



## MEASUREMENT REPORT

### FCC PART 15.231(e) & RSS 210

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**FCC ID:** TTETSB38

**IC:** 6707A-TSB38

**APPLICANT:** Suzhou Sate Auto Electronic Co., Ltd.

**Application Type:** Certification

**Product:** Tire Pressure Monitoring System Sensor

**Model No.:** TSB38

**Brand Name:** SATE

**FCC Classification:** FCC Part 15 Security/Remote Control Transmitter (DSC)

**FCC Rule Part(s):** Part 15.231(e)

**IC Rule(s):** RSS-210 Issue 9 – Annex A

**Test Procedure(s):** ANSI C63.10-2013

**Test Date:** December 01, 2016 ~ April 27, 2017

Reviewed By : Robin Wu  
( Robin Wu )

Approved By : Marlin Chen  
( Marlin Chen )



The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. Test results reported herein relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

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### Revision History

Report No.	Version	Description	Issue Date	Note
1703RSU01501	Rev. 01	Initial report	05-11-2017	Valid

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## §2.1033 General Information

<b>Applicant:</b>	Suzhou Sate Auto Electronic Co., Ltd.
<b>Applicant Address:</b>	No.36 Building, Yangtai Road, Suzou Industrial Park, Suzhou, Jiangsu, P.R.China
<b>Manufacturer:</b>	Suzhou Sate Auto Electronic Co., Ltd.
<b>Manufacturer Address:</b>	No.36 Building, Yangtai Road, Suzou Industrial Park, Suzhou, Jiangsu, P.R.China
<b>Test Site:</b>	MRT Technology (Suzhou) Co., Ltd
<b>Test Site Address:</b>	D8 Building, Youxin Industrial Park, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China
<b>MRT Registration No.:</b>	809388
<b>FCC Rule Part(s):</b>	Part 15.231(e)
<b>IC Rule(s):</b>	RSS-210 Issue 9 – Annex A
<b>Model No.</b>	TSB38
<b>FCC ID:</b>	TTETSB38
<b>IC</b>	6707A-TSB38
<b>Test Device Serial No.:</b>	N/A <input type="checkbox"/> Production <input checked="" type="checkbox"/> Pre-Production <input type="checkbox"/> Engineering
<b>FCC Classification:</b>	FCC Part 15 Security/Remote Control Transmitter(DSC)

### Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Tian'edang Rd., Suzhou, China.

- MRT facility is a FCC registered (MRT Reg. No. 809388) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules.
- MRT facility is an IC registered (MRT Reg. No. 11384A-1) test laboratory with the site description on file at Industry Canada.
- MRT facility is a VCCI registered (R-4179, G-814, C-4664, T-2206) test laboratory with the site description on file at VCCI Council.
- MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (A2LA) under the American Association for Laboratory Accreditation Program (A2LACert. No.3628.01) in EMC, Telecommunications and Radio testingfor FCC, Industry Canada, EU and TELEC Rules.



## 1. INTRODUCTION

### 1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

### 1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taihu Lake. These measurement tests were conducted at the MRT Technology (Suzhou) Co., Ltd. Facility located at D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2009 on September 30, 2013.



## 2. PRODUCT INFORMATION

### 2.1. Equipment Description

Product Name	Tire Pressure Monitoring System Sensor
Model No.	TSB38
Frequency Range	433.92 MHz
Type of modulation	ASK, FSK
Antenna Type	Integral Antenna
Device Category	Fixed Device

### 2.2. Test Standards

The following report is prepared on behalf of the **Suzhou Sate Auto Electronic Co., Ltd** in accordance with FCC Part 15, Subpart C, and section 15.231, 15.203, 15.205 and 15.209 of the Federal Communication Commission rules, and RSS-210 Issue 9 & RSS-Gen Issue 4 rules of IC rules.

The objective is to determine compliance with FCC Part 15, Subpart C, and section 15.231, 15.203, 15.205 and 15.209 of the Federal Communication Commission rules, and RSS-210 Issue 9 & RSS-Gen Issue 4 rules of IC rules.

**Maintenance of compliance** is the responsibility of the manufacturer. Any modification of the product, which results in lowering the emission/immunity, should be checked to ensure compliance has been maintained.

### 2.3. Test Methodology

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2013).

**Deviation from measurement procedure.....None**

## 2.4. EUT Setup and Test Mode

The EUT was operated at continuous transmitting mode that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
Mode 1	Transmitting	With ASK Modulation
Mode 2	Transmitting	With FSK Modulation



### 3. ANTENNA REQUIREMENTS

**Excerpt from §15.203 of the FCC Rules/Regulations:**

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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.”

- The antenna of the **Tire Pressure Monitoring System Sensor** is permanently attached.
- There are no provisions for connection to an external antenna.

**Conclusion:**

The Tire Pressure Monitoring System Sensor **FCC ID: TTETSB38** unit complies with the requirement of §15.203.

## 4. TEST EQUIPMENT CALIBRATION DATA

### Radiated Emissions – AC2

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9020A	MY52090106	1 year	2018/05/08
EMI Test Receiver	R&S	ESR 3.6	102030	1 year	2018/05/08
Preamplifier	Schwarzbeck	BBV 9718	302	1 year	2018/04/16
Preamplifier	Schwarzbeck	BBV9721	9721-008	1 year	2018/04/16
Loop Antenna	Schwarzbeck	FMZB1519	1519-041	1 year	2017/11/21
Bilog Period Antenna	Schwarzbeck	VULB 9168	662	1 year	2017/11/18
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	1457	1 year	2017/11/18
Broadband Horn Antenna	Schwarzbeck	BBHA9170	BBHA9170549	1 year	2018/01/03
Temperature/Humidity Meter	Yuhuaze	ETH529	N/A	1 year	2017/12/24
Anechoic Chamber	RIKEN	Chamber-AC2	N/A	1 year	2018/05/10

### 20dB Bandwidth

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cal. Due. Date
Spectrum Analyzer	Agilent	N9020A	MY52090106	1 year	2018/05/08
Bilog Period Antenna	Schwarzbeck	VULB 9168	662	1 year	2017/11/18
Temperature/Humidity Meter	Yuhuaze	ETH529	N/A	1 year	2017/12/24

### Transmission Time – AC2

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cal. Due. Date
Spectrum Analyzer	Agilent	N9020A	MY52090106	1 year	2018/05/08
Bilog Period Antenna	Schwarzbeck	VULB 9168	662	1 year	2017/11/18
Temperature/Humidity Meter	Yuhuaze	ETH529	N/A	1 year	2017/12/24

### Duty Cycle – AC2

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cal. Due. Date
Spectrum Analyzer	Agilent	N9020A	MY52090106	1 year	2017/05/08
Bilog Period Antenna	Schwarzbeck	VULB 9168	662	1 year	2017/11/18
Temperature/Humidity Meter	Yuhuaze	ETH529	N/A	1 year	2017/12/24

Software	Version	Function
e3	V8.3.5	EMI Test Software

## 5. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k = 2$ .

Radiated Emission Measurement – AC2
Measuring Uncertainty for a Level of Confidence of 95% ( $U=2U_c(y)$ ): 9kHz ~ 1GHz: 3.86dB 1GHz ~ 18GHz: 4.33dB

## 6. TEST RESULT

### 6.1. Summary

Company Name: Suzhou Sate Auto Electronic Co., Ltd.

FCC ID: TTETSB38

IC: 6707A-TSB38

FCC Part Section(s)	IC Section(s)	Test Description	Test Condition	Test Result
15.205 15.231(e)	RSS-210, A1.4	Radiated Spurious Emissions	Radiated	Pass
15.231(c)	RSS-210, A1.3	20dB Bandwidth / 99% Bandwidth		Pass
15.231(e)	RSS-210, A1.4	Transmission Time		Pass
15.231(e)	RSS-Gen, 6.10	Duty Cycle		Pass

#### Notes:

- 1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
- 3) The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

## 6.2. Radiated Emissions

### 6.2.1. Standard Applicable

According to §15.231(e), 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 emission (microvolts/meter)
40.66-40.70	1,000	100
70-130	500	50
130-174	500 to 1,500 <sup>1</sup>	50 to 150 <sup>1</sup>
174-260	1,500	150
260-470	1,500 to 5,000 <sup>1</sup>	150 to 500 <sup>1</sup>
Above 470	5,000	500

The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in §15.209, whichever limit permits a higher field strength.

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements start below or at the lowest crystal frequency.

Compliance with the provisions of §15.205 shall be demonstrated using the measurement instrumentation specified in that section.

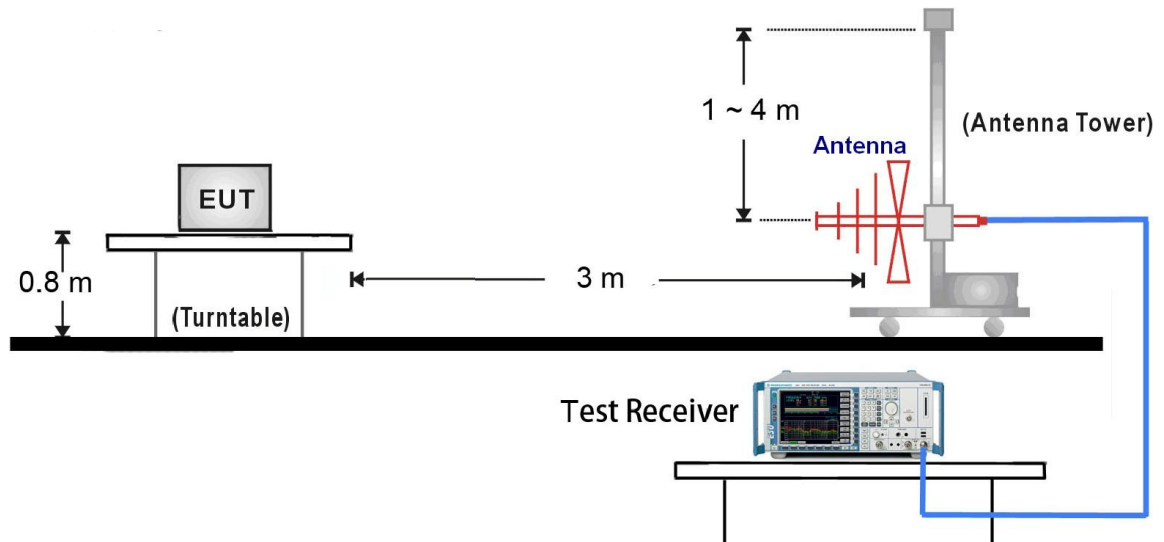
### 6.2.2. Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.231(e) and FCC Part 15.209 Limit.

