FCC RF Test Report

APPLICANT	**:**	**Motorola Mobility LLC**
EQUIPMENT	**:**	**Mobile Cellular Phone**
BRAND NAME	**:**	**Motorola**
MODEL NAME	**:**	**XT1941-5, XT1941-3**
FCC ID	**:**	**IHDT56XK1**
STANDARD	**:**	**FCC Part 15 Subpart C §15.225**
CLASSIFICATION	**:**	**(DXX) Low Power Communication Device Transmitter**

The product was received on Jun. 04, 2018 and testing was completed on Jun. 28, 2018. We, Sporton International (Kunshan) Inc., would like to declare that the tested sample has been evaluated in accordance with the test procedures 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.

James Huang

Approved by: James Huang / Manager

TESTING
NVLAP LAB CODE 600155-0

Sporton International (Kunshan) Inc.

No.3-2 Ping-Xiang Rd, Kunshan Development Zone Kunshan City Jiangsu Province 215335 China

TABLE OF CONTENTS

TABLE OF CONTENTS **2**
REVISION HISTORY **3**
SUMMARY OF THE 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 6
1.5 Specification of Accessory 7
1.6 Modification of EUT 8
1.7 Testing Location 9
1.8 Applicable Standards 9
2. TEST CONFIGURATION OF EQUIPMENT UNDER TEST **10**
2.1 Descriptions of Test Mode 10
2.2 Connection Diagram of Test System 11
2.3 Table for Supporting Units 11
2.4 EUT Operation Test Setup 11
3. TEST RESULTS **12**
3.1 AC Power Line Conducted Emissions Measurement 12
3.2 20dB and 99% OBW Spectrum Bandwidth Measurement 14
3.3 Frequency Stability Measurement 15
3.4 Field Strength of Fundamental Emissions and Mask Measurement 16
3.5 Radiated Emissions Measurement 18
3.6 Antenna Requirements 21
4. LIST OF MEASURING EQUIPMENT **22**
5. UNCERTAINTY OF EVALUATION **23**
APPENDIX A. TEST RESULTS OF CONDUCTED EMISSION TEST
APPENDIX B. TEST RESULTS OF CONDUCTED TEST ITEMS
B1. Test Result of 20dB Spectrum Bandwidth
B2. Test Result of Frequency Stability
APPENDIX C. TEST RESULTS OF RADIATED TEST ITEMS
C1. Test Result of Field Strength of Fundamental Emissions
C2. Results of Radiated Emissions (9 kHz~30MHz)
C3. Results of Radiated Emissions (30MHz~1GHz)
APPEDNIX D. SETUP PHOTOGRAPHS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR860402D	Rev. 01	Initial issue of report	Jul. 12, 2018

SUMMARY OF THE TEST RESULT

Report Section	FCC Rule	Description of Test	Result	Remark
3.1	15.207	AC Power Line Conducted Emissions	Complies	Under limit 4.40 dB at 0.169MHz
3.2	15.215(c)	20dB Spectrum Bandwidth	Complies	-
	-	99% OBW Spectrum Bandwidth	Complies	-
3.3	15.225(e)	Frequency Stability	Complies	-
3.4	15.225(a)(b)(c)	Field Strength of Fundamental Emissions	Complies	Max level 57.55 dBμV/m at 13.56 MHz
3.5	15.225(d) & 15.209	Radiated Spurious Emissions	Complies	Under limit 6.80 dB at 40.670MHz
3.6	15.203	Antenna Requirements	Complies	-

1. General Description

1.1 Applicant

Motorola Mobility LLC

222 W, Merchandise Mart Plaza, Chicago IL 60654 USA

1.2 Manufacturer

Motorola Mobility LLC

222 W, Merchandise Mart Plaza, Chicago IL 60654 USA

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Cellular Phone
Brand Name	Motorola
Model Name	XT1941-5, XT1941-3
FCC ID	IHDT56XK1
EUT supports Radios application	GSM/GPRS/EGPRS/WCDMA/HSPA/DC-HSDPA/ HSPA+(16QAM is not supported)/LTE/NFC WLAN 2.4GHz 802.11b/g/n HT20 WLAN 5GHz 802.11a/n HT20/HT40 Bluetooth BR/EDR/LE
IMEI Code	Conducted: 355542090027733/355542090027741 Conduction: 355542090025752/355542090025760 Radiation: 355542090025091/355542090025109
HW Version	DVT1B
SW Version	fastboot_deen_oem_userdebug_8.1.0_OPK28.26_f325 _intcfg-test-keys_oem
EUT Stage	Identical Prototype

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. There are two types of EUT sample 1 and sample 2, the differences between two samples are only for SIM slot, the sample 1(XT1941-3) is dual SIM slot, the sample 2(XT1941-5) is single SIM slot. We only choose dual SIM sample to perform full tests.

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Frequency Range	13.553 ~ 13.567MHz
Channel Number	1
20dBW	2.49 KHz
99%OBW	2.10 KHz
Antenna Type	Loop Antenna
Type of Modulation	ASK

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

1.5 Specification of Accessory

Specification of Accessory				
AC Adapter 1(US)	Brand Name	Motorola(Salom)	Model Name	SC-51
	Power Rating	I/P: 100-240 Vac, 600mA, O/P: 5/9/12 Vdc, 3000/2000/1500 mA		
AC Adapter 1(EU)	Brand Name	Motorola(Salom)	Model Name	SC-52
	Power Rating	I/P: 100-240 Vac, 600mA, O/P: 5/9/12 Vdc, 3000/2000/1500 mA		
AC Adapter 1(UK)	Brand Name	Motorola(Salom)	Model Name	SC-53
	Power Rating	I/P: 100-240 Vac, 600mA, O/P: 5/9/12 Vdc, 3000/2000/1500 mA		
AC Adapter 1(India)	Brand Name	Motorola(Salom)	Model Name	SC-54
	Power Rating	I/P: 100-240 Vac, 600mA, O/P: 5/9/12 Vdc, 3000/2000/1500 mA		
AC Adapter 1(AU)	Brand Name	Motorola(Salom)	Model Name	SC-55
	Power Rating	I/P: 100-240 Vac, 600mA, O/P: 5/9/12 Vdc, 3000/2000/1500 mA		
AC Adapter 1(AR)	Brand Name	Motorola(Salom)	Model Name	SC-56
	Power Rating	I/P: 100-240 Vac, 600mA, O/P: 5/9/12 Vdc, 3000/2000/1500 mA		
AC Adapter 1(BR)	Brand Name	Motorola(Salom)	Model Name	SC-57
	Power Rating	I/P: 100-240 Vac, 600mA, O/P: 5/9/12 Vdc, 3000/2000/1500 mA		
AC Adapter 1(PRC)	Brand Name	Motorola(Salom)	Model Name	SC-58
	Power Rating	I/P: 100-240 Vac, 600mA, O/P: 5/9/12 Vdc, 3000/2000/1500 mA		
AC Adapter 1(Chile)	Brand Name	Motorola(Salom)	Model Name	SC-52
	Power Rating	I/P: 100-240 Vac, 600mA, O/P: 5/9/12 Vdc, 3000/2000/1500 mA		
AC Adapter 2(US)	Brand Name	Motorola(chenyang)	Model Name	SC-51
	Power Rating	I/P: 100-240 Vac, 600mA, O/P: 5/9/12 Vdc, 3000/2000/1500 mA		
AC Adapter 2(EU)	Brand Name	Motorola(chenyang)	Model Name	SC-52
	Power Rating	I/P: 100-240 Vac, 600mA, O/P: 5/9/12 Vdc, 3000/2000/1500 mA		
AC Adapter 2(UK)	Brand Name	Motorola(chenyang)	Model Name	SC-53
	Power Rating	I/P: 100-240 Vac, 600mA, O/P: 5/9/12 Vdc, 3000/2000/1500 mA		
AC Adapter 2(AU)	Brand Name	Motorola(chenyang)	Model Name	SC-55
	Power Rating	I/P: 100-240 Vac, 600mA, O/P: 5/9/12 Vdc, 3000/2000/1500 mA		
AC Adapter 2(AR)	Brand Name	Motorola(chenyang)	Model Name	SC-56
	Power Rating	I/P: 100-240 Vac, 600mA, O/P: 5/9/12 Vdc, 3000/2000/1500 mA		
AC Adapter 2(PRC)	Brand Name	Motorola(chenyang)	Model Name	SC-58
	Power Rating	I/P: 100-240 Vac, 600mA, O/P: 5/9/12 Vdc, 3000/2000/1500 mA		
AC Adapter 3(BR)	Brand Name	Motorola(Salom/Flex)	Model Name	SC-57
	Power Rating	I/P: 100-240 Vac, 600mA, O/P: 5/9/12 Vdc, 3000/2000/1500 mA		
AC Adapter 4(BR)	Brand Name	Motorola (Tenpao/Cliptech)	Model Name	SC-57
	Power Rating	I/P: 100-240 Vac, 600mA, O/P: 5/9/12 Vdc, 3000/2000/1500 mA		
Battery	Brand Name	Motorola	Model Name	JE40
	Power Rating	3.8Vdc,2820mAh	Type	Li-ion
Earphone 1	Brand Name	Motorola (New Leader)	Model Name	NLD-EM307E-09SF
	Signal Line Type	1.2 meter, non-shielded cable, without ferrite core		
Earphone 2	Brand Name	Motorola	Model Name	SH38C16618 (L20)
	Signal Line Type	1.2 meter, non-shielded cable, without ferrite core		

