FCC RF Test Report

APPLICANT	:	NEC Corporation of America
EQUIPMENT	:	Digital Portable Cellular Telephone
BRAND NAME	:	NEC CASIO Mobile Communications
MODEL NAME	:	KMP7N4AB-1A
MARKETING NAME	:	KMP7N4AB-1A
FCC ID	:	A98-IQF1504
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	Digital Spread Spectrum (DSS)

The product was received on Sep. 22, 2011 and completely tested on Oct. 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

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
FR192229A	Rev. 01	Initial issue of report	Oct. 25, 2011

SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(1)	A8.4(2)	Number of Channels	≥ 15Chs	Pass	-
3.2	15.247(a)(1)	A8.1(a)	20dB Bandwidth	NA	Pass	-
3.3	15.247(a)(1)	A8.1(b)	Channel Separation	≥ 2/3 of 20dB BW	Pass	-
3.4	15.247(a)(1)	A8.1(d)	Dwell Time of Each Channel	≤ 0.4sec in 31.6sec period	Pass	-
3.5	15.247(b)(1)	A8.1(b)	Peak Output Power	≤ 125 mW	Pass	-
3.6	15.247(d)	A8.5	Frequency Band Edges	≤ 20dBc	Pass	-
3.7	15.247(d)	A8.5	Spurious Emission	< 20 dBc	Pass	-
3.8	15.207	Gen 7.2.4	AC Conducted Emission	15.207(a)	Pass	Under limit 19.40 dB at 0.342 MHz
3.9	15.247(d)	A8.5	Transmitter Radiated Emission	15.209(a) & 15.247(d)	Pass	Under limit 8.92 dB at 2483.5 MHz
3.10	15.203 & 15.247(b)	A8.4	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

NEC Corporation of America
6535N. State HWY. 161 Irving, TX 75039, USA

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	Digital Portable Cellular Telephone
Brand Name	NEC CASIO Mobile Communications
Model Name	KMP7N4AB-1A
Marketing Name	KMP7N4AB-1A
FCC ID	A98-IQF1504
Tx/Rx Frequency Range	2400 MHz ~ 2483.5 MHz
Number of Channels	79
Carrier Frequency of Each Channel	2402+n*1 MHz; n=0~78
Channel Spacing	1 MHz
Maximum Output Power to Antenna	Bluetooth (1Mbps) : -4.29 dBm (0.0004 W) Bluetooth EDR (2Mbps) : -3.82 dBm (0.0004 W) Bluetooth EDR (3Mbps) : -4.29 dBm (0.0004 W)
Antenna Type	PIFA Antenna with gain 1.25 dBi
HW Version	EP2-1
SW Version	M4730000
Type of Modulation	Bluetooth (1Mbps) : GFSK Bluetooth EDR (2Mbps) : π/4-DQPSK Bluetooth EDR (3Mbps) : 8-DPSK
EUT Stage	Identical Prototype

Remark:

1. For other wireless features of this EUT, test report will be issued separately.
2. This test report recorded only product characteristics and test results of Digital Spread Spectrum (DSS).
3. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

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.
	CO05-HY	03CH05-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 Public Notice DA 00-705
- ANSI C63.4-2003
- 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 (DoC), recorded in a separate test report.

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.	Bluetooth Base Station	R&S	CBT32	N/A	N/A	Unshielded, 1.8 m
4.	WLAN AP	D-Link	DIR-628	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
5.	Notebook	DELL	Vostro 1510	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
6.	Bluetooth Earphone	Nokia	BH-102	PYAHS-107W	N/A	N/A

2 Test Configuration of Equipment Under Test

2.1 RF Output Power

Preliminary tests were performed in different data rate and recorded the RF output power in the following table:

Channel	Frequency	Bluetooth RF Output Power		
		Data Rate / Modulation		
		GFSK	π/4-DQPSK	8-DPSK
		1Mbps	2Mbps	3Mbps
Ch00	2402MHz	-4.55 dBm	-4.08 dBm	-4.45 dBm
Ch39	2441MHz	-4.29 dBm	**-3.82** dBm	-4.29 dBm
Ch78	2480MHz	-5.13 dBm	-4.66 dBm	-5.02 dBm

Remark:

1. The data rate was set in 2Mbps for all the test items due to the highest RF output power.
2. The EUT is programmed to transmit signals continuously for all testing.

2.2 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 (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

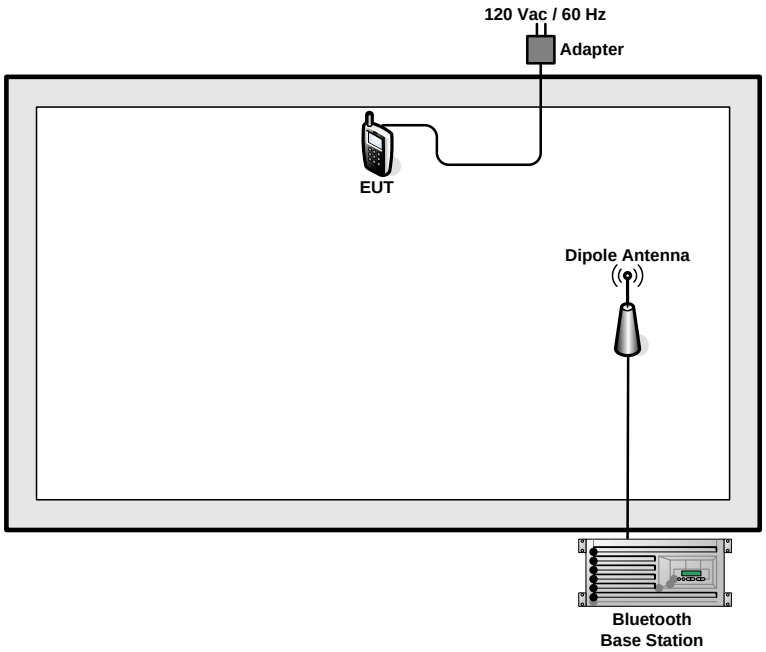
Pre-scanned tests, X, Y, Z in three orthogonal panels, were conducted to determine the final configuration from all possible combinations.

The following tables are showing the test modes as the worst cases (E2 plane) and recorded in this report.

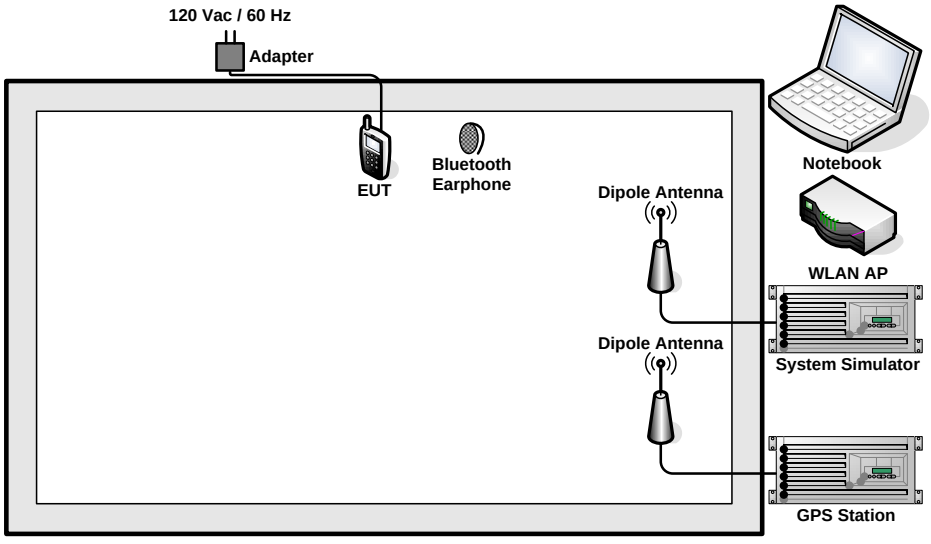
Test Cases			
Test Item	**Data Rate / Modulation**		
	Bluetooth 1Mbps GFSK	**Bluetooth EDR 2Mbps π/4-DQPSK**	**Bluetooth EDR 3Mbps 8-DPSK**
Conducted TCs	Mode 1: CH00_2402 MHz Mode 2: CH39_2441 MHz Mode 3: CH78_2480 MHz	Mode 4: CH00_2402 MHz Mode 5: CH39_2441 MHz Mode 6: CH78_2480 MHz	Mode 7: CH00_2402 MHz Mode 8: CH39_2441 MHz Mode 9: CH78_2480 MHz
Radiated TCs	N/A	Mode 1: CH00_2402 MHz Mode 2: CH39_2441 MHz Mode 3: CH78_2480 MHz	N/A
AC Conducted Emission	Mode 1 : GSM850 Idle + Bluetooth Link + WLAN (2.4G) Link + GPS Rx + USB Cable (Charging from Adapter)		
Remark: For radiated TCs, the data rate was set in 2Mbps due to the highest RF output power; only the data of these modes was reported.			

2.3 Connection Diagram of Test System

<Bluetooth Tx Mode>



<AC Conducted Emission Mode>



2.4 RF Utility

For Bluetooth function, the RF utility, “Diag Tool Nx9320.exe” was installed in EUT which was programmed in order to make the EUT into the engineering modes to contact with Bluetooth base station for transmitting and receiving signals continuously.

3 Test Result

3.1 Number of Channel Measurement

3.1.1 Limits of Number of Hopping Frequency

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedure

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. The modulation types of EUT are irrelevant to number of hopping channels deviation.
4. The EUT must have its hopping function enabled. Use the following spectrum analyzer settings: Span = the frequency band of operation; RBW ≥ 1% of the span; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
5. The number of hopping frequency used is defined as the device has the numbers of total channel.

