



## MEASUREMENT REPORT

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

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**FCC ID:** TTETSB403  
**IC:** 6707A-TSB403  
**APPLICANT:** Suzhou Sate Auto Electronic Co., Ltd.  
**Application Type:** Certification  
**Product:** Tire Pressure Monitoring System Sensor  
**Model No.:** TSB403  
**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 26, 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
1703RSU01601	Rev. 01	Initial report	05-11-2017	Valid

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## CONTENTS

Description	Page
<b>1. INTRODUCTION .....</b>	<b>6</b>
1.1. Scope .....	6
1.2. MRT Test Location .....	6
<b>2. PRODUCT INFORMATION .....</b>	<b>7</b>
2.1. Equipment Description.....	7
2.2. Test Standards .....	7
2.3. Test Methodology .....	7
2.4. EUT Setup and Test Mode .....	8
<b>3. ANTENNA REQUIREMENTS .....</b>	<b>9</b>
<b>4. TEST EQUIPMENT CALIBRATION DATA .....</b>	<b>10</b>
<b>5. MEASUREMENT UNCERTAINTY .....</b>	<b>11</b>
<b>6. TEST RESULT .....</b>	<b>12</b>
6.1. Summary .....	12
6.2. Radiated Emissions .....	13
6.2.1. Standard Applicable .....	13
6.2.2. Test Procedure.....	13
6.2.3. Test Setup.....	14
6.2.4. Test Results .....	15
6.3. 20dB Bandwidth / 99% Bandwidth .....	27
6.3.1. Standard Applicable .....	27
6.3.2. Test Procedure.....	27
6.3.3. Test Setup.....	27
6.3.4. Test Result.....	28
6.4. Transmission Time.....	30
6.4.1. Standard Applicable .....	30
6.4.2. Test Procedure.....	30
6.4.3. Test Setup.....	30
6.4.4. Test Result.....	31
6.5. Duty Cycle .....	34
6.5.1. Standard Applicable .....	34
6.5.2. Test Procedure.....	34
6.5.3. Test Setup.....	34
6.5.4. Test Result.....	35

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**7. CONCLUSION..... 38**

## §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>	TSB403
<b>FCC ID:</b>	TTETSB403
<b>IC</b>	6707A-TSB403
<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 testing for 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.	TSB403
Frequency Range	315 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:

<b>Test Mode List</b>		
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: TTETSB403** 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	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

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% ( $U=2Uc(y)$ ):

9kHz ~ 1GHz: 3.86dB

1GHz ~ 18GHz: 4.33dB

## 6. TEST RESULT

### 6.1. Summary

**Company Name:** Suzhou Sate Auto Electronic Co., Ltd.  
**FCC ID:** TTETSB403  
**IC:** 6707A-TSB403

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.

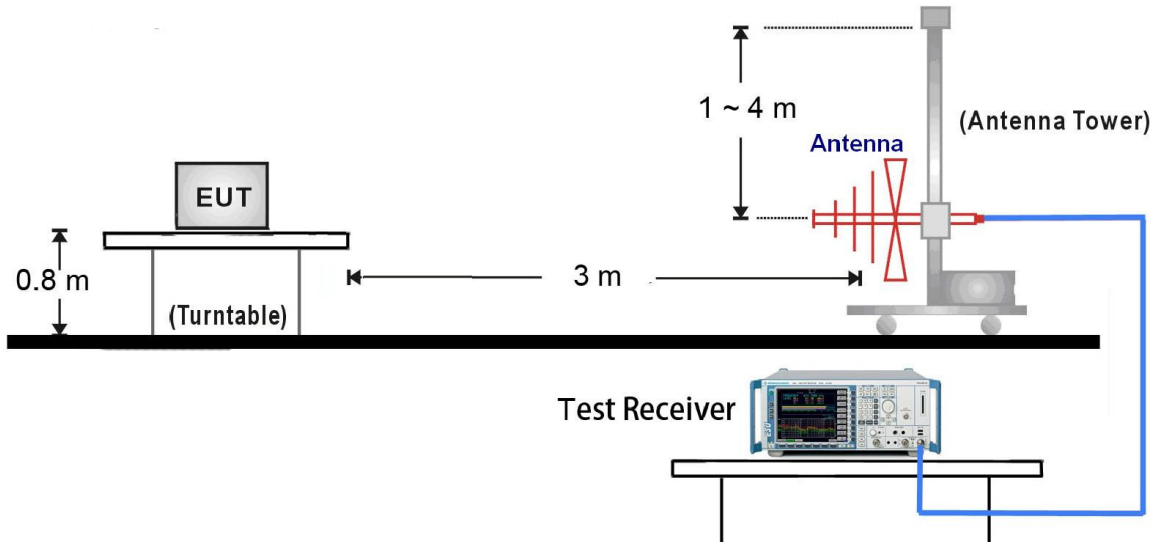
### 6.2.2. Test Procedure

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.

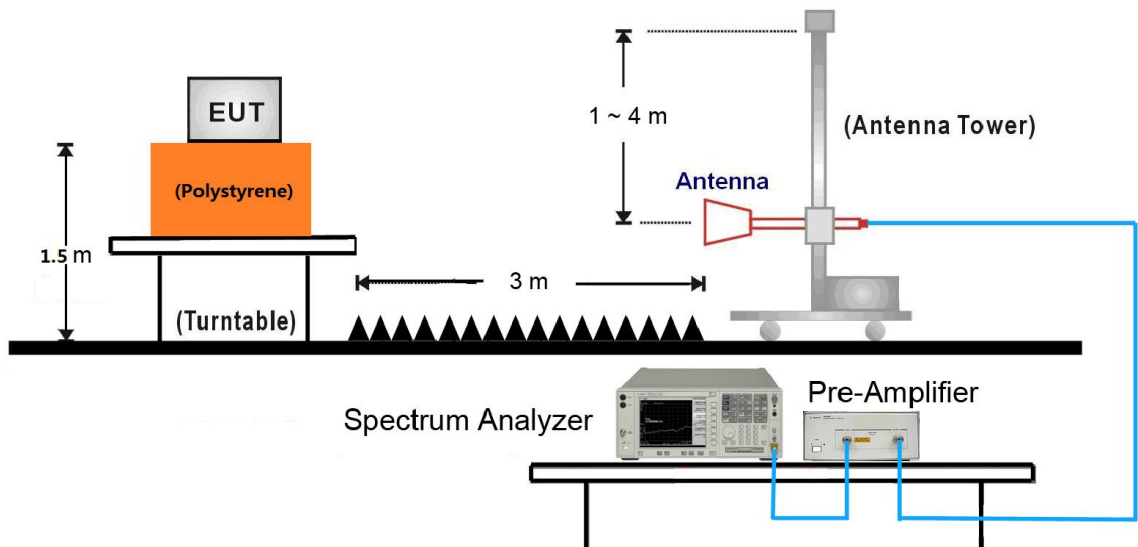
### 6.2.3. Test Setup

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:

