



FCC RF Test Report

APPLICANT : HMD Global Oy
EQUIPMENT : Smart Phone
BRAND NAME : NOKIA
MODEL NAME : TA-1257
FCC ID : 2AJOTTA-1257
STANDARD : 47 CFR Part 2, 22, 24, 27
CLASSIFICATION : PCS Licensed Transmitter Held to Ear (PCE)

The product was received on May 29, 2020 and completely tested on Jul. 29, 2020. We, Sporton International (Kunshan) Inc., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.26-2015 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International (Kunshan) Inc., the test report shall not be reproduced except in full.

Jason Jia

Reviewed by: Jason Jia / Supervisor

James Huang

Approved by: James Huang / Manager



Sporton International (Kunshan) Inc.

No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
People's Republic of China



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REVISION HISTORY

| REPORT NO. | VERSION | DESCRIPTION | ISSUED DATE |
|------------|---------|-------------------------|---------------|
| FG052902C | Rev. 01 | Initial issue of report | Sep. 04, 2020 |
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SUMMARY OF TEST RESULT

| Report Section | FCC Rule | Description | Limit | Result | Remark |
|----------------|------------------------------------|---|--|--------|---|
| 3.4 | §2.1053 §24.238(a) §27.53(g) | Radiated Spurious Emission (5G NR n2) (5G NR n66) | $< 43 + 10 \log_{10}(P[\text{Watts}])$ | PASS | Under limit 35.62 dB at 7484.000 MHz |



1 General Description

1.1 Applicant

HMD Global Oy
Bertel Jungin aukio 9, 02600 Espoo, Finland

1.2 Manufacturer

HMD Global Oy
Bertel Jungin aukio 9, 02600 Espoo, Finland

1.3 Product Feature of Equipment Under Test

| Product Feature | |
|---------------------------------|---|
| Equipment | Smart Phone |
| Brand Name | NOKIA |
| Model Name | TA-1257 |
| FCC ID | 2AJOTTA-1257 |
| EUT supports Radios application | GSM/WCDMA/LTE/5G NR/NFC WLAN 2.4GHz 802.11b/g/n HT20 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE FM Receiver and GNSS |
| IMEI Code | Radiation : 353139110020384 |
| HW Version | HW03 |
| SW Version | 00VPO_0_092 |
| EUT Stage | Identical Prototype |

Remark:

1. Only 5G NR bands are tested in this report, all the other RF bands are tested in the other reports separately.
2. 5G NR supports CP-OFDM and DFT-s-OFDM modulation, DFT-s-OFDM power is higher than CP-OFDM, so only DFT-s-OFDM modulation is perform for all test.



1.4 Product Specification of Equipment Under Test

| Standards-related Product Specification | |
|---|--|
| Tx Frequency | 5G NR n2: 1852.5 MHz ~ 1907.5 MHz 5G NR n5: 826.5 MHz ~ 846.5 MHz 5G NR n66: 1712.5 MHz ~ 1777.5 MHz |
| Rx Frequency | 5G NR n2: 1932.5 MHz ~ 1987.5 MHz 5G NR n5: 871.5 MHz ~ 891.5 MHz 5G NR n66: 2112.5 MHz~ 2197.5 MHz |
| Bandwidth | n2, n5, n66: 5MHz / 10MHz / 15MHz / 20MHz |
| SCS | n2, n5, n66: 15KHz |
| Antenna Gain | n2 : -1.10 dBi n5 : -1.10 dBi n66 : -2.50 dBi |
| Type of Modulation | CP-OFDM: QPSK / 16QAM / 64QAM / 256QAM DFT-s-OFDM: PI/2 BPSK / QPSK / 16QAM / 64QAM / 256QAM |

1.5 Modification of EUT

No modifications are made to the EUT during all test items.

1.6 Re-use of Measured Data

1.6.1 Introduction Section

This application re-uses data collected on a similar device. The subject device of this application (Model: TA-1257, FCC ID: 2AJOTTA-1257) is electrically identical to the reference device (Model: TA-1243, TA-1251, FCC ID: 2AJOTTA-1243) for the portions of the circuitry corresponding to the data being re-used, as treated by KDB Publication 484596 D01.

1.6.2 Difference Section

For details concerning the similarity with respect to component placement, mechanical/electrical design etc., please refer to the Product Equality Declaration.

The re-used RF data includes the following bands provided in Appendix C (Sporton RF Report No. FG051228D for the reference device Model: TA-1243, TA-1251, FCC ID: 2AJOTTA-1243).

