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Report No.: FCC12-RTE082104
Page 1 of 39

FCC REPORT

Applicant: Seco Larm USA Inc

Address of Applicant: 16842 Millikan Avenue, Irvine, California, United States

Equipment Under Test (EUT)

Product Name: Wireless HDMI

Model No.: MVE-WH010Q/T

FCC ID: ERYMVE-WH010QT

Applicable standards: FCC CFR Title 47 Part 15 Subpart C Section 15.407:2010

Date of sample receipt: June 28, 2012

Date of Test: July 3 ~ August 10, 2012

Date of report issue: August 21, 2012

Test Result : PASS *

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Kavin Yu
Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the EBO product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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2 Contents

	Page
1 COVER PAGE.....	1
2 CONTENTS	2
3 TEST SUMMARY	3
4 GENERAL INFORMATION.....	4
4.1 CLIENT INFORMATION	4
4.2 GENERAL DESCRIPTION OF E.U.T.	4
4.3 TEST MODE	4
4.4 TEST FACILITY.....	5
4.5 TEST LOCATION.....	5
4.6 OTHER INFORMATION REQUESTED BY THE CUSTOMER	5
4.7 TEST INSTRUMENTS LIST	6
5 TEST RESULTS AND MEASUREMENT DATA	7
5.1 ANTENNA REQUIREMENT:	7
5.2 CONDUCTED EMISSIONS	8
5.3 PEAK TRANSMIT POWER	11
5.4 POWER SPECTRAL DENSITY.....	17
5.5 PEAK EXCURSION.....	22
5.6 UNDESIRABLE EMISSION	24
5.7 BAND EDGE	26
5.8 RADIATED EMISSION	29
5.9 FREQUENCY STABILITY.....	35
6 TEST SETUP PHOTO	38
7 EUT CONSTRUCTIONAL DETAILS	39



3 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203	PASS
AC Power Line Conducted Emission	15.207	PASS
Peak Transmit Power	15.407(a)(1)	PASS
Power Spectral Density	15.407(a)(1)	PASS
Peak Excursion	15.407(a)(6)	PASS
Undesirable Emission	15.407(b)(6), 15.205/15.209	PASS
Radiated Emission	15.205/15.209	PASS
Band Edge	15.205	PASS
Frequency Stability	15.407(f)	PASS

Remark:

Pass: The EUT complies with the essential requirements in the standard.

Fail: The EUT does not comply with the essential requirements in the standard.



4 General Information

4.1 Client Information

Applicant:	Seco Larm USA Inc
Address of Applicant:	16842 Millikan Avenue, Irvine, California, United States
Manufacturer/ Factory:	HANK Electronics Ltd.
Address of Manufacturer/ Factory:	2nd floor, Block B9 & 8th floor Block B20, Hengfeng Industrial City, Xixiang Town Baoan District, Shenzhen, China

4.2 General Description of E.U.T.

Product Name:	Wireless HDMI
Model No.:	MVE-WH010Q/T
Operation Frequency:	5190MHz, 5230MHz; 5755MHz, 5795MHz
Channel numbers:	4
Test Frequency:	5190MHz, 5230MHz
Modulation technology:	OFDM
Antenna Type:	PCB Antenna (Transmit antenna: 4pcs; receive antenna: 1pcs)
Antenna gain:	2dBi
Power supply:	Adapter Trade mark:GOSPELL Adapter Model:GP005U-050-200 Adapter Input:100-240VAC, 50/60Hz, 0.5A Adapter Output:5VDC, 2.0A 10VA max

4.3 Test mode

Operation mode	Keep the EUT in transmitting MIMO mode with modulation. EUT transmitting at 100 % duty cycle at its maximum power control level
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4.4 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

● **FCC —Registration No.: 600491**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 600491, July 20, 2010.

● **Industry Canada (IC)**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-1.

4.5 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

Address: 2nd Floor, Block No.2, Laodong Industrial Zone, Xixiang Road Baoan District, Shenzhen, China

Tel: 0755-27798480

Fax: 0755-27798960

4.6 Other Information Requested by the Customer

None.



4.7 Test Instruments list

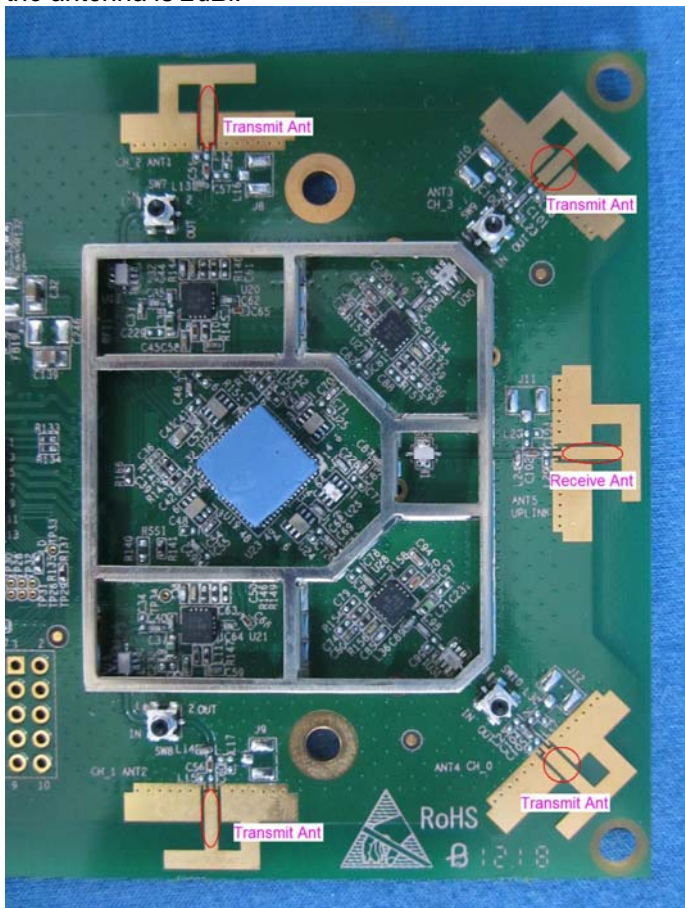
Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (dd-mm-yy)	Cal.Due date (dd-mm-yy)
1	3m Semi-Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS201	Mar. 30 2011	Mar. 29 2013
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS202	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	Jul. 03 2012	Jul. 02 2013
4	Spectrum analyzer	Rohde & Schwarz	FSP40	GTS203	Sep. 8 2012	Sep. 7 2013
5	8-WAY Power Divider	JFW	50PD-647	GTS203	Sep. 8 2012	Sep. 7 2013
6	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS204	Feb. 25 2012	Feb. 24 2013
7	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS205	June 29 2012	June 28 2013
8	Horn Antenna	SCHWARZBECK MESS-ELEKTRONIK	9170	GTS205	Mar. 30 2011	Mar. 29 2013
9	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
10	Coaxial Cable	GTS	N/A	GTS400	Mar. 31 2012	Mar. 30 2013
11	Coaxial Cable	GTS	N/A	GTS401	Mar. 31 2012	Mar. 30 2013
12	Coaxial cable	GTS	N/A	GTS402	Mar. 31 2012	Mar. 30 2013
13	Coaxial Cable	GTS	N/A	GTS407	Mar. 31 2012	Mar. 30 2013
14	Coaxial Cable	GTS	N/A	GTS408	Mar. 31 2012	Mar. 30 2013
15	Amplifier	Sonnoma Instrument	305-1052	GTS210	Jul. 03 2012	Jul. 02 2013
16	Amplifier	HP	8349B	GTS231	Jul. 03 2012	Jul. 02 2013

Conducted Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (dd-mm-yy)	Cal.Due date (dd-mm-yy)
1	Shielding Room	ZhongYu Electron	7.0(L)x3.0(W)x3.0(H)	GTS206	Jul. 03 2012	Jul. 02 2013
2	EMI Test Receiver	Rohde & Schwarz	ESCS30	GTS208	Jul. 03 2012	Jul. 02 2013
3	10dB Pulse Limita	Rohde & Schwarz	N/A	GTS209	Jul. 03 2012	Jul. 02 2013
4	LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	GTS207	Jul. 03 2012	Jul. 02 2013
5	Coaxial Cable	GTS	N/A	GTS406	Mar. 31 2012	Mar. 30 2013
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A

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5 Test results and Measurement Data

5.1 Antenna requirement:

Standard requirement:	FCC Part15 C Section 15.203
<p>15.203 requirement: <i>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, 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.</i></p>	
E.U.T Antenna:	
<p><i>The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 2dBi.</i></p> 	



5.2 Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207			
Test Method:	ANSI C63.4: 2003			
Test Frequency Range:	150KHz to 30MHz			
Class / Severity:	Class B			
Receiver setup:	RBW=9KHz, VBW=30KHz			
Limit:	Frequency range (MHz)	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.				
Test procedure	The E.U.T and simulators are connected to the main power through a line impedance stabilization network(L.I.S.N.). The provide a 50ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs). Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2003 on conducted measurement.			
Test setup:	<div><div><div>Reference Plane</div><div><div><div>LISN</div><div>AUX Equipment</div><div>E.U.T</div><div>Test table/Insulation plane</div></div><div><div>LISN</div><div>Filter</div><div>AC power</div></div><div><div>EMI Receiver</div></div></div><div><div>40cm</div><div>80cm</div></div></div></div> <div><div>Remark:</div><div>E.U.T: Equipment Under Test</div><div>LISN: Line Impedance Stabilization Network</div><div>Test table height=0.8m</div></div>			
Test Instruments:	Refer to section 4.7 for details			
Test mode:	Refer to section 4.3 for details			
Test results:	Pass			

