




# TEST REPORT FROM RADIO FREQUENCY INVESTIGATION LTD.

Test of: Hasbro Inc.  
Commtech Reader 84151  
13.56 MHz Passive Tag


To: F.C.C. Part 15:1997  
Subpart C. Section 15.225  
(Intentional Radiators)

**Test Report Serial No:**  
RFI/EMCB1/RP37410A

<p><b>This Test Report Is Issued Under The Authority Of Brian Watson Technical Director:</b></p> 	<p><b>Checked By:</b></p> 
<p><b>Tested By:</b></p> 	<p><b>Release Version No:</b></p> <p>01</p>
<p><b>Issue Date: 19 October 1998</b></p>	<p><b>Test Date: 25 September 1997</b></p>

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<p>Radio Frequency Investigation Ltd, Ewhurst Park, Ramsdell, Basingstoke, Hampshire, RG26 5RQ, ENGLAND. Tel: +44 (0) 1256 851193 Fax: +44 (0) 1256 851192</p>	<p>Registered in England, No. 211 7901. Registered Office: Ewhurst Park, Ramsdell, Basingstoke, Hampshire RG26 5RQ</p>	
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**RADIO FREQUENCY INVESTIGATION LTD.**

**TEST REPORT**

**EMC Department**

**S.No: RFI/EMCB1/RP37410A**

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**Issue Date: 19 October 1998**

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## 1. Client Information

<b>Company Name:</b>	Hasbro Europe
<b>Address:</b>	2 Roundwood Avenue Stockley Park Uxbridge Middex UB11 1AZ
<b>Contact Name:</b>	Mr D Anderson.

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## **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:	Commtech Reader
Model Name or Number:	84151
Unique Type Identification:	None stated by client
Serial Number:	None stated by client
Country of Manufacture:	China
FCC ID Number:	Pending Application
Date of Receipt:	5 October 1998

### **2.2. Description Of EUT**

The equipment under test is a 13.56 MHz passive tag data download and decoder unit.

### **2.3. Modifications Incorporated In EUT**

To enable emission measurements to be made, the EUT was modified to allow for a continuous transmit operation.

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#### **2.4. Additional Information Related To Testing**

<b>Power Supply Requirement:</b>	Internal battery supply of + 9 volt
<b>Intended Operating Environment:</b>	Domestic - Indoor
<b>Weight:</b>	240 Gms
<b>Dimensions:</b>	80 mm x 200 mm x 60 mm
<b>Interface Ports:</b>	None

#### **2.5. Support Equipment**

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

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### **3. Test Specification, Methods And Procedures**

#### **3.1. Test Specification**

<b>Reference:</b>	F.C.C. Part 15 Subpart C. Section 15.225 (Intentional Radiators)*
<b>Title:</b>	Code of Federal Regulations, Part 15 (47CFR15), 1997 Radio Frequency Devices: Intentional Radiators.
<b>Comments:</b>	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.
<b>Purpose of Test:</b>	To determine whether the equipment complied with the requirements of the specification for the purposes of certification.

\*Sections 15.209 (Radiated Emissions; general requirements) and 15.225 (Operation within the band 13.553 to 13.567 MHz).

#### **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 (1987)

Title: Specification for Radio Interference measuring apparatus and measurement methods.

#### **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.

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#### **4. Deviations From The Test Specification**

None.

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## **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 its internal battery supply of + 9.0 volts (for electric field strength measurements), and by a variable power supply unit (for frequency stability tests).

### **5.2. Operating Modes**

The EUT was tested in the following operating mode: Continuous transmit. The reason for choosing this 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 the only configuration.

NB Section 2 of this report contains a full list of support equipment used and Appendix 3 contains a schematic diagram of the test configuration.

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## **6. Summary Of Test Results**

<b>Range Of Measurements</b>	<b>Specification Reference</b>	<b>Compliance Status</b>
Electric Field Strength, 1 MHz to 1000 MHz	Section 15 of C.F.R. 47: 1997, Clause 15.225	Complied
Environmental Tests, -20 to +50 degrees C.	Section 15 of C.F.R. 47: 1997, Clause 15.225	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 5RG. England.

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## **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.

7.1.3. As the EUT was powered from an internal battery supply, no conducted emissions measurements were performed.

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**7.2. Test Results For Radiated Emissions (Section 15.225)****7.2.1. Electric Field Strength Measurements of the Fundamental Emission**

7.2.1.1. The following tables list the fundamental emission level of the EUT when measured with a Quasi-Peak, Average and Peak detector. Due to high level ambient levels, all measurements in this section were performed at a test distance of 3 and 10m.

7.2.1.2. The limit specified in section 15.225(a) is 10000 $\mu$ V/m at 30m (80.0dB $\mu$ V/m at 30m). As stated in section 15.15.31(f (2)) measurements may be performed at a test distance closer than specified and limit can be extrapolated by using the square of an inverse factor (40dB/decade). Using this method the limit increases to 99.1dB $\mu$ V/m at 10m and 120.0dB $\mu$ V/m at 3m.

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

7.2.1.4. All measured results below incorporate antenna factors and cable losses:

**Results at 10m.**

Frequency (MHz)	Ant. Pol.	Q-P Level (dB $\mu$ V/m)	Q-P Limit (dB $\mu$ V/m)	Margin (dB)	Result
13.556	Face On. (0 °)	52.7	99.1	46.4	Complied

Frequency (MHz)	Ant. Pol.	Av. Level (dB $\mu$ V/m)	Av. Limit (dB $\mu$ V/m)	Margin (dB)	Result
13.556	Face On. (0 °)	50.8	99.1	48.3	Complied

Frequency (MHz)	Ant. Pol.	Peak Level (dB $\mu$ V/m)	Peak Limit (dB $\mu$ V/m)	Margin (dB)	Result
13.556	Face On. (0 °).	56.4	119.1	62.7	Complied

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### Results at 3m.

Frequency (MHz)	Ant. Pol.	Q-P Level (dBmV/m)	Q-P Limit (dBmV/m)	Margin (dB)	Result
13.556	Face On. (0 °)	68.0	120.0	52.0	Complied

Frequency (MHz)	Ant. Pol.	Av. Level (dBmV/m)	Av. Limit (dBmV/m)	Margin (dB)	Result
13.556	Face On. (0 °)	68.5	120.0	51.5	Complied

Frequency (MHz)	Ant. Pol.	Peak Level (dBmV/m)	Peak Limit (dBmV/m)	Margin (dB)	Result
13.556	Face On. (0 °)	68.7	140.0	71.3	Complied

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### **7.2.2. Electric Field Strength Measurements of Spurious Emissions: Section 15.209**

7.2.2.1. The client has stated that the highest frequency generated or used in the EUT was 13.56 MHz. Therefore tests were performed from 1.0 MHz, up to 1000 MHz.

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

7.2.2.3. 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)	Q-P Limit (dBmV/m)	Margin (dB)	Result
40.679	Vert.	23.0	40.0	17.0	Complied
54.239	Vert.	23.3	40.0	16.7	Complied
94.918	Vert.	32.6	43.5	10.9	Complied
122.038	Vert.	16.1	43.5	27.4	Complied
135.522	Vert.	18.8	43.5	24.7	Complied
162.717	Vert.	14.5	43.5	29.0	Complied
189.837	Horiz.	22.2	43.5	21.3	Complied
230.516	Horiz.	23.6	46.0	22.4	Complied
257.636	Horiz.	23.6	46.0	22.4	Complied
271.196	Horiz.	23.2	46.0	22.8	Complied
325.434	Horiz.	17.2	46.0	28.8	Complied
488.152	Horiz.	21.6	46.0	24.4	Complied
515.272	Vert.	22.6	46.0	23.4	Complied

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### **7.3. Frequency Tolerance.**

7.3.1. The EUT was tested for frequency stability as specified in Part 15.225(c).

7.3.2. The EUT is operated by a nominal supply of + 9 volts. Measurements were performed at this voltage, 7.65 volts (85%) and 10.45 volts (115%).

7.3.3. The EUT was tested for frequency stability at the following ambient temperatures: -20°C, +20°C and +50°C.

7.3.4. Plots showing the frequency stability at each setting can be found in Appendix 4 of this test report.

Measured Frequency (MHz)		Ambient Temperature in Environmental Chamber		
		-20°C	+20°C	+50°C
Applied Input Voltage	7.65 volts	13.56001	13.55983	13.55969
	9.00 volts	13.56001	13.55984	13.55968
	10.35 volts	13.56001	13.55982	13.55967

7.3.5. Maximum Measured Frequency Deviation: 0.00034MHz.  
Deviation Limit: (13.556 x 0.01%): 0.0013556MHz.

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## **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:

<b>Measurement Type</b>	<b>Range</b>	<b>Confidence Level</b>	<b>Calculated Uncertainty</b>
Radiated Emissions	1 MHz to 30 MHz	95%	+/- 2.6 dB
Radiated Emissions	30 MHz to 1000 MHz	95%	+/- 4.9 dB

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).

