

**FCC PART 15 SUBPART C TEST REPORT**

**for**

**Reader**

**Model No.: R300**

**FCC ID: SPH-R300**

**of**

Applicant: **ASIS TECHNOLOGIES PTE LTD**

Address: **71, Ubi Crescent #08-05, Excalibur Centre , Singapore 408571**

Tested and Prepared

by

**Worldwide Testing Services (Taiwan) Co., Ltd.**

**FCC Registration No.: 930600**

**Industry Canada filed test laboratory Reg. No. IC 5679A-1, IC 5107A-1**

**A2LA Accredited No.: 2732.01**



**Report No.: W6M21606-15899-C-1**

6F, NO. 58, LANE 188, RUEY-KUANG RD., NEIHU TAIPEI 114, TAIWAN, R.O.C.  
TEL: 886-2-66068877 FAX: 886-2-66068879 E-mail: [wtls@wtls-lab.com](mailto:wtls@wtls-lab.com)



Registration number: W6M21606-15899-C-1  
FCC ID: SPH-R300

## **TABLE OF CONTENTS**

|          |                                        |           |
|----------|----------------------------------------|-----------|
| <b>1</b> | <b>GENERAL INFORMATION .....</b>       | <b>2</b>  |
| 1.1      | NOTES.....                             | 2         |
| 1.2      | TESTING LABORATORY .....               | 3         |
| 1.2.1    | Location .....                         | 3         |
| 1.2.2    | Details of accreditation status .....  | 3         |
| 1.3      | DETAILS OF APPROVAL HOLDER.....        | 4         |
| 1.4      | APPLICATION DETAILS .....              | 4         |
| 1.5      | GENERAL INFORMATION OF TEST ITEM ..... | 4         |
| 1.6      | TEST STANDARDS.....                    | 4         |
| <b>2</b> | <b>TECHNICAL TEST .....</b>            | <b>5</b>  |
| 2.1      | SUMMARY OF TEST RESULTS .....          | 5         |
| 2.2      | TEST ENVIRONMENT .....                 | 5         |
| 2.3      | TEST EQUIPMENT LIST .....              | 6         |
| 2.4      | GENERAL TEST PROCEDURE .....           | 8         |
| <b>3</b> | <b>TEST RESULTS (ENCLOSURE) .....</b>  | <b>10</b> |
| 3.1      | OUTPUT POWER (FIELD STRENGTH) .....    | 11        |
| 3.2      | OUT OF BAND RADIATED EMISSIONS.....    | 12        |
| 3.3      | OCCUPIED BANDWIDTH .....               | 14        |
| 3.4      | FREQUENCY TOLERANCE .....              | 15        |
| 3.5      | POWER LINE CONDUCTED EMISSION .....    | 16        |
|          | APPENDIX .....                         | 17        |



Registration number: W6M21606-15899-C-1  
FCC ID: SPH-R300

## **1 General Information**

### **1.1 Notes**

The purpose of conformity testing is to increase the probability of adherence to the essential requirements or conformity specifications, as appropriate.

The complexity of the technical specifications, however, means that full and thorough testing is impractical for both technical and economic reasons.

Furthermore, there is no guarantee that a test sample which has passed all the relevant tests conforms to a specification.

Neither is there any guarantee that such a test sample will interwork with other genuinely open systems.

The existence of the tests nevertheless provides the confidence that the test sample possesses the qualities as maintained and that its performance generally conforms to representative cases of communications equipment.

The test results of this test report relate exclusively to the item tested as specified in 1.5.

The test report may only be reproduced or published in full.

Reproduction or publication of extracts from the report requires the prior written approval of the Worldwide Testing Services(Taiwan) Co., Ltd.

### **Tester:**

July 06, 2016

Rick Chen

*Rick Chen.*

Date

WTS-Lab.

Name

Signature

### **Technical responsibility for area of testing:**

July 06, 2016

Kevin Wang

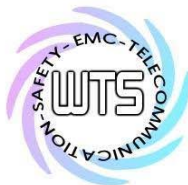
*Kevin Wang*

Date

WTS

Name

Signature



Registration number: W6M21606-15899-C-1  
FCC ID: SPH-R300

## **1.2 Testing laboratory**

### **1.2.1 Location**

OATS

No.5-1, Lishui, Shuang Sing Village,  
Wanli Dist., New Taipei City 207,  
Taiwan (R.O.C.)

3 meter semi-anechoic chamber

No.35, Aly. 21, Ln. 228, Ankang Rd., Neihu Dist., Taipei City 114, Taiwan (R.O.C.)

TEL:886-2-6613-0228

FAX:886-2-2791-5046

Company

Worldwide Testing Services(Taiwan) Co., Ltd.

6F, NO. 58, LANE 188, RUEY-KUANG RD.

NEIHU, TAIPEI 114, TAIWAN R.O.C.

Tel : 886-2-66068877

Fax : 886-2-66068879

### **1.2.2 Details of accreditation status**

Accredited testing laboratory

A2LA accredited number: 2732.01

FCC filed test laboratory Reg. No. 930600

Industry Canada filed test laboratory Reg. No. IC 5679A-1, IC 5107A-1

**Test location, where different from Worldwide Testing Services (Taiwan) Co., Ltd. :**

Name: ./.

Accredited number: ./.

Street: ./.

Town: ./.

Country: ./.

Telephone: ./.

Fax: ./.



Registration number: W6M21606-15899-C-1  
FCC ID: SPH-R300

## **1.3 Details of approval holder**

|            |                                            |
|------------|--------------------------------------------|
| Name:      | ASIS TECHNOLOGIES PTE LTD                  |
| Street:    | 71, Ubi Crescent #08-05, Excalibur Centre, |
| City:      | ./.                                        |
| Country:   | Singapore 408571                           |
| Telephone: | +65 6 844 2141                             |
| Fax:       | +65 6 844 0213                             |

## **1.4 Application details**

|                               |                                     |
|-------------------------------|-------------------------------------|
| Date of receipt of test item: | June 08, 2016                       |
| Date of test:                 | from June 08, 2016 to July 06, 2016 |

## **1.5 General information of Test item**

|                             |             |
|-----------------------------|-------------|
| Description of test item:   | Reader      |
| Type identification:        | R300        |
| Multi-listing model number: | ./.         |
| Brand Name:                 | ASIS        |
| Transmitting frequency:     | 13.56 MHz   |
| Operation mode:             | Half-duplex |
| Voltage supply:             | 12 Vd.c.    |

(If the device is using battery, please check if the device is tested under fresh battery condition.)

|               |              |
|---------------|--------------|
| Antenna type: | Loop antenna |
| Photos:       | see Annex    |

### **Manufacturer: (if applicable)**

|                         |     |
|-------------------------|-----|
| Name:                   | ./. |
| Street:                 | ./. |
| Town:                   | ./. |
| Country:                | ./. |
| Additional information: | ./. |

## **1.6 Test standards**

Technical standard : FCC RULES PART 15 SUBPART C § 15.225 (2015-10)



Registration number: W6M21606-15899-C-1

FCC ID: SPH-R300

## **2 Technical test**

### **2.1 Summary of test results**

No deviations from the technical specification(s) were ascertained in the course of the tests performed.



**or**

The deviations as specified in 3 were ascertained in the course of the tests performed.



### **2.2 Test environment**

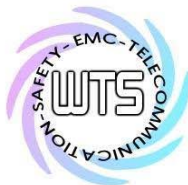
Temperature: 23 °C

Relative humidity content: 20 ... 75 %

Air pressure: 86 ... 103 kPa

Details of power supply: 12 Vd.c.

Extreme conditions parameters: /.



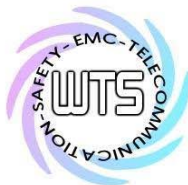
# Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21606-15899-C-1

FCC ID: SPH-R300

## 2.3 Test Equipment List

| No.          | Test equipment                               | Type                   | Serial No.    | Manufacturer       | Cal. Date     | Next Cal. Date |
|--------------|----------------------------------------------|------------------------|---------------|--------------------|---------------|----------------|
| ETSTW-CE 001 | EMI TEST RECEIVER                            | ESHS10                 | 842121/013    | R&S                | 2016/5/20     | 2017/5/19      |
| ETSTW-CE 003 | AC POWER SOURCE                              | APS-9102               | D161137       | GW                 | Function Test |                |
| ETSTW-CE 008 | HF-EICHLEITUNG RF STEP ATTENUATOR 139dB DPSP | 334.6010.02            | 844581/024    | R&S                | Function Test |                |
| ETSTW-CE 009 | TEMP.&HUMIDITY CHAMBER                       | GTH-225-40-1P-U        | MAA0305-009   | GIANT FORCE        | 2015/7/13     | 2016/7/12      |
| ETSTW-CE 016 | TWO-LINE V-NETWORK                           | ENV216                 | 100050        | R&S                | 2015/9/7      | 2016/9/6       |
| ETSTW-RE 003 | EMI TEST RECEIVER                            | ESI 26                 | 831438/001    | R&S                | 2016/5/20     | 2017/5/19      |
| ETSTW-RE 004 | EMI TEST RECEIVER                            | ESI 40                 | 832427/004    | R&S                | 2016/5/25     | 2017/5/24      |
| ETSTW-RE 005 | EMI TEST RECEIVER                            | ESVS10                 | 843207/020    | R&S                | 2015/8/14     | 2016/8/13      |
| ETSTW-RE 012 | TUNABLE BANDREJECT FILTER                    | D.C 0309               | 146           | K&L                | Function Test |                |
| ETSTW-RE 013 | TUNABLE BANDREJECT FILTER                    | D.C 0336               | 397           | K&L                | Function Test |                |
| ETSTW-RE 018 | MICROWAVE HORN ANTENNA                       | AT4560                 | 27212         | AR                 | 2016/6/15     | 2017/6/14      |
| ETSTW-RE 027 | Passive Loop Antenna                         | 6512                   | 00034563      | ETS-Lindgren       | 2016/6/15     | 2017/6/14      |
| ETSTW-RE 030 | Double-Ridged Guide Horn Antenna             | 3117                   | 00035224      | ETS-Lindgren       | 2016/3/23     | 2017/3/22      |
| ETSTW-RE 042 | Biconical Antenna                            | HK116                  | 100172        | R&S                | 2016/1/25     | 2017/1/24      |
| ETSTW-RE 043 | Log-Periodic Dipole Antenna                  | HL223                  | 100166        | R&S                | 2016/3/28     | 2017/3/27      |
| ETSTW-RE 044 | Log-Periodic Antenna                         | HL050                  | 100094        | R&S                | 2016/4/14     | 2017/4/13      |
| ETSTW-RE 045 | ESA-E SERIES SPECTRUM ANALYZER               | E4404B                 | MY45111242    | Agilent            | Pre-test Use  |                |
| ETSTW-RE 050 | Attenuator 10dB                              | 50HF-010-1             | None          | JFW                | 2016/2/25     | 2017/2/24      |
| ETSTW-RE 051 | Attenuator 6dB                               | 50HF-006-1             | None          | JFW                | 2016/2/25     | 2017/2/24      |
| ETSTW-RE 053 | Attenuator 3dB                               | 50HF-003-1             | None          | JFW                | 2016/2/25     | 2017/2/24      |
| ETSTW-RE 055 | SPECTRUM ANALYZER                            | FSU 26                 | 200074        | R&S                | 2016/2/27     | 2017/2/26      |
| ETSTW-RE 060 | Attenuator 30dB                              | 5015-30                | F651012z-01   | ATM                | 2016/2/25     | 2017/2/24      |
| ETSTW-RE 062 | Amplifier Module                             | CHC 2                  | None          | KMIC               | 2016/4/13     | 2017/4/12      |
| ETSTW-RE 064 | Bluetooth Test Set                           | MT8852B-042            | 6K00005709    | Anritsu            | Function Test |                |
| ETSTW-RE 069 | Double-Ridged Guide Horn Antenna             | 3117                   | 00069377      | ETS-Lindgren       | Function Test |                |
| ETSTW-RE 072 | CELL SITE TEST SET                           | 8921A                  | 3339A00375    | HP                 | 2015/9/6      | 2016/9/5       |
| ETSTW-RE 088 | SOLID STATE AMPLIFIER                        | KMA180265A01           | 99057         | KMIC               | 2015/9/21     | 2016/9/20      |
| ETSTW-RE 099 | DC Block                                     | 50DB-007-1             | None          | JFW                | 2016/2/25     | 2017/2/24      |
| ETSTW-RE 112 | AC POWER SOURCE                              | TFC-1005               | T-0A023536    | T-Power            | Function test |                |
| ETSTW-RE 115 | 2.4GHz Notch Filter                          | N0124411               | 473874        | MICROWAVE CIRCUITS | 2016/1/13     | 2017/1/12      |
| ETSTW-RE 120 | RF Player                                    | MP9200                 | MP9210-111022 | ADIVIC             | Function test |                |
| ETSTW-RE 122 | SIGNAL GENERATOR                             | SMF100A                | 102149        | R&S                | 2016/5/23     | 2017/5/22      |
| ETSTW-RE 125 | 5GHz Notch filter                            | 5NSL11-5200/E221.3-O/O | 1             | K&L Microwave      | 2015/8/11     | 2016/8/10      |

