



FCC RADIO TEST REPORT

FCC ID : UZ7WT63B0
Equipment : WT6300 Wearable Computer
Brand Name : Zebra
Model Name : WT63B0
Applicant : Zebra Technologies Corporation
1 Zebra Plaza, Holtsville, NY 11742
Manufacturer : Zebra Technologies Corporation
1 Zebra Plaza, Holtsville, NY 11742
Standard : FCC Part 15 Subpart C §15.225

The product was received on Aug. 12, 2020 and testing was started from Aug. 26, 2020 and completed on Sep. 16, 2020. We, SPORTON INTERNATIONAL INC., EMC & Wireless Communications Laboratory, 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 INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Reviewed by: Louis Wu

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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History of this test report

Report No.	Version	Description	Issued Date
FR072944D	01	Initial issue of report	Sep. 29, 2020



Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.207	AC Power Line Conducted Emissions	Pass	Under limit 6.25 dB at 0.752MHz
3.2	15.215(c)	20dB Spectrum Bandwidth	Pass	-
	2.1049	99% OBW Spectrum Bandwidth	Reporting only	-
3.3	15.225(e)	Frequency Stability	Pass	-
3.4	15.225(a)(b)(c)	Field Strength of Fundamental Emissions	Pass	Max level 28.6 dB μ V/m at 13.560 MHz
3.5	15.225(d) 15.209	Radiated Spurious Emissions	Pass	Under limit 7.09 dB at 95.960MHz
3.6	15.203	Antenna Requirements	Pass	-

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.

Reviewed by: Wii Chang

Report Producer: Vivian Hsu



1. General Description

1.1 Product Feature of Equipment Under Test

Product Feature	
Equipment	WT6300 Wearable Computer
Brand Name	Zebra
Model Name	WT63B0
FCC ID	UZ7WT63B0
EUT supports Radios application	NFC WLAN 11a/b/g/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE
HW Version	EV2.5
SW Version	10-14-10.00-QC-U01-PRD-HEL-04
OS Version	Android 10
FW Version	FUSION_QA_2_1.3.0.006_Q
MFD	29JUL20
EUT Stage	Engineering Sample

Remark: The above EUT's information was declared by manufacturer.

Specification of Accessories				
AC Adapter 1	Brand Name	Zebra	Part Number	PWR-WUA5V12W0US
AC Adapter 2	Brand Name	Zebra	Part Number	PWR-WUA5V12W0WW
AC Adapter 3	Brand Name	Zebra	Part Number	PWR-BUA5V16W0WW
Battery 1	Brand Name	Zebra	Part Number	BT000262A01
Battery 2	Brand Name	Zebra	Part Number	BT-000262-50
Battery 3	Brand Name	Zebra	Part Number	BT-000362-00
AC Power Cable	Brand Name	Zebra	Part Number	50-16000-182R
DC Cable	Brand Name	Zebra	Part Number	CBL-DC-383A1-01
USB Cable	Brand Name	Zebra	Part Number	CBL-NGWT-USBCHG-01
Vibrating Cable	Brand Name	Zebra	Part Number	CBL-NGWT-HDVBAP-01
Audio Cable 1	Brand Name	Zebra	Part Number	CBL-HS2100-12S1-01
Audio Cable 2	Brand Name	Zebra	Part Number	CBL-HS3100-CUC1-01
Keyboard	Brand Name	Zebra	Part Number	KYPD-WT6XANFASM-01
Scanner 1	Brand Name	Zebra	Part Number	RS51B0-TBSNWR
Scanner 2	Brand Name	Zebra	Part Number	RS60B0-SRSTWR
Scanner 3	Brand Name	Zebra	Part Number	RS4000-HPCSWR
Scanner 4	Brand Name	Zebra	Part Number	RS5000-LCFSWR
Earphone 1	Brand Name	Zebra	Part Number	HS2100-OTH
Earphone 2	Brand Name	Zebra	Part Number	HS3100-OTH
Wrist Mount	Brand Name	Zebra	Part Number	SG-NGWT-WRMTS-01
Wrist Mount	Brand Name	Zebra	Part Number	SG-NGWT-WRMTL-01
Wrist Mount	Brand Name	Zebra	Part Number	SG-NGWT-WRMTXL-01
Hip Mount	Brand Name	Zebra	Part Number	SG-NGWT-HPMNT-01



1.2 Product Specification of Equipment Under Test

Product Specification subjective to this standard	
Tx/Rx Frequency Range	13.553 ~ 13.567MHz
Channel Number	1
20dBW	2.66 KHz
99%OBW	2.26 KHz
Antenna Type	Loop Antenna
Type of Modulation	ASK

1.3 Modification of EUT

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

1.4 Testing Location

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory	
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978	
Test Site No.	Sporton Site No.	
	TH03-HY	CO05-HY
Test Engineer	Louis Chung	Tom Lee and Howard Huang
Temperature	20.4°C	24~26°C
Relative Humidity	63.3%	42~50%

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

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory	
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd Rd. Guishan Dist, Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855	
Test Site No.	Sporton Site No.	
	03CH11-HY	
Test Engineer	Fu Chen	
Temperature	19.8~23.7°C	
Relative Humidity	57.4~66.8%	

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

FCC designation No.: TW1190 and TW0007



1.5 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
- ♦ FCC KDB 414788 D01 Radiated Test Site v01r01
- ♦ ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. The TAF code is not including all the FCC KDB listed without accreditation.
3. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.



2. Test Configuration of Equipment Under Test

2.1 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.

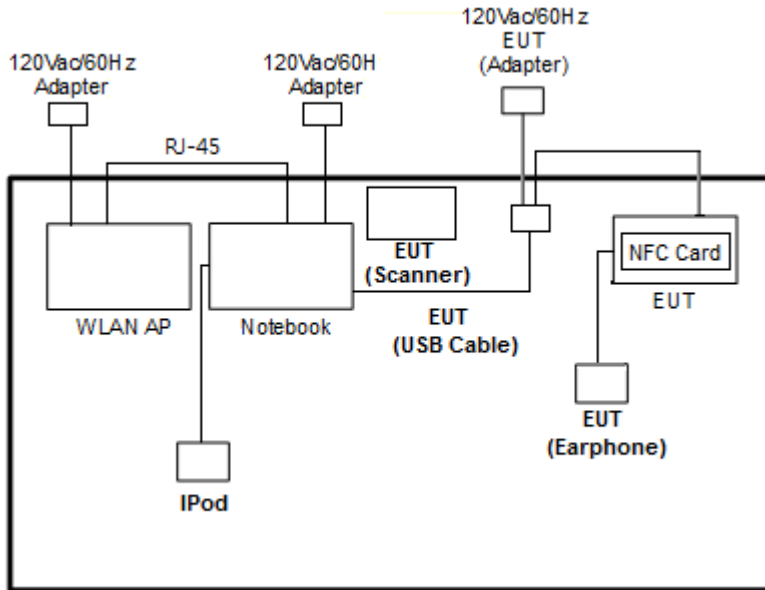
Test Items	
AC Power Line Conducted Emissions	Field Strength of Fundamental Emissions
20dB Spectrum Bandwidth	Frequency Stability
Radiated Emissions 9kHz~30MHz	Radiated Emissions 30MHz~1GHz

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 (Z plane as worst plane) from all possible combinations.

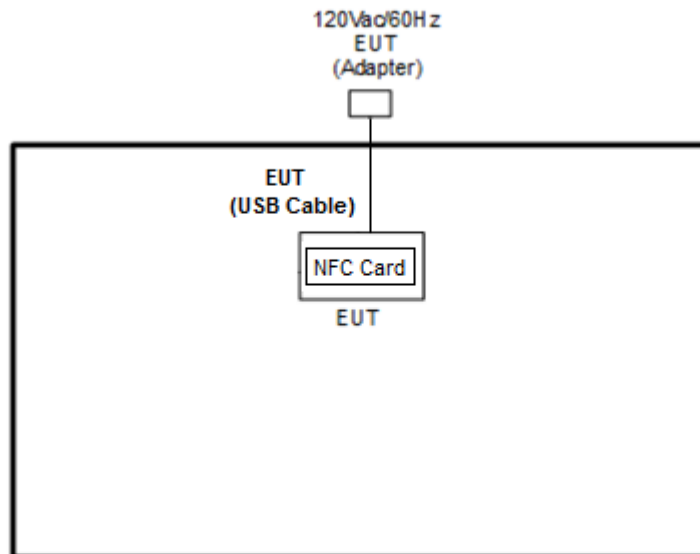
Test Cases	
AC Conducted Emission	Mode 1 : WLAN (2.4GHz) Idle + Bluetooth Idle + NFC Link + Color Bar + Battery 1 + Scanner 1 + Earphone 1 + Audio Cable 1 + USB Cable (Data Link with Notebook) + AC Adapter 3
Remark:	
1. Data Link with Notebook means data application transferred mode between EUT and Notebook.	
2. For Radiated Test Cases, the tests were performed with Adapter 1, Battery 1.	

