



TEST REPORT

Test Report No. : UL-RPT-RP10809253JD16C V2.0

Manufacturer : Aava Mobile Oy
Model No. : INARI10-LTDN-2
FCC ID : 2ABVH-INARI102
IC Certification No. : 11875A-INARI102
Technology : *Bluetooth* – Low Energy
Test Standard(s) : FCC Parts 15.209(a) & 15.247(d);
Industry Canada RSS-Gen 6.13 & 8.9 / RSS-247 5.5

1. This test report shall not be reproduced in full or partial, without the written approval of UL VS LTD.
2. The results in this report apply only to the sample(s) tested.
3. The sample tested is in compliance with the above standard(s).
4. The test results in this report are traceable to the national or international standards.
5. Version 2.0 supersedes all previous versions.

Date of Issue: 04 September 2015

Checked by:

Ian Watch
Senior Engineer, Radio Laboratory

Issued by :

pp

John Newell
Quality Manager,
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This laboratory is accredited by UKAS.
The tests reported herein have been
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1. Customer Information




| | |
|----------------------|---|
| Company Name: | Aava Mobile Oy |
| Address: | Nahkatehtaankatu 2 90130 Oulu Finland |

2. Summary of Testing

2.1. General Information

| | |
|---------------------------------|---|
| Specification Reference: | 47CFR15.247 |
| Specification Title: | Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Section 15.247 |
| Specification Reference: | 47CFR15.209 |
| Specification Title: | Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Sections 15.207 and 15.209 |
| Specification Reference: | RSS-Gen Issue 4, November 13 2014 |
| Specification Title: | General Requirements for Compliance of Radio Apparatus |
| Specification Reference: | RSS-247 Issue 1, May 28 2015 |
| Specification Title: | Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices |
| Site Registration: | FCC: 209735; Industry Canada: 3245B-2 |
| Location of Testing: | UL VS LTD, Unit 3 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, RG24 8AH, United Kingdom |
| Test Dates: | 15 August 2015 to 26 August 2015 |

2.2. Summary of Test Results

| FCC Reference (47CFR) | IC Reference | Measurement | Result |
|--|--|--------------------------------|---|
| Part 15.247(d) / 15.209(a) | RSS-Gen 6.13 & 8.9 / RSS-247 5.5 | Transmitter Radiated Emissions |  |
| Key to Results  = Complied  = Did not comply | | | |

2.3. Methods and Procedures

| | |
|-------------------|--|
| Reference: | ANSI C63.10-2013 |
| Title: | American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices |
| Reference: | KDB 558074 D01 v03r03 June 9, 2015 |
| Title: | Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 |

2.4. Deviations from the Test Specification

For the measurements contained within this test report, there were no deviations from, additions to, or exclusions from the test specification identified above.

3. Equipment Under Test (EUT)

3.1. Identification of Equipment Under Test (EUT)

| | |
|--|--|
| Brand Name: | Aava Mobile Oy |
| Model Name or Number: | Inari10-LTDN-2 |
| Test Sample Serial Number: | BB44102116 |
| Hardware Version: | Tablet PC: RU Wireless Module: 1.0, 1.1 |
| Software Version: | Tablet PC :Windows Embedded 8.1 Industry Pro Build 9600 Wireless Module: SW19X15C_05.05.58.00 |
| FCC ID: | 2ABVH-INARI102 |
| Industry Canada Certification Number: | 11875A-INARI102 |

3.2. Description of EUT

The Equipment Under Test was a 10.1 inch tablet PC with cellular, WiFi, *Bluetooth* , NFC and GPS connectivity.

3.3. Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

3.4. Additional Information Related to Testing

| | | | |
|------------------------------|--|----------------|-------------------------|
| Technology Tested: | Bluetooth Low Energy (Digital Transmission System) | | |
| Type of Unit: | Transceiver | | |
| Channel Spacing: | 2 MHz | | |
| Modulation: | GFSK | | |
| Data Rate: | 1 Mbit/s | | |
| Power Supply Requirement(s): | Nominal | 3.8 VDC | |
| Transmit Frequency Range: | 2402 MHz to 2480 MHz | | |
| Transmit Channels Tested: | Channel ID | Channel Number | Channel Frequency (MHz) |
| | Bottom | 0 | 2402 |
| | Middle | 19 | 2440 |
| | Top | 39 | 2480 |

