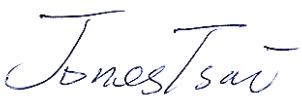
FCC RF Test Report

APPLICANT	:	VeriFone, Inc.
EQUIPMENT	:	Point of Sale Terminal
BRAND NAME	:	VeriFone
MODEL NAME	:	VX690 3G-BT-WiFi
FCC ID	:	B32VX6903GBTWIFI
STANDARD	:	FCC Part 15 Subpart C §15.225
CLASSIFICATION	:	(DXX) Low Power Communication Device Transmitter

The product was received on Apr. 11, 2014 and testing was completed on Apr. 28, 2014. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown the 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: Joseph Lin / Supervisor



Approved by: Jones Tsai / Manager

Testing Laboratory 1190

SPORTON INTERNATIONAL INC.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR441115D	Rev. 01	Initial issue of report	May 13, 2014

1. SUMMARY OF THE TEST RESULT

Applied Standard: 47 CFR FCC Part 15 Subpart C				
Part	**FCC Rule**	**Description of Test**	**Result**	**Under Limit**
3.1	15.207	AC Power Line Conducted Emissions	Complies	1.00 dB at 13.558MHz
3.2	15.225(a)(b)(c)	Field Strength of Fundamental Emissions	Complies	42.49 dB at 13.560 MHz
3.3	2.1049	20dB Spectrum Bandwidth	Complies	-
3.4	15.225(d) 15.209	Radiated Emissions	Complies	16.02 dB at 1.450 MHz for Quasi-Peak
3.5	15.225(e)	Frequency Stability	Complies	-
3.6	15.203	Antenna Requirements	Complies	-

Test Items	Uncertainty	Remark
AC Power Line Conducted Emissions	±2.3dB	Confidence levels of 95%
Field Strength of Fundamental Emissions	±0.8dB	Confidence levels of 95%
20dB Spectrum Bandwidth / Frequency Stability	$\pm 8.5\times10^{-8}$	Confidence levels of 95%
Radiated / Band Edge Emissions (9kHz~30MHz)	±0.8dB	Confidence levels of 95%
Radiated Emissions (30MHz~1000MHz)	±1.9dB	Confidence levels of 95%
Temperature	±0.7℃	Confidence levels of 95%
Humidity	±3.2%	Confidence levels of 95%
DC / AC Power Source	±1.4%	Confidence levels of 95%

2. GENERAL INFORMATION

2.1 Applicant

VeriFone, Inc.

1400 West Stanford Ranch Road Suite 200 Rocklin CA 95765 USA

2.2 Manufacturer

Inventec Appliances (Pudong) Co., Ltd.

No. 789 Pu Xing Road, Shanghai, PRC

2.3 Product Details

For more detailed features description, please refer to the manufacturer's specifications or user's manual.

Items	Description
Power Type	5Vdc from Adapter 3.7Vdc from Li-ion Battery
Modulation	ASK
Channel Number	1
Channel Bandwidth (99%)	2.240 kHz
Max. Field Strength	81.51 dBμV/m
Test Freq. Range	13.553 ~ 13.567MHz
Carrier Frequencies	13.56 MHz (Ch. 1)
Antenna	Loop antenna (Without any antenna connector)

2.4 Table for Test Modes

Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Channel
AC Power Line Conducted Emissions	CTX	-
Field Strength of Fundamental Emissions	CTX	1
20dB Spectrum Bandwidth	CTX	1
Radiated Emissions 9kHz~30MHz	CTX	1
Radiated Emissions 9kHz~10th Harmonic Band Edge Emissions	CTX	1
Frequency Stability	Un-modulation	1

Note:

1. CTX=continuously transmitting.
2. The ancillary equipment, NFC card, is used to make the EUT (NFC) continuously transmit at 13.56MHz and is placed around 3 cm gap to the EUT.

2.5 Table for Testing Locations

Test Site No.	Site Category	Location
CO05-HY	Conduction	Hwa Ya
TH02-HY	OVEN Room	Hwa Ya
03CH07-HY	SAC	Hwa Ya

Semi Anechoic Chamber (SAC).

2.6 Applied Standards

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

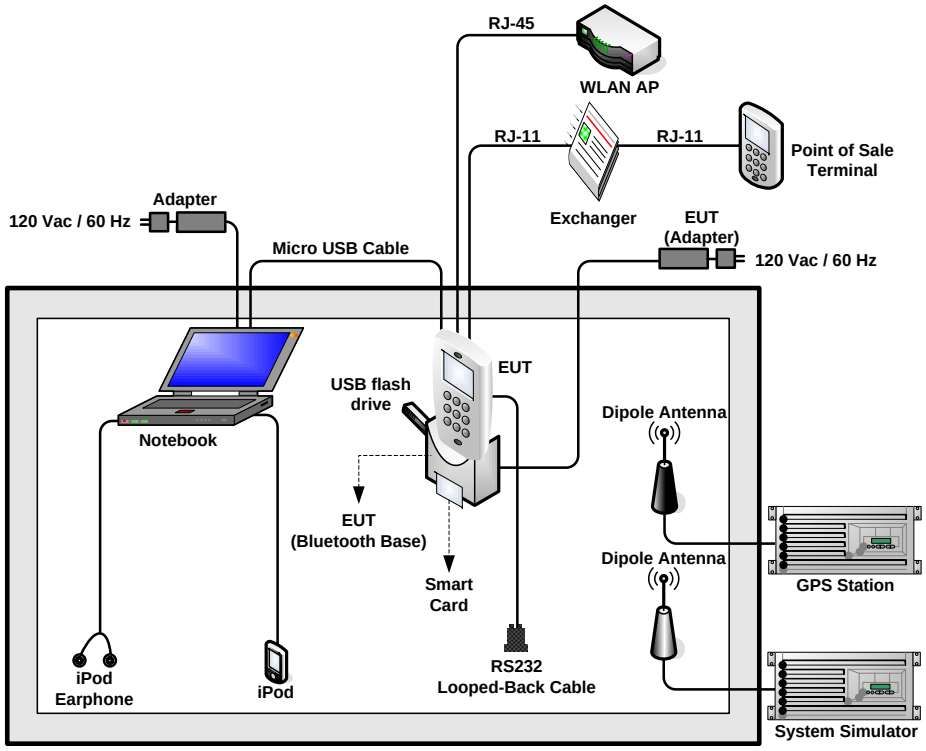
- FCC Part 15 Subpart C §15.225
- ANSI C63.4-2003

2.7 Table for Supporting Units

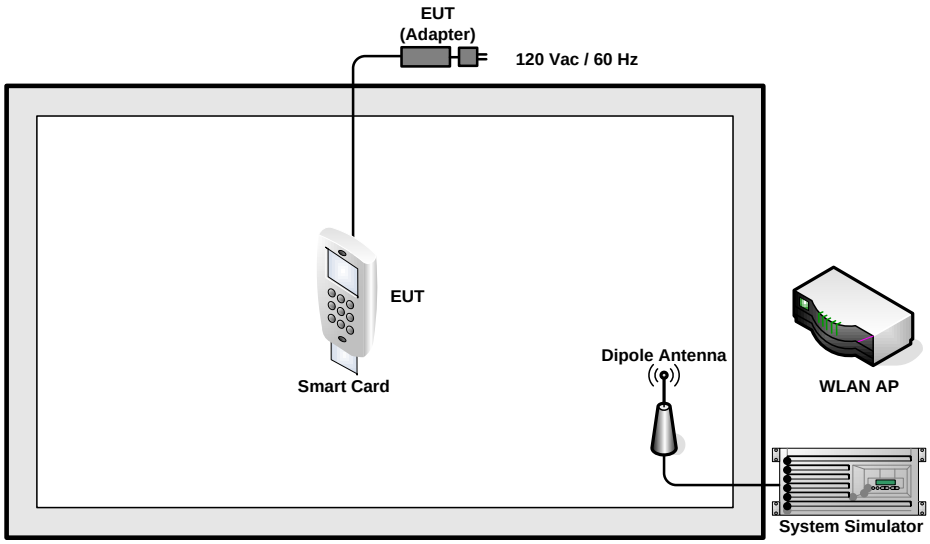
Support Unit	Manufacturer	Model	FCC ID
System Simulator	R&S	CMU 200	N/A
GPS Station	Pendulum	GSG-54	N/A
WLAN AP	D-Link	DIR-628	KA2DIR628A2
Notebook	DELL	Latitude E6320	FCC DoC/ Contains FCC ID: QDS-BRCM1054
Point of Sale Terminal	VeriFone	VX520	FCC DoC
Exchange	Sun Moon Star	SMS-4 PLUS	N/A
iPod	Apple	A1285	FCC DoC
iPod Earphone	Apple	N/A	Verification
Smart Card	N/A	N/A	N/A
MSR Card	N/A	N/A	N/A
Point of Sale Terminal	VeriFone	VX520	FCC DoC
USB flash drive	SP	Touch T01	N/A