1.6.3 Reference detail Section:

| Equipment Class | Reference FCC ID | Report Number | Report Title/Section |
|-----------------|------------------|--|---|
| PCE (5G NR) | 2AJOTTA-1243 | Part22, 24, 27 (Report No. FG051228D) | All sections applicable for 5G NR n2/n5/n66 except for n2/n66 of NSA mode for RSE testing |



1.6.4 Spot Check Verification Data Section

In order to confirm hardware similarity of the subject device with the reference device, spot check measurements were performed on the subject device for the following test items, the test result were consistent with FCC ID: 2AJOTTA-1243, the RSE of EN-DC_13A_n2A/ EN-DC_13A_n66A to re-test.

Assertions concerning the similarity of these devices are based on representations by the applicant. The applicant accepts full responsibility for the validity of the similarity claim, and for the determination that verification test data are sufficient to support it.

Table with 5 columns: Test Item, Mode, 2AJOTTA-1243 Worst Result, 2AJOTTA-1257 Worst Result, Difference (dB). Rows include modes like 5G NR n2, EN-DC_66A_n2A, EN-DC_5A_n2A, EN-DC_2A_n5A, EN-DC_66A_n5A, EN-DC_2A_n66A, EN-DC_5A_n66A.

1.7 Testing Location

Sporton International (Kunshan) Inc. is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Table with 4 columns: Test Firm, Test Site Location, Test Site No., FCC Designation No., FCC Test Firm Registration No. Values include Sporton International (Kunshan) Inc., No. 1098, Pengxi North Road, Kunshan Economic Development Zone, Jiangsu Province 215300 People's Republic of China, 03CH04-KS, CN1257, 314309.



1.8 Test Software

| Item | Site | Manufacture | Name | Version |
|------|-----------|-------------|------|--------------|
| 1. | 03CH04-KS | AUDIX | E3 | 6.2009-8-24a |

1.9 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ 47 CFR Part 2, 22, 24, 27
- ♦ ANSI C63.26-2015
- ♦ FCC KDB 971168 D01 Power Meas License Digital Systems v03r01
- ♦ FCC KDB 412172 D01 Determining ERP and EIRP v01r01

Remark:

All test items were verified and recorded according to the standards and without any deviation during the test.




2 Test Configuration of Equipment Under Test

2.1 Test Mode

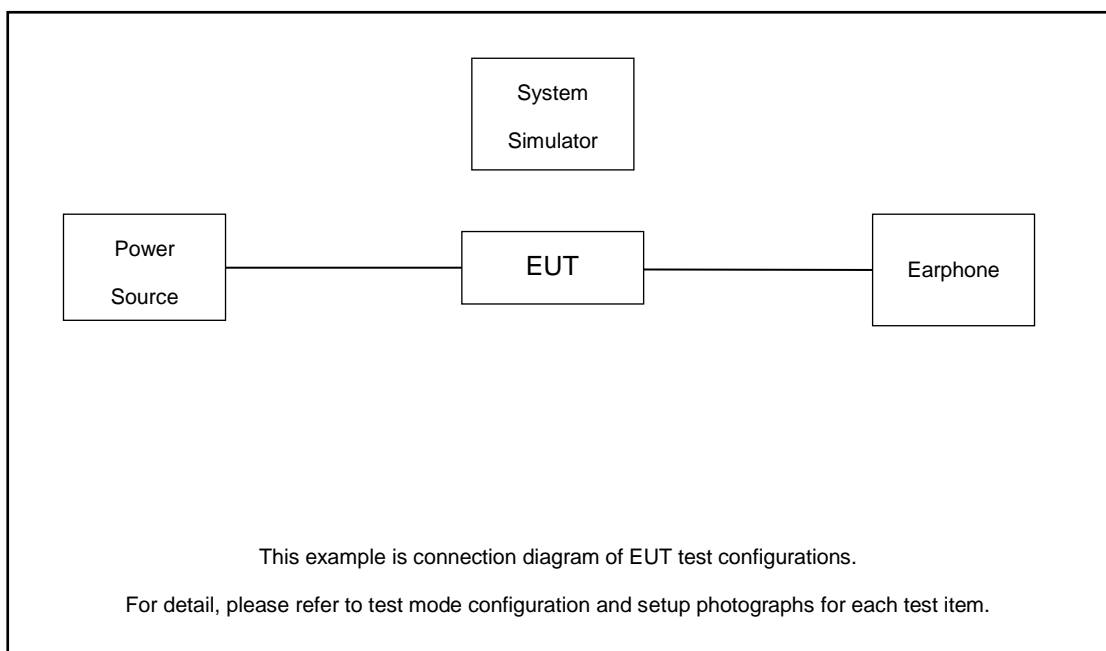
Antenna port radiated test items are performed according to KDB 971168 D01 Power Meas License Digital Systems v03r01 with maximum output power.

