



HERMON LABORATORIES



Electrical

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## **RADIO TEST REPORT**

ACCORDING TO 47 CFR Part 15 subpart C §15.231 and subpart B  
for

**Rokonet Electronics Ltd.**

EQUIPMENT UNDER TEST:

**PIR detector**

**brand name NOVA, model RWT90V2**

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         | : PIR detector             |
| Manufacturer       | : Rokonet Electronics Ltd. |
| Types (Models)     | : RWT90V2                  |
| Equipment FCC code | : DSC                      |

### Applicant information

|                                |                                               |
|--------------------------------|-----------------------------------------------|
| Applicant's responsible person | : Mr. David Kartoun, Chief Technology Officer |
| Company                        | : Rokonet Electronics Ltd.                    |
| Address                        | : 14 Hachoma street                           |
| Postal code                    | : 75655                                       |
| City                           | : Rishon Lezion                               |
| Country                        | : Israel                                      |
| Telephone number               | : +972 3961 6555                              |
| Telefax number                 | : +972 3961 6584                              |

### Test performance

|                       |                                                                              |
|-----------------------|------------------------------------------------------------------------------|
| Project Number:       | : 14925                                                                      |
| Location              | : Hermon Laboratories                                                        |
| Receipt date          | : December 16, 2001                                                          |
| Test started          | : January 15, 2002                                                           |
| Test completed        | : January 20, 2002                                                           |
| Purpose of test       | : Apparatus compliance verification in accordance with emission requirements |
| Test specification(s) | : 47CFR Part 15, subpart C, §15.231, §15.209, §15.205, and subpart B §15.109 |



## 2 Summary of tests and requirements

| Parameter                                                                                                                                             | Subclause    | C | NC | NT | NA | Tested by                        | Date tested          | Remarks |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|---|----|----|----|----------------------------------|----------------------|---------|
| <b>Transmitter characteristics, §15.231</b>                                                                                                           |              |   |    |    |    |                                  |                      |         |
| Periodic operation                                                                                                                                    | 15.231(a)    | X |    |    |    |                                  |                      |         |
| Bandwidth of emission                                                                                                                                 | 15.231(c)    | X |    |    |    | Mr. M. Feldman,<br>test engineer | January 20,<br>2002  |         |
| Field strength of fundamental                                                                                                                         | 15.231(b)(2) | X |    |    |    | Mr. M. Feldman,<br>test engineer | December 27,<br>2001 |         |
| Field strength of spurious radiation                                                                                                                  | 15.231(b)(3) | X |    |    |    | Mr. M. Feldman,<br>test engineer | January 20,<br>2002  |         |
| <b>Unintentional radiation, §15.107, §15.109</b>                                                                                                      |              |   |    |    |    |                                  |                      |         |
| Conducted emissions                                                                                                                                   | 15.107       |   |    |    | X  |                                  |                      |         |
| Radiated emissions                                                                                                                                    | 15.109       | X |    |    |    | Mr. M. Feldman,<br>test engineer | December 27,<br>2001 |         |
| <b>General conditions under §15.231, Periodic operation in the band 40.66 - 40.70 MHz and above 70 MHz</b>                                            |              |   |    |    |    |                                  |                      |         |
| The intentional radiator does not operate in the restricted bands of operation.                                                                       | 15.205       | X |    |    |    |                                  |                      |         |
| The intentional radiator has permanently attached antenna or antenna that uses a unique coupling to the intentional radiator.                         | 15.203       | X |    |    |    | Integral antenna                 |                      |         |
| No antenna other than that furnished by the responsible party can be used with the device.                                                            | 15.203       | X |    |    |    |                                  |                      |         |
| The intentional radiator has no standard antenna jack or electrical connector.                                                                        | 15.203       |   |    |    | X  |                                  |                      |         |
| The intentional radiator must be professionally installed.                                                                                            | 15.203       |   |    |    | X  |                                  |                      |         |
| The Intentional radiator operates at 318.00 MHz.                                                                                                      | 15.231 (a)   | X |    |    |    |                                  |                      |         |
| Intentional radiator is restricted to the transmission of a control signal such as those used with alarm systems, door openers, remote switches, etc. | 15.231 (a)   | X |    |    |    |                                  |                      |         |
| Radio control of toys is not permitted.                                                                                                               | 15.231 (a)   | X |    |    |    |                                  |                      |         |
| Continuous transmissions, such as voice or video, and data transmissions are not permitted.                                                           | 15.231 (a)   | X |    |    |    |                                  |                      |         |



