

# **RADIO TEST REPORT**

## **FCC ID: 2BLHD-AF930**

**Product:** Wireless POS

**Trade Mark:** N/A

**Model No.:** AF930

**Family Model:** N/A

**Report No.:** S24062804302002

**Issue Date:** Nov. 01, 2024

### **Prepared for**

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### **Prepared by**

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**1 TEST RESULT CERTIFICATION**

Applicant's name .....	Beijing Shenzhou Anfu Technology Co., Ltd
Address.....	1102, Block A, Longyu center, Huilongguan, Changping District, Beijing
Manufacturer's Name .....	Beijing Shenzhou Anfu Technology Co., Ltd
Address.....	1102, Block A, Longyu center, Huilongguan, Changping District, Beijing
Product description	
Product name .....	Wireless POS
Trade Mark.....	N/A
Model and/or type reference .....	AF930
Family Model .....	N/A
Test Sample number.....	S240628043002
Date (s) of performance of tests	Jun. 29, 2024 ~ Nov. 01, 2024

Measurement Procedure Used:

APPLICABLE STANDARDS	
STANDARD/ TEST PROCEDURE	TEST RESULT
FCC 47 CFR Part 2, Subpart J FCC 47 CFR Part 15, Subpart C ANSI C63.10-2013	Complied

This device described above has been tested by Shenzhen NTEK Testing Technology Co., Ltd., and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

This report shall not be reproduced except in full, without the written approval of Shenzhen NTEK Testing Technology Co., Ltd., this document may be altered or revised by Shenzhen NTEK Testing Technology Co., Ltd., personnel only, and shall be noted in the revision of the document. The test results of this report relate only to the tested sample identified in this report.

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(Project Engineer)

Reviewed By : Aaron Cheng  
Aaron Cheng  
(Supervisor)

Approved By : Alex Li  
Alex Li  
(Manager)

**2 SUMMARY OF TEST RESULTS****FCC Part15 (15.247), Subpart C**

Standard Section	Test Item	Verdict	Remark
15.207	Conducted Emission	PASS	
15.209 (a) 15.205 (a)	Radiated Spurious Emission	PASS	
15.247(a)(1)	Hopping Channel Separation	**PASS	
15.247(b)(1)	Peak Output Power	**PASS	
15.247(a)(iii)	Number of Hopping Frequency	**PASS	
15.247(a)(iii)	Dwell Time	**PASS	
15.247(a)(1)	Bandwidth	**PASS	
15.247 (d)	Band Edge Emission	**PASS	
15.247 (d)	Spurious RF Conducted Emission	**PASS	
15.203	Antenna Requirement	PASS	

## Remark:

1. "N/A" denotes test is not applicable in this Test Report.
2. All test items were verified and recorded according to the standards and without any deviation during the test.
3. \*\* The conducted Test data please refer to the report: S23033100205001 under the WWAN module Z400-H FCC ID: 2A9FT-Z400-H.

### 3 FACILITIES AND ACCREDITATIONS

#### 3.1 FACILITIES

All measurement facilities used to collect the measurement data are located at 1&5/F, Building C, 1&2/F, Building E, Fenda Science Park, Sanwei Community, Hangcheng Street, Baoan District, Shenzhen, Guangdong, China

The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.10 and CISPR Publication 22.

#### 3.2 LABORATORY ACCREDITATIONS AND LISTINGS

##### Site Description

CNAS-Lab.

: The Certificate Registration Number is L5516.

IC-Registration

The Certificate Registration Number is 9270A.

CAB identifier:CN0074

FCC- Accredited

Test Firm Registration Number: 463705.

Designation Number: CN1184

A2LA-Lab.

The Certificate Registration Number is 4298.01

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories.

This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009).

Name of Firm

: Shenzhen NTEK Testing Technology Co., Ltd.

Site Location

: 1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen 518126 P.R. China.

#### 3.3 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement  $y \pm U$ , where expanded uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	Conducted Emission Test	$\pm 3.1\text{dB}$
2	RF power, conducted	$\pm 0.9\text{dB}$
3	Spurious emissions, conducted	$\pm 2.2\text{dB}$
4	All emissions, radiated(30MHz~1GHz)	$\pm 2.64\text{dB}$
5	All emissions, radiated(<1G)	$\pm 5.2\text{dB}$
6	All emissions, radiated(>1G)	$\pm 5.1\text{dB}$
7	Temperature	$\pm 0.5^{\circ}\text{C}$
8	Humidity	$\pm 2\%$
9	All emissions, radiated(9KHz~30MHz)	$\pm 6\text{dB}$
10	Occupied bandwidth	$\pm 3.7\%$

#### 4 GENERAL DESCRIPTION OF EUT

Product Feature and Specification	
Equipment	Wireless POS
Trade Mark	N/A
FCC ID	2BLHD-AF930
Model No.	AF930
Family Model	N/A
Model Difference	N/A
Operating Frequency	2402MHz~2480MHz
Modulation	GFSK, $\pi/4$ -DQPSK, 8-DPSK
Number of Channels	79 Channels
Antenna Type	FPC Antenna
Antenna Gain	1.93dBi
Adapter	N/A
Battery	DC 3.7V,5600mAh, 20.72Wh
Power supply	DC 3.7V from battery or DC 5V from type-C port
HW Version	AF930_MAIN_V2.0_1001
SW Version	SZANFU_AF930_V1.14_00_20240102_userdebug

Note 1: Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.

Note 2: The engineering test program was provided and the EUT was programmed to be in continuously transmitting mode.

Revision History

Report No.	Version	Description	Issued Date
S24062804302002	Rev.01	Initial issue of report	Nov. 01, 2024

## 5 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possibly have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

Those data rates (1Mbps for GFSK modulation; 2Mbps for  $\pi/4$ -DQPSK modulation; 3Mbps for 8-DPSK modulation) were used for all test.

The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement –X, Y, and Z-plane. The X-plane results were found as the worst case and were shown in this report.

Carrier Frequency and Channel list:

Channel	Frequency(MHz)
0	2402
1	2403
...	...
39	2441
40	2442
...	...
77	2479
78	2480

Note:  $f_c = 2402\text{MHz} + k \times 1\text{MHz}$   $k=0$  to 78

The following summary table is showing all test modes to demonstrate in compliance with the standard.

For AC Conducted Emission	
Final Test Mode	Description
N/A	N/A

Note: AC power line Conducted Emission was tested under maximum output power.

For Radiated Test Cases	
Final Test Mode	Description
Mode 1	normal link mode
Mode 2	CH00(2402MHz)
Mode 3	CH39(2441MHz)
Mode 4	CH78(2480MHz)

Note: For radiated test cases, the worst mode data rate 1Mbps was reported only, because this data rate has the highest RF output power at preliminary tests, and no other significantly frequencies found in conducted spurious emission.

