

TEST REPORT

Report No.: SHE19020010-03HE

Date: 2020-5-7

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Applicant : Shenzhen UniStrong Science & Technology Co., Ltd.
Address of Applicant : B,4-4Factory, Zhengcheng Road, FuyongBaoan District, Shenzhen, China

Product Name : Rugged Smart Tablet
Model No. : UT30P
Sample No. : E19020010-05#01
FCC ID : 2AOPD-UT30P
ISED Number : 11546A-UT30P
Standards : FCC CFR47 Part 15, Subpart C
RSS-Gen (Issue 5, March 2019)
RSS-210 (Issue 2, February 2017)

Date of Receipt : 2020-2-10
Date of Test : 2020-2-10 ~ 2020-5-7
Date of Issue : 2020-5-7

Remark:

This report details the results of the testing carried out on one sample, the results contained in this report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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Reviewed by: jesse
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Approved by: Guoyou Chi
(Authorized signatory: Guoyou Chi)

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Revision Record			
Version	Date	Revisions	Revised By
1.0	2019-12-12	Original	--

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1 General Information

1.1 Testing Laboratory

Company Name	ICAS Testing Technology Services (Shanghai) Co., Ltd.
Address	155 Pingbei Rd, Minhang District, Shanghai, China
Telephone	0086 21-51682999
Fax	0086 21-54711112
Homepage	www.icasiso.com

1.2 Details of Application

Company Name	Shanghai ZoomSmart Technology Co.,Ltd.
Address	Room 802 Hengxi Road No.809 Pujiang Town Minhang district, Shanghai, China
Contact Person	yc.qiao
Telephone	15800844215
Email	yc.qiao@zoomsmart.com.cn

1.3 Details of EUT

Product Name	Rugged Smart Tablet
Brand Name	Unistrong
Model No.	UT30P
FCC ID	2AOPD-UT30P
Mode of Operation	NFC
Frequency Range	13.56MHz
Modulation Type	ASK
Antenna Type	Internal Antenna
Antenna Gain	0 dBi
Extreme Temperature Range	0℃~ +40℃
Test Voltage	DC 3.8V

1.4 Test Methodology

47 CFR Part 15, Subpart C (10-1-16 Edition)	Miscellaneous Wireless Communications Services
ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

Note(s):

All test items were verified and recorded according to the standards and without any addition/deviation/exclusion during the test.

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1.5 Test Verdict

No.	FCC Part No.	ISED Part No.	Description	Test Result	Verdict
1	15.203	RSS-Gen7.1.4	Antenna Requirement	Clause 4.1.1	PASS
2	15.225(e)	RSS-210 B.6	Frequency Tolerance	Clause 4.1.2	PASS
3	2.1049	RSS-Gen	20dB Bandwidth and 99% Bandwidth	Clause 4.1.3	PASS
4	15.225	RSS-210 B.6	Radiated Emission	Clause 4.1.4	PASS
5	15.207	RSS-Gen	Conducted Emission	Clause 4.1.5	PASS

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2 Test Condition

2.1 Environmental conditions

Temperature (°C)	18-25
Humidity (%RH)	40-65
Barometric Pressure (mbar)	960-1060

2.2 Equipment List

Name of Equipment	Manufacturer	Model	Serial No.	Cal. Due Date
Spectrum Analyzer	Keysight	N9020B	MY59260184	2020-07-28
Spectrum Analyzer	Rohde & Schwarz	FSV40N	101450	2020-06-24
EMI Test Receiver	Rohde & Schwarz	ESPI3	100173	2020-06-19
EMI Test Receiver	Rohde & Schwarz	ESR 7	101911	2020-06-19
V-network	SCHWARZBECK	NSLK 8127	8127-902	2021-02-20
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	100687	2020-08-22
Broadband Antenna	SCHWARZBECK	VULB9163	9163-1037	2020-06-06
Horn Antenna-18G	SCHWARZBECK	BBHA9120D	9120D-1775	2020-06-06
Loop Antenna	SCHWARZBECK	FMZB 1513	N/A	2021-03-19
Horn Antenna-40G	YINGLIAN	LB-180400-KF	N/A	2020-07-26
EMC chamber 9*6*6 (L*W*H)	CHANGNING	966	N/A	2020-06-26
Shielded Enclosure 8*5*4 (L*W*H)	CHANGNING	854	N/A	2020-08-28
Test Software	BL	BL410_E	N/A	N/A

2.3 Measurement Uncertainty

Parameter	Frequency	Uncertainty
Antenna Port Conducted Emission	< 1GHz	± 1.5 dB
	> 1GHz	± 1.5 dB
Radiated Emission	30 MHz – 1 GHz	± 3 dB
	> 1GHz	± 3 dB

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3 Test Set-up and Operation Modes

3.1 Details of Test Mode

Using test software was control EUT work in continuous transmitter and receiver mode. Select test channel as below:

Channel	Frequency
Test channel	13.56MHz

The basic operation modes are:

- A. On
 - 1. test mode
 - a. Transmitting
 - i. Test Channel
- B. Standby
- C. Off

