

TEST REPORT
of
FCC PART 15 SUBPART E

New Application; Class I PC; Class II PC

Limited Modular Approval for Notebook Model V100-G4/V200-G2

Product : **Wireless LAN Module**

Brand: **N/A**

Model: **Advanced-N 6235**

Model Difference: **N/A**

FCC ID: **MAU046**

FCC Rule Part: **§15.407, Cat: NII**

Applicant: **Getac Technology Corporation**

Address: **5F., Building A, No. 209, Sec. 1, Nangang Rd.,
Nangang Dist., Taipei City 11568, Taiwan,
R.O.C.**

Test Performed by:

International Standards Laboratory

<Lung-Tan LAB>

*Site Registration No.

BSMI: SL2-IN-E-0013; MRA TW1036; TAF: 0997; IC: IC4067B-3;

*Address:

No. 120, Lane 180, San Ho Tsuen, Hsin Ho Rd.
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Report No.: ISL-12LR098FCE

Issue Date : 2012/07/16

Test results given in this report apply only to the specific sample(s) tested and are traceable to national or international standard through calibration of the equipment and evaluating measurement uncertainty herein.

This report MUST not be used to claim product endorsement by TAF, NVLAP or any agency of the Government.

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VERIFICATION OF COMPLIANCE

Applicant: Getac Technology Corporation
Product Description: Wireless LAN Module
Brand Name: N/A
Model No.: Advanced-N 6235
Model Difference: N/A
FCC ID: MAU046
FCC Rule Part: §15.407
Date of test: 2012/05/16 ~ 2012/06/28
Date of EUT Received: 2012/05/16

We hereby certify that:

All the tests in this report have been performed and recorded in accordance with the standards described above and performed by an independent electromagnetic compatibility consultant, International Standards Laboratory.

The test results contained in this report accurately represent the measurements of the characteristics and the energy generated by sample equipment under test at the time of the test. The sample equipment tested as described in this report is in compliance with the limits of above standards.

Test By:



Date:

2012/07/16

Dion Chang / Engineer

Prepared By:



Date:

2012/07/16

Eva Kao / Technical Supervisor

Approved By:



Date:

2012/07/16

Vincent Su / Technical Manager

Version

Version No.	Date	Description
00	2012/07/16	Initial creation of document

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1. GENERAL INFORMATION

1.1 Product Description

General:

Product Name	Wireless LAN Module
Brand Name	Getac
Model Name	Advanced-N 6235
Model Difference	N/A

Notebook Platform Information:

Model Name	V100-G4/ V200-G2	
Model Difference	V100-G4: panel size 10", V200-G2: panel size 12"	
Power Supply	10.8Vdc from Li-ion Battery or 19Vdc AC/DC Adapter or Car Charge	
	Adapter:	Model: ADM-6019M, Supplier: Getac

Bluetooth:

Bluetooth Version	V2.1 + EDR (GFSK + $\pi/4$ DQPSK + 8DPSK)	V4.0(GFSK)
Frequency Range:	2402 – 2480MHz	2402 – 2480MHz
Channel number:	79 channels	40 channels
Modulation type:	Frequency Hopping Spread Spectrum	Digital Modulation (Direct Sequence Spread Spectrum)
Transmit Power:	5.36 dBm	5.50dBm
Dwell Time:	<= 0.4s	N/A
Operating Mode:	Point-to-Point	
Antenna Designation:	PIFA Antenna, 2.6dBi P/N: 422125500011	

The EUT is compliance with Bluetooth EDR V2.1 +V4.0 Standard.

WLAN: 2X2 MIMO

Wi-Fi	Frequency Range (MHz)	Channels	Rated Power	Modulation Technology	
802.11b	2412 – 2462(DTS)	11	15.33dBm	DSSS	
802.11g	2412 – 2462(DTS)	11	15.34dBm	DSSS, OFDM	
802.11n	HT20 2412 – 2462(DTS)	11	17.58dBm	OFDM	
	HT20 5180 – 5240(NII)	4	11.44dBm		
	HT20 5260 – 5320(NII)	4	12.69dBm		
	HT20 5500 – 5700(NII)	8	12.99dBm		
	HT20 5S)	5	15.85dBm		
	HT40 2422 – 2452(DTS)	7	17.84dBm		
	HT40 5190 – 5230(NII)	2	11.75dBm		
	HT40 5270 – 5310(NII)	2	12.90dBm		
	HT40 5510 – 5670(NII)	4	13.39dBm		
	HT40 5755 – 5795(DTS)	2	15.98dBm		
802.11a	5180 – 5240(NII)	4	11.83dBm	OFDM	
	5260 – 5320(NII)	4	12.87dBm		
	5500 – 5700(NII)	8	12.87dBm		
	5745 – 5825(DTS)	5	15.65dBm		
Modulation type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM				
Transition Rate:	Upto 300Mbps				
Antenna Designation:	PIFA Antenna R Site P/N: 422125500010; L Site P/N: 422125500011 R Site: 1.61dBi / L Site: 2.60dBi for 2.4GHz R Site: 2.45dBi / L Site: 3.97dBi for 5GHz				

The EUT is compliance with IEEE 802.11 a/b/g/n Standard.

