

FCC 47 CFR PART 15 SUBPART C

CERTIFICATION TEST REPORT

For

Nero One Automation Gateway

MODEL No.: N1-GW03-UN-LTE, N1-GW03-UN

FCC ID: 2AU2VN1GW03

Trade Mark: Nero One, FAMTEM, OOMI by Fantem

REPORT NO.: ES190826014W01

ISSUE DATE: October 14, 2019

Prepared for

Blue Sky Technology Group Pty. Ltd.

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Prepared by

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1 TEST RESULT CERTIFICATION

Applicant: Blue Sky Technology Group Pty. Ltd.
50 Ricketts Road, Mount Waverley Victoria 3149, Australia

Manufacturer: Fantem Technologies (Shenzhen) Co.,Ltd
5th Floor, Yingtang Building, South 5th Road, Hi-tech Park, Nanshan District, Shenzhen, Guangdong, China

EUT Description: Nero One Automation Gateway

Model Number: N1-GW03-UN-LTE, N1-GW03-UN

Trade Mark: Nero One, FAMTEM, OOMI by Fantem

File Number: ES190826014W01

Measurement Procedure Used:

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 2, Subpart J	PASS
FCC 47 CFR Part 15, Subpart C	

The above equipment was tested by EMTEK (SHENZHEN) CO., LTD.. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 2 and Part 15.249

The test results of this report relate only to the tested sample identified in this report.

Date of Test : August 26, 2019 to October 09, 2019



Prepared by : Sandor wu /Editor

Reviewer : Joe Xia

Joe Xia/Supervisor

Approve & Authorized Signer : Lisa Wang

Lisa Wang/Manager



2 EUT TECHNICAL DESCRIPTION

Characteristics	Description
Product:	Nero One Automation Gateway
Model Number:	N1-GW03-UN-LTE, N1-GW03-UN (Note: The difference between the two models is that N1-GW03-UN-LTE adds a LTE module and a battery to N1-GW03-UN, We prepare N1-GW03-UN-LTE for test)
Device Type	Z-WAVE
Modulation:	FSK
Operating Frequency Range(s):	908.4MHz, 916MHz
Number of Channels:	2 channels
Channel space:	7.6MHz
Antenna Type :	Monopole antenna
Antenna Gain:	2.0 dBi
Power supply:	<input checked="" type="checkbox"/> DC 5V from Adapter <input checked="" type="checkbox"/> Adapter: Model: SAW12-050-2000UD Input: AC 100-240V, 50/60Hz, 0.3A Output: DC 5V, 2A

Note: for more details, please refer to the User's manual of the EUT.

3 SUMMARY OF TEST RESULT

FCC Part Clause	Test Parameter	Verdict	Remark
15.207	Conducted Emission	Pass	
15.205			
15.209	Radiated Emission	Pass	
15.249			
15.249	Band edge test	Pass	
15.209			
15.249	20dB Bandwidth	Pass	
15.35(c)	Periodic Operation	Pass	
15.203	Antenna Requirement	Pass	
NOTE1: N/A (Not Applicable) NOTE2: The report use radiated measurements in the restricted frequency bands. In addition, the radiated test is also performed to ensure the emissions emanating from the device cabinet also comply with the applicable limits.			

RELATED SUBMITTAL(S) / GRANT(S):

This submittal(s) (test report) is intended for FCC ID: 2AU2VN1GW03 filing to comply with Section 15.249 of the FCC Part 15, Subpart C Rules.

The system is compliance with Subpart B is authorized under a DOC procedure

4 TEST METHODOLOGY

4.1 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to its specifications, the EUT must comply with the requirements of the following standards:
 FCC 47 CFR Part 2, Subpart J
 FCC 47 CFR Part 15, Subpart C

4.2 MEASUREMENT EQUIPMENT USED

4.2.1 Conducted Emission Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LASTCAL.	DUE CAL.
Test Receiver	Rohde & Schwarz	ESCI	26115-010-0027	May 18, 2019	May 17, 2020
L.I.S.N.	Rohde & Schwarz	ENV216	101161	May 18, 2019	May 17, 2020
50Ω Coaxial Switch	Anritsu	MP59B	6100175589	May 19, 2019	May 18, 2020
Voltage Probe	Rohde & Schwarz	ESH2-Z3	100122	May 19, 2019	May 18, 2020
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100006	May 19, 2019	May 18, 2020
I.S.N	Teseq GmbH	ISN T800	30327	May 19, 2019	May 18, 2020

4.2.2 Radiated Emission Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	DUE CAL.
EMI Test Receiver	Rohde & Schwarz	ESU	1302.6005.26	May 19, 2019	May 18, 2020
Pre-Amplifier	HP	8447F	2944A07999	May 18, 2019	May 17, 2020
Bilog Antenna	Schwarzbeck	VULB9163	142	May 18, 2019	May 17, 2020
Loop Antenna	ARA	PLA-1030/B	1029	May 18, 2019	May 17, 2020
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	May 19, 2019	May 18, 2020
Horn Antenna	Schwarzbeck	BBHA 9120	D143	May 18, 2019	May 17, 2020
Cable	Schwarzbeck	AK9513	ACRX1	May 19, 2019	May 18, 2020
Cable	Rosenberger	N/A	FP2RX2	May 19, 2019	May 18, 2020
Cable	Schwarzbeck	AK9513	CRPX1	May 19, 2019	May 18, 2020
Cable	Schwarzbeck	AK9513	CRRX2	May 19, 2019	May 18, 2020

4.2.3 Radio Frequency Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LASTCAL.	DUE CAL.
Spectrum Analyzer	Agilent	E4407B	88156318	May 19, 2019	May 18, 2020
Signal Analyzer	Agilent	N9010A	My53470879	May 19, 2019	May 18, 2020
Power meter	Anritsu	ML2495A	0824006	May 19, 2019	May 18, 2020
Power sensor	Anritsu	MA2411B	0738172	May 19, 2019	May 18, 2020

Remark: Each piece of equipment is scheduled for calibration once a year.

4.3 DESCRIPTION OF TEST MODES

The EUT has been tested under its typical operating condition.

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

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 modulation FSK were used for all test.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Frequency and Channel list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	908.4	2	916		

Test Frequency and Channel list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	908.4				

5 FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at Bldg 69, Majialong Industry Zone District, Nanshan District, Shenzhen, China. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10 and CISPR Publication 22.

5.2 LABORATORY ACCREDITATIONS AND LISTINGS

Site Description

EMC Lab.

- : Accredited by CNAS, 2016.10.24
The certificate is valid until 2022.10.28
The Laboratory has been assessed and proved to be in compliance with CNAS-CL01: 2006(identical to ISO/IEC17025: 2017)
The Certificate Registration Number is L2291
- : Accredited by TUV Rheinland Shenzhen, 2018.3.30
The Laboratory has been assessed according to the requirements ISO/IEC 17025.
- : Accredited by FCC, August 06, 2018
The certificate is valid until August 07, 2020
Designation Number: CN1204
Test Firm Registration Number: 882943
- : Accredited by Industry Canada, November 09, 2018
The Conformity Assessment Body Identifier is CN0008.

