

TEST REPORT

Reference No. : WTS17S1093892-3E
FCC ID : V5PA80
Applicant..... : PAX Technology Limited
Address..... : Room 2416, 24/F., Sun Hung Kai Centre, 30 Harbour, Hong Kong, China
Manufacturer : PAX Computer Technology (Shenzhen) Co., Ltd.
Address..... : 4/F, No.3 Building, Software Park, Second Central Science-Tech Road, High-Tech industrial Park, Shenzhen, Guangdong, P.R.C. China
Product..... : Countertop Payment Terminal
Model(s). : A80
Brand..... : PAX
Standards..... : FCC CFR47 Part 15.225: 2017
Date of Receipt sample : 2017-10-31
Date of Test : 2017-11-01 to 2017-12-19
Date of Issue..... : 2017-12-20
Test Result..... : Pass

Remarks:

The 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.

Prepared By:

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2 Laboratories Introduction

Waltek Services Test Group Ltd. is one of the largest and the most comprehensive third party testing organizations in China, our headquarter located in Shenzhen (CNAS Registration No. L3110, A2LA Certificate Number: 4243.01) and have branches in Foshan (CNAS Registration No. L6478), Dongguan (CNAS Registration No. L9950), Zhongshan, Suzhou (CNAS Registration No. L7754), Ningbo and Hong Kong, Our test capability covered four large fields: safety test. Electronic Magnetic Compatibility(EMC), reliability and energy performance, Chemical test. Meanwhile, Waltek has got recognition as registration and accreditation laboratory from EMSD (Electrical and Mechanical Services Department), and American Energy star, FCC(The Federal Communications Commission), CPSC(Consumer Product Safety Commission), CEC(California energy efficiency), IC(Industry Canada) and ELI(Efficient Lighting Initiative). It's the strategic partner and data recognition laboratory of international authoritative organizations, such as UL, Intertek(ETL-SEMKO), CSA, TÜV Rheinland, TÜV SÜD, etc. As a professional, comprehensive, justice international test organization, we still keep the scientific and rigorous work attitude to help each client satisfy the international standards and assist their product enter into globe market smoothly.

Waltek Services (Shenzhen) Co., Ltd.

A. Accreditations for Conformity Assessment (International)

Country/Region	Accreditation Body	Scope	Note
USA	CNAS (Registration No.: L3110) A2LA (Certificate No.: 4243.01)	FCC ID \ DOC \ VOC	1
Canada		IC ID \ VOC	2
Japan		MIC-T \ MIC-R	-
Europe		EMCD \ RED	-
Taiwan		NCC	-
Hong Kong		OFCA	-
Australia		RCM	-
India		International Services	WPC
Thailand	NTC		-
Singapore	IDA		-
Note:			
1. FCC Designation No.: CN1201. Test Firm Registration No.: 523476.			
2. IC Canada Registration No.: 7760A			

B. TCBs and Notify Bodies Recognized Testing Laboratory.

Recognized Testing Laboratory of ...	Notify body number
TUV Rheinland	Optional.
Intertek	
TUV SUD	
SGS	
Phoenix Testlab GmbH	0700
Element Materials Technology Warwick Ltd	0891
Timco Engineering, Inc.	1177
Eurofins Product Service GmbH	0681

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3 Revision History

Test report No.	Date of Receipt sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTS17S1093892-3E	2017-10-31	2017-11-01 to 2017-12-19	2017-12-20	original	-	Valid

4 General Information

4.1 General Description of E.U.T.

Product Name:	Countertop Payment Terminal
Model No.:	A80
Model Description:	N/A
Wi-Fi Specification:	2.4G-802.11b/g/n HT20
Bluetooth Version:	Bluetooth v4.0 with BLE
GPS:	N/A
NFC:	Support
Hardware Version:	A80-MAIN-B
Software Version:	G510_V0D.00.45
Highest frequency (Exclude Radio):	1.2GHz
Storage Location:	Internal Storage
Note:	N/A

4.2 Details of E.U.T.

Operation Frequency:	WiFi: 802.11b/g/n HT20: 2412~2462MHz Bluetooth: 2402~2480MHz NFC:13.56 MHz
Max. RF output power:	WiFi(2.4G): 21.12dBm Bluetooth: -3.42dBm BLE: 9.20dBm
Type of Modulation:	WiFi: CCK, OFDM Bluetooth: GFSK, Pi/4 DQPSK, 8DPSK NFC: ASK, 2ASK
Antenna installation:	WiFi/Bluetooth: internal permanent antenna NFC: Loop antenna
Antenna Gain:	WiFi(2.4G): 1.5dBi Bluetooth: 1.5dBi
Ratings:	Battery DC 7.4V, 720mAh DC 9V, 1.0A, charging from adapter (Adapter Input: 100-240V~50/60Hz 0.6A)
Adapter:	Manufacturer: SHENZHEN HONOR ELECTRONIC CO.,LTD Model No.: ADS-18SG-09-2 09009G

4.3 Channel List

NFC Test Mode		
Channel No.	Channel No.	Frequency (MHz)
0	0	13.56MHz

4.4 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests; the worst data were recorded and reported.