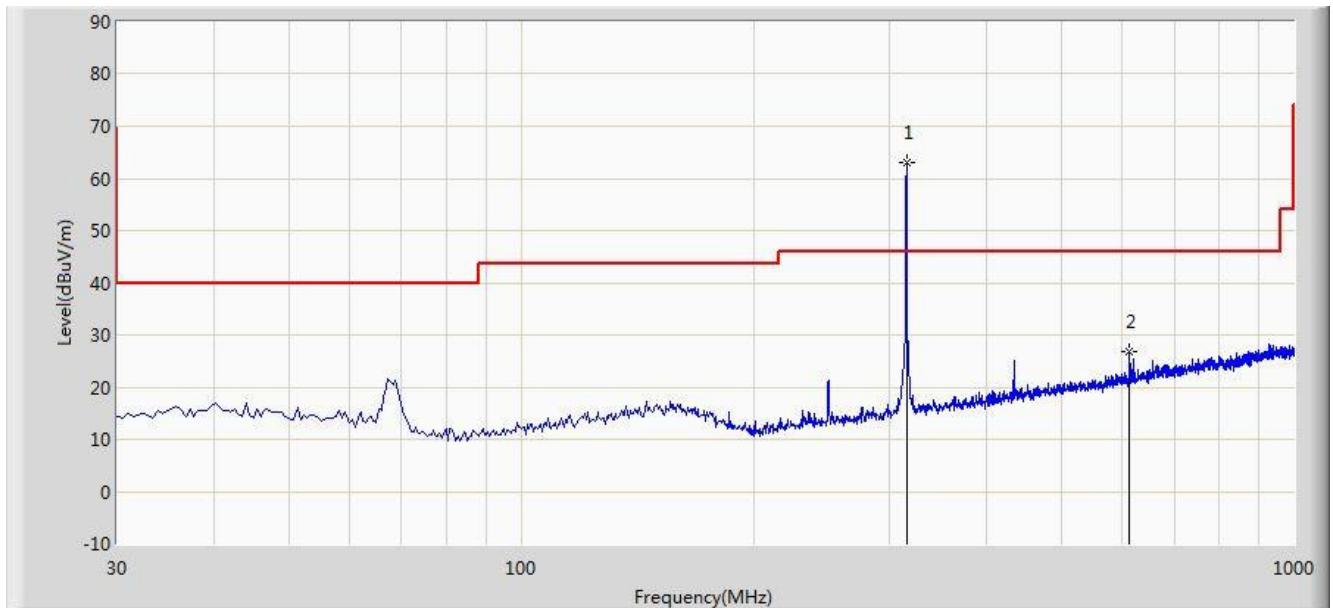


#### 1GHz ~ 25GHz Test Setup:



### 6.2.4. Test Results

Site: AC2	Time: 2017/03/17 - 02:31
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: VULB 9168 _20-2000MHz	Polarity: Horizontal
EUT: TSB40_3	Power: By Battery
Test Mode: 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	315.180	48.184	14.718	N/A	62.902	87.664	-24.762	PK
	315.180	48.184	14.718	16.760	46.142	67.664	-21.522	AV
2	612.970	5.933	20.742	N/A	26.675	67.664	-40.989	PK
	612.970	5.933	20.742	16.760	9.915	47.664	-37.749	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.

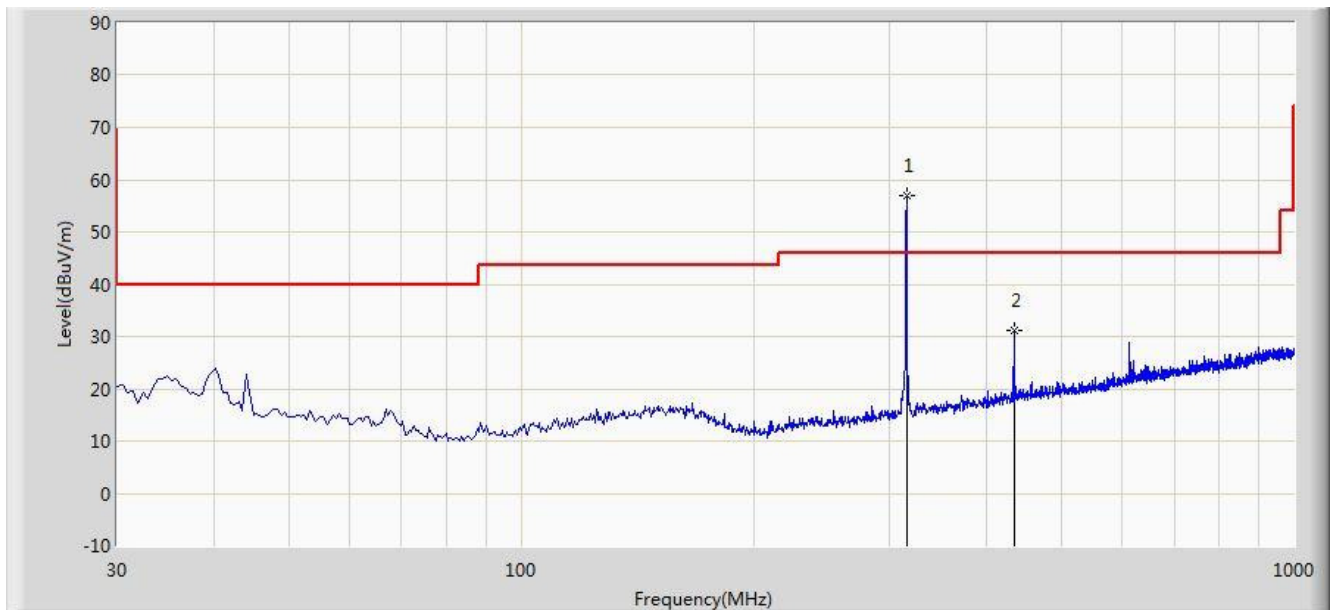
Note 2: The fundamental frequency is 315MHz, so the fundamental and spurious emissions radiated limit base on the operating frequency 315MHz.

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).

Site: AC2	Time: 2017/03/17 - 02:33
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: VULB 9168 _20-2000MHz	Polarity: Vertical
EUT: TSB40_3	Power: By Battery
Test Mode: 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	315.180	42.222	14.718	N/A	56.940	87.664	-30.724	PK
	315.180	42.222	14.718	16.760	40.180	67.664	-27.484	AV
2	434.005	13.816	17.427	N/A	31.243	67.664	-36.421	PK
	434.005	13.816	17.427	16.760	14.483	47.664	-33.181	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.

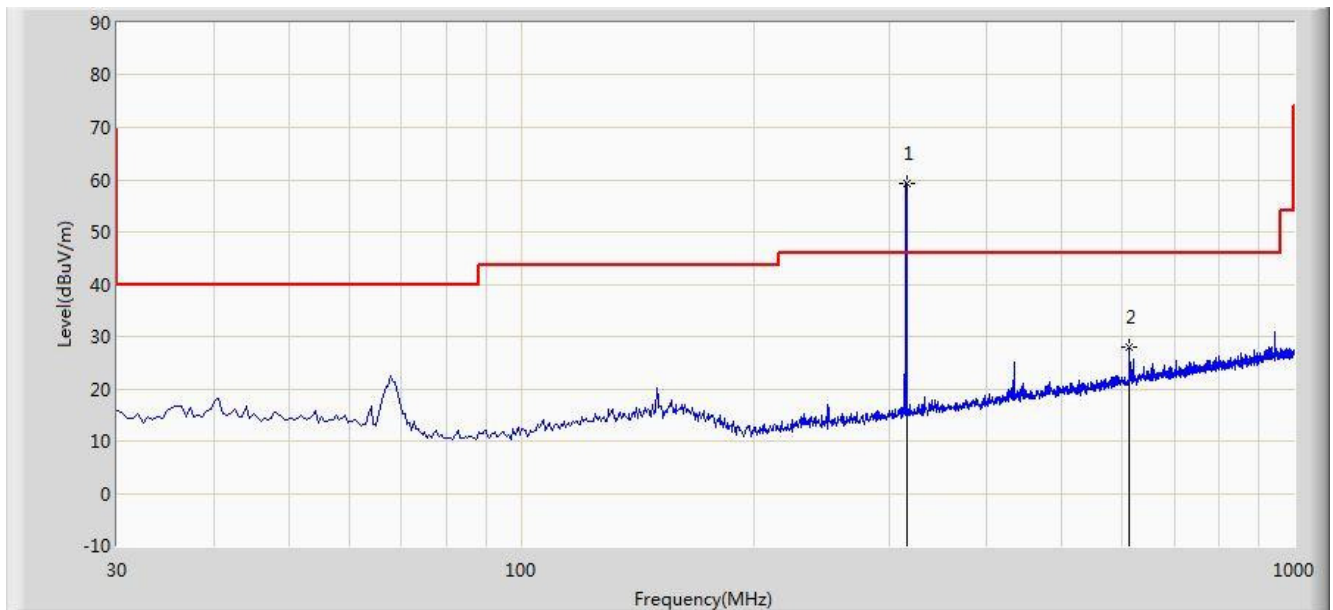
Note 2: The fundamental frequency is 315MHz, so the fundamental and spurious emissions radiated limit base on the operating frequency 315MHz.

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 - 02:26
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: VULB 9168 _20-2000MHz	Polarity: Horizontal
EUT: TSB40_3	Power: By Battery
Test Mode: 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	315.180	44.570	14.718	N/A	59.288	87.664	-28.376	PK
	315.180	44.570	14.718	16.310	42.978	67.664	-24.686	AV
2	612.970	7.241	20.742	N/A	27.983	67.664	-39.681	PK
	612.970	7.241	20.742	16.310	11.673	47.664	-35.991	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.

