

EMC TEST REPORT

No. SH10070489-002

Applicant : China Hualu Group Co., Ltd.
No.1 Hua Road Qixianling Hi-tech Zone, Dalian, China

Manufacturer : China Hualu Group Co., Ltd.
No.1 Hua Road Qixianling Hi-tech Zone, Dalian, China

Product Name : Blu-ray Disc Player

Type/Model : MVBD2535GPH

SUMMARY

The equipment complies with the requirements according to the following standard(s):

47CFR Part 15 (2009): Radio Frequency Devices

ANSIC63.4 (2003): American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

RSS-210 Issue 7 (June 2007): Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment

RSS-Gen Issue 2 (June 2007): General Requirements and Information for the Certification of Radiocommunication Equipment

Date of issue: Aug 21, 2010

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FCC ID: YLZ-C2
IC: 9088A-C2

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FCC ID: YLZ-C2
IC: 9088A-C2

1. General Information

1.1 Applicant Information

Applicant:	China Hualu Group Co., Ltd. No.1 Hua Road Qixianling Hi-tech Zone, Dalian, China	
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Manufacturer:	China Hualu Group Co., Ltd. No.1 Hua Road Qixianling Hi-tech Zone, Dalian, China	
Sample received date	:	July 5, 2010
Sample Identification No	:	*0100705-05-002*
Date of test	:	July 5, 2010 ~ Aug 1, 2010

1.2 Identification of the EUT

Equipment:	Blu-ray Disc Player
Type/model:	MVBD2535GPH
FCC ID:	YLZ-C2
IC:	9088A-C2



1.3 Technical specification

Operation Frequency Band: 2412 - 2462 MHz

Modulation: DBPSK @1Mbps
DQPSK@2Mbp
CCK@5.5/11Mbps
BPSK@6/9 Mbps
QPSK@12/18Mbps
16-QAM@24Mbps
64-QAM@48/54Mpb and above

Description of EUT: Here is one model only.
The EUT supports wireless network of 802.11b/g/n (2.4 GHz band only). The wireless network properties have been saved in the unit's memory for use. The user can visit default web site (set by the manufactory) by the wireless network.
The wireless module inserted in the EUT contains of two chains, namely chain 0 and chain 1. The 802.11n supports both single and dual chain modes.

Antenna Designation: Integral, PCB Antenna

Gain of Antenna: 2.0dBi max.

Rating: 120V~, 60Hz, 25W

Signal terminal: USB, Ethernet, HDMI, Audio out, Video out, Coaxial, Optical

Channel Description:

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

1.4 Mode of operation during the test / Test peripherals used

Within this test report, EUT was tested under 120V/60Hz. The EUT has transmitting as well as receiving condition, so both were assessed.

While testing transmitting mode of EUT, the internal modulation was used.

While testing receiving mode of EUT, the signal generator was employed to generate 2.4GHz continuous answer signal.

During test, the maximum power level for 802.11b/g/n was set as “10” indicated in software offered by the manufactory.

Test peripherals used:

Item No	Description	Band and Model	S/No
1	Laptop computer	FUJITSU SIMENS, LIFEBOOK	NA
2	iPod	Apple, A1199	7J707T9QVQS
3	TV	KONKA, F5428D4	NA

The lowest, middle and highest channel were tested as representatives.

For 802.11b----- lowest, 2412MHz; middle, 2437MHz; highest, 2462MHz.

For 802.11g----- lowest, 2412MHz; middle, 2437MHz; highest, 2462MHz.

For 802.11n HT20 ----- lowest, 2412MHz; middle, 2437MHz; highest, 2462MHz.

For 802.11n HT40 ----- lowest, 2422MHz; middle, 2437MHz; highest, 2452MHz.



All the transmission rate were listed here:

802.11g	Data rate (Mbps)	802.11b	Data rate (Mbps)	802.11n HT20 1X	Data rate (Mbps)	802.11n HT20 2X	Data rate (Mbps)
MCS0	6	MCS0	1	MCS0	6.5	MCS8	13
MCS1	9	MCS1	2	MCS1	13	MCS9	26
MCS2	12	MCS2	5.5	MCS2	19.5	MCS10	39
MCS3	18	MCS3	11	MCS3	26	MCS11	52
MCS4	24	-	-	MCS4	39	MCS12	78
MCS5	36	-	-	MCS5	52	MCS13	104
MCS6	48	-	-	MCS6	58.5	MCS14	117
MCS7	54	-	-	MCS7	65	MCS15	130
802.11n HT40 1X	Data rate (Mbps)	802.11n HT40 2X	Data rate (Mbps)				
MCS0	15	MCS8	30				
MCS1	30	MCS9	60				
MCS2	45	MCS10	90				
MCS3	60	MCS11	120				
MCS4	90	MCS12	180				
MCS5	120	MCS13	240				
MCS6	135	MCS14	270				
MCS7	150	MCS15	300				

