# FCC PART 15 SUBPART C / RSS-210 TEST REPORT

# for

# Wireless TPMS

# Model No.: US1-005R

# FCC ID: XVBU1F02

# IC: 9368A-U1F02

of

Applicant: Standard Motor Products, Inc.
Address: 37-18 Northern Boulevard Long Island City,
New York United States 11101

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.: W6M21602-15608-C-1**

6F, NO. 58, LANE 188, RUEY-KUANG RD., NEIHU TAIPEI 114, TAIWAN, R.O.C.
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Registration number: W6M21602-15608-C-1
FCC ID: XVBU1F02
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# 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 is 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.
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**Tester:**

| March 1, 2016 | | Leon Chueh | Leon Chueh |
|---|---|---|---|
| Date | WTS-Lab. | Name | Signature |

**Technical responsibility for area of testing:**

| March 1, 2016 | | Kevin Wang | Kevin Wang |
|---|---|---|---|
| Date | WTS | Name | Signature |

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## 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 : 886-2-66068875

### 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

## 1.3 Details of approval holder

| | |
|---|---|
| Name: | Standard Motor Products, Inc. |
| Street: | 37-18 Northern Boulevard |
| Town: | Long Island City, New York |
| Country: | United States 11101 |
| Telephone: | 718-316-4571 |
| Fax: | 718-786-8247 |

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## 1.4 Application details

| | |
|---|---|
| Date of receipt of test item: | February 15, 2016 |
| Date of test | from February 16, 2016 to February 26, 2016 |

## 1.5 Test item

| | |
|---|---|
| Description of test item: | Wireless TPMS |
| Type identification: | US1-005R |
| Brand name: | SMP |
| Multi-listing model number: | US1-005M |
| Transmitting frequency: | 315 MHz |
| Operation mode: | Simplex |
| Voltage supply: | Battery: 3VDC (CR2050HR) |

(The device is tested under fresh battery condition.)

| | |
|---|---|
| Highest clock frequency: | 315 MHz |
| Antenna type: | Monopole antenna |
| Photos: | see Annex |

**Manufacturer** (if applicable)

| | |
|---|---|
| Name: | Orange Electronic Co., Ltd |
| Street: | 5F., No.29, Keya Rd., Daya Dist., |
| Town: | Taichung City 428, |
| Country: | Taiwan |

Additional information: ./.

## 1.6 Test standards

Technical standard : FCC RULES PART 15 SUBPART C § 15.231 (e) (2014-10)
RSS-210 Issue 8: December 2010

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# 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: | Battery: 3VDC (CR2050HR) |

## 2.3 Test Mode

This EUT is the portable device. So the EUT was tested on three different axes. Please see assessment test results as section 3 of this test report.

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## 2.4 Test equipment utilized

| No. | Test equipment | Type | Serial No. | Manufacturer | Cal. Date | Next Cal. Date |
|---|---|---|---|---|---|---|
| ETSTW-CE 001 | EMI TEST RECEIVER | ESHS10 | 842121/013 | R&S | 2015/9/4 | 2016/9/3 |
| 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 | 2015/8/14 | 2016/8/13 |
| ETSTW-RE 004 | EMI TEST RECEIVER | ESI 40 | 832427/004 | R&S | 2015/9/4 | 2016/9/3 |
| 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 | 2015/6/22 | 2016/6/21 |
| ETSTW-RE 027 | Passive Loop Antenna | 6512 | 00034563 | ETS-Lindgren | 2015/6/16 | 2016/6/15 |
| ETSTW-RE 030 | Double-Ridged Guide Horn Antenna | 3117 | 00035224 | ETS-Lindgren | 2015/3/17 | 2016/3/16 |
| ETSTW-RE 042 | Biconical Antenna | HK116 | 100172 | R&S | 2016/1/13 | 2017/1/12 |
| ETSTW-RE 043 | Log-Periodic Dipole Antenna | HL223 | 100166 | R&S | 2015/3/19 | 2016/3/18 |
| ETSTW-RE 044 | Log-Periodic Antenna | HL050 | 100094 | R&S | 2015/3/31 | 2016/3/30 |
| ETSTW-RE 045 | ESA-E SERIES SPECTRUM ANALYZER | E4404B | MY45111242 | Agilent | Pre-test Use | |
| ETSTW-RE 049 | TRILOG Super Broadband test Antenna | VULB 9160 | 9160-3185 | Schwarzbeck | 2015/3/19 | 2016/3/18 |
| ETSTW-RE 050 | Attenuator 10dB | 50HF-010-1 | None | JFW | 2015/3/2 | 2016/3/1 |
| ETSTW-RE 051 | Attenuator 6dB | 50HF-006-1 | None | JFW | 2015/3/2 | 2016/3/1 |
| ETSTW-RE 053 | Attenuator 3dB | 50HF-003-1 | None | JFW | 2015/3/2 | 2016/3/1 |
| ETSTW-RE 055 | SPECTRUM ANALYZER | FSU 26 | 200074 | R&S | 2015/6/8 | 2016/6/7 |
| ETSTW-RE 060 | Attenuator 30dB | 5015-30 | F651012z-01 | ATM | 2015/3/2 | 2016/3/1 |
| ETSTW-RE 062 | Amplifier Module | CHC 2 | None | KMIC | 2015/11/25 | 2016/11/24 |
| 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 | 2015/3/2 | 2016/3/1 |
| ETSTW-RE 111 | TRILOG Super Broadband test Antenna | VULB 9160 | 9160-3309 | Schwarz beck | 2015/9/18 | 2016/9/17 |
| 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 |

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| | | | | | | |
|---|---|---|---|---|---|---|
| ETSTW-RE 120 | RF Player | MP9200 | MP9210-111022 | ADIVIC | Function test | |
| ETSTW-RE 122 | SIGNAL GENERATOR | SMF100A | 102149 | R&S | 2015/6/8 | 2016/6/7 |
| ETSTW-RE 125 | 5GHz Notch filter | 5NSL11-5200/E221.3-O/O | 1 | K&L Microwave | 2015/8/11 | 2016/8/10 |
| 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 | 2015/3/2 | 2016/3/1 |
| 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 143 | Humidity Temperature Meter | TES-1260 | 110104623 | TES | 2015/9/9 | 2016/9/8 |
| ETSTW-GSM 002 | Universal Radio Communication Tester | CMU 200 | 109439 | R&S | 2015/8/14 | 2016/8/13 |
| ETSTW-GSM 003 | Radio Communication Analyzer | MT8820C | 6201342073 | Anritsu | 2015/3/5 | 2016/3/4 |
| 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 | 2015/2/25 | 2016/2/24 |
| ETSTW-Cable 017 | BNC Cable | X Cable | B Cable 2 | Schwarz beck | 2015/2/25 | 2016/2/24 |
| ETSTW-Cable 018 | BNC Cable | Y Cable | B Cable 3 | Schwarz beck | 2015/2/25 | 2016/2/24 |
| ETSTW-Cable 019 | BNC Cable | Z Cable | B Cable 4 | Schwarz beck | 2015/2/25 | 2016/2/24 |
| ETSTW-Cable 020 | N TYPE Cable | OATS Cable 1 | N30N30-L335-15M | JYE BAO CO.,LTD. | 2015/4/23 | 2016/4/22 |
| ETSTW-Cable 022 | N TYPE Cable | 5006 | 0002 | JYE BAO CO.,LTD. | 2015/3/19 | 2016/3/18 |
| ETSTW-Cable 026 | Microwave Cable | SUCOFLEX 104 | 279075 | HUBER+SUHNER | 2015/3/2 | 2016/3/1 |
| ETSTW-Cable 027 | Microwave Cable | SUCOFLEX 104 | 279083 | HUBER+SUHNER | 2015/5/14 | 2016/5/13 |
| 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 | 2015/3/2 | 2016/3/1 |
| ETSTW-Cable 031 | Microwave Cable | SUCOFLEX 104（S_Cable 10） | 238092 | HUBER+SUHNER | 2015/11/25 | 2016/11/24 |
| ETSTW-Cable 043 | Microwave Cable | SUCOFLEX 104 | 317576 | HUBER+SUHNER | 2015/11/25 | 2016/11/24 |
| ETSTW-Cable 048 | Microwave Cable | SUCOFLEX 104 | 325518 | HUBER+SUHNER | 2015/11/25 | 2016/11/24 |
| ETSTW-Cable 053 | N TYPE To SMA Cable | RG142 | None | JYE BAO CO.,LTD. | 2015/3/19 | 2016/3/18 |
| ETSTW-Cable 058 | Microwave Cable | SUCOFLEX 104 | none | HUBER+SUHNER | 2015/3/19 | 2016/3/18 |
| WTSTW-SW 002 | EMI TEST SOFTWARE | EZ_EMC | None | Farad | Version ETS-03A1 | |