3.2 Special Accessories and Auxiliary Equipment

Description	Manufacturer	Model No.	Serial No.
Laptop	Lenovo	TP00083A	N/A

3.3 Support Software

Description	Manufacturer	Software Name
Software	NXP	PNX

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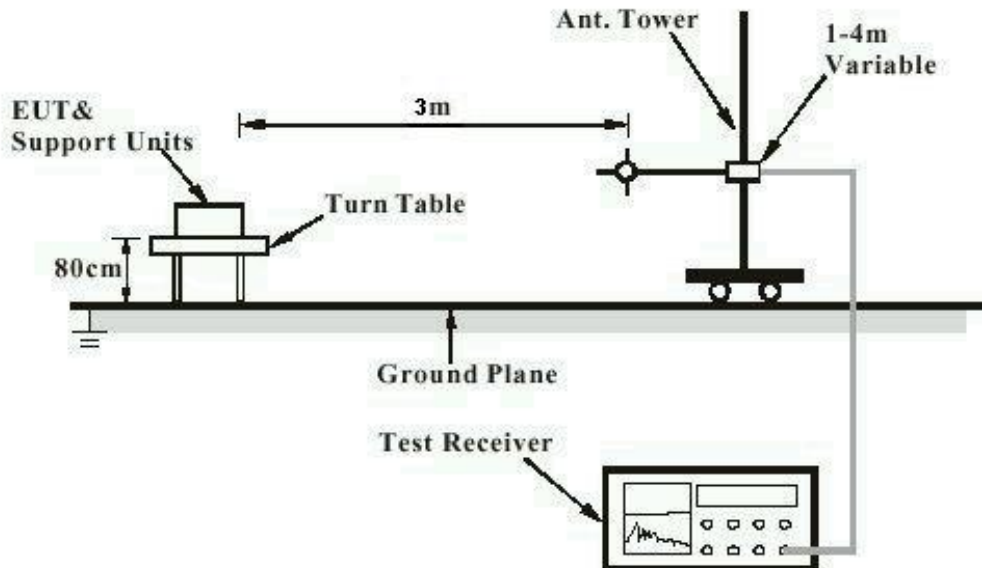
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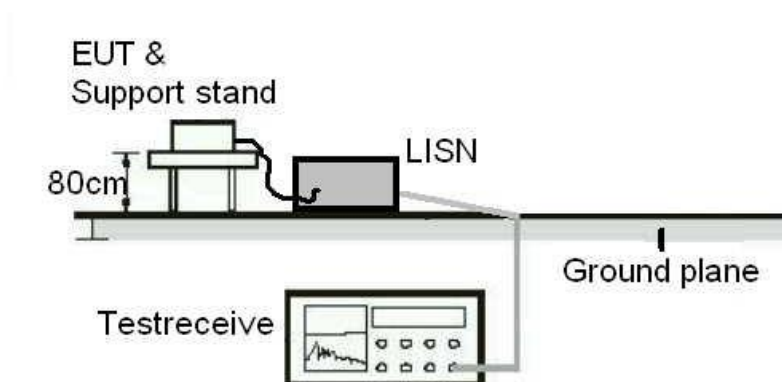
3.4 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



Note: Measurements above 30MHz are done with a table height of 0.8m.

Diagram of Measurement Equipment Configuration for Conduction Measurement



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4 Test Results

4.1 Transmitter Requirement & Test Suites

4.1.1 Antenna Requirement

RESULT:

PASS

Test standard : Part 15.203

Requirement : The use of approved antennas only with directional gains that do not exceed 6 dBi

According to the manufacturer declaration, the EUT has an antenna with a gain of 0 dBi. The antenna is an internal antenna with no possibility of replacement with a non-approved antenna by the end-user.

Therefore, the EUT is considered to comply with this provision.

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4.1.2 Frequency Tolerance

RESULT:

PASS

Test standard : FCC Part 15.225(e)

Requirement : ANSI C63.10-2013

Kind of test site : Shielded room

Test setup

Test Channel : Test channel

Operation Mode : A.1.a

Ambient temperature : 25°C

Relative humidity : 52%

Table 1: Frequency Tolerance

Temperature (°C)	Voltage (VDC)	Measured		Limit (ppm)
		Frequency (MHz)	Tolerance (ppm)	
-20	3.8	13.559740	20	< 100
-10		13.559740	19	
0		13.559740	20	
+10		13.559740	19	
+20		13.559740	19	
+40		13.559740	25	
+50		13.559737	19	
+20	2.8	13.559740	63	
+20	4.35	13.559740	19	

