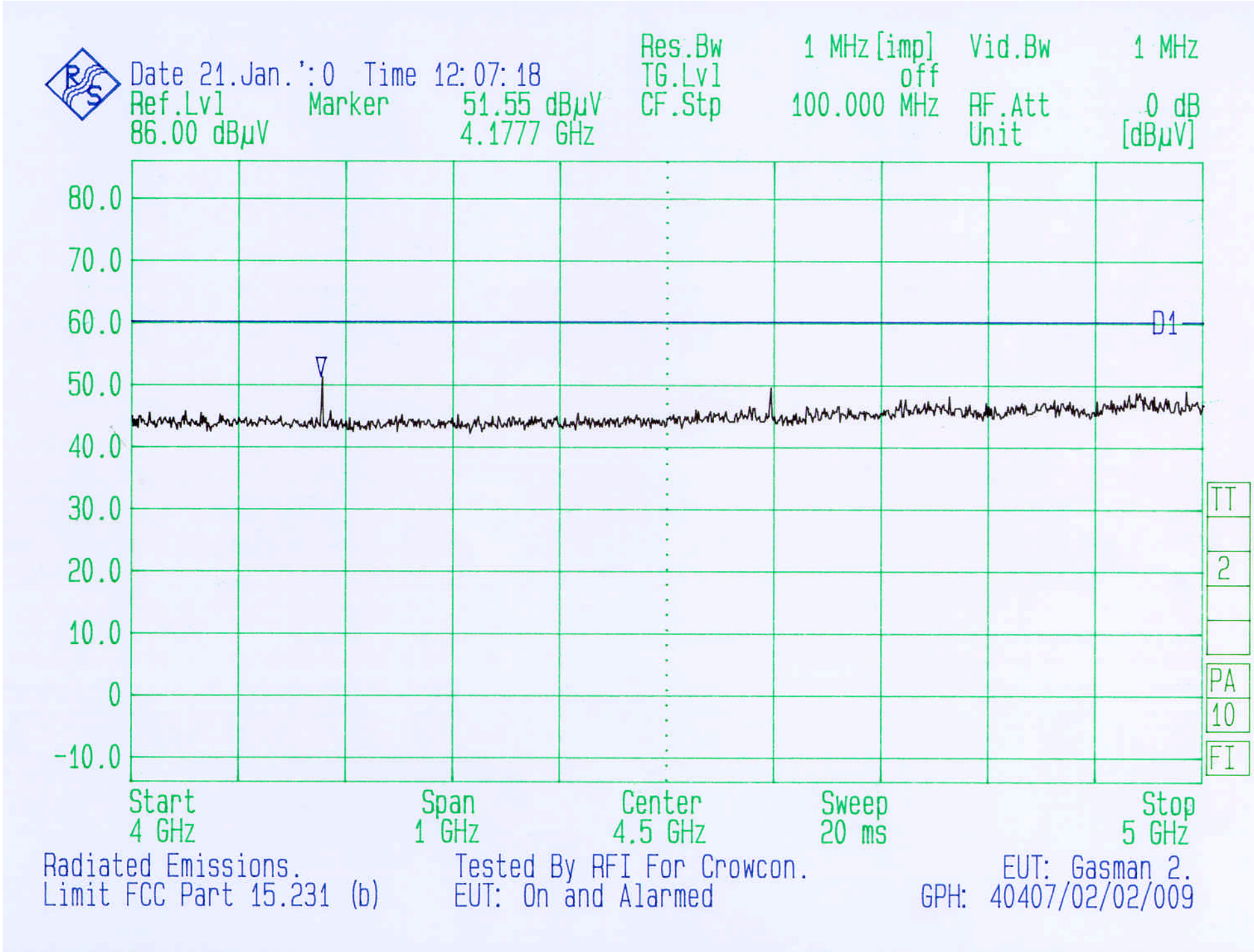
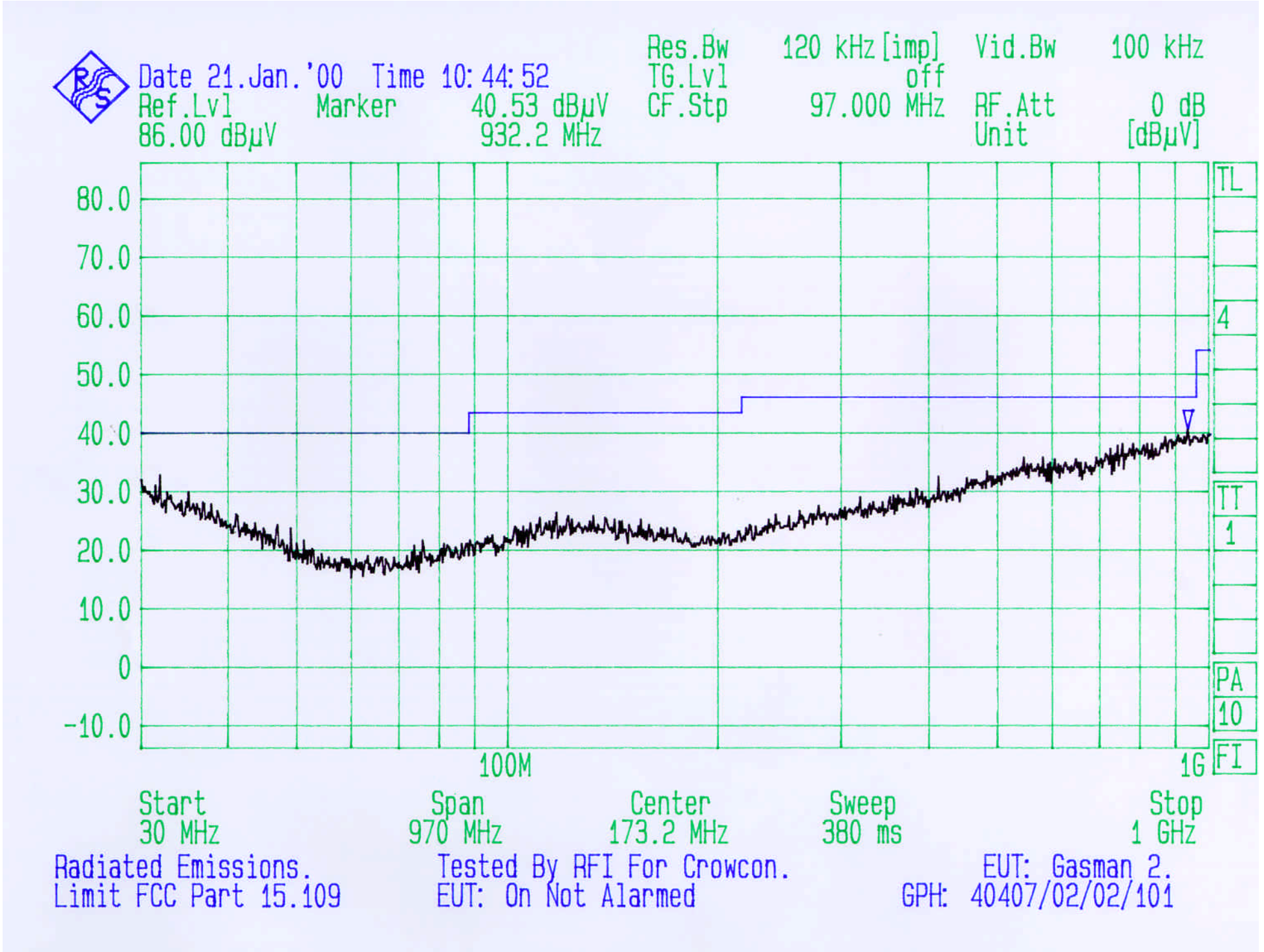
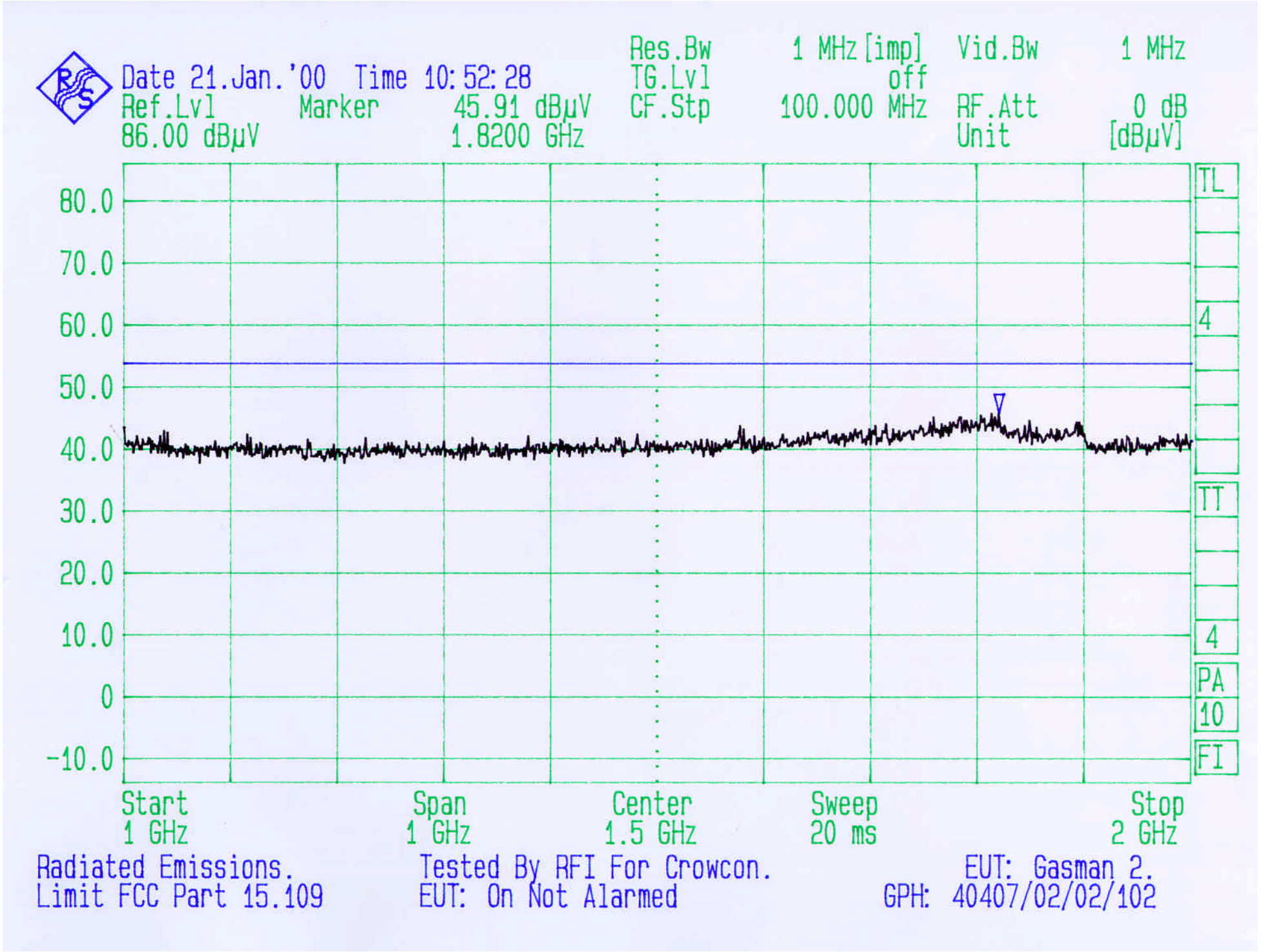
86.00 dBµV
Marker
49.54 dBµV
1.8033 GHz
Res.Bw
1 MHz [imp]
TG.Lvl
off
CF.Stp
100.000 MHz
Vid.Bw
1 MHz
RF.Att
0 dB
Unit
[dBµV]
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
-10.0
D1
TT
2
PA
10
FI
Start
1 GHz
Span
1 GHz
Center
1.5 GHz
Sweep
20 ms
Stop
2 GHz
Radiated Emissions.
Limit FCC Part 15.231 (b)
Tested By RFI For Crowcon.
EUT: On and Alarmed
EUT: Gasman 2.
GPH: 40407/02/02/006
007