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### Appendix 1. Test Equipment Used

Instrument	Manufacturer	Model	RFI No.
Receiver / Spectrum Analyser System	R & S	ESBI	M090
Bilog Antenna	Chase	CBL6111-2	A1037
Magnetic Loop Antenna	R & S	HFH2-Z2	A007
Large Environmental Chamber	RFI	None	S208
Bilog Antenna	Chase	CBL6111	A259
Attenuator	Narda	771-03	A262
OATS Positioning Controller	R & S	HCC	A276
OATS Antenna Mast	R & S	HCM	A277
Spectrum Monitor	R & S	EZM	M003
Receiver	R & S	ESVP	M023

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

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## **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 detector (between 30 and 1000 MHz). Where applicable, for measurements in the frequency band 13.553 to 13.567 MHz, Quasi-Peak, 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 above 30MHz, the antenna height was varied between 1 m and 4 m. For frequencies below 30MHz, the antenna height was fixed at 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.

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A2.1.7. The test equipment settings for radiated emissions measurements were as follows:

Receiver Function	Initial Scans (Below 30MHz)	Final Measurements Fundamental Emission	Final Measurements (Below 30MHz)
Detector Type:	Peak	Average, Quasi-Peak (CISPR) & Peak	Quasi-Peak (CISPR) or Average
Mode:	Max Hold	Not applicable	Not applicable
Bandwidth:	9 kHz	9 kHz	9 kHz
Amplitude Range:	60 dB	20 dB	20 dB
Measurement Time:	Not applicable	> 1 s	> 1 s
Observation Time:	Not applicable	> 15 s	> 15 s
Step Size:	Continuous sweep	Not applicable	Not applicable
Sweep Time:	Coupled	Not applicable	Not applicable

Receiver Function	Initial Scans (Above 30MHz)	Final Measurements (Above 30MHz)
Detector Type:	Peak	Quasi-Peak (CISPR)
Mode:	Max Hold	Not applicable
Bandwidth:	120 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

Spurious radiated emissions were measured against the limits specified in Section 15.209 of C.F.R. 47 Part 15 Subpart C - Intentional Radiators. Unless otherwise stated, the limits given in this report correspond to those specified in Section 15.209 as these are the most stringent.

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## **A2.2. Frequency Stability. FCC Part 15.225**

A2.2.1. Measurements were performed to determine the frequency stability of the EUT as specified in C.F.R. 47 Part 15.225(c).

A2.2.2. The EUT was connected to a Power Supply Unit which was capable of supplying a steady supply voltage between 85 and 115% of the rated voltage. The power supply unit was situated outside of the environmental test chamber.

A2.2.3. The EUT was placed into the environmental test chamber and the required temperature (starting from the lowest level) was set and allowed to settle, and be maintained for 30 minutes prior to switching on the EUT.

A2.2.4. The EUT was switched on and allowed 30 seconds to stabilise. The carrier frequency was then recorded in the form of a frequency plot.

A2.2.5. The EUT was then switched off for a minimum of 30 minutes, and the supply voltage was adjusted. Step A2.2.4. was then repeated.

A2.2.6. After all 3 voltage levels were recorded, the EUT was switched off, and the chamber was adjusted for the next temperature. Steps A2.2.3. to A2.2.6. were repeated for the remainder of the temperature ranges.

A2.2.7. Calculations were then performed to determine the frequency deviation of the EUT.

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### **Appendix 3. Test Configuration Drawings**

This appendix contains the following drawings:

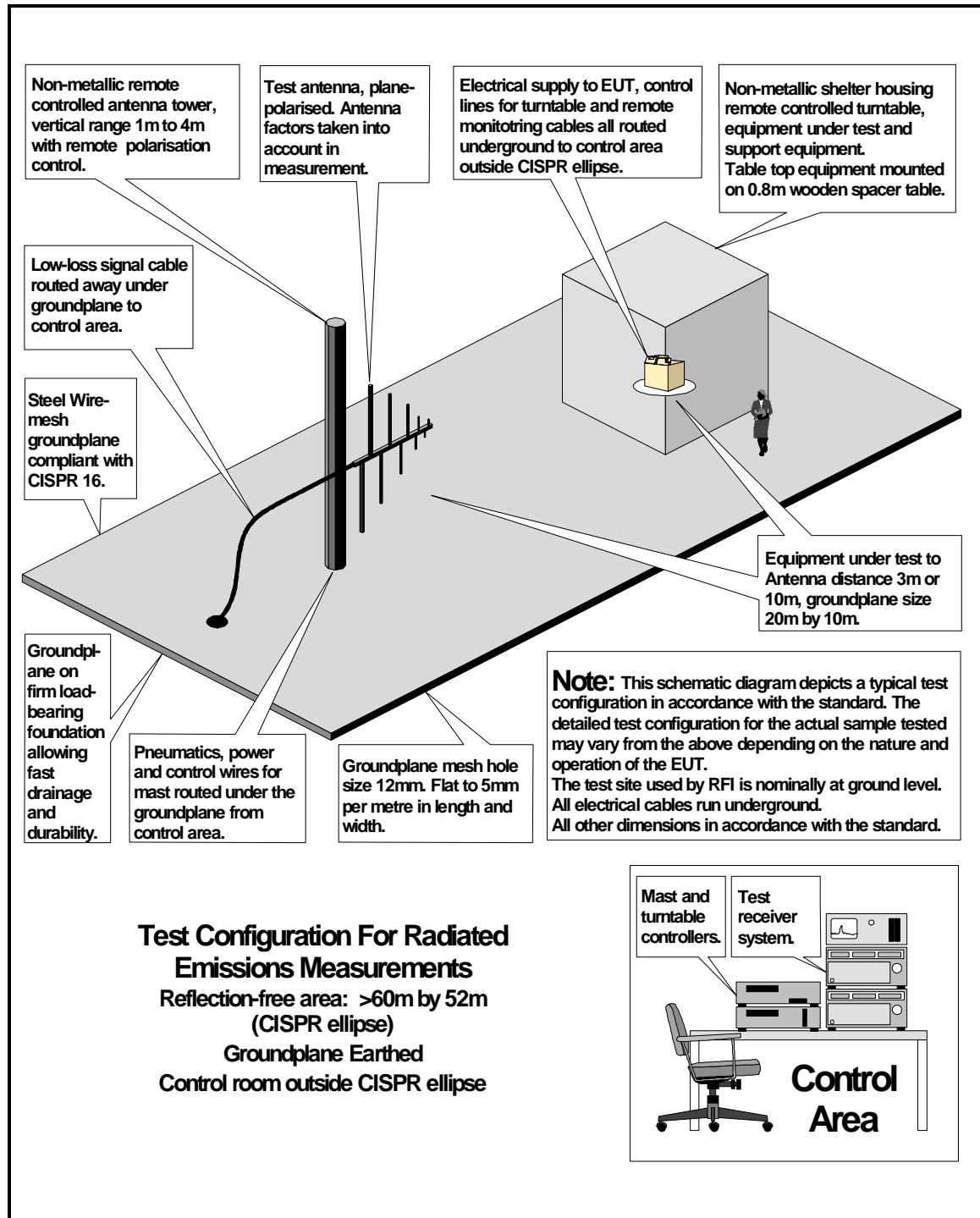
<b>Drawing Reference Number</b>	<b>Title</b>
DRG\37410JD02\EMIRAD	Test configuration for measurement of radiated emissions
DRG\37410JD02\001	Schematic diagram of the EUT, support equipment and interconnecting cables used for the test

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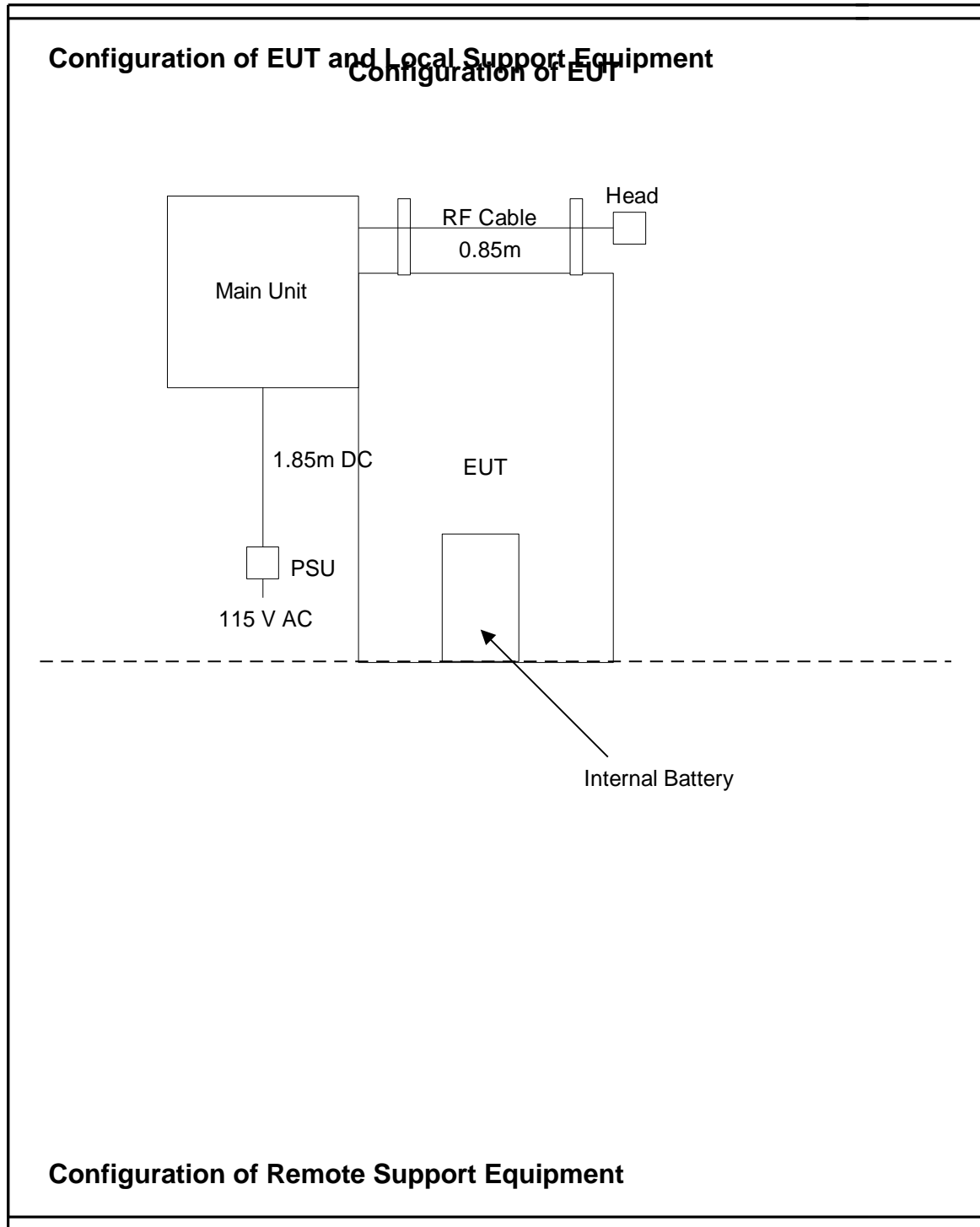
DRG\37410JD02\EMIRAD



