

# FCC REPORT

**Applicant:** Autel Intelligent Tech. Corp., Ltd.

**Address of Applicant:** 6th - 10th Floor, Bldg. B1, Zhiyuan, Xueyuan Rd., Xili, Nanshan, Shenzhen 518055, China

**Manufacturer/Factory:** Autel Intelligent Tech. Corp., Ltd.

**Address of Manufacturer/Factory:** 6th - 10th Floor, Bldg. B1, Zhiyuan, Xueyuan Rd., Xili, Nanshan, Shenzhen 518055, China

**Equipment Under Test (EUT)**

Product Name: PROFESSIONAL SCAN TOOL

Model No.: TS508WF

Trade Mark: AUTEL

**FCC ID:** WQ8MTPMS508WF

**Applicable standards:** FCC CFR Title 47 Part 15 Subpart C Section 15.231

**Date of sample receipt:** May 20, 2018

**Date of Test:** May 21, 2018-June 05, 2018

**Date of report issued:** June 06, 2018

**Test Result :** PASS \*

\* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



**Robinson Lo**

**Laboratory Manager**

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

## 2 Version

Version No.	Date	Description
01	June 06, 2018	Original

Prepared By:

*Bill. yuan*

Date:

June 06, 2018

Project Engineer

Check By:

*Andy. wu*

Date:

June 06, 2018

Reviewer

## 3 Contents

	Page
1 COVER PAGE .....	1
2 VERSION .....	2
3 CONTENTS .....	3
4 TEST SUMMARY .....	4
4.1 MEASUREMENT UNCERTAINTY .....	4
5 GENERAL INFORMATION .....	5
5.1 GENERAL DESCRIPTION OF EUT .....	5
5.2 TEST MODE .....	6
5.3 DESCRIPTION OF SUPPORT UNITS .....	6
5.4 TEST FACILITY.....	6
5.5 TEST LOCATION .....	6
5.6 OTHER INFORMATION REQUESTED BY THE CUSTOMER .....	6
6 TEST INSTRUMENTS LIST .....	7
7 TEST RESULTS AND MEASUREMENT DATA.....	8
7.1 ANTENNA REQUIREMENT .....	8
7.2 CONDUCTED EMISSIONS .....	9
7.3 RADIATED EMISSION METHOD.....	14
7.3.1 Field Strength of The Fundamental Signal .....	16
7.3.2 Spurious Emissions .....	17
7.4 20dB OCCUPY BANDWIDTH .....	22
7.5 DWELL TIME.....	24
7.6 DUTY CYCLE .....	27
8 TEST SETUP PHOTO .....	30
9 EUT CONSTRUCTIONAL DETAILS .....	31

## 4 Test Summary

Test Item	Section in CFR 47	Result
Antenna Requirement	15.203	Pass
Conduction Emission	15.207	Pass
Field strength of the Fundamental Signal	15.231 (e)	Pass
Spurious Emissions	15.231 (e)/15.209	Pass
20dB Bandwidth	15.231 (c)	Pass
Dwell Time	15.231 (e)	Pass

*Pass: The EUT complies with the essential requirements in the standard.*

### 4.1 Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	9kHz ~ 30MHz	$\pm 4.34\text{dB}$	(1)
Radiated Emission	30MHz ~ 1000MHz	$\pm 4.24\text{dB}$	(1)
Radiated Emission	1GHz ~ 26.5GHz	$\pm 4.68\text{dB}$	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	$\pm 3.45\text{dB}$	(1)
Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.			

## 5 General Information

### 5.1 General Description of EUT

Product Name:	PROFESSIONAL SCAN TOOL
Model No.:	TS508WF
Serial No.:	000001
Test sample(s) ID:	GTS201805000205-1
Sample(s) Status:	Engineer sample
Hardware Version:	V3
Software Version:	V1.00
Operation Frequency:	433.92MHz, 315MHz
Modulation technology:	ASK+FSK
Antenna Type:	PCB Antenna
Antenna gain:	0dBi (declare by applicant)
Power supply:	Adapter: Model:GME10C-050200FUu Input: AC 100-240V, 50/60Hz, 0.28A Output: DC 5V, 2A Battery: DC 3.7V, 3000mAh, 11.10Wh

## 5.2 Test mode

Transmitting mode	Keep the EUT in transmitting mode.
-------------------	------------------------------------

### Per-test mode.

We have verified the construction and function in typical operation, The EUT was placed on three different polar directions; i.e. X axis, Y axis, Z axis. which only the worst case was shown in this test report and defined as follows:

433.92MHz	Axis	X	Y	Z
	Field Strength(dBuV/m)	77.25	78.77	78.31
315MHz	Axis	X	Y	Z
	Field Strength(dBuV/m)	76.86	77.05	76.05

## 5.3 Description of Support Units

Manufacturer	Description	Model	Serial Number
ECU	N/A	M25	N/A

## 5.4 Test Facility

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

### • FCC —Registration No.: 381383

Global United Technology Services Co., Ltd., Shenzhen 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 files. Registration 381383, January 08, 2018.

### • Industry Canada (IC) —Registration No.: 9079A-2

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-2, August 15, 2016

## 5.5 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.  
No. 301-309, 3/F., Jinyuan Business Building, No.2, Laodong Industrial Zone,  
Xixiang Road, Baoan District, Shenzhen, Guangdong, China  
Tel: 0755-27798480  
Fax: 0755-27798960

## 5.6 Other Information Requested by the Customer

None.

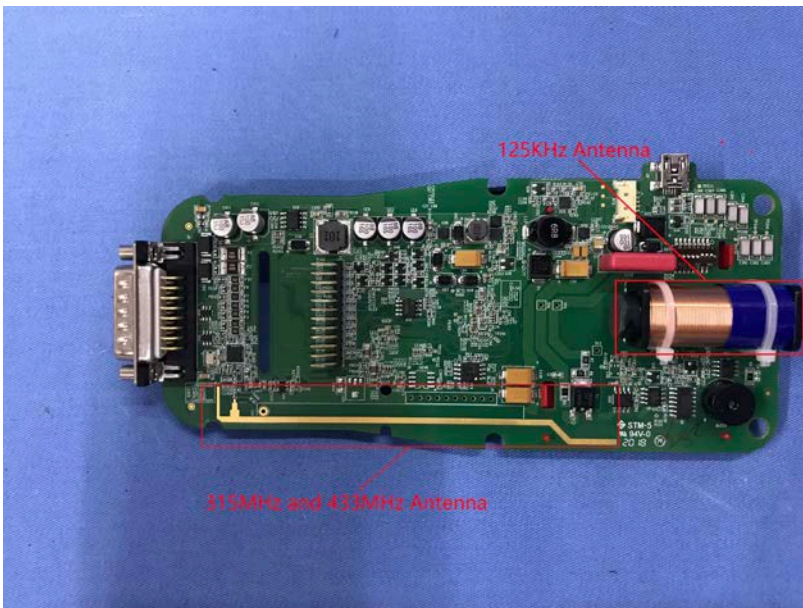
## 6 Test Instruments list

Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.0(L)*6.0(W)* 6.0(H)	GTS250	July. 03 2015	July. 02 2020
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	Spectrum Analyzer	Agilent	E4440A	GTS533	June 28 2017	June 27 2018
4	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June 28 2017	June 27 2018
5	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June 28 2017	June 27 2018
6	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS208	June 28 2017	June 27 2018
7	Horn Antenna	ETS-LINDGREN	3160	GTS217	June 28 2017	June 27 2018
8	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
9	Coaxial Cable	GTS	N/A	GTS213	June 28 2017	June 27 2018
10	Coaxial Cable	GTS	N/A	GTS211	June 28 2017	June 27 2018
11	Coaxial cable	GTS	N/A	GTS210	June 28 2017	June 27 2018
12	Coaxial Cable	GTS	N/A	GTS212	June 28 2017	June 27 2018
13	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June 28 2017	June 27 2018
14	Amplifier(2GHz-20GHz)	HP	8349B	GTS206	June 28 2017	June 27 2018
15	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June 28 2017	June 27 2018

General used equipment:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Barometer	ChangChun	DYM3	GTS257	June 29 2016	June 28 2017

## 7 Test results and Measurement Data

### 7.1 Antenna Requirement

<b>Standard requirement:</b>	FCC Part15 C Section 15.203
<b>15.203 requirement:</b> 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 an 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.	
<b>EUT Antenna:</b>	
The antenna is PCB antenna, the best case gain of the antenna is 0dBi.	
	



