FCC Test Report

APPLICANT : HMD Global Oy EQUIPMENT : Mobile Phone

BRAND NAME : Nokia MODEL NAME : TA-1187

FCC ID : 2AJOTTA-1187

STANDARD : 47 CFR Part 15 Subpart B

CLASSIFICATION: Certification

The product was received on May 27, 2019 and testing was completed on Jun. 20, 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.

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Sporton International (Kunshan) Inc.

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FC952702	Rev. 01	Initial issue of report	Aug. 05, 2019

Sporton International (Kunshan) Inc.

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SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark	
					Under limit	
3.1	15.107	AC Conducted Emission	< 15.107 limits	PASS	4.14 dB at	
					0.156 MHz	
	15.109					Under limit
2.0		15.109 Radiated Emission	< 15.109 limits	PASS	5.53 dB at	
3.2					42.610 MHz	
					for Quasi-Peak	

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1. General Description

1.1. Applicant

HMD Global Oy

Bertel Jungin aukio 9,02600 ESPOO. FINLAND

1.2. Product Feature of Equipment Under Test

	Product Feature
Equipment	Mobile Phone
Brand Name	Nokia
Model Name	TA-1187
FCC ID	2AJOTTA-1187
EUT supports Radios application	GSM/GPRS/EGPRS/WCDMA/HSPA/DC-HSDPA/ HSPA+(16QAM Uplink is not supported)/LTE 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 NFC/GNSS/FM Receiver
IMEI Code	Conduction/ Radiation: 354209100006112
HW Version	LLDM490B
SW Version	LLDB7016
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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1.3. Product Specification of Equipment Under Test

Standards-related Product Specification						
	GSM850: 824.2 MHz ~ 848.8 MHz					
	GSM1900: 1850.2 MHz ~ 1909.8MHz					
	WCDMA Band V: 826.4 MHz ~ 846.6 MHz					
	WCDMA Band IV : 1712.4 MHz ~ 1752.6 MHz					
	WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz					
	LTE Band 2 : 1850.7 MHz ~ 1909.3 MHz					
	LTE Band 4: 1710.7 MHz ~ 1754.3 MHz					
	LTE Band 5 : 824.7 MHz ~ 848.3 MHz					
	LTE Band 7 : 2502.5 MHz ~ 2567.5 MHz					
Tx Frequency	LTE Band 12 : 699.7 MHz ~ 715.3 MHz					
	LTE Band 17 : 706.5 MHz ~ 713.5 MHz					
	802.11b/g/n: 2412 MHz ~ 2462 MHz					
	802.11a/n/ac: 5180 MHz ~ 5240 MHz;					
	5260 MHz ~ 5320 MHz;					
	5500 MHz ~ 5700 MHz;					
	5745 MHz ~ 5825 MHz					
	Bluetooth: 2402 MHz ~ 2480 MHz					
	NFC : 13.56 MHz					
	GSM850: 869.2 MHz ~ 893.8 MHz					
	GSM1900: 1930.2 MHz ~ 1989.8 MHz					
	WCDMA Band V: 871.4 MHz ~ 891.6 MHz					
	WCDMA Band IV : 2112.4 MHz ~ 2152.6 MHz					
	WCDMA Band II: 1932.4 MHz ~ 1987.6 MHz					
	LTE Band 2 : 1930.7 MHz ~ 1989.3 MHz					
	LTE Band 4 : 2110.7 MHz ~ 2154.3 MHz					
	LTE Band 5 : 869.7 MHz ~ 893.3 MHz					
	LTE Band 7 : 2622.5 MHz ~ 2687.5 MHz					
Rx Frequency	LTE Band 12 : 729.7 MHz ~ 745.3 MHz					
	LTE Band 17 : 736.5 MHz ~ 743.5 MHz					
	802.11b/g/n: 2412 MHz ~ 2462 MHz					
	802.11a/n/ac: 5180 MHz ~ 5240 MHz;					
	5260 MHz ~ 5320 MHz;					
	5500 MHz ~ 5700 MHz;					
	5745 MHz ~ 5825 MHz					
	Bluetooth: 2402 MHz ~ 2480 MHz					
	GNSS: 1559 MHz ~ 1610 MHz					
	NFC : 13.56 MHz					
	WWAN : Loop Antenna					
	WLAN: PIFA Antenna					
Antenna Type	Bluetooth : PIFA Antenna					
[GNSS: PIFA Antenna					
	NFC : Loop Antenna					
	FM: External Headset Antenna					

