



# FCC RADIO TEST REPORT

FCC ID : APYHRO00287

**Equipment** : Smart phone

**Brand Name** : SHARP

: SHARP CORPORATION **Applicant** 

2-13-1, HACHIHONMATSU-IIDA,

HIGASHI-HIROSHIMA-SHI,

HIROSHIMA PREFECTURE 739-0192,

JAPAN

: SHARP CORPORATION Manufacturer

1 Takumi-Cho, Sakai-Ku, Sakai-Shi,

Osaka 590-8522, Japan

**Standard** : FCC Part 15 Subpart C §15.225

The product was received on Jun. 18, 2020 and testing was started from Jul. 02, 2020 and completed on Jul. 15, 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

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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Report Template No.: BU5-FR15CNFC Version 2.4 Report Version : 01

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# History of this test report

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Report No.	Version	Description	Issued Date
FR031906-01	01	Initial issue of report	Jul. 22, 2020

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## **Summary of Test Result**

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Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.207	AC Power Line Conducted Emissions	Pass	Under limit 14.44 dB at 2.182MHz
3.2	15.215(c)	20dB Spectrum Bandwidth	Pass	-
3.2	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 17.47 dBµV/m at 13.560 MHz
3.5	15.225(d) 15.209	Radiated Spurious Emissions Pass		Under limit 7.26 dB at 482.000MHz
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: Tina Chuang** 

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# 1. General Description

## 1.1 Product Feature of Equipment Under Test

GSM/WCDMA/LTE, Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n, Wi-Fi 5GHz 802.11a/n/ac, FM Receiver, NFC, and GNSS

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Product Specification subjective to this standard			
Sample 1 Main Source			
Sample 2 Second Source,128GB			
Sample 3	Second source, 64GB		
Antenna Type	WWAN <ant. 1="">: PIFA / LDS Antenna  <ant. 2="">: PIFA / LDS Antenna  <ant. 3="">: Monopole Antenna  WLAN  <ant. 1="">: PIFA Antenna  <ant. 2="">: PIFA Antenna  Bluetooth: PIFA Antenna  GPS/Glonass/BDS/Galileo: PIFA Antenna  NFC: Loop Antenna  FM: Using Earphone as Antenna</ant.></ant.></ant.></ant.></ant.>		

#### 1.2 Modification of EUT

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

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## 1.3 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.			
rest site No.	TH03-HY	CO05-HY	03CH07-HY	
Test Engineer	Oscar Chi	Tom Lee	Stan Hsieh and Ken Wu	
Temperature	25.4~25.7°C 23~25°C 23~25°C			
Relative Humidity	54.1~54.6% 42~50% 56~62%			

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

FCC designation No.: TW1190

## 1.4 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.

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# 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	

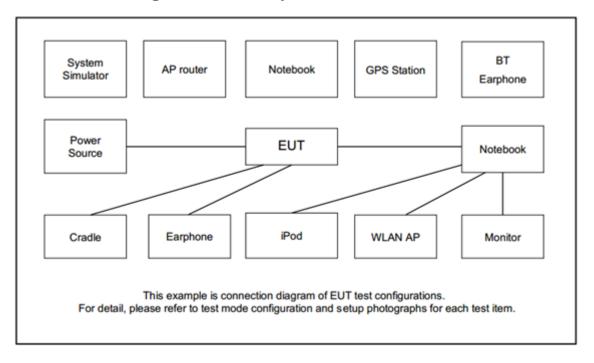
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The EUT pre-scanned in four NFC type, A, B, F, V. The worst type (type F) was recorded in this report. Pre-scanned tests, X, Y, Z in three orthogonal panels to determine the final configuration (Z Plane for Sample 1 and Y plane for Sample 2) from all possible combinations.

	Test Cases				
AC	Mode 1: NFC Link + USB Cable (Charging from AC Adapter) + Earphone for				
Conducted	Sample 1				
Emission	Mode 2: NFC Link + USB Cable (Charging from AC Adapter) + Earphone for				
EIIIISSIOII	Sample 2				
Remark: The	<b>Remark:</b> The worst case of conducted emission is mode 1; only the test data of it was reported.				

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## 2.2 Connection Diagram of Test System



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## 2.3 Table for Supporting Units

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Adapter	DVE	DSA-10PF06-05 FUS 050200	N/A	N/A	N/A
2.	USB Cable	JCTC	JCT024-F014	N/A	N/A	N/A
3.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A
4.	NFC Card	N/A	N/A	N/A	N/A	N/A
5.	iPod Earphone	Apple	N/A	Verification	Unshielded, 1.0 m	N/A
6.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0m	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 0 cm gap to the EUT.

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### 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.

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Frequency of Emission	Conducted Limit (dBμV)	
(MHz)	Quasi-Peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

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

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

#### 3.1.2 Measuring Instruments

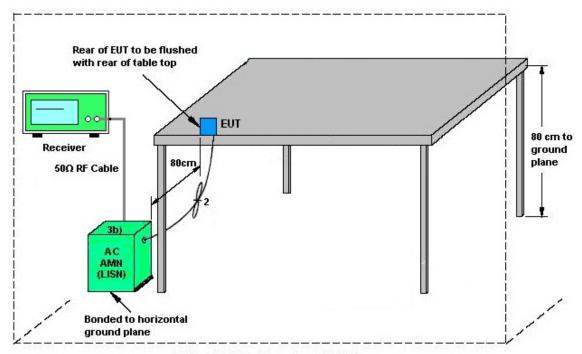
See list of measuring equipment of this test report.

#### 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.

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## 3.1.4 Test setup



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AMN = Artificial mains network (LISN)

AE = Associated equipment

EUT = Equipment under test

ISN = Impedance stabilization network

#### 3.1.5 Test Result of AC Conducted Emission

Please refer to Appendix A.

#### Note:

(1) with antenna

Remark: 13.56MHz is the NFC RF fundamental signal.

(2) with dummy load

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

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## 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.

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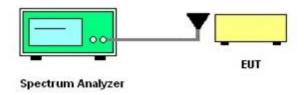
#### 3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

#### 3.2.3 Test Procedures

- 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.

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## 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.

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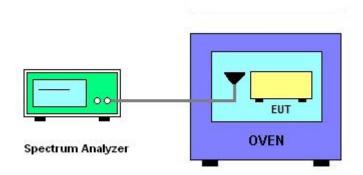
#### 3.3.2 Measuring Instruments

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  $\pm 100$ 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.

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# 3.4 Field Strength of Fundamental Emissions and Mask Measurement

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#### 3.4.1 Limit

Rules and specifications	FCC CFR 47 Part 15 section 15.225			
Description	Compliance with th	Compliance with the spectrum mask is tested with RBW set to 9kHz.		
From of Francisco (MIII-)	Field Strength	Field Strength	Field Strength	Field Strength
Freq. of Emission (MHz)	(µV/m) at 30m	(dBµV/m) at 30m	(dBµV/m) at 10m	(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.

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#### 3.4.3 Test Procedures

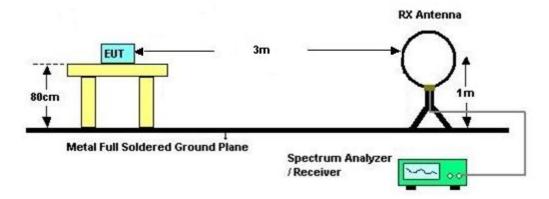
 Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the loop receiving antenna mounted antenna tower was placed 3 meters far away from the turntable.

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- 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.
- 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.

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#### 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.

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Frequencies	Field Strength	Measurement Distance	
(MHz)	(μV/m)	(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.

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#### 3.5.4 Test Procedures

 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.

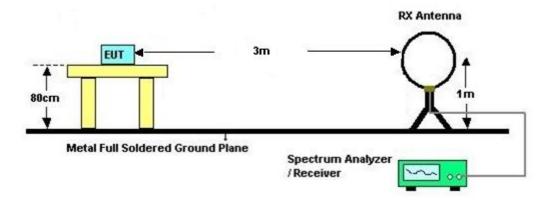
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- 2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
- The height of the broadband receiving antenna was varied between one meter and four meters above ground 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.
- 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.

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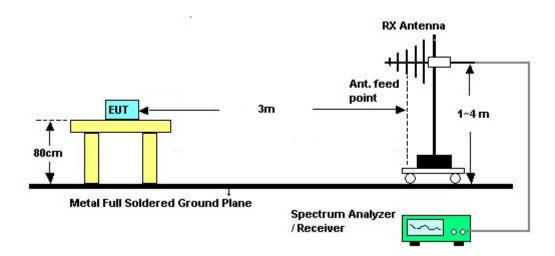
## 3.5.5 Test Setup

#### For radiated emissions below 30MHz



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#### 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.

