Zhejiang Kezheng Electronic Product Inspection
Building 5, No. 316, Jianghong South Road Binjiang District, Hangzhou 310052, China
TEL: +86-571-88366800

TEST REPORT

Certificate Number 4749.01

Report No.....:	**2019-9051**
FCC ID.....:	**2AR6M-WBSRC**
Applicant.....:	ShenZhen LiCheng Technology Co.,Ltd.
Address.....:	Xinghe World Phase I, Bantian Street, Longgang District, Shenzhen, Guangdong, China
Manufacturer.....:	Shenzhen Lixin Technology Co., Ltd.
Address.....:	Tongyi Industrial Park, No. 351, Jihua Road, Longgang District, Shenzhen, China
Product Name.....:	**Wireless Receiver**
Trade Mark.....:	inateck
Model/Type reference.....:	Receiver 7
Listed Model(s).....:	Receiver 6, Receiver 8, Receiver 9
Standard.....:	**FCC CFR Title 47 Part 15 Subpart C Section 15.231**
Date of Receipt.....:	Jul.7, 2019
Date of Test Date.....:	Jul.7, 2019-Aug.20, 2019
Date of issue.....:	Aug.20, 2019
Test result.....:	**Pass**

Compiled by: (Printed name+signature)	John Xie	Liu Wei
Supervised by: (Printed name+signature)	Kelly Cheng	Chen Yiyun
Approved by: (Printed name+signature)	Cary Luo	Wang Weixiong

Testing Laboratory Name.....:	**Zhejiang Kezheng Electronic Product Inspection**
Address.....:	Building 5, No. 316, Jianghong South Road Binjiang District, Hangzhou 310052, China

TABLE OF CONTENTS Page

1. TEST SUMMARY **3**

1.1. Test Standards 3
1.2. Report version 3
1.3. Test Description 4
1.4. Measurement Uncertainty 5
1.5. Environmental conditions 5

2. GENERAL INFORMATION **6**

2.1. Client Information 6
2.2. General Description of EUT 6
2.3. Test Mode 6
2.4. Measurement Instruments List 7
2.3. Test Software 7

3. TEST ITEM AND RESULTS **8**

3.1. ANTENNA REQUIREMENT 8
3.2. Conducted Emission 9
3.3. 20dB Occupied Bandwidth 12
3.4. Deactivation Time 14
3.5. Spurious Emission (radiated) 16

4. EUT TEST PHOTOS **22**

5. PHOTOGRAPHS OF EUT CONSTRUCTIONAL **23**

1. TEST SUMMARY

1.1. Test Standards

The tests were performed according to following standards:

FCC Rules Part 15.231: Periodic operation in the band 40.66–40.70 MHz and above 70 MHz.

ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.

1.2. Report version

Revised No.	Date of issue	Description
01	Aug.20, 2019	Original

1.3. Test Description

FCC Rules Part 15.231			
Test Item	**Standard Section**	**Result**	**Test Engineer**
	FCC		
Antenna requirement	15.203	Pass	John Xie
Conducted Emissions	15.207	Pass	John Xie
Radiated Spurious Emissions	15.205/15.209(a)/15.231(b)/15.35(c)	Pass	John Xie
Deactivation Time	15.231(a)(1)	Pass	John Xie
Duty Cycle	15.231	Pass	John Xie
Occupied Bandwidth	15.231(c)	Pass	John Xie

Note: The measurement uncertainty is not included in the test result.

1.4. 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 Zhejiang Kezheng Electronic Product Inspection 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 Zhejiang Kezheng Electronic Product Inspection.

Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.57 dB	(1)
Transmitter power Radiated	2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	1.60 dB	(1)
Radiated spurious emission 9KHz-40 GHz	2.20 dB	(1)
Conducted Emission 9KHz-30MHz	3.23dB	(1)
Radiated Emission 30~1000MHz	3.36 dB	(1)
Radiated Emissio 1~18GHz	4.74 dB	(1)
Radiated Emissio 18-40GHz	5.20 dB	(1)
Occupied Bandwidth	2.80 dB	(1)

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

1.5. 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

2. GENERAL INFORMATION

2.1. Client Information

Applicant:	ShenZhen LiCheng Technology Co.,Ltd.
Address:	Xinghe World Phase I, Bantian Street, Longgang District, Shenzhen, Guangdong, China
Manufacturer:	Shenzhen Lixin Technology Co., Ltd.
Address:	Tongyi Industrial Park, No. 351, Jihua Road, Longgang District, Shenzhen, China

2.2. General Description of EUT

Product Name:	Wireless Receiver
Model/Type reference:	Receiver 7
Trademark:	inateck
Listed models:	Receiver 6, Receiver 8, Receiver 9
Model Difference:	All these models are identical in the same PCB, layout and electrical circuit, the only difference is model name.
Power supply:	DC 5V output from the PC
Hardware version:	V1.0
Software version:	0.5
RF Specification	
Operation frequency:	433.221MHz,433.50MHz,433.790MHz,433.940MHz,434.231MHz, 434.482MHz
Modulation Type:	2GFSK
Modulation connector:	☒ Without external ☐ External
Occupied bandwidth	>25KHz
Product type:	☒ Wideband deceive ☐ Narrowband deceive
Channel number:	6
Antenna type:	Spring antenna
Antenna gain:	1.7dBi

2.3. Test Mode

The EUT was operated at continuous transmitting mode that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode	Description	Remark
1	TX&RX	DC 5V

