APPLICATION CERTIFICATION
On Behalf of
Chuango Security Technology Corporation

Water Senor
Model No.: FD2200, WI-20

FCC ID: RJY-FDWI20

Prepared for	:	Chuango Security Technology Corporation.
Address	:	6-17, Overseas Students Pioneer Park, No. 108, Jia Economic & Technological Development Zone, Fuzhou 350015, China
Prepared by	:	Accurate Technology Co., Ltd.
Address	:	F1, Bldg. A&D, Changyuan New Material Port, Keyuan Rd., Science & Industry Park, Nanshan District Shenzhen 518057, P.R. China Tel: +86-755-26503290 Fax: +86-755-26503396

Report No.	:	ATE20161267
Date of Test	:	June 28, 2016
Date of Report	:	July 20, 2016

TABLE OF CONTENTS

Description Page

Test Report Certification

Applicant	:	Chuango Security Technology Corporation
Manufacturer	:	Chuango Security Technology Corporation
EUT Description	:	Water Senor

(A) MODEL NO.: FD2200, WI-20

(B) SERIAL NO.: N/A

(C) POWER SUPPLY: DC 3.0V (powered by Battery)

Measurement Procedure Used:

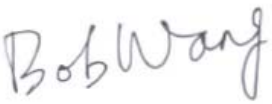
FCC Rules and Regulations Part 15 Subpart C Section 15.231e
ANSI C63.10-2013

The device described above is tested by 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 15.231. The measurement results are contained in this test report and 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.

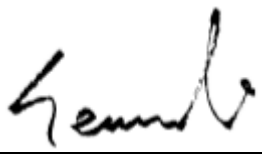
This report applies to above tested sample only. This report shall not be reproduced in part without written approval of ACCURATE TECHNOLOGY CO., LTD.

Date of Test : June 28, 2016

Date of Report : July 20, 2016

Prepared by : 

(Bob Wang , Engineer)

Approved & Authorized Signer : 

(Sean Liu, Manager)

1. GENERAL INFORMATION

1.1.Description of Device (EUT)

EUT	:	Water Senor
Model Number	:	FD2200, WI-20 (Note: Above models are identical in schematic, structure and critical components except for model name. So we prepare FD2200 for test only.)
Trade Mark	:	smanos
Power Supply	:	DC 3.0V (powered by battery)
Modulation:	:	ASK
Operation Frequency	:	915MHz
Applicant	:	Chuango Security Technology Corporation
Address	:	6-17, Overseas Students Pioneer Park, No. 108, Jia Economic & Technological Development Zone, Fuzhou 350015, China
Manufacturer	:	Chuango Security Technology Corporation
Address	:	6-17, Overseas Students Pioneer Park, No. 108, Jia Economic & Technological Development Zone, Fuzhou 350015, China
Date of sample received	:	June 20, 2016
Date of Test	:	June 28, 2016

1.2.Description of Test Facility

EMC Lab	:	Accredited by TUV Rheinland Shenzhen Listed by FCC The Registration Number is 752051 Listed by Industry Canada The Registration Number is 5077A-2 Accredited by China National Accreditation Committee for Laboratories The Certificate Registration Number is L3193
Name of Firm	:	ACCURATE TECHNOLOGY CO., LTD
Site Location	:	F1, Bldg. A, Changyuan New Material Port, Keyuan Rd. Science & Industry Park, Nanshan, 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. 9, 2016	One Year
EMI Test Receiver	Rohde&Schwarz	ESPI3	101526/003	Jan. 9, 2016	One Year
Spectrum Analyzer	Agilent	E7405A	MY45115511	Jan. 9, 2016	One Year
Pre-Amplifier	Rohde&Schwarz	CBLU1183540-01	3791	Jan. 9, 2016	One Year
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan. 14, 2016	One Year
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan. 14, 2016	One Year
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan. 14, 2016	One Year
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1067	Jan. 14, 2016	One Year
LISN	Rohde&Schwarz	ESH3-Z5	100305	Jan. 9, 2016	One Year
LISN	Schwarzbeck	NSLK8126	8126431	Jan. 9, 2016	One Year
Highpass Filter	Wainwright Instruments	WHKX3.6/18G-10SS	N/A	Jan. 9, 2016	One Year
Band Reject Filter	Wainwright Instruments	WRCG2400/2485-2375/2510-60/11SS	N/A	Jan. 9, 2016	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

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.

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

4. THE FIELD STRENGTH OF RADIATION EMISSION

4.1.Block Diagram of Test Setup

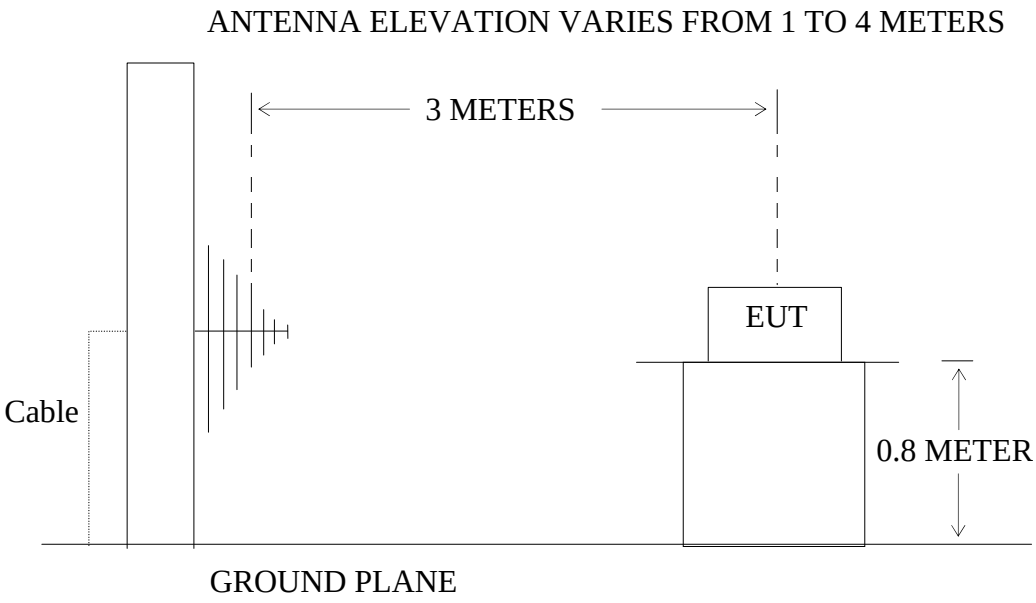
4.1.1.Block diagram of connection between the EUT and simulators

