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TEST REPORT

ACCORDING TO: FCC CFR 47 Part 15 subpart C, section 15.231 and subpart B
RSS-210 issue 8 Annex 1, ICES-003 Issue 5:2012

FOR:

**Elpas Solutions Ltd.
Personnel Identity Badge**

Models:

**5-PBB00433
5-PBB00433-1
5-PBB00433-7
5-PBB00433-2
5-PBB00433-3
5-PBB00433-E
5-PBB00433-K
5-PBB01433-E
5-PBB00433-5
5-PBB00433-G**

**FCC ID:O4X5-PBB00433
IC:1467G-5PBB00433**

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. This test report shall not be reproduced in any form except in full with the written approval of Hermon Laboratories Ltd.

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1 Applicant information

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Contact name: Mr. Arick Elshtein

2 Equipment under test attributes

Product name: Personnel Identity Badge
Product type: Transceiver
Model(s): 5-PBB00433-2
Software release: JS-703059 (FW); JS-703058 (E^2)
Receipt date: 26-Aug-15

3 Manufacturer information

Manufacturer name: Elpas Solutions Ltd.
Address: 23 Habarzel street, Tel Aviv 69710, Israel
Telephone: +972 3768 1400
Fax: +972 3768 1415
E-Mail: aelshtein@tycoint.com
Contact name: Mr. Arick Elshtein

4 Test details

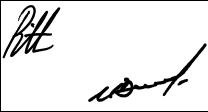


Project ID: 27371
Location: Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started: 26-Aug-15
Test completed: 11-Oct-15
Test specification(s): FCC 47CFR part 15, subpart C, §15.231 and subpart B;
RSS-210 issue 8 Annex 1, RSS-Gen issue 4, ICES-003 issue 5:2012

5 Tests summary

| Test | Status |
|--|--------------|
| Transmitter characteristics | |
| FCC Part 15, Section 231(a) / RSS-210, Section A1.1.5, Periodic operation requirements | Pass |
| FCC Part 15, Section 231(a) / RSS-210, Section A1.1.5, Field strength of emissions | Pass |
| FCC Part 15, Section 231(c) / RSS-210, Section A1.1.3, Occupied bandwidth | Pass |
| FCC Part 15, Section 207 / RSS-Gen, Section 8.8, Conducted emission | Not required |
| FCC Part 15, Section 203 / RSS-Gen, Section 8.3, Antenna requirements | Pass |
| Unintentional emissions | |
| FCC Part 15, Section 107 / ICES-003, Section 6.1 class B, Conducted emission at AC power port | Not required |
| FCC Part 15, Section 109 / RSS-Gen, Section 7.1.2/ ICES-003, Section 6.2 class B, Radiated emission | Pass |

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.

This test report supersedes the previously issued test report identified by Doc ID:ELPRAD_FCC.27371.

| | Name and Title | Date | Signature |
|---------------------|--|-------------------|---|
| Tested by: | Mrs. E. Pitt, test engineer | October 11, 2015 |  |
| | Mr. I. Zilberstein, test engineer | | |
| Reviewed by: | Mrs. M. Cherniavsky, certification engineer | November 9, 2015 |  |
| Approved by: | Mr. M. Nikishin, EMC and Radio group manager | December 30, 2015 |  |

6 EUT description

6.1 General information

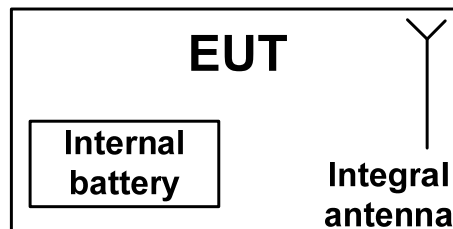
The EUT is a Personnel Identity Badge that comprises the 433 MHz transceiver the 125 kHz receiver radio modules. The EUT is powered from 3V internal battery.

According to manufacturer's declaration of similarity provided in Appendix G of the test report, all EUT models have the same housing, PCB, RF GFSK (175 kbit/s) modulated transceiver (433.42 MHz Tx/Rx). Some variants PCB are also populated with the components of LF receiver (125 kHz) as described below:

- the EUT model 5-PBB00433-7 comprises the 433.42 MHz transceiver (GFSK modulation. It does not have an IR receiver and LF receiver (125 kHz);
- the EUT models 5-PBB00433-3 and 5-PBB00433-G are the same as 5-PBB00433-7 with different firmware.
- the EUT model 5-PBB00433-1 comprises the 433.42 MHz transceiver (GFSK modulation and LF receiver (125 kHz). It does not have an IR receiver.
- the EUT models 5-PBB00433-E, 5-PBB00433-K and 5-PBB01433-E are the same as 5-PBB00433-1 with different firmware.
- the EUT model 5-PBB00433 comprises the 433.42 MHz transceiver (GFSK modulation, LF receiver (125 kHz) and an IR receiver.
- the EUT model 5-PBB00433-5 is the same as 5-PBB00433 with different firmware.
- the EUT model 5-PBB00433-2 comprises the 433.42 MHz transceiver (GFSK modulation, LF receiver (125 kHz) and an IR receiver. It is also equipped with a proximity tag (i.e. twice 125 kHz).

That is why the EUT model 5-PBB00433-2 was tested as the most populated versions covering all other variants.

6.2 Test configuration

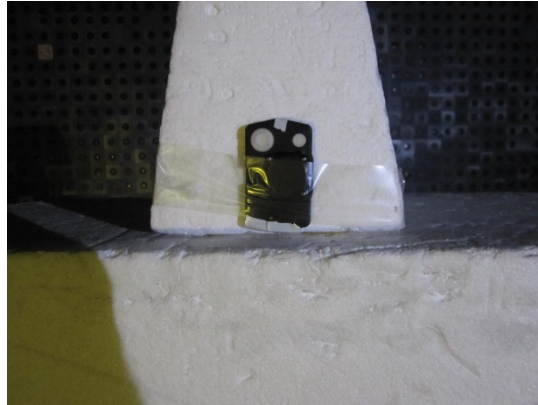


6.3 Changes made in EUT

No changes were implemented in the EUT during testing.

6.4 EUT test positions

Photograph 6.4.1 EUT in X-axis orthogonal position



Photograph 6.4.2 EUT in Y-axis orthogonal position



Photograph 6.4.3 EUT in Z-axis orthogonal position





6.5 Transmitter characteristics

| | | | | | | |
|---|--|---|--------------------------------|-----------------------------|--|-----|
| Type of equipment | | | | | | |
| X | Stand-alone (Equipment with or without its own control provisions) | | | | | |
| | Combined equipment (Equipment where the radio part is fully integrated within another type of equipment) | | | | | |
| | Plug-in card (Equipment intended for a variety of host systems) | | | | | |
| Operating frequency | | 433.42 MHz | | | | |
| Maximum rated output power | | At transmitter 50 Ω RF output connector | | | dBm | |
| | | Field strength at 3 m distance | | | 86.8 dB(μV/m) -peak 54.5 dB(μV/m)-average | |
| Is transmitter output power variable? | | X | No | | | |
| | | | continuous variable | | | |
| | | | stepped variable with stepsize | | | dB |
| | | Yes | minimum RF power | | | dBm |
| | | | maximum RF power | | | dBm |
| Antenna connection | | | | | | |
| unique coupling | standard connector | X | integral | with temporary RF connector | | |
| | | | | X | without temporary RF connector | |
| Type of modulation | | GFSK | | | | |
| Transmitter aggregate data rate/s | | 175 kbps | | | | |
| Transmitter power source | | | | | | |
| X | Battery | Nominal rated voltage | 3.0 VDC | Battery type | Lithium | |
| | DC | Nominal rated voltage | VDC | | | |
| | AC mains | Nominal rated voltage | VAC | Frequency | | |
| Common power source for transmitter and receiver | | X | yes | no | | |



| | | | |
|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | FCC Part 15, Section 231(a) / RSS-210, Section A1.1.1, Periodic operation requirements | | |
| Test procedure: | Supplier declaration | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 26-Aug-15 | | |
| Temperature: 25 °C | Air Pressure: 1006 hPa | Relative Humidity: 43 % | Power Supply: Battery |
| Remarks: | | | |

7 Transmitter tests according to 47CFR part 15 subpart C requirements

7.1 Periodic operation requirements

7.1.1 General

The EUT was verified for compliance with periodic operation requirements listed below:

- Continuous transmissions such as voice, video and the radio control of toys are not permitted;
- A manually operated transmitter shall employ switch that will automatically deactivate the transmitter within not more than 5 seconds of being released;
- A transmitter activated automatically shall cease transmission within 5 seconds after activation;
- Periodic transmissions, excluding polling or supervision transmissions, at regular predetermined intervals are not permitted;
- Total duration of polling or supervision transmissions, including data, to determine system integrity in security or safety applications shall not exceed 2 seconds per hour;
- Transmission of set-up information for security systems may exceed the transmission duration limits of 5 seconds, provided such transmissions are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is released or a transmitter is activated automatically. Such set-up information may include data.

The rationale for compliance with the above requirements was either test results or supplier declaration. The summary of results is provided in Table 7.1.1.

7.1.2 Test procedure for transmitter shut down test

7.1.2.1 The EUT was set up as shown in Figure 7.1.1.

7.1.2.2 The spectrum analyzer center frequency was adjusted to the EUT carrier, span set to zero and video triggered for transmission.

7.1.2.3 The transmitter was activated either manually or automatically. Once manually operated transmitter was activated, the switch was immediately released.

7.1.2.4 The transmission time was captured and shown in Plot 7.1.1.

7.1.3 Test procedure for measurements of polling / supervision transmission duration

7.1.3.1 The EUT was set up as shown in Figure 7.1.1.

7.1.3.2 The spectrum analyzer center frequency was adjusted to the EUT carrier, span set to zero and video triggered for transmission.

7.1.3.3 The transmission time was captured and shown in Plot 7.1.2 to Plot 7.1.4.

Figure 7.1.1 Setup for transmitter shut down test



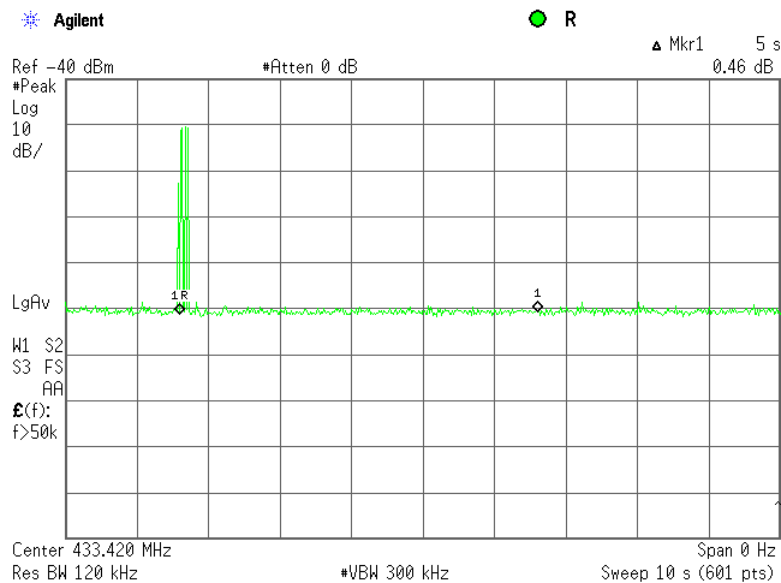


| | | | |
|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | FCC Part 15, Section 231(a) / RSS-210, Section A1.1.1, Periodic operation requirements | | |
| Test procedure: | Supplier declaration | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date(s): | 26-Aug-15 | | |
| Temperature: 25 °C | Air Pressure: 1006 hPa | Relative Humidity: 43 % | Power Supply: Battery |
| Remarks: | | | |

Table 7.1.1 Periodic operation requirements

| Requirement | Rationale | Verdict |
|---|--------------------------|---------|
| Continuous transmissions are not permitted | Supplier declaration | Comply |
| A manually operated transmitter shall be deactivated within not more than 5 seconds of switch being released | Plot 7.1.1 | Comply |
| Transmitter activated automatically shall cease transmission within 5 seconds | NA | NA |
| Periodic transmissions at regular predetermined intervals are not permitted | Supplier declaration | Comply |
| Total duration of polling or supervision transmissions shall not exceed 2 seconds per hour | Plot 7.1.2 to Plot 7.1.4 | Comply |
| Transmission of set-up information for security systems may exceed the transmission duration limits of 5 seconds, provided such transmissions are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is released or a transmitter is activated automatically. Such set-up information may include data. | Supplier declaration | Comply |

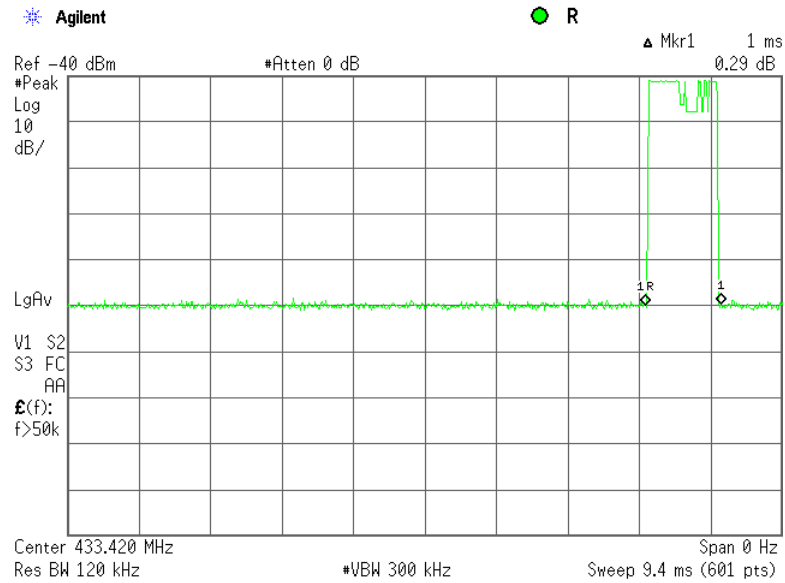
Plot 7.1.1 Transmitter shut down test result



