FCC RF Test Report

APPLICANT	**:**	**Hong Fu Jin Precision Industry(Shenzhen) CO., LTD.**
EQUIPMENT	**:**	**RFID UHF Reader**
BRAND NAME	**:**	**CMC Lab**
MODEL NAME	**:**	**CMC 181**
FCC ID	**:**	**XWJ-CMC181UR**
STANDARD	**:**	**FCC Part 15 Subpart C §15.247**
CLASSIFICATION	**:**	**Digital Spread Spectrum (DSS)**

The product was received on Jul. 02, 2010 and completely tested on Nov. 09, 2010. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.4-2003 and shown the compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by:

Anderson Chiu

Anderson Chiu / Deputy 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
FR070226	Rev. 01	Initial issue of report	Dec. 17, 2010

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	≥ 50 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	≥ 20dB BW	Pass	-
3.4	15.247(a)(1)	A8.1(d)	Dwell Time of Each Channel	≤ 0.4 sec	Pass	-
3.5	15.247(b)(1)	A8.1(b)	Peak Output Power	≤ 1W	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 7.2.2	AC Conducted Emission	15.207(a)	Pass	Under limit 7.0 dB at 0.510 MHz
3.9	15.247(d)	A8.5	Transmitter Radiated Emission	15.209(a) & 15.247(d)	Pass	Under limit 0.53 dB at 2781.00 MHz
3.10	15.203 & 15.247(b)	A8.4	Antenna Requirement	N/A	Pass	Reversed SMA connectors are used.

1 General Description

1.1 Applicant

Hong Fu Jin Precision Industry(Shenzhen) CO., LTD.
No. 2, 2nd Donghuan Road, 10th Yousong Industrial District, Longhua, Baoan, Shenzhen City, Guangdong Province, China

1.2 Manufacturer

Hong Fu Jin Precision Industry(Shenzhen) CO., LTD.
No. 2, 2nd Donghuan Road, 10th Yousong Industrial District, Longhua, Baoan, Shenzhen City, Guangdong Province, China

1.3 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	RFID UHF Reader
Brand Name	CMC Lab
Model Name	CMC 181
FCC ID	XWJ-CMC181UR
Tx/Rx Frequency Range	902 MHz ~ 928 MHz
Number of Channels	50
Maximum Output Power to Antenna	25.00 dBm (0.316 W)
HW Version	V1.8
SW Version	V1.1.0.38
Type of Modulation	ASK
EUT Stage	Production Unit

Antenna Information	
Manufacturer	S9025P
Model Name	Laird
Antenna Type	Panel Antenna
Antenna Gain	5.5 dBi

Remark:

1. This test report recorded only product characteristics and test results of Digital Spread Spectrum (DSS).
2. 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 7

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

1.6 Ancillary Equipment List

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	DELL	Vostro 1510	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
2.	LCD Monitor	Lenovo	6135-AB1	FCC DoC	Shielded, 1.6 m	Unshielded, 1.8 m
3.	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 ant port and recorded the RF output power in the following table:

Channel	Frequency (MHz)	RF Output Power (dBm)			
		Ant 1	Ant 2	Ant 3	Ant 4
00	902.75	24.83	24.91	**25.00**	24.83
24	915.25	24.78	24.44	24.92	24.58
49	927.25	23.92	23.79	24.39	23.94

Remark: The ant port was set in port 3 for all the test items due to the highest RF output power.

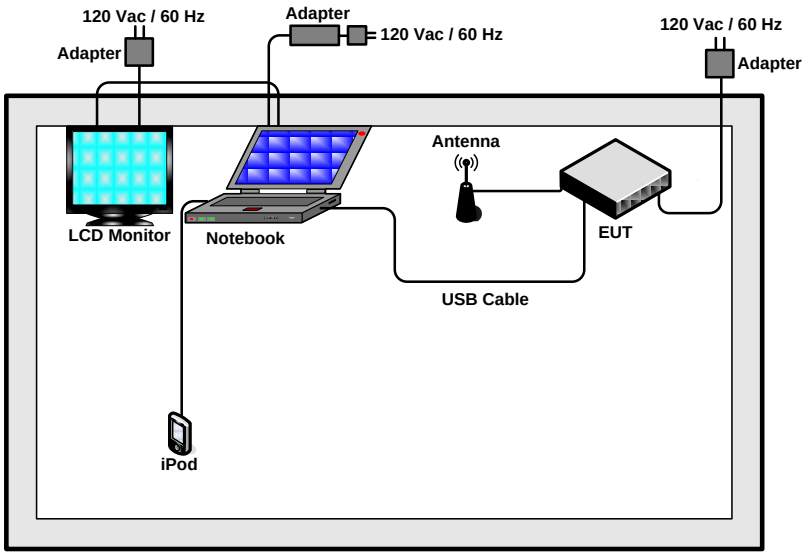
2.2 Test Mode

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).

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

Test Cases	
Conducted	Mode 1: RFID Tx CH00_902.75 MHz Mode 2: RFID Tx CH24_914.75 MHz Mode 3: RFID Tx CH49_927.25 MHz
Radiated Emission	Mode 1: RFID Tx CH00_902.75 MHz Mode 2: RFID Tx CH24_914.75 MHz Mode 3: RFID Tx CH49_927.25 MHz
AC Conducted Emission	Mode 1 :RFID Tx CH24_914.75 MHz

2.3 Connection Diagram of Test System



2.4 RF Utility

Execute “RFID Teacer” to make the EUT transmit signals continuously.

3 Test Result

3.1 Number of Channel Measurement

3.1.1 Limits of Number of Hopping Frequency

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

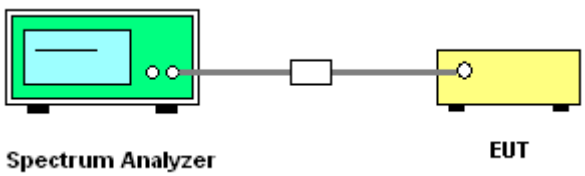
3.1.2 Measuring Instruments

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

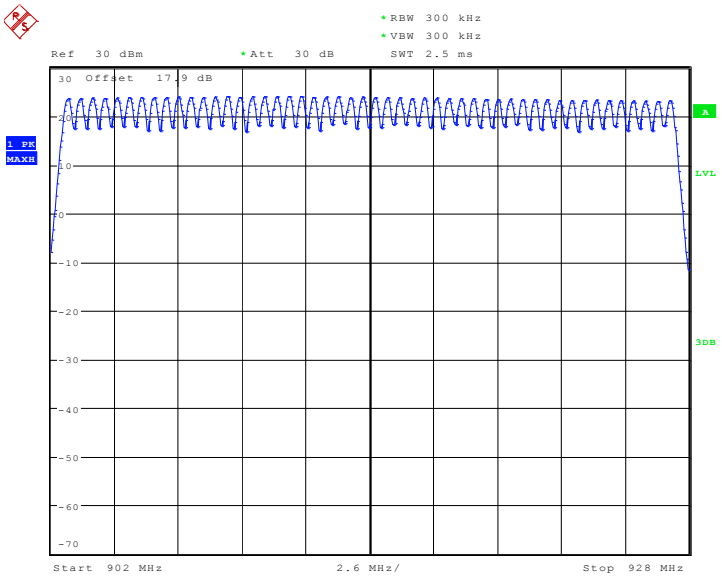


3.1.5 Test Result of Number of Hopping Frequency

Test Mode :	Mode 1~3	Temperature :	24~26℃
Test Engineer :	Alan Liu	Relative Humidity :	50~53%

Number of Hopping Channels (Channel)	Limits (Channel)	Pass/Fail
50	≥ 50	Pass

Number of Hopping Channel Plot on Channel 00 - 49



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3.2 20dB Bandwidth Measurement