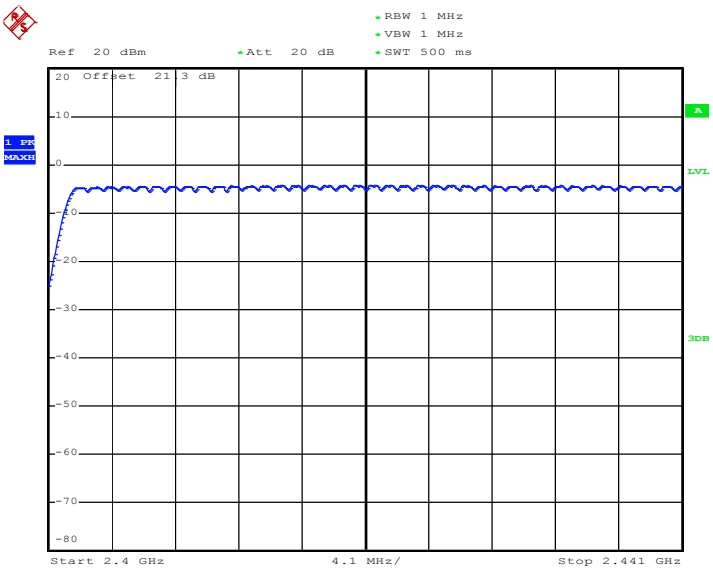
3.1.4 Test Setup

3.1.5 Test Result of Number of Hopping Frequency

Test Mode :	Mode 4~6	Temperature :	21~24℃
Test Engineer :	Reece Li	Relative Humidity :	52~55%

Number of Hopping Channels (Channel)	Limits (Channel)	Pass/Fail
79	> 15	Pass

Number of Hopping Channel Plot on Channel 00 - 78



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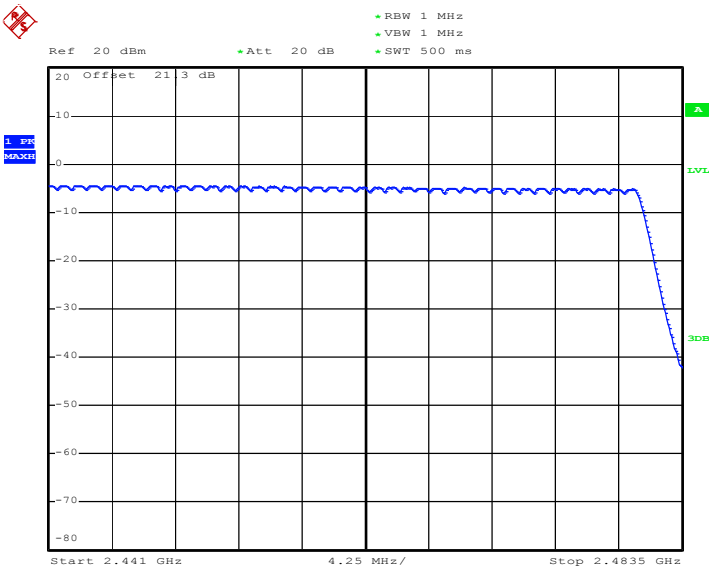

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3.2 20dB Bandwidth Measurement

3.2.1 Limit of 20dB Bandwidth

N/A

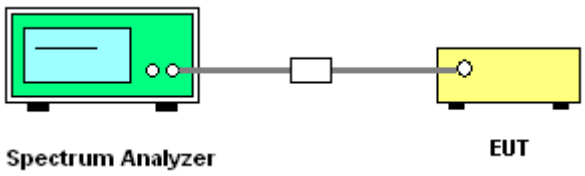
3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 Test Procedures

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. The EUT should be transmitting at its maximum data rate as the worst cases.
4. Use the following spectrum analyzer settings:
   Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel;
   RBW ≥ 1% of the 20 dB bandwidth; VBW ≥ RBW; Sweep = auto; Detector function = peak;
   Trace = max hold.
5. The marker-delta reading at this point is the 20 dB bandwidth of the emission.

3.2.4 Test Setup

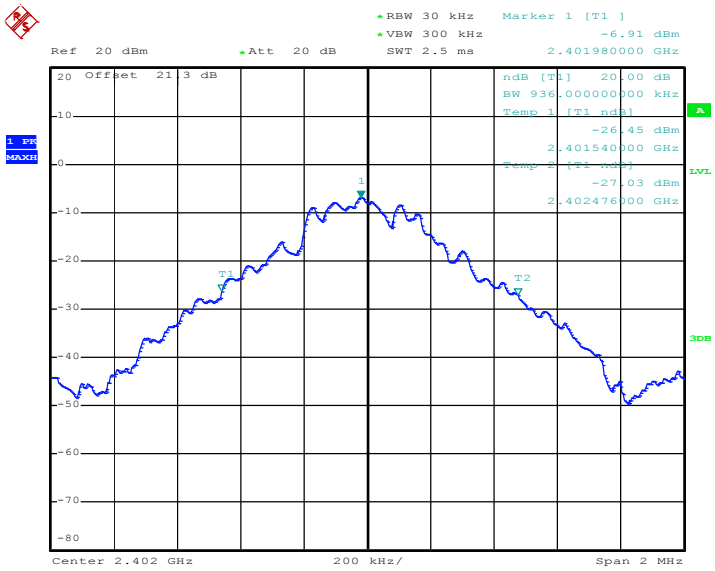


3.2.5 Test Result of 20dB Bandwidth

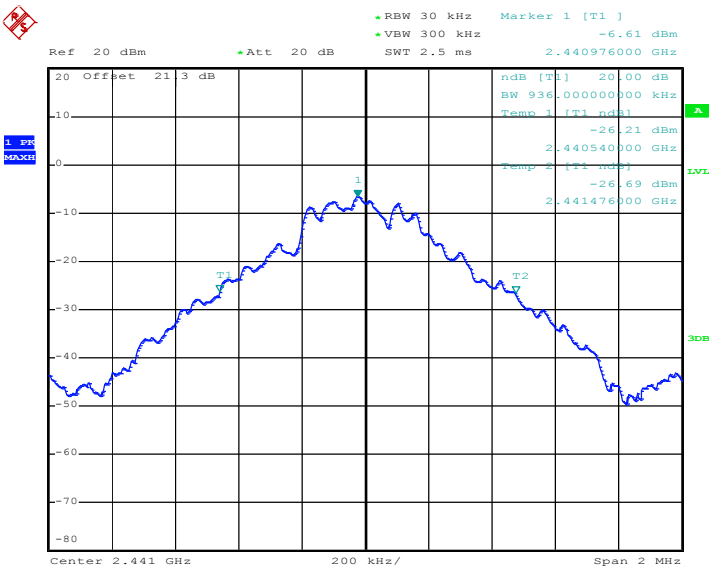
Test Mode :	Mode 1, 2, 3	Temperature :	21~24℃
Test Engineer :	Reece Li	Relative Humidity :	52~55%

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	0.936
39	2441	0.936
78	2480	0.936

20 dB Bandwidth Plot on Channel 00



20 dB Bandwidth Plot on Channel 39



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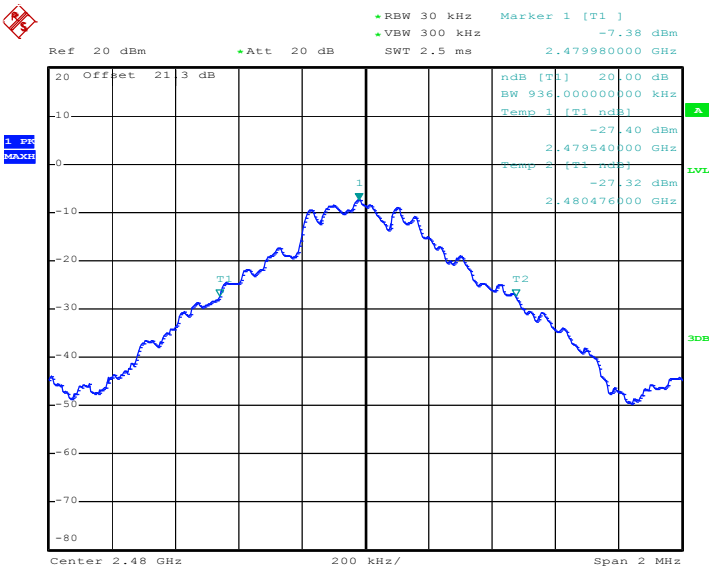
20 dB Bandwidth Plot on Channel 78



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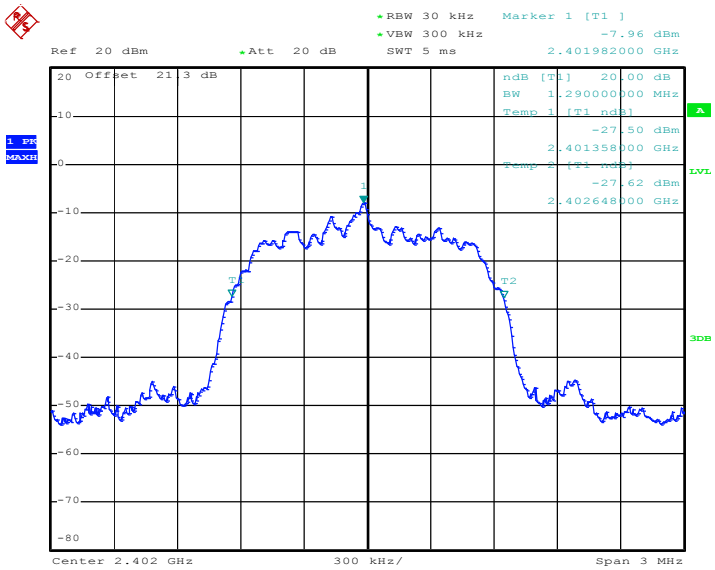
Test Mode :	Mode 4, 5, 6	Temperature :	21~24℃
Test Engineer :	Reece Li	Relative Humidity :	52~55%

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.290
39	2441	1.296
78	2480	1.290

20 dB Bandwidth Plot on Channel 00



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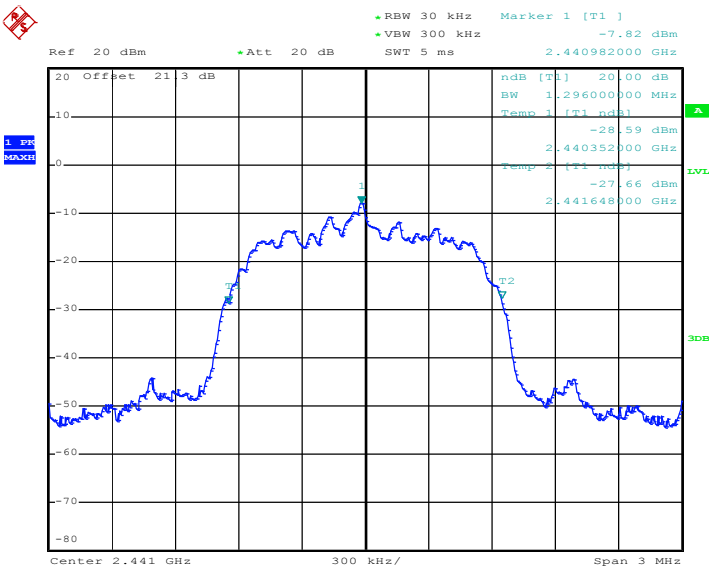
20 dB Bandwidth Plot on Channel 39



