



FCC Test Report

Equipment : Mobile Phone
Brand Name : Xi
Model No. : F-06E
FCC ID : VQK-F06E
Standard : 47 CFR FCC Part 15.225
Operating Band : 13.553 – 13.567 MHz (channel freq. 13.56 MHz)
FCC Classification : DXX
Applicant : FUJITSU LIMITED
Manufacturer : 1-1, Kamikodanaka 4-chome, Nakahara-ku, Kawasaki 211-8588, Japan

The product sample received on Feb. 25, 2013 and completely tested on Feb. 25, 2013. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2009 and shown 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., the test report shall not be reproduced except in full.

Reviewed by:



Vic Hsiao / Supervisor



Testing Laboratory
1190



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Summary of Test Result

Conformance Test Specifications					
Report Clause	Ref. Std. Clause	Description	Measured	Limit	Result
1.1.2	15.203	Antenna Requirement	Antenna connector mechanism complied	FCC 15.203	Complied
-	15.207	AC Power-line Conducted Emissions	-	FCC 15.207	N/A
3.1	15.215(c)	Emission Bandwidth	20dB Bandwidth 5.055 [kHz] $F_L: 13.557502$ MHz $F_H: 13.562557$ MHz	Fall in band $F_L \geq 13.553$ MHz $F_H \leq 13.567$ MHz	Complied
3.2	15.225(a)~(d)	Field Strength of Fundamental Emissions and Spectrum Mask	Fundamental Emissions peak:58.33 dBuV/m at 3 Device complies with spectrum mask – refer to test data	124 dBuV/m at 3	Complied
3.3	15.225(d)	Transmitter Radiated Unwanted Emissions	[dBuV/m at 3m]:67.83MHz 33.31 (Margin 6.69dB) - PK	FCC 15.209	Complied
3.4	15.225(e)	Frequency Stability	73.5988 ppm	$\pm 0.01\%$ (100ppm)	Complied



Revision History



1 General Description

1.1 Information

1.1.1 RF General Information

RF General Information				
Frequency Range	Modulation	Ch. Frequency (MHz)	Channel Number	Field Strength (dBuV/m)
13.553 – 13.567 MHz	NFC (ASK)	13.56	1	58.33
13.553 – 13.567 MHz	RFID (ASK)	13.56	1	58.06

Note 1: Field strength performed peak level at 3m.

1.1.2 Antenna Information

Antenna Category	
<input type="checkbox"/>	Equipment placed on the market without antennas
<input checked="" type="checkbox"/>	Integral antenna (antenna permanently attached)
<input type="checkbox"/>	External antenna (dedicated antennas)

1.1.3 Type of EUT

Identify EUT	
EUT Serial Number	N/A
IMEI No.	355250050009549
Presentation of Equipment	<input type="checkbox"/> Production ; <input checked="" type="checkbox"/> Pre-Production ; <input type="checkbox"/> Prototype
Type of EUT	
<input checked="" type="checkbox"/>	Stand-alone
<input type="checkbox"/>	Combined (EUT where the radio part is fully integrated within another device) Combined Equipment - Brand Name / Model No.: ...
<input type="checkbox"/>	Plug-in radio (EUT intended for a variety of host systems) Host System - Brand Name / Model No.: ...
<input type="checkbox"/>	Other:

1.1.4 Test Signal Duty Cycle

Operated Mode for Worst Duty Cycle	
<input type="checkbox"/> Operated normally mode for worst duty cycle	
<input checked="" type="checkbox"/> Operated test mode for worst duty cycle	
Test Signal Duty Cycle (x)	Voltage Duty Factor [dB] – (20 log 1/x)
<input checked="" type="checkbox"/> 100%	0



1.1.5 EUT Operational Condition

Supply Voltage	<input type="checkbox"/> AC mains	<input checked="" type="checkbox"/> DC	
Type of DC Source	<input type="checkbox"/> Internal DC supply	<input checked="" type="checkbox"/> External DC adapter	<input type="checkbox"/> Battery
Test Voltage	<input checked="" type="checkbox"/> Vnom (3.9 V)	<input checked="" type="checkbox"/> Vmax (4.29 V)	<input checked="" type="checkbox"/> Vmin (3.51 V)
Test Climatic	<input checked="" type="checkbox"/> Tnom (20°C)	<input checked="" type="checkbox"/> Tmax (55°C)	<input checked="" type="checkbox"/> Tmin (-20°C)

1.2 Accessories and Support Equipment

Accessories				
No.	Equipment	Brand Name	Model Name	Spec.
1	Cradle	Fujitsu limited	CA50601-1791	5.0Vdc, 1.5A
2	Battery	Fujitsu limited	CA54310-0046	3.8V, 3,020mA Li-ion

Support Equipment				
No.	Equipment	Brand Name	Model Name	Serial No.
1	-	-	-	-

Note: As client's request, no support equipment was set.

1.3 Testing Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ◆ 47 CFR FCC Part 15
- ◆ ANSI C63.10-2009
- ◆ FCC KDB 174176

1.4 Testing Location Information

Testing Location						
		Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
<input checked="" type="checkbox"/>	HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 886-3-327-3456 FAX : 886-3-318-0055				
<input type="checkbox"/>	JHUBEI	ADD : No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C. TEL : 886-3-656-9065 FAX : 886-3-656-9085				



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		
Test Item	Uncertainty	Limit
AC power-line conducted emissions	±2.26 dB	N/A
Emission bandwidth	±1.42 %	N/A
Unwanted emissions, conducted	9 – 150 kHz	±0.38 dB
	0.15 – 30 MHz	±0.42 dB
	30 – 1000 MHz	±0.51 dB
All emissions, radiated	9 – 150 kHz	±2.49 dB
	0.15 – 30 MHz	±2.28 dB
	30 – 1000 MHz	±2.56 dB
Temperature	±0.8 °C	N/A
Humidity	±3 %	N/A
DC and low frequency voltages	±3 %	N/A
Time	±1.42 %	N/A
Duty Cycle	±1.42 %	N/A



2 Test Configuration of EUT

2.1 The Worst Case Modulation Configuration

Modulation Used for Conformance Testing	
Modulation Mode	Field Strength (dBuV/m at 3 m)
NFC	58.33
RFID	58.06

2.2 Test Channel Frequencies Configuration

Modulation Mode	Test Channel Frequencies (MHz)
NFC	13.56-(F1)
RFID	13.56-(F1)

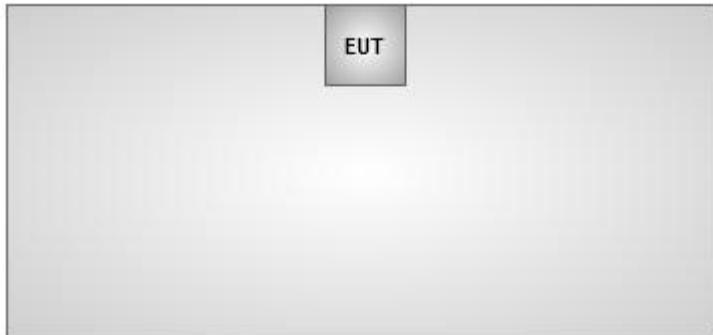
2.3 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests							
Tests Item	Emission Bandwidth, Field Strength of Fundamental Emissions Spectrum Mask, Transmitter Radiated Unwanted Emissions, Frequency Stability						
Test Condition	Radiated measurement						
User Position	<input type="checkbox"/> EUT will be placed in fixed position. <input type="checkbox"/> EUT will be placed in mobile position and operating multiple positions. EUT shall be performed two orthogonal planes. The worst planes is X. <input checked="" type="checkbox"/> EUT will be a hand-held or body-worn battery-powered devices and operating multiple positions. EUT shall be performed three orthogonal planes. The worst planes is Z.						
Operating Mode < 1GHz	<input checked="" type="checkbox"/> 1. NFC-Read/Write <input checked="" type="checkbox"/> 2. RFID-Read/Write						
Modulation Mode	NFC / RFID						
Orthogonal Planes of EUT	<table><thead><tr><th>X Plane</th><th>Y Plane</th><th>Z Plane</th></tr></thead><tbody><tr><td></td><td></td><td></td></tr></tbody></table>	X Plane	Y Plane	Z Plane			
X Plane	Y Plane	Z Plane					



2.4 Test Setup Diagram

Test Setup Diagram - Radiated Test



3 Transmitter Test Result

3.1 Emission Bandwidth

3.1.1 Emission Bandwidth Limit

20dB Bandwidth Limit

- Intentional radiators must be designed to ensure that the 20 dB bandwidth of the emissions in the specific band (13.553 – 13.567 MHz).

