



FCC - TEST REPORT

Report Number : **60.792.22.004.01R01** Date of Issue : November 18, 2022

Model : **HG09913A-US, HG09913B-US**

Product Type : **Bluetooth Speaker**

Applicant : Lidl US LLC

Address : 3500 South Clark Street, Arlington, VA 22202, US

Production Facility : DIGI-MAX TECHNOLOGY LIMITED

Address : RM 1902 EASEY COMM BLDG, 253 – 261 HENNESSY ROAD, WANCHAI, HK

Test Result : **Positive** **Negative**

Total pages including Appendices : 83

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1 Table of Contents

| | |
|--|----|
| 1 Table of Contents..... | 2 |
| 2 Description of Equipment Under Test | 3 |
| 3 Summary of Test Standards | 4 |
| 4 Details about the Test Laboratory | 5 |
| 4.1 Test Equipment Site List | 6 |
| 4.2 Measurement System Uncertainty | 7 |
| 5 Summary of Test Results..... | 8 |
| 6 General Remarks..... | 9 |
| 7 Test Setups..... | 10 |
| 7.1 Radiated test setups Below 1GHz..... | 10 |
| 7.2 Radiated test setups Above 1GHz | 10 |
| 7.3 AC Power Line Conducted Emission test setups | 11 |
| 7.4 Conducted RF test setups..... | 11 |
| 8 Emission Test Results | 12 |
| 8.1 Spurious Radiated Emission | 12 |
| 8.2 Conducted Emission at AC Power line..... | 19 |
| 8.3 20dB & 99% Bandwidth | 21 |
| 8.4 Peak Output Power..... | 30 |
| 8.5 Spurious Emissions at Antenna Terminals..... | 39 |
| 8.6 100kHz Bandwidth of band edges..... | 57 |
| 8.7 Minimum. Number of Hopping Frequencies | 63 |
| 8.8 Minimum Hopping Channel Carrier Frequency Separation | 66 |
| 8.9 Average Channel Occupancy Time..... | 69 |
| 8.10 Antenna Requirement..... | 72 |
| 9 Test setup procedure | 73 |
| 10 Appendix A - General Product Information | 83 |

2 Description of Equipment Under Test

Description of the Equipment Under Test

| | |
|-----------------------------|---|
| Product: | Bluetooth Speaker |
| Model no.: | HG09913A-US, HG09913B-US |
| FCC ID: | 2AJ90-HG9913 |
| Rating: | 5.0 VDC form USB port Or 3.7V DC, 2000mAh rechargeable Li-ion battery |
| Frequency: | 2402MHz-2480MHz (Tx and Rx) |
| Antenna gain: | 2 dBi |
| Number of operated channel: | 79 |
| Modulation: | GFSK, $\pi/4$ DQPSK, 8DPSK |

Auxiliary Equipment and Software Used during Test:

| DESCRIPTION | MANUFACTURER | MODEL NO. | S/N |
|-------------|--------------|-----------|--------------------------------|
| Adaptor | Apple | A1357 | EMC-126 |
| iPhone | Apple | iPhone 6 | 2014CJ9409/352089 077956552 |
| Laptop | Lenovo | X240 | L34015282 |

Auxiliary Software Used during Test:

| DESCRIPTION | SOFTWARE NAME | VERSION | REMARK |
|-----------------------|---------------|---------|-----------------------|
| RF Test Mode Software | --- | --- | Provided by applicant |

3 Summary of Test Standards

| Test Standards |
|----------------|
|----------------|

| |
|--|
| FCC Part 15 Subpart C 10-1-20 Edition Federal Communications Commission, PART 15 — Radio Frequency Devices, Subpart C —Intentional Radiators |
|--|

All the test methods were according to ANSI C63.10 (2013).

4 Details about the Test Laboratory

Site 1

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
 Building 12&13 Zhiheng Wisdomland Business Park,
 Nantou Checkpoint Road 2,
 Shenzhen 518052, P.R.China
 FCC Registration Number: 514049
 ISED test site number: 10320A

| Emission Tests | |
|---|-----------|
| Test Item | Test Site |
| FCC Part 15 Subpart C | |
| FCC Title 47 Part 15.205, 15.209 & 15.247(d) Spurious Radiated Emission | Site 1 |
| FCC Title 47 Part 15.207(a) AC Line Conducted Emission | Site 1 |
| FCC Title 47 Part 15.247(a)(1) 20dB & 99% Bandwidth | Site 1 |
| FCC Title 47 Part 15.247(b) Peak Output Power | Site 1 |
| FCC Title 47 Part 2.1051 & 15.247(d) Spurious Emissions at Antenna Terminals | Site 1 |
| FCC Title 47 Part 15.247(d) 100kHz Bandwidth of band edges | Site 1 |
| FCC Title 47 Part 15.247(a)(1) Minimum Number of Hopping Frequencies | Site 1 |
| FCC Title 47 Part 15.247(a)(1) Minimum Hopping Channel Carrier Frequency Separation | Site 1 |
| FCC Title 47 Part 15.247(a)(1) Average Time of Occupancy | Site 1 |
| FCC Title 47 Part 15.203 & 15.247(b) Antenna Requirement | Site 1 |

4.1 Test Equipment Site List

Radiated Emission Test – Site 1

| DESCRIPTION | MANUFACTURER | MODEL NO. | SERIAL NO. | CAL. DUE DATE |
|-------------------------------------|-----------------|-----------|-----------------|---------------|
| EMI Test Receiver | Rohde & Schwarz | ESR 7 | 102176 | 2023-5-27 |
| Trilog Super Broadband Test Antenna | Schwarzbeck | VULB 9163 | 707 | 2023-5-27 |
| Horn Antenna | Rohde & Schwarz | HF907 | 102294 | 2023-6-19 |
| Loop Antenna | Rohde & Schwarz | HFH2-Z2 | 100398 | 2023-8-25 |
| Pre-amplifier | Rohde & Schwarz | SCU 18 | 102230 | 2023-5-28 |
| Attenuator | Mini-circuits | UNAT-6+ | 15542 | 2023-5-27 |
| 3m Semi-anechoic chamber | TDK | SAC-3 #1 | ---- | 2023-5-28 |
| Test software | Rohde & Schwarz | EMC32 | Version10.35.02 | N/A |

Conducted Emission Test – Site 1

| DESCRIPTION | MANUFACTURER | MODEL NO. | SERIAL NO. | CAL. DUE DATE |
|--------------------|-------------------|----------------|----------------|---------------|
| EMI Test Receiver | Rohde & Schwarz | ESR 3 | 101782 | 2023-5-27 |
| LISN | Rohde & Schwarz | ENV4200 | 100249 | 2023-5-27 |
| LISN | Rohde & Schwarz | ENV432 | 101318 | 2023-5-27 |
| LISN | Rohde & Schwarz | ENV216 | 100326 | 2023-5-27 |
| ISN | Rohde & Schwarz | ENY81 | 100177 | 2023-5-27 |
| ISN | Rohde & Schwarz | ENY81-CA6 | 101664 | 2023-5-27 |
| High Voltage Probe | Schwarzbeck | TK9420(VT9420) | 9420-584 | 2023-5-27 |
| RF Current Probe | Rohde & Schwarz | EZ-17 | 100816 | 2023-5-31 |
| Attenuator | Shanghai Huaxiang | TS2-26-3 | 080928189 | 2023-5-27 |
| Test software | Rohde & Schwarz | EMC32 | Version9.15.00 | N/A |
| Shielding Room | TDK | CSR #1 | ---- | 2023-5-27 |

20dB & 99% Bandwidth, Peak Output Power, Spurious Emissions at Antenna Terminals, 100kHz Bandwidth of band edges, hopping items – Site 1

| DESCRIPTION | MANUFACTURER | MODEL NO. | SERIAL NO. | CAL. DUE DATE |
|------------------|-----------------|-----------------|---------------|---------------|
| Signal Analyzer | Rohde & Schwarz | FSV40 | 101030 | 2023-5-27 |
| RF Switch Module | Rohde & Schwarz | OSP120/OSP-B157 | 101226/100851 | 2023-5-27 |

4.2 Measurement System Uncertainty

Measurement System Uncertainty Emissions

| System Measurement Uncertainty | |
|---|--|
| Items | Extended Uncertainty |
| Uncertainty for Radiated Emission in 3m chamber 9kHz-30MHz | 4.76dB |
| Uncertainty for Radiated Emission in 3m chamber 30MHz-1000MHz | Horizontal: 5.12dB; Vertical: 5.10dB; |
| Uncertainty for Radiated Emission in 3m chamber 1000MHz-25000MHz | Horizontal: 5.01dB; Vertical: 5.00dB; |
| Uncertainty for Conducted Emission at AC Power Line 150kHz-30MHz | 3.21dB |
| Uncertainty for conducted power test | 1.16dB |
| Uncertainty for frequency test | 0.6×10^{-7} |

Measurement Uncertainty Decision Rule

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115: 2007, clause 4.4.3 and 4.5.1.

