

RF TEST REPORT

Test item : Wireless Audio Transceiver Module
Model No. : R2
Order No. : 1110-01404
Date of receipt : 2011-10-18
Test duration : 2011-12-05 ~ 2011-12-28
Date of issue : 2011-12-28
Use of report : FCC Original Grant

Applicant : LG Electronics USA.
1000 Sylvan Avenue Englewood Cliffs, New Jersey, United States

Test laboratory : Digital EMC Co., Ltd.
683-3, Yubang-Dong, Cheoin-Gu, Yongin-Si, Kyunggi-Do, 449-080, Korea

Test specification : FCC Part 15.407 Subpart E
Test environment : See appended test report
Test result : ☒ Pass ☐ Fail

The test results presented in this test report are limited only to the sample supplied by applicant and the use of this test report is inhibited other than its purpose. This test report shall not be reproduced except in full, without the written approval of Digital EMC Co., Ltd.

Tested by:

Witnessed by:

Reviewed by:



Engineer
S.K.Ryu

N/A



Manager
W.J. Lee

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1. Equipment information

1.1 Equipment description

FCC Equipment Class	Unlicensed National Information Infrastructure (UNII)
Equipment type	Wireless Audio Transceiver Module
Equipment model name	R2
Equipment add model name	N/A
Equipment serial no.	Identical prototype
Frequency band	5180 ~ 5240MHz
Channel number	3
Modulation type	QPSK
Antenna type	PIFA Antenna (Max. peak gain) Chain A : 3.3dBi, Chain B : 4.0dBi
Power Supply	DC 3.3 V

1.2 Ancillary equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
-	-	-	-	-
-	-	-	-	-

2. Information about test items

2.1 Test mode

Test case	Band	Channel No.	Frequency [MHz]
Test case 1	5GHz	1	5180
		2	5210
		3	5240

All the testing items are performed at maximum power and each antenna.

2.2 Supported antenna configuration

Band	Single Transmitting and Receiving		Multiple Transmitting
	Chain A	Chain B	
5GHz	Yes	Yes	No

2.3 Auxiliary equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
Notebook	X51RL	85N0AS318314227	ASUSTeK Computer Inc.	-
Mouse	M-UAE96	910-000004	Logitech Inc.	-
-	-	-	-	-

2.4 Tested environment

Temperature	: 20 ~ 25 °C
Relative humidity content	: 35 ~ 45 % R.H.
Details of power supply	: DC 3.3 V

2.5 EMI Suppression Device(s)/Modifications

EMI suppression device(s) added and/or modifications made during testing

→ None

3. Test Report

3.1 Summary of tests

FCC Part Section(s)	Parameter	Limit	Test Condition	Status Note 1
I. Test Items (TX)				
15.407(a)	26 dB Bandwidth	N/A	Conducted	C
15.407(a)	Maximum Conducted Output Power	< the lesser of 50mW or $4 + 10\log_{10}(B)$ dBm		C
15.407(a)	Peak Power Spectral Density	< 4 dBm/MHz		C
15.407(a)	Peak Excursion	< 13 dB/MHz maximum difference		C
15.407(c)	Frequency Stability	The emissions is maintained within the band of the operation.		C
15.407(b)	Undesirable Emissions	< -27 dBm/MHz EIRP	Radiated	C
15.205 15.209 15.407(b)	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209		C Note.2
15.207	AC Conducted Emissions	15.207	AC Line Conducted	C
15.203	Antenna Requirements	FCC 15.203	-	C
Note 1: C=Comply NC=Not Comply NT=Not Tested NA=Not Applicable Note 2: This test item was performed in each axis and the worst case data were reported.				

The sample was tested according to the following specification:
ANSI C-63.4-2003, DA02-2138

3.2 Transmitter requirements

3.2.1 26 dB Bandwidth

- Procedure:

The bandwidth at 26 dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies. The 26dB bandwidth is used to determine the conducted power limits.

- Measurement Data: **Comply**

Test Case	Channel	Frequency [MHz]	Test Result [MHz]	
			Chain A	Chain B
1	1	5180	16.08	16.06
	2	5210	16.08	16.07
	3	5240	16.08	16.04

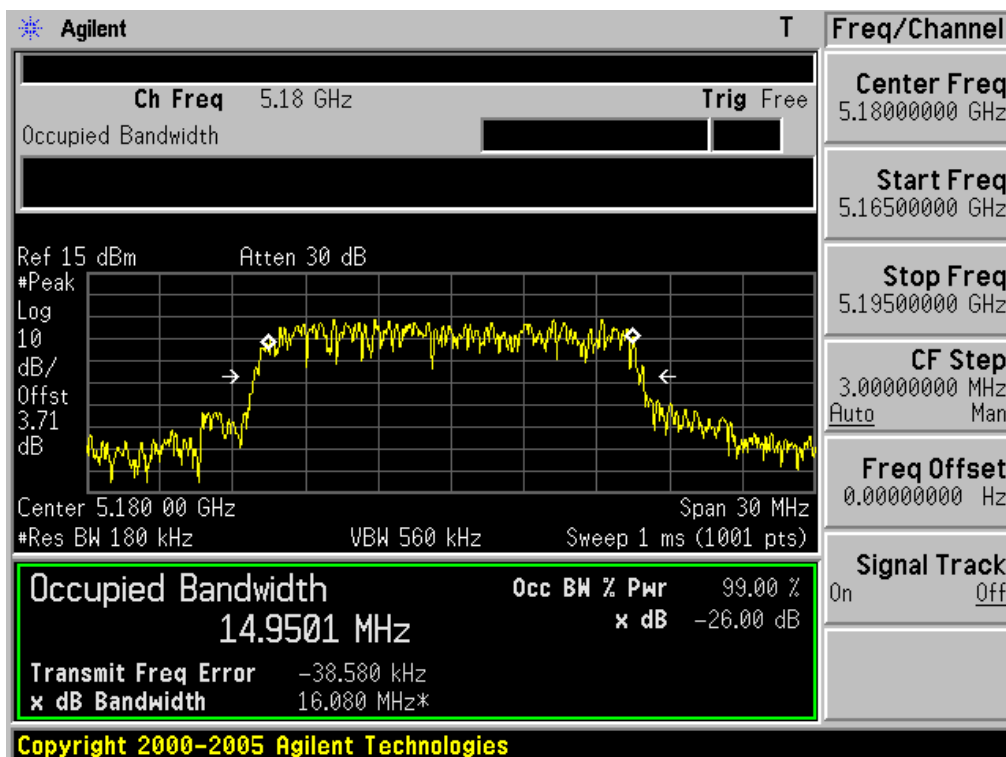
Note 1: The worst case plots in both chains are attached on next page.

- Minimum Standard:

The minimum 26 dB bandwidth shall be at least 500 kHz

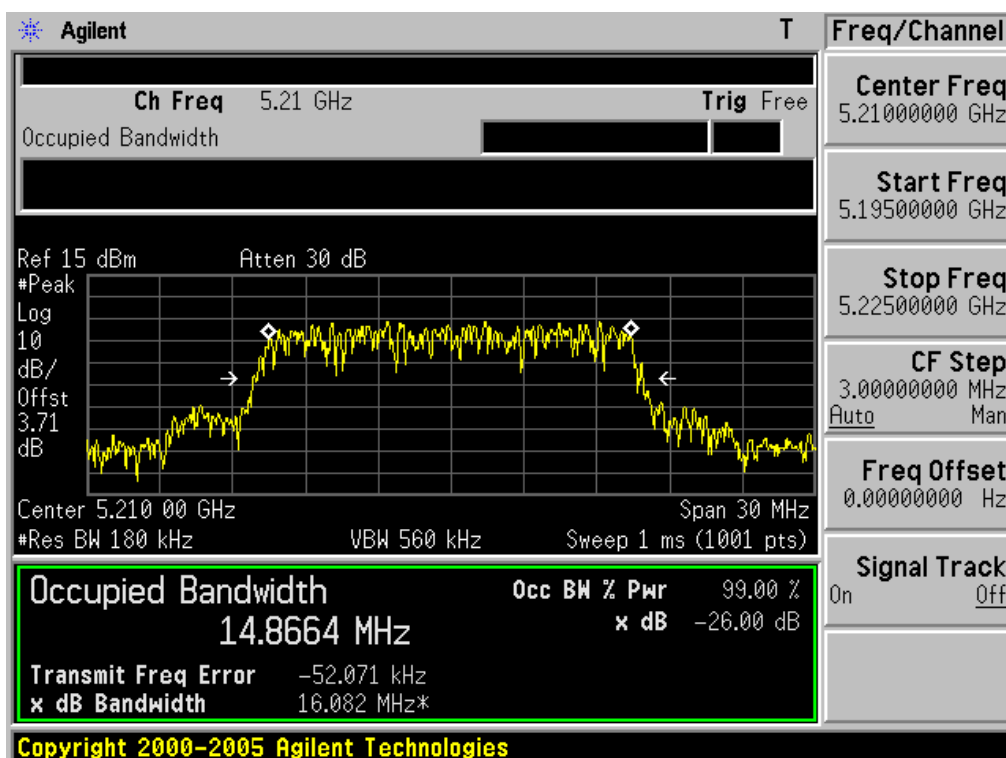
26 dB Bandwidth

Test Case 1 & Ch.1 & Chain A



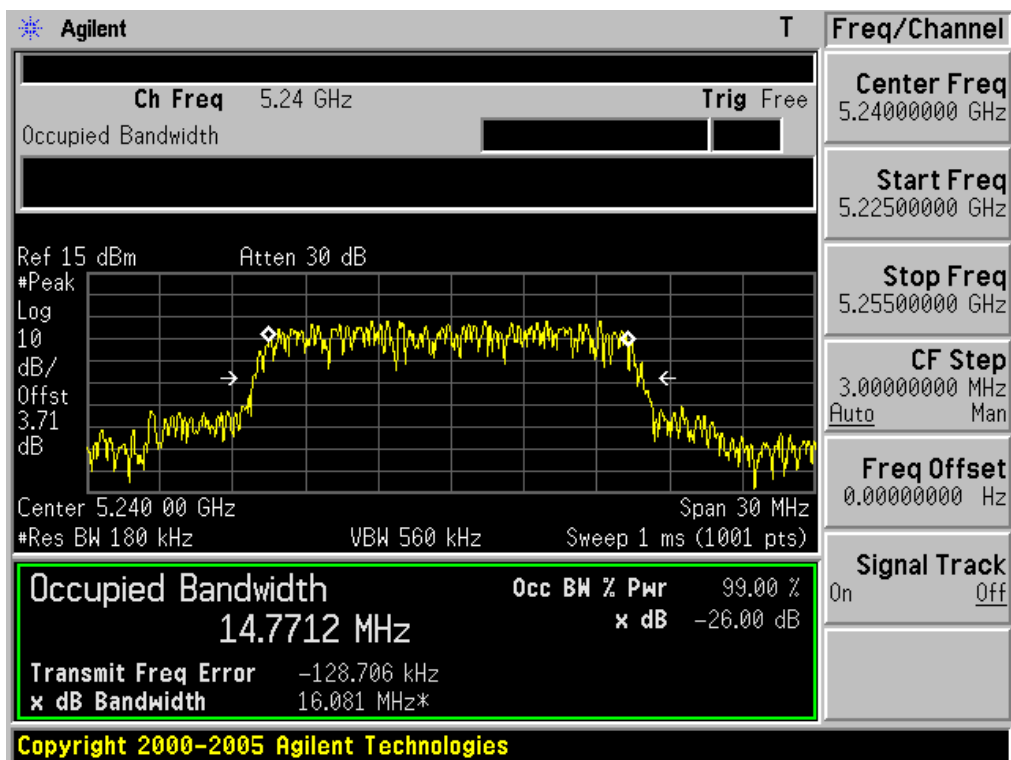
26 dB Bandwidth

Test Case 1 & Ch.2 & Chain A



26 dB Bandwidth

Test Case 1 & Ch.3 & Chain A



3.2.2 Peak conducted transmit output power

- Test Procedure

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

Method #3 was used.(T = 780us)

- Measurement Data: **Comply**

Test case	Channel	Frequency [MHz]	ANT Chain	Peak conducted transmit output power		
				Measured Value [dBm]	Result Value	
					[dBm]	[W]
1	1	5180	Chain A	-4.15	7.91	0.00618
			Chain B	-4.42	7.64	0.00580
	2	5210	Chain A	-4.35	7.71	0.00591
			Chain B	-4.62	7.44	0.00555
	3	5240	Chain A	-4.45	7.61	0.00577
			Chain B	-4.70	7.35	0.00544

Note 1: Result value = Measured value + $10 \times \log(\text{EBW} / 1\text{MHz})$

Note 2: The worst case plots in both chains are attached on next page.

- Calculation of limit

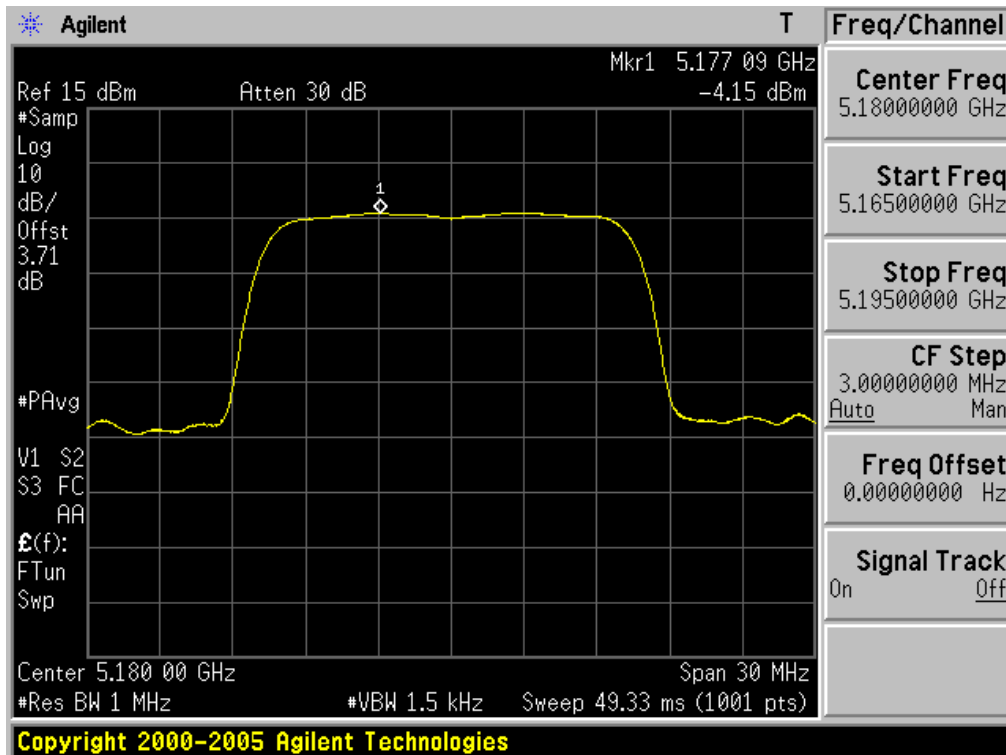
Test Case	Min. 26dB BW (MHz)	Limit 1 (dBm)	Limit 2 (dBm)
		50mW	4dbm + $10\log(26\text{dB BW} / 1\text{MHz})$
1	16.04	16.99	16.05 ^{Note 1}

Note 1: This limit is applied for compliance of the requirement.

