STU Standard Technology Union Co., Ltd.

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FCC ID TEST REPORT

Application No.:	STUGZEMO120914942RF2
Applicant:	Hi-Target Surveying Instrument Co., Ltd
Address	10th Floor, Chuangxin Building, Tian'an Technology Zone, No.555, the North of Panyu Road, Panyu District, Guangzhou City, China
Equipment Under Test (EUT):	
EUT Name:	Qstar High Accuracy GIS Data Collection Handheld
Trade Mark:	HI-TARGET
Model No.:	Qstar5, Qstar6, Qstar8
Serial No.:	Not supplied by client
FCC ID:	O39ZHDQSTAR
Standards:	FCC PART 15B
Date of Receipt:	Sep.15, 2012
Date of Test:	Sep.15, 2012 to Oct.30, 2012
Test Result :	**PASS***

Tested By: David Li / Test Engineer…… David . Li ……

Reviewed By： Jimmy Yao / EMC Manager… Jimmy Yao .

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1. VERIFICATION OF COMPLIANCE

EUT Name:	Qstar High Accuracy GIS Data Collection Handheld
Trade Mark:	HI-TARGET
Model No.:	Qstar5, Qstar6, Qstar8
Model Difference:	All models are completely same except for model name and positioning software version of GPS module.
Applicant:	Hi-Target Surveying Instrument Co., Ltd 10th Floor, Chuangxin Building, Tian'an Technology Zone, No.555, the North of Panyu Road, Panyu District, Guangzhou City, China
Manufacturer:	Hi-Target Surveying Instrument Co., Ltd 10th Floor, Chuangxin Building, Tian'an Technology Zone, No.555, the North of Panyu Road, Panyu District, Guangzhou City, China
Type of Test:	FCC Class B
File Number:	STUGZEMO120914942RF2
Date of test:	Sep.15, 2012 to Oct.30, 2012
Deviation:	None
Condition of Test Sample:	Normal

The above equipment was tested by STU Standard Technology Union Co., Ltd. For compliance with the requirements set forth in the FCC Rules and Regulations Part 15, the measurement procedure according to ANSI C63.4:2003 This said equipment in the configuration described in this report shows the maximum emission levels emanating from equipment are within the compliance requirements.

The test results of this report relate only to the tested sample identified in this report.

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2. TEST LOCATION

All measurement facilities used to collect the measurement data are located at

Guangdong Electronic & Electrical Products Inspection and Supervision Institute（CGEL）
45 Cunnan Street, Shayongnan, Sanyuanli District, Guangzhou, Guangdong, China

The test site is constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003.

FCC Registration No.: 597719.

Industry Canada (IC) Assigned No.: 6664A.

China National Accreditation Service for Conformity Assessment (CNAS) No.: L0307.

3. SUPPORT EQUIPMENT LIST

Device Type	Manufacturer	Model Name	Serial No.	Data Cable	Power Cable
--	--	--	--	--	--

**Note: All the above equipment/cables were placed in worse case positions to maximize emission signals during emission test.

Grounding: Grounding was in accordance with the manufacturer's requirements and conditions for the intended use.

4. SYSTEM DESCRIPTION

EUT test procedure:

1. Connect EUT and peripheral devices (if any).
2. Power on the EUT, then EUT begins to work.
3. Make sure the EUT works normally during the test.

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5. FCC LINE CONDUCTED EMISSION TEST

5.1. TEST EQUIPMENT OF LINE CONDUCTED EMISSION TEST

Test Equipment	Manufacturer	Description	Cal.Date	Cal.Due date
EMI TEST Receiver	R/S	9KHz-18GHz	2012-6-15	2013-6-14
Power meter	BOOTON	0～18GHz	2012-6-9	2013-6-8
CND	Liithi	150KHz-230MHz	2012-7-3	2013-7-2
CDN	Liithi	150KHz-230MHz	2012-7-3	2013-7-2
LISN	SCHWARZBECK	9KHz-30MHz	2012-7-3	2013-7-2
LISN	SCHWARZBECK	9KHz-30MHz	2012-7-3	2013-7-2
Chamber	ETS	DC～18GHz	2012-4-11	2013-4-10

