

**APPLICATION CERTIFICATION**  
On Behalf of  
Guangdong Victor Electronics Co.,Ltd.

**OE Replacement Sensor**

Model No.: TPNZ005-315, America315.00MHz-1, America315.00MHz-2

**FCC ID: 2APZR-TPNZ005**

Prepared for : Guangdong Victor Electronics Co.,Ltd.  
Address : 3/F, Building 19, No.16 Chuangye Road, Torch Development  
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Report Number : ATE20180402  
Date of Test : March 26-April 7, 2018  
Date of Report : April 9, 2018

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## Test Report Certification

Applicant : Guangdong Victor Electronics Co.,Ltd.  
Manufacturer : Guangdong Victor Electronics Co.,Ltd.  
EUT Description : OE Replacement Sensor  
Model No. : TPNZ005-315, America315.00MHz-1, America315.00MHz-2  
Trade Mark : N/A

Measurement Procedure Used:

**FCC Rules and Regulations Part 15 Subpart C Section 15.231e  
ANSI C63.10-2013**

The device described above is tested by Shenzhen Accurate Technology Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C Section 15.231e. The measurement results are contained in this test report and Shenzhen Accurate Technology Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of Shenzhen Accurate Technology Co., Ltd.

Date of Test :

March 26-April 7, 2018

Date of Report :

April 9, 2018

Prepared by :

  
(Sean Yang, Engineer)



Approved & Authorized Signer :

  
(Sean Liu, Manager)

## 1. GENERAL INFORMATION

### 1.1. Description of Device (EUT)

EUT : OE Replacement Sensor

Model Number : TPNZ005-315, America315.00MHz-1, America315.00MHz-2  
(Note: Above series are identical in schematic, structure and critical components except for model name. So we prepare TPNZ005-315 for test only.)

Power Supply : DC 3V (Powered by battery)

Modulation Mode : FSK

Operation Frequency : 315MHz

Antenna type : Integral Antenna

Antenna gain : 0dBi

RF power setting in test : Max power

Applicant : Guangdong Victor Electronics Co.,Ltd.  
Address : 3/F, Building 19, No.16 Chuangye Road, Torch Development Zone, Zhongshan City, Guangdong Province, China

Manufacturer : Guangdong Victor Electronics Co.,Ltd.  
Address : 3/F, Building 19, No.16 Chuangye Road, Torch Development Zone, Zhongshan City, Guangdong Province, China

Date of sample received : March 22, 2018

Date of Test : March 26-April 7, 2018

## 1.2.Description of Test Facility

EMC Lab	: Recognition of accreditation by Federal Communications Commission (FCC) The Designation Number is CN1189 The Registration Number is 708358
	Listed by Innovation, Science and Economic Development Canada (ISED) The Registration Number is 5077A-2
	Accredited by China National Accreditation Service for Conformity Assessment (CNAS) The Registration Number is CNAS L3193
	Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 4297.01
Name of Firm	: Shenzhen Accurate Technology Co., Ltd.
Site Location	: 1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China

## 1.3.Measurement Uncertainty

Conducted Emission Expanded Uncertainty	=	2.23dB, k=2
Radiated emission expanded uncertainty (9kHz-30MHz)	=	3.08dB, k=2
Radiated emission expanded uncertainty (30MHz-1000MHz)	=	4.42dB, k=2
Radiated emission expanded uncertainty (Above 1GHz)	=	4.06dB, k=2

## 2. MEASURING DEVICE AND TEST EQUIPMENT

**Table 1: List of Test and Measurement Equipment**

Kind of equipment	Manufacturer	Type	S/N	Calibrated dates	Cal. Interval
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	Jan. 06, 2018	One Year
EMI Test Receiver	Rohde&Schwarz	ESPI3	101526/003	Jan. 06, 2018	One Year
Spectrum Analyzer	Agilent	E7405A	MY45115511	Jan. 06, 2018	One Year
Pre-Amplifier	Rohde&Schwarz	CBLU118354 0-01	3791	Jan. 06, 2018	One Year
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan. 06, 2018	One Year
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan. 06, 2018	One Year
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan. 06, 2018	One Year
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1067	Jan. 06, 2018	One Year
LISN	Rohde&Schwarz	ESH3-Z5	100305	Jan. 06, 2018	One Year
LISN	Schwarzbeck	NSLK8126	8126431	Jan. 06, 2018	One Year
Highpass Filter	Wainwright Instruments	WHKX3.6/18 G-10SS	N/A	Jan. 06, 2018	One Year
Band Reject Filter	Wainwright Instruments	WRCG2400/2 485-2375/2510 -60/11SS	N/A	Jan. 06, 2018	One Year

### 3. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
Section 15.207	Conducted Emission	N/A
Section 15.231(e)	Radiated Emission	Compliant
Section 15.231(c)	20dB Bandwidth	Compliant
Section 15.231(e)	Release Time Measurement	Compliant
Section 15.203	Antenna Requirement	Compliant

The product is a activated automatically transmitter.

Note: The power supply mode of the EUT is DC 3V, According to the FCC standard requirements, conducted emission is not applicable

All normal using modes of the normal function were tested but only the worst test data of the worst mode is recorded by this report.

## 4. THE FIELD STRENGTH OF RADIATION EMISSION

### 4.1. Block Diagram of Test Setup

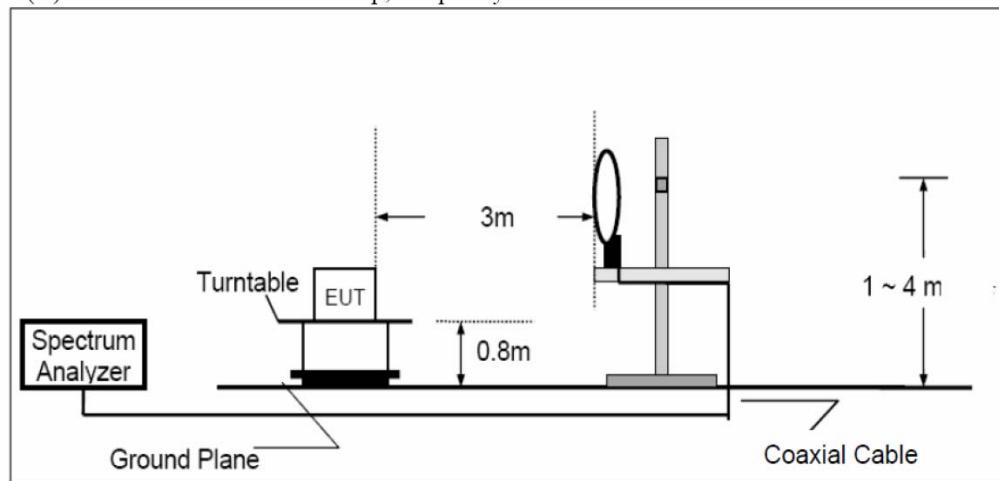
#### 4.1.1. Block diagram of connection between the EUT and simulators