6 TEST SYSTEM UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the apparatus:

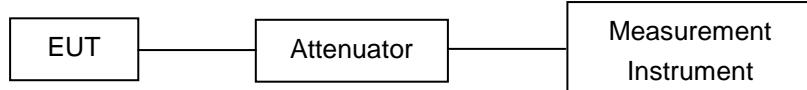
Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-5}$
Maximum Peak Output Power Test	$\pm 1.0 \text{dB}$
Conducted Emissions Test	$\pm 2.0 \text{dB}$
Radiated Emission Test	$\pm 2.0 \text{dB}$
Power Density	$\pm 2.0 \text{dB}$
Occupied Bandwidth Test	$\pm 1.0 \text{dB}$
Band Edge Test	$\pm 3 \text{dB}$
All emission, radiated	$\pm 3 \text{dB}$
Antenna Port Emission	$\pm 3 \text{dB}$
Temperature	$\pm 0.5^\circ\text{C}$
Humidity	$\pm 3\%$

Measurement Uncertainty for a level of Confidence of 95%

7 SETUP OF EQUIPMENT UNDER TEST

7.1 RADIO FREQUENCY TEST SETUP 1

The Z-WAVE component's antenna port(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by PC/software/itself to emit the specified signals for the purpose of measurements.



7.2 RADIO FREQUENCY TEST SETUP 2

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10. 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.

Below 30MHz:

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The Antenna should be positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. The center of the loop shall be 1 m above the ground. For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the EUT.

Above 30MHz:

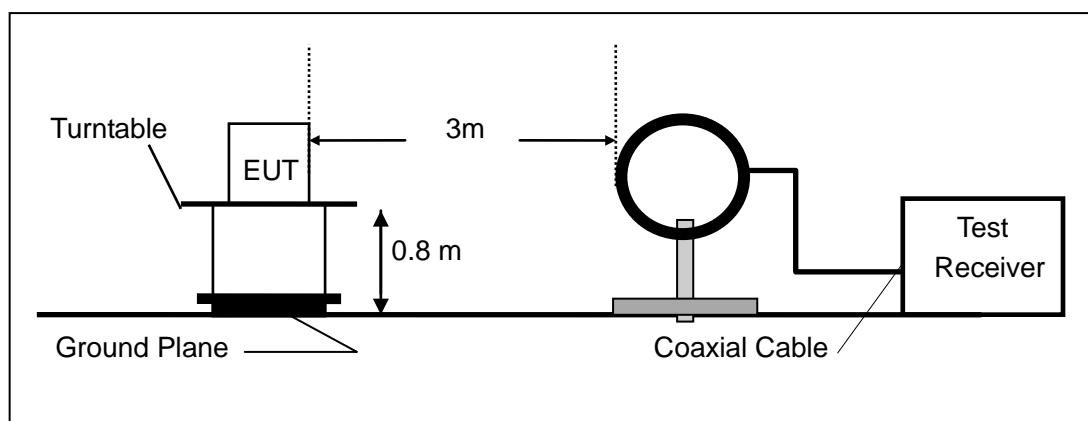
The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

Above 1GHz:

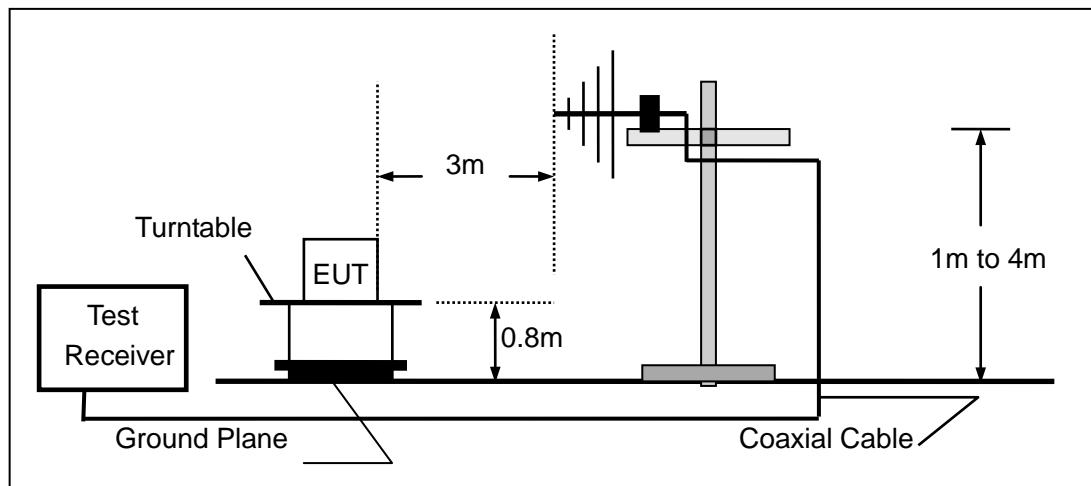
(Note: the FCC's permission to use 1.5m as an alternative per TCBC Conf call of Dec. 2, 2014.)

The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

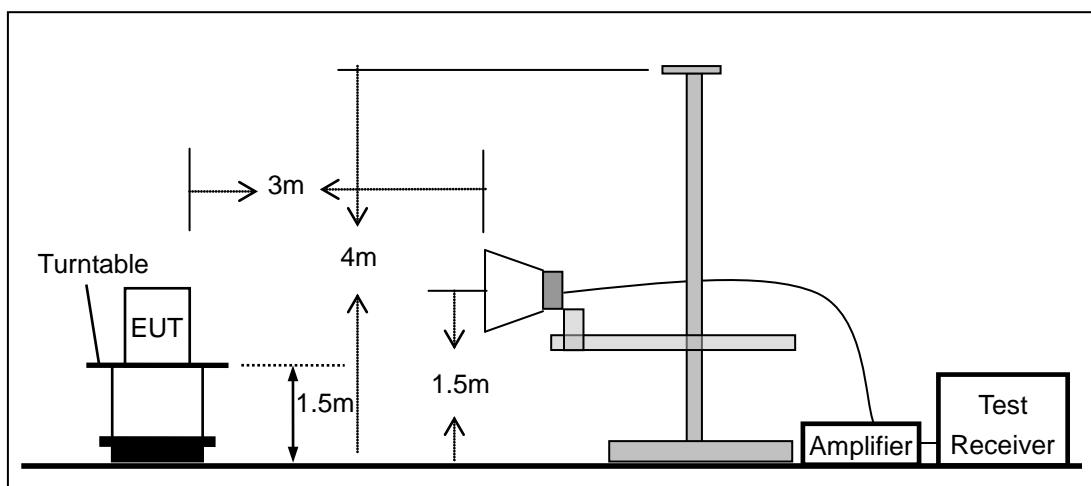
(a) Radiated Emission Test Set-Up, Frequency Below 30MHz



(b) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(c) Radiated Emission Test Set-Up, Frequency above 1000MHz