Test mode	Lower channel	Middle channel	Upper channel
Transmitting	N/A	13.56MHz	N/A

5 Test Summary

Test Items	Test Requirement	Result
Conducted Emissions	15.207	PASS
Radiated Emission	15.205(a) 15.209 15.225	PASS
Frequency Tolerance	15.225	PASS
20dB Bandwidth	15.215(c)	PASS
Antenna Requirement	15.203	PASS
Note: C=Compliance; NC=Not Compliance; NT=Not Tested; N/A=Not Applicable.		

6 Equipment Used during Test

6.1 Equipments List

Conducted Emissions Test Site 1#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMI Test Receiver	R&S	ESCI	100947	2017-09-12	2018-09-11
2.	LISN	R&S	ENV216	101215	2017-09-12	2018-09-11
3.	Cable	Top	TYPE16(3.5M)	-	2017-09-12	2018-09-11
Conducted Emissions Test Site 2#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMI Test Receiver	R&S	ESCI	101155	2017-09-12	2018-09-11
2.	LISN	SCHWARZBECK	NSLK 8128	8128-289	2017-09-12	2018-09-11
3.	Limiter	York	MTS-IMP-136	261115-001-0024	2017-09-12	2018-09-11
4.	Cable	LARGE	RF300	-	2017-09-12	2018-09-11
3m Semi-anechoic Chamber for Radiation Emissions Test site 1#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	Spectrum Analyzer	R&S	FSP	100091	2017-04-29	2018-04-28
2	Amplifier	Agilent	8447D	2944A10178	2017-01-13	2018-01-12
3	Active Loop Antenna	Beijing Dazhi	ZN30900A	0703	2017-10-17	2018-10-16
4	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	33 6	2017-04-09	2018-04-08
5	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	2017-09-12	2018-09-11
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	2017-04-09	2018-04-08
7	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	2017-04-13	2018-04-12
8	Coaxial Cable (above 1GHz)	Top	1GHz-18GHz	EW02014-7	2017-04-13	2018-04-12
3m Semi-anechoic Chamber for Radiation Emissions Test site 2#						
Item	Equipment	Manufacturer	Model No.	Serial No	Last Calibration Date	Calibration Due Date
1	Test Receiver	R&S	ESCI	101296	2017-04-13	2018-04-12
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	2017-04-09	2018-04-08
3	Amplifier	ANRITSU	MH648A	M43381	2017-04-13	2018-04-12
4	Cable	HUBER+SUHNER	CBL2	525178	2017-04-13	2018-04-12

RF Conducted Testing						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMC Analyzer (9k~26.5GHz)	Agilent	E7405A	MY45114943	2017-09-12	2018-09-11
2.	Spectrum Analyzer (9k~6GHz)	R&S	FSL6	100959	2017-09-12	2018-09-11
3.	Signal Analyzer (9k~26.5GHz)	Agilent	N9010A	MY50520207	2017-09-12	2018-09-11

6.2 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-6}$
RF Power	± 1.0 dB
RF Power Density	± 2.2 dB
Radiated Spurious Emissions test	± 5.03 dB (Bilog antenna 30M~1000MHz)
	± 5.47 dB (Horn antenna 1000M~25000MHz)
Confidence interval: 95%. Confidence factor:k=2	

6.3 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R.China.

7 Conducted Emission

Test Requirement: FCC CFR 47 Part 15 Section 15.207
 Test Method: ANSI C63.10:2013
 Test Result: PASS
 Frequency Range: 150kHz to 30MHz
 Class/Severity: Class B
 Limit:

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

7.1 E.U.T. Operation

Operating Environment :