3.5. Support Equipment

The following support equipment was used to exercise the EUT during testing:

| | |
|------------------------------|--------------------|
| Description: | 2 GB Micro SD Card |
| Brand Name: | Generic |
| Model Name or Number: | Not marked |

| | |
|------------------------------|-----------------------|
| Brand Name: | Delta Electronics Inc |
| Description: | AC/DC Adaptor |
| Model Name or Number: | ADP-10BW B |
| Serial Number: | 05GW441000K |

| | |
|------------------------------|-------------|
| Description: | USB Cable |
| Brand Name: | None stated |
| Model Name or Number: | None stated |
| Serial Number: | None stated |

| | |
|------------------------------|-------------|
| Description: | PHF |
| Brand Name: | None stated |
| Model Name or Number: | None stated |
| Serial Number: | None stated |

| | |
|------------------------------|------------------------|
| Description: | Male to Male USB Cable |
| Brand Name: | None stated |
| Model Name or Number: | None stated |
| Serial Number: | None stated |

| | |
|------------------------------|-------------|
| Description: | USB Hub |
| Brand Name: | Belkin |
| Model Name or Number: | F5U404-BLK |
| Serial Number: | D12-0047312 |

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

The EUT was tested in the following operating mode(s):

- Transmitting at maximum power in *Bluetooth* LE test mode with modulation, maximum possible data length available and Pseudorandom Bit Sequence 9.

4.2. Configuration and Peripherals

The EUT was tested in the following configuration(s):

- The EUT was placed into *Bluetooth* LE test mode by running test software. This was a preinstalled application on the EUT. Once in *Bluetooth* LE test mode, channels, packet lengths and other settings were then set by running commands, provided by the customer, through an open terminal window.
- The EUT was powered by its own 3.8 VDC internal battery. The DC output of an AC/DC power supply was connected to the EUT via a USB cable. The power supply input was connected to a 120 VAC 60 Hz single phase supply.
- All ports were terminated during radiated emissions testing.

5. Measurements, Examinations and Derived Results

5.1. General Comments

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to *Section 6. Measurement Uncertainty* for details.

In accordance with UKAS requirements all the measurement equipment is on a calibration schedule. All equipment was within the calibration period on the date of testing.

5.2. Test Results

5.2.1. Transmitter Radiated Emissions

Test Summary:

| | | | |
|-----------------------------------|-------------|-------------------|----------------|
| Test Engineer: | David Doyle | Test Date: | 26 August 2015 |
| Test Sample Serial Number: | BB44102116 | | |

