

FCC Test Report

APPLICANT : Motorola Mobility, Inc.
EQUIPMENT : Mobile Phone
BRAND NAME : MOTOROLA
MODEL NAME : EX226
GPPD NUMBER : 3164
FCC ID : IHDT56MK3
STANDARD : FCC 47 CFR FCC Part 15 Subpart B
CLASSIFICATION : Certification

The product was received on Aug. 02, 2011 and completely tested on Aug. 17, 2011. 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:



Jones Tsai / Manager



SPORTON INTERNATIONAL INC.

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FCC ID : IHDT56MK3

Page Number : 1 of 22

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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 14.4 dB at 0.19 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 4.24 dB at 35.13 MHz



1. General Description

1.1. Applicant

Motorola Mobility, Inc.

No.1, Wang Jing East Road, Chao Yang District, 100102 Beijing, P. R. China

1.2. Manufacturer

Arima Communications Corp.

6F., No. 866, Jhongjheng Rd., Jhonghe Dist., New Taipei City 23586, Taiwan

1.3. Feature of Equipment Under Test

Product Feature & Specification	
Equipment	Mobile Phone
Brand Name	MOTOROLA
Model Name	EX226
FCC ID	IHDT56MK3
Tx Frequency Range	GSM850 : 824 MHz ~ 849 MHz GSM1900 : 1850 MHz ~ 1910 MHz WCDMA Band V : 824 MHz ~ 849 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 Bluetooth : 2400 MHz ~ 2483.5 MHz WLAN : 2400 MHz ~ 2483.5 MHz
Antenna Type	WWAN : Fixed Internal Antenna WLAN / Bluetooth : IFA Antenna
HW Version	P2
SW Version	BREA3G_W_02.07.01R_D_WIFI
Type of Modulation	GSM / GPRS : GMSK EDGE : 8PSK WCDMA : QPSK(Uplink) HSDPA : QPSK(Uplink) HSUPA : QPSK(Uplink) 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)
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

Test Site	SPORTON INTERNATIONAL INC.		
Test Site Location	No. 52, Hwa Ya 1 st 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		
Test Site No.	Sporton Site No.		FCC/IC Registration No.
	CO05-HY	03CH06-HY	722060/4086B-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 3

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.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
3.	Bluetooth Earphone	Nokia	BH-102	PYAHS-107W	N/A	N/A
4.	Notebook	DELL	N4110	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
5.	Notebook	DELL	P20G	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 1	Apple	A1199	DoC	Shielded, 1.0m	N/A
8.	iPod 4	Apple	A1285	DoC	Shielded, 1.0m	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 EUT uses a USB interface and microprocessor operating 611MHz which is the maximum frequency used.

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<1G	EMI RE≥1G
1.	Charging Mode (EUT with adapter)	☒	☒	Note 1
2.	Data application transferred mode (EUT with notebook)	☒	☒	☒

Abbreviations:

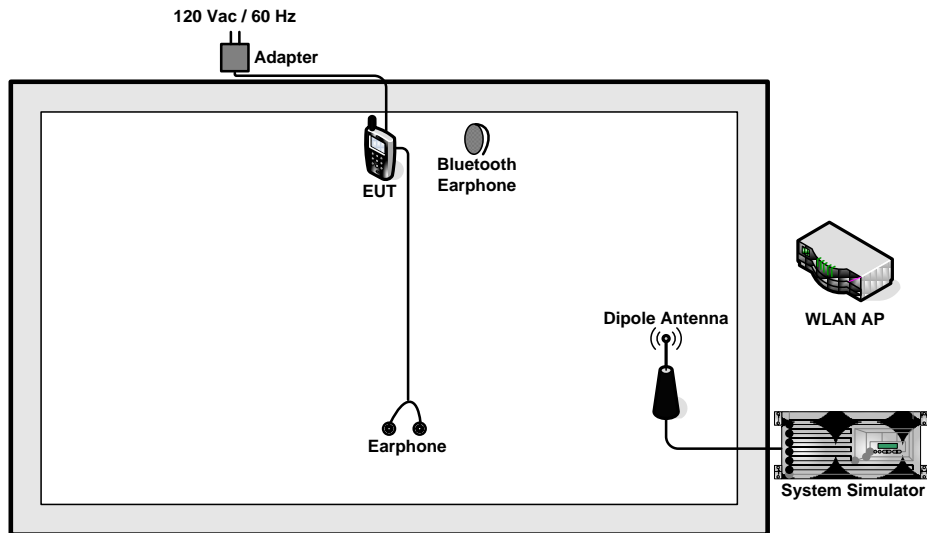
- EMI AC: AC conducted emissions
- EMI RE ≥ 1G: EUT radiated emissions ≥ 1GHz
- EMI RE < 1G: EUT radiated emissions < 1GHz

Note 1: Testing for this mode is not required or not the worst case.

