

FCC TEST REPORT

Product : TPMS Repeater
Trade mark : Alligator
Model/Type reference : 030892
Serial Number : N/A
Report Number : EED32J001820
FCC ID : YMY-030892
Date of Issue : Oct. 11, 2017
Test Standards : 47 CFR Part 15 Subpart C
Test result : PASS

Prepared for:

Alligator Ventilfabrik GmbH
Richard-Steiff-Strasse 4, 89537 Giengen, Germany

Prepared by:

Centre Testing International Group Co., Ltd.
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Date:

Oct. 11, 2017

Check No.: 2457540528



2 Version

Version No.	Date	Description
00	Oct. 11, 2017	Original

3 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15 Subpart C Section 15.203	ANSI C63.10-2013	PASS
AC Power Line Conducted Emission	47 CFR Part 15 Subpart C Section 15.207	ANSI C63.10-2013	N/A
Field Strength of the Fundamental Signal	47 CFR Part 15 Subpart C Section 15.231 (b)	ANSI C63.10-2013	PASS
Spurious Emissions	47 CFR Part 15 Subpart C Section 15.231 (b)/15.209	ANSI C63.10-2013	PASS
20dB Bandwidth	47 CFR Part 15 Subpart C Section 15.231 (c)	ANSI C63.10-2013	PASS
Dwell Time	47 CFR Part 15 Subpart C Section 15.231 (a)	ANSI C63.10-2013	PASS

Remark:

The tested sample(s) and the sample information are provided by the client.

N/A:The device is battery operated and not connected to AC mains, so the conducted emission is not applicable

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5 General Information

5.1 Client Information

Applicant:	Alligator Ventilfabrik GmbH
Address of Applicant:	Richard-Steiff-Strasse 4, 89537 Giengen, Germany
Manufacturer:	Gobiz Electronics Limited
Address of Manufacturer:	Rm 201, 2/F, Hi-Tech Centre, 9 Choi Yuen Road, Sheung Shui, N.T., Hong Kong, China
Factory:	Gobiz Electronics Limited
Address of Factory:	Rm 201, 2/F, Hi-Tech Centre, 9 Choi Yuen Road, Sheung Shui, N.T., Hong Kong, China

5.2 General Description of EUT

Product Name:	TPMS Repeater
Model No.(EUT):	030892
Trade Mark:	Alligator
EUT Supports Radios application:	433.92MHz
Power Supply:	DC 12V

5.3 Product Specification subjective to this standard

Frequency Range:	433.92MHz
Software Version:	VER.: 1
Hardware Version:	RP03_V2 20170621; RP02-K REV:2.0 2013.6.25
Modulation Type:	FSK
Antenna Type:	Internal antenna
Antenna Gain:	2dBi
Test voltage:	DC 12V
Sample Received Date:	Aug. 18, 2017
Sample tested Date:	Aug. 18, 2017 to Oct. 9, 2017

5.4 Test Environment and Mode

Operating Environment:	
Temperature:	24.0 °C
Humidity:	53 % RH
Atmospheric Pressure:	1010 mbar
Test mode:	
TX mode	Continuous transmit 433.92MHz signal with the continuous transmission sample
Normal operation	Transmit 433.92MHz signal by the normal sample

5.5 Description of Support Units

The EUT has been tested independently.

5.6 Test Location

All tests were performed at:

Centre Testing International Group Co., Ltd.

Hongwei Industrial Zone, Bao'an 70 District, Shenzhen, Guangdong, China 518101

Telephone: +86 (0) 755 3368 3668 Fax: +86 (0) 755 3368 3385

No tests were sub-contracted.

5.7 Test Facility

Test site at Centre Testing International Group Co., Ltd has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 06, 2014.

The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

FCC Designation No.: CN1164

FCC-Registration No.: 886427

Centre Testing International Group Co., Ltd. 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 our files. Registration 886427.

5.8 Deviation from Standards

None.

5.9 Abnormalities from Standard Conditions

None.

5.10 Other Information Requested by the Customer

None.