Remark: The above DUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

This report applies for frequency bands 5150 MHz– 5250 MHz, 5250MHz-5350MHz and 5470 MHz– 5725 MHz.

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: **MAU046** filing to comply with Section 15.407 of the FCC Part 15, Subpart E Rules. The composite system (digital device) is compliance with Subpart B is authorized under a DoC procedure.

1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 (2003). Radiated testing was performed at an antenna to EUT distance 3 meters.

Tested in accordance with KDB789033

1.4 Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of **International Standards Laboratory** <Lung-Tan LAB> No. 120, Lane 180, San Ho Tsuen, Hsin Ho Rd., Lung-Tan Hsiang, Tao Yuan County 325, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003. FCC Registration Number is: TW1036, Canada Registration Number: 4067B-3.

1.5 Special Accessories

Not available for this EUT intended for grant.

1.6 Equipment Modifications

Not available for this EUT intended for grant.

1.1. SYSTEM TEST CONFIGURATION

1.2. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

1.3. EUT Exercise

The EUT (Transmitter) was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements.

1.4. Test Procedure

2.3.1 Conducted Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. According to the requirements in Section 7 and 13 of ANSI C63.4-2003. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and Average detector mode.

2.3.2 Radiated Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” Is still within the 3Db illumination BW of the measurement antenna. According to the requirements in Section 8 and 13 and Subclause 8.3.1.2 of ANSI C63.4-2003.

1.5. Configuration of Tested System

Fig. 2-1 Configuration of Tested System

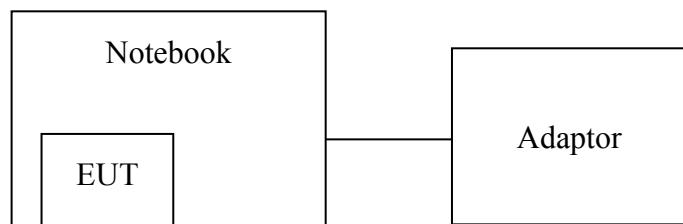


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/ Type No.	Series No.	Data Cable	Power Cord
1	Notebook	Getac	V100-G4	N/A	Un-Shielding	Shielding
2	Adapter	Getac	ADM-6019M	N/A	N/A	Shielding

2. SUMMARY OF TEST RESULT

FCC Rules	Description Of Test	Result
§15.207	AC Power Line Conducted Emission	Compliant
§15.407(a)	Peak Output Power Measurement	Compliant
§15.407(b)	Undesirable Emission – Radiated Measurement	Compliant
§15.407(a)	Antenna Requirement	Compliant

3. DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.

Test program used to control the EUT for staying in continuous transmitting mode is programmed.

a mode:

5150MHz-5250MHz: Channel lowest(5180MHz) 、 Mid(5220MHz) and Highest(5240MHz).

5250MHz-5350MHz: Channel lowest(5260MHz) 、 Mid(5300MHz) and Highest(5320MHz).

5470MHz-5725MHz: Channel lowest (5500MHz) 、 Mid(5580MHz) and Highest(5700MHz) with 6Mbps data rate are chosen for pre-test testing of radiated emissions.

n HT 20 mode:

5150MHz-5250MHz: Channel lowest(5180MHz) 、 Mid(5220MHz) and Highest(5240MHz).

5250MHz-5350MHz: Channel lowest(5260MHz) 、 Mid(5300MHz) and Highest(5320MHz).

5470MHz-5725MHz: Channel lowest (5500MHz) 、 Mid(5580MHz) and Highest(5700MHz) with 6.5Mbps data rate are chosen for pre-test testing of radiated emissions.

n HT 40 mode:

5150MHz-5250MHz: Channel lowest(5190MHz) and Highest(5230MHz).

5250MHz-5350MHz: Channel lowest(5270MHz) and Highest(5310MHz).

5470MHz-5725MHz: Channel lowest (5510MHz), Mid(5590MHz) and Highest(5670MHz) with 13.5Mbps data rate are chosen for pre-test testing of radiated emissions.

