

FCC RADIO TEST REPORT

FCC 47 CFR PART 15 SUBPART C

Test Standard	FCC Part 15.231
FCC ID	R4UARCFLEXEX2
Trade name	ARC
Product name	Industrial radio remote control systems
Model No.	FLEX 4ES、FLEX 4EX、FLEX 6ES、FLEX 6EX、FLEX 8ES、 FLEX 8EX、FLEX 12ES、FLEX 12EX
Operation Freq.	433.00MHz - 440.00MHz
Test Result	Pass

The test Result was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were given in ANSI C63.10: 2013 and compliance standards.

The test results of this report relate only to the tested sample (EUT) identified in this report.

The test Report of full or partial shall not copy. Without written approval of CCS. Inc.

The sample selected for test was production product and was provided by manufacturer.



Approved by:

A handwritten signature in black ink that reads "Sam Chuang". The signature is written in a cursive style with a long, sweeping underline.

Sam Chuang
Manager

Reviewed by:

A handwritten signature in black ink that reads "Zeus Chen". The signature is written in a cursive style with a long, sweeping underline.

Zeus Chen
Supervisor

Revision History

Rev.	Issue Date	Revisions	Revised By
00	November 21, 2016	Initial Issue	Doris Chu
01	Dec 09, 2016	1. P.4, Modify the model discrepancy. 2. P.10, Added worst case model No. 2. P.11, Revised the Duty Cycle 3. P.16, Revised the Average Values 4. P.26, Revised the limit 5. P.27, Revised the data and limit 6. P.29, Revised the limit	Doris Chu
02	Dec 10, 2016	1. P.4 Modify the model discrepancy. 2. P5, Revised Date of Test 3. P.11, Added worst case model No. 4. P.28, Revised the limit and test date 5. P.30, Revised the limit	Doris Chu

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1. GENERAL INFORMATION

1.1 EUT INFORMATION

Applicant	Advanced Radiotech Corporation 1F. 288-1, Hsin Ya Road, Chien Chen Dist., Kaohsiung City, Taiwan.				
Equipment	Industrial radio remote control systems				
Model Name	FLEX 4ES、FLEX 4EX、FLEX 6ES、FLEX 6EX、FLEX 8ES、 FLEX 8EX、FLEX 12ES、FLEX 12EX				
Model Discrepancy	Model name	Quantity of button	Difference description		
	FLEX 4EX	4	Two steps / speeds push buttons	1. There have multiple push buttons with the TX devices (series of EX/ES). EX (two steps) is for the TX device with the push buttons that end users should push the buttons twice. Also, every push button for the relay quantity of the RX device is two accordingly. ES (one step) is for the TX device with the push buttons that end users should push the buttons just once. Also, every push button for the relay quantity of the RX device is one accordingly. The design of push buttons is for controlling how to trigger the devices, and there is no any different hardware design for RF part to influence the testing result. 2. The RF circuit in each device is exactly the same and connects into the digital circuit board (the board with the buttons and control processor). The main circuitry (micro-controller) on this digital circuit board is the same for all the devices in the family, the main difference being that the board is extended as more buttons are added.	
	FLEX 6EX	6			
	FLEX 8EX	8			
	FLEX 12EX	12			
	FLEX 4ES	4	One step / speeds push buttons		
	FLEX 6ES	6			
	FLEX 8ES	8			
	FLEX 12ES	12			
Received Date	August 22, 2016				
Date of Test	Nov. 14, 2016 ~ Dec 09, 2016				
Maximum Output Power	1mW				
Periodic operation	☒ (1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released. ☐ (2) A transmitter activated automatically shall cease transmission within 5 seconds after activation ☐ (3) Periodic transmissions at regular predetermined intervals are not permitted. ☐ (4) Periodic transmissions (lower field strength): each transmission is not greater than 1 sec and the silent period between transmissions is at least 30 times the duration of the transmission but in no case less than 10 sec.				

Power Operation	☐ AC ☒ DC Type : ☒ Battery : 3V ☐ DC Power Supply ☐ External DC adapter
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Remark:

All listed models are using an identical RF module with the only differences on number of key buttons mounted for additional function. Due to similarity of RF product constructions of given model series, only dedicated model as described in test report with the most complexity constructions was selected for testing and record.

1.2 EUT CHANNEL INFORMATION

Frequency Range	433.00-440.00 MHz
Modulation Type	GFSK
Bandwidth	50 KHz
Number of Channels	141 channels

Remark:

Refer as ANSI 63.10:2013 clause 5.6.1 Table 4 for test channels

Number of frequencies to be tested		
Frequency range in which device operates	Number of frequencies	Location in frequency range of operation
☐ 1 MHz or less	1	Middle
☒ 1 MHz to 10 MHz	2	1 near top and 1 near bottom
☐ More than 10 MHz	3	1 near top, 1 near middle, and 1 near bottom

1.3 ANTENNA INFORMATION

Antenna Category	☒ Integral: antenna permanently attached ☐ External dedicated antennas ☐ External Unique antenna connector
Antenna Type	☐ PIFA ☒ PCB ☐ Dipole ☐ Printed ☐ Coils
Antenna Gain	0 dBi

1.4 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
AC Powerline Conducted Emission	+/- 1.2575
Emission bandwidth, 20dB bandwidth	+/- 1.4003
RF output power, conducted	+/- 1.1372
Power density, conducted	+/- 1.4003
3M Semi Anechoic Chamber / 30M~200M	+/- 4.0138
3M Semi Anechoic Chamber / 200M~1000M	+/- 3.9483
3M Semi Anechoic Chamber / 1G~8G	+/- 2.5975
3M Semi Anechoic Chamber / 8G~18G	+/- 2.6112
3M Semi Anechoic Chamber / 18G~26G	+/- 2.7389
3M Semi Anechoic Chamber / 26G~40G	+/- 2.9683
3M Semi Anechoic Chamber / 40G~60G	+/- 1.8509
3M Semi Anechoic Chamber / 60G~75G	+/- 1.9869
3M Semi Anechoic Chamber / 75G~110G	+/- 2.9651
3M Semi Anechoic Chamber / 110G~170G	+/- 2.7807
3M Semi Anechoic Chamber / 170G~220G	+/- 3.6437
3M Semi Anechoic Chamber / 220G~325G	+/- 4.2982

Remark:

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$
2. ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report.

1.5 FACILITIES AND TEST LOCATION

All measurement facilities used to collect the measurement data are located at
No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.)

Test site	Test Engineer	Remark
AC Conduction Room	N/A	Not applicable
Radiation	ED Chiang.	-
RF Conducted	Ian Tu.	-

Remark: The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

1.6 INSTRUMENT CALIBRATION

RF Conducted Test Site				
Equipment	Manufacturer	Model	S/N	Cal Due
Spectrum Analyzer	R&S	FSV 40	101073	07/31/2017
Loop Ant	TEKBOX	TBPS01	TBWA22015055	12/12/2016

3M 966 Chamber Test Site				
Equipment	Manufacturer	Model	S/N	Cal Due
Spectrum Analyzer	Agilent	E4446A	US42510252	12/07/2016
Spectrum Analyzer	Agilent	E4446A	US42510268	02/14/2017
Loop Ant	COM-POWER	AL-130	121051	02/24/2017
Bilog Antenna	Sunol Sciences	JB3	A030105	07/02/2017
Pre-Amplifier	EMEC	EM330	60609	06/07/2017
Horn Antenna	ETC	MCTD 1209	DRH13M02003	09/01/2017
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R
Turn Table	CCS	CC-T-1F	N/A	N.C.R

AC Conducted Emissions Test Site				
Equipment	Manufacturer	Model	S/N	Cal Due
LISN	R&S	ENV216	101054	05/10/2017
Receiver	R&S	ESCI	101073	08/19/2017

Remark: Each piece of equipment is scheduled for calibration once a year.

1.7 SUPPORT AND EUT ACCESSORIES EQUIPMENT

There are no accessories and support equipment be used during the test.

EUT Accessories Equipment					
No.	Equipment	Brand	Model	Series No.	FCC ID
	N/A				

Support Equipment					
No.	Equipment	Brand	Model	Series No.	FCC ID
	N/A				

1.8 Test methodology and applied standards

The test methodology, setups and results comply with all requirements in accordance with ANSI C63.10:2013, FCC 15.231 Rules.

1.9 Table of Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3M Semi Anechoic Chamber (FCC MRA: TW1039) to perform FCC Part 15 measurements	 FCC MRA: TW1039
Canada	Industry Canada	3M Semi Anechoic Chamber (IC 2324G-1 / IC 2324G-2) to perform	 IC 2324G-1 IC 2324G-2

* No part of this report may be used to claim or imply product endorsement by A2LA or any agency of the US Government.

2. TEST SUMMERY

Standard Sec.	Chapter	Test Item	Result
15.203	1.2	Antenna Requirement	Pass
15.207	4.1	AC Power-line Conducted Emission	Not applicable
15.231(c)	4.2	Emission Bandwidth	Pass
15.231(b),	4.3	Fundamental Emission	Pass
15.231(b),	4.4	Transmitter Radiated Emission	Pass
15.231(a),	4.5	Operation Restriction	Pass

3. DESCRIPTION OF TEST MODES

3.1 THE WORST MODE OF OPERATING CONDITION

Operation mode	433.00 MHz -440.00MHz
Test Channel Frequencies	Mode 1 : Tx- Low CH (433.00 MHz) Mode 2 : Tx-High CH(440.00 MHz)
RF Filed strength	Peak : 85.67 dBuv/m Average : 73.06 dBuv/m

Remark: Field strength performed Average level at 3m.