2.2 Connection Diagram of Test System

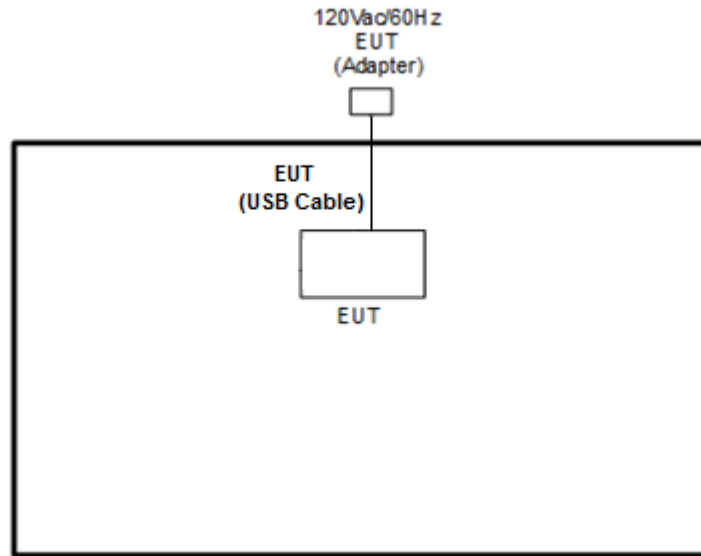
<AC Conducted Emission Mode>



<Radiated Emission Mode with NFC Card>



<Radiated Emission Mode with Tx Tool>



2.3 Table for Supporting Units

Item	Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
1.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded, 1.8 m
2.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A
3.	Notebook	Dell	Latitude 3400	FCC DOC	N/A	AC I/P : Unshielded, 1.2m DC O/P : Shielded, 1.8m
4.	NFC Card	Metro Taipei	Easy Card	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 (Type A/B/V), is used to make the EUT (NFC) continuously transmit at 13.56MHz and is placed around 0 cm gap to the EUT.

The RF test items, utility "Git Bash Here v2.26.2" was installed in Notebook which was programmed in order to make the EUT get into the engineering modes to provide channel selection, power level (Power setting: Default), data rate (Type F Bit Rate: 424kbps) and the application type and for continuous transmitting signals.



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.

For terminal test result, the testing follows FCC KDB 174176.

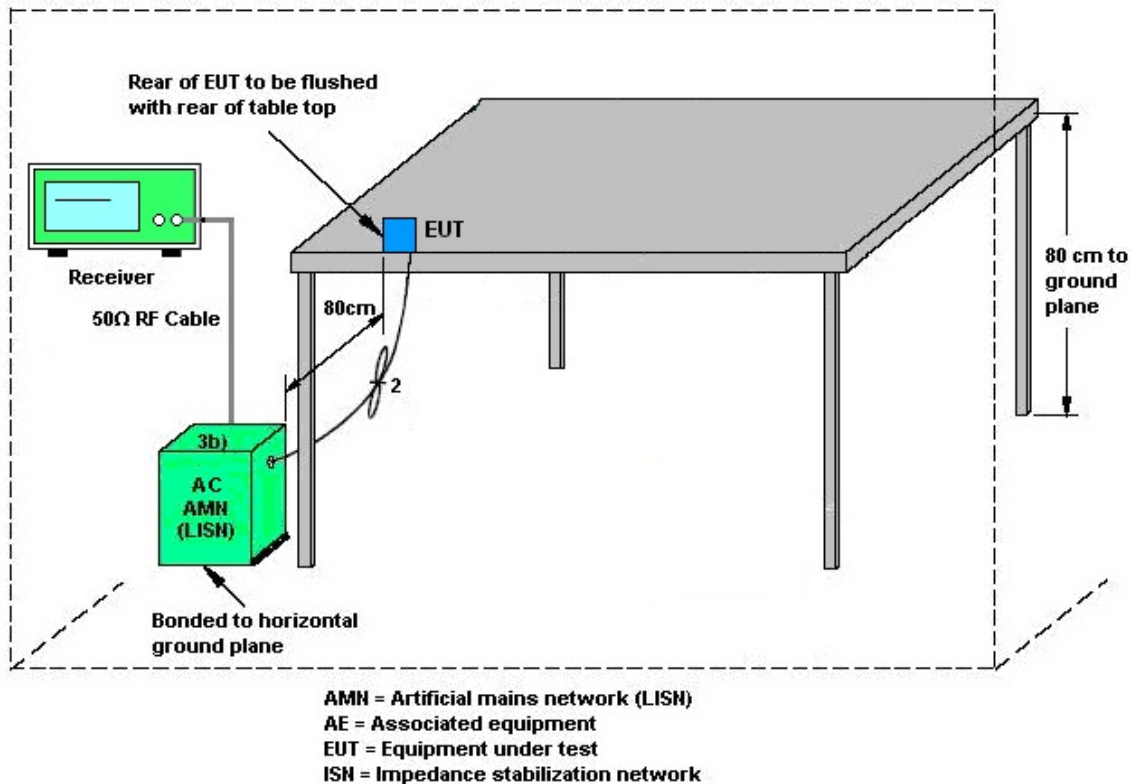
3.1.2 Measuring Instruments

See list of measuring equipment 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.

Note:

(1) with antenna

Remark: 13.560MHz is the NFC RF fundamental signal.

(2) with dummy load

Remark: Only the fundamental NFC signal needs to be retested per C63.4.

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.

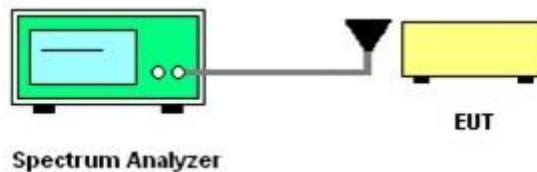
3.2.2 Measuring Instruments

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.

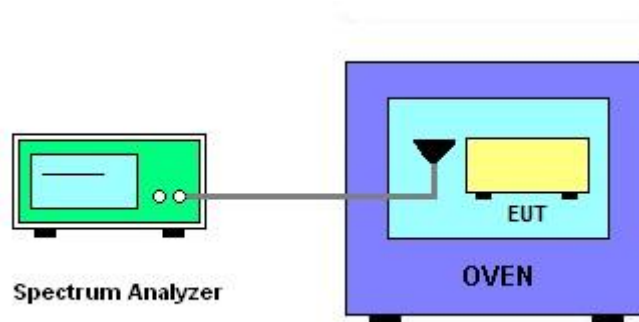
3.3.2 Measuring Instruments

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 f_c is declaring of channel frequency. Then the frequency error formula is $(f_c - f) / f_c \times 10^6$ ppm and the limit is less than ± 100 ppm.
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 (μ V/m) at 30m	Field Strength (dB μ V/m) at 30m	Field Strength (dB μ V/m) at 10m	Field Strength (dB μ V/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

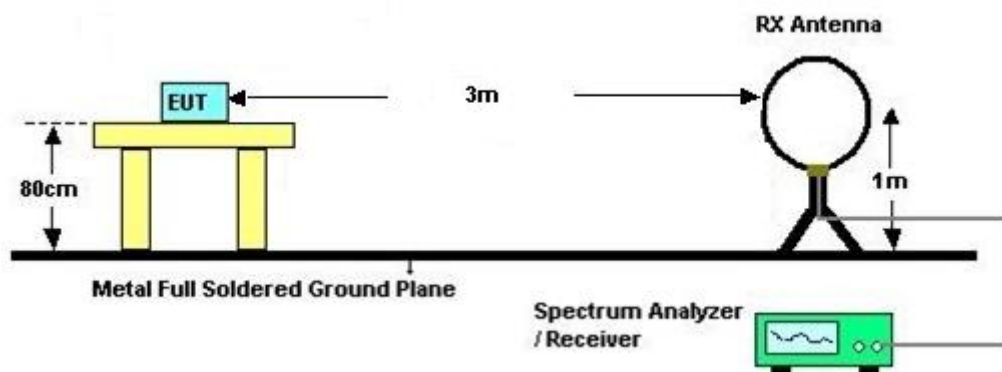
See list of measuring instruments of this test report.