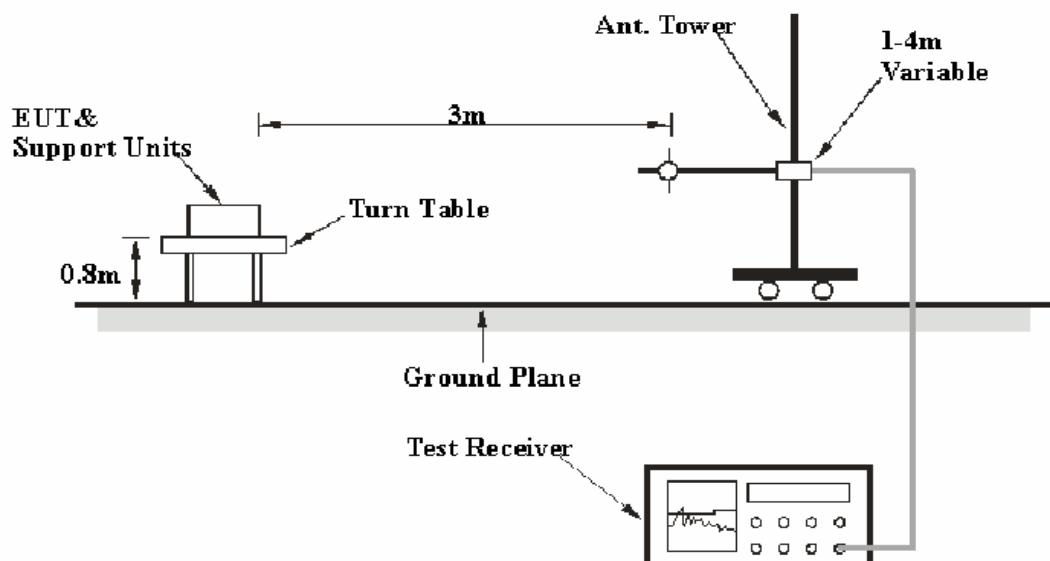
(EUT: OE Replacement Sensor)

#### 4.1.2. Semi-Anechoic Chamber Test Setup Diagram

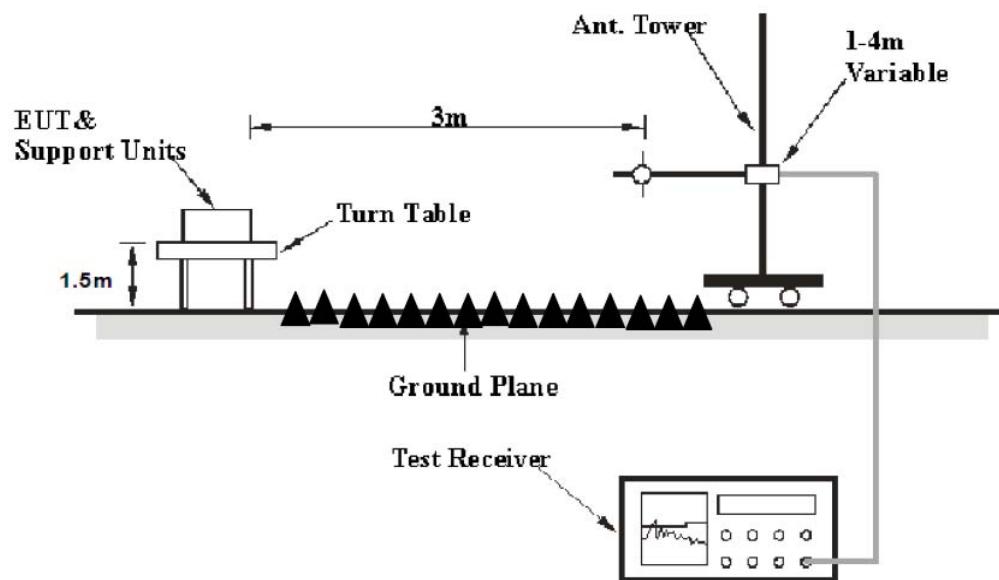
(A) Radiated Emission Test Set-Up, Frequency below 30MHz



(B) Radiated Emission Test Set-Up, Frequency 30-1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1GHz



## 4.2. The Field Strength of Radiation Emission Measurement Limits

### 4.2.1. Radiation Emission Measurement Limits According to FCC Part 15 Section 15.231(e)

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

<sup>1</sup> Linear interpolations.

Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz,  $\text{uV/m at 3 meters} = 22.73(F) - 2454.55$ ; for the band 260-470 MHz,  $\text{uV/m at 3 meters} = 16.67(F) - 2833.33$ . The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.

### 4.2.2. Restricted Band Radiation Emission Measurement Limits According to FCC part 15 Section 15.205 and Section15.209.

#### 4.3. Configuration of EUT on Measurement

The equipment is installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

#### 4.4. Operating Condition of EUT

4.4.1. Setup the EUT and simulator as shown as Section 4.1.

4.4.2. Turn on the power of all equipment.

4.4.3. Let the EUT work in TX mode measure it.

#### 4.5. Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground(Below 1GHz). The EUT and its simulators are placed on a turntable, which is 1.5 meter high above ground(Above 1GHz). The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bi-log antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the EUT location must be manipulated according to ANSI C63.10:2013 on radiated emission measurement. This EUT was tested in 3 orthogonal positions and the worst case position data was reported.

The bandwidth of test receiver is set at 120 kHz in 30-1000 MHz, and 1 MHz in 1000 MHz.

