



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.

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
FC903108	Rev. 01	Initial issue of report	Nov. 29, 2019



SUMMARY OF TEST RESULT

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



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
EUT supports Radios application	GSM / LTE Cat 1bis / FM Receiver Bluetooth BR / EDR
IMEI Code	Conduction/Radiation: 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.



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.



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.		
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.
	CO01-KS 03CH02-KS	CN1257	314309

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.



2. Test Configuration of Equipment Under Test

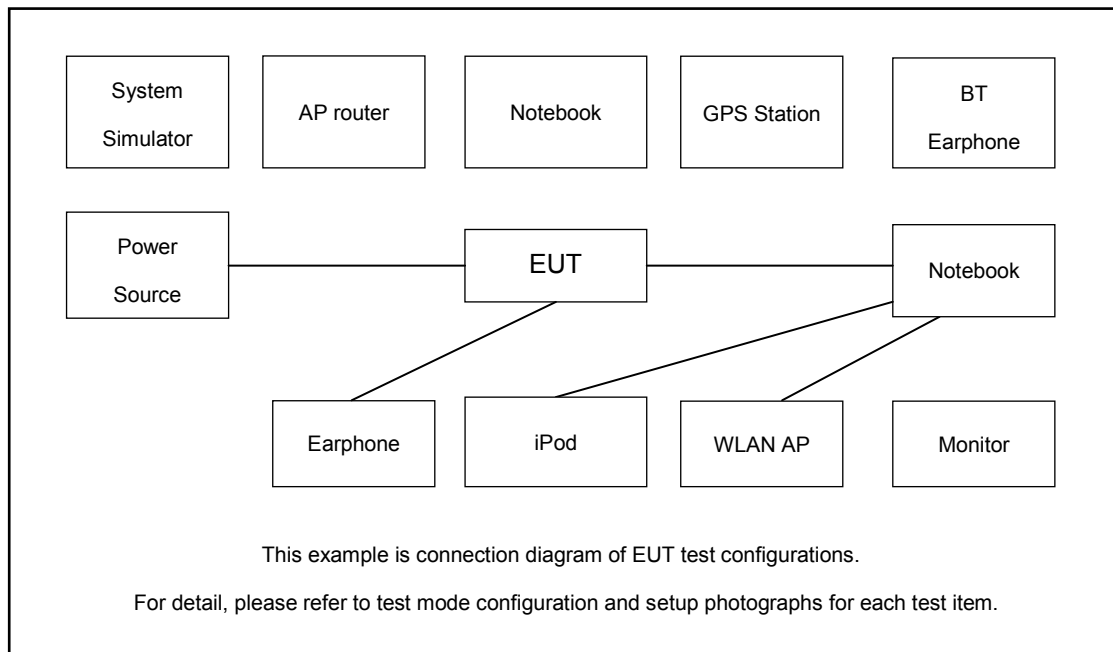
2.1. Test Mode

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
AC Conducted Emission	Mode 1: GSM 850 Rx(Middle) + Bluetooth Idle + Earphone + Adapter 1 Mode 2: GSM 850 Rx(Low) + Bluetooth Idle + Earphone + Camera(Rear) + Adapter 2 Mode 3: LTE Band 5 Rx(High) + Bluetooth Idle + Earphone + MPEG4 + Adapter 2 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)
Radiated Emissions	Mode 1: GSM 850 Rx(Middle) + Bluetooth Idle + Earphone + Adapter 1 Mode 2: GSM 850 Rx(Low) + Bluetooth Idle + Earphone + Camera(Rear) + Adapter 2 Mode 3: LTE Band 5 Rx(High) + Bluetooth Idle + Earphone + MPEG4 + Adapter 2 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: <ol style="list-style-type: none"> The worst case of AC is mode 2; only the test data of this mode is reported. 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. Pre-scanned Low/Middle/High channel for GSM 850/LTE Band 5 and FM Rx, the worst channel was recorded in this report. 	

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



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



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.



