FCC Test Report

FCC ID	:	**VQK-F05F**
Equipment	:	**Mobile Phone**
Model No.	:	**F-05F**
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	:	**Dec. 25, 2013**
Tested Date	:	**Feb. 26 ~ Mar. 05, 2014**

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

Testing Laboratory
2732

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Release Record

Report No.	Version	Description	Issued Date
FR3D2502	Rev. 01	Initial issue	Mar. 20, 2014

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	N/A	N/A
15.225(a)~(c)	Field strength of fundamental emissions and spectrum mask	[dBuV/m at 3m]: NFC: 13.56 MHz 54.55 (Margin -69.45dB) RFID: 13.56 MHz 54.57 (Margin -69.43dB)	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

1 General Description

1.1 Information

1.1.1 Product Details

Product Name	Mobile Phone
Brand Name	FUJITSU
Model Name	F-05F
IMEI Code	359401050024766
H/W Version	V2.1.0
S/W Version	R18Ae

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
13.553 – 13.567	RFID-ASK	13.56	1

1.1.3 Antenna Details

Type	Gain (dBi)	Connector	Remark
Loop antenna	---	---	---

1.1.4 EUT Operational Condition

Power Supply Type	Battery: 3.75Vdc / 3200mAh Adapter: DC5.0V 1.8A, DC9.0V 1.8A

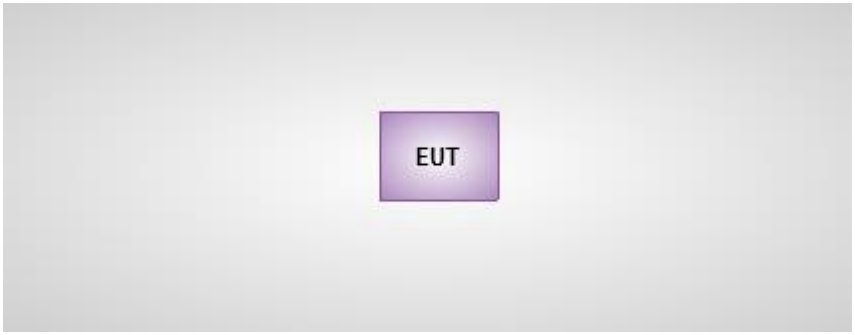
1.1.5 Accessories

Accessories		
No.	**Equipment**	**Description**
1	Battery (Built-in battery)	Brand Name: Panasonic Model Name: CA54310-0052 Power Rating: O/P: 3.75Vdc, 3200mA

1.1.6 Test Tool and Power Setting

Test tool	NFC RW TEST	
Modulation Mode	**NFC**	**RFID**
Setting	Default	Default

1.2 Test Setup Chart

Test Setup Diagram


1.3 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	Jan. 25, 2014	Jan. 24, 2015
Receiver	R&S	ESR3	101658	Jan. 10, 2014	Jan. 09, 2015
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Jan. 02, 2014	Jan. 01, 2015
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Feb. 13, 2014	Feb. 12, 2015
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Dec. 27, 2013	Dec. 26, 2014
Preamplifier	Burgeon	BPA-530	SN:100219	Nov. 22, 2013	Nov. 21, 2014
Preamplifier	Agilent	83017A	MY39501308	Dec. 16, 2013	Dec. 15, 2014
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16014/4	Dec. 16, 2013	Dec. 15, 2014
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Dec. 16, 2013	Dec. 15, 2014
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16139/4	Dec. 16, 2013	Dec. 15, 2014
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Dec. 16, 2013	Dec. 15, 2014
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-002	Dec. 16, 2013	Dec. 15, 2014
Note: Calibration Interval of instruments listed above is one year.					

Loop Antenna	R&S	HFH2-Z2	100330	Nov. 15, 2012	Nov. 14, 2014
Preamplifier	EM	EM18G40G	060572	Jun. 20, 2013	Jun. 19, 2014
Note: Calibration Interval of instruments listed above is two year.					

Test Item	RF Conducted				
Test Site	(TH01-WS)				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	R&S	FSV40	101063	Feb. 17, 2014	Feb. 16, 2015
Note: Calibration Interval of instruments listed above is one year.					

1.4 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 C63.10-2009

Note: The EUT has been tested and complied with FCC part 15B requirement. FCC Part 15B test results are issued to another report.

