# **FCC Test Report**

APPLICANT : HMD Global Oy EQUIPMENT : 4G feature phone

BRAND NAME : Nokia MODEL NAME : TA-1155

FCC ID : 2AJOTTA-1155

STANDARD : 47 CFR Part 15 Subpart B

**CLASSIFICATION**: Certification

The product was received on Oct. 31, 2019 and testing was completed on Nov. 13, 2019. We, Sporton International (Kunshan) Inc., would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI C63.4-2014 and has been in 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.

Reviewed by: Jason Jia / Supervisor

JasonJia

Approved by: James Huang / Manager

Sporton International (Kunshan) Inc.

No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
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Sporton International (Kunshan) Inc.

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ACCREDITED
Cert #5145.02

Report No.: FC9O3108

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## **REVISION HISTORY**

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FC9O3108	Rev. 01	Initial issue of report	Nov. 29, 2019

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### SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark		
	15.107	15.107 AC Conducted Emission	< 15.107 limits	PASS	Under limit		
3.1					9.32 dB at		
					0.154 MHz		
	15.109						Under limit
3.2		15.109 Radiated Emission	< 15.109 limits	PASS	3.78 dB at		
					719.670 MHz		

#### **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.

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## 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	4G feature phone
Brand Name	Nokia
Model Name	TA-1155
FCC ID	2AJOTTA-1155
ELIT cumparts Badica application	GSM / LTE Cat 1bis / FM Receiver
EUT supports Radios application	Bluetooth BR / EDR
IMEI Code	Conduction/Radiation:
IMEI Code	357686100000475/357686100015473
HW Version	HW0301
SW Version	14.01.17.05
EUT Stage	Identical Prototype

**Remark:** The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

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## 1.4. Product Specification of Equipment Under Test

Standards-related Product Specification					
Tx Frequency	GSM850: 824.2 MHz ~ 848.8 MHz LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 7: 2502.5 MHz ~ 2567.5 MHz LTE Band 38: 2572.5 MHz ~ 2617.5 MHz Bluetooth: 2402 MHz ~ 2480 MHz				
Rx Frequency	GSM850: 869.2 MHz ~ 893.8 MHz LTE Band 5: 869.7 MHz ~ 893.3 MHz LTE Band 7: 2622.5 MHz ~ 2687.5 MHz LTE Band 38: 2572.5 MHz ~ 2617.5 MHz Bluetooth: 2402 MHz ~ 2480 MHz FM: 88MHz~108MHz				
Antenna Type	WWAN : Fixed Internal Antenna Bluetooth : PIFA Antenna FM: External Headset Antenna				
Type of Modulation	GSM: GMSK GPRS: GMSK EGPRS: Downlink only LTE: QPSK / 16QAM Bluetooth (1Mbps): GFSK Bluetooth (2Mbps): \pi /4-DQPSK Bluetooth (3Mbps): 8-DPSK FM				

### 1.5. Modification of EUT

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

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### 1.6. Test 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.						
	No. 1098, Pengxi North F	Road, Kunshan Economic	Development Zone				
Test Site Location	Jiangsu Province 215300 People's Republic of China						
rest site Location	TEL: +86-512-57900158						
	FAX: +86-512-57900958						
	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.				
Test Site No.	CO01-KS 03CH02-KS	CN1257	314309				

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#### 1.7. Test Software

Item	Site	Manufacture	Name	Version
1.	03CH02-KS	AUDIX	E3	6.2009-8-24a
2.	CO01-KS	AUDIX	E3	6.2009-8-24

### 1.8. Applicable Standards

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

- 47 CFR Part 15 Subpart B
- ANSI C63.4-2014

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

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## 2. Test Configuration of Equipment Under Test

#### 2.1. Test Mode

The EUT has been associated with peripherals pursuant to ANSI C63.4-2014 and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (30MHz to the 5th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