5 Summary of Test Results

| Emission Tests | | | | |
|---|-------|-------------------------------------|--------------------------|--------------------------|
| FCC Part 15 Subpart C | | | | |
| Test Condition | Pages | Test Result | | |
| | | Pass | Fail | N/A |
| FCC Title 47 Part 15.205, 15.209 & 15.247(d) Spurious Radiated Emission | 12-18 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| FCC Title 47 Part 15.207(a) AC Line Conducted Emission | 19-20 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| FCC Title 47 Part 15.247(a)(2) 20dB & 99% Bandwidth | 21-29 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| FCC Title 47 Part 15.247(b) Peak Output Power | 30-38 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| FCC Title 47 Part 2.1051 & 15.247(d) Spurious Emissions at Antenna Terminals | 39-56 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| FCC Title 47 Part 15.247(d) 100kHz Bandwidth of band edges | 57-62 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| FCC Title 47 Part 15.247(a)(1) Min. No. of Hopping Frequencies | 63-65 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| FCC Title 47 Part 15.247(a)(1) Min. of Hopping Channel Carrier Frequency Separation | 66-68 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| FCC Title 47 Part 15.247(a)(1) Average Time of Occupancy | 69-71 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| FCC Title 47 Part 15.203 & 15.247(b) Antenna Requirement | 72 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Remark:

6 General Remarks

Remarks

This submittal(s) (test report) is intended for **FCC ID: 2AJ90-HG9913**, complies with Section 15.203, 15.205, 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C rules for the DSS grant.

Client informs that the **HG09913A-US** and **HG09913B-US** have the same technical construction including circuit diagram, PCB layout, components and component layout, all electrical construction and mechanical construction. The difference lies only on color & model of different model.

All tests were performed on model: **HG09913A-US**. All data packet type modes have been tested, only the worst case is shown on the report.

The TX and RX range is 2402MHz-2480MHz.

SUMMARY:

- All tests according to the regulations cited on page 8 were

n - Performed

o - **Not** Performed

- The Equipment Under Test

n - **Fulfills** the general approval requirements.

o - **Does not** fulfill the general approval requirements.

Sample Received Date: September 30, 2022

Testing Start Date: October 1, 2022

Testing End Date: November 17, 2022

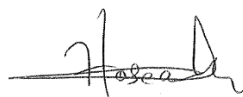
- TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch -

Reviewed by:

Prepared by:

Tested by:





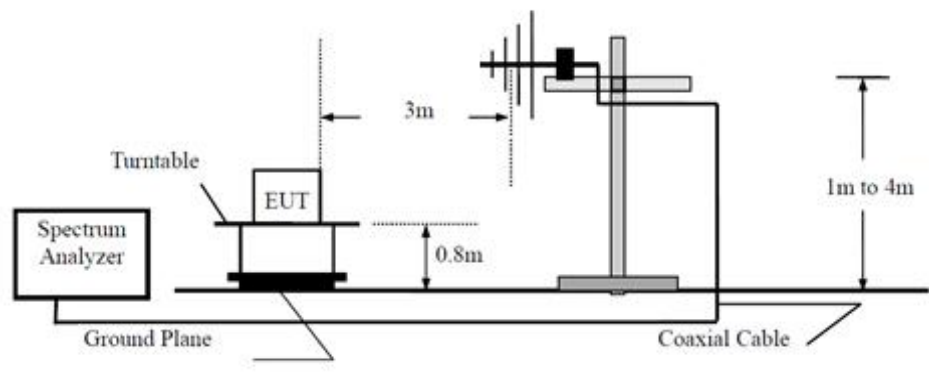

Eric LI
Section Manager

Hosea CHAN
EMC Project Engineer

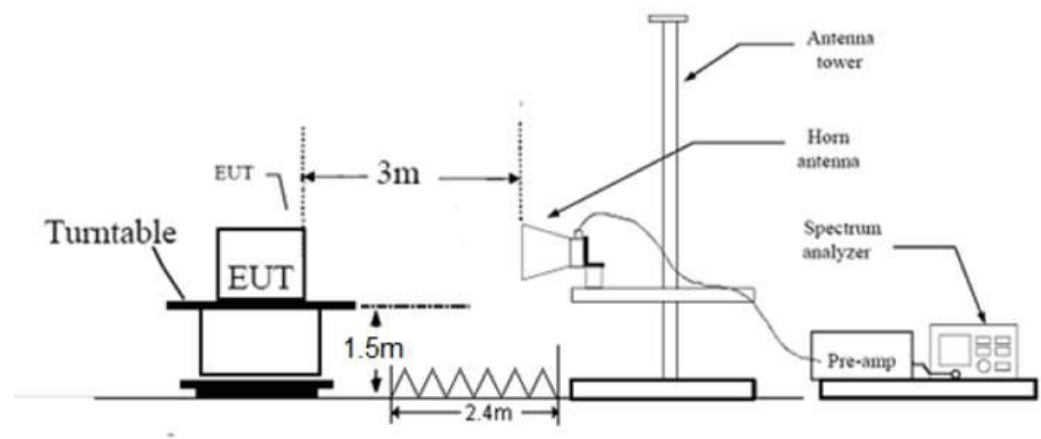
Louise Liu
EMC Test Engineer

7 Test Setups

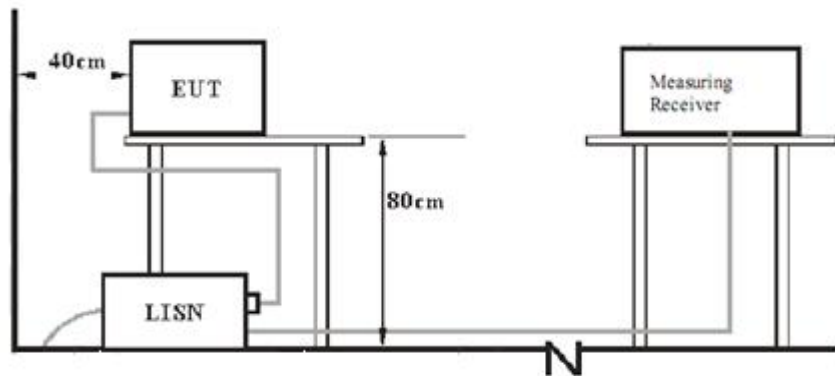
7.1 Radiated test setups Below 1GHz



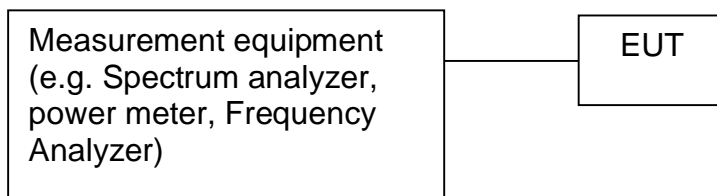
7.2 Radiated test setups Above 1GHz



7.3 AC Power Line Conducted Emission test setups



7.4 Conducted RF test setups



8 Emission Test Results

8.1 Spurious Radiated Emission

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (3DH5)
 (Highest channel is the worst case)
 Test Specification: FCC15.205, 15.209 & 15.247(d)
 Comment: DC 5V
 Remark: Below 1GHz

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

| Frequency MHz | Result dB μ V/m | Limit dB μ V/m | Margin dB | Detector PK/QP/AV | Ant. Polarity H/V | Corr. (dB) |
|------------------|------------------------|-----------------------|--------------|----------------------|----------------------|---------------|
| 47.998889 | 20.97 | 40.00 | 19.03 | PK | H | 20.70 |
| 57.537222 | 19.90 | 40.00 | 20.10 | PK | H | 20.10 |
| 97.037778 | 20.30 | 43.50 | 23.20 | PK | H | 18.00 |
| 119.671111 | 20.03 | 43.50 | 23.47 | PK | H | 16.54 |
| 198.402778 | 19.95 | 43.50 | 23.55 | PK | H | 18.81 |
| 473.828889 | 29.17 | 46.00 | 16.83 | PK | H | 24.94 |
| 47.998889 | 27.93 | 40.00 | 12.07 | PK | V | 20.70 |
| 56.513333 | 21.86 | 40.00 | 18.14 | PK | V | 20.31 |
| 104.205000 | 19.84 | 43.50 | 23.66 | PK | V | 18.43 |
| 197.540556 | 20.89 | 43.50 | 22.61 | PK | V | 18.85 |
| 356.458889 | 24.60 | 46.00 | 21.40 | PK | V | 22.30 |
| 611.137778 | 30.94 | 46.00 | 15.06 | PK | V | 27.60 |

Remark:

- As the measured peak value not exceeded the Quasi-peak limit, Quasi-peak value no need to be measured.
- Result Level=Reading Level + Correction Factor
 Above 1GHz: Corrector factor = Antenna Factor + Cable Loss- Amplifier Gain
 Below 1GHz: Corrector factor = Antenna Factor + Cable Loss
 (The Reading Level is recorded by software which is not shown in the sheet)

Spurious Radiated Emission

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2402MHz, 3DH5)
 Test Specification: FCC15.205, 15.209 & 15.247(d)
 Comment: DC 5V
 Remark: 1GHz to 25GHz

| Test Result | |
|-------------------------------------|------------|
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

| Frequency MHz | Result dBµV/m | Limit dBµV/m | Margin dB | Detector PK/QP/AV | Ant. Polarity H/V | Corr. (dB) |
|------------------|------------------|-----------------|--------------|----------------------|----------------------|---------------|
| 2388.000000 | 40.98 | 74.00 | 33.02 | PK | H | -2.95 |
| 2496.500000 | 41.35 | 74.00 | 32.65 | PK | H | -2.19 |
| 4432.500000 | 47.53 | 74.00 | 26.47 | PK | H | 3.01 |
| 6405.000000 | 45.53 | 74.00 | 28.47 | PK | H | 9.20 |
| 2391.000000 | 40.11 | 74.00 | 33.89 | PK | V | -2.90 |
| 2480.000000 | 44.39 | 74.00 | 29.61 | PK | V | -2.15 |
| 4804.000000 | 51.71 | 74.00 | 22.29 | PK | V | 3.73 |
| 6405.000000 | 47.66 | 74.00 | 26.34 | PK | V | 9.20 |

Remark:

1. According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in data table if the peak value complies with average limit.
2. Consequence Level=Reading Level + Correction Factor
 Above 1GHz: Corrector factor = Antenna Factor + Cable Loss- Amplifier Gain
 Below 1GHz: Corrector factor = Antenna Factor + Cable Loss
 (The Reading Level is recorded by software which is not shown in the sheet)
3. No significant emissions were detected above 18GHz.

