

47 CFR PART 15B

# TEST REPORT

Of

## RFID Reader

Brand Name: Convergence Systems Limited  
Model Name: CS468-2  
Report No.: SZ10080004E02  
FCC ID.: UB4CS468C1GEN2

*prepared for*

### Convergence Systems Limited

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*prepared by*

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LAB CODE 20081223-00

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Change History		
Issue	Date	Reason for change
1.0	October 21, 2010	First edition

## 1. TEST CERTIFICATION

Equipment under Test: RFID Reader

Brand Name: Convergence Systems Limited

Model Name: CS468-2

FCC ID: UB4CS468C1GEN2

Applicant: Convergence Systems Limited

20/F chung Nam Building, 1 Lockhart Road, Wanchai, Hong Kong

Manufacturer: Nam Tai Electronic(Shenzhen) Lo. Ltd

No.38 Luogang Road, Luogang Industrial Zone, Bu Ji, Shen Zhen, China

Test Standards: 47 CFR Part 15 Subpart B

Test Date(s): August 06, 2010 - October 20, 2010

Test Result: PASS

### \* We Hereby Certify That:

The equipment under test was tested by Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory. The test data, data evaluation, test procedures and equipment configurations shown in this report were made in accordance with the requirement of related FCC rules.

The test results of this report only apply for the tested sample equipment identified above. The test report shall be invalid without all the signatures of the test engineer, the reviewer and the approver.

Tested by: Ni Yong Dated: 2010.10.21  
Ni Yong

Reviewed by: Wei Yanquan Dated: 2010.10.21  
Wei Yanquan

Approved by: Shu Luan Dated: 2010.10.21  
Shu Luan



## 2. GENERAL INFORMATION

### 2.1 EUT Description

EUT Type ..... RFID Reader  
Model Name..... CS468-2  
Serial No. .... (n.a, marked #1 by test site)  
Hardware Version..... V1.0  
Software Version ..... V1.0  
Modulation Type ..... Frequency Hopping Spread Spectrum (FHSS)  
Data Type ..... DSB-ASK, PR-ASK  
Frequency ..... The frequency range used is 902MHz - 928MHz (50 channels, at intervals of 500KHz)  
Option Power Supply A . AC Adapter (Charger for Battery)  
Model Name: YS04-120250U/J  
Serial No.: (n.a. marked #1 by test site)  
Rated Input: ~ 100-240V, 1.0A Max, 50/60Hz  
Rated Output: = 12V, 2500mA

Option Power Supply B . POE

EUT specification:

Profile	0	1	2	3	4	5
R-T Modulation	DSB-ASK	DSB-ASK	PR-ASK	PR-ASK	DSB-ASK	PR-ASK
Tari (μs)	25.00	12.50	25.00	25.00	6.25	25.00
R-T speed (kbps)	40	80	40	40	160	40
PIE	2:1	2:1	1.5:1	1.5:1	1.5:1	1.5:1
Pulse Width (uS)	12.50	6.25	12.50	12.50	3.13	12.50
T-R LF (kbps)	40	160	250	300	400	250
T-R Modulation	FM0	Miller-2	Miller-4	Miller-4	FM0	Miller-2
Divide Ratio	8	8	64/3	64/3	8	64/3
T-R Data Rate (kbps)	40	80	62.5	75	400	125

*Note 1:* The EUT is a RFID Fixed Reader, it contains Radio Module operating at 900MHz ISM band; the frequencies allocated for the Radio Module is  $F(\text{MHz})=902.25+0.5*n$  ( $1 \leq n \leq 50$ ). The lowest, middle, highest channel numbers of the Radio Module used and tested in this report are separately 0 (902.75MHz), 26 (915.25MHz) and 50 (927.25MHz).

*Note 2:* The EUT can powered by AC adapter or POE separately

*Note 3:* For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

## 2.2 Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart B:

No.	Identity	Document Title
1	47 CFR Part 15 (10-1-05 Edition)	Radio Frequency Devices

Test detailed items/section required by FCC rules and results are as below:

No.	Section	Description	Result
1	15.107	Conducted Emission	PASS
2	15.109	Radiated Emission	PASS

NOTE:

The tests were performed according to the method of measurements prescribed in ANSI C63.4 2003.

## 2.3 Facilities and Accreditations

### 2.3.1 Facilities

Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L3572.