Test Items	Function Type
	Mode 1: GSM 850 Rx(Middle) + Bluetooth Idle + Earphone + Adapter 1
	Mode 2: GSM 850 Rx(Low) + Bluetooth Idle + Earphone + Camera(Rear) + Adapter 2
AC Conducted	Mode 3: LTE Band 5 Rx(High) + Bluetooth Idle + Earphone + MPEG4 + Adapter 2
AC Conducted Emission	Mode 4: LTE Band 7 Rx + Bluetooth Idle + Earphone + FM Rx(98MHz) + Adapter 2
	Mode 5: LTE Band 38 Rx + Bluetooth Idle + Earphone + FM Rx(98MHz) + Adapter 2
	Mode 6: GSM 850 Rx(Middle) + Bluetooth Idle + Earphone + USB Cable(Data Link with Notebook)
	Mode 1: GSM 850 Rx(Middle) + Bluetooth Idle + Earphone + Adapter 1
	Mode 2: GSM 850 Rx(Low) + Bluetooth Idle + Earphone + Camera(Rear) + Adapter 2
Dodieted	Mode 3 : LTE Band 5 Rx(High) + Bluetooth Idle + Earphone + MPEG4 + Adapter 2
Radiated Emissions	Mode 4: LTE Band 7 Rx + Bluetooth Idle + Earphone + FM Rx(88MHz) + Adapter 2
	Mode 5: LTE Band 38 Rx + Bluetooth Idle + Earphone + FM Rx(88MHz) + Adapter 2
	Mode 6: GSM 850 Rx(Low) + Bluetooth Idle + Earphone + USB Cable(Data Link with Notebook)

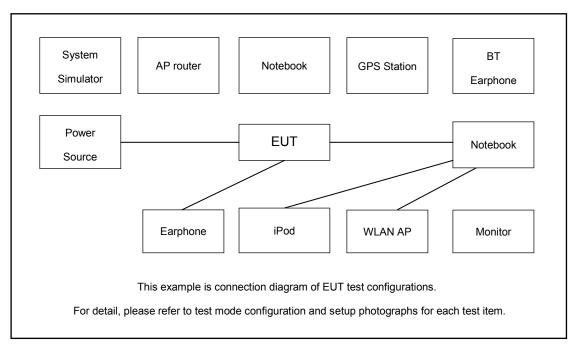
#### Remark:

- **1.** The worst case of AC is mode 2; only the test data of this mode is reported.
- 2. The worst case of RE is mode 6; only the test data of this mode is reported.
- Data Link with Notebook means data application transferred mode between EUT and Notebook.
- **4.** Pre-scanned Low/Middle/High channel for GSM 850/LTE Band 5 and FM Rx, the worst channel was recorded in this report.

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## 2.2. Connection Diagram of Test System



The EUT has been associated with peripherals pursuant to ANSI C63.4-2014 and configuration operated in a manner tended to maximize its emission characteristics in a typical application

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## 2.3. Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Base Station	Anritsu	MT8820C	N/A	N/A	Unshielded,1.8m
2.	FM Station	R&S	SMBV100A	N/A	N/A	Unshielded,1.8m
3.	WLAN AP	D-Link	DIR-655	KA21R655B1	N/A	Unshielded,1.8m
4.	WLAN AP	ASUS	AC66U	N/A	N/A	Unshielded,1.8m
5.	Bluetooth Earphone	Lenovo	LBH308	N/A	N/A	N/A
6.	Bluetooth Earphone	Xiaomi	LYEJ02LM	N/A	N/A	N/A
7.	Notebook	Lenovo	G480	QDS-BRCM1050I	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
8.	Notebook	Lenovo	Yoga-S730	N/A	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
9.	SD Card	Kingston	8GB	N/A	N/A	N/A
10.	SD Card	SanDisk	Uitra	N/A	N/A	N/A
11.	iPod	Apple	A1199	FCC DoC	shielded, 1.2 m	N/A
12.	Hard disk	Lenovo	FH310	Fcc DoC	Shielded, 1.2m	N/A

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### 2.4. EUT Operation Test Setup

The EUT was in GSM or LTE idle mode during the testing. The EUT was synchronized to the BCCH, and is in continuous receiving mode by setting system simulator's paging reorganization.

At the same time, the EUT was attached to the Bluetooth earphone or WLAN AP, and the following programs installed in the EUT were programmed during the test.

- 1. Data application is transferred between notebook and EUT via USB cable.
- 2. Turn on camera to capture images.
- 3. Turn on MPEG4 function.
- 4. Turn on FM function to make the EUT receive continuous signals from FM station.

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### 3. Test Result

#### 3.1. Test of AC Conducted Emission Measurement

#### 3.1.1 Limits of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

#### <Class B Limit>

Frequency of emission	Conducted limit (dBuV)			
(MHz)	Quasi-peak	Average		
0.15-0.5	66 to 56*	56 to 46*		
0.5-5	56	46		
5-30	60	50		

<sup>\*</sup>Decreases with the logarithm of the frequency.