5.11 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Radio Frequency	7.9×10^{-8}
2	RF power, conducted	0.31dB (30MHz-1GHz)
		0.57dB (1GHz-18GHz)
3	Radiated Spurious emission test	4.5dB (30MHz-1GHz)
		4.8dB (1GHz-12.75GHz)
4	Conduction emission	3.6dB (9kHz to 150kHz)
		3.2dB (150kHz to 30MHz)
5	Temperature test	0.64°C
6	Humidity test	2.8%
7	DC power voltages	0.025%

6 Equipment List

3M Semi/full-anechoic Chamber					
Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
3M Chamber & Accessory Equipment	TDK	SAC-3	---	06-05-2016	06-05-2019
TRILOG Broadband Antenna	SCHWARZBECK	VULB9163	9163-618	08-14-2017	08-13-2018
Microwave Preamplifier	Agilent	8449B	3008A02425	02-16-2017	02-15-2018
Horn Antenna	ETS-LINDGREN	3117	00057407	07-20-2015	07-18-2018
Loop Antenna	ETS	6502	00071730	06-22-2017	06-21-2019
Spectrum Analyzer	R&S	FSP40	100416	06-13-2017	06-12-2018
Receiver	R&S	ESCI	100435	06-14-2017	06-13-2018
Multi device Controller	maturo	NCD/070/10711 112	---	01-11-2017	01-10-2018
LISN	schwarzbeck	NNBM8125	81251547	06-13-2017	06-12-2018
LISN	schwarzbeck	NNBM8125	81251548	06-13-2017	06-12-2018
Signal Generator	Agilent	E4438C	MY45095744	03-14-2017	03-13-2018
Signal Generator	Keysight	E8257D	MY53401106	03-14-2017	03-13-2018
Temperature/ Humidity Indicator	TAYLOR	1451	1905	05-08-2017	05-07-2018
Cable line	Fulai(7M)	SF106	5219/6A	01-11-2017	01-10-2018
Cable line	Fulai(6M)	SF106	5220/6A	01-11-2017	01-10-2018
Cable line	Fulai(3M)	SF106	5216/6A	01-11-2017	01-10-2018
Cable line	Fulai(3M)	SF106	5217/6A	01-11-2017	01-10-2018
High-pass filter	Sinoscite	FL3CX03WG18 NM12-0398-002	---	01-11-2017	01-10-2018
High-pass filter	MICRO-TRONICS	SPA-F-63029-4	---	01-11-2017	01-10-2018
band rejection filter	Sinoscite	FL5CX01CA09C L12-0395-001	---	01-11-2017	01-10-2018
band rejection filter	Sinoscite	FL5CX01CA08C L12-0393-001	---	01-11-2017	01-10-2018
band rejection filter	Sinoscite	FL5CX02CA04C L12-0396-002	---	01-11-2017	01-10-2018
band rejection filter	Sinoscite	FL5CX02CA03C L12-0394-001	---	01-11-2017	01-10-2018

RF Conducted test					
Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
Spectrum Analyzer	R&S	FSP40	100416	06-13-2017	06-12-2018
Receiver	R&S	ESCI	100435	03-14-2017	03-13-2018
Signal Generator	Agilent	E4438C	MY45095744	03-14-2017	03-13-2018
Signal Generator	Keysight	E8257D	MY53401106	03-14-2017	03-13-2018
High-pass filter	Sinoscite	FL3CX03WG18 NM12-0398-002	---	01-12-2017	01-11-2018
High-pass filter	MICRO-TRONICS	SPA-F-63029-4	---	01-12-2017	01-11-2018
band rejection filter	Sinoscite	FL5CX01CA09C L12-0395-001	---	01-12-2017	01-11-2018
band rejection filter	Sinoscite	FL5CX01CA08C L12-0393-001	---	01-12-2017	01-11-2018
band rejection filter	Sinoscite	FL5CX02CA04C L12-0396-002	---	01-12-2017	01-11-2018

7 Test results and Measurement Data

7.1 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:	
The antenna is Internal antenna on the main PCB and no consideration of replacement. The best case gain of the antenna is 2dBi.	

7.2 Spurious Emissions

7.2.1 Spurious Emissions

Test Requirement: 47 CFR Part 15C Section 15.231(b) and 15.209

Test Method: ANSI C63.10

Test Site: Measurement Distance: 3m (Semi-Anechoic Chamber)

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	120kHz	300kHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Test Setup:

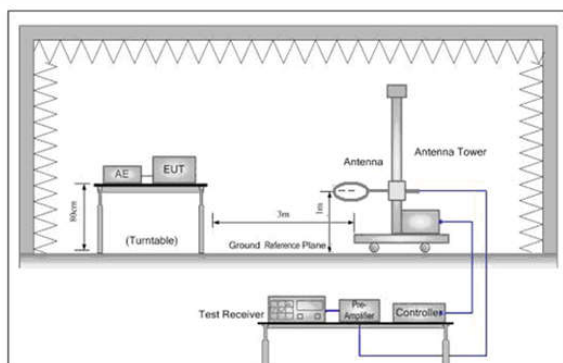


Figure 1. Below 30MHz

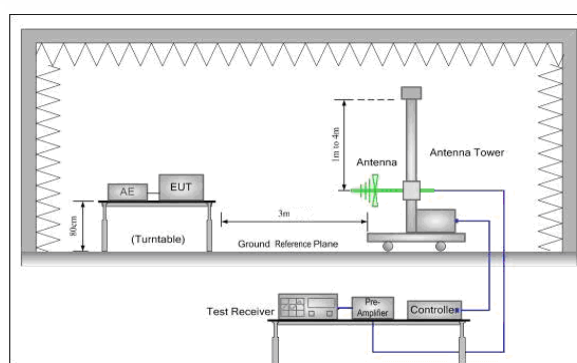


Figure 2. 30MHz to 1GHz

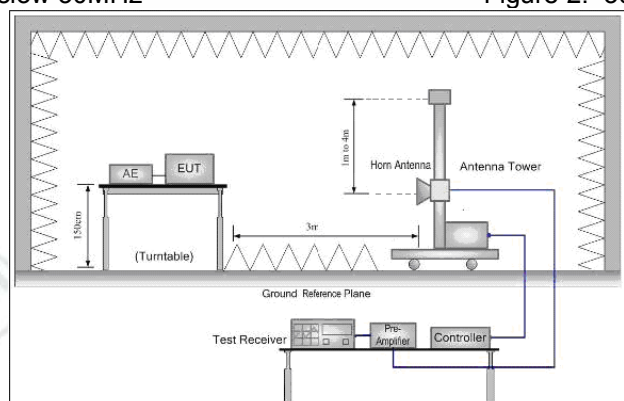


Figure 3. Above 1GHz

Test Procedure:

Below 1GHz test procedure as below:

- 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.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 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.
- 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.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- 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.

Above 1GHz test procedure as below:

- Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre(Above 18GHz the distance is 1 meter and table is 1.5 metre).
- Test the EUT in the lowest channel ,middle channel, the Highest channel
- The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case.
- Repeat above procedures until all frequencies measured was complete.

Limit:
(Spurious Emissions)

Frequency	Field strength (microvolt/meter)	Limit (dBμV/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 (dBμV/m @3m)	Detector
433.92MHz	80.8	Average
	100.8	Peak

Test Mode:

TX mode

Instruments Used:

Refer to section 6 for details

Test Results:

Pass

Test data

Field Strength of the Fundamental Signal

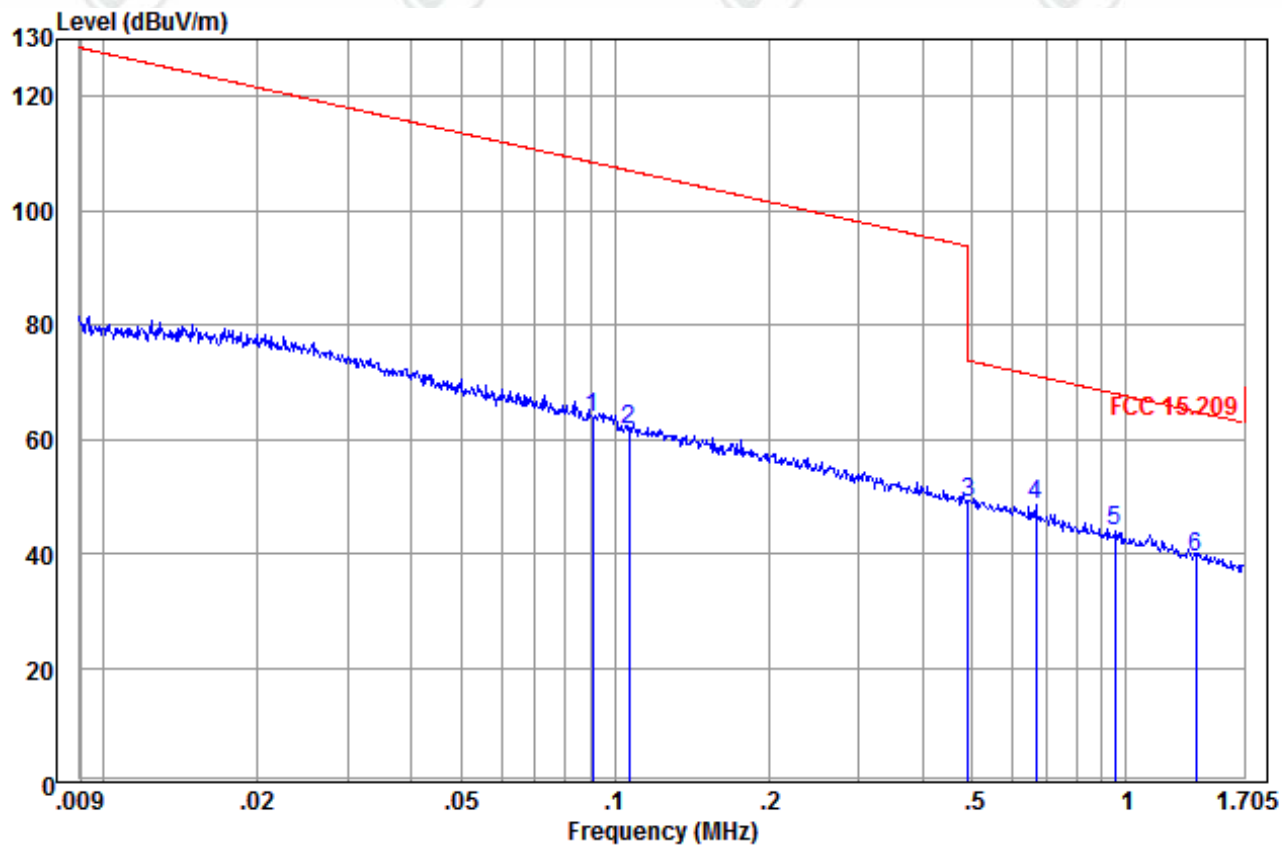
Peak value:								
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Read Level (dB μ V)	Level (dB μ V/m)	Limit (dB μ V/m)	Over Limit (dB)	Result	Antenna Polaxis
433.92	15.89	1.42	57.38	74.69	80.80	-6.11	Pass	H
433.92	15.89	1.42	57.20	74.51	80.80	-6.29	Pass	V

Remark: As shown in this section, for field strength of the fundamental signal measurements, the 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. So, only the peak value is measured.

