



# Radio Test Report

## FCC ID: RBWESY19M-HID5121

This report concerns (check one) :  Original Grant  Class II Change

**Issued Date** : Oct. 18, 2013  
**Project No.** : 1309222  
**Equipment** : Touch Computer  
**Test Model Name** : ESY19M1  
**Multiple Listing** : ESY19MX (X=0-9, A-Z or blank for marketing purpose and no impact Safety related critical components and constructions)  
  
**Applicant** : Elo Touch Solutions, Inc.  
**Address** : 1033 McCarthy Blvd, Milpitas, CA 95035, USA

**Tested by:** Neutron Engineering Inc. EMC Laboratory  
**Date of Receipt:** Sep. 25, 2013  
**Date of Test:** Sep. 25, 2013 ~ Oct. 04, 2013

**Testing Engineer:** Josh Lin  
 (Josh Lin)

**Technical Manager:** Jeff Yang  
 (Jeff Yang)

**Authorized Signatory:** Andy Chiu  
 (Andy Chiu)

**Neutron Engineering Inc.**  
 B1, No. 37, Lane 365, YangGuang St.,  
 NeiHu District 114, Taipei, Taiwan.  
 TEL: +886-2-2657-3299  
 FAX: +886-2-2657-3331



**Neutron Engineering Inc.****Declaration**

**Neutron** represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with the standards traceable to National Measurement Laboratory (**NML**) of **R.O.C.**, or National Institute of Standards and Technology (**NIST**) of **U.S.A.**

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**Limitation**

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.



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**REPORT ISSUED HISTORY**

| Revised Version No. | Description    | Issued Date   |
|---------------------|----------------|---------------|
| -                   | Initial Issue. | Oct. 18, 2013 |



## **Neutron Engineering Inc.**

### **1 CERTIFICATION**

Equipment : Touch Computer  
Brand Name : Elo Touch Solutions  
Test Model Name : ESY19M1  
Multiple Listing : ESY19MX (X=0-9, A-Z or blank for marketing purpose and no impact  
Safety related critical components and constructions)  
Applicant : Elo Touch Solutions, Inc.  
Date of Test : Sep. 25, 2013 ~ Oct. 04, 2013  
Standards : FCC Part 15, Subpart C: 2012  
ANSI C63.4: 2009

The above equipment has been tested and found compliance with the requirement of the relative standards by Neutron Engineering Inc. EMC Laboratory.  
The test data, data evaluation, and equipment configuration contained in our test report (Ref No. NEI-FCCP-1-1309222) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of TAF according to the ISO-17025 quality assessment standard and technical standard(s).



## 2 SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

| Standard Section                 | Test Item           | Result      |
|----------------------------------|---------------------|-------------|
| 15.207                           | Conducted emission  | <b>PASS</b> |
| 15.35 / 15.205 / 15.209 / 15.225 | Radiated emission   | <b>PASS</b> |
| 15.225(e)                        | Frequency Stability | <b>PASS</b> |
| 15.203                           | Antenna Requirement | <b>PASS</b> |

NOTE:

1. **N/A**: denotes test is not applicable in this Test Report



**2.1 TEST FACILITY**

The test facilities used to collect the test data in this report:

**Conducted emission Test:**

**C02:** (VCCI RN: C-3477; FCC RN: 614388; FCC DN: TW1054)  
1F., No. 61, Ln. 77, Sing-ai Rd., Neihu Dist., Taipei City 114, Taiwan (R.O.C.)

**Radiated emission Test:**

**CB08:** (FCC RN: 614388; FCC DN: TW1054; IC Assigned Code: 4428C-1)  
1F., No. 61, Ln. 77, Sing-ai Rd., Neihu Dist., Taipei City 114, Taiwan (R.O.C.)

**2.2 MEASUREMENT UNCERTAINTY**

**The measurement uncertainty is not specified by FCC rules and for reference only.**

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%**.

The measurement instrumentation uncertainty considerations contained in CISPR 16-4-2.

**A. Conducted emission test:**

| Test Site | Measurement Frequency Range | U , (dB) | NOTE |
|-----------|-----------------------------|----------|------|
| C02       | 150 kHz ~ 30 MHz            | 2.59     |      |

**B. Radiated emission test:**

| Test Site | Item                    | Measurement Frequency Range | Uncertainty   | NOTE    |  |
|-----------|-------------------------|-----------------------------|---------------|---------|--|
| CB08      | Radiated emission at 3m | Horizontal Polarization     | 30 - 200MHz   | 3.35 dB |  |
|           |                         |                             | 200 - 1000MHz | 3.11 dB |  |
|           |                         |                             | 1 - 18GHz     | 3.97 dB |  |
|           |                         |                             | 18 - 40GHz    | 4.01 dB |  |
|           |                         | Vertical Polarization       | 30 - 200MHz   | 3.22 dB |  |
|           |                         |                             | 200 - 1000MHz | 3.24 dB |  |
|           |                         |                             | 1 - 18GHz     | 4.05 dB |  |
|           |                         |                             | 18 - 40GHz    | 4.04 dB |  |

Our calculated Measurement Instrumentation Uncertainty is shown in the tables above. These are our  $U_{lab}$  values in CISPR 16-4-2 terminology.

Since Table 1 of CISPR 16-4-2 has values of measurement instrumentation uncertainty, called  $U_{CISPR}$ , as follows:

Conducted Disturbance (mains port) – 150 kHz – 30 MHz : 3.6 dB

Radiated Disturbance (electric field strength on an open area test site or alternative test site) – 30 MHz – 1000 MHz : 5.2 dB

It can be seen that our  $U_{lab}$  values are smaller than  $U_{CISPR}$ .



