FCC RF Test Report

APPLICANT	:	Razer (Asia-Pacific) Pte Ltd.
EQUIPMENT	:	5.1 Wireless Gaming Headset
BRAND NAME	:	Razer
MODEL NAME	:	RC30-004801
FCC ID	:	WX9RC30004801
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	Digital Transmission System (DTS)

The product was received on Sep. 28, 2010 and completely tested on Jan. 13, 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:

Anderson Chiu

Anderson Chiu / Deputy 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.

TABLE OF CONTENTS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR092811	Rev. 01	Initial issue of report	Jan. 19, 2011
FR092811	Rev. 02	Update the test data of AC Conducted Emission.	Jan. 26, 2011

SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	A8.2(a)	6dB Bandwidth	≥ 0.5MHz	Pass	-
3.1	-	Gen 4.4.1	99% Bandwidth	-	Pass	-
3.2	15.247(b)	A8.4	Output Power Measurement	≤ 30dBm	Pass	-
3.3	15.247(d)	A8.5	Frequency Band Edges	≤ 20dBc	Pass	-
3.4	15.247(d)	A8.5	Spurious Emission	< 20 dBc	Pass	-
3.5	15.247(e)	A8.2(b)	Power Spectral Density	≤ 8dBm	Pass	-
3.6	-	-	Number of Channels	-	-	-
3.7	15.207	Gen 7.2.2	AC Conducted Emission	15.207(a)	Pass	Under limit 11.80 dB at 0.43 MHz
3.8	15.247(d)	A8.5	Transmitter Radiated Emission	15.209(a) & 15.247(d)	Pass	Under limit 10.36 dB at 11574 MHz
3.9	15.203 & 15.247(b)	A8.4	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Razer (Asia-Pacific) Pte Ltd.
514 Chai Chee Lane #07-01~06 Singapore 469029

1.2 Manufacturer

Merry Electronics (Shenzhen) CO., LTD.
No. 50, MeiBao Road, Dalang Street, BaoAn District, Shenzhen City, GuangDong Province, China

1.3 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	5.1 Wireless Gaming Headset
Brand Name	Razer
Model Name	RC30-004801
FCC ID	WX9RC30004801
Tx/Rx Frequency Range	5730 MHz ~ 5844 MHz
Maximum Output Power to Antenna	7.5 dBm (0.006 W)
Antenna Type	PCB Antenna with gain 0 dBi
HW Version	BHC607-HS-L-EAR-RF
SW Version	BACHRX_1216
Type of Modulation	GFSK
EUT Stage	Production Unit

Remark:

1. This test report recorded only product characteristics and test results of Digital Transmission System (DTS).
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	03CH07HY	722060/4086B-1

1.5 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.247
- FCC KDB Publication No. 558074 (Measurement Guidelines of DTS)
- ANSI C63.4-2003
- IC RSS-210 Issue 8

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.	DVD Player	Sony	BDP-S370	FCC DoC	N/A	Unshielded, 1.8 m
2.	Controller	Microsoft	XBOX360 Controller	FCC DoC	Unshielded, 1.8 m	N/A
3.	Decoder	Yamada	AD-201	FCC DoC	N/A	Unshielded, 1.8 m
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 Power

Frequency	RF Power (dBm)	
	Antenna Port	
	0	1
5730 MHz	6.37	7.50
5787 MHz	6.22	6.78
5844 MHz	5.33	6.26

Remark:

1. The Antenna port 1 was used for conducted test due to the highest RF output power.

2. The EUT is programmed to transmit signals continuously for all testing.

2.2 Test Mode

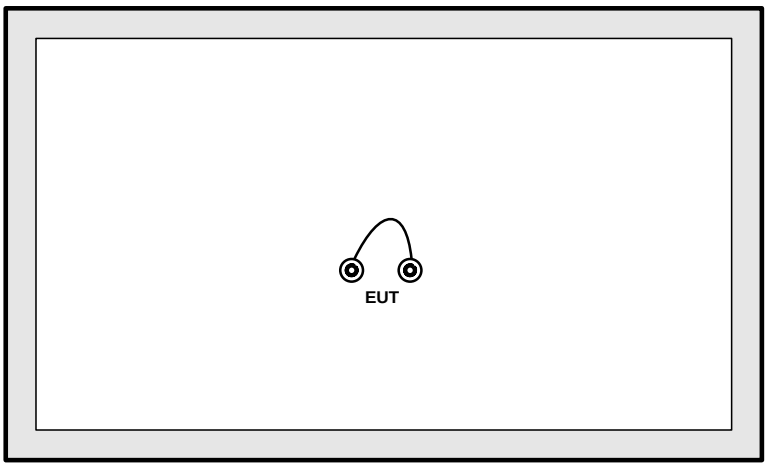
The EUT has been associated with peripherals pursuant to ANSI C63.4-2003 and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conducted emission (150 kHz to 30 MHz), radiated emission (30 MHz to the 10th harmonic 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.

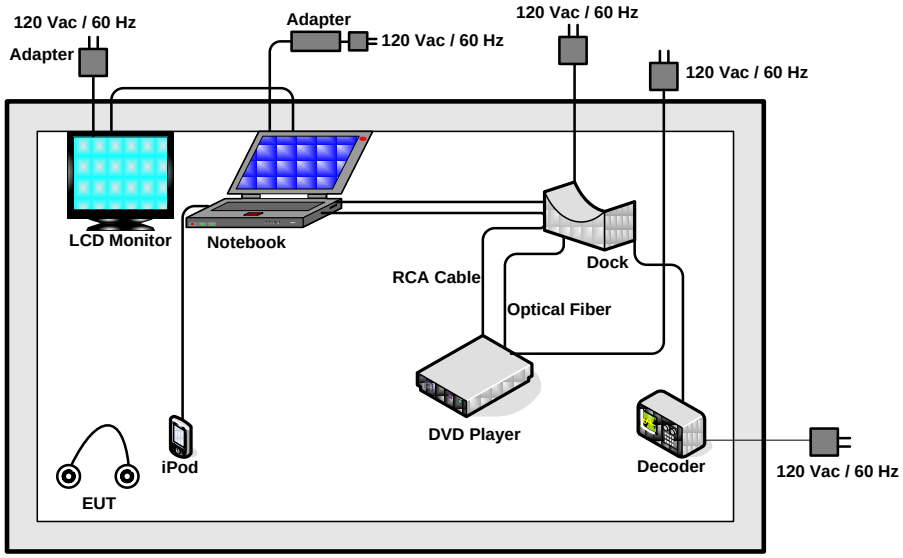
<table>
<tr><th colspan="3">Test Cases</th></tr>
<tr><th>Test Item</th><th colspan="2">GFSK</th></tr>
<tr><td>Conducted TCs</td><td colspan="2">Mode 1: Low Ch_5730 MHz
Mode 2: Mid Ch_5787 MHz
Mode 3: High Ch_5844 MHz</td></tr>
<tr><td>Radiated TCs</td><td>Mode 1: Low Ch_5730 MHz (Ant-0)
Mode 2: Mid Ch_5787 MHz (Ant-0)
Mode 3: High Ch_5844 MHz (Ant-0)</td><td>Mode 4: Mid Ch_5787 MHz (Ant-1)</td></tr>
<tr><td>AC Conducted Emission</td><td colspan="2">Mode 1: Headset Wireless Link (Standalone) + Dock Wireless Link with DVD Player (MP3 Play via RCA Cable) + Adapter + Notebook (Recording) + Decoder
Mode 2: Headset Wireless Link (Standalone) + Dock Wireless Link with DVD Player (MP3 Play via Optical Fiber) + Adapter + Notebook (Recording) + Decoder
Mode 3: Headset Wireless Link with XBOX Controller + Notebook (Recording) + Dock Wireless Link with DVD Player (MP3 Play via RCA Cable) + Adapter + Decoder
Mode 4: Headset Charging from Dock + Adapter + DVD Player + Notebook + Decoder</td></tr>
<tr><td colspan="3">Remark: The worst case of conducted emission is mode 4; only the test data of it was reported.</td></tr>
</table>