2.4. Measurement Instruments List

Tonscend JS0806-2 Test system					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
1	Spectrum Analyzer	R&S	FSV40-N	101798	Sept. 09, 2020
2	Vector Signal Generator	Agilent	N5182A	MY50142520	Sept. 09, 2020
3	Analog Signal Generator	HP	83752A	3344A00337	Sept. 09, 2020
4	Power Sensor	Agilent	E9304A	MY50390009	Sept. 09, 2020
5	Power Sensor	Agilent	E9300A	MY41498315	Sept. 09, 2020
6	Wideband Radio Communication Tester	R&S	CMU200	115297	Sept. 09, 2020
7	Climate Chamber	Angul	AGNH80L	1903042120	Sept. 09, 2020
8	Dual Output DC Power Supply	Agilent	E3646A	MY40009992	Sept. 09, 2020
9	RF Control Unit	Tonscend	JS0806-2	/	Sept. 09, 2020

Transmitter spurious emissions & Receiver spurious emissions					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	EMI Test Receiver	R&S	ESR	102525	Sept. 09, 2020
2	High Pass Filter	Chengdu E-Microwave	OHF-3-18-S	0E01901038	Sept. 09, 2020
3	High Pass Filter	Chengdu E-Microwave	OHF-6.5-18-S	0E01901039	Sept. 09, 2020
4	Spectrum Analyzer	HP	8593E	3831U02087	Sept. 09, 2020
5	Ultra-Broadband logarithmic period Antenna	Schwarzbeck	VULB 9163	01230	Sept. 09, 2020
6	Loop Antenna	Beijin ZHINAN	ZN30900C	18050	Sept. 09, 2020
7	Horn Antenna	R&S	Sep-60	69483	Sept. 09, 2020
8	Spectrum Analyzer	R&S	FSV40-N	101798	Sept. 09, 2020
9	Horn Antenna	Schwarzbeck	BBHA 9120 D	2023	Sept. 09, 2020
10	Pre-Amplifier	Schwarzbeck	BBV 9745	9745#129	Sept. 09, 2020
11	Pre-Amplifier	EMCI	EMC051835SE	980662	Sept. 09, 2020
12	Power Meter	Agilent	E4419B	GB41293710	Sept. 09, 2020

Note:
1)The Cal. Interval was one year.
2)The cable loss has calculated in test result which connection between each test instruments.

2.3. Test Software

Software name	Model	Version
Conducted emission Measurement Software	EZ-EMC	EMC-Con 3A1.1
Radiated emission Measurement Software	EZ-EMC	FA-03A.2.RE
Bluetooth and WIFI Test System	JS1120-3	2.5.77.0418

3. TEST ITEM AND RESULTS

3.1. Antenna requirement

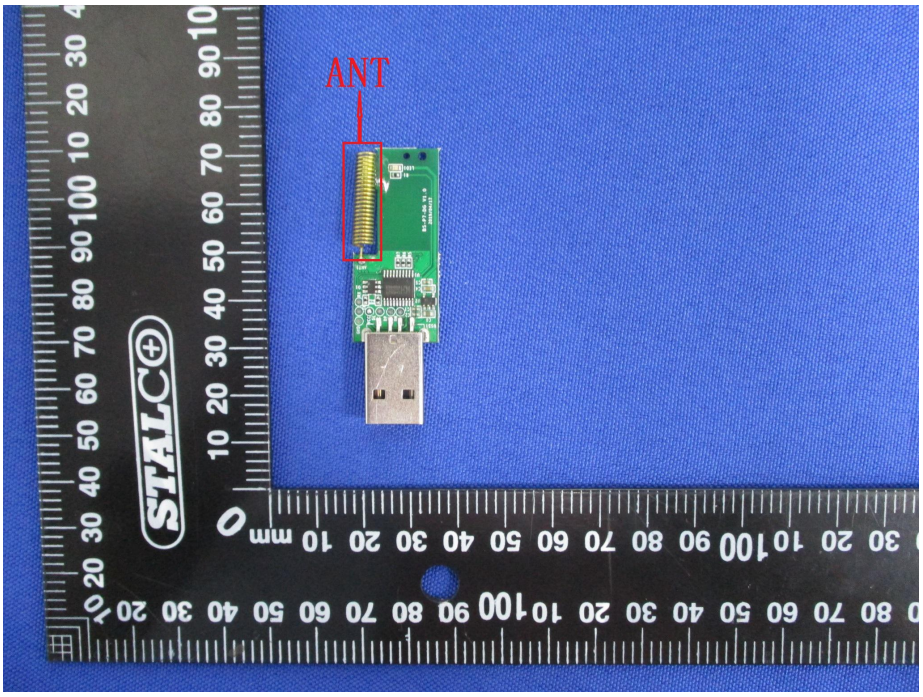
Requirement

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 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.

Test Result

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



3.2. Conducted Emission

Limit

Conducted Emission Test Limit

Frequency	Maximum RF Line Voltage (dBμV)	
	Quasi-peak Level	Average Level
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
500kHz~5MHz	56	46
5MHz~30MHz	60	50

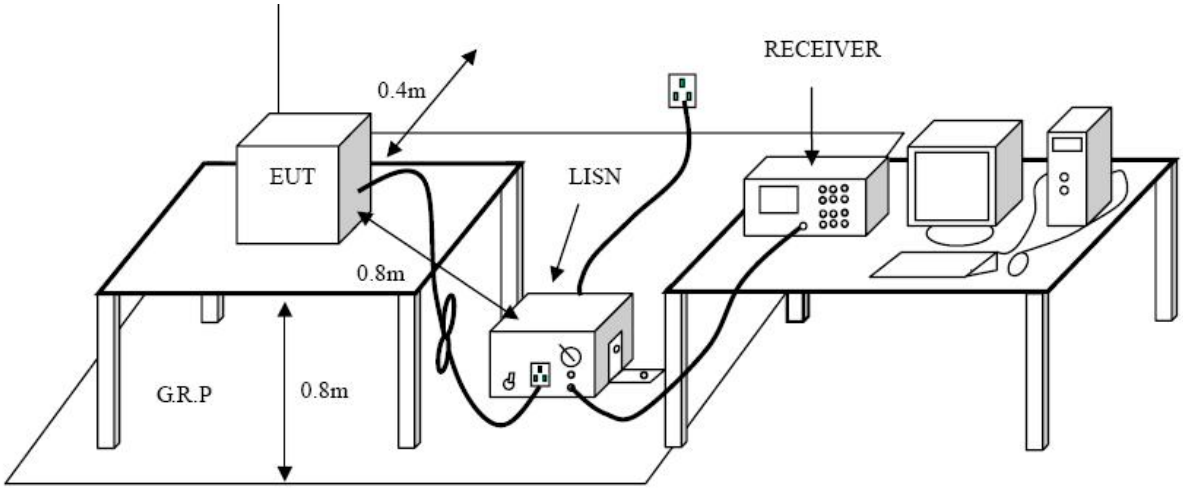
Notes:

(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

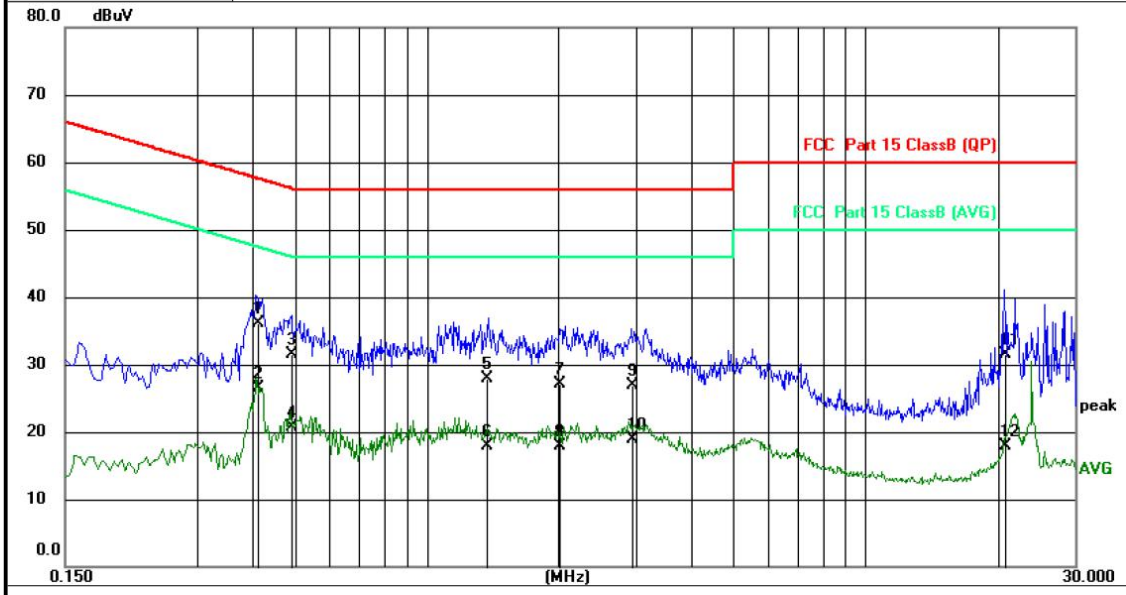
1. The EUT was setup according to ANSI C63.10:2013 requirements.
2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from 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 2.3.

Test Results

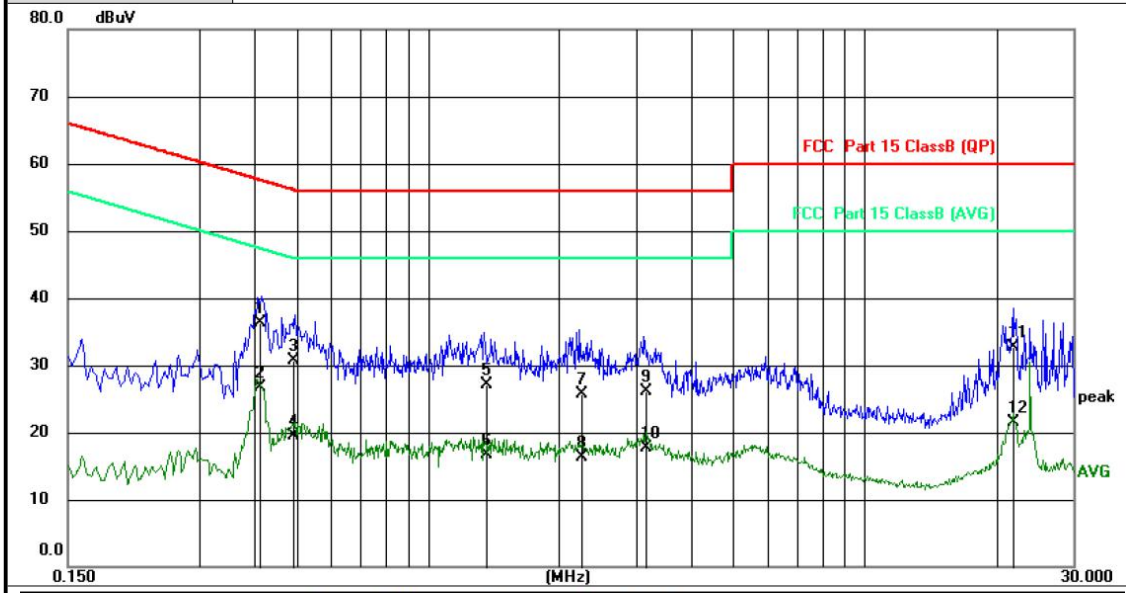
Test Voltage:	AC 120V/60 Hz
Terminal:	Line