All measurement facilities used to collect the measurement data are located at 3/F, Electronic Testing Building, Shahe Road, Xili, Nanshan District, Shenzhen, 518055 P. R. China. The test site is constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22; the FCC registration number is 741109.

### 2.3.2 Test Environment Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature ( °C):	15 - 35
Relative Humidity (%):	30 -60
Atmospheric Pressure (kPa):	86-106

### 2.3.3 Measurement Uncertainty

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in Measurement" (GUM) published by ISO.

Uncertainty of Conducted Emission:	$\pm 1.8\text{dB}$
Uncertainty of Radiated Emission:	$\pm 3.1\text{dB}$

### **3. TEST CONDITIONS SETTING**

#### **3.1 Test Mode**

##### **1. Test Mode**

- (1) The first test mode (powered by AC adapter)

The EUT configuration of the emission tests is EUT + AC adapter + PC.

During the measurement, the EUT was powered by AC adapter and working normally but not transmitting power of RFID. The EUT was connected with a PC and controlled by the PC.

- (2) The second test mode (powered by POE)

The EUT configuration of the emission tests is EUT + POE + PC.

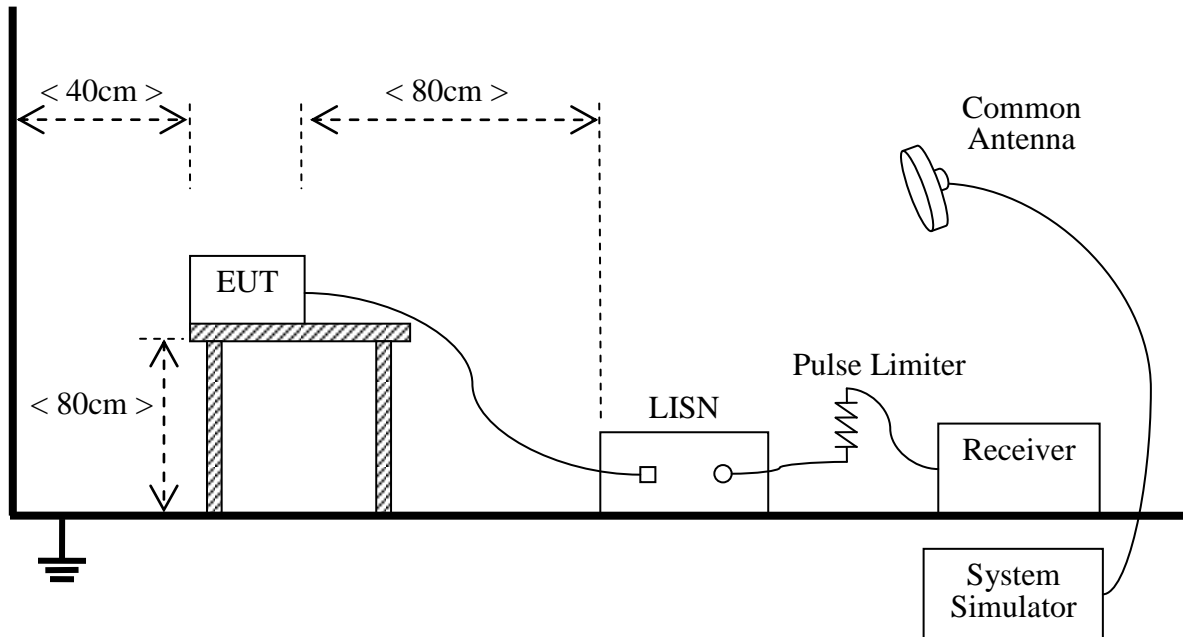
During the measurement, the EUT was powered by POE working normally but not transmitting power of RFID. The EUT was connected with a PC and controlled by the PC.

NOTE: all the profiles are performed, only the worst cases are recorded in this report.

### 3.2 Test Setup and Equipments List

#### 3.2.1 Conducted Emission

##### A. Test Setup:



The EUT is placed on a 0.8m high insulating table, which stands on the grounded conducting floor, and keeps 0.4m away from the grounded conducting wall. The EUT is connected to the power mains through a LISN which provides  $50\Omega/50\mu\text{H}$  of coupling impedance for the measuring instrument. The Common Antenna is used for the call between the EUT and the System Simulator (SS). A Pulse Limiter is used to protect the measuring instrument. The factors of the whole test system are calibrated to correct the reading.