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DRG\37410JD02\001



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#### **Appendix 4. Graphical Test Results**

This appendix contains the following graphs:

<b>Graph Reference Number</b>	<b>Title</b>
GPH\37410\JD02\001	Scan of radiated magnetic field: (1 to 30 MHz) Continuous Transmit Mode. (Both Polarisation's)
GPH\37410\JD02\002	Scan of radiated electric field: (30 to 200 MHz) Continuous Transmit Mode (Both Polarisation's)
GPH\37410\JD02\003	Scan of radiated electric field: (200 to 1000 MHz) Continuous Transmit Mode (Both Polarisation's)
GPH\37410\JD02\004	Frequency Stability. 9.00 volts at +20°C
GPH\37410\JD02\005	Frequency Stability. 7.65 volts at +20°C
GPH\37410\JD02\006	Frequency Stability. 10.35 volts at +20°C
GPH\37410\JD02\007	Frequency Stability. 10.35 volts at -20°C
GPH\37410\JD02\008	Frequency Stability. 9.00 volts at -20°C
GPH\37410\JD02\009	Frequency Stability. 7.65 volts at -20°C
GPH\37410\JD02\010	Frequency Stability. 7.65 volts at +50°C
GPH\37410\JD02\011	Frequency Stability. 9.00 volts at +50°C
GPH\37410\JD02\012	Frequency Stability. 10.35 volts at +50°C

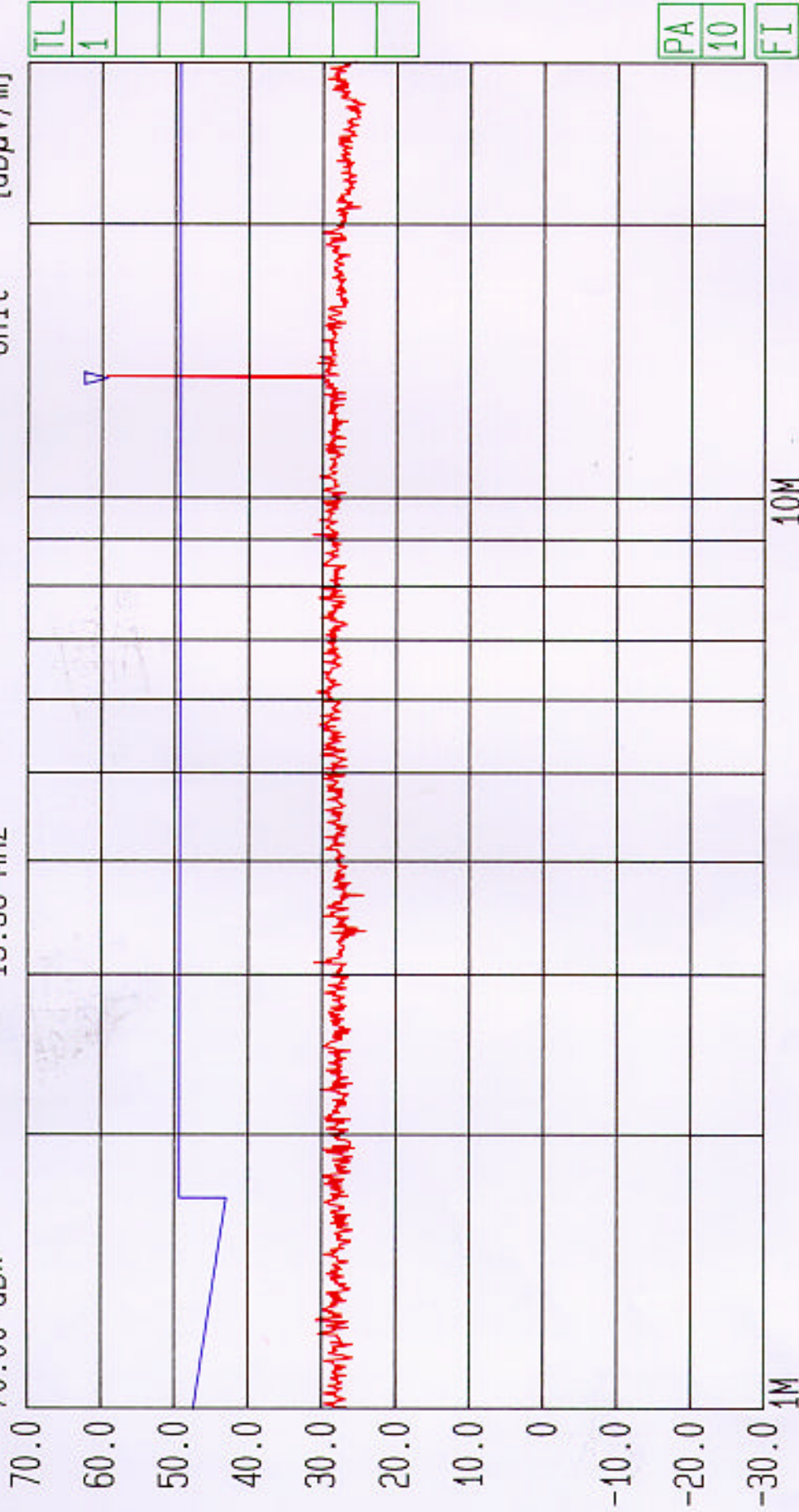
**These pages are not included in the total number of pages for this report.**





Date 30.Sep.'98 Time 15:29:15  
 Ref.Lvl 70.00 dB\* Marker  
 Res.Bw 59.39 dB\*  
 TG.Lvl 13.56 MHz  
 CF.Stp

9 kHz [imp] Vid.Bw 10 kHz  
 Off  
 2.900 MHz RF.Att 0 dB  
 Unit [dB $\mu$ V/m]