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

*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

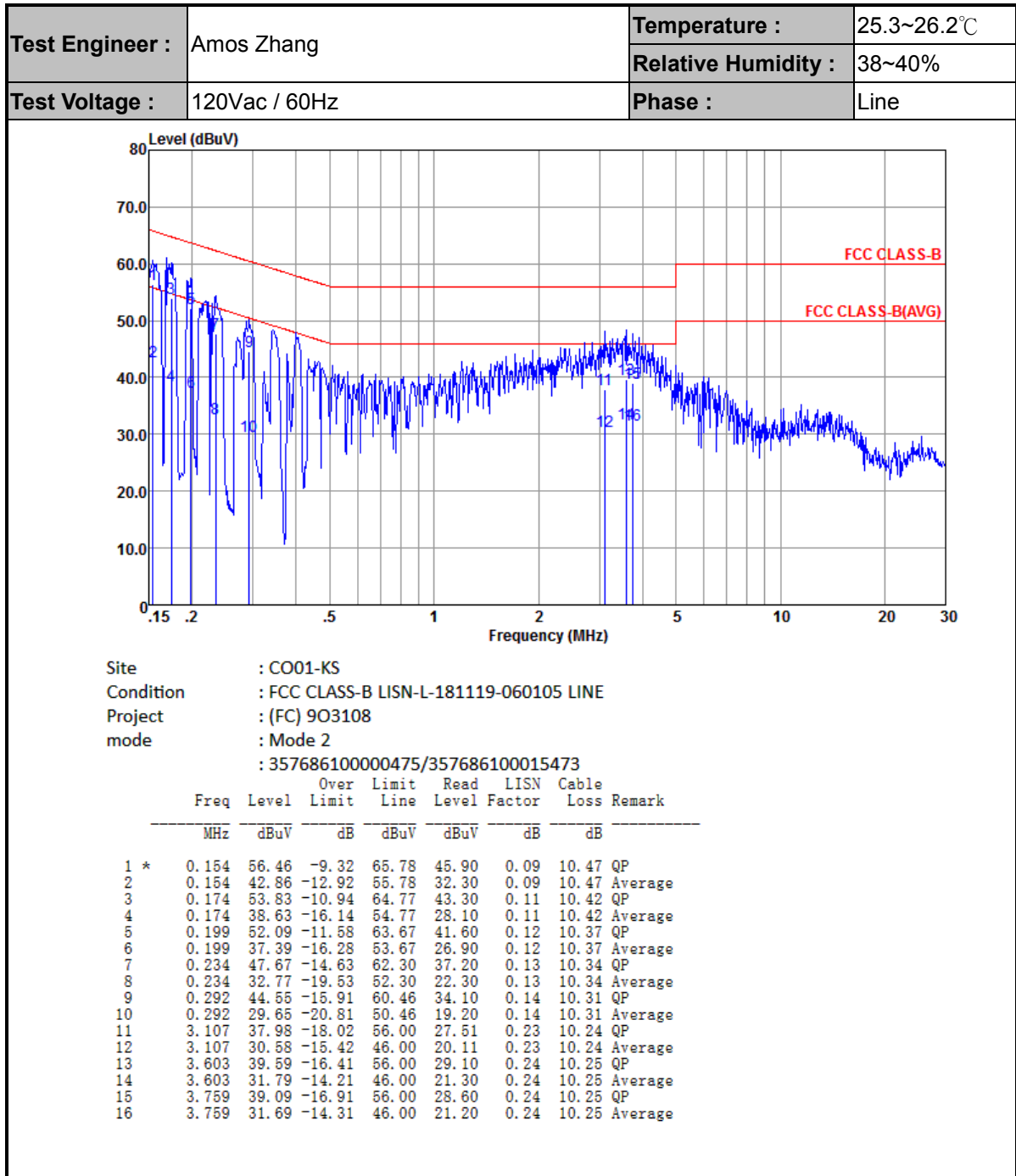
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
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.