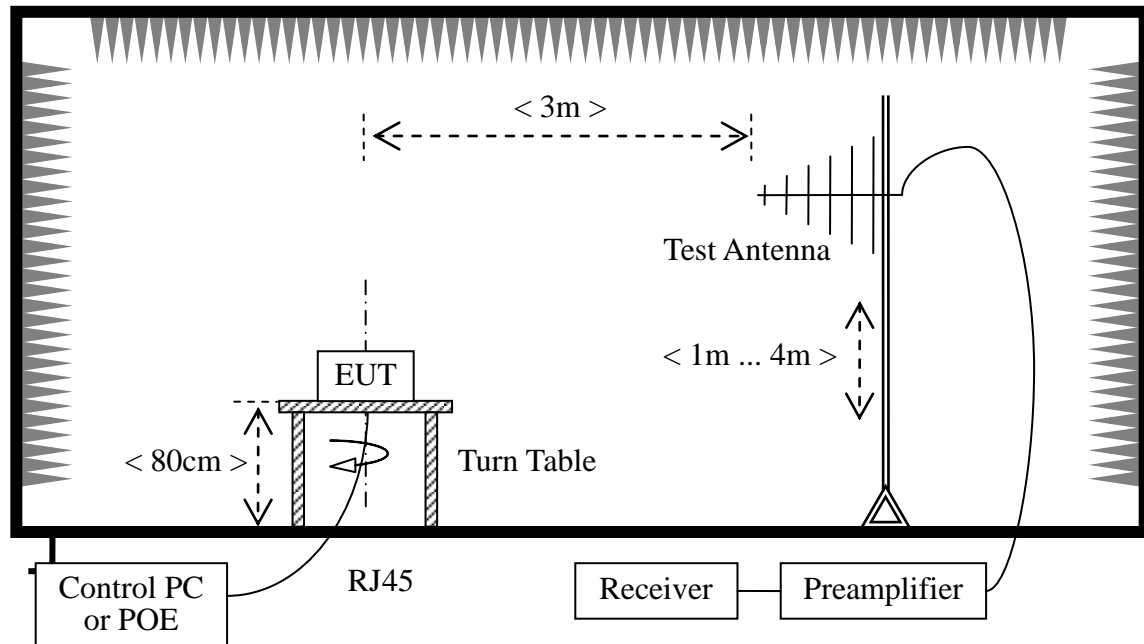
##### B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Receiver	Agilent	E7405A	US44210471	2009.09	2year
LISN	Schwarzbeck	NSLK 8127	812744	2009.09	2year
Pulse Limiter (20dB)	Schwarzbeck	VTSD 9561-D	9391	(n.a.)	(n.a.)
Personal Computer	DELL	(n,a)	(n.a)	(n.a.)	(n.a.)

#### 3.2.2 Radiated Emission

##### C. Test Setup:





The test is performed in a 3m Semi-Anechoic Chamber; the antenna factor, cable loss and so on of the site (factors) is calculated to correct the reading. The EUT is placed on a 0.8m high insulating Turn Table, and keeps 3m away from the Test Antenna, which is mounted on a variable-height antenna master tower. The Common Antenna is used for the call between the EUT and the System Simulator (SS).

#### D. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Receiver	Agilent	E7405A	US44210471	2009.09	2year
Semi-Anechoic Chamber	Albatross	9m*6m*6m	(n.a.)	2009.09	2year
Test Antenna - Bi-Log	Schwarzbeck	VULB 9163	9163-274	2009.09	2year
Test Antenna - Horn	Schwarzbeck	BBHA 9120C	9120C-384	2009.09	2year
Personal Computer	DELL	(n,a)	(n.a)	(n.a.)	(n.a.)