Minimum Standard:	Maximum conducted output power shall not exceed the lesser of 50 mW or 4 dBm + $10 \log B$, where B is the 26dB emission bandwidth in MHz.
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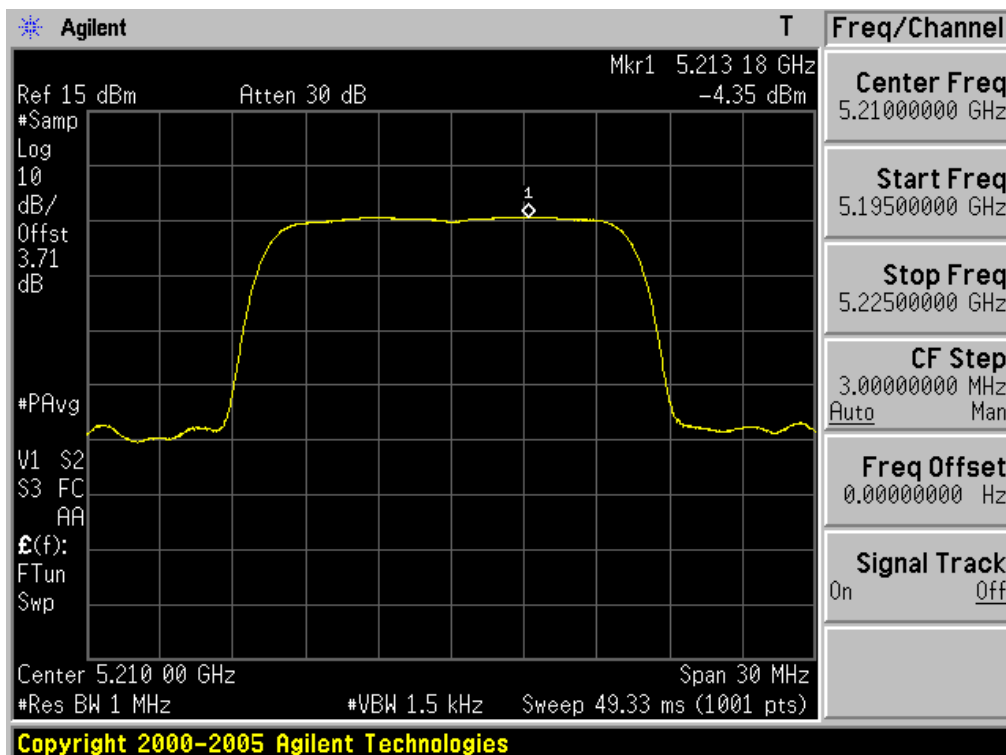
Output Power

Test Case 1 & Ch.1 & Chain A



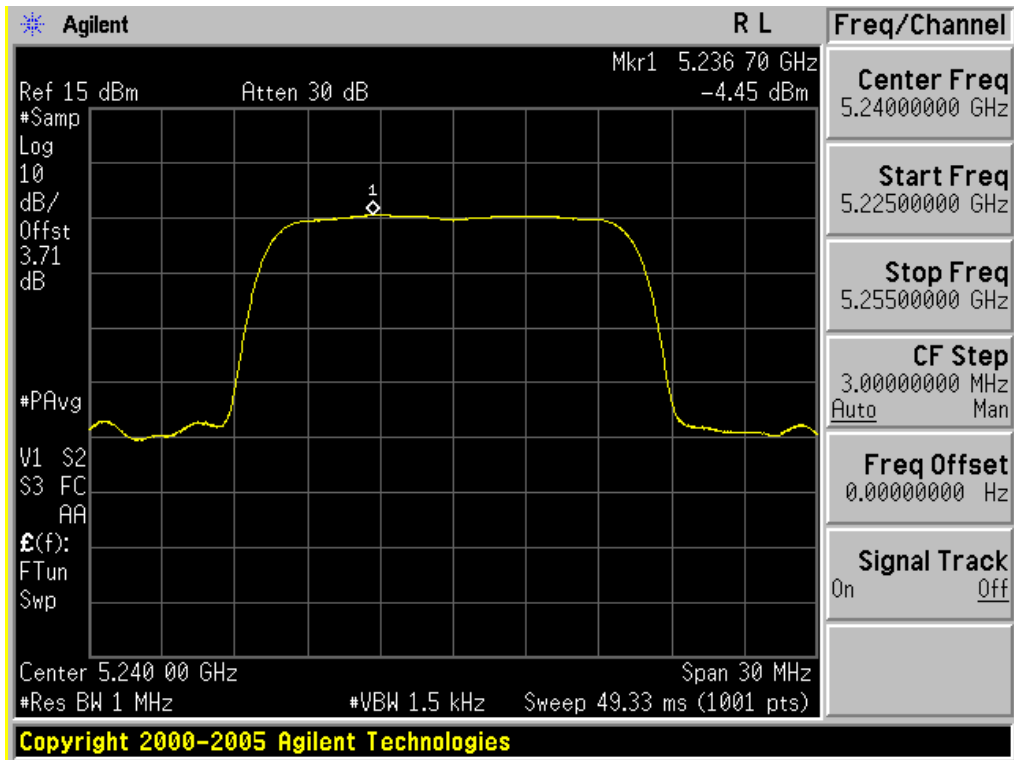
Output Power

Test Case 1 & Ch.2 & Chain A



Output Power

Test Case 1 & Ch.3 & Chain A



3.2.3 Peak Power Spectral Density

- Procedure:

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for assessing Unlicensed National Information Infrastructure (U-NII) devices – Part 15, Subpart E, August 2002.

PPSD method #2 was used.

- Measurement Data: Comply

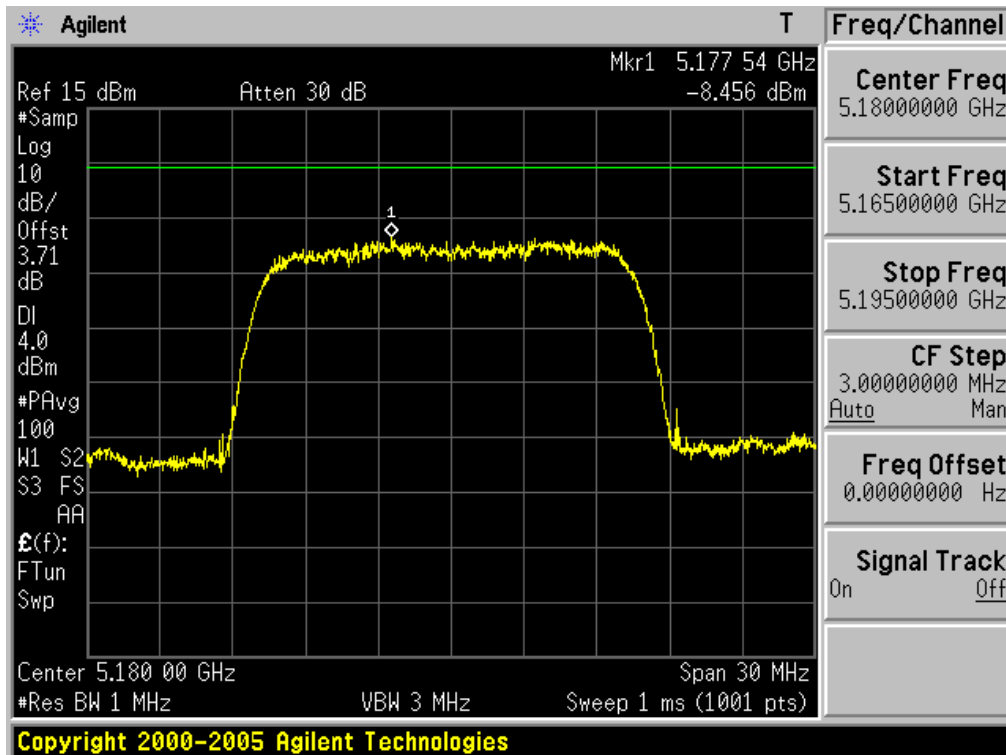
Test Case	Channel	Frequency [MHz]	Test Result [dBm]	
			Chain A	Chain B
1	1	5180	-8.456	-8.618
	2	5210	-8.199	-8.353
	3	5240	-7.205	-8.378

Note 1: The worst case plots in both chains are attached on next page.