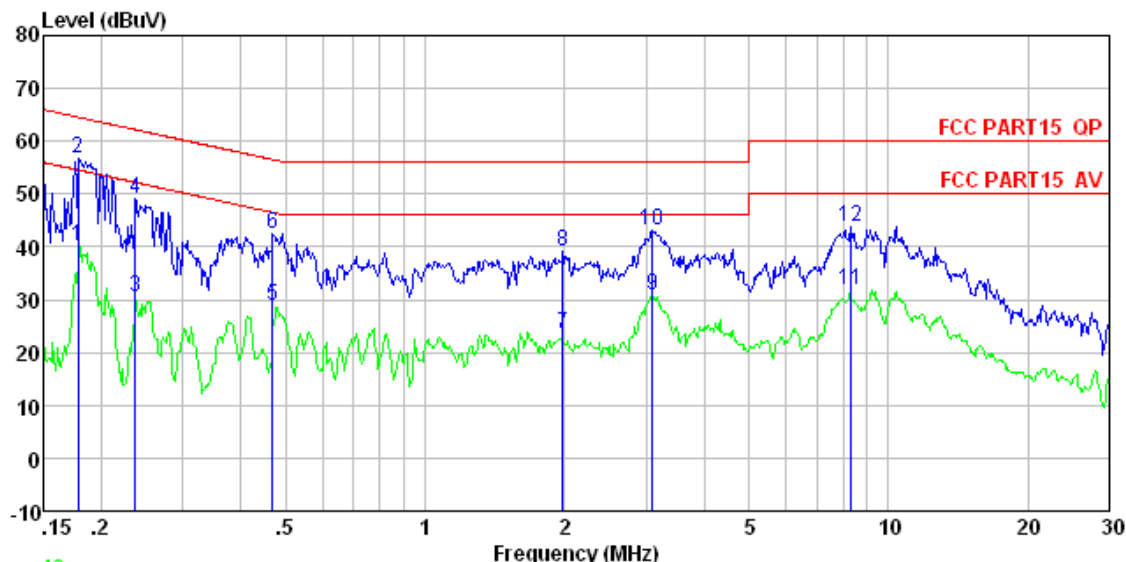
Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

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Line:

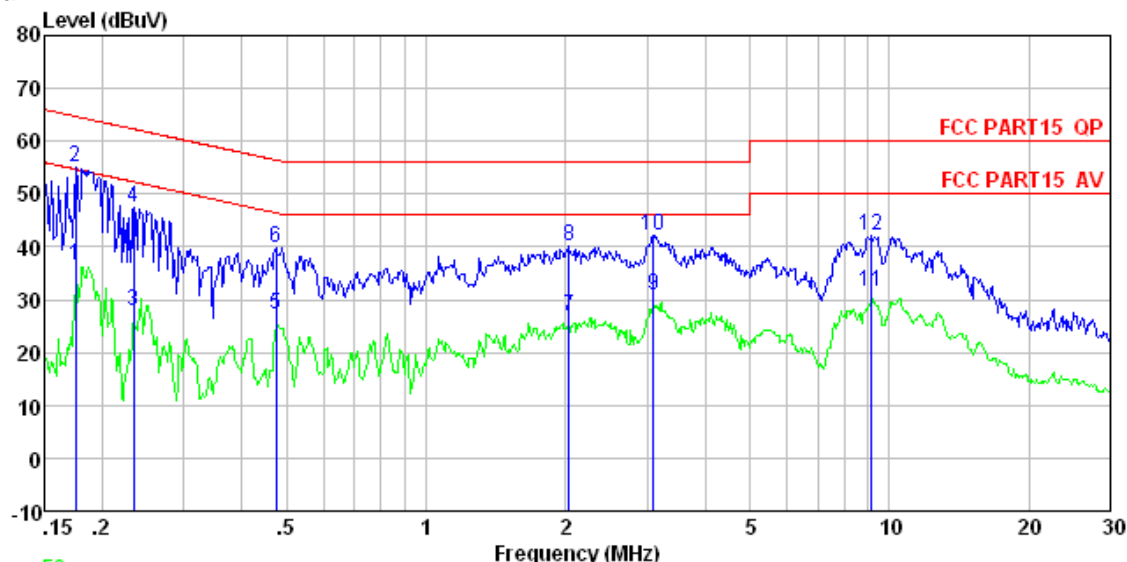


Trace: 48
Site : Shielded room
Condition : FCC PART15 QP LISN(2011) LINE
Job No. : 705RF
Test Mode : Operation
Test Engineer: HuXiaohe
Remark : Transmitter

	Freq	Read	LISN	Cable	Level	Limit	Over	
	MHz	Level	Factor	Loss	dBuV	Line	Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.179	39.40	0.67	0.10	40.17	54.55	-14.38	Average
2	0.179	55.86	0.67	0.10	56.63	64.55	-7.92	QP
3	0.237	29.70	0.64	0.10	30.44	52.22	-21.78	Average
4	0.237	48.32	0.64	0.10	49.06	62.22	-13.16	QP
5	0.469	28.30	0.56	0.10	28.96	46.54	-17.58	Average
6	0.469	41.96	0.56	0.10	42.62	56.54	-13.92	QP
7	1.980	23.20	0.40	0.10	23.70	46.00	-22.30	Average
8	1.980	38.51	0.40	0.10	39.01	56.00	-16.99	QP
9	3.090	30.30	0.35	0.10	30.75	46.00	-15.25	Average
10	3.090	42.59	0.35	0.10	43.04	56.00	-12.96	QP
11	8.323	31.27	0.24	0.18	31.69	50.00	-18.31	Average
12	8.323	43.43	0.24	0.18	43.85	60.00	-16.15	QP



Neutral:



Trace: 50

Site : Shielded room
Condition : FCC PART15 QP LISN(2011) NEUTRAL
Job No. : 705RF
Test Mode : Operation
Test Engineer: HuXiaohe
Remark : Transmitter

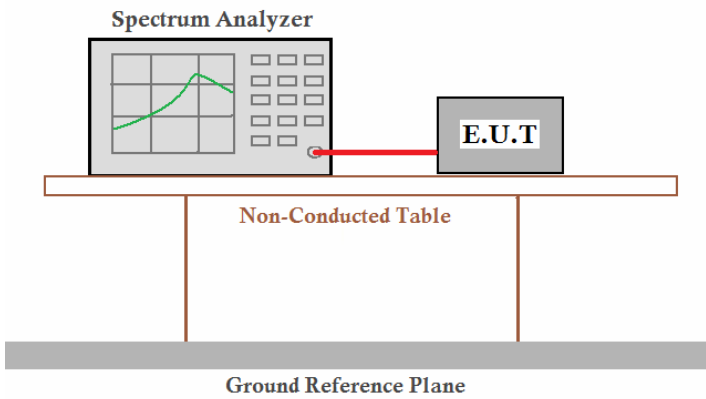
	Freq	Read	LISN	Cable	Level	Limit	Over	
	MHz	Level	Factor	Loss	dBuV	Line	Limit	Remark
		dBuV	dB	dB	dBuV	dBuV	dB	
1	0.175	35.70	0.67	0.10	36.47	54.72	-18.25	Average
2	0.175	54.30	0.67	0.10	55.07	64.72	-9.65	QP
3	0.234	27.20	0.64	0.10	27.94	52.30	-24.36	Average
4	0.234	46.58	0.64	0.10	47.32	62.30	-14.98	QP
5	0.474	26.60	0.56	0.10	27.26	46.45	-19.19	Average
6	0.474	39.17	0.56	0.10	39.83	56.45	-16.62	QP
7	2.033	26.40	0.40	0.10	26.90	46.00	-19.10	Average
8	2.033	39.73	0.40	0.10	40.23	56.00	-15.77	QP
9	3.090	30.36	0.35	0.10	30.81	46.00	-15.19	Average
10	3.090	41.85	0.35	0.10	42.30	56.00	-13.70	QP
11	9.156	31.00	0.23	0.19	31.42	50.00	-18.58	Average
12	9.156	41.64	0.23	0.19	42.06	60.00	-17.94	QP

Notes:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.



5.3 Peak Transmit Power

Test Requirement:	FCC Part15 E Section 15.407
Test Method:	ANSI C63.4: 2003 and KDB 789033
Limit:	For the band 5.15-5.25 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm + 10log B, where B is the 26-dB emission bandwidth in MHz.
Test setup:	
Test procedure:	<p>As an alternative to Publication: 662911 D01, the test method is “measure and sum”, In the measure and sum approach, the conducted emission level (e.g., transmit power or power in specified bandwidth) is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically to determine the total emission level from the device. Summing is performed in linear power units (e.g., mW—not dBm).</p> <p>The EUT peak power was measured with a peak power meter employing a video bandwidth greater than 6dB BW of the emission under test. Peak output power was read directly from the spectrum analyzer across all data rates, Special care was used to make sure that the EUT was transmitting in continuous mode.</p>
Test Instruments:	Refer to section 4.7 for details
Test mode:	Refer to section 4.3 for details
Test results:	Pass



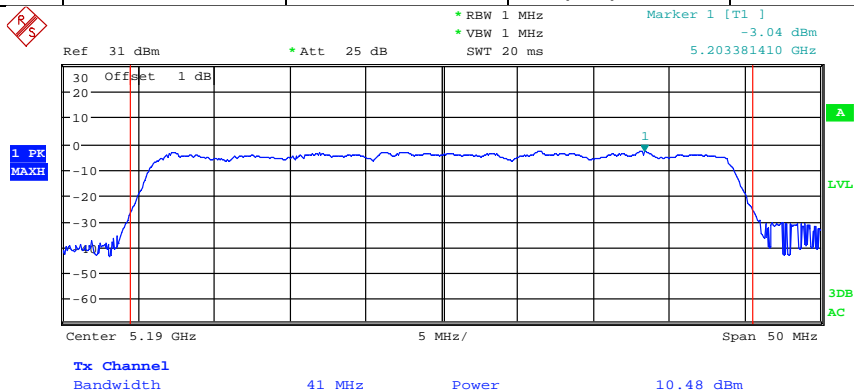
Measurement Data

Channel	Antenna	Output power (dBm)	26dB Bandwidth (MHz)	Sum Output Power (dBm)	Limit		Result
					dBm	4dBm+10log(BW)	
5190MHz	1	10.48	40.06	16.64	17.00	20.02	Pass
	2	10.43					
	3	10.73					
	4	10.84					
5230MHz	1	9.57	40.06	15.75	17.00	20.02	Pass
	2	9.68					
	3	9.70					
	4	9.95					

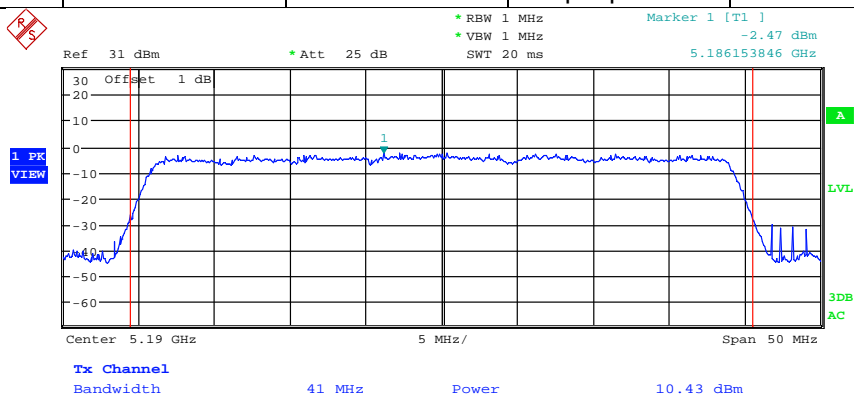


Test plot as follows:

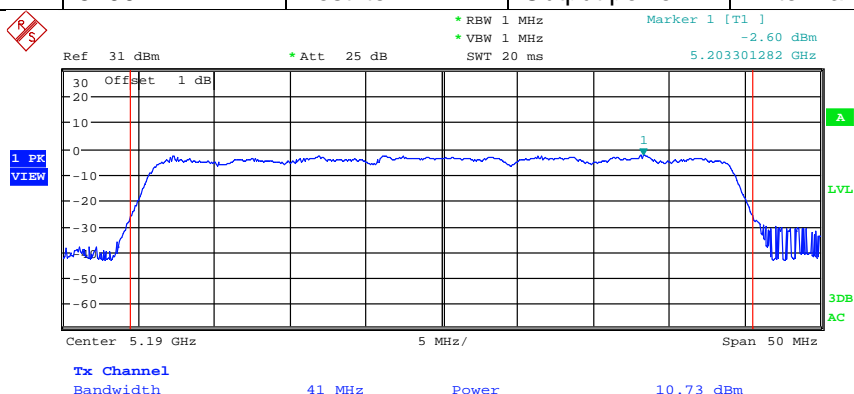
Channel:	5190MHz	Test item:	Output power	Antenna:	1
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Channel:	5190MHz	Test item:	Output power	Antenna:	2
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Channel:	5190MHz	Test item:	Output power	Antenna:	3
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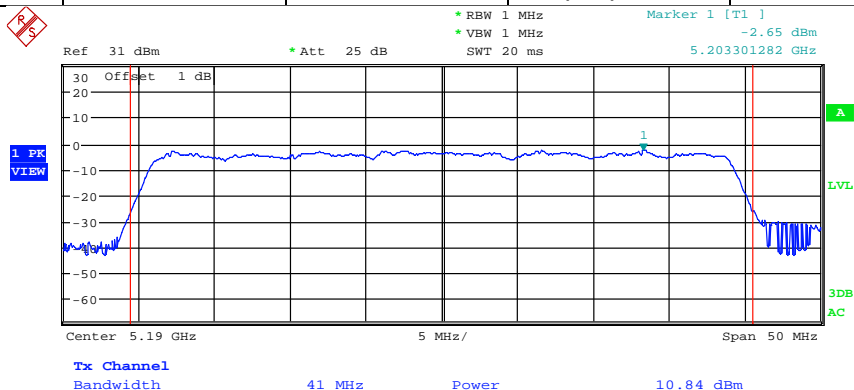




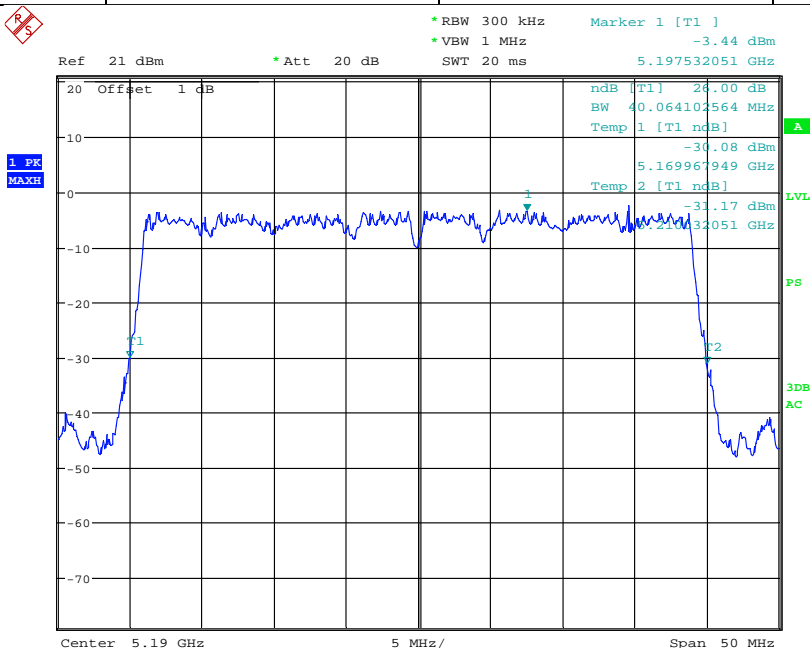
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Report No.: FCC12-RTE082104
Page 14 of 39

Channel:	5190MHz	Test item:	Output power	Antenna:	4
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Channel:	5190MHz	Test item:	26dB bandwidth
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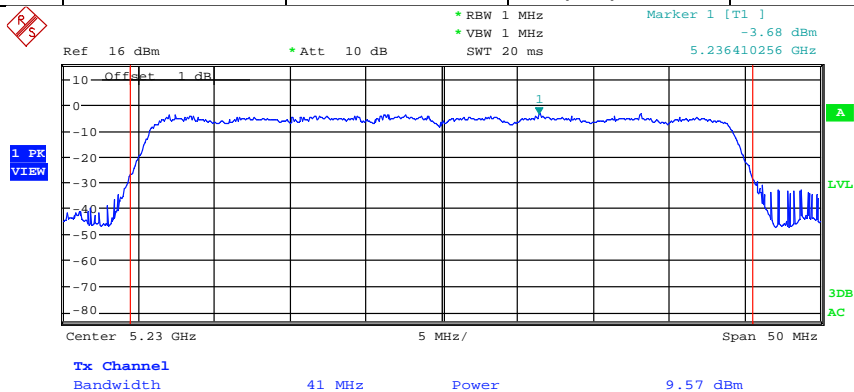
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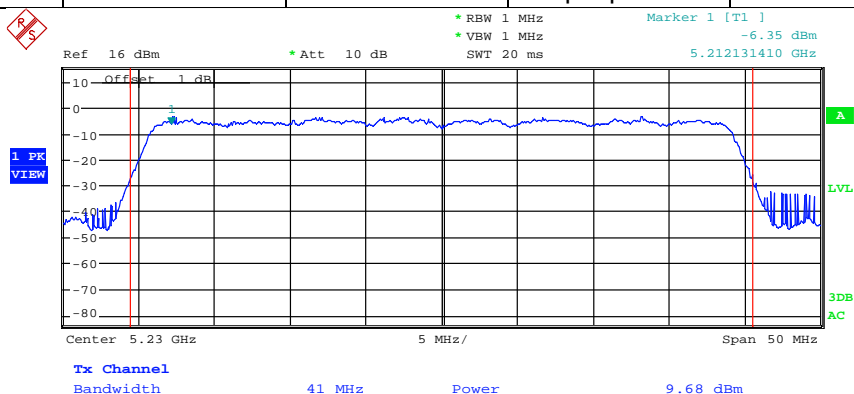
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Report No.: FCC12-RTE082104
Page 15 of 39

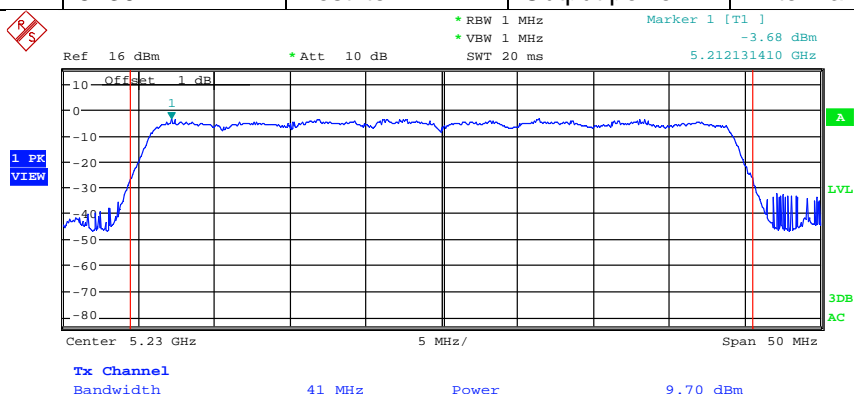
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Channel:	5230MHz	Test item:	Output power	Antenna:	2
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Channel:	5230MHz	Test item:	Output power	Antenna:	3
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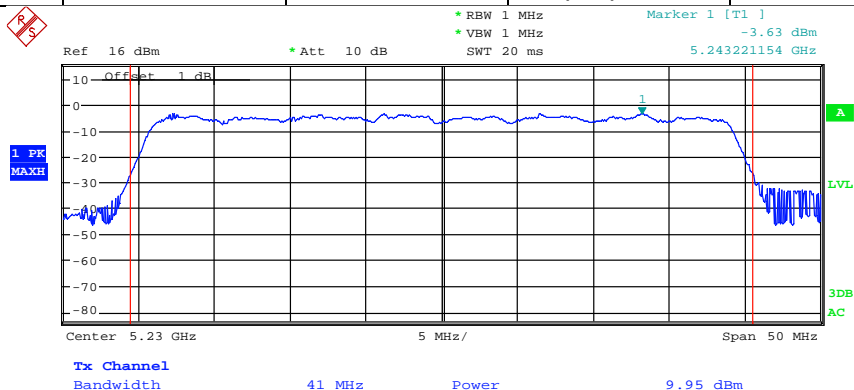
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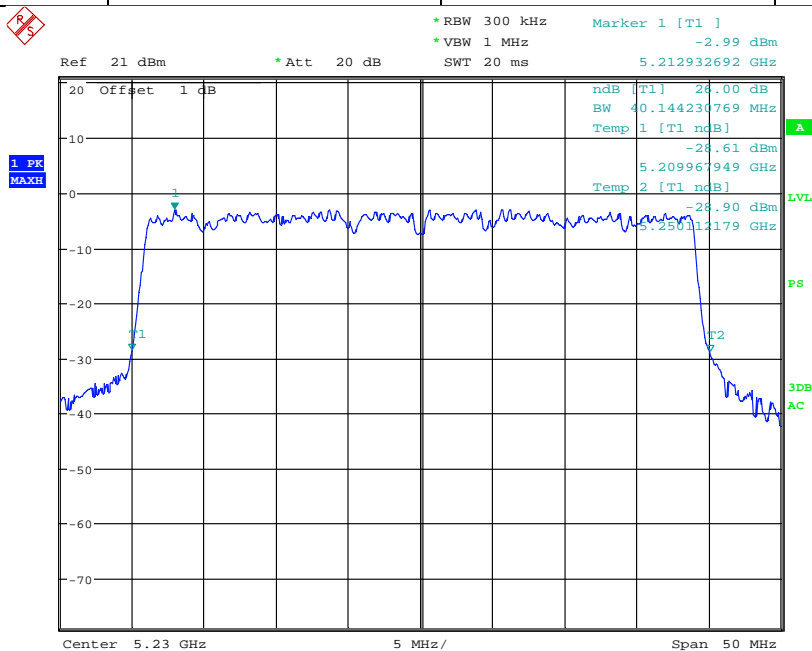
Shenzhen EBO Technology Co., Ltd.