For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Y plane) were recorded in this report.

The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported.

| | X Plane | Y Plane | Z Plane |
|--------------------------|---|---|---|
| Orthogonal Planes of EUT |  |  |  |

2.2 Connection Diagram of Test System





2.3 Support Unit used in test configuration and system

| Item | Equipment | Trade Name | Model No. | FCC ID | Data Cable | Power Cord |
|------|------------------|------------|-------------------|--------|------------|-------------------|
| 1. | LTE Base Station | Anritsu | MT8821C | N/A | N/A | Unshielded, 1.8 m |
| 2. | NR Base Station | Anritsu | MT8000A | N/A | N/A | Unshielded, 1.8 m |
| 3. | Fixture | INTEL | NGFF Card Carrier | N/A | N/A | N/A |

2.4 Frequency List of Low/Middle/High Channels

| 5G NR n2 Channel and Frequency List | | | | |
|-------------------------------------|------------------------|--------|--------|---------|
| BW [MHz] | Channel/Frequency(MHz) | Lowest | Middle | Highest |
| 20 | Channel | 372000 | 376000 | 380000 |
| | Frequency | 1860 | 1880 | 1900 |
| 15 | Channel | 371500 | 376000 | 380500 |
| | Frequency | 1857.5 | 1880 | 1902.5 |
| 10 | Channel | 371000 | 376000 | 381000 |
| | Frequency | 1855 | 1880 | 1905 |
| 5 | Channel | 370500 | 376000 | 381500 |
| | Frequency | 1852.5 | 1880 | 1907.5 |

| 5G NR n5 Channel and Frequency List | | | | |
|-------------------------------------|------------------------|--------|--------|---------|
| BW [MHz] | Channel/Frequency(MHz) | Lowest | Middle | Highest |
| 20 | Channel | 166800 | 167300 | 167800 |
| | Frequency | 834 | 836.5 | 839 |
| 15 | Channel | 166300 | 167300 | 168300 |
| | Frequency | 831.5 | 836.5 | 841.5 |
| 10 | Channel | 165800 | 167300 | 168800 |
| | Frequency | 829 | 836.5 | 844 |
| 5 | Channel | 165300 | 167300 | 169300 |
| | Frequency | 826.5 | 836.5 | 846.5 |



| 5G NR n66 Channel and Frequency List | | | | |
|--------------------------------------|------------------------|--------|--------|---------|
| BW [MHz] | Channel/Frequency(MHz) | Lowest | Middle | Highest |
| 20 | Channel | 344000 | 349000 | 354000 |
| | Frequency | 1720 | 1745 | 1770 |
| 15 | Channel | 343500 | 349000 | 354500 |
| | Frequency | 1717.5 | 1745 | 1772.5 |
| 10 | Channel | 343000 | 349000 | 355000 |
| | Frequency | 1715 | 1745 | 1775 |
| 5 | Channel | 342500 | 349000 | 355500 |
| | Frequency | 1712.5 | 1745 | 1777.5 |