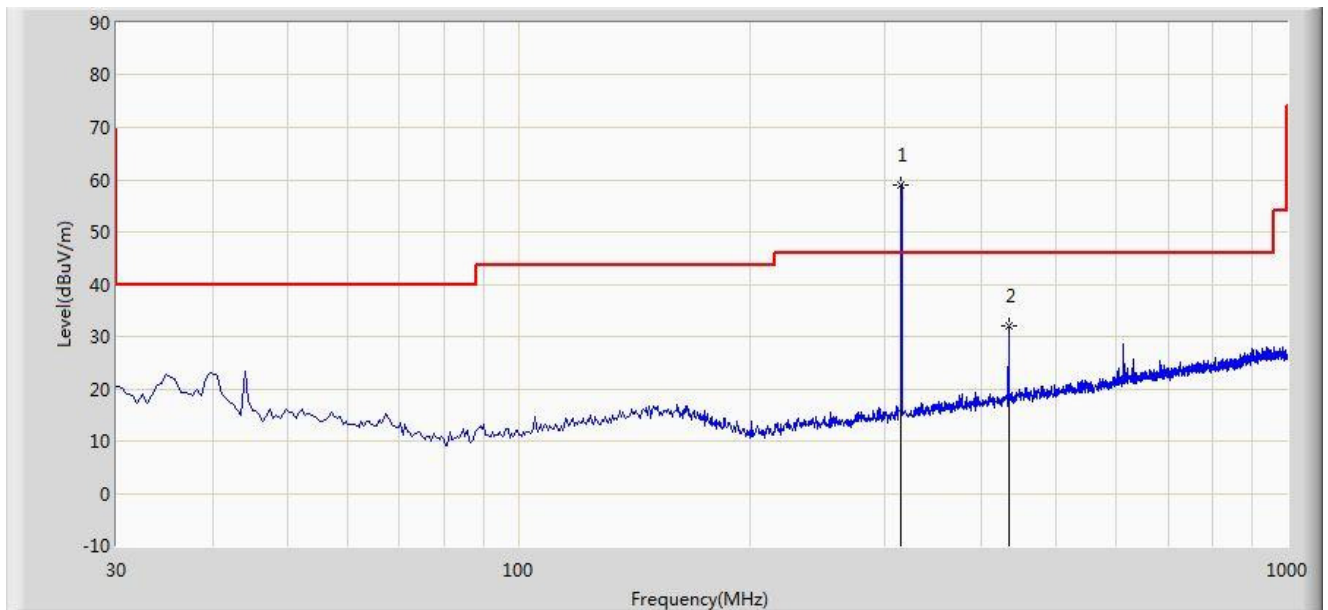
Note 2: The fundamental frequency is 315MHz, so the fundamental and spurious emissions radiated limit base on the operating frequency 315MHz.

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).

Site: AC2	Time: 2017/03/17 - 02:27
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: VULB 9168 _20-2000MHz	Polarity: Vertical
EUT: TSB40_3	Power: By Battery
Test Mode: 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	314.695	44.239	14.708	N/A	58.947	87.664	-28.717	PK
	314.695	44.239	14.708	16.310	42.637	67.664	-25.027	AV
2	434.005	14.476	17.427	N/A	31.903	67.664	-35.761	PK
	434.005	14.476	17.427	16.310	15.593	47.664	-32.071	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.

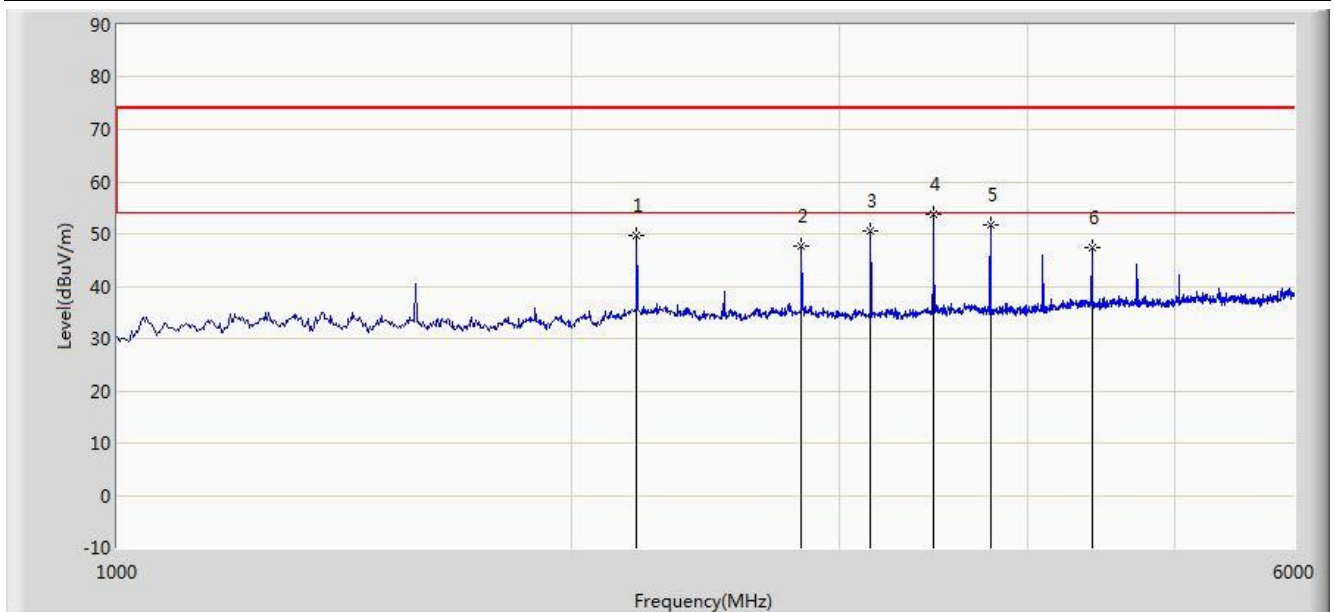
Note 2: The fundamental frequency is 315MHz, so the fundamental and spurious emissions radiated limit base on the operating frequency 315MHz.

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).

Site: AC2	Time: 2017/03/16 - 23:21
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: TSB40_3	Power: By Battery
Test Mode: 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	2205.000	53.204	-3.606	N/A	49.598	67.664	-18.066	PK
	2205.000	53.204	-3.606	16.760	18.625	47.664	-29.039	AV
2	2835.000	50.149	-2.416	N/A	47.733	67.664	-19.931	PK
	2835.000	50.149	-2.416	16.760	30.973	47.664	-16.691	AV
3	3150.000	52.089	-1.534	N/A	50.556	67.664	-17.108	PK
	3150.000	52.089	-1.534	16.760	33.796	47.664	-13.868	AV
4	3465.000	55.110	-1.333	N/A	53.777	67.664	-13.887	PK
	3465.000	55.110	-1.333	16.760	37.017	47.664	-10.647	AV
5	3780.000	52.140	-0.285	N/A	51.855	67.664	-15.809	PK
	3780.000	52.140	-0.285	16.760	35.095	47.664	-12.569	AV
6	4410.000	46.082	1.408	N/A	47.490	67.664	-20.174	PK
	4410.000	46.082	1.408	16.760	30.730	47.664	-16.934	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.

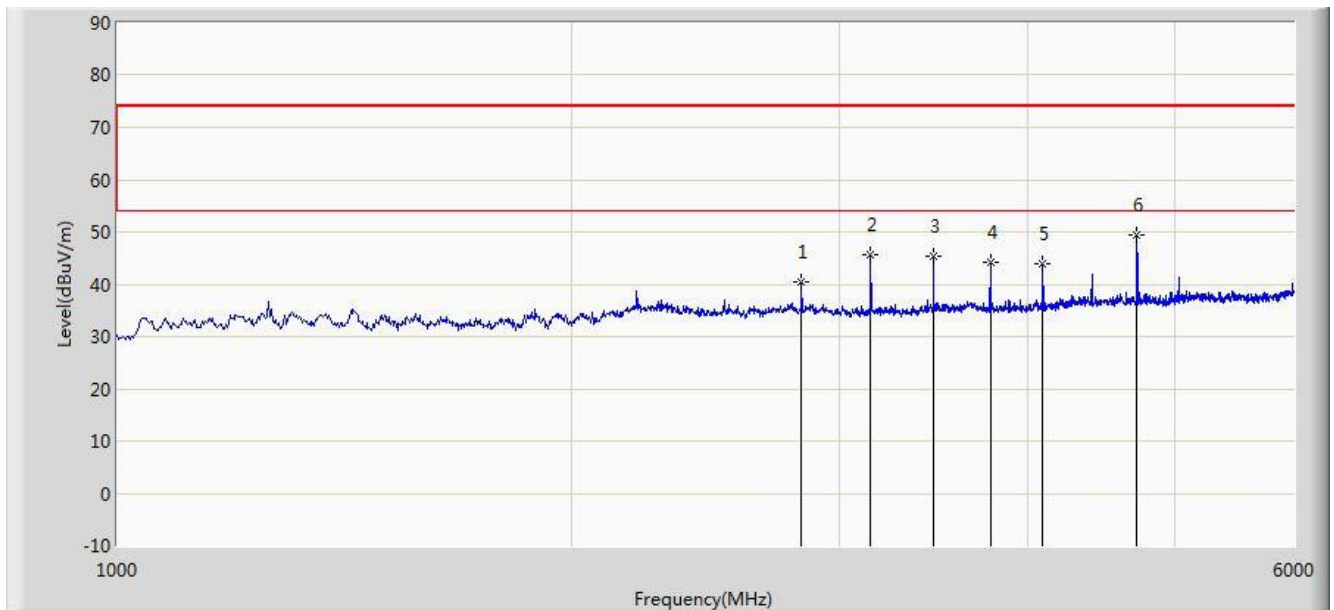
Note 2: The fundamental frequency is 315MHz, so the fundamental and spurious emissions radiated limit base on the operating frequency 315MHz.