2.8 Test Configurations

<AC Conducted Emissions for Data Link with Notebook >

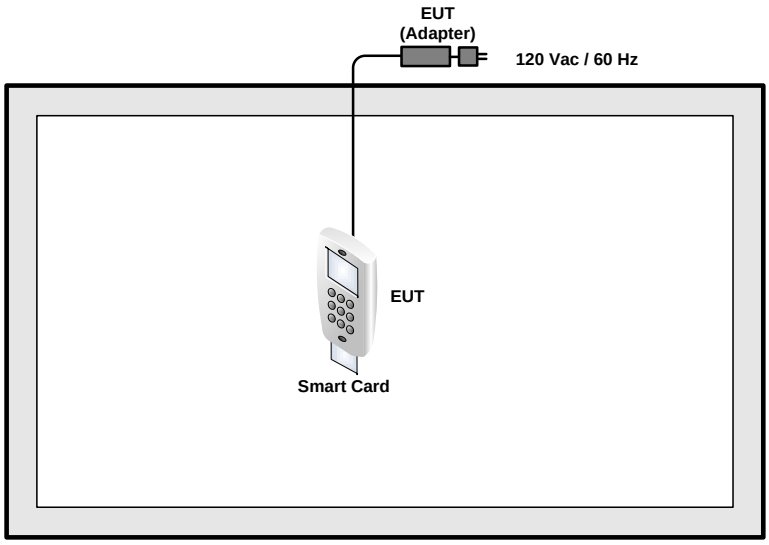


<AC Conducted Emissions for Adapter Mode >



<Fundamental Emissions and Mask Measurement>

For radiated emissions 9kHz~30MHz and 30MHz~1GHz



3. TEST RESULT

3.1 AC Power Line Conducted Emissions Measurement

3.1.1 Limit

For a Low-power Radio-frequency device which is designed to be connected to the 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 below limits table.

Frequency (MHz)	QP Limit (dBμV)	AV Limit (dBμV)
0.15~0.5	66~56	56~46
0.5~5	56	46
5~30	60	50

3.1.2 Measuring Instruments and Setting

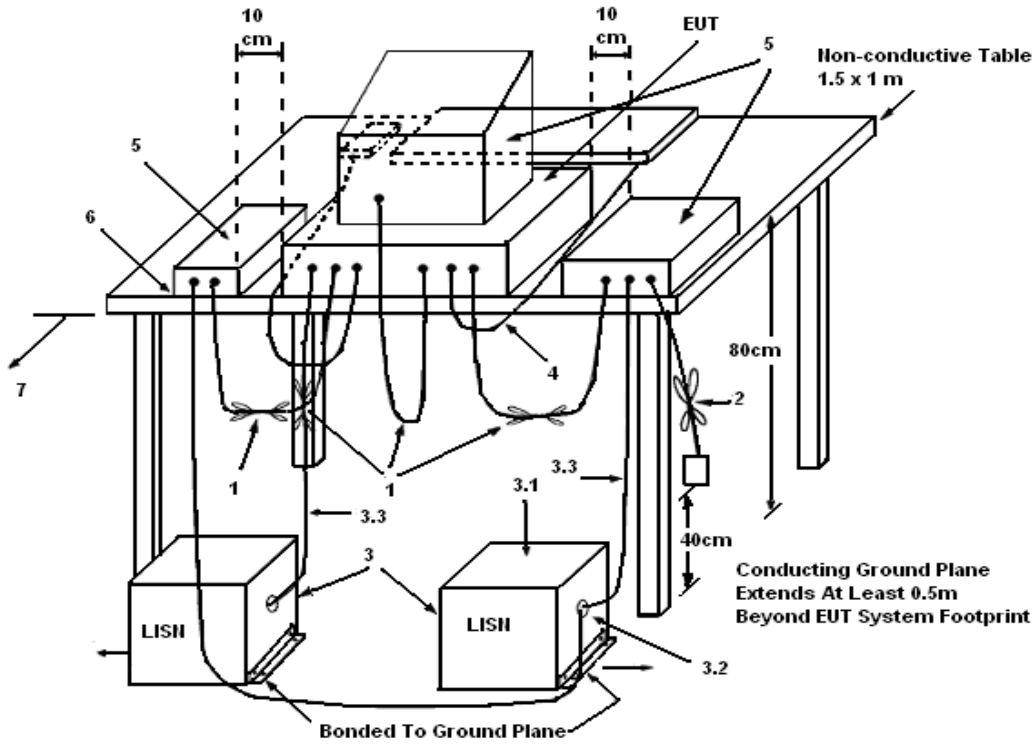
Please refer to section 4 of equipments list in this report. The following table is the setting of the receiver.

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

3.1.3 Test Procedures

1. Configure the EUT according to ANSI C63.4. The EUT or host of EUT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT or host of EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connected to the other LISNs. The LISN should provide 50uH/50ohms coupling impedance.
4. The frequency range from 150 kHz to 30 MHz was searched.
5. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. The measurement has to be done between each power line and ground at the power terminal.

3.1.4 Test Setup Layout



LEGEND:

(1) Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

(2) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

(3) EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω. LISN can be placed on top of, or immediately beneath, reference ground plane.

(3.1) All other equipment powered from additional LISN(s).

(3.2) Multiple outlet strip can be used for multiple power cords of non-EUT equipment.

(3.3) LISN at least 80 cm from nearest part of EUT chassis.

(4) Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use.

(5) Non-EUT components of EUT system being tested.

(6) Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.

(7) Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.

3.1.5 Test Deviation

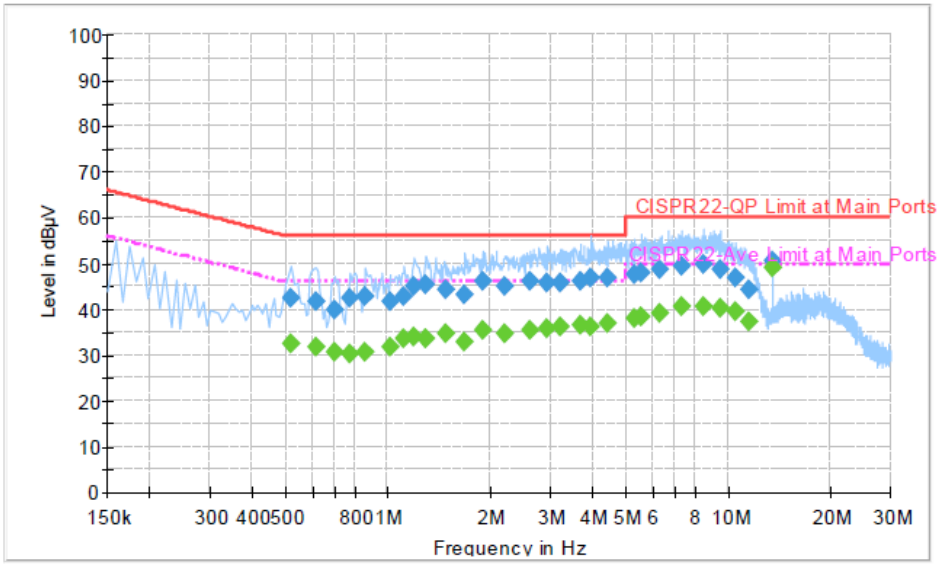
There is no deviation with the original standard.

3.1.6 EUT Operation during Test

The EUT was placed on the test table and programmed in transmitting function.

3.1.7 Results of AC Power Line Conducted Emissions Measurement

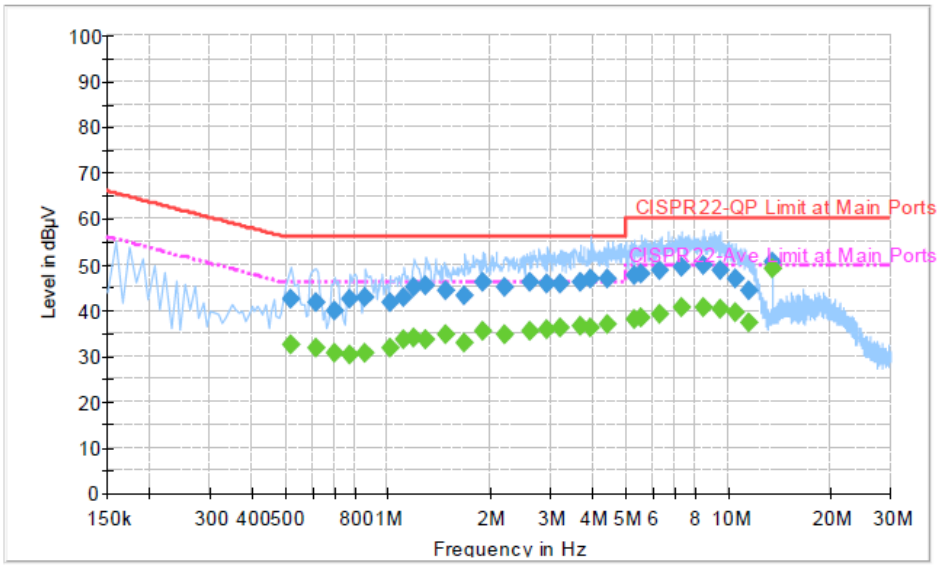
Final Test Date	Apr. 23, 2014 ~ Apr. 28, 2014	**Test Site No.**	CO05-HY
Temperature	20~22℃	**Humidity**	45~47%
Test Engineer	Cosmo Xu	**Configuration**	Transmitting Mode (13.56MHz)
		Phase	Line
Mode	GSM850 (GPRS 8) Idle + Bluetooth Link + MSR On + Smart Card + SD Card + Printer + RFID On + GPS Rx + Battery 2 + Bluetooth Base (Charging from Adapter 1) + USB flash drive + Micro USB Cable (Data Link with Notebook) + RJ-45 (Load) + RJ-11 (Load) + RS232 (Load)		



Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.518000	42.6	Off	L1	19.3	13.4	56.0
0.614000	41.7	Off	L1	19.4	14.3	56.0
0.702000	39.9	Off	L1	19.5	16.1	56.0
0.774000	42.5	Off	L1	19.4	13.5	56.0
0.862000	42.7	Off	L1	19.5	13.3	56.0
1.014000	41.6	Off	L1	19.5	14.4	56.0
1.118000	42.8	Off	L1	19.5	13.2	56.0
1.198000	45.0	Off	L1	19.6	11.0	56.0
1.294000	45.3	Off	L1	19.5	10.7	56.0
1.486000	44.2	Off	L1	19.5	11.8	56.0
1.686000	43.3	Off	L1	19.5	12.7	56.0
1.894000	46.3	Off	L1	19.6	9.7	56.0
2.214000	45.2	Off	L1	19.6	10.8	56.0

Final Test Date	Apr. 23, 2014 ~ Apr. 28, 2014	Test Site No.	CO05-HY
Temperature	20~22℃	Humidity	45~47%
Test Engineer	Cosmo Xu	Configuration	Transmitting Mode (13.56MHz)
		Phase	Line
Mode	GSM850 (GPRS 8) Idle + Bluetooth Link + MSR On + Smart Card + SD Card + Printer + RFID On + GPS Rx + Battery 2 + Bluetooth Base (Charging from Adapter 1) + USB flash drive + Micro USB Cable (Data Link with Notebook) + RJ-45 (Load) + RJ-11 (Load) + RS232 (Load)		



Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
2.614000	46.0	Off	L1	19.6	10.0	56.0
2.950000	45.8	Off	L1	19.6	10.2	56.0
3.222000	45.8	Off	L1	19.6	10.2	56.0
3.678000	46.0	Off	L1	19.6	10.0	56.0
3.942000	46.7	Off	L1	19.6	9.3	56.0
4.446000	47.0	Off	L1	19.6	9.0	56.0
5.294000	47.8	Off	L1	19.6	12.2	60.0
5.574000	48.1	Off	L1	19.6	11.9	60.0
6.278000	48.5	Off	L1	19.6	11.5	60.0
7.286000	49.4	Off	L1	19.6	10.6	60.0
8.430000	49.8	Off	L1	19.6	10.2	60.0
9.470000	48.8	Off	L1	19.7	11.2	60.0
10.502000	46.9	Off	L1	19.7	13.1	60.0
11.566000	44.3	Off	L1	19.7	15.7	60.0
13.558000	50.7	Off	L1	19.8	9.3	60.0

Final Test Date	Apr. 23, 2014 ~ Apr. 28, 2014	Test Site No.	CO05-HY
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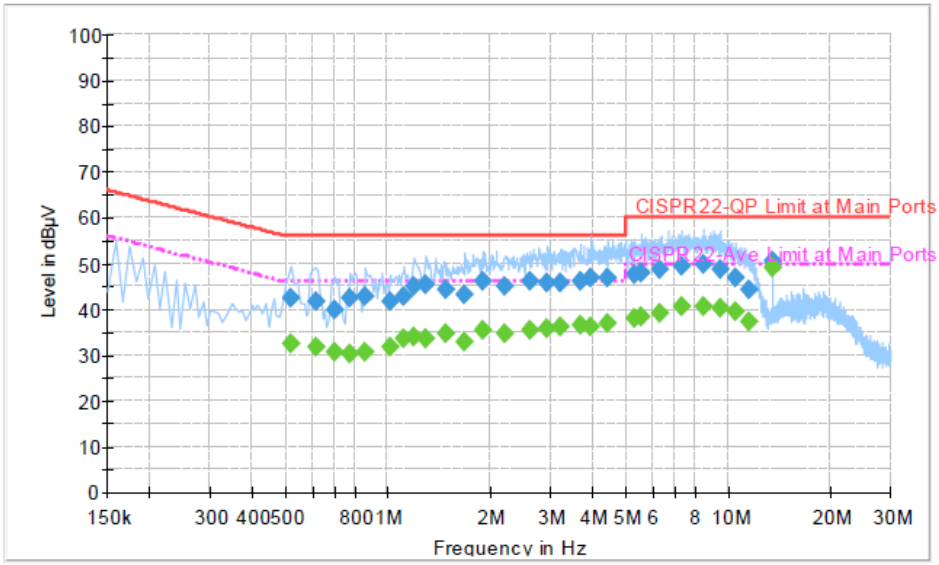
Test Engineer	Cosmo Xu	Configuration	Transmitting Mode (13.56MHz)
		Phase	Line
Mode	GSM850 (GPRS 8) Idle + Bluetooth Link + MSR On + Smart Card + SD Card + Printer + RFID On + GPS Rx + Battery 2 + Bluetooth Base (Charging from Adapter 1) + USB flash drive + Micro USB Cable (Data Link with Notebook) + RJ-45 (Load) + RJ-11 (Load) + RS232 (Load)		



Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.518000	32.3	Off	L1	19.3	13.7	46.0
0.614000	31.7	Off	L1	19.4	14.3	46.0
0.702000	30.7	Off	L1	19.5	15.3	46.0
0.774000	30.1	Off	L1	19.4	15.9	46.0
0.862000	30.7	Off	L1	19.5	15.3	46.0
1.014000	31.7	Off	L1	19.5	14.3	46.0
1.118000	33.5	Off	L1	19.5	12.5	46.0
1.198000	33.8	Off	L1	19.6	12.2	46.0
1.294000	33.7	Off	L1	19.5	12.3	46.0
1.486000	34.9	Off	L1	19.5	11.1	46.0
1.686000	32.7	Off	L1	19.5	13.3	46.0
1.894000	35.6	Off	L1	19.6	10.4	46.0
2.214000	34.9	Off	L1	19.6	11.1	46.0

Final Test Date	Apr. 23, 2014 ~ Apr. 28, 2014	Test Site No.	CO05-HY
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Test Engineer	Cosmo Xu	Configuration	Transmitting Mode (13.56MHz)
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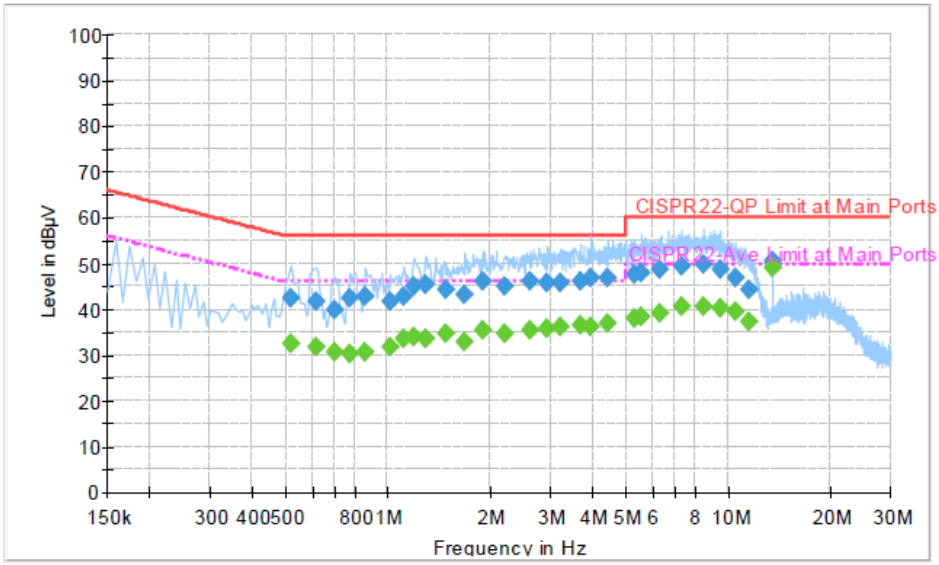
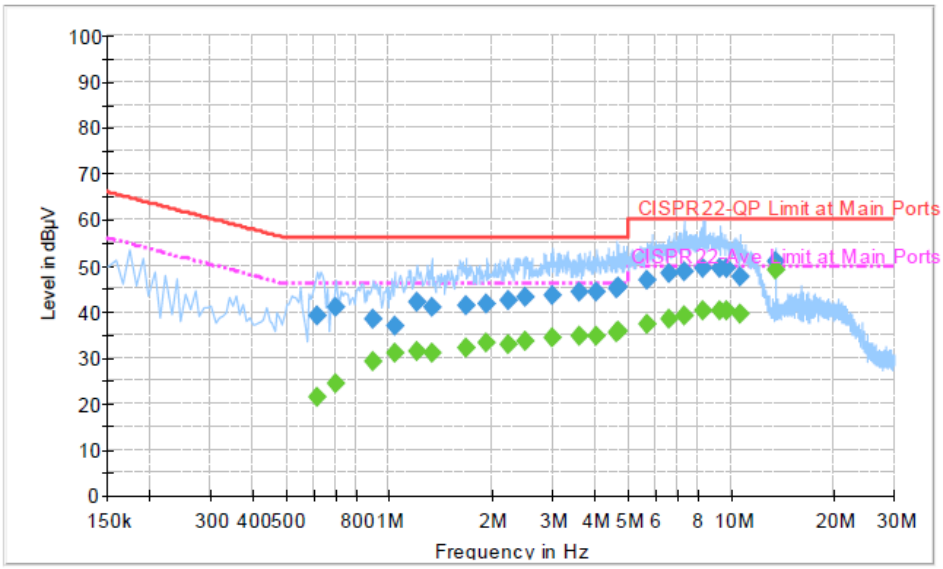


Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
2.614000	35.3	Off	L1	19.6	10.7	46.0
2.950000	35.8	Off	L1	19.6	10.2	46.0
3.222000	36.1	Off	L1	19.6	9.9	46.0
3.678000	36.6	Off	L1	19.6	9.4	46.0
3.942000	36.3	Off	L1	19.6	9.7	46.0
4.446000	36.9	Off	L1	19.6	9.1	46.0
5.294000	37.9	Off	L1	19.6	12.1	50.0
5.574000	38.4	Off	L1	19.6	11.6	50.0
6.278000	39.0	Off	L1	19.6	11.0	50.0
7.286000	40.4	Off	L1	19.6	9.6	50.0
8.430000	40.7	Off	L1	19.6	9.3	50.0
9.470000	40.1	Off	L1	19.7	9.9	50.0
10.502000	39.3	Off	L1	19.7	10.7	50.0
11.566000	37.2	Off	L1	19.7	12.8	50.0
13.558000	49.0	Off	L1	19.8	1.0	50.0

Final Test Date	Apr. 23, 2014 ~ Apr. 28, 2014	Test Site No.	CO05-HY
Temperature	20~22℃	Humidity	45~47%
Test Engineer	Cosmo Xu	Configuration	Transmitting Mode (13.56MHz)
		Phase	Neutral
Mode	GSM850 (GPRS 8) Idle + Bluetooth Link + MSR On + Smart Card + SD Card + Printer + RFID On + GPS Rx + Battery 2 + Bluetooth Base (Charging from Adapter 1) + USB flash drive + Micro USB Cable (Data Link with Notebook) + RJ-45 (Load) + RJ-11 (Load) + RS232 (Load)		



Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.614000	39.0	Off	N	19.4	17.0	56.0
0.702000	41.0	Off	N	19.5	15.0	56.0
0.902000	38.3	Off	N	19.5	17.7	56.0
1.038000	36.7	Off	N	19.5	19.3	56.0
1.206000	42.1	Off	N	19.6	13.9	56.0
1.334000	40.8	Off	N	19.5	15.2	56.0
1.678000	41.3	Off	N	19.5	14.7	56.0
1.934000	41.6	Off	N	19.5	14.4	56.0
2.222000	42.5	Off	N	19.6	13.5	56.0
2.510000	43.2	Off	N	19.6	12.8	56.0
3.014000	43.4	Off	N	19.6	12.6	56.0
3.622000	44.2	Off	N	19.6	11.8	56.0

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		Phase	Neutral
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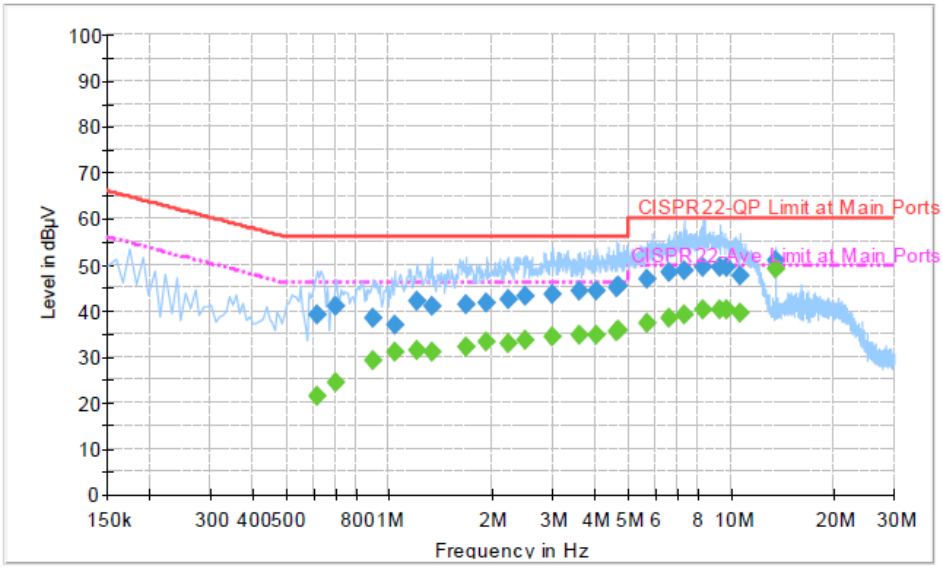

Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
4.046000	44.1	Off	N	19.6	11.9	56.0
4.630000	45.1	Off	N	19.7	10.9	56.0
4.686000	45.2	Off	N	19.6	10.8	56.0
5.670000	46.7	Off	N	19.7	13.3	60.0
6.614000	48.5	Off	N	19.7	11.5	60.0
7.262000	48.8	Off	N	19.7	11.2	60.0
8.294000	49.3	Off	N	19.7	10.7	60.0
9.254000	49.6	Off	N	19.7	10.4	60.0
9.670000	49.5	Off	N	19.8	10.5	60.0
10.670000	47.6	Off	N	19.7	12.4	60.0
13.558000	51.0	Off	N	19.9	9.0	60.0

Final Test Date	Apr. 23, 2014 ~ Apr. 28, 2014	Test Site No.	CO05-HY
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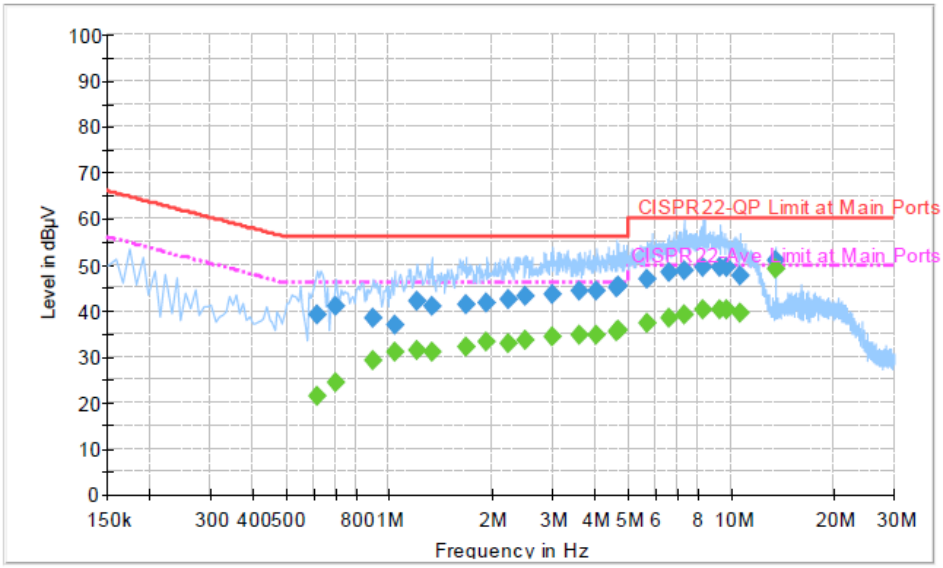
Test Engineer	Cosmo Xu	Configuration	Transmitting Mode (13.56MHz)
		Phase	Neutral
Mode	GSM850 (GPRS 8) Idle + Bluetooth Link + MSR On + Smart Card + SD Card + Printer + RFID On + GPS Rx + Battery 2 + Bluetooth Base (Charging from Adapter 1) + USB flash drive + Micro USB Cable (Data Link with Notebook) + RJ-45 (Load) + RJ-11 (Load) + RS232 (Load)		



Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.614000	21.4	Off	N	19.4	24.6	46.0
0.702000	24.5	Off	N	19.5	21.5	46.0
0.902000	29.2	Off	N	19.5	16.8	46.0
1.038000	31.1	Off	N	19.5	14.9	46.0
1.206000	31.4	Off	N	19.6	14.6	46.0
1.334000	31.2	Off	N	19.5	14.8	46.0
1.678000	32.3	Off	N	19.5	13.7	46.0
1.934000	33.2	Off	N	19.5	12.8	46.0
2.222000	32.9	Off	N	19.6	13.1	46.0
2.510000	33.6	Off	N	19.6	12.4	46.0
3.014000	34.4	Off	N	19.6	11.6	46.0
3.622000	34.7	Off	N	19.6	11.3	46.0