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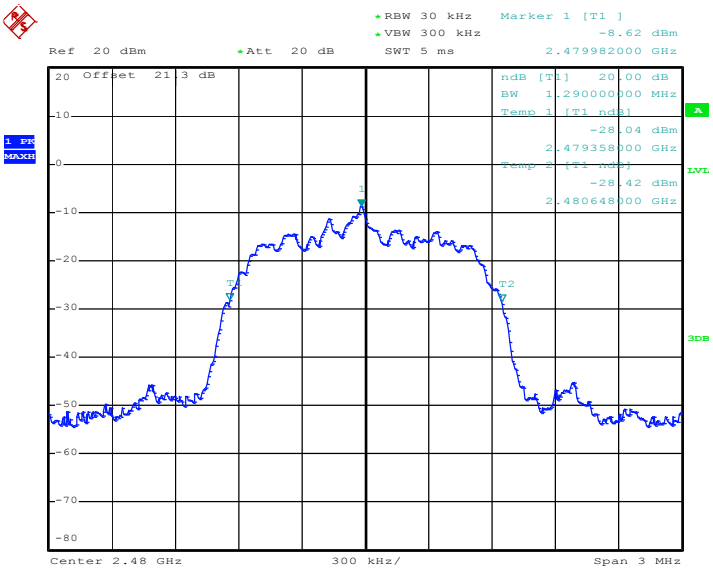
20 dB Bandwidth Plot on Channel 78

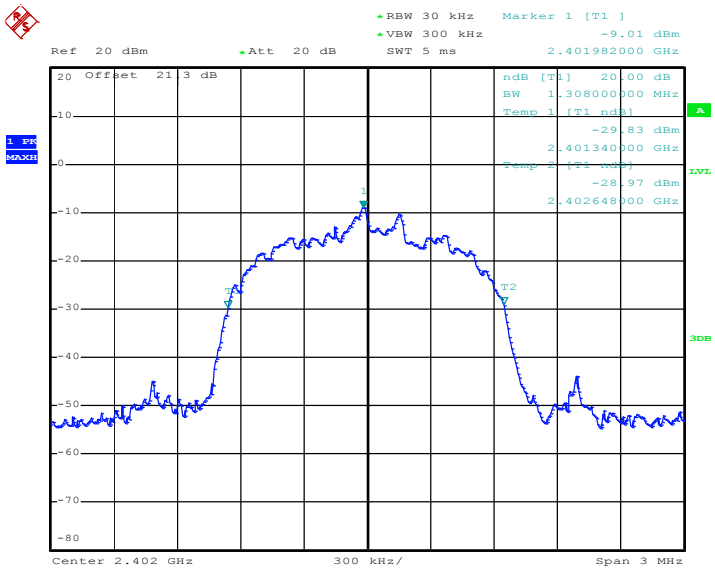


Date: 15.OCT.2011 02:45:51

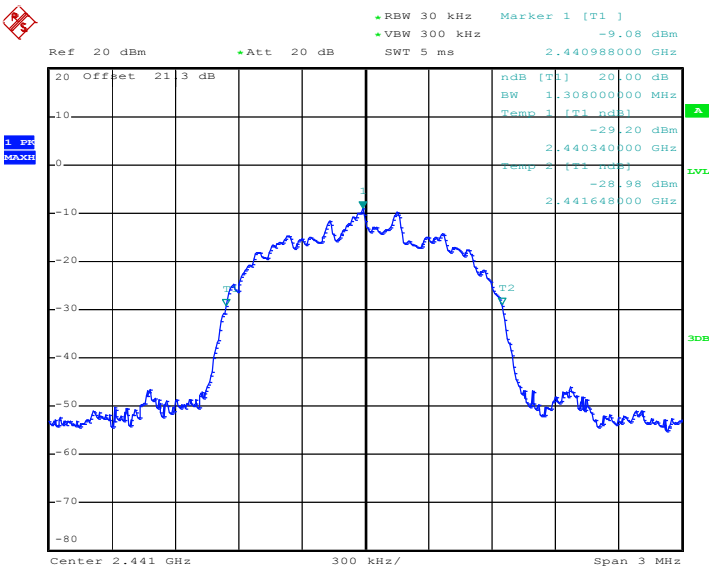
Test Mode :	Mode 7, 8, 9	Temperature :	21~24℃
Test Engineer :	Reece Li	Relative Humidity :	52~55%

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.308
39	2441	1.308
78	2480	1.308

20 dB Bandwidth Plot on Channel 00



20 dB Bandwidth Plot on Channel 39



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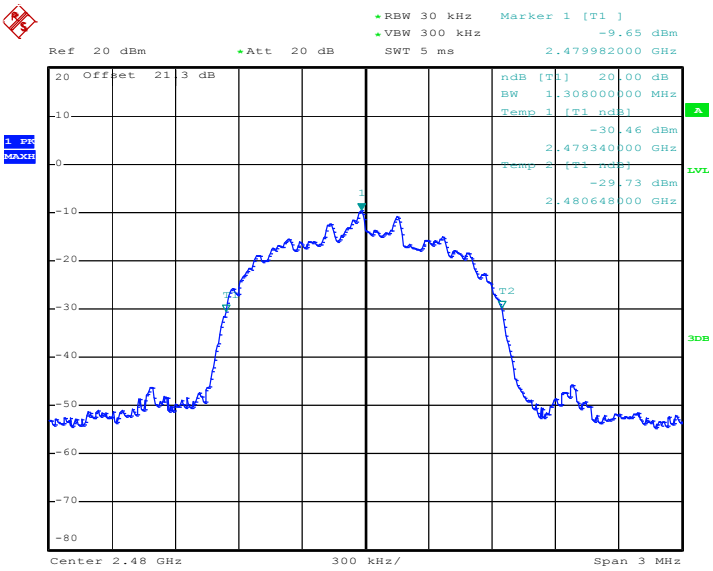
20 dB Bandwidth Plot on Channel 78



Date: 15.OCT.2011 02:46:56

3.3 Hopping Channel Separation Measurement

3.3.1 Limit of Hopping Channel Separation

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

3.3.3 Test Procedures

1. Please refer FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. The EUT should be transmitting at its maximum data rate as the worst cases.
4. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peaks of two adjacent channels; RBW ≥ 1% of the span; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
5. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

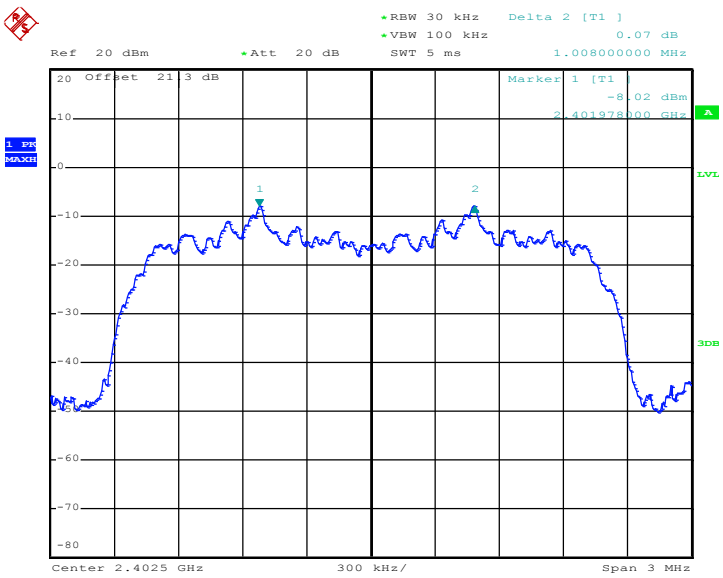
3.3.4 Test Setup

3.3.5 Test Result of Hopping Channel Separation

Test Mode :	Mode 4, 5, 6	Temperature :	21~24℃
Test Engineer :	Reece Li	Relative Humidity :	52~55%

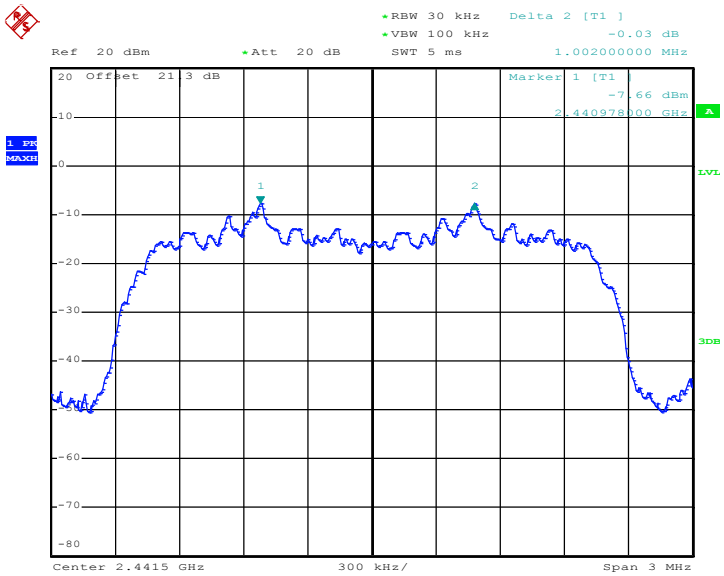
Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.008	0.8600	Pass
39	2441	1.002	0.8640	Pass
78	2480	1.002	0.8600	Pass

Channel Separation Plot on Channel 00 - 01



Date: 15.OCT.2011 02:59:03

Channel Separation Plot on Channel 39 - 40



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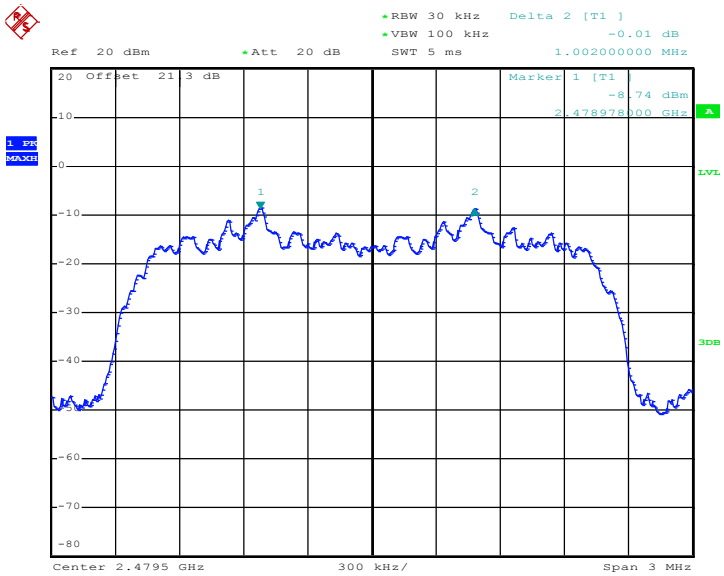
Channel Separation Plot on Channel 77 - 78



Date: 15.OCT.2011 03:01:21

3.4 Dwell Time Measurement

3.4.1 Limit of Dwell Time

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

3.4.2 Measuring Instruments

See list of measuring instruments of this test report.