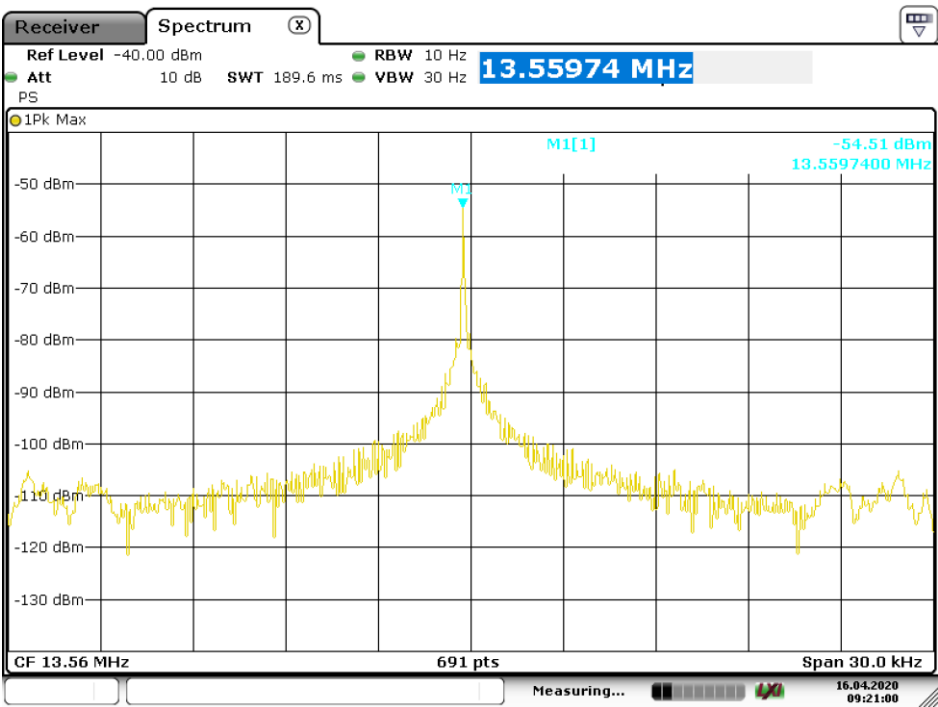
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Figure: Normal Condition



Date: 16.APR.2020 09:21:00

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4.1.3 20dB Bandwidth and 99% Bandwidth

RESULT:

PASS

Test standard : FCC Part 2.1049

Requirement : ANSI C63.10-2013

Kind of test site : Chamber

Test setup

Test Channel : Test channel

Operation Mode : A.1.a

Ambient temperature : 25°C

Relative humidity : 52%

Table 2: 20dB Bandwidth and 99% Bandwidth

Test Mode	Test Channel (MHz)	20dB Bandwidth (kHz)	99% Bandwidth (kHz)
ASK	13.56	24.60	20.70

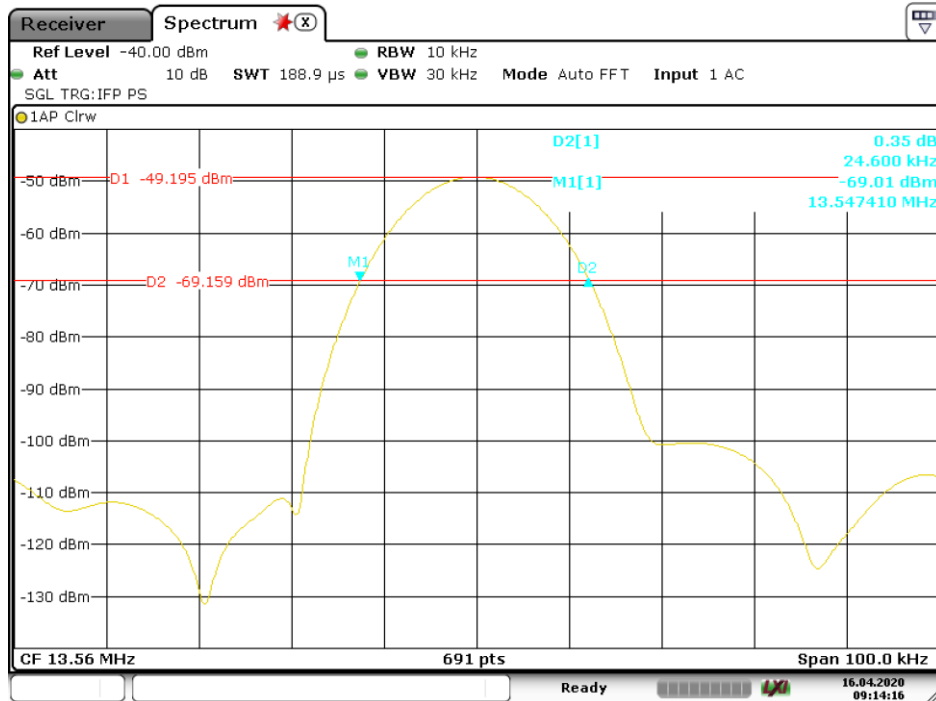
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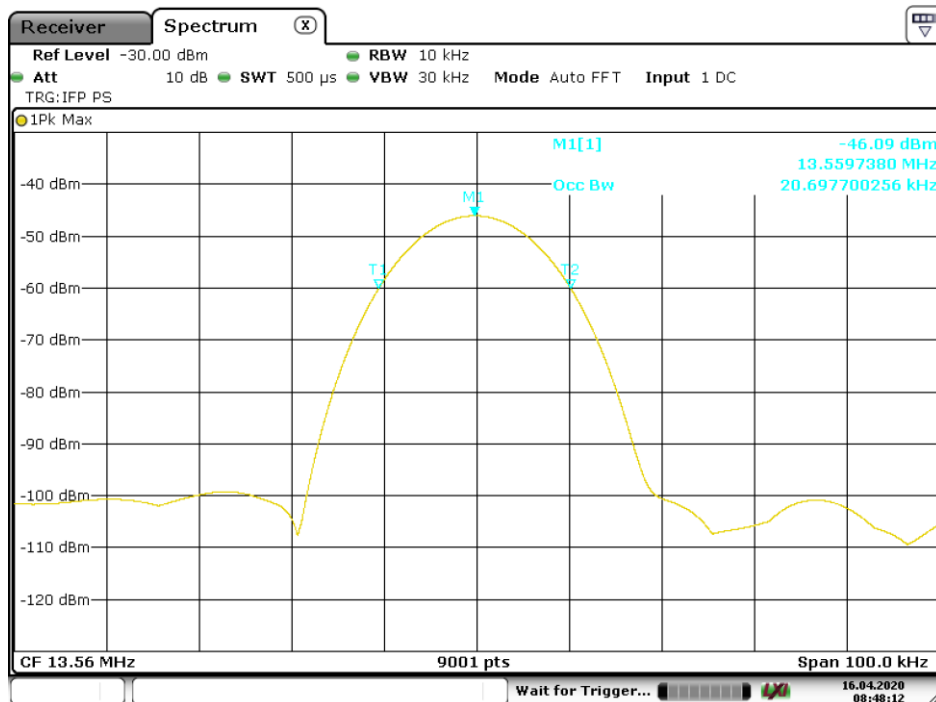
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Figure: 20dB Bandwidth