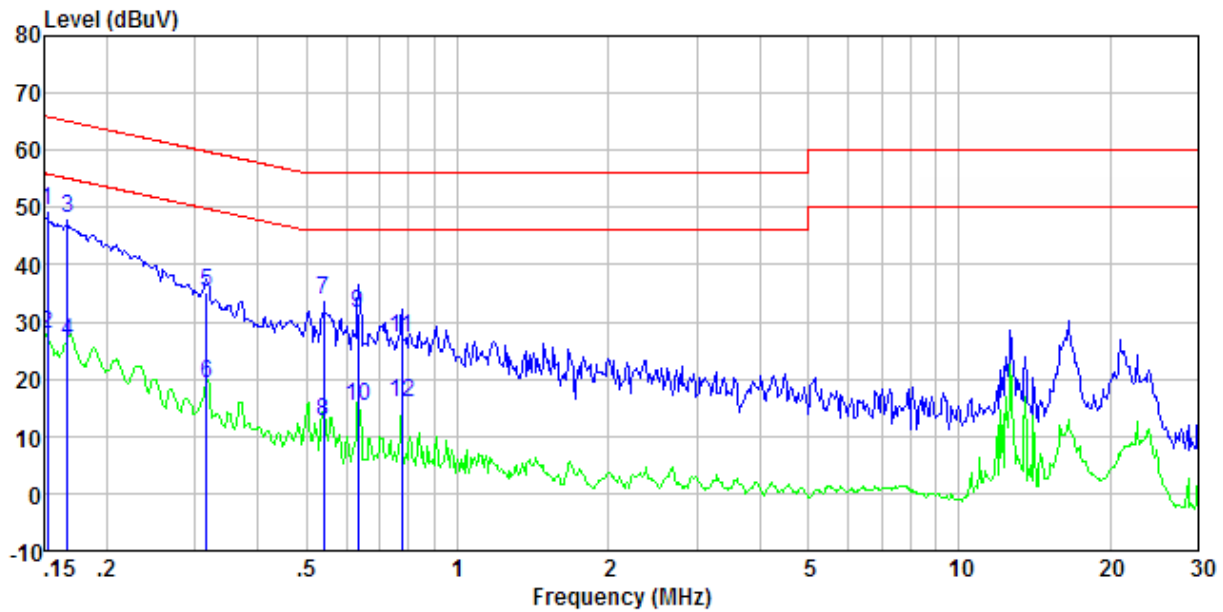
## 7.2 Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207																
Test Method:	ANSI C63.10:2013																
Test Frequency Range:	150KHz to 30MHz																
Class / Severity:	Class B																
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto																
Limit:	<table><tr><th rowspan="2">Frequency range (MHz)</th><th colspan="2">Limit (dBuV)</th></tr><tr><th>Quasi-peak</th><th>Average</th></tr><tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr><tr><td>0.5-5</td><td>56</td><td>46</td></tr><tr><td>5-30</td><td>60</td><td>50</td></tr></table> <p>* Decreases with the logarithm of the frequency.</p>			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
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															
Test setup:	<div><p style="text-align: center;"><b>Reference Plane</b></p><p style="text-align: center;">Test table/Insulation plane</p><p><i>Remark: E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</i></p></div>																
Test procedure:	<div><div>1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.</div><div>2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).</div><div>3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.</div></div>																
Test Instruments:	Refer to section 6.0 for details																
Test mode:	Refer to section 5.2 for details																
Test results:	Pass																

### Measurement data:

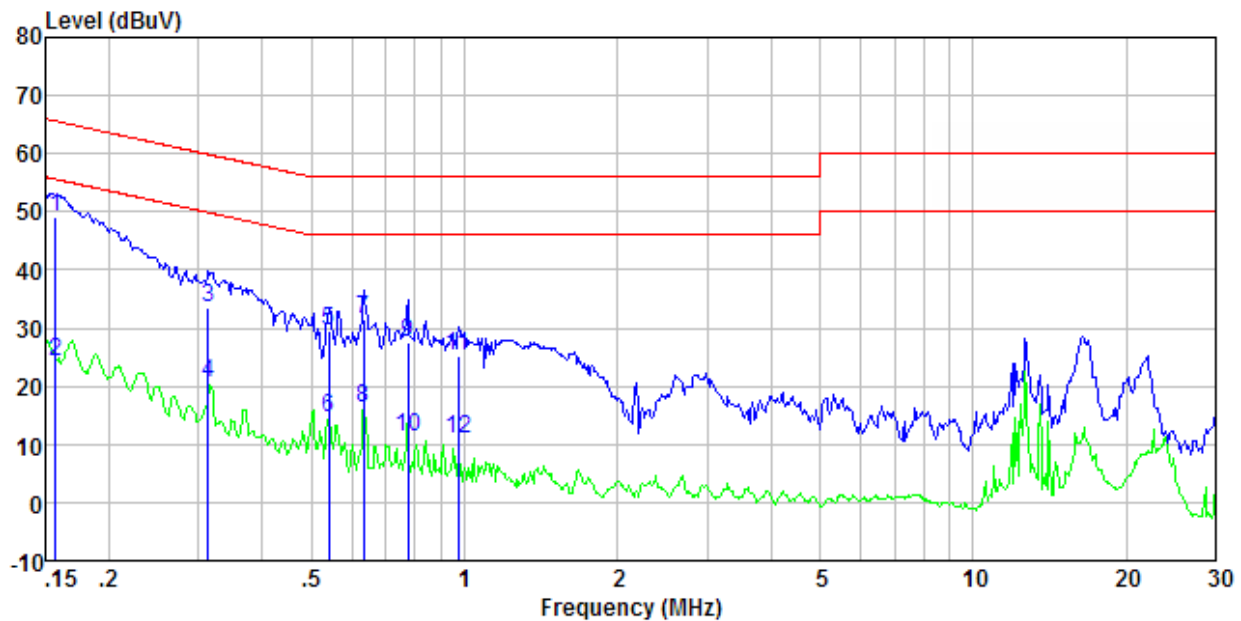
433.92MHz

Line:



Freq MHz	Reading level dBuV	LISN/ISN factor dB/m	Cable loss dB	Level dBuV	Limit level dBuV	Over limit dB	Remark
0.15	49.12	0.40	0.07	49.59	65.87	-16.28	QP
0.15	27.24	0.40	0.07	27.71	55.87	-28.16	Average
0.17	47.56	0.40	0.08	48.04	65.12	-17.08	QP
0.17	26.14	0.40	0.08	26.62	55.12	-28.50	Average
0.32	34.53	0.39	0.10	35.02	59.80	-24.78	QP
0.32	18.81	0.39	0.10	19.30	49.80	-30.50	Average
0.54	33.40	0.30	0.11	33.81	56.00	-22.19	QP
0.54	12.16	0.30	0.11	12.57	46.00	-33.43	Average
0.63	31.23	0.28	0.12	31.63	56.00	-24.37	QP
0.63	14.73	0.28	0.12	15.13	46.00	-30.87	Average
0.78	26.71	0.24	0.14	27.09	56.00	-28.91	QP
0.78	15.46	0.24	0.14	15.84	46.00	-30.16	Average

