

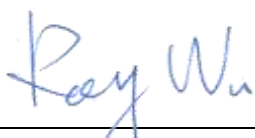
FCC RF Test Report

APPLICANT : Pantech Co., Ltd.
EQUIPMENT : Quad-Band GSM/GPRS/EDGE and
Dual-Band WCDMA/HSDPA Mobile Station
BRAND NAME : Pantech
MODEL NAME : P9020
FCC ID : JYCP9020
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : Digital Spread Spectrum (DSS)

The product was received on Nov. 18, 2009 and completely tested on Nov. 27, 2009. 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 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
FR9N1832	Rev. 01	Initial issue of report	Dec. 23, 2009



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	$\geq 15\text{Chs}$	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	$\geq 2/3$ of 20dB BW	Pass	-
3.4	15.247(a)(1)	A8.1(d)	Dwell Time of Each Channel	$\leq 0.4\text{sec}$ in 31.6sec period	Pass	-
3.5	15.247(b)(1)	A8.1(b)	Peak Output Power	$\leq 1\text{W}$	Pass	-
3.6	15.247(d)	A8.5	Frequency Band Edges	$\leq 20\text{dBc}$	Pass	-
3.7	15.247(d)	A8.5	Spurious Emission	$< 20\text{ dBc}$	Pass	-
3.8	15.207	Gen 7.2.2	AC Conducted Emission	15.207(a)	Pass	Under limit 8.8 dB at 0.310 MHz
3.9	15.247(d)	A8.5	Transmitter Radiated Emission	15.209(a) & 15.247(d)	Pass	Under limit 4.20 dB at 2483.50 MHz
3.10	15.203 & 15.247(b)	A8.4	Antenna Requirement	N/A	Pass	-



1 General Description

1.1 Applicant

Pantech Co., Ltd.

Pantech Bldg, I-2, DMC, Sangam-dong, Mapo-gu, Seoul, 121-270, South Korea

1.2 Manufacturer

Pantech Co., Ltd.

Pantech Bldg, I-2, DMC, Sangam-dong, Mapo-gu, Seoul, 121-270, South Korea

1.3 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	Quad-Band GSM/GPRS/EDGE and Dual-Band WCDMA/HSDPA Mobile Station
Brand Name	Pantech
Model Name	P9020
FCC ID	JYCP9020
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) : 2.74 dBm (1.88 mW) Bluetooth EDR (2Mbps) : 4.75 dBm (2.99 mW) Bluetooth EDR (3Mbps) : 5.14 dBm (3.27 mW)
Antenna Type	PIFA Antenna with gain -7 dBi
HW Version	1.0
SW Version	1.0
Type of Modulation	Bluetooth (1Mbps) : GFSK Bluetooth EDR (2Mbps) : $\pi/4$ -DQPSK Bluetooth EDR (3Mbps) : 8-DPSK
EUT Stage	Production Unit

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).

List of Accessory:

Specification of Accessory		
AC Adapter	Brand Name	GREEN POWER TECH, LTD
	Model Name	PTA-5070C9US
	Power Rating	I/P:100-240Vac, 50-60Hz, 0.3A; O/P: 5.0Vdc, 700mA
	AC Power Cord Type	1.8 meter non-shielded cable without ferrite core
Battery	Brand Name	T-cube tech
	Model Name	PBR-55D
	Power Rating	3.7Vdc, 1000mAh, 3.7Wh
	Type	Li-ion
Earphone	Brand Name	Pantech C&I
	Model Name	PEM-S500B16P
	Signal Line Type	1.56 meter non-shielded cable without ferrite core
USB Cable	Brand Name	Gana
	Model Name	PDC-UA16HS
	Signal Line Type	1.0 meter non-shielded cable without ferrite core
LCD Panel	Brand Name	LGIT
	Model Name	DM28-DSM01
Camera	Brand Name	Patron
	Model Name	CM200RF04PHAIR

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. For accessories equipped with this EUT, please refer to the appendix of the external photo.

1.4 Testing 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: +886-3-3273456 / FAX: +886-3-3284978		
Test Site No.	Sporton Site No.		FCC/IC Registration No.
	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 Part 15 Subpart C §15.247
- ♦ FCC Public Notice DA 00-705
- ♦ ANSI C63.4-2003
- ♦ IC RSS-210 Issue 7

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.	Bluetooth Base Station	R&S	CBT32	N/A	N/A	Unshielded, 1.8 m
3.	Bluetooth Earphone	Nokia	BH-102	PYAHS-107W	N/A	N/A
4.	Notebook	DELL	Vostro 1510	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
5.	LCD Monitor	Lenovo	6135-AB1	FCC DoC	Shielded, 1.6 m	Unshielded, 1.8 m
6.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	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	2.74 dBm	4.75 dBm	5.14 dBm
Ch39	2441MHz	2.65 dBm	4.69 dBm	5.08 dBm
Ch78	2480MHz	2.06 dBm	4.11 dBm	4.42 dBm

Remark:

1. The data rate was set in 3Mbps 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).

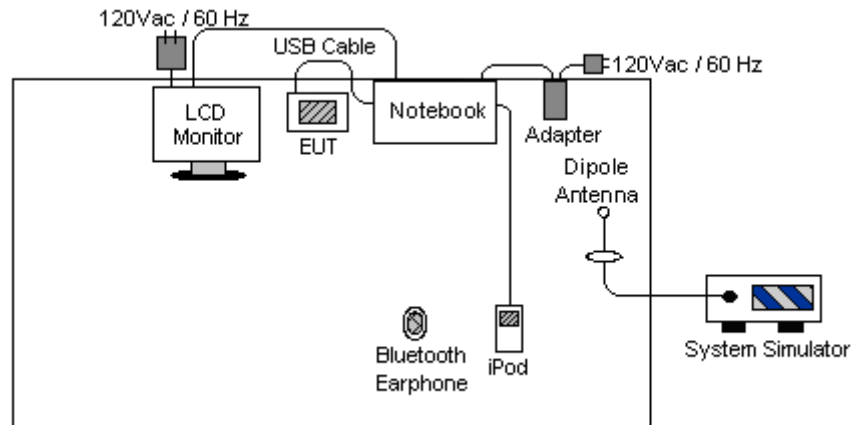
Pre-scanned tests were conducted to determine the final configuration from all possible combinations.

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

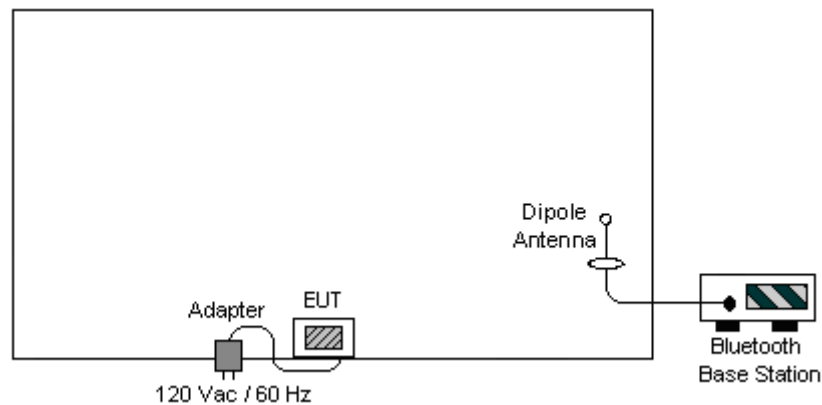
Test Cases			
Test Item	Data Rate / Modulation		
	Bluetooth 1Mbps GFSK	Bluetooth EDR 2Mbps π /4-DQPSK	Bluetooth EDR 3Mbps 8-DPSK
Conducted TCs	Mode 1: CH00_2402 MHz Mode 2: CH39_2441 MHz Mode 3: CH78_2480 MHz	Mode 4: CH00_2402 MHz Mode 5: CH39_2441 MHz Mode 6: CH78_2480 MHz	Mode 7: CH00_2402 MHz Mode 8: CH39_2441 MHz Mode 9: CH78_2480 MHz
Radiated TCs	N/A	N/A	Mode 1: CH00_2402 MHz Mode 2: CH39_2441 MHz Mode 3: CH78_2480 MHz
AC Conducted Emission	Mode 1 :GSM850 Idle + Bluetooth Link + MPEG4 + USB Cable (Link with Notebook)		
Remark: For radiated TCs, the data rate was set in 3Mbps due to the highest RF output power; only the data of these modes was reported.			

2.3 Connection Diagram of Test System

<Conducted Emission>



<Radiated Emission>



2.4 RF Utility

The RF utility was installed in EUT which was programmed in order to make the EUT into the engineering modes to contact with BT 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.

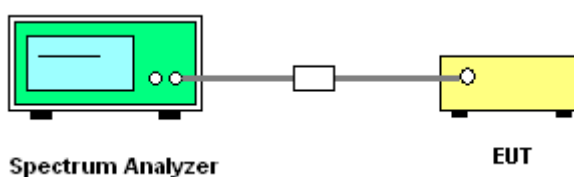
3.1.2 Measuring Instruments

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; $RBW \geq 1\%$ of the span; $VBW \geq RBW$; 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.

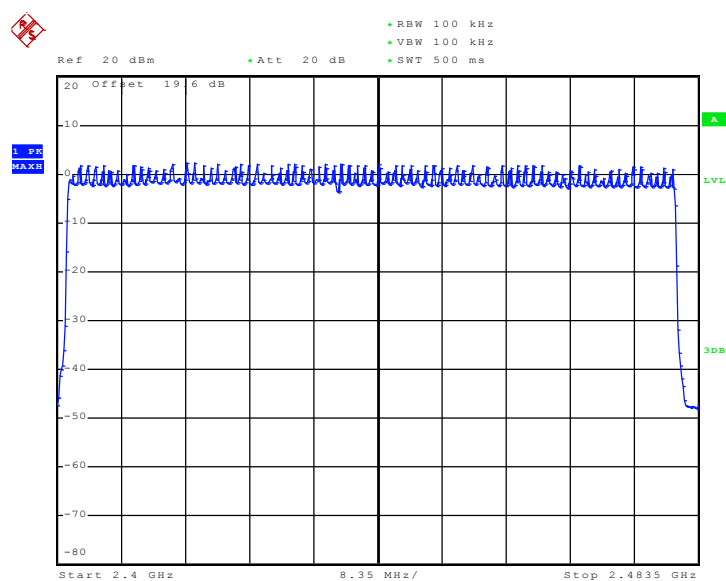
3.1.4 Test Setup



3.1.5 Test Result of Number of Hopping Frequency

Test Mode :	Mode 7~9	Temperature :	27~29°C
Test Engineer :	Tang Liu	Relative Humidity :	55~58%
Number of Hopping Channels (Channel)		Limits (Channel)	Pass/Fail
79		> 15	Pass

Number of Hopping Channel Plot on Channel 00 - 78



Date: 23.NOV.2009 17:28:16

3.2 20dB Bandwidth Measurement

3.2.1 Limit of 20dB Bandwidth

N/A

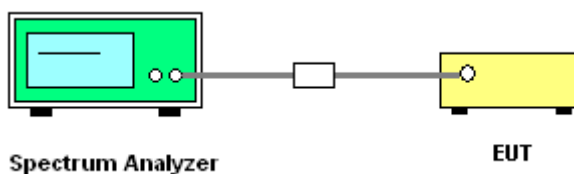
3.2.2 Measuring Instruments

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 $\geq$ 1% of the 20 dB bandwidth; VBW $\geq$ 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



