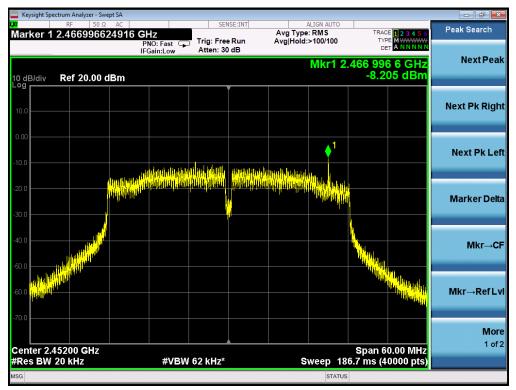


# TEST PLOT OF SPECTRAL DENSITY FOR MIDDLE CHANNEL

#### TEST PLOT OF SPECTRAL DENSITY FOR HIGH CHANNEL

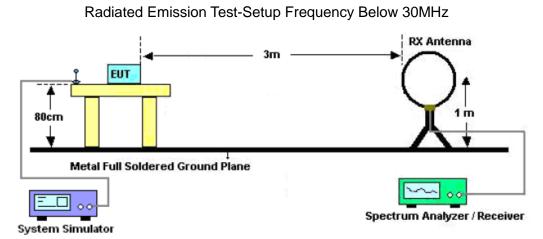


# 11. RADIATED EMISSION

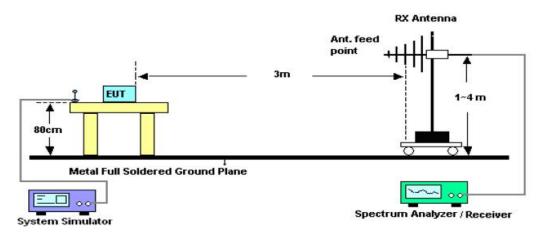
# **11.1. MEASUREMENT PROCEDURE**

- 1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
- 2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
- 3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
- 4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
- 5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
- 6. For emissions above 1GHz, use 1MHz VBW and 3MHz RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- 7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
- 8.If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
- 9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
- 10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High Low scan is not required in this case.

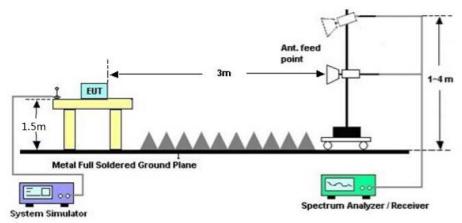
#### 11.2. TEST SETUP



#### RADIATED EMISSION TEST SETUP 30MHz-1000MHz



# RADIATED EMISSION TEST SETUP ABOVE 1000MHz



# **11.3. LIMITS AND MEASUREMENT RESULT**

15.209(a) Limit in the below table has to be followed

Frequencies (MHz)	Field Strength (micorvolts/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

Note: All modes were tested For restricted band radiated emission,

the test records reported below are the worst result compared to other modes.

EUT can work at 802.11b/g/n mode by used two antenna (ant0 + ant1), but at 802.11b/g mode EUT cannot use two antenna at the same time, only at 802.11n mimo mode two antenna (ant0+ant1) work at the same time.

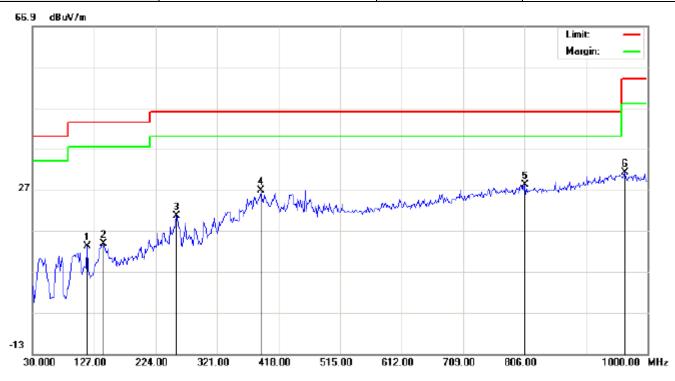
### 11.4. TEST RESULT

### **RADIATED EMISSION BELOW 30MHZ**

No emission found between lowest internal used/generated frequencies to 30MHz.