3.1.4 Test Setup



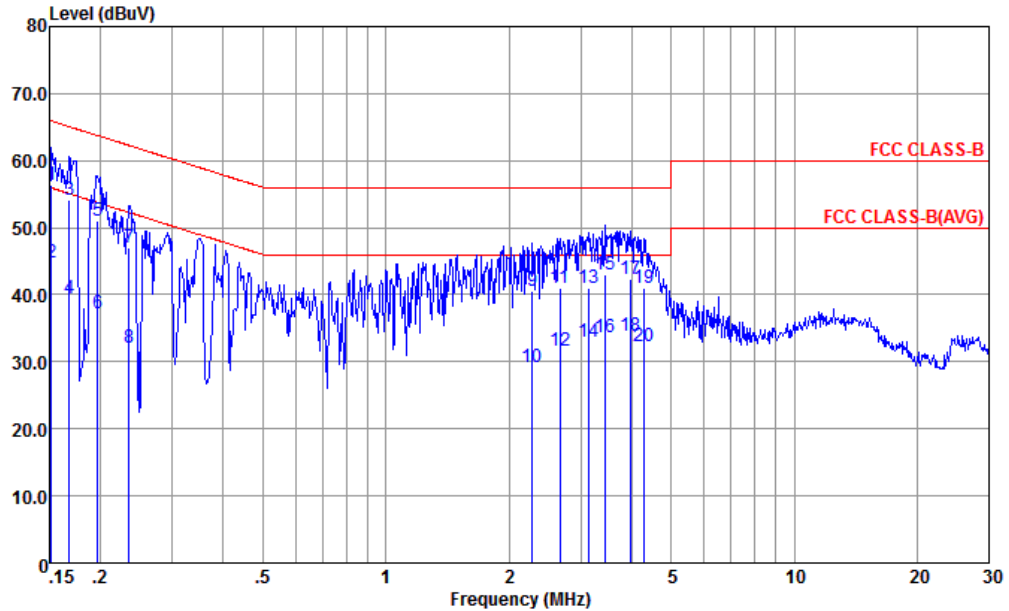


3.1.5 Test Result of AC Conducted Emission





Test Engineer :	Amos Zhang	Temperature :	25.3~26.2°C
		Relative Humidity :	38~40%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral



Site : CO01-KS
 Condition : FCC CLASS-B LISN-N-181119-060105 NEUTRAL
 Project : (FC) 903108
 mode : Mode 2
 : 357686100000475/357686100015473

	Freq	Level	Over	Limit	Read	LISN	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
		dBuV	dB	dBuV	dBuV	dB	dB	
1 *	0.152	56.46	-9.45	65.91	45.80	0.18	10.48	QP
2	0.152	44.86	-11.05	55.91	34.20	0.18	10.48	Average
3	0.168	54.11	-10.97	65.08	43.50	0.18	10.43	QP
4	0.168	39.51	-15.57	55.08	28.90	0.18	10.43	Average
5	0.197	51.04	-12.72	63.76	40.50	0.17	10.37	QP
6	0.197	37.14	-16.62	53.76	26.60	0.17	10.37	Average
7	0.235	47.11	-15.15	62.26	36.60	0.17	10.34	QP
8	0.235	32.11	-20.15	52.26	21.60	0.17	10.34	Average
9	2.285	40.59	-15.41	56.00	30.21	0.15	10.23	QP
10	2.285	29.29	-16.71	46.00	18.91	0.15	10.23	Average
11	2.664	41.00	-15.00	56.00	30.60	0.16	10.24	QP
12	2.664	31.60	-14.40	46.00	21.20	0.16	10.24	Average
13	3.140	41.01	-14.99	56.00	30.61	0.16	10.24	QP
14	3.140	33.01	-12.99	46.00	22.61	0.16	10.24	Average
15	3.436	42.91	-13.09	56.00	32.49	0.17	10.25	QP
16	3.436	33.71	-12.29	46.00	23.29	0.17	10.25	Average
17	3.964	42.32	-13.68	56.00	31.90	0.17	10.25	QP
18	3.964	33.92	-12.08	46.00	23.50	0.17	10.25	Average
19	4.269	40.93	-15.07	56.00	30.50	0.17	10.26	QP
20	4.269	32.33	-13.67	46.00	21.90	0.17	10.26	Average

Note:

- Level(dBμV) = Read Level(dBμV) + LISN Factor(dB) + Cable Loss(dB)
- Over Limit(dB) = Level(dBμV) – Limit Line(dBμV)



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 (MHz)	Field Strength (microvolts/meter)	Measurement Distance (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.

