





## ELECTROMAGNETIC EMISSIONS TEST REPORT


ACCORDING TO FCC PART 15, SUBPART C, §15.231


FOR  
**VISIONIC Ltd.**

EQUIPMENT UNDER TEST  
**PERSONAL SECURITY TRANSMITTER,  
MDT-122S**

Prepared by:   
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### Description of equipment under test

Test items	Security transmitter, FCC ID:GSAMDT122S
Manufacturer	Visonic Ltd.
Trade Mark	NA
Type (Model)	MDT-122S

### Applicant information

Applicant's representative & responsible person	Mr. Arick Elshtein, technical support manager
Company	Visonic Ltd.
Address	30 Habarzel St.
P.O. Box	22020
Postal code	61220
City	Tel Aviv
Country	Israel
Telephone number	011-972-3645 6714
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### Test performance

Project Number	13331
Location of the test	Hermon Laboratories, Binyamina, Israel
Test started	March 15, 1999
Test completed	March 15, 1999
Purpose of test	The EUT certification in accordance with CFR 47, part 2, §2.1033
Test specification(s)	FCC part 15 subpart C §15.231, §15.209 subpart B, §15.109

The A2LA logo endorsement applies only to the test methods and the standards that are listed in the scope of Hermon Laboratories accreditation by A2LA.  
Through this report period is used as decimal separator while thousands are separated by comma.  
This report is in conformity with EN 45001 and ISO GUIDE 25.  
The test results relate only to the items tested.

**This test report must not be reproduced in any form except in full, with the approval of Hermon Labs Ltd.**



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# 1 General information

## 1.1 Abbreviations and acronyms

The following abbreviations and acronyms are applicable to this test report:

AVRG	average (detector)
BW	bandwidth
dB	decibel
dBm	decibel referred to one milliwatt
dB( $\mu$ V)	decibel referred to one microvolt
dB( $\mu$ V/m)	decibel referred to one microvolt per meter
DC	direct current
EMC	electromagnetic compatibility
EUT	equipment under test
GHz	gigahertz
H	height
HL	Hermon Laboratories
Hz	hertz
IF	intermediate frequency
kHz	kilohertz
L	length
m	meter
mm	millimeter
MHz	megahertz
msec	millisecond
NA	not applicable
NARTE	National Association of Radio and Telecommunications Engineers, Inc.
QP	quasi-peak (detector)
RBW	resolution bandwidth
RF	radio frequency
RE	radiated emission
V	volt
W	watt



## 1.2 Specification references

CFR 47 part 15: October 1998	Radio Frequency Devices.
ANSI C63.2:06/1987	American National Standard for Instrumentation- Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications.
ANSI C63.4:1992	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low- Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

## 1.3 EUT description

The EUT, MDT-122S, is an automatic personal security transmitter operating at 315 MHz frequency. This micro-processor controlled transmitter is designed for use by guards in a prison, by security officers in an organization or by employees in a large industrial complex. It is attached to the user's belt with a clip or connected with a pull cord to the guard's belt.

EUT is supplied with built-in internal antenna and is powered by 3.6 V internal lithium battery.




#### 1.4 Statement of manufacturer

I, Arick Elshtein, technical support manager of Visonic Ltd., declare that the MDT-122S transmitter, FCC ID:GSAMDT122S was tested on March 15, 1999 by Hermon Laboratories and which this test report applies to, is identical of the equipment that will be marketed.

The term identical means identical within the variations that can be expected to arise as a result of quantity production technique.

Arick Elshtein, technical support manager  
Visonic Ltd.

Signature: \_\_\_\_\_

Date: May 31, 1999



## 2 Test facility description

### 2.1 General

Tests were performed at Hermon Laboratories, which is a fully independent, private EMC, Safety and Telecommunication testing facility. Hermon Laboratories is listed by the Federal Communications Commission (USA) for all parts of Code of Federal Regulations 47 (CFR 47), listed by Industry Canada for radiated measurements (file numbers IC 2186-1 for OATS and IC 2186-2 for anechoic chamber), certified by VCCI, Japan (the registration numbers are R-808 for OATS, R-809 for anechoic chamber, C-845 for conducted emissions site), assessed by NMI Certin B.V. (Netherlands) for a number of EMC, Telecommunications and Safety standards, and Accredited by AMTAC (UK) for safety of Medical Devices. The laboratory is accredited by American Association for Laboratory Accreditation (USA) according to ISO GUIDE 25/EN 45001 for EMC, Telecommunications and Product Safety Information Technology Equipment (Certificate No. 839.01).