3.2 THE WORST MODE OF MEASUREMENT

AC Conducted Emission	
Test Condition	AC Power line conducted emission for line and neutral
Voltage/Hz	120V/60Hz
Test Mode	N/A- Not applicable
Worst Mode	☐ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4

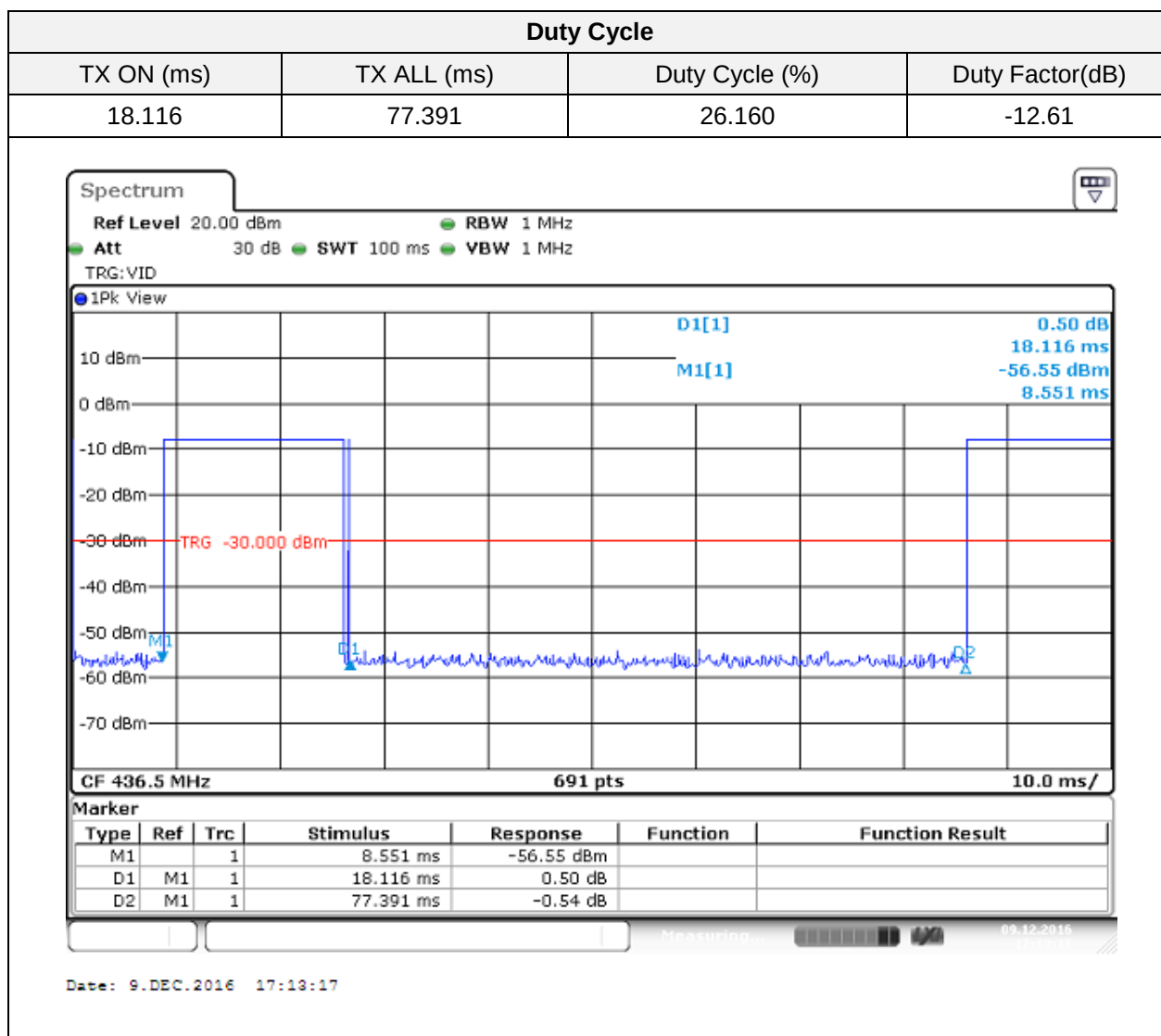
Remark: The worst mode was record in this test report.

Radiated Emission Measurement	
Test Condition	Band edge, Emission for Unwanted and Fundamental
Voltage/Hz	120V/60Hz
Test Mode	Mode 1 : Tx- Low CH (433.00 MHz) Mode 2 : Tx- High CH(440.00 MHz)
Worst Mode	☒ Mode 1 ☒ Mode 2 ☒ Mode 3 ☐ Mode 4
Position	☐ Placed in fixed position. ☐ Placed in fixed position at X-Plane (E2-Plane) ☒ Placed in fixed position at Y-Plane (E1-Plane) ☐ Placed in fixed position at Z-Plane (H-Plane)
Worst Polarity	☐ Horizontal ☒ Vertical

Remark:

1. The worst mode was record in this test report.
2. EUT pre-scanned in three axis ,X,Y, Z and two polarity, Horizontal and Vertical for radiated measurement. The worst case (Y-Plane and Vertical) were recorded in this report.
3. Baseline testing was performed on the two type(one/two step) each four variants (4/6/8/12 buttons, Four Variants RF circuit, RF Chip are the same and the output power was base on 1mW) to determine the worst case on all conducted test and radiated test. Therefore worst case is one step for 12 buttons.

3.3 EUT DUTY CYCLE



Remarks:

Calculation of emission correction factor

Correction factor = Total amount of Ton / TP (if TP is travel under 100ms)

Correction factor = Total amount of Ton/ 100 (if TP is travel exceeding 100ms)

In log , $20 \log (Ton / TP) = \text{correction factor (in dB)}$.

4. TEST RESULT

4.1 AC POWER LINE CONDUCTED EMISSION

4.1.1 Test Limit

According to §15.207(a) ,

Frequency Range (MHz)	Limits(dB μ V)	
	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

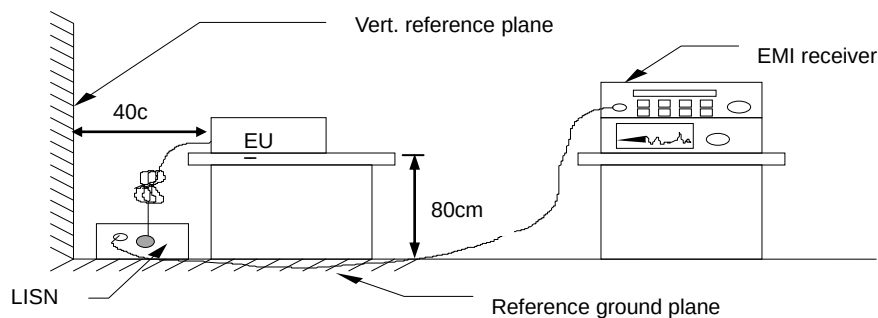
* Decreases with the logarithm of the frequency.

4.1.2 Test Procedure

Test method Refer as ANSI 63.10:2013 clause 6.2,

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

4.1.3 Test Setup



4.1.4 Test Result

Not applicable

4.2 EMISSION BANDWIDTH

4.2.1 Test Limit

According to §15.231(c) ,

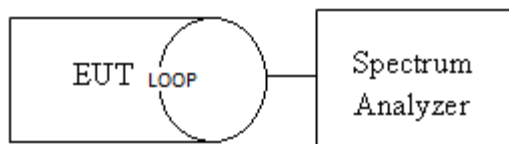
Limit	☒ 70 MHz - 900 MHz : $F_c * 0.25 \%$ ☐ Above 900 MHz : $F_c * 0.5 \%$
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4.2.2 Test Procedure

Test method Refer as ANSI 63.10:2013 clause 6.9.2,

The Loop antenna connected to the spectrum analyzer, was touching to the transmitter antenna. Set the RBW=10KHz, VBW $\geq 3 \times$ RBW, Detector = Peak, Trace mode = Max hold, Sweep = Auto. Measure the maximum width of the emission that is constrained by the frequencies associated with the 20dB Bandwidth and Occupied Bandwidth(99%).