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	GSM: GMSK
	GPRS: GMSK
	EDGE(MCS 0-4): GMSK / (MCS 5-9): 8PSK
	WCDMA: BPSK (Uplink)
	HSDPA/DC-HSDPA: QPSK (Uplink)
	HSUPA : QPSK (Uplink)
	HSPA+: 16QAM (16QAM Uplink is not supported)
	DC-HSDPA: 64QAM
Turns of Madulation	LTE: QPSK / 16QAM / 64QAM
Type of Modulation	802.11b: DSSS (DBPSK / DQPSK / CCK)
	802.11a/g/n/ac : OFDM (BPSK / QPSK / 16QAM / 64QAM
	/256QAM)
	Bluetooth LE : GFSK
	Bluetooth (1Mbps) : GFSK
	Bluetooth (2Mbps) : π /4-DQPSK
	Bluetooth (3Mbps) : 8-DPSK
	GNSS: BPSK
	NFC: ASK

GNSS Rx = GPS Rx + Glonass Rx + Galileo Rx + BDS Rx

1.4. Modification of EUT

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

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1.5. 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	n Road, Kunshan Econom	ic Development Zone				
Test Site Location	Jiangsu Province 215300 People's Republic of China						
Test 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	CN1257	314309				
	03CH02-KS	GN1257	314309				

1.6. 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: GSM850 Rx(Middle channel) + USB Cable 1(Charging from Adapter 1)+ Earphone 1 + Bluetooth Idle + Camera(Rear) + WLAN (2.4G) Idle
	Mode 2: PCS1900 Rx + USB Cable 2(Charging from Adapter 2)+ Earphone 2 + Bluetooth Idle + Camera(Front) + WLAN (5G) Idle
	Mode 3: LTE Band 12 Rx(Middle) + USB Cable 1(Charging from Adapter 3)+ Earphone 1 + Bluetooth Idle + MPEG4 + WLAN (2.4G) Idle
AC Conducted Emission	Mode 4: LTE Band 17 Rx(High) + USB Cable 1(Charging from Adapter 4)+ Earphone 1 + Bluetooth Idle + NFC On + WLAN (5G) Idle
	Mode 5: LTE Band 2 Rx + USB Cable 1(Charging from Adapter 5)+ Earphone 1 + Bluetooth Idle + FM Rx(98MHz) + WLAN (2.4G) Idle
	Mode 6: LTE Band 4 Rx + USB Cable 1(Data Link with Notebook) + Earphone 1 + Bluetooth Idle + GNSS Rx + WLAN (5G) Idle
	Mode 7: LTE Band 7 Rx + USB Cable 2(Data Link with Notebook) + Earphone 1 + Bluetooth Idle + GNSS Rx + WLAN (2.4G) Idle
	Mode 1: GSM850 Rx(Middle channel) + USB Cable 1(Charging from Adapter 1)+ Earphone 1 + Bluetooth Idle + Camera(Rear) + WLAN (2.4G) Idle
	Mode 2: PCS1900 Rx + USB Cable 2(Charging from Adapter 2)+ Earphone 2 + Bluetooth Idle + Camera(Front) + WLAN (5G) Idle
	Mode 3: LTE Band 12 Rx(Middle) + USB Cable 2(Charging from Adapter 3)+ Earphone 2 + Bluetooth Idle + MPEG4 + WLAN (2.4G) Idle
Radiated Emissions	Mode 4: LTE Band 17 Rx(High) + USB Cable 2(Charging from Adapter 4)+ Earphone 2 + Bluetooth Idle + NFC On + WLAN (5G) Idle
	Mode 5: LTE Band 2 Rx + USB Cable 2(Charging from Adapter 5)+ Earphone 2 + Bluetooth Idle + FM Rx(88MHz) + WLAN (2.4G) Idle
	Mode 6: LTE Band 4 Rx + USB Cable 1(Data Link with Notebook) + Earphone 2 + Bluetooth Idle + GNSS Rx + WLAN (5G) Idle
	Mode 7: LTE Band 7 Rx + USB Cable 2(Data Link with Notebook) + Earphone 2 + Bluetooth Idle + GNSS Rx + WLAN (2.4G) Idle

