



HERMON LABORATORIES



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## **RADIO TEST REPORT**

ACCORDING TO 47 CFR Part 15 SUBPART C §15.231, §15.205, §15.209 and SUBPART B;  
RSS-210 Issue 5:2001; ICES-003 Issue 3:1997  
for

**VISONIC Ltd.**

EQUIPMENT UNDER TEST:

**Wireless "Power Code" PIR detector  
Model: Discovery QUAD MCW**

Approved by: \_\_\_\_\_  
**Mr. Arick Elshtein, International Standards Department Manager  
Visonic Ltd.**

This report is in conformity with ISO/IEC 17025. The A2LA logo endorsement applies only to the test methods and the standards that are listed in the scope of Hermon Laboratories accreditation.  
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 Laboratories Ltd.**



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## 1 Project information

### Description of equipment under test

|                                 |                                      |
|---------------------------------|--------------------------------------|
| Test items                      | : Wireless "Power Code" PIR detector |
| Manufacturer                    | : Visonic Ltd.                       |
| Types (Models)                  | : Discovery QUAD MCW                 |
| Equipment FCC code <sup>1</sup> | : DSC                                |

### Applicant information

|                                |                                       |
|--------------------------------|---------------------------------------|
| Applicant's responsible person | : Mr. Arick Elshtein, project manager |
| Company                        | : Visonic Ltd.                        |
| Address                        | : 27, Habarzel Street                 |
| City                           | : Tel Aviv                            |
| Postal code                    | : 69710                               |
| Country                        | : Israel                              |
| Telephone number               | : +972 3 6456714                      |
| Telefax number                 | : +972 3 6456891                      |

### Test performance

|                       |                                                                                                                                |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Project Number:       | : 15458                                                                                                                        |
| Location              | : Hermon Laboratories                                                                                                          |
| Test started          | : March 5, 2003                                                                                                                |
| Test completed        | : June 15, 2003                                                                                                                |
| Purpose of test       | : Apparatus compliance verification in accordance with emission requirements                                                   |
| Test specification(s) | : 47CFR Part 15, subpart C, §15.231, §15.205, §15.209, and subpart B §15.109; RSS-210 Issue 5: 2001 and ICES-003 Issue 3: 1997 |

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<sup>1</sup> FCC Equipment codes – see Appendix D



## 2 Summary of tests and requirements

| Parameter                                        | Subclause    | Tested by                      | Date tested                         | Verdict     | Remarks              |
|--------------------------------------------------|--------------|--------------------------------|-------------------------------------|-------------|----------------------|
| <b>Transmitter characteristics, §15.231</b>      |              |                                |                                     |             |                      |
| Bandwidth of emission                            | 15.231(c)    | Mrs. E. Pitt,<br>test engineer | May 5, 2003                         | <b>Pass</b> |                      |
| Field strength of fundamental                    | 15.231(b)(2) | Mrs. E. Pitt,<br>test engineer | March 5, May 5, 2003                | <b>Pass</b> |                      |
| Field strength of spurious radiation             | 15.231(b)(3) | Mrs. E. Pitt,<br>test engineer | March 5, May 5, 8, June<br>15, 2003 | <b>Pass</b> |                      |
| <b>Unintentional radiation, §15.107, §15.109</b> |              |                                |                                     |             |                      |
| Radiated emissions                               | 15.109       |                                |                                     | <b>Pass</b> | Tested in Tx<br>mode |

**Test report prepared by:** Mrs. V. Mednikov, MSc, certification engineer

**Test report approved by:** Mr. M. Nikishin, MSc, EMC group leader

Mr. E. Usoskin, PhD, C.E.O.



### 3 EUT description

#### 3.1 General description

The Discovery QUAD MCW is a battery operated PIR detector, which shares its housing with a UHF "Power Code" type transmitter.

#### 3.2 EUT test configuration

Test configuration is provided in Figure 3.2.1.

Figure 3.2.1 EUT test configuration





### 3.3 Transmitter description

|                                                                          |          |                             |                                                               |
|--------------------------------------------------------------------------|----------|-----------------------------|---------------------------------------------------------------|
| <b>Operating frequency:</b>                                              |          | 315 MHz                     |                                                               |
| <b>Extreme temperature conditions<sup>2</sup>:</b>                       |          |                             |                                                               |
| Operating Temperature: -10°C to 50°C (14°F to 122°F)                     |          |                             |                                                               |
| <b>Maximum rated output power</b>                                        |          |                             |                                                               |
| At transmitter permanent external 50 $\Omega$ rf output connector (dBm)  |          | NA                          |                                                               |
| Effective radiated power (for equipment with integral antenna) (dBm)     |          | -17                         |                                                               |
| <b>Transmitter duty cycle (worst case)</b>                               |          |                             |                                                               |
| Tx on (seconds)                                                          |          | 0.062                       |                                                               |
| Tx off (seconds)                                                         |          | 0.038                       |                                                               |
| <b>Modulation</b>                                                        |          |                             |                                                               |
| Amplitude                                                                |          |                             |                                                               |
| Frequency                                                                |          |                             |                                                               |
| <input checked="" type="checkbox"/> Other (specify): ASK (ON OFF KEYING) |          |                             |                                                               |
| Can the transmitter be operated without modulation                       |          | yes                         | <input checked="" type="checkbox"/> no                        |
| <b>Transmitter power source</b>                                          |          |                             |                                                               |
| <input checked="" type="checkbox"/>                                      | Battery  | Nominal rated voltage (VDC) | 3                                                             |
| Nickel Cadmium                                                           |          |                             |                                                               |
| <input checked="" type="checkbox"/>                                      | Lithium  |                             |                                                               |
| Alkaline                                                                 |          |                             |                                                               |
|                                                                          | DC       | Nominal rated voltage (VDC) |                                                               |
|                                                                          | AC mains | Nominal rated voltage (VAC) |                                                               |
| Is there common power source for transmitter and receiver - NA           |          | yes                         | <input type="checkbox"/> no                                   |
| <b>Antenna type</b>                                                      |          |                             |                                                               |
| <input checked="" type="checkbox"/>                                      | Integral |                             |                                                               |
|                                                                          | External |                             |                                                               |
| <b>Type of antenna jack<sup>3</sup> - NA</b>                             |          |                             |                                                               |
|                                                                          | standard | connector type              | Male <input type="checkbox"/> Female <input type="checkbox"/> |
|                                                                          | unique   | connector type              | Male <input type="checkbox"/> Female <input type="checkbox"/> |

<sup>2</sup> Frequency tolerance test for devices operating in the frequency band 40.66 – 40.70 MHz shall be performed in normal and extreme test conditions.

<sup>3</sup> Standard antenna jack use is prohibited excluding devices which must be professionally installed



## 4 Test results

### 4.1 Bandwidth of emission according to § 15.231 (c) and RSS-210 § 6.1.1(c)

METHOD OF MEASUREMENT: ANSI 63.4 §13.1.7  
DATE: May 5, 2003  
RELATIVE HUMIDITY: 43 %  
AMBIENT TEMPERATURE: 23 °C  
AIR PRESSURE: 1012 hPa  
MODULATION: ON  
DETECTOR USED: Peak

| Carrier frequency<br>MHz     | Occupied bandwidth,<br>kHz | Reference to plot in Annex A |
|------------------------------|----------------------------|------------------------------|
| 315                          | 485                        | A1                           |
| Measurement uncertainty, ppm | 0.168                      |                              |

#### TEST EQUIPMENT USED:

|         |         |         |         |         |  |  |
|---------|---------|---------|---------|---------|--|--|
| HL 0034 | HL 0038 | HL 0415 | HL 0812 | HL 1430 |  |  |
|---------|---------|---------|---------|---------|--|--|

#### LIMIT (§ 15.231 (c))

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

**For 315 MHz frequency the specified limit is 787.5 kHz**

#### TEST PROCEDURE

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 dBc.



## 4.2 Field strength of fundamental, § 15.231 and RSS-210 § 6.1.1(b)

METHOD OF MEASUREMENT: ANSI 63.4 §13.1.5  
DATE: March 5, May 5, 2003  
RELATIVE HUMIDITY: 51 %  
AMBIENT TEMPERATURE: 22 °C  
AIR PRESSURE: 1013 hPa  
SITE DESCRIPTION: OATS  
MODULATION: ON  
DETECTOR USED: Peak

|                                           | § 15.231 (b) | § 15.231 (e) |
|-------------------------------------------|--------------|--------------|
| The EUT complies with the requirements of | X            |              |

| Frequency,<br>MHz           | Measured field<br>strength,<br>dB(uV/m) | Average factor,<br>dB | Calculated<br>result,<br>dB(uV/m) | Specification<br>limit,<br>dB(uV/m) | Reference to plot<br>in Annex A |
|-----------------------------|-----------------------------------------|-----------------------|-----------------------------------|-------------------------------------|---------------------------------|
| 315                         | 68.76                                   | -4.2                  | 64.56                             | 75.62                               | A2                              |
| Measurement uncertainty, dB |                                         |                       | ± 6                               |                                     |                                 |

### 4.2.1 Average factor calculation, §15.35

| Tx ON | Duty cycle | Average factor | Reference to plot in<br>Annex A |
|-------|------------|----------------|---------------------------------|
| 61.2  | 0.612      | -4.2           | A3                              |

Average factor (AF) was calculated as follows:  $AF = 20 \cdot \log(0.612) = -4.2$

### TEST EQUIPMENT USED:

|         |         |         |         |         |  |  |
|---------|---------|---------|---------|---------|--|--|
| HL 0034 | HL 0038 | HL 0415 | HL 0812 | HL 1430 |  |  |
|---------|---------|---------|---------|---------|--|--|

### LIMIT § 15.231 (b)

| Fundamental frequency (MHz) | Field strength of fundamental (b) (mV/m) @ 3 m |
|-----------------------------|------------------------------------------------|
| 260 – 470                   | 3,750 to 12,500                                |

The specified limit for 315 MHz frequency is 75.62 dB(μV/m)

### TEST PROCEDURE

The EUT was tested, being placed on a wooden 80 cm height turntable in vertical and horizontal position in turn. To find maximum radiation the turntable was rotated 360°, measuring antenna height was changed from 1 to 4 m, and the antenna polarization was changed from vertical to horizontal.