## 2.5 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 ANSI STANDARD C63.10-2013 6.3 using a spectrum analyzer. The bandwidth of the spectrum analyzer was 100 kHz with an appropriate sweep speed. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was the 100 kHz and the video bandwidth was 300 kHz.

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 dBµV) 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 dBµV + 10.36 dB/m + 6 dB = 36.36 dBµV/m @3m |

ANSI STANDARD C63.10-2013 6.2.2 MEASUREMENT PROCEDURES: The EUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m (non metallic table). The EUT was placed in the center of the table. The table used for radiated measurements is capable of continuous rotation. The spectrum was scanned from 30 MHz to 10$^{th}$ harmonic of the fundamental.

Peak readings were taken in three (3) orthogonal planes and the highest readings.
Measurements were made by Worldwide Testing Services(Taiwan) Co., Ltd. at the registered open field test site located at. The Registration Number: **930600**

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.

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.

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# 3 Test results (enclosure)

☒ 1st test ☐ test after modification ☐ production test

| TEST CASE | Para. Number | Required | Test passed | Test failed |
|---|---|---|---|---|
| Transmission Requirements | FCC 15.231(a)<br>IC RSS-210 Annex 1 A1.1.1 | ☒ | ☒ | ☐ |
| Radiated Emission | FCC 15.231(b)<br>IC RSS-210 A1.1.2 | ☒ | ☒ | ☐ |
| Bandwidth of Emission | FCC 15.231(c)<br>IC RSS-210 A1.1.3 | ☒ | ☒ | ☐ |
| Frequency Tolerance | FCC 15.231(d)<br>IC RSS-210 A1.1.4 | ☐ | ☐ | ☐ |
| Period Alternate Field Strength Requirements | FCC 15.231(e)<br>IC RSS-210 2.7 Table 5 | ☐ | ☐ | ☐ |
| Antenna Requirement | FCC 15.203<br>IC RSS-Gen | ☒ | ☒ | ☐ |
| Conducted Measurement at (AC) Power Line | FCC 15.207<br>IC RSS-Gen | ☐ | ☐ | ☐ |

**The following is intentionally left blank.**

## 3.1 Transmission Requirements

FCC 15.231(e)

3.1.1 Limit of Transmission Time

Devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

3.1.2 Results for the duration and silent period measurement

☐ This manually operated transmitter employs software to control the duration of each transmission and silent period between transmissions. The real measured result for the duration of each transmission is _____ ms, and the result for silent period between transmissions is _____ second.

☒ This transmitter is operated by automatic activation, and the duration of each transmission and silent period between transmissions will be controlled by software. The real measured result for the duration of each transmission is 641.282 ms, and the result for silent period between transmissions is 62.204 second.

Explanation: See attached diagrams in appendix.

Test equipment used : ETSTW-RE 004 ETSTW-RE 111

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## 3.2 Output Power (Field Strength)

Model: US1-005R Date: 2016/2/18
Mode: Power Temperature: 24 °C Engineer: Roy
Polarization: Horizontal Humidity: 60 %

| Frequency (MHz) | Reading (dBuV) Peak | Factor (dB) Corr. | Factor (dB) Duty | Result (dBuV/m) Peak | Result (dBuV/m) Ave. | Limit (dBuV/m) Peak | Limit (dBuV/m) Ave. | Margin (dB) | Table Degree (Deg.) | Ant. High (cm) |
|---|---|---|---|---|---|---|---|---|---|---|
| 315.0256 | 54.83 | 16.34 | -19.48 | 71.17 | 51.69 | 87.66 | 67.66 | -15.97 | 235 | 100 |

Polarization: Vertical

| Frequency (MHz) | Reading (dBuV) Peak | Factor (dB) Corr. | Factor (dB) Duty | Result (dBuV/m) Peak | Result (dBuV/m) Ave. | Limit (dBuV/m) Peak | Limit (dBuV/m) Ave.. | Margin (dB) | Table Degree (Deg.) | Ant. High (cm) |
|---|---|---|---|---|---|---|---|---|---|---|
| 314.9454 | 41.43 | 16.34 | -19.48 | 57.77 | 38.29 | 87.66 | 67.66 | -29.37 | 70 | 100 |

Limit 15.231(e)

| Fundamental Frequency (MHz) | Field strength of fundamental, limit µV/m |
|---|---|
| 40.66 – 40.70 | 1,000 |
| 70 – 130 | 500 |
| 130 – 174 | 500 to 1,500 |
| 174 – 260 | 1,500 |
| 260 – 470 | 1,500 to 5,000** (315 MHz: 67.66 dBµV/m = 2416.677 µV/m) |
| Above 470 | 5,000 |

** linear interpolation

Explanation: See attached diagrams in appendix.

Test equipment used: ETSTW-RE 004, ETSTW-RE 111

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## 3.3 Out of Band Radiated Emissions

FCC Rule: 15.231(e) , 15.35
For out of band emissions that are close to or that exceed the 20 dB attenuation requirement described in the specification, radiated measurements were performed at a 3 m separation distance to determine whether these emissions complied with the general radiated emission requirement.

Guidance on Measurement of pulsed emission: 15.35(c)
"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."

Duty Cycle correction = 20 log (dwell time/100ms or one period)

Limits:
For frequencies (Average measurements)
Correction factor conform 15.35 (c) (Average measurements)
Duty cycle correction :
Max. Peak reading – duty cycle correction

Max permitted average Limits = Max permitted Fundamental limit – 20 dB

For example for 315 MHz fundamental carrier:
Max permitted average Limit: 87.66 dBµV/m - 20 dB= 67.66 dBµV/m

For frequencies above 1GHz (Peak measurements).
Modified Limits for peak conform 15.35 (b) = Max Permitted average Limits + 20dB (because Peak detector is used)

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## 3.4 Transmitter Radiated Emissions in restricted Bands

FCC Rules: 15.231 (b), 15.205, 15.209, 15.35
Radiated emission measurements were performed from 30 MHz to 8000 MHz.
For radiated emission tests, the analyzer setting was as followings:
RES BW VID BW
Frequency <1 GHz 100 kHz 100 kHz (Peak measurements)
Frequency >1 GHz 1 MHz 1 MHz (Peak measurements)
1 MHz 1 MHz (Average measurements)
Limits:

For frequencies below 1GHz :

| Frequency of Emission (MHz) | Field strength (microvolts/meter) | Field Strength (dB microvolts/meter) |
|---|---|---|
| 30 – 88 | 100 | 40.0 |
| 88 – 216 | 150 | 43.5 |
| 216 – 960 | 200 | 46.0 |
| Above 960 | 500 | 54.0 |

For frequencies above 1GHz (Average measurements).
Guidance on Measurement of pulsed emission:
“If the emission is pulsed, modify the unit for continues operation , use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation.