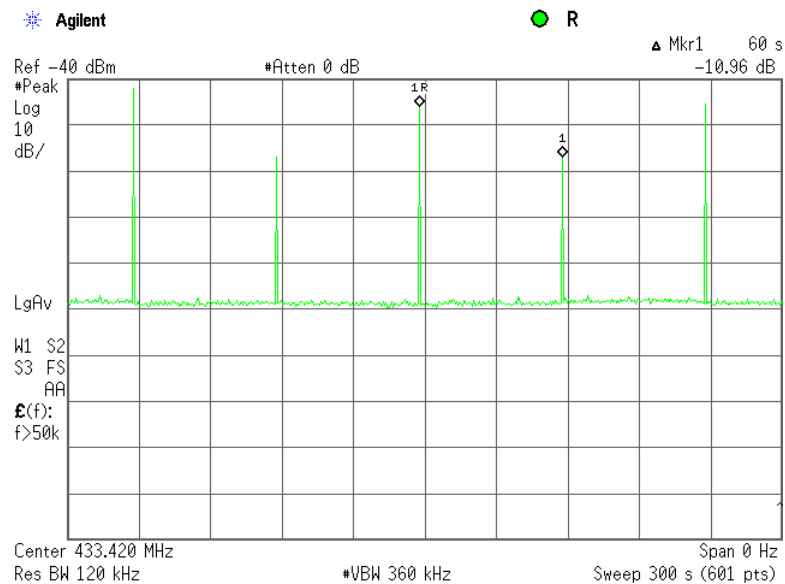


| | | | |
|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | FCC Part 15, Section 231(a) / RSS-210, Section A1.1.1, Periodic operation requirements | | |
| Test procedure: | Supplier declaration | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 26-Aug-15 | | |
| Temperature: 25 °C | Air Pressure: 1006 hPa | Relative Humidity: 43 % | Power Supply: Battery |
| Remarks: | | | |

Plot 7.1.2 Polling / supervision transmission duration



Plot 7.1.3 Polling / supervision transmission period

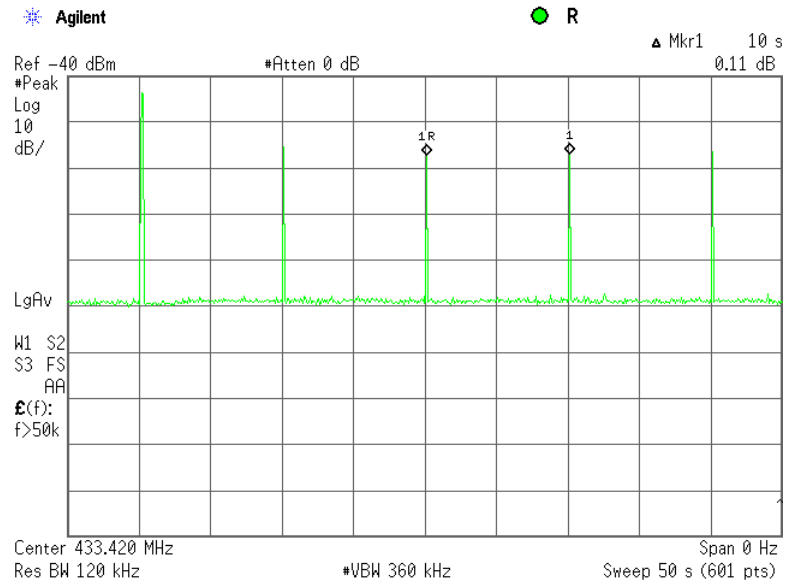




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| | | | |
|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | FCC Part 15, Section 231(a) / RSS-210, Section A1.1.1, Periodic operation requirements | | |
| Test procedure: | Supplier declaration | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date(s): | 26-Aug-15 | | |
| Temperature: 25 °C | Air Pressure: 1006 hPa | Relative Humidity: 43 % | Power Supply: Battery |
| Remarks: | | | |

Plot 7.1.4 Polling / supervision transmission period





| | | | |
|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | FCC Part 15, Section 231(a) / RSS-210, Section A1.1.1, Periodic operation requirements | | |
| Test procedure: | Supplier declaration | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 26-Aug-15 | | |
| Temperature: 25 °C | Air Pressure: 1006 hPa | Relative Humidity: 43 % | Power Supply: Battery |
| Remarks: | | | |

Table 7.1.2 Total duration of polling / supervision transmissions

| Duration, ms | Repetition period, ms | Maximum number of transmissions within 1 hour | Total duration within 1 hour, ms |
|--------------|-----------------------|---|----------------------------------|
| 1.0 | 10 | 360 | 360 |

Reference numbers of test equipment used

| | | | | | | | |
|---------|---------|---------|--|--|--|--|--|
| HL 3818 | HL 4164 | HL 4274 | | | | | |
|---------|---------|---------|--|--|--|--|--|

Full description is given in Appendix A.



| | | | |
|----------------------------|--|--------------------------------|------------------------------|
| Test specification: | FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions | | |
| Test procedure: | ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 26-Aug-15 | | |
| Temperature: 26 °C | Air Pressure: 1006 hPa | Relative Humidity: 43 % | Power Supply: Battery |
| Remarks: | | | |

7.2 Field strength of emissions

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 in Table 7.2.1 and Table 7.2.2.

Table 7.2.1 Radiated fundamental emission limits

| Fundamental frequency, MHz | Field strength at 3 m, dB(μV/m) | |
|----------------------------|---------------------------------|---------|
| | Peak | Average |
| 433.42 | 100.8 | 80.8 |

Table 7.2.2 Radiated spurious emissions limits

| Frequency, MHz | Field strength at 3 m, dB(μV/m) | | | | |
|----------------|---------------------------------|-----------------|-----------------|--------------------------|---------|
| | Within restricted bands | | | Outside restricted bands | |
| | Peak | Quasi Peak | Average | Peak | Average |
| 0.009 – 0.090 | 148.5 – 128.5 | NA | 128.5 – 108.5** | 80.8 | 60.8 |
| 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 | | | |
| Above 1000 | 74.0 | NA | 54.0 | | |

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

$$Lim_{S_2} = Lim_{S_1} + 40 \log (S_1/S_2),$$

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

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

Note 1: The fundamental emission limit in dB(μV/m) was calculated as follows:

$$Lim_{AVR} = 20 \times \log(56.81818 \times F - 6136.3636) \text{ - within } 130 - 174 \text{ MHz band;}$$

$$Lim_{AVR} = 20 \times \log(41.6667 \times F - 7083.3333) \text{ - within } 260 - 470 \text{ MHz band,}$$

where F is the carrier frequency in MHz.

The limit for spurious emissions was 20 dB lower than fundamental emission limit.

The above limits provided in terms of average values, peak limit was 20 dB above the average limit.

Note 2: The above field strength limits applied from the lowest radio frequency generated in the device, without going below 9 kHz up to the tenth harmonic of the highest fundamental frequency.



| | | | |
|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions | | |
| Test procedure: | ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 26-Aug-15 | | |
| Temperature: 26 °C | Air Pressure: 1006 hPa | Relative Humidity: 43 % | Power Supply: Battery |
| Remarks: | | | |

7.2.2 Test procedure for spurious emission field strength measurements in 9 kHz to 30 MHz band

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 measurements were performed in three EUT orthogonal positions.

7.2.2.3 The specified frequency range was investigated with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360° and the measuring antenna was rotated around its vertical axis.

7.2.2.4 The worst test results (the lowest margins) were recorded in Table 7.2.3, Table 7.2.5 and shown in the associated plots.

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

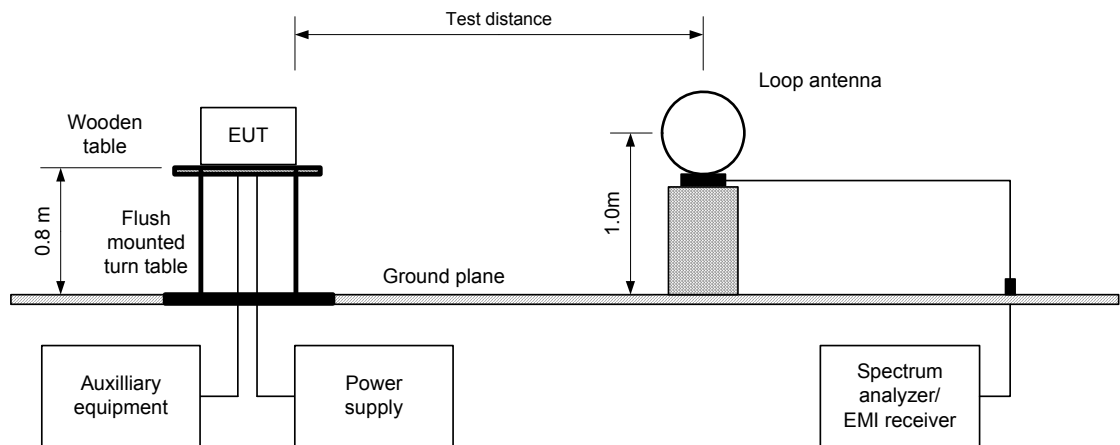
7.2.3.1 The EUT was set up as shown in Figure 7.2.2, energized and the performance check was conducted.

7.2.3.2 The measurements were performed in three EUT orthogonal positions.

7.2.3.3 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.

7.2.3.4 The worst test results (the lowest margins) were recorded in Table 7.2.3, Table 7.2.5 and shown in the associated plots.

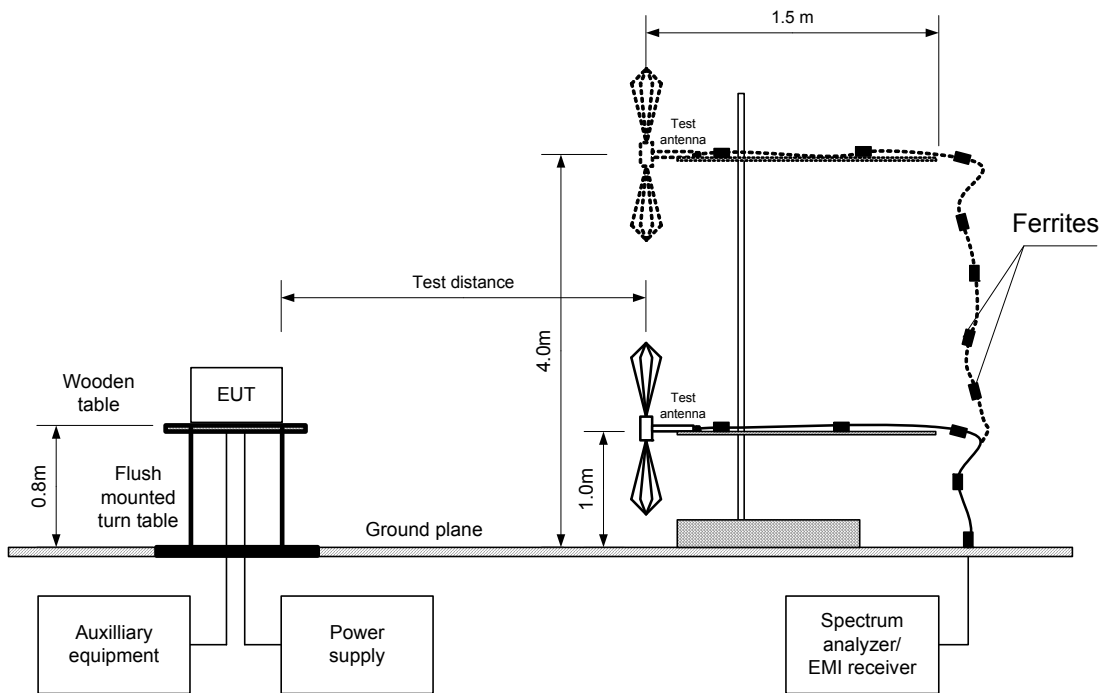
Figure 7.2.1 Setup for spurious emission field strength measurements below 30 MHz





| | | | |
|----------------------------|--|--------------------------------|------------------------------|
| Test specification: | FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions | | |
| Test procedure: | ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 26-Aug-15 | | |
| Temperature: 26 °C | Air Pressure: 1006 hPa | Relative Humidity: 43 % | Power Supply: Battery |
| Remarks: | | | |

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





| | | | |
|----------------------------|--|--------------------------------|------------------------------|
| Test specification: | FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions | | |
| Test procedure: | ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date(s): | 26-Aug-15 | | |
| Temperature: 26 °C | Air Pressure: 1006 hPa | Relative Humidity: 43 % | Power Supply: Battery |
| Remarks: | | | |

Table 7.2.3 Field strength of fundamental emission, spurious emissions outside restricted bands and within restricted bands at frequencies above 1 GHz

TEST DISTANCE: 3 m
 EUT POSITION: 3 orthogonal (X / Y / Z)
 MODULATION: GFSK
 BIT RATE: 175 kbps
 INVESTIGATED FREQUENCY RANGE: 0.009 - 4500 MHz
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: 1.0 kHz (9 kHz – 150 kHz)
 9.0 kHz (150 kHz – 30 MHz)
 120 kHz (30 MHz – 1000 MHz)
 1.0 MHz (above 1000 MHz)
 VIDEO BANDWIDTH: ≥ Resolution bandwidth
 TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)
 Biconilog (30 MHz – 1000 MHz)
 Double ridged guide (above 1000 MHz)

| F, MHz | 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) | Calculated, dB(µV/m) | Limit, dB(µV/m) | Margin, dB** | |
| Fundamental emission*** | | | | | | | | | | | |
| 433.414 | V | 1.0 | 350 | 86.79 | 100.8 | -14.01 | 86.78 | 54.49 | 80.8 | -26.31 | Pass |
| Spurious emissions | | | | | | | | | | | |
| 866.835 | V | 1.2 | 0 | 49.16 | 80.8 | -31.64 | 49.16 | 16.87 | 60.8 | -43.93 | Pass |
| 1733.790 | V | 1.0 | 20 | 39.39 | 80.8 | -41.41 | 39.39 | 7.10 | 60.8 | -53.70 | |
| 3467.243 | H | 1.2 | 30 | 45.84 | 80.8 | -34.96 | 45.84 | 13.55 | 60.8 | -47.25 | |
| 4334.158 | H | 1.0 | 0 | 46.53 | 74.0 | -27.47 | 46.53 | 14.24 | 54.0 | -39.76 | |

*- EUT front panel refers to 0 degrees position of turntable.
 **- Margin, dB = Measured (calculated) value, dB(µV/m) - Limit, dB(µV/m)
 *** The same test results were obtained in 3 orthogonal positions, the X-axis orthogonal position was considered for spurious emissions measurement.