For Conducted Test Cases	
Final Test Mode	Description
Mode 2	CH00(2402MHz)

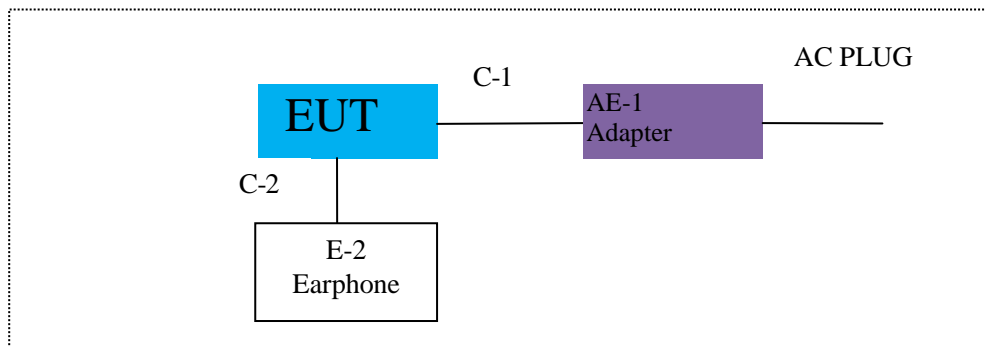
Note: The engineering test program was provided and the EUT was programmed to be in continuously transmitting mode. Max. power in BT Device Under Test Mode.



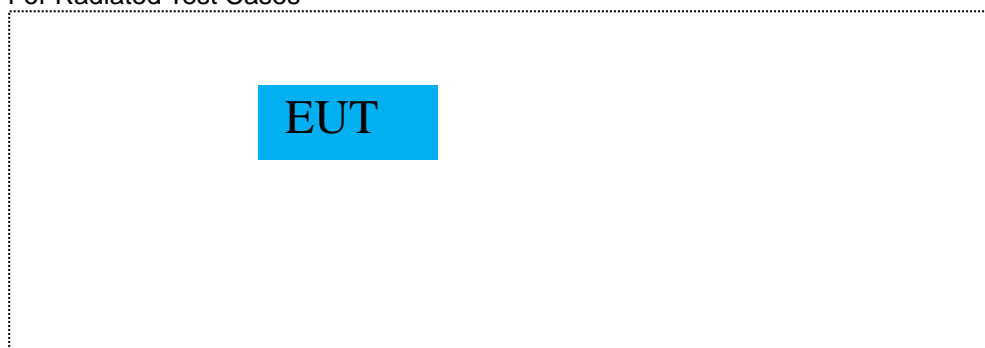
## 6 SETUP OF EQUIPMENT UNDER TEST

### 6.1 BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM

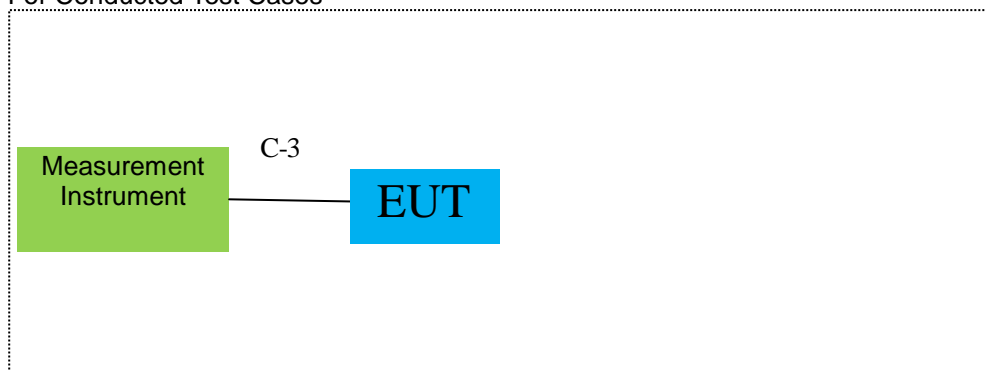
For AC Conducted Emission Mode



For Radiated Test Cases



For Conducted Test Cases



## 6.2 SUPPORT EQUIPMENT

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Model/Type No.	Series No.	Note
AE-1	Adapter	N/A	N/A	Peripherals
E-2	Earphone	N/A	N/A	Peripherals
-	-	-	-	-
-	-	-	-	-

Item	Cable Type	Shielded Type	Ferrite Core	Length
C-1	Type-C Cable	NO	NO	1.0m
C-2	Earphone Cable	NO	NO	1.2m
C-3	RF Cable	YES	NO	0.1m
-	-	-	-	-

### Notes:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.
- (3) “YES” is means “shielded” “with core”; “NO” is means “unshielded” “without core”.
- (4) “\*\*\*” RF Cable is between the module and the antenna, that’s part of the EUT. Provided by the applicant.

### 6.3 EQUIPMENTS LIST FOR ALL TEST ITEMS

#### Radiation& Conducted Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Spectrum Analyzer	Agilent	N9020A	MY53280244	2024.04.26	2025.04.25	1 year
2	Spectrum Analyzer	R&S	FSV40	101417	2024.04.26	2025.04.25	1 year
3	Test Receiver	R&S	ESPI7	101318	2024.03.12	2025.03.11	1 year
4	Active Loop Antenna	SCHWARZBECK	FMZB 1519 B	055	2024.05.17	2027.05.16	3 year
5	Log-Periodic Antenna	SCHWARZBECK	VULB 9162	586	2024.05.12	2025.05.11	1 year
6	Broadband Horn Antenna	SCHWARZBECK	BBHA 9120 D	2816	2024.05.18	2027.05.17	3 year
7	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	803	2024.05.12	2027.05.11	3 year
8	50Ω Coaxial Switch	Anritsu	MP59B	6200983705	2024.04.26	2027.04.25	3 year
9	Pre-Amplifier	EMC	EMC051835 SE	980246	2024.01.23	2025.01.22	1 year
10	Low Noise Amplifier	B&Z	BZ-P540-550 850-452727	16476-11729	2024.02.03	2025.02.02	1 year
11	Pre-Amplifier	Sonoma	310N	186604	2024.04.25	2025.04.24	1 year
12	Power sensor	MWRFTest	MW100-PD	MW2021043	2023.12.19	2024.12.18	1 year
13	Filter	TRILTHIC	2400MHz	29	2024.04.26	2027.04.25	3 year
14	RF Control Unit	MWRFTest	MW100-RFC B	MW230608N TEK-43	N/A	N/A	N/A

Note: Each piece of equipment is scheduled for calibration once a year except the Aux Equipment & Test Cable which is scheduled for calibration every 2 or 3 years.

