

# Variant FCC Test Report

APPLICANT : Trimble Navigation Ltd.  
EQUIPMENT : PDA  
BRAND NAME : Trimble  
MODEL NAME : Juno SC  
FCC ID : JUP66400  
STANDARD : FCC 47 CFR FCC Part 15 Subpart B  
CLASSIFICATION : Certification

This is a variant report which is only valid combined with the original report. The product was received on May 21, 2010 and completely tested on Jul. 05, 2010. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.4-2003 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:



Roy Wu / Manager



## SPORTON INTERNATIONAL INC.

No. 52, Hwa Ya 1<sup>st</sup> 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
FD8O0405-01	Rev. 01	This is a variant report which is added one new adapter. All the test cases were performed on original report which can be referred to Sporton Report Number FC8O0405 as appendix C; only worst cases were verified.	Jul. 09, 2010



### SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.107	7.2.2	AC Conducted Emission	< 15.107 limits < RSS-Gen table 2 limits	PASS	Under limit 15.5 dB at 0.166 MHz
3.2	15.109	7.2.3.2	Radiated Emission	< 15.109 limits or < RSS-Gen table 1 limits (Section 6)	PASS	Under limit 3.96 dB at 202.53 MHz



## 1. General Description

### 1.1. Applicant

**Trimble Navigation Ltd.**

935 Stewart Drive, Sunnyvale, CA 94088-3642 U.S.A.

### 1.2. Manufacturer

**GOLDTEK Technology Co., Ltd.**

3F., No. 3, Ln. 768, Sec. 4, Pateh Rd., Taipei 115, Taiwan, R.O.C.

### 1.3. Feature of Equipment Under Test

Product Feature & Specification	
Equipment	PDA
Brand Name	Trimble
Model Name	Juno SC
FCC ID	JUP66400
Integrated WWAN Module	Brand Name : CINTERION Model Name : HC25 HW Version : B2.12.1 SW Version : Revision 02.050 (SV 15)
Tx Frequency Range	GSM850 : 824 MHz ~ 849 MHz GSM1900 : 1850 MHz ~ 1910 MHz WCDMA Band V : 824 MHz ~ 849 MHz WCDMA Band II : 1850 MHz ~ 1910 MHz Bluetooth : 2400 MHz ~ 2483.5 MHz WLAN : 2400 MHz ~ 2483.5 MHz
Rx Frequency Range	GSM850 : 869 MHz ~ 894 MHz GSM1900 : 1930 MHz ~ 1990 MHz WCDMA Band V : 869 MHz ~ 894 MHz WCDMA Band II : 1930 MHz ~ 1990 MHz Bluetooth : 2400 MHz ~ 2483.5 MHz WLAN : 2400 MHz ~ 2483.5 MHz GPS : 1.57542 GHz
Antenna Type	Fixed Internal Antenna
HW Version	1.0
SW Version	1.0
Type of Modulation	GSM / GPRS : GMSK EDGE : 8PSK WCDMA : QPSK HSDPA : QPSK / 16QAM Bluetooth (1Mbps) : GFSK Bluetooth EDR (2Mbps) : $\pi/4$ -DQPSK Bluetooth EDR (3Mbps) : 8-DPSK 802.11b : DSSS (BPSK / QPSK / CCK) 802.11g : OFDM (BPSK / QPSK / 16QAM / 64QAM) GPS : BPSK
EUT Stage	Identical Prototype

**Remark:** The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

## 1.4. Test Site

<b>Test Site</b>	SPORTON INTERNATIONAL INC.		
<b>Test Site Location</b>	No. 52, Hwa Ya 1 <sup>st</sup> Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978		
<b>Test Site No.</b>	<b>Sporton Site No.</b>		<b>FCC/IC Registration No.</b>
	CO05-HY	03CH06-HY	TW1022/4086B-1

## 1.5. Applied Standards

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

- FCC 47 CFR FCC Part 15 Subpart B
- ANSI C63.4-2003
- IC RSS-Gen Issue 2

**Remark:** All test items were verified and recorded according to the standards and without any deviation during the test.

