

TEST REPORT

1. Applicant

Name : HIMS International Corporation
Brand Name : N/A
Address : 174, Gajeong-ro, Yuseong-gu, Daejeon, KOREA 305-350
FCC ID : QJCEB100AC

2. Products

Name : Remote Controller (E-bot ADV Controller)
Model No. : EB100AC
Variant Model No. : N/A
Manufacturer : HIMS International Corporation
Address : 174, Gajeong-ro, Yuseong-gu, Daejeon, KOREA 305-350

3. Test Standard : 47 CFR Part 15, Subpart C

4. Test Method : ANSI C63.10-2009

5. Test Result : PASS

6. Dates of Test : March 10, 2014 to March 13, 2014

7. Date of Issue : March 18, 2014

8. Test Laboratory : Korea Standard Quality Laboratories
FCC Designation Number : 100384

Tested by



Kwang Min, Lee

Test Engineer:

Approved by



Su Wook, Chae

Compliance Engineer:

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1. Test Summary

Test	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15, Subpart C Section 15.203	ANSI C63.10(2009)	PASS
Field Strength of the Fundamental Signal	47 CFR Part 15, Subpart C Section 15.231 (b)	ANSI C63.10(2009)	PASS
Spurious Emissions	47 CFR Part 15, Subpart C Section 15.231 (b)/15.209	ANSI C63.10(2009)	PASS
20dB Bandwidth	47 CFR Part 15, Subpart C Section 15.231 (c)	ANSI C63.10(2009)	PASS
Deactivated time	47 CFR Part 15 Subpart C Section 15.231 (a) (1)	ANSI C63.10(2009)	PASS

2. TABLE OF CONTENTS

1. Test Summary	2
2. Table of Contents	3
3. General Information	4
3.1 Client Information.....	4
3.2 General Description of E.U.T.....	4
3.3 Details of E.U.T.....	4
3.4 Test Environment and Mode.....	4
3.5 Description of Support Units	4
3.6 Abnormalities from Standard Conditions.....	5
3.7 Other Information Requested by the Customer.....	5
3.8 Test Location.....	5
4. Equipment Used during Test	6
5. Test Results and Measurement Data	8
5.1 Antenna Requirement.....	8
5.2 Spurious Emissions.....	9
5.2.1 Spurious Emissions.....	9
5.2.1.1 Field Strength Of The Fundamental Signal.....	12
5.2.1.2 Spurious Emissions.....	13
5.3 20dB Bandwidth.....	16
5.4 Deactivated time.....	18
** APPENDIX	20

3. General Information

3.1. Client Information

Applicant : HIMS International Corporation
 Address of Applicant : 174, Gajeong-ro, Yuseong-gu, Daejeon, KOREA 305-350
 Manufacturer : HIMS International Corporation
 Address of Manufacturer : 174, Gajeong-ro, Yuseong-gu, Daejeon, KOREA 305-350

3.2. General Description of E.U.T.

Product Name : Remote Controller (E-bot ADV Controller)
 Model No. : EB100AC

3.3. Details of E.U.T.

Operation Frequency : 447.925MHz
 Channel Numbers : 1
 Modulation Type : 2FSK
 Antenna Type : Integral antenna
 Antenna Gain : 0dBi
 Power Supply : 3.0V DC (1.5V x 2 "Alkaline AAA Type Battery")
 Test Voltage : DC 3.0V

3.4. Test Environment and Mode

Operating Environment:	
Temperature:	25.0 °C
Humidity:	48% RH
Atmospheric Pressure:	1016 mbar
Test mode:	
Transmitting mode:	Keep the EUT in transmitting mode with modulation.

3.5. Description of Support Units

The EUT has been tested independent unit.

3.6. Abnormalities from Standard Conditions

None.

3.7. Other Information Requested by the Customer

None.

3.8. Test Location

#102, Jangduk Dong, Hwasung City, Kyunggi Do, South Korea
(FCC Designation Number : 100384)

This test site is in compliance with ISO/IEC 17025 for general requirements for the competence of testing and calibration laboratories.