3.4.3 Test Procedures

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. The EUT should be transmitting at its maximum data rate as the worst cases.
4. The EUT must have its hopping function enabled. Use the following spectrum analyzer settings: Span = zero span, centered on a hopping channel; RBW = 1 MHz; VBW ≥ RBW; Sweep = as necessary to capture the entire dwell time per hopping channel; Detector function = peak; Trace = max hold.
5. Use the marker-delta function to calculate the dwell time.

3.4.4 Test Setup

3.4.5 Test Result of Dwell Time

Test Mode :	Mode 5	Temperature :	21~24℃
Test Engineer :	Reece Li	Relative Humidity :	52~55%

Package Mode	Average Hopping Channel	Package Transfer Time (usec)	Dwell Time (sec)	Limits (sec)	Pass/Fail
2DH5	2.80	2950.00	0.26	0.4	Pass

Remark:

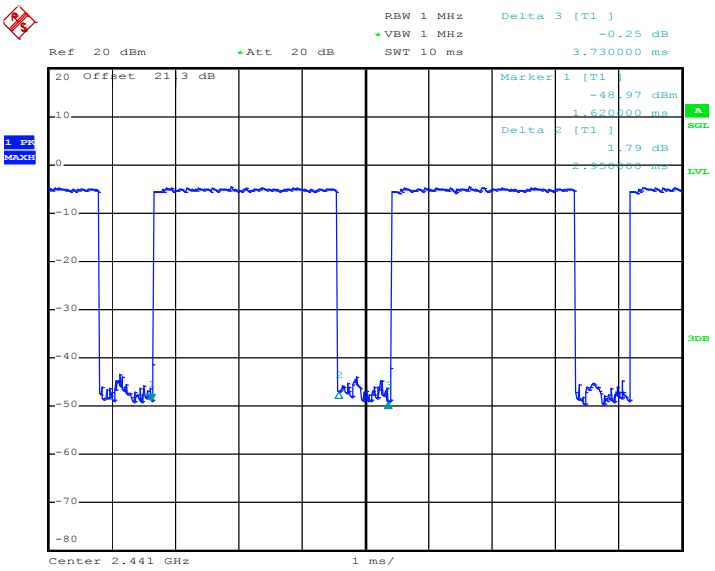
1. Dwell Time=79(channels) x 0.4(s) x average hopping channel x package transfer time

2. 79 channels come from the Hopping Channel number.

3. Average Hopping Channel = hops/sweep time

4. t: Package Transfer Time(us)

2DH5 Dwell Time (One Pulse) Plot on Channel 39



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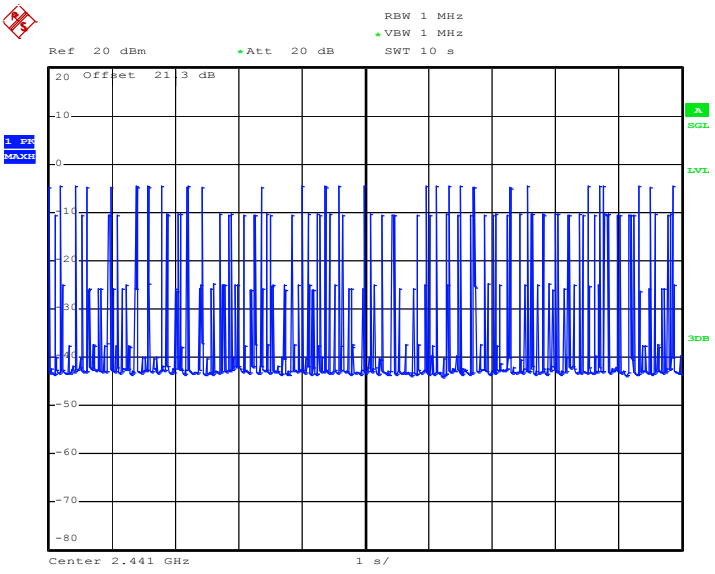
2DH5 Dwell Time (Count Pulses) Plot on Channel 39



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3.5 Peak Output Power Measurement

3.5.1 Limit of Peak Output Power

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW (20.97dBm).

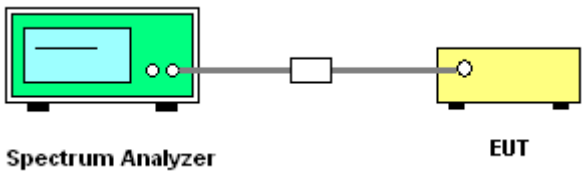
3.5.2 Measuring Instruments

See list of measuring instruments of this test report.

3.5.3 Test Procedures

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.

3.5.4 Test Setup

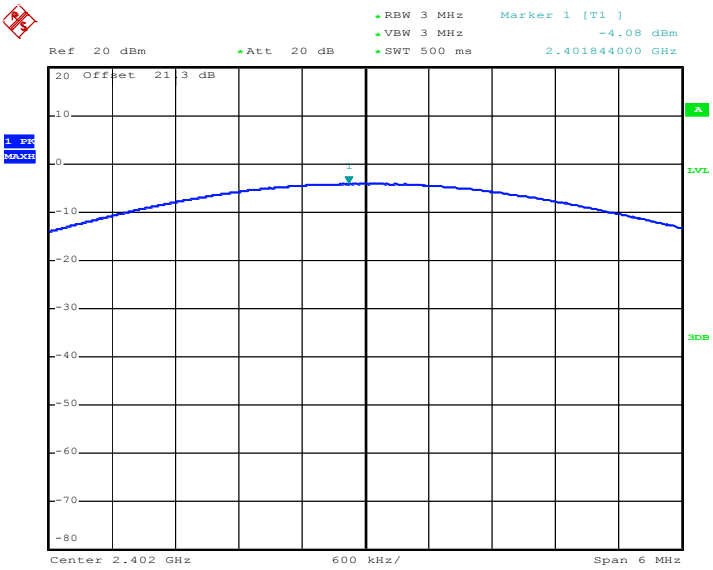


3.5.5 Test Result of Peak Output Power

Test Mode :	Mode 4, 5, 6	Temperature :	21~24℃
Test Engineer :	Reece Li	Relative Humidity :	52~55%

Channel	Frequency (MHz)	RF Power (dBm)		
		π /4-DQPSK	Max. Limits	Pass/Fail
		2 Mbps	(dBm)	
00	2402	-4.08	20.97	Pass
39	2441	-3.82	20.97	Pass
78	2480	-4.66	20.97	Pass

Peak Output Power Plot on Channel 00



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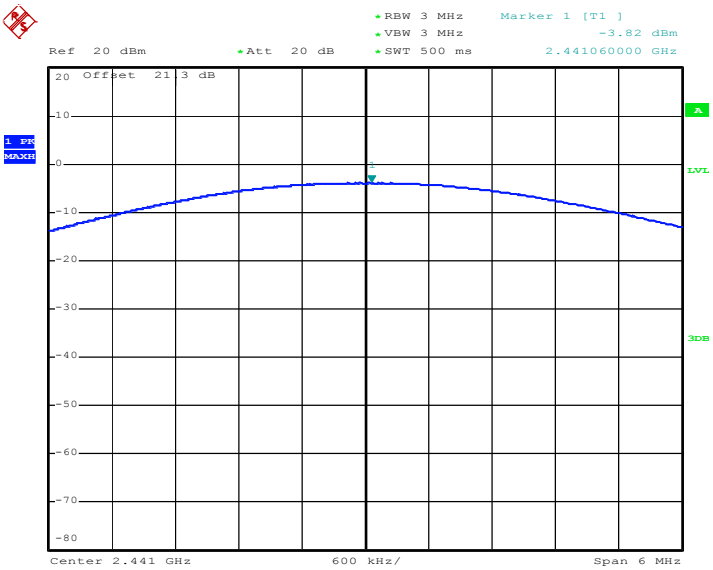
Peak Output Power Plot on Channel 39



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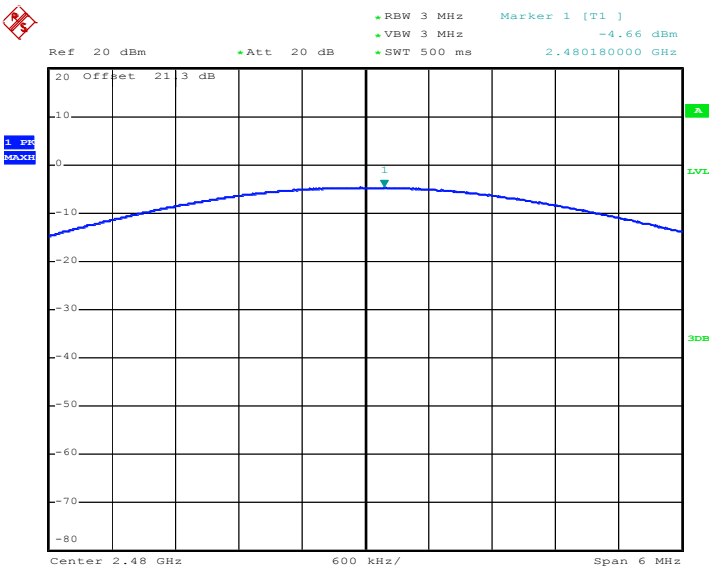
Peak Output Power Plot on Channel 78



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3.6 Band Edges Measurement

3.6.1 Limit of Band Edges

In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

3.6.2 Measuring Instruments

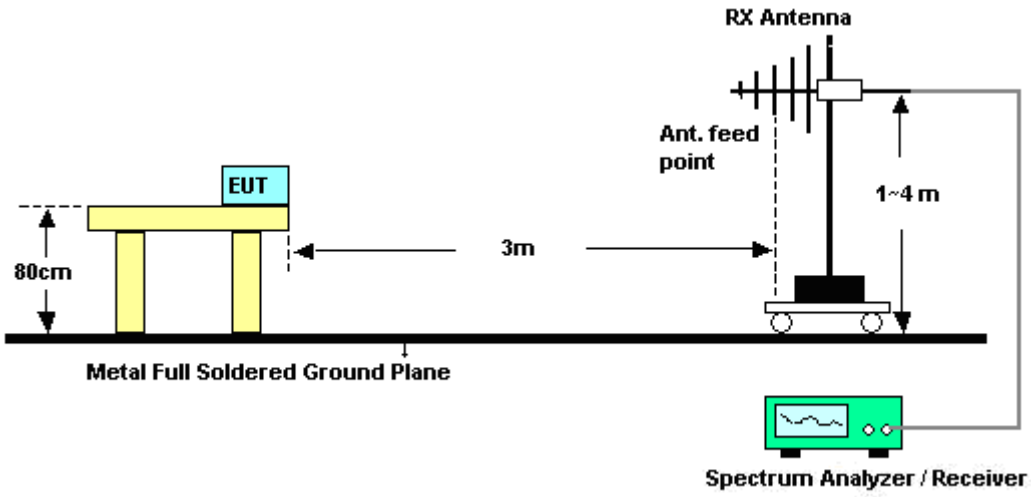
See list of measuring instruments of this test report.