**3 GENERAL INFORMATION**

**3.1 GENERAL DESCRIPTION OF EUT**

|                        |  |              |
|------------------------|--|--------------|
| Equipment              | Touch Computer   |              |
| Brand Name             | Elo Touch Solutions  |              |
| Test Model Name        | ESY19M1  |              |
| Multiple Listing       | ESY19MX (X=0-9, A-Z or blank for marketing purpose and no impact Safety related critical components and constructions)   |              |
| OEM Brand/Model Name   | N/A  |              |
| Model Difference       | Models' differences between each other only the changes of model name which do not affect the EMI performance.<br>Model ESY19M1 was used for final testing and collecting test data included in this report.   |              |
| Product Description    | The EUT is a Touch Computer.   |              |
|                        | Operation Frequency:   | 13.56 MHz    |
|                        | Antenna Designation:   | LOOP Antenna |
|                        | More details of EUT technical specification, please refer to the User's Manual.  |              |
| Power Source           | DC Voltage supplied from External Power Supply.  |              |
| Power Rating           | 1. EUT: I/P: DC 12V 6A<br>2. External Power Supply:<br>(1) XP, AHM85PS12<br>I/P: AC 100-240V 1.0A 50/60Hz / O/P: DC 12V 7.08A<br>(2) Elo Touch Solutions, FSP110-RAAM<br>I/P: AC 100-240V 50-60Hz 0.8A / O/P: DC 12V 9.17A   |              |
| Connecting I/O Port(s) | Please refer to the User's Manual  |              |
| Products Covered       | 1 * Mother Board: KONTRON, COMe-cPV2XT<br>1 * CPU: Intel, Atom D525, 1.80 GHz<br>2 * Memory: 2 GB<br>1 * SSD: 64 GB<br>1 * HID 5121 Omnikey RFID + Smart Card Reader<br>1 * External Power Supply (optional):<br>(1) XP, AHM85PS12<br>(2) Elo Touch Solutions, FSP110-RAAM |              |
| EUT Modification(s)    | N/A  |              |

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.





**3.2 DESCRIPTION OF TEST MODES**

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

| Pretest Test Mode | Description  |
|-------------------|--------------|
| Mode 1            | Transmitting |

**Conducted emission test**

| Final Test Mode | Description  |
|-----------------|--------------|
| Mode 1          | Transmitting |

**Radiated emission test**

| Final Test Mode | Description  |
|-----------------|--------------|
| Mode 1          | Transmitting |

**Frequency Stability test**

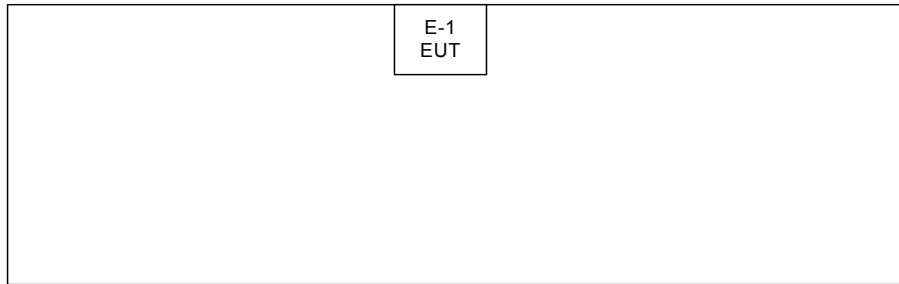
| Final Test Mode | Description  |
|-----------------|--------------|
| Mode 1          | Transmitting |

**Antenna Requirement test**

| Final Test Mode | Description  |
|-----------------|--------------|
| Mode 1          | Transmitting |



**3.3 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED**



**Neutron Engineering Inc.****3.4 DESCRIPTION OF SUPPORT UNITS**

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      | Mfr/Brand           | Model/Type No. | FCC ID            | Series No. | Note |
|------|----------------|---------------------|----------------|-------------------|------------|------|
| E-1  | Touch Computer | Elo Touch Solutions | ESY19M1        | RBWESY19M-HID5121 | N/A        | EUT  |

| Item | Shielded Type | Ferrite Core | Length | Note |
|------|---------------|--------------|--------|------|
| N/A  | -             | -            | -      | -    |

**Note:**

- (1) The support equipment was authorized by Declaration of Conformity (DOC).



**4 CONDUCTED EMISSION**

**4.1 LIMITS**

| FREQUENCY (MHz) | Class A (dBuV) |         | Class B (dBuV) |           |
|-----------------|----------------|---------|----------------|-----------|
|                 | Quasi-peak     | Average | Quasi-peak     | Average   |
| 0.15 - 0.5      | 79.00          | 66.00   | 66 - 56 *      | 56 - 46 * |
| 0.50 - 5.0      | 73.00          | 60.00   | 56.00          | 46.00     |
| 5.0 - 30.0      | 73.00          | 60.00   | 60.00          | 50.00     |

NOTE:

1. The tighter limit applies at the band edges.
2. The limit of " \* " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.
3. The test result calculated as following:  
 Measurement Value = Reading Level + Correct Factor  
 Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor(if use)  
 Margin Level = Measurement Value – Limit Value

**4.2 MEASUREMENT INSTRUMENTS LIST**

| Item | Kind of Equipment    | Manufacturer | Type No.                | Serial No. | Calibrated until |
|------|----------------------|--------------|-------------------------|------------|------------------|
| 1    | LISN                 | Schwarzbeck  | NSLK 8127               | 8127685    | Jun. 03, 2014    |
| 2    | Test Cable           | TIMES        | CFD300-NL               | 130        | Jun. 13, 2014    |
| 3    | EMI Test Receiver    | Agilent      | N9038A                  | MY51210215 | Feb. 24, 2014    |
| 4    | TRANSIENT LIMITER    | EM           | EM-7600                 | 772        | Aug. 21, 2014    |
| 5    | Measurement Software | EZ           | EZ_EMG (Version NB-03A) | N/A        | N/A              |

NOTE: **N/A**: denotes No Model Name, No Serial No. or No Calibration specified.