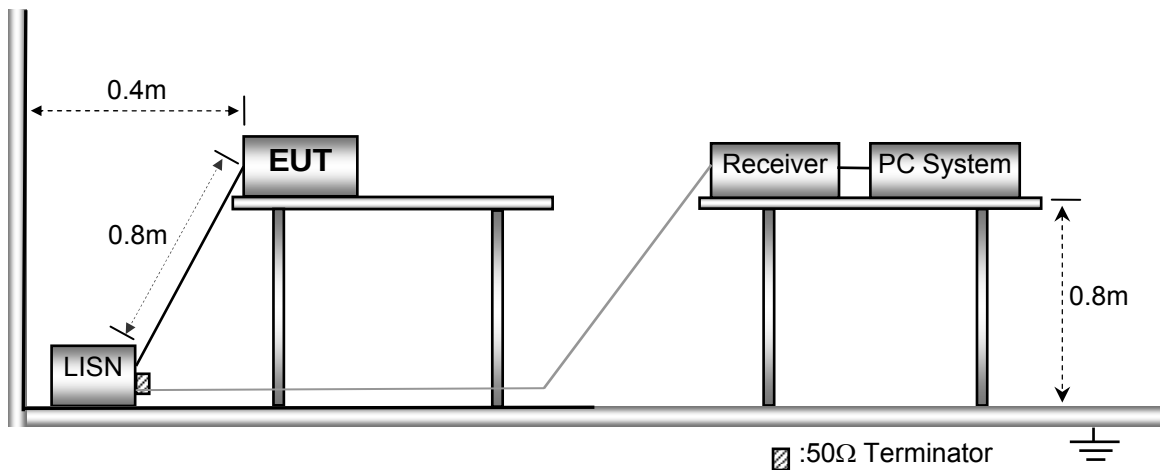
Temperature: 25.5 °C
 Humidity: 51 % RH
 Atmospheric Pressure: 101.2kPa

EUT Operation :

The test was performed in transmitting mode, the test data were shown in the report.

7.2 EUT Setup

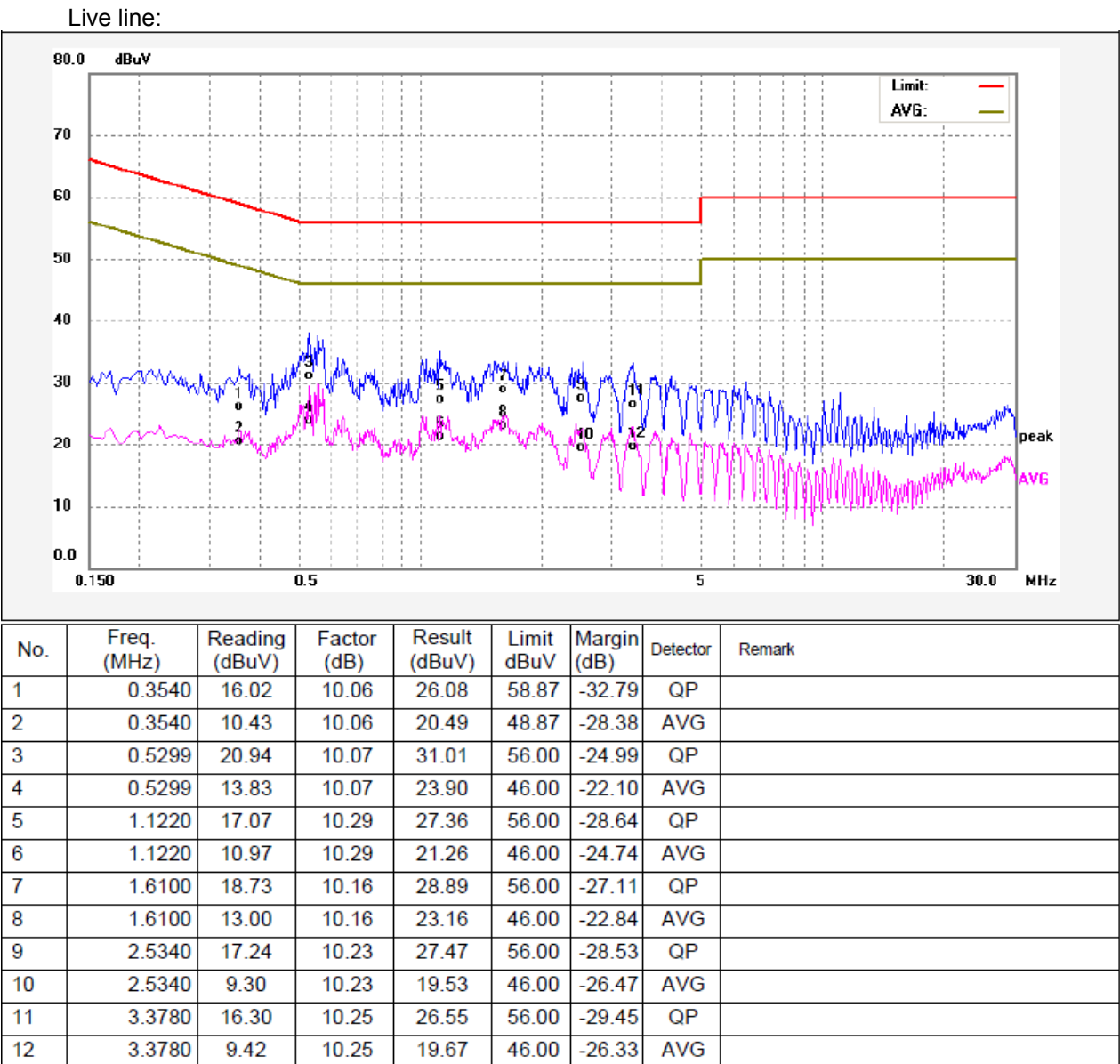
The conducted emission tests were performed using the setup accordance with the ANSI C63.10:2013