### 4.3 Field strength of spurious radiation, § 15.231 and RSS-210 § 6.1.1(b)

METHOD OF MEASUREMENT: ANSI 63.4 §13.1.4  
TEST PERFORMED IN: Anechoic chamber, OATS  
DATE: March 5, May 5, 8, June 15, 2003  
RELATIVE HUMIDITY: 43 %  
AMBIENT TEMPERATURE: 23 °C  
AIR PRESSURE: 1012 hPa  
TEST PERFORMED AT FIELD STRENGTH: 68.76 dB(μV/m)  
MODULATION: ON  
DETECTOR USED: Peak  
RANGE OF MEASUREMENTS: 9 kHz to 3200 MHz

| Frequency,<br>MHz           | RBW,<br>kHz | VBW,<br>kHz | Radiated<br>emission (peak),<br>dB(μV/m) | Limit (peak)<br>@ 3 m,<br>dB(μV/m) | Radiated<br>emission, (avrg)*<br>dB(μV/m) | Limit (avrg)<br>@ 3 m,<br>dB(μV/m) | Ref. to plot<br>in App. A |
|-----------------------------|-------------|-------------|------------------------------------------|------------------------------------|-------------------------------------------|------------------------------------|---------------------------|
| 630.1                       | 120         | 300         | 33.00                                    | 75.62                              | 28.8                                      | 55.62                              | A7                        |
| 945.1                       | 120         | 1000        | 55.58                                    | 75.62                              | 51.18                                     | 55.62                              | A8                        |
| 1260.0                      | 1000        | 3000        | 57.2                                     | 75.62**                            | 53.0                                      | 55.62**                            | A10                       |
| 1575.0                      | 1000        | 3000        | 58.06                                    | 74.00                              | 53.86                                     | 54.00                              | A11                       |
| 1890.3                      | 1000        | 1000        | 48.95                                    | 75.62                              | 44.75                                     | 55.62                              | A12                       |
| 2205.4                      | 1000        | 3000        | Ambient noise 14 dB below the limit      |                                    |                                           | 54.00                              | A14                       |
| 2520.4                      | 1000        | 3000        | 44.64                                    | 75.62                              | 40.44                                     | 55.62                              | A15                       |
| 2835.4                      | 1000        | 3000        | 48.84                                    | 74.00                              | 44.64                                     | 54.00                              | A16                       |
| 3150.4                      | 1000        | 1000        | Ambient noise 10 dB below the limit      |                                    |                                           | 55.62                              | A17                       |
| Measurement uncertainty, dB |             |             |                                          | ± 6                                |                                           |                                    |                           |

For test results refer to Plots A4 to A17.

\* Radiated emission value was calculated: Peak value + Average factor

\*\* In Canada this frequency falls into restricted band, therefore the limit is 74.00 dB(μV/m) (peak) and 54.00 dB(μV/m) (average)

#### Notes to table:

RBW: resolution bandwidth

VBW: video bandwidth

#### TEST EQUIPMENT USED:

|         |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|---------|
| HL 0041 | HL 0446 | HL 0465 | HL 0521 | HL 0589 | HL 0592 | HL 0593 |
| HL 0594 | HL 0604 | HL 1004 | HL 1365 | HL 1430 | HL 1942 | HL 1947 |
| HL 1984 | HL 2009 |         |         |         |         |         |

#### LIMIT § 15.231 (b)

| Fundamental frequency (MHz) | Field strength of harmonics (b) (mV/m) @ 3 m |
|-----------------------------|----------------------------------------------|
| 260 – 470                   | 375 to 1,250                                 |

The specified limit for 315 MHz frequency is 55.62 dB(μV/m)

#### TEST PROCEDURE

The EUT was tested, being placed on a wooden 80 cm height turntable in vertical and horizontal position in turn.

**9 kHz – 30 MHz frequency range.** The loop antenna was positioned with its plane vertical. The loop center was 1 meter above the ground plane. To find maximum radiation the turntable was rotated 360° and the measuring antenna was rotated about its vertical axis.

**30 MHz – 9.5 GHz frequency range.** 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.



#### 4.4 Unintentional radiated emissions test according to §15.109 and ICES-003

METHOD OF MEASUREMENT: ANSI 63.4 §11.6 / ANSI 63.4 §12.1.4  
TEST PERFORMED IN: Anechoic chamber  
DATE: May 8, 2003  
RELATIVE HUMIDITY: 43 %  
AMBIENT TEMPERATURE: 23 °C  
DISTANCE BETWEEN ANTENNA AND EUT: 3 m  
THE EUT WAS TESTED AS: TABLE-TOP  
FREQUENCY RANGE: 30 MHz – 2 GHz  
DETECTOR TYPE: Peak  
RESOLUTION BANDWIDTH: 120 kHz below 1 GHz, 1 MHz above 1 GHz

| The EUT highest used frequency (including operating frequency), MHz | Upper frequency of measurement range, MHz                                       |
|---------------------------------------------------------------------|---------------------------------------------------------------------------------|
| Below 1.705                                                         | 30                                                                              |
| 1.705 – 108                                                         | 1000                                                                            |
| 108 – 500                                                           | 2000                                                                            |
| 500 – 1000                                                          | 5000                                                                            |
| Above 1000                                                          | 5 <sup>th</sup> harmonic of the highest frequency or 40 GHz, whichever is lower |

The EUT was tested in Tx mode, no unintentional emissions except harmonics were found, refer to Plots A6, A9 in Appendix A.

#### TEST EQUIPMENT USED:

|  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|
|  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|

#### LIMIT (§ 15.109)

| Frequency, MHz | Class A equipment @ 10 m dB(μV/m) | Class B equipment @ 3 m dB(μV/m) |
|----------------|-----------------------------------|----------------------------------|
| 30 - 88        | 39.0                              | 40                               |
| 88 - 216       | 43.5                              | 43.5                             |
| 216 - 960      | 46.4                              | 46                               |
| 960 - 5000     | 49.5                              | 54                               |

#### TEST PROCEDURE

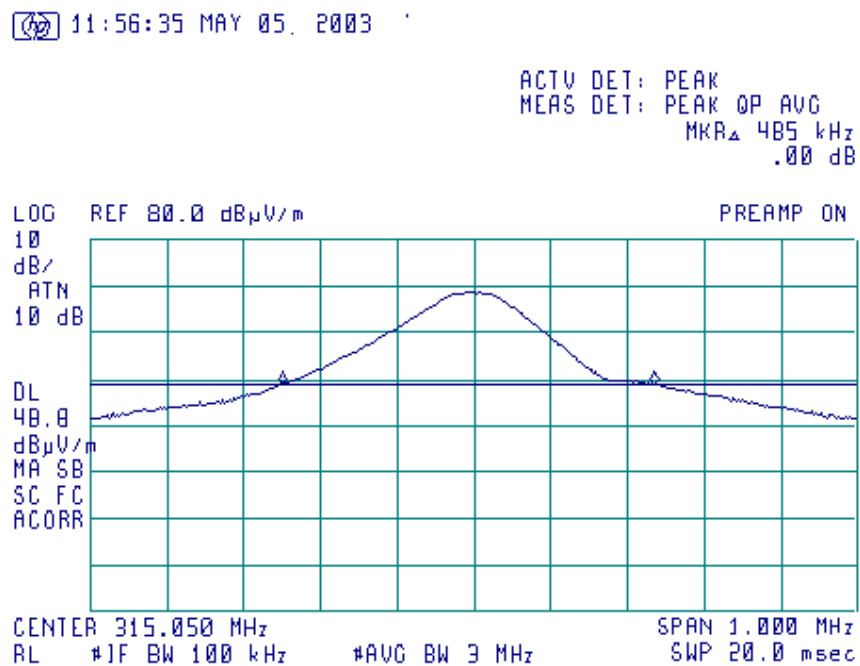
The EUT was placed on a wooden 80 cm height turntable. To find maximum radiation the turntable was rotated 360°, measuring antenna height was changed from 1 to 4 m, and the antennas polarization was changed from vertical to horizontal.