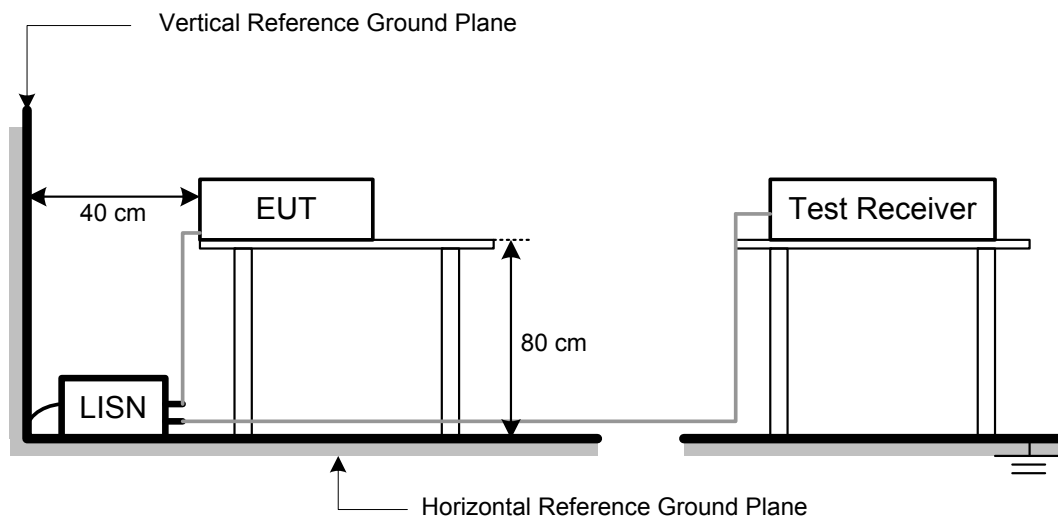
**4.3 TEST PROCEDURES**

- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected 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.
- b. 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 40 cm long.
- c. 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.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

**NOTE:**

- a. Reading in which marked as Peak, QP or AVG means measurements by using are Quasi-Peak or Average Mode with Detector BW=9 kHz (6 dB Bandwidth).
- b. All readings are Peak Mode value unless otherwise stated QP or AVG in column of Note. If the Peak or QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only Peak or QP Mode was measured, but AVG Mode didn't perform.

**4.4 TEST SETUP LAYOUT**



**4.5 DEVIATION FROM TEST STANDARD**

No deviation



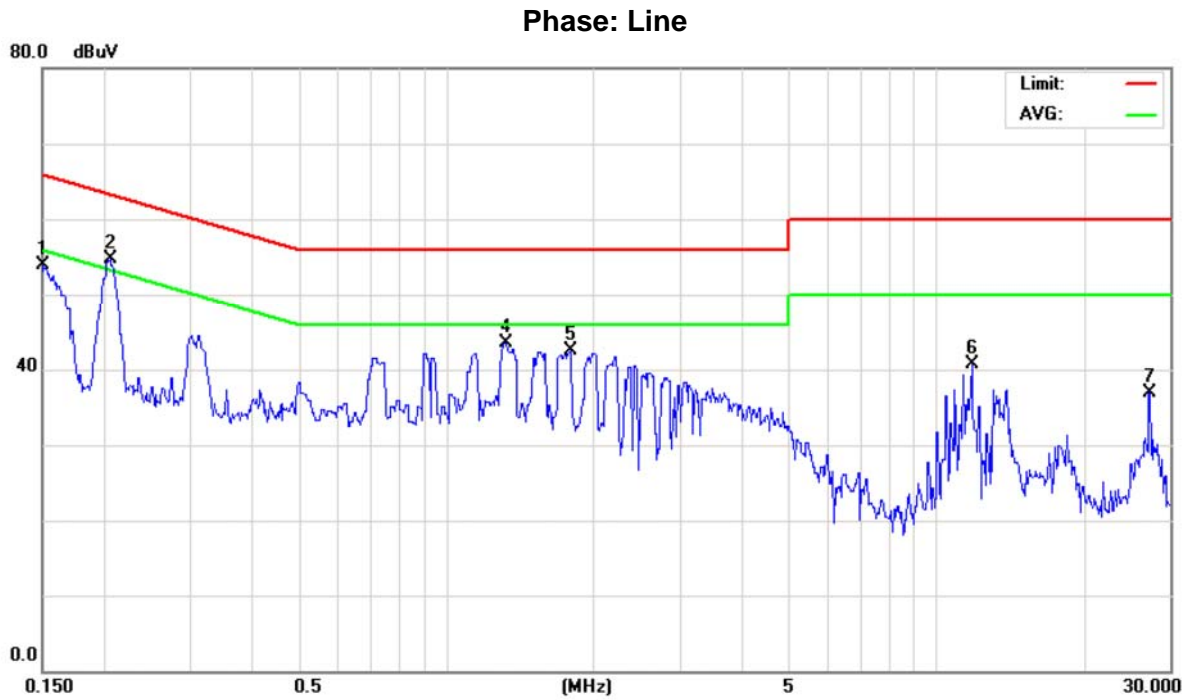
#### **4.6 EUT OPERATING CONDITIONS**

The EUT used during radiated and/or conducted emission measurement was designed to exercise in a manner similar to a typical use.