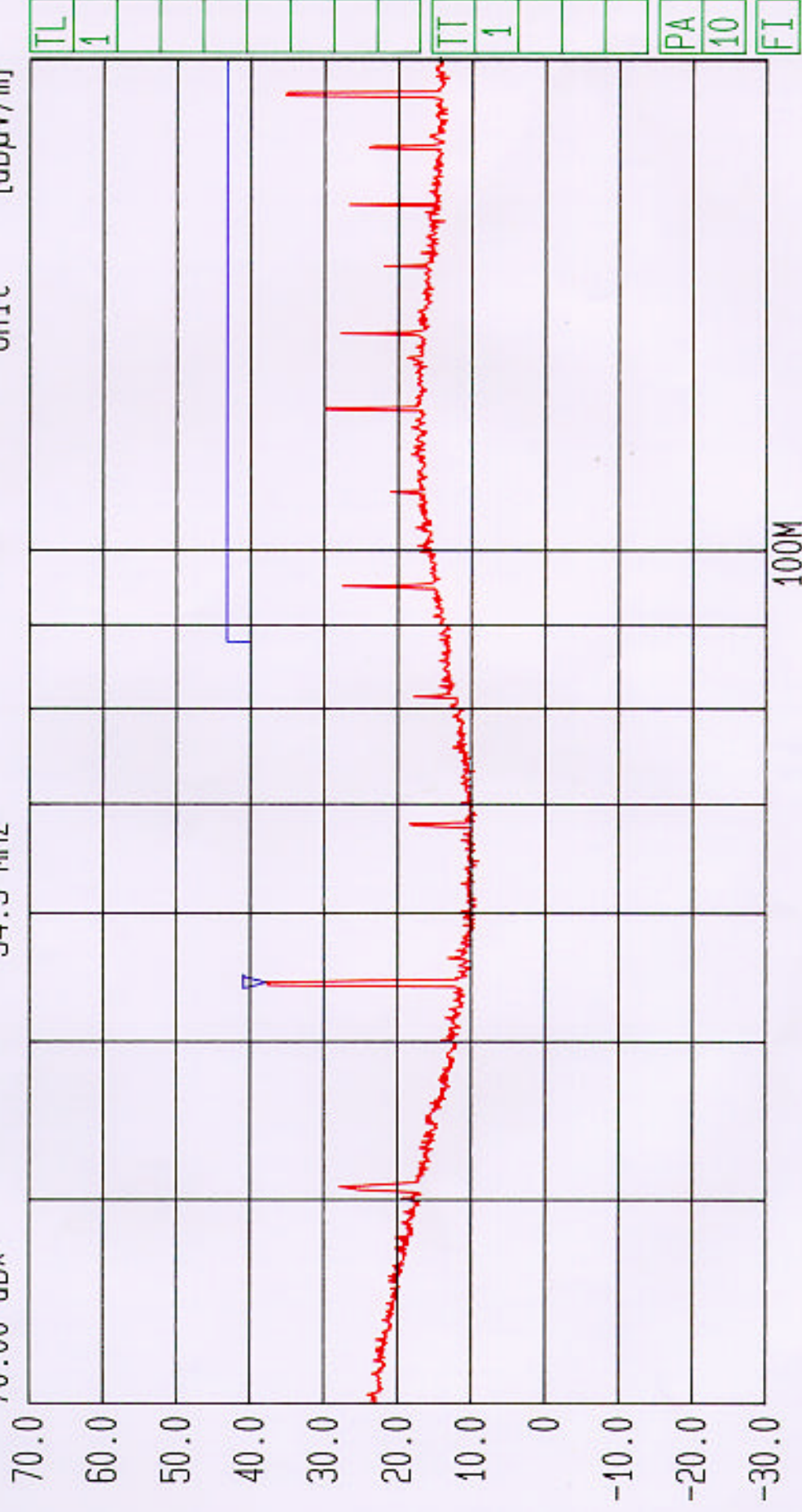


Start 1 MHz Span 29 MHz Center 5.477 MHz Sweep 360 ms Stop 30 MHz  
 Radiated. Tested by RFI for Hasbro Europe. EUT: Commtech Reader. FCC Part 15.225  
 Limit: 15.209. Tx Limit: 80dB $\mu$ V/m @ 3m. Cont. Tx Mode. GPH/37410/JD02/001



Date 30.Sep.'98 Time 15:38:12  
Ref.Lvl 70.00 dB\*  
Marker 37.93 dB\*  
54.3 MHz

Res.Bw 120 kHz [imp]  
TG.Lvl Off  
CF.Stp 17.000 MHz  
Vid.Bw 10 kHz  
RF.Att 0 dB  
Unit [dBuV/m]



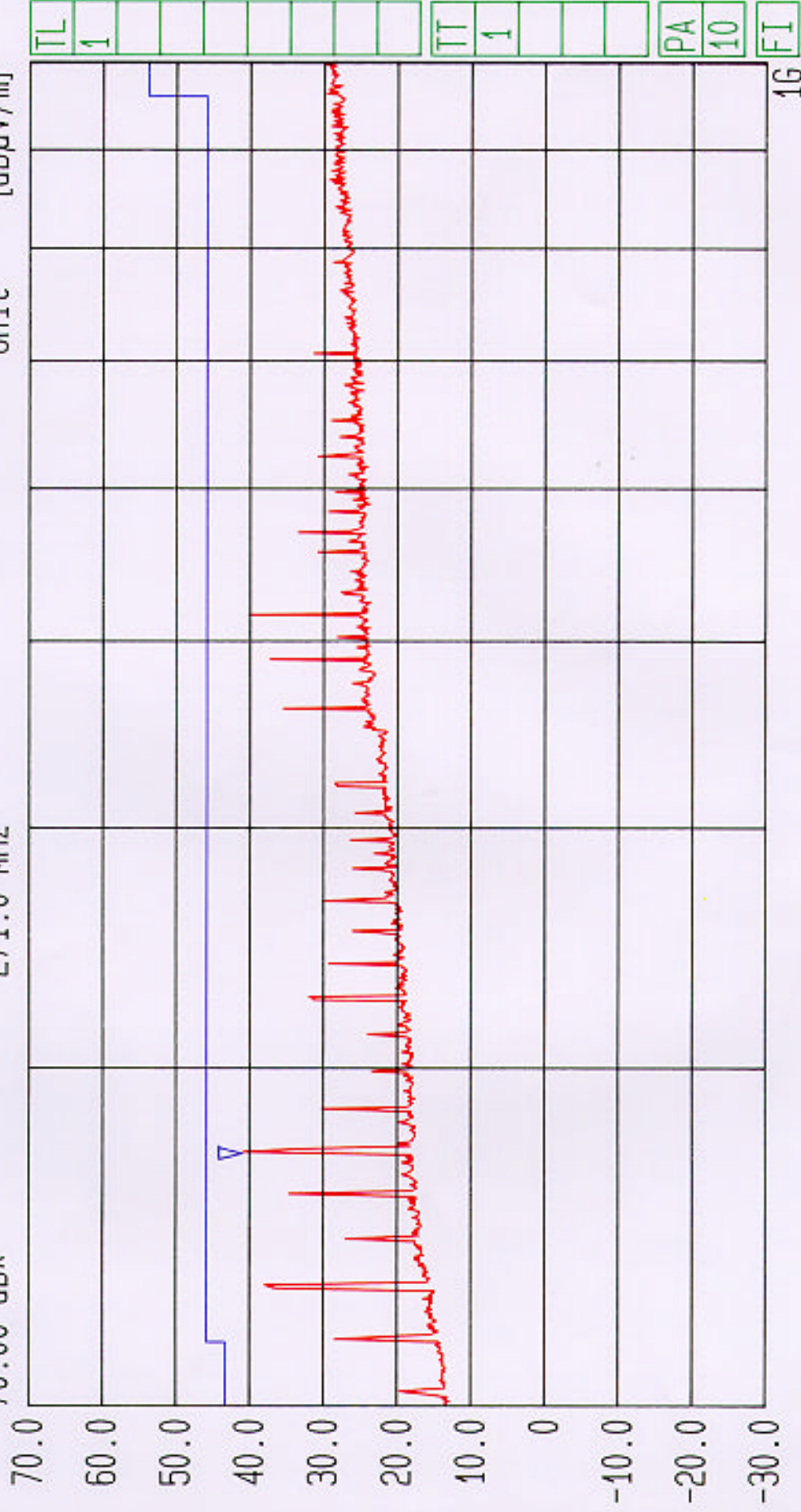
Start 30 MHz  
Span 170 MHz  
Center 77.45 MHz  
Sweep 620 ms  
Stop 200 MHz

Radiated. Tested by RFI for Hasbro Europe. EUT: Commtech Reader. FCC Part 15.225  
Limit: 15.209. Cont. Tx Mode. GPH/37410/JD02/002



Date 30.Sep.'98 Time 15:43:11  
Ref.Lvl 70.00 dB\*  
Marker 40.90 dB\*  
271.0 MHz

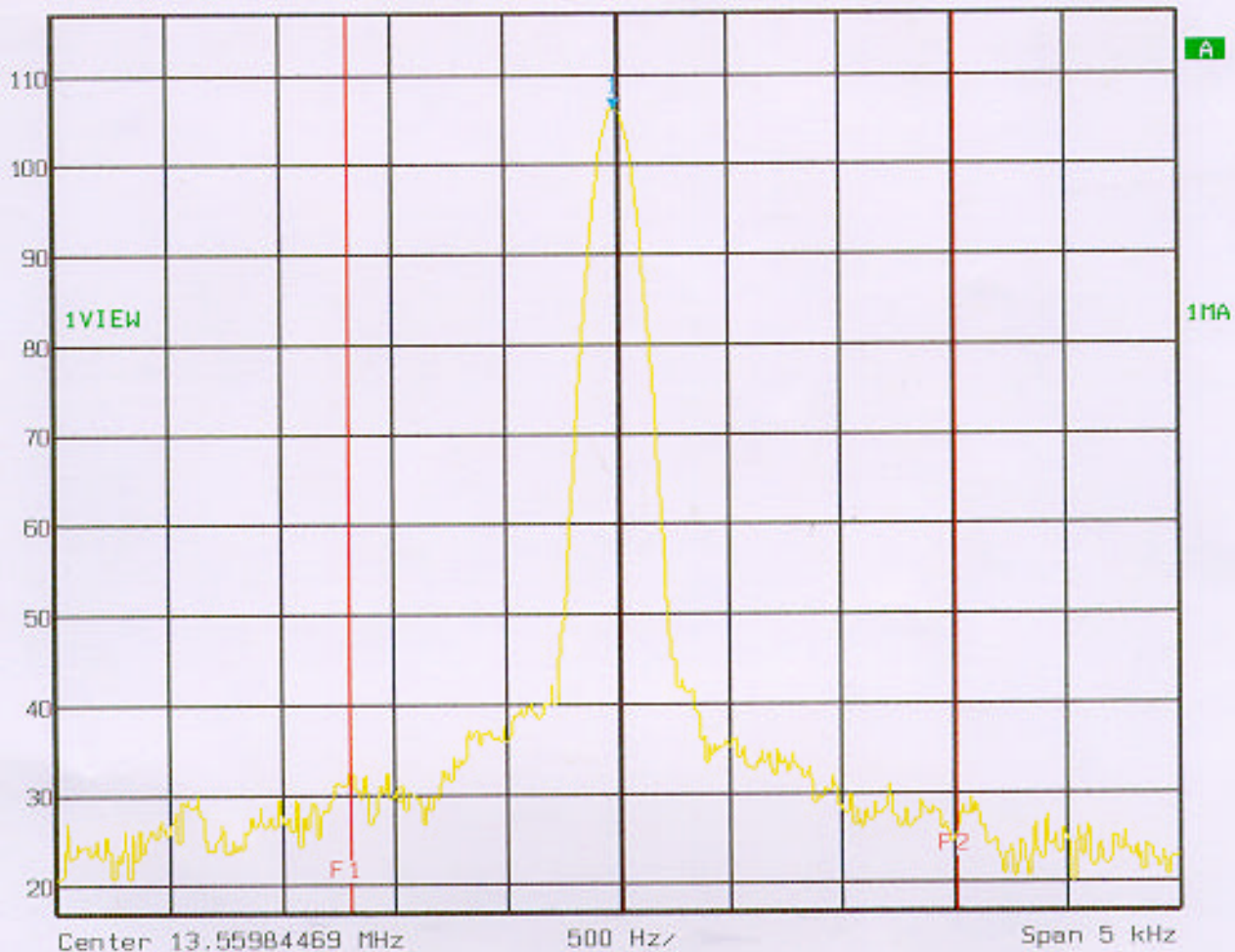
Res.Bw 120 kHz [imp]  
TG.Lvl off  
CF.Stp 80.000 MHz  
Vid.Bw 10 kHz  
RF.Att 0 dB  
Unit [dB $\mu$ V/m]