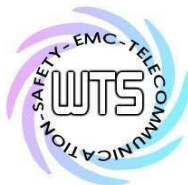


# Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6M21606-15899-C-1  
FCC ID: SPH-R300

|                 |                                      |                                        |                 |                    |                  |           |
|-----------------|--------------------------------------|----------------------------------------|-----------------|--------------------|------------------|-----------|
| ETSTW-RE 126    | 5GHz Notch filter                    | 5NSL11-5800/E221.3-O/O                 | 1               | K&L Microwave      | 2015/8/11        | 2016/8/10 |
| ETSTW-RE 127    | RF Switch Box                        | RFS-01                                 | None            | WTS                | 2016/2/25        | 2017/2/24 |
| ETSTW-RE 128    | 5.3GHz Notch filter                  | N0153001                               | SN487233        | Microwave Circuits | 2015/8/11        | 2016/8/10 |
| ETSTW-RE 129    | 5.5GHz Notch filter                  | N0555984                               | SN487234        | Microwave Circuits | 2015/8/11        | 2016/8/10 |
| ETSTW-RE 130    | Handheld RF Spectrum Analyzer        | N9340A                                 | CN0147000204    | Agilent            | Pre-test Use     |           |
| ETSTW-RE 142    | Amplifier                            | 8447D                                  | 2805A03378      | Agilent            | 2016/4/13        | 2017/4/12 |
| ETSTW-RE 143    | Humidity Temperature Meter           | TES-1260                               | 110104623       | TES                | 2015/9/9         | 2016/9/8  |
| ETSTW-RE 147    | Bi-log Hybrid Antenna                | MCTD 2786B                             | BLB16M04005     | ETC                | 2016/3/31        | 2017/3/30 |
| ETSTW-EMI 011   | USB Compact Modulator                | SFC-U                                  | 101689          | R&S                | 2016/5/4         | 2017/5/3  |
| ETSTW-GSM 002   | Universal Radio Communication Tester | CMU 200                                | 109439          | R&S                | 2016/3/4         | 2017/3/3  |
| ETSTW-GSM 003   | Radio Communication Analyzer         | MT8820C                                | 6201342073      | Anritsu            | 2016/2/3         | 2017/2/2  |
| ETSTW-GSM 019   | Band Reject Filter                   | WRCTF824/849-822/851-40 /12+9SS        | 3               | WI                 | 2016/1/13        | 2017/1/12 |
| ETSTW-GSM 020   | Band Reject Filter                   | WRCD1747/1748-1743/1752-32/5SS         | 1               | WI                 | 2016/1/13        | 2017/1/12 |
| ETSTW-GSM 021   | Band Reject Filter                   | WRCD1879.5/1880.5-1875.5/1884.5-32/5SS | 3               | WI                 | 2016/1/13        | 2017/1/12 |
| ETSTW-GSM 022   | Band Reject Filter                   | WRCT901.9/903.1-904.25-50/8SS          | 1               | WI                 | 2016/1/13        | 2017/1/12 |
| ETSTW-GSM 023   | Power Divider                        | 4901.19.A                              | None            | SUHNER             | 2015/9/16        | 2016/9/15 |
| ETSTW-Cable 010 | BNC Cable                            | 5 M BNC Cable                          | None            | JYE BAO CO.,LTD.   | 2015/9/11        | 2016/9/10 |
| ETSTW-Cable 011 | BNC Cable                            | BNC Cable 1                            | None            | JYE BAO CO.,LTD.   | Pre-test Use NCR |           |
| ETSTW-Cable 012 | N TYPE To SMA Cable                  | Cable 012                              | None            | JYE BAO CO.,LTD.   | 2015/9/11        | 2016/9/10 |
| ETSTW-Cable 016 | BNC Cable                            | Switch Box                             | B Cable 1       | Schwarz beck       | 2016/2/24        | 2017/2/23 |
| ETSTW-Cable 017 | BNC Cable                            | X Cable                                | B Cable 2       | Schwarz beck       | 2016/2/24        | 2017/2/23 |
| ETSTW-Cable 018 | BNC Cable                            | Y Cable                                | B Cable 3       | Schwarz beck       | 2016/2/24        | 2017/2/23 |
| ETSTW-Cable 019 | BNC Cable                            | Z Cable                                | B Cable 4       | Schwarz beck       | 2016/2/24        | 2017/2/23 |
| ETSTW-Cable 020 | N TYPE Cable                         | OATS Cable 1                           | N30N30-L335-15M | JYE BAO CO.,LTD.   | 2016/4/22        | 2017/4/21 |
| ETSTW-Cable 022 | N TYPE Cable                         | 5006                                   | 0002            | JYE BAO CO.,LTD.   | 2016/4/7         | 2017/4/6  |
| ETSTW-Cable 026 | Microwave Cable                      | SUCOFLEX 104                           | 279075          | HUBER+SUHNER       | 2016/2/25        | 2017/2/24 |
| ETSTW-Cable 027 | Microwave Cable                      | SUCOFLEX 104                           | 279083          | HUBER+SUHNER       | 2016/5/13        | 2017/5/12 |
| ETSTW-Cable 028 | Microwave Cable                      | FA147A0015M2020                        | 30064-2         | UTIFLEX            | 2015/9/21        | 2016/9/20 |
| ETSTW-Cable 029 | Microwave Cable                      | FA147A0015M2020                        | 30064-3         | UTIFLEX            | 2015/9/21        | 2016/9/20 |
| ETSTW-Cable 030 | Microwave Cable                      | SUCOFLEX 104 (S_Cable 9)               | 279067          | HUBER+SUHNER       | 2016/2/25        | 2017/2/24 |
| ETSTW-Cable 031 | Microwave Cable                      | SUCOFLEX 104 (S_Cable 10)              | 238092          | HUBER+SUHNER       | 2016/4/13        | 2017/4/12 |
| ETSTW-Cable 043 | Microwave Cable                      | SUCOFLEX 104                           | 317576          | HUBER+SUHNER       | 2016/4/13        | 2017/4/12 |
| ETSTW-Cable 048 | Microwave Cable                      | SUCOFLEX 104                           | 325518          | HUBER+SUHNER       | 2016/4/13        | 2017/4/12 |
| ETSTW-Cable 058 | Microwave Cable                      | SUCOFLEX 104                           | none            | HUBER+SUHNER       | 2016/4/7         | 2017/4/6  |
| ETSTW-Cable 064 | Microwave Cable                      | SUCOFLEX 104                           | MY28891         | HUBER+SUHNER       | 2016/4/13        | 2017/4/12 |
| WTSTW-SW 002    | EMI TEST SOFTWARE                    | EZ EMC                                 | None            | Farad              | Version ETS-03A1 |           |





Registration number: W6M21606-15899-C-1  
FCC ID: SPH-R300

## **2.4 General Test Procedure**

**POWER LINE CONDUCTED INTERFERENCE:** The procedure used was ANSI STANDARD C63.10-2013 6.2 using a LISN (if necessary). Both lines were observed. The bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed.

**RADIATION INTERFERENCE:** The test procedure used was according to ANSI STANDARD C63.10-2013 6.3 employing a spectrum analyzer. For investigated frequency is equal to or below 1GHz, the RBW and VBW of the spectrum analyzer was 100 kHz and 100kHz respectively with an appropriate sweep speed. For investigated frequency is above 1GHz, both of RBW and VBW of the spectrum analyzer were 1 MHz with an appropriate sweep speed. The analyzer was calibrated in dB above a microvolt at the output of the antenna.

**FORMULA OF CONVERSION FACTORS:** The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dB $\mu$ V) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB.

Example:

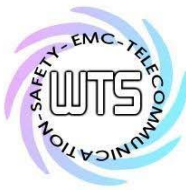
|            |                                                          |
|------------|----------------------------------------------------------|
| Freq (MHz) | METER READING + ACF + CABLE LOSS (to the receiver) = FS  |
| 33         | 20 dB $\mu$ V + 10.36 dB + 6 dB = 36.36 dB $\mu$ V/m @3m |

The EUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m (non metallic table) and arranged according to ANSI C63.10-2013 Section 6.2.2 The table used for radiated measurements is capable of continuous rotation. The spectrum was scanned from 30 MHz to the frequency specified as follows:

- (1) If the intentional radiator operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
- (2) If the intentional radiator operates at or above 10 GHz and below 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 100 GHz, whichever is lower.
- (3) If the intentional radiator operates at or above 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 200 GHz, whichever is lower, unless specified otherwise elsewhere in the rules.
- (4) If the intentional radiator contains a digital device, regardless of whether this digital device controls the functions of the intentional radiator or the digital device is used for additional control or function purposes other than to enable the operation of the intentional radiator, the frequency range shall be investigated up to the range specified in paragraphs (a)(1)-(a)(3) of this section or the range applicable to the digital device, as shown in paragraph (b)(1) of this Section, whichever is the higher frequency range of investigation.

For hand-held devices, a exploratory test was performed with three (3) orthogonal planes to determine the highest emissions.

Measurements were made by Worldwide Testing Services(Taiwan) Co., Ltd. at the registered open field test site located No.5-1, Lishui, Shuang Sing Village, Wanli Dist., New Taipei City 207, Taiwan (R.O.C.). The Registration Number: **930600**.



Registration number: W6M21606-15899-C-1

FCC ID: SPH-R300

When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.

When the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.

The formula is as follows:

Average = Peak + Duty Factor

Duty Factor =  $20 \log (\text{dwell time}/T)$

T = 100ms when the pulse train period is over 100 ms or the period of the pulse train.

Modified Limits for peak according to 15.35 (b) = Max Permitted average Limits + 20dB

ANSI STANDARD C63.10-2013 B.2.7: Any measurements that utilize special test software shall be indicated and referenced in the test report. During testing, test software 'EZ EMC' was used for setting up different operation modes.



Registration number: W6M21606-15899-C-1  
FCC ID: SPH-R300

**3 Test results (enclosure)**

| TEST CASE                      | Para. Number       | Required                            | Test passed                         | Test failed              |
|--------------------------------|--------------------|-------------------------------------|-------------------------------------|--------------------------|
| Output Power Field Strength    | 15.225 (a) (b) (c) | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Out of Band Radiated Emissions | 15.225 (d)         | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Band Edge                      | 15.225 (d)         | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Occupied Bandwidth             | 2.1049             | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Frequency Stability            | 15.225 (e)         | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Power Line Conducted Emission  | 15.207 (a)         | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> |

The following is intentionally left blank.