**4.7 TEST RESULTS**

|              |                |                   |         |
|--------------|----------------|-------------------|---------|
| EUT          | Touch Computer | Model Name        | ESY19M1 |
| Temperature  | 24°C           | Relative Humidity | 48%     |
| Test Voltage | AC 120V/60Hz   |                   |         |
| Test Mode    | Transmitting   |                   |         |

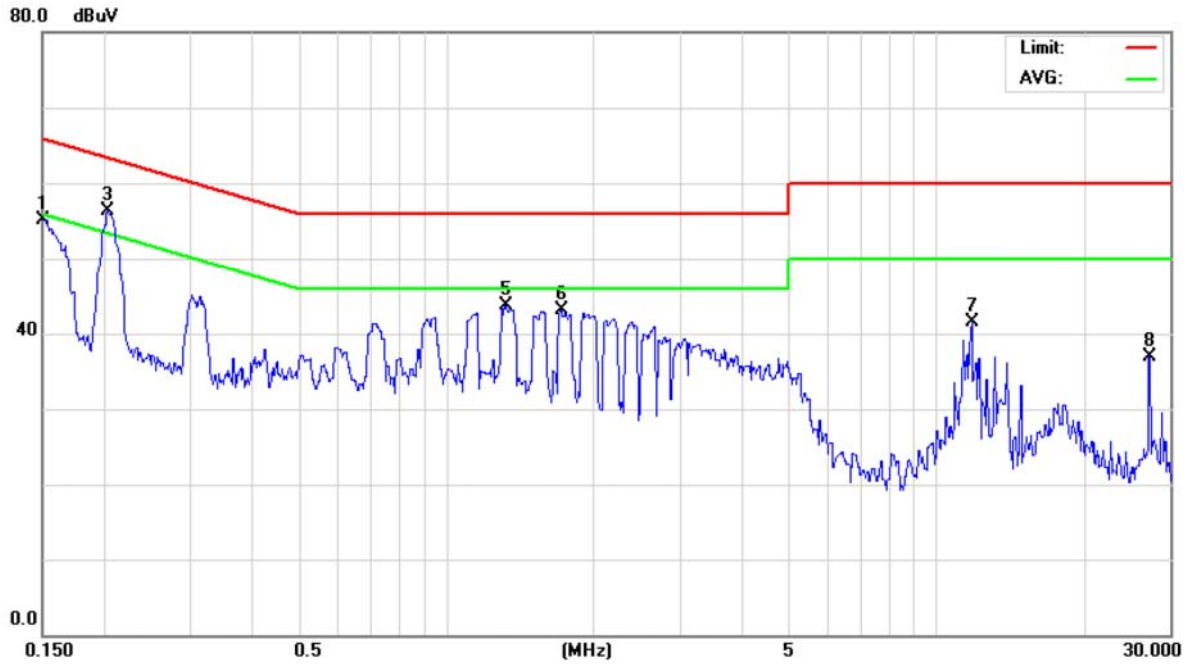


| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV | Limit<br>dBuV | Over<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|--------------------------|---------------|------------|----------|---------|
| 1   |     | 0.1500       | 45.22                    | 8.68                    | 53.90                    | 66.00         | -12.10     | peak     |         |
| 2   | *   | 0.2059       | 45.39                    | 9.40                    | 54.79                    | 63.37         | -8.58      | peak     |         |
| 3   |     | 0.2059       | 27.82                    | 9.40                    | 37.22                    | 53.37         | -16.15     | AVG      |         |
| 4   |     | 1.3189       | 33.85                    | 9.57                    | 43.42                    | 56.00         | -12.58     | peak     |         |
| 5   |     | 1.7959       | 33.07                    | 9.41                    | 42.48                    | 56.00         | -13.52     | peak     |         |
| 6   |     | 11.8000      | 31.36                    | 9.35                    | 40.71                    | 60.00         | -19.29     | peak     |         |
| 7   |     | 27.1498      | 27.25                    | 9.64                    | 36.89                    | 60.00         | -23.11     | peak     |         |



|              |                |                   |         |
|--------------|----------------|-------------------|---------|
| EUT          | Touch Computer | Model Name        | ESY19M1 |
| Temperature  | 24°C           | Relative Humidity | 48%     |
| Test Voltage | AC 120V/60Hz   |                   |         |
| Test Mode    | Transmitting   |                   |         |

