

## EMC TEST REPORT

**No. SH08030942-001**

Applicant : Klipsch L.L.C.  
3502 Woodview Trace Suite 200, Indianapolis, Indiana,  
46268, USA

Manufacturer : Hansong (Nanjing) Technology Ltd.  
8 Kangping Road, Jiangning Econ. And Tech. Development  
Zone, Nanjing, 211100, China

Equipment : DVD receiver  
Type/Model : CS-700

### SUMMARY

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

**47CFR Part 15 (2007):** Radio Frequency Devices

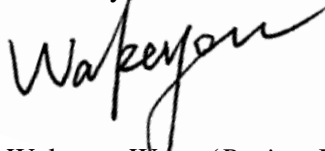
**ANSI C63.4 (2003):** American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

**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: April 13, 2008

Tested by:



Wakeyou Wang (*Project Engineer*)

Reviewed by:



Daniel Zhao (*Reviewer*)



**FCC ID: STI-CS700**  
**IC: 5788A-CS700**

## **Description of Test Facility**

Name: Intertek Testing Services Limited Shanghai  
Address: Building No.86, 1198 Qinzhou Road(North), Shanghai 200233, P.R. China

FCC Registration Number: 236597  
IC Assigned Code: 6201A

Name of contact: Steve Li  
Tel: +86 21 64956565 ext. 214  
Fax: +86 21 54262335 ext. 214

## Content

<b>SUMMARY</b> .....	<b>1</b>
<b>DESCRIPTION OF TEST FACILITY</b> .....	<b>2</b>
<b>1. GENERAL INFORMATION</b> .....	<b>5</b>
1.1 Applicant Information.....	5
1.2 Identification of the EUT .....	5
1.3 Technical specification .....	6
1.4 Mode of operation during the test / Test peripherals used.....	6
<b>2. TEST SPECIFICATION</b> .....	<b>7</b>
2.1 Instrument list.....	7
2.2 Test Standard.....	7
<b>3. MINIMUM 6DB BANDWIDTH</b> .....	<b>9</b>
3.1 Limit.....	9
3.2 Test Configuration.....	9
3.3 Test Procedure and test setup .....	9
3.4 Test Protocol .....	10
3.5 Measurement uncertainty .....	10
<b>4. MAXIMUM PEAK OUTPUT POWER</b> .....	<b>11</b>
4.1 Test limit .....	11
4.2 Test Configuration.....	11
4.3 Test procedure and test setup .....	11
4.4 Test protocol.....	12
4.5 Measurement uncertainty .....	12
<b>5. POWER SPECTRUM DENSITY</b> .....	<b>13</b>
5.1 Test limit .....	13
5.2 Test Configuration.....	13
5.3 Test procedure and test setup .....	13
5.4 Test Protocol .....	14
5.5 Measurement uncertainty.....	14
<b>6. SPURIOUS EMISSION</b> .....	<b>15</b>
6.1 Test limit .....	15
6.2 Test Configuration.....	15
6.3 Test procedure and test setup .....	15
6.4 Test protocol.....	16
6.5 Measurement uncertainty .....	17
<b>7. RESTRICT BAND RADIATED EMISSION</b> .....	<b>18</b>
7.1 Test limit .....	18
7.2 Test Configuration.....	18
7.3 Test procedure and test setup .....	19
7.4 Test protocol.....	20
7.5 Measurement uncertainty .....	20
<b>8. EMISSION OUTSIDE THE FREQUENCY BAND</b> .....	<b>21</b>
8.1 Limit.....	21
8.2 Test Configuration.....	21
8.3 Test procedure and test setup .....	21
8.4 Test protocol.....	22
8.5 Measurement uncertainty .....	22

<b>9. POWER LINE CONDUCTED EMISSION .....</b>	<b>23</b>
9.1 Limit.....	23
9.2 Test configuration.....	23
9.3 Test procedure and test set up .....	24
9.4 Test protocol.....	25
9.5 Measurement Uncertainty .....	25
<b>10. CHANNEL NUMBER OF HOPPING SYSTEM.....</b>	<b>26</b>
10.1 Limit.....	26
10.2 Test Configuration .....	26
10.3 Test procedure and test setup .....	26
10.4 Test protocol.....	27
10.5 Measurement uncertainty .....	27
<b>11. AVERAGE TIME OF OCCUPANCY IN ANY CHANNEL .....</b>	<b>28</b>
11.1 Limit.....	28
11.2 Test Configuration .....	28
11.3 Test procedure and test setup .....	28
11.4 Test protocol.....	29
11.5 Measurement uncertainty .....	29
<b>12. OCCUPIED BANDWIDTH .....</b>	<b>30</b>
12.1 Test limit .....	30
12.2 Test Configuration .....	30
12.3 Test procedure and test setup .....	30
12.4 Test protocol.....	31
12.5 Measurement uncertainty .....	31
<b>13. SPURIOUS EMISSION FOR RECEIVER .....</b>	<b>32</b>
13.1 Test limit .....	32
13.2 Test Configuration .....	32
13.3 Test procedure and test setup .....	32
13.4 Test protocol.....	33
13.5 Measurement uncertainty .....	33



