

FCC Test Report

FCC ID : VQK-M02

Equipment : Mobile Phone

Model No. : M02

Brand Name : FUJITSU

Applicant : FUJITSU LIMITED

Address : 1-1, Kamikodanaka 4-chome, Nakahara-ku,

Kawasaki 211-8588, Japan

Standard : 47 CFR FCC Part 15.225

Received Date : Nov. 24, 2015

Tested Date : Nov. 25 ~ Nov. 27, 2015

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.

Approved & Reviewed by:

Gary Chang / Manager

ilac MRA

Testing Laboratory

Report No.: FR560301-02 Report Version: Rev. 01 Page: 1 of 24



Table of Contents

1	GENERAL DESCRIPTION	5
1.1	Information	5
1.2	Local Support Equipment List	7
1.3	Test Setup Chart	7
1.4	The Equipment List	
1.5	Test Standards	g
1.6	Measurement Uncertainty	g
2	TEST CONFIGURATION	10
2.1	Testing Condition	10
2.2	The Worst Test Modes and Channel Details	
3	TRANSMITTER TEST RESULTS	11
3.1	20dB and Occupied Bandwidth	11
3.2	Field Strength of Fundamental Emissions and Spectrum Mask	
3.3	Unwanted Emissions into Restricted Frequency Bands	16
3.4	Frequency Stability	22
4	TEST LABORATORY INFORMATION	24



Release Record

Report No.	Version	Description	Issued Date
FR560301-02	Rev. 01	Initial issue	Dec. 17, 2015

Report No.: FR560301-02 Page: 3 of 24



Summary of Test Results

FCC Rules Test Items		Measured	Result
15.207	Conducted Emissions	Note	N/A
15.225(a)~(c)	Field strength of fundamental emissions and spectrum mask	[dBuV/m at 3m]: 13.56 MHz 64.90 (Margin -59.10dB)	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

Note: The EUT consumes DC power from battery, so the test is not required.

Report No.: FR560301-02 Page: 4 of 24



1 General Description

1.1 Information

This report is issued as a supplementary report to original ICC report no. FR560301. PCB/trace layouts, product form factor and antenna are identical except following items:

→ Wi-Fi:

5GHz function is removed by software setting and hardware modification. Hardware modification-Remove components of 5GHz transmission path to cancel 5GHz function that will not affect 2.4GHz function since 2.4GHz and 5GHz transmission path is separately.

- ♦ LTE: B26 814 ~849 MHz: Activated by software.
- ♦ Without Fingerprint: Remove components.
- ♦ Change AC adapter.
- ♦ Same cradle as original report, change model name from F-51 to FAR-CR105.

In this report, all tests had been re-tested and presented in the following sections.

1.1.1 Product Details

Product Name	Mobile Phone
Brand Name	FUJITSU
Model Name	M02
IMEI Code	353546070006064
H/W Version	v3.0.0
S/W Version	R021.3

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		

1.1.3 Antenna Details

Ant. No.	Туре	Gain (dBi)	Connector	Remark
1	Loop antenna			

Report No.: FR560301-02 Page : 5 of 24



1.1.4 EUT Operational Condition

Supply Voltage 5.0Vdc from AC adapter 3.8Vdc from Battery			
Operational Voltage			∨min (3.51 V)
Operational Climatic	⊠ Tnom (20°C)		☐ Tmin (-20°C)

1.1.5 Accessories

No.	Equipment	Description
1	Adapter	Brand Name: Fujitsu Limited Model Name: FMV-AC346 Input rating: 100-240Vac, 50/60Hz, 0.3A Output rating: 5.0Vdc, 2A 1.1m USB shielded cable without core (for charging use)
2	Cradle	Brand Name: Fujitsu Limited Model Name: FAR-CR105 Input rating: 5Vdc, 1.5A Output rating: 5.0Vdc, 1.5A
3	Battery (Unremovable)	Brand Name: Fujitsu Limited Model Name: CA54310-0064 Power Rating: 3.8Vdc, 2330mAh, 8.9Wh