For frequencies above 1GHz (Average measurements).

The correction factor, based on the channel dwell tine in a 100 ms period, may be mathematically applied to a measurement made with an average detector, to further reduce the value.

Duty cycle correction = 20 log (dwell time/100ms)
No duty cycle correction was added to the reading

Modified Limits for peak conform 15.35 (b) = Max Permitted average Limits + 20dB (because Peak detector is used)

Above 960 MHz
For mode DSSS CW: 54 dBµV/m + 20 dB = 74 dBµV/m

Explanation: See attached diagrams.

## 3.5 Spurious Emission radiated, Transmitter

Spurious emission was measured with modulation (declared by manufacturer).

The limits on the field strength of the spurious emission in the table § 15.231(e) are based on the fundamental frequency of the intentional radiator. Spurious emission shall be attenuated to the average (or alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in § 15.209, whichever limit permits a higher field strength.
In addition, radiated emission which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

SAMPLE CALCULATION OF LIMIT. All results will be updated by an automatic measuring system in accordance to point 2.3.

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.

The peak and average spurious emission plots was measured with the average limits.
In the Table being listed the critical peak and average value an exhibit the compliance with the above calculated Limits.

Summary table with radiated data of the test plots

Model: US1-005R Date: 2016/2/18
Mode: TX 315 MHz Temperature: 24 °C Engineer: Roy
Polarization: Horizontal Humidity: 60 %

| Frequency (MHz) | Reading (dBuV) | Detector | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Table Degree (Deg.) | Ant. High (cm) |
|---|---|---|---|---|---|---|---|---|
| 132.8054 | 2.93 | peak | 14.72 | 17.65 | 43.50 | -25.85 | 105 | 100 |
| 258.3367 | 3.06 | peak | 14.49 | 17.55 | 46.00 | -28.45 | 90 | 100 |

Polarization: Horizontal

| Frequency (MHz) | Reading (dBuV) Peak | Factor (dB) Corr. | Factor (dB) Duty | Result (dBuV/m) Peak | Result (dBuV/m) Ave. | Limit (dBuV/m) Peak | Limit (dBuV/m) Ave. | Margin (dB) | Table Degree (Deg.) | Ant. High (cm) |
|---|---|---|---|---|---|---|---|---|---|---|
| 629.6593 | 30.09 | 23.45 | -19.48 | 53.54 | 34.06 | 67.66 | 47.66 | -13.60 | 55 | 100 |
| 945.2906 | 35.45 | 28.29 | -19.48 | 63.74 | 44.26 | 67.66 | 47.66 | -3.40 | 180 | 100 |
| 1258.5170 | 55.38 | -9.48 | -19.48 | 45.90 | 26.42 | 67.66 | 47.66 | -21.24 | 75 | 100 |
| 1575.1500 | 54.24 | -8.44 | -19.48 | 45.80 | 26.32 | 74.00 | 54.00 | -27.68 | 110 | 100 |
| 1890.0000 | 45.64 | -6.06 | -19.48 | 39.58 | 20.10 | 67.66 | 47.66 | -27.56 | 210 | 100 |
| 2205.0000 | 43.73 | -5.29 | -19.48 | 38.44 | 18.96 | 74.00 | 54.00 | -35.04 | 10 | 100 |

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IC: 9368A-U1F02

Polarization: Vertical

| Frequency (MHz) | Reading (dBuV) | Detector | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Table Degree (Deg.) | Ant. High (cm) |
|---|---|---|---|---|---|---|---|---|
| 55.9718 | 11.79 | peak | 13.39 | 25.18 | 67.66 | -42.48 | 240 | 100 |
| 131.1824 | 3.61 | peak | 14.61 | 18.22 | 43.50 | -25.28 | 175 | 100 |

Polarization: Vertical

| Frequency (MHz) | Reading (dBuV) Peak | Factor (dB) Corr. | Duty | Result (dBuV/m) Peak | Ave. | Limit (dBuV/m) Peak | Ave. | Margin (dB) | Table Degree (Deg.) | Ant. High (cm) |
|---|---|---|---|---|---|---|---|---|---|---|
| 629.6593 | 23.89 | 23.45 | -19.48 | 47.34 | 27.86 | 67.66 | 47.66 | -19.80 | 230 | 100 |
| 945.2906 | 23.32 | 28.29 | -19.48 | 51.61 | 32.13 | 67.66 | 47.66 | -15.53 | 165 | 100 |
| 1258.5170 | 50.62 | -9.48 | -19.48 | 41.14 | 21.66 | 67.66 | 47.66 | -26.00 | 50 | 100 |
| 1575.1500 | 48.69 | -8.44 | -19.48 | 40.25 | 20.77 | 74.00 | 54.00 | -33.23 | 135 | 100 |
| 1890.0000 | 44.48 | -6.06 | -19.48 | 38.42 | 18.94 | 67.66 | 47.66 | -28.72 | 95 | 100 |
| 2205.0000 | 43.50 | -5.29 | -19.48 | 38.21 | 18.73 | 74.00 | 54.00 | -35.27 | 40 | 100 |

**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 : 30-1000 MHz = ± 3.90 dB, 1-18 GHz = ±4.78 dB, 18-40 GHz= ±2.44 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 030, ETSTW-RE 111

## 3.6 Channel Bandwidth

Measurement of Necessary Bandwidth (BN)

| Used frequency | Bandwidth | Limit |
|---|---|---|
| 315 MHz | 156.321 kHz | 1.0848 MHz |

Explanation: The bandwidth fulfills the requirements of FCC § 15.231, see attached diagrams.

Limits:

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Test equipment used: ETSTW-RE 004

## 3.7 Antenna requirement

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

Explanation: This Monopole antenna is integral antenna which passes antenna requirement.

| | | |
|---|---|---|
| The equipment meets the requirements | yes<br>☒ | no<br>☐ |

## 3.8 Duty Cycle

The correction factor, based on the channel dwell time in a 100ms period, may be mathematically applied to a measurement made with an average detector, to further reduce the measured value.

Average Reading = Peak Reading (dBuV/m) + Duty Cycle Correction

Duty Cycle Correction = 20 log (Cycle)
In order to determine the Duty Cycle, the EUT is measured as:

| Testing Mode | T period (ms) | T on (ms) | Duty Cycle | Duty Cycle Correction 20*log(Duty Cycle) |
|---|---|---|---|---|
| Transmitting mode | 100 | 10.62224 | 0.106222425 | -19.48 |

Test equipment used: ETSTW-RE 004

## 3.9 Conducted Measurement at (AC) Power Line

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 | |
|---|---|---|
| | quasi-peak (dBμV/m) | average (dBμV/m) |
| -- kHz | -- | -- |

**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 = ±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 because the EUT is battery-used.**

**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 003, ETSTW-CE 016, ETSTW-RE 045

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FCC ID: XVBU1F02
IC: 9368A-U1F02