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## 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.

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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.

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# 4. List of Measuring Equipment

Instrument	Manufacturer	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	Jul. 02, 2020~ Jul. 15, 2020	Apr. 08, 2021	Conducted (TH03-HY)
Hygrometer	Testo	608-H1	34893241	N/A	Mar. 26, 2020	Jul. 02, 2020~ Jul. 15, 2020	Mar. 25, 2021	Conducted (TH03-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP30	101329	9kHz~30GHz	Sep. 04, 2019	Jul. 02, 2020~ Jul. 15, 2020	Sep. 03, 2020	Conducted (TH03-HY)
Temperature Chamber	ESPEC	SU-641	92013721	-30℃ ~70℃	Nov. 26, 2019	Jul. 02, 2020~ Jul. 15, 2020	Nov. 25, 2020	Conducted (TH03-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Jul. 07, 2020	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9kHz~3.6GHz	Nov. 15, 2019	Jul. 07, 2020	Nov. 14, 2020	Conduction (CO05-HY)
Hygrometer	Testo	608-H1	34913912	N/A	Nov. 07, 2019	Jul. 07, 2020	Nov. 06, 2020	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Nov. 15, 2019	Jul. 07, 2020	Nov. 14, 2020	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	Jul. 07, 2020	N/A	Conduction (CO05-HY)
LF Cable	HUBER + SUHNER	RG-214/U	LF01	N/A	Jan. 02, 2020	Jul. 07, 2020	Jan. 01, 2021	Conduction (CO05-HY)
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100851	N/A	Jan. 02, 2020	Jul. 07, 2020	Jan. 01, 2021	Conduction (CO05-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D01 N-06	35419 & 03	30MHz~1GHz	Apr. 29, 2020	Jul. 10, 2020	Apr. 28, 2021	Radiation (03CH07-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Dec. 26, 2019	Jul. 10, 2020	Dec. 25, 2020	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	10MHz~1GHz	May. 19, 2020	Jul. 10, 2020	May. 18, 2021	Radiation (03CH07-HY)
Filter	Wainwright	WHK20/1000 C7/40SS	SN3	20MHz High Pass Filter	Aug. 22, 2019	Jul. 10, 2020	Aug. 21, 2020	Radiation (03CH07-HY)
3m Semi Anechoic Chamber (NSA)	TDK	SAC-3M	03CH07-H Y	30MHz~1GHz	Jan. 01, 2020	Jul. 10, 2020	Dec. 31, 2020	Radiation (03CH07-HY)
3m Semi Anechoic Chamber (Site VSWR)	TDK	SAC-3M	03CH07-H Y	1GHz~18GHz	Dec. 24, 2019	Jul. 10, 2020	Dec. 23, 2020	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY24971/ 4, MY28655/ 4	9kHz~30MHz	Feb. 25, 2020	Jul. 10, 2020	Feb. 24, 2021	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY28655/ 4, MY24971/ 4, MY15682/ 4	30MHz~1GHz	Feb. 25, 2020	Jul. 10, 2020	Feb. 24, 2021	Radiation (03CH07-HY)
Controller	ChainTek	Chaintek 3000	N/A	Control Turn table	N/A	Jul. 10, 2020	N/A	Radiation (03CH07-HY)
Controller	Max-Full	MF7802	MF780208 368	Control Ant Mast	N/A	Jul. 10, 2020	N/A	Radiation (03CH07-HY)
Antenna Mast	Max-Full	MFA520BS	N/A	1m~4m	N/A	Jul. 10, 2020	N/A	Radiation (03CH07-HY)

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Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Turn Table	ChainTek	Chaintek 3000	N/A	0~360 Degree	N/A	Jul. 10, 2020	N/A	Radiation (03CH07-HY)
USB Data Logger	TECPEL	TR-32	HE17XB24 95	N/A	N/A	Jul. 10, 2020	N/A	Radiation (03CH07-HY)
EMI Test Receiver	Agilent	N9038A(MXE )	MY532900 53	20Hz~26.5GHz	May. 21, 2020	Jul. 10, 2020	May. 20, 2021	Radiation (03CH07-HY)
Software	Audix	E3 6.2009-8-24	805040046 56H	N/A	N/A	Jul. 10, 2020	N/A	Radiation (03CH07-HY)

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# 5. Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence	2.30
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	2.6
of 95% (U = 2Uc(y))	2.0

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

Measuring Uncertainty for a Level of Confidence	16
of 95% (U = 2Uc(y))	4.6

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# **Appendix A. Test Results of Conducted Emission Test**

Took Engineer		Temperature :	<b>23~25</b> ℃
Test Engineer :	Tom Lee	Relative Humidity :	42~50%

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## Original Mode Report NO :

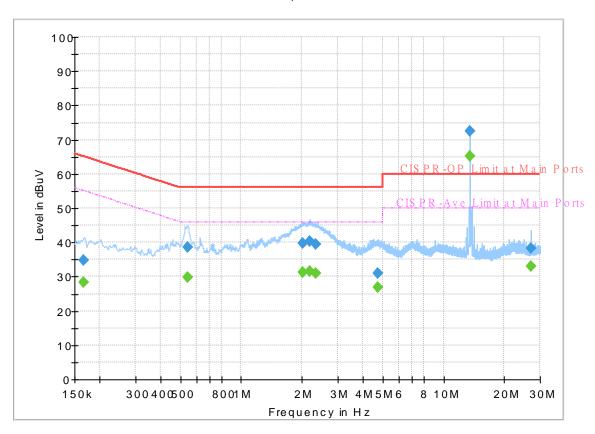
 Report NO:
 031906-01

 Test Mode:
 Mode 1

 Test Voltage:
 120Vac/60Hz

Phase: Line

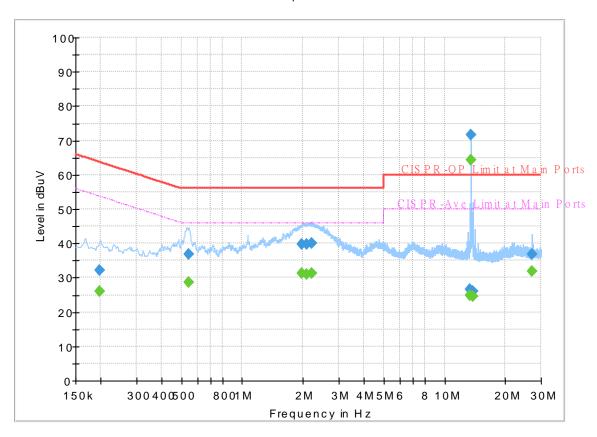
#### Full Spectrum



Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.166650		28.42	55.13	26.71	L1	OFF	19.6
0.166650	34.77		65.13	30.36	L1	OFF	19.6
0.545010	-	29.78	46.00	16.22	L1	OFF	19.6
0.545010	38.70		56.00	17.30	L1	OFF	19.6
2.004000		31.27	46.00	14.73	L1	OFF	19.6
2.004000	39.83		56.00	16.17	L1	OFF	19.6
2.181660	-	31.56	46.00	14.44	L1	OFF	19.6
2.181660	40.25		56.00	15.75	L1	OFF	19.6
2.328000		31.03	46.00	14.97	L1	OFF	19.6
2.328000	39.52		56.00	16.48	L1	OFF	19.6
4.745580		27.04	46.00	18.96	L1	OFF	19.8
4.745580	31.12		56.00	24.88	L1	OFF	19.8
13.560000		65.23	50.00	-15.23	L1	OFF	20.2
13.560000	72.52		60.00	-12.52	L1	OFF	20.2
27.120000	1	32.97	50.00	17.03	L1	OFF	20.6
27.120000	38.20		60.00	21.80	L1	OFF	20.6

Report NO: 031906-01
Test Mode: Mode 1
Test Voltage: 120Vac/60Hz
Phase: Neutral

Full Spectrum



Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.196170		26.02	53.77	27.75	N	OFF	19.5
0.196170	32.08		63.77	31.69	N	OFF	19.5
0.542670		28.53	46.00	17.47	N	OFF	19.5
0.542670	36.98		56.00	19.02	N	OFF	19.5
1.970250		31.15	46.00	14.85	N	OFF	19.6
1.970250	39.73		56.00	16.27	N	OFF	19.6
2.080500		31.06	46.00	14.94	N	OFF	19.6
2.080500	39.81		56.00	16.19	N	OFF	19.6
2.215500		31.20	46.00	14.80	N	OFF	19.6
2.215500	40.01		56.00	15.99	N	OFF	19.6
13.344000	-	24.89	50.00	25.11	N	OFF	19.9
13.344000	26.59		60.00	33.41	N	OFF	19.9
13.560000		64.40	50.00	-14.40	N	OFF	19.9
13.560000	71.69		60.00	-11.69	N	OFF	19.9
13.767000		24.69	50.00	25.31	N	OFF	19.9
13.767000	26.16		60.00	33.84	N	OFF	19.9
27.120000		31.90	50.00	18.10	N	OFF	20.0
27.120000	36.97		60.00	23.03	N	OFF	20.0

