

# TEST REPORT

ACCORDING TO: FCC 47CFR part 15 subpart C § 15.209 and  
RSS-210 issue 8 section 2.5.1

FOR:

**LogiTag Systems Ltd.**  
**One Channel Exciter**  
**Model: LTG2-04**  
**Single Location Unit**  
**Model: LTG2-04-PRF**  
**FCC ID:Z97LTG2-04**

This report is in conformity with ISO/ IEC 17025. The "A2LA Accredited" symbol endorsement applies only to the tests and calibrations that are listed in the scope of Hermon Laboratories accreditation. The test results relate only to the items tested.  
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## 1 Applicant information

**Client name:** LogiTag Systems Ltd.  
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**Telephone:** +972 9835 4848  
**Fax:** +972 9865 6262  
**E-mail:** golank@Logi-tag.com  
**Contact name:** Mr. Golan Kormian

## 2 Equipment under test attributes

**Product name:** One Channel Exciter  
**Model:** LTG2-04  
**Serial number:** LTG2-04-1312-078  
**Hardware version:** C01  
**Software release:** V2.00  
**Receipt date** 17-Apr-14

## 3 Manufacturer information

**Manufacturer name:** LogiTag Systems Ltd.  
**Address:** 1st Floor, Building 9, 29 Yad Harutzim street, Poleg Industrial Zone, P.O.B. 8249, Netanya 4250473, Israel  
**Telephone:** +972 9835 4848  
**Fax:** +972 9865 6262  
**E-Mail:** golank@Logi-tag.com  
**Contact name:** Mr. Golan Kormian

## 4 Test details

**Project ID:** 25494  
**Location:** Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel  
**Test started:** 17-Apr-14  
**Test completed:** 09-May-14  
**Test specification(s):** FCC 47CFR part 15, subpart C, §15.209;  
RSS-210 issue 8 section 2.5.1, RSS-Gen issue 3 Table 6

## 5 Tests summary

| Test                                                                   | Status |
|------------------------------------------------------------------------|--------|
| FCC section 15.209, RSS-Gen section 7.2.5, Field strength of emissions | Pass   |
| FCC section 15.207(a) / RSS-Gen, Section 7.2.4, Conducted emission     | Pass   |
| FCC section 15.203, RSS-Gen section 7.1.2, Antenna requirement         | Pass   |
| RSS-Gen, Section 4.6.1, Occupied bandwidth                             | Tested |

Testing was completed against all relevant requirements of the test standard. The results obtained indicate that the product under test complies in full with the requirements tested.

The test results relate only to the items tested. Pass/ fail decision was based on nominal values.

|                     | Name and Title                                             | Date             | Signature                                                                                                                                                                  |
|---------------------|------------------------------------------------------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Tested by:</b>   | Mrs. E. Pitt, test engineer<br>Mr. V. Einem, test engineer | May 9, 2014      | <br> |
| <b>Reviewed by:</b> | Mrs. M. Cherniavsky, certification engineer                | May 21, 2014     |                                                                                        |
| <b>Approved by:</b> | Mr. M. Nikishin, EMC and Radio group manager               | November 2, 2014 |                                                                                       |

## 6 EUT description

### 6.1 General information

The EUT, One Channel Exciter, has 2 main functions:

- To generate RF field at 125 kHz. The One Channel Exciter carries a unique number as identifier to the location/area where the RF field is operated.
- To communicate with RFID tags and a Base Station unit

The Exciter is a system which generates the RF field at 125 kHz, when RFID tag is within the range of the field, the tag is awaked and communicates with the Exciter via wireless transmitter at frequency of 433 MHz.

The Exciter communicates with the Base Station unit wireless at UHF frequency (902-928 MHz). The Exciter has an internal 125 kHz antenna, and has option to connect to external LF antenna (Ceiling or Door antenna). Only one antenna can transmit.

The EUT has the following features/ports:

- 1) The 125 kHz antenna driver outputs, 3 kinds of antennas: integrated, Ceiling and Door;
- 2) Transceivers
  - a) Tx/Rx with a base station in 902-928 MHz (UHF4)
  - b) Tx/Rx with a tamper tag at 433 MHz (UHF3)
  - c) Tx to tag at 433 MHz (UHF1)
  - d) Rx from tag at 433 MHz (UHF2);
- 3) General use relay;
- 4) USB ports;
- 5) Digital input.

According to manufacturer's declaration of identity provided in Appendix G of the test report, both One Channel Exciter, model LTG2-04 and Single Location Unit, model LTG2-04-PRF are electronically/electrically/mechanically identical and have only different design of Led lexan and different cover shape. That is why only model LTG2-04 was tested.

The present test report involves the test results for certification of 125 kHz transmitters as a part of a composite application for certification.

### 6.2 Ports and lines

| Port type | Port description | Connected from | Connected to  | Qty. | Cable type | Cable length, m |
|-----------|------------------|----------------|---------------|------|------------|-----------------|
| Power     | AC power         | AC mains       | AC/DC adapter | 1    | Unshielded | 1.5             |
| Power     | DC               | AC/DC adapter  | EUT           | 1    | Unshielded | 3               |
| Control   | Input            | EUT            | Open circuit  | 1    | Unshielded | 3               |
| Control   | Relay            | EUT            | Open circuit  | 1    | Unshielded | 3               |
| Control   | USB              | EUT            | No used       | 1    | NA         | NA              |
| RF        | Antenna          | EUT            | Antenna       | 4    | NA         | NA              |
| RF        | LF               | EUT            | Antenna       | 1    | Unshielded | 3               |

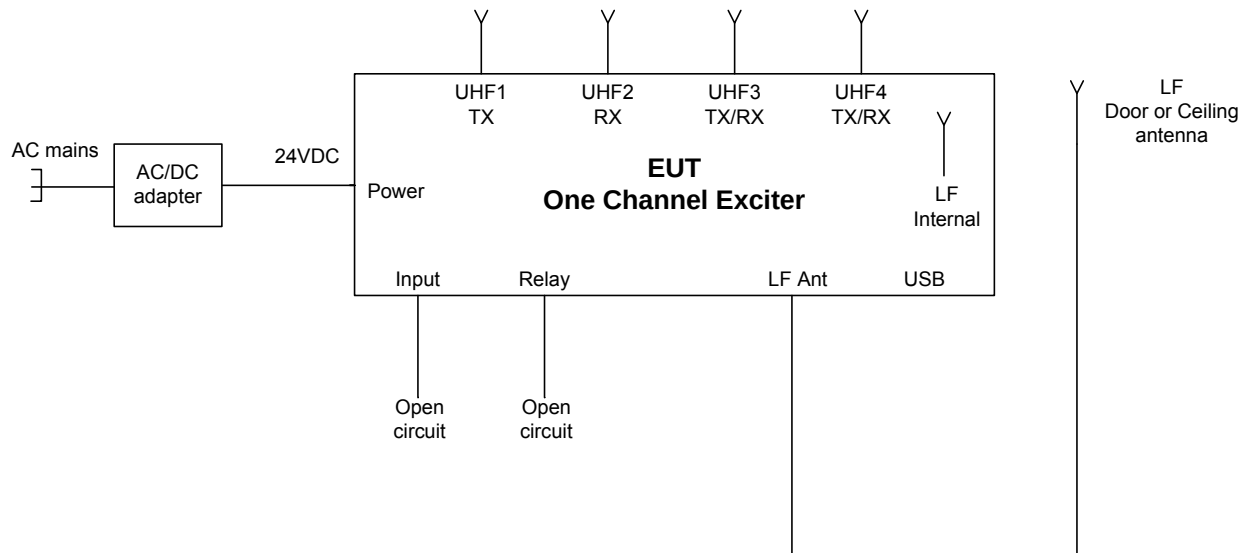
### 6.3 Changes made in the EUT

To withstand the standard requirements the following changes were implemented in the EUT:

- 1) an inductor of 68  $\mu$ H was installed instead of L4;
- 2) a 10  $\mu$ F/50 V capacitor was added between pins of J5;
- 3) a 1nF/250 V capacitor was added between the following pins:
  - J8 pin 1 to J1 pin 2
  - J8 pin 2 to J1 pin 2
  - between pins of J1;
- 4) capacitors C150=1  $\mu$ F/25 V, C141=1 nF/50 V
- 5) a toroid p/n 5975004901 with 2x10 turns was connected between J5 and D13.

It is manufacturer responsibility to implement the change in the production version of the EUT. In any case the test report applies to the tested item only.

## 6.4 Test configuration



|                                  |                               |                                                                                |                             |
|----------------------------------|-------------------------------|--------------------------------------------------------------------------------|-----------------------------|
| <b>Test specification:</b>       |                               | <b>FCC Section 15.209 / RSS-Gen section 7.2.5, Field strength of emissions</b> |                             |
| <b>Test procedure:</b>           |                               | ANSI C63.4, Section 13.1.4                                                     |                             |
| <b>Test mode:</b>                |                               | Compliance                                                                     | <b>Verdict:</b> PASS        |
| <b>Date(s):</b>                  |                               | 16-Apr-14 - 01-May-14                                                          |                             |
| <b>Temperature:</b> 25 °C        | <b>Air Pressure:</b> 1020 hPa | <b>Relative Humidity:</b> 45 %                                                 | <b>Power Supply:</b> 24 VDC |
| <b>Remarks:</b> Internal antenna |                               |                                                                                |                             |

## 7 Transmitter tests according to 47CFR part 15 subpart C and RSS-210 requirements

### 7.1 Field strength of emissions with internal antenna

#### 7.1.1 General

This test was performed to measure field strength of fundamental and spurious emissions from the EUT. Specification test limits are given Table 7.1.1 and Table 7.1.2.

Table 7.1.1 Radiated fundamental emission limits

| Fundamental frequency, kHz | Field strength at 3 m, dB(μV/m) |         |
|----------------------------|---------------------------------|---------|
|                            | Peak                            | Average |
| 125                        | 125.69                          | 105.69  |

Table 7.1.2 Radiated spurious emissions limits

| Frequency, MHz                  | Field strength at 3 m, dB(μV/m) |                 |                 |
|---------------------------------|---------------------------------|-----------------|-----------------|
|                                 | Within restricted bands         |                 |                 |
|                                 | Peak                            | Quasi Peak      | Average         |
| 0.009 – 0.090                   | 148.5 – 128.5                   | NA              | 128.5 – 108.5** |
| 0.090 – 0.110                   | NA                              | 108.5 – 106.8** | NA              |
| 0.110 – 0.490                   | 126.8 – 113.8                   | NA              | 106.8 – 93.8**  |
| 0.490 – 1.705                   | NA                              | 73.8 – 63.0**   | NA              |
| 1.705 – 30.0*                   |                                 | 69.5            |                 |
| 30 – 88                         |                                 | 40.0            |                 |
| 88 – 216                        |                                 | 43.5            |                 |
| 216 – 960                       |                                 | 46.0            |                 |
| 960 - 1000                      |                                 | 54.0            |                 |
| 1000 – 10 <sup>m</sup> harmonic | 74.0                            | NA              | 54.0            |

\*- The limit for 3 m test distance was calculated using the inverse square distance extrapolation factor as follows:

$$\text{Lim}_{S_2} = \text{Lim}_{S_1} + 40 \log (S_1/S_2),$$

where  $S_1$  and  $S_2$  – standard defined and test distance respectively in meters.

\*\* - The limit decreases linearly with the logarithm of frequency.

#### 7.1.2 Test procedure for fundamental and spurious emission field strength measurements in 9 kHz to 30 MHz

7.1.2.1 The EUT was set up as shown in Figure 7.1.1, energized and the performance check was conducted.

7.1.2.2 The specified frequency range was investigated with a loop antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360°, the measuring antenna was rotated around its vertical axis. The measuring antenna polarization was switched from vertical to horizontal.

7.1.2.3 The worst test results (the lowest margins) were recorded in Table 7.1.3 and shown in the associated plots.

#### 7.1.3 Test procedure for spurious emission field strength measurements above 30 MHz

7.1.3.1 The EUT was set up as shown in Figure 7.1.2, energized and the performance check was conducted.

7.1.3.2 The specified frequency range was investigated with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360°, the measuring antenna height was changed from 1 to 4 m, its polarization was switched from vertical to horizontal.

7.1.3.3 The worst test results (the lowest margins) were recorded in Table 7.1.4 and shown in the associated plots.

|                                                                                                    |                               |                                |                             |
|----------------------------------------------------------------------------------------------------|-------------------------------|--------------------------------|-----------------------------|
| <b>Test specification:</b> FCC Section 15.209 / RSS-Gen section 7.2.5, Field strength of emissions |                               |                                |                             |
| <b>Test procedure:</b> ANSI C63.4, Section 13.1.4                                                  |                               |                                |                             |
| <b>Test mode:</b> Compliance                                                                       |                               | <b>Verdict:</b> PASS           |                             |
| <b>Date(s):</b> 16-Apr-14 - 01-May-14                                                              |                               |                                |                             |
| <b>Temperature:</b> 25 °C                                                                          | <b>Air Pressure:</b> 1020 hPa | <b>Relative Humidity:</b> 45 % | <b>Power Supply:</b> 24 VDC |
| <b>Remarks:</b> Internal antenna                                                                   |                               |                                |                             |

Figure 7.1.1 Setup for spurious emission field strength measurements below 30 MHz

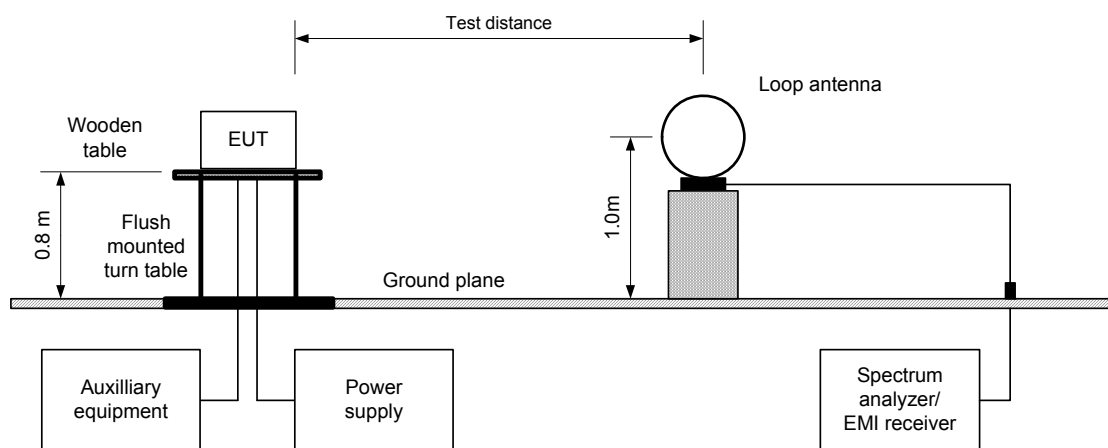
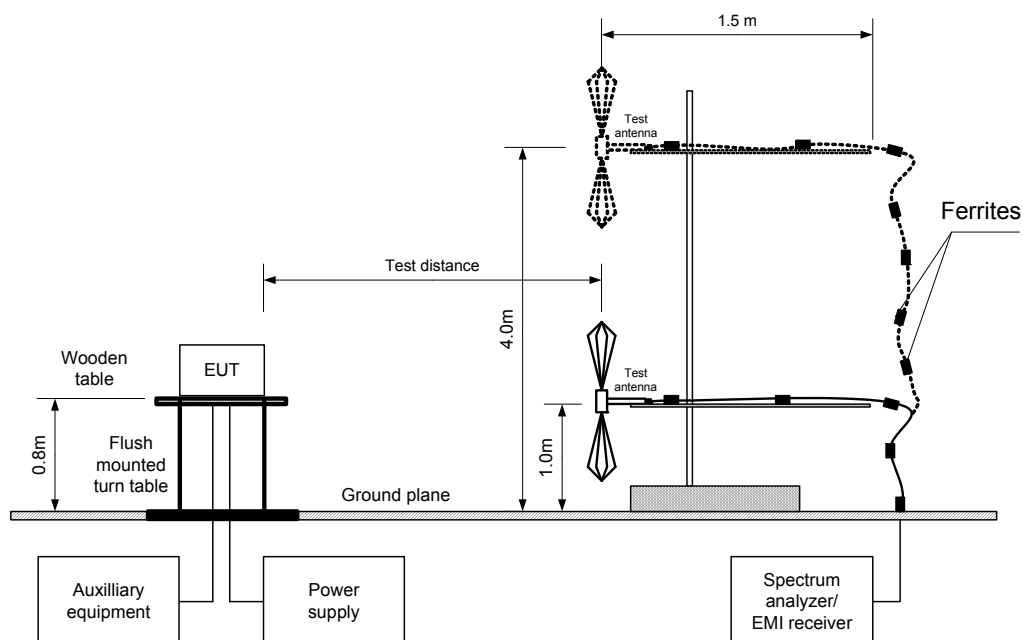


Figure 7.1.2 Setup for spurious emission field strength measurements above 30 MHz





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|                                  |                               |                                                                                |                             |
|----------------------------------|-------------------------------|--------------------------------------------------------------------------------|-----------------------------|
| <b>Test specification:</b>       |                               | <b>FCC Section 15.209 / RSS-Gen section 7.2.5, Field strength of emissions</b> |                             |
| <b>Test procedure:</b>           |                               | ANSI C63.4, Section 13.1.4                                                     |                             |
| <b>Test mode:</b>                |                               | Compliance                                                                     | <b>Verdict:</b> PASS        |
| <b>Date(s):</b>                  |                               | 16-Apr-14 - 01-May-14                                                          |                             |
| <b>Temperature:</b> 25 °C        | <b>Air Pressure:</b> 1020 hPa | <b>Relative Humidity:</b> 45 %                                                 | <b>Power Supply:</b> 24 VDC |
| <b>Remarks:</b> Internal antenna |                               |                                                                                |                             |

**Table 7.1.3 Field strength of fundamental emission**

TEST DISTANCE: 3 m  
 RF CHAIN: Internal antenna  
 TEST SITE: Semi Anechoic chamber  
 EUT POSITION: Typical (Vertical, Horizontal)  
 MODULATION: ASK  
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum  
 INVESTIGATED FREQUENCY RANGE: 0.009 – 1000 MHz  
 DETECTOR USED: Peak  
 RESOLUTION BANDWIDTH: 1 kHz (9 kHz – 150 kHz)  
 9.0 kHz (150 kHz – 30 MHz)  
 120 kHz (30 MHz – 1000 MHz)  
 VIDEO BANDWIDTH: ≥ Resolution bandwidth  
 TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)

| F, kHz | Antenna |           | Azimuth, degrees* | Peak field strength |                 |              | Average field strength |                 |              | Verdict |
|--------|---------|-----------|-------------------|---------------------|-----------------|--------------|------------------------|-----------------|--------------|---------|
|        | Pol.    | Height, m |                   | Measured, dB(μV/m)  | Limit, dB(μV/m) | Margin, dB** | Measured, dB(μV/m)     | Limit, dB(μV/m) | Margin, dB** |         |
| 125.0  | V       | 1.0       | 180               | 125.30              | 125.69          | -0.39        | 100.7                  | 105.69          | -4.99        | Pass    |

Note: The recorded value was obtained during measurements in the EUT vertical position.