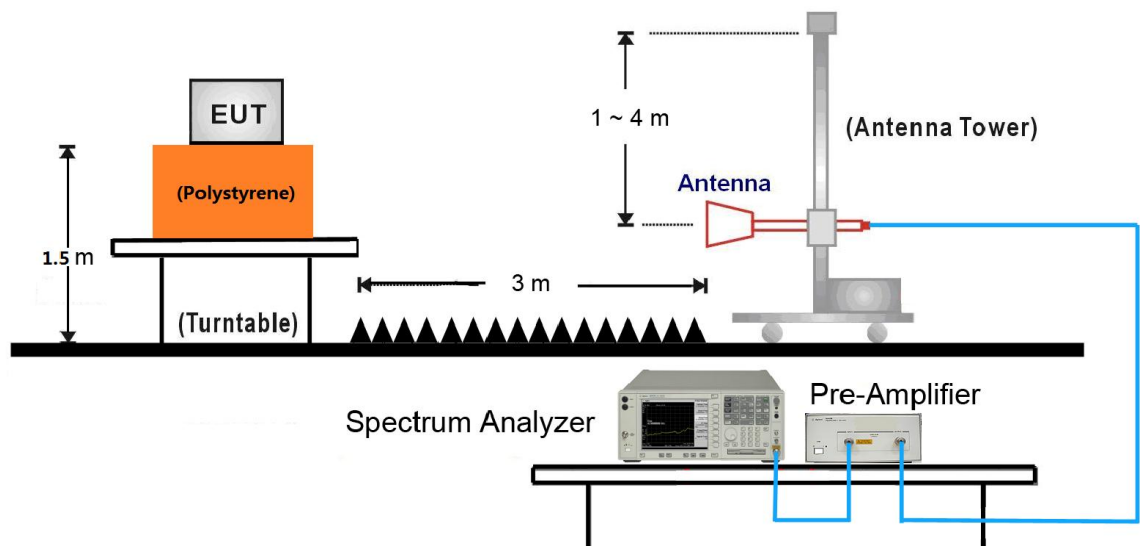
### 6.2.3. Test Setup

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.231(e) and FCC Part 15.209 Limit.

#### 30MHz ~ 1GHz Test Setup:

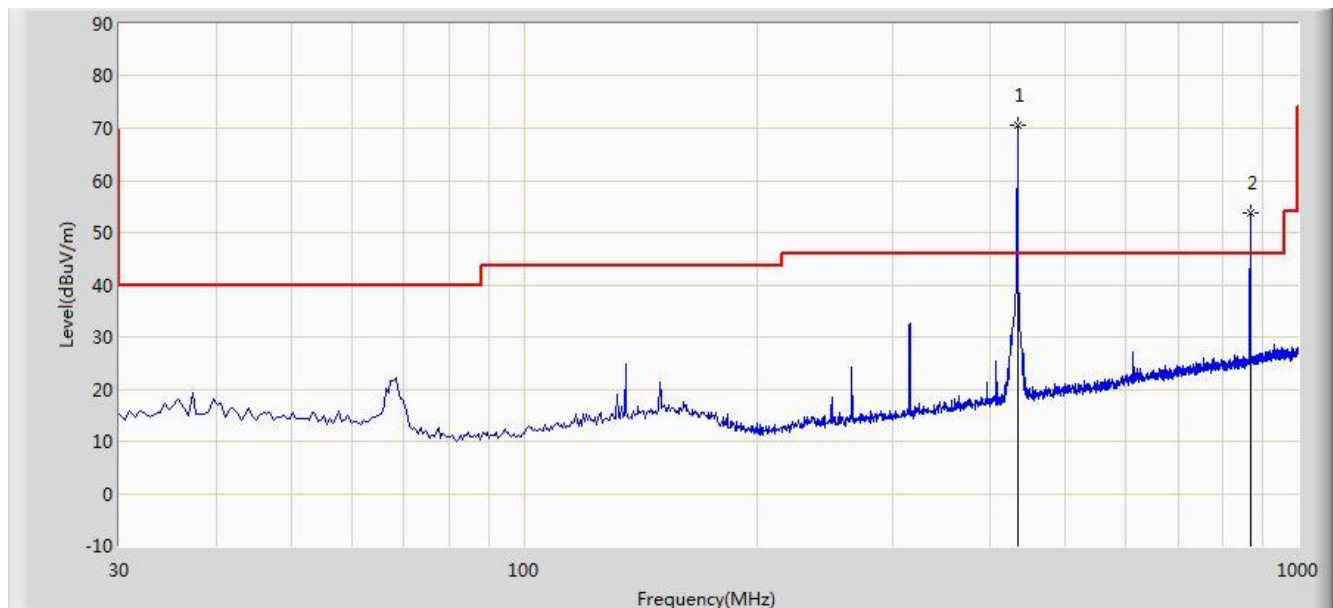


#### 1GHz ~ 25GHz Test Setup:



## 6.2.4. Test Results

Site: AC2	Time: 2017/03/17 - 02:08
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: VULB 9168 _20-2000MHz	Polarity: Horizontal
EUT: TSB38	Power: By Battery
Note: Transmit with ASK Mode	



No	Frequency (MHz)	Reading Level (dBuV)	Factor (dB)	Dutycycle Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Type
1	434.005	53.048	17.427	N/A	70.475	92.866	-22.391	PK
	434.005	53.048	17.427	21.070	49.405	72.866	-23.461	AV
2	867.595	29.919	23.882	N/A	53.801	72.866	-19.065	PK
	867.595	29.919	23.882	21.070	32.731	52.866	-20.135	AV

Note 1: Testing is carried out with frequency rang 9 kHz to the tenth harmonics. There is the ambient noise within frequency range 9 kHz ~ 30 MHz, the permissible value is not show in the report.

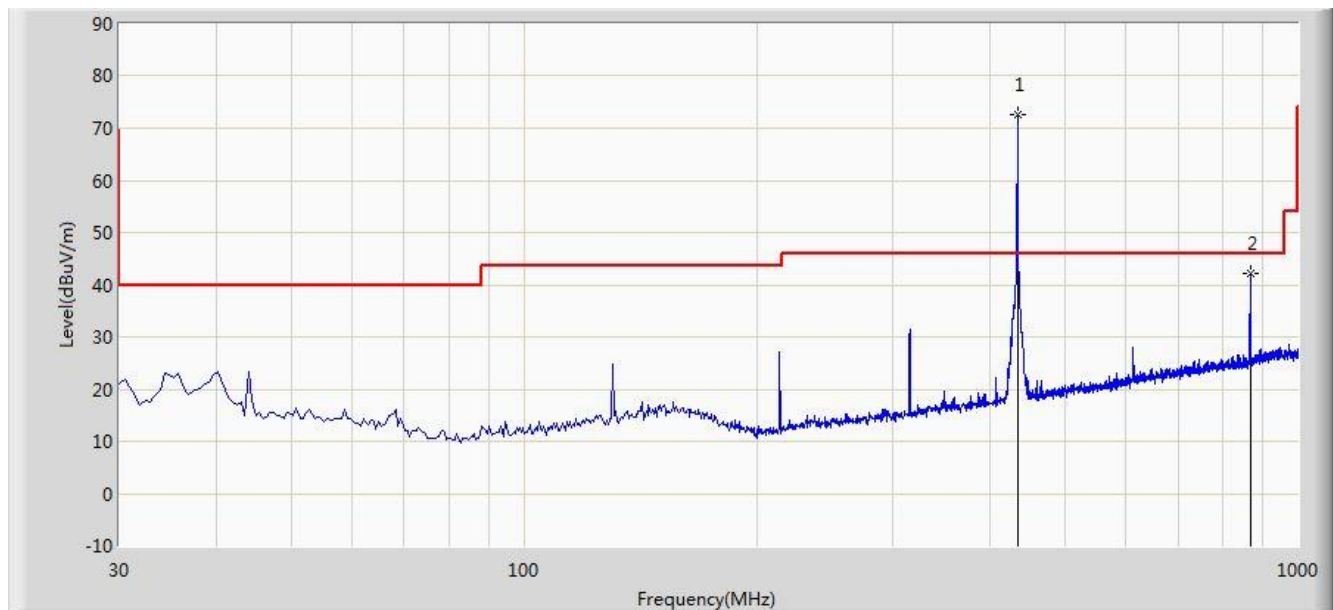
Note 2: The fundamental frequency is 433.92MHz, so the fundamental and spurious emissions radiated limit base on the operating frequency 433.92MHz.

Note 3: Peak Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB).

AV Measure Level = Peak Measure Level – Duty Cycle Factor.

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: AC2	Time: 2017/03/17 - 02:21
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: VULB 9168 _20-2000MHz	Polarity: Vertical
EUT: TSB38	Power: By Battery
Note: Transmit with ASK Mode	



No	Frequency (MHz)	Reading Level (dBuV)	Factor (dB)	Dutycycle Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Type
1	434.005	55.239	17.427	N/A	72.666	92.866	-20.200	PK
	434.005	55.239	17.427	21.070	51.596	72.866	-21.270	AV
2	867.595	18.180	23.882	N/A	42.062	72.866	-30.804	PK
	867.595	18.180	23.882	21.070	20.992	52.866	-31.874	AV

Note 1: Testing is carried out with frequency rang 9 kHz to the tenth harmonics. There is the ambient noise within frequency range 9 kHz ~ 30 MHz, the permissible value is not show in the report.