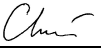
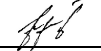
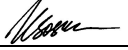
| Parameter                                                                                                                                                                                                                                                                                                             | Subclause      | C | NC | NT | NA | Tested by | Date tested | Remarks |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|---|----|----|----|-----------|-------------|---------|
| A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.                                                                                                                                                            | 15.231 (a) (1) |   |    |    | X  |           |             |         |
| A transmitter activated automatically shall cease transmission within 5 seconds after activation.                                                                                                                                                                                                                     | 15.231 (a) (2) | X |    |    |    |           |             |         |
| Periodic transmissions at regular predetermined intervals are not permitted.                                                                                                                                                                                                                                          | 15.231 (a) (3) | X |    |    |    |           |             |         |
| The intentional radiator is used for polling or supervision transmissions to determine system integrity of transmitters used in security or safety applications are allowed if the periodic rate of transmission does not exceed one transmission of not more than one second duration per hour for each transmitter. | 15.231 (a) (3) | X |    |    |    |           |             |         |
| The intentional radiators employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition.                                                                                             | 15.231 (a) (4) | X |    |    |    |           |             |         |
| NOTE: C: The parameter is compliant with the requirements.<br>NC: The parameter is not compliant with the requirements.<br>NT: The parameter is not tested.<br>NA: The test of this parameter is not applicable.                                                                                                      |                |   |    |    |    |           |             |         |

**Tests performed by:** Mr. M. Feldman, test engineer

**Test report prepared by:** Mrs. M. Cherniavsky, certification engineer

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

Dr. E. Usoskin, C.E.O.

  
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### 3 EUT description

#### 3.1 General

The EUT, RWT90V2, is a PIR detector which provides alarm and supervisory codes transmission to a base station by RF link at 318 MHz. The device is powered by a single internal 3 V lithium battery and its clocks generate 4 MHz and 9.9375 MHz, the data rate is 666 bps.

#### 3.2 Transmitter description

|                                                                                                                                                                                                                                                                              |  |                                    |      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|------------------------------------|------|
| <b>Operating frequency:</b>                                                                                                                                                                                                                                                  |  | 318.00 MHz                         |      |
| <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)                                                                                                                                                                                                         |  | - 24 dBm (0.004 mW)                |      |
| <b>Transmitter duty cycle</b>                                                                                                                                                                                                                                                |  |                                    |      |
| Tx on                                                                                                                                                                                                                                                                        |  | 31.92 msec                         |      |
| <b>Modulation</b>                                                                                                                                                                                                                                                            |  |                                    |      |
| Amplitude                                                                                                                                                                                                                                                                    |  |                                    |      |
| Frequency                                                                                                                                                                                                                                                                    |  |                                    |      |
| Other (specify): on/off keying (pulse modulation)                                                                                                                                                                                                                            |  |                                    |      |
| Can the transmitter be operated without modulation                                                                                                                                                                                                                           |  |                                    | X no |
| <b>Transmitter power source</b>                                                                                                                                                                                                                                              |  |                                    |      |
| <b>Battery</b>                                                                                                                                                                                                                                                               |  | <b>Nominal rated voltage (VDC)</b> | 3.0  |
| Lithium                                                                                                                                                                                                                                                                      |  |                                    |      |
|                                                                                                                                                                                                                                                                              |  |                                    |      |
|                                                                                                                                                                                                                                                                              |  |                                    |      |
| <b>DC</b>                                                                                                                                                                                                                                                                    |  | <b>Nominal rated voltage (VDC)</b> | NA   |
| <b>AC mains</b>                                                                                                                                                                                                                                                              |  | <b>Nominal rated voltage (VAC)</b> | NA   |
| Is there common power source for transmitter and receiver                                                                                                                                                                                                                    |  | yes                                | no   |
| <b>Antenna type</b>                                                                                                                                                                                                                                                          |  |                                    |      |
| Integral                                                                                                                                                                                                                                                                     |  |                                    |      |
|                                                                                                                                                                                                                                                                              |  |                                    |      |
| <b>§15.231(a)(2)</b>                                                                                                                                                                                                                                                         |  |                                    |      |
| An RWT90V2 device includes a microcontroller which is clocked by a resonator. All time activities of the RWT90V2 device are strictly dictated by the software programmed into the memory of the microcontroller. The microcontroller is OTP type (OTP=One Time Programming). |  |                                    |      |