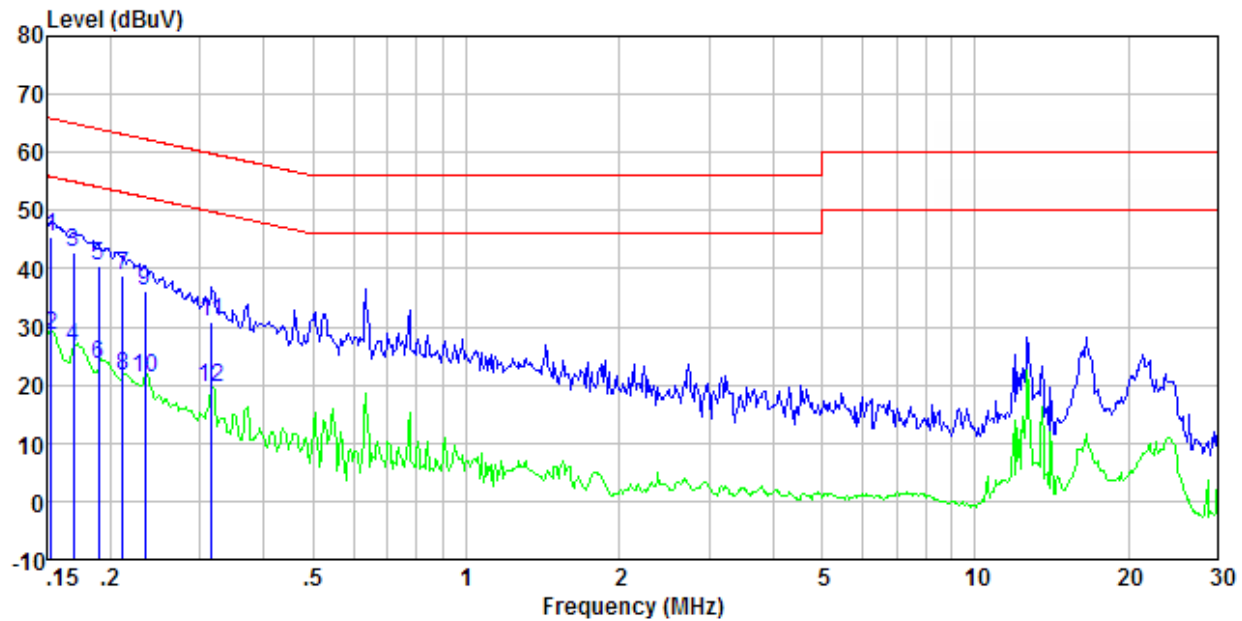
## Neutral:



Freq MHz	Reading level dBuV	LISN/ISN factor dB/m	Cable loss dB	Level dBuV	Limit level dBuV	Over limit dB	Remark
0.16	48.71	0.40	0.08	49.19	65.60	-16.41	QP
0.16	23.81	0.40	0.08	24.29	55.60	-31.31	Average
0.31	32.85	0.39	0.10	33.34	59.88	-26.54	QP
0.31	19.93	0.39	0.10	20.42	49.88	-29.46	Average
0.54	29.25	0.30	0.11	29.66	56.00	-26.34	QP
0.54	14.04	0.30	0.11	14.45	46.00	-31.55	Average
0.63	31.09	0.28	0.12	31.49	56.00	-24.51	QP
0.63	15.86	0.28	0.12	16.26	46.00	-29.74	Average
0.78	27.14	0.24	0.14	27.52	56.00	-28.48	QP
0.78	10.89	0.24	0.14	11.27	46.00	-34.73	Average
0.97	24.92	0.21	0.15	25.28	56.00	-30.72	QP
0.97	10.68	0.21	0.15	11.04	46.00	-34.96	Average

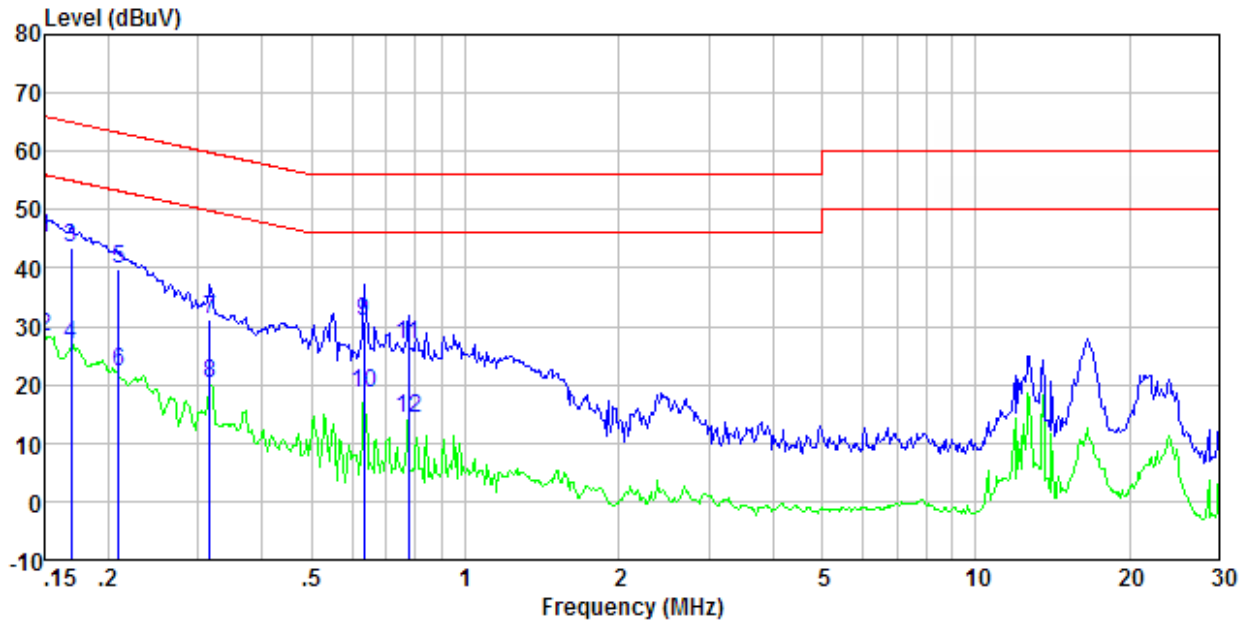
## 315MHz

Line:



Freq MHz	Reading level dBuV	LISN/ISN factor dB/m	Cable loss dB	Level dBuV	Limit level dBuV	Over limit dB	Remark
0.15	44.83	0.40	0.07	45.30	65.82	-20.52	QP
0.15	28.01	0.40	0.07	28.48	55.82	-27.34	Average
0.17	42.23	0.40	0.09	42.72	64.99	-22.27	QP
0.17	25.93	0.40	0.09	26.42	54.99	-28.57	Average
0.19	40.01	0.40	0.10	40.51	64.06	-23.55	QP
0.19	23.12	0.40	0.10	23.62	54.06	-30.44	Average
0.21	38.18	0.40	0.11	38.69	63.14	-24.45	QP
0.21	20.94	0.40	0.11	21.45	53.14	-31.69	Average
0.23	35.69	0.40	0.11	36.20	62.30	-26.10	QP
0.23	20.67	0.40	0.11	21.18	52.30	-31.12	Average
0.32	30.34	0.39	0.10	30.83	59.80	-28.97	QP
0.32	19.18	0.39	0.10	19.67	49.80	-30.13	Average