1.5 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	±35.286 Hz
Conducted power	±0.536 dB
Frequency error	±35.286 Hz
Temperature	±0.3 ^{o}C
Conducted emission	±2.946 dB
AC conducted emission	±2.43 dB
Radiated emission	±2.49 dB

2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
Radiated Emissions	03CH01-WS	22°C / 64%	Aska Huang
RF Conducted	TH01-WS	22°C / 64%	Felix Sung

- FCC site registration No.: 657002
- IC site registration No.: 10807A-1

2.2 The Worst Test Modes and Channel Details

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

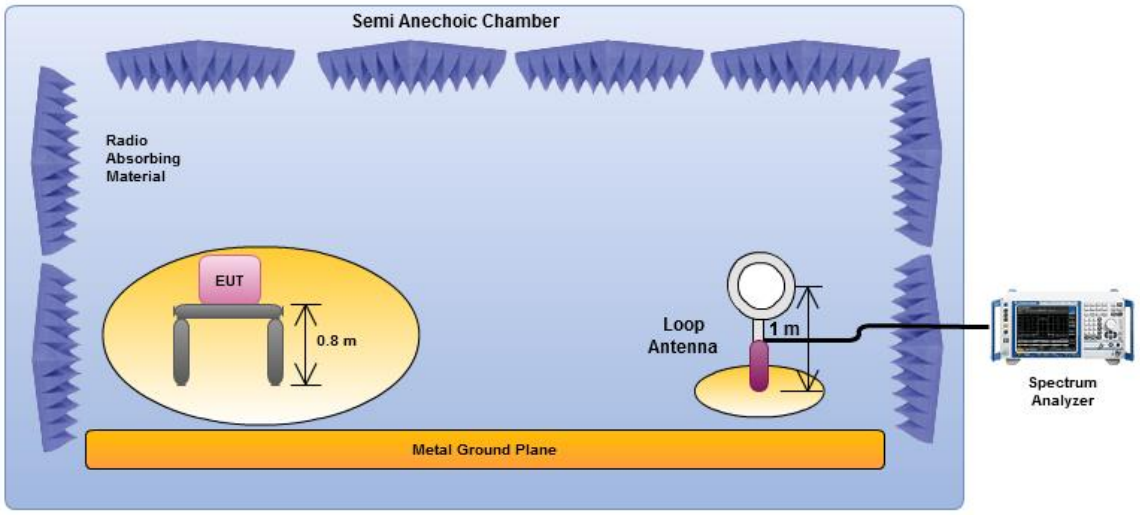
3.1.1 Limit of 20dB Bandwidth

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

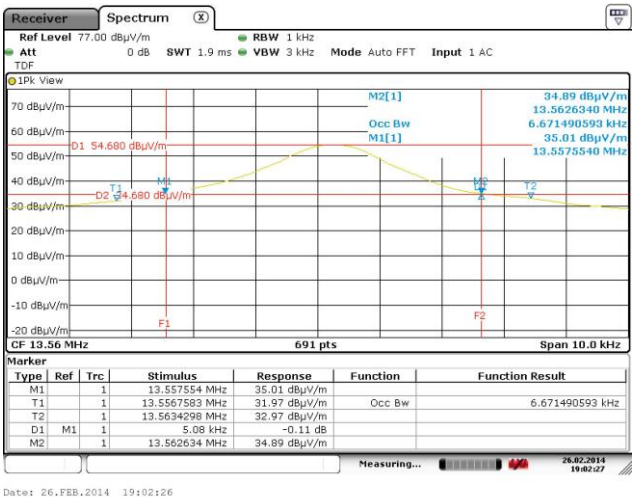


3.1.4 Test Result of 20dB and Occupied Bandwidth

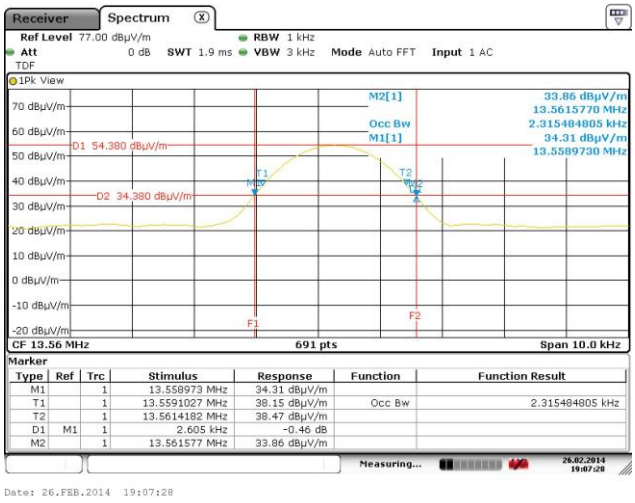
Modulation Mode	Freq. (MHz)	20dB Bandwidth (kHz)	F_L at 20dB BW (MHz)	F_H at 20dBBW (MHz)	99% Bandwidth (kHz)
NFC	13.56	5.0800	13.5576	13.5626	6.6715
RFID	13.56	2.6050	13.5590	13.5616	2.3155
Limit		N/A	13.553	13.567	N/A

