

Report No. : FR9D0531B



# FCC RADIO TEST REPORT

FCC ID	: XRAFB417
Equipment	: wireless activity tracker
Brand Name	: Fitbit
Model Name	: FB417
Applicant	: FITBIT, INC.
	199 FREMONT, 14TH FLOOR, SAN FRANCISCO, CA
Manufacturer	: FITBIT, INC.
	199 FREMONT, 14TH FLOOR, SAN FRANCISCO, CA
Standard	: FCC Part 15 Subpart C §15.225

The product was received on Dec. 05, 2019 and testing was started from Dec. 16, 2019 and completed on Jan. 08, 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 report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

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.

Louis Wu

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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FAX : 886-3-328-4978	Issued Date	: Jan. 22, 2020
Report Template No.: BU5-FR15CNFC Version 2.4	Report Version	: 01



# History of this test report

Report No.	Version	Description	Issued Date
FR9D0531B	01	Initial issue of report	Jan. 22, 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 21.62 dB at 4.123MHz
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 15.32 dBµV/m at 13.560 MHz
3.5	15.225(d) 15.209	Radiated Spurious Emissions	Pass	Under limit 6.07 dB at 40.680MHz
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: Cindy Liu** 



# 1. General Description

# **1.1 Product Feature of Equipment Under Test**

Bluetooth, NFC, and GNSS.

Product Specification subjective to this standard			
Sample 1 EUT with Battery 1			
Sample 2 EUT with Battery 2			
Antenna Type  Bluetooth: Monopole Antenna    GPS / Glonass: Monopole Antenna  NFC: Loop Antenna			

### **1.2 Modification of EUT**

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

# **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.		
Test Site NO.	TH03-HY	CO05-HY	03CH07-HY
Test Engineer	Loius Chung Tom Lee Stan Hsie		
Temperature	22~24°C 22~25°C 21~23°C		
Relative Humidity	53~55% 44~53% 60~62%		

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

# 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.

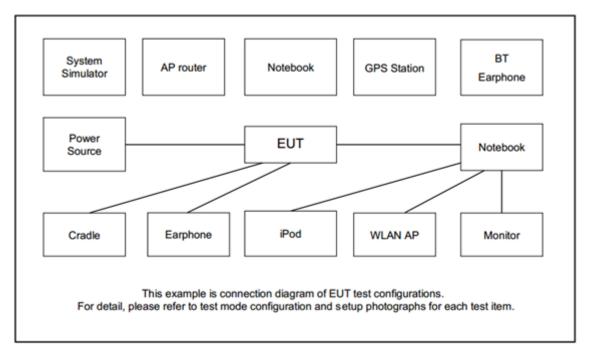
Test Items			
AC Power Line Conducted Emissions	Field Strength of Fundamental Emissions		
20dB Spectrum Bandwidth	Frequency Stability		
Radiated Emissions 9kHz~30MHz Radiated Emissions 30MHz~1GHz			

The EUT pre-scanned in four NFC type, A, B. The worst type (type B 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	Conducted Mode 1: NFC Idle +Charging cable (Charging from Adapter) for Sample 1		
Emission			
Remark: For Radiated Test Cases, the tests were performed with 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.	Adapter	DVE	DSA-5PFM-05 FUS 050100	FCC DoC	N/A	N/A
2.	Adapter	SONY	EP800	N/A	N/A	N/A

# 2.4 EUT Operation Test Setup

The RF test items, utility "Tera Term" was installed in EUT which was programmed in order to make the EUT get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.

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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.

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	

\*Decreases with the logarithm of the frequency.

#### **3.1.2 Measuring Instruments**

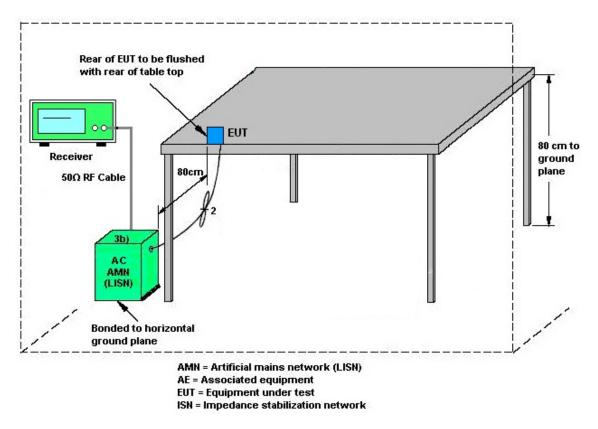
See list of measuring equipment of this test report.