\*- EUT front panel refers to 0 degrees position of turntable.

\*\* - Margin (dB) = measured result - specification limit.

**Reference numbers of test equipment used**

|         |         |         |         |         |  |  |  |
|---------|---------|---------|---------|---------|--|--|--|
| HL 0446 | HL 0521 | HL 0604 | HL 2871 | HL 4353 |  |  |  |
|---------|---------|---------|---------|---------|--|--|--|

Full description is given in Appendix A.



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|                                  |                               |                                                                                |                             |
|----------------------------------|-------------------------------|--------------------------------------------------------------------------------|-----------------------------|
| <b>Test specification:</b>       |                               | <b>FCC Section 15.209 / RSS-Gen section 7.2.5, Field strength of emissions</b> |                             |
| <b>Test procedure:</b>           |                               | ANSI C63.4, Section 13.1.4                                                     |                             |
| <b>Test mode:</b>                |                               | Compliance                                                                     | <b>Verdict:</b> PASS        |
| <b>Date(s):</b>                  |                               | 16-Apr-14 - 01-May-14                                                          |                             |
| <b>Temperature:</b> 25 °C        | <b>Air Pressure:</b> 1020 hPa | <b>Relative Humidity:</b> 45 %                                                 | <b>Power Supply:</b> 24 VDC |
| <b>Remarks:</b> Internal antenna |                               |                                                                                |                             |

Table 7.1.4 Field strength of spurious emissions

TEST DISTANCE: 3 m  
 TEST SITE: Semi Anechoic chamber  
 EUT POSITION: Typical (Vertical)  
 MODULATION: ASK  
 BIT RATE: 160 kbps  
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum  
 INVESTIGATED FREQUENCY RANGE: 0.009 – 1000 MHz  
 DETECTOR USED: Peak  
 RESOLUTION BANDWIDTH: 1 kHz (9 kHz – 150 kHz)  
 9.0 kHz (150 kHz – 30 MHz)  
 120 kHz (30 MHz – 1000 MHz)  
 VIDEO BANDWIDTH: ≥ Resolution bandwidth  
 TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)  
 Biconilog (30 MHz – 1000 MHz)

| Frequency, MHz | Peak emission, dB(μV/m) | Quasi-peak                  |                 |             | Antenna polarization | Antenna height, m | Turn-table position**, degrees | Verdict |
|----------------|-------------------------|-----------------------------|-----------------|-------------|----------------------|-------------------|--------------------------------|---------|
|                |                         | Measured emission, dB(μV/m) | Limit, dB(μV/m) | Margin, dB* |                      |                   |                                |         |
| 25.0           | 49.0                    | 46.7                        | 69.5            | -22.8       | V                    | 1.0               | 270                            | Pass    |
| 480            | 35.5                    | 34.0                        | 46.0            | -12.0       | V                    | 1.0               | 180                            |         |
| 188.2          | 34.4                    | 32.0                        | 43.5            | -11.5       | V                    | 1.0               | 300                            |         |
| 215.0          | 34.2                    | 32.2                        | 43.5            | -11.3       | V                    | 1.0               | 275                            |         |
| 59.98          | 30.3                    | 25.8                        | 40.0            | -14.2       | V                    | 1.0               | 255                            |         |
| 300.0          | 40.6                    | 39.5                        | 46.0            | -6.5        | H                    | 1.0               | 180                            |         |
| 240.0          | 36.1                    | 34.8                        | 46.0            | -11.2       | H                    | 1.0               | 170                            |         |
| 205.7          | 30.4                    | 29.1                        | 43.5            | -14.4       | H                    | 1.0               | 170                            |         |

| F, kHz | Antenna |           | Azimuth, degrees* | Peak field strength |                 |              | Average field strength |                 |              | Verdict |
|--------|---------|-----------|-------------------|---------------------|-----------------|--------------|------------------------|-----------------|--------------|---------|
|        | Pol.    | Height, m |                   | Measured, dB(μV/m)  | Limit, dB(μV/m) | Margin, dB** | Measured, dB(μV/m)     | Limit, dB(μV/m) | Margin, dB** |         |
| 150    | V       | 1.0       | 250               | 80.5                | 124.1           | -43.6        | 70.7                   | 104.1           | -33.4        | Pass    |

\*- Margin = Measured emission - specification limit.

\*\* - EUT front panel refer to 0 degrees position of turntable.

Reference numbers of test equipment used

|         |         |         |         |         |  |  |  |
|---------|---------|---------|---------|---------|--|--|--|
| HL 0446 | HL 0521 | HL 0604 | HL 2871 | HL 4353 |  |  |  |
|---------|---------|---------|---------|---------|--|--|--|

Full description is given in Appendix A.

|                           |                                                                         |                         |                      |      |  |
|---------------------------|-------------------------------------------------------------------------|-------------------------|----------------------|------|--|
| Test specification:       | FCC Section 15.209 / RSS-Gen section 7.2.5, Field strength of emissions |                         |                      |      |  |
| Test procedure:           | ANSI C63.4, Section 13.1.4                                              |                         |                      |      |  |
| Test mode:                | Compliance                                                              | Verdict:                |                      | PASS |  |
| Date(s):                  | 16-Apr-14 - 01-May-14                                                   |                         |                      |      |  |
| Temperature: 25 °C        | Air Pressure: 1020 hPa                                                  | Relative Humidity: 45 % | Power Supply: 24 VDC |      |  |
| Remarks: Internal antenna |                                                                         |                         |                      |      |  |

Table 7.1.5 Restricted bands according to FCC 15, Section 205

| MHz               | MHz                 | MHz                   | MHz             | MHz           | GHz           |
|-------------------|---------------------|-----------------------|-----------------|---------------|---------------|
| 0.09 - 0.11       | 8.37625 - 8.38675   | 73 - 74.6             | 399.9 - 410     | 2690 - 2900   | 10.6 - 12.7   |
| 0.495 - 0.505     | 8.41425 - 8.41475   | 74.8 - 75.2           | 608 - 614       | 3260 - 3267   | 13.25 - 13.4  |
| 2.1735 - 2.1905   | 12.290 - 12.293     | 108 - 121.94          | 960 - 1240      | 3332 - 3339   | 14.47 - 14.5  |
| 4.125 - 4.128     | 12.51975 - 12.52025 | 123 - 138             | 1300 - 1427     | 3345.8 - 3358 | 15.35 - 16.2  |
| 4.17725 - 4.17775 | 12.57675 - 12.57725 | 149.9 - 150.05        | 1435 - 1626.5   | 3600 - 4400   | 17.7 - 21.4   |
| 4.20725 - 4.20775 | 13.36 - 13.41       | 156.52475 - 156.52525 | 1645.5 - 1646.5 | 4500 - 5150   | 22.01 - 23.12 |
| 6.215 - 6.218     | 16.420 - 16.423     | 156.7 - 156.9         | 1660 - 1710     | 5350 - 5460   | 23.6 - 24     |
| 6.26775 - 6.26825 | 16.69475 - 16.69525 | 162.0125 - 167.17     | 1718.8 - 1722.2 | 7250 - 7750   | 31.2 - 31.8   |
| 6.31175 - 6.31225 | 16.80425 - 16.80475 | 167.72 - 173.2        | 2200 - 2300     | 8025 - 8500   | 36.43 - 36.5  |
| 8.291 - 8.294     | 25.5 - 25.67        | 240 - 285             | 2310 - 2390     | 9000 - 9200   | Above 38.6    |
| 8.362 - 8.366     | 37.5 - 38.25        | 322 - 335.4           | 2483.5 - 2500   | 9300 - 9500   |               |

Table 7.1.6 Restricted bands according to RSS-Gen, Table 3

| MHz               | MHz                 | MHz                   | MHz             | MHz           | GHz           |
|-------------------|---------------------|-----------------------|-----------------|---------------|---------------|
| 0.09 - 0.11       | 8.291 - 8.294       | 16.80425 - 16.80475   | 399.9 - 410     | 3260 - 3267   | 10.6 - 12.7   |
| 2.1735 - 2.190    | 8.362 - 8.366       | 25.5 - 25.67          | 608 - 614       | 3332 - 3339   | 13.25 - 13.4  |
| 3.020 - 3.026     | 8.37625 - 8.38675   | 37.5 - 38.25          | 960 - 1427      | 3345.8 - 3358 | 14.47 - 14.5  |
| 4.125 - 4.128     | 8.41425 - 8.41475   | 73 - 74.6             | 1435 - 1626.5   | 3500 - 4400   | 15.35 - 16.2  |
| 4.17725 - 4.17775 | 12.290 - 12.293     | 74.8 - 75.2           | 1645.5 - 1646.5 | 4500 - 5150   | 17.7 - 21.4   |
| 4.20725 - 4.20775 | 12.51975 - 12.52025 | 108 - 138             | 1660 - 1710     | 5350 - 5460   | 22.01 - 23.12 |
| 5.677 - 5.683     | 12.57675 - 12.57725 | 156.52475 - 156.52525 | 1718.8 - 1722.2 | 7250 - 7750   | 23.6 - 24.0   |
| 6.215 - 6.218     | 13.36 - 13.41       | 156.7 - 156.9         | 2200 - 2300     | 8025 - 8500   | 31.2 - 31.8   |
| 6.26775 - 6.26825 | 16.42 - 16.423      | 240 - 285             | 2310 - 2390     | 9000 - 9200   | 36.43 - 36.5  |
| 6.31175 - 6.31225 | 16.69475 - 16.69525 | 322 - 335.4           | 2655 - 2900     | 9300 - 9500   | Above 38.6    |

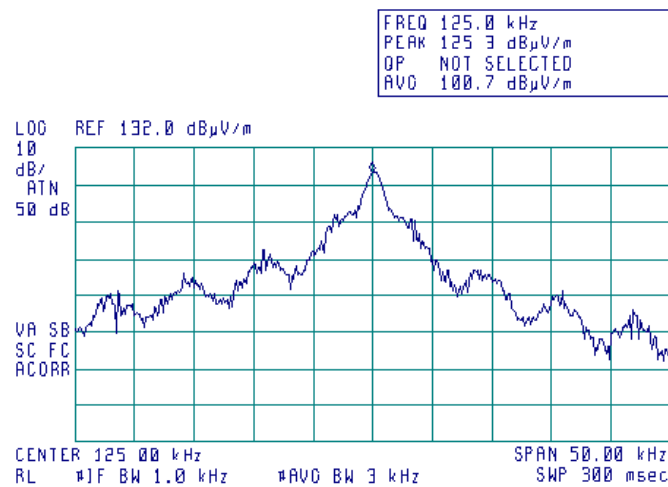


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|                           |                        |                                                                         |                      |
|---------------------------|------------------------|-------------------------------------------------------------------------|----------------------|
| Test specification:       |                        | FCC Section 15.209 / RSS-Gen section 7.2.5, Field strength of emissions |                      |
| Test procedure:           |                        | ANSI C63.4, Section 13.1.4                                              |                      |
| Test mode:                |                        | Compliance                                                              | Verdict: PASS        |
| Date(s):                  |                        | 16-Apr-14 - 01-May-14                                                   |                      |
| Temperature: 25 °C        | Air Pressure: 1020 hPa | Relative Humidity: 45 %                                                 | Power Supply: 24 VDC |
| Remarks: Internal antenna |                        |                                                                         |                      |

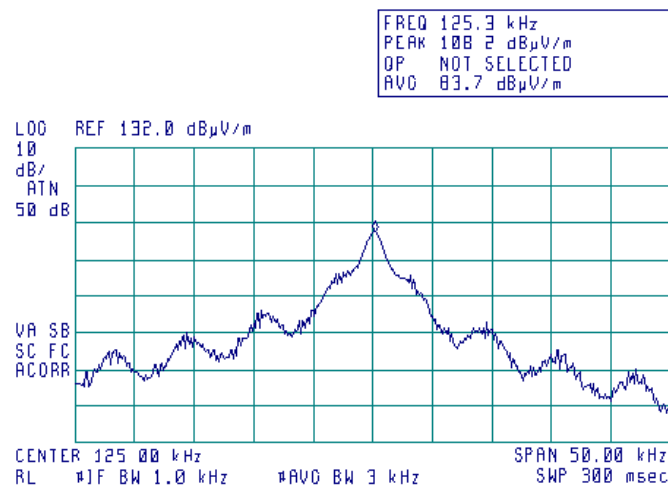
Plot 7.1.1 Radiated emission measurements at the fundamental frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical and Horizontal  
EUT POSITION: Typical (Vertical)



Plot 7.1.2 Radiated emission measurements at the fundamental frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical and Horizontal  
EUT POSITION: Typical (Horizontal)



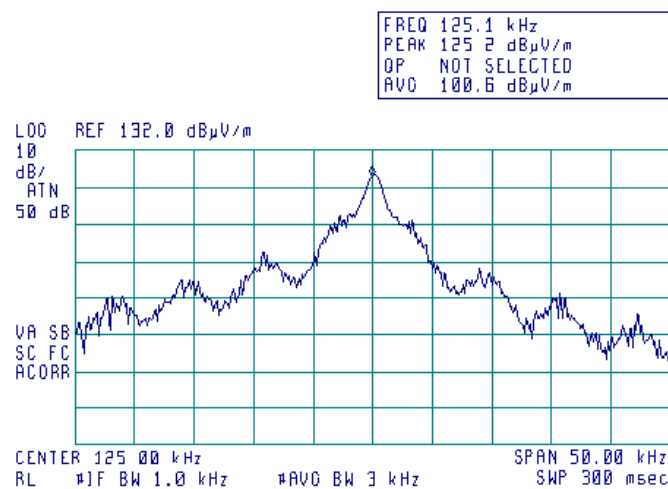


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|                           |                        |                                                                         |                      |
|---------------------------|------------------------|-------------------------------------------------------------------------|----------------------|
| Test specification:       |                        | FCC Section 15.209 / RSS-Gen section 7.2.5, Field strength of emissions |                      |
| Test procedure:           |                        | ANSI C63.4, Section 13.1.4                                              |                      |
| Test mode:                |                        | Compliance                                                              | Verdict: PASS        |
| Date(s):                  |                        | 16-Apr-14 - 01-May-14                                                   |                      |
| Temperature: 25 °C        | Air Pressure: 1020 hPa | Relative Humidity: 45 %                                                 | Power Supply: 24 VDC |
| Remarks: Internal antenna |                        |                                                                         |                      |

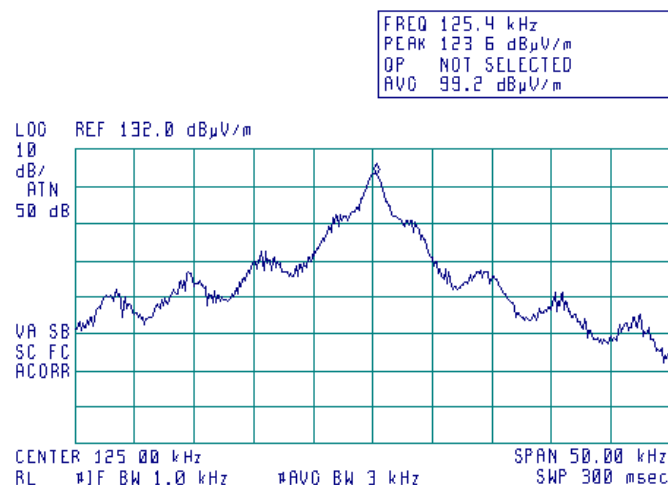
Plot 7.1.3 Radiated emission measurements at the fundamental frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical  
EUT POSITION: Typical (Vertical)  
VOLTAGE: 115%Unom



Plot 7.1.4 Radiated emission measurements at the fundamental frequency

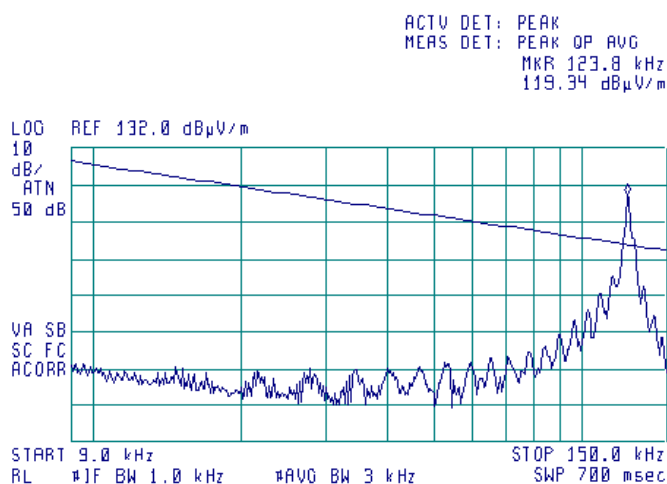
TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical  
EUT POSITION: Typical (Vertical)  
VOLTAGE: 85%Unom



|                                                                                                    |                                |
|----------------------------------------------------------------------------------------------------|--------------------------------|
| <b>Test specification:</b> FCC Section 15.209 / RSS-Gen section 7.2.5, Field strength of emissions |                                |
| <b>Test procedure:</b> ANSI C63.4, Section 13.1.4                                                  |                                |
| <b>Test mode:</b> Compliance                                                                       | <b>Verdict:</b> PASS           |
| <b>Date(s):</b> 16-Apr-14 - 01-May-14                                                              |                                |
| <b>Temperature:</b> 25 °C                                                                          | <b>Air Pressure:</b> 1020 hPa  |
|                                                                                                    | <b>Relative Humidity:</b> 45 % |
|                                                                                                    | <b>Power Supply:</b> 24 VDC    |
| <b>Remarks:</b> Internal antenna                                                                   |                                |