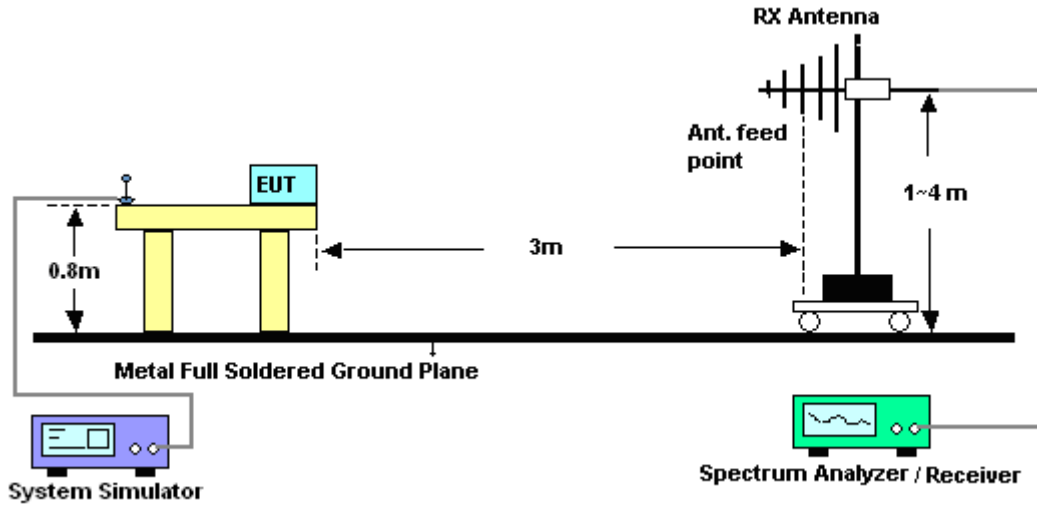


3.2.3. Test Procedures

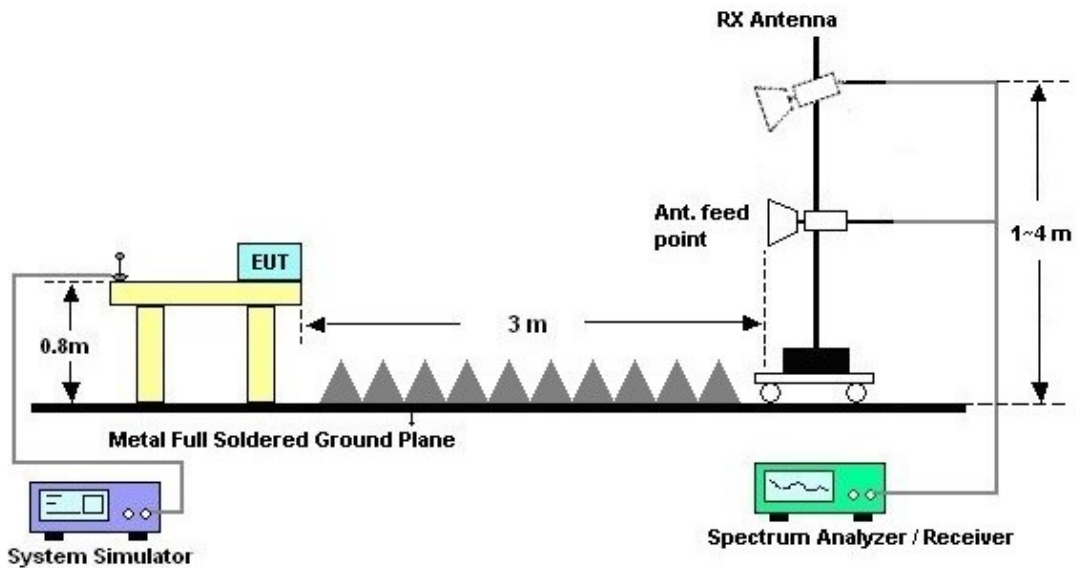
1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna 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 μ V/m) = 20 log Emission level (μ V/m)
9. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