Table 7.2.4 Average factor calculation

| Transmission pulse | | Transmission burst | | Transmission train duration, ms | Average factor, dB |
|--------------------|-----------------|--------------------|------------|---------------------------------|--------------------|
| Duration, ms | Pulse period ms | Duration, ms | Period, ms | | |
| 8.5 | 350 | NA | NA | NA | -32.29 |

*- Average factor was calculated as follows
 for pulse train shorter than 100 ms: $Average\ factor = 20 \times \log_{10} \left(\frac{Pulse\ duration}{Pulse\ period} \times \frac{Burst\ duration}{Train\ duration} \times Number\ of\ bursts\ within\ pulse\ train \right)$
 for pulse train longer than 100 ms: $Average\ factor = 20 \times \log_{10} \left(\frac{Pulse\ duration}{Pulse\ period} \times \frac{Burst\ duration}{100\ ms} \times Number\ of\ bursts\ within\ 100\ ms \right)$

Reference numbers of test equipment used

| | | | | | | |
|---------|---------|---------|---------|---------|---------|---------|
| HL 0446 | HL 0604 | HL 3818 | HL 3901 | HL 3903 | HL 4114 | HL 4932 |
|---------|---------|---------|---------|---------|---------|---------|

Full description is given in Appendix A.



| | | | |
|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions | | |
| Test procedure: | ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date(s): | 26-Aug-15 | | |
| Temperature: 26 °C | Air Pressure: 1006 hPa | Relative Humidity: 43 % | Power Supply: Battery |
| Remarks: | | | |

Table 7.2.5 Field strength of emissions below 1 GHz within restricted bands

TEST DISTANCE: 3 m
 EUT POSITION: 3 orthogonal (X / Y / Z)
 MODULATION: GFSK
 BIT RATE: 175 kbps
 INVESTIGATED FREQUENCY RANGE: 0.009 – 1000 MHz
 DETECTOR USED: Peak
 RESOLUTION BANDWIDTH: 1.0 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* | | | | |
| No emissions were found | | | | | | | | Pass |

*- Margin = Measured emission - specification limit.
 **- EUT front panel refer to 0 degrees position of turntable.



| | | | | | |
|----------------------------|--|--------------------------------|------------------------------|------|--|
| Test specification: | FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions | | | | |
| Test procedure: | ANSI C63.4, Section 13.1.4 | | | | |
| Test mode: | Compliance | Verdict: | | PASS | |
| Date(s): | 26-Aug-15 | | | | |
| Temperature: 26 °C | Air Pressure: 1006 hPa | Relative Humidity: 43 % | Power Supply: Battery | | |
| Remarks: | | | | | |

Table 7.2.6 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 7.2.7 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 |

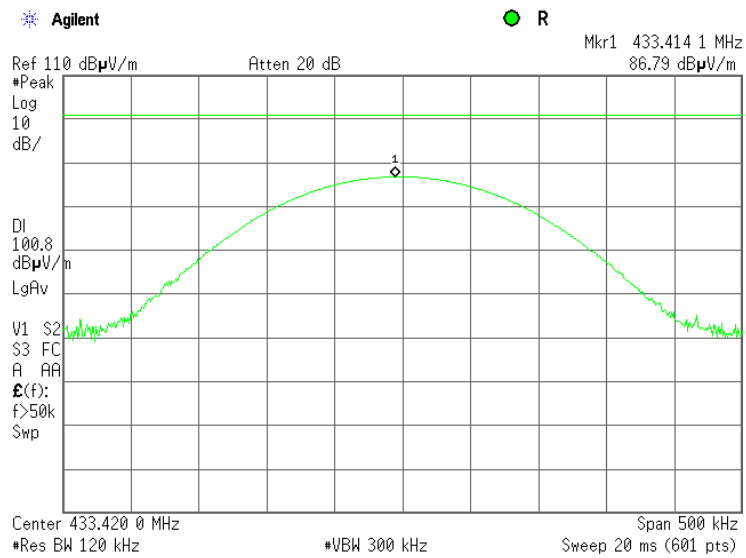


HERMON LABORATORIES

| | | | |
|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions | | |
| Test procedure: | ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date(s): | 26-Aug-15 | | |
| Temperature: 26 °C | Air Pressure: 1006 hPa | Relative Humidity: 43 % | Power Supply: Battery |
| Remarks: | | | |

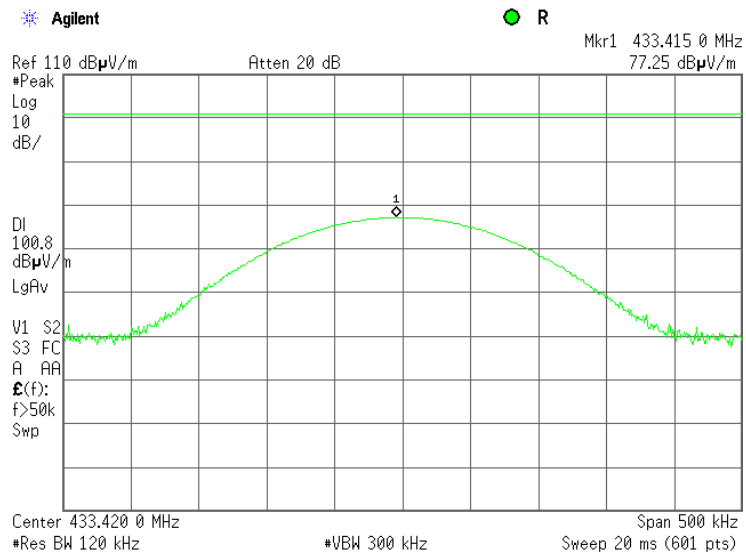
Plot 7.2.1 Radiated emission measurements at the fundamental frequency

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical
 EUT POSITION: 3 orthogonal (X/ Y/ Z)



Plot 7.2.2 Radiated emission measurements at the fundamental frequency

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Horizontal
 EUT POSITION: 3 orthogonal (X/ Y/ Z)





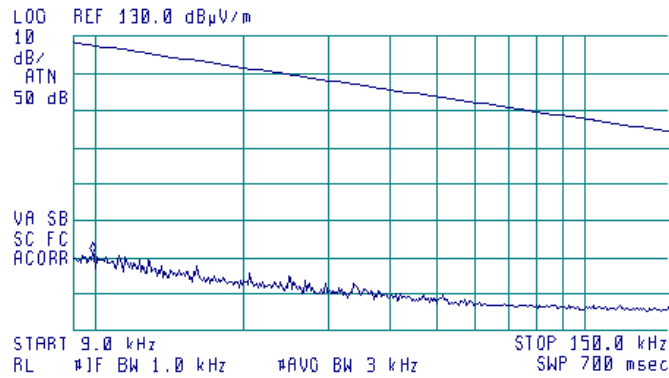
| | | | |
|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions | | |
| Test procedure: | ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 26-Aug-15 | | |
| Temperature: 26 °C | Air Pressure: 1006 hPa | Relative Humidity: 43 % | Power Supply: Battery |
| Remarks: | | | |

Plot 7.2.3 Radiated emission measurements from 9 to 150 kHz

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical
 EUT POSITION: X-axis



ACTV DET: PEAK
 MEAS DET: PEAK OP AVG
 MKR 9.9 kHz
 71.12 dBµV/m

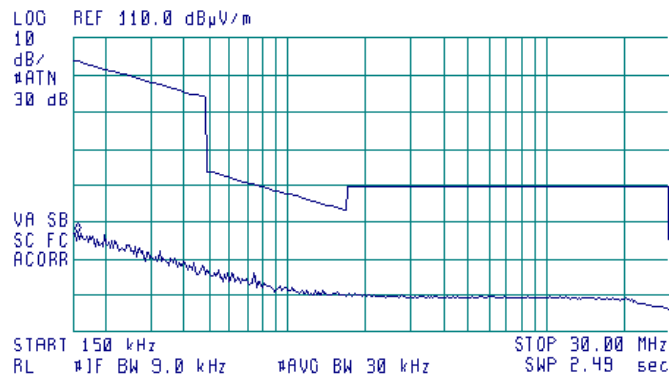


Plot 7.2.4 Radiated emission measurements from 0.15 to 30 MHz

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical
 EUT POSITION: X-axis



ACTV DET: PEAK
 MEAS DET: PEAK OP AVG
 MKR 160 kHz
 56.96 dBµV/m



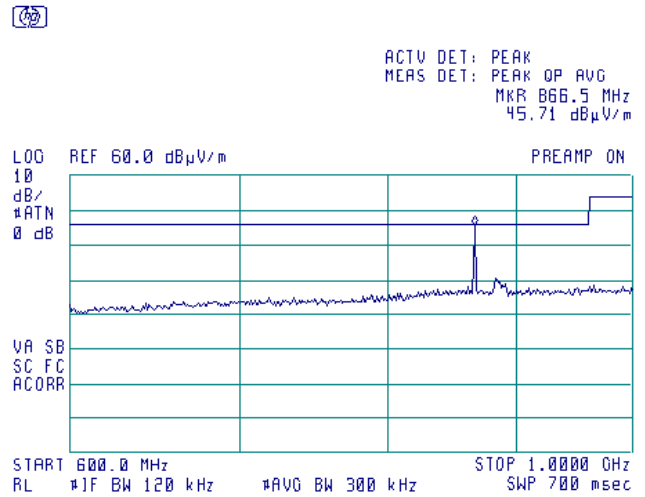
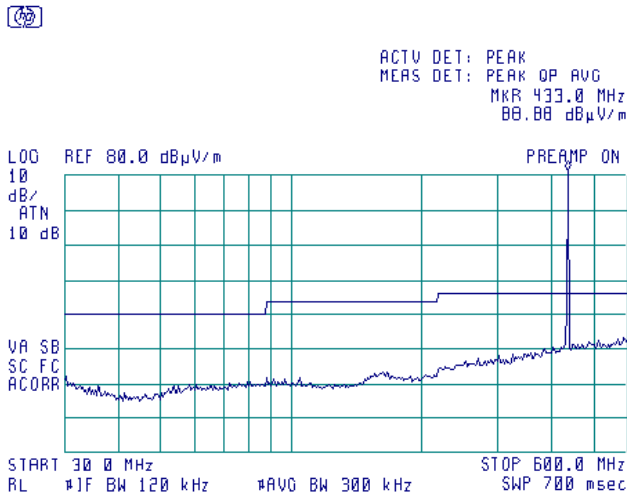


HERMON LABORATORIES

| | | | |
|----------------------------|--|--------------------------------|------------------------------|
| Test specification: | FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions | | |
| Test procedure: | ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 26-Aug-15 | | |
| Temperature: 26 °C | Air Pressure: 1006 hPa | Relative Humidity: 43 % | Power Supply: Battery |
| Remarks: | | | |

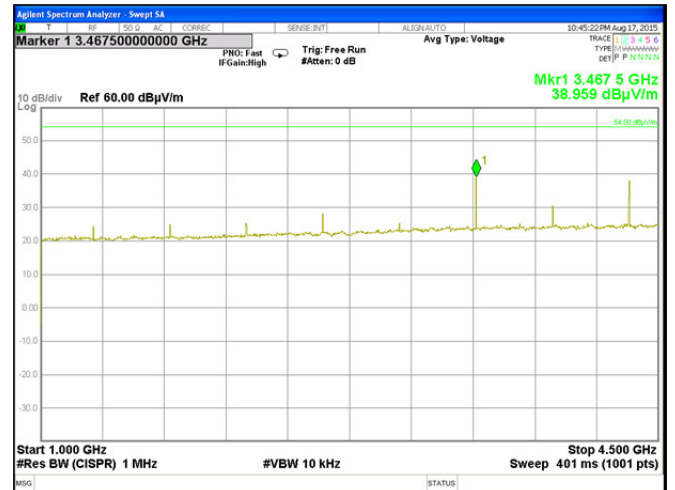
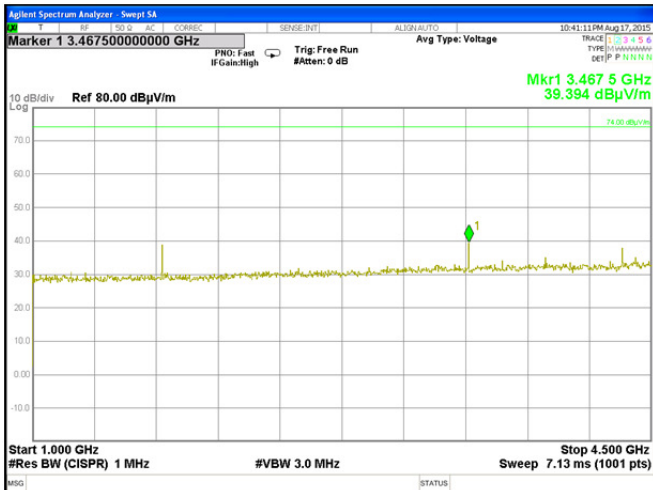
Plot 7.2.5 Radiated emission measurements from 30 to 1000 MHz

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
EUT POSITION: X-axis



Plot 7.2.6 Radiated emission measurements from 1000 to 4.5 MHz

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
EUT POSITION: X-axis



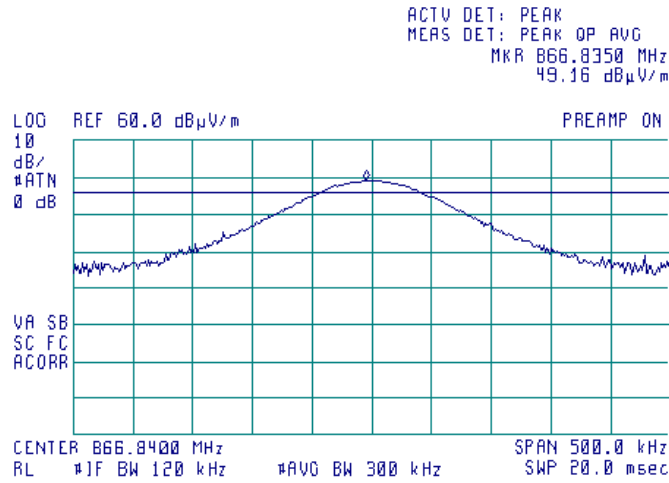


HERMON LABORATORIES

| | | | |
|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions | | |
| Test procedure: | ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 26-Aug-15 | | |
| Temperature: 26 °C | Air Pressure: 1006 hPa | Relative Humidity: 43 % | Power Supply: Battery |
| Remarks: | | | |

