TEST REPORT

1. Applicant		
Name	:	TROICA Corporation
Address	:	#1405B, 102-dong, Chunui Techno Park, Wonmi-gu, Bucheon-si, Gyeonggi-do, Korea
FCC ID	:	2ADCOSFO-V1-041
2. Products		
Name	:	Remote Control Transmitter
Model No.	:	SFO-V1-041
Variant Model No.	:	N/A
Manufacturer		GIORDON AUDIO ALARM EQUIPMENT CO.,LTD
Address	:	NO.25 EAST TONGXING ROAD, DONGSHENG, ZHONGSHAN
3. Test Standard	:	47 CFR Part 15, Subpart C
4. Test Method	:	ANSI C63.10-2009
5. Test Result	:	PASS
6. Dates of Test	:	October 04, 2014 to October 07, 2014
7. Date of Issue	:	October 08, 2014
8. Test Laboratory	:	Standard Engineering Co. Ltd. FCC Designation Number : 624439

Tested by	Approved by
	
SoonHo, Kim / Test Engineer	SeongSeok, Seo / Compliance Engineer

Standard Engineering Co. Ltd.
145, Hwanggeumteo-gil, Eumam-myeon, Seosan-si, Chungcheongnam-do 356-844, Republic of Korea
Tel.: +82-41-663-9436, Fax :+82-41-663-9434
www.stdeng.com

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
Dwell time	47 CFR Part 15 Subpart C Section 15.231 (a) (1)	ANSI C63.10(2009)	PASS

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3. General Information

3.1. Client Information

Applicant	:	TROICA Corporation
Address of Applicant	:	#1405B, 102-dong, Chunui Techno Park, Wonmi-gu, Bucheon-si, Gyeonggi-do, Korea
Manufacturer	:	GIORDON AUDIO ALARM EQUIPMENT CO.,LTD
Address of Manufacturer	:	NO.25 EAST TONGXING ROAD, DONGSHENG, ZHONGSHAN

3.2. General Description of E.U.T.

Product Name	:	Remote Control Transmitter
Model No.	:	SFO-V1-041

3.3. Details of E.U.T.

Operation Frequency	:	315MHz
Channel Numbers	:	1
Modulation Type	:	ASK
Antenna Type	:	PCB Pattern Antenna
Power Supply	:	6.0V DC (3.0V x 2 "Lithium Battery")
Test Voltage	:	DC 6.0V

3.4. Test Environment and Mode

Operating Environment:		
Temperature	:	26.5 ℃
Humidity	:	47% RH
Atmospheric Pressure	:	1023 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

145, Hwanggeumteo-gil, Eumam-myeon, Seosan-si, Chungcheongnam-do, Republic of korea. (FCC Designation Number : 624439)

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	LSA-265	L07098033	12/20/2014	12/20/2015	■
2	EMI Test Receiver	Rhode & Schwarz	ESIB7	3311	02/11/2014	02/11/2015	■
2	Bi-log Antenna	Schwarzbeck	VULB9163	164	09/15/2014	09/15/2016	■
5	Loop Antenna	EMCO	6502	9206-2769	02/13/2014	02/13/2016	■
6	Spectrum Analyzer	Agilent	E4440A	US45303130	02/04/2014	02/04/2015	■
8	Frequency Counter	HP	5347A	3009A02742	02/04/2014	02/04/2015	□
13	Attenuator	Agilent	8495B	3308A22485	02/04/2014	02/04/2015	□
15	Power Meter	Agilent	E4418B	MY405111655	02/04/2014	02/04/2015	□
16	Power Sensor	HP	8485A	2347A02746	02/04/2014	02/04/2015	□
18	RF Cable	Gigalane	SMS102-MF141-SMS102-1.0M	PB1252301285	N/A	N/A	■
20	Signal Generator	HP	83630A	3420A00728	02/04/2014	02/04/2015	■
21	Oscilloscope	HP	54815A	US38380122	02/04/2014	02/04/2015	□
23	Pre Amplifier	Agilent	8449B	3008A02105	02/04/2014	02/04/2015	■
25	Signal Generator	Rhode & Schwarz	SML03	102330	01/23/2014	01/23/2015	■
26	POWER DIVIDER	Agilent	11636B	50309	02/04/2014	02/04/2015	□
27	Power Sensor	Agilent	8482B	3318A05111	02/04/2014	02/04/2015	□
29	DC Power Supply	HP	6032A	US35420383	02/04/2014	02/04/2015	□
30	Slidacs	Sunchang Electrics	5KV	N/A	02/04/2014	02/04/2015	□
32	Bandreject Filter	K&L Microwave	50140	555	02/04/2014	02/04/2015	□
33	Horn Antenna	Schwarzbeck	BBHA9120A	346	01/27/2013	01/27/2015	■
34	Horn Antenna	A.H. SYSTEMS	SAS-572	269	09/07/2013	09/07/2015	■
35	DC Power Supply	Provice	PWS-5005D	205050	02/04/2014	02/04/2015	■
36	Artificial Mains	Rhode & Schwarz	ESH2-Z5	100064	01/27/2014	01/27/2015	□
38	Pulse Limiter	Rhode & Schwarz	ESH3-Z2	100137	11/15/2013	11/15/2014	□