2. Test Specification

2.1 Instrument list

Equipment	Type	Manu.	Internal no.	Cal. Date	Due date
Test Receiver	ESIB 26	R&S	EC 3045	2010-6-1	2011-5-31
Semi-anechoic chamber	-	Albatross project	EC 3048	2010-6-1	2011-5-31
A.M.N.	ESH2-Z5	R&S	EC 3119	2010-1-23	2011-1-22
A.M.N.	ENV 216	R&S	EC 3394	2009-10-19	2010-10-18
Test Receiver	ESCS 30	R&S	EC 2107	2010-1-23	2011-1-22
Ultra-broadband Antenna	CBL 6112D	TESEQ	EC 4206	2010-5-30	2011-6-1
Horn Antenna	HF 906	R&S	EC 3049	2010-6-30	2011-6-29
Pre-amplifier	Pre-amp 18	R&S	EC 3222	2010-6-30	2011-6-29
Power meter	PM2002	AR	EC3043-7	2010-1-23	2011-1-22
Power sensor	PH2000	AR	EC3043-8	2010-1-23	2011-1-22
Signal generator	SMR 20	R&S	EC 3044-1	2009-8-21	2010-8-20
Spectrum Analyzer	E7402A	Agilent	EC2254	2009-9-17	2010-9-16
High Pass Filter	WHKX 1.0/15G-10SS	Wainwright	EC4297-1	2010-2-8	2011-2-7
High Pass Filter	WHKX 2.8/18G-12SS	Wainwright	EC4297-2	2010-2-8	2011-2-7
High Pass Filter	WHKX 7.0/1.8G-8SS	Wainwright	EC4297-3	2010-2-8	2011-2-7
Band Reject Filter	WRCGV 2400/2483-2390/2493-35/10SS	Wainwright	EC4297-4	2010-2-8	2011-2-7

2.2 Test Standard

47CFR Part 15 (2009)
ANSI C63.4: 2003
RSS-210 Issue 7 (June 2007)
RSS-Gen Issue 2 (June 2007)

2.3 Test Summary

This report applies to tested sample only. This report shall not be reproduced in part without written approval of Intertek Testing Service Shanghai Limited.

TEST ITEM	FCC REFERENCE	IC REFERENCE	RESULT
Minimum 6dB Bandwidth	15.247(a)(2)	RSS-210 Issue 7 Annex 8	Pass
Maximum peak output power	15.247(b)(1)	RSS-210 Issue 7 Annex 8	Pass
Power spectrum density	15.247(e)	RSS-210 Issue 7 Annex 8	Pass
Radiated emission	15.205 & 15.209	RSS-210 Issue 7 Clause 2	Pass
Emission outside the frequency band	15.247(d)	RSS-210 Issue 7 Annex 8	Pass
Power line conducted emission	15.207	RSS-Gen Issue 2 Clause 7.2.2	Pass
Channel number of hopping system	15.247(a)(1)(iii)	RSS-210 Issue 7 Annex 8	NA
Average time of occupancy in any channel	15.247(a)(1)(iii)	RSS-210 Issue 7 Annex 8	NA
Occupied bandwidth	-	RSS-Gen Issue 2 Clause 4.6.1	Tested
Spurious emission for receiver	-	RSS-210 Issue 7 Clause 2.3	Pass

2.4 Data rate VS power

Mode	Data Rate	CH	Level at certain a chain (dBm)
11b	MCS0	M	12.06
	MCS1	M	12.95
	MCS2	M	14.52
	MCS3	M	14.71
11g	MCS0	M	17.11
	MCS1	M	17.42
	MCS2	M	17.35
	MCS3	M	17.60
	MCS4	M	17.53
	MCS5	M	17.60
	MCS6	M	17.49
	MCS7	M	17.67
11n HT20 2.4GHz	MCS0	M	16.90
	MCS1	M	17.15
	MCS2	M	17.32
	MCS3	M	17.47
	MCS4	M	17.25
	MCS5	M	17.38
	MCS6	M	17.41
	MCS7	M	17.60
11n HT40 2.4GHz	MCS0	M	17.25
	MCS1	M	17.25
	MCS2	M	17.11
	MCS3	M	17.29
	MCS4	M	17.35
	MCS5	M	17.63
	MCS6	M	17.54
	MCS7	M	17.99

Conclusion: For all RF test items in this report, MCS7 should be set for 11g and 11n and MCS3 for 11b.

3. Maximum peak output power

Test result: Pass

3.1 Test limit

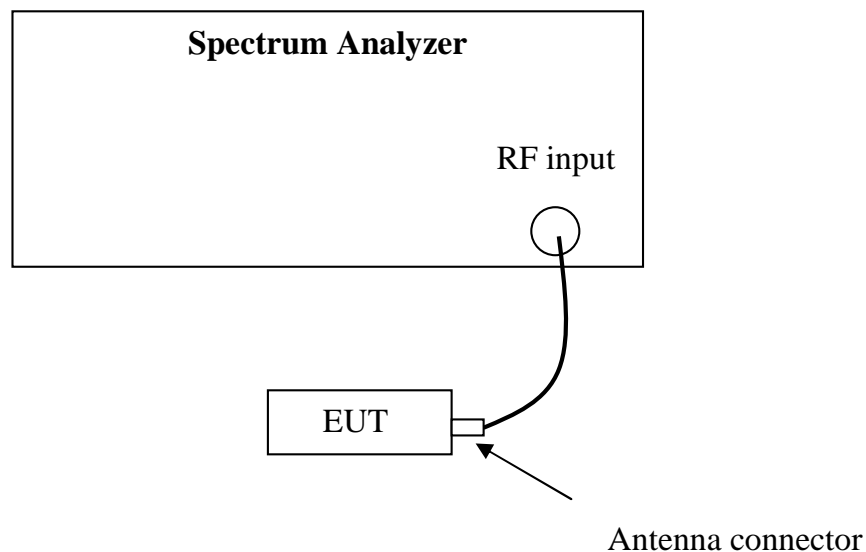
For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt

For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts

If the transmitting antenna of directional gain greater than 6dBi is used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt.