Registration number: W6M21606-15899-C-1  
FCC ID: SPH-R300

## 3.1 Output Power (Field Strength)

FCC Rules: 15.225 (a) (b) (c), 15.205, 15.209, 15.35

Operation within the band 13.110 - 14.010 MHz

Limit

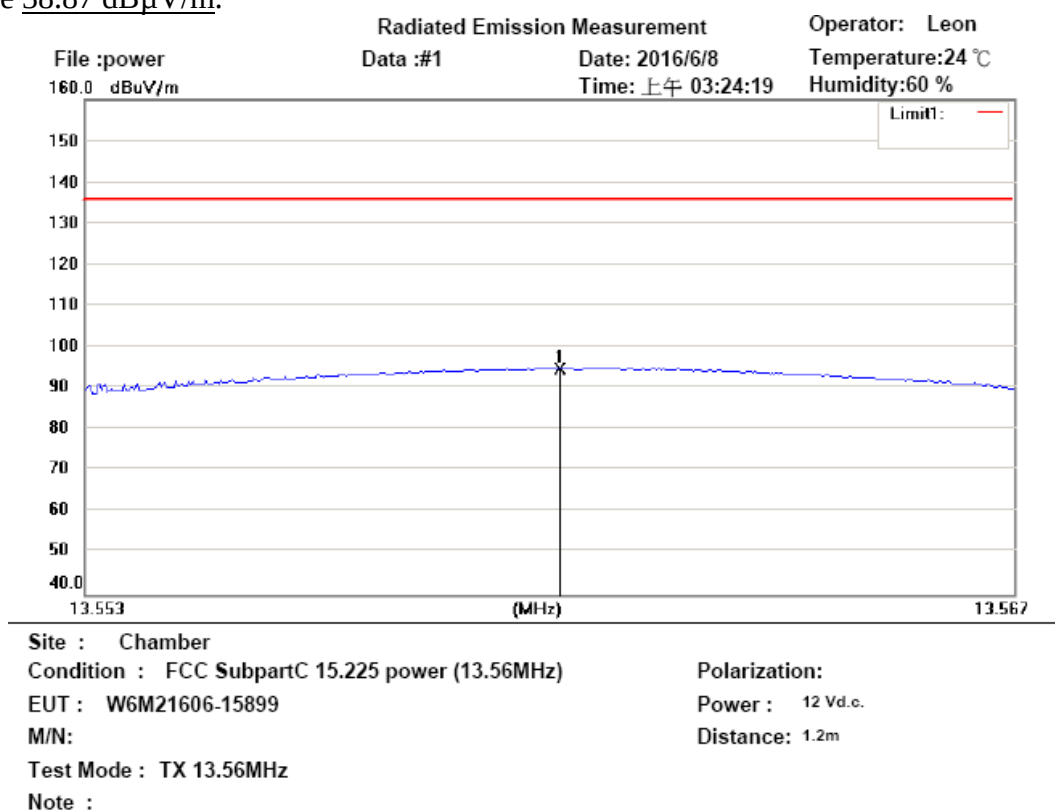
(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

Measurement Results:

The field strength at 1.2 meter distance as 94.87 dB $\mu$ V/m. Extrapolated with 56 dB to 30 meter distance it would be 38.87 dB $\mu$ V/m.



| Mk. | Frequency (MHz) | Reading (dBuV) | Detector | Corr. factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Ant.Pos (cm) | Tab.Pos (deg.) | Margin (dB) | Comment |
|-----|-----------------|----------------|----------|---------------------|-----------------|----------------|--------------|----------------|-------------|---------|
| *   | 13.5602         | 60.47          | peak     | 34.40               | 94.87           | 135.92         | 100          | 359            | -41.05      |         |

Test equipment used: ETSTW-RE 027, ETSTW-RE 055



Registration number: W6M21606-15899-C-1

FCC ID: SPH-R300

## 3.2 Out of Band Radiated Emissions

(d) The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.

| Frequency of Emission (MHz) | Limit           | Measurement distance |
|-----------------------------|-----------------|----------------------|
| 0.009 – 0.490               | 2400 / f (KHz)  | 300                  |
| 0.49 – 1.705                | 24000 / f (KHz) | 30                   |
| 1.705 – 30                  | 30              | 30                   |
| 30 – 88                     | 100             | 3                    |
| 88 – 216                    | 150             | 3                    |
| 216 – 960                   | 200             | 3                    |
| Above 960                   | 500             | 3                    |

### Calculation of test results:

Such factors like antenna correction, cable loss, external attenuation etc. are already included in the provided measurement results. This is done by using validated test software and calibrated test system according the accreditation requirements.

Summary table with radiated data of the test plots

Model: R300 Date: --  
Mode: -- Temperature: -- °C Engineer: --  
Polarization: -- Humidity: -- %

| Frequency (MHz) | Reading (dBuV) | Detector | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Table Degree (Deg.) | Ant. High (cm) |
|-----------------|----------------|----------|-------------|-----------------|----------------|-------------|---------------------|----------------|
| --              | --             | --       | --          | --              | --             | --          | --                  | --             |
| --              | --             | --       | --          | --              | --             | --          | --                  | --             |

Polarization: Vertical

| Frequency (MHz) | Reading (dBuV) | Detector | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Table Degree (Deg.) | Ant. High (cm) |
|-----------------|----------------|----------|-------------|-----------------|----------------|-------------|---------------------|----------------|
| --              | --             | --       | --          | --              | --             | --          | --                  | --             |
| --              | --             | --       | --          | --              | --             | --          | --                  | --             |

### Note

1. Correction Factor = Antenna factor + Cable loss - Preamplifier
2. The formula of measured value as: Test Result = Reading + Correction Factor
3. Detector function in the form : PK = Peak, QP = Quasi Peak, AV = Average
4. All not in the table noted test results are more than 20 dB below the relevant limits.
5. Measurement uncertainty for 3m measurement: 0.009-30MHz  $\pm$  5.65 dB, 30-1000 MHz :  $\pm$  4.69 dB ; Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.
6. See attached diagrams in appendix.

All other not noted test plots do not contain significant test results in relation to the limits

Test results: The unit meet the FCC requirements.

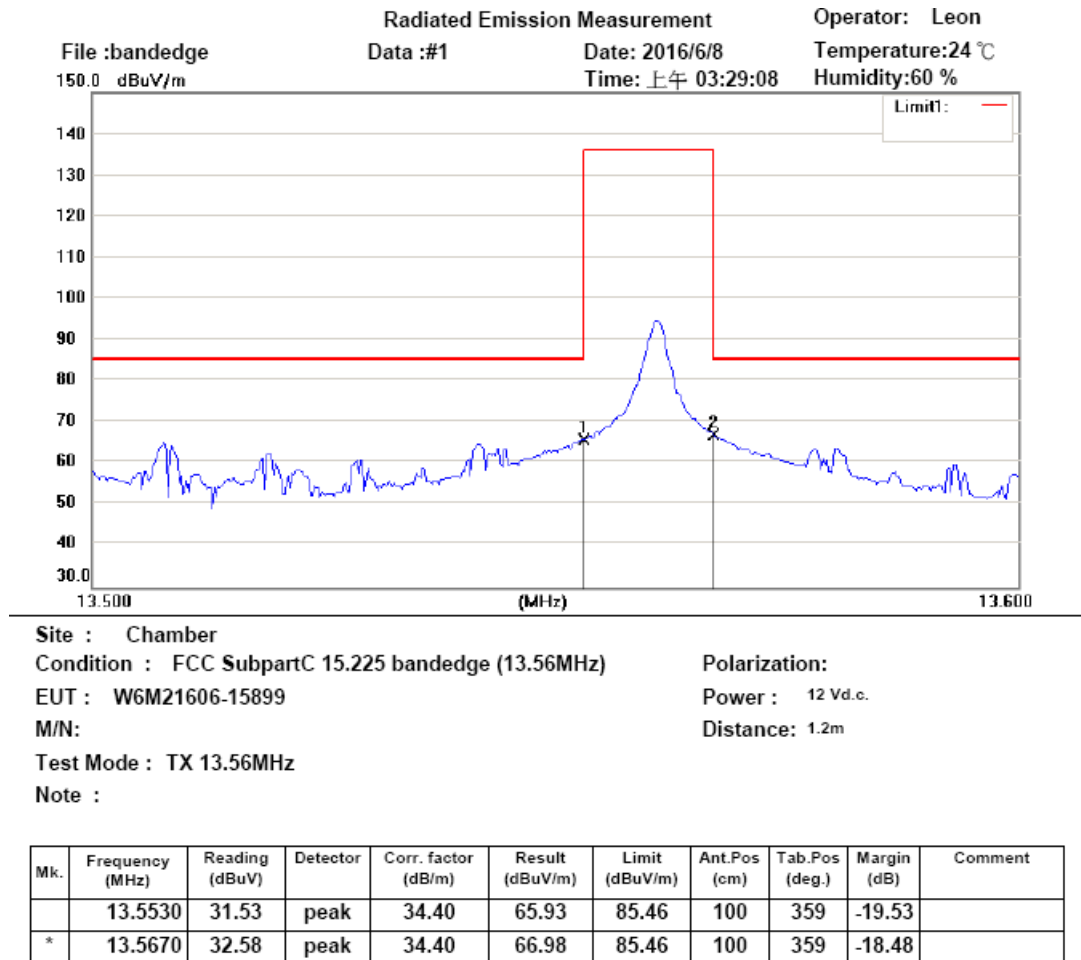
Test equipment used: ETSTW-RE 004, ETSTW-RE 027, ETSTW-RE 142, ETSTW-RE 147,

ETSTW-RE 062



Registration number: W6M21606-15899-C-1  
FCC ID: SPH-R300

## Test result of Band Edge

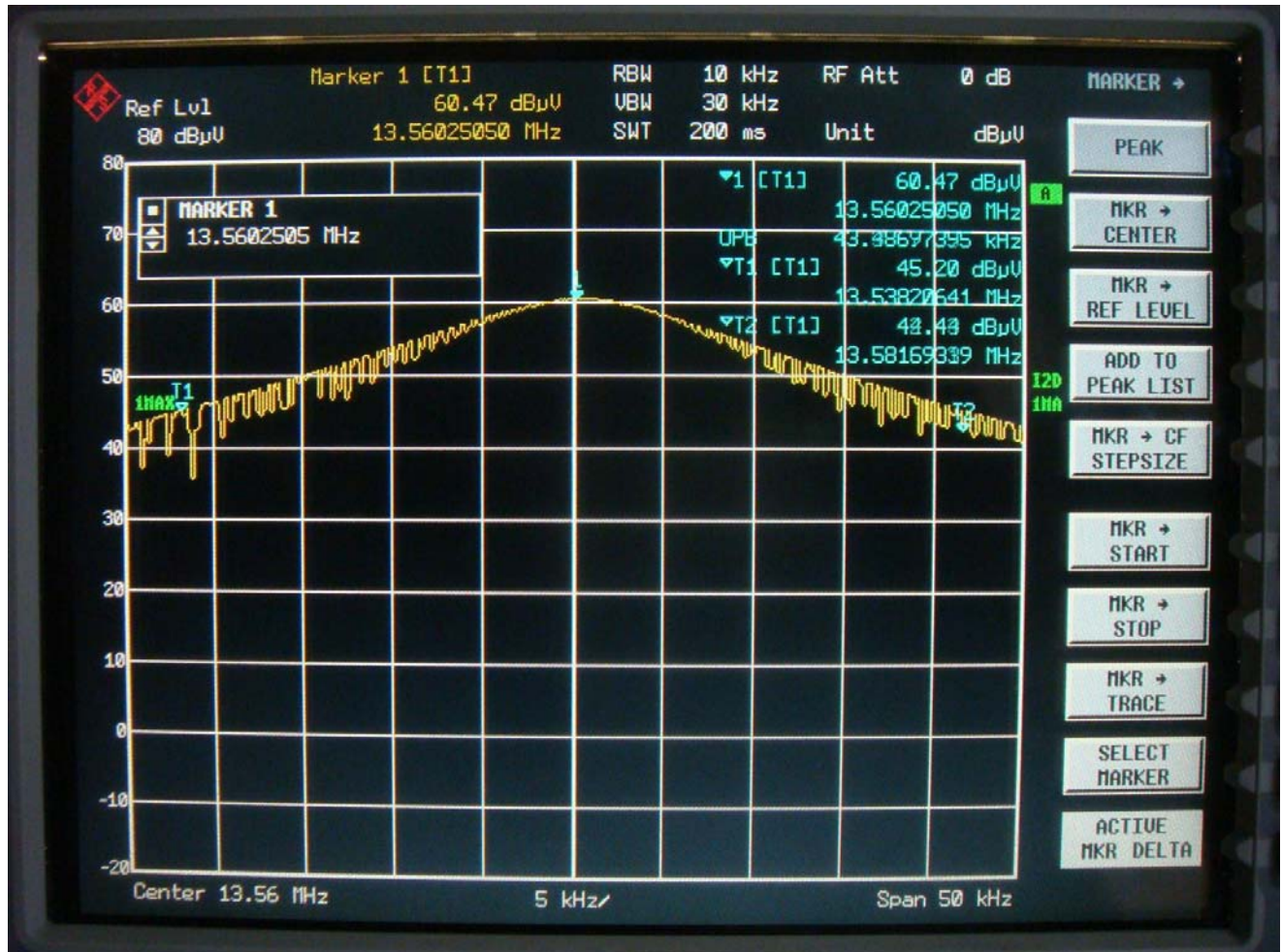


Test equipment used: ETSTW-RE 055

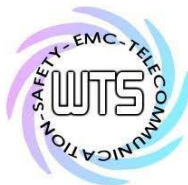


Registration number: W6M21606-15899-C-1  
FCC ID: SPH-R300

## 3.3 Occupied Bandwidth



Test equipment used: ETSTW-RE 055, ETSTW-RE 064



Registration number: W6M21606-15899-C-1  
FCC ID: SPH-R300

## **3.4 Frequency tolerance**

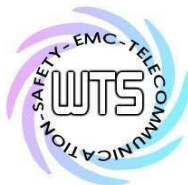
The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of -20°C to +50°C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20°C. For battery operated equipment, the equipment tests shall be performed using a new battery.