## 4. 47 CFR PART 15B REQUIREMENTS

### 4.1 Conducted Emission

#### 4.1.1 Requirement

According to FCC section 15.107, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 $\Omega$  line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dB $\mu$ V)	
	Quasi-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

NOTE:

- a) The limit subjects to the Class B digital device.
- b) The lower limit shall apply at the band edges.
- c) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

#### 4.1.2 Test Description

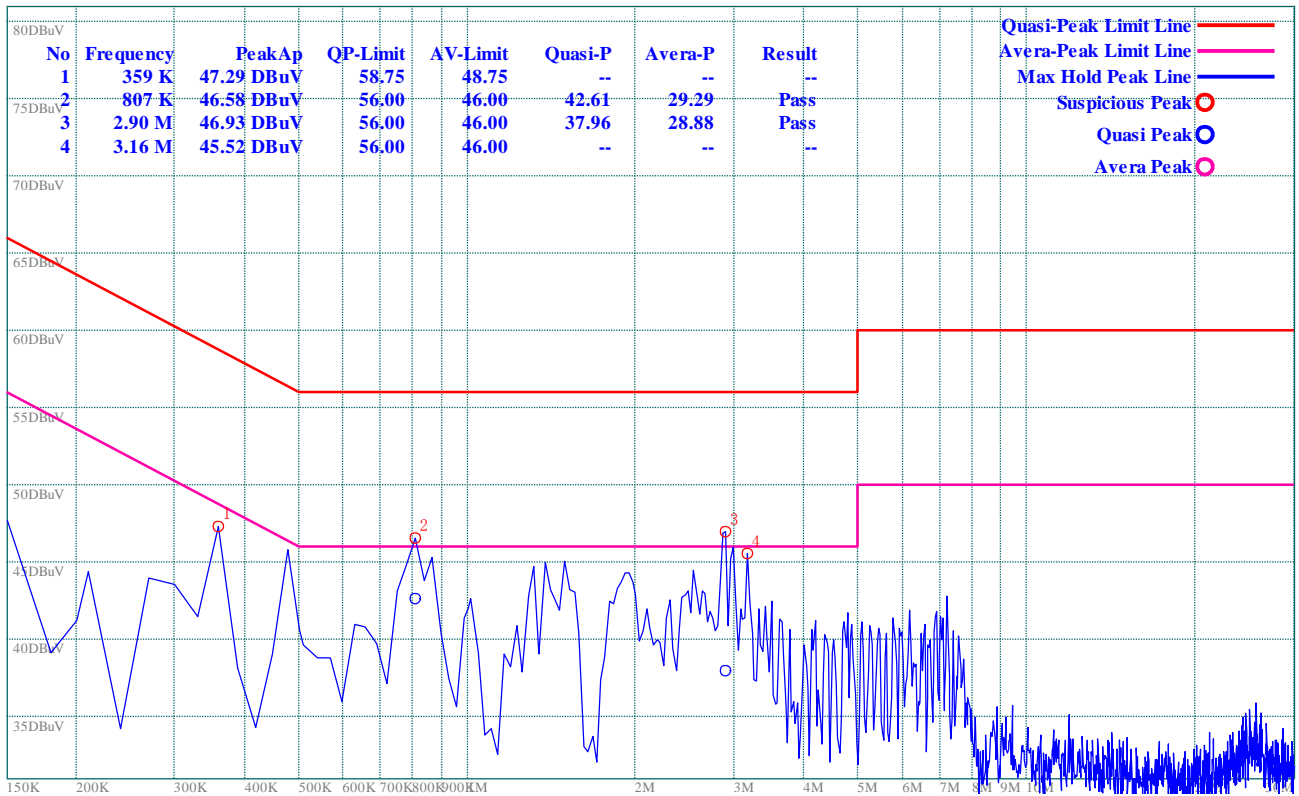
See section 3.2.1 of this report.