Spurious Radiated Emission

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2441MHz, 3DH5)
 Test Specification: FCC15.205, 15.209 & 15.247(d)
 Comment: DC 5V
 Remark: 1GHz to 25GHz

| Test Result | |
|-------------------------------------|------------|
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

| Frequency MHz | Result dBµV/m | Limit dBµV/m | Margin dB | Detector PK/QP/AV | Ant. Polarity H/V | Corr. (dB) |
|------------------|------------------|-----------------|--------------|----------------------|----------------------|---------------|
| 2392.000000 | 42.08 | 74.00 | 31.92 | PK | H | -2.88 |
| 2488.500000 | 42.89 | 74.00 | 31.11 | PK | H | -2.17 |
| 4193.000000 | 46.89 | 74.00 | 27.11 | PK | H | 2.01 |
| 6507.000000 | 45.86 | 74.00 | 28.14 | PK | H | 9.11 |
| 2390.000000 | 44.13 | 74.00 | 29.87 | PK | H | -2.92 |
| 2495.000000 | 42.72 | 74.00 | 31.29 | PK | V | -2.19 |
| 4880.500000 | 51.60 | 74.00 | 22.40 | PK | V | 3.89 |
| 6506.500000 | 45.52 | 74.00 | 28.48 | PK | V | 9.10 |

Remark:

1. According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in data table if the peak value complies with average limit.
2. Consequence Level=Reading Level + Correction Factor
 Above 1GHz: Corrector factor = Antenna Factor + Cable Loss- Amplifier Gain
 Below 1GHz: Corrector factor = Antenna Factor + Cable Loss
 (The Reading Level is recorded by software which is not shown in the sheet)
3. No significant emissions were detected above 18GHz.

Spurious Radiated Emission

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2480MHz, 3DH5)
 Test Specification: FCC15.205, 15.209 & 15.247(d)
 Comment: DC 5V
 Remark: 1GHz to 25GHz

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

| Frequency MHz | Result dBµV/m | Limit dBµV/m | Margin dB | Detector PK/QP/AV | Ant. Polarity H/V | Corr. (dB) |
|------------------|------------------|-----------------|--------------|----------------------|-------------------------|---------------|
| 2390.000000 | 41.61 | 74.00 | 32.39 | PK | H | -2.92 |
| 2489.000000 | 41.47 | 74.00 | 32.53 | PK | H | -2.17 |
| 4388.000000 | 48.15 | 74.00 | 25.85 | PK | H | 2.74 |
| 6613.000000 | 47.14 | 74.00 | 26.86 | PK | H | 9.88 |
| 2383.000000 | 40.78 | 74.00 | 33.22 | PK | V | -3.03 |
| 2492.000000 | 42.32 | 74.00 | 31.68 | PK | V | -2.18 |
| 4960.500000 | 50.86 | 74.00 | 23.14 | PK | V | 4.23 |
| 6613.000000 | 47.17 | 74.00 | 26.83 | PK | V | 9.88 |

Remark:

1. According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in data table if the peak value complies with average limit.
2. Consequence Level=Reading Level + Correction Factor
 Above 1GHz: Corrector factor = Antenna Factor + Cable Loss- Amplifier Gain
 Below 1GHz: Corrector factor = Antenna Factor + Cable Loss
 (The Reading Level is recorded by software which is not shown in the sheet)
3. No significant emissions were detected above 18GHz.

Spurious Radiated Emission

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2402MHz, DH5)
 Test Specification: FCC15.205, 15.209 & 15.247(d)
 Comment: DC 5V
 Remark: 1GHz to 25GHz

| Test Result | |
|-------------------------------------|------------|
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

| Frequency MHz | Result dBµV/m | Limit dBµV/m | Margin dB | Detector PK/QP/AV | Ant. Polarity H/V | Corr. (dB) |
|------------------|------------------|-----------------|--------------|----------------------|----------------------|---------------|
| 2391.500000 | 41.87 | 74.00 | 32.13 | PK | H | -2.89 |
| 2495.500000 | 41.25 | 74.00 | 32.75 | PK | H | -2.19 |
| 4804.000000 | 51.52 | 74.00 | 22.48 | PK | H | 3.73 |
| 6405.500000 | 47.44 | 74.00 | 26.56 | PK | H | 9.20 |
| 9607.500000 | 48.79 | 74.00 | 25.21 | PK | H | 13.15 |
| 2391.500000 | 40.87 | 74.00 | 33.13 | PK | V | -2.89 |
| 2483.500000 | 40.38 | 74.00 | 33.62 | PK | V | -2.16 |
| 4804.500000 | 52.18 | 74.00 | 21.82 | PK | V | 3.73 |
| 6405.000000 | 48.41 | 74.00 | 25.59 | PK | V | 9.20 |

Remark:

1. According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in data table if the peak value complies with average limit.
2. Consequence Level=Reading Level + Correction Factor
 Above 1GHz: Corrector factor = Antenna Factor + Cable Loss- Amplifier Gain
 Below 1GHz: Corrector factor = Antenna Factor + Cable Loss
 (The Reading Level is recorded by software which is not shown in the sheet)
3. No significant emissions were detected above 18GHz.

Spurious Radiated Emission

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2441MHz, DH5)
 Test Specification: FCC15.205, 15.209 & 15.247(d)
 Comment: DC 5V
 Remark: 1GHz to 25GHz

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

| Frequency MHz | Result dBμV/m | Limit dBμV/m | Margin dB | Detector PK/QP/AV | Ant. Polarity H/V | Corr. (dB) |
|------------------|------------------|-----------------|--------------|----------------------|-------------------------|---------------|
| 2398.500000 | 40.81 | 74.00 | 33.19 | PK | H | -2.77 |
| 2491.500000 | 41.65 | 74.00 | 32.35 | PK | H | -2.18 |
| 4571.000000 | 47.74 | 74.00 | 26.26 | PK | H | 3.03 |
| 6506.500000 | 45.16 | 74.00 | 28.84 | PK | H | 9.10 |
| 2393.000000 | 41.12 | 74.00 | 32.88 | PK | V | -2.86 |
| 2489.500000 | 41.47 | 74.00 | 32.53 | PK | V | -2.17 |
| 4880.000000 | 52.21 | 74.00 | 21.79 | PK | V | 3.89 |
| 6380.500000 | 46.65 | 74.00 | 27.35 | PK | V | 9.38 |

Remark:

1. According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in data table if the peak value complies with average limit.
2. Consequence Level=Reading Level + Correction Factor
 Above 1GHz: Corrector factor = Antenna Factor + Cable Loss- Amplifier Gain
 Below 1GHz: Corrector factor = Antenna Factor + Cable Loss
 (The Reading Level is recorded by software which is not shown in the sheet)
3. No significant emissions were detected above 18GHz.

Spurious Radiated Emission

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2480MHz, DH5)
 Test Specification: FCC15.205, 15.209 & 15.247(d)
 Comment: DC 5V
 Remark: 1GHz to 25GHz

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

| Frequency MHz | Result dBµV/m | Limit dBµV/m | Margin dB | Detector PK/QP/AV | Ant. Polarity H/V | Corr. (dB) |
|------------------|------------------|-----------------|--------------|----------------------|-------------------------|---------------|
| 2390.500000 | 41.69 | 74.00 | 32.31 | PK | H | -2.91 |
| 2489.000000 | 41.69 | 74.00 | 32.31 | PK | H | -2.17 |
| 4960.500000 | 49.43 | 74.00 | 24.57 | PK | H | 4.23 |
| 6613.500000 | 47.07 | 74.00 | 26.93 | PK | H | 9.89 |
| 2389.500000 | 40.59 | 74.00 | 33.41 | PK | V | -2.92 |
| 2495.500000 | 41.61 | 74.00 | 32.39 | PK | V | -2.19 |
| 4960.000000 | 52.85 | 74.00 | 21.15 | PK | V | 4.23 |
| 6613.000000 | 49.28 | 74.00 | 24.72 | PK | V | 9.88 |