USB Cable 1	**Brand Name**	Motorola (Liqi)	**Model Name**	LQ-03500079
	Signal Line Type	1.0 meter, shielded cable, without ferrite core		
USB Cable 2	**Brand Name**	Motorola (Saibao)	**Model Name**	SLQ-A1111A
	Signal Line Type	1.0 meter, shielded cable, without ferrite core		
USB Cable 3	**Brand Name**	Motorola (I SHENG)	**Model Name**	SC18C28955
	Signal Line Type	1.0 meter, shielded cable, without ferrite core		

1.6 Modification of EUT

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

1.7 Testing Location

Sporton International (Kunshan) Inc. is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600155-0) and the FCC designation No is CN5013.

Test Site	Sporton International (Kunshan) Inc.			
Test Site Location	No.3-2 Ping-Xiang Rd, Kunshan Development Zone Kunshan City Jiangsu Province 215335 China TEL : +86-512-57900158 FAX : +86-512-57900958			
Test Site No.	**Sporton Site No.**			**FCC Registration No.**
	TH01-KS	03CH02-KS	CO01-KS	630927
Test Engineer	Silent Hai	Rock Shi	Amos Zhang	
Temperature	21~25℃	21~22℃	24.7~25.1℃	
Relative Humidity	51~55%	41~42%	46~47%	

Note: The test site complies with ANSI C63.4 2014 requirement.

1.8 Applicable Standards

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

- FCC Part 15 Subpart C §15.225
- ANSI C63.10-2013

2. Test Configuration of Equipment Under Test

2.1 Descriptions of Test Mode

Investigation has been done on all the possible configurations.

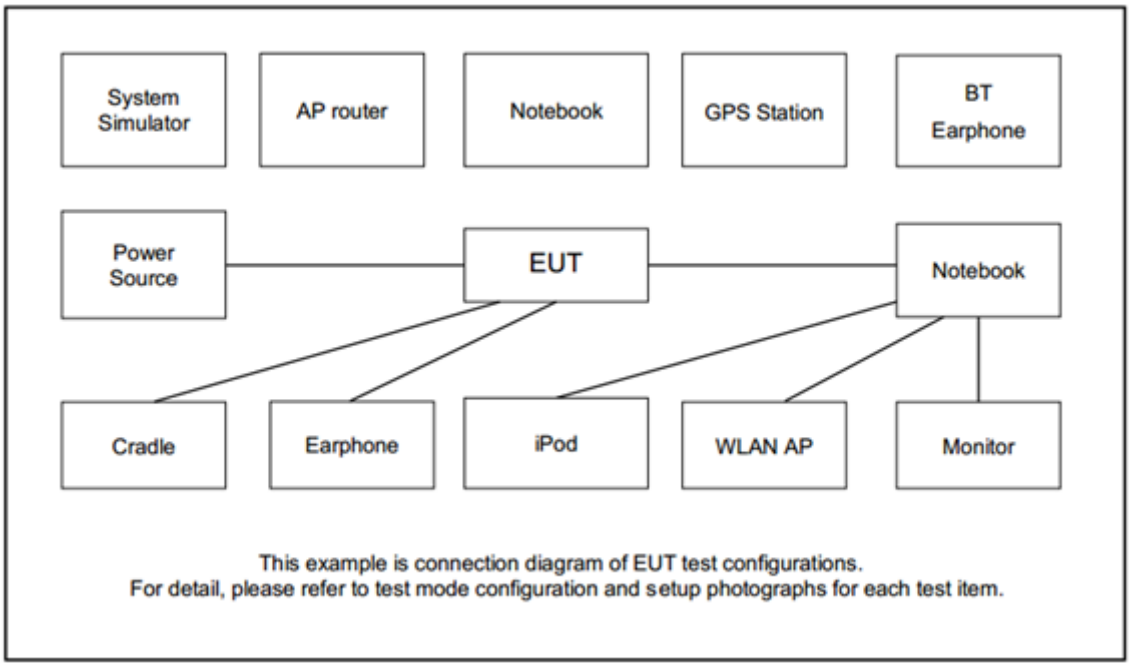
The following table is a list of the test modes shown in this test report.

Test Items	
AC Power Line Conducted Emissions	Field Strength of Fundamental Emissions
20dB Spectrum Bandwidth	Frequency Stability
Radiated Emissions 9kHz~30MHz	Radiated Emissions 30MHz~1GHz

The EUT pre-scanned in four NFC type, A, B, F, V. The worst type (type F) was recorded in this report. Pre-scanned tests, X, Y, Z in three orthogonal panels to determine the final configuration (Y plane as worst plane) from all possible combinations.

Test Cases	
AC Conducted Emission	Mode 1 : GSM850 Idle + Bluetooth Link + WLAN Link(2.4G) + USB Cable 1(Charging from Adapter 4) + Earphone
Remark: For Radiated Test Cases, The tests were performed with Adapter 1, USB Cable 1, Earphone 1 and Sample 1.	