Date: 16.APR.2020 09:14:17

Figure: 99% Bandwidth



Date: 16.APR.2020 08:48:13

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4.1.4 Radiated Emission

RESULT:

PASS

Test standard : FCC Part 15.225
Requirement : ANSI C63.10-2013
Kind of test site : 3m Semi-Anechoic Chamber

Test setup

Test Channel : Test channel
Operation Mode : A
Ambient temperature : 25°C
Relative humidity : 52%

Notes:

Operation within the band 13.110-14.010 MHz as contained in §15.225:

(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 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.

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		μV/m	dB(μV)/m
0.009 ~ 0.490	300	2400/F(KHz)	67.6-20log(F)
0.490 ~ 1.705	30	24000/F(KHz)	87.6-20log(F)
1.705 ~ 13.110	30	30	29.54
13.110 ~ 13.410	30	106	40.51
13.410~ 13.553	30	334	50.47
13.553~13.567	30	15848	84.00
13.567~13.710	30	334	50.47
13.710~14.010	30	106	40.51
14.010~30	30	30	29.54
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0

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(1) The emission limits shown in the above table are based on measurements employing a CISPR QP detector except for the frequency bands 9-90KHz, 110-490KHz and above 1000MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector.

(2) At frequencies below 30MHz, measurement may be performed at a distance closer than that specified, and the limit at closer measurement distance can be extrapolated by below formula:

$$\text{Limit}_{3\text{m}}(\text{dBuV/m}) = \text{Limit}_{300\text{m}}(\text{dBuV/m}) + 40\text{Log}(300\text{m}/3\text{m}) = \text{Limit}_{300\text{m}}(\text{dBuV/m}) + 80$$

$$\text{Limit}_{3\text{m}}(\text{dBuV/m}) = \text{Limit}_{30\text{m}}(\text{dBuV/m}) + 40\text{Log}(30\text{m}/3\text{m}) = \text{Limit}_{30\text{m}}(\text{dBuV/m}) + 40$$

(3) EUT was placed on a non-metallic table, 100 cm above the ground plane inside a semi-anechoic chamber.

(4) Test antenna was located 3m from the EUT on an adjustable mast

According ANSI C63.10:2013 clause 6.4.4.2 and 6.5.3, for measurements below 30 MHz, the loop antenna was positioned with its plane vertical from the EUT and rotated about its vertical axis for maximum response at each azimuth position around the EUT. And the loop antenna also be positioned with its plane horizontal at the specified distance from the EUT. The center of the loop is 1 m above the ground. for measurement above 30MHz, the Trilog Broadband Antenna or Horn Antenna was located 3m from EUT, Measurements were made with the antenna positioned in both the horizontal and vertical planes of Polarization, and the measurement antenna was varied from 1 m to 4 m. in height above the reference ground plane to obtain the maximum signal strength.