# **RADIATED EMISSION BELOW 1GHZ**

EUT	RouterBOARD LHG 2nD-XL	Model Name	LHG XL 2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2412MHZ,ant0	Antenna	Horizontal

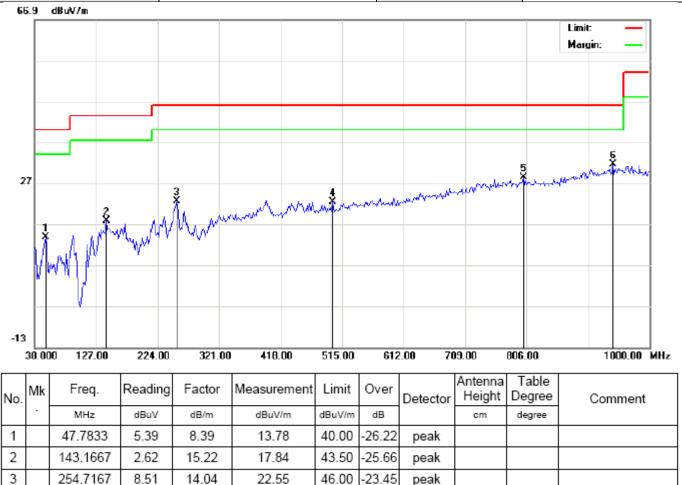


No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	•	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		115.6833	6.25	6.86	13.11	43.50	-30.39	peak			
2		141.5500	-0.99	14.82	13.83	43.50	-29.67	peak			
3		256.3333	12.64	7.98	20.62	46.00	-25.38	peak			
4		390.5167	7.72	19.01	26.73	46.00	-19.27	peak			
5	*	806.0000	0.88	27.32	28.20	46.00	-17.80	peak			
6		964.4333	1.33	29.86	31.19	54.00	-22.81	peak			

**RESULT: PASS** 

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EUT	RouterBOARD LHG 2nD-XL	Model Name	LHG XL 2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2412MHZ,ant0	Antenna	Vertical



# **RESULT: PASS**

500.4500

801.1500

941.8000

1.20

1.02

1.81

Note:

4

5

6

1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

21.14

27.32

29.77

2. The "Factor" value can be calculated automatically by software of measurement system.

22.34

28.34

31.58

3. All test modes had been pre-tested. The 802.11b at low channel is the worst case and recorded in the report.

-23.66

-17.66

-14.42

peak

peak

peak

46.00

46.00

46.00

# **RADIATED EMISSION ABOVE 1GHZ**

EUT	RouterBOARD LHG 2nD-XL	Model Name	LHG XL 2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2412MHZ, Ant0	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type		
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type		
4824.119	48.83	3.72	52.55	74	-21.45	peak		
4824.032	42.43	3.72	46.15	54	-7.85	AVG		
7236.119	41.32	8.15	49.47	74	-24.53	peak		
7236.107	37.11	8.15	45.26	54	-8.74	AVG		
Remark:								
Factor = Ante	enna Factor + C	able Loss – F	Pre-amplifier.					

EUT	RouterBOARD LHG 2nD-XL	Model Name	LHG XL 2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2412MHZ, Ant0	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type	
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value rype	
4824.098	48.09	3.72	51.81	74	-22.19	peak	
4824.040	43.51	3.72	47.23	54	-6.77	AVG	
7236.103	43.08	8.15	51.23	74	-22.77	peak	
7236.028	38.05	8.15	46.2	54	-7.8	AVG	
Remark:							
-actor = Ante	enna Factor + Ca	able Loss – I	Pre-amplifier.				

# Report No.: AGC07248170703FE02 Page 77 of 106

EUT	RouterBOARD LHG 2nD-XL	Model Name	LHG XL 2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2437MHZ, Ant0	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4874.039	48.15	3.75	51.9	74	-22.1	peak
4874.055	43.48	3.75	47.23	54	-6.77	AVG
7311.054	42.21	8.16	50.37	74	-23.63	peak
7311.117	37.46	8.16	45.62	54	-8.38	AVG
Remark:						
actor = Ante	enna Factor + Ca	able Loss – F	Pre-amplifier.			

EUT	RouterBOARD LHG 2nD-XL	Model Name	LHG XL 2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2437MHZ, Ant0	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type	
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type	
4874.098	48.22	3.75	51.97	74	-22.03	peak	
4874.108	43.55	3.75	47.3	54	-6.7	AVG	
7311.041	42.28	8.16	50.44	74	-23.56	peak	
7311.054	37.53	8.16	45.69	54	-8.31	AVG	
Remark:							
Factor = Antenna Factor + Cable Loss – Pre-amplifier.							

