FCC Test Report

FCC ID	:	**2AQYEFMP176**
Equipment	:	**Mobile Phone**
Model No.	:	**F-51A**
Brand Name	:	**FUJITSU**
Applicant	:	**FUJITSU CONNECTED TECHNOLOGIES Ltd.**
Address	:	**Chuorinkan 7-10-1 Yamato, Kanagawa 242-0007, Japan.**
Standard	:	**47 CFR FCC Part 15.225**
Received Date	:	**Feb. 26, 2020**
Tested Date	:	**Feb. 27 ~ Mar. 22, 2020**

We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.

Reviewed by: **Approved by:**

Along Chen / Assistant Manager **Gary Chang / Manager**

Testing Laboratory 2732

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Release Record

Report No.	Version	Description	Issued Date
FR011605	Rev. 01	Initial issue	May 18, 2020

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	Note[1]	N/A
15.225(a)	Field strength of fundamental emissions	[dBuV/m at 3m]: 13.56 53.05 (Margin -52.34dB)	Pass
15.225(d)	Field strength of any emissions appearing outside of the 13.110-14.010 MHz band	Meet the requirement of limit	Pass
15.225(e)	Frequency tolerance	Meet the requirement of limit	Pass
15.215 (c)	20dB bandwidth	Meet the requirement of limit	Pass
15.203	Antenna Requirement	Meet the requirement of limit	Pass
N/A means Not Applicable. Note[1]: The EUT consumes DC power from battery, so the test is not required.			

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.

1 General Description

1.1 Information

1.1.1 Product Details

Product Name	Mobile Phone
Brand Name	FUJITSU
Model Name	F-51A
IMEI Code	353704110012309 / 353704110012135
H/W Version	v2.1.0
S/W Version	R047.4

1.1.2 Specification of the Equipment under Test (EUT)

RF General Information			
Frequency Range (MHz)	**Modulation**	**Ch. Frequency (MHz)**	**Channel Number**
13.553 – 13.567	NFC-ASK	13.56	1

1.1.3 Antenna Details

Ant. No.	Type	Connector	Gain (dBi)	Remarks
1	Loop	No	---	---

1.1.4 EUT Operational Condition

Supply Voltage	3.83Vdc from battery: 9Vdc,1.5A from adapter (No bundle, support unit only)		
Operational Voltage	☒ Vnom (3.9 V)	☒ Vmax (4.29 V)	☒ Vmin (3.51 V)
Operational Climatic	☒ Tnom (20°C)	☒ Tmax (55°C)	☒ Tmin (-20°C)

1.1.5 Accessories

No.	Equipment	Description
1	Battery	Brand: FUJITSU CONNECTED TECHNOLOGIES LIMITED Model: CA54310-0079-A1 Rated: 4000mAh, 15.4Wh Typ. 4070mAh, 15.6Wh
2	Type-C <-> Earphone	9.5cm non-shielded without core

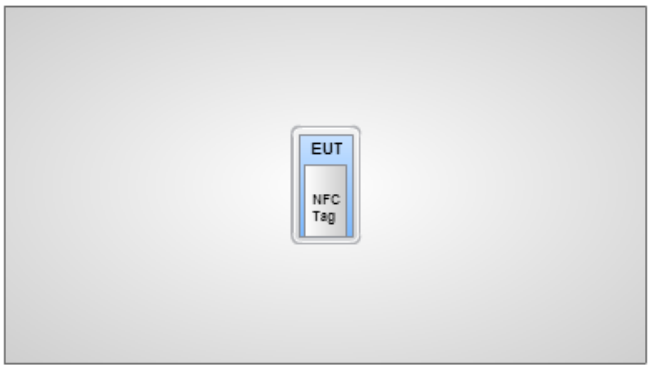
1.1.6 Test Tool and Power Index

Test tool	NfcRWTest, V 1.01

1.2 Local Support Equipment List

Support Equipment List					
No.	**Equipment**	**Brand**	**Model**	**S/N**	**Remarks**
1	NFC Tag	Easy Card Corp.	Easy Card	---	---