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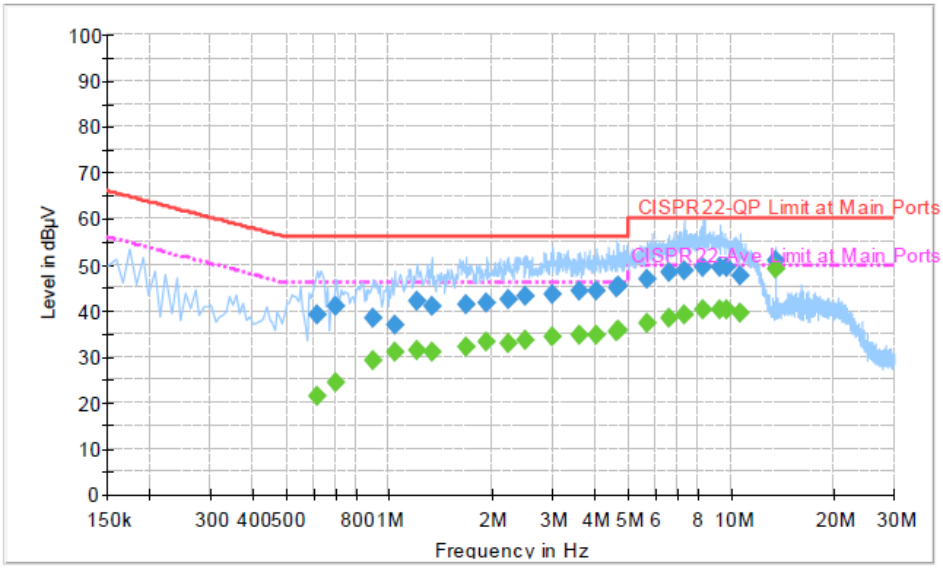
Temperature	20~22℃	Humidity	45~47%
Test Engineer	Cosmo Xu	Configuration	Transmitting Mode (13.56MHz)
		Phase	Neutral
Mode	GSM850 (GPRS 8) Idle + Bluetooth Link + MSR On + Smart Card + SD Card + Printer + RFID On + GPS Rx + Battery 2 + Bluetooth Base (Charging from Adapter 1) + USB flash drive + Micro USB Cable (Data Link with Notebook) + RJ-45 (Load) + RJ-11 (Load) + RS232 (Load)		



Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
4.046000	34.6	Off	N	19.6	11.4	46.0
4.630000	35.3	Off	N	19.7	10.7	46.0
4.686000	35.8	Off	N	19.6	10.2	46.0
5.670000	37.3	Off	N	19.7	12.7	50.0
6.614000	38.5	Off	N	19.7	11.5	50.0
7.262000	39.2	Off	N	19.7	10.8	50.0
8.294000	40.1	Off	N	19.7	9.9	50.0
9.254000	40.2	Off	N	19.7	9.8	50.0
9.670000	40.1	Off	N	19.8	9.9	50.0
10.670000	39.4	Off	N	19.7	10.6	50.0
13.558000	48.9	Off	N	19.9	1.1	50.0

3.2 Field Strength of Fundamental Emissions and Mask Measurement

3.2.1 Limit

Field strength of fundamental emissions limit:

The field strength of fundamental emissions shall not exceed 15848 microvolts/meter at 30 meters. The emissions limit in this paragraph is based on measurement instrumentation employing a QP detector.

Frequencies (MHz)	Field Strength (microvolts/meter)	Field Strength (dBμV/m) at 10m	Field Strength (dBμV/m) at 3m
13.553 ~ 13.567MHz	15848 at 30m	103.08 (QP)	124 (QP)

Mask limit:

Rules and specifications	CFR 47 Part 15 section 15.225(a)-(d)				
Description	Compliance with the spectrum mask is tested using a spectrum analyzer with RBW set to a 9kHz for the band 13.553~13.567MHz				
Limit	Freq. of Emission (MHz)	Field Strength (μV/m) at 30m	Field Strength (dBμV/m) at 30m	Field Strength (dBμV/m) at 10m	Field Strength (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

3.2.2 Measuring Instruments and Setting

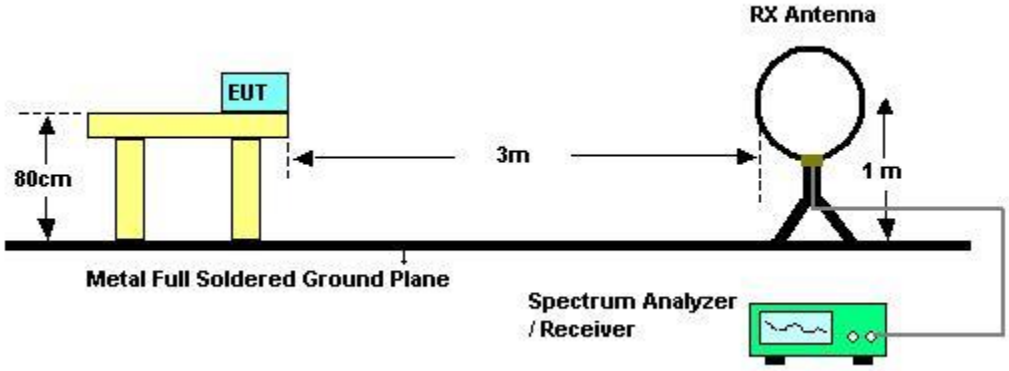
Please refer to section 4 of equipments list in this report. The following table is the setting of the receiver.

Receiver Parameter	Setting
Attenuation	Auto
Center Frequency	Fundamental Frequency
RBW	9 kHz
Detector	QP

3.2.3 Test Procedures

1. Configure the EUT according to ANSI C63.4. 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.
6. Compliance with the spectrum mask is tested using a spectrum analyzer with RBW set to a 9kHz for the band 13.553~13.567MHz.

3.2.4 Test Setup Layout



3.2.5 Test Deviation

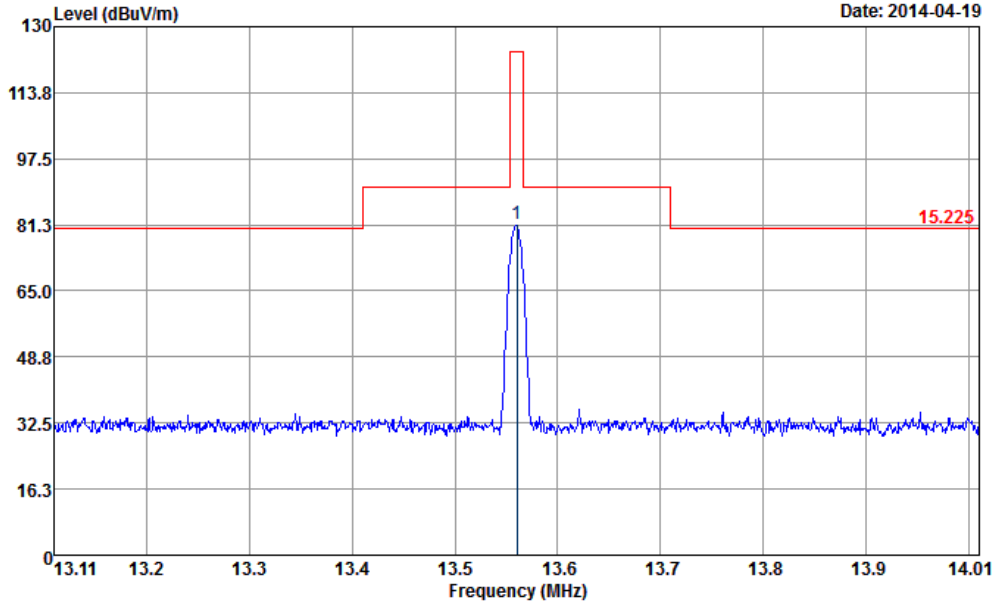
There is no deviation with the original standard.

3.2.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

3.2.7 Test Result of Field Strength of Fundamental Emissions

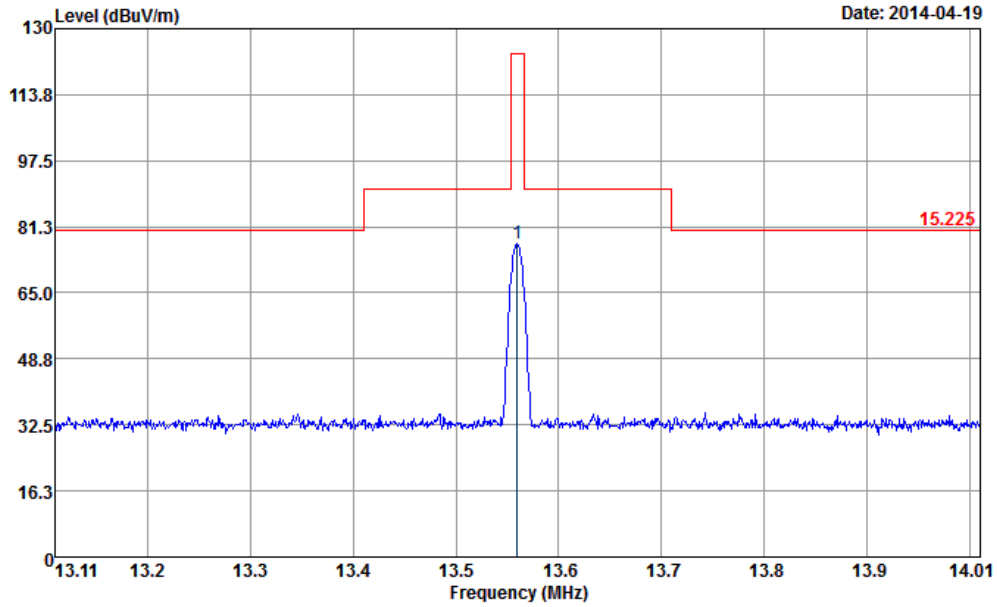
Final Test Date	Apr. 19, 2014	Test Site No.	03CH07-HY
Temperature	21~23°C	Humidity	47~49%
Test Engineer	Eric Shih	Configurations	Ch. 1
		Polarization	Horizontal