Start 200 MHz  
Span 800 MHz  
Center 447.2 MHz  
Sweep 3.0 s  
Stop 1 GHz

Radiated. Tested by RFI for Hasbro Europe. EUT: Commtech Reader. FCC Part 15.225  
Limit: 15.209. Cont. Tx Mode. GPH/37410/JD02/003

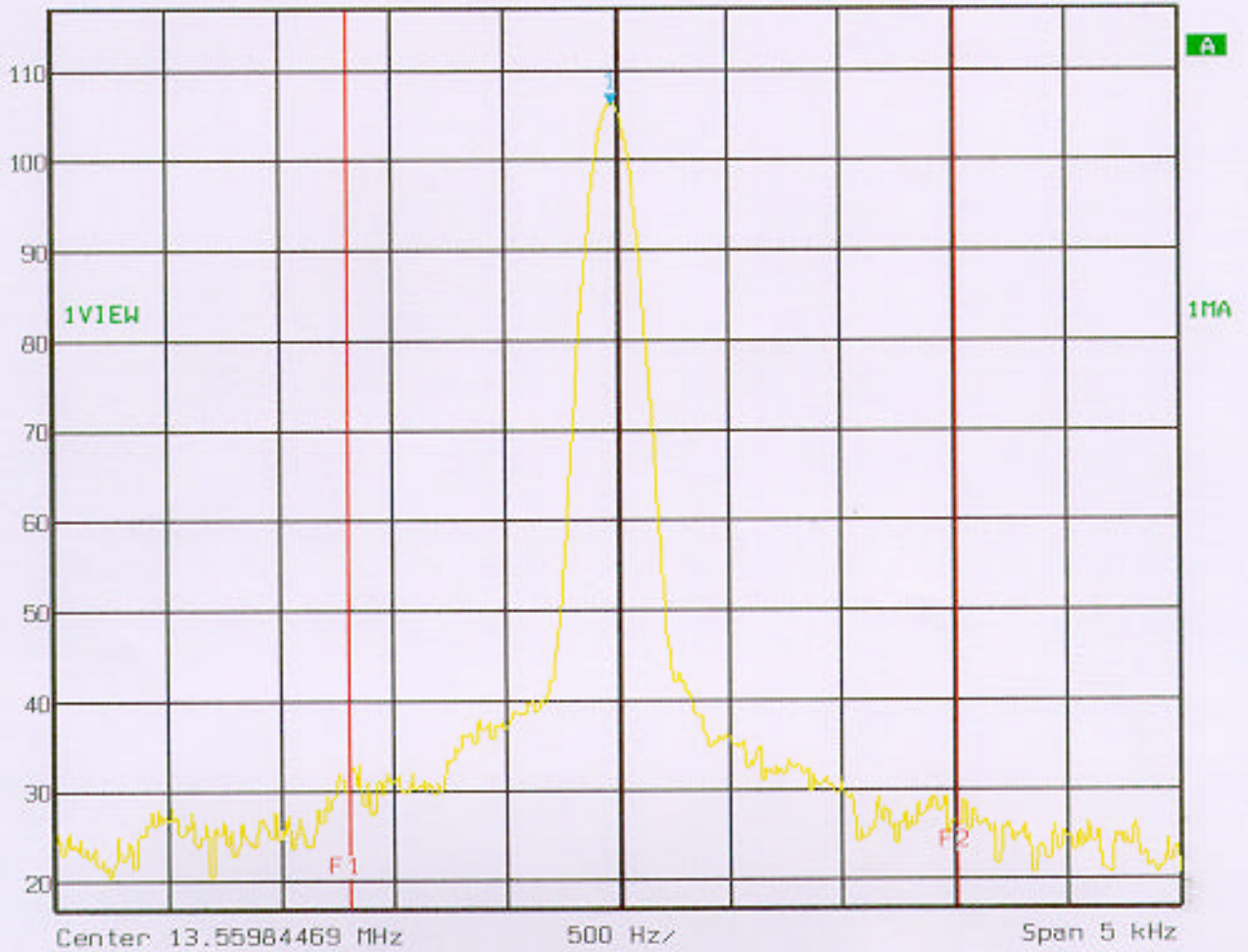
	Marker 1 [T1]	RBW	100 Hz	RF Att	40 dB
Ref Lvl	106.25 dB $\mu$ V	VBW	100 Hz		
117 dB $\mu$ V	13.55983968 MHz	SWT	3 s	Unit	dB $\mu$ V



Comment A: Frequency error for Hasbro. Frequency Tolerance 0.01%  
 9.0Volts at 20degs.  
 Date: 7.OCT.98 15:13:05

GPH/37410/JD02/004

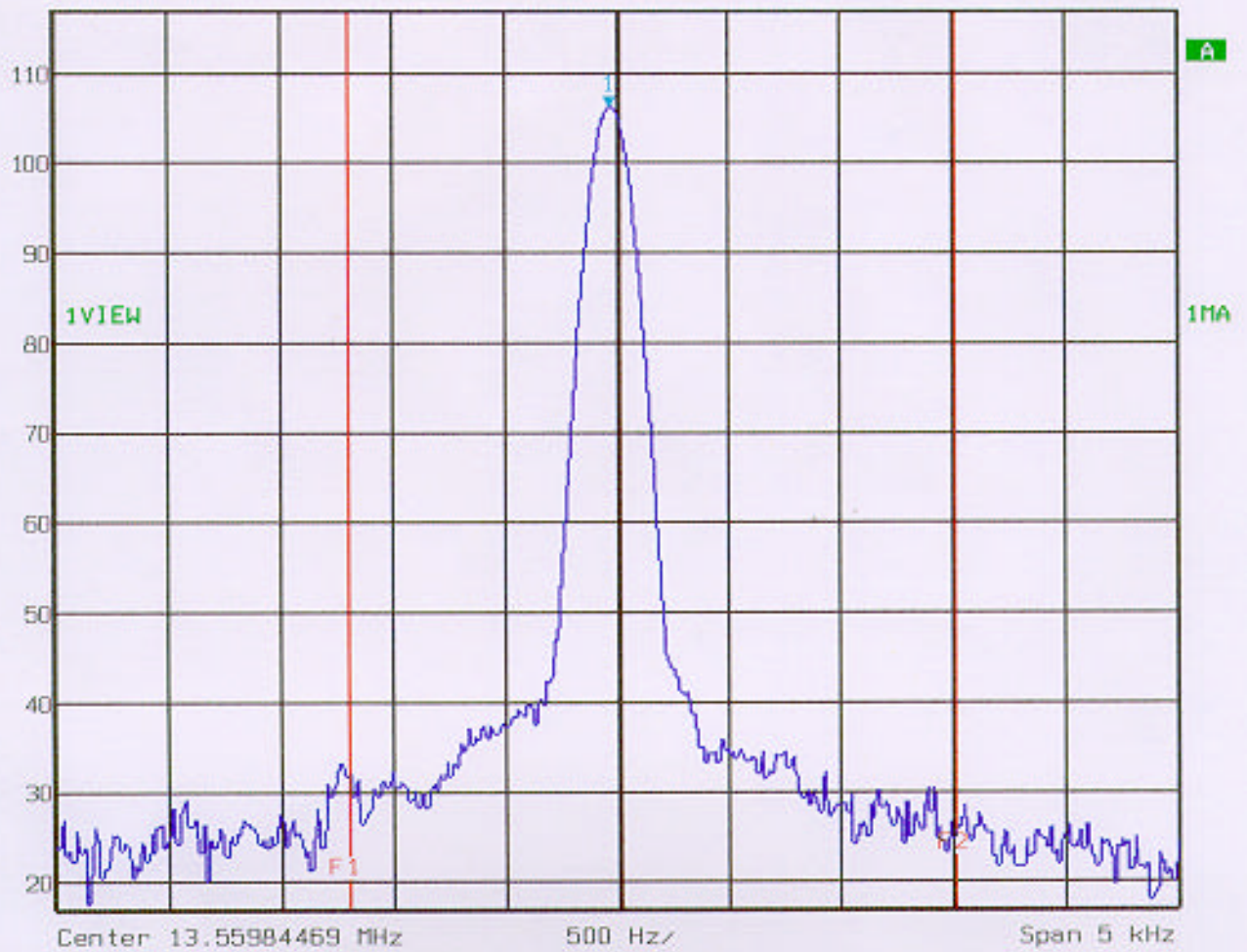
Marker 1 [T1] RBW 100 Hz RF Att 40 dB  
 Ref Lvl 106.19 dB $\mu$ V VBW 100 Hz  
 117 dB $\mu$ V 13.55982966 MHz SWT 3 s Unit dB $\mu$ V