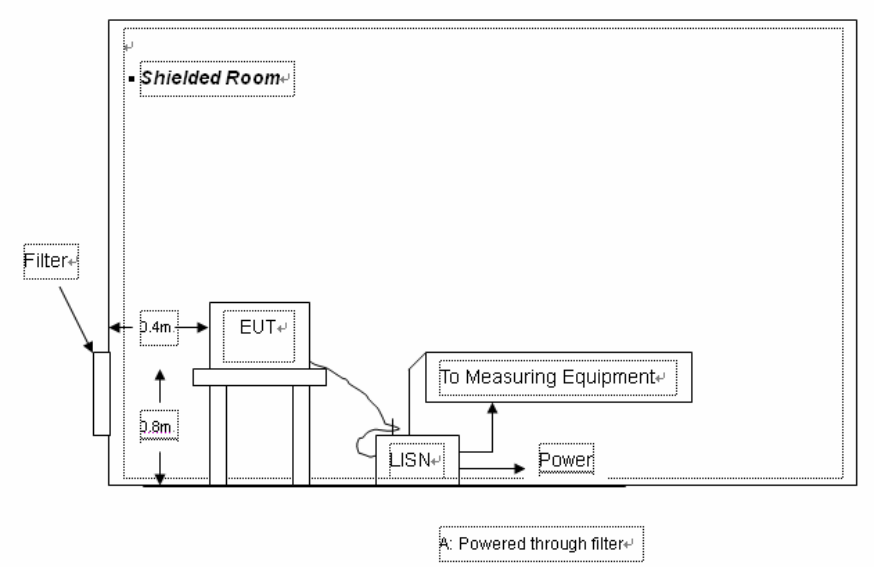
5.2 .LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	Maximum RF Line Voltage	
	Q.P.(dBuV)	Average(dBuV)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

**Note: 1. The lower limit shall apply at the transition frequency.

2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz

5.3. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



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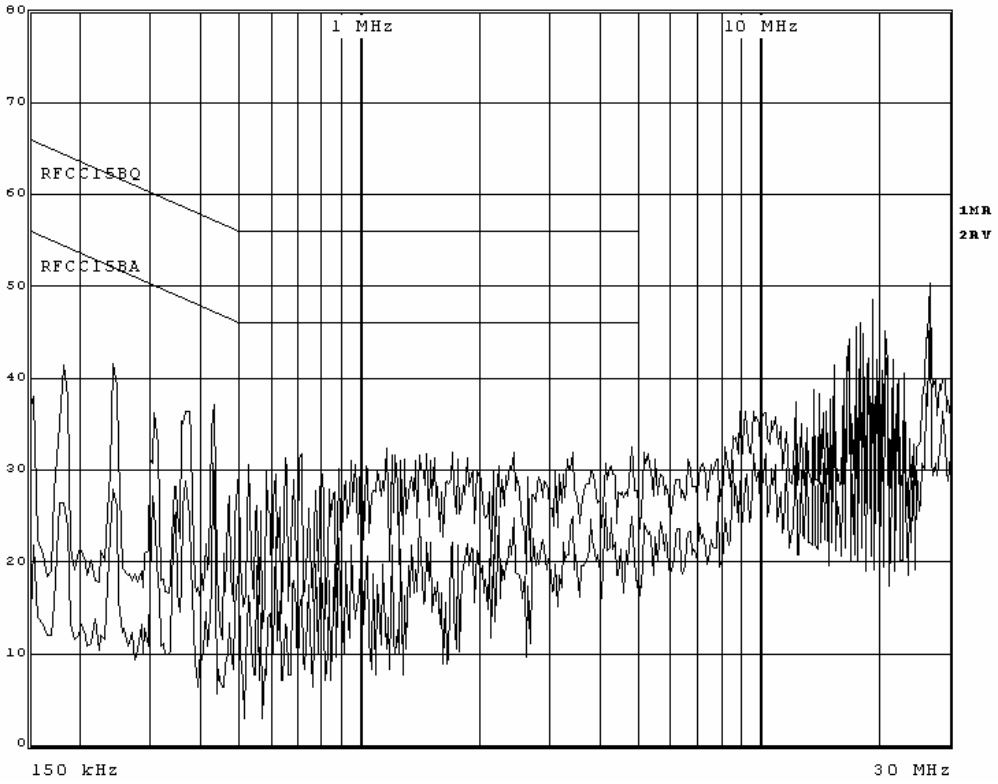
5.4. PROCEDURE OF LINE CONDUCTED EMISSION TEST