**Phase: Neutral**



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV | Limit<br>dBuV | Over<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|--------------------------|---------------|------------|----------|---------|
| 1   |     | 0.1500       | 46.45                    | 8.68                    | 55.13                    | 66.00         | -10.87     | peak     |         |
| 2   |     | 0.1500       | 33.33                    | 8.68                    | 42.01                    | 56.00         | -13.99     | AVG      |         |
| 3   | *   | 0.2038       | 45.91                    | 10.40                   | 56.31                    | 63.45         | -7.14      | peak     |         |
| 4   |     | 0.2038       | 27.85                    | 10.40                   | 38.25                    | 53.45         | -15.20     | AVG      |         |
| 5   |     | 1.3189       | 34.11                    | 9.57                    | 43.68                    | 56.00         | -12.32     | peak     |         |
| 6   |     | 1.7149       | 33.62                    | 9.44                    | 43.06                    | 56.00         | -12.94     | peak     |         |
| 7   |     | 11.8000      | 32.12                    | 9.35                    | 41.47                    | 60.00         | -18.53     | peak     |         |
| 8   |     | 27.1498      | 27.27                    | 9.64                    | 36.91                    | 60.00         | -23.09     | peak     |         |





**5 RADIATED EMISSION**

**5.1 LIMITS**

| <b>FCC Part 15.209</b>            |                           |      |  |                         |
|-----------------------------------|---------------------------|------|--|-------------------------|
| Frequency (MHz)                   | Field Strength Limitation |      | Field Strength Limitation at 3m Measurement Dist |                         |
|                                   | (uV/m)                    | Dist | (uV/m)   | (dBuV/m)                |
| 0.009 – 0.490                     | 2400 / F(KHz)             | 300m | 10000 * 2400/F(KHz)                              | 20log 2400/F(KHz) + 80  |
| 0.490 – 1.705                     | 24000 / F(KHz)            | 30m  | 100 * 24000/F(KHz)                               | 20log 24000/F(KHz) + 40 |
| 1.705 – 30.00                     | 30                        | 30m  | 100* 30  | 20log 30 + 40           |
| 30.0 – 88.0                       | 100                       | 3m   | 100  | 20log 100               |
| 88.0 – 216.0                      | 150                       | 3m   | 150  | 20log 150               |
| 216.0 – 960.0                     | 200                       | 3m   | 200  | 20log 200               |
| Above 960.0                       | 500                       | 3m   | 500  | 20log 500               |
| <b>FCC Part 15.225(a)/(b)/(c)</b> |                           |      |  |                         |
| Frequency (MHz)                   | Field Strength Limitation |      | Field Strength Limitation at 3m Measurement Dist |                         |
|                                   | (uV/m)                    | Dist | (uV/m)   | (dBuV/m)                |
| 13.553 – 13.567                   | 15,848                    | 30 m | 15,848*100                                       | 124                     |
| 13.567 – 13.710                   | 334                       | 30 m | 334*100  | 90.5                    |
| 13.110 – 13.410                   | 106                       | 30 m | 106*100  | 80.5                    |
| 13.710 – 14.010                   |                           |      |  |                         |

**NOTE:**

- (1) The tighter limit shall apply at the boundary between two frequency range.
- (2) Limitation expressed in dBuV/m is calculated by 20log Emission Level (uV/m).
- (3) If measurement is made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula of  $L_{d1} = L_{d2} * (d_2/d_1)^2$ .  
 Example:  
 F.S Limit at 30m distance is 30uV/m , then F.S Limitation at 3m distance is adjusted as  $L_{d1} = L_1 = 30uV/m * (10)^2 = 100 * 30 uV/m$
- (4) The test result calculated as following:  
 Measurement Value = Reading Level + Correct Factor  
 Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor(if use)  
 Margin Level = Measurement Value – Limit Value



**5.2 MEASUREMENT INSTRUMENTS LIST**

| Item | Kind of Equipment         | Manufacturer | Type No.     | Serial No. | Calibrated until |
|------|---------------------------|--------------|--------------|------------|------------------|
| 1    | Spectrum Analyzer         | R&S          | FSP-30       | 100854     | Sep. 08, 2014    |
| 2    | Test Cable                | LMR          | LMR-400      | 12m        | May. 14, 2014    |
| 3    | Test Cable                | LMR          | LMR-400      | 3m         | May. 14, 2014    |
| 4    | Pre-Amplifier             | Anritsu      | MH648A       | M92649     | Jun. 18, 2014    |
| 5    | Log-Bicon Antenna         | Schwarzbeck  | VULB9168-352 | 9168-352   | Jun. 11, 2014    |
| 6    | Preamplifier With Adaptor | EMC          | EMC2654045   | 980030     | Feb. 18, 2014    |
| 7    | Horn Antenna              | Schwarzbeck  | BBHA 9170    | 187        | Dec. 24, 2013    |
| 8    | Loop Ant.                 | EMCO         | 6502         | 00042960   | Sep. 29,2014     |

Remark: "N/A" denotes No Model Name, No Serial No. or No Calibration specified.

**5.3 TEST PROCEDURE**

- a. 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.
- b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m or 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The height of the equipment or of the substitution antenna shall be 0.8 m; 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.
- d. The initial step in collecting radiated 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.
- e. 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.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

**NOTE: (FCC PART 15.209)**

- a. Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode with Detector BW=120 kHz.
- b. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.