EUT	RouterBOARD LHG 2nD-XL	Model Name	LHG XL 2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2462MHZ, Ant0	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4924.062	48.22	3.75	51.97	74	-22.03	peak
4924.076	43.55	3.75	47.3	54	-6.7	AVG
7386.115	42.28	8.16	50.44	74	-23.56	peak
7386.047	37.53	8.16	45.69	54	-8.31	AVG
Demenulu						
Remark:						
Factor = Ante	enna Factor + C	able Loss – P	re-amplifier.			

EUT	RouterBOARD LHG 2nD-XL	Model Name	LHG XL 2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2462MHZ, Ant0	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Value Type
4924.072	48.22	3.75	51.97	74	-22.03	peak
4924.100	43.55	3.75	47.3	54	-6.7	AVG
7386.101	42.28	8.16	50.44	74	-23.56	peak
7386.042	37.53	8.16	45.69	54	-8.31	AVG
Remark:						
	enna Factor + Ca	able Loss – I	Pre-amplifier.			

EUT	RouterBOARD LHG 2nD-XL	Model Name	LHG XL 2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n20mimo with date rate 1 2412MHZ, ant0+ant1	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value rype
4824.111	48.22	3.75	51.97	74	-22.03	peak
4824.090	43.55	3.75	47.3	54	-6.7	AVG
7236.023	42.28	8.16	50.44	74	-23.56	peak
7236.083	37.53	8.16	45.69	54	-8.31	AVG
Remark:						
	enna Factor + Ca	ahle I oss – F	Pre-amplifier			

EUT	RouterBOARD LHG 2nD-XL	Model Name	LHG XL 2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n20mimo with date rate 1 2412MHZ, ant0+ant1	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4824.045	48.22	3.75	51.97	74	-22.03	peak
4824.055	43.55	3.75	47.3	54	-6.7	AVG
7236.032	42.28	8.16	50.44	74	-23.56	peak
7236.100	37.53	8.16	45.69	54	-8.31	AVG
Remark:	-					
Factor = Ante	enna Factor + Ca	able Loss – P	re-amplifier.			

EUT	RouterBOARD LHG 2nD-XL	Model Name	LHG XL 2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n20mimo with date rate 1 2437MHZ, ant0+ant1	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value rype
4874.085	48.22	3.75	51.97	74	-22.03	peak
4874.082	43.55	3.75	47.3	54	-6.7	AVG
7311.037	42.28	8.16	50.44	74	-23.56	peak
7311.114	37.53	8.16	45.69	54	-8.31	AVG
Remark:						
-actor = Ante	enna Factor + Ca	able Loss – F	Pre-amplifier.			

EUT	RouterBOARD LHG 2nD-XL	Model Name	LHG XL 2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n20mimo with date rate 1 2437MHZ, ant0+ant1	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type	
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value rype	
4874.029	48.22	3.75	51.97	74	-22.03	peak	
4874.036	43.55	3.75	47.3	54	-6.7	AVG	
7311.029	42.28	8.16	50.44	74	-23.56	peak	
7311.058	37.53	8.16	45.69	54	-8.31	AVG	
Remark:			· · ·				
Factor = Ante	enna Factor + Ca	able Loss – I	Pre-amplifier.				

EUT	RouterBOARD LHG 2nD-XL	Model Name	LHG XL 2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n20mimo with date rate 1 2462MHZ, ant0+ant1	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4924.050	48.22	3.75	51.97	74	-22.03	peak
4924.098	43.55	3.75	47.3	54	-6.7	AVG
7386.110	42.28	8.16	50.44	74	-23.56	peak
7386.022	37.53	8.16	45.69	54	-8.31	AVG
Remark:						
-actor = Ante	enna Factor + Ca	able Loss – F	Pre-amplifier.			

EUT	RouterBOARD LHG 2nD-XL	Model Name	LHG XL 2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n20mimo with date rate 1 2462MHZ, ant0+ant1	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4924.051	48.22	3.75	51.97	74	-22.03	peak
4924.081	43.55	3.75	47.3	54	-6.7	AVG
7386.086	42.28	8.16	50.44	74	-23.56	peak
7386.036	37.53	8.16	45.69	54	-8.31	AVG
Remark:						
Factor = Ante	enna Factor + Ca	able Loss – F	Pre-amplifier.			

# **RESULT: PASS**

Note:

Other emissions from 1G to 25 GHz are considered as ambient noise. No recording in the test report. Factor = Antenna Factor + Cable loss - Amplifier gain, Over=Measure-Limit. The "Factor" value can be calculated automatically by software of measurement system.