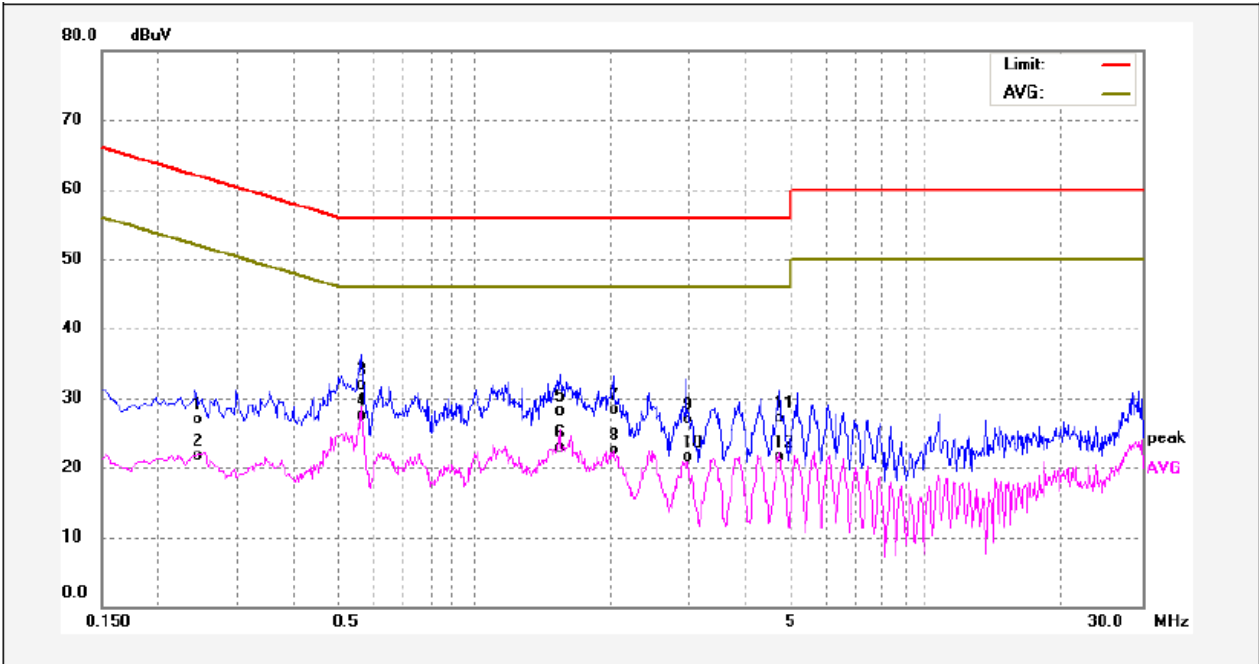
7.3 Measurement Description

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

7.4 Test Result



Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.2420	16.87	9.99	26.86	62.02	-35.16	QP	
2	0.2420	11.66	9.99	21.65	52.02	-30.37	AVG	
3	0.5660	21.85	10.07	31.92	56.00	-24.08	QP	
4	0.5660	17.43	10.07	27.50	46.00	-18.50	AVG	
5	1.5460	17.99	10.15	28.14	56.00	-27.86	QP	
6	1.5460	12.79	10.15	22.94	46.00	-23.06	AVG	
7	2.0420	18.13	10.20	28.33	56.00	-27.67	QP	
8	2.0420	12.22	10.20	22.42	46.00	-23.58	AVG	
9	2.9380	16.73	10.24	26.97	56.00	-29.03	QP	
10	2.9380	11.18	10.24	21.42	46.00	-24.58	AVG	
11	4.7340	16.93	10.26	27.19	56.00	-28.81	QP	
12	4.7340	11.25	10.26	21.51	46.00	-24.49	AVG	