20dB Bandwidth

NFC



RFID



3.2 Field Strength of Fundamental Emissions and Spectrum Mask

3.2.1 Field Strength of Fundamental Emissions and Spectrum Mask Limit

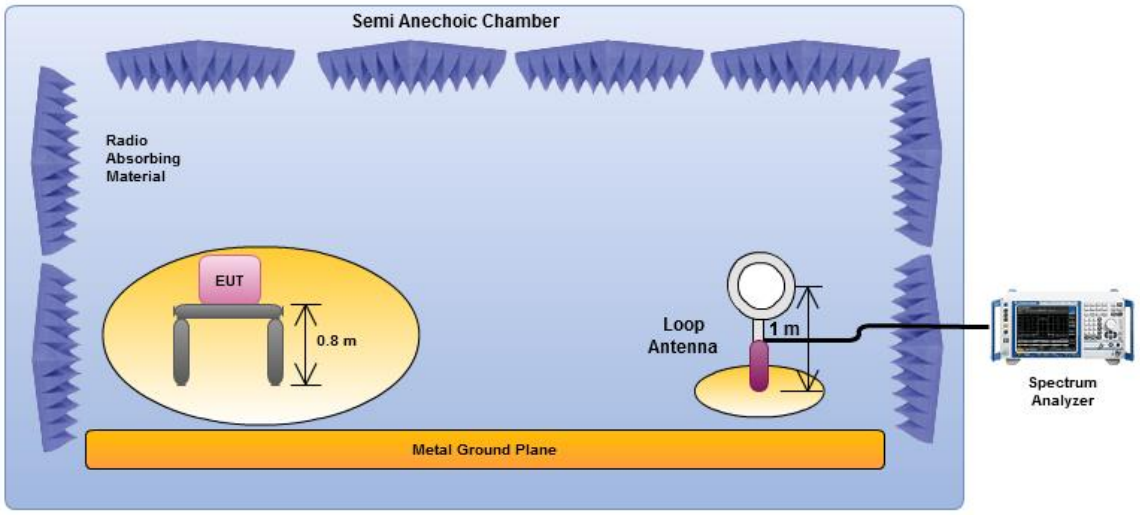
Field Strength of Fundamental Emissions					
Emissions	**(uV/m)@30m**	**(dBuV/m)@30m**	**(dBuV/m)@10m**	**(dBuV/m)@3m**	**(dBuV/m)@1m**
Fundamental	15848	84.0	103.1	124.0	143.1
Quasi peak measurement of the fundamental.					

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.

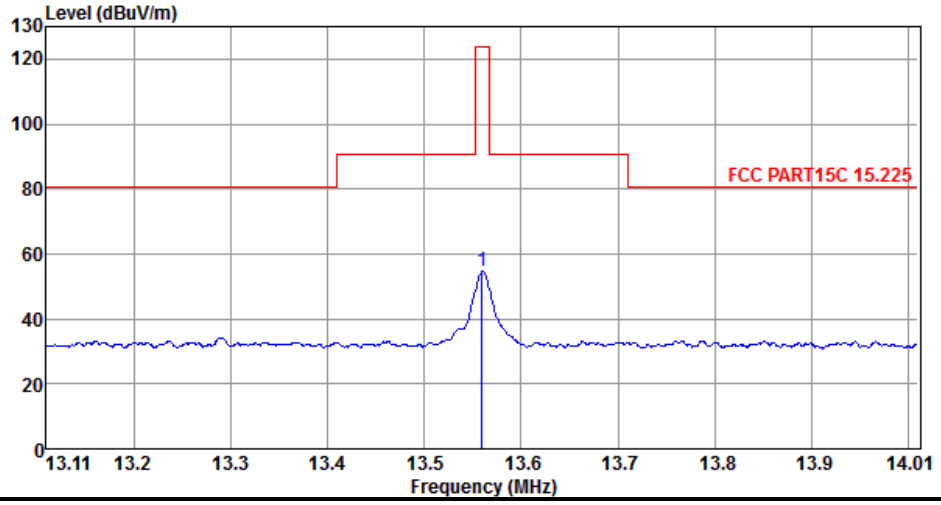
3.2.3 Test Setup



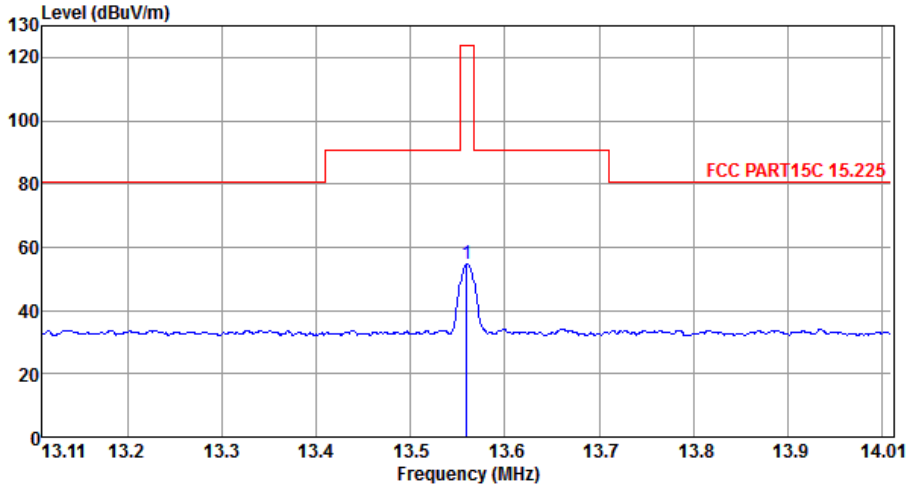
3.2.4 Test Result of Field Strength of Fundamental Emissions and Spectrum Mask