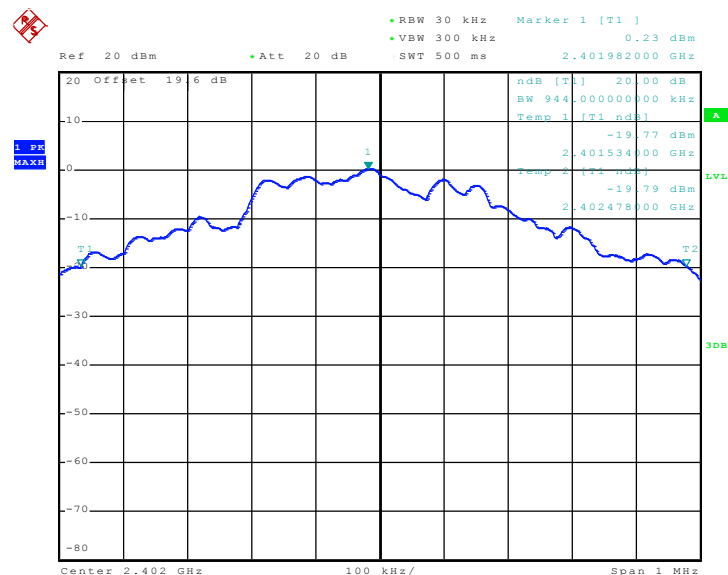


3.2.5 Test Result of 20dB Bandwidth

Test Mode :	Mode 1, 2, 3	Temperature :	27~29°C
Test Engineer :	Tang Liu	Relative Humidity :	55~58%

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	0.944
39	2441	0.944
78	2480	0.942

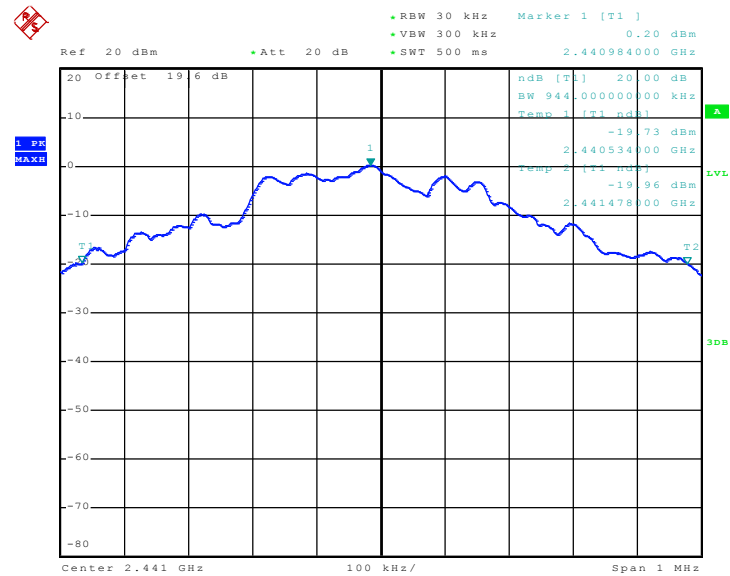
20 dB Bandwidth Plot on Channel 00



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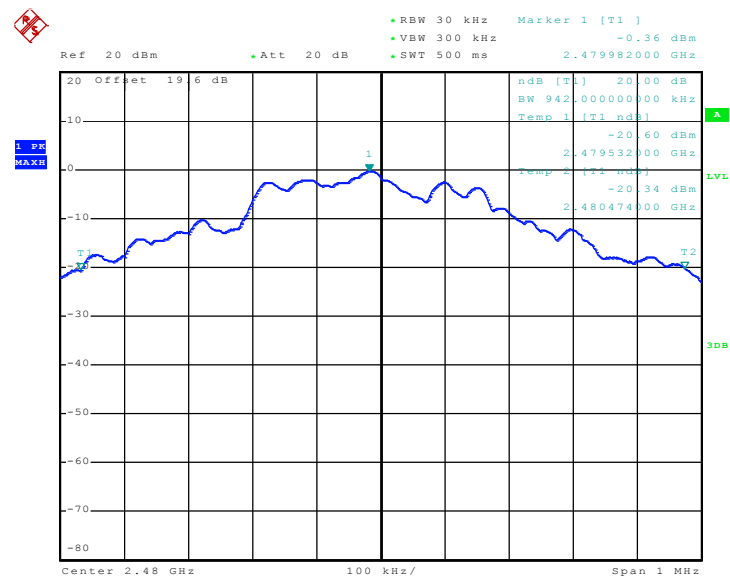


20 dB Bandwidth Plot on Channel 39



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20 dB Bandwidth Plot on Channel 78

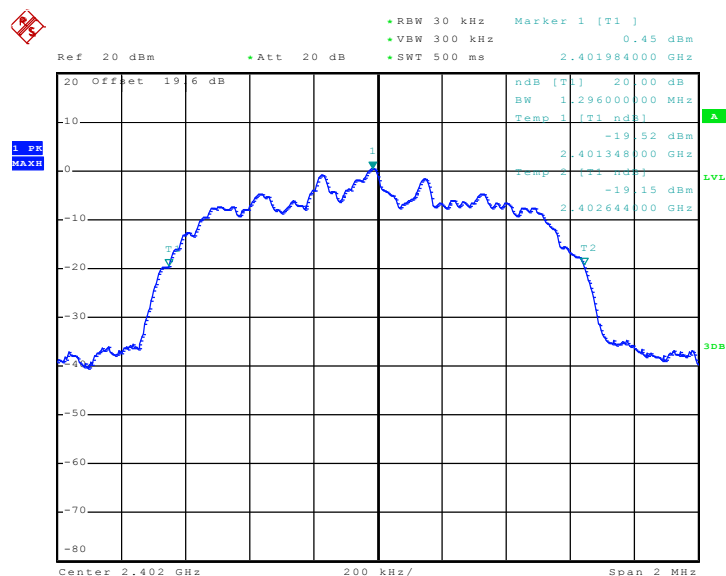


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Test Mode :	Mode 4, 5, 6	Temperature :	27~29°C
Test Engineer :	Tang Liu	Relative Humidity :	55~58%

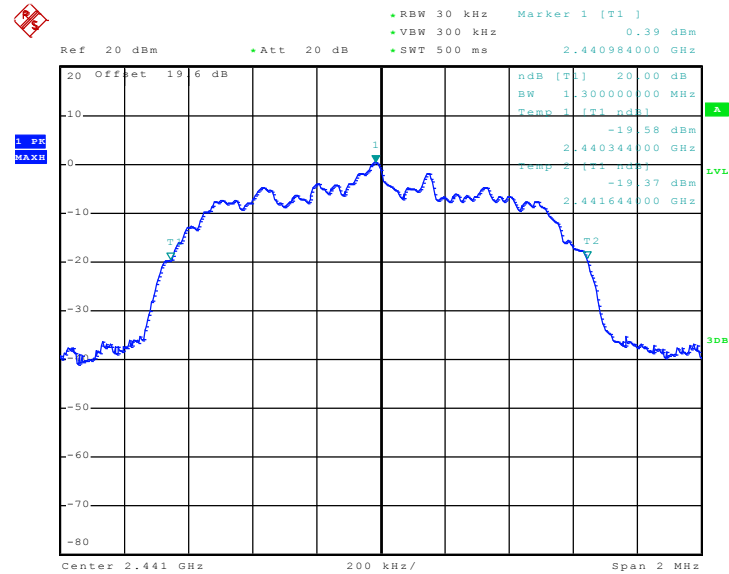
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.296
39	2441	1.300
78	2480	1.300

20 dB Bandwidth Plot on Channel 00

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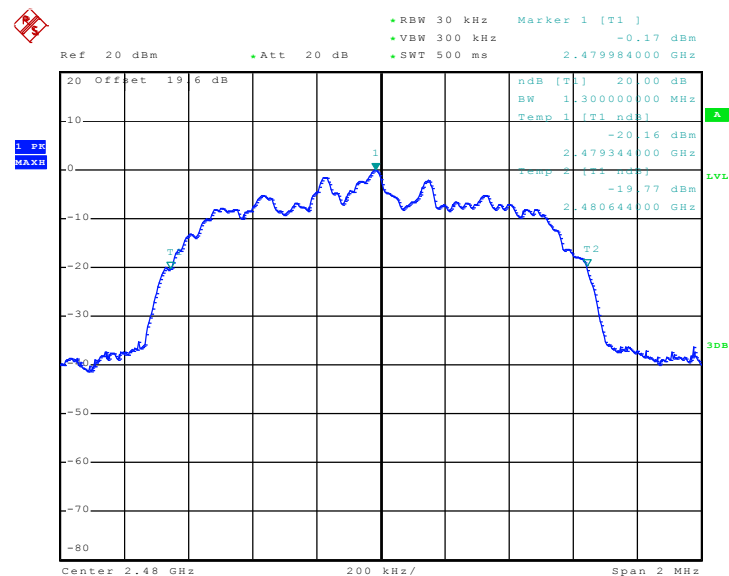


20 dB Bandwidth Plot on Channel 39



Date: 24.NOV.2009 15:56:55

20 dB Bandwidth Plot on Channel 78



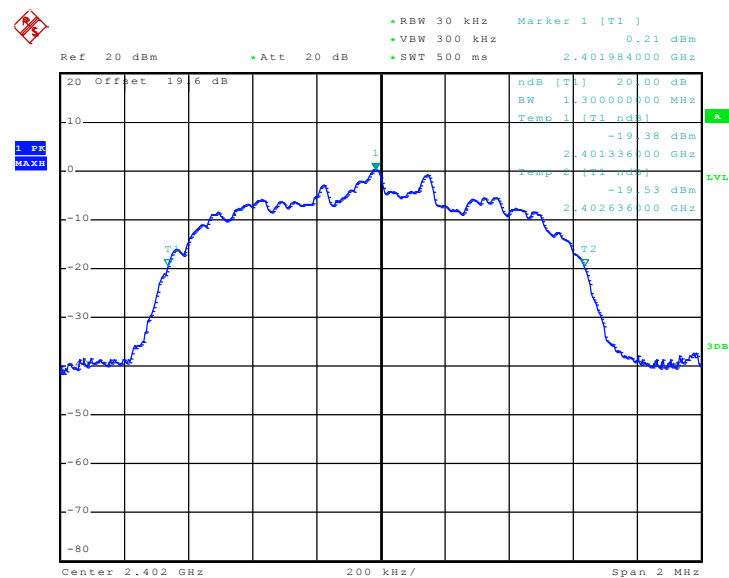
Date: 24.NOV.2009 15:57:21



Test Mode :	Mode 7, 8, 9	Temperature :	27~29°C
Test Engineer :	Tang Liu	Relative Humidity :	55~58%

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.300
39	2441	1.308
78	2480	1.308