8 Radiated Spurious Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.209

Test Method: ANSI C63.10

Test Result: PASS

Measurement Distance: 3m

Limit:

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	2400/F(kHz)	300	$10000 * 2400/F(kHz)$	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	$100 * 24000/F(kHz)$	$20\log^{(24000/F(kHz))} + 40$
1.705 ~ 30	30	30	$100 * 30$	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

8.1 EUT Operation

Operating Environment :

Temperature: 23.5 °C

Humidity: 51.1 % RH

Atmospheric Pressure: 101.2kPa

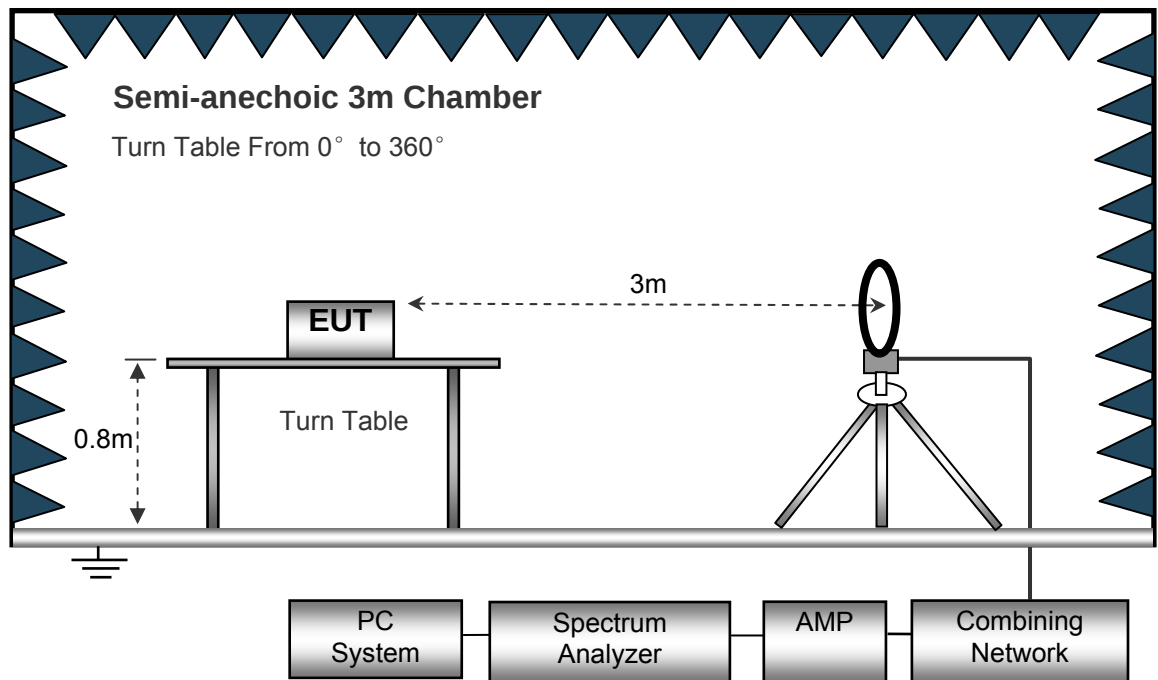
EUT Operation :

The test was performed in transmitting mode, the test data were shown in the report.

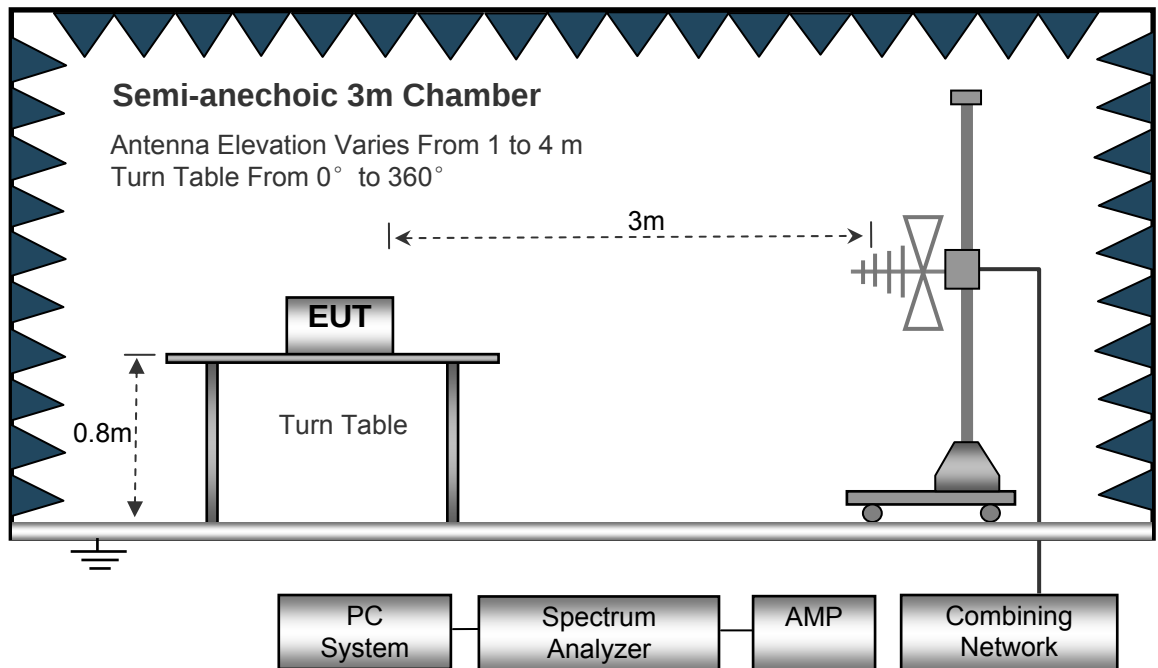
8.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.10: 2013