## **1. General Information**

### **1.1 Applicant Information**

Applicant: Klipsch L.L.C.  
3502 Woodview Trace Suite 200, Indianapolis, Indiana,  
46268, USA

Name of contact: Clinton Bradley

Tel: 317-860-8618

Fax: 317-860-9618

Manufacturer: Hansong (Nanjing) Technology Ltd.  
8 Kangping Road, Jiangning Econ. And Tech.  
Development Zone, Nanjing, 211100, China

Sample received date : March 27, 2008

Date of test : March 27, 2008 ~ April 13, 2008

### **1.2 Identification of the EUT**

Equipment: DVD receiver

Type/model: CS-700

FCC ID: STI-CS700

IC: 5788A-CS700



### 1.3 Technical specification

Operation Frequency Band: 2400-2483.5MHz

Modulation: BPSK

Antenna Designation: External replaceable omnidirectional antenna, using reverse-SMA connector to connect to the EUT.

Gain of Antenna: 1.80dBi max.

Rating: AC 100~120V, 60Hz, 1A

Description of EUT: Here is one model only.  
The EUT is a DVD receiver. It can play TV, DVD, CD, Radio and etc. The low-frequency audio signal is sent out by wireless method to an external subwoofer to sound.  
Just after the DVD receiver is powered, it receives a signal from subwoofer to set up linking with each other. After the communication is set up, the DVD receiver modulates the low-frequency audio signal (lower than 100Hz) to 2.4GHz RF signal and then emits out by antenna while the subwoofer is receiving this signal in the available dimensional range.

Channel Description:

Channel	Central frequency (MHz)
1	2412
2	2438
3	2464

### 1.4 Mode of operation during the test / Test peripherals used

Within this test report, EUT was tested under 120V/60Hz. The DVD receiver has transmitting as well as receiving condition, so both were observed. The channel 1, 2 and 3 as the lowest, middle and highest channel were tested. A DVD containing 50Hz audio signal was used to perform test.

## 2. Test Specification

### 2.1 Instrument list

Equipment	Type	Manu.	Internal no.	Cal. Date	Due date
Test Receiver	ESIB 26	R&S	EC 3045	2007-6-1	2008-5-31
Semi-anechoic chamber	-	Albatross project	EC 3048	2007-6-1	2008-5-31
A.M.N.	ESH2-Z5	R&S	EC 3119	2008-1-23	2009-1-22
Test Receiver	ESCS 30	R&S	EC 2107	2008-1-23	2009-1-22
Ultra-broadband antenna	HL 562	R&S	EC 3046-1	2007-6-30	2008-6-29
Horn antenna	HF 906	R&S	EC 3049	2007-6-30	2008-6-29
Pre-amplifier	Pre-amp 18	R&S	EC 3222	2007-6-30	2008-6-29
Pre-amplifier	Pre-amp 40	Beijing Radio 2	-	2008-3-4	2009-3-3
Horn antenna	K638A	Beijing Radio 2	-	2008-3-4	2009-3-3
Power meter	PM2002	AR	EC3043-7	2008-1-23	2009-1-22
Power sensor	PH2000	AR	EC3043-8	2008-1-23	2009-1-22
Signal generator	SMR 20	R&S	EC 3044-1	2007-8-21	2008-8-20
Spectrum Analyzer	E7402A	Agilent	EC2254	2007-9-17	2008-9-16

### 2.2 Test Standard

47CFR Part 15 (2007)

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 REFERANCE	IC REFERANCE	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
Spurious emission	15.209	RSS-210 Issue 7 Clause 2	Pass
Restrict band radiated emission	15.205	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