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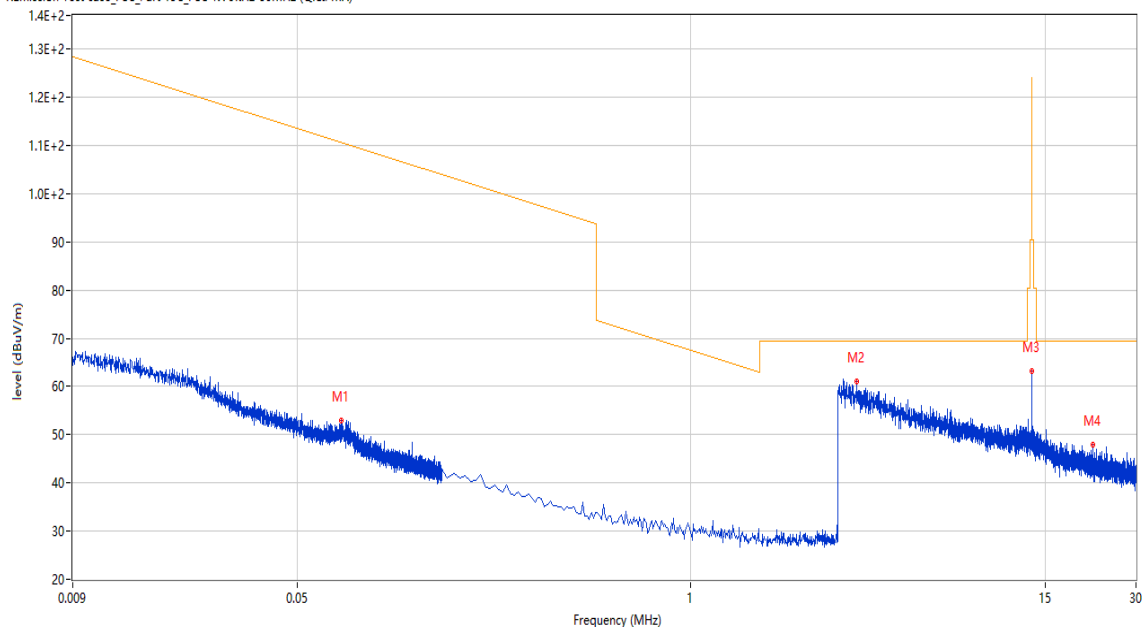
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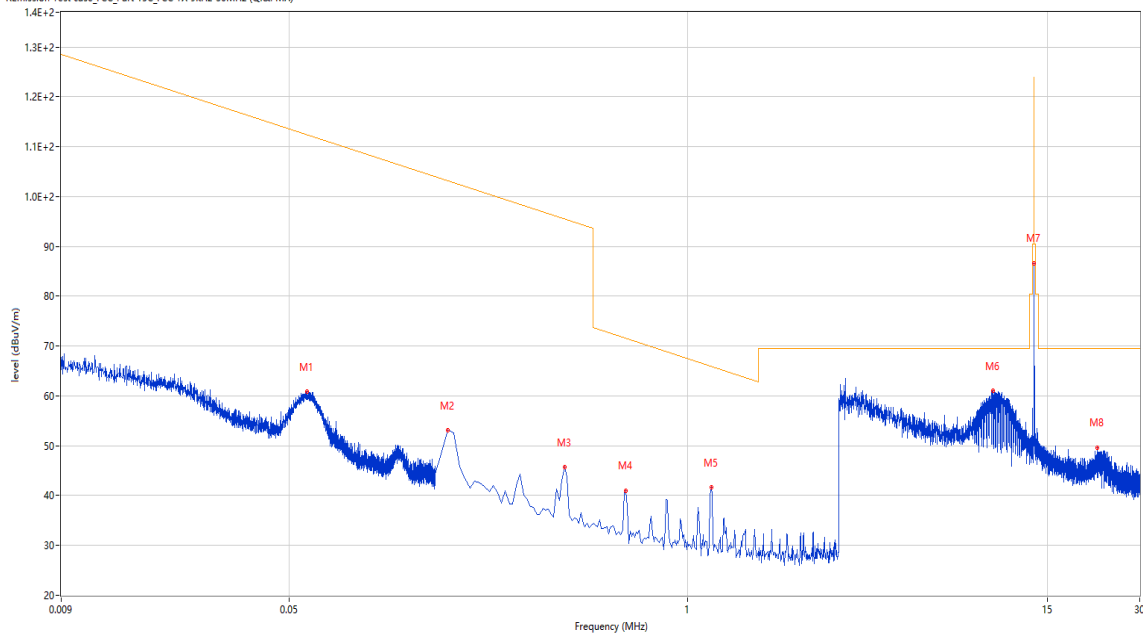
Test data :

REmission Test case_FCC_Part 15C_FCC TX 9kHz-30MHz (QI&PMA)



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	0.070	52.93	21.07	110.7	-57.77	Peak	33.90	100	Horizontal	Pass
2	3.574	61.06	21.05	69.5	-8.44	Peak	360.00	100	Horizontal	Pass
3	13.557	63.20	20.94	124.0	-60.80	Peak	175.70	100	Horizontal	Pass
4	21.659	47.84	21.19	69.5	-21.66	Peak	360.00	100	Horizontal	Pass

REmission Test case_FCC_Part 15C_FCC TX 9kHz-30MHz (QI&PMA)