## 1.6. Ancillary Equipment List

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	GPS Station	T&E	GS-50	N/A	N/A	Unshielded, 1.8 m
3.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
4.	Bluetooth Earphone	Nokia	BH-102	PYAHS-107W	N/A	N/A
5.	Notebook	DELL	Vostro 1510	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
6.	LCD Monitor	Lenovo	6135-AB1	FCC DoC	Shielded, 1.6 m	Unshielded, 1.8 m
7.	iPod	Apple	A1199	FCC DoC	Unshielded, 1.2 m	N/A
8.	iPod	Apple	A1285	FCC DoC	Unshielded, 1.2 m	N/A

## 2. Test Configuration of Equipment Under Test

### 2.1. Test Mode

The EUT has been associated with peripherals pursuant to ANSI C63.4-2003 and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

Frequency range investigated: conduction (150 kHz to 30 MHz), radiation (30MHz to the 5th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

The following tables are showing the test modes as the worst cases and recorded in this report.

Item	EUT Configuration	Test Condition	
		EMI AC	EMI RE
1.	Charging Mode (EUT with adapter)	☒	☒

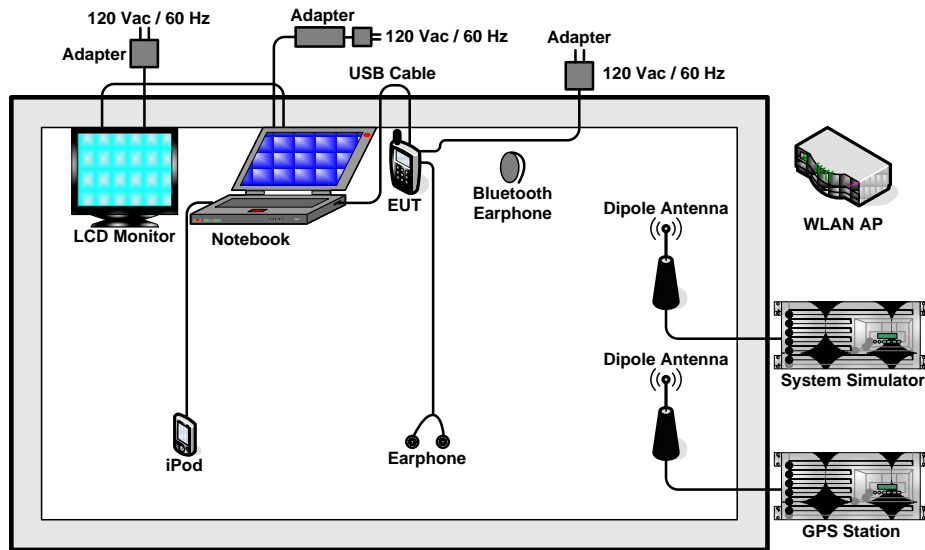
**Abbreviations:**

- EMI AC: AC conducted emissions
- EMI RE: EUT radiated emissions

Test Items	EUT Configure Mode	Function Type
AC Conducted Emission	1	Mode 1: WCDMA Band V Idle + GPS Rx + Bluetooth Idle + WLAN Idle + Earphone + USB Link + Camera + Adapter 2
Radiated Emissions	1	Mode 1: WCDMA Band V Idle + GPS Rx + Bluetooth Idle + WLAN Idle + Earphone + USB Link + Camera + Adapter 2



## 2.2. Connection Diagram of Test System



## 2.3. Test Software

The EUT was in WCDMA idle mode during the testing. The EUT was synchronized to the BCCH, and is in continuous receiving mode by setting system simulator's paging reorganization.

At the same time, the EUT was attached to the Bluetooth earphone and WLAN AP, and the following programs installed in the EUT were programmed during the test.

1. Execute the programs, "EMI Test" or "Activesync.exe" under WINXP installed in notebook for active sync files transfer with EUT via USB cable.
2. Execute "mGpsCmd" to make the EUT receive signals from GPS station continuously.
3. Turn on camera to capture images.

### 3. Test Result

#### 3.1. Test of AC Conducted Emission Measurement

##### 3.1.1 Limits of AC Conducted Emission

For equipment that is designed to be connected to the public utility (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 the limits in the following table.

Frequency of emission (MHz)	Conducted limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

\*Decreases with the logarithm of the frequency.