The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



8.3 Spectrum Analyzer Setup

Below 30MHz

Sweep Speed Auto
 IF Bandwidth..... 10kHz
 Video Bandwidth..... 10kHz
 Resolution Bandwidth..... 10kHz

30MHz ~ 1GHz

Sweep Speed Auto
 Detector PK
 Resolution Bandwidth..... 100kHz
 Video Bandwidth..... 300kHz

8.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane for below 1GHz
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions. The spectrum was investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the Z position. So the data shown was the Z position only.

8.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Limit}$$

8.6 Summary of Test Results

Test Frequency: 9 kHz ~ 30MHz Note: Correct factor = Cable loss + Antenna factor

Frequency	Receiver Reading (PK)	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude (PK)	FCC Part 15.225	
			Height	Polar			Limit	Margin
(MHz)	(dBμV) @3m	Degree	(m)	(H/V)	(dB/m)	(dBμV/m) @3m	(dBμV/m)@3m	(dB)
13.56	49.57	114	2	H	19.68	69.25	124	-54.75
13.56	35.65	341	1.6	V	29.71	65.36	124	-58.64

Frequency (MHz)	Receiver Reading	Detector	Correct factor	Extrapolation factor	Measurement results (calculated)	Limits	Margin
	dBμV @3m	QP	dB/m	dB	dBμV/m @30m	dBμV/m @30m	dB
3.62	32.45	QP	20.2	40	12.65	29.54	-16.89
10.34	35.26	QP	19.9	40	15.16	29.54	-14.38

Frequency Range (MHz)	Frequency (MHz)	Maximum Reading	Detector	Correct factor	Extrapolation factor	Measurement results (calculated)	Limits	Margin
		dBμV @3m	QP	dB/m	dB	dBμV/m @30m	dBμV/m @30m	dB
13.110~13.41	13.581	40.36	QP	21.55	40	21.91	40.5	-18.59
13.410~13.553	13.551	45.36	QP	21.55	40	26.91	50.5	-23.59
13.567~13.71	13.559	48.25	QP	21.55	40	29.8	84	-54.20
13.710~14.01	13.347	43.65	QP	21.55	40	25.2	50.5	-25.30

Test Frequency: 30MHz ~ 1GHz

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.225/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV) @3m	(QP)	Degree	(m)	(H/V)	(dB)	(dBμV/m) @3m	(dBμV/m) @3m	(dB)
34.22	32.26	QP	279	1.9	H	-14.30	17.96	40.00	-22.04
34.22	35.26	QP	360	1.9	V	-14.30	20.96	40.00	-19.04
220.34	33.55	QP	171	2.1	H	-13.58	19.97	46.50	-26.53
220.34	35.26	QP	270	2.0	V	-13.58	21.68	46.50	-24.82
519.67	36.24	QP	243	1.2	H	-5.63	30.61	46.50	-15.89
519.67	38.25	QP	356	1.3	V	-5.63	32.62	46.50	-13.88

9 Frequency Tolerance

Test Requirement: FCC Part15.225

Test Method: ANSI C63.10: 2013

Limit The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

9.1 Test Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as normal operation
3. Set SPA Centre Frequency = fundamental frequency, RBW=30 Hz, VBW= 100 Hz, Span =3 kHz.
4. Set SPA Max hold. Mark peak.