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 (dB μ V/m) = 20 log Emission level (μ V/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 and 110-490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.

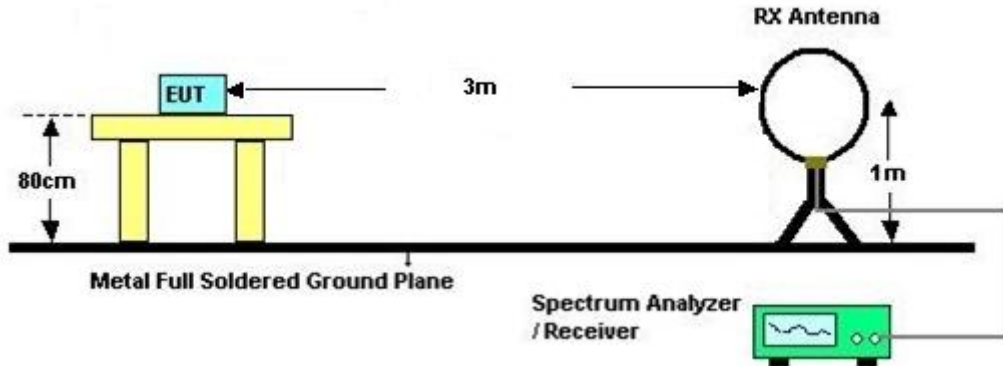


3.5.4 Test Procedures

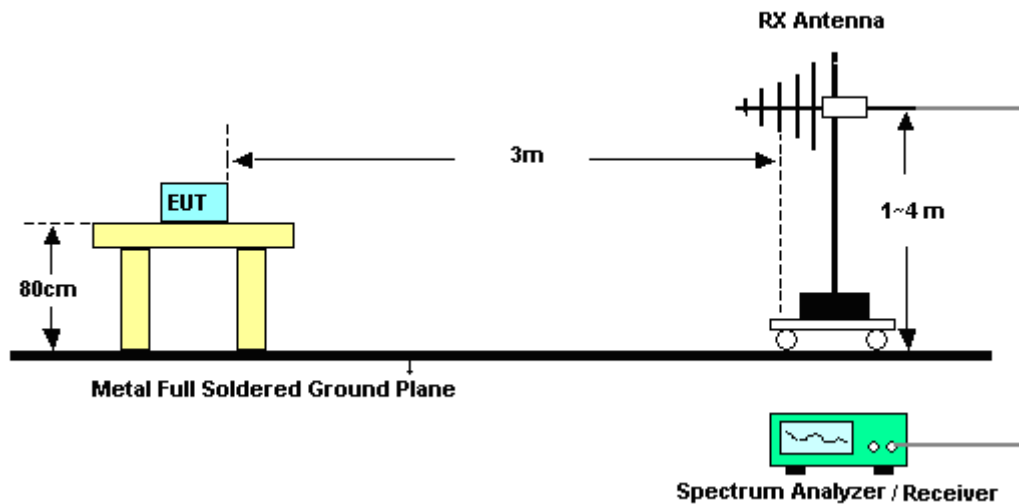
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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.

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.

Remark: There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.



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	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Software	Audix	E3 6.2009-8-24	RK-001053	N/A	N/A	Sep. 15, 2020~ Sep. 16, 2020	N/A	Radiation (03CH11-HY)
Amplifier	SONOMA	310N	187312	9kHz~1GHz	Dec. 03, 2019	Sep. 15, 2020~ Sep. 16, 2020	Dec. 02, 2020	Radiation (03CH11-HY)
Bilog Antenna	TESEQ	CBL 6111D & N-6-06	35414 & AT-N0602	30MHz~1GHz	Oct. 12, 2019	Sep. 15, 2020~ Sep. 16, 2020	Oct. 11, 2020	Radiation (03CH11-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Jul. 14, 2020	Sep. 15, 2020~ Sep. 16, 2020	Jul. 13, 2021	Radiation (03CH11-HY)
Controller	EMEC	EM 1000	N/A	Control Turn table & Ant Mast	N/A	Sep. 15, 2020~ Sep. 16, 2020	N/A	Radiation (03CH11-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	Sep. 15, 2020~ Sep. 16, 2020	N/A	Radiation (03CH11-HY)
Turn Table	EMEC	TT 2000	N/A	0~360 Degree	N/A	Sep. 15, 2020~ Sep. 16, 2020	N/A	Radiation (03CH11-HY)
EMI Test Receiver	Agilent	N9038A(MXE)	MY532900 45	20MHz~8.4GHz	Jan. 18, 2020	Sep. 15, 2020~ Sep. 16, 2020	Jan. 17, 2021	Radiation (03CH11-HY)
Spectrum Analyzer	Keysight	N9010A	MY542004 86	10Hz~44GHz	Oct. 28, 2019	Sep. 15, 2020~ Sep. 16, 2020	Oct. 27, 2020	Radiation (03CH11-HY)
Filter	Wainwright	WHK20/1000C 7/40SS	SN2	20M High Pass	Sep. 14, 2020	Sep. 15, 2020~ Sep. 16, 2020	Sep. 13, 2021	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4 PE	9kHz-30MHz	Mar. 12, 2020	Sep. 15, 2020~ Sep. 16, 2020	Mar. 11, 2021	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4 PE	30M-18G	Mar. 12, 2020	Sep. 15, 2020~ Sep. 16, 2020	Mar. 11, 2021	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY2859/2	30MHz-40GHz	Mar. 12, 2020	Sep. 15, 2020~ Sep. 16, 2020	Mar. 11, 2021	Radiation (03CH11-HY)
Hygrometer	TECPEL	DTN-303B	TP140325	N/A	Nov. 07, 2019	Sep. 15, 2020~ Sep. 16, 2020	Nov. 06, 2020	Radiation (03CH11-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Aug. 26, 2020~ Sep. 08, 2020	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9kHz~3.6GHz	Nov. 15, 2019	Aug. 26, 2020~ Sep. 08, 2020	Nov. 14, 2020	Conduction (CO05-HY)
Hygrometer	Testo	608-H1	34913912	N/A	Nov. 07, 2019	Aug. 26, 2020~ Sep. 08, 2020	Nov. 06, 2020	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Nov. 20, 2019	Aug. 26, 2020~ Sep. 08, 2020	Nov. 19, 2020	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Nov. 15, 2019	Aug. 26, 2020~ Sep. 08, 2020	Nov. 14, 2020	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	Aug. 26, 2020~ Sep. 08, 2020	N/A	Conduction (CO05-HY)
LF Cable	HUBER + SUHNER	RG-214/U	LF01	N/A	Jan. 02, 2020	Aug. 26, 2020~ Sep. 08, 2020	Jan. 01, 2021	Conduction (CO05-HY)
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100851	N/A	Jan. 02, 2020	Aug. 26, 2020~ Sep. 08, 2020	Jan. 01, 2021	Conduction (CO05-HY)



Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
AC Power Source	AC POWER	AFC-500W	F10407001 1	50Hz~60Hz	Apr. 09, 2020	Sep. 05, 2020	Apr. 08, 2021	Conducted (TH03-HY)
Hygrometer	Testo	608-H1	34893241	N/A	Mar. 26, 2020	Sep. 05, 2020	Mar. 25, 2021	Conducted (TH03-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz~40GHz	Dec. 30, 2019	Sep. 05, 2020	Dec. 29, 2020	Conducted (TH03-HY)
Temperature Chamber	ESPEC	SU-641	92013721	-30°C ~70°C	Nov. 26, 2019	Sep. 05, 2020	Nov. 25, 2020	Conducted (TH03-HY)



5. Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.30
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Uncertainty of Radiated Emission Measurement (9 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.12
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.40
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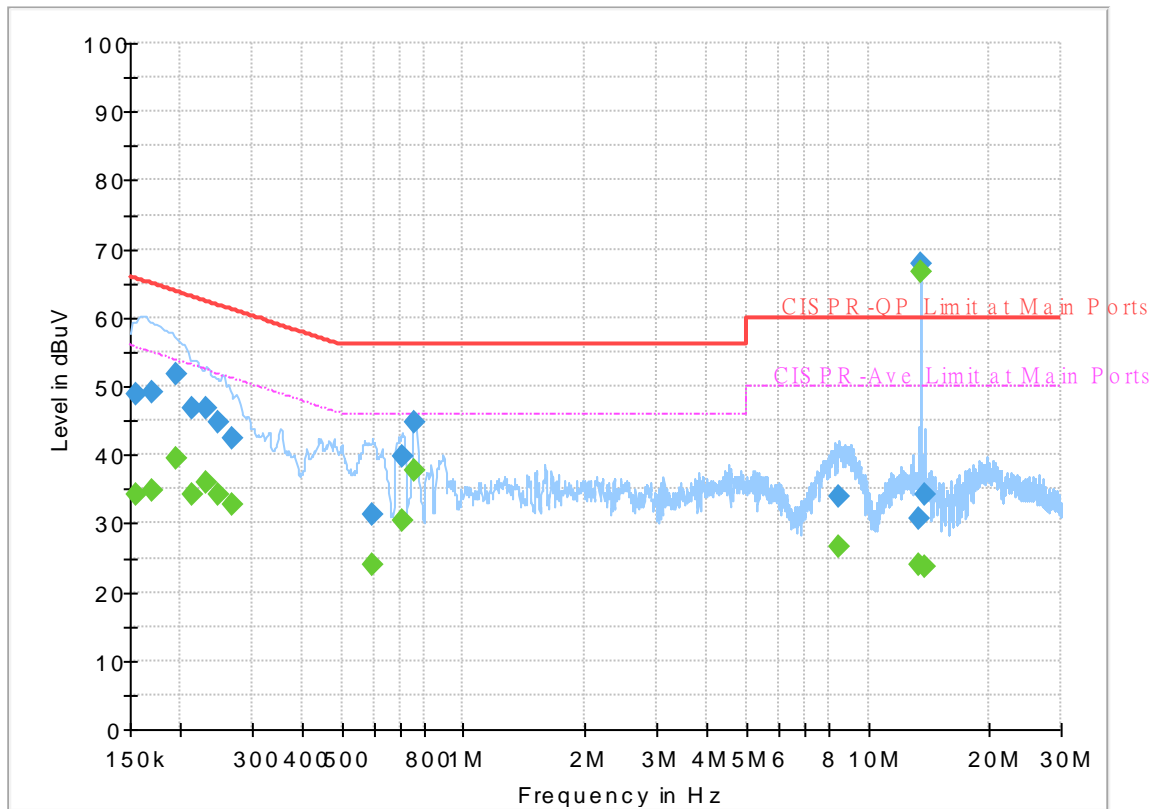
Appendix A. Test Results of Conducted Emission Test

Test Engineer :	Tom Lee and Howard Huang	Temperature :	24~26°C
		Relative Humidity :	42~50%

Original Mode

Report NO : 072944
 Test Mode : Mode 1
 Test Voltage : 120Vac/60Hz
 Phase : Line

Full Spectrum



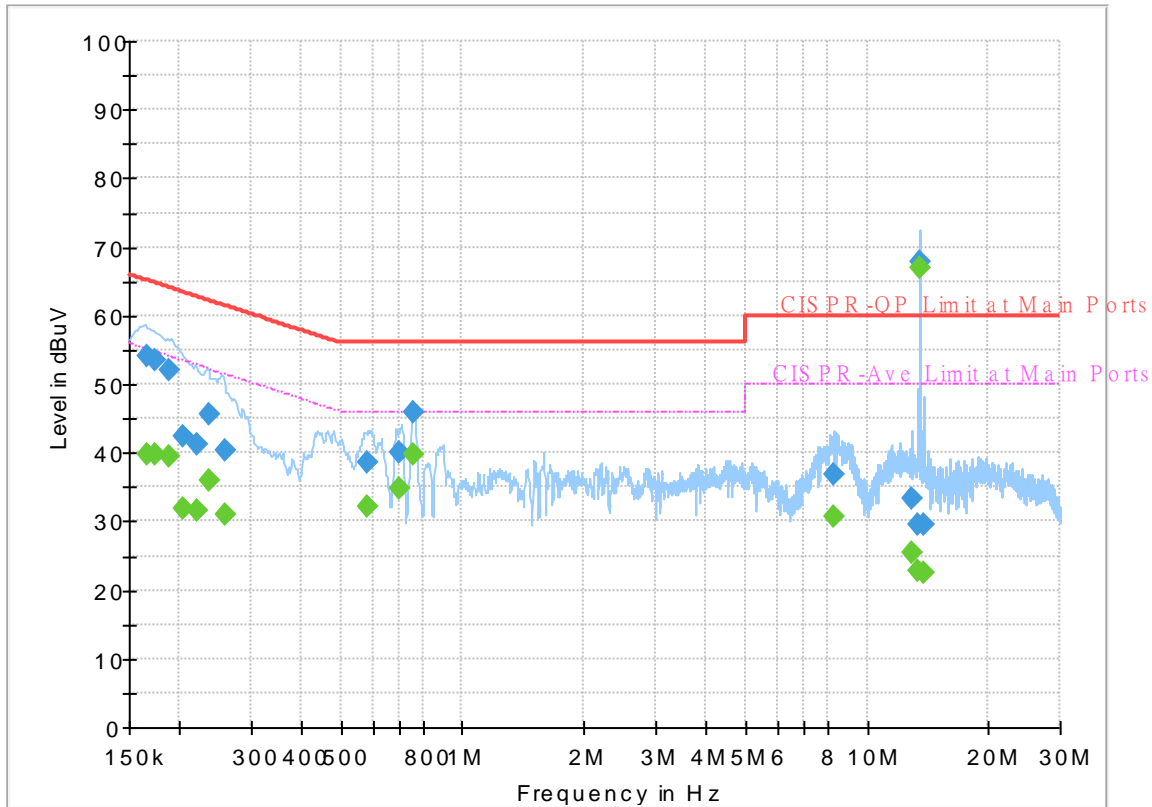
Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.154860	---	34.32	55.74	21.42	L1	OFF	19.5
0.154860	48.92	---	65.74	16.82	L1	OFF	19.5
0.170250	---	34.74	54.95	20.21	L1	OFF	19.5
0.170250	49.15	---	64.95	15.80	L1	OFF	19.5
0.195450	---	39.39	53.80	14.41	L1	OFF	19.5
0.195450	51.87	---	63.80	11.93	L1	OFF	19.5
0.213000	---	34.27	53.09	18.82	L1	OFF	19.5
0.213000	46.85	---	63.09	16.24	L1	OFF	19.5
0.231000	---	36.11	52.41	16.30	L1	OFF	19.5
0.231000	46.76	---	62.41	15.65	L1	OFF	19.5
0.249000	---	34.28	51.79	17.51	L1	OFF	19.5
0.249000	44.83	---	61.79	16.96	L1	OFF	19.5
0.269250	---	32.80	51.14	18.34	L1	OFF	19.5
0.269250	42.50	---	61.14	18.64	L1	OFF	19.5
0.594600	---	24.02	46.00	21.98	L1	OFF	19.5
0.594600	31.42	---	56.00	24.58	L1	OFF	19.5
0.706650	---	30.33	46.00	15.67	L1	OFF	19.5
0.706650	39.89	---	56.00	16.11	L1	OFF	19.5
0.753000	---	37.60	46.00	8.40	L1	OFF	19.5
0.753000	44.71	---	56.00	11.29	L1	OFF	19.5
8.477250	---	26.53	50.00	23.47	L1	OFF	19.8

8.477250	33.96	---	60.00	26.04	L1	OFF	19.8
13.353000	---	24.07	50.00	25.93	L1	OFF	19.8
13.353000	30.58	---	60.00	29.42	L1	OFF	19.8
13.560000	---	66.71	50.00	-16.71	L1	OFF	19.8
13.560000	67.92	---	60.00	-7.92	L1	OFF	19.8
13.776000	---	23.66	50.00	26.34	L1	OFF	19.8
13.776000	34.11	---	60.00	25.89	L1	OFF	19.8

Report NO : 072944
 Test Mode : Mode 1
 Test Voltage : 120Vac/60Hz
 Phase : Neutral