3.6.3 Test Procedures

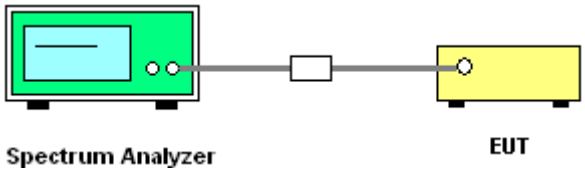
1. The testing follows the guidelines in ANSI C63.4-2003 and FCC Public Notice DA 00-705 Measurement Guidelines.
2. RF antenna conducted test: Set RBW = 300kHz, Video bandwidth (VBW) ≥ RBW. Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 300k Hz RBW. Note: If the device complies with the use of power option 2 the attenuation under this paragraph shall be 30 dB instead of 20 dB.
3. Radiated emission test: Applies to band edge emissions that fall in the restricted bands listed in FCC Section 15.205. The maximum permitted average field strength is listed in FCC Section 15.209. A pre-amp is necessary for this measurement. For measurements above 1 GHz, set RBW = 1MHz, VBW = 1MHz, Sweep: Auto for Peak; set RBW = 1MHz, VBW = 10 Hz, Sweep: Auto for Average. If the emission is pulsed, modify the unit for continuous operation; use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation. See FCC Section 15.35(b) and (c).
4. In case the emission is fail due to the used RBW / VBW is too wide, marker-delta method of FCC Public Notice DA 00-705 will be followed.

3.6.4 Test Setup

<Radiated Band Edges>



<Conducted Band Edges>



3.6.5 Test Result of Radiated Band Edges

Test Mode :	Mode 1	Temperature :	22~24°C
Test Channel :	00	Relative Humidity :	49~51%
		Test Engineer :	David Yang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2352.56	45.76	-28.24	74	43.05	31.99	4.55	33.83	179	171	Peak
2352.56	33.11	-20.89	54	30.4	31.99	4.55	33.83	179	171	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2349.52	45.73	-28.27	74	43.03	31.98	4.55	33.83	100	285	Peak
2349.52	33.09	-20.91	54	30.39	31.98	4.55	33.83	100	285	Average

Test Mode :	Mode 3	Temperature :	22~24°C
Test Channel :	78	Relative Humidity :	49~51%
		Test Engineer :	David Yang

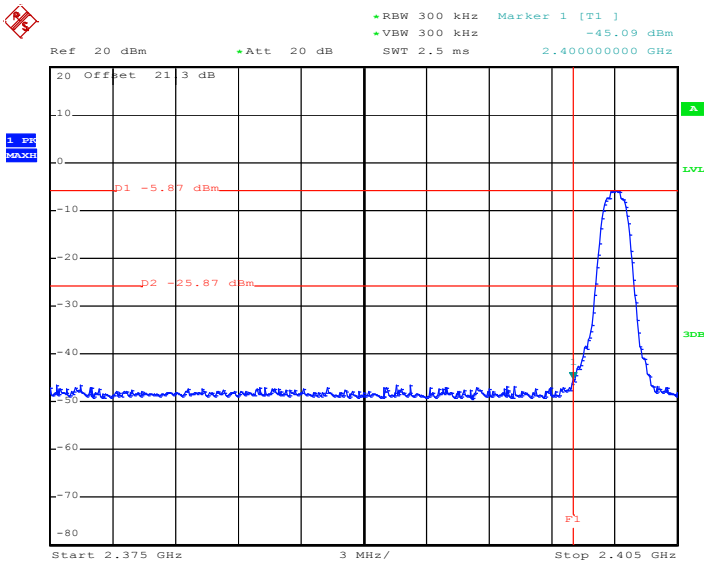
ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.5	55.72	-18.28	74	52.89	32.09	4.64	33.9	104	163	Peak
2483.5	45.08	-8.92	54	42.25	32.09	4.64	33.9	104	163	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.5	52.2	-21.8	74	49.37	32.09	4.64	33.9	100	276	Peak
2483.5	42.31	-11.69	54	39.48	32.09	4.64	33.9	100	276	Average

3.6.6 Test Result of Conducted Band Edges

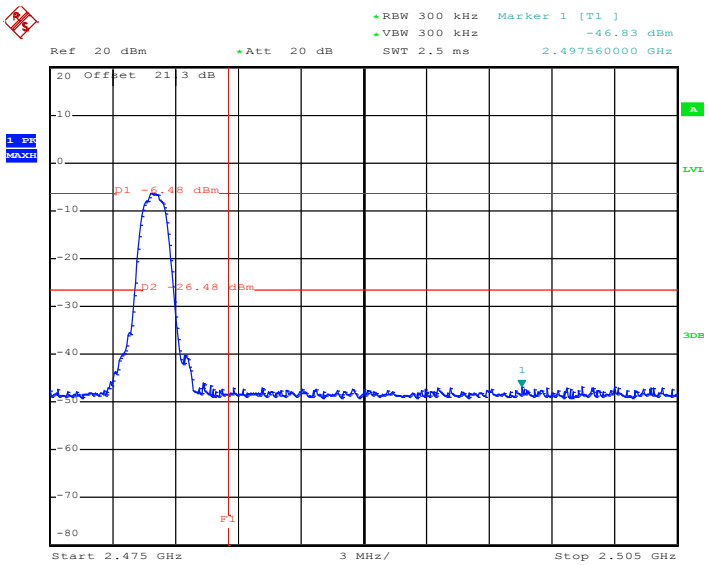
Test Mode :	Mode 4 and 6	**Temperature :**	21~24℃
Test Channel :	00 and 78	**Relative Humidity :**	52~55%
		Test Engineer :	Reece Li

Low Band Edge Plot on Channel 00



Date: 15.OCT.2011 02:49:45

High Band Edge Plot on Channel 78



Date: 15.OCT.2011 02:50:47

3.7 Spurious Emission Measurement

3.7.1 Limit of Spurious Emission Measurement

All harmonics/spurious must be at least 20 dB down from the highest emission level within the authorized band.

3.7.2 Measuring Instruments

See list of measuring instruments of this test report.

3.7.3 Test Procedure

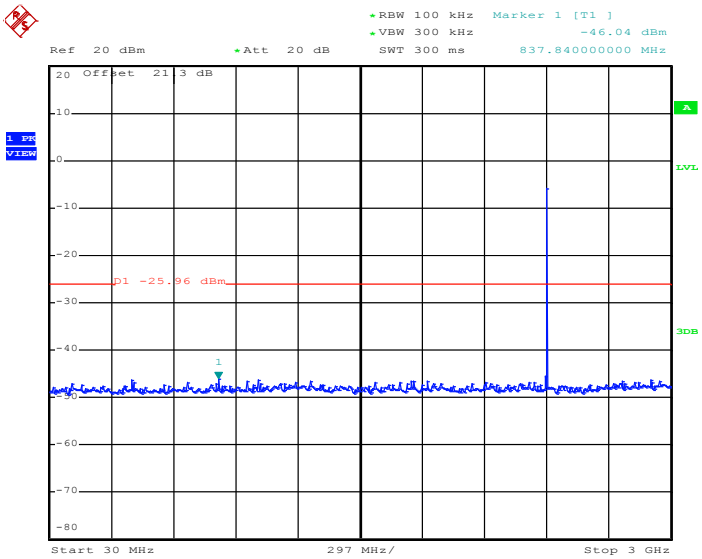
1. The transmitter output was connected to the spectrum analyzer via a low lose cable.
2. Set RBW = 100 kHz, Video bandwidth (VBW) ≥ RBW, scan up through 10th harmonic. All harmonics / spurs must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.

3.7.4 Test Setup

3.7.5 Test Result

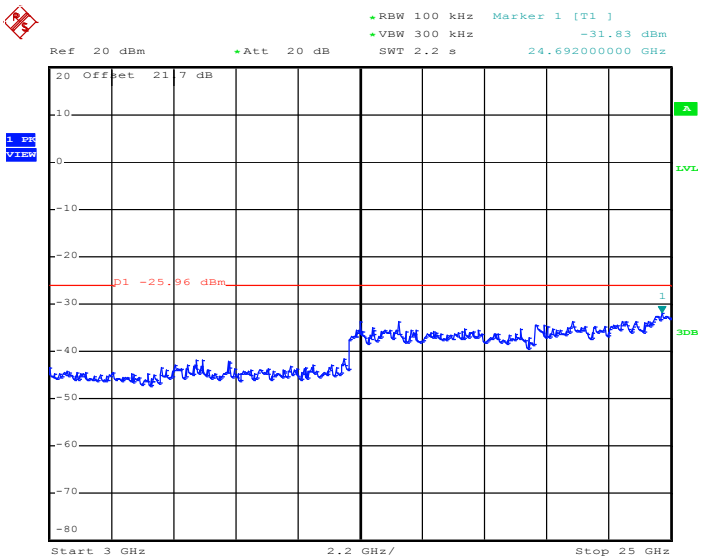
Test Mode :	Mode 4	Temperature :	21~24℃
Test Channel :	00	Relative Humidity :	52~55%
		Test Engineer :	Reece Li

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Date: 15.OCT.2011 02:24:25

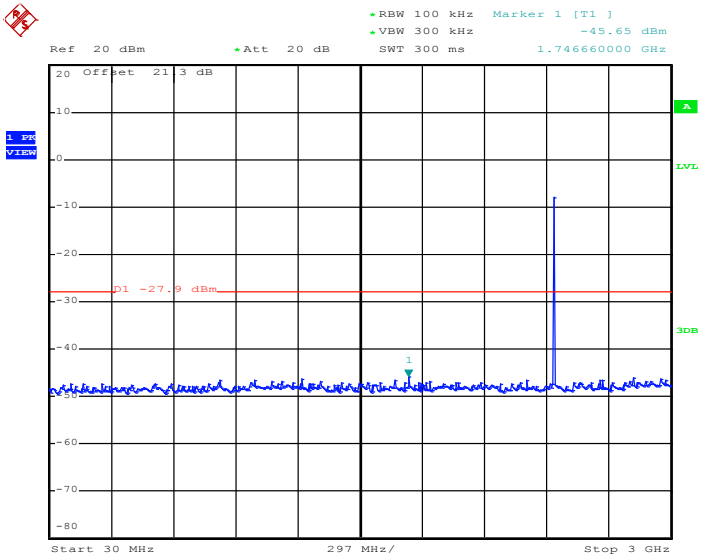
Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz



Date: 15.OCT.2011 02:24:38

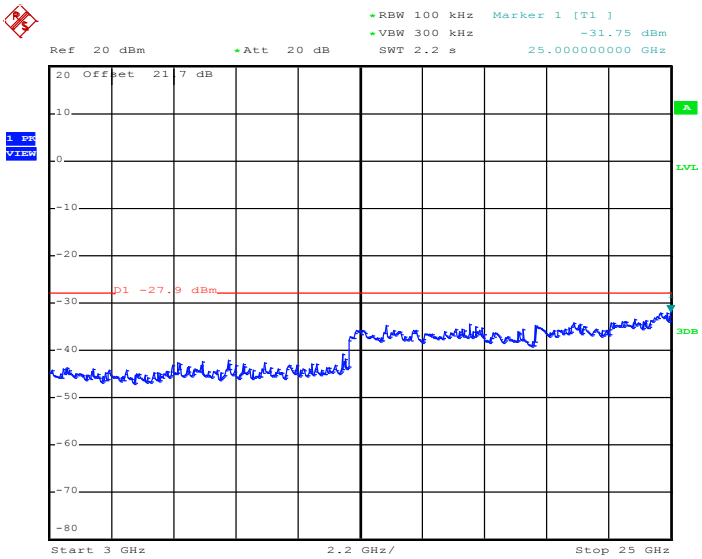
Test Mode :	Mode 5	Temperature :	21~24℃
Test Channel :	39	Relative Humidity :	52~55%
		Test Engineer :	Reece Li

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Date: 15.OCT.2011 02:25:30

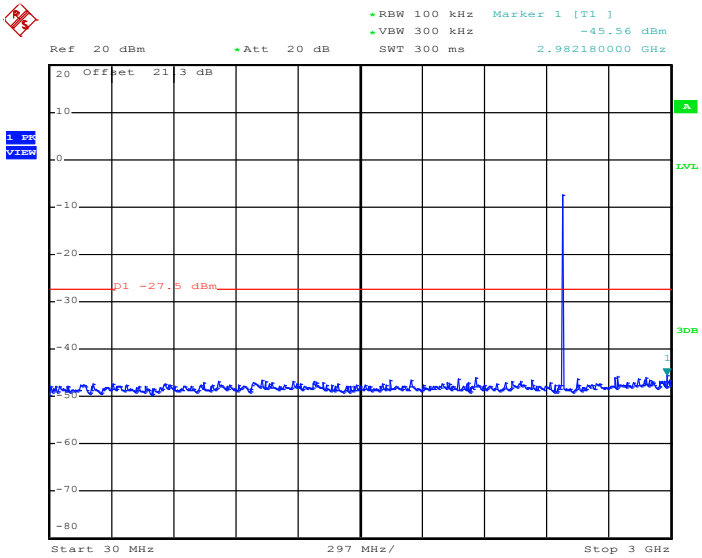
Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz



Date: 15.OCT.2011 02:25:43

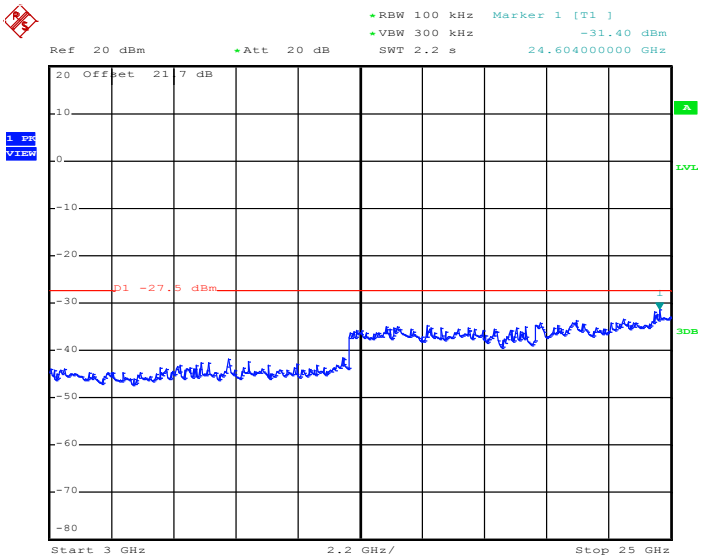
Test Mode :	Mode 6	Temperature :	21~24℃
Test Channel :	78	Relative Humidity :	52~55%
		Test Engineer :	Reece Li

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Date: 15.OCT.2011 02:26:34

Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz



Date: 15.OCT.2011 02:26:47

3.8 AC Conducted Emission Measurement

3.8.1 Limit 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.

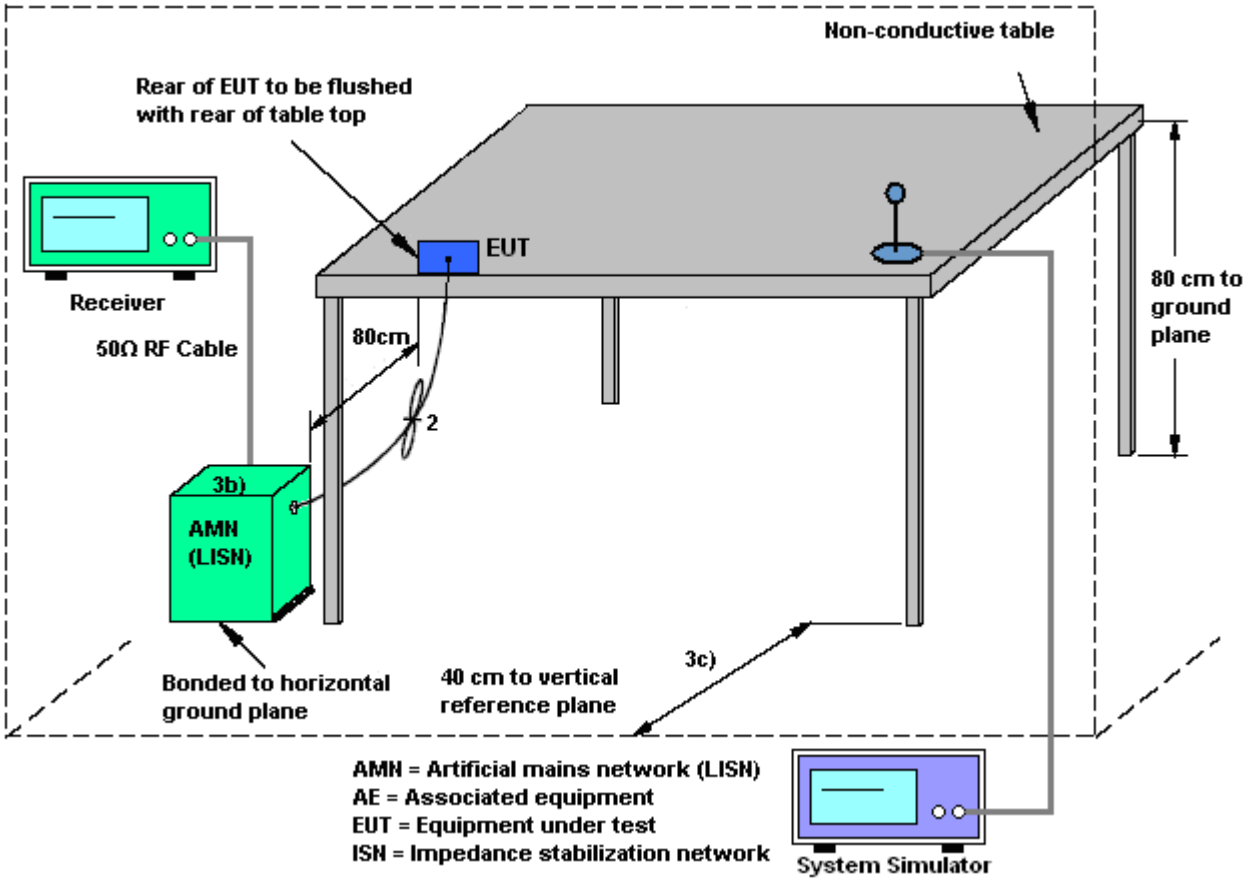
3.8.2 Measuring Instruments

See list of measuring instruments of this test report.

3.8.3 Test Procedures

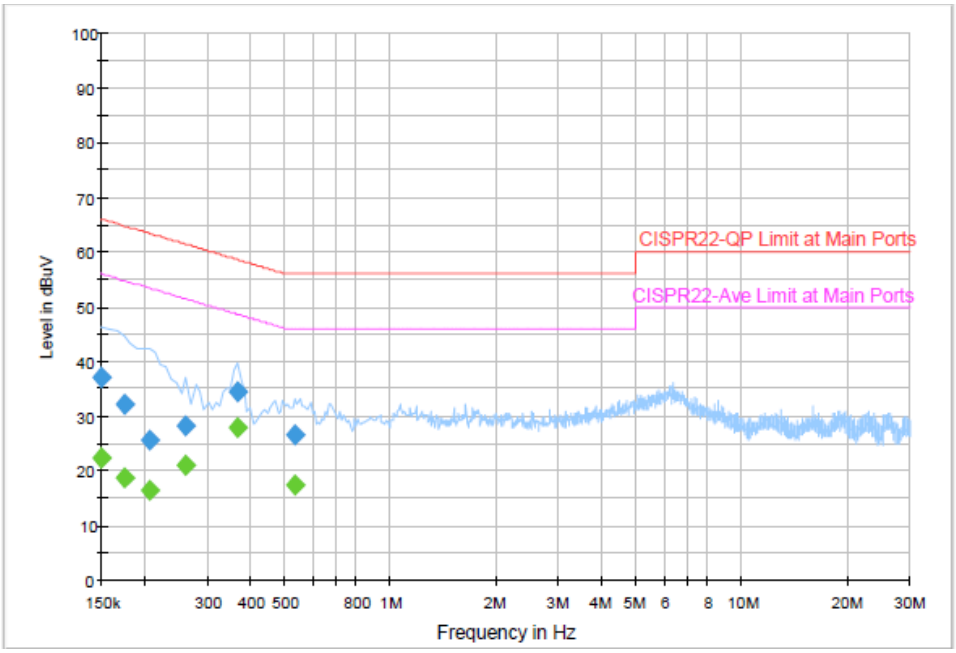
1. Please follow the guidelines in ANSI C63.4-2003.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN).
4. All the support units are connecting to the other LISN.
5. The LISN provides 50 ohm coupling impedance for the measuring instrument.
6. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
7. Both sides of AC line were checked for maximum conducted interference.
8. The frequency range from 150 kHz to 30 MHz was searched.
9. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

3.8.4 Test Setup



3.8.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	**Temperature :**	20~22℃
Test Engineer :	Novic Chiang	**Relative Humidity :**	40~42%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	GSM850 Idle + Bluetooth Link + WLAN (2.4G) Link + GPS Rx + USB Cable (Charging from Adapter)		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



