Variant FCC RF Test Report

APPLICANT	:	Intel Corp.
EQUIPMENT	:	Android Smart Phone
BRAND NAME	:	Intel
MODEL NAME	:	AZ210
MARKETING NAME	:	AZ210
FCC ID	:	O2Z-AZ210
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DTS) Digital Transmission System

This is a variant report which is only valid together with the original test report. The product was received on Aug. 21, 2012 and completely tested on Sep. 01, 2012. 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:

Jones Tsai

Jones Tsai / Manager

Testing Laboratory 1190

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR232306-03B	Rev. 01	This is a variant report based on the original report, Sporton Report Number FR232306B. Detail changes list as below : 1. HW change. 2. Change HW/SW version. 3. GPRS power reduction (GMPP2→1) via software setting change. Based on the product-equality-declaration exhibit, only the worst radiated test case found in the original report is verified.	Sep. 12, 2012

SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.247(b)	A8.4	Power Output Measurement	≤ 30dBm	Pass	-
3.2	15.247(d)	A8.5	Radiated Band Edges	15.209(a) & 15.247(d)	Pass	-
			Radiated Spurious Emission		Pass	Under limit 0.90 dB at 2389.92 MHz
3.3	15.203 & 15.247(b)	A8.4	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Intel Corp.
RNB-5-112, 2200 Mission College Blvd, Santa Clara, CA 95054, USA

1.2 Manufacturer

Chi Mei Communication Systems, Inc.
No. 4, Mingsheng Street, Tucheng City, New Taipei City 23678, Taiwan

1.3 Feature of Equipment Under Test

Product Feature	
Equipment	Android Smart Phone
Brand Name	Intel
Model Name	AZ210
Marketing Name	AZ210
FCC ID	O2Z-AZ210
EUT supports Radios application	GSM/EGPRS/WCDMA/HSPA WLAN 11abgn / Bluetooth / NFC
HW Version	DV3.0
SW Version	6082
EUT Stage	Production Unit

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

Product Specification subjective to this standard	
Tx/Rx Frequency Range	2412 MHz ~ 2462 MHz
Number of Channels	11
Carrier Frequency of Each Channel	2412+(n-1)*5 MHz; n=1~11
Maximum Output Power to Antenna	802.11b : 18.69 dBm (0.0740 W) 802.11g : 24.26 dBm (0.2667 W) 802.11n HT20 : 21.60 dBm (0.1445 W)
Antenna Type	PIFA Antenna with gain 0.36 dBi
Type of Modulation	802.11b : DSSS (BPSK / QPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)

1.4 Testing Site

Test Site	SPORTON INTERNATIONAL INC.		
Test Site Location	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-3273456 / FAX: +886-3-3284978		
Test Site No.	Sporton Site No.		FCC/IC Registration No.
	TH02-HY	03CH07-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 Part 15 Subpart C §15.247
- FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v01
- FCC TCB Workshop 2012, April
- ANSI C63.4-2003 and ANSI C63.10-2009
- IC RSS-210 Issue 8
- IC RSS-Gen Issue 3

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conducted emission (150 KHz to 30 MHz) and radiated emission (9 KHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Z plane) were recorded in this report.

The final configuration from all the combinations and the worst-case data rates were investigated by measuring the maximum power across all the data rates and modulation modes under section 2.2.

Based on the worst configuration found above, the RF power setting is set individually to meet FCC compliance limit for the final conducted and radiated tests shown in section 2.3.

2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	1	2412	7	2442
	2	2417	8	2447
	3	2422	9	2452
	4	2427	10	2457
	5	2432	11	2462
	6	2437		

2.2 Pre-Scanned RF Power

Preliminary tests were performed in different data rate and antenna configurations as following table and the highest power data rates were chosen for full test in the following tables. Final Output Power equals to Measured Output Power adds the duty factor.