3.2.4. Test Setup of Radiated Emission

For radiated emissions from 30MHz to 1GHz



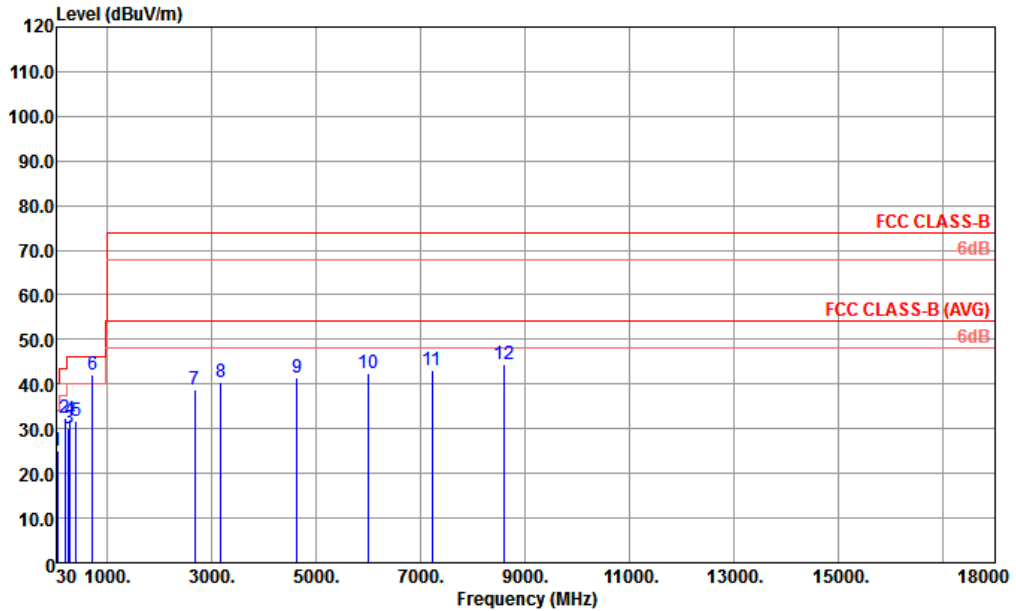
For radiated emissions above 1GHz





3.2.5. Test Result of Radiated Emission

Test Engineer :	Jack Guo	Temperature :	21~22°C
		Relative Humidity :	41~42%
Test Distance :	3m	Polarization :	Horizontal