Full Spectrum



Final_Result

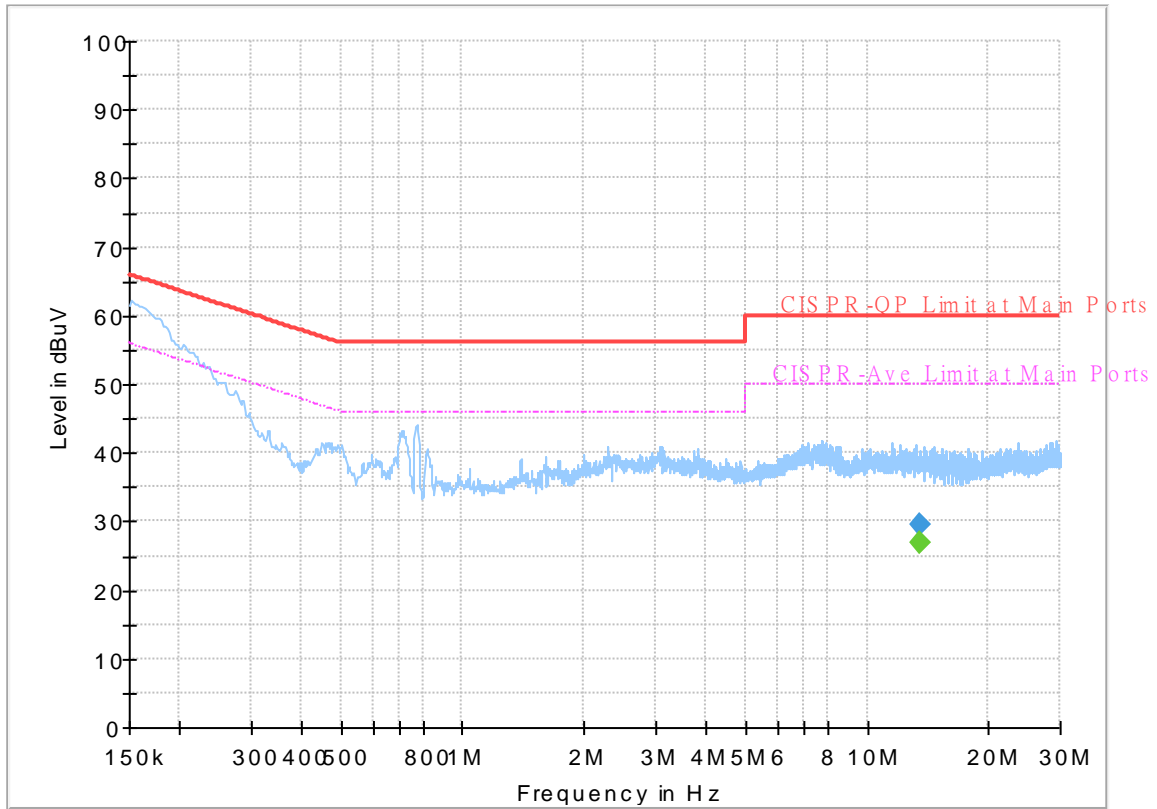
Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.165390	---	39.81	55.19	15.38	N	OFF	19.5
0.165390	54.18	---	65.19	11.01	N	OFF	19.5
0.173400	---	39.80	54.80	15.00	N	OFF	19.5
0.173400	53.37	---	64.80	11.43	N	OFF	19.5
0.188250	---	39.60	54.11	14.51	N	OFF	19.5
0.188250	52.03	---	64.11	12.08	N	OFF	19.5
0.204000	---	31.81	53.45	21.64	N	OFF	19.5
0.204000	42.54	---	63.45	20.91	N	OFF	19.5
0.219750	---	31.49	52.83	21.34	N	OFF	19.5
0.219750	41.37	---	62.83	21.46	N	OFF	19.5
0.237750	---	35.91	52.17	16.26	N	OFF	19.5
0.237750	45.64	---	62.17	16.53	N	OFF	19.5
0.258000	---	30.91	51.50	20.59	N	OFF	19.5
0.258000	40.21	---	61.50	21.29	N	OFF	19.5
0.582000	---	32.19	46.00	13.81	N	OFF	19.5
0.582000	38.49	---	56.00	17.51	N	OFF	19.5
0.701250	---	34.93	46.00	11.07	N	OFF	19.5
0.701250	39.97	---	56.00	16.03	N	OFF	19.5
0.752370	---	39.75	46.00	6.25	N	OFF	19.6
0.752370	45.89	---	56.00	10.11	N	OFF	19.6
8.321550	---	30.81	50.00	19.19	N	OFF	19.8

8.321550	36.75	---	60.00	23.25	N	OFF	19.8
12.927750	---	25.40	50.00	24.60	N	OFF	19.9
12.927750	33.32	---	60.00	26.68	N	OFF	19.9
13.353000	---	22.92	50.00	27.08	N	OFF	19.9
13.353000	29.55	---	60.00	30.45	N	OFF	19.9
13.560000	---	67.04	50.00	-17.04	N	OFF	19.9
13.560000	67.72	---	60.00	-7.72	N	OFF	19.9
13.767000	---	22.56	50.00	27.44	N	OFF	19.9
13.767000	29.63	---	60.00	30.37	N	OFF	19.9

Terminal Mode

Report NO : 072944
 Test Mode : Mode 1
 Test Voltage : 120Vac/60Hz
 Phase : Line

Full Spectrum

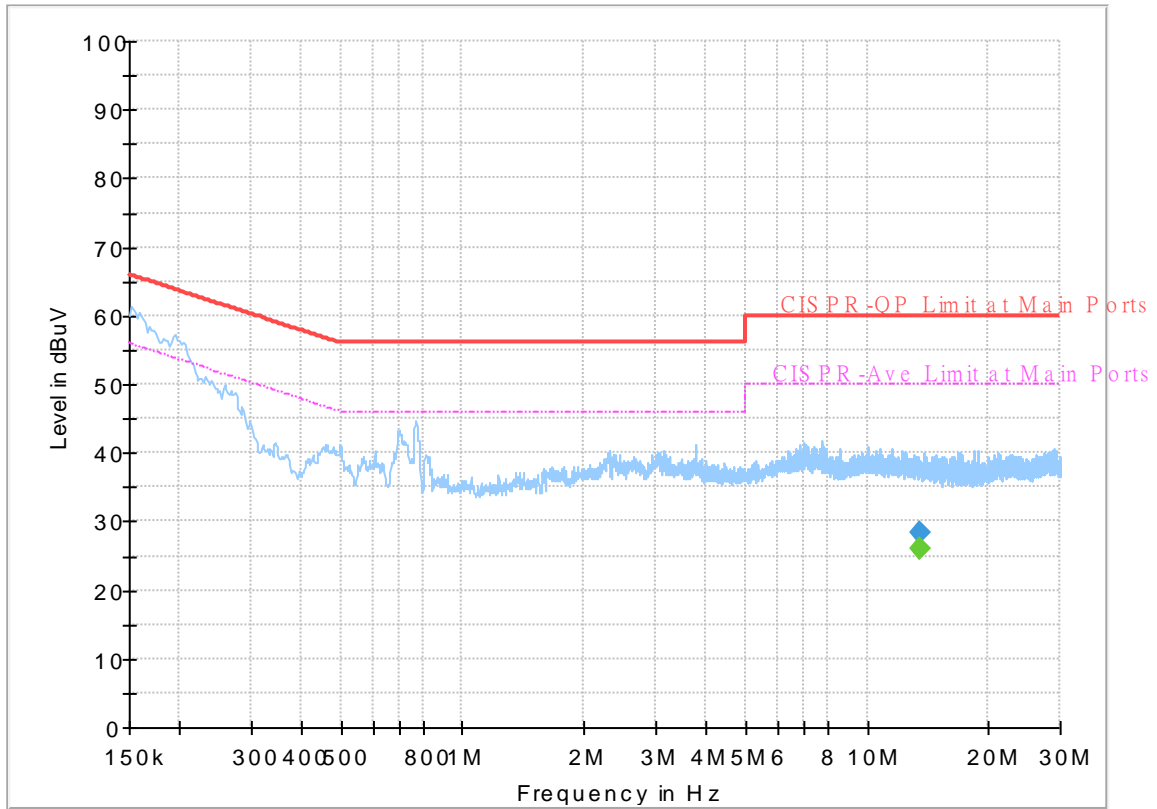


Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
13.560000	---	26.94	50.00	23.06	L1	OFF	20.2
13.560000	29.63	---	60.00	30.37	L1	OFF	20.2

Report NO : 072944
 Test Mode : Mode 1
 Test Voltage : 120Vac/60Hz
 Phase : Neutral

Full Spectrum



Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
13.560000	---	26.01	50.00	23.99	N	OFF	19.9
13.560000	28.23	---	60.00	31.77	N	OFF	19.9