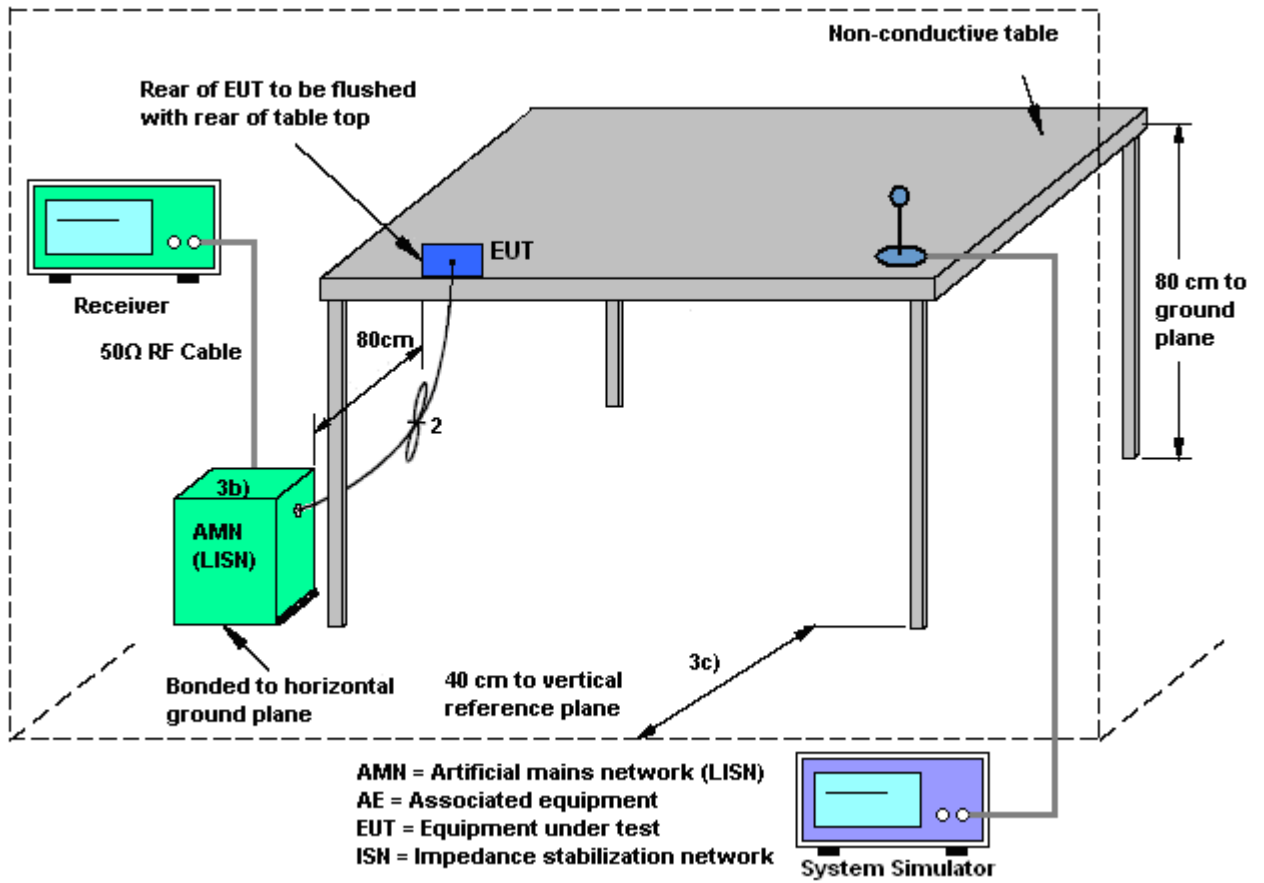
##### 3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