Address: PO Box 23, Binyamina 30550, Israel  
Telephone: +972-6-628-8001  
Fax: +972-6-628-8277

Person for contact: Mr. Alex Usoskin, testing and QA manager.

### 2.2 Equipment calibration

The test equipment has been calibrated according to its recommended procedures and is within the manufacturer's published limit of error. The standards and instruments used in the calibration system conform to the present requirements of MIL-STD-45662A. The laboratory standards are calibrated by the third party (traceable to NIST, USA) on a regular basis according to equipment manufacturer requirements.

#### 2.2.1 Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

Conducted emissions with LISN	9 kHz to 30 MHz: $\pm 2.1$ dB
Radiated emissions in the open field test site at 10 m measuring distance	Biconilog antenna: $\pm 3.2$ dB Log periodic antenna: $\pm 3$ dB Biconical antenna: $\pm 4$ dB
Radiated emissions in the anechoic chamber at 3 m measuring distance	Biconilog antenna: $\pm 3.2$ dB



## 2.3 Laboratory personnel

The four people of Hermon Laboratories that have participated in measurements and documentation preparation are: Dr. Edward Usoskin - C.E.O., Mrs. Eleonora Pitt, test engineer and Mrs. Marina Cherniavsky - certification engineer.

Dr. E. Usoskin is an EMC specialist and M. Cherniavsky is a telecommunication engineer certified by the National Association of Radio and Telecommunications Engineers (NARTE, USA.).


The Hermon Laboratories' personnel that participated in this project have more than 100 years combined experience time in EMC measurements and electronic products design.

## 2.4 Statement of qualification

The test measurement data supplied in this test measurement report having been received by me, is hereby duly certified. The following is a statement of my qualifications:

I am an engineer, graduated from university in 1974 with an MScEE degree, have obtained 26 years experience in EMC measurements and have been with Hermon Laboratories since 1991.

Name: Mrs. Eleonora Pitt  
Position: test engineer

Signature:   
Date: May 30, 1999

I hereby certify that this test measurement report was prepared by me and is hereby duly certified. The following is a statement of my qualifications.

I am an engineer, graduated from University in 1971, with an MScEE degree, have obtained 26 years experience in electronic products design and development and have been with Hermon Laboratories since 1991. Also, I am a Telecommunication Class II engineer certified by the National Association of Radio and Telecommunications Engineers, Inc. (USA.), the certificate no. is E2-03410.

Name: Mrs. Marina Cherniavsky

Signature: 

Position: certif. engineer

Date: May 30, 1999


I hereby certify that this test measurement report was prepared under my direction and that to the best of my knowledge and belief, the facts set in the report and accompanying technical data are true and correct.

The following is a statement of my qualifications.

I have a Ph.D. degree in electronics, have obtained more than 42 years of experience in EMC measurements and electronic product design and have been with Hermon Laboratories since 1986.

Also, I am an EMC engineer certified by the National Association of Radio and Telecommunications Engineers, Inc. (USA). The certificate no. is EMC-000623-NE, Senior Member.

Name: Dr. Edward Usoskin  
Position: C.E.O.

Signature:   
Date: May 30, 1999





### 3 Radiated emission measurements

#### 3.1 Field strength of emissions according to § 15.231 (b)

##### 3.1.1 Specified limits at 3 m distance

Fundamental frequency MHz	Field strength of fundamental dB ( $\mu\text{V/m}$ )	Field strength of spurious emissions dB ( $\mu\text{V/m}$ )
315	75.6	55.6

##### 3.1.2 Test procedure and results

The test was performed in the Hermon Labs anechoic chamber at 3 meters test distance, i.e. the distance between measuring antenna and EUT boundary. The EUT was placed on the wooden turntable, as shown in Figure 3.1 and Photographs 3.1.1, 3.1.2. The EUT was operated in continuous transmitting mode and measured in three orthogonal axes during the testing. All the transmitter modes of operation were tested. The frequency range from 30 MHz up to 10<sup>th</sup> harmonic was investigated.

