

FCC PART 15.231

TEST REPORT

For

AKUVOX(XIAMEN)NETWORKS CO.,LTD.

10/F, No.56 GuanRi Road., Software Park II, Xiamen, China

FCC ID: 2AHCR-EP10-433

Report Type: Original Report	Product Type: Emergency Pendant
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Report Number: RXM160524053-00	
Report Date: 2016-09-26	
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Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan).

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The **AKUVOX(XIAMEN)NETWORKS CO.,LTD.**'s product, model number: *EP10 (433)* (FCC ID: *2AHCR-EP10-433*) (the "EUT") in this report is a *Emergency Pendant*, which was measured approximately: 5.5cm (L) x 4 cm (W) x1.6 cm (H), rated input voltage: DC 3V battery.

All measurement and test data in this report was gathered from production sample serial number: 160524053 (Assigned by BACL, Dongguan). The EUT was received on 2016-05-27.

Objective

This document is a test report based on the Electromagnetic Interference (EMI) tests performed on the EUT. The EMI 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, and section 15.203, 15.205, 15.209, 15.35(c) and 15.231 rules.

Related Submittal(s)/Grant(s)

Submitted with the part of a system with FCC ID: 2AHCR-R15P-433

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 and Bay Area Compliance Laboratories Corp. (Dongguan).

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China

Test site at Bay Area Compliance Laboratories Corp. (Dongguan) has been fully described in reports submitted to the Federal Communications 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 February 06, 2015.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 273710. 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

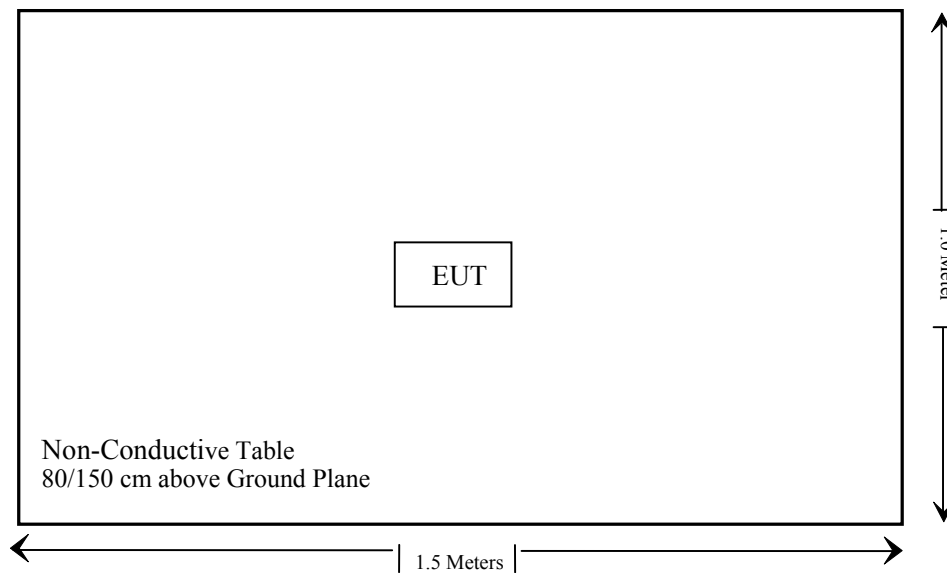
Justification

The system was configured in testing mode which was provided by manufacturer.

Equipment Modifications

No modifications were made to the unit tested.

Block Diagram of Test Setup



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 Bandwidth Testing	Compliance
§15.231 (a)	Deactivation Testing	Compliance

Not applicable: The EUT is battery operated equipment.

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.

Result: Compliant.

The EUT has one integral antenna arrangement, which was permanently attached and the antenna gain is 0 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

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

Applicable Standard

FCC §15.205, §15.209, §15.231 (b)

Measurement Uncertainty

Compliance or non-compliance with a disturbance limit shall be determined in the following manner:

If U_{lab} is less than or equal to U_{cisp} of Table 1, then:

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

If U_{lab} is greater than U_{cisp} of Table 1, then:

- compliance is deemed to occur if no measured disturbance level, increased by $(U_{lab} - U_{cisp})$, exceeds the disturbance limit;

- non-compliance is deemed to occur if any measured disturbance level, increased by $(U_{lab} - U_{cisp})$, exceeds the disturbance limit.