1) The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2) Support equipment, was placed as per ANSI C63.4.
3) All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
4) PC, one support equipment received AC power through a Line Impedance Stabilization Network (LISN) that was grounded to the protect earth.
5) Monitor, the other support equipment received AC power from a second LISN.
6) The EUT test program was started. Emissions were measured on each current carrying line of the PC using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7) Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
8) During the above scans, the emissions were maximized by cable manipulation.
9) A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions.
10) Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less –2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
11) The test data of the worst case condition(s) was reported on the Summary Data page.

5.5 TEST RESULT OF LINE CONDUCTED EMISSION TEST

Charging mode is the worst mode. Test data as following:

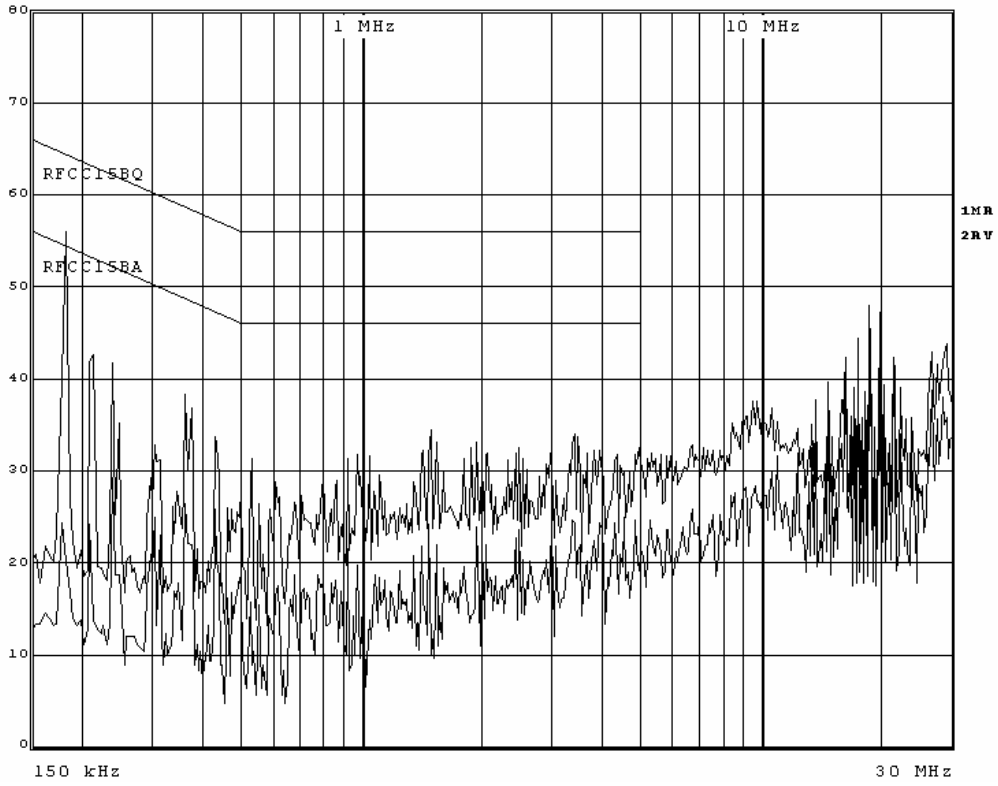
CONDUCTED EMISSION TEST-L



Quasi-peak and Average measurement:

TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
2 Average	16.8980 MHz	37.90 L1 gnd	-12.09
1 Quasi Peak	17.5900 MHz	40.75 L1 gnd	-19.24
1 Quasi Peak	17.9340 MHz	44.45 L1 gnd	-15.54
2 Average	17.9340 MHz	37.41 L1 gnd	-12.59
2 Average	18.2780 MHz	35.45 L1 gnd	-14.54
1 Quasi Peak	19.3140 MHz	46.75 L1 gnd	-13.24
2 Average	19.3140 MHz	37.62 L1 gnd	-12.37
1 Quasi Peak	20.6900 MHz	45.47 L1 gnd	-14.53
2 Average	20.6900 MHz	39.29 L1 gnd	-10.70
1 Quasi Peak	20.6940 MHz	40.59 L1 gnd	-19.41
1 Quasi Peak	26.8980 MHz	48.57 L1 gnd	-11.42
2 Average	26.8980 MHz	35.55 L1 gnd	-14.44

CONDUCTED EMISSION TEST-N



Quasi-peak and Average measurement:

TRACE		FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
1	Quasi Peak	182.0000 kHz	41.16	N gnd	-23.22
2	Average	16.2060 MHz	33.04	N gnd	-16.96
1	Quasi Peak	17.5820 MHz	44.21	N gnd	-15.79
2	Average	17.5820 MHz	37.61	N gnd	-12.38
1	Quasi Peak	18.6180 MHz	47.52	N gnd	-12.47
2	Average	18.6180 MHz	38.91	N gnd	-11.08
1	Quasi Peak	18.9620 MHz	42.46	N gnd	-17.53
2	Average	18.9620 MHz	34.67	N gnd	-15.32
1	Quasi Peak	19.9980 MHz	45.90	N gnd	-14.10
2	Average	19.9980 MHz	36.39	N gnd	-13.61
2	Average	21.3780 MHz	28.04	N gnd	-21.95
1	Quasi Peak	29.3020 MHz	41.31	N gnd	-18.68

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6. FCC RADIATED EMISSION TEST