Report No.: FCC12-RTE082104
Page 16 of 39

Channel:	5230MHz	Test item:	Output power	Antenna:	4
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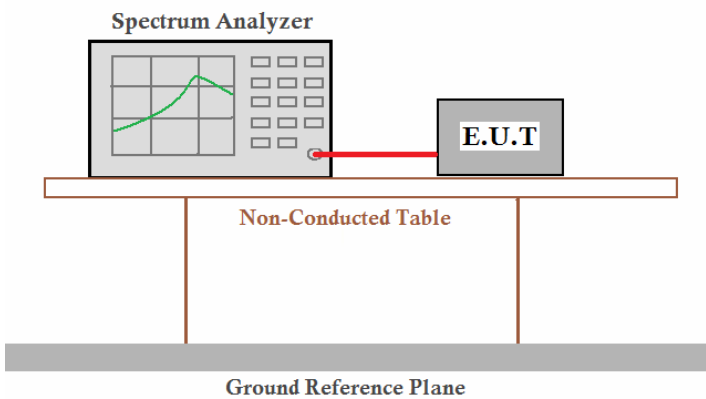
Channel:	5230MHz	Test item:	26dB bandwidth
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5.4 Power Spectral Density

Test Requirement:	FCC Part15 E Section 15.407
Test Method:	ANSI C63.4: 2003 and KDB 789033
Limit:	4dBm
Test setup:	
Test procedure:	As an alternative to Publication: 662911 D01, Measure and sum the PSDs across the outputs. With this technique, PSD is measured at each output of the device. The individual PSDs are then summed mathematically in linear power units
Test Instruments:	Refer to section 4.7 for details
Test mode:	Refer to section 4.3 for details
Test results:	Pass

Measurement Data

Channel	Antenna	Power density (dBm/MHz)	Sum Power density (dBm/MHz)	Limit (dBm/MHz)	Result
Low	1	-2.65	3.61	4.00	Pass
	2	-2.75			
	3	-2.42			
	4	-1.87			
High	1	-2.84	3.90	4.00	Pass
	2	-2.03			
	3	-1.98			
	4	-1.71			



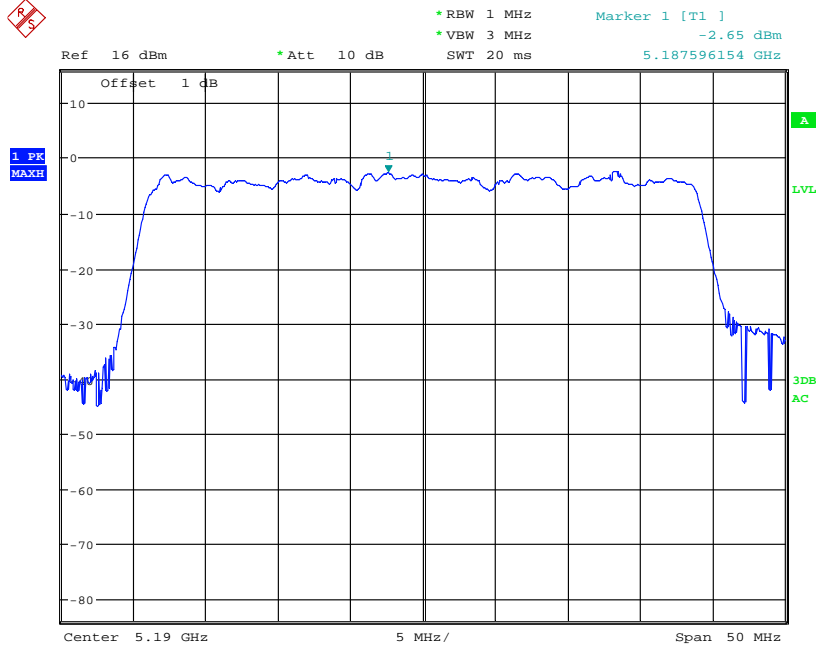
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Report No.: FCC12-RTE082104

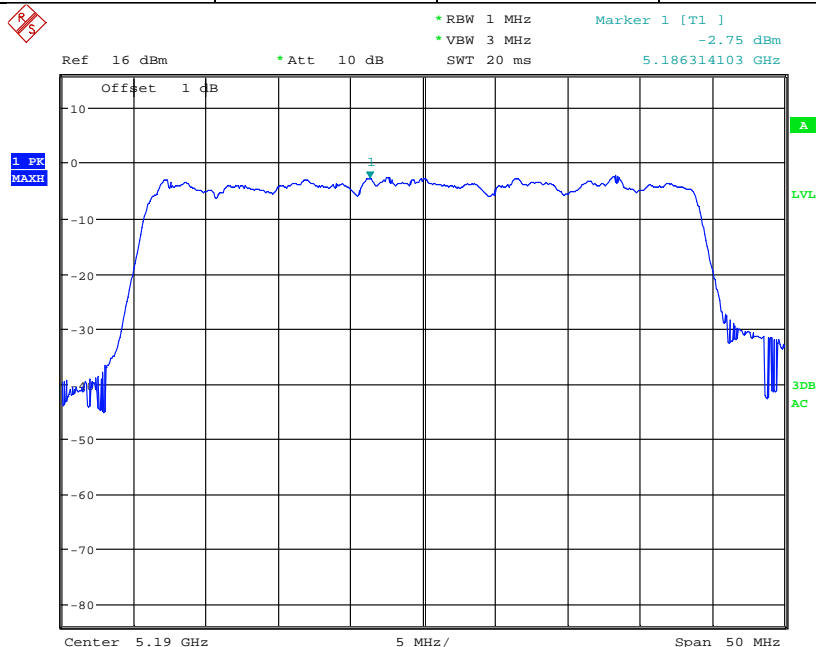
Page 18 of 39

Test plot as follows:

Channel:	5190MHz	Test item:	Power density	Antenna:	1
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Channel:	5190MHz	Test item:	Power density	Antenna:	2
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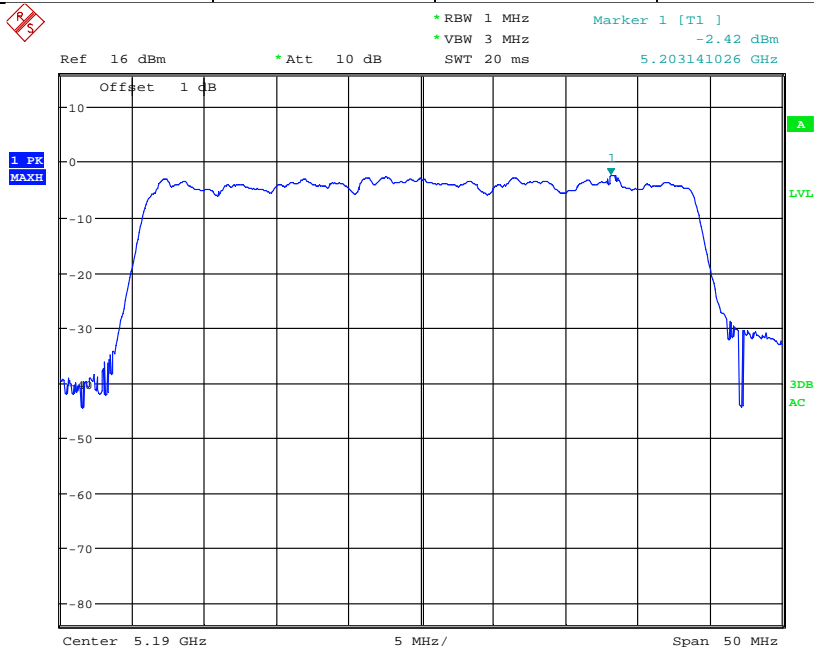
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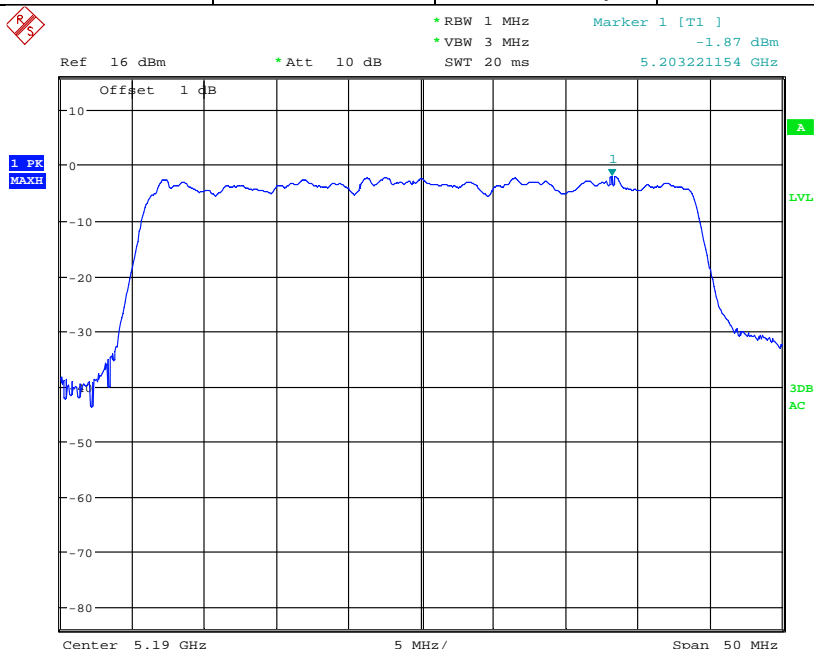
Shenzhen EBO Technology Co., Ltd.