1.3 Test Setup Chart

Test Setup Diagram


1.4 The Equipment List

Test Item	Radiated Emission				
Test Site	966 chamber1 / (03CH01-WS)				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	R&S	FSV40	101498	Dec. 17, 2019	Dec. 16, 2020
Receiver	R&S	ESR3	101657	Feb. 14, 2020	Feb. 13, 2021
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Jul. 12, 2019	Jul. 11, 2020
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 13, 2019	Nov. 12, 2020
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Oct. 07, 2019	Oct. 06, 2020
Preamplifier	EMC	EMC02325	980225	Jul. 09, 2019	Jul. 08, 2020
LF cable 1M	EMC	EMCCFD400-NM-NM-1000	160502	Oct. 07, 2019	Oct. 06, 2020
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Oct. 07, 2019	Oct. 06, 2020
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-002	Oct. 07, 2019	Oct. 06, 2020
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	RF Conducted				
Test Site	(TH01-WS)				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	R&S	FSV40	101499	Jan. 09, 2020	Jan. 08, 2021
TEMP&HUMIDITY CHAMBER	GIANT FORCE	GCT-225-40-SP-SD	MAF1212-002	Dec. 12, 2019	Dec. 11, 2020
Measurement Software	Sporton	Sporton_1	1.3.30	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

1.5 Test Standards

According to the specification of EUT, the EUT must comply with following standards and KDB documents.

47 CFR FCC Part 15.225
ANSI C63.10-2013

1.6 Deviation from Test Standard and Measurement Procedure

None

1.7 Measurement Uncertainty

The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2).

Measurement Uncertainty	
Parameters	**Uncertainty**
Bandwidth	±34.130 Hz
Radiated emission ≤ 30MHz	±2.3 dB
Radiated emission ≤ 1GHz	±3.41 dB
Temperature	±0.4 ^{o}C

2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
Radiated Emissions	03CH01-WS	21°C / 68%	Mike Su
RF Conducted	TH01-WS	20°C / 65%	Aska Huang

- FCC Designation No.: TW2732
- FCC site registration No.: 181692
- ISED#: 10807A
- CAB identifier: TW2732

2.2 The Worst Test Modes and Channel Details

Test item	Mode	Test Frequency (MHz)
Field strength of fundamental emissions	NFC	13.56
Field strength of any emissions appearing outside of the 13.110-14.010 MHz band	NFC	13.56
Frequency tolerance	NFC	13.56
20dB bandwidth	NFC	13.56

NOTE:

1. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The **Z-plane** results were found as the worst case and were shown in this report.

