

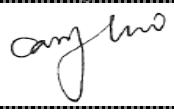


## CTC Laboratories, Inc.

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# TEST REPORT

**Report No.** ..... **GTI20182610F**  
**FCC ID** ..... **2AR7G-238216**  
**IC** ..... **24653-238216**  
**Applicant** ..... **HangZhou Dingyu Electronic Technology Co., Ltd**  
**Address** ..... Room 1-901, A side, Lianhe Tower, No.2 Zijinghua Rd.  
Hangzhou, Zhejiang, China 310012  
**Manufacturer** ..... HangZhou Dingyu Electronic Technology Co., Ltd  
**Address** ..... Room 1-901, A side, Lianhe Tower, No.2 Zijinghua Rd.  
Hangzhou, Zhejiang, China 310012  
**Product Name** ..... **Wireless Remote Control**  
**Trade Mark** ..... N/A  
**Model/Type reference** ..... 2382116  
**Listed Model(s)** ..... N/A  
**Standard** ..... **FCC CFR Title 47 Part 15 Subpart C Section 15.231(a)  
RSS-210 Issue 9**  
**Date of receipt of test sample**....: Jan. 3, 2019  
**Date of testing**.....: Jan. 4, 2019 ~ Jan. 10, 2019  
**Date of issue**.....: Jan. 11, 2019  
**Result**.....: **PASS**

Compiled by:  
(Printed name+signature) Terry Su   
Supervised by:  
( Printed name+signature) Cary Luo   
Approved by:  
( Printed name+signature) Walter Chen 

**Testing Laboratory Name** ..... **CTC Laboratories, Inc.**

**Address**..... 1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park,  
Shenzhen, Guangdong, China

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# 1. TEST SUMMARY

## 1.1. Test Standards

The tests were performed according to following standards:

[FCC Rules Part 15.231\(a\)](#): Periodic operation in the band 40.66–40.70 MHz and above 70MHz.

[RSS-210 Issue 9](#): Licence-Exempt Radio Apparatus: Category I Equipment.

[RSS-Gen](#): General Requirements for Compliance of Radio Apparatus.

[ANSI C63.10-2013](#): American National Standard for Testing Unlicensed Wireless Devices.

## 1.2. Report version

Revised No.	Date of issue	Description
01	Jan. 11, 2019	Original



### 1.3. Test Description

FCC Part 15 Subpart C 15.231(a)/ RSS-210 Issue 9				
Test Item	Standard Section		Result	Test Engineer
	FCC	IC		
Antenna Requirement	15.203	/	Pass	Terry Su
Conducted Emission	15.207	RSS-Gen 7.2	N/A	N/A
Radiated Emissions	15.205	RSS-Gen 7.3	Pass	Terry Su
Field Strength of the Fundamental	15.231(b)	RSS-210 A.1.2	Pass	Terry Su
20dB Bandwidth	15.231(c)	RSS-210 A.1.3	Pass	Terry Su
Continue Transmission Time	15.231(a)	/	Pass	Terry Su

Note: N/A: Not applicable.

The measurement uncertainty is not included in the test result.



## 1.4. Test Facility

### Address of the report laboratory

**CTC Laboratories, Inc.**

Add: 1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China

### Laboratory accreditation

The test facility is recognized, certified, or accredited by the following organizations:

#### **CNAS-Lab Code: L5365**

Shenzhen General Testing & Inspection Technology Co.,Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

#### **A2LA-Lab Cert. No.: CN1208**

Shenzhen General Testing & Inspection Technology Co.,Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

#### **IC Registration No.: CN0029**

The 3m alternate test site of Shenzhen General Testing & Inspection Technology Co.,Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: CN0029 on Dec, 2018.

#### **FCC-Registration No.: 951311**

Shenzhen General Testing & Inspection Technology Co.,Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 951311, Aug 26, 2017

## 1.5. Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01 " Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the Shenzhen General Testing & Inspection Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Below is the best measurement capability for Shenzhen General Testing & Inspection Technology Co., Ltd.



Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.42 dB	(1)
Transmitter power Radiated	2.14 dB	(1)
Conducted spurious emissions 9kHz~40GHz	1.60 dB	(1)
Radiated spurious emissions 9kHz~40GHz	2.20 dB	(1)
Conducted Emissions 9kHz~30MHz	3.20 dB	(1)
Radiated Emissions 30~1000MHz	4.70 dB	(1)
Radiated Emissions 1~18GHz	5.00 dB	(1)
Radiated Emissions 18~40GHz	5.54 dB	(1)
Occupied Bandwidth	-----	(1)

**Note (1):** This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

## 1.6. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15~35°C
Relative Humidity:	30~60 %
Air Pressure:	950~1050mba

## 1.7. EUT Operation state

The EUT has been tested under typical operating condition. The Applicant provides software to control the EUT for staying in continuous transmitting mode for testing.



## 2. GENERAL INFORMATION

### 2.1. Client Information

Applicant:	HangZhou Dingyu Electronic Technology Co., Ltd
Address:	Room 1-901, A side, Lianhe Tower, No.2 Zijinghua Rd. Hangzhou, Zhejiang, China 310012
Manufacturer:	HangZhou Dingyu Electronic Technology Co., Ltd
Address:	Room 1-901, A side, Lianhe Tower, No.2 Zijinghua Rd. Hangzhou, Zhejiang, China 310012
Factory:	Dongguan Duoli Electronic Technology Co., Ltd
Address:	F2 Zheng wei High-Tech Zone Jun da Community, Dongkeng Town, Dongguan, Guangdong, China 523457

### 2.2. General Description of EUT

Product Name:	Wireless Remote Control
Model/Type reference:	2382116
Marketing Name:	N/A
Listed Model(s):	N/A
Power supply:	12V from alkaline battery.
Hardware version:	N/A
Software version:	N/A
<b>RF parameter</b>	
Modulation:	ASK
Operation frequency:	315MHz
Channel number:	1
Antenna type:	PCB Antenna
Antenna gain:	2dBi