2.4GHz 802.11b mode				
Data Rate (MHz)	1M bps	2M bps	5.5M bps	11M bps
Peak Power (dBm)	18.69	18.66	18.41	18.45

2.4GHz 802.11g mode								
Data Rate (MHz)	6M bps	9M bps	12M bps	18M bps	24M bps	36M bps	48M bps	54M bps
Peak Power (dBm)	24.26	24.25	24.14	24.21	24.17	23.97	23.52	23.51

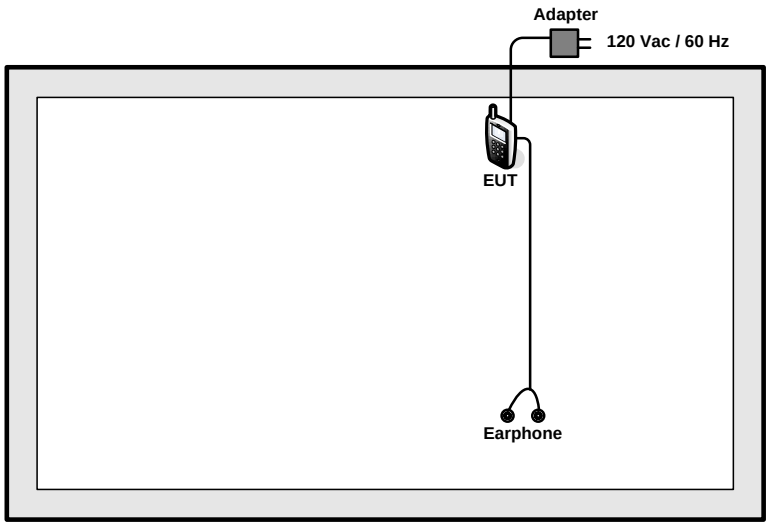
2.4GHz 802.11n HT20 mode								
Data Rate (MHz)	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Peak Power (dBm)	21.60	21.56	21.56	21.55	21.45	21.45	21.58	21.39

2.3 Test Mode

Final results of test modes, data rates and test channels are shown as following table.

Test Cases				
-	Test Items	Mode	Data Rate	Test Channel
Radiated TCs	Radiated Band EDGE	802.11g	6 Mbps	1
	Radiated Spurious Emission	802.11g	6 Mbps	1

2.4 Connection Diagram of Test System



2.5 RF Utility

The programmed RF utility “Intel bt/wifi tools-WI TX TESTING” is installed in EUT to provide channel selection, power level, data rate and the application type. RF Utility can send transmitting signal for all testing. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

3 Test Result

3.1 Output Power Measurement

3.1.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting antenna of directional gain greater than 6dBi are used the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

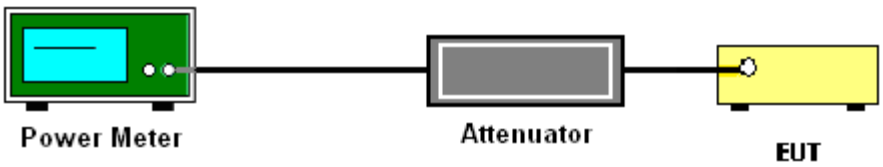
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance and TCB Workshop 2012, April.
2. The RF output of EUT was connected to the power meter by a low loss cable
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.

3.1.4 Test Setup



3.1.5 Test Result of Peak Output Power

Test Mode :	802.11b	Temperature :	24~26℃
Test Engineer :	Book Lin	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11b Peak Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	18.13	30	Pass
06	2437	18.29	30	Pass
11	2462	18.69	30	Pass

Test Mode :	802.11g	Temperature :	24~26℃
Test Engineer :	Book Lin	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11g Peak Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	23.95	30	Pass
06	2437	24.06	30	Pass
11	2462	24.26	30	Pass

Test Mode :	802.11n HT20	Temperature :	24~26℃
Test Engineer :	Book Lin	Relative Humidity :	50~53%

Channel	Frequency (MHz)	2.4GHz 802.11n HT20 Peak Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	21.04	30	Pass
06	2437	21.60	30	Pass
11	2462	21.58	30	Pass

3.1.6 Test Result of Average output Power (Reporting Only)

Test Mode :	802.11b	Temperature :	24~26℃
Test Engineer :	Book Lin	Relative Humidity :	50~53%
Duty Cycle:	100%	Duty Factor:	0.00dB

Channel	Frequency (MHz)	802.11b Average Output Power (dBm)
01	2412	15.98
06	2437	16.23
11	2462	16.64