##### 3.1.3 Test Procedure

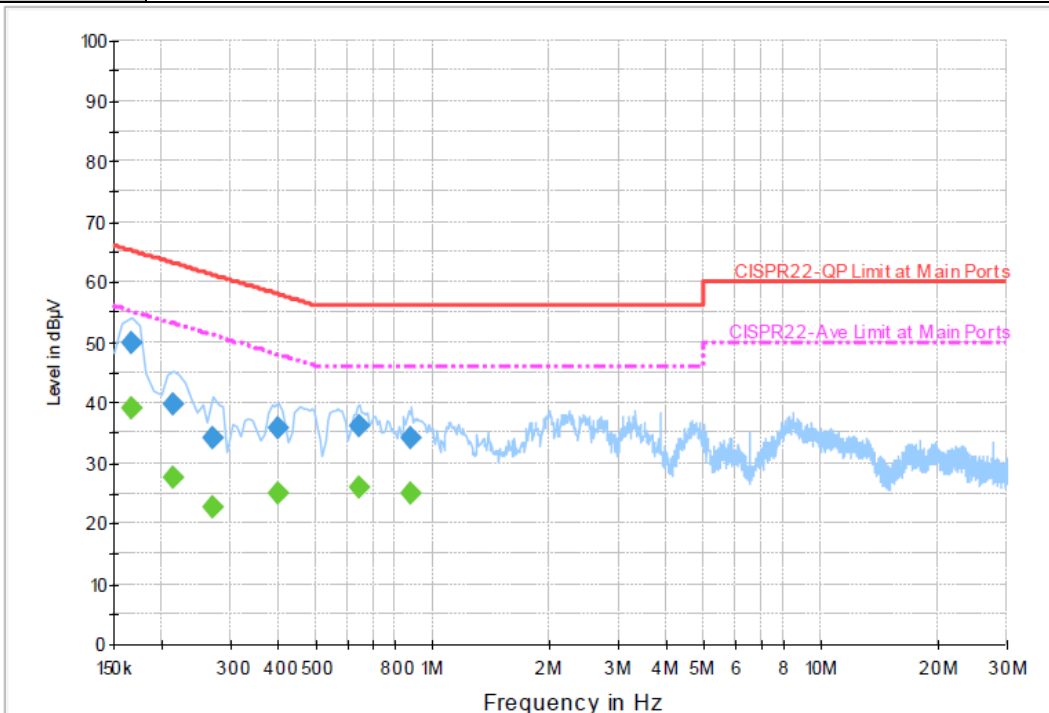
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

### 3.1.4 Test Setup



3.1.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	20~22°C
Test Engineer :	Novic Jiang	Relative Humidity :	40~42%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WCDMA Band V Idle + GPS Rx + Bluetooth Idle + WLAN Idle + Earphone + USB Link + Camera + Adapter 2		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



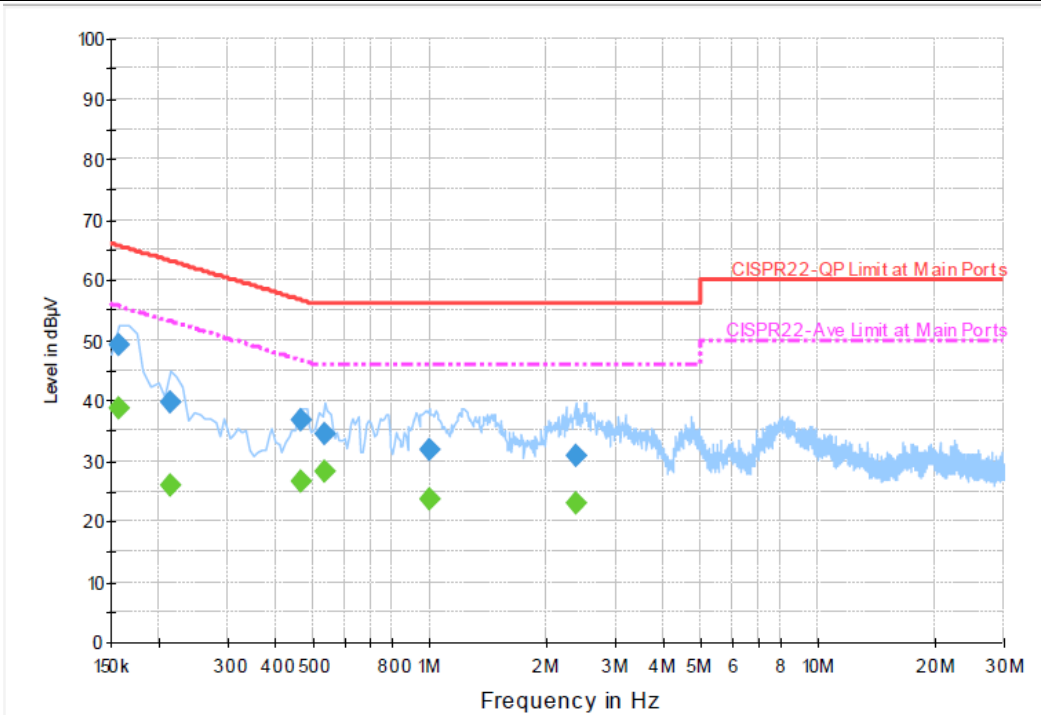
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.166000	49.7	Off	L1	19.3	15.5	65.2
0.214000	39.8	Off	L1	19.3	23.2	63.0
0.270000	34.2	Off	L1	19.3	26.9	61.1
0.398000	35.7	Off	L1	19.4	22.2	57.9
0.646000	36.2	Off	L1	19.3	19.8	56.0
0.878000	34.1	Off	L1	19.4	21.9	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.166000	39.1	Off	L1	19.3	16.1	55.2
0.214000	27.4	Off	L1	19.3	25.6	53.0
0.270000	22.7	Off	L1	19.3	28.4	51.1
0.398000	25.0	Off	L1	19.4	22.9	47.9
0.646000	26.1	Off	L1	19.3	19.9	46.0
0.878000	25.0	Off	L1	19.4	21.0	46.0