9.2 Test Result

Power Supply	Temperature (°C)	Measured Frequency (MHz)	Frequency Error	Part 15.225 Limit
DC 3.8V	-20	13.5685	0.0624%	±0.01%
	-10	13.5689	0.0656%	±0.01%
	0	13.5682	0.0605%	±0.01%
	+10	13.5679	0.0585%	±0.01%
	+20	13.5679	0.0584%	±0.01%
	+30	13.5699	0.0729%	±0.01%
	+40	13.5695	0.0701%	±0.01%
	+50	13.5680	0.0590%	±0.01%
DC 3.23 V	-20	13.4578	-0.7538%	±0.01%
	-10	13.4569	-0.7603%	±0.01%
	0	13.4576	-0.7554%	±0.01%

	+10	13.4564	-0.7643%	±0.01%
	+20	13.4573	-0.7577%	±0.01%
	+30	13.4576	-0.7548%	±0.01%
	+40	13.4570	-0.7598%	±0.01%
	+50	13.4567	-0.7614%	±0.01%
DC4.37V	-20	13.2538	-2.2581%	±0.01%
	-10	13.2546	-2.2522%	±0.01%
	0	13.2536	-2.2595%	±0.01%
	+10	13.2543	-2.2545%	±0.01%
	+20	13.2551	-2.2485%	±0.01%
	+30	13.2538	-2.2583%	±0.01%
	+40	13.2552	-2.2475%	±0.01%
	+50	13.2546	-2.2520%	±0.01%

10 20dB Bandwidth

Test Requirement: FCC Part15.215(C)

Test Method: ANSI C63.10: 2013

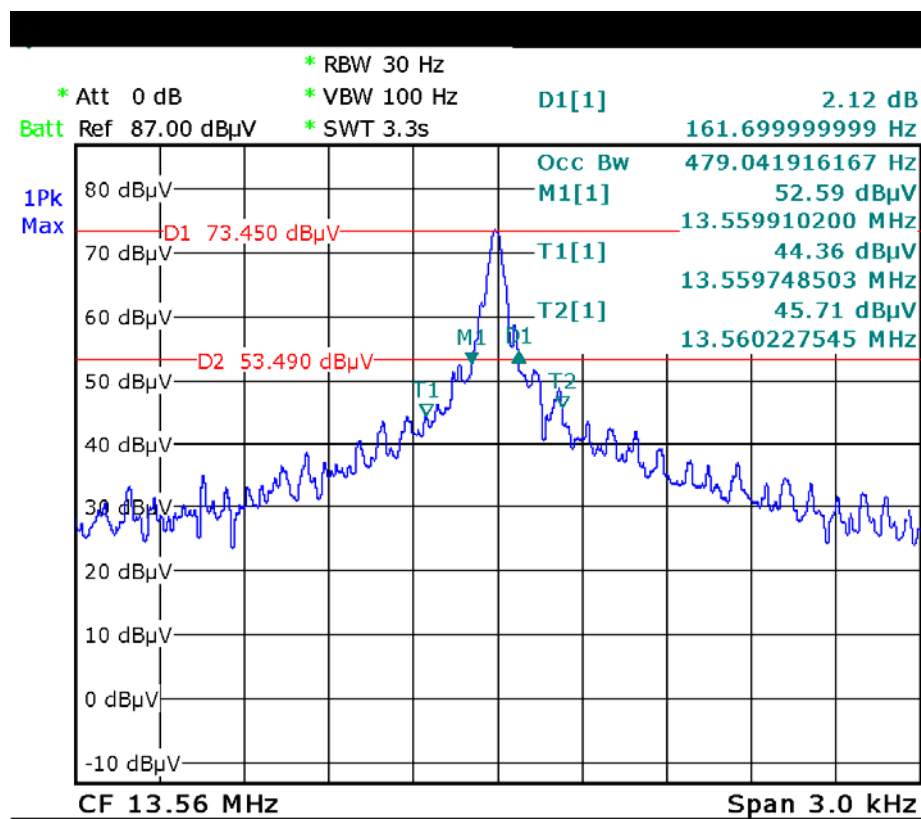
10.1 Test Procedure

1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak mode.
2. 20dB Bandwidth the resolution bandwidth of 30 Hz and the video bandwidth of 100 Hz were used.
3. Measured the spectrum width with power higher than 20dB below carrier.

10.2 Test Result

Frequency(MHz)	Bandwidth Emission(Hz)
13.56	161.70

Test Plot



11 Antenna Requirement

According to the FCC Part 15 Paragraph 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.

This product has an Loop antenna, fulfil the requirement of this section.