## 2.3. Measurement Instruments List

Tonscend JS0806-2 Test system					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	Spectrum Analyzer	Rohde & Schwarz	FSU26	100105	Dec. 27, 2019
2	Spectrum Analyzer	Rohde & Schwarz	FUV40-N	101331	Dec. 27, 2019
3	MXG Vector Signal Generator	Agilent	N5182A	MY47420864	Dec. 27, 2019
4	Signal Generator	Agilent	E8257D	MY46521908	Dec. 27, 2019
5	Power Sensor	Agilent	U2021XA	MY5365004	Dec. 27, 2019
6	Power Sensor	Agilent	U2021XA	MY5365006	Dec. 27, 2019
7	Simultaneous Sampling DAQ	Agilent	U2531A	TW54493510	Dec. 27, 2019
8	Climate Chamber	TABA	PR-4G	A8708055	Dec. 27, 2019
9	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	116410	Dec. 27, 2019
10	Climate Chamber	ESPEC	MT3065	/	Dec. 27, 2019
11	300328 v2.1.1 test system	TONSCEND	v2.6	/	/

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	EMI Test Receiver	Rohde & Schwarz	ESCI	100658	Dec. 27, 2019
2	High pass filter	micro-tranics	HPM50111	142	Dec. 27, 2019
3	Log-Bicon Antenna	Schwarzbeck	CBL6141A	4180	Dec. 27, 2019
4	Ultra-Broadband Antenna	ShwarzBeck	BBHA9170	25841	Dec. 27, 2019
5	Loop Antenna	LAPLAC	RF300	9138	Dec. 27, 2019
6	Spectrum Analyzer	Rohde & Schwarz	FSU26	100105	Dec. 27, 2019
7	Horn Antenna	Schwarzbeck	BBHA 9120D	647	Dec. 27, 2019
8	Pre-Amplifier	HP	8447D	1937A03050	Dec. 27, 2019
9	Pre-Amplifier	EMCI	EMC051835	980075	Dec. 27, 2019
10	Antenna Mast	UC	UC3000	N/A	N/A
11	Turn Table	UC	UC3000	N/A	N/A
12	Cable Below 1GHz	Schwarzbeck	AK9515E	33155	Dec. 27, 2019
13	Cable Above 1GHz	Hubersuhner	SUCOFLEX102	DA1580	Dec. 27, 2019
14	Splitter	Mini-Circuit	ZAPD-4	400059	Dec. 27, 2019
15	RF Connection Cable	HUBER+SUHNER	RE-7-FL	N/A	Dec. 27, 2019
16	RF Connection Cable	Chengdu E-Microwave	---	---	Dec. 27, 2019
17	High pass filter	Compliance Direction systems	BSU-6	34202	Dec. 27, 2019



18	Attenuator	Chengdu E-Microwave	EMCAXX-10R NZ-3	---	Dec. 29, 2019
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Note:1. The Cal. Interval was one year.

2. The cable loss has calculated in test result which connection between each test instruments.

### 3. TEST ITEM AND RESULTS

#### 3.1. Conducted Emission

##### Limit

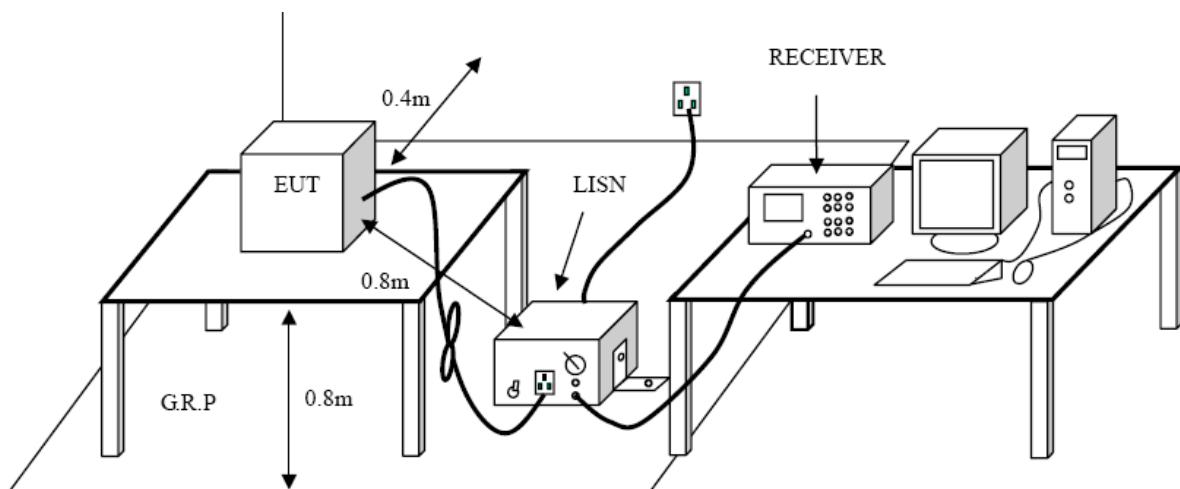
FCC CFR Title 47 Part 15 Subpart C Section 15.207/ RSS-Gen 7.2:

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

Notes:

- (1) \*Decreasing linearly with logarithm of the frequency.
- (2) The lower limit shall apply at the transition frequencies.
- (3) The limit decrease in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

##### Test Configuration



##### Test Procedure

1. The EUT was setup according to ANSI C63.10:2013 requirements.
2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
4. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
5. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
6. Conducted Emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
7. During the above scans, the emissions were maximized by cable manipulation.

**Test Mode:**

Please refer to the clause 1.7.

**Test Results**

Not applicable.



## 3.2. Radiated Emission

### Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.231(b)/ RSS-Gen 7.3.