All test modes had been pre-tested. The 802.11b and 802.11n20mimo mode is the worst case and recorded in the report.

# 12. BAND EDGE EMISSION

# **12.1. MEASUREMENT PROCEDURE**

Radiated restricted band edge measurements

The radiated restricted band edge measurements are measured with an EMI test receiver connected to the receive antenna while the EUT is transmitting

### 12.2. TEST SET-UP

same as 11.2

### Note:

1. Factor=Antenna Factor + Cable loss - Amplifier gain. Field Strength=Factor + Reading level 2. The factor had been edited in the "Input Correction" of the Spectrum Analyzer. So the Amplitude of test plots is equal to Reading level plus the Factor in dB. Use the A dB( $\mu$ V) to represent the Amplitude. Use the F dB( $\mu$ V/m) to represent the Field Strength. So A=F.

#### 12.3. TEST RESULT

EUT	RouterBOARD LHG 2nD-XL	Model Name	LHG XL 2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2412MHZ	Antenna	Horizontal

ctrum Analyzer - Swept S/ Peak Search Marker 1 2.413383383383 GHz PN0: Fast IFGain:Low HAtten: 20 dB Aug Type: Log-Pwr Avg|Hold:>100/100 RACE 1 2 3 4 TYPE MWWW Next Peal 2.413 38 GHz 100.942 dBµ\ Mkr′ Ref 106.99 dBµV 0 dB/div Next Pk Right Next Pk Left Ø<sup>2</sup> Marker Delta Stop 2.42500 GHz Sweep 1.066 ms (1000 pts) Start 2.37000 GHz #Res BW 1.0 MHz #VBW 3.0 MHz Mkr→CF 2.413 38 GHz 2.390 00 GHz 100.942 dBµV 46.667 dBµV N 1 f N 1 f Mkr→RefLvl More 1 of 2 STATUS

AV



EUT	RouterBOARD LHG 2nD-XL	Model Name	LHG XL 2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2412MHZ	Antenna	Vertical







EUT	RouterBOARD LHG 2nD-XL	Model Name	LHG XL 2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2462MHZ	Antenna	Horizontal







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EUT	RouterBOARD LHG 2nD-XL	Model Name	LHG XL 2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2462MHZ	Antenna	Vertical



AV

larker 1	RF 5 2.45990	0Ω AC 9909910	GHz PNO: Fast IFGain:Low	Trig: Free Ru #Atten: 20 dB	Avg	ALIGN AUTO Type: RMS Hold:>100/100	TRACE 12 TYPE A DET A N	www.w	Peak Search
0 dB/div	Ref 106	.99 dBµV				Mk	r1 2.459 91 0 97.256 dE		NextPea
- <b>og</b> 97.0 87.0 77.0		<u>↓</u> 1							Next Pk Righ
57.0 57.0 47.0						¢ <sup>2</sup>			Next Pk Le
37.0 27.0 17.0						×			Marker De
	000 GHz 1.0 MHz	X	#VB	W 3.0 MHz*	FUNCTION	Sweep	Stop 2.50000 1.066 ms (1000	pts)	Mkr→C
1 N 1 2 N 1 3 4 5			9 91 GHz 3 50 GHz	97.249 dBµV 40.378 dBµV					Mkr→RefL
6 7 8 9 0									<b>Mo</b> 1 o
1								-	

EUT	RouterBOARD LHG 2nD-XL	Model Name	LHG XL 2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11g with data rate 6 2412MHZ	Antenna	Horizontal



arker 1 2.416246246246	CHZ PNO: Fast IFGain:Low #Atten: 20 dB	ALIGN AUTO Avg Type: RMS Avg Hold:>100/100	TRACE 1 2 3 4 5 6 TYPE A WWWWW DET A NNNN	Peak Search
DdB/div Ref 106.99 dBµV		Mkr	1 2.416 25 GHz 90.766 dBµV	Next Pea
<b>og</b> 77.0 77.0				Next Pk Rigi
7.0				Next Pk Le
7.0 	2			Marker Del
tart 2.37000 GHz Res BW 1.0 MHz	#VBW 3.0 MHz*	Sweep 1	Stop 2.42500 GHz .066 ms (1000 pts)	Mkr→C
	16 25 GHz 90.768 dBµV 90 00 GHz 37.006 dBµV		E	Mkr→RefL
8 8 9 0				<b>Mo</b> 1 of