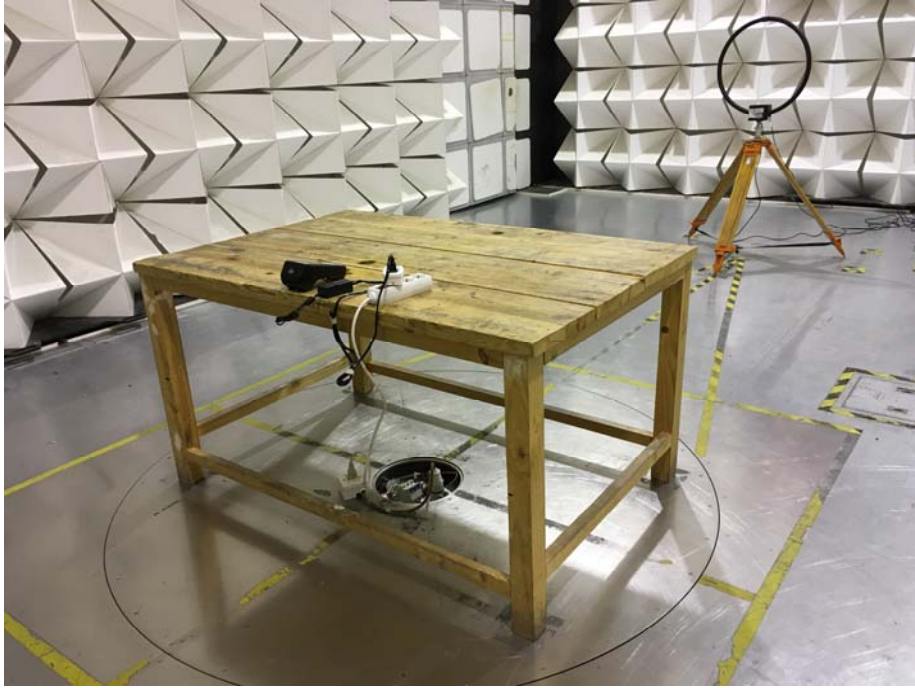
12 RF Exposure

Remark: refer to SAR test report: WTS17S1093893E

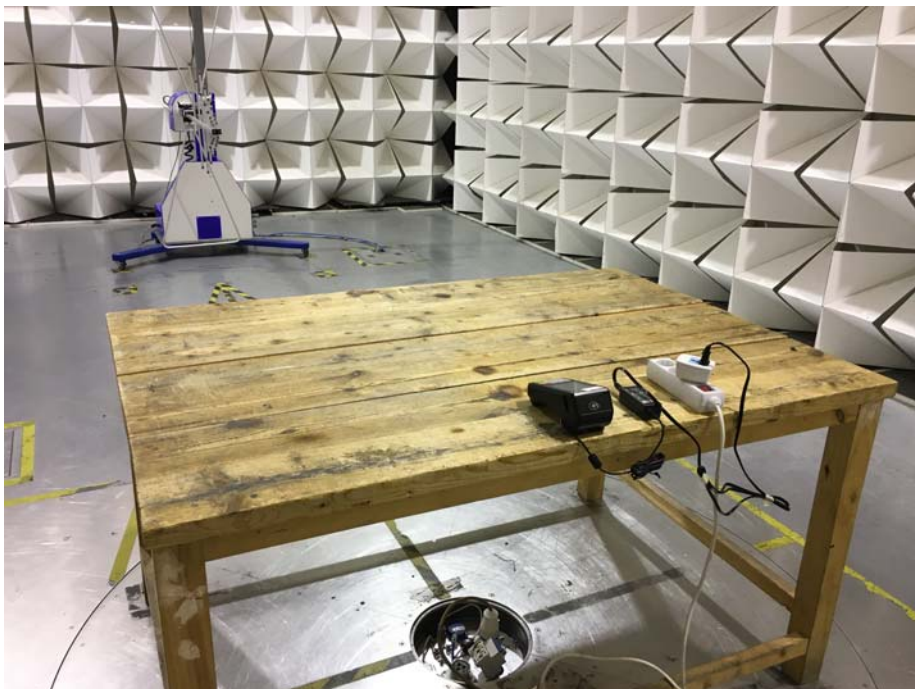
13 Photographs- Test Setup Photos

13.1 Photograph – Radiation Emission Test Setup Model A80 FCC ID: V5PA80

Test frequency from 9 KHz to 30MHz



Test frequency from 30MHz to 1GHz



13.2 Photograph – Conducted Emission Test Setup



14 Photographs of EUT.

Note: Please refer to appendix: WTS17S1093892E_Photo.

=====End of Report=====