The field strength of emissions from intentional radiators operated **average value** under this section shall not exceed the following

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Unwanted emissions (millivolts/meter)
260 - 470 MHz	3,750 to 12,500 **	375 to 1,250 **

\*\* linear interpolation with frequency, f, in MHz:

F is **315.00MHz**

Field strength of fundamental: Limit at 3 meters =  $41.67 \times F - 7083.34$

Field strength of harmonics: Limit at 3 meters =  $4.167 \times F - 708.334$

So the field strength of emission limits have been calculated in below table.

Fundamental Frequency (MHz)	Field Strength of Fundamental (microvolt/meter) at 3m
315MHz	95.63 (Peak)
315MHz	75.63 (Average)

### Radiated Emission Limits (9 kHz~1000 MHz)

Frequency (MHz)	Field Strength (microvolt/meter)	Measurement Distance (meters)
0.009~0.490	$2400/F(\text{kHz})$	300
0.490~1.705	$24000/F(\text{kHz})$	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

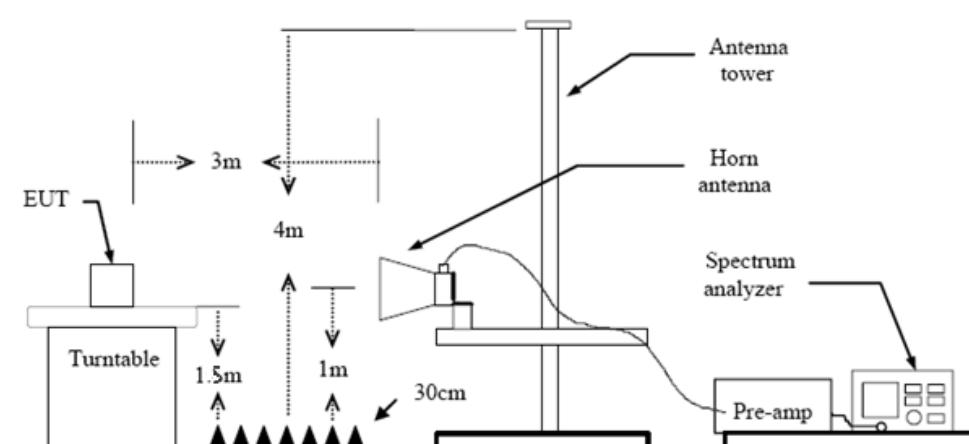
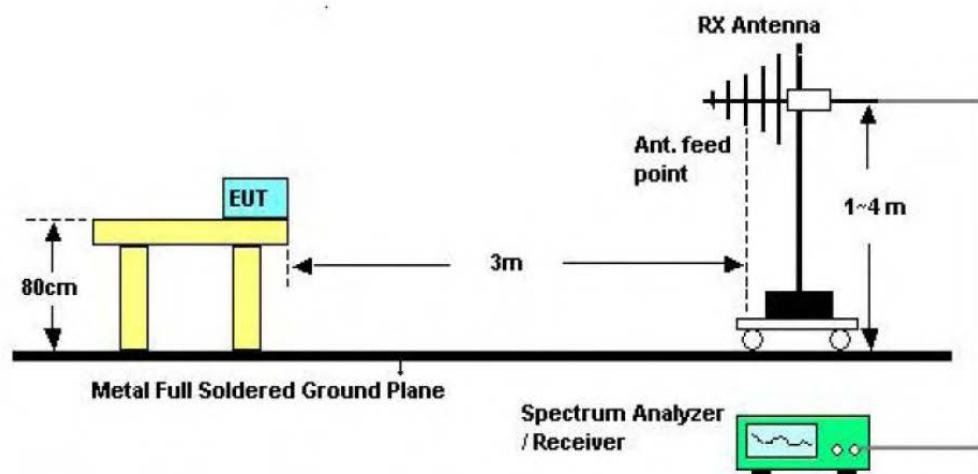
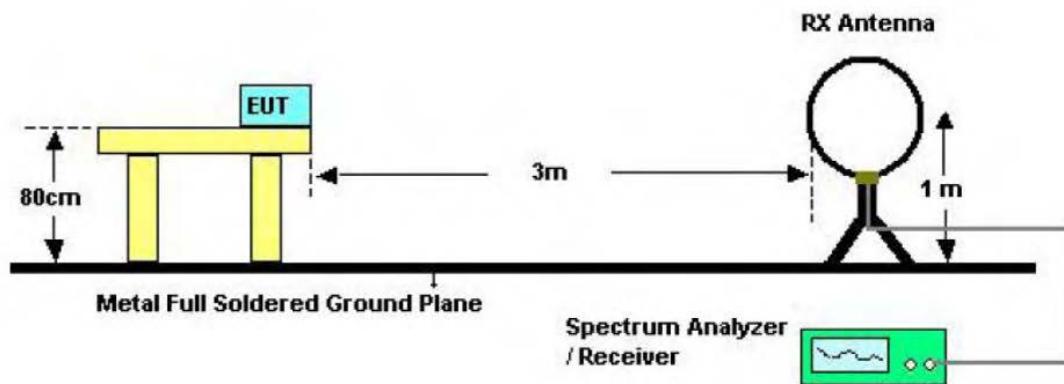
### Radiated Emission Limit (Above 1000MHz)

Frequency (MHz)	Distance Meters(at 3m)	
	Peak	Average
Above 1000	74	54

#### Note:

- (1) The tighter limit applies at the band edges.
- (2) Emission Level (dBuV/m) =  $20 \log_{10}$  Emission Level (uV/m).

### Test Configuration



### Test Procedure

1. The EUT was setup and tested according to ANSI C63.10:2013
2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1



GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.

3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings
  - (1) Span shall wide enough to fully capture the emission being measured;
  - (2) Below 1 GHz:  
RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;  
If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
  - (3) From 1 GHz to 10<sup>th</sup> harmonic:  
RBW=1MHz, VBW=3MHz Peak detector for Peak value.  
RBW=1MHz, VBW=3MHz RMS detector for Average value.

### **Test Mode**

Please refer to the clause 1.7.