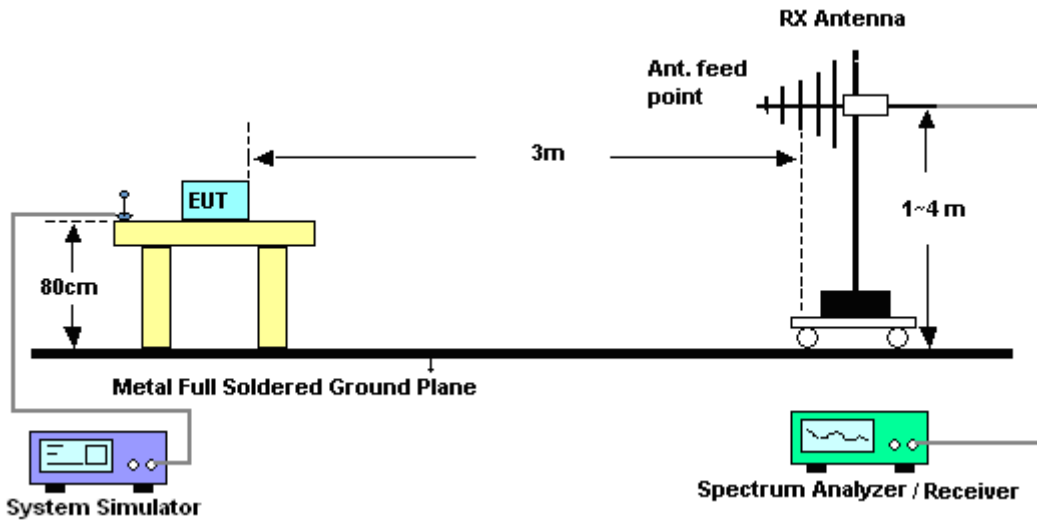
3 Radiated Test Items

3.1 Measuring Instruments

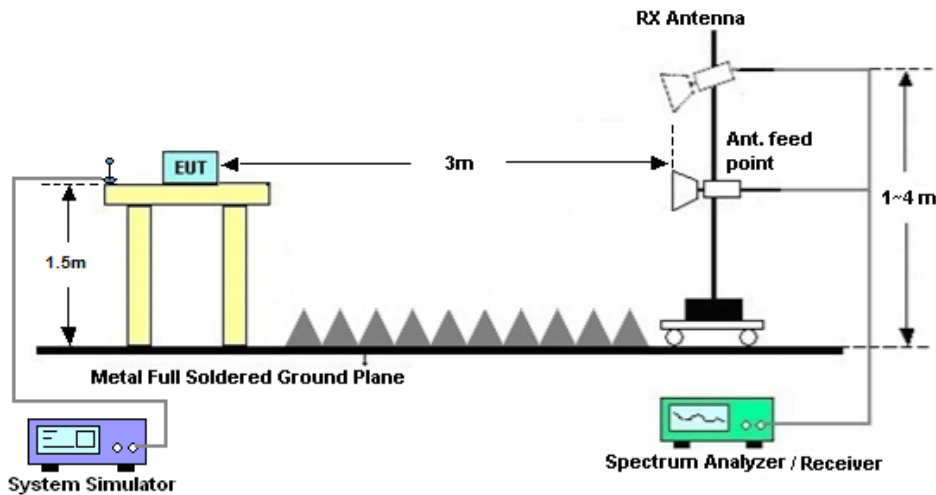
See list of measuring instruments of this test report.

3.2 Test Setup

3.2.1 For radiated test from 30MHz to 1GHz



3.2.2 For radiated test above 1GHz



3.3 Test Result of Radiated Test

Please refer to Appendix B.



3.4 Radiated Spurious Emission

3.4.1 Description of Radiated Spurious Emission

The radiated spurious emission was measured by substitution method according to ANSI C63.26. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least $43 + 10 \log (P)$ dB.

For 5G NR n41

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least $55 + 10 \log (P)$ dB.

The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

3.4.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.5
2. The EUT was placed on a turntable with 0.8 meter height for frequency below 1GHz and 1.5 meter height for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the receiving antenna mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. The height of the receiving antenna is varied between 1m to 4m to search the maximum spurious emission for both horizontal and vertical polarizations.
6. During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power.
7. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
8. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
9. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
10. $EIRP \text{ (dBm)} = S.G. \text{ Power} - Tx \text{ Cable Loss} + Tx \text{ Antenna Gain}$
11. $ERP \text{ (dBm)} = EIRP - 2.15$
12. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P(Watts)
= $P(W) - [43 + 10\log(P)] \text{ (dB)}$
= $[30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$
= -13dBm.