Biconilog and double ridged guide antennas were used. To find maximum radiation the turntable was rotated 360°, measuring antenna height was changed from 1 to 4 m, and the antennas polarization was changed from vertical to horizontal.

The peak detector with RBW = 120 kHz at frequencies below 1 GHz and RBW = VBW = 1 MHz above 1 GHz was used in course of measurements.

The test results were recorded into Table 3.1. Average factor is equal to  $20 \log (61.6/100) = -4.2 \text{ dB}$ , where the pulse train duration within 0.1 sec is 0.0616 sec. The specification was supplied by the manufacturer.

##### Reference numbers of test equipment used

HL 0041	HL 0275	HL 0465	HL 0521	HL 0593	HL 0594	HL 0604
HL 0815	HL 0816					

Full description is given in Appendix A.

**Table 3.1****Radiated emission measurements - test results  
(Field strength of fundamental frequency and spurious)**

TEST SPECIFICATION: FCC part 15 subpart C § 15.231  
COMPANY: Visonic Ltd.  
EUT: MDT-122S  
DATE: March 15, 1999  
RELATIVE HUMIDITY: 48%  
AMBIENT TEMPERATURE: 22°C

MEASUREMENTS PERFORMED AT 3 METRES DISTANCE

Frequency MHz	Measured Result dB (μV/m)	RWB MHz	Radiated Emissions dB (μV/m)	Specified Limit dB (μV/m)	Spec. Margin dB	Pass/ Fail
315.000	74.8	0.120	70.6	75.6	5.0	Pass
630.030	40.9	0.120	36.7	55.6	18.9	Pass
945.000	39.7	0.120	35.5	55.6	20.1	Pass
1575.15	47.0	1	42.8	55.6	12.8	Pass
1890.13	46.4	1	42.2	55.6	13.4	Pass

**Notes to table:**

Peak detector was used.

Radiated emission dB(μV/m) = measured result dB(μV/m) + average factor (dB).

Average factor =  $20 \log (61.6/100) = -4.2$  dB, where 61.6 msec is transmitting time of each 100 msec

Specified limit is in accordance with § 15.231(b)

**Table abbreviations:**

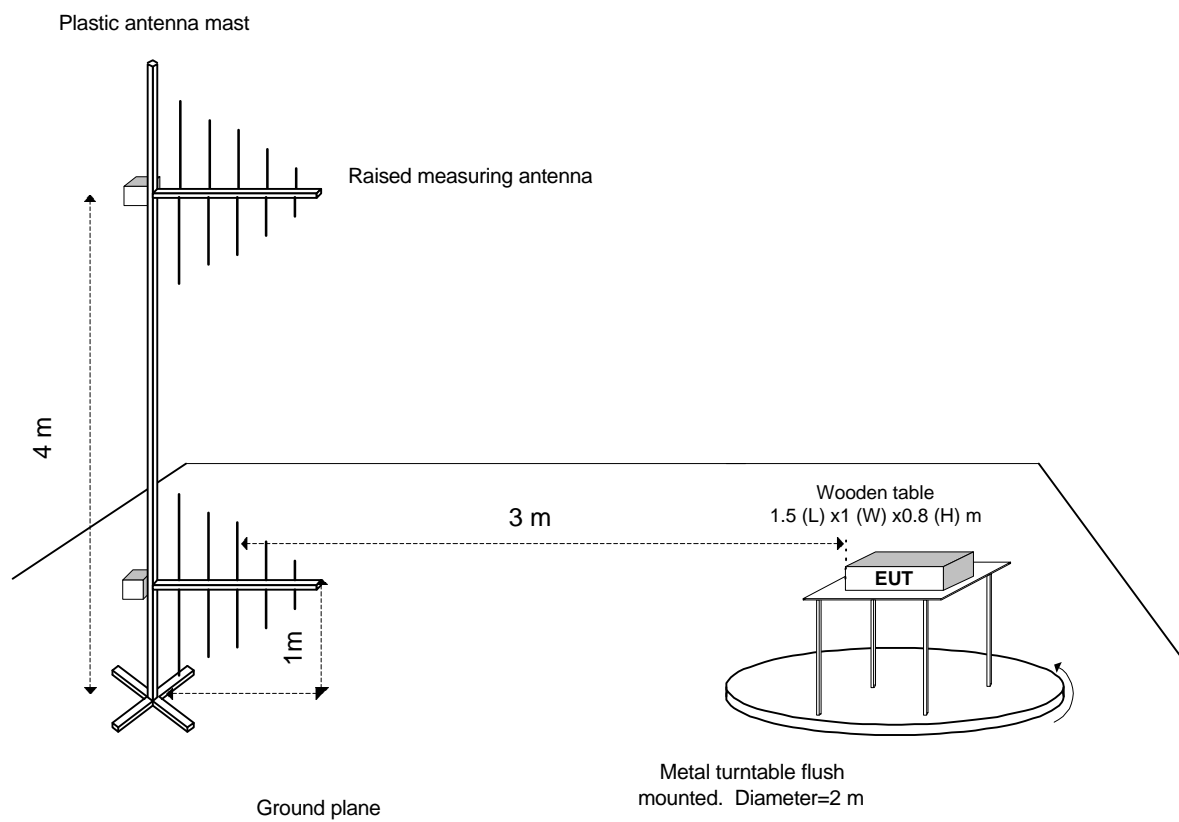
Spec. Margin = Specification margins = dB below (negative if above) specification limit.