#### Measurement Software

Item	Manufacturer	Software Name	Software Version	Description
1	MWRFTest	MTS 8310 2.4GHz/5GHz	2.0	RF Conducted Test
2	Farad	EZ-EMC_RE	AIT-03A	Radiated Test
3	raditeq	RadiMation	2023.1.3	Radiated Test

## 7 TEST REQUIREMENTS

### 7.1 CONDUCTED EMISSIONS TEST

#### 7.1.1 Applicable Standard

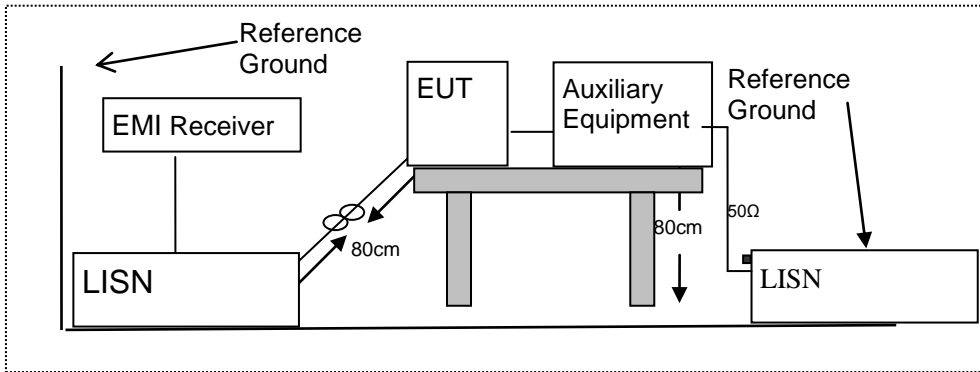
According to FCC Part 15.207(a)

#### 7.1.2 Conformance Limit

Frequency(MHz)	Conducted Emission Limit	
	Quasi-peak	Average
0.15-0.5	66-56*	56-46*
0.5-5.0	56	46
5.0-30.0	60	50

Note: 1. \*Decreases with the logarithm of the frequency  
2. The lower limit shall apply at the transition frequencies  
3. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

#### 7.1.3 Test Configuration



#### 7.1.4 Test Procedure

According to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 Conducted emissions the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room.
2. The EUT was placed on a table which is 0.8m above ground plane.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
4. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40cm long.
5. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
6. LISN at least 80 cm from nearest part of EUT chassis.
7. The frequency range from 150KHz to 30MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth(IF bandwidth=9KHz) with Maximum Hold Mode
9. For the actual test configuration, please refer to the related Item –EUT Test Photos.

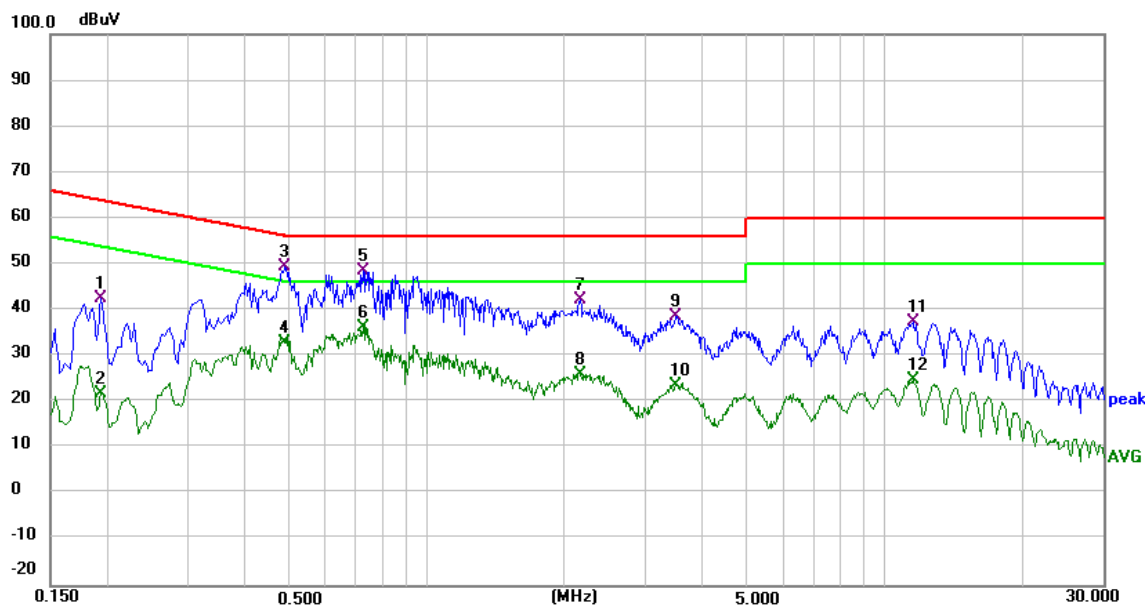
### 7.1.5 Test Results

EUT:	Wireless POS	Model Name :	AF930
Temperature:	22 °C	Relative Humidity:	57%
Pressure:	1010hPa	Phase :	L
Test Voltage :	DC 5V from Adapter AC 120V/60Hz	Test Mode:	Mode 1

Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measure-ment (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.1940	32.46	10.01	42.47	63.86	-21.39	QP
0.1940	11.93	10.01	21.94	53.86	-31.92	AVG
0.4900	38.85	10.63	49.48	56.17	-6.69	QP
0.4900	22.38	10.63	33.01	46.17	-13.16	AVG
0.7260	37.34	11.11	48.45	56.00	-7.55	QP
0.7260	25.26	11.11	36.37	46.00	-9.63	AVG
2.1660	32.61	9.66	42.27	56.00	-13.73	QP
2.1660	16.51	9.66	26.17	46.00	-19.83	AVG
3.5060	29.07	9.67	38.74	56.00	-17.26	QP
3.5060	13.98	9.67	23.65	46.00	-22.35	AVG
11.5219	27.63	9.69	37.32	60.00	-22.68	QP
11.5219	15.29	9.69	24.98	50.00	-25.02	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