Test Mode :	Mode 1	Temperature :	20~22°C
Test Engineer :	Novic Jiang	Relative Humidity :	40~42%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WCDMA Band V Idle + GPS Rx + Bluetooth Idle + WLAN Idle + Earphone + USB Link + Camera + Adapter 2		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	49.2	Off	N	19.4	16.4	65.6
0.214000	39.7	Off	N	19.4	23.3	63.0
0.462000	36.8	Off	N	19.3	19.9	56.7
0.534000	34.5	Off	N	19.3	21.5	56.0
0.990000	32.0	Off	N	19.4	24.0	56.0
2.358000	31.0	Off	N	19.5	25.0	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	38.6	Off	N	19.4	17.0	55.6
0.214000	25.9	Off	N	19.4	27.1	53.0
0.462000	26.5	Off	N	19.3	20.2	46.7
0.534000	28.1	Off	N	19.3	17.9	46.0
0.990000	23.4	Off	N	19.4	22.6	46.0
2.358000	23.1	Off	N	19.5	22.9	46.0



### 3.2. Test of Radiated Emission Measurement

#### 3.2.1. Limit of Radiated Emission

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	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

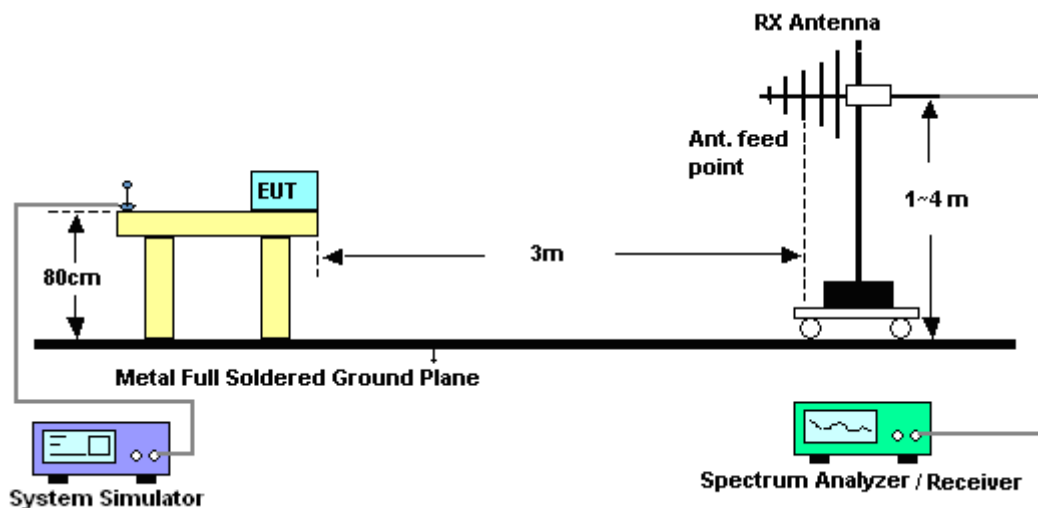
#### 3.2.2. Measuring Instruments

See list of measuring instruments of this test report.