Test Mode :	802.11g	Temperature :	24~26℃
Test Engineer :	Book Lin	Relative Humidity :	50~53%
Duty Cycle:	97.62%	Duty Factor:	0.10dB

Channel	Frequency (MHz)	802.11g Average Output Power (dBm)
01	2412	16.71
06	2437	16.15
11	2462	16.45

Test Mode :	802.11n HT20	Temperature :	24~26℃
Test Engineer :	Book Lin	Relative Humidity :	50~53%
Duty Cycle:	97.62%	Duty Factor:	0.10dB

Channel	Frequency (MHz)	802.11n HT20 Average Output Power (dBm)
01	2412	10.79
06	2437	11.30
11	2462	11.28

3.2 Radiated Emission Measurement

3.2.1 Limit of Radiated Emission

In any 100 KHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

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

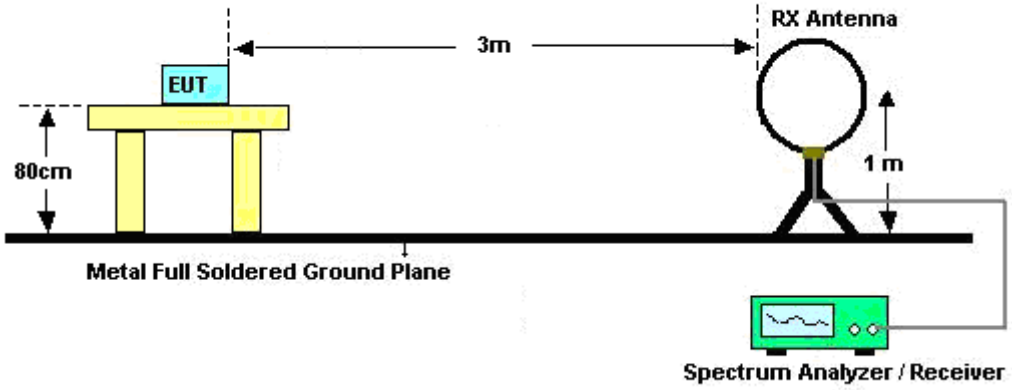
See list of measuring instruments of this test report.

3.2.3 Test Procedures

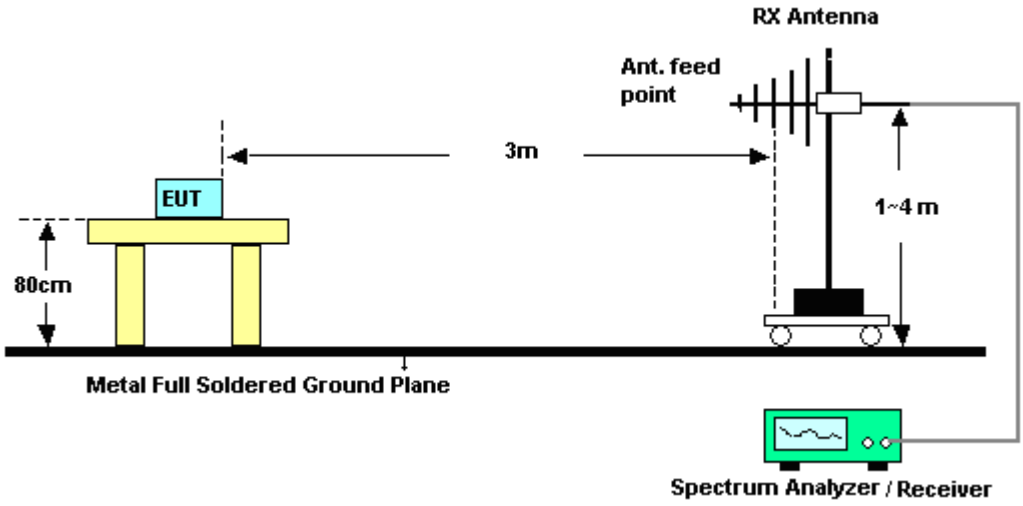
1. The testing follows the guidelines in ANSI C63. 10-2009
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW=100 KHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
   (3) Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz for peak measurement.
   For average measurement:
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.2.4 Test Setup

