FCC PART 15.231

TEST REPORT

For

AIN TECHNICAL (SHENZHEN) CO.,LTD

C6 Building 301A Heng Feng Industrial City, He Zhou, Xi Xiang Street ,Bao An Qu, Shenzhen, China

FCC ID: 2ALPWAS-100TX

Report Type:	**Product Type:**
Original Report	Wireless Transmission Module--Transmitter

Report Number:	RSZ170327005-00
Report Date:	2017-04-12
Reviewed By:	Oscar Ye Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Kunshan) No.248 Chenghu Road, Kunshan, Jiangsu province, China Tel: +86-0512-86175000 Fax: +86-0512-88934268 www.baclcorp.com.cn

TABLE OF CONTENTS

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *AIN TECHNICAL (SHENZHEN) CO.,LTD's* product, model number: *AS-100TX (FCC ID:* 2ALPWAS-100TX*)* (or the "EUT") in this report was a *Wireless Transmission Module--Transmitter,* which was measured approximately: 65.0 mm (L) * 31.0 mm (W) * 18.5 mm (H), rated with input voltage: DC 3.0V battery.

** All measurement and test data in this report was gathered from production sample serial number: 1700499 (Assigned by BACL, Kunshan).The EUT supplied by the applicant was received on 2017-03-30.*

Objective

This test report is prepared on behalf of *AIN TECHNICAL (SHENZHEN) CO.,LTD.* All the test measurements were performed according to the measurement procedure described in ANSI C63.10 - 2013.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, section 15.203, 15.205, 15.207, 15.209, 15.35(c) and 15.231 rules.

Related Submittal(s)/Grant(s)

FCC Part 15B CYY submissions with FCC ID: 2ALPWAS-100RX.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10 - 2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Item		Uncertainty
Radiated emission	30MHz~1GHz	±5.91dB
	Above 1G	±4.92dB
Occupied Bandwidth		±0.5kHz
Temperature		±1.0℃
Humidity		±6%

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road, Kunshan, Jiangsu province, China

Test site at Bay Area Compliance Laboratories Corp. (Kunshan) 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 C63.10-2013.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 815570. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

Special Accessories

No special accessories was used

Equipment Modifications

No modification was made to the EUT.

Support Equipment List and Details

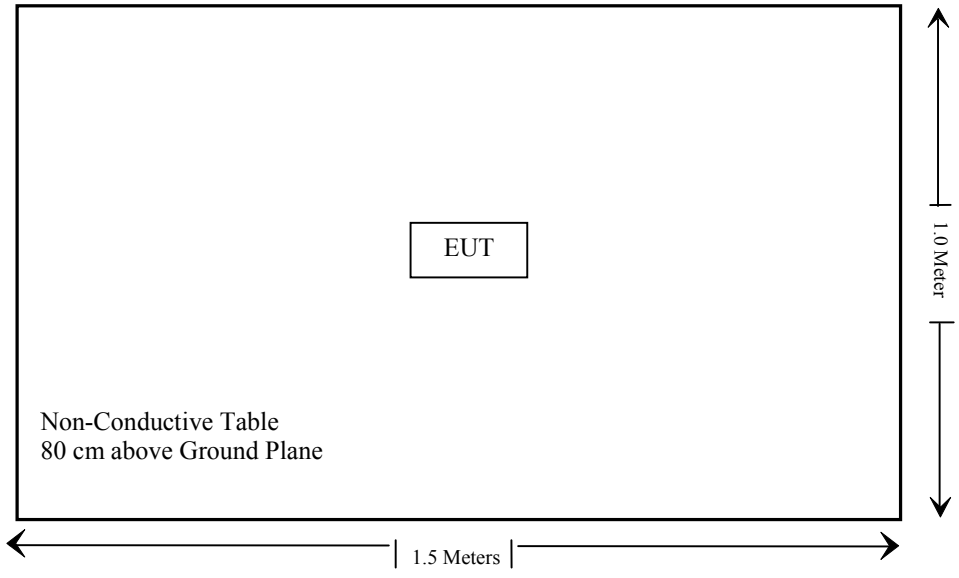
Manufacturer	Description	Model	Serial Number
N/A	N/A	N/A	N/A