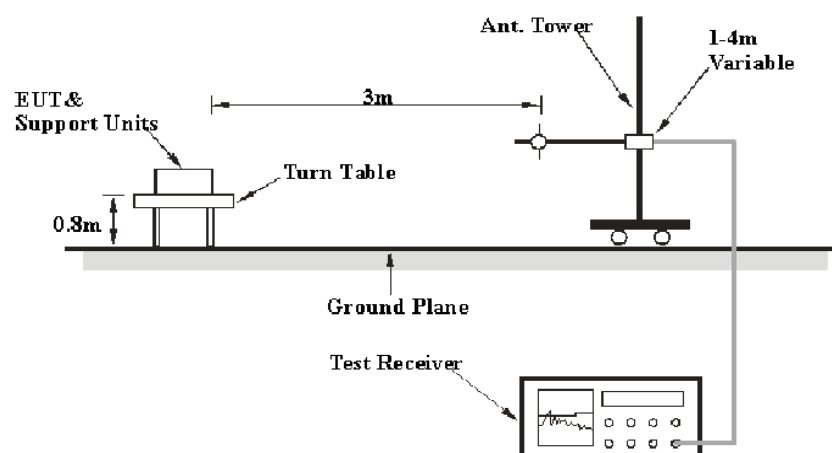
Based on CISPR 16-4-2: 2011, measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Dongguan) is: 30M~200MHz: 4.58 dB for Horizontal, 4.59 dB for Vertical; 200M~1GHz: 4.83 dB for Horizontal, 5.85 dB for Vertical; 1G~6GHz: 4.45 dB, 6G~18GHz: 5.23 dB.

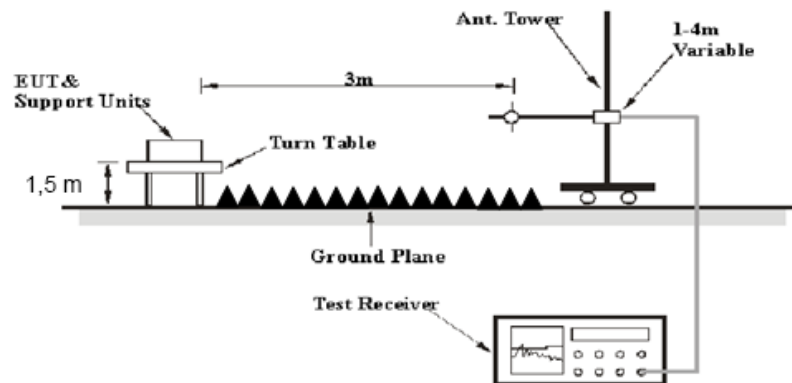
Table 1 – Values of U_{cisp}

Measurement	U_{cisp}
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

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
30 MHz – 1000 MHz	100 kHz	300 kHz	100 kHz	PK
1 GHz – 5 GHz	1 MHz	3 MHz	/	PK

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2015-09-01	2016-09-01
Sunol Sciences	Antenna	JB3	A060611-3	2014-11-06	2017-11-05
HP	Amplifier	8447E	2434A02181	2015-09-01	2016-09-01
Agilent	Spectrum Analyzer	E4440A	SG43360054	2015-11-23	2016-11-22
ETS-Lindgren	Horn Antenna	3115	9808-5557	2015-11-23	2016-11-22
Mini-Circuit	Amplifier	ZVA-213-S+	054201245	2015-09-06	2018-09-06
R&S	Spectrum Analyzer	FSP 38	100478	2016-02-19	2017-02-19
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-01 1304	2014-06-16	2017-06-15
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2015-09-06	2016-09-06
N/A	Coaxial Cable	14m	N/A	2016-05-06	2017-05-06
N/A	Coaxial Cable	8m	N/A	2016-05-06	2017-05-06

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

Test Procedure

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

According to §15.231, Intentional radiators operating under the provisions of this Section shall demonstrate compliance with the limits on the field strength of emissions, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector

Applicable Standard

According to §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.