### **Test Result**

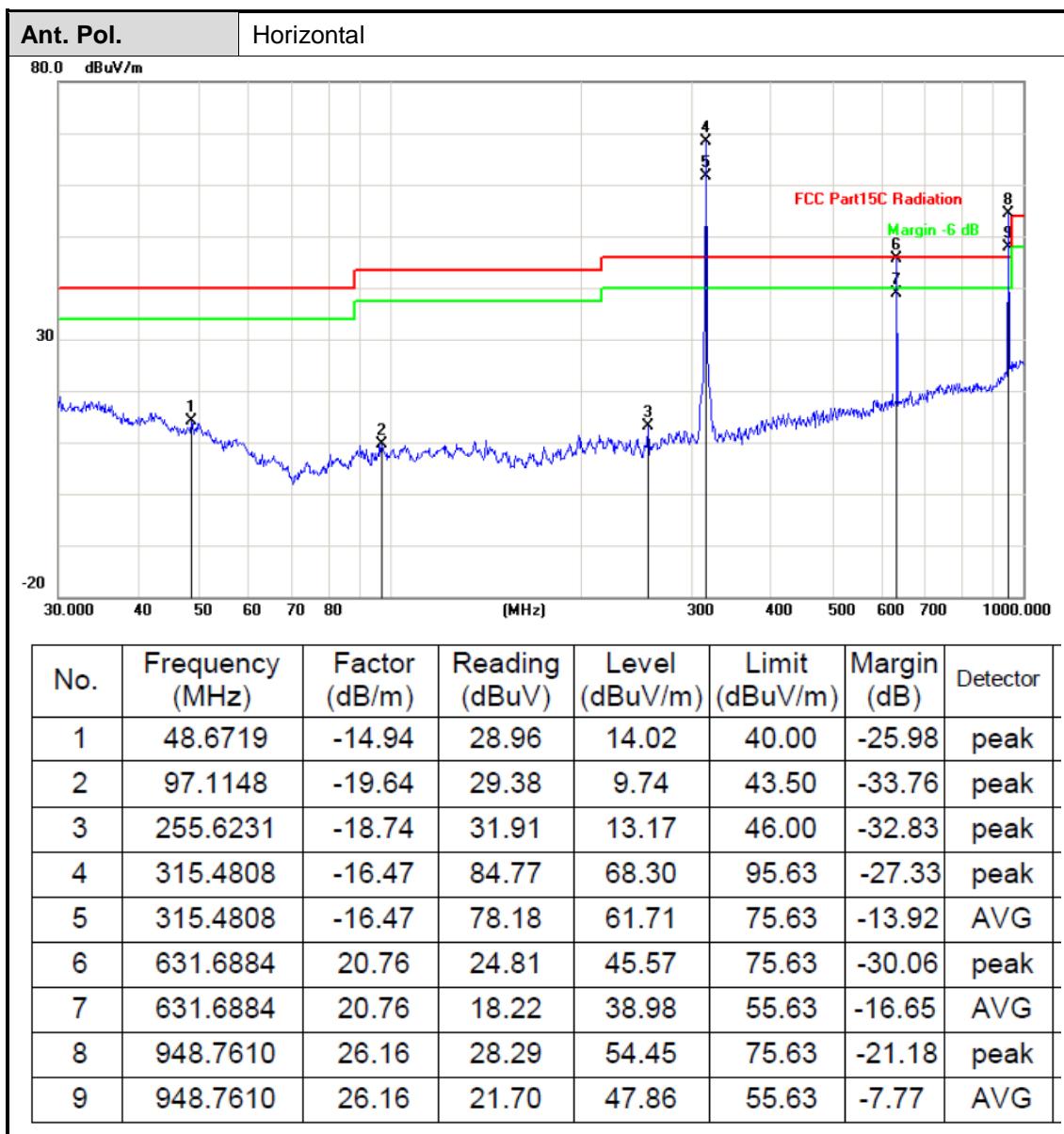
#### **9 KHz~30 MHz**

From 9 KHz to 30 MHz: Conclusion: PASS

Note: The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.