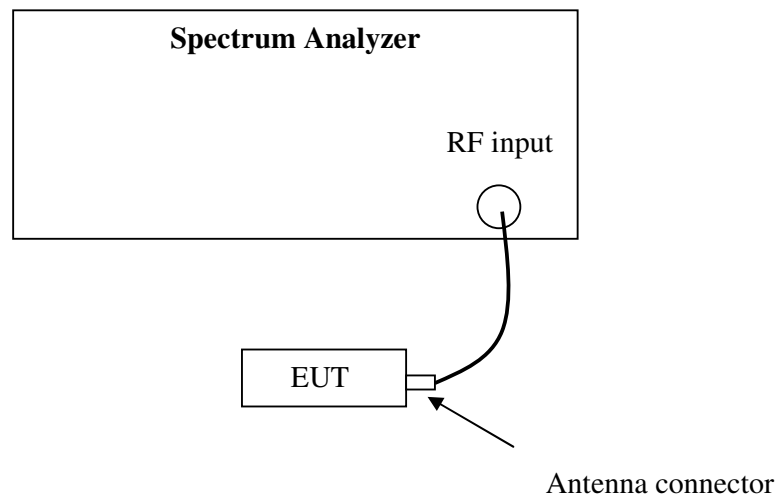
### 3. Minimum 6dB Bandwidth

Test result: PASS

#### 3.1 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.

#### 3.2 Test Configuration



#### 3.3 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).



### 3.4 Test Protocol

Temperature : 22°C  
Relative Humidity : 43%

Channel	Bandwidth (MHz)	Limit (MHz)
1	8.08	$\geq 0.5$
2	8.08	$\geq 0.5$
3	8.08	$\geq 0.5$

### 3.5 Measurement uncertainty

The measurement uncertainty is  $\pm 100\text{Hz}$ .

#### 4. Maximum peak output power

Test result: Pass

##### 4.1 Test limit

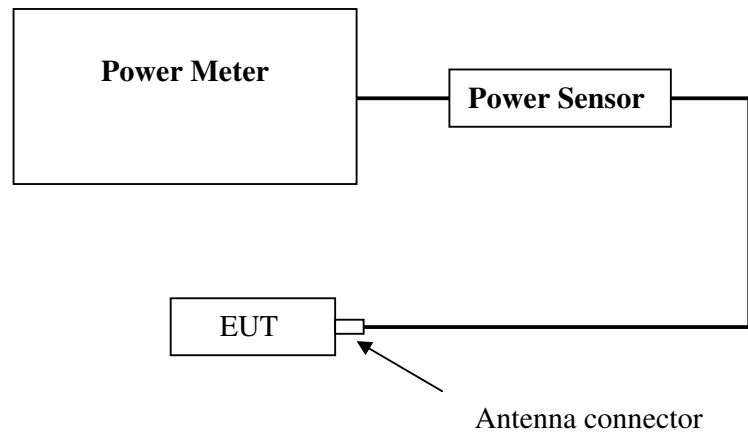
For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt

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.

##### 4.2 Test Configuration



##### 4.3 Test procedure and test setup

The power output per FCC § 15.247(b)(1) was measured on the EUT using a power meter via power sensor. The test was performed at 3 channels (lowest, middle and highest channel).

#### 4.4 Test protocol

Temperature : 22 °C  
Relative Humidity : 43 %

Channel	Cable loss L(dB)	Reading of power meter R(dBm)	Corrected reading C(dBm)	Limit (dBm)
1	0.56	11.92	12.48	≤30
2	0.56	11.34	11.90	≤30
3	0.56	11.28	11.84	≤30

**Remark: C = L + R**

#### 4.5 Measurement uncertainty

The measurement uncertainty is ±1dB.

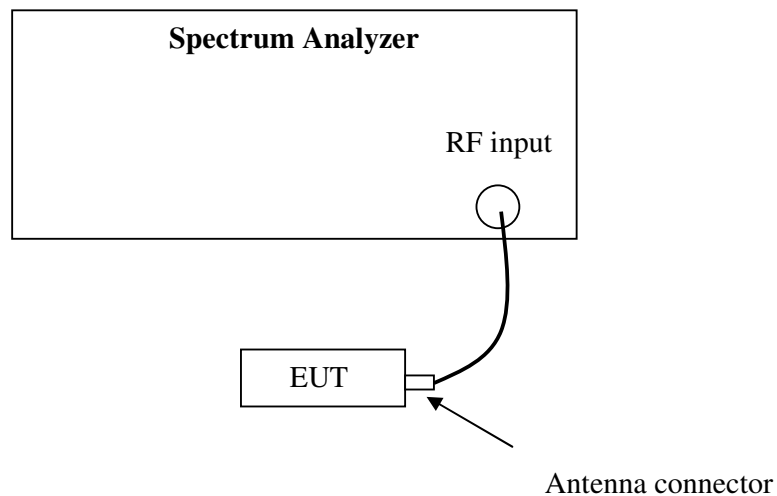
## 5. Power spectrum density

**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).

#### 5.4 Test Protocol

Temperature : 22 °C  
Relative Humidity : 43 %

Channel	Reading of Receiver (dBm/3kHz) <b>R</b>	Cable loss (dB) <b>L</b>	Corrected Reading (dBm/3kHz) <b>C</b>	Limit (dBm/3kHz)
1	-10.84 (96.16dBuV/3kHz)	0.56	-10.28	≤ 8
6	-11.53 (95.47dBuV/3kHz)	0.56	-10.97	≤ 8
11	-12.2 (94.80dBuV/3kHz)	0.56	-11.64	≤ 8

Remark: **C = R + L**

#### 5.5 Measurement uncertainty

The measurement uncertainty is ±1dB/3kHz.