## Appendix A - Plots

Plot A1

Occupied bandwidth measurements





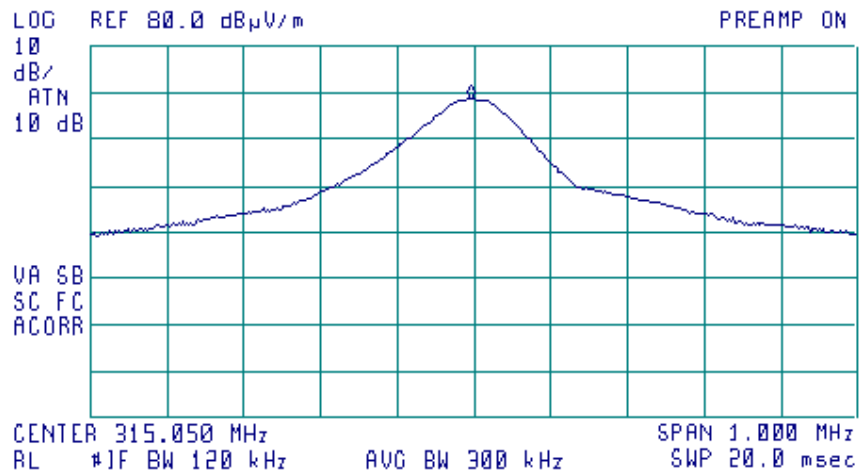
Plot A2

Field strength of fundamental

Note Horizontal polarization

11:49:39 MAY 05, 2003

ACTV DET: PEAK  
MEAS DET: PEAK OP AVG  
MKR 315.045 MHz  
68.76 dB $\mu$ V/m



$\text{LIMIT}_{\text{peak}} = 95.62 \text{ dB}(\mu\text{V/m}) @ 3\text{m}$

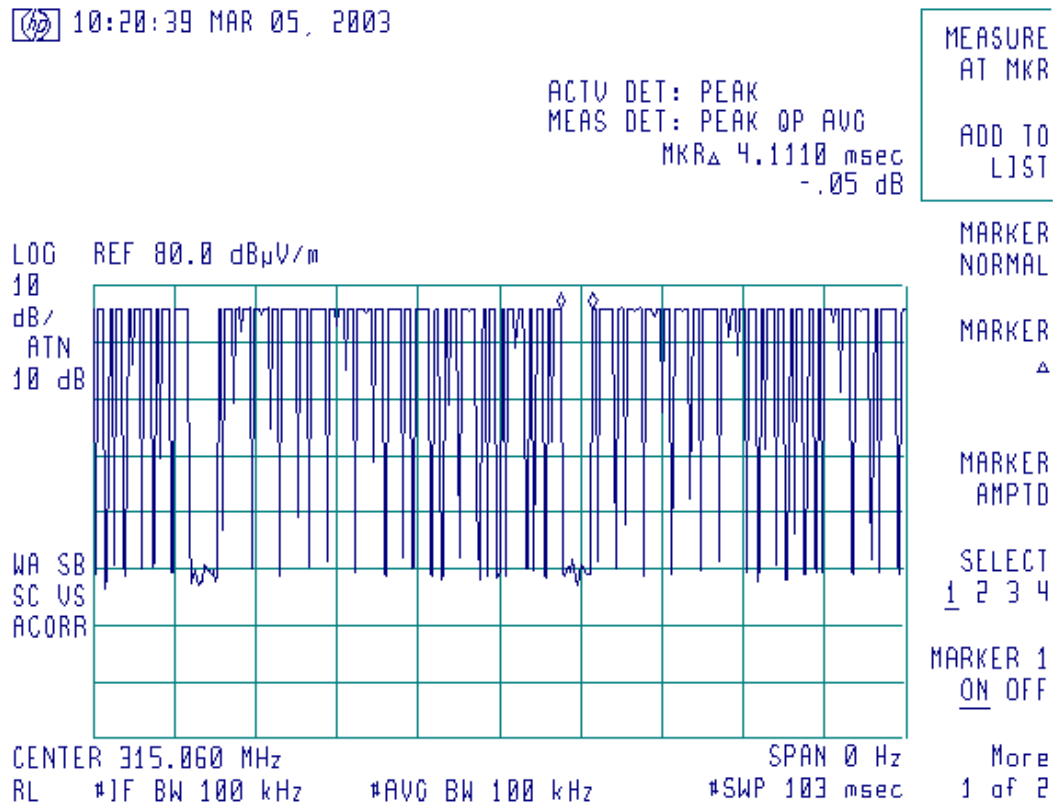
$\text{LIMIT}_{\text{average}} = 75.62 \text{ dB}(\mu\text{V/m}) @ 3\text{m}$

$E_{\text{avg}} = E_{\text{peak}} + \text{Average Factor} = 68.76 \text{ dB}(\mu\text{V/m}) - 4.2 \text{ dB} = 64.56 \text{ dB}(\mu\text{V/m})$



Plot A3

Duty cycle measurements



The time between the end of one transmission and the beginning of the other one is 4.1 ms.

“Power code” means transmission of a sequence of “0” (1/3 ON; 2/3 OFF) or “1” (2/3 ON; 1/3 OFF). The worst case is when all “1” are transmitted.

Tx ON in 100 ms interval =  $(100 - 2 \times 4.1) \times 2/3 = 61.2$  ms.

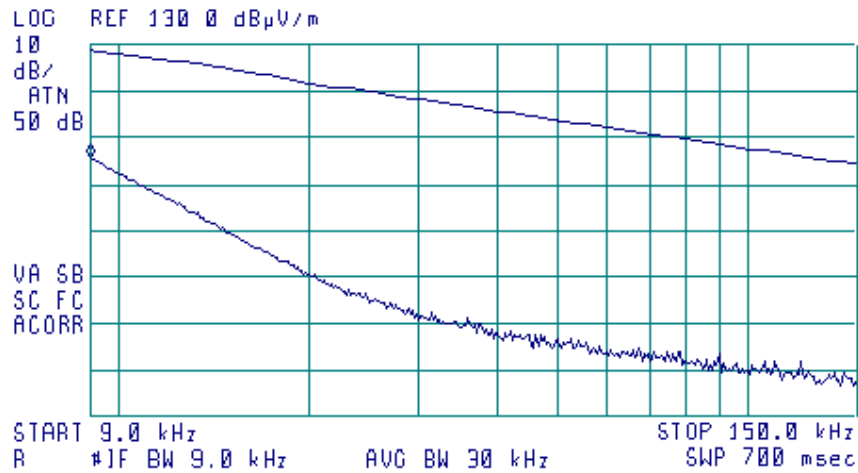


Plot A4

Spurious emission measurements  
in 9 – 150 kHz frequency range

12:27:04 15 JUN 2003  
CMD ERR.1M1AMP5CL

ACTV DET: PEAK  
MEAS DET: PEAK OP AVG  
MKA 9.0 kHz  
105.66 dB $\mu$ V/m





Plot A5

Spurious emission measurements  
in 150 kHz – 30 MHz frequency range

12:23:13 15 JUN 2003  
CMD ERR.1M1AMPSC1

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 150 kHz  
56.53 dB $\mu$ V/m

LOG REF 105 0 dB $\mu$ V/m

10  
dB/  
ATTN  
30 dB

VA SB  
SC FC  
ACORR

START 150 kHz STOP 30.00 MHz  
R IF BW 9.0 kHz AVG BW 30 kHz SWP 2.49 sec



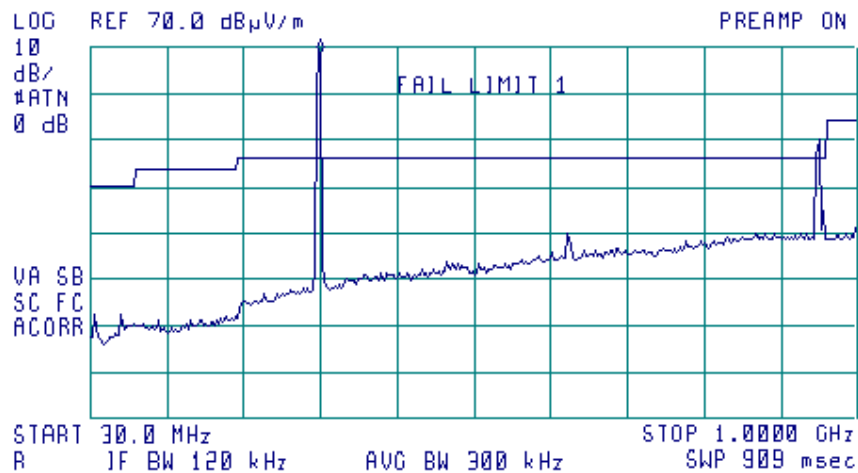
Plot A6

Spurious emission measurements  
in 30 – 1000 MHz range

Note Vertical & Horizontal polarization

09:37:42 08 MAY 2003

ACTV DET: PEAK  
MEAS DET: PEAK OP AVG  
MKR 321.0 MHz  
68.50 dB $\mu$ V/m



No spurious emissions except harmonics were found.



Plot A7

Spurious emission measurements  
Field strength of 2<sup>nd</sup> harmonic

Note Vertical polarization

11:16:56 MAR 05, 2003

ACTV DET: PEAK  
MEAS DET: PEAK OP AVG  
MKR 630.103 MHz  
33.00 dB $\mu$ V/m

MEASURE  
AT MKR

ADD TO  
LIST

LOG REF 40.0 dB $\mu$ V/m

PREAMP ON

MARKER  
↓ CF

10  
dB/  
#ATN  
0 dB

MARKER  
△

VA SB  
SC FC  
ACORR

NEXT  
PEAK

NEXT PK  
RIGHT

NEXT PK  
LEFT

CENTER 630.103 MHz

SPAN 1.000 MHz

More

RL #1F BW 120 kHz

#AVG BW 300 kHz

SWP 20.0 msec

1 of 2



Plot A8

Spurious emission measurements  
Field strength of 3<sup>d</sup> harmonic

Note Vertical polarization

11:13:22 MAR 05, 2003

ACTV DET: PEAK  
MEAS DET: PEAK OP AVG  
MKR 945.160 MHz  
55.58 dB $\mu$ V/m

MEASURE  
AT MKR

ADD TO  
LIST

MARKER  
↓ CF

MARKER  
△

NEXT  
PEAK

NEXT PK  
RIGHT

NEXT PK  
LEFT

More  
1 of 2

LOG REF 60.0 dB $\mu$ V/m

10  
dB/  
#ATN  
0 dB

VA SB  
SC FC  
ACORR

CENTER 945.158 MHz SPAN 1.000 MHz  
RL #1F BW 120 kHz #AVG BW 1 MHz SWP 20.0 msec



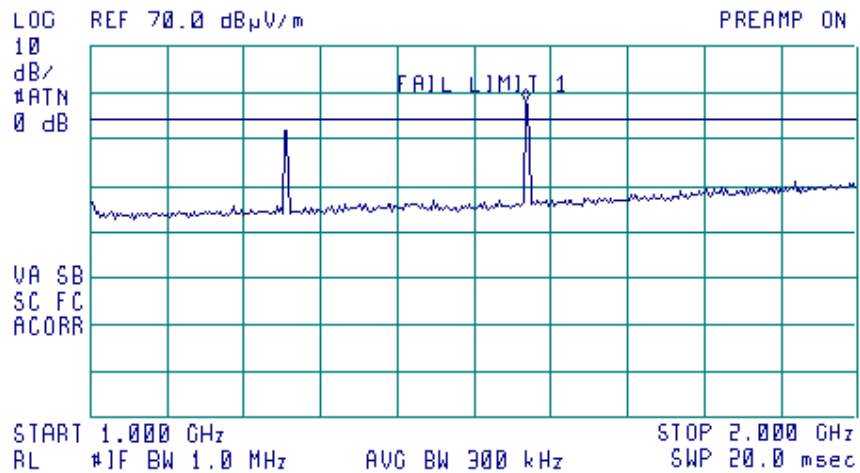
Plot A9

Spurious emission measurements  
in 1 – 2 GHz range

Note Vertical & Horizontal polarization

10:09:37 08 MAY 2003

ACTV DET: PEAK  
MEAS DET: PEAK OP AVG  
MKR 1.568 GHz  
58.03 dB $\mu$ V/m



No spurious emissions were found except 4<sup>th</sup> and 5<sup>th</sup> harmonics of fundamental.

