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Test Report

Report Number:

F222063E2 2nd version

Equipment under Test (EUT):

Hino TCU

Applicant:

Hino Motors Sales U.S.A., Inc

Manufacturer:

Bosch Car Multimedia Portugal SA





References

- [1] ANSI C63.4:2014 American National Standard for Methods of Measuring of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
- [2] FCC 47 CFR Part 2: General Rules and Regulations
- [3] FCC 47 CFR Part 15: Radio Frequency Devices (Subpart B)
- [4] ICES-003 Issue 7: Information Technology Equipment (including Digital Apparatus)



Test Result

The requirements of the tests performed as shown in the overview (clause 4) were fulfilled by the equipment under test. The complete test results are presented in the following. "Passed" indicates that the equipment under test conforms with the relevant limits of the testing standard without taking any measurement uncertainty into account as stated in clause 10.2.8.2 of ANSI C63.4 (2014). However, the measurement uncertainty is calculated and shown in this test report.

| Tested and written by: | |
|---------------------------|-----------|
| | Signature |
| Reviewed and approved by: | |
| | Signature |

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The test results herein refer only to the tested sample. PHOENIX TESTLAB GmbH is not responsible for any generalisations or conclusions drawn from these test results concerning further samples. Any modification of the tested samples is prohibited and leads to the invalidity of this test report. Each page necessarily contains the PHOENIX TESTLAB Logo and the TEST REPORT NUMBER.



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1 Identification

1.1 Applicant

| Name: | Hino Motors Sales U.S.A., Inc |
|--|--|
| Address: | 45501 Twelve Mile Road, Novi, MI 48377 |
| Country: | United States of America |
| Name for contact purposes: | Anthony Luttman |
| Phone: | 248-221-9683 |
| Fax: | N.A. |
| eMail Address: | Luttman@hino.com |
| Applicant represented during the test by the following person: | None |

1.2 Manufacturer

| Name: | Bosch Car Multimedia Portugal SA |
|---|--|
| Address: | Rua Max Grundig 35 – Lomar, Braga 4705-820 |
| Country: | Portugal |
| Name for contact purposes: | Carla Caridade (BrgP/MFE11) |
| Phone: | +351 253 306306 |
| Fax: | N.A. |
| eMail Address: | Carla.Caridade@pt.bosch.com |
| Manufacturer represented during the test by the following person: | None |

1.3 Test Laboratory

The tests were carried out by:

PHOENIX TESTLAB GmbH Königswinkel 10 32825 Blomberg Germany

Accredited by Deutsche Akkreditierungsstelle GmbH (DAkkS) in compliance with DIN EN ISO/IEC 17025 under Reg. No. D-PL-17186-01-06 and D-PL-17186-01-05, FCC Test Firm Designation Number DE0004, FCC Test Firm Registration Number 469623, CAB Identifier DE0003 and ISED# 3469A.



1.4 EUT (Equipment under Test)

| Type of equipment: * | Telematics Control Unit |
|--|------------------------------------|
| Type / PMN: * | Hino Telematics Control Unit |
| Product number: * | 7620.000.271 |
| Serial number: * | 0015496 |
| FCC ID: * | 2AXKD-HINOTCU1 |
| IC certification number: * | 26600-HINOTCU1 |
| HVIN (Hardware Version Identification Number): * | Hino Telematics Control Unit 1 |
| FVIN (Firmware Version Identification Number): * | N.A. |
| EUT marking: * | None |
| PCB identifier: * | 8638.924.832 |
| Hardware version: * | 8959H01 |
| Software version: * | GENERIC.CCU.22.01.D.018.PRODUCTION |

* Declared by the applicant

Note: PHOENIX TESTLAB GmbH does not take samples. The samples used for tests are provided exclusively by the applicant.