3.2 Test Configuration



3.3 Test procedure and test setup

The power output per FCC § 15.247(b)(1) is measured using the Spectrum Analyzer with the resolutions bandwidth set at 1MHz, the video bandwidth set at 3MHz, and the SPAN>>RBW. The test was performed at 3 channels (lowest, middle and highest channel). The EUT was tested according to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements (Power Output Option 2, method#1).

3.4 Test protocol

Temperature : 22 °C
Relative Humidity : 43 %

Single Chain

Mode	CH	Chain 0 (dBm)	Chain 1 (dBm)	Limit (dBm)
11b	L	15.10	15.14	≤30
	M	15.10	15.16	≤30
	H	14.86	14.93	≤30
11g	L	17.46	17.48	≤30
	M	17.09	17.60	≤30
	H	16.91	17.53	≤30
11n HT20 2.4GHz	L	17.62	17.57	≤30
	M	17.36	17.43	≤30
	H	17.25	17.19	≤30
11n HT40 2.4GHz	L	17.57	17.48	≤30
	M	17.99	18.07	≤30
	H	17.40	18.24	≤30

Dual Chain

Mode	CH	Chain 0 (dBm)	Chain 1 (dBm)	Chain 0 + Chain 1 (dBm)	Limit (dBm)
11n HT20 2.4GHz	L	17.06	18.02	20.58	≤30
	M	17.46	18.16	20.83	≤30
	H	16.92	17.49	20.22	≤30
11n HT40 2.4GHz	L	17.76	17.00	20.41	≤30
	M	18.18	18.23	21.22	≤30
	H	18.21	16.59	20.49	≤30

For the gain of Antenna = 2.0dBi, the maximum e.i.r.p = 21.22dBm + 2.00dBi = 23.22dBm = 209.89mW (lower than the e.i.r.p limit of 4W showed in RSS-210.).

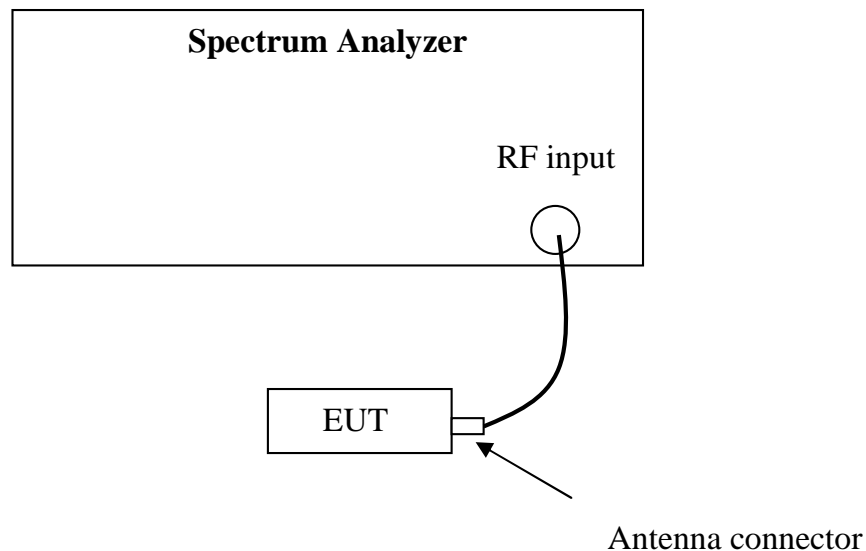
4. Minimum 6dB Bandwidth

Test result: PASS

4.1 Limit

For systems using digital modulation techniques that may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz and 5725 - 5850 MHz bands, the minimum 6 dB bandwidth shall be at least 500 kHz.

4.2 Test Configuration



4.3 Test Procedure and test setup

The minimum 6dB bandwidth per FCC §15.247(a)(2) is measured using the Spectrum Analyzer with the resolutions bandwidth set at 100kHz, the video bandwidth set at 300kHz, and the SPAN>>RBW. The test was performed at 3 channels (lowest, middle and highest channel).

The EUT was tested according to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

4.4 Test Protocol

Temperature : 22°C
Relative Humidity : 43%

Single Chain

Mode	CH	Chain 1 (MHz)	Limit (MHz)
11b	L	7.79	≥ 0.5
	M	7.80	≥ 0.5
	H	8.26	≥ 0.5
11g	L	15.11	≥ 0.5
	M	15.15	≥ 0.5
	H	15.27	≥ 0.5
11n HT20 2.4GHz	L	15.31	≥ 0.5
	M	15.55	≥ 0.5
	H	15.55	≥ 0.5
11n HT40 2.4GHz	L	26.85	≥ 0.5
	M	26.04	≥ 0.5
	H	27.88	≥ 0.5

Note: It was found the conducted output power of chain1 is higher than that of chain0, therefore chain1 was chosen to perform test as representative.