## 6. Spurious emission

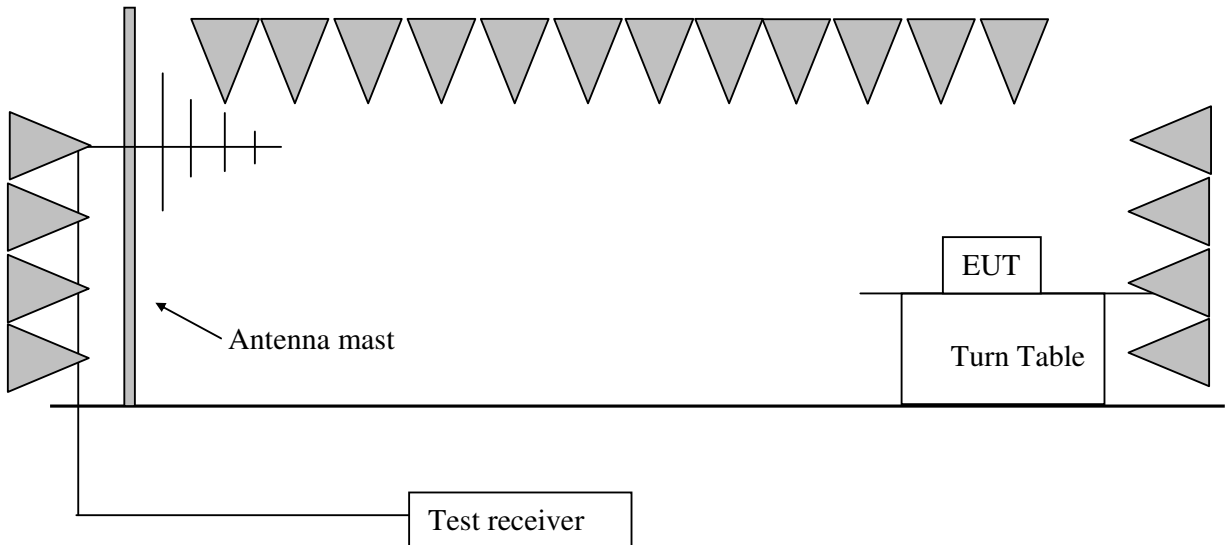
**Test result: PASS**

### 6.1 Test limit

The spurious emission shall test through the 10th harmonic or to 40GHz, whichever is lower. It must 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, the pre-amplifier is 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 1meter to 4 meters to find out the maximum emission level.

### 6.4 Test protocol

Spurious emission for test below 1GHz, highest reading related to the limit

Antenna	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
H	148.58	8.70	36.00	43.50	7.50	QP
H	296.31	12.00	39.90	46.00	6.10	QP
H	372.12	14.30	36.30	46.00	9.70	QP
H	519.86	18.30	36.20	46.00	9.80	QP
H	593.73	19.50	35.60	46.00	10.40	QP
H	891.14	24.20	35.40	46.00	10.60	QP
V	41.66	13.40	38.20	40.00	1.80	QP
V	74.71	8.60	36.70	40.00	3.30	QP
V	148.58	8.70	41.10	43.50	2.40	QP
V	372.12	14.30	39.30	46.00	6.70	QP
V	519.86	18.30	42.00	46.00	4.00	QP
V	675.37	20.90	40.00	46.00	6.00	QP

Remark: 1. Correct Factor = Antenna Factor + Cable Loss

2. Corrected Reading = Original Receiver Reading + Correct Factor

3. Margin = limit - Corrected Reading

4. If the margin higher than 20dB, it would be marked as \*.

5. For more details, please refer to the test data.



Spurious emission for test above 1GHz, highest reading related to the limit

Channel	Antenna	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	H	2412.35	2.20	99.70	Fundamental	/	PK
1	H	4824.81	-0.90	51.40	54.00	2.60	PK
1	V	2412.35	2.20	112.20	Fundamental	/	PK
1	V	4824.81	-0.90	52.30	54.00	1.70	PK
2	H	2439.01	2.20	98.60	Fundamental	/	PK
2	H	4879.24	-0.90	51.50	54.00	2.50	PK
2	V	2439.01	2.20	110.80	Fundamental	/	PK
2	V	4879.24	-0.90	52.00	54.00	2.00	PK
3	H	2463.69	2.20	99.10	Fundamental	/	PK
3	H	4927.43	-0.90	51.20	54.00	2.80	PK
3	V	2463.69	2.20	111.70	Fundamental	/	PK
3	V	4927.43	-0.90	52.50	54.00	1.50	PK