#### **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.
- 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



Spectrum Analyzer

#### 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.

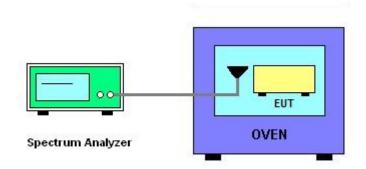
#### **3.3.2 Measuring Instruments**

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 th	e spectrum mask is t	ested with RBW set t	o 9kHz.		
	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.

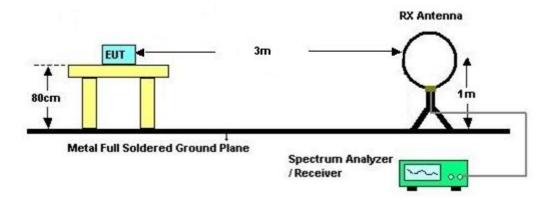
#### 3.4.3 Test Procedures

- 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.
- 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.
- 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	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.



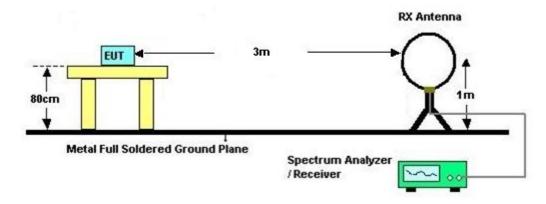
#### 3.5.4 Test Procedures

- 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.
- 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.

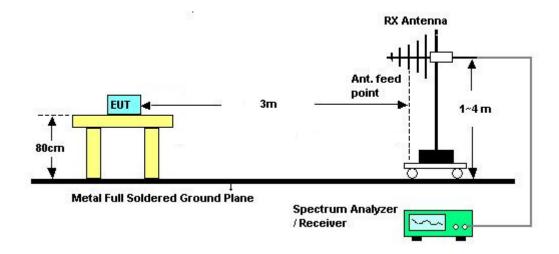


#### 3.5.5 Test Setup

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	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D 01N-06	35419 & 03	30MHz~1GHz	Apr. 30, 2019	Jan. 07, 2020~ Jan. 08, 2020	Apr. 29, 2020	Radiation (03CH07-HY)
EMI Test Receiver	Agilent	N9038A(M XE)	MY5329005 3	20Hz~26.5GHz	Jan. 23, 2019	Jan. 07, 2020~ Jan. 08, 2020	Jan. 22, 2020	Radiation (03CH07-HY)
Hygrometer	TECPEL	HTC-2	1	N/A	Jun. 17, 2019	Jan. 07, 2020~ Jan. 08, 2020	Jun. 16, 2020	Radiation (03CH07-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Jan. 11, 2019	Jan. 07, 2020~ Jan. 08, 2020	Jan. 10, 2020	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	10MHz~1GHz	May 20, 2019	Jan. 07, 2020~ Jan. 08, 2020	May 19, 2020	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLE X 104	MY24971/4, MY28655/4	9kHz~30MHz	Feb. 26, 2019	Jan. 07, 2020~ Jan. 08, 2020	Feb. 25, 2020	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLE X 104	MY28655/4, MY24971/4, MY15682/4	30MHz~1GHz	Feb. 26, 2019	Jan. 07, 2020~ Jan. 08, 2020	Feb. 25, 2020	Radiation (03CH07-HY)