Dual Chain

Mode	CH	Chain 0 (MHz)	Chain 1 (MHz)	Limit (MHz)
11n HT20 2.4GHz	L	15.43	15.15	≥ 0.5
	M	15.39	15.15	≥ 0.5
	H	15.55	17.23	≥ 0.5
11n HT40 2.4GHz	L	27.80	27.55	≥ 0.5
	M	29.01	24.36	≥ 0.5
	H	30.30	26.05	≥ 0.5

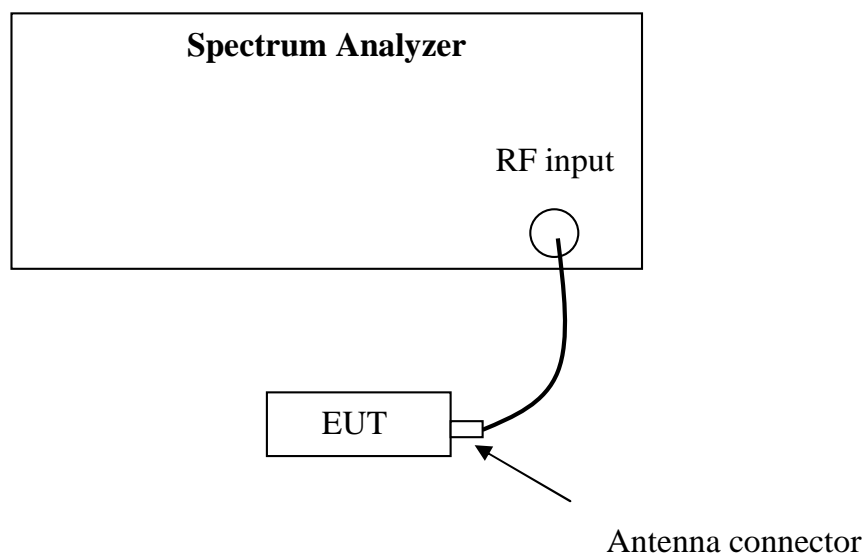
5. Power spectrum density

Test result: Pass

5.1 Test limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

5.2 Test Configuration



5.3 Test procedure and test setup

The power output per FCC §15.247(e) was measured using the Spectrum Analyzer with the resolutions bandwidth set at 3kHz, the video bandwidth set at 10kHz. The test was performed at 3 channels (lowest, middle and highest channel).

The EUT was tested according to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

5.4 Test Protocol

Temperature : 22 °C
Relative Humidity : 43 %

Single Chain

Mode	CH	Chain 1 (dBm/3kHz)	Limit (dBm/3kHz)
11b	L	-13.85	≤8
	M	-13.32	≤8
	H	-12.49	≤8
11g	L	-11.91	≤8
	M	-13.92	≤8
	H	-13.31	≤8
11n HT20 2.4GHz	L	-12.01	≤8
	M	-11.86	≤8
	H	-12.01	≤8
11n HT40 2.4GHz	L	-13.93	≤8
	M	-13.51	≤8
	H	-14.38	≤8

Note: It was found the conducted output power of chain1 is higher than that of chain0, therefore chain1 was chosen to perform test as representative.

Dual chain

Mode	CH	Chain 0 (dBm/3kHz)	Chain 1 (dBm/3kHz)	Chain A +B (dBm/3kHz)	Limit (dBm/3kHz)
11n HT20 2.4GHz	L	-16.95	-12.15	-10.91	≤8
	M	-14.11	-13.87	-10.98	≤8
	H	-11.67	-13.85	-9.61	≤8
11n HT40 2.4GHz	L	-13.18	-12.85	-10.00	≤8
	M	-13.33	-13.12	-10.21	≤8
	H	-8.48	-14.80	-7.57	≤8