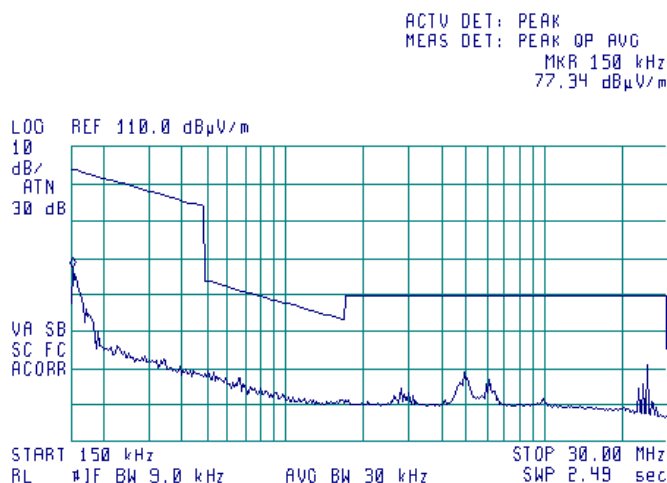
**Plot 7.1.5 Radiated emission measurements from 9 to 150 kHz**

TEST SITE: Anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical  
EUT POSITION: Typical (Vertical)



**Plot 7.1.6 Radiated emission measurements from 0.15 to 30 MHz**

TEST SITE: Anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical  
EUT POSITION: Typical (Vertical)



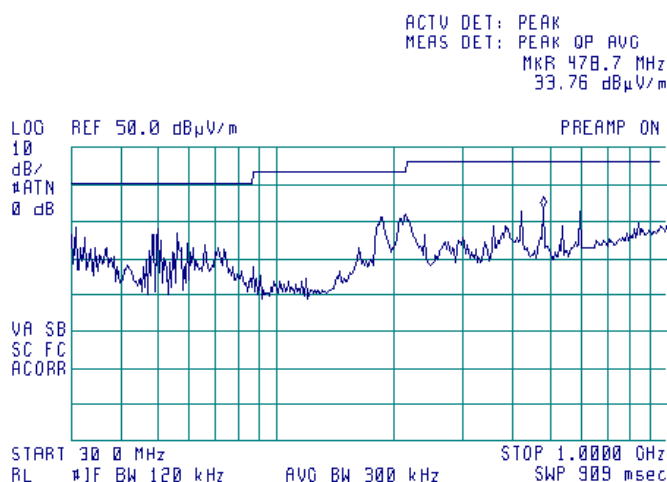


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|                           |                        |                                                                         |                      |
|---------------------------|------------------------|-------------------------------------------------------------------------|----------------------|
| Test specification:       |                        | FCC Section 15.209 / RSS-Gen section 7.2.5, Field strength of emissions |                      |
| Test procedure:           |                        | ANSI C63.4, Section 13.1.4                                              |                      |
| Test mode:                |                        | Compliance                                                              | Verdict: PASS        |
| Date(s):                  |                        | 16-Apr-14 - 01-May-14                                                   |                      |
| Temperature: 25 °C        | Air Pressure: 1020 hPa | Relative Humidity: 45 %                                                 | Power Supply: 24 VDC |
| Remarks: Internal antenna |                        |                                                                         |                      |

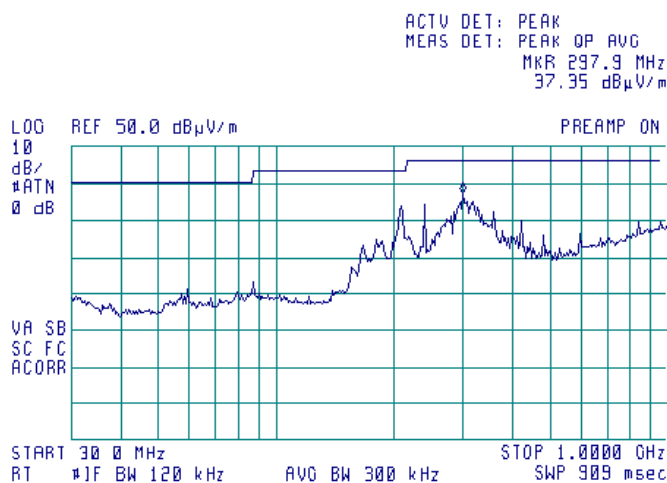
Plot 7.1.7 Radiated emission measurements from 30 to 1000 MHz

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical  
EUT POSITION: Typical (Vertical)



Plot 7.1.8 Radiated emission measurements from 30 to 1000 MHz

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Horizontal  
EUT POSITION: Typical (Vertical)



|                                       |                               |                                                                                |                             |
|---------------------------------------|-------------------------------|--------------------------------------------------------------------------------|-----------------------------|
| <b>Test specification:</b>            |                               | <b>FCC Section 15.209 / RSS-Gen section 7.2.5, Field strength of emissions</b> |                             |
| <b>Test procedure:</b>                |                               | ANSI C63.4, Section 13.1.4                                                     |                             |
| <b>Test mode:</b>                     |                               | <b>Verdict:</b> PASS                                                           |                             |
| <b>Date(s):</b>                       |                               |                                                                                |                             |
| 08-May-14 - 09-May-14                 |                               |                                                                                |                             |
| <b>Temperature:</b> 24 °C             | <b>Air Pressure:</b> 1005 hPa | <b>Relative Humidity:</b> 67 %                                                 | <b>Power Supply:</b> 24 VDC |
| <b>Remarks:</b> External Door Antenna |                               |                                                                                |                             |

## 7.2 Field strength of emissions with external Door Antenna

### 7.2.1 General

This test was performed to measure field strength of fundamental and spurious emissions from the EUT. Specification test limits are given Table 7.2.1 and Table 7.2.2.

Table 7.2.1 Radiated fundamental emission limits

| Fundamental frequency, kHz | Field strength at 3 m, dB(μV/m) |         |
|----------------------------|---------------------------------|---------|
|                            | Peak                            | Average |
| 125                        | 125.69                          | 105.69  |

Table 7.2.2 Radiated spurious emissions limits

| Frequency, MHz                   | Field strength at 3 m, dB(μV/m) |                 |                 |
|----------------------------------|---------------------------------|-----------------|-----------------|
|                                  | Within restricted bands         |                 |                 |
|                                  | Peak                            | Quasi Peak      | Average         |
| 0.009 – 0.090                    | 148.5 – 128.5                   | NA              | 128.5 – 108.5** |
| 0.090 – 0.110                    | NA                              | 108.5 – 106.8** | NA              |
| 0.110 – 0.490                    | 126.8 – 113.8                   | NA              | 106.8 – 93.8**  |
| 0.490 – 1.705                    | NA                              | 73.8 – 63.0**   | NA              |
| 1.705 – 30.0*                    |                                 | 69.5            |                 |
| 30 – 88                          |                                 | 40.0            |                 |
| 88 – 216                         |                                 | 43.5            |                 |
| 216 – 960                        |                                 | 46.0            |                 |
| 960 – 1000                       |                                 | 54.0            |                 |
| 1000 – 10 <sup>th</sup> harmonic | 74.0                            | NA              | 54.0            |

\*- The limit for 3 m test distance was calculated using the inverse square distance extrapolation factor as follows:

$$\text{Lim}_{S2} = \text{Lim}_{S1} + 40 \log (S_1/S_2),$$

where  $S_1$  and  $S_2$  – standard defined and test distance respectively in meters.

\*\* - The limit decreases linearly with the logarithm of frequency.

### 7.2.2 Test procedure for fundamental and spurious emission field strength measurements in 9 kHz to 30 MHz

7.2.2.1 The EUT was set up as shown in Figure 7.2.1, energized and the performance check was conducted.

7.2.2.2 The specified frequency range was investigated with a loop antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360°, the measuring antenna was rotated around its vertical axis. The measuring antenna polarization was switched from vertical to horizontal.

7.2.2.3 The worst test results (the lowest margins) were recorded in Table 7.2.3 and shown in the associated plots.

### 7.2.3 Test procedure for spurious emission field strength measurements above 30 MHz

7.2.3.1 The EUT was set up as shown in Figure 7.2.2, energized and the performance check was conducted.

7.2.3.2 The specified frequency range was investigated with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360°, the measuring antenna height was changed from 1 to 4 m, its polarization was switched from vertical to horizontal.

7.2.3.3 The worst test results (the lowest margins) were recorded in Table 7.2.4 and shown in the associated plots.

|                                                                                                    |                                |
|----------------------------------------------------------------------------------------------------|--------------------------------|
| <b>Test specification:</b> FCC Section 15.209 / RSS-Gen section 7.2.5, Field strength of emissions |                                |
| <b>Test procedure:</b> ANSI C63.4, Section 13.1.4                                                  |                                |
| <b>Test mode:</b> Compliance                                                                       | <b>Verdict:</b> PASS           |
| <b>Date(s):</b> 08-May-14 - 09-May-14                                                              |                                |
| <b>Temperature:</b> 24 °C                                                                          | <b>Air Pressure:</b> 1005 hPa  |
|                                                                                                    | <b>Relative Humidity:</b> 67 % |
|                                                                                                    | <b>Power Supply:</b> 24 VDC    |
| <b>Remarks:</b> External Door Antenna                                                              |                                |

Figure 7.2.1 Setup for spurious emission field strength measurements below 30 MHz

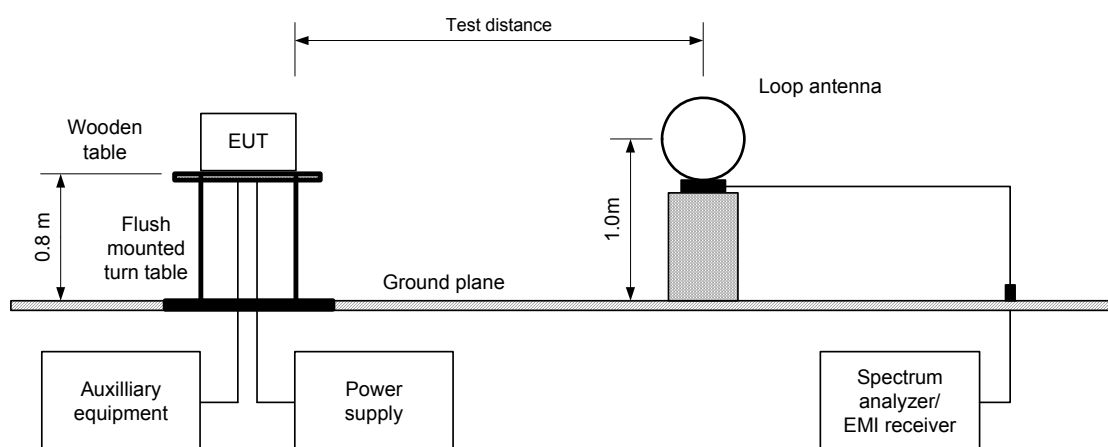
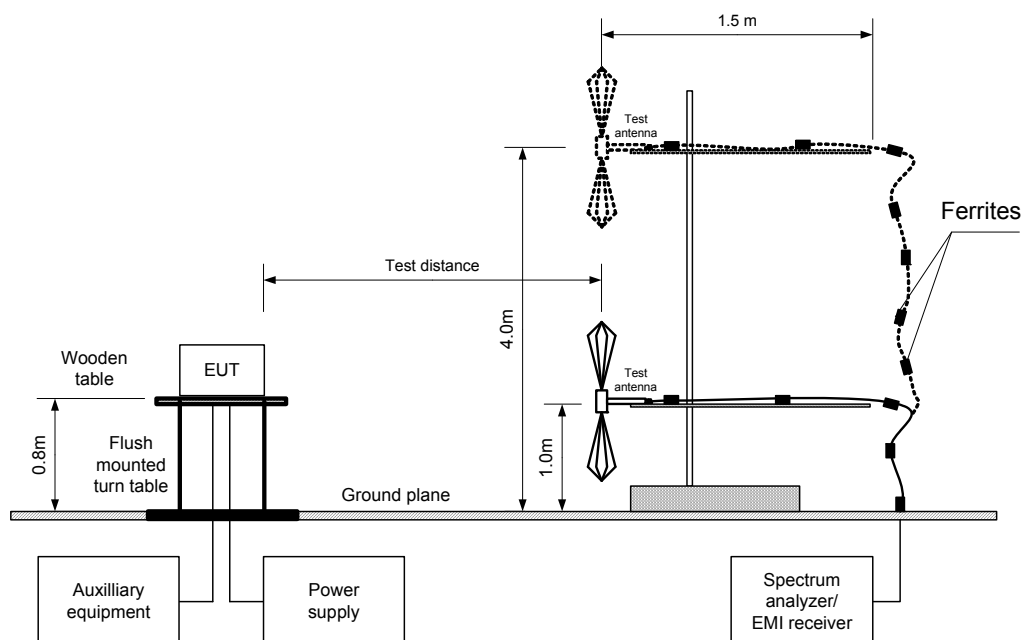


Figure 7.2.2 Setup for spurious emission field strength measurements above 30 MHz





|                                       |                               |                                                                                |                             |
|---------------------------------------|-------------------------------|--------------------------------------------------------------------------------|-----------------------------|
| <b>Test specification:</b>            |                               | <b>FCC Section 15.209 / RSS-Gen section 7.2.5, Field strength of emissions</b> |                             |
| <b>Test procedure:</b>                |                               | ANSI C63.4, Section 13.1.4                                                     |                             |
| <b>Test mode:</b>                     |                               | Compliance                                                                     | <b>Verdict:</b> PASS        |
| <b>Date(s):</b>                       |                               | 08-May-14 - 09-May-14                                                          |                             |
| <b>Temperature:</b> 24 °C             | <b>Air Pressure:</b> 1005 hPa | <b>Relative Humidity:</b> 67 %                                                 | <b>Power Supply:</b> 24 VDC |
| <b>Remarks:</b> External Door Antenna |                               |                                                                                |                             |

Table 7.2.3 Field strength of fundamental emission

TEST DISTANCE: 3 m  
 RF CHAIN: External Door Antenna  
 TEST SITE: Semi Anechoic chamber  
 EUT POSITION: Typical (Vertical, Horizontal)  
 MODULATION: ASK  
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum  
 INVESTIGATED FREQUENCY RANGE: 0.009 – 1000 MHz  
 DETECTOR USED: Peak  
 RESOLUTION BANDWIDTH: 1 kHz (9 kHz – 150 kHz)  
 9.0 kHz (150 kHz – 30 MHz)  
 120 kHz (30 MHz – 1000 MHz)  
 VIDEO BANDWIDTH: ≥ Resolution bandwidth  
 TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)

| F, kHz | Antenna |           | Azimuth, degrees* | Peak field strength |                 |              | Average field strength |                 |              | Verdict |
|--------|---------|-----------|-------------------|---------------------|-----------------|--------------|------------------------|-----------------|--------------|---------|
|        | Pol.    | Height, m |                   | Measured, dB(μV/m)  | Limit, dB(μV/m) | Margin, dB** | Measured, dB(μV/m)     | Limit, dB(μV/m) | Margin, dB** |         |
| 124.9  | V       | 1.0       | 10                | 114.8               | 125.69          | -10.89       | 89.9                   | 105.69          | -15.79       | Pass    |

Note: The recorded value was obtained during measurements in the EUT vertical position.

\*- EUT front panel refers to 0 degrees position of turntable.

\*\* - Margin (dB) = measured result - specification limit.

#### Reference numbers of test equipment used

|         |         |         |         |         |  |  |  |
|---------|---------|---------|---------|---------|--|--|--|
| HL 0446 | HL 0521 | HL 0604 | HL 2871 | HL 4353 |  |  |  |
|---------|---------|---------|---------|---------|--|--|--|

Full description is given in Appendix A.



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|                                       |                               |                                                                                |                             |
|---------------------------------------|-------------------------------|--------------------------------------------------------------------------------|-----------------------------|
| <b>Test specification:</b>            |                               | <b>FCC Section 15.209 / RSS-Gen section 7.2.5, Field strength of emissions</b> |                             |
| <b>Test procedure:</b>                |                               | ANSI C63.4, Section 13.1.4                                                     |                             |
| <b>Test mode:</b>                     |                               | Compliance                                                                     | <b>Verdict:</b> PASS        |
| <b>Date(s):</b>                       |                               | 08-May-14 - 09-May-14                                                          |                             |
| <b>Temperature:</b> 24 °C             | <b>Air Pressure:</b> 1005 hPa | <b>Relative Humidity:</b> 67 %                                                 | <b>Power Supply:</b> 24 VDC |
| <b>Remarks:</b> External Door Antenna |                               |                                                                                |                             |

Table 7.2.4 Field strength of spurious emissions

TEST DISTANCE: 3 m  
 RF CHAIN: External Door antenna  
 TEST SITE: Semi Anechoic chamber  
 EUT POSITION: Typical (Vertical)  
 MODULATION: ASK  
 BIT RATE: 160 kbps  
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum  
 INVESTIGATED FREQUENCY RANGE: 0.009 – 1000 MHz  
 DETECTOR USED: Peak  
 RESOLUTION BANDWIDTH: 1 kHz (9 kHz – 150 kHz)  
 9.0 kHz (150 kHz – 30 MHz)  
 120 kHz (30 MHz – 1000 MHz)  
 VIDEO BANDWIDTH: ≥ Resolution bandwidth  
 TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)  
 Biconilog (30 MHz – 1000 MHz)

| Frequency, MHz | Peak emission, dB(μV/m) | Quasi-peak                  |                 |             | Antenna polarization | Antenna height, m | Turn-table position**, degrees | Verdict |
|----------------|-------------------------|-----------------------------|-----------------|-------------|----------------------|-------------------|--------------------------------|---------|
|                |                         | Measured emission, dB(μV/m) | Limit, dB(μV/m) | Margin, dB* |                      |                   |                                |         |
| 39.0050        | 38.73                   | 35.67                       | 40.0            | -4.33       | V                    | 1.0               | 126                            | Pass    |
| 41.0035        | 35.50                   | 33.26                       | 40.0            | -6.74       | V                    | 1.0               | 283                            |         |
| 240.0130       | 37.20                   | 35.20                       | 46.0            | -10.8       | V                    | 1.0               | 54                             |         |
| 480.0113       | 33.69                   | 31.61                       | 46.0            | -14.39      | V                    | 1.0               | 301                            |         |
| 840.0000       | 36.20                   | 33.49                       | 46.0            | -12.51      | V                    | 1.1               | 31                             |         |
| 300.0053       | 39.10                   | 37.12                       | 46.0            | -8.88       | H                    | 1.3               | 202                            |         |

| F, kHz | Antenna |           | Azimuth, degrees* | Peak field strength |                 |              | Average field strength |                 |              | Verdict |
|--------|---------|-----------|-------------------|---------------------|-----------------|--------------|------------------------|-----------------|--------------|---------|
|        | Pol.    | Height, m |                   | Measured, dB(μV/m)  | Limit, dB(μV/m) | Margin, dB** | Measured, dB(μV/m)     | Limit, dB(μV/m) | Margin, dB** |         |
| 155.1  | V       | 1         | 355               | 91.1                | 123.82          | -32.72       | 52.8                   | 103.82          | -51.02       | Pass    |

\*- Margin = Measured emission - specification limit.