6.1. TEST EQUIPMENT OF RADIATED EMISSION

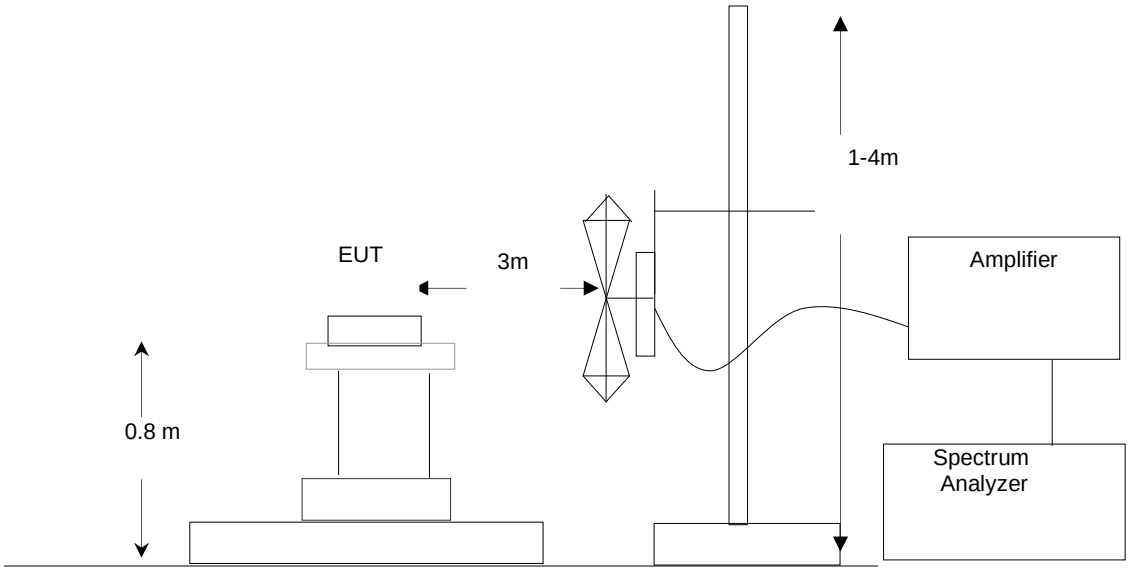
Test Equipment	Manufacturer	Description	Cal.Date	Cal.Due date
EMI TEST Receiver	R/S	9KHz-18GHz	2012-6-15	2013-6-14
Spectrum Analyzer	Agilent	9KHz-18GHz	2012-6-15	2013-6-14
Power meter	BOOTON	0～18GHz	2012-6-9	2013-6-8
Chamber	ETS	DC～18GHz	2012-4-11	2013-4-10
Antenna	SCHWARZBECK	9kHz～30MHz	2012-6-20	2013-6-19
Antenna	SCHWARZBECK	450MHz～6GHz	2012-6-4	2013-6-3
Antenna	SCHWARZBECK	65MHz～3GHz	2012-6-17	2013-6-16
Antenna	SCHWARZBECK	9kHz～30MHz	2012-7-4	2013-7-3
Antenna	ETS	1GHz～18GHz	2012-7-4	2013-7-3
Antenna	ETS	26MHz～3GHz	2012-7-4	2013-7-3
Signal Generator	R&S	--	2012-6-17	2013-6-16

6.2. LIMITS OF RADIATED EMISSION TEST

Frequency (MHz)	Distance (m)	Maximum Field Strength Limit (dBuV/m/ Q.P.)
30~88	3	40.0
88~216	3	43.5
216~960	3	46.0
Above 960	3	54.0

**Note: The lower limit shall apply at the transition frequency.

6.3 BLOCK DIAGRAM OF RADIATED EMISSION TEST



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6.4 PROCEDURE OF RADIATED EMISSION TEST

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. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. 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.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. 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.

6.5 TEST RESULT OF RADIATED EMISSION TEST

Test Result of Radiated Emission Test (9KHZ ~30MHZ)

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS
--	--	--	--	PASS

Note:

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 = 20 log (specific distance / test distance) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