External I/O Cable

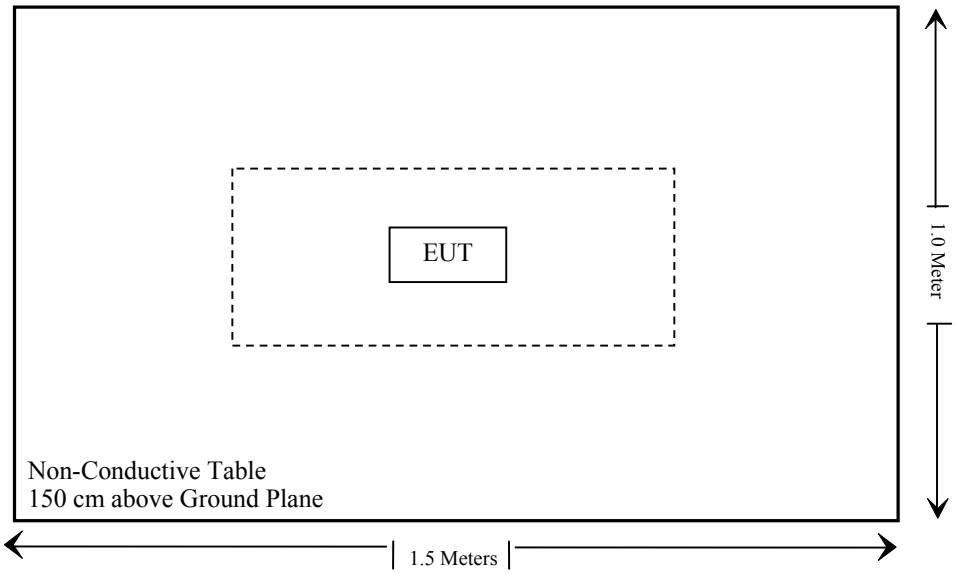
Cable Description	Length (m)	From / Port	To
N/A	N/A	N/A	N/A

Block Diagram of Test Setup

For Radiated Emission: Below 1GHz



For Radiated Emission: Above 1GHz



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.207 (a)	Conducted Emissions	Not Applicable
§15.205, §15.209, §15.231(b)	Radiated Emissions	Compliance
§15.231 (c)	20dB Emission Bandwidth	Compliance
§15.231 (a) (2)	Deactivation	Compliance

Not Applicable: The EUT is powered by battery only.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
Sonoma Instrunent	Amplifier	330	171377	2016-12-12	2017-12-12
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2016-11-25	2017-11-25
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2016-01-09	2019-01-08
ETS	Horn Antenna	3115	9311-4159	2016-01-11	2019-01-10
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2016-11-25	2017-11-25
Mini	Pre-amplifier	ZVA-183-S+	857001418	2016-09-16	2017-09-16
R&S	Auto test Software	EMC32	V 09.10.0	NCR	NCR
haojintech	Coaxial Cable	Cable-1	001	2016-09-08	2017-09-07
haojintech	Coaxial Cable	Cable-2	002	2016-09-08	2017-09-07
haojintech	Coaxial Cable	Cable-3	003	2016-09-08	2017-09-07
MICRO-COAX	Coaxial Cable	Cable-4	004	2016-11-18	2017-11-17
MICRO-COAX	Coaxial Cable	Cable-5	005	2016-11-18	2017-11-17

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

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 shall be considered sufficient to comply with the provisions of this section.

Antenna Connector Construction

The EUT has one monopole antenna arrangement, which was permanently attached. The antenna is 2.0 dBi, fulfill the requirement of this section. Please refer to EUT photos.

Result: Compliant.

FCC §15.205, §15.209, §15.231 (b) - RADIATED EMISSIONS

Applicable Standard

FCC §15.205, §15.209, §15.231 (b)

According to FCC §15.231(b), the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