## **Terminal Mode**

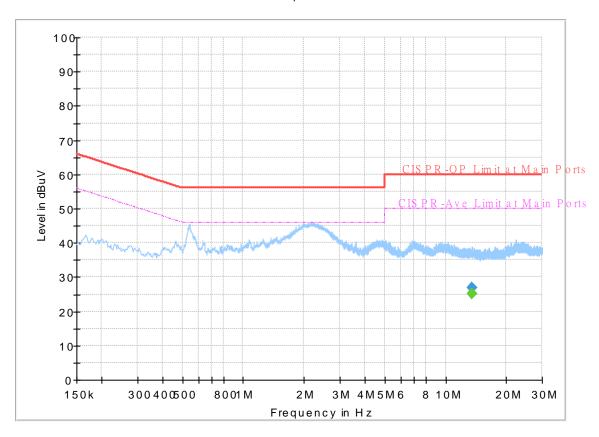
 Report NO :
 031906-01

 Test Mode :
 Mode 1

 Test Voltage :
 120Vac/60Hz

Phase: Line

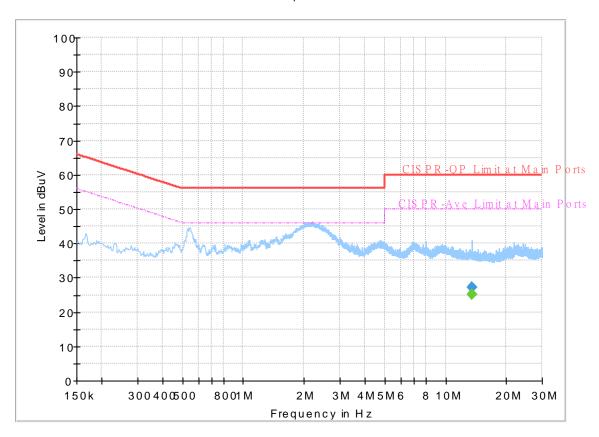
#### Full Spectrum



Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
13.560000		25.20	50.00	24.80	L1	OFF	20.2
13.560000	26.90		60.00	33.10	L1	OFF	20.2

Report NO: 031906-01
Test Mode: Mode 1
Test Voltage: 120Vac/60Hz
Phase: Neutral

Full Spectrum

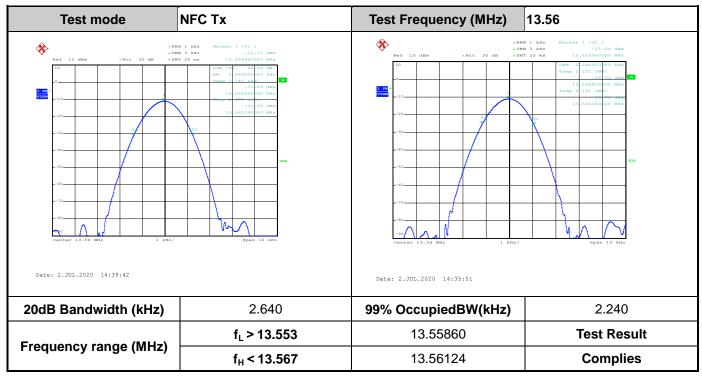


Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
13.560000		25.05	50.00	24.95	N	OFF	19.9
13.560000	27.25		60.00	32.75	N	OFF	19.9

# **Appendix B. Test Results of Conducted Test Items**

#### **B1. Test Result of 20dB Spectrum Bandwidth**

#### <Sample 1>

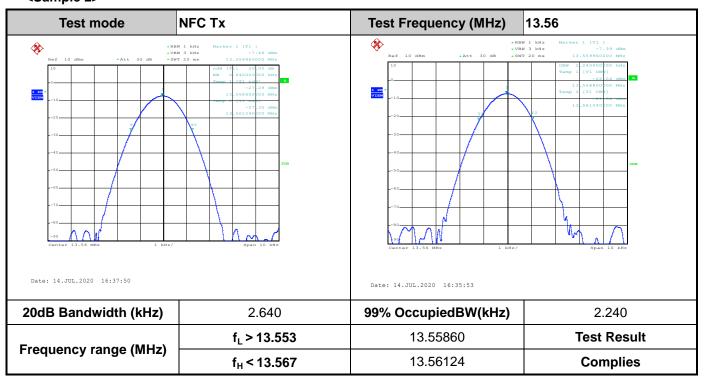


Report No.: FR031906-01

**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.

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### <Sample 2>



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# **B2. Test Result of Frequency Stability**

## <Sample 1>

Voltage vs. Fred	quency Stability	Temperature vs. Frequency Stability					
Voltage (Vac)	Measurement Frequency (MHz)	Temperature (℃)	Time	Measurement Frequency (MHz)			
120	13.559920	-20	0	13.559980			
102	13.559920		2	13.559980			
138	13.559920		5	13.559960			
			10	13.559960			
		-10	0	13.560000			
			2	13.560000			
			5	13.560000			
			10	13.560000			
		0	0	13.560000			
			2	13.560000			
			5	13.560000			
			10	13.560000			
		10	0	13.559960			
			2	13.559960			
			5	13.559980			
			10	13.559970			
		20	0	13.559920			
			2	13.559920			
			5	13.559920			
			10	13.559920			
		30	0	13.559940			
			2	13.559930			
			5	13.559960			
			10	13.559920			
		40	0	13.559910			
			2	13.559900			
			5	13.559900			
			10	13.559900			

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Voltage vs. Frequency Stability		Temperature vs. Frequency Stability				
Voltage (Vac)	Measurement Frequency (MHz)	Temperature (°C)	Time	Measurement Frequency (MHz)		
		50	0	13.559880		
			2	13.559880		
			5	13.559880		
			10	13.559880		
Max.Deviation (MHz)	-0.000080	Max.Deviation	on (MHz)	-0.000120		
Max.Deviation (ppm)	-5.8997	Max.Deviation (ppm)		Max.Deviation (ppm) -8.3		-8.8496
Limit	FS < ±100 ppm	Limit		Limit		FS < ±100 ppm
Test Result	PASS	Test Result		Test Result		PASS

TEL: 886-3-327-3456 Page Number : B4 of B6



## <Sample 2>

Voltage vs. Frequency Stability		Temperature vs. Frequency Stability		
Voltage (Vac)	Measurement Frequency (MHz)	Temperature (°C)	Time	Measurement Frequency (MHz)
120	13.559920	-20	0	13.560000
102	13.559900		2	13.560000
138	13.559900		5	13.560000
			10	13.559990
		-10	0	13.560010
			2	13.560020
			5	13.560020
			10	13.560020
		0	0	13.560020
			2	13.560020
			5	13.560020
			10	13.560020
		10	0	13.560000
			2	13.560000
			5	13.560000
			10	13.560000
		20	0	13.559920
			2	13.559920
			5	13.559910
			10	13.559900
		30	0	13.559920
			2	13.559920
			5	13.559920
			10	13.559920
		40	0	13.559920
			2	13.559900
			5	13.559900
			10	13.559900

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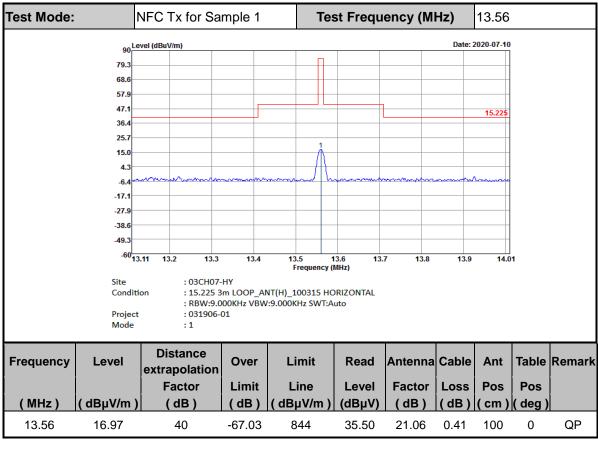
TEL: 886-3-327-3456 Page Number: B5 of B6