Minimum Standard:	The peak power spectral density shall not exceed 4 dBm in any 1MHz band.
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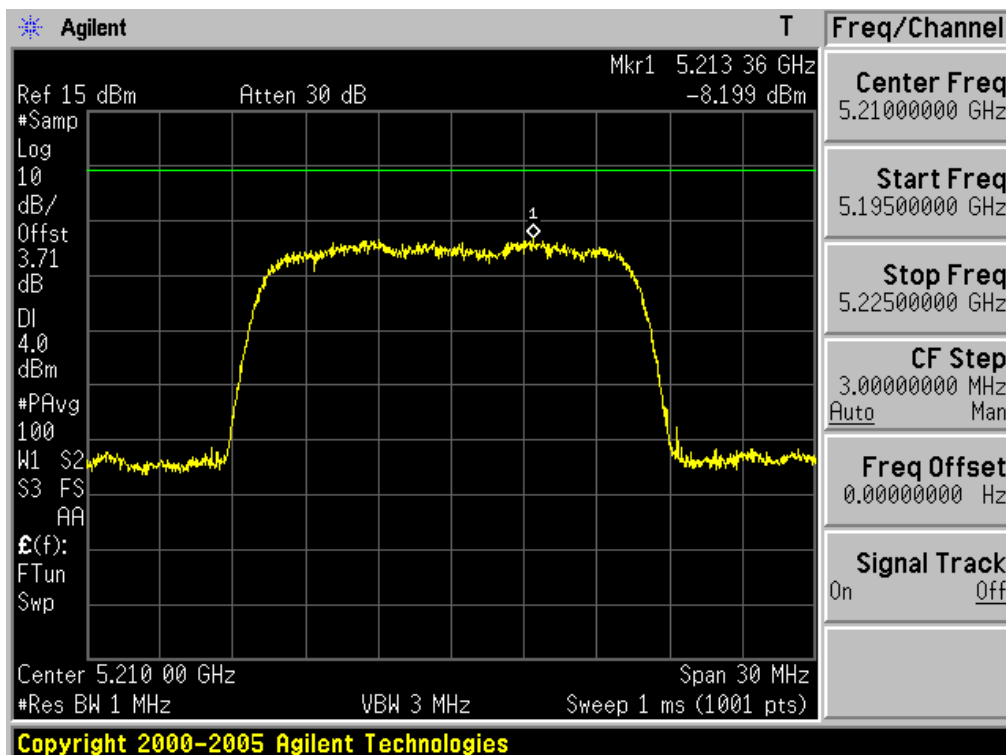
Peak Power Spectral Density

Test Case 1 & Ch.1 & Chain A



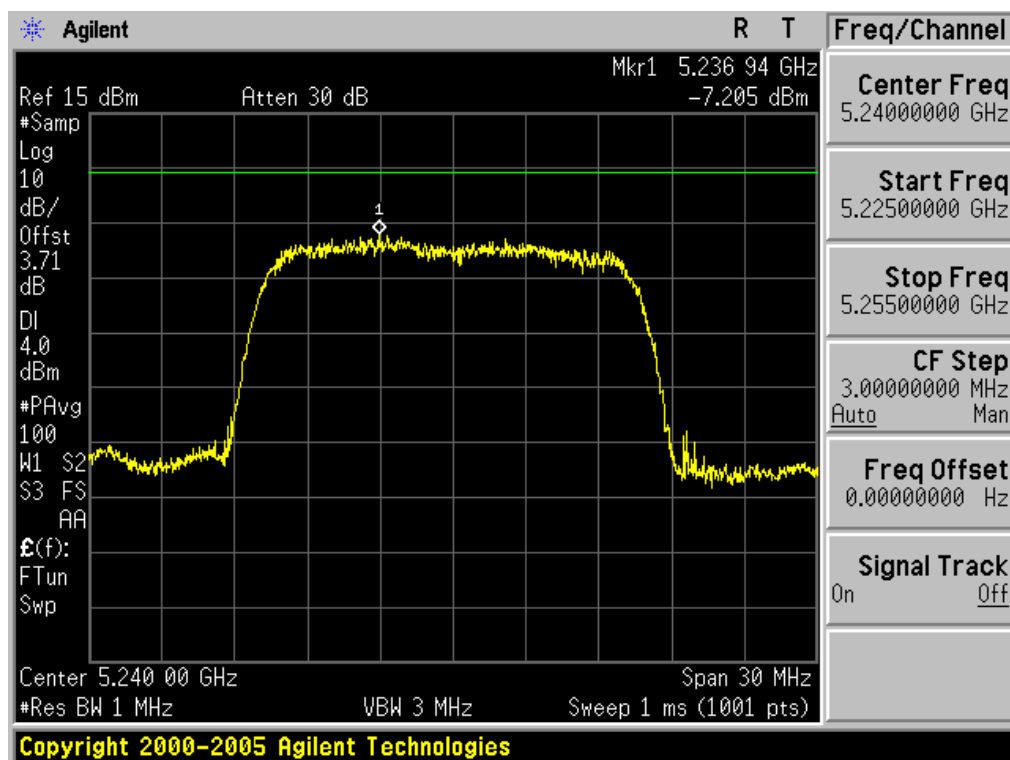
Peak Power Spectral Density

Test Case 1 & Ch.2 & Chain A



Peak Power Spectral Density

Test Case 1 & Ch.3 & Chain A



3.2.4 Peak Excursion Ratio

- Procedure:

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

- Measurement Data: Comply

Mode	Channel	Frequency [MHz]	Test Result [dB]	
			Chain A	Chain B
Test Case 1	1	5180	7.76	7.77
	2	5210	7.81	7.82
	3	5240	7.70	7.75

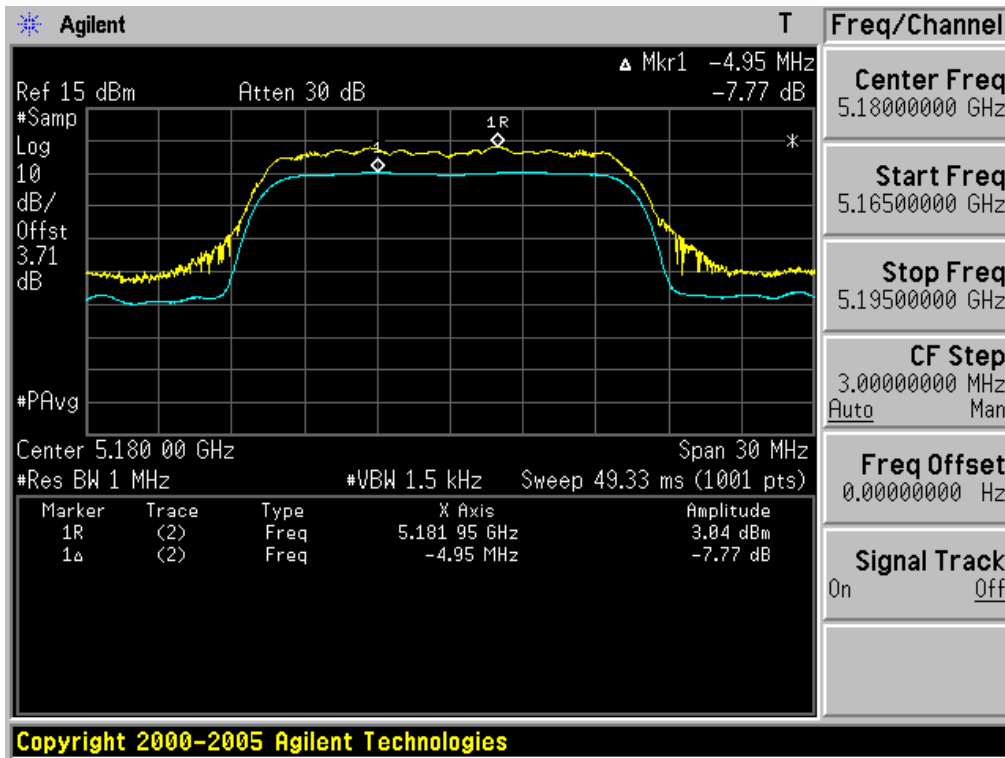
Note 1: The worst case plots in both chains are attached on next page.