3.2.1 Limit of 20dB Bandwidth

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

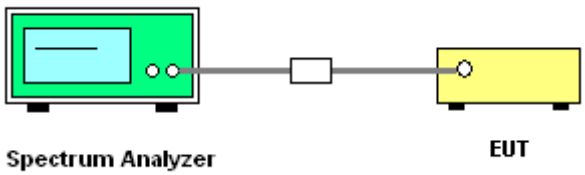
3.2.2 Measuring Instruments

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

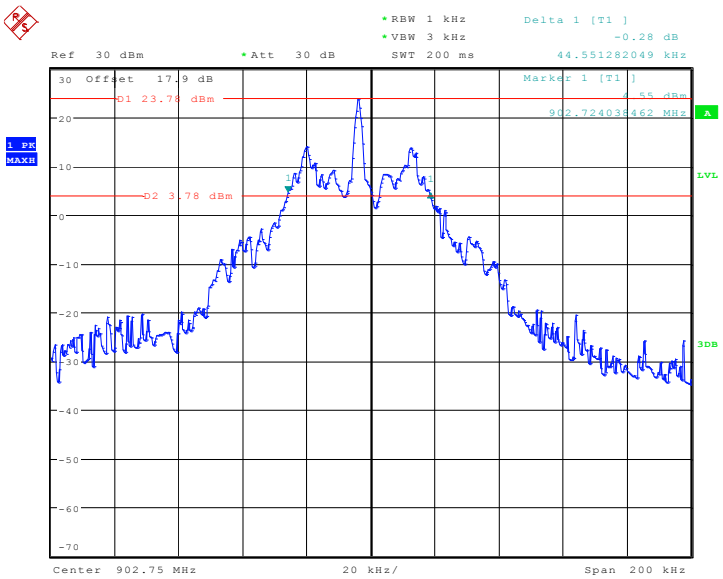


3.2.5 Test Result of 20dB Bandwidth

Test Mode :	Mode 1, 2, 3	Temperature :	24~26℃
Test Engineer :	Alan Liu	Relative Humidity :	50~53%

Channel	Frequency (MHz)	20dB Bandwidth (kHz)
00	902.75MHz	44.55
24	915.25MHz	44.55
49	927.25MHz	45.19

20 dB Bandwidth Plot on Channel 00



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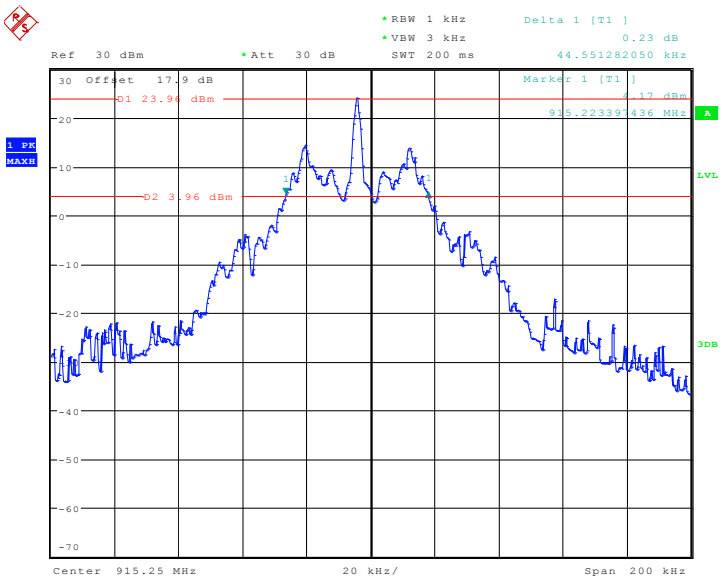
20 dB Bandwidth Plot on Channel 24



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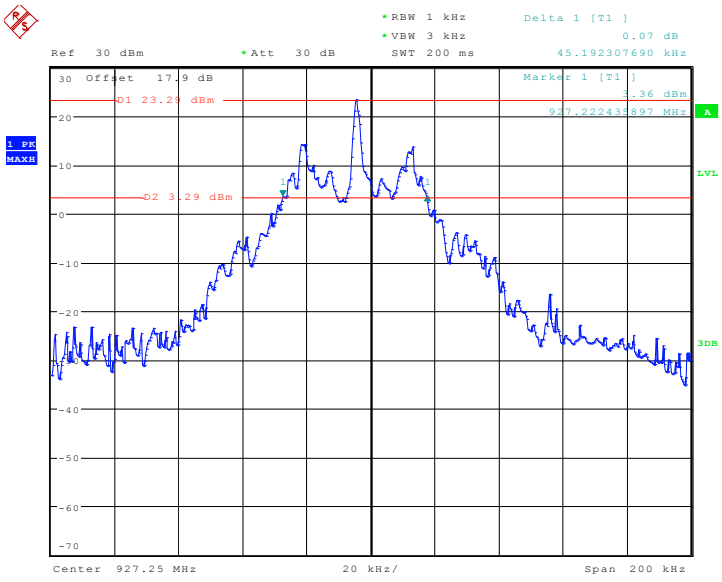
20 dB Bandwidth Plot on Channel 49



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3.3 Hopping Channel Separation Measurement

3.3.1 Limit of Hopping Channel Separation

Minimum of 25 kHz or the 20 dB bandwith of the hopping channel, whichever is greater.

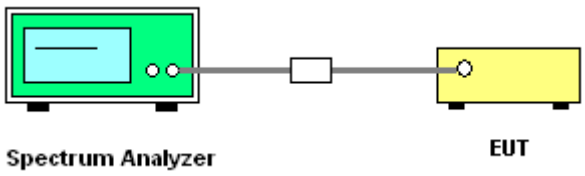
3.3.2 Measuring Instruments

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

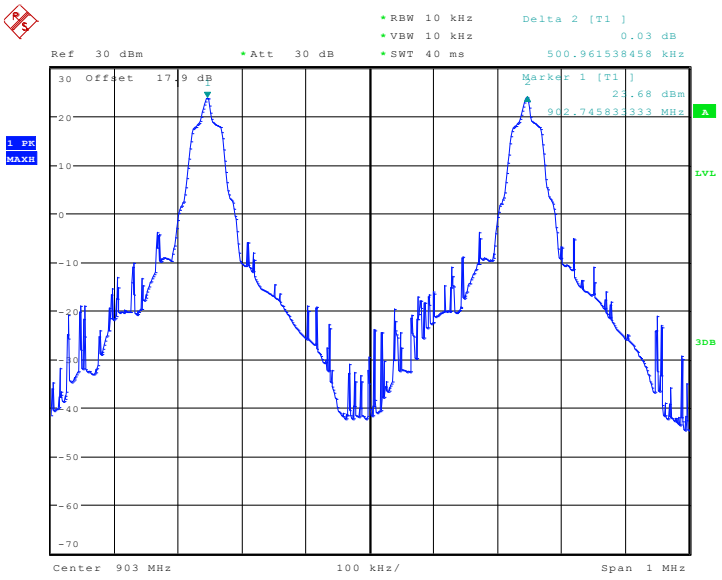


3.3.5 Test Result of Hopping Channel Separation

Test Mode :	Mode 1,2,3	Temperature :	24~26℃
Test Engineer :	Alan Liu	Relative Humidity :	50~53%

Channel	Frequency (MHz)	Frequency Separation (kHz)	(20dB BW) Limits (kHz)	Pass/Fail
00	902.75	500.96	44.55	Pass
24	915.25	501.60	44.55	Pass
49	927.25	499.99	45.19	Pass

Channel Separation Plot on Channel 00 - 01



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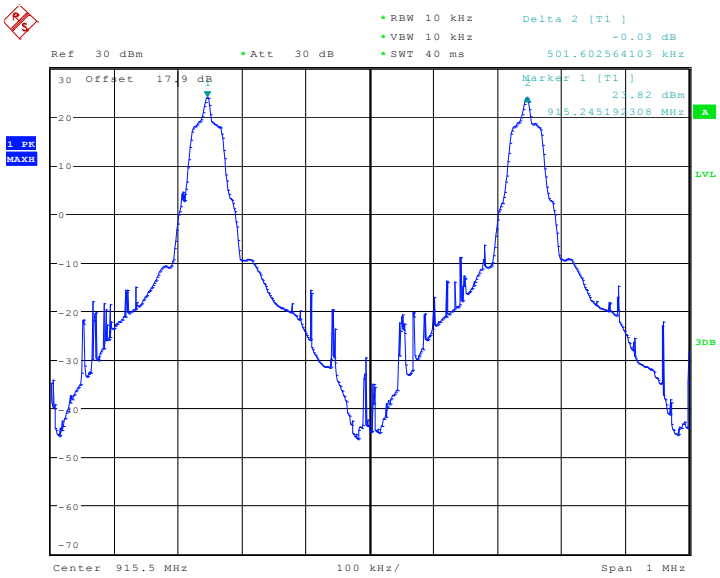
Channel Separation Plot on Channel 24 - 25