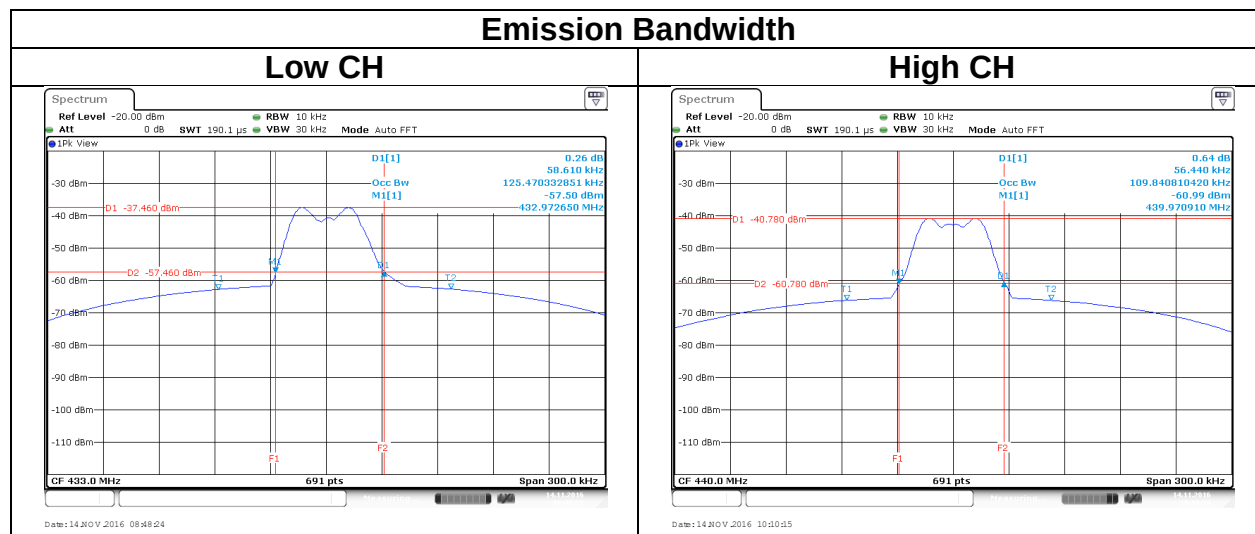
4.2.3 Test Setup



4.2.4 Test Result

Spectrum Bandwidth				
Channel	Frequency (MHz)	99% Occupied BW (KHz)	20dB Bandwidth (KHz)	20dB Bandwidth Limits (MHz)
Low	433.00	125.470	58.610	1.08
High	440.00	109.841	56.440	1.10

Test Data



4.3 FIELD STRENGTH OF FUNDAMENTAL

4.3.1 Test Limit

According to §15.231(b), For manually operated within 5 sec, activated automatically within 5 sec,

Fundamental frequency (MHz)	Field strength of fundamental (uv/m) at 3m	Field strength of fundamental (dBuv/m) at 3m
40.66-40.70	2,250	67
70-130	1,250	61.9
*130-174	*1,250 to 3,750	61.9-71.5
174-260	3,750	71.5
*260-470	*3,750 to 12,500	71.5-81.9
Above 470	12,500	81.9

REMARK:

1. "*" Linear interpolations
2. Based on the average value of the measured Field strength of fundamental.

4.3.2 Test Procedure

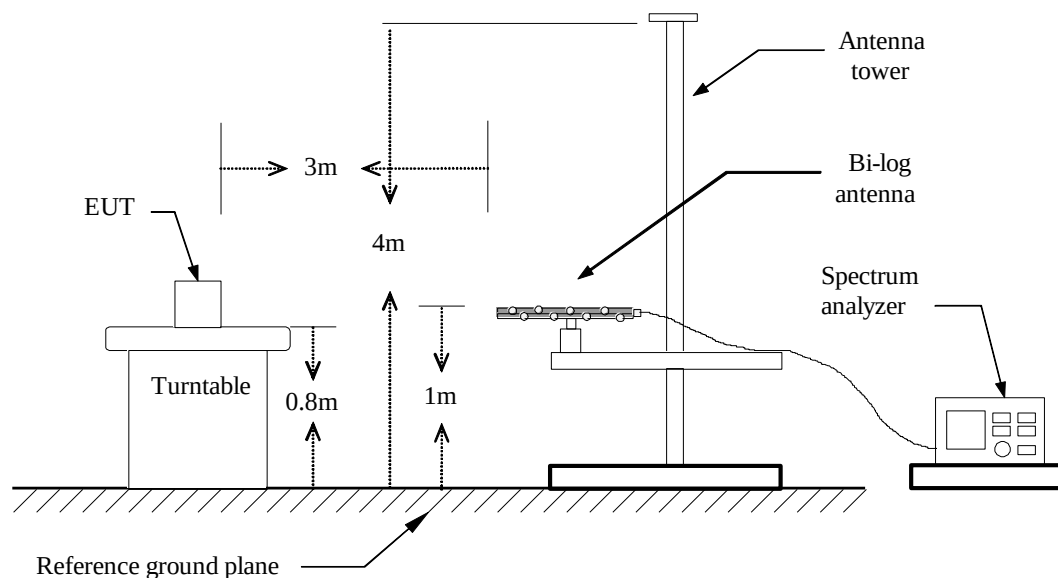
Test method Refer as ANSI 63.10:2013 clause 4.1.4 and clause 6.5

clause 4.1.4	☒ 4.1.4.2.2: Measurement Peak value. ☐ 4.1.4.2.3: Duty cycle $\geq$ 100%. ☒ 4.1.4.2.4: Measurement Average value.
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REMARK:

1. Duty factor = $20 \log$ (dwell time)
2. Average emission = Peak emission + $20 \log$ (duty cycle).

4.3.3 Test Setup



4.3.4 Test Result

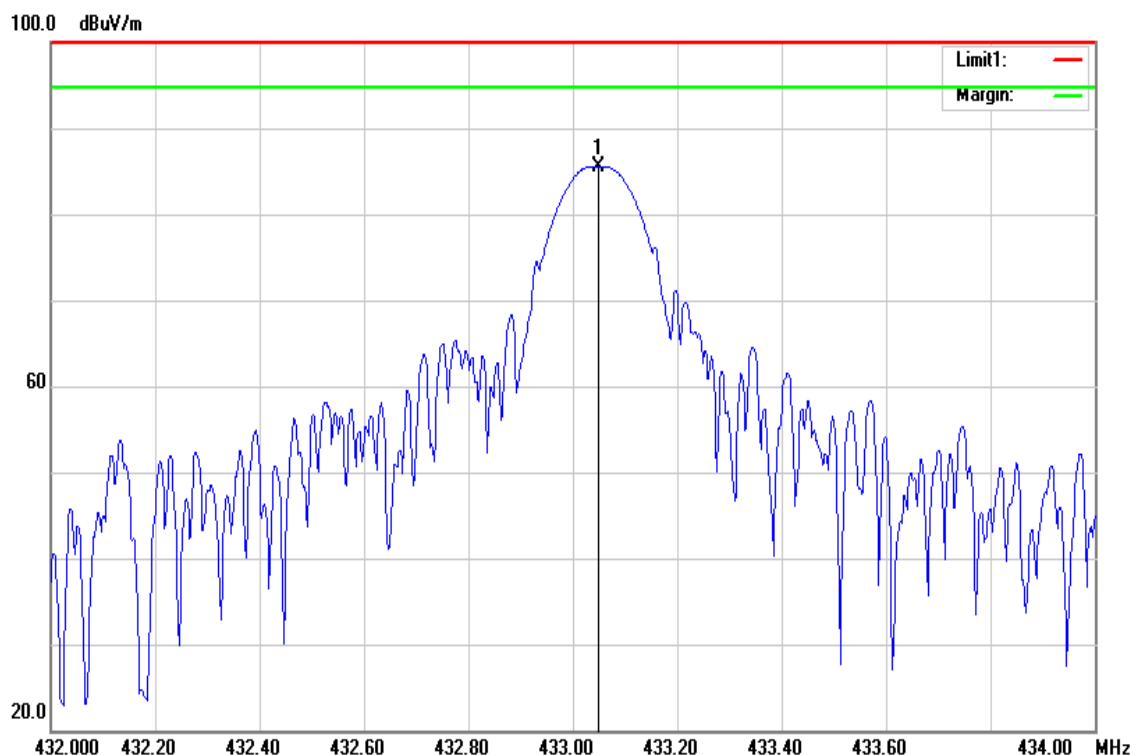
Field Strength						
CH	Frequency (MHz)	Fundamental (dBuV/m) at 3m	Limit (dBuV/m) at 3m	Margin (dB)	Axis/Pol.	Remark
Low	433.00	85.67	100.79	-15.12	Y/V	Peak
	433.00	73.06	80.79	-7.73		Average
High	440.00	85.58	101.02	-15.44	Y/V	Peak
	440.00	72.97	81.02	-8.05		Average

Remark

1. Peak results = actual peak readings + factor; Average results = actual peak readings + correction factor (-12.61dB).
2. Fundamental measured method setting on spectrum, RBW=100 kHz, VBW=100kHz and Detector=Peak