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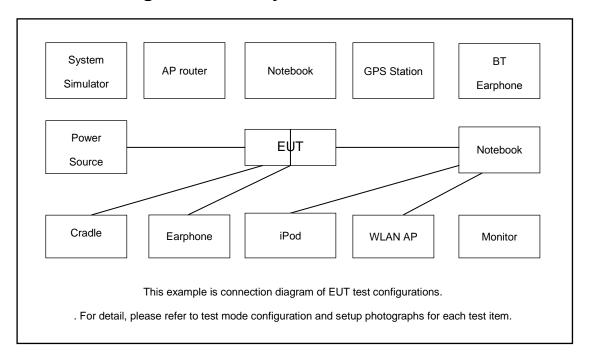
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Remark:

- 1. The worst case of AC is mode 1; 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 GSM850/ LTE Band 12/17and FM Rx, the worst channel was recorded in this report.

2.2. Connection Diagram of Test System



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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.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8m	
2.	Vector Signal Generator	R&S	SMBV100A	258305	N/A	N/A	
3.	WLAN AP	ASUS	AC66U	N/A	N/A	Unshielded, 1.8m	
4.	WLAN AP	TP-Link	TL-WDR5600	N/A	N/A	Unshielded, 1.8m	
5.	Notebook Lenovo (G480	N/A	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m	
6.	lpod	Apple	A1199	Fcc DoC	Shielded, 1.2m	N/A	
7.	Bluetooth Earphone	Lenovo	LBH308	N/A	N/A	N/A	
8.	Bluetooth Earphone	Xiaomi	LYEJ02LM	N/A	N/A	N/A	
9.	SD Card	Kingston	8GB	N/A	N/A	N/A	
10.	SD Card	SanDisk	Uitra	N/A	N/A	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 NFC Function.
- 4. Turn on MPEG4 function.
- 5. Turn on GNSS function to make the EUT receive continuous signals from GNSS station.
- 6. 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				

^{*}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.