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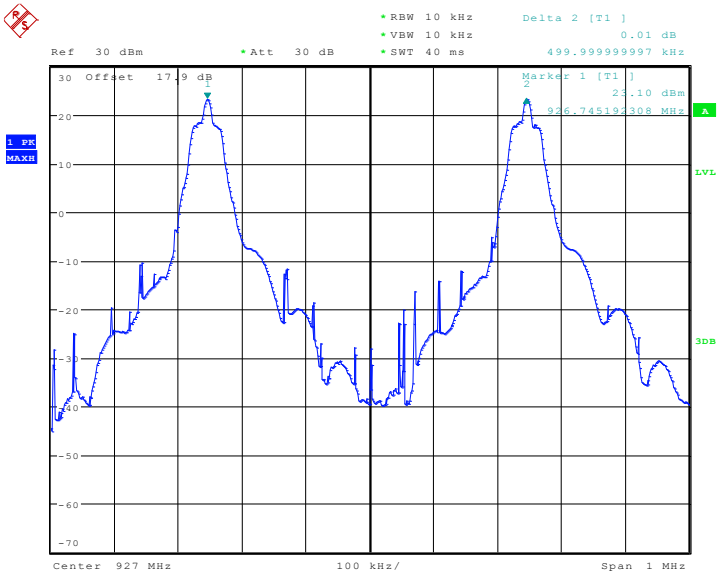
Channel Separation Plot on Channel 48 - 49



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3.4 Dwell Time Measurement

3.4.1 Limit of Dwell Time

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

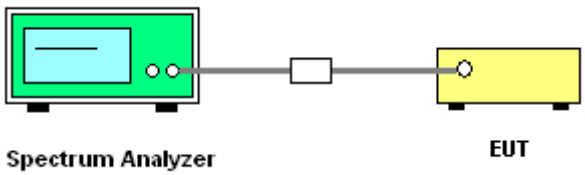
3.4.2 Measuring Instruments

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



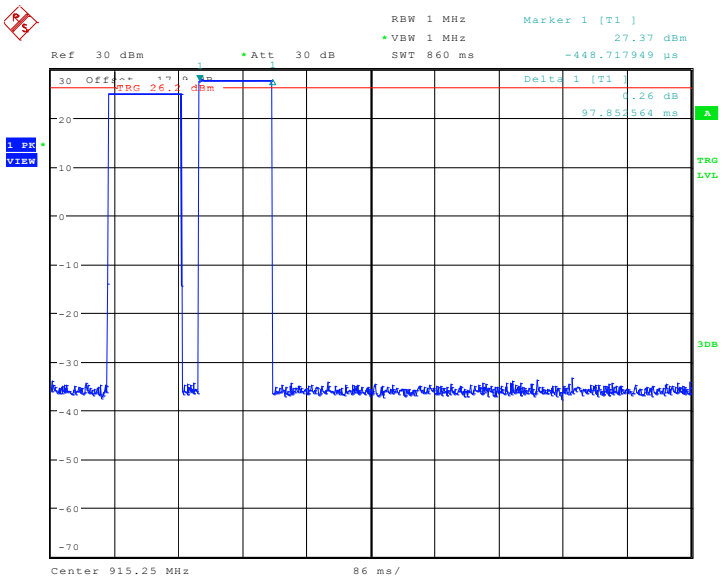
3.4.5 Test Result of Dwell Time

Test Mode :	Mode 2	Temperature :	24~26℃
Test Engineer :	Alan Liu	Relative Humidity :	50~53%

Average Hopping Channel	On-Time (msec)	Time of occupancy (sec)	Limits (sec)	Pass/Fail
3	97.85	0.29	0.4	Pass

Remark: Dwell Time=average hopping channel x on-time

On-Time Plot



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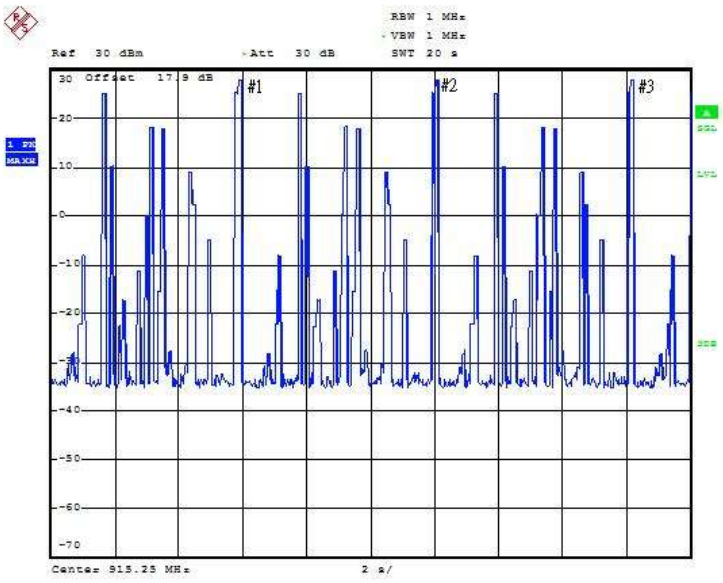
Time of occupancy Plot



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3.5 Peak Output Power Measurement

3.5.1 Limit of Peak Output Power

For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels.

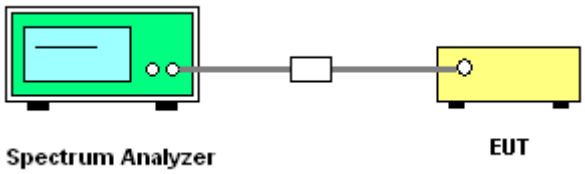
3.5.2 Measuring Instruments

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

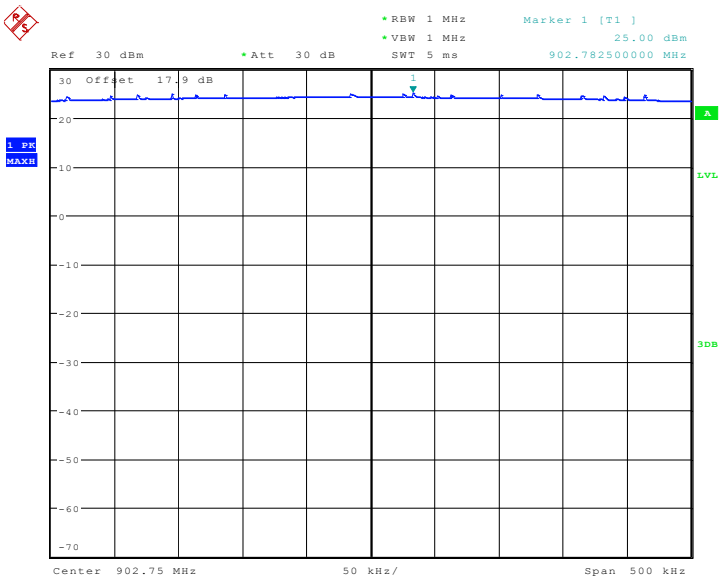


3.5.5 Test Result of Peak Output Power

Test Mode :	Mode 1, 2, 3	Temperature :	24~26℃
Test Engineer :	Alan Liu	Relative Humidity :	50~53%

Channel	Frequency (MHz)	RF Power (dBm)		
		Measure Power	Max. Limits (dBm)	Pass/Fail
00	902.75MHz	25.00	30	Pass
24	915.25MHz	24.92	30	Pass
49	927.25MHz	24.39	30	Pass

Peak Output Power Plot on Channel 00



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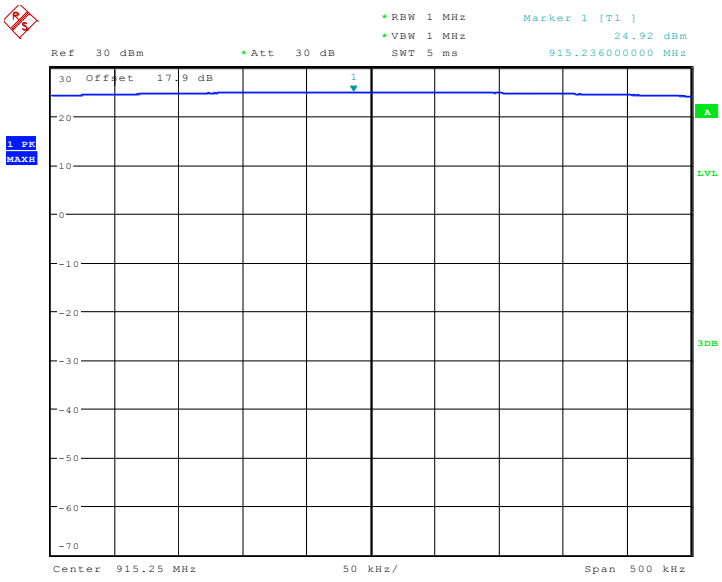
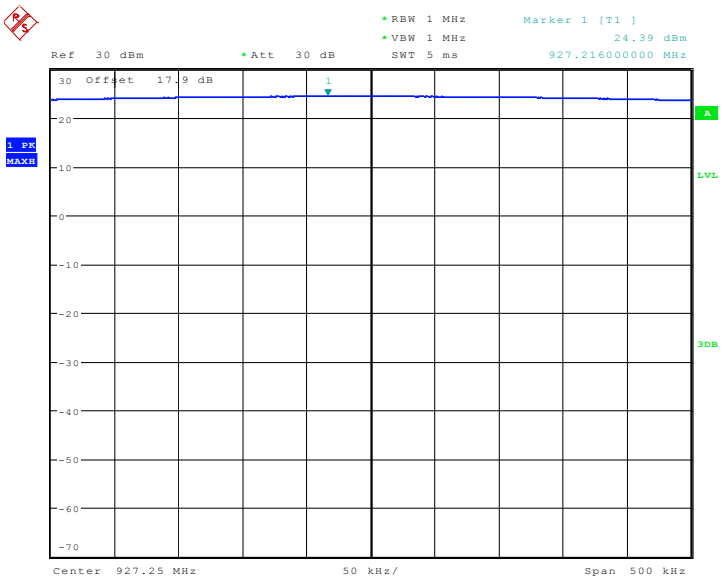
Peak Output Power Plot on Channel 24