#### 3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

#### 3.1.3 Test Procedure

- 1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
- 2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
- 3. All the support units are connecting to the other LISN.
- 4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
- 5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
- 6. Both sides of AC line were checked for maximum conducted interference.
- 7. The frequency range from 150 kHz to 30 MHz was searched.
- 8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

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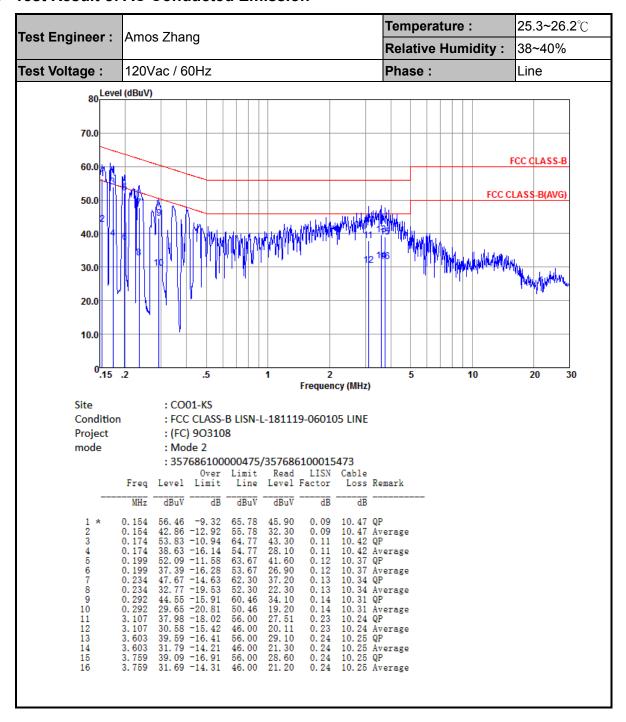
### 3.1.4 Test Setup



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#### 3.1.5 Test Result of AC Conducted Emission



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Temperature: 25.3~26.2℃ Test Engineer: Amos Zhang **Relative Humidity:** 38~40% Test Voltage: 120Vac / 60Hz Phase: Neutral 80 Level (dBuV) 70.0 FCC CLASS-B 60.0 FCC CLASS-B(AVG) 50.0 40.0 30.0 20.0 10.0 30 Frequency (MHz) Site : CO01-KS Condition : FCC CLASS-B LISN-N-181119-060105 NEUTRAL Project : (FC) 9O3108 mode : Mode 2 : 357686100000475/357686100015473 Over Limit Read LISN Cable Freq Level Limit Line Level Factor Loss Remark MHz dBuV dB dBuV dBuV 65. 91 55. 91 56. 46 -9. 45 44. 86 -11. 05 54. 11 -10. 97 39. 51 -15. 57 51. 04 -12. 72 37. 14 -16. 62 47. 11 -15. 15 32. 11 -20. 15 40. 59 -15. 41 29. 29 -16. 71 41. 00 -15. 00 31. 60 -14. 40 41. 01 -14. 99 33. 01 -12. 99 42. 91 -13. 09 33. 71 -12. 29 42. 32 -13. 68 -9.45 45, 80 0.152 56, 46 0.18 10.48 QP 34. 20 0.18 10. 48 Average 0. 18 0. 18 0. 17 0. 17 0. 17 10. 43 QP 10. 43 Ave 10. 37 QP 10. 37 Ave 0.168 0.168 65.08 55.08 43.50 28.90 3 4 5 6 7 8 9 Average 63. 76 53. 76 62. 26 52. 26 56. 00 40. 50 26. 60 0.197 0.197Average 0. 235 0. 235 2. 285 2. 285 2. 664 2. 664 3. 140 3. 140 3. 436 3. 436 36.60 21. 60 30. 21 0. 17 0. 15 10.34 Average 10.23 QP 46. 00 56. 00 18. 91 30. 60 21. 20 0. 15 0. 16 10 11 12 13 14 15 16 10, 24 QP 46.00 30. 61 22. 61 32. 49 23. 29 0. 16 0. 16 0. 17 0. 17 56. 00 46. 00 10, 24 QP 10. 24 Average 56.00 46.00 10.25 10.25 Average 42. 32 -13. 68 33. 92 -12. 08 40. 93 -15. 07 32. 33 -13. 67 56. 00 46. 00 56. 00 31. 90 23. 50 30. 50 0. 17 0. 17 0. 17 3.964 18 19 10.25 Average 10.26 QP 3.964 46.00 21.90 0.17 10.26 Average