2.2 Connection Diagram of Test System



2.3 Table for Supporting Units

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	WLAN AP	D-Link	DIR-855	KA2DIR855A2	N/A	Unshielded,1.8m
3.	Notebook	Lenovo	G480	PRC4	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	SD Card	Kingston	8GB	N/A	N/A	N/A
5.	NFC Card	N/A	N/A	N/A	N/A	N/A

2.4 EUT Operation Test Setup

The EUT was programmed to be in continuously transmitting mode.

The ancillary equipment, NFC card, is used to make the EUT (NFC) continuously transmit at 13.56MHz and is placed around 3 cm gap to the EUT.

3. Test Results

3.1 AC Power Line Conducted Emissions Measurement

3.1.1 Limit 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.

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	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.

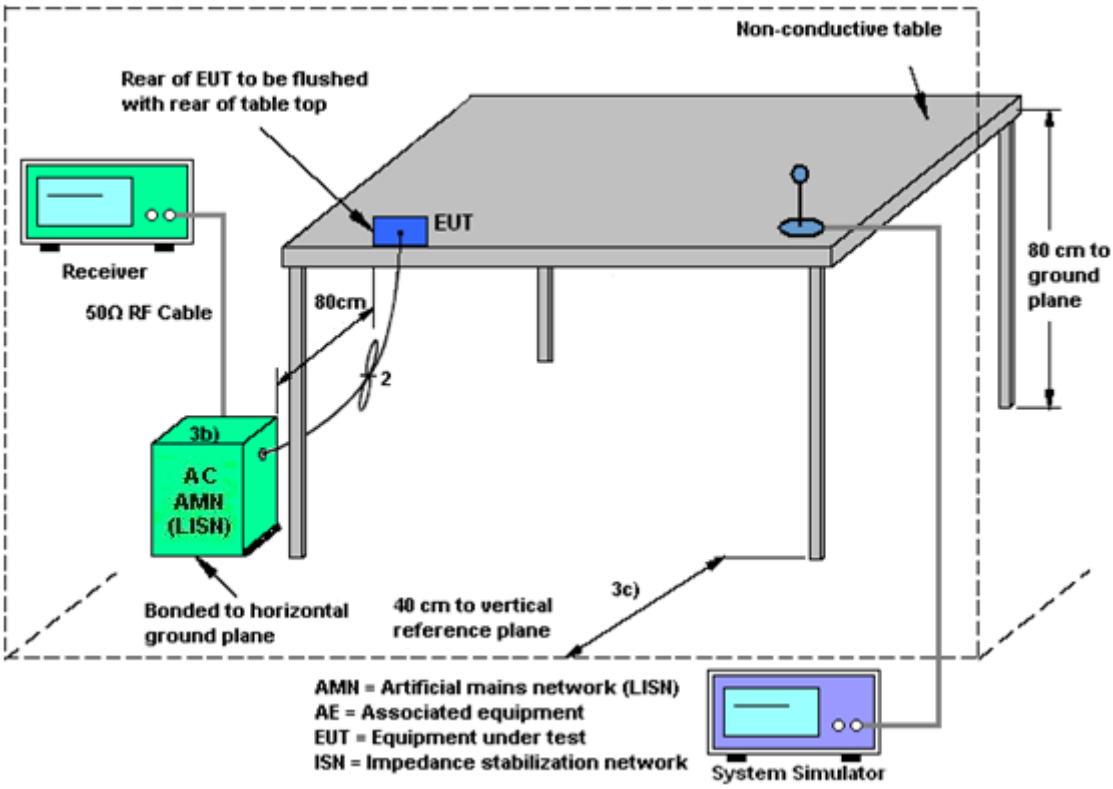
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it 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

Please refer to Appendix A.

3.2 20dB and 99% OBW Spectrum Bandwidth Measurement

3.2.1 Limit

Intentional radiators must be designed to ensure that the 20dB and 99% emission bandwidth in the specific band 13.553~13.567MHz.

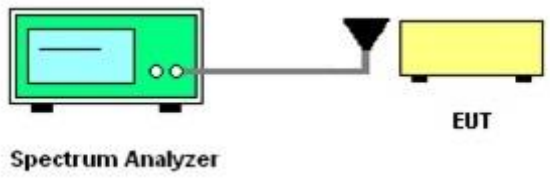
3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 Test Procedures

1. The spectrum analyzer connected via a receive antenna placed near the EUT in peak Max hold mode.
2. The resolution bandwidth of 1 kHz and the video bandwidth of 3 kHz were used.
3. Measured the spectrum width with power higher than 20dB below carrier.
4. Measured the 99% OBW.

3.2.4 Test Setup



3.2.5 Test Result of Conducted Test Items

Please refer to Appendix B.

3.3 Frequency Stability Measurement

3.3.1 Limit

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% (100ppm) of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

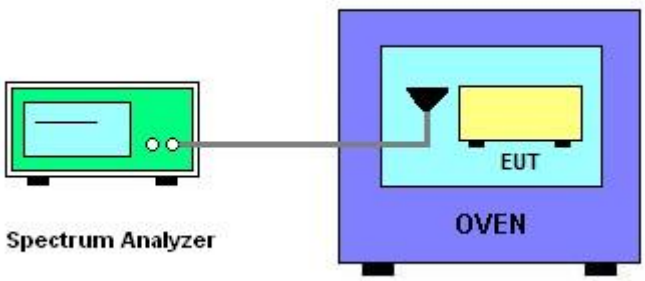
3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

3.3.3 Test Procedures

1. The spectrum analyzer connected via a receive antenna placed near the EUT.
2. EUT have transmitted signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire emissions bandwidth.
4. Set RBW = 1 kHz, VBW = 3 kHz with peak detector and maxhold settings.
5. The fc is declaring of channel frequency. Then the frequency error formula is $(fc-f)/fc \times 10^6$ ppm and the limit is less than ±100ppm.
6. Extreme temperature rule is -20°C~50°C.

3.3.4 Test Setup



3.3.5 Test Result of Conducted Test Items

Please refer to Appendix B.

3.4 Field Strength of Fundamental Emissions and Mask Measurement

3.4.1 Limit

Rules and specifications	FCC CFR 47 Part 15 section 15.225			
Description	Compliance with the spectrum mask is tested with RBW set to 9kHz.			
Freq. of Emission (MHz)	Field Strength (μV/m) at 30m	Field Strength (dBμV/m) at 30m	Field Strength (dBμV/m) at 10m	Field Strength (dBμV/m) at 3m
1.705~13.110	30	29.5	48.58	69.5
13.110~13.410	106	40.5	59.58	80.5
13.410~13.553	334	50.5	69.58	90.5
13.553~13.567	15848	84.0	103.08	124.0
13.567~13.710	334	50.5	69.58	90.5
13.710~14.010	106	40.5	59.58	80.5
14.010~30.000	30	29.5	48.58	69.5

3.4.2 Measuring Instruments

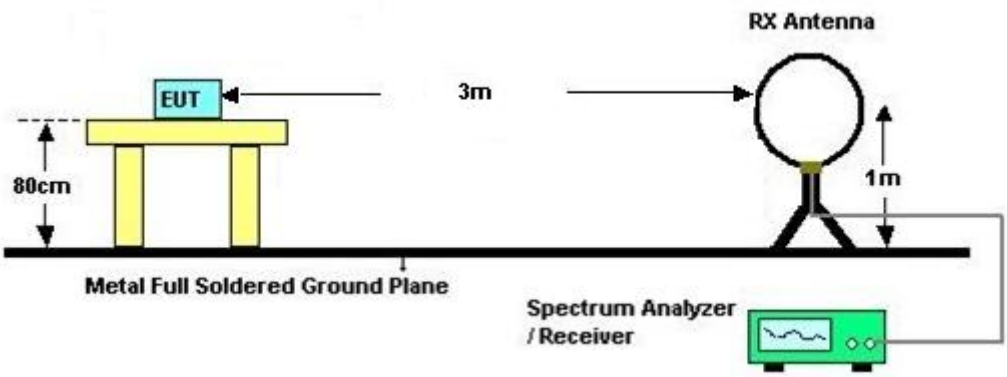
See list of measuring instruments of this test report.