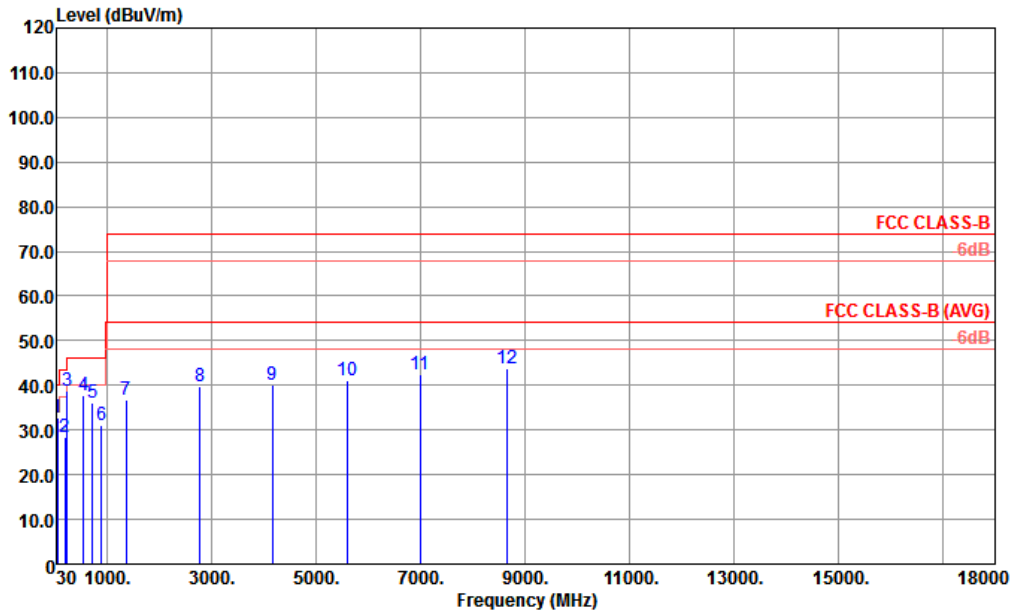


Site : 03CH02-KS
 Condition : FCC CLASS-B 3m LF 49922-3M HORIZONTAL
 Mode : 6
 IMEI : 357686100000475/15473#1

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Factor	Preamp Loss	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1	46.490	25.14	-14.86	40.00	40.02	16.27	0.79	31.94	---	Peak
2	191.020	32.42	-11.08	43.50	47.26	15.47	1.60	31.91	---	Peak
3	270.560	30.20	-15.80	46.00	41.35	18.95	1.91	32.01	---	Peak
4	289.960	32.03	-13.97	46.00	42.95	19.18	1.96	32.06	---	Peak
5	408.300	31.70	-14.30	46.00	39.45	22.11	2.27	32.13	---	Peak
6	719.670	42.22	-3.78	46.00	44.05	27.41	3.07	32.31	100	0 Peak
7	2680.000	38.86	-35.14	74.00	33.27	32.18	5.95	32.54	---	Peak
8	3176.000	40.28	-33.72	74.00	33.09	33.16	6.58	32.55	---	Peak
9	4640.000	41.36	-32.64	74.00	31.40	33.53	7.98	31.55	---	Peak
10	6000.000	42.36	-31.64	74.00	29.78	34.97	9.11	31.50	---	Peak
11	7216.000	43.17	-30.83	74.00	28.93	35.70	10.11	31.57	---	Peak
12	8608.000	44.42	-29.58	74.00	28.38	36.43	11.44	31.83	---	Peak



Test Engineer :	Jack Guo	Temperature :	21~22°C
		Relative Humidity :	41~42%
Test Distance :	3m	Polarization :	Vertical



Site : 03CH02-KS
 Condition : FCC CLASS-B 3m LF 49922-3M VERTICAL
 Mode : 6
 IMEI : 357686100000475/15473#1

Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Preamp	A/Pos	T/Pos	Remark	
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm deg	
1	46.490	32.78	-7.22	40.00	47.66	16.27	0.79	31.94	100 0 Peak
2	189.080	28.31	-15.19	43.50	43.09	15.55	1.58	31.91	--- --- Peak
3	239.520	38.67	-7.33	46.00	50.86	17.94	1.82	31.95	--- --- Peak
4	554.770	37.78	-8.22	46.00	42.03	25.46	2.64	32.35	--- --- Peak
5	719.670	36.23	-9.77	46.00	38.06	27.41	3.07	32.31	--- --- Peak
6	892.330	31.05	-14.95	46.00	29.91	29.22	3.43	31.51	--- --- Peak
7	1360.000	36.76	-37.24	74.00	39.05	28.05	4.24	34.58	--- --- Peak
8	2784.000	39.73	-34.27	74.00	33.76	32.28	6.06	32.37	--- --- Peak
9	4168.000	40.23	-33.77	74.00	30.77	33.79	7.60	31.93	--- --- Peak
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
12	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)
- Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)



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;Max 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~26.5GHz	Apr. 15, 2019	Nov. 10, 2019	Apr. 14, 2020	Radiation (03CH02-KS)
AC Power Source	Chroma	61601	616010002473	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	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 11, 2019	Nov. 13, 2019	Oct. 10, 2020	Conduction (CO01-KS)

NCR: No Calibration Required



5. Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.9dB
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

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

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.0dB
-------------------------------------------------------------------------	-------