\*\* - EUT front panel refer to 0 degrees position of turntable.

Reference numbers of test equipment used

|         |         |         |         |         |  |  |  |
|---------|---------|---------|---------|---------|--|--|--|
| HL 0446 | HL 0521 | HL 0604 | HL 2871 | HL 4353 |  |  |  |
|---------|---------|---------|---------|---------|--|--|--|

Full description is given in Appendix A.

|                                       |  |                                                                                |  |                                |  |
|---------------------------------------|--|--------------------------------------------------------------------------------|--|--------------------------------|--|
| <b>Test specification:</b>            |  | <b>FCC Section 15.209 / RSS-Gen section 7.2.5, Field strength of emissions</b> |  |                                |  |
| <b>Test procedure:</b>                |  | ANSI C63.4, Section 13.1.4                                                     |  |                                |  |
| <b>Test mode:</b>                     |  | Compliance                                                                     |  | <b>Verdict:</b> PASS           |  |
| <b>Date(s):</b>                       |  | 08-May-14 - 09-May-14                                                          |  |                                |  |
| <b>Temperature:</b> 24 °C             |  | <b>Air Pressure:</b> 1005 hPa                                                  |  | <b>Relative Humidity:</b> 67 % |  |
|                                       |  |                                                                                |  | <b>Power Supply:</b> 24 VDC    |  |
| <b>Remarks:</b> External Door Antenna |  |                                                                                |  |                                |  |

Table 7.2.5 Restricted bands according to FCC 15, Section 205

| MHz               | MHz                 | MHz                   | MHz             | MHz           | GHz           |
|-------------------|---------------------|-----------------------|-----------------|---------------|---------------|
| 0.09 - 0.11       | 8.37625 - 8.38675   | 73 - 74.6             | 399.9 - 410     | 2690 - 2900   | 10.6 - 12.7   |
| 0.495 - 0.505     | 8.41425 - 8.41475   | 74.8 - 75.2           | 608 - 614       | 3260 - 3267   | 13.25 - 13.4  |
| 2.1735 - 2.1905   | 12.290 - 12.293     | 108 - 121.94          | 960 - 1240      | 3332 - 3339   | 14.47 - 14.5  |
| 4.125 - 4.128     | 12.51975 - 12.52025 | 123 - 138             | 1300 - 1427     | 3345.8 - 3358 | 15.35 - 16.2  |
| 4.17725 - 4.17775 | 12.57675 - 12.57725 | 149.9 - 150.05        | 1435 - 1626.5   | 3600 - 4400   | 17.7 - 21.4   |
| 4.20725 - 4.20775 | 13.36 - 13.41       | 156.52475 - 156.52525 | 1645.5 - 1646.5 | 4500 - 5150   | 22.01 - 23.12 |
| 6.215 - 6.218     | 16.420 - 16.423     | 156.7 - 156.9         | 1660 - 1710     | 5350 - 5460   | 23.6 - 24     |
| 6.26775 - 6.26825 | 16.69475 - 16.69525 | 162.0125 - 167.17     | 1718.8 - 1722.2 | 7250 - 7750   | 31.2 - 31.8   |
| 6.31175 - 6.31225 | 16.80425 - 16.80475 | 167.72 - 173.2        | 2200 - 2300     | 8025 - 8500   | 36.43 - 36.5  |
| 8.291 - 8.294     | 25.5 - 25.67        | 240 - 285             | 2310 - 2390     | 9000 - 9200   | Above 38.6    |
| 8.362 - 8.366     | 37.5 - 38.25        | 322 - 335.4           | 2483.5 - 2500   | 9300 - 9500   |               |

Table 7.2.6 Restricted bands according to RSS-Gen, Table 3

| MHz               | MHz                 | MHz                   | MHz             | MHz           | GHz           |
|-------------------|---------------------|-----------------------|-----------------|---------------|---------------|
| 0.09 - 0.11       | 8.291 - 8.294       | 16.80425 - 16.80475   | 399.9 - 410     | 3260 - 3267   | 10.6 - 12.7   |
| 2.1735 - 2.190    | 8.362 - 8.366       | 25.5 - 25.67          | 608 - 614       | 3332 - 3339   | 13.25 - 13.4  |
| 3.020 - 3.026     | 8.37625 - 8.38675   | 37.5 - 38.25          | 960 - 1427      | 3345.8 - 3358 | 14.47 - 14.5  |
| 4.125 - 4.128     | 8.41425 - 8.41475   | 73 - 74.6             | 1435 - 1626.5   | 3500 - 4400   | 15.35 - 16.2  |
| 4.17725 - 4.17775 | 12.290 - 12.293     | 74.8 - 75.2           | 1645.5 - 1646.5 | 4500 - 5150   | 17.7 - 21.4   |
| 4.20725 - 4.20775 | 12.51975 - 12.52025 | 108 - 138             | 1660 - 1710     | 5350 - 5460   | 22.01 - 23.12 |
| 5.677 - 5.683     | 12.57675 - 12.57725 | 156.52475 - 156.52525 | 1718.8 - 1722.2 | 7250 - 7750   | 23.6 - 24.0   |
| 6.215 - 6.218     | 13.36 - 13.41       | 156.7 - 156.9         | 2200 - 2300     | 8025 - 8500   | 31.2 - 31.8   |
| 6.26775 - 6.26825 | 16.42 - 16.423      | 240 - 285             | 2310 - 2390     | 9000 - 9200   | 36.43 - 36.5  |
| 6.31175 - 6.31225 | 16.69475 - 16.69525 | 322 - 335.4           | 2655 - 2900     | 9300 - 9500   | Above 38.6    |

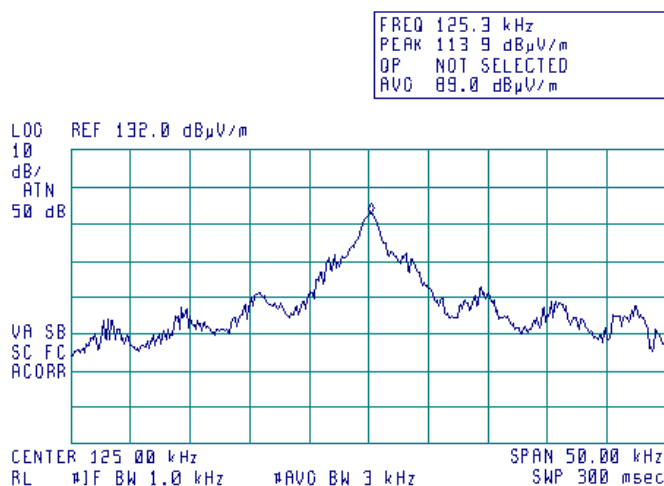


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|                                |                        |                                                                         |                      |
|--------------------------------|------------------------|-------------------------------------------------------------------------|----------------------|
| Test specification:            |                        | FCC Section 15.209 / RSS-Gen section 7.2.5, Field strength of emissions |                      |
| Test procedure:                |                        | ANSI C63.4, Section 13.1.4                                              |                      |
| Test mode:                     |                        | Compliance                                                              | Verdict: PASS        |
| Date(s):                       |                        | 08-May-14 - 09-May-14                                                   |                      |
| Temperature: 24 °C             | Air Pressure: 1005 hPa | Relative Humidity: 67 %                                                 | Power Supply: 24 VDC |
| Remarks: External Door Antenna |                        |                                                                         |                      |

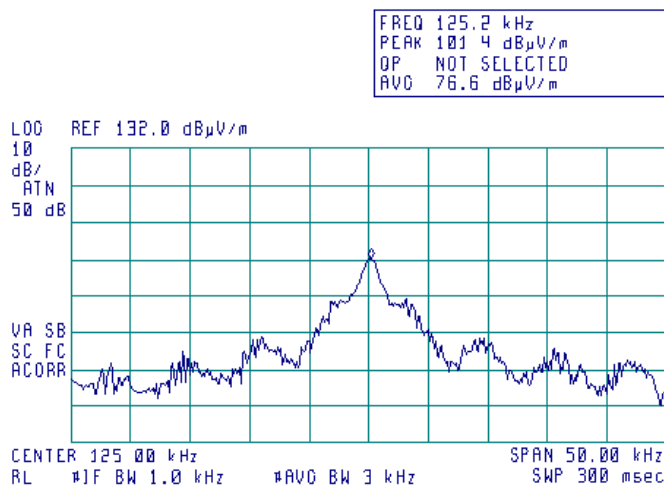
#### Plot 7.2.1 Radiated emission measurements at the fundamental frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical and Horizontal  
EUT POSITION: Typical (Vertical)



#### Plot 7.2.2 Radiated emission measurements at the fundamental frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical and Horizontal  
EUT POSITION: Typical (Horizontal)



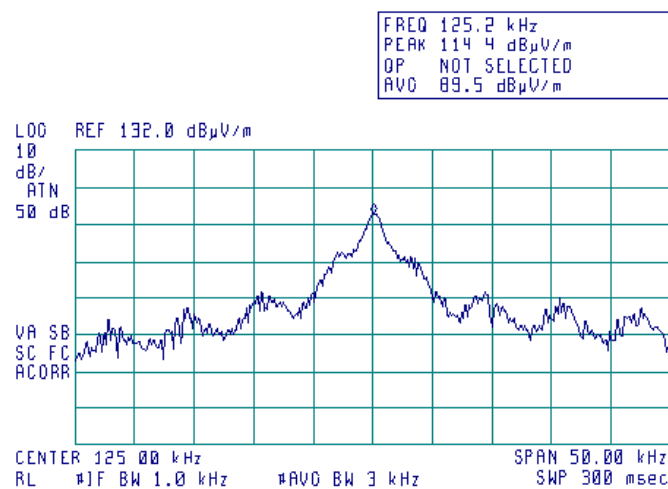


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|                                |                        |                                                                         |                      |
|--------------------------------|------------------------|-------------------------------------------------------------------------|----------------------|
| Test specification:            |                        | FCC Section 15.209 / RSS-Gen section 7.2.5, Field strength of emissions |                      |
| Test procedure:                |                        | ANSI C63.4, Section 13.1.4                                              |                      |
| Test mode:                     |                        | Compliance                                                              | Verdict: PASS        |
| Date(s):                       |                        | 08-May-14 - 09-May-14                                                   |                      |
| Temperature: 24 °C             | Air Pressure: 1005 hPa | Relative Humidity: 67 %                                                 | Power Supply: 24 VDC |
| Remarks: External Door Antenna |                        |                                                                         |                      |

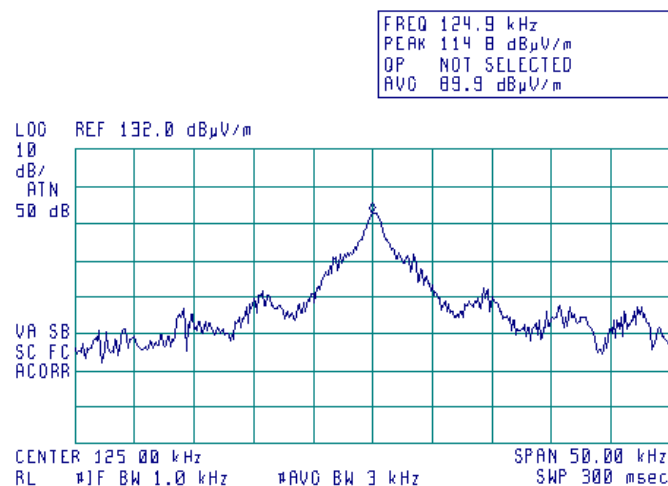
Plot 7.2.3 Radiated emission measurements at the fundamental frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical  
EUT POSITION: Typical (Vertical)  
VOLTAGE: 115%Unom



Plot 7.2.4 Radiated emission measurements at the fundamental frequency

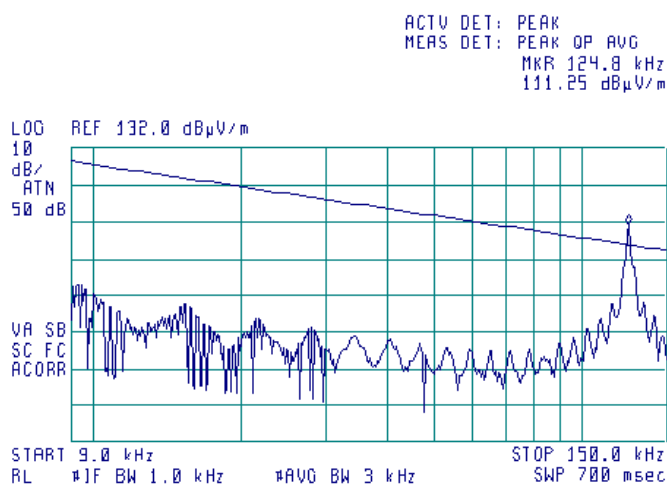
TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical  
EUT POSITION: Typical (Vertical)  
VOLTAGE: 85%Unom



|                                                                                                    |                                |
|----------------------------------------------------------------------------------------------------|--------------------------------|
| <b>Test specification:</b> FCC Section 15.209 / RSS-Gen section 7.2.5, Field strength of emissions |                                |
| <b>Test procedure:</b> ANSI C63.4, Section 13.1.4                                                  |                                |
| <b>Test mode:</b> Compliance                                                                       | <b>Verdict:</b> PASS           |
| <b>Date(s):</b> 08-May-14 - 09-May-14                                                              |                                |
| <b>Temperature:</b> 24 °C                                                                          | <b>Air Pressure:</b> 1005 hPa  |
|                                                                                                    | <b>Relative Humidity:</b> 67 % |
|                                                                                                    | <b>Power Supply:</b> 24 VDC    |
| <b>Remarks:</b> External Door Antenna                                                              |                                |

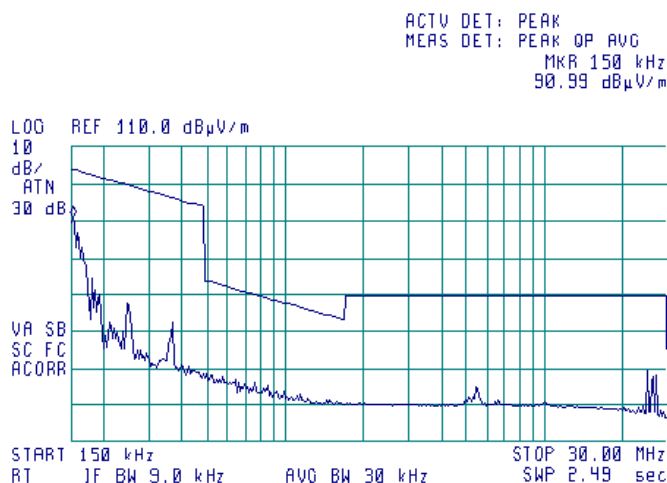
**Plot 7.2.5 Radiated emission measurements from 9 to 150 kHz**

TEST SITE: Anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical  
EUT POSITION: Typical (Vertical)



**Plot 7.2.6 Radiated emission measurements from 0.15 to 30 MHz**

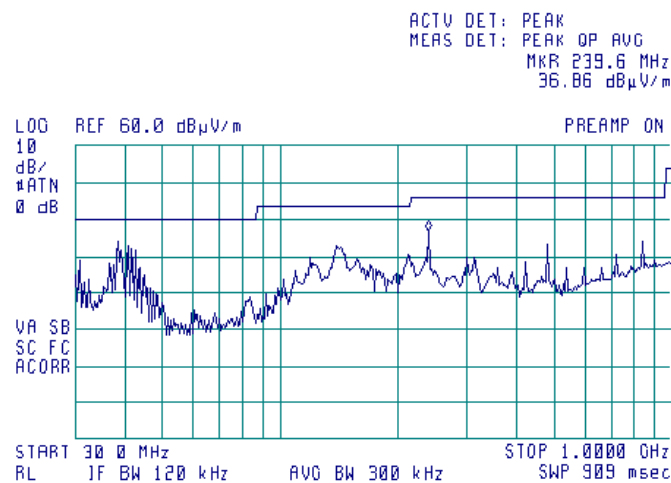
TEST SITE: Anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical  
EUT POSITION: Typical (Vertical)



|                                                                                                    |                                |
|----------------------------------------------------------------------------------------------------|--------------------------------|
| <b>Test specification:</b> FCC Section 15.209 / RSS-Gen section 7.2.5, Field strength of emissions |                                |
| <b>Test procedure:</b> ANSI C63.4, Section 13.1.4                                                  |                                |
| <b>Test mode:</b> Compliance                                                                       | <b>Verdict:</b> PASS           |
| <b>Date(s):</b> 08-May-14 - 09-May-14                                                              |                                |
| <b>Temperature:</b> 24 °C                                                                          | <b>Air Pressure:</b> 1005 hPa  |
|                                                                                                    | <b>Relative Humidity:</b> 67 % |
|                                                                                                    | <b>Power Supply:</b> 24 VDC    |
| <b>Remarks:</b> External Door Antenna                                                              |                                |