## Neutral:

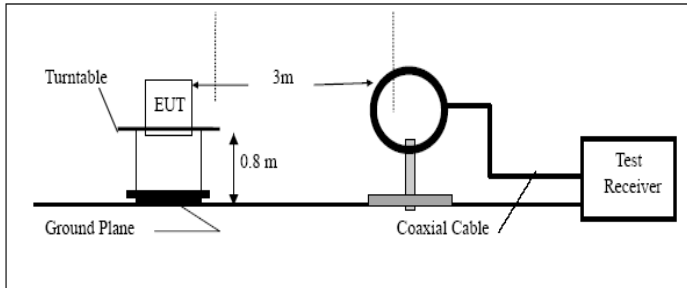


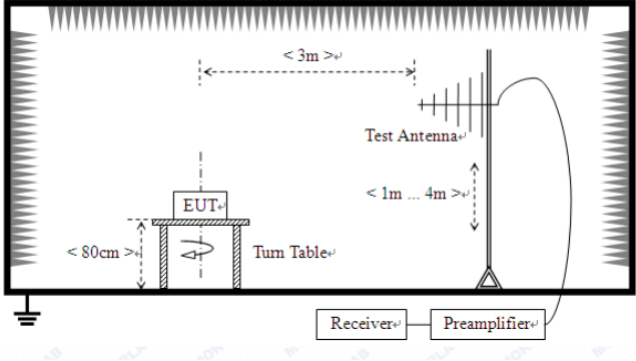
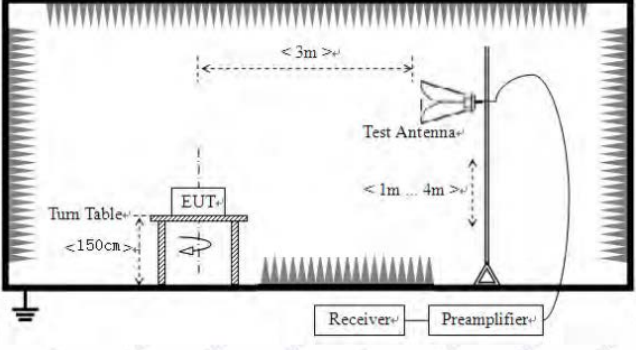
Freq MHz	Reading level dBuV	LISN/ISN factor dB/m	Cable loss dB	Level dBuV	Limit level dBuV	Over limit dB	Remark
0.15	44.79	0.40	0.07	45.26	66.00	-20.74	QP
0.15	27.77	0.40	0.07	28.24	56.00	-27.76	Average
0.17	43.09	0.40	0.09	43.58	64.99	-21.41	QP
0.17	26.30	0.40	0.09	26.79	54.99	-28.20	Average
0.21	39.19	0.40	0.11	39.70	63.23	-23.53	QP
0.21	21.73	0.40	0.11	22.24	53.23	-30.99	Average
0.32	30.66	0.39	0.10	31.15	59.80	-28.65	QP
0.32	19.70	0.39	0.10	20.19	49.80	-29.61	Average
0.63	30.35	0.28	0.12	30.75	56.00	-25.25	QP
0.63	18.00	0.28	0.12	18.40	46.00	-27.60	Average
0.78	26.35	0.24	0.14	26.73	56.00	-29.27	QP
0.78	13.76	0.24	0.14	14.14	46.00	-31.86	Average

## Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss

## 7.3 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.231 (e)& Section 15.209					
Test Method:	ANSI C63.10:2013					
Test Frequency Range:	9kHz to 5000MHz					
Test site:	Measurement Distance: 3m					
Receiver setup:	Frequency	Detector	RBW	VBW	Value	
	9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak	
	150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak	
	30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak	
	Above 1GHz	Peak	1MHz	3MHz	Peak	
		Peak	1MHz	10Hz	Average	
Limit: (Field strength of the fundamental signal)	Frequency	Limit (dBuV/m @3m)		Remark		
	433.92MHz	72.87		Average Value		
		92.87		Peak Value		
	315MHz	67.66		Average Value		
		87.66		Peak Value		
Limit: (Spurious Emissions)	Fundamental Frequency (MHz)	Field Strength of fundamental (microvolts/meter)		Field Strength of Unwanted Emissions (microvolts/meter)		
	40.66 - 40.70	1,000		100		
	70 - 130	500		50		
	130 - 174	500 to 1,500 **		50 to 1,50 **		
	174 - 260	1,500		1,50		
	260 - 470	1,500 to 5,000 **		1,50 to 5,00 **		
	Above 470	5,000		5,00		
	FREQUENCY (MHz)	Class B (dBuV/m) (at 3M)				
		PEAK		AVERAGE		
		Above 1000		74		54
	Or The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level whichever limit permits a higher field strength.					
	Test setup:	Below 30MHz				
		<div></div>				
Test setup:	Below 1GHz					

	 <p>Above 1GHz</p> 
<p>Test Procedure:</p>	<ol style="list-style-type: none"> <li>1. The EUT was placed on the top of a rotating table (0.8 meters for below 1GHz and 1.5 meters for above 1GHz) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</li> <li>3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</li> <li>4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.</li> <li>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</li> </ol>
<p>Test Instruments:</p>	<p>Refer to section 6.0 for details</p>
<p>Test mode:</p>	<p>Refer to section 5.2 for details</p>
<p>Test results:</p>	<p>Pass</p>

**Measurement data:**
**7.3.1 Field Strength of The Fundamental Signal**
**433.92MHz**
**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
433.92	87.65	17.53	3.02	29.43	78.77	92.87	-14.10	Horizontal
433.92	82.71	17.53	3.02	29.43	73.83	92.87	-19.04	Vertical

**Average value:**

Frequency (MHz)	Peak Value (dBuV/m)	Duty cycle factor	Average value (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
433.92	78.77	-15.74	63.03	72.87	-9.84	Horizontal
433.92	73.83	-15.74	58.09	72.87	-14.78	Vertical

**315 MHz**
**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
315.00	88.62	15.28	2.44	29.29	77.05	87.66	-10.61	Horizontal
315.00	83.51	15.28	2.44	29.91	71.32	87.66	-16.34	Vertical

**Average value:**

Frequency (MHz)	Peak Value (dBuV/m)	Duty cycle factor	Average value (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
315.00	77.05	-15.56	61.49	67.66	-6.17	Horizontal
315.00	71.32	-15.56	55.76	67.66	-11.90	Vertical

**Remark:**

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *Average value = Peak value + Duty cycle factor*