4 List of Measuring Equipment

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Test Date | Due Date | Remark |
|-----------------------|--------------|--------------------------|------------|-------------------|------------------|---------------|---------------|-----------------------|
| EXA Spectrum Analyzer | Keysight | N9010A | MY55150244 | 10Hz-44G,MAX 30dB | Apr. 15, 2020 | Jul. 29, 2020 | Apr. 14, 2021 | Radiation (03CH04-KS) |
| Bilog Antenna | TeseQ | CBL6111D | 49922 | 30MHz-1GHz | Jun. 08, 2020 | Jul. 29, 2020 | Jun. 07, 2021 | Radiation (03CH04-KS) |
| Horn Antenna | Schwarzbeck | BBHA9120D | 1356 | 1GHz~18GHz | Apr. 20, 2020 | Jul. 29, 2020 | Apr. 19, 2021 | Radiation (03CH04-KS) |
| SHF-EHF Horn | Com-power | AH-840 | 101115 | 18GHz~40GHz | Nov. 10, 2019 | Jul. 29, 2020 | Nov. 09, 2020 | Radiation (03CH04-KS) |
| Amplifier | SONOMA | 310N | 187289 | 9KHz-1GHz | Aug. 06, 2019 | Jul. 29, 2020 | Aug. 05, 2020 | Radiation (03CH04-KS) |
| Amplifier | MITEQ | EM18G40G GA | 060728 | 18~40GHz | Jan. 08, 2020 | Jul. 29, 2020 | Jan. 07, 2021 | Radiation (03CH04-KS) |
| high gain Amplifier | MITEQ | AMF-7D-00 101800-30-1 0P | 2025788 | 1Ghz-18Ghz | Aug. 16, 2019 | Jul. 29, 2020 | Aug. 15, 2020 | Radiation (03CH04-KS) |
| Amplifier | Keysight | 83017A | MY57280106 | 500MHz~26.5GHz | Oct. 15, 2019 | Jul. 29, 2020 | Oct. 14, 2020 | Radiation (03CH04-KS) |
| AC Power Source | Chroma | 61601 | F104090004 | N/A | NCR | Jul. 29, 2020 | NCR | Radiation (03CH04-KS) |
| Turn Table | ChamPro | EM 1000-T | 060762-T | 0~360 degree | NCR | Jul. 29, 2020 | NCR | Radiation (03CH04-KS) |
| Antenna Mast | ChamPro | EM 1000-A | 060762-A | 1 m~4 m | NCR | Jul. 29, 2020 | NCR | Radiation (03CH04-KS) |

NCR: No Calibration Required



5 Uncertainty of Evaluation

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.26-2015. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

| | |
|---|-------|
| Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y)) | 3.3dB |
|---|-------|

Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

| | |
|---|-------|
| Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y)) | 2.8dB |
|---|-------|

Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

| | |
|---|-------|
| Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y)) | 2.8dB |
|---|-------|



Appendix A. Test Results of Radiated Test

Radiated Spurious Emission

Ant 0 / Ant 2

| EN-DC_13A_n2A / LTE 10MHz + NR 20MHz / BPSK | | | | | | | | |
|---|-------------------|--------------|---------------|-------------------|--------------------|----------------------|-----------------------|--------------------|
| Channel | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Over Limit (dB) | S.G. Power (dBm) | TX Cable loss (dB) | TX Antenna Gain (dBi) | Polarization (H/V) |
| Middle | 3741 | -57.36 | -13 | -44.36 | -69.62 | 2.64 | 14.90 | H |
| | 5613 | -52.84 | -13 | -39.84 | -64.70 | 2.94 | 14.80 | H |
| | 7484 | -48.74 | -13 | -35.74 | -58.51 | 3.39 | 13.16 | H |
| | 3741 | -57.44 | -13 | -44.44 | -69.70 | 2.64 | 14.90 | V |
| | 5613 | -52.81 | -13 | -39.81 | -64.67 | 2.94 | 14.80 | V |
| | 7484 | -48.62 | -13 | -35.62 | -58.39 | 3.39 | 13.16 | V |

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

Ant 0 / Ant 2

| EN-DC_13A_n66A / LTE 10MHz + NR 20MHz / BPSK | | | | | | | | |
|--|-------------------|--------------|---------------|-------------------|--------------------|----------------------|-----------------------|--------------------|
| Channel | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Over Limit (dB) | S.G. Power (dBm) | TX Cable loss (dB) | TX Antenna Gain (dBi) | Polarization (H/V) |
| Middle | 3472 | -60.39 | -13 | -47.39 | -71.13 | 2.604 | 13.34 | H |
| | 5208 | -52.28 | -13 | -39.28 | -62.79 | 3.011 | 13.52 | H |
| | 6944.36 | -50.86 | -13 | -37.86 | -61.06 | 3.271 | 13.47 | H |
| | 3471 | -60.18 | -13 | -47.18 | -70.92 | 2.604 | 13.34 | V |
| | 5208 | -51.58 | -13 | -38.58 | -62.09 | 3.011 | 13.52 | V |
| | 6944.36 | -50.30 | -13 | -37.30 | -60.50 | 3.271 | 13.47 | V |

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.



Appendix C. Reference Report

Please refer to Sporton report number FG051228D which is issued separately.