EUT

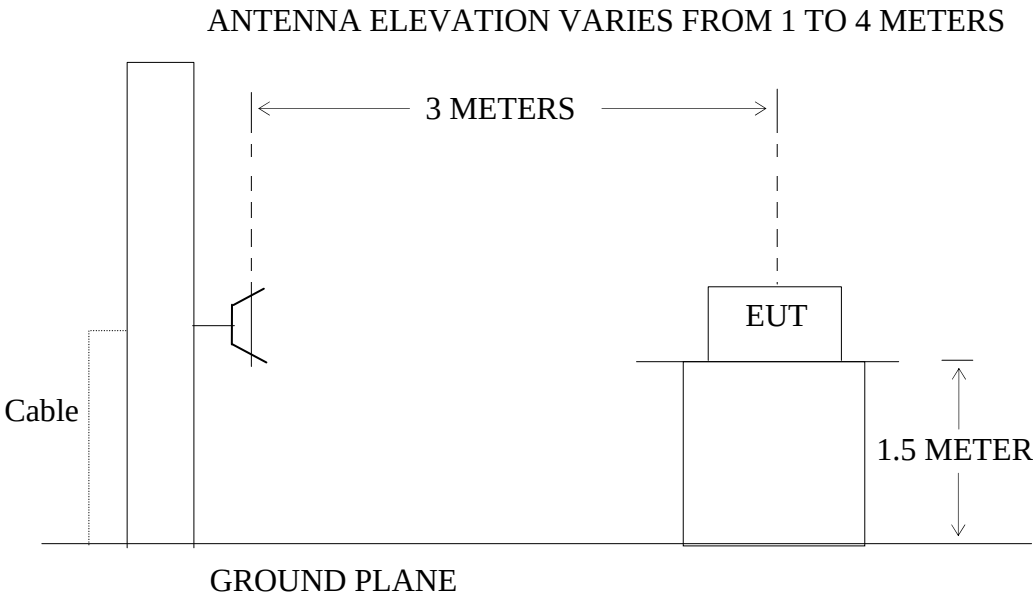
(EUT: Water Senor)

4.1.2.Semi-Anechoic Chamber Test Setup Diagram

Below 1GHz



Above 1GHz



4.2.The Field Strength of Radiation Emission Measurement Limits

4.2.1. Radiation Emission Measurement Limits According to FCC 15.231e

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 [1]	50 to 150 [1]
174–260	1,500	150
260–470	1,500 to 5,000 [1]	150 to 500 [1]
Above 470	5,000	500

1 Linear interpolations

4.3.Configuration of EUT on Measurement

The following 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. 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. The EUT was tested in 3 orthogonal planes.

The bandwidth of test receiver is set at 120 kHz in 30-1000 MHz, and 1 MHz in 1000-10000 MHz.

The frequency range from 30 MHz to 10000 MHz is checked.

4.6. The Field Strength of Radiation Emission Measurement Results

PASS.

The frequency range 30MHz to 10000MHz is investigated.

Date of Test:	June 28, 2016	Temperature:	25°C
EUT:	Water Senor	Humidity:	50%
Model No.:	FD2200	Power Supply:	DC 3.0V
Test Mode:	TX	Test Engineer:	Star

Frequency (MHz)	Reading (dBμV/m)	Factor Corr.	Average Factor	Result(dBμV/m)		Limit(dBμV/m)		Margin(dB)		Polarization
	PEAK	(dB)	(dB)	AV	PEAK	AV	PEAK	AV	PEAK	
915	**81.47**	**-4.11**	**-7.23**	**70.13**	**77.36**	**73.98**	**93.98**	**-3.85**	**-16.62**	Horizontal
40.4411	37.09	-19.13	--	--	17.96	--	40.0	--	-22.04 (QP)	
45.4130	36.23	-19.49	--	--	16.74	--	40.0	--	-23.26 (QP)	
108.6424	36.74	-21.36	--	--	15.40	--	43.5	--	-28.10 (QP)	
198.6424	37.19	-18.79	--	--	18.40	--	43.5	--	-25.10 (QP)	
500.4857	33.10	-12.24	--	--	20.86	--	46.0	--	-25.14 (QP)	
7177.810	42.14	3.21	--	--	45.35	--	74.0	--	-28.65	
915	**75.75**	**-4.11**	**-7.23**	**64.41**	**71.64**	**73.98**	**93.98**	**-9.57**	**-22.34**	Vertical
39.3203	38.00	-18.88	--	--	19.12	--	40.00	--	-20.88 (QP)	
133.0809	38.74	-21.84	--	--	16.90	--	43.5	--	-26.60 (QP)	
212.3558	37.44	-18.46	--	--	18.98	--	43.5	--	-24.52 (QP)	
264.9707	36.67	-17.29	--	--	19.38	--	46.0	--	-26.62 (QP)	
398.2961	37.14	-13.99	--	--	23.15	--	46.0	--	-22.85 (QP)	
7013.284	43.45	2.98	--	--	46.43	--	74.0	--	-27.57	

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. The spectral diagrams display the measurement of peak values.