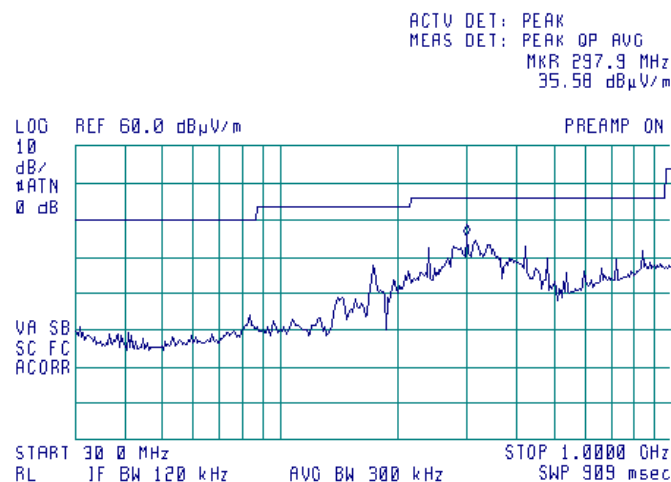
#### Plot 7.2.7 Radiated emission measurements from 30 to 1000 MHz

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical  
EUT POSITION: Typical (Vertical)



#### Plot 7.2.8 Radiated emission measurements from 30 to 1000 MHz

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Horizontal  
EUT POSITION: Typical (Vertical)



|                                          |                               |                                                                                |                             |
|------------------------------------------|-------------------------------|--------------------------------------------------------------------------------|-----------------------------|
| <b>Test specification:</b>               |                               | <b>FCC Section 15.209 / RSS-Gen section 7.2.5, Field strength of emissions</b> |                             |
| <b>Test procedure:</b>                   |                               | ANSI C63.4, Section 13.1.4                                                     |                             |
| <b>Test mode:</b>                        |                               | <b>Verdict:</b> PASS                                                           |                             |
| <b>Date(s):</b>                          |                               |                                                                                |                             |
| 08-May-14 - 09-May-14                    |                               |                                                                                |                             |
| <b>Temperature:</b> 24 °C                | <b>Air Pressure:</b> 1005 hPa | <b>Relative Humidity:</b> 67 %                                                 | <b>Power Supply:</b> 24 VDC |
| <b>Remarks:</b> External Ceiling Antenna |                               |                                                                                |                             |

## 7.3 Field strength of emissions with external Ceiling Antenna

### 7.3.1 General

This test was performed to measure field strength of fundamental and spurious emissions from the EUT. Specification test limits are given Table 7.3.1 and Table 7.3.2.

Table 7.3.1 Radiated fundamental emission limits

| Fundamental frequency, kHz | Field strength at 3 m, dB(μV/m) |         |
|----------------------------|---------------------------------|---------|
|                            | Peak                            | Average |
| 125                        | 125.69                          | 105.69  |

Table 7.3.2 Radiated spurious emissions limits

| Frequency, MHz                   | Field strength at 3 m, dB(μV/m) |                 |                 |
|----------------------------------|---------------------------------|-----------------|-----------------|
|                                  | Within restricted bands         |                 |                 |
|                                  | Peak                            | Quasi Peak      | Average         |
| 0.009 – 0.090                    | 148.5 – 128.5                   | NA              | 128.5 – 108.5** |
| 0.090 – 0.110                    | NA                              | 108.5 – 106.8** | NA              |
| 0.110 – 0.490                    | 126.8 – 113.8                   | NA              | 106.8 – 93.8**  |
| 0.490 – 1.705                    | NA                              | 73.8 – 63.0**   | NA              |
| 1.705 – 30.0*                    |                                 | 69.5            |                 |
| 30 – 88                          |                                 | 40.0            |                 |
| 88 – 216                         |                                 | 43.5            |                 |
| 216 – 960                        |                                 | 46.0            |                 |
| 960 – 1000                       |                                 | 54.0            |                 |
| 1000 – 10 <sup>th</sup> harmonic | 74.0                            | NA              | 54.0            |

\*- The limit for 3 m test distance was calculated using the inverse square distance extrapolation factor as follows:

$$\text{Lim}_{S2} = \text{Lim}_{S1} + 40 \log (S_1/S_2),$$

where  $S_1$  and  $S_2$  – standard defined and test distance respectively in meters.

\*\* - The limit decreases linearly with the logarithm of frequency.

### 7.3.2 Test procedure for fundamental and spurious emission field strength measurements in 9 kHz to 30 MHz

7.3.2.1 The EUT was set up as shown in Figure 7.3.1, energized and the performance check was conducted.

7.3.2.2 The specified frequency range was investigated with a loop antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360°, the measuring antenna was rotated around its vertical axis. The measuring antenna polarization was switched from vertical to horizontal.

7.3.2.3 The worst test results (the lowest margins) were recorded in Table 7.3.3 and shown in the associated plots.

### 7.3.3 Test procedure for spurious emission field strength measurements above 30 MHz

7.3.3.1 The EUT was set up as shown in Figure 7.3.2, energized and the performance check was conducted.

7.3.3.2 The specified frequency range was investigated with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360°, the measuring antenna height was changed from 1 to 4 m, its polarization was switched from vertical to horizontal.

7.3.3.3 The worst test results (the lowest margins) were recorded in Table 7.3.4 and shown in the associated plots.

|                                                                                                    |                                |
|----------------------------------------------------------------------------------------------------|--------------------------------|
| <b>Test specification:</b> FCC Section 15.209 / RSS-Gen section 7.2.5, Field strength of emissions |                                |
| <b>Test procedure:</b> ANSI C63.4, Section 13.1.4                                                  |                                |
| <b>Test mode:</b> Compliance                                                                       | <b>Verdict:</b> PASS           |
| <b>Date(s):</b> 08-May-14 - 09-May-14                                                              |                                |
| <b>Temperature:</b> 24 °C                                                                          | <b>Air Pressure:</b> 1005 hPa  |
|                                                                                                    | <b>Relative Humidity:</b> 67 % |
|                                                                                                    | <b>Power Supply:</b> 24 VDC    |
| <b>Remarks:</b> External Ceiling Antenna                                                           |                                |

Figure 7.3.1 Setup for spurious emission field strength measurements below 30 MHz

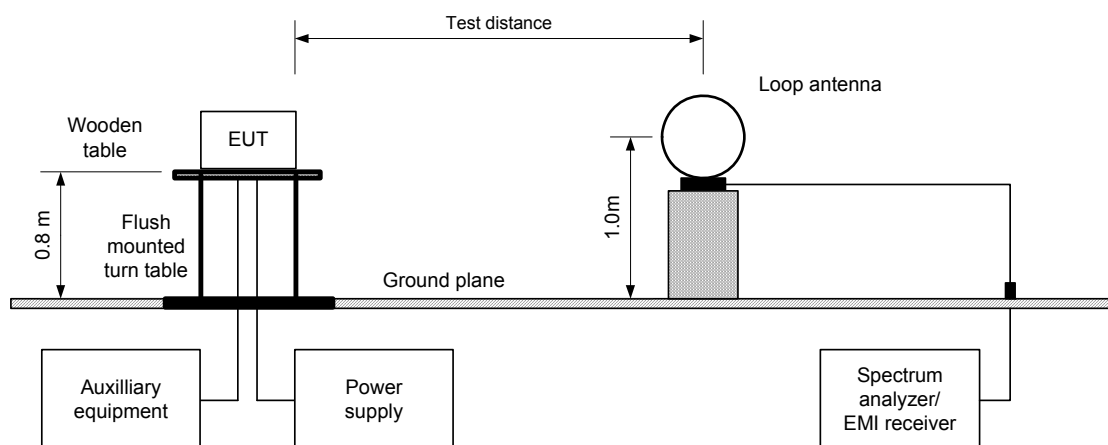
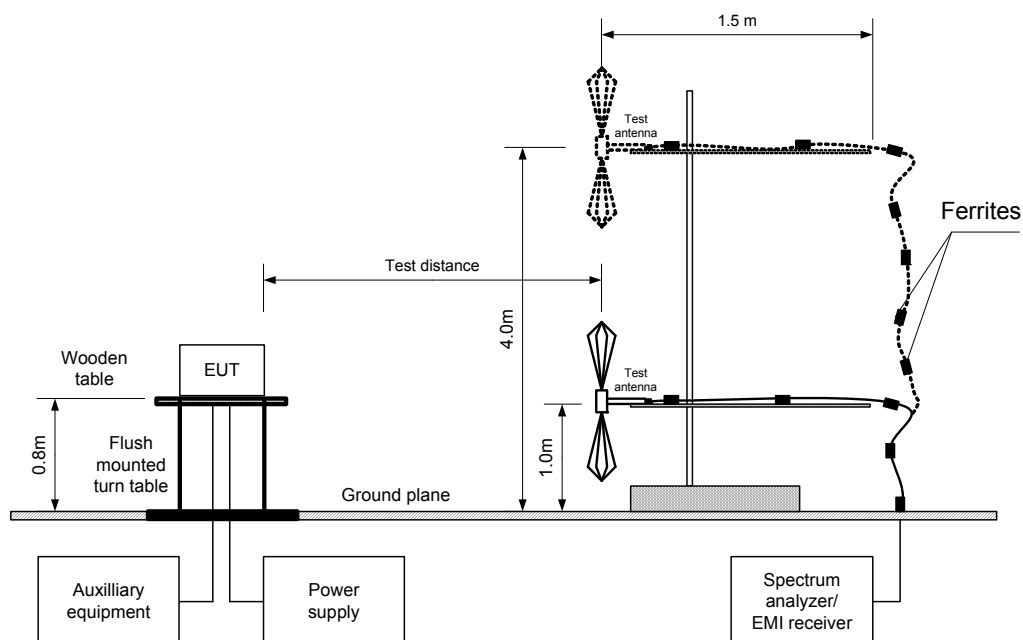


Figure 7.3.2 Setup for spurious emission field strength measurements above 30 MHz





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|                                                                                                    |                               |                                |                             |
|----------------------------------------------------------------------------------------------------|-------------------------------|--------------------------------|-----------------------------|
| <b>Test specification:</b> FCC Section 15.209 / RSS-Gen section 7.2.5, Field strength of emissions |                               |                                |                             |
| <b>Test procedure:</b> ANSI C63.4, Section 13.1.4                                                  |                               |                                |                             |
| <b>Test mode:</b> Compliance                                                                       |                               | <b>Verdict:</b> PASS           |                             |
| <b>Date(s):</b> 08-May-14 - 09-May-14                                                              |                               |                                |                             |
| <b>Temperature:</b> 24 °C                                                                          | <b>Air Pressure:</b> 1005 hPa | <b>Relative Humidity:</b> 67 % | <b>Power Supply:</b> 24 VDC |
| <b>Remarks:</b> External Ceiling Antenna                                                           |                               |                                |                             |

**Table 7.3.3 Field strength of fundamental emission**

TEST DISTANCE: 3 m  
 RF CHAIN: Ceiling Antenna  
 TEST SITE: Semi Anechoic chamber  
 EUT POSITION: Typical (Vertical, Horizontal)  
 MODULATION: ASK  
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum  
 INVESTIGATED FREQUENCY RANGE: 0.009 – 1000 MHz  
 DETECTOR USED: Peak  
 RESOLUTION BANDWIDTH: 1 kHz (9 kHz – 150 kHz)  
 9.0 kHz (150 kHz – 30 MHz)  
 120 kHz (30 MHz – 1000 MHz)  
 VIDEO BANDWIDTH: ≥ Resolution bandwidth  
 TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)

| F, kHz | Antenna |           | Azimuth, degrees* | Peak field strength |                 |              | Average field strength |                 |              | Verdict |
|--------|---------|-----------|-------------------|---------------------|-----------------|--------------|------------------------|-----------------|--------------|---------|
|        | Pol.    | Height, m |                   | Measured, dB(μV/m)  | Limit, dB(μV/m) | Margin, dB** | Measured, dB(μV/m)     | Limit, dB(μV/m) | Margin, dB** |         |
| 124.95 | V       | 1.0       | 1                 | 125.25              | 125.69          | -0.44        | 98.80                  | 105.69          | -6.89        | Pass    |

Note: The recorded value was obtained during measurements in the EUT vertical position.

\*- EUT front panel refers to 0 degrees position of turntable.

\*\*- Margin (dB) = measured result - specification limit.

**Reference numbers of test equipment used**

|         |         |         |         |  |  |  |  |
|---------|---------|---------|---------|--|--|--|--|
| HL 0446 | HL 0521 | HL 2871 | HL 4353 |  |  |  |  |
|---------|---------|---------|---------|--|--|--|--|

Full description is given in Appendix A.



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|                                          |                               |                                                                                |                             |
|------------------------------------------|-------------------------------|--------------------------------------------------------------------------------|-----------------------------|
| <b>Test specification:</b>               |                               | <b>FCC Section 15.209 / RSS-Gen section 7.2.5, Field strength of emissions</b> |                             |
| <b>Test procedure:</b>                   |                               | ANSI C63.4, Section 13.1.4                                                     |                             |
| <b>Test mode:</b>                        |                               | Compliance                                                                     | <b>Verdict:</b> PASS        |
| <b>Date(s):</b>                          |                               | 08-May-14 - 09-May-14                                                          |                             |
| <b>Temperature:</b> 24 °C                | <b>Air Pressure:</b> 1005 hPa | <b>Relative Humidity:</b> 67 %                                                 | <b>Power Supply:</b> 24 VDC |
| <b>Remarks:</b> External Ceiling Antenna |                               |                                                                                |                             |

Table 7.3.4 Field strength of spurious emissions

TEST DISTANCE: 3 m  
 Rx CHAIN: Ceiling Antenna  
 TEST SITE: Semi Anechoic chamber  
 EUT POSITION: Typical (Vertical)  
 MODULATION: ASK  
 BIT RATE: 160kbps  
 TRANSMITTER OUTPUT POWER SETTINGS: Maximum  
 INVESTIGATED FREQUENCY RANGE: 0.009 – 1000 MHz  
 DETECTOR USED: Peak  
 RESOLUTION BANDWIDTH: 1 kHz (9 kHz – 150 kHz)  
 9.0 kHz (150 kHz – 30 MHz)  
 120 kHz (30 MHz – 1000 MHz)  
 VIDEO BANDWIDTH: ≥ Resolution bandwidth  
 TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)  
 Biconilog (30 MHz – 1000 MHz)

| Frequency, MHz | Peak emission, dB(μV/m) | Quasi-peak                  |                 |             | Antenna polarization | Antenna height, m | Turn-table position**, degrees | Verdict |
|----------------|-------------------------|-----------------------------|-----------------|-------------|----------------------|-------------------|--------------------------------|---------|
|                |                         | Measured emission, dB(μV/m) | Limit, dB(μV/m) | Margin, dB* |                      |                   |                                |         |
| 39.0013        | 37.60                   | 34.89                       | 40.0            | -5.11       | V                    | 1.0               | 360                            | Pass    |
| 41.0033        | 34.00                   | 32.20                       | 40.0            | -7.8        | V                    | 1.0               | 41                             |         |
| 145.1653       | 36.10                   | 35.30                       | 43.5            | -8.2        | V                    | 1.0               | 83                             |         |
| 240.0078       | 38.2                    | 35.40                       | 46.0            | -10.6       | V                    | 1.0               | 193                            |         |
| 300.0038       | 42.4                    | 40.54                       | 46.0            | -5.46       | H                    | 1.1               | 22                             |         |
| 480.0095       | 36.9                    | 35.20                       | 46.0            | -10.8       | H                    | 1.0               | 245                            |         |

| F, kHz | Antenna |           | Azimuth, degrees* | Peak field strength |                 |              | Average field strength |                 |              | Verdict |
|--------|---------|-----------|-------------------|---------------------|-----------------|--------------|------------------------|-----------------|--------------|---------|
|        | Pol.    | Height, m |                   | Measured, dB(μV/m)  | Limit, dB(μV/m) | Margin, dB** | Measured, dB(μV/m)     | Limit, dB(μV/m) | Margin, dB** |         |
| 155.13 | V       | 1         | 2                 | 90.8                | 123.82          | -33.02       | 48.0                   | 103.82          | -55.82       | Pass    |

\*- Margin = Measured emission - specification limit.

\*\* - EUT front panel refer to 0 degrees position of turntable.