2.3 Connection Diagram of Test System

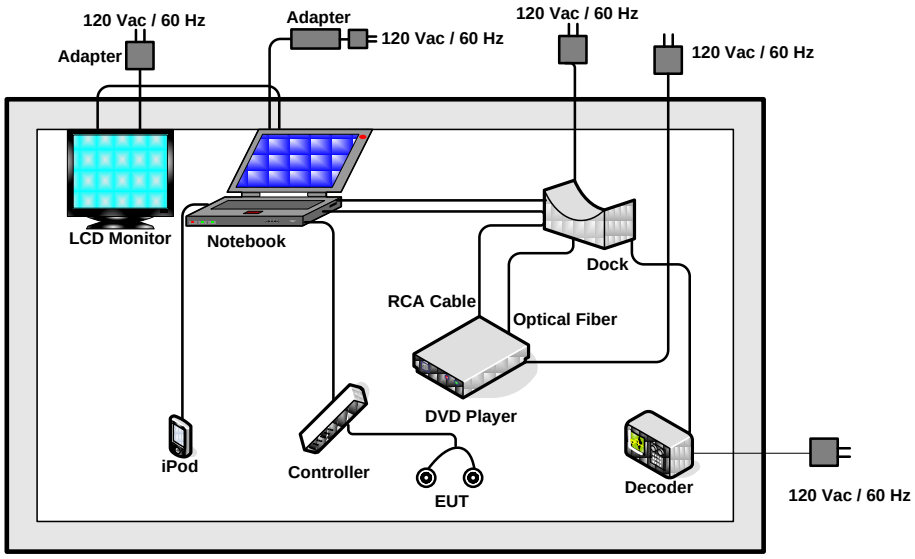
<WLAN Tx Mode>



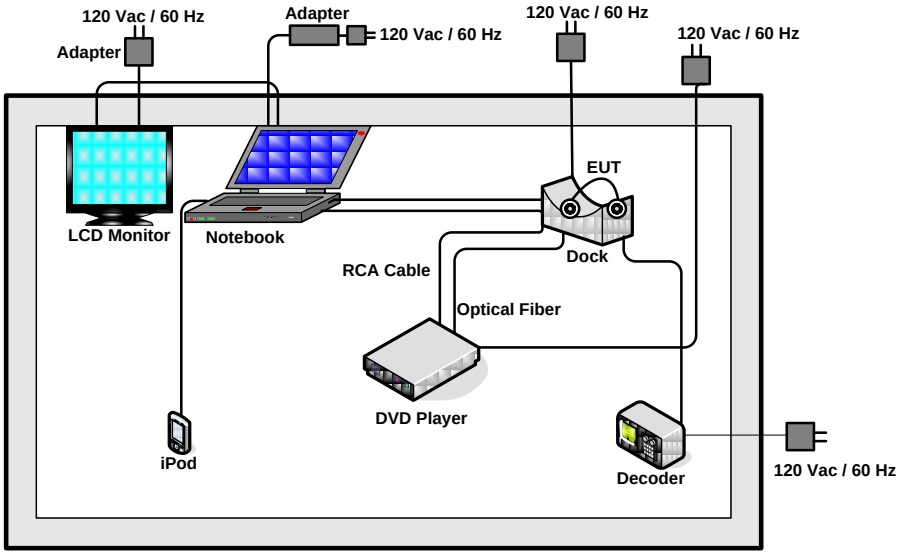
<Headset Standalone Mode>



<Headset with XBOX Controller Mode>



<Headset Charging from Dock Mode>



2.4 RF Utility

The programmed RF utility is to provide channel selection, power level, data rate and the application type. RF utility can send transmitting signal for all testing. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

3 Test Result

3.1 6dB and 99% Bandwidth Measurement

3.1.1 Limit of 6dB Bandwidth

The minimum 6 dB bandwidth shall be at least 500 kHz.

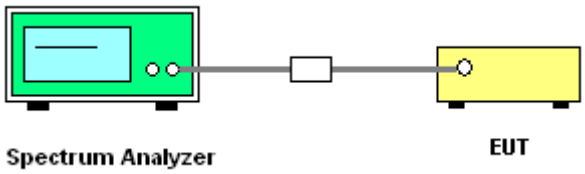
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 (Measurement Guidelines of DTS).
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW. The 6 dB bandwidth must be greater than 500 kHz.
4. The marker-delta reading at this point is the 6 dB bandwidth of the emission.

3.1.4 Test Setup

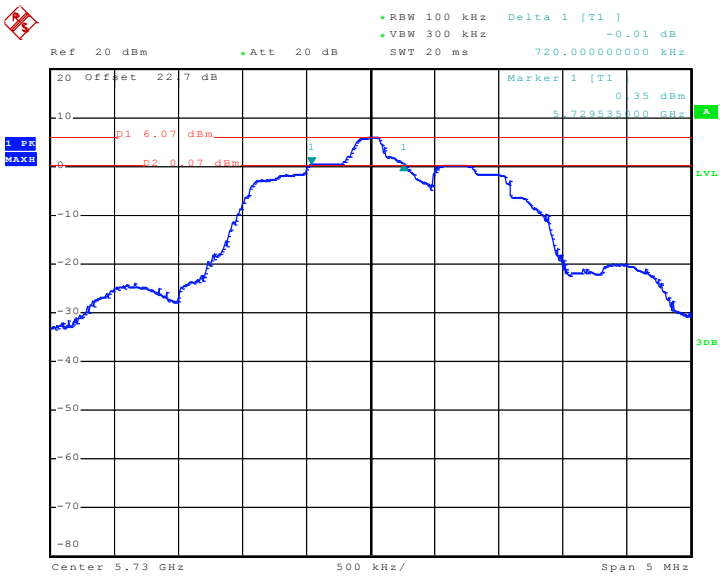


3.1.5 Test Result of 6dB Bandwidth

Test Mode :	Mode 1, 2, 3	Temperature :	23~25℃
Test Engineer :	Hank Yu	Relative Humidity :	47~51%

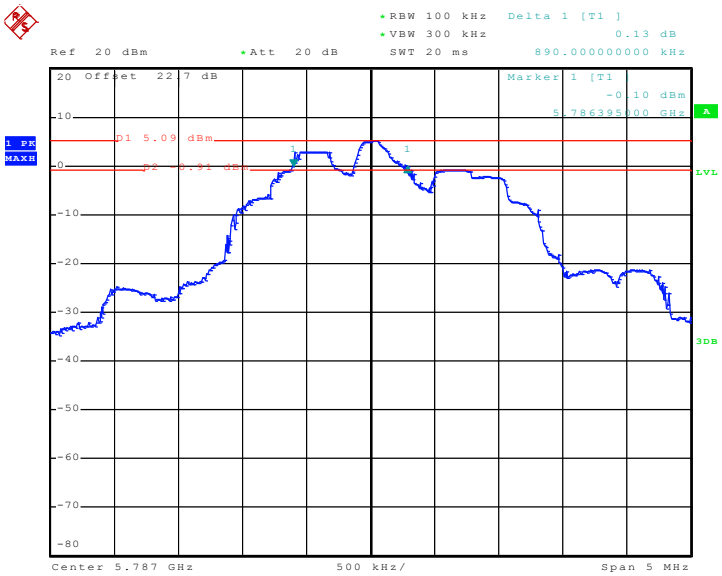
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
Low	5730	0.72	0.5	Pass
Mid	5787	0.89	0.5	Pass
High	5844	0.79	0.5	Pass