#### Note:

- 1. Level( $dB\mu V$ ) = Read Level( $dB\mu V$ ) + LISN Factor(dB) + Cable Loss(dB)
- 2. Over Limit(dB) = Level(dB $\mu$ V) Limit Line(dB $\mu$ V)

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### 3.2. Test of Radiated Emission Measurement

#### 3.2.1. Limit of Radiated Emission

The emissions from an unintentional radiator shall not exceed the field strength levels specified in the following table:

#### <Class B Limit>

Frequency	Field Strength	Measurement Distance		
(MHz)	(microvolts/meter)	(meters)		
30 – 88	100	3		
88 – 216	150	3		
216 - 960	200	3		
Above 960	500	3		

### 3.2.2. Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

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#### 3.2.3. Test Procedures

- 1. The EUT was placed on a turntable with 0.8 meter above ground.
- 2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
- 3. The table was rotated 360 degrees to determine the position of the highest radiation.
- 4. The antenna is a Bi-Log antenna and its height is adjusted between one to four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
- 5. For each suspected emission, the EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
- 6. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode (RBW=120kHz/VBW=300kHz for frequency below 1GHz; RBW=1MHz VBW=3MHz (Peak), RBW=1MHz/VBW=10Hz (Average) for frequency above 1GHz).
- 7. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, peak values of EUT will be reported. Otherwise, the emission will be repeated by using the quasi-peak method and reported.
- 8. Emission level (dB $\mu$ V/m) = 20 log Emission level ( $\mu$ V/m)
- 9. Corrected Reading: Antenna Factor + Cable Loss + Read Level Preamp Factor = Level

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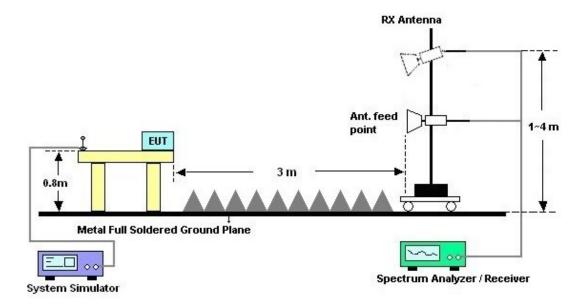
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### 3.2.4. Test Setup of Radiated Emission

#### For radiated emissions from 30MHz to 1GHz



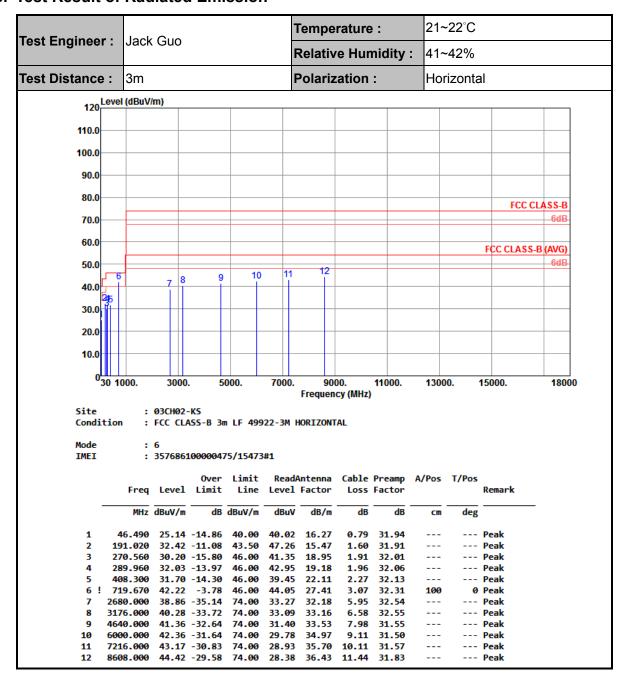
#### For radiated emissions above 1GHz



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#### 3.2.5. Test Result of Radiated Emission



