

## TEST REPORT

**Application No.:** SZEM1908017374CR  
**Applicant:** ZK Technology LLC DBA ZK Teco  
**Address of Applicant:** 200 Centennial Ave, Suite 211 Piscataway, NJ 08854, US  
**Manufacturer:** ZKTECO CO., LTD.  
**Address of Manufacturer:** No.26, Pingshan 188 Industry zone, Tangxia Town, Dongguan City, Guangdong Province, China 523728  
**Factory:** ZKTECO CO., LTD.  
**Address of Factory:** No.26, Pingshan 188 Industry zone, Tangxia Town, Dongguan City, Guangdong Province, China 523728  
**Equipment Under Test (EUT):**  
**EUT Name:** Data Collection Terminal  
**Model No.:** ULTIMA-200, ULTIMA, ULTIMA-BAR, ULTIMA-MAG, ULTIMA-SILKID, ULTIMA-LUM, ULTIMA-PRO, ULTIMA-PLUS, ORION, ORION-BAR, ORION-MAG, ORION-TC1, ORION-SILKID, ORION-LUM, ORION-PRO, Orion-PLUS, CRONUS-200, CRONUS, CRONUS-BAR, CRONUS-MAG, CRONUS-SILKID, CRONUS-LUM, CRONUS-PRO, CRONUS-PLUS, PLATO, PLATO-BAR, PLATO-MAG, PLATO-SILKID, PLATO-LUM, PLATO-PRO, PLATO-PLUS ♣  
 ♣ Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.  
**Trade mark:** ZKTECO  
**FCC ID:** 2AUC7-858462  
**Standard(s) :** 47 CFR Part 15, Subpart C 15.225  
**Date of Receipt:** 2019-08-13  
**Date of Test:** 2019-08-16 to 2019-09-02  
**Date of Issue:** 2019-09-18

<b>Test Result:</b>	<b>Pass*</b>
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\* In the configuration tested, the EUT complied with the standards specified above.

*Keny Xu*

Keny Xu  
EMC Laboratory Manager





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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2019-09-18		Original

<b>Authorized for issue by:</b>			
			
		<hr/> <b>Damon Su /Project Engineer</b>	
			
		<hr/> <b>Eric Fu /Reviewer</b>	



## 2 Test Summary

Radio Spectrum Technical Requirement				
Item	Standard	Method	Requirement	Result
Antenna Requirement	47 CFR Part 15, Subpart C 15.225	N/A	47 CFR Part 15, Subpart C 15.203	Pass

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.225	ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	Pass
20dB Bandwidth	47 CFR Part 15, Subpart C 15.225	ANSI C63.10 (2013) Section 6.9	47 CFR Part 15, Subpart C 15.215	Pass
Emission Mask	47 CFR Part 15, Subpart C 15.225	ANSI C63.10 (2013) Section 6.4	47 CFR Part 15, Subpart C 15.225(a)&(b)&(C )	Pass
Frequency tolerance	47 CFR Part 15, Subpart C 15.225	ANSI C63.10 (2013) Section 6.8	47 CFR Part 15, Subpart C 15.225(e)	Pass
Radiated Emissions (9kHz-30MHz)	47 CFR Part 15, Subpart C 15.225	ANSI C63.10 (2013) Section 6.4&6.5	47 CFR Part 15, Subpart C 15.225(d) & 15.209	Pass
Radiated Emissions (30MHz-1GHz)	47 CFR Part 15, Subpart C 15.225	ANSI C63.10 (2013) Section 6.4&6.5	47 CFR Part 15, Subpart C 15.225(d) & 15.209	Pass

### Remark:

Model No.: ULTIMA-200, ULTIMA, ULTIMA-BAR, ULTIMA-MAG, ULTIMA-SILKID, ULTIMA-LUM, ULTIMA-PRO, ULTIMA-PLUS, ORION, ORION-BAR, ORION-MAG, ORION-TC1, ORION-SILKID, ORION-LUM, ORION-PRO, Orion-PLUS, CRONUS-200, CRONUS, CRONUS-BAR, CRONUS-MAG, CRONUS-SILKID, CRONUS-LUM, CRONUS-PRO, CRONUS-PLUS, PLATO, PLATO-BAR, PLATO-MAG, PLATO-SILKID, PLATO-LUM, PLATO-PRO, PLATO-PLUS

Only the model ULTIMA-200 was tested, since the electrical circuit design, layout, components used, internal wiring and functions were identical for the above models, with only difference on model No..



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### 3 Contents

	Page
1 COVER PAGE .....	1
2 TEST SUMMARY .....	3
3 CONTENTS .....	4
4 GENERAL INFORMATION .....	6
4.1 DETAILS OF E.U.T. ....	6
4.2 DESCRIPTION OF SUPPORT UNITS .....	6
4.3 MEASUREMENT UNCERTAINTY .....	6
4.4 TEST LOCATION .....	7
4.5 TEST FACILITY .....	7
4.6 DEVIATION FROM STANDARDS .....	7
4.7 ABNORMALITIES FROM STANDARD CONDITIONS .....	7
5 EQUIPMENT LIST .....	8
6 RADIO SPECTRUM TECHNICAL REQUIREMENT .....	10
6.1 ANTENNA REQUIREMENT .....	10
6.1.1 Test Requirement: .....	10
6.1.2 Conclusion .....	10
7 RADIO SPECTRUM MATTER TEST RESULTS .....	11
7.1 CONDUCTED EMISSIONS AT AC POWER LINE (150KHZ-30MHZ) .....	11
7.1.1 E.U.T. Operation .....	12
7.1.2 Test Setup Diagram .....	12
7.1.3 Measurement Procedure and Data .....	12
7.2 20DB BANDWIDTH .....	15
7.2.1 E.U.T. Operation .....	15
7.2.2 Test Setup Diagram .....	15
7.2.3 Measurement Procedure and Data .....	15
7.3 EMISSION MASK .....	17
7.3.1 E.U.T. Operation .....	17
7.3.2 Test Setup Diagram .....	17
7.3.3 Measurement Procedure and Data .....	18
7.4 FREQUENCY TOLERANCE .....	20
7.4.1 E.U.T. Operation .....	20
7.4.2 Test Setup Diagram .....	20
7.4.3 Measurement Procedure and Data .....	20
7.5 RADIATED EMISSIONS(9KHZ-30MHZ) .....	22
7.5.1 E.U.T. Operation .....	23
7.5.2 Test Setup Diagram .....	23
7.5.3 Measurement Procedure and Data .....	23
7.6 RADIATED EMISSIONS(30MHZ-1GHZ) .....	26
7.6.1 E.U.T. Operation .....	26
7.6.2 Test Setup Diagram .....	26
7.6.3 Measurement Procedure and Data .....	27



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8 PHOTOGRAPHS .....30

8.1 TEST SETUP .....30

8.2 EUT CONSTRUCTIONAL DETAILS (EUT PHOTOS) .....30



## 4 General Information

### 4.1 Details of E.U.T.

Power supply:	Input: DC 12V. Adapter Model No.: FJ-SW1203000U Input: 100-240V~50/60Hz 1.5A Output: DC 12V 3A
Operation Frequency:	13.56MHz
Modulation Type:	ASK
Antenna Type:	Loop Antenna

### 4.2 Description of Support Units

The EUT has been tested as an independent unit.