Date: 10.NOV.2010 12:33:58

Peak Output Power Plot on Channel 49



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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

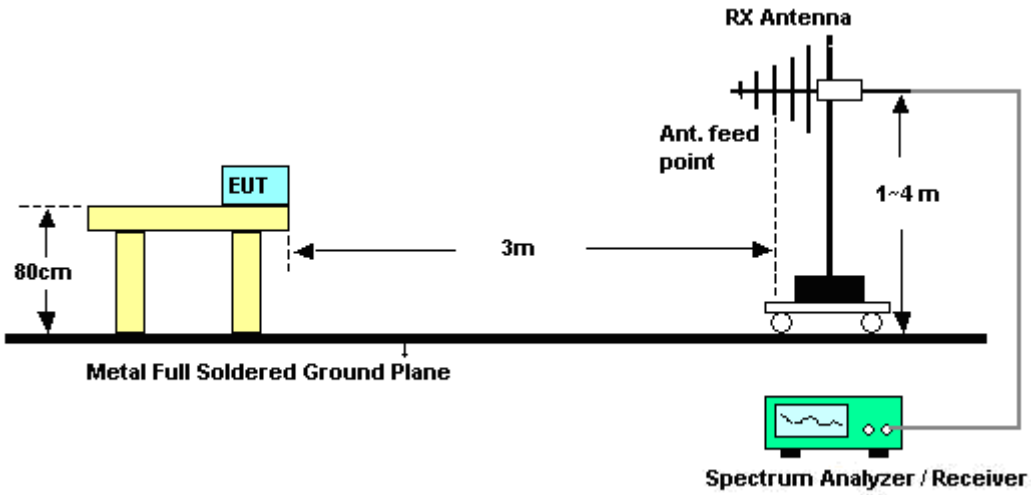
See list of measuring instruments of this test report.

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 = 100kHz, 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 100k 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. 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>



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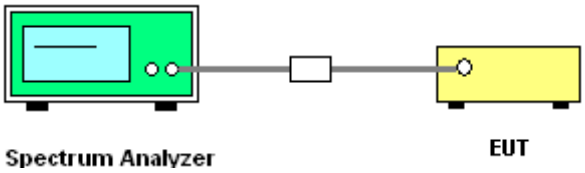
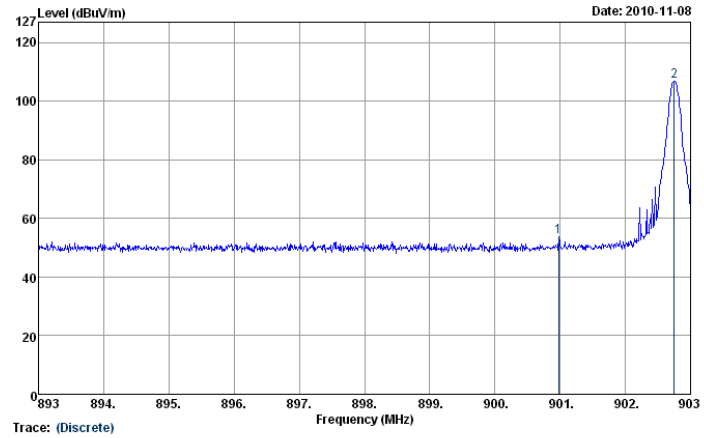


3.6.5 Test Result of Radiated Band Edges

Test Mode :	Mode 1	Temperature :	22~23°C
Test Channel :	00	Relative Humidity :	50~54%
		Test Engineer :	Cona Huang

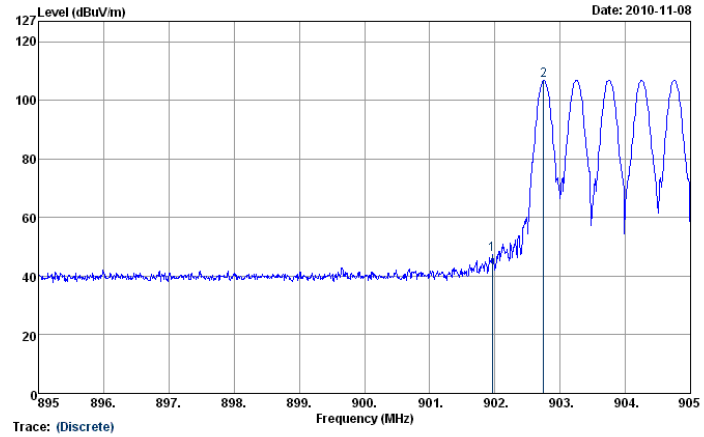
Low Band Edge Plot on Channel 00 (Single Carrier)



Trace: (Discrete)
Site : 03CH05-HY
Condition : LF_ANT_101108 HORIZONTAL
Project : FR 070226
Memo : Model

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	900.98	53.78	------	------	59.76	21.80	2.70	30.48	---	---	Peak
2	902.75	106.75	------	------	112.68	21.85	2.70	30.48	100	0	Peak

Low Band Edge Plot on Channel 00 (Hopping)

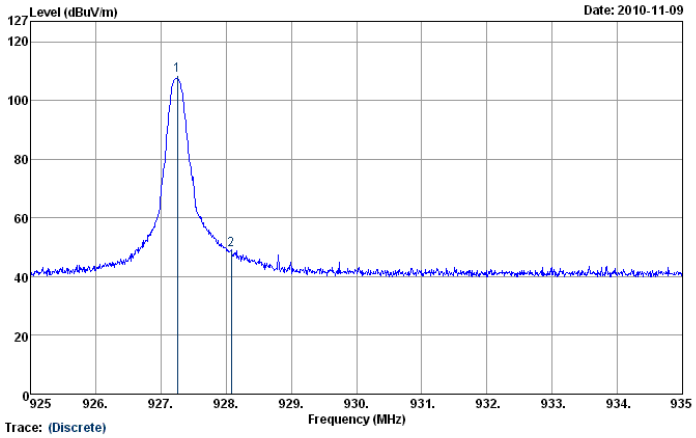


Trace: (Discrete)
Site : 03CH05-HY
Condition : LF_ANT_101108 HORIZONTAL
Project : FR 070226
Memo : Model

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	901.96	47.27	------	------	53.23	21.82	2.70	30.48	---	---	Peak
2	902.75	106.74	------	------	112.67	21.85	2.70	30.48	100	0	Peak

Test Mode :	Mode 3	Temperature :	22~23°C
Test Channel :	49	Relative Humidity :	50~54%
		Test Engineer :	Cona Huang

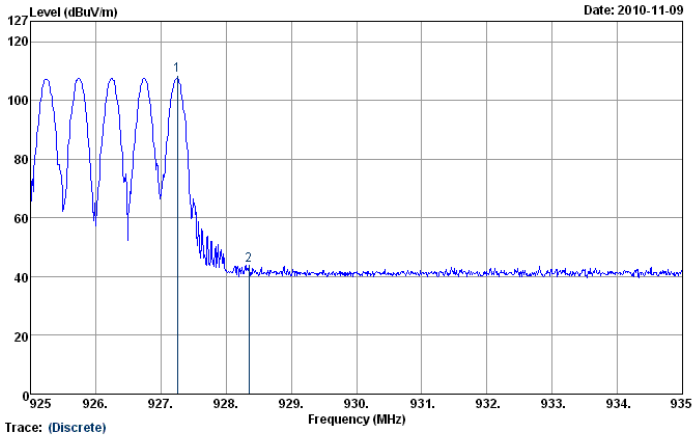
High Band Edge Plot on Channel 49 (Single Carrier)



Trace: (Discrete)
Site : 03CH05-HY
Condition : LF_ANT_101108 HORIZONTAL
Project : FR 070226
Memo : Mode3