Test performed by:  
Mrs. Eleonora Pitt, test engineer

Hermon Labs

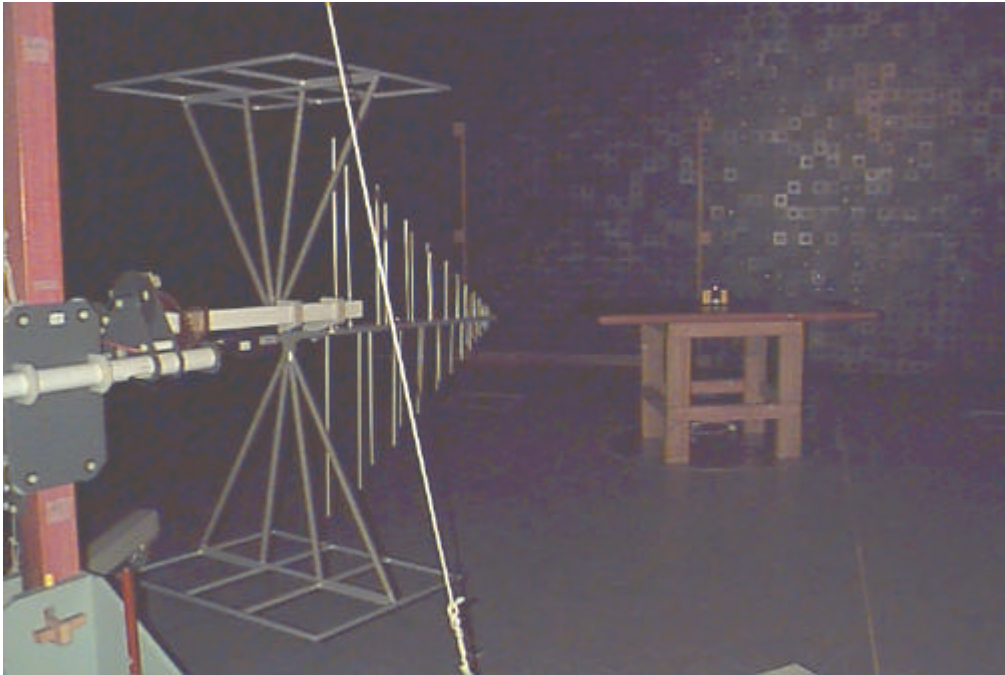


**Figure 3.1**  
**Radiated emission test setup**





**Photograph 3.1.1**  
**Radiated emission measurements setup**



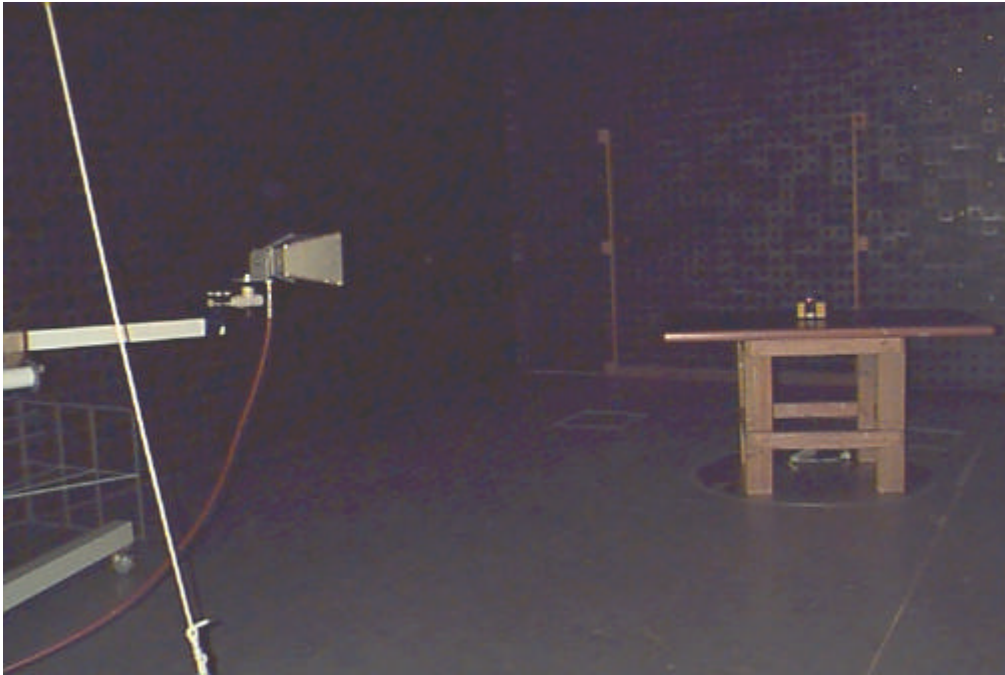


**Photograph 3.1.2**  
**Radiated emission measurements setup**





**Photograph 3.1.3**  
**Radiated emission measurements setup**





### 3.2 Bandwidth of emission according to § 15.231 (c)

#### 3.2.1 Specified limits

The bandwidth of the emissions shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz.