## 4 Test results

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

METHOD OF MEASUREMENT: ANSI 63.4 §13.1.7  
DATE: January 15, 2002  
RELATIVE HUMIDITY: 43%  
AMBIENT TEMPERATURE: 23 °C  
MODULATION: Pulse  
DETECTOR USED: Peak

| Carrier frequency<br>MHz | Occupied<br>bandwidth,<br>MHz | Limit,<br>MHz | Reference to plot in Annex A |
|--------------------------|-------------------------------|---------------|------------------------------|
| 318                      | 0.1                           | 0.795         | No.1                         |
| Measurement uncertainty  | 0.21 ppm                      |               |                              |

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

#### 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 dB down from the modulated carrier.

#### TEST EQUIPMENT USED:

|         |         |         |         |         |  |  |
|---------|---------|---------|---------|---------|--|--|
| HL 0465 | HL 0521 | HL 0593 | HL 0594 | HL 0604 |  |  |
|---------|---------|---------|---------|---------|--|--|

#### 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.



## 4.2 Field strength of fundamental, § 15.231(b)(2)

METHOD OF MEASUREMENT: ANSI 63.4 §13.1.5  
 DATE: January 15, 2002  
 RELATIVE HUMIDITY: 43 %  
 AMBIENT TEMPERATURE: 23 °C  
 MODULATION: Pulse  
 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(μV/m) | Average<br>factor,<br>dB | Result,<br>dB(μV/m) | Specification<br>limit,<br>dB(μV/m) | Margin,<br>dB | Reference to<br>plot in Annex A |
|-----------------------------|-----------------------------------------|--------------------------|---------------------|-------------------------------------|---------------|---------------------------------|
| 318.0424                    | 70.49                                   | -9.9                     | 60.59               | 75.8                                | 15.21         | No.2                            |
| Measurement uncertainty, dB |                                         | +5.73 / -5.57            |                     |                                     |               |                                 |

LIMIT § 15.231 (b)

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

### 4.2.1 Average factor calculation, §15.35

| Tx ON      | Duty cycle | Average factor | Reference to plot in<br>Annex A |
|------------|------------|----------------|---------------------------------|
| 31.92 msec | 31.92/100  | -9.9 dB        | No. 3 - 5                       |

### TEST PROCEDURE

The EUT was tested, being placed on a wooden table in each of three orthogonal planes in turn. 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.

### TEST EQUIPMENT USED:

|         |         |         |         |         |  |  |
|---------|---------|---------|---------|---------|--|--|
| HL 0465 | HL 0521 | HL 0593 | HL 0594 | HL 0604 |  |  |
|---------|---------|---------|---------|---------|--|--|



### 4.3 Field strength of spurious radiation, § 15.231(b)(3)

METHOD OF MEASUREMENT: ANSI 63.4 §13.1.4  
 DATE: January 20, 2002  
 RELATIVE HUMIDITY: 37 %  
 AMBIENT TEMPERATURE: 22 °C  
 TEST PERFORMED IN: Anechoic chamber  
 DISTANCE BETWEEN ANTENNA AND EUT: 3 m (refer to Photographs No.1 to No.2 in Appendix B)  
 DETECTOR USED: Peak

|                                                                                                                                                                                 |                                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| The frequency spectrum was investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to at least the frequency shown below: |                                                                                                                                   |
| X                                                                                                                                                                               | The equipment operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower. |

**Limit @ 3 m = 55.8 dB(μV/m)**

Antenna type: loop

| Frequency,<br>MHz           | Antenna<br>polarization | RBW,<br>kHz | VBW,<br>kHz | Radiated<br>emission,<br>dB (μV/m)       | Limit @ 3 m,<br>dB(μV/m) | Margin,<br>dB | Ref. to plot in<br>App. A |
|-----------------------------|-------------------------|-------------|-------------|------------------------------------------|--------------------------|---------------|---------------------------|
| 0.009 – 0.150               | V, H                    | 0.2         | 0.3         | All emissions were found below the limit |                          |               | No.6                      |
| 0.150 - 30                  | V, H                    | 9           | 30          | All emissions were found below the limit |                          |               | No.7                      |
| Measurement uncertainty, dB |                         |             |             | ± 4                                      |                          |               |                           |

Antenna type: biconilog

| Frequency,<br>MHz           | Antenna<br>polarization | RBW,<br>kHz | VBW,<br>kHz | Radiated emission,<br>dB (μV/m)          | Margin,<br>dB | Ref. to plot in<br>App. A |
|-----------------------------|-------------------------|-------------|-------------|------------------------------------------|---------------|---------------------------|
| 30 - 1000                   | V, H                    | 120         | 300         | All emissions were found below the limit |               | No.2                      |
| Measurement uncertainty, dB |                         |             |             | +5.73 / -5.57                            |               |                           |