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 - 23:26
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: TSB40_3	Power: By Battery
Test Mode: 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	2835.000	42.778	-2.416	N/A	40.362	67.664	-27.302	PK
	2835.000	42.778	-2.416	16.760	23.602	47.664	-24.062	AV
2	3150.000	47.233	-1.534	N/A	45.700	67.664	-21.964	PK
	3150.000	47.233	-1.534	16.760	28.940	47.664	-18.724	AV
3	3465.000	46.811	-1.333	N/A	45.478	67.664	-22.186	PK
	3465.000	46.811	-1.333	16.760	28.718	47.664	-18.946	AV
4	3780.000	44.523	-0.285	N/A	44.238	67.664	-23.426	PK
	3780.000	44.523	-0.285	16.760	27.478	47.664	-20.186	AV
5	4095.000	43.351	0.646	N/A	43.997	67.664	-23.667	PK
	4095.000	43.351	0.646	16.760	27.237	47.664	-20.427	AV
6	4725.000	46.957	2.445	N/A	49.402	67.664	-18.262	PK
	4725.000	46.957	2.445	16.760	32.642	47.664	-15.022	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.

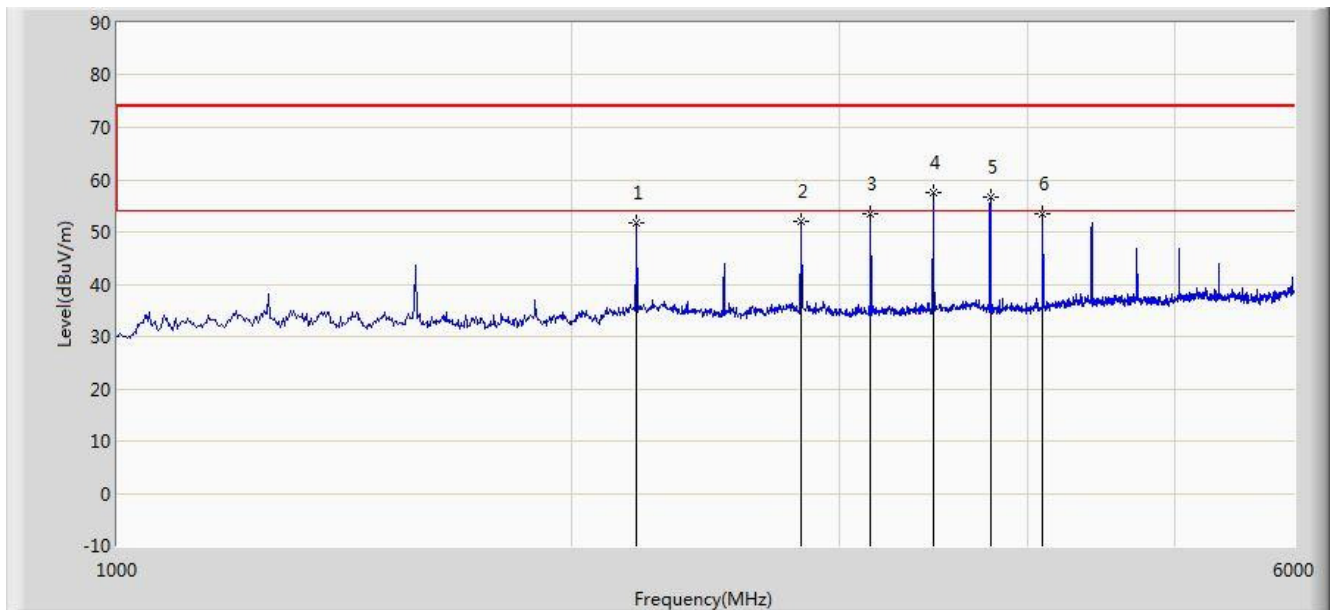
Note 2: The fundamental frequency is 315MHz, so the fundamental and spurious emissions radiated limit base on the operating frequency 315MHz.

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 - 23:01
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: TSB40_3	Power: By Battery
Test Mode: 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	2205.000	55.311	-3.606	N/A	51.705	67.664	-15.959	PK
	2205.000	55.311	-3.606	16.310	35.395	47.664	-12.269	AV
2	2835.000	54.427	-2.416	N/A	52.011	67.664	-15.653	PK
	2835.000	54.427	-2.416	16.310	35.701	47.664	-11.963	AV
3	3150.000	54.989	-1.534	N/A	53.456	67.664	-14.208	PK
	3150.000	54.989	-1.534	16.310	37.146	47.664	-10.518	AV
4	3465.000	58.845	-1.333	N/A	57.512	67.664	-10.152	PK
	3465.000	58.845	-1.333	16.310	41.202	47.664	-6.462	AV
5	3780.000	56.816	-0.285	N/A	56.531	67.664	-11.133	PK
	3780.000	56.816	-0.285	16.310	40.221	47.664	-7.443	AV
6	4095.000	52.711	0.646	N/A	53.357	67.664	-14.307	PK
	4095.000	52.711	0.646	16.310	37.047	47.664	-10.617	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.

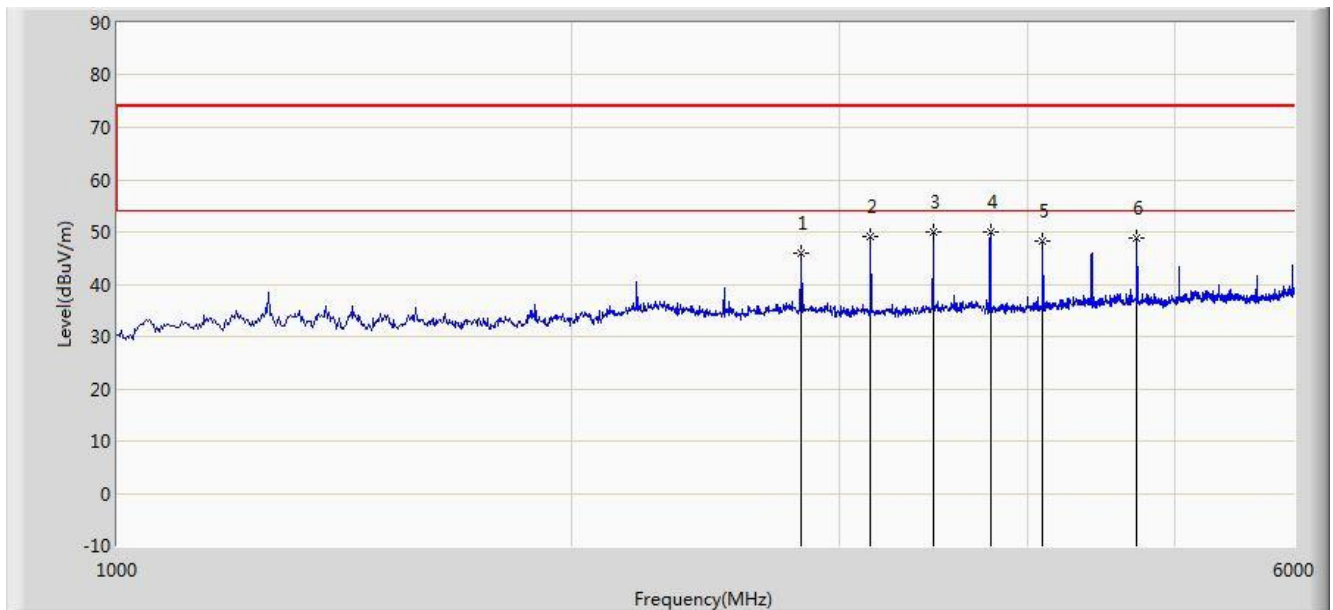
Note 2: The fundamental frequency is 315MHz, so the fundamental and spurious emissions radiated limit base on the operating frequency 315MHz.