#### 4.6. The Field Strength of Radiation Emission Measurement Results

**PASS.**

The frequency range from 30 MHz to 6000 MHz is checked.

EUT :		OE Replacement Sensor							
Model No. :		TPNZ005-315				Power Supply :		DC 3V	
Test Mode :		TX				Test Engineer :		Frank	
Frequency (MHz)	Reading (dB $\mu$ V/m)		Factor Corr.	Average Factor	Result(dB $\mu$ V/m)		Limit(dB $\mu$ V/m)		Margin(dB)
	PEAK		(dB)	(dB)	AV	PEAK	AV	PEAK	AV
<b>315.00</b>	72.17	-15.91	<b>-6.97</b>	<b>49.29</b>	56.26	<b>67.67</b>	<b>87.67</b>	<b>-18.38</b>	<b>-31.41</b>
630.0878	46.62	-9.33	<b>-6.97</b>	30.32	37.29	47.67	67.67	-17.35	-30.38
945.0213	46.99	-3.63	<b>-6.97</b>	36.39	43.36	47.67	67.67	-11.28	-24.31
1890.002	50.77	-9.63	<b>-6.97</b>	34.17	41.14	47.67	67.67	-13.50	-26.53
2205.096	47.14	-8.55	<b>-6.97</b>	31.62	38.59	47.67	67.67	-16.05	-29.08
2520.093	51.26	-7.76	<b>-6.97</b>	36.53	43.50	47.67	67.67	-11.14	-24.17
<b>315.00</b>	<b>69.10</b>	<b>-15.91</b>	<b>-6.97</b>	<b>43.22</b>	<b>53.19</b>	<b>67.67</b>	<b>87.67</b>	<b>-24.45</b>	<b>-34.48</b>
630.0884	46.60	-9.41	<b>-6.97</b>	30.22	37.19	47.67	67.67	-17.45	-30.48
945.0398	41.98	-3.63	<b>-6.97</b>	31.38	38.35	47.67	67.67	-16.29	-29.32
1575.042	45.26	-11.05	<b>-6.97</b>	27.24	34.21	47.67	67.67	-20.43	-33.46
1890.002	51.57	-9.63	<b>-6.97</b>	34.97	41.94	47.67	67.67	-12.70	-25.73
2520.093	53.43	-7.76	<b>-6.97</b>	38.70	45.67	47.67	67.67	-8.97	-22.00

Note:

1. Emissions attenuated more than 20 dB below the permissible value are not reported.
2. The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

Result = Reading + Corrected Factor

Where Corrected Factor = Antenna Factor + Cable Loss + High Pass Filter Loss – Amplifier Gain

3. FCC Limit for Average Measurement =  $16.67(315) - 2833.33 = 2417.72 \mu\text{V/m} = 67.67 \text{ dB}\mu\text{V/m}$

4. The spectral diagrams in appendix I display the measurement of peak values.

5. Average value= PK value + Average Factor (duty factor)

6. If the peak-detected amplitude can be shown to comply with the average limit, then it is not necessary to perform a separate average measurement.

7. The EUT is tested radiation emission in three axes(X,Y,Z). The worst emissions are reported in three axes.

8. Pulse Desensitization Correction Factor

Pulse Width (PW) = 1.5ms

$2/\text{PW} = 2/1.5\text{ms} = 1.333\text{kHz}$

RBW (100kHz) > 2/PW (5kHz)

Therefore PDCF is not needed.



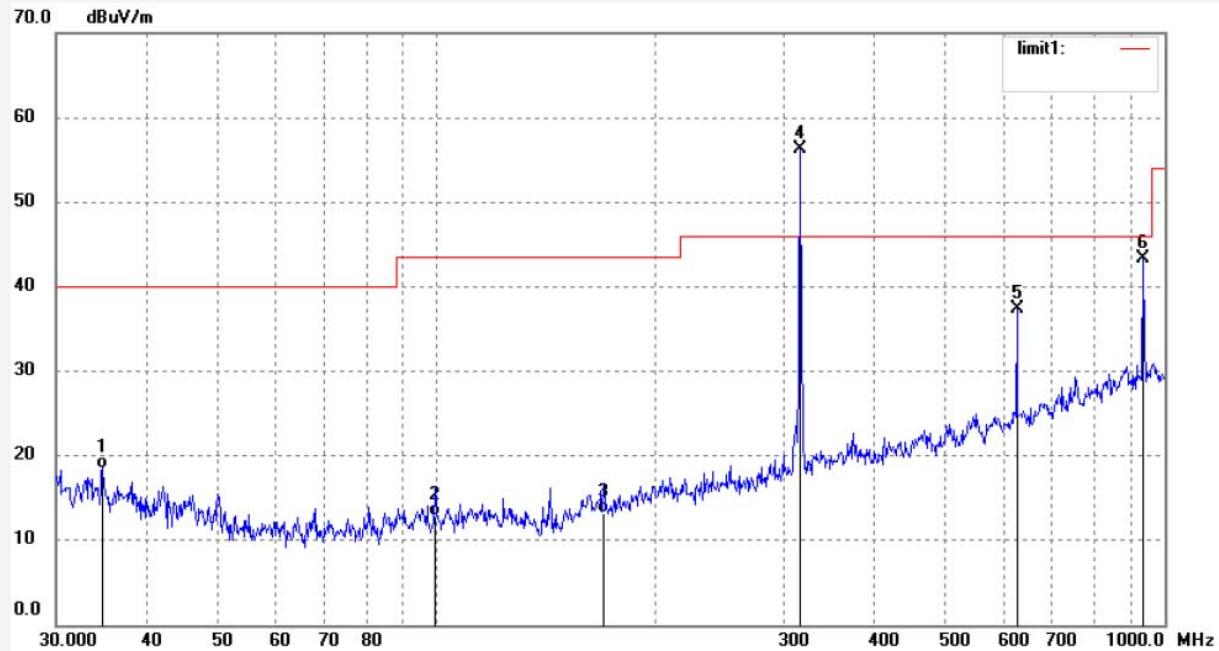
## ACCURATE TECHNOLOGY CO., LTD.