# Appendix

## A Measurement diagrams

1. Active Time
2. Output Power
3. Spurious Emissions radiated
4. Bandwidth
5. Duty Cycle

## B Photos

1. External Photos
2. Internal Photos
3. Set Up Photos

Registration number: W6M21602-15608-C-1
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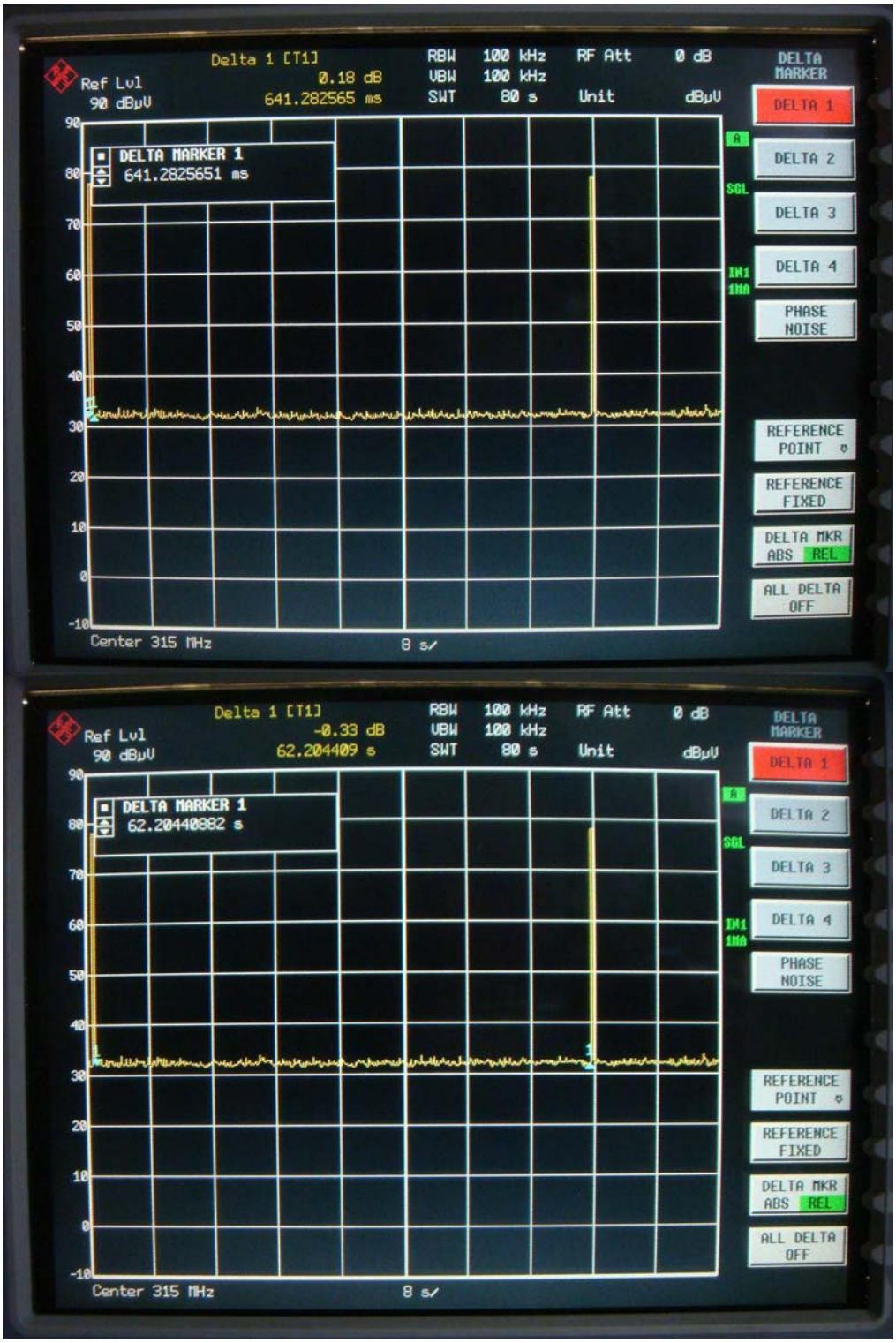
# Measurement diagrams

## Active Time



Registration number: W6M21602-15608-C-1
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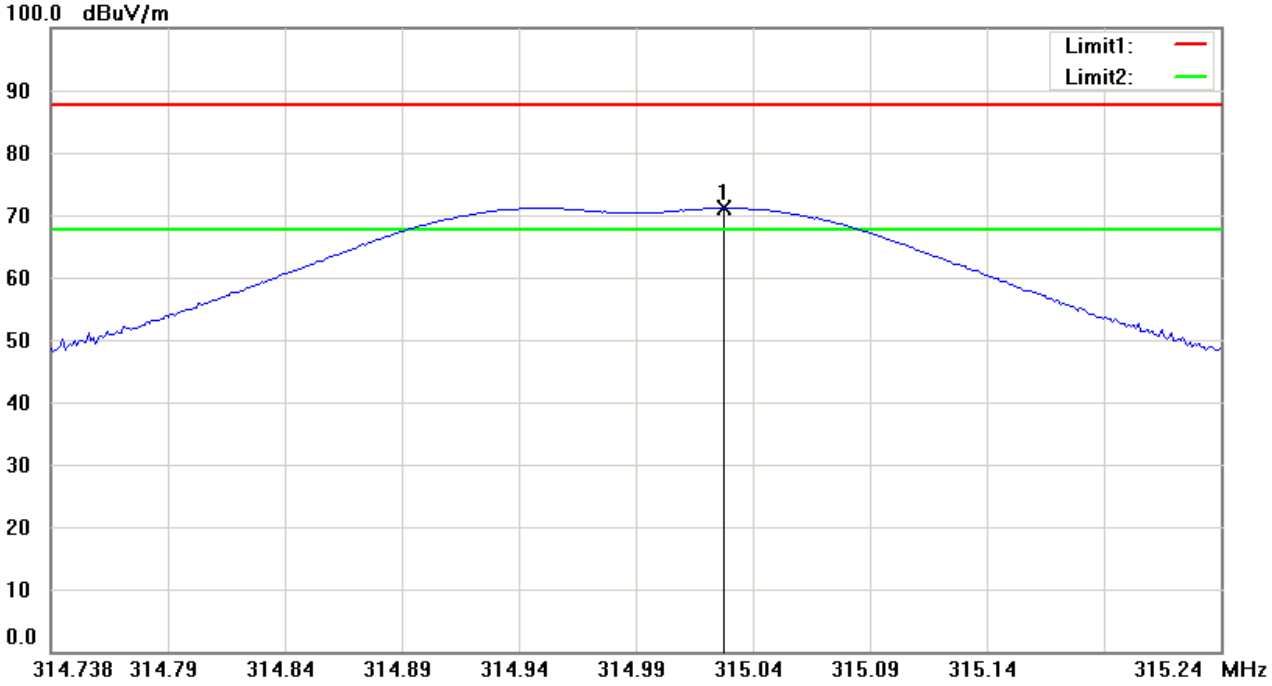
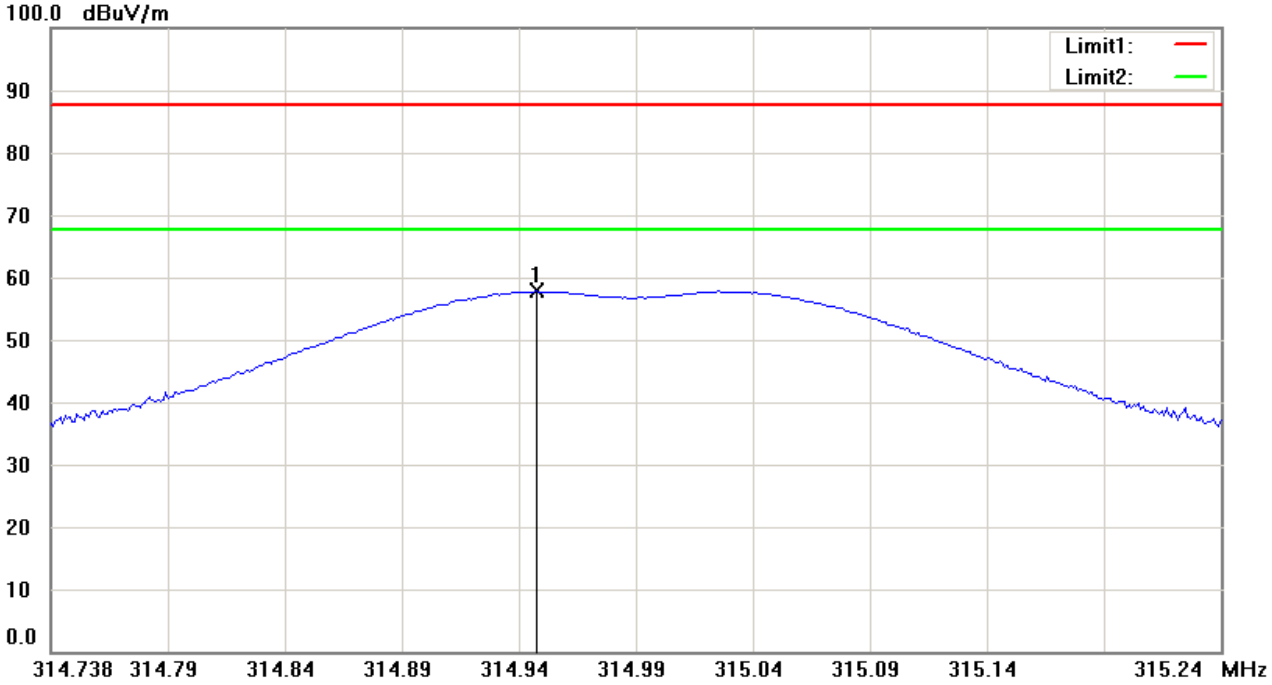
IC: 9368A-U1F02