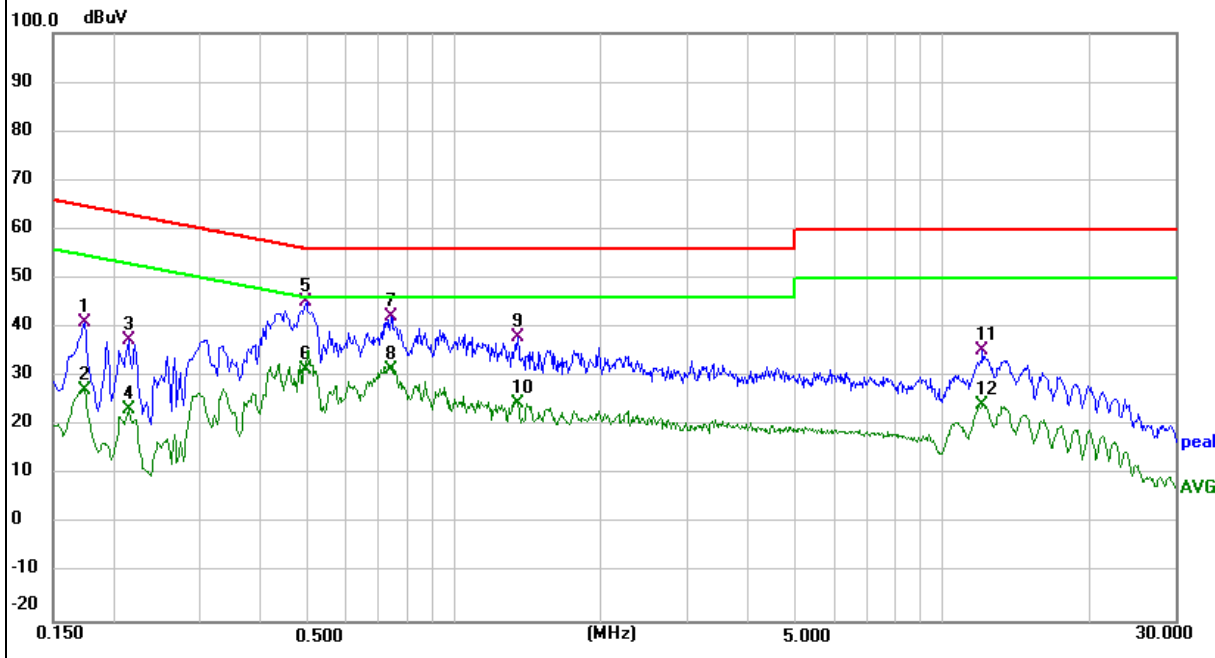


EUT:	Wireless POS	Model Name :	AF930
Temperature:	22 °C	Relative Humidity:	57%
Pressure:	1010hPa	Phase :	N
Test Voltage :	DC 5V from Adapter AC 120V/60Hz	Test Mode:	Mode 1

Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measure-ment (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.1740	31.19	9.97	41.16	64.77	-23.61	QP
0.1740	17.35	9.97	27.32	54.77	-27.45	AVG
0.2140	27.28	10.06	37.34	63.05	-25.71	QP
0.2140	13.31	10.06	23.37	53.05	-29.68	AVG
0.4941	34.58	10.63	45.21	56.10	-10.89	QP
0.4941	20.97	10.63	31.60	46.10	-14.50	AVG
0.7420	31.10	11.13	42.23	56.00	-13.77	QP
0.7420	20.26	11.13	31.39	46.00	-14.61	AVG
1.3460	25.65	12.36	38.01	56.00	-17.99	QP
1.3460	12.14	12.36	24.50	46.00	-21.50	AVG
12.0860	25.65	9.70	35.35	60.00	-24.65	QP
12.0860	14.60	9.70	24.30	50.00	-25.70	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



## 7.2 RADIATED SPURIOUS EMISSION

### 7.2.1 Applicable Standard

According to FCC Part 15.247(d) and 15.209 and ANSI C63.10-2013

### 7.2.2 Conformance Limit

According to FCC Part 15.247(d): radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).  
According to FCC Part 15.205, Restricted bands

MHz	MHz	MHz	GHz
0.090-0.110	13.36-13.41	322-335.4	3.6-4.4
0.495-0.505	16.42-16.423	399.9-410	4.5-5.15
2.1735-2.1905	16.69475-16.69525	608-614	5.35-5.46
4.125-4.128	16.80425-16.80475	960-1240	7.25-7.75
4.17725-4.17775	25.5-25.67	1300-1427	8.025-8.5
4.20725-4.20775	37.5-38.25	1435-1626.5	9.0-9.2
6.215-6.218	73-74.6	1645.5-1646.5	9.3-9.5
6.26775-6.26825	74.8-75.2	1660-1710	10.6-12.7
6.31175-6.31225	108-121.94	1718.8-1722.2	13.25-13.4
8.291-8.294	123-138	2200-2300	14.47-14.5
8.362-8.366	149.9-150.05	2310-2390	15.35-16.2
8.37625-8.38675	156.52475-156.52525	2483.5-2500	17.7-21.4
8.41425-8.41475	156.7-156.9	2690-2900	22.01-23.12
12.29-12.293	162.0125-167.17	3260-3267	23.6-24.0
12.51975-12.52025	167.72-173.2	3332-3339	31.2-31.8
12.57675-12.57725	240-285	3345.8-3358	36.43-36.5
			(2)

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Restricted Frequency(MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Measurement Distance
0.009~0.490	2400/F(KHz)	20 log (uV/m)	300
0.490~1.705	24000/F(KHz)	20 log (uV/m)	30
1.705~30.0	30	29.5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

Limits of Radiated Emission Measurement(Above 1000MHz)

Frequency(MHz)	Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

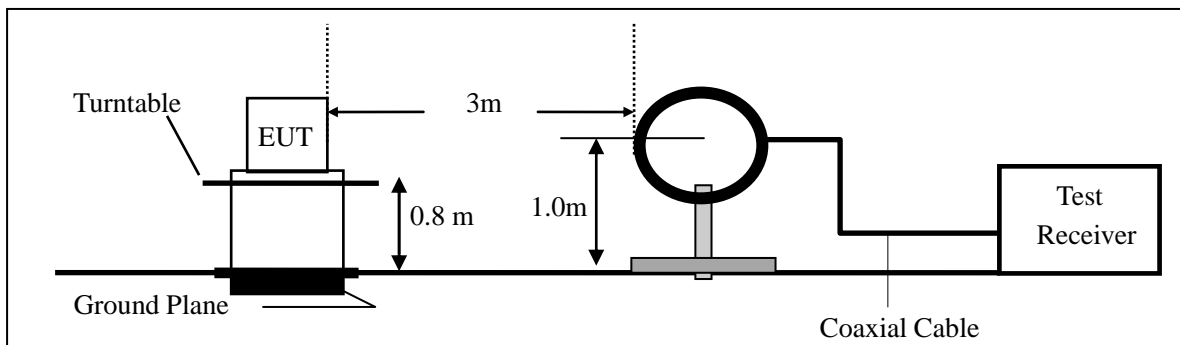
Remark :1. Emission level in dBuV/m=20 log (uV/m)  
2. Measurement was performed at an antenna to the closed point of EUT distance of meters.  
3. For Frequency 9kHz~30MHz:  
Distance extrapolation factor =40log(Specific distance/ test distance)(dB);  
Limit line=Specific limits(dBuV) + distance extrapolation factor.  
For Frequency above 30MHz:  
Distance extrapolation factor =20log(Specific distance/ test distance)(dB);  
Limit line=Specific limits(dBuV) + distance extrapolation factor.