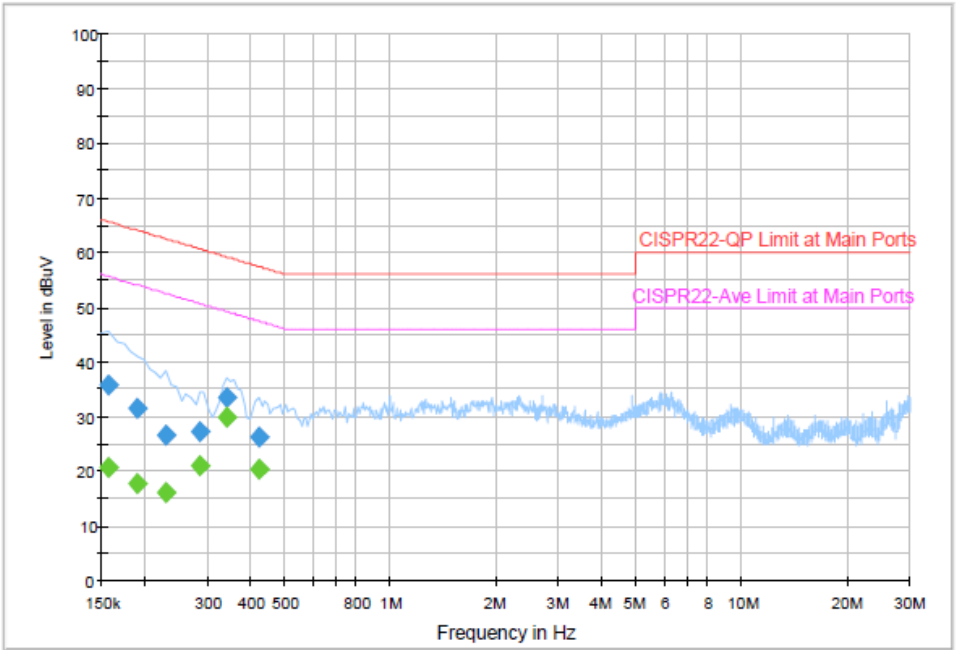
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	36.9	Off	L1	19.4	29.1	66.0
0.174000	32.2	Off	L1	19.4	32.6	64.8
0.206000	25.6	Off	L1	19.4	37.8	63.4
0.262000	28.1	Off	L1	19.4	33.3	61.4
0.366000	34.3	Off	L1	19.4	24.3	58.6
0.534000	26.7	Off	L1	19.4	29.3	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	22.2	Off	L1	19.4	33.8	56.0
0.174000	18.8	Off	L1	19.4	36.0	54.8
0.206000	16.5	Off	L1	19.4	36.9	53.4
0.262000	21.1	Off	L1	19.4	30.3	51.4
0.366000	28.0	Off	L1	19.4	20.6	48.6
0.534000	17.3	Off	L1	19.4	28.7	46.0

Test Mode :	Mode 1	**Temperature :**	20~22℃
Test Engineer :	Novic Chiang	**Relative Humidity :**	40~42%
Test Voltage :	120Vac / 60Hz	**Phase :**	Neutral
Function Type :	GSM850 Idle + Bluetooth Link + WLAN (2.4G) Link + GPS Rx + USB Cable (Charging from Adapter)		
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	35.8	Off	N	19.4	29.8	65.6
0.190000	31.6	Off	N	19.4	32.4	64.0
0.230000	26.4	Off	N	19.5	36.0	62.4
0.286000	27.1	Off	N	19.4	33.5	60.6
0.342000	33.6	Off	N	19.4	25.6	59.2
0.422000	26.2	Off	N	19.5	31.2	57.4

Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	20.6	Off	N	19.4	35.0	55.6
0.190000	17.6	Off	N	19.4	36.4	54.0
0.230000	16.2	Off	N	19.5	36.2	52.4
0.286000	21.0	Off	N	19.4	29.6	50.6
0.342000	29.8	Off	N	19.4	19.4	49.2
0.422000	20.4	Off	N	19.5	27.0	47.4

3.9 Radiated Emission Measurement

3.9.1 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. 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

3.9.2 Measuring Instruments

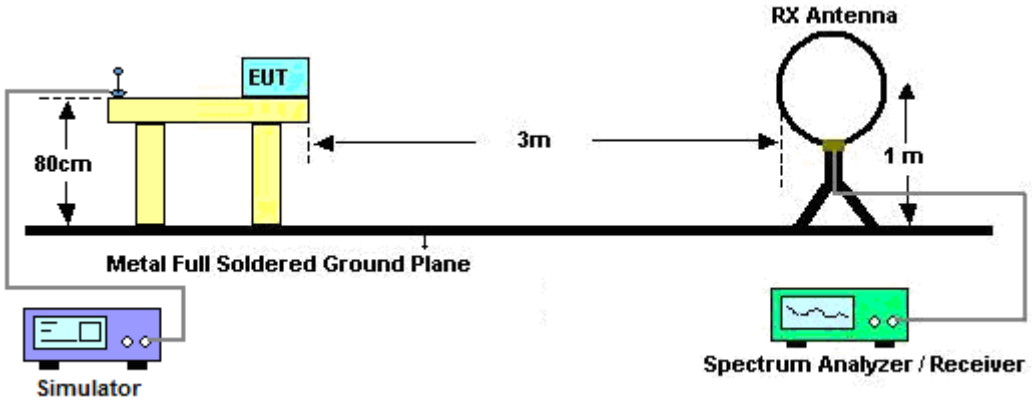
See list of measuring instruments of this test report.

3.9.3 Test Procedures

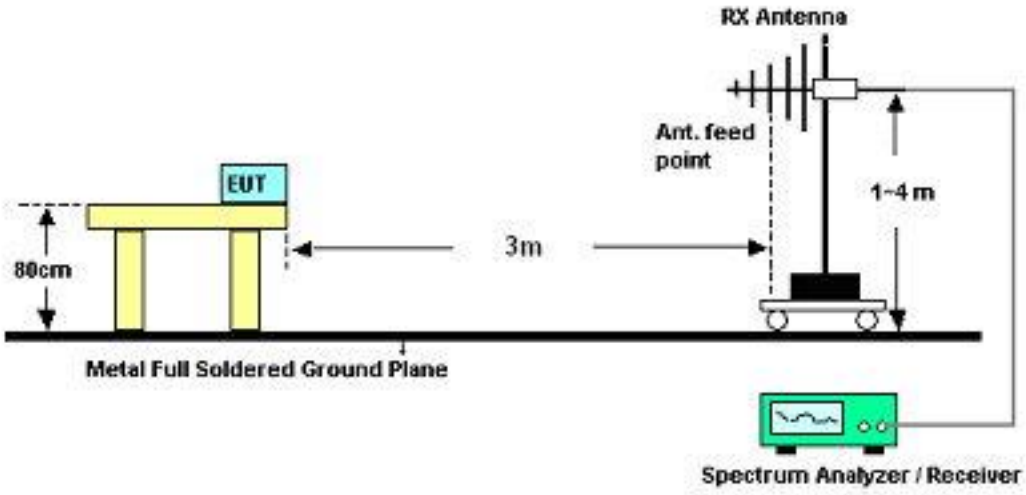
1. The testing follows the guidelines in FCC Public Notice DA 00-705 Measurement Guidelines.
2. Use the following spectrum analyzer settings:
   (1) Span = wide enough to fully capture the emission being measured; RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
   (2) Above 18 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1m.
   Distance extrapolation factor = 20 log (specific distance [3m] / test distance [1m]) (dB)
3. Follow the guidelines in ANSI C63.4-2003 with respect to maximizing the emission by rotating the EUT, measuring the emission for three EUT orthogonal planes, and adjusting the measurement antenna height and polarization. A pre-amp and a high pass filter are used for this test in order to get the good signal level.
4. Measured average value for the peak value is greater than 54 dBuv/m

3.9.4 Test Setup

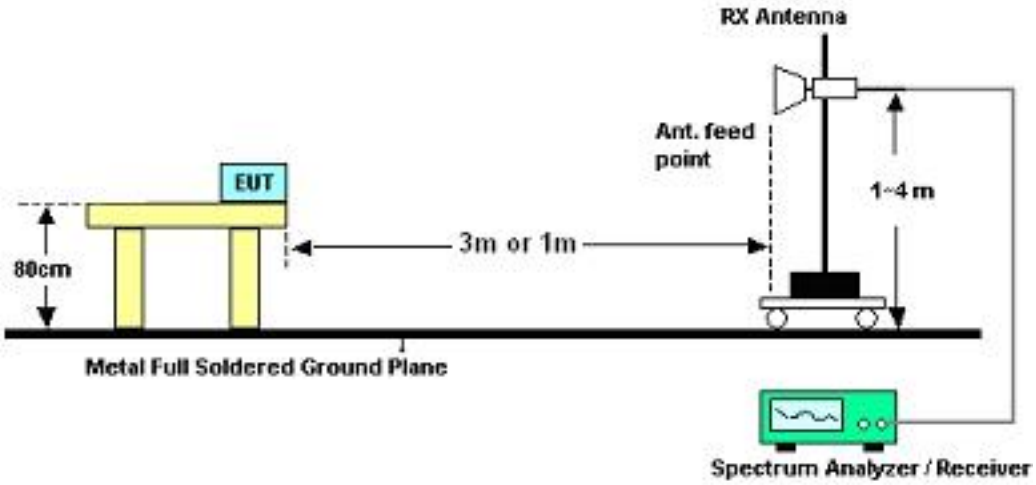
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.9.5 Test Results of Radiated Emissions (9 kHz ~ 30 MHz)

Test Engineer :	David Yang	**Temperature :**	22~24°C
		Relative Humidity :	49~51%

Frequency (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

Note:

The amplitude of spurious emissions that 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 (dBuV) + distance extrapolation factor.