Antenna type: double ridged guide  
 Frequency range 1000 – 3200 MHz

| Frequency,<br>MHz           | Antenna<br>polarization | RBW,<br>MHz | VBW,<br>MHz | Radiated<br>emission,<br>dB (μV/m) | Limit @ 3 m,<br>dB(μV/m) | Margin,<br>dB | Ref. to plot in<br>App. A |
|-----------------------------|-------------------------|-------------|-------------|------------------------------------|--------------------------|---------------|---------------------------|
| 1272.0793                   | V, H                    | 1           | 3           | 40.53                              | 55.8                     | 15.27         | No.8                      |
| Measurement uncertainty, dB |                         |             |             | +5.73 / -5.57                      |                          |               |                           |

**Notes to table:**

RBW: resolution bandwidth

VBW: video bandwidth

**TEST PROCEDURE**

The EUT was tested, being placed on a wooden table in each of three orthogonal planes in turn. To find maximum radiation the turntable was rotated 360°, measuring antenna height was changed from 1 to 4 m in the range above 30 MHz, and the antennas polarization was changed from vertical to horizontal excluding the range below 30 MHz.

**TEST EQUIPMENT USED:**

|         |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|---------|
| HL 0041 | HL 0465 | HL 0521 | HL 0593 | HL 0594 | HL 0604 | HL 1915 |
|---------|---------|---------|---------|---------|---------|---------|



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

METHOD OF MEASUREMENT: ANSI 63.4 §11.6 / ANSI 63.4 §12.1.4  
 DATE: January 20, 2002  
 RELATIVE HUMIDITY: 43 %  
 AMBIENT TEMPERATURE: 23 °C  
 TEST PERFORMED IN: Anechoic chamber  
 DISTANCE BETWEEN ANTENNA AND EUT: 3 m (refer to Photograph No.1 in Appendix B)  
 THE EUT WAS TESTED AS: Table-top  
 FREQUENCY RANGE: 30 MHz – 1 GHz  
 DETECTOR TYPE: Quasi-peak  
 RESOLUTION BANDWIDTH: 120 kHz  
 ANTENNA TYPE: BICONILOG in vertical and horizontal polarization

| The EUT highest used frequency (not including operating frequency), MHz | Upper frequency of measurement range, MHz                                       |
|-------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| Below 1.705                                                             | 30                                                                              |
| <b>1.705 – 108</b>                                                      | <b>1000</b>                                                                     |
| 108 – 500                                                               | 2000                                                                            |
| 500 – 1000                                                              | 5000                                                                            |
| Above 1000                                                              | 5 <sup>th</sup> harmonic of the highest frequency or 40 GHz, whichever is lower |

| Frequency, MHz                                                                                       | Antenna polarization | Antenna height, m | Turntable position (°) | Radiated emissions, dB (μV/m) | Specification limit, dB (μV/m) | Margin, dB |
|------------------------------------------------------------------------------------------------------|----------------------|-------------------|------------------------|-------------------------------|--------------------------------|------------|
| All measured emissions were at least 20 dB below the specified limit – refer to Plot No.9 in Annex A |                      |                   |                        |                               |                                |            |
|                                                                                                      |                      |                   |                        |                               |                                |            |
|                                                                                                      |                      |                   |                        |                               |                                |            |
| Measurement uncertainty, dB                                                                          |                      | +5.73 / -5.57     |                        |                               |                                |            |

#### TEST PROCEDURE

The EUT was placed on a wooden table. 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.

#### TEST EQUIPMENT USED:

|         |         |         |         |         |         |  |
|---------|---------|---------|---------|---------|---------|--|
| HL 0465 | HL 0521 | HL 0593 | HL 0594 | HL 0604 | HL 1947 |  |
|---------|---------|---------|---------|---------|---------|--|