Note 2: The fundamental frequency is 433.92MHz, so the fundamental and spurious emissions radiated limit base on the operating frequency 433.92MHz.

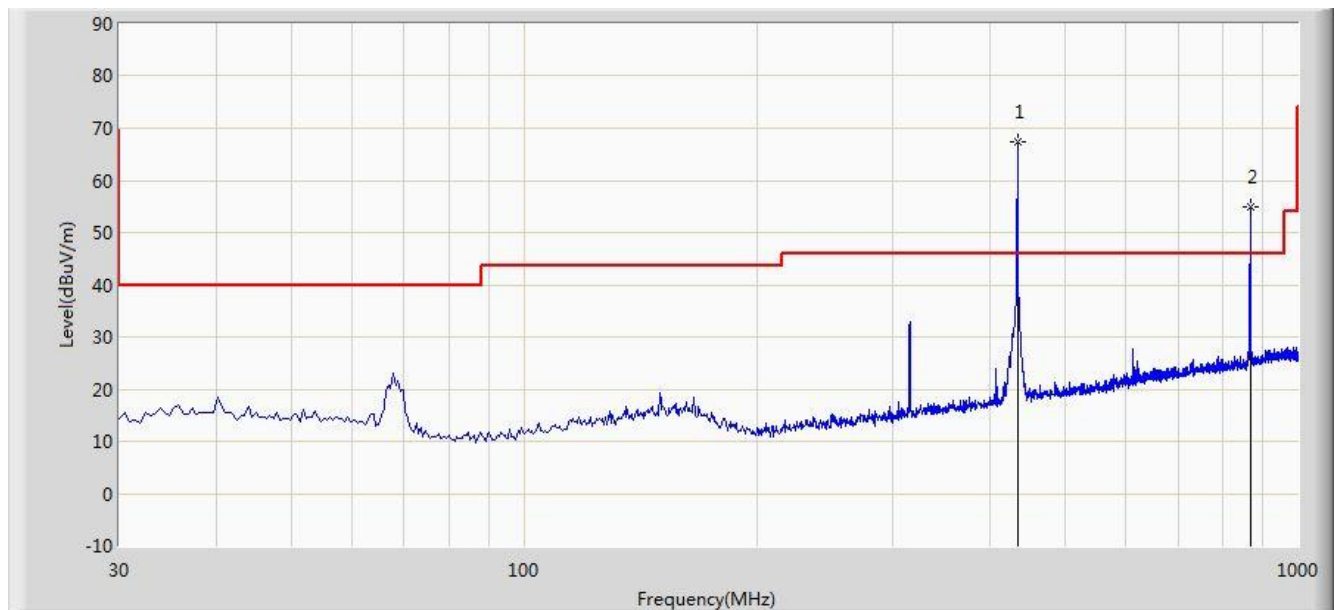
Note 3: Peak Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB).

AV Measure Level = Peak Measure Level – Duty Cycle Factor.

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).



Site: AC2	Time: 2017/03/17 - 02:22
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: VULB 9168 _20-2000MHz	Polarity: Horizontal
EUT: TSB38	Power: By Battery
Note: Transmit with FSK Mode	



No	Frequency (MHz)	Reading Level (dBuV)	Factor (dB)	Dutycycle Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Type
1	434.005	49.876	17.427	N/A	67.303	92.866	-25.563	PK
	434.005	49.876	17.427	15.330	51.973	72.866	-20.893	AV
2	867.595	31.088	23.882	N/A	54.970	72.866	-17.896	PK
	867.595	31.088	23.882	15.330	39.640	52.866	-13.226	AV

Note 1: Testing is carried out with frequency rang 9 kHz to the tenth harmonics. There is the ambient noise within frequency range 9 kHz ~ 30 MHz, the permissible value is not show in the report.

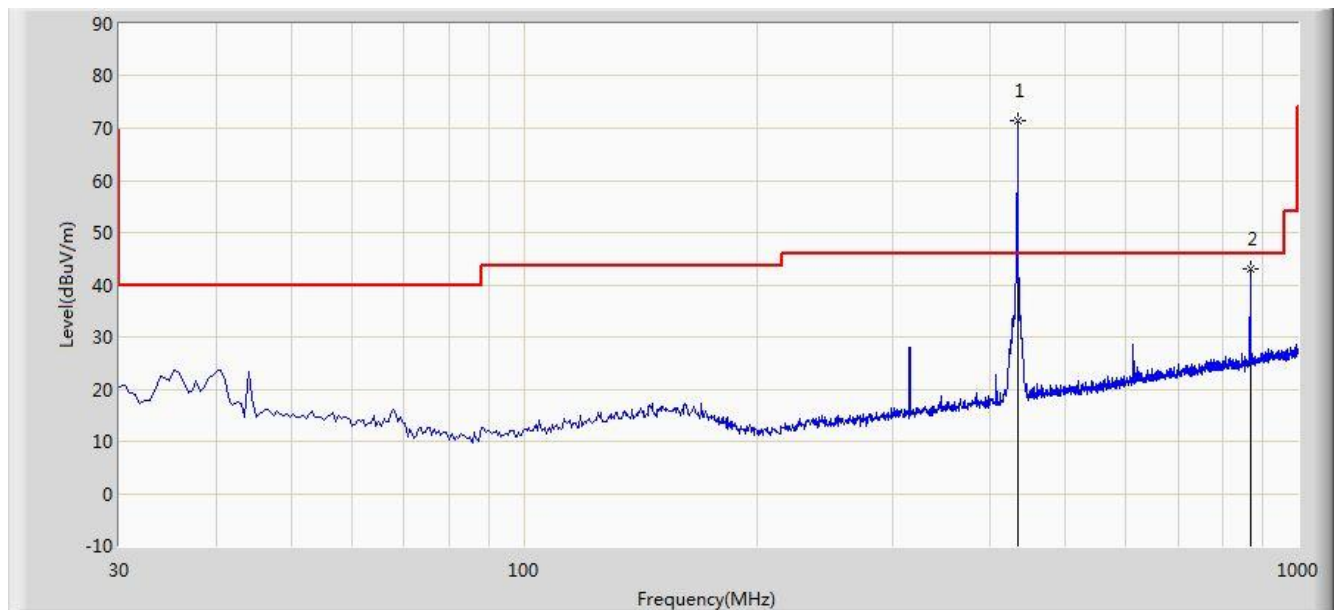
Note 2: The fundamental frequency is 433.92MHz, so the fundamental and spurious emissions radiated limit base on the operating frequency 433.92MHz.

Note 3: Peak Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB).

AV Measure Level = Peak Measure Level – Duty Cycle Factor.

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: AC2	Time: 2017/03/17 - 02:24
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: VULB 9168 _20-2000MHz	Polarity: Vertical
EUT: TSB38	Power: By Battery
Note: Transmit with FSK Mode	



No	Frequency (MHz)	Reading Level (dBuV)	Factor (dB)	Dutycycle Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Type
1	434.005	53.975	17.427	N/A	71.402	92.866	-21.464	PK
	434.005	53.975	17.427	15.330	56.072	72.866	-16.794	AV
2	868.080	19.227	23.890	N/A	43.117	72.866	-29.749	PK
	868.080	19.227	23.890	15.330	27.787	52.866	-25.079	AV

Note 1: Testing is carried out with frequency rang 9 kHz to the tenth harmonics. There is the ambient noise within frequency range 9 kHz ~ 30 MHz, the permissible value is not show in the report.

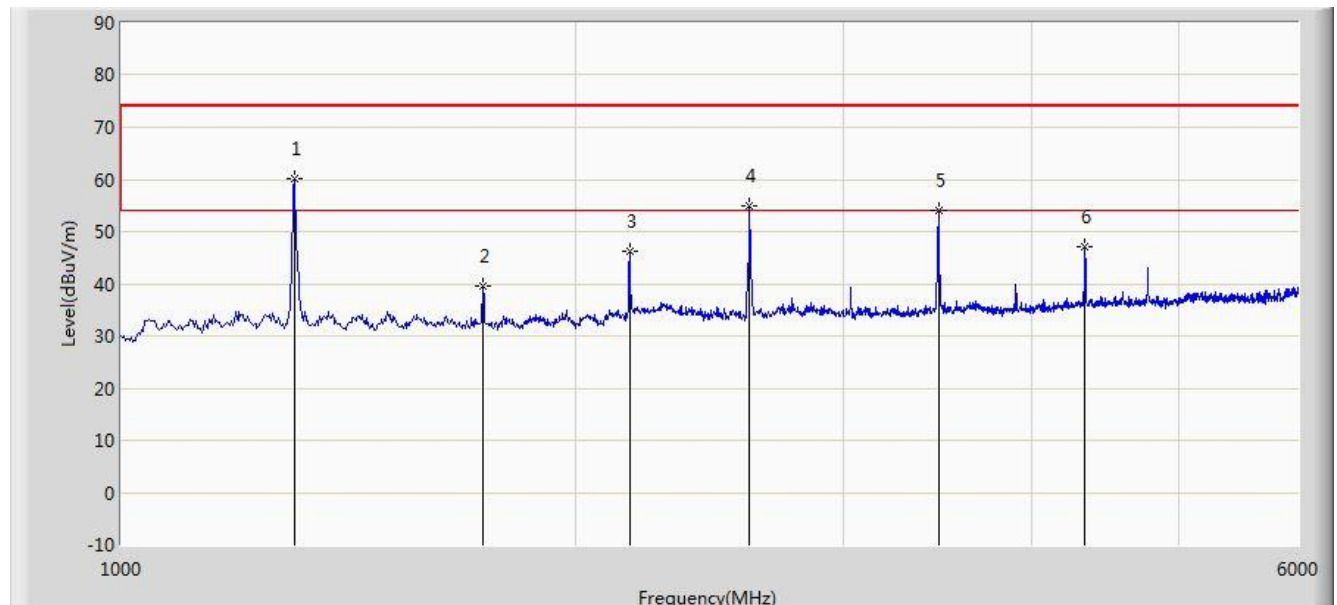
Note 2: The fundamental frequency is 433.92MHz, so the fundamental and spurious emissions radiated limit base on the operating frequency 433.92MHz.