Mode 1: 6 dB Bandwidth Plot on Low Channel



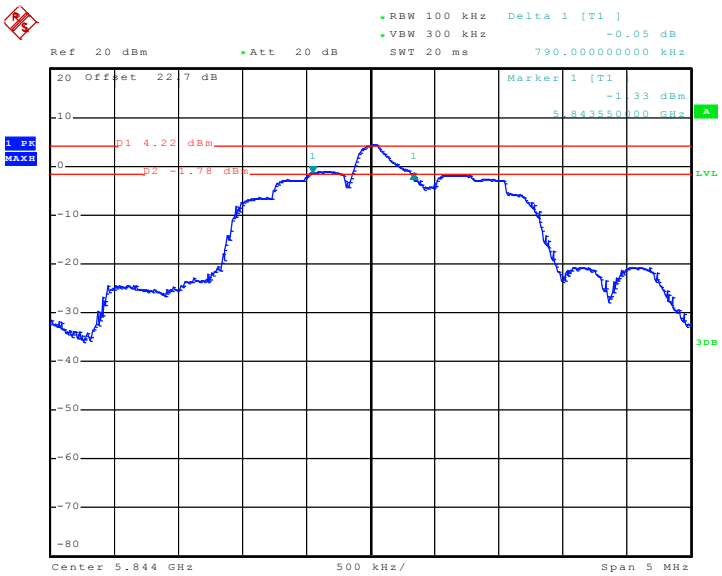
Date: 6.JAN.2011 00:31:22

Mode 2: 6 dB Bandwidth Plot on Mid Channel



Date: 6.JAN.2011 00:33:57

Mode 3: 6 dB Bandwidth Plot on High Channel



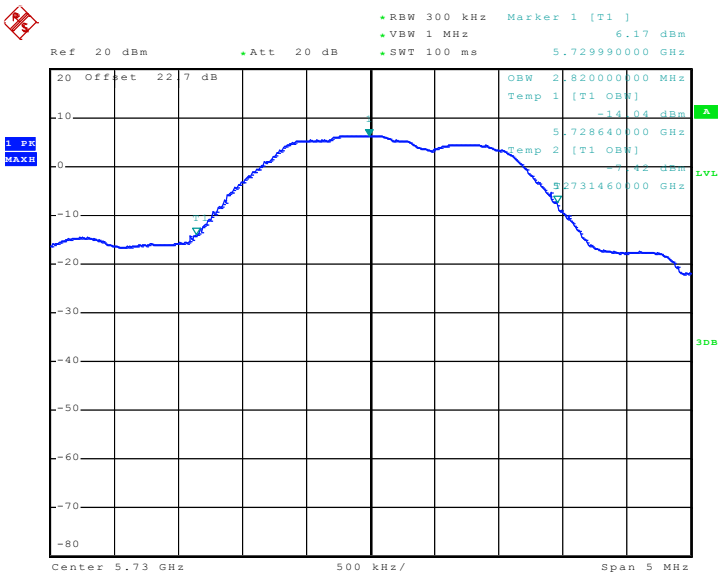
Date: 6.JAN.2011 00:36:02

3.1.6 Test Result of 99% Occupied Bandwidth

Test Mode :	Mode 1, 2, 3	Temperature :	23~25℃
Test Engineer :	Hank Yu	Relative Humidity :	47~51%

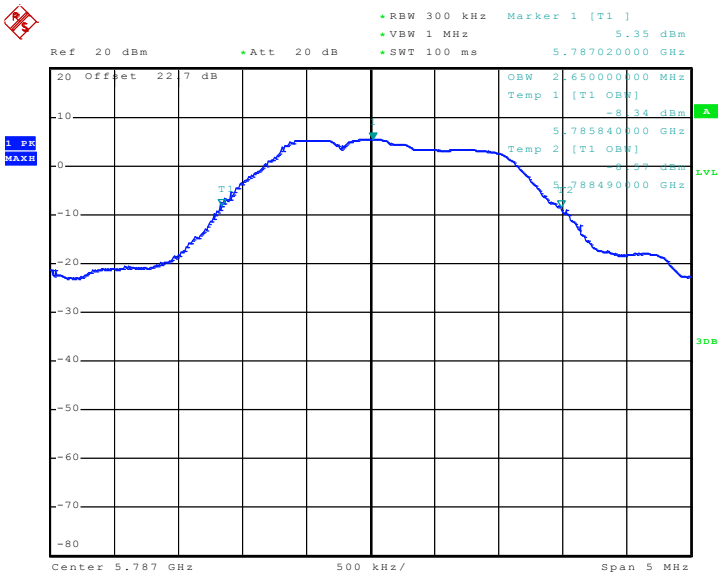
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Pass/Fail
Low	5730	2.82	Pass
Mid	5787	2.65	Pass
High	5844	2.74	Pass

Mode 1: 99% Occupied Bandwidth Plot on Low Channel



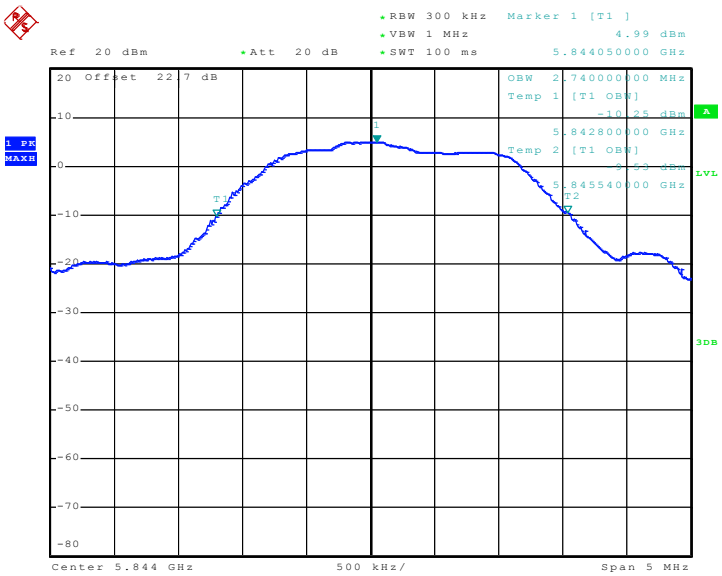
Date: 8.JAN.2011 14:25:58

Mode 2: 99% Occupied Bandwidth Plot on Mid Channel



Date: 8.JAN.2011 14:26:57

Mode 3: 99% Occupied Bandwidth Plot on High Channel



Date: 8.JAN.2011 14:27:48

3.2 Output Power Measurement

3.2.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5MHz and 5725-5850MHz, the limit for peak output power is 30dBm. If transmitting antenna of directional gain greater than 6dBi are used the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

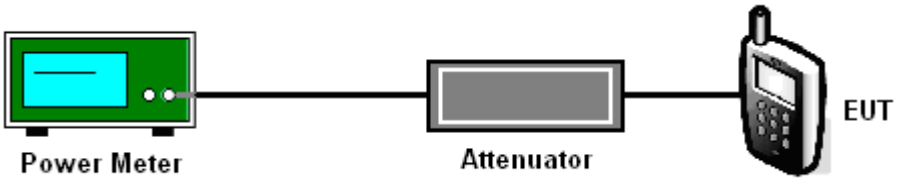
3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 (Measurement Guidelines of DTS).
2. The RF output of EUT was connected to the power meter by a low loss cable.
3. Measure the power by power meter.

3.2.4 Test Setup



3.2.5 Test Result of Output Power

Test Mode :	Mode 1, 2, 3	Temperature :	23~25℃
Test Engineer :	Hank Yu	Relative Humidity :	47~51%

Channel	Frequency (MHz)	Measured Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
Low	5730	7.50	30	Pass
Mid	5787	6.78	30	Pass
High	5844	6.26	30	Pass

3.3 Band Edges Measurement

3.3.1 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. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB.

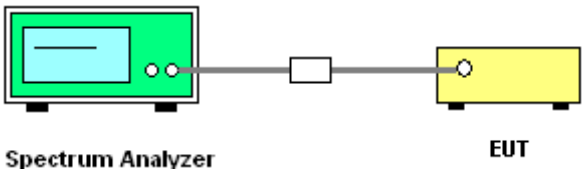
3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

3.3.3 Test Procedures

1. The testing follows the guidelines in ANSI C63.4-2003 and FCC KDB Publication No. 558074 (Measurement Guidelines of DTS).
2. Conducted emission test: Set RBW = 100 kHz, Video bandwidth (VBW) > RBW. Band edge emissions must be at least 20 dB below the highest emission level within the authorized band as measured with a 100 kHz RBW. Note: If the output power of this device was measured by power meter, the attenuation under this paragraph shall be 30 dB instead of 20 dB.
3. Radiated emission test: Apply 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 = 10 Hz, Sweep=Auto. 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 as in FCC Section 15.35(b) and (c).