Remark: 1. Correct Factor = Antenna Factor + Cable Loss - Gain of Preamplifier

2. Corrected Reading = Original Receiver Reading + Correct Factor

3. Margin = limit - Corrected Reading

4. Here the PK value is evaluated with AV limit. As a result, the AV test can be elided.

5. The spurious emissions among 1GHz ~ 25GHz are all submerged in the floor noise except the data listed above.

## 6.5 Measurement uncertainty

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.

Measurement uncertainty of radiated emission is:  $\pm 5.31\text{dB}$

The measurement uncertainty is given with a confidence of 95%,  $k=2$ .

The measurement uncertainty is traceable to internal procedure TI-036.

## 7. Restrict band radiated emission

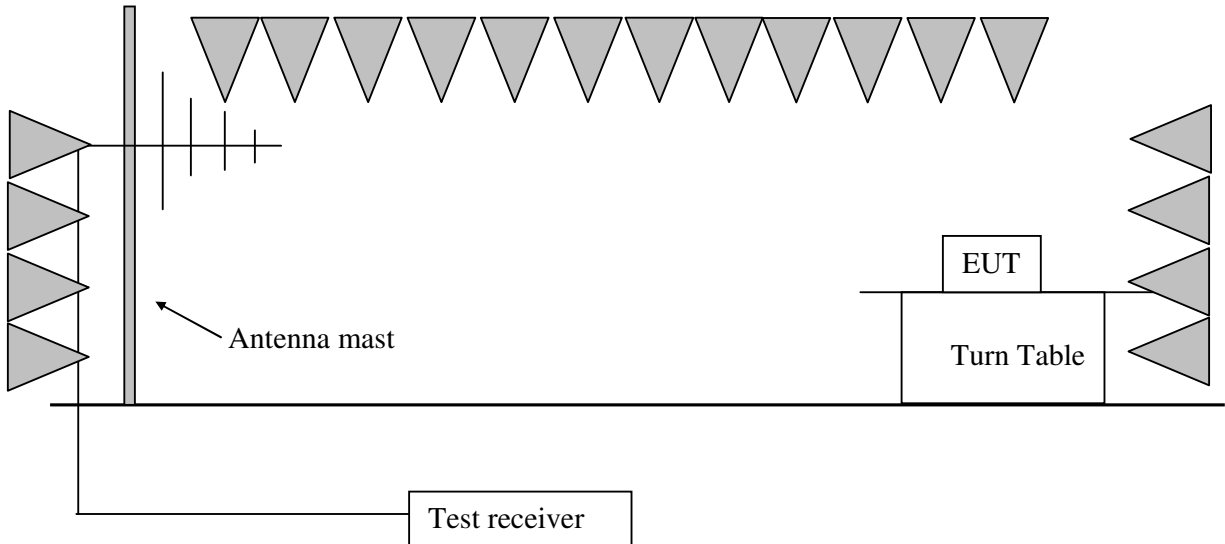
**Test result: PASS**

### 7.1 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

### 7.2 Test Configuration



### 7.3 Test procedure and test setup

1. Perform an in-band field strength measurement of the fundamental emission using the RBW and detector function as the Spurious Radiated Emissions test procedure.
2. Choose a spectrum analyzer span that encompasses both the peak of the fundamental emission and the band-edge emission under investigation. Set the analyzer RBW to 1% of the total span (but never less than 30 kHz) with a video bandwidth equal to or greater than the RBW. Record the peak levels of the fundamental emission and the relevant band-edge emission (i.e., run several sweeps in peak hold mode). Observe the stored trace and measure the amplitude delta between the peak of the fundamental and the peak of the band-edge emission. This is not a field strength measurement; it is only a relative measurement to determine the amount by which the emission drops at the band-edge relative to the highest fundamental emission level.
3. Subtract the delta measured in step (2) from the field strengths measured in step (1). The resultant field strengths (CISPR QP, average, or peak, as appropriate) are then used to determine band-edge compliance as required by Section 15.205.
4. The above "delta" measurement technique may be used for measuring emissions that are up to two "standard" bandwidths away from the band-edge, where a "standard" bandwidth is the bandwidth specified by C63.4 for the frequency being measured. For example, for band-edge measurements in the restricted band that begins at 2483.5 MHz, C63.4 specifies a measurement bandwidth of at least 1 MHz. Therefore you may use the "delta" technique for measuring emissions up to 2 MHz removed from the band-edge.
5. Radiated emissions that are removed by more than two "standard" bandwidths must be measured as the above Spurious Radiated Emissions test procedure.