1.5 Technical Data of Equipment

| EUT data | | | | | |
|---|--|--|--|--|--|
| Power supply EUT: * DC | | | | | |
| Supply voltage EUT: * Unom = 12.0 V Umin = 8.0 V DC Umax = 16.0 | | | | | |
| Temperature range: * | -40 °C to +70 °C | | | | |
| Lowest / highest internal clock frequency: * | 32.768 kHz/ 16 MHz / 24 MHz / 26 MHz / 2.480 GHz | | | | |

* Declared by the applicant

| Ports / Connectors | | | | | |
|--------------------|------------------------|---|-------------|------------|--|
| Identification | Connector | Length | Shielding | | |
| Identification | EUT | Ancillary | during test | (Yes / No) | |
| Antennas | SMB FAKRA plugs | Combined GPS/cellular/WLAN/BT antenna | ~ 0.9 m | Yes | |
| Main connector | Customized 24 pin | DC Laboratory plug used for power supply | ~ 2.0 m | No | |
| SIM slot | SIM slot | - | - | - | |
| USB | Micro USB port, type B | Test laptop | ~ 3 m | Yes | |

| Equipment used for testing | | | | |
|--|--|--|--|--|
| Cables (Connected to the EUT): *1*3 | Main connector-cable (~ 3 m) only connected to DC supply during the tests *³ USB cable – X7601 @ EUT connected to test laptop X700 – SMB port for WLAN/BT – connected to P407087 antenna during radiated tests. X7201, X7200, X7000 Cellular connectors + GNSS connector – connected to PP407087 antenna during radiated tests | | | |
| Laptop: *1 | - LENOVO ThinkPad T14 G2 (S/N: PF38R8H3) | | | |
| USB Hub*1 | - Lindy USB 2.0 Hub 4 Port N°42619 | | | |
| CAN/LIN Interface*1 | - Vector VN1630A | | | |
| Load box*1 | - cTP2019 EMC Load Box | | | |

*1 Provided by the applicant

*² Provided by the laboratory

*³ Connected via USB / fibre optic converters to the Laptop PC during the radiated tests in the anechoic chamber.

1.6 Dates

| Date of receipt of test sample: | 06.06.2023 |
|---------------------------------|------------|
| Start of test: | 07.06.2023 |
| End of test: | 07.06.2023 |



2 **Operational States**

Description of function of the EUT:

The product is a telematics control unit integrated into the vehicle. It collects data from the vehicle and the environment via various internal interfaces, processes and sends them over the mobile network customer's backend server.

The following states were defined as the operating conditions:

The EUT has been connected to a load box through the main connector. To simulate a CAN system, the 3 high speed CAN bus lines have been connected to 3 sensors and forwarded by means of CAN/optical converters to a CAN Vector interface to connect to the laptop outside the semi anechoic chamber.

The USB port from the EUT has been also connected via USB/optical converters to the laptop to simulate a data transmission.

A Kline port was also connected to the laptop through optical converters for simulation.

The cellular module was active during the test.

The RS232 interfaces were terminated.

During the tests the EUT and the load box were powered by 13.5 V DC from a generator.



Test setup





Label plate of the EUT

3 Additional Information

General information:

The EUT was not appropriately labeled as required by FCC/ISED.

Classification of cables:

- none

Maximum length of cables, declared by the manufacturer:

- no maximum length declared

Type of cables, declared by the manufacturer:

- no special type of cable declared

Deviation of the standard or test plan:

- no deviation

Special EMC measures, as a result of the tests:

- none



4 Overview

| Conducted emissions FCC 47 CFR Part 15 section 15.107 (a), (b) [3] ICES-003 Issue 7 section 3.2.1[4] | | | | | | |
|---|--|--|--------------------|---------------|--------|--|
| Application | Frequency range | Limits | Reference standard | Tested EUT | Status | |
| AC supply line Class B | 0.15 to 0.5 MHz 0.5 to 5 MHz 5 to 30 MHz | 66 to 56 dB(μV) QP* 56 to 46 dB(μV) AV* 56 dB(μV) QP 46 dB(μV) AV 60 dB(μV) QP 50 dB(μV) AV | ANSI C63.4 | - | N.A. | |
| *: Decreases with the logarithm of the frequency | | | | | | |