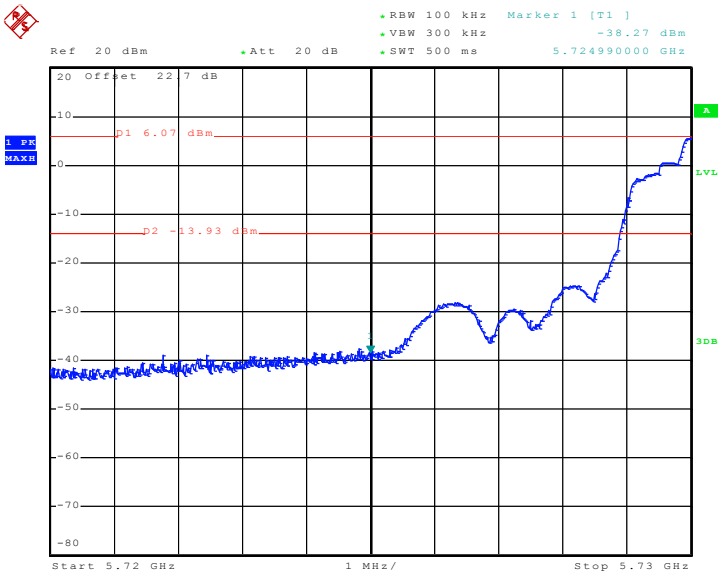
3.3.4 Test Setup



3.3.5 Test Result of Conducted Band Edges

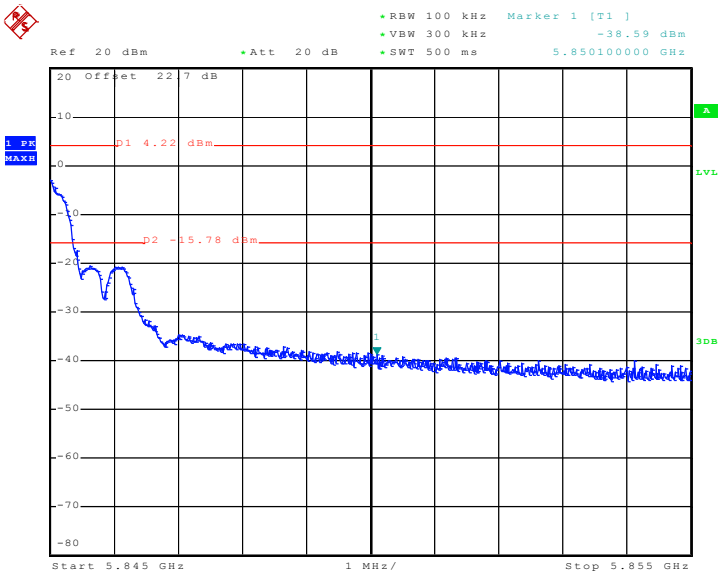
Test Mode :	Mode 1 and 3	**Temperature :**	23~25℃
Test Band :	Low and High	**Relative Humidity :**	47~51%
		Test Engineer :	Hank Yu

Low Band Edge Plot



Date: 6.JAN.2011 00:48:55

High Band Edge Plot



Date: 6.JAN.2011 00:44:55

3.4 Spurious Emission Measurement

3.4.1 Limit of Spurious Emission Measurement

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

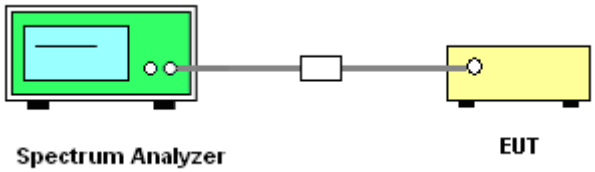
3.4.2 Measuring Instruments

See list of measuring instruments of this test report.

3.4.3 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.

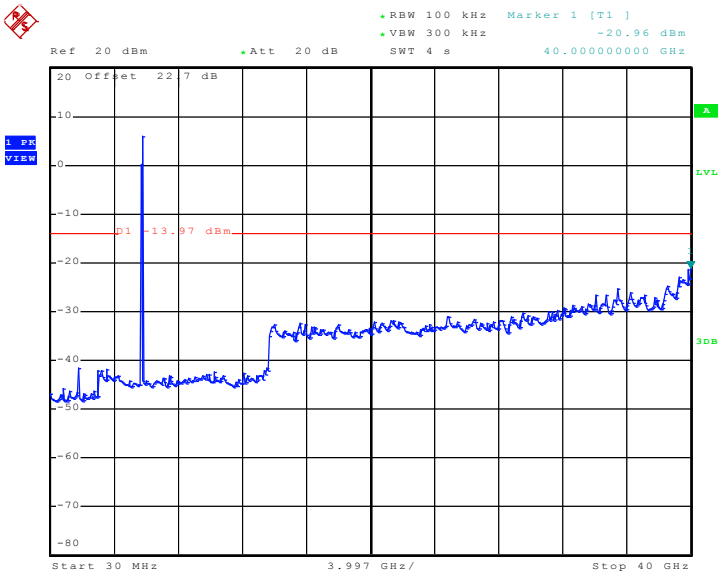
3.4.4 Test Setup



3.4.5 Test Result

Test Mode :	Mode 1	Temperature :	23~25℃
Test Band :	Low	Relative Humidity :	47~51%
Test Engineer :	Hank Yu		

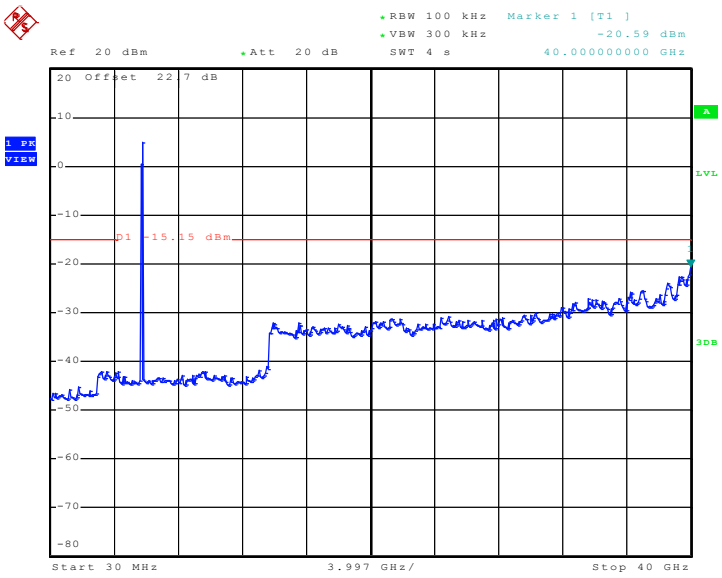
Conducted Spurious Emission Plot between 30MHz ~ 40 GHz



Date: 6.JAN.2011 03:20:11

Test Mode :	Mode 2	Temperature :	23~25℃
Test Channel :	Mid	Relative Humidity :	47~51%
Test Engineer :	Hank Yu		

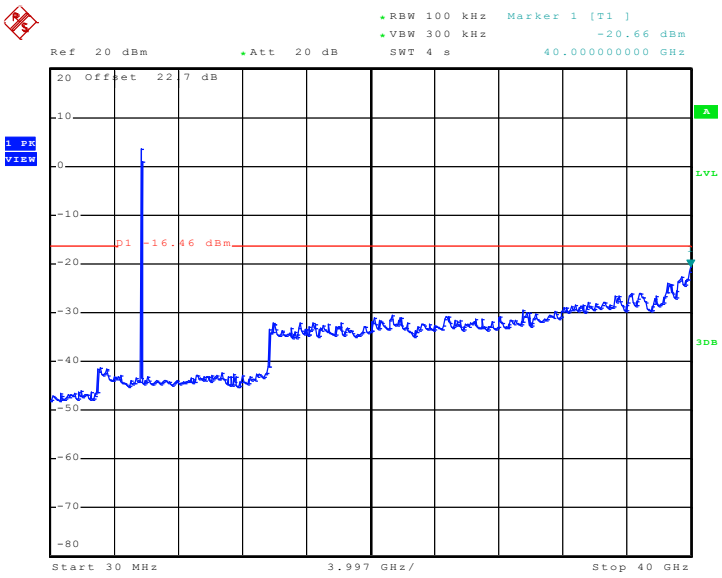
Conducted Spurious Emission Plot between 30MHz ~ 40 GHz



Date: 6.JAN.2011 03:22:33

Test Mode :	Mode 3	Temperature :	23~25℃
Test Channel :	High	Relative Humidity :	47~51%
Test Engineer :	Hank Yu		

Conducted Spurious Emission Plot between 30MHz ~ 40 GHz



Date: 6.JAN.2011 03:24:27

3.5 Power Spectral Density Measurement

3.5.1 Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8dBm in any 3 kHz band at any time interval of continuous transmission.