4. Equipment Used during Test

No.	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Data	Used equipment
1	EMI Test Receiver	LIG Nex1	LSA-265	L07098033	2013.12.20	2014.12.20	■
2	Bi-log Antenna	Schwarzbeck	VULB9160	3311	2013.10.16	2015.10.16	■
3	Turn Table	KEI	KEI-TURN	9210	N/A	N/A	■
4	Turn Table	KEI	KEI-TURN	N/A	N/A	N/A	■
5	Loop ANT.	EMCO	6502/1	9801-3191	2014.02.04	2016.02.04	■
6	Spectrum Analyzer	Agilent	E4440A	MY45304715	2014.02.14	2015.02.14	■
7	Function Generator	Agilent	33120A	US36026465	2013.06.08	2014.06.08	□
8	Frequency Counter	HP	5350B	3049A05530	2013.06.08	2014.06.08	■
9	Modulation Analyzer	Agilent	8901B	3438A05099	2013.06.08	2014.06.08	□
10	Audio Analyaer	Agilent	8903B	3729A18576	2013.06.08	2014.06.08	□
11	Attenuator	Agilent	8494B	MY4111020 4	2013.06.08	2014.06.08	□
12	Attenuator	Agilent	8496B	US40152183	2013.06.08	2014.06.08	□
13	Attenuator	Agilent	8495B	3308A17660	2013.06.08	2014.06.08	□
14	Attenuator	TAE SUNG	SMA-2	N/A	2013.06.08	2014.06.08	□
15	Power Meter	Agilent	E4418B	GB43312894	2013.06.08	2014.06.08	□
16	Power Sensor	HP	8485A	3316A14708	2013.06.08	2014.06.08	□
17	Vibration Tester	Gana	GNV-400		2013.06.21	2014.06.21	□
18	RF Cable	Gigalane	SMS-LL280-SMS- 1.5M	SMS105-LL 280-SMS105 -1.5M	N/A	N/A	■
19	Temp & Humidity Chamber	Seoksan Tech	SE-CT-02	S7400JD534 0618	2013.06.08	2014.06.08	■
20	Signal Generator	Leader Electronics	3220	0137231	2013.06.08	2014.06.08	■
21	Oscilloscope	Tektronix	TDS-350	B031902	2013.06.08	2014.06.08	□
22	Drop Tester	Self-made	KSQ-01	N/A	N/A	N/A	□
23	Pre Amplifier	GTC	GA-1825A	GT0929/003	2013.06.08	2014.06.08	■
24	Continuous operation tester	GTC	CT-100	GT0929/001	N/A	N/A	□
25	CW Generator	HP	83711B	US34490158	2013.06.08	2014.06.08	■
26	POWER DIVIDER	Agilent	11636B	54381	2013.06.08	2014.06.08	□
27	Power Sensor	Agilent	8482B	N/A	2013.06.08	2014.06.08	□
28	Attenuator	Winswell	53-30-33	N/A	2013.06.08	2014.06.08	□
29	DC Power Supply	Hanil	HPS-505A	0606123	2013.06.08	2014.06.08	□

30	Slidacs	Hanchang	5KV	N/A	2013.06.08	2014.06.08	<input type="checkbox"/>
31	Termination	Kwang Yeok	KYTE-NJ-150W	2040004	2013.06.08	2014.06.08	<input type="checkbox"/>
32	Band-limited filter	MITECH	KSQ-02	N/A	2013.06.08	2014.06.08	<input type="checkbox"/>
33	Horn ANT.	SCHWARZBEC K	BBHA 9120D	9120D-679	2012.07.12	2014.07.12	<input checked="" type="checkbox"/>
34	Horn ANT.	A.H. SYSTEMS	SAS-572	100284	2013.09.07	2015.09.07	<input type="checkbox"/>
35	DC Power Supply	ALINCO	DM-340MW	F001015	2013.06.08	2014.06.08	<input type="checkbox"/>
36	LISN	Electro Metrics	ANS-25/2	2535	2013.04.25	2014.04.25	<input type="checkbox"/>
37	LISN	Kyoritsu	KNW-407	8-1010-14	2013.06.08	2014.06.08	<input type="checkbox"/>
38	Pulse Limiter	LIG Nex1	EPL-30	N/A	2013.06.08	2014.06.08	<input type="checkbox"/>

5. Test Results and Measurement Data

5.1. Antenna Requirement

Standard requirement: 47 CFR Part 15C Section 15.203

15.203 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, 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.

EUT Antenna

PASS

The transmitter has an Integrated Helical antenna. The directional gain of the antenna is 0 dBi. please refer to the EUT internal photos.