### **Measurement Results:**

| Temperature<br>Degrees °C | Voltage | Frequency<br>MHz | Frequency deviation<br>kHz | Limit<br>kHz (0.01%) |
|---------------------------|---------|------------------|----------------------------|----------------------|
| 20°C                      | 10.8    | 13.5608974       | 0.000                      | 1.356                |
| 20°C                      | 13.2    | 13.5608974       | 0.000                      | 1.356                |
| 50°C                      | 12      | 13.5608654       | 0.032                      | 1.356                |
| 40°C                      | 12      | 13.5608654       | 0.032                      | 1.356                |
| 30°C                      | 12      | 13.5608974       | 0.000                      | 1.356                |
| 20°C                      | 12      | 13.5608974       | 0.000                      | 1.356                |
| 10°C                      | 12      | 13.5608974       | 0.000                      | 1.356                |
| 0°C                       | 12      | 13.5608974       | 0.000                      | 1.356                |
| -10°C                     | 12      | 13.5608974       | 0.000                      | 1.356                |
| -20°C                     | 12      | 13.5608333       | 0.064                      | 1.356                |

Test equipment used: ETSTW-RE 055, ETSTW-CE 009





Registration number: W6M21606-15899-C-1  
FCC ID: SPH-R300

## 3.5 Power Line Conducted Emission

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the table bellows with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals.

This measurement was transact first with instrumentation using an average and peak detector and a 10 kHz bandwidth. If the peak detector achieves a calculated level, the measurement is repeated by an instrumentation using a quasi-peak detector.

| Frequency | Level (dBμV)     |                  |
|-----------|------------------|------------------|
|           | quasi-peak       | average          |
| 150 kHz   | lower limit line | Lower limit line |

|               |         |      |              |        |      |           |      |        |
|---------------|---------|------|--------------|--------|------|-----------|------|--------|
| Model:        | R300    |      | Date:        | --     |      |           |      |        |
| Mode:         | --      |      | Temperature: | --     | °C   | Engineer: |      | --     |
| Polarization: | --      |      | Humidity:    | --     | %    |           |      |        |
| Frequency     | Reading |      | Factor       | Result |      | Limit     |      | Margin |
| (MHz)         | QP      | Ave. | (dB)         | QP     | Ave. | QP        | Ave. | (dB)   |
|               |         |      | Corr.        |        |      |           |      |        |
| --            | --      | --   | --           | --     | --   | --        | --   | --     |
| --            | --      | --   | --           | --     | --   | --        | --   | --     |

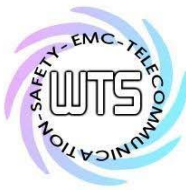
| Polarization: --   |                   |      |                         |                  |      |                 |      |                |
|--------------------|-------------------|------|-------------------------|------------------|------|-----------------|------|----------------|
| Frequency<br>(MHz) | Reading<br>(dBuV) |      | Factor<br>(dB)<br>Corr. | Result<br>(dBuV) |      | Limit<br>(dBuV) |      | Margin<br>(dB) |
|                    | QP                | Ave. |                         | QP               | Ave. | QP              | Ave. |                |
| --                 | --                | --   | --                      | --               | --   | --              | --   | --             |
| --                 | --                | --   | --                      | --               | --   | --              | --   | --             |

- Note:**
1. The formula of measured value as: **Test Result = Reading + Correction Factor**
  2. The **Correction Factor = Cable Loss + LISN Insertion Loss + Pulse Limit Loss**
  3. Detector function in the form : **PK = Peak, QP = Quasi Peak, AV = Average**
  4. All not in the table noted test results are more than 20 dB below the relevant limits
  5. Measurement uncertainty =  $\pm 1.14$  dB; Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of  $k = 2$ .
  6. Up Line: QP Limit Line, Down Line: Ave Limit Line.
  7. This test is not required.

### Limits:

| Frequency of Emission (MHz) | Conducted Limit (dBuV) |          |
|-----------------------------|------------------------|----------|
|                             | Quasi Peak             | Average  |
| 0.15-0.5                    | 66 to 56               | 56 to 46 |
| 0.5-5                       | 56                     | 46       |
| 5-30                        | 60                     | 50       |