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

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. Pulse Desensitization Correction Factor

Pulse Width (PW) =0.74ms

2/PW = 2/0.74ms = 2.703kHz

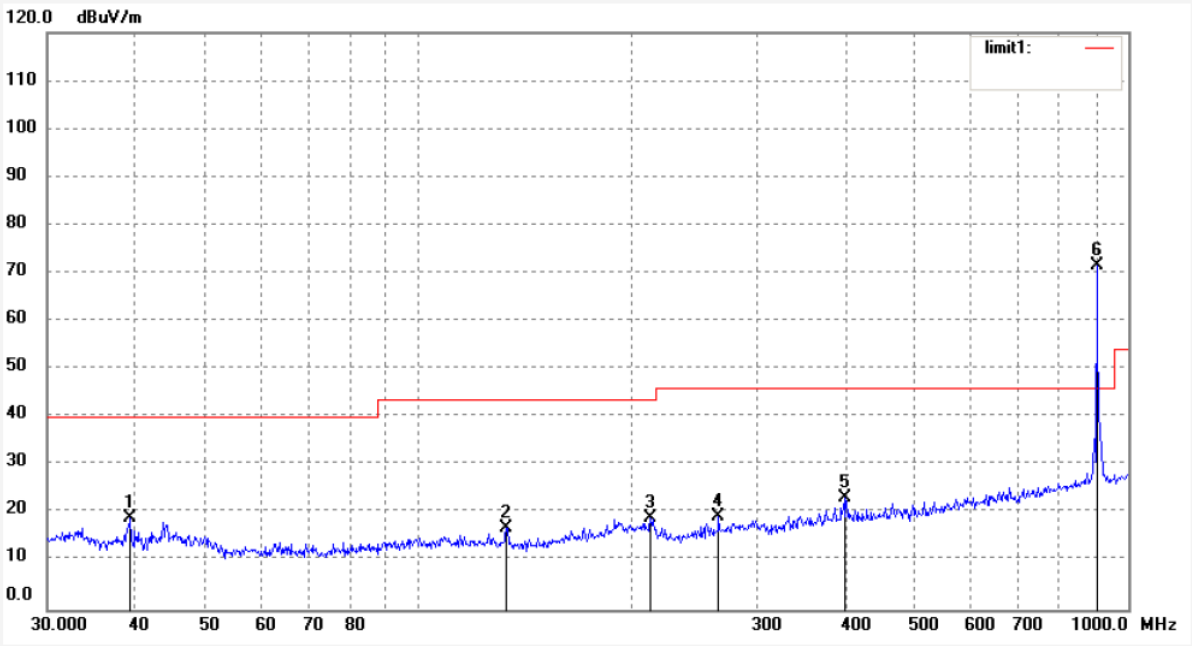
RBW (100 kHz) > 2/PW (2.703 kHz) Therefore PDCF is not needed

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.: STAR2016 #1351
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Water Senor
Mode: TX
Model: FD2200
Manufacturer: Chuango

Polarization: Vertical
Power Source: DC 3V
Date: 16/06/28/
Time: 9/10/00
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20161267



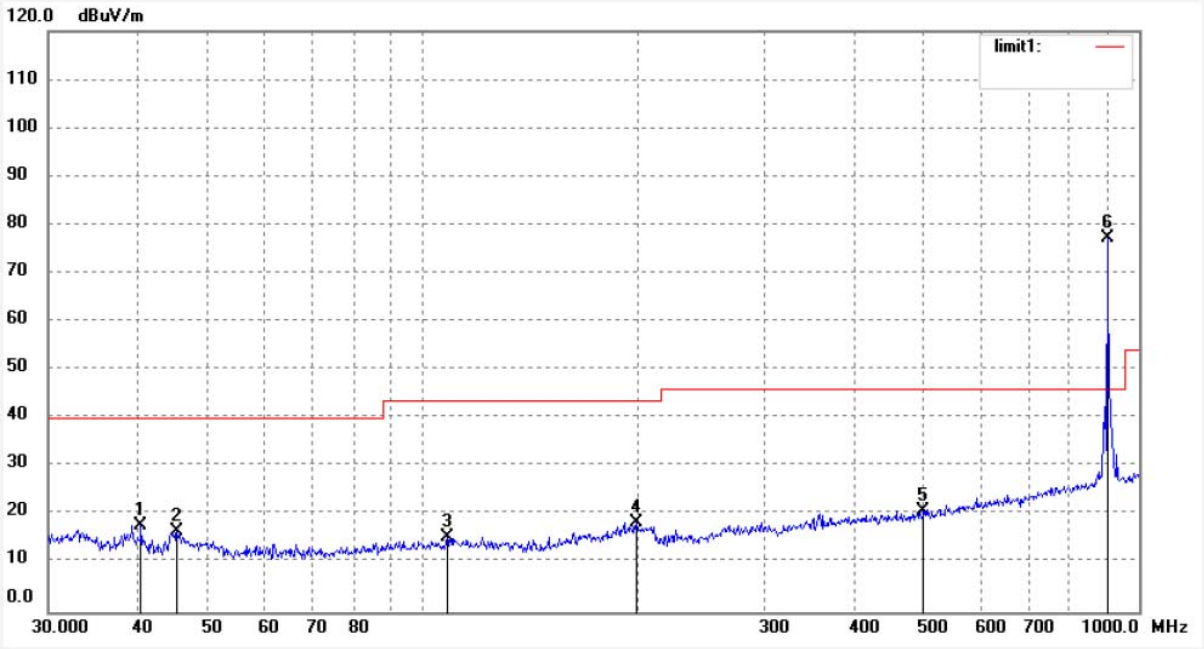
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	39.3203	38.00	-18.88	19.12	40.00	-20.88	QP			"X" axes
2	133.0809	38.74	-21.84	16.90	43.50	-26.60	QP			"X" axes
3	212.3558	37.44	-18.46	18.98	43.50	-24.52	QP			"X" axes
4	264.9707	36.67	-17.29	19.38	46.00	-26.62	QP			"X" axes
5	398.2961	37.14	-13.99	23.15	46.00	-22.85	QP			"X" axes
6	915.0000	75.75	-4.11	71.64	93.98	-22.34	peak			"X" axes