### 4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	$\pm 7.25 \times 10^{-8}$
2	Duty cycle	$\pm 0.37\%$
3	Occupied Bandwidth	$\pm 3\%$
4	Conduction emission	$\pm 3.0\text{dB}$ (150kHz to 30MHz)
5	RF conducted power	$\pm 0.75\text{dB}$
6	RF power density	$\pm 2.84\text{dB}$
7	Conducted Spurious emissions	$\pm 0.75\text{dB}$
8	RF Radiated power	$\pm 4.5\text{dB}$ (Below 1GHz)
		$\pm 4.8\text{dB}$ (Above 1GHz)
9	Radiated Spurious emission test	$\pm 4.5\text{dB}$ (Below 1GHz)
		$\pm 4.8\text{dB}$ (Above 1GHz)
10	Temperature test	$\pm 1^\circ\text{C}$
11	Humidity test	$\pm 3\%$
12	Supply voltages	$\pm 1.5\%$
13	Time	$\pm 3\%$

#### 4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057.

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No tests were sub-contracted.

#### 4.5 Test Facility

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

- **CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

- **VCCI**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

- **FCC –Designation Number: CN1178**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

#### 4.6 Deviation from Standards

None

#### 4.7 Abnormalities from Standard Conditions

None



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## 5 Equipment List

RF conducted test					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (yyyy-mm-dd)	Cal. Due date (yyyy-mm-dd)
Shielding Room	SAEMC	MSR733	SEM001-09	2019-06-13	2024-06-12
DC Power Supply	ZhaoXin	PS-3005D	SEM011-05	2018-09-25	2019-09-24
Spectrum Analyzer (20Hz-43GHz)	Rohde & Schwarz	FSU43	SEM004-08	2019-04-12	2020-04-11
Signal Generator (9kHz-40GHz)	KEYSIGHT	N5173B	SEM006-05	2018-09-27	2019-09-26
Measurement Software	JS Tonscend	JS1120-2 BT/WIFI V2.6	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-01	2019-07-11	2020-07-10
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Programmable Temperature & Humidity Chamber	Votsch Industrietechnik GmbH	VT 4002	SEM002-15	2019-04-01	2020-03-31

Conducted Emissions at AC Power Line (150kHz-30MHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Shielding Room	ZhongYu Electron	GB-88	SEM001-06	2019-06-13	2022-06-12
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM024-01	2019-07-11	2020-07-10
LISN	Rohde & Schwarz	ENV216	SEM007-01	2018-09-25	2019-09-24
LISN	ETS-LINDGREN	3816/2	SEM007-02	2019-04-01	2020-03-31
EMI Test Receiver	Rohde & Schwarz	ESCI	SEM004-02	2019-04-01	2020-03-31

Emission Mask, Radiated Emissions(9kHz-30MHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
10m Semi-Anechoic Chamber	SAEMC	FSAC1018	SEM001-03	2018-03-31	2021-03-30
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM029-01	2019-07-11	2020-07-10
EMI Test Receiver (9kHz-7GHz)	Rohde & Schwarz	ESR	SEM004-03	2019-04-01	2020-03-31
Trilog-Broadband Antenna(30MHz-1GHz)	Schwarzbeck	VULB9168	SEM003-18	2019-02-22	2022-02-21
Pre-amplifier	Sonoma Instrument Co	310N	SEM005-04	2019-04-12	2020-04-11



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Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2017-08-22	2020-08-21
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Radiated Emissions(30MHz-1GHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
10m Semi-Anechoic Chamber	SAEMC	FSAC1018	SEM001-03	2018-03-31	2021-03-30
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM029-01	2019-07-11	2020-07-10
EMI Test Receiver (9kHz-7GHz)	Rohde & Schwarz	ESR	SEM004-03	2019-04-01	2020-03-31
Trilog-Broadband Antenna(30MHz-1GHz)	Schwarzbeck	VULB9168	SEM003-18	2019-06-28	2022-06-27
Pre-amplifier	Sonoma Instrument Co	310N	SEM005-04	2019-04-12	2020-04-11
				2019-04-12	2020-04-11
Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2017-08-22	2020-08-21

General used equipment					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-03	2018-09-27	2019-09-26
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2018-09-27	2019-09-26
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2018-09-27	2019-09-26
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2019-04-04	2020-04-03



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## 6 Radio Spectrum Technical Requirement

### 6.1 Antenna Requirement

#### 6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203

#### 6.1.2 Conclusion

Standard Requirement:

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 antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit permanently attached antenna or of an so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement.

Antenna location: Refer to Internal photos.



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## 7 Radio Spectrum Matter Test Results

### 7.1 Conducted Emissions at AC Power Line (150kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.207  
Test Method: ANSI C63.10 (2013) Section 6.2  
Limit:

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

\* Decreases with the logarithm of the frequency.



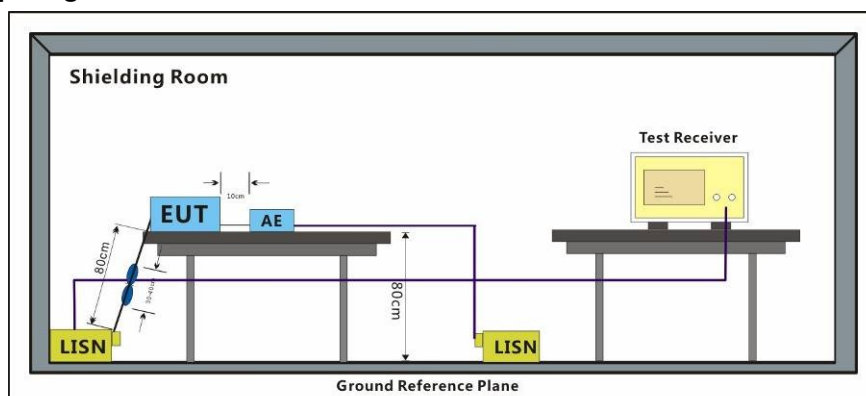
### 7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 20.5 °C Humidity: 56.4 % RH Atmospheric Pressure: 1000 mbar

Test mode b:TX mode\_Keep the EUT in transmitting with modulation mode.

### 7.1.2 Test Setup Diagram



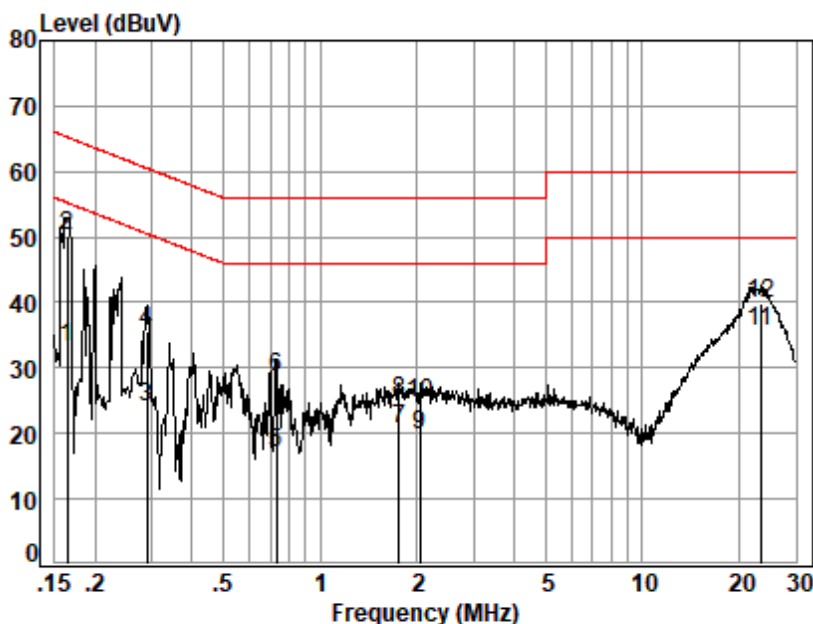
### 7.1.3 Measurement Procedure and Data

- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50μH + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
- 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,
- 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
- 5) 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 on conducted measurement.