# Output Power
## TX_433.92 MHz
### Antenna Polarization H



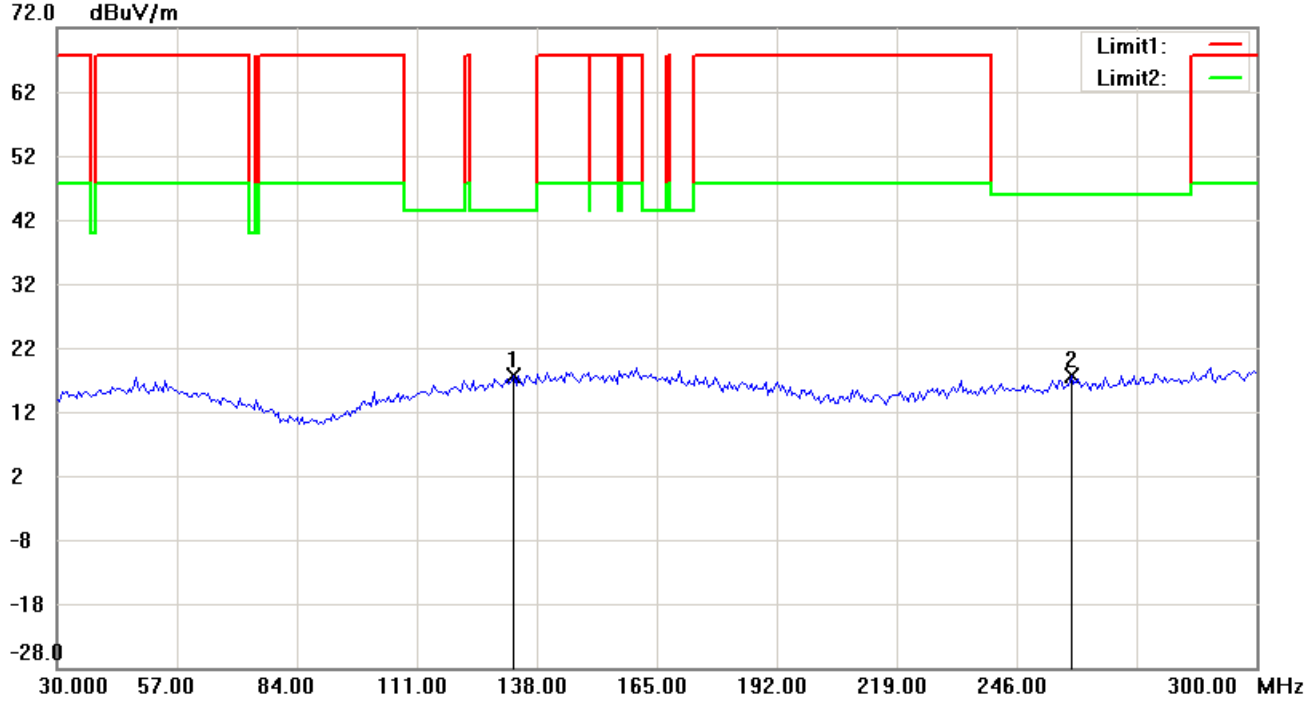

### Antenna Polarization V

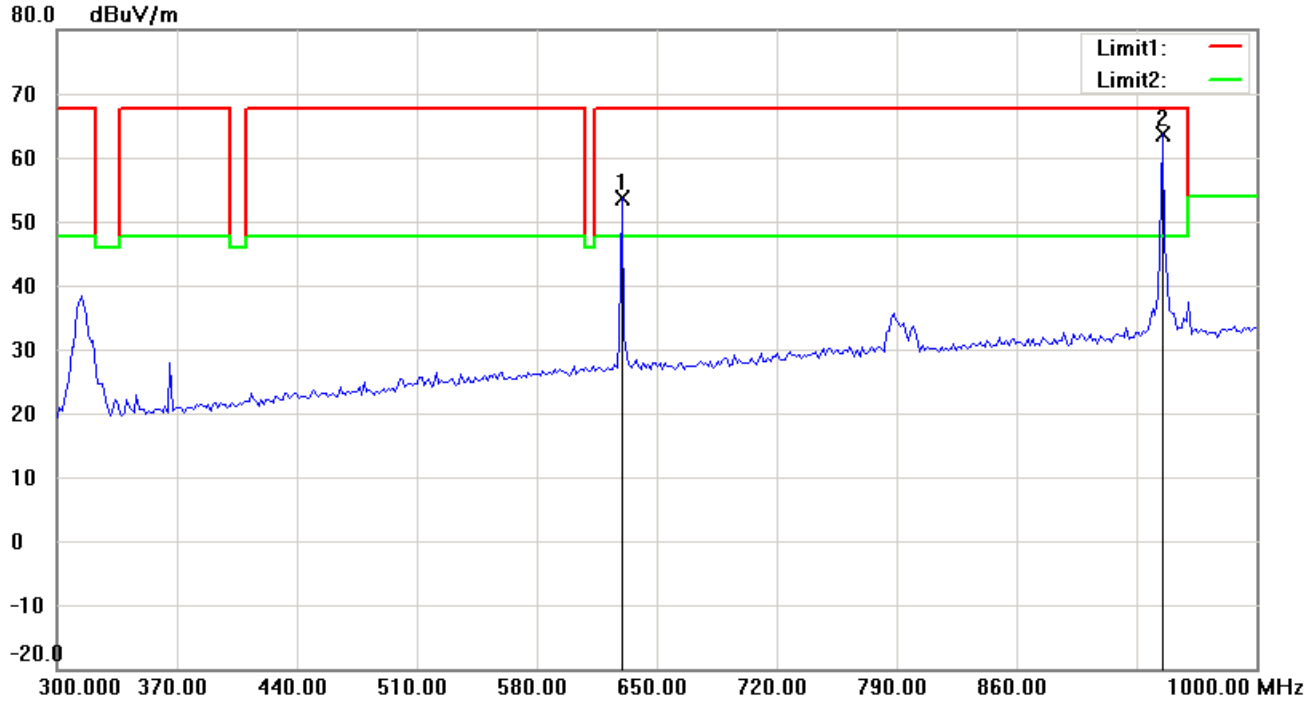



**Note:**
**Up Line: Peak Limit Line, Down Line: Ave Limit Line**
**1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.**
**2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification of test standard.**
**3 . For corrected test results are listed in the relevant table of field strength test data of this test report.**