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.: STAR2016 #1352
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Water Senor
Mode: TX
Model: FD2200
Manufacturer: Chuango

Polarization: Horizontal
Power Source: DC 3V
Date: 16/06/28/
Time: 9/11/21
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20161267

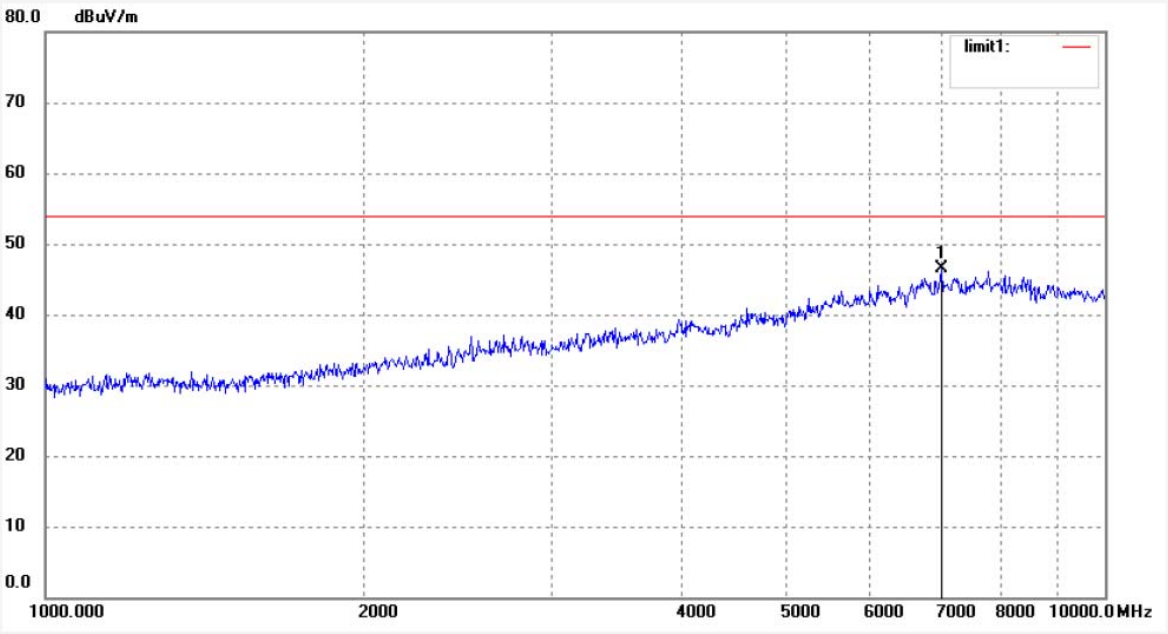


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	40.4411	37.09	-19.13	17.96	40.00	-22.04	QP			"X" axes
2	45.4130	36.23	-19.49	16.74	40.00	-23.26	QP			"X" axes
3	108.1645	36.76	-21.36	15.40	43.50	-28.10	QP			"X" axes
4	198.6424	37.19	-18.79	18.40	43.50	-25.10	QP			"X" axes
5	500.4857	33.10	-12.24	20.86	46.00	-25.14	QP			"X" axes
6	915.0000	81.47	-4.11	77.36	93.98	-16.62	peak			"X" axes

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.: STAR2016 #1353	Polarization: Vertical
Standard: FCC Class B 3M Radiated	Power Source: DC 3V
Test item: Radiation Test	Date: 16/06/28/
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 9/15/30
EUT: Water Senor	Engineer Signature: star
Mode: TX	Distance: 3m
Model: FD2200	
Manufacturer: Chuango	