3.1.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

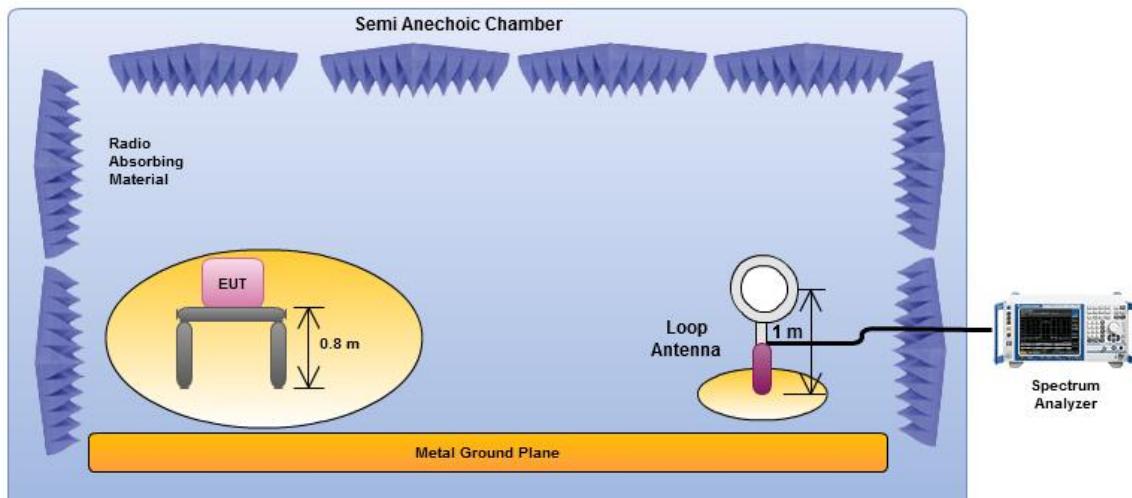
3.1.3 Test Procedures

Test Method

- For the emission bandwidth refer ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.
- For radiated measurement. Loop antenna was rotated about the horizontal and vertical axis and the equipment to be measured and the test antenna shall be oriented to obtain the maximum emitted field strength level.

3.1.4 Test Setup

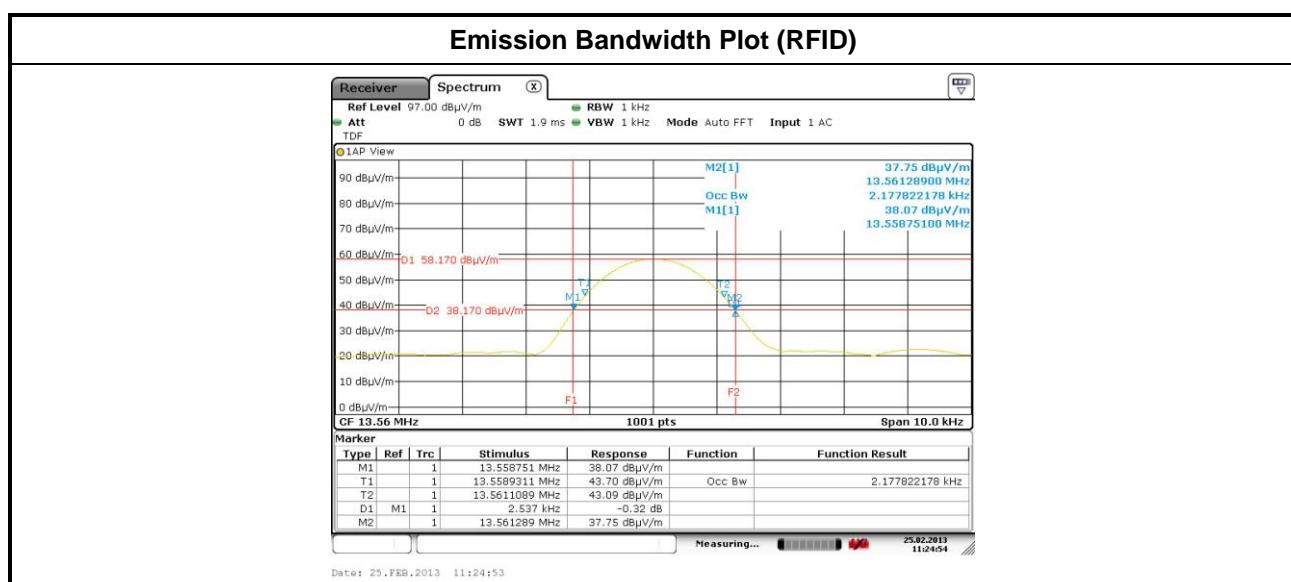
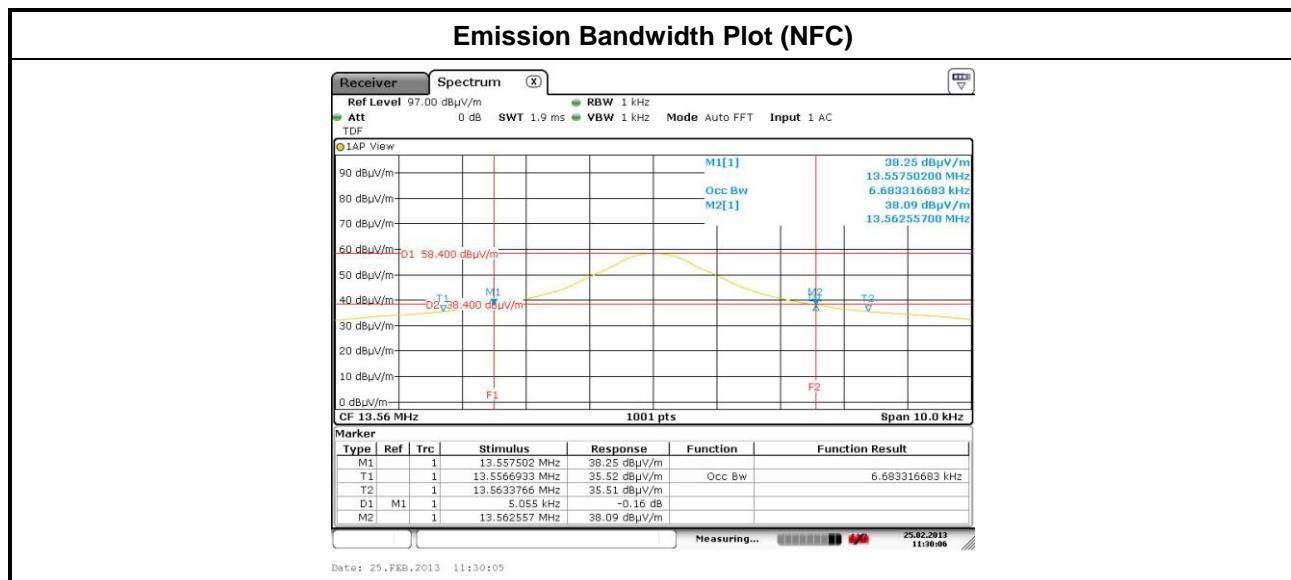
Emission Bandwidth