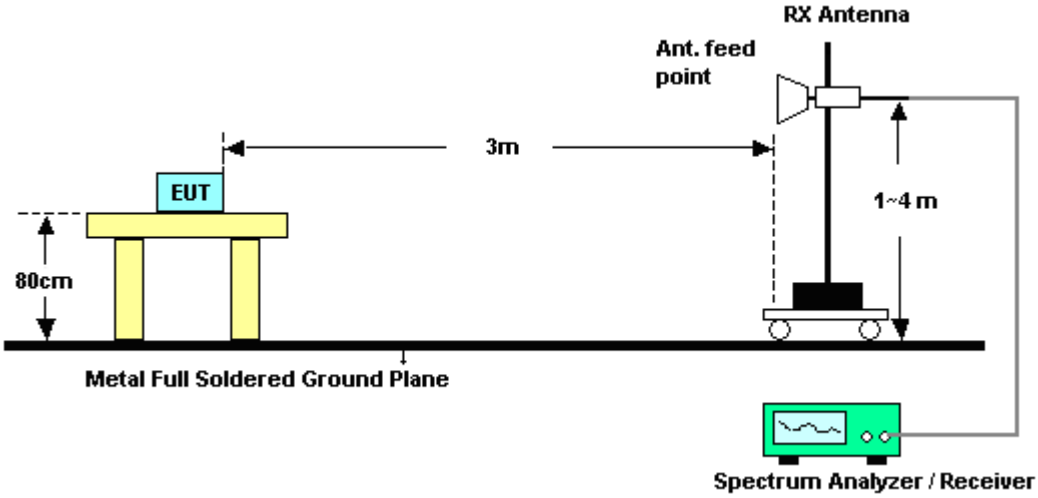
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.2.5 Test Results of Radiated Emissions (9 KHz ~ 30 MHz)

The low frequency, which started from 9 KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

3.2.6 Test Result of Radiated Band Edges

Test Mode :	802.11g	**Temperature :**	25~26℃
Test Band :	Low	**Relative Humidity :**	44~45%
Test Channel :	01	**Test Engineer :**	Gavin Wu

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	**Level (dBμV/m)**	**Over Limit (dB)**	**Limit Line (dBμV/m)**	**Read Level (dBμV)**	**Antenna Factor (dB)**	**Cable Loss (dB)**	**Preamp Factor (dB)**	**Ant Pos (cm)**	**Table Pos (deg)**	**Remark**
2389.92	73.1	-0.9	74	68.73	32.3	6.03	33.96	140	248	Peak
2390	51.26	-2.74	54	46.89	32.3	6.03	33.96	140	248	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	**Level (dBμV/m)**	**Over Limit (dB)**	**Limit Line (dBμV/m)**	**Read Level (dBμV)**	**Antenna Factor (dB)**	**Cable Loss (dB)**	**Preamp Factor (dB)**	**Ant Pos (cm)**	**Table Pos (deg)**	**Remark**
2389.83	63.47	-10.53	74	59.1	32.3	6.03	33.96	200	273	Peak
2390	44.52	-9.48	54	40.15	32.3	6.03	33.96	200	273	Average

3.2.7 Test Result of Radiated Emission (30 MHz ~ 10th Harmonic)

Test Mode :	802.11g	Temperature :	25~26℃
Test Channel :	01	Relative Humidity :	44~45%
Test Engineer :	Gavin Wu	Polarization :	Horizontal
Remark :	2412 MHz is fundamental signal which can be ignored.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
221.97	40.71	-5.29	46	59.85	10.65	1.43	31.22	100	83	QP
237.63	40.19	-5.81	46	58.14	11.73	1.52	31.2	100	261	QP
247.08	42.91	-3.09	46	60.15	12.4	1.53	31.17	100	261	QP
313.3	41.13	-4.87	46	56.83	13.67	1.8	31.17	-	-	Peak
338.5	39.78	-6.22	46	54.93	14.35	1.88	31.38	-	-	Peak
342	39.26	-6.74	46	54.31	14.45	1.91	31.41	-	-	Peak
2412	104.82	-	-	100.41	32.31	6.07	33.97	140	248	Average
2412	114.93	-	-	110.52	32.31	6.07	33.97	140	248	Peak
4824	41.43	-32.57	74	55.81	33.97	9.12	57.47	100	0	Peak