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 - 23:17
Limit: FCC_Part15.209_RE(3m)	Engineer: Will Yan
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: TSB40_3	Power: By Battery
Test Mode: 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	2835.000	48.442	-2.416	N/A	46.026	67.664	-21.638	PK
	2835.000	48.442	-2.416	16.310	29.716	47.664	-17.948	AV
2	3150.000	50.640	-1.534	N/A	49.107	67.664	-18.557	PK
	3150.000	50.640	-1.534	16.310	32.797	47.664	-14.867	AV
3	3465.000	51.218	-1.333	N/A	49.885	67.664	-17.779	PK
	3465.000	51.218	-1.333	16.310	33.575	47.664	-14.089	AV
4	3780.000	50.381	-0.285	N/A	50.096	67.664	-17.568	PK
	3780.000	50.381	-0.285	16.310	33.786	47.664	-13.878	AV
5	4095.000	47.600	0.646	N/A	48.246	67.664	-19.418	PK
	4095.000	47.600	0.646	16.310	31.936	47.664	-15.728	AV
6	4725.000	46.389	2.445	N/A	48.834	67.664	-18.830	PK
	4725.000	46.389	2.445	16.310	32.524	47.664	-15.140	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 315MHz, so the fundamental and spurious emissions radiated limit base on the operating frequency 315MHz.

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

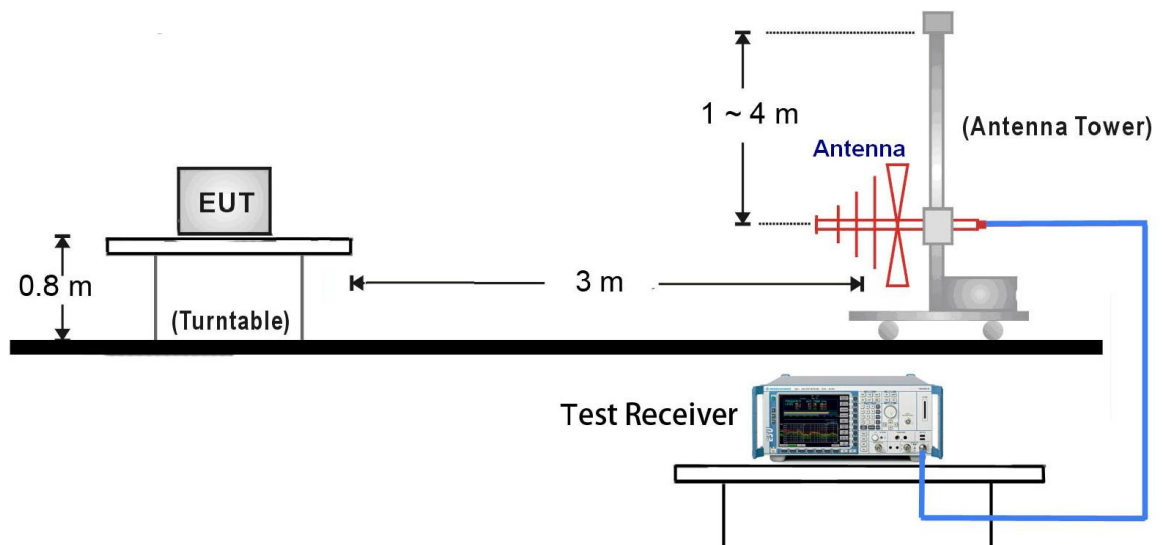
#### 6.3.1. Standard Applicable

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

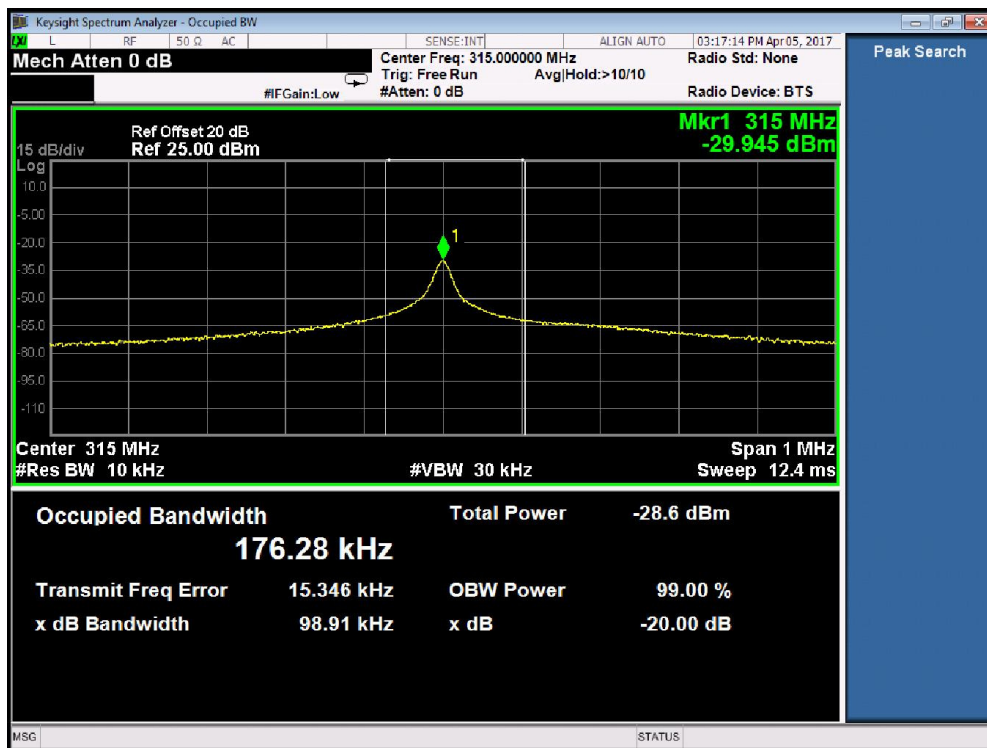


### 6.3.4. Test Result

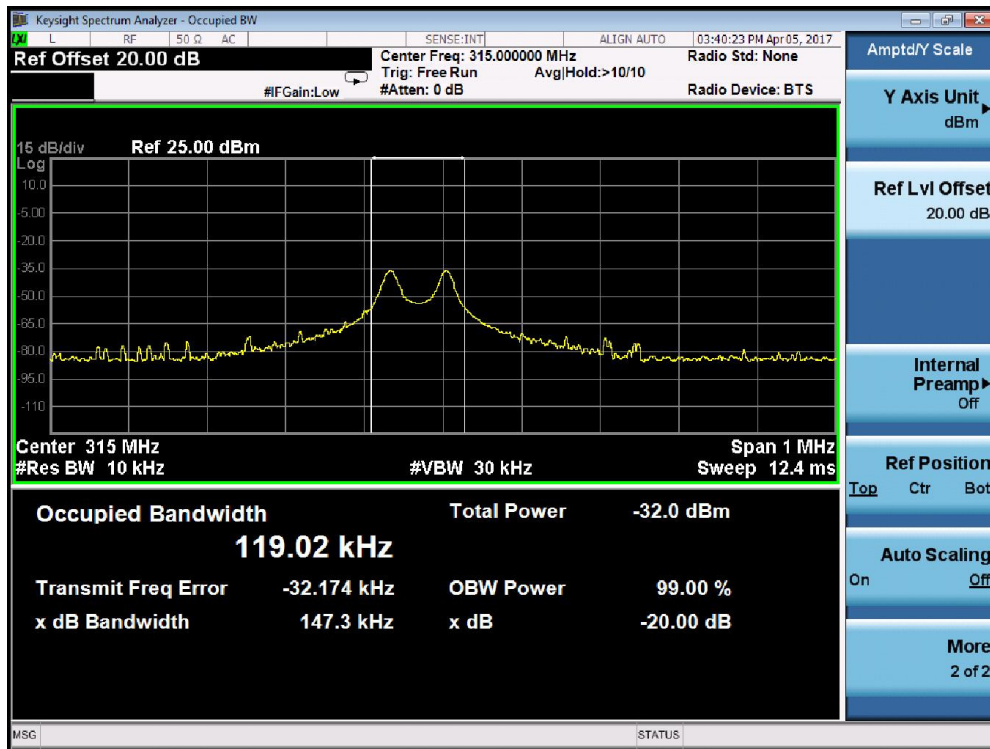
Test Frequency (MHz)	Modulation Type	20dB Bandwidth (KHz)	99% Bandwidth (KHz)	Limit (KHz)	Result
433.92	ASK	98.91	176.28	≤ 787.5	Pass
	FSK	147.3	119.02	≤ 787.5	Pass