Voltage vs. Frequency Stability		Temperature vs. Frequency Stability		
Voltage (Vac)	Measurement Frequency (MHz)	Temperature (°C)	Time	Measurement Frequency (MHz)
		50	0	13.559900
			2	13.559880
			5	13.559900
			10	13.559890
Max.Deviation (MHz)	-0.000100	Max.Deviation (MHz)		-0.000120
Max.Deviation (ppm)	-7.3746	Max.Deviation (ppm)		-8.8496
Limit	FS < ±100 ppm	Limit		FS < ±100 ppm
Test Result	PASS	Test Result		PASS

TEL: 886-3-327-3456 Page Number : B6 of B6

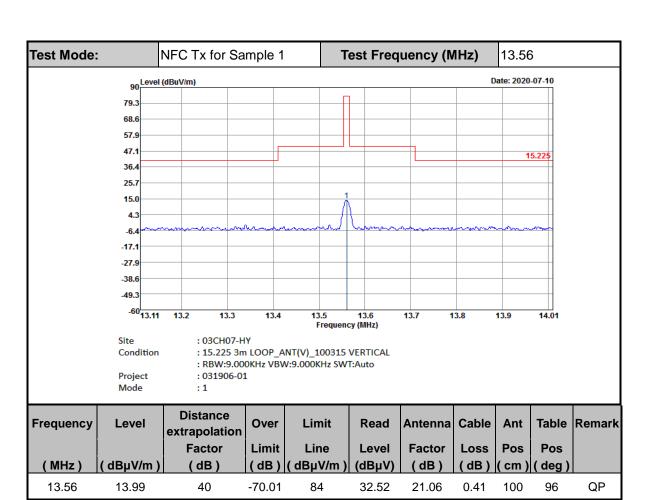
# **Appendix C. Test Results of Radiated Test Items**

#### C1. Test Result of Field Strength of Fundamental Emissions

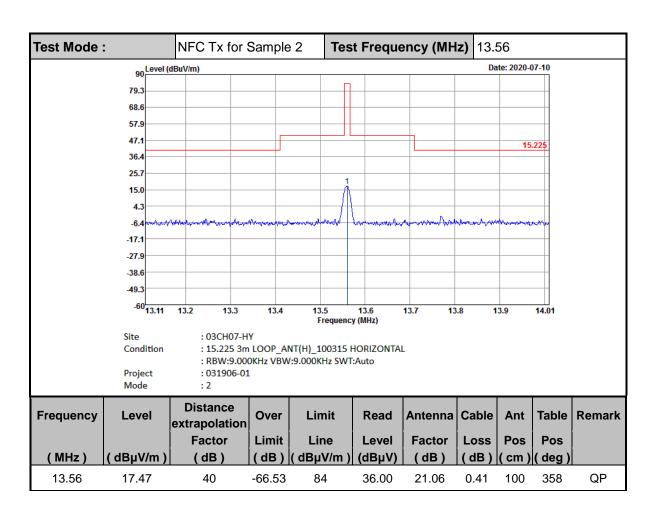


Report No.: FR031906-01

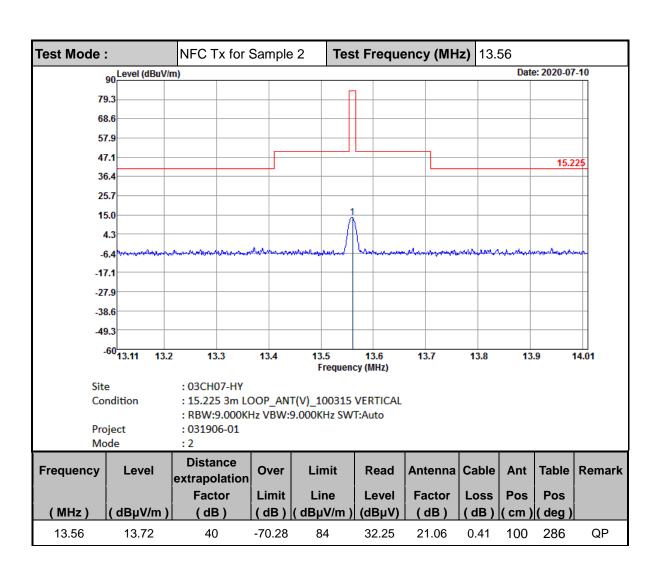
TEL: 886-3-327-3456 Page Number : C1 of C28



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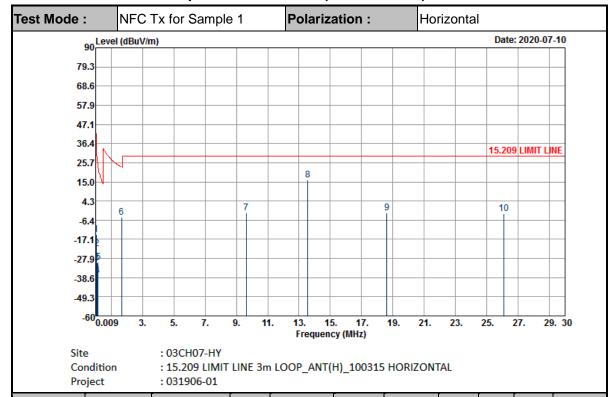


TEL: 886-3-327-3456 Page Number : C3 of C28



TEL: 886-3-327-3456 Page Number : C4 of C28

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

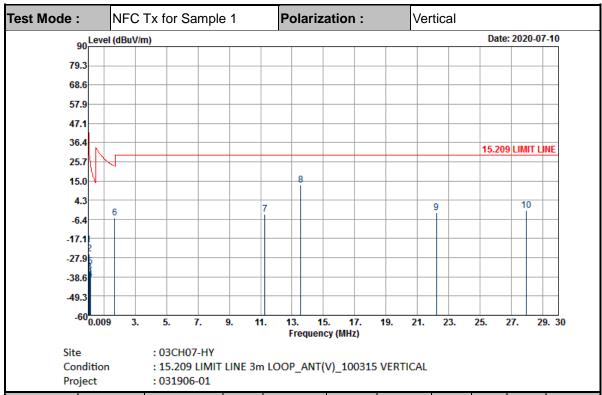


Report No.: FR031906-01

Frequency	Level	Distance extrapolation	Over	Limit	Read	Antenna	Cable	Ant	Table	Remark
		Factor	Limit	Line	Level	Factor	Loss	Pos	Pos	
(MHz)	( dBµV/m )	( dB )	(dB)	$(dB\mu V/m)$	(dBµV)	( dB )	(dB)	( cm )	(deg)	
0.03491	-14.66	80	-51.41	36.75	45.71	19.5	0.13	-	-	Average
0.06414	-22.24	80	-53.7	31.46	38.61	19	0.15	-	-	Average
0.0953	-30.47	80	-58.49	28.02	30.86	18.5	0.17	-	-	QP
0.11044	-37.35	80	-64.09	26.74	23.97	18.5	0.18	-	-	Average
0.15238	-29.98	80	-53.93	23.95	31.15	18.67	0.2	-	-	Average
1.654	-4.65	40	-27.88	23.23	16.07	18.93	0.35	100	0	QP
9.624	-2.34	40	-31.84	29.5	16.63	20.63	0.4	-	-	QP
13.56	16.11	40	-13.39	29.5	34.64	21.06	0.41	-	-	QP
18.61	-2.31	40	-31.81	29.5	15.74	21.56	0.39	-	-	QP
26.08	-2.61	40	-32.11	29.5	14.66	22.19	0.54	-	-	QP

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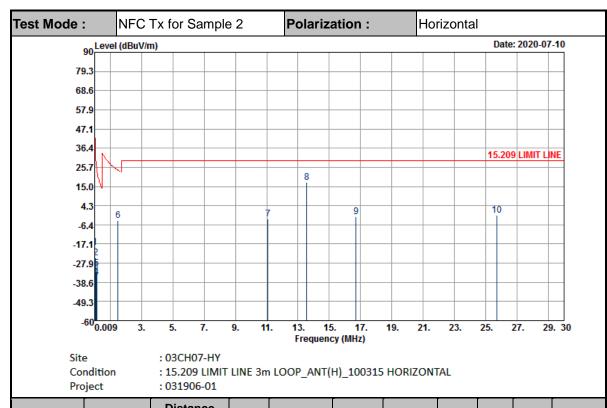
CC RADIO TEST REPORT Report No. : FR031906-01