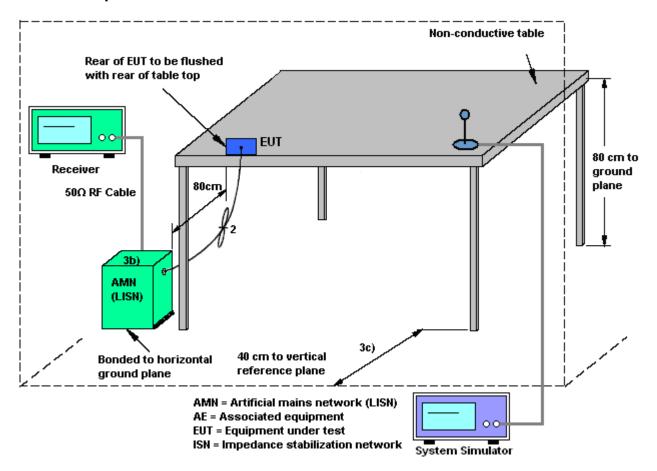
3.1.3 Test Procedure

- 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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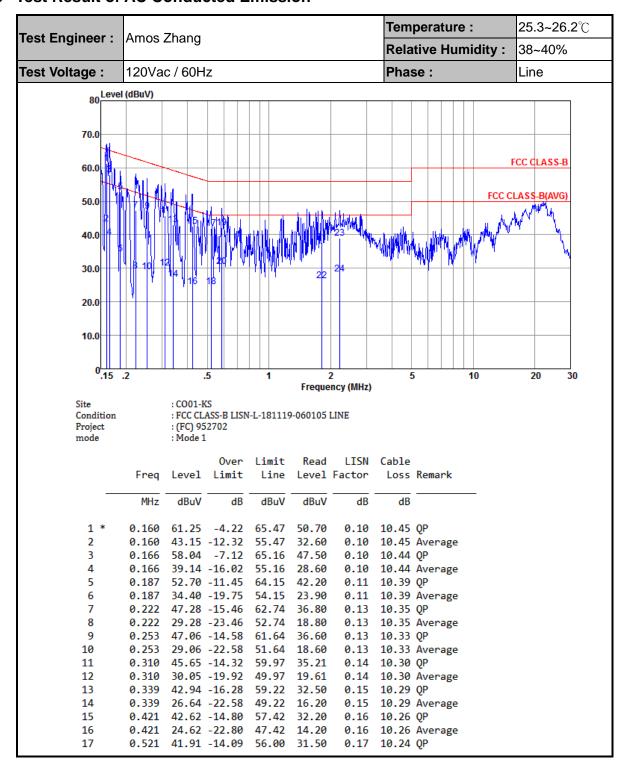
3.1.4 Test Setup



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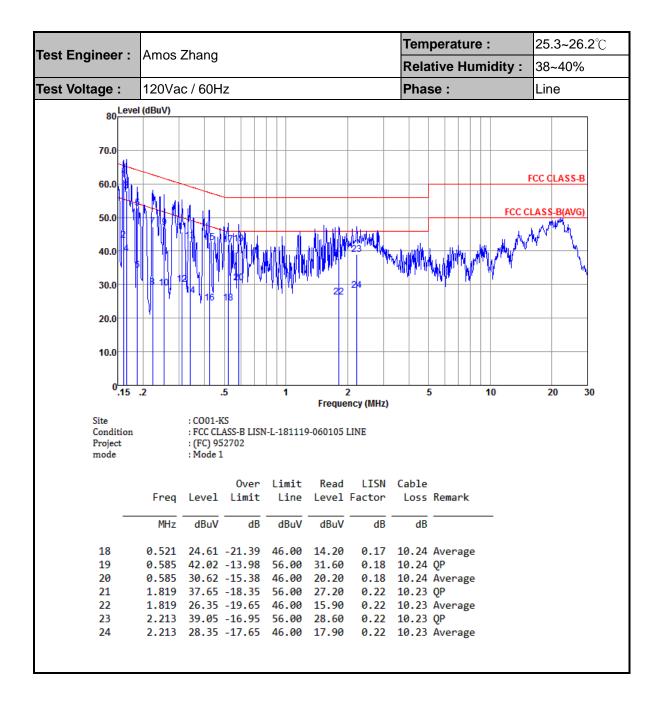
3.1.5 Test Result of AC Conducted Emission



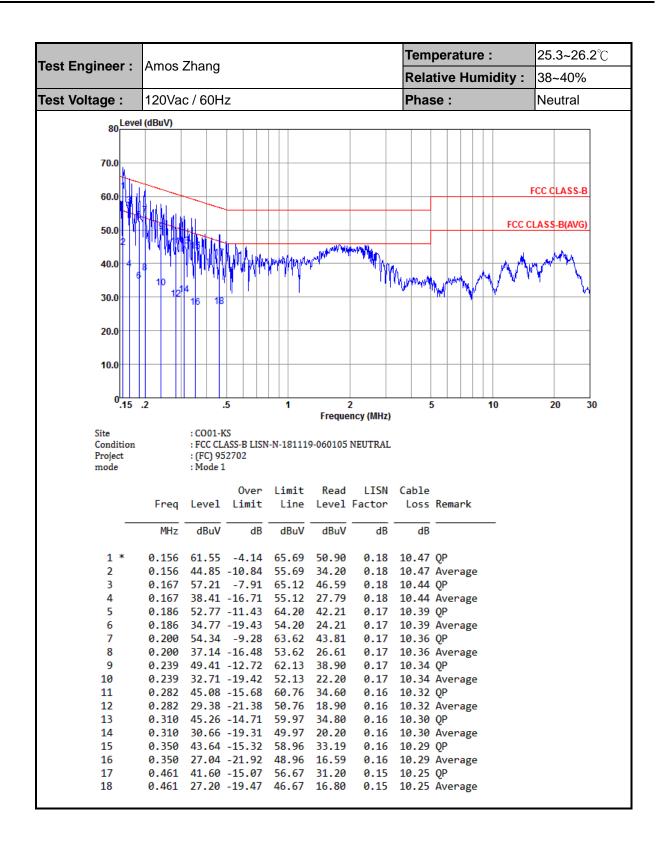
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3.2. Test of Radiated Emission Measurement