| Radiated emissions FCC 47 CFR Part 15 section 15.109 (a), (b) [3] | | | | | | | |
|---|--|---|--------------------|---------------|--------|--|--|
| Application | Frequency range | Limits | Reference standard | Tested EUT | Status | | |
| Radiated Emission Class B | 30 to 88 MHz 88 to 216 MHz 216 to 960 MHz 960 to 1000 MHz above 1000 MHz | 40.0 dB(μ V/m) QP at 3 m 43.5 dB(μ V/m) QP at 3 m 46.0 dB(μ V/m) QP at 3 m 54.0 dB(μ V/m) QP at 3 m 54.0 dB(μ V/m) AV at 3 m and 74.0 dB(μ V/m) PK at 3 m | ANSI C63.4 | - | Passed | | |

| Radiated emissions ICES-003 Issue 7 section 3.2.2 [4] | | | | | | |
|---|--|--|--------------------|---------------|--------|--|
| Application | Frequency range | Limits | Reference standard | Tested EUT | Status | |
| Radiated Emission Class B | 30 to 88 MHz 88 to 216 MHz 216 to 230 MHz 230 to 960 MHz 960 to 1000 MHz above 1000 MHz | 40.0 dB(μ V/m) QP at 3 m 43.5 dB(μ V/m) QP at 3 m 46.0 dB(μ V/m) QP at 3 m 47.0 dB(μ V/m) QP at 3 m 54.0 dB(μ V/m) QP at 3 m 54 dB(μ V/m) AV at 3 m and 74 dB(μ V/m) PK at 3 m | ANSI C63.4 | - | Passed | |

Remark: As declared by the applicant the highest generated frequency is the Bluetooth module frequency at 2.480 GHz.

Therefore the radiated emission measurement has been carried out up to the 5th harmonic in this case 13 GHz.

The EUT was classified by the applicant as CLASS B equipment.



5 Results

5.1 Radiated emissions

5.1.1 Test method

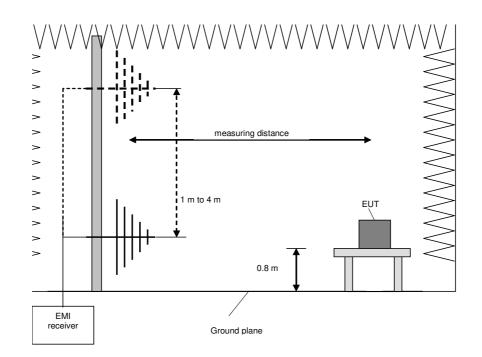
Preliminary and final measurement (30 MHz to 1 GHz)

The preliminary and final measurements were conducted in a semi-anechoic chamber with a metal ground plane in a 3 m distance.

During the test the EUT will be rotated in the range of 0 ° to 360 °, the measuring antenna will be set to horizontal and vertical polarization and raised and lowered in the range from 1 m to 4 m to find the maximum level of emissions.

The resolution bandwidth of the EMI Receiver will be set to the following values:

| Test | Frequency range | Resolution bandwidth |
|-------------------------|-----------------|----------------------|
| Preliminary measurement | 30 MHz to 1 GHz | 100 kHz |
| Frequency peak search | + / - 1 MHz | 10 kHz |
| Final measurement | 30 MHz to 1 GHz | 120 kHz |





Procedure preliminary measurement:

The following procedure is used:

- 1. Set the measurement antenna to 1 m height.
- 2. Monitor the frequency range at vertical polarisation and a EUT azimuth of 0 °.
- 3. Rotate the EUT by 360° to maximize the detected signals.
- 4. Repeat 1) to 2) with the vertical polarisation of the measuring antenna.
- 5. Increase the height of the antenna for 0.5 m and repeat steps 2 4 until the final height of 4 m is reached.
- 6. The highest values for each frequency will be saved by the software, including the antenna height, measurement antenna polarization and turntable azimuth for that value.