Field Strength of Fundamental Emissions Result					
Modulation Mode	Frequency (MHz)	Fundamental (dBuV/m)@3m	Polarization	Margin (dB)	Limit (dBuV/m)@3m
NFC	13.56	54.55	Open	-69.45	124.0
RFID	13.56	54.57	Open	-69.43	124.0

Spectrum Mask Plot (NFC)



Spectrum Mask Plot (RFID)



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

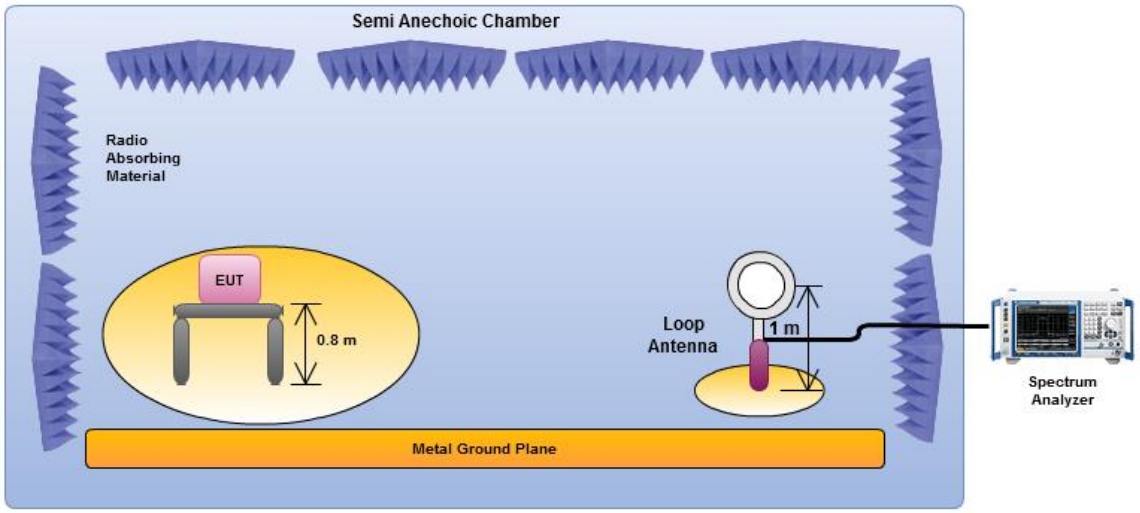
4. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission 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:

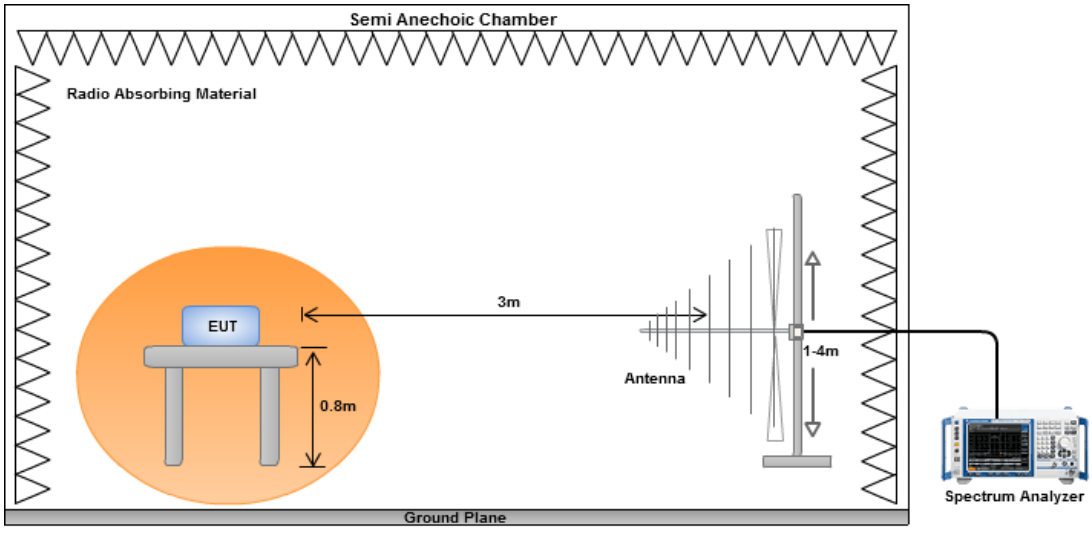
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.