#### 4.1.3 Test Result

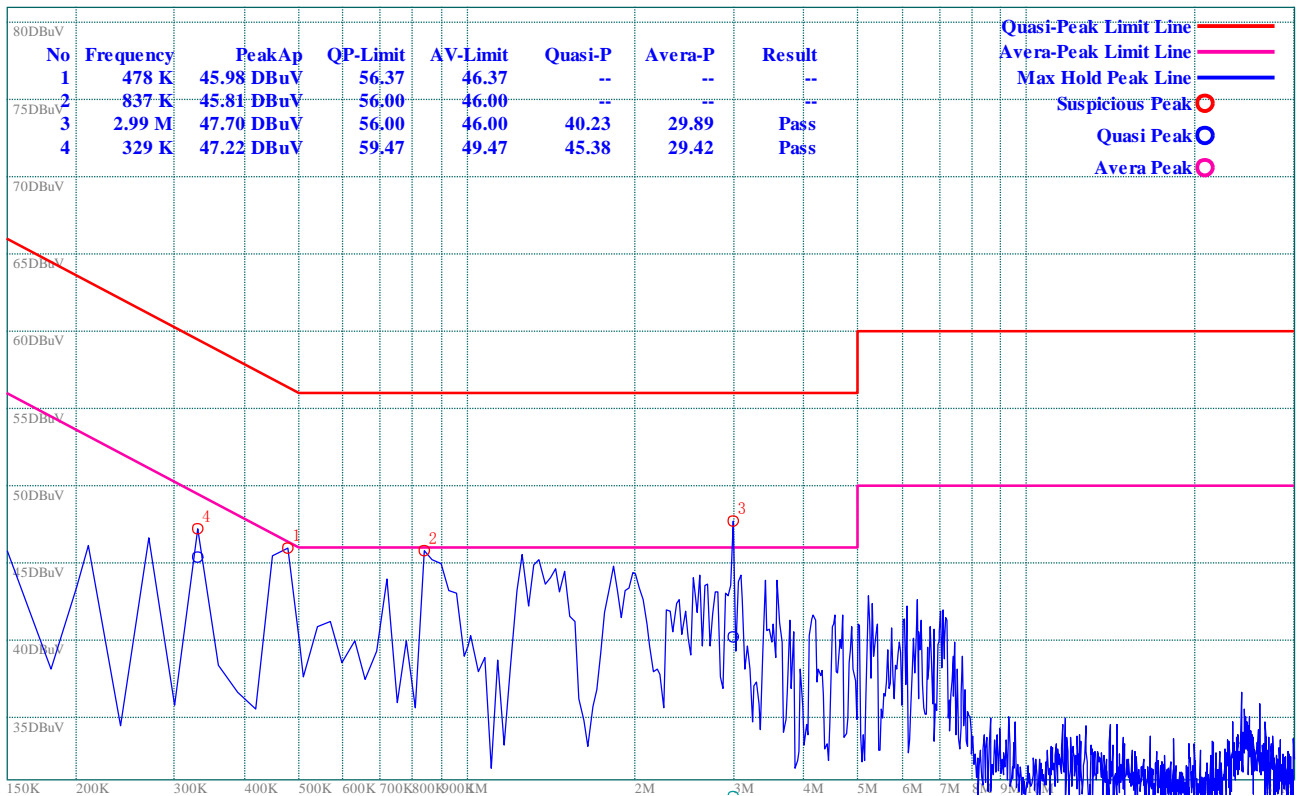
The maximum conducted interference is searched using Peak (PK), Quasi-peak (QP) and Average (AV) detectors; the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. All test modes are considered, refer to recorded points and plots below.

##### 4.1.3.1 the first test mode (powered by AC adapter)

##### A. Test Plot and Suspicious Points::



(Plot A: L Phase)



(Plot B: N Phase)

## 4.2 Radiated Emission

### 4.2.1 Requirement

According to FCC section 15.109, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency range (MHz)	Field Strength	
	$\mu\text{V/m}$	$\text{dB } \mu\text{V/m}$
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

NOTE:

- a)  $\text{Field Strength (dB } \mu\text{V/m)} = 20 * \log[\text{Field Strength (} \mu\text{V/m)}]$ .
- b) In the emission tables above, the tighter limit applies at the band edges.