Frequency	Level	Distance extrapolation	Over	Limit	Read	Antenna	Cable	Ant	Table	Remark
		Factor	Limit	Line	Level	Factor	Loss	Pos	Pos	
(MHz)	$(dB\mu V/m)$	( dB )	(dB)	( dBµV/m )	(dBµV)	( dB )	(dB)	( cm )	(deg)	
0.01313	-20.53	80	-65.77	45.24	40.65	18.7	0.12	-	-	Average
0.07122	-25.87	80	-56.42	30.55	34.98	19	0.15	-	-	Average
0.09026	-35.87	80	-64.36	28.49	25.47	18.5	0.16	-	-	QP
0.11188	-39.77	80	-66.4	26.63	21.55	18.5	0.18	-	-	Average
0.15136	-33.04	80	-57.04	24	28.09	18.67	0.2	-	-	Average
1.699	-5.66	40	-28.66	23	15.06	18.93	0.35	100	0	QP
11.28	-3.72	40	-33.22	29.5	15.04	20.83	0.41	-	-	QP
13.56	12.5	40	-17	29.5	31.03	21.06	0.41	-	-	QP
22.228	-2.84	40	-32.34	29.5	14.88	21.88	0.4	-	-	QP
27.965	-1.3	40	-30.8	29.5	15.63	22.34	0.73	-	-	QP

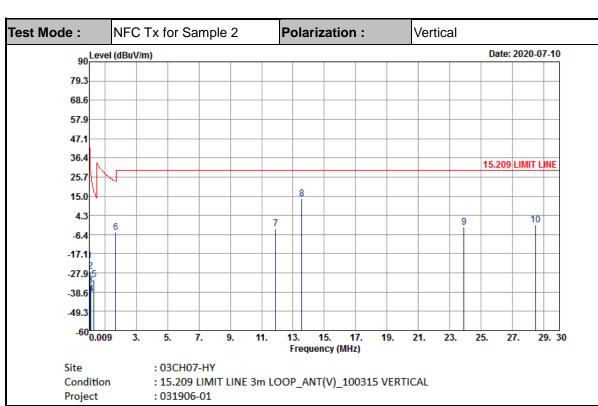
TEL: 886-3-327-3456 Page Number : C6 of C28





١	Frequency	Level	Distance extrapolation	Over	Limit	Read	Antenna	Cable	Ant	Table	Remark
	(MHz)	( dBµV/m )	Factor ( dB )	Limit ( dB )	Line ( dBµV/m )	Level (dBµV)	Factor ( dB )	Loss (dB)	Pos ( cm )	Pos ( deg )	
	0.02935	-19.08	80	-57.33	38.25	41.29	19.5	0.13	-	-	Average
	0.07293	-24.93	80	-55.28	30.35	35.92	19	0.15	-	-	Average
	0.09138	-32.57	80	-60.96	28.39	28.76	18.5	0.17	-	-	QP
	0.1126	-35.81	80	-62.38	26.57	25.51	18.5	0.18	-	-	Average
	0.15	-30.61	80	-54.69	24.08	30.52	18.67	0.2	-	-	Average
	1.489	-4.21	40	-28.36	24.15	16.5	18.95	0.34	100	0	QP
	11.072	-3.37	40	-32.87	29.5	15.42	20.81	0.4	-	-	QP
	13.56	17.45	40	-12.05	29.5	35.98	21.06	0.41	-	-	QP
	16.711	-2.07	40	-31.57	29.5	16.15	21.37	0.41	-	-	QP
	25.725	-0.95	40	-30.45	29.5	16.39	22.16	0.5	-	-	QP

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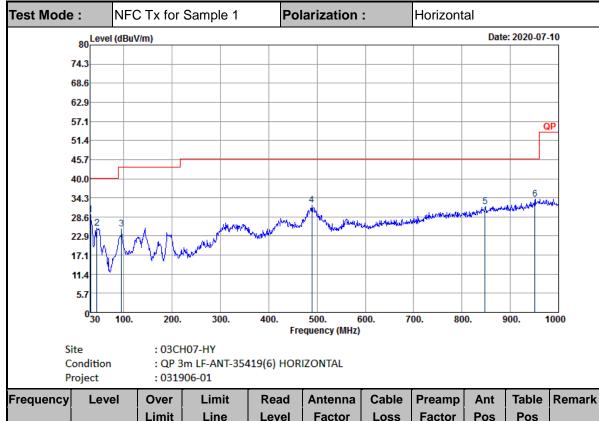
Frequency	Level	Distance extrapolation	Over	Limit	Read	Antenna	Cable	Ant	Table	Remark
		Factor	Limit	Line	Level	Factor	Loss	Pos	Pos	
(MHz)	( $dB\mu V/m$ )	( dB )	(dB)	$( dB\mu V/m )$	(dBµV)	( dB )	(dB)	( cm )	(deg)	
0.01038	-20.98	80	-68.26	47.28	40.2	18.7	0.12	-	-	Average
0.07218	-26.97	80	-57.41	30.44	33.88	19	0.15	-	-	Average
0.09602	-34.84	80	-62.8	27.96	26.49	18.5	0.17	-	-	QP
0.11952	-39.59	80	-65.65	26.06	21.64	18.59	0.18	-	-	Average
0.29994	-31.39	80	-49.45	18.06	29.23	19.1	0.28	-	-	Average
1.684	-5.45	40	-28.53	23.08	15.27	18.93	0.35	100	0	QP
11.888	-3.12	40	-32.62	29.5	15.58	20.89	0.41	-	-	QP
13.56	13.59	40	-15.91	29.5	32.12	21.06	0.41	-	-	QP
23.902	-2.25	40	-31.75	29.5	15.32	22.01	0.42	-	-	QP
28.47	-0.95	40	-30.45	29.5	15.89	22.38	0.78	-	-	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
- 4. 13.56 MHz is fundamental signal which can be ignored

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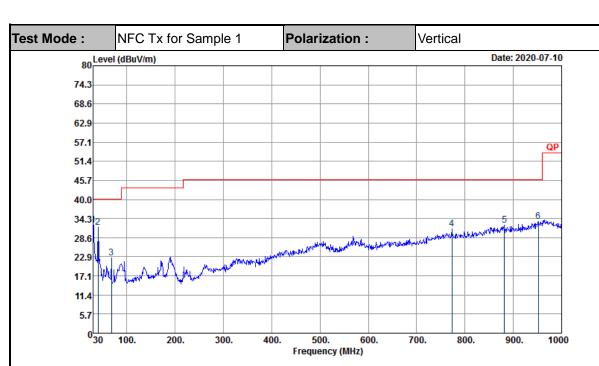
## C3. Results of Radiated Spurious Emissions (30MHz~1GHz)



Report No.: FR031906-01

Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Remark
		Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	
(MHz)	( dBµV/m )	(dB)	( dBµV/m )	(dBµV)	(dB)	(dB)	( dB )	( cm )	(deg)	
30.81	29.09	-10.91	40	34.04	24.12	0.94	30.01	100	0	Peak
44.31	25.13	-14.87	40	37.17	16.83	1.12	29.99	-	-	Peak
94.8	25.01	-18.49	43.5	38.06	15.29	1.63	29.97	-	-	Peak
489	32.2	-13.8	46	34.56	23.77	3.74	29.87	-	-	Peak
848.1	31.6	-14.4	46	27.22	28.65	4.96	29.23	-	-	Peak
951	33.87	-12.13	46	27.04	30.26	5.26	28.69	-	-	Peak

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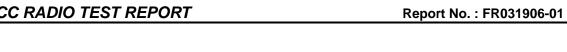
Site : 03CH07-HY

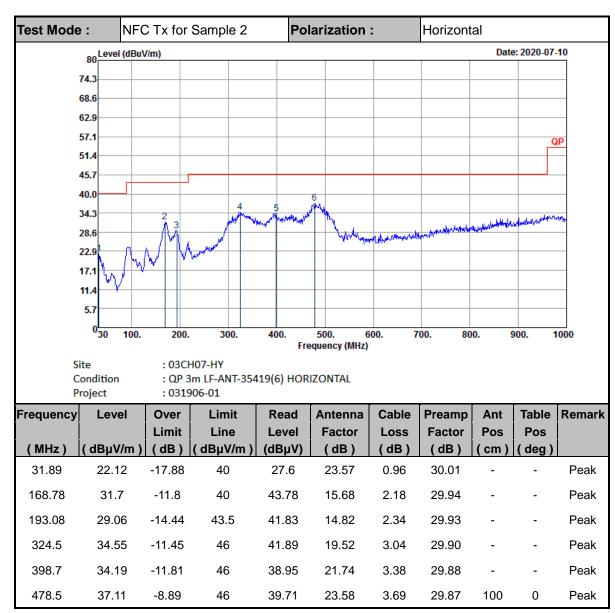
Condition : QP 3m LF-ANT-35419(6) VERTICAL