3.1.5 Test Result of Emission Bandwidth

Occupied Channel Bandwidth Result					
Modulation Mode	Frequency (MHz)	20dB Bandwidth (kHz)	F _L at 20dB BW (MHz)	F _H at 20dB BW (MHz)	99% Bandwidth (kHz)
NFC	13.56	5.055	13.557502	13.562557	6.683316683
RFID	13.56	2.537	13.558751	13.561289	2.177822178
Limit		N/A	13.553	13.567	N/A
Result		Complied			





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 Measuring Instruments

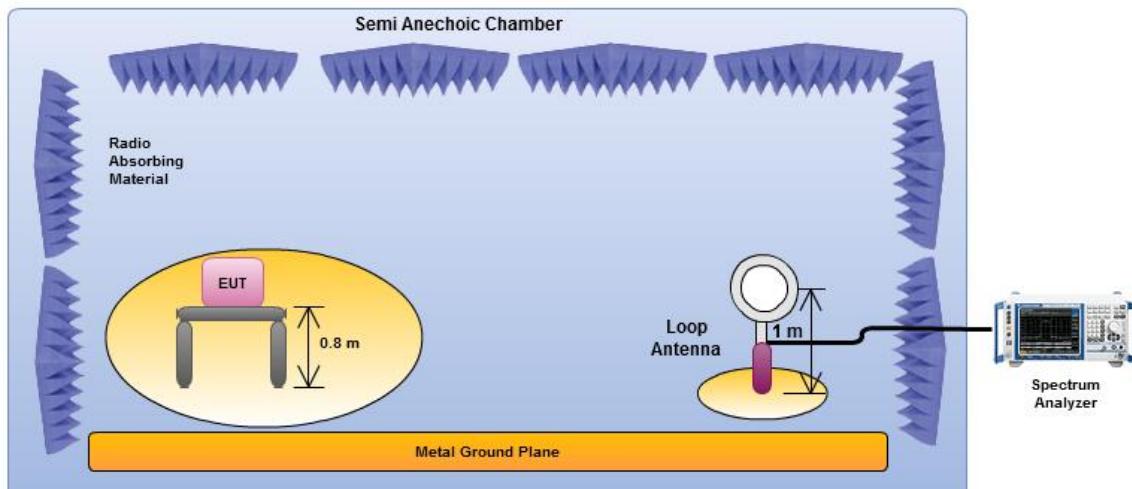
Refer a test equipment and calibration data table in this test report.

3.2.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 6.4 for radiated emissions from below 30 MHz. quasi peak measurement of the fundamental.
<input checked="" type="checkbox"/>	At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the requirements; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be following below methods.
<input type="checkbox"/>	The results shall be extrapolated to the specified distance by making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor.
<input checked="" type="checkbox"/>	The results shall be by using the square of an inverse linear distance extrapolation factor (40 dB/decade).
<input checked="" type="checkbox"/>	For radiated measurement. Loop antenna was rotated about the horizontal and vertical axis and the equipment to be measured and the test antenna shall be oriented to obtain the maximum emitted field strength level.

3.2.4 Test Setup

Field Strength of Fundamental Emissions and Spectrum Mask

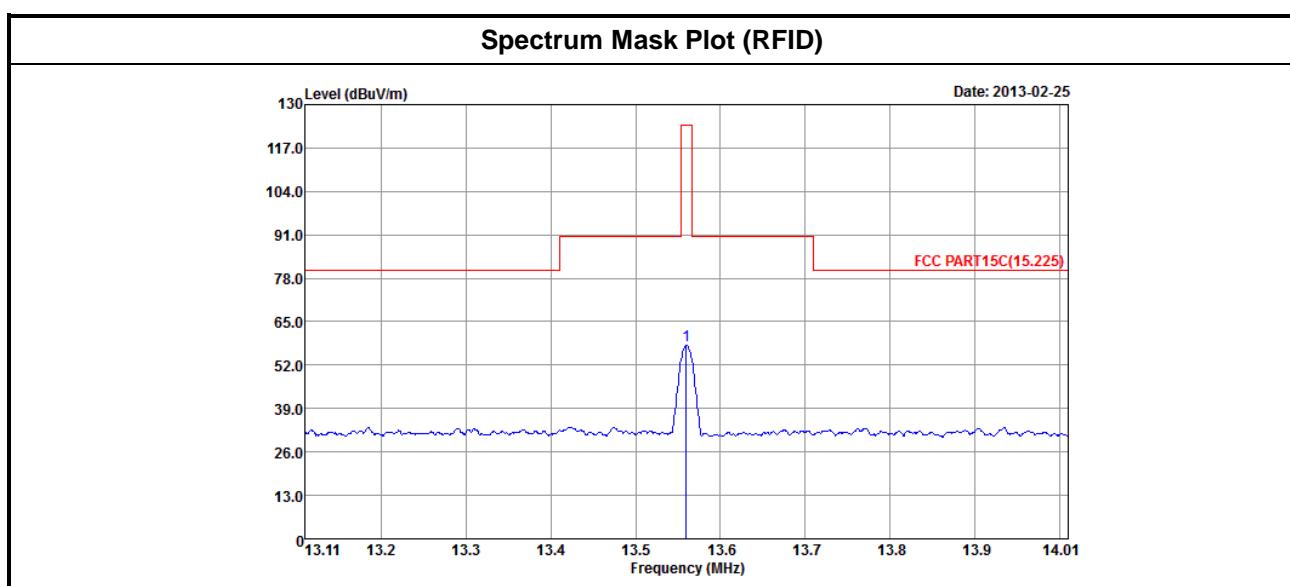
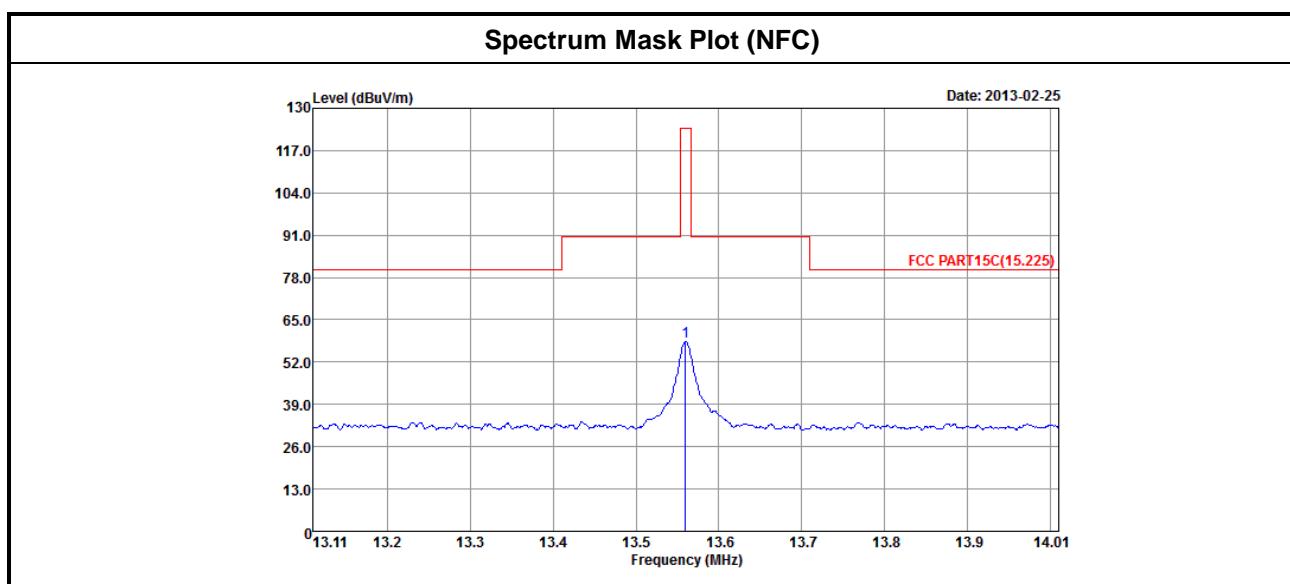




3.2.5 Test Result of Field Strength of Fundamental Emissions and Spectrum Mask

Field Strength of Fundamental Emissions Result					
Modulation Mode	Frequency (MHz)	Fundamental (dBuV/m)@3m	Polarization	Margin (dB)	Limit (dBuV/m)@3m
NFC	F1	58.33	Open	65.67	124.0
RFID	F1	58.06	Open	65.94	124.0
Result		Complied			

Note 1: Measurement worst emissions of receive antenna polarization: V (Vertical).