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:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Loss} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Results Summary

According to the data in the following table, the EUT complied with the CFR47 §15.205, §15.209, §15.231 (b).

Test Data

Environmental Conditions

Temperature:	29.1 °C
Relative Humidity:	48 %
ATM Pressure:	99.7 kPa

The testing was performed by Dean Liu on 2016-08-31.

Test mode: Transmitting

Field Strength (Peak)

Frequency	Receiver	Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	15.231(b)	
(MHz)	Reading (dBµV)	Polar (H/V)	Factor (dB)				Limit (dBµV/m)	Margin (dB)
Operating Frequency:434 MHz								
434	45.88	H	16.85	2.49	0.00	65.22	100.83	35.61
434	58.9	V	16.85	2.49	0.00	78.24	100.83	22.59
868	20.83	H	22.51	3.59	0.00	46.93	80.83	33.90
868	20.86	V	22.51	3.59	0.00	46.96	80.83	33.87
1302	32.23	H	23.09	3.02	26.91	31.43	74.00	42.57
1302	32.5	V	23.09	3.02	26.91	31.70	74.00	42.30
1736	32.19	H	24.07	2.69	27.62	31.33	80.83	49.50
1736	32.98	V	24.07	2.69	27.62	32.12	80.83	48.71
2170	29.52	H	25.04	3.22	27.32	30.46	80.83	50.37
2170	29.76	V	25.04	3.22	27.32	30.70	80.83	50.13
2604	36.55	H	26.17	4.43	27.42	39.73	80.83	41.10
2604	37.39	V	26.17	4.43	27.42	40.57	80.83	40.26

Field Strength (Average)

Frequency (MHz)	Peak Measurement @ 3m (dBμV/m)	Polar (H/V)	Duty Cycle Correction Factor (dB)	Average Amp. (dBμV/m)	15.231(b)	
					Limit (dBμV/m)	Margin (dB)
Operating Frequency:434 MHz						
434	65.22	H	-8.68	56.54	80.83	24.29
434	78.24	V	-8.68	69.56	80.83	11.27
868	46.93	H	-8.68	38.25	60.83	22.58
868	46.96	V	-8.68	38.28	60.83	22.55
1302	31.43	H	-8.68	22.75	54.00	31.25
1302	31.70	V	-8.68	23.02	54.00	30.98
1736	31.33	H	-8.68	22.65	60.83	38.18
1736	32.12	V	-8.68	23.44	60.83	37.39
2170	30.46	H	-8.68	21.78	60.83	39.05
2170	30.70	V	-8.68	22.02	60.83	38.81
2604	39.73	H	-8.68	31.05	60.83	29.78
2604	40.57	V	-8.68	31.89	60.83	28.94

Duty Cycle:

Ton (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
100	36.8	-8.68

Note:

Calculate Average value based on duty cycle correction factor:

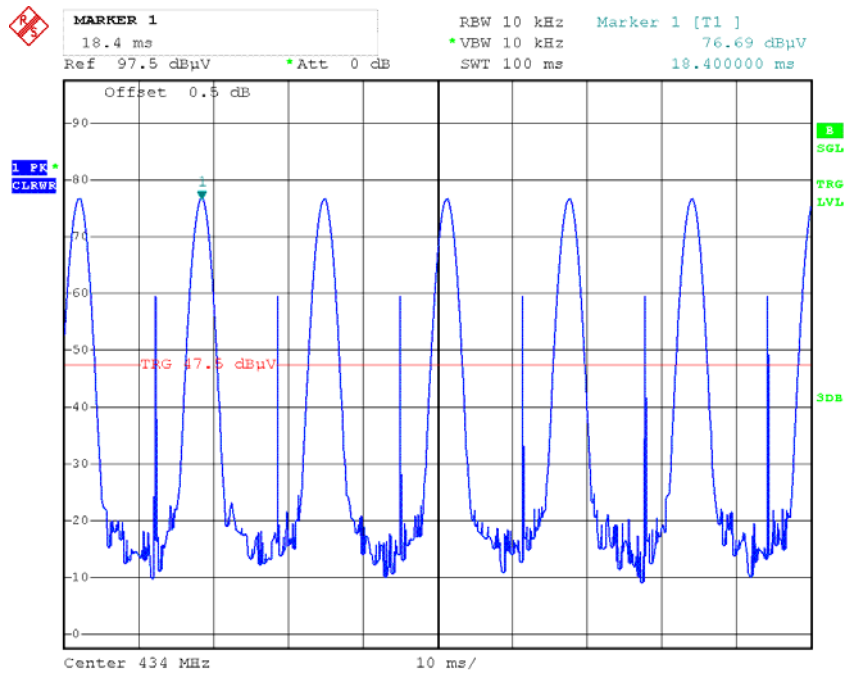
$$\begin{aligned}
 \text{Duty cycle} &= T_{\text{ON}}/100\text{ms} = (T_{\text{on}} * N)/100 \\
 &= (6.14 * 6) / 100 \\
 &= 36.8\%
 \end{aligned}$$

Duty cycle correction factor = $20 * \log(\text{duty cycle}) = -8.68 \text{ dB}$

Average = Peak + Duty cycle correction factor

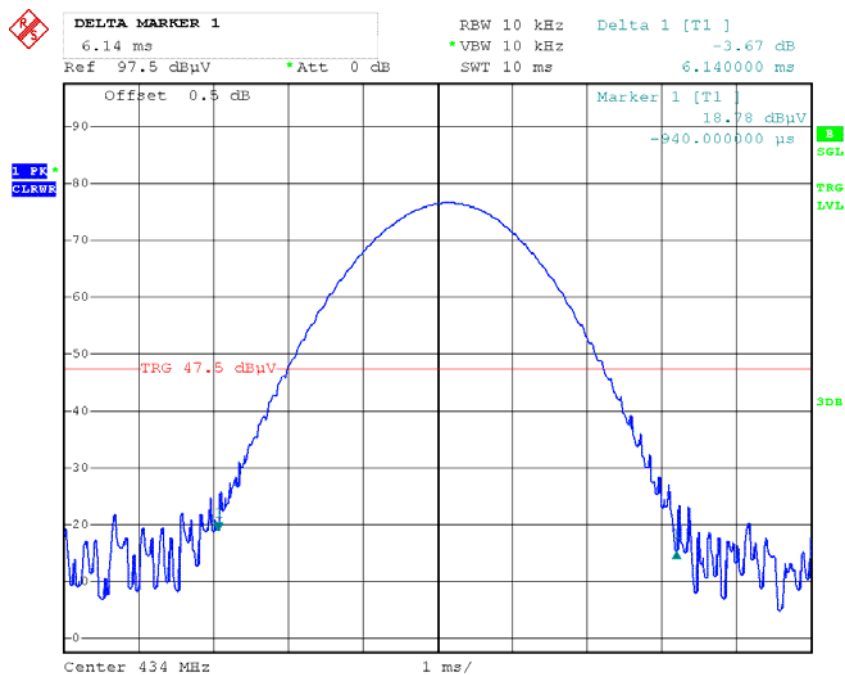
Please refer to following plot.

Duty Cycle



Date: 31.AUG.2016 16:39:25

Duty Cycle



Date: 31.AUG.2016 16:41:51

FCC §15.231(c) – 20 dB BANDWIDTH TESTING

Requirement

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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2015-11-23	2016-11-22
N/A	Coaxial Cable	0.1m	N/A	2016-05-06	2017-05-06
NARDA	Attenuator	769-6	2754	2016-05-06	2017-05-06
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2016-05-06	2017-05-06

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

Test Procedure

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

Test Data

Environmental Conditions

Temperature:	28.3 °C
Relative Humidity:	64 %
ATM Pressure:	100.3 kPa

The testing was performed by Dean Liu on 2016-06-01.