Controller	ChainTek	Chaintek 3000	N/A	Control Turn table	N/A	Jan. 07, 2020~ Jan. 08, 2020	N/A	Radiation (03CH07-HY)
Controller	Max-Full	MF7802	MF7802083 68	Control Ant Mast	N/A	Jan. 07, 2020~ Jan. 08, 2020	N/A	Radiation (03CH07-HY)
Antenna Mast	Max-Full	MFA520B S	N/A	1m~4m	N/A	Jan. 07, 2020~ Jan. 08, 2020	N/A	Radiation (03CH07-HY)
Turn Table	ChainTek	Chaintek 3000	N/A	0~360 Degree	N/A	Jan. 07, 2020~ Jan. 08, 2020	N/A	Radiation (03CH07-HY)
AC Power Source	ChainTek	APC-1000 W	N/A	N/A	N/A	Jan. 08, 2020	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9kHz~3.6GHz	Nov. 15, 2019	Jan. 08, 2020	Nov. 14, 2020	Conduction (CO05-HY)
Hygrometer	Testo	608-H1	34913912	N/A	Mar. 19, 2019	Jan. 08, 2020	Mar. 18, 2020	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Nov. 15, 2019	Jan. 08, 2020	Nov. 14, 2020	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	Jan. 08, 2020	N/A	Conduction (CO05-HY)
LF Cable	HUBER + SUHNER	RG-214/U	LF01	N/A	Jan. 02, 2020	Jan. 08, 2020	Jan. 01, 2021	Conduction (CO05-HY)
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100851	N/A	Jan. 02, 2020	Jan. 08, 2020	Jan. 01, 2021	Conduction (CO05-HY)
Hygrometer	Testo	608-H1	34893241	N/A	Mar. 06, 2019	Dec. 16, 2019~ Dec. 17, 2019	Mar. 05, 2020	Conducted (TH03-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP30	101329	9kHz~30GHz	Sep. 04, 2019	Dec. 16, 2019~ Dec. 17, 2019	Sep. 03, 2020	Conducted (TH03-HY)
Power Divider	Warison	WCOU-0.4 -26.5S-20	#A	N/A	Nov. 06, 2019	Dec. 16, 2019~ Dec. 17, 2019	Nov. 05, 2020	Conducted (TH03-HY)
Temperature Chamber	ESPEC	SU-641	92013721	-30°C ~70°C	Nov. 26, 2019	Dec. 16, 2019~ Dec. 17, 2019	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	2.0
of 95% (U = 2Uc(y))	2.0