Procedure final measurement:

The following procedure is used:

- 1. Select the highest frequency peaks to the limit for the final measurement.
- 2. The software will determine the exact peak frequencies by doing a partial scan with reduced RBW with +/- 10 times the RBW of the pre-scan of the selected peaks.
- 3. If the EUT is portable or ceiling mounted, find the worst case EUT position (x,y,z) for the final test.
- 4. The worst measurement antenna height is found by the measurement software by varying the measurement antenna height by +/- 0.5 m from the value obtained in the preliminary measurement, and to monitor the emission level.
- 5. The worst azimuth turntable position is found by varying the turntable azimuth by +/- 30° from the value obtained in the preliminary measurement, and to monitor the emission level.
- 6. The final measurement is performed at the worst-case antenna height and the worst-case turntable azimuth
- 7. Steps 2 6 will be repeated for each frequency peak selected in step 1.

Preliminary and final measurement (1 – 40 GHz)

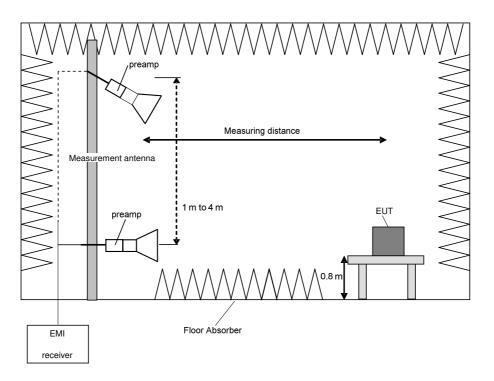
The preliminary and final measurements were conducted in a semi-anechoic chamber with floor absorbers between EUT and measurement antenna in a 3 m distance.

During the test the EUT will be rotated in the range of 0 ° to 360 °, the measuring antenna will be set to horizontal and vertical polarization and raised and lowered in the range from 1 m to 4 m to find the maximum level of emissions. For each height the angle of the antenna will be tilted so that the measurement antenna is always aiming at the EUT.

The resolution bandwidth of the EMI Receiver will be set to the following values:

| Test | Frequency range | Resolution bandwidth | | |
|-------------------------|-----------------|----------------------|--|--|
| Preliminary measurement | 1 - 40 GHz | 1 MHz | | |
| Frequency peak search | + / - 10 MHz | 100 kHz | | |
| Final measurement | 1 - 40 GHz | 1 MHz | | |





Procedure preliminary measurement:

The following procedure is used:

- 1. Set the measurement antenna to 1 m height.
- 2. Monitor the frequency range at vertical polarisation and a EUT azimuth of 0 °.
- 3. Rotate the EUT by 360° to maximize the detected signals.
- 4. Repeat 1) to 2) with the vertical polarisation of the measuring antenna.
- 5. Increase the height of the antenna for 0.5 m and repeat steps 2 4 until the final height of 4 m is reached.
- 6. The highest values for each frequency will be saved by the software, including the antenna height, measurement antenna polarization and turntable azimuth for the highest value.

Procedure final measurement:

The following procedure is used:

- 1. Select the highest frequency peaks to the limit for the final measurement.
- 2. The software will determine the exact peak frequencies by doing a partial scan with reduced RBW with +/-10 times the RBW of the pre-scan of the selected peaks.
- 3. If the EUT is portable or ceiling mounted, find the worst case EUT orientation (x,y,z) for the final test.
- 4. The worst measurement antenna height is found by the measurement software by varying the measurement antenna height by +/- 0.5 m from the worst case value obtained in the preliminary measurement, and to monitor the emission level.
- 5. The worst azimuth turntable position is found by varying the turntable azimuth by +/- 30° from the worst case value obtained in the preliminary measurement, and to monitor the emission level.
- 6. The final measurement is performed at the worst case antenna height and the worst case turntable azimuth.
- 7. Steps 2 6 will be repeated for each frequency peak selected in step 1.