Reference numbers of test equipment used

|         |         |         |         |         |  |  |  |
|---------|---------|---------|---------|---------|--|--|--|
| HL 0446 | HL 0521 | HL 0604 | HL 2871 | HL 4353 |  |  |  |
|---------|---------|---------|---------|---------|--|--|--|

Full description is given in Appendix A.

|                                          |  |                                                                                |  |                                |                             |
|------------------------------------------|--|--------------------------------------------------------------------------------|--|--------------------------------|-----------------------------|
| <b>Test specification:</b>               |  | <b>FCC Section 15.209 / RSS-Gen section 7.2.5, Field strength of emissions</b> |  |                                |                             |
| <b>Test procedure:</b>                   |  | ANSI C63.4, Section 13.1.4                                                     |  |                                |                             |
| <b>Test mode:</b>                        |  | Compliance                                                                     |  | <b>Verdict:</b> PASS           |                             |
| <b>Date(s):</b>                          |  | 08-May-14 - 09-May-14                                                          |  |                                |                             |
| <b>Temperature:</b> 24 °C                |  | <b>Air Pressure:</b> 1005 hPa                                                  |  | <b>Relative Humidity:</b> 67 % | <b>Power Supply:</b> 24 VDC |
| <b>Remarks:</b> External Ceiling Antenna |  |                                                                                |  |                                |                             |

Table 7.3.5 Restricted bands according to FCC 15, Section 205

| MHz               | MHz                 | MHz                   | MHz             | MHz           | GHz           |
|-------------------|---------------------|-----------------------|-----------------|---------------|---------------|
| 0.09 - 0.11       | 8.37625 - 8.38675   | 73 - 74.6             | 399.9 - 410     | 2690 - 2900   | 10.6 - 12.7   |
| 0.495 - 0.505     | 8.41425 - 8.41475   | 74.8 - 75.2           | 608 - 614       | 3260 - 3267   | 13.25 - 13.4  |
| 2.1735 - 2.1905   | 12.290 - 12.293     | 108 - 121.94          | 960 - 1240      | 3332 - 3339   | 14.47 - 14.5  |
| 4.125 - 4.128     | 12.51975 - 12.52025 | 123 - 138             | 1300 - 1427     | 3345.8 - 3358 | 15.35 - 16.2  |
| 4.17725 - 4.17775 | 12.57675 - 12.57725 | 149.9 - 150.05        | 1435 - 1626.5   | 3600 - 4400   | 17.7 - 21.4   |
| 4.20725 - 4.20775 | 13.36 - 13.41       | 156.52475 - 156.52525 | 1645.5 - 1646.5 | 4500 - 5150   | 22.01 - 23.12 |
| 6.215 - 6.218     | 16.420 - 16.423     | 156.7 - 156.9         | 1660 - 1710     | 5350 - 5460   | 23.6 - 24     |
| 6.26775 - 6.26825 | 16.69475 - 16.69525 | 162.0125 - 167.17     | 1718.8 - 1722.2 | 7250 - 7750   | 31.2 - 31.8   |
| 6.31175 - 6.31225 | 16.80425 - 16.80475 | 167.72 - 173.2        | 2200 - 2300     | 8025 - 8500   | 36.43 - 36.5  |
| 8.291 - 8.294     | 25.5 - 25.67        | 240 - 285             | 2310 - 2390     | 9000 - 9200   | Above 38.6    |
| 8.362 - 8.366     | 37.5 - 38.25        | 322 - 335.4           | 2483.5 - 2500   | 9300 - 9500   |               |

Table 7.3.6 Restricted bands according to RSS-Gen, Table 3

| MHz               | MHz                 | MHz                   | MHz             | MHz           | GHz           |
|-------------------|---------------------|-----------------------|-----------------|---------------|---------------|
| 0.09 - 0.11       | 8.291 - 8.294       | 16.80425 - 16.80475   | 399.9 - 410     | 3260 - 3267   | 10.6 - 12.7   |
| 2.1735 - 2.190    | 8.362 - 8.366       | 25.5 - 25.67          | 608 - 614       | 3332 - 3339   | 13.25 - 13.4  |
| 3.020 - 3.026     | 8.37625 - 8.38675   | 37.5 - 38.25          | 960 - 1427      | 3345.8 - 3358 | 14.47 - 14.5  |
| 4.125 - 4.128     | 8.41425 - 8.41475   | 73 - 74.6             | 1435 - 1626.5   | 3500 - 4400   | 15.35 - 16.2  |
| 4.17725 - 4.17775 | 12.290 - 12.293     | 74.8 - 75.2           | 1645.5 - 1646.5 | 4500 - 5150   | 17.7 - 21.4   |
| 4.20725 - 4.20775 | 12.51975 - 12.52025 | 108 - 138             | 1660 - 1710     | 5350 - 5460   | 22.01 - 23.12 |
| 5.677 - 5.683     | 12.57675 - 12.57725 | 156.52475 - 156.52525 | 1718.8 - 1722.2 | 7250 - 7750   | 23.6 - 24.0   |
| 6.215 - 6.218     | 13.36 - 13.41       | 156.7 - 156.9         | 2200 - 2300     | 8025 - 8500   | 31.2 - 31.8   |
| 6.26775 - 6.26825 | 16.42 - 16.423      | 240 - 285             | 2310 - 2390     | 9000 - 9200   | 36.43 - 36.5  |
| 6.31175 - 6.31225 | 16.69475 - 16.69525 | 322 - 335.4           | 2655 - 2900     | 9300 - 9500   | Above 38.6    |

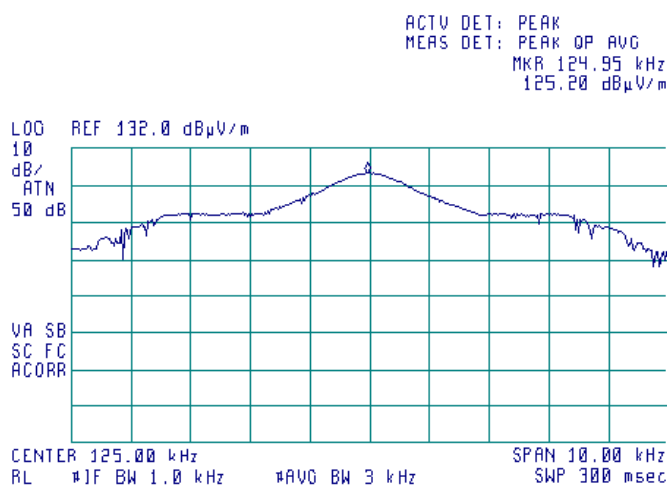


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|                                   |                        |                                                                         |                      |
|-----------------------------------|------------------------|-------------------------------------------------------------------------|----------------------|
| Test specification:               |                        | FCC Section 15.209 / RSS-Gen section 7.2.5, Field strength of emissions |                      |
| Test procedure:                   |                        | ANSI C63.4, Section 13.1.4                                              |                      |
| Test mode:                        |                        | Compliance                                                              | Verdict: PASS        |
| Date(s):                          |                        | 08-May-14 - 09-May-14                                                   |                      |
| Temperature: 24 °C                | Air Pressure: 1005 hPa | Relative Humidity: 67 %                                                 | Power Supply: 24 VDC |
| Remarks: External Ceiling Antenna |                        |                                                                         |                      |

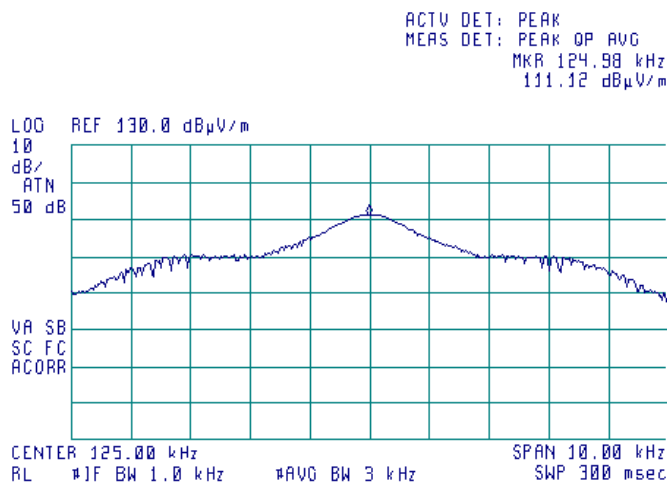
Plot 7.3.1 Radiated emission measurements at the fundamental frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical and Horizontal  
EUT POSITION: Typical (Vertical)



Plot 7.3.2 Radiated emission measurements at the fundamental frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical and Horizontal  
EUT POSITION: Typical (Horizontal)



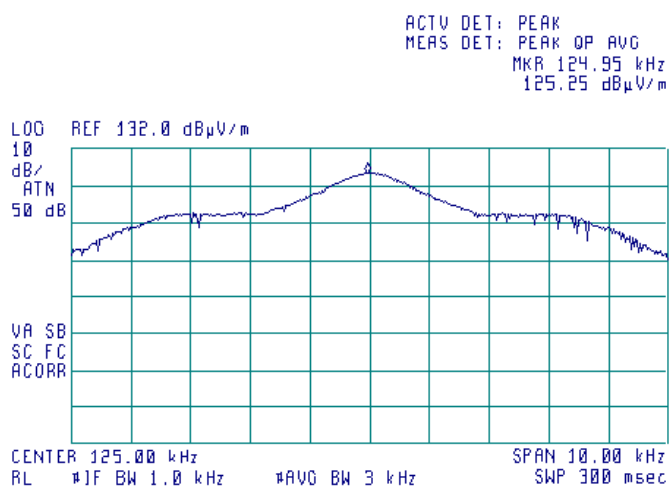


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|                                   |                        |                                                                         |                      |
|-----------------------------------|------------------------|-------------------------------------------------------------------------|----------------------|
| Test specification:               |                        | FCC Section 15.209 / RSS-Gen section 7.2.5, Field strength of emissions |                      |
| Test procedure:                   |                        | ANSI C63.4, Section 13.1.4                                              |                      |
| Test mode:                        |                        | Compliance                                                              | Verdict: PASS        |
| Date(s):                          |                        | 08-May-14 - 09-May-14                                                   |                      |
| Temperature: 24 °C                | Air Pressure: 1005 hPa | Relative Humidity: 67 %                                                 | Power Supply: 24 VDC |
| Remarks: External Ceiling Antenna |                        |                                                                         |                      |

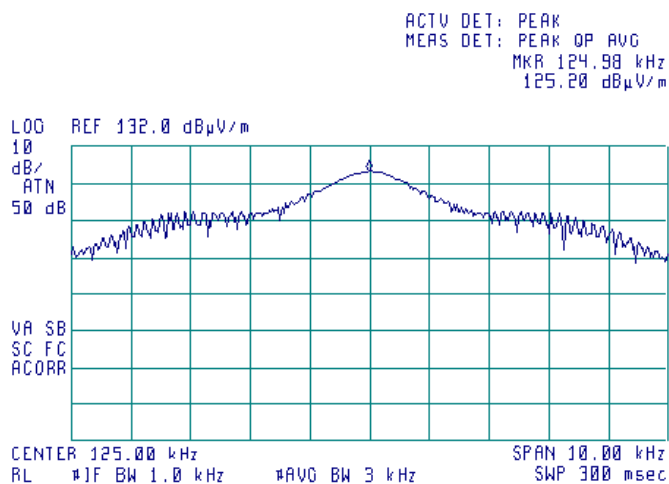
Plot 7.3.3 Radiated emission measurements at the fundamental frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical  
EUT POSITION: Typical (Vertical)  
VOLTAGE: 115%Unom



Plot 7.3.4 Radiated emission measurements at the fundamental frequency

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical  
EUT POSITION: Typical (Vertical)  
VOLTAGE: 85%Unom



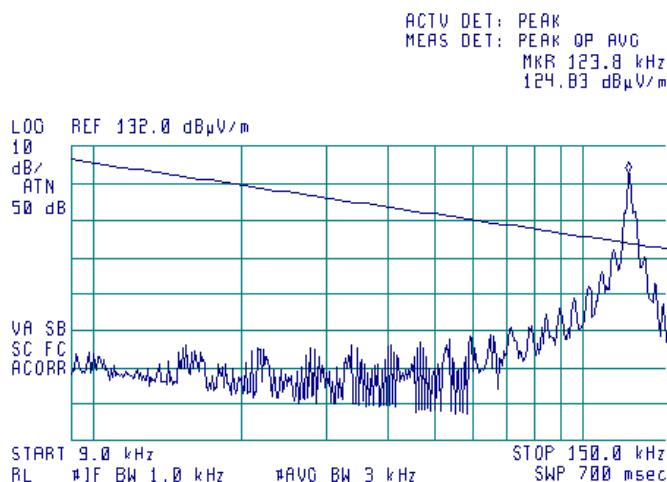


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|                                   |                        |                                                                         |                      |
|-----------------------------------|------------------------|-------------------------------------------------------------------------|----------------------|
| Test specification:               |                        | FCC Section 15.209 / RSS-Gen section 7.2.5, Field strength of emissions |                      |
| Test procedure:                   |                        | ANSI C63.4, Section 13.1.4                                              |                      |
| Test mode:                        |                        | Compliance                                                              | Verdict: PASS        |
| Date(s):                          |                        | 08-May-14 - 09-May-14                                                   |                      |
| Temperature: 24 °C                | Air Pressure: 1005 hPa | Relative Humidity: 67 %                                                 | Power Supply: 24 VDC |
| Remarks: External Ceiling Antenna |                        |                                                                         |                      |

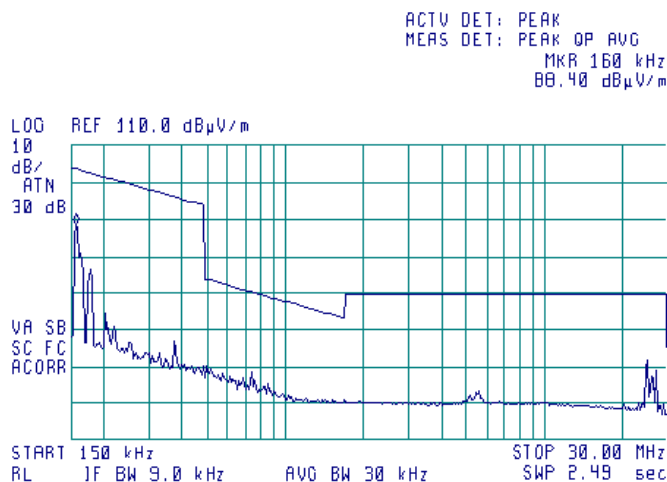
Plot 7.3.5 Radiated emission measurements from 9 to 150 kHz

TEST SITE: Anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical  
EUT POSITION: Typical (Vertical)



Plot 7.3.6 Radiated emission measurements from 0.15 to 30 MHz

TEST SITE: Anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical  
EUT POSITION: Typical (Vertical)



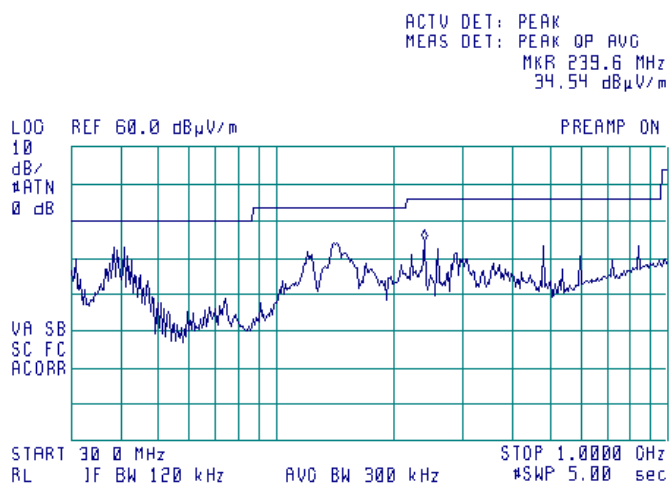


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|                                   |                        |                                                                         |                      |
|-----------------------------------|------------------------|-------------------------------------------------------------------------|----------------------|
| Test specification:               |                        | FCC Section 15.209 / RSS-Gen section 7.2.5, Field strength of emissions |                      |
| Test procedure:                   |                        | ANSI C63.4, Section 13.1.4                                              |                      |
| Test mode:                        |                        | Compliance                                                              | Verdict: PASS        |
| Date(s):                          |                        | 08-May-14 - 09-May-14                                                   |                      |
| Temperature: 24 °C                | Air Pressure: 1005 hPa | Relative Humidity: 67 %                                                 | Power Supply: 24 VDC |
| Remarks: External Ceiling Antenna |                        |                                                                         |                      |

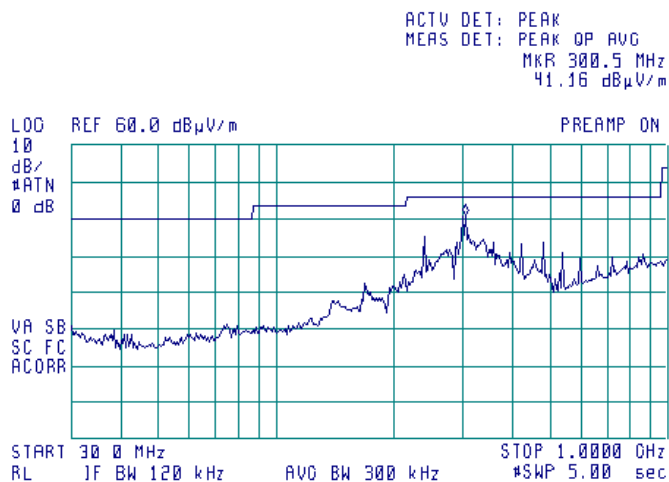
Plot 7.3.7 Radiated emission measurements from 30 to 1000 MHz

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Vertical



Plot 7.3.8 Radiated emission measurements from 30 to 1000 MHz

TEST SITE: Semi anechoic chamber  
TEST DISTANCE: 3 m  
ANTENNA POLARIZATION: Horizontal



|                            |                               |                                                   |                             |
|----------------------------|-------------------------------|---------------------------------------------------|-----------------------------|
| <b>Test specification:</b> |                               | <b>RSS-Gen, Section 4.6.1, Occupied bandwidth</b> |                             |
| <b>Test procedure:</b>     |                               | ANSI C63.4, Section 13.1.7                        |                             |
| <b>Test mode:</b>          |                               | Compliance                                        | <b>Verdict:</b> PASS        |
| <b>Date(s):</b>            |                               | 29-Apr-14                                         |                             |
| <b>Temperature:</b> 24 °C  | <b>Air Pressure:</b> 1008 hPa | <b>Relative Humidity:</b> 41 %                    | <b>Power Supply:</b> 24 VDC |
| <b>Remarks:</b>            |                               |                                                   |                             |

## 7.4 Occupied bandwidth test

### 7.4.1 General

This test was performed to measure transmitter occupied bandwidth not specified by the standard.

### 7.4.2 Test procedure

**7.4.2.1** The EUT was set up as shown in Figure 7.4.1, energized and its proper operation was checked.

**7.4.2.2** The EUT was set to transmit modulated carrier at maximum data rate.

**7.4.2.3** The transmitter bandwidth was measured with spectrum analyzer as frequency delta between reference points on modulation envelope and provided in Table 7.4.1 and the associated plots.