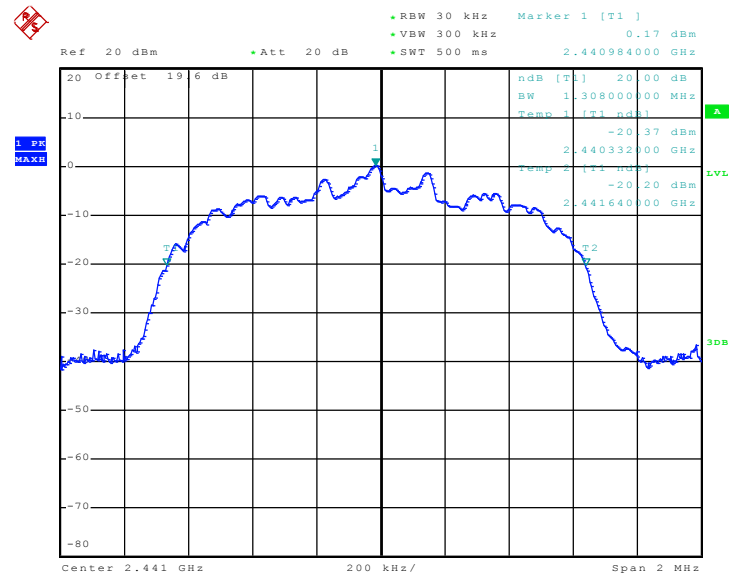
20 dB Bandwidth Plot on Channel 00



Date: 24.NOV.2009 15:57:50

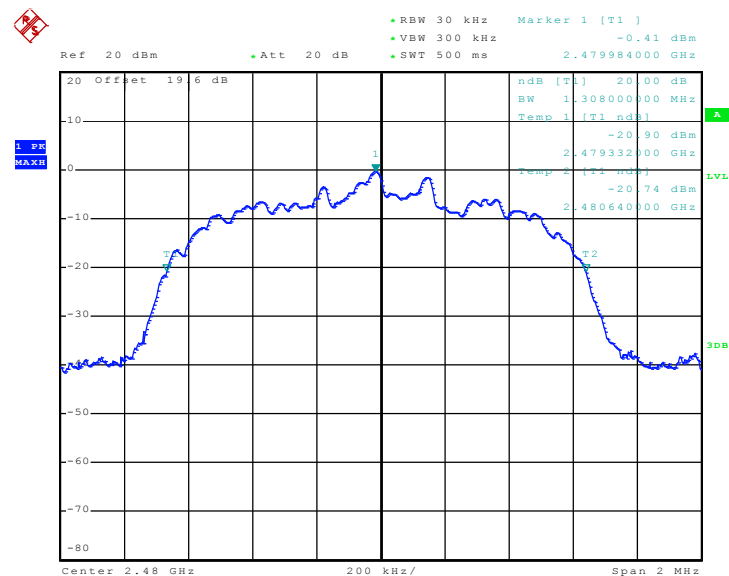


20 dB Bandwidth Plot on Channel 39



Date: 24.NOV.2009 15:58:14

20 dB Bandwidth Plot on Channel 78



Date: 24.NOV.2009 15:58:44

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.

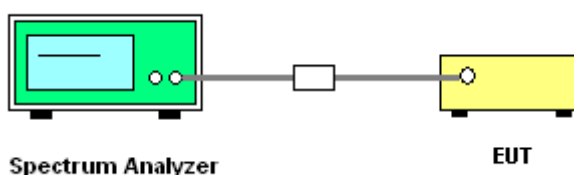
3.3.2 Measuring Instruments

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; $RBW \geq 1\%$ of the span;
 $VBW \geq RBW$; 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

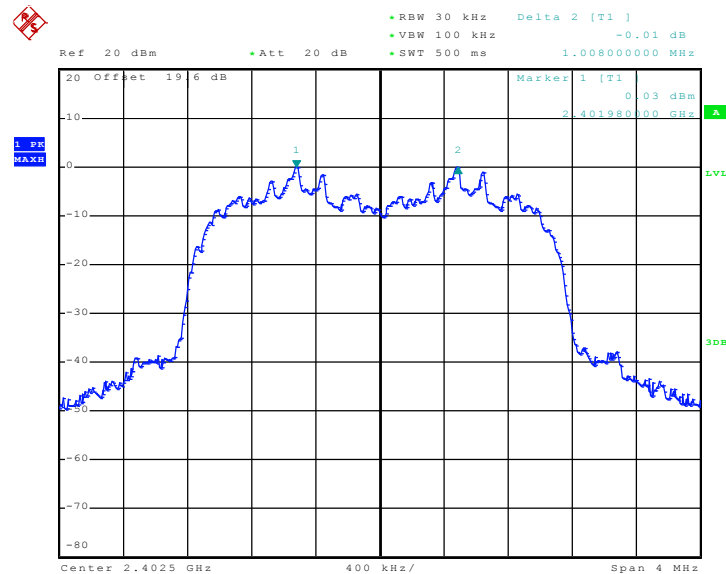


3.3.5 Test Result of Hopping Channel Separation

Test Mode :	Mode 7, 8, 9	Temperature :	27~29°C
Test Engineer :	Tang Liu	Relative Humidity :	55~58%

Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.008.00	0.867	Pass
39	2441	1.000.00	0.872	Pass
78	2480	1.000.00	0.872	Pass

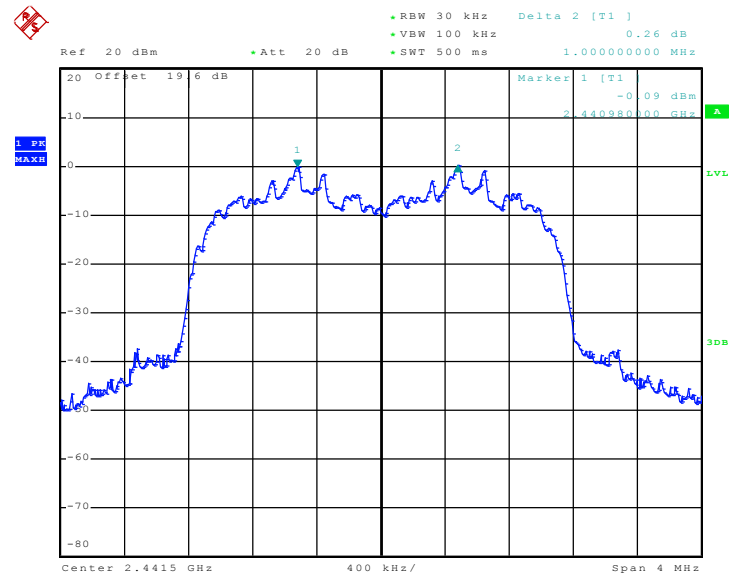
Channel Separation Plot on Channel 00 - 01



Date: 23.NOV.2009 17:07:13

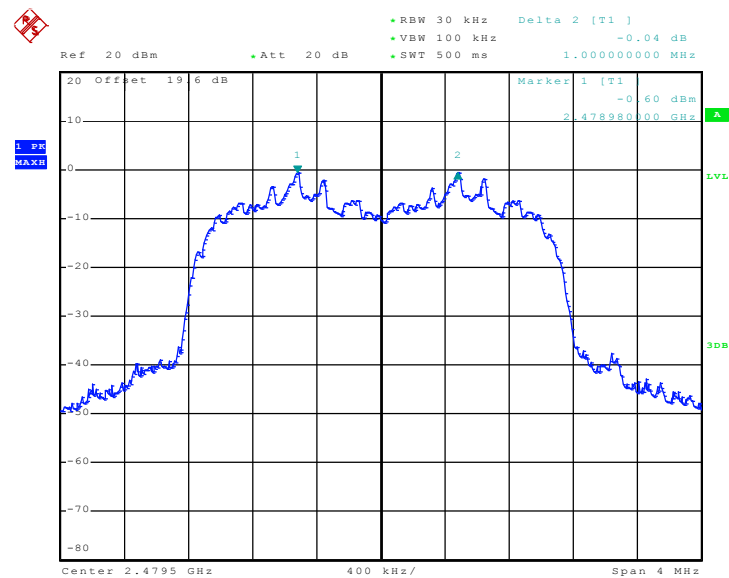


Channel Separation Plot on Channel 39 - 40



Date: 23.NOV.2009 17:07:40

Channel Separation Plot on Channel 77 - 78



Date: 23.NOV.2009 17:08:09

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.

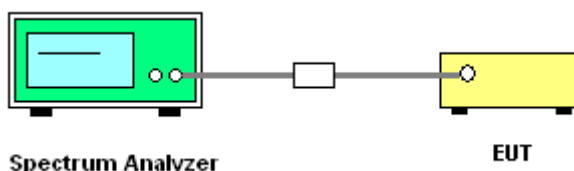
3.4.2 Measuring Instruments

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 $\geq$ 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 8	Temperature :	27~29℃
Test Engineer :	Tang Liu	Relative Humidity :	55~58%

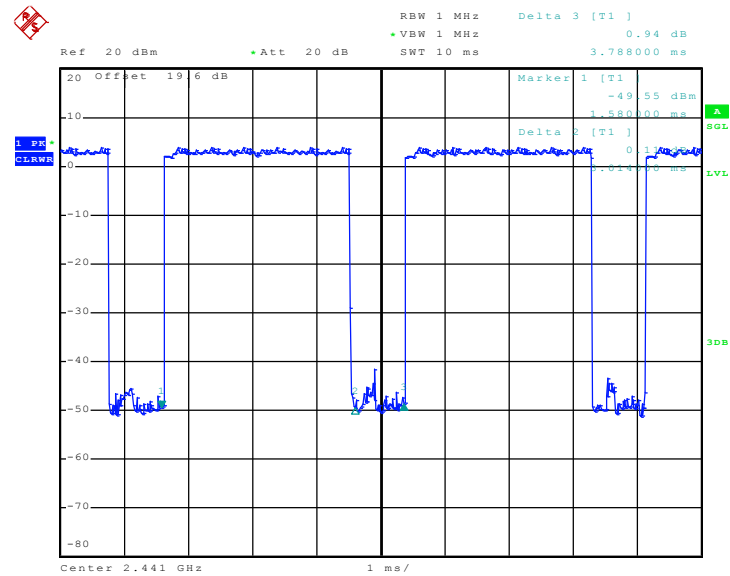
Package Mode	Average Hopping Channel	Package Transfer Time (usec)	Dwell Time (sec)	Limits (sec)	Pass/Fail
3DH5	3.20	3014.00	0.30	0.4	Pass

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)

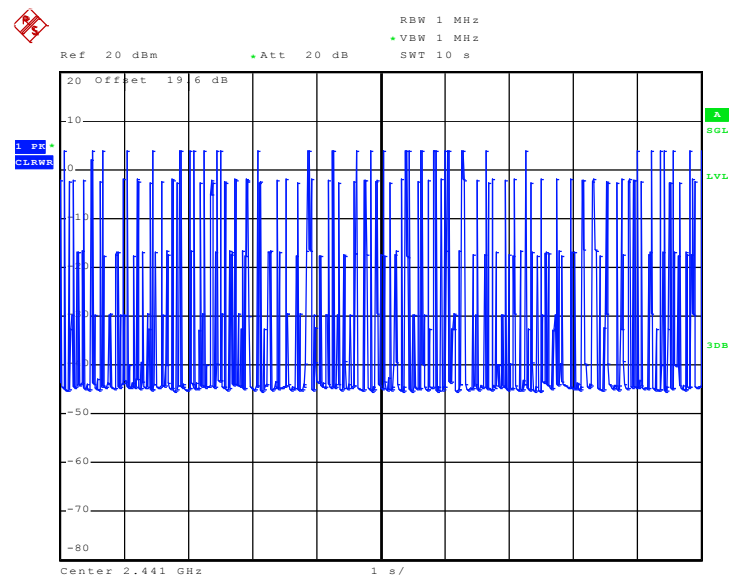


3DH5 Dwell Time (One Pulse) Plot on Channel 39



Date: 23.NOV.2009 17:16:32

3DH5 Dwell Time (Count Pulses) Plot on Channel 39



Date: 23.NOV.2009 17:17:09

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 employing at least 75 non-overlapping hopping channels: 1W (30 dBm).