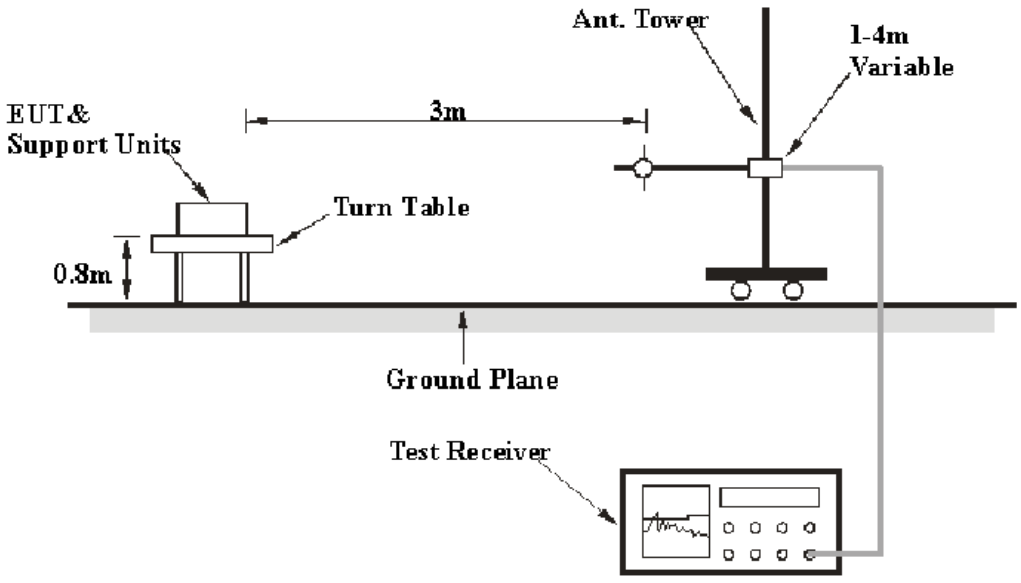
Fundamental frequency (MHz)	Field Strength of Fundamental (Microvolts /meter)	Field Strength of spurious emissions ((Microvolts /meter)
40.66-40.70	2250	225
70-130	1250	125
130-174	1250 to 3750**	125 to 375**
174-260	3750	375
260-470	3750 to 12500**	375 to 1250**
Above 470	12500	1250

*Linear interpolations.

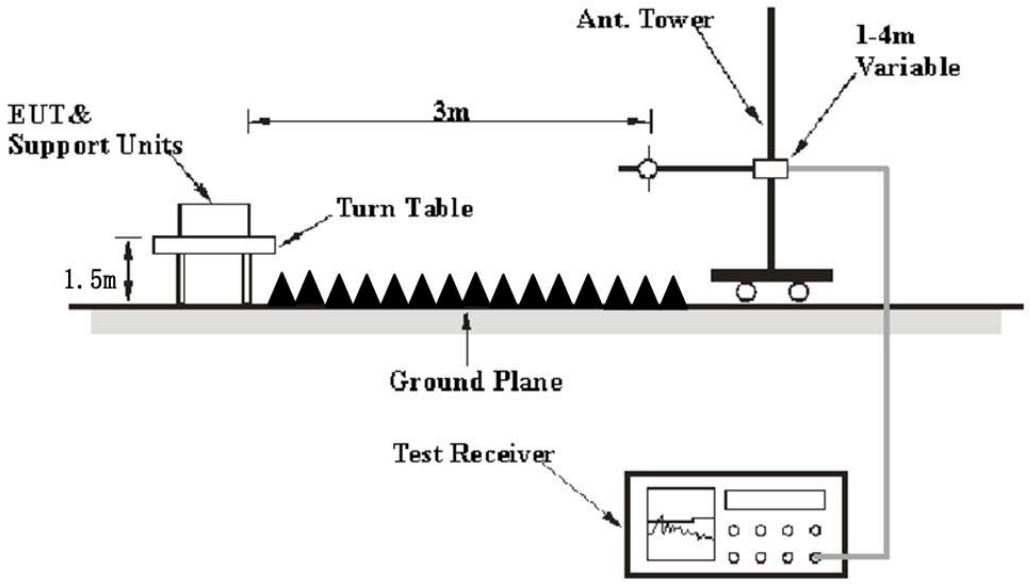
The above field strength limits are specified at a distance of 3-meters the tighter limits apply at the band edges.

EUT Setup

Below 1 GHz:



Above 1 GHz:



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10 - 2013. The specification used was the FCC 15 § 15.209, 15.205 and 15.231.

EMI Test Receiver Setup

The system was investigated from 30 MHz to 5 GHz.