#### 3.2.2 Test procedure and results

The maximum allowed occupied bandwidth was calculated as 0.0025 of the center frequency:

$$0.0025 \times 315 \text{ MHz} = 0.795 \text{ MHz}$$

The spectrum trace data around transmitter fundamental frequency was obtained with the spectrum analyzer in "Max Hold" mode. The bandwidth value was determined between two points 20 dB down from the modulated carrier. The occupied bandwidth of 0.475 MHz was measured which is narrower than required 0.795 MHz.

The test results are shown in Plot 3.2.1.

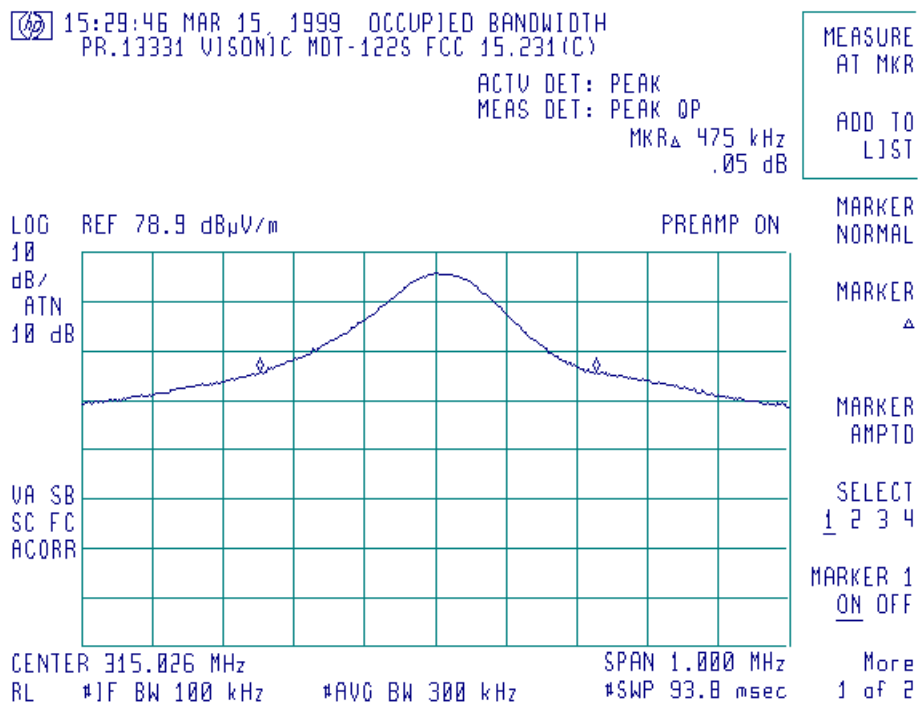
#### Reference numbers of test equipment used