Comment A: Frequency error for Hasbro. Frequency Tolerance 0.01%  
 7.65Volts at 20degs.  
 Date: 7.OCT.98 15:15:07

9PH/37410/J002/005

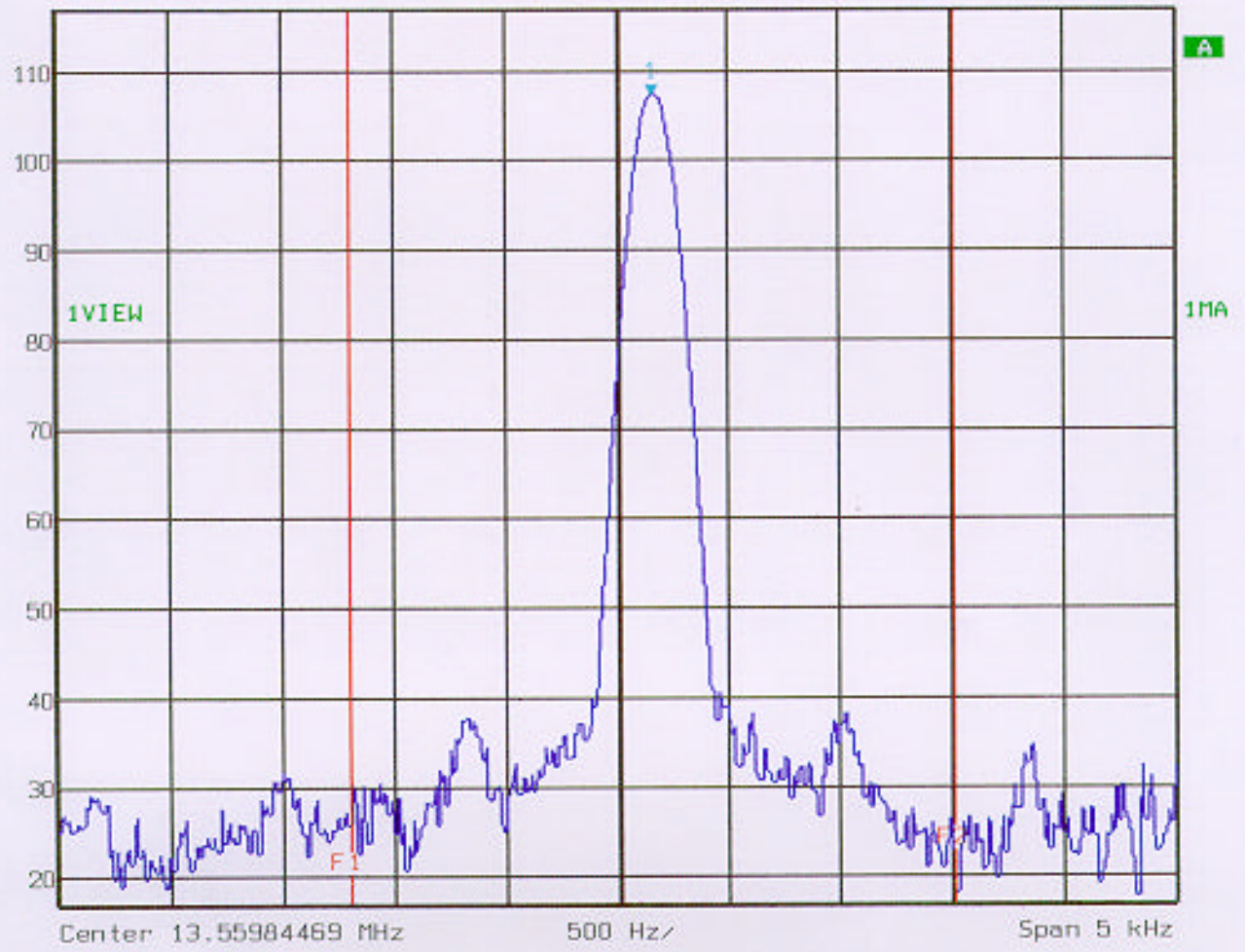
Marker 1 [T1] RBW 100 Hz RF Att 40 dB  
Ref Lvl 106.14 dB $\mu$ V VBW 100 Hz  
117 dB $\mu$ V 13.55981964 MHz SWT 3 s Unit dB $\mu$ V



Comment A: Frequency error for Hasbro. Frequency Tolerance 0.01%  
10.35Volts at 20degs.  
Date: 7.OCT.98 15:17:09

GPH/37410/JD02/006

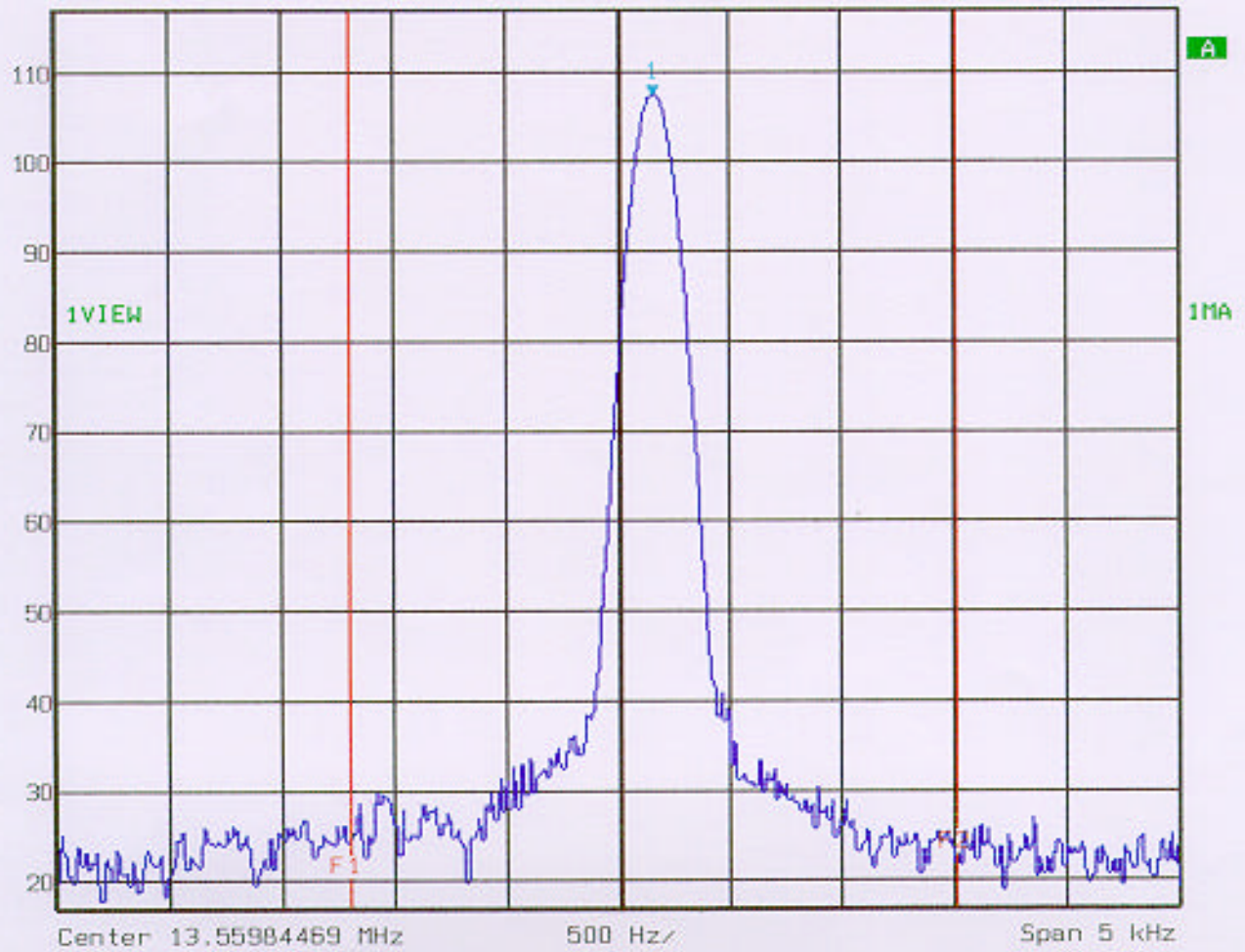
Marker 1 [T1] RBW 100 Hz RF Att 40 dB  
 Ref Lvl 107.44 dB $\mu$ V VBW 100 Hz  
 117 dB $\mu$ V 13.56001002 MHz SWT 3 s Unit dB $\mu$ V



Comment A: Frequency error for Hasbro. Frequency Tolerance 0.01%  
 10.35Volts at -20degs.  
 Date: 7.OCT.98 15:42:24