During the radiated emission test, the test receiver was set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1 MHz	3 MHz	/	PK
	1 MHz	10 Hz	/	Ave.

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All final data was recorded in the Quasi-peak detection mode from 30MHz to 1GHz, Peak and average detection mode above 1 GHz.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Loss and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Amplitude = Meter Reading + Antenna Loss + Cable Loss - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 5.8 dB means the emission is 5.8 dB below the limit. The equation for margin calculation is as follows:

Margin = Limit –Corrected Amplitude

Test Results Summary

According to the data in the following table, the EUT complied with the FCC §15.205, §15.209, §15.231 (b)

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL, $U_{(Lm)}$ is less than + U_{cispr}, if L_m is less than L_{lim}, it implies that the EUT complies with the limit.

Test Data

Environmental Conditions

Temperature:	24~26 ℃
Relative Humidity:	53~55 %
ATM Pressure:	100.0~100.1 kPa

The testing was performed by Chris Wang on 2017-04-10 and 2017-04-11.

Test mode: Transmitting

30MHz - 5GHz (OOK):

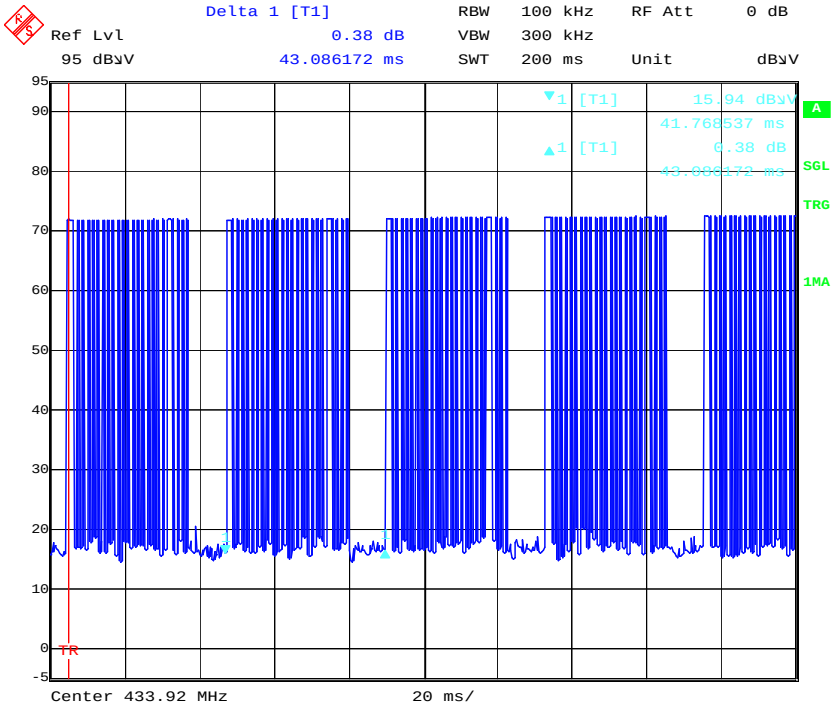
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.231(b)/205/209		
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)	Comment
Peak										
433.92	82.54	PK	253	1.5	H	-8.34	74.20	100.8	26.60	Fundamental
433.92	68.26	PK	214	1.3	V	-8.34	59.92	100.8	40.88	Fundamental
867.84	56.91	PK	136	1.6	H	-1.23	55.68	80.8	25.12	Harmonic
867.84	51.47	PK	187	2.2	V	-1.23	50.24	80.8	30.56	Harmonic
1301.76	47.03	PK	42	2.1	H	-10.66	36.37	74	37.63	Harmonic
1301.76	45.81	PK	300	1.2	V	-10.66	35.15	74	38.85	Harmonic
2169.60	58.49	PK	358	1.1	H	-6.64	51.85	80.8	28.95	Harmonic
2169.60	51.05	PK	63	2.0	V	-6.64	44.41	80.8	36.39	Harmonic
3037.44	54.41	PK	294	1.7	H	-3.24	51.17	80.8	29.63	Harmonic
3037.44	52.84	PK	350	1.2	V	-3.24	49.60	80.8	31.20	Harmonic
Average										
433.92	74.20	Ave.	253	1.5	H	-12.37	61.83	80.8	18.97	Fundamental
433.92	59.92	Ave.	214	1.3	V	-12.37	47.55	80.8	33.25	Fundamental
867.84	55.68	Ave.	136	1.6	H	-12.37	43.31	60.8	17.49	Harmonic
867.84	50.24	Ave.	187	2.2	V	-12.37	37.87	60.8	22.93	Harmonic
1301.76	36.37	Ave.	42	2.1	H	-12.37	24.00	54	30.00	Harmonic
1301.76	35.15	Ave.	300	1.2	V	-12.37	22.78	54	31.22	Harmonic
2169.60	51.85	Ave.	358	1.1	H	-12.37	39.48	60.8	21.32	Harmonic
2169.60	44.41	Ave.	63	2.0	V	-12.37	32.04	60.8	28.76	Harmonic
3037.44	51.17	Ave.	294	1.7	H	-12.37	38.80	60.8	22.00	Harmonic
3037.44	49.60	Ave.	350	1.2	V	-12.37	37.23	60.8	23.57	Harmonic