Remark: LISN=Read Level+ Cable Loss+ LISN Factor



Mode:b; Line:Live Line

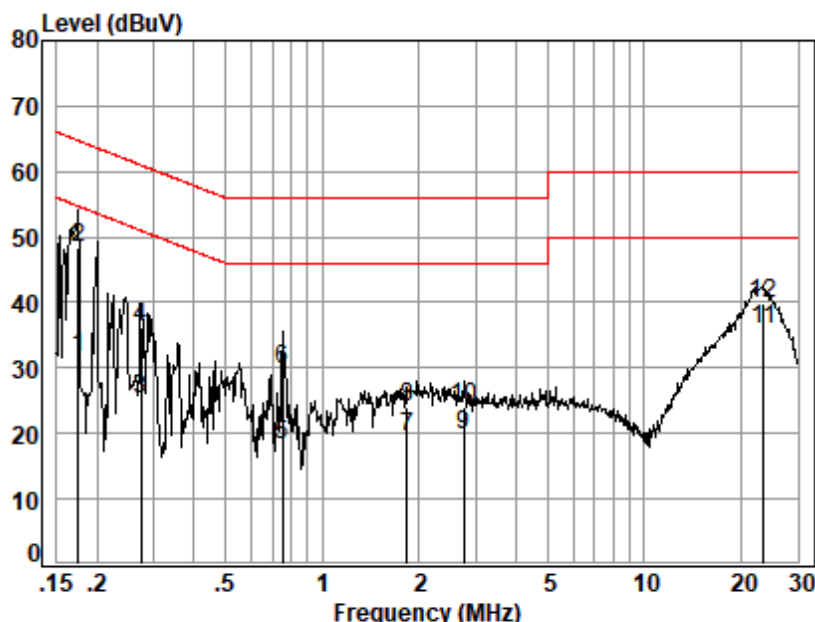


Site : Shielding Room  
Condition: Line  
Job No. : 17374CR  
Test mode: b

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.16	0.01	9.66	23.39	33.06	55.25	-22.19	Average
2	0.16	0.01	9.66	40.41	50.08	65.25	-15.17	QP
3	0.29	0.04	9.67	14.27	23.98	50.54	-26.56	Average
4	0.29	0.04	9.67	25.81	35.52	60.54	-25.02	QP
5	0.73	0.08	9.70	7.39	17.17	46.00	-28.83	Average
6	0.73	0.08	9.70	18.87	28.65	56.00	-27.35	QP
7	1.76	0.15	9.72	10.73	20.60	46.00	-25.40	Average
8	1.76	0.15	9.72	15.12	24.99	56.00	-31.01	QP
9	2.03	0.16	9.72	9.78	19.66	46.00	-26.34	Average
10	2.03	0.16	9.72	14.65	24.53	56.00	-31.47	QP
11	23.26	0.25	10.19	25.16	35.60	50.00	-14.40	Average
12	23.26	0.25	10.19	29.44	39.88	60.00	-20.12	QP



Mode:b; Line:Neutral Line



Site : Shielding Room  
Condition: Neutral  
Job No. : 17374CR  
Test mode: b

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.17	0.02	9.64	22.02	31.68	54.72	-23.04	Average
2	0.17	0.02	9.64	38.75	48.41	64.72	-16.31	QP
3	0.27	0.04	9.64	15.43	25.11	50.98	-25.87	Average
4	0.27	0.04	9.64	26.47	36.15	60.98	-24.83	QP
5	0.75	0.08	9.68	8.62	18.38	46.00	-27.62	Average
6	0.75	0.08	9.68	20.00	29.76	56.00	-26.24	QP
7	1.84	0.15	9.69	9.65	19.49	46.00	-26.51	Average
8	1.84	0.15	9.69	14.15	23.99	56.00	-32.01	QP
9	2.75	0.16	9.68	10.00	19.84	46.00	-26.16	Average
10	2.75	0.16	9.68	14.05	23.89	56.00	-32.11	QP
11	23.39	0.25	10.24	25.47	35.96	50.00	-14.04	Average
12	23.39	0.25	10.24	29.39	39.88	60.00	-20.12	QP

### 7.2 20dB Bandwidth

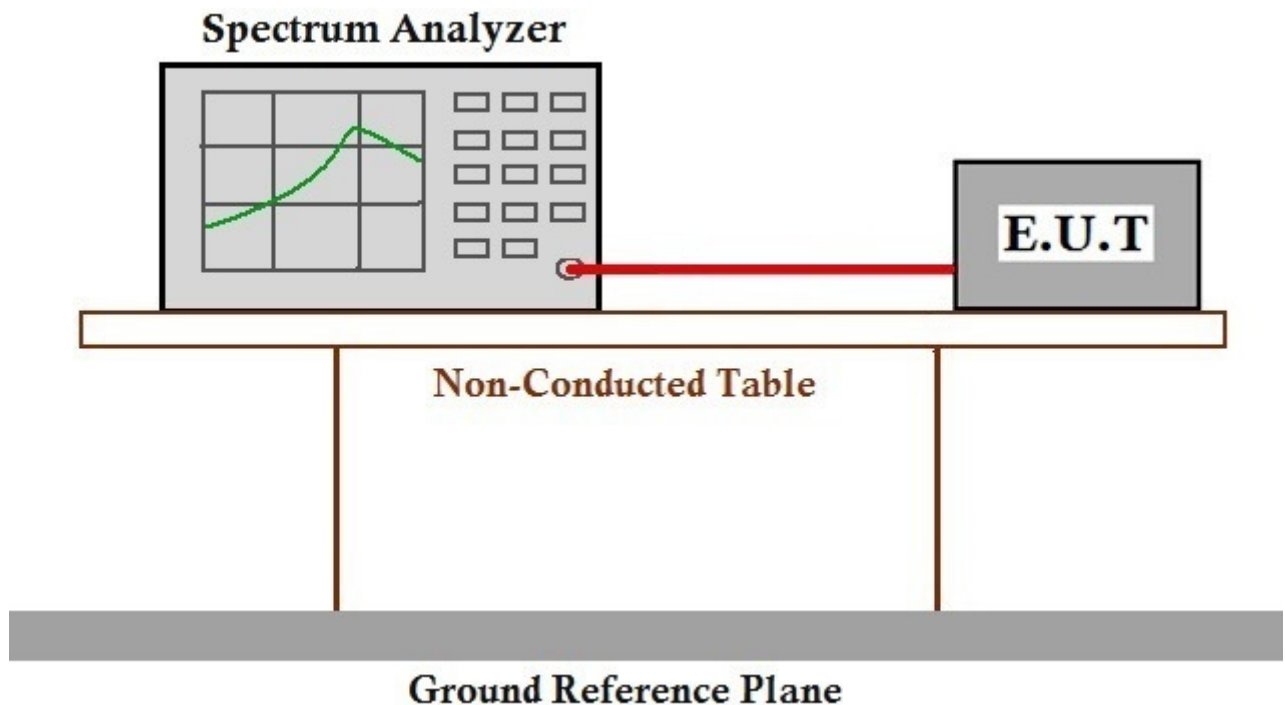
Test Requirement 47 CFR Part 15, Subpart C 15.215  
Test Method: ANSI C63.10 (2013) Section 6.9  
Limit: N/A

#### 7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 27.8 °C Humidity: 39.7 % RH Atmospheric Pressure: 1000 mbar  
Test mode b:TX mode\_Keep the EUT in transmitting with modulation mode.