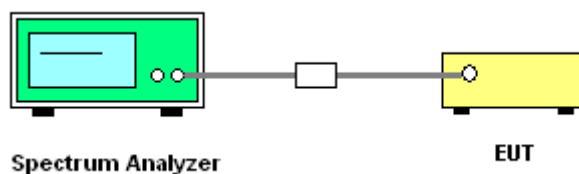
3.5.2 Measuring Instruments

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



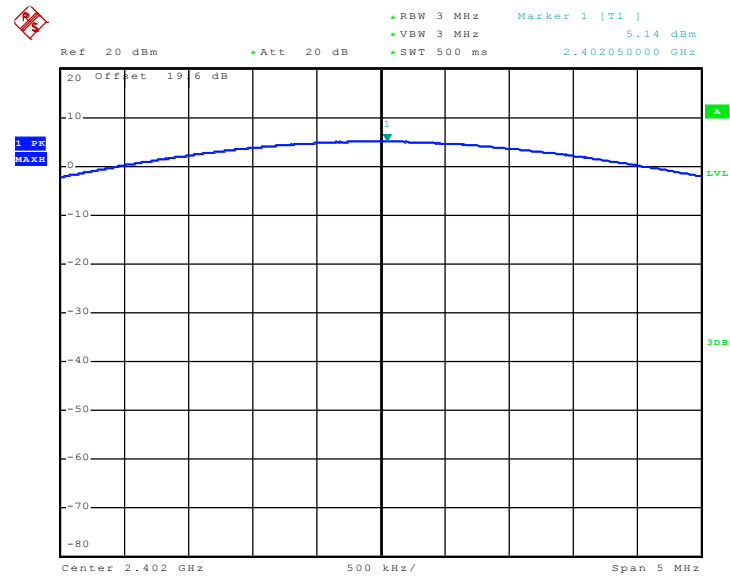
3.5.5 Test Result of Peak Output Power

Test Mode :	Mode 7, 8, 9	Temperature :	27~29°C
Test Engineer :	Tang Liu	Relative Humidity :	55~58%

Channel	Frequency (MHz)	RF Power (dBm)		
		8-DPSK	Max. Limits (dBm)	Pass/Fail
		3 Mbps		
00	2402	5.14	30	Pass
39	2441	5.08	30	Pass
78	2480	4.42	30	Pass

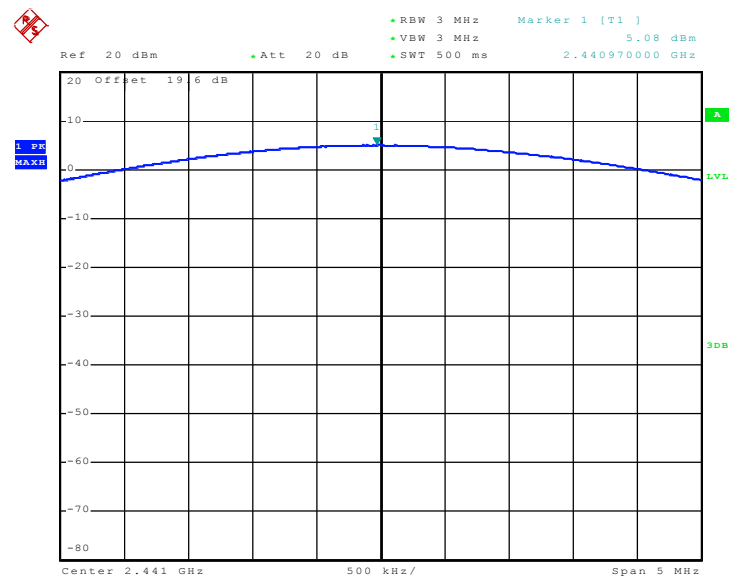


Peak Output Power Plot on Channel 00



Date: 23.NOV.2009 16:41:53

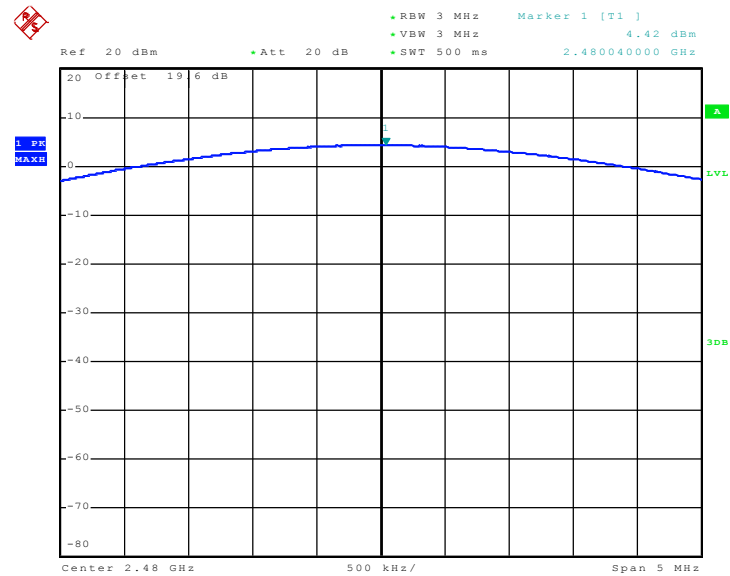
Peak Output Power Plot on Channel 39



Date: 23.NOV.2009 16:42:14



Peak Output Power Plot on Channel 78



Date: 23.NOV.2009 16:46:48

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

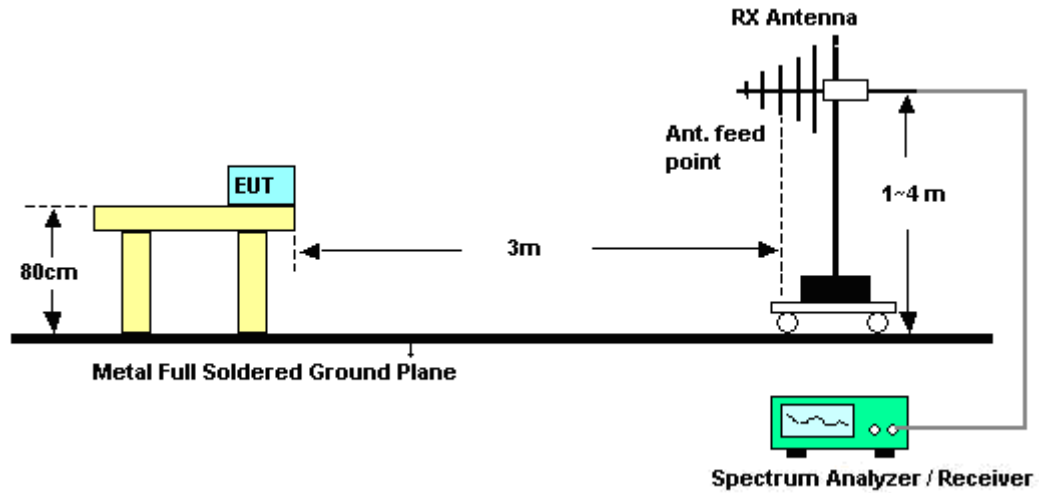
See list of measuring instruments of this test report.

3.6.3 Test Procedures

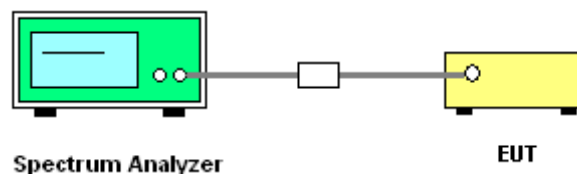
1. The testing follows the guidelines in ANSI C63.4-2003 and FCC Public Notice DA 00-705 Measurement Guidelines.
2. RF antenna conducted test: Set RBW = 300kHz, Video bandwidth (VBW) $\geq$ RBW. Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band 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 :	23~24°C
Test Channel :	00	Relative Humidity :	46~47%
		Test Engineer :	Mac Lin

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
2386.38	45.60	-28.4	74	45.89	31.86	3.92	36.07	135	347	Peak
2386.38	32.09	-21.91	54	32.38	31.86	3.92	36.07	135	347	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
2343.06	45.07	-28.93	74	45.5	31.78	3.86	36.07	128	296	Peak
2343.06	32.03	-21.97	54	32.46	31.78	3.86	36.07	128	296	Average

Test Mode :	Mode 3	Temperature :	23~24°C
Test Channel :	78	Relative Humidity :	46~47%
		Test Engineer :	Mac Lin

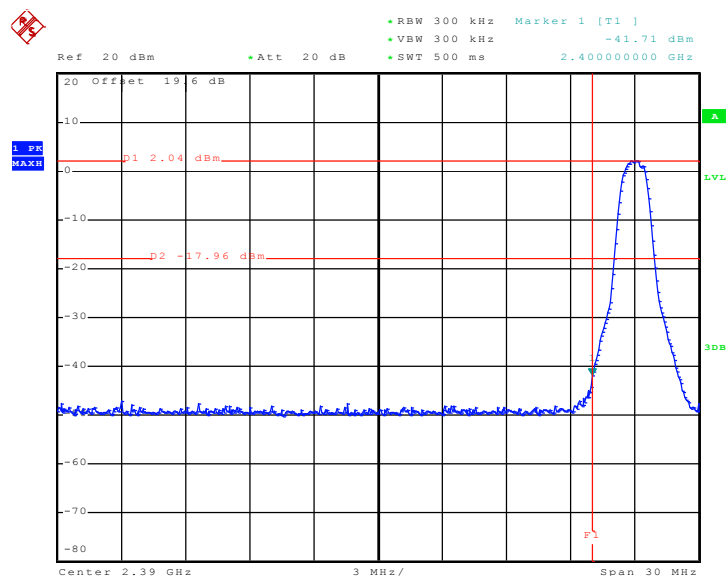
ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.5	63.05	-10.95	74	63.11	31.98	4.05	36.09	100	351	Peak
2483.5	49.80	-4.2	54	49.86	31.98	4.05	36.09	100	351	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	61.22	-12.78	74	61.28	31.98	4.05	36.09	158	270	Peak
2483.5	48.42	-5.58	54	48.48	31.98	4.05	36.09	158	270	Average

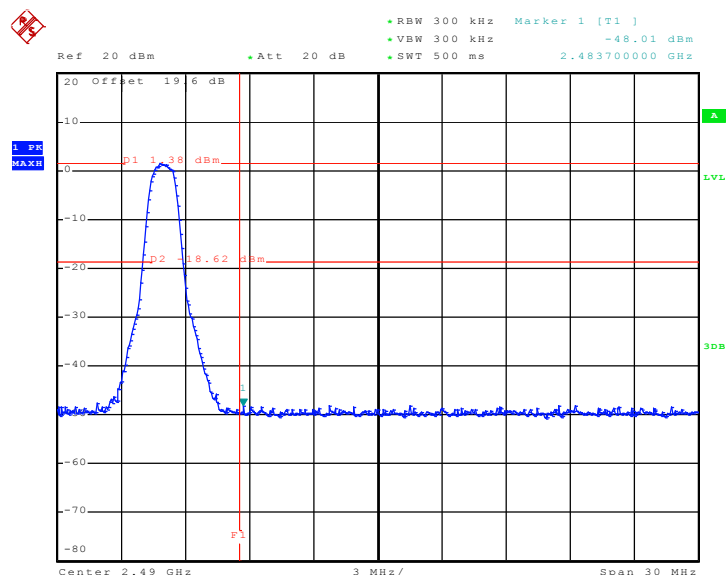
3.6.6 Test Result of Conducted Band Edges

Test Mode :	Mode 7 and 9	Temperature :	27~29°C
Test Channel :	00 and 78	Relative Humidity :	55~58%
		Test Engineer :	Tang Liu

Low Band Edge Plot on Channel 00



High Band Edge Plot on Channel 78



3.7 Spurious Emission Measurement

3.7.1 Limit of Spurious Emission Measurement

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

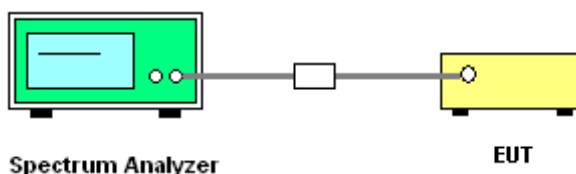
3.7.2 Measuring Instruments

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) $\geq$ 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.