Note:

Corrected Amplitude = Corrected Factor + Reading
Corrected Factor = Antenna factor (Rx) + cable loss – amplifier factor
Margin = Limit - Corr. Amplitude

Duty Cycle =(Ton1*n1+Ton2*n2+...)/Tp*100%, Ton1 = 1.03ms, n1=2 ,Ton2=356.82us ;n2=23 ,Tp=42.67ms
Duty Cycle Factor = 20lg(Duty Cycle) = -12.37 dB
Ave. = PK + 20*lg(Duty Cycle)

Duty Cycle 1



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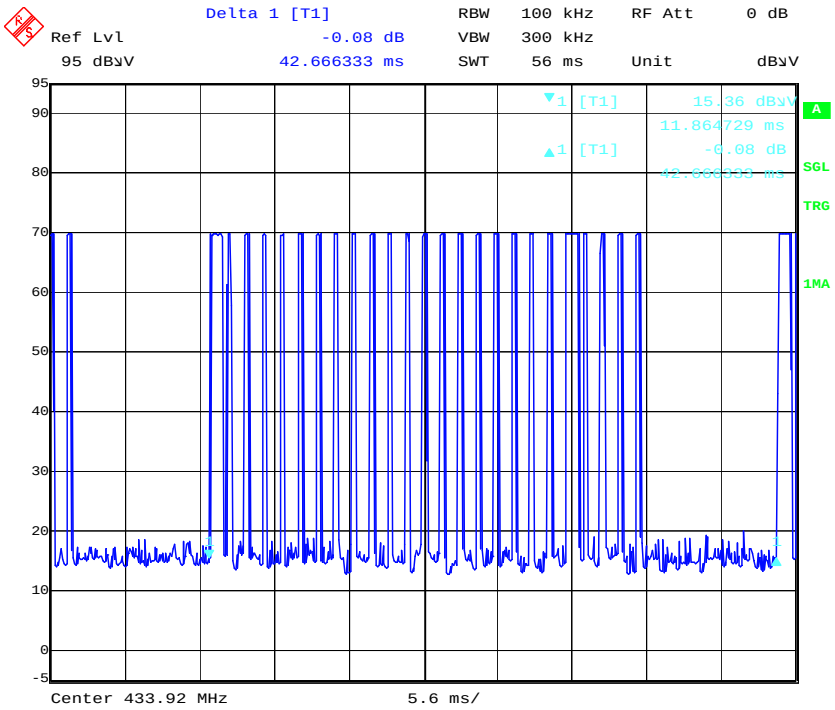
Duty Cycle 2