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.4106	25.68	10.40	36.08	57.64	-21.56	QP
2	*	0.4106	16.16	10.40	26.56	47.64	-21.08	AVG
3		0.4904	21.18	10.41	31.59	56.16	-24.57	QP
4		0.4904	10.35	10.41	20.76	46.16	-25.40	AVG
5		1.3713	17.56	10.43	27.99	56.00	-28.01	QP
6		1.3713	7.53	10.43	17.96	46.00	-28.04	AVG
7		2.0104	16.69	10.45	27.14	56.00	-28.86	QP
8		2.0104	7.45	10.45	17.90	46.00	-28.10	AVG
9		2.9343	16.45	10.47	26.92	56.00	-29.08	QP
10		2.9343	8.53	10.47	19.00	46.00	-27.00	AVG
11		20.7973	20.53	11.04	31.57	60.00	-28.43	QP
12		20.7973	6.87	11.04	17.91	50.00	-32.09	AVG

Remarks:
1.Measurement = Reading Level+ Correct Factor
2.Over = Measurement -Limit

Test Voltage:	AC 120V/60 Hz
Terminal:	Neutral



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.4122	25.97	10.40	36.37	57.60	-21.23	QP
2	*	0.4122	16.39	10.40	26.79	47.60	-20.81	AVG
3		0.4900	20.21	10.41	30.62	56.17	-25.55	QP
4		0.4900	9.19	10.41	19.60	46.17	-26.57	AVG
5		1.3597	16.75	10.43	27.18	56.00	-28.82	QP
6		1.3597	6.32	10.43	16.75	46.00	-29.25	AVG
7		2.2403	15.32	10.45	25.77	56.00	-30.23	QP
8		2.2403	5.89	10.45	16.34	46.00	-29.66	AVG
9		3.1511	15.53	10.48	26.01	56.00	-29.99	QP
10		3.1511	7.29	10.48	17.77	46.00	-28.23	AVG
11		21.8481	21.58	11.05	32.63	60.00	-27.37	QP
12		21.8481	10.37	11.05	21.42	50.00	-28.58	AVG

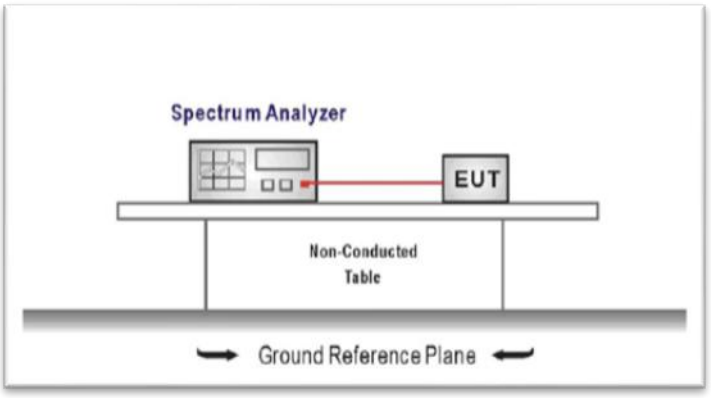
Remarks:
1.Measurement = Reading Level+ Correct Factor
2.Over = Measurement -Limit

3.3. 20dB Occupied Bandwidth

Limit

The bandwidth of the emission shall be no wider than 0.25% of the center frequency

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≥1% of the 20 dB bandwidth, VBW ≥ RBW

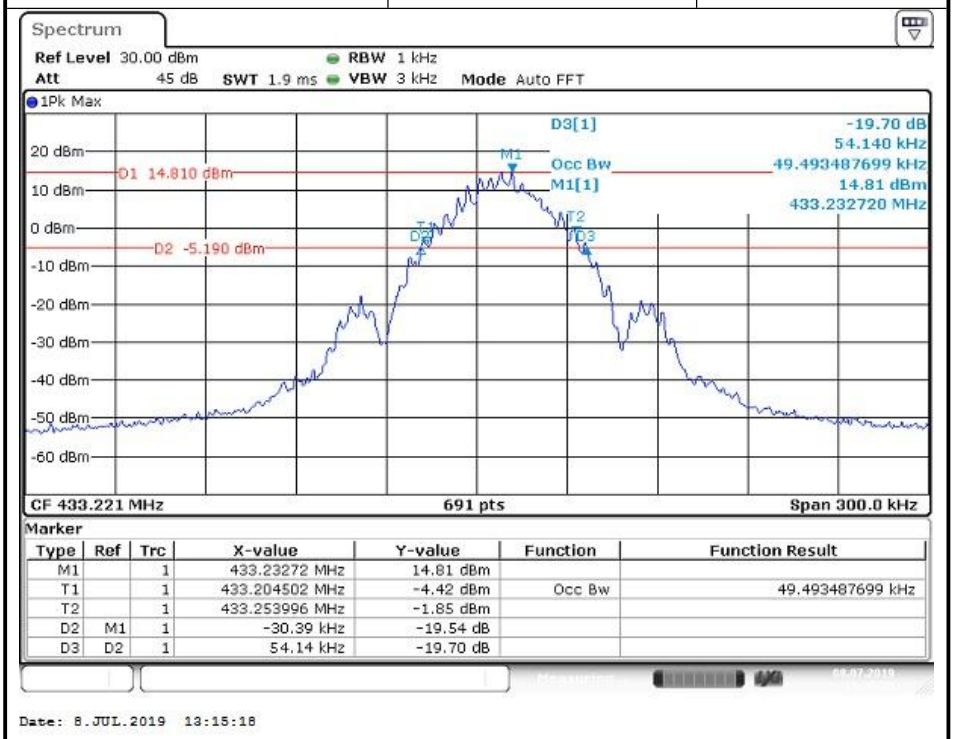
   Sweep = auto, Detector function = peak, Trace = max hold
4. Measure and record the results in the test report.

Test Mode

Please refer to the clause 2.3.