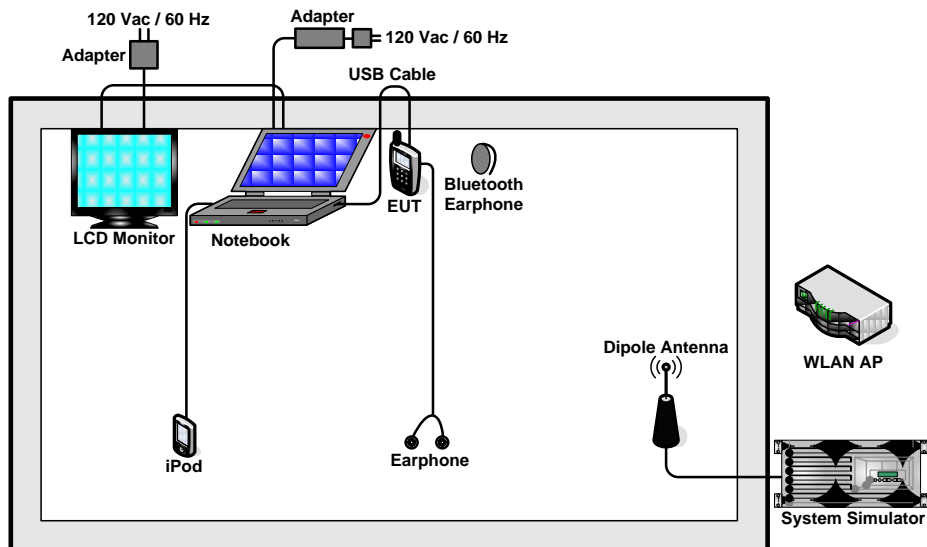
Test Items	EUT Configure Mode	Function Type
AC Conducted Emission	1/2	Mode 1: GSM850 Idle + Bluetooth Idle + WLAN Idle + Earphone + MPEG4 + Adapter + SIM 2 Mode 2: GSM1900 Idle + Bluetooth Idle + WLAN Idle + Earphone + Camera + Adapter + SIM 1 Mode 3: WCDMA Band V Idle + Bluetooth Idle + WLAN Idle + Earphone + USB Cable (Data Link with Notebook) + SIM 1
Radiated Emissions < 1GHz	1/2	Mode 1: GSM850 Idle + Bluetooth Idle + WLAN Idle + Earphone + MPEG4 + Adapter + SIM 2 Mode 2: GSM1900 Idle + Bluetooth Idle + WLAN Idle + Earphone + Camera + Adapter + SIM 1 Mode 3: WCDMA Band V Idle + Bluetooth Idle + WLAN Idle + Earphone + USB Cable (Data Link with Notebook) + SIM 1
Radiated Emissions ≥ 1GHz	2	Mode 1: WCDMA Band V Idle + Bluetooth Idle + WLAN Idle + Earphone + USB Cable (Data Link with Notebook) + SIM 1
Remark: <ol style="list-style-type: none"> 1. The worst case of AC is mode 3; only the test data of this mode was reported. 2. The worst case of RE < 1G is mode 3; only the test data of this mode was reported. 3. Link with Notebook means data application transferred mode between DUT and Notebook. 		

2.2. Connection Diagram of Test System

<EUT with Adapter Mode>



<EUT with USB Cable (Data Link with Notebook) Mode>





2.3. Test Software

The EUT was in GSM or 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 or WLAN AP, and the following programs installed in the EUT were programmed during the test.

1. Execute the program, "Winthrax", installed in notebook for active sync files transfer with EUT via USB cable.
2. Execute "Video Player" to play MPEG4 files.
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.