QPH/37410/3002/007

Marker 1 [T1] RBW 100 Hz RF Att 40 dB  
Ref Lvl 107.44 dB $\mu$ V VBW 100 Hz  
117 dB $\mu$ V 13.56001002 MHz SWT 3 s Unit dB $\mu$ V

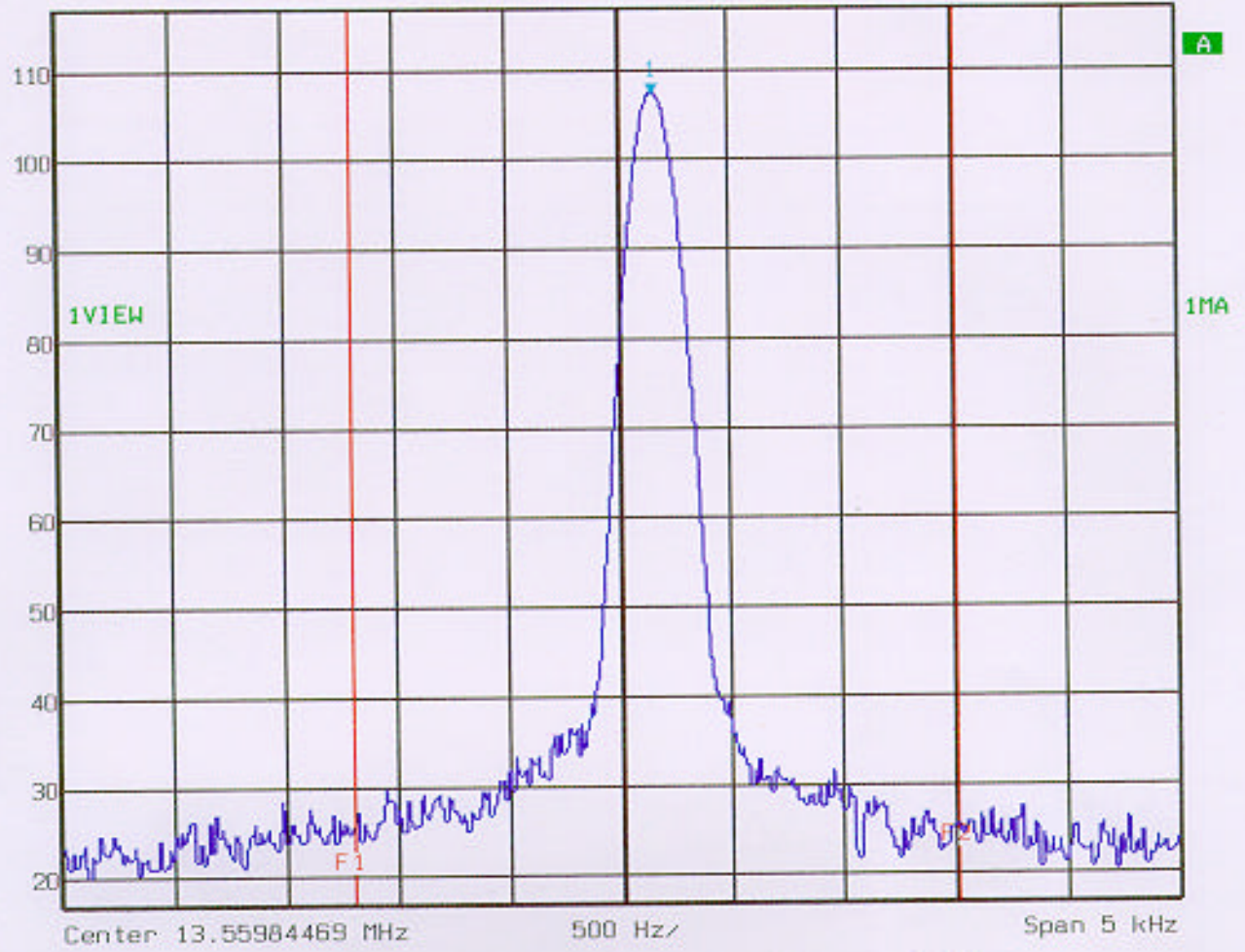


Comment A: Frequency error for Hasbro. Frequency Tolerance 0.01%  
9.0Volts at -20degs.  
Date: 7.OCT.98 15:44:27

QPH/37410/3002/008



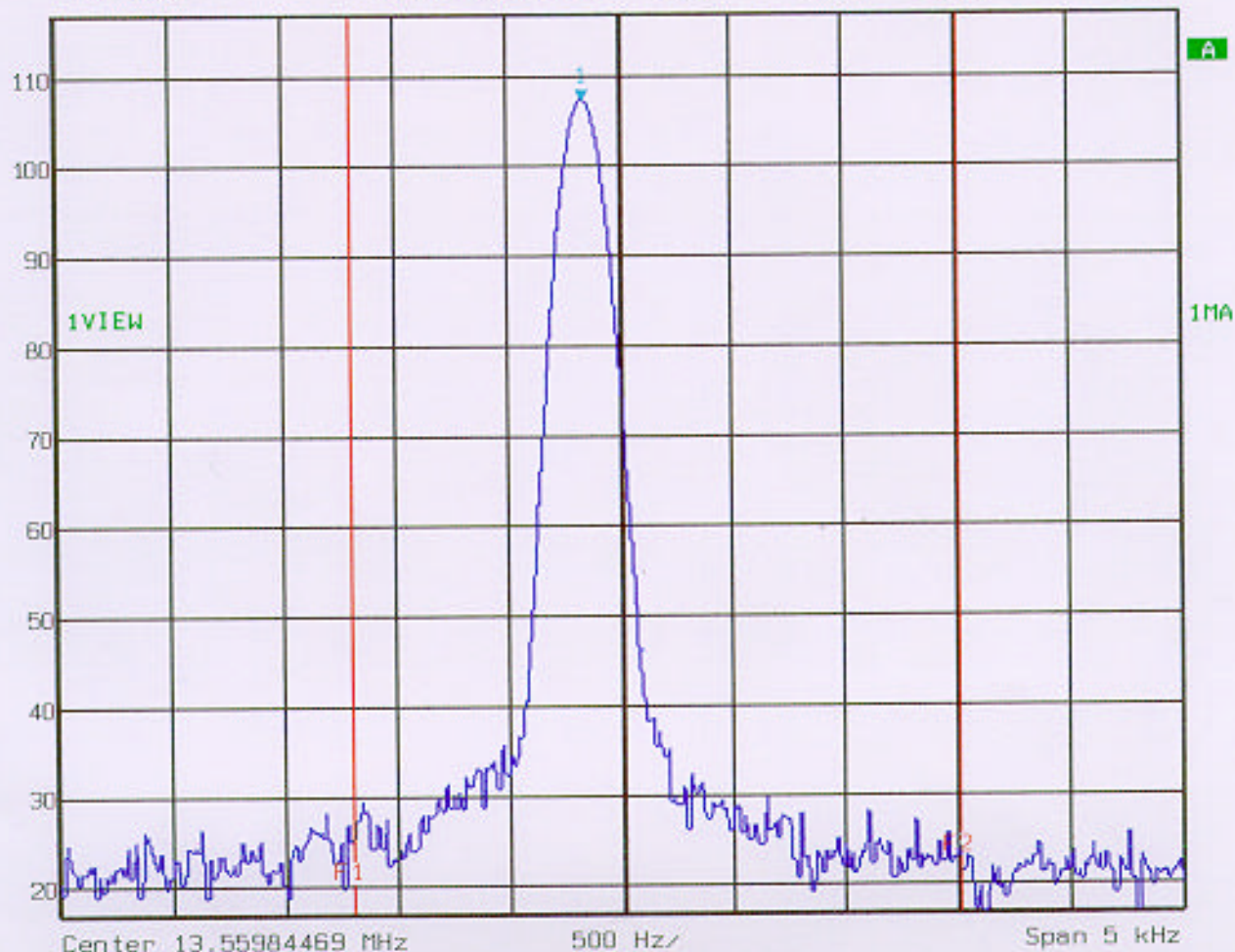
Marker 1 [T1]      RBW    100 Hz    RF Att    40 dB  
 Ref Lvl            107.44 dB $\mu$ V    VBW    100 Hz  
 117 dB $\mu$ V            13.56001002 MHz    SWT    3 s    Unit    dB $\mu$ V



Comment A: Frequency error for Hasbro. Frequency Tolerance 0.01%  
 7.65Volts at -20degs.  
 Date: 7.OCT.98 15:46:31