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	927.25	108.70	------	------	113.95	22.41	2.78	30.44	146	7	Peak
2	928.08	49.12	------	------	54.34	22.43	2.78	30.43	146	7	Peak

High Band Edge Plot on Channel 49 (Hopping)



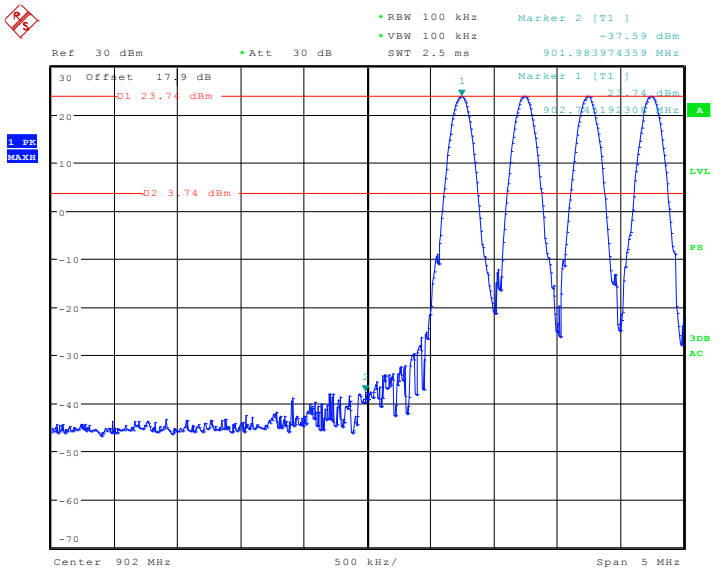
Trace: (Discrete)
Site : 03CH05-HY
Condition : LF_ANT_101108 HORIZONTAL
Project : FR 070226
Memo : Mode3

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	927.25	108.70	------	------	113.95	22.41	2.78	30.44	146	7	Peak
2	928.35	43.95	------	------	49.17	22.43	2.78	30.43	146	7	Peak

3.6.6 Test Result of Conducted Band Edges

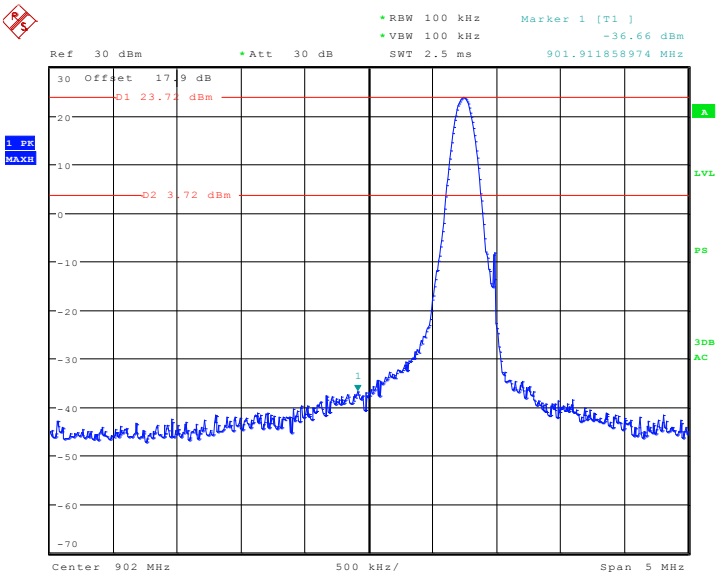
Test Mode :	Mode 1 and 3	**Temperature :**	24~26℃
Test Channel :	00 and 49	**Relative Humidity :**	50~53%
		Test Engineer :	Alan Liu

Low Band Edge Plot on Channel 00 (Hopping On)



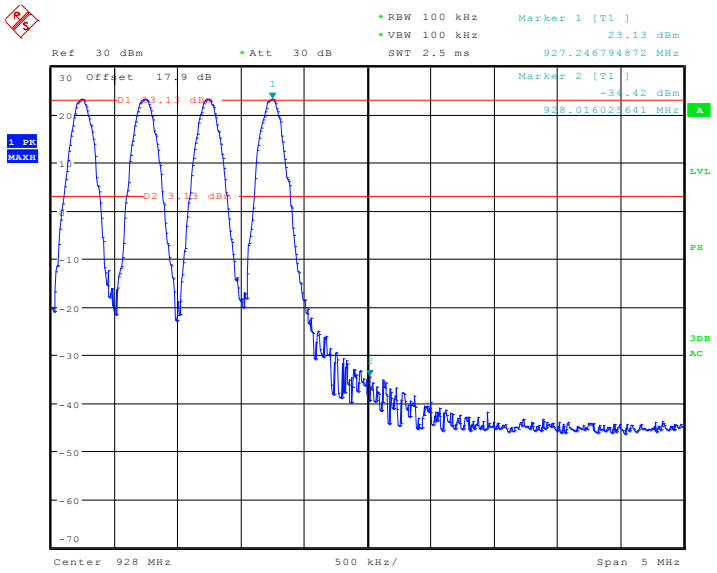
Date: 5.NOV.2010 14:56:33

Low Band Edge Plot on Channel 00 (Hopping Off)



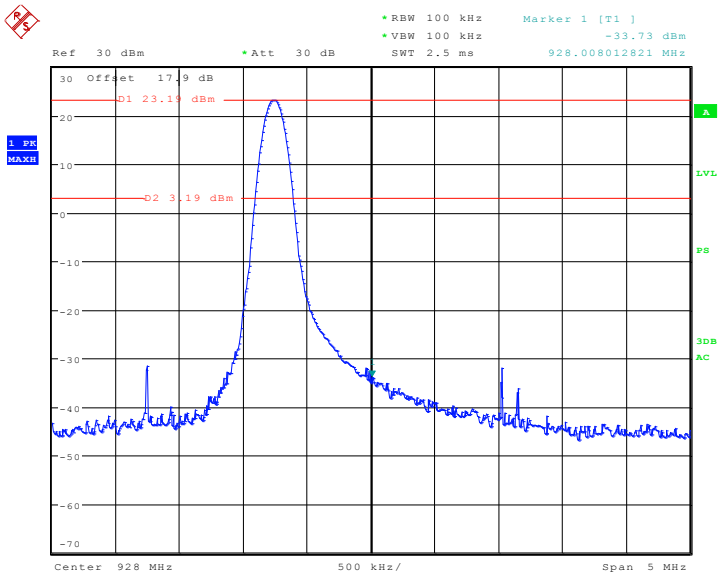
Date: 5.NOV.2010 14:50:20

High Band Edge Plot on Channel 49 (Hopping On)



Date: 5.NOV.2010 14:59:41

High Band Edge Plot on Channel 49 (Hopping Off)



Date: 5.NOV.2010 14:51:53

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.

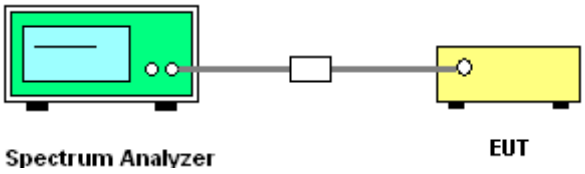
3.7.2 Measuring Instruments

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) ≥ 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.

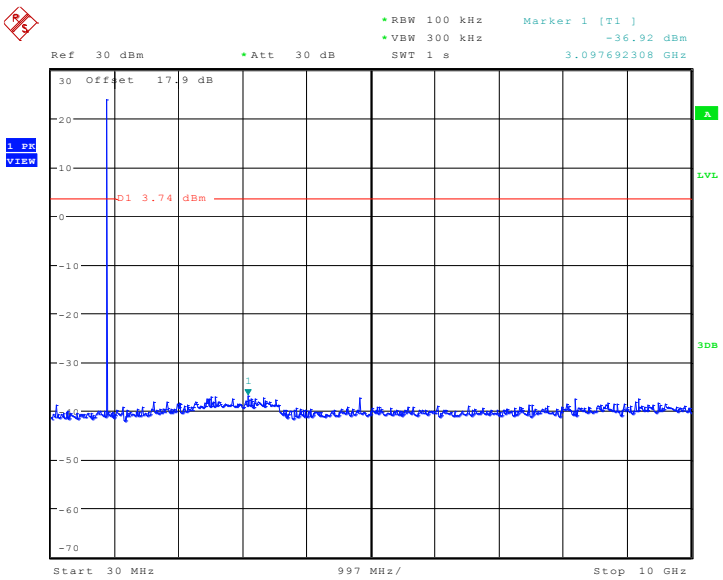
3.7.4 Test Setup



3.7.5 Test Result

Test Mode :	Mode 1	Temperature :	24~26℃
Test Channel :	00	Relative Humidity :	50~53%
		Test Engineer :	Alan Liu