3.4.3 Test Procedures

1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the loop receiving antenna mounted antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the receiving antenna was fixed at one meter above ground to find the maximum emissions field strength.
4. For Fundamental emissions, use the receiver to measure QP reading.
5. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
6. Compliance with the spectrum mask is tested with RBW set to 9kHz.
   Note: Emission level (dBμV/m) = 20 log Emission level (μV/m).

3.4.4 Test Setup

For radiated emissions below 30MHz



3.4.5 Test Result of Field Strength of Fundamental Emissions and Mask

Please refer to Appendix C.

3.5 Radiated Emissions Measurement

3.5.1 Limit

The field strength of any emissions which appear outside of 13.110 ~14.010MHz band shall not exceed the general radiated emissions limits.

Frequencies (MHz)	Field Strength (μV/m)	Measurement Distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

3.5.2 Measuring Instruments

See list of measuring instruments of this test report.

3.5.3 Measuring Instrument Setting

The following table is the setting of receiver.

Receiver Parameter	Setting
Attenuation	Auto
Frequency Range: 9kHz~150kHz	RBW 200Hz for QP
Frequency Range: 150kHz~30MHz	RBW 9kHz for QP
Frequency Range: 30MHz~1000MHz	RBW 120kHz for Peak

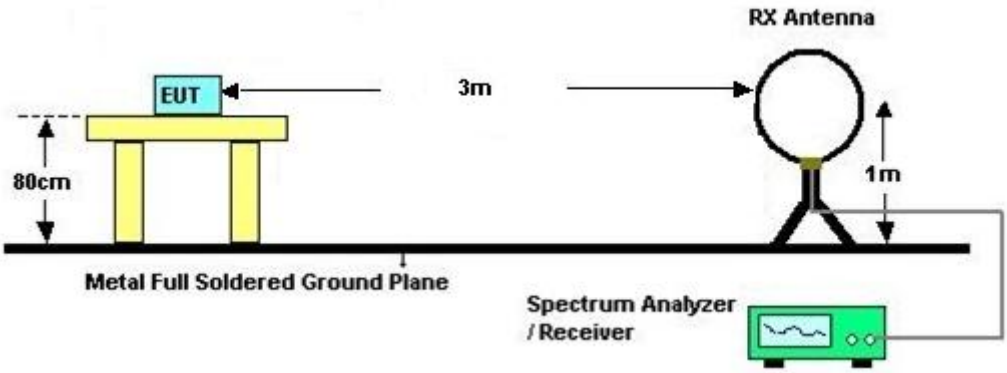
Note: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.

3.5.4 Test Procedures

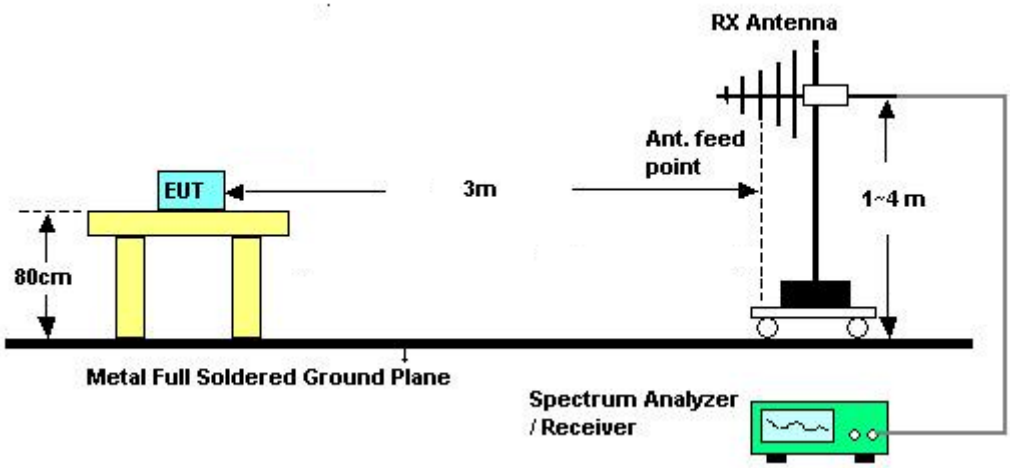
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
7. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. Antenna Requirements

3.5.5 Test Setup

For radiated emissions below 30MHz



For radiated emissions above 30MHz



3.5.6 Test Result of Radiated Emissions Measurement

Please refer to Appendix C.

3.6 Antenna Requirements

3.6.1 Standard Applicable

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited.

The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the rule.

3.6.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

4. List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Aug. 08, 2017	Jun. 26, 2018	Aug. 07, 2018	Conducted (TH01-KS)
Pulse Power Senor	Anritsu	MA2411B	1339163	300MHz~40GHz	Jan. 18, 2018	Jun. 26, 2018	Jan. 17, 2019	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1435004	50MHz Bandwidth	Jan. 18, 2018	Jun. 26, 2018	Jan. 17, 2019	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz;Max 30dBm	Aug. 08, 2017	Jun. 24, 2018~ Jun. 27, 2018	Aug. 07, 2018	Radiation (03CH02-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150208	10Hz-44G,MAX 30dB	Apr. 17, 2018	Jun. 24, 2018~ Jun. 27, 2018	Apr. 16, 2019	Radiation (03CH02-KS)
Bilog Antenna	TeseQ	CBL6112D	23182	30MHz-2GHz	Jan. 29, 2018	Jun. 24, 2018~ Jun. 27, 2018	Jan. 28, 2019	Radiation (03CH02-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75957	1GHz~18GHz	Oct. 21, 2017	Jun. 24, 2018~ Jun. 27, 2018	Oct. 20, 2018	Radiation (03CH02-KS)
Amplifier	SONOMA	310N	187289	9KHz-1GHz	Aug. 07, 2017	Jun. 24, 2018~ Jun. 27, 2018	Aug. 06, 2018	Radiation (03CH02-KS)
Amplifier	Agilent	8449B	3008A02384	1GHz~26.5GHz	Oct. 12, 2017	Jun. 24, 2018~ Jun. 27, 2018	Oct. 11, 2018	Radiation (03CH02-KS)
AC Power Source	Chroma	61601	616010002473	N/A	NCR	Jun. 24, 2018~ Jun. 27, 2018	NCR	Radiation (03CH02-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	Jun. 24, 2018~ Jun. 27, 2018	NCR	Radiation (03CH02-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	Jun. 24, 2018~ Jun. 27, 2018	NCR	Radiation (03CH02-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 19, 2018	Jun. 28, 2018	Apr. 18, 2019	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 13, 2017	Jun. 28, 2018	Oct. 12, 2018	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Oct. 13, 2017	Jun. 28, 2018	Oct. 12, 2018	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 12, 2017	Jun. 28, 2018	Oct. 11, 2018	Conduction (CO01-KS)

