



FCC RF Test Report

APPLICANT : HMD Global Oy
EQUIPMENT : GSM/WCDMA/LTE Mobile Phone
BRAND NAME : NOKIA
MODEL NAME : TA-1378
FCC ID : 2AJOTTA-1378
STANDARD : 47 CFR Part 2, 22(H), 27(M)
CLASSIFICATION : Licensed Non-Broadcast Transmitter Held to Ear(TNE)
TEST DATE(S) : Jul. 30, 2021

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

Alex Wang

Approved by: Alex Wang / Manager



Sporton International (Kunshan) Inc.

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



TABLE OF CONTENTS

REVISION HISTORY...3
SUMMARY OF TEST RESULT...4
1 GENERAL DESCRIPTION...5
1.1 Applicant...5
1.2 Manufacturer...5
1.3 Product Feature of Equipment Under Test...5
1.4 Product Specification of Equipment Under Test...5
1.5 Modification of EUT...5
1.6 Re-use of Measured Data...6
1.7 Testing Location...7
1.8 Test Software...7
1.9 Applicable Standards...7
2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST...8
2.1 Test Mode...8
2.2 Connection Diagram of Test System...9
2.3 Support Unit used in test configuration and system...9
2.4 Frequency List of Low/Middle/High Channels...10
3 RADIATED TEST ITEMS...11
3.1 Measuring Instruments...11
3.2 Test Setup...11
3.3 Test Result of Radiated Test...12
3.4 Radiated Spurious Emission...13
4 LIST OF MEASURING EQUIPMENT...14
5 UNCERTAINTY OF EVALUATION...15
APPENDIX A. TEST RESULTS OF RADIATED TEST
APPENDIX B. TEST SETUP PHOTOGRAPHS
APPENDIX C. REFERENCE REPORT



REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG170507B	Rev. 01	Initial issue of report	Aug. 10, 2021



SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.4	§2.1053 §22.917(a)	Radiated Spurious Emission (Band 5)	$< 43+10\log_{10}(P[\text{Watts}])$	PASS	Under limit 20.34 dB at 10100.000 MHz
	§2.1053 §27.53(m)(4)	Radiated Spurious Emission (Band 7)	$< 55+10\log_{10}(P[\text{Watts}])$		

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.



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	GSM/WCDMA/LTE Mobile Phone
Brand Name	NOKIA
Model Name	TA-1378
FCC ID	2AJOTTA-1378
IMEI Code	004402972535516/12
HW Version	HW0212
SW Version	0.2105.11.10
EUT Stage	Identical Prototype

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx Frequency	LTE Band 5 : 824 MHz ~ 849 MHz LTE Band 7 : 2500 MHz ~ 2570 MHz
Rx Frequency	LTE Band 5 : 869 MHz ~ 894 MHz LTE Band 7 : 2620 MHz ~ 2690 MHz
Bandwidth	LTE Band 5 : 1.4MHz / 3MHz / 5MHz / 10MHz LTE Band 7 : 5MHz / 10MHz / 15MHz / 20MHz
Type of Modulation	QPSK / 16QAM

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-1378, FCC ID: 2AJOTTA-1378) is electrically identical to the reference device (Model: TA-1386, FCC ID: 2AJOTTA-1386) 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 TA-1378_Operational Description of product equality declaration.

The main difference between FCC ID: 2AJOTTA-1386 and FCC ID: 2AJOTTA-1378 is as below:

- TA-1386with Camera/SD card/4pcs Keymet LED, TA-1378 without camera/SD card and 2pcs keymet LED.

Except Listings above, the others are the same and no change in radio parameters has occurred. The power levels are all identical with the reference device Model: TA-1386, FCC ID: 2AJOTTA-1386.

The re-used RF data includes the following bands provided in Appendix C (Sporton RF Report No. FG170505B for the reference device Model: TA-1386, FCC ID: 2AJOTTA-1386).

1.6.3 Reference detail Section:

Equipment Class	Reference FCC ID	Folder Test	Report Title/Section
TNE	2AJOTTA-1386	Part22H.27M (FG170505B)	Except RSE, all the other test results applicable

1.6.4 Spot Check Verification Data Section

In order to confirm hardware similarity of the subject device with the reference device, radiated spurious emission test against the variant model based on the worst-case condition from the original model was performed to demonstrate the test data from original model remains representative for the variant model, the test result were consistent with FCC ID: 2AJOTTA-1386.

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.