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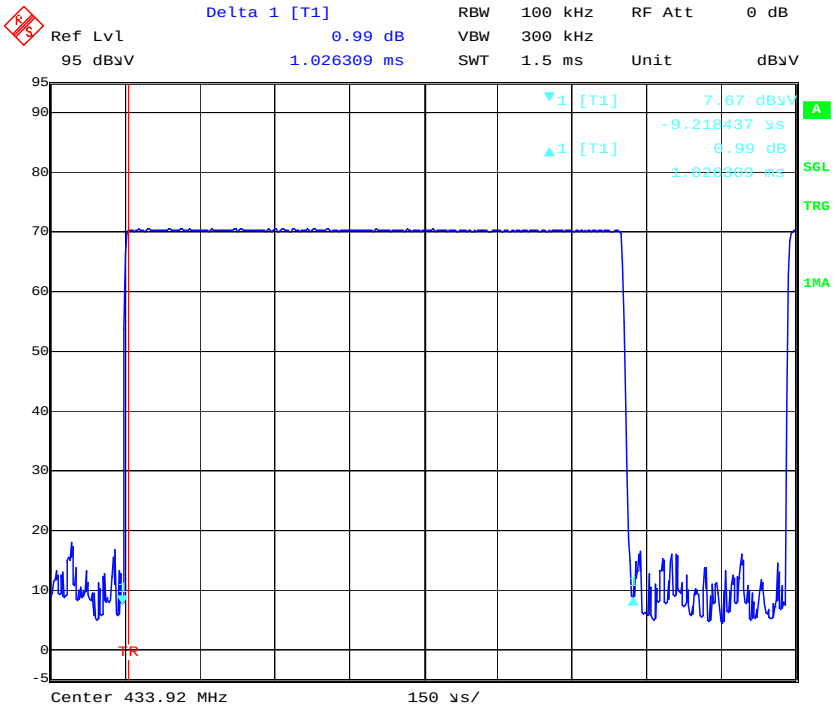
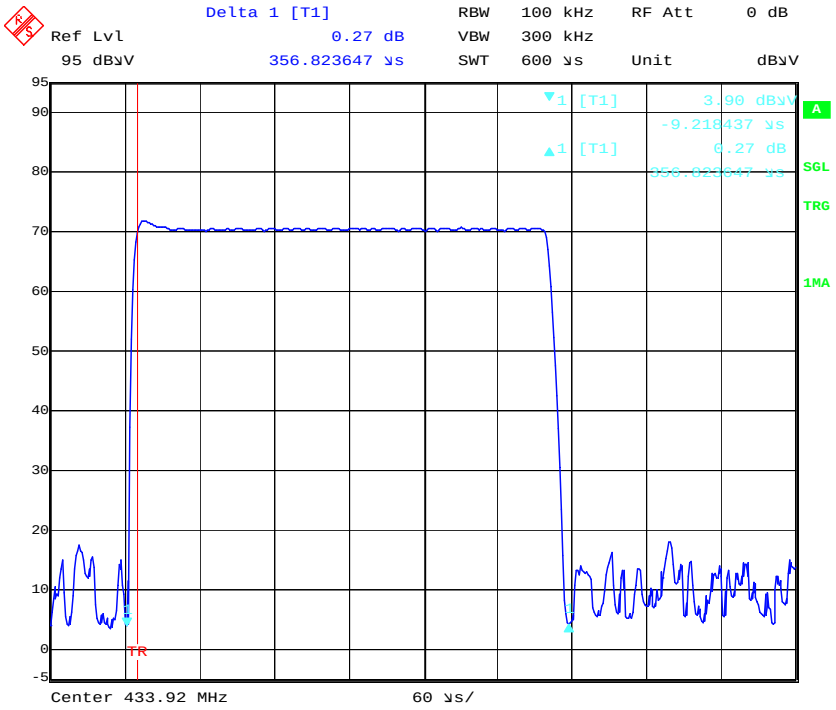
Duty Cycle 3



Duty Cycle 4



FCC §15.231(a) (2) - DEACTIVATION TESTING

Applicable Standard

Per FCC §15.231(a) (2), a transmitter activated automatically shall cease transmission within 5 seconds after activation.

Test Procedure

1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set center frequency of spectrum analyzer=operating frequency.
3. Set the spectrum analyzer as RBW=100k VBW=100k Span=0Hz.
4. Repeat above procedures until all frequency measured was complete.