NCR: No Calibration Required

5. Uncertainty of Evaluation

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

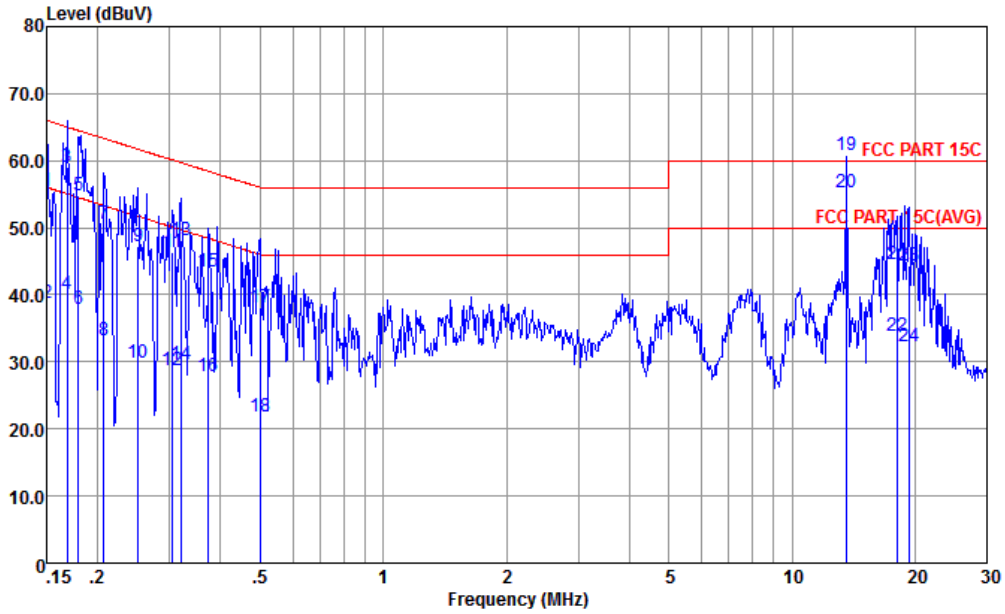
Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.9dB**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.2 dB**

Appendix A. Test Results of Conducted Emission Test

Test Engineer :	Amos Zhang	**Temperature :**	24.7~25.1℃
		Relative Humidity :	46~47%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line

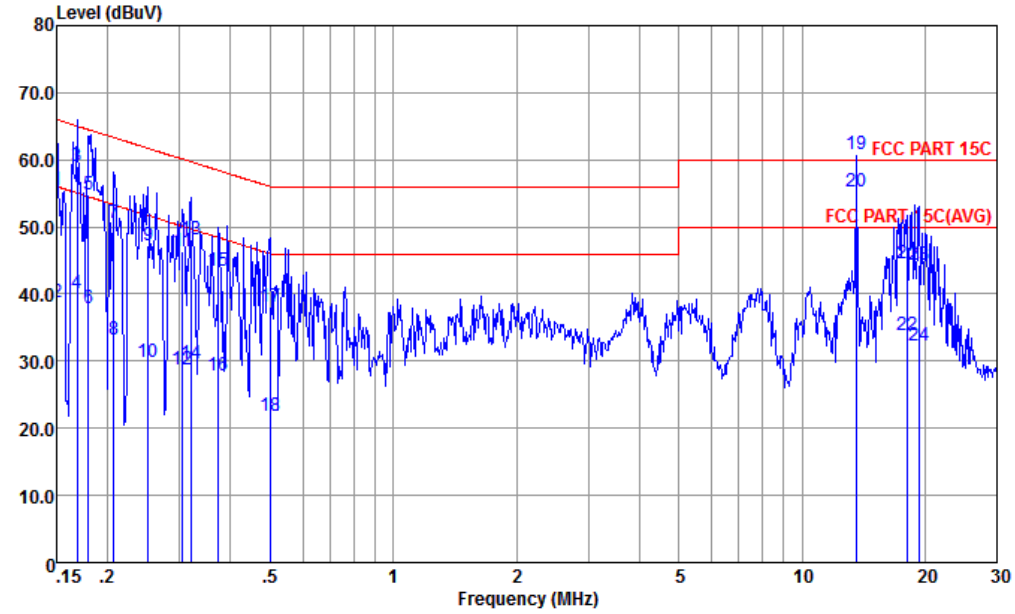


Site : CO01-KS
Condition : FCC PART 15C LISN-L-171013-060103 LINE

: 355542090025752/355542090025760 #13

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.150	55.38	-10.62	66.00	44.60	0.16	10.62	QP
2	0.150	38.68	-17.32	56.00	27.90	0.16	10.62	Average
3	0.169	59.03	-6.00	65.03	48.30	0.18	10.55	QP
4	0.169	40.03	-15.00	55.03	29.30	0.18	10.55	Average
5	0.180	54.80	-9.70	64.50	44.09	0.19	10.52	QP
6	0.180	37.90	-16.60	54.50	27.19	0.19	10.52	Average
7	0.207	50.56	-12.76	63.32	39.91	0.20	10.45	QP
8	0.207	33.26	-20.06	53.32	22.61	0.20	10.45	Average
9	0.251	47.25	-14.48	61.73	36.60	0.21	10.44	QP
10	0.251	29.95	-21.78	51.73	19.30	0.21	10.44	Average
11	0.305	46.25	-13.85	60.10	35.59	0.23	10.43	QP
12	0.305	28.85	-21.25	50.10	18.19	0.23	10.43	Average
13	0.320	48.15	-11.56	59.71	37.50	0.23	10.42	QP
14	0.320	29.55	-20.16	49.71	18.90	0.23	10.42	Average
15	0.373	43.55	-14.88	58.43	32.90	0.24	10.41	QP
16	0.373	27.85	-20.58	48.43	17.20	0.24	10.41	Average
17	0.499	38.17	-17.84	56.01	27.60	0.26	10.31	QP

Test Engineer :	Amos Zhang	**Temperature :**	24.7~25.1℃
		Relative Humidity :	46~47%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line