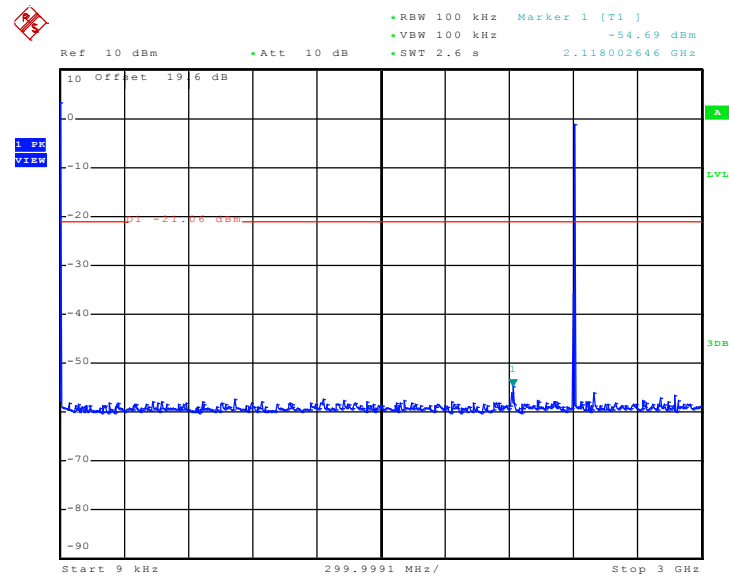
3.7.4 Test Setup



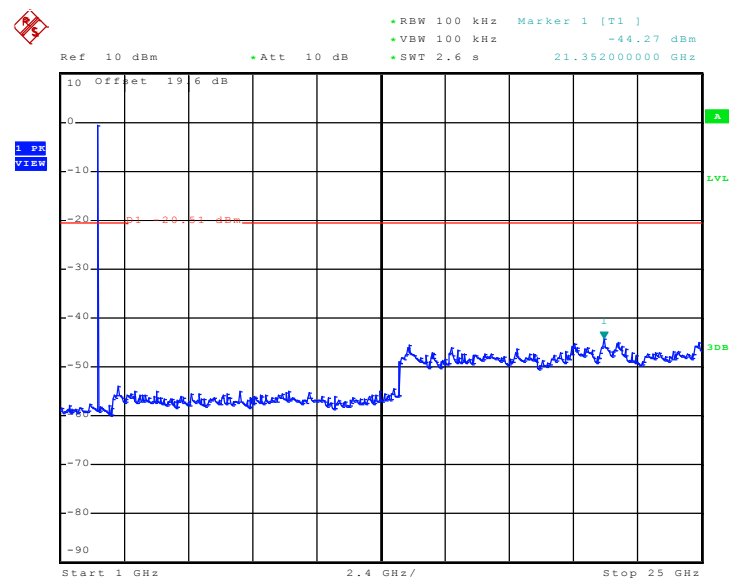
3.7.5 Test Result

Test Mode :	Mode 7	Temperature :	27~29°C
Test Channel :	00	Relative Humidity :	55~58%
		Test Engineer :	Tang Liu

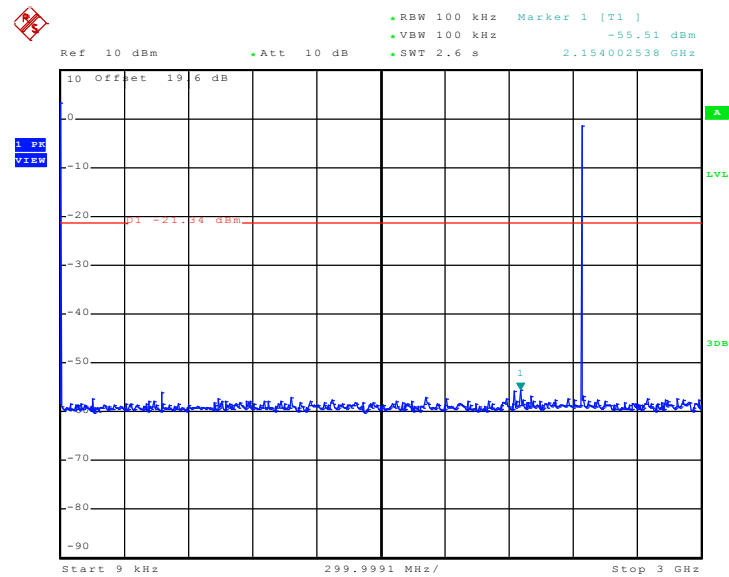
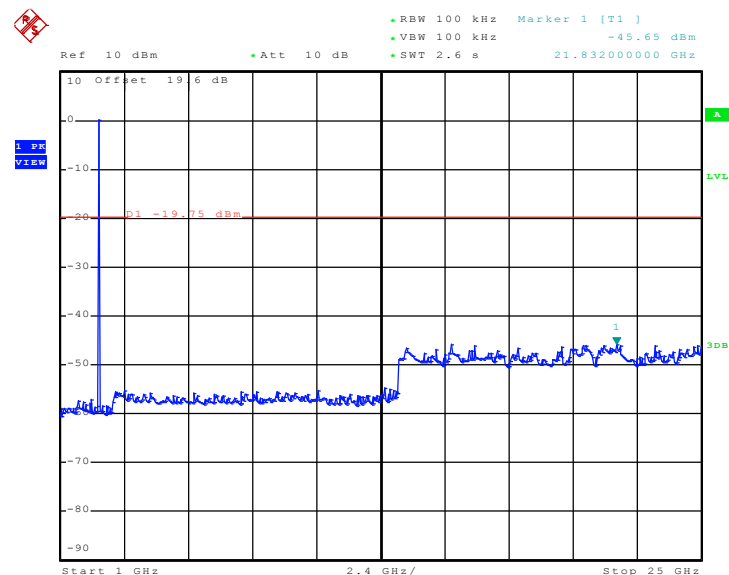
Conducted Spurious Emission Plot between 9 kHz ~ 3 GHz



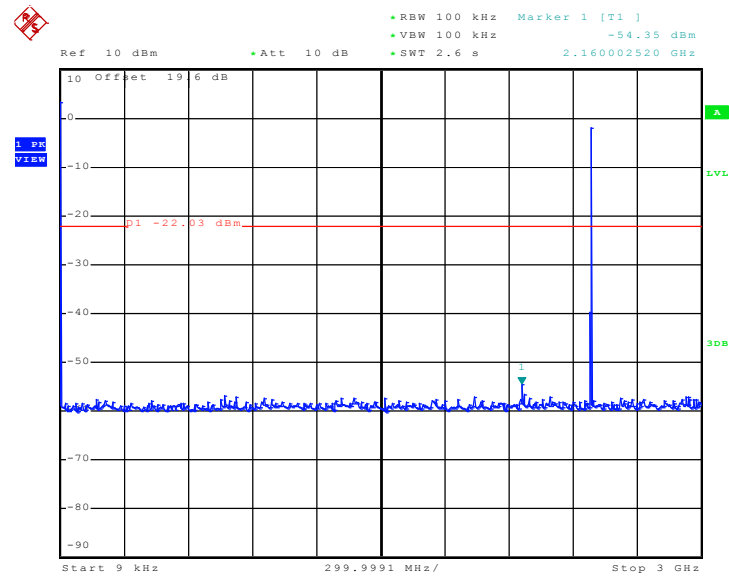
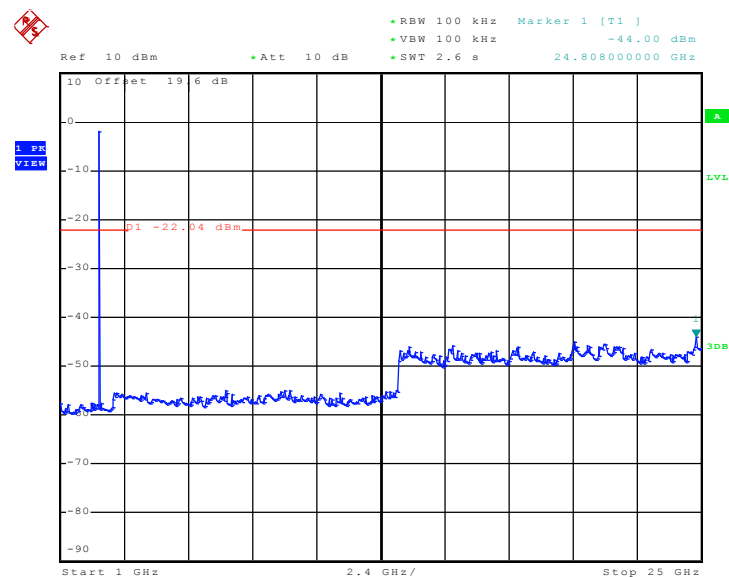
Conducted Spurious Emission Plot between 1 GHz ~ 25 GHz



Test Mode :	Mode 8	Temperature :	27~29°C
Test Channel :	39	Relative Humidity :	55~58%
		Test Engineer :	Tang Liu

Conducted Spurious Emission Plot between 9 kHz ~ 3 GHz

Conducted Spurious Emission Plot between 1 GHz ~ 25 GHz


Test Mode :	Mode 9	Temperature :	27~29°C
Test Channel :	78	Relative Humidity :	55~58%
		Test Engineer :	Tang Liu

Conducted Spurious Emission Plot between 9 kHz ~ 3 GHz

Conducted Spurious Emission Plot between 1 GHz ~ 25 GHz


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.

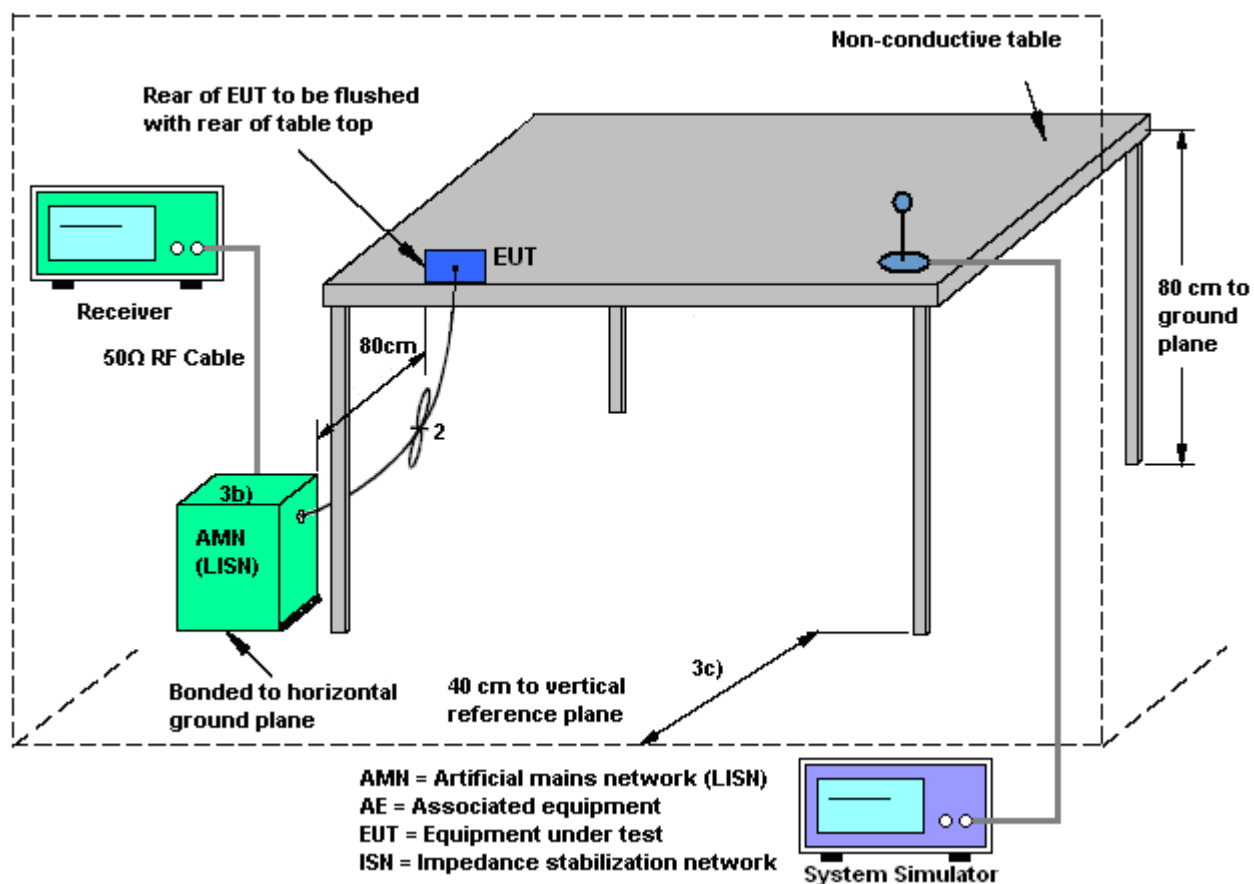
3.8.2 Measuring Instruments

See list of measuring instruments of this test report.