3.3.3 Test Setup

Radiated Emissions below 30MHz

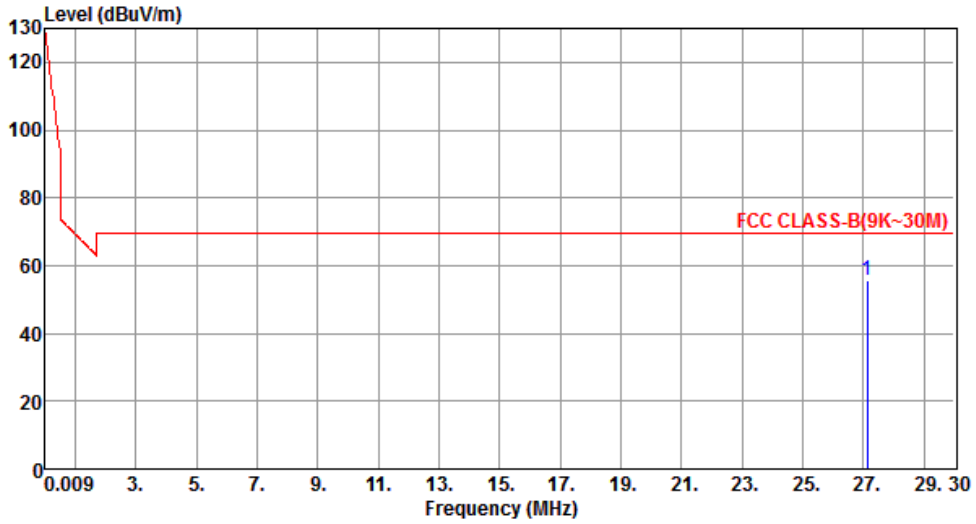


Radiated Emissions above 30MHz



3.3.4 Transmitter Radiated Unwanted Emissions (Below 30GHz)

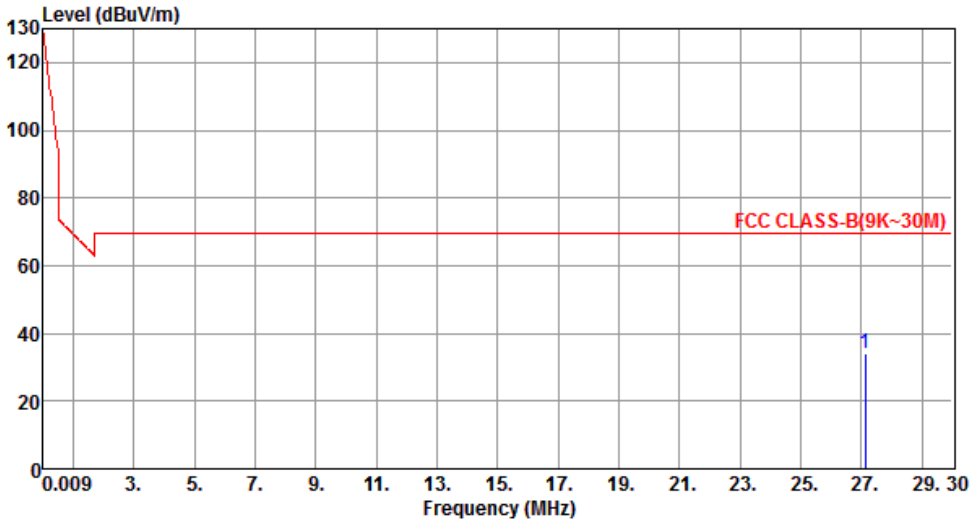
Polarization	Loop open	Test Freq. (MHz)	13.56
Test Mode	NFC		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	27.12	55.72	69.54	-13.82	35.38	20.34	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor (dB)
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

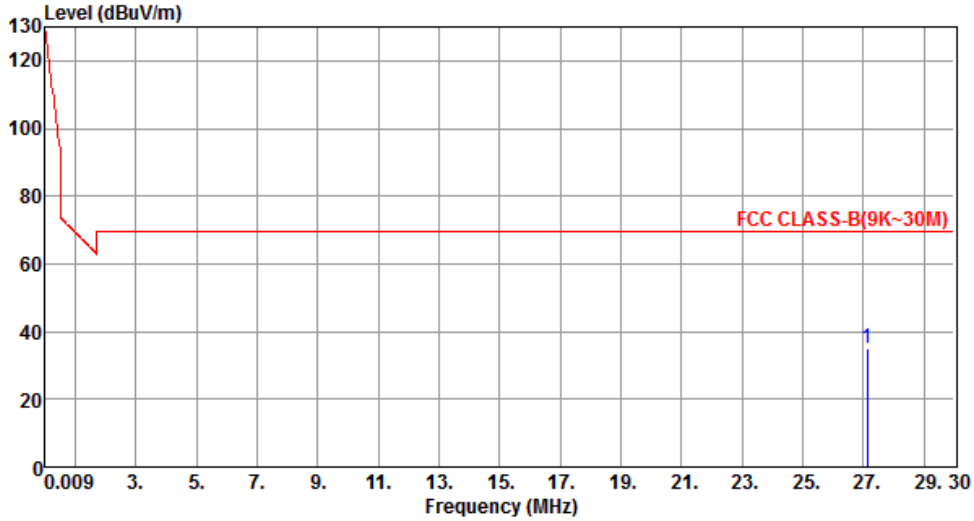
Polarization	Loop close	Test Freq. (MHz)	13.56
Test Mode	NFC		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	27.12	34.25	69.54	-35.29	13.91	20.34	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor (dB)
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