#### LIMIT (§ 15.109)

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



## Appendix A - Plots

Plot No.1  
Occupied bandwidth measurement test result

12:13:10 JAN 15, 2002

MARKER  $\Delta$   
100 kHz  
-.65 dB

ACTV DET: PEAK  
MEAS DET: PEAK OP AVG  
MKR  $\Delta$  100 kHz  
-.65 dB

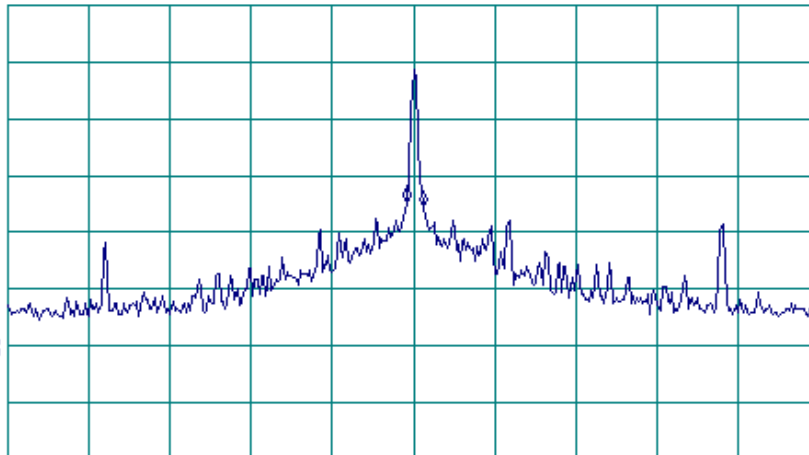
MEASURE  
AT MKR

ADD TO  
LIST

LOG REF 76.0 dB $\mu$ V/m

10  
dB/  
ATN  
10 dB

VA SB  
SC FC  
ACORR



CENTER 318.038 MHz  
RL #1F BW 10 kHz

#AVG BW 30 kHz

SPAN 5.000 MHz  
SWP 150 msec

MARKER  
NORMAL

MARKER  
 $\Delta$

MARKER  
AMPTD

SELECT  
1 2 3 4

MARKER 1  
ON OFF

More  
1 of 2



Plot No.2  
Field strength of fundamental test result

12:08:54 JAN 15, 2002

ACTV DET: PEAK  
MEAS DET: PEAK OP AVG  
MKR 316.4 MHz  
70.01 dB $\mu$ V/m

MEASURE  
AT MKR

ADD TO  
LIST

CLEAR  
WRITE A

MAX  
HOLD A

VIEW A

BLANK A

Trace  
A B C

More  
1 of 3

LOG REF 80.0 dB $\mu$ V/m

10  
dB/  
ATTN  
10 dB

VA SB  
SC FC  
ACORR

START 30.0 MHz

RL #1F BW 120 kHz

AVG BW 300 kHz

STOP 1.0000 GHz

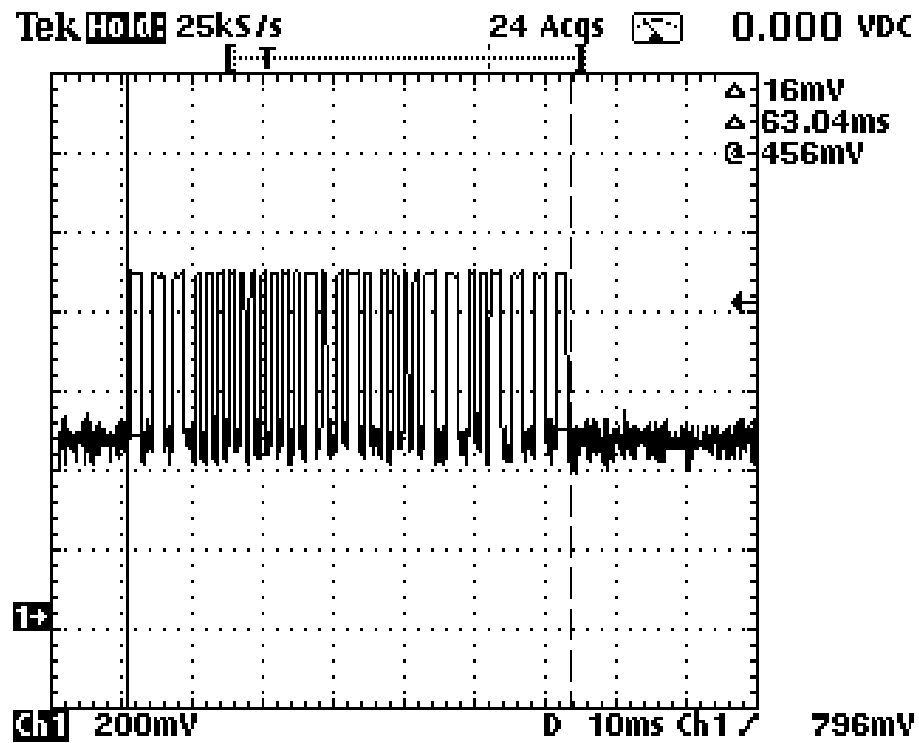
SWP 909 msec

| Signal | Freq (MHz) | Peak Amp (dB $\mu$ V/m) | Result (dB $\mu$ V/m) | Corrections (dB) |
|--------|------------|-------------------------|-----------------------|------------------|
| 1      | 318.042413 | 70.49                   | 60.59                 | 17.01            |