## 7.3.2 Spurious Emissions

### Measurement data:

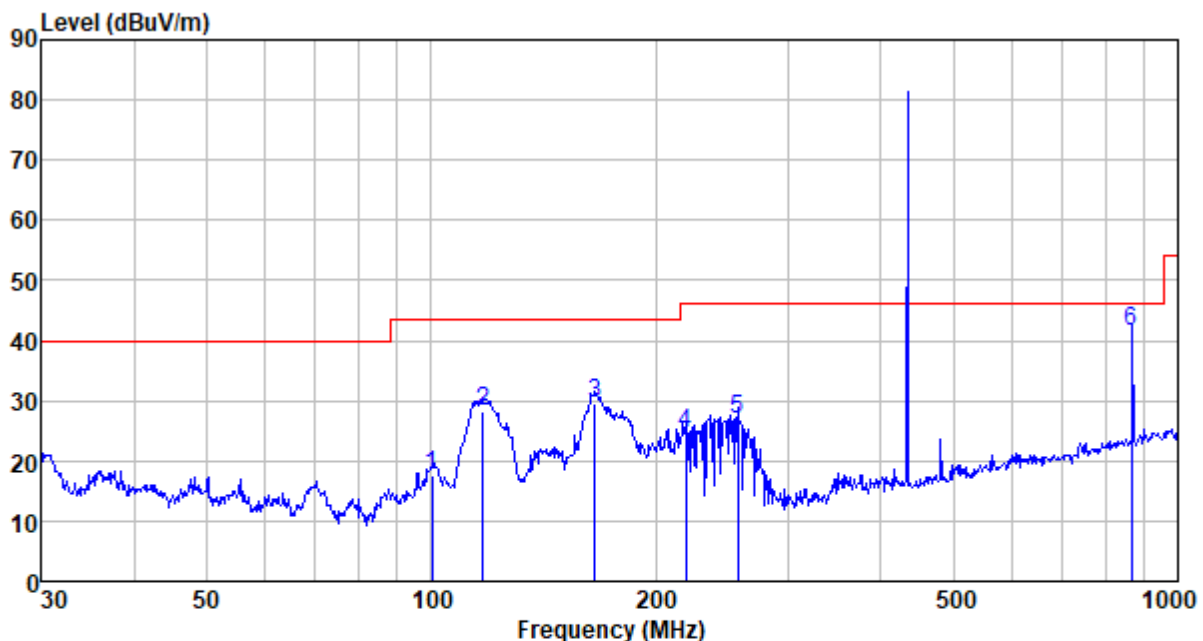
#### 9 kHz ~ 30 MHz

The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

#### 433.92MHz

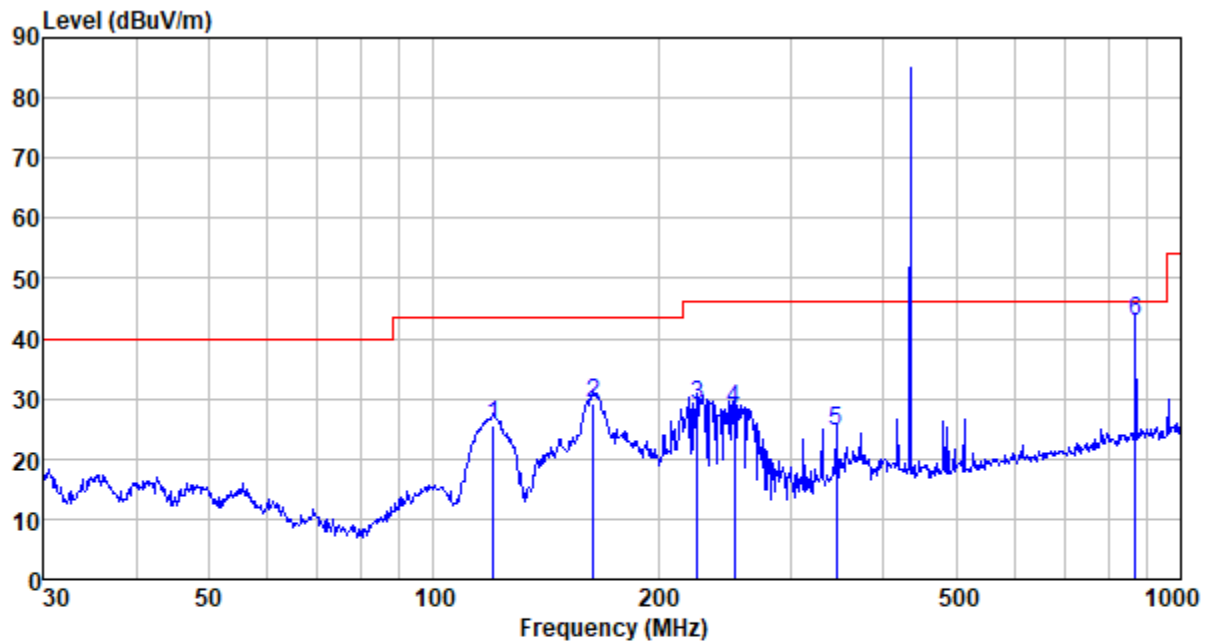
#### Below 1GHz:

#### Vertical:



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
100.229	41.18	12.10	1.19	36.72	17.75	43.50	-25.75	QP
117.360	53.80	10.00	1.34	36.86	28.28	43.50	-15.22	QP
165.487	56.83	8.33	1.66	37.16	29.66	43.50	-13.84	QP
219.075	49.08	10.88	1.95	37.35	24.56	46.00	-21.44	QP
257.422	49.98	12.14	2.16	37.39	26.89	46.00	-19.11	QP
867.810	52.37	21.91	4.73	37.61	41.40	46.00	-4.60	QP

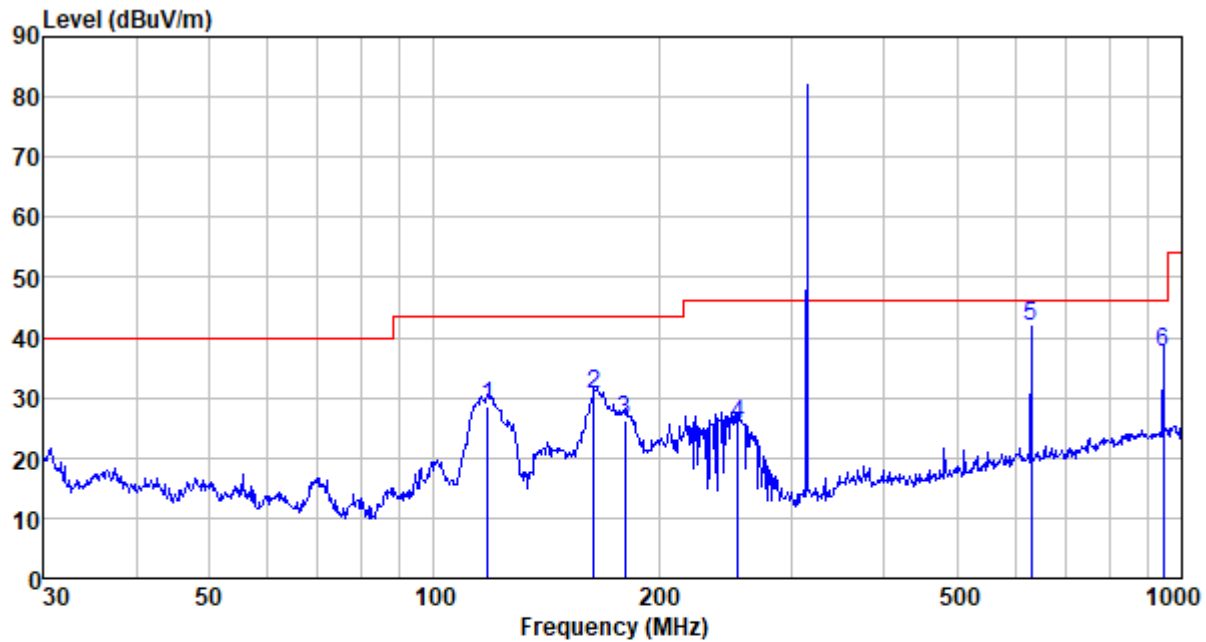
## Horizontal:



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
120.277	51.58	9.40	1.36	36.88	25.46	43.50	-18.04	QP
163.755	56.39	8.27	1.65	37.15	29.16	43.50	-14.34	QP
225.308	53.08	11.07	1.99	37.36	28.78	46.00	-17.22	QP
252.948	51.66	11.95	2.14	37.38	28.37	46.00	-17.63	QP
345.595	44.95	14.38	2.60	37.47	24.46	46.00	-21.54	QP
867.870	53.88	21.91	4.73	37.61	42.91	46.00	-3.09	QP

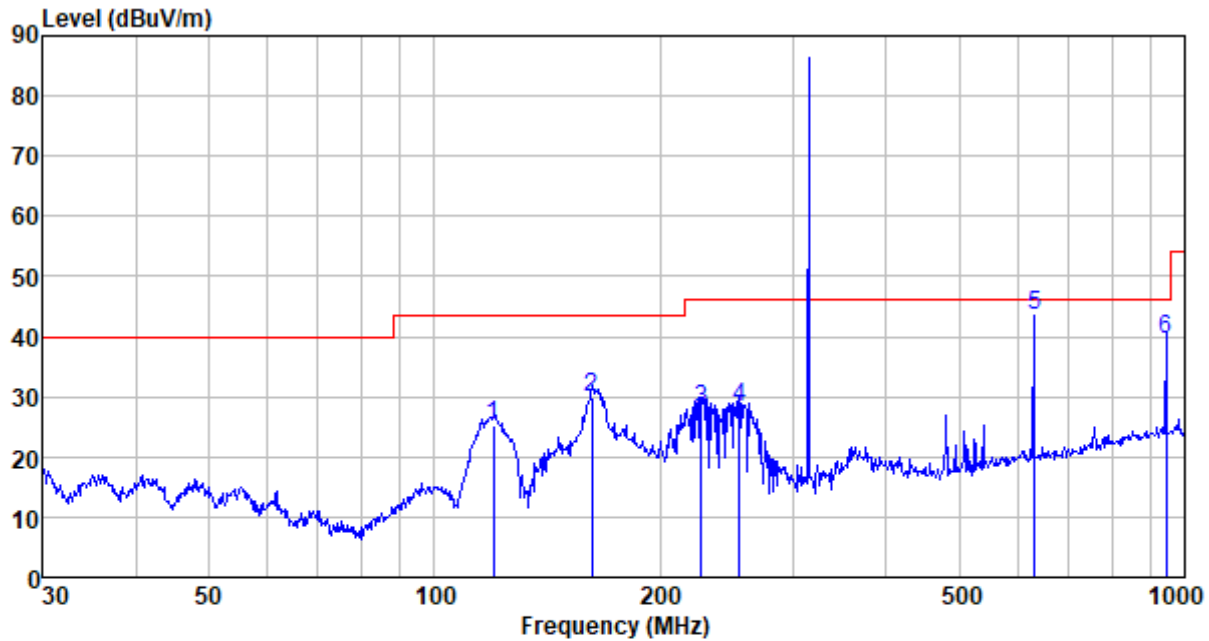
315 MHz

Vertical:



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
118.186	54.71	9.40	1.34	36.87	28.58	43.50	-14.92	QP
163.755	57.91	8.27	1.65	37.15	30.68	43.50	-12.82	QP
180.017	53.07	8.80	1.74	37.24	26.37	43.50	-17.13	QP
254.728	48.71	12.04	2.15	37.38	25.52	46.00	-20.48	QP
629.477	56.07	19.45	3.83	37.57	41.78	46.00	-4.22	QP
945.440	47.59	22.46	5.03	37.56	37.52	46.00	-8.48	QP