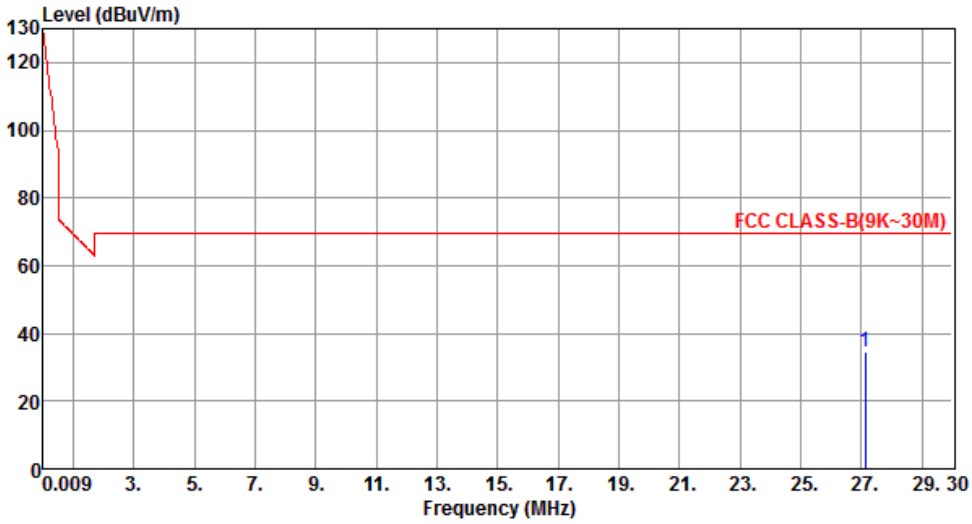
Polarization	Loop open	Test Freq. (MHz)	13.56
Test Mode	RFID		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	27.12	35.06	69.54	-34.48	14.72	20.34	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor (dB)
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Polarization	Loop close	Test Freq. (MHz)	13.56
Test Mode	RFID		

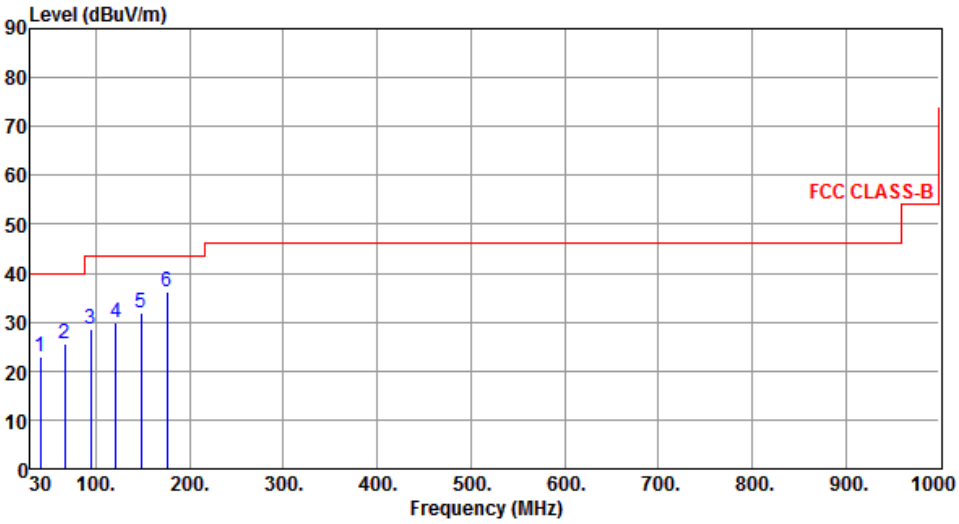


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	27.12	34.31	69.54	-35.23	13.97	20.34	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor (dB)
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

3.3.5 Transmitter Radiated Unwanted Emissions (Above 30MHz)

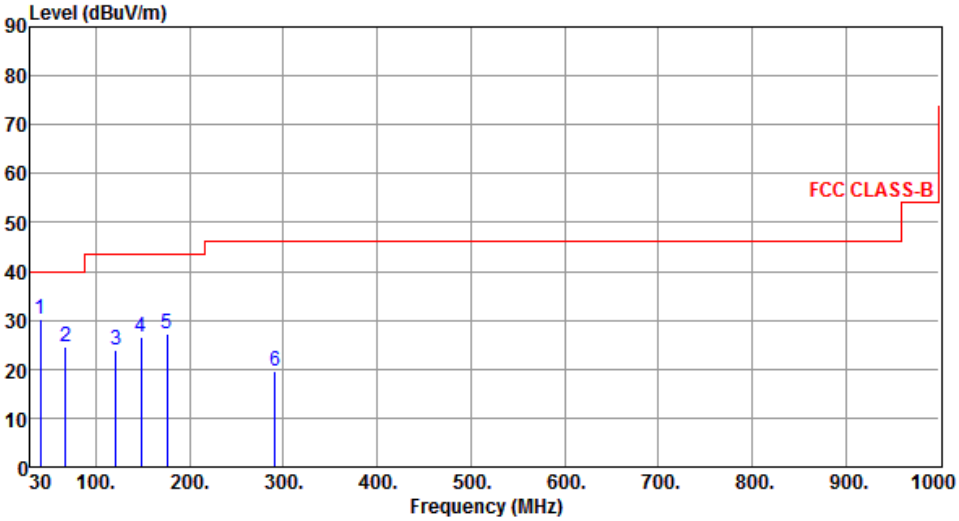
Polarization	Horizontal	Test Freq. (MHz)	13.56
Test Mode	NFC		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	40.67	22.84	40.00	-17.16	39.89	-17.05	Peak	---	---
2	66.86	25.41	40.00	-14.59	44.11	-18.70	Peak	---	---
3	94.02	28.60	43.50	-14.90	51.14	-22.54	Peak	---	---
4	121.18	29.83	43.50	-13.67	48.87	-19.04	Peak	---	---
5	148.34	31.79	43.50	-11.71	48.69	-16.90	Peak	---	---
6	175.50	36.13	43.50	-7.37	54.16	-18.03	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).