EUT	RouterBOARD LHG 2nD-XL	Model Name	LHG XL 2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11g with data rate 6 2412MHZ	Antenna	Vertical





5.99 dBµV	2		Mkr	1 2.416 4 89.777		Next Pea Next Pk Rig Next Pk Le
¢	2					
\$	2					Next Pk Le
						Marker Del
	BW 3.0 MHz*	FUNCTION			00 pts)	Mkr→C
2.416 47 GHz 2.390 00 GHz	89.824 dBµV 37.298 dBµV	TORCHOR		Tone how		Mkr→RefL
						<b>Mo</b> 1 of
	× 2.416 47 GHz	X Y 2.416 47 GHz 89.824 dBµV	X Y FUNCTION 2.416 47 GHz 89.824 dBuV 2.390 00 GHz 37.298 dBuV	X Y FUNCTION FUNCTION MIDTH 2.41647 GHz 89.824 dBpV 2.390 00 GHz 37.298 dBpV 	X Y FUNCTION FUNCTION MDTH FUNCTION 2.41647 GHz 89.824 dBpV 2.390 00 GHz 37.298 dBpV	X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE 2 416 47 GHz 89 924 dBmV 2 390 00 GHz 37.293 dBmV 

EUT	RouterBOARD LHG 2nD-XL	Model Name	LHG XL 2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11g with data rate 6 2462MHZ	Antenna	Horizontal





AV

arker	1	RF	/zer - Swe 50 Ω 15845	AC				NSE:INT		Type:	IGN AUTO RMS 100/100		RACE 1 2 3	MAMAA	Peak Search
					PNO: F IFGain:I	ast ⊊⊃ ∟ow	#Atten: 2		Avgi	noid.>	100/100			NNŇ	
) dB/div	/	Ref 1	06.99	dBµV							Mkr	1 2.45 91.2	8 46 G 82 dE		NextPea
og 97.0			<b>●</b> <sup>1</sup>		****										Next Pk Rig
7.0															
57.0 17.0								Carlow Show when		\$ <sup>2</sup>					Next Pk Le
7.0 7.0										V					Marker De
7.0 tart 2.	4500	0 GI	z									Stop 2.	50000 (	GHz	
Res B	W 1.	0 MH		X		#VBW	3.0 MHz Y	FU	NCTION		weep 1	.066 ms	CTION VALUE	pts)	Mkr→C
1 N 2 N 3		f f			58 46 GH 33 50 GH		91.281 dE 38.581 dE								Mkr→RefL
4 5 6 7															
7 8 9 0															<b>Mo</b> 1 o
1														-	

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EUT	RouterBOARD LHG 2nD-XL	Model Name	LHG XL 2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11g with data rate 6 2462MHZ	Antenna	Vertical



AV

Keysight Spectrum Analyze RF Iarker 1 2.4577(	50 Ω AC 07707708 GHz	Fast Trig: Free Run Low #Atten: 20 dB	ALIGN AUTO Avg Type: RMS Avg Hold:>100/100	TRACE 123456 TYPE A WWWW DET A NNNN	Peak Search
0 dB/div Ref 10	6.99 dBµV		Mkr	1 2.457 71 GHz 90.062 dBµV	NextPea
og 97.0 87.0	1				Next Pk Righ
67.0 57.0			<sup>2</sup>		Next Pk Le
37.0 27.0 17.0					Marker Del
itart 2.45000 GHz Res BW 1.0 MHz		#VBW 3.0 MHz*	Sweep 1	Stop 2.50000 GHz .066 ms (1000 pts)	Mkr→C
1  N  1  f    2  N  1  f    3	2.457 71 G 2.483 50 G			1 1 1 1 1	Mkr→RefL
6 7 8 9 0 0					<b>Мо</b> 1 о
G		m	STATU	5	

EUT	RouterBOARD LHG 2nD-XL	Model Name	LHG XL 2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n 20 with data rate 6.5 2412MHZ	Antenna	Horizontal
	РК		







EUT	RouterBOARD LHG 2nD-XL	Model Name	LHG XL 2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n 20 with data rate 6.5 2412MHZ	Antenna	Vertical







EUT	RouterBOARD LHG 2nD-XL	Model Name	LHG XL 2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n 20with data rate 6.5 2462MHZ	Antenna	Horizontal







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EUT	RouterBOARD LHG 2nD-XL	Model Name	LHG XL 2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n 20 with data rate 6.5 2462MHZ	Antenna	Vertical