#### Uncertainty of Radiated Emission Measurement (9 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence	26
of 95% (U = 2Uc(y))	2.0

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

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

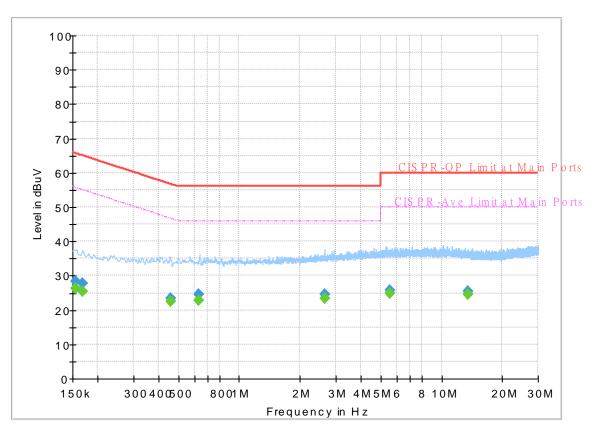


# **Appendix A. Test Results of Conducted Emission Test**

Toot Engineer	Tom Loo	Temperature :	<b>22~25</b> ℃
Test Engineer :	Tom Lee	Relative Humidity :	44~53%

# **EUT Information**

Report NO : Test Mode : Test Voltage : Phase : 9D0531 Mode 1 120Vac/60Hz Line



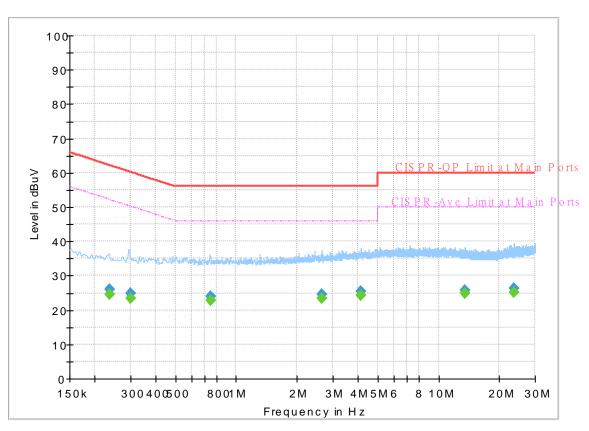
#### FullSpectrum

# Final\_Result

Frequency	QuasiPeak	CAverage	Limit	Margin	Line	Filter	Corr.
(MHz)	(dBuV)	(dBuV)	(dBuV)	(dB)			(dB)
0.155670		26.26	55.69	29.43	L1	OFF	19.5
0.155670	28.38		65.69	37.31	L1	OFF	19.5
0.168090		25.49	55.05	29.56	L1	OFF	19.5
0.168090	27.70		65.05	37.35	L1	OFF	19.5
0.456180		22.46	46.76	24.30	L1	OFF	19.5
0.456180	23.41		56.76	33.35	L1	OFF	19.5
0.633750		22.91	46.00	23.09	L1	OFF	19.5
0.633750	24.55		56.00	31.45	L1	OFF	19.5
2.636880		23.48	46.00	22.52	L1	OFF	19.7
2.636880	24.44		56.00	31.56	L1	OFF	19.7
5.561070		24.83	50.00	25.17	L1	OFF	19.8
5.561070	25.79		60.00	34.21	L1	OFF	19.8
13.560000		24.51	50.00	25.49	L1	OFF	20.1
13.560000	25.55		60.00	34.45	L1	OFF	20.1

### **EUT Information**

Report NO : Test Mode : Test Voltage : Phase : 9D0531 Mode 1 120Vac/60Hz Neutral



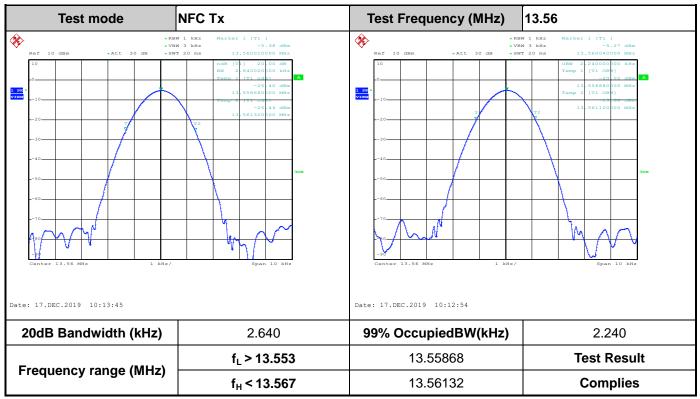
#### FullSpectrum

# Final\_Result

Frequency	QuasiPeak	CAverage	Limit	Margin	Line	Filter	Corr.
(MHz)	(dBuV)	(dBuV)	(dBuV)	(dB)			(dB)
0.237120		24.44	52.20	27.76	Ν	OFF	19.6
0.237120	26.07		62.20	36.13	Ν	OFF	19.6
0.299400		23.33	50.26	26.93	Ν	OFF	19.6
0.299400	24.91		60.26	35.35	Ν	OFF	19.6
0.744000		22.74	46.00	23.26	Ν	OFF	19.6
0.744000	24.07		56.00	31.93	Ν	OFF	19.6
2.657490		23.52	46.00	22.48	Ν	OFF	19.6
2.657490	24.53		56.00	31.47	Ν	OFF	19.6
4.122600		24.38	46.00	21.62	Ν	OFF	19.7
4.122600	25.34		56.00	30.66	Ν	OFF	19.7
13.560000		24.72	50.00	25.28	Ν	OFF	20.1
13.560000	25.76		60.00	34.24	Ν	OFF	20.1
23.696970		25.11	50.00	24.89	Ν	OFF	20.5
23.696970	26.24		60.00	33.76	Ν	OFF	20.5