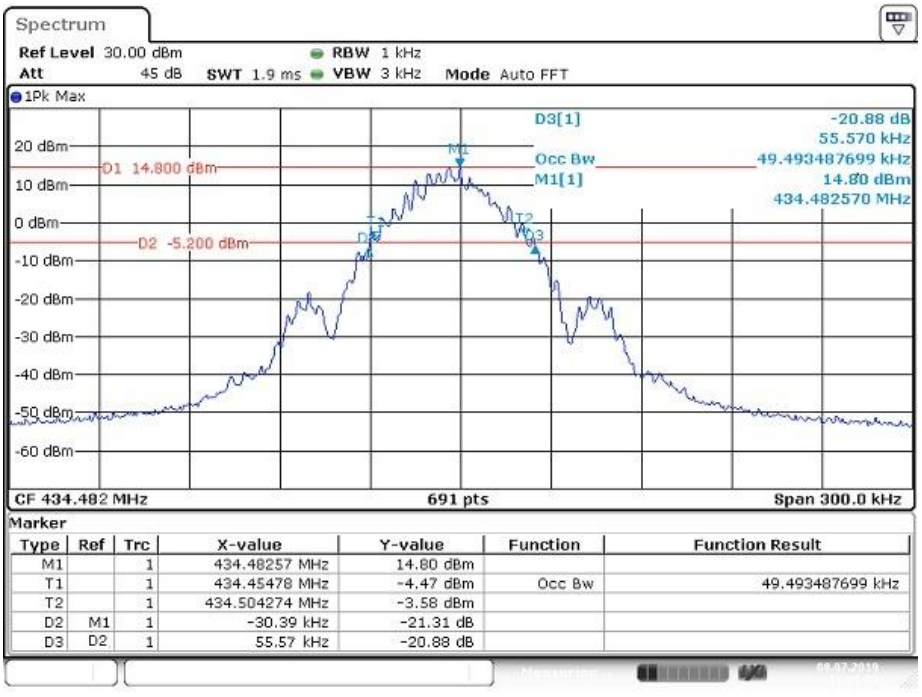
Test Results

Channel frequency (MHz)	20dB Bandwidth (kHz)	Limit (MHz)
433.221	54.140	0.25%*=1.0831



Date: 8.JUL.2019 13:15:18

Channel frequency (MHz)	20dB Bandwidth (kHz)	Limit (MHz)
434.482	55.570	0.25%*=1.0862



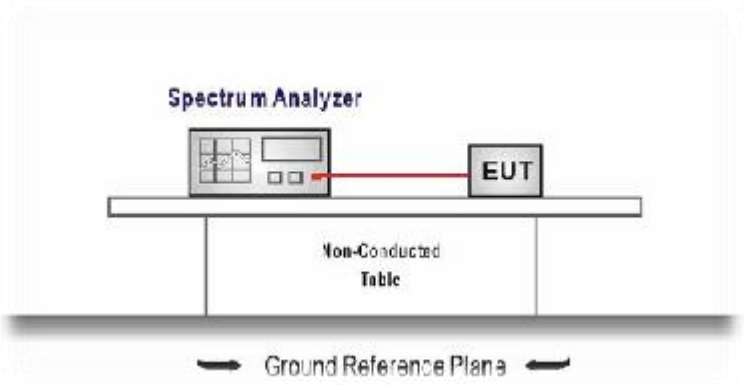
Date: 8.JUL.2019 13:21:56

3.4. Deactivation Time

Limit

A manually operated transmitter shall employ a switch that will auto-matically 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,

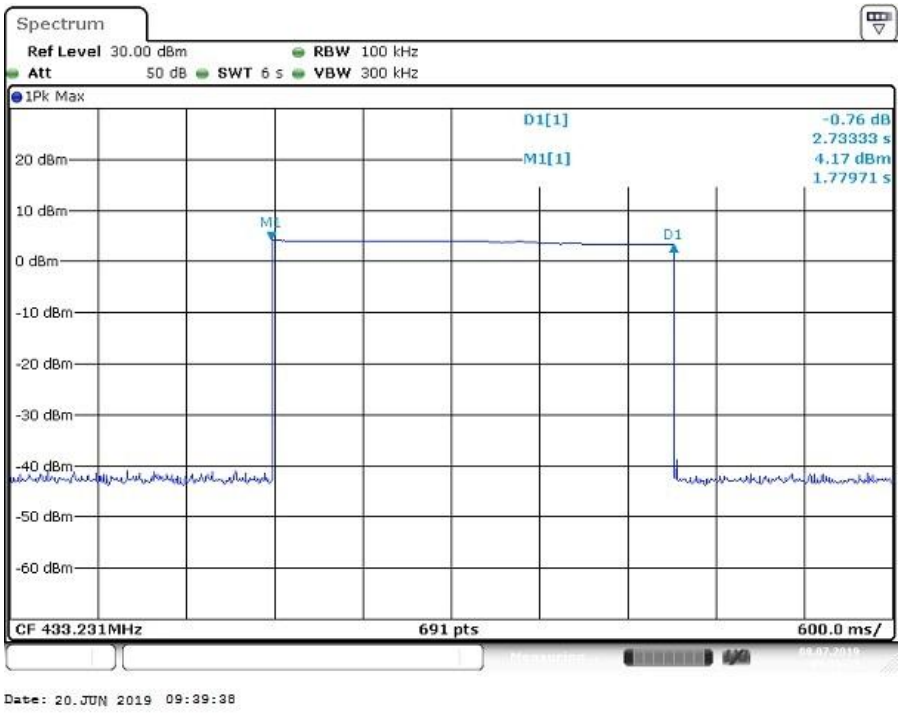
   Sweep time= 10second, Detector function = peak, Trace = single
4. Measure and record the results in the test report.