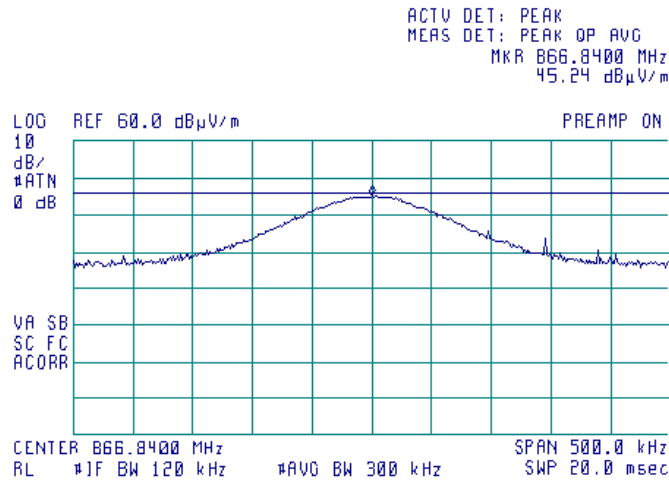
Plot 7.2.7 Radiated emission measurements at the second harmonic frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
EUT POSITION: X-axis



Plot 7.2.8 Radiated emission measurements at the second harmonic frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
EUT POSITION: X-axis



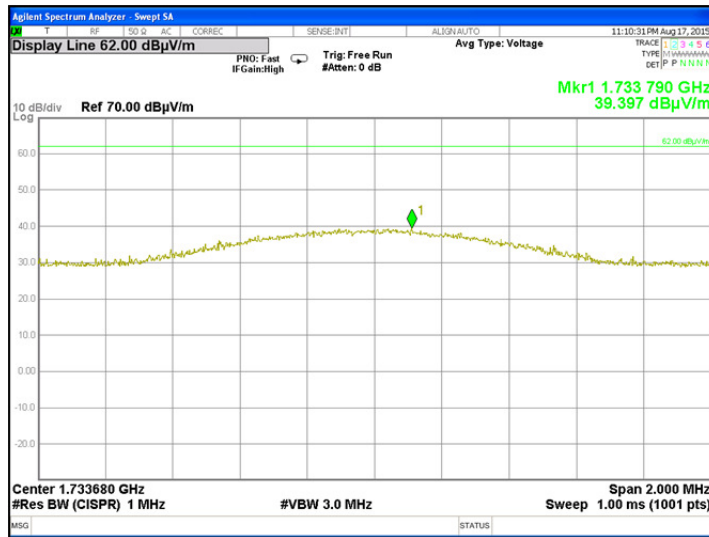


HERMON LABORATORIES

| | | | |
|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions | | |
| Test procedure: | ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 26-Aug-15 | | |
| Temperature: 26 °C | Air Pressure: 1006 hPa | Relative Humidity: 43 % | Power Supply: Battery |
| Remarks: | | | |

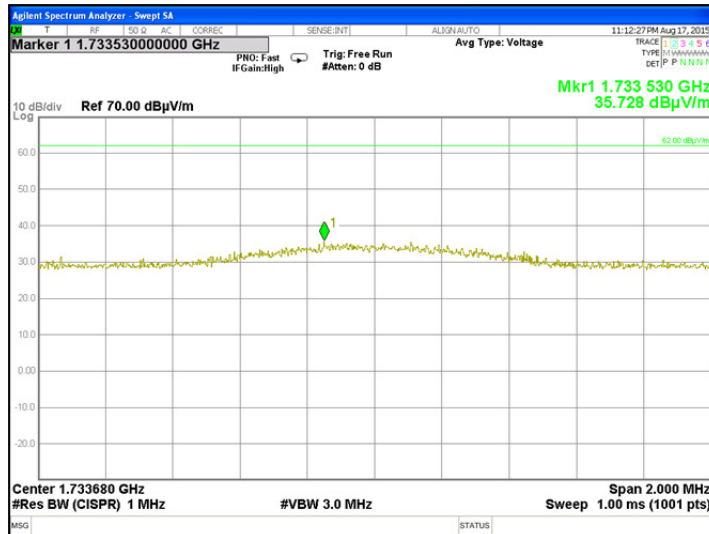
Plot 7.2.9 Radiated emission measurements at the 4 harmonic frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
EUT POSITION: X-axis



Plot 7.2.10 Radiated emission measurements at the 4 harmonic frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
EUT POSITION: X-axis

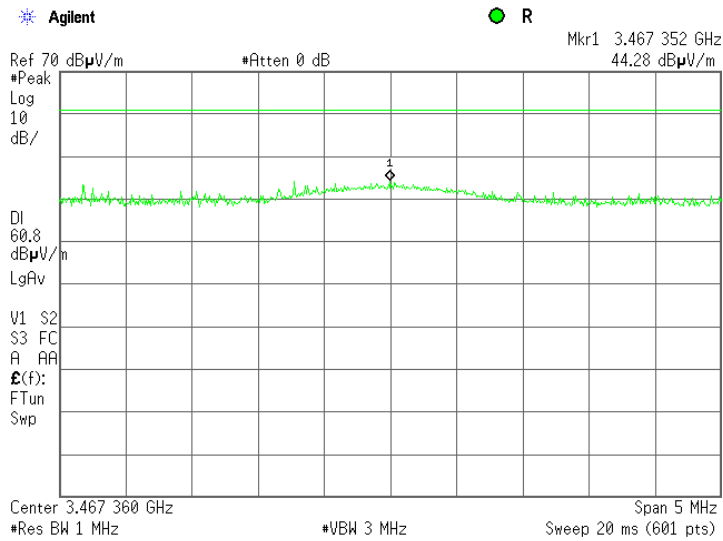




| | | | |
|----------------------------|---|---------------------------|-------------|
| Test specification: | FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions | | |
| Test procedure: | ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 26-Aug-15 | Relative Humidity: | 43 % |
| Temperature: 26 °C | Air Pressure: 1006 hPa | Power Supply: | Battery |
| Remarks: | | | |

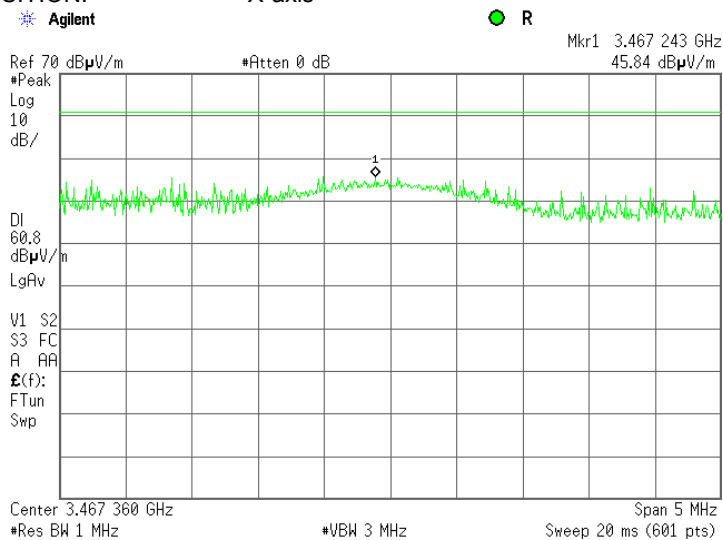
Plot 7.2.11 Radiated emission measurements at the 8 harmonic frequency

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical
 EUT POSITION: X-axis



Plot 7.2.12 Radiated emission measurements at the 8 harmonic frequency

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Horizontal
 EUT POSITION: X-axis

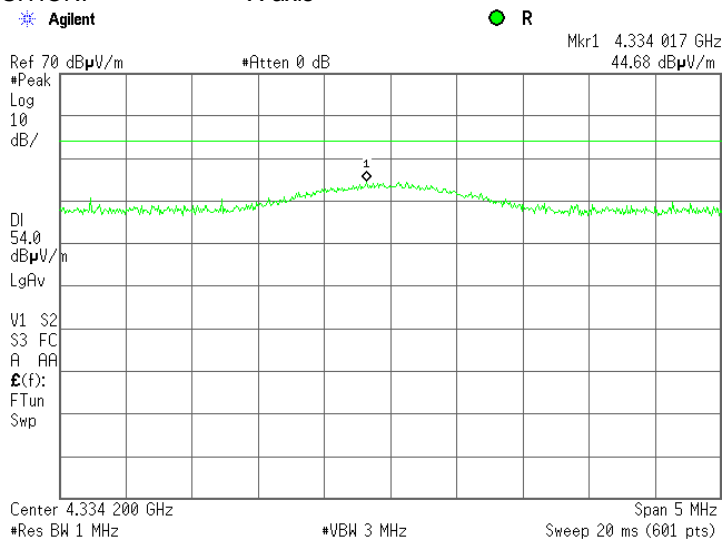




| | | | |
|----------------------------|---|---------------------------|-------------|
| Test specification: | FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions | | |
| Test procedure: | ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 26-Aug-15 | Relative Humidity: | 43 % |
| Temperature: 26 °C | Air Pressure: 1006 hPa | Power Supply: | Battery |
| Remarks: | | | |

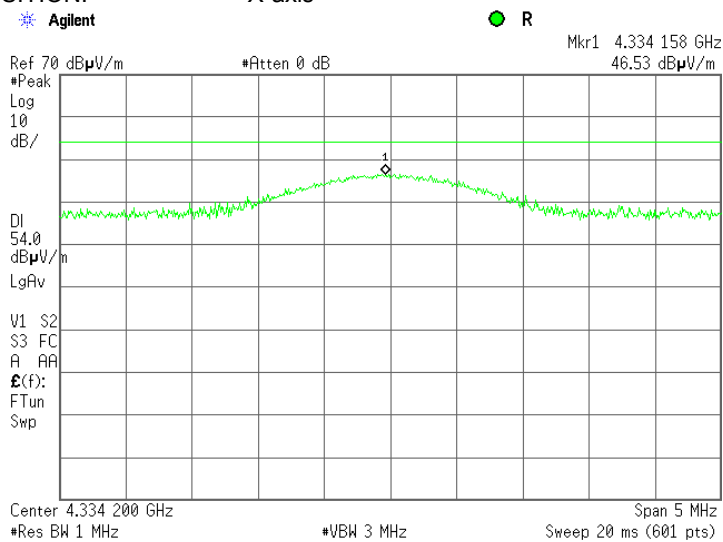
Plot 7.2.13 Radiated emission measurements at the 10 harmonic frequency

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Vertical
 EUT POSITION: X-axis



Plot 7.2.14 Radiated emission measurements at the 10 harmonic frequency

TEST SITE: Semi anechoic chamber
 TEST DISTANCE: 3 m
 ANTENNA POLARIZATION: Horizontal
 EUT POSITION: X-axis

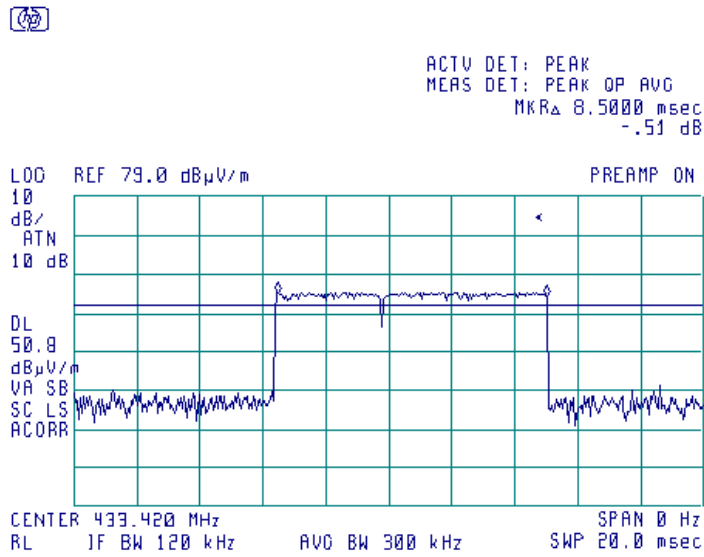




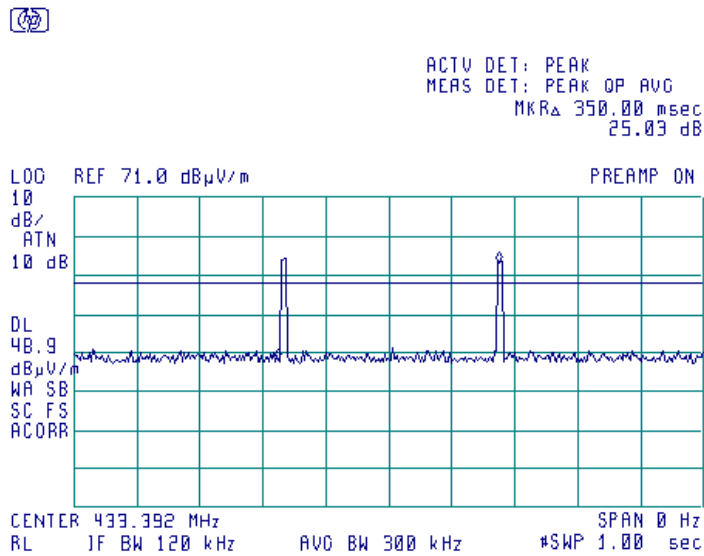
HERMON LABORATORIES

| | | | |
|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions | | |
| Test procedure: | ANSI C63.4, Section 13.1.4 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 26-Aug-15 | | |
| Temperature: 26 °C | Air Pressure: 1006 hPa | Relative Humidity: 43 % | Power Supply: Battery |
| Remarks: | | | |

Plot 7.2.15 Transmission pulse duration



Plot 7.2.16 Transmission pulse period





| | | | |
|-----------------------------|--|--------------------------------|------------------------------|
| Test specification: | FCC Part 15, Section 231(c) / RSS-210, Section A1.1.3, Occupied bandwidth | | |
| Test procedure: | ANSI C63.4, Section 13.1.7 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 26-Aug-15 | | |
| Temperature: 25.4 °C | Air Pressure: hPa | Relative Humidity: 46 % | Power Supply: Battery |
| Remarks: | | | |

7.3 Occupied bandwidth test

7.3.1 General

This test was performed to measure transmitter occupied bandwidth. Specification test limits are given in Table 7.3.1.