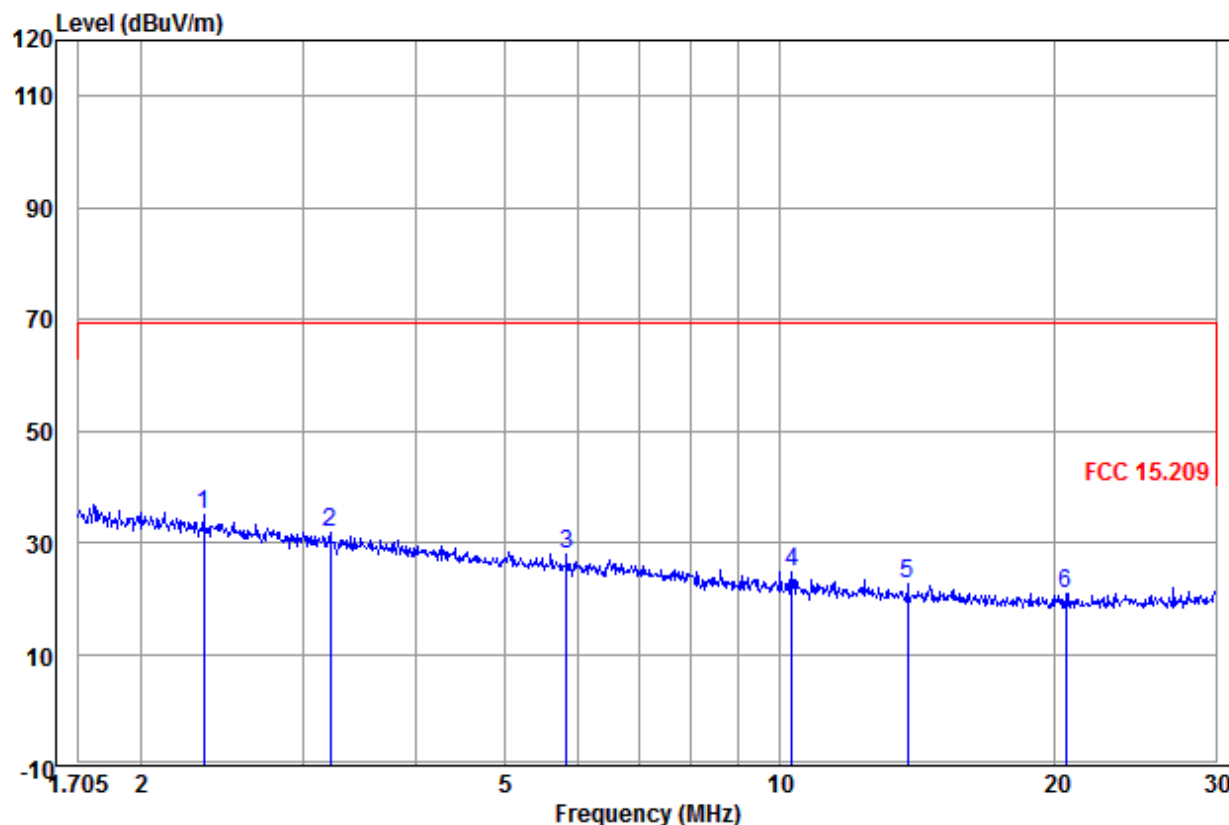
Spurious Emissions

Test data:

9 kHz-1.705MHz



Freq (MHz)	Antenna_Factor (dB/m)	Cable_Loss (dB)	Read_Level (dBuV)	Level (dBuV/m)	Limit_Line (dBuV/m)	Over_Limit (dB)	Polarization	Remark
0.09000	11.43	0.10	52.12	63.65	108.47	-44.82	X	QP
0.10700	11.40	0.11	50.17	61.87	107.01	-45.33	X	QP
0.49200	11.30	0.12	37.50	48.92	73.76	-24.84	X	QP
0.66700	11.30	0.12	37.05	48.47	71.11	-22.64	X	QP
0.95300	11.38	0.13	32.34	43.85	67.99	-24.14	X	QP
1.37500	11.40	0.16	27.60	39.16	64.78	-25.62	X	QP



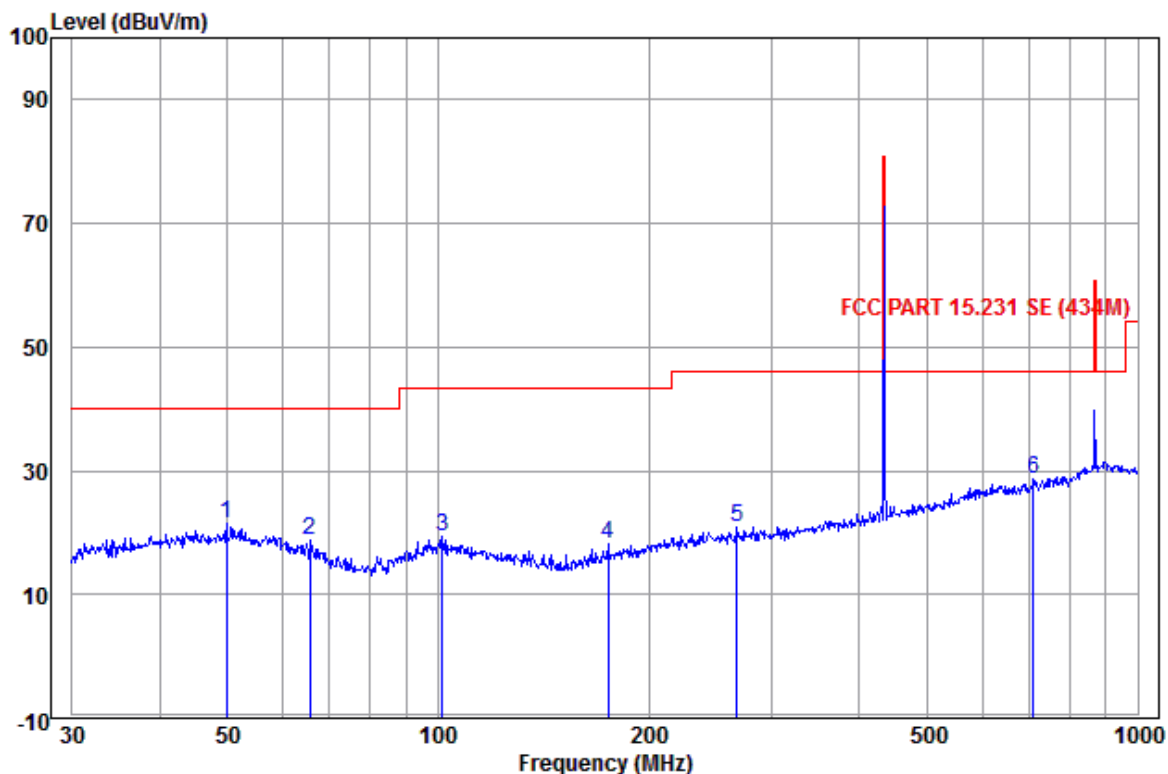
Freq (MHz)	Antenna_Factor (dB/m)	Cable_Loss (dB)	Read_Level (dBuV)	Level (dBuV/m)	Limit_Line (dBuV/m)	Over_Limit (dB)	Polarization	Remark
2.337	11.44	0.18	23.27	34.89	69.5	-34.61	X	QP
3.213	11.45	0.17	20.16	31.78	69.5	-37.72	X	QP
5.834	11.13	0.25	16.59	27.97	69.5	-41.53	X	QP
10.294	10.89	0.64	13.13	24.66	69.5	-44.84	X	QP
13.792	10.74	0.69	11.20	23.63	69.5	-46.87	X	QP
20.546	10.03	0.80	10.14	20.97	69.5	-48.53	X	QP