Site : 03CH07-HY
Condition : 15.225 3m NFC FACTOR(120912)-H HORIZONTAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg	
1	13.56	81.51	-42.49	124.00	61.36	19.75	0.40	100	181	QP

Final Test Date	Apr. 19, 2014	Test Site No.	03CH07-HY
Temperature	21~23°C	Humidity	47~49%
Test Engineer	Eric Shih	Configurations	Ch. 1
		Polarization	Vertical



Site : 03CH07-HY
Condition : 15.225 3m NFC FACTOR(120912)-V VERTICAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg	
1	13.56	77.11	-46.89	124.00	56.96	19.75	0.40	100	268	QP

Note:

1. Emission level (dBμV/m) = 20 log Emission level (μV/m).
2. Measured distance is 3m.
3. All emissions emit form non-NFC function of digital unintentional emissions. All NFC's spurious emissions are below 20dB of limits.

3.3 20dB Spectrum Bandwidth Measurement

3.3.1 Limit

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

3.3.2 Measuring Instruments and Setting

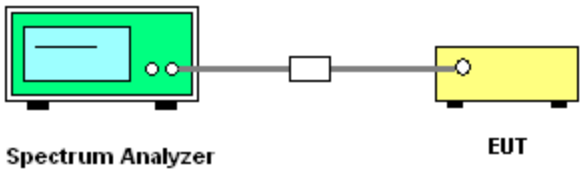
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> 20dB Bandwidth
RBW	1 kHz
VBW	3 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

3.3.3 Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak 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.

3.3.4 Test Setup Layout



3.3.5 Test Deviation

There is no deviation with the original standard.

3.3.6 EUT Operation during Test

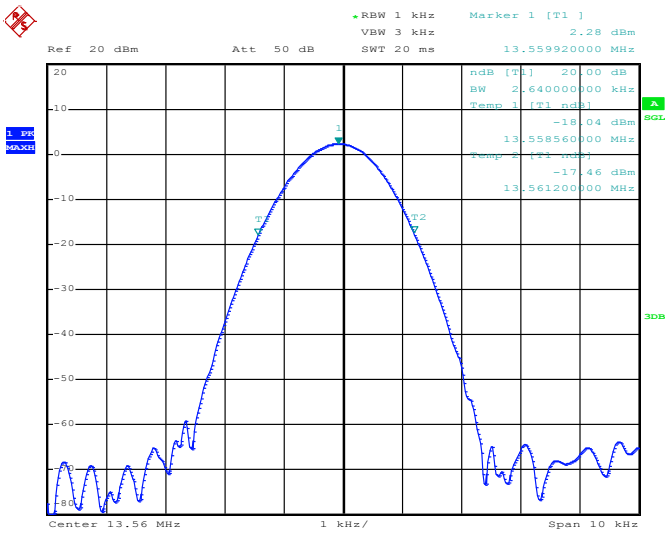
The EUT was programmed to be in continuously transmitting mode.

3.3.7 Test Result of 20dB Spectrum Bandwidth

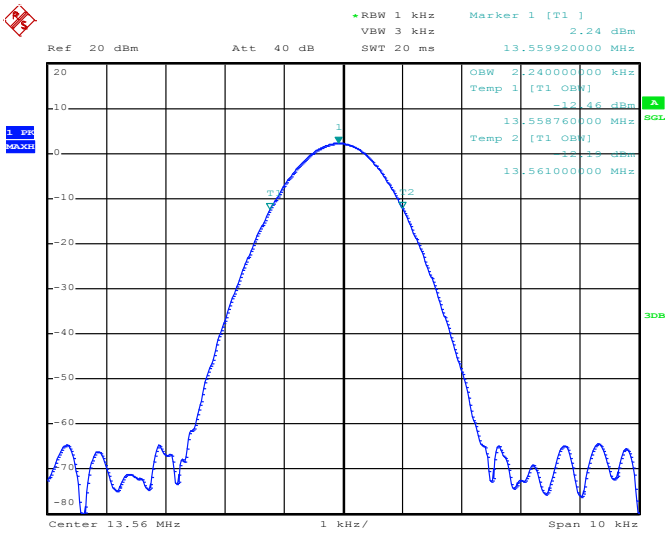
Final Test Date	Apr. 24, 2014	Test Site No.	TH02-HY
Temperature	22~24℃	Humidity	53~55%
Test Engineer	Tommy Lee	Configurations	Ch. 1

Frequency	20dB BW (kHz)	99% OBW (kHz)	Frequency range (MHz) f_L > 13.553MHz	Frequency range (MHz) f_H < 13.567MHz	Test Result
13.56 MHz	2.640	2.240	13.55856	13.56120	**Complies**

20 dB / 99% Bandwidth Plot on 13.56 MHz



Date: 24.APR.2014 10:07:59



Date: 24.APR.2014 10:17:56

3.4 Radiated Emissions Measurement

3.4.1 Limit

The field strength of any emissions which appear outside of 13.553 ~ 13.567MHz band shall not exceed the general radiated emissions limits.

Frequencies (MHz)	Field Strength (μV/m)	Measurement Distance (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

3.4.2 Measuring Instruments and Setting

Please refer to section 4 of equipment list in this report. The following table is the setting of receiver.

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RBW 120kHz for Peak

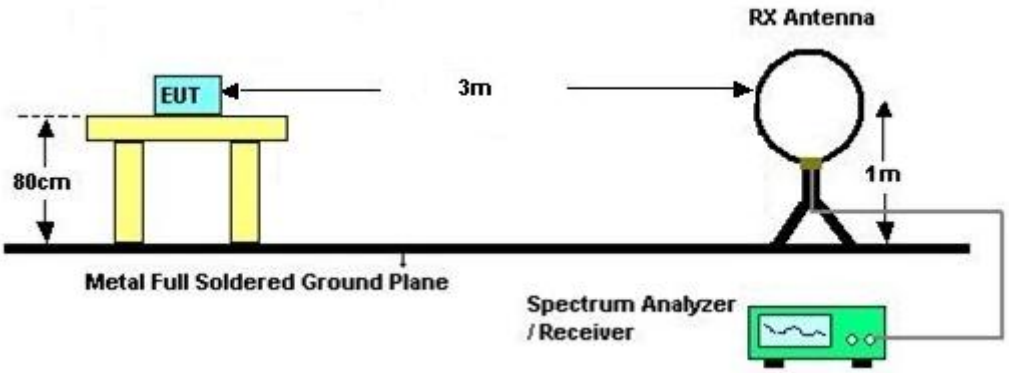
Note: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.

3.4.3 Test Procedures

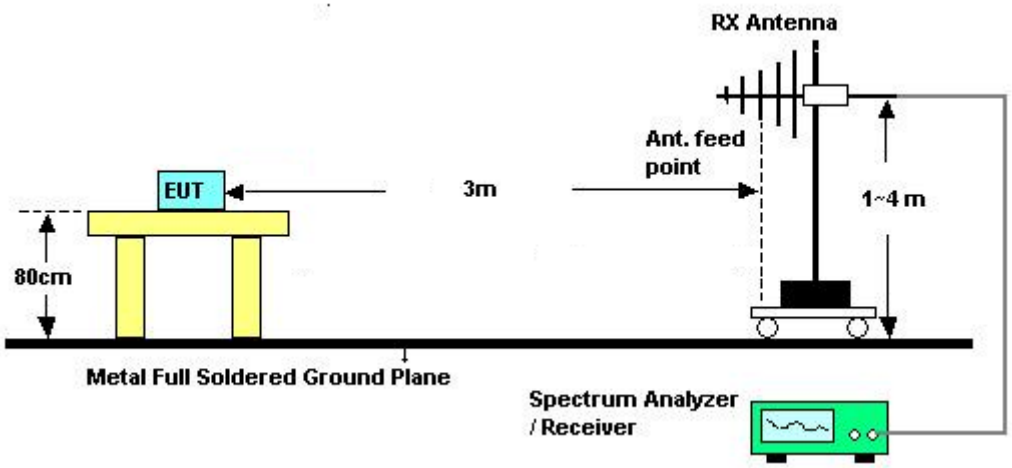
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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. High – Low scan is not required in this case.