6. Radiated emission

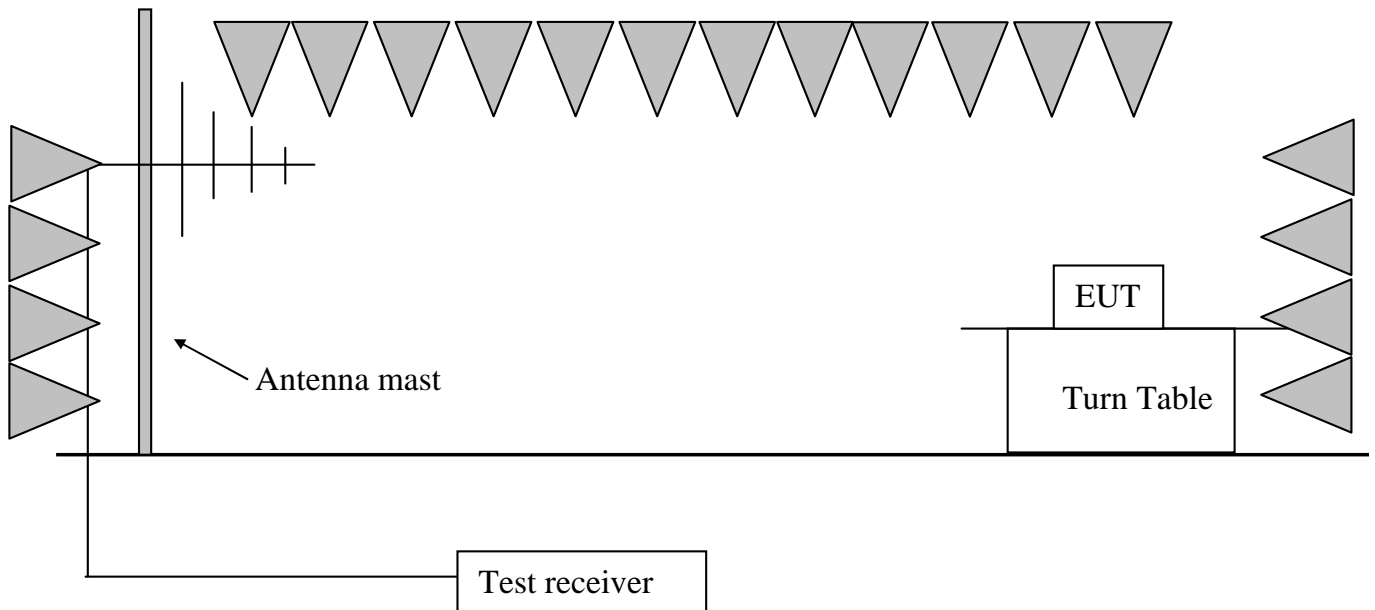
Test result: **PASS**

6.1 Test limit

The radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) showed as below:

Frequency (MHz)	Field Strength (dBuV/m)	Measurement Distance (m)
30 - 88	40.0	3
88 - 216	43.5	3
216 - 960	46.0	3
Above 960	54.0	3

6.2 Test Configuration



6.3 Test procedure and test setup

The measurement was applied in a semi-anechoic chamber. While testing for spurious emission higher than 1GHz, if applied, the pre-amplifier would be equipped just at the output terminal of the antenna.

The EUT and simulators were placed on a 0.8m high wooden turntable above the horizontal metal ground plane. The turn table rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mast. The antenna moved up and down between from 1 meter to 4 meters to find out the maximum emission level.

The EUT was tested according to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

The radiated emission was measured using the Spectrum Analyzer with the resolutions bandwidth set as:

RBW = 100kHz, VBW = 300kHz (30MHz~1GHz)

RBW = 1MHz, VBW = 3MHz (>1GHz for PK);

RBW = 1MHz, VBW = 10Hz (>1GHz for AV);

6.4 Test protocol

11n HT20, Chain0 + Chain1

CH	Polarization	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H	2408.35	30.70	108.10	Fundamental	/	PK
	H	432.38	18.40	44.70	Spurious	/	PK
	H	496.53	19.50	45.40	Spurious	/	PK
	V	661.76	21.90	39.50	Spurious	/	PK
	H	826.99	23.50	41.30	Spurious	/	PK
	H	2387.32	30.70	64.20	74.00	9.80	PK
	H	2387.32	30.70	41.20	54.00	12.80	AV
	H	2483.50	30.70	39.70	54.00	14.30	PK
	H	4826.17	-2.10	43.10	54.00	10.90	PK
M	H	2440.92	30.70	108.90	Fundamental	/	PK
	H	432.38	18.40	44.70	Spurious	/	PK
	H	496.53	19.50	45.40	Spurious	/	PK
	V	661.76	21.90	39.50	Spurious	/	PK
	H	826.99	23.50	41.30	Spurious	/	PK
	H	2390.00	30.70	39.50	54.00	14.50	PK
	H	2483.50	30.70	39.60	54.00	14.40	PK
	H	4879.06	-2.10	44.20	54.00	9.80	PK
H	H	2460.37	30.70	107.80	Fundamental	/	PK
	H	432.38	18.40	44.70	Spurious	/	PK
	H	496.53	19.50	45.40	Spurious	/	PK
	V	661.76	21.90	39.50	Spurious	/	PK
	H	826.99	23.50	41.30	Spurious	/	PK
	H	2390.00	30.70	39.40	54.00	14.60	PK
	H	2483.50	30.70	60.50	74.00	13.50	PK
	H	2483.50	30.70	38.70	54.00	15.30	PK
	H	4922.64	-2.10	44.00	54.00	10.00	PK

11n HT40, Chain0 + Chain1

CH	Polarization	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H	2428.45	30.70	106.70	Fundamental	/	PK
	H	432.38	18.40	44.70	Spurious	/	PK
	H	496.53	19.50	45.40	Spurious	/	PK
	V	661.76	21.90	39.50	Spurious	/	PK
	H	826.99	23.50	41.30	Spurious	/	PK
	H	2390.00	30.70	65.10	74.00	8.90	PK
	H	2389.58	30.70	42.00	54.00	12.00	AV
	H	2483.50	30.70	39.60	54.00	14.40	PK
	H	4855.72	-2.10	43.70	54.00	10.30	PK
M	H	2442.03	30.70	105.90	Fundamental	/	PK
	H	432.38	18.40	44.70	Spurious	/	PK
	H	496.53	19.50	45.40	Spurious	/	PK
	V	661.76	21.90	39.50	Spurious	/	PK
	H	826.99	23.50	41.30	Spurious	/	PK
	H	2390.00	30.70	39.40	54.00	14.60	PK
	H	2483.50	30.70	39.50	54.00	14.50	PK
	H	4887.41	-2.10	43.90	54.00	10.10	PK
H	H	2455.96	30.70	105.20	Fundamental	/	PK
	H	432.38	18.40	44.70	Spurious	/	PK
	H	496.53	19.50	45.40	Spurious	/	PK
	V	661.76	21.90	39.50	Spurious	/	PK
	H	826.99	23.50	41.30	Spurious	/	PK
	H	2390.00	30.70	39.60	54.00	14.40	PK
	H	2483.50	30.70	61.00	74.00	13.00	PK
	H	2483.50	30.70	39.30	54.00	14.70	PK
	H	4913.85	-2.10	44.70	54.00	9.30	PK