1.1.6 Test Tool and Power Setting

Test tool	NFC RW TEST
Setting	Default

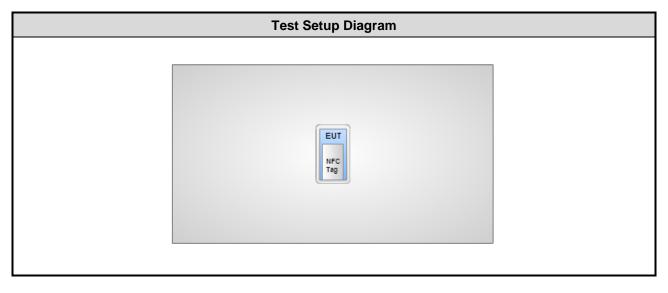
Report No.: FR560301-02 Page: 6 of 24



1.2 Local Support Equipment List

	Support Equipment List					
No.	Equipment	Brand	Model	S/N	Signal cable / Length (m)	
1	NFC Tag	Easy Card Corp.	Easy Card			

1.3 Test Setup Chart



Report No.: FR560301-02 Page: 7 of 24



1.4 The Equipment List

Test Item	Radiated Emission						
Test Site	966 chamber 2 / (03CH02-WS)						
Instrument	Manufacturer Model No. Serial No. Calibration Date Calibration Until						
Spectrum Analyzer	R&S	FSV40	101499	Dec. 31, 2014	Dec. 30, 2015		
Receiver	R&S	ESR3	101657	Jan. 15, 2015	Jan. 14, 2016		
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-523	Nov. 09, 2015	Nov. 08, 2016		
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1095	Oct. 07, 2015	Oct. 06, 2016		
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 04, 2015	Nov. 03, 2016		
Loop Antenna	R&S	HFH2-Z2	11900	Nov. 16, 2015	Nov. 15, 2016		
Preamplifier	Burgeon	BPA-530	100218	Nov. 03, 2015	Nov. 02, 2016		
Preamplifier	Agilent	83017A	MY39501309	Sep. 22, 2015	Sep. 21, 2016		
Preamplifier	EMC	EMC184045B	980192	Sep. 01, 2015	Aug. 31, 2016		
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16140/4	Dec. 16, 2014	Dec. 15, 2015		
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16018/4	Dec. 16, 2014	Dec. 15, 2015		
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16015/4	Dec. 16, 2014	Dec. 15, 2015		
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-003	Dec. 16, 2014	Dec. 15, 2015		
LF cable 10M	EMCC	CFD400-E	CFD400-001	Jun. 17, 2015	Jun. 16, 2016		
Measurement Software AUDIX e3 6.120210g NA NA NA							
Note: Calibration Inter	Note: Calibration Interval of instruments listed above is one year.						

Test Item	RF Conducted	RF Conducted				
Test Site	(TH01-WS)					
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until	
Spectrum Analyzer	R&S	FSV40	101063	Feb. 03, 2015	Feb. 02, 2016	
Power Meter	Anritsu	ML2495A	1241002	Sep. 21, 2015	Sep. 20, 2016	
Power Sensor	Anritsu	MA2411B	1207366	Sep. 21, 2015	Sep. 20, 2016	
DC POWER SOURCE	GW INSTEK	GPC-3060D	EM884797	Oct. 20, 2015	Oct. 19, 2016	
Measurement Software	Sporton	Sporton_1	1.3.30	NA	NA	
Note: Calibration Interval of instruments listed above is one year.						

Report No.: FR560301-02 Page: 8 of 24



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 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)

Measurement Uncertainty						
Parameters Uncertainty						
Bandwidth	±34.134 Hz					
Radiated emission ≤ 1GHz	±3.62 dB					
Radiated emission > 1GHz	±5.60 dB					

Report No.: FR560301-02 Page: 9 of 24



2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By		
RF Conducted	TH01-WS	20°C / 62%	Mark Liao		
Radiated Emissions	03CH02-WS	23°C / 65%	Mark Liao		

FCC site registration No.: 657002IC site registration No.: 10807A-2

2.2 The Worst Test Modes and Channel Details

Test item	Mode	Test Frequency (MHz)
Field strength of fundamental emissions and spectrum mask	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:

Report No.: FR560301-02 Page: 10 of 24

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



3 Transmitter Test Results

3.1 20dB and Occupied Bandwidth

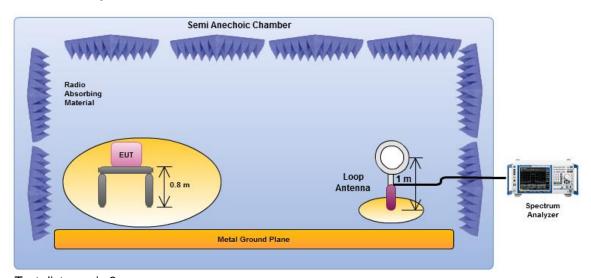
3.1.1 Limit of 20dB Bandwidth

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



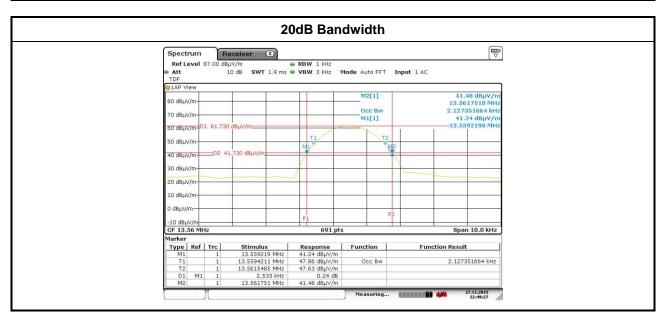
Note: Test distance is 3m

Report No.: FR560301-02 Page: 11 of 24



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	2.533	13.559219	13.561751	2.127351664	
Lir	nit	N/A	13.553	13.567	N/A	



Report No.: FR560301-02 Page: 12 of 24



3.2 Field Strength of Fundamental Emissions and Spectrum Mask

3.2.1 Field Strength of Fundamental Emissions and Spectrum Mask Limit

Field Strength of Fundamental Emissions											
Emissions	Emissions (uV/m)@30m (dBuV/m)@30m (dBuV/m)@10m (dBuV/m)@3m (dBuV/m)@1m										
Fundamental	15848	84.0	103.1	124.0	143.1						
Quasi peak measurement of the fundamental.											

Spectrum Mask											
Freq. of Emission (MHz)	(uV/m)@30m	(dBuV/m)@30m	(dBuV/m)@10m	(dBuV/m)@3m	(dBuV/m)@1m						
1.705~13.110	30	29.5	48.6	69.5	88.6						
13.110~13.410	106	40.5	59.6	80.5	99.6						
13.410~13.553	334	50.5	69.6	90.5	109.6						
13.553~13.567	15848	84.0	103.1	124.0	143.1						
13.567~13.710	334	50.5	69.6	90.5	109.6						
13.710~14.010	106	40.5	59.6	80.5	99.6						
14.010~30.000	30	29.5	48.6	69.5	88.6						

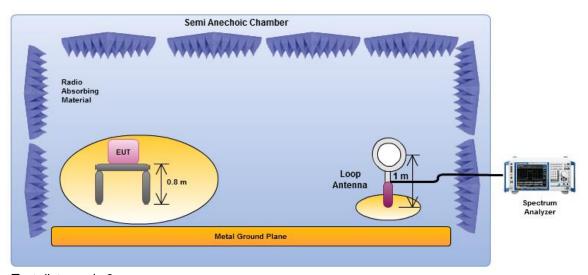
3.2.2 Test Procedures

- 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.

Report No.: FR560301-02 Page: 13 of 24



3.2.3 Test Setup



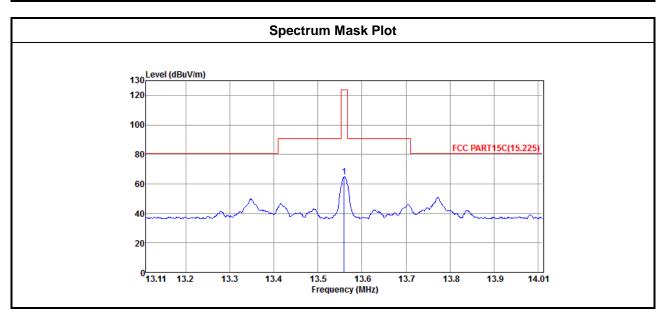
Note: Test distance is 3m

Report No.: FR560301-02 Page: 14 of 24



3.2.4 Test Result of Field Strength of Fundamental Emissions and Spectrum Mask

Field Strength of Fundamental Emissions Result										
Modulation Mode	Frequency (MHz)	Fundamental (dBuV/m)@3m	Polarization	Margin (dB)	Limit (dBuV/m)@3m					
NFC	13.56	64.90	Open	-59.10	124.0					



Report No.: FR560301-02 Page: 15 of 24



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

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.