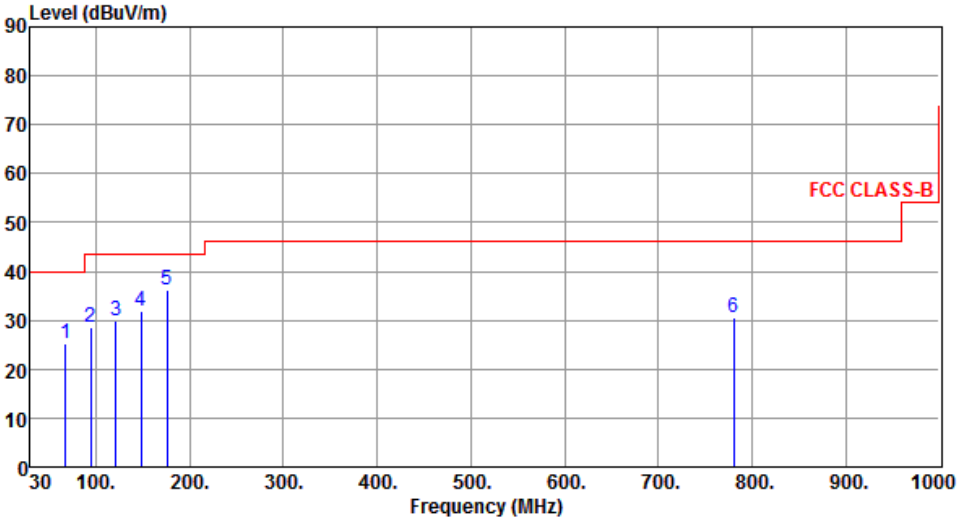
Polarization	Vertical	**Test Freq. (MHz)**	13.56
Test Mode	NFC		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	40.67	30.23	40.00	-9.77	47.28	-17.05	Peak	---	---
2	67.83	24.73	40.00	-15.27	43.64	-18.91	Peak	---	---
3	121.18	24.01	43.50	-19.49	43.05	-19.04	Peak	---	---
4	148.34	26.60	43.50	-16.90	43.50	-16.90	Peak	---	---
5	175.50	27.17	43.50	-16.33	45.20	-18.03	Peak	---	---
6	290.93	19.46	46.00	-26.54	35.91	-16.45	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).

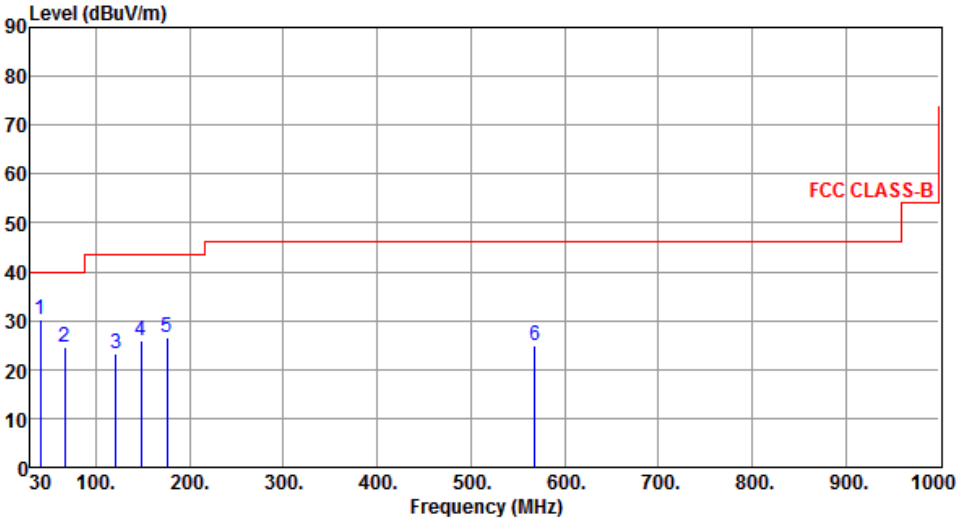
Polarization	Horizontal	**Test Freq. (MHz)**	13.56
Test Mode	RFID		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	67.83	25.34	40.00	-14.66	44.25	-18.91	Peak	---	---
2	94.02	28.59	43.50	-14.91	51.13	-22.54	Peak	---	---
3	121.18	29.98	43.50	-13.52	49.02	-19.04	Peak	---	---
4	148.34	31.99	43.50	-11.51	48.89	-16.90	Peak	---	---
5	175.50	36.09	43.50	-7.41	54.12	-18.03	Peak	---	---
6	780.78	30.62	46.00	-15.38	37.56	-6.94	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
Test Mode	RFID		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	40.67	30.31	40.00	-9.69	47.36	-17.05	Peak	---	---
2	66.86	24.73	40.00	-15.27	43.43	-18.70	Peak	---	---
3	121.18	23.39	43.50	-20.11	42.43	-19.04	Peak	---	---
4	148.34	25.83	43.50	-17.67	42.73	-16.90	Peak	---	---
5	175.50	26.57	43.50	-16.93	44.60	-18.03	Peak	---	---
6	568.35	24.95	46.00	-21.05	35.23	-10.28	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

