

TEST REPORT

Reference No..... : WTS16S1165620-5E V3
FCC ID : V5PA920
Applicant..... : PAX Technology Limited
Address..... : Room 2416, 24/F., Sun Hung Kai Centre, 30 Harbour Road, Wanchai,
Hong Kong
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.
Product Name..... : Wireless POS Terminal
Model No..... : A920
Brand..... : PAX
Standards..... : FCC CFR47 Part 15 Section 15.225: 2016
Date of Receipt sample : Nov. 11, 2016
Date of Test : Nov. 12 – Dec. 06, 2016
Date of Issue..... : Dec. 07, 2016
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 a professional third-party testing and certification organization with multi-year product testing and certification experience, established strictly in accordance with ISO/IEC 17025 requirements, and accredited by CNAS (China National Accreditation Service for Conformity Assessment) AQSIIQ, CMA and IECEE for CBTL. 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.



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 and have branches in Foshan, Dongguan, Zhongshan, Suzhou, Ningbo and Hong Kong, Our test capability covered four large fields: safety test. ElectroMagnetic Compatibility(EMC), reliability and energy performance, Chemical test. 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.

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4 Revision History

Test report No.	Date of Receipt sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTS16S1165620-5E	Nov. 11, 2016	Nov. 12 – Dec. 06, 2016	Dec. 07, 2016	original	-	Replaced
WTS16S1165620-5E V1	Nov. 11, 2016	Nov. 12 – Dec. 06, 2016	Dec. 30, 2016	Version 1	Updated	Replaced
WTS16S1165620-5E V2	Nov. 11, 2016	Nov. 12 – Dec. 06, 2016	Jan. 03 2016	Version 2	Updated	Replaced
WTS16S1165620-5E V3	Nov. 11, 2016	Nov. 12 – Dec. 06, 2016	Jan. 05 2016	Version 3	Updated	Valid

5 General Information

5.1 General Description of E.U.T.

Product Name:	Wireless POS Terminal
Model No.:	A920
Model Description:	N/A
GSM Band(s):	N/A
GPRS/EGPRS Class:	N/A
WCDMA Band(s):	FDD Band II/IV/V
LTE Band(s):	FDD Band 2/4/5/17
Wi-Fi Specification:	2.4G-802.11b/g/n HT20
Bluetooth Version:	Bluetooth v4.0 with BLE
GPS:	Support
NFC:	Support
Hardware Version:	v 01.01.01
Software Version:	24.00.xxxx
Storage Location:	Internal Storage
Note:	N/A

5.2 Details of E.U.T.

Operation Frequency:	WCDMA Band II: 1850~1910MHz WCDMA Band V: 824~849MHz WCDMA Band IV:1710~1755MHz LTE Band 2: 1850~1910MHz LTE Band 4: 1710~1755MHz LTE Band 5: 823~850MHz LTE Band 17: 704-716MHz WiFi: 802.11b/g/n HT20: 2412~2462MHz Bluetooth: 2402~2480MHz NFC:13.56MHZ
Max. RF output power:	WCDMA Band II: 22.67dBm WCDMA Band V: 22.66dBm WCDMA Band IV: 22.13dBm LTE Band 2: 22.22dBm LTE Band 4: 22.08dBm LTE Band 5: 22.91Bm LTE Band 17: 22.83dBm WiFi(2.4G): 22.67dBm Bluetooth: 10.88dBm

Type of Modulation:	WCDMA: BPSK LTE: QPSK, 16QAM WiFi: CCK, OFDM Bluetooth: GFSK, Pi/4 DQPSK, 8DPSK NFC: ASK,2ASK
Antenna installation:	WCDMA/LTE: internal permanent antenna WiFi/Bluetooth: internal permanent antenna NFC: Loop antenna
Antenna Gain:	WCDMA Band II: 3.0dBi WCDMA Band V: 0.5dBi WCDMA Band IV: 3.0dBi LTE Band 2: 3.0dBi LTE Band 4: 3.0dBi LTE Band 5: 0.5dBi LTE Band 17: 0.5dBi WiFi(2.4G): -0.8dBi Bluetooth: -0.8dBi
Technical Data:	Battery DC 3.7V, 3400mAh DC 5V, 2.0A, charging from adapter (Adapter Input: 100-240V~50/60Hz 0.5A)
Adapter:	Manufacture: SHENZHEN HUNTKEY ELECTRIC CO., LTD. Model No.: HKC0115020-1B