Keysight Spectrum Analyzer - Swept SA RF 50 Q AC		SENSE:INT	ALIGN AUTO		
larker 1 2.4579079079			Avg Type: RMS Avg Hold:>100/100	TRACE 1 2 3 4 5 6 TYPE A WWWWW	Peak Search
	PNO: Fast ( IFGain:Low	#Atten: 20 dB	-	DET A NNNNN	New Dee
			Mkr	2.457 91 GHz	NextPea
0 dB/div Ref 106.99 dB	μV	•		88.650 dBµV	
97.0					Next Pk Righ
37.0					Next PK Righ
77.0					
57.0 Januar					Next Pk Le
57.0					NEXTERLE
17.0			\$ <sup>2</sup>		
27.0					Marker Del
17.0					Marker Der
tart 2.45000 GHz Res BW 1.0 MHz	#VB	W 3.0 MHz*	Sween 1	Stop 2.50000 GHz 066 ms (1000 pts)	Mkr→C
	x		INCTION FUNCTION WIDTH	EUNCTION VALUE	
1 N 1 f	2.457 91 GHz 2.483 50 GHz	88.606 dBµV 38.259 dBµV			
	2.463 50 GHZ	38.259 dBµv			Mkr→RefL
5				E	
6 7					
8 9 9					Mo
				-	1 of
		m		F	
G			STATUS		

# Report No.: AGC07248170703FE02 Page 96 of 106

EUT	RouterBOARD LHG 2nD-XL	Model Name	LHG XL 2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n 40 with data rate 13.5 2422MHZ	Antenna	Horizontal
	РК		

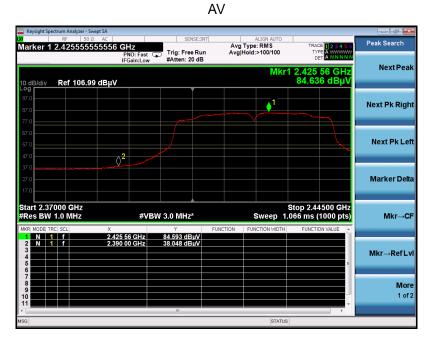


AV

	RF 50		SENSE:INT	ALIGN AUTO		Peak Search
larker 1	2.419774	774775 GHz PNO: Fas IFGain:Lo		Avg Type: RMS Avg Hold:>100/100	TRACE 1 2 3 4 5 6 TYPE A WWWWW DET A NNNNN	Feak Sealch
0 dB/div	Ref 106.9	9 dBµV		M	r1 2.419 77 GHz 84.937 dBµV	Next Pea
- <b>og</b> 97.0			The second se			
87.0				<sup>1</sup>		Next Pk Rig
77.0						
67.0						
57.0						Next Pk Le
47.0		2	eren and a second a			
37.0						
27.0						Marker Del
17.0						
	000 CHz				Stop 2.44500 GHz	
Start 2.37		#	/B)A( 3.0 MHz*	Sween	1 066 ms (1000 pts)	Mkr_C
Res BW	1.0 MHz	#*	/BW 3.0 MHz*	Sweep	1.066 ms (1000 pts)	Mkr→C
Res BW	1.0 MHz	× 2.419 77 GHz	۲ 84.930 dBµV	· · · · ·	1.066 ms (1000 pts)	Mkr→C
Res BW	1.0 MHz	х	۲ 84.930 dBµV	· · · · ·	1.066 ms (1000 pts)	
Res BW    IKR MODE TF    1  N    2  N    3    4    5	1.0 MHz	× 2.419 77 GHz	۲ 84.930 dBµV	· · · · ·	1.066 ms (1000 pts)	
Res  BW    MKR  MODE  TF    1  N  1    2  N  1    3  4  5    6  7  1	1.0 MHz	× 2.419 77 GHz	۲ 84.930 dBµV	· · · · ·	1.066 ms (1000 pts)	Mkr→RefL
Res  BW    Ikr  MODE  TF    1  N  1    2  N  1    3  4  5    5  6  7    8  9  9	1.0 MHz	× 2.419 77 GHz	۲ 84.930 dBµV	· · · · ·	1.066 ms (1000 pts)	Mkr→RefL Mo
Res  BW    IKR  MODE  TF    1  N  1    2  N  1    3  -  -    4  -  -    5  -  -    6  -  -    7  -  -	1.0 MHz	× 2.419 77 GHz	۲ 84.930 dBµV	· · · · ·	1.066 ms (1000 pts)	Mkr→C Mkr→RefL Mo 1 oi