QPH/57410/JD02/009

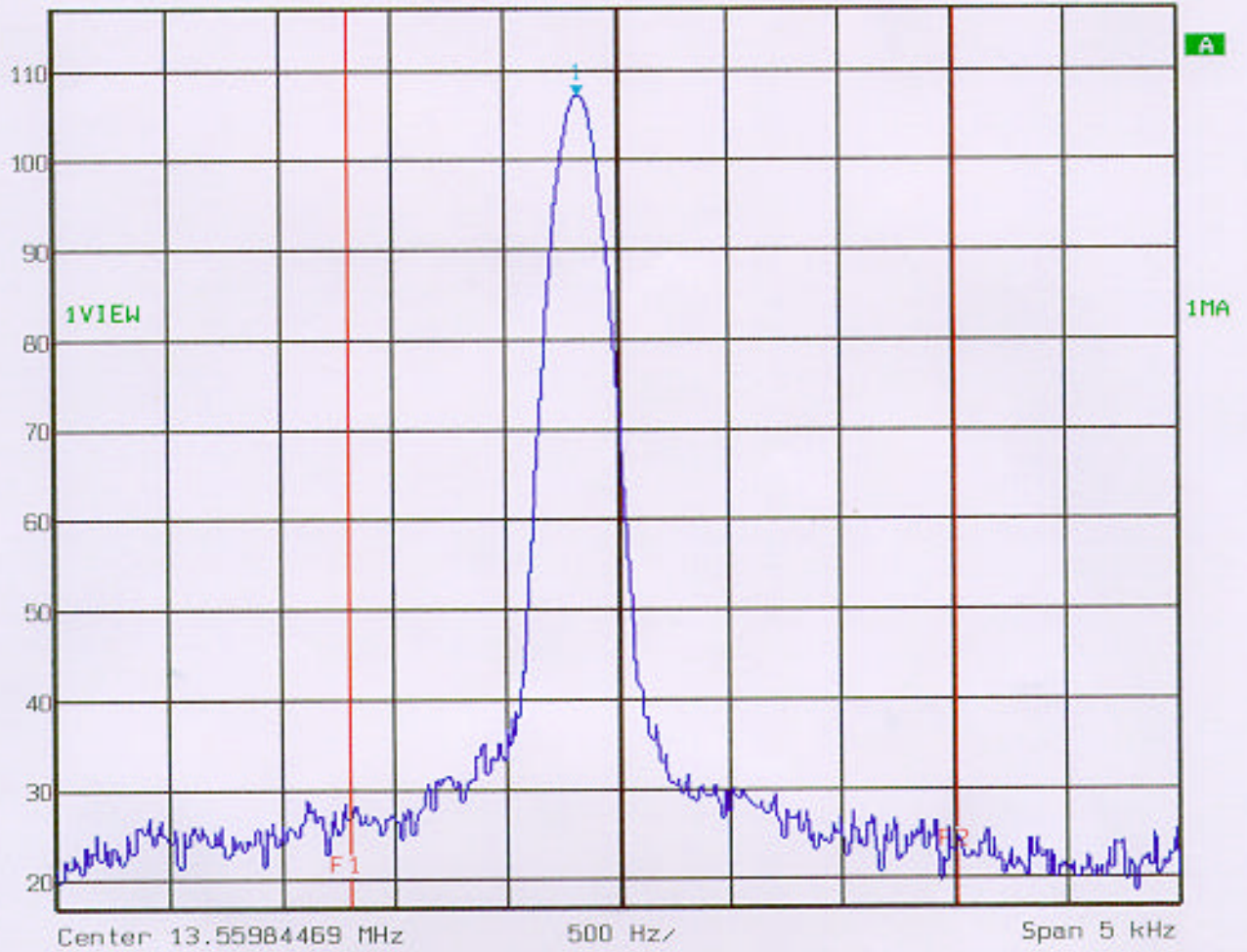
	Marker 1 [T1]	RBW	100 Hz	RF Att	40 dB
Ref Lvl	107.27 dB $\mu$ V	VBW	100 Hz		
117 dB $\mu$ V	13.55968938 MHz	SWT	3 s	Unit	dB $\mu$ V



Comment A: Frequency error for Hasbro. Frequency Tolerance 0.01%  
 7.65Volts at 50degs.  
 Date: 7.OCT.98 16:21:40

GPH/37410/JD02/010

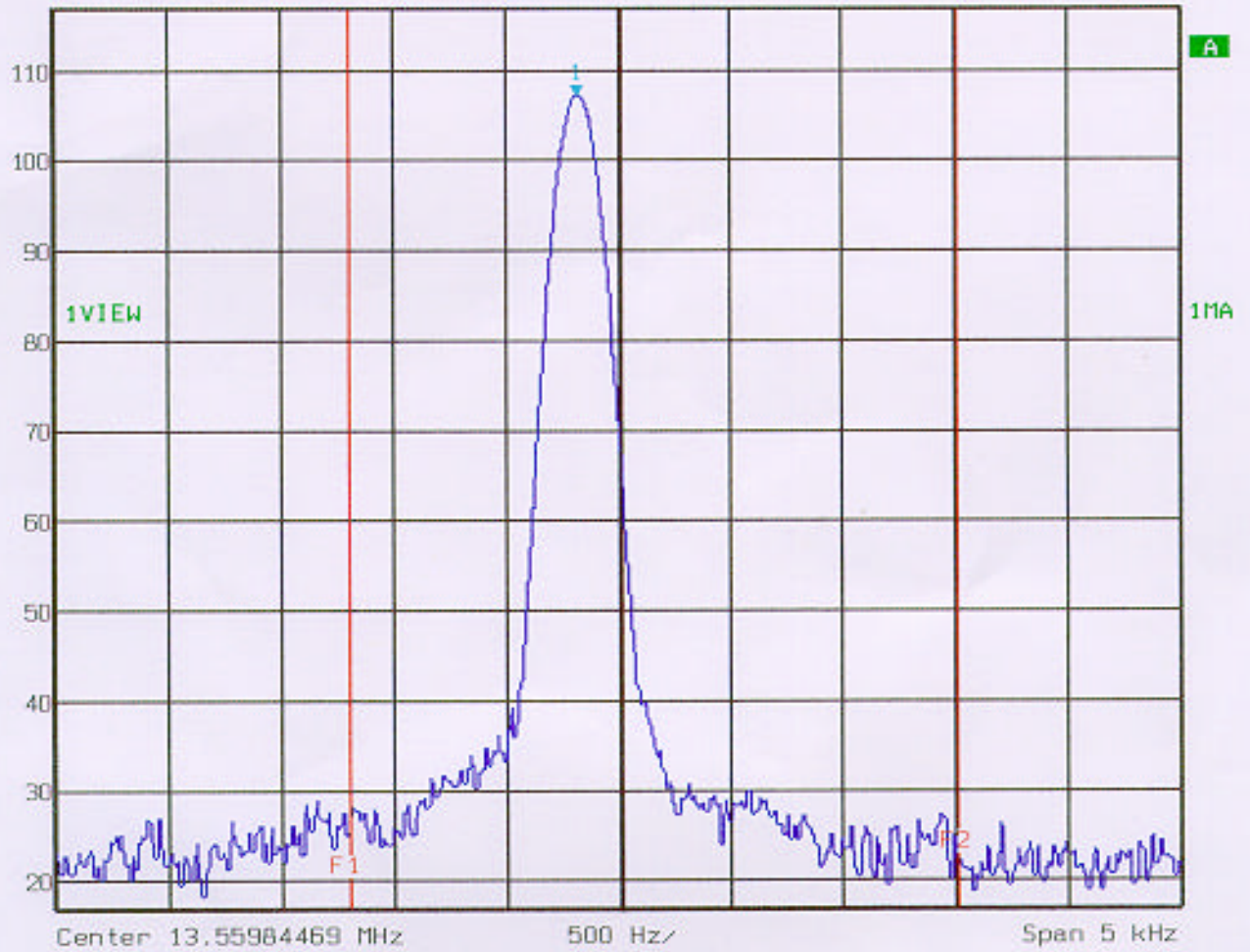
	Marker 1 [T1]	RBW	100 Hz	RF Att	40 dB
Ref Lvl	107.20 dB $\mu$ V	VBW	100 Hz		
117 dB $\mu$ V	13.55967936 MHz	SWT	3 s	Unit	dB $\mu$ V



Comment A: Frequency error for Hasbro. Frequency Tolerance 0.01%  
 9.0Volts at 50degs.  
 Date: 7.OCT.98 16:23:44

GPH/37410/JD02/01

Marker 1 [T1] RBW 100 Hz RF Att 40 dB  
Ref Lvl 107.16 dB $\mu$ V VBW 100 Hz  
117 dB $\mu$ V 13.55966934 MHz SWT 3 s Unit dB $\mu$ V



Comment A: Frequency error for Hasbro. Frequency Tolerance 0.01%  
10.35Volts at 50degs.  
Date: 7.OCT.98 16:25:46

GPH/37410/0002/012.

**Test Of: Hasbro Inc.  
Commtech Reader 84151  
13.56 MHz Passive Tag**

**To: F.C.C. Part 15:1997, Subpart C Section 15.225 (Intentional Radiators)**

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Test Of: Hasbro Inc.  
Commtech Reader 84151  
13.56 MHz Passive Tag

To: F.C.C. Part 15:1997, Subpart C Section 15.225 (Intentional Radiators)

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### **Appendix 5. Photographs of EUT**

This appendix contains the following photographs

<b>Photo Reference Number</b>	<b>Title</b>
PHT\37410JD02\001	Rear view of radiated emissions.
PHT\37410JD02\002	Front view of radiated emissions.

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

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EMC Department

Test Of: Hasbro Inc.  
Commtech Reader 84151  
13.56 MHz Passive Tag  
To: F.C.C. Part 15:1997, Subpart C Section 15.225 (Intentional Radiators)

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PHT\37410\001 Rear view of radiated emissions.



EMC Department

Test Of: Hasbro Inc.  
Commtech Reader 84151  
13.56 MHz Passive Tag  
To: F.C.C. Part 15:1997, Subpart C Section 15.225 (Intentional Radiators)

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PHT\37410\002 Front view of radiated emissions.