#### 7.4 Test protocol

Highest reading on restrict band 2310MHz ~ 2390MHz, test on the lowest channel

Detector	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)
PK	2389.04	2.20	67.06	74
AV	2388.40	2.20	32.05	54

Highest reading on restrict band 2483.5MHz ~ 2500MHz, test on the highest channel

Detector	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)
PK	2483.83	2.20	63.90	74
AV	2483.86	2.20	30.75	54

#### 7.5 Measurement uncertainty

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.

Measurement uncertainty of radiated emission is:  $\pm 5.31\text{dB}$

The measurement uncertainty is given with a confidence of 95%,  $k=2$ .

The measurement uncertainty is traceable to internal procedure TI-036.

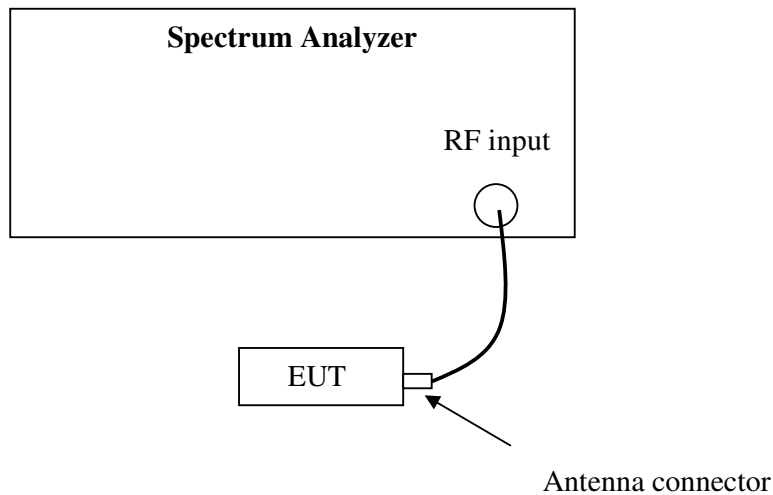
## 8. Emission outside the frequency Band

Test result: PASS

### 8.1 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.

### 8.2 Test Configuration



### 8.3 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.

#### 8.4 Test protocol

Highest level outside the band edge (dBuV)	Highest emission within the band edge (dBuV)	Delta (dB)	Limit
70.16 (frequency lower than 2.4GHz)	110.80	40.64	$\geq 20\text{dB}$
62.88 (frequency higher than 2.4835GHz)	109.50	46.62	$\geq 20\text{dB}$

#### 8.5 Measurement uncertainty

The measurement uncertainty is  $\pm 1\text{dB}$ .

## 9. Power line conducted emission

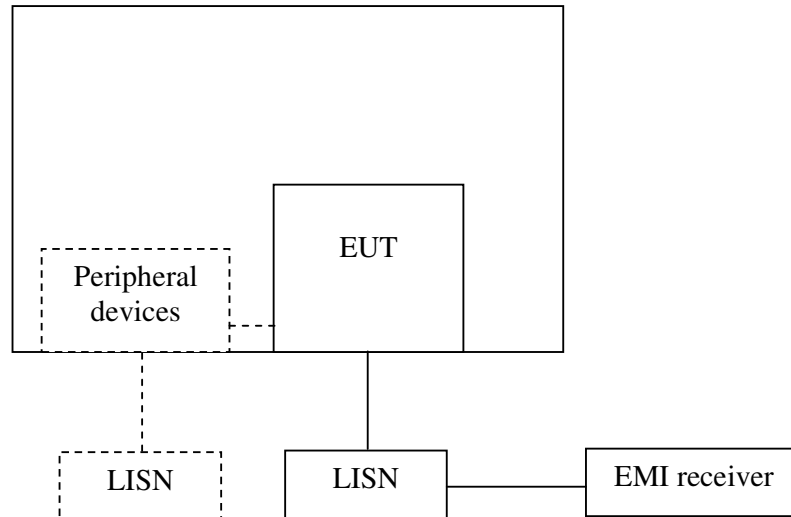
Test result: Pass

### 9.1 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.

### 9.2 Test configuration



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

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

### **9.3 Test procedure and test set up**

The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50Ω/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50Ω/50uH 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.