Test Mode

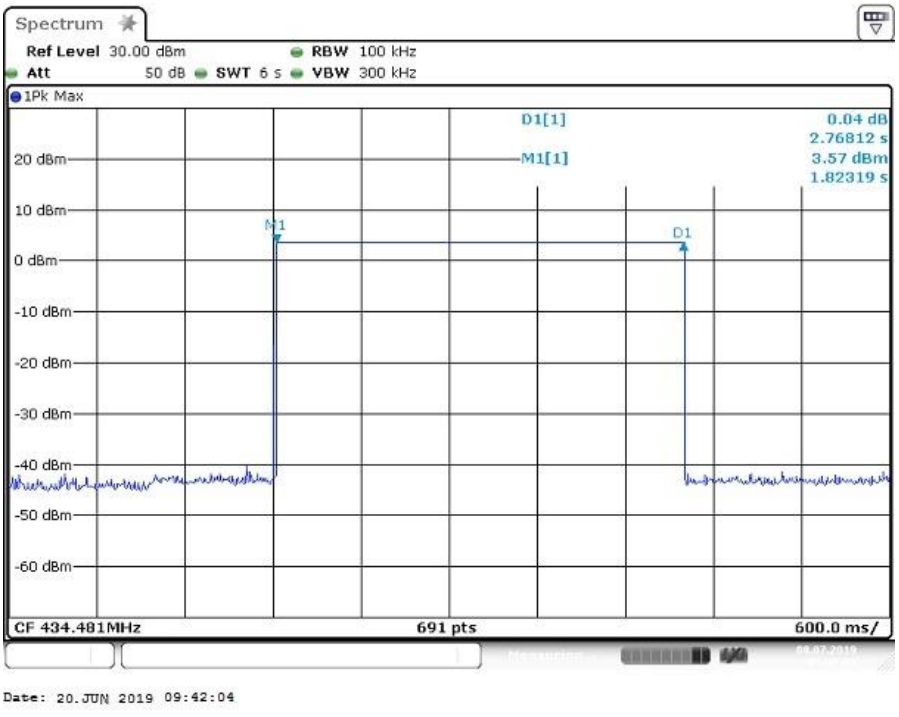
Please refer to the clause 2.3.

Test Results

Channel frequency (MHz)	One transmission time (second)	Limit (second)
433.221	0.95362	5



Channel frequency (MHz)	One transmission time (second)	Limit (second)
434.482	0.94493	5



3.5. Spurious Emission (radiated)

Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.209

Radiated Emission Limits (9 kHz~1000 MHz)

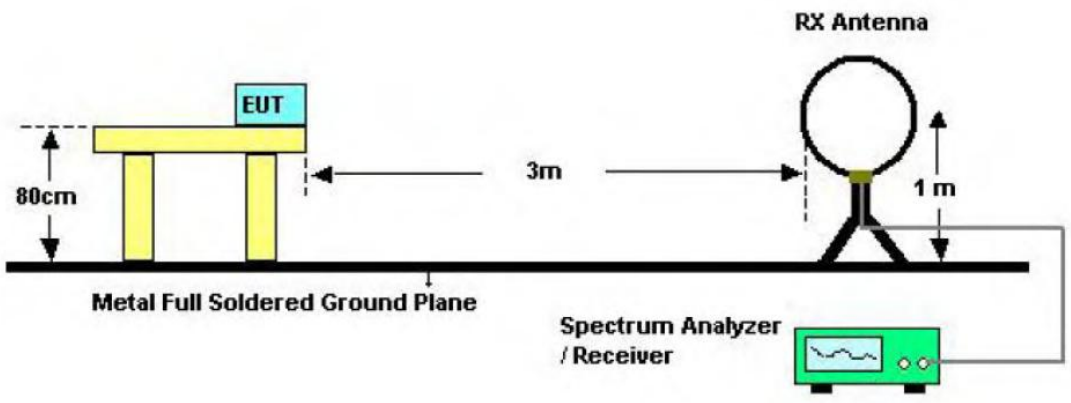
Frequency (MHz)	Field Strength (microvolt/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

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

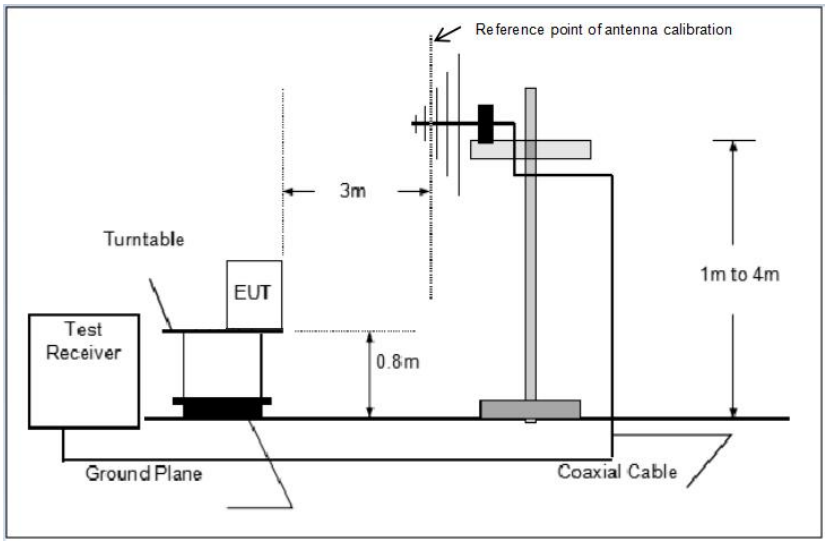
Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
260 - 470 MHz	3,750 to 12,500 **	375 to 1,250 **

** linear interpolations
F is 433.221MHz
Field strength of fundamental: μV/m at 3 meters = 41.6667(F) - 7083.3420
Field strength of harmonics: μV/m at 3 meters = 4.16667(F) - 708.3342