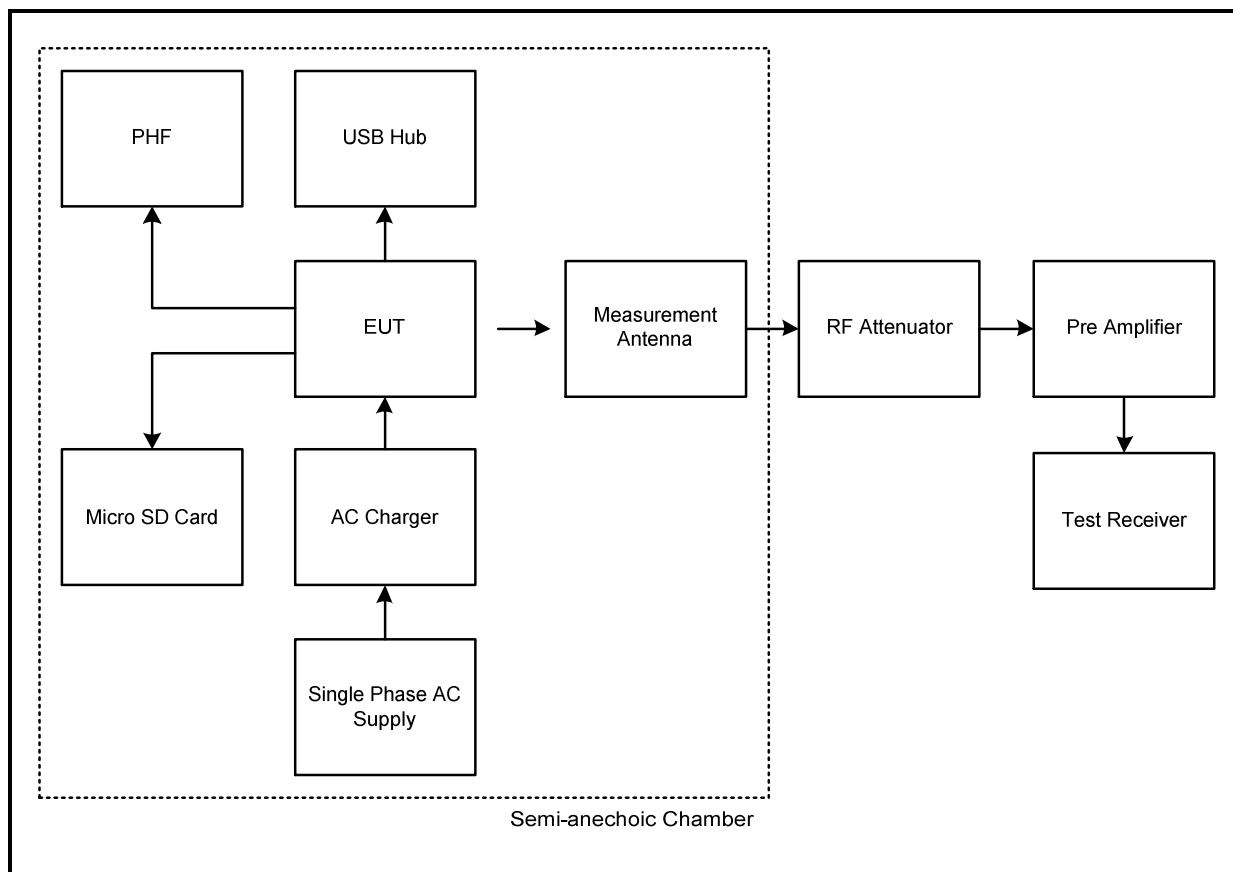
| | |
|-----------------------------------|----------------------------------|
| FCC Reference: | Parts 15.247(d) & 15.209(a) |
| Industry Canada Reference: | RSS-Gen 6.13 & 8.9 / RSS-247 5.5 |
| Test Method Used: | ANSI C63.10 Sections 6.3 and 6.5 |
| Frequency Range | 30 MHz to 1000 MHz |

Environmental Conditions:

| | |
|-------------------------------|----|
| Temperature (°C): | 25 |
| Relative Humidity (%): | 40 |

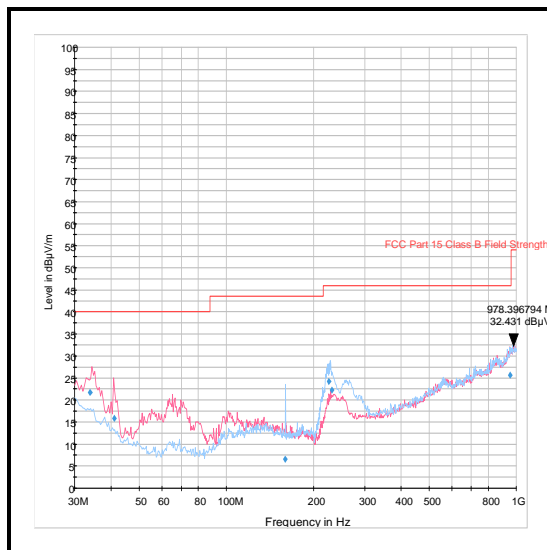
Note(s):

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. The preliminary scans showed similar emission levels below 1 GHz, for each channel of operation. Therefore final radiated emissions measurements were performed with the EUT set to the middle channel only.
3. All emissions shown on the pre-scan plot were investigated and found to be ambient or >20 dB below the applicable limit or below the measurement system noise floor. Therefore the highest peak noise floor reading of the measuring receiver was recorded in the table below.
4. Measurements below 1 GHz were performed in a semi-anechoic chamber (Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.
5. Pre-scans were performed and markers placed on the highest measured levels. The test receiver resolution bandwidth was set to 100 kHz and video bandwidth 300 kHz. A peak detector was used, sweep time was set to auto and trace mode was Max Hold.