Limit = Fundamental Frequency \* 0.25% = 315 MHz \* 0.25% = 1084.8 kHz

20dB Bandwidth Test Plot for ASK



## 20dB Bandwidth Test Plot for FSK



## 6.4. Transmission Time

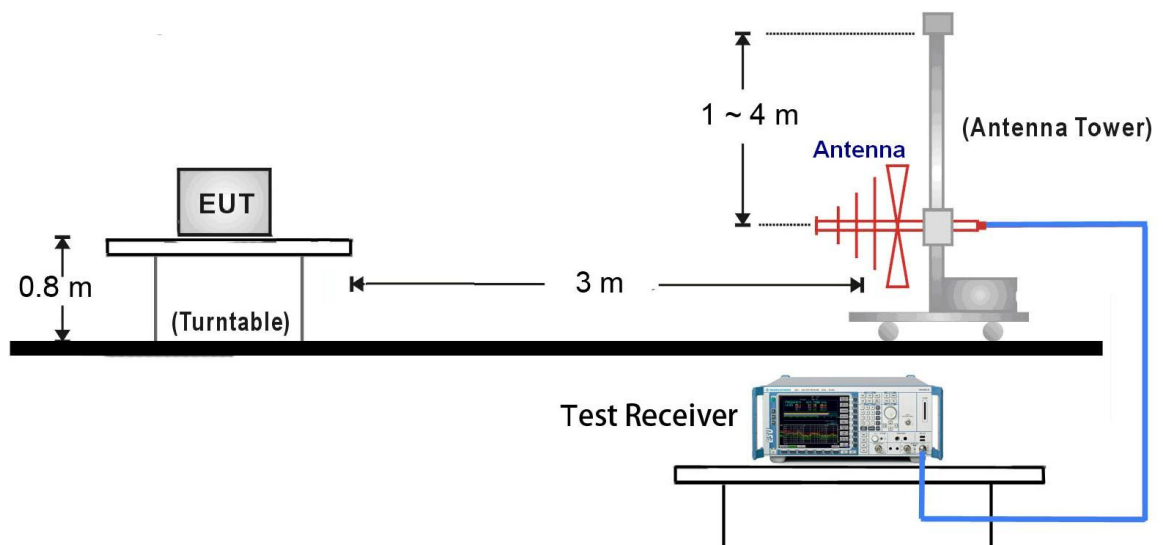
### 6.4.1. Standard Applicable

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



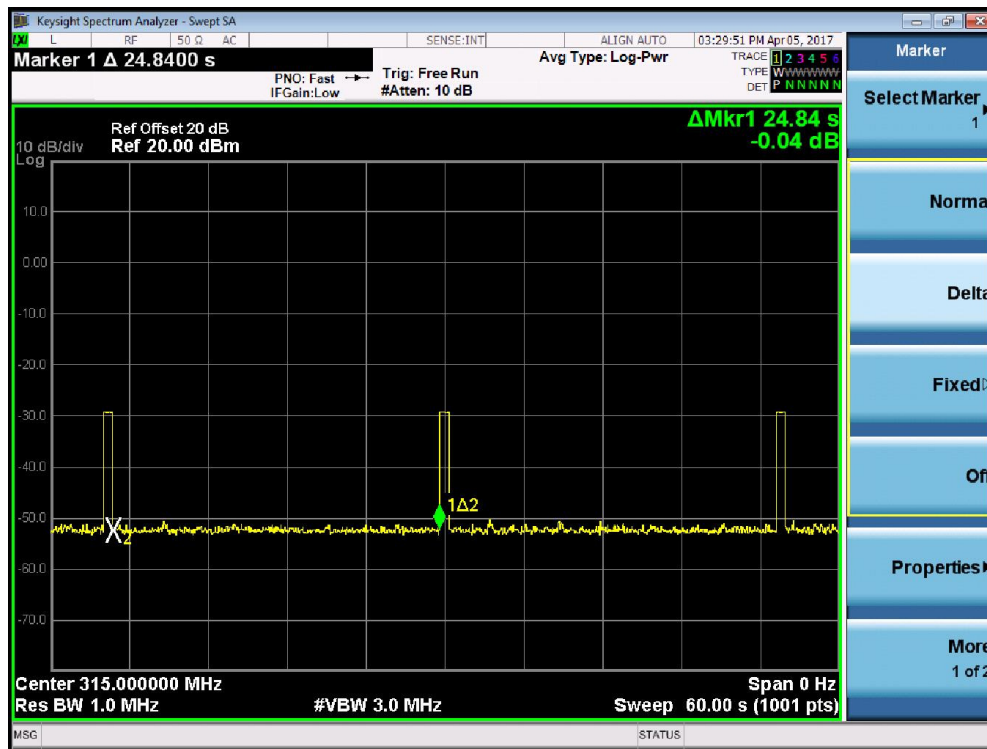
### 6.4.4. Test Result

Modulation Type	Item	Measured Value	Limit	Result
ASK	Transmission Time( $T_{on}$ )	0.015 s	$\leq 1$ s	Pass
	Silent Time	24.84 s	$\geq 10$ s	Pass
	Silent Time/Transmission Time	1656	$\geq 30$ times	Pass
FSK	Transmission Time( $T_{on}$ )	0.015 s	$\leq 1$ s	Pass
	Silent Time	24.42 s	$\geq 10$ s	Pass
	Silent Time/Transmission Time	1628	$\geq 30$ times	Pass

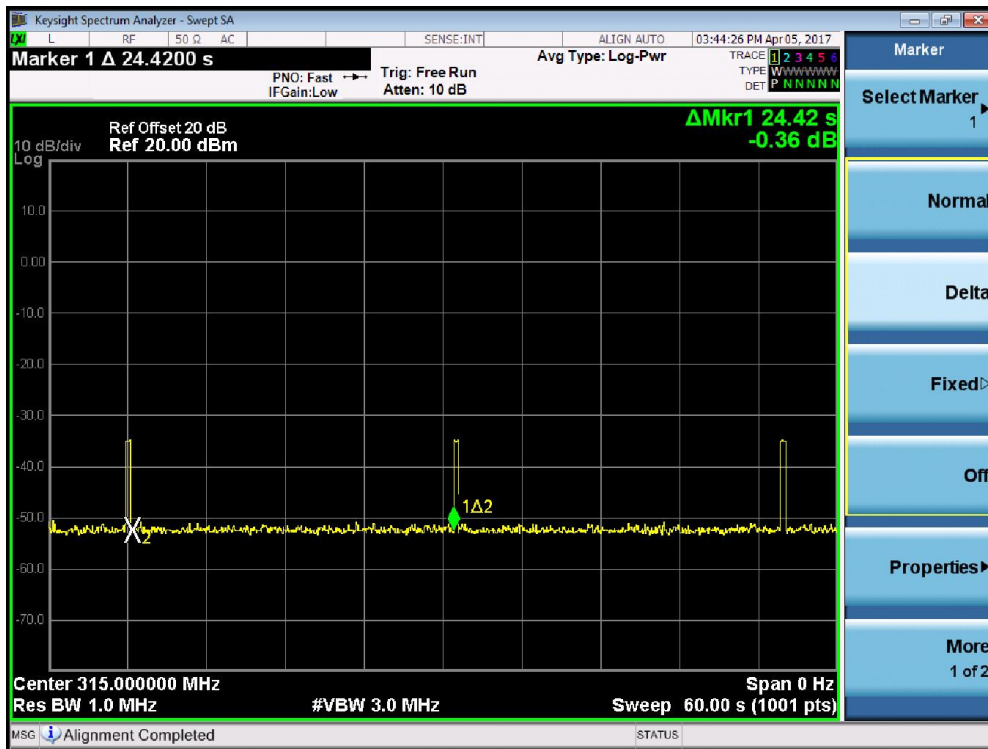
Note:

For ASK Modulation, Transmission time ( $T_{on}$ ) (ms) =  $15 * 0.220$  (ms) +  $85 * 0.132$ (ms) = 14.52 (ms)