Appendix B. Test Results of Conducted Test Items

B1. Test Result of 20dB Spectrum Bandwidth

Test mode	NFC Tx	Test Frequency (MHz)	13.56
<p>Ref 10 dBm Att 30 dB RBW 1 kHz Marker 1 [T1] -8.58 dBm VBW 3 kHz VSWR 2.66000000 kHz SWT 20 ms Center 13.560020000 MHz Temp 1 [T1] dBm -28.77 dBm 13.558660000 MHz Temp 2 [T1] dBm -28.64 dBm 13.561320000 MHz</p> <p>Date: 5.SEP.2020 10:38:23</p>		<p>Ref 10 dBm Att 30 dB RBW 1 kHz Marker 1 [T1] -8.47 dBm VBW 3 kHz VSWR 2.26000000 kHz SWT 20 ms Center 13.560020000 MHz Temp 1 [T1] dBm -28.38 dBm 13.558660000 MHz Temp 2 [T1] dBm -28.25 dBm 13.561120000 MHz</p> <p>Date: 5.SEP.2020 10:37:07</p>	
20dB Bandwidth (kHz)	2.66	99% OccupiedBW(kHz)	2.26
Frequency range (MHz)	$f_L > 13.553$	13.55866	Test Result
	$f_H < 13.567$	13.56132	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 (°C)	Time	Measurement Frequency (MHz)
120	13.559990	-20	0	13.560070
			2	13.560080
			5	13.560070
			10	13.560070
		-10	0	13.560070
			2	13.560070
			5	13.560070
			10	13.560070
		0	0	13.560070
			2	13.560080
			5	13.560080
			10	13.560080
		10	0	13.560070
			2	13.560070
			5	13.560070
			10	13.560060
		20	0	13.559990
			2	13.559980
			5	13.559990
			10	13.559990
		30	0	13.560030
			2	13.560030
			5	13.560010
			10	13.560010
		40	0	13.560000
			2	13.559990
			5	13.559990
			10	13.559970

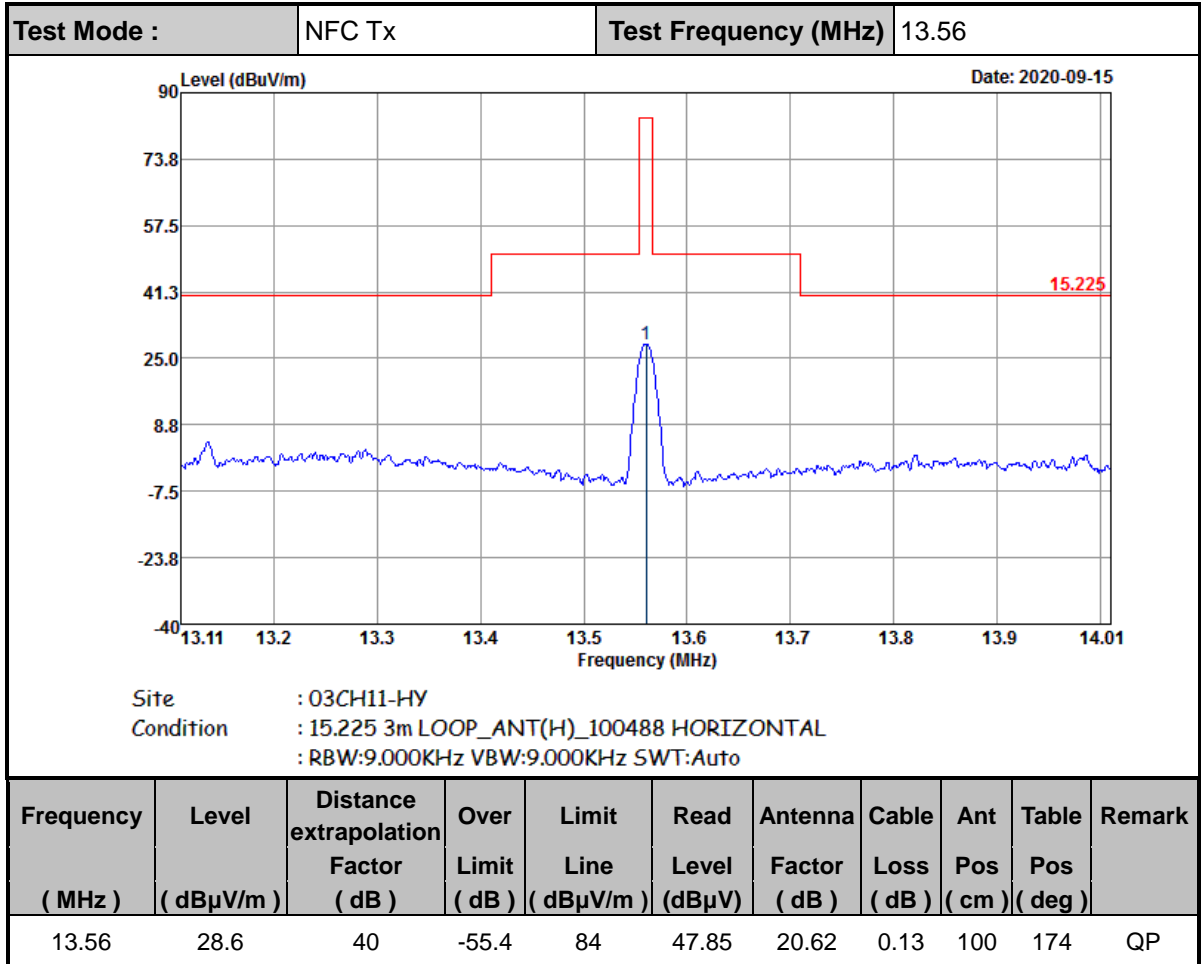


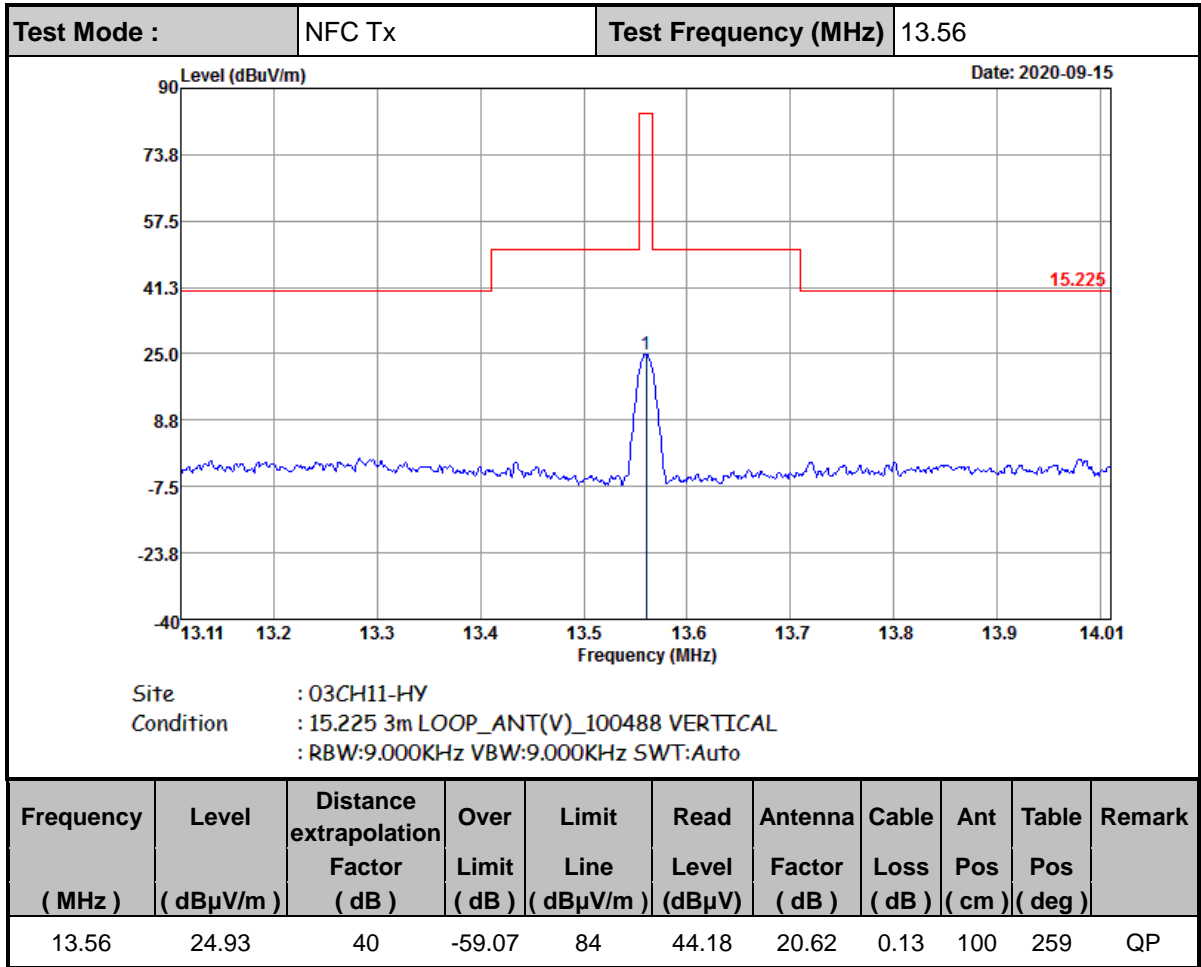
Voltage vs. Frequency Stability		Temperature vs. Frequency Stability		
Voltage (Vac)	Measurement Frequency (MHz)	Temperature (°C)	Time	Measurement Frequency (MHz)
		50	0	13.559970
			2	13.559970
			5	13.559970
			10	13.559970
Max.Deviation (MHz)	-0.000010	Max.Deviation (MHz)		0.000080
Max.Deviation (ppm)	-0.7375	Max.Deviation (ppm)		5.8997
Limit	FS < ±100 ppm	Limit		FS < ±100 ppm
Test Result	PASS	Test Result		PASS