5.2. Spurious Emissions

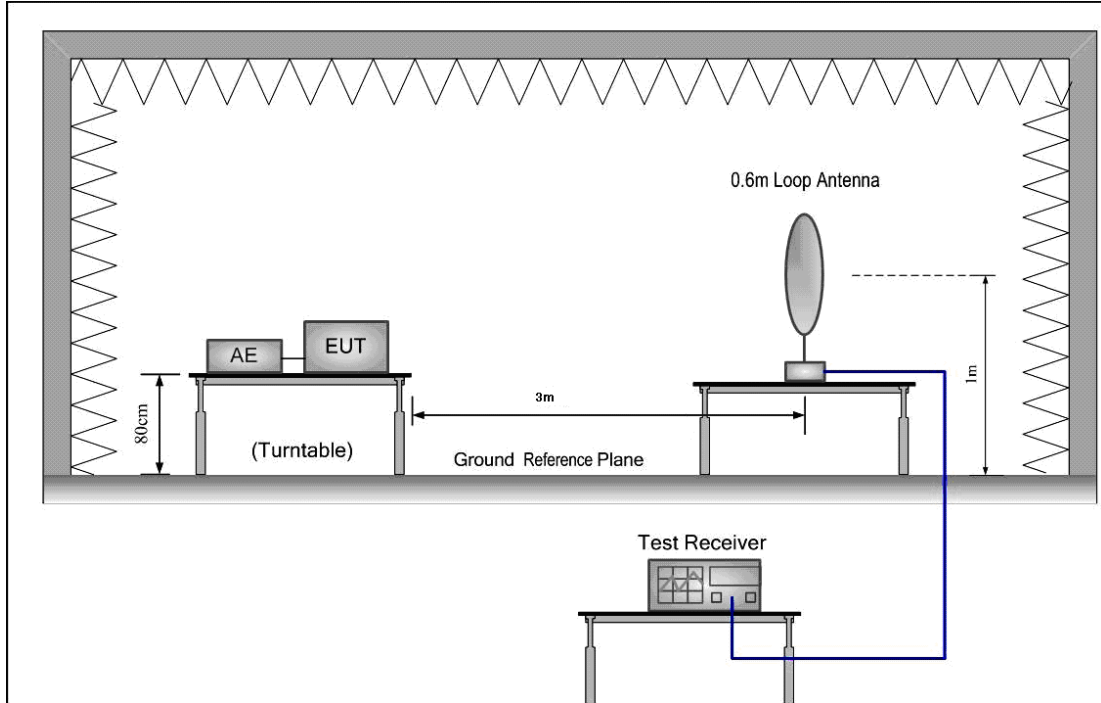
5.2.1. Spurious Emissions

Test Requirement:	47 CFR Part 15C Section 15.231(b) and 15.209				
Test Method:	ANSI C63.10 2009				
Test Site:	Measurement Distance: 3m				
Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
	0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
	0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
	0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
	0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	30MHz-1GHz	Quasi-peak	100kHz	300kHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
Peak		1MHz	10Hz	Average	
Limit: (Spurious Emissions)	Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
	0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
	1.705MHz-30MHz	30	-	-	30
	30MHz-88MHz	100	40.0	Quasi-peak	3
	88MHz-216MHz	150	43.5	Quasi-peak	3
	216MHz-960MHz	200	46.0	Quasi-peak	3
	960MHz-1GHz	500	54.0	Quasi-peak	3
	Above 1GHz	500	54.0	Average	3
Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.					
Limit: (Field strength of the fundamental signal)	Frequency	Limit (dBuV/m @3m)		Remark	
	447.925MHz	100.83		Peak Value	
		80.83		Average Value	

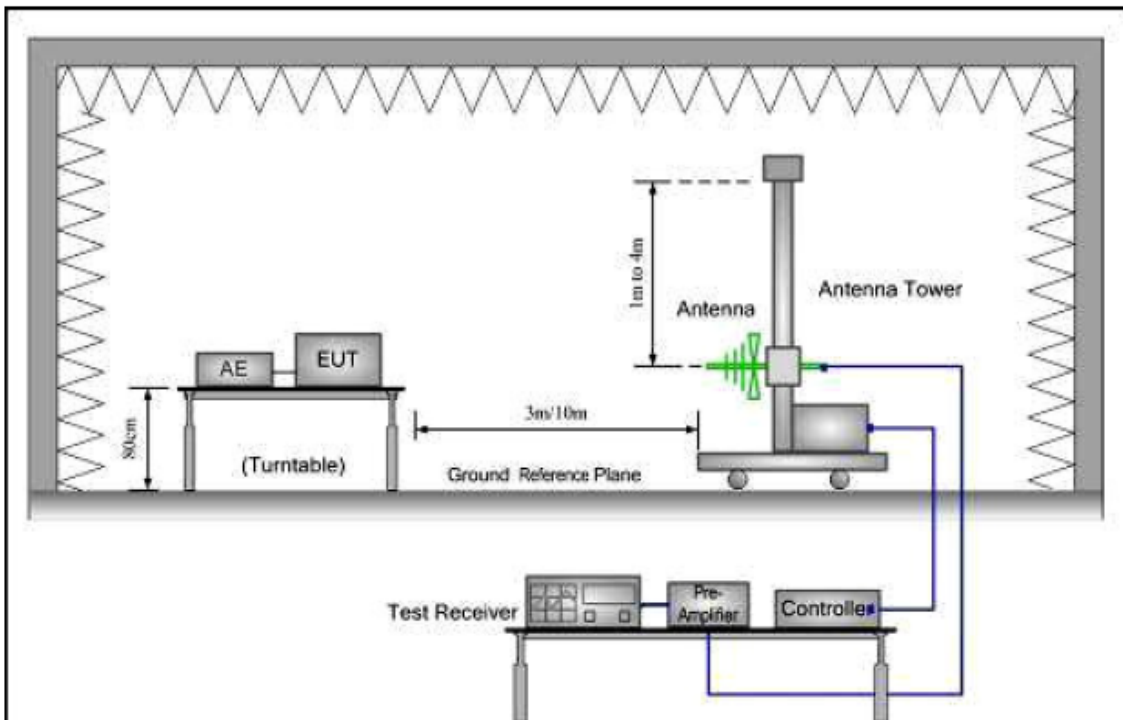
<p>Test Procedure:</p>	<ul style="list-style-type: none"> a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. c. 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. d. 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. f. 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. g. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.
<p>Test Mode:</p>	<p>Transmitting mode</p>
<p>Instruments Used:</p>	<p>Refer to section 4.10 for details</p>
<p>Test Results:</p>	<p>Pass</p>