Note: Report No.:ATE20161267

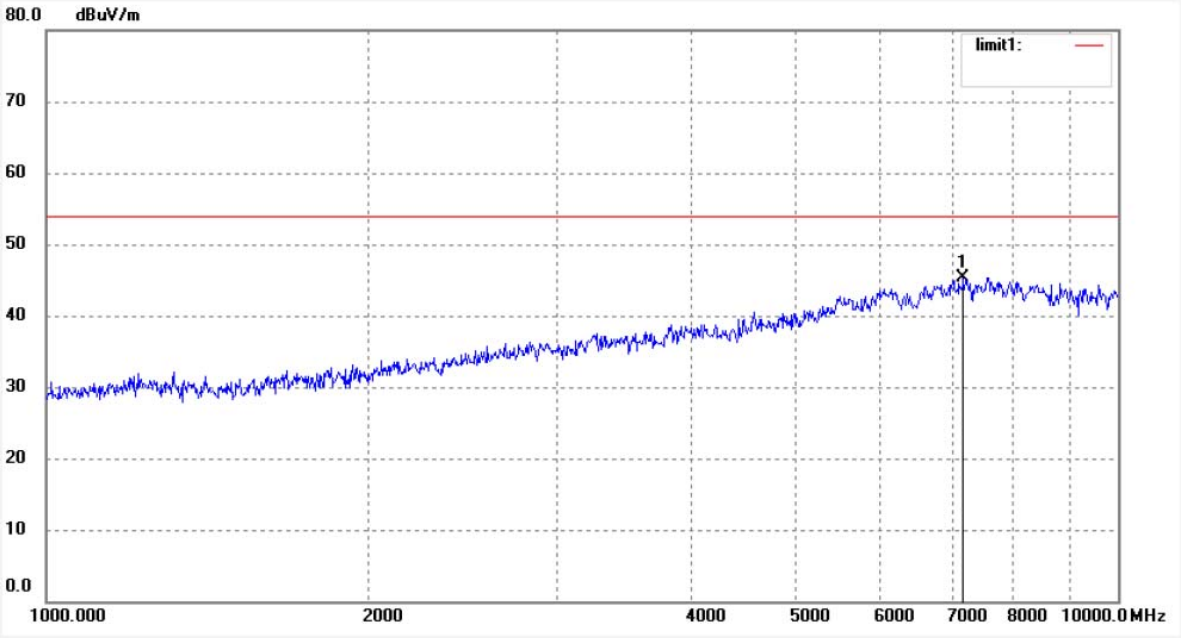


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	7013.284	43.45	2.98	46.43	74.00	-27.57	peak			"X" axes

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.: STAR2016 #1354	Polarization: Horizontal
Standard: FCC Class B 3M Radiated	Power Source: DC 3V
Test item: Radiation Test	Date: 16/06/28/
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 9/17/25
EUT: Water Senor	Engineer Signature: star
Mode: TX	Distance: 3m
Model: FD2200	
Manufacturer: Chuango	

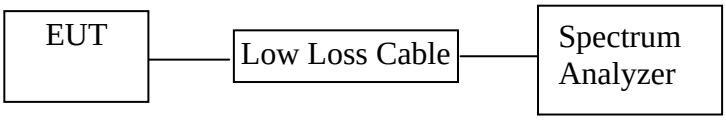
Note: Report No.:ATE20161267



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	7177.810	42.14	3.21	45.35	74.00	-28.65	peak			"X" axes

5. 20DB BANDWIDTH

5.1.Block Diagram of Test Setup



(EUT: Water Senor)

5.2.The Limit of 20dB Bandwidth

The bandwidth of emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz. For devices operating above 900MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the two points 20 dB down from the top of modulated carrier.

5.3.EUT Configuration on Measurement

The following 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(20dB Bandwidth)

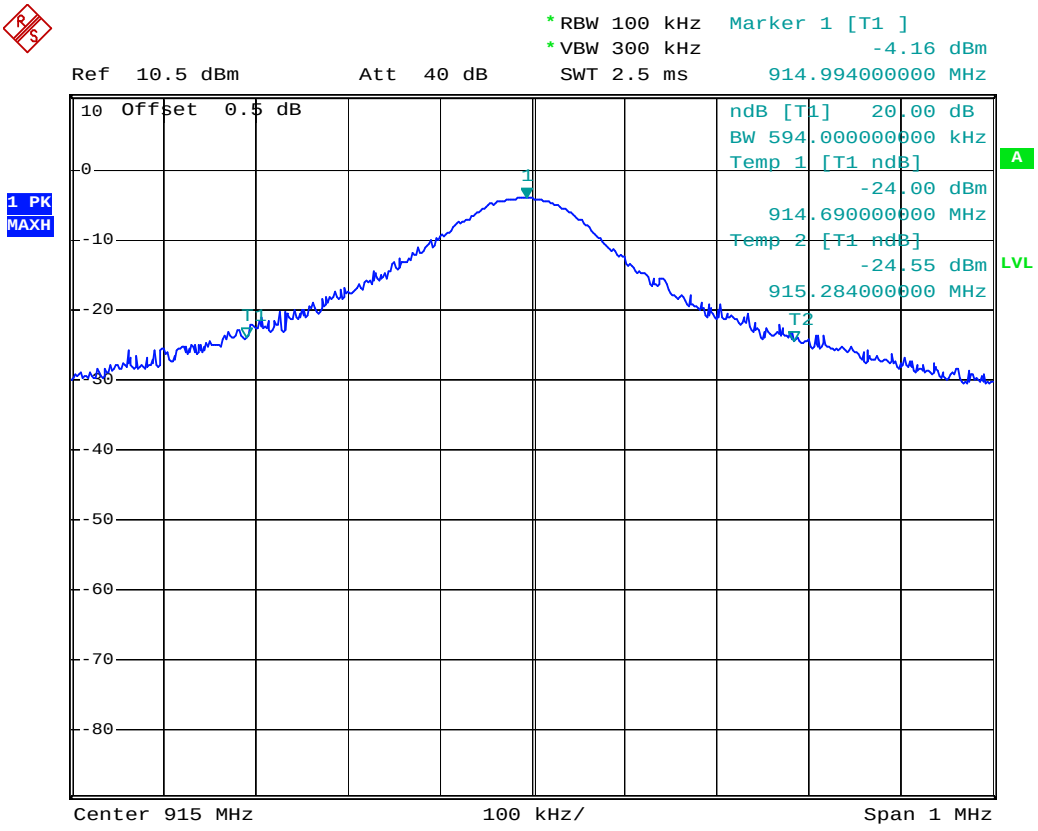
5.5.1. Set SPA Center Frequency = Fundamental frequency, RBW = 100 kHz, VBW = 300 kHz, Span = 1MHz.