Site : CO01-KS
Condition : FCC PART 15C LISN-L-171013-060103 LINE

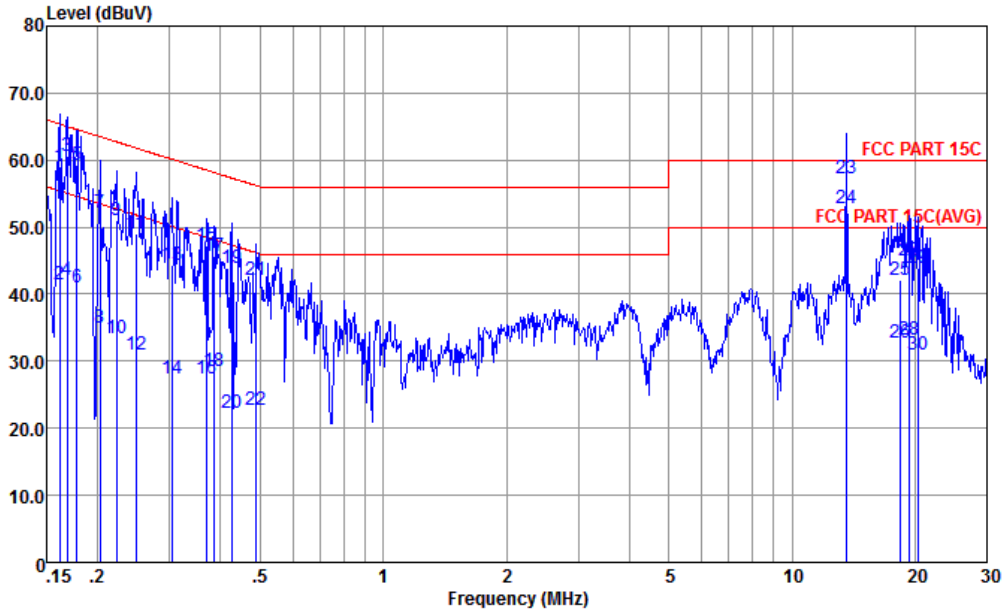
: 355542090025752/355542090025760 #13

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
18	0.499	21.77	-24.24	46.01	11.20	0.26	10.31	Average
19 *	13.560	60.78	0.78	60.00	50.11	0.28	10.39	QP
20 *	13.560	55.18	5.18	50.00	44.51	0.28	10.39	Average
21	18.039	44.57	-15.43	60.00	33.90	0.21	10.46	QP
22	18.039	33.87	-16.13	50.00	23.20	0.21	10.46	Average
23	19.428	44.26	-15.74	60.00	33.60	0.19	10.47	QP
24	19.428	32.26	-17.74	50.00	21.60	0.19	10.47	Average

(1) with antenna

Remark: 13.560MHz is the NFC RF fundamental signal.

Test Engineer :	Amos Zhang	**Temperature :**	24.7~25.1℃
		Relative Humidity :	46~47%
Test Voltage :	120Vac / 60Hz	**Phase :**	Neutral

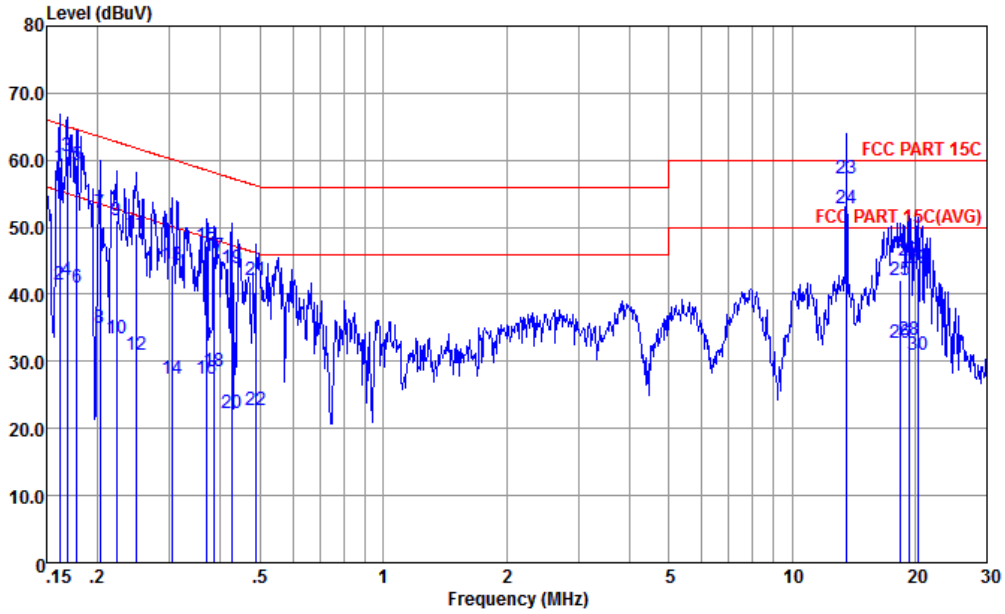


Site : CO01-KS
Condition : FCC PART 15C LISN-N-171013-060103 NEUTRAL

: 355542090025752/355542090025760 #13

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.162	59.06	-6.32	65.38	48.20	0.28	10.58	QP
2	0.162	41.36	-14.02	55.38	30.50	0.28	10.58	Average
3	0.169	60.63	-4.40	65.03	49.80	0.28	10.55	QP
4	0.169	42.03	-13.00	55.03	31.20	0.28	10.55	Average
5	0.178	59.30	-5.29	64.59	48.50	0.28	10.52	QP
6	0.178	41.10	-13.49	54.59	30.30	0.28	10.52	Average
7	0.203	52.23	-11.26	63.49	41.50	0.28	10.45	QP
8	0.203	35.03	-18.46	53.49	24.30	0.28	10.45	Average
9	0.222	50.93	-11.81	62.74	40.20	0.28	10.45	QP
10	0.222	33.33	-19.41	52.74	22.60	0.28	10.45	Average
11	0.248	48.92	-12.90	61.82	38.20	0.28	10.44	QP
12	0.248	31.02	-20.80	51.82	20.30	0.28	10.44	Average
13	0.303	44.31	-15.84	60.15	33.60	0.28	10.43	QP
14	0.303	27.31	-22.84	50.15	16.60	0.28	10.43	Average
15	0.369	47.30	-11.22	58.52	36.60	0.29	10.41	QP
16	0.369	27.30	-21.22	48.52	16.60	0.29	10.41	Average
17	0.385	45.60	-12.57	58.17	34.90	0.29	10.41	QP

Test Engineer :	Amos Zhang	**Temperature :**	24.7~25.1℃
		Relative Humidity :	46~47%
Test Voltage :	120Vac / 60Hz	**Phase :**	Neutral