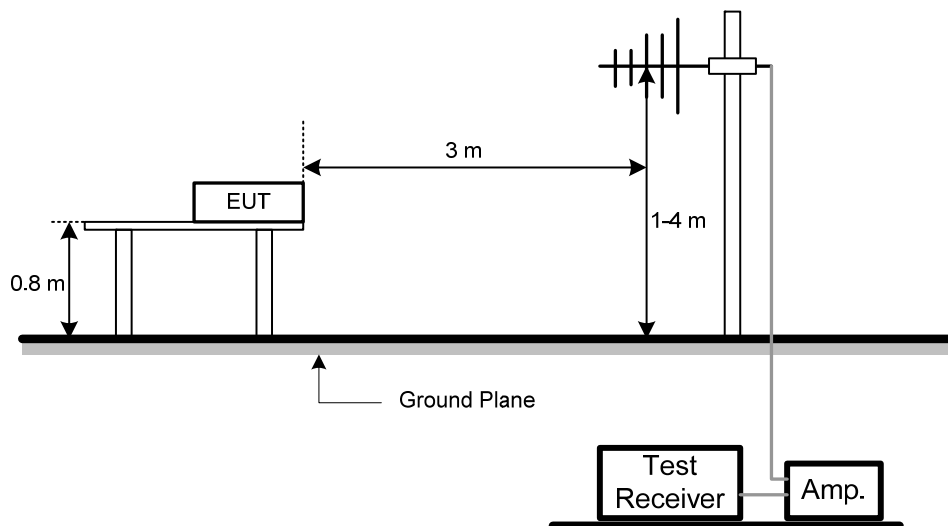
**NOTE: (FCC PART 15.225)**

- a. Spectrum Setting:
  - 9 KHz – 150 KHz, RBW= 200Hz, VBW=200Hz, Sweep time = 200 ms.
  - 150 K Hz – 30 MHz, RBW= 10 KHz, VBW=10 KHz, Sweep time = 200 ms.
  - 30 MHz – 1000 MHz, RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms.
- b. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.
- c. The Log-Bicon Antenna will use to test frequency range from 30MHz to 1000MHz and the Loop Antenna will use to test frequency below 30MHz.

#### 5.4 DEVIATION FROM TEST STANDARD

No deviation

#### 5.5 TEST SETUP





## **Neutron Engineering Inc.**

### **5.6 EUT OPERATING CONDITIONS**

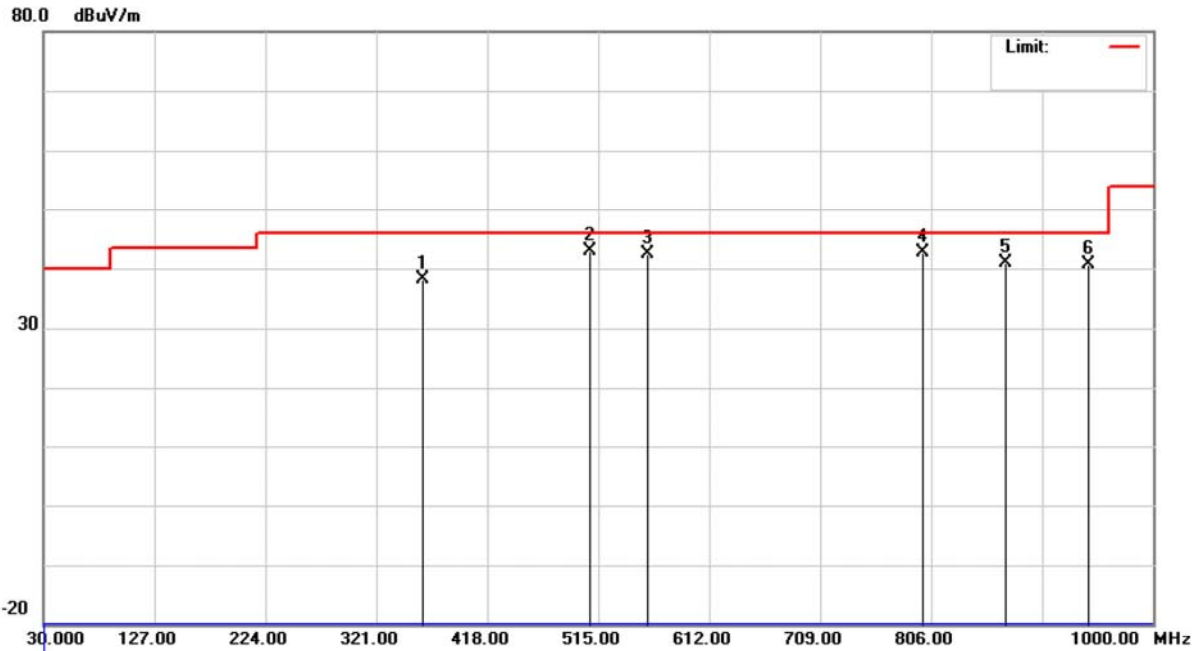
The EUT tested system was configured as the statements of **4.1.6** Unless otherwise a special operating condition is specified in the follows during the testing.



**5.7 TEST RESULTS- FCC PART 15.209**

|              |                |                   |         |
|--------------|----------------|-------------------|---------|
| EUT          | Touch Computer | Model Name        | ESY19M1 |
| Temperature  | 26 °C          | Relative Humidity | 60%     |
| Test Voltage | AC 120V/60Hz   |                   |         |
| Test Mode    | Transmitting   |                   |         |