Test equipment used: ETSTW-CE 001, ETSTW-CE 016, ETSTW-RE 045



Registration number: W6M21606-15899-C-1  
FCC ID: SPH-R300

## **Appendix**

### **A. Photos**

1. External Photos
2. Internal Photos
3. Set Up Photo of Radiated Emission

### **B. Measurement diagrams**

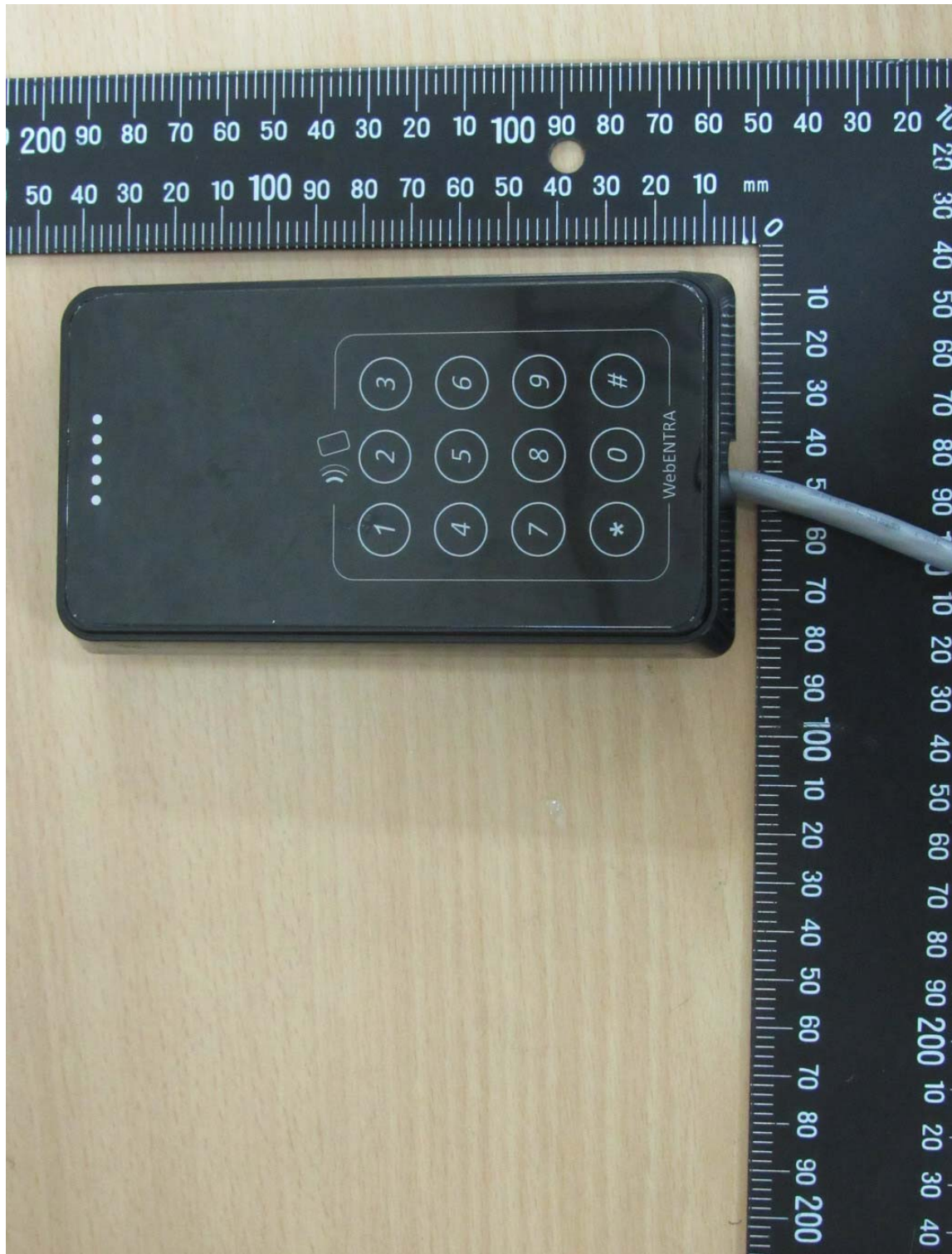
Out of Band Radiated Emissions



Registration number: W6M21606-15899-C-1

FCC ID: SPH-R300

External Photos

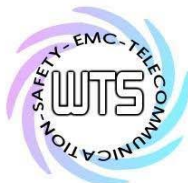






Registration number: W6M21606-15899-C-1  
FCC ID: SPH-R300





Registration number: W6M21606-15899-C-1  
FCC ID: SPH-R300







# ***Worldwide Testing Services(Taiwan) Co., Ltd.***

Registration number: W6M21606-15899-C-1

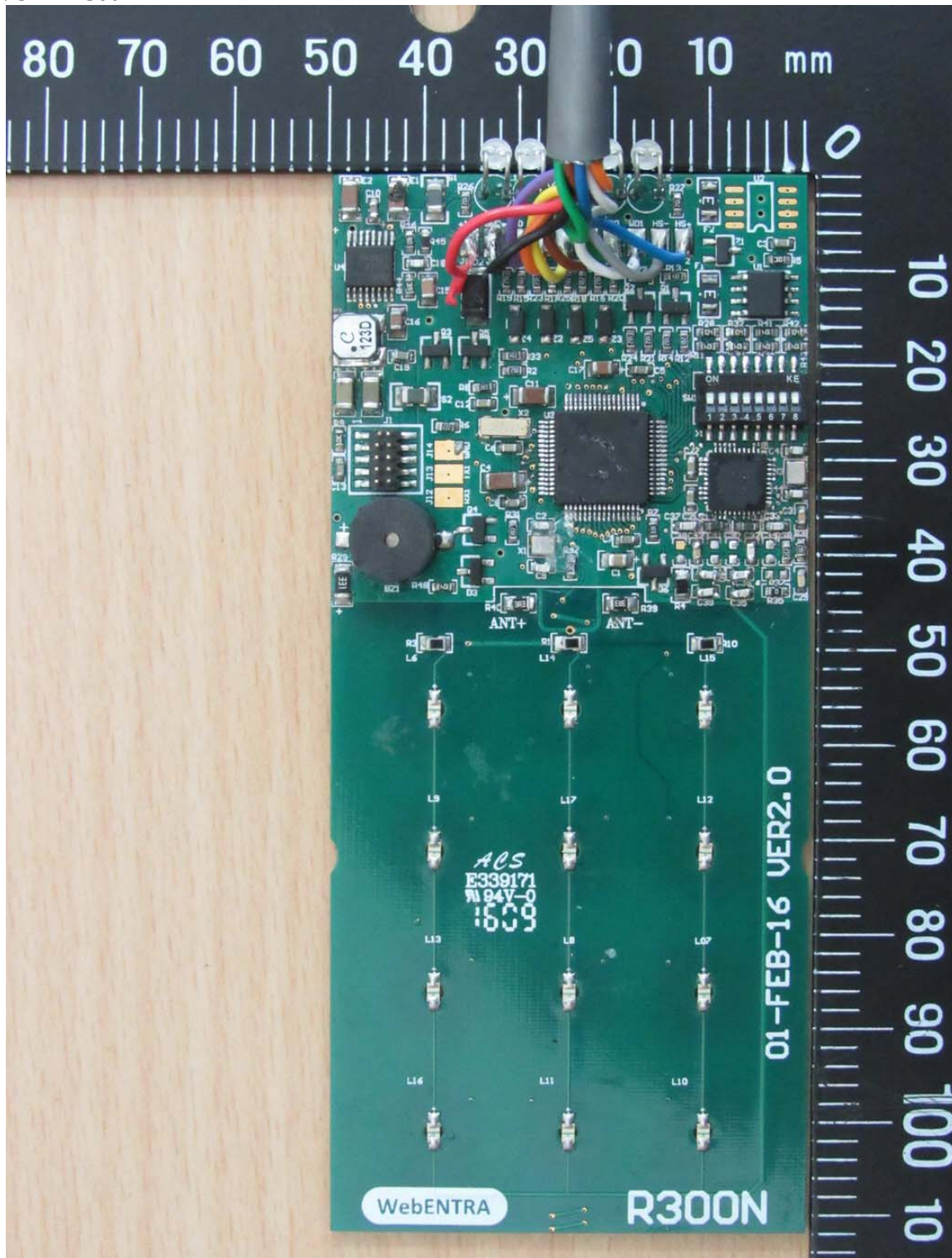
FCC ID: SPH-R300

Internal Photos





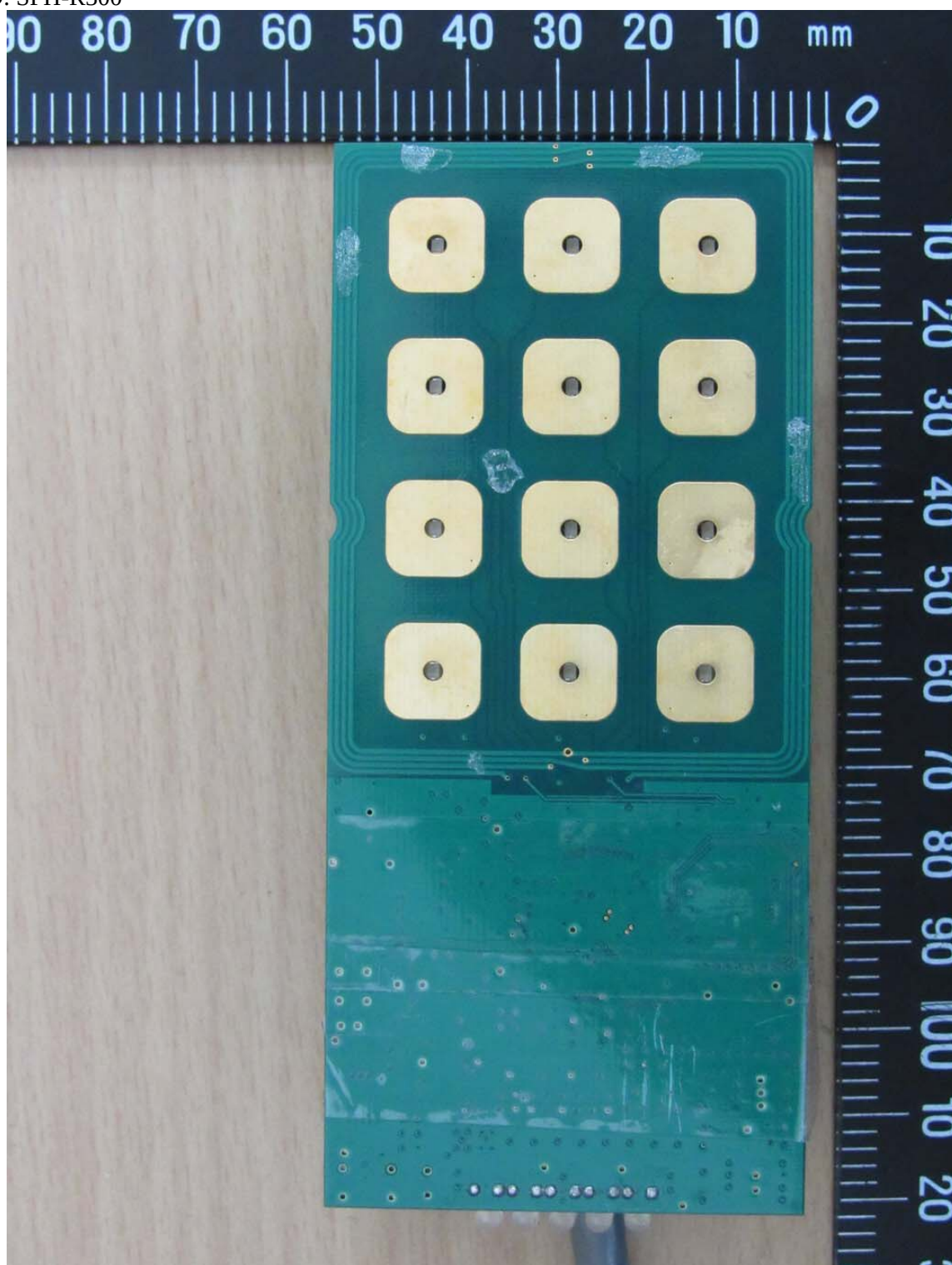
Registration number: W6M21606-15899-C-1  
FCC ID: SPH-R300







Registration number: W6M21606-15899-C-1  
FCC ID: SPH-R300



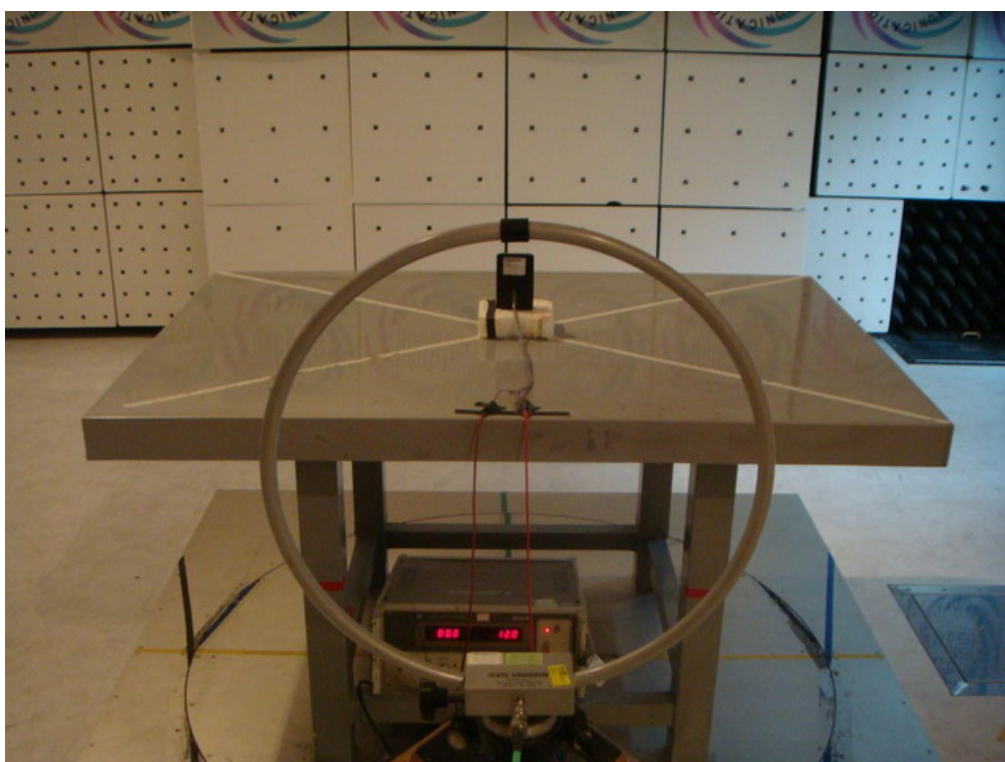
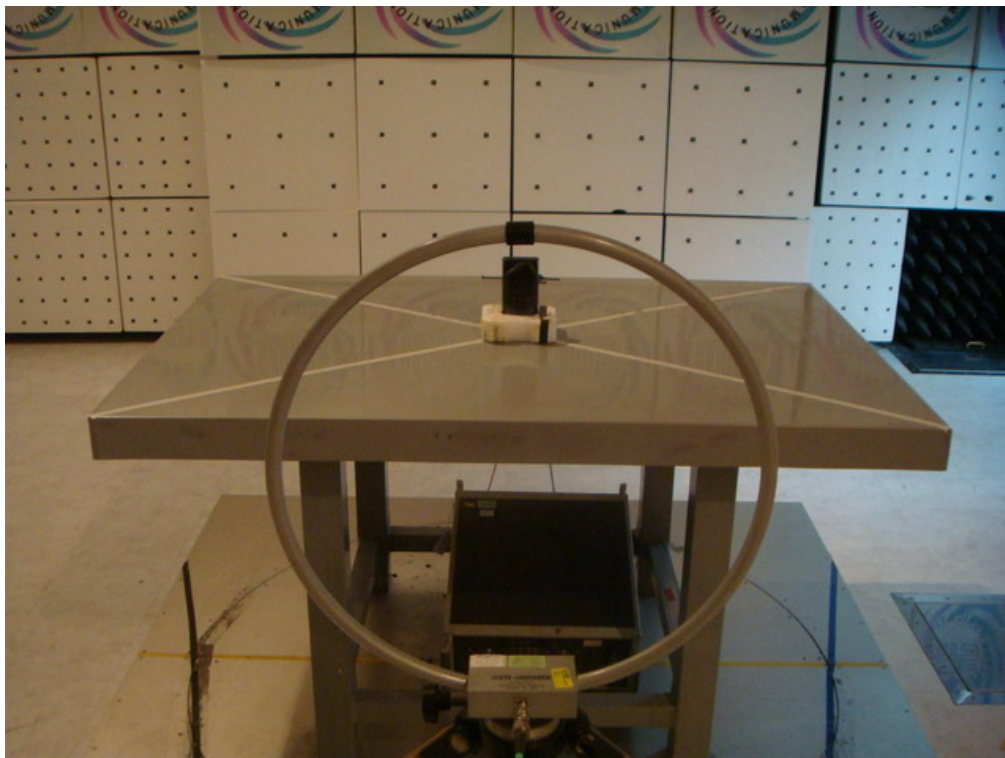
Registration number: W6M21606-15899-C-1