5.1.2 Test results (Maximum unwanted emissions)

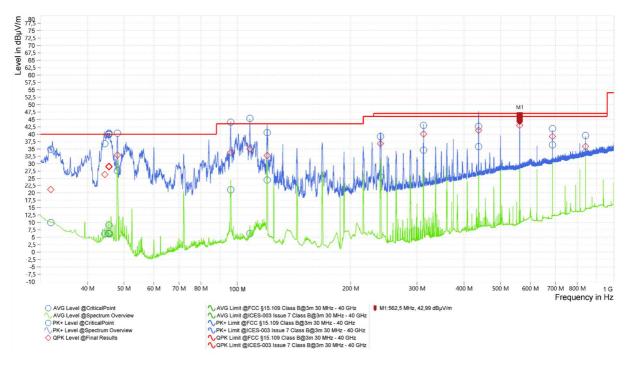
5.1.2.1 Test results final measurement (radiated 30 MHz to 1 GHz)

| Ambient temperature: | 23 °C | 1 | Date: | 07.06.2023 | | | | |
|----------------------|---|---|------------------|---------------------|--|--|--|--|
| Relative humidity: | 57 % | | Tested by: | Yassine KHALEK | | | | |
| Position of EUT: | For tests for f between 30 MHz and 1 GHz, the EUT was set-up on a table with a heig of 80 cm. The distance between EUT and antenna was 3 m. | | | | | | | |
| Cable guide: | For detail information of test set-up and the cable guide refer to the pictures in the annex A in the test report. | | | | | | | |
| Test record: | Plots for each freq | uency range are subm | itted below. | | | | | |
| Remark: | Operation mode: (| CAN, K-Line, RS232, C | ellular, WLAN, G | SNSS, USB connected | | | | |
| | | | | | | | | |
| Calculation: | | | | | | | | |
| Max Peak [dBµV/m] | = Reading [dBµV] | + Correction [dB/m] | | | | | | |
| Average [dBµV/m] | = Reading [dBµV] | + Correction [dB/m] | | | | | | |
| Correction [dB/m] | | ble attenuation [dB] + o nly for Average values, | | | | | | |
| Margin [dB] | = Limit [dBµV/m] - | - Max Peak Average [| dBµV/m] | | | | | |

The results are shown in the following:



Spurious emissions from 30 MHz to 1GHz:



Result according to FCC 47 CFR Part 15 section 15.109 (a), (b) [3]

| Frequency [MHz] | QPK Level [dBµV/m] | QPK Limit [dBµV/m] | QPK Margin [dB] | Correction [dB] | Polarization | Azimuth [deg] | Antenna Height [m] | Meas. BW [kHz] | Meas. Time [ms] |
|--------------------|-----------------------|-----------------------|-----------------------|--------------------|--------------|------------------|--------------------------|-------------------|--------------------|
| 31.95 | 21.12 | 40.0 | 18.88 | 24.79 | V | 56.38 | 1.17 | 120.0 | 1,000.000 |
| 44.46 | 26.38 | 40.0 | 13.62 | 17.25 | V | 55.41 | 1.06 | 120.0 | 1,000.000 |
| 45.60 | 28.92 | 40.0 | 11.08 | 16.51 | V | 36.42 | 1.02 | 120.0 | 1,000.000 |
| 45.60 | 29.19 | 40.0 | 10.81 | 16.51 | V | 39.66 | 1.03 | 120.0 | 1,000.000 |
| 45.60 | 29.13 | 40.0 | 10.87 | 16.51 | V | 31.99 | 1 | 120.0 | 1,000.000 |
| 48.03 | 32.93 | 40.0 | 7.07 | 14.98 | V | 120.11 | 1 | 120.0 | 1,000.000 |
| 96.03 | 33.75 | 43.5 | 9.75 | 17.14 | V | 148.44 | 1.27 | 120.0 | 1,000.000 |
| 108.00 | 35.02 | 43.5 | 8.48 | 17.69 | V | 181.6 | 1.17 | 120.0 | 1,000.000 |
| 120.03 | 32.75 | 43.5 | 10.75 | 17.61 | V | 163.69 | 1 | 120.0 | 1,000.000 |
| 240.03 | 36.81 | 46.0 | 9.19 | 17.24 | Н | 119.79 | 1.02 | 120.0 | 1,000.000 |
| 312.51 | 40.08 | 46.0 | 5.92 | 19.43 | Н | 134.08 | 1 | 120.0 | 1,000.000 |
| 437.49 | 41.32 | 46.0 | 4.68 | 22.74 | V | 55.15 | 1.05 | 120.0 | 1,000.000 |
| 562.50 | 42.99 | 46.0 | 3.01 | 25.38 | V | 177 | 1 | 120.0 | 1,000.000 |
| 687.48 | 39.20 | 46.0 | 6.80 | 27.07 | Н | 156.02 | 1.06 | 120.0 | 1,000.000 |
| 841.50 | 35.88 | 46.0 | 10.12 | 29.40 | Н | 236.52 | 1.38 | 120.0 | 1,000.000 |