The spurious radiation emission were measured for both host model V100-G4/V200-G2 as EUT notebook position (H) and tablet position (E1) for testing with power adaptors.

The Worst case of n HT 40 mode: 5470MHz-5725MHz of host V100-G4 was reported for Radiated Emission.

4. AC POWER LINE CONDUCTED EMISSION TEST

4.1. Standard Applicable

According to §15.207, frequency range within 150 KHz to 30 MHz shall not exceed the Limit table as below.

Frequency range MHz	Limits dB(uV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Note

- 1.The lower limit shall apply at the transition frequencies
- 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

4.2. Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Conduction 03 -1 Cable	WOKEN	CFD 300-NL	Conduction 0-1	06/27/2011	06/27/2012
EMI Receiver 12	ROHDE & SCHWARZ	ESCI	100804	07/12/2011	07/12/2012
LISN 07	FCC Inc.	FCC-LISN-50-100-4 -02	07040	07/13/2011	07/13/2012
LISN 08	FCC	FCC-LISN50-25-2-0 1	07039	07/13/2011	07/13/2012

4.3. EUT Setup:

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.4-2003.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
3. The LISN was connected with 120Vac/60Hz power source.

4.4. Measurement Procedure:

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

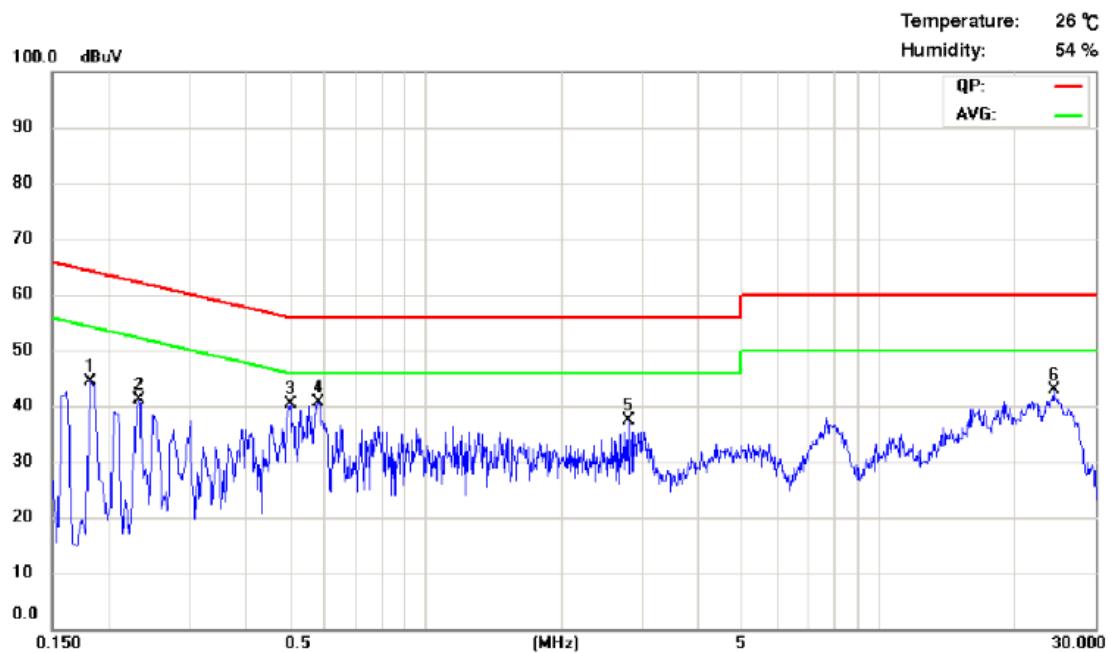
4.5. Measurement Result:

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

Note: Refer to next page for measurement data and plots.

AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation Mode	Test Date:	2012/6/22
Test By:	Lake		



Site: Conduction 02

 Phase: L1

Limit: CISPR22 Class B Conduction

No.	Frequency MHz	LISN Loss dB	Cable Loss dB	QP Correct. dBuV	QP Limit dBuV	QP Margin dB	AVG Correct. dBuV	AVG Limit dBuV	AVG Margin dB	Note
1	0.1820	9.64	0.01	43.27	64.39	-21.12	27.44	54.39	-26.95	
2	0.2340	9.64	0.02	37.05	62.31	-25.26	24.15	52.31	-28.16	
3	0.5020	9.62	0.03	37.37	56.00	-18.63	29.55	46.00	-16.45	
4	0.5820	9.62	0.03	38.19	56.00	-17.81	27.21	46.00	-18.79	
5	2.8060	9.63	0.1	30.14	56.00	-25.86	20.89	46.00	-25.11	
6	24.3060	9.65	0.27	37.57	60.00	-22.43	31.64	50.00	-18.36	