Registration number: W6M21602-15608-C-1
FCC ID: XVBU1F02
IC: 9368A-U1F02

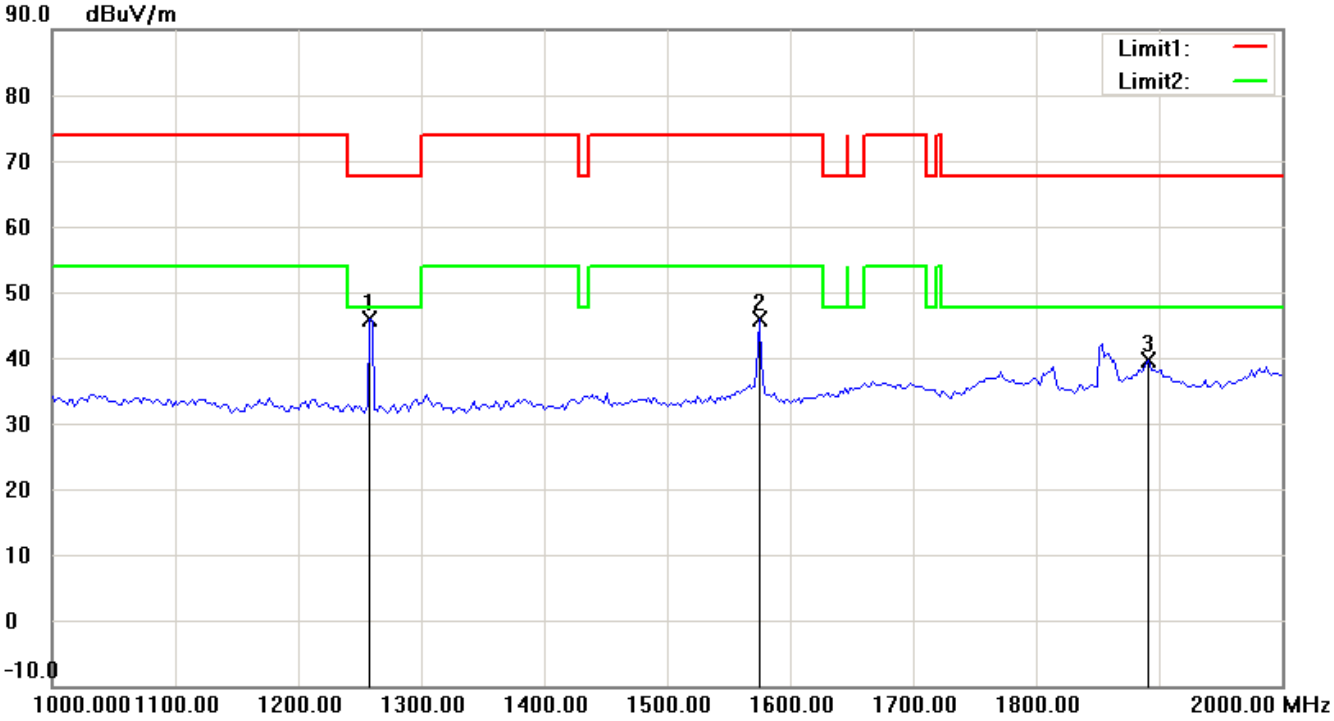
# Spurious Emissions radiated
# TX_315 MHz
# Antenna Polarization H

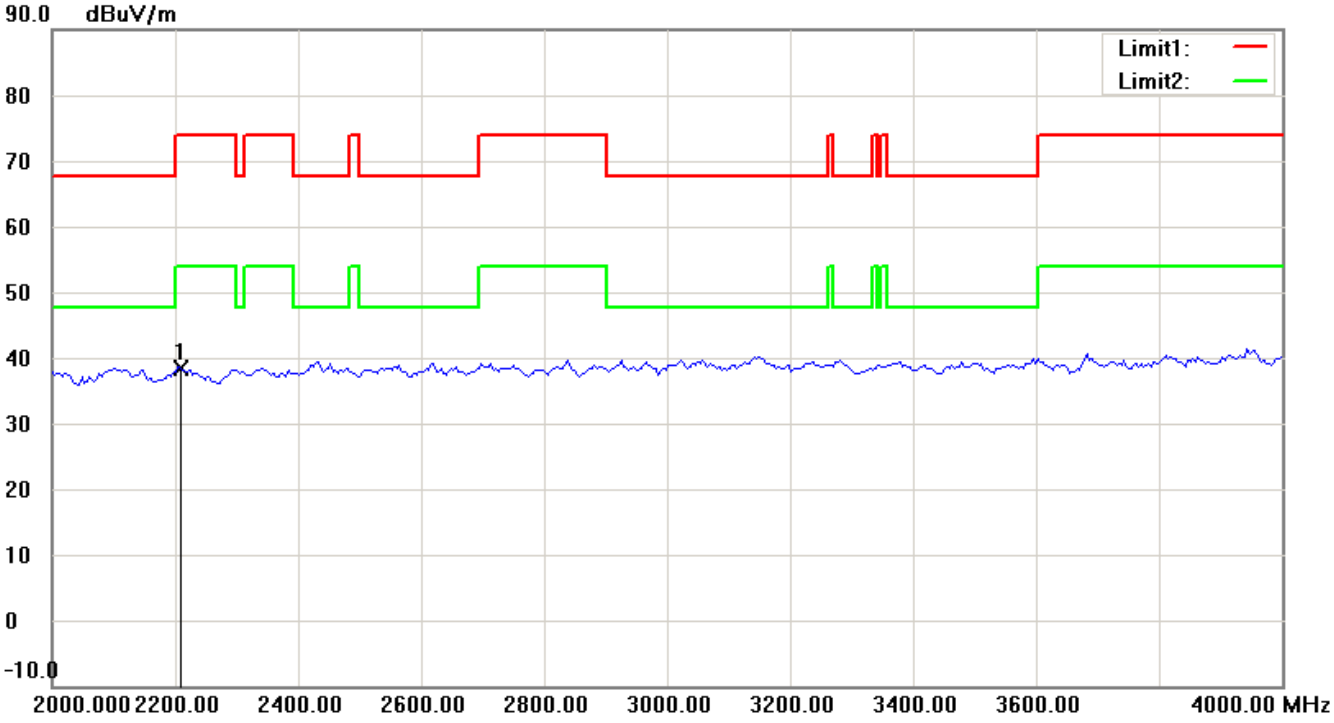



**Note:**
**Up Line: Peak Limit Line Down Line: Ave Limit Line**
**1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.**
**2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification of test standard.**
**3. For corrected test results are listed in the relevant table of radiated test data of this test report**