Result according to ICES-003 Issue 7 section 3.2.2 [4]

| Frequency [MHz] | QPK Level [dBµV/m] | QPK Limit [dBµV/m] | QPK Margin [dB] | Correction [dB] | Polarization | Azimuth [deg] | Antenna Height [m] | Meas. BW [kHz] | Meas. Time [ms] |
|--------------------|-----------------------|-----------------------|-----------------------|--------------------|--------------|------------------|--------------------------|-------------------|--------------------|
| 31.95 | 21.12 | 40.0 | 18.88 | 24.79 | V | 56.38 | 1.17 | 120.0 | 1,000.000 |
| 44.46 | 26.38 | 40.0 | 13.62 | 17.25 | V | 55.41 | 1.06 | 120.0 | 1,000.000 |
| 45.60 | 28.92 | 40.0 | 11.08 | 16.51 | V | 36.42 | 1.02 | 120.0 | 1,000.000 |
| 45.60 | 29.19 | 40.0 | 10.81 | 16.51 | V | 39.66 | 1.03 | 120.0 | 1,000.000 |
| 45.60 | 29.13 | 40.0 | 10.87 | 16.51 | V | 31.99 | 1 | 120.0 | 1,000.000 |
| 48.03 | 32.93 | 40.0 | 7.07 | 14.98 | V | 120.11 | 1 | 120.0 | 1,000.000 |
| 96.03 | 33.75 | 43.5 | 9.75 | 17.14 | V | 148.44 | 1.27 | 120.0 | 1,000.000 |
| 108.00 | 35.02 | 43.5 | 8.48 | 17.69 | V | 181.6 | 1.17 | 120.0 | 1,000.000 |
| 120.03 | 32.75 | 43.5 | 10.75 | 17.61 | V | 163.69 | 1 | 120.0 | 1,000.000 |
| 240.03 | 36.81 | 47.0 | 10.19 | 17.24 | Н | 119.79 | 1.02 | 120.0 | 1,000.000 |
| 312.51 | 40.08 | 47.0 | 6.92 | 19.43 | Н | 134.08 | 1 | 120.0 | 1,000.000 |
| 437.49 | 41.32 | 47.0 | 5.68 | 22.74 | V | 55.15 | 1.05 | 120.0 | 1,000.000 |
| 562.50 | 42.99 | 47.0 | 4.01 | 25.38 | V | 177 | 1 | 120.0 | 1,000.000 |
| 687.48 | 39.20 | 47.0 | 7.80 | 27.07 | Н | 156.02 | 1.06 | 120.0 | 1,000.000 |
| 841.50 | 35.88 | 47.0 | 11.12 | 29.40 | Н | 236.52 | 1.38 | 120.0 | 1,000.000 |

Test result: Passed

| Test equipment (please refer to chapter 7 for details) | |
|--|--|
| Test equipment (please refer to chapter 7 for details) | |
| 3- 12 | |