Site: Conduction 02

 Phase: **N**

Limit: CISPR22 Class B Conduction

No.	Frequency MHz	LISN Loss dB	Cable Loss dB	QP Correct. dBuV	QP Limit dBuV	QP Margin dB	Avg Correct. dBuV	Avg Limit dBuV	Avg Margin dB	Note
1	0.1540	9.5	0.01	47.36	65.78	-18.42	27.02	55.78	-28.76	
2	0.1820	9.55	0.01	42.84	64.39	-21.55	25.65	54.39	-28.74	
3	0.5740	9.61	0.03	38.67	56.00	-17.33	27.40	46.00	-18.60	
4	1.4780	9.61	0.06	31.97	56.00	-24.03	22.16	46.00	-23.84	
5	2.6340	9.61	0.09	27.86	56.00	-28.14	19.84	46.00	-26.16	
6	23.9940	9.7	0.27	38.77	60.00	-21.23	32.93	50.00	-17.07	

5. PEAK OUTPUT POWER MEASUREMENT

5.1. Standard Applicable

According to §15.407(a)

1. For the band 5.15-5.25 GHz, the maximum conducted power over the frequency of operation shall not exceed the lesser of 50 mW (17dBm) or 4 dBm + 10log B.
2. For the band 5.25-5.35 GHz and 5.47-5.725GHz, the maximum conducted power over the frequency of operation shall not exceed the lesser of 250 mW (24dBm) or 11 dBm + 10log B.
3. For the band 5.725-5.825 GHz, the maximum conducted power over the frequency of operation shall not exceed the lesser of 1W (30dBm) or 17 dBm + 10log B.

5.2. Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter.
3. Record the max. reading.
4. Repeat above procedures until all frequency measured were complete.

5.3. Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter 05	Anritsu	ML2495A	1116010	04/17/2012	04/16/2013
Power Sensor 05	Anritsu	MA2411B	34NKF50	04/16/2012	04/15/2013
Temperature Chamber	KSON	THS-B4H100	2287	03/03/2012	03/02/2013
DC Power supply	ABM	51850	N/A	06/17/2012	06/16/2013
AC Power supply	EXTECH	CFC105W	NA	12/19/2011	12/18/2012
Splitter	MCLI	PS4-199	12465	07/18/2012	07/17/2013
Spectrum analyzer	Agilent	N9030A	MY51360021	03/11/2012	03/10/2013

5.4. Measurement Result

UNII 802.11a

Mode	Freq(MHz)	channel	power (dBm)	limit(dBm)	result
802.11a	5180	36	8.32	16.98	pass
	5200	40	10.91	16.98	pass
	5220	44	11.46	16.98	pass
	5240	48	11.83	16.98	pass
	5260	52	12.54	23.97	pass
	5280	56	12.86	23.97	pass
	5300	60	12.87	23.97	pass
	5320	64	12.21	23.97	pass
	5500	100	12.35	23.97	pass
	5520	104	12.21	23.97	pass
	5540	108	12.21	23.97	pass
	5560	112	12.54	23.97	pass
	5580	116	12.87	23.97	pass
	5660	132	11.12	23.97	pass
	5680	136	11.41	23.97	pass
	5700	140	11.50	23.97	pass

UNII 802.11n
 2*2 MIMO

Mode	Freq(MHz)	channel	Output Chain (dBm)		Combined Output Power (dBm)	Limit(dBm)	Result
			Chain A	chain B			
HT20	5180	36	7.22	6.13	9.72	16.98	Pass
	5200	40	7.55	7.07	10.33	16.98	Pass
	5220	44	7.98	7.48	10.75	16.98	Pass
	5240	48	8.97	7.82	11.44	16.98	Pass
	5260	52	9.25	7.78	11.59	23.97	Pass
	5280	56	9.28	8.47	11.90	23.97	Pass
	5300	60	9.72	8.73	12.26	23.97	Pass
	5320	64	10.17	9.12	12.69	23.97	Pass
	5500	100	9.91	9.97	12.95	23.97	Pass
	5520	104	9.84	10.12	12.99	23.97	Pass
	5540	108	9.45	9.92	12.70	23.97	Pass
	5560	112	9.57	9.89	12.74	23.97	Pass
	5580	116	8.58	9.88	12.29	23.97	Pass
	5660	132	7.91	8.20	11.07	23.97	Pass
	5680	136	8.03	8.31	11.18	23.97	Pass
	5700	140	8.12	8.39	11.27	23.97	Pass