Report No.: FCC12-RTE082104
Page 19 of 39

Channel:	5190MHz	Test item:	Power density	Antenna:	3
----------	---------	------------	---------------	----------	---



Channel:	5190MHz	Test item:	Power density	Antenna:	4
----------	---------	------------	---------------	----------	---



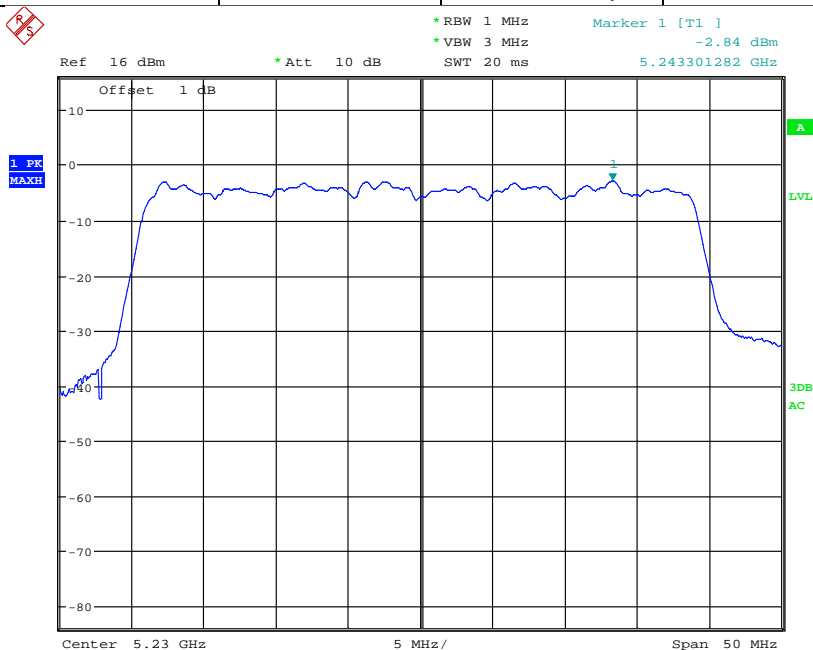
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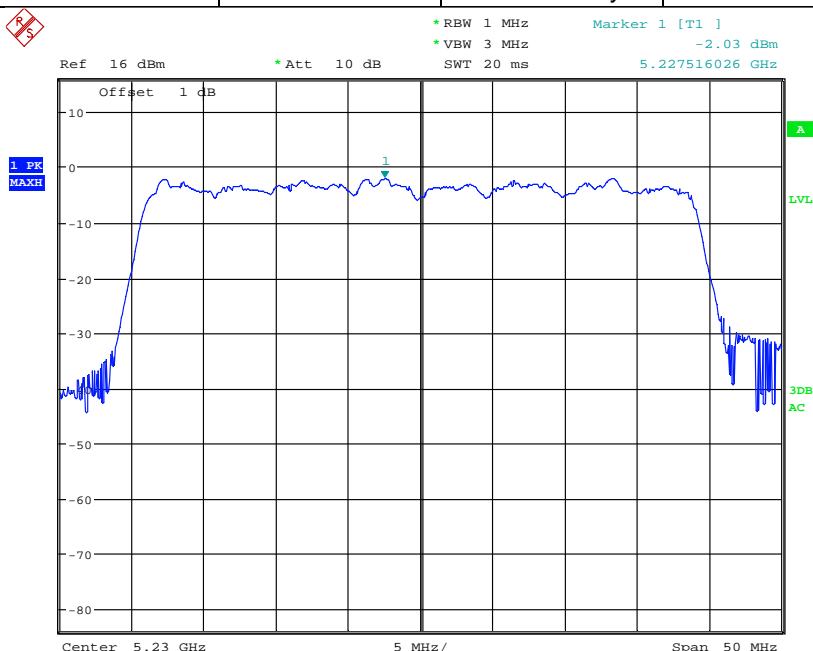
Shenzhen EBO Technology Co., Ltd.

Report No.: FCC12-RTE082104
Page 20 of 39

Channel:	5230MHz	Test item:	Power density	Antenna:	1
----------	---------	------------	---------------	----------	---



Channel:	5230MHz	Test item:	Power density	Antenna:	2
----------	---------	------------	---------------	----------	---



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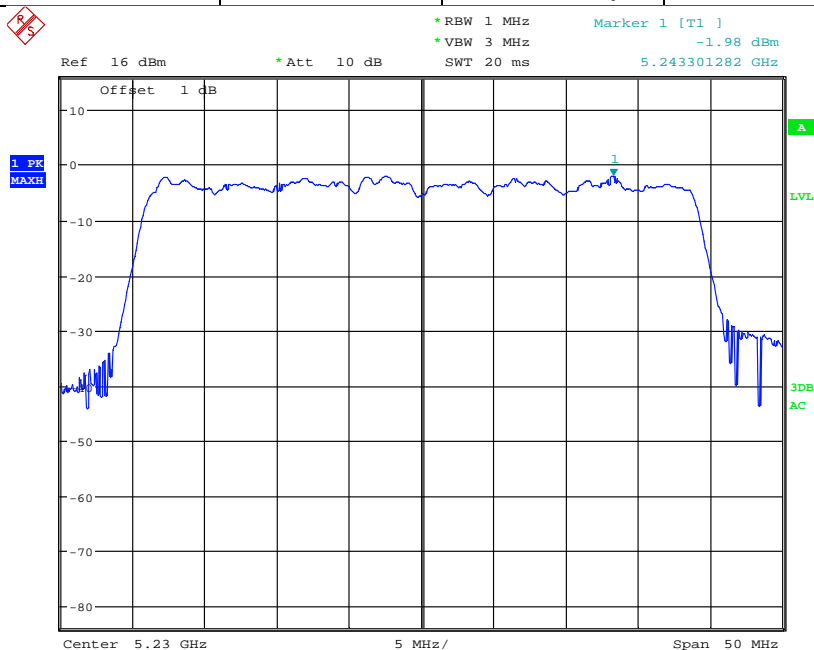


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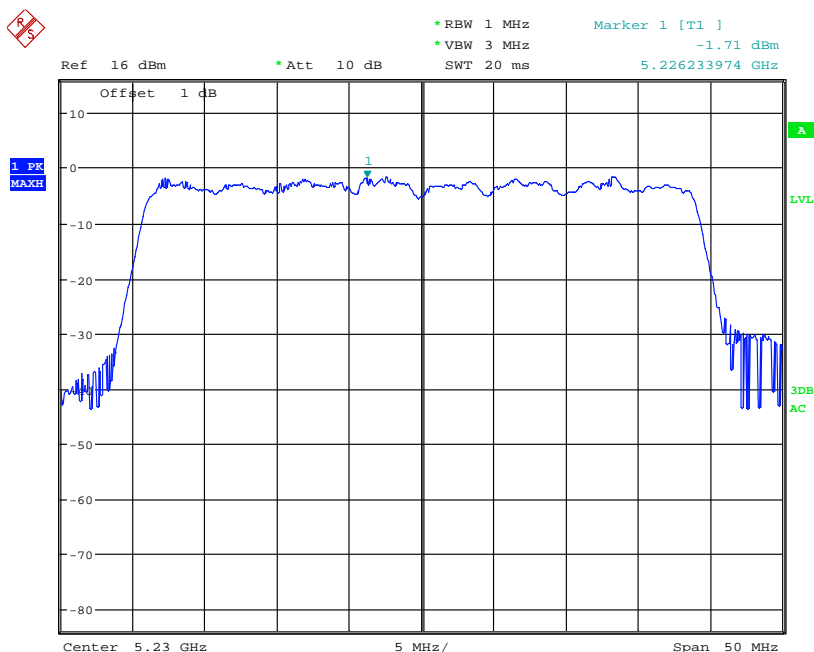
Report No.: FCC12-RTE082104

Page 21 of 39

Channel:	5230MHz	Test item:	Power density	Antenna:	3
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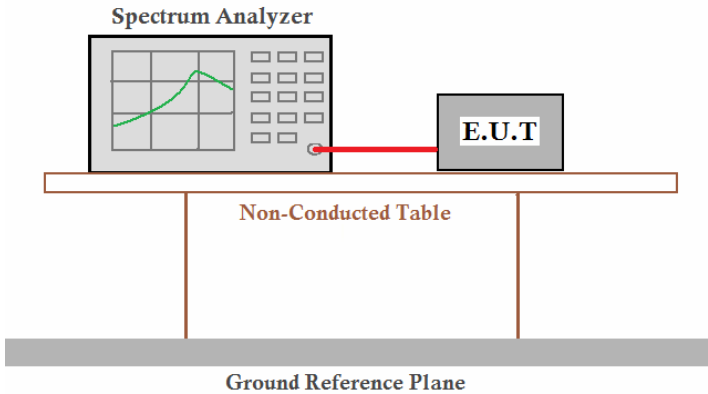
Channel:	5230MHz	Test item:	Power density	Antenna:	4
----------	---------	------------	---------------	----------	---



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5.5 Peak Excursion

Test Requirement:	FCC Part15 E Section 15.407
Test Method:	ANSI C63.4: 2003 and KDB 789033
Limit:	The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.
Test setup:	
Test procedure:	The EUT was setup to ANSI C63.4, 2003; tested to KDB 789033 for compliance to FCC 47CFR Subpart E requirements.
Test Instruments:	Refer to section 4.7 for details
Test mode:	4 antenna ports were tested, and the worst case is antenna port 4, so the data shows that port's only.
Test results:	Pass

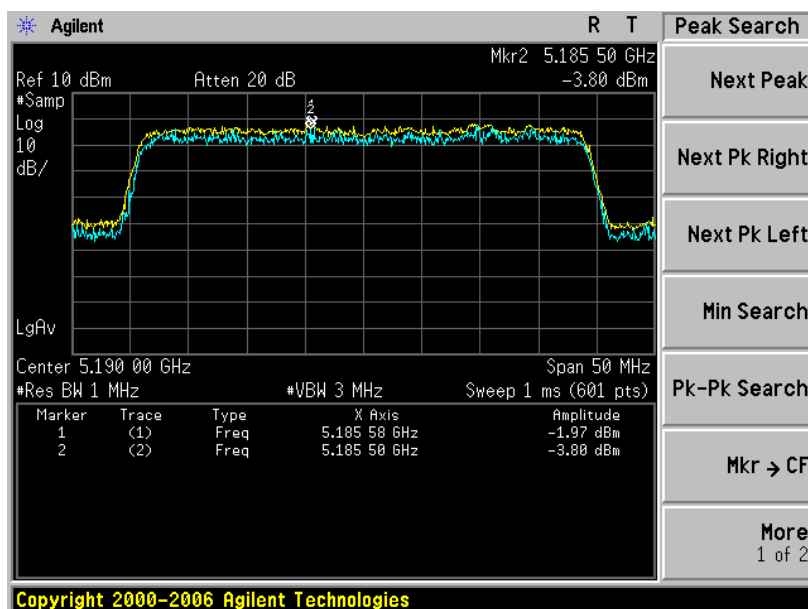
Measurement Data

Channel	Measurement Level (dB)	Limit (dBm)	Result
5190 MHz	1.83	13.00	Pass
5230 MHz	0.88	13.00	Pass