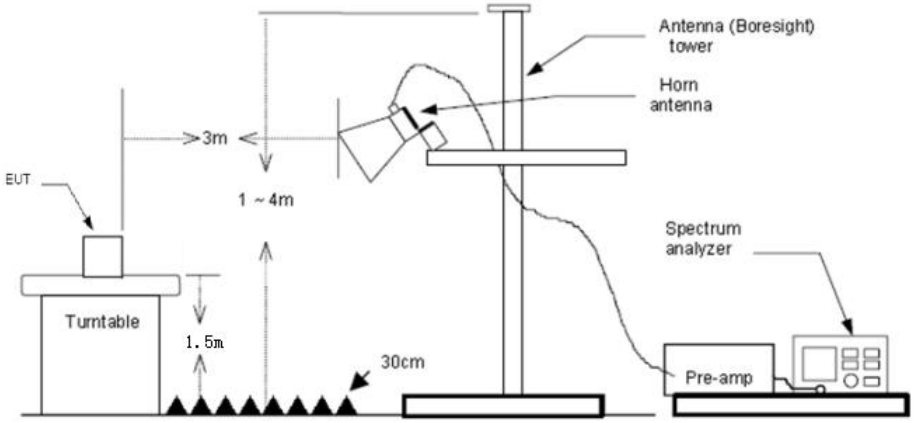
Test Configuration



Below 30MHz Test Setup



Below 1000MHz Test Setup



Above 1GHz Test Setup

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 10th harmonic:
   RBW=1MHz, VBW=3MHz Peak detector for Peak value.
   RBW=1MHz, VBW=10Hz RMS detector for Average value.

Test Mode

Please refer to the clause 2.3.

Test Result

9 KHz~30 MHz , 30MHz-1GHz and 1GHz~6GHz

From 9 KHz~30 MHz , 30MHz-1GHz and 1GHz~6GHz: Conclusion: PASS

Note:

1) Final level= Reading level + Correct Factor

   Correct Factor=Antenna Factor + Cable Loss -Preamplifier Factor

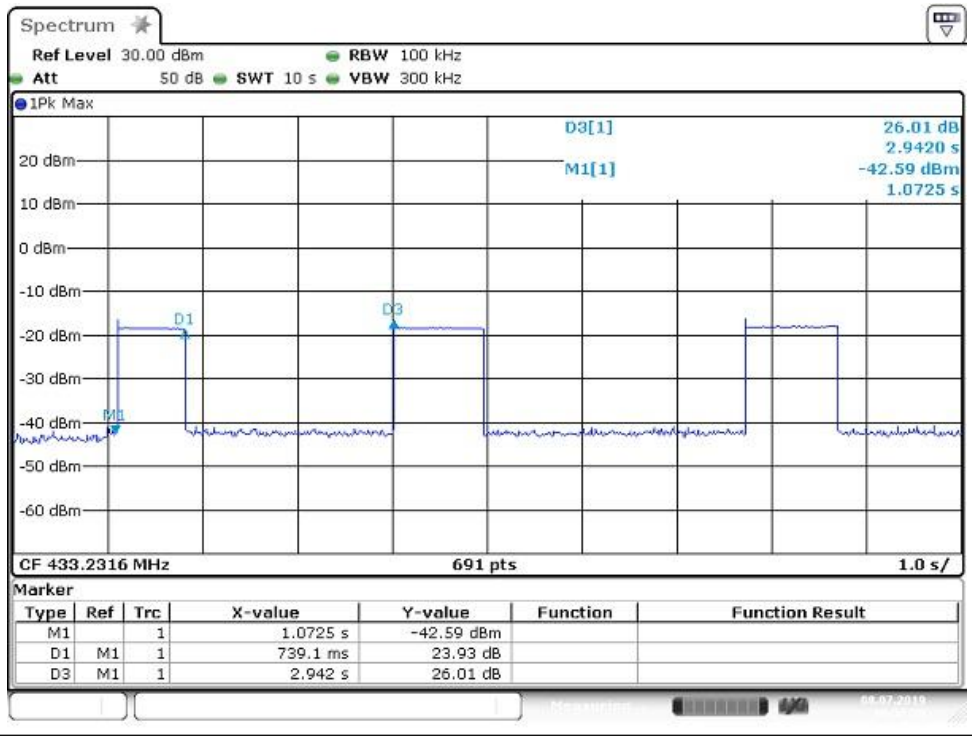
2) The emission levels of other frequencies are very lower than the limit and not show in test report.

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

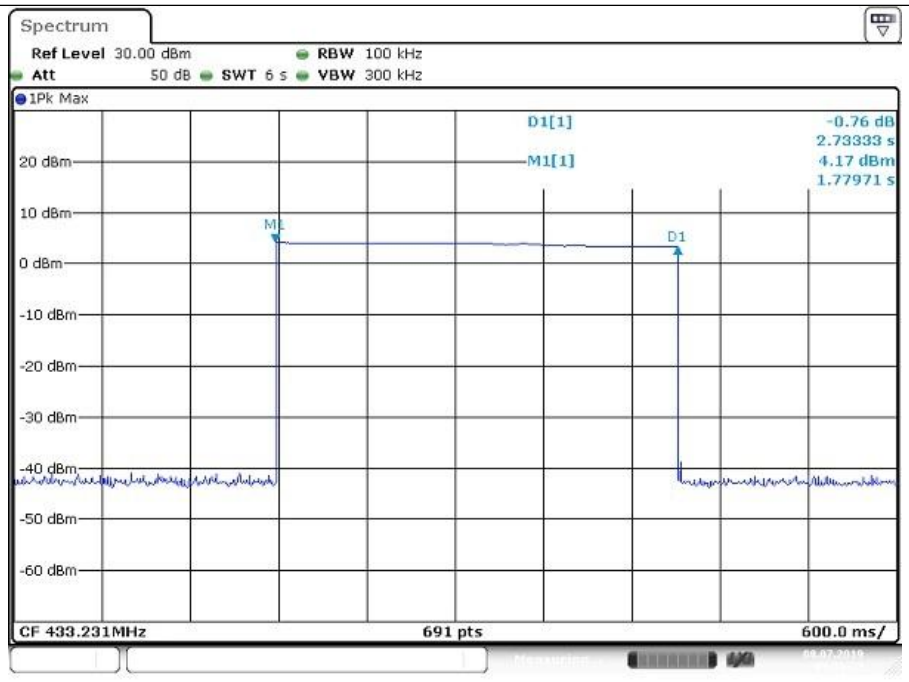
4) We have tested all mode at high and low channel,and recoreded worst case at low channel.