Test Item	Mode	2AJOTTA-1386 Worst Result	2AJOTTA-1378 Worst Result	Difference (dB)
Radiated Spurious Emission (dBm)	LTE Band 5	-40.98	-42.58	1.6
	LTE Band 7	-20.43	-20.34	0.09



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.

Test Firm	Sporton International (Kunshan) Inc.		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	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(H), 27(M)
- ♦ ANSI C63.26-2015
- ♦ FCC KDB 971168 D01 Power Meas License Digital Systems v03r01
- ♦ FCC KDB 412172 D01 Determining ERP and EIRP v01r01

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.



2 Test Configuration of Equipment Under Test

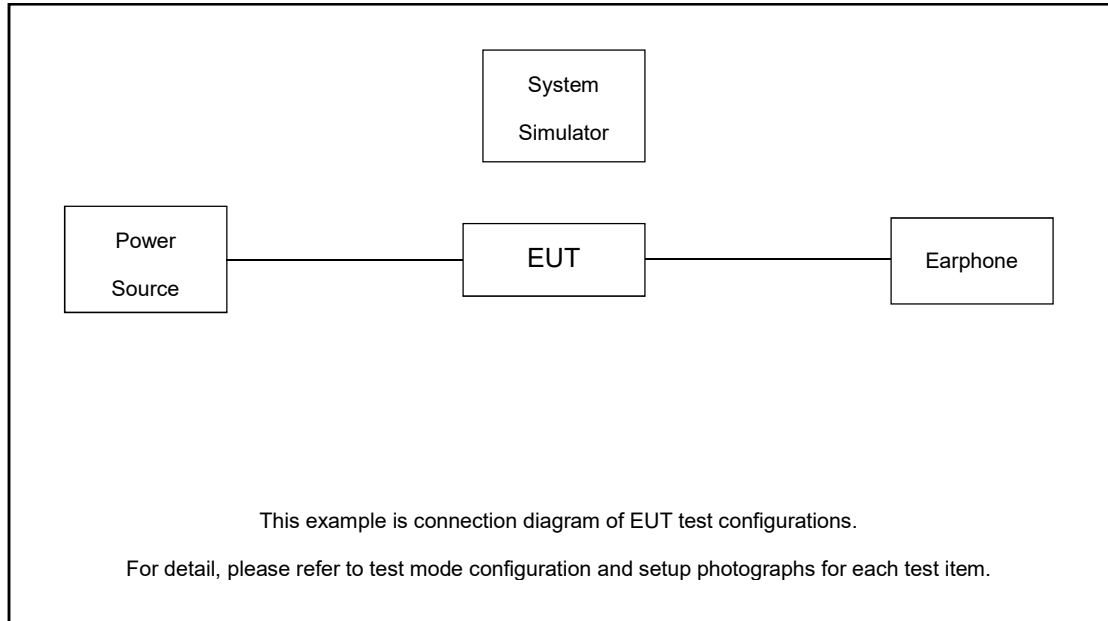
2.1 Test Mode

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

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes to find the maximum emission.

Test Items	Band	Bandwidth (MHz)						Modulation			RB #			Test Channel				
		1.4	3	5	10	15	20	QPSK	16QAM		1	Half	Full	L	M	H		
Radiated Spurious Emission	5	Worst Case															v	
	7	Worst Case															v	
Note	<ol style="list-style-type: none"> The mark "v" means that this configuration is chosen for testing The mark "-" means that this bandwidth is not supported. 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. 																	

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.	Power Supply	GWINSTEK	PSS-2002	N/A	N/A	Unshielded, 1.8 m
2.	LTE Base Station	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m



2.4 Frequency List of Low/Middle/High Channels

LTE Band 5 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
10	Channel	20450	20525	20600
	Frequency	829	836.5	844
5	Channel	20425	20525	20625
	Frequency	826.5	836.5	846.5
3	Channel	20415	20525	20635
	Frequency	825.5	836.5	847.5
1.4	Channel	20407	20525	20643
	Frequency	824.7	836.5	848.3

LTE Band 7 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
20	Channel	20850	21100	21350
	Frequency	2510	2535	2560
15	Channel	20825	21100	21375
	Frequency	2507.5	2535	2562.5
10	Channel	20800	21100	21400
	Frequency	2505	2535	2565
5	Channel	20775	21100	21425
	Frequency	2502.5	2535	2567.5