5.3 Channel List

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

5.4 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

5.5 Test Facility

The test facility has a test site registered with the following organizations:

- **IC – Registration No.: 7760A-1**

Waltek Services (Shenzhen) Co., Ltd. has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration 7760A-1, October 15, 2015

- **FCC Test Site 1#– Registration No.: 880581**

Waltek Services(Shenzhen) Co., Ltd. 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 our files. Registration 880581, April 29, 2014.

- **FCC Test Site 2#– Registration No.: 328995**

Waltek Services(Shenzhen) Co., Ltd. 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 our files. Registration 328995, December 3, 2014.

6 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.		

7 Equipment Used during Test

7.1 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	Sep.12, 2016	Sep.11, 2017
2.	LISN	R&S	ENV216	101215	Sep.12, 2016	Sep.11, 2017
3.	Cable	Top	TYPE16(3.5M)	-	Sep.12, 2016	Sep.11, 2017
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	Sep.12, 2016	Sep.11, 2017
2.	LISN	SCHWARZBECK	NSLK 8128	8128-289	Sep.12, 2016	Sep.11, 2017
3.	Limitter	York	MTS-IMP-136	261115-001-0024	Sep.12, 2016	Sep.11, 2017
4.	Cable	LARGE	RF300	-	Sep.12, 2016	Sep.11, 2017
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	Apr.29, 2016	Apr.28, 2017
2	Amplifier	Agilent	8447D	2944A10178	Jan.13, 2016	Jan.12, 2017
3	Active Loop Antenna	Beijing Dazhi	ZN30900A	0703	Oct.17, 2016	Oct.16, 2017
4	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	33 6	Apr.09, 2016	Apr.08, 2017
5	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	Sep.12, 2016	Sep.11, 2017
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	Apr.09, 2016	Apr.08, 2017
7	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	Apr.13, 2016	Apr.12, 2017
8	Coaxial Cable (above 1GHz)	Top	1GHz-18GHz	EW02014-7	Apr.13, 2016	Apr.12, 2017
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	Apr.13, 2016	Apr.12, 2017
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	Apr.09, 2016	Apr.08, 2017
3	Amplifier	ANRITSU	MH648A	M43381	Apr.13, 2016	Apr.12, 2017
4	Cable	HUBER+SUHNER	CBL2	525178	Apr.13, 2016	Apr.12, 2017

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	Sep.12, 2016	Sep.11, 2017
2.	Spectrum Analyzer (9k~6GHz)	R&S	FSL6	100959	Sep.12, 2016	Sep.11, 2017
3.	Signal Analyzer (9k~26.5GHz)	Agilent	N9010A	MY50520207	Sep.12, 2016	Sep.11, 2017

7.2 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	

7.3 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.

8 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 56*	56 to 46*
0.5 to 5	56	60
5 to 30	60	50

8.1 E.U.T. Operation

Operating Environment :