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,  
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber  
Tel:+86-0755-26503290  
Fax:+86-0755-26503396

Job No.: frank2017 #2321	Polarization: Horizontal
Standard: FCC Class B 3M Radiated	Power Source: DC 3V
Test item: Radiation Test	Date: 18/04/02/
Temp. ( C)/Hum.(%) 25 C / 55 %	Time: 11/03/34
EUT: OE Replacement Sensor	Engineer Signature: Frank
Mode: TX 315MHz	Distance: 3m
Model: TPNZ005-315	
Manufacturer: Guangdong Victor Electronics Co.,Ltd	

Note: Report NO.:ATE20180402



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	34.7704	36.02	-17.47	18.55	40.00	-21.45	QP	200	36	
2	99.4175	34.54	-21.67	12.87	43.50	-30.63	QP	200	219	
3	169.5919	33.48	-20.33	13.15	43.50	-30.35	QP	200	97	
4	315.0599	72.17	-15.91	56.26			peak	200	19	
5	630.0878	46.62	-9.33	37.29			peak	200	200	
6	945.0213	46.99	-3.63	43.36			peak	200	178	



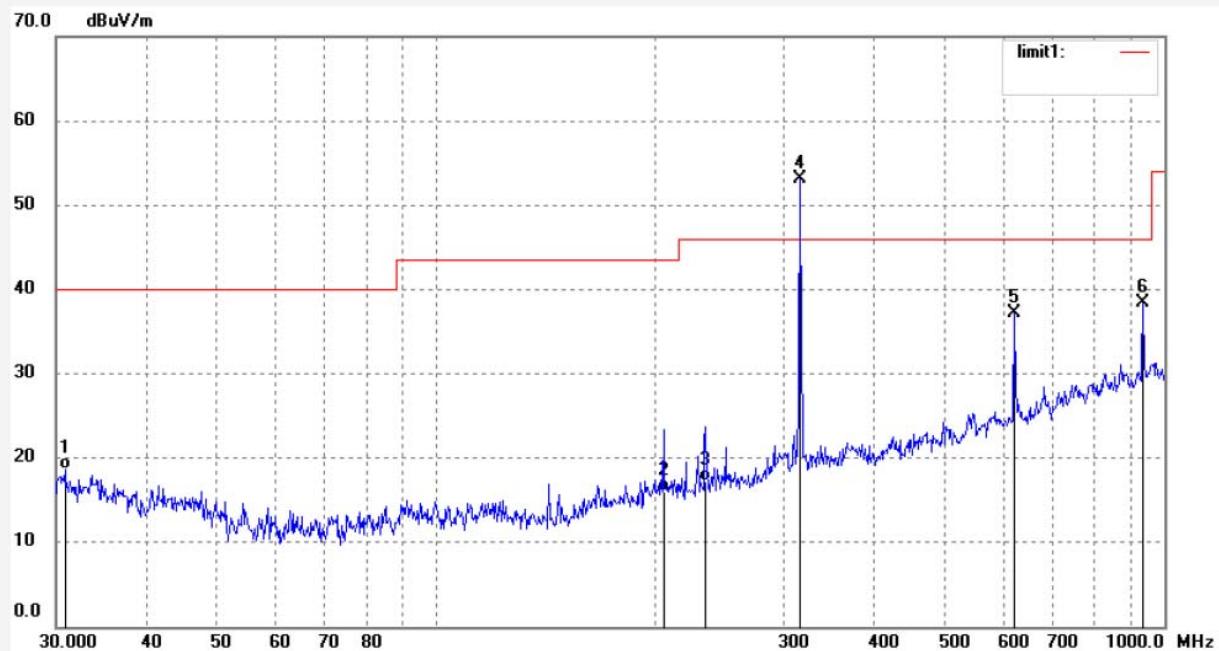
## ACCURATE TECHNOLOGY CO., LTD.

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,  
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber  
Tel:+86-0755-26503290  
Fax:+86-0755-26503396

Job No.: frank2017 #2322	Polarization: Vertical
Standard: FCC Class B 3M Radiated	Power Source: DC 3V
Test item: Radiation Test	Date: 18/04/02/
Temp.( C)/Hum.(%) 25 C / 55 %	Time: 11/04/41
EUT: OE Replacement Sensor	Engineer Signature: Frank
Mode: TX 315MHz	Distance: 3m
Model: TPNZ005-315	
Manufacturer: Guangdong Victor Electronics Co.,Ltd	

Note: Report NO.:ATE20180402



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	30.8551	35.55	-16.92	18.63	40.00	-21.37	QP	100	128	
2	205.0243	34.48	-18.52	15.96	43.50	-27.54	QP	100	130	
3	234.3097	35.48	-18.29	17.19	46.00	-28.81	QP	100	165	
4	315.0599	69.10	-15.91	53.19			peak	100	268	
5	630.0993	46.60	-9.41	37.19			peak	100	109	
6	945.0213	41.98	-3.63	38.35			peak	100	183	



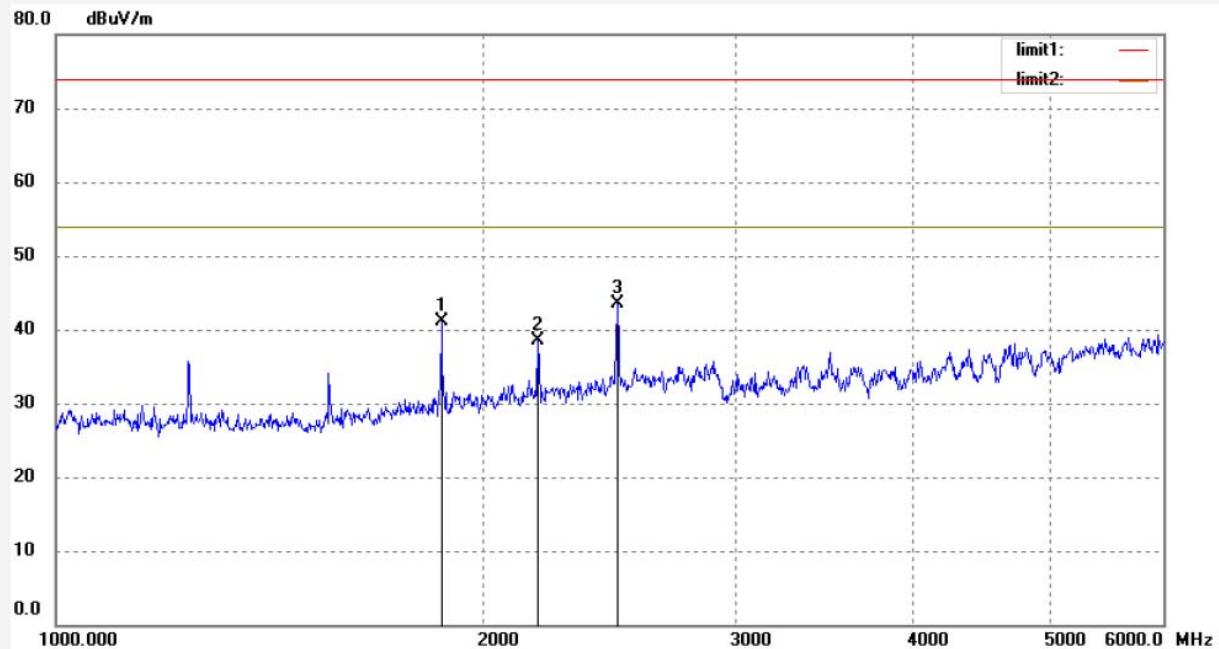
## ACCURATE TECHNOLOGY CO., LTD.