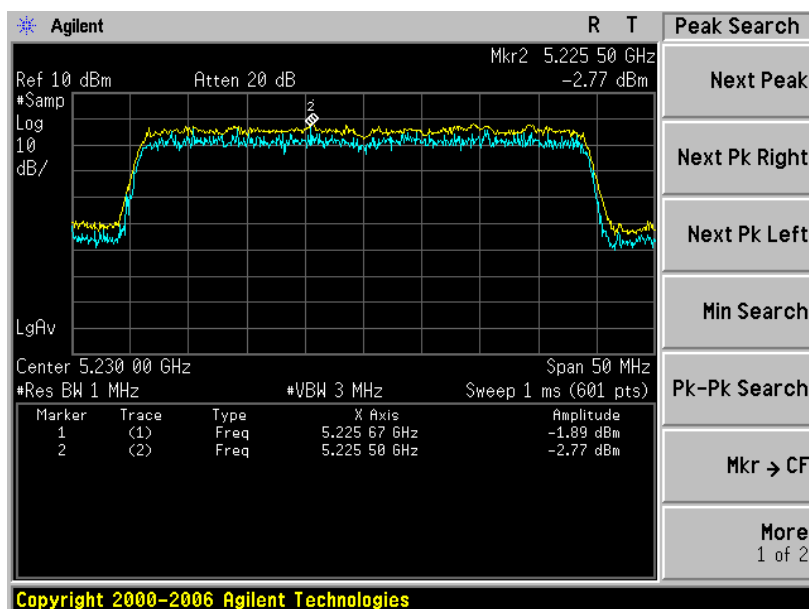


Test plot as follows:

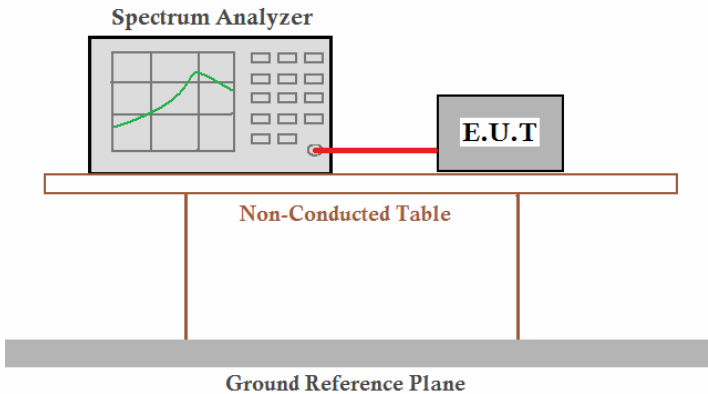
5190MHz:



5230MHz:

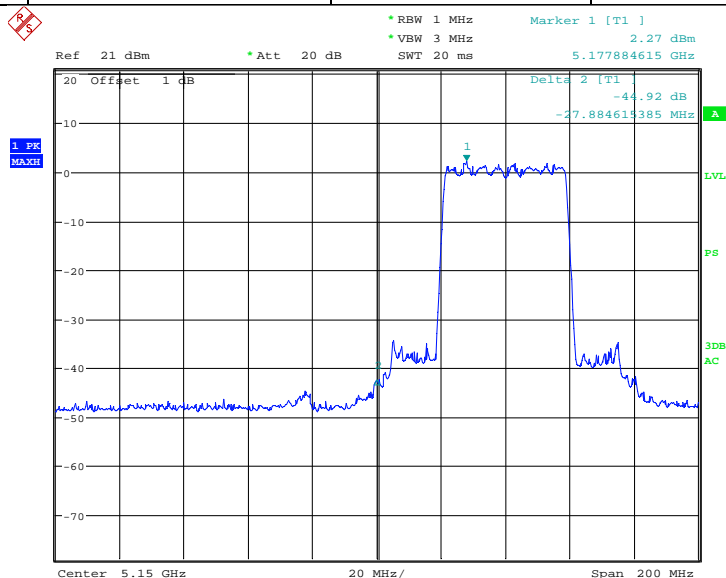


5.6 Undesirable Emission

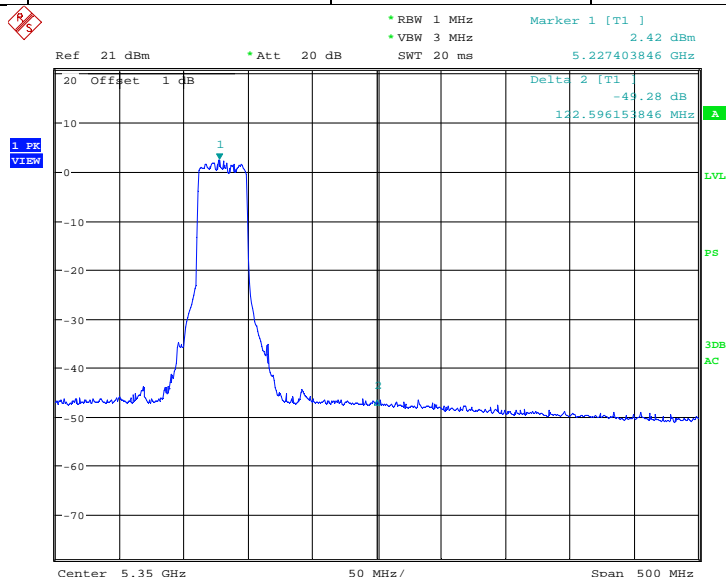
Test Requirement:	FCC Part15 E Section 15.407
Test Method:	ANSI C63.4: 2003
Limit:	The 20 dB bandwidth of the emission, not exceed in operation frequency range.
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. Below the table is a Ground Reference Plane.</p>
Test procedure:	<p>The EUT was setup according to ANSI C63.4, 2003 and tested according to FCC KDB 789033 test procedure for compliance to FCC 47CFR 15.407 requirements.</p> <p>The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level.</p> <p>This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4:2003 on radiated measurement.</p>
Test Instruments:	Refer to section 4.7 for details
Test mode:	4 antenna ports were tested, and the worst case is antenna port 4, so the data shows that port's only.
Test results:	Pass



Operation channel	Reference Frequency (MHz)	Measurement level (dB)	Limit (dB)	Result
5190MHz	5150	-27.88	-20	Pass



Operation channel	Reference Frequency (MHz)	Measurement level (dB)	Limit (dB)	Result
5230MHz	5350	-49.28	-20	Pass



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5.7 Band Edge

Test Requirement:	FCC Part15 E Section 15.407 and 5.205				
Test Method:	ANSI C63.4: 2003				
Test site:	Measurement Distance: 3m (Semi-Anechoic Chamber)				
Receiver setup:					
	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
AV		1MHz	10Hz	Average Value	
Limit:					
	Frequency		Limit (dBuV/m @3m)		Remark
	30MHz-88MHz		40.0		Quasi-peak Value
	88MHz-216MHz		43.5		Quasi-peak Value
	216MHz-960MHz		46.0		Quasi-peak Value
	960MHz-1GHz		54.0		Quasi-peak Value
	Above 1GHz		54.0		Average Value
74.0			Peak Value		
Test Procedure:	<div>a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.</div> <div>b. The EUT was set to operate with MIMO modes,</div> <div>c. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</div> <div>d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</div> <div>e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.</div> <div>f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</div> <div>g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</div>				
Test setup:	Above 1GHz				



Shenzhen EBO Technology Co., Ltd.

Report No.: FCC12-RTE082104
Page 27 of 39

	<p>The diagram illustrates a radio frequency (RF) test setup. On the left, a small rectangular object labeled 'EUT' (Equipment Under Test) sits on a 'Turn Table'. To the right of the turn table is a vertical 'Antenna Tower'. A 'Horn Antenna' is mounted on the tower at a height of 4m from the ground. The EUT is positioned 3m horizontally from the tower's vertical axis. The turn table is 0.8m high from the ground. The antenna is 1m high from the ground. A 'Spectrum Analyzer' is connected to the horn antenna via a cable, and an 'Amplifier' is connected to the spectrum analyzer. The spectrum analyzer has a small screen and several buttons.</p>
Test Instruments:	Refer to section 4.7 for details
Test mode:	Refer to section 4.3 for details
Test results:	Pass

Test channel:		5190MHz			Remark:		Peak	
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
5100	41.70	32.54	5.26	30.75	48.75	74.00	-25.25	Vertical
5150	43.15	32.58	5.28	30.82	50.19	74.00	-23.81	Vertical
5250	37.57	32.86	5.31	31.05	44.69	74.00	-29.31	Vertical
5350	36.81	32.91	5.32	31.12	43.92	74.00	-30.08	Vertical
5100	44.35	32.54	5.26	30.75	51.40	74.00	-22.60	Horizontal
5150	46.33	32.58	5.28	30.82	53.37	74.00	-20.63	Horizontal
5250	41.29	32.86	5.31	31.05	48.41	74.00	-25.59	Horizontal
5350	41.12	32.91	5.32	31.12	48.23	74.00	-25.77	Horizontal

Test channel:		5190MHz			Remark:		Average	
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
5100	30.19	32.54	5.26	30.75	37.24	54.00	-16.76	Vertical
5150	33.23	32.58	5.28	30.82	40.27	54.00	-13.73	Vertical
5250	28.25	32.86	5.31	31.05	35.37	54.00	-18.63	Vertical
5350	26.38	32.91	5.32	31.12	33.49	54.00	-20.51	Vertical
5100	32.84	32.54	5.26	30.75	39.89	54.00	-14.11	Horizontal
5150	36.41	32.58	5.28	30.82	43.45	54.00	-10.55	Horizontal
5250	31.97	32.86	5.31	31.05	39.09	54.00	-14.91	Horizontal
5350	30.69	32.91	5.32	31.12	37.80	54.00	-16.20	Horizontal

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Shenzhen EBO Technology Co., Ltd.