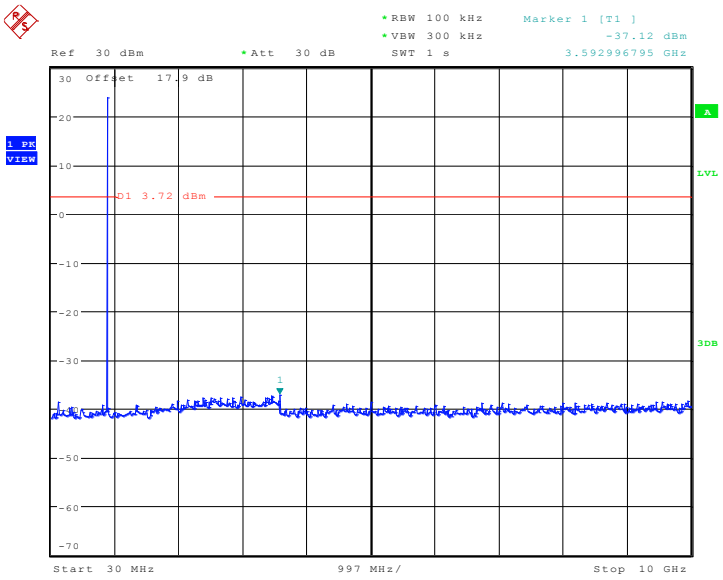
Conducted Spurious Emission Plot between 30MHz ~ 10 GHz



Date: 14.OCT.2010 18:08:19

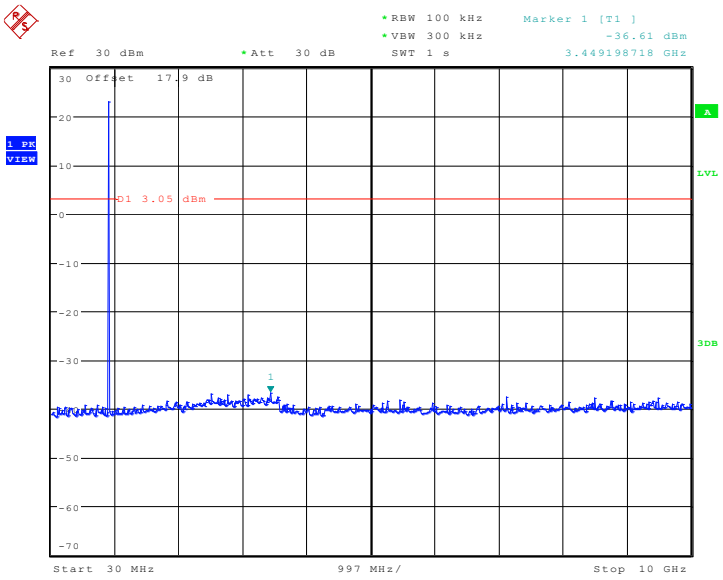
Test Mode :	Mode 2	**Temperature :**	24~26℃
Test Channel :	24	**Relative Humidity :**	50~53%
		Test Engineer :	Alan Liu

Conducted Spurious Emission Plot between 30MHz ~ 10 GHz



Test Mode :	Mode 3	**Temperature :**	24~26℃
Test Channel :	49	**Relative Humidity :**	50~53%
		Test Engineer :	Alan Liu

Conducted Spurious Emission Plot between 30MHz ~ 10 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.

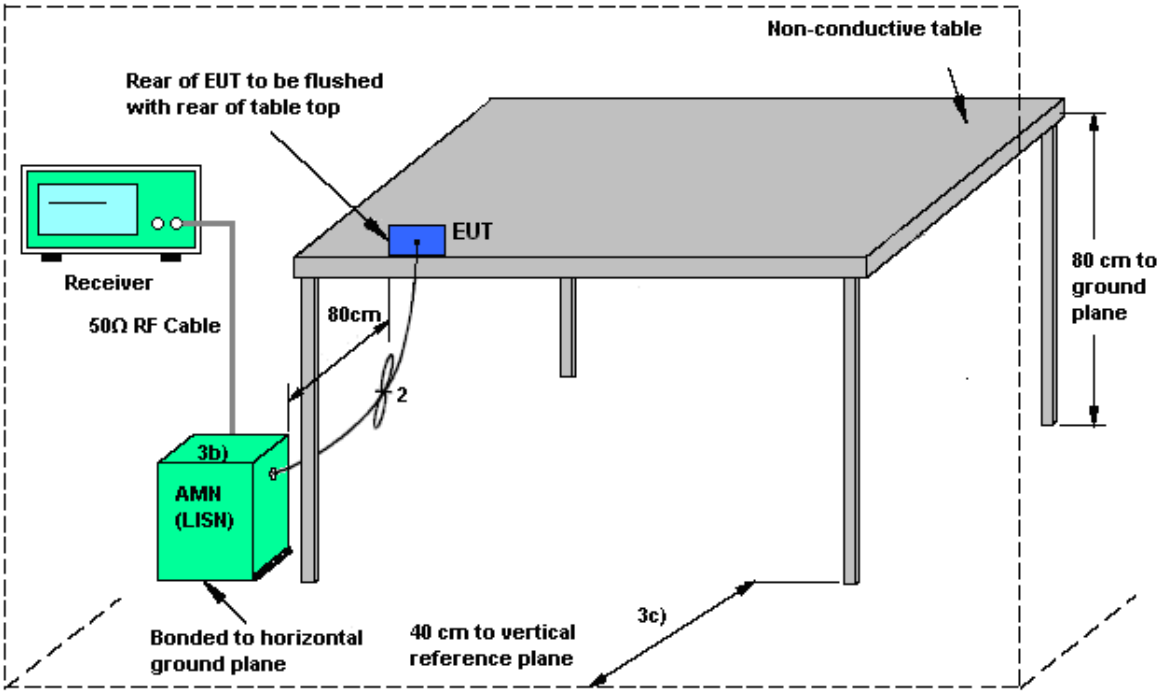
3.8.2 Measuring Instruments

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.

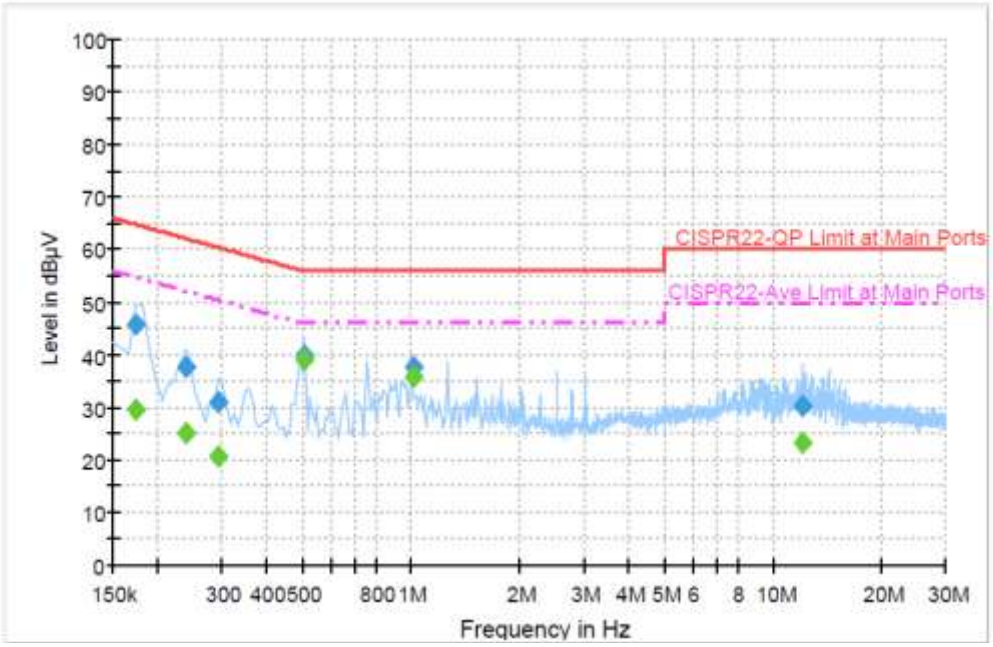
3.8.4 Test Setup



AMN = Artificial mains network (LISN)
AE = Associated equipment
EUT = Equipment under test
ISN = Impedance stabilization network

3.8.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	**Temperature :**	20~22℃
Test Engineer :	Novic Chiang	**Relative Humidity :**	42~44%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	RFID Tx CH24_914.75 MHz		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