#### 7.2.2 Test Setup Diagram

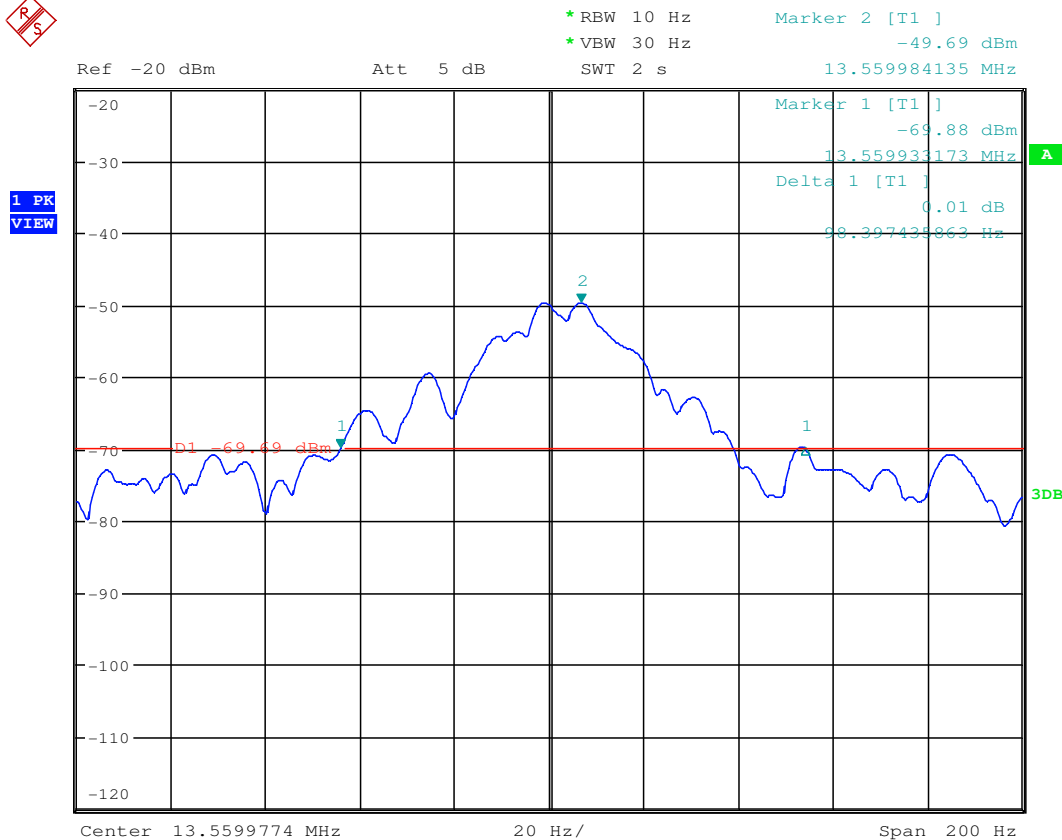


#### 7.2.3 Measurement Procedure and Data





Mode b:





### 7.3 Emission Mask

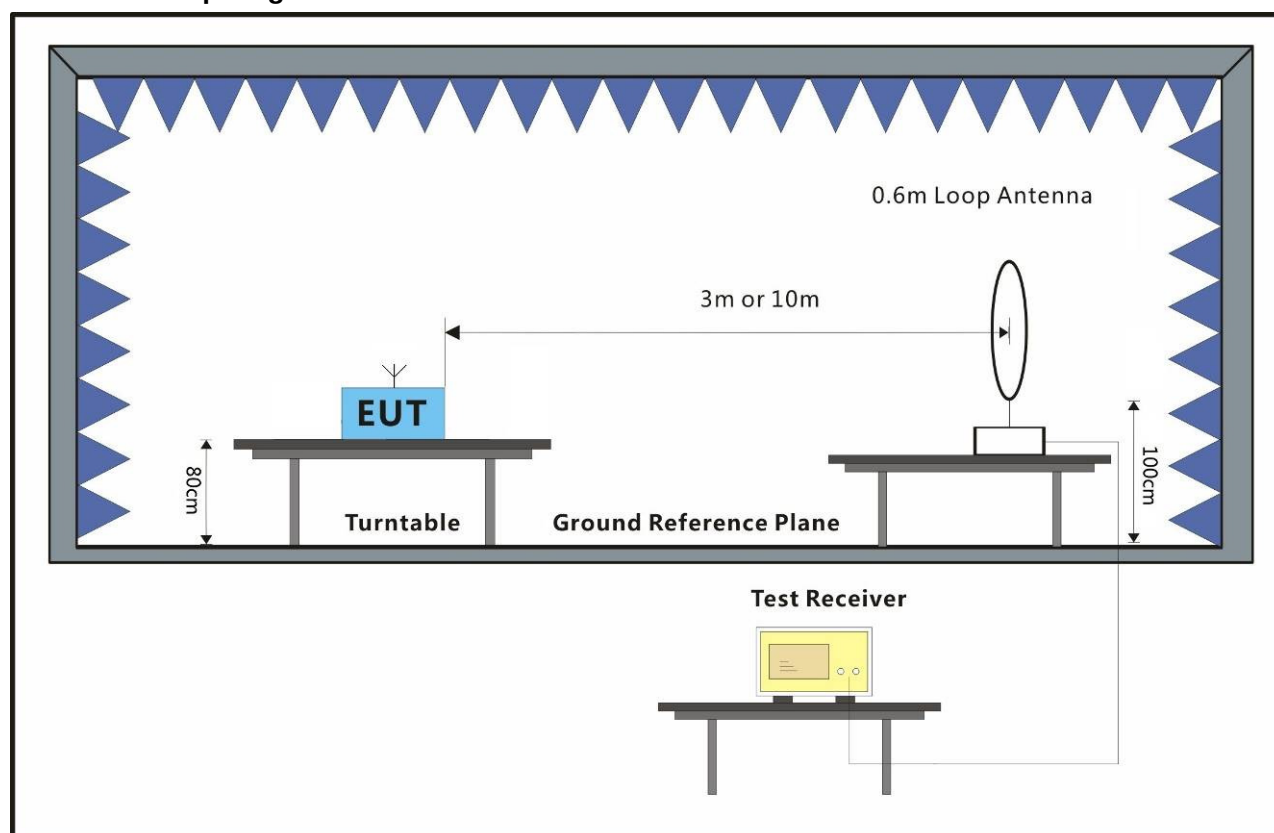
Test Requirement 47 CFR Part 15, Subpart C 15.225(a)&(b)&(C )  
Test Method: ANSI C63.10 (2013) Section 6.4  
Measurement Distance: 10m  
Limit:

- (a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.
- (b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
- (c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.
- (d) The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.