Table 7.3.1 Occupied bandwidth limits

| Assigned frequency, MHz | Modulation envelope reference points*, dBc | Maximum allowed bandwidth, % of the carrier frequency |
|-------------------------|--|---|
| 70 - 900 | 20.0 | 0.25 |
| Above 900 | | 0.50 |

*- Modulation envelope reference points provided in terms of attenuation below modulated carrier.

7.3.2 Test procedure

7.3.2.1 The EUT was set up as shown in Figure 7.3.1, energized and its proper operation was checked.

7.3.2.2 The EUT was set to transmit modulated carrier.

7.3.2.3 The transmitter occupied bandwidth was measured with spectrum analyzer as frequency delta between reference points on modulation envelope and provided in Table 7.3.2 and associated plot.

Figure 7.3.1 Occupied bandwidth test setup





| | | | |
|-----------------------------|--|--------------------------------|------------------------------|
| Test specification: | FCC Part 15, Section 231(c) / RSS-210, Section A1.1.3, Occupied bandwidth | | |
| Test procedure: | ANSI C63.4, Section 13.1.7 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 26-Aug-15 | | |
| Temperature: 25.4 °C | Air Pressure: hPa | Relative Humidity: 46 % | Power Supply: Battery |
| Remarks: | | | |

Table 7.3.2 Occupied bandwidth test results

DETECTOR USED: Peak hold
 RESOLUTION BANDWIDTH: 30 kHz
 VIDEO BANDWIDTH: 100 kHz
 MODULATION: GFSK
 BIT RATE: 175 kbps

MODULATION ENVELOPE REFERENCE POINTS: 20 dBc

| Carrier frequency, MHz | Occupied bandwidth, kHz | Limit | | Margin, kHz | Verdict |
|------------------------|-------------------------|----------------------------|---------|-------------|---------|
| | | % of the carrier frequency | kHz | | |
| 433.42 | 381.81 | 0.25 | 1083.55 | -701.74 | Pass |

MODULATION ENVELOPE REFERENCE POINTS: 99 %

| Carrier frequency, MHz | Occupied bandwidth, kHz | Limit | | Margin, kHz | Verdict |
|------------------------|-------------------------|----------------------------|---------|-------------|---------|
| | | % of the carrier frequency | kHz | | |
| 433.42 | 336.33 | 0.25 | 1083.55 | -747.22 | Pass |

Reference numbers of test equipment used

| | | | | | | | |
|---------|---------|---------|--|--|--|--|--|
| HL 3818 | HL 4164 | HL 4274 | | | | | |
|---------|---------|---------|--|--|--|--|--|

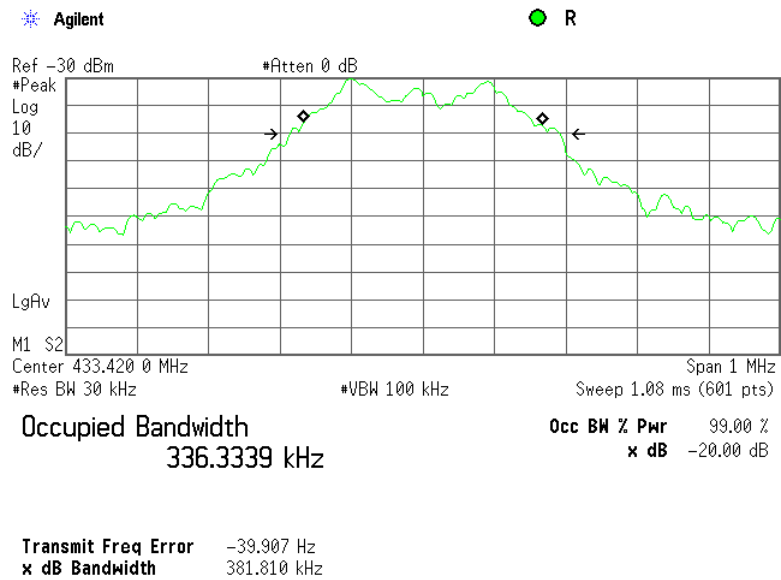
Full description is given in Appendix A.



HERMON LABORATORIES

| | | | |
|-----------------------------|--------------------------|--|------------------------------|
| Test specification: | | FCC Part 15, Section 231(c) / RSS-210, Section A1.1.3, Occupied bandwidth | |
| Test procedure: | | ANSI C63.4, Section 13.1.7 | |
| Test mode: | | Verdict: PASS | |
| Date(s): | | 26-Aug-15 | |
| Temperature: 25.4 °C | Air Pressure: hPa | Relative Humidity: 46 % | Power Supply: Battery |
| Remarks: | | | |

Plot 7.3.1 Occupied bandwidth test result





| | | | |
|----------------------------|--|--------------------------------|------------------------------|
| Test specification: | FCC Part 15, Section 203 / RSS-Gen, Section 7.1.4, Antenna requirements | | |
| Test procedure: | Visual inspection / supplier declaration | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 11-Oct-15 | | |
| Temperature: 24 °C | Air Pressure: hPa | Relative Humidity: 55 % | Power Supply: Battery |
| Remarks: | | | |

7.4 Antenna requirements

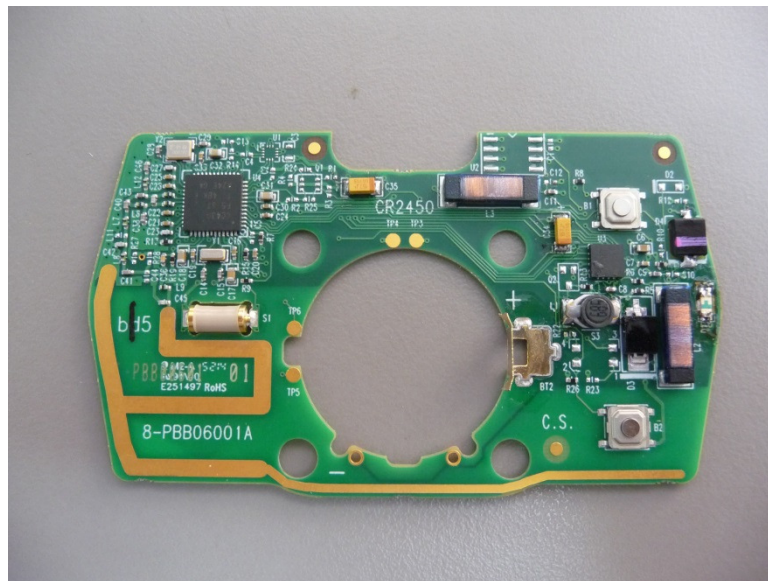
The EUT was verified for compliance with antenna requirements. A transmitter shall be designed to ensure that no antenna other than that furnished by the responsible party will be used with the device. It may be either permanently attached or employs a unique antenna connector for every antenna proposed 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 7.4.1.

Table 7.4.1 Antenna requirements

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

Photograph 7.4.1 Antenna assembly





| | | | |
|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | FCC Part 15, Section 109 / RSS-Gen, Section 7.1.2 / ICES-003, Radiated emission | | |
| Test procedure: | ANSI C63.4, Sections 11.6 and 12.1.4 / RSS-Gen, Section 4.10 / CISPR 22 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date(s): | 31-Aug-15 | | |
| Temperature: 24 °C | Air Pressure: hPa | Relative Humidity: 55 % | Power Supply: Battery |
| Remarks: | | | |

8 Unintentional emissions

8.1 Radiated emission measurements

8.1.1 General

This test was performed to measure radiated emissions from the EUT enclosure. The specification test limits are given in Table 8.1.1, Table 8.1.2.

Table 8.1.1 Radiated emission test limits to FCC Part 15, Section 109 and ICES-003, Section 6.2

| Frequency, MHz | Class B limit, dB(μV/m) | | Class A limit, dB(μV/m) | |
|----------------|-------------------------|--------------|-------------------------|--------------|
| | 10 m distance | 3 m distance | 10 m distance | 3 m distance |
| 30 - 88 | 29.5* | 40.0 | 39.0 | 49.5* |
| 88 - 216 | 33.0* | 43.5 | 43.5 | 54.0* |
| 216 - 960 | 35.5* | 46.0 | 46.4 | 56.9* |
| Above 960 | 43.5* | 54.0 | 49.5 | 60.0* |

* The limit for test distance other than specified was calculated using the inverse linear distance extrapolation factor as follows: $Lim_{S_2} = Lim_{S_1} + 20 \log(S_1/S_2)$, where S_1 and S_2 – standard defined and test distance respectively in meters.

Table 8.1.2 Radiated emission limits according to RSS-Gen, Section 7.1.2

| Frequency, MHz | Field strength limit at 3 m test distance, dB(μV/m) |
|----------------------------------|---|
| 30 - 88 | 40.0 |
| 88 - 216 | 43.5 |
| 216 - 960 | 46.0 |
| 960 - 5 th harmonic** | 54.0 |

** - harmonic of the highest frequency the EUT generates, uses, operates or tunes to.

8.1.2 Test procedure

8.1.2.1 The EUT was set up as shown in Figure 8.1.1 and the associated photograph/s, energized and the EUT performance was checked.

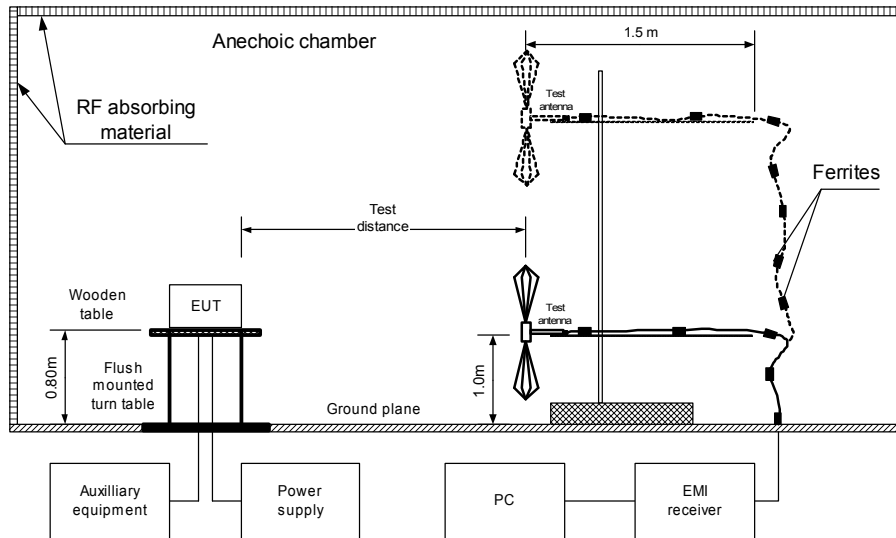
8.1.2.2 The measurements were performed in the anechoic chamber at 3 m test distance. The specified frequency range was investigated with the antenna connected to the EMI receiver. To find the highest emission the turntable was rotated 360° and the measuring antenna height was swept from 1 to 4 m in both, vertical and horizontal polarizations. The EUT cables position was varied to maximize emission.

8.1.2.3 The worst test results with respect to the limits were recorded in Table 8.1.3 and shown in the associated plots.



| | | | |
|----------------------------|--|--------------------------------|------------------------------|
| Test specification: | FCC Part 15, Section 109 / RSS-Gen, Section 7.1.2 / ICES-003, Radiated emission | | |
| Test procedure: | ANSI C63.4, Sections 11.6 and 12.1.4 / RSS-Gen, Section 4.10 / CISPR 22 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date(s): | 31-Aug-15 | | |
| Temperature: 24 °C | Air Pressure: hPa | Relative Humidity: 55 % | Power Supply: Battery |
| Remarks: | | | |

Figure 8.1.1 Setup for radiated emission measurements in anechoic chamber, table-top EUT



Photograph 8.1.1 Setup for final radiated emission measurements





| | | | |
|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | FCC Part 15, Section 109 / RSS-Gen, Section 7.1.2 / ICES-003, Radiated emission | | |
| Test procedure: | ANSI C63.4, Sections 11.6 and 12.1.4 / RSS-Gen, Section 4.10 / CISPR 22 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 31-Aug-15 | | |
| Temperature: 24 °C | Air Pressure: hPa | Relative Humidity: 55 % | Power Supply: Battery |
| Remarks: | | | |

Photograph 8.1.2 Setup for final radiated emission measurements



Photograph 8.1.3 Setup for final radiated emission measurements, EUT close view





| | | | |
|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | FCC Part 15, Section 109 / RSS-Gen, Section 7.1.2 / ICES-003, Radiated emission | | |
| Test procedure: | ANSI C63.4, Sections 11.6 and 12.1.4 / RSS-Gen, Section 4.10 / CISPR 22 | | |
| Test mode: | Compliance | Verdict: PASS | |
| Date(s): | 31-Aug-15 | | |
| Temperature: 24 °C | Air Pressure: hPa | Relative Humidity: 55 % | Power Supply: Battery |
| Remarks: | | | |

Table 8.1.3 Radiated emission test results

EUT SET UP: TABLE-TOP
 TEST SITE: SEMI ANECHOIC CHAMBER
 EUT OPERATING MODE: Stand-by/Receive
 TEST DISTANCE: 3 m

DETECTORS USED: PEAK / QUASI-PEAK
 FREQUENCY RANGE: 30 MHz – 1000 MHz
 RESOLUTION BANDWIDTH: 120 kHz

| 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* | | | | |
| No emission were found | | | | | | | | Pass |

DETECTORS USED: PEAK / AVERAGE
 FREQUENCY RANGE: 1000 MHz – 6000 MHz
 RESOLUTION BANDWIDTH: 1000 kHz

| Frequency, MHz | Peak | | | Average | | | Antenna polarization | Antenna height, m | Turn-table position**, degrees | Verdict |
|------------------------|-----------------------------|-----------------|-------------|-----------------------------|-----------------|-------------|----------------------|-------------------|--------------------------------|---------|
| | Measured emission, dB(µV/m) | Limit, dB(µV/m) | Margin, dB* | Measured emission, dB(µV/m) | Limit, dB(µV/m) | Margin, dB* | | | | |
| No emission were found | | | | | | | | | | Pass |

*- Margin = Measured emission - specification limit.
 **- EUT front panel refers to 0 degrees position of turntable.