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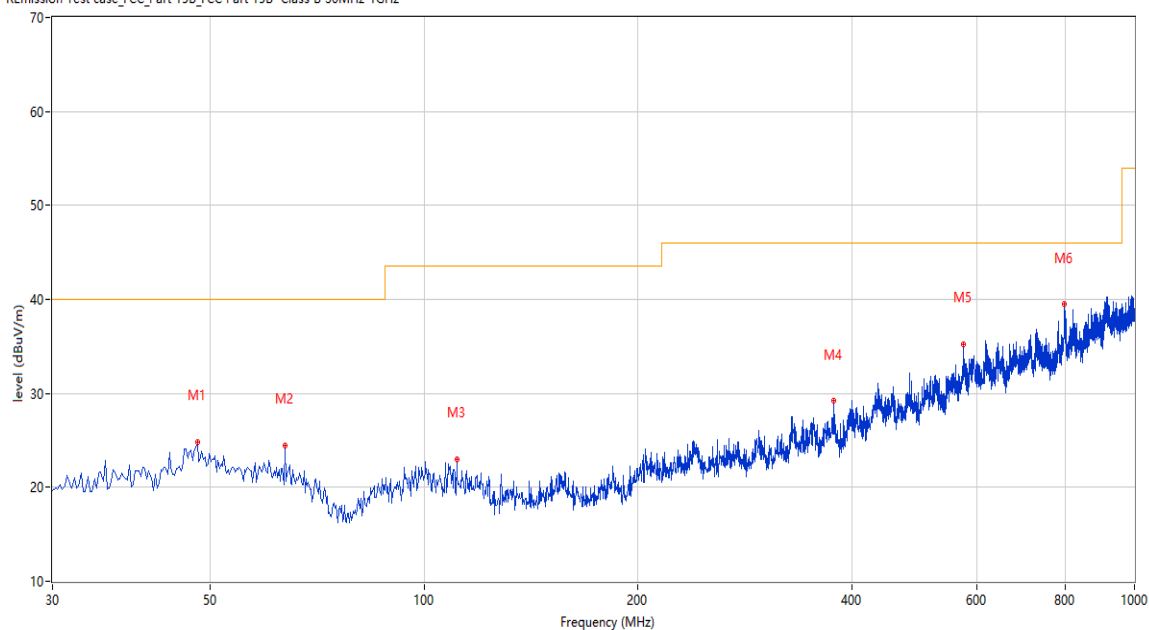
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No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	0.057	59.24	21.06	112.4	-53.16	Peak	334.30	100	Vertical	Pass
2	0.165	53.13	21.04	103.2	-50.07	Peak	0.00	100	Vertical	Pass
3	0.396	45.70	21.05	95.6	-49.90	Peak	219.80	100	Vertical	Pass
4	0.627	41.03	21.09	71.6	-30.57	Peak	219.80	100	Vertical	Pass
5	1.194	41.63	21.02	66.0	-24.37	Peak	224.30	100	Vertical	Pass
6	9.968	61.05	21.12	69.5	-8.45	Peak	0.00	100	Vertical	Pass
7	13.557	86.56	20.94	124.0	-37.44	Peak	31.90	100	Vertical	Pass
8	21.749	49.64	21.19	69.5	-19.86	Peak	0.00	100	Vertical	Pass

REmission Test case_FCC_Part 15B_FCC Part 15B Class B 30MHz-1GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	47.941	24.81	-23.67	40.0	-15.19	Peak	241.10	100	Horizontal	Pass
2	63.699	24.49	-25.81	40.0	-15.51	Peak	275.30	100	Horizontal	Pass
3	111.217	23.02	-27.12	43.5	-20.48	Peak	253.70	100	Horizontal	Pass
4	377.658	29.18	-21.41	46.0	-16.82	Peak	155.90	100	Horizontal	Pass
5	574.761	35.24	-16.36	46.0	-10.76	Peak	147.70	100	Horizontal	Pass
6	796.593	39.46	-12.00	46.0	-6.54	Peak	356.50	100	Horizontal	Pass