Remark: The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case X axis is shown in the report.

30MHz-1GHz

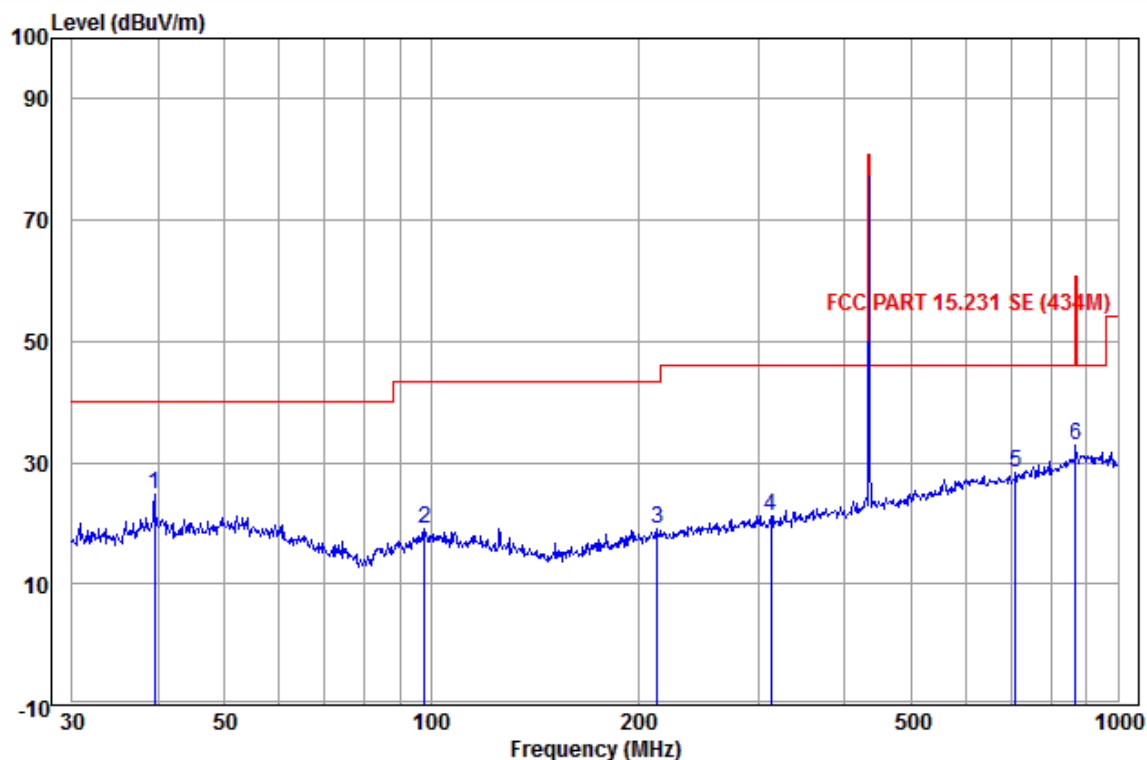
QP value:

Horizontal



	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	49.881	14.59	0.11	6.81	21.51	40.00	-18.49	Horizontal	
2	65.573	11.54	0.23	6.91	18.68	40.00	-21.32	Horizontal	
3	101.289	12.38	0.59	6.51	19.48	43.50	-24.02	Horizontal	
4	175.037	10.25	0.87	7.11	18.23	43.50	-25.27	Horizontal	
5	267.546	12.90	1.24	6.81	20.95	46.00	-25.05	Horizontal	
6 pp	709.182	19.18	2.11	7.33	28.62	46.00	-17.38	Horizontal	

Vertical



	Ant Freq	Cable Factor	Read Loss	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dB		
1	pp 39.576	13.73	0.05	11.02	24.80	40.00	-15.20	Vertical
2	97.798	12.16	0.55	6.25	18.96	43.50	-24.54	Vertical
3	213.763	11.83	1.17	6.04	19.04	43.50	-24.46	Vertical
4	312.179	13.66	1.13	6.43	21.22	46.00	-24.78	Vertical
5	709.182	19.18	2.11	6.97	28.26	46.00	-17.74	Vertical
6	869.130	21.61	2.47	8.77	32.85	60.80	-27.95	Vertical

Above 1GHz

Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Level (dBμV/m)	Average Limit (dBμV/m)	Over Limit (dB)	Polarization
1301.760	30.45	2.01	44.25	46.81	35.02	60.80	-25.78	Horizontal
1735.680	31.28	2.56	43.75	47.24	37.33	60.80	-23.47	Horizontal
2169.600	32.08	2.94	43.74	48.15	39.43	60.80	-21.37	Horizontal
3060.000	33.54	3.42	44.69	47.73	40.00	54.00	-14.00	Horizontal
3645.000	33.06	3.92	44.63	47.80	40.15	54.00	-13.85	Horizontal
4670.000	34.40	5.70	44.60	45.51	41.01	54.00	-12.99	Horizontal
1301.760	30.45	2.01	44.25	47.63	35.84	60.80	-24.96	Vertical
1735.680	31.28	2.56	43.75	47.39	37.48	60.80	-23.32	Vertical
2460.000	32.67	3.11	44.11	49.11	40.78	54.00	-13.22	Vertical
3215.000	33.41	3.56	44.68	48.36	40.65	54.00	-13.35	Vertical
4190.000	33.28	4.64	44.60	47.00	40.32	54.00	-13.68	Vertical
4695.000	34.45	5.76	44.60	45.66	41.27	54.00	-12.73	Vertical

Remark:

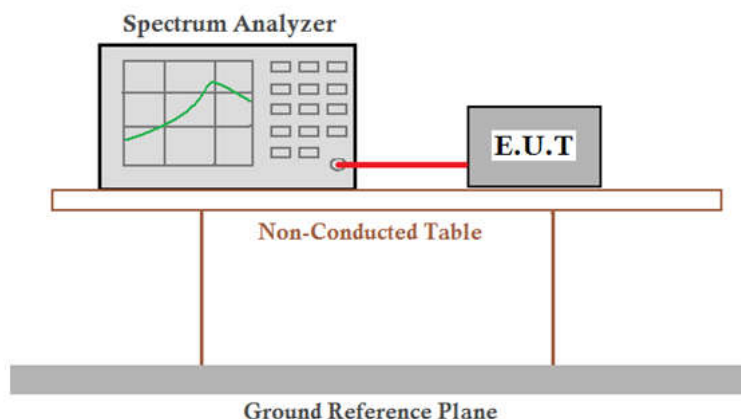
- 1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
 Final Test Level = Receiver Reading - Correct Factor
 Correct Factor = Preamplifier Factor - Antenna Factor - Cable Factor
- 2) As shown in this section, for frequencies above 1GHz, the 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. So, only the peak values are measured.

7.3 20dB Bandwidth

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

Test Method: ANSI C63.10

Test Setup:



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 Mode: TX mode

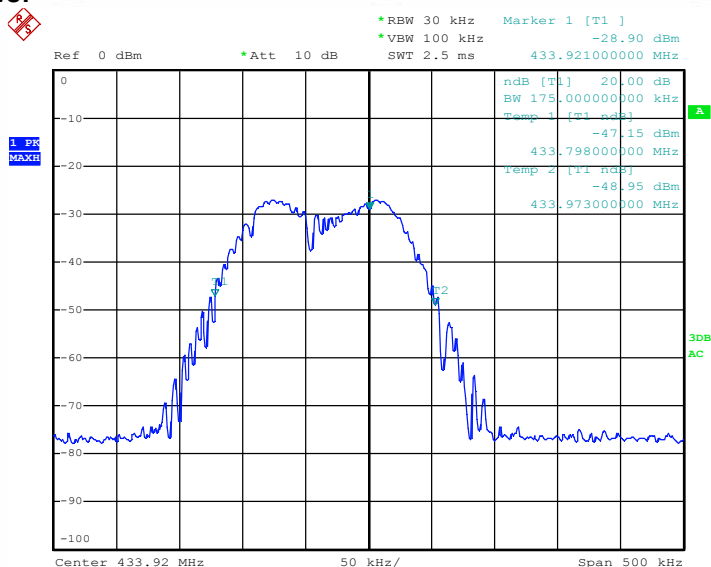
Instruments Used: Refer to section 6 for details

Test Results: Pass

Test data

20dB bandwidth (kHz)	Limit (kHz)	Results
175	1084.8	Pass

Test plot as follows:



Date: 10.OCT.2017 14:52:31

7.4 Dwell Time

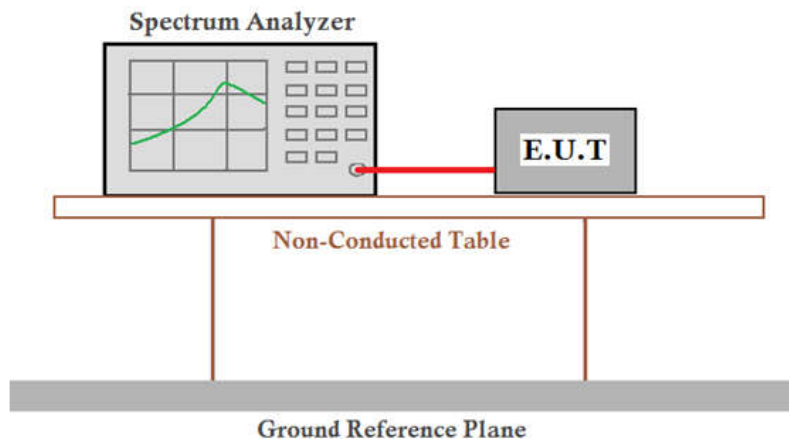
Test Requirement:

47 CFR Part 15C Section 15.231 (a) (2)

Test Method:

ANSI C63.10

Test Setup:



Limit:

Not more than 5 seconds

Test Mode:

Normal mode

Instruments Used:

Refer to section 6 for details

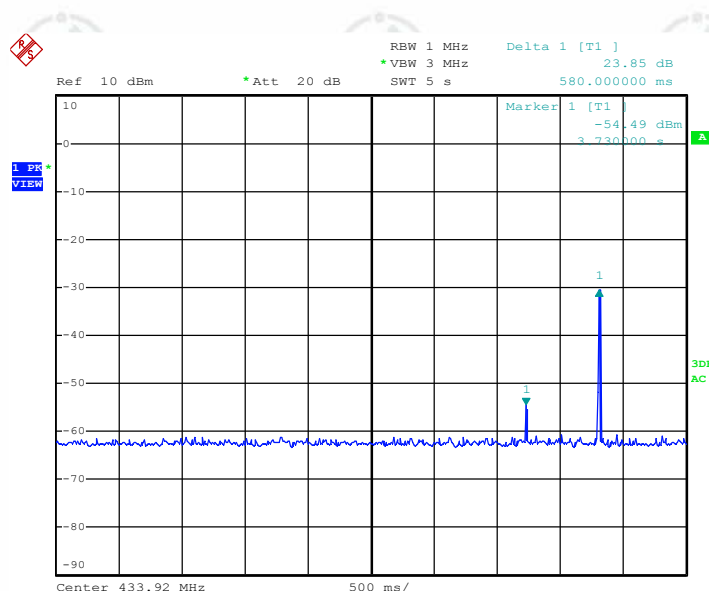
Test Results:

Pass

Test data:

Transmitting time	Limit	Results
580ms	≤5S	Pass

Test plot as follows:



Date: 10.OCT.2017 14:31:50

APPENDIX 1 PHOTOGRAPHS OF TEST SETUP

Please refer to the document of test Setup Photos.

APPENDIX 2 PHOTOGRAPHS OF EUT

Please refer to the document of external photos and internal photos.

***** End of Report *****

The test report is effective only with both signature and specialized stamp. The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CTI, this report can't be reproduced except in full.