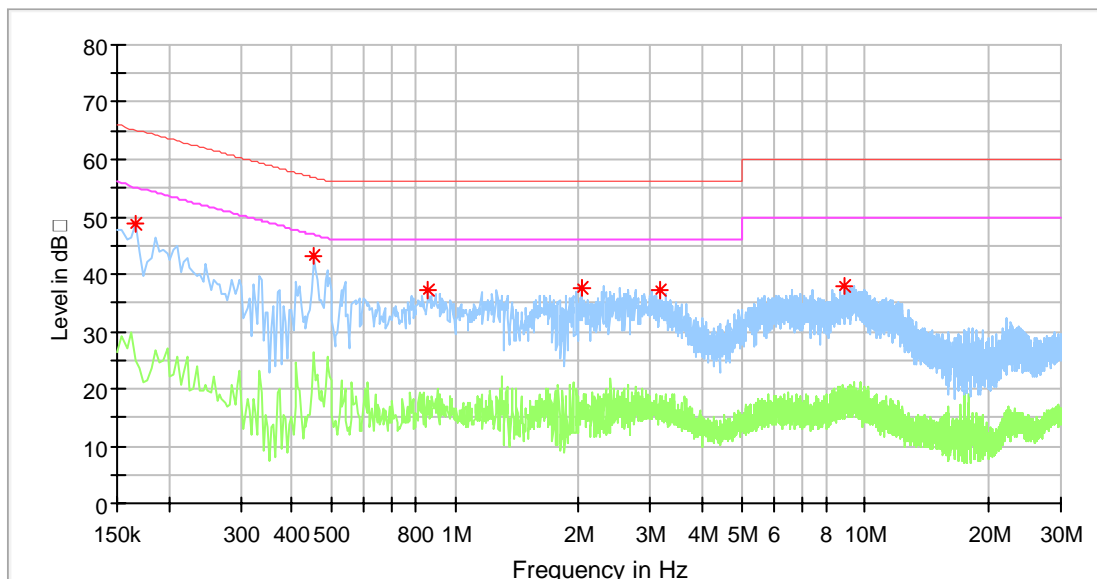
Remark:

1. According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in data table if the peak value complies with average limit.
2. Consequence Level=Reading Level + Correction Factor
 Above 1GHz: Corrector factor = Antenna Factor + Cable Loss- Amplifier Gain
 Below 1GHz: Corrector factor = Antenna Factor + Cable Loss
 (The Reading Level is recorded by software which is not shown in the sheet)
3. No significant emissions were detected above 18GHz.

8.2 Conducted Emission at AC Power line

EUT: HG09913A-US
 Op Condition: BT Link
 Test Specification: AC Mains, L Line
 Comment: 120V AC, 60Hz (supporting adapter input)

| Test Result | |
|-------------------------------------|------------|
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

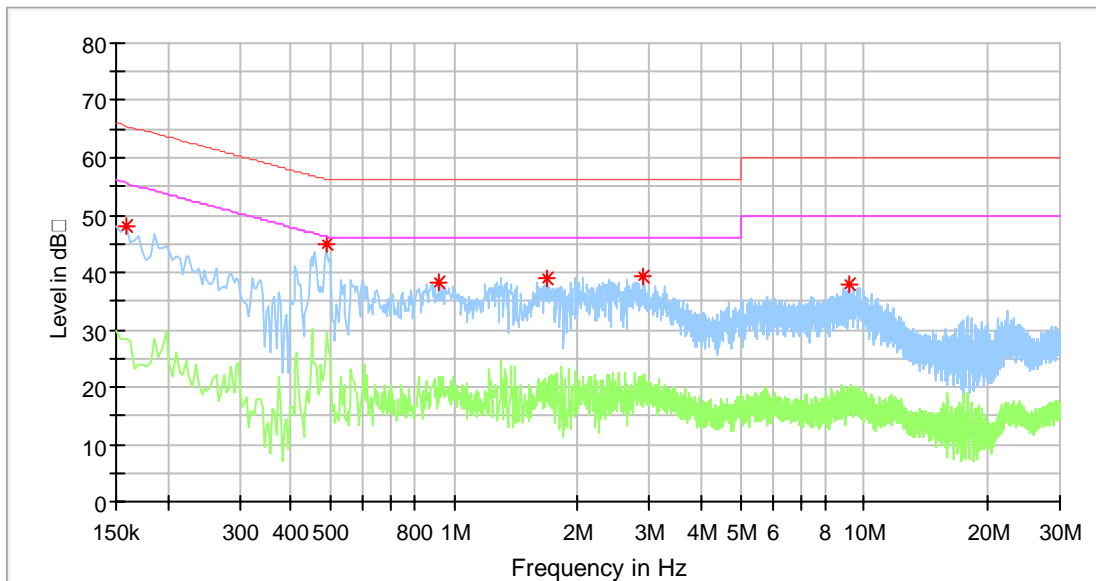


| Frequency (MHz) | MaxPeak (dBµV) | Average (dBµV) | Limit (dBµV) | Margin (dB) |
|-----------------|----------------|----------------|--------------|-------------|
| 0.166000 | 48.83 | --- | 65.16 | 16.33 |
| 0.454000 | 43.18 | --- | 56.80 | 13.62 |
| 0.858000 | 37.21 | --- | 56.00 | 18.79 |
| 2.030000 | 37.42 | --- | 56.00 | 18.58 |
| 3.150000 | 37.19 | --- | 56.00 | 18.81 |
| 8.922000 | 37.80 | --- | 60.00 | 22.20 |

Conducted Emission Test

EUT: HG09913A-US
 Op Condition: BT Link
 Test Specification: AC Mains, N Line
 Comment: 120V AC, 60Hz (supporting adapter input)

| Test Result | |
|-------------------------------------|------------|
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

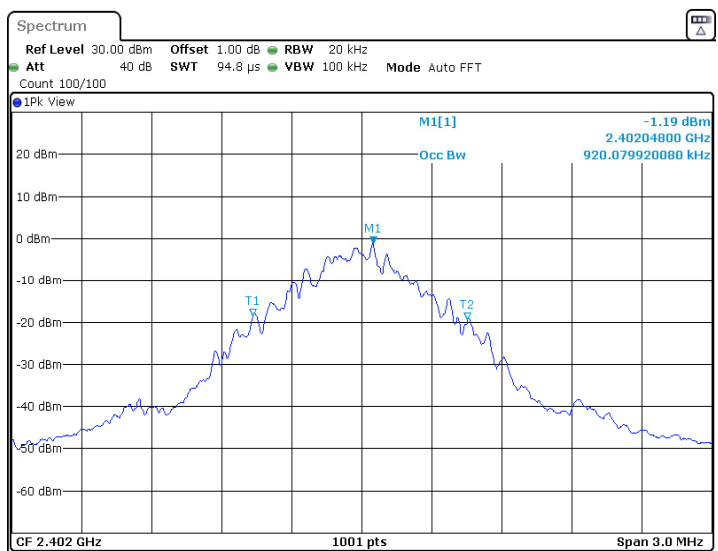
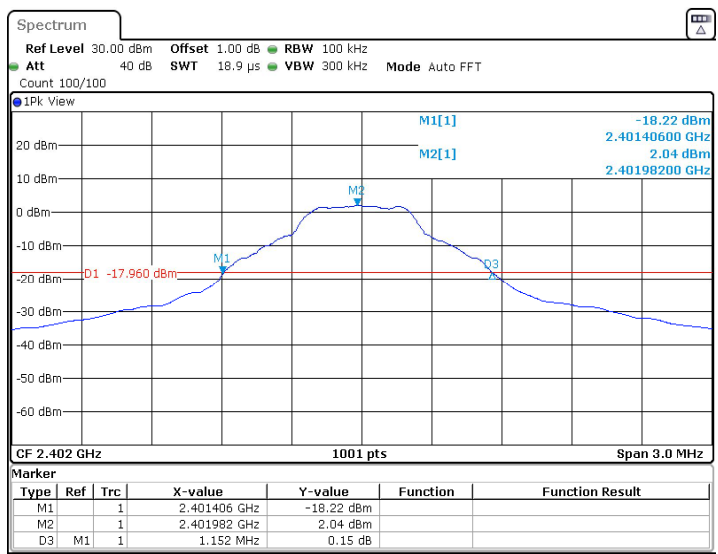


| Frequency (MHz) | MaxPeak (dBµV) | Average (dBµV) | Limit (dBµV) | Margin (dB) |
|-----------------|----------------|----------------|--------------|-------------|
| 0.158000 | 48.00 | --- | 65.57 | 17.57 |
| 0.486000 | 44.96 | --- | 56.24 | 11.27 |
| 0.918000 | 38.22 | --- | 56.00 | 17.78 |
| 1.682000 | 38.80 | --- | 56.00 | 17.20 |
| 2.906000 | 39.42 | --- | 56.00 | 16.58 |
| 9.234000 | 37.96 | --- | 60.00 | 22.04 |

8.3 20dB & 99% Bandwidth

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2402MHz, DH5)
 Test Specification: FCC15.247(a)(1), 20dB Bandwidth & 99% Bandwidth
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