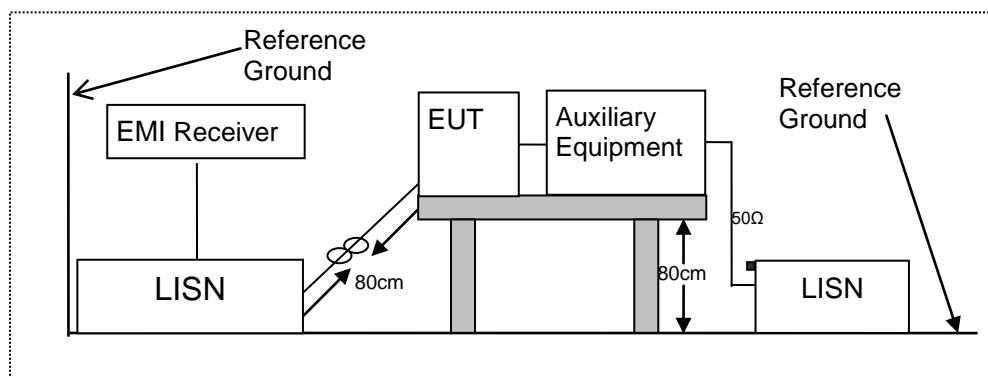


7.3 CONDUCTED EMISSION TEST SETUP

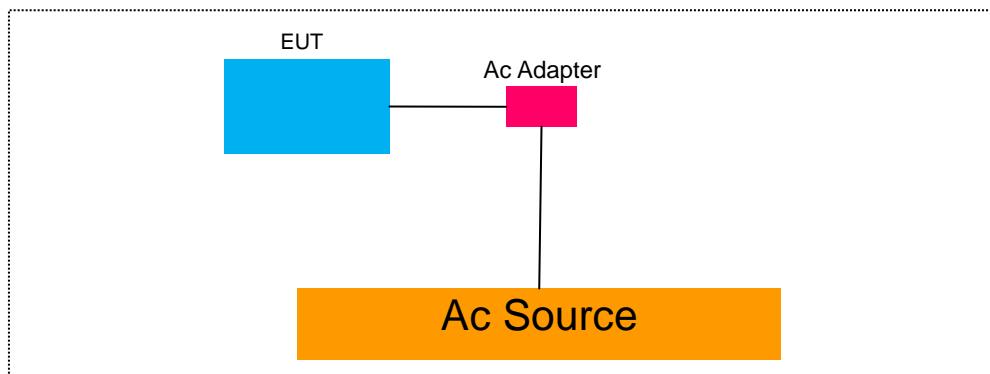
The mains cable of the EUT (maybe per AC/DC Adapter) must be connected to LISN. The LISN shall be placed 0.8 m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8m from the LISN.

Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than 0.8 m.

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



7.4 BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM



7.5 SUPPORT EQUIPMENT

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

8 TEST REQUIREMENTS

8.1 BANDWIDTH TEST

8.1.1 Applicable Standard

According to FCC Part 15.249

8.1.2 Conformance Limit

N/A

8.1.3 Test Configuration

Test according to clause 7.1 radio frequency test setup

8.1.4 Test Procedure

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

Set RBW = 1% to 5% of the anticipated emission bandwidth

Set the video bandwidth (VBW) = $3 \times$ RBW

Set Span= approximately 2 to 3 times the 20 dB bandwidth

Set Detector = Peak.

Set Trace mode = max hold.

Set Sweep = auto couple.

Allow the trace to stabilize.

X dB Bandwidth: 20 dB

Note: The automatic bandwidth measurement capability of a spectrum analyzer or EMI receiver may be employed if it implements the functionality described above.

8.1.5 Test Results

Temperature :	24°C	Test By:	King Kong
Humidity :	65 %		

Operation Mode	Channel Number	Channel Frequency (MHz)	20dB Bandwidth (KHz)	Limit (kHz)
FSK	1	908.4	85.38	N/A

Test Model

Bandwidth Test

FSK

908.4MHz



8.2 PERIODIC OPERATION

8.2.1 Applicable Standard

According to FCC Part 15.35C

8.2.2 Conformance Limit

N/A

8.2.3 Test Configuration

Test according to clause 7.1 radio frequency test setup

8.2.4 Test Procedure

The EUT was operating in controlled its channel. Printed out the test result from the spectrum by hard copy function.

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

Set RBW = 1MHz

Set the video bandwidth (VBW) = 3MHz

Set Span=0MHz

Set Detector = Peak.

Set Trace mode = max hold.

Set Sweep = 100ms.

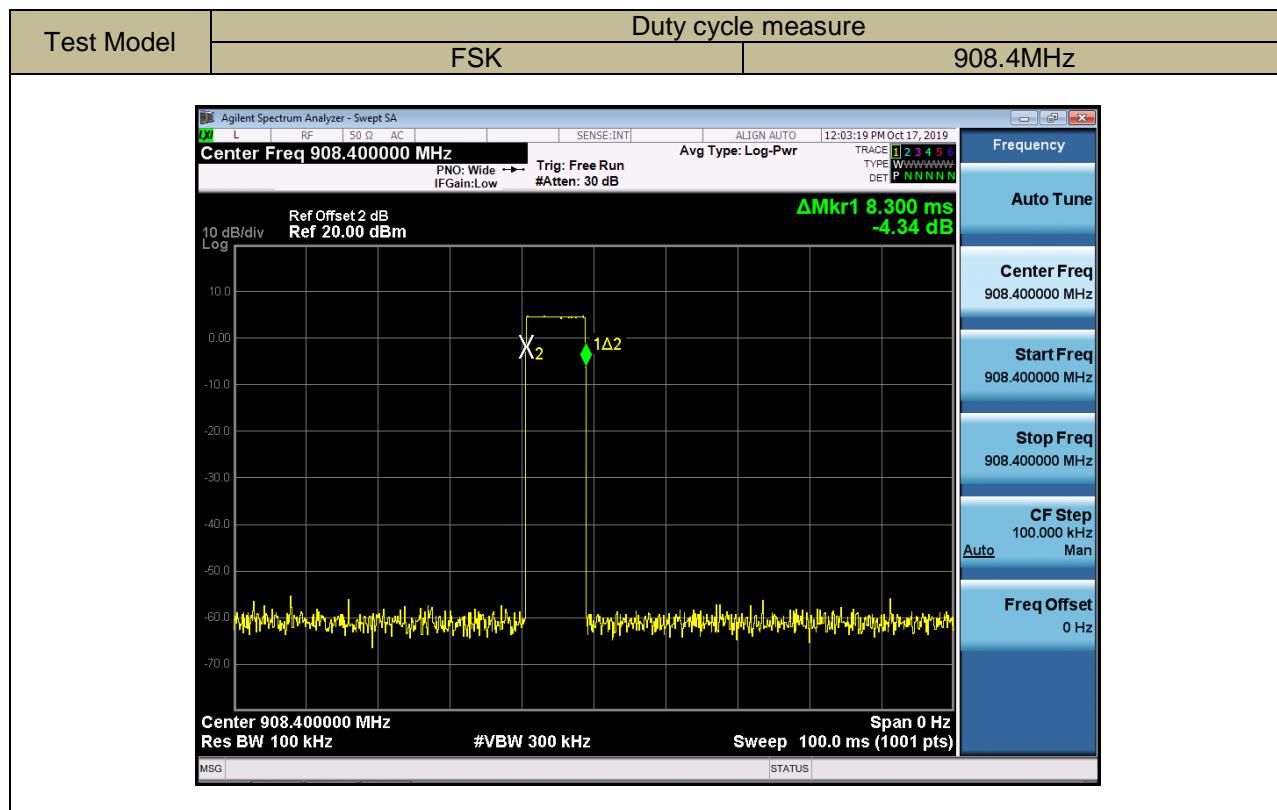
Allow the trace to stabilize.

Measure and record the results in the test report.

8.2.5 Test Results

Temperature : 24°C	Test By: King Kong
Humidity : 53 %	
Total transmission time(ms)	100
Length of a complete transmission period(ms)	8.3
Duty Cycle(%)	8.3
Duty Cycle Correction Factor(dB)	18.4

Note: Duty Cycle(%)=Total On interval in a complete pulse train/ Length of a complete pulse train * %
 Duty Cycle Correction Factor(dB)= $20 * \log_{10}(\text{Duty Cycle}(\%))$



8.3 RADIATED SPURIOUS EMISSION

8.3.1 Applicable Standard

According to FCC Part 15.249, 15.209 and 15.205.