### 3.2.3. Test Procedures

1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna is a Bi-Log antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.
7. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the quasi-peak method and reported
8. Emission level (dBuV/m) = 20 log Emission level (uV/m)
9. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

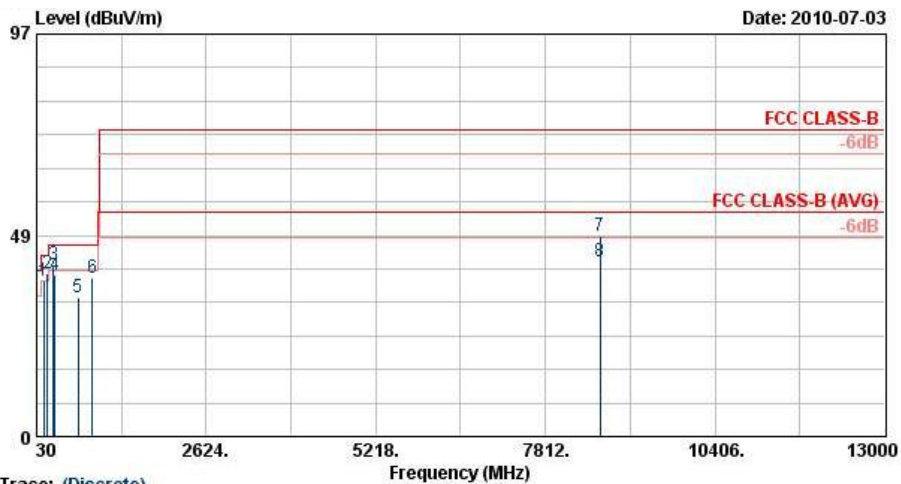
### 3.2.4. Test Setup of Radiated Emission





3.2.5. Test Result of Radiated Emission

Test Mode :	Mode 1	Temperature :	22~23°C
Test Engineer :	Hayden Wu	Relative Humidity :	45~46%
Test Distance :	3m	Polarization :	Horizontal
Function Type :	WCDMA Band V Idle + GPS Rx + Bluetooth Idle + WLAN Idle + Earphone + USB Link + Camera + Adapter 2		
Remark :	#6 is System Simulator Signal which can be ignored.		



Trace: (Discrete)

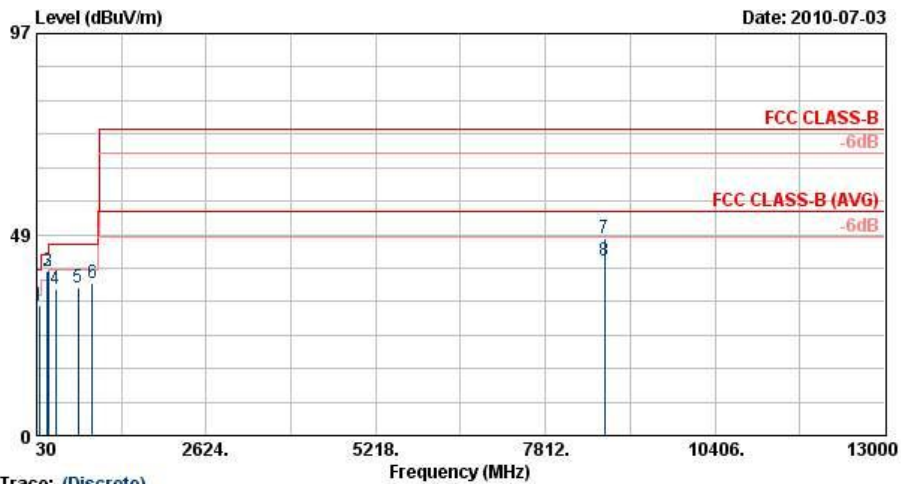
Site : 03CH06-HY  
 Condition : FCC CLASS-B 3m HF-ANT(8-18G)\_091111 HORIZONTAL  
 Power : FromSystem  
 Project : FD 600405-01  
 Memo : Mode 1  
 Temp. : 22 °C  
 Humidity : 45 %