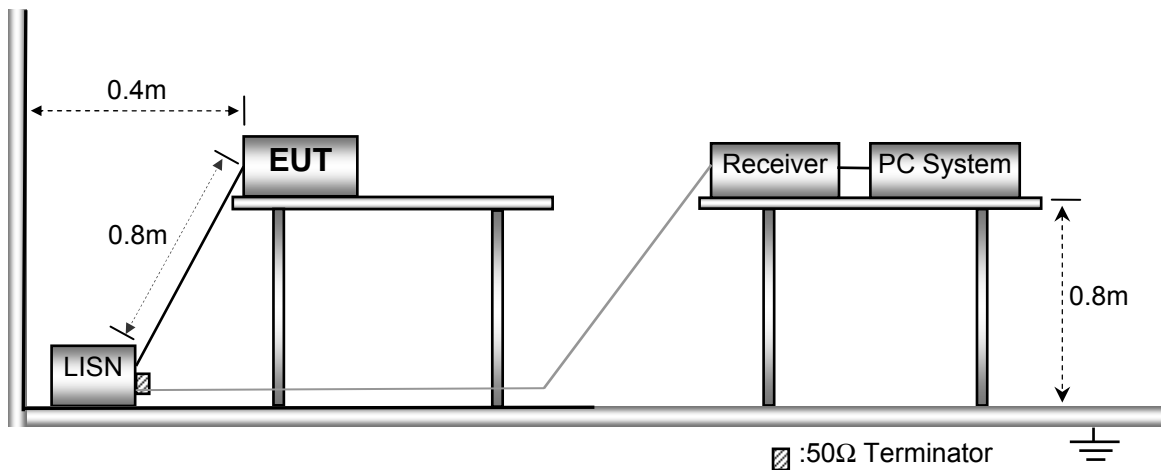
Temperature:	25.5 °C
Humidity:	51 % RH
Atmospheric Pressure:	101.2kPa

EUT Operation :

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

8.2 EUT Setup

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

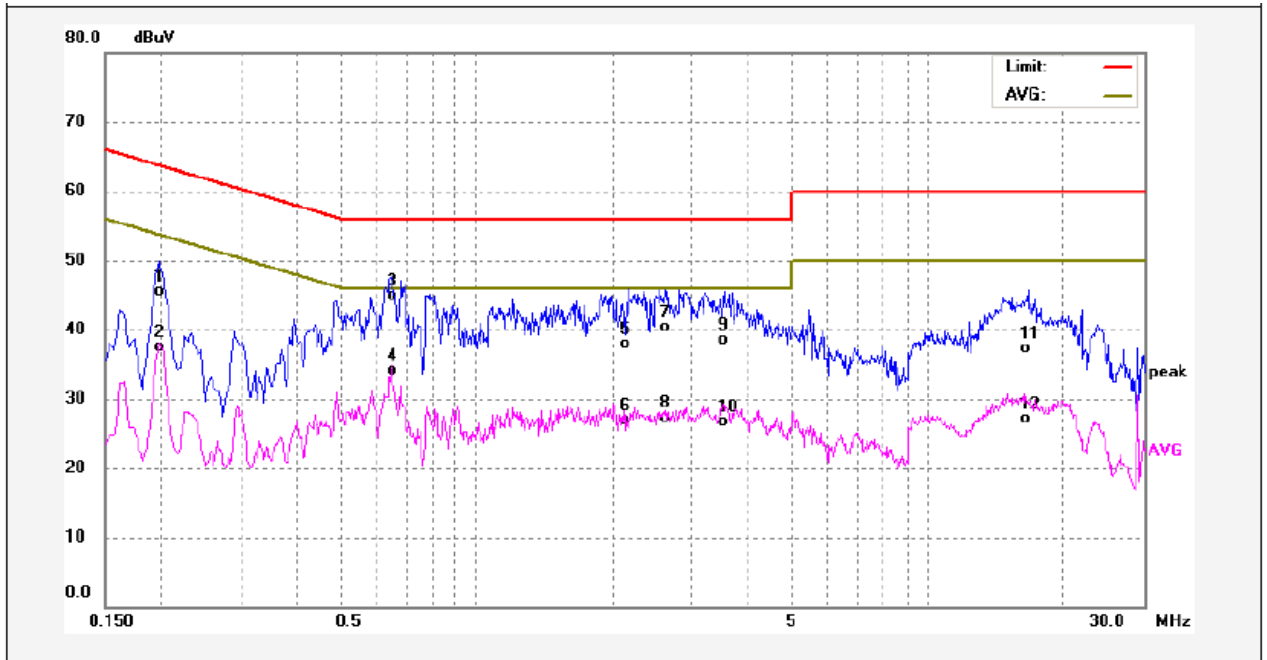


8.3 Measurement Description

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.