Project : 031906-01

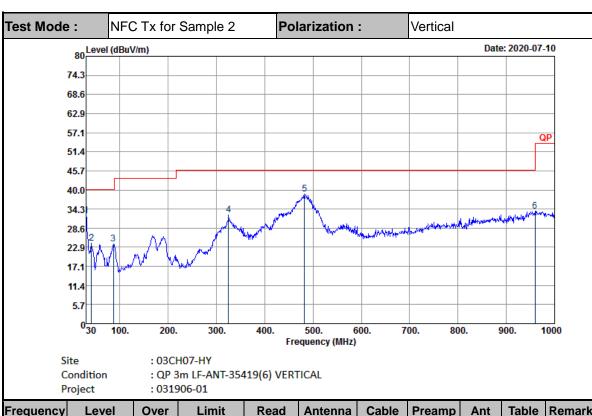
Į	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Remark
			Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	
	(MHz)	( dBµV/m )	(dB)	( dBµV/m )	(dBµV)	(dB)	(dB)	( dB )	( cm )	(deg)	
	30	32.36	-7.64	40	37.12	24.32	0.93	30.01	100	0	Peak
	40.53	31.53	-8.47	40	41.45	19	1.08	30.00	-	-	Peak
	67.8	22.62	-17.38	43.5	39.16	12.06	1.38	29.98	-	-	Peak
	773.2	31.13	-14.87	46	28.19	27.71	4.74	29.51	-	-	Peak
	881.7	32.34	-13.66	46	27.48	28.87	5.06	29.07	-	-	Peak
	951.7	33.38	-12.62	46	26.5	30.31	5.26	28.69	-	-	Peak

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Report No.: FR031906-01

Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Remark
		Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	
(MHz)	(dBµV/m)	(dB)	( dBµV/m )	(dBµV)	( dB )	(dB)	(dB)	( cm )	(deg)	
30	32.2	-7.8	40	36.96	24.32	0.93	30.01	-	-	Peak
40.8	24.11	-15.89	40	34.03	19	1.08	30	-	-	Peak
86.7	23.82	-16.18	43.5	38.21	14.03	1.56	29.98	-	-	Peak
325.2	32.55	-13.45	46	39.88	19.52	3.05	29.9	-	-	Peak
482	38.74	-7.26	46	41.26	23.64	3.71	29.87	100	0	Peak
959.4	33.71	-12.29	46	26.66	30.41	5.29	28.65	-	-	Peak

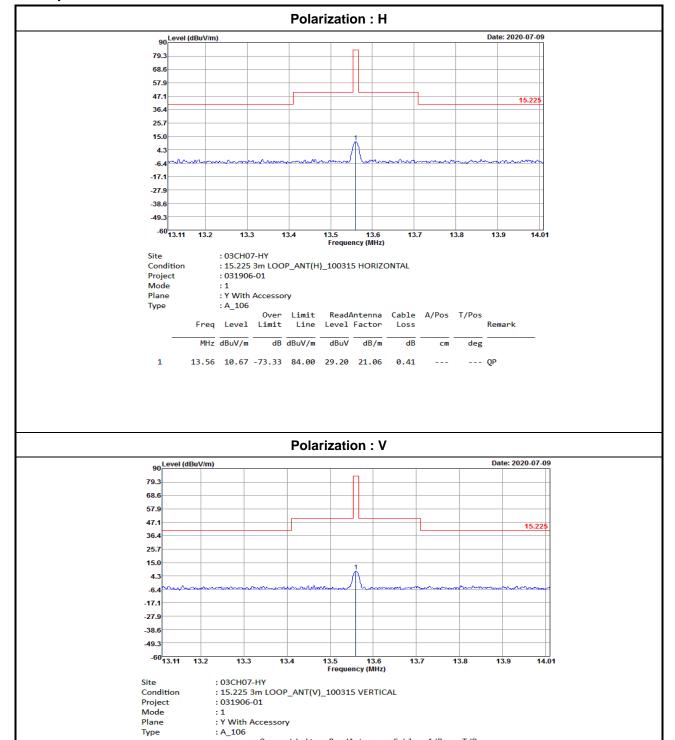
#### Note:

- 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 (dB $\mu$ V/m) = 20 log Emission level ( $\mu$ V/m).
- 3. Corrected Reading: Antenna Factor + Cable Loss + Read Level Preamp Factor= Level.

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# C RADIO TEST REPORT Report No. : FR031906-01

### <Sample 1>



Over Limit ReadAntenna Cable A/Pos T/Pos
Freq Level Limit Line Level Factor Loss Remark

MHz dBuV/m dB dBuV/m dBuV dB/m dB cm deg

1 13.56 8.03 -75.97 84.00 26.56 21.06 0.41 --- OP

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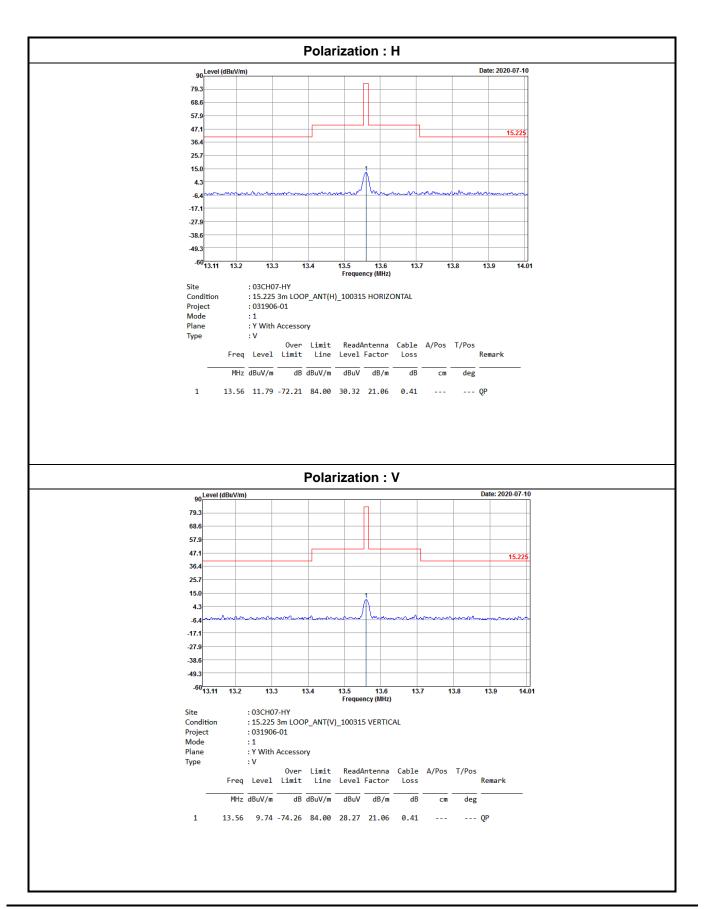
TEL: 886-3-327-3456 : C15 of C28 Page Number





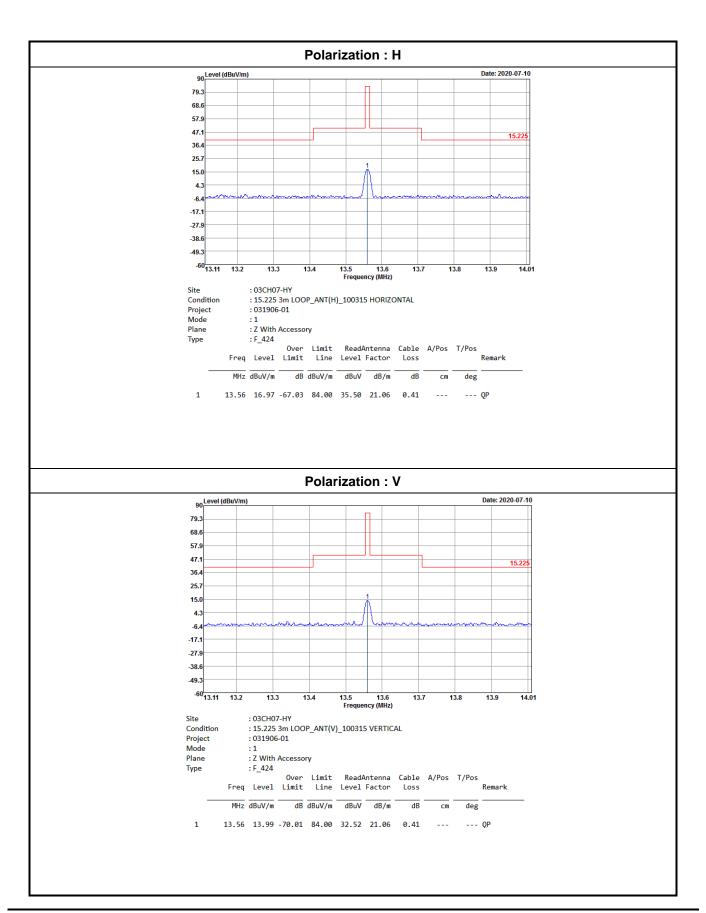
TEL: 886-3-327-3456 Page Number : C16 of C28