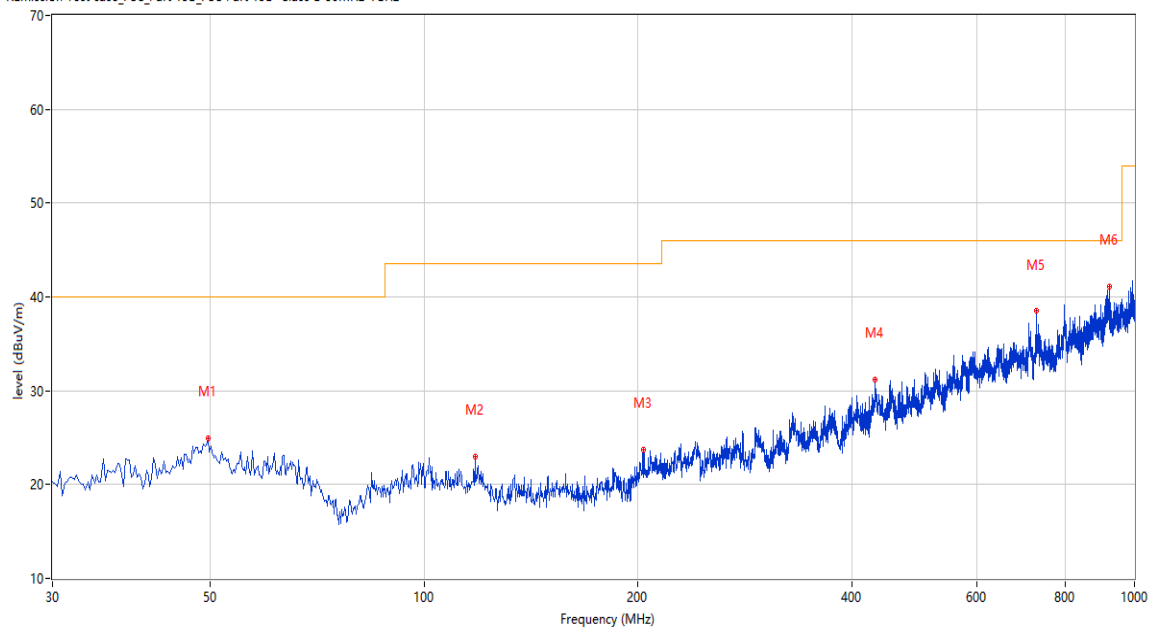
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REmission Test case_FCC_Part 15B_FCC Part 15B Class B 30MHz-1GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	49.638	24.92	-24.12	40.0	-15.08	Peak	4.50	100	Vertical	Pass
2	118.005	23.03	-27.15	43.5	-20.47	Peak	293.30	100	Vertical	Pass
3	203.829	23.75	-26.48	43.5	-19.75	Peak	201.80	100	Vertical	Pass
4	431.237	31.17	-19.44	46.0	-14.83	Peak	354.60	100	Vertical	Pass
5	728.710	38.47	-14.43	46.0	-7.53	Peak	13.10	100	Vertical	Pass
6	923.632	41.09	-10.95	46.0	-4.91	Peak	61.10	100	Vertical	Pass

Note : margin (Over Limit) > 10dB, so do not need to test by QP Detector

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4.2 Mains Emissions

4.2.1 Conducted Emission on AC Mains

RESULT:

PASS

Test standard : FCC Part 15.207(a)

Requirement : ANSI C63.10-2013

Kind of test site : Shielded room

Test setup

Input Voltage : AC 120V, 60Hz; AC 240V, 50Hz

Operation Mode : A.1.a

Earthing : Not Connected

Ambient temperature : 25°C

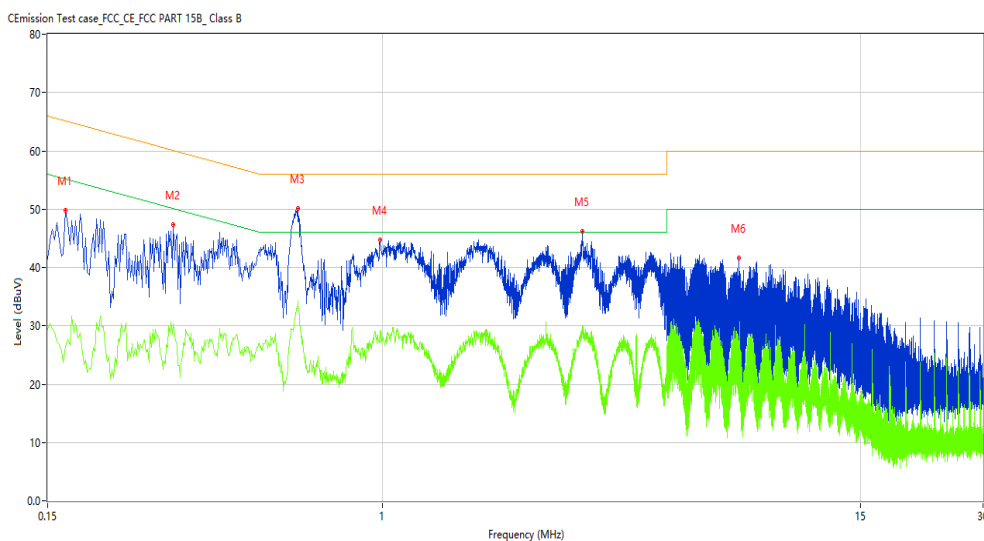
Relative humidity : 52%

For details refer to following test plot.

Note:

The all configurations were tested respectively, but only the worst configuration shown here.