8.3.2 Conformance Limit

According to FCC Part 15.249: 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 Part15.205, Restricted bands

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
10.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(2)
13.36-13.41			

According to FCC Part15.205, the level of any transmitter spurious emission in Restricted bands shall not exceed the level of the emission specified in the following table

Restricted Frequency(MHz)	Field Strength (μ V/m)	Field Strength (dB μ V/m)	Measurement Distance
0.009-0.490	2400/F(KHz)	20 log (μ V/m)	300
0.490-1.705	2400/F(KHz)	20 log (μ V/m)	30
1.705-30	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

Remark :1. Emission level in dB μ V/m=20 log (μ V/m)

2. Measurement was performed at an antenna to the closed point of EUT distance of meters.

3. Distance extrapolation factor =40log(Specific distance/ test distance)(dB);

Limit line=Specific limits(dB μ V) + distance extrapolation factor.

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*lg(100 [kHz]/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.

Field strength of fundamental and Field strength of harmonics Limit:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902-928 MHz	50(94 dBV/m)	500(54 dBV/m)
2400-2483.5 MHz	50(94 dBV/m)	500(54 dBV/m)
5725-5875 MHz	50(94 dBV/m)	500(54 dBV/m)
24.0-24.25 GHz	250(108 dBV/m)	2500(68 dBV/m)

8.3.3 Test Configuration

Test according to clause 7.2 radio frequency test setup

8.3.4 Test Procedure

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:

For Above 1GHz:

The EUT was placed on a turn table which is 1.5m above ground plane.

Maximum procedure was performed on the highest emissions to ensure EUT compliance.

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz

VBW \geq RBW

Sweep = auto

Detector function = peak

Trace = max hold

For Below 1GHz:

The EUT was placed on a turn table which is 0.8m above ground plane.

Maximum procedure was performed on the highest emissions to ensure EUT compliance.

Span = wide enough to fully capture the emission being measured

RBW = 100 kHz for

VBW \geq RBW

Sweep = auto

Detector function = peak

Trace = max hold

For Below 30MHz:

The EUT was placed on a turn table which is 0.8m above ground plane.

Maximum procedure was performed on the highest emissions to ensure EUT compliance.

Span = wide enough to fully capture the emission being measured

RBW = 9kHz

VBW \geq RBW

Sweep = auto

Detector function = peak

Trace = max hold

For Below 150KHz:

The EUT was placed on a turn table which is 0.8m above ground plane.

Maximum procedure was performed on the highest emissions to ensure EUT compliance.

Span = wide enough to fully capture the emission being measured

RBW = 200Hz

VBW \geq RBW

Sweep = auto

Detector function = peak

Trace = max hold

Follow the guidelines in ANSI C63.10-2013 with respect to maximizing the emission by rotating the EUT,

measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization, etc. A pre-amp and a high pass filter are required for this test, in order to provide the measuring system with sufficient sensitivity. Allow the trace to stabilize. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, which must comply with the limit specified in Section 15.35(b). Submit this data.

Now set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a "duty cycle correction factor", derived from $20\log(\text{dwell time}/100 \text{ ms})$, in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

Repeat above procedures until all frequency measured was complete.

8.3.5 Test Results

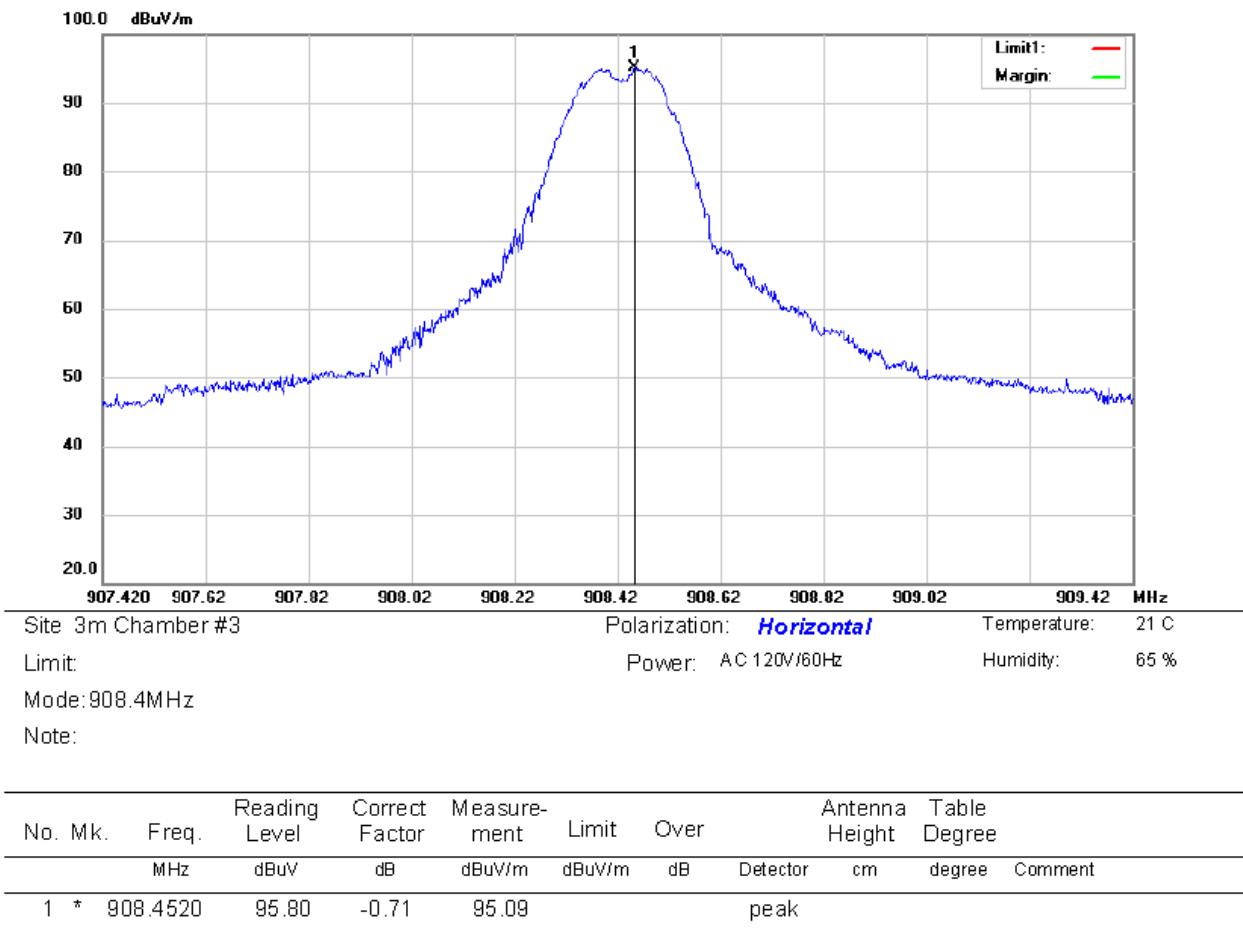
■ Field Strength of the fundamental signal

Temperature:	24°C	Test By:	KK
Humidity:	53 %	Frequency:	Channel 2: 908.4MHz
Test mode:	FSK		