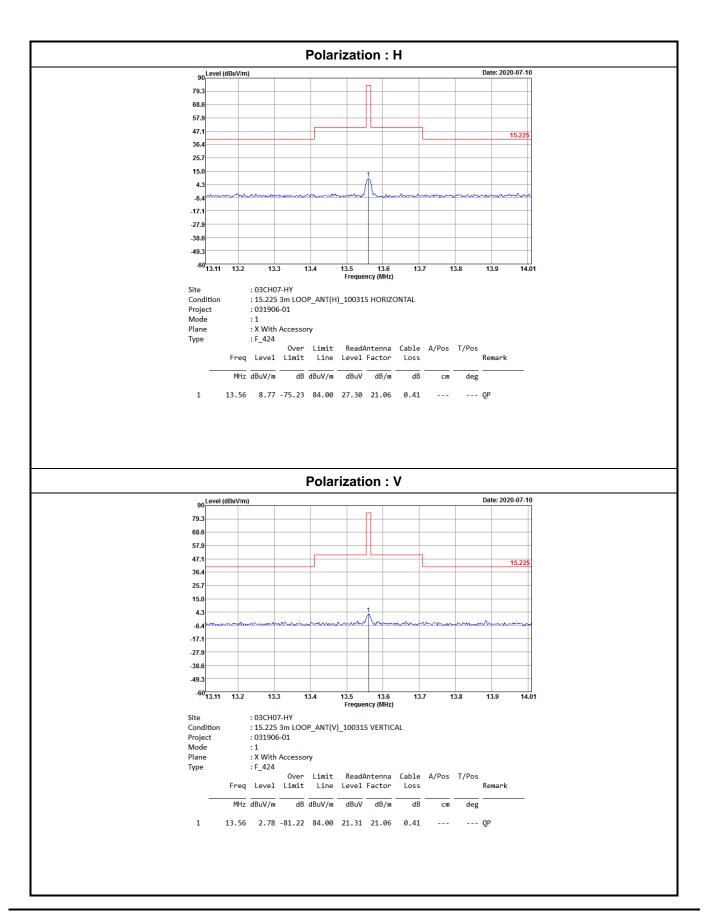
TEL: 886-3-327-3456 : C17 of C28 Page Number





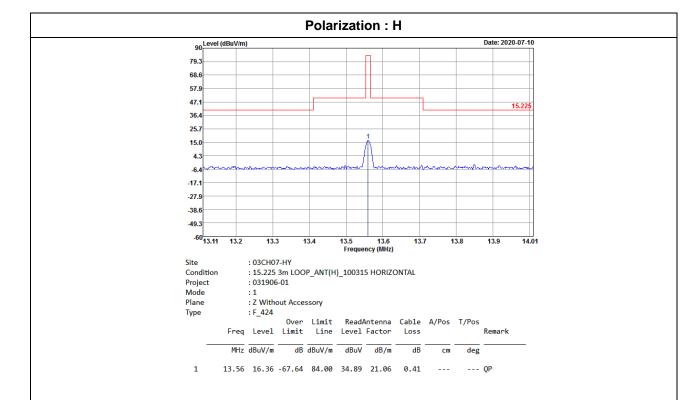
TEL: 886-3-327-3456 Page Number : C18 of C28



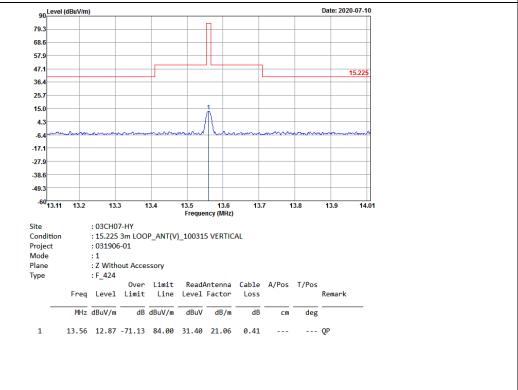


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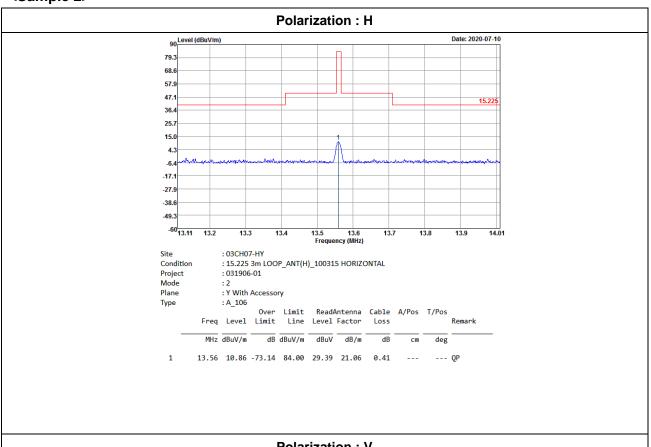






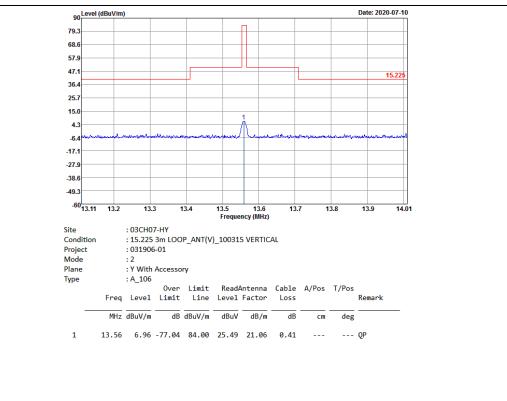
TEL: 886-3-327-3456 Page Number : C20 of C28

# <Sample 2>



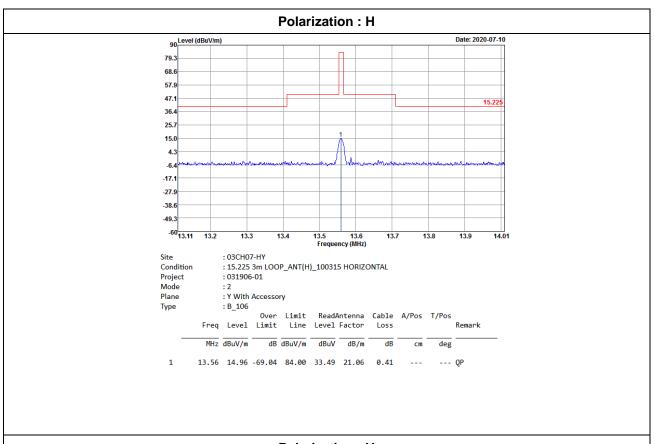
Report No.: FR031906-01



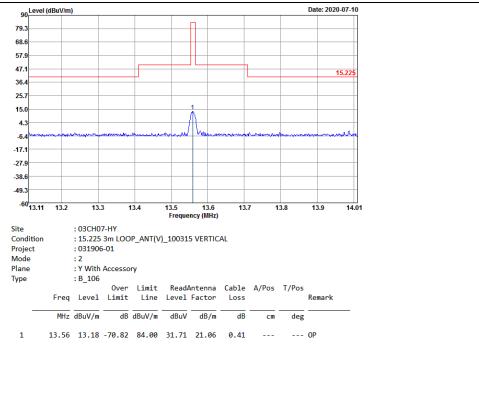


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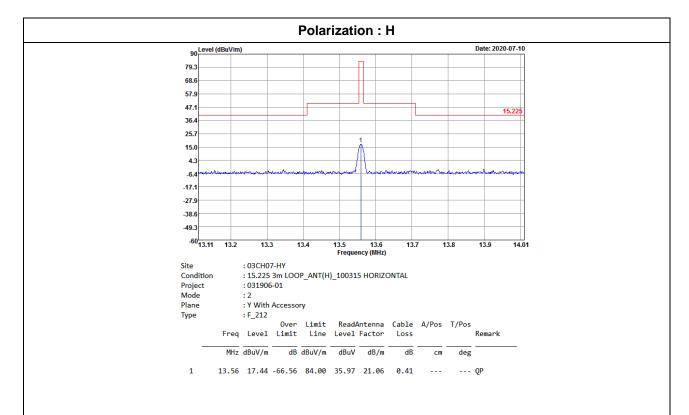