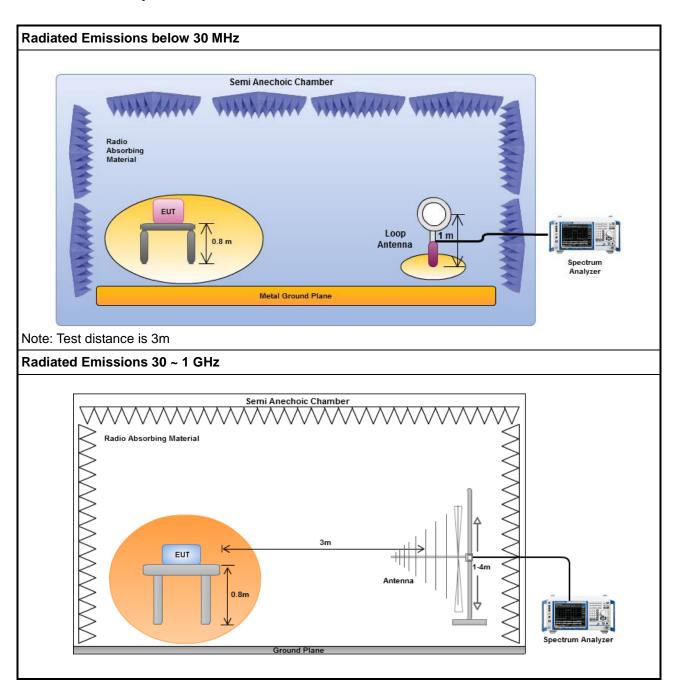
Note:

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

Report No.: FR560301-02 Page: 16 of 24



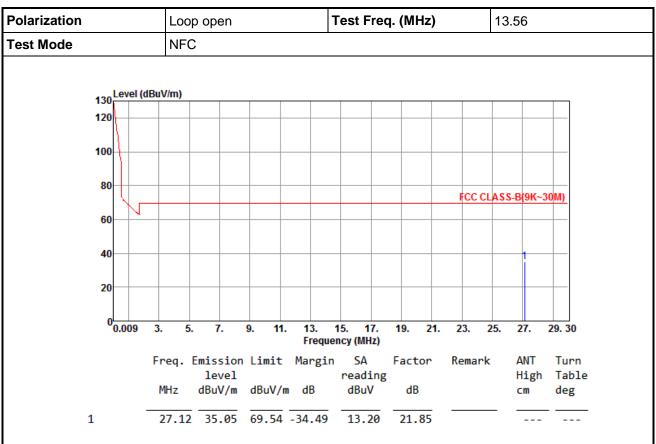
3.3.3 Test Setup



Report No.: FR560301-02 Page: 17 of 24



3.3.4 Transmitter Radiated Unwanted Emissions (Below 30GHz)



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).

Report No.: FR560301-02 Page: 18 of 24



1

Polarization		Loop	close				-	Γest	Fre	q. (N	/IHz)		13	.56	
Test Mode		NFC					1							1		
		•														
130 Lev	el (dBu\	//m)														
120																
\																
100				+												
80																
80													FCC C	LASS	-B(9K-	-30M)
60	7															
40															1	
20									_	_						-
0.00	09 3.	5.	7.	9.	11		3. reque	15.	17.	19.	. 2	1.	23.	25.	27.	29. 3
	E+	oa F	missi	n I	imi+				мп <i>2)</i> А	Ear	ctor	p	lemar	l-	ANT	Tur
	FI	eq. L	leve		11111C	rid	ı.RTII		ding		L COI	IN.	reman.	κ.	High	
	M	Mz	dBuV/r	n d	BuV/	m d	В	dB	ωV	(dB				cm	deg

27.12 34.87 69.54 -34.67 13.02 21.85

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

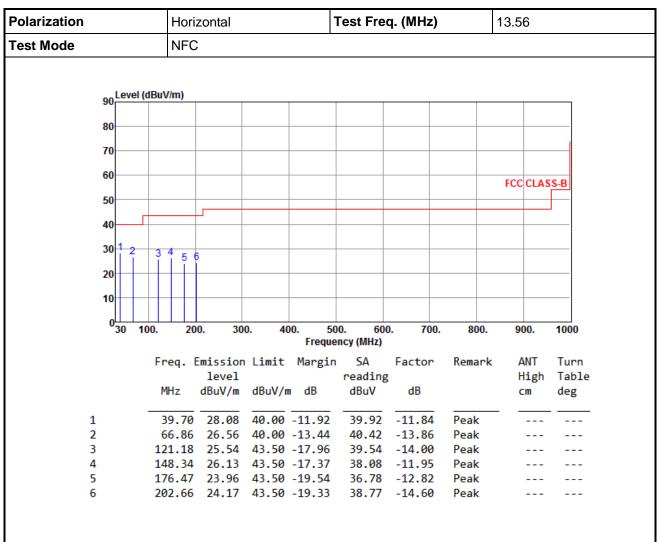
*Factor includes antenna factor, cable loss

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Report No.: FR560301-02 Page: 19 of 24