#### 7.3.1 E.U.T. Operation

Operating Environment:  
Temperature: 25.1 °C Humidity: 57.7 % RH Atmospheric Pressure: 1000 mbar  
Test mode b:TX mode\_Keep the EUT in transmitting with modulation mode.

#### 7.3.2 Test Setup Diagram





### 7.3.3 Measurement Procedure and Data

For testing performed with the loop antenna, the center of the loop was positioned 1 m above the ground and positioned with its plane vertical at the specified distance from the EUT. During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane. Only the worst position of vertical was shown in the report.

Freq (MHz)	Cable_Loss(dB)	Antenna_Factor (dB/m)	Preamp_Gain (dB)	Read_Level (dBuV)	Level (dBuV/m)	Limit_Line (dBuV/m)	Over_Limit (dB)
13.56	0.57	10.47	32.51	60.45	38.98	103.08	-64.1

#### Below 30MHz

The test was performed at a 10m test site.

The level at 30m test distance is below:

The factor calculated by the following equation:

$$FS_{\text{limit}} = FS_{\text{max}} - 20 \log \left( \frac{d_{\text{limit}}}{d_{\text{measure}}} \right)$$

where

$FS_{\text{limit}}$  is the calculation of field strength at the limit distance, expressed in dBμV/m  
 $FS_{\text{max}}$  is the measured field strength, expressed in dBμV/m  
 $d_{\text{near field}}$  is the  $\lambda/2\pi$  distance  
 $d_{\text{measure}}$  is the distance of the measurement point from the EUT  
 $d_{\text{limit}}$  is the reference distance or the distance of the  $\lambda/2\pi$  point

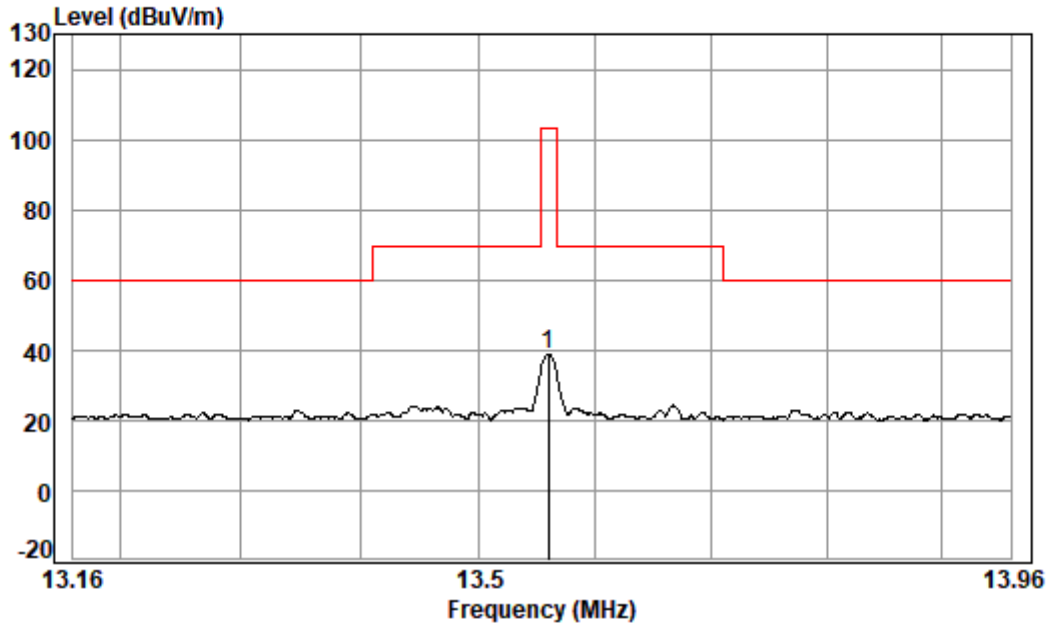


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Mode b:



Condition: 10m  
Job No. : 17374CR  
Test Mode: b

	Cable	Ant	Preamp	Read		Limit	Over
Freq	Loss	Factor	Factor	Level	Level	Line	Limit
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 pp 13.560	0.57	10.47	32.51	60.45	38.98	103.08	-64.10



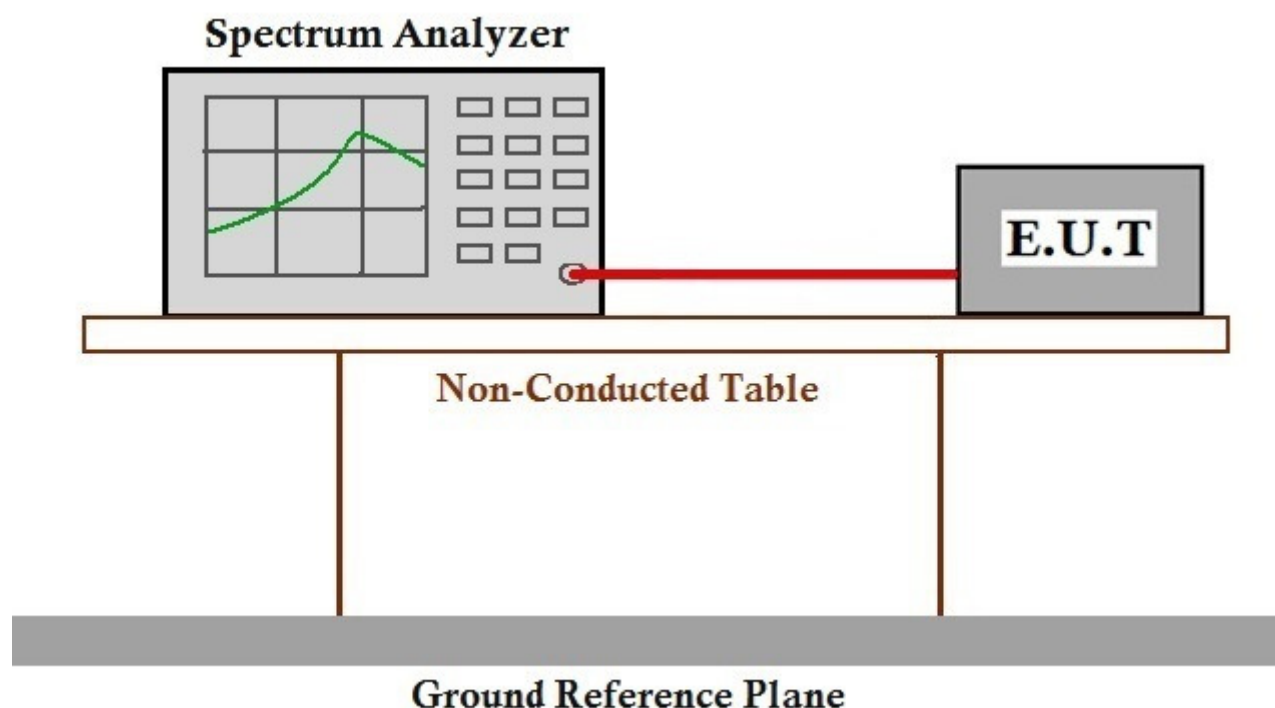
## 7.4 Frequency tolerance

Test Requirement 47 CFR Part 15, Subpart C 15.225(e)  
Test Method: ANSI C63.10 (2013) Section 6.8  
Limit: Within 0.01%

### 7.4.1 E.U.T. Operation

Operating Environment:  
Temperature: 23 °C Humidity: 54 % RH Atmospheric Pressure: 1000 mbar  
Test mode b:TX mode\_Keep the EUT in transmitting with modulation mode.