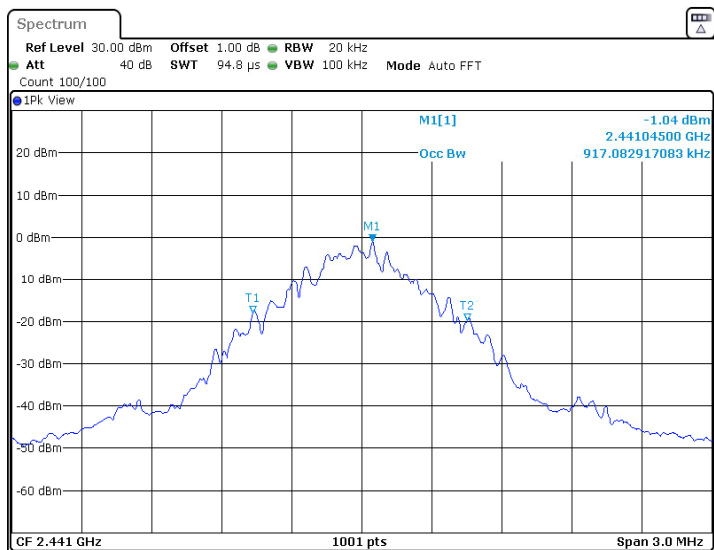
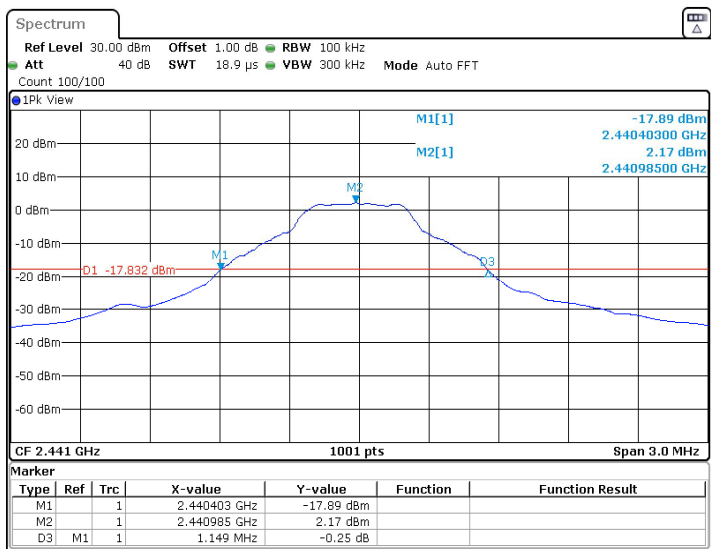


| Bandwidth | Measured Value | Limit |
|----------------|----------------|-------|
| 20dB bandwidth | 1.152 MHz | NA |
| 99% OCB | 0.920 MHz | NA |

20dB & 99% Bandwidth

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2441MHz, DH5)
 Test Specification: FCC15.247(a)(1), 20dB Bandwidth & 99% Bandwidth
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

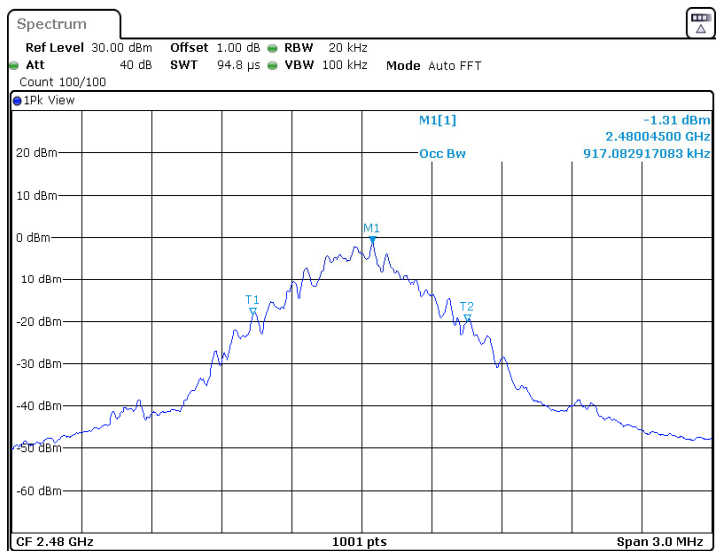
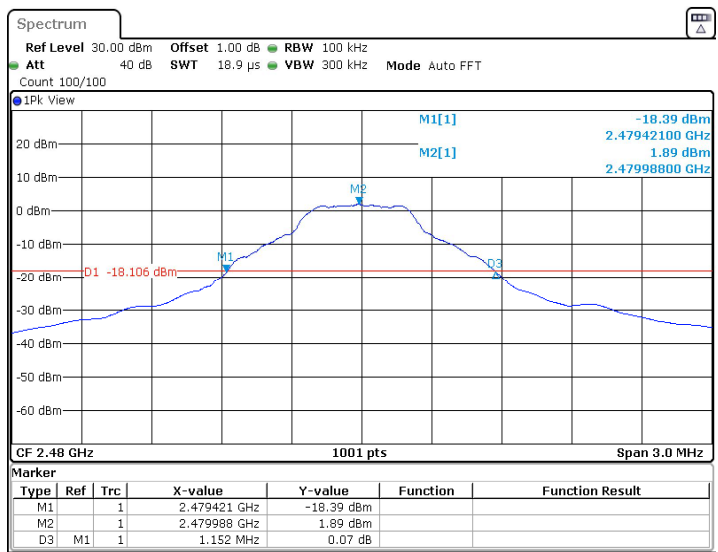


| Bandwidth | Measured Value | Limit |
|----------------|----------------|-------|
| 20dB bandwidth | 1.149 MHz | NA |
| 99% OCB | 0.917 MHz | NA |

20dB & 99% Bandwidth

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2480MHz, DH5)
 Test Specification: FCC15.247(a)(1), 20dB Bandwidth & 99% Bandwidth
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

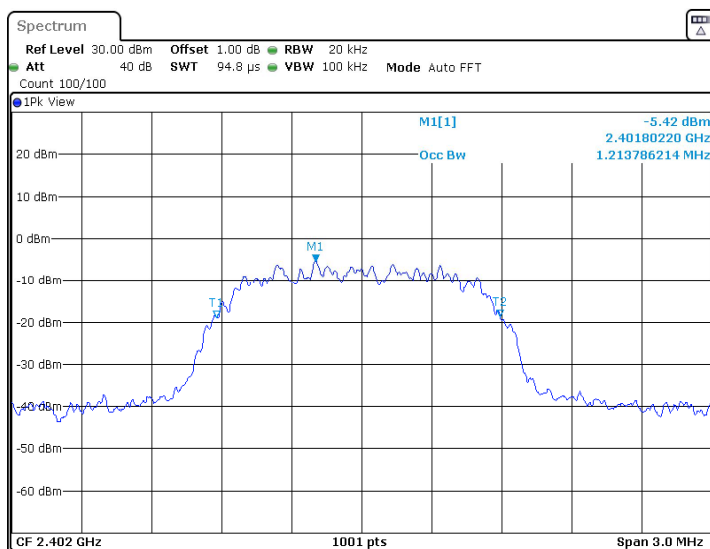
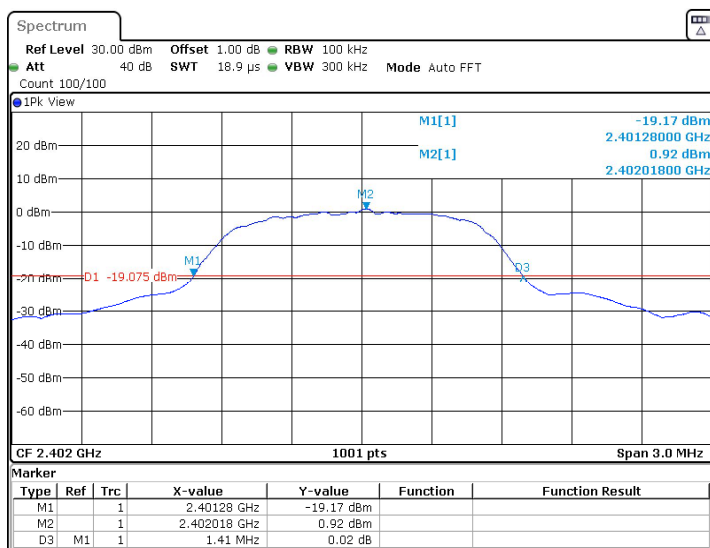


| Bandwidth | Measured Value | Limit |
|----------------|----------------|-------|
| 20dB bandwidth | 1.152 MHz | NA |
| 99% OCB | 0.917 MHz | NA |

20dB & 99% Bandwidth

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2402MHz, 2DH5)
 Test Specification: FCC15.247(a)(1), 20dB Bandwidth & 99% Bandwidth
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

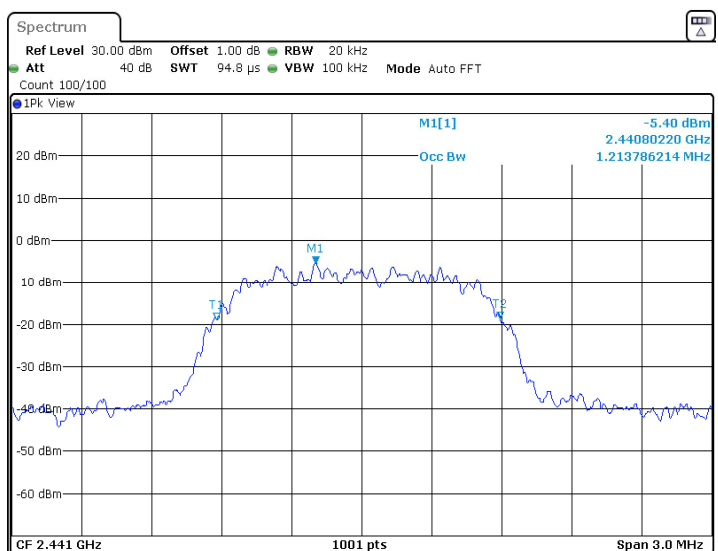
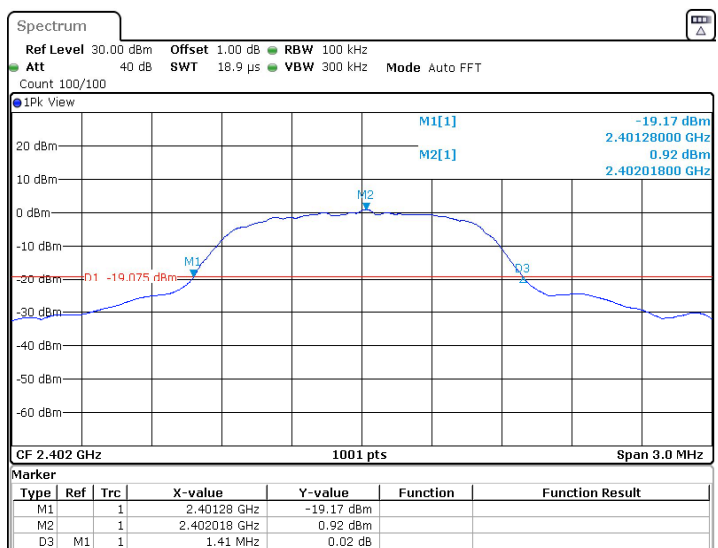


| Bandwidth | Measured Value | Limit |
|----------------|----------------|-------|
| 20dB bandwidth | 1.410 MHz | NA |
| 99% OCB | 1.214 MHz | NA |