3 Transmitter Test Results

3.1 20dB and Occupied Bandwidth

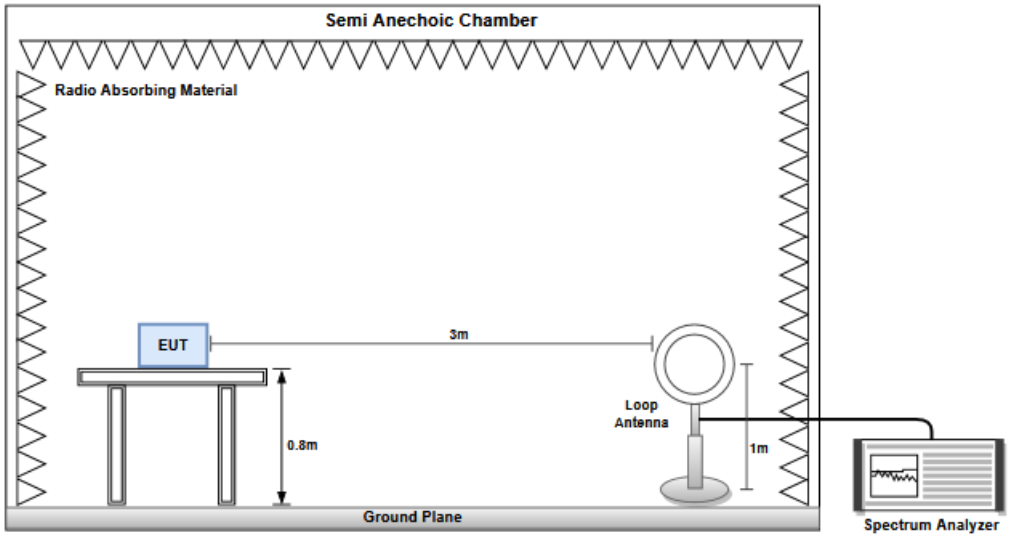
3.1.1 Limit of 20dB Bandwidth

The upper and lower frequency of the 20dB bandwidth shall within 13.553~13.567 MHz

3.1.2 Test Procedures

1. Set resolution bandwidth (RBW) = 1 kHz, Video bandwidth = 3 kHz.
2. Detector = Peak, Trace mode = max hold.
3. Sweep = auto couple, Allow the trace to stabilize.
4. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 20dB relative to the maximum level measured in the fundamental emission.

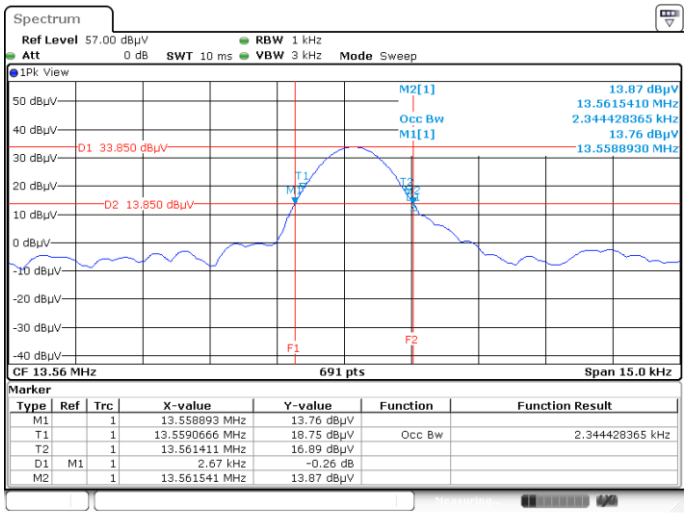
3.1.3 Test Setup



3.1.4 Test Result of 20dB and Occupied Bandwidth

Modulation Mode	Freq. (MHz)	20dB Bandwidth (kHz)	F_L at 20dB BW (MHz)	F_H at 20dBBW (MHz)	99% Bandwidth (kHz)
NFC	13.56	2.67	13.558893	13.561541	2.344428365
Limit		N/A	13.553	13.567	N/A

Test Plot



3.2 Field Strength of Fundamental Emissions

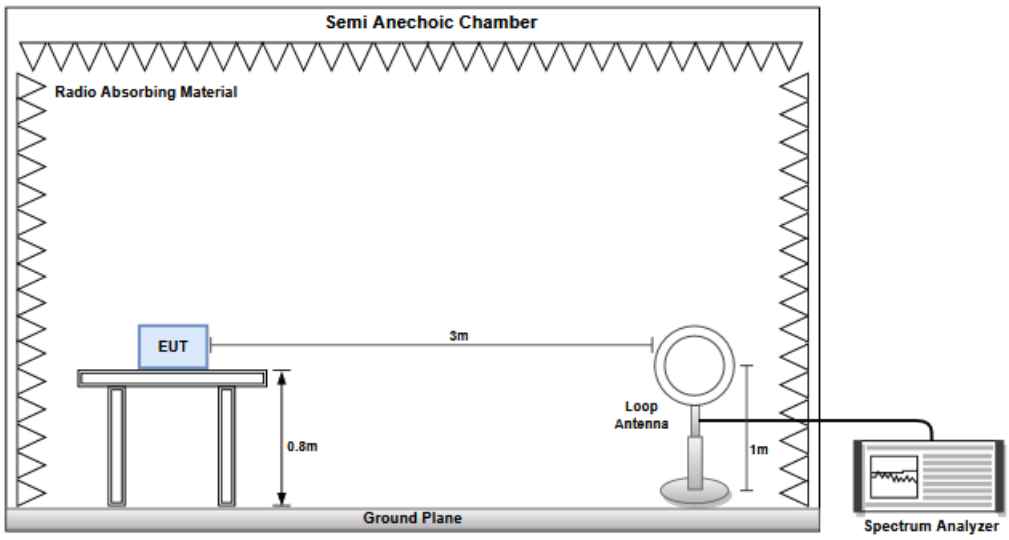
3.2.1 Field Strength of Fundamental Emissions