### 7.4.2 Test Setup Diagram



### 7.4.3 Measurement Procedure and Data





Declared Frequency (MHz)	13.56MHz	
--------------------------	----------	--

Temperature (°C)	Voltage(VDC)	Measurement Frequency(MHz)	Frequency Tolerance (%)	Limit (%)	Result
50	12	13.560804	0.00593	±0.01	Pass
40		13.560421	0.00310		Pass
30		13.560512	0.00378		Pass
20		13.560533	0.00393		Pass
10		13.560445	0.00328		Pass
0		13.560111	0.00082		Pass
-10		13.560551	0.00406		Pass
-20		13.560670	0.00494		Pass
20	13.80	13.560137	0.00101		Pass
	10.20	13.560045	0.00033		Pass





## 7.5 Radiated Emissions(9kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.225(d) & 15.209  
Test Method: ANSI C63.10 (2013) Section 6.4&6.5  
Measurement Distance: 10m  
Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

If field strength is measured at only a single point, then that point shall be at the radial from the EUT that produces the maximum emission at the frequency being measured, as described in 5.4. If that point is closer to the EUT than  $\lambda/2\pi$  and the limit distance is greater than  $\lambda/2\pi$ , the measurement shall be extrapolated to the limit distance by conservatively presuming that the field strength decreases at a 40 dB/decade of distance rate to the  $\lambda/2\pi$  distance, and at a 20 dB/decade of distance rate beyond  $\lambda/2\pi$ . This shall be accomplished using Equation (2):

$$FS_{(10m)} = FS_{(30/300m)} + 40\log\{d_{(\text{near field})}/d_{(10m)}\} + 20\log\{d_{(30/300m)}/d_{(\text{near field})}\} \quad (2)$$

If the single point measured is at a distance greater than  $\lambda/2\pi$ , then extrapolation to the limit distance shall be calculated using Equation (3):

$$FS_{(10m)} = FS_{(30/300m)} + 20\log\{d_{(30/300m)}/d_{(10m)}\} \quad (3)$$

If both the single point and the limit distance are equal to or closer to the EUT than  $\lambda/2\pi$ , then extrapolation to the limit distance shall be calculated using Equation (4):

$$FS_{(10m)} = FS_{(30/300m)} + 40\log\{d_{(30/300m)}/d_{(10m)}\} \quad (4)$$

Remark:

$$d_{\text{near field}} = 47.77 / f_{\text{MHz}}$$

where  $f_{\text{MHz}}$  is the frequency of the emission being measured in MHz.



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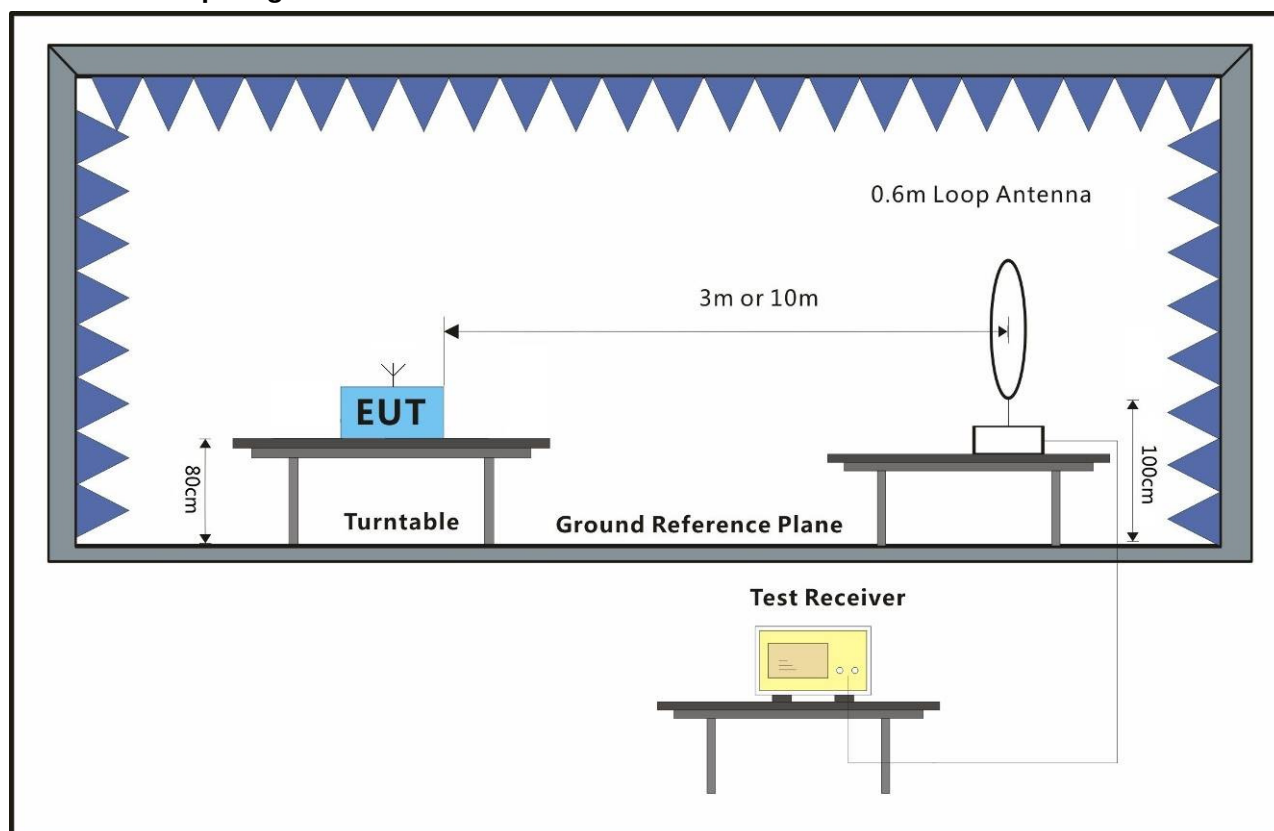
### 7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 23 °C Humidity: 54 % RH Atmospheric Pressure: 1000 mbar