Note 3: Peak Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB).

AV Measure Level = Peak Measure Level – Duty Cycle Factor.

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: AC2	Time: 2017/03/16 - 23:29
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: TSB38	Power: By Battery
Note: Transmit with ASK Mode	



No	Frequency (MHz)	Reading Level (dBuV)	Factor (dB)	Dutycycle Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Type
1	1302.500	68.389	-8.229	N/A	60.161	72.866	-12.705	PK
	1302.500	68.389	-8.229	21.070	41.787	52.866	-11.079	AV
2	1735.000	46.762	-7.319	N/A	39.444	72.866	-33.422	PK
	1735.000	46.762	-7.319	21.070	18.374	52.866	-34.492	AV
3	2170.000	50.123	-3.940	N/A	46.183	72.866	-26.683	PK
	2170.000	50.123	-3.940	21.070	25.113	52.866	-27.753	AV
4	2605.000	58.184	-3.277	N/A	54.906	72.866	-17.960	PK
	2605.000	58.184	-3.277	21.070	33.836	52.866	-19.030	AV
5	3472.500	55.321	-1.284	N/A	54.037	72.866	-18.829	PK
	3472.500	55.321	-1.284	21.070	32.967	52.866	-19.899	AV
6	4340.000	45.774	1.286	N/A	47.060	72.866	-25.806	PK
	4340.000	45.774	1.286	21.070	25.990	52.866	-26.876	AV

Note 1: Testing is carried out with frequency rang 9 kHz to the tenth harmonics. There is the ambient noise within frequency range 9 kHz ~ 30 MHz, the permissible value is not show in the report.

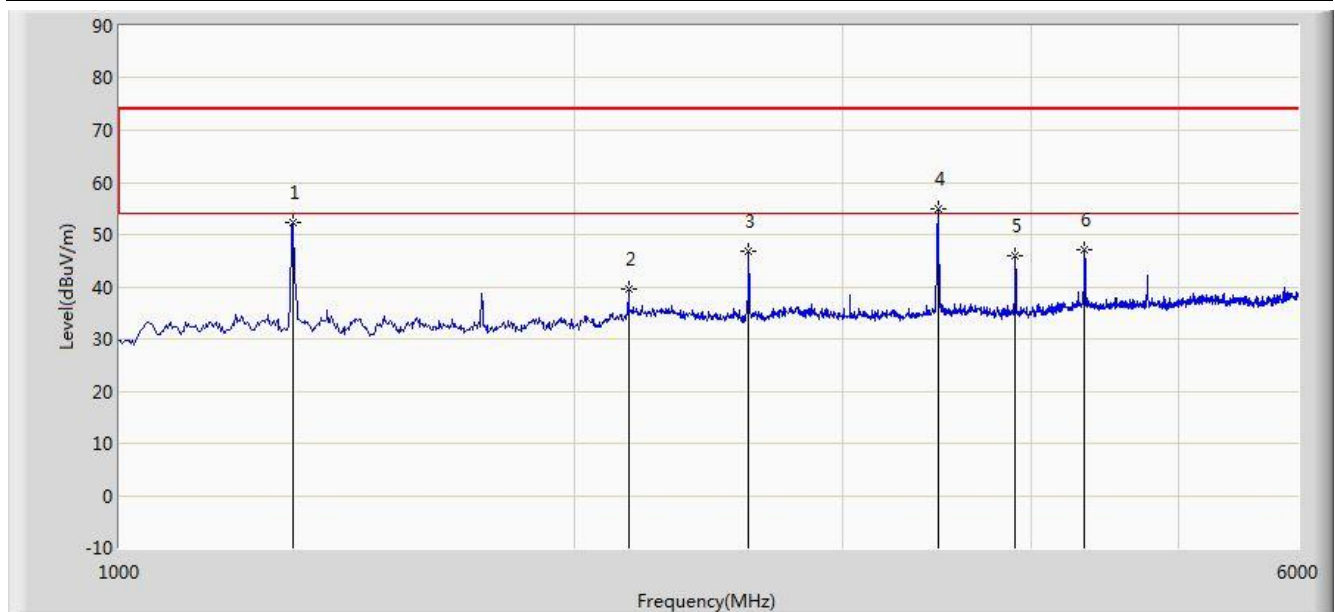
Note 2: The fundamental frequency is 433.92MHz, so the fundamental and spurious emissions radiated limit base on the operating frequency 433.92MHz.

Note 3: Peak Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB).

AV Measure Level = Peak Measure Level – Duty Cycle Factor.

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) – Pre\_Amplifier Gain (dB).

Site: AC2	Time: 2017/03/16 - 23:33
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: TSB38	Power: By Battery
Note: Transmit with ASK Mode	



No	Frequency (MHz)	Reading Level (dBuV)	Factor (dB)	Dutycycle Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Type
1	1302.500	60.518	-8.229	N/A	52.290	72.866	-20.576	PK
	1302.500	60.518	-8.229	21.070	31.220	52.866	-21.646	AV
2	2170.000	43.581	-3.940	N/A	39.641	72.866	-33.225	PK
	2170.000	43.581	-3.940	21.070	18.571	52.866	-34.295	AV
3	2605.000	50.013	-3.277	N/A	46.735	72.866	-26.131	PK
	2605.000	50.013	-3.277	21.070	25.665	52.866	-27.201	AV
4	3470.000	56.090	-1.300	N/A	54.790	72.866	-18.076	PK
	3470.000	56.090	-1.300	21.070	33.720	52.866	-19.146	AV
5	3905.000	45.872	0.208	N/A	46.079	72.866	-26.787	PK
	3905.000	45.872	0.208	21.070	25.009	52.866	-27.857	AV
6	4337.500	45.785	1.281	N/A	47.067	72.866	-25.799	PK
	4337.500	45.785	1.281	21.070	25.997	52.866	-26.869	AV

Note 1: Testing is carried out with frequency rang 9 kHz to the tenth harmonics. There is the ambient noise within frequency range 9 kHz ~ 30 MHz, the permissible value is not show in the report.

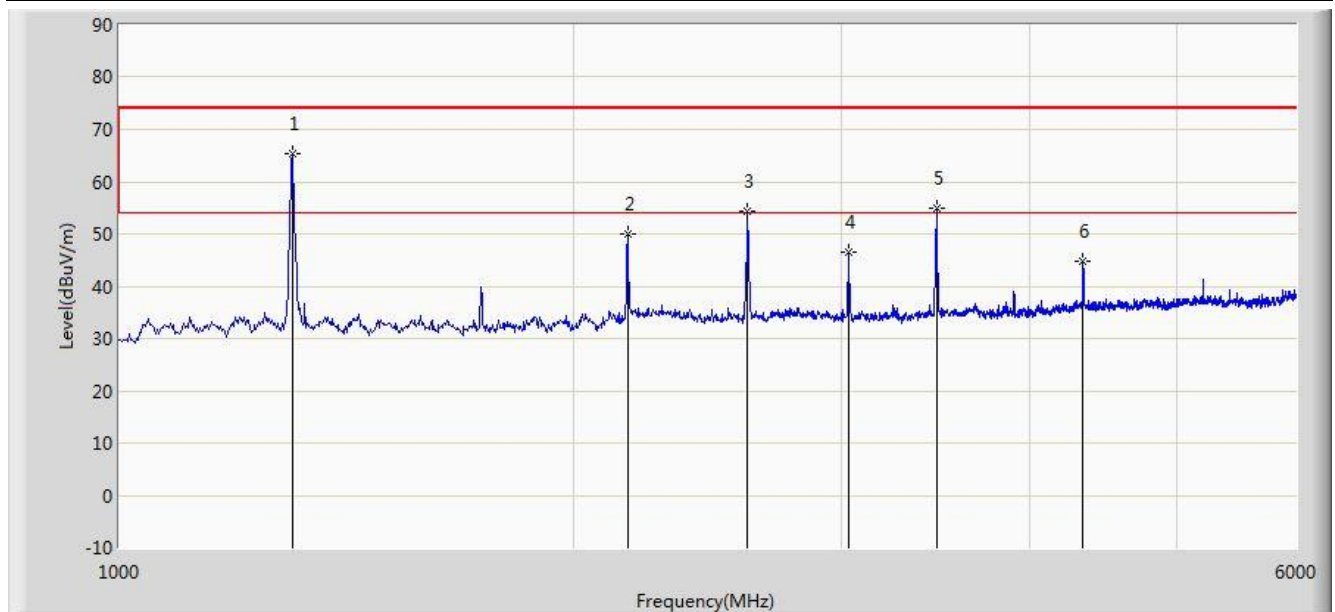
Note 2: The fundamental frequency is 433.92MHz, so the fundamental and spurious emissions radiated limit base on the operating frequency 433.92MHz.

Note 3: Peak Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB).

AV Measure Level = Peak Measure Level – Duty Cycle Factor.

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) – Pre\_Amplifier Gain (dB).