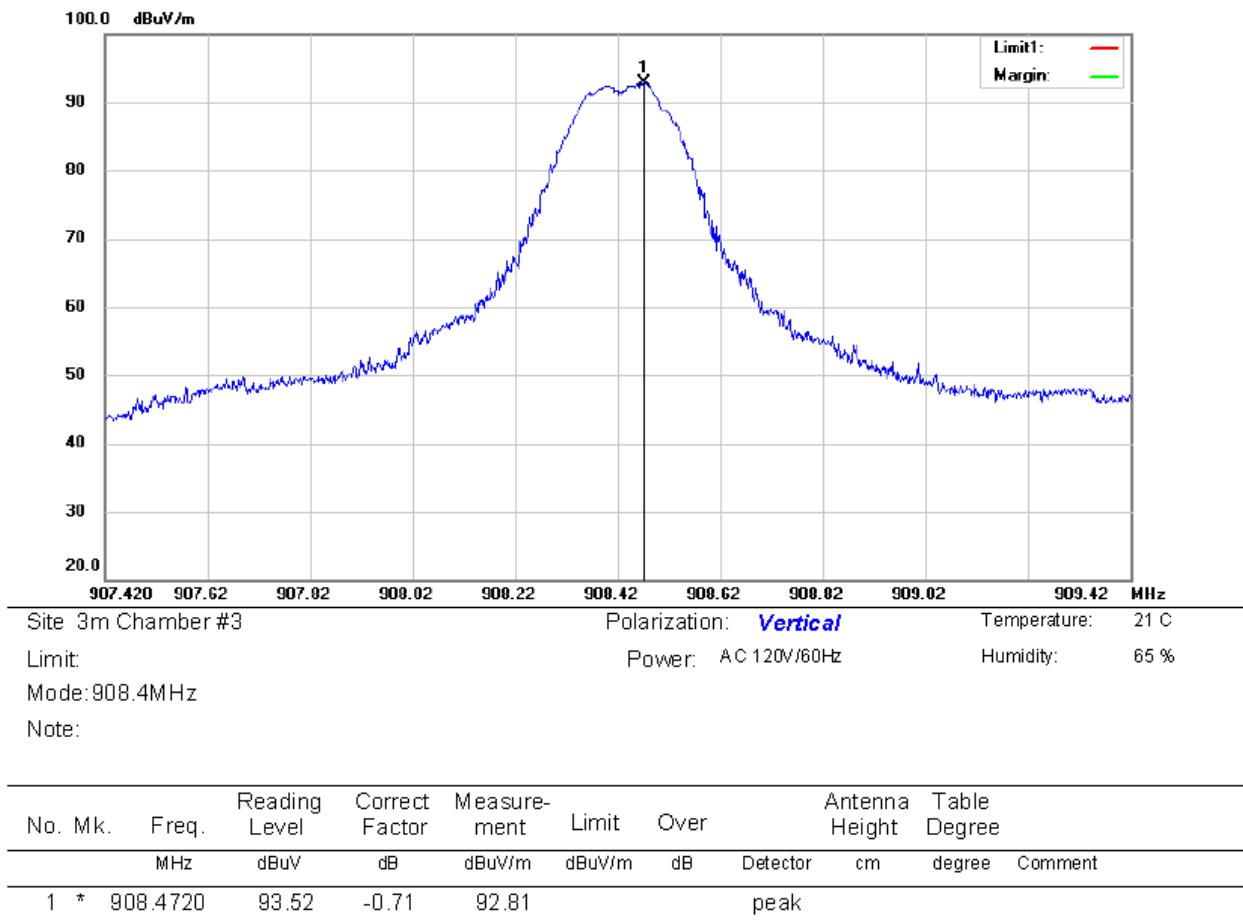
Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
908.4520	H	95.09	86.62	114.00	94.00	-18.91	-7.38
908.4720	V	92.81	83.12	114.00	94.00	-21.19	-10.88

Note: (1) Correct Factor= Antenna Factor +Cable Loss- Amplifier Gain
 (2) Emission Level= Reading Level + Probe Factor +Cable Loss
 (3) True Value = Emission Level + Correction Factor
 (4) DF= Duty Cycle Correction Factor
 (5) Duty Cycle Correction Factor (dB) = -9.37dB
 (6) average results= peak results + Duty Cycle Correction Factor(dB)

Fundamental signal-H



Fundamental signal-V



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

Temperature: 24°C Test By: KK
 Humidity: 53 %
 Test mode: TX Mode

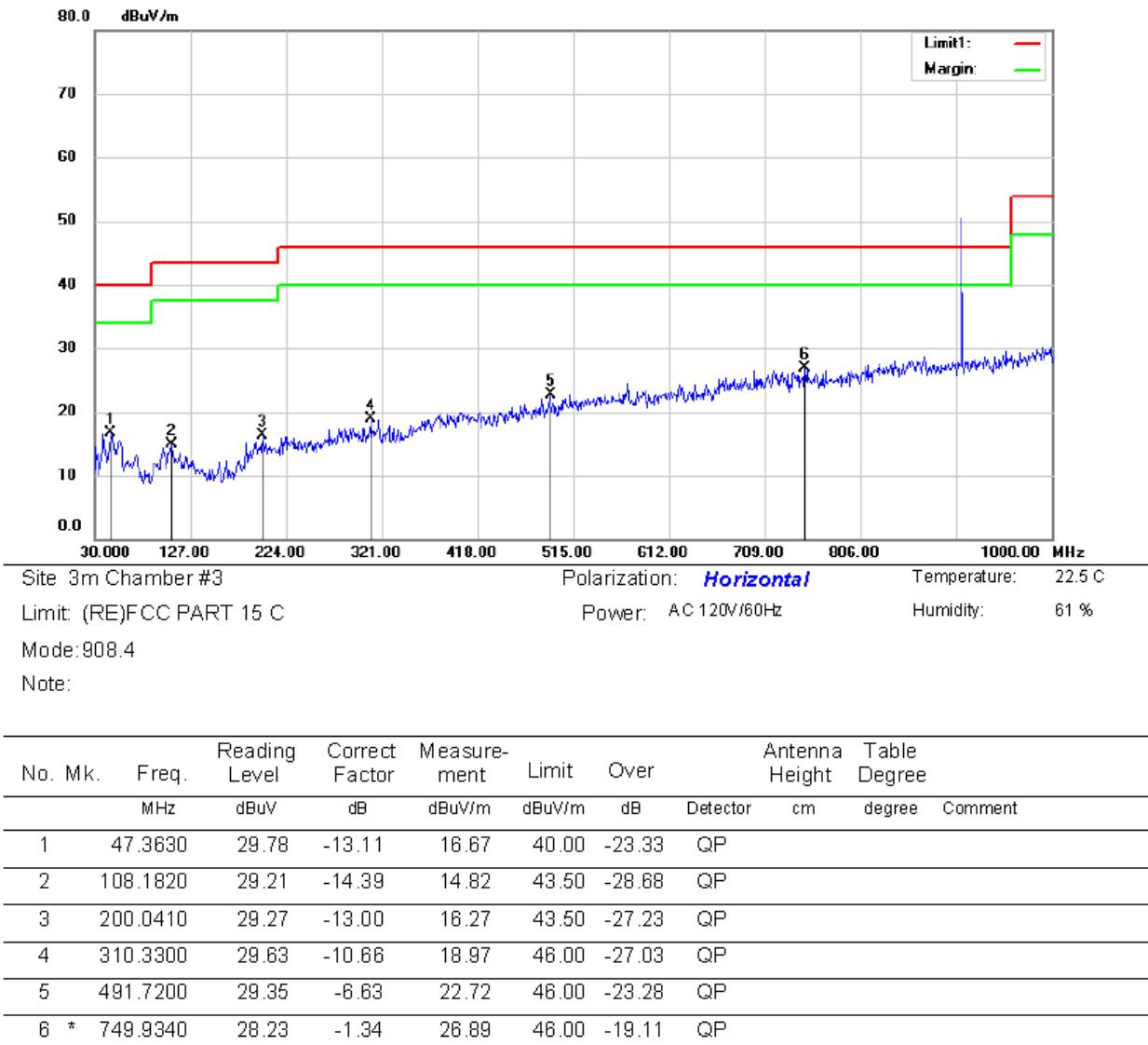
Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
--	--	--	--	--	--	--	--