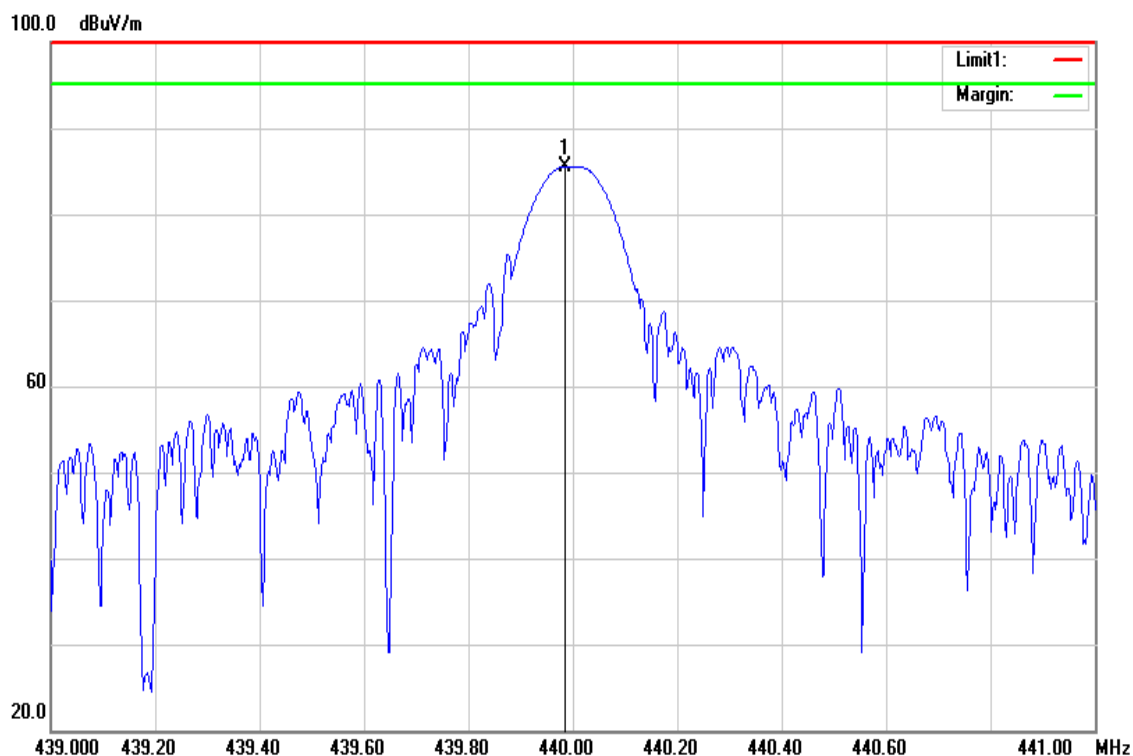
Test Data

Test Mode:	TX-Low CH	Temp/Hum	27(°C)/ 53%RH
Test Item	Fundamental	Test Date	Nov 19, 2016
Axis/Polarize	Y-Plane/Vertical	Test Engineer	ED Chiang.
Detector	Peak	Test Voltage:	3Vdc



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
433.048	98.79	-13.12	85.67	100.79	-15.12	100	129	peak

Test Mode:	TX-High CH	Temp/Hum	27(°C)/ 53%RH
Test Item	Fundamental	Test Date	Nov 19, 2016
Axis/Polarize	Y-Plane/Vertical	Test Engineer	ED Chiang.
Detector	Peak	Test Voltage:	3Vdc



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
439.9840	98.51	-12.93	85.58	101.02	-15.44	100	96	peak

4.4 RADIATION UNWANTED EMISSION

4.4.1 Test Limit

According to §15.231(b)(3) and §15.209

Unwanted emissions limit follow the table or the FCC Part 15.209, whichever limit permits higher field strength.

According to §15.231(b), For manually operated within 5 sec, activated automatically within 5 sec,

Fundamental frequency (MHz)	Field strength of Spurious emission (uv/m) at 3m	Field strength of Spurious emission (dBuv/m) at 3m
40.66-40.70	225	47
70-130	125	41.9
*130-174	*125-375	41.9-51.5
174-260	375	51.5
*260-470	*375-1250	51.5-61.9
Above 470	1250	61.9

REMARK:

1. "*" Linear interpolations
2. Based on the average value of the measured Field strength of fundamental.

Below 30MHz

Frequency (MHz)	Field Strength				
	(μV/m)	(dBμV/m)	Measurement Distance (meter)	(dBμV/m)	Measurement Distance (meter)
0.009 - 0.490	2400/F(kHz)	48.52 – 13.80	300	128.52–104.84	3
0.490 - 1.705	24000/F(kHz)	33.80 – 22.97	30	73.80– 62.97	3
1.705 – 30.0	30	29.54	30	69.54	3

Above 30MHz

Frequency (MHz)	Field Strength		Measurement Distance (meter)
	(μV/m)	(dBμV/m)	
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

4.4.2 Test Procedure

Test method Refer as ANSI 63.10:2013

☒ Unwanted Emission	☒ clause 4.1.4.2.2: Measurement Peak value. ☐ clause 4.1.4.2.3: Duty cycle $\geq 100\%$. ☒ clause 4.1.4.2.4: Measurement Average value.
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REMARK:

1. Duty factor = $20\log(\text{dwell time}/100\text{ ms})$
2. Average emission = Peak emission + $20\log(\text{duty cycle})$.

☒ Radiated Emission	☒ clause 6.4: below 30 MHz and test distance is 3m. ☒ clause 6.5: below 30 MHz -1 GHz and test distance is 3m. ☒ clause 6.6: Above 30 MHz and test distance is 3m.
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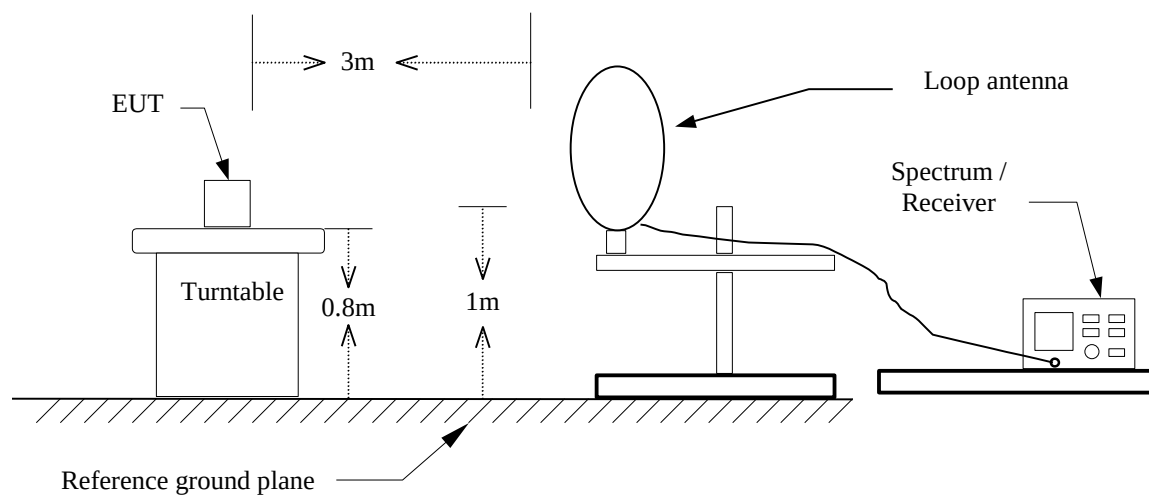
1. The EUT is placed on a turntable, which is 0.8m for test below 1G and 1.5m for test above 1G, above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to 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. Set the spectrum analyzer in the following setting as:
 Below 1GHz:
 RBW=100kHz / VBW=300kHz / Sweep=AUTO
 Above 1GHz:
 (a)PEAK: RBW=1MHz / VBW=3MHz / Sweep=AUTO
 (b)AVERAGE: RBW=1MHz,
7. Repeat above procedures until the measurements for all frequencies are complete.

Remark.

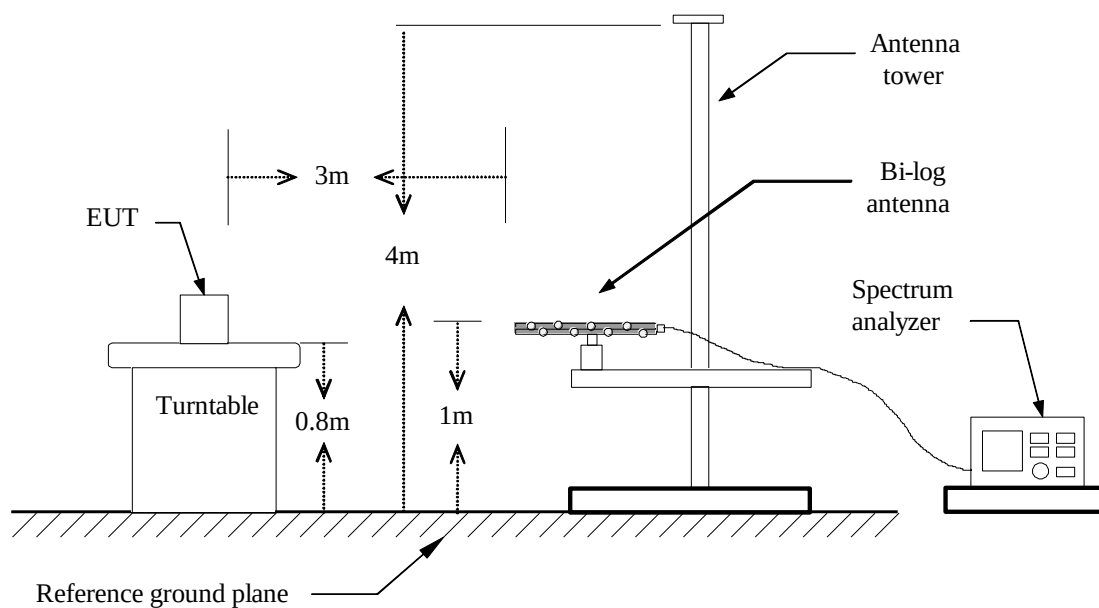
1. The EUT has a oscillator operating at 32 MHz, harmonic/spurious was verified. And didn't catch any emission at 32MHz.
2. Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open area test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 937606.
3. No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz)..