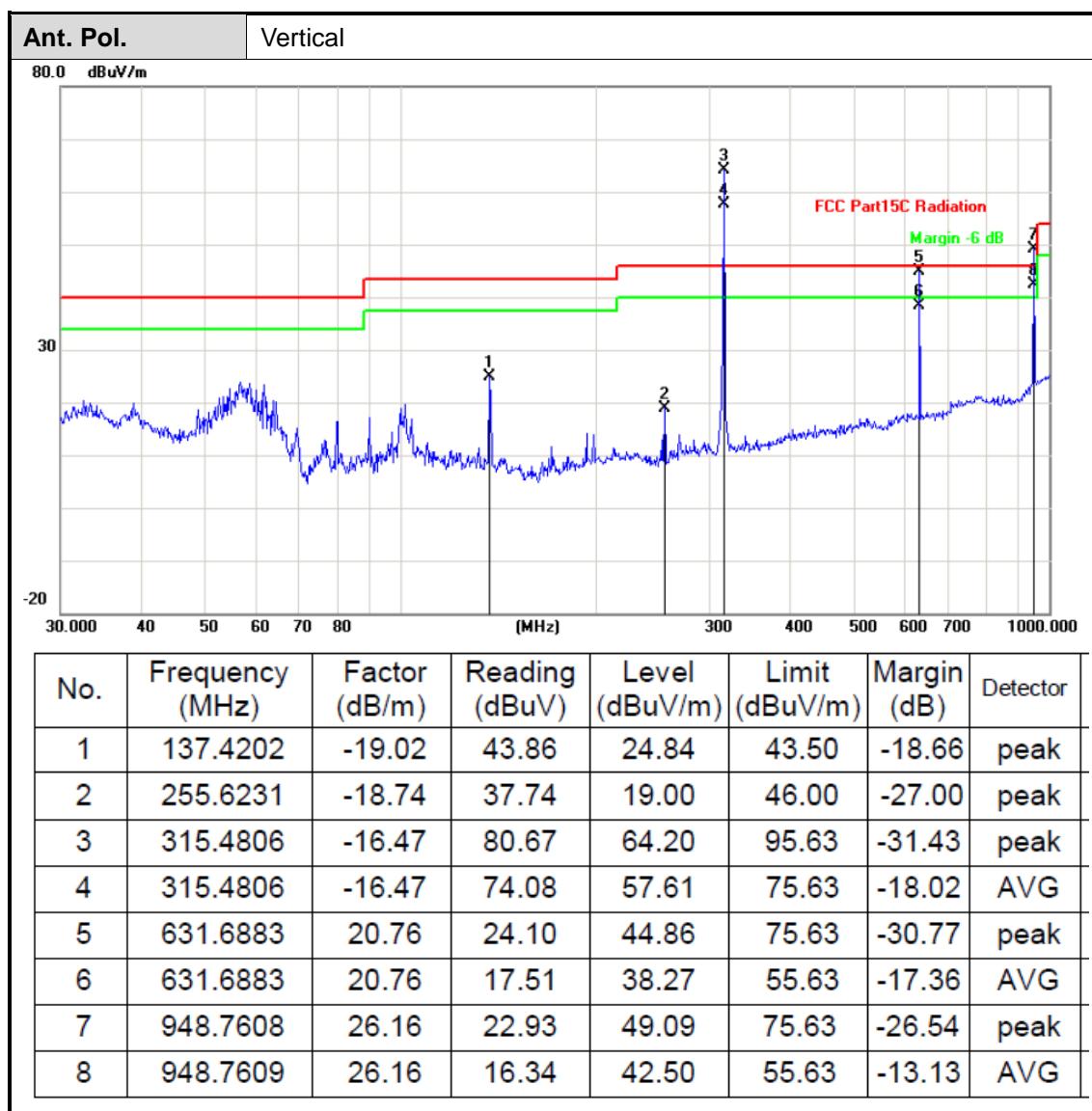
30MHz-1GHz



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**Remark:**

1. Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2. Margin value = Level -Limit value

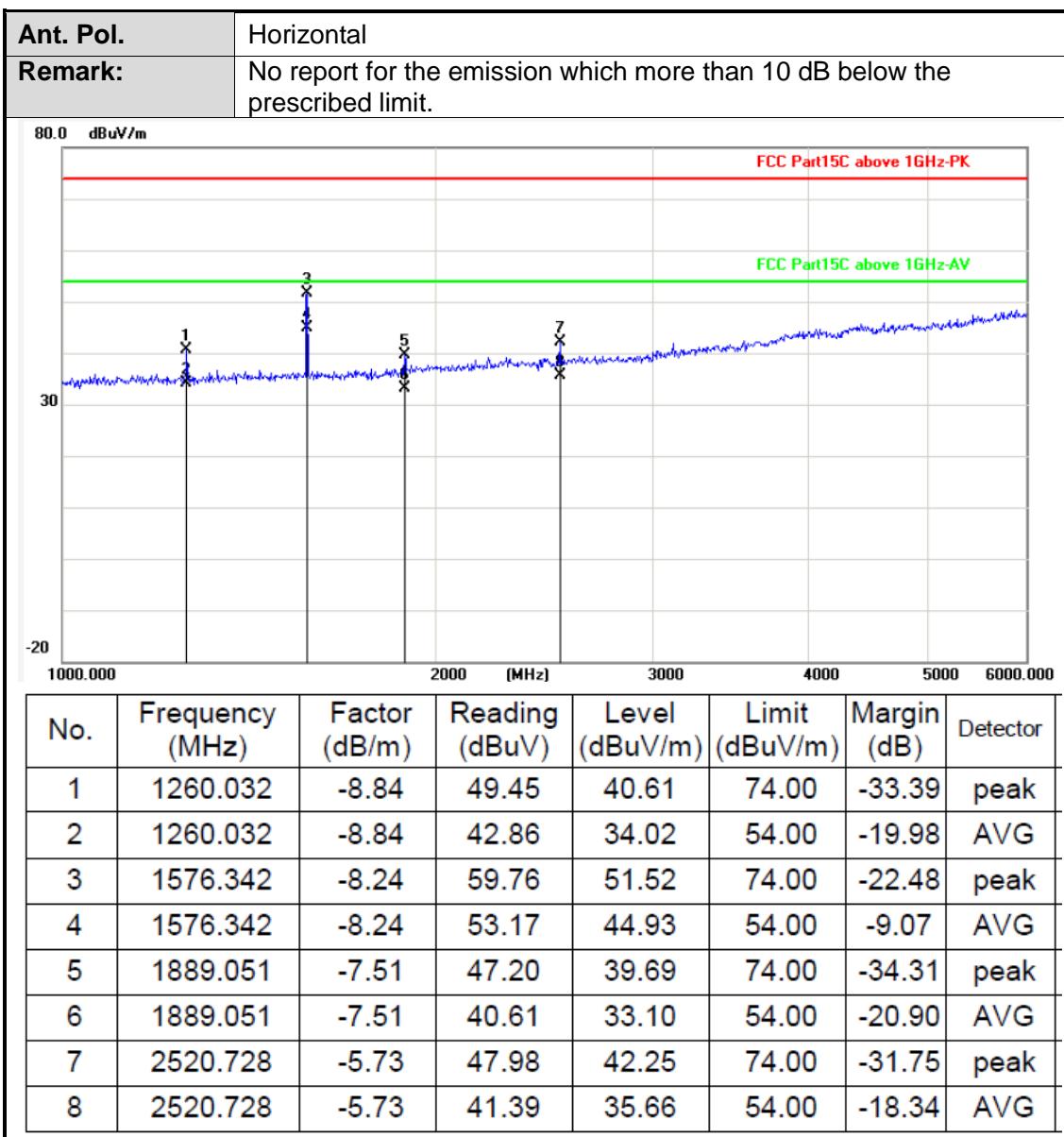


Remark:

1. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor
2. Margin value = Level - Limit value

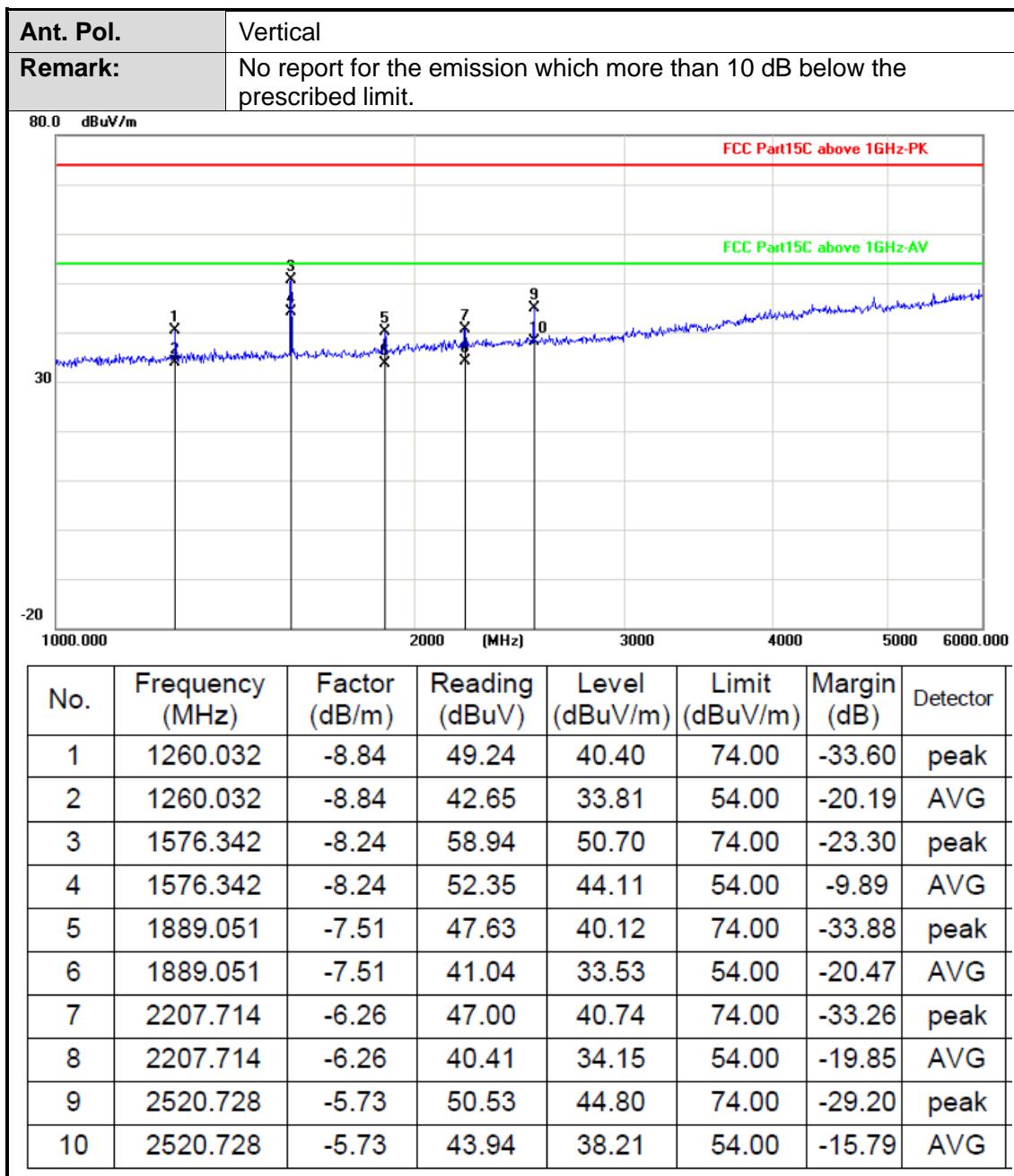


Adobe 1GHz



Remark:

1. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor
2. Margin value = Level - Limit value



Remark:

1. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor
2. Margin value = Level - Limit value



### 3.3. 20 dB Bandwidth

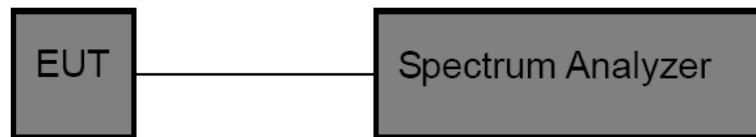
#### Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.231(c)/ RSS-210 A.1.3.

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

**433.92MHz\*0.25%=1.085MHz**

#### Test Configuration



#### Test Procedure

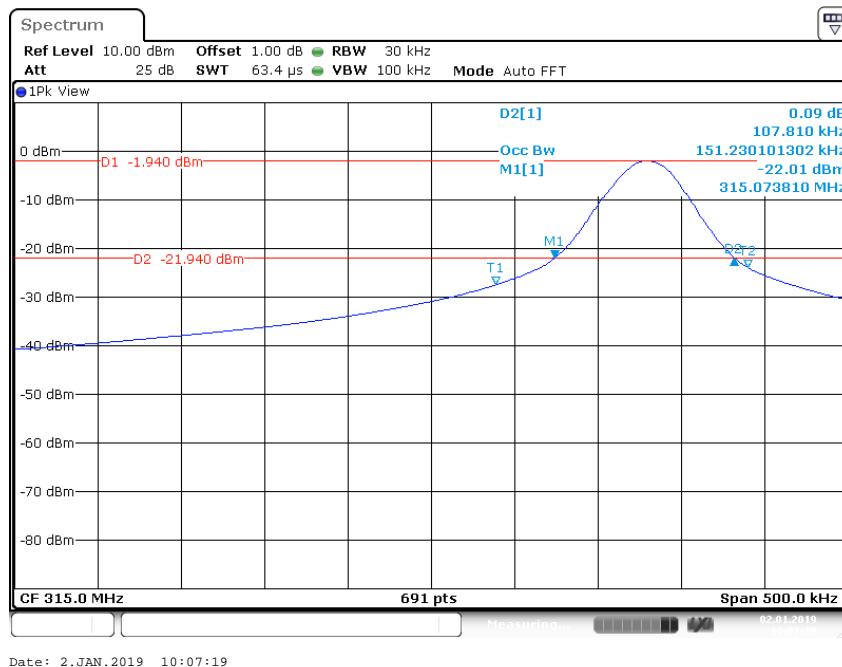
1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:  
Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a operation channel  
RBW  $\geq$  1% of the 20 dB bandwidth, VBW  $\geq$  RBW  
Sweep = auto, Detector function = peak, Trace = max hold
4. Measure and record the results in the test report.