- Minimum Standard:

Minimum Standard:	13 dBm/MHz
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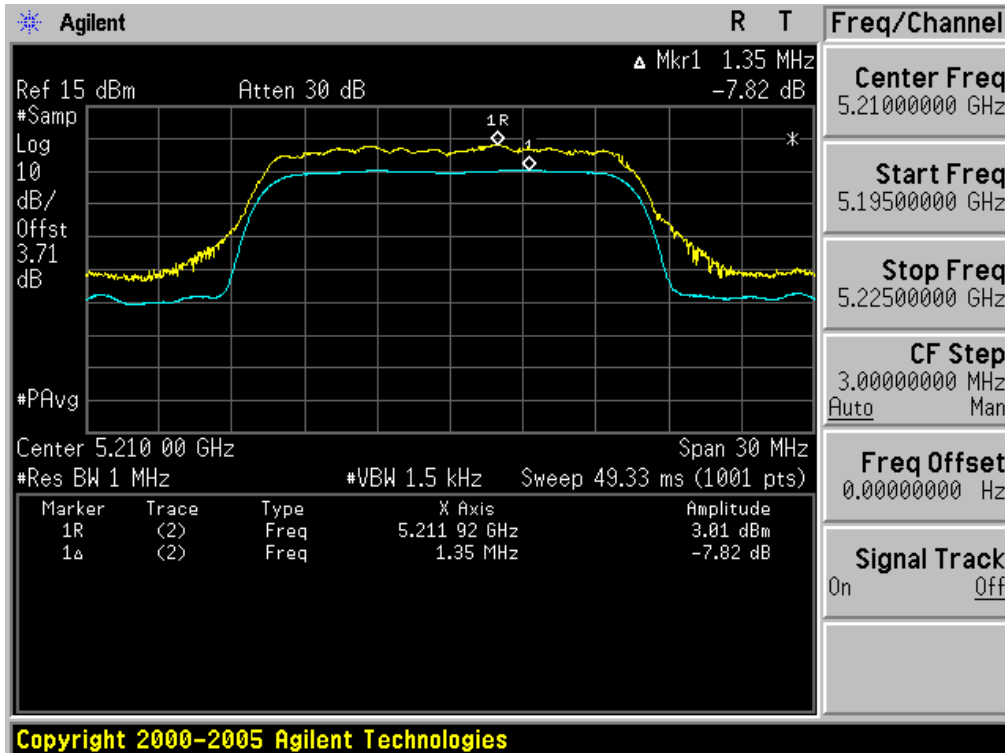
Peak Excursion Ratio

Test Case 1 & Ch.1 & Chain B



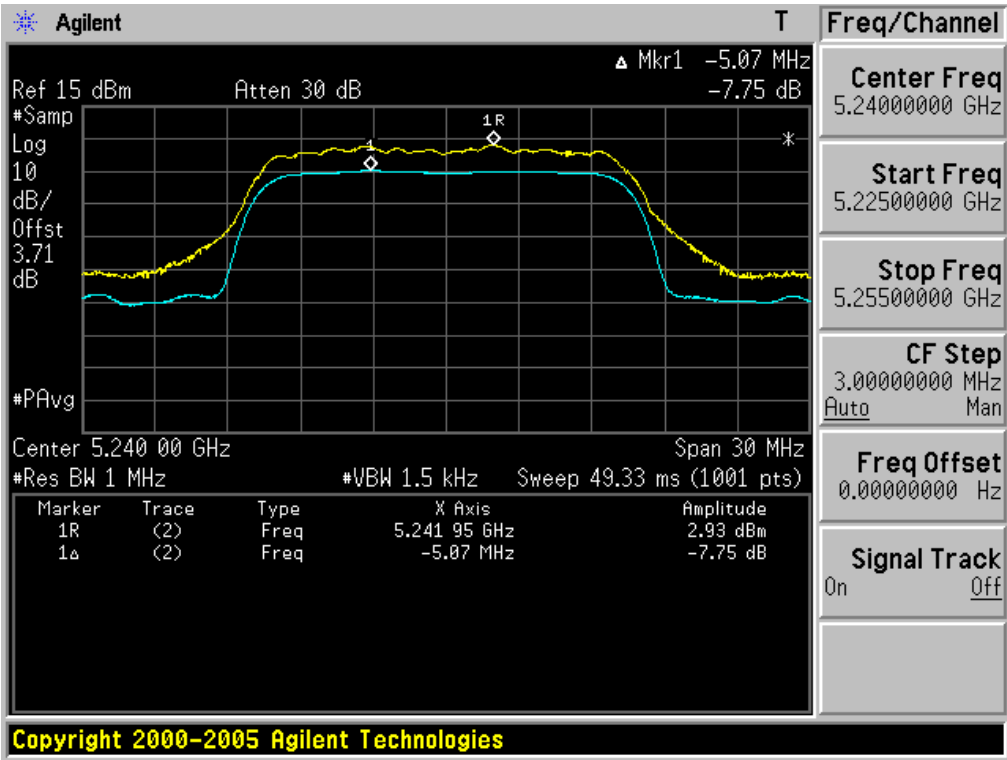
Peak Excursion Ratio

Test Case 1 & Ch.2 & Chain B



Peak Excursion Ratio

Test Case 1 & Ch.3 & Chain B



3.2.5 Frequency Stability

- Procedure:

The EUT was placed inside of an environmental chamber as the temperature in the chamber was varied between -10°C and +60°C. The temperature was incremented by 10°C intervals and the unit was allowed to stabilize at each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded.

- Measurement Data:

Test Mode : Test Case 1 & Chain A
 OPERATING FREQUENCY : 5,210,000,000 Hz
 CHANNEL : 2
 REFERENCE VOLTAGE : 3.300 V DC

VOLTAGE (%)	POWER (V DC)	TEMP (°C)	FREQ (Hz)	Deviation
				(%)
100%	3.300	+25(Ref)	5,209,934,056	-0.001266
100%		-10	5,209,966,693	-0.000639
100%		0	5,209,951,473	-0.000931
100%		+10	5,209,941,768	-0.001118
100%		+20	5,209,935,766	-0.001233
100%		+30	5,209,930,434	-0.001335
100%		+40	5,209,924,102	-0.001457
100%		+50	5,209,926,715	-0.001407
100%		+60	5,209,921,448	-0.001508
115%	3.795	+25	5,209,936,188	-0.001225
ENDPOINT	3.100	+25	5,209,933,768	-0.001271

Note1 : This device was tested above operating temperatures according to manufacturer's declaration

- Minimum Standard: The emissions are maintained within the band of the operation.

3.2.6 Radiated Spurious Emission Measurements

- Procedure:

The EUT was placed on a 0.8m high wooden table inside a shielded enclosure. An antenna was placed near the EUT and measurements of frequencies and amplitudes of field strengths were recorded for reference during final measurements. For final radiated testing, measurements were performed in OATS. Measurements were performed with the EUT oriented in 3 orthogonal axis and rotated 360 degrees to determine worst-case orientation for maximum emissions.

- Measurement Data: **Comply**

- Minimum Standard:

• FCC Part 15.209(a) and (b)

Frequency (MHz)	Limit (uV/m) @ 3m
30 ~ 88	100 **
88 ~ 216	150 **
216 ~ 960	200 **
Above 960	500

** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

• FCC Part 15.205 (a): Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	8.41425 ~ 8.41475	108 ~ 121.94	1300 ~ 1427	3600 ~ 4400	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1435 ~ 1626.5	4.5 ~ 5.15	15.35 ~ 16.2
2.1735 ~ 2.1905	12.51975 ~	149.9 ~ 150.05	1645.5 ~ 1646.5	5.35 ~ 5.46	17.7 ~ 21.4
4.125 ~ 4.128	12.52025	156.52475 ~	1660 ~ 1710	7.25 ~ 7.75	22.01 ~ 23.12
4.17725 ~ 4.17775	12.57675 ~	156.52525	1718.8 ~ 1722.2	8.025 ~ 8.5	23.6 ~ 24.0
4.20725 ~ 4.20775	12.57725	156.7 ~ 156.9	2200 ~ 2300	9.0 ~ 9.2	31.2 ~ 31.8
6.215 ~ 6.218	13.36 ~ 13.41	162.0125 ~ 167.17	2310 ~ 2390	9.3 ~ 9.5	36.43 ~ 36.5
6.26775 ~ 6.26825	16.42 ~ 16.423	167.72 ~ 173.2	2483.5 ~ 2500	10.6 ~ 12.7	Above 38.6
6.31175 ~ 6.31225	16.69475 ~	240 ~ 285	2655 ~ 2900	13.25 ~ 13.4	
8.291 ~ 8.294	16.69525	322 ~ 335.4	3260 ~ 3267		
8.362 ~ 8.366	16.80425 ~	399.90 ~ 410	3332 ~ 3339		
8.37625 ~ 8.38675	16.80475	608 ~ 614	3345.8 ~ 3358		
	25.5 ~ 25.67	960 ~ 1240			
	37.5 ~ 38.25				
	73 ~ 74.6				
	74.8 ~ 75.2				

• FCC Part 15.205(b): The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

• FCC Part 15.407(b)(2)

For transmitters operating in the 5.25–5.35 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of –27dBm/MHz(68.23dBuV/m).