Test Configuration:

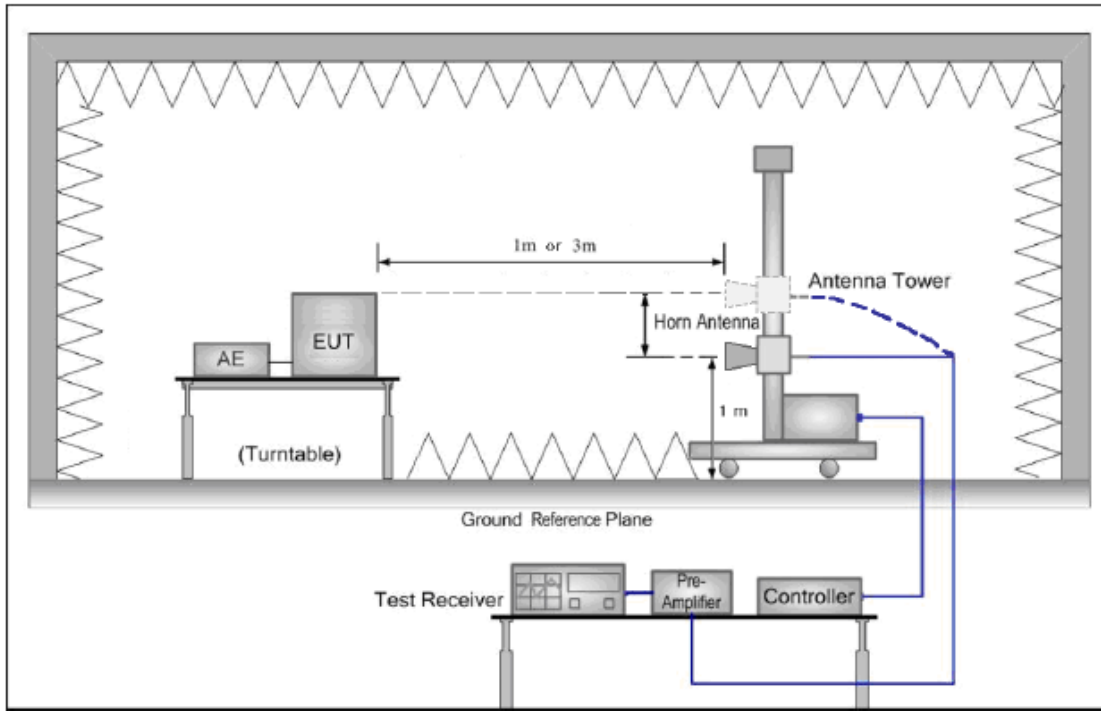
1) 9 kHz to 30 MHz emissions:



2) 30 MHz to 1 GHz emissions:



3) 1 GHz to 40 GHz emissions:



Measurement Data

5.2.1.1. Field Strength Of The Fundamental Signal

Frequency (MHz)	Detetor	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV)	Limit (dBuV/m)	Margin (dB)	polarization
447.925	Peak	22.53	21.78	44.31	100.83	56.52	Horizontal
	Avg	20.50	21.78	42.28	80.83	28.55	Horizontal
	Peak	22.15	21.78	43.93	100.83	56.90	Vertical
	Avg	19.39	21.78	41.17	80.83	39.66	Vertical

Remark:

1. $3m \text{ Limit(dBuV/m)} = 20\log[41.6667(F(\text{MHz}))-7083.3333] = 80.83$
2. Correction Factor = Antenna Factor + Cable Loss
3. Field Strength of Fundamental test results meet both peak and average limit