20dB & 99% Bandwidth

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2441MHz, 2DH5)
 Test Specification: FCC15.247(a)(1), 20dB Bandwidth & 99% Bandwidth
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

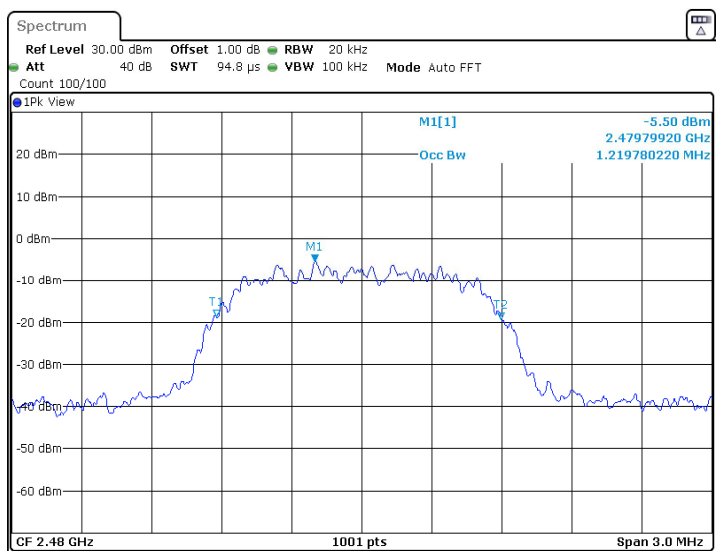
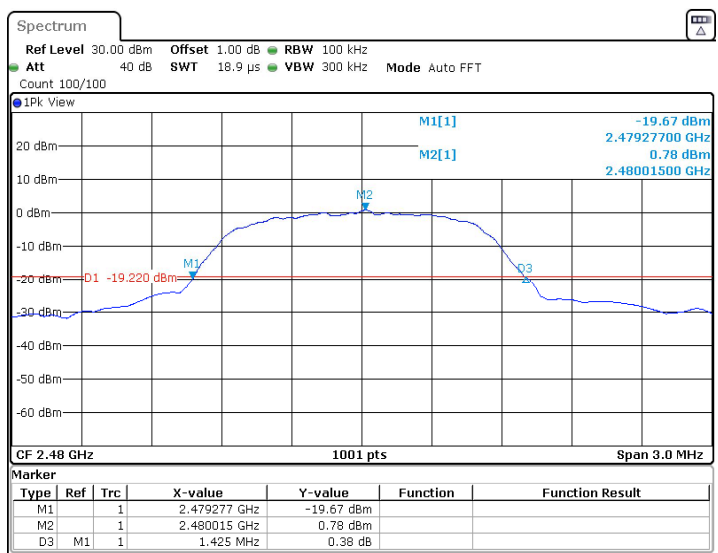


| Bandwidth | Measured Value | Limit |
|----------------|----------------|-------|
| 20dB bandwidth | 1.410 MHz | NA |
| 99% OCB | 1.214 MHz | NA |

20dB & 99% Bandwidth

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2480MHz, 2DH5)
 Test Specification: FCC15.247(a)(1), 20dB Bandwidth & 99% Bandwidth
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

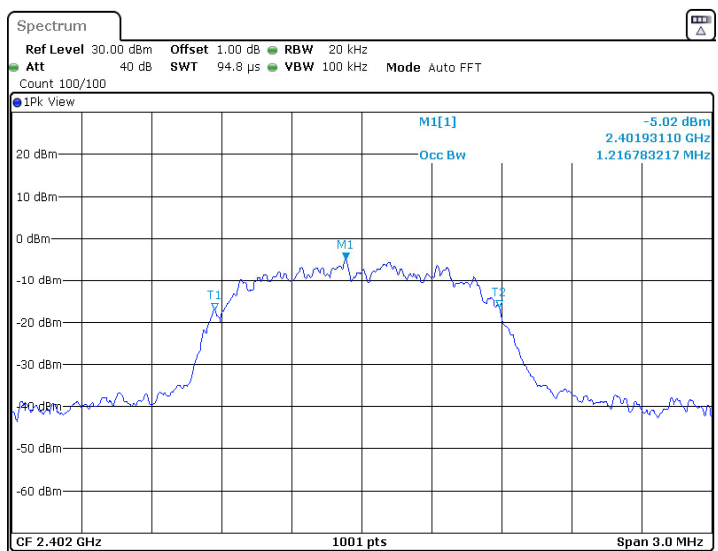
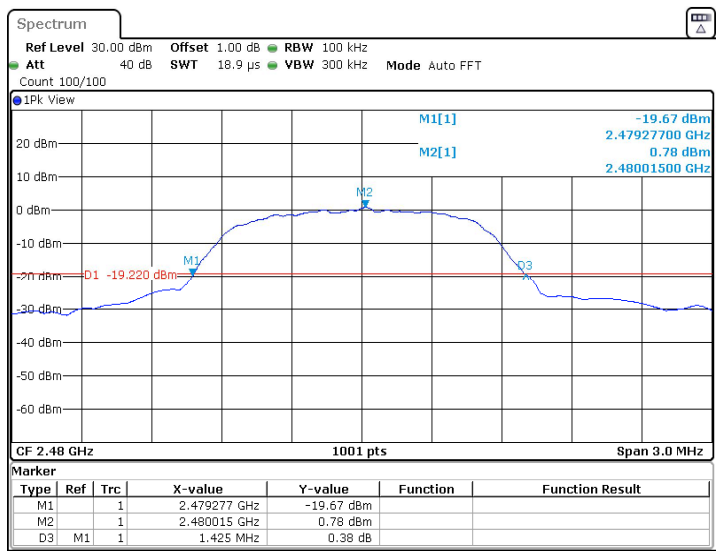


| Bandwidth | Measured Value | Limit |
|----------------|----------------|-------|
| 20dB bandwidth | 1.425 MHz | NA |
| 99% OCB | 1.220 MHz | NA |

20dB & 99% Bandwidth

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2402MHz, 3DH5)
 Test Specification: FCC15.247(a)(1), 20dB Bandwidth & 99% Bandwidth
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

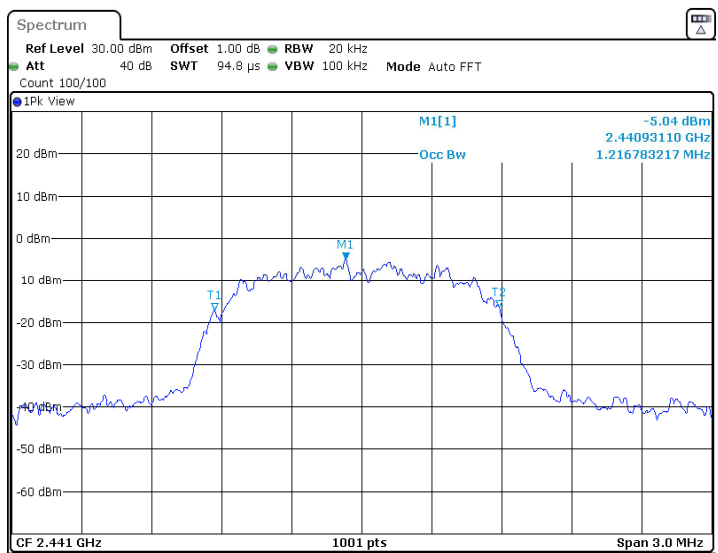
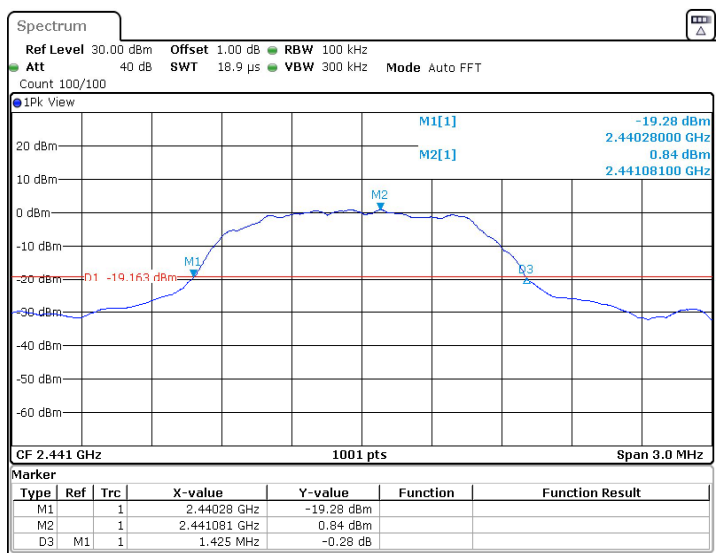


| Bandwidth | Measured Value | Limit |
|----------------|----------------|-------|
| 20dB bandwidth | 1.425 MHz | NA |
| 99% OCB | 1.217 MHz | NA |