HL 0275	HL 0465	HL 0521	HL 0593	HL 0594	HL 0604	HL 0815
HL 0816						

Full description is given in Appendix A.



**Plot 3.2.1**  
**Emission bandwidth measurement results**  
**Occupied bandwidth = 0.475 MHz**







### **3.3 Periodic operation requirement §15.231(a)(4)**

The transmitter MDT-122S employs for radio control purposes during emergencies involving safety of life, hence, when activated to signal an alarm, may operate during the pendency of the alarm condition.



### 3.4 Unintentional radiated emissions test according to §15.109

#### 3.4.1 Definition of the test

This test was performed to measure radiated emissions from the incorporated digital device of the EUT and also to verify the EUT full compliance with §15.109.

#### 3.4.2 The test set-up configuration

The radiated emissions measurements of the EUT incorporated digital device were performed in the anechoic chamber at 3 meters measuring distance in the frequency range from 30 MHz to 2 GHz. The EUT was placed on the wooden table as shown in Figure 3.1 and Photographs 3.1.1, 3.1.2. The biconilog antenna was used. To find maximum radiation the turntable was rotated 360°, the measuring antenna height changed from 1 to 4 m, and the antennas polarization was changed from vertical to horizontal.

The measurements were performed with the EMI receiver settings:

from 30 MHz to 1 GHz RBW=120 kHz, peak detector;

from 1 GHz up to 2 GHz RBW = VBW = 1 MHz, peak detector.

The results of measurements are shown in Plots 3.4.1, 3.4.2. All the found emissions were at least 15 dB below specified limit.

#### Reference numbers of test equipment used

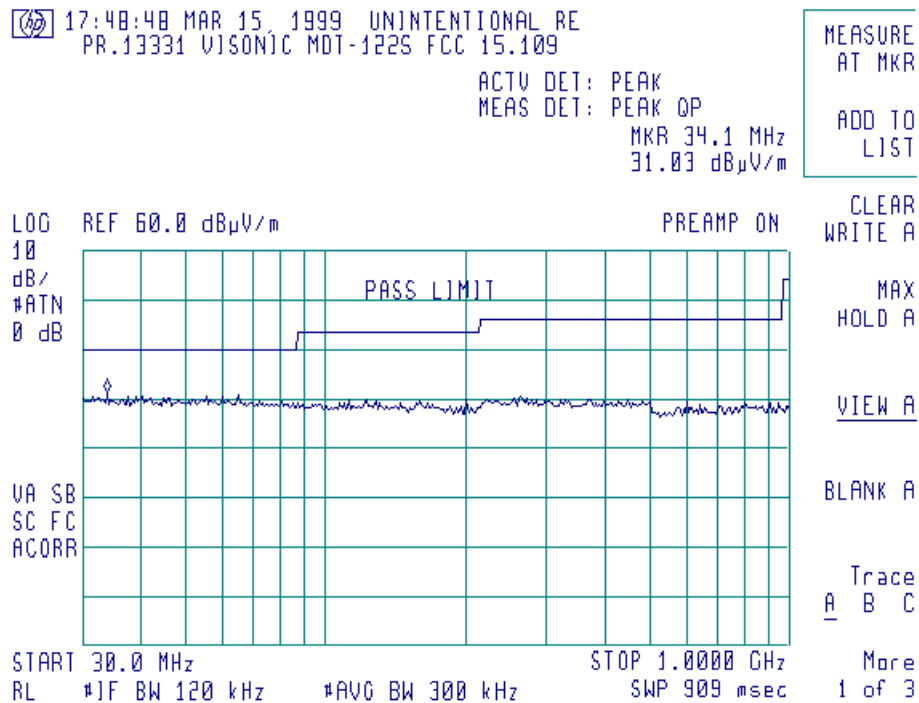
HL 0275	HL 0465	HL 0521	HL 0593	HL 0594	HL 0604	HL 0815
HL 0816						