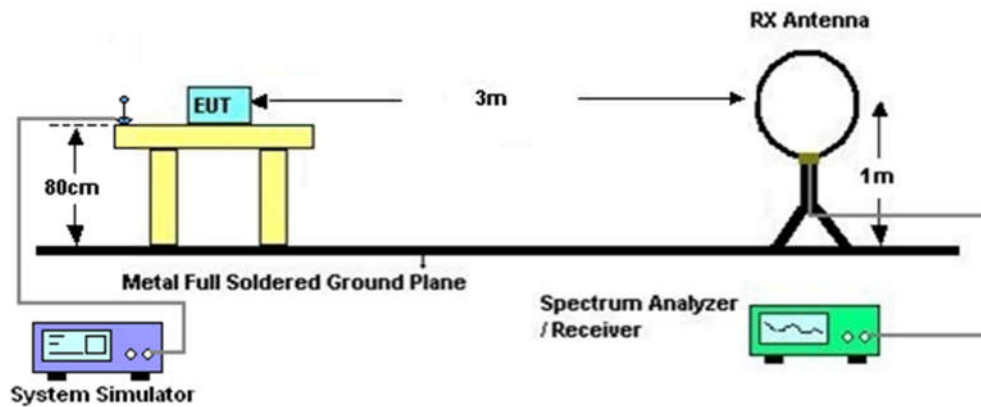
3 Radiated Test Items

3.1 Measuring Instruments

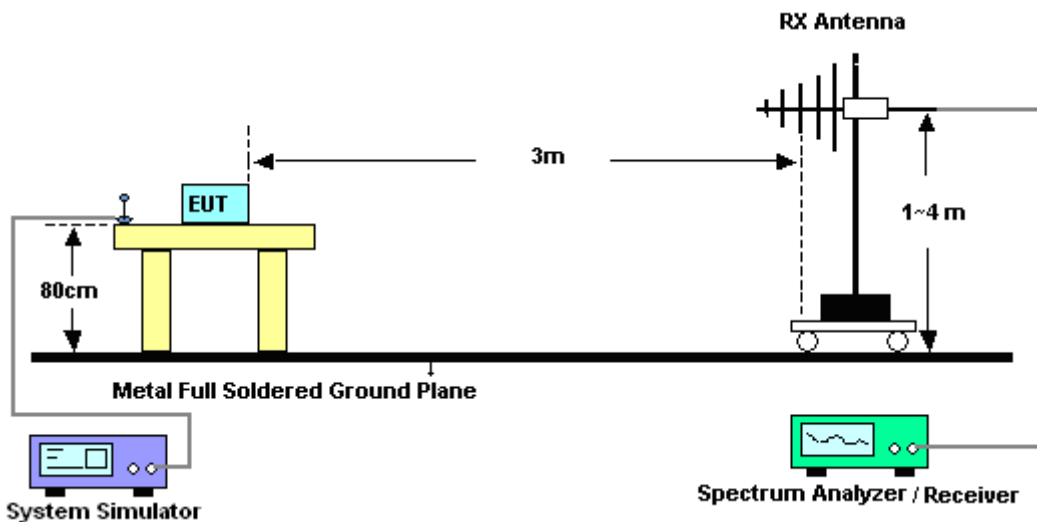
See list of measuring instruments of this test report.