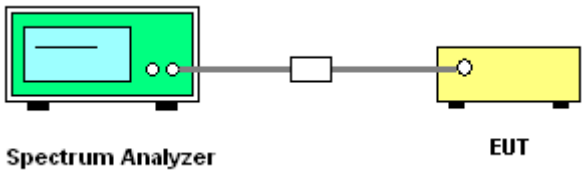
3.5.2 Measuring Instruments

See list of measuring instruments of this test report.

3.5.3 Test Procedures

1. The test follows FCC KDB Publication No. 558074 (Measurement Guidelines of DTS).
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. Take the measured data from spectrum analyzer.

3.5.4 Test Setup

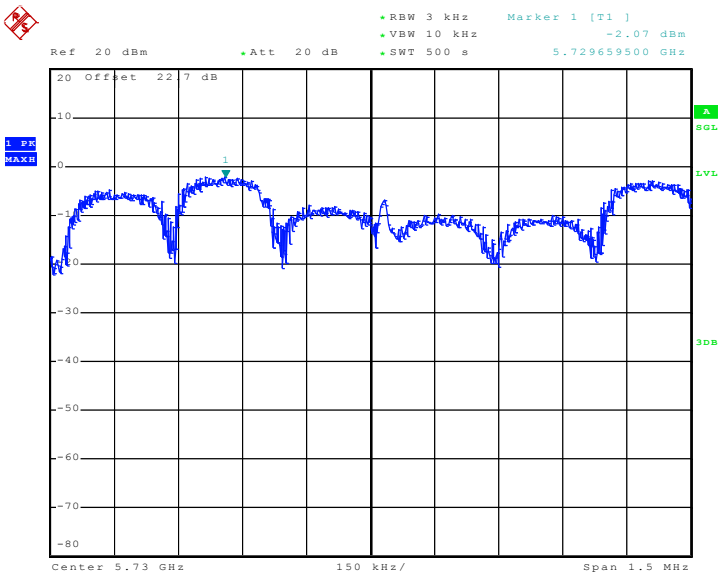


3.5.5 Test Result of Power Spectral Density

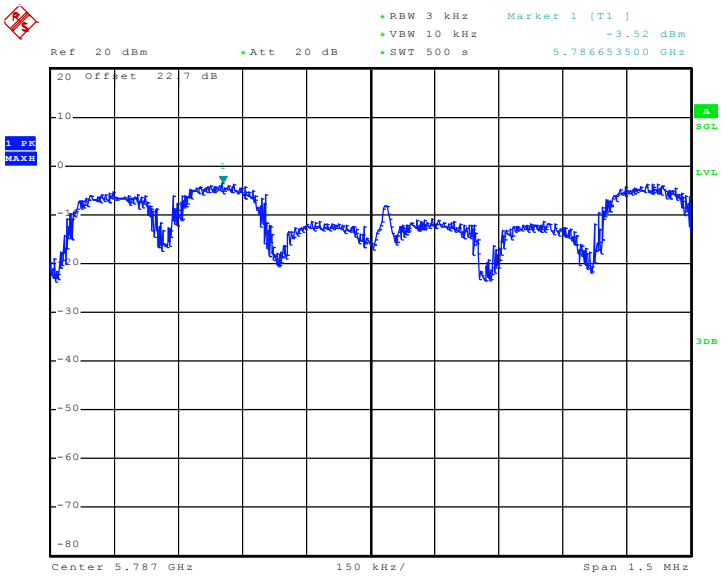
Test Mode :	Mode 1, 2, 3	Temperature :	23~25℃
Test Engineer :	Hank Yu	Relative Humidity :	47~51%

Channel	Frequency (MHz)	Measured PSD (dBm)	Max. Limits (dBm)	Pass/Fail
Low	5730	-2.07	8	Pass
Mid	5787	-3.52	8	Pass
High	5844	-3.70	8	Pass

Mode 1 : PSD Plot on 802.11b Channel 01

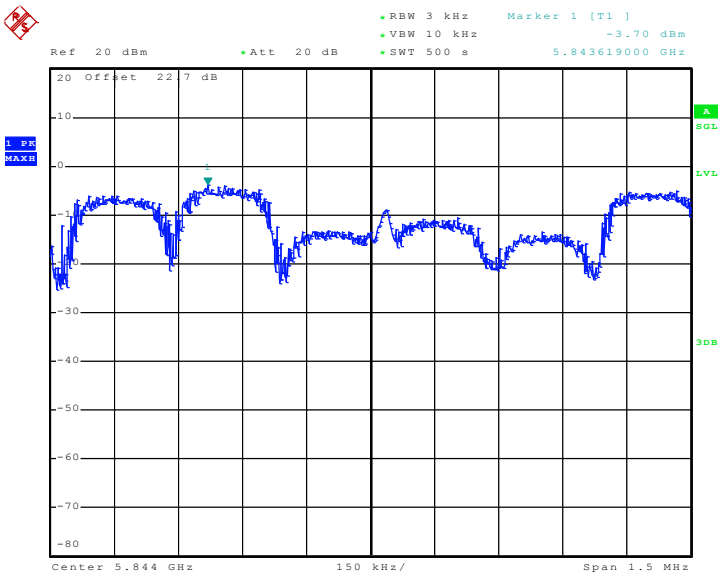


Mode 2 : PSD Plot on Mid Channel



Date: 6.JAN.2011 01:11:45

Mode 3 : PSD Plot on High Channel



Date: 6.JAN.2011 01:21:11

3.6 Number of Channel Measurement

3.6.1 Limits of Number of Hopping Frequency

Since this is a hybrid device, there is no minimum of hopping channels limit.

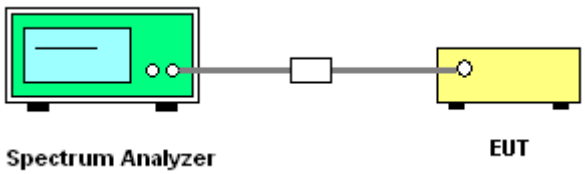
3.6.2 Measuring Instruments

See list of measuring instruments of this test report.

3.6.3 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.

3.6.4 Test Setup

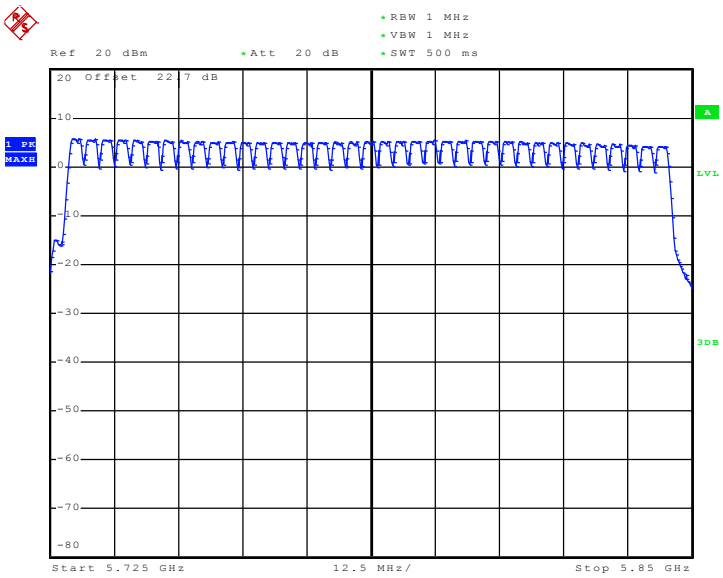


3.6.5 Test Result of Number of Hopping Frequency

Test Mode :	Mode 1, 2, 3	Temperature :	23~25℃
Test Engineer :	Hank Yu	Relative Humidity :	47~51%

Number of Hopping Channels (Channel)	Limits (Channel)
39	N/A

Number of Hopping Channel Plot



Date: 6.JAN.2011 01:38:02

3.7 AC Conducted Emission Measurement

3.7.1 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.