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 EUT has an integral PCB Pattern antenna and meets the requirements of this section. please refer to the EUT internal photos.

5.2. Spurious Emissions

5.2.1. Spurious Emissions

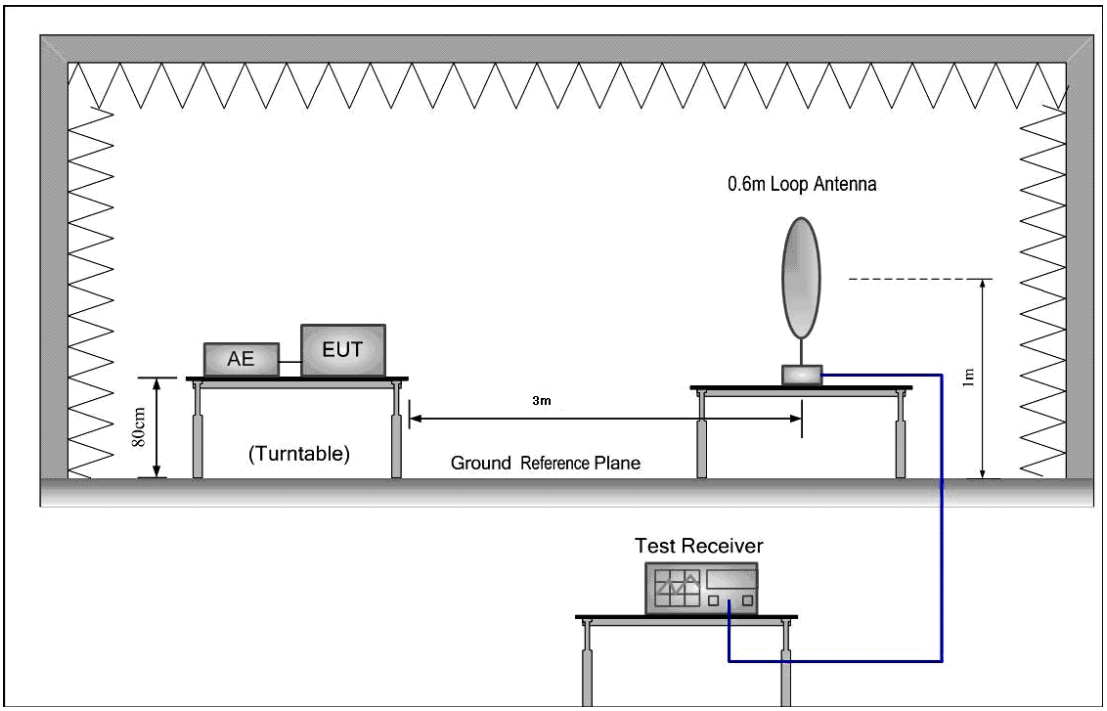
Test Requirement:	47 CFR Part 15C Section 15.231(b) and 15.209				
Test Method:	ANSI C63.10 2009				
Test Site:	Measurement Distance: 3m				
Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
	0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
	0.090MHz-0.110MHz	Quasi-peak	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
	315MHz	95.62	Peak Value
		75.62	Average Value