5.2.1.2. Spurious Emissions

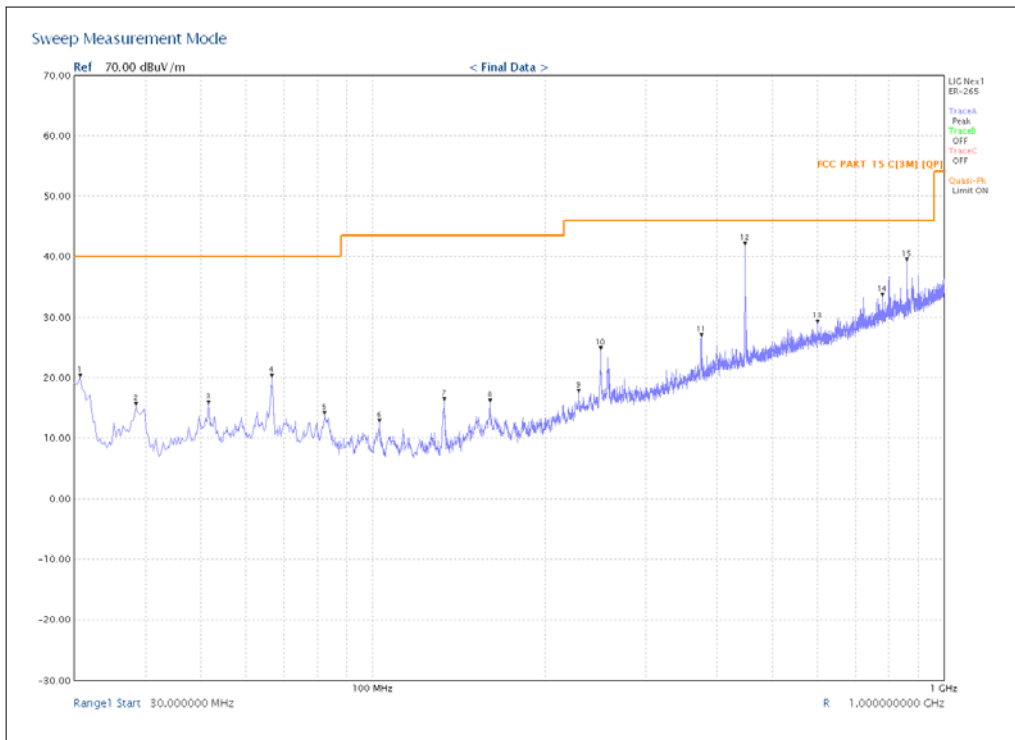
9 kHz~30 MHz Field Strength of Unwanted Emissions. Quasi-Peak Measurement

The measurements with active loop antenna were greater than 20dB below the limit, so the test data were not recorded in the test report.

30 MHz~1 GHz Spurious Emissions. Quasi-Peak Measurement

Vertical:

Level (dB μ V/m)