**Polarization: Vertical**

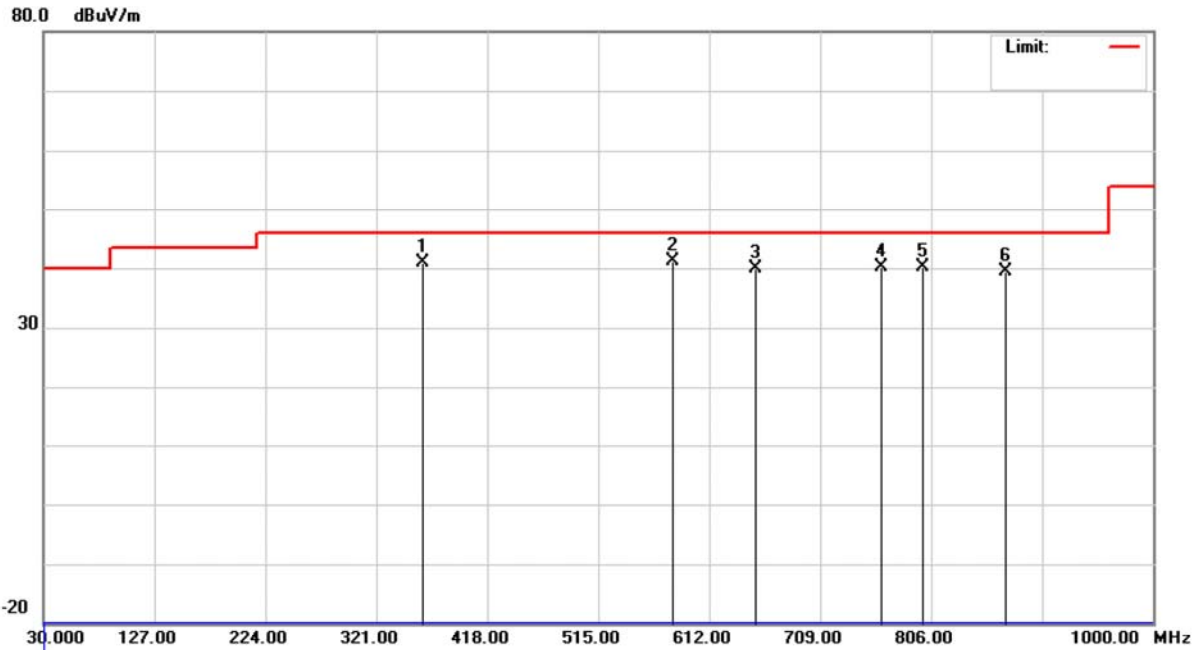


| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|----------|---------|
| 1   |     | 362.2250     | 50.35                    | -12.31                  | 38.04                      | 46.00           | -7.96      | peak     |         |
| 2   | *   | 507.7250     | 52.08                    | -9.29                   | 42.79                      | 46.00           | -3.21      | peak     |         |
| 3   |     | 558.6500     | 50.40                    | -7.97                   | 42.43                      | 46.00           | -3.57      | peak     |         |
| 4   |     | 798.7249     | 47.49                    | -4.85                   | 42.64                      | 46.00           | -3.36      | peak     |         |
| 5   |     | 871.4749     | 44.65                    | -3.88                   | 40.77                      | 46.00           | -5.23      | peak     |         |
| 6   |     | 944.2249     | 43.22                    | -2.53                   | 40.69                      | 46.00           | -5.31      | peak     |         |



|              |                |                   |         |
|--------------|----------------|-------------------|---------|
| EUT          | Touch Computer | Model Name        | ESY19M1 |
| Temperature  | 26 °C          | Relative Humidity | 60%     |
| Test Voltage | AC 120V/60Hz   |                   |         |
| Test Mode    | Transmitting   |                   |         |