Reference numbers of test equipment used

| | | | | | | | |
|---------|---------|---------|---------|---------|---------|---------|---------|
| HL 4295 | HL 4535 | HL 4541 | HL 4542 | HL 4543 | HL 4549 | HL 4551 | HL 4575 |
| HL 4603 | HL 4604 | | | | | | |

Full description is given in Appendix A.

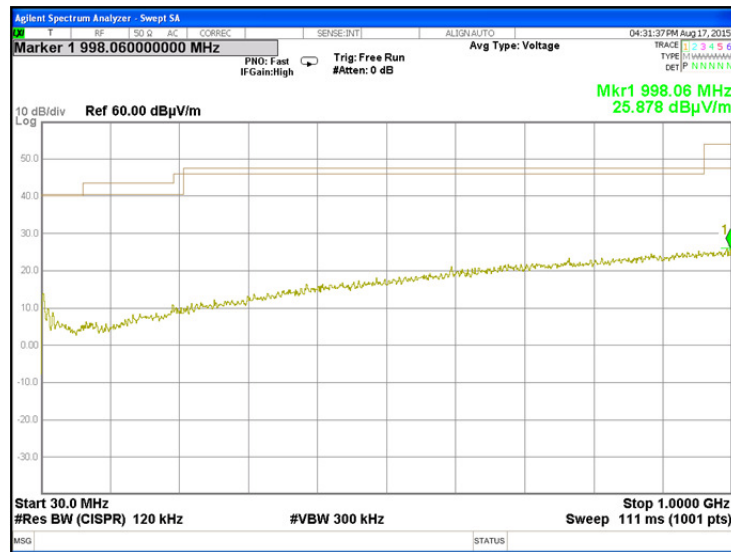


HERMON LABORATORIES

| | | | |
|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | FCC Part 15, Section 109 / RSS-Gen, Section 7.1.2 / ICES-003, Radiated emission | | |
| Test procedure: | ANSI C63.4, Sections 11.6 and 12.1.4 / RSS-Gen, Section 4.10 / CISPR 22 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 31-Aug-15 | | |
| Temperature: 24 °C | Air Pressure: hPa | Relative Humidity: 55 % | Power Supply: Battery |
| Remarks: | | | |

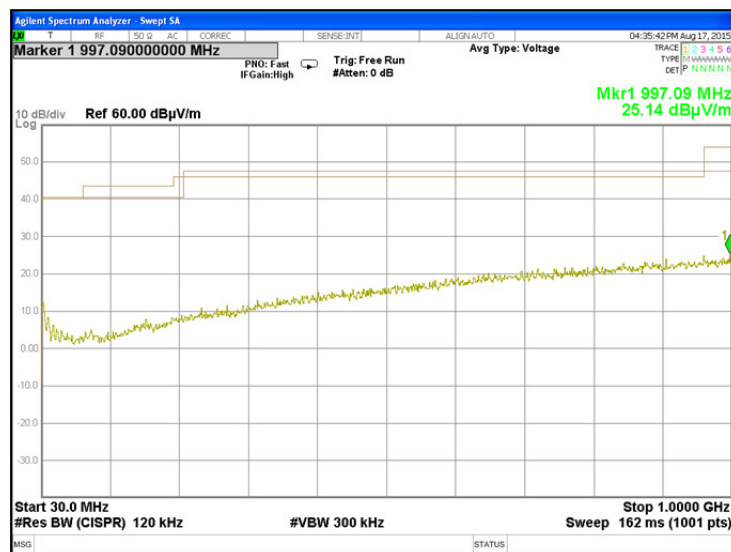
Plot 8.1.1 Radiated emission measurements in 30 - 1000 MHz range, vertical antenna polarization

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m



Plot 8.1.2 Radiated emission measurements in 30 - 1000 MHz range, horizontal antenna polarization

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m





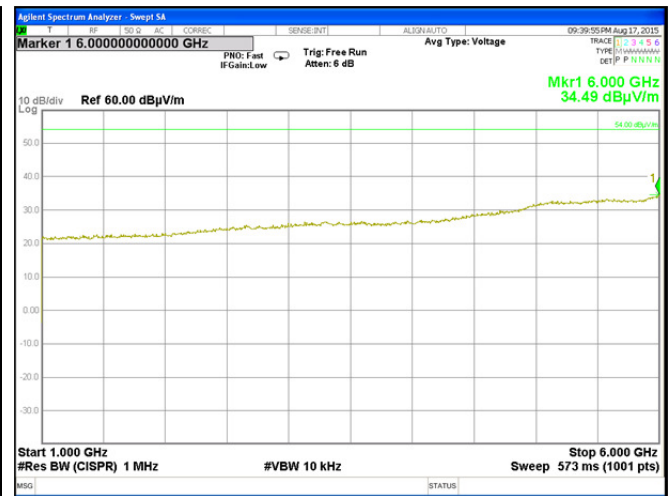
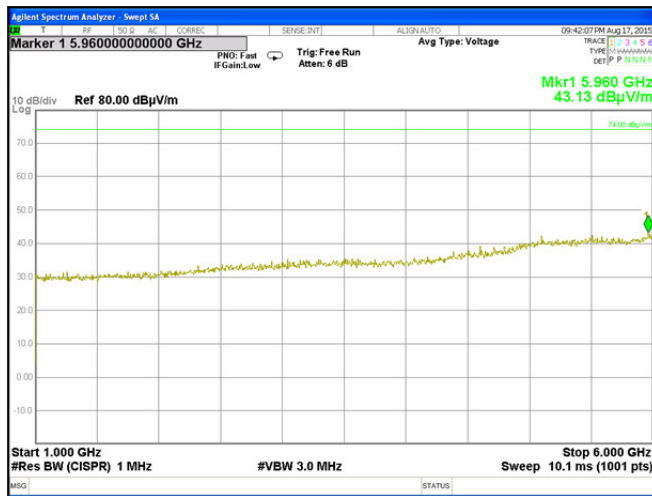
HERMON LABORATORIES

| | | | |
|----------------------------|---|--------------------------------|------------------------------|
| Test specification: | FCC Part 15, Section 109 / RSS-Gen, Section 7.1.2 / ICES-003, Radiated emission | | |
| Test procedure: | ANSI C63.4, Sections 11.6 and 12.1.4 / RSS-Gen, Section 4.10 / CISPR 22 | | |
| Test mode: | Compliance | Verdict: | PASS |
| Date(s): | 31-Aug-15 | | |
| Temperature: 24 °C | Air Pressure: hPa | Relative Humidity: 55 % | Power Supply: Battery |
| Remarks: | | | |

Plot 8.1.3 Radiated emission measurements above 1000 MHz, vertical antenna polarization

TEST SITE:
TEST DISTANCE:

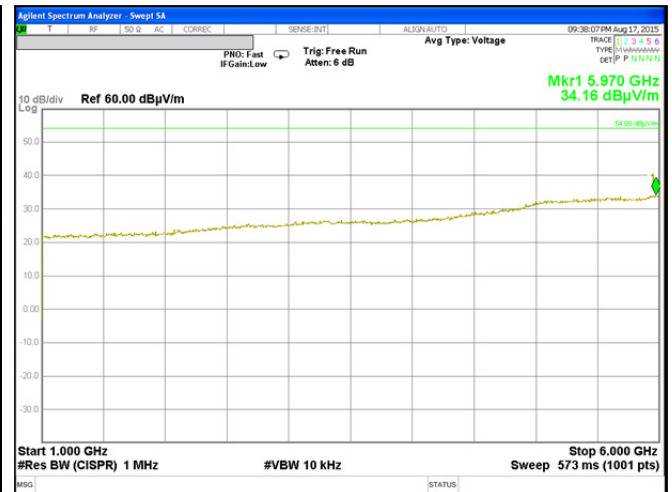
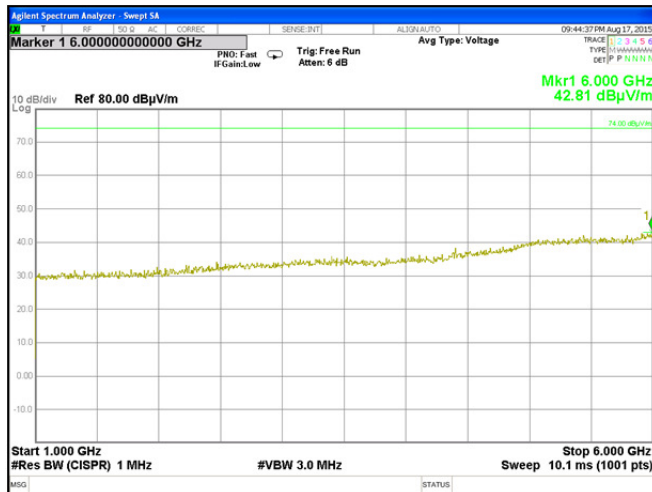
Anechoic chamber
3 m



Plot 8.1.4 Radiated emission measurements above 1000 MHz, horizontal antenna polarization

TEST SITE:
TEST DISTANCE:

Anechoic chamber
3 m



**9 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 | 13-Jan-15 | 13-Jan-16 |
| 0604 | Antenna BiconiLog Log-Periodic/T Bow-TIE, 26 - 2000 MHz | EMCO | 3141 | 9611-1011 | 15-May-15 | 15-May-16 |
| 3818 | PSA Series Spectrum Analyzer, 3 Hz- 44 GHz | Agilent Technologies | E4446A | MY48250288 | 29-Apr-15 | 29-Apr-16 |
| 3901 | Microwave Cable Assembly, 40.0 GHz, 3.5 m, SMA/SMA | Huber-Suhner | SUCOFLEX 102A | 1225/2A | 10-Feb-15 | 10-Feb-16 |
| 3903 | Microwave Cable Assembly, 40.0 GHz, 1.5 m, SMA/SMA | Huber-Suhner | SUCOFLEX 102A | 1226/2A | 10-Feb-15 | 10-Feb-16 |
| 4114 | Antenna, Double-Ridged Waveguide Horn, 1 to 18 GHz | ETS Lindgren | 3117 | 00123515 | 19-Dec-14 | 19-Dec-15 |
| 4164 | DC Power Supply, 60V, 5A | Standig | 605D | NA | 11-Jan-15 | 11-Jan-16 |
| 4274 | Test Cable , DC-18 GHz, 1.8 m, SMA/M - N/M | Mini-Circuits | CBL-6FT-SMNM+ | 70047 | 28-May-15 | 28-May-16 |
| 4295 | Microwave Cable Assembly, 18.0 GHz, 3.4 m, SMA/SMA | Huber-Suhner | Sucoflex P103 | NA | 04-Dec-14 | 04-Dec-15 |
| 4535 | Microwave Cable Assembly, 6.5 GHz, 5.0 m, N/M type-N/M type | Suhner Switzerland | 214-U | NA | 15-May-15 | 15-May-16 |
| 4541 | Microwave Cable Assembly, 4.0 GHz, 1.0 m, N/M type-N/M type | Suhner Switzerland | 214-U | NA | 26-Aug-15 | 26-Aug-16 |
| 4542 | Amplifier, 9 kHz to 1 GHz, 32 dB gain | Sonoma Instrument | 310 | 0002A05639 | 26-Mar-15 | 26-Mar-16 |
| 4543 | Broadband preamplifier, 0.5 to 18 GHz, 35 dB gain | Schwarzbeck mess-elektronik | BBV 9718 | 9718-134 | 05-Mar-15 | 05-Mar-16 |
| 4549 | Cable RF, 6.8 m, N/N - type, up to 3 GHz | Suhner Switzerland | NA | 07262 | 05-Mar-15 | 05-Mar-16 |
| 4551 | Cable RF, 6.6 m, N/N - type, up to 18 GHz | Suhner Switzerland | Sucoflex 104E | 22200/4E | 05-Mar-15 | 05-Mar-16 |
| 4575 | EXA Signal Analyzer, 9 kHz - 26.5 GHz | Agilent Technologies | N9010A | MY48030110 | 05-Feb-15 | 05-Feb-16 |
| 4603 | Horn Antenna, 1 - 18 GHz | Schwarzbeck mess-elektronik | BBHA 9120 D | 9120D-611 | 18-Jun-15 | 18-Jul-16 |
| 4604 | Biconilog Antenna, 26 - 2000 MHz | EMCO | 3142B | 9909-1421 | 15-May-15 | 15-May-16 |
| 4932 | Microwave preamplifier, 500 MHz to 18 GHz, 40 dB Gain | Com-Power Corporation | PAM-118A | 551029 | 18-Nov-14 | 18-Nov-15 |

10 APPENDIX B Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

| Test description | Expanded uncertainty |
|---|--|
| Radiated emissions at 10 m measuring distance Horizontal polarization Vertical polarization | Biconilog antenna: ± 5.0 dB Biconical antenna: ± 5.0 dB Log periodic antenna: ± 5.1 dB Double ridged horn antenna: ± 5.3 dB Biconilog antenna: ± 5.5 dB Biconical antenna: ± 5.5 dB Log periodic antenna: ± 5.6 dB Double ridged horn antenna: ± 5.8 dB |
| Radiated emissions at 3 m measuring distance Horizontal polarization Vertical polarization | Biconilog antenna: ± 5.3 dB Biconical antenna: ± 5.0 dB Log periodic antenna: ± 5.3 dB Double ridged horn antenna: ± 5.3 dB Biconilog antenna: ± 6.0 dB Biconical antenna: ± 5.7 dB Log periodic antenna: ± 6.0 dB Double ridged horn antenna: ± 6.0 dB |
| Conducted emissions at RF antenna connector | 9 kHz to 2.9 GHz: ± 2.6 dB 2.9 GHz to 6.46 GHz: ± 3.5 dB 6.46 GHz to 13.2 GHz: ± 4.3 dB 13.2 GHz to 22.0 GHz: ± 5.0 dB 22.0 GHz to 26.8 GHz: ± 5.5 dB 26.8 GHz to 40.0 GHz: ± 4.8 dB |
| Duty cycle, timing (Tx ON / OFF) and average factor measurements | ± 1.0 % |
| Occupied bandwidth | ± 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.