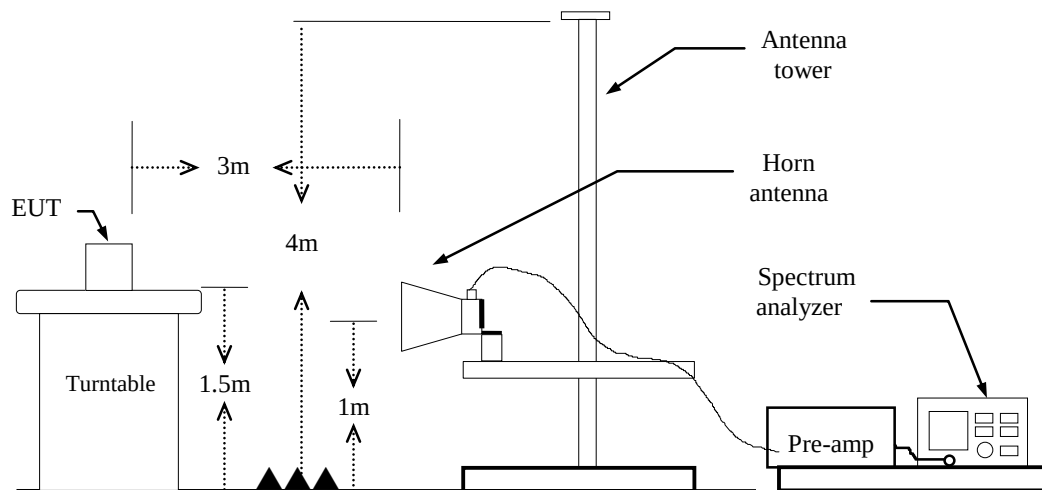
4.4.3 Test Setup

9kHz ~ 30MHz



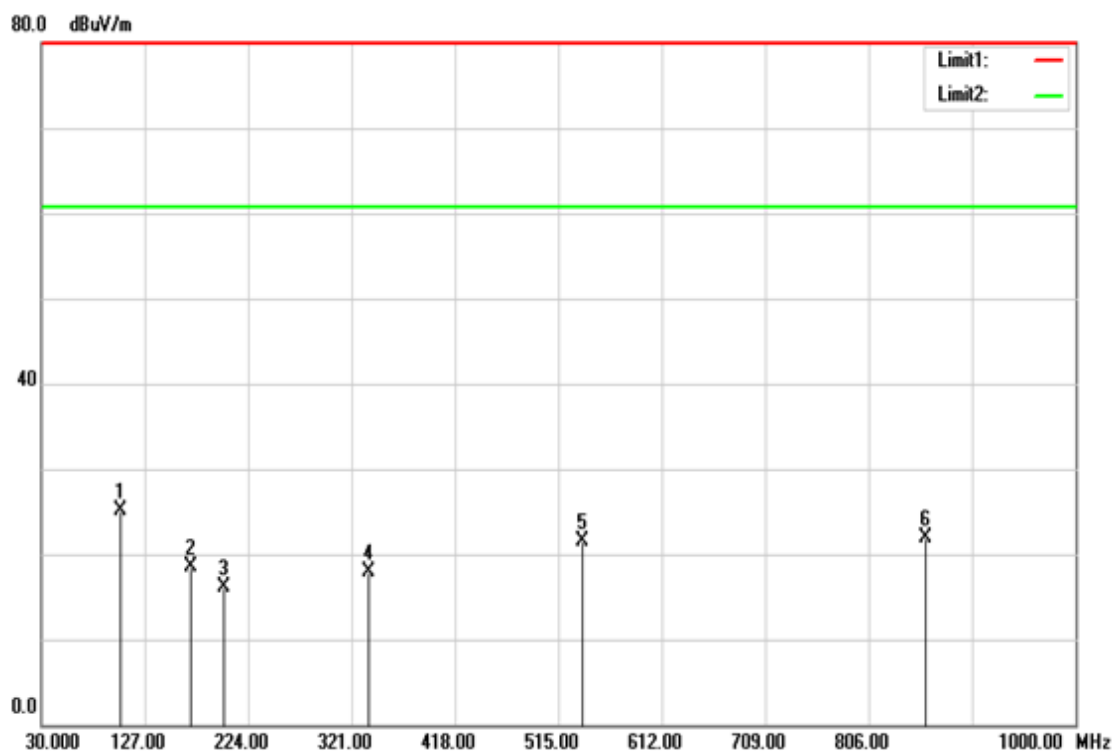
30MHz ~ 1 GHz



Above 1 GHz**4.4.4 Test Result****Pass**

Test Data**Below 1G**

Test Mode:	TX-Low CH	Temp/Hum	27(°C)/ 53%RH
Test Item	Below 1G	Test Date	Nov 19, 2016
Polarize	Vertical	Test Engineer	ED Chiang.
Detector	Peak and Average	Test Voltage:	3Vdc

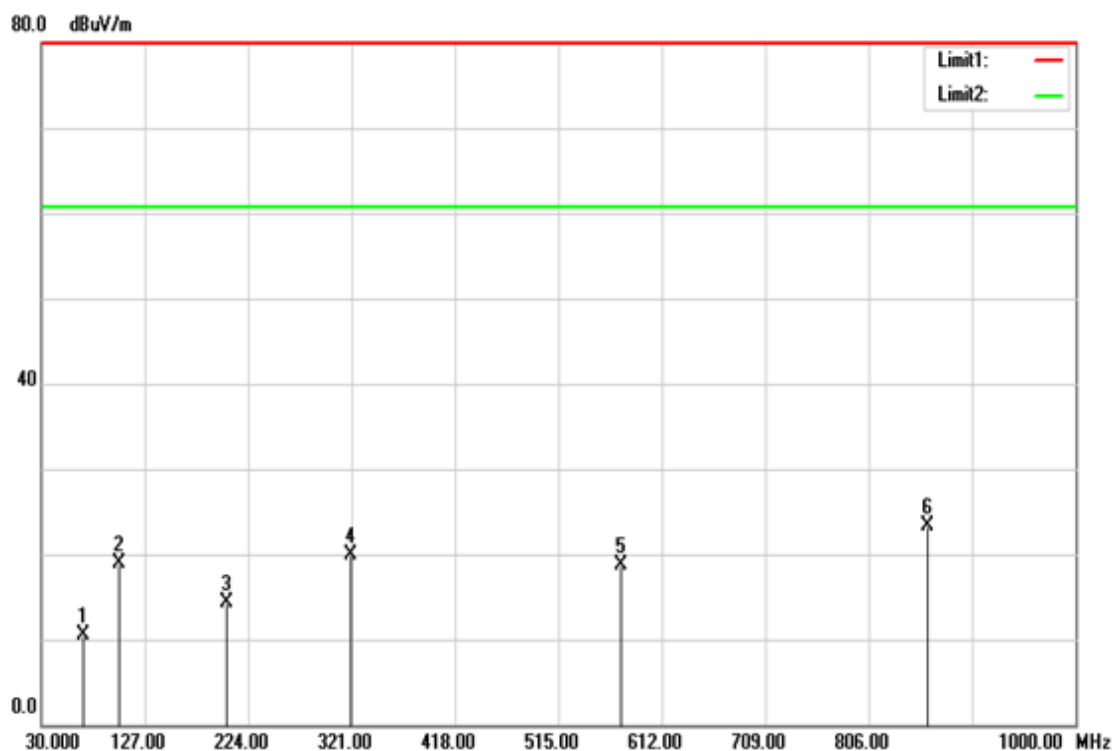


Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
103.7200	43.46	-18.37	25.09	80.79	-55.70	peak
**169.6800	35.39	-16.83	18.56	43.52	-24.96	peak
200.7200	31.79	-15.60	16.19	80.79	-64.60	peak
336.5200	31.11	-13.25	17.86	80.79	-62.93	peak
537.3100	30.12	-8.68	21.44	80.79	-59.35	peak
867.8600	25.35	-3.51	21.84	80.79	-58.95	peak

Remark:

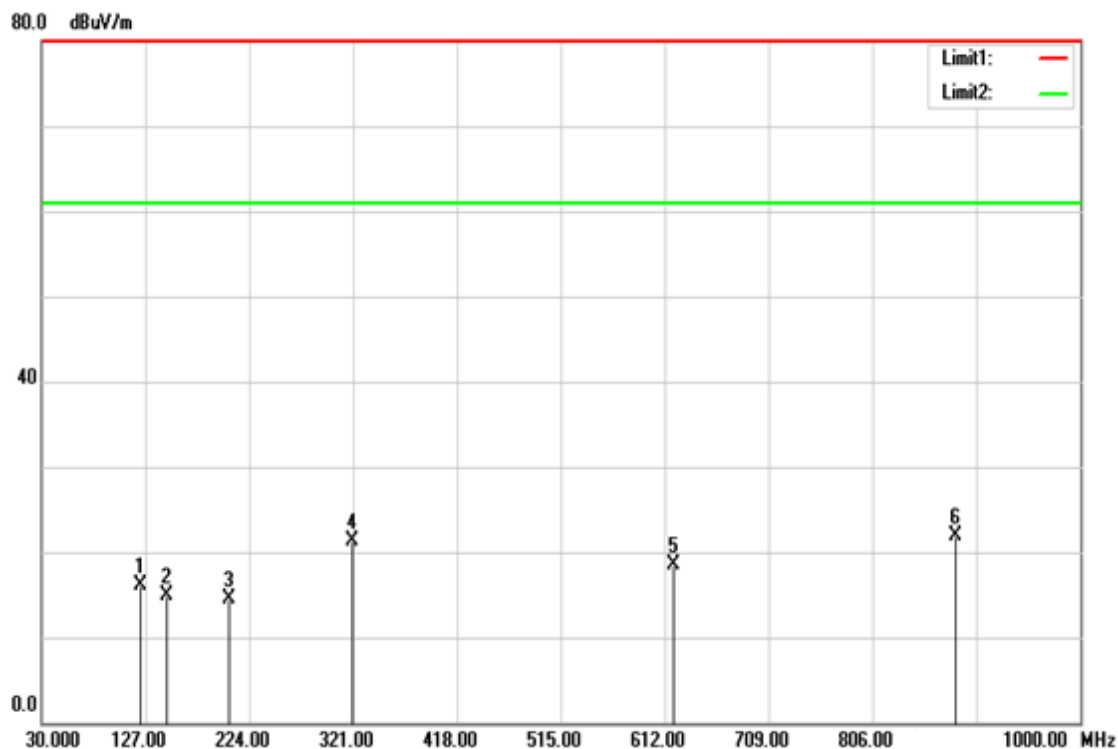
1. ** Means emission locates in restricted bands and complies with 15.209 limit.

Test Mode:	TX-Low CH	Temp/Hum	27(°C)/ 53%RH
Test Item	Below 1G	Test Date	Nov 19, 2016
Polarize	Horizontal	Test Engineer	ED Chiang.
Detector	Peak and Average	Test Voltage:	3Vdc



Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
68.8000	31.44	-20.89	10.55	80.79	-70.24	peak
102.7500	37.49	-18.54	18.95	80.79	-61.84	peak
203.6300	30.06	-15.81	14.25	80.79	-66.54	peak
320.0300	33.65	-13.70	19.95	80.79	-60.84	peak
573.2000	26.95	-8.15	18.80	80.79	-61.99	peak
867.1200	26.79	-3.51	23.28	80.79	-57.51	peak

Test Mode:	TX-High CH	Temp/Hum	27(°C)/ 53%RH
Test Item	Below 1G	Test Date	Nov 19, 2016
Polarize	Vertical	Test Engineer	ED Chiang.
Detector	Peak and Average	Test Voltage:	3Vdc

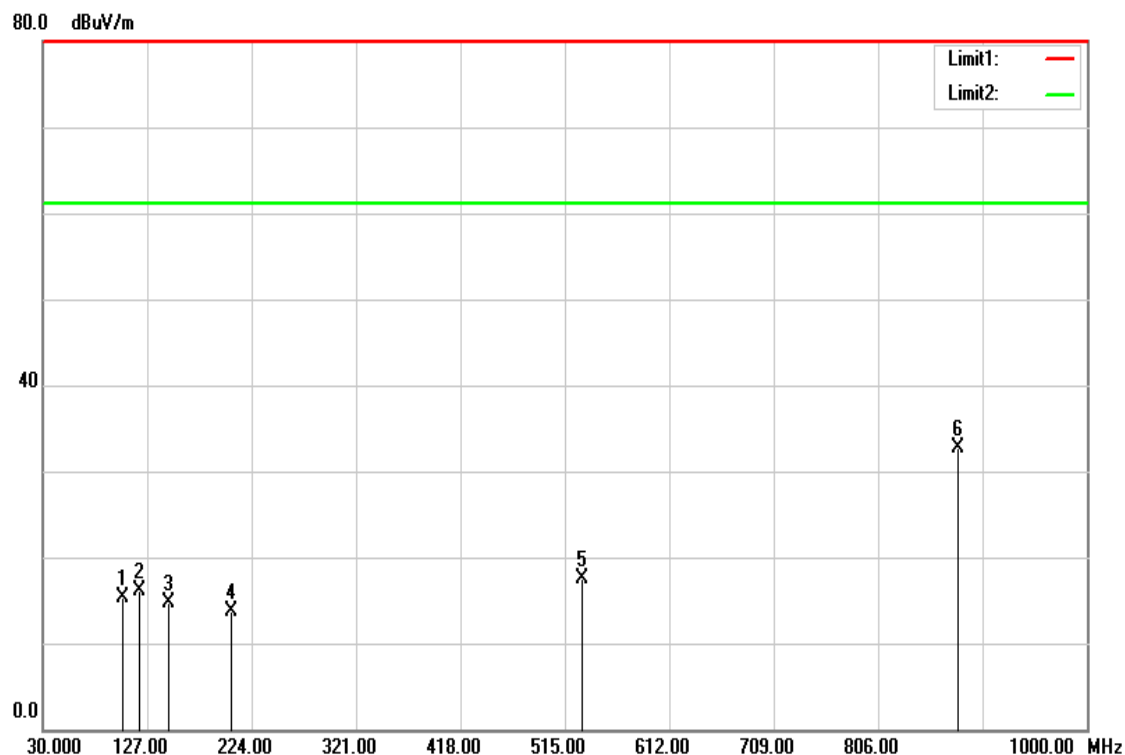


Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
103.7200	40.87	-18.37	22.50	81.02	-58.52	peak
170.6500**	31.96	-16.88	15.08	43.52	-28.44	peak
240.4900**	31.62	-16.50	15.12	43.52	-28.40	peak
336.5200	30.61	-13.25	17.36	81.02	-63.66	peak
679.9000	27.21	-6.27	20.94	81.02	-60.08	peak
882.7700	27.70	-3.84	23.86	81.02	-57.16	peak

Remark:

1. ** Means emission locates in restricted bands and complies with 15.209 limit.

Test Mode:	TX-High CH	Temp/Hum	27(°C)/ 53%RH
Test Item	Below 1G	Test Date	Nov 19, 2016
Polarize	Horizontal	Test Engineer	ED Chiang.
Detector	Peak and Average	Test Voltage:	3Vdc



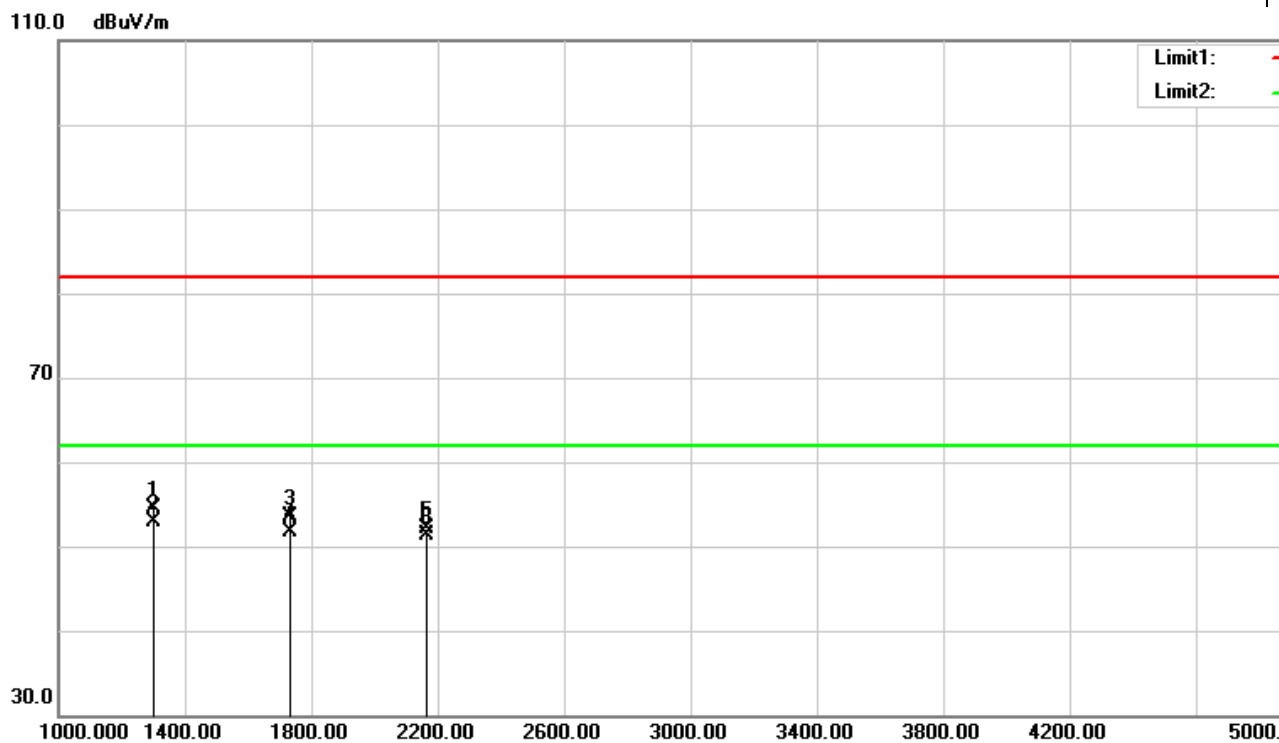
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
103.7200	33.66	-18.37	15.29	81.02	-65.73	peak
**120.2100	31.54	-15.50	16.04	43.52	-27.48	peak
146.4000	30.72	-15.97	14.75	81.02	-66.27	peak
204.6000	29.52	-15.87	13.65	81.02	-67.37	peak
531.4900	26.25	-8.77	17.48	81.02	-63.54	peak
879.7200	36.04	-3.43	32.61	81.02	-48.41	peak

Remark:

1. ** Means emission locates in restricted bands and complies with 15.209 limit.