Site: AC2	Time: 2017/03/16 - 23:34
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: TSB38	Power: By Battery
Note: Transmit with FSK Mode	



No	Frequency (MHz)	Reading Level (dBuV)	Factor (dB)	Dutycycle Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Type
1	1302.500	73.604	-8.229	N/A	65.376	72.866	-7.490	PK
	1302.500	73.604	-8.229	15.330	50.046	52.866	-2.820	AV
2	2170.000	54.048	-3.940	N/A	50.108	72.866	-22.758	PK
	2170.000	54.048	-3.940	15.330	34.778	52.866	-18.088	AV
3	2602.500	57.739	-3.288	N/A	54.451	72.866	-18.415	PK
	2602.500	57.739	-3.288	15.330	39.121	52.866	-13.745	AV
4	3037.500	48.649	-2.042	N/A	46.607	72.866	-26.259	PK
	3037.500	48.649	-2.042	15.330	31.277	52.866	-21.589	AV
5	3472.500	56.301	-1.284	N/A	55.017	72.866	-17.849	PK
	3472.500	56.301	-1.284	15.330	39.687	52.866	-13.179	AV
6	4340.000	43.503	1.286	N/A	44.789	72.866	-28.077	PK
	4340.000	43.503	1.286	15.330	29.459	52.866	-23.407	AV

Note 1: Testing is carried out with frequency rang 9 kHz to the tenth harmonics. There is the ambient noise within frequency range 9 kHz ~ 30 MHz, the permissible value is not show in the report.

Note 2: The fundamental frequency is 433.92MHz, so the fundamental and spurious emissions radiated limit base on the operating frequency 433.92MHz.

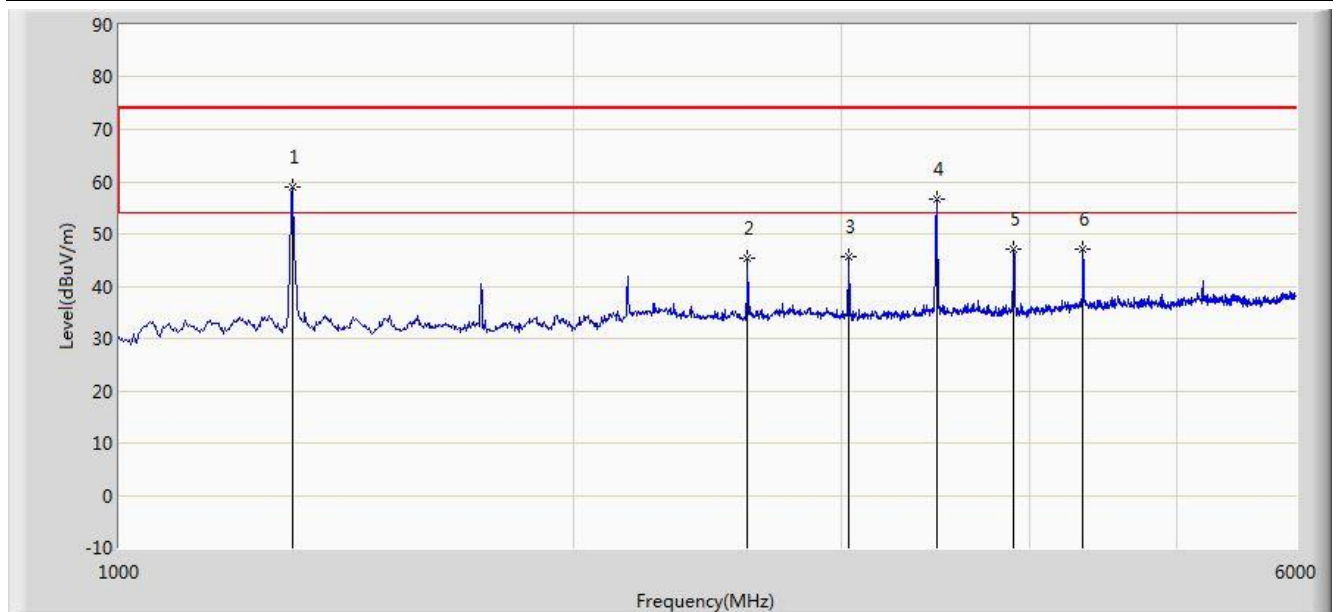
Note 3: Peak Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB).

AV Measure Level = Peak Measure Level – Duty Cycle Factor.

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) – Pre\_Amplifier Gain (dB).



Site: AC2	Time: 2017/03/16 - 23:40
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: TSB38	Power: By Battery
Note: Transmit with FSK Mode	



No	Frequency (MHz)	Reading Level (dBuV)	Factor (dB)	Dutycycle Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Type
1	1302.500	67.330	-8.229	N/A	59.102	72.866	-13.764	PK
	1302.500	67.330	-8.229	15.330	43.772	52.866	-9.094	AV
2	2602.500	48.565	-3.288	N/A	45.277	72.866	-27.589	PK
	2602.500	48.565	-3.288	15.330	29.947	52.866	-22.919	AV
3	3037.500	47.654	-2.042	N/A	45.612	72.866	-27.254	PK
	3037.500	47.654	-2.042	15.330	30.282	52.866	-22.584	AV
4	3470.000	58.050	-1.300	N/A	56.750	72.866	-16.116	PK
	3470.000	58.050	-1.300	15.330	41.420	52.866	-11.446	AV
5	3905.000	46.982	0.208	N/A	47.189	72.866	-25.677	PK
	3905.000	46.982	0.208	15.330	31.859	52.866	-21.007	AV
6	4340.000	45.835	1.286	N/A	47.121	72.866	-25.745	PK
	4340.000	45.835	1.286	15.330	31.791	52.866	-21.075	AV

Note 1: Testing is carried out with frequency rang 9 kHz to the tenth harmonics. There is the ambient noise within frequency range 9 kHz ~ 30 MHz, the permissible value is not show in the report.

Note 2: The fundamental frequency is 433.92MHz, so the fundamental and spurious emissions radiated limit base on the operating frequency 433.92MHz.

Note 3: Peak Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB).

AV Measure Level = Peak Measure Level – Duty Cycle Factor.

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) – Pre\_Amplifier Gain (dB).

### 6.3. 20dB Bandwidth / 99% Bandwidth

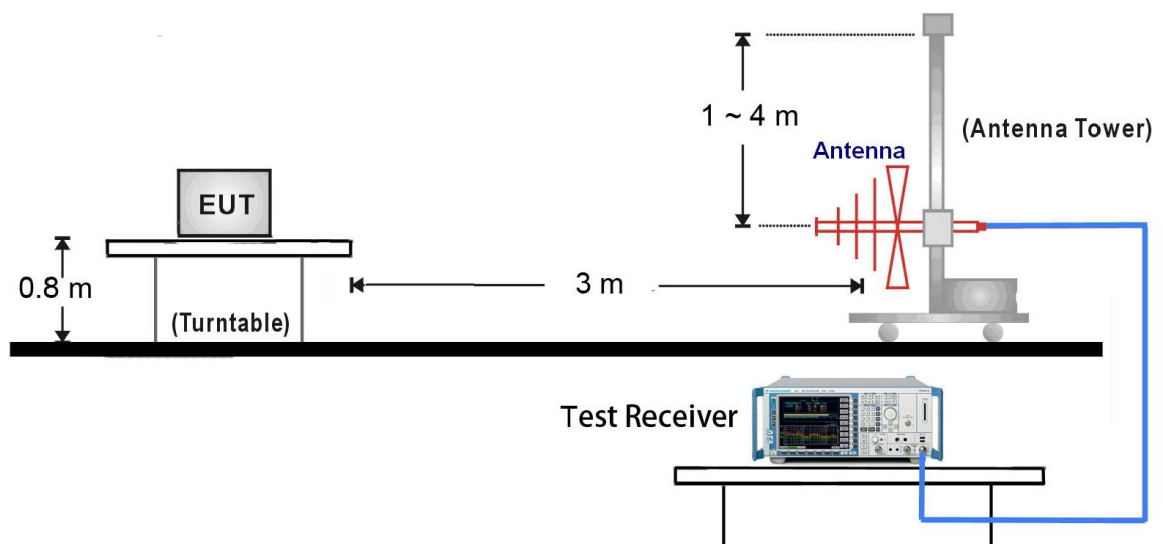
#### 6.3.1. Standard Applicable

According to FCC Part 15.231(c), the bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

#### 6.3.2. Test Procedure

With the EUT's antenna attached, the EUT's 20dB Bandwidth power was received by the test antenna, which was connected to the spectrum analyzer with the START, and STOP frequencies set to the EUT's operation band.