The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

3.2.2 Test Procedures

1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at a height of 0.8 m test table above the ground plane.
2. Measurement is made with the antenna positioned in both the open and close planes of polarization. . Distance between EUT and antenna is 3 m.
3. This investigation is performed with the EUT rotated 360°, and the antenna rotated to repeat the measurements for both the open and close antenna polarizations.

3.2.3 Test Setup



3.2.4 Test Result of Field Strength of Fundamental Emissions

Field Strength of Fundamental Emissions Result							
Polarization	**Emission Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**SA Reading (dBuV)**	**Factor**	**Remark**
Open	13.56	53.05	105.39	-52.34	31.89	21.16	QP

Field Strength of Fundamental Emissions Result							
Polarization	**Emission Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**SA Reading (dBuV)**	**Factor**	**Remark**
Close	13.56	48.95	105.39	-56.44	27.79	21.16	QP

3.3 Unwanted Emissions into Restricted Frequency Bands

3.3.1 Limit of Unwanted Emissions into Restricted Frequency Bands

Restricted Band Emissions Limit			
Frequency Range (MHz)	**Field Strength (uV/m)**	**Field Strength (dBuV/m)**	**Measure Distance (m)**
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1:
Qusai-Peak value is measured for frequency below 1GHz except for 9–90 kHz, 110–490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit
Note 2:
Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

3.3.2 Test Procedures

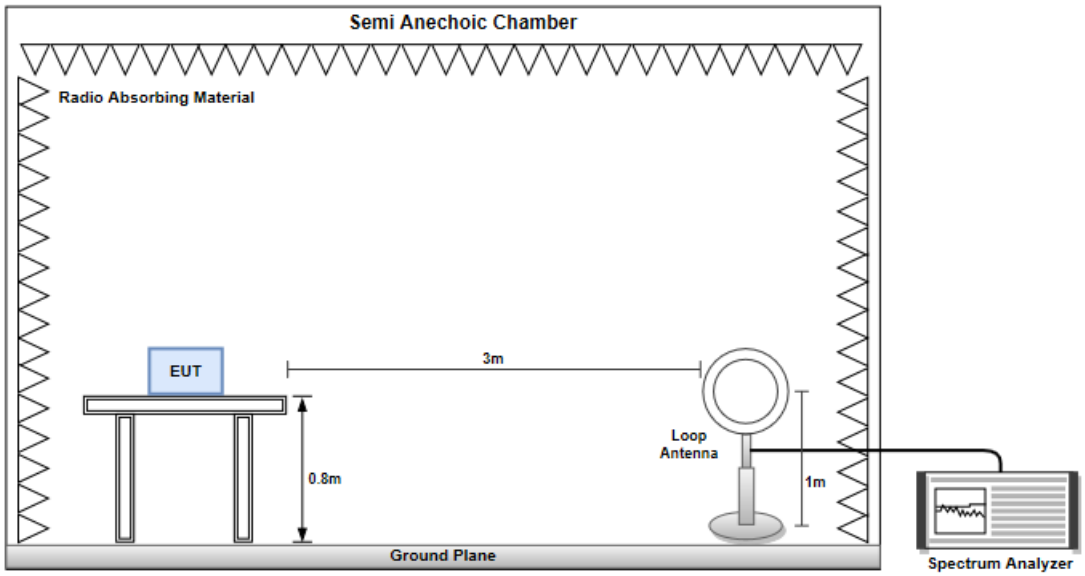
4. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at a height of 0.8 m test table above the ground plane.
5. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
6. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