Remark: 1. For fundamental & restrict emission at 2300-2390MHz and 2483.5-2500MHz test, no amplifier is employed.

2. Correct Factor = Antenna Factor + Cable Loss (-Amplifier, is employed)

3. Corrected Reading = Original Receiver Reading + Correct Factor
4. Margin = limit – Corrected Reading
5. If the PK reading is lower than AV limit, the AV test can be elided.

Example: Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10dBuV.
Then Correct Factor = $30.20 + 2.00 - 32.00 = 0.20\text{dB/m}$; Corrected Reading =
 $10\text{dBuV} + 0.20\text{dB/m} = 10.20\text{dBuV/m}$
Assuming limit = 54dBuV/m, Corrected Reading = 10.20dBuV/m, then Margin =
 $54 - 10.20 = 43.80\text{dBuV/m}$

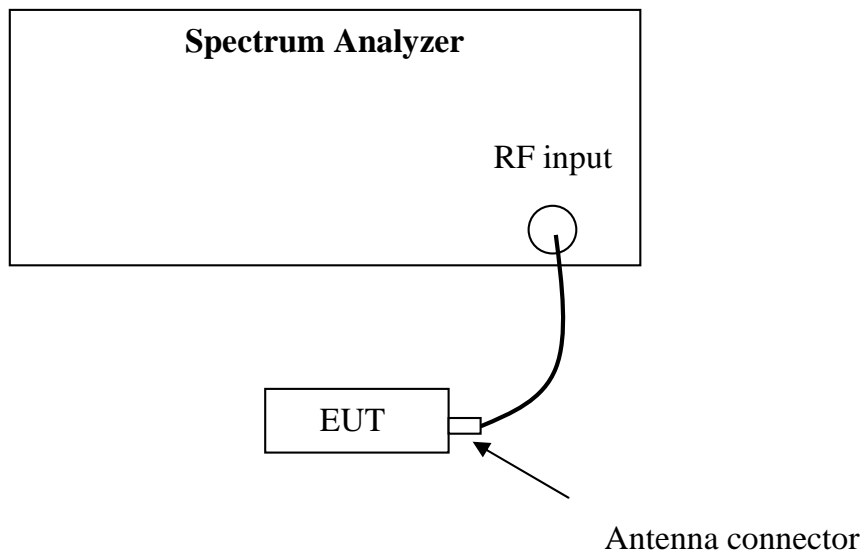
7. Emission outside the frequency Band

Test result: PASS

7.1 Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

7.2 Test Configuration



7.3 Test procedure and test setup

The Emission outside the frequency Band per FCC §15.247(d) is measured using the Spectrum Analyzer with the resolutions bandwidth set at 100kHz, the video bandwidth set at 300kHz, and the SPAN>>RBW.

The EUT was tested according to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.



7.4 Test protocol

Please refer to the test data. All the emission outside the frequency band is at least 20 dB below that in the 100 kHz bandwidth within the band.

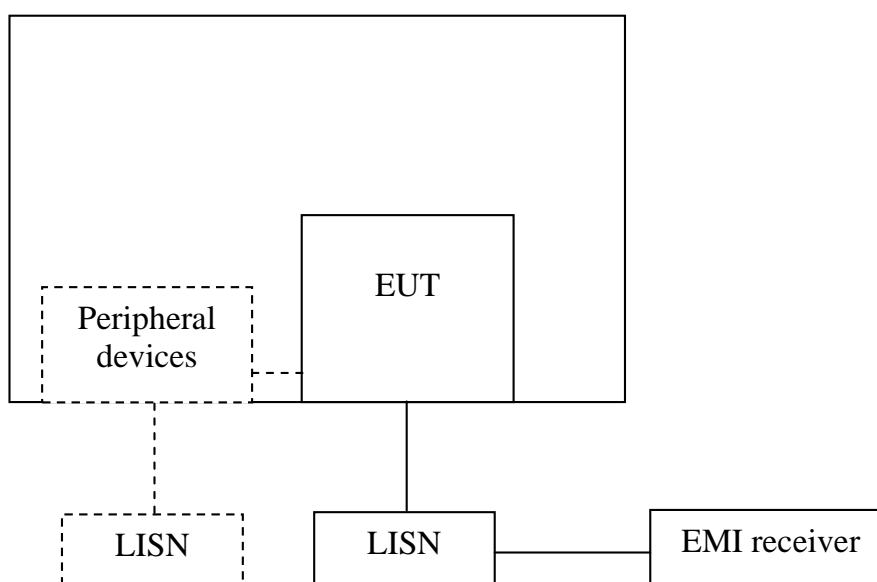
8. Power line conducted emission

Test result: **Pass**

8.1 Limit

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	QP	AV
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.		