3.3 Transmitter Radiated Unwanted Emissions

3.3.1 Transmitter Radiated Unwanted Emissions Limit

Transmitter Radiated Unwanted 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: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

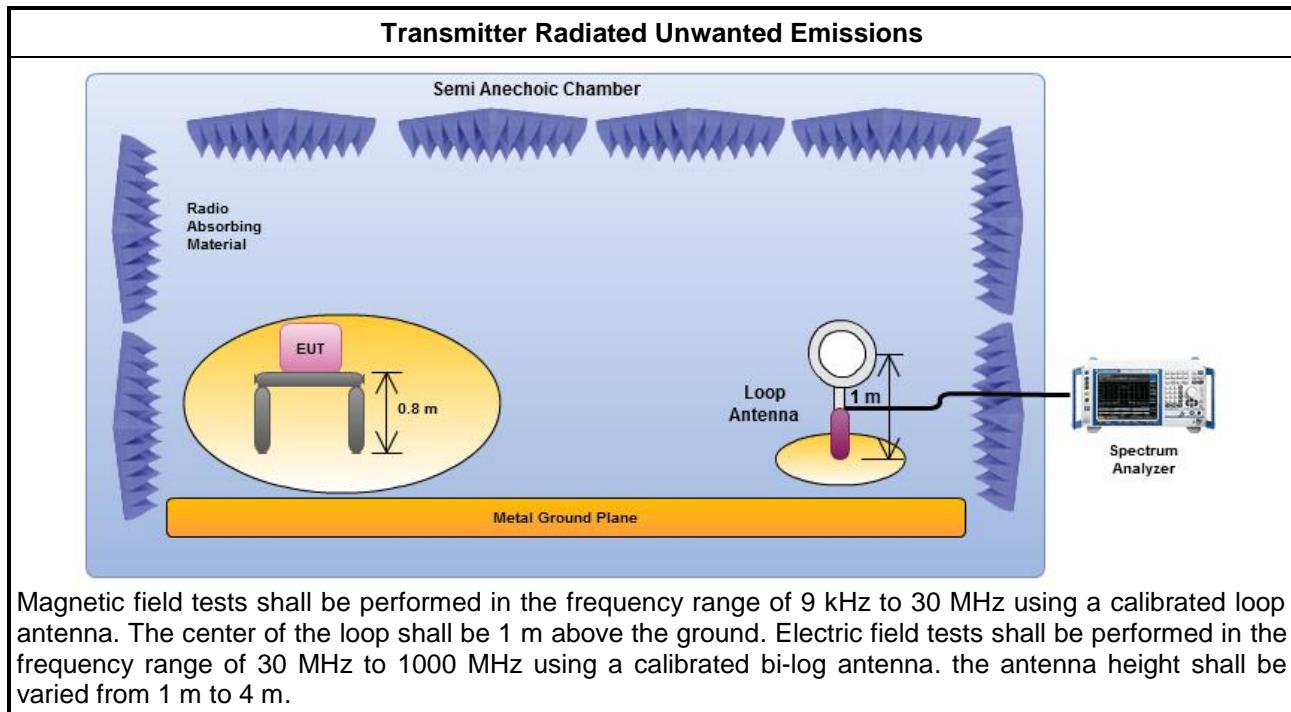
3.3.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.3.3 Test Procedures

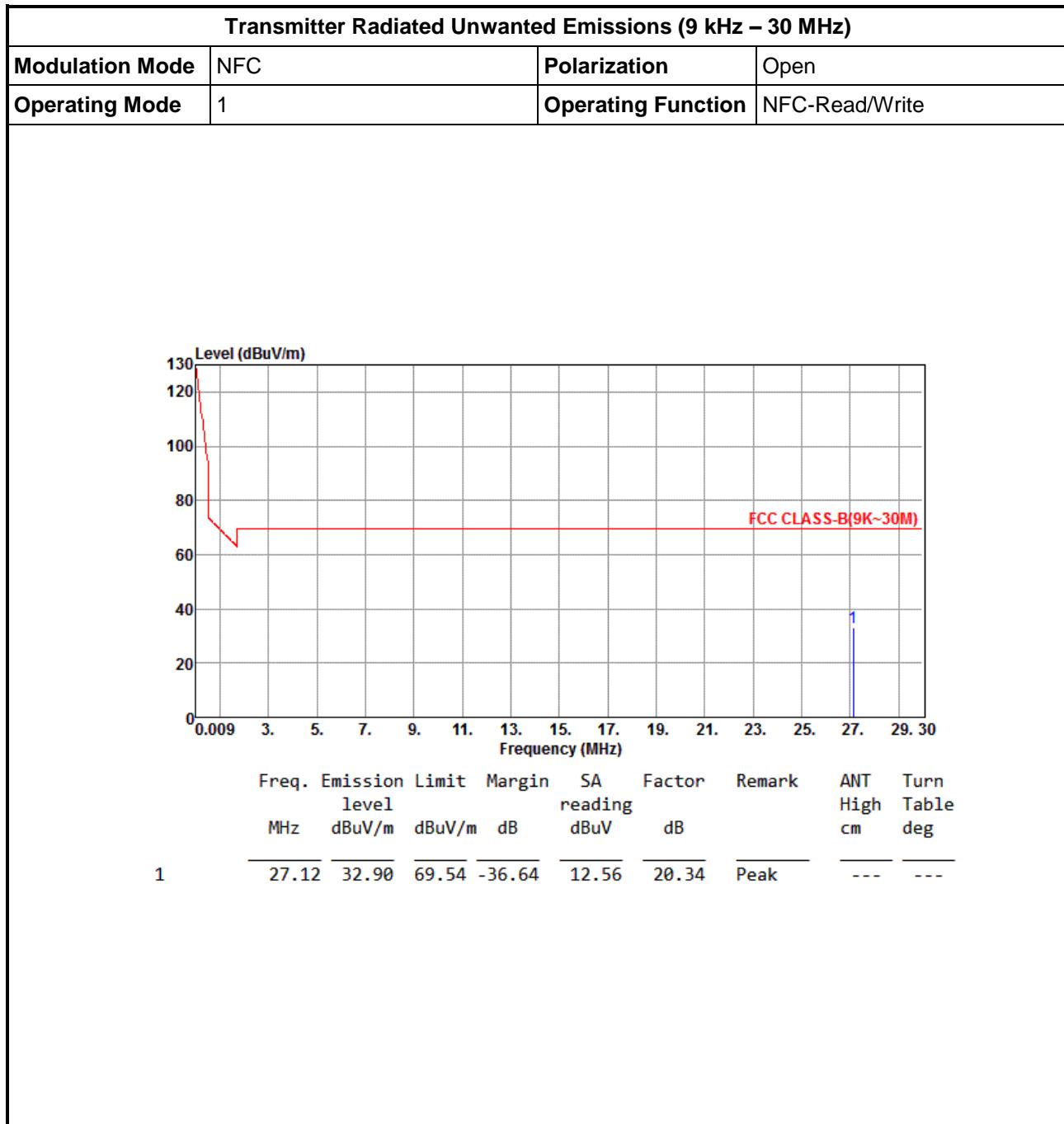
Test Method
<input checked="" type="checkbox"/> Refer as ANSI C63.10, clause 6.5 for radiated emissions from 30 MHz to 1000 MHz.
<input checked="" type="checkbox"/> Refer as ANSI C63.10, clause 6.4 for radiated emissions from below 30 MHz. quasi peak measurement of the fundamental.
<input checked="" type="checkbox"/> At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the requirements; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be following below methods.
<input type="checkbox"/> The results shall be extrapolated to the specified distance by making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor.
<input checked="" type="checkbox"/> The results shall be by using the square of an inverse linear distance extrapolation factor (40 dB/decade).
<input checked="" type="checkbox"/> For radiated measurement. Loop antenna was rotated about the horizontal and vertical axis and the equipment to be measured and the test antenna shall be oriented to obtain the maximum emitted field strength level.