3.3.5 Transmitter Radiated Unwanted Emissions (Above 30MHz)



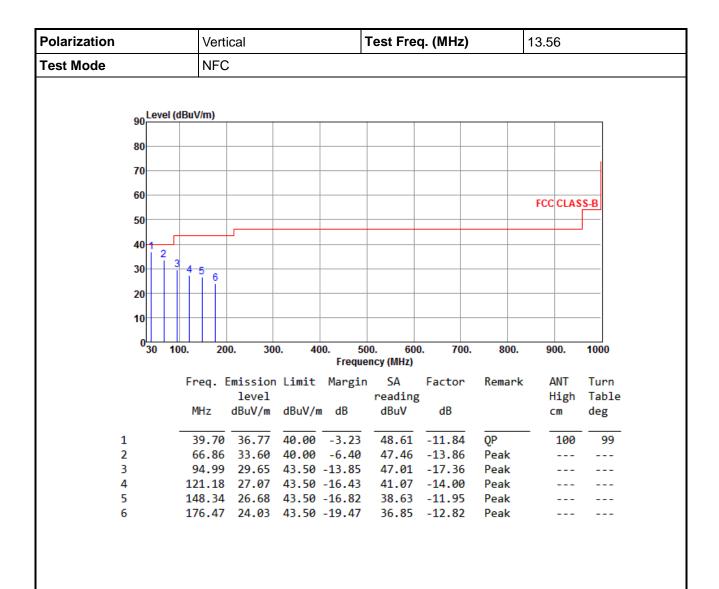
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*Factor includes antenna factor, cable loss

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Report No.: FR560301-02 Page: 20 of 24





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).

Report No.: FR560301-02 Page: 21 of 24



3.4 Frequency Stability

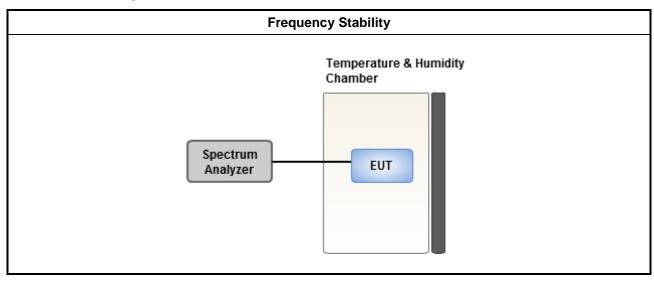
3.4.1 Frequency Stability Limit

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

3.4.2 Test Procedures

	Test Method							
\boxtimes	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



Report No.: FR560301-02 Page: 22 of 24



3.4.4 Test Result of Frequency Stability

	Frequency Stability Result										
Condition	Ch. Freq.		Frequency Stability (ppm)								
	(MHz)	0 Min	2 Min	5Min	10Min						
T _{20°C} Vmax	13.56	31.64	35.47	34.22	38.20						
T _{20°C} Vmin	13.56	34.22	34.59	34.00	32.60						
T _{55°C} Vnom	13.56	34.88	34.59	30.31	36.14						
T _{50°C} Vnom	13.56	37.46	35.18	32.01	39.53						
T _{40°C} Vnom	13.56	38.79	33.78	39.45	36.50						
T _{30°C} Vnom	13.56	36.21	35.84	38.42	38.20						
T _{20°C} Vnom	13.56	35.77	37.39	35.84	35.62						
T _{10°C} Vnom	13.56	37.46	39.16	36.36	36.14						
T _{0°C} Vnom	13.56	36.36	36.14	37.32	32.82						
T _{-10°C} Vnom	13.56	32.30	34.22	35.91	32.45						
T _{-20°C} Vnom	13.56	35.40	35.40	35.99	37.09						
Limit (p	ppm)	100									

Report No.: FR560301-02 Page: 23 of 24



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, 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 Hsiang. Location map can be found on our website http://www.icertifi.com.tw.

Linkou

Tel: 886-2-2601-1640

No. 30-2, Ding Fwu Tsuen, Lin Kou District, New Taipei City, Taiwan,

R.O.C.

Kwei Shan

Tel: 886-3-271-8666 No. 3-1, Lane 6, Wen San 3rd St., Kwei Shan Hsiang, Tao Yuan

Hsien 333, Taiwan, R.O.C.

Kwei Shan Site II

Tel: 886-3-271-8640

No. 14-1, Lane 19, Wen San 3rd St., Kwei Shan Hsiang, Tao Yuan Hsien 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

==END==

Report No.: FR560301-02 Page: 24 of 24