Above 1G

Test Mode:	TX-Low CH	Temp/Hum	27(°C)/ 53%RH
Test Item	Above 1G	Test Date	Dec 08, 2016
Polarize	Vertical	Test Engineer	ED Chiang.
Detector	Peak and Average	Test Voltage:	3Vdc

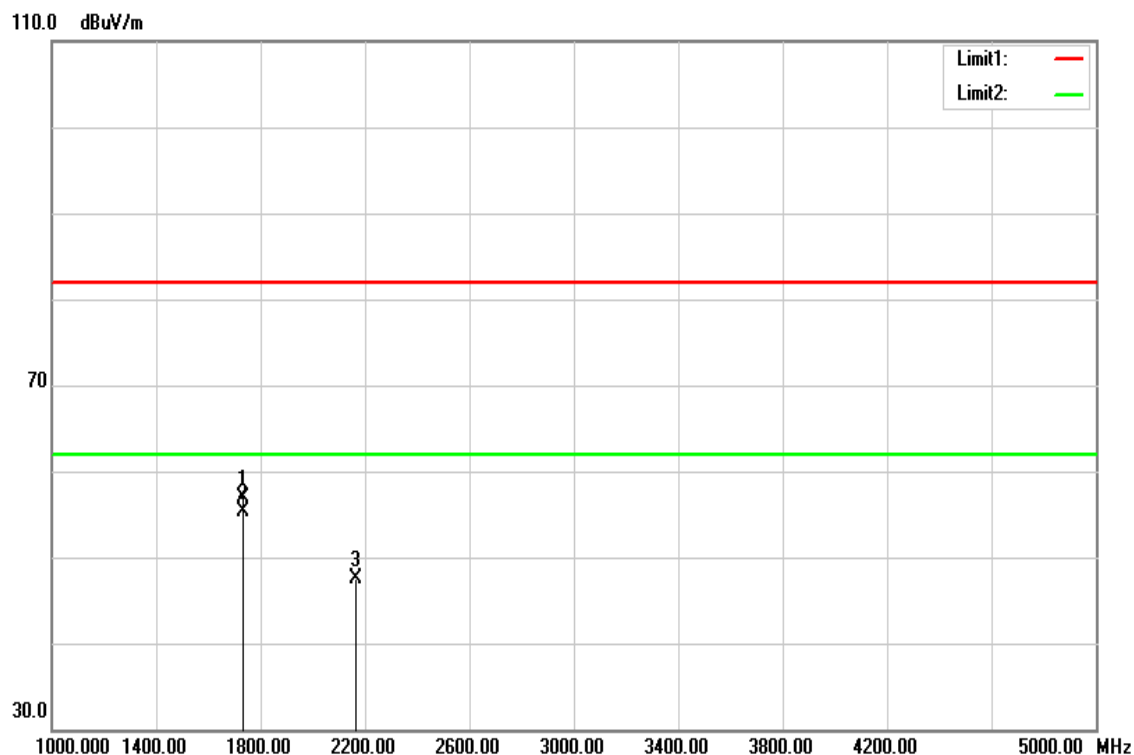


Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1299.260	61.38	-6.89	54.49	81.90	-27.41	PEAK
1299.260	59.82	-6.89	52.93	61.90	-8.97	AVG
1732.000	58.40	-4.99	53.41	81.90	-28.49	PEAK
1732.000	56.74	-4.99	51.75	61.90	-10.15	AVG
2164.000	55.43	-3.35	52.08	81.90	-29.82	PEAK
2164.000	54.58	-3.35	51.23	61.90	-10.67	AVG

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. ** Means emission locates in restricted bands and complies with 15.209 limit.

Test Mode:	TX-Low CH	Temp/Hum	27(°C)/ 53%RH
Test Item	Above 1G	Test Date	Nov 19, 2016
Polarize	Horizontal	Test Engineer	ED Chiang.
Detector	Peak and Average	Test Voltage:	3Vdc

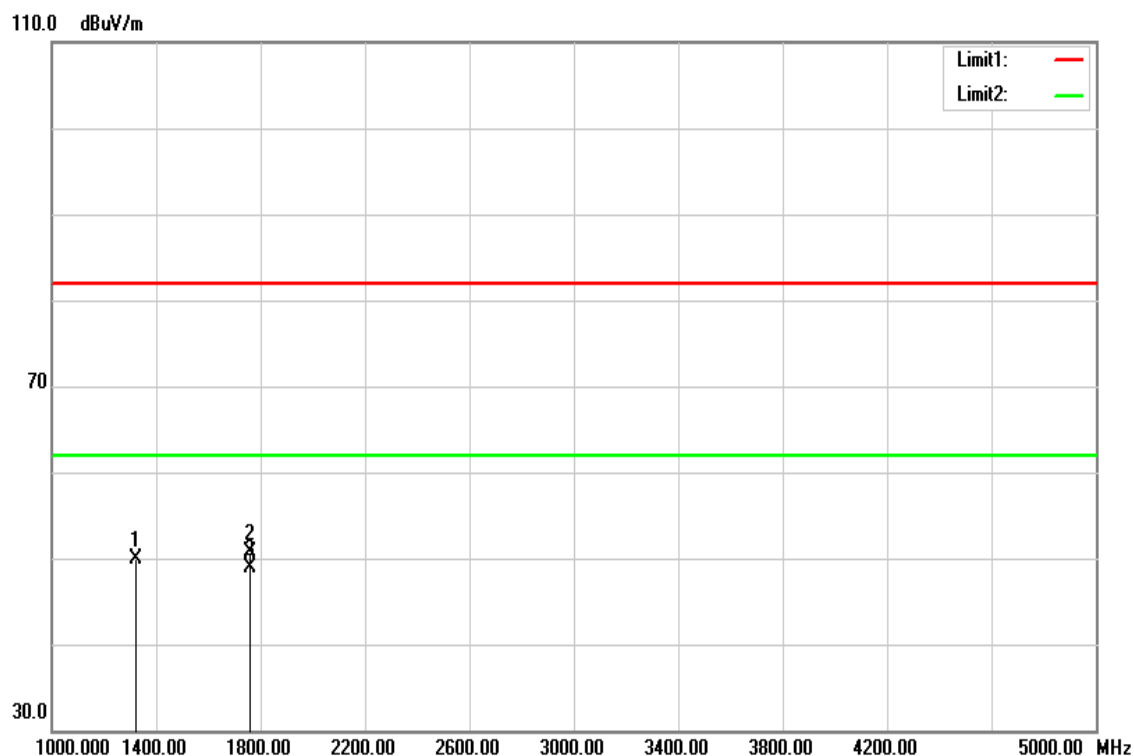


Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1732.000	61.80	-4.99	56.81	80.79	-23.98	peak
1732.000	60.39	-4.99	55.40	60.79	-5.39	AVG
2164.000	50.83	-3.35	47.48	80.79	-33.31	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit

Test Mode:	TX-High CH	Temp/Hum	27(°C)/ 53%RH
Test Item	Above 1G	Test Date	Nov 19, 2016
Polarize	Vertical	Test Engineer	ED Chiang.
Detector	Peak and Average	Test Voltage:	3Vdc