Mode	Freq(MHz)	channel	Output Chain (dBm)		Combined Output Power (dBm)	Limit(dBm)	Result
			Chain A	chain B			
HT40	5190	38	7.58	8.52	11.09	16.98	Pass
	5230	46	8.94	8.53	11.75	16.98	Pass
	5270	54	9.14	8.70	11.94	23.97	Pass
	5310	62	10.03	9.74	12.90	23.97	Pass
	5510	102	9.66	10.62	13.18	23.97	Pass
	5550	110	10.21	10.54	13.39	23.97	Pass
	5590	118	9.23	10.71	13.04	23.97	Pass
	5670	134	8.68	9.31	12.02	23.97	Pass

6. UNDESIRABLE EMISSION - RADICTED MEASUREMENT

6.1. Standard Applicable

According to §15.407(b),

(b) Undesirable Emission Limits: Except as shown in Paragraph (b)(6) of this section, the peak emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

- (1) For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.
- (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 -27 dBm/MHz. Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.
- (3) For transmitters operating in the 5.47-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of -27 dBm/MHz.
- (4) For transmitters operating in the 5.725-5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz.
- (5) The above emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
- (6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in Section 15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in Section 15.207.
- (7) The provisions of Section 15.205 of this part apply to intentional radiators operating under this section.
- (8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency block edges as the design of the equipment permits.

§15.205- RESTRICTED BANDS OF OPERATIONS

- (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	(²)
13.36 - 13.41	322 - 335.4		

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

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

§15.209- RADIATED EMISSION LIMITS: GENERAL REQUIREMENTS

FCC PART 15.209

MEASURING DISTANCE OF 3 METER		
FREQUENCY RANGE (MHz)	FIELD STRENGTH (Microvolts/m)	FIELD STRENGTH (dBuV/m)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

6.2. EUT Setup

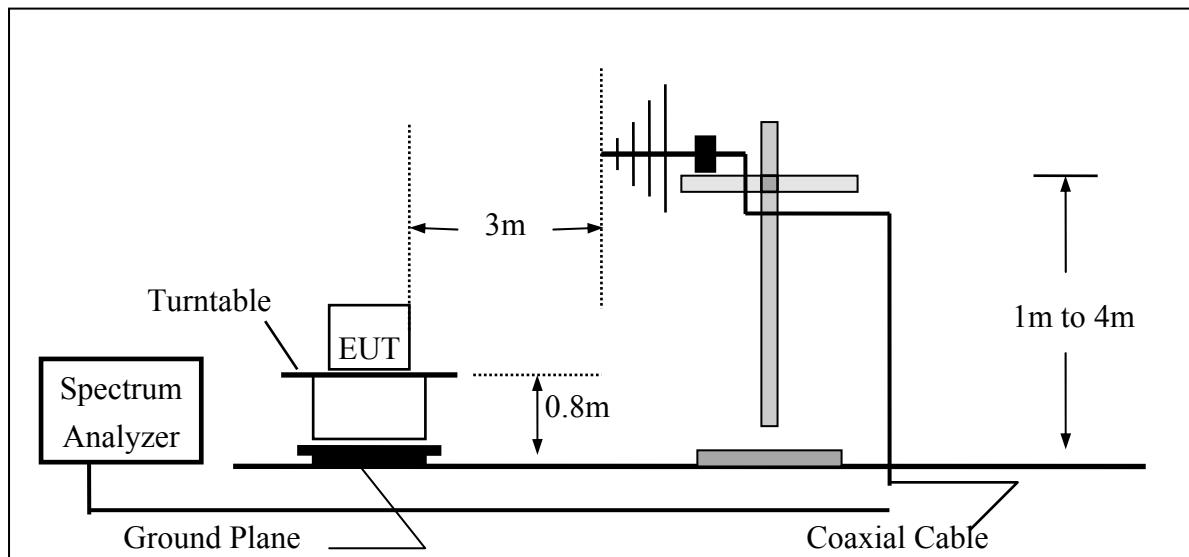
1. The radiated emission tests were performed in the 3 meter open-test site, using the setup in accordance with the ANSI C63.4-1992.
2. The EUT was put in the front of the test table. The host PC system was placed on the center of the back edge on the test table. The peripherals like modem, monitor printer, K/B, and mouse were placed on the side of the host PC system. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
3. The keyboard was placed directly in the front of the monitor, flushed with the front tabletop. The mouse was placed next to the Keyboard, flushed with the back of keyboard.
4. The spacing between the peripherals was 10 centimeters.
5. External I/O cables were draped along the edge of the test table and bundle when necessary.
6. The host PC system was connected with 120Vac/60Hz power source.