3.8.3 Test Procedures

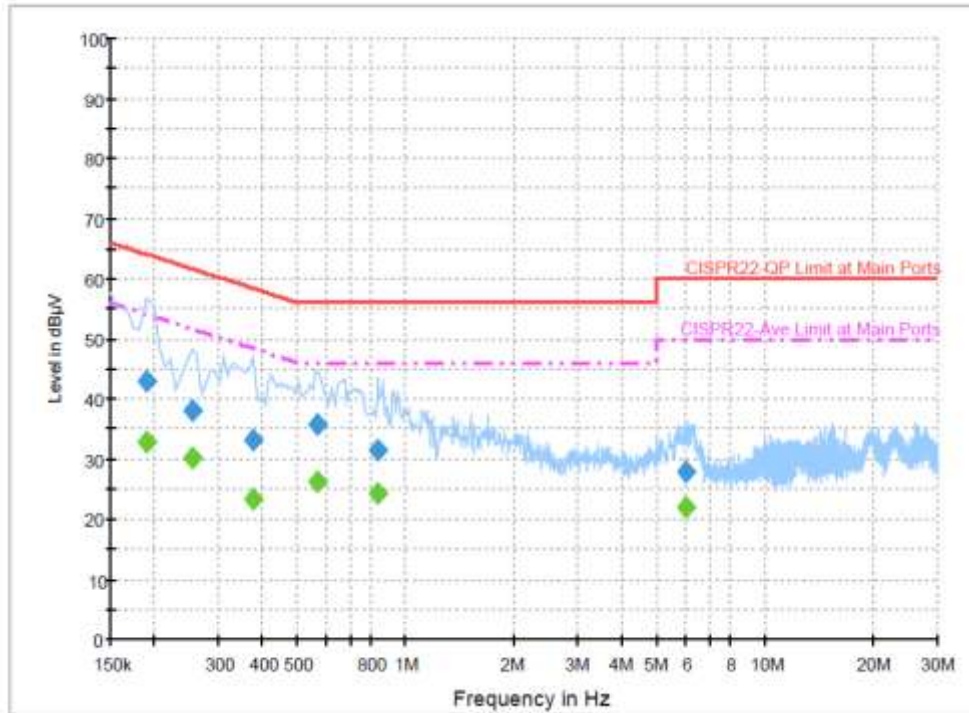
1. Please follow the guidelines in ANSI C63.4-2003.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN).
4. All 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 :	22~24°C
Test Engineer :	Hayden Wu	Relative Humidity :	54~57%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	GSM850 Idle + Bluetooth Link + MPEG4 + USB Cable (Link with Notebook)		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



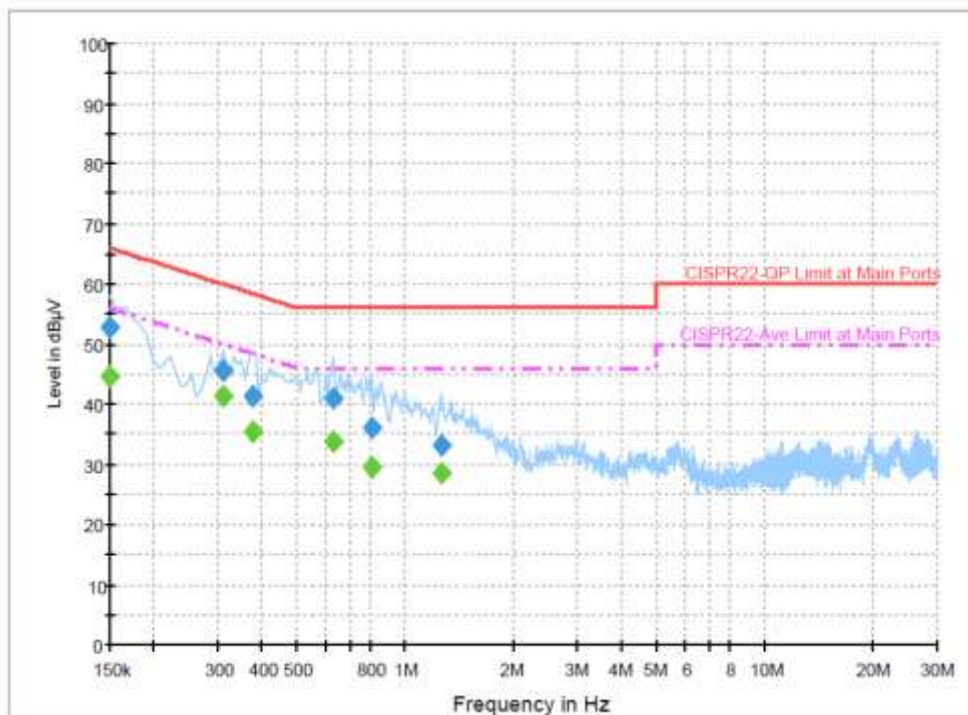
Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.190000	43.1	Off	L1	19.6	20.9	64.0
0.254000	38.1	Off	L1	19.5	23.5	61.6
0.374000	33.2	Off	L1	19.5	25.2	58.4
0.566000	35.7	Off	L1	19.5	20.3	56.0
0.838000	31.6	Off	L1	19.5	24.4	56.0
5.974000	27.7	Off	L1	19.5	32.3	60.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.190000	32.9	Off	L1	19.6	21.1	54.0
0.254000	30.1	Off	L1	19.5	21.5	51.6
0.374000	23.1	Off	L1	19.5	25.3	48.4
0.566000	26.3	Off	L1	19.5	19.7	46.0
0.838000	24.4	Off	L1	19.5	21.6	46.0
5.974000	22.0	Off	L1	19.5	28.0	50.0

Test Mode :	Mode 1	Temperature :	22~24°C
Test Engineer :	Hayden Wu	Relative Humidity :	54~57%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM850 Idle + Bluetooth Link + MPEG4 + USB Cable (Link with Notebook)		
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	52.9	Off	N	19.6	13.1	66.0
0.310000	45.4	Off	N	19.5	14.6	60.0
0.374000	41.2	Off	N	19.5	17.2	58.4
0.630000	40.9	Off	N	19.5	15.1	56.0
0.806000	36.1	Off	N	19.5	19.9	56.0
1.254000	33.2	Off	N	19.5	22.8	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	44.6	Off	N	19.6	11.4	56.0
0.310000	41.2	Off	N	19.5	8.8	50.0
0.374000	35.5	Off	N	19.5	12.9	48.4
0.630000	33.7	Off	N	19.5	12.3	46.0
0.806000	29.5	Off	N	19.5	16.5	46.0
1.254000	28.5	Off	N	19.5	17.5	46.0

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

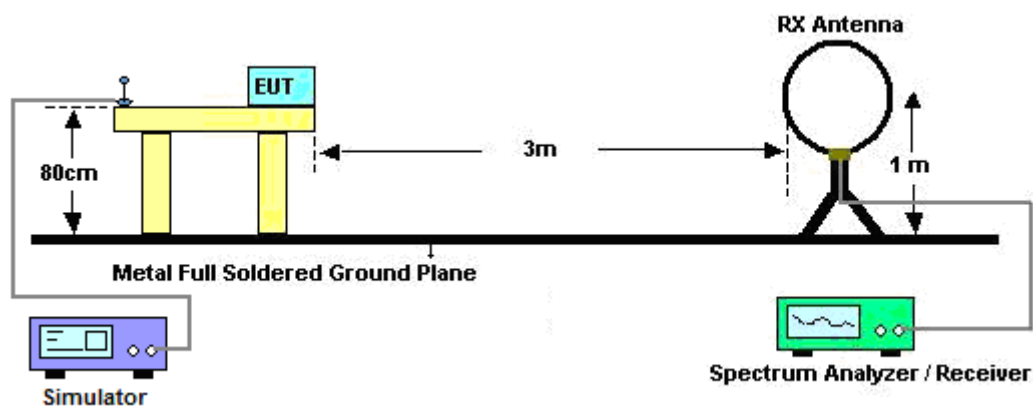
See list of measuring instruments of this test report.

3.9.3 Test Procedures

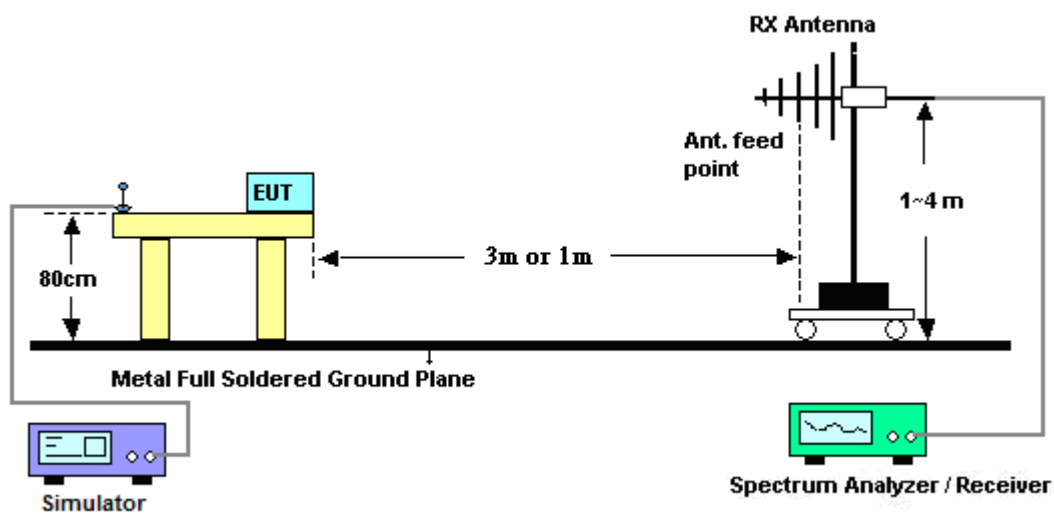
1. The testing follows the guidelines in FCC Public Notice DA 00-705 Measurement Guidelines.
2. Use the following spectrum analyzer settings:
 - (1) Span = wide enough to fully capture the emission being measured; RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz; VBW $\geq$ RBW; Sweep = auto; 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 = $20 \log (\text{specific distance [3m]} / \text{test distance [1m]})$ (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.