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

Distance extrapolation factor =40log(Specific distance/ test distance)(dB);

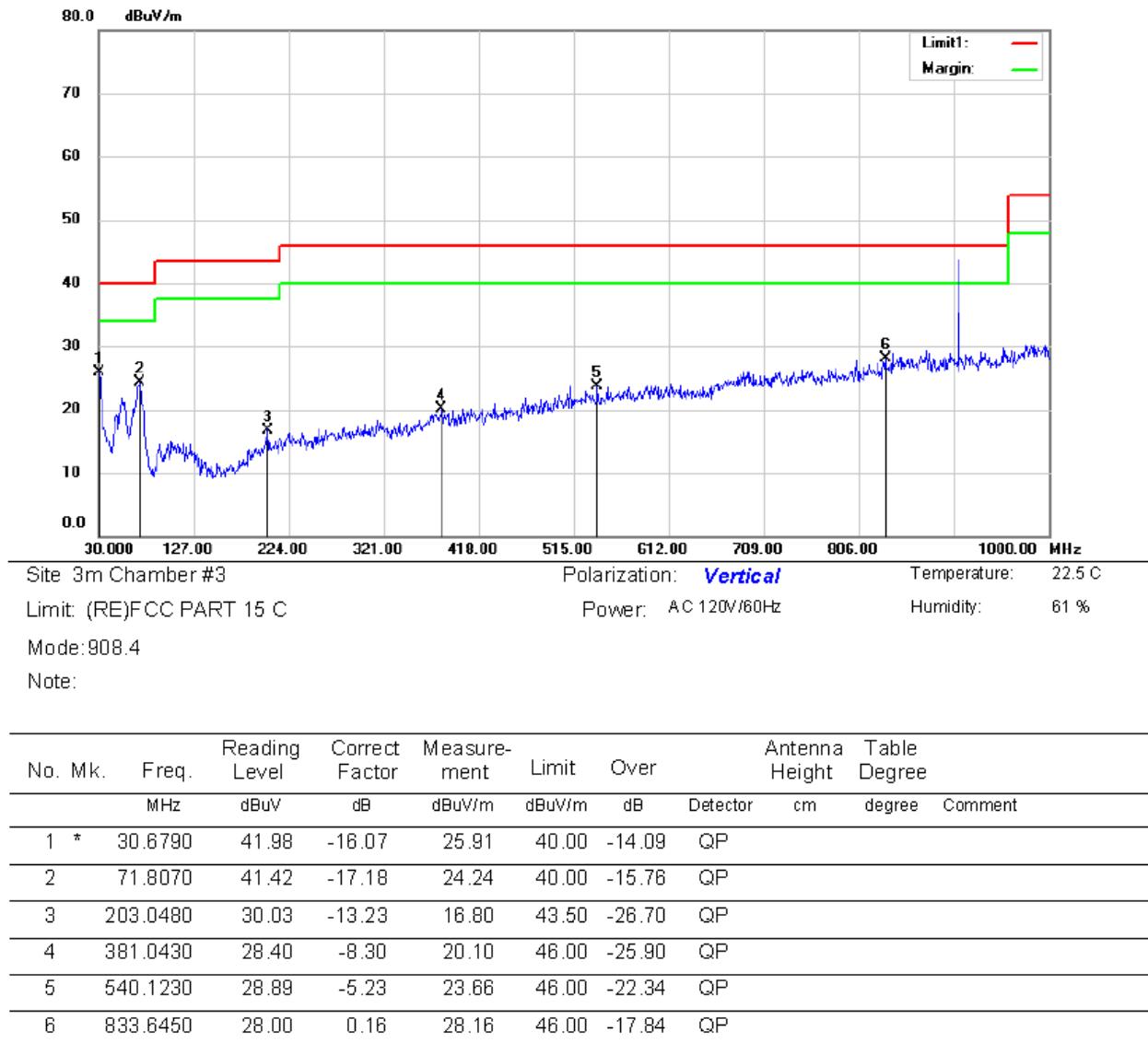
Limit line=Specific limits(dBuV) + distance extrapolation factor