8.2 Test configuration



☒ For table top equipment, wooden support is 0.8m height table

☐ For floor standing equipment, wooden support is 0.1m height rack.

8.3 Test procedure and test set up

The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a $50\Omega/50\mu\text{H}$ coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a $50\Omega/50\mu\text{H}$ coupling impedance with 50Ω termination.

Both sides (Line and Neutral) of AC line are checked for maximum conducted interference.

In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4 on conducted measurement.

The bandwidth of the test receiver is set at 9 kHz.

The EUT was tested according to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

8.4 Test protocol

Frequency	Correct Factor (dB)	Corrected Reading (dBuV)		Limit (dBuV)		Margin (dB)	
		QP	AV	QP	AV	QP	AV
0.17 (L)	3.00	56.09	36.77	64.97	54.97	8.88	18.20
0.18 (L)	3.00	56.71	43.01	64.38	54.38	7.67	11.37
0.24 (L)	3.00	47.82	32.22	62.05	52.05	14.23	19.83
0.43 (N)	3.00	34.33	17.97	57.31	47.31	22.98	29.34
3.57 (N)	3.00	30.25	23.14	56.00	46.00	25.75	22.86
13.12 (L)	3.00	27.44	20.08	60.00	50.00	32.56	29.92
Remark: 1. Correction Factor (dB) = LISN Factor (dB) + Cable Loss (dB). 2. Margin (dB) = Limit - Corrected Reading.							

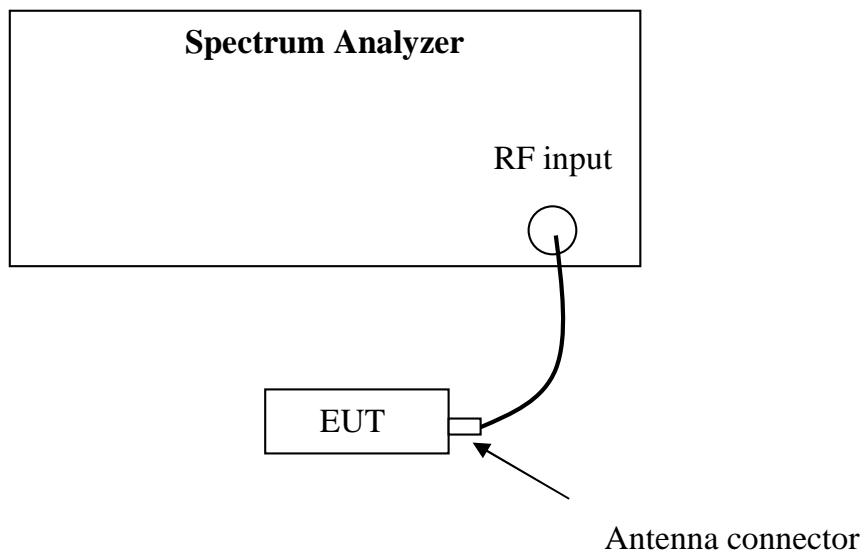
9. Channel Number of hopping system

Test result: NA

9.1 Limit

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

9.2 Test Configuration



9.3 Test procedure and test setup

The channel number per FCC §15.247(a)(1)(iii) is measured using the Spectrum Analyzer with the resolutions bandwidth set at 100kHz, the video bandwidth set at 300kHz, and the SPAN>>RBW.

The RF passband of the EUT was divided into 3 appropriate bands to test.

The EUT was tested according to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

9.4 Test protocol

Channel Number	Limit
-	≥ 15

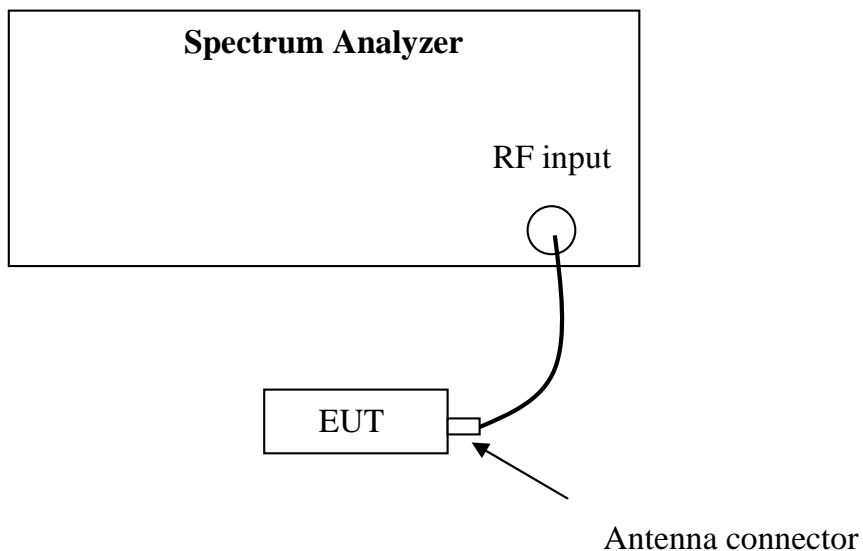
10. Average time of occupancy in any channel

Test result: NA

10.1 Limit

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. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

10.2 Test Configuration



10.3 Test procedure and test setup

Average time of occupancy in any channel per FCC § 15.247(a)(1)(iii) is measured using the Spectrum Analyzer with the resolutions bandwidth set at 100kHz, the video bandwidth set at 300kHz, and the SPAN set to be 0Hz to test in time domain. The test is performed at the middle channel.