6.3. Measurement Procedure

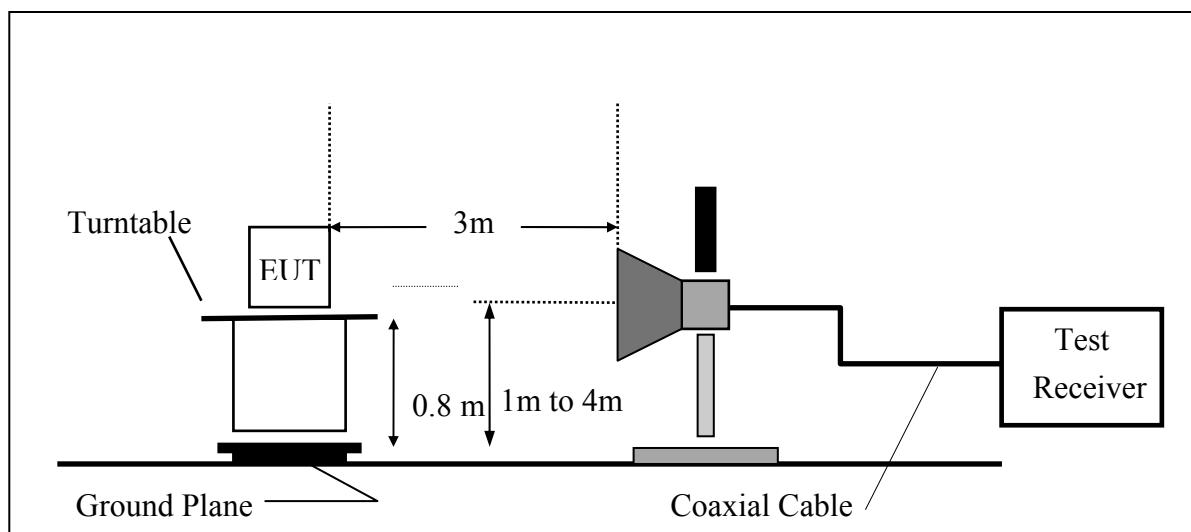
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until all frequency measured were complete.

6.4. Test SET-UP (Block Diagram of Configuration)

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-UP Frequency Over 1 GHz



6.5. Measurement Equipment Used:

Chamber 14(966)					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer 21(26.5GHz)	Agilent	N9010A	MY49060537	07/18/2011	07/17/2012
Spectrum Analyzer 20(6.5GHz)	Agilent	E4443A	MY48250315	05/24/2012	05/23/2013
Spectrum Analyzer 22(43GHz)	R&S	FSU43	100143	04/25/2012	04/24/2013
Loop Antenna9K-30M	A.H.SYSTEM	SAS-564	294	02/28/2011	02/27/2013
Bilog Antenna30-1G	Schaffner	CBL 6111B	2756	12/27/2011	12/26/2012
Horn antenna1-18G	COM-POWER	AH118	2011071401	03/01/2012	02/29/2013
Horn antenna1-18G(06)	EMCO	3117	0006665	09/21/2011	09/20/2012
Horn antenna26-40G(05)	Com-power	AH-640	100A	01/11/2011	01/10/2013
Horn antenna18-26G(04)	Com-power	AH-826	081001	05/04/2011	05/03/2013
Preamplifier9-1000M	HP	8447D	NA	02/10/2012	02/09/2013
Preamplifier1-18G	MITEQ	AFS44-001018 00-25-10P-44	1329256	07/19/2011	07/18/2012
Preamplifier1-26G	EM	EM01M26G	NA	02/21/2012	02/20/2013
Preamplifier26-40G	MITEQ	JS-26004000-2 7-5A	818471	05/21/2011	05/20/2013
Cable1-18G	HUBER SUHNER	Sucoflex 106	NA	02/10/2012	02/09/2013
Cable UP to 1G	HUBER SUHNER	RG 214/U	NA	12/14/2011	12/13/2012
SUCOFLEX 1GHz~40GHz cable	HUBER SUHNER	Sucoflex 102	27963/2&3742 1/2	09/21/2011	09/20/2012
2.4G Filter	Micro-Tronics	Brm50702	76	10/22/2011	10/21/2012
5G Filter	Micro-Tronics	Brm50716	005	10/22/2011	10/21/2012

6.6. Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$\mathbf{FS = RA + AF - CL - AG}$$

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

6.7. Measurement Result

Refer to attach tabular data sheets.