Note:

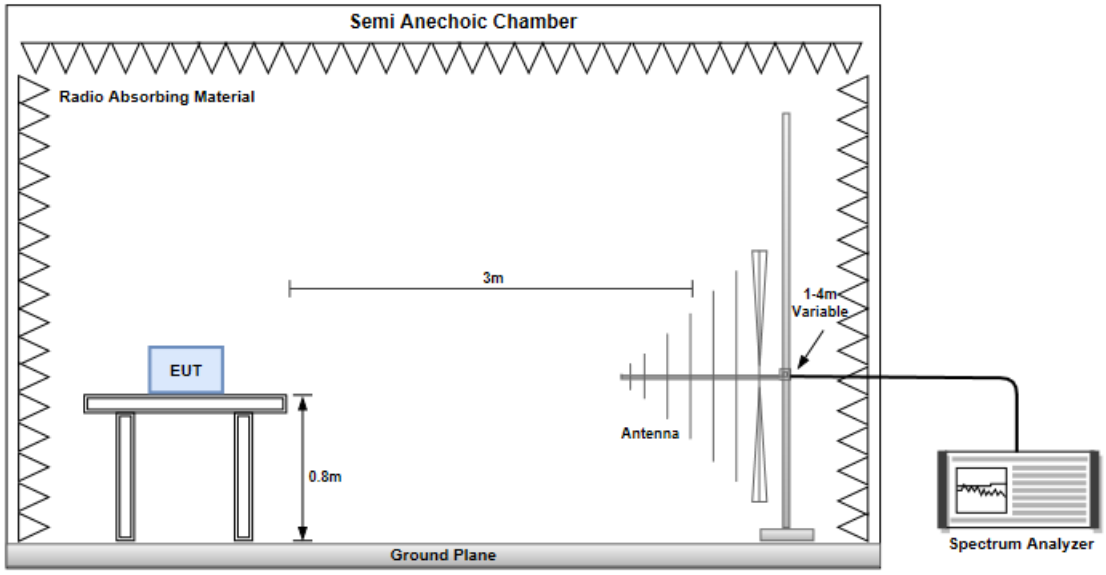
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.