## Horizontal:



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
119.856	51.35	9.40	1.36	36.88	25.23	43.50	-18.27	QP
162.041	57.10	8.20	1.64	37.14	29.80	43.50	-13.70	QP
226.894	52.30	11.07	2.00	37.36	28.01	46.00	-17.99	QP
254.728	51.52	12.04	2.15	37.38	28.33	46.00	-17.67	QP
629.951	57.64	19.45	3.84	37.57	43.36	46.00	-2.64	QP
945.125	49.49	22.46	5.03	37.56	39.42	46.00	-6.58	QP

## Above 1G:

### Peak value: (433.92MHz)

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
1735.68	50.42	25.05	4.82	34.00	46.29	72.87	-26.58	Vertical
2169.60	36.15	27.74	5.15	34.27	34.77	72.87	-38.10	Vertical
2603.52	38.71	27.82	5.58	33.78	38.33	72.87	-34.54	Vertical
1298.59	56.71	25.63	4.54	33.27	53.61	72.87	-19.26	Horizontal
1735.68	46.95	25.05	4.82	34.00	42.82	72.87	-30.05	Horizontal
2169.60	40.82	27.74	5.15	34.27	39.44	72.87	-33.43	Horizontal
2603.52	36.75	27.82	5.58	33.78	36.37	72.87	-36.50	Horizontal

### Average value:

Frequency (MHz)	Level (dBuV/m)	Duty cycle factor	Average value (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
1735.68	46.29	-15.74	30.55	52.87	-22.32	Vertical
2169.60	34.77	-15.74	19.03	52.87	-33.84	Vertical
2603.52	38.33	-15.74	22.59	52.87	-30.28	Vertical
1735.68	42.82	-15.74	27.08	52.87	-25.79	Horizontal
2169.60	39.44	-15.74	23.70	52.87	-29.17	Horizontal
2603.52	36.37	-15.74	20.63	52.87	-32.24	Horizontal

### Peak value: (315MHz)

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
1260.00	39.08	25.55	4.51	33.18	35.96	67.66	-31.70	Vertical
1890.00	36.81	25.70	4.90	34.26	33.15	67.66	-34.51	Vertical
2520.00	33.67	27.58	5.51	33.88	32.88	67.66	-34.78	Vertical
1260.00	38.63	25.55	4.51	33.18	35.51	67.66	-32.15	Horizontal
1890.00	38.17	25.70	4.90	34.26	34.51	67.66	-33.15	Horizontal
2520.00	36.95	27.58	5.51	33.88	36.16	67.66	-31.50	Horizontal

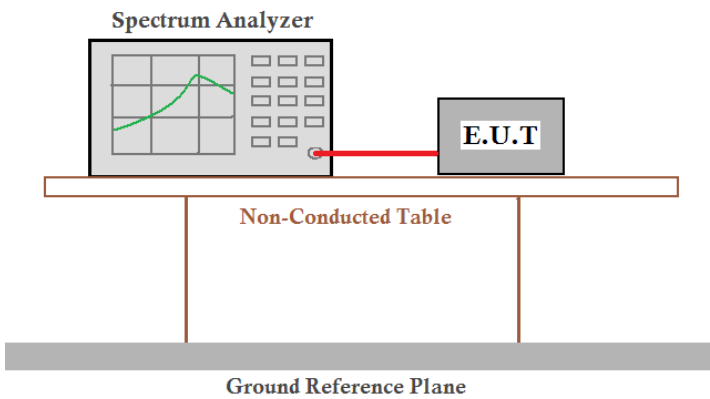
### Average value: (315MHz)

Frequency (MHz)	Level (dBuV/m)	Duty cycle factor	Average value (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
1260.00	35.96	-15.56	20.40	47.66	-27.26	Vertical
1890.00	33.15	-15.56	17.59	47.66	-30.07	Vertical
2520.00	32.88	-15.56	17.32	47.66	-30.34	Vertical
1260.00	35.51	-15.56	19.95	47.66	-27.71	Horizontal
1890.00	34.51	-15.56	18.95	47.66	-28.71	Horizontal
2520.00	36.16	-15.56	20.60	47.66	-27.06	Horizontal

### Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. Average value = Peak value + Duty cycle factor

## 7.4 20dB Occupy Bandwidth

Test Requirement:	FCC Part15 C Section 15.231 (c)
Test Method:	ANSI C63.10:2013
Limit:	The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900MHz. 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.
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T are placed on a Non-Conducted Table. The table is supported by a Ground Reference Plane.</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

### Measurement Data

Test Frequency (MHz)	20dB bandwidth (MHz)	Limit (MHz)	Result
315.00	0.073	0.79	Pass
433.92	0.074	1.08	Pass

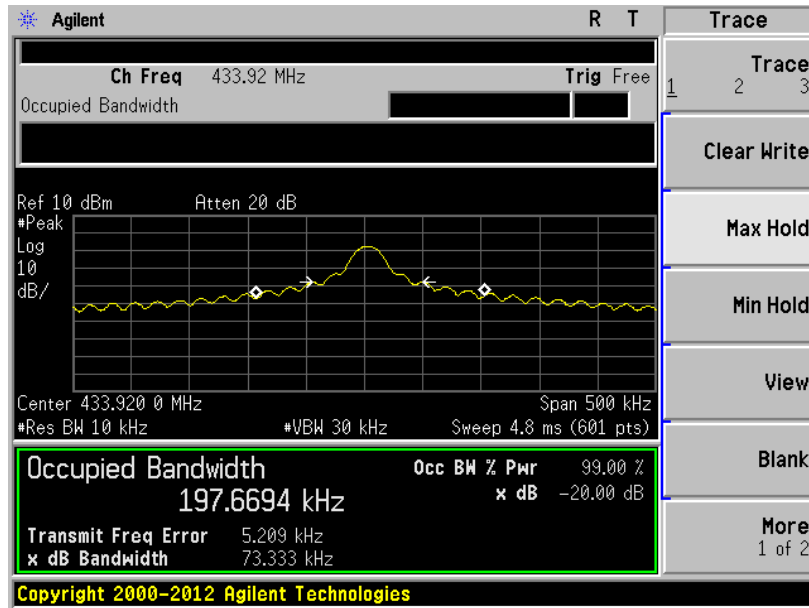
Note: Limit= Fundamental frequency×0.25%

$433.92 \times 0.25\% = 1.08\text{MHz}$

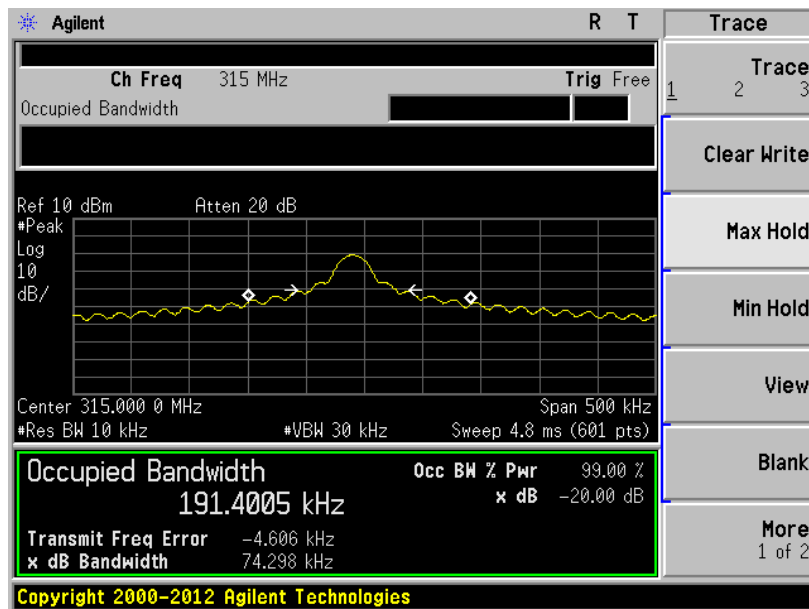
$315 \times 0.25\% = 0.79\text{MHz}$

Test plot as follows:

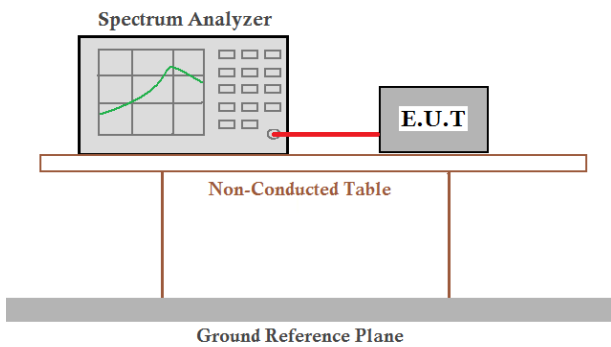
433.92MHz



315MHz



## 7.5 Dwell Time

Test Requirement:	FCC Part15 C Section 15.231 (e)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=100KHz, VBW=100KHz, span=0Hz, detector: Peak
Limit:	Not more than 1 seconds Silent period: at least 30 times the duration of the transmission or more than 10 seconds
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by a Ground Reference Plane.</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

### Measurement data:

Frequency (MHz)	Duration of each TX (second)	Limit (second)	Result
433.92	0.0167	<1.0	Pass
315.00	0.0165	<1.0	Pass

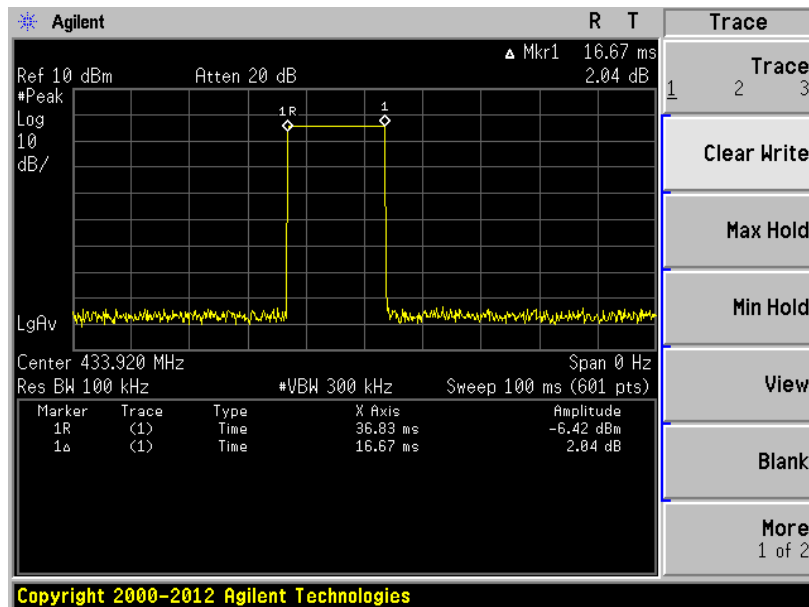
### Silent period

Frequency (MHz)	Duration of each TX (seconds):	Limit (seconds)	Result
315.00	16.03	At least 30 times the duration of the transmission or more than 10 seconds	Pass
433.92	16.03		Pass

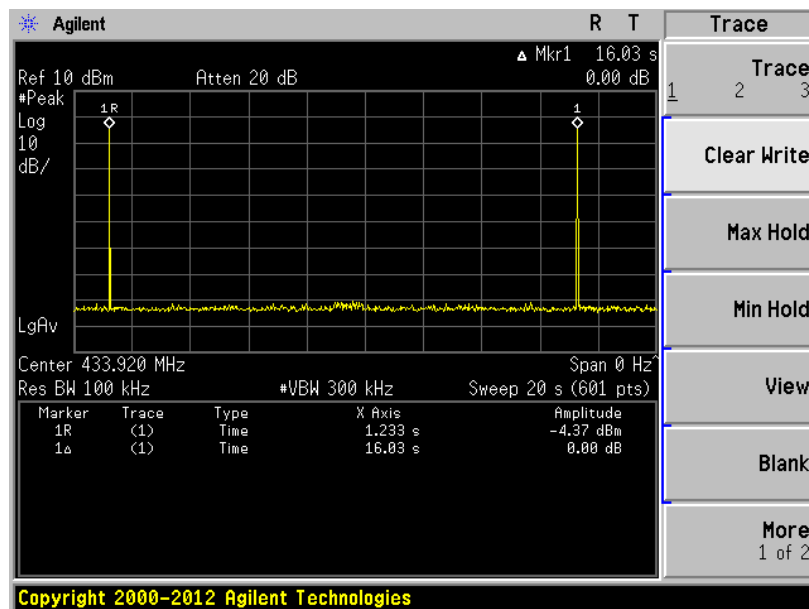


Test plot as follows:

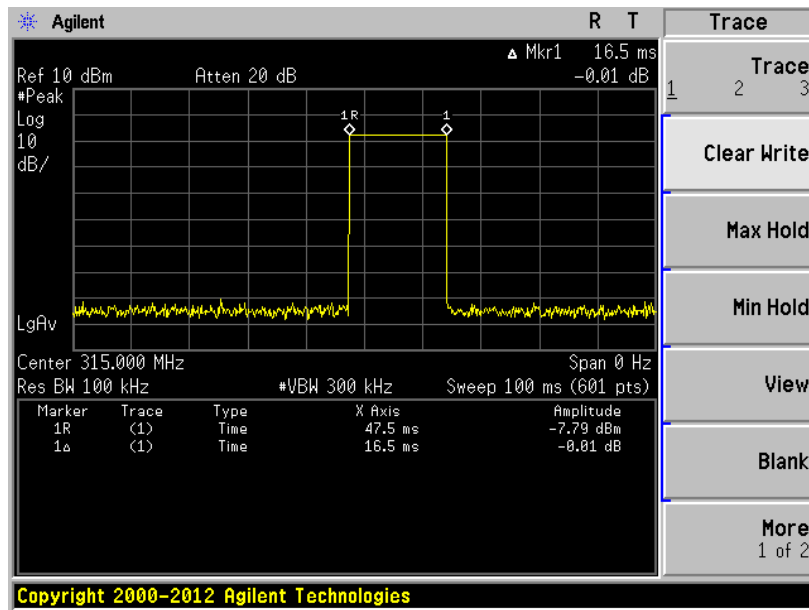
**433.92MHz**



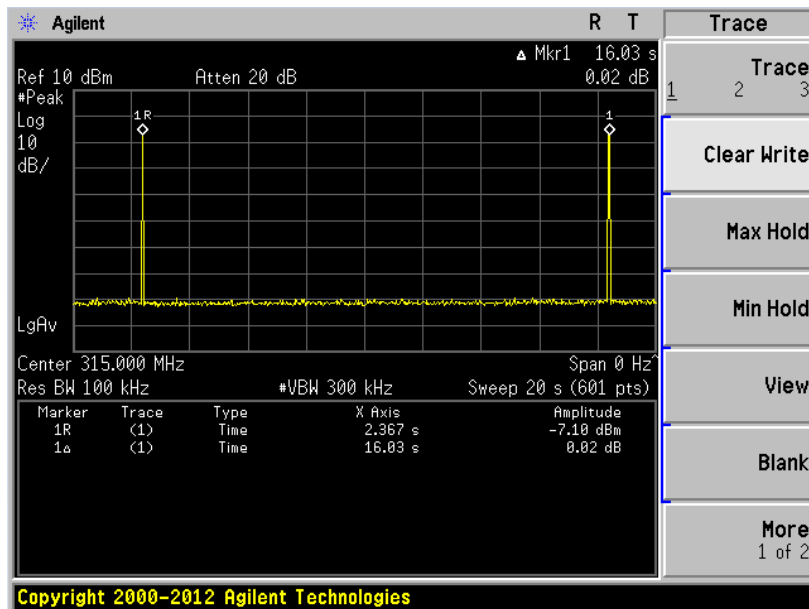
**Silent period**



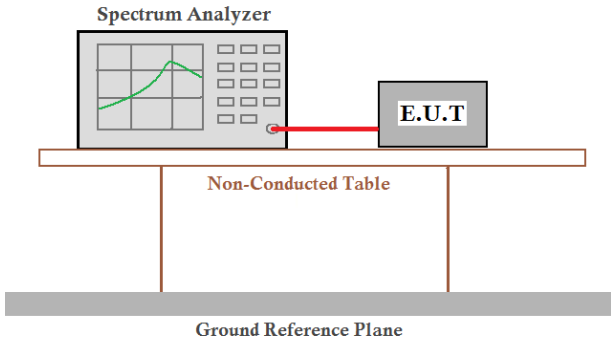
## 315MHz



## Silent period



## 7.6 Duty Cycle

Test Requirement:	FCC Part15 C Section 15.231
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=100KHz, VBW=100KHz, span=0Hz, detector: Peak
Limit:	No dedicated limit specified in the Rules.
Test Procedure:	<ol style="list-style-type: none"> <li>1. Place the EUT on the table and set it in transmitting mode.</li> <li>2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.</li> <li>3. Set centre frequency of spectrum analyzer=operating frequency.</li> <li>4. Set the spectrum analyzer as RBW=100kHz, VBW=100KHz, Span=0Hz, Adjust Sweep=100ms to obtain the "worst-case" pulse on time</li> <li>5. Repeat above procedures until all frequency measured was complete.</li> </ol>
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by two vertical legs and sits on a Ground Reference Plane, which is represented by a thick grey bar at the bottom.</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