### 7.2.3 Measuring Instruments

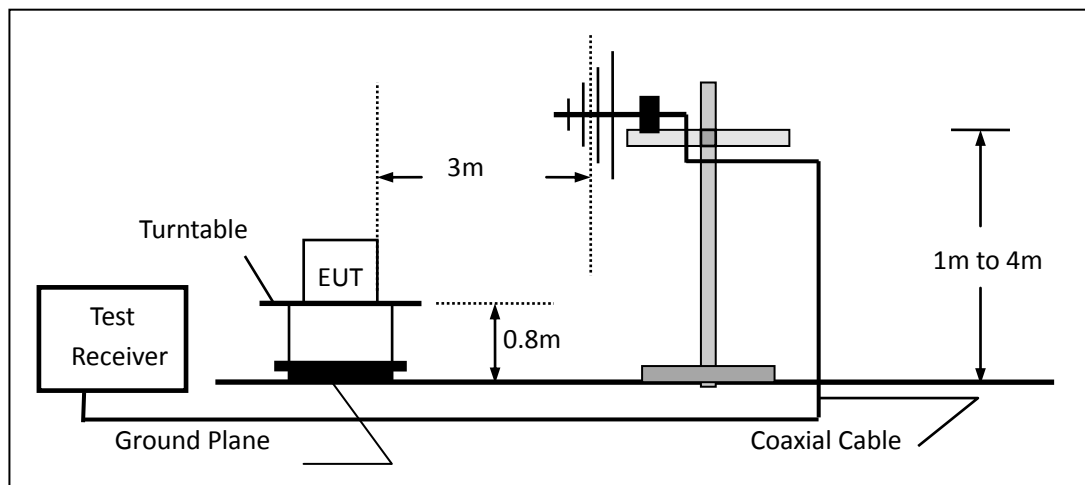
The Measuring equipment is listed in the section 6.3 of this test report.

### 7.2.4 Test Configuration

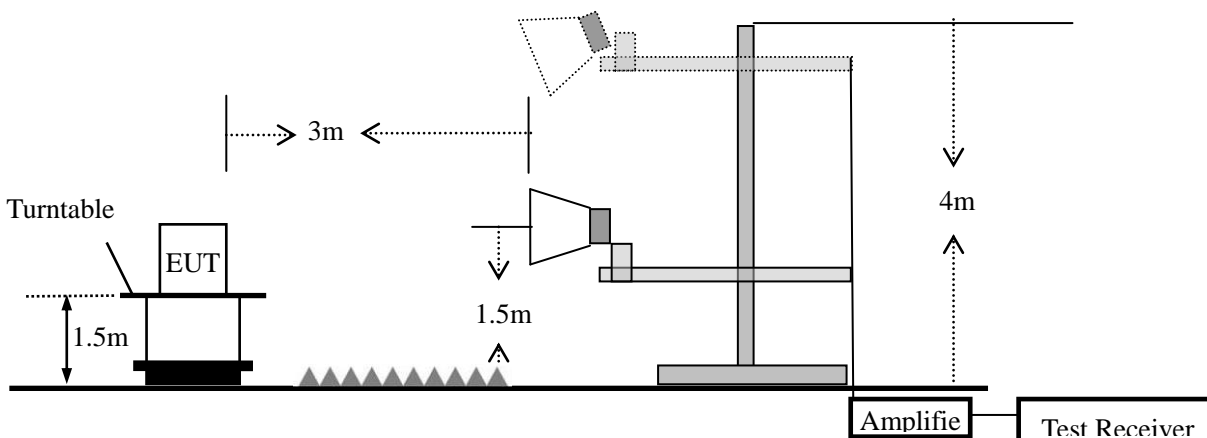
(a) For radiated emissions below 30MHz



(b) For radiated emissions from 30MHz to 1000MHz



(c) For radiated emissions above 1000MHz





## 7.2.5 Test Procedure

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10-2013. The test distance is 3m. The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 22.

This test is required for any spurious emission that falls in a Restricted Band, as defined in Section 15.205. It must be performed with the highest gain of each type of antenna proposed for use with the EUT.

Use the following spectrum analyzer settings:

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 3 MHz for Peak, 1 MHz / 3 MHz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

- The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- The EUT was placed on the top of a rotating table 0.8 m for below 1GHz and 1.5m for above 1GHz the ground at a 3 meter. The table was rotated 360 degrees to determine the position of the highest radiation.
- The height of the equipment or of the substitution antenna shall be 0.8 m for below 1GHz and 1.5m for above 1GHz; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For the radiated emission test above 1GHz:  
Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

During the radiated emission test, the Spectrum Analyzer was set with the following configurations:

Frequency Band (MHz)	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	QP	120 kHz	300 kHz
Above 1000	Peak	1 MHz	3 MHz
	Average	1 MHz	3 MHz

Note: for the frequency ranges below 30 MHz, a narrower RBW is used for these ranges but the measured value should add a RBW correction factor (RBWCF) where  $RBWCF [dB] = 10 \cdot \lg(100 [kHz] / \text{narrower RBW} [kHz])$ . , the narrower RBW is 1 kHz and RBWCF is 20 dB for the frequency 9 kHz to 150 kHz, and the narrower RBW is 10 kHz and RBWCF is 10 dB for the frequency 150 kHz to 30 MHz.

## 7.2.6 Test Results

### ■ Spurious Emission below 30MHz (9KHz to 30MHz)

EUT:	Wireless POS	Model No.:	AF930
Temperature:	20 °C	Relative Humidity:	48%
Test Mode:	Mode2/Mode3/Mode4	Test By:	Mary Hu

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
--	--	--	--	--	--	--	--

Note: the amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

■ Spurious Emission below 1GHz (30MHz to 1GHz)

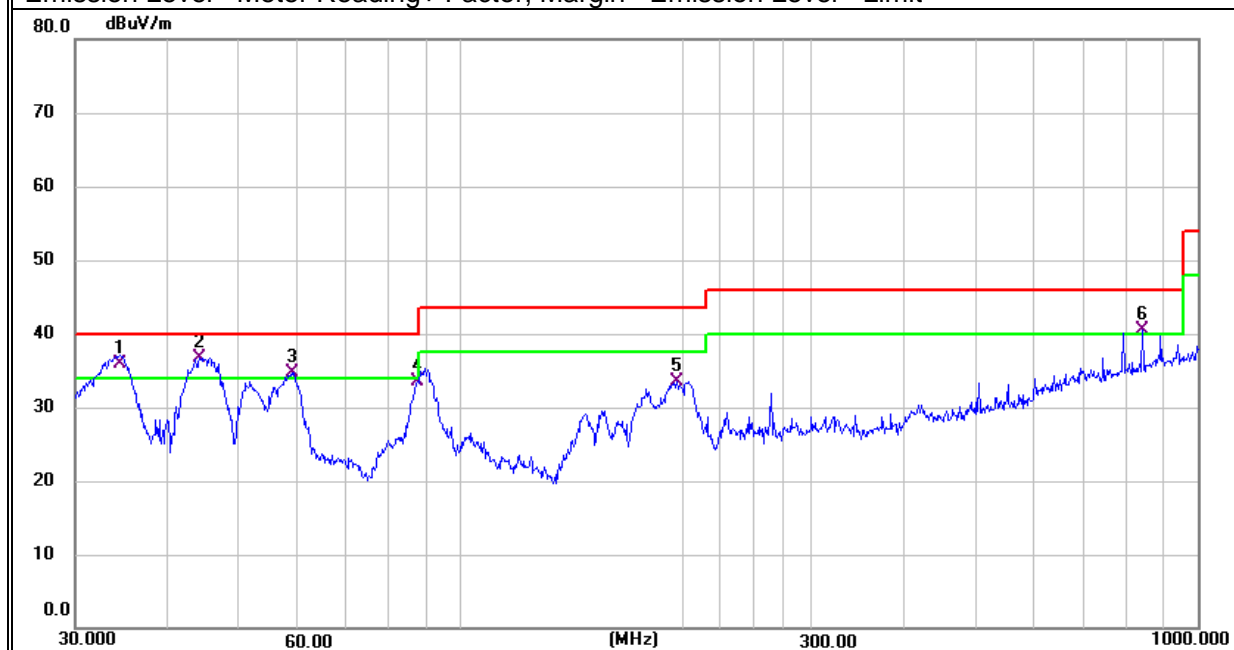
All the modulation modes have been tested, and the worst result was report as below:

EUT:	Wireless POS	Model Name :	AF930
Temperature:	25℃	Relative Humidity:	55%
Pressure:	1010hPa	Test Mode:	Mode 2
Test Voltage :	DC 5V		

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
V	34.6111	53.43	-17.53	35.90	40.00	-4.10	QP
V	44.2751	61.73	-24.94	36.79	40.00	-3.21	QP
V	59.0251	15.86	18.78	34.64	40.00	-5.36	QP
V	87.4177	18.58	14.89	33.47	40.00	-6.53	QP
V	196.5098	15.82	17.65	33.47	43.50	-10.03	QP
V	842.1296	10.67	29.78	40.45	46.00	-5.55	QP

**Remark:**

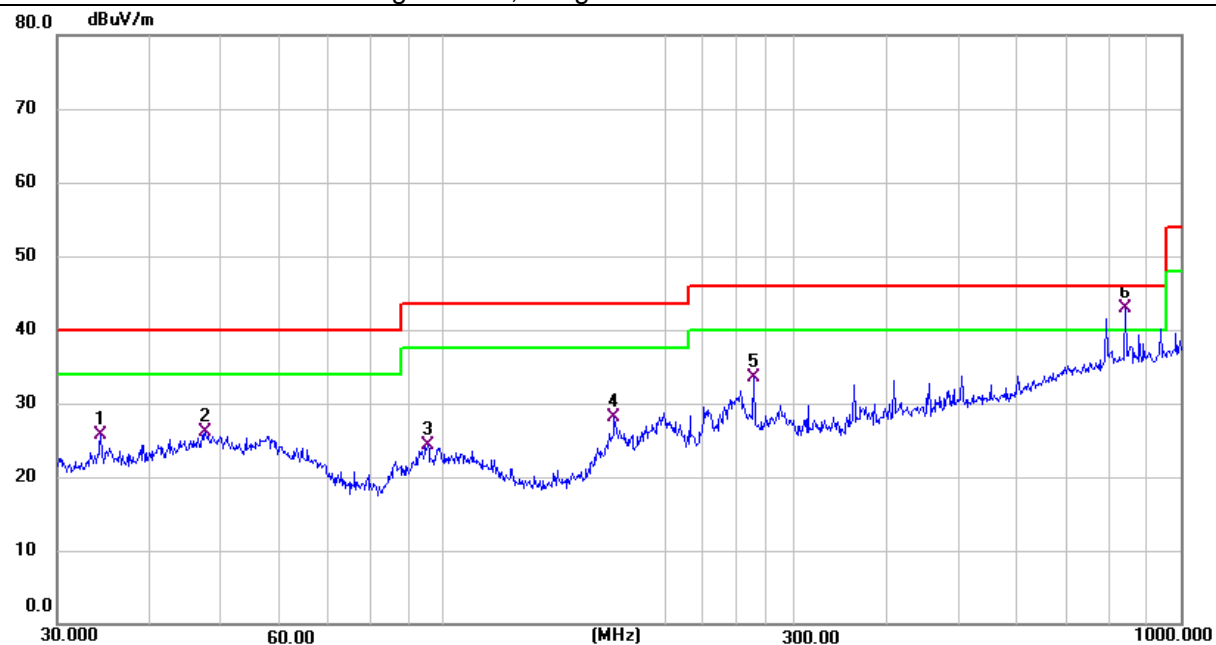
Emission Level= Meter Reading+ Factor, Margin= Emission Level - Limit



Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
H	34.3964	43.07	-17.36	25.71	40.00	-14.29	QP
H	47.6584	6.65	19.53	26.18	40.00	-13.82	QP
H	95.4270	7.45	16.83	24.28	43.50	-19.22	QP
H	170.7926	12.78	15.40	28.18	43.50	-15.32	QP
H	263.8190	13.88	19.54	33.42	46.00	-12.58	QP
H	842.1295	13.14	29.78	42.92	46.00	-3.08	QP

**Remark:**

Emission Level= Meter Reading+ Factor, Margin= Emission Level - Limit



# Spurious Emission Above 1GHz (1GHz to 25GHz)

EUT:	Smart LTE Module	Model No.:	Z400-H
Temperature:	20 °C	Relative Humidity:	48%
Test Mode:	Mode2/Mode3/Mode4	Test By:	Mukzi Lee

All the modulation modes have been tested, and the worst result was report as below:

Frequency	Read Level	Cable loss	Antenna Factor	Preamp Factor	Emission Level	Limits	Margin	Remark	Comment
(MHz)	(dBμV)	(dB)	dB/m	(dB)	(dBμV/m)	(dBμV/m)	(dB)		
Low Channel (2402 MHz)(GFSK)--Above 1G									
4804	67.5	5.21	35.59	44.30	64.00	74.00	-10.00	Pk	Vertical
4804	47.33	5.21	35.59	44.30	43.83	54.00	-10.17	AV	Vertical
7206	68.74	6.48	36.27	44.60	66.89	74.00	-7.11	Pk	Vertical
7206	46.85	6.48	36.27	44.60	45.00	54.00	-9.00	AV	Vertical
4804	70.06	5.21	35.55	44.30	66.52	74.00	-7.48	Pk	Horizontal
4804	46.66	5.21	35.55	44.30	43.12	54.00	-10.88	AV	Horizontal
7206	68.02	6.48	36.27	44.52	66.25	74.00	-7.75	Pk	Horizontal
7206	47.65	6.48	36.27	44.52	45.88	54.00	-8.12	AV	Horizontal
Mid Channel (2441 MHz)(GFSK)--Above 1G									
4882	68.07	5.21	35.66	44.20	64.74	74.00	-9.26	Pk	Vertical
4882	45.14	5.21	35.66	44.20	41.81	54.00	-12.19	AV	Vertical
7323	69.99	7.10	36.50	44.43	69.16	74.00	-4.84	Pk	Vertical
7323	48.53	7.10	36.50	44.43	47.70	54.00	-6.30	AV	Vertical
4882	68.21	5.21	35.66	44.20	64.88	74.00	-9.12	Pk	Horizontal
4882	47.18	5.21	35.66	44.20	43.85	54.00	-10.15	AV	Horizontal
7323	69.88	7.10	36.50	44.43	69.05	74.00	-4.95	Pk	Horizontal
7323	44.17	7.10	36.50	44.43	43.34	54.00	-10.66	AV	Horizontal
High Channel (2480 MHz)( GFSK)-- Above 1G									
4960	67.64	5.21	35.52	44.21	64.16	74.00	-9.84	Pk	Vertical
4960	48.93	5.21	35.52	44.21	45.45	54.00	-8.55	AV	Vertical
7440	69.24	7.10	36.53	44.60	68.27	74.00	-5.73	Pk	Vertical
7440	46.66	7.10	36.53	44.60	45.69	54.00	-8.31	AV	Vertical
4960	68.61	5.21	35.52	44.21	65.13	74.00	-8.87	Pk	Horizontal
4960	44.72	5.21	35.52	44.21	41.24	54.00	-12.76	AV	Horizontal
7440	69.62	7.10	36.53	44.60	68.65	74.00	-5.35	Pk	Horizontal
7440	46.41	7.10	36.53	44.60	45.44	54.00	-8.56	AV	Horizontal