### 9.4 Test protocol

Power line: L

Frequency	Correct Factor (dB)	Corrected Reading (dBuV)		Limit (dBuV)		Margin (dB)	
		QP	AV	QP	AV	QP	AV
0.18	3.00	*	*	*	*	*	*
0.33	3.00	40.80	40.24	59.51	49.51	18.71	9.27
0.92	3.00	*	27.26	*	46.00	*	18.74
1.31	3.00	*	26.90	*	46.00	*	19.10
5.63	3.00	*	*	*	*	*	*
8.06	3.00	*	31.16	*	50.00	*	18.84

Remark: 1. Correction Factor (dB) = LISN Factor (dB) + Cable Loss (dB).  
2. Margin (dB) = Limit - Corrected Reading.  
3. If the margin higher than 20dB, it would be marked as \*.

Power line: N

Frequency	Correct Factor (dB)	Corrected Reading (dBuV)		Limit (dBuV)		Margin (dB)	
		QP	AV	QP	AV	QP	AV
0.18	3.00	*	*	*	*	*	*
0.33	3.00	*	39.68	*	49.51	*	9.83
0.92	3.00	*	29.30	*	46.00	*	16.70
2.91	3.00	*	29.53	*	46.00	*	16.47
6.60	3.00	*	*	*	*	*	*
8.12	3.00	*	*	*	*	*	*

Remark: 1. Correction Factor (dB) = LISN Factor (dB) + Cable Loss (dB).  
2. Margin (dB) = Limit - Corrected Reading.  
3. If the margin higher than 20dB, it would be marked as \*.

### 9.5 Measurement Uncertainty

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.

Measurement uncertainty at mains terminal:  $\pm 1.99\text{dB}$

The measurement uncertainty is given with a confidence of 95%,  $k=2$ .

The measurement uncertainty is traceable to internal procedure TI-036.

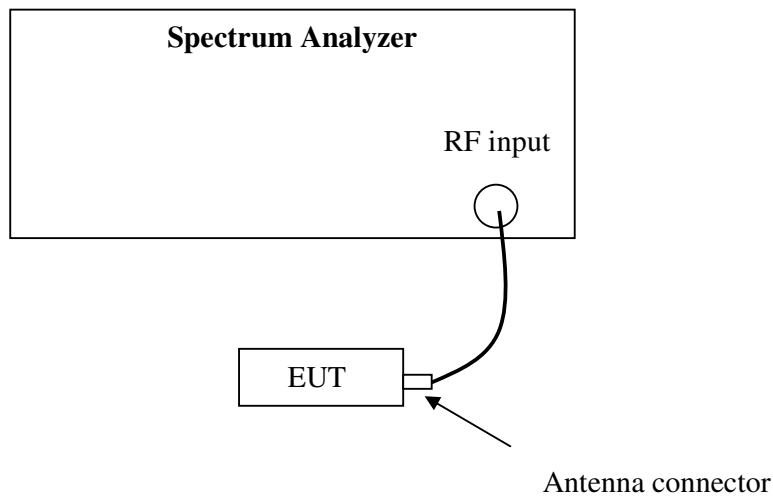
## 10. Channel Number of hopping system

Test result: NA

### 10.1 Limit

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

### 10.2 Test Configuration



### 10.3 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.



**10.4 Test protocol**

Channel Number	Limit
-	$\geq 15$

**10.5 Measurement uncertainty**

The measurement uncertainty is  $\pm 1$ dB.

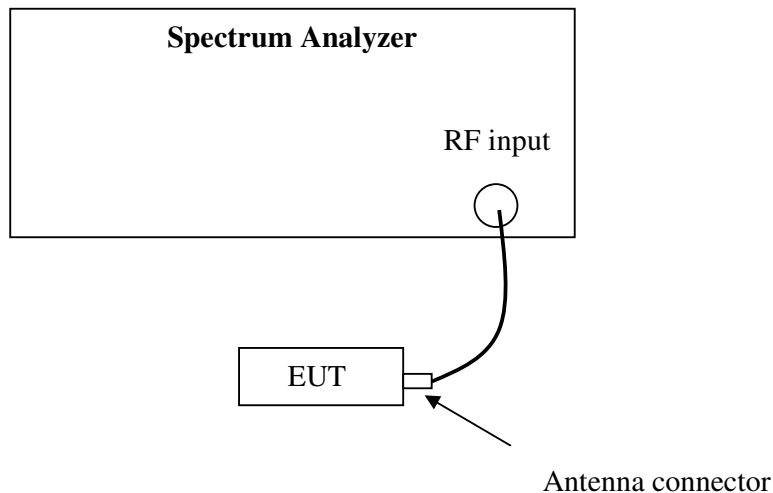
## 11. Average time of occupancy in any channel

Test result: NA

### 11.1 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.

### 11.2 Test Configuration



### 11.3 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.

### 11.4 Test protocol

Packet	Observed period (s) <b>P</b>	Time of occupancy for single hopping (ms) <b>O</b>	Hops among the interval of 3.6 s <b>I</b>	Average time of occupancy (s) <b>T</b>	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  $T = O * I * P / 3.6$

### 11.5 Measurement uncertainty

The measurement uncertainty is  $\pm 10\mu\text{s}$ .