Site : CO01-KS
Condition : FCC PART 15C LISN-N-171013-060103 NEUTRAL

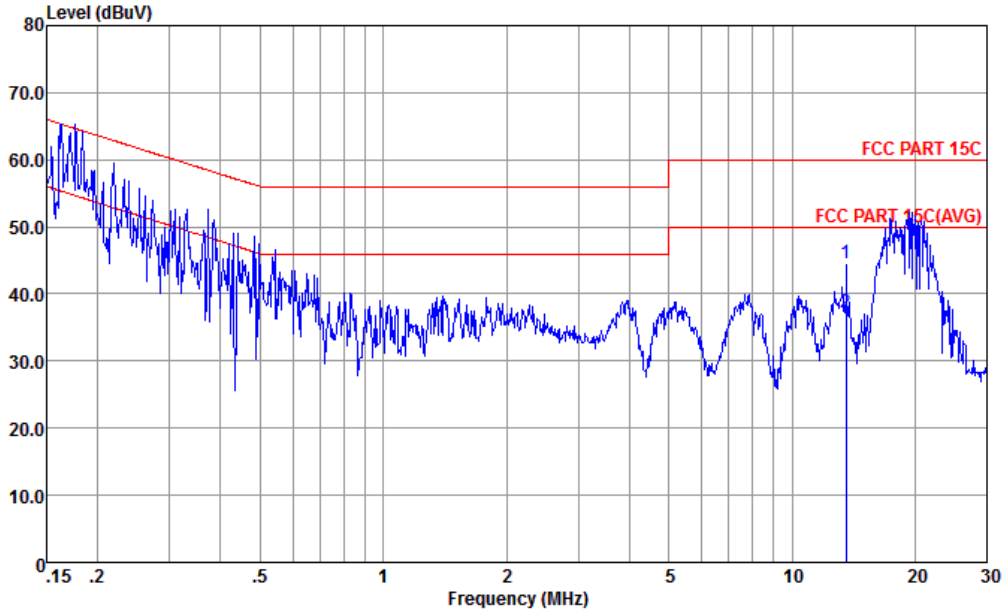
: 355542090025752/355542090025760 #13

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
18	0.385	28.50	-19.67	48.17	17.80	0.29	10.41	Average
19	0.426	43.87	-13.46	57.33	33.20	0.29	10.38	QP
20	0.426	22.27	-25.06	47.33	11.60	0.29	10.38	Average
21	0.489	42.21	-13.98	56.19	31.60	0.29	10.32	QP
22	0.489	22.81	-23.38	46.19	12.20	0.29	10.32	Average
23	13.560	57.23	-2.77	60.00	46.61	0.23	10.39	QP
24 *	13.560	52.73	2.73	50.00	42.11	0.23	10.39	Average
25	18.426	42.20	-17.80	60.00	31.60	0.14	10.46	QP
26	18.426	32.70	-17.30	50.00	22.10	0.14	10.46	Average
27	19.428	45.09	-14.91	60.00	34.50	0.12	10.47	QP
28	19.428	33.19	-16.81	50.00	22.60	0.12	10.47	Average
29	20.377	43.81	-16.19	60.00	33.20	0.12	10.49	QP
30	20.377	30.91	-19.09	50.00	20.30	0.12	10.49	Average

(1) with antenna

Remark: 13.560MHz is the NFC RF fundamental signal.

Test Engineer :	Amos Zhang	**Temperature :**	24.7~25.1℃
		Relative Humidity :	46~47%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line



Site : CO01-KS
Condition : FCC PART 15C LISN-L-171013-060103 LINE

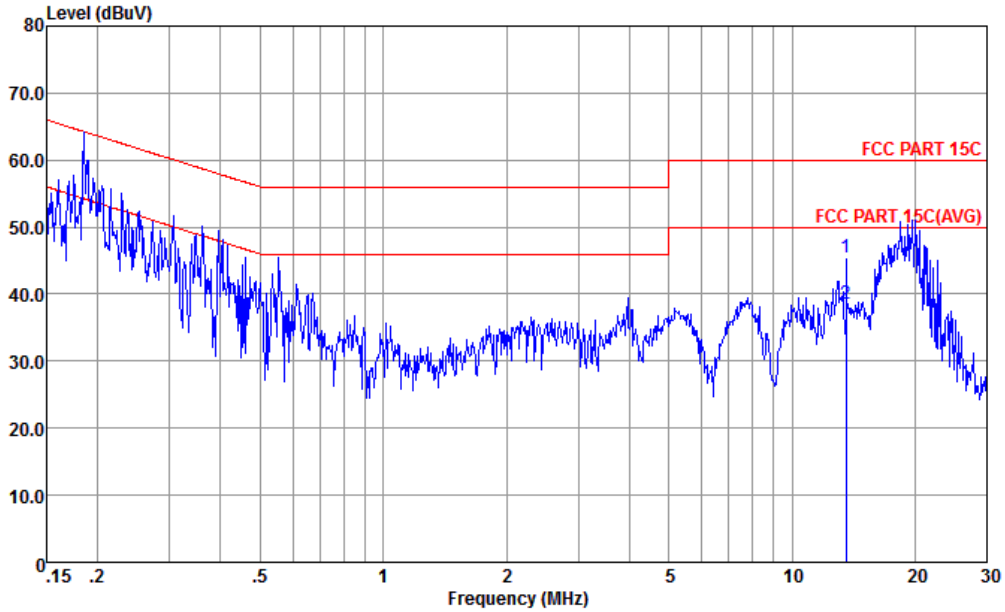
: 355542090025752/355542090025760 #13

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	13.560	44.48	-15.52	60.00	33.81	0.28	10.39	QP
2 *	13.560	37.18	-12.82	50.00	26.51	0.28	10.39	Average

(2) With dummy load

Remark: Only the fundamental NFC signal needs to be retested per KDB 174176 D01.

Test Engineer :	Amos Zhang	**Temperature :**	24.7~25.1℃
		Relative Humidity :	46~47%
Test Voltage :	120Vac / 60Hz	**Phase :**	Neutral



Site : CO01-KS
Condition : FCC PART 15C LISN-N-171013-060103 NEUTRAL

: 355542090025752/355542090025760 #13

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	13.560	45.43	-14.57	60.00	34.81	0.23	10.39	QP
2 *	13.560	38.53	-11.47	50.00	27.91	0.23	10.39	Average

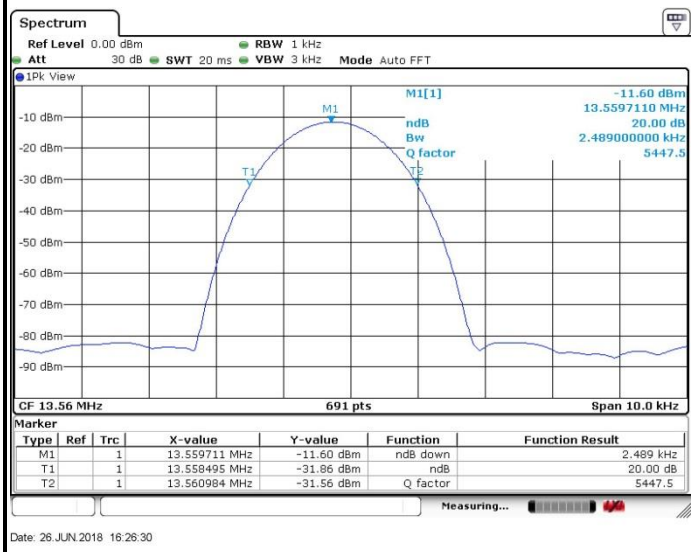
(2) With dummy load

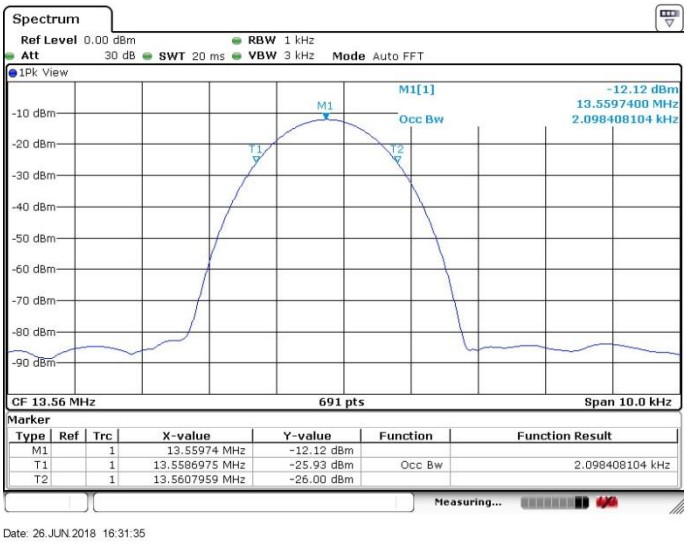
Remark: Only the fundamental NFC signal needs to be retested per KDB 174176 D01.