Average factor = -9.9 dB



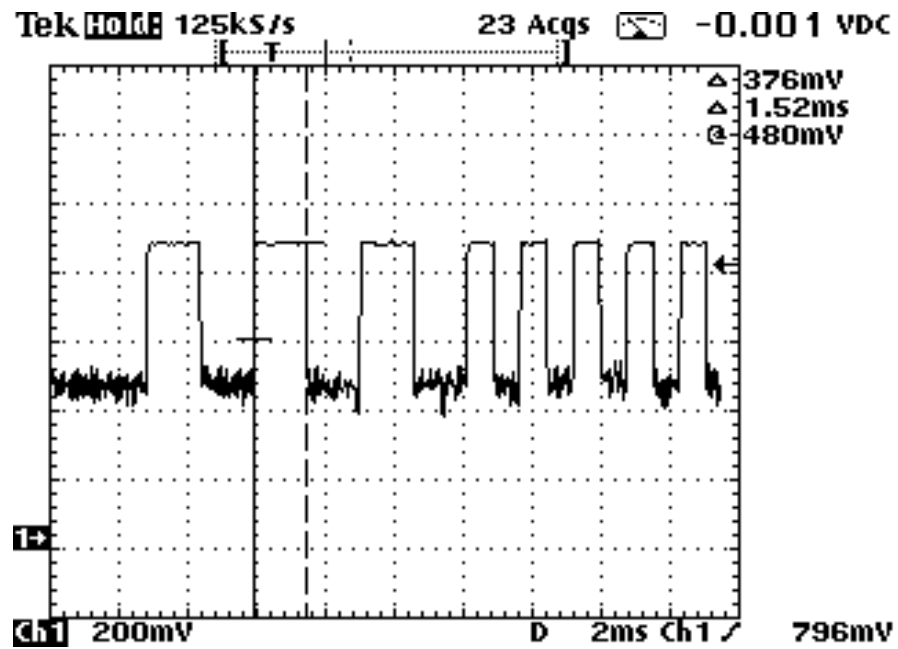
Plot No.3  
Tx on (duty cycle) measurement test result



$11 \times 1.52 \text{ ms} = 16.72 \text{ ms}$   
 $19 \times 0.8 \text{ ms} = 15.2 \text{ ms}$   
Tx on = 31.92 ms  
Average factor =  $20 \log 31.9/100 = -9.9 \text{ dB}$