Test Mode :	802.11g	Temperature :	25~26℃
Test Channel :	01	Relative Humidity :	44~45%
Test Engineer :	Gavin Wu	Polarization :	Vertical
Remark :	2412 MHz is fundamental signal which can be ignored.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
177.42	37.56	-5.94	43.5	58.53	9	1.24	31.21	-	-	Peak
263.28	42.21	-3.79	46	59.09	12.78	1.61	31.27	-	-	Peak
266.25	41.5	-4.5	46	58.33	12.83	1.62	31.28	-	-	Peak
325.9	33.72	-12.28	46	49.09	14.01	1.83	31.21	-	-	Peak
332.2	37.2	-8.8	46	52.44	14.19	1.86	31.29	-	-	Peak
342	35.55	-10.45	46	50.6	14.45	1.91	31.41	-	-	Peak
2412	98.5	-	-	94.09	32.31	6.07	33.97	200	273	Average
2412	108.65	-	-	104.24	32.31	6.07	33.97	200	273	Peak
4824	41.47	-32.53	74	55.85	33.97	9.12	57.47	100	0	Peak

3.3 Antenna Requirements

3.3.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. 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 FCC rule.

3.3.2 Antenna Connected Construction

Non-standard connector used.

3.3.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP40	100055	9kHz~40GHz	Jun. 06, 2012	Aug. 30, 2012	Jun. 05, 2013	Conducted (TH02-HY)
Power Meter	Anritsu	ML2495A	0932001	N/A	Sep. 18, 2011	Aug. 30, 2012	Sep. 17, 2012	Conducted (TH02-HY)
Power Sensor	Anritsu	MA2411B	0846202	N/A	Sep. 18, 2011	Aug. 30, 2012	Sep. 17, 2012	Conducted (TH02-HY)
Bilog Antenna	SCHAFFNER	CBL6111C	2726	30MHz ~ 1GHz	Oct. 22, 2011	Aug. 30, 2012 ~ Sep. 01, 2012	Oct. 21, 2012	Radiation (03CH07-HY)
Spectrum Analyzer	R&S	FSP30	101067	9KHz ~ 30GHz	Dec. 06, 2011	Aug. 30, 2012 ~ Sep. 01, 2012	Dec. 05, 2012	Radiation (03CH07-HY)
Double Ridge Horn Antenna	EMCO	3117	00066583	1GHz ~ 18GHz	Aug. 01, 2012	Aug. 30, 2012 ~ Sep. 01, 2012	Jul. 31, 2013	Radiation (03CH07-HY)
Pre Amplifier	Agilent	8449B	3008A02362	1GHz ~ 26.5GHz	Dec. 05, 2011	Aug. 30, 2012 ~ Sep. 01, 2012	Dec. 04, 2012	Radiation (03CH07-HY)
Pre Amplifier	COM-POWER	PA-103A	161241	10-1000MHz.32 dB.GAIN	Feb. 27, 2012	Aug. 30, 2012 ~ Sep. 01, 2012	Feb. 26, 2013	Radiation (03CH07-HY)
Signal Analyzer	Rohde & Schwarz	FSQ	200578/026	20Hz~26.5GHz	Feb. 06, 2012	Aug. 30, 2012 ~ Sep. 01, 2012	Feb. 05, 2013	Radiation (03CH07-HY)
Pre Amplifier	MITEQ	AMF-7D-00 101800-30-10P	159088	1GHz ~ 18GHz	Mar. 10, 2012	Aug. 30, 2012 ~ Sep. 01, 2012	Mar. 09, 2013	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15GHz ~ 40GHz	Oct. 21, 2011	Aug. 30, 2012 ~ Sep. 01, 2012	Oct. 20, 2012	Radiation (03CH07-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9KHz ~ 30MHz	Jul. 03, 2012	Aug. 30, 2012 ~ Sep. 01, 2012	Jul. 02, 2014	Radiation (03CH07-HY)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.54**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.72**

Appendix A. Photographs of EUT

Please refer to Sporton report number EP232306-03 as below