Note:

- (1) Emission Level= Antenna Factor + Cable Loss + Read Level - Preamp Factor
- (2)All other emissions more than 20dB below the limit.

# Spurious Emission Above in Band Edge

EUT:	Wireless POS	Model No.:	AF930
Temperature:	20 °C	Relative Humidity:	48%
Test Mode:	Mode2/Mode3/Mode4	Test By:	Mary Hu

All the modulation modes have been tested, and the worst result was report as below:

Frequency	Meter Reading	Cable Loss	Antenna Factor	Preamplifier Factor	Emission Level	Limits	Margin	Detector	Comment
(MHz)	(dBμV)	(dB)	(dB/m)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type	
1Mbps(GFSK)-Non-hopping									
2310.00	69.34	2.97	27.80	43.80	56.31	74	-17.69	Pk	Horizontal
2310.00	48.72	2.97	27.80	43.80	35.69	54	-18.31	AV	Horizontal
2310.00	69.97	2.97	27.80	43.80	56.94	74	-17.06	Pk	Vertical
2310.00	47.3	2.97	27.80	43.80	34.27	54	-19.73	AV	Vertical
2390.00	69.46	3.14	27.21	43.80	56.01	74	-17.99	Pk	Vertical
2390.00	48.83	3.14	27.21	43.80	35.38	54	-18.62	AV	Vertical
2390.00	67.98	3.14	27.21	43.80	54.53	74	-19.47	Pk	Horizontal
2390.00	47.76	3.14	27.21	43.80	34.31	54	-19.69	AV	Horizontal
2483.50	72.18	3.58	27.70	44.00	59.46	74	-14.54	Pk	Vertical
2483.50	50.17	3.58	27.70	44.00	37.45	54	-16.55	AV	Vertical
2483.50	69.76	3.58	27.70	44.00	57.04	74	-16.96	Pk	Horizontal
2483.50	47.96	3.58	27.70	44.00	35.24	54	-18.76	AV	Horizontal
1Mbps(GFSK)-hopping									
2310.00	68.07	2.97	27.80	43.80	55.04	74	-18.96	Pk	Horizontal
2310.00	47.77	2.97	27.80	43.80	34.74	54	-19.26	AV	Horizontal
2310.00	66.6	2.97	27.80	43.80	53.57	74	-20.43	Pk	Vertical
2310.00	45.8	2.97	27.80	43.80	32.77	54	-21.23	AV	Vertical
2390.00	69.99	3.14	27.21	43.80	56.54	74	-17.46	Pk	Vertical
2390.00	47.65	3.14	27.21	43.80	34.20	54	-19.80	AV	Vertical
2390.00	69.65	3.14	27.21	43.80	56.20	74	-17.80	Pk	Horizontal
2390.00	46.19	3.14	27.21	43.80	32.74	54	-21.26	AV	Horizontal
2483.50	66.87	3.58	27.70	44.00	54.15	74	-19.85	Pk	Vertical
2483.50	46.19	3.58	27.70	44.00	33.47	54	-20.53	AV	Vertical
2483.50	69.11	3.58	27.70	44.00	56.39	74	-17.61	Pk	Horizontal
2483.50	48.31	3.58	27.70	44.00	35.59	54	-18.41	AV	Horizontal

Note: (1) All other emissions more than 20dB below the limit.

■ Spurious Emission in Restricted Band 3260MHz-18000MHz

EUT:	Wireless POS	Model No.:	AF930
Temperature:	20 °C	Relative Humidity:	48%
Test Mode:	Mode2/Mode3/Mode4	Test By:	Mary Hu

All the modulation modes have been tested, and the worst result was report as below:

Frequency	Reading Level	Cable Loss	Antenna Factor	Preamplifier Factor	Emission Level	Limits	Margin	Detector	Comment
(MHz)	(dBμV)	(dB)	dB/m	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type	
3260	68.26	4.04	29.57	44.70	57.17	74	-16.83	Pk	Vertical
3260	47.13	4.04	29.57	44.70	36.04	54	-17.96	AV	Vertical
3260	69.39	4.04	29.57	44.70	58.30	74	-15.70	Pk	Horizontal
3260	48.92	4.04	29.57	44.70	37.83	54	-16.17	AV	Horizontal
3332	70.61	4.26	29.87	44.40	60.34	74	-13.66	Pk	Vertical
3332	49.62	4.26	29.87	44.40	39.35	54	-14.65	AV	Vertical
3332	67.81	4.26	29.87	44.40	57.54	74	-16.46	Pk	Horizontal
3332	47.26	4.26	29.87	44.40	36.99	54	-17.01	AV	Horizontal
17797	60.64	10.99	43.95	43.50	72.08	74	-1.92	Pk	Vertical
17797	39.37	10.99	43.95	43.50	50.81	54	-3.19	AV	Vertical
17788	59.61	11.81	43.69	44.60	70.51	74	-3.49	Pk	Horizontal
17788	39.31	11.81	43.69	44.60	50.21	54	-3.79	AV	Horizontal

Note: (1) All other emissions more than 20dB below the limit.

### 7.3 NUMBER OF HOPPING CHANNEL

#### 7.3.1 Applicable Standard

According to FCC Part 15.247(a)(1) (iii) and ANSI C63.10-2013

#### 7.3.2 Conformance Limit

Frequency hopping systems in the 2400-2483.5MHz band shall use at least 15 channels.

#### 7.3.3 Measuring Instruments

The Measuring equipment is listed in the section 6.3 of this test report.

#### 7.3.4 Test Setup

Please refer to Section 6.1 of this test report.

#### 7.3.5 Test Procedure

The testing follows ANSI C63.10-2013 clause 7.8.3

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.

The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously.

The EUT must have its hopping function enabled.

Use the following spectrum analyzer settings:

Span = the frequency band of operation

RBW : To identify cN/Aly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.

VBW  $\geq$  RBW

Sweep = auto

Detector function = peak

Trace = max hold

#### 7.3.6 Test Results

The conducted Test data please refer to the report: S23033100205001 under the WWAN module Z400-H  
FCC ID: 2A9FT-Z400-H.