#### 6.3.3. Test Setup

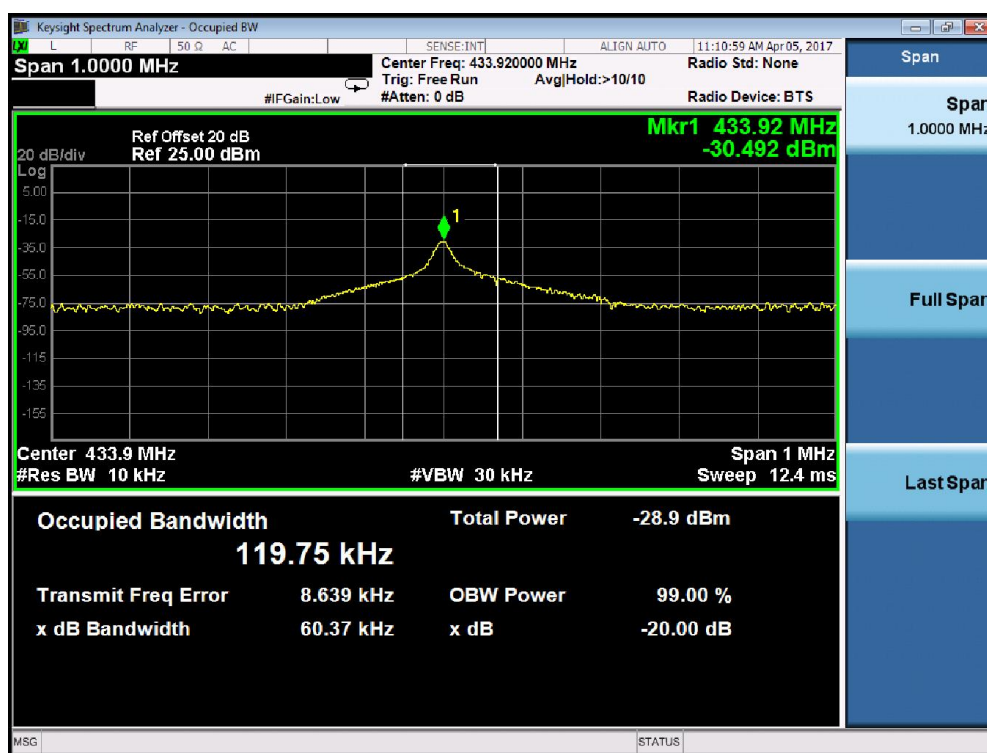


### 6.3.4. Test Result

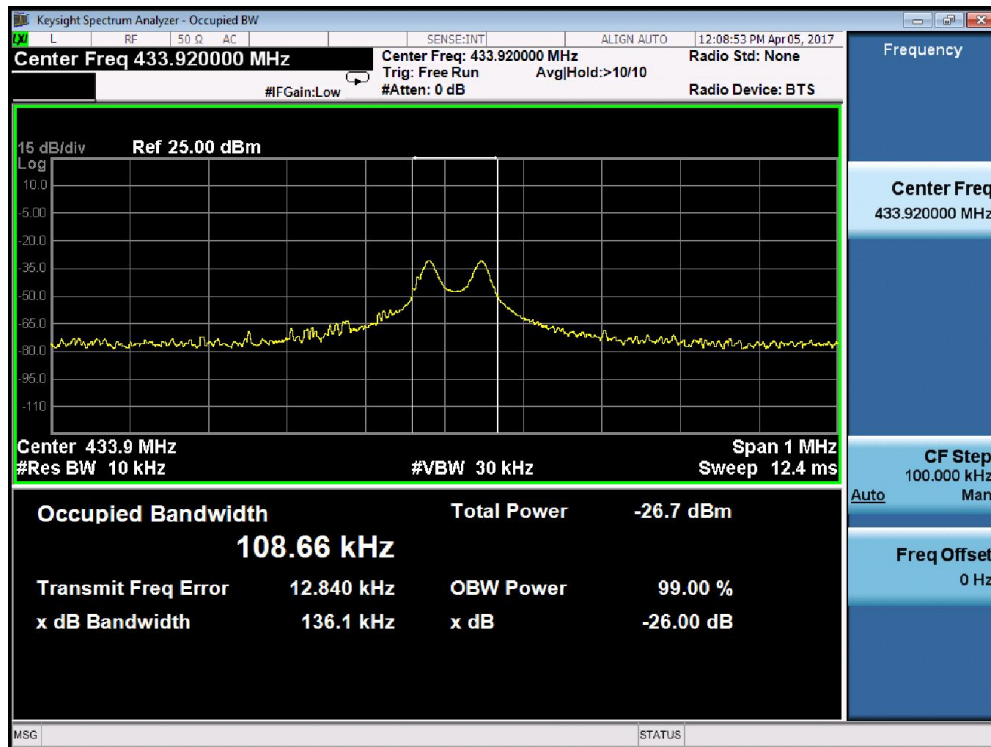
Test Frequency (MHz)	Modulation Type	20dB Bandwidth (KHz)	99% Bandwidth (KHz)	Limit (KHz)	Result
433.92	ASK	60.37	119.75	≤ 1084.8	Pass
	FSK	136.1	108.66	≤ 1084.8	Pass

Limit = Fundamental Frequency \* 0.25% = 433.92 MHz \* 0.25% = 1084.8 kHz

20dB Bandwidth Test Plot for ASK



## 20dB Bandwidth Test Plot for FSK



## 6.4. Transmission Time

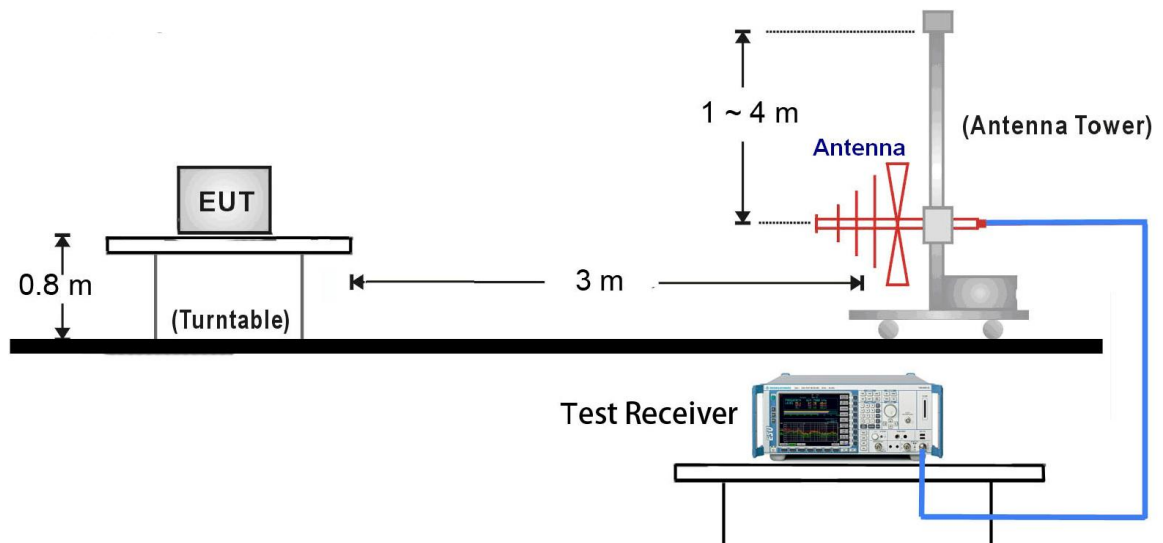
### 6.4.1. Standard Applicable

According to FCC 15.231(e), devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

### 6.4.2. Test Procedure

With the EUT's antenna attached, the EUT's output signal was received by the test antenna, which was connected to the spectrum analyzer. Set the center frequency to 433.92MHz, then set the spectrum analyzer to Zero Span for the release time reading. During the testing, the switch was released then the EUT automatically deactivated.

### 6.4.3. Test Setup



#### 6.4.4. Test Result

Modulation Type	Item	Measured Value	Limit	Result
ASK	Transmission Time( $T_{on}$ )	0.009 s	$\leq 1$ s	Pass
	Silent Time	18.20 s	$\geq 10$ s	Pass
	Silent Time/Transmission Time	2022	$\geq 30$ times	Pass
FSK	Transmission Time( $T_{on}$ )	0.017 s	$\leq 1$ s	Pass
	Silent Time	18.10 s	$\geq 10$ s	Pass
	Silent Time/Transmission Time	1064	$\geq 30$ times	Pass

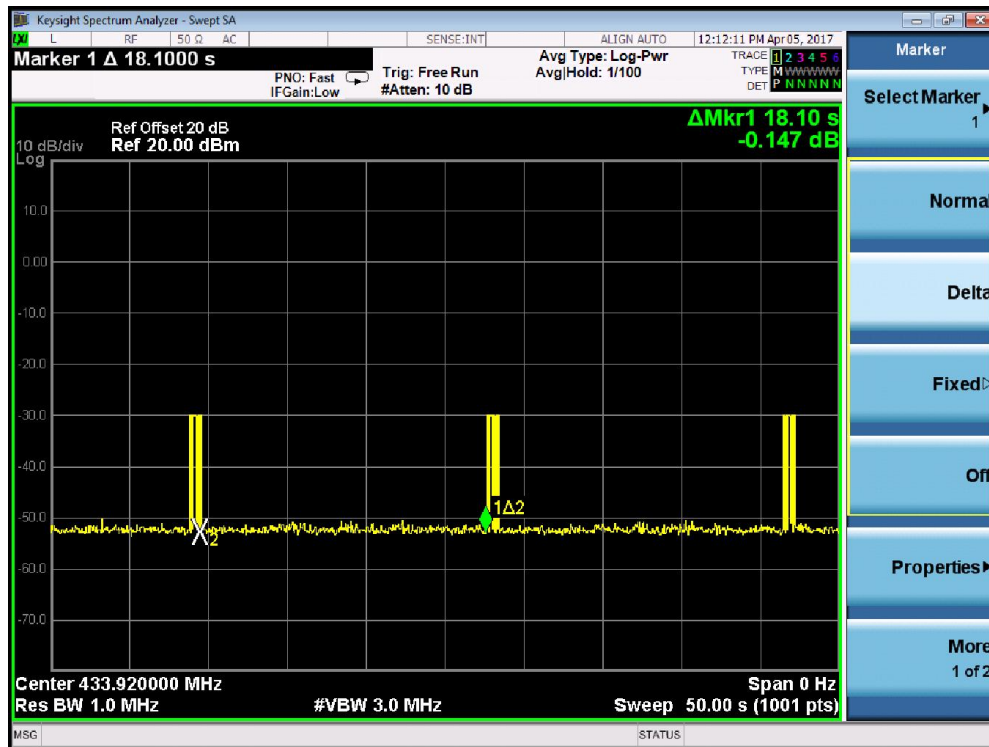
Note:

For ASK Modulation, Transmission time ( $T_{on}$ ) (ms) =  $1 * 0.472$  (ms) +  $10 * 0.246$ (ms) +  $48 * 0.123$  = 8.84 (ms)