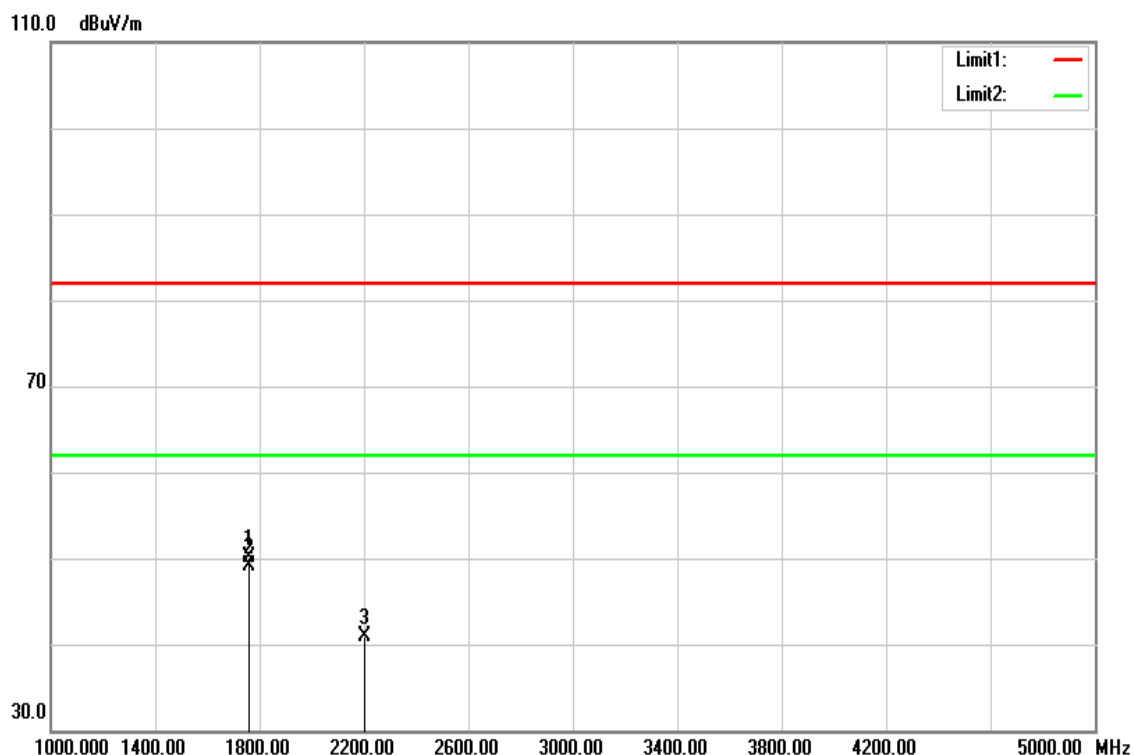


Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
** 1320.000	56.79	-6.82	49.97	74.00	-24.03	peak
1760.000	55.56	-4.84	50.72	80.79	-30.07	peak
1760.000	53.71	-4.84	48.87	60.79	-11.92	AVG

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit
3. ** Means emission locates in restricted bands and complies with 15.209 limit.

Test Mode:	TX-High CH	Temp/Hum	27(°C)/ 53%RH
Test Item	Above 1G	Test Date	Nov 19, 2016
Polarize	Horizontal	Test Engineer	ED Chiang.
Detector	Peak and Average	Test Voltage:	3Vdc



Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1760.000	55.02	-4.84	50.18	81.02	-31.72	peak
1760.000	53.92	-4.84	49.08	61.02	-12.82	AVG
** 2200.000	44.12	-3.15	40.97	74.00	-33.03	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit
3. ** Means emission locates in restricted bands and complies with 15.209 limit.

4.5 OPERATION RESTRICTION

4.5.1 Test Limit

According to §15.231(a) (e),

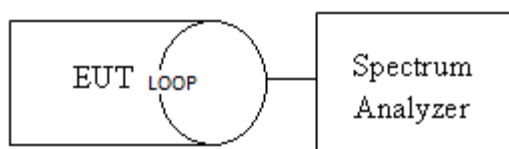
Limit	☒ Periodic operation(1) ☐ Periodic operation(2) ☐ Periodic operation(3) ☐ Periodic operation(4)
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4.5.2 Test Procedure

Test method Refer as ANSI 63.10:2013 clause 7.4

The Loop antenna connected to the spectrum analyzer, was touching to the transmitter antenna. Set the RBW=1MHz, VBW $\geq 3 \times$ RBW, Detector = Peak, Trace mode = Max hold, Sweep = 10s.Measure

4.5.3 Test Setup



4.5.4 Test Result

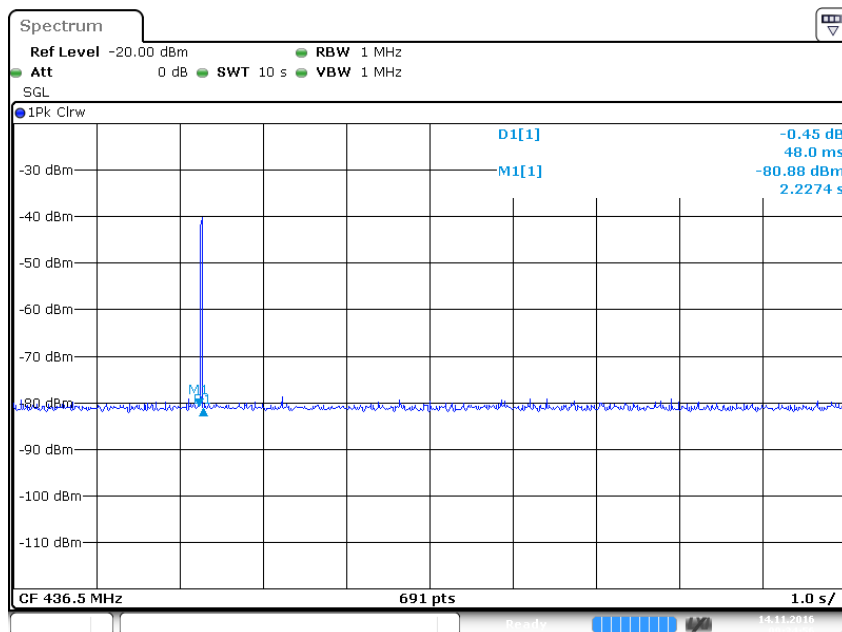
Dwell Time		
Operation condition	Burst Duration (ms)	Limits
Manually Operated	28.99	5 sec

,

Test Data

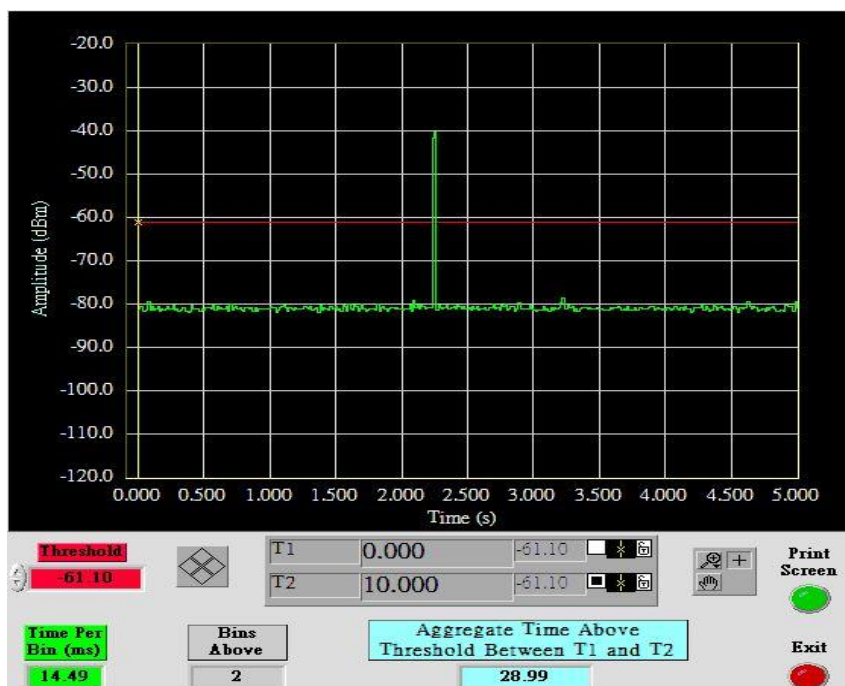
Operation Restriction

0s-10s



Date: 14 NOV 2016 09:34:56

Brust Duration



APPENDIX-B Channel List

CH	Freq.(MHz)	CH	Freq.(MHz)	CH	Freq.(MHz)	CH	Freq.(MHz)	CH	Freq.(MHz)
1	433.00	31	434.50	61	436.00	91	437.50	121	439.00
2	433.05	32	434.55	62	436.05	92	437.55	122	439.05
3	433.10	33	434.60	63	436.10	93	437.60	123	439.10
4	433.15	34	434.65	64	436.15	94	437.65	124	439.15
5	433.20	35	434.70	65	436.20	95	437.70	125	439.20
6	433.25	36	434.75	66	436.25	96	437.75	126	439.25
7	433.30	37	434.80	67	436.30	97	437.80	127	439.30
8	433.35	38	434.85	68	436.35	98	437.85	128	439.35
9	433.40	39	434.90	69	436.40	99	437.90	129	439.40
10	433.45	40	434.95	70	436.45	100	437.95	130	439.45
11	433.50	41	435.00	71	436.50	101	438.00	131	439.50
12	433.55	42	435.05	72	436.55	102	438.05	132	439.55
13	433.60	43	435.10	73	436.60	103	438.10	133	439.60
14	433.65	44	435.15	74	436.65	104	438.15	134	439.65
15	433.70	45	435.20	75	436.70	105	438.20	135	439.70
16	433.75	46	435.25	76	436.75	106	438.25	136	439.75
17	433.80	47	435.30	77	436.80	107	438.30	137	439.80
18	433.85	48	435.35	78	436.85	108	438.35	138	439.85
19	433.90	49	435.40	79	436.90	109	438.40	139	439.90
20	433.95	50	435.45	80	436.95	110	438.45	140	439.95
21	434.00	51	435.50	81	437.00	111	438.50	141	440.00
22	434.05	52	435.55	82	437.05	112	438.55		
23	434.10	53	435.60	83	437.10	113	438.60		
24	434.15	54	435.65	84	437.15	114	438.65		
25	434.20	55	435.70	85	437.20	115	438.70		
26	434.25	56	435.75	86	437.25	116	438.75		
27	434.30	57	435.80	87	437.30	117	438.80		
28	434.35	58	435.85	88	437.35	118	438.85		
29	434.40	59	435.90	89	437.40	119	438.90		
30	434.45	60	435.95	90	437.45	120	438.95		