**Polarization: Horizontal**

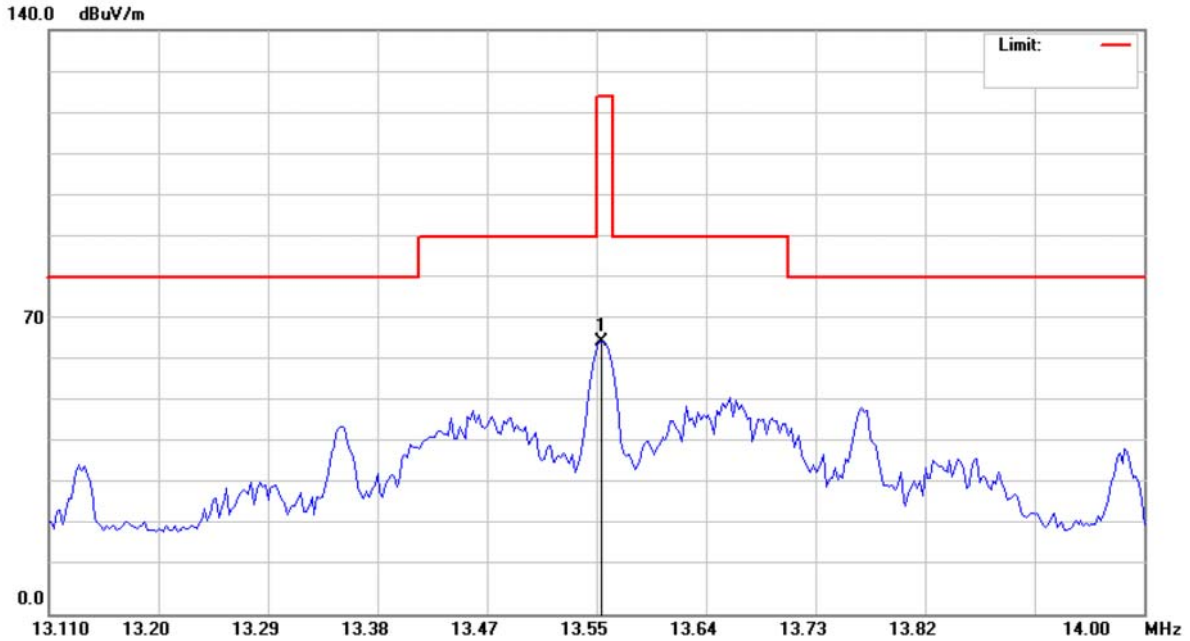


| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|----------|---------|
| 1   |     | 362.2250     | 53.28                    | -12.31                  | 40.97                      | 46.00           | -5.03      | peak     |         |
| 2   | *   | 580.4749     | 48.52                    | -7.33                   | 41.19                      | 46.00           | -4.81      | peak     |         |
| 3   |     | 653.2249     | 46.75                    | -6.86                   | 39.89                      | 46.00           | -6.11      | peak     |         |
| 4   |     | 762.3499     | 45.30                    | -5.22                   | 40.08                      | 46.00           | -5.92      | peak     |         |
| 5   |     | 798.7249     | 44.87                    | -4.85                   | 40.02                      | 46.00           | -5.98      | peak     |         |
| 6   |     | 871.4749     | 43.15                    | -3.88                   | 39.27                      | 46.00           | -6.73      | peak     |         |



**5.8 TEST RESULTS- FCC PART 15.225**

|              |                |                   |         |
|--------------|----------------|-------------------|---------|
| EUT          | Touch Computer | Model Name        | ESY19M1 |
| Temperature  | 26 °C          | Relative Humidity | 60%     |
| Test Voltage | AC 120V/60Hz   |                   |         |
| Test Mode    | Transmitting   |                   |         |



| No. | Mk. | Freq.   | Reading Level | Correct Factor | Measurement | Limit  | Over   | Detector | Comment |
|-----|-----|---------|---------------|----------------|-------------|--------|--------|----------|---------|
|     |     | MHz     | dBuV          | dB             | dBuV/m      | dBuV/m | dB     |          |         |
| 1   | *   | 13.5594 | 54.17         | 11.18          | 65.35       | 124.0  | -58.65 | peak     |         |



|              |                |                   |         |
|--------------|----------------|-------------------|---------|
| EUT          | Touch Computer | Model Name        | ESY19M1 |
| Temperature  | 26 °C          | Relative Humidity | 60%     |
| Test Voltage | AC 120V/60Hz   |                   |         |
| Test Mode    | Transmitting   |                   |         |



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|----------|---------|
| 1   | *   | 27.1200      | 12.42                    | 9.92                    | 22.34                      | 69.54           | -47.20     | peak     |         |





## 6 FREQUENCY STABILITY

### 6.1 LIMITS

#### FCC Part 15.225(e)

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.

### 6.2 MEASUREMENT INSTRUMENTS LIST

| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
|------|-------------------|--------------|----------|------------|------------------|
| 1    | Spectrum Analyzer | R&S          | FSP-30   | 100854     | Sep. 08, 2014    |

Remark: "N/A" denotes No Model Name, No Serial No. or No Calibration specified.

### 6.3 TEST PROCEDURE

- a. The equipment under test was connected to an external AC power supply and the RF output was connected to a frequency counter via feed through attenuators. The EUT was placed inside the temperature chamber.  
After the temperature stabilized for approximately 20 minutes, the frequency of the output signal was recorded from the counter.
- b. At room temperature ( $25\pm 5^{\circ}\text{C}$ ), an external variable AC power supply was connected to the EUT. The frequency of the transmitter was measured for 115%, 100% and 85% of the nominal operating input voltage.

### 6.4 DEVIATION FROM TEST STANDARD

No deviation

### 6.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.



**6.6 TEST RESULTS**

|              |                |                   |         |
|--------------|----------------|-------------------|---------|
| EUT          | Touch Computer | Model Name        | ESY19M1 |
| Temperature  | 26 °C          | Relative Humidity | 60%     |
| Test Voltage | AC 120V/60Hz   |                   |         |
| Test Mode    | Transmitting   |                   |         |

**Frequency Stability Versus Environmental Temperature**

|        | Temperature (°C) | Voltage (AC) | Frequency (MHz) | Frequency Error (kHz) | Limit (kHz) | Result |
|--------|------------------|--------------|-----------------|-----------------------|-------------|--------|
|        | 20               | 120V         | 13.55954        |                       |             |        |
| 0 min  | 50               | 120V         | 13.55954        | 0.000                 | +/- 1.356   | PASS   |
|        | -20              | 120V         | 13.55958        | 0.040                 | +/- 1.356   | PASS   |
| 2 min  | 50               | 120V         | 13.55954        | 0.000                 | +/- 1.356   | PASS   |
|        | -20              | 120V         | 13.55958        | 0.040                 | +/- 1.356   | PASS   |
| 5 min  | 50               | 120V         | 13.55954        | 0.000                 | +/- 1.356   | PASS   |
|        | -20              | 120V         | 13.55960        | 0.060                 | +/- 1.356   | PASS   |
| 10 min | 50               | 120V         | 13.55956        | 0.020                 | +/- 1.356   | PASS   |
|        | -20              | 120V         | 13.55958        | 0.040                 | +/- 1.356   | PASS   |

**Frequency Stability Versus Input Voltage**

| Temperature (°C) | Voltage (AC) |     | Frequency (MHz) | Frequency Error (kHz) | Limit (kHz) | Result |
|------------------|--------------|-----|-----------------|-----------------------|-------------|--------|
| 20               | V-nom        | 120 | 13.55954        |                       |             |        |
| 20               | V-min        | 102 | 13.55958        | 0.04                  | +/- 1.356   | PASS   |
| 20               | V-max        | 138 | 13.55958        | 0.04                  | +/- 1.356   | PASS   |