- Measurement Data:**30MHz ~ 40GHz Radiated Spurious Emissions: Test Case 1 & Chain A & 5180MHz(Ch. 1)**

Frequency (MHz)	ANT Pol	The worst case EUT Position	Detector	Reading (dBuV)	T.F (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
73.731	H	Y axis	QP	51.78	-15.00	36.78	40.00	3.22
96.043	H	X axis	QP	48.54	-11.70	36.84	43.50	6.66
5135.880	H	X axis	PK	46.47	7.35	53.82	74.00	20.18
5136.440	H	X axis	AV	33.60	7.35	40.95	54.00	13.05
6906.550	V	Z axis	PK	46.82	9.89	56.71	68.23	11.52

30MHz ~ 40GHz Radiated Spurious Emissions: Test Case 1 & Chain A & 5210MHz(Ch. 2)

Frequency (MHz)	ANT Pol	The worst case EUT Position	Detector	Reading (dBuV)	T.F (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
73.702	H	Y axis	QP	50.73	-15.00	35.73	40.00	4.27
96.018	H	X axis	QP	47.76	-11.70	36.06	43.50	7.44
6946.270	V	Z axis	PK	47.34	10.03	57.37	68.23	10.86

30MHz ~ 40GHz Radiated Spurious Emissions: Test Case 1 & Chain A & 5240MHz(Ch. 3)

Frequency (MHz)	ANT Pol	The worst case EUT Position	Detector	Reading (dBuV)	T.F (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
73.706	H	Y axis	QP	51.83	-15.00	36.83	40.00	3.17
95.961	H	X axis	QP	48.53	-11.70	36.83	43.50	6.67
6986.390	V	Z axis	PK	48.07	9.85	57.92	74.00	16.08

Note.

1. This test item was performed in each axis and the worst case data were reported.
2. Sample Calculation.

$$\text{Margin} = \text{Limit} - \text{Result} \quad / \quad \text{Result} = \text{Reading} + \text{T.F} \quad / \quad \text{T.F} = \text{AF} + \text{CL} - \text{AG}$$

Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain.

- Measurement Data:**30MHz ~ 40GHz Radiated Spurious Emissions: Test Case 1 & Chain B & 5180MHz(Ch. 1)**

Frequency (MHz)	ANT Pol	The worst case EUT Position	Detector	Reading (dBuV)	T.F (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
73.702	H	Y axis	QP	51.21	-15.00	36.21	40.00	3.79
96.057	H	X axis	QP	48.26	-11.70	36.56	43.50	6.94
5135.160	H	X axis	PK	45.33	7.35	52.68	74.00	21.32
5147.300	H	X axis	AV	33.29	7.35	40.64	54.00	13.36
6906.460	V	Z axis	PK	46.14	9.89	56.03	68.23	12.20

30MHz ~ 40GHz Radiated Spurious Emissions: Test Case 1 & Chain B & 5210MHz(Ch. 2)

Frequency (MHz)	ANT Pol	The worst case EUT Position	Detector	Reading (dBuV)	T.F (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
73.712	H	Y axis	QP	51.43	-15.00	36.43	40.00	3.57
95.961	H	X axis	QP	48.33	-11.70	36.63	43.50	6.87
6946.140	V	Z axis	PK	46.82	10.03	56.85	68.23	11.38

30MHz ~ 40GHz Radiated Spurious Emissions: Test Case 1 & Chain B & 5240MHz(Ch. 3)

Frequency (MHz)	ANT Pol	The worst case EUT Position	Detector	Reading (dBuV)	T.F (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
73.741	H	Y axis	QP	50.99	-15.00	35.99	40.00	4.01
96.042	H	X axis	QP	48.37	-11.70	36.67	43.50	6.83
6986.430	V	Z axis	PK	48.63	9.85	58.48	74.00	15.52

Note.

1. This test item was performed in each axis and the worst case data were reported.
2. Sample Calculation.
 $\text{Margin} = \text{Limit} - \text{Result}$ $\text{Result} = \text{Reading} + \text{T.F} / \text{T.F} = \text{AF} + \text{CL} - \text{AG}$
 Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain.

3.2.7 AC Conducted Emissions

- Procedure:

The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. Emissions closest to the limit are measured in the quasi-peak mode (QP) and average mode (AV) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation and Exerciser operation. The highest emissions relative to the limit are listed.

- Measurement Data: Comply

Note 1: See next pages for actual measured spectrum plots and data.