### 4.2.2 Test Description

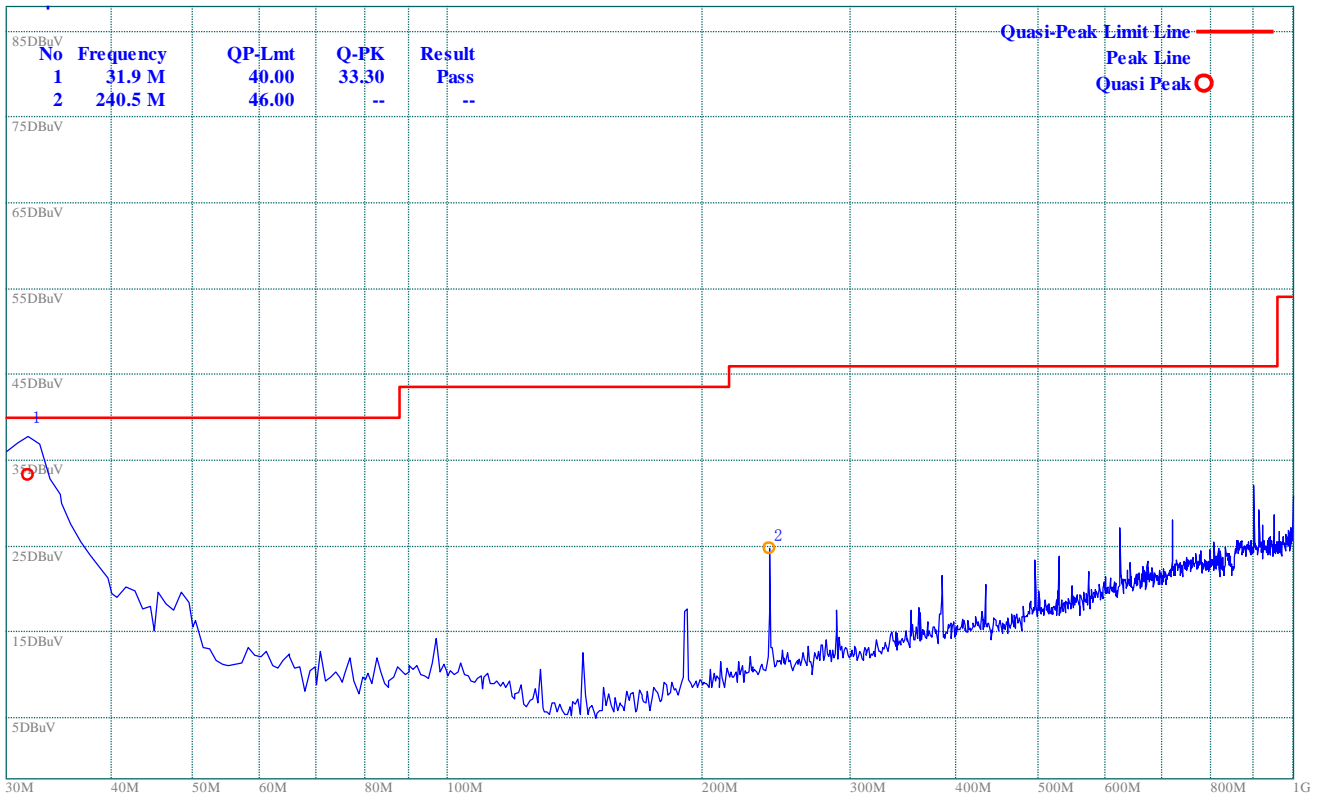
See section 3.2.2 of this report.