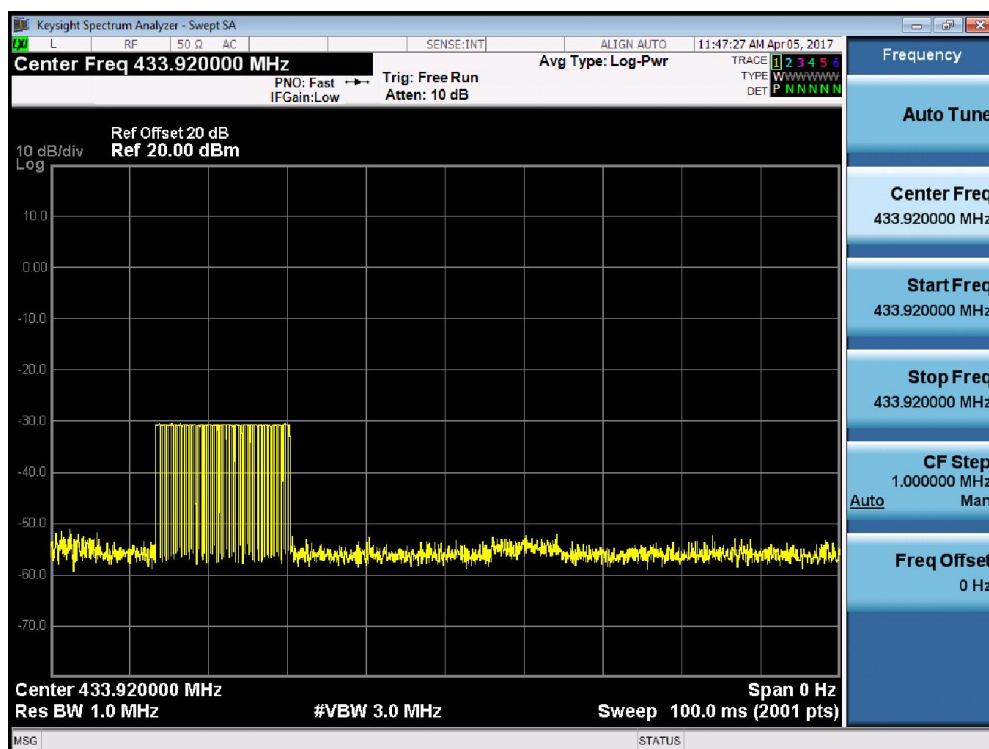
#### Silent Time for ASK



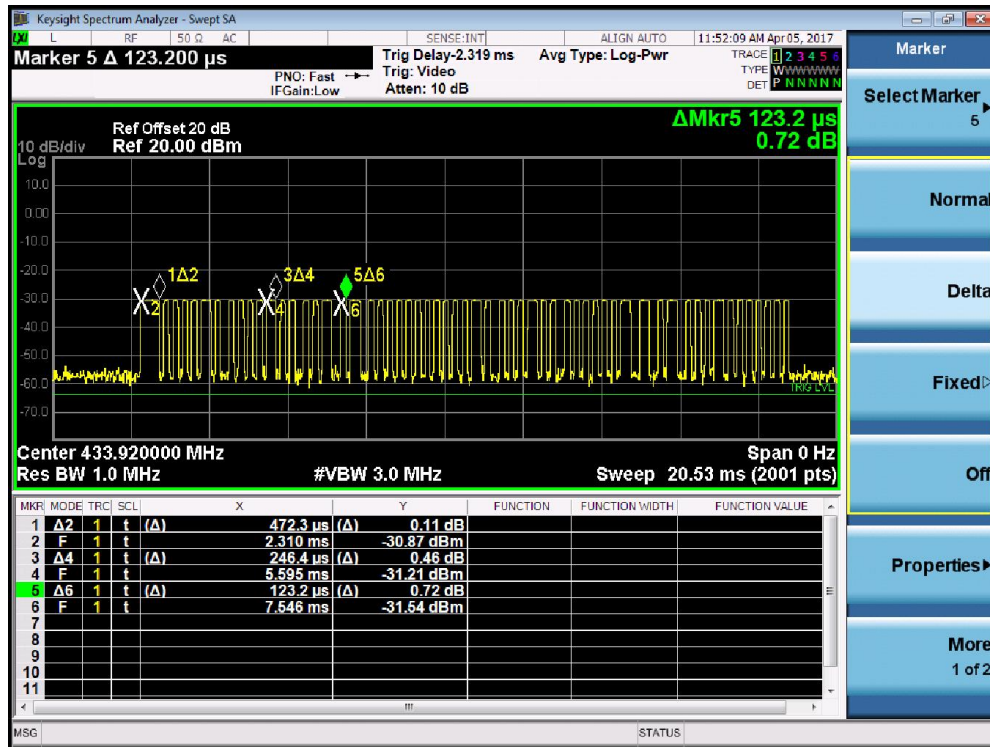
### Silent Time for FSK



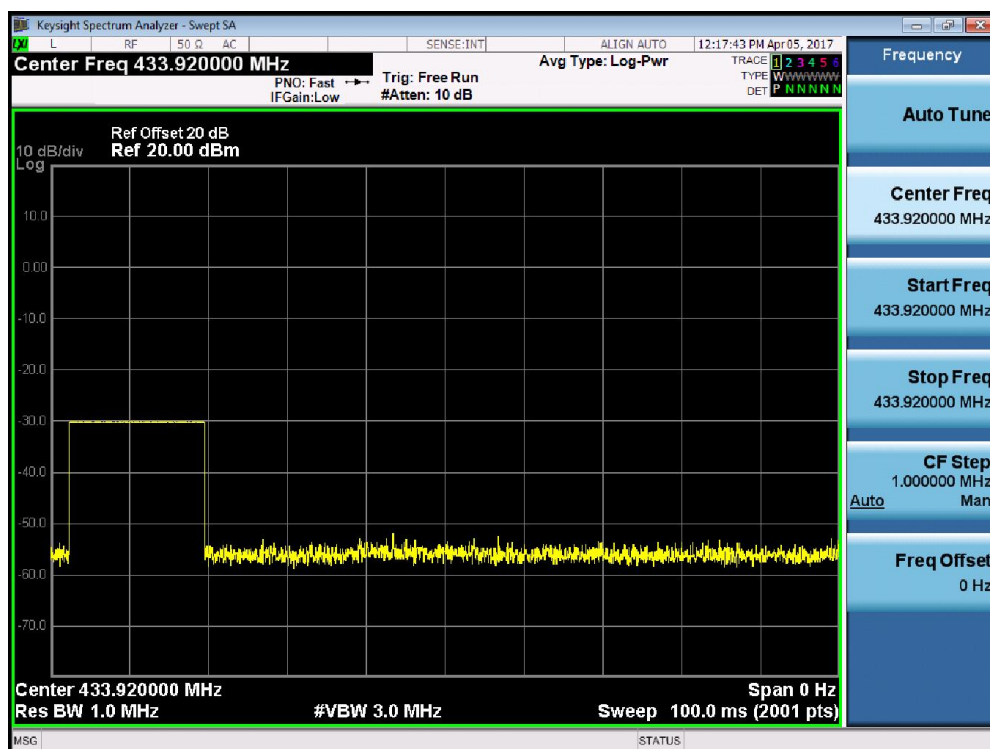
### Transmission Time for ASK

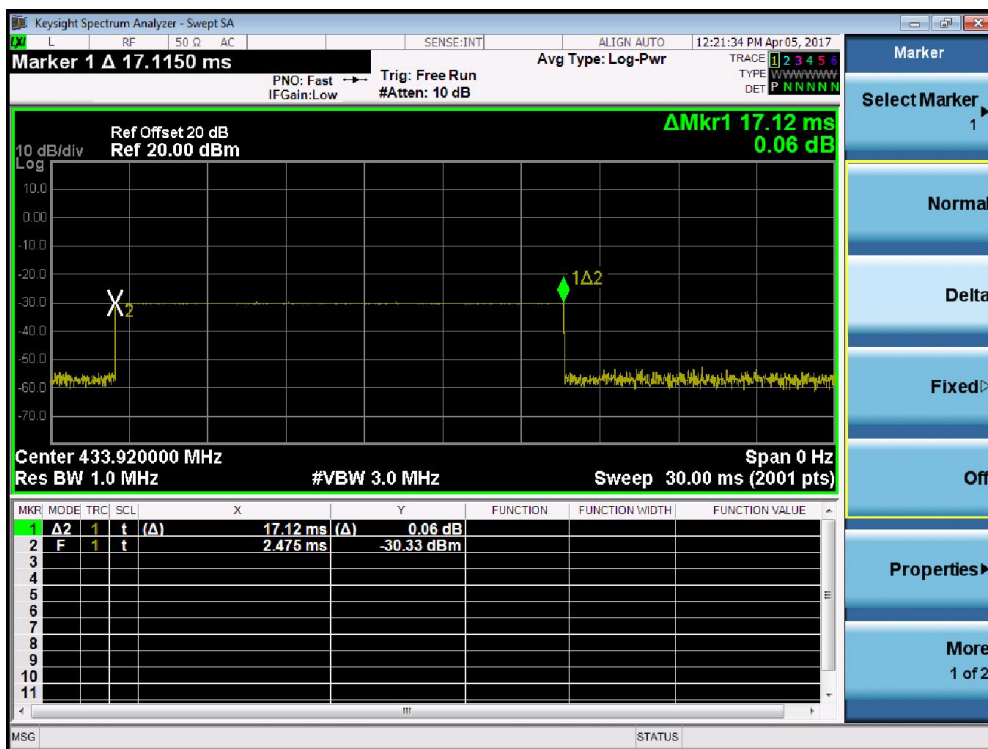






### Transmission Time for FSK





## 6.5. Duty Cycle

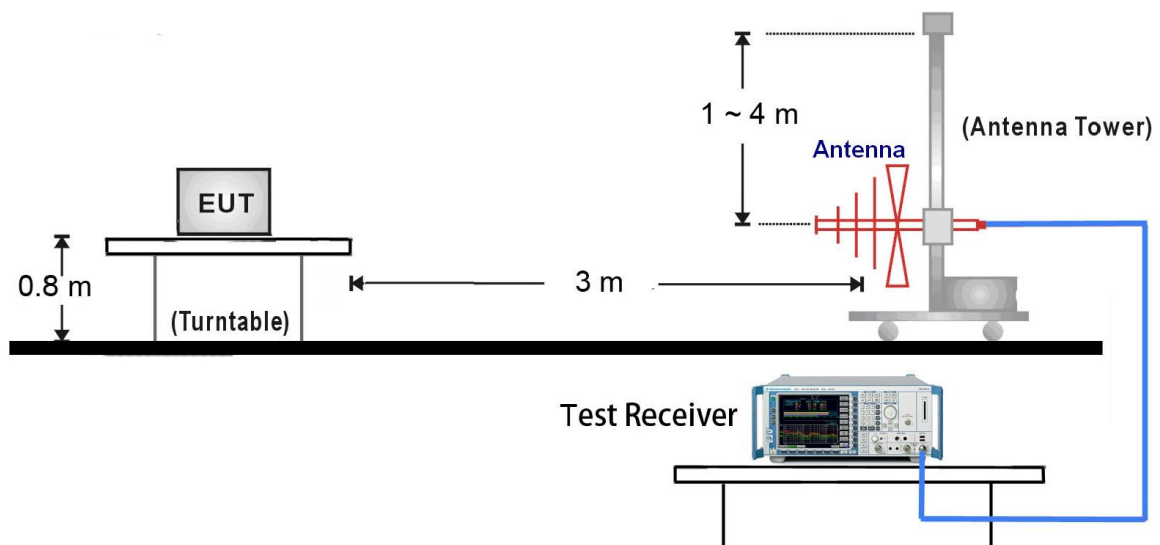
### 6.5.1. Standard Applicable

According to FCC Part 15.231(e) and 15.35(c), for pulse operation transmitter, the averaging pulsed emissions are calculated by peak value of measured emission plus duty cycle factor.