Transmitter Radiated Emissions (continued)**Test setup for radiated measurements: Semi-anechoic chamber**

Transmitter Radiated Emissions (continued)**Results: Middle Channel**

| Frequency (MHz) | Antenna Polarity | Level (dB μ V/m) | Limit (dB μ V/m) | Margin (dB) | Result |
|-----------------|------------------|----------------------|----------------------|-------------|----------|
| 978.398 | Horizontal | 32.4 | 54.0 | 21.6 | Complied |

**Test Equipment Used:**

| Asset No. | Instrument | Manufacturer | Type No. | Serial No. | Date Calibration Due | Cal. Interval (Months) |
|-----------|------------------|-----------------|------------|------------|----------------------|------------------------|
| M1945 | Thermohygrometer | JM Handelspunkt | 30.5015.01 | Not stated | 23 Apr 2016 | 12 |
| K0001 | 5m RSE Chamber | Rainford EMC | N/A | N/A | 19 Mar 2016 | 12 |
| M1273 | Test Receiver | Rohde & Schwarz | ESIB26 | 100275 | 19 Mar 2016 | 12 |
| A490 | Bilog Antenna | Chase | CBL6111A | 1590 | 30 Apr 2016 | 12 |
| G0543 | Amplifier | Sonoma | 310N | 230801 | 06 Nov 2015 | 3 |
| A1834 | Attenuator | Hewlett Packard | 8491B | 10444 | 05 Mar 2016 | 12 |

Transmitter Radiated Emissions (continued)**Test Summary:**

| | | | |
|-----------------------------------|-------------|-------------------|----------------|
| Test Engineer: | Nick Steele | Test Date: | 15 August 2015 |
| Test Sample Serial Number: | BB44102116 | | |

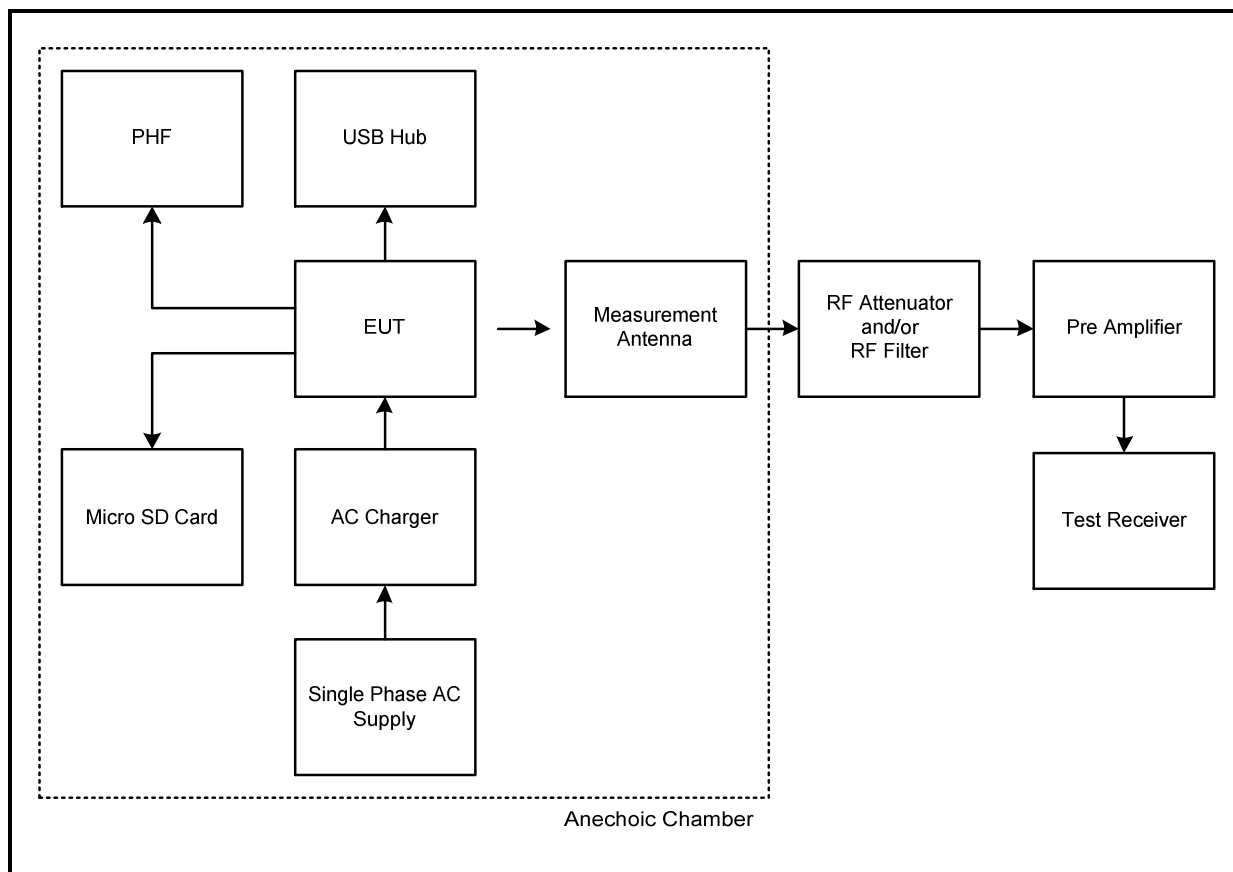
| | |
|-----------------------------------|--|
| FCC Reference: | Parts 15.247(d) & 15.209(a) |
| Industry Canada Reference: | RSS-Gen 6.13 & 8.9 / RSS-247 5.5 |
| Test Method Used: | FCC KDB 558074 Sections 11 & 12 referencing ANSI C63.10 Sections 6.3 and 6.6 |
| Frequency Range | 1 GHz to 25 GHz |