F1,Bldg.A,Changyuan New Material Port Keyuan Rd,  
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber  
Tel:+86-0755-26503290  
Fax:+86-0755-26503396

Job No.: frank2017 #2320	Polarization: Horizontal
Standard: FCC PK	Power Source: DC 3V
Test item: Radiation Test	Date: 18/04/02/
Temp. ( C)/Hum.(%) 25 C / 55 %	Time: 11/02/04
EUT: OE Replacement Sensor	Engineer Signature: Frank
Mode: TX 315MHz	Distance: 3m
Model: TPNZ005-315	
Manufacturer: Guangdong Victor Electronics Co.,Ltd	

Note: Report NO.:ATE20180402



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	1890.002	50.77	-9.63	41.14			peak	200	199	
2	2205.096	47.14	-8.55	38.59			peak	200	140	
3	2520.093	51.26	-7.76	43.50			peak	200	66	

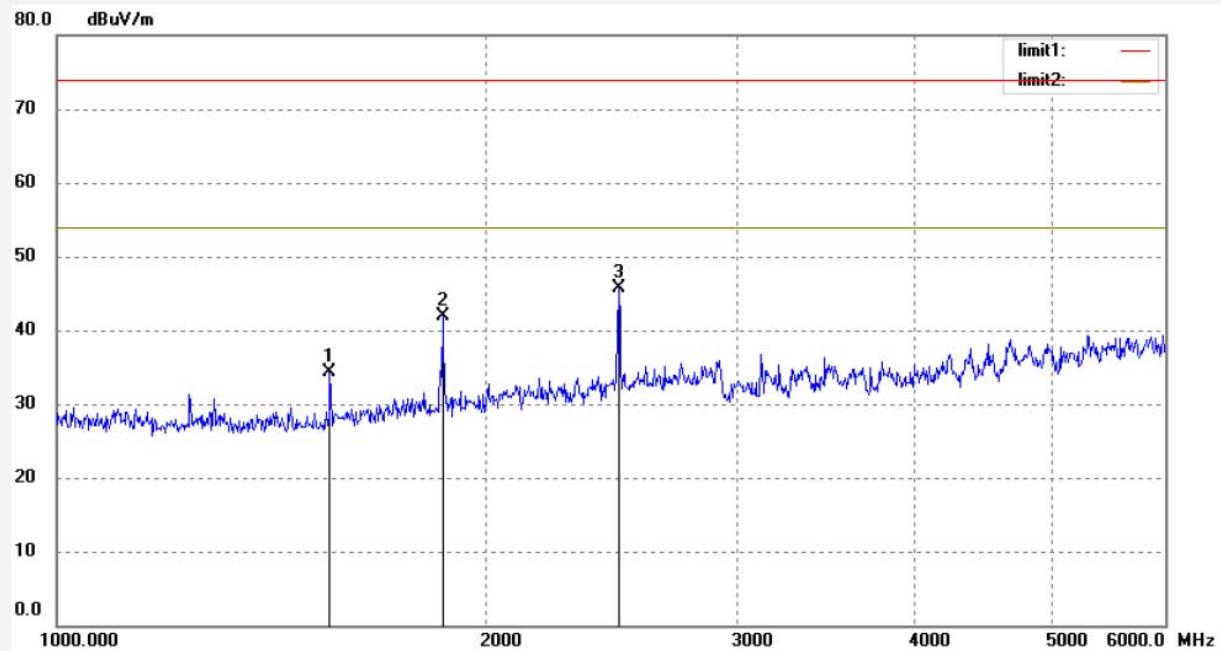


## ACCURATE TECHNOLOGY CO., LTD.

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,  
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber  
Tel:+86-0755-26503290  
Fax:+86-0755-26503396

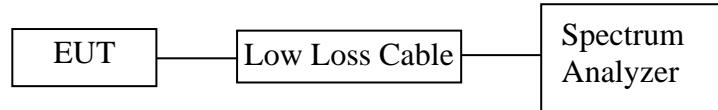
Job No.: frank2017 #2319	Polarization: Vertical
Standard: FCC PK	Power Source: DC 3V
Test item: Radiation Test	Date: 18/04/02/
Temp. ( C)/Hum.(%) 25 C / 55 %	Time: 11/01/03
EUT: OE Replacement Sensor	Engineer Signature: Frank
Mode: TX 315MHz	Distance: 3m
Model: TPNZ005-315	
Manufacturer: Guangdong Victor Electronics Co.,Ltd	
Note: Report NO.:ATE20180402	



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	1575.042	45.26	-11.05	34.21			peak	150	117	
2	1890.002	51.57	-9.63	41.94			peak	150	305	
3	2520.093	53.43	-7.76	45.67			peak	150	188	

## 5. 20DB OCCUPIED BANDWIDTH

### 5.1. Block Diagram of Test Setup



(EUT: OE Replacement Sensor)

### 5.2. The Bandwidth of Emission Limit According To FCC Part 15 Section

#### 15.231(c)

The bandwidth of emission shall be no wider than 0.25% of the center frequency. Therefore, the bandwidth of the emission limit is  $315 \text{ MHz} \times 0.25\% = 787.5 \text{ kHz}$ . Bandwidth is determined at the two points 20 dB down from the top of modulated carrier.