3.4.4 Test Setup Layout

For radiated emissions below 30MHz



For radiated emissions above 30MHz



3.4.5 Test Deviation

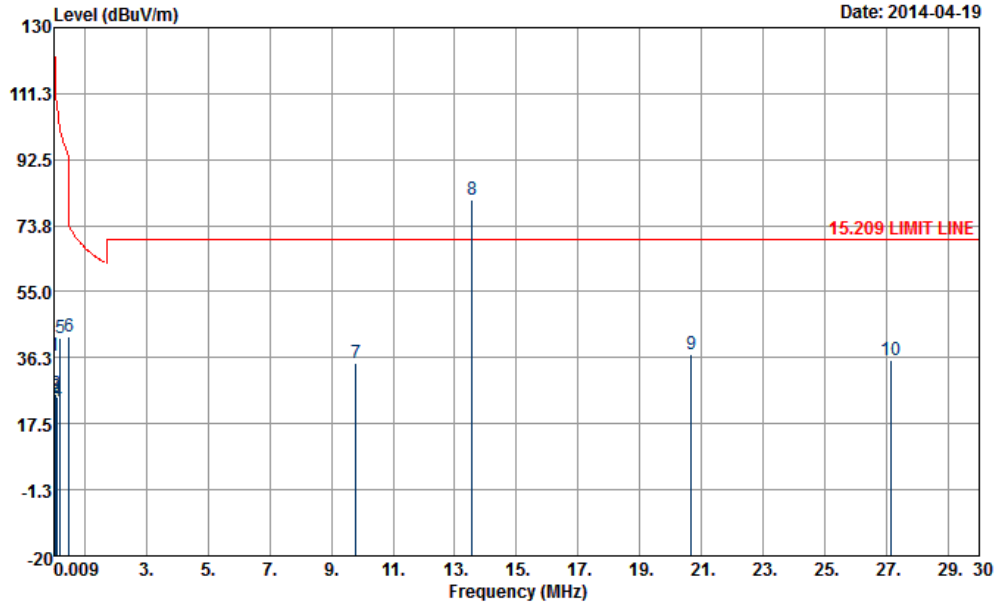
There is no deviation with the original standard.

3.4.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

3.4.7 Results of Radiated Emissions (9 kHz~30MHz)

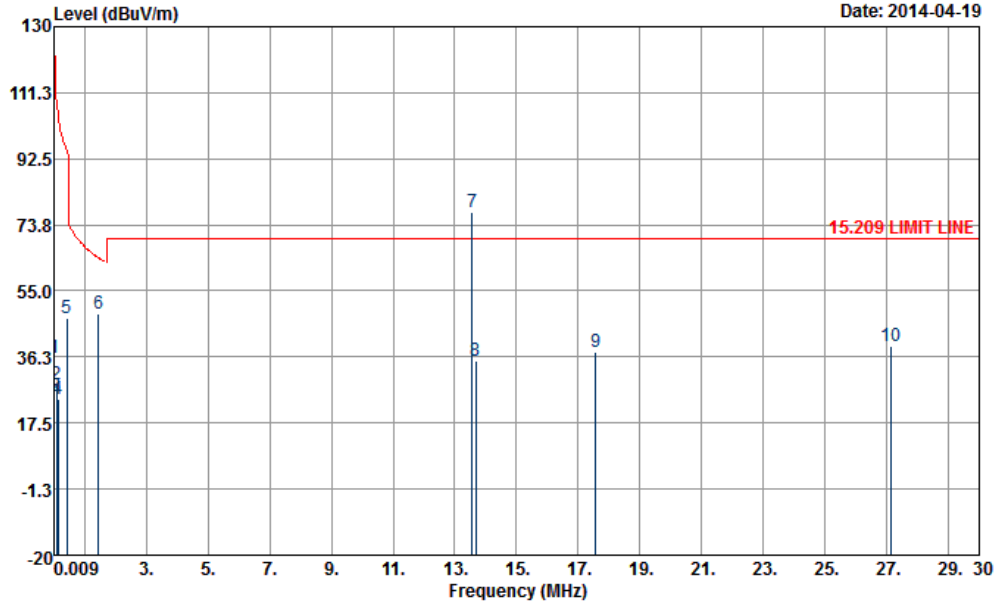
Final Test Date	Apr. 19, 2014	Test Site No.	03CH07-HY
Temperature	21~23°C	Humidity	47~49%
Test Engineer	Eric Shih	Configurations	Ch. 1
		Polarization	Horizontal



Site : 03CH07-HY
Condition : 15.209 LIMIT LINE 3m NFC FACTOR(120912)-H HORIZONTAL

		Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	A/Pos	T/Pos	Remark
		MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg	
1		0.01	37.00	-88.65	125.65	16.45	20.26	0.29	---	---	Average
2		0.07	25.90	-84.62	110.52	5.50	20.11	0.29	---	---	Average
3		0.10	25.31	-82.28	107.59	4.95	20.07	0.29	---	---	QP
4		0.11	23.99	-82.47	106.46	3.64	20.06	0.29	---	---	Average
5		0.21	41.88	-59.23	101.11	21.57	20.02	0.29	---	---	Average
6		0.49	42.29	-31.51	73.80	22.00	20.00	0.29	100	177	QP
7		9.79	34.56	-35.44	70.00	14.42	19.75	0.39	---	---	QP
8	*	13.56	81.16			61.01	19.75	0.40	---	---	QP
9		20.67	37.26	-32.74	70.00	16.63	20.20	0.43	---	---	QP
10		27.12	35.61	-34.39	70.00	14.75	20.38	0.48	---	---	QP

Final Test Date	Apr. 19, 2014	Test Site No.	03CH07-HY
Temperature	21~23°C	Humidity	47~49%
Test Engineer	Eric Shih	Configurations	Ch. 1
		Polarization	Vertical



Site : 03CH07-HY
Condition : 15.209 LIMIT LINE 3m NFC FACTOR(120912)-V VERTICAL

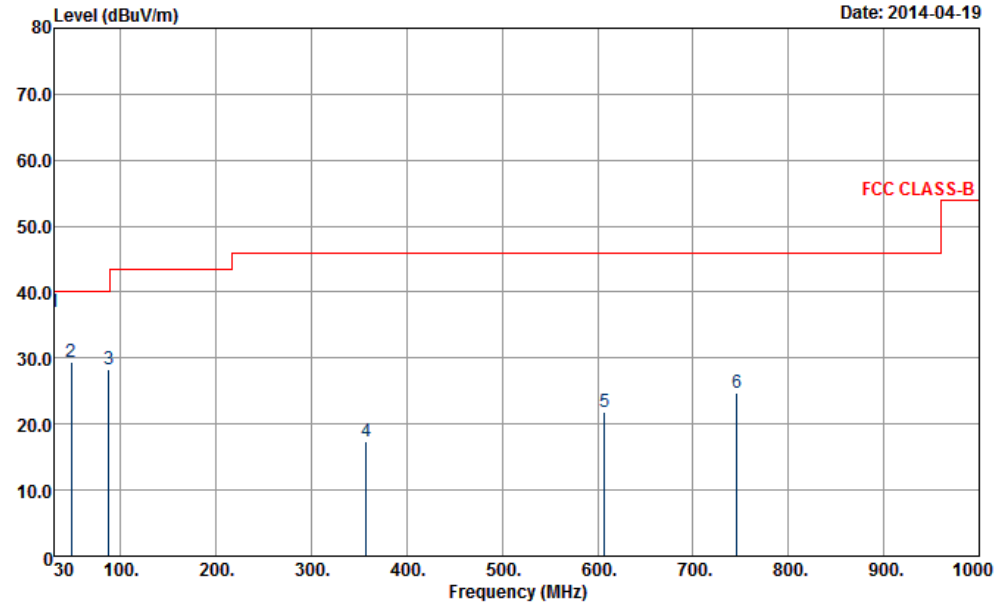
		Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	A/Pos	T/Pos	Remark
		MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	cm	deg	
1		0.02	36.16	-86.33	122.49	15.61	20.26	0.29	---	---	Average
2		0.08	28.43	-80.95	109.38	8.03	20.11	0.29	---	---	Average
3		0.10	24.94	-82.96	107.90	4.58	20.07	0.29	---	---	QP
4		0.14	24.21	-80.72	104.93	3.86	20.06	0.29	---	---	Average
5		0.42	47.14	-48.08	95.22	26.85	20.00	0.29	---	---	Average
6		1.45	48.35	-16.02	64.37	28.03	20.01	0.31	100	96	QP
7	*	13.56	77.25			57.10	19.75	0.40	---	---	QP
8		13.69	35.11	-34.89	70.00	14.97	19.74	0.40	---	---	QP
9		17.58	37.82	-32.18	70.00	17.53	19.87	0.42	---	---	QP
10		27.12	39.53	-30.47	70.00	18.67	20.38	0.48	---	---	QP

Note:

1. Remark 8 is transmitter's fundamental signal for Horizontal. Remark 7 is transmitter's fundamental signal for Vertical.
2. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
   Distance extrapolation factor = 40 log (specific distance / test distance) (dB);
   Limit line = specific limits (dBμV) + distance extrapolation factor.