3.9.4 Test Setup

For radiated emissions below 30MHz



For radiated emissions above 30MHz



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

Test Engineer :	Mac Lin	Temperature :	23~24°C	
		Relative Humidity :	46~47%	
Frequency (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

Note:

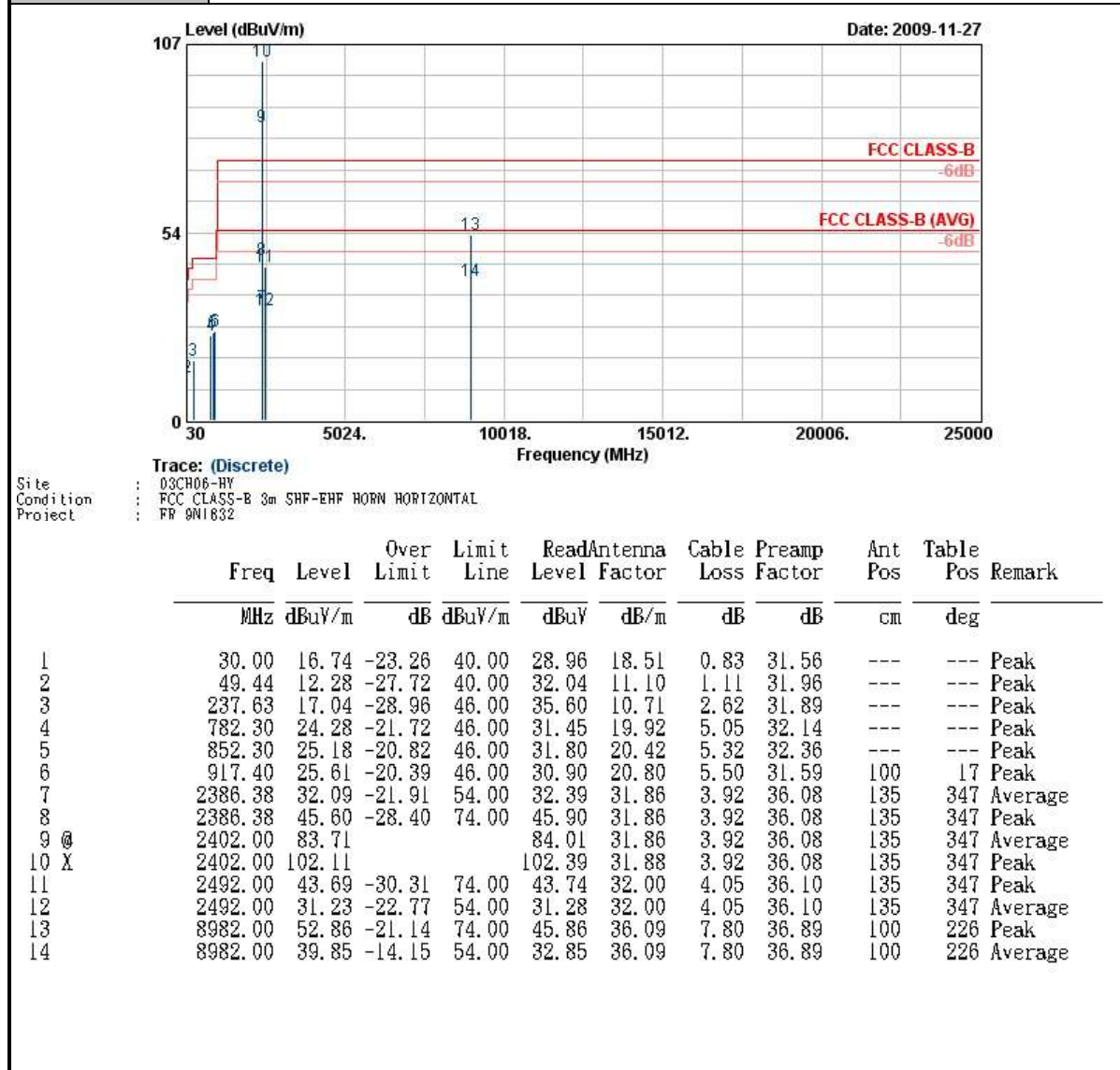
The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB);

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

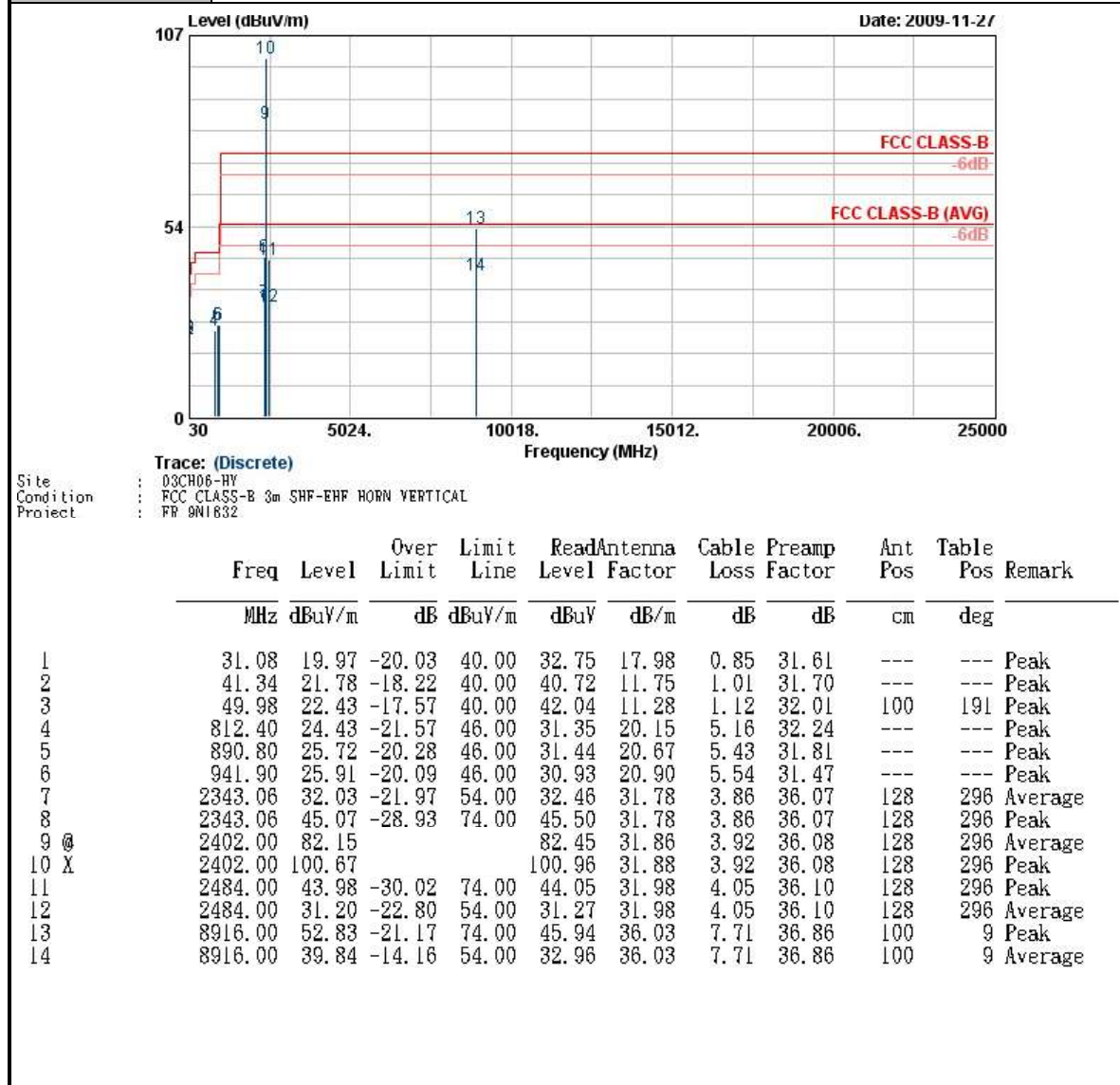
3.9.6 Test Result of Radiated Emission (30 MHz ~ 10th Harmonic)

Test Mode :	Mode 1	Temperature :	23~24°C
Test Channel :	00	Relative Humidity :	46~47%
Test Engineer :	Mac Lin	Polarization :	Horizontal
Remark :	#9 and #10 are Fundamental Signals which can be ignored.		



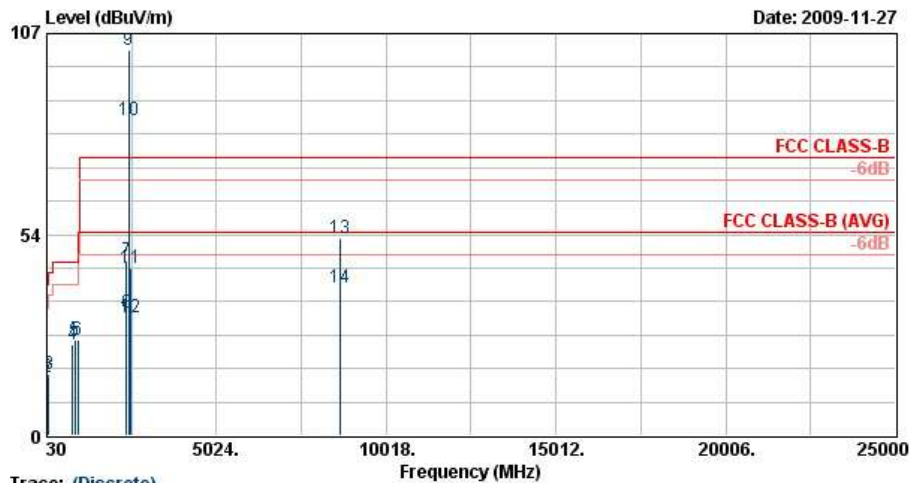


Test Mode :	Mode 1	Temperature :	23~24°C
Test Channel :	00	Relative Humidity :	46~47%
Test Engineer :	Mac Lin	Polarization :	Vertical
Remark :	#9 and #10 are Fundamental Signals which can be ignored.		





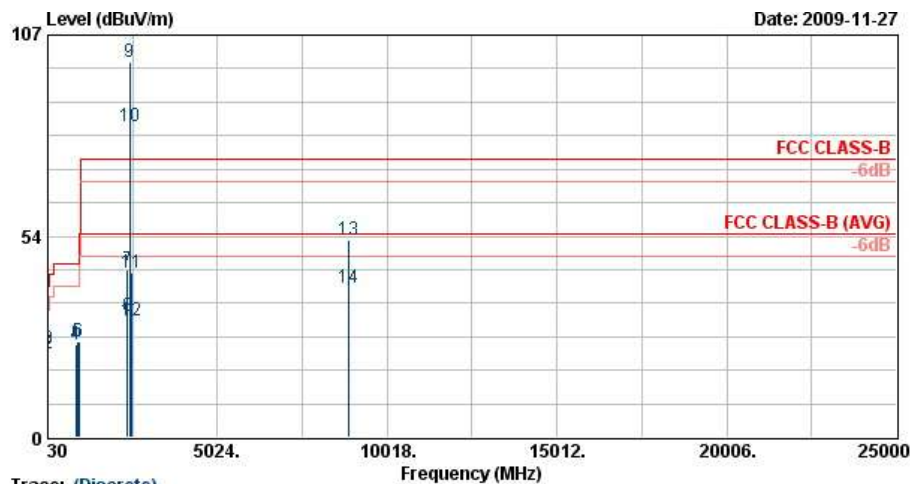
Test Mode :	Mode 2	Temperature :	23~24°C
Test Channel :	39	Relative Humidity :	46~47%
Test Engineer :	Mac Lin	Polarization :	Horizontal
Remark :	#9 and #10 are Fundamental Signals which can be ignored.		



	Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	30.00	17.09	-22.91	40.00	29.31	18.51	0.83	31.56	---	---	Peak
2	45.39	15.59	-24.41	40.00	35.92	10.36	1.08	31.77	---	---	Peak
3	94.53	16.45	-27.05	43.50	37.04	9.89	1.58	32.06	---	---	Peak
4	791.40	24.19	-21.81	46.00	31.28	20.00	5.08	32.16	---	---	Peak
5	861.40	25.49	-20.51	46.00	31.90	20.47	5.34	32.23	100	28	Peak
6	953.80	25.38	-20.62	46.00	30.23	20.95	5.57	31.38	---	---	Peak
7	2366.00	46.43	-27.57	74.00	46.81	31.81	3.89	36.08	108	334	Peak
8	2366.00	32.42	-21.58	54.00	32.80	31.81	3.89	36.08	108	334	Average
9 @	2441.00	102.62			102.80	31.93	3.99	36.09	108	334	Peak
10 @	2441.00	83.97			84.15	31.93	3.99	36.09	108	334	Average
11	2494.00	44.39	-29.61	74.00	44.44	32.00	4.05	36.10	108	334	Peak
12	2494.00	31.34	-22.66	54.00	31.39	32.00	4.05	36.10	108	334	Average
13	8676.00	52.34	-21.66	74.00	45.85	35.85	7.42	36.77	100	249	Peak
14	8676.00	39.38	-14.62	54.00	32.89	35.85	7.42	36.77	100	249	Average



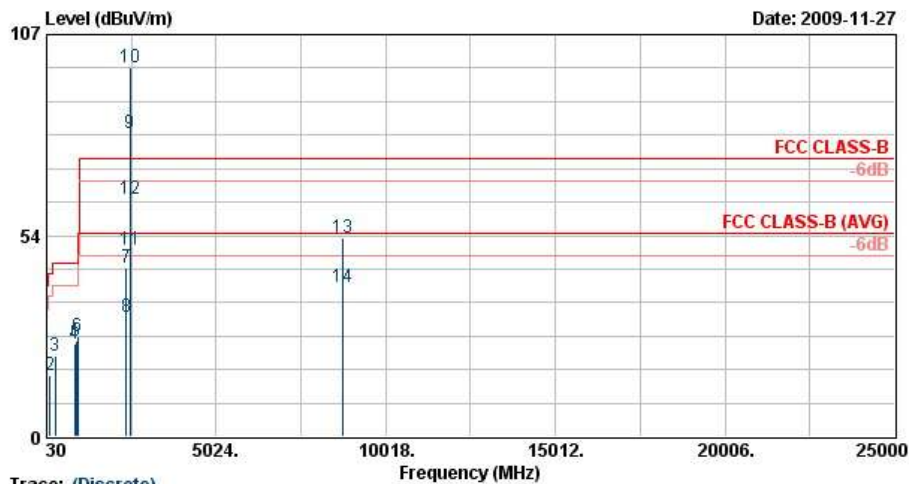
Test Mode :	Mode 2	Temperature :	23~24°C
Test Channel :	39	Relative Humidity :	46~47%
Test Engineer :	Mac Lin	Polarization :	Vertical
Remark :	#9 and #10 are Fundamental Signals which can be ignored.		



	Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	30.54	23.77	-16.23	40.00	36.56	17.98	0.85	31.61	100	229	Peak
2	40.53	22.27	-17.73	40.00	40.69	12.28	0.99	31.70	---	---	Peak
3	49.44	23.31	-16.69	40.00	43.06	11.10	1.11	31.96	---	---	Peak
4	857.90	24.62	-21.38	46.00	31.11	20.45	5.34	32.27	---	---	Peak
5	894.30	25.39	-20.61	46.00	31.01	20.69	5.44	31.75	---	---	Peak
6	953.80	25.63	-20.37	46.00	30.48	20.95	5.57	31.38	---	---	Peak
7	2374.00	44.64	-29.36	74.00	44.99	31.83	3.89	36.08	100	314	Peak
8	2374.00	32.29	-21.71	54.00	32.65	31.83	3.89	36.08	100	314	Average
9 X	2441.00	100.03			100.20	31.93	3.99	36.09	100	314	Peak
10 @	2441.00	82.54			82.72	31.93	3.99	36.09	100	314	Average
11	2484.00	43.64	-30.36	74.00	43.71	31.98	4.05	36.10	100	314	Peak
12	2484.00	31.19	-22.81	54.00	31.26	31.98	4.05	36.10	100	314	Average
13	8877.00	52.70	-21.30	74.00	45.90	35.99	7.65	36.85	100	159	Peak
14	8877.00	39.71	-14.29	54.00	32.91	35.99	7.65	36.85	100	159	Average



Test Mode :	Mode 3	Temperature :	23~24°C
Test Channel :	78	Relative Humidity :	46~47%
Test Engineer :	Mac Lin	Polarization :	Horizontal
Remark :	#9 and #10 are Fundamental Signals which can be ignored.		



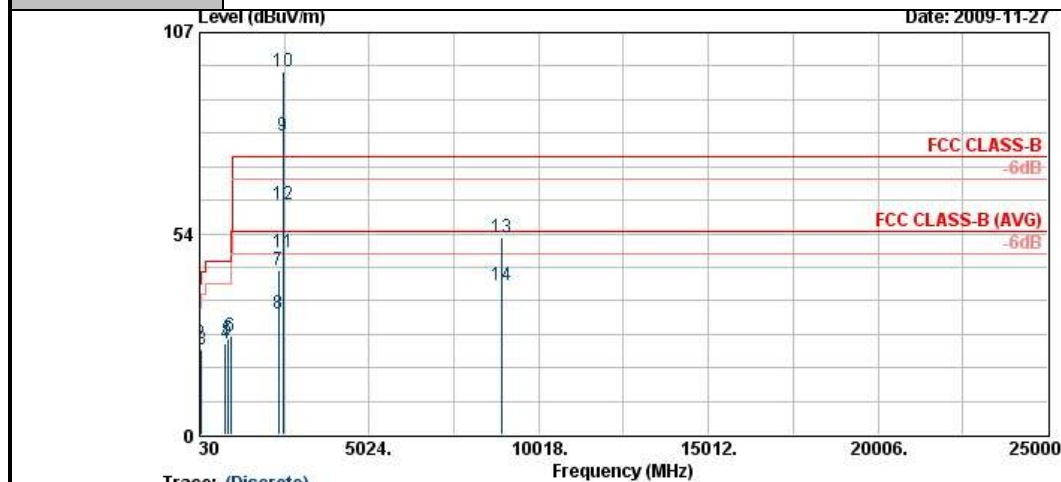
Trace: (Discrete)

Site : 03CH06-HY
Condition : FCC CLASS-B 3m SHF-EHF HORN HORIZONTAL
Project : FR 9N1832

	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	30.00	17.78	-22.22	40.00	30.00	18.51	0.83	31.56	---	---	Peak
2	127.74	16.23	-27.27	43.50	34.36	11.75	1.82	31.70	---	---	Peak
3	288.93	21.51	-24.49	46.00	37.71	12.93	2.94	32.07	---	---	Peak
4	857.90	24.86	-21.14	46.00	31.34	20.45	5.34	32.27	---	---	Peak
5	894.30	25.49	-20.51	46.00	31.11	20.69	5.44	31.75	---	---	Peak
6	934.90	26.61	-19.39	46.00	31.71	20.87	5.53	31.50	100	11	Peak
7	2372.00	44.78	-29.22	74.00	45.14	31.83	3.89	36.08	100	351	Peak
8	2372.00	31.65	-22.35	54.00	32.01	31.83	3.89	36.08	100	351	Average
9 @	2480.00	80.72			80.79	31.98	4.05	36.10	100	351	Average
10 X	2480.00	98.41			98.48	31.98	4.05	36.10	100	351	Peak
11 !	2483.50	49.80	-4.20	54.00	49.87	31.98	4.05	36.10	100	351	Average
12	2483.50	63.05	-10.95	74.00	63.12	31.98	4.05	36.10	100	351	Peak
13	8742.00	52.84	-21.16	74.00	46.25	35.89	7.50	36.80	100	223	Peak
14	8742.00	39.61	-14.39	54.00	33.02	35.89	7.50	36.80	100	223	Average



Test Mode :	Mode 3	Temperature :	23~24°C
Test Channel :	78	Relative Humidity :	46~47%
Test Engineer :	Mac Lin	Polarization :	Vertical
Remark :	#9 and #10 are Fundamental Signals which can be ignored.		



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark	
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	39.18	20.90	-19.10	40.00	38.24	13.42	0.96	31.72	---	---	Peak
2	49.44	24.14	-15.86	40.00	43.89	11.10	1.11	31.96	100	202	Peak
3	91.83	22.80	-20.70	43.50	44.06	9.31	1.53	32.10	---	---	Peak
4	789.30	24.31	-21.69	46.00	31.41	19.98	5.07	32.15	---	---	Peak
5	855.80	25.45	-20.55	46.00	32.00	20.44	5.33	32.32	---	---	Peak
6	943.30	26.32	-19.68	46.00	31.32	20.91	5.55	31.46	---	---	Peak
7	2350.00	43.92	-30.08	74.00	44.35	31.78	3.86	36.07	158	270	Peak
8	2350.00	32.18	-21.82	54.00	32.61	31.78	3.86	36.07	158	270	Average
9 @	2480.00	79.68			79.75	31.98	4.05	36.10	158	270	Average
10 X	2480.00	96.54			96.61	31.98	4.05	36.10	158	270	Peak
11 !	2483.50	48.42	-5.58	54.00	48.49	31.98	4.05	36.10	158	270	Average
12	2483.50	61.22	-12.78	74.00	61.29	31.98	4.05	36.10	158	270	Peak
13	8931.00	52.50	-21.50	74.00	45.61	36.05	7.71	36.87	100	198	Peak
14	8931.00	39.58	-14.42	54.00	32.69	36.05	7.71	36.87	100	198	Average



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
System Simulator	R&S	CMU200	116456	N/A	Jun. 05, 2008	Jun. 04, 2010	Conducted (TH02-HY)
Spectrum Analyzer	R&S	FSP40	100055	9kHz~40GHz	Jun. 23, 2009	Jun. 22, 2010	Conducted (TH02-HY)
Power Meter	Anritsu	ML2495A	0932001	N/A	Sep. 17, 2009	Sep. 16, 2010	Conducted (TH02-HY)
Power Sensor	Anritsu	MA2411B	0846202	N/A	Sep. 10, 2009	Sep. 09, 2010	Conducted (TH02-HY)
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-1000 W	N/A	N/A	N/A	N/A	Conduction (CO05-HY)
System Simulator	R&S	CMU200	105934	N/A	Nov. 11, 2008	Nov. 10, 2010	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-1000MHz	Apr. 28, 2009	Apr. 27, 2010	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. 20, 2009	Apr. 19, 2010	Radiation (03CH06-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9KHz~30MHz	May 22, 2008	May 21, 2010	Radiation (03CH06-HY)
Bluetooth Base Station	R&S	CBT32	100519	N/A	May 12, 2009	May 11, 2011	Radiation (03CH06-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 $U_c(y)$	1.13		
Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	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 $U_c(y)$	1.27		
Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	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				

6 Certification of TAF Accreditation


財團法人全國認證基金會
Taiwan Accreditation Foundation

Certificate No. : L1190-090417

Certificate of Accreditation

This is to certify that

Sporton International Inc.
EMC & Wireless Communications Laboratory
No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien,
Taiwan, R.O.C.

is accredited in respect of laboratory

Accreditation Criteria	: ISO/IEC 17025:2005
Accreditation Number	: 1190
Originally Accredited	: December 15, 2003
Effective Period	: January 10, 2007 to January 09, 2010
Accredited Scope	: Testing Field, see described in the Appendix
Specific Accreditation Program	: Accreditation Program for Designated Testing Laboratory for Commodities Inspection Accreditation Program for Telecommunication Equipment Testing Laboratory Accreditation Program for BSMI Mutual Recognition Arrangement with Foreign Authorities


Jay-San Chen
President, Taiwan Accreditation Foundation
Date : April 17, 2009

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The Appendix forms an integral part of this Certificate, which shall be invalid when use without the Appendix



Appendix A. Photographs of EUT

Please refer to Sporton report number EP9N1832 as below.