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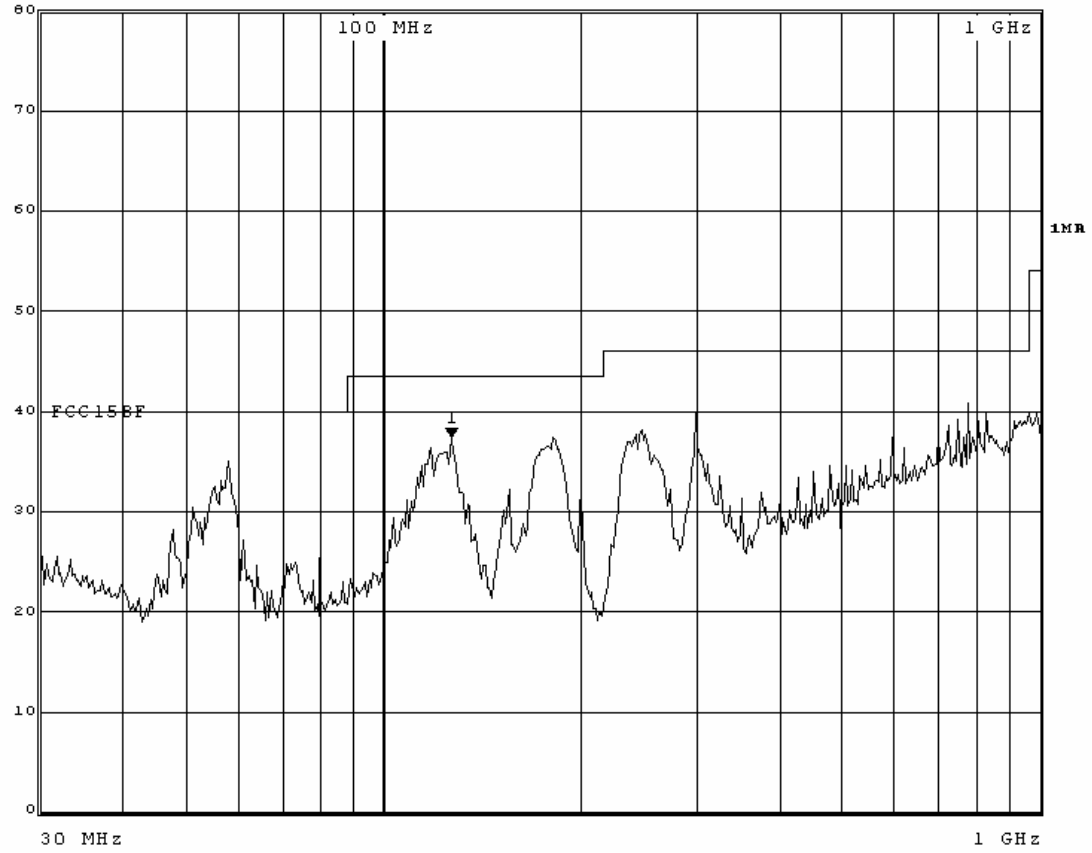
Test Result of Radiated Emission Test (30MHZ ~ 1GHz)
Charging mode is the worst mode. Test data as following:

RADIATED EMISSION HORIZONTAL AT 3M



Quasi-peak measurement

TRACE	FREQUENCY	LEVEL dBµV/m	DELTA LIMIT dB
1 Quasi Peak	58.0400 MHz	19.74	-20.25
1 Quasi Peak	127.5200 MHz	29.16	-14.33
1 Quasi Peak	181.9600 MHz	33.88	-9.61
1 Quasi Peak	298.9600 MHz	36.88	-9.11
1 Quasi Peak	779.9600 MHz	33.88	-12.11
1 Quasi Peak	831.9600 MHz	35.83	-10.16

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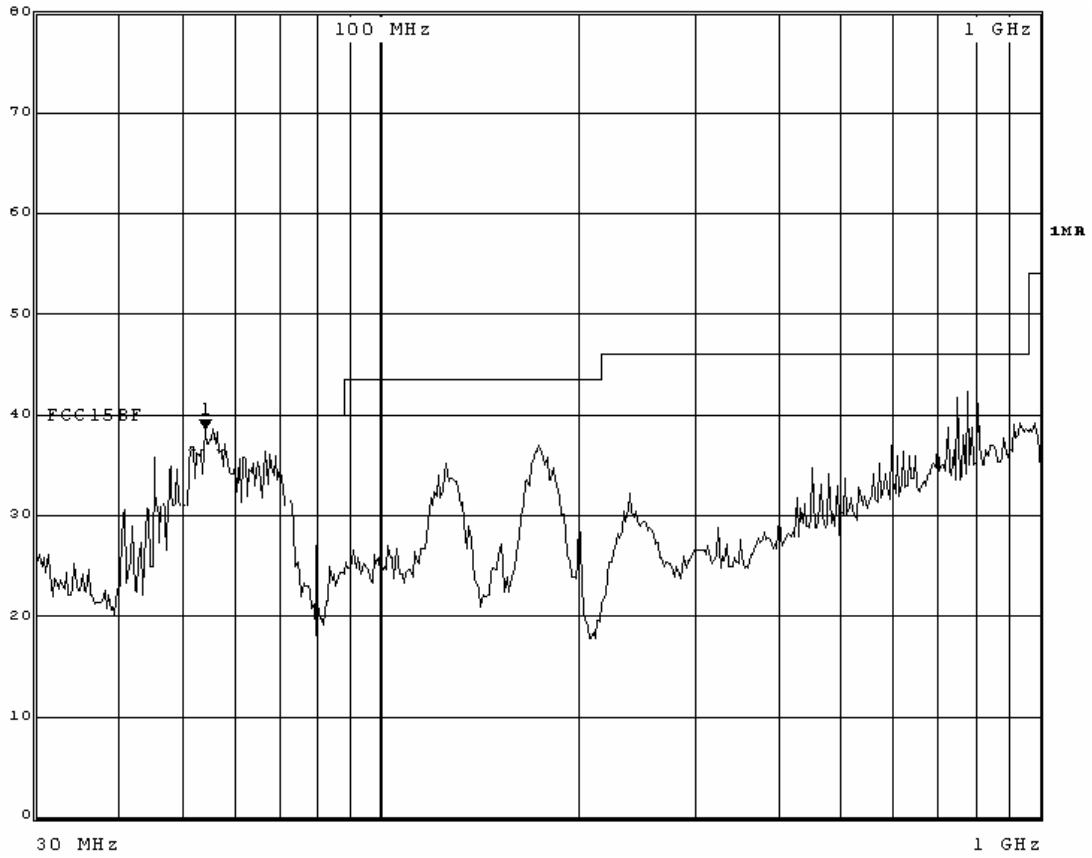
RADIATED EMISSION VERTICAL AT 3M