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

5.6.Measurement Result

Frequency (MHz)	20dB Bandwidth (MHz)	Limit (MHz)	Result
915	0.594	4.575	Pass

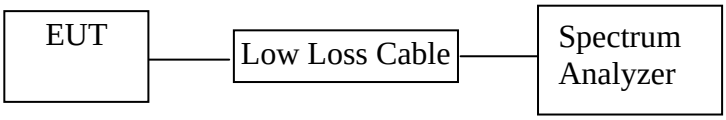
Note:Limit=915*0.5%=4.575MHz



Date: 28.JUN.2016 11:37:47

6. TRANSMISSION TIME MEASUREMENT

6.1.Block Diagram of Test Setup



(EUT: Water Senor)

6.2.Release Time Measurement

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.$_{seconds}$EUT Configuration on Measurement

The following equipment are installed on Transmission 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

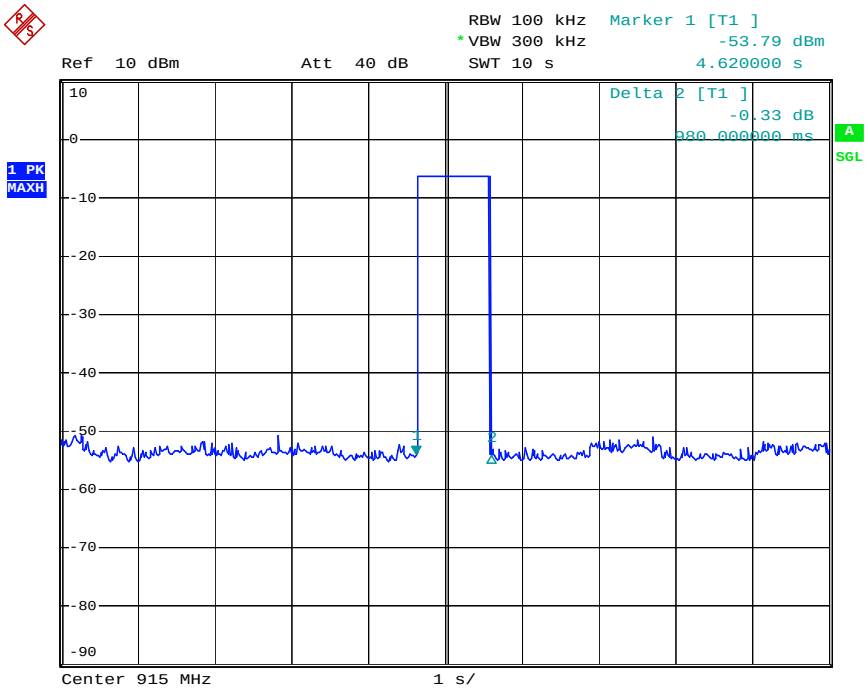
6.5.1. Set SPA Center Frequency = Fundamental frequency, RBW = 100 kHz, VBW = 300 kHz, Span = 0 Hz.

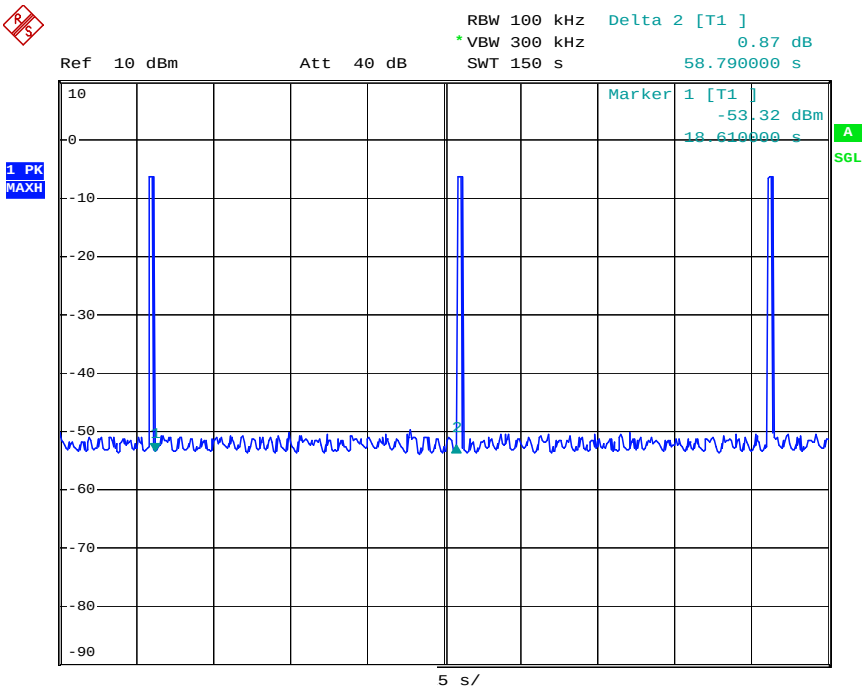
6.5.2.Set EUT as normal operation.

6.5.3.Set SPA View. Delta Mark time.