■ Radiated spurious emission 30MHz to 1GHz



*:Maximum data x:Over limit l:over margin

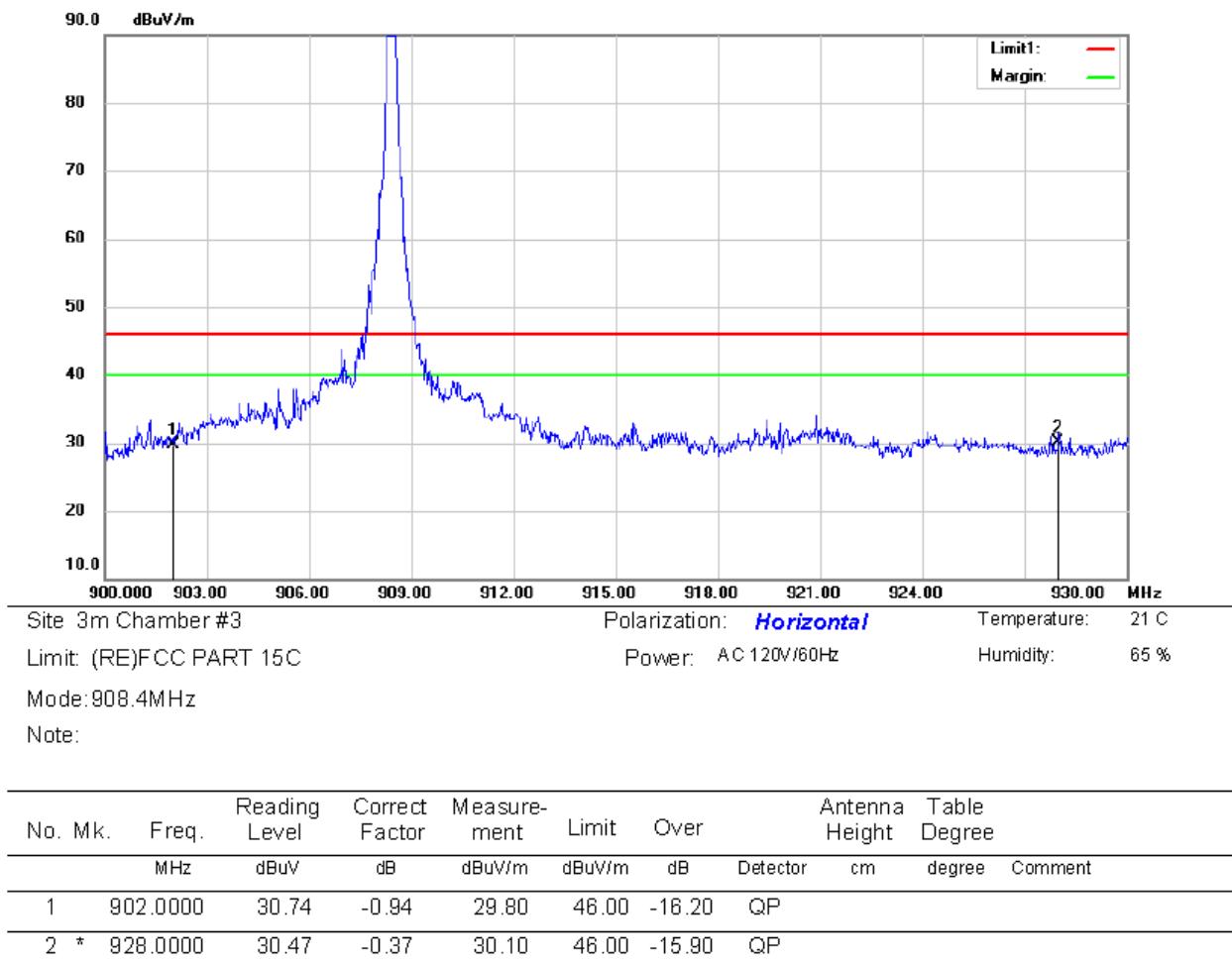
Operator: ZL

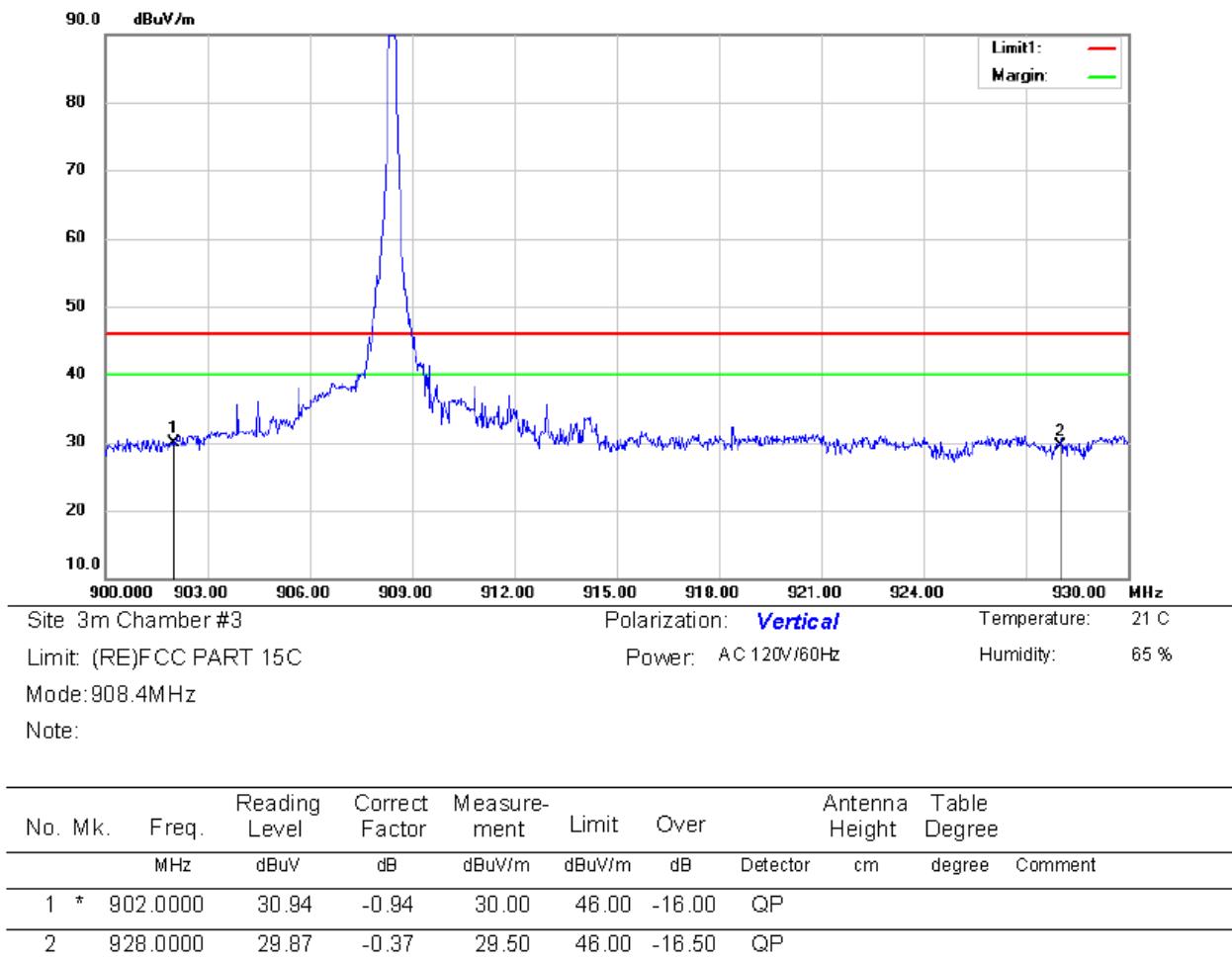


*:Maximum data x:Over limit l:over margin

Operator: ZL

Transmitter Fundamental Field Strength and outside of the specified frequency bands





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

Temperature: 24°C Test By: KK
 Humidity: 53 % Frequency: Channel 2: 908.4MHz
 Test mode: FSK

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
1816.84	V	42.06	32.69	74.00	54.00	-31.94	-21.31
2725.26	V	42.71	33.34	74.00	54.00	-31.29	-20.66
3633.68	V	44.36	34.99	74.00	54.00	-29.64	-19.01
4542.10	V	48.98	39.61	74.00	54.00	-25.02	-14.39
5450.52	V	50.93	41.56	74.00	54.00	-23.07	-12.44
6358.94	V	54.93	45.56	74.00	54.00	-19.07	-8.44
1816.84	H	42.89	33.52	74.00	54.00	-31.11	-20.48
2725.26	H	42.39	33.02	74.00	54.00	-31.61	-20.98
3633.68	H	44.99	35.62	74.00	54.00	-29.01	-18.38
4542.10	H	48.28	38.91	74.00	54.00	-25.72	-15.09
5450.52	H	50.14	40.77	74.00	54.00	-23.86	-13.23
6358.94	H	52.88	43.51	74.00	54.00	-21.12	-10.49

Note: (1) All Readings are Peak Value (VBW=3MHz) and Average Value=Peak Value + Duty Cycle Correction Factor(dB)
 (2) Emission Level= Reading Level+Probe Factor +Cable Loss.
 (3) Data of measurement within this frequency range shown “ -- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

8.4 CONDUCTED EMISSIONS TEST

8.4.1 Applicable Standard

According to FCC Part 15.207(a)

8.4.2 Conformance Limit

Conducted Emission Limit		
Frequency(MHz)	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. The lower limit shall apply at the transition frequencies
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