### 5.3. EUT Configuration on Measurement

The equipment are installed on the bandwidth of emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

### 5.4. Operating Condition of EUT

5.4.1. Setup the EUT and simulator as shown as Section 5.1.

5.4.2. Turn on the power of all equipment.

5.4.3. Let the EUT work in TX mode measure it.

### 5.5. Test Procedure

5.5.1. Set SPA Center Frequency = Fundamental frequency, RBW = 10 kHz, VBW = 30 kHz, Span = 1MHz.

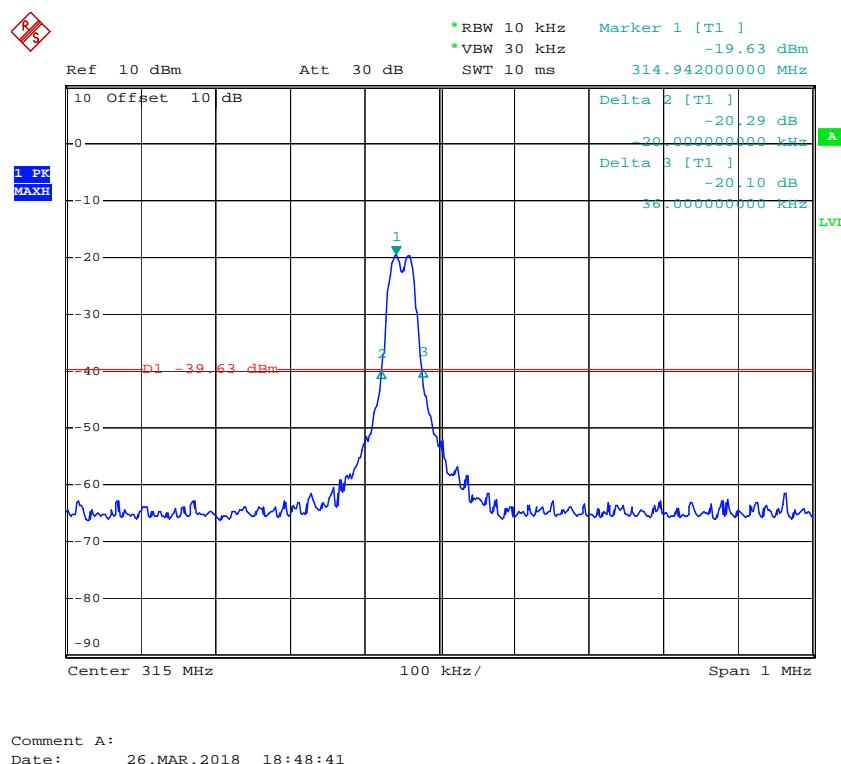
5.5.2. Set SPA Max hold, Mark peak, -20 dB.

## 5.6.Measurement Result

**The EUT does meet the FCC requirement.**

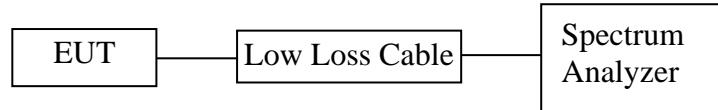
-20 dB bandwidth =56.0 kHz <787.5KHz.

The spectral following.



## 6. RELEASE TIME MEASUREMENT

### 6.1. Block Diagram of Test Setup



(EUT: OE Replacement Sensor)

### 6.2. Release Time Measurement According To FCC Part 15 Section 15.231(e)

Section 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.

### 6.3. EUT Configuration on Measurement

The equipment are installed on Release Time Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