FCC ID: SPH-R300

Set Up Photo of Radiated Emission

RF

Below 30 MHz



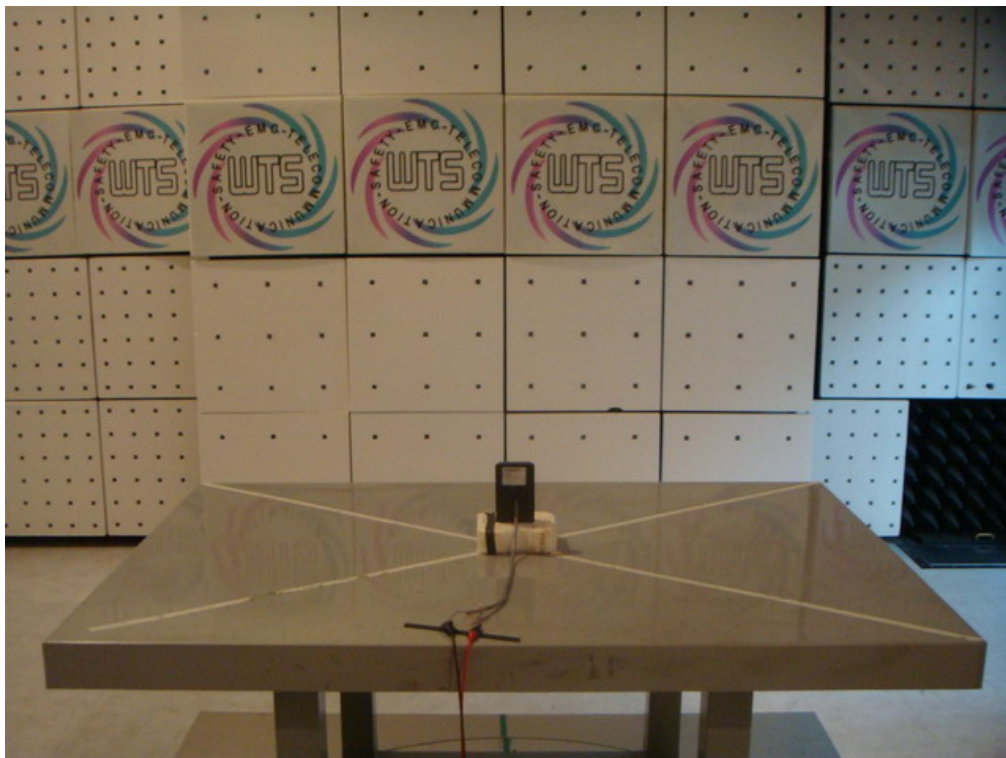




Registration number: W6M21606-15899-C-1

FCC ID: SPH-R300

Above 30 MHz





Radiated Emission Measurement

Operator: Leon

File :1

Data :#1

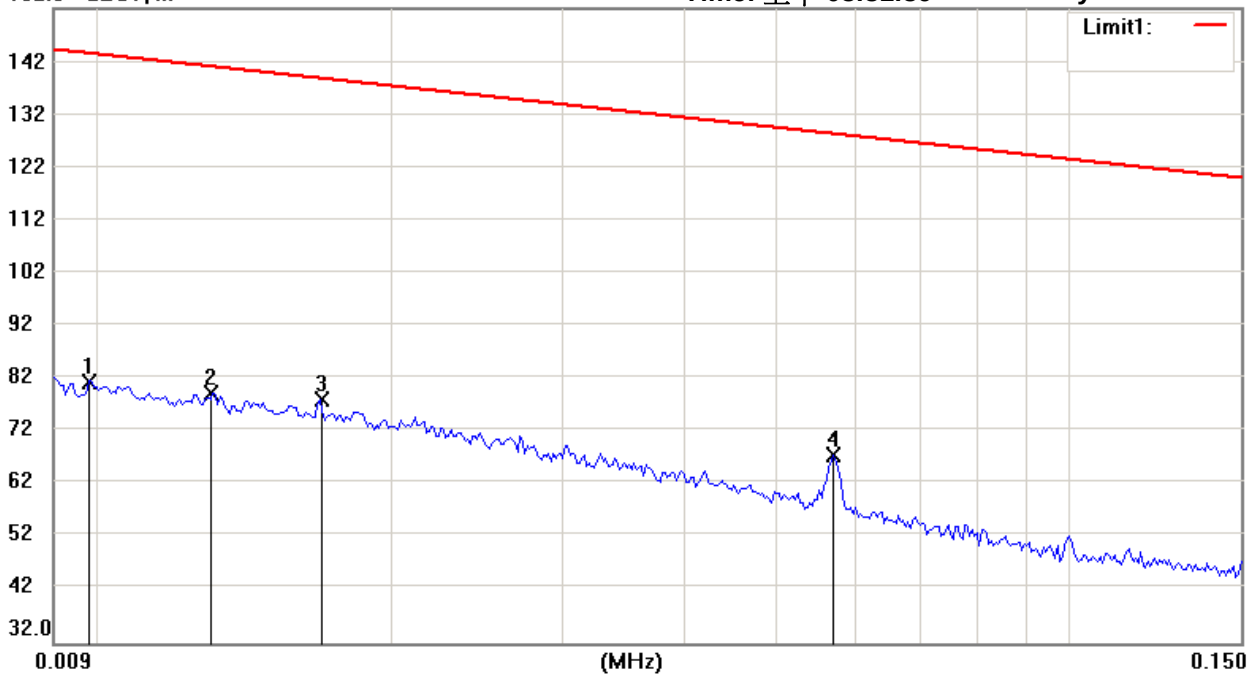
Date: 2016/6/8

Temperature:24 °C

152.0 dBuV/m

Time: 上午 03:31:39

Humidity:60 %



Site : Chamber

Condition : FCC SubpartC 15.205 (<30MHz)

EUT : W6M21606-15899

M/N:

Test Mode : TX 13.56MHz

Note :

Polarization:

Power : 12 Vd.c.

Distance: 1.2m

| Mk. | Frequency (MHz) | Reading (dBuV) | Detector | Corr. factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Ant.Pos (cm) | Tab.Pos (deg.) | Margin (dB) | Comment |
|-----|-----------------|----------------|----------|---------------------|-----------------|----------------|--------------|----------------|-------------|---------|
|     | 0.0098          | -5.41          | peak     | 86.91               | 81.50           | 143.70         | 100          | 125            | -62.20      |         |
|     | 0.0131          | -6.12          | peak     | 85.39               | 79.27           | 141.18         | 100          | 30             | -61.91      |         |
|     | 0.0170          | -5.72          | peak     | 83.62               | 77.90           | 138.92         | 100          | 55             | -61.02      |         |
| *   | 0.0572          | -4.44          | peak     | 71.93               | 67.49           | 128.38         | 100          | 60             | -60.89      |         |



Radiated Emission Measurement

Operator: Leon

File :2

Data :#1

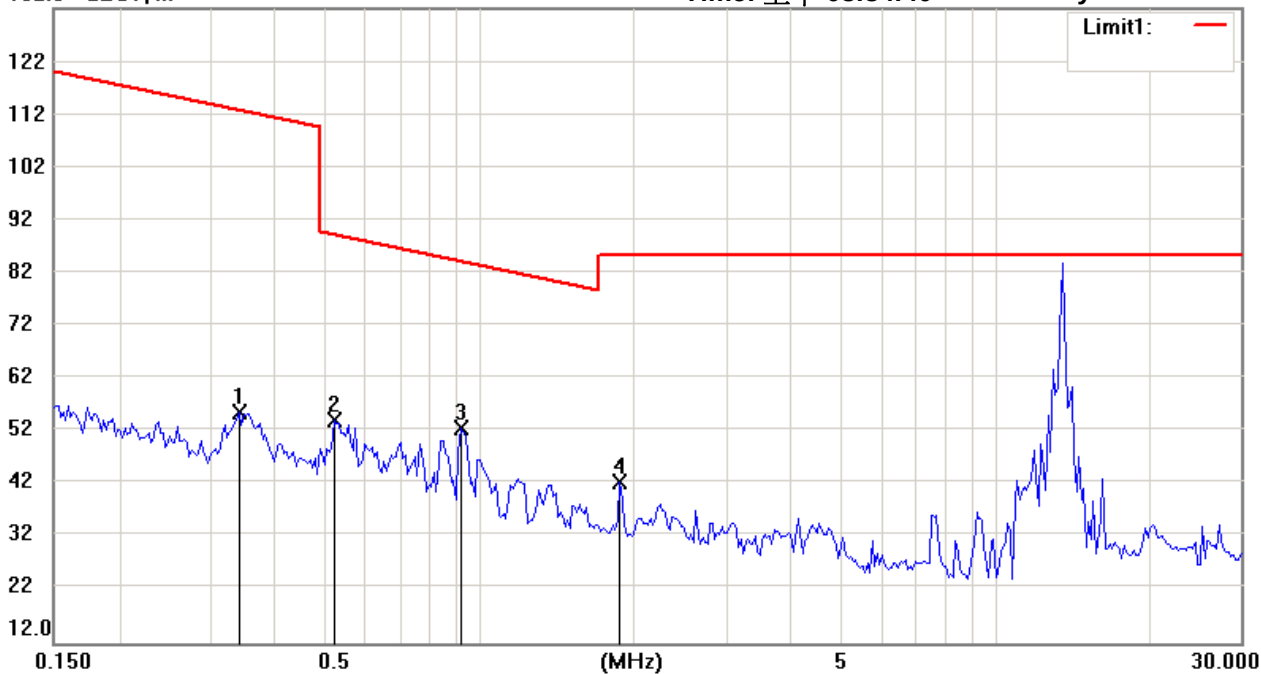
Date: 2016/6/8

Temperature:24 °C

132.0 dBuV/m

Time: 上午 03:34:40

Humidity:60 %



Site : Chamber

Condition : FCC SubpartC 15.205 (<30MHz)

EUT : W6M21606-15899

M/N:

Test Mode : TX 13.56MHz

Note :

Polarization:

Power : 12 Vd.c.

Distance: 1.2m

| Mk. | Frequency (MHz) | Reading (dBuV) | Detector | Corr. factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Ant.Pos (cm) | Tab.Pos (deg.) | Margin (dB) | Comment |
|-----|-----------------|----------------|----------|---------------------|-----------------|----------------|--------------|----------------|-------------|---------|
|     | 0.3434          | -0.14          | peak     | 55.85               | 55.71           | 112.81         | 100          | 355            | -57.10      |         |
|     | 0.5251          | 2.10           | peak     | 52.07               | 54.17           | 89.12          | 100          | 20             | -34.95      |         |
| *   | 0.9218          | 4.75           | peak     | 48.03               | 52.78           | 84.23          | 100          | 45             | -31.45      |         |
|     | 1.8775          | -0.76          | peak     | 43.18               | 42.42           | 85.46          | 100          | 90             | -43.04      |         |





Radiated Emission Measurement

Operator: Leon

File :3

Data :#1

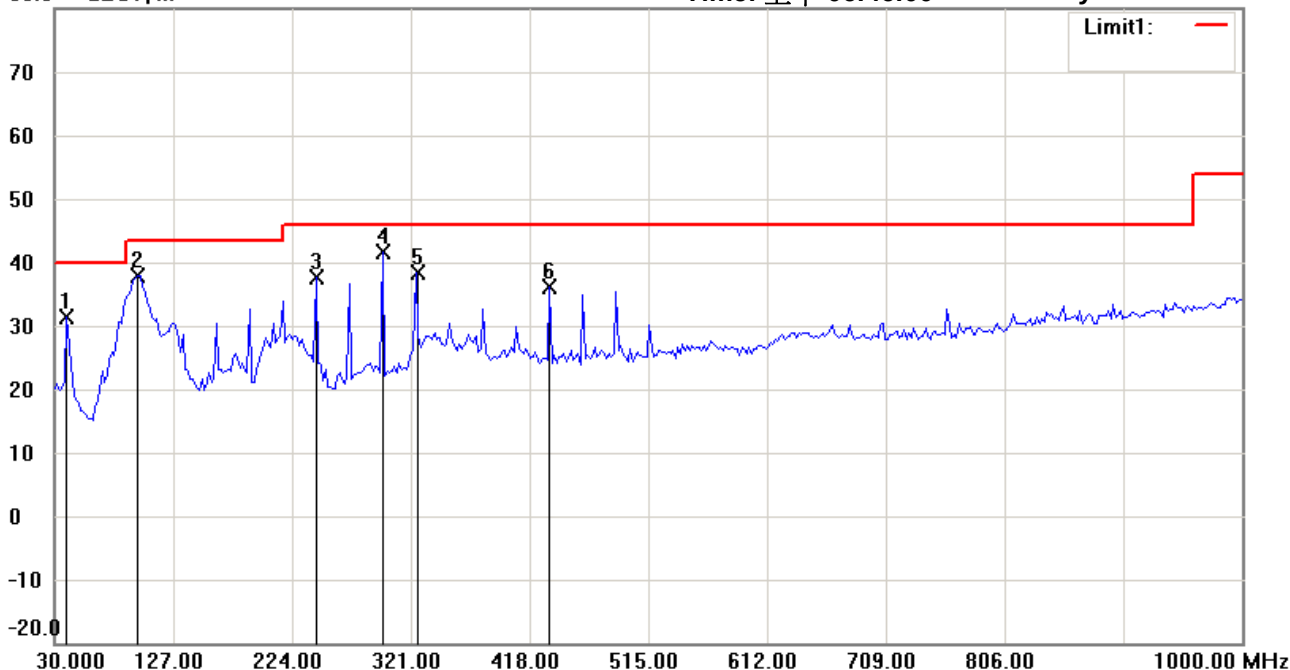
Date: 2016/6/8

Temperature:24 °C

80.0 dBuV/m

Time: 上午 06:46:00

Humidity:60 %



Site : Chamber

Condition : FCC\_part 15 RE-Class C\_30-1000MHz

EUT : W6M21606-15899

M/N:

Test Mode : TX 13.56MHz

Note :

Polarization: *Horizontal*

Power : 12 Vd.c.