8.4.3 Test Configuration

Test according to clause 7.3 conducted emission test setup

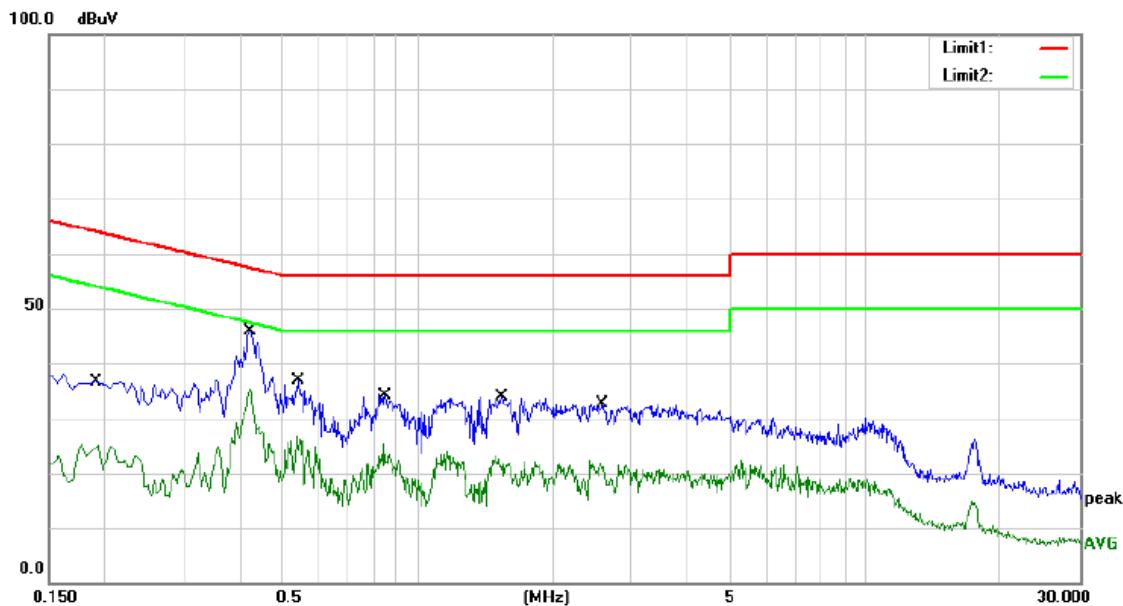
8.4.4 Test Procedure

The EUT was placed on a table which is 0.8m above ground plane.
Maximum procedure was performed on the highest emissions to ensure EUT compliance.
Repeat above procedures until all frequency measured were complete.

8.4.5 Test Results

Pass

We test the EUT at 120V and 240V, and show the worst result as bellow.



Site Conduction #2

Phase: **L1**

Temperature: 23.7

Limit: (CE)FCC PART 15 class B_QP

Power: AC 120V/60Hz

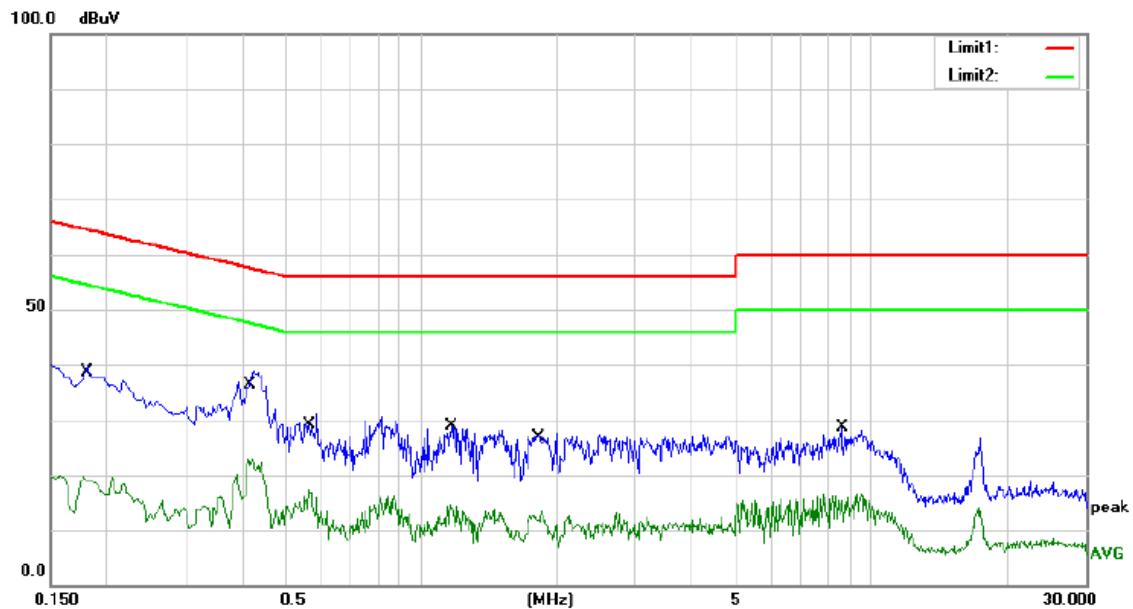
Humidity: 41 %

Mode: ON

Note:

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	Detector	Comment
			Level	Factor	ment				
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1940	28.29	9.90	38.19	63.86	-25.67	QP	
2		0.1940	15.24	9.90	25.14	53.86	-28.72	AVG	
3	*	0.4220	35.90	9.92	45.82	57.41	-11.59	QP	
4		0.4220	25.43	9.92	35.35	47.41	-12.06	AVG	
5		0.5420	27.05	9.92	36.97	56.00	-19.03	QP	
6		0.5420	16.79	9.92	26.71	46.00	-19.29	AVG	
7		0.8420	24.45	9.92	34.37	56.00	-21.63	QP	
8		0.8420	15.50	9.92	25.42	46.00	-20.58	AVG	
9		1.5420	23.91	9.93	33.84	56.00	-22.16	QP	
10		1.5420	14.00	9.93	23.93	46.00	-22.07	AVG	
11		2.5900	22.60	9.94	32.54	56.00	-23.46	QP	
12		2.5900	12.31	9.94	22.25	46.00	-23.75	AVG	

*:Maximum data x:Over limit l:over margin Comment: Factor build in receiver. Operator: KK



Site Conduction #2

Phase: **N**

Temperature: 23.7

Limit: (CE)FCC PART 15 class B_QP

Power: AC 120V/60Hz

Humidity: 41 %

Mode: ON

Note:

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	Detector	Comment
			Level	Factor	ment				
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1780	29.88	9.90	39.78	64.58	-24.80	QP	
2		0.1780	10.08	9.90	19.98	54.58	-34.60	AVG	
3	*	0.4140	29.07	9.92	38.99	57.57	-18.58	QP	
4		0.4140	13.06	9.92	22.98	47.57	-24.59	AVG	
5		0.5660	21.21	9.92	31.13	56.00	-24.87	QP	
6		0.5660	7.58	9.92	17.50	46.00	-28.50	AVG	
7		1.1620	19.02	9.93	28.95	56.00	-27.05	QP	
8		1.1620	4.72	9.93	14.85	46.00	-31.35	AVG	
9		1.8580	17.80	9.93	27.73	56.00	-28.27	QP	
10		1.8580	3.53	9.93	13.46	46.00	-32.54	AVG	
11		8.6100	18.61	10.00	28.61	60.00	-31.39	QP	
12		8.6100	6.65	10.00	16.65	50.00	-33.35	AVG	

*:Maximum data

x: Over limit

l:over margin

Comment: Factor build in receiver.

Operator: KK

8.5 ANTENNA APPLICATION

8.5.1 Antenna Requirement

Standard	Requirement
FCC CRF Part 15.203	An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

8.5.2 Result

PASS.

The EUT has 1 antenna: a monopole antenna 2dBi for Z-WAVE.

Note: Antenna use a permanently attached antenna which is not replaceable.
 Not using a standard antenna jack or electrical connector for antenna replacement
 The antenna has to be professionally installed (please provide method of installation)

which in accordance to section 15.203, please refer to the internal photos.

-----THE END-----