### 6.4. Operating Condition of EUT

6.4.1. Setup the EUT and simulator as shown as Section 6.1.

6.4.2. Turn on the power of all equipment.

6.4.3. Let the EUT work in TX mode measure it.

### 6.5. Test Procedure

6.5.1. Set SPA Center Frequency = Fundamental frequency, RBW = 100 kHz, VBW = 300 kHz, Span = 0 Hz.

6.5.2. Set EUT as normal operation and press Transmitter button.

6.5.3. Set SPA View. Delta Mark time.

## 6.6. Measurement Result

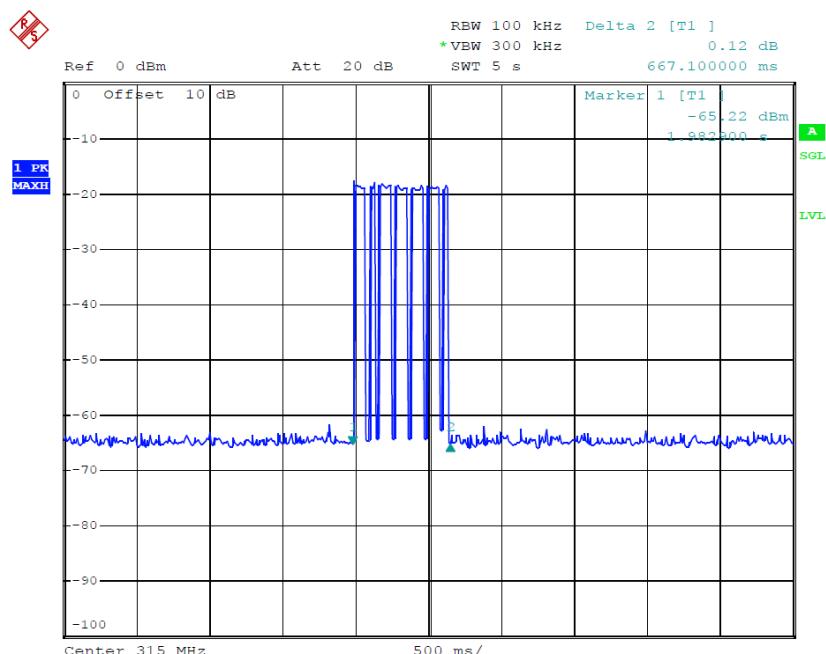
**Test result: pass**

Period Time =  $30.467\text{s}+667.1\text{ms}=31.1341\text{s}$

Duration time =  $667.1\text{ms} < 1\text{s}$

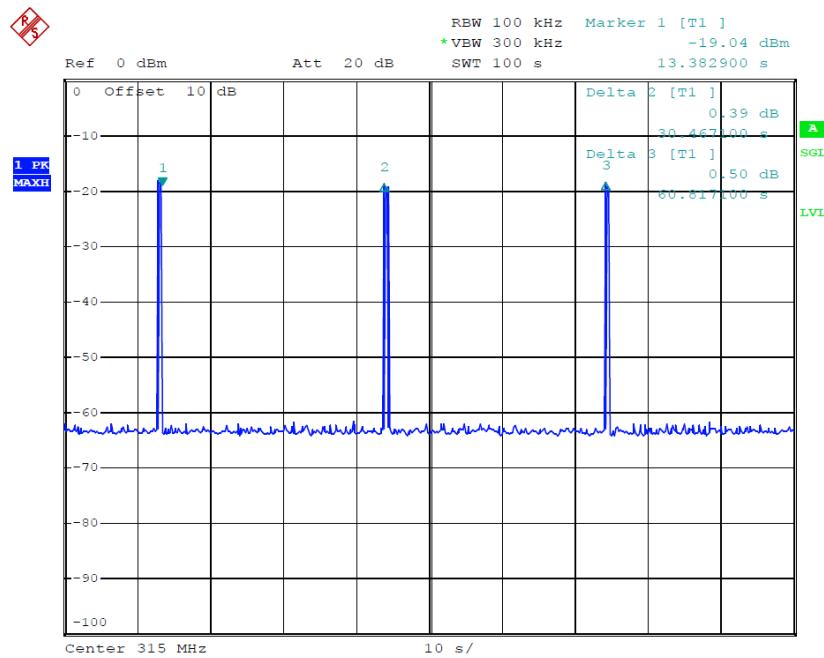
Silent time =  $30.467\text{s} > 10\text{s}$

Silent time =  $30.467\text{s} > 30*667.1\text{ms}=20.013\text{s}$



Date: 7.APR.2018 13:05:50

the duration of a transmission Time = 667.1ms

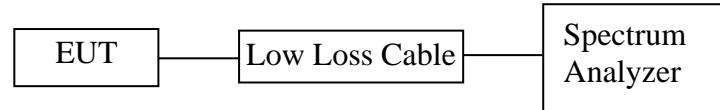


Date: 7.APR.2018 13:09:57

the silent period between transmissions =30.467s

## 7. AVERAGE FACTOR MEASUREMENT

### 7.1. Block Diagram of Test Setup



(EUT: OE Replacement Sensor)

### 7.2. Average factor Measurement according to ANSI C63.10-2013

**ANSI C63.10-2013 Section 7.5** Unless otherwise specified, when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 s (100 ms). In cases where the pulse train exceeds 0.1 s, the measured field strength shall be determined during a 0.1 s interval.<sup>64</sup> The following procedure is an example of how the average value may be determined. The average field strength may be found by measuring the peak pulse amplitude (in log equivalent units) and determining the duty cycle correction factor (in dB) associated with the pulse modulation as shown in Equation (10):

$$\text{Average factor in dB} = 20 \log (\text{duty cycle})$$

### 7.3. EUT Configuration on Measurement

The equipment are installed on average factor Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

### 7.4. Operating Condition of EUT

7.4.1. Setup the EUT and simulator as shown as Section 7.1.

7.4.2. Turn on the power of all equipment.

7.4.3. Let the EUT work in TX mode measure it.

## 7.5. Test Procedure

7.5.1. The time period over which the duty cycle is measured is 100 milliseconds, or the repetition cycle, whichever is a shorter time frame. The worst case (highest percentage on) duty cycle is used for the calculation.

7.5.2. Set SPA Center Frequency = Fundamental frequency, RBW = 100 kHz, VBW = 300 kHz, Span = 0 Hz.

7.5.3. Set EUT as normal operation.

7.5.4. Set SPA View. Delta Mark time.

## 7.6. Measurement Result

**The duty cycle is simply the on time divided by the period:**

The duration of one cycle = 55.1 ms

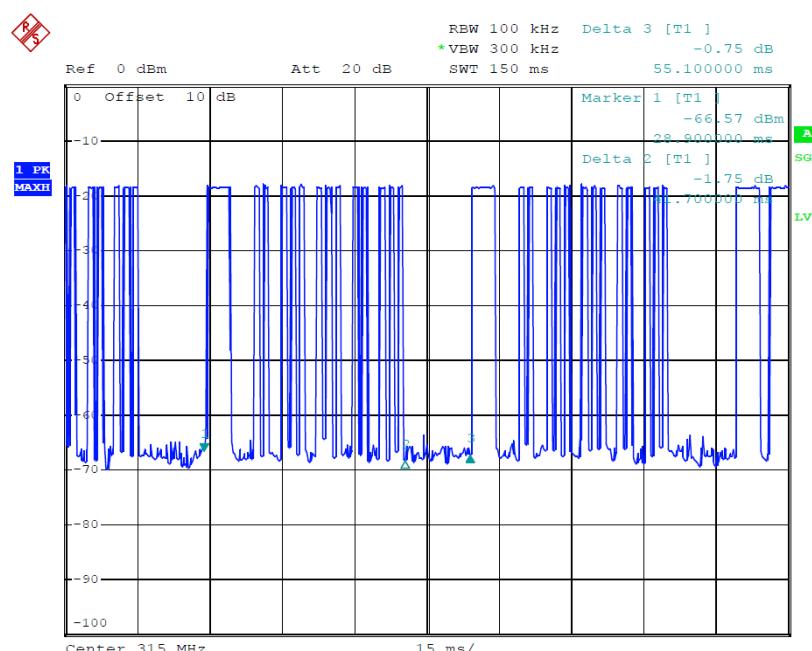
Effective period of the cycle =  $5.2 + (1.5 \times 13)$  ms = 24.7 ms