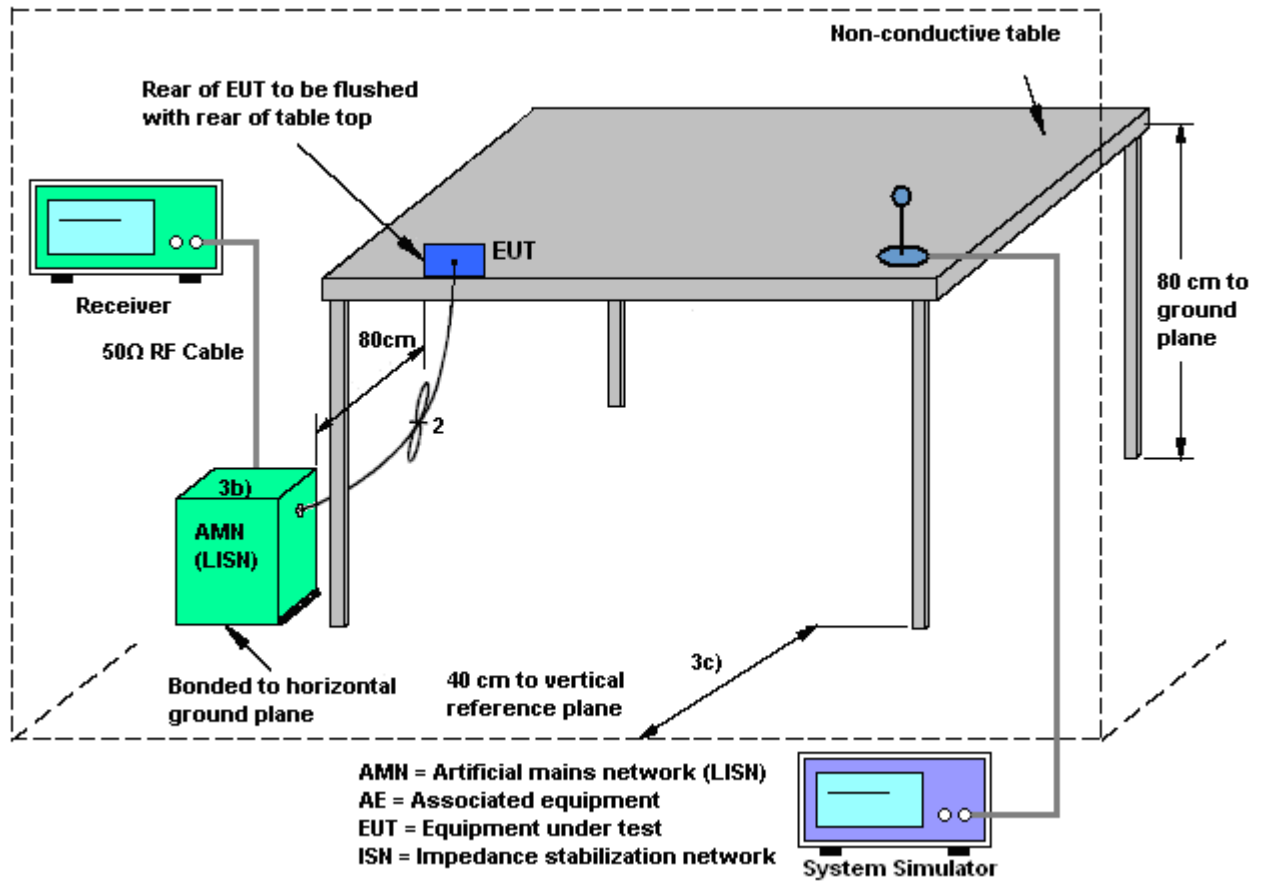
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedure

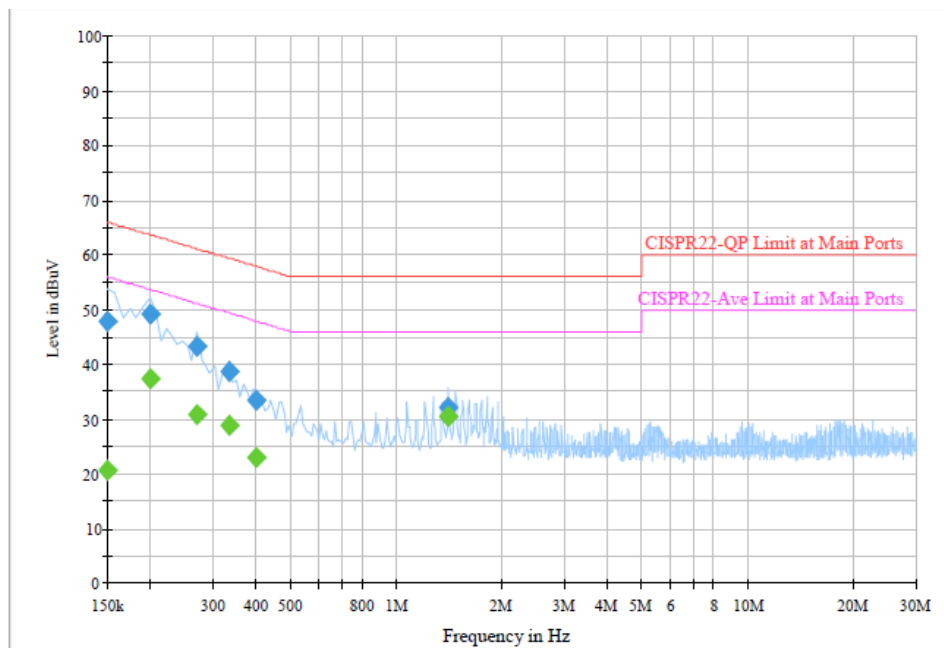
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
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 3	Temperature :	21~23°C
Test Engineer :	Kai-Chun Chu	Relative Humidity :	42~44%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WCDMA Band V Idle + Bluetooth Idle + WLAN Idle + Earphone + USB Cable (Data Link with Notebook) + SIM 1		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



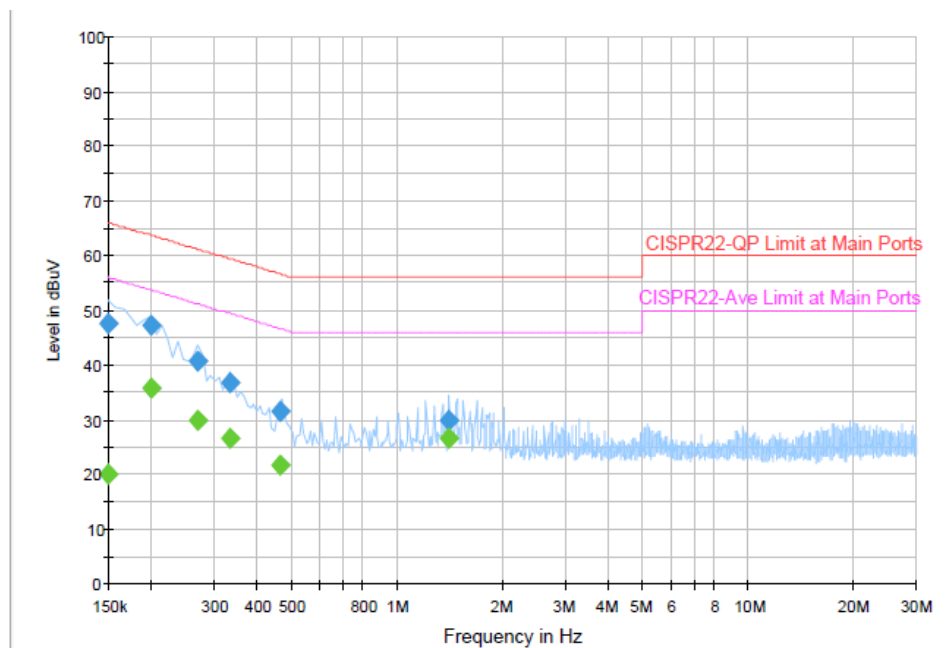
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	47.9	Off	L1	19.4	18.1	66.0
0.198000	49.3	Off	L1	19.4	14.4	63.7
0.270000	43.4	Off	L1	19.4	17.7	61.1
0.334000	38.6	Off	L1	19.4	20.8	59.4
0.398000	33.3	Off	L1	19.4	24.6	57.9
1.406000	32.3	Off	L1	19.4	23.7	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	20.6	Off	L1	19.4	35.4	56.0
0.198000	37.5	Off	L1	19.4	16.2	53.7
0.270000	30.7	Off	L1	19.4	20.4	51.1
0.334000	28.7	Off	L1	19.4	20.7	49.4
0.398000	22.9	Off	L1	19.4	25.0	47.9
1.406000	30.4	Off	L1	19.4	15.6	46.0