Date 21.Jan.': 0 Time 12: 00: 39
Ref.Lvl
86.00 dBµV
Marker
60.54 dBµV
2.5000 GHz
Res.Bw
1 MHz [imp]
TG.Lvl
off
CF.Stp
200.000 MHz
Vid.Bw
1 MHz
RF.Att
0 dB
Unit
[dBµV]
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
-10.0
D1
TT
2
PA
10
FI
Start
2 GHz
Span
2 GHz
Center
3 GHz
Sweep
20 ms
Stop
4 GHz
Radiated Emissions.
Limit FCC Part 15.231 (b)
Tested By RFI For Crowcon.
EUT: On and Alarmed
EUT: Gasman 2.
GPH: 40407/02/02/008


Date 21.Jan.': 0 Time 12:07:18
Ref.Lvl
86.00 dBµV
Marker
51.55 dBµV
4.1777 GHz
Res.Bw
1 MHz [imp]
TG.Lvl
off
CF.Stp
100.000 MHz
Vid.Bw
1 MHz
RF.Att
0 dB
Unit
[dBµV]
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
-10.0
D1
TT
2
PA
10
FI
Start
4 GHz
Span
1 GHz
Center
4.5 GHz
Sweep
20 ms
Stop
5 GHz
Radiated Emissions.
Limit FCC Part 15.231 (b)
Tested By RFI For Crowcon.
EUT: On and Alarmed
EUT: Gasman 2.
GPH: 40407/02/02/009