3.2 Test Setup

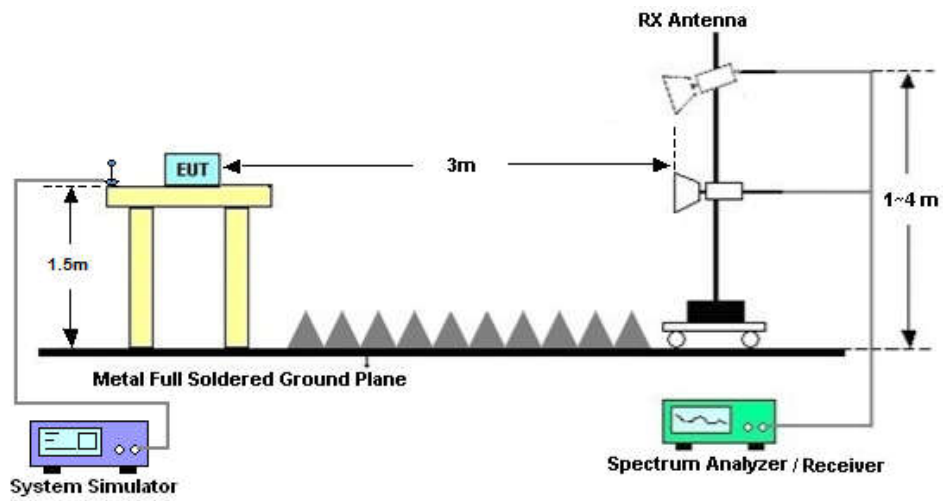
3.2.1 For radiated test below 30MHz



3.2.2 For radiated test from 30MHz to 1GHz



3.2.3 For radiated test above 1GHz



3.3 Test Result of Radiated Test

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

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 Band 7

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. $EIRP (dBm) = S.G. Power - Tx Cable Loss + Tx Antenna Gain$
11. $ERP (dBm) = EIRP - 2.15$
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)
 $= P(W) - [43 + 10\log(P)] (dB)$
 $= [30 + 10\log(P)] (dBm) - [43 + 10\log(P)] (dB)$
 $= -13dBm.$
13. For Band 7:
The limit line is derived from $55 + 10\log(P)$ dB below the transmitter power P(Watts)



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. 13, 2021	Jul. 30, 2021	Apr. 12, 2022	Radiation (03CH04-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Nov. 01, 2020	Jul. 30, 2021	Oct. 31, 2021	Radiation (03CH04-KS)
Bilog Antenna	TeseQ	CBL6111D	49922	30MHz-1GHz	May 30, 2021	Jul. 30, 2021	May 29, 2022	Radiation (03CH04-KS)
Horn Antenna	Schwarzbeck	BBHA9120D	1356	1GHz~18GHz	Apr. 18, 2021	Jul. 30, 2021	Apr. 17, 2022	Radiation (03CH04-KS)
SHF-EHF Horn	Com-power	AH-840	101115	18GHz~40GHz	Jan. 06, 2021	Jul. 30, 2021	Jan. 05, 2022	Radiation (03CH04-KS)
Amplifier	SONOMA	310N	187289	9KHz-1GHz	Jan. 06, 2021	Jul. 30, 2021	Jan. 05, 2022	Radiation (03CH04-KS)
Amplifier	MITEQ	EM18G40G GA	060728	18~40GHz	Jan. 07, 2021	Jul. 30, 2021	Jan. 06, 2022	Radiation (03CH04-KS)
high gain Amplifier	MITEQ	AMF-7D-00 101800-30-1 OP	2025788	1Ghz-18Ghz	Jan. 06, 2021	Jul. 30, 2021	Jan. 05, 2022	Radiation (03CH04-KS)
Amplifier	Keysight	83017A	MY57280106	500MHz~26.5GHz	Oct. 14, 2020	Jul. 30, 2021	Oct. 13, 2021	Radiation (03CH04-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Jul. 30, 2021	NCR	Radiation (03CH04-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Jul. 30, 2021	NCR	Radiation (03CH04-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Jul. 30, 2021	NCR	Radiation (03CH04-KS)
Thermometer & hygrometer	SHENTUO	HTC-1	KS150428JCG S01	HTC-109	Apr. 14, 2021	Jul. 30, 2021	Apr. 13, 2022	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 ~ 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

LTE Band 5 / 10MHz / QPSK								
Channel	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	1664	-60.92	-13	-47.92	-67.89	1.58	10.70	H
	2496	-57.00	-13	-44.00	-65.25	2.102	12.50	H
	3330	-55.58	-13	-42.58	-64.47	2.856	13.90	H
	1664	-60.27	-13	-47.27	-67.24	1.58	10.70	V
	2496	-58.27	-13	-45.27	-66.52	2.10	12.50	V
	3330	-57.67	-13	-44.67	-66.56	2.86	13.90	V

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

LTE Band 7 / 20MHz / QPSK								
Channel	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	5052	-49.10	-25	-24.10	-59.31	3.03	13.24	H
	7580	-56.26	-25	-31.26	-65.71	3.56	13.01	H
	10100	-45.34	-25	-20.34	-54.86	3.92	13.44	H
	12630	-49.25	-25	-24.25	-59.17	4.44	14.36	H
	5052	-52.73	-25	-27.73	-62.94	3.03	13.24	V
	7580	-60.05	-25	-35.05	-69.50	3.56	13.01	V
	10100	-49.91	-25	-24.91	-59.43	3.92	13.44	V
	12630	-46.37	-25	-21.37	-56.29	4.44	14.36	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 FG170505B which is issued separately.