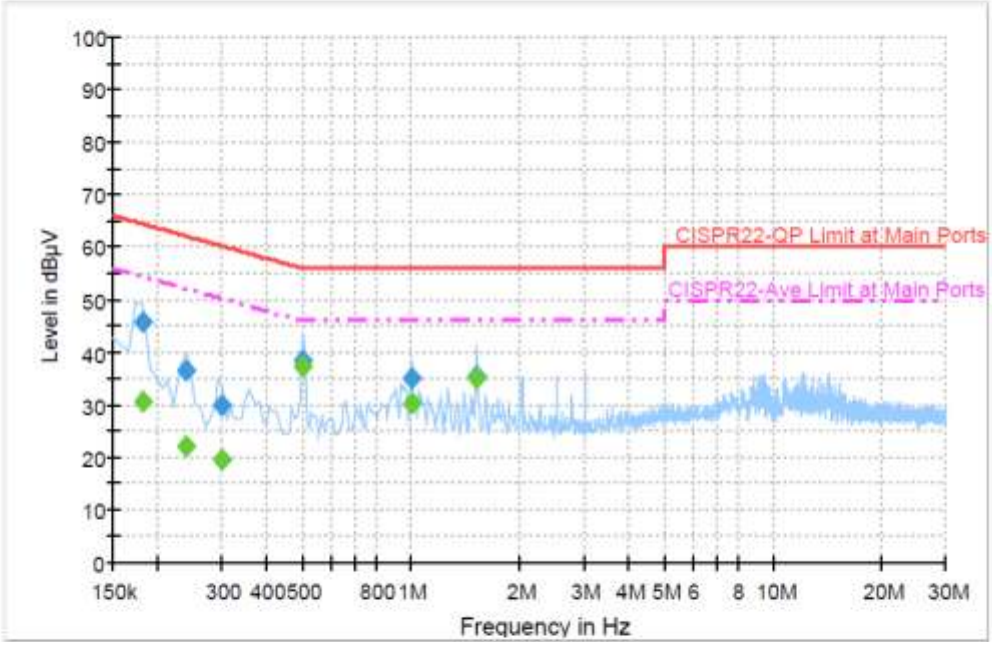
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.174000	45.9	Off	L1	19.3	18.9	64.8
0.238000	37.7	Off	L1	19.4	24.5	62.2
0.294000	31.1	Off	L1	19.3	29.3	60.4
0.510000	39.7	Off	L1	19.3	16.3	56.0
1.014000	37.5	Off	L1	19.4	18.5	56.0
11.998000	30.3	Off	L1	19.7	29.7	60.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.174000	29.6	Off	L1	19.3	25.2	54.8
0.238000	25.0	Off	L1	19.4	27.2	52.2
0.294000	20.7	Off	L1	19.3	29.7	50.4
0.510000	39.0	Off	L1	19.3	7.0	46.0
1.014000	35.9	Off	L1	19.4	10.1	46.0
11.998000	23.3	Off	L1	19.7	26.7	50.0

Test Mode :	Mode 1	Temperature :	20~22℃
Test Engineer :	Novic Chiang	Relative Humidity :	42~44%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	RFID Tx CH24_914.75 MHz		
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)
0.182000	45.7	Off	N	19.4	18.7	64.4
0.238000	36.6	Off	N	19.4	25.6	62.2
0.302000	29.9	Off	N	19.3	30.3	60.2
0.502000	38.5	Off	N	19.3	17.5	56.0
1.006000	35.2	Off	N	19.4	20.8	56.0
1.518000	35.3	Off	N	19.4	20.7	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.182000	30.8	Off	N	19.4	23.6	54.4
0.238000	22.1	Off	N	19.4	30.1	52.2
0.302000	19.7	Off	N	19.3	30.5	50.2
0.502000	37.4	Off	N	19.3	8.6	46.0
1.006000	30.3	Off	N	19.4	15.7	46.0
1.518000	35.2	Off	N	19.4	10.8	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

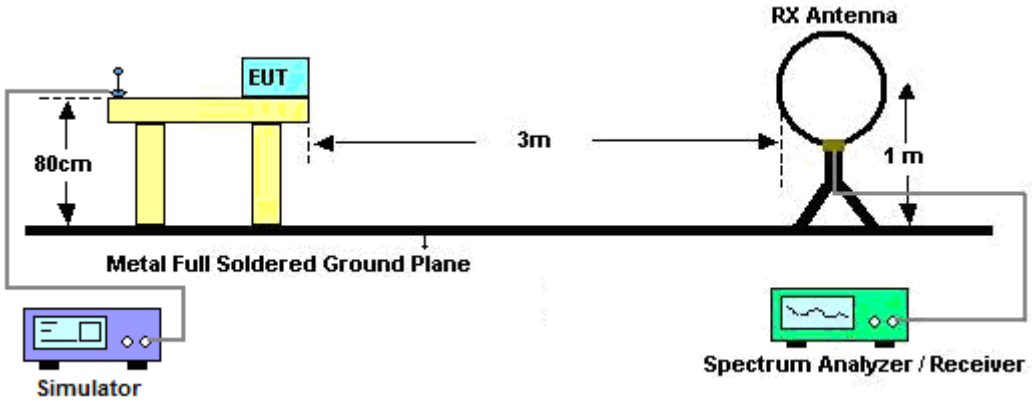
See list of measuring instruments of this test report.

3.9.3 Test Procedures

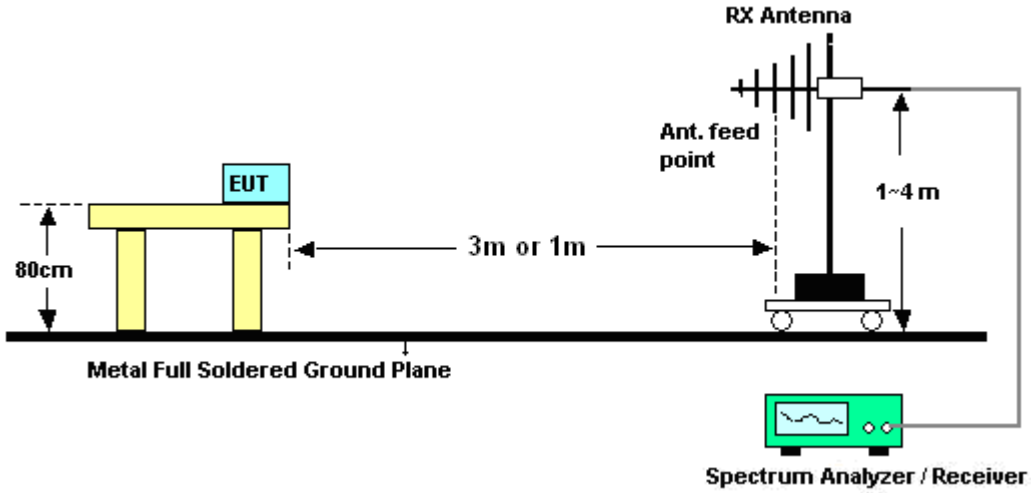
1. The testing follows the guidelines in FCC Public Notice DA 00-705 Measurement Guidelines.
2. Use the following spectrum analyzer settings:
   (1) Span = wide enough to fully capture the emission being measured; RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = 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.

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 :	Cona Huang	Temperature :	22~23°C
		Relative Humidity :	50~54%

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 :**	22~23°C
Test Channel :	00	**Relative Humidity :**	50~54%
Test Engineer :	Cona Huang	**Polarization :**	Horizontal
Remark :	902 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	27.92	-12.08	40	40.54	18.36	0.58	31.56	-	-	Peak
156.09	25.36	-18.14	43.5	45.84	9.88	1.14	31.5	-	-	Peak
265.17	30.47	-15.53	46	48.69	11.81	1.42	31.45	-	-	Peak
304.9	35.51	-10.49	46	52.94	12.29	1.55	31.27	100	124	Peak
420.4	31.36	-14.64	46	45.43	15.23	1.87	31.17	-	-	Peak
902	106.88	-	-	112.84	21.82	2.7	30.48	-	-	Peak
1806	49.92	-36.96	86.88	70.82	29.98	3.84	54.72	100	0	Peak
2708	51.77	-2.23	54	69.86	32.12	4.8	55.01	100	350	Average
2708	53.32	-20.68	74	71.41	32.12	4.8	55.01	100	350	Peak
3609	45.99	-40.89	86.88	63.74	32.37	5.36	55.48	100	0	Peak
5418	45.76	-28.24	74	61.98	34.13	6.84	57.19	100	0	Peak
7221	49.53	-37.35	86.88	63.3	35.22	8.03	57.02	100	0	Peak