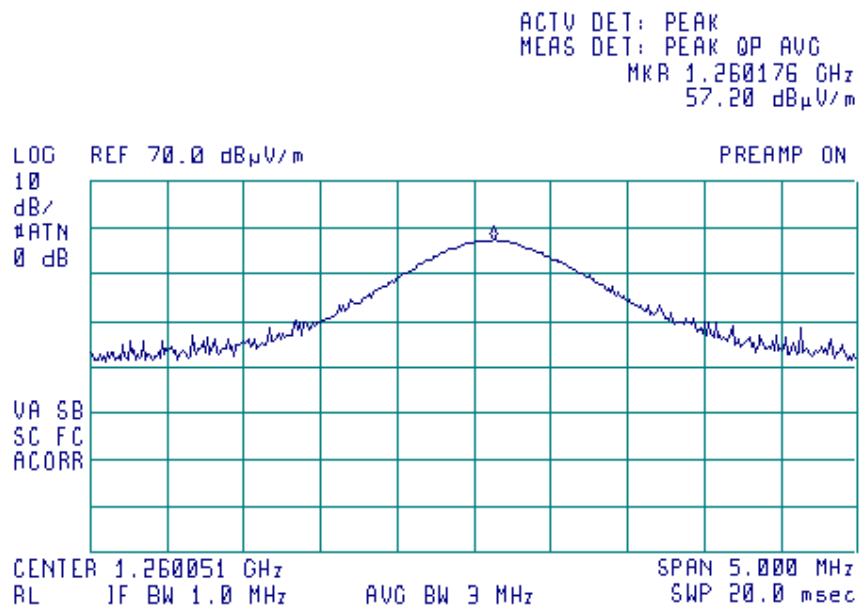


Plot A10

Field strength of 4<sup>th</sup> harmonic

Note Horizontal polarization

10:08:55 MAY 05, 2003



The 4<sup>th</sup> harmonic of fundamental.

Average value = 57.2 dB( $\mu$ V/m) – 4.2 dB (avg.factor) = 53.0 dB( $\mu$ V/m)



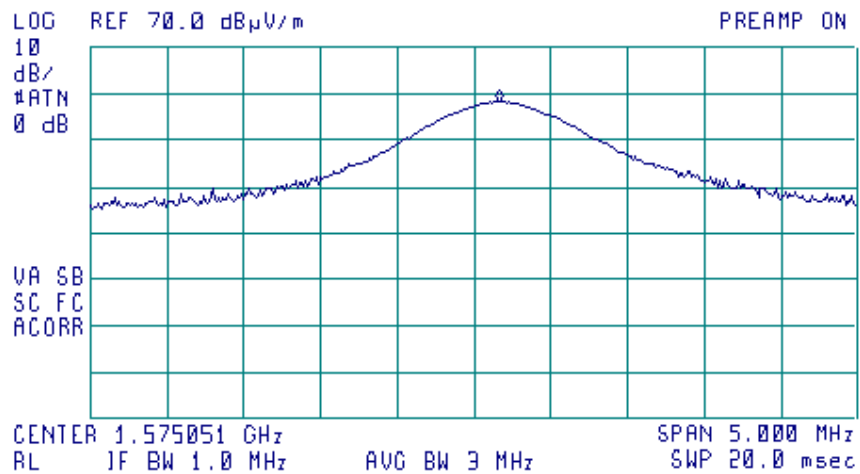
Plot A11

Field strength of 5<sup>th</sup> harmonic

Note Horizontal polarization

09:25:09 MAY 05, 2003

ACTV DET: PEAK  
MEAS DET: PEAK OP AVG  
MKR 1.575214 GHz  
58.06 dB $\mu$ V/m



The 5<sup>th</sup> harmonic of fundamental.

Average value = 58.06 dB( $\mu$ V/m) – 4.2 dB (avg.factor) = 53.86 dB( $\mu$ V/m)

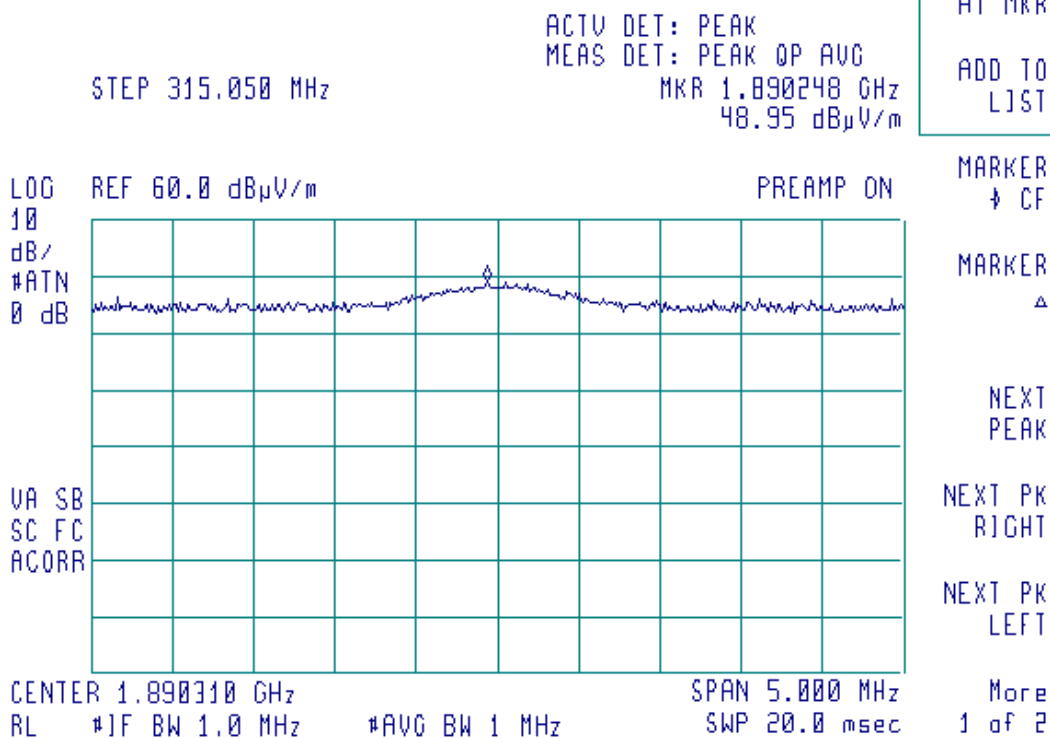


## Plot A12

Field strength of 6<sup>th</sup> harmonic

Note Horizontal polarization

10:52:27 MAR 05, 2003



The 6<sup>th</sup> harmonic of fundamental.

Average value = 48.95 dB( $\mu$ V/m) – 4.2 dB (avg.factor) = 44.75 dB( $\mu$ V/m)



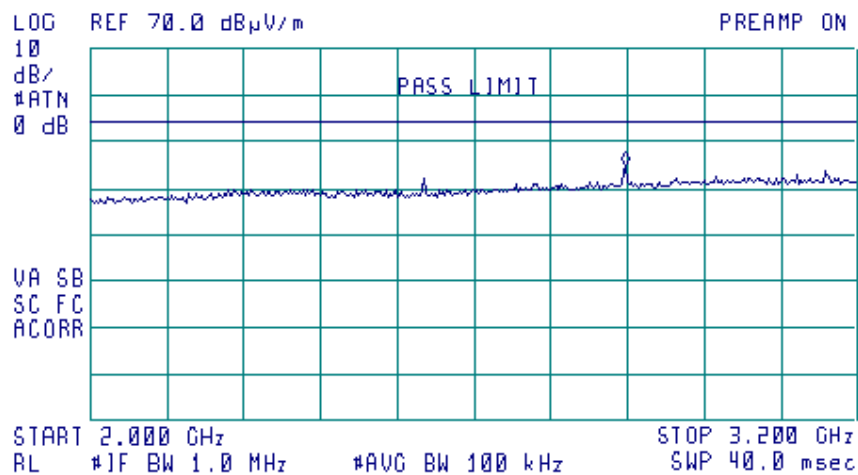
Plot A13

Spurious emission measurements  
in 2 – 3.2 GHz range

Note Vertical & Horizontal polarization

10:36:48 08 MAY 2003

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 2.837 GHz  
45.14 dB $\mu$ V/m



No spurious emissions except 8<sup>th</sup> and 9<sup>th</sup> harmonics were found