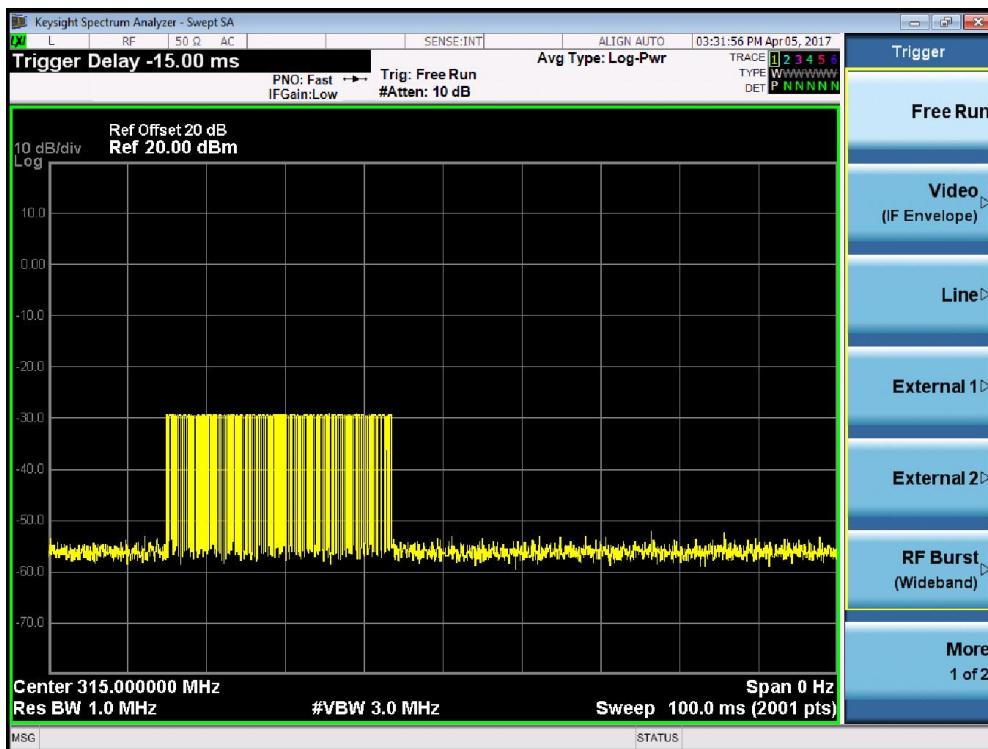
Silent Time for ASK

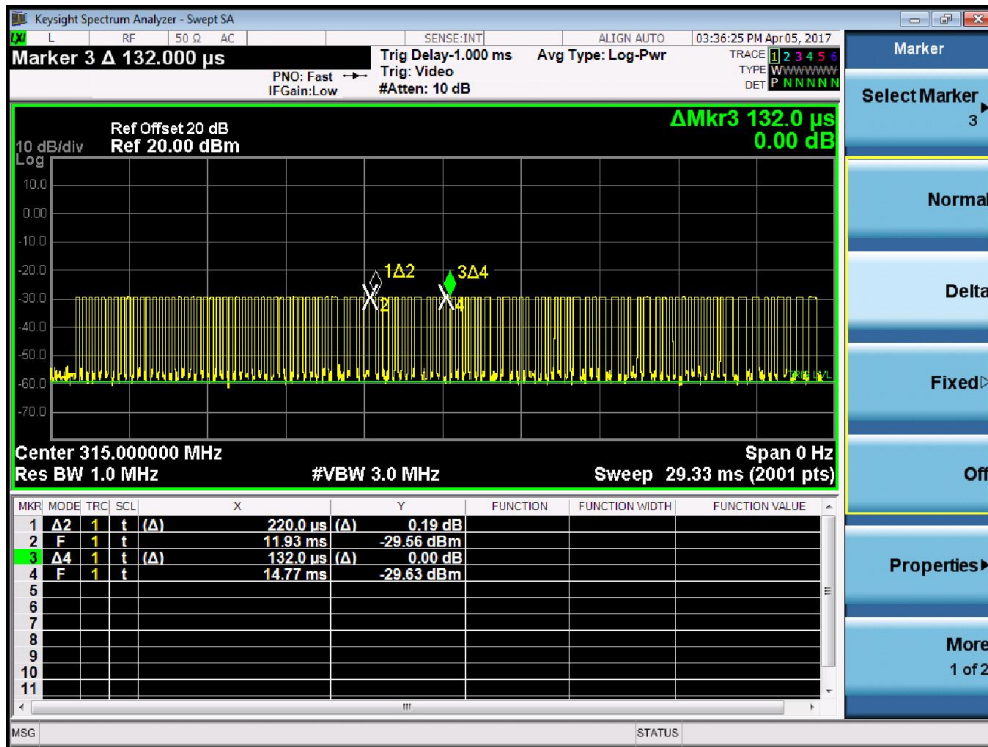


### Silent Time for FSK

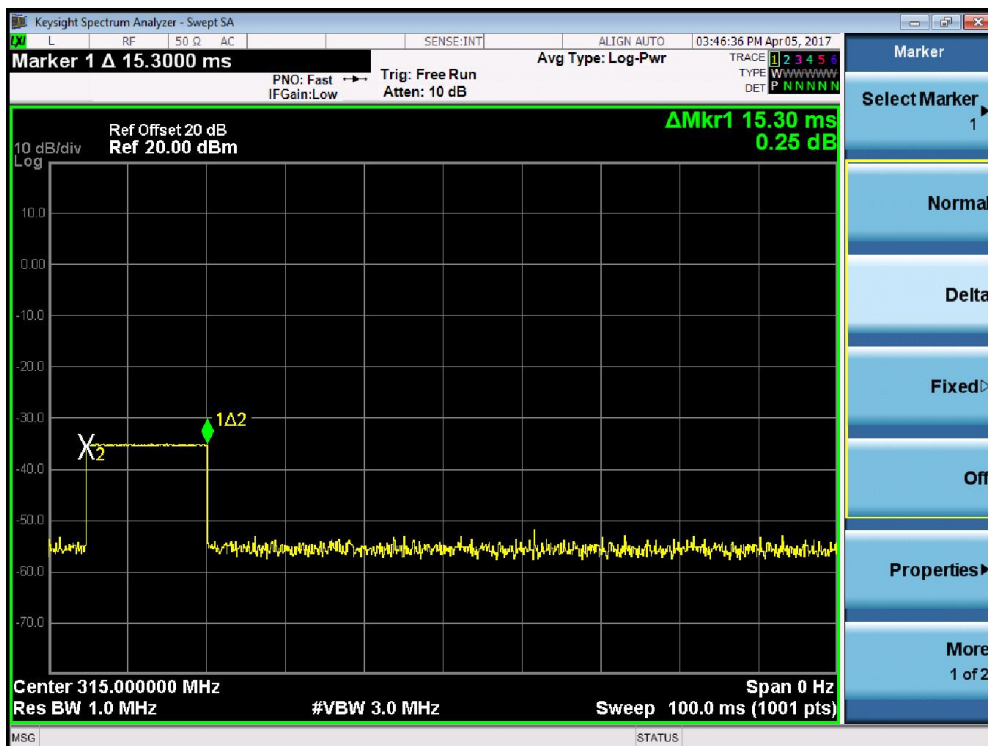


### Transmission Time for ASK





### Transmission Time for FSK



## 6.5. Duty Cycle

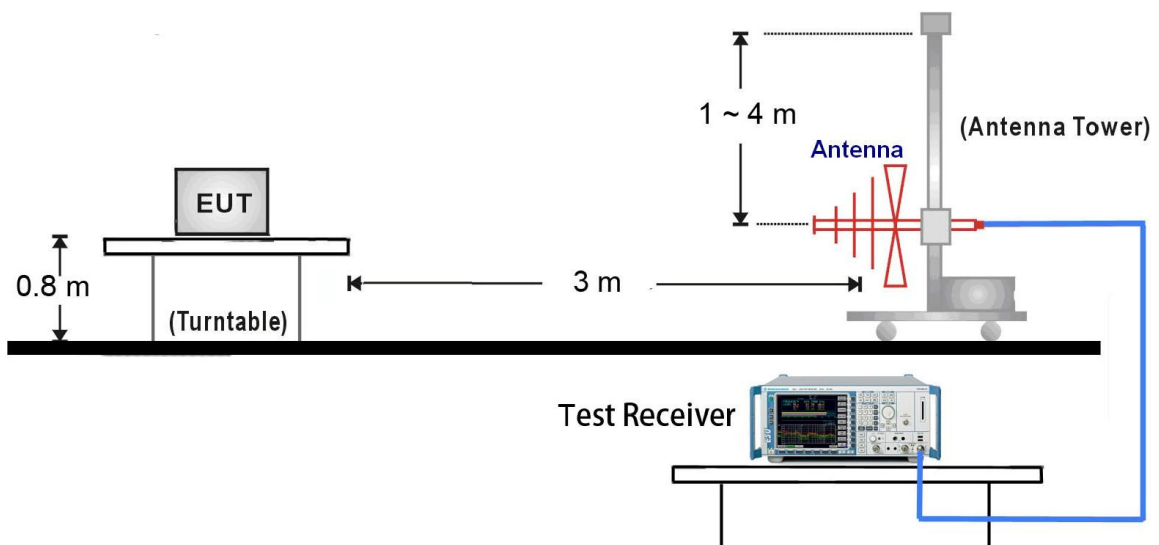
### 6.5.1. Standard Applicable

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



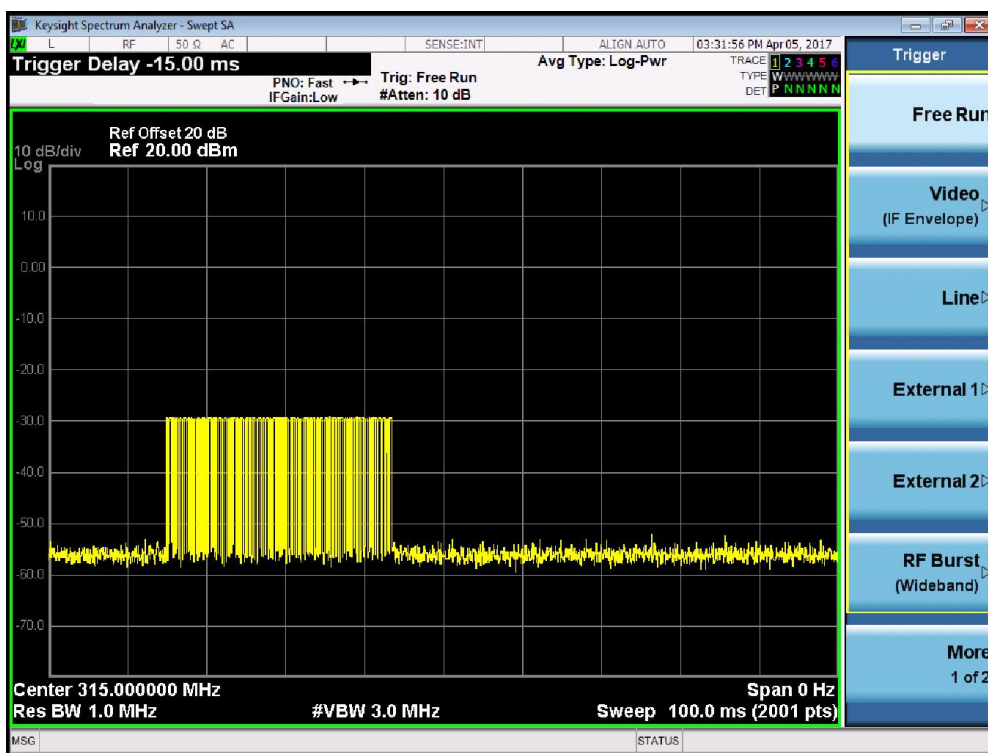
### 6.5.4. Test Result

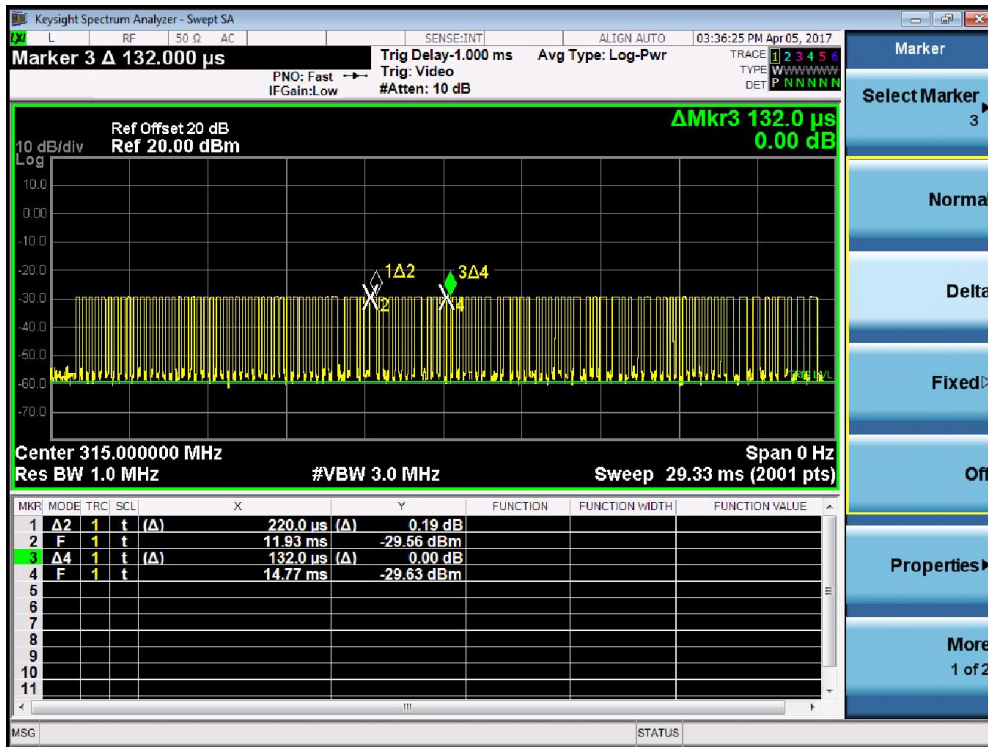