### 4.2.3 Test Result

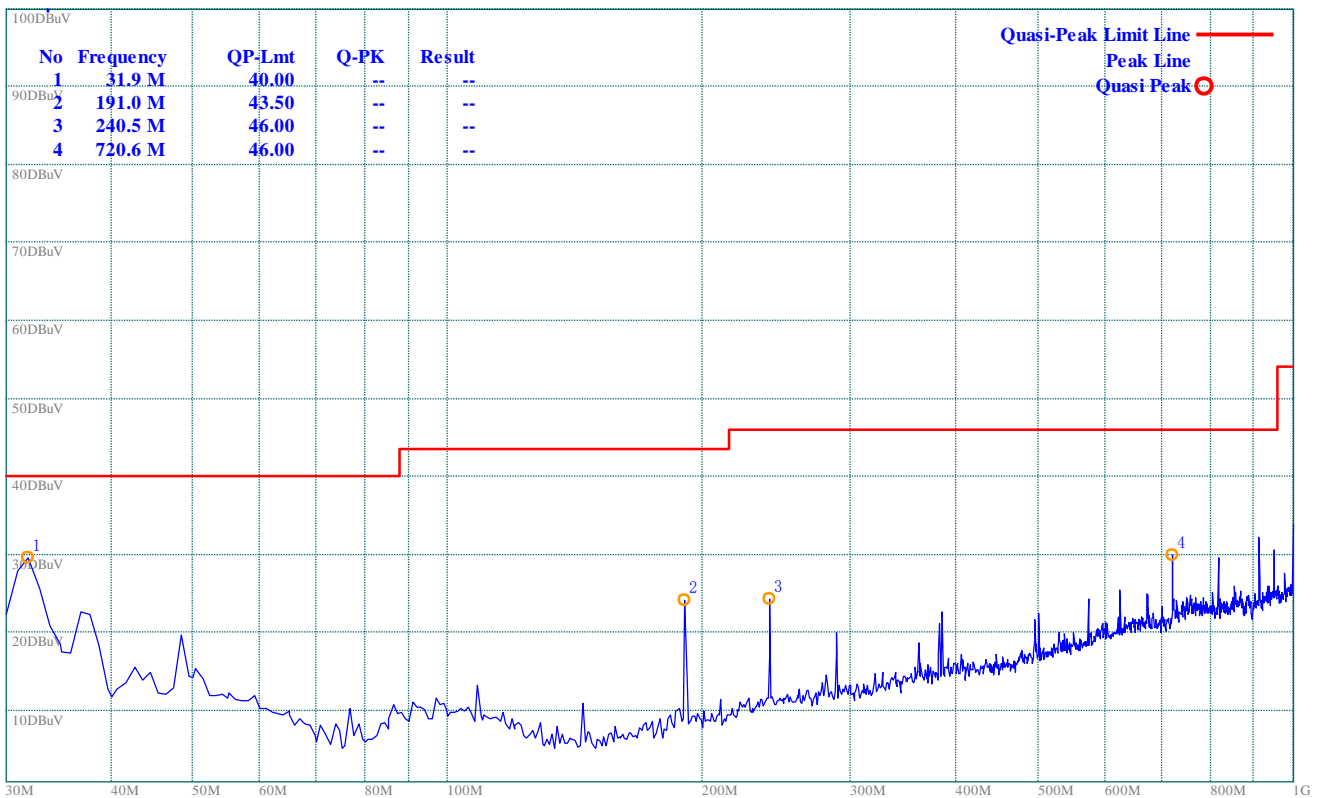
The maximum radiated emission is searched using PK, QP and AV detectors; the emission levels more than the limits, and that have narrow margins from the limits will be re-measured with AV and QP detectors. Both the vertical and the horizontal polarizations of the Test Antenna are considered to perform the tests. All test modes are considered, refer to recorded points and plots below.

#### 4.2.3.1 the first test mode (powered by AC adapter)

##### A. Test Plots and Suspicious Points:



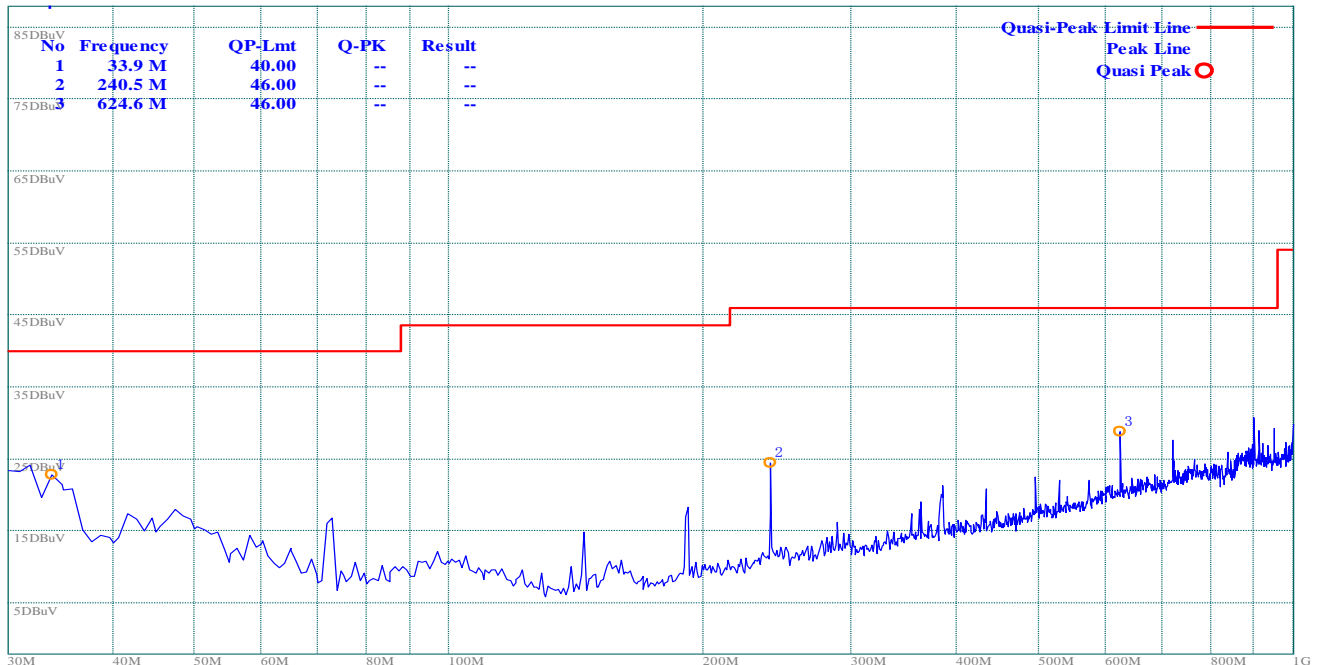
(Plot A: Test Antenna Vertical)