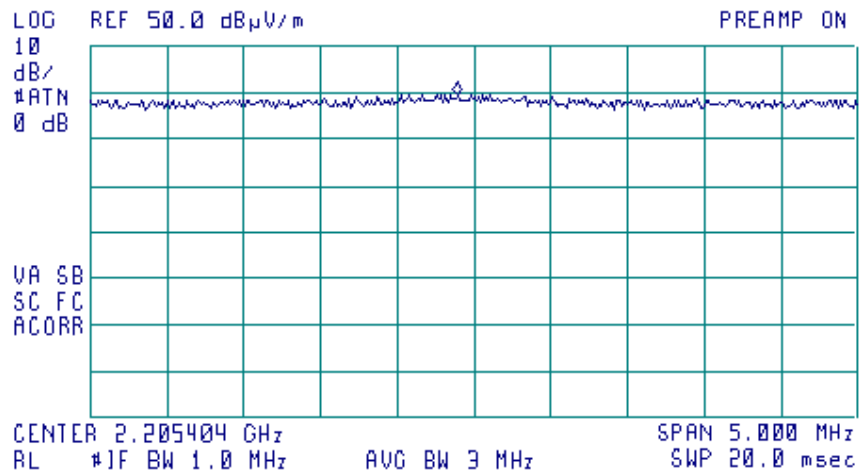
Plot A14

Field strength of 7<sup>th</sup> harmonic

Note Vertical polarization

10:45:31 MAY 05, 2003

ACTV DET: PEAK  
MEAS DET: PEAK OP AVG  
MKR 2.205291 GHz  
39.44 dB $\mu$ V/m



Ambient noise more than 14 dB below the limit



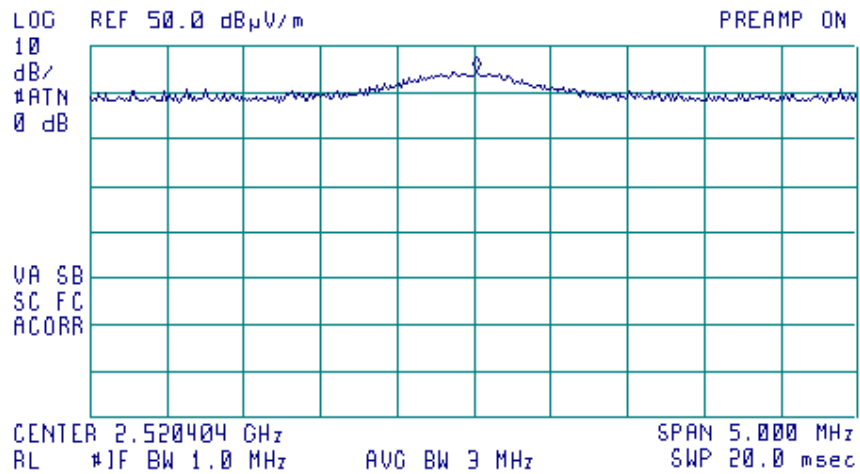
Plot A15

Field strength of 8<sup>th</sup> harmonic

Note Horizontal polarization

10:27:13 MAY 05. 2003

ACTV DET: PEAK  
MEAS DET: PEAK OP AVG  
MKR 2.520416 GHz  
44.64 dB $\mu$ V/m



Average value = 44.64 dB( $\mu$ V/m) – 4.2 dB (avg.factor) = 40.44 dB( $\mu$ V/m)



Plot A16

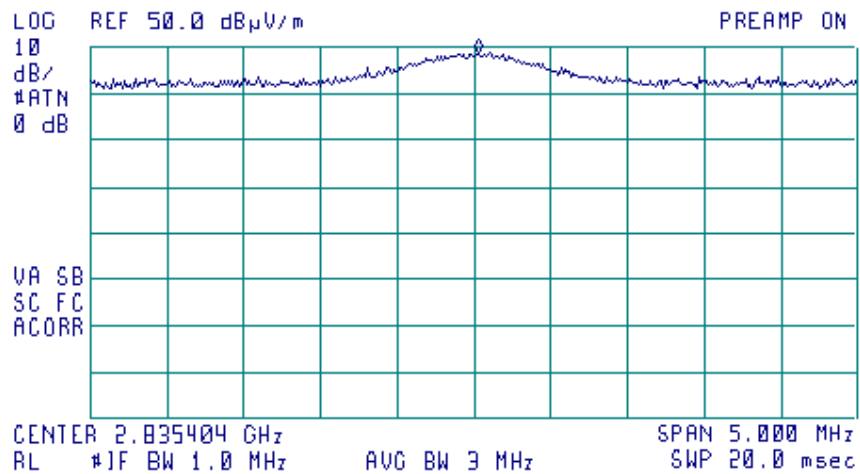
Field strength of 9<sup>th</sup> harmonic

Note

Horizontal Polarization

10:35:22 MAY 05, 2003

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 2.835429 GHz  
48.84 dB $\mu$ V/m



Average value = 48.84 dB( $\mu$ V/m) – 4.2 dB (avg.factor) = 44.64 dB( $\mu$ V/m)