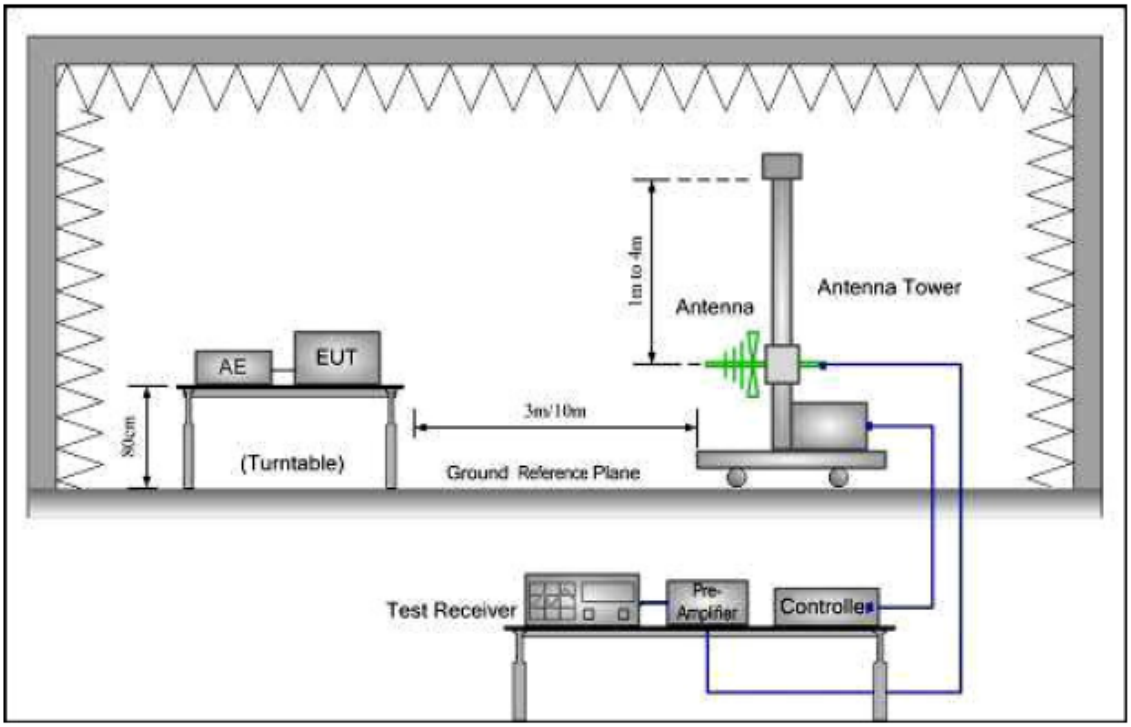
Test Procedure:	a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. b. The EUT was set 3 meters away from the interference-receiving antenna, which was 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.
Test Mode:	Transmitting mode
Instruments Used:	Refer to section 4.10 for details
Test Results:	Pass

Test Configuration:

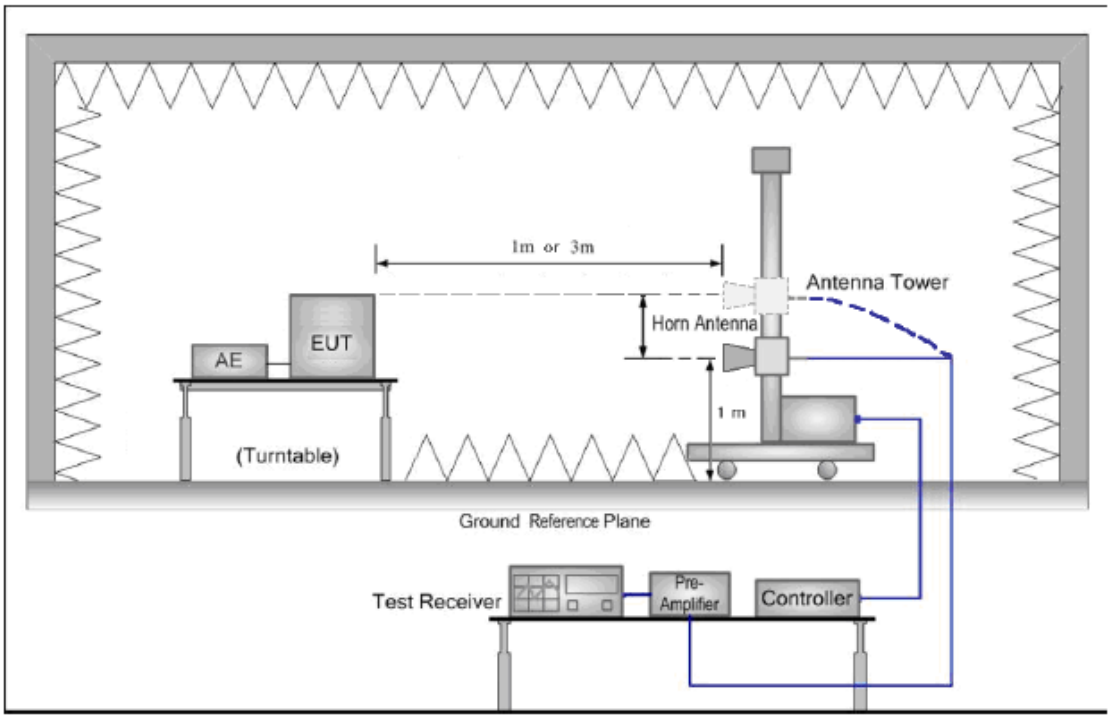
1) 9 kHz to 30 MHz emissions:



2) 30 MHz to 1 GHz emissions:



3) 1 GHz to 25 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
315	Peak	34.86	15.96	50.82	95.62	44.80	Horizontal
	Avg	17.05	15.96	33.01	75.62	42.61	Horizontal
	Peak	19.39	15.96	35.35	95.62	60.27	Vertical
	Avg	3.76	15.96	19.72	75.62	55.90	Vertical

Remark:

1. 3m Limit(dBuV/m) = 20log[41.6667(F(㎒))-7083.3333] = 75.62
2. Correction Factor = Antenna Factor + Cable Loss
3. Field Strength of Fundamental test results meet both peak and average limit

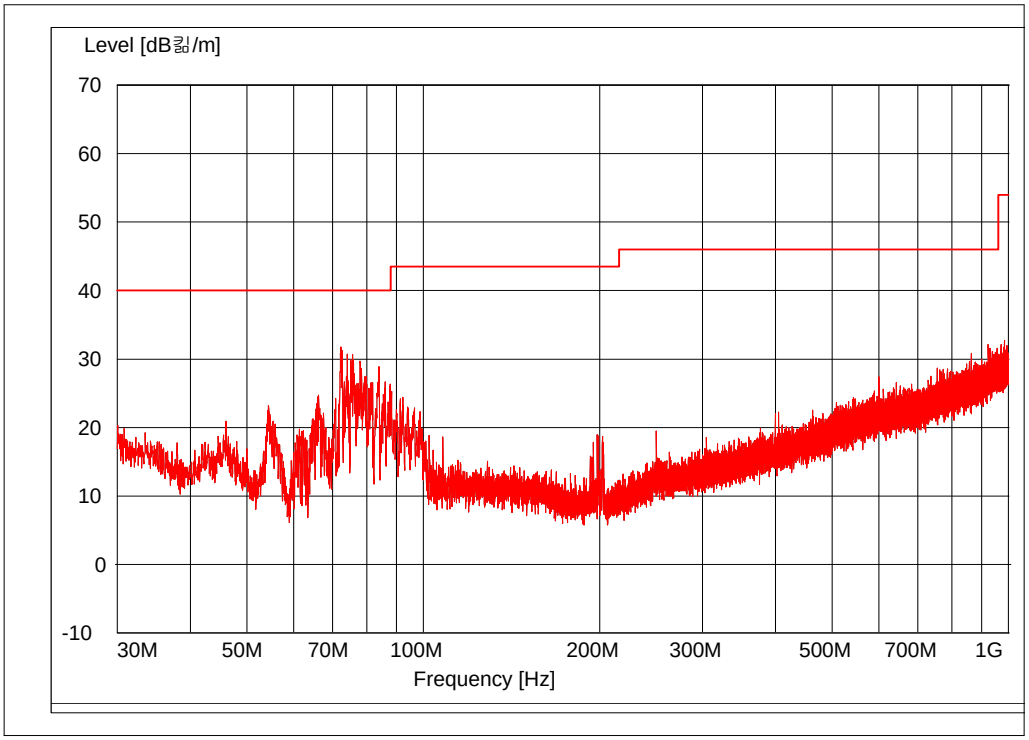
5.2.1.2. Spurious Emissions

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

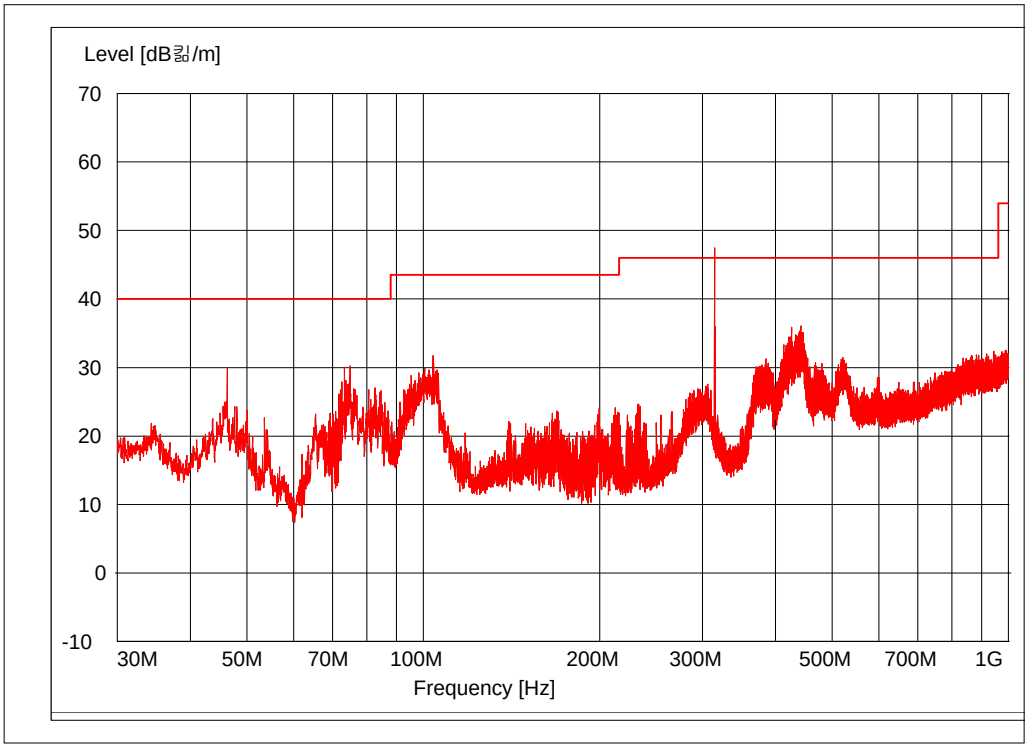
Vertical: Level (dBμV/m)



Quasi-peak measurement

Frequency (MHz)	Detect Mode	Polarization (V/H)	Measured Value (dBμV)	Antenna Factor + Cable Loss (dB/m)	Emission Level (dBμV/m)	Limit (dBμV/m)	Magin (dB)
72.49	QP	V	32.47	7.41	25.06	40.0	14.94
75.28	QP	V	30.68	7.54	23.14	40.0	16.86
84.38	QP	V	28.82	9.35	9.35	40.0	30.65

Horizontal: Level (dBμV/m)



Quasi-peak measurement

Frequency (MHz)	Detect Mode	Polarization (V/H)	Measured Value (dBμV)	Antenna Factor + Cable Loss (dB/m)	Emission Level (dBμV/m)	Limit (dBμV/m)	Magin (dB)
48.51	QP	H	30.05	12.03	18.02	40.0	21.98
85.69	QP	H	30.13	9.88	20.25	40.0	19.75
110.54	QP	H	32.69	11.82	20.87	43.5	22.63
450.32	QP	H	36.83	19.32	17.51	46.0	28.49

1~4 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

Peak Measurement:

Frequency (MHz)	Polarization (V/H)	Measured Value (dBμV)	Correction Factor Antenna+Cable-Amp. Gain	Emission Level (dBμV/m)	Limit (dBμV/m)	Magin (dB)
The frequency range was scanned from 1000 MHz to 4000 MHz. All emissions not reported were more than 20 dB below the specified limit or in the noise floor.						