3.3.4 Test Setup





3.3.5 Transmitter Radiated Unwanted Emissions (Below 30MHz)



Note 1: ">20dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.

Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

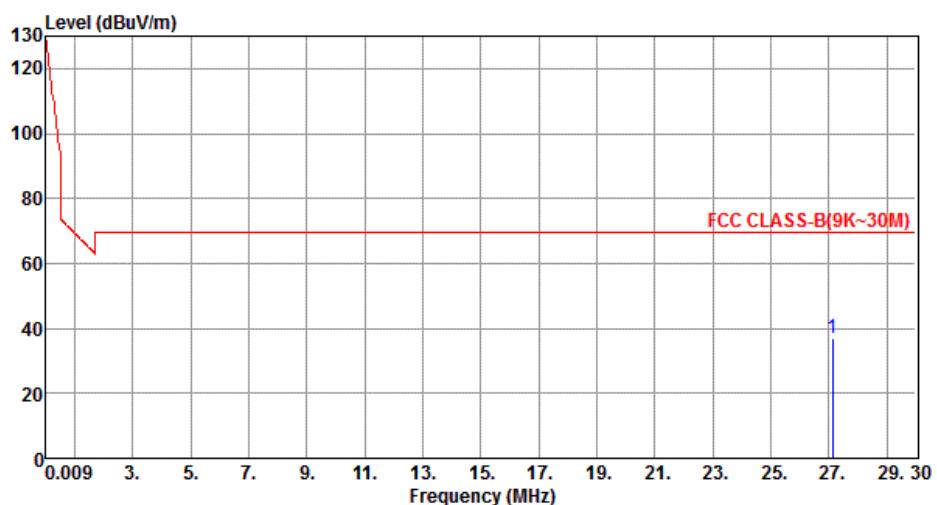
Note 3: Measurement worst emissions of receive antenna polarization: V (Vertical).

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



Transmitter Radiated Unwanted Emissions (9 kHz – 30 MHz)

Modulation Mode	NFC	Polarization	Close
Operating Mode	1	Operating Function	NFC-Read/Write



	Freq.	Emission level	Limit	Margin	SA reading	Factor	Remark	ANT	Turn
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB		High	Table
1	27.12	36.78	69.54	-32.76	16.44	20.34	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.

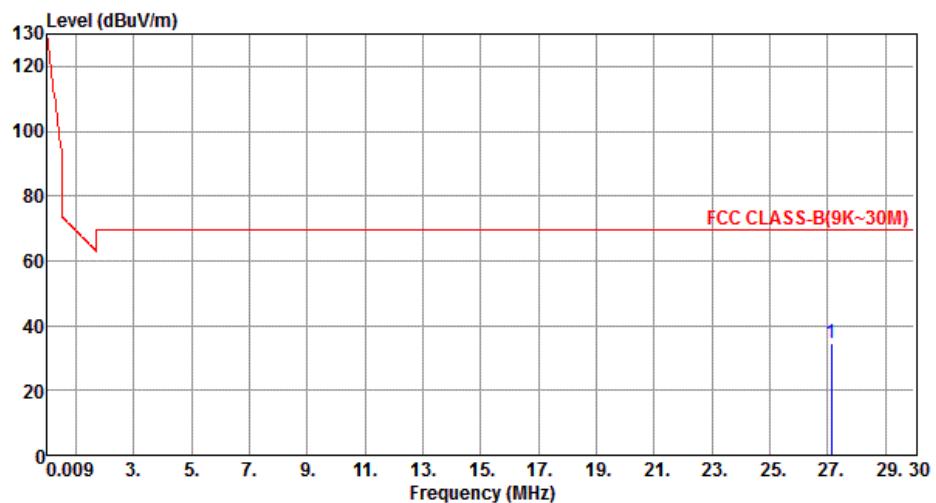
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

Note 3: Measurement worst emissions of receive antenna polarization: V (Vertical).



Transmitter Radiated Unwanted Emissions (9 kHz – 30 MHz)

Modulation Mode	RFID	Polarization	Open
Operating Mode	1	Operating Function	RFID-Read/Write

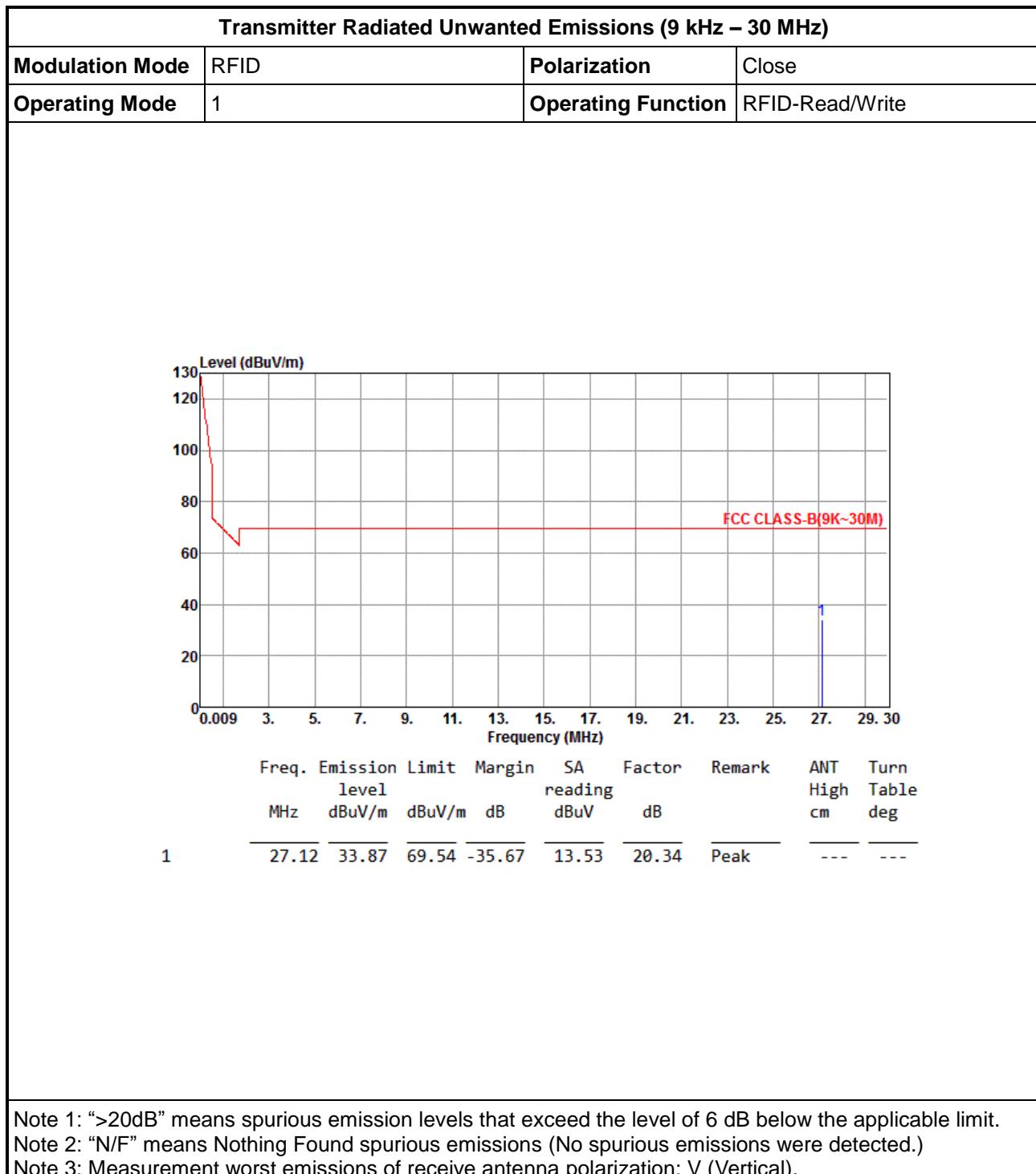


	Freq.	Emission level	Limit	Margin	SA reading	Factor	Remark	ANT High	Turn Table
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB		cm	deg
1	27.12	34.69	69.54	-34.85	14.35	20.34	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.