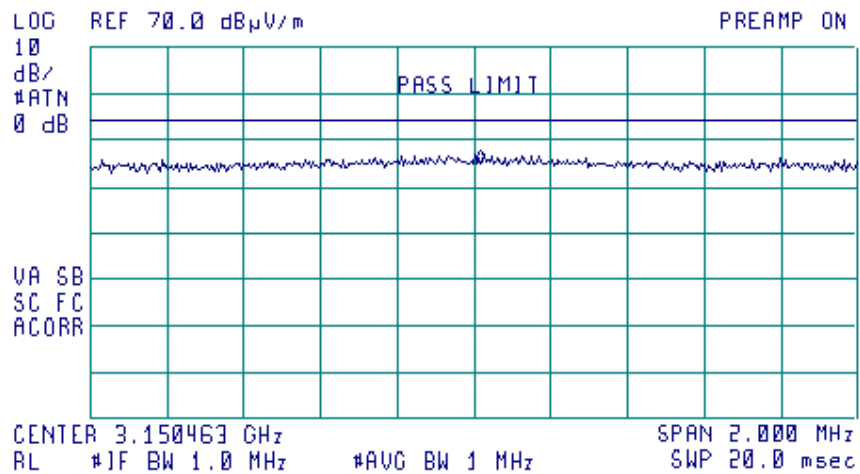
Plot A17

Field strength of 10<sup>th</sup> harmonic

Note Vertical polarization

10:46:01 08 MAY 2003

ACTV DET: PEAK  
MEAS DET: PEAK OP AVG  
MKR 3.150478 GHz  
45.13 dB $\mu$ V/m



Ambient noise more than 10 dB below the limit

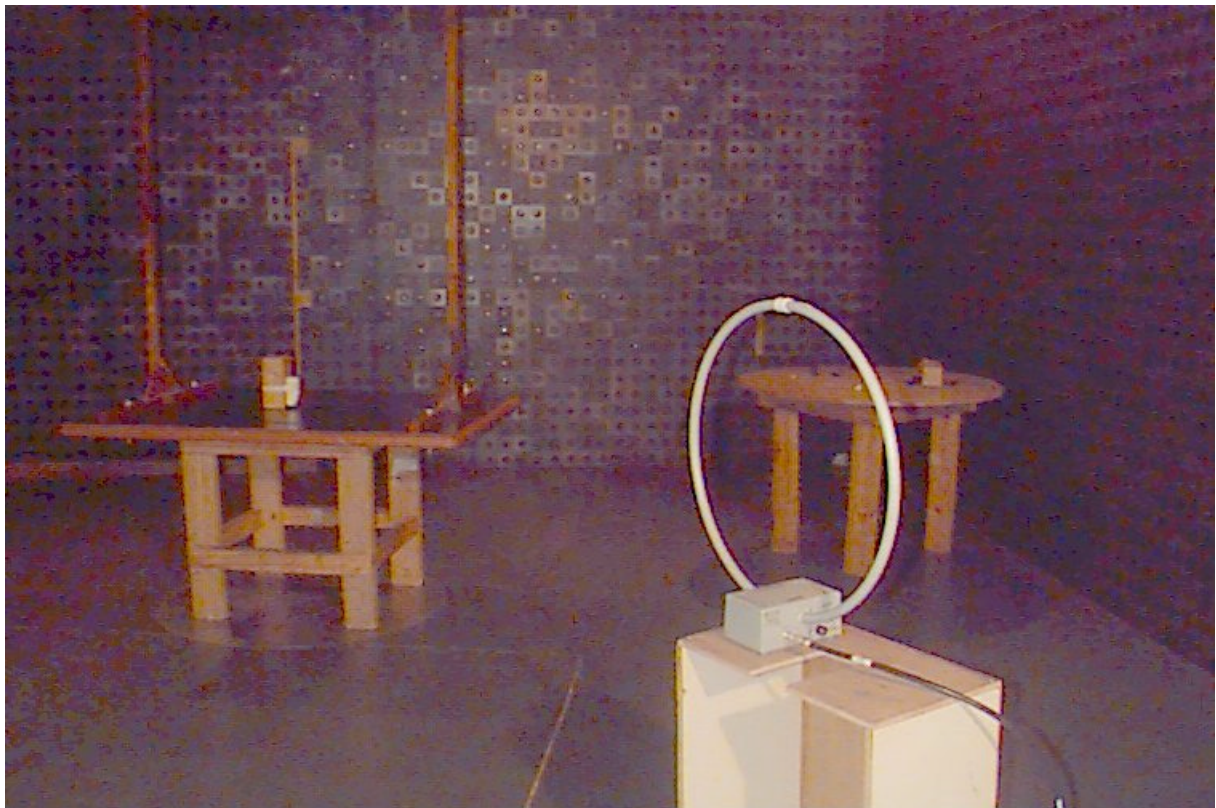


## Appendix B – Test setup photographs

### Photograph 1

Spurious emission measurement setup in 9 kHz – 30 MHz range,

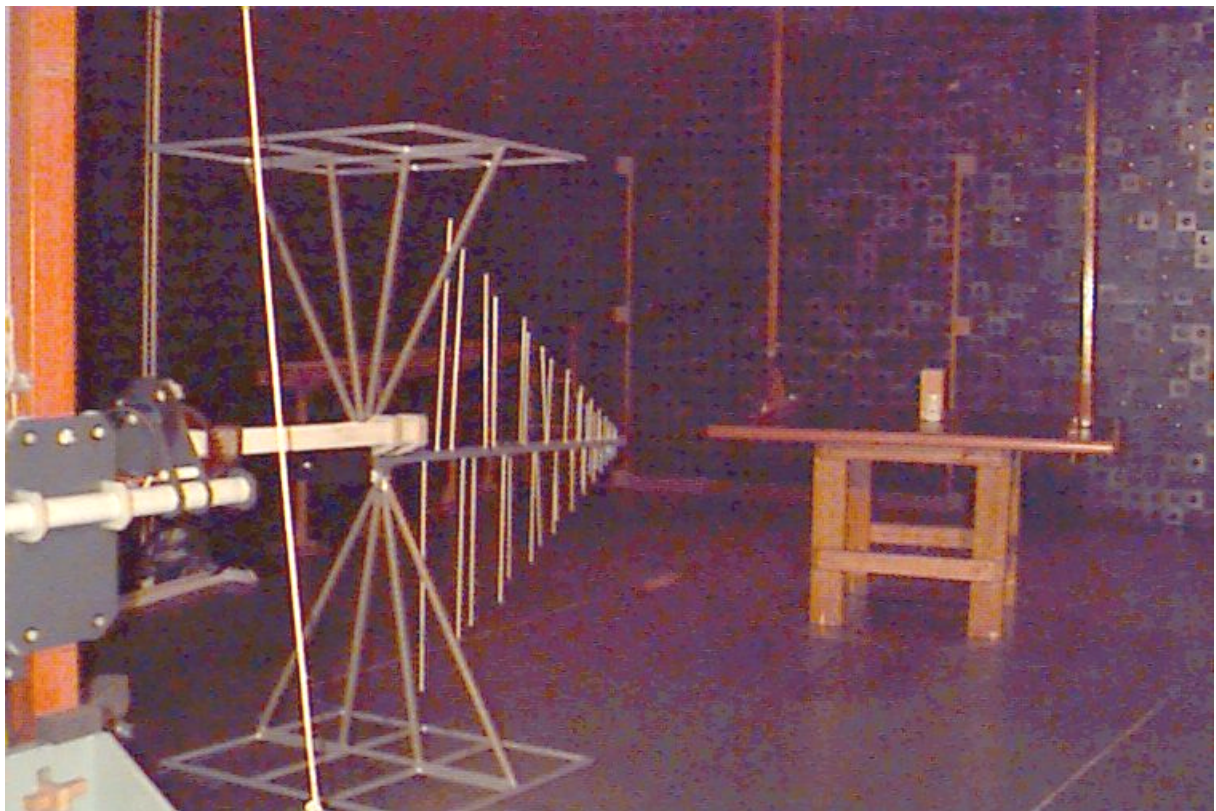
Loop antenna in vertical polarization





**Photograph 2**

**Spurious emission measurements in 30 – 2000 MHz range,  
Biconilog antenna in vertical polarization**





**Photograph 3**

**Spurious emission measurements in 2000 – 3200 MHz range,  
Double ridged guide antenna in horizontal polarization**





**Photograph 4**

**Field strength of fundamental measurements,  
Log periodic antenna in horizontal polarization**





**Photograph 5**

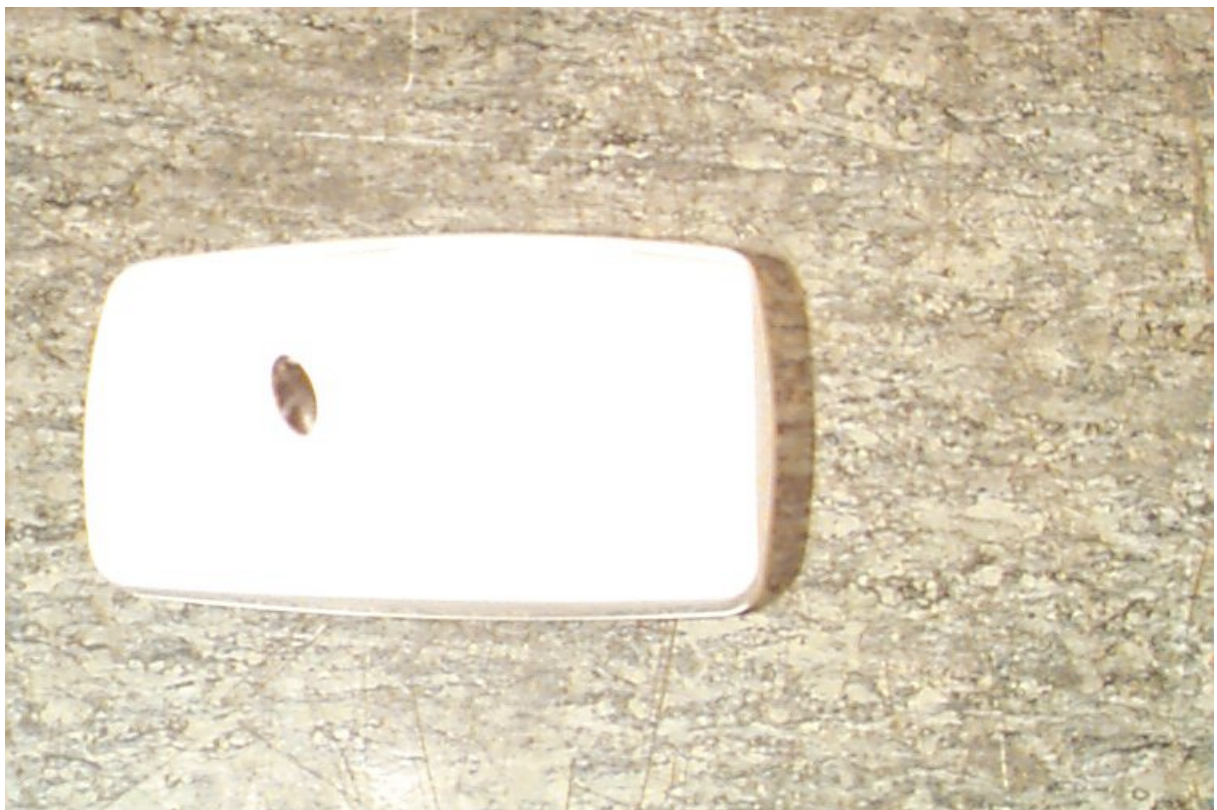
**EUT setup view, OATS measurements**





**Photograph 6**

**EUT setup view, OATS measurements**





**Photograph 7**

**Harmonics measurements in OATS,  
Double ridged guide antenna in horizontal polarization**





## Appendix C - Test equipment used for tests

| HL<br>Serial<br>No. | Description                                                                | Manufacturer information  |                        |            | Due<br>Calibration<br>Month/ year |
|---------------------|----------------------------------------------------------------------------|---------------------------|------------------------|------------|-----------------------------------|
|                     |                                                                            | Name                      | Model No.              | Serial No. |                                   |
| 0034                | Log periodic antenna, 200 - 1000 MHz                                       | Electro-Metrics           | LPA 25/30              | 1988       | 1/04                              |
| 0038                | Antenna Mast, 1-4 m                                                        | Hermon Labs               | AM-1                   | 028        | 2/04 check                        |
| 0041                | Double ridged guide antenna, 1-18 GHz                                      | Electro-Metrics           | RGA 50/60              | 2811       | 8/03                              |
| 0415                | Cable coax RF, RG-58                                                       | Hermon Labs               | CC-3                   | 056        | 12/03                             |
| 0446                | Active Loop Antenna 10 kHz-30 MHz                                          | Electro-Mechanics         | 6502                   | 2857       | 10/03                             |
| 0465                | Anechoic Chamber<br>9 (L) x 6.5 (W) x 5.5 (H) m                            | Hermon Labs               | AC-1                   | 023        | 3/04                              |
| 0521                | Spectrum Analyzer with RF filter<br>section (EMI Receiver 9 kHz - 6.5 GHz) | Hewlett Packard           | 8546A                  | 0319       | 7/03                              |
| 0589                | Cable Coaxial, GORE A2POL118.2, 3m                                         | Hermon Labs               | GORE-3                 | 589        | 11/03                             |
| 0592                | Position controller                                                        | Hermon Labs               | L2-SR3000              | 100        | 5/04 check                        |
| 0593                | Antenna Mast, 1-4 m/<br>1-6 m Pneumatic                                    | Hermon Labs               | AM-F1                  | 101        | 2/04 check                        |
| 0594                | Turntable for Anechoic Chamber, flush<br>mounted, d=1.2 m, pneumatic       | Hermon Labs               | WDC1                   | 102        | 1/04 check                        |
| 0604                | Antenna Biconilog Log-Periodic/T Bow-<br>Tie, 26 - 2000 MHz                | EMCO                      | 3141                   | 9611-1011  | 1/04                              |
| 1004                | Cable coaxial, ANDREW PSWJ4, 6 m                                           | Hermon Labs               | ANDREW-6               | 163        | 12/03                             |
| 1365                | Cable coaxial, RG-214, 5 m                                                 | Hermon Labs               | C214-5                 | 1365       | 4/04                              |
| 1430                | EMI Receiver System, 9 kHz - 2.9 GHz                                       | Agilent Technologies      | 8542E                  | 3807A00262 | 9/03                              |
| 1942                | Cable 18 GHz, 4 m, blue                                                    | Rhophase Microwave<br>Ltd | SPS-1803A-<br>4000-NPS | T4658      | 10/03                             |
| 1947                | Cable 18 GHz, 6.5 m, blue                                                  | Rhophase Microwave<br>Ltd | NPS-1803A-<br>6500-NPS | T4974      | 10/03                             |
| 1984                | Antenna, double ridged waveguide<br>horn, 1-18 GHz, 300W, N-type           | EMC Test Systems          | 3115                   | 9911-5964  | 3/04                              |
| 2009                | Cable RF, 8 m                                                              | Alpha Wire                | RG-214                 | 2009       | 12/03                             |



## Appendix E Test equipment correction factors

**Antenna factor, Active Loop Antenna  
Model 6502  
S/N 2857**

| Frequency, MHz | Antenna Factor, dB |
|----------------|--------------------|
| 0.009          | -32.8              |
| 0.010          | -33.8              |
| 0.020          | -38.3              |
| 0.050          | -41.1              |
| 0.075          | -41.3              |
| 0.100          | -41.6              |
| 0.150          | -41.7              |
| 0.250          | -41.6              |
| 0.500          | -41.8              |
| 0.750          | -41.9              |
| 1.000          | -41.4              |
| 2.000          | -41.5              |
| 3.000          | -41.4              |
| 4.000          | -41.4              |
| 5.000          | -41.5              |
| 10.000         | -41.9              |
| 15.000         | -41.9              |
| 20.000         | -42.2              |
| 25.000         | -42.8              |
| 30.000         | -44.0              |

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**  
**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  
Log periodic antenna  
Electro-Metrics, model LPA-25/30  
Ser.No.1988**

| Frequency<br>MHz | Antenna Factor<br>dB(1/m) | Frequency<br>MHz | Antenna Factor<br>dB(1/m) |
|------------------|---------------------------|------------------|---------------------------|
| 200              | 12.6                      | 625              | 20.4                      |
| 225              | 12.2                      | 650              | 20.9                      |
| 250              | 13.4                      | 675              | 22.0                      |
| 275              | 14.3                      | 700              | 22.2                      |
| 300              | 15.2                      | 725              | 22.7                      |
| 325              | 15.7                      | 750              | 22.5                      |
| 350              | 15.9                      | 775              | 22.7                      |
| 375              | 16.4                      | 800              | 22.8                      |
| 400              | 17.0                      | 825              | 23.2                      |
| 425              | 17.4                      | 850              | 23.5                      |
| 450              | 17.9                      | 875              | 23.9                      |
| 475              | 18.6                      | 900              | 24.0                      |
| 500              | 19.1                      | 925              | 24.0                      |
| 525              | 19.3                      | 950              | 24.2                      |
| 550              | 19.6                      | 975              | 24.7                      |
| 575              | 19.8                      | 1000             | 25.1                      |
| 600              | 20.0                      |                  |                           |