Figure 1: Conducted Emission on AC Mains, L Phase



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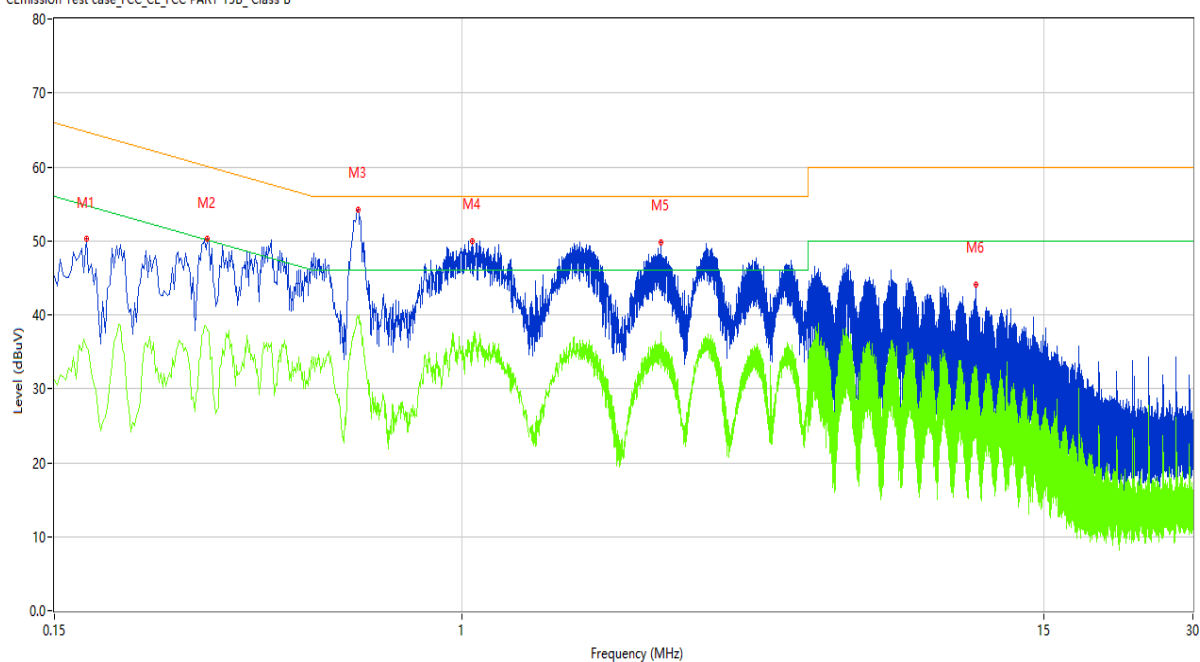
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No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Over Limit (dB)	Detector	Line	Verdict
1	0.166	54.63	10.15	65.16	-10.53	Peak	L	Pass
1*	0.166	44.48	10.15	65.16	-20.68	QP	L	Pass
1**	0.166	26.41	10.15	55.16	-28.75	AV	L	Pass
2	0.306	48.05	10.14	60.08	-12.03	Peak	L	Pass
2*	0.306	43.10	10.14	60.08	-16.98	QP	L	Pass
2**	0.306	30.38	10.14	50.08	-19.70	AV	L	Pass
3	0.620	50.90	10.15	56.00	-5.10	Peak	L	Pass
3*	0.620	46.83	10.15	56.00	-9.17	QP	L	Pass
3**	0.620	34.28	10.15	46.00	-11.72	AV	L	Pass
4	0.986	46.02	10.15	56.00	-9.98	Peak	L	Pass
4*	0.986	41.10	10.15	56.00	-14.90	QP	L	Pass
4**	0.986	28.54	10.15	46.00	-17.46	AV	L	Pass
5	3.102	44.96	10.22	56.00	-11.04	Peak	L	Pass
5*	3.102	39.19	10.22	56.00	-16.81	QP	L	Pass
5**	3.102	30.12	10.22	46.00	-15.88	AV	L	Pass
6	7.538	42.97	10.32	60.00	-17.03	Peak	L	Pass
6*	7.538	35.18	10.32	60.00	-24.82	QP	L	Pass
6**	7.538	25.91	10.32	50.00	-24.09	AV	L	Pass

Figure: Conducted Emission on AC Mains, N Phase

CEmission Test case_FCC_CE_FCC PART 15B_Class B



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No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Over Limit (dB)	Detector	Line	Verdict
1	0.174	54.53	10.15	64.77	-10.24	Peak	N	Pass
1*	0.174	45.79	10.15	64.77	-18.98	QP	N	Pass
1**	0.174	35.52	10.15	54.77	-19.25	AV	N	Pass
2	0.306	50.33	10.14	60.08	-9.75	Peak	N	Pass
2*	0.306	46.85	10.14	60.08	-13.23	QP	N	Pass
2**	0.306	37.95	10.14	50.08	-12.13	AV	N	Pass
3	0.616	54.47	10.15	56.00	-1.53	Peak	N	Pass
3*	0.616	51.10	10.15	56.00	-4.90	QP	N	Pass
3**	0.616	39.46	10.15	46.00	-6.54	AV	N	Pass
4	1.050	50.58	10.15	56.00	-5.42	Peak	N	Pass
4*	1.050	45.38	10.15	56.00	-10.62	QP	N	Pass
4**	1.050	36.29	10.15	46.00	-9.71	AV	N	Pass
5	2.522	50.69	10.20	56.00	-5.31	Peak	N	Pass
5*	2.522	44.60	10.20	56.00	-11.40	QP	N	Pass
5**	2.522	37.79	10.20	46.00	-8.21	AV	N	Pass
6	10.928	42.96	10.45	60.00	-17.04	Peak	N	Pass
6*	10.928	36.80	10.45	60.00	-23.20	QP	N	Pass
6**	10.928	33.07	10.45	50.00	-16.93	AV	N	Pass

End of the report