**Figure 7.4.1 Occupied bandwidth test setup**





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|                            |                               |                                                   |                             |
|----------------------------|-------------------------------|---------------------------------------------------|-----------------------------|
| <b>Test specification:</b> |                               | <b>RSS-Gen, Section 4.6.1, Occupied bandwidth</b> |                             |
| <b>Test procedure:</b>     |                               | ANSI C63.4, Section 13.1.7                        |                             |
| <b>Test mode:</b>          |                               | Compliance                                        | <b>Verdict:</b> PASS        |
| <b>Date(s):</b>            |                               | 29-Apr-14                                         |                             |
| <b>Temperature:</b> 24 °C  | <b>Air Pressure:</b> 1008 hPa | <b>Relative Humidity:</b> 41 %                    | <b>Power Supply:</b> 24 VDC |
| <b>Remarks:</b>            |                               |                                                   |                             |

Table 7.4.1 Occupied bandwidth test results

DETECTOR USED: Peak hold  
 RESOLUTION BANDWIDTH: 1 kHz  
 VIDEO BANDWIDTH: 3 kHz  
 MODULATION ENVELOPE REFERENCE POINTS: 20 dBc / 99%  
 MODULATION: ASK  
 MODULATING SIGNAL: ID code

| Carrier frequency, kHz | Occupied bandwidth 20 dBc, kHz | Occupied bandwidth 99%, kHz | Margin, kHz | Verdict |
|------------------------|--------------------------------|-----------------------------|-------------|---------|
| 125                    | 9.330                          | 10.6942                     | NA          | Tested  |

**Reference numbers of test equipment used**

|         |         |         |         |  |  |  |  |  |
|---------|---------|---------|---------|--|--|--|--|--|
| HL 0446 | HL 0521 | HL 2871 | HL 3623 |  |  |  |  |  |
|---------|---------|---------|---------|--|--|--|--|--|

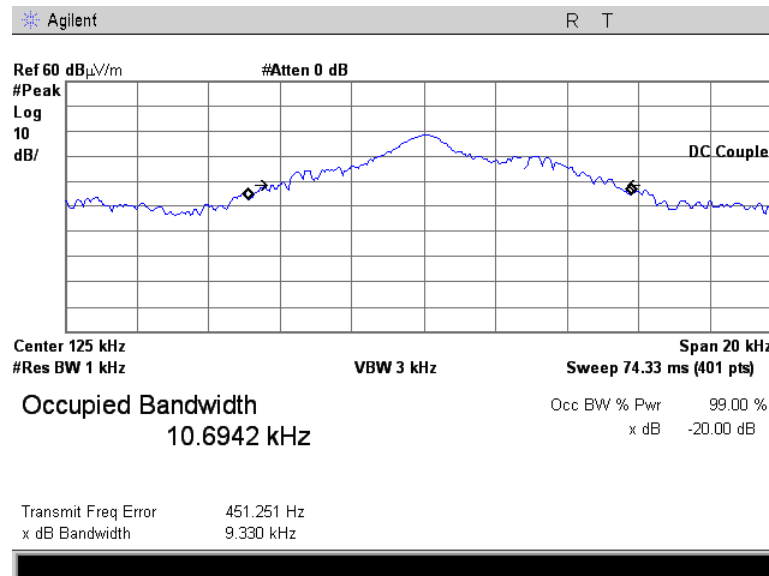
Full description is given in Appendix A.



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|                     |                        |                                            |                      |
|---------------------|------------------------|--------------------------------------------|----------------------|
| Test specification: |                        | RSS-Gen, Section 4.6.1, Occupied bandwidth |                      |
| Test procedure:     |                        | ANSI C63.4, Section 13.1.7                 |                      |
| Test mode:          |                        | Compliance                                 | Verdict: PASS        |
| Date(s):            |                        | 29-Apr-14                                  |                      |
| Temperature: 24 °C  | Air Pressure: 1008 hPa | Relative Humidity: 41 %                    | Power Supply: 24 VDC |
| Remarks:            |                        |                                            |                      |

Plot 7.4.1 Occupied bandwidth test result



|                            |                               |                                                                       |                             |
|----------------------------|-------------------------------|-----------------------------------------------------------------------|-----------------------------|
| <b>Test specification:</b> |                               | <b>Section 15.207(a) / RSS-Gen, Section 7.2.4, Conducted emission</b> |                             |
| <b>Test procedure:</b>     |                               | ANSI C63.4, Section 13.1.3                                            |                             |
| <b>Test mode:</b>          |                               | Compliance                                                            | <b>Verdict:</b> PASS        |
| <b>Date(s):</b>            |                               | 30-Apr-14                                                             |                             |
| <b>Temperature:</b> 24 °C  | <b>Air Pressure:</b> 1011 hPa | <b>Relative Humidity:</b> 41 %                                        | <b>Power Supply:</b> 24 VDC |
| <b>Remarks:</b>            |                               |                                                                       |                             |

## 7.5 Conducted emissions

### 7.5.1 General

This test was performed to measure common mode conducted emissions at the EUT power port. The specification test limits are given in Table 7.5.1.

Table 7.5.1 Limits for conducted emissions

| Frequency,<br>MHz | Class B limit, dB(μV) |          |
|-------------------|-----------------------|----------|
|                   | QP                    | AVRG     |
| 0.15 - 0.5        | 66 - 56*              | 56 - 46* |
| 0.5 - 5.0         | 56                    | 46       |
| 5.0 - 30          | 60                    | 50       |

\* The limit decreases linearly with the logarithm of frequency.

### 7.5.2 Test procedure

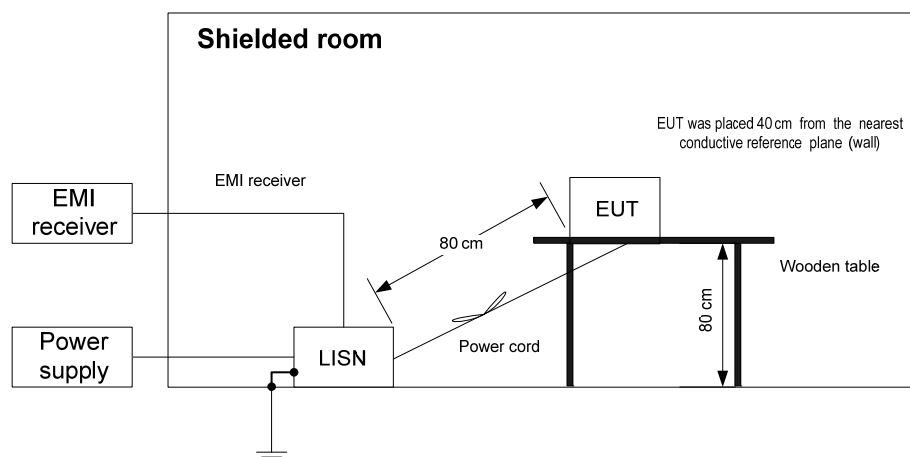
**7.5.2.1** The EUT was set up as shown in Figure 7.5.1 and the associated photographs, energized and the EUT performance was checked.

**7.5.2.2** The measurements were performed at the EUT power terminals with the LISN, connected to the EMI receiver in the frequency range referred to in Table 7.5.2. The unused coaxial connector of the LISN was terminated with 50 Ohm.

**7.5.2.3** The position of the EUT cables was varied to find the highest emission.

**7.5.2.4** The worst test results with respect to the limits were recorded in Table 7.5.2 and shown in the associated plots.

Figure 7.5.1 Setup for conducted emission measurements, table-top EUT





HERMON LABORATORIES

|                            |                               |                                                                       |                             |
|----------------------------|-------------------------------|-----------------------------------------------------------------------|-----------------------------|
| <b>Test specification:</b> |                               | <b>Section 15.207(a) / RSS-Gen, Section 7.2.4, Conducted emission</b> |                             |
| <b>Test procedure:</b>     |                               | ANSI C63.4, Section 13.1.3                                            |                             |
| <b>Test mode:</b>          | Compliance                    | <b>Verdict:</b>                                                       | <b>PASS</b>                 |
| <b>Date(s):</b>            | 30-Apr-14                     |                                                                       |                             |
| <b>Temperature:</b> 24 °C  | <b>Air Pressure:</b> 1011 hPa | <b>Relative Humidity:</b> 41 %                                        | <b>Power Supply:</b> 24 VDC |
| <b>Remarks:</b>            |                               |                                                                       |                             |

Table 7.5.2 Conducted emission test results

LINE: AC mains  
 EUT OPERATING MODE: Transmit  
 EUT SET UP: TABLE-TOP  
 TEST SITE: SHIELDED ROOM  
 DETECTORS USED: PEAK / QUASI-PEAK / AVERAGE  
 FREQUENCY RANGE: 150 kHz - 30 MHz  
 RESOLUTION BANDWIDTH: 9 kHz

| Frequency,<br>MHz | Peak<br>emission,<br>dB(μV) | Quasi-peak                      |                  |                | Average                         |                  |                | Line ID | Verdict |
|-------------------|-----------------------------|---------------------------------|------------------|----------------|---------------------------------|------------------|----------------|---------|---------|
|                   |                             | Measured<br>emission,<br>dB(μV) | Limit,<br>dB(μV) | Margin,<br>dB* | Measured<br>emission,<br>dB(μV) | Limit,<br>dB(μV) | Margin,<br>dB* |         |         |
| 0.194963          | 41.76                       | 38.48                           | 63.85            | -25.37         | 27.94                           | 53.85            | -25.91         | L1      | Pass    |
| 0.352538          | 44.21                       | 41.96                           | 58.96            | -17.00         | 25.70                           | 48.96            | -23.26         |         |         |
| 0.423950          | 49.38                       | 46.32                           | 57.42            | -11.10         | 29.03                           | 47.42            | -18.39         |         |         |
| 0.444825          | 45.06                       | 42.06                           | 57.03            | -14.97         | 24.27                           | 47.03            | -22.76         |         |         |
| 0.508600          | 44.08                       | 41.59                           | 56.00            | -14.41         | 24.45                           | 46.00            | -21.55         |         |         |
| 0.989000          | 45.52                       | 42.60                           | 56.00            | -13.40         | 27.47                           | 46.00            | -18.53         |         |         |
| 0.354010          | 46.51                       | 43.81                           | 58.93            | -15.12         | 25.45                           | 48.93            | -23.48         | L2      | Pass    |
| 0.415030          | 50.70                       | 47.59                           | 57.59            | -10.00         | 33.47                           | 47.59            | -14.12         |         |         |
| 0.444875          | 45.90                       | 43.07                           | 57.03            | -13.96         | 24.26                           | 47.03            | -22.77         |         |         |
| 0.759580          | 45.66                       | 38.90                           | 56.00            | -17.10         | 25.59                           | 46.00            | -20.41         |         |         |
| 0.919675          | 46.47                       | 41.97                           | 56.00            | -14.03         | 25.43                           | 46.00            | -20.57         |         |         |
| 1.074950          | 45.22                       | 40.67                           | 56.00            | -15.33         | 31.70                           | 46.00            | -14.30         |         |         |

\*- Margin = Measured emission - specification limit.

Reference numbers of test equipment used

|         |         |         |         |         |  |  |  |
|---------|---------|---------|---------|---------|--|--|--|
| HL 0447 | HL 0787 | HL 1425 | HL 1513 | HL 3612 |  |  |  |
|---------|---------|---------|---------|---------|--|--|--|

Full description is given in Appendix A.

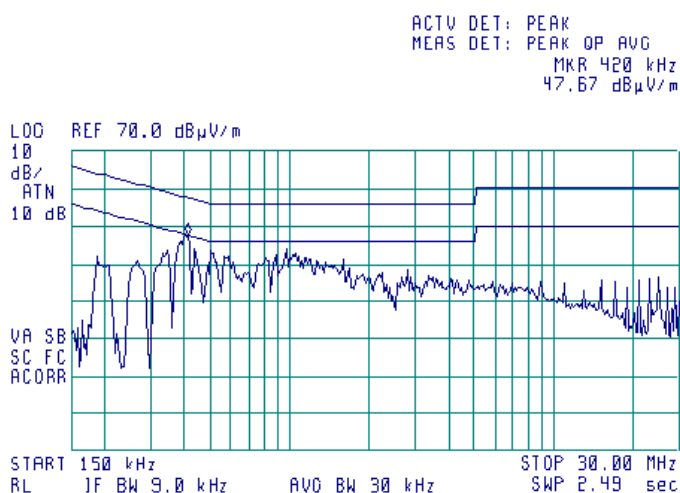


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|                     |                        |                                                                |                      |
|---------------------|------------------------|----------------------------------------------------------------|----------------------|
| Test specification: |                        | Section 15.207(a) / RSS-Gen, Section 7.2.4, Conducted emission |                      |
| Test procedure:     |                        | ANSI C63.4, Section 13.1.3                                     |                      |
| Test mode:          |                        | Compliance                                                     | Verdict: PASS        |
| Date(s):            |                        | 30-Apr-14                                                      |                      |
| Temperature: 24 °C  | Air Pressure: 1011 hPa | Relative Humidity: 41 %                                        | Power Supply: 24 VDC |
| Remarks:            |                        |                                                                |                      |

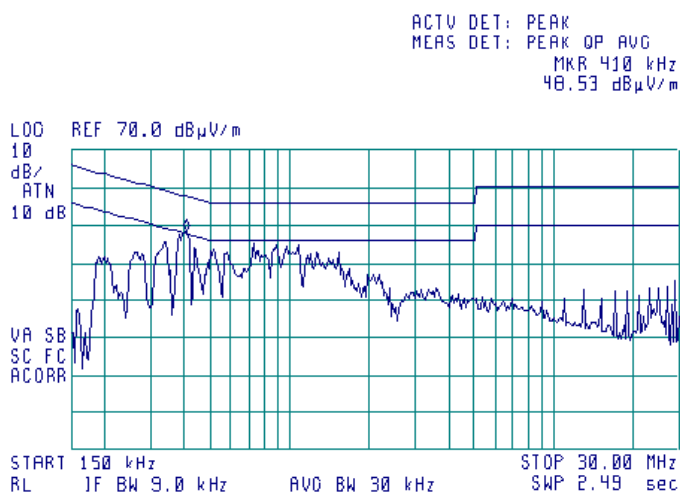
Plot 7.5.1 Conducted emission measurements

LINE: L1  
LIMIT: QUASI-PEAK, AVERAGE  
DETECTOR: PEAK



Plot 7.5.2 Conducted emission measurements

LINE: L2  
LIMIT: QUASI-PEAK, AVERAGE  
DETECTOR: PEAK





|                     |                        |                                                                         |                      |
|---------------------|------------------------|-------------------------------------------------------------------------|----------------------|
| Test specification: |                        | FCC Part 15, Section 203 / RSS-Gen, Section 7.1.2, Antenna requirements |                      |
| Test procedure:     |                        | Visual inspection / supplier declaration                                |                      |
| Test mode:          | Compliance             | Verdict: PASS                                                           |                      |
| Date(s):            | 30-Apr-14              |                                                                         |                      |
| Temperature: 24 °C  | Air Pressure: 1011 hPa | Relative Humidity: 41 %                                                 | Power Supply: 24 VDC |
| Remarks:            |                        |                                                                         |                      |

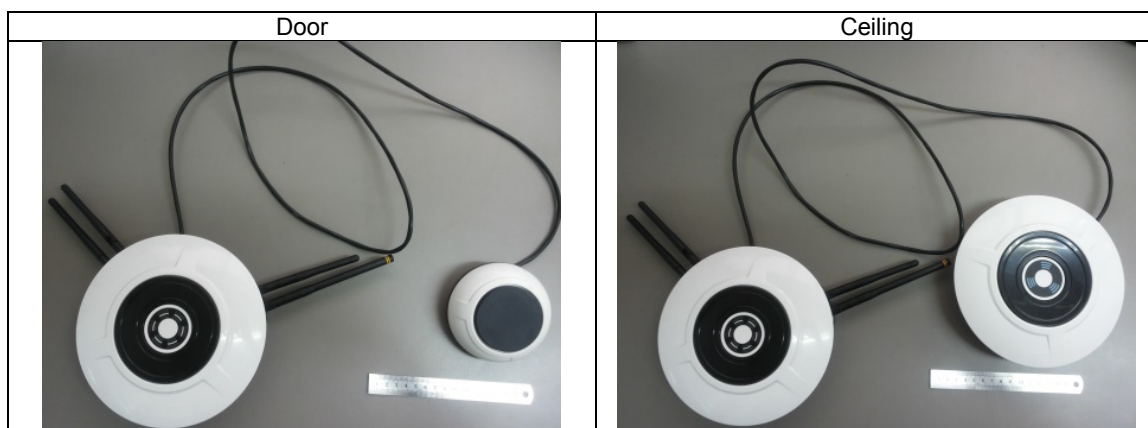
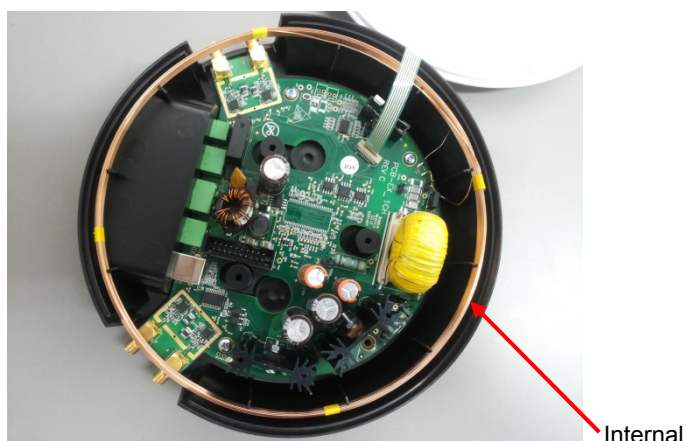
## 7.6 Antenna requirements

The EUT was verified for compliance with antenna requirements. A transmitter shall be designed to ensure that no antenna other than that furnished by the responsible party will be used with the device. It may be either permanently attached or employs a unique antenna connector for every antenna proposed for use with the EUT. This requirement does not apply to professionally installed transmitters. The rationale for compliance with the above requirements was either visual inspection results or supplier declaration. The summary of results is provided in Table 7.6.1.