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21~22°C Temperature: Test Engineer: Jack Guo **Relative Humidity:** 41~42% Polarization: Test Distance: 3m Vertical 120 Level (dBuV/m) 110.0 100.0 90.0 80.0 FCC CLASS-B 70.0 60.0 FCC CLASS-B (AVG) 50.0 12 10 40.0 30.0 20.0 10.0 <sup>0</sup>30 1000. 18000 3000. 5000. 7000. 9000. 11000. 13000. 15000. Frequency (MHz) : 03CH02-KS Site Condition : FCC CLASS-B 3m LF 49922-3M VERTICAL Mode : 357686100000475/15473#1 IMEI Over Limit ReadAntenna Cable Preamp A/Pos T/Pos Freq Level Limit Line Level Factor Loss Factor Remark dB dBuV/m dBuV MHz dBuV/m dB/m dB dB deg 46.490 32.78 -7.22 40.00 47.66 16.27 0.79 31.94 100 0 Peak 189.080 28.31 -15.19 43.50 43.09 15.55 1.58 31.91 --- Peak 239.520 38.67 -7.33 46.00 50.86 17.94 1.82 31.95 --- Peak 554.770 37.78 -8.22 46.00 42.03 25.46 2.64 32.35 --- Peak --- Peak 719.670 36.23 -9.77 46.00 38.06 27.41 3.07 32.31 892.330 31.05 -14.95 46.00 29.91 29.22 3.43 31.51 --- Peak 1360.000 36.76 -37.24 74.00 39.05 28.05 4.24 34.58 --- Peak 2784.000 39.73 -34.27 74.00 33.76 32.28 6.06 32.37 --- Peak --- Peak 4168.000 40.23 -33.77 74.00 30.77 33.79 7.60 31.93 10 5600.000 41.11 -32.89 74.00 28.51 34.66 8.94 31.00 --- Peak 11 6992,000 42.42 -31.58 74.00 28.42 35.30 9.95 31.25 --- Peak 8656.000 43.82 -30.18 74.00 27.74 36.41 11.47 31.80 --- Peak

#### Note:

- Level(dBμV/m) = Read Level(dBμV) + Antenna Factor(dB/m) + Cable Loss(dB) Preamp Factor(dB)
- 2. Over Limit(dB) = Level(dB $\mu$ V/m) Limit Line(dB $\mu$ V/m)

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## 4. List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz;Ma x 30dBm	Aug. 06, 2019	Nov. 10, 2019	Aug. 05, 2020	Radiation (03CH02-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150208	10Hz-44G,MAX 30dB	Apr. 15, 2019	Nov. 10, 2019	Apr. 16, 2020	Radiation (03CH02-KS)
Bilog Antenna	TeseQ	CBL6111D	49922	30MHz-1GHz	May 30, 2019	Nov. 10, 2019	May 29, 2020	Radiation (03CH02-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75959	1GHz~18GHz	Jan. 27, 2019	Nov. 10, 2019	Jan. 26, 2020	Radiation (03CH02-KS)
Amplifier	SONOMA	310N	187289	9KHz-1GHz	Aug. 06, 2019	Nov. 10, 2019	Aug. 05, 2020	Radiation (03CH02-KS)
Amplifier	Keysight	83017A	MY57280106	500MHz~26.5G Hz	Apr. 15, 2019	Nov. 10, 2019	Apr. 14, 2020	Radiation (03CH02-KS)
AC Power Source	Chroma	61601	61601000247 3	N/A	NCR	Nov. 10, 2019	NCR	Radiation (03CH02-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	Nov. 10, 2019	NCR	Radiation (03CH02-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	Nov. 10, 2019	NCR	Radiation (03CH02-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 16, 2019	Nov. 13, 2019	Apr. 15, 2020	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 11, 2019	Nov. 13, 2019	Oct. 10, 2020	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Nov. 19, 2018	Nov. 13, 2019	Nov. 18, 2019	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP0000008 11	AC 0V~300V, 45Hz~1000Hz	Oct. 11, 2019	Nov. 13, 2019	Oct. 10, 2020	Conduction (CO01-KS)

NCR: No Calibration Required

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## 5. Uncertainty of Evaluation

#### **Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)**

Measuring Uncertainty for a Level of Confidence	2.9dB
of 95% (U = 2Uc(y))	2.906

#### <u>Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)</u>

Measuring Uncertainty for a Level of Confidence	4.9dB
of 95% (U = 2Uc(y))	4.905

#### <u>Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)</u>

Measuring Uncertainty for a Level of Confiden	sce 5.0dB
of 95% (U = 2Uc(y))	5.0UB

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