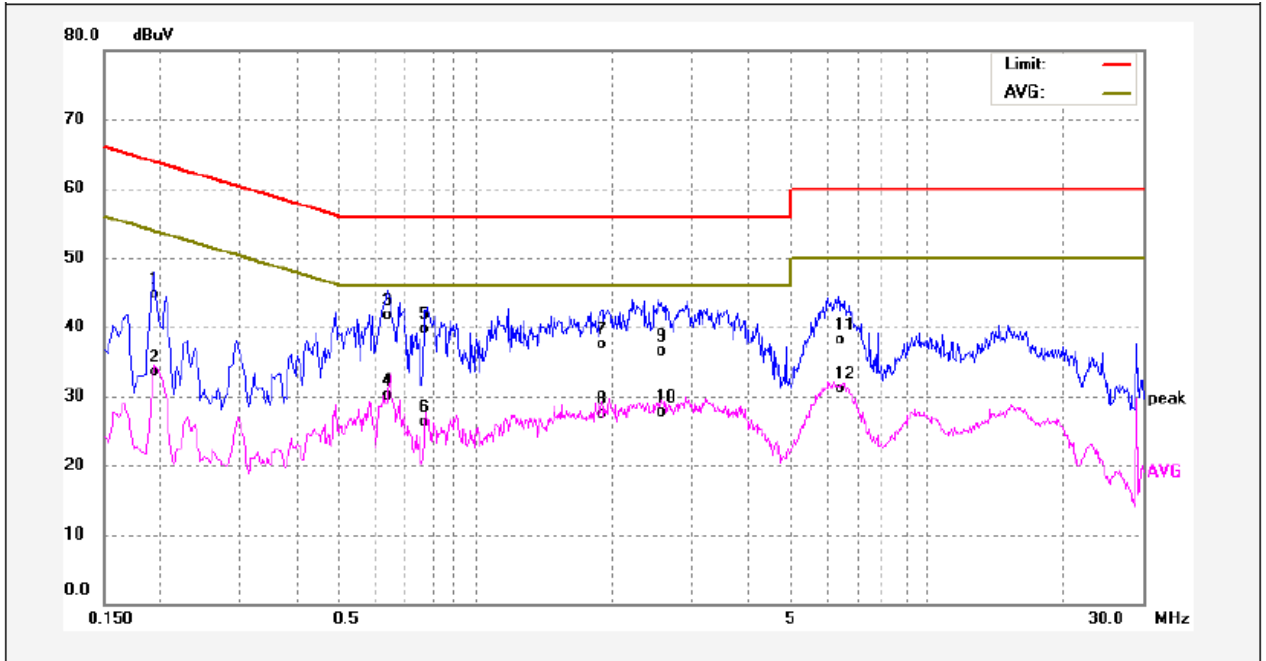
8.4 Test Result

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1980	35.31	10.26	45.57	63.69	-18.12	QP	
2	0.1980	27.32	10.26	37.58	53.69	-16.11	AVG	
3	0.6500	34.63	10.33	44.96	56.00	-11.04	QP	
4	0.6500	23.68	10.33	34.01	46.00	-11.99	AVG	
5	2.1660	27.49	10.47	37.96	56.00	-18.04	QP	
6	2.1660	16.34	10.47	26.81	46.00	-19.19	AVG	
7	2.6220	29.77	10.48	40.25	56.00	-15.75	QP	
8	2.6220	16.82	10.48	27.30	46.00	-18.70	AVG	
9	3.5380	27.94	10.51	38.45	56.00	-17.55	QP	
10	3.5380	16.23	10.51	26.74	46.00	-19.26	AVG	
11	16.6259	26.34	10.98	37.32	60.00	-22.68	QP	
12	16.6259	16.05	10.98	27.03	50.00	-22.97	AVG	

Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1940	34.48	10.26	44.74	63.86	-19.12	QP	
2	0.1940	23.20	10.26	33.46	53.86	-20.40	AVG	
3	0.6340	31.33	10.32	41.65	56.00	-14.35	QP	
4	0.6340	19.79	10.32	30.11	46.00	-15.89	AVG	
5	0.7820	29.32	10.36	39.68	56.00	-16.32	QP	
6	0.7820	15.90	10.36	26.26	46.00	-19.74	AVG	
7	1.9100	26.98	10.46	37.44	56.00	-18.56	QP	
8	1.9100	17.03	10.46	27.49	46.00	-18.51	AVG	
9	2.5420	26.12	10.48	36.60	56.00	-19.40	QP	
10	2.5420	17.18	10.48	27.66	46.00	-18.34	AVG	
11	6.3659	27.58	10.61	38.19	60.00	-21.81	QP	
12	6.3659	20.41	10.61	31.02	50.00	-18.98	AVG	

9 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	$20\log^{(500)}$

9.1 EUT Operation

Operating Environment :

Temperature: 23.5 °C

Humidity: 51.1 % RH

Atmospheric Pressure: 101.2kPa

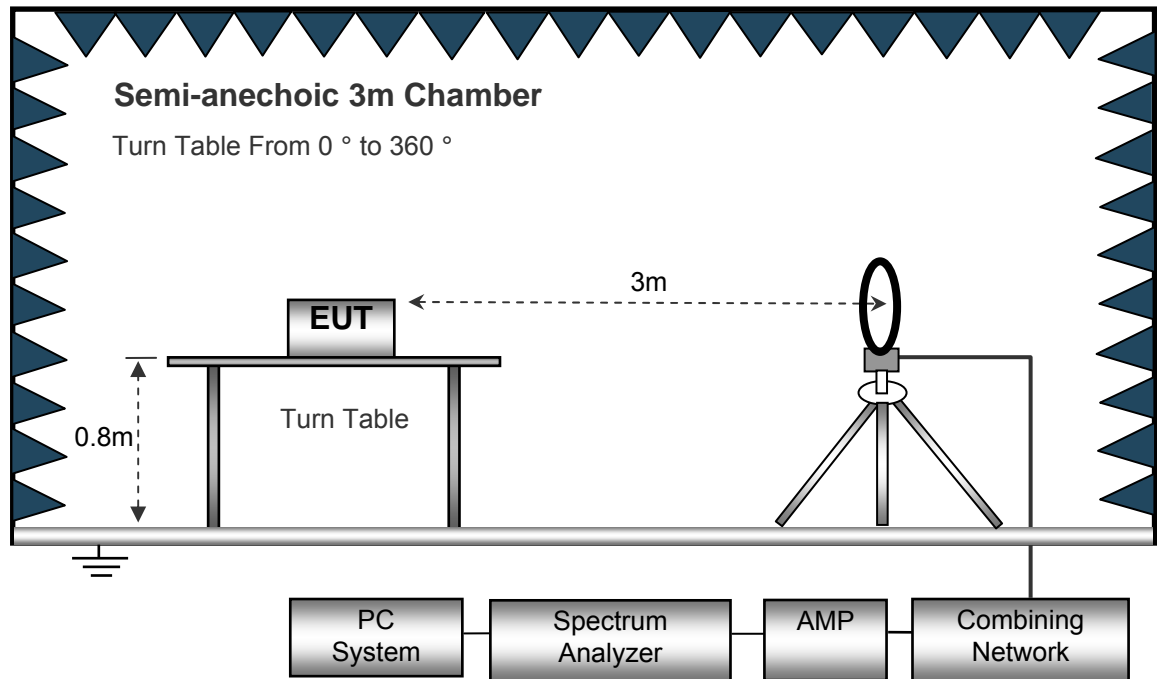
EUT Operation :