Distance: 3m

| Mk. | Frequency (MHz) | Reading (dBuV) | Detector | Corr. factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Ant.Pos (cm) | Tab.Pos (deg.) | Margin (dB) | Comment |
|-----|-----------------|----------------|----------|---------------------|-----------------|----------------|--------------|----------------|-------------|---------|
|     | 39.7194         | 39.52          | peak     | -8.15               | 31.37           | 40.00          | 100          | 95             | -8.63       |         |
|     | 98.0361         | 48.04          | peak     | -10.19              | 37.85           | 43.50          | 100          | 175            | -5.65       |         |
|     | 243.8277        | 45.41          | peak     | -7.90               | 37.51           | 46.00          | 100          | 80             | -8.49       |         |
| *   | 298.2565        | 47.28          | peak     | -5.64               | 41.64           | 46.00          | 100          | 120            | -4.36       |         |
|     | 325.4710        | 43.42          | peak     | -5.08               | 38.34           | 46.00          | 100          | 155            | -7.66       |         |
|     | 434.3287        | 39.22          | peak     | -3.05               | 36.17           | 46.00          | 100          | 230            | -9.83       |         |



Radiated Emission Measurement

Operator: Leon

File :3

Data :#2

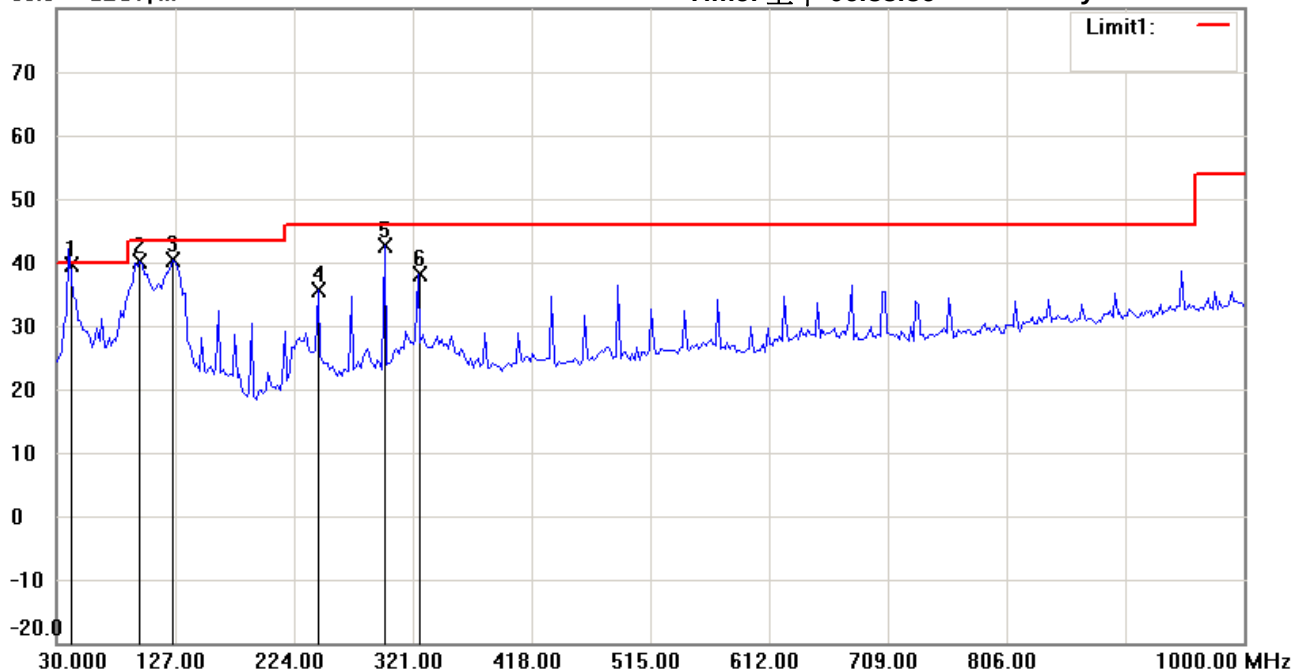
Date: 2016/6/8

Temperature:24 °C

80.0 dBuV/m

Time: 上午 06:33:36

Humidity:60 %



Site : Chamber

Condition : FCC\_part 15 RE-Class C\_30-1000MHz

EUT : W6M21606-15899

M/N:

Test Mode : TX 13.56MHz

Note :

Polarization: Vertical

Power : 12 Vd.c.

Distance: 3m

| Mk. | Frequency (MHz) | Reading (dBuV) | Detector | Corr. factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Ant.Pos (cm) | Tab.Pos (deg.) | Margin (dB) | Comment |
|-----|-----------------|----------------|----------|---------------------|-----------------|----------------|--------------|----------------|-------------|---------|
| *   | 40.6758         | 47.96          | QP       | -8.25               | 39.71           | 40.00          | 100          | 280            | -0.29       |         |
|     | 98.0361         | 50.23          | peak     | -10.19              | 40.04           | 43.50          | 100          | 235            | -3.46       |         |
|     | 125.2505        | 46.71          | peak     | -6.22               | 40.49           | 43.50          | 100          | 190            | -3.01       |         |
|     | 243.8277        | 43.53          | peak     | -7.90               | 35.63           | 46.00          | 100          | 240            | -10.37      |         |
|     | 298.2565        | 48.18          | peak     | -5.64               | 42.54           | 46.00          | 100          | 175            | -3.46       |         |
|     | 325.4710        | 43.24          | peak     | -5.08               | 38.16           | 46.00          | 100          | 250            | -7.84       |         |



Address:6F.,No.58,Ln 188,Ruey Kuang Rd,Neihu,Taipei  
Tel:+886-2-6606-8877  
Fax:+886-2-6606-8875

# Radiated Emission Measurement

Operator: Leon

File :1

Data :#1

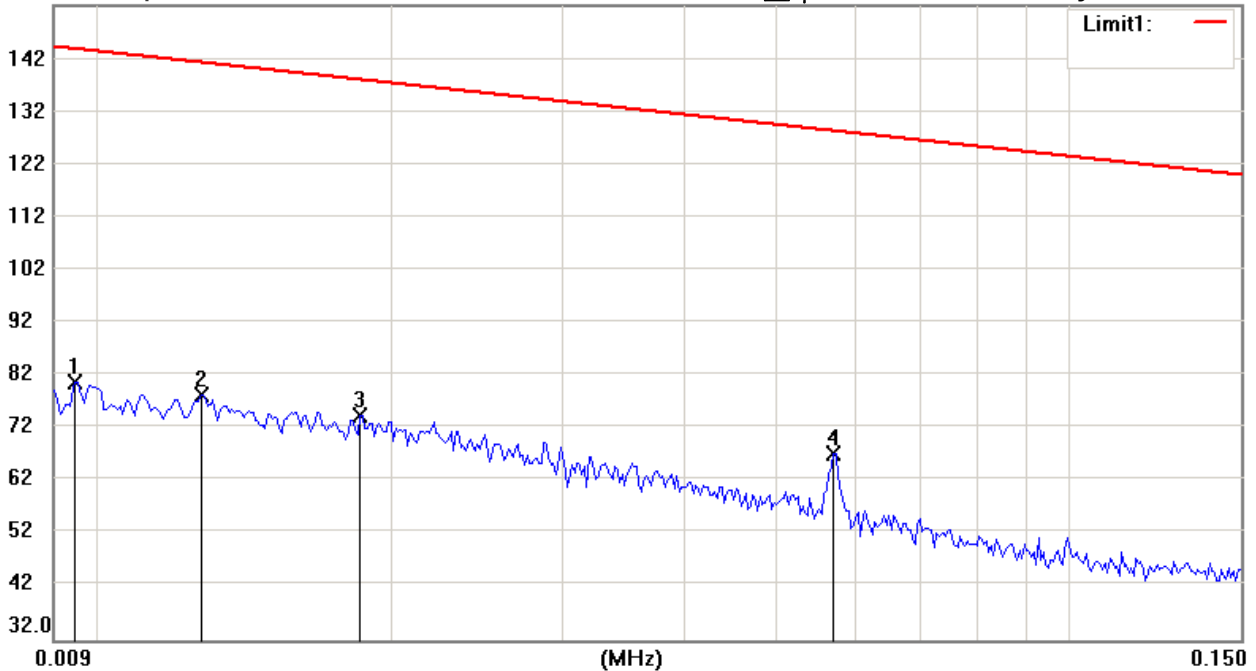
Date: 2016/6/8

Temperature:24 °C

152.0 dBuV/m

Time: 上午 03:32:15

Humidity:60 %



Site : Chamber

Condition : FCC SubpartC 15.205 (<30MHz)

EUT : W6M21606-15899

M/N:

Test Mode : RX 13.56MHz

Note :

Polarization:

Power : 12 Vd.c.

Distance: 1.2m

| Mk. | Frequency (MHz) | Reading (dBuV) | Detector | Corr. factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Ant.Pos (cm) | Tab.Pos (deg.) | Margin (dB) | Comment |
|-----|-----------------|----------------|----------|---------------------|-----------------|----------------|--------------|----------------|-------------|---------|
|     | 0.0095          | -6.25          | peak     | 87.09               | 80.84           | 143.97         | 100          | 115            | -63.13      |         |
|     | 0.0128          | -7.08          | peak     | 85.52               | 78.44           | 141.38         | 100          | 35             | -62.94      |         |
|     | 0.0186          | -8.30          | peak     | 82.90               | 74.60           | 138.13         | 100          | 90             | -63.53      |         |
| *   | 0.0572          | -4.64          | peak     | 71.93               | 67.29           | 128.38         | 100          | 10             | -61.09      |         |

\*:Maximum data    x:Over limit    !:over margin



Address:6F.,No.58,Ln 188,Ruey Kuang Rd,Neihu,Taipei  
Tel:+886-2-6606-8877  
Fax:+886-2-6606-8875