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  
Model RGA-50/60  
S/N 2811**

| Frequency, MHz | Antenna Factor, dB |
|----------------|--------------------|
| 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               |
| 10000          | 38.2               |
| 10500          | 38.5               |
| 11000          | 39.0               |
| 11500          | 40.1               |
| 12000          | 40.2               |
| 12500          | 39.3               |
| 13000          | 39.9               |
| 13500          | 40.6               |
| 14000          | 41.1               |
| 14500          | 40.5               |
| 15000          | 39.9               |
| 15500          | 37.8               |
| 16000          | 39.1               |
| 16500          | 41.1               |
| 17000          | 41.7               |
| 17500          | 45.1               |
| 18000          | 44.3               |

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 wave guide horn antenna**  
**Model 3115**  
**Serial no: 9911-5964**  
**(HL1984)**

| <b>Frequency,<br/>MHz</b> | <b>Antenna factor.<br/>dB(1/m)</b> |
|---------------------------|------------------------------------|
| 1000.0                    | 24.7                               |
| 1500.0                    | 25.7                               |
| 2000.0                    | 27.6                               |
| 2500.0                    | 28.9                               |
| 3000.0                    | 31.2                               |
| 3500.0                    | 32.0                               |
| 4000.0                    | 32.5                               |
| 4500.0                    | 32.7                               |
| 5000.0                    | 33.6                               |
| 5500.0                    | 35.1                               |
| 6000.0                    | 35.4                               |
| 6500.0                    | 34.9                               |
| 7000.0                    | 36.1                               |
| 7500.0                    | 37.8                               |
| 8000.0                    | 38.0                               |
| 8500.0                    | 38.1                               |
| 9000.0                    | 39.1                               |
| 9500.0                    | 38.3                               |
| 10000.0                   | 38.6                               |
| 10500.0                   | 38.2                               |
| 11000.0                   | 38.7                               |
| 11500.0                   | 39.5                               |
| 12000.0                   | 40.0                               |
| 12500.0                   | 40.4                               |
| 13000.0                   | 40.5                               |
| 13500.0                   | 41.1                               |
| 14000.0                   | 41.6                               |
| 14500.0                   | 41.7                               |
| 15000.0                   | 38.7                               |
| 15500.0                   | 38.2                               |
| 16000.0                   | 38.8                               |
| 16500.0                   | 40.5                               |
| 17000.0                   | 42.5                               |
| 17500.0                   | 45.9                               |
| 18000.0                   | 49.4                               |

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



**Cable Coaxial, GORE A2P01POL118, 2.3 m, model:GORE-3, s/n 176 (HL 0589)**  
**+ Cable Coaxial, ANDREW PSWJ4, 6m, model: ANDREW-6, s/n 163 (HL 1004)**  
**Calibration data**

| No. | Parameter      | SET, MHz | Measured, dB | Deviation, dB | Tolerance (Specification), dB | Meas. Uncert., dB | Notes |
|-----|----------------|----------|--------------|---------------|-------------------------------|-------------------|-------|
| 1   | Insertion Loss | 30       | 0.33         | -             | $\leq 6.5$                    | $\pm 0.12$        |       |
| 2   |                | 50       | 0.40         | -             |                               |                   |       |
| 3   |                | 100      | 0.57         | -             |                               |                   |       |
| 4   |                | 300      | 0.97         | -             |                               |                   |       |
| 5   |                | 500      | 1.25         | -             |                               |                   |       |
| 6   |                | 800      | 1.59         | -             |                               |                   |       |
| 7   |                | 1000     | 1.81         | -             |                               |                   |       |
| 8   |                | 1200     | 1.97         | -             |                               |                   |       |
| 9   |                | 1400     | 2.15         | -             |                               |                   |       |
| 10  |                | 1600     | 2.28         | -             |                               |                   |       |
| 11  |                | 1800     | 2.43         | -             |                               |                   |       |
| 12  |                | 2000     | 2.61         | -             |                               |                   |       |
| 13  |                | 2200     | 2.75         | -             |                               |                   |       |
| 14  |                | 2400     | 2.89         | -             |                               |                   |       |
| 15  |                | 2600     | 2.97         | -             |                               |                   |       |
| 16  | Insertion Loss | 2800     | 3.21         | -             | $\leq 6.5$                    | $\pm 0.12$        |       |
| 17  |                | 3000     | 3.32         | -             |                               |                   |       |
| 18  |                | 3300     | 3.47         | -             |                               |                   |       |
| 19  |                | 3600     | 3.62         | -             |                               |                   |       |
| 20  |                | 3900     | 3.84         | -             |                               |                   |       |
| 21  |                | 4200     | 3.92         | -             |                               | $\pm 0.17$        |       |
| 22  |                | 4500     | 4.07         | -             |                               |                   |       |
| 23  |                | 4800     | 4.36         | -             |                               |                   |       |
| 24  |                | 5100     | 4.62         | -             |                               |                   |       |
| 25  |                | 5400     | 4.78         | -             |                               |                   |       |
| 26  |                | 5700     | 5.16         | -             |                               |                   |       |
| 27  |                | 6000     | 5.67         | -             |                               |                   |       |
| 28  |                | 6500     | 5.99         | -             |                               |                   |       |



**Cable Coaxial, RF, RG-58,  
Model CC-3, s/n 056 (HL 0415)  
Calibration data**

| No. | Parameter         | Set,<br>MHz | Measured,<br>dB | Deviation,<br>dB | Tolerance<br>(Specification), dB | Meas.<br>Uncert., dB |
|-----|-------------------|-------------|-----------------|------------------|----------------------------------|----------------------|
| 1   | Insertion<br>Loss | 20          | 0.73            | -                | NA                               | ±0.12                |
| 2   |                   | 30          | 0.91            | -                |                                  |                      |
| 3   |                   | 50          | 1.2             | -                |                                  |                      |
| 4   |                   | 80          | 1.56            | -                |                                  |                      |
| 5   |                   | 100         | 1.76            | -                |                                  |                      |
| 6   |                   | 200         | 2.59            | -                |                                  |                      |
| 7   |                   | 300         | 3.26            | -                |                                  |                      |
| 8   |                   | 400         | 3.93            | -                |                                  |                      |
| 9   |                   | 500         | 4.42            | -                |                                  |                      |
| 10  |                   | 600         | 4.92            | -                |                                  |                      |
| 11  |                   | 700         | 5.36            | -                |                                  |                      |
| 12  |                   | 800         | 5.88            | -                |                                  |                      |
| 13  |                   | 900         | 6.41            | -                |                                  |                      |
| 14  |                   | 1000        | 6.71            | -                |                                  |                      |
| 15  |                   | 1500        | 8.63            | -                |                                  |                      |
| 16  |                   | 2000        | 10.39           | -                |                                  |                      |

**Cable Coaxial, S-FLC 12-50, 5 m,  
Model C214-5, s/n 1365 (HL 1365)  
Calibration data**

| No. | Parameter         | SET, MHz | Measured,<br>dB | Deviation,<br>dB | Tolerance<br>(Specification), dB | Meas.<br>Uncert., dB |
|-----|-------------------|----------|-----------------|------------------|----------------------------------|----------------------|
| 1   | Insertion<br>Loss | 1000     | 0.41            | -                | NA                               | ±0.12                |
| 2   |                   | 1200     | 0.44            | -                |                                  |                      |
| 3   |                   | 1400     | 0.48            | -                |                                  |                      |
| 4   |                   | 1600     | 0.52            | -                |                                  |                      |
| 5   |                   | 1800     | 0.55            | -                |                                  |                      |
| 6   |                   | 2000     | 0.58            | -                |                                  |                      |
| 7   |                   | 2200     | 0.61            | -                |                                  |                      |
| 8   |                   | 2400     | 0.64            | -                |                                  | ±0.17                |
| 9   |                   | 2600     | 0.67            | -                |                                  |                      |
| 10  |                   | 2800     | 0.7             | -                |                                  |                      |
| 11  |                   | 3000     | 0.73            | -                |                                  |                      |
| 12  |                   | 3300     | 0.79            | -                |                                  |                      |
| 13  |                   | 3600     | 0.84            | -                |                                  |                      |
| 14  |                   | 3900     | 0.94            | -                |                                  |                      |
| 15  |                   | 4200     | 1.22            | -                |                                  |                      |



**Cable 18GHz, 4 m, blue, model: SPS-1803A-4000-NPS, s/nT4658 (HL 1942)**  
**Calibration data**

| Frequency,<br>GHz | Insertion Loss, dB |
|-------------------|--------------------|
|                   | HL1942             |
| 0.03              | 0.21               |
| 0.05              | 0.26               |
| 0.10              | 0.36               |
| 0.20              | 0.50               |
| 0.30              | 0.61               |
| 0.40              | 0.70               |
| 0.50              | 0.78               |
| 0.60              | 0.85               |
| 0.70              | 0.93               |
| 0.80              | 0.99               |
| 0.90              | 1.04               |
| 1.00              | 1.10               |
| 1.10              | 1.16               |
| 1.20              | 1.22               |
| 1.30              | 1.26               |
| 1.40              | 1.31               |
| 1.50              | 1.35               |
| 1.60              | 1.41               |
| 1.70              | 1.45               |
| 1.80              | 1.49               |
| 1.90              | 1.53               |
| 2.00              | 1.57               |
| 2.10              | 1.61               |
| 2.20              | 1.65               |
| 2.30              | 1.69               |
| 2.40              | 1.72               |
| 2.50              | 1.76               |
| 2.60              | 1.79               |
| 2.70              | 1.83               |
| 2.80              | 1.87               |
| 2.90              | 1.90               |
| 3.10              | 1.97               |
| 3.30              | 2.04               |
| 3.50              | 2.11               |
| 3.70              | 2.18               |
| 3.90              | 2.24               |
| 4.10              | 2.31               |
| 4.30              | 2.38               |
| 4.50              | 2.43               |
| 4.70              | 2.53               |
| 4.90              | 2.53               |
| 5.10              | 2.63               |
| 5.30              | 2.65               |
| 5.50              | 2.72               |
| 5.70              | 2.76               |
| 5.90              | 2.79               |