EUT	RouterBOARD LHG 2nD-XL	Model Name	LHG XL 2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n 40 with data rate 13.5 2422MHZ	Antenna	Vertical





ΡK

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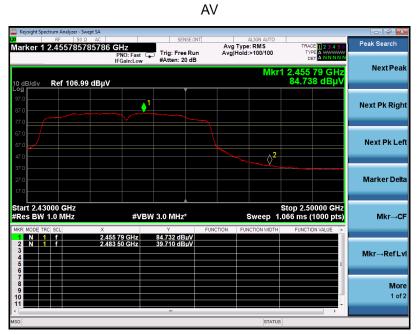
EUT	RouterBOARD LHG 2nD-XL	Model Name	LHG XL 2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n 40 with data rate 13.5 2452MHZ	Antenna	Horizontal



	RF 50 Ω AC 14954954955	0 GHz PNO: Fast	SENSE:INT	Avg	ALIGN AUTO Type: RMS fold:>100/100	TRACE 1 2 3 4 5 TYPE A WWW DET A NNN	Peak Search
0 dB/div R	ef 106.99 dBµ		WAIten: 10 dB		Mkr	2.449 55 GH 85.945 dBµ	z Next Pea V
<b>og</b> 37.0 37.0							Next Pk Rig
77.0 57.0 57.0							Next Pk Le
17.0 17.0 17.0 7.0					2		Marker De
tart 2.43000 Res BW 1.0	) MHz		N 3.0 MHz*	FUNCTION	Sweep 1.	Stop 2.50000 GH 066 ms (1000 pts	z s) Mkr→C
2 N 1 1 3 4 5 5		449 55 GHz 483 50 GHz	85.913 dBµV 39.117 dBµV				Mkr→RefL
							Mo
6 7 8 9 0							1 of

EUT	RouterBOARD LHG 2nD-XL	Model Name	LHG XL 2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11n 40 with data rate 13.5 2452MHZ	Antenna	Vertical





Note: Two transmit chains had been tested, the chain 0 was the worst case and record in the test report. EUT can work at 802.11b/g/n mode by used two antenna (ant0 + ant1), but at 802.11b/g mode EUT cannot use two antenna at the same time, only at 802.11n mimo mode two antenna (ant0+ant1) work at the same time.

# **13. FCC LINE CONDUCTED EMISSION TEST**

# **13.1. LIMITS OF LINE CONDUCTED EMISSION TEST**

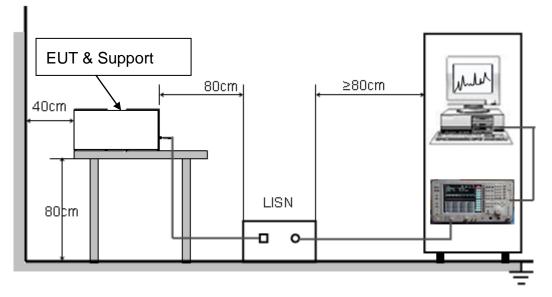
Frequency	Maximum RF Line Voltage						
Frequency	Q.P.( dBuV)	Average( dBuV)					
150kHz~500kHz	66-56	56-46					
500kHz~5MHz	56	46					
5MHz~30MHz	60	50					

Note:

1. The lower limit shall apply at the transition frequency.

2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50MHz.

# 13.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



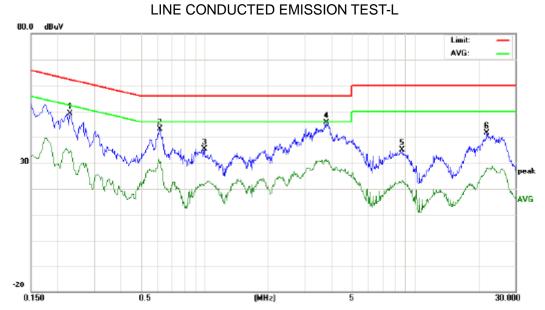
# 13.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

- The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- 2. Support equipment, if needed, was placed as per ANSI C63.10.
- 3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
- 4. All support equipments received AC120V/60Hz power from a LISN, if any.
- 5. The EUT received charging voltage by adapter which received 120V/60Hzpower by a LISN.
- 6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
- 8. During the above scans, the emissions were maximized by cable manipulation.
- 9. The test mode(s) were scanned during the preliminary test.