Modulation Type	Total Time (T <sub>on</sub> ) (ms)	The duration of one cycle (ms)	Duty Cycle (%)	Duty Cycle Factor (dB)
ASK	10.05	100	14.52	16.76
FSK	8.45	100	15.30	16.31

Note 1: Duty Cycle Factor =  $20 \cdot \log_{10}(1/\text{Duty Cycle})$ .

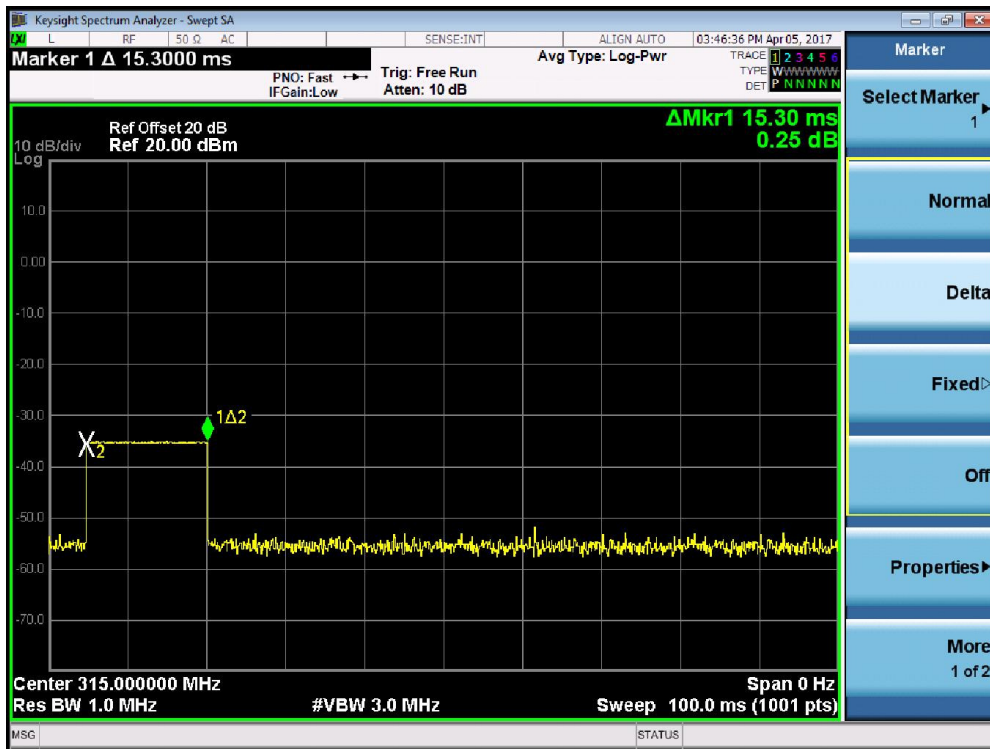
Note 2: For ASK Modulation, Total time (T<sub>on</sub>) (ms) =  $15 \cdot 0.220 \text{ (ms)} + 85 \cdot 0.132 \text{ (ms)} = 14.52 \text{ (ms)}$

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: TTETSB403 & IC: 6707A-TSB403** 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 \_\_\_\_\_