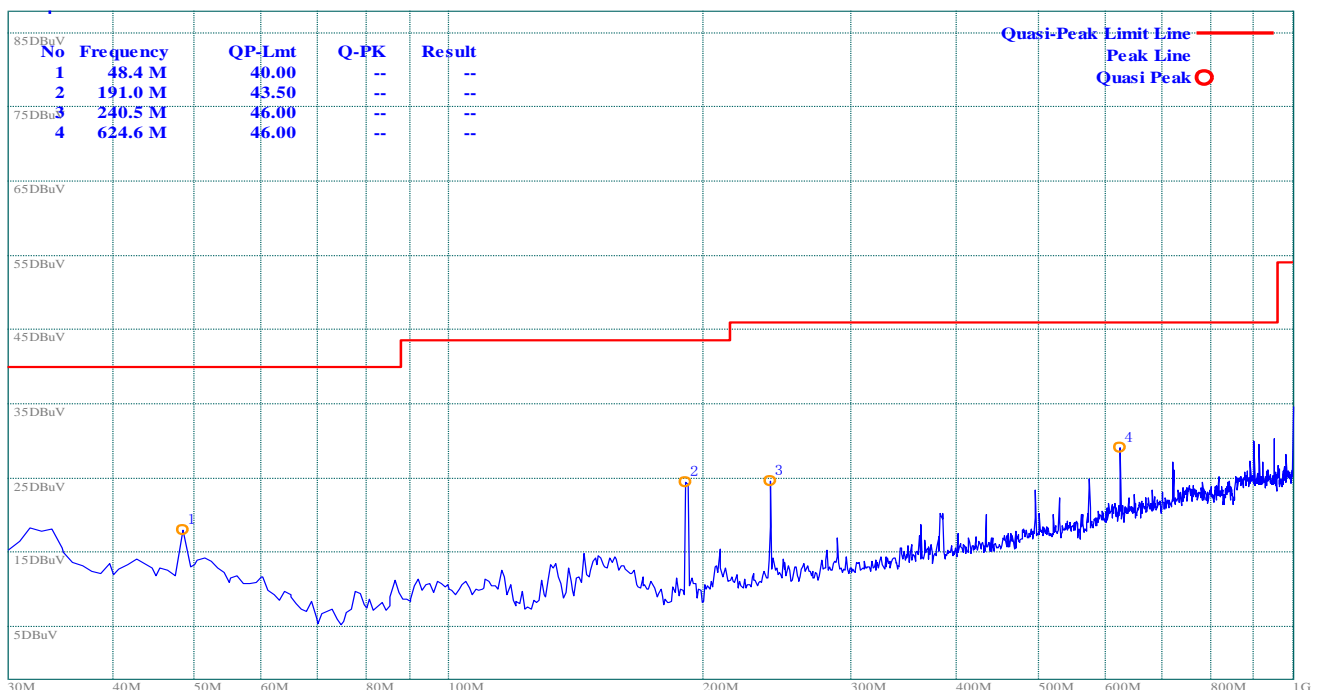
(Plot B: Test Antenna Horizontal)

### 4.2.3.2 The second test mode (powered by POE)

#### A. Test Plots and Suspicious Points:



(Plot A: Test Antenna Vertical)



(Plot B: Test Antenna Horizontal)

\*\* END OF REPORT \*\*