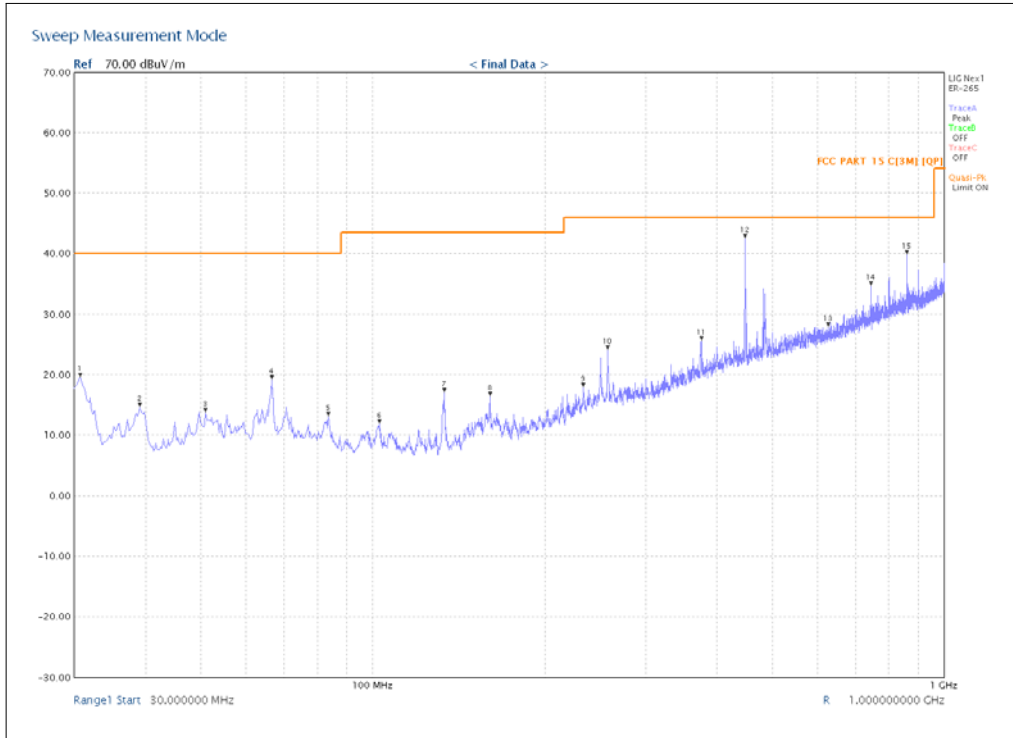


Quasi-peak measurement

Frequency (MHz)	Detect Mode	Polarization (V/H)	Measured Value (dB μ V)	Antenna Factor + Cable Loss (dB/m)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
66.59	QP	V	19.99	11.43	8.56	40.0	20.01
250.62	QP	V	24.60	16.61	7.99	46.0	21.40
375.55	QP	V	26.72	20.69	6.03	46.0	19.28
860.73	QP	V	39.11	30.11	9.00	46.0	6.89

Horizontal:

Level (dB μ V/m)



Quasi-peak measurement

Frequency (MHz)	Detect Mode	Polarization (V/H)	Measured Value (dB μ V)	Antenna Factor + Cable Loss (dB/m)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
66.59	QP	H	19.26	11.43	7.83	40.0	20.74
257.72	QP	H	24.16	16.71	7.45	46.0	21.84
375.55	QP	H	25.73	20.69	5.04	46.0	20.27
860.73	QP	H	39.96	30.11	9.85	46.0	6.04

1~25 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

Peak Measurement:

Frequency (MHz)	Polarization (V/H)	Measured Value (dB μ V)	Antenna Factor Cable Loss(dB/m) Amplifier Gain(dB)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
1791.50	H	49.11	2.06	47.05	74.0	26.95
2239.50	H	47.70	3.99	43.71	74.0	30.29
2411.50	H	48.82	4.72	44.10	74.0	29.90
2693.50	H	50.08	5.66	44.42	74.0	29.58
1344.00	V	43.79	0.38	43.41	74.0	30.59
1791.50	V	47.29	2.06	45.23	74.0	28.77
2289.50	V	47.54	4.21	43.33	74.0	30.67
2687.50	V	50.80	5.64	45.16	74.0	28.84

Average Measurement:

Frequency (MHz)	Polarization (V/H)	Measured Value (dB μ V)	Antenna Factor Cable Loss(dB/m) Amplifier Gain(dB)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
1791.50	H	46.69	2.06	44.63	54.0	9.37
2239.50	H	44.40	3.99	40.41	54.0	13.59
2411.50	H	45.02	4.72	40.30	54.0	13.70
2693.50	H	45.74	5.66	40.08	54.0	13.92
1344.00	V	40.41	0.38	40.03	54.0	13.97
1791.50	V	44.53	2.06	42.47	54.0	11.53
2239.50	V	43.80	3.99	39.81	54.0	14.19
2687.50	V	45.83	5.64	40.19	54.0	13.81

Remark:

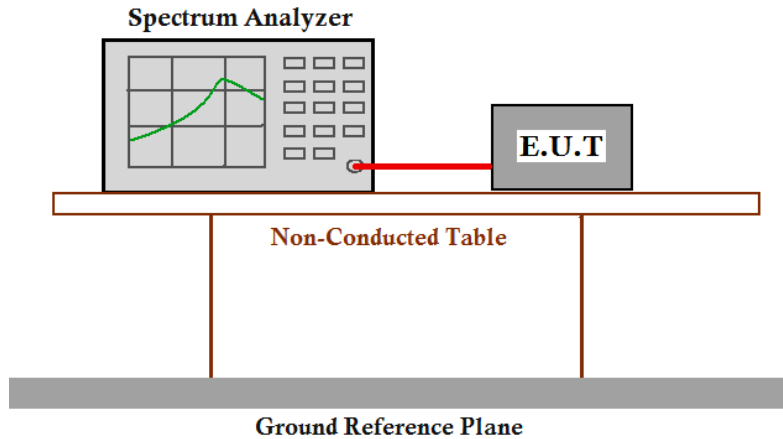
- 1). The field strength is calculated by adding the Antenna Factor. Cable Factor & Pre-amplifier. The basic equation with a sample calculation is as follows:
Final Test Level = Measured Value + Antenna Factor + Cable Loss - Amplifier Gain.
- 2). As shown in Section, for frequencies above 1000 MHz. the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.
- 3). The test only perform the EUT in transmitting status since the test frequencies were over 1GHz only required transmitting status.