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

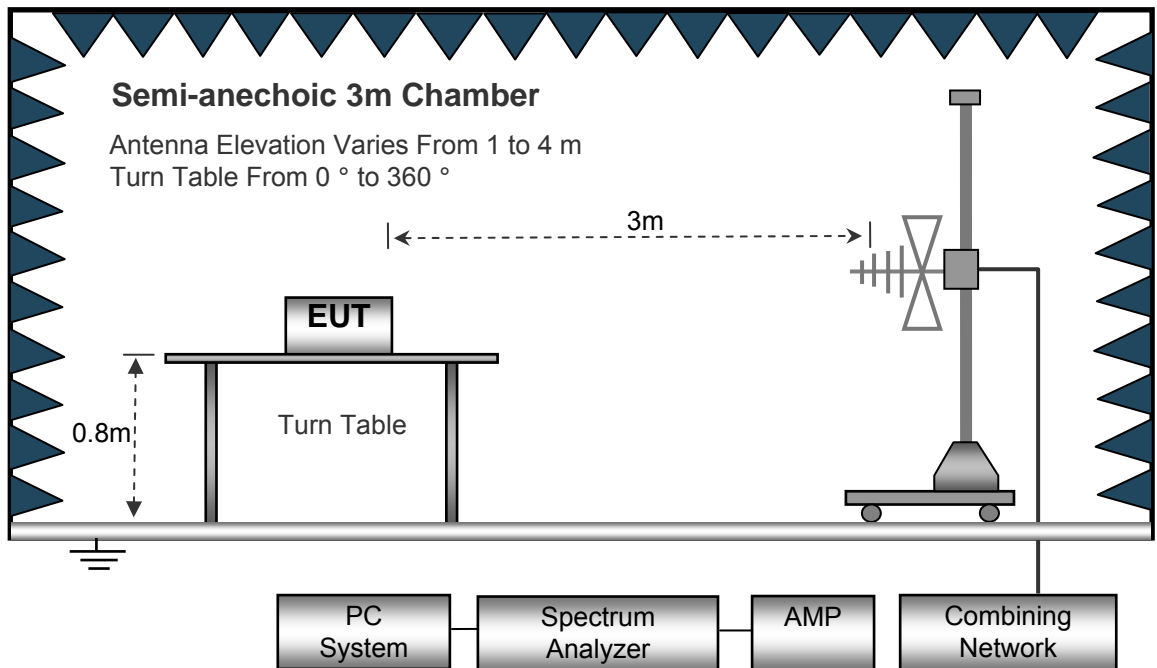
9.2 Test Setup

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.



9.3 Spectrum Analyzer Setup

Below 30MHz

Sweep SpeedAuto
IF Bandwidth..... 10kHz
Video Bandwidth..... 10kHz
Resolution Bandwidth..... 10kHz

30MHz ~ 1GHz

Sweep SpeedAuto
DetectorPK
Resolution Bandwidth..... 100kHz
Video Bandwidth.....300kHz

9.4 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.

9.5 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:

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

9.6 Summary of Test Results

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

Frequency (MHz)	Receiver Reading (PK) (dB μ V) @3m	Turn table Angle Degree	RX Antenna		Corrected Factor (dB/m)	Corrected Amplitude (PK) (dB μ V/m) @3m	FCC Part 15.225	
			Height (m)	Polar (H/V)			Limit (dB μ V/ m)@3m	Margin (dB)
13.56	43.51	123	1.9	H	19.68	63.19	124	-60.81
13.56	34.50	316	1.5	V	19.68	54.18	124	-69.82

Frequency (MHz)	Receiver Reading	Detector	Correct factor	Extrapolation factor	Measurement results (calculated)	Limits	Margin
	dB μ V @3m	QP	dB/m	dB	dB μ V/m @30m	dB μ V/m @30m	dB
4.259	32.64	QP	20.20	40.00	12.84	29.54	-16.70
11.437	35.38	QP	19.90	40.00	15.28	29.54	-14.26