### 6.5.2. Test Procedure

With the EUT's antenna attached, the EUT's output signal was received by the test antenna, which was connected to the spectrum analyzer. Set the center frequency to 433.92MHz, then set the spectrum analyzer to Zero Span for the release time reading. During the testing, the switch was released then the EUT automatically deactivated.

### 6.5.3. Test Setup



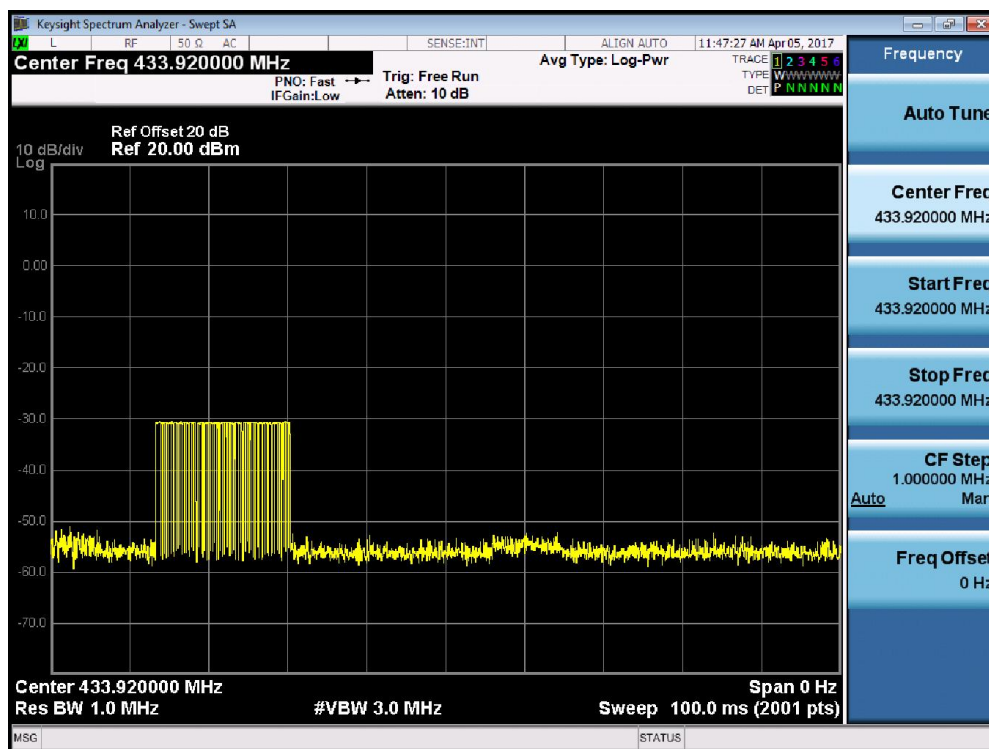
#### 6.5.4. Test Result

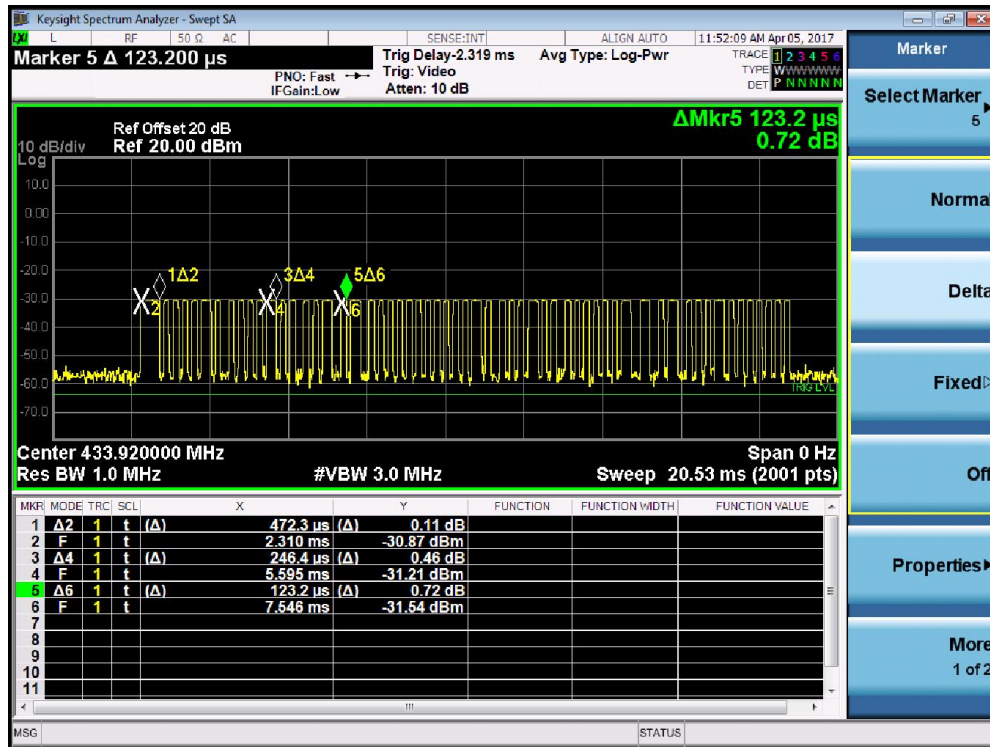
Modulation Type	Total Time ( $T_{on}$ ) (ms)	The duration of one cycle (ms)	Duty Cycle (%)	Duty Cycle Factor (dB)
ASK	8.84	100	8.84	21.07
FSK	17.12	100	17.12	15.33

Note 1: Duty Cycle Factor =  $20 \cdot \log(1/\text{Duty Cycle})$ .

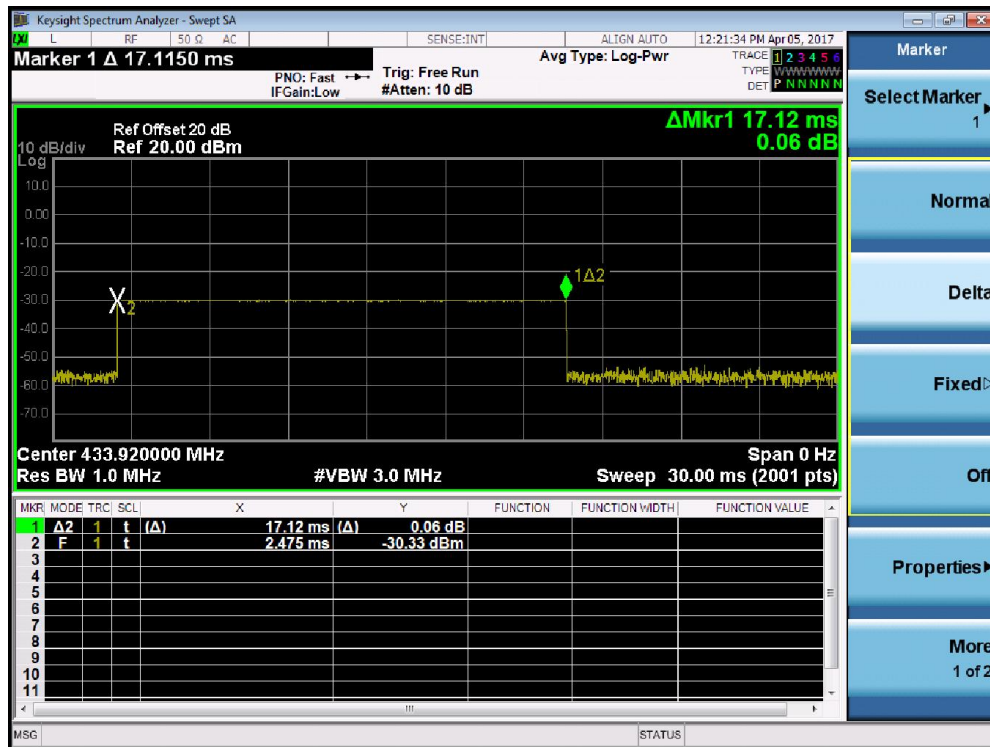
Note 2: For ASK Modulation, Total time ( $T_{on}$ ) (ms) =  $1 \cdot 0.472 \text{ (ms)} + 10 \cdot 0.246 \text{ (ms)} + 48 \cdot 0.123 = 8.84 \text{ (ms)}$

Width of Pulse for ASK





### Width of Pulse for FSK



## 7. CONCLUSION

The data collected relate only the item(s) tested and show that the **Tire Pressure Monitoring System Sensor FCC ID: TTETSB38 & IC: 6707A-TSB38** is in compliance with FCC Part 15.231(e) of the FCC Rules and RSS 210 Issue 9 – Annex A of IC Rules.

\_\_\_\_\_ The End \_\_\_\_\_