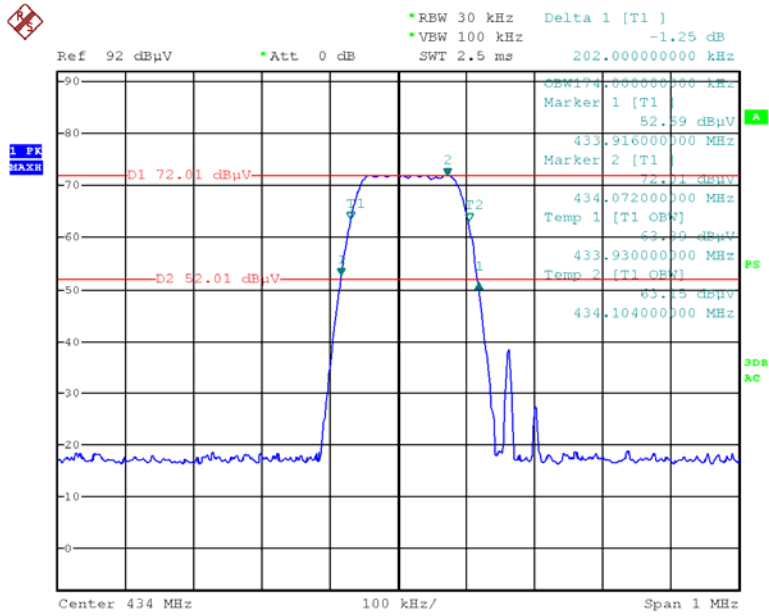
Test Mode: Transmitting

Please refer to following table and plot.

Channel Frequency (MHz)	20 dB Bandwidth (kHz)	Limit (kHz)	Result
434	202	1085	Pass

Note: Limit = 0.25% * Center Frequency = 0.25%*434 MHz = 1085 kHz

20 dB Bandwidth



Date: 1.JUN.2016 21:15:22

FCC §15.231(a) - DEACTIVATION TESTING**Applicable Standard**

Per 15.231(a)(1), A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2015-08-03	2016-08-02

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

Test Data**Environmental Conditions**

Temperature:	28.9°C
Relative Humidity:	56 %
ATM Pressure:	100.5 kPa

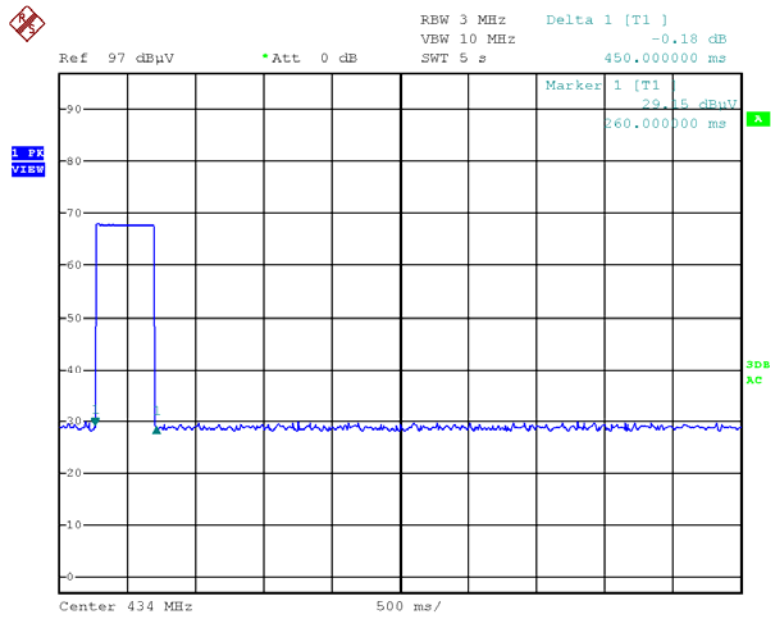
The testing was performed by Dean Liu on 2016-07-25.

Test Mode: Transmitting

Test Result: Compliance. Please refer to following plot.

Fc (MHz)	deactivation time (S)	Limit (S)	Result
434	0.45	<5.0	Pass

Deactivation Time



Date: 25.JUL.2016 20:52:20

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