| Frequency,<br>GHz | Insertion Loss, dB |
|-------------------|--------------------|
|                   | HL1942             |
| 6.10              | 2.88               |
| 6.30              | 2.90               |
| 6.50              | 2.97               |
| 6.70              | 3.02               |
| 6.90              | 3.04               |
| 7.10              | 3.07               |
| 7.30              | 3.12               |
| 7.50              | 3.13               |
| 7.70              | 3.19               |
| 7.90              | 3.24               |
| 8.10              | 3.30               |
| 8.30              | 3.36               |
| 8.50              | 3.45               |
| 8.70              | 3.41               |
| 8.90              | 3.45               |
| 9.10              | 3.42               |
| 9.30              | 3.55               |
| 9.50              | 3.48               |
| 9.70              | 3.58               |
| 9.90              | 3.61               |
| 10.10             | 3.66               |
| 10.30             | 3.68               |
| 10.50             | 3.70               |
| 10.70             | 3.70               |
| 10.90             | 3.75               |
| 11.10             | 3.78               |
| 11.30             | 3.86               |
| 11.50             | 3.98               |
| 11.70             | 4.10               |
| 11.90             | 4.12               |
| 12.10             | 4.09               |
| 12.40             | 4.13               |
| 13.00             | 4.23               |
| 13.50             | 4.35               |
| 14.00             | 4.40               |
| 14.50             | 4.44               |
| 15.00             | 4.57               |
| 15.50             | 4.66               |
| 16.00             | 4.64               |
| 16.50             | 4.66               |
| 17.00             | 4.75               |
| 17.50             | 4.85               |
| 18.00             | 4.93               |



**Cable 18GHz, 6.5 m, blue, model: NPS-1803A-6500-NPS, s/n T4974 (HL 1947)**  
**Calibration data**

| Frequency,<br>GHz | Insertion Loss, dB |
|-------------------|--------------------|
|                   | HL1947             |
| 0.03              | 0.30               |
| 0.05              | 0.38               |
| 0.10              | 0.53               |
| 0.20              | 0.74               |
| 0.30              | 0.91               |
| 0.40              | 1.05               |
| 0.50              | 1.18               |
| 0.60              | 1.29               |
| 0.70              | 1.40               |
| 0.80              | 1.50               |
| 0.90              | 1.59               |
| 1.00              | 1.68               |
| 1.10              | 1.77               |
| 1.20              | 1.86               |
| 1.30              | 1.94               |
| 1.40              | 2.01               |
| 1.50              | 2.08               |
| 1.60              | 2.16               |
| 1.70              | 2.22               |
| 1.80              | 2.29               |
| 1.90              | 2.36               |
| 2.00              | 2.42               |
| 2.10              | 2.48               |
| 2.20              | 2.54               |
| 2.30              | 2.60               |
| 2.40              | 2.66               |
| 2.50              | 2.71               |
| 2.60              | 2.77               |
| 2.70              | 2.83               |
| 2.80              | 2.89               |
| 2.90              | 2.95               |
| 3.10              | 3.06               |
| 3.30              | 3.17               |
| 3.50              | 3.28               |
| 3.70              | 3.39               |
| 3.90              | 3.51               |
| 4.10              | 3.62               |
| 4.30              | 3.76               |
| 4.50              | 3.87               |
| 4.70              | 4.01               |
| 4.90              | 4.10               |
| 5.10              | 4.21               |
| 5.30              | 4.31               |
| 5.50              | 4.43               |
| 5.70              | 4.56               |
| 5.90              | 4.71               |

| Frequency,<br>GHz | Insertion Loss, dB |
|-------------------|--------------------|
|                   | HL1947             |
| 6.10              | 4.87               |
| 6.30              | 4.95               |
| 6.50              | 4.94               |
| 6.70              | 4.88               |
| 6.90              | 4.87               |
| 7.10              | 4.83               |
| 7.30              | 4.85               |
| 7.50              | 4.86               |
| 7.70              | 4.91               |
| 7.90              | 4.96               |
| 8.10              | 5.03               |
| 8.30              | 5.08               |
| 8.50              | 5.13               |
| 8.70              | 5.21               |
| 8.90              | 5.22               |
| 9.10              | 5.34               |
| 9.30              | 5.35               |
| 9.50              | 5.52               |
| 9.70              | 5.51               |
| 9.90              | 5.66               |
| 10.10             | 5.70               |
| 10.30             | 5.78               |
| 10.50             | 5.79               |
| 10.70             | 5.82               |
| 10.90             | 5.86               |
| 11.10             | 5.94               |
| 11.30             | 6.06               |
| 11.50             | 6.21               |
| 11.70             | 6.44               |
| 11.90             | 6.61               |
| 12.10             | 6.76               |
| 12.40             | 6.68               |
| 13.00             | 6.66               |
| 13.50             | 6.81               |
| 14.00             | 6.90               |
| 14.50             | 6.90               |
| 15.00             | 6.97               |
| 15.50             | 7.17               |
| 16.00             | 7.28               |
| 16.50             | 7.27               |
| 17.00             | 7.38               |
| 17.50             | 7.68               |
| 18.00             | 7.92               |



**Cable RF, 8 m, model:RG-214, s/n C-56 (HL 2009)**  
**Calibration data**

| No. | Parameter      | SET,<br>MHz | Measured,<br>dB | Deviation | Tolerance<br>(Specification) | Meas. Uncert.,<br>dB | Notes |
|-----|----------------|-------------|-----------------|-----------|------------------------------|----------------------|-------|
| 1   | Insertion Loss | 1           | 0.10            | NA        | NA                           | ±0.12                |       |
| 2   |                | 10          | 0.14            |           |                              |                      |       |
| 3   |                | 30          | 0.25            |           |                              |                      |       |
| 4   |                | 50          | 0.34            |           |                              |                      |       |
| 5   |                | 100         | 0.53            |           |                              |                      |       |
| 6   |                | 300         | 0.99            |           |                              |                      |       |
| 7   |                | 500         | 1.31            |           |                              |                      |       |
| 8   |                | 800         | 1.73            |           |                              |                      |       |
| 9   |                | 1000        | 1.98            |           |                              |                      |       |
| 10  |                | 1100        | 2.11            |           |                              |                      |       |
| 11  |                | 1200        | 2.21            |           |                              |                      |       |
| 12  |                | 1300        | 2.35            |           |                              |                      |       |
| 13  |                | 1400        | 2.46            |           |                              |                      |       |
| 14  |                | 1500        | 2.55            |           |                              |                      |       |
| 15  |                | 1600        | 2.68            |           |                              |                      |       |
| 16  |                | 1700        | 2.78            |           |                              |                      |       |
| 17  |                | 1800        | 2.88            |           |                              |                      |       |
| 18  |                | 1900        | 2.98            |           |                              |                      |       |
| 19  |                | 2000        | 3.09            |           |                              |                      |       |



## Appendix E - General information

### Test facility description

Tests were performed at Hermon Laboratories Ltd., 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) and by Industry Canada for electromagnetic emissions (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-1082 for anechoic chamber, C-845 for conducted emissions site), assessed by TNO Certification EP&S (Netherlands) for a number of EMC, Telecommunications, Safety standards, and by AMTAC (UK) for safety of Medical Devices. The laboratory is accredited by American Association for Laboratory Accreditation (USA) according to ISO/IEC 17025 for Electromagnetic Compatibility, Product Safety, Telecommunications Testing and Environmental Simulation (for exact scope please refer to Certificate No. 839.01).

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### Abbreviations and acronyms

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

|                |                                             |
|----------------|---------------------------------------------|
| AC             | alternating current                         |
| AE             | auxiliary equipment                         |
| cm             | centimeter                                  |
| 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 |
| EMC            | electromagnetic compatibility               |
| EUT            | equipment under test                        |
| GHz            | gigahertz                                   |
| H              | height                                      |
| Hz             | hertz                                       |
| kHz            | kilohertz                                   |
| kV             | kilovolt                                    |
| L              | length                                      |
| LISN           | line impedance stabilization network        |
| m              | meter                                       |
| MHz            | megahertz                                   |
| NA             | not applicable                              |
| QP             | quasi-peak                                  |
| RF             | radio frequency                             |
| RE             | radiated emission                           |
| rms            | root mean square                            |
| s              | second                                      |
| V              | volt                                        |
| W              | width                                       |

### Specification references

|                     |                                                                                                                                                                      |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 47CFR part 15: 2001 | Radio Frequency Devices                                                                                                                                              |
| ANSI C63.2:96       | American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications.                                            |
| ANSI C63.4:92       | 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. |



## FCC Equipment codes and descriptions

|     |                                                     |
|-----|-----------------------------------------------------|
| CYY | Communications Receiver used w/ P.15 transmitter    |
| DCD | Part 15 Low Power transmitter Below 1705 kHz        |
| DSC | Part 15 Security/Remote Control Transmitter         |
| DSR | Part 15 Remote Control/Security Device Transceiver  |
| DSS | Part 15 Spread Spectrum Transmitter                 |
| DXX | Part 15 Low Power Communication Device Transmitter  |
| EAV | Part 15 Automatic Vehicle Identification System     |
| ETB | Part 15 Cordless Telephone Base Transceiver         |
| ETR | Part 15 Cordless Telephone Remote Transceiver       |
| ETS | Part 15 Cordless telephone system                   |
| FAP | Part 15 Anti-Pilferage Device                       |
| FDS | Part 15 Field Disturbance Sensor                    |
| GAT | Part 15 Auditory Assistance Device (Transmitter)    |
| HID | Part 15 TV Interface Device                         |
| JBC | Part 15 Class B Computing Device/ Personal Computer |
| JBP | Part 15 Class B Computing Device Peripheral         |
| PUB | Part 15 Unlicensed PCS base station                 |
| PUE | Part 15 Unlicensed PCS portable Tx held to ear      |
| PUF | Part 15 Unlicensed PCS portable Tx held to face     |
| PUT | Part 15 Unlicensed PCS portable Tx worn on body     |