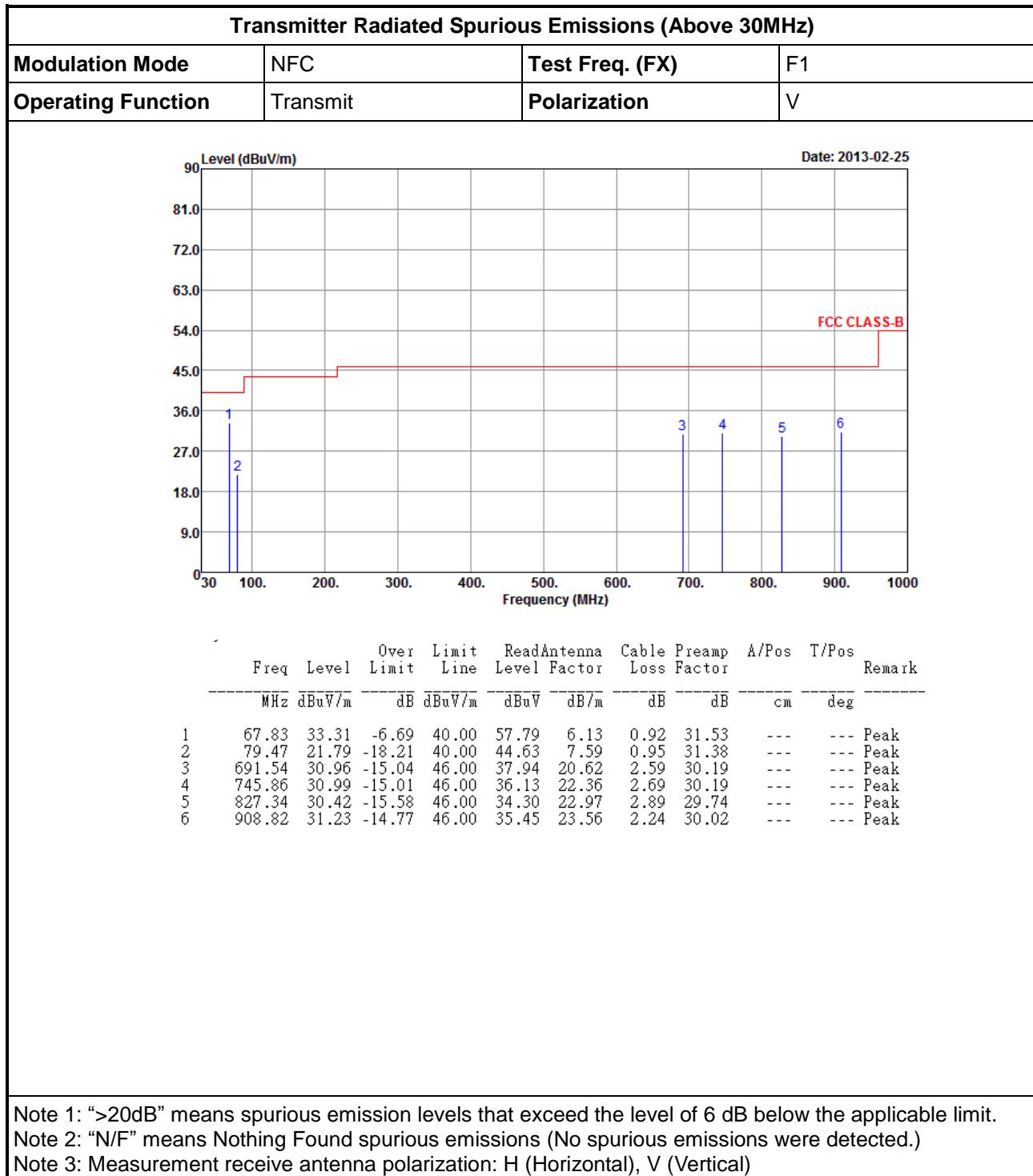
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)

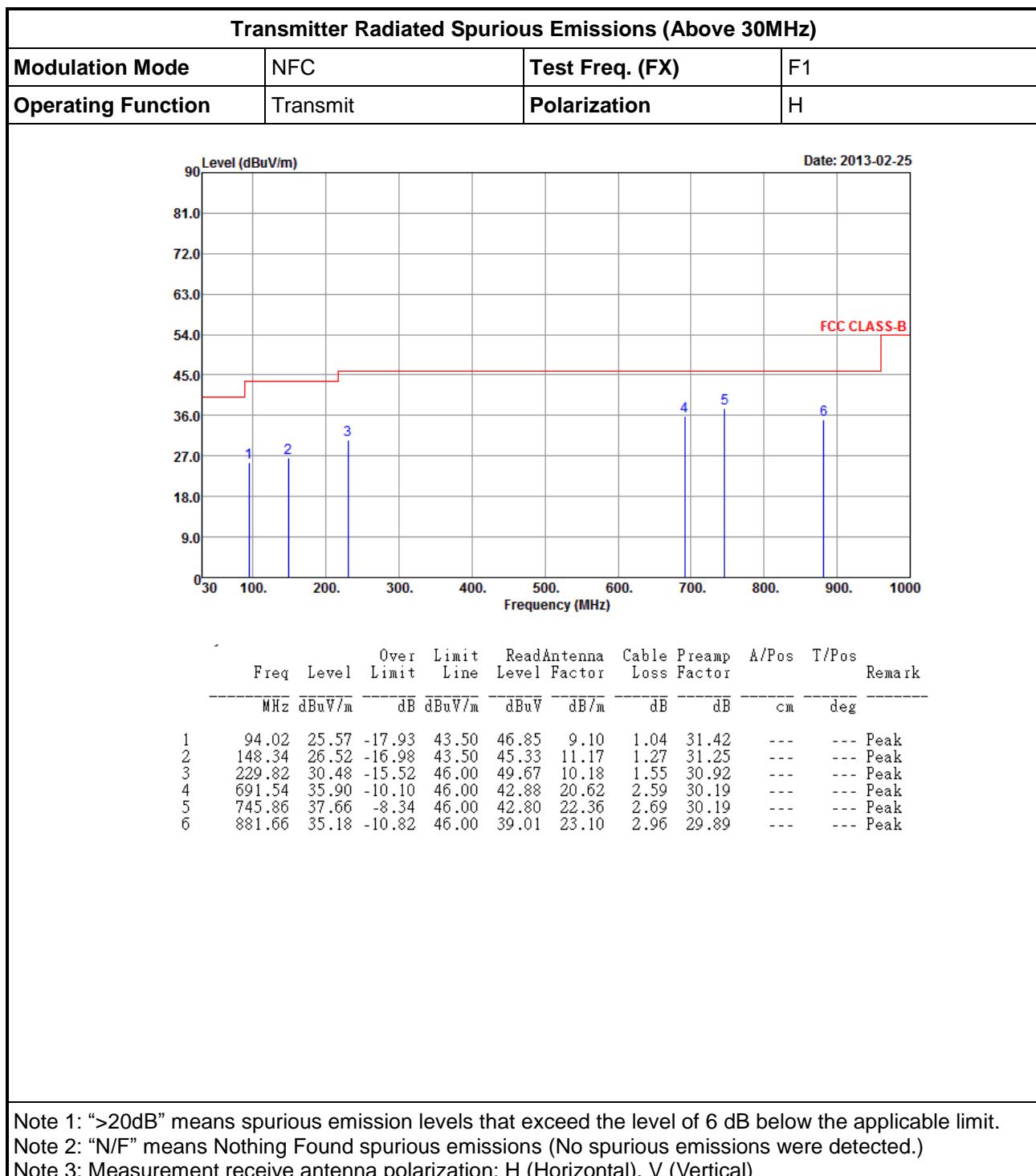
Note 3: Measurement worst emissions of receive antenna polarization: V (Vertical).