NOTE:

The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 100kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.

Radiated Spurious Emission Measurement Result (below 1GHz) HT40, 5470~5725 MHz

Operation Mode	TX CH Low	Test Date	2012/06/15
Fundamental Frequency	5510MHz	Test By	Dino
Temperature	25 °C	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	271.53	40.38	-12.15	28.23	46.00	-17.77	Peak	VERTICAL
2	324.88	39.10	-11.15	27.95	46.00	-18.05	Peak	VERTICAL
3	387.93	42.96	-9.82	33.14	46.00	-12.86	Peak	VERTICAL
4	409.27	39.88	-9.52	30.36	46.00	-15.64	Peak	VERTICAL
5	519.85	39.72	-8.35	31.37	46.00	-14.63	Peak	VERTICAL
6	649.83	35.73	-6.80	28.93	46.00	-17.07	Peak	VERTICAL
1	258.92	40.28	-12.10	28.18	46.00	-17.82	Peak	HORIZONTAL
2	387.93	41.39	-9.82	31.57	46.00	-14.43	Peak	HORIZONTAL
3	409.27	42.21	-9.52	32.69	46.00	-13.31	Peak	HORIZONTAL
4	456.80	40.81	-9.16	31.65	46.00	-14.35	Peak	HORIZONTAL
5	505.30	41.28	-8.64	32.64	46.00	-13.36	Peak	HORIZONTAL
6	649.83	31.72	-6.80	24.92	46.00	-21.08	Peak	HORIZONTAL

Remark:

- 1 No further spurious emissions detected from the lowest internal frequency and 30MHz.
- 2 Measuring frequencies from the lowest internal frequency to the 1GHz.
- 3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90KHz/110-490KHz using PK/AV and other Frequency Band using PK/QP
- 4 Measurement result within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100KHz, VBW=300KHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	TX CH Mid	Test Date	2012/06/15
Fundamental Frequency	5590MHz	Test By	Dino
Temperature	25 °C	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	255.04	44.08	-12.47	31.61	46.00	-14.39	Peak	VERTICAL
2	387.93	39.67	-9.82	29.85	46.00	-16.15	Peak	VERTICAL
3	409.27	39.79	-9.52	30.27	46.00	-15.73	Peak	VERTICAL
4	456.80	39.79	-9.16	30.63	46.00	-15.37	Peak	VERTICAL
5	505.30	40.30	-8.64	31.66	46.00	-14.34	Peak	VERTICAL
6	649.83	29.60	-6.80	22.80	46.00	-23.20	Peak	VERTICAL
1	264.74	40.09	-12.07	28.02	46.00	-17.98	Peak	HORIZONTAL
2	324.88	38.65	-11.15	27.50	46.00	-18.50	Peak	HORIZONTAL
3	387.93	42.43	-9.82	32.61	46.00	-13.39	Peak	HORIZONTAL
4	409.27	40.41	-9.52	30.89	46.00	-15.11	Peak	HORIZONTAL
5	519.85	40.86	-8.35	32.51	46.00	-13.49	Peak	HORIZONTAL
6	649.83	34.22	-6.80	27.42	46.00	-18.58	Peak	HORIZONTAL

Remark:

- 1 No further spurious emissions detected from the lowest internal frequency and 30MHz.
- 2 Measuring frequencies from the lowest internal frequency to the 1GHz.
- 3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90KHz/110-490KHz using PK/AV and other Frequency Band using PK/QP
- 4 Measurement result within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100KHz, VBW=300KHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	TX CH High	Test Date	2012/06/15
Fundamental Frequency	5670MHz	Test By	Dino
Temperature	25 °C	Pol	Ver./Hor
Humidity	60 %		

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	270.56	39.43	-12.16	27.27	46.00	-18.73	Peak	VERTICAL
2	324.88	38.44	-11.15	27.29	46.00	-18.71	Peak	VERTICAL
3	387.93	42.27	-9.82	32.45	46.00	-13.55	Peak	VERTICAL
4	409.27	39.96	-9.52	30.44	46.00	-15.56	Peak	VERTICAL
5	519.85	40.33	-8.35	31.98	46.00	-14.02	Peak	VERTICAL
6	649.83	34.83	-6.80	28.03	46.00	-17.97	Peak	VERTICAL
1	258.92	43.77	-12.10	31.67	46.00	-14.33	Peak	HORIZONTAL
2	360.77	39.74	-10.34	29.40	46.00	-16.60	Peak	HORIZONTAL
3	387.93	41.19	-9.82	31.37	46.00	-14.63	Peak	HORIZONTAL
4	409.27	42.23	-9.52	32.71	46.00	-13.29	Peak	HORIZONTAL
5	456.80	41.09	-9.16	31.93	46.00	-14.07	Peak	HORIZONTAL
6	505.30	41.77	-8.64	33.13	46.00	-12.87	Peak	HORIZONTAL

Remark:

- 1 No further spurious emissions detected from the lowest internal frequency and 30MHz.
- 2 Measuring frequencies from the lowest internal frequency to the 1GHz.
- 3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90KHz/110-490KHz using PK/AV and other Frequency Band using PK/QP
- 4 Measurement result within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100KHz, VBW=300KHz.