#### Test Mode

Please refer to the clause 1.7.

#### Test Results

Channel Frequency(MHz)	20dB Bandwidth(kHz)	Limit (MHz)	Result
315.00	107.81	1.085	PASS



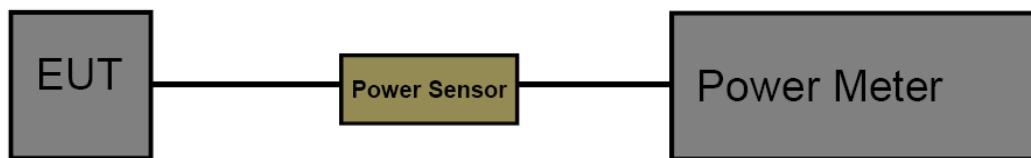
### 3.4. Continue Transmission Time

#### Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.231(a).

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

#### Test Configuration



#### Test Procedure

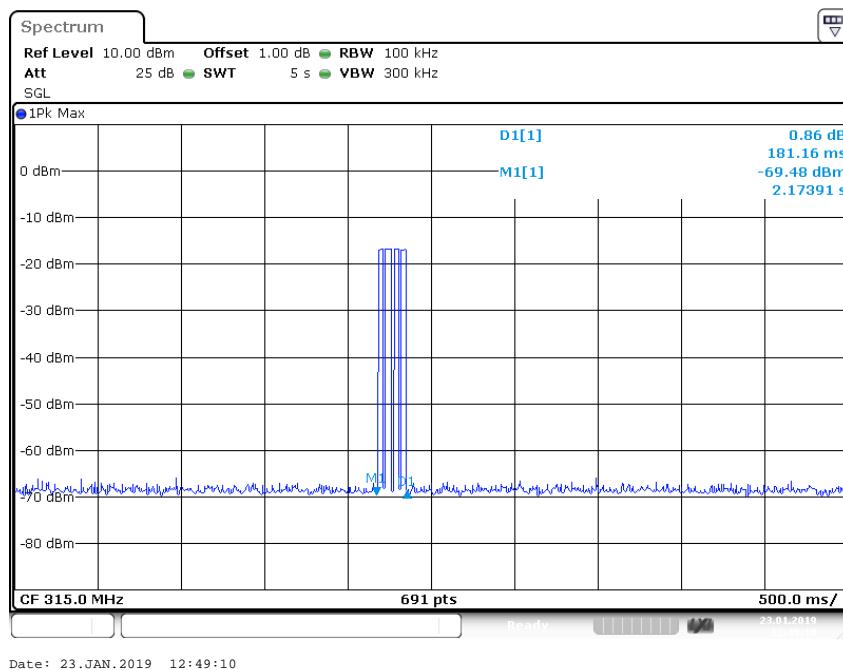
1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:  
Frequency=Center carrier frequency  
RBW=100KHz, VBW=300KHz, Span= 0,  
Sweep time= 10second, Detector function = peak, Trace = single
4. Measure and record the results in the test report.

#### Test Mode

Please refer to the clause 1.7.

#### Test Result

Frequency (MHz)	Transmission time (ms)	Limit (s)	Result
315.00	181.16	<5.00	Pass

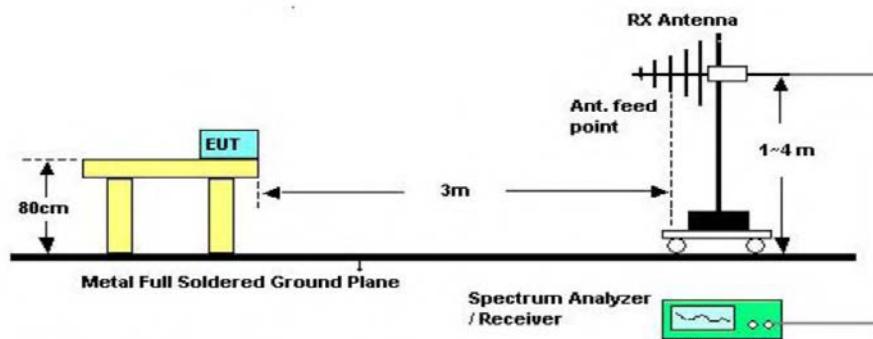


### 3.5. Duty Cycle

#### Limit

The duration of each transmission shall not be more than 1 second and the rest time between transfers shall be at least 30 times the duration of propagation, but in any case less than 10 seconds.

#### Test Configuration



#### Test Procedure

1. The EUT was setup and tested according to ANSI C63.10:2013 requirements.
2. The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.

#### Test Mode

Please refer to the clause 1.7.

#### Test Result

Please refer the following pages:

**Plot 1:** each cycle is 46.522ms there are two kinds of pulse in each cycle, the large pulses total 16, the small pulses total 8.