3.3.3 Test Setup

Radiated Emissions below 30MHz



Radiated Emissions below 1 GHz



3.3.4 Transmitter Radiated Unwanted Emissions (Below 30MHz)

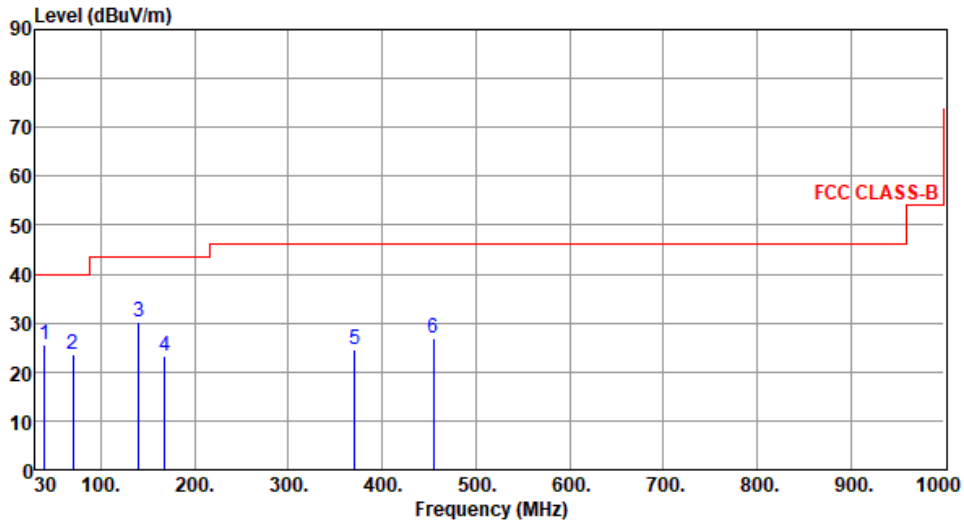
Field Strength of Fundamental Emissions Result							
Polarization	**Emission Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**SA Reading (dBuV)**	**Factor(dB)**	**Remark**
Open	13.41	33.97	51.03	-17.06	12.83	21.14	QP
Open	13.553	37.35	50.94	-13.59	16.2	21.15	QP
Open	13.567	39.65	50.93	-11.28	18.49	21.16	QP
Open	13.71	33.93	50.84	-16.91	12.76	21.17	QP
Open	27.12	35.62	49.54	-13.92	13.34	22.28	QP

Field Strength of Fundamental Emissions Result							
Polarization	**Emission Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**SA Reading (dBuV)**	**Factor(dB)**	**Remark**
Close	13.41	33.72	51.03	-17.31	12.58	21.14	QP
Close	13.553	34.05	50.94	-16.89	12.9	21.15	QP
Close	13.567	36.35	50.93	-14.58	15.19	21.16	QP
Close	13.71	33.86	50.84	-16.98	12.69	21.17	QP
Close	27.12	37.3	49.54	-12.24	15.02	22.28	QP

Note: Emission level = SA reading + Factor

3.3.5 Transmitter Radiated Unwanted Emissions (Above 30MHz)

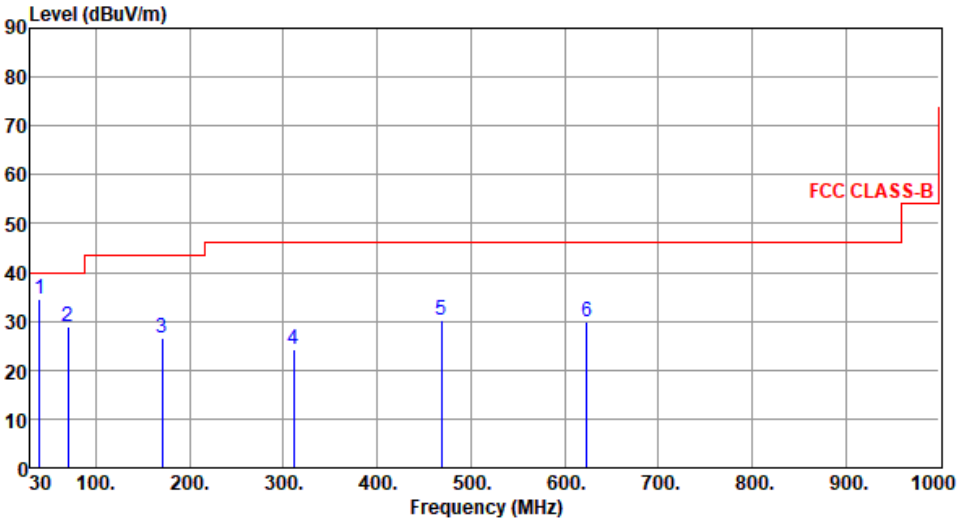
Polarization	Horizontal	Test Freq. (MHz)	13.56



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	39.70	25.42	40.00	-14.58	34.14	-8.72	Peak	---	---
2	69.77	23.59	40.00	-16.41	34.19	-10.60	Peak	---	---
3	140.58	30.35	43.50	-13.15	39.21	-8.86	Peak	---	---
4	167.74	23.16	43.50	-20.34	31.86	-8.70	Peak	---	---
5	370.47	24.49	46.00	-21.51	30.66	-6.17	Peak	---	---
6	454.86	26.74	46.00	-19.26	30.72	-3.98	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Polarization	Vertical	Test Freq. (MHz)	13.56