Environmental Conditions:

| | |
|-------------------------------|----|
| Temperature (°C): | 23 |
| Relative Humidity (%): | 41 |

Note(s):

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. The emission shown on the 1 GHz to 4 GHz plot is the EUT fundamental.
3. All emissions shown on the pre-scan plots were investigated and found to be ambient, or > 20 dB below the appropriate limit or below the noise floor of the measurement system therefore the highest peak and average noise floor levels were recorded as shown in the tables below.
4. Pre-scans above 1 GHz were performed in a fully anechoic chamber (Asset Number K0002) at a distance of 3 metres. The EUT was placed at a height of 1.5 metres above the test chamber floor in the centre of the chamber turntable. All measurement antennas were placed at a fixed height of 1.5 metres above the test chamber floor, in line with the EUT. Final measurements above 1 GHz were performed in a semi-anechoic chamber (Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 1.5 metres above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.
5. Pre-scans were performed and a marker placed on the highest measured level of the appropriate plot. The test receiver resolution bandwidth was set to 1 MHz and video bandwidth 3 MHz. The sweep time was set to auto.

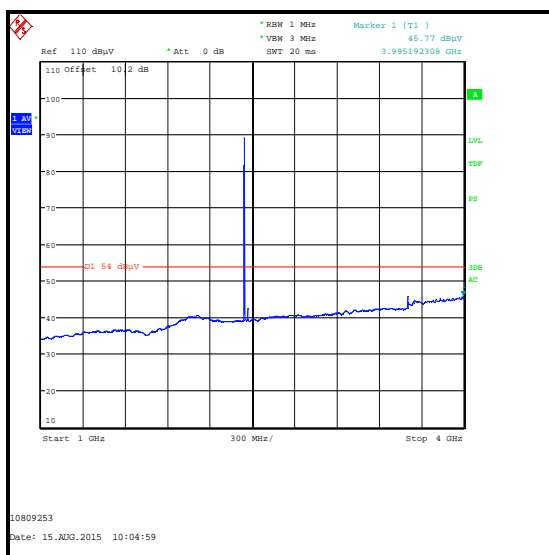
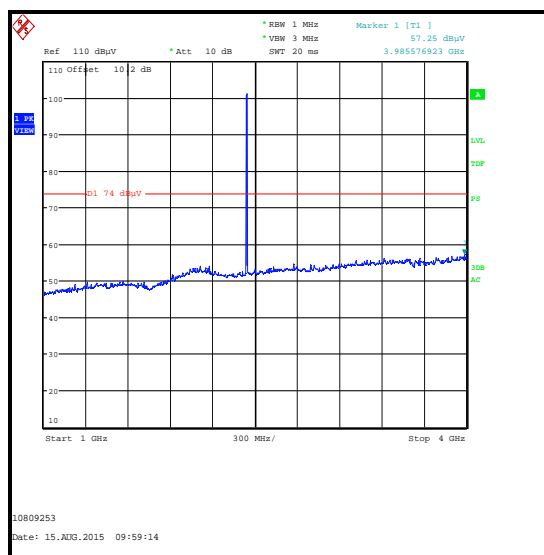
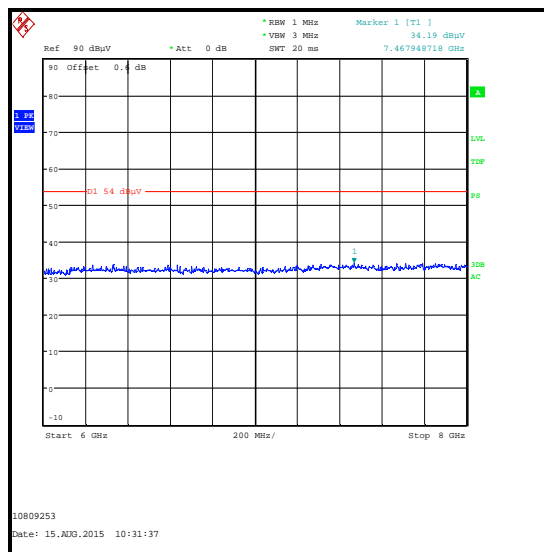
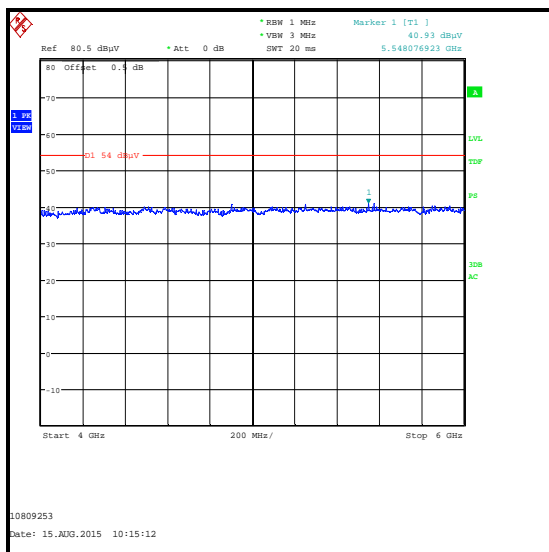
Transmitter Radiated Emissions (continued)**Test setup for radiated measurements: Anechoic chamber**

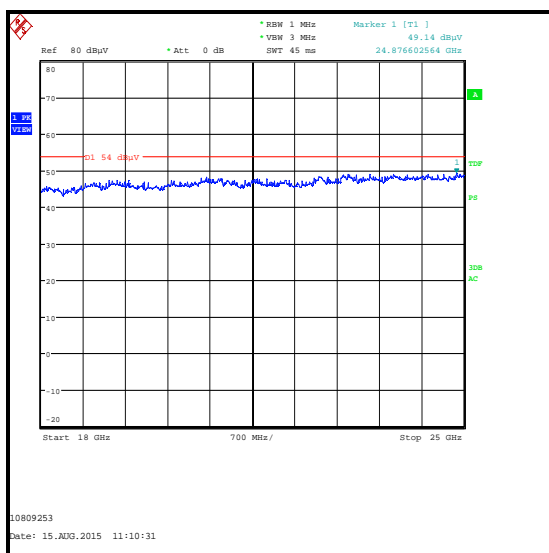
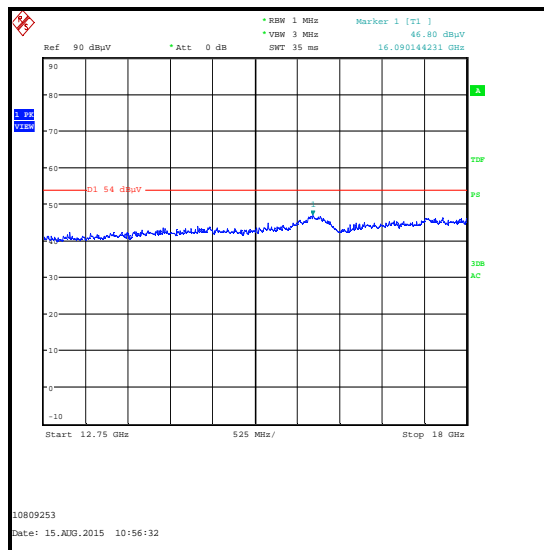
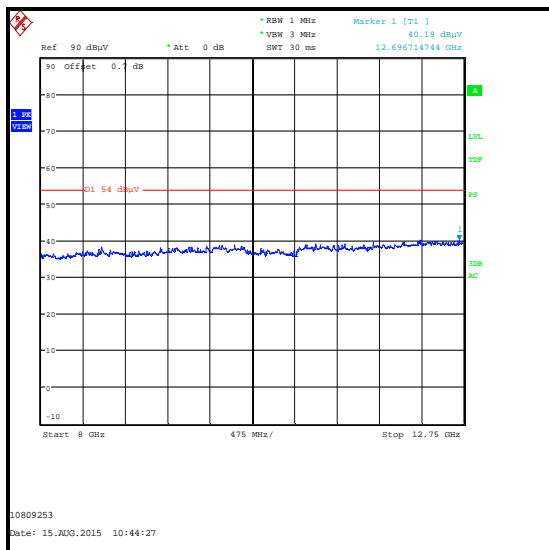
Transmitter Radiated Emissions (continued)**Results: Peak**