11 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 number IC 2186A-1 for OATS, certified by VCCI, Japan (the registration numbers are R-808 for OATS, R-1082 for anechoic chamber, 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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12 APPENDIX D Specification references

| | |
|-------------------------|---|
| FCC 47CFR part 15: 2014 | 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: 2009 | 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 4: 2014 | General Requirements and Information for the Certification of Radiocommunication Equipment |
| ICES-003 issue 5:2012 | Information Technology Equipment (ITE) – Limits and methods of measurement |



13 APPENDIX E Test equipment correction factors

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

| Frequency, MHz | Magnetic antenna factor, dB | Electric antenna factor, 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(μ V) to convert it into field strength in dB(μ V/m).



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

| Frequency, MHz | Antenna factor, dB(1/m) | Frequency, MHz | Antenna factor, dB(1/m) | Frequency, MHz | Antenna factor, 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(μV) to convert it into field strength in dB(μV/m).



Antenna factor
Double-ridged waveguide horn antenna
ETS Lindgren, Model 3117, serial number: 00123515, HL 4114

| Frequency, MHz | Antenna factor, dB/m | | |
|----------------|----------------------|--------------|-----------|
| | Measured | Manufacturer | Deviation |
| 1000 | 28.0 | 28.4 | -0.4 |
| 1500 | 28.0 | 27.4 | 0.6 |
| 2000 | 31.2 | 30.9 | 0.3 |
| 2500 | 32.5 | 33.4 | -0.9 |
| 3000 | 32.9 | 32.6 | 0.3 |
| 3500 | 32.7 | 32.8 | -0.1 |
| 4000 | 33.1 | 33.4 | -0.3 |
| 4500 | 33.8 | 33.9 | -0.1 |
| 5000 | 33.8 | 34.1 | -0.3 |
| 5500 | 34.4 | 34.5 | -0.1 |
| 6000 | 35.0 | 35.2 | -0.2 |
| 6500 | 35.4 | 35.5 | -0.1 |
| 7000 | 35.7 | 35.7 | 0.0 |
| 7500 | 35.9 | 35.7 | 0.2 |
| 8000 | 35.8 | 35.8 | 0.0 |
| 8500 | 35.9 | 35.8 | 0.1 |
| 9000 | 36.3 | 36.2 | 0.1 |
| 9500 | 36.6 | 36.6 | 0.0 |
| 10000 | 37.1 | 37.1 | 0.0 |
| 10500 | 37.6 | 37.5 | 0.1 |
| 11000 | 37.9 | 37.7 | 0.2 |
| 11500 | 38.5 | 38.1 | 0.4 |
| 12000 | 39.2 | 38.7 | 0.5 |
| 12500 | 39.0 | 38.9 | 0.1 |
| 13000 | 39.1 | 39.1 | 0.0 |
| 13500 | 38.9 | 38.8 | 0.1 |
| 14000 | 39.0 | 38.8 | 0.2 |
| 14500 | 39.6 | 39.9 | -0.3 |
| 15000 | 39.9 | 39.7 | 0.2 |
| 15500 | 39.9 | 40.1 | -0.2 |
| 16000 | 40.7 | 40.8 | -0.1 |
| 16500 | 41.3 | 41.8 | -0.5 |
| 17000 | 42.5 | 42.1 | 0.4 |
| 17500 | 41.3 | 41.2 | 0.1 |
| 18000 | 41.4 | 40.9 | 0.5 |

Antenna factor is to be added to receiver meter reading in dB(μ V) to convert to field strength in dB(μ V/meter)



Antenna factor
Horn antenna
Schwarzbeck mess-elektronik, Model BBHA 9120 D, serial number: 9120D-611, HL 4603

| Frequency, MHz | Measured antenna factor, dB/m |
|----------------|-------------------------------|
| 1000 | 25.2 |
| 1500 | 25.7 |
| 2000 | 26.1 |
| 2500 | 27.5 |
| 3000 | 28.3 |
| 3500 | 29.0 |
| 4000 | 30.0 |
| 4500 | 30.8 |
| 5000 | 31.9 |
| 5500 | 32.2 |
| 6000 | 33.1 |
| 6500 | 34.6 |
| 7000 | 35.9 |
| 7500 | 36.6 |
| 8000 | 37.2 |
| 8500 | 36.6 |
| 9000 | 36.9 |
| 9500 | 37.5 |
| 10000 | 38.4 |
| 10500 | 39.5 |
| 11000 | 40.3 |
| 11500 | 40.0 |
| 12000 | 39.2 |
| 12500 | 38.7 |
| 13000 | 39.6 |
| 13500 | 40.8 |
| 14000 | 41.6 |
| 14500 | 42.1 |
| 15000 | 41.2 |
| 15500 | 39.1 |
| 16000 | 38.5 |
| 16500 | 39.9 |
| 17000 | 41.0 |
| 17500 | 44.1 |
| 18000 | 55.6 |

The antenna factor shall be added to receiver reading in dB μ V to obtain field strength in dB μ V/m.



Antenna factor
Biconilog Antenna, 26 - 2000 MHz
EMCO, Model 3142B, serial number: 9909-1421, HL 4604

| Frequency, MHz | Measured, dB/m |
|----------------|----------------|
| 30 | 17.9 |
| 35 | 14.8 |
| 40 | 12.1 |
| 45 | 10.0 |
| 50 | 8.7 |
| 60 | 8.1 |
| 70 | 7.3 |
| 80 | 6.6 |
| 90 | 7.6 |
| 100 | 7.9 |
| 120 | 7.0 |
| 140 | 7.7 |
| 160 | 9.6 |
| 180 | 10.0 |
| 200 | 10.2 |
| 250 | 12.7 |
| 300 | 13.4 |
| 400 | 16.7 |
| 500 | 18.2 |
| 600 | 20.2 |
| 700 | 22.0 |
| 800 | 22.7 |
| 900 | 24.1 |
| 1000 | 25.0 |

The antenna factor shall be added to receiver reading in dB μ V to obtain field strength in dB μ V/m



Cable loss
Microwave Cable Assembly, Huber-Suhner, 40 GHz, 3.5 m, SMA-SMA, S/N 1225/2A
HL 3901

| Frequency, MHz | Cable loss, dB | Frequency, MHz | Cable loss, dB | Frequency, MHz | Cable loss, dB |
|----------------|----------------|----------------|----------------|----------------|----------------|
| 10 | 0.09 | 9500 | 4.29 | 21000 | 6.67 |
| 100 | 0.41 | 10000 | 4.40 | 22000 | 6.92 |
| 500 | 0.93 | 10500 | 4.52 | 23000 | 7.00 |
| 1000 | 1.33 | 11000 | 4.64 | 24000 | 7.18 |
| 1500 | 1.63 | 11500 | 4.76 | 25000 | 7.29 |
| 2000 | 1.90 | 12000 | 4.87 | 26000 | 7.55 |
| 2500 | 2.12 | 12500 | 4.99 | 27000 | 7.70 |
| 3000 | 2.33 | 13000 | 5.11 | 28000 | 7.88 |
| 3500 | 2.50 | 13500 | 5.20 | 29000 | 8.02 |
| 4000 | 2.67 | 14000 | 5.31 | 30000 | 8.15 |
| 4500 | 2.82 | 14500 | 5.42 | 31000 | 8.35 |
| 5000 | 2.99 | 15000 | 5.51 | 32000 | 8.40 |
| 5500 | 3.16 | 15500 | 5.58 | 33000 | 8.62 |
| 6000 | 3.32 | 16000 | 5.68 | 34000 | 8.73 |
| 6500 | 3.51 | 16500 | 5.78 | 35000 | 8.78 |
| 7000 | 3.65 | 17000 | 5.91 | 36000 | 8.94 |
| 7500 | 3.79 | 17500 | 5.99 | 37000 | 9.21 |
| 8000 | 3.92 | 18000 | 6.07 | 38000 | 9.37 |
| 8500 | 4.04 | 19000 | 6.36 | 39000 | 9.45 |
| 9000 | 4.18 | 20000 | 6.49 | 40000 | 9.52 |



Cable loss
Microwave Cable Assembly, Huber-Suhner, 40 GHz, 1.5 m, SMA-SMA, S/N 1226/2A
HL 3903

| Frequency, MHz | Cable loss, dB | Frequency, MHz | Cable loss, dB | Frequency, MHz | Cable loss, dB |
|----------------|----------------|----------------|----------------|----------------|----------------|
| 10 | -0.02 | 9500 | 1.84 | 21000 | 2.98 |
| 100 | 0.15 | 10000 | 1.86 | 22000 | 3.07 |
| 500 | 0.38 | 10500 | 1.93 | 23000 | 3.13 |
| 1000 | 0.56 | 11000 | 1.99 | 24000 | 3.21 |
| 1500 | 0.69 | 11500 | 2.04 | 25000 | 3.26 |
| 2000 | 0.82 | 12000 | 2.10 | 26000 | 3.48 |
| 2500 | 0.90 | 12500 | 2.15 | 27000 | 3.44 |
| 3000 | 0.98 | 13000 | 2.21 | 28000 | 3.53 |
| 3500 | 1.06 | 13500 | 2.25 | 29000 | 3.59 |
| 4000 | 1.11 | 14000 | 2.29 | 30000 | 3.66 |
| 4500 | 1.17 | 14500 | 2.34 | 31000 | 3.70 |
| 5000 | 1.24 | 15000 | 2.36 | 32000 | 3.79 |
| 5500 | 1.32 | 15500 | 2.40 | 33000 | 3.88 |
| 6000 | 1.40 | 16000 | 2.45 | 34000 | 3.94 |
| 6500 | 1.50 | 16500 | 2.48 | 35000 | 3.91 |
| 7000 | 1.56 | 17000 | 2.56 | 36000 | 4.05 |
| 7500 | 1.62 | 17500 | 2.58 | 37000 | 4.22 |
| 8000 | 1.68 | 18000 | 2.60 | 38000 | 4.25 |
| 8500 | 1.74 | 19000 | 2.84 | 39000 | 4.27 |
| 9000 | 1.78 | 20000 | 2.88 | 40000 | 4.33 |



Cable loss
Test cable, Mini-Circuits, S/N 70047, 18 GHz, 1.8 m, SMA/M - N/M
CBL-6FT-SMNM+, HL 4274

| Frequency, MHz | Cable loss, dB | Frequency, MHz | Cable loss, dB | Frequency, MHz | Cable loss, dB | Frequency, MHz | Cable loss, dB |
|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 10 | 0.07 | 4800 | 1.69 | 9800 | 2.62 | 14800 | 3.42 |
| 30 | 0.11 | 4900 | 1.70 | 9900 | 2.63 | 14900 | 3.39 |
| 50 | 0.14 | 5000 | 1.72 | 10000 | 2.64 | 15000 | 3.38 |
| 100 | 0.21 | 5100 | 1.75 | 10100 | 2.64 | 15100 | 3.40 |
| 200 | 0.26 | 5200 | 1.76 | 10200 | 2.66 | 15200 | 3.41 |
| 300 | 0.30 | 5300 | 1.77 | 10300 | 2.67 | 15300 | 3.40 |
| 400 | 0.37 | 5400 | 1.79 | 10400 | 2.68 | 15400 | 3.39 |
| 500 | 0.44 | 5500 | 1.82 | 10500 | 2.68 | 15500 | 3.41 |
| 600 | 0.49 | 5600 | 1.85 | 10600 | 2.70 | 15600 | 3.44 |
| 700 | 0.54 | 5700 | 1.86 | 10700 | 2.71 | 15700 | 3.46 |
| 800 | 0.58 | 5800 | 1.87 | 10800 | 2.73 | 15800 | 3.45 |
| 900 | 0.63 | 5900 | 1.91 | 10900 | 2.74 | 15900 | 3.47 |
| 1000 | 0.67 | 6000 | 1.94 | 11000 | 2.76 | 16000 | 3.51 |
| 1100 | 0.71 | 6100 | 1.97 | 11100 | 2.77 | 16100 | 3.56 |
| 1200 | 0.75 | 6200 | 1.98 | 11200 | 2.78 | 16200 | 3.55 |
| 1300 | 0.78 | 6300 | 1.99 | 11300 | 2.79 | 16300 | 3.54 |
| 1400 | 0.81 | 6400 | 2.02 | 11400 | 2.80 | 16400 | 3.57 |
| 1500 | 0.85 | 6500 | 2.05 | 11500 | 2.82 | 16500 | 3.62 |
| 1600 | 0.88 | 6600 | 2.06 | 11600 | 2.83 | 16600 | 3.61 |
| 1700 | 0.91 | 6700 | 2.06 | 11700 | 2.84 | 16700 | 3.60 |
| 1800 | 0.94 | 6800 | 2.08 | 11800 | 2.85 | 16800 | 3.62 |
| 1900 | 0.97 | 6900 | 2.10 | 11900 | 2.87 | 16900 | 3.68 |
| 2000 | 1.00 | 7000 | 2.12 | 12000 | 2.88 | 17000 | 3.70 |
| 2100 | 1.03 | 7100 | 2.12 | 12100 | 2.89 | 17100 | 3.68 |
| 2200 | 1.06 | 7200 | 2.13 | 12200 | 2.90 | 17200 | 3.70 |
| 2300 | 1.08 | 7300 | 2.16 | 12300 | 2.92 | 17300 | 3.80 |
| 2400 | 1.11 | 7400 | 2.19 | 12400 | 2.94 | 17400 | 3.84 |
| 2500 | 1.14 | 7500 | 2.22 | 12500 | 2.95 | 17500 | 3.83 |
| 2600 | 1.16 | 7600 | 2.23 | 12600 | 2.96 | 17600 | 3.83 |
| 2700 | 1.19 | 7700 | 2.26 | 12700 | 2.98 | 17700 | 3.86 |
| 2800 | 1.21 | 7800 | 2.30 | 12800 | 3.00 | 17800 | 3.86 |
| 2900 | 1.27 | 7900 | 2.33 | 12900 | 3.02 | 17900 | 3.80 |
| 3000 | 1.29 | 8000 | 2.35 | 13000 | 3.03 | 18000 | 3.79 |
| 3100 | 1.32 | 8100 | 2.37 | 13100 | 3.06 | | |
| 3200 | 1.35 | 8200 | 2.41 | 13200 | 3.08 | | |
| 3300 | 1.37 | 8300 | 2.44 | 13300 | 3.09 | | |
| 3400 | 1.38 | 8400 | 2.47 | 13400 | 3.10 | | |
| 3500 | 1.41 | 8500 | 2.48 | 13500 | 3.13 | | |
| 3600 | 1.43 | 8600 | 2.51 | 13600 | 3.17 | | |
| 3700 | 1.46 | 8700 | 2.53 | 13700 | 3.17 | | |
| 3800 | 1.47 | 8800 | 2.55 | 13800 | 3.18 | | |
| 3900 | 1.49 | 8900 | 2.56 | 13900 | 3.22 | | |
| 4000 | 1.52 | 9000 | 2.57 | 14000 | 3.26 | | |
| 4100 | 1.55 | 9100 | 2.58 | 14100 | 3.28 | | |
| 4200 | 1.56 | 9200 | 2.59 | 14200 | 3.30 | | |
| 4300 | 1.58 | 9300 | 2.59 | 14300 | 3.35 | | |
| 4400 | 1.60 | 9400 | 2.60 | 14400 | 3.39 | | |
| 4500 | 1.63 | 9500 | 2.60 | 14500 | 3.39 | | |
| 4600 | 1.65 | 9600 | 2.61 | 14600 | 3.39 | | |
| 4700 | 1.67 | 9700 | 2.61 | 14700 | 3.41 | | |