Radiated Spurious Emission Measurement Result (above 1GHz) HT40, 5470~5725 MHz

Operation Mode	TX CH Low	Test Date	2012/06/15
Fundamental Frequency	5510MHz	Test By	Dino
Temperature	25 °C	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	2260.00	42.50	-11.82	30.68	74.00	-43.32	Peak	VERTICAL
2	3282.00	40.79	-8.70	32.09	74.00	-41.91	Peak	VERTICAL
3	11020.00	34.33	7.08	41.41	74.00	-32.59	Peak	VERTICAL
1	1966.00	42.36	-12.71	29.65	74.00	-44.35	Peak	HORIZONTAL
2	3345.00	40.73	-8.52	32.21	74.00	-41.79	Peak	HORIZONTAL
3	11020.00	33.93	7.08	41.01	74.00	-32.99	Peak	HORIZONTAL

Remark:

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	TX CH Mid	Test Date	2012/06/15
Fundamental Frequency	5590MHz	Test By	Dino
Temperature	25 °C	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	2253.00	41.66	-11.84	29.82	74.00	-44.18	Peak	VERTICAL
2	4388.00	37.56	-4.13	33.43	74.00	-40.57	Peak	VERTICAL
3	11180.00	33.70	7.10	40.80	74.00	-33.20	Peak	VERTICAL
1	2148.00	41.42	-12.11	29.31	74.00	-44.69	Peak	HORIZONTAL
2	4353.00	37.74	-4.26	33.48	74.00	-40.52	Peak	HORIZONTAL
3	11180.00	31.73	7.10	38.83	74.00	-35.17	Peak	HORIZONTAL

Remark:

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	TX CH High	Test Date	2012/06/15
Fundamental Frequency	5670MHz	Test By	Dino
Temperature	25 °C	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	3765.00	40.32	-6.80	33.52	74.00	-40.48	Peak	VERTICAL
2	7160.00	37.81	3.92	41.73	74.00	-32.27	Peak	VERTICAL
3	11340.00	33.29	7.10	40.39	74.00	-33.61	Peak	VERTICAL
1	2869.00	40.05	-9.98	30.07	74.00	-43.93	Peak	HORIZONTAL
2	3646.00	39.91	-7.36	32.55	74.00	-41.45	Peak	HORIZONTAL
3	11340.00	33.14	7.10	40.24	74.00	-33.76	Peak	HORIZONTAL

Remark:

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Emission: (worst case: HT40 5470MHz-5725MHz)

Operation Mode	TX CH Low	Test Date	2012/06/15
Fundamental Frequency	5510 MHz	Test By	Dino
Temperature	25 °C	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	5460.00	56.11	-0.78	55.33	54.00	-7.28	Average	VERTICAL
2	5460.00	66.07	-0.78	65.29	74.00	-8.71	Peak	VERTICAL
1	5460.00	45.04	-0.78	44.26	54.00	-9.74	Average	HORIZONTAL
2	5460.00	65.23	-0.78	64.45	74.00	-9.55	Peak	HORIZONTAL

Operation Mode	TX CH High	Test Date	2012/06/15
Fundamental Frequency	5670MHz	Test By	Dino
Temperature	25 °C	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	5725.00	43.57	-0.12	43.45	54.00	-10.55	Average	VERTICAL
2	5725.00	55.72	-0.12	55.60	74.00	-18.40	Peak	VERTICAL
1	5725.00	45.31	-0.12	45.19	54.00	-8.81	Average	HORIZONTAL
2	5725.00	57.22	-0.12	57.10	74.00	-16.90	Peak	HORIZONTAL

Remark:

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

7. ANTENNA REQUIREMENT

7.1. Standard Applicable

According to §15.203, Antenna requirement.

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 of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

7.2. Antenna Connected Construction

The directional gins of antenna used for transmitting is R Site: 2.45dBi / L Site: 3.97dBi and the antenna connector is designed with unique type RF connector and no consideration of replacement. Please see EUT photo and antenna spec. for details.