Full description is given in Appendix A.



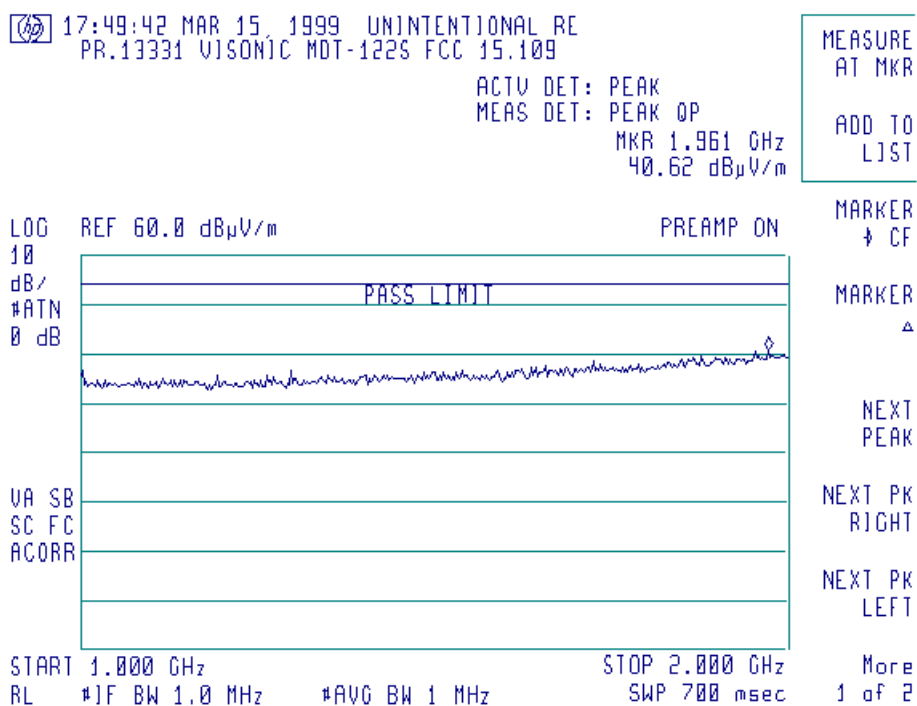
### Plot 3.4.1

Test Specification: §15.109, §15.209  
Radiated emissions of digital incorporated device





## Plot 3.4.2

Test Specification: §15.109, §15.209  
Radiated emissions of digital incorporated device



## 4 Summary and Signatures

The transmitter MDT-122S, FCC ID:GSAMDT122S was found to be in compliance with the requirements of FCC part 15 subpart C §§ 15.231, 15.209 and subpart B §15.109.

**Test performed by:**

Mrs. Eleonora Pitt, test engineer

**Approved by:**

Dr. Edward Usoskin, C.E.O.