## **7.4 HOPPING CHANNEL SEPARATION MEASUREMENT**

### **7.4.1 Applicable Standard**

According to FCC Part 15.247(a)(1) and ANSI C63.10-2013

### **7.4.2 Conformance Limit**

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5MHz band shall have hopping channel carrier frequencies that are separated by 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater.

### **7.4.3 Measuring Instruments**

The Measuring equipment is listed in the section 6.3 of this test report.

### **7.4.4 Test Setup**

Please refer to Section 6.1 of this test report.

### **7.4.5 Test Procedure**

The testing follows ANSI C63.10-2013 clause 7.8.2

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.

The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously.

The EUT was operating in controlled its channel.

Use the following spectrum analyzer settings:

Span = Measurement Bandwidth or Channel Separation

RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.

VBW  $\geq$  RBW

Sweep = auto

Detector function = peak

Trace = max hold

### **7.4.6 Test Results**

The conducted Test data please refer to the report: S23033100205001 under the WWAN module Z400-H  
FCC ID: 2A9FT-Z400-H.

## **7.5 AVERAGE TIME OF OCCUPANCY (DWELL TIME)**

### **7.5.1 Applicable Standard**

According to FCC Part 15.247(a)(1)(iii) and ANSI C63.10-2013

### **7.5.2 Conformance Limit**

The average time of occupancy on any channel shall not be greater than 0.4s within a period of 0.4s multiplied by the number of hopping channels employed.

### **7.5.3 Measuring Instruments**

The Measuring equipment is listed in the section 6.3 of this test report.

### **7.5.4 Test Setup**

Please refer to Section 6.1 of this test report.

### **7.5.5 Test Procedure**

The testing follows ANSI C63.10-2013 clause 7.8.4

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.

The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously.

The EUT must have its hopping function enabled.

Use the following spectrum analyzer settings:

Span = zero span, centered on a hopping channel

RBW  $\geq$  1MHz

VBW  $\geq$  RBW

Sweep = as necessary to capture the entire dwell time per hopping channel

Detector function = peak

Trace = max hold

Measure the maximum time duration of one single pulse.

Set the EUT for DH5, DH3 and DH1 packet transmitting.

Measure the maximum time duration of one single pulse.

### 7.5.6 Test Results

The conducted Test data please refer to the report: S23033100205001 under the WWAN module Z400-H  
FCC ID: 2A9FT-Z400-H.

## **7.6 20DB BANDWIDTH TEST**

### **7.6.1 Applicable Standard**

According to FCC Part 15.247(a)(1) and ANSI C63.10-2013

### **7.6.2 Conformance Limit**

No limit requirement.

### **7.6.3 Measuring Instruments**

The Measuring equipment is listed in the section 6.3 of this test report.

### **7.6.4 Test Setup**

Please refer to Section 6.1 of this test report.

### **7.6.5 Test Procedure**

The testing follows ANSI C63.10-2013 clause 6.9.2

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.

The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously.

The EUT was operating in controlled its channel.

Use the following spectrum analyzer settings:

Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel

RBW  $\geq$  1% of the 20 dB bandwidth

VBW  $\geq$  RBW

Sweep = auto

Detector function = peak

Trace = max hold

### **7.6.6 Test Results**

The conducted Test data please refer to the report: S23033100205001 under the WWAN module Z400-H  
FCC ID: 2A9FT-Z400-H.

## **7.7 PEAK OUTPUT POWER**

### **7.7.1 Applicable Standard**

According to FCC Part 15.247(b)(1) and ANSI C63.10-2013

### **7.7.2 Conformance Limit**

The maximum peak conducted output power of the intentional radiator shall not exceed the following: (1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band 0.125 watts.

### **7.7.3 Measuring Instruments**

The Measuring equipment is listed in the section 6.3 of this test report.

### **7.7.4 Test Setup**

Please refer to Section 6.1 of this test report.

### **7.7.5 Test Procedure**

The testing follows ANSI C63.10-2013 clause 7.8.5.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.

The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously.

The EUT was operating in controlled its channel.

Use the following spectrum analyzer settings:

Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel

RBW  $\geq$  the 20 dB bandwidth of the emission being measured

VBW  $\geq$  RBW

Sweep = auto

Detector function = peak

Trace = max hold

### 7.7.6 Test Results

The conducted Test data please refer to the report: S23033100205001 under the WWAN module Z400-H  
FCC ID: 2A9FT-Z400-H.

## **7.8 CONDUCTED BAND EDGE MEASUREMENT**

### **7.8.1 Applicable Standard**

According to FCC Part 15.247(d) and ANSI C63.10-2013

### **7.8.2 Conformance Limit**

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

### **7.8.3 Measuring Instruments**

The Measuring equipment is listed in the section 6.3 of this test report.

### **7.8.4 Test Setup**

Please refer to Section 6.1 of this test report.

### **7.8.5 Test Procedure**

The testing follows ANSI C63.10-2013 clause 7.8.6.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.

The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously.

The EUT must have its hopping function enabled.

Use the following spectrum analyzer settings:

Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel

RBW = 100KHz

VBW = 300KHz

Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100kHz RBW. The attenuation shall be 30 dB instead of 20 dB when RMS conducted output power procedure is used.

Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.

Repeat above procedures until all measured frequencies were complete.

### **7.8.6 Test Results**

The conducted Test data please refer to the report: S23033100205001 under the WWAN module Z400-H  
FCC ID: 2A9FT-Z400-H.

## 7.9 SPURIOUS RF CONDUCTED EMISSION

### 7.9.1 Applicable Standard

According to FCC Part 15.247(d) and ANSI C63.10-2013.

### 7.9.2 Conformance Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

### 7.9.3 Measuring Instruments

The Measuring equipment is listed in the section 6.3 of this test report.

### 7.9.4 Test Setup

Please refer to Section 6.1 of this test report.

### 7.9.5 Test Procedure

Establish an emission level by using the following procedure:

- a) Set the center frequency and span to encompass frequency range to be measured.
  - b) Set the RBW = 100 kHz.
  - c) Set the VBW  $\geq [3 \times \text{RBW}]$ .
  - d) Detector = peak.
  - e) Sweep time = auto couple.
  - f) Trace mode = max hold.
  - g) Allow trace to fully stabilize.
  - h) Use the peak marker function to determine the maximum amplitude level.
- Then the limit shall be attenuated by at least 20 dB relative to the maximum amplitude level in 100 kHz.

### 7.9.6 Test Results

Remark: The measurement frequency range is from 30MHzHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and bandege measurement data.

The conducted Test data please refer to the report: S23033100205001 under the WWAN module Z400-H FCC ID: 2A9FT-Z400-H.



**7.10 ANTENNA APPLICATION****7.10.1 Antenna Requirement**

15.203 requirement: For intentional device, according to 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.

**7.10.2 Result**

The EUT antenna is permanent attached FPC Antenna (Gain: 1.93dBi). It comply with the standard requirement.

END OF REPORT