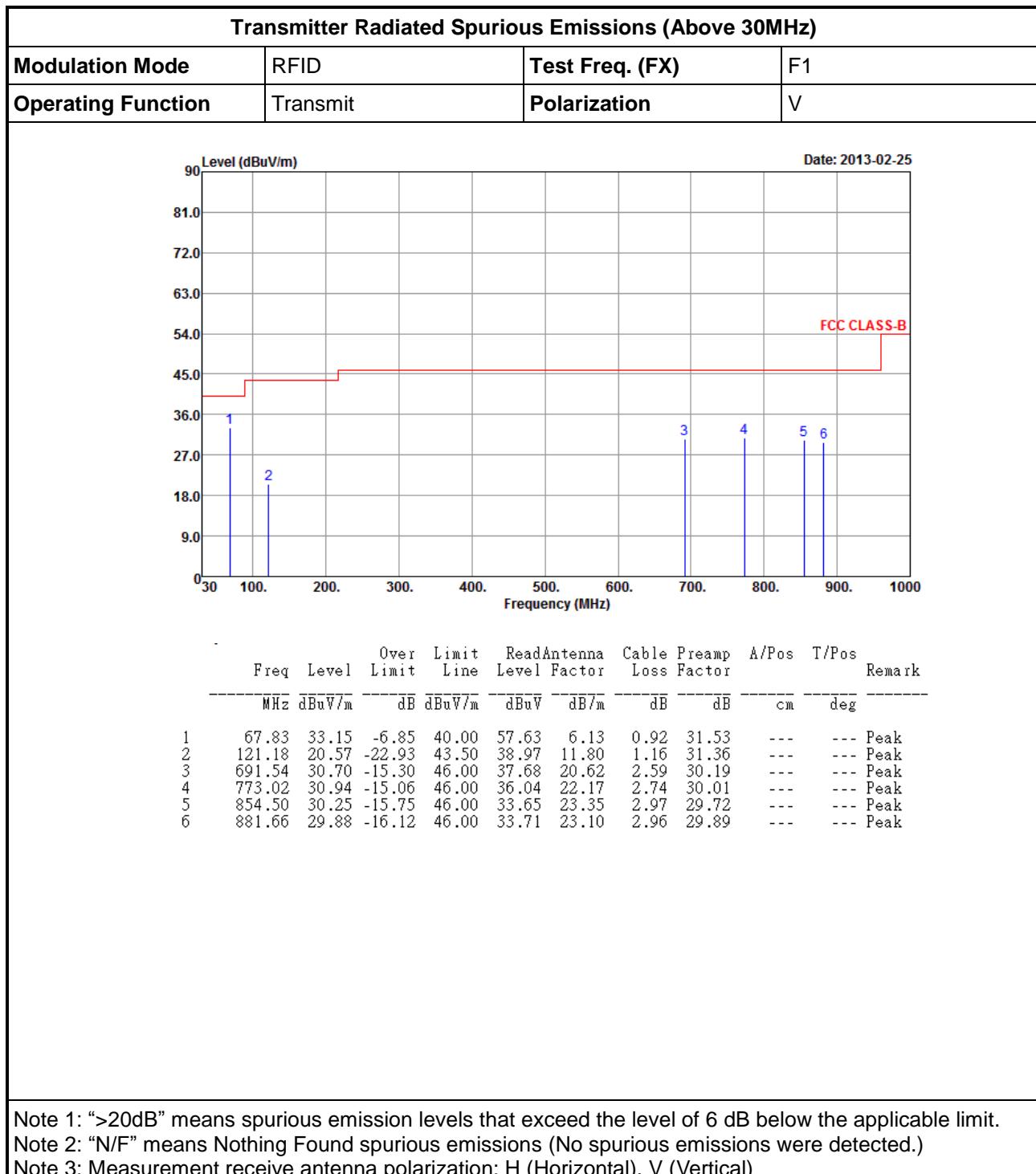


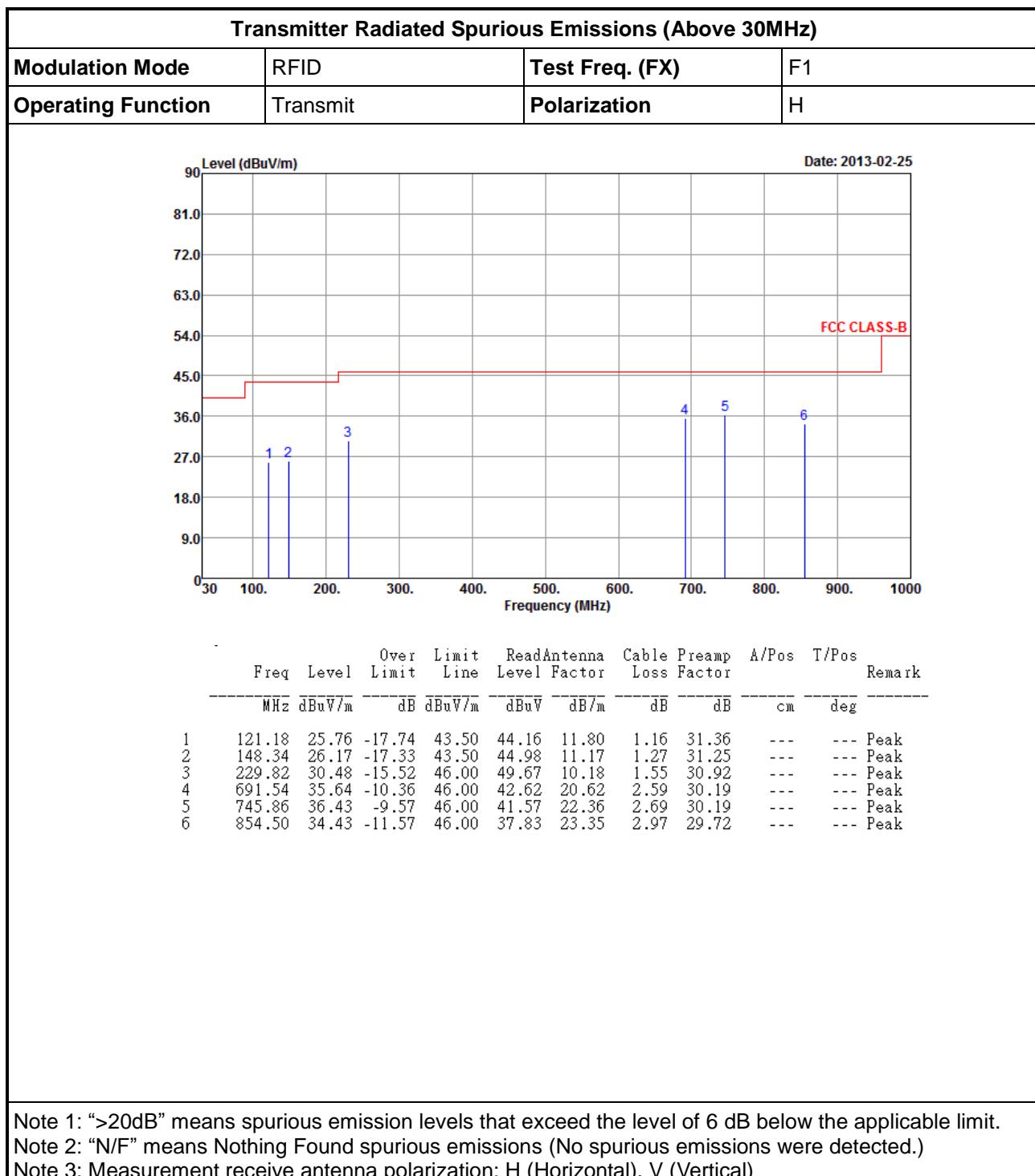


3.3.6 Transmitter Radiated Unwanted Emissions (Above 30MHz)









3.4 Frequency Stability

3.4.1 Frequency Stability Limit

Frequency Stability Limit
<input checked="" type="checkbox"/> Carrier frequency stability shall be maintained to $\pm 0.01\%$ (± 100 ppm).