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



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

**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**

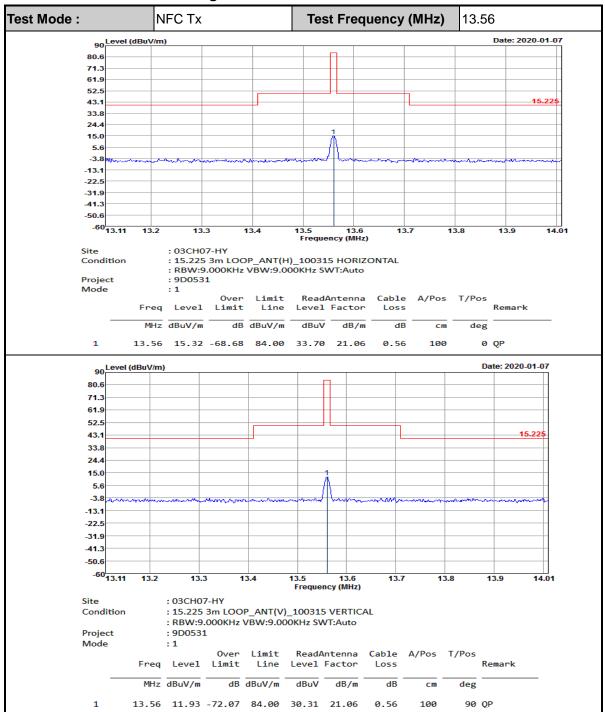
Voltage vs. Freq	uency Stability	Temper	ature vs. Frequ	ency Stability
Voltage (Vac)	Measurement Frequency (MHz)	Temperature (°C)	Time	Measurement Frequency (MHz)
120	13.560000	-20	0	13.560060
102	13.560000		2	13.560060
138	13.559990		5	13.560100
			10	13.560120
		-10	0	13.560140
			2	13.560100
			5	13.560080
			10	13.560060
		0	0	13.560140
			2	13.560090
			5	13.560060
			10	13.560060
		10	0	13.560120
			2	13.560060
			5	13.560040
			10	13.560020
		20	0	13.560000
			2	13.559990
			5	13.559980
			10	13.559990
		30	0	13.560060
			2	13.560020
			5	13.560000
			10	13.560000
		40	0	13.560020
			2	13.560000
			5	13.560000
			10	13.560000



Voltage vs. Frequ	ency Stability	Temperature vs. Frequency Stability			
	Measurement	Temperature (°C)	Time	Measurement	
Voltage (Vac)	Frequency (MHz)	remperature (C)		Frequency (MHz)	
		50	0	13.560000	
			2	13.560000	
			5	13.560000	
			10	13.560020	
Max.Deviation (MHz)	-0.000010	Max.Deviati	on (MHz)	0.000140	
Max.Deviation (ppm)	-0.7375	Max.Deviation (ppm)		10.3245	
Limit	FS < ±100 ppm	Limit		FS < ±100 ppm	
Test Result	PASS	Test Result		PASS	



# Appendix C. Test Results of Radiated Test Items



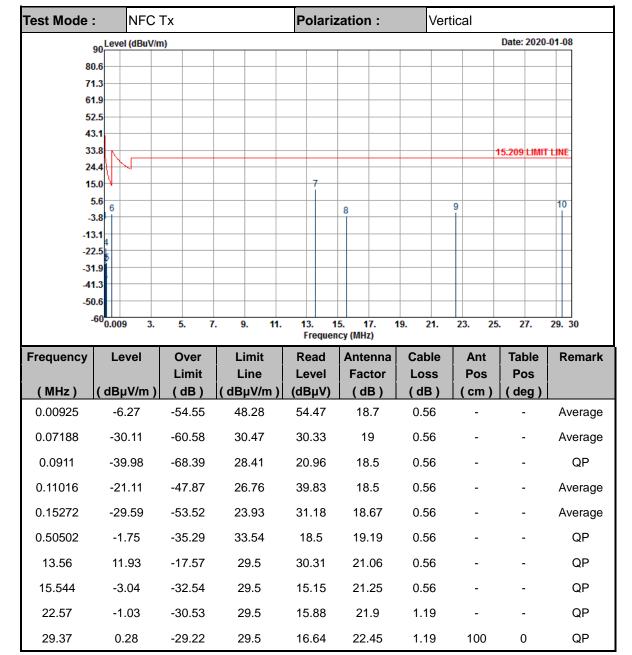
#### C1. Test Result of Field Strength of Fundamental Emissions