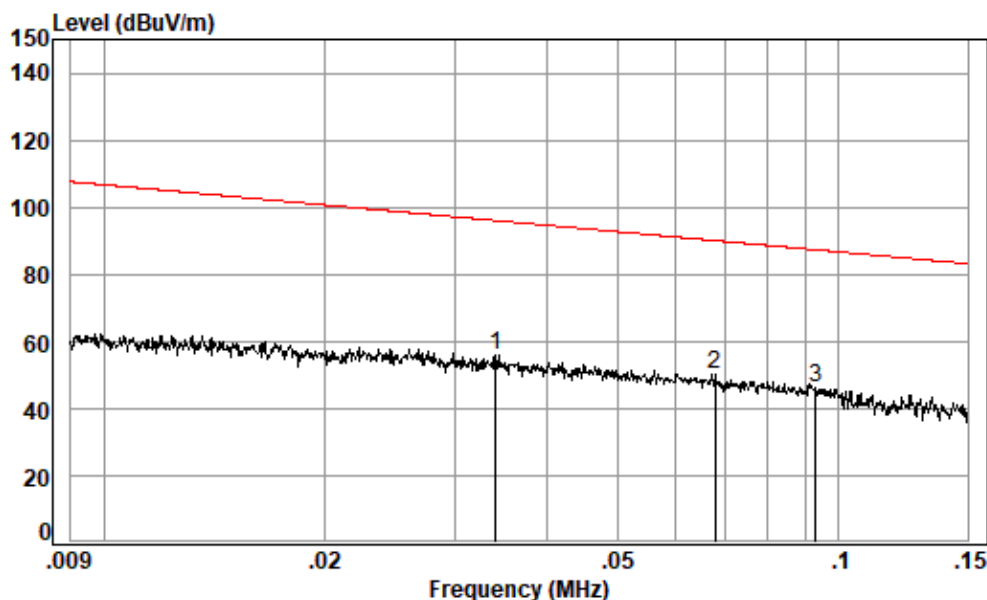
Test mode b:TX mode\_Keep the EUT in transmitting with modulation mode.

### 7.5.2 Test Setup Diagram



### 7.5.3 Measurement Procedure and Data

For testing performed with the loop antenna, the center of the loop was positioned 1 m above the ground and positioned with its plane vertical at the specified distance from the EUT. During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane. Only the worst position of vertical was shown in the report.



Condition: 10m

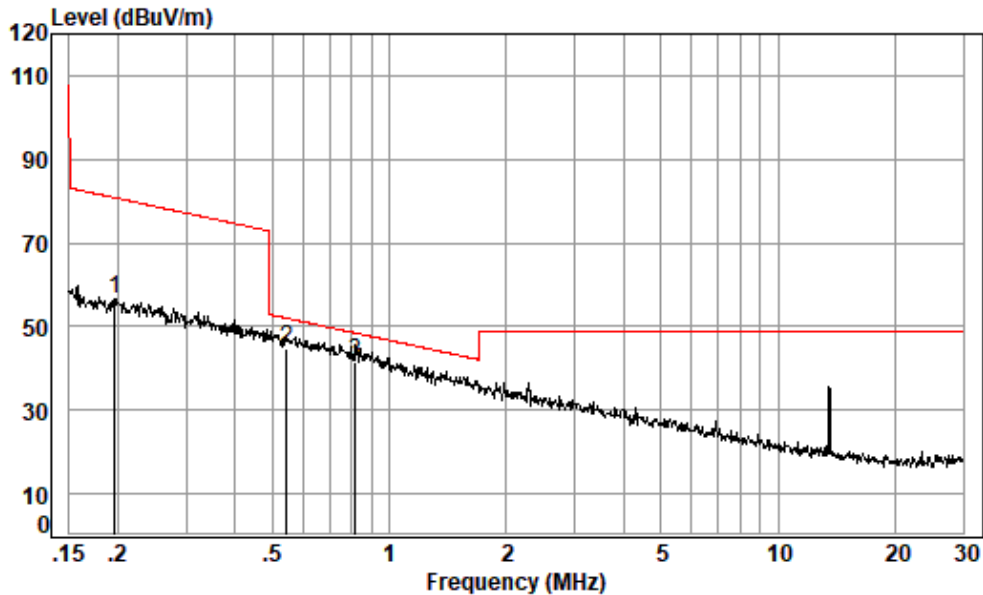
Job No. : 17374CR

Test Mode: b

	Freq	Cable Loss	Ant Factor	Preamplifier Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 pp	0.034	0.16	13.48	32.56	75.08	56.16	96.02	-39.86
2	0.068	0.09	12.17	32.56	70.28	49.98	90.06	-40.08
3	0.093	0.06	12.03	32.56	66.91	46.44	87.32	-40.88







Condition: 10m

Job No. : 17374CR

Test Mode: b

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	0.197	0.08	11.86	32.56	77.11	56.49	80.82	-24.33
2	0.544	0.13	11.76	32.56	65.21	44.54	51.98	-7.44
3 pp	0.817	0.19	12.00	32.56	62.11	41.74	48.44	-6.70

Mode b:

Freq (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Gain (dB)	Read_Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)
0.03415	0.16	13.48	32.56	75.08	56.16	96.02	-39.86
0.06785	0.09	12.17	32.56	70.28	49.98	90.06	-40.08
0.09298	0.06	12.03	32.56	66.91	46.44	87.32	-40.88
0.19654	0.08	11.86	32.56	77.11	56.49	80.82	-24.33
0.54355	0.13	11.76	32.56	65.21	44.54	51.98	-7.44
0.81737	0.19	12	32.56	62.11	41.74	48.44	-6.7



## 7.6 Radiated Emissions(30MHz-1GHz)

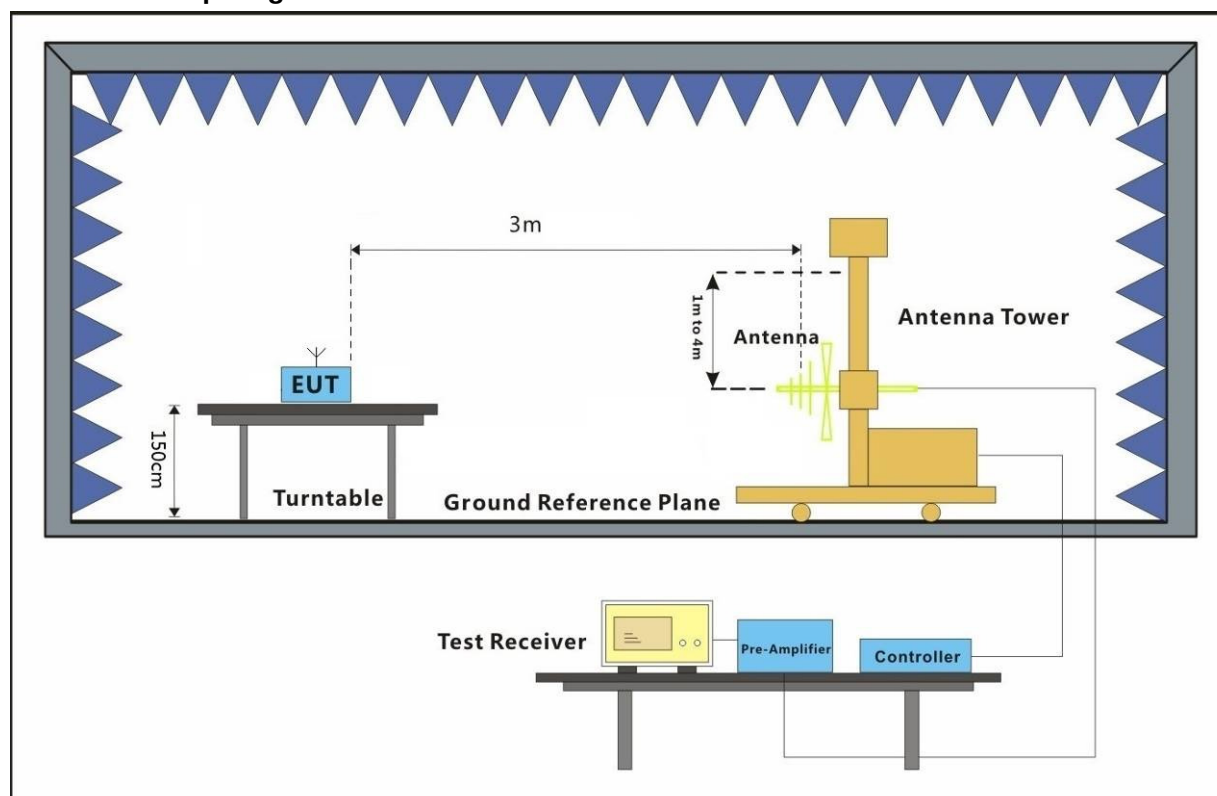
Test Requirement 47 CFR Part 15, Subpart C 15.225(d) & 15.209  
Test Method: ANSI C63.10 (2013) Section 6.4&6.5  
Measurement Distance: 3m  
Limit:

Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3

### 7.6.1 E.U.T. Operation

Operating Environment:  
Temperature: 25.1 °C Humidity: 58.3 % RH Atmospheric Pressure: 1000 mbar  
Test mode b:TX mode\_Keep the EUT in transmitting with modulation mode.

### 7.6.2 Test Setup Diagram





### 7.6.3 Measurement Procedure and Data

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground for below 1GHz at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. 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.
- d. 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. 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.
- g. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

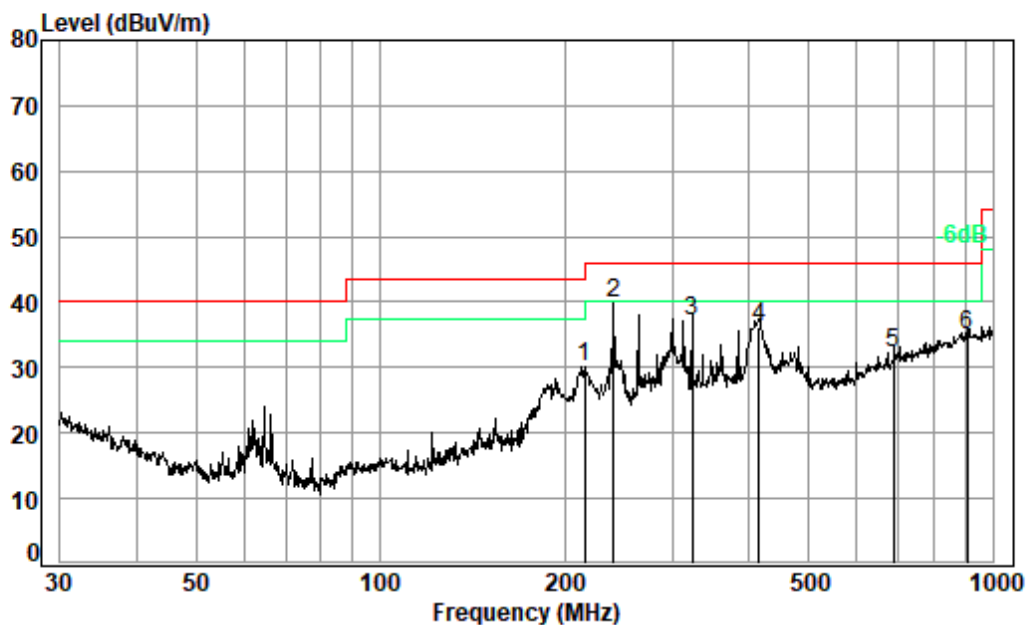


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Mode:b; Polarization:Horizontal



Condition: 3m HORIZONTAL

Job No. : 17374CR

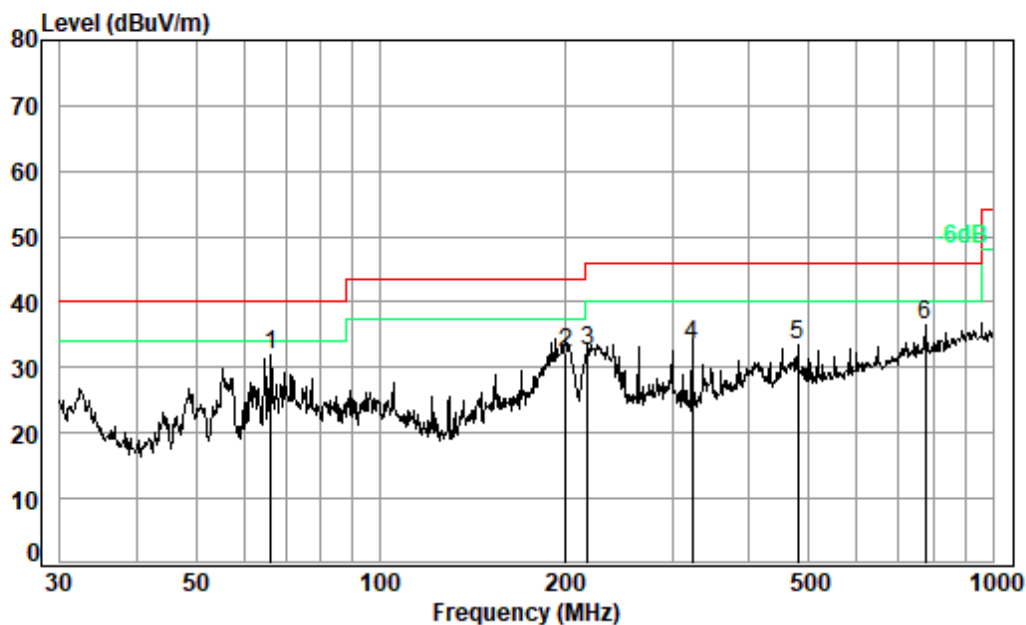
Test Mode: b

		Cable	Ant	Preamp	Read		Limit	Over
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	215.27	1.49	17.04	27.12	38.82	30.23	43.50	-13.27
2 pp	239.99	1.62	18.80	27.04	46.48	39.86	46.00	-6.14
3	323.32	1.98	20.33	27.03	41.97	37.25	46.00	-8.75
4	414.72	2.26	22.76	27.49	38.80	36.33	46.00	-9.67
5	689.56	2.88	27.77	27.95	29.61	32.31	46.00	-13.69
6	906.48	3.61	29.83	27.27	28.69	34.86	46.00	-11.14





Mode:b; Polarization:Vertical



Condition: 3m VERTICAL

Job No. : 17374CR

Test Mode: b

		Cable	Ant	Preamp	Read		Limit	Over
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	pp	66.27	0.80	12.94	27.67	45.96	32.03	40.00 -7.97
2		200.69	1.40	16.53	27.16	41.60	32.37	43.50 -11.13
3		218.31	1.51	17.14	27.11	41.09	32.63	46.00 -13.37
4		323.32	1.98	20.33	27.03	38.12	33.40	46.00 -12.60
5		480.53	2.53	24.21	27.76	34.60	33.58	46.00 -12.42
6		776.88	3.14	28.37	27.77	32.63	36.37	46.00 -9.63





## 8 Photographs

### 8.1 Test Setup

Please refer to setup photos.

### 8.2 EUT Constructional Details (EUT Photos)

Please refer to external and internal photos for details.

- End of the Report -