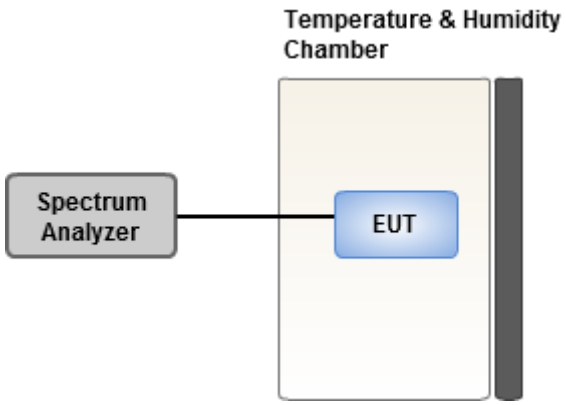
Carrier frequency stability shall be maintained to ±0.01% (±100 ppm).

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

Frequency Stability



3.4.4 Test Result of Frequency Stability

Frequency Stability Result (NFC)					
Condition	**Ch. Freq. (MHz)**	**Frequency Stability (ppm)**			
		0 Min	**2 Min**	**5 Min**	**10 Min**
$T_{20°C}$Vmax	13.56	13.27	8.85	11.80	11.06
$T_{20°C}$Vmin	13.56	11.06	10.32	12.54	12.54
$T_{55°C}$Vnom	13.56	8.85	11.06	10.32	11.06
$T_{50°C}$Vnom	13.56	10.32	8.85	8.85	9.59
$T_{40°C}$Vnom	13.56	8.11	11.06	8.11	10.32
$T_{30°C}$Vnom	13.56	11.06	10.32	11.80	11.80
$T_{20°C}$Vnom	13.56	14.01	12.54	8.85	12.54
$T_{10°C}$Vnom	13.56	8.85	11.80	11.06	11.06
$T_{0°C}$Vnom	13.56	10.32	8.85	14.01	8.11
$T_{-10°C}$Vnom	13.56	11.80	8.11	11.06	14.75
$T_{-20°C}$Vnom	13.56	9.59	10.32	10.32	12.54
Limit (ppm)		100			
Note 1: Measure at 85 % [Vmin] and 115 % [Vmax] of the nominal voltage [Vnom]. The nominal voltage refer test report clause 1.1.4 for EUT operational condition. Note 2: Measure maximum deviation frequency at operating frequency at startup and two, five, and ten min.					

Frequency Stability Result (RFID)					
Condition	**Ch. Freq. (MHz)**	**Frequency Stability (ppm)**			
		0 Min	**2 Min**	**5 Min**	**10 Min**
$T_{20°C}$Vmax	13.56	8.85	8.11	8.11	8.85
$T_{20°C}$Vmin	13.56	11.80	14.01	9.59	12.54
$T_{55°C}$Vnom	13.56	10.32	11.06	10.32	8.85
$T_{50°C}$Vnom	13.56	8.11	12.54	8.85	9.59
$T_{40°C}$Vnom	13.56	8.85	10.32	12.54	12.54
$T_{30°C}$Vnom	13.56	7.37	9.59	13.27	8.85
$T_{20°C}$Vnom	13.56	9.59	11.06	11.80	9.59
$T_{10°C}$Vnom	13.56	12.54	12.54	10.32	10.32
$T_{0°C}$Vnom	13.56	11.06	11.80	8.85	11.80
$T_{-10°C}$Vnom	13.56	11.80	11.06	11.06	8.85
$T_{-20°C}$Vnom	13.56	22.12	7.37	13.27	14.01
Limit (ppm)		100			
Note 1: Measure at 85 % [Vmin] and 115 % [Vmax] of the nominal voltage [Vnom]. The nominal voltage refer test report clause 1.1.4 for EUT operational condition. Note 2: Measure maximum deviation frequency at operating frequency at startup and two, five, and ten min.					

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.

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

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