5.1.2.2 Result final measurement above 1 GHz

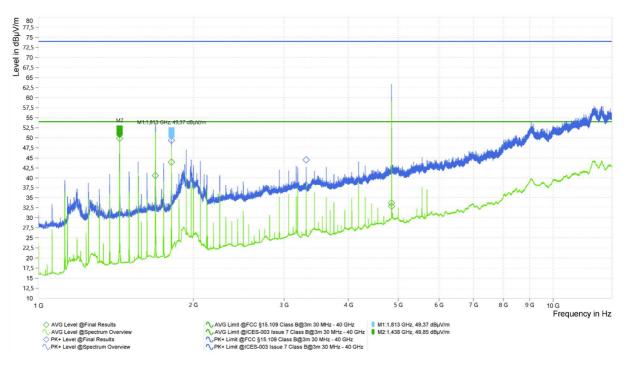
| Ambient temperature: | 23 °C | | Date: | 07.06.2023 | | | | |
|----------------------|---|--|------------------|--------------------|--|--|--|--|
| Relative humidity: | 57 % | | Tested by: | Yassine KHALEK | | | | |
| | | - | | | | | | |
| Position of EUT: | For tests for f between 1 GHz and the 5 th harmonic, the EUT was set-up on a table with a height of 80 cm. The distance between EUT and antenna was 3 m. | | | | | | | |
| Cable guide: | For detail information of test set-up and the cable guide refer to the pictures in the annex A in the test report. | | | | | | | |
| Test record: | Plots for each freq | uency range are subm | itted below. | | | | | |
| Remark: | Operation mode: 0 | CAN, K-Line, RS232, C | ellular, WLAN, G | NSS, USB connected | | | | |
| | | | | | | | | |
| Calculation: | | | | | | | | |
| Max Peak [dBµV/m] | = Reading [dBµV] | + Correction [dB/m] | | | | | | |
| Average [dBµV/m] | = Reading [dBµV] | + Correction [dB/m] | | | | | | |
| Correction [dB/m] | | ble attenuation [dB] + on here attenuation [dB] + on here attenues, here attenues, here attenues, here attenues, | | | | | | |
| Margin [dB] | = Limit [dBµV/m] - | - Max Peak Average [| dBµV/m] | | | | | |

The curves in the diagram only represent the maximum measured value for each frequency point of all preliminary measurements, which were carried out with various EUT and antenna positions.

The top measured curve represents the peak measurement. The measured points marked with " \diamond " are frequency points for the final peak detector measurement. These values are indicated in the following table. The bottom measured curve represents the average measurement. The measured points marked with " \diamond " are frequency points for the final average detector measurement.



Spurious emissions from 1 GHz to 13 GHz:



Result tables:

Operation mode 1:

| Frequency [MHz] | PK+ Level [dBµV/m] | PK+ Limit [dBµV/m] | PK+ Margin [dB] | AVG Level [dBµV/m] | AVG Limit [dBµV/m] | AVG Margin [dB] | Correction [dB] | Polarization | Azimuth [deg] | Antenna Height [m] | Meas. BW [kHz] |
|--------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|--------------------|--------------|------------------|--------------------------|-------------------|
| 1437.50 | - | - | - | 49.85 | 54.0 | 4.15 | -6.92 | Н | 290.57 | 2.47 | 1000.0 |
| 4855.00 | - | - | - | 32.87 | 54.0 | 21.13 | 9.82 | V | 324.47 | 2.57 | 1000.0 |
| 4852.25 | - | - | - | 33.68 | 54.0 | 20.32 | 9.82 | V | 317.02 | 2.7 | 1000.0 |
| 1812.50 | 49.37 | 74.0 | 24.63 | 43.96 | 54.0 | 10.04 | -4.27 | Н | 326.65 | 1.4 | 1000.0 |
| 3312.50 | 44.53 | 74.0 | 29.47 | 38.20 | 54.0 | 15.80 | 3.60 | V | 279.53 | 1.63 | 1000.0 |
| 1687.50 | - | - | - | 40.62 | 54.0 | 13.38 | -4.81 | Н | 336.33 | 1.25 | 1000.0 |