Test Mode :	Mode 3	Temperature :	21~23°C
Test Engineer :	Kai-Chun Chu	Relative Humidity :	42~44%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WCDMA Band V Idle + Bluetooth Idle + WLAN Idle + Earphone + USB Cable (Data Link with Notebook) + SIM 1		
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)
0.150000	47.5	Off	N	19.4	18.5	66.0
0.198000	47.3	Off	N	19.4	16.4	63.7
0.270000	40.8	Off	N	19.4	20.3	61.1
0.334000	36.7	Off	N	19.4	22.7	59.4
0.462000	31.6	Off	N	19.4	25.1	56.7
1.406000	29.9	Off	N	19.5	26.1	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	20.0	Off	N	19.4	36.0	56.0
0.198000	35.8	Off	N	19.4	17.9	53.7
0.270000	29.7	Off	N	19.4	21.4	51.1
0.334000	26.6	Off	N	19.4	22.8	49.4
0.462000	21.7	Off	N	19.4	25.0	46.7
1.406000	26.5	Off	N	19.5	19.5	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

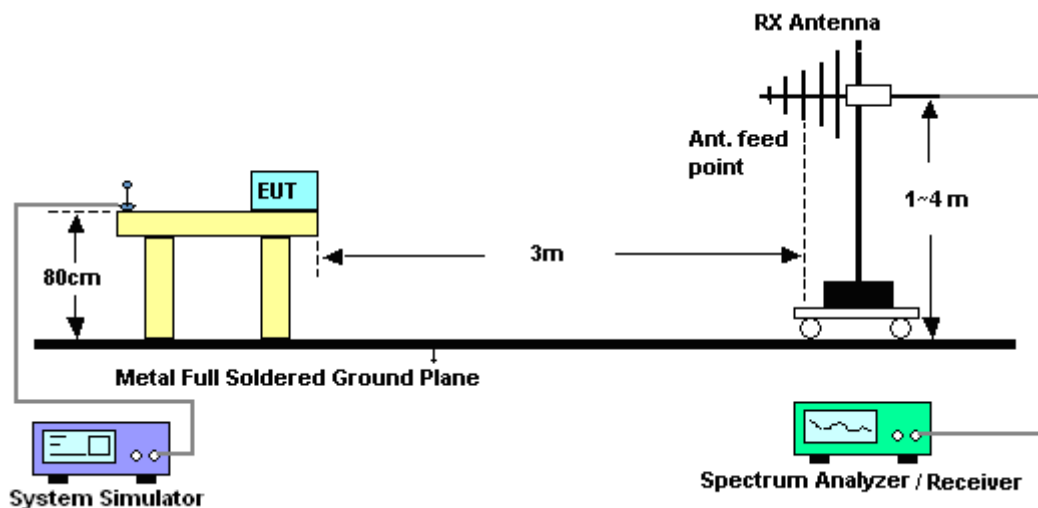
3.2.2. Measuring Instruments

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

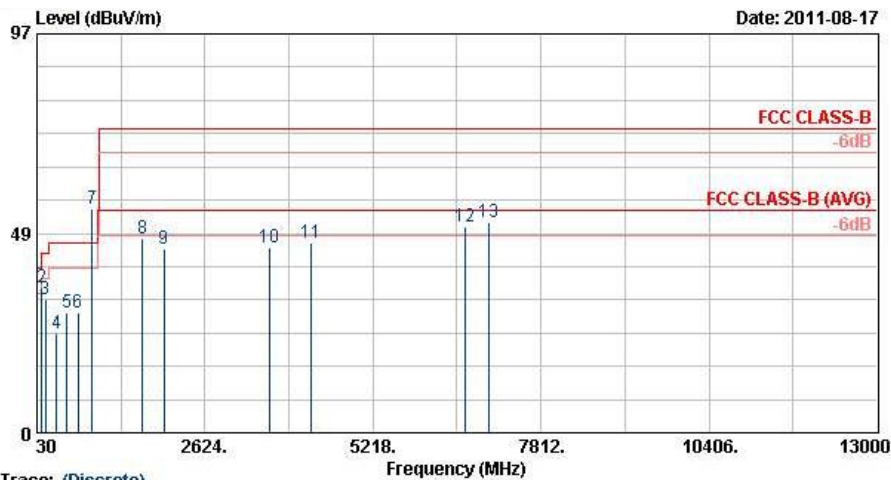
3.2.4. Test Setup of Radiated Emission





3.2.5. Test Result of Radiated Emission

Test Mode :	Mode 3	Temperature :	28~29°C
Test Engineer :	Kay Wu	Relative Humidity :	48~49%
Test Distance :	3m	Polarization :	Horizontal
Function Type :	WCDMA Band V Idle + Bluetooth Idle + WLAN Idle + Earphone + USB Cable (Data Link with Notebook) + SIM 1		
Remark :	#7 is System Simulator Signal which can be ignored.		



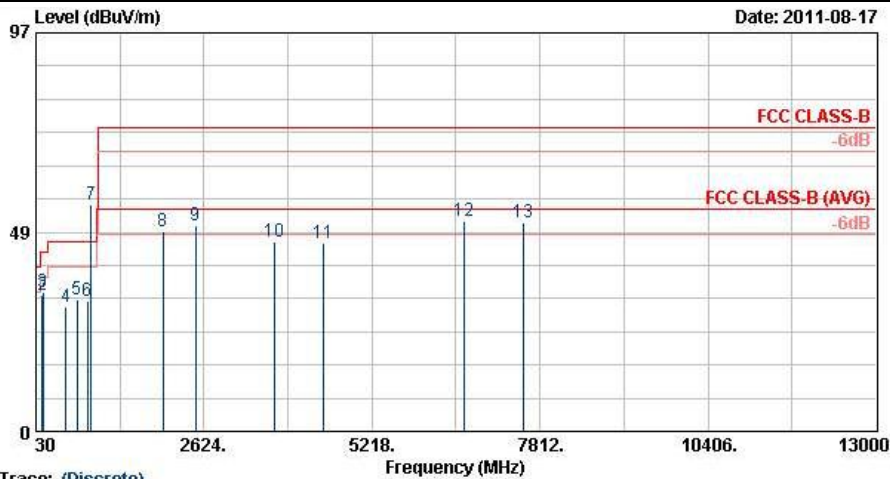
Site :
Condition :
Power :