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

Test Mode :	Mode 1	Temperature :	22~24°C
Test Channel :	00	Relative Humidity :	49~51%
Test Engineer :	David Yang	Polarization :	Horizontal
Remark :	2402 MHz is Fundamental Signals which can be ignored.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
32.97	22.17	-17.83	40	36.36	16.63	0.72	31.54	167	224	Peak
151.77	17.44	-26.06	43.5	37.52	10.13	1.29	31.5	-	-	Peak
195.78	21.85	-21.65	43.5	43.63	8.23	1.45	31.46	-	-	Peak
422.5	17.93	-28.07	46	31.73	15.3	2.07	31.17	-	-	Peak
640.9	20.31	-25.69	46	29.65	18.89	2.56	30.79	-	-	Peak
814.5	23.13	-22.87	46	29.67	21.13	2.86	30.53	-	-	Peak
2352.56	33.11	-20.89	54	30.4	31.99	4.55	33.83	179	171	Average
2352.56	45.76	-28.24	74	43.05	31.99	4.55	33.83	179	171	Peak
2402	76.01	-	-	73.26	32.02	4.58	33.85	179	171	Average
2402	91.29	-	-	88.54	32.02	4.58	33.85	179	171	Peak
2488	32.71	-21.29	54	29.87	32.1	4.64	33.9	179	171	Average
2488	44.9	-29.1	74	42.06	32.1	4.64	33.9	179	171	Peak

Test Mode :	Mode 1	Temperature :	22~24°C
Test Channel :	00	Relative Humidity :	49~51%
Test Engineer :	David Yang	Polarization :	Vertical
Remark :	2402 MHz is Fundamental Signals which can be ignored.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
34.86	28.43	-11.57	40	43.73	15.48	0.74	31.52	101	85	Peak
141.51	26.03	-17.47	43.5	45.65	10.62	1.27	31.51	-	-	Peak
196.86	26.04	-17.46	43.5	47.84	8.21	1.45	31.46	-	-	Peak
402.9	16.66	-29.34	46	30.99	14.83	2.02	31.18	-	-	Peak
567.4	20.82	-25.18	46	31.2	18.18	2.36	30.92	-	-	Peak
759.2	22.22	-23.78	46	29.74	20.25	2.77	30.54	-	-	Peak
2349.52	33.09	-20.91	54	30.39	31.98	4.55	33.83	100	285	Average
2349.52	45.73	-28.27	74	43.03	31.98	4.55	33.83	100	285	Peak
2402	73.09	-	-	70.34	32.02	4.58	33.85	100	285	Average
2402	87.91	-	-	85.16	32.02	4.58	33.85	100	285	Peak
2496	32.7	-21.3	54	29.86	32.1	4.64	33.9	100	285	Average
2496	44.52	-29.48	74	41.68	32.1	4.64	33.9	100	285	Peak

Test Mode :	Mode 2	Temperature :	22~24°C
Test Channel :	39	Relative Humidity :	49~51%
Test Engineer :	David Yang	Polarization :	Horizontal
Remark :	2441 MHz is Fundamental Signals which can be ignored.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
30.27	19.23	-20.77	40	31.73	18.36	0.7	31.56	116	193	Peak
152.31	19.38	-24.12	43.5	39.46	10.13	1.29	31.5	-	-	Peak
195.51	21.9	-21.6	43.5	43.68	8.23	1.45	31.46	-	-	Peak
437.9	22.16	-23.84	46	35.56	15.65	2.11	31.16	-	-	Peak
593.3	21.47	-24.53	46	31.33	18.61	2.41	30.88	-	-	Peak
783	22.93	-23.07	46	29.98	20.69	2.8	30.54	-	-	Peak
2356	33.07	-20.93	54	30.36	31.99	4.55	33.83	104	157	Average
2356	45.81	-28.19	74	43.1	31.99	4.55	33.83	104	157	Peak
2441	76.48	-	-	73.69	32.06	4.61	33.88	104	157	Average
2441	91.9	-	-	89.11	32.06	4.61	33.88	104	157	Peak
2488	32.07	-21.93	54	29.23	32.1	4.64	33.9	104	157	Average
2488	44.78	-29.22	74	41.94	32.1	4.64	33.9	104	157	Peak

Test Mode :	Mode 2	Temperature :	22~24°C
Test Channel :	39	Relative Humidity :	49~51%
Test Engineer :	David Yang	Polarization :	Vertical
Remark :	2441 MHz is Fundamental Signals which can be ignored.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
34.86	26.98	-13.02	40	42.28	15.48	0.74	31.52	100	193	Peak
83.19	24.04	-15.96	40	47.41	7.16	1.02	31.55	-	-	Peak
140.7	26.43	-17.07	43.5	46.01	10.66	1.27	31.51	-	-	Peak
441.4	17.56	-28.44	46	30.88	15.72	2.12	31.16	-	-	Peak
645.1	20.35	-25.65	46	29.65	18.91	2.57	30.78	-	-	Peak
797.7	22.95	-23.05	46	29.69	20.97	2.83	30.54	-	-	Peak
2364	33.05	-20.95	54	30.33	31.99	4.57	33.84	100	277	Average
2364	45.38	-28.62	74	42.66	31.99	4.57	33.84	100	277	Peak
2441	73.02	-	-	70.23	32.06	4.61	33.88	100	277	Average
2441	87.53	-	-	84.74	32.06	4.61	33.88	100	277	Peak
2484	32.65	-21.35	54	29.82	32.09	4.64	33.9	100	277	Average
2484	44.92	-29.08	74	42.09	32.09	4.64	33.9	100	277	Peak

Test Mode :	Mode 3	Temperature :	22~24°C
Test Channel :	78	Relative Humidity :	49~51%
Test Engineer :	David Yang	Polarization :	Horizontal
Remark :	2480 MHz is Fundamental Signals which can be ignored.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
30.27	20.14	-19.86	40	32.64	18.36	0.7	31.56	127	314	Peak
150.96	19.04	-24.46	43.5	39.07	10.19	1.28	31.5	-	-	Peak
193.35	22.18	-21.32	43.5	43.91	8.29	1.45	31.47	-	-	Peak
407.1	16.6	-29.4	46	30.81	14.94	2.03	31.18	-	-	Peak
563.2	20.34	-25.66	46	30.81	18.11	2.35	30.93	-	-	Peak
767.6	22.61	-23.39	46	29.97	20.4	2.78	30.54	-	-	Peak
2360	33.06	-20.94	54	30.34	31.99	4.57	33.84	104	163	Average
2360	45.35	-28.65	74	42.63	31.99	4.57	33.84	104	163	Peak
2480	76.04	-	-	73.21	32.09	4.64	33.9	104	163	Average
2480	91.27	-	-	88.44	32.09	4.64	33.9	104	163	Peak
2483.5	45.08	-8.92	54	42.25	32.09	4.64	33.9	104	163	Average
2483.5	55.72	-18.28	74	52.89	32.09	4.64	33.9	104	163	Peak

Test Mode :	Mode 3	Temperature :	22~24°C
Test Channel :	78	Relative Humidity :	49~51%
Test Engineer :	David Yang	Polarization :	Vertical
Remark :	2480 MHz is Fundamental Signals which can be ignored.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
34.86	27.82	-12.18	40	43.12	15.48	0.74	31.52	109	113	Peak
87.78	23.52	-16.48	40	45.93	8.07	1.06	31.54	-	-	Peak
197.4	26.43	-17.07	43.5	48.24	8.19	1.46	31.46	-	-	Peak
414.8	16.96	-29.04	46	30.96	15.12	2.05	31.17	-	-	Peak
589.1	20.78	-25.22	46	30.74	18.53	2.4	30.89	-	-	Peak
814.5	23.15	-22.85	46	29.69	21.13	2.86	30.53	-	-	Peak
2376	33.05	-20.95	54	30.32	32	4.57	33.84	100	276	Average
2376	45.41	-28.59	74	42.68	32	4.57	33.84	100	276	Peak
2480	72.58	-	-	69.75	32.09	4.64	33.9	100	276	Average
2480	87.53	-	-	84.7	32.09	4.64	33.9	100	276	Peak
2483.5	42.31	-11.69	54	39.48	32.09	4.64	33.9	100	276	Average
2483.5	52.2	-21.8	74	49.37	32.09	4.64	33.9	100	276	Peak

3.10 Antenna Requirements

3.10.1 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. 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.

3.10.2 Antenna Connected Construction

The antennas type used in this product is PIFA Antenna without connector and it is considered to meet antenna requirement.

3.10.3 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	Due Date	Remark
Spectrum Analyzer	R&S	FSP40	100055	9kHz~40GHz	Jun. 13, 2011	Jun. 12, 2012	Conducted (TH02-HY)
Power Meter	Agilent	E4416A	GB41292344	N/A	Feb. 18, 2011	Feb. 17, 2012	Conducted (TH02-HY)
Power Sensor	Agilent	E9327A	US40441548	N/A	Feb. 18, 2011	Feb. 17, 2012	Conducted (TH02-HY)
EMI Test Receive	R&S	ESCI 7	100724	9kHz~7GHz	Aug. 22, 2011	Aug. 21, 2012	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)
System Simulator	R&S	CMU200	112403	N/A	Feb. 22, 2011	Feb. 21, 2012	Conduction (CO05-HY))
GPS Station	T&E	GS-50	N/A	N/A	N/A	N/A	Conduction (CO05-HY))
Spectrum Analyzer	R&S	FSP30	101352	9KHz-30GHz	Nov. 03, 2010	Nov. 02, 2011	Radiation (03CH05-HY)
COM-POWER	Double Ridge Horn	AH-118	701030	1HGz~18GHz	N/A	N/A	Radiation (03CH05-HY)
Bilog Antenna	SCHAFFNER	CBL6111C	2725	30MHz ~ 1GHz	Nov. 06, 2010	Nov. 05, 2011	Radiation (03CH05-HY)
Turn Table	HD	Deis HD 2000	420/611	0 - 360 degree	N/A	N/A	Radiation (03CH05-HY)
Antenna Mast	HD	MA 240	240/666	1 m - 4 m	N/A	N/A	Radiation (03CH05-HY)
Horn Antenna	ESCO	3117	66584	1GHz ~ 18GHz	Aug. 04, 2011	Aug. 03, 2012	Radiation (03CH05-HY)
COM-POWER	COM-POWER	PA-103	161075	1KHz - 1GHz	Mar. 29, 2011	Mar. 28, 2012	Radiation (03CH05-HY)
Pre Amplifier	EMCI	EMC051845	SN980048	1HGz~18GHz	Jul. 19, 2011	Jul. 18, 2012	Radiation (03CH05-HY)
Preamplifier	MITEQ	AMF-7D-00101800-30-10P	159087	1HGz~18GHz	Feb. 21, 2011	Feb. 20, 2012	Radiation (03CH05-HY)
Pre Amplifier	Agilent	8449B	3008A01917	1GHz- 26.5GHz	Apr. 14, 2011	Apr. 13, 2012	Radiation (03CH05-HY)
Bluetooth Base Station	R&S	CBT32	100522	N/A	Jan. 13, 2011	Jan. 12, 2012	Radiation (03CH05-HY)

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 Γ1 = 0.197 Antenna VSWR Γ2 = 0.194 Uncertainty = 20Log(1-Γ1*Γ2)	+0.34 / -0.35	U-Shape	0.244	1	0.244
Combined Standard Uncertainty Uc(y)	**2.36**				
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 EP192229 as below.