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	Ant	Table	Remark	
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	133.68	37.38	-6.12	43.50	55.63	11.42	1.87	31.54	---	---	Peak
2 !	199.83	39.28	-4.22	43.50	60.17	8.20	2.39	31.48	100	48	Peak
3 !	283.53	41.29	-4.71	46.00	57.02	12.83	2.90	31.46	---	---	Peak
4	311.90	38.83	-7.17	46.00	53.73	13.43	3.08	31.42	---	---	Peak
5	663.30	33.50	-12.50	46.00	41.48	19.05	4.60	31.64	---	---	Peak
6	882.40	38.34		46.00	43.35	20.61	5.41	31.03	---	---	Peak
7	8648.00	48.22	-25.78	74.00	39.22	35.82	7.39	34.21	100	98	Peak
8	8648.00	42.16	-11.84	54.00	33.16	35.82	7.39	34.21	100	98	Average





Test Mode :	Mode 1	Temperature :	22~23°C
Test Engineer :	Hayden Wu	Relative Humidity :	45~46%
Test Distance :	3m	Polarization :	Vertical
Function Type :	WCDMA Band V Idle + GPS Rx + Bluetooth Idle + WLAN Idle + Earphone + USB Link + Camera + Adapter 2		
Remark :	#6 is System Simulator Signal which can be ignored.		



Trace: (Discrete)

Site : 03CH06-HY  
 Condition : FCC CLASS-B 3m HF-ANT(8-18G)\_091111 VERTICAL  
 Power : FromSystem  
 Project : FD 800405-01  
 Memo : Mode 1  
 Temp. : 22 °C  
 Humidity : 45 %

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	Ant	Table	Remark	
	MHz	dBuV/m	Limit	Line	Level Factor	Loss	Factor	Pos	Pos		
			dB	dBuV/m	dBuV	dB/m	dB	cm	deg		
1	72.39	31.43	-8.57	40.00	54.90	6.80	1.33	31.60	100	62 QP	
2 !	190.38	39.52	-3.98	43.50	59.98	8.70	2.34	31.50	---	---	Peak
3 @	202.53	39.54	-3.96	43.50	60.30	8.31	2.41	31.48	100	95	Peak
4	323.80	35.45	-10.55	46.00	49.95	13.73	3.15	31.38	---	---	Peak
5	663.30	35.60	-10.40	46.00	43.58	19.05	4.60	31.64	---	---	Peak
6	880.30	36.83			41.86	20.60	5.40	31.04	---	---	Peak
7	8716.00	47.57	-26.43	74.00	38.50	35.87	7.48	34.27	165	75	Peak
8	8716.00	42.23	-11.77	54.00	33.16	35.87	7.48	34.27	165	75	Average

## 4. List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Due Date	Remark
EMI Test Receive	R&S	ESCS 30	100356	9KHz – 2.75GHz	Aug. 05, 2009	Aug. 04, 2010	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100081	9kHz~30MHz	Nov. 30, 2009	Nov. 29, 2010	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100080	9kHz~30MHz	Nov. 23, 2009	Nov. 22, 2010	Conduction (CO05-HY)
AC Power Source	APC	APC-1000W	N/A	N/A	N/A	N/A	Conduction (CO05-HY)
Spectrum Analyzer	Agilent	E4408B	MY44211030	9KHz-26.5GHz	Oct. 23, 2009	Oct. 22, 2010	Radiation (03CH06-HY)
Spectrum Analyzer	R&S	FSP40	100057	9KHz-40GHz	Oct. 20, 2009	Oct. 19, 2010	Radiation (03CH06-HY)
EMI Test Receiver	R&S	ESVS10	834468/003	20MHz-1000M Hz	Apr. 28, 2010	Apr. 27, 2011	Radiation (03CH06-HY)
Bilog Antenna	SCHAFFNER	CBL6112B	2885	30MHz -2GHz	Oct. 31, 2009	Oct. 30, 2010	Radiation (03CH06-HY)
Double Ridge Horn Antenna	EMCO	3117	00066583	1GHz~18GHz	Aug. 20, 2009	Aug. 19, 2010	Radiation (03CH06-HY)
Double Ridge Horn Antenna	Training Research	AH-0801	95119	8GHz~18GHz	Nov. 02, 2009	Nov. 01, 2010	Radiation (03CH06-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15GHz- 40GHz	Oct. 14, 2009	Oct. 13, 2010	Radiation (03CH06-HY)
Pre Amplifier	Agilent	8449B	3008A01917	1GHz- 26.5GHz	Nov. 11, 2009	Nov. 10, 2010	Radiation (03CH06-HY)
Amplifier	Agilent	310N	186713	9KHz~1GHz	Apr. 15, 2010	Apr. 14, 2011	Radiation (03CH06-HY)
System Simulator	R&S	CMU200	105934	N/A	Nov. 11, 2008	Nov. 10, 2010	-