DC = 24.7 ms / 55.1 ms = 0.448

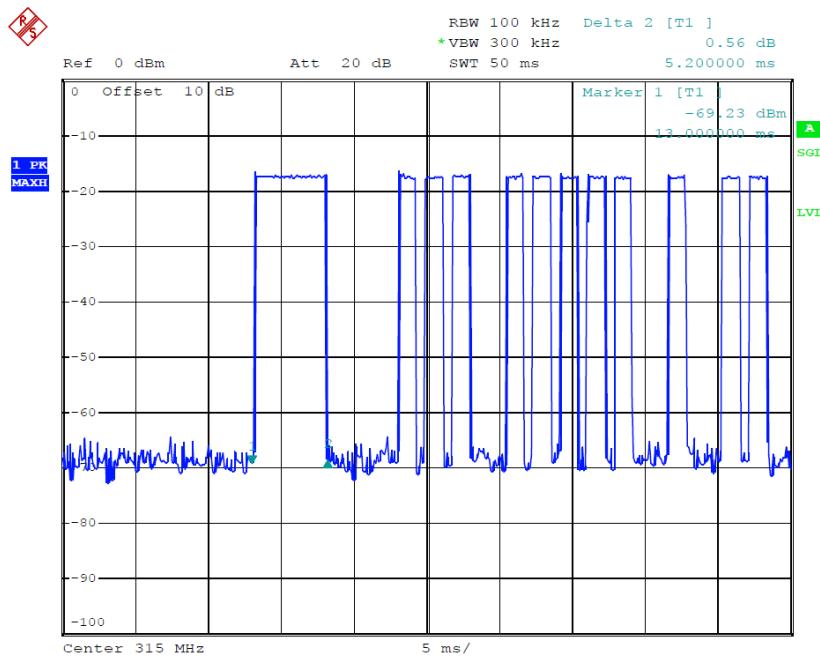
**Therefore, the average factor is found by  $20\log 0.448 = -6.97$  dB**

The spectral following.

The graph shows the pattern of coding during the signal transmission.  
The duration of one cycle = 55.1 ms.

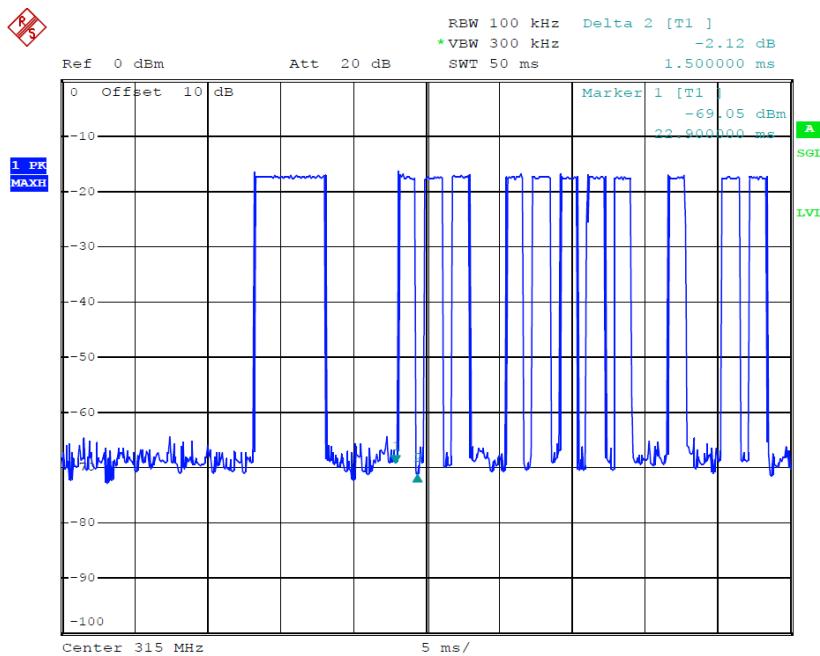


Date: 7.APR.2018 12:59:33



Date: 7.APR.2018 13:01:13

The graph shows the duration of 'on' signal. From marker 1 to marker 2, duration is 5.2 ms.



Date: 7.APR.2018 13:01:52

The graph shows the duration of 'on' signal. From marker 1 to marker 2, duration is 1.5 ms.

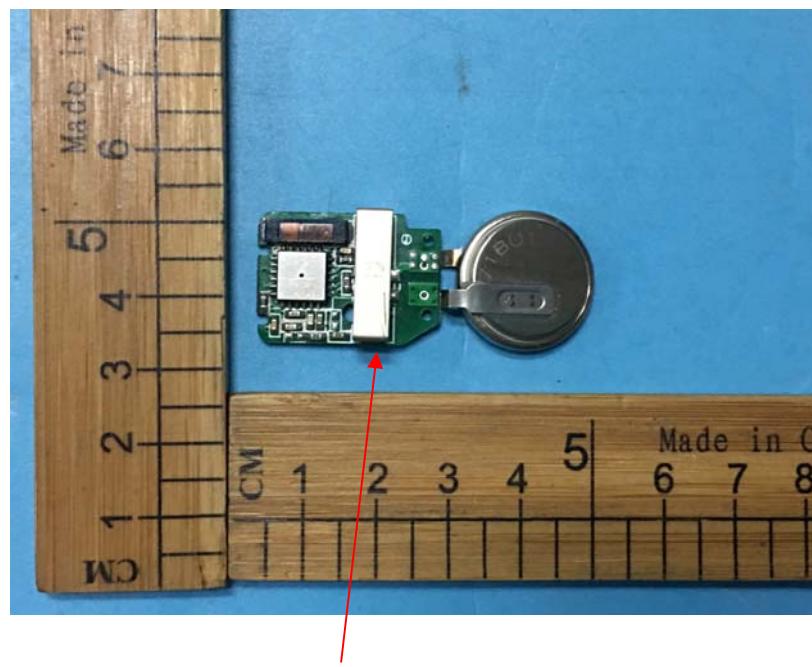
## 8. ANTENNA REQUIREMENT

### 8.1. The Requirement

According to Section 15.203, 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.

### 8.2. Antenna Construction

Device is equipped with permanent attached antenna, which isn't displaced by other antenna. The Antenna gain of EUT is 0dBi. Therefore, the equipment complies with the antenna requirement of Section 15.203.



\*\*\*\*\* End of Test Report \*\*\*\*\*