5.3. 20dB Bandwidth

Test Requirement: 47 CFR Part 15C Section 15.231 (c)

Test Method: ANSI C63.10:2009

Test Configuration:



Instruments Used: Refer to section 4.10 for details

Exploratory Test Mode: Transmitting mode

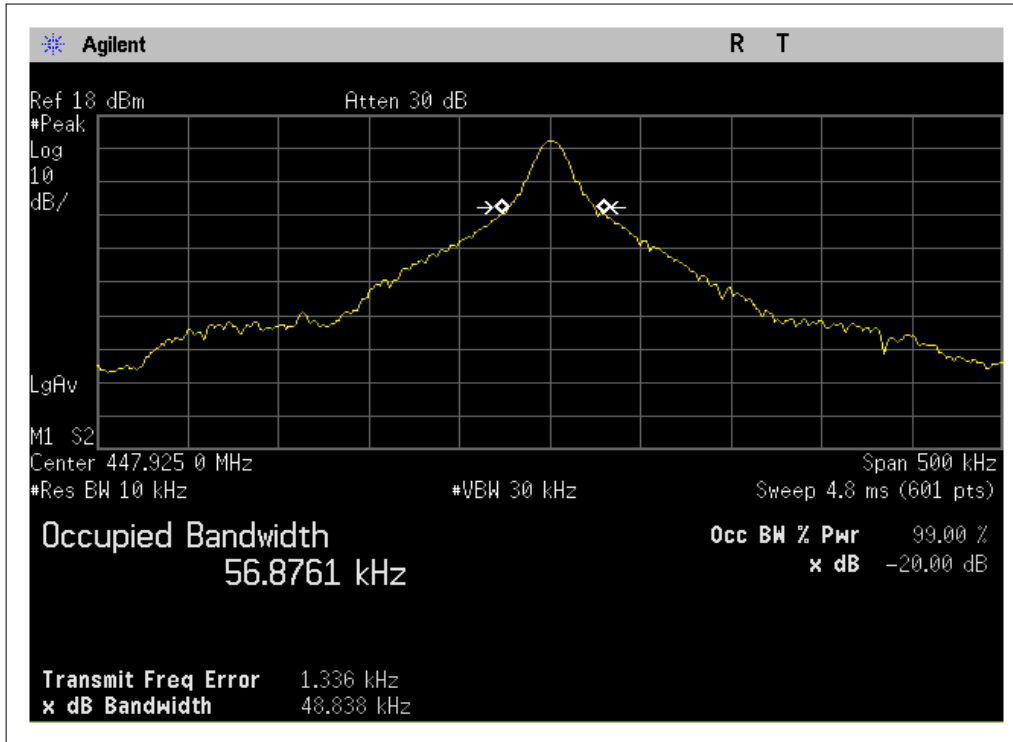
Limit: The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Test Results: Pass

Measurement Data

20dB bandwidth (MHz)	Limit (MHz)	Results
0.48838	1.0848	Pass

Result plot as follows:

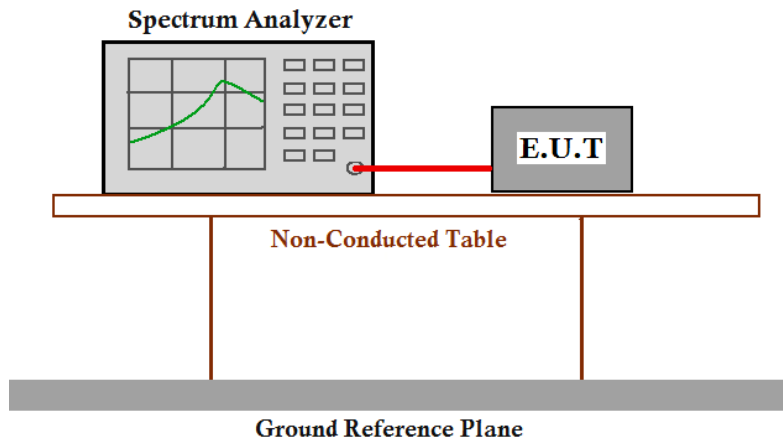


5.4. Deactivated time

Test Requirement: 47 CFR Part 15C Section 15.231 (a) (1)

Test Method: ANSI C63.10:2009

Test Configuration:



Test Instruments: Refer to section 4.10 for details

Exploratory Test Mode: Transmitting mode

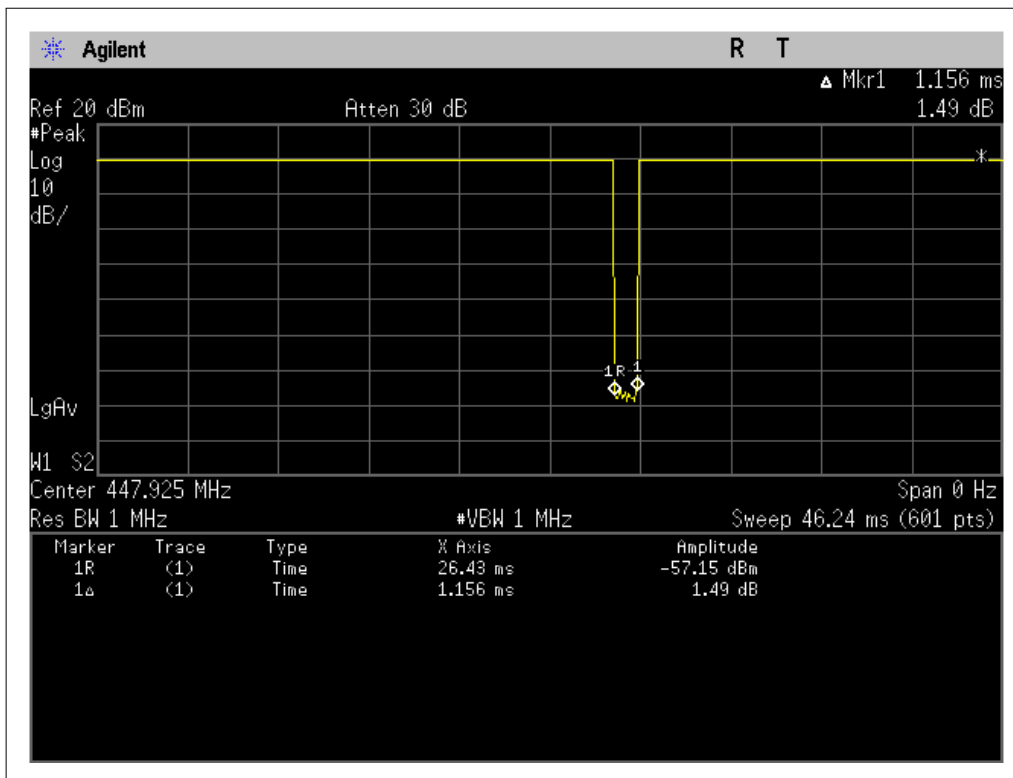
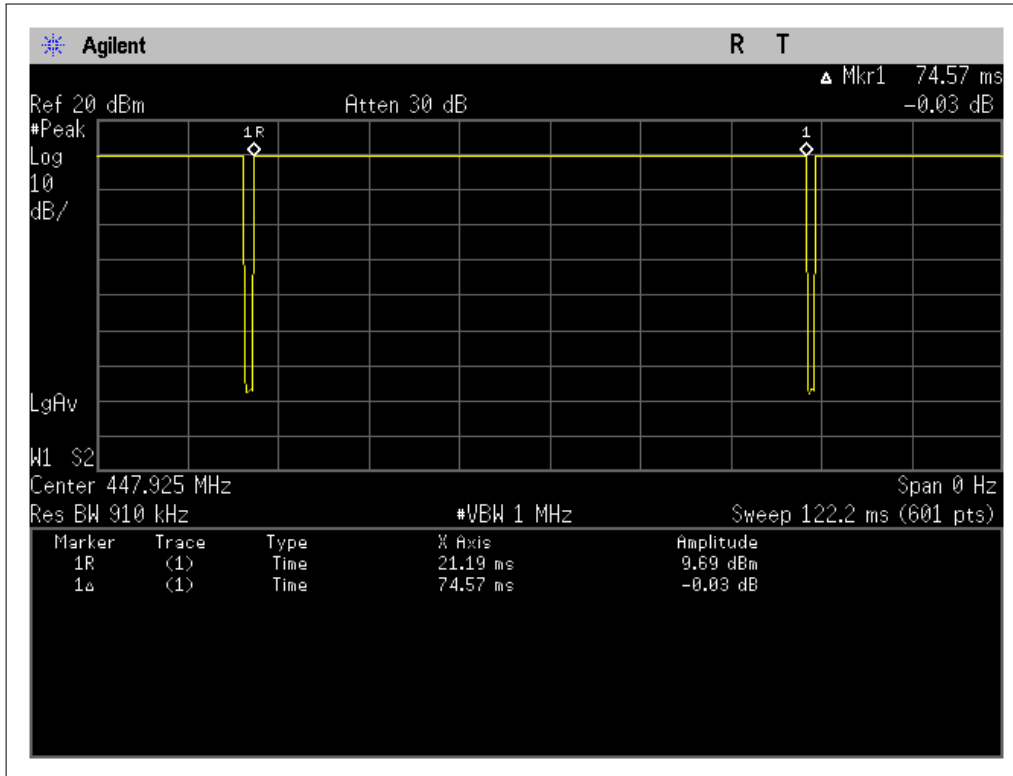
Limit: Within not more than 5 seconds

Test Results: Pass

Measurement Data

Test item	Limit (sec)	Results
Deactivated time	Within not more than 5 seconds	Pass

Result plot as follows:



APPENDIX

1. EUT photo