Report No.: FCC12-RTE082104

Page 28 of 39

Test channel:		5230MHz			Remark:		Peak	
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
5100	39.27	32.54	5.26	30.75	46.32	74.00	-27.68	Vertical
5150	40.72	32.58	5.28	30.82	47.76	74.00	-26.24	Vertical
5250	50.61	32.86	5.31	31.05	57.73	74.00	-16.27	Vertical
5350	41.05	32.91	5.32	31.12	48.16	74.00	-25.84	Vertical
5100	40.76	32.54	5.26	30.75	47.81	74.00	-26.19	Horizontal
5150	42.38	32.58	5.28	30.82	49.42	74.00	-24.58	Horizontal
5250	52.45	32.86	5.31	31.05	59.57	74.00	-14.43	Horizontal
5350	43.12	32.91	5.32	31.12	50.23	74.00	-23.77	Horizontal

Test channel:		5230MHz			Remark:		Average	
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
5100	30.76	32.54	5.26	30.75	37.81	54.00	-16.19	Vertical
5150	31.17	32.58	5.28	30.82	38.21	54.00	-15.79	Vertical
5250	39.02	32.86	5.31	31.05	46.14	54.00	-7.86	Vertical
5350	34.18	32.91	5.32	31.12	41.29	54.00	-12.71	Vertical
5100	32.25	32.54	5.26	30.75	39.30	54.00	-14.70	Horizontal
5150	32.83	32.58	5.28	30.82	39.87	54.00	-14.13	Horizontal
5250	40.86	32.86	5.31	31.05	47.98	54.00	-6.02	Horizontal
5350	36.25	32.91	5.32	31.12	43.36	54.00	-10.64	Horizontal

According to FCC Part 15.407 (b)(1) for transmitters operating in the 5.15–5.25 GHz band: all emissions out-side of the 5.15–5.35 GHz band shall not exceed an EIRP of –27 dBm/MHz.

According to KDB 789033 D01 G(2), the field strength @3m is converted to EIRP as below:

$$\text{EIRP[dBm]} = \text{E[dBuV/m]} - 95.2$$

* E is the field strength in dBuV/m.

The calculated result is below:

Test channel:		5190MHz		Remark:		Peak		Test channel:	
Frequency (MHz)		Field Strength (dBuV/m)		EIRP (dBm)		Limit (dBm/MHz)		polarization	
5150		50.19		-45.01		-27		Vertical	
5150		53.37		-41.83		-27		Horizontal	
Test channel:		5230MHz		Remark:		Peak			
5350		48.16		-47.04		-27		Vertical	
5350		50.23		-44.97		-27		Horizontal	

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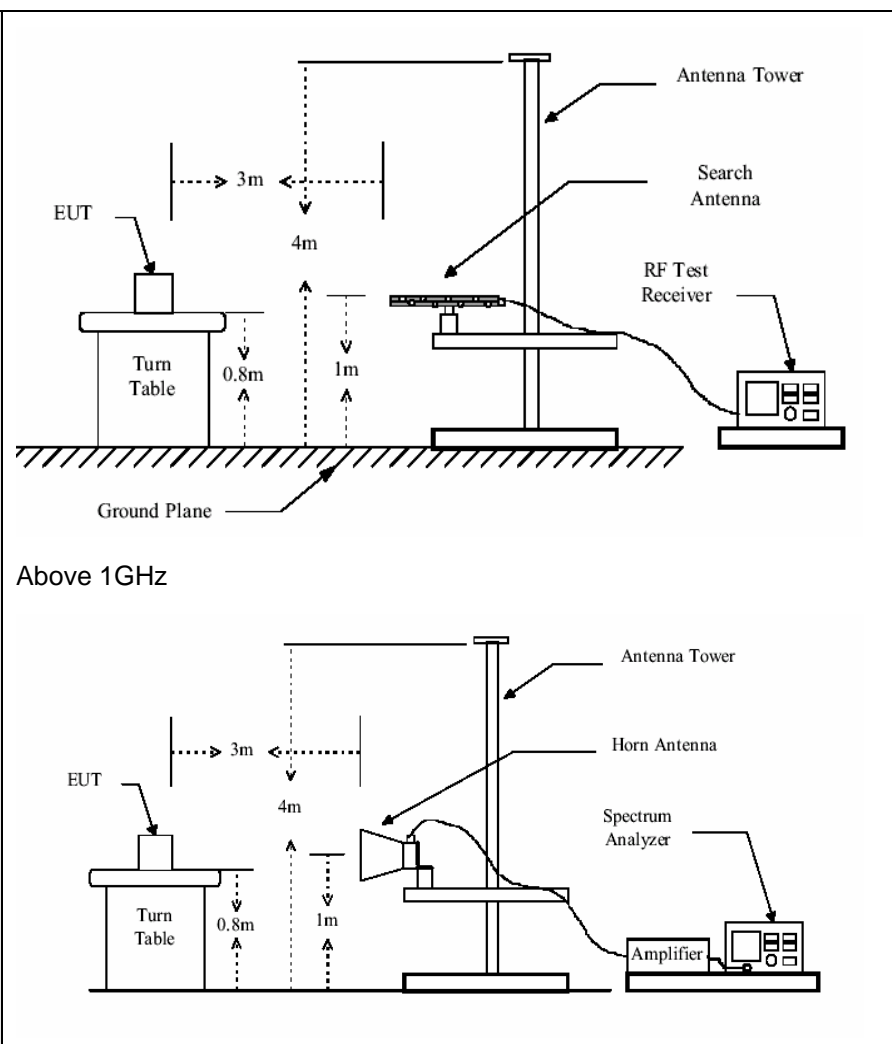
5.8 Radiated Emission

Test Requirement:	FCC Part15 C Section 15.209 and 15.205				
Test Method:	ANSI C63.4: 2003				
Test Frequency Range:	30MHz to 40GHz				
Test site:	Measurement Distance: 3m (Semi-Anechoic Chamber)				
Receiver setup:					
	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
Limit:					
	Frequency		Limit (dBuV/m @3m)		Remark
	30MHz-88MHz		40.0		Quasi-peak Value
	88MHz-216MHz		43.5		Quasi-peak Value
	216MHz-960MHz		46.0		Quasi-peak Value
	960MHz-1GHz		54.0		Quasi-peak Value
	Frequency		Limit (dBm/MHz)		Remark
	Above 1GHz		-27.0		Peak Value
	Test Procedure:	<p>Substitution method was performed to determine the actual ERP emission levels of the EUT.</p> <p>The following test procedure as below:</p> <p>1>.Below 1GHz test procedure:</p> <ol style="list-style-type: none">1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.2. The EUT was set to operate with MIMO modes,3. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.4. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.5. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.6. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.7. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.			

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	<p>2>.Above 1GHz test procedure:</p> <ol style="list-style-type: none">1. On the test site as test setup graph above,the EUT shall be placed at the 0.8m support on the turntable and in the position closest to normal use as declared by the provider.2. The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the frequency of the transmitter.The output of the test antenna shall be connected to the measuring receiver.3. The transmitter shall be switched on, if possible, without modulation and the measuring receiver shall be tuned to the frequency of the transmitter under test.4. The test antenna shall be raised and lowered from 1m to 4m until a maximum signal level is detected by the measuring receiver. Then the turntable should be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.5. Repeat step 4 for test frequency with the test antenna polarized horizontally.6. Remove the transmitter and replace it with a substitution antenna7. Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a nonradiating cable. With the antennas at both ends vertically polarized, and with the signal generator tuned to a particular test frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output.8. Repeat step 7 with both antennas horizontally polarized for each test frequency.9. Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps 7 and 8 by the power loss in the cable between the generator and the antenna, and further corrected for the gain of the substitution antenna used relative to an ideal half-wave dipole antenna by the following formula: $\text{EIRP(dBm)} = \text{Pg(dBm)} - \text{cable loss (dB)} + \text{antenna gain (dBi)}$where: Pg is the generator output power into the substitution antenna.
Test setup:	Below 1GHz

	
Test Instruments:	Refer to section 4.7 for details
Test mode:	Refer to section 4.3 for details
Test results:	Pass

Note:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

$$\text{Final Test Level} = \text{Receiver Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Preamplifier Factor}$$



Shenzhen EBO Technology Co., Ltd.

Report No.: FCC12-RTE082104

Page 32 of 39

Measurement Record:

Below 1GHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
47.659	52.74	16.50	0.75	31.98	38.01	40.00	-1.99	Vertical
50.232	52.15	16.35	0.77	31.96	37.31	40.00	-2.69	Vertical
135.032	60.24	11.72	1.47	31.92	41.51	43.50	-1.99	Vertical
195.137	51.65	13.57	1.81	32.13	34.90	43.50	-8.60	Vertical
810.265	44.26	23.15	4.49	31.30	40.60	46.00	-5.40	Vertical
945.440	43.70	23.92	5.03	31.21	41.44	46.00	-4.56	Vertical
47.49	52.87	16.52	0.74	31.98	38.15	40.00	-1.85	Horizontal
50.59	51.25	16.32	0.78	31.96	36.39	40.00	-3.61	Horizontal
189.07	50.14	13.52	1.78	32.11	33.33	43.50	-10.17	Horizontal
270.38	50.07	15.42	2.22	32.17	35.54	46.00	-10.46	Horizontal
406.09	51.63	17.22	2.88	31.87	39.86	46.00	-6.14	Horizontal
675.21	45.27	21.46	4.00	31.16	39.57	46.00	-6.43	Horizontal

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Shenzhen EBO Technology Co., Ltd.

Report No.: FCC12-RTE082104

Page 33 of 39

Above 1GHz

Test channel:		5190MHz		Remark:		Peak	
Frequency (MHz)	Read Level (dBm)	Factor (dB)	Level (dBm)	Limit Line (dBm/MHz)	Over Limit (dB)	polarization	
10380	-76.06	30.24	-45.82	-27.00	-18.82	Vertical	
15570	-73.09	34.58	-38.51	-27.00	-11.51	Vertical	
20760	*	*	*	-27.00	*	Vertical	
25950	*	*	*	-27.00	*	Vertical	
31140	*	*	*	-27.00	*	Vertical	
36330	*	*	*	-27.00	*	Vertical	
10380	-73.38	30.24	-43.14	-27.00	-16.14	Horizontal	
15570	-74.44	34.58	-39.86	-27.00	-12.86	Horizontal	
20760	*	*	*	-27.00	*	Horizontal	
25950	*	*	*	-27.00	*	Horizontal	
31140	*	*	*	-27.00	*	Horizontal	
36330	*	*	*	-27.00	*	Horizontal	

Test channel:		5230MHz		Remark:		Peak	
Frequency (MHz)	Read Level (dBm)	Factor (dB)	Level (dBm)	Limit Line (dBm/MHz)	Over Limit (dB)	polarization	
10460	-74.04	30.58	-43.46	-27.00	-16.46	Vertical	
15690	-74.62	34.86	-39.76	-27.00	-12.76	Vertical	
20920	*	*	*	-27.00	*	Vertical	
26150	*	*	*	-27.00	*	Vertical	
31380	*	*	*	-27.00	*	Vertical	
36610	*	*	*	-27.00	*	Vertical	
10460	-72.74	30.58	-42.16	-27.00	-15.16	Horizontal	
15690	-75.72	34.86	-40.86	-27.00	-13.86	Horizontal	
20920	*	*	*	-27.00	*	Horizontal	
26150	*	*	*	-27.00	*	Horizontal	
31380	*	*	*	-27.00	*	Horizontal	
36610	*	*	*	-27.00	*	Horizontal	

Remark:

1. “ * ”, means this data is the too weak instrument of signal is unable to test.
2. Level = Reading Level + Factor
3. The emission levels of other frequencies are very lower than the limit and not show in test report.