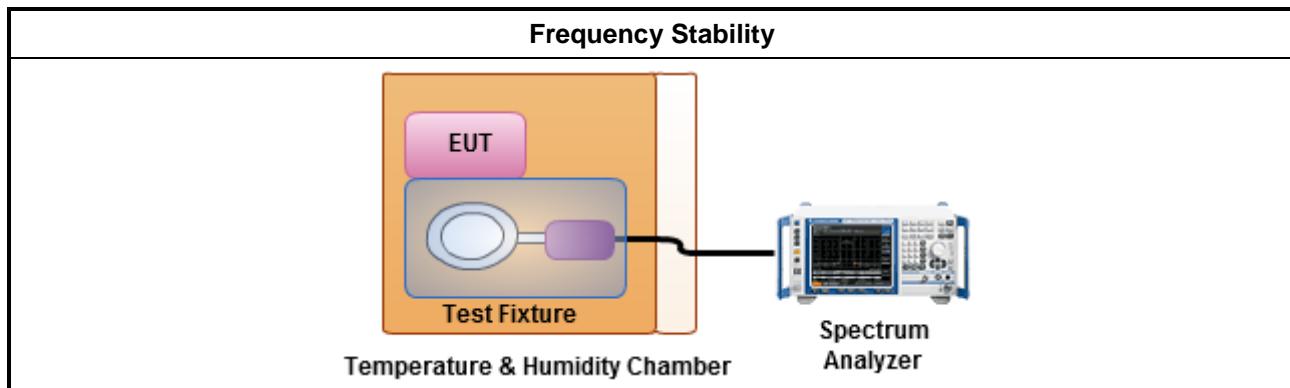
3.4.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.4.3 Test Procedures

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

3.4.4 Test Setup





3.4.5 Test Result of Frequency Stability

Frequency Stability Result (NFC)			
Condition	Ch. Freq. (MHz)	Frequency Stability (ppm)	
		Test Frequency (MHz)	Frequency Stability (ppm)
T _{20°C} Vmax	13.56	13.56087	64.2330
T _{20°C} Vmin	13.56	13.56089	65.2655
T _{50°C} Vnom	13.56	13.56084	61.9469
T _{40°C} Vnom	13.56	13.56087	64.2330
T _{30°C} Vnom	13.56	13.56090	66.2979
T _{20°C} Vnom	13.56	13.56085	62.9056
T _{10°C} Vnom	13.56	13.56091	67.1829
T _{0°C} Vnom	13.56	13.56087	64.1593
T _{-10°C} Vnom	13.56	13.56093	68.3628
T _{-20°C} Vnom	13.56	13.56088	65.1180
Limit (ppm)		100	
Result		Complied	

Note 1: Measure at 85 % [Vmin] and 115 % [Vmax] of the nominal voltage [Vnom]. The nominal voltage refer test report clause 1.1.5 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)	
		Test Frequency (MHz)	Frequency Stability (ppm)
T _{20°C} Vmax	13.56	13.56090	66.0029
T _{20°C} Vmin	13.56	13.56089	65.7817
T _{50°C} Vnom	13.56	13.56091	66.8142
T _{40°C} Vnom	13.56	13.56087	64.3805
T _{30°C} Vnom	13.56	13.56100	73.5988
T _{20°C} Vnom	13.56	13.56088	65.1180
T _{10°C} Vnom	13.56	13.56098	72.0501
T _{0°C} Vnom	13.56	13.56087	63.9381
T _{-10°C} Vnom	13.56	13.56094	69.4690
T _{-20°C} Vnom	13.56	13.56090	66.1504
Limit (ppm)		100	
Result		Complied	

Note 1: Measure at 85 % [Vmin] and 115 % [Vmax] of the nominal voltage [Vnom]. The nominal voltage refer test report clause 1.1.5 for EUT operational condition.

Note 2: Measure maximum deviation frequency at operating frequency at startup and two, five, and ten min.



4 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Remark
Spectrum Analyzer	R&S	FSV 40	101486	9KHz~40GHz	Nov. 14, 2012	Conducted (TH01-HY)
Spectrum Analyzer	R&S	FSP 40	100593	9KHz ~ 40GHz	Aug. 14, 2012	Conducted (TH01-HY)
DC Power Source	G.W.	GPC-6030D	C671845	DC 1V ~ 60V	Jun. 19, 2012	Conducted (TH01-HY)
AC Power Source	G.W	APS-9102	EL920581	AC 0V ~ 300V	Jul. 02, 2012	Conducted (TH01-HY)
Temp. and Humidity Chamber	Giant Force	GTH-225-20-S P-SD	MAA1112-007	-20 ~ 100°C	Nov. 21, 2012	Conducted (TH01-HY)
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	Jun. 26, 2012	Conducted (TH01-HY)
Power Sensor	Anritsu	MA2411B	1027452	300MHz ~ 40GHz	Sep. 08, 2012	Conducted (TH01-HY)
Power Meter	Anritsu	ML2495A	1124009	300MHz ~ 40GHz	Sep. 08, 2012	Conducted (TH01-HY)
RF Cable-2m	HUBER+SUHNER	SUCOFLEX_104	SN 345675/4	1GHz ~ 26.5GHz	NA	Conducted (TH01-HY)
RF Cable-3m	HUBER+SUHNER	SUCOFLEX_104	SN 345669/4	1GHz ~ 26.5GHz	NA	Conducted (TH01-HY)

Note: Calibration Interval of instruments listed above is one year.

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Remark
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz ~ 1GHz 3m	Dec. 01, 2012	Radiation (03CH03-HY)
Amplifier	HP	8447D	2944A08033	10kHz ~ 1.3GHz	May. 10, 2012	Radiation (03CH03-HY)
Amplifier	Agilent	8449B	3008A02120	1GHz ~ 26.5GHz	Aug. 16, 2012	Radiation (03CH03-HY)
Amplifier	MITEQ	AMF-7D-00101 800-30-10P	159088	1GHz ~ 18GHz	Mar. 10, 2012	Radiation (03CH03-HY)
Spectrum Analyzer	R&S	FSP30	100793	9kHz ~ 30GHz	Sep. 26, 2012	Radiation (03CH03-HY)
Bilog Antenna	SCHAFFNER	CBL 6112D	22237	30MHz ~ 1GHz	Sep. 22, 2012	Radiation (03CH03-HY)
Horn Antenna	EMCO	3115	6741	1GHz ~ 18GHz	May 30, 2012	Radiation (03CH03-HY)
Horn Antenna	SCHWARZBEC K	BBHA9170	BBHA9170154	15GHz ~ 40GHz	Jan. 08, 2013	Radiation (03CH03-HY)
Horn Antenna	ETS · LINDGREN	3117	00075962	1GHz ~ 18GHz	Aug. 22, 2012	Radiation (03CH03-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	30MHz ~ 1GHz	Jan. 17, 2013	Radiation (03CH03-HY)
RF Cable-high	SUHNER	SUCOFLEX 106	03CH03-HY	1GHz ~ 40GHz	Jan. 17, 2013	Radiation (03CH03-HY)
Turn Table	HD	DS 420	420/650/00	0 ~ 360 degree	N/A	Radiation (03CH03-HY)
Antenna Mast	MF	MF-7802	MF780208179	1 ~ 4 m	N/A	Radiation (03CH03-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9kHz ~ 30MHz	Jul. 03, 2012	Radiation (03CH03-HY)

Note: Calibration Interval of instruments listed above is one year.