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.

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.
- 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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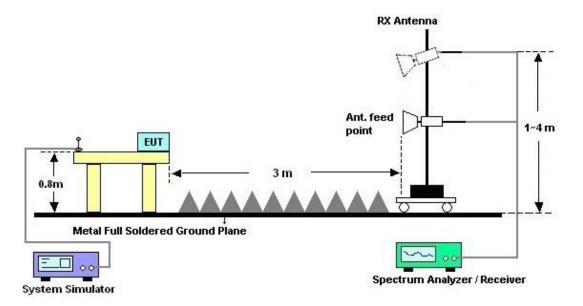
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3.2.4. Test Setup of Radiated Emission

For radiated emissions from 30MHz to 1GHz



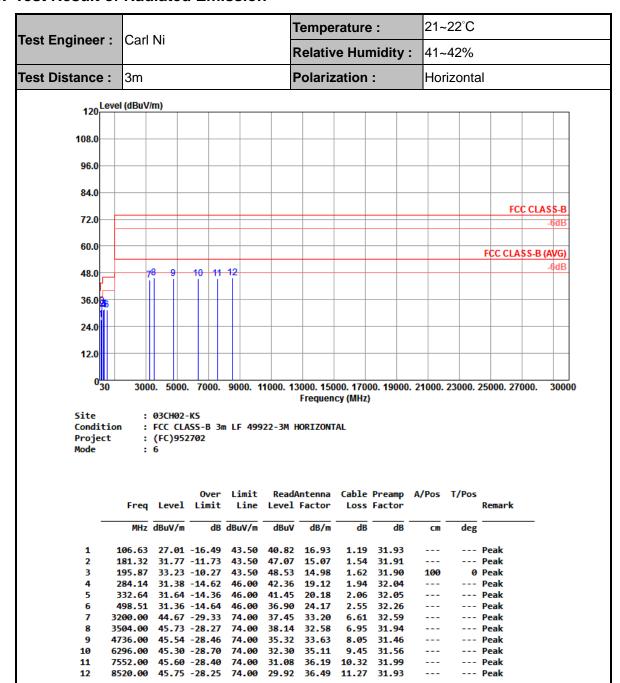
For radiated emissions above 1GHz



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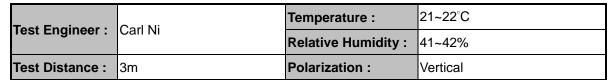
3.2.5. Test Result of Radiated Emission