Test Mode	: NFC	Тх		Polariz	ation :	Hor	zontal		
	90 Level (dBu	V/m)						Date: 202	0-01-08
:	30.6								
i	71.3								
	61.9								
	52.5 43.1								
	33.8							15.209 LIM	IT LINE
	24.4			7					
	15.0 ¥ 5.6								
	-3.8				8	9			10
-	13.1					_			
	22.5								
	31.9 41.3								
	50.6								
	-60 <mark>0.009</mark>	3. 5.	7. 9. 11		15. 17. ency (MHz)	19. 21.	23. 2	25. 27.	29. 30
Frequency	Level	Over	Limit	Read	Antenna	Cable	Ant	Table	Remark
		Limit	Line	Level	Factor	Loss	Pos	Pos	
(MHz)	( dBµV/m		(dBµV/m)	(dBµV)	(dB)	( dB )	( cm )	(deg)	
0.009	-5.26	-53.78	48.52	55.48	18.7	0.56	-	-	Average
0.0735	-30.35	-60.63	30.28	30.09	19	0.56	-	-	Average
0.09066	-39.6	-68.06	28.46	21.34	18.5	0.56	-	-	QP
0.12128	-22.17	-48.1	25.93	38.68	18.59	0.56	-	-	Average
0.15272	-28.26	-52.19	23.93	32.51	18.67	0.56	-	-	Average
0.51253	-2.73	-36.14	33.41	17.52	19.19	0.56	-	-	QP
13.56	15.32	-14.18	29.5	33.7	21.06	0.56	-	-	QP
15.216	-2.32	-31.82	29.5	15.9	21.22	0.56	-	-	QP
20.806	-1.13	-30.63	29.5	15.92	21.76	1.19	-	-	QP
29.68	0.91	-28.59	29.5	17.25	22.47	1.19	100	0	QP

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





Note:

1. 13.56 MHz is fundamental signal which can be ignored.

2. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

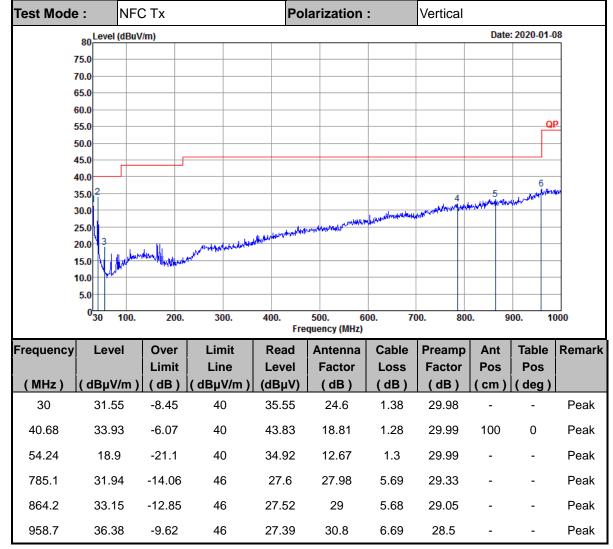
- 3. Distance extrapolation factor = 40 log (specific distance / test distance) (dB);
- 4. Limit line = specific limits  $(dB\mu V)$  + distance extrapolation factor.



Fest Mode	:	NFC Tx				larization	Horizontal Date: 2020-01-08				
	۰ <sup>Le</sup>										
	75.0										
	70.0										
	65.0										
	60.0										
	55.0										QP
	50.0										
	45.0										<u> </u>
	40.0										
	35.0					low for the weather we		4		Man Marine	y we have
	30.0 25.0 <del>2</del>					الليوري	Hardward and provide	gullophinelylunder	Approx 1		
	20.0				Where the state of the	And And Half and All water					
	15.0		and maker with the	When the area and a second							
	10.0	where									
	5.0										
	0 <mark>11</mark> 30	10	0. 20	0. 300.	400.	500.	600.	700.	800.	900.	1000
						Frequency (MH	z)	-	-	•	
requency	Lev	el	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Rema
			Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	
(MHz)	(dBµ\	//m)	(dB)	(dBµV/m)	(dBµV)	(dB)	( dB )	(dB)	( cm )	(deg)	
30	23.5	57	-16.43	40	27.57	24.6	1.38	29.98	-	-	Peak
40.68	22.8	35	-17.15	40	32.75	18.81	1.28	29.99	-	-	Peak
48.9	16.	4	-23.6	40	30.03	15.07	1.29	29.99	-	-	Peak
773.9	30.3	32	-15.68	46	26.26	27.94	5.48	29.36	-	-	Peal
880.3	32.3	34	-13.66	46	26.71	28.89	5.74	29	-	-	Peak
946.1	33.9	м	-12.06	46	25.84	30.13	6.56	28.59	100	0	Peak

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