Average Measurement:

Frequency (MHz)	Polarization (V/H)	Measured Value (dBμV)	Correction Factor Antenna+Cable-Amp. Gain	Emission Level (dBμV/m)	Limit (dBμV/m)	Magin (dB)
The frequency range was scanned from 1000 MHz to 4000 MHz. All emissions not reported were more than 20 dB below the specified limit or in the noise floor.						

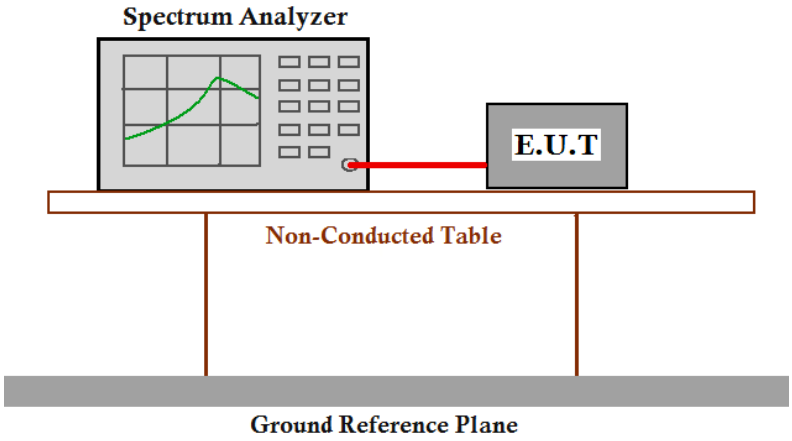
Remark:

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

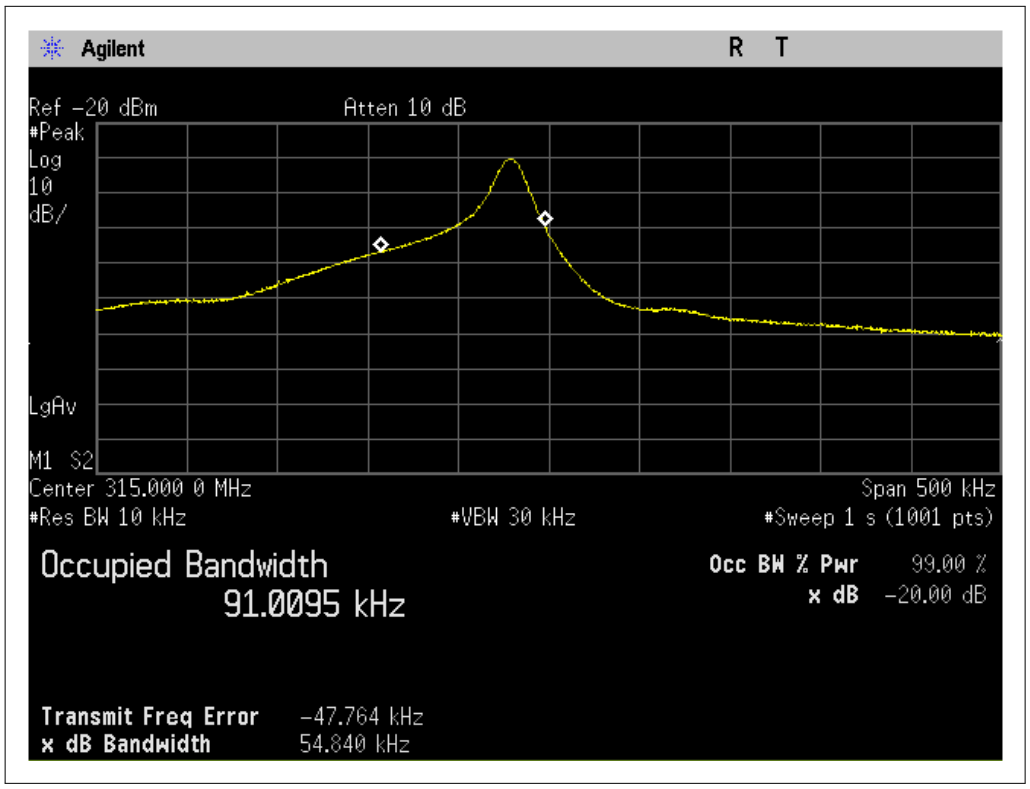
5.3. 20dB Bandwidth

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

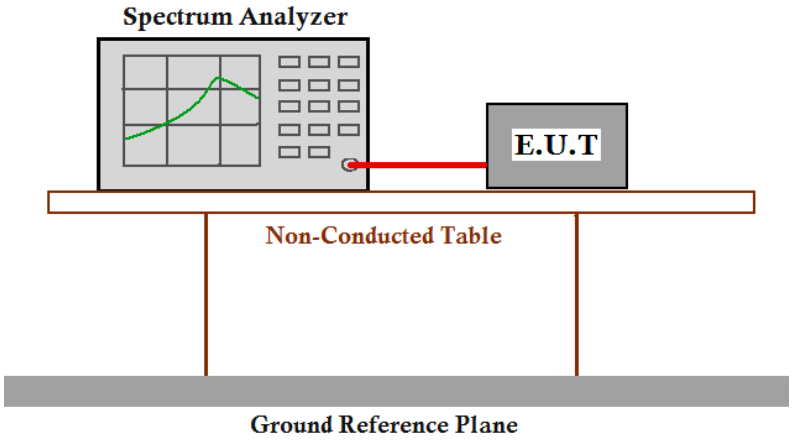
Measurement Data

20dB bandwidth (MHz)	Limit (MHz)	Results
0.05484	0.7875	Pass

Result plot as follows:



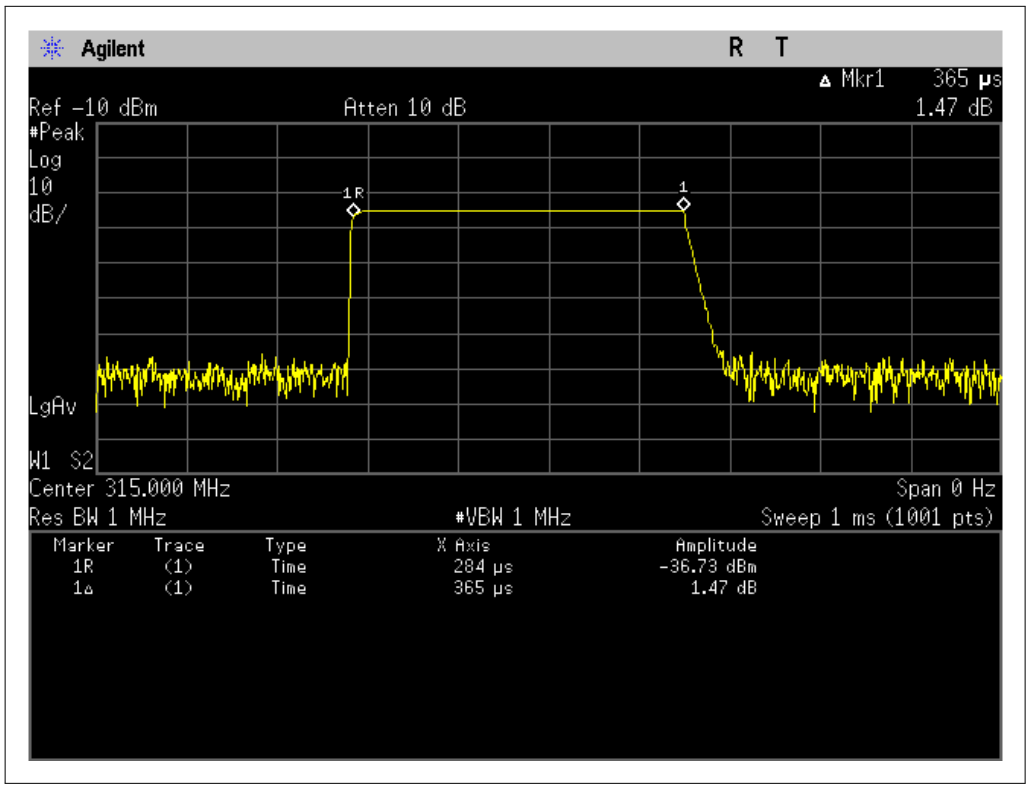
5.4. Dwell time

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
Transmitting time	Within not more than 5 seconds	Pass

Result plot as follows:



APPENDIX

1. EUT photo