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

### **13.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST**

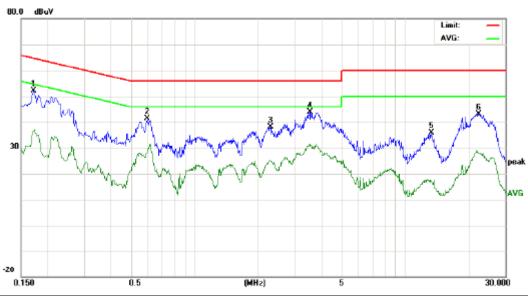
- 1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
- 2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less –2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
- 3. The test data of the worst case condition(s) was reported on the Summary Data page.



# 13.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

No.	No. Freq.			Rea	ding_L (dBuV)		Correct Factor	Me	asuren (dBuV)			nit uV)		rgin IB)	P/F	Comment
	(MHz)	Peak	QP	AVG	dB	Peak	QP	AVG	QP	AVG	QP	AVG				
1	0.2300	38.89		24.52	10.25	49.14		34.77	62.45	52.45	-13.31	-17.68	Ρ			
2	0.6139	32.79		19.57	10.32	43.11		29.89	56.00	46.00	-12.89	-16.11	Р			
3	1.0020	24.96		11.45	10.37	35.33		21.82	56.00	46.00	-20.67	-24.18	Ρ			
4	3.8140	35.14		20.97	10.46	45.60		31.43	56.00	46.00	-10.40	-14.57	Ρ			
5	8.7018	24.71		13.10	10.29	35.00		23.39	60.00	50.00	-25.00	-26.61	Р			
6	22.0419	31.45		17.97	10.12	41.57		28.09	60.00	50.00	-18.43	-21.91	Р			

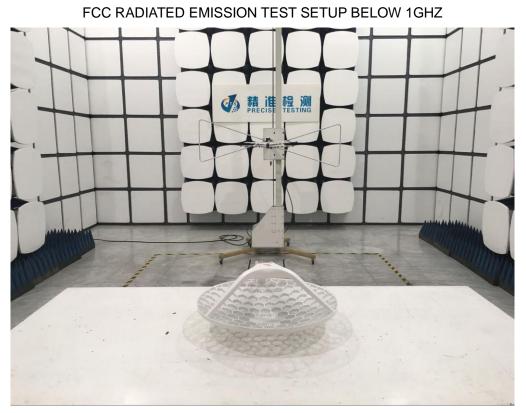
**RESULT: PASS** 



LINE CONDUCTED EMISSION TEST-N

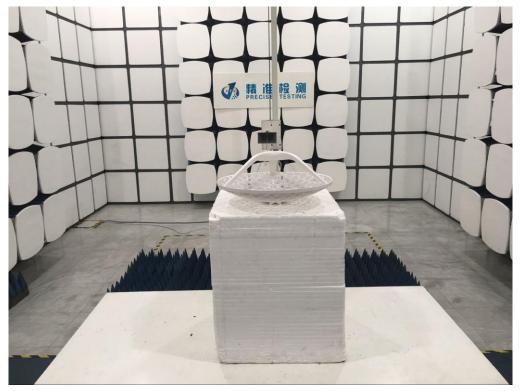
#### Reading\_Level Measurement Limit Correct Margin Freq. (dB) Factor (dBuV) (dBuV) (dBuV) P/F Comment No. (MHz) Peak QP QP AVG QP Peak QP AVG AVG dB AVG 0.1720 41.99 26.36 10.18 52.17 54.86 Ρ 36.54 64.86 12.69 -18.32 1 2 31.04 19.10 41.35 56.00 Ρ 0.5979 10.31 29.41 46.00 -14.65 -16.59 3 2.3060 27.89 14.55 10.35 38.24 24.90 56.00 46.00 -17.76 -21.10 Ρ 20.89 4 10.50 43.91 31.39 Ρ 3.5459 33.41 56.00 46.00 12.09 -14.61 5 13.3498 25.62 6.68 10.13 35.75 16.81 60.00 50.00 -24.25 -33.19 Ρ 6 22.5180 33.07 18.04 10.11 43.18 28.15 80.00 50.00 -16.82 -21.85 Ρ

# **RESULT: PASS**



APPENDIX A: PHOTOGRAPHS OF TEST SETUP

FCC RADIATED EMISSION TEST SETUP ABOVE 1GHZ





FCC LINE CONDUCTED EMISSION TEST SETUP

----END OF REPORT----