20dB & 99% Bandwidth

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2441MHz, 3DH5)
 Test Specification: FCC15.247(a)(1), 20dB Bandwidth & 99% Bandwidth
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

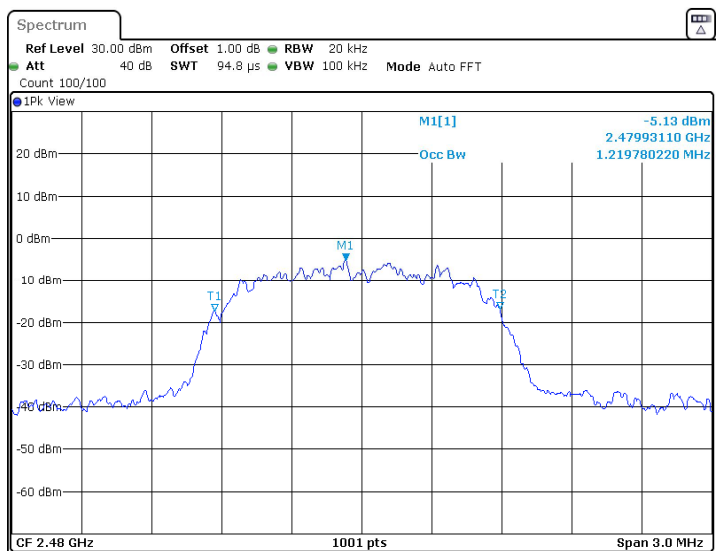
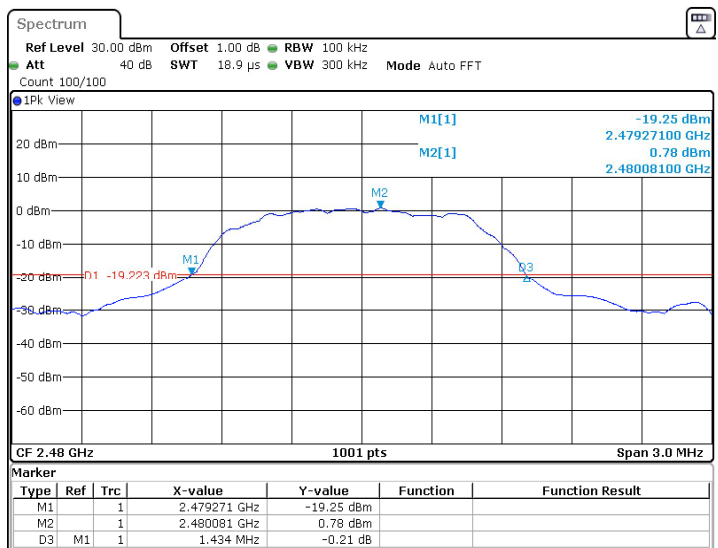


| Bandwidth | Measured Value | Limit |
|----------------|----------------|-------|
| 20dB bandwidth | 1.425 MHz | NA |
| 99% OCB | 1.217 MHz | NA |

20dB & 99% Bandwidth

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2480MHz, 3DH5)
 Test Specification: FCC15.247(a)(1), 20dB Bandwidth & 99% Bandwidth
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

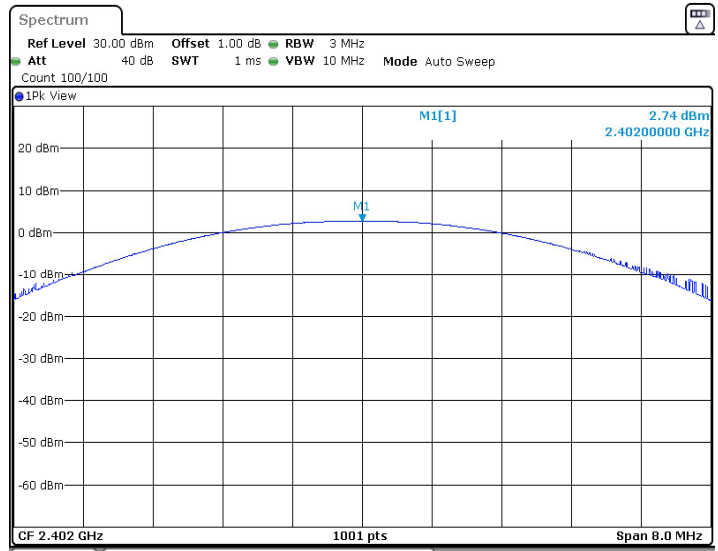


| Bandwidth | Measured Value | Limit |
|----------------|----------------|-------|
| 20dB bandwidth | 1.434 MHz | NA |
| 99% OCB | 1.220 MHz | NA |

8.4 Peak Output Power

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2402MHz, DH5)
 Test Specification: FCC15.247(b)
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

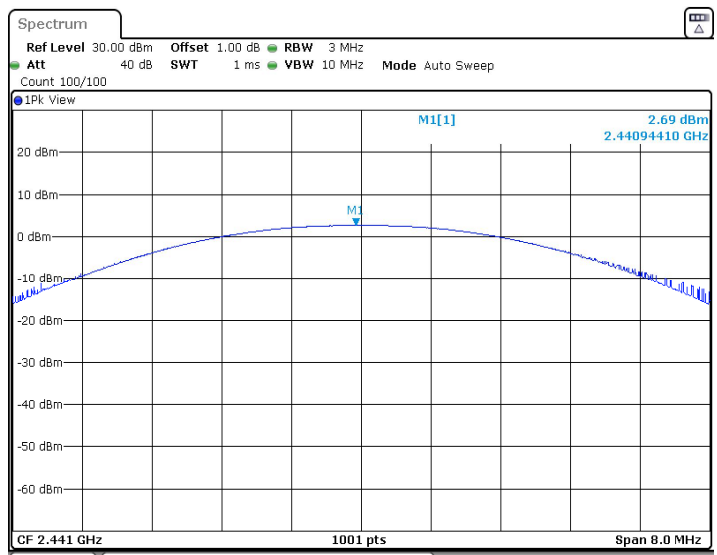


| Conducted Output Power | Limit |
|------------------------|---------|
| 2.74 dBm | < 30dBm |

Peak Output Power

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2441MHz, DH5)
 Test Specification: FCC15.247(b)
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

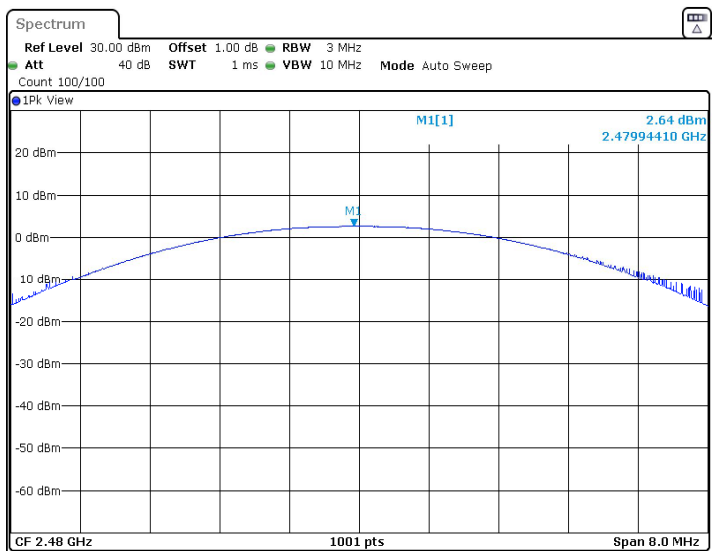


| Conducted Output Power | Limit |
|------------------------|---------|
| 2.69 dBm | < 30dBm |

Peak Output Power

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2480MHz, DH5)
 Test Specification: FCC15.247(b)
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

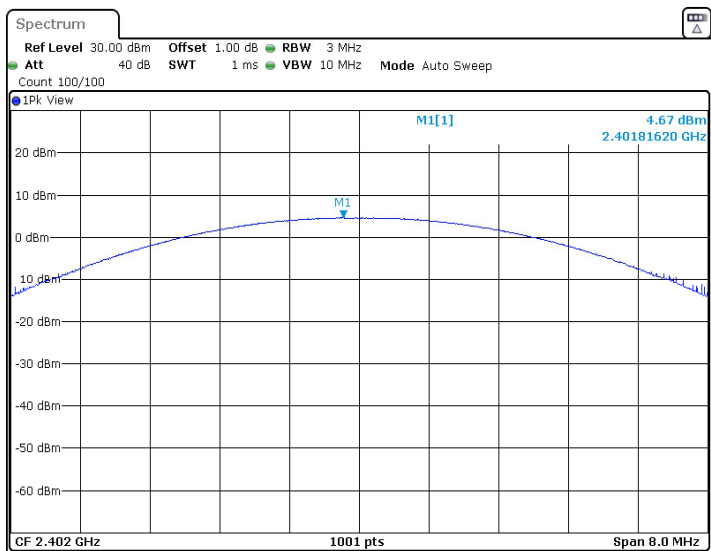


| Conducted Output Power | Limit |
|------------------------|---------|
| 2.64 dBm | < 30dBm |