Appendix B. Test Results of Conducted Test Items

B1. Test Result of 20dB Spectrum Bandwidth

Test mode	NFC Tx	Test Frequency (MHz)	13.56





20dB Bandwidth (kHz)	2.49	99% OccupiedBW(kHz)	2.10
Frequency range (MHz)	f_L > 13.553	13.558495	Test Result
	f_H < 13.567	13.560984	Complies

Remark: Because the measured signal is CW adjusting the RBW per C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be approximately twice the RBW.

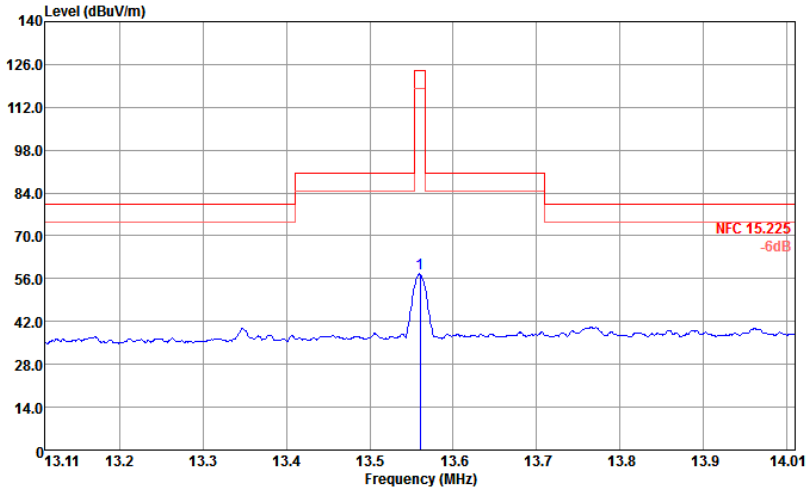
B2. Test Result of Frequency Stability

Voltage vs. Frequency Stability		Temperature vs. Frequency Stability	
Voltage (Vac)	Measurement Frequency (MHz)	Temperature (℃)	Measurement Frequency (MHz)
120	13.559747	-20	13.559747
102	13.559747	-10	13.559747
138	13.559747	0	13.559747
		10	13.559747
		20	13.559747
		30	13.559747
		40	13.559747
		50	13.559747
Max.Deviation (MHz)	-0.000254	**Max.Deviation (MHz)**	-0.000254
Max.Deviation (ppm)	-18.6947	**Max.Deviation (ppm)**	-18.6947
Limit	**FS < ±100 ppm**	**Limit**	**FS < ±100 ppm**
Test Result	**PASS**	**Test Result**	**PASS**

Appendix C. Test Results of Radiated Test Items

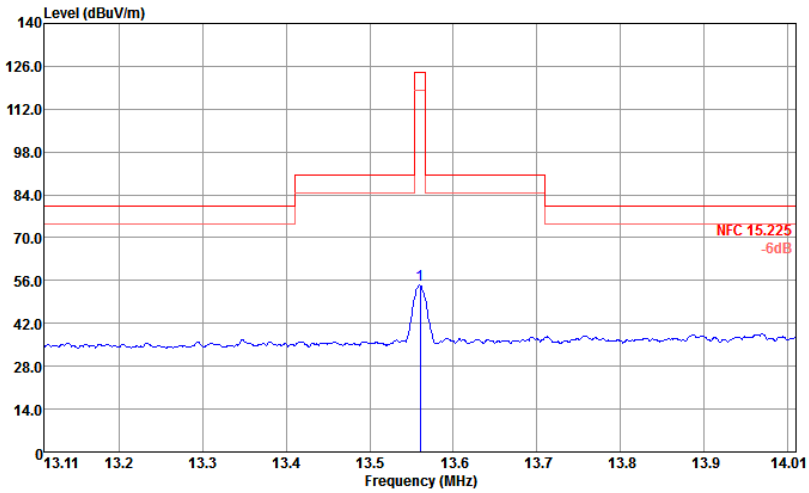
C1. Test Result of Field Strength of Fundamental Emissions

Test Mode :	NFC Tx	Test Frequency (MHz)	13.56



Site : 03CH02-KS
Condition : NFC 15.225 3m 02 NFC ANT HORIZONTAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg	
1	13.56	57.55	-66.45	124.00	36.59	20.80	0.16	---	---	QP



Site : 03CH02-KS
Condition : NFC 15.225 3m 02 NFC ANT VERTICAL
Project : (FR)860402

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg	
1	13.56	54.53	-69.47	124.00	33.57	20.80	0.16	---	---	QP

C2. Results of Radiated Spurious Emissions (9 kHz~30MHz)

Test Mode :	NFC Tx			Polarization :		Horizontal			
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
0.01915	45.52	-76.44	121.96	25.41	20.1	0.01	-	-	Average
0.06554	35.14	-76.12	111.26	15.33	19.8	0.01	-	-	Average
1.258	50.46	-15.14	65.6	29.69	20.75	0.02	-	-	QP
1.321	52.61	-12.56	65.17	31.89	20.7	0.02	-	-	QP
6.548	35.24	-34.3	69.54	14.71	20.45	0.08	-	-	QP
24.676	35.15	-34.39	69.54	13.51	21.36	0.28	-	-	QP

Test Mode :	NFC Tx			Polarization :		Vertical			
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
0.01915	47.03	-74.93	121.96	26.92	20.1	0.01	-	-	Average
0.03339	37.91	-79.21	117.12	18.5	19.4	0.01	-	-	Average
1.258	44.4	-21.2	65.6	23.63	20.75	0.02	-	-	QP
1.321	46.12	-19.05	65.17	25.4	20.7	0.02	-	-	QP
6.242	35.25	-34.29	69.54	14.69	20.48	0.08	-	-	QP
25.798	36.04	-33.5	69.54	14.5	21.25	0.29	-	-	QP

Note:

1. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
2. Distance extrapolation factor = 40 log (specific distance / test distance) (dB);
3. Limit line = specific limits (dBμV) + distance extrapolation factor.

C3. Results of Radiated Spurious Emissions (30MHz~1GHz)

Test Mode :	NFC Tx				Polarization :		Horizontal			
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
30	20.59	-19.41	40	27.55	24.5	0.57	32.03	-	-	Peak
40.67	19.47	-20.53	40	32.53	18.35	0.64	32.05	-	-	Peak
67.83	13.99	-26.01	40	32.63	12.56	0.85	32.05	-	-	Peak
129.91	15.66	-27.84	43.5	28.73	17.65	1.16	31.88	-	-	Peak
454.86	22.25	-23.75	46	28.09	22.48	2.2	30.52	-	-	Peak
854.5	29.76	-16.24	46	28.45	26.13	3.06	27.88	100	0	Peak

Test Mode :	NFC Tx				Polarization :		Vertical			
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
40.67	33.2	-6.8	40	46.26	18.35	0.64	32.05	100	0	Peak
67.83	23.85	-16.15	40	42.49	12.56	0.85	32.05	-	-	Peak
94.99	19.5	-24	43.5	34.47	16.05	0.98	32	-	-	Peak
447.1	23.9	-22.1	46	29.93	22.35	2.17	30.55	-	-	Peak
664.38	27.03	-18.97	46	29.02	24.49	2.71	29.19	-	-	Peak
963.14	29.74	-24.26	54	26.5	27.09	3.22	27.07	-	-	Peak

Note:

1. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
2. Emission level (dBμV/m) = 20 log Emission level (μV/m).
3. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor= Level.