6.6. Measurement Result

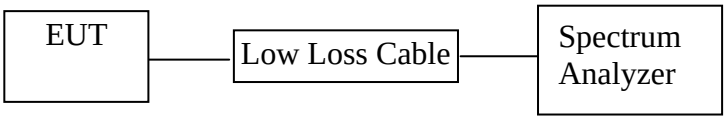
Duration time = 0.98s
Silent time = 58.79s>10s
Silent time = 58.79s>30*0.98s=29.4s
Test result: pass





7. AVERAGE FACTOR MEASUREMENT

7.1.Block Diagram of Test Setup



(EUT: Water Senor)

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

ANSI C63.10-2013 Section 7.5

1. Adjust and configure any EUT switches, controls, or input data streams to ensure that the EUT is transmitting or encoded to obtain the “worst-case” pulse ON time.
2. Couple the final radio frequency output signal to the input of a spectrum analyzer. This may be performed by a radiated, direct connection (i.e., conducted) or by a “near-field” coupling method. The signal received shall be of sufficient level to trigger adequately the spectrum analyzer sweep display.
3. Adjust the center frequency of the spectrum analyzer to the center of the RF signal.
4. Set the spectrum analyzer for ZERO SPAN.
5. Adjust the SWEEP TIME to obtain at least a 100 ms period of time on the horizontal display axis of the spectrum analyzer.
6. If the pulse train is periodic (i.e., consists of a series of pulses that repeat in a characteristic pattern over a constant time period), and the period (T) is less than or equal to 100 ms, then:

1) Set the TRIGGER on the spectrum analyzer to capture at least one period of the pulse train, including any blanking intervals.
2) Determine the total maximum pulse “ON time” (tON) over one period of the pulse train. An example of a periodic pulse train and the associated period is shown in Figure 14. If the pulse train contains pulses of different widths, then tON is determined by summing the duration of all of the pulses within the pulse train [i.e., tON = (t1 + t2 + …tn)].
3) The duty cycle is then determined by dividing the total maximum “ON time” by the period of the pulse train (tON/T).

Average factor in dB = 20 log (duty cycle)

7.3.EUT Configuration on Measurement

The following 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.

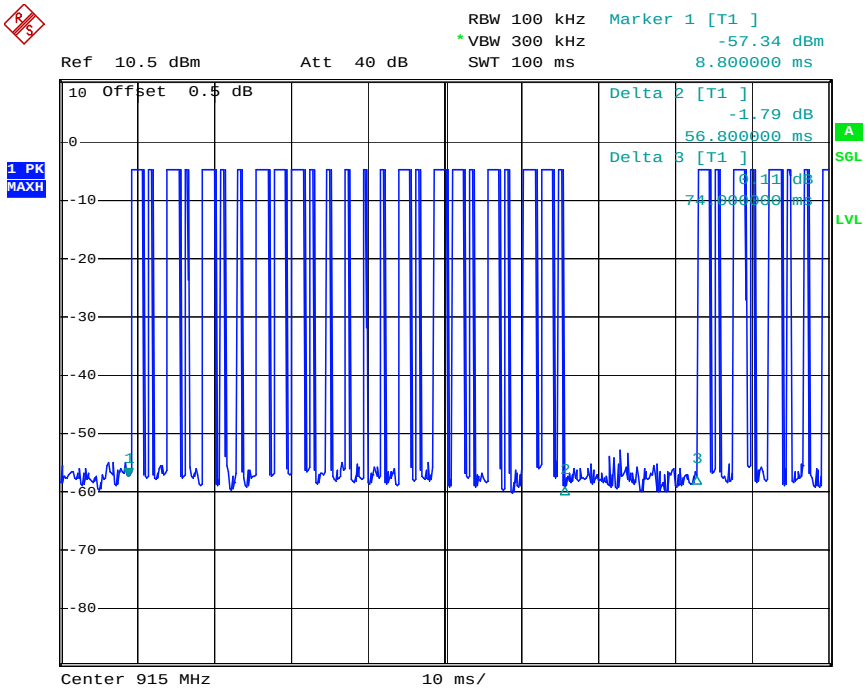
7.6. Measurement Result

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

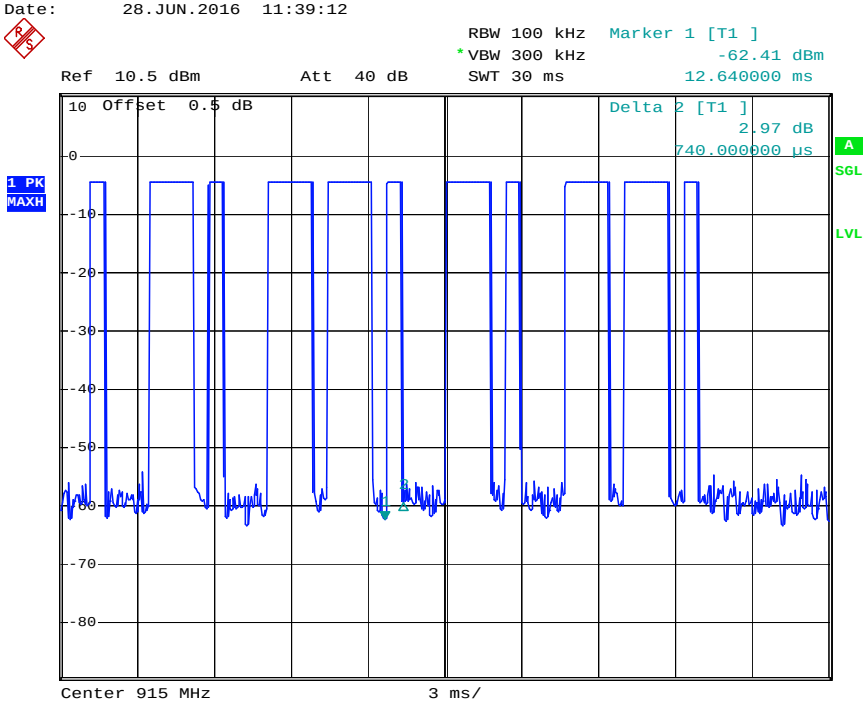
Effective period of the cycle = 1.88*12+0.74*13ms=32.18 ms