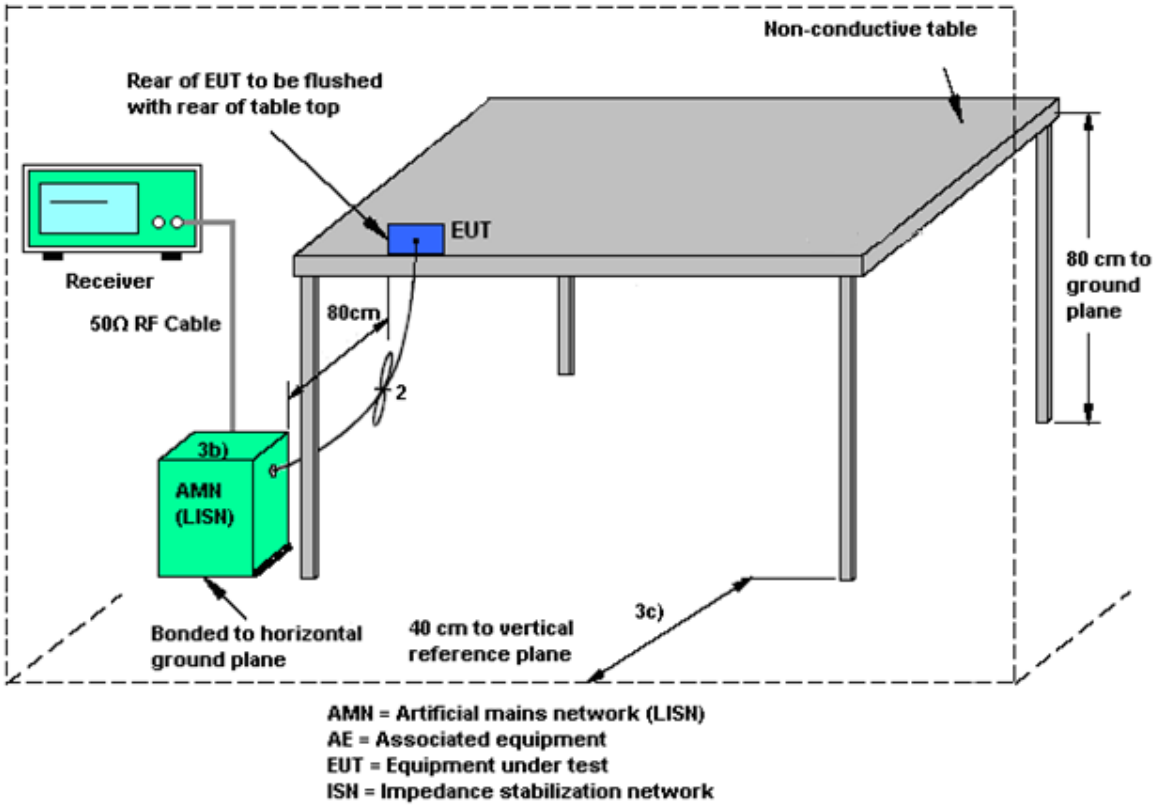
3.7.2 Measuring Instruments

See list of measuring instruments of this test report.

3.7.3 Test Procedures

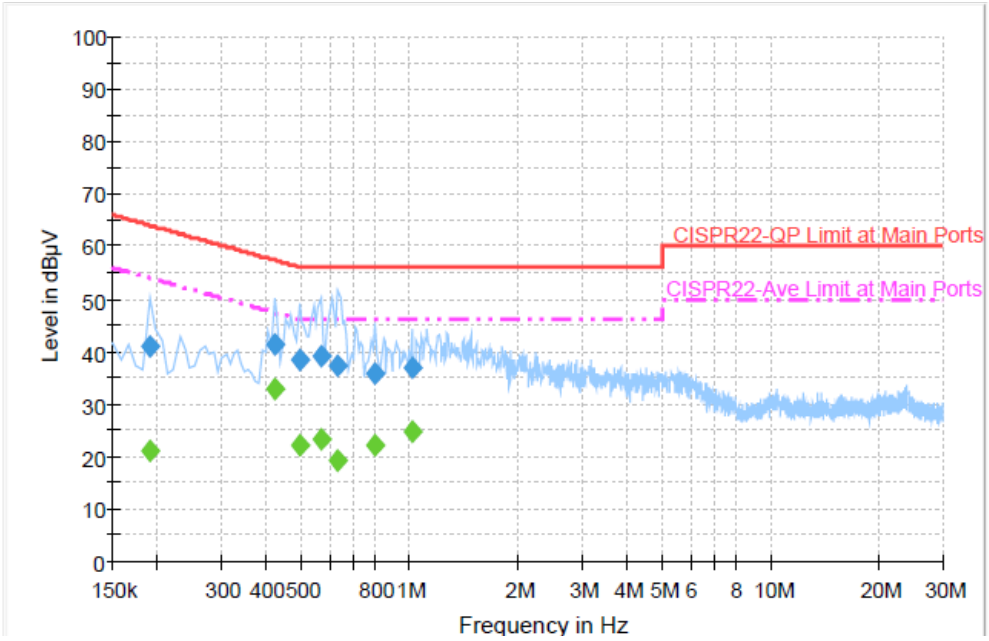
6. The testing follows the guidelines in ANSI C63.4-2003.
7. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
8. Connect EUT to the power mains through a line impedance stabilization network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

3.7.4 Test Setup



3.7.5 Test Result of AC Conducted Emission

Test Mode :	Mode 4	**Temperature :**	20~22℃
Test Engineer :	Cona Huang	**Relative Humidity :**	42~44%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	Headset Charging from Dock + Adapter + DVD Player + Notebook + Decoder		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



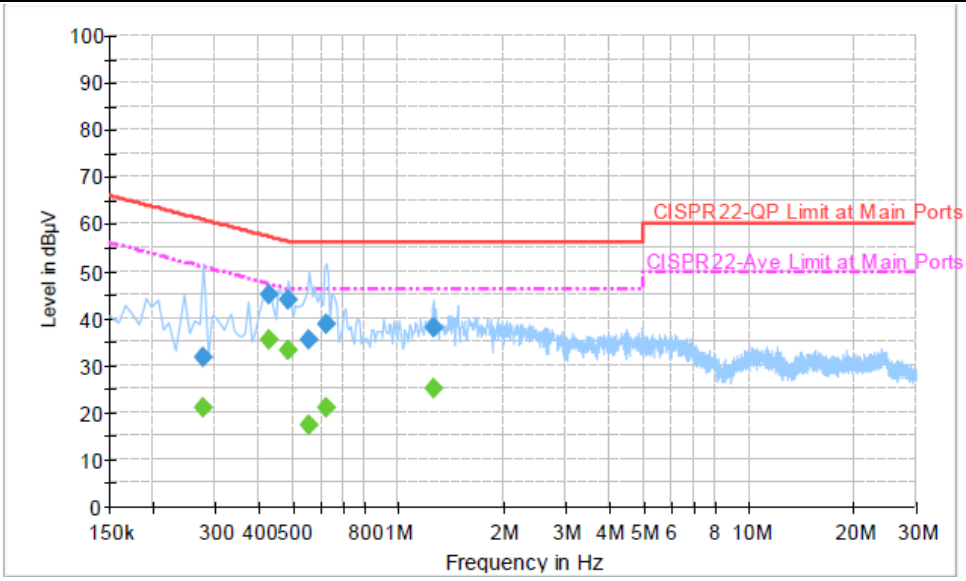
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.190000	41.0	Off	L1	19.4	23.0	64.0
0.422000	41.2	Off	L1	19.4	16.2	57.4
0.494000	38.2	Off	L1	19.3	17.9	56.1
0.566000	39.2	Off	L1	19.3	16.8	56.0
0.630000	37.3	Off	L1	19.4	18.7	56.0
0.798000	35.8	Off	L1	19.4	20.2	56.0
1.014000	37.0	Off	L1	19.4	19.0	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.190000	20.9	Off	L1	19.4	33.1	54.0
0.422000	32.7	Off	L1	19.4	14.7	47.4
0.494000	22.3	Off	L1	19.3	23.8	46.1
0.566000	23.1	Off	L1	19.3	22.9	46.0
0.630000	19.1	Off	L1	19.4	26.9	46.0
0.798000	22.2	Off	L1	19.4	23.8	46.0
1.014000	24.9	Off	L1	19.4	21.1	46.0