Frequency (MHz)	Transmission cease Time (s)	Limit: not more than 5 seconds of being released (s)	Conclusion
433.221	0.95362	5	PASS

T_{on} (ms)	$T_{on}+T_{off}$ (ms)
739.1	2942
Duty cycle factor (dB)= 20log (T_{on} / (T_{on} + T_{off})) (dB) = -12.00(dB)	



Pulse 1



$T_{on} + T_{off}$

■ **30MHz~ 1000MHz**

Test Channel				433.221MHz			
Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB/m)	Final level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
112.4455	42.32	-16.43	25.89	43.50	-17.61	Vertical	QP
233.1851	43.01	-15.78	27.23	46.00	-18.77	Vertical	QP
299.0011	47.98	-14.22	33.76	46.00	-12.24	Vertical	QP
433.4567	91.51	-10.15	81.36	100.80	-19.44	Vertical	Peak
564.6389	42.61	-9.08	33.53	46.00	-12.47	Vertical	QP
866.9995	57.98	-5.07	52.91	80.80	-27.89	Vertical	Peak
111.0349	39.91	-16.27	23.64	43.50	-19.86	Horizontal	QP
160.5145	47.18	-19.67	27.51	43.50	-15.99	Horizontal	QP
299.0011	44.65	-14.22	30.43	46.00	-15.57	Horizontal	QP
433.4566	91.32	-10.15	81.17	100.80	-19.63	Horizontal	Peak
564.8369	42.23	-9.08	33.15	46.00	-12.85	Horizontal	QP
866.9994	58.21	-5.07	53.14	80.80	-27.66	Horizontal	Peak

Frequency (MHz)	Peak Level (dBuV/m)	Duty cycle factor	AV Level (dBuV/m)	FCC Limit (dBμV/m)	Margin (dB)	Polarization
433.4567	81.36	-12.00	69.36	80.80	-11.44	Vertical
866.9995	52.91	-12.00	40.91	60.80	-19.89	Vertical
433.4566	81.17	-12.00	69.17	80.80	-11.63	Horizontal
866.9994	53.14	-12.00	41.14	60.80	-19.66	Horizontal

Note:Duty cycle factor = 20log (Duty cycle),Duty cycle = T_{on} / (T_{on} + T_{off})

■ **1GHz~ 6GHz**

Test Channel				433.221MHz			
Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB/m)	Final level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
1302.000	61.70	-17.70	44.00	74.00	-30.00	Vertical	Peak
2170.000	56.80	-15.53	41.27	74.00	-32.73	Vertical	
3038.000	63.33	-14.40	48.93	74.00	-25.07	Vertical	
3471.600	62.74	-13.22	49.52	74.00	-24.48	Vertical	
3905.600	63.06	-12.02	51.04	74.00	-22.96	Vertical	
4773.600	54.91	-10.36	44.55	74.00	-29.45	Vertical	
1736.000	61.71	-16.44	45.27	74.00	-28.73	Horizontal	
2170.000	62.35	-15.53	46.82	74.00	-27.18	Horizontal	
2604.000	54.15	-14.95	39.20	74.00	-34.80	Horizontal	
3038.000	66.04	-14.40	51.64	74.00	-22.36	Horizontal	
3472.000	66.32	-13.22	53.10	74.00	-20.90	Horizontal	
3905.600	67.80	-12.02	55.78	74.00	-18.22	Horizontal	

Frequency (MHz)	Peak Level (dBuV/m)	Duty cycle factor(dB)	AV Level (dBuV/m)	FCC Limit (dBμV/m)	Margin (dB)	Polarization
1302.000	44.00	-12.00	32.00	60.80	-28.80	Vertical
2170.000	41.27	-12.00	29.27	60.80	-31.53	Vertical
3038.000	48.93	-12.00	36.93	60.80	-23.87	Vertical
3471.600	49.52	-12.00	37.52	60.80	-23.28	Vertical
3905.600	51.04	-12.00	39.04	60.80	-21.76	Vertical
4773.600	44.55	-12.00	32.55	60.80	-28.25	Vertical
1736.000	45.27	-12.00	33.27	60.80	-27.53	Horizontal
2170.000	46.82	-12.00	34.82	60.80	-25.98	Horizontal
2604.000	39.20	-12.00	27.20	60.80	-33.60	Horizontal
3038.000	51.64	-12.00	39.64	60.80	-21.16	Horizontal
3472.000	53.10	-12.00	41.10	60.80	-19.70	Horizontal
3905.600	55.78	-12.00	43.78	60.80	-17.02	Horizontal

Note:Duty cycle factor = 20log (Duty cycle),Duty cycle = T_{on} / (T_{on} + T_{off})

4. EUT TEST PHOTOS

Reference to the document No.: Test Photos.

5. PHOTOGRAPHS OF EUT CONSTRUCTIONAL

Reference to the document No.: External Photos and Internal Photos.

**************************THE END**************************