**Responsible person from Visonic Ltd.**

Mr. Arick Elshtein, technical support manager

**APPENDIX A - Test equipment and ancillaries used for tests**

HL Serial No.	Serial No.	Description	Manufacturer	Model No.	Due Calibr.
0041	2811	Double Ridged Guide Antenna, 1-18 GHz	Electro-Metrics	RGA 50/60	8/99
0275	040	Table non-metallic, 1.5 x 1.0 x 0.8 m	Hermon Labs	WT-1	3/00 check
0465	023	Anechoic Chamber 9 (L) x 6.5 (W) x 5.5 (H) m	Hermon Labs	AC-1	10/99
0521	0319	Spectrum Analyzer with RF filter section (EMI Receiver 9 kHz – 6.5 GHz)	Hewlett Packard	8546A	7/99
0593	101	Antenna Mast, 1-4 m/ 1-6 m, pneumatic	Hermon Labs	AM-F1	4/00 check
0594	102	Turntable for Anechoic Chamber, flush mounted, d=1.2 m, pneumatic	Hermon Labs	WDC1	11/99 check
0604	1011	Antenna Log-Periodic/T Bow-Tie, 26 – 2000 MHz	EMCO	3141	12/99
0815	151	Cable, coax, RG-214, 7.3 m, N-type connectors, inside anechoic chamber	Hermon Labs	C214-7	8/99
0816	152	Cable, coax, RG-214, 8 m, N-type connectors, outside anechoic chamber	Hermon Labs	C214-8	8/99



## APPENDIX B-Test Equipment Correction Factors

Antenna Factor at 3m calibration  
Biconilog Antenna EMCO Model 3141  
Ser.No.1011

Frequency, MHz	Antenna Factor, dB(1/m)	Frequency, MHz	Antenna Factor, dB(1/m)
26	7.8	940	24.0
28	7.8	960	24.1
30	7.8	980	24.5
40	7.2	1000	24.9
60	7.1	1020	25.0
70	8.5	1040	25.2
80	9.4	1060	25.4
90	9.8	1080	25.6
100	9.7	1100	25.7
110	9.3	1120	26.0
120	8.8	1140	26.4
130	8.7	1160	27.0
140	9.2	1180	27.0
150	9.8	1200	26.7
160	10.2	1220	26.5
170	10.4	1240	26.5
180	10.4	1260	26.5
190	10.3	1280	26.6
200	10.6	1300	27.0
220	11.6	1320	27.8
240	12.4	1340	28.3
260	12.8	1360	28.2
280	13.7	1380	27.9
300	14.7	1400	27.9
320	15.2	1420	27.9
340	15.4	1440	27.8
360	16.1	1460	27.8
380	16.4	1480	28.0
400	16.6	1500	28.5
420	16.7	1520	28.9
440	17.0	1540	29.6
460	17.7	1560	29.8
480	18.1	1580	29.6
500	18.5	1600	29.5
520	19.1	1620	29.3
540	19.5	1640	29.2
560	19.8	1660	29.4
580	20.6	1680	29.6
600	21.3	1700	29.8
620	21.5	1720	30.3
640	21.2	1740	30.8
660	21.4	1760	31.1
680	21.9	1780	31.0
700	22.2	1800	30.9
720	22.2	1820	30.7
740	22.1	1840	30.6
760	22.3	1860	30.6
780	22.6	1880	30.6
800	22.7	1900	30.6
820	22.9	1920	30.7
840	23.1	1940	30.9
860	23.4	1960	31.2
880	23.8	1980	31.6
900	24.1	2000	32.0
920	24.1		

Antenna factor is to be added to receiver meter reading in dB( $\mu$ V) to convert to field intensity in dB( $\mu$ V/meter).



**Antenna Factor**  
**Double Ridged Guide Antenna**  
**Electro-Metrics, Model RGA-50/60**  
**Ser.No.2811**

Frequency, MHz	Antenna Factor, dB(1/m)
1000	24.3
1500	25.4
2000	28.4
2500	29.2
3000	30.5
3500	31.6
4000	33.7
4500	32.2
5000	34.5
5500	34.5
6000	34.6
6500	35.3
7000	35.5
7500	35.9
8000	36.6
8500	37.3
9000	37.7
9500	37.7
10,000	38.2
10,500	38.5
11,000	39.0
11,500	40.1
12,000	40.2
12,500	39.3
13,000	39.9
13,500	40.6
14,000	41.1
14,500	40.5
15,000	39.9
15,500	37.8
16,000	39.1
16,500	41.1
17,000	41.7
17,500	45.1
18,000	44.3

Antenna factor dB(1/m) is to be added to receiver meter reading in dB( $\mu$ V) to convert it into field intensity in dB( $\mu$ V/meter)