Project :
Memo :

Trace: (Discrete)
: 03CH06-HY
: FCC CLASS-B 3m HF-ANT_090624 HORIZONTAL
: FromSystem
: FD 180203
: Mode 3

	Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Remark
	MHz	dBuV/m	Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	
			dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	32.43	31.81	-8.19	40.00	46.67	16.12	0.73	31.71	---	---	Peak
2	99.93	35.45	-8.05	43.50	55.22	10.69	1.22	31.68	100	31	Peak
3	164.73	32.34	-11.16	43.50	52.57	9.91	1.53	31.66	---	---	Peak
4	332.90	24.27	-21.73	46.00	39.46	14.22	2.17	31.58	---	---	Peak
5	498.80	29.18	-16.82	46.00	40.51	17.79	2.66	31.78	---	---	Peak
6	663.30	29.34	-16.66	46.00	38.90	19.31	3.11	31.98	---	---	Peak
7 X	882.40	54.41			60.96	21.48	3.68	31.71	---	---	Peak
8	1660.00	47.23	-26.77	74.00	68.05	29.47	4.39	54.68	---	---	Peak
9	1996.00	44.85	-29.15	74.00	62.71	32.00	4.93	54.79	---	---	Peak
10	3622.00	45.12	-28.88	74.00	60.25	33.50	6.85	55.49	---	---	Peak
11	4262.00	46.06	-27.94	74.00	60.09	34.39	7.56	55.98	---	---	Peak
12	6638.00	50.29	-23.71	74.00	61.10	36.16	10.16	57.13	---	---	Peak
13	7000.00	51.08	-22.92	74.00	61.23	36.30	10.69	57.14	100	0	Peak



Test Mode :	Mode 3	Temperature :	28~29°C
Test Engineer :	Kay Wu	Relative Humidity :	48~49%
Test Distance :	3m	Polarization :	Vertical
Function Type :	WCDMA Band V Idle + Bluetooth Idle + WLAN Idle + Earphone + USB Cable (Data Link with Notebook) + SIM 1		
Remark :	#7 is System Simulator Signal which can be ignored.		