Test result: Passed

Test equipment (please refer to chapter 7 for details) 1 - 9, 12



6 Measurement Uncertainties

| Conducted measurements | | | | | | | |
|--|--|---|--|--|--|--|--|
| Measurement method | Standard used for calculating measurement uncertainty | Expanded measurement uncertainty (95 %) U _{lab} | | | | | |
| Conducted emissions from 150 kHz to 30 MHz with LISN | CISPR 16-4-2 | 2.8 dB | | | | | |

| Radiated measurements | | | | | | | | | |
|--|------------------------------|--------|--|--|--|--|--|--|--|
| Radiated field strength M276 | Radiated field strength M276 | | | | | | | | |
| R&S HL562E @ 3 m 30 MHz – 1 GHz | CISPR 16-4-2 | 4.8 dB | | | | | | | |
| R&S HL050 @ 3 m | - | | | | | | | | |
| 1 – 6 GHz | CISPR 16-4-2 | 5.1 dB | | | | | | | |
| 6 – 18 GHz | CISPR 16-4-2 | 5.4 dB | | | | | | | |
| Flann Standard Gain Horns 18 – 40 GHz | - | 5.9 dB | | | | | | | |



7 Test Equipment used for Tests

| No. | Test equipment | Туре | Manufacturer | Serial No. | PM. No. | Cal. Date | Cal Due |
|-----|---|--------------------------------|------------------------------|------------------------------|---------|---------------------------|-----------|
| 1 | Low Noise Amplifier 100 MHz - 18 GHz | LNA-30- 00101800-25- 10P | Narda-Miteq | 2110917 | 482967 | 18.02.2022 02.2024 | |
| 2 | Log Per Antenna | HL050 | Rohde & Schwarz | 4062.4063.02- 100908 | 482977 | 22.09.2022 | 09.2025 |
| 3 | RF Switch Matrix | OSP220 | Rohde & Schwarz | | 482976 | Calibration not | necessary |
| 4 | Turntable | TT3.0-3t | Maturo | 825/2612/.01 | 483224 | Calibration not | necessary |
| 5 | Antennasupport | BAM 4.5-P-10kg | Maturo | 222/2612.01 | 483225 | Calibration not | necessary |
| 6 | Controller | NCD | Maturo | 474/2612.01 | 483226 | Calibration not necessary | |
| 7 | System software EM276 | EMC32 | Rohde & Schwarz | 100970 | 482972 | Calibration not | necessary |
| 8 | EMI Test receiver | ESW44 | Rohde & Schwarz | 101828 | 482979 | 08.12.2021 | 12.2023 |
| 9 | Semi Anechoic Chamber M276 | SAC5-2 | Albatross Projects | C62128-A540- A138-10-0006 | 483227 | Calibration not necessary | |
| 10 | Antenna (Bilog) | HL562E | Rohde & Schwarz | 101079 | 482978 | 18.03.2021 | 03.2024 |
| 11 | Attenuator 6 dB | WA2-6 | Weinschel | BG0931 | 483499 | Calibration not | necessary |
| 12 | Power Supply | TOE8852 (DC) | Toellner Electronic Inst. | 51712 | 480233 | Calibration not | necessary |



8 Test site Verification

| Test equipment | PM. No. | Frequency range | Type of validation | According to | Val. Date | Val Due |
|-------------------------------|---------|-----------------|--------------------|--|------------|------------|
| Semi anechoic chamber M276 | 483227 | 30 – 1000 MHz | NSA/RSM | CISPR 16-1-4 + Cor1:2010 + A1:2012 +A2:2017 | 01.03.2023 | 01.03.2025 |
| Semi anechoic chamber M276 | 483227 | 1 -18 GHz | SVSWR | CISPR 16-1-4 + Cor1:2010 + A1:2012 +A2:2017 | 28.02.2023 | 28.02.2025 |

9 Report History

| Report Number | Date | Comment |
|-----------------------------------|------------|--|
| F222063E2 | 30.01.2024 | Initial Test Report |
| F222063E2 2 nd version | 20.02.2024 | Minor changes: - Updated HVIN and ICES version - Editorial changes |
| - | - | - |

10 List of Annexes

| Annex A | Test Setup Photos | 3 pages |
|---------|---------------------|---------|
| Annex B | EUT External Photos | 2 pages |
| Annex C | EUT Internal Photos | 3 pages |