DC = 32.18ms/74ms=43.49%

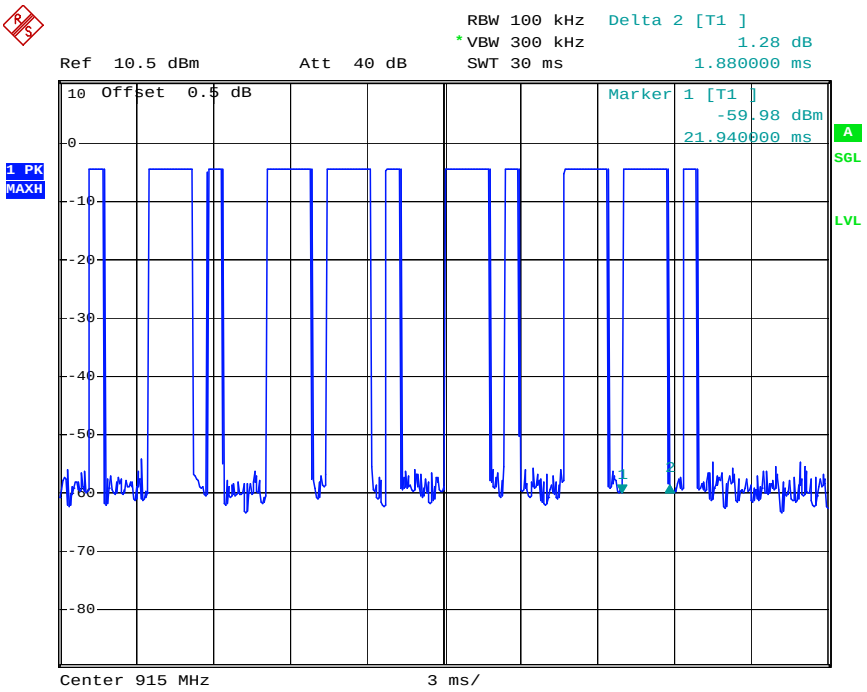
Therefore, the average factor is found by 20log0.4665= -7.23dB



Date: 28.JUN.2016 11:39:12



Date: 28.JUN.2016 11:40:14



Date: 28.JUN.2016 11:40:40

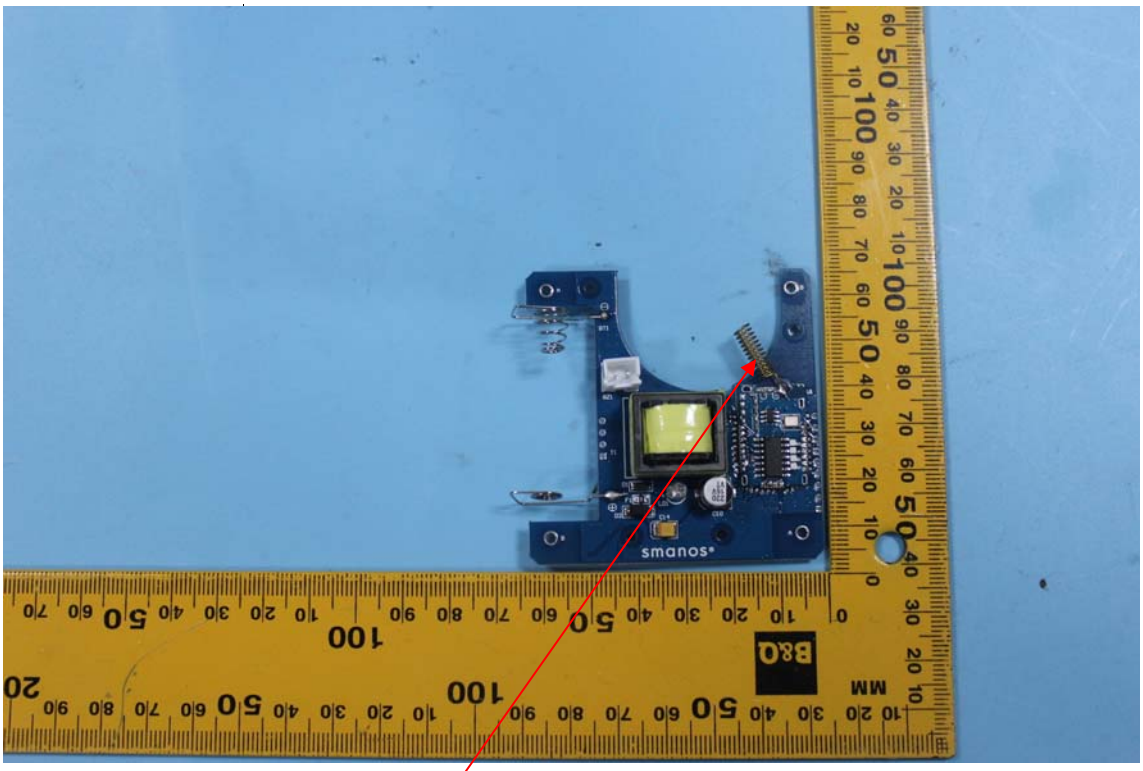
8. ANTENNA REQUIREMENT

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 3dBi. Therefore, the equipment complies with the antenna requirement of 15.203.



Antenna