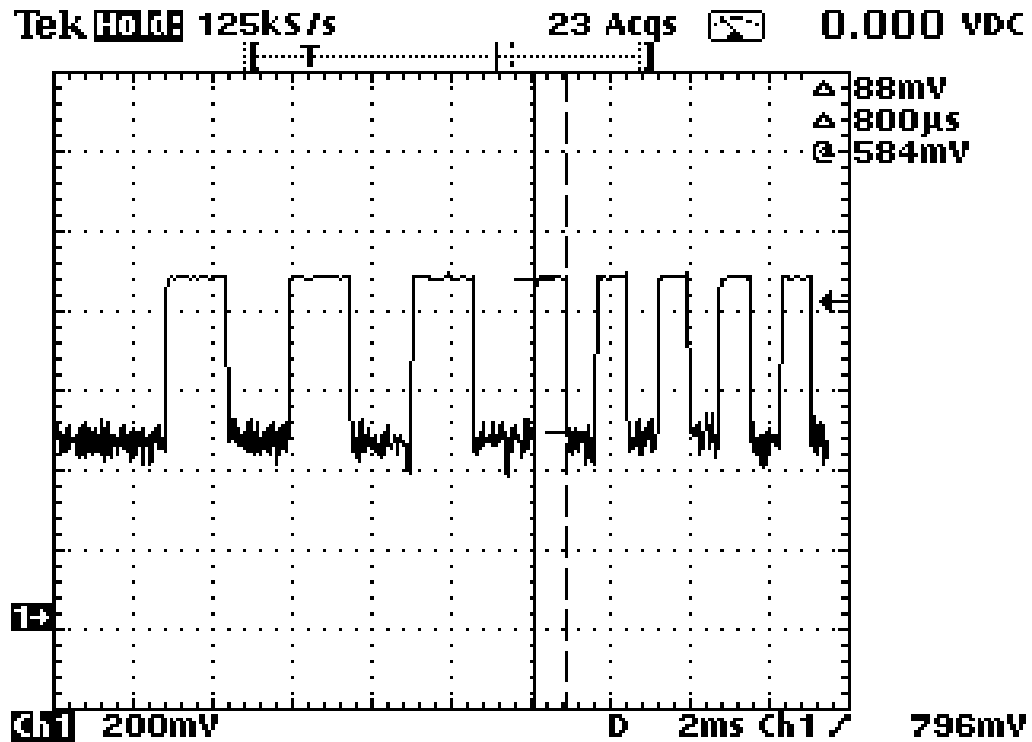


Plot No.4  
Tx on (duty cycle) measurement test result





Plot No.5  
Tx on (duty cycle) measurement test result





Plot No.6  
Spurious emissions test results

18:07:49 JAN 20, 2002

ACTV DET: PEAK  
MEAS DET: PEAK OP AVG  
MKR 10.6 kHz  
78.67 dB $\mu$ V/m

MEASURE  
AT MKR

ADD TO  
LIST

CLEAR  
WRITE A

MAX  
HOLD A

VIEW A

BLANK A

Trace  
A B C

More  
1 of 3

LOG REF 130.0 dB $\mu$ V/m

10  
dB/  
ATTN  
50 dB

VA SB  
SC FC  
ACORR

START 9.0 kHz

RL #1F BW 200 Hz

AVG BW 300 Hz

STOP 150.0 kHz

SWP 10.3 sec



Plot No.7  
Spurious emissions test results

18:09:38 JAN 20, 2002

ACTV DET: PEAK  
MEAS DET: PEAK OP AVG  
MKR 200 kHz  
65.87 dB $\mu$ V/m

MEASURE  
AT MKR

ADD TO  
LIST

CLEAR  
WRITE A

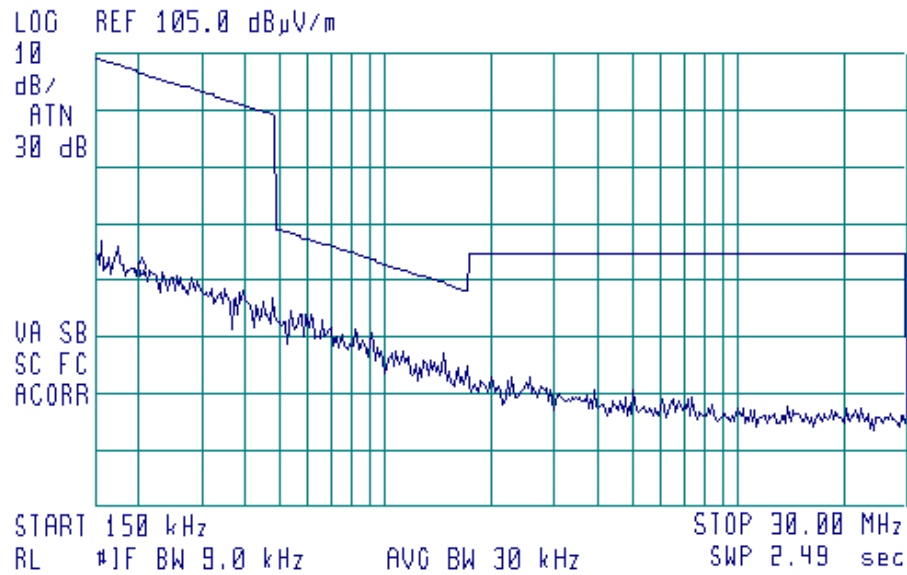
MAX  
HOLD A

VIEW A

BLANK A

Trace  
A B C

More  
1 of 3





Plot No.8  
Spurious emissions test results

11:30:52 JAN 15, 2002

ACTV DET: PEAK  
MEAS DET: PEAK OP AVG  
MKR 1.270 GHz  
47.70 dB $\mu$ V/m

MEASURE  
AT MKR

ADD TO  
LIST

CLEAR  
WRITE A

MAX  
HOLD A

VIEW A

BLANK A

Trace  
A B C

More  
1 of 3

LOG REF 65.0 dB $\mu$ V/m

PREAMP ON

10  
dB/  
#ATTN  
0 dB

VA SB  
SC FC  
ACORR

START 1.000 GHz

RL #1F BW 1.0 MHz

#AVG BW 3 MHz

STOP 3.200 GHz

SWP 58.4 msec

| Signal | Freq (MHz)  | Peak Amp (dB $\mu$ V/m) | Result (dB $\mu$ V/m) | Corrections (dB) |
|--------|-------------|-------------------------|-----------------------|------------------|
| 1      | 1272.079262 | 50.43                   | 40.53                 | 28.78            |