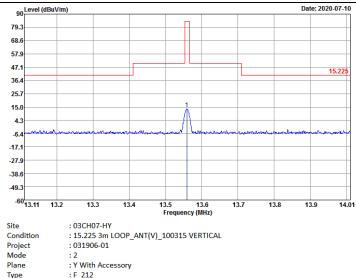


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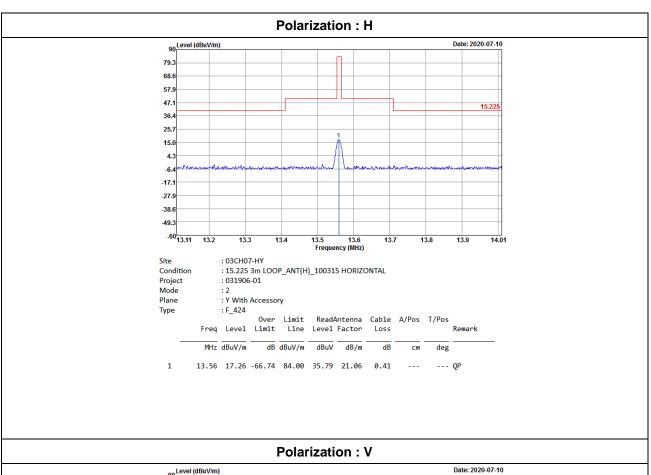


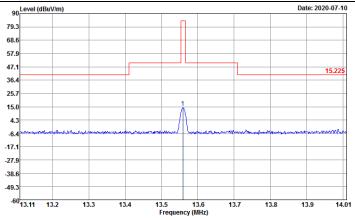


### Polarization: V









Site : 03CH07-HY : 15.225 3m LOOP\_ANT(V)\_100315 VERTICAL : 031906-01 Condition

Project Mode : 2

Plane : Y With Accessory : F\_424 Type

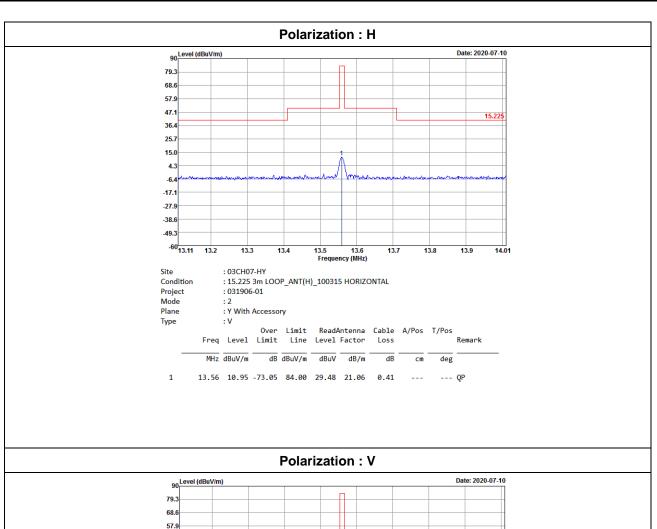
Over Limit ReadAntenna Cable A/Pos T/Pos
Freq Level Limit Line Level Factor Loss Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB cm deg

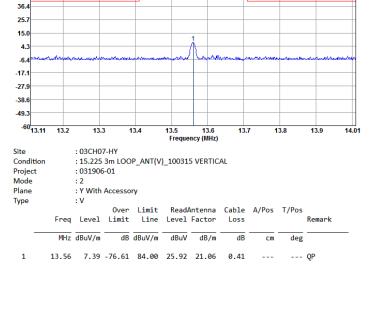
13.56 14.25 -69.75 84.00 32.78 21.06 0.41 ---

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47.1

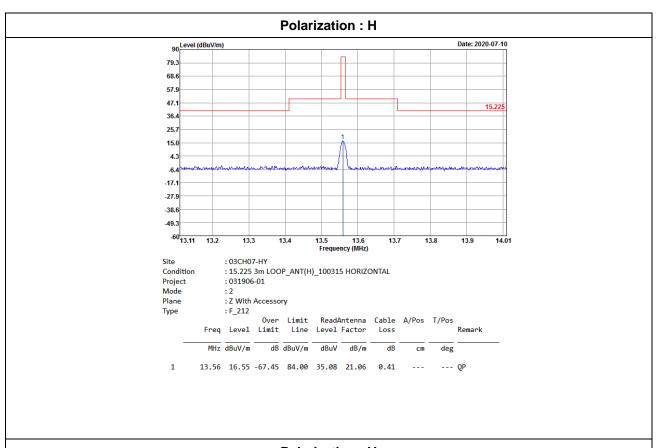




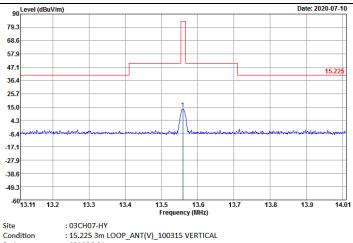


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Condition

Project : 031906-01 Mode

: 2 : Z With Accessory Plane

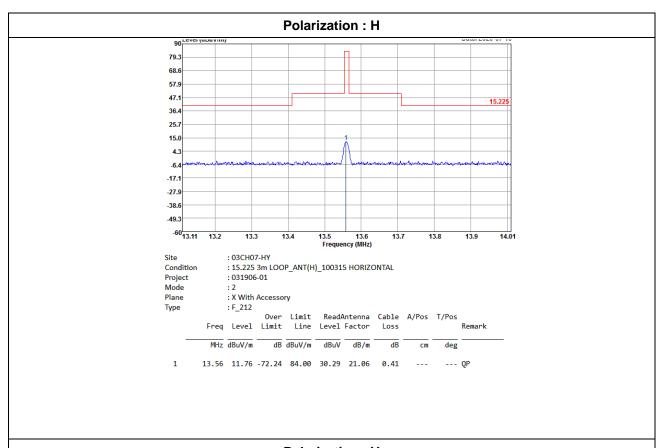
: F\_212

FAX: 886-3-328-4978

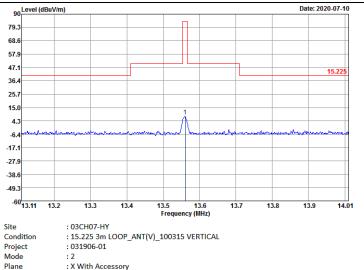
Over Limit ReadAntenna Cable A/Pos T/Pos
Freq Level Limit Line Level Factor Loss Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB

13.56 13.74 -70.26 84.00 32.27 21.06 0.41 --- QP









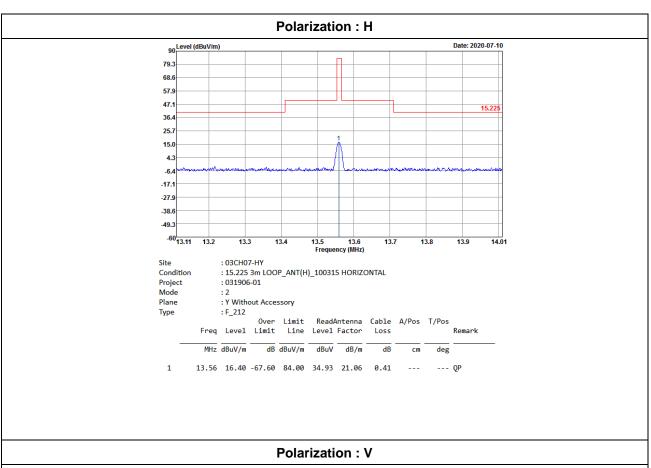
: X With Accessory Type : F\_212

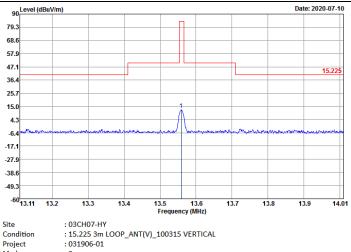
FAX: 886-3-328-4978

Over Limit ReadAntenna Cable A/Pos T/Pos
Freq Level Limit Line Level Factor Loss Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB cm deg

13.56 8.09 -75.91 84.00 26.62 21.06 0.41 ------ QP







: 2 : Y Without Accessory Mode Plane : F\_212

Over Limit ReadAntenna Cable A/Pos T/Pos
Freq Level Limit Line Level Factor Loss Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB cm deg

13.56 12.47 -71.53 84.00 31.00 21.06 0.41

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