Quasi-peak measurement

TRACE	FREQUENCY	LEVEL dBµV/m	DELTA LIMIT dB
1 Quasi Peak	54.2800 MHz	42.19	-2.19
1 Quasi Peak	55.6800 MHz	41.63	-2.63
1 Quasi Peak	56.7200 MHz	42.02	-2.02
1 Quasi Peak	53.5600 MHz	39.57	-1.42
1 Quasi Peak	51.8800 MHz	37.66	-2.33
1 Quasi Peak	67.0400 MHz	36.51	-3.48

Test Result of Radiated Emission Test (1GHZ-10th Harmonic)

Radiated emission for Bottom Channel						
Frequency	Antenna Pol.	Field Strength	Field Strength	Limit (PK)	Limit (AV)	Memo
GHz	H/V	dBuV/m (PK)	dBuV/m (AV)	dBuV/m	dBuV/m	

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2.390	H	47.22	33.18	74	54	*
2.390	V	47.22	33.18	74	54	H
2.486	H	46.88	34.52	74	54	*
2.486	V	46.11	33.29	74	54	*
4.804	H	--	--	74	54	*
4.804	V	--	--	74	54	*
Other(1G-25G)	--	--	--	74	54	

Radiated emission for Middle Channel						
Frequency	Antenna Pol.	Field Strength	Field Strength	Limit (PK)	Limit (AV)	Memo
GHz	H/V	dBuV/m (PK)	dBuV/m (AV)	dBuV/m	dBuV/m	
2.390	H	47.43	33.43	74	54	*
2.390	V	47.43	33.64	74	54	H
2.486	H	46.32	34.32	74	54	*
2.486	V	46.21	33.32	74	54	*
4.882	H	--	--	74	54	*
4.882	V	--	--	74	54	*
Other(1G-25G)	--	--	--	74	54	

Radiated emission for Top Channel						
Frequency	Antenna Pol.	Field Strength	Field Strength	Limit (PK)	Limit (AV)	Memo
GHz	H/V	dBuV/m (PK)	dBuV/m (AV)	dBuV/m	dBuV/m	
2.4835	H	60.22	49.52	74	54	*
2.4835	V	59.58	48.33	74	54	*
4.960	H	--	--	74	54	
4.960	V	--	--	74	54	
8.625	H	55.87	44.32	74	54	
8.625	V	54.43	43.31	74	54	
Other(1G-25G)	--	--	--	74	54	

******** END OF REPORT *******

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