Average factor = -9.9 dB



Plot No.9  
Unintentional radiated emissions test results

17:02:17 JAN 20, 2002

ACTV DET: PEAK  
MEAS DET: PEAK OP AVG

MEASURE  
AT MKR  
  
ADD TO  
LIST

LOG REF 60.0 dB $\mu$ V/m  
10  
dB/  
#ATN  
0 dB

PREAMP ON

CLEAR  
WRITE A

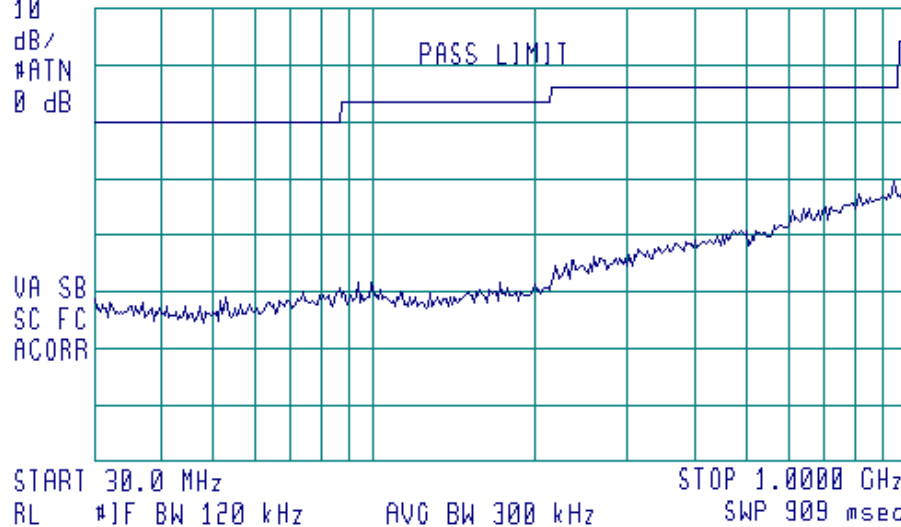
MAX  
HOLD A

VIEW A

BLANK A

Trace  
A B C

More  
1 of 3





## Appendix B - Photographs

Photograph No.1  
Radiated emissions measurement test setup





**Photograph No.2**  
**Radiated emissions measurement test setup**





## Appendix C - Test equipment used for tests

| HL<br>Serial No. | Description                                                                   | Manufacturer information   |                        |            | Due<br>Calibration<br>Month/ year |
|------------------|-------------------------------------------------------------------------------|----------------------------|------------------------|------------|-----------------------------------|
|                  |                                                                               | Name                       | Model No.              | Serial No. |                                   |
| 0041             | Double ridged guide antenna,<br>1-18 GHz                                      | Electro-Metrics            | RGA 50/60              | 2811       | 3/03                              |
| 0465             | Anechoic chamber<br>9 (L) x 6.5 (W) x 5.5 (H) m                               | Hermon Labs                | AC-1                   | 023        | 11/02                             |
| 0521             | Spectrum analyzer with RF<br>filter section (EMI receiver<br>9 kHz - 6.5 GHz) | Hewlett Packard            | 8546A                  | 0319       | 9/02                              |
| 0593             | Antenna mast, 1-4 m/<br>1-6 m pneumatic                                       | Hermon Labs                | AM-F1                  | 101        | 2/03<br>Check                     |
| 0594             | Turntable for anechoic<br>chamber, flush mounted,<br>d=1.2 m, pneumatic       | Hermon Labs                | WDC1                   | 102        | 1/03<br>Check                     |
| 0604             | Antenna biconilog log-<br>periodic/T Bow-Tie,<br>26 - 2000 MHz                | EMCO                       | 3141                   | 9611-1011  | 1/03                              |
| 1915             | Active receiving loop antenna,<br>1 kHz – 30 MHz                              | EMC test<br>systems        | 6507                   | 1457       | 6/02                              |
| 1947             | Cable 18 GHz, 6.5 m, blue                                                     | Rhophase<br>Microwave Ltd. | NPS-1803A-<br>6500-NPS | T4974      | 10/02                             |



## Appendix D - 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:

|                |                                             |
|----------------|---------------------------------------------|
| bps            | bit per second                              |
| 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                                      |
| m              | meter                                       |
| MHz            | megahertz                                   |
| NA             | not applicable                              |
| PIR            | passive infrared detector                   |
| 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. |