Frequency Range (MHz)	Frequency (MHz)	Maximum Reading	Detector	Correct factor	Extrapolation factor	Measurement results (calculated)	Limits	Margin
		dB μ V @3m	QP	dB/m	dB	dB μ V/m @30m	dB μ V/m @30m	dB
13.110~ 13.41	13.401	40.12	QP	21.55	40	21.67	40.51	-18.84
13.410~ 13.553	13.546	48.65	QP	21.55	40	30.20	50.47	-20.27
13.567~ 13.71	13.587	48.05	QP	21.55	40	29.60	50.47	-20.87
13.710~ 14.01	13.719	37.65	QP	21.55	40	19.20	40.51	-21.31

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)	(dB μ V) @3m	(QP)	Degree	(m)	(H/V)	(dB)	(dB μ V/m) @3m	(dB μ V/m) @3m	(dB)
32.59	31.41	QP	150	1.2	H	-14.30	17.11	40.00	-22.89
32.59	32.96	QP	206	2.0	V	-14.30	18.66	40.00	-21.34
223.45	36.12	QP	51	1.8	H	-13.58	22.54	46.00	-23.46
223.45	40.81	QP	117	1.6	V	-13.58	27.23	46.00	-18.77
517.98	39.25	QP	192	1.7	H	-5.63	33.62	46.00	-12.38
517.98	40.13	QP	173	1.6	V	-5.63	34.50	46.00	-11.50

10 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.

10.1 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.

10.2 Test Result

Power Supply	Temperature ()	Measured Frequency (MHz)	Frequency Error	Part 15.225 Limit
DC 3.7V	-20	13.5612	0.0091%	±0.01%
	-10	13.5606	0.0043%	±0.01%
	0	13.5598	-0.0018%	±0.01%
	+10	13.5595	-0.0035%	±0.01%
	+20	13.5608	0.0059%	±0.01%
	+30	13.5592	-0.0058%	±0.01%
	+40	13.5593	-0.0053%	±0.01%
	+50	13.5605	0.0037%	±0.01%
DC 3.145 V	-20	13.5607	0.0052%	±0.01%
	-10	13.5602	0.0016%	±0.01%
	0	13.5597	-0.0022%	±0.01%

	+10	13.5608	0.0061%	±0.01%
	+20	13.5609	0.0066%	±0.01%
	+30	13.5611	0.0083%	±0.01%
	+40	13.5594	-0.0044%	±0.01%
	+50	13.5609	0.0070%	±0.01%
DC4.255V	-20	13.5604	0.0029%	±0.01%
	-10	13.5601	0.0076%	±0.01%
	0	13.5596	-0.0032%	±0.01%
	+10	13.5601	0.0006%	±0.01%
	+20	13.5600	0.0001%	±0.01%
	+30	13.5593	-0.0055%	±0.01%
	+40	13.5606	0.0046%	±0.01%
	+50	13.5603	0.0024%	±0.01%

11 20dB Bandwidth

Test Requirement: FCC Part15.215(C)