### Measurement data:

Calculate Formula: Duty cycle factor =  $20 \log(\text{Duty cycle})$   
Duty cycle = on time / 0.1 seconds or period, whichever is less

Test data:

433.92MHz

T on time = 16.33 (ms)  
T period = 103(ms)  
Duty cycle =  $16.33 / 100 = 16.33\%$   
Duty cycle factor =  $20 \log(0.1633) = -15.74$

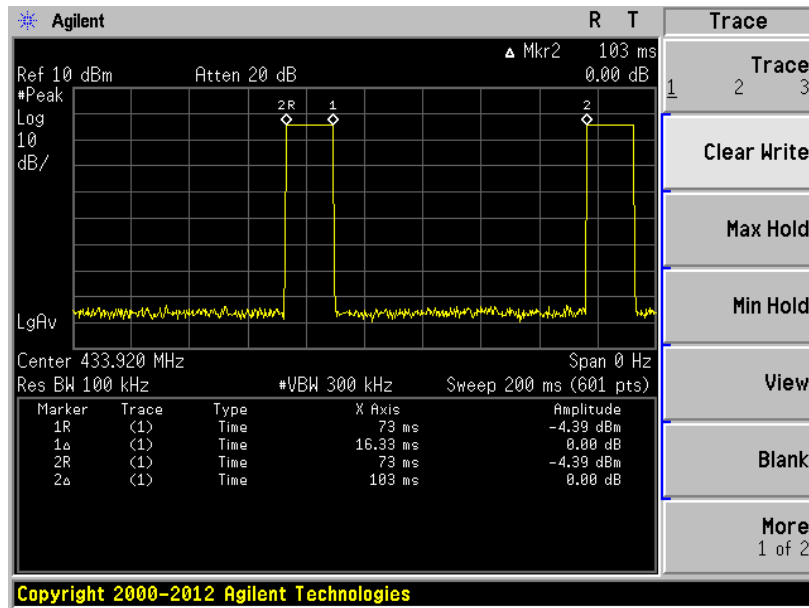
315MHz

T on time = 16.67(ms)  
T period = 103(ms)  
Duty cycle =  $16.67 / 100 = 16.67\%$   
Duty cycle factor =  $20 \log(0.1667) = -15.56$

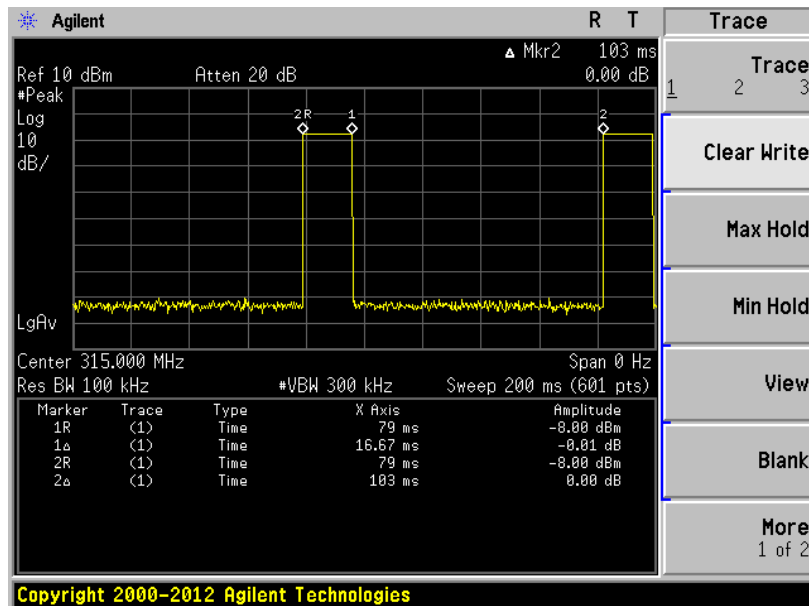


Test plot as follows:

433.92MHz

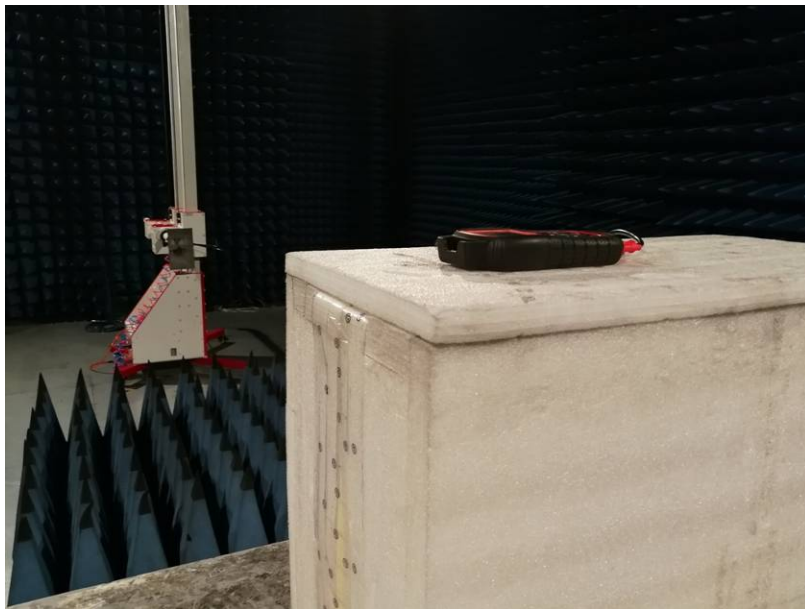
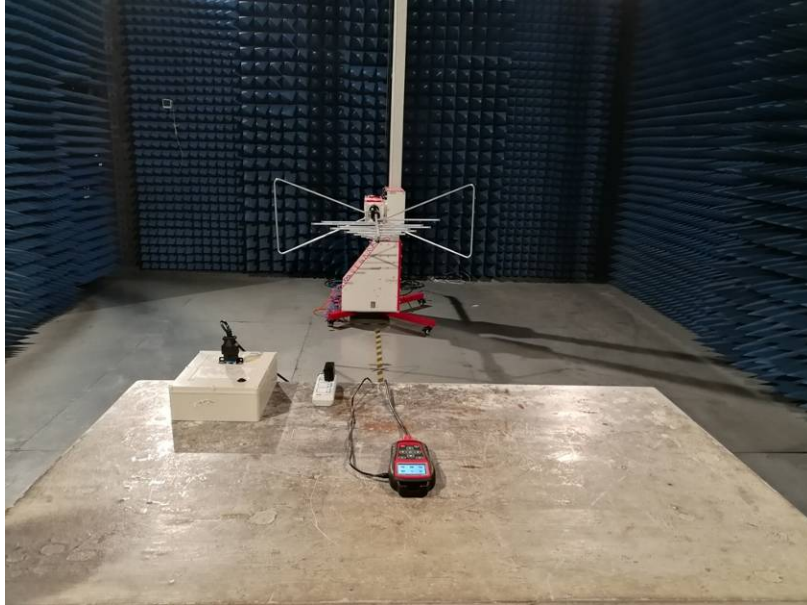


315MHz



## 8 Test Setup Photo

Radiated Emission



## Conducted Emission



## 9 EUT Constructional Details

Reference to the test report No. GTS201805000205F01

----- End -----