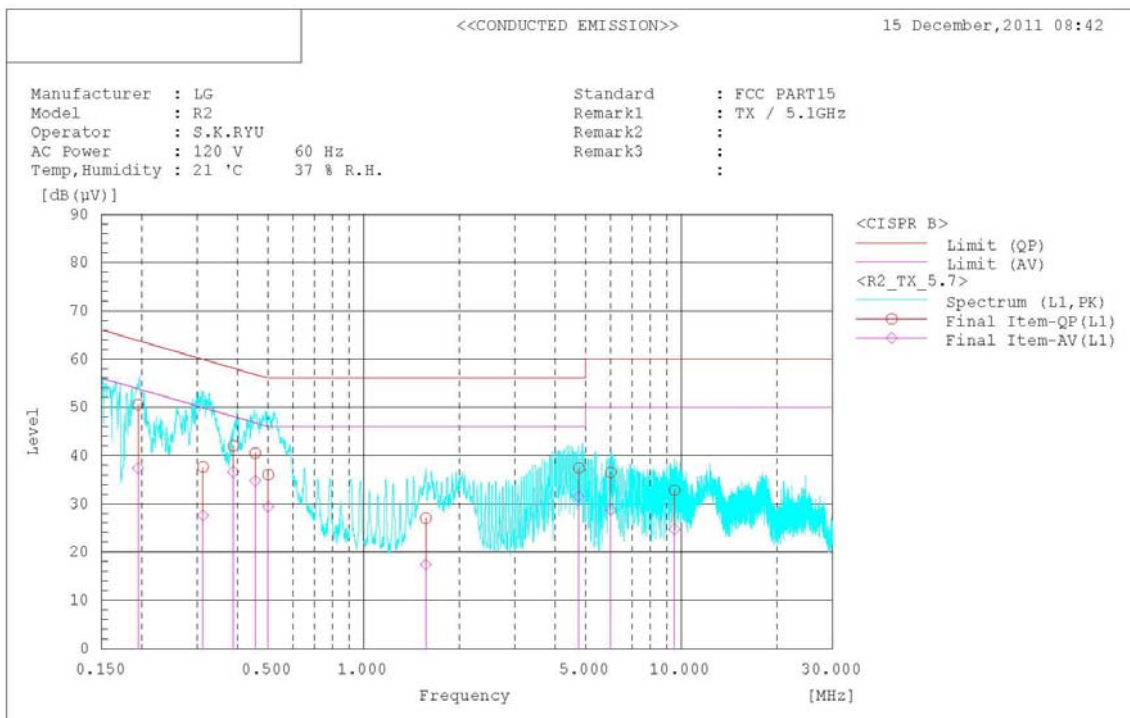
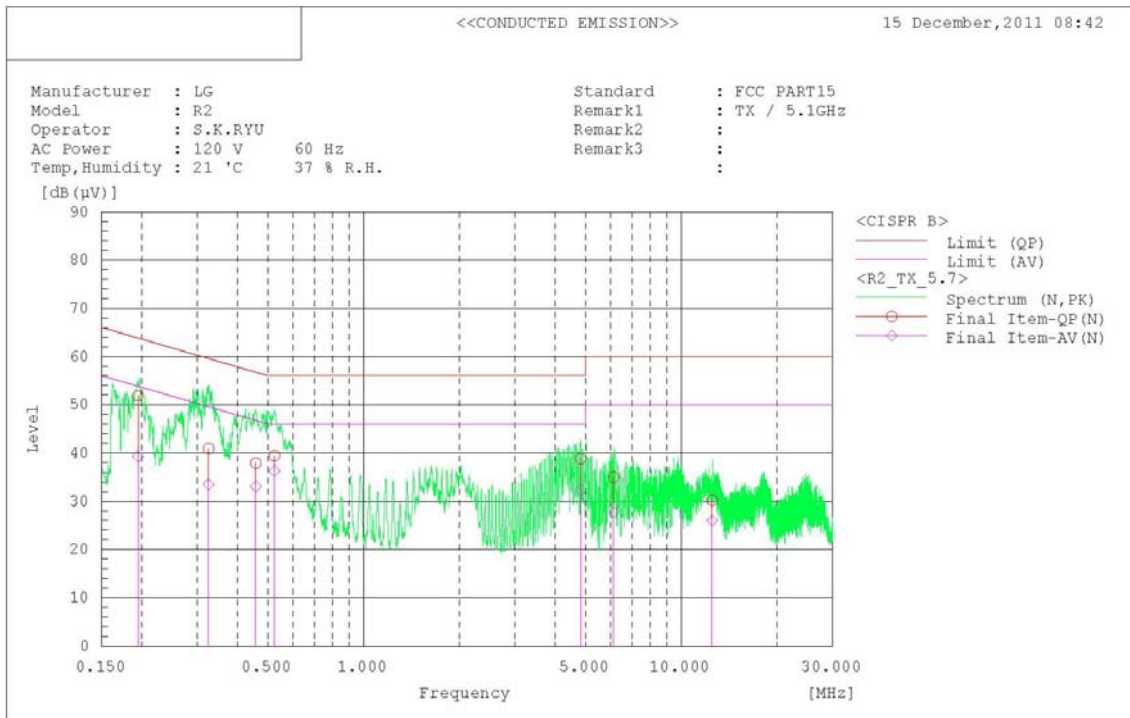
- Minimum Standard: FCC Part 15.207(a)/EN 55022

Frequency Range (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

AC Line Conducted Emissions (Graph)

Test Mode: Test Case 1



AC Line Conducted Emissions (Data List)

Test Mode: Test Case 1

<<CONDUCTED EMISSION>>

15 December, 2011 08:42

Standard : FCC PART15

Manufacturer : LG

Model : R2

Operator : S.K.R.YU

AC Power : 120 V 60 Hz

Temp,Humidity : 21 °C 37 % R.H.

Remark1 : TX / 5.1GHz

Remark2 :

Remark3 :

Final Result

--- N Phase ---

No.	Frequency	Reading QP	Reading AV	c.f	Result QP	Result AV	Limit QP	Limit AV	Margin QP	Margin AV	Remark
	[MHz]	[dB(μV)]	[dB(μV)]		[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB]	[dB]	
1	0.195	51.8	39.2	0.1	51.9	39.3	63.8	53.8	11.9	14.5	
2	0.325	40.8	33.4	0.1	40.9	33.5	59.6	49.6	18.7	16.1	
3	0.458	37.8	33.0	0.1	37.9	33.1	56.7	46.7	18.8	13.6	
4	0.524	39.3	36.2	0.1	39.4	36.3	56.0	46.0	16.6	9.7	
5	4.821	38.5	32.0	0.3	38.8	32.3	56.0	46.0	17.2	13.7	
6	6.129	34.6	27.4	0.4	35.0	27.8	60.0	50.0	25.0	22.2	
7	12.510	29.5	25.3	0.7	30.2	26.0	60.0	50.0	29.8	24.0	

--- L1 Phase ---

No.	Frequency	Reading QP	Reading AV	c.f	Result QP	Result AV	Limit QP	Limit AV	Margin QP	Margin AV	Remark
	[MHz]	[dB(μV)]	[dB(μV)]		[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB]	[dB]	
1	0.195	50.3	37.2	0.2	50.5	37.4	63.8	53.8	13.3	16.4	
2	0.312	37.4	27.4	0.2	37.6	27.6	59.9	49.9	22.3	22.3	
3	0.389	41.8	36.4	0.2	42.0	36.6	58.1	48.1	16.1	11.5	
4	0.456	40.3	34.6	0.2	40.5	34.8	56.8	46.8	16.3	12.0	
5	0.501	35.8	29.2	0.2	36.0	29.4	56.0	46.0	20.0	16.6	
6	1.570	26.8	17.2	0.2	27.0	17.4	56.0	46.0	29.0	28.6	
7	4.758	37.0	31.1	0.4	37.4	31.5	56.0	46.0	18.6	14.5	
8	5.998	36.0	28.2	0.5	36.5	28.7	60.0	50.0	23.5	21.3	
9	9.517	32.1	24.0	0.7	32.8	24.7	60.0	50.0	27.2	25.3	

3.2.8 Antenna Requirements

- Procedure:

Describe how the EUT complies with the requirement that either its antenna is permanently attached, or that it employs a unique antenna connector, for every antenna proposed for use with the EUT.

- Conclusion: Comply

The antenna is permanently attached by soldering. (Refer to Internal Photo file.)

- Minimum Standard:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. 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 provisions.

APPENDIX

TEST EQUIPMENT FOR TESTS

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment.

	Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
☒	Spectrum Analyzer	Agilent	E4440A	11/09/30	12/09/30	MY45304199
☒	Spectrum Analyzer	Rohde Schwarz	FSQ26	11/01/11	12/01/11	200445
☐	Spectrum analyzer	Agilent	E4404B	11/03/08	12/03/08	US41061134
☐	Spectrum Analyzer(RE)	H.P	8563E	11/10/04	12/10/04	3551A04634
☐	MXA Signal Analyzer	Agilent Technologies, Inc	N9020A	11/01/07	12/01/07	MY49100833
☐	Power Meter	H.P	EPM-442A	11/07/01	12/07/01	GB37170413
☐	Power Sensor	H.P	8481A	11/07/01	12/07/01	3318A96332
☐	Wideband Power Sensor	Rohde Schwarz	NRP-Z81	11/06/04	12/06/04	1137.9009.02-101001
☐	Power Divider	Agilent	11636B	11/09/30	12/09/30	56471
☐	4-Way Power Divider	ET Industries	D-0526-4	11/12/01	12/12/01	210195001
☐	Power Splitter	Anritsu	K241B	11/09/30	12/09/30	020611
☐	Power Splitter	Anritsu	K241B	11/07/01	12/07/01	017060
☐	Power Splitters & Dividers	Aeroflex/Weinschel	1594	11/02/21	12/02/21	1177
☐	Frequency Counter	H.P	5342A	11/07/01	12/07/01	2119A04450
☒	TEMP & HUMIDITY Chamber	JISCO	KR-100/J-RHC2	11/09/30	12/09/30	30604493/021031
☒	Digital Multimeter	H.P	34401A	11/03/07	12/03/07	3146A13475, US36122178
☐	Multifunction Synthesizer	HP	8904A	11/10/06	12/10/06	3633A08404
☒	Signal Generator	Rohde Schwarz	SMR20	11/03/08	12/03/08	101251
☐	Signal Generator	H.P	ESG-3000A	11/07/01	12/07/01	US37230529
☐	Vector Signal Generator	Rohde Schwarz	SMJ100A	11/01/11	12/01/11	100148
☐	Vector Signal Generator	Rohde Schwarz	SMBV100A	11/01/11	12/01/11	255571
☐	Audio Analyzer	H.P	8903B	11/07/02	12/07/02	3011A09448
☐	Modulation Analyzer	H.P	8901B	11/07/01	12/07/01	3028A03029
☐	8960 Series 10 Wireless Comms. Test Set	Agilent	E5515C	11/03/07	12/03/07	GB43461134
☐	Universal Radio communication Tester	Rohde Schwarz	CMU200	11/03/07	12/03/07	106760
☐	Bluetooth Tester	TESCOM	TC-3000B	11/07/01	12/07/01	3000B000268
☐	Thermo hygrometer	BODYCOM	BJ5478	11/01/13	12/01/13	090205-3
☒	Thermo hygrometer	BODYCOM	BJ5478	11/01/13	12/01/13	090205-2
☐	Thermo hygrometer	BODYCOM	BJ5478	11/01/13	12/01/13	090205-4
☐	AC Power supply	DAEKWANG	5KVA	11/03/08	12/03/08	20060321-1
☒	DC Power Supply	HP	6622A	11/03/07	12/03/07	3448A03760
☐	DC Power Supply	HP	6633A	11/03/07	12/03/07	3524A06634
☐	DC Power Supply	Protek	PWS-3010D	11/09/30	12/09/30	4072702
☐	DC Power Supply	SM techno	SDP30-5D	11/05/20	12/05/20	305DKA013
☐	BAND Reject Filter	Microwave Circuits	N0308372	11/09/30	12/09/30	3125-01DC0352
☐	BAND Reject Filter	Wainwright	WRCG1750	11/09/30	12/09/30	2
☐	High-Pass Filter	ANRITSU	MP526D	11/09/30	12/09/30	M27756

	Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
☐	High-pass filter	Wainwright	WHNX2.1	11/09/30	12/09/30	1
☐	High-pass filter	Wainwright	WHNX3.0	11/09/30	12/09/30	9
☐	High-pass filter	Wainwright	WHNX5.0	11/09/19	12/09/19	8
☒	High-Pass Filter	Wainwright	WHKX8.5	11/09/19	12/09/19	1
☐	High-Pass Filter	Wainwright	WHKX1.0	11/09/30	12/09/30	9
☐	Tunable Notch Filter	Wainwright	WRCT800.0 /960.0-0.2/40-8SSK	N/A	N/A	32
☐	Tunable Notch Filter	Wainwright	WRCD1700.0 /2000.0-0.2/40-10SSK	N/A	N/A	53
☐	Tunable Notch Filter	Wainwright	WRCT1900.0/ 2200.0-5/40-10SSK	N/A	N/A	30
☐	HORN ANT	ETS	3115	11/09/06	12/09/06	21097
☒	HORN ANT	ETS	3115	11/03/22	12/03/22	6419
☒	HORN ANT	A.H.Systems	SAS-574	11/03/25	13/03/25	154
☐	HORN ANT	A.H.Systems	SAS-574	11/03/25	13/03/25	155
☒	HORN ANT	SCHWARZBECK	BBHA9120A	10/04/13	12/04/13	322
☐	Dipole Antenna	Schwarzbeck	VHA9103	11/11/22	12/11/22	2116
☐	Dipole Antenna	Schwarzbeck	VHA9103	11/11/22	12/11/22	2117
☐	Dipole Antenna	Schwarzbeck	UHA9105	11/11/22	12/11/22	2261
☐	Dipole Antenna	Schwarzbeck	UHA9105	11/11/22	12/11/22	2262
☐	LOOP Antenna	ETS	6502	10/10/29	12/10/29	3471
☐	Coaxial Fixed Attenuators	Agilent	8491B	11/07/02	12/07/02	MY39260700
☒	Attenuator (3dB)	WEINSCHTEL	56-3	11/09/30	12/09/30	Y2342
☐	Attenuator (3dB)	WEINSCHTEL	56-3	11/09/30	12/09/30	Y2370
☐	Attenuator (10dB)	WEINSCHTEL	23-10-34	11/09/30	12/09/30	BP4386
☐	Attenuator (10dB)	WEINSCHTEL	23-10-34	11/01/11	12/01/11	BP4387
☐	Attenuator (10dB)	WEINSCHTEL	86-10-11	11/09/30	12/09/30	446
☐	Attenuator (10dB)	WEINSCHTEL	86-10-11	11/09/30	12/09/30	408
☐	Attenuator (20dB)	WEINSCHTEL	86-20-11	11/09/30	12/09/30	432
☐	Attenuator (30dB)	JFW	50FH-030-300	11/03/07	12/03/07	060320-1
☐	Attenuator (40dB)	WEINSCHTEL	57-40-33	11/09/30	12/09/30	NN837
☐	Termination	H.P	HP-909D	11/07/02	12/07/02	02750
☐	Termination	H.P	HP-909D	11/07/02	12/07/02	02702
☐	Type N Coaxial CIRCULATOR	NOVA MICROWAVE	0088CAN	11/07/01	12/07/01	788
☐	Type N Coaxial CIRCULATOR	NOVA MICROWAVE	0185CAN	11/07/01	12/07/01	790
☐	Amplifier (30dB)	Agilent	8449B	11/03/07	12/03/07	3008A01590
☒	Amplifier (30dB)	H.P	8449B	11/03/07	12/03/07	3008A00370
☐	Amplifier	EMPOWER	BBS3Q7ELU	11/09/30	12/09/30	1020
☐	RF Power Amplifier	OPHIRRF	5069F	11/07/01	12/07/01	1006
☒	EMI TEST RECEIVER	R&S	ESU	11/01/20	12/01/20	100014

	Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
☒	BILOG ANTENNA	SCHAFFNER	CBL6112B	10/07/14	12/07/14	2737
☒	Amplifier (22dB)	H.P	8447E	11/01/11	12/01/11	2945A02865
☐	EMI TEST RECEIVER	R&S	ESCI	11/03/08	12/03/08	100364
☐	BICONICAL ANT.	Schwarzbeck	VHA 9103	10/11/29	12/11/29	91032789
☐	LOG-PERIODIC ANT.	Schwarzbeck	UHALP9108A1	10/11/29	12/11/29	1098
☐	BICONICAL ANT.	Schwarzbeck	VHA 9103	10/12/21	12/12/21	91031946
☐	LOG-PERIODIC ANT.	Schwarzbeck	UHALP9108A1	10/07/07	12/07/07	0590
☐	Low Noise Pre Amplifier	TSJ	MLA-100K01-B01-2	11/03/07	12/03/07	1252741
☐	Low Noise Pre Amplifier	TSJ	MLA-00108-B02-36	11/01/11	12/01/11	1518831
☐	Amplifier (25dB)	Agilent	8447D	11/03/07	12/03/07	2944A10144
☐	Amplifier (25dB)	Agilent	8447D	11/07/01	12/07/01	2648A04922
☒	Spectrum Analyzer(CE)	H.P	8591E	11/03/07	12/03/07	3649A05889
☒	LISN	Kyoritsu	KNW-407	11/01/11	12/01/11	8-317-8
☒	LISN	Kyoritsu	KNW-242	11/07/02	12/07/02	8-654-15
☒	CVCF	NF Electronic	4420	11/09/15	12/19/15	304935/4420023
☒	50 ohm Terminator	HME	CT-01	11/01/11	12/01/11	N/A
☒	RFI/FIELD Intensity Meter	Kyoritsu	KNM-2402	11/07/02	12/07/02	4N-170-3
☐	EMI Test Receiver	R&S	ECSI	11/03/08	12/03/08	100364
☐	LISN	R&S	ESH2-Z5	11/09/30	12/09/30	8287391006
☐	CVCF	NF Electronic	4420	11/03/08	12/03/08	304935/337980
☐	RFI/FIELD Intensity Meter	ES4152	424059	11/09/30	12/09/30	424059
☐	Wideband Radio Communication Tester	R&S	CMW500	11/09/30	12/09/30	100989