10.4 Test protocol

Packet	Observed period (s) P	Time of occupancy for single hopping (ms) O	Hops among the interval of 3.6 s I	Average time of occupancy (s) T	Limit (s)
Packet Type 4	-	-	-	-	≤0.4
Packet Type 11	-	-	-	-	≤0.4
Packet Type 15	-	-	-	-	≤0.4

Remark: 1. There are 79 channels in all. So the observed period $P = 0.4 * 79 = 31.6$ s.

2. Average time of occupancy $T = O * I * P / 3.6$

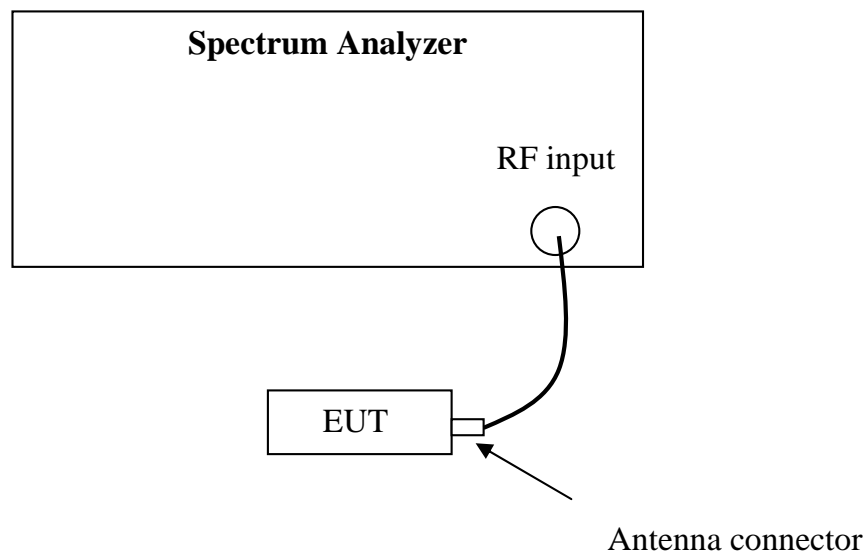
11. Occupied Bandwidth

Test Status: Tested

11.1 Test limit

None

11.2 Test Configuration



11.3 Test procedure and test setup

The occupied bandwidth per RSS-Gen Issue 2 Clause 4.6.1 was measured using the Spectrum Analyzer with the resolutions bandwidth set at 1MHz, the video bandwidth set at 3MHz.

11.4 Test protocol

Temperature : 22 °C
Relative Humidity : 43 %

Single Chain

Mode	Occupied Bandwidth (MHz)
11b	11.12
11g	17.94
11n HT20 2.4GHz	18.64
11n HT40 2.4GHz	36.67

Dual Chain

Mode	Occupied Bandwidth (MHz)
11n HT20 2.4GHz	18.74
	18.64
11n HT40 2.4GHz	36.47
	36.27

Conclusion: Max. Value of “11n HT20 2.4GHz” is 18.74MHz while 11n HT40 2.4GHz” is 36.67MHz

12. Spurious emission for receiver

Test result: PASS

12.1 Test limit

The spurious emission shall test through 3 times tuneable or local oscillator frequency whichever is the higher, without exceeding 40 GHz.

1) If a conducted measurement is made, no spurious output signals appearing at the antenna terminals shall exceed 2nW per any 4 kHz spurious frequency in the band 30-1000 MHz, or 5nW above 1 GHz.

2) If a radiated measurement is made, all spurious emissions shall comply with the limits of Table below:

Frequency (MHz)	Field Strength (dBuV/m)	Measurement Distance (m)
30 - 88	40.0	3
88 - 216	43.5	3
216 - 960	46.0	3
Above 960	54.0	3

12.2 Test Configuration

Please refer to clause 6.2

12.3 Test procedure and test setup

Please refer to clause 6.3.

12.4 Test protocol

Polarization	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
H	319.64	15.70	37.80	46.00	8.20	PK
H	432.38	18.40	44.60	46.00	1.40	PK
H	496.53	19.50	45.20	46.00	0.80	PK
V	661.76	21.90	39.90	46.00	6.10	PK
H	762.85	23.00	35.80	46.00	10.20	PK
H	826.99	23.50	41.50	46.00	4.50	PK
H	1203.60	-5.20	43.20	54.00	10.80	PK

Remark: 1. Correct Factor = Antenna Factor + Cable Loss (-Amplifier, is employed)
 2. Corrected Reading = Original Receiver Reading + Correct Factor
 3. Margin = limit – Corrected Reading

Example: Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
 Original Receiver Reading = 10dBuV.
 Then Correct Factor = 30.20 + 2.00 = 32.20dB/m; Corrected Reading = 10dBuV + 32.20dB/m = 42.20dBuV/m
 Assuming limit = 54dBuV/m, Corrected Reading = 42.20dBuV/m, then Margin = 54 - 42.20 = 11.80dBuV/m