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Emissions fall into restricted band

Detector		Peak					
Frequency (MHz)	Read Level (dBuV/m)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization	
15570	29.14	34.58	63.72	74.00	-10.28	Vertical	
15570	31.19	34.58	65.77	74.00	-8.23	Horizontal	
15690	27.05	34.86	61.91	74.00	-12.09	Vertical	
15690	30.45	34.86	65.31	74.00	-8.69	Horizontal	
Detector		Average					
Frequency (MHz)	Read Level (dBuV/m)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization	
15570	13.85	34.58	48.43	54.00	-5.57	Vertical	
15570	15.87	34.58	50.45	54.00	-3.55	Horizontal	
15690	12.57	34.86	47.43	54.00	-6.57	Vertical	
15690	14.70	34.86	49.56	54.00	-4.44	Horizontal	



5.9 Frequency stability

Test Requirement:	FCC Part15 C Section 15.407
Test Method:	ANSI C63.4: 2003
Limit:	Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified
Test Procedure:	The EUT was setup to ANSI C63.4, 2003; tested to KDB 789033 for compliance to FCC 47CFR Subpart E requirements.
Test setup:	<div><p style="text-align: center;">Temperature Chamber</p><pre>graph LR; SA[Spectrum analyzer] --- Att[Att.]; Att --- EUT[EUT]; EUT --- VPS[Variable Power Supply]; subgraph TC [Temperature Chamber]; EUT; end</pre><p style="text-align: center;">Note : Measurement setup for testing on Antenna connector</p></div>
Test Instruments:	Refer to section 4.7 for details
Test mode:	Refer to section 4.3 for details
Test results:	Pass



Measurement data:

Frequency stability versus Temp.									
Operating Frequency: 5190MHz									
Temp. (°C)	Power supply (Vac)	0 minute		2 minute		5 minute		10 minute	
		Measured Frequency (MHz)	Frequency drift (MHz)	Measured Frequency (MHz)	Frequency drift (MHz)	Measured Frequency (MHz)	Frequency drift (MHz)	Measured Frequency (MHz)	Frequency drift (MHz)
55	120	5190.0033	0.0033	5190.0030	0.0030	5190.0027	0.0027	5190.0023	0.0023
50	120	5190.0030	0.0030	5190.0030	0.0030	5190.0026	0.0026	5190.0021	0.0021
40	120	5190.0030	0.0030	5190.0028	0.0028	5190.0023	0.0023	5190.0020	0.0020
30	120	5190.0025	0.0025	5190.0026	0.0026	5190.0019	0.0019	5190.0018	0.0018
20	120	5190.0026	0.0026	5190.0027	0.0027	5190.0020	0.0020	5190.0020	0.0020
10	120	5190.0022	0.0022	5190.0023	0.0023	5190.0018	0.0018	5190.0017	0.0017
0	120	5190.0021	0.0021	5190.0020	0.0020	5190.0015	0.0015	5190.0015	0.0015
-10	120	5190.0021	0.0021	5190.0020	0.0020	5190.0014	0.0014	5190.0015	0.0015
-20	120	5190.0015	0.0015	5190.0016	0.0016	5190.0009	0.0009	5190.0012	0.0012

Frequency stability versus voltage									
Operating Frequency: 5190MHz									
Temp. (°C)	Power supply (Vac)	0 minute		2 minute		5 minute		10 minute	
		Measured Frequency (MHz)	Frequency drift (MHz)	Measured Frequency (MHz)	Frequency drift (MHz)	Measured Frequency (MHz)	Frequency drift (MHz)	Measured Frequency (MHz)	Frequency drift (MHz)
20	102	5190.0022	0.0022	5190.0023	0.0023	5190.0018	0.0018	5190.0016	0.0016
	120	5190.0024	0.0024	5190.0025	0.0025	5190.0018	0.0018	5190.0018	0.0018
	138	5190.0027	0.0027	5190.0028	0.0028	5190.0020	0.0020	5190.0019	0.0019



Shenzhen EBO Technology Co., Ltd.

Report No.: FCC12-RTE082104

Page 37 of 39

Frequency stability versus Temp.									
Operating Frequency: 5230MHz									
Temp. (°C)	Power supply (Vac)	0 minute		2 minute		5 minute		10 minute	
		Measured Frequency (MHz)	Frequency drift (MHz)	Measured Frequency (MHz)	Frequency drift (MHz)	Measured Frequency (MHz)	Frequency drift (MHz)	Measured Frequency (MHz)	Frequency drift (MHz)
55	120	5230.0042	0.0042	5230.0037	0.0037	5230.0036	0.0036	5230.0036	0.0036
50	120	5230.0038	0.0038	5230.0037	0.0037	5230.0034	0.0034	5230.0033	0.0033
40	120	5230.0037	0.0037	5230.0034	0.0034	5230.0032	0.0032	5230.0032	0.0032
30	120	5230.0033	0.0033	5230.0032	0.0032	5230.0030	0.0030	5230.0028	0.0028
20	120	5230.0035	0.0035	5230.0034	0.0034	5230.0031	0.0031	5230.0032	0.0032
10	120	5230.0033	0.0033	5230.0032	0.0032	5230.0029	0.0029	5230.0028	0.0028
0	120	5230.0029	0.0029	5230.0028	0.0028	5230.0027	0.0027	5230.0026	0.0026
-10	120	5230.0031	0.0031	5230.0031	0.0031	5230.0029	0.0029	5230.0029	0.0029
-20	120	5230.0029	0.0029	5230.0027	0.0027	5230.0028	0.0028	5230.0027	0.0027

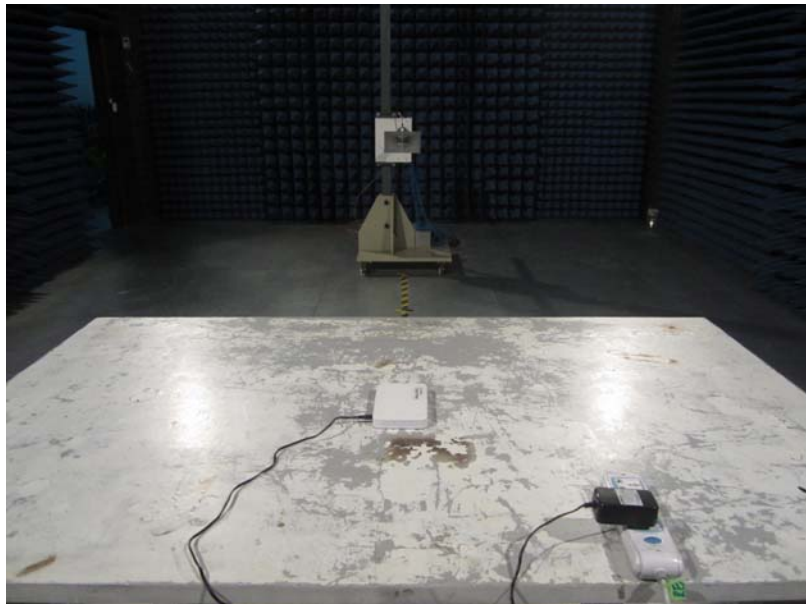
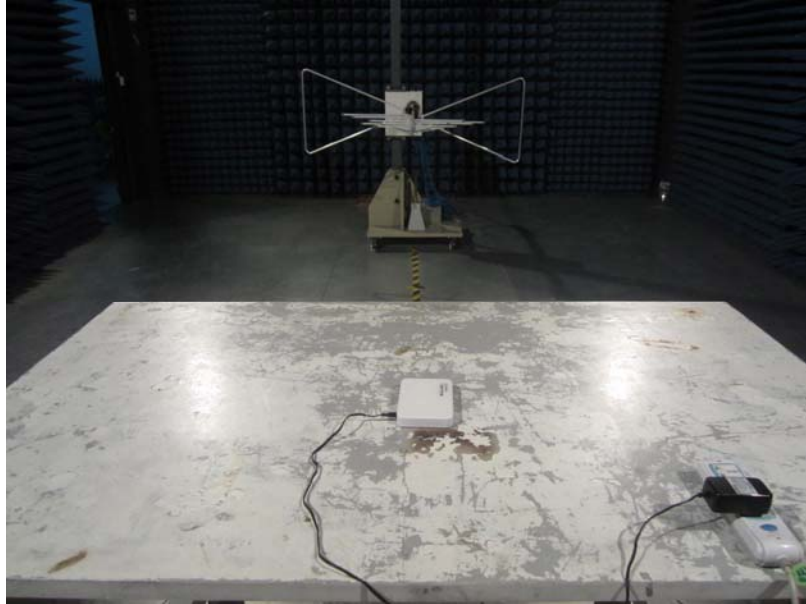
Frequency stability versus voltage									
Operating Frequency: 5230MHz									
Temp. (°C)	Power supply (Vac)	0 minute		2 minute		5 minute		10 minute	
		Measured Frequency (MHz)	Frequency drift (MHz)	Measured Frequency (MHz)	Frequency drift (MHz)	Measured Frequency (MHz)	Frequency drift (MHz)	Measured Frequency (MHz)	Frequency drift (MHz)
20	102	5230.0029	0.0029	5230.0029	0.0029	5230.0028	0.0028	5230.0026	0.0026
	120	5230.0035	0.0035	5230.0034	0.0034	5230.0031	0.0031	5230.0032	0.0032
	138	5230.0035	0.0035	5230.0031	0.0031	5230.0030	0.0030	5230.0029	0.0029

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6 Test Setup Photo

Radiated Emission



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Conducted Emissions



7 EUT Constructional Details

Reference to the test report No. : FCC12-RTE082103

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