| Frequency (MHz) | Antenna Polarity | Peak Level (dB μ V/m) | Peak Limit (dB μ V/m) | Margin (dB) | Result |
|-----------------|------------------|---------------------------|---------------------------|-------------|----------|
| 3985.577 | Vertical | 57.3 | 74.0 | 16.7 | Complied |

Results: Average

| Frequency (MHz) | Antenna Polarity | Average Level (dB μ V/m) | Average Limit (dB μ V/m) | Margin (dB) | Result |
|-----------------|------------------|------------------------------|------------------------------|-------------|----------|
| 3995.192 | Vertical | 45.8 | 54.0 | 8.2 | Complied |

**Average Detector****Peak Detector**

Transmitter Radiated Emissions (continued)

Transmitter Radiated Emissions (continued)**Test Equipment Used:**

| Asset No. | Instrument | Manufacturer | Type No. | Serial No. | Date Calibration Due | Cal. Interval (Months) |
|------------------|-------------------|---------------------|-----------------|-------------------|-----------------------------|-------------------------------|
| M1656 | Thermohygrometer | JM Handelspunkt | 30.5015.13 | None stated | 23 Apr 2016 | 12 |
| K0002 | 3m RSE Chamber | Rainford EMC | N/A | N/A | 01 May 2016 | 12 |
| M1874 | Test Receiver | Rohde & Schwarz | ESU26 | 100553 | 12 Jun 2016 | 12 |
| A1534 | Pre Amplifier | Hewlett Packard | 8449B | 3008A00405 | 21 Dec 2015 | 12 |
| A1396 | Attenuator | Huber & Suhner | 6810.17.B | 757987 | 05 May 2016 | 12 |
| A1975 | High Pass Filter | AtlanTecRF | AFH-03000 | 090424010 | 17 Apr 2016 | 12 |
| A1818 | Antenna | EMCO | 3118 | 00075692 | 20 Dec 2015 | 12 |
| A253 | Antenna | Flann Microwave | 12240-20 | 128 | 20 Dec 2015 | 12 |
| A254 | Antenna | Flann Microwave | 14240-20 | 139 | 20 Dec 2015 | 12 |
| A255 | Antenna | Flann Microwave | 16240-20 | 519 | 20 Dec 2015 | 12 |
| A256 | Antenna | Flann Microwave | 18240-20 | 400 | 20 Dec 2015 | 12 |
| A436 | Antenna | Flann Microwave | 20240-20 | 330 | 20 Dec 2015 | 12 |

6. Measurement Uncertainty

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently the result of a measurement is only an approximation to the value measured (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor such that a confidence level of approximately 95% is maintained. For the purposes of this document "approximately" is interpreted as meaning "effectively" or "for most practical purposes".

| Measurement Type | Range | Confidence Level (%) | Calculated Uncertainty |
|-----------------------------|-------------------|----------------------|------------------------|
| Radiated Spurious Emissions | 30 MHz to 1 GHz | 95% | ± 5.65 dB |
| Radiated Spurious Emissions | 1 GHz to 26.5 GHz | 95% | ± 2.94 dB |

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty the published guidance of the appropriate accreditation body is followed.

7. Report Revision History

| Version Number | Revision Details | | |
|----------------|------------------|--------|--|
| | Page No(s) | Clause | Details |
| 1.0 | - | - | Initial Version |
| 2.0 | 1 & 6 | - | Changed Model Name from INARI10-LTDN-1 to INARI10-LTDN-2 |

--- END OF REPORT ---