3.4.8 Results for Radiated Emissions (30MHz~1GHz)

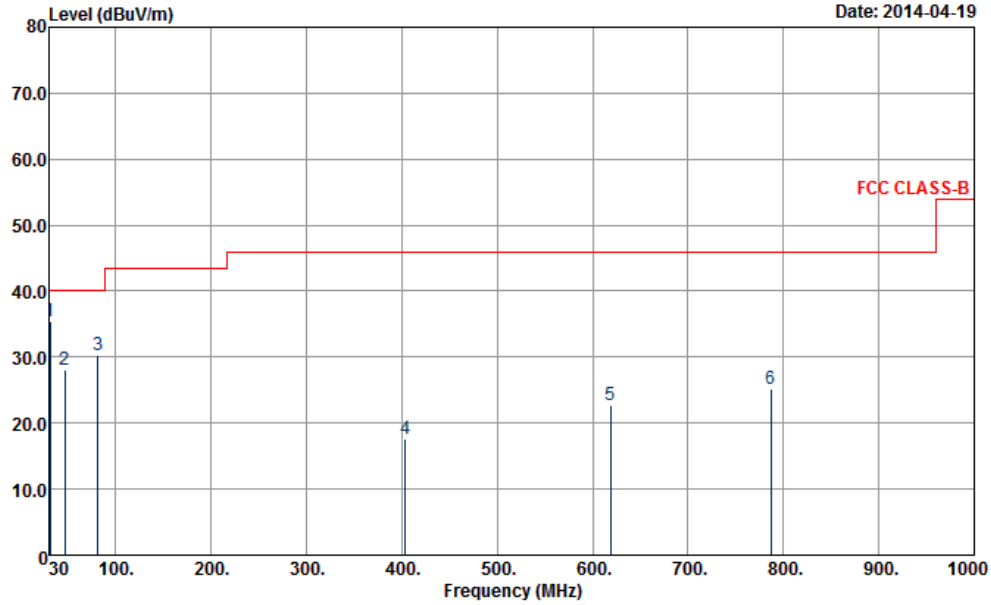
Final Test Date	Apr. 19, 2014	Test Site No.	03CH07-HY
Temperature	21~23°C	Humidity	47~49%
Test Engineer	Eric Shih	Configurations	Ch. 1
		Polarization	Horizontal



Site : 03CH07-HY
Condition : FCC CLASS-B 3m LF-ANT(131102) HORIZONTAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	30.00	36.99	-3.01	40.00	49.16	18.80	0.53	31.50	125	193	Peak
2	48.36	29.34	-10.66	40.00	50.76	9.10	0.68	31.20	---	---	Peak
3	87.78	28.23	-11.77	40.00	49.94	8.46	0.93	31.10	---	---	Peak
4	357.40	17.41	-28.59	46.00	31.82	14.64	2.04	31.09	---	---	Peak
5	607.30	21.81	-24.19	46.00	29.88	19.81	2.71	30.59	---	---	Peak
6	745.90	24.74	-21.26	46.00	29.95	22.14	3.05	30.40	---	---	Peak

Final Test Date	Apr. 19, 2014	Test Site No.	03CH07-HY
Temperature	21~23°C	Humidity	47~49%
Test Engineer	Eric Shih	Configurations	Ch. 1
		Polarization	Vertical



Site : 03CH07-HY
Condition : FCC CLASS-B 3m LF-ANT(131102) VERTICAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	31.08	35.49	-4.51	40.00	48.13	18.28	0.54	31.46	133	208	Peak
2	46.47	28.11	-11.89	40.00	48.84	9.80	0.67	31.20	---	---	Peak
3	81.30	30.24	-9.76	40.00	53.30	7.22	0.89	31.17	---	---	Peak
4	403.60	17.64	-28.36	46.00	30.37	16.01	2.15	30.89	---	---	Peak
5	618.50	22.73	-23.27	46.00	30.37	20.17	2.75	30.56	---	---	Peak
6	786.50	25.16	-20.84	46.00	30.43	21.94	3.12	30.33	---	---	Peak

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 (dBμV/m) = 20 log Emission level (μV/m).
3. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor= Level.

3.5 Frequency Stability Measurement

3.5.1 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.

3.5.2 Measuring Instruments and Setting

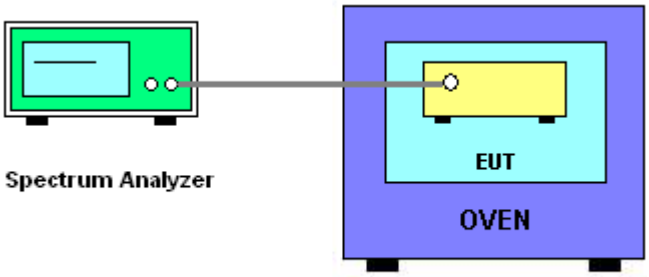
Please refer to section 4 of equipment list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Entire absence of modulation emissions bandwidth
RBW	1 kHz
VBW	3 kHz
Sweep Time	Auto

3.5.3 Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. EUT have transmitted absence of modulation signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4. Set RBW = 1 kHz, VBW = 3 kHz with peak detector and maxhold settings.
5. fc is declaring of channel frequency. Then the frequency error formula is (fc-f)/fc × 10^6 ppm and the limit is less than ±100ppm.
6. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
7. Extreme temperature rule is -20°C~50°C.

3.5.4 Test Setup Layout



3.5.5 Test Deviation

There is no deviation with the original standard.

3.5.6 EUT Operation during Test

The EUT was programmed to be in continuously un-modulation transmitting mode.

3.5.7 Test Result of Frequency Stability

Final Test Date	Apr. 24, 2014	Test Site No.	TH02-HY
Temperature	22~24℃	Humidity	53~55%
Test Engineer	Tommy Lee	Configurations	Ch. 1

Voltage vs. Frequency Stability

Voltage(V)	Measurement Frequency (MHz)
120	13.559880
102	13.559880
138	13.559880
Max. Deviation (MHz)	-0.000120
Max. Deviation (ppm)	-8.8496

Temperature vs. Frequency Stability

Temperature (℃)	Measurement Frequency (MHz)
-20	13.559880
-10	13.559890
0	13.559890
10	13.559890
20	13.559880
30	13.559880
40	13.559880
50	13.559920
Max. Deviation (MHz)	-0.000120
Max. Deviation (ppm)	-8.8496

3.6 Antenna Requirements

3.6.1 Limit

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.

3.6.2 Antenna Connector Construction

Enbedded in Antenna.

4. LIST OF MEASURING EQUIPMENT

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz~40GHz	Jun. 07, 2013	Apr. 24, 2014	Jun. 06, 2014	Conducted (TH02-HY)
Thermal Chamber	Ten Billion	TTH-D3SP	TBN-930701	N/A	Jul. 19, 2013	Apr. 24, 2014	Jul. 18, 2014	Conducted (TH02-HY)
EMI Test Receiver	Rohde & Schwarz	ESCS 30	100356	9kHz ~ 2.75GHz	Nov. 15, 2013	Apr. 23, 2014 ~ Apr. 28, 2014	Nov. 14, 2014	Conduction (CO05-HY)
LISN (for auxiliary equipment)	Rohde & Schwarz	ENV216	100081	9kHz ~ 30MHz	Dec. 12, 2013	Apr. 23, 2014 ~ Apr. 28, 2014	Dec. 11, 2014	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz ~ 30MHz	Dec. 04, 2013	Apr. 23, 2014 ~ Apr. 28, 2014	Dec. 03, 2014	Conduction (CO05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Apr. 23, 2014 ~ Apr. 28, 2014	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9kHz~7GHz	Sep. 06, 2013	Apr. 19, 2014	Sep. 05, 2014	Radiation (03CH07-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	860004/0001	9 kHz~30 MhZ	Jul. 03, 2012	Apr. 19, 2014	Jul. 02, 2014	Radiation (03CH07-HY)
Bilog Antenna	Schaffner	CBL6111C	2726	30MHz ~ 1GHz	Oct. 10, 2013	Apr. 19, 2014	Oct. 09, 2014	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	10 MHz ~ 1000MHz 32dB GAIN	Mar. 17, 2014	Apr. 19, 2014	Mar. 16, 2015	Radiation (03CH07-HY)
Turn Table	ChainTek	ChainTek 3000	N/A	0 ~ 360 degree	N/A	Apr. 19, 2014	N/A	Radiation (03CH07-HY)
Antenna Mast	ChainTek	ChainTek 3000	N/A	N/A	N/A	Apr. 19, 2014	N/A	Radiation (03CH07-HY)

5. TEST LOCATION

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

6. TAF CERTIFICATE OF ACCREDITATION

Certificate No. : L1190-130110

財團法人全國認證基金會
Taiwan Accreditation Foundation

Certificate of Accreditation

This is to certify that

Sporton International Inc.
EMC & Wireless Communications Laboratory
No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.

is accredited in respect of laboratory

Accreditation Criteria	:	ISO/IEC 17025:2005
Accreditation Number	:	1190
Originally Accredited	:	December 15, 2003
Effective Period	:	January 10, 2013 to January 09, 2016
Accredited Scope	:	Testing Field, see described in the Appendix
Specific Accreditation Program	:	Accreditation Program for Designated Testing Laboratory for Commodities Inspection Accreditation Program for Telecommunication Equipment Testing Laboratory Accreditation Program for BSMI Mutual Recognition Arrangment with Foreign Authorities

Jay-San Chen
President, Taiwan Accreditation Foundation
Date:January 10, 2013

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The Appendix forms an integral part of this Certificate, which shall be invalid when use without the Appendix