Trace: (Discrete)
 Site : 03CH06-HY
 Condition : FCC CLASS-B 3m HF-ANT_090824 VERTICAL
 Power : FromSystem
 Project : FD 180203
 Memo : Mode 3

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	Ant	Table	Remark
	MHz	dBuV/m	Limit	Line	Level	Loss	Factor	Pos	Pos	
			dB	dBuV/m	dBuV	dB	dB	cm	deg	
1 !	35.13	35.76	-4.24	40.00	51.79	14.93	0.74	31.70	58	Peak
2	124.23	33.18	-10.32	43.50	51.52	12.01	1.35	31.71	---	Peak
3	141.24	33.99	-9.51	43.50	52.98	11.27	1.44	31.70	---	Peak
4	495.30	30.26	-15.74	46.00	41.65	17.73	2.65	31.78	---	Peak
5	663.30	32.24	-13.76	46.00	41.80	19.31	3.11	31.98	---	Peak
6	829.90	31.89	-14.11	46.00	39.32	21.03	3.47	31.93	---	Peak
7 @	882.40	55.10			61.64	21.48	3.68	31.71	---	Peak
8	1990.00	48.73	-25.27	74.00	66.75	31.87	4.89	54.78	---	Peak
9	2494.00	50.09	-23.91	74.00	66.90	32.60	5.52	54.93	---	Peak
10	3708.00	46.22	-27.78	74.00	61.21	33.57	6.98	55.54	---	Peak
11	4460.00	45.77	-28.23	74.00	59.41	34.83	7.72	56.19	---	Peak
12	6652.00	51.19	-22.81	74.00	61.96	36.16	10.20	57.13	100	0 Peak
13	7550.00	50.93	-23.07	74.00	60.37	36.11	11.31	56.86	---	Peak



4. List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Due Date	Remark
EMI Test Receive	R&S	ESCI 7	100724	9kHz~7GHz	Aug. 19, 2010	Aug. 18, 2011	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100081	9KHz – 30MHz	Dec. 03, 2010	Dec. 02, 2011	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100080	9KHz – 30MHz	Dec. 01, 2010	Nov. 30, 2011	Conduction (CO05-HY)
AC Power Source	APC	APC-1000W	N/A	N/A	N/A	N/A	Conduction (CO05-HY)
Spectrum Analyzer	R&S	FSP40	100057	9KHz-40GHz	Oct. 25, 2010	Oct. 24, 2011	Radiation (03CH06-HY)
EMI Test Receiver	R&S	ESVS10	834468/003	20MHz-1000M Hz	May 10, 2011	May 09, 2012	Radiation (03CH06-HY)
Bilog Antenna	SCHAFFNER	CBL6112B	2885	30MHz -2GHz	Oct. 31, 2010	Oct. 30, 2011	Radiation (03CH06-HY)
Double Ridge Horn Antenna	EMCO	3117	00066583	1GHz~18GHz	Aug. 01, 2011	Jul. 31, 2012	Radiation (03CH06-HY)
Double Ridge Horn Antenna	Training Research	AH-0801	95119	8GHz~18GHz	Oct. 20, 2010	Oct. 19, 2011	Radiation (03CH06-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15GHz- 40GHz	Oct. 18, 2010	Oct. 17, 2011	Radiation (03CH06-HY)
Pre Amplifier	Agilent	8449B	3008A01917	1GHz- 26.5GHz	Apr. 14, 2011	Apr. 13, 2012	Radiation (03CH06-HY)
Amplifier	Agilent	310N	186713	9KHz~1GHz	Apr. 14, 2011	Apr. 13, 2012	Radiation (03CH06-HY)
System Simulator	R&S	CMU200	117591	N/A	Oct. 18, 2010	Oct. 17, 2011	-

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
Combined Standard Uncertainty $Uc(y)$	1.13		
Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.26		

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
Combined Standard Uncertainty $Uc(y)$	1.27		
Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.54		



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	± 0.10	Normal (k=2)	0.10	1	0.10
Antenna Factor Calibration	± 1.70	Normal (k=2)	0.85	1	0.85
Cable Loss Calibration	± 0.50	Normal (k=2)	0.25	1	0.25
Receiver Correction	± 2.00	Rectangular	1.15	1	1.15
Antenna Factor Directional	± 1.50	Rectangular	0.87	1	0.87
Site Imperfection	± 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
Combined Standard Uncertainty $U_c(y)$	2.36				
Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	4.72				