Test Method: ANSI C63.10: 2013

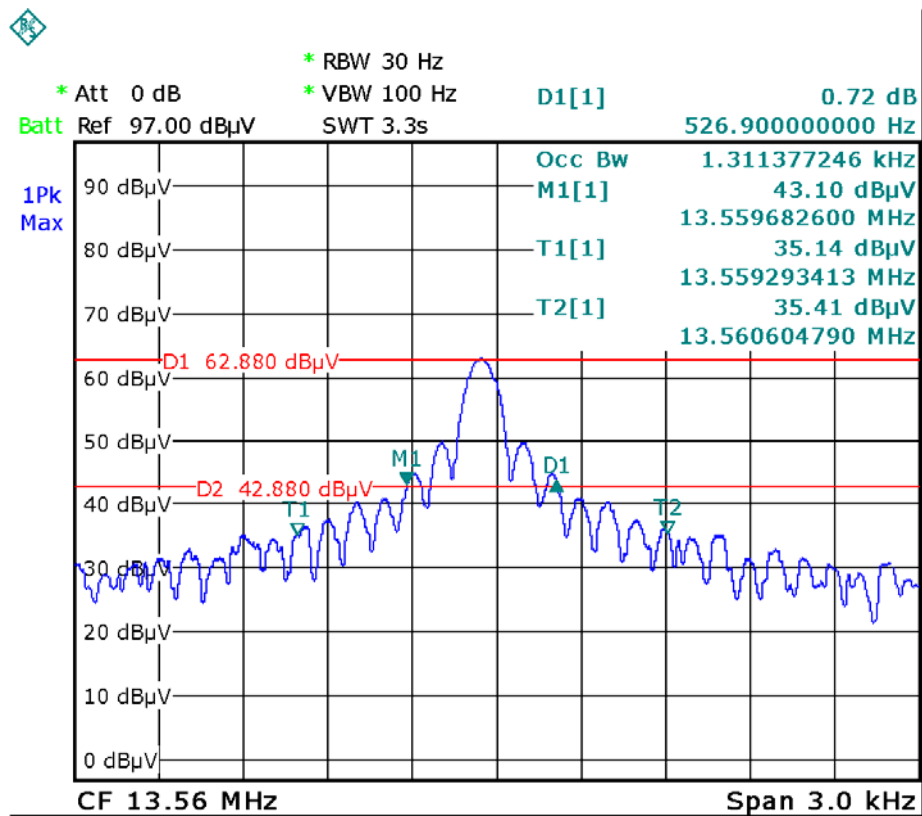
11.1 Test Procedure

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.

11.2 Test Result

Frequency(MHz)	Bandwidth Emission(Hz)
13.56	526.90

Test Plot



12 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.

13 RF Exposure

Remark: refer to SAR test report: WTS16S1165622E.

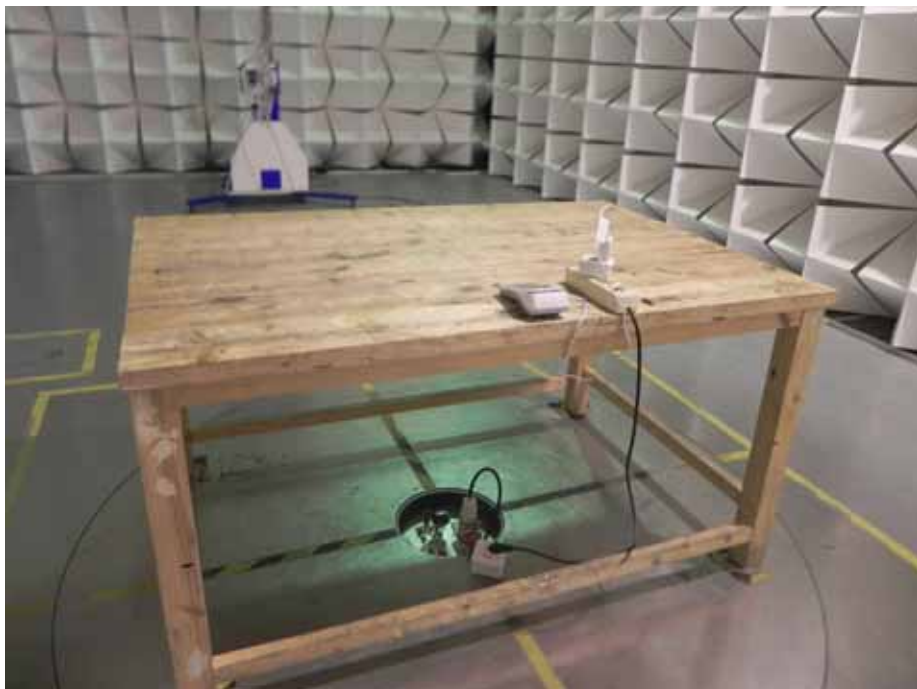
14 Photographs- Test Setup Photos

14.1 Photograph – Radiation Emission

Test frequency from 9 KHz to 30MHz at test site 2#



Test frequency from 30MHz to 1GHz at test site 2#



14.2 Photograph – Conducted Emission Test Setup at Test Site 2#



15 Photographs of test setup and EUT.

Note: Please refer to appendix: WTS16S1165620E_Photo.

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