# Radiated Emission Measurement

Operator: Leon

File :2

Data :#1

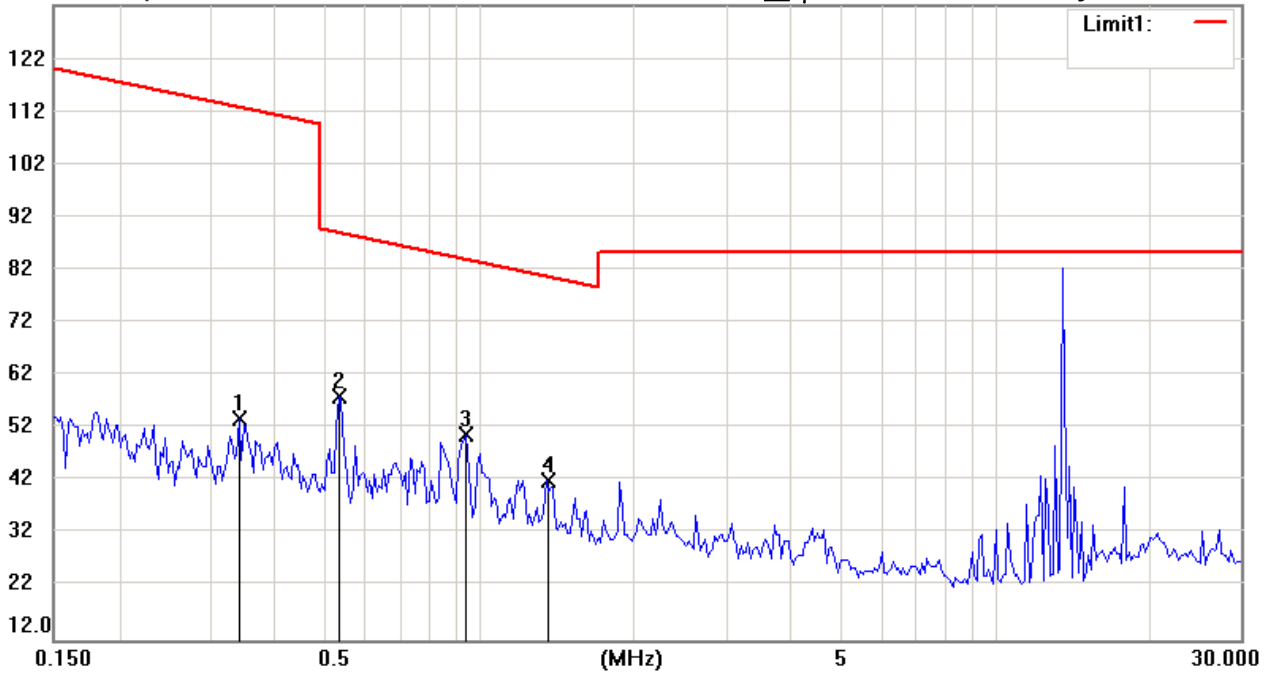
Date: 2016/6/8

Temperature:24 °C

132.0 dBuV/m

Time: 上午 03:32:57

Humidity:60 %



Site : Chamber

Condition : FCC SubpartC 15.205 (<30MHz)

EUT : W6M21606-15899

M/N:

Test Mode : RX 13.56MHz

Note :

Polarization:

Power : 12 Vd.c.

Distance: 1.2m

| Mk. | Frequency (MHz) | Reading (dBuV) | Detector | Corr. factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Ant.Pos (cm) | Tab.Pos (deg.) | Margin (dB) | Comment |
|-----|-----------------|----------------|----------|---------------------|-----------------|----------------|--------------|----------------|-------------|---------|
|     | 0.3434          | -1.95          | peak     | 55.85               | 53.90           | 112.81         | 100          | 60             | -58.91      |         |
| *   | 0.5363          | 6.03           | peak     | 51.96               | 57.99           | 88.94          | 100          | 25             | -30.95      |         |
|     | 0.9415          | 3.13           | peak     | 47.83               | 50.96           | 84.05          | 100          | 10             | -33.09      |         |
|     | 1.3510          | -3.48          | peak     | 45.61               | 42.13           | 80.91          | 100          | 175            | -38.78      |         |

\*:Maximum data    x:Over limit    !:over margin



Radiated Emission Measurement

Operator: Leon

File :3

Data :#1

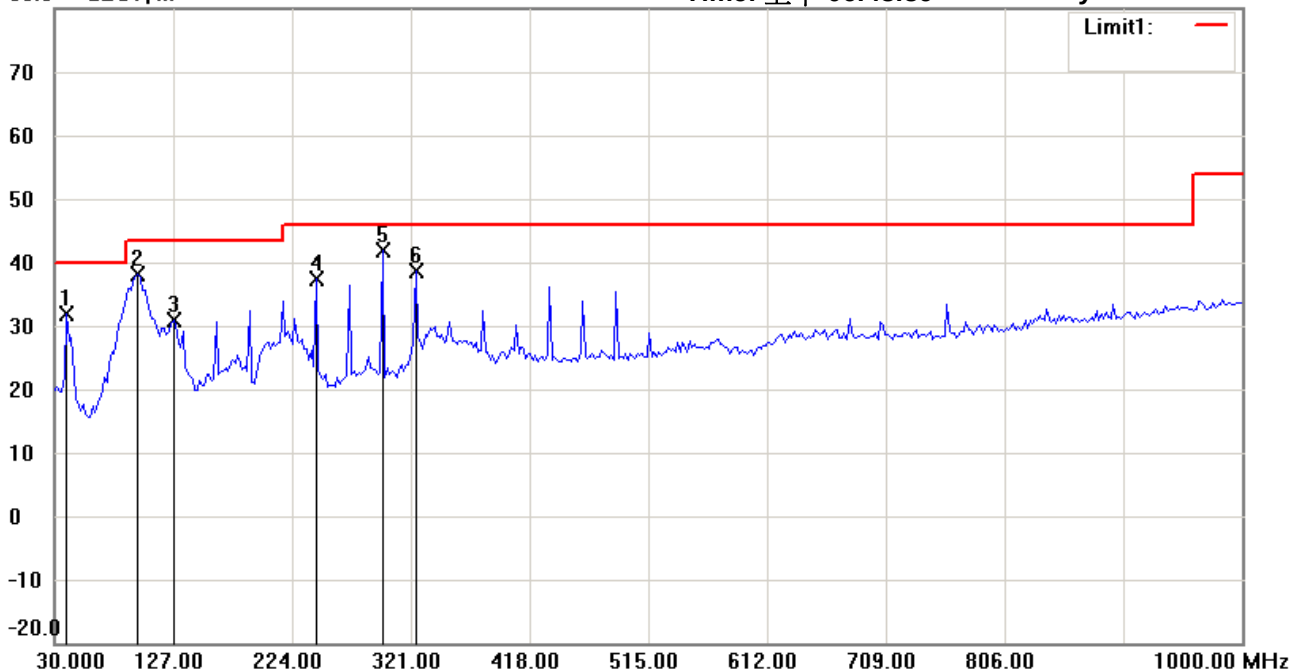
Date: 2016/6/8

Temperature:24 °C

80.0 dBuV/m

Time: 上午 06:48:39

Humidity:60 %



Site : Chamber

Condition : FCC\_part 15 RE-Class C\_30-1000MHz

EUT : W6M21606-15899

M/N:

Test Mode : RX 13.56MHz

Note :

Polarization: *Horizontal*

Power : 12 Vd.c.

Distance: 3m

| Mk. | Frequency (MHz) | Reading (dBuV) | Detector | Corr. factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Ant.Pos (cm) | Tab.Pos (deg.) | Margin (dB) | Comment |
|-----|-----------------|----------------|----------|---------------------|-----------------|----------------|--------------|----------------|-------------|---------|
|     | 39.7194         | 39.94          | peak     | -8.15               | 31.79           | 40.00          | 100          | 175            | -8.21       |         |
|     | 98.0361         | 48.30          | peak     | -10.19              | 38.11           | 43.50          | 100          | 90             | -5.39       |         |
|     | 127.1944        | 37.08          | peak     | -6.19               | 30.89           | 43.50          | 100          | 120            | -12.61      |         |
|     | 243.8276        | 45.25          | peak     | -7.90               | 37.35           | 46.00          | 100          | 235            | -8.65       |         |
| *   | 298.2565        | 47.60          | peak     | -5.64               | 41.96           | 46.00          | 100          | 260            | -4.04       |         |
|     | 325.4708        | 43.60          | peak     | -5.08               | 38.52           | 46.00          | 100          | 190            | -7.48       |         |





Address:6F.,No.58,Ln 188,Ruey Kuang Rd,Neihu,Taipei  
Tel:+886-2-6606-8877  
Fax:+886-2-6606-8875

# Radiated Emission Measurement

Operator: Leon

File :3

Data :#2

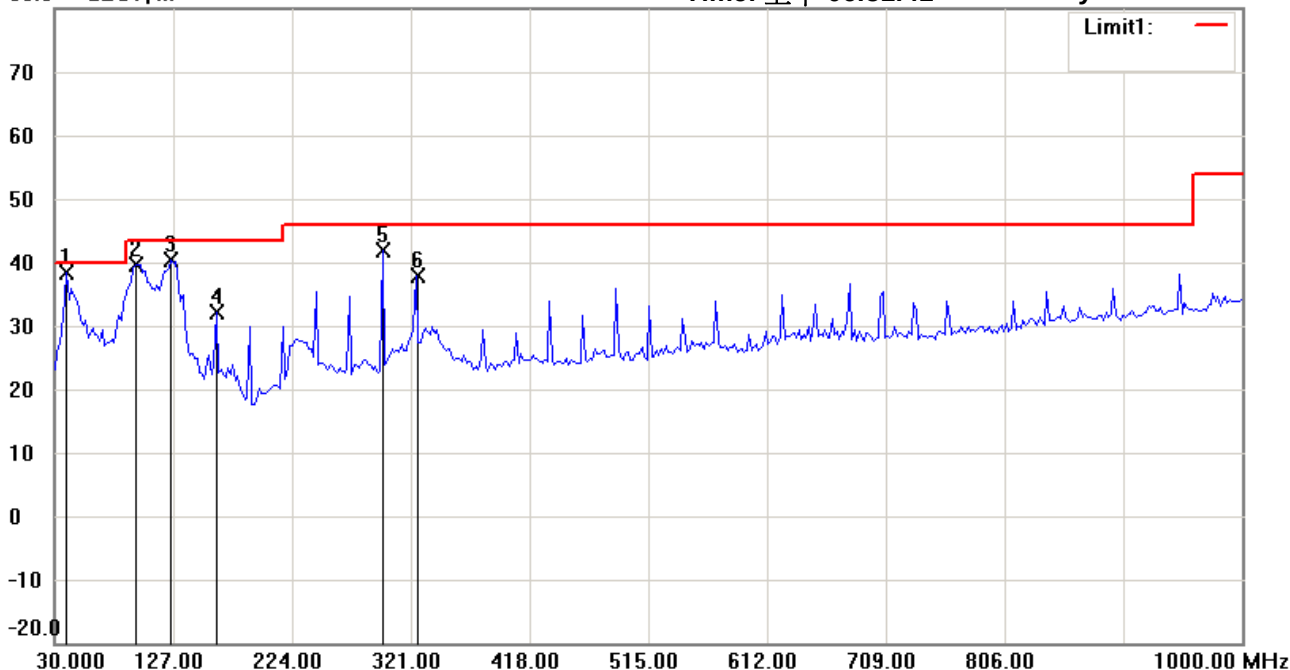
Date: 2016/6/8

Temperature:24 °C

80.0 dBuV/m

Time: 上午 06:51:41

Humidity:60 %



Site : Chamber

Condition : FCC\_part 15 RE-Class C\_30-1000MHz

EUT : W6M21606-15899

M/N:

Test Mode : RX 13.56MHz

Note :

Polarization: Vertical

Power : 12 Vd.c.

Distance: 3m

| Mk. | Frequency (MHz) | Reading (dBuV) | Detector | Corr. factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Ant.Pos (cm) | Tab.Pos (deg.) | Margin (dB) | Comment |
|-----|-----------------|----------------|----------|---------------------|-----------------|----------------|--------------|----------------|-------------|---------|
| *   | 39.7194         | 46.43          | peak     | -8.15               | 38.28           | 40.00          | 100          | 85             | -1.72       |         |
|     | 96.0922         | 50.52          | peak     | -10.89              | 39.63           | 43.50          | 100          | 110            | -3.87       |         |
|     | 125.2505        | 46.69          | peak     | -6.22               | 40.47           | 43.50          | 100          | 145            | -3.03       |         |
|     | 162.1844        | 41.11          | peak     | -9.08               | 32.03           | 43.50          | 100          | 50             | -11.47      |         |
|     | 298.2565        | 47.60          | peak     | -5.64               | 41.96           | 46.00          | 100          | 130            | -4.04       |         |
|     | 325.4710        | 42.99          | peak     | -5.08               | 37.91           | 46.00          | 100          | 220            | -8.09       |         |

\*:Maximum data    x:Over limit    !:over margin