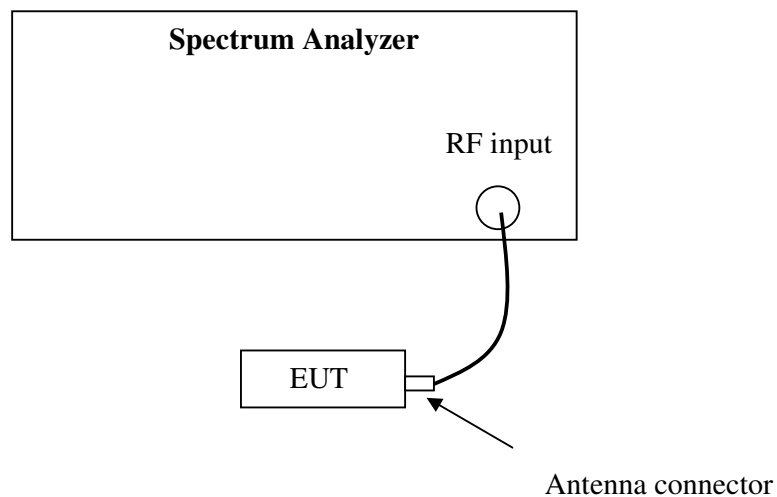
## 12. Occupied Bandwidth

Test Status: Tested

### 12.1 Test limit

None

### 12.2 Test Configuration



### 12.3 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. The test was performed at 3 channels (lowest, middle and highest channel).

**12.4 Test protocol**

Temperature : 22 °C

Relative Humidity : 43 %

Channel	Occupied Bandwidth (MHz)	Max. Value (MHz)
1	17.88	18.25
2	18.25	
3	18.13	

**Remark: “Max. Value” is the maximum test result of the three measured occupied bandwidth.**

**12.5 Measurement uncertainty**The measurement uncertainty is  $\pm 100\text{Hz}$ .

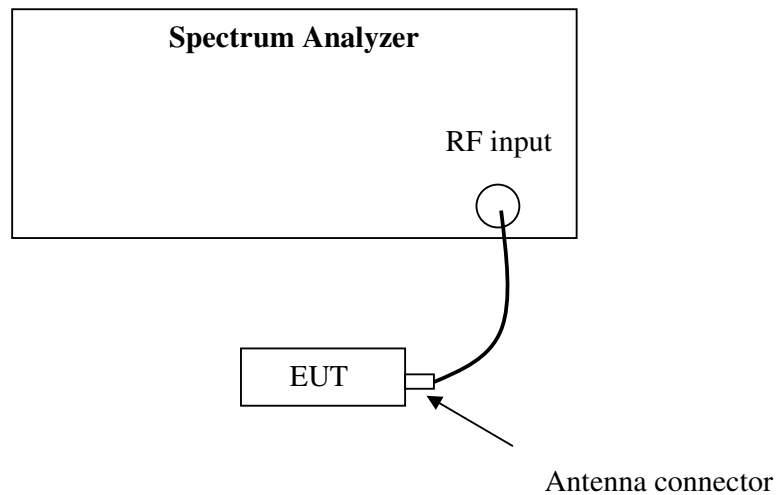
### 13. Spurious emission for receiver

Test result: PASS

#### 13.1 Test limit

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

#### 13.2 Test Configuration



#### 13.3 Test procedure and test setup

The receiver spurious emission per RSS-210 Issue 7 Clause 2.3 is measured using the Spectrum Analyzer with the resolution bandwidth / video bandwidth set at 5kHz for 30MHz ~ 1GHz and with the resolution bandwidth / video bandwidth set at 1MHz for higher than 1GHz.



### 13.4 Test protocol

Highest reading related to the limit

Detector	Frequency (MHz)	Correct Factor (dB)	Corrected Receiver Reading (dBm)	Limit (dBm)
PK	$\leq 1\text{GHz}$	0.21	$< -70$	-57
PK	$> 1\text{GHz}$	0.56	$< -60$	-53

Note: For frequency higher than 1GHz, the PK detector is employed while the limit is AV limit.

### 13.5 Measurement uncertainty

The measurement uncertainty is  $\pm 1\text{dB}$ .