Registration number: W6M21602-15608-C-1
FCC ID: XVBU1F02
IC: 9368A-U1F02

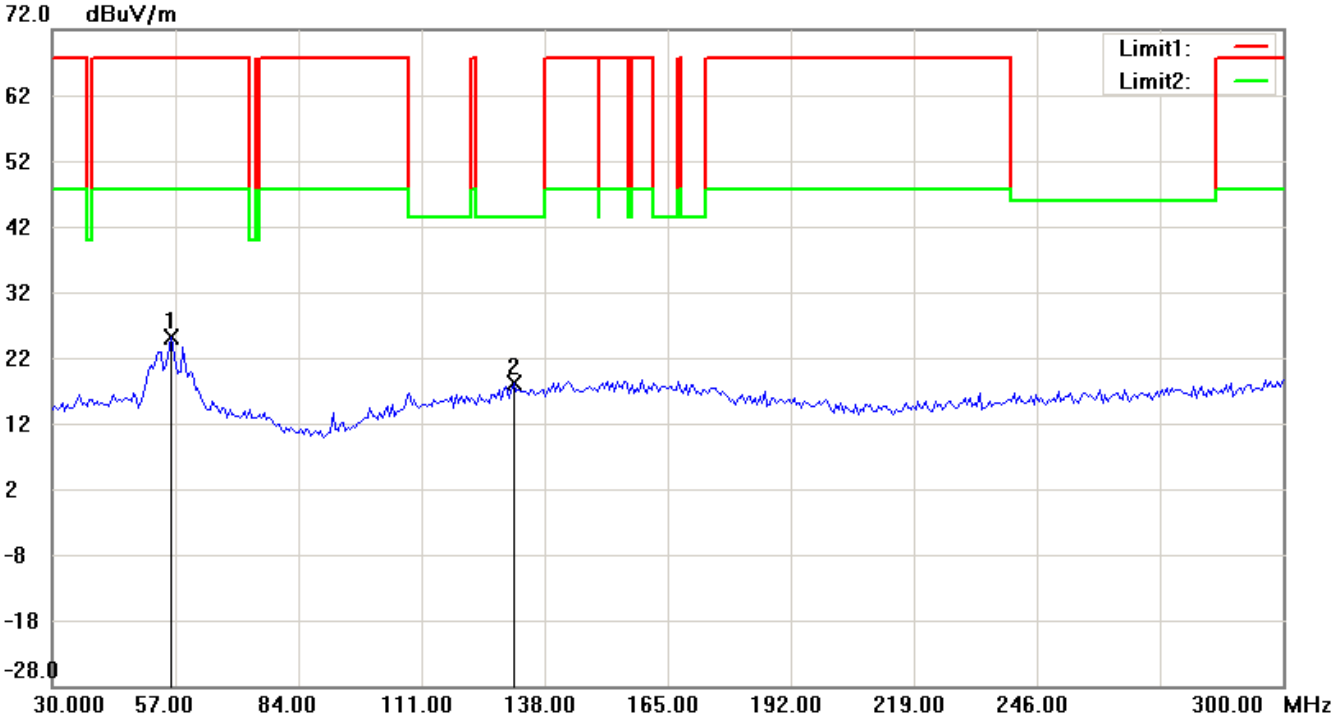


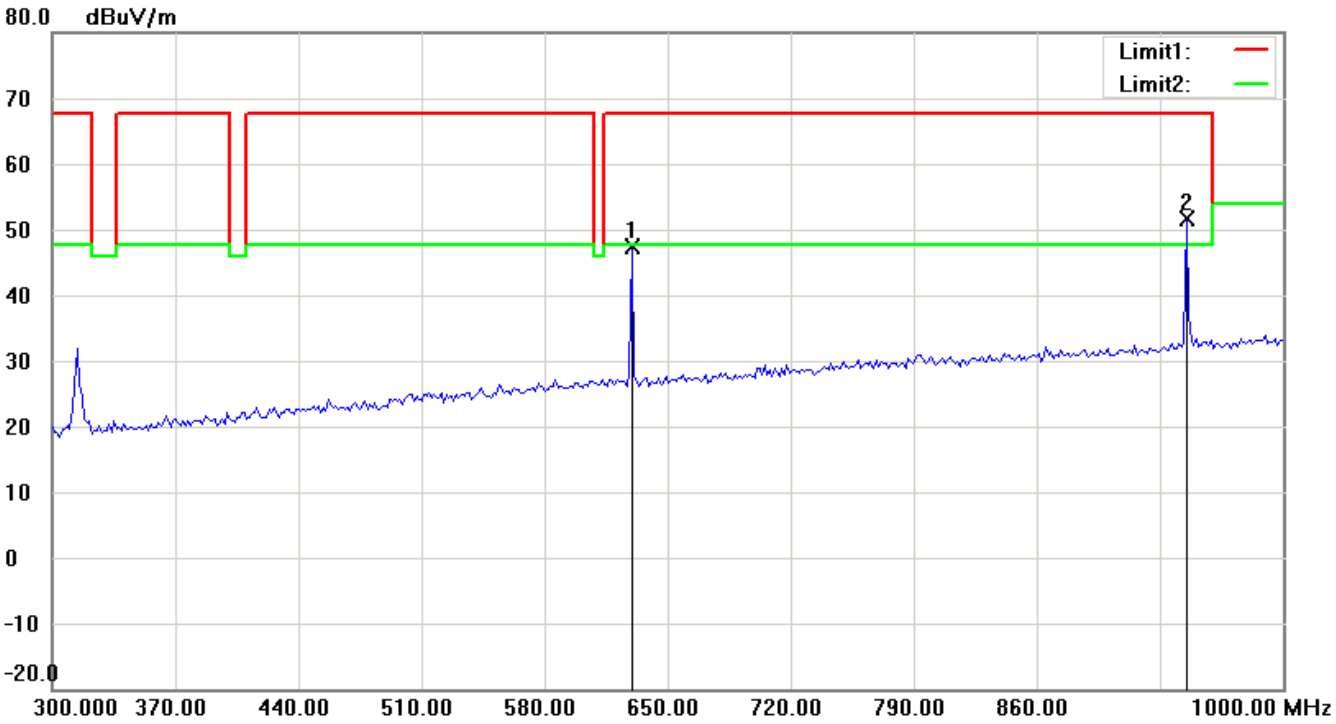




**Note:**
**Up Line: Peak Limit Line Down Line: Ave Limit Line**
**1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.**
**2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification of test standard.**
**3. For corrected test results are listed in the relevant table of radiated test data of this test report**

Registration number: W6M21602-15608-C-1
FCC ID: XVBU1F02
IC: 9368A-U1F02

## Antenna Polarization V




**Note:**
**Up Line: Peak Limit Line Down Line: Ave Limit Line**
**1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.**
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Registration number: W6M21602-15608-C-1
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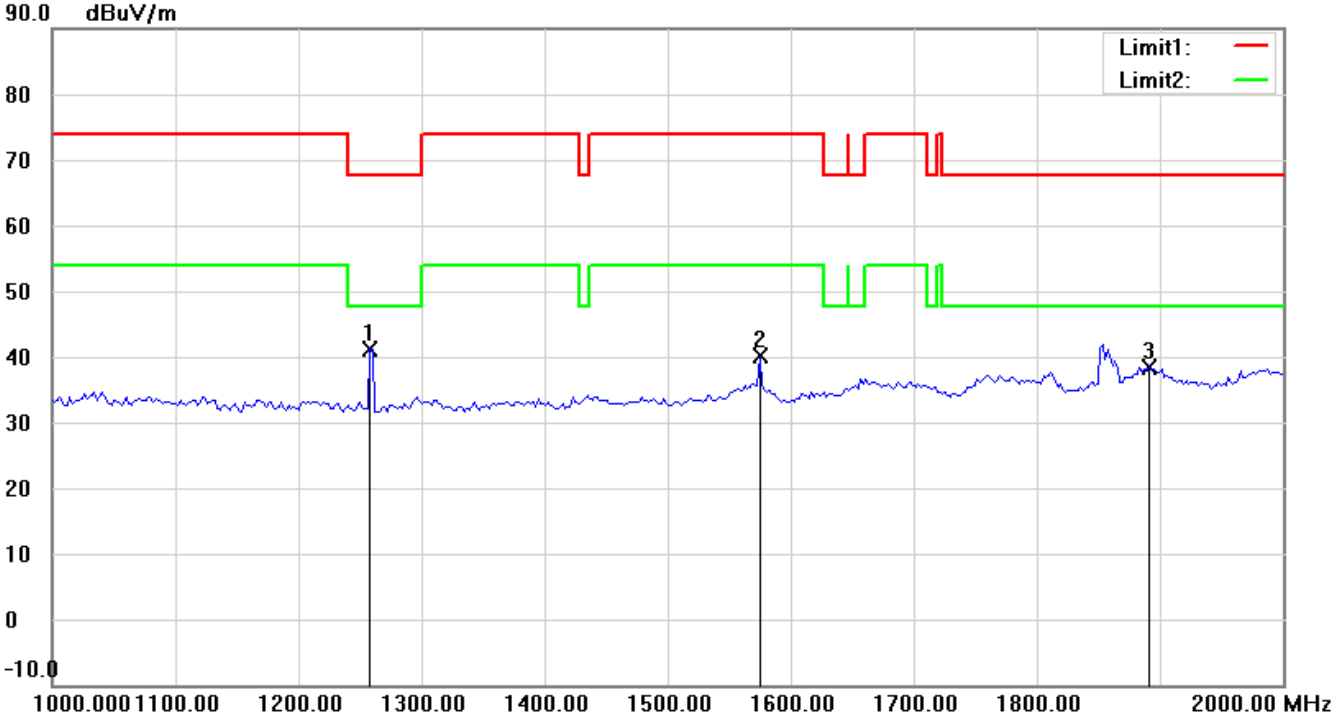