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	39.70	34.43	40.00	-5.57	43.15	-8.72	Peak	---	---
2	69.77	28.91	40.00	-11.09	39.51	-10.60	Peak	---	---
3	170.65	26.60	43.50	-16.90	35.56	-8.96	Peak	---	---
4	311.30	24.18	46.00	-21.82	31.87	-7.69	Peak	---	---
5	468.44	30.38	46.00	-15.62	34.05	-3.67	Peak	---	---
6	623.64	29.80	46.00	-16.20	30.31	-0.51	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

3.4 Frequency Stability

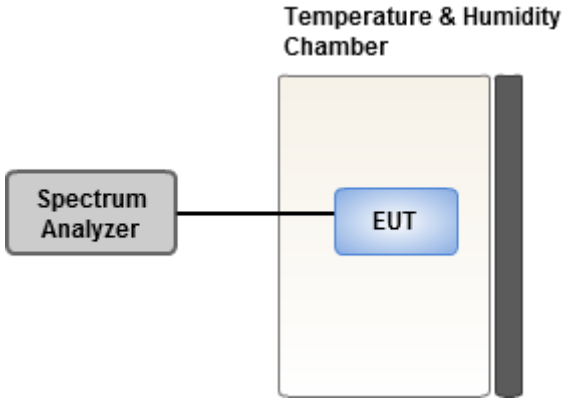
3.4.1 Frequency Stability Limit

Carrier frequency stability shall be maintained to ±0.01% (±100 ppm).

3.4.2 Test Procedures

Test Method	
☒	Refer as ANSI C63.10, clause 6.8 for frequency stability tests
	☒ Frequency stability with respect to ambient temperature
	☒ Frequency stability when varying supply voltage
☐	For conducted measurement.
☒	For radiated measurement. The equipment to be measured and the test antenna shall be oriented to obtain the maximum emitted power level.

3.4.3 Test Setup



3.4.4 Test Result of Frequency Stability

Frequency: 13.56 MHz	Frequency Drift (ppm)			
Temperature (°C)	0 minute	2 minutes	5 minutes	10 minutes
T20°C Vmax	1.03	1.18	1.03	1.03
T20°C Vmin	1.11	1.03	1.11	1.18
T55°C Vnom	2.65	2.73	2.51	2.58
T50°C Vnom	2.58	2.51	2.51	2.73
T40°C Vnom	2.36	2.29	1.55	1.47
T30°C Vnom	1.33	1.25	1.18	1.25
T20°C Vnom	1.18	0.96	1.11	0.88
T10°C Vnom	0.88	0.81	0.96	0.88
T0°C Vnom	0.88	1.11	0.88	1.11
T-10°C Vnom	1.55	1.62	1.40	1.70
T-20°C Vnom	1.40	1.11	2.29	2.29
Vnom [V]: 3.9		Vmax [V]: 4.29		Vmin [V]: 3.51
Tnom [°C]: 20		Tmax [°C]: 55		Tmin [°C]: -20

4 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corp (EMC and Wireless Communication Laboratory), it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan District. Location map can be found on our website http://www.icertifi.com.tw.

Linkou	**Kwei Shan**	**Kwei Shan Site II**
Tel: 886-2-2601-1640	Tel: 886-3-271-8666	Tel: 886-3-271-8640
No. 30-2, Ding Fwu Tsuen, Lin Kou District, New Taipei City, Taiwan, R.O.C.	No. 3-1, Lane 6, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C.	No. 14-1, Lane 19, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C.

If you have any suggestion, please feel free to contact us as below information.

Tel: 886-3-271-8666
Fax: 886-3-318-0155
Email: ICC_Service@icertifi.com.tw

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