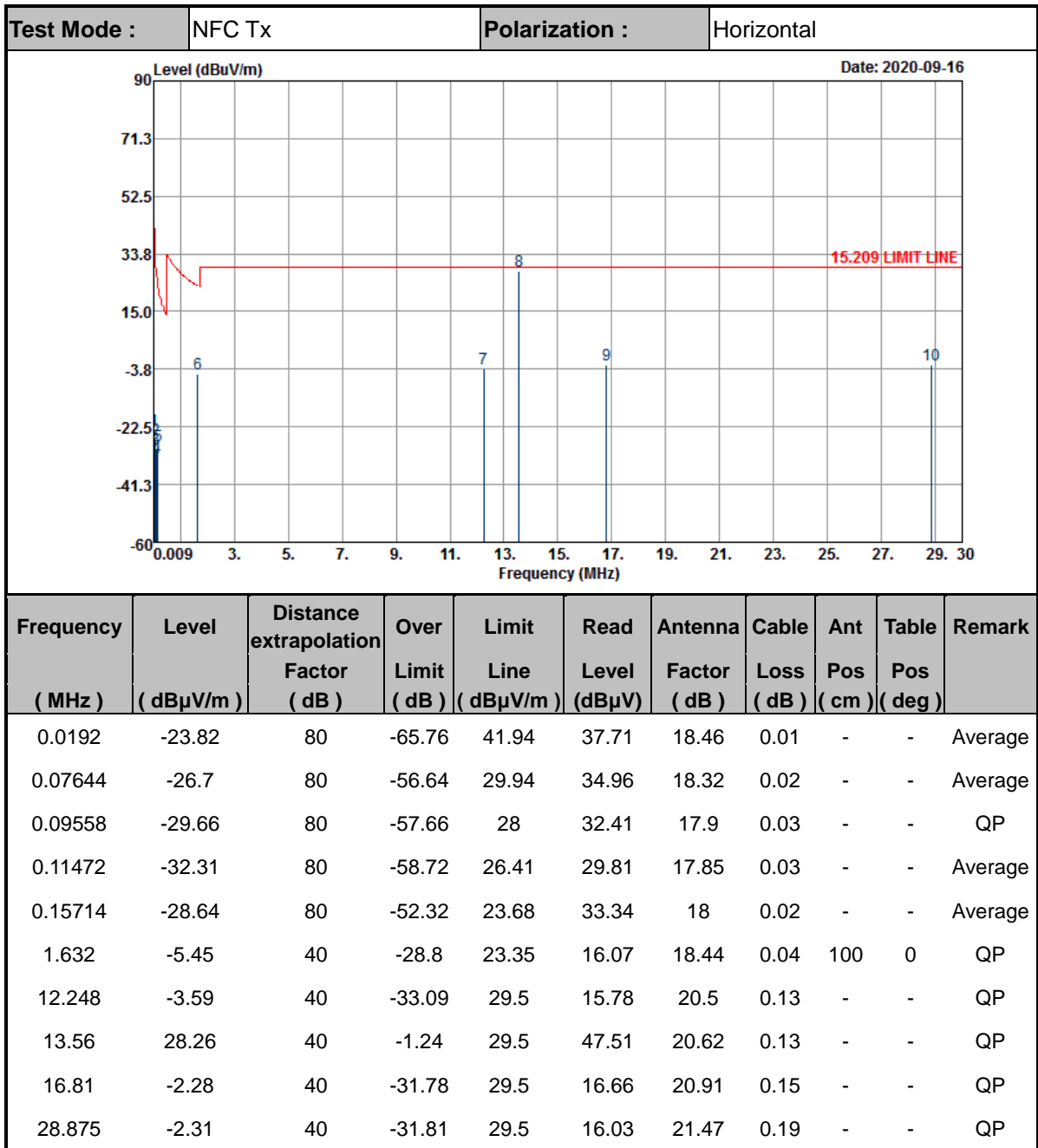
Appendix C. Test Results of Radiated Test Items

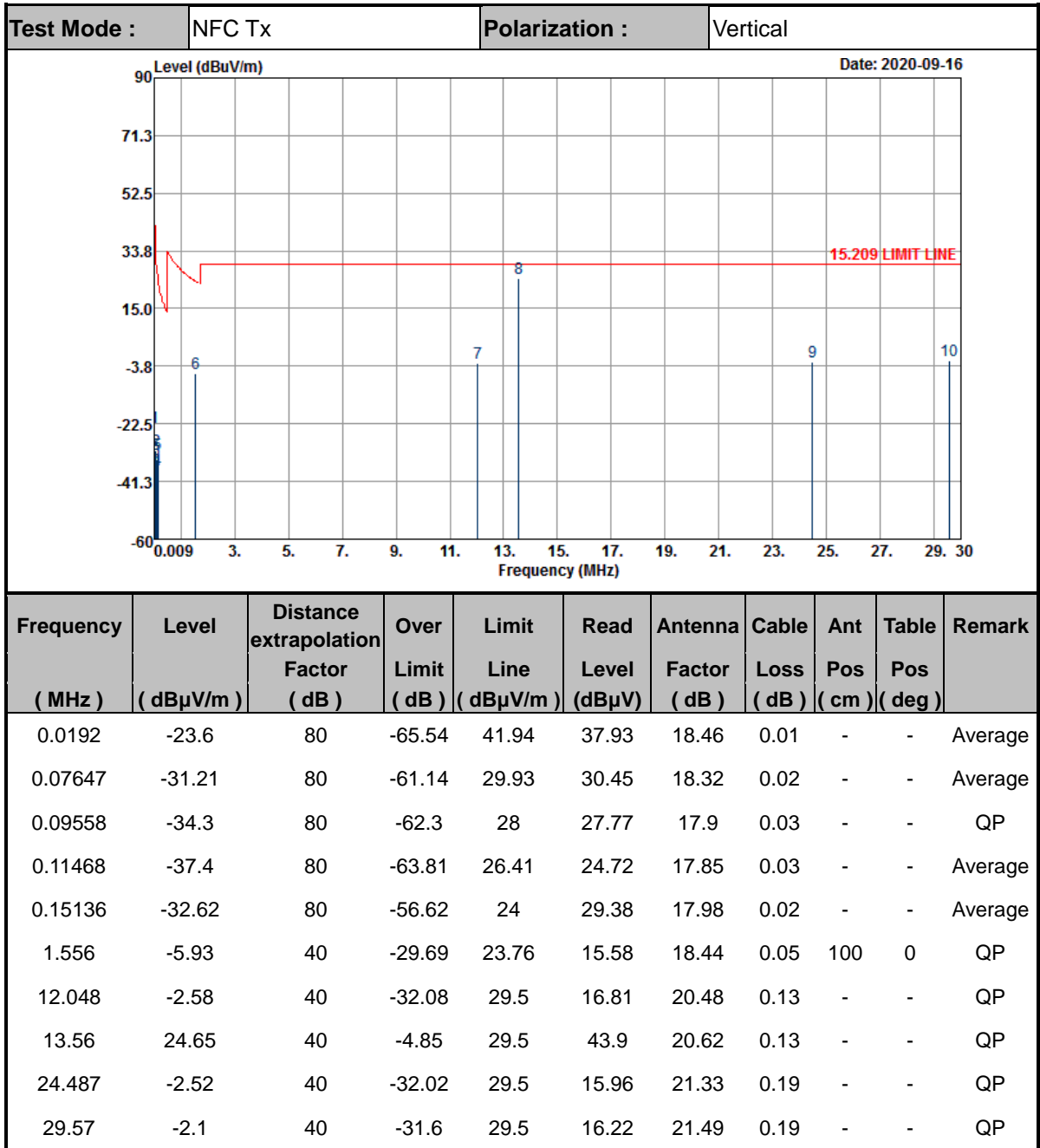
C1. Test Result of Field Strength of Fundamental Emissions