Test Data

Environmental Conditions

Temperature:	26 ℃
Relative Humidity:	55 %
ATM Pressure:	100.1 kPa

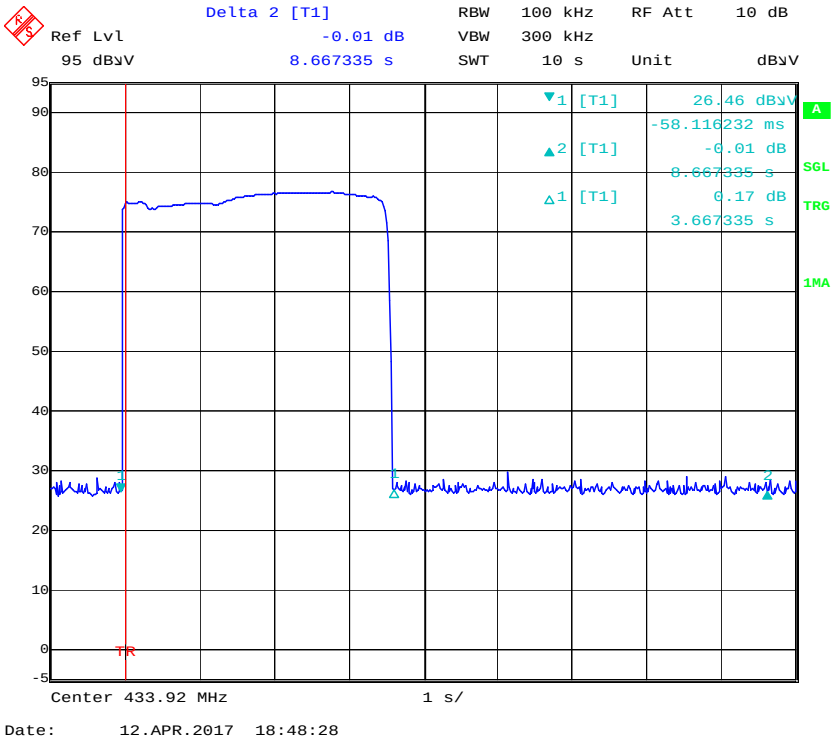
The testing was performed by Chris Wang on 2017-04-12.

Test mode: Transmitting

Test Result: Compliant, please refer to following plot.

OOK modulation:

Transmission period	Limit	Result
3.67 s	< 5 s	Pass



FCC §15.231(c) – 20 dB EMISSION BANDWIDTH TESTING

Applicable Standard

Per 15.231(c), 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. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Test Procedure

With the EUT's antenna attached, the waveforzm was received by the test antenna which was connected to the spectrum analyzer, plot the 20 dB bandwidth.

Test Data

Environmental Conditions

Temperature:	26 ℃
Relative Humidity:	55 %
ATM Pressure:	100.1 kPa

The testing was performed by Chris Wang on 2017-04-04.

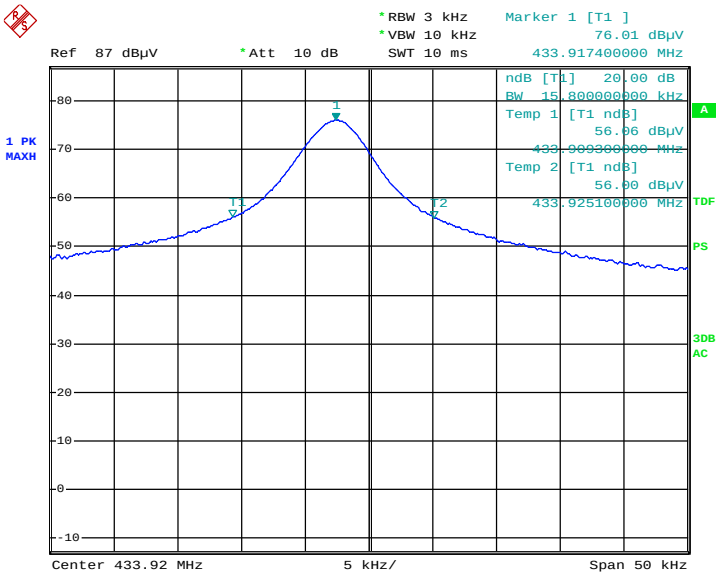
Test Mode: Transmitting

Please refer to following table and plot.

Channel Frequency (MHz)	20 dB Emission Bandwidth (kHz)	＜Limit (kHz)	Result
433.92	15.8	1084.8	Pass

Note: Limit = 0.25% * center frequency = 0.25% * 433.92 MHz = 1084.8 kHz
20dB bandwidth = 15.8 kHz <1084.8 kHz

20 dB Emission Bandwidth



EUT

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******* END OF REPORT *******