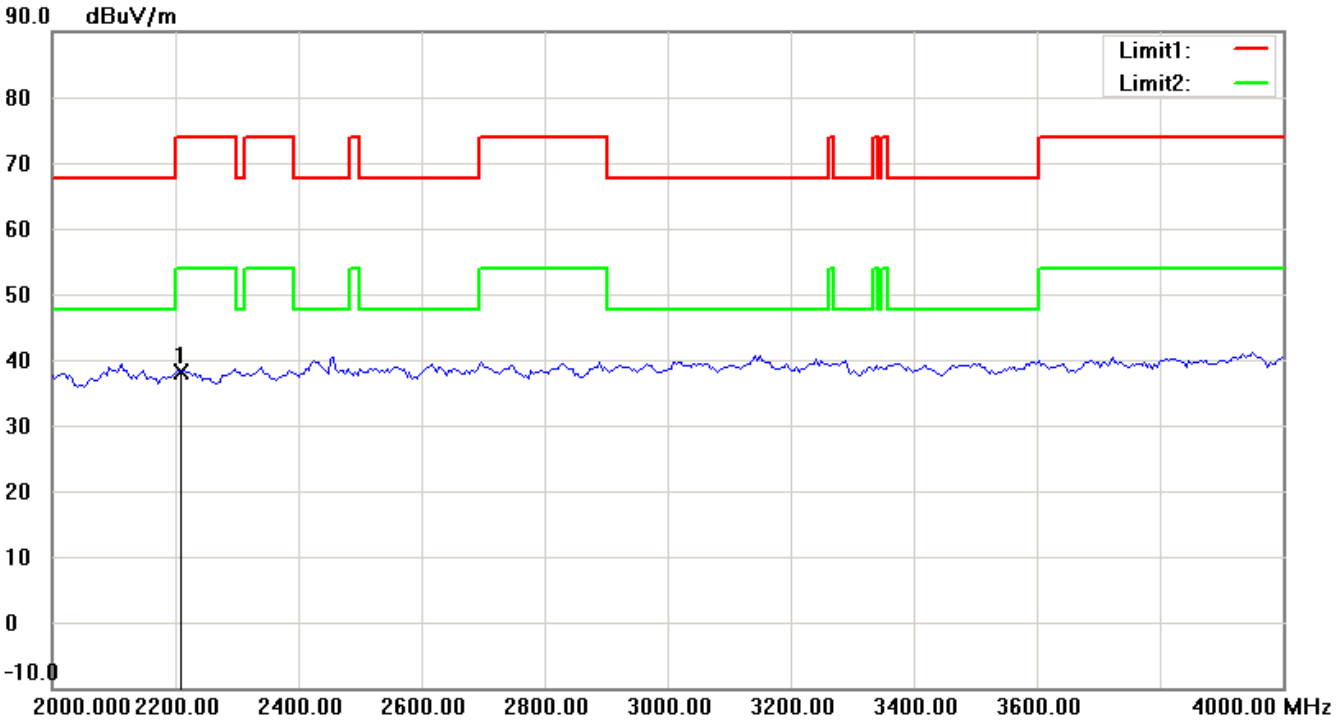


**Note:**
**Up Line: Peak Limit Line Down Line: Ave Limit Line**
**1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.**
**2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification of test standard.**
**3. For corrected test results are listed in the relevant table of radiated test data of this test report**

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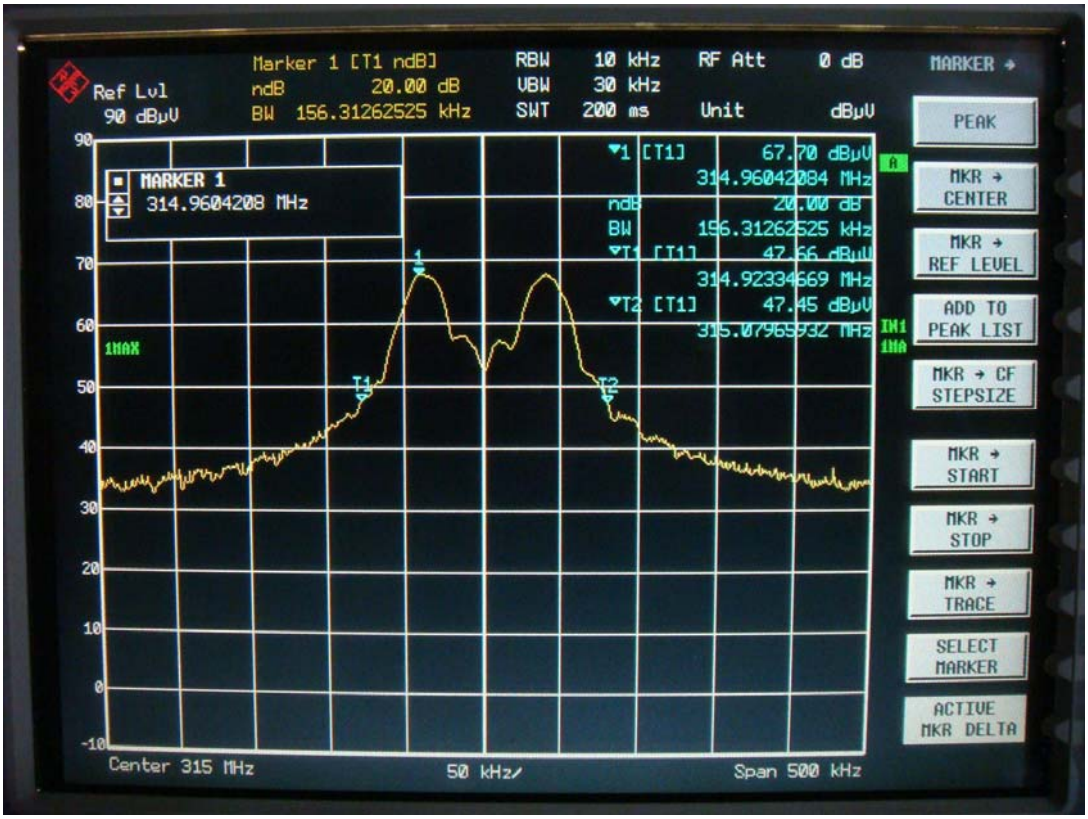
## Bandwidth




## Duty Cycle