Test Mode :	Mode 4	Temperature :	20~22℃
Test Engineer :	Cona Huang	Relative Humidity :	42~44%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	Headset Charging from Dock + Adapter + DVD Player + Notebook + Decoder		
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)
0.278000	31.9	Off	N	19.3	29.0	60.9
0.430000	45.1	Off	N	19.4	12.2	57.3
0.486000	43.8	Off	N	19.4	12.4	56.2
0.558000	35.3	Off	N	19.3	20.7	56.0
0.622000	38.8	Off	N	19.3	17.2	56.0
1.262000	38.0	Off	N	19.5	18.0	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.278000	20.9	Off	N	19.3	30.0	50.9
0.430000	35.5	Off	N	19.4	11.8	47.3
0.486000	33.3	Off	N	19.4	12.9	46.2
0.558000	17.4	Off	N	19.3	28.6	46.0
0.622000	20.9	Off	N	19.3	25.1	46.0
1.262000	25.2	Off	N	19.5	20.8	46.0

3.8 Radiated Emission Measurement

3.8.1 Limit of Radiated Emission

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

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.8.2 Measuring Instruments

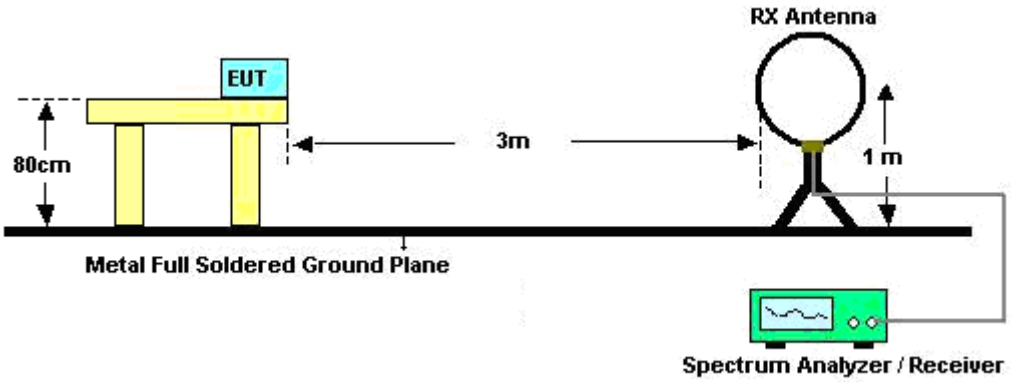
See list of measuring instruments of this test report.

3.8.3 Test Procedures

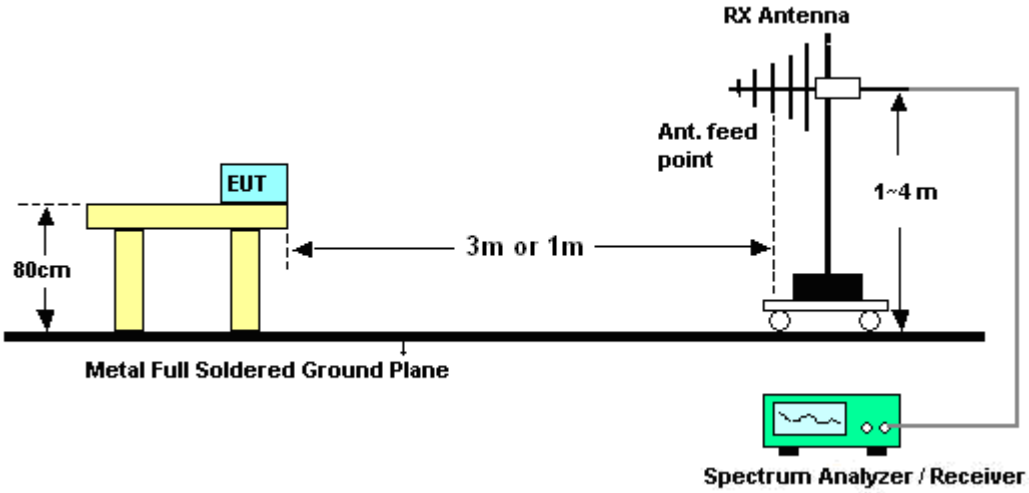
1. The testing follows the guidelines in FCC KDB Publication No. 558074 (Measurement Guidelines of DTS).
2. Use the following spectrum analyzer settings:
   (1) Span = wide enough to fully capture the emission being measured; RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; 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.

3.8.4 Test Setup

For radiated emissions below 30MHz



For radiated emissions above 30MHz



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

Test Engineer :	Jason Wang	Temperature :	21~23℃
		Relative Humidity :	47~51%

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.

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

Test Mode :	Mode 1	**Temperature :**	21~23℃
Test Channel :	Low	**Relative Humidity :**	47~51%
Test Engineer :	Jason Wang	**Polarization :**	Horizontal
Remark :	5730 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
42.69	23.58	-16.42	40	42.85	11.59	0.64	31.5	-	-	Peak
48.9	23.74	-16.26	40	45.51	9.08	0.68	31.53	-	-	Peak
173.1	28.71	-14.79	43.5	49.46	9.53	1.24	31.52	133	120	Peak
302.1	22.33	-23.67	46	38.33	13.55	1.78	31.33	-	-	Peak
346.2	20.57	-25.43	46	35.02	14.9	1.94	31.29	-	-	Peak
783.7	26.44	-19.56	46	31.81	22.21	3.11	30.69	-	-	Peak
5730	105.76	-	-	94.2	34.82	9.92	33.18	100	340	Peak
5730	100.6	-	-	89.04	34.82	9.92	33.18	100	340	Average
11460	52.91	-21.09	74	57.21	38.26	13.15	55.71	100	332	Peak
11460	42.73	-11.27	54	47.03	38.26	13.15	55.71	100	332	Average
17190	59.3	-26.46	85.76	56.69	41.9	14.36	53.65	100	0	Peak

Test Mode :	Mode 1	Temperature :	21~23℃
Test Channel :	Low	Relative Humidity :	47~51%
Test Engineer :	Jason Wang	Polarization :	Vertical
Remark :	5730 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
30.54	20.67	-19.33	40	35.32	16.27	0.54	31.46	-	-	Peak
92.37	22.82	-20.68	43.5	44.48	8.9	0.96	31.52	-	-	Peak
101.82	24.92	-18.58	43.5	45.5	9.96	1	31.54	141	216	Peak
346.2	23.16	-22.84	46	37.61	14.9	1.94	31.29	-	-	Peak
596.1	21.34	-24.66	46	29.87	19.71	2.68	30.92	-	-	Peak
841.8	24.32	-21.68	46	28.84	22.95	3.25	30.72	-	-	Peak
5730	104.36	-	-	92.8	34.82	9.92	33.18	100	38	Peak
5730	99.26	-	-	87.7	34.82	9.92	33.18	100	38	Average
11460	55.81	-18.19	74	60.1	38.27	13.15	55.71	101	326	Peak
11460	42.78	-11.22	54	47.08	38.26	13.15	55.71	101	326	Average
17190	57.07	-27.29	84.36	54.41	41.92	14.36	53.62	100	0	Peak