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



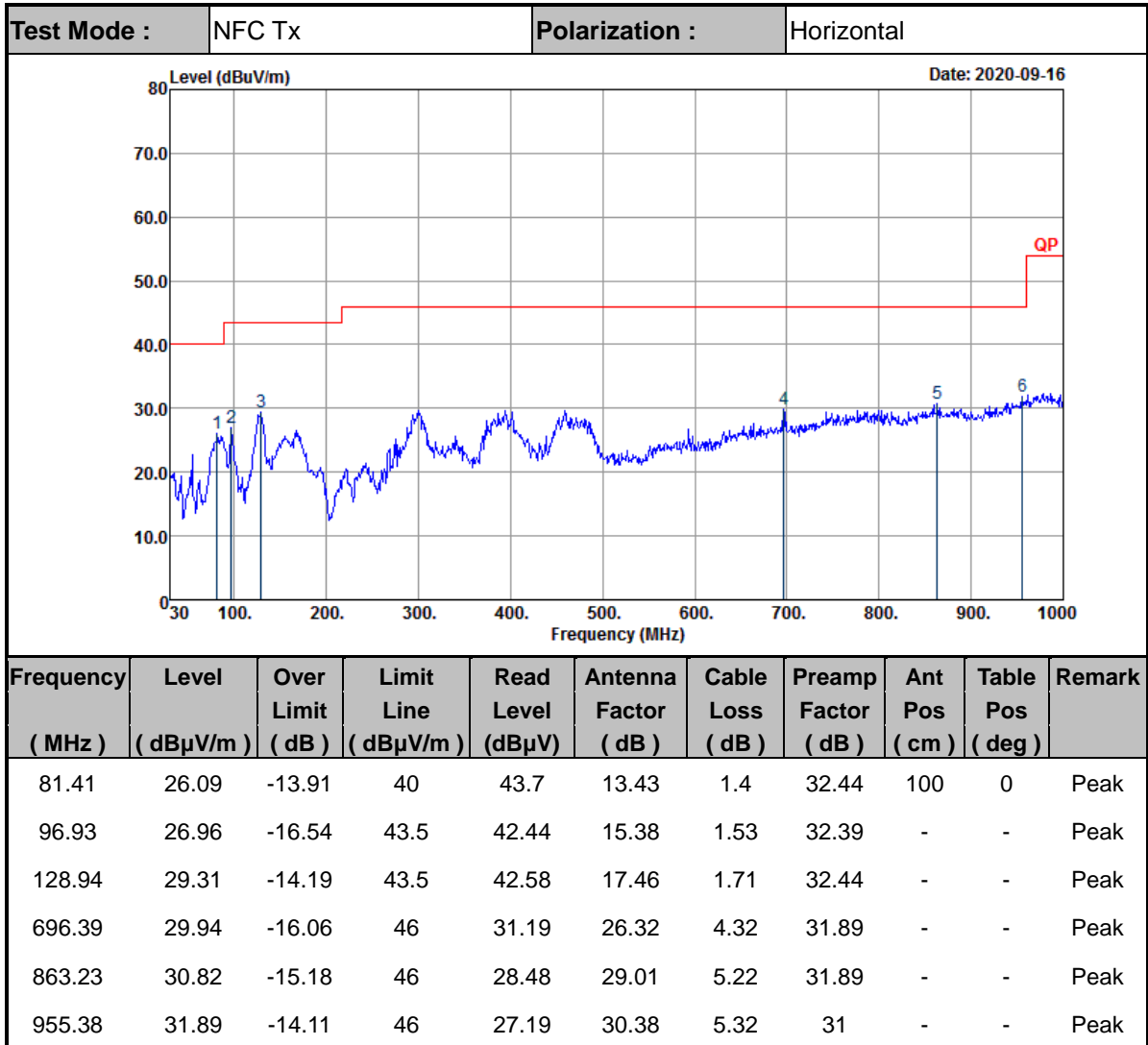


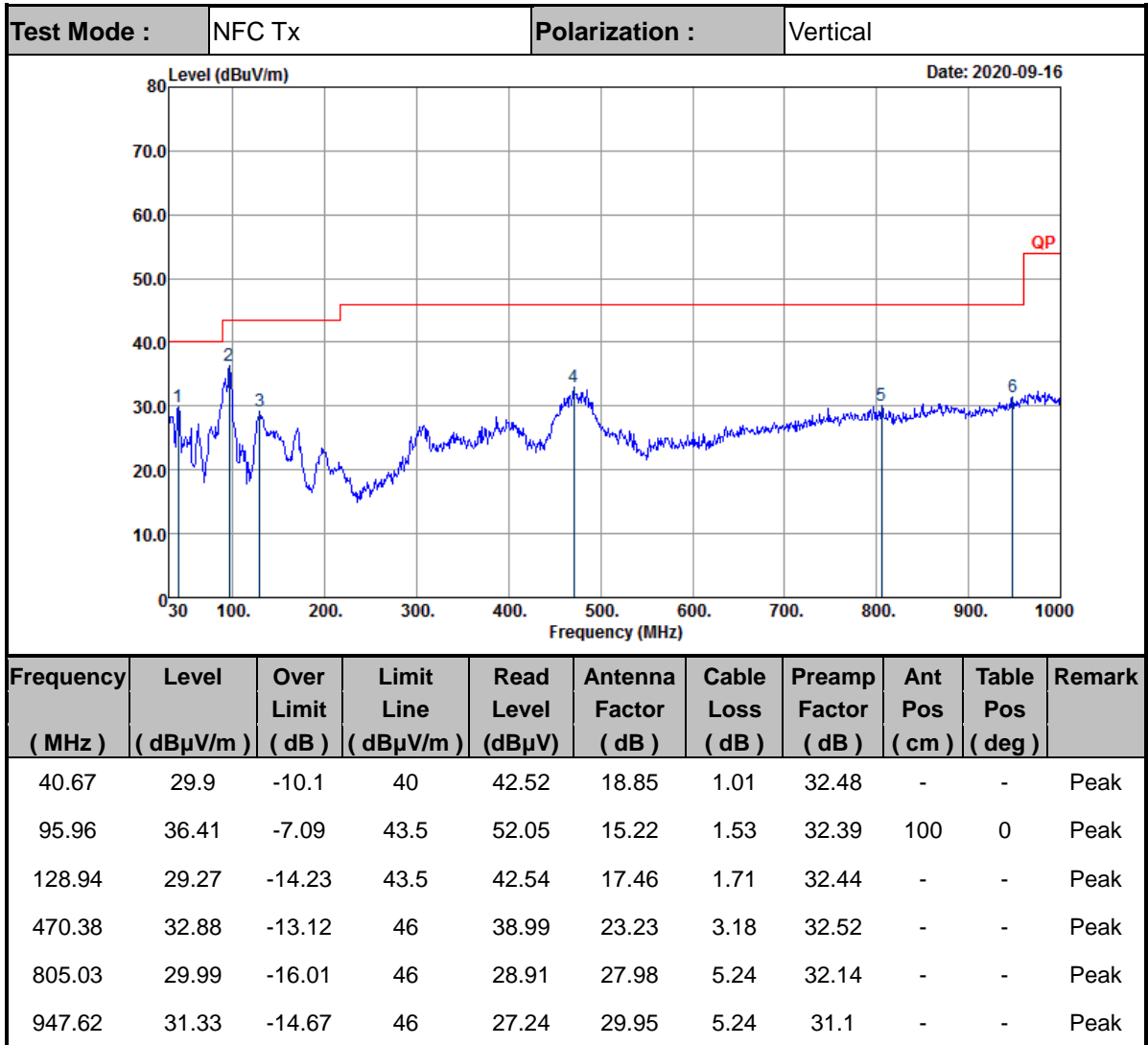
Note:

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
4. 13.56 MHz is fundamental signal which can be ignored



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





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.