## 5. Uncertainty of Evaluation

### Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)

Contribution	Uncertainty of $X_i$		$u(X_i)$
	dB	Probability Distribution	
Receiver Reading	0.10	Normal (k=2)	0.05
Cable Loss	0.10	Normal (k=2)	0.05
AMN Insertion Loss	2.50	Rectangular	0.63
Receiver Specification	1.50	Rectangular	0.43
Site Imperfection	1.39	Rectangular	0.80
Mismatch	+0.34 / -0.35	U-Shape	0.24
<b>Combined Standard Uncertainty <math>U_c(y)</math></b>	<b>1.13</b>		
<b>Measuring Uncertainty for a Level of Confidence of 95% (<math>U = 2U_c(y)</math>)</b>	<b>2.26</b>		

### Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Contribution	Uncertainty of $X_i$		$u(X_i)$
	dB	Probability Distribution	
Receiver Reading	0.41	Normal (k=2)	0.21
Antenna Factor Calibration	0.83	Normal (k=2)	0.42
Cable Loss Calibration	0.25	Normal (k=2)	0.13
Pre-Amplifier Gain Calibration	0.27	Normal (k=2)	0.14
RCV/SPA Specification	2.50	Rectangular	0.72
Antenna Factor Interpolation for Frequency	1.00	Rectangular	0.29
Site Imperfection	1.43	Rectangular	0.83
Mismatch	+0.39 / -0.41	U-Shape	0.28
<b>Combined Standard Uncertainty <math>U_c(y)</math></b>	<b>1.27</b>		
<b>Measuring Uncertainty for a Level of Confidence of 95% (<math>U = 2U_c(y)</math>)</b>	<b>2.54</b>		



**Uncertainty of Radiated Emission Measurement (1 GHz ~ 40 GHz)**

Contribution	Uncertainty of $X_i$		$u(X_i)$	$C_i$	$C_i * u(X_i)$
	dB	Probability Distribution			
Receiver Reading	$\pm 0.10$	Normal (k=2)	0.10	1	0.10
Antenna Factor Calibration	$\pm 1.70$	Normal (k=2)	0.85	1	0.85
Cable Loss Calibration	$\pm 0.50$	Normal (k=2)	0.25	1	0.25
Receiver Correction	$\pm 2.00$	Rectangular	1.15	1	1.15
Antenna Factor Directional	$\pm 1.50$	Rectangular	0.87	1	0.87
Site Imperfection	$\pm 2.80$	Triangular	1.14	1	1.14
Mismatch Receiver VSWR $\Gamma_1 = 0.197$ Antenna VSWR $\Gamma_2 = 0.194$ Uncertainty = $20\text{Log}(1-\Gamma_1*\Gamma_2)$	+0.34 / -0.35	U-Shape	0.244	1	0.244
<b>Combined Standard Uncertainty <math>U_c(y)</math></b>	<b>2.36</b>				
<b>Measuring Uncertainty for a Level of Confidence of 95% (<math>U = 2U_c(y)</math>)</b>	<b>4.72</b>				



## **Appendix A. Photographs of EUT**

Please refer to Sporton report number EP8O0405-01 as below.



## Appendix C. Original Report

Please refer to Sporton report number FC8O0405 as below.