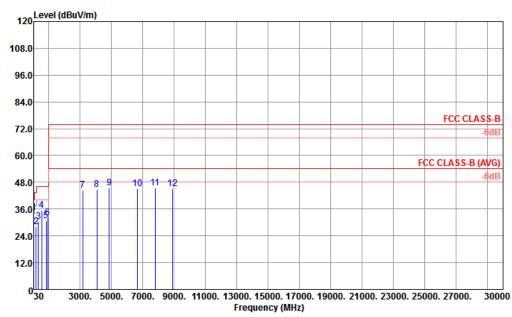


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: 03CH02-KS Site

Condition : FCC CLASS-B 3m LF 49922-3M VERTICAL

Project Mode : (FC)952702 : 6

			0ver	Limit	Read	Antenna	Cable	Preamp	A/Pos	T/Pos	
	Freq	Level	Limit	Line	Level	Factor	Loss	Factor			Remark
-	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1!	42.61	34.47	-5.53	40.00	47.50	18.18	0.74	31.95	100	62	QP
2	181.32	28.08	-15.42	43.50	43.38	15.07	1.54	31.91			Peak
3	332.64	30.34	-15.66	46.00	40.15	20.18	2.06	32.05			Peak
4	530.52	35.34	-10.66	46.00	40.06	24.99	2.60	32.31			Peak
5	831.22	30.62	-15.38	46.00	30.28	28.93	3.32	31.91			Peak
6	923.37	31.99	-14.01	46.00	30.15	29.58	3.50	31.24			Peak
7	3160.00	44.56	-29.44	74.00	37.39	33.13	6.56	32.52			Peak
8	4064.00	44.90	-29.10	74.00	35.59	33.74	7.53	31.96			Peak
9	4848.00	45.33	-28.67	74.00	34.83	33.73	8.14	31.37			Peak
10	6632.00	45.26	-28.74	74.00	31.91	35.27	9.71	31.63			Peak
11	7776.00	45.47	-28.53	74.00	30.55	36.14	10.80	32.02			Peak
12	8888.00	45.28	-28.72	74.00	28.98	36.27	11.60	31.57			Peak

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4. List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 16, 2019	Jun. 19, 2019	Apr. 15, 2020	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 12, 2018	Jun. 19, 2019	Oct. 11, 2019	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Nov. 19, 2018	Jun. 19, 2019	Nov. 18, 2019	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP0000008 11	AC 0V~300V, 45Hz~1000Hz	Oct. 12, 2018	Jun. 19, 2019	Oct. 11, 2019	Conduction (CO01-KS)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz;Ma x 30dBm	Aug. 06, 2018	Jun. 20, 2019	Aug. 05, 2019	Radiation (03CH02-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150244	10Hz-44G,MAX 30dB	Apr. 15, 2019	Jun. 20, 2019	Apr. 16, 2020	Radiation (03CH02-KS)
Bilog Antenna	TeseQ	CBL6112D	23182	30MHz-2GHz	Dec. 29, 2018	Jun. 20, 2019	Dec. 28, 2019	Radiation (03CH02-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75959	1GHz~18GHz	Jan. 27, 2019	Jun. 20, 2019	Jan. 26, 2020	Radiation (03CH02-KS)
SHF-EHF Horn	Com-power	AH-840	101070	18GHz~40GHz	Jan. 05, 2019	Jun. 20, 2019	Jan. 04, 2020	Radiation (03CH02-KS)
Amplifier	SONOMA	310N	187289	9KHz-1GHz	Aug. 06, 2018	Jun. 20, 2019	Aug. 05, 2019	Radiation (03CH02-KS)
Amplifier	Keysight	83017A	MY57280106	500MHz~26.5G Hz	Apr. 15, 2019	Jun. 20, 2019	Apr. 14, 2020	Radiation (03CH02-KS)
Amplifier	MITEQ	TTA1840-35-H G	1887435	18~40GHz	Jan. 14, 2019	Jun. 20, 2019	Jan. 13, 2020	Radiation (03CH02-KS)
AC Power Source	Chroma	61601	61601000247 3	N/A	NCR	Jun. 20, 2019	NCR	Radiation (03CH02-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	Jun. 20, 2019	NCR	Radiation (03CH02-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	Jun. 20, 2019	NCR	Radiation (03CH02-KS)

NCR: No Calibration Required

Sporton International (Kunshan) Inc.

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5. Uncertainty of Evaluation

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

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

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

Measuring Uncertainty for a Level of Confidence	4.9 dB
of 95% (U = 2Uc(y))	4.5 UB

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

Measuring Uncertainty for a Level of Confidence	5.0 dB
of 95% (U = 2Uc(y))	3.0 dB

Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence	
of 95% (U = 2Uc(y))	5.1 dB

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