Date 21.Jan.'00 Time 10:44:52
Res.Bw 120 kHz [imp]
Vid.Bw 100 kHz
TG.Lvl off
Ref.Lvl 86.00 dBµV
Marker 40.53 dBµV
932.2 MHz
CF.Stp 97.000 MHz
RF.Att 0 dB
Unit [dBµV]
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
-10.0
100M
1G
TL
4
TT
1
PA
10
FI
Start 30 MHz
Span 970 MHz
Center 173.2 MHz
Sweep 380 ms
Stop 1 GHz
Radiated Emissions.
Limit FCC Part 15.109
Tested By RFI For Crowcon.
EUT: On Not Alarmed
EUT: Gasman 2.
GPH: 40407/02/02/101


Date 21.Jan.'00 Time 10:52:28
Ref.Lvl
86.00 dBµV
Marker
45.91 dBµV
1.8200 GHz
Res.Bw
1 MHz [imp]
TG.Lvl
off
CF.Stp
100.000 MHz
Vid.Bw
1 MHz
RF.Att
0 dB
Unit
[dBµV]
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
-10.0
TL
4
TT
4
PA
10
FI
Start
1 GHz
Span
1 GHz
Center
1.5 GHz
Sweep
20 ms
Stop
2 GHz
Radiated Emissions.
Limit FCC Part 15.109
Tested By RFI For Crowcon.
EUT: On Not Alarmed
EUT: Gasman 2.
GPH: 40407/02/02/102

Appendix 5. Photographs of EUT

This appendix contains the following photographs:

Photo Reference Number	Title
PHT\40407\001	Front view of equipment under test.
PHT\40407\002	Side view of equipment under test.
PHT\40407\003	Rear view of equipment under test.

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

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Test Of: **Crowcon Detection Instruments Ltd.**
Gasman 2
To: **F.C.C. Part 15: 1998 Subpart C (Intentional Radiators) Section 15.231**

PHT\40407\001 Front view of equipment under test.

Test Of: **Crowcon Detection Instruments Ltd.**
Gasman 2
To: **F.C.C. Part 15: 1998 Subpart C (Intentional Radiators) Section 15.231**

PHT\40407\002 Side view of equipment under test.

Test Of: **Crowcon Detection Instruments Ltd.**
Gasman 2
To: **F.C.C. Part 15: 1998 Subpart C (Intentional Radiators) Section 15.231**

PHT\40407\003 Rear view of equipment under test.