Cable loss
Microwave Cable Assembly, 18.0 GHz, 3.4 m, SMA/SMA, Huber-Suhner, S/N 4295,
Sucoflex P103, HL 4295

| Frequency, MHz | Cable loss, dB | Frequency, MHz | Cable loss, dB | Frequency, MHz | Cable loss, dB | Frequency, MHz | Cable loss, dB |
|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 10 | 0.11 | 5000 | 2.09 | 10200 | 2.97 | 15400 | 3.63 |
| 30 | 0.18 | 5100 | 2.12 | 10300 | 3.01 | 15500 | 3.65 |
| 50 | 0.23 | 5200 | 2.13 | 10400 | 3.00 | 15600 | 3.63 |
| 100 | 0.31 | 5300 | 2.16 | 10500 | 3.05 | 15700 | 3.64 |
| 200 | 0.38 | 5400 | 2.19 | 10600 | 3.09 | 15800 | 3.64 |
| 300 | 0.43 | 5500 | 2.21 | 10700 | 3.05 | 15900 | 3.66 |
| 400 | 0.52 | 5600 | 2.21 | 10800 | 3.09 | 16000 | 3.71 |
| 500 | 0.60 | 5700 | 2.24 | 10900 | 3.10 | 16100 | 3.67 |
| 600 | 0.67 | 5800 | 2.24 | 11000 | 3.08 | 16200 | 3.71 |
| 700 | 0.72 | 5900 | 2.25 | 11100 | 3.11 | 16300 | 3.70 |
| 800 | 0.78 | 6000 | 2.27 | 11200 | 3.12 | 16400 | 3.71 |
| 900 | 0.83 | 6100 | 2.25 | 11300 | 3.12 | 16500 | 3.72 |
| 1000 | 0.89 | 6200 | 2.29 | 11400 | 3.20 | 16600 | 3.84 |
| 1100 | 0.94 | 6300 | 2.34 | 11500 | 3.16 | 16700 | 3.78 |
| 1200 | 0.98 | 6400 | 2.37 | 11600 | 3.16 | 16800 | 3.85 |
| 1300 | 1.03 | 6500 | 2.33 | 11700 | 3.20 | 16900 | 3.88 |
| 1400 | 1.06 | 6600 | 2.34 | 11800 | 3.19 | 17000 | 3.85 |
| 1500 | 1.11 | 6700 | 2.39 | 11900 | 3.21 | 17100 | 3.88 |
| 1600 | 1.14 | 6800 | 2.46 | 12000 | 3.28 | 17200 | 3.92 |
| 1700 | 1.19 | 6900 | 2.45 | 12100 | 3.23 | 17300 | 3.90 |
| 1800 | 1.22 | 7000 | 2.44 | 12200 | 3.26 | 17400 | 4.00 |
| 1900 | 1.26 | 7100 | 2.43 | 12300 | 3.30 | 17500 | 4.02 |
| 2000 | 1.30 | 7200 | 2.44 | 12400 | 3.25 | 17600 | 4.00 |
| 2100 | 1.34 | 7300 | 2.51 | 12500 | 3.26 | 17700 | 3.96 |
| 2200 | 1.37 | 7400 | 2.54 | 12600 | 3.30 | 17800 | 4.01 |
| 2300 | 1.40 | 7500 | 2.49 | 12700 | 3.26 | 17900 | 4.02 |
| 2400 | 1.44 | 7600 | 2.52 | 12800 | 3.34 | 18000 | 4.08 |
| 2500 | 1.47 | 7700 | 2.59 | 12900 | 3.37 | | |
| 2600 | 1.50 | 7800 | 2.57 | 13000 | 3.30 | | |
| 2700 | 1.55 | 7900 | 2.55 | 13100 | 3.35 | | |
| 2800 | 1.58 | 8000 | 2.57 | 13200 | 3.31 | | |
| 2900 | 1.60 | 8100 | 2.58 | 13300 | 3.33 | | |
| 3000 | 1.63 | 8200 | 2.64 | 13400 | 3.42 | | |
| 3100 | 1.64 | 8300 | 2.70 | 13500 | 3.43 | | |
| 3200 | 1.67 | 8400 | 2.65 | 13600 | 3.40 | | |
| 3300 | 1.69 | 8500 | 2.66 | 13700 | 3.47 | | |
| 3400 | 1.73 | 8600 | 2.68 | 13800 | 3.45 | | |
| 3500 | 1.74 | 8700 | 2.70 | 13900 | 3.43 | | |
| 3600 | 1.76 | 8800 | 2.74 | 14000 | 3.52 | | |
| 3700 | 1.79 | 8900 | 2.74 | 14100 | 3.51 | | |
| 3800 | 1.82 | 9000 | 2.76 | 14200 | 3.54 | | |
| 3900 | 1.85 | 9100 | 2.82 | 14300 | 3.55 | | |
| 4000 | 1.87 | 9200 | 2.79 | 14400 | 3.52 | | |
| 4100 | 1.90 | 9300 | 2.82 | 14500 | 3.52 | | |
| 4200 | 1.92 | 9400 | 2.83 | 14600 | 3.56 | | |
| 4300 | 1.93 | 9500 | 2.83 | 14700 | 3.55 | | |
| 4400 | 1.94 | 9600 | 2.86 | 14800 | 3.55 | | |
| 4500 | 1.97 | 9700 | 2.93 | 14900 | 3.59 | | |
| 4600 | 1.99 | 9800 | 2.89 | 15000 | 3.56 | | |
| 4700 | 2.01 | 9900 | 2.91 | 15100 | 3.59 | | |
| 4800 | 2.02 | 10000 | 2.94 | 15200 | 3.59 | | |
| 4900 | 2.04 | 10100 | 2.94 | 15300 | 3.59 | | |



Cable loss
Microwave Cable Assembly, 6.5 GHz, 5.0 m, N/M type-N/M type
Suhner Switzerland, HL 4535

| Frequency, MHz | Cable loss, dB | Frequency, MHz | Cable loss, dB | Frequency, MHz | Cable loss, dB |
|----------------|----------------|----------------|----------------|----------------|----------------|
| 10 | 0.10 | 1700 | 1.79 | 4400 | 3.53 |
| 15 | 0.13 | 1800 | 1.86 | 4500 | 3.60 |
| 20 | 0.15 | 1900 | 1.93 | 4600 | 3.72 |
| 30 | 0.18 | 2000 | 2.00 | 4700 | 3.80 |
| 40 | 0.21 | 2100 | 2.06 | 4800 | 3.87 |
| 50 | 0.24 | 2200 | 2.13 | 4900 | 3.94 |
| 60 | 0.26 | 2300 | 2.19 | 5000 | 3.99 |
| 70 | 0.29 | 2400 | 2.25 | 5100 | 4.06 |
| 80 | 0.31 | 2500 | 2.32 | 5200 | 4.12 |
| 90 | 0.33 | 2600 | 2.38 | 5300 | 4.17 |
| 100 | 0.35 | 2700 | 2.45 | 5400 | 4.25 |
| 150 | 0.43 | 2800 | 2.51 | 5500 | 4.31 |
| 200 | 0.50 | 2900 | 2.57 | 5600 | 4.40 |
| 300 | 0.63 | 3000 | 2.64 | 5700 | 4.47 |
| 400 | 0.74 | 3100 | 2.73 | 5800 | 4.54 |
| 500 | 0.85 | 3200 | 2.79 | 5900 | 4.64 |
| 600 | 0.94 | 3300 | 2.86 | 6000 | 4.73 |
| 700 | 1.03 | 3400 | 2.91 | 6100 | 4.79 |
| 800 | 1.12 | 3500 | 2.97 | 6200 | 4.89 |
| 900 | 1.20 | 3600 | 3.02 | 6300 | 5.00 |
| 1000 | 1.28 | 3700 | 3.07 | 6400 | 5.06 |
| 1100 | 1.35 | 3800 | 3.14 | 6500 | 5.13 |
| 1200 | 1.43 | 3900 | 3.20 | | |
| 1300 | 1.50 | 4000 | 3.25 | | |
| 1400 | 1.58 | 4100 | 3.32 | | |
| 1500 | 1.65 | 4200 | 3.38 | | |
| 1600 | 1.72 | 4300 | 3.46 | | |



Cable loss
Microwave Cable Assembly, 4.0 GHz, 1.0 m, N/M type-N/M type
Suhner Switzerland, HL 4541

| Frequency, MHz | Cable loss, dB | Frequency, MHz | Cable loss, dB |
|----------------|----------------|----------------|----------------|
| 10 | 0.02 | 1700 | 0.45 |
| 15 | 0.03 | 1800 | 0.46 |
| 20 | 0.03 | 1900 | 0.48 |
| 30 | 0.04 | 2000 | 0.49 |
| 40 | 0.04 | 2100 | 0.52 |
| 50 | 0.05 | 2200 | 0.54 |
| 60 | 0.06 | 2300 | 0.55 |
| 70 | 0.06 | 2400 | 0.56 |
| 80 | 0.07 | 2500 | 0.58 |
| 90 | 0.07 | 2600 | 0.59 |
| 100 | 0.08 | 2700 | 0.61 |
| 150 | 0.10 | 2800 | 0.63 |
| 200 | 0.12 | 2900 | 0.64 |
| 300 | 0.15 | 3000 | 0.67 |
| 400 | 0.18 | 3100 | 0.70 |
| 500 | 0.20 | 3200 | 0.74 |
| 600 | 0.23 | 3300 | 0.77 |
| 700 | 0.25 | 3400 | 0.80 |
| 800 | 0.28 | 3500 | 0.82 |
| 900 | 0.30 | 3600 | 0.86 |
| 1000 | 0.31 | 3700 | 0.88 |
| 1100 | 0.33 | 3800 | 0.94 |
| 1200 | 0.35 | 3900 | 0.95 |
| 1300 | 0.37 | 4000 | 0.99 |
| 1400 | 0.39 | | |
| 1500 | 0.41 | | |
| 1600 | 0.43 | | |



14 APPENDIX F Abbreviations and acronyms

| | |
|----------------|---|
| A | ampere |
| AC | alternating current |
| A/m | ampere per meter |
| AM | amplitude modulation |
| AVRG | average (detector) |
| cm | centimeter |
| dB | decibel |
| dBm | decibel referred to one milliwatt |
| dB(μ V) | decibel referred to one microvolt |
| dB(μ V/m) | decibel referred to one microvolt per meter |
| dB(μ 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 |
| μ s | microsecond |
| NA | not applicable |
| NB | narrow band |
| OATS | open area test site |
| Ω | Ohm |
| PM | pulse modulation |
| 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 |
| WB | wideband |

END OF TEST REPORT

15 APPENDIX G Manufacturer's declaration of similarity



Elpas Solutions Ltd.
23 Habarzel Street
Tel-Aviv 69710, Israel

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Fax: +972 3 768 1415
www.elpas.com

Declaration of Identity

We, the undersigned,

Company: Elpas Solutions Ltd
Address: 23 Habarzel Street Tel Aviv 69710
Country: Israel
Telephone number: +972 37681400
Fax number: +972 37681415

declare under our sole responsibility that the following equipment:

The Elpas 5-PBB00433-XX Personnel Identity badge family of variants is a passive RFID Tag that provides wireless real-time monitoring and tracking of staff members and visitors.

All the variants have the same PCB, housing, battery, GFSK (175 kbit/s) modulated transceiver (433.42 MHz TX, 434.42 MHz RX). Some variants PCB are also populated with the components of a 125 KHZ receiver .

| | | |
|-------------------------------|---|--|
| Manufacturer: | Elpas Solutions Ltd | Software release: JS-703059 E^2 JS-703058 |
| Trademark | Elpas | |
| Model/Hardware version | 5-PBB00433, 5-PBB00433-1;5-PBB00433-7; 5-PBB00433-2;5-PBB00433-3;5-PBB00433-E; 5-PBB00433-K; 5-PBB01433-E;5-PBB00433-5; 5-PBB00433-G | |

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