Test Mode :	Mode 2	Temperature :	21~23℃
Test Channel :	Mid	Relative Humidity :	47~51%
Test Engineer :	Jason Wang	Polarization :	Horizontal
Remark :	5787 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
52.14	28.38	-11.62	40	51.45	7.76	0.71	31.54	117	98	Peak
103.17	30.03	-13.47	43.5	50.52	10.04	1.01	31.54	-	-	Peak
173.1	28.89	-14.61	43.5	49.64	9.53	1.24	31.52	-	-	Peak
346.2	20.2	-25.8	46	34.65	14.9	1.94	31.29	-	-	Peak
419	20.9	-25.1	46	32.96	16.88	2.21	31.15	-	-	Peak
783.7	25.79	-20.21	46	31.16	22.21	3.11	30.69	-	-	Peak
5787	101.07	-	-	89.51	34.89	9.9	33.23	134	343	Average
5787	106.5	-	-	94.98	34.89	9.89	33.26	134	343	Peak
11574	50.83	-23.17	74	54.77	38.38	13.18	55.5	100	0	Peak
17361	58.63	-27.87	86.5	56.34	41.75	14.42	53.88	100	0	Peak

Test Mode :	Mode 2	Temperature :	21~23℃
Test Channel :	Mid	Relative Humidity :	47~51%
Test Engineer :	Jason Wang	Polarization :	Vertical
Remark :	5787 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	19.64	-20.36	40	34.06	16.51	0.53	31.46	-	-	Peak
42.69	20.73	-19.27	40	40	11.59	0.64	31.5	100	351	Peak
101.82	23.16	-20.34	43.5	43.74	9.96	1	31.54	-	-	Peak
346.2	23.02	-22.98	46	37.47	14.9	1.94	31.29	-	-	Peak
494.6	19.72	-26.28	46	30.23	18.13	2.43	31.07	-	-	Peak
785.8	24.68	-21.32	46	30.01	22.24	3.12	30.69	-	-	Peak
5787	103.74	-	-	92.22	34.89	9.89	33.26	100	48	Peak
5787	98.39	-	-	86.83	34.89	9.9	33.23	100	48	Average
11574	53.51	-20.49	74	57.45	38.38	13.18	55.5	106	316	Peak
11574	43.64	-10.36	54	47.58	38.38	13.18	55.5	106	316	Average

Test Mode :	Mode 3	Temperature :	21~23℃
Test Channel :	High	Relative Humidity :	47~51%
Test Engineer :	Jason Wang	Polarization :	Horizontal
Remark :	5844 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
42.69	22.99	-17.01	40	42.26	11.59	0.64	31.5	-	-	Peak
48.9	23.4	-16.6	40	45.17	9.08	0.68	31.53	-	-	Peak
42.69	22.99	-17.01	40	42.26	11.59	0.64	31.5	-	-	Peak
48.9	23.4	-16.6	40	45.17	9.08	0.68	31.53	-	-	Peak
173.1	28.67	-14.83	43.5	49.42	9.53	1.24	31.52	147	269	Peak
419	20.34	-25.66	46	32.4	16.88	2.21	31.15	-	-	Peak
593.3	22.53	-23.47	46	31.12	19.67	2.67	30.93	-	-	Peak
783.7	27	-19	46	32.37	22.21	3.11	30.69	-	-	Peak
5844	104.34	-	-	92.85	34.94	9.87	33.32	164	343	Peak
5844	98.88	-	-	87.39	34.94	9.87	33.32	164	343	Average
17532	58.09	-26.25	84.34	56.12	41.61	14.48	54.12	100	0	Peak

Test Mode :	Mode 3	Temperature :	21~23℃
Test Channel :	High	Relative Humidity :	47~51%
Test Engineer :	Jason Wang	Polarization :	Vertical
Remark :	5844 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
51.06	20.63	-19.37	40	43.44	8.02	0.71	31.54			Peak
101.82	24.17	-19.33	43.5	44.75	9.96	1	31.54			Peak
246.81	27.53	-18.47	46	44.95	12.46	1.53	31.41	117	315	Peak
340.6	24.27	-21.73	46	38.96	14.72	1.89	31.3			Peak
579.3	21.44	-24.56	46	30.32	19.44	2.63	30.95			Peak
884.5	25.33	-20.67	46	29.27	23.45	3.32	30.71			Peak
5844	102.92	-	-	91.43	34.94	9.87	33.32	200	31	Peak
5844	97.43	-	-	85.94	34.94	9.87	33.32	200	31	Average
11688	50.59	-23.41	74	53.93	38.53	13.23	55.1	100	0	Peak

Test Mode :	Mode 4	Temperature :	21~23℃
Test Channel :	Mid	Relative Humidity :	47~51%
Test Engineer :	Jason Wang	Polarization :	Horizontal
Remark :	5787 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
42.69	24.39	-15.61	40	43.66	11.59	0.64	31.5	-	-	Peak
48.9	25.72	-14.28	40	47.49	9.08	0.68	31.53	125	214	Peak
173.1	28.76	-14.74	43.5	49.51	9.53	1.24	31.52	-	-	Peak
416.9	20.28	-25.72	46	32.38	16.85	2.2	31.15	-	-	Peak
581.4	22.92	-23.08	46	31.75	19.47	2.64	30.94	-	-	Peak
783.7	26.49	-19.51	46	31.86	22.21	3.11	30.69	-	-	Peak
5787	100.95	-	-	89.39	34.89	9.9	33.23	200	276	Average
5787	106.32	-	-	94.8	34.89	9.89	33.26	200	276	Peak
17361	57.6	-28.72	86.32	55.31	41.75	14.42	53.88	100	0	Peak

Test Mode :	Mode 4	Temperature :	21~23℃
Test Channel :	Mid	Relative Humidity :	47~51%
Test Engineer :	Jason Wang	Polarization :	Vertical
Remark :	5787 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
42.69	21.59	-18.41	40	40.86	11.59	0.64	31.5	-	-	Peak
102.09	32.14	-11.36	43.5	52.72	9.96	1	31.54	138	96	Peak
121.26	24.81	-18.69	43.5	43.72	11.54	1.11	31.56	-	-	Peak
346.2	23.63	-22.37	46	38.08	14.9	1.94	31.29	-	-	Peak
582.1	20.88	-25.12	46	29.69	19.49	2.64	30.94	-	-	Peak
783.7	24.6	-21.4	46	29.97	22.21	3.11	30.69	-	-	Peak
5787	99.12	-	-	87.56	34.89	9.9	33.23	110	21	Average
5787	104.52	-	-	93	34.89	9.89	33.26	110	21	Peak
11574	52.1	-21.9	74	56.04	38.38	13.18	55.5	121	174	Peak
11574	41.93	-12.07	54	45.87	38.38	13.18	55.5	121	174	Average

3.9 Antenna Requirements

3.9.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the FCC rule.

3.9.2 Antenna Connected Construction

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

3.9.3 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	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)
Bilog Antenna	SCHAFFNER	CBL6111C	2726	30MHz ~ 1GHz	Oct. 31, 2010	Oct. 30, 2011	Radiation (03CH07-HY)
Spectrum Analyzer	R&S	FSP	101067	9KHz ~ 30GHz	Dec. 03, 2010	Dec. 02, 2011	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Aug. 19, 2010	Aug. 18, 2011	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15GHz- 40GHz	Oct. 18, 2010	Oct. 17, 2011	Radiation (03CH07-HY)
Pre Amplifier	Agilent	8449B	3008A02362	1GHz~ 26.5GHz	Dec. 06, 2010	Dec. 05, 2011	Radiation (03CH07-HY)
Pre Amplifier	COM-POWER	PA-103A	161241	10-1000MHz.32 dB.GAIN	Mar. 27, 2010	Mar. 26, 2011	Radiation (03CH07-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz~30 MHz	Jul. 29, 2010	Jul. 28, 2011	Radiation (03CH07-HY)

5 Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150kHz ~ 30MHz)

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 (30MHz ~ 1000MHz)

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 (1GHz ~ 40GHz)

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 EP092811 as below.