Test Mode :	Mode 1	Temperature :	22~23°C
Test Channel :	00	Relative Humidity :	50~54%
Test Engineer :	Cona Huang	Polarization :	Vertical
Remark :	902 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
35.94	31.89	-8.11	40	47.79	15.04	0.58	31.52	100	222	Peak
41.07	31.16	-8.84	40	49.42	12.68	0.58	31.52	-	-	Peak
119.64	28.53	-14.97	43.5	48.17	10.81	1.07	31.52	-	-	Peak
395.9	30.44	-15.56	46	45.15	14.66	1.82	31.19	-	-	Peak
664	34.7	-11.3	46	44.17	18.99	2.3	30.76	-	-	Peak
902	106.68	-	-	112.64	21.82	2.7	30.48	-	-	Peak
1806	45.93	-40.75	86.68	66.83	29.98	3.84	54.72	100	0	Peak
2708	51.59	-2.41	54	69.68	32.12	4.8	55.01	100	166	Average
2708	53.3	-20.7	74	71.37	32.15	4.8	55.02	100	166	Peak
3609	45.09	-41.59	86.68	62.84	32.37	5.36	55.48	100	0	Peak
5418	46.25	-27.75	74	62.47	34.13	6.84	57.19	100	0	Peak

Test Mode :	Mode 2	Temperature :	22~23°C
Test Channel :	24	Relative Humidity :	50~54%
Test Engineer :	Cona Huang	Polarization :	Horizontal
Remark :	914.6 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	27.98	-12.02	40	40.6	18.36	0.58	31.56	-	-	Peak
180.12	28.33	-15.17	43.5	50.07	8.54	1.23	31.51	-	-	Peak
290.82	30.98	-15.02	46	48.75	12.07	1.48	31.32	-	-	Peak
335.7	34.16	-11.84	46	50.74	13.09	1.63	31.3	102	219	Peak
468	33.16	-12.84	46	45.96	16.34	1.98	31.12	-	-	Peak
914.6	108.46	-	-	114.1	22.12	2.7	30.46	-	-	Peak
1828	50.49	-37.97	88.46	71.16	30.2	3.86	54.73	100	0	Peak
2742	52.08	-1.92	54	70.08	32.17	4.85	55.02	101	342	Average
2742	54.72	-19.28	74	72.7	32.2	4.85	55.03	101	342	Peak
3656	48.48	-25.52	74	66.14	32.45	5.4	55.51	100	0	Peak
4570	47.53	-26.47	74	63.9	33.71	6.19	56.27	100	0	Peak
5484	47.93	-40.53	88.46	64.15	34.19	6.88	57.29	100	0	Peak
7312	47.95	-6.05	54	61.68	35.15	8.1	56.98	100	347	Average
7312	50.59	-23.41	74	64.32	35.14	8.1	56.97	100	347	Peak

Test Mode :	Mode 2	Temperature :	22~23°C
Test Channel :	24	Relative Humidity :	50~54%
Test Engineer :	Cona Huang	Polarization :	Vertical
Remark :	914.6 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
35.94	33.12	-6.88	40	49.02	15.04	0.58	31.52	100	163	Peak
42.15	31.53	-8.47	40	50.96	11.53	0.58	31.54	-	-	Peak
97.77	27.78	-15.72	43.5	49.19	9.2	0.95	31.56	-	-	Peak
396.6	29.91	-16.09	46	44.6	14.68	1.82	31.19	-	-	Peak
745.2	34.66	-11.34	46	42.73	19.98	2.51	30.56	-	-	Peak
914.6	108.16	-	-	113.8	22.12	2.7	30.46	-	-	Peak
1828	46.76	-41.4	88.16	67.43	30.2	3.86	54.73	100	0	Peak
2742	52.36	-1.64	54	70.36	32.17	4.85	55.02	100	390	Average
2742	55	-19	74	72.98	32.2	4.85	55.03	100	390	Peak
3656	50.21	-23.79	74	67.87	32.45	5.4	55.51	100	0	Peak

Test Mode :	Mode 3	Temperature :	22~23°C
Test Channel :	49	Relative Humidity :	50~54%
Test Engineer :	Cona Huang	Polarization :	Horizontal
Remark :	927.2 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	28.64	-11.36	40	41.26	18.36	0.58	31.56	-	-	Peak
180.12	28.85	-14.65	43.5	50.59	8.54	1.23	31.51	-	-	Peak
295.95	32.26	-13.74	46	49.88	12.12	1.55	31.29	-	-	Peak
335	35.01	-10.99	46	51.61	13.07	1.63	31.3	100	137	Peak
480.6	32.39	-13.61	46	44.89	16.63	1.98	31.11	-	-	Peak
927.2	108.75	-	-	114	22.41	2.78	30.44	-	-	Peak
1854	53.44	-35.31	88.75	73.98	30.31	3.89	54.74	100	0	Peak
2781	53.47	-0.53	54	71.39	32.25	4.87	55.04	100	342	Average
2781	56.09	-17.91	74	74.01	32.25	4.87	55.04	100	342	Peak
3708	45.46	-8.54	54	63.03	32.53	5.44	55.54	100	348	Average
3708	48.08	-25.92	74	65.65	32.53	5.44	55.54	100	348	Peak
7416	48.49	-5.51	54	62.17	35.07	8.17	56.92	100	166	Average
7416	51.11	-22.89	74	64.8	35.06	8.17	56.92	100	166	Peak

Test Mode :	Mode 3	Temperature :	22~23°C
Test Channel :	49	Relative Humidity :	50~54%
Test Engineer :	Cona Huang	Polarization :	Vertical
Remark :	927.2MHz 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
35.94	33.6	-6.4	40	49.5	15.04	0.58	31.52	100	277	Peak
42.15	31	-9	40	50.43	11.53	0.58	31.54	-	-	Peak
96.15	27.05	-16.45	43.5	48.64	9.01	0.95	31.55	-	-	Peak
384	29.51	-16.49	46	44.6	14.36	1.77	31.22	-	-	Peak
745.2	35.3	-10.7	46	43.37	19.98	2.51	30.56	-	-	Peak
927.2	108.18	-	-	113.43	22.41	2.78	30.44	-	-	Peak
1854	52.26	-35.92	88.18	72.8	30.31	3.89	54.74	100	0	Peak
2781	50.89	-3.11	54	68.81	32.25	4.87	55.04	100	299	Average
2781	53.51	-20.49	74	71.43	32.25	4.87	55.04	100	299	Peak
3708	48.11	-5.89	54	65.68	32.53	5.44	55.54	100	340	Average
3708	50.73	-23.27	74	68.3	32.53	5.44	55.54	100	340	Peak
7416	46.75	-7.25	54	60.43	35.07	8.17	56.92	100	174	Average
7416	49.37	-24.63	74	63.06	35.06	8.17	56.92	100	174	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 Panel Antenna with Reversed SMA 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	FSP30	101329	9kHz~30GHz	Apr. 26, 2010	Apr. 25, 2011	Conducted (TH02-HY)
Power Meter	Anritsu	ML2495A	0932001	N/A	Sep. 13, 2010	Sep. 12, 2011	Conducted (TH02-HY)
Power Sensor	Anritsu	MA2411B	0846202	N/A	Sep. 14, 2010	Sep. 13, 2011	Conducted (TH02-HY)
EMI Test Receive	R&S	ESCS 30	100356	9KHz – 2.75GHz	Aug. 16, 2010	Aug. 15, 2011	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100081	9kHz~30MHz	Nov. 30, 2009	Nov. 29, 2010	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100080	9kHz~30MHz	Nov. 23, 2009	Nov. 22, 2010	Conduction (CO05-HY)
AC Power Source	APC	APC-1000W	N/A	N/A	N/A	N/A	Conduction (CO05-HY)
Spectrum Analyzer	R&S	FSP30	101352	9KHz-40GHz	Nov. 3, 2010	Nov. 2, 2011	Radiation (03CH05-HY)
Amplifier	COM-POWER	PA-103	161069	1KHz - 1GHz	Mar. 29, 2010	Mar. 28, 2011	Radiation (03CH05-HY)
Bilog Antenna	SCHAFFNER	CBL6111C	2725	30MHz ~ 1GHz	Nov. 6, 2010	Nov. 5, 2011	Radiation (03CH05-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15GHz- 40GHz	Oct. 18, 2010	Oct. 17, 2011	Radiation (03CH05-HY)
Pre Amplifier	Agilent	8449B	3008A01917	1GHz- 26.5GHz	Apr. 15, 2010	Apr. 14, 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	00066584	1GHz ~ 18GHz	Aug. 05, 2010	Aug. 04, 2011	Radiation (03CH05-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz~30 MHz	Jul. 29, 2010	Jul. 28, 2011	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 EP070226 as below.