Table 7.6.1 Antenna requirements

| Requirement                                        | Rationale            | Verdict |
|----------------------------------------------------|----------------------|---------|
| The transmitter antenna is permanently attached    | Supplier declaration | Comply  |
| The transmitter employs a unique antenna connector | NA                   |         |
| The transmitter requires professional installation | NA                   |         |

Photograph 7.6.1 Antenna view



## 8 APPENDIX A Test equipment and ancillaries used for tests

| HL No | Description                                                           | Manufacturer         | Model               | Ser. No.                          | Last Cal./ Check | Due Cal./ Check |
|-------|-----------------------------------------------------------------------|----------------------|---------------------|-----------------------------------|------------------|-----------------|
| 0446  | Antenna, Loop, Active, 10 kHz - 30 MHz                                | EMCO                 | 6502                | 2857                              | 21-Jan-14        | 21-Jan-15       |
| 0447  | LISN, 16/2, 300V RMS, 50 Ohm/50 uH + 5 Ohm, STD CISPR 16-1            | Hermon Laboratories  | LISN 16 - 1         | 066                               | 23-Oct-13        | 23-Oct-14       |
| 0521  | EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz | Hewlett Packard      | 8546A               | 3617A<br>00319,<br>3448A002<br>53 | 28-Oct-13        | 28-Oct-14       |
| 0604  | Antenna BiconiLog Log-Periodic/T Bow-TIE, 26 - 2000 MHz               | EMCO                 | 3141                | 9611-1011                         | 04-Jun-13        | 04-Jun-14       |
| 0787  | Transient Limiter 9 kHz-200 MHz                                       | Hewlett Packard      | 11947A              | 3107A018<br>77                    | 13-Oct-13        | 13-Oct-14       |
| 1425  | EMI Receiver, 9 kHz - 2.9 GHz, System: HL1426, HL1427                 | Agilent Technologies | 8542E               | 3710A002<br>22,<br>3705A002<br>04 | 25-Oct-13        | 25-Dec-14       |
| 1513  | Cable RF, 8 m, BNC/BNC                                                | Belden               | M17/167<br>MIL-C-17 | 1513                              | 05-Nov-13        | 05-Nov-14       |
| 2871  | Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA                    | Huber-Suhner         | 198-8155-00         | 2871                              | 04-Dec-13        | 04-Dec-14       |
| 3612  | Cable RF, 17.5 m, N type-N type                                       | Teldor               | RG-214/U            | NA                                | 05-Dec-13        | 05-Dec-14       |
| 3623  | Cable RF, 6.0 m, N type-N type, DC-6.5 GHz                            | Belden               | MIL C-17            | NA                                | 08-May-14        | 08-May-15       |
| 4353  | Low Loss Armored Test Cable, DC - 18 GHz, 6.2 m, N type-M/N type-M    | MegaPhase            | NC29-N1N1-244       | 12025101<br>003                   | 16-Mar-14        | 16-Mar-15       |

## 9 APPENDIX B Measurement uncertainties

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

| Test description                                                                                     | Expanded uncertainty                                                                                                                                                                                                                                                                                         |
|------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Conducted emissions with LISN                                                                        | 9 kHz to 150 kHz: $\pm 3.9$ dB<br>150 kHz to 30 MHz: $\pm 3.8$ dB                                                                                                                                                                                                                                            |
| Radiated emissions at 3 m measuring distance<br>Horizontal polarization<br><br>Vertical polarization | Biconilog antenna: $\pm 5.3$ dB<br>Biconical antenna: $\pm 5.0$ dB<br>Log periodic antenna: $\pm 5.3$ dB<br>Double ridged horn antenna: $\pm 5.3$ dB<br>Biconilog antenna: $\pm 6.0$ dB<br>Biconical antenna: $\pm 5.7$ dB<br>Log periodic antenna: $\pm 6.0$ dB<br>Double ridged horn antenna: $\pm 6.0$ dB |
| Conducted emissions at RF antenna connector                                                          | 9 kHz to 2.9 GHz: $\pm 2.6$ dB<br>2.9 GHz to 6.46 GHz: $\pm 3.5$ dB<br>6.46 GHz to 13.2 GHz: $\pm 4.3$ dB<br>13.2 GHz to 22.0 GHz: $\pm 5.0$ dB<br>22.0 GHz to 26.8 GHz: $\pm 5.5$ dB<br>26.8 GHz to 40.0 GHz: $\pm 4.8$ dB                                                                                  |
| Duty cycle, timing (Tx ON / OFF) and average factor measurements                                     | $\pm 1.0$ %                                                                                                                                                                                                                                                                                                  |
| Occupied bandwidth                                                                                   | $\pm 8.0$ %                                                                                                                                                                                                                                                                                                  |

Hermon Laboratories is accredited by A2LA for calibration according to present requirements of ISO/IEC 17025 and NCSL Z540-1. The accreditation is granted to perform calibration of parameters that are listed in the Scope of Hermon Laboratories Accreditation.

Hermon Laboratories calibrates its reference and transfer standards by calibration laboratories accredited to ISO/IEC 17025 by a mutually recognized Accreditation Body or by a recognized national metrology institute. All reference and transfer standards used in the calibration system are traceable to national or international standards.

In-house calibration of all test and measurement equipment is performed on a regular basis according to Hermon Laboratories calibration procedures, manufacturer calibration/verification procedures or procedures defined in the relevant standards. The Hermon Laboratories test and measurement equipment is calibrated within the tolerances specified by the manufacturers and/or by the relevant standards.

## 10 APPENDIX C Test laboratory description

Tests were performed at Hermon Laboratories Ltd., which is a fully independent, private, EMC, safety, environmental 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), Registration Numbers 90624 for OATS and 90623 for the anechoic chamber; by Industry Canada for electromagnetic emissions (file numbers IC 2186A-1 for OATS, IC 2186A-2 for anechoic chamber, IC 2186A-3 for full-anechoic chamber for RE measurements above 1 GHz), certified by VCCI, Japan (the registration numbers are R-808 for OATS, R-1082 for anechoic chamber, G-27 for full-anechoic chamber for RE measurements above 1 GHz, C-845 for conducted emissions site, T-1606 for conducted emissions at telecommunication ports), has a status of a Telefication - Listed Testing Laboratory, Certificate No. L138/00. 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). The FCC Designation Number is US1003.

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Person for contact: Mr. Alex Usoskin, CEO.

## 11 APPENDIX D Specification references

|                         |                                                                                                                                                                     |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FCC 47CFR part 15: 2013 | Radio Frequency Devices                                                                                                                                             |
| ANSI C63.2: 1996        | American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications                                            |
| ANSI C63.4: 2003        | 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 |
| RSS-210 Issue 8: 2010   | Low Power Licence- Exempt Radiocommunication Devices                                                                                                                |
| RSS-Gen Issue 3: 2010   | General Requirements and Information for the Certification of Radiocommunication Equipment                                                                          |
| ICES-003 issue 5:2012   | Information Technology Equipment (ITE) – Limits and methods of measurement                                                                                          |

## 12 APPENDIX E Test equipment correction factors

Correction factor  
Line impedance stabilization network  
Model LISN 16 - 1  
Hermon Laboratories, HL 0447

| Frequency, kHz | Correction factor, dB |
|----------------|-----------------------|
| 10             | 4.9                   |
| 15             | 2.86                  |
| 20             | 1.83                  |
| 25             | 1.25                  |
| 30             | 0.91                  |
| 35             | 0.69                  |
| 40             | 0.53                  |
| 50             | 0.35                  |
| 60             | 0.25                  |
| 70             | 0.18                  |
| 80             | 0.14                  |
| 90             | 0.11                  |
| 100            | 0.09                  |
| 125            | 0.06                  |
| 150            | 0.04                  |

The correction factor in dB is to be added to meter readings of an interference analyzer or a spectrum analyzer.

Antenna factor  
Active loop antenna  
Model 6502, S/N 2857, HL 0446

| Frequency,<br>MHz | Magnetic antenna factor,<br>dB | Electric antenna factor,<br>dB |
|-------------------|--------------------------------|--------------------------------|
| 0.009             | -32.8                          | 18.7                           |
| 0.010             | -33.8                          | 17.7                           |
| 0.020             | -38.3                          | 13.2                           |
| 0.050             | -41.1                          | 10.4                           |
| 0.075             | -41.3                          | 10.2                           |
| 0.100             | -41.6                          | 9.9                            |
| 0.150             | -41.7                          | 9.8                            |
| 0.250             | -41.6                          | 9.9                            |
| 0.500             | -41.8                          | 9.8                            |
| 0.750             | -41.9                          | 9.7                            |
| 1.000             | -41.4                          | 10.1                           |
| 2.000             | -41.5                          | 10.0                           |
| 3.000             | -41.4                          | 10.2                           |
| 4.000             | -41.4                          | 10.1                           |
| 5.000             | -41.5                          | 10.1                           |
| 10.000            | -41.9                          | 9.6                            |
| 15.000            | -41.9                          | 9.6                            |
| 20.000            | -42.2                          | 9.3                            |
| 25.000            | -42.8                          | 8.7                            |
| 30.000            | -44.0                          | 7.5                            |

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

**Antenna factor**  
**Biconilog antenna EMCO Model 3141**  
**Ser.No.1011, HL 0604**

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

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

**Cable loss**  
Cable coaxial, Huber-Suhner, 18 GHz, 6.4 m, SMA - SMA, model 198-8155-00,  
HL 2871

| Frequency,<br>MHz | Cable loss,<br>dB | Frequency,<br>MHz | Cable loss,<br>dB | Frequency,<br>MHz | Cable loss,<br>dB |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| 10                | 0.12              | 5750              | 2.34              | 12000             | 3.55              |
| 30                | 0.14              | 6000              | 2.39              | 12250             | 3.61              |
| 100               | 0.27              | 6250              | 2.46              | 12500             | 3.67              |
| 250               | 0.45              | 6500              | 2.52              | 12750             | 3.74              |
| 500               | 0.63              | 6750              | 2.58              | 13000             | 3.79              |
| 750               | 0.76              | 7000              | 2.64              | 13250             | 3.82              |
| 1000              | 0.89              | 7250              | 2.68              | 13500             | 3.83              |
| 1250              | 1.01              | 7500              | 2.73              | 13750             | 3.83              |
| 1500              | 1.12              | 7750              | 2.78              | 14000             | 3.88              |
| 1750              | 1.23              | 8000              | 2.83              | 14250             | 3.93              |
| 2000              | 1.32              | 8250              | 2.88              | 14500             | 3.96              |
| 2250              | 1.41              | 8500              | 2.94              | 14750             | 4.01              |
| 2500              | 1.49              | 8750              | 2.97              | 15000             | 4.00              |
| 2750              | 1.58              | 9000              | 3.02              | 15250             | 4.01              |
| 3000              | 1.66              | 9250              | 3.07              | 15500             | 4.00              |
| 3250              | 1.73              | 9500              | 3.13              | 15750             | 4.13              |
| 3500              | 1.80              | 9750              | 3.18              | 16000             | 4.22              |
| 3750              | 1.87              | 10000             | 3.21              | 16250             | 4.29              |
| 4000              | 1.93              | 10250             | 3.26              | 16500             | 4.29              |
| 4250              | 2.01              | 10500             | 3.30              | 16750             | 4.32              |
| 4500              | 2.06              | 10750             | 3.36              | 17000             | 4.37              |
| 4750              | 2.12              | 11000             | 3.39              | 17250             | 4.45              |
| 5000              | 2.17              | 11250             | 3.44              | 17500             | 4.49              |
| 5250              | 2.24              | 11500             | 3.48              | 17750             | 4.53              |
| 5500              | 2.29              | 11750             | 3.52              | 18000             | 4.55              |

**Cable loss**  
**Cable coaxial, MIL C-17, N type-N type, 6 m**  
**Belden, HL 3623**

| Frequency,<br>MHz | Cable loss,<br>dB | Frequency,<br>MHz | Cable loss,<br>dB | Frequency,<br>MHz | Cable loss,<br>dB |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| 10                | 0.10              | 2600              | 4.35              | 5300              | 7.67              |
| 50                | 0.30              | 2700              | 4.54              | 5400              | 7.79              |
| 100               | 0.45              | 2800              | 4.70              | 5500              | 7.89              |
| 200               | 0.69              | 2900              | 4.87              | 5600              | 7.94              |
| 300               | 0.89              | 3000              | 5.04              | 5700              | 8.01              |
| 400               | 1.06              | 3100              | 5.19              | 5800              | 8.12              |
| 500               | 1.24              | 3200              | 5.35              | 5900              | 8.19              |
| 600               | 1.38              | 3300              | 5.50              | 6000              | 8.30              |
| 700               | 1.54              | 3400              | 5.65              | 6100              | 8.35              |
| 800               | 1.69              | 3500              | 5.79              | 6200              | 8.45              |
| 900               | 1.83              | 3600              | 5.92              | 6300              | 8.55              |
| 1000              | 1.96              | 3700              | 6.07              | 6400              | 8.65              |
| 1100              | 2.14              | 3800              | 6.17              | 6500              | 8.75              |
| 1200              | 2.31              | 3900              | 6.30              |                   |                   |
| 1300              | 2.38              | 4000              | 6.43              |                   |                   |
| 1400              | 2.51              | 4100              | 6.53              |                   |                   |
| 1500              | 2.63              | 4200              | 6.65              |                   |                   |
| 1600              | 2.76              | 4300              | 6.75              |                   |                   |
| 1700              | 2.90              | 4400              | 6.85              |                   |                   |
| 1800              | 3.04              | 4500              | 7.01              |                   |                   |
| 1900              | 3.19              | 4600              | 7.09              |                   |                   |
| 2000              | 3.35              | 4700              | 7.20              |                   |                   |
| 2100              | 3.51              | 4800              | 7.24              |                   |                   |
| 2200              | 3.67              | 4900              | 7.31              |                   |                   |
| 2300              | 3.84              | 5000              | 7.41              |                   |                   |
| 2400              | 4.01              | 5100              | 7.48              |                   |                   |
| 2500              | 4.18              | 5200              | 7.56              |                   |                   |

**Cable loss**  
**Low Loss Armored Test Cable, MegaPhase, 18 GHz, 6.2 m, N type-M/N type-M,**  
**NC29-N1N1-244S/N 12025101 003,**  
**HL 4353**

| Frequency,<br>MHz | Cable loss,<br>dB | Frequency,<br>MHz | Cable loss,<br>dB |
|-------------------|-------------------|-------------------|-------------------|
| 50                | 0.20              | 9000              | 2.71              |
| 100               | 0.27              | 9500              | 2.81              |
| 300               | 0.47              | 10000             | 2.90              |
| 500               | 0.61              | 10500             | 2.97              |
| 1000              | 0.87              | 11000             | 3.06              |
| 1500              | 1.07              | 11500             | 3.13              |
| 2000              | 1.24              | 12000             | 3.20              |
| 2500              | 1.39              | 12500             | 3.26              |
| 3000              | 1.53              | 13000             | 3.34              |
| 3500              | 1.65              | 13500             | 3.39              |
| 4000              | 1.77              | 14000             | 3.47              |
| 4500              | 1.89              | 14500             | 3.54              |
| 5000              | 1.99              | 15000             | 3.62              |
| 5500              | 2.07              | 15500             | 3.69              |
| 6000              | 2.20              | 16000             | 3.76              |
| 6500              | 2.30              | 16500             | 3.83              |
| 7000              | 2.39              | 17000             | 3.86              |
| 7500              | 2.51              | 17500             | 3.94              |
| 8000              | 2.58              | 18000             | 4.02              |
| 8500              | 2.65              |                   |                   |

## 13 APPENDIX F Abbreviations and acronyms

|                |                                             |
|----------------|---------------------------------------------|
| A              | ampere                                      |
| AC             | alternating current                         |
| A/m            | ampere per meter                            |
| AVRG           | average (detector)                          |
| 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 |
| dB( $\mu$ A)   | decibel referred to one microampere         |
| DC             | direct current                              |
| EIRP           | equivalent isotropically radiated power     |
| ERP            | effective radiated power                    |
| EUT            | equipment under test                        |
| F              | frequency                                   |
| GHz            | gigahertz                                   |
| GND            | ground                                      |
| H              | height                                      |
| HL             | Hermon laboratories                         |
| Hz             | hertz                                       |
| k              | kilo                                        |
| kHz            | kilohertz                                   |
| LO             | local oscillator                            |
| m              | meter                                       |
| MHz            | megahertz                                   |
| min            | minute                                      |
| mm             | millimeter                                  |
| ms             | millisecond                                 |
| $\mu$ s        | microsecond                                 |
| NA             | not applicable                              |
| OATS           | open area test site                         |
| $\Omega$       | Ohm                                         |
| PS             | power supply                                |
| ppm            | part per million ( $10^{-6}$ )              |
| QP             | quasi-peak                                  |
| RE             | radiated emission                           |
| RF             | radio frequency                             |
| rms            | root mean square                            |
| Rx             | receive                                     |
| s              | second                                      |
| T              | temperature                                 |
| Tx             | transmit                                    |
| V              | volt                                        |

END OF TEST REPORT

## 14 APPENDIX G Manufacturer's declaration of identity



### Declaration of Identity

We, the undersigned,

Company: LOGITAG SYSTEMS

Address: Hamelach 2 Ntanya

Country: Israel

Telephone number: 972-9-8354848

Fax number: 972-9-8656262

Declare under our sole responsibility that the following equipment:

| Brand/Item          | Type/Model | Short Product description                                    |
|---------------------|------------|--------------------------------------------------------------|
| One Channel Exciter | LTG2-04    | Exciter and transceiver console for active RFID transponders |

is electronically/electrically/mechanically identical to the following equipment (including Software/Hardware version(s)):

| Brand/Item           | Type/Model  | Short Product description                                    |
|----------------------|-------------|--------------------------------------------------------------|
| Single Location Unit | LTG2-04-PRF | Exciter and transceiver console for active RFID transponders |

The reason for name change is: **different design of Led lexan**

...28/05/2014.....

(date)

Headoffice | LogiTag Systems Ltd.

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www.logi-tag.com



... Golan Kormian.....

(signature)

(printed name)

Logitag systems.....

(company stamp)

... Engineering manager.....

(position)

Headoffice | LogiTag Systems Ltd.

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