**Plot 2:** one small pulse in a time period of 0.4638ms

**Plot 3:** one large pulse in a time period of 1.1304ms

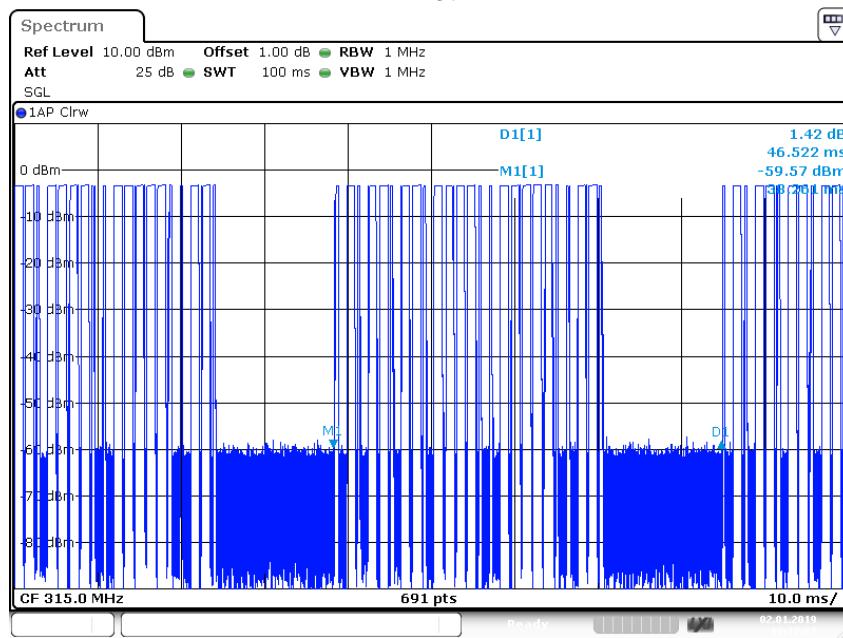
**Duty Cycle=On/Total=(16\*1.1304+8\*0.4638)/46.522=21.7968/46.522=46.85%**

**20 log(Duty Cycle)=-6.59**

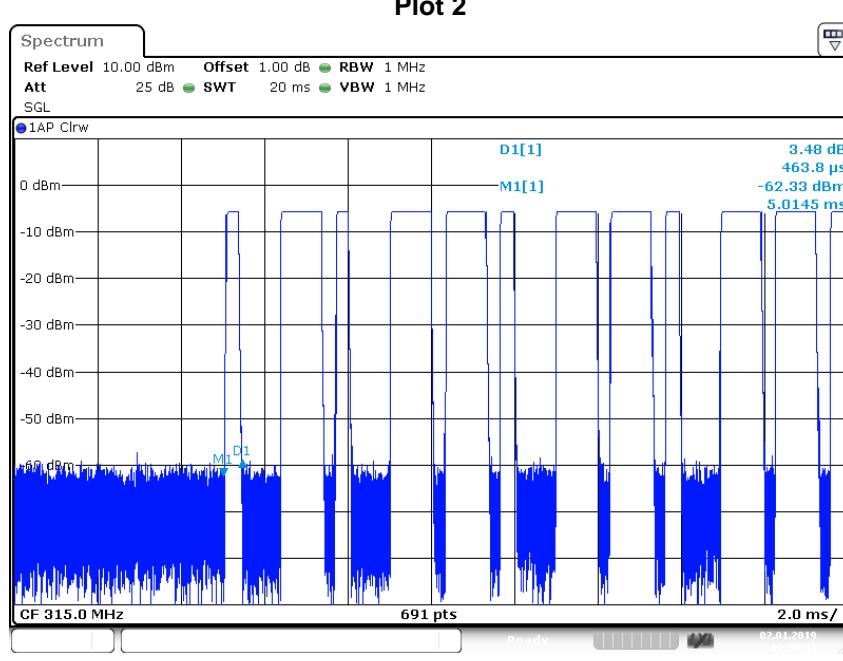
**Average=Peak Value+20log(Duty Cycle), AV=PK-6.59**



Plot 1

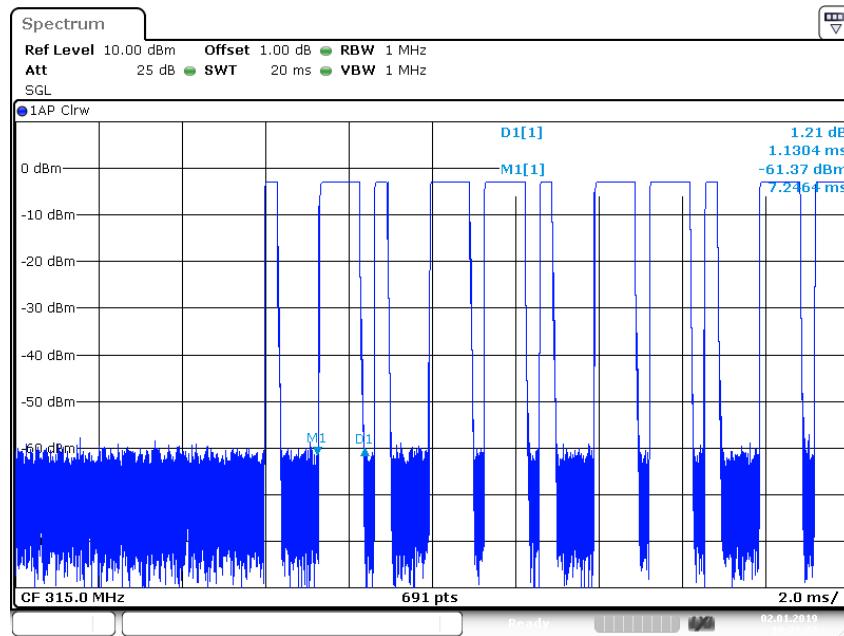


Plot 2





Plot 3



Date: 2.JAN.2019 10:21:27

Shenzhen General Testing &amp; Inspection Technology Co., Ltd.

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### 3.6. Antenna requirement

#### Requirement

##### FCC CFR Title 47 Part 15 Subpart C 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. The use of a permanently attached antenna or of antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

(i) Systems operating in the 2400~2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

#### Test Result

The directional gain of the antenna less than 6dBi, please refer to the EUT internal photographs antenna photo.