Peak Output Power

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2402MHz, 2DH5)
 Test Specification: FCC15.247(b)
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

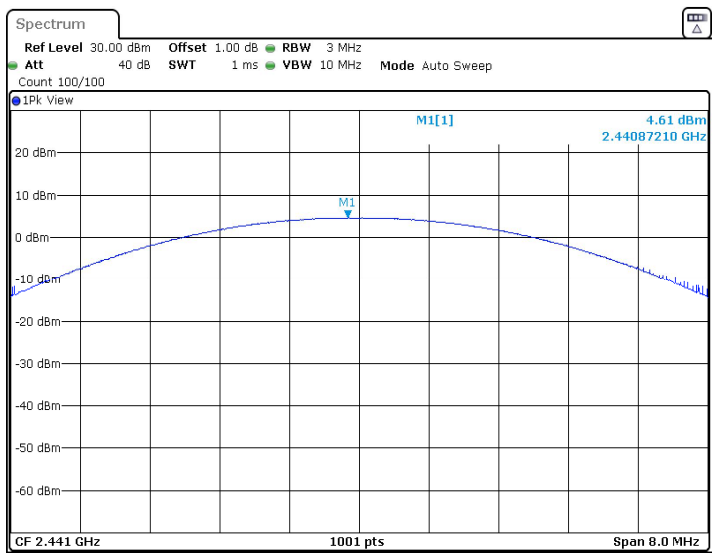


| Conducted Output Power | Limit |
|------------------------|---------|
| 4.67 dBm | < 30dBm |

Peak Output Power

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2441MHz, 2DH5)
 Test Specification: FCC15.247(b)
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

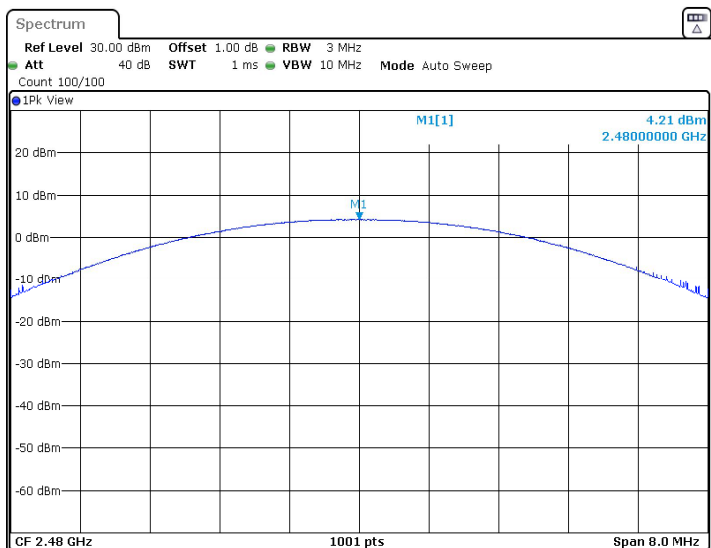


| Conducted Output Power | Limit |
|------------------------|---------|
| 4.61 dBm | < 30dBm |

Peak Output Power

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2480MHz, 2DH5)
 Test Specification: FCC15.247(b)
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

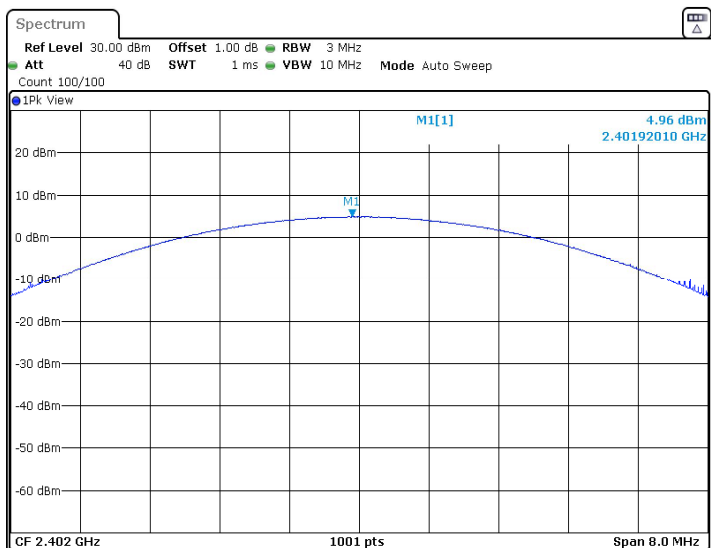


| Conducted Output Power | Limit |
|------------------------|---------|
| 4.21 dBm | < 30dBm |

Peak Output Power

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2402MHz, 3DH5)
 Test Specification: FCC15.247(b)
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

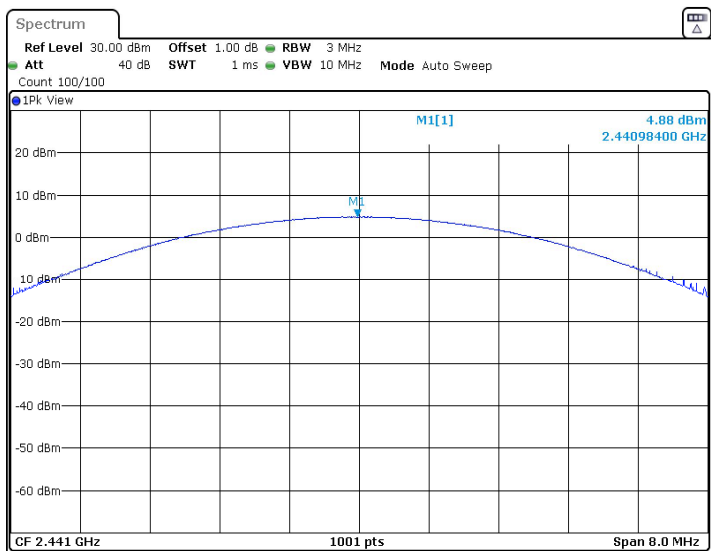


| Conducted Output Power | Limit |
|------------------------|---------|
| 4.96 dBm | < 30dBm |

Peak Output Power

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2441MHz, 3DH5)
 Test Specification: FCC15.247(b)
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

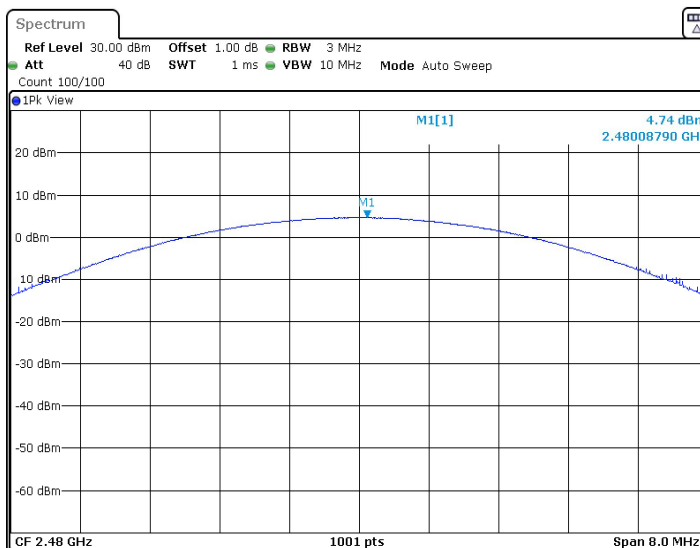


| Conducted Output Power | Limit |
|------------------------|---------|
| 4.88 dBm | < 30dBm |

Peak Output Power

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2480MHz, 3DH5)
 Test Specification: FCC15.247(b)
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |



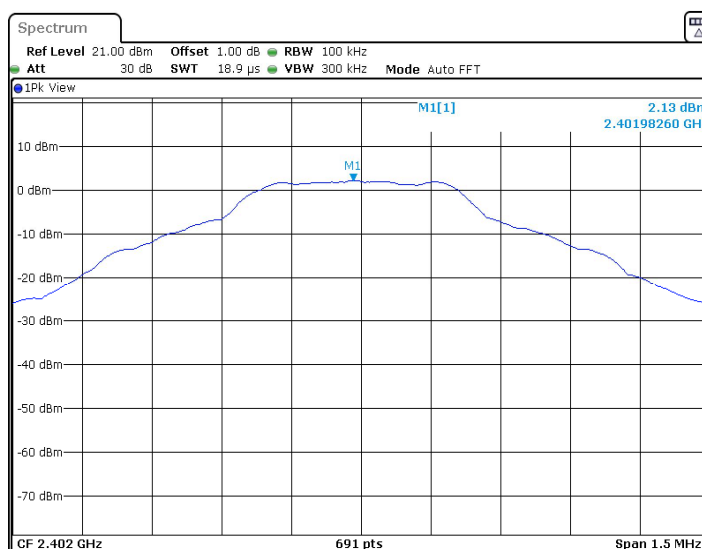
| Conducted Output Power | Limit |
|------------------------|---------|
| 4.74 dBm | < 30dBm |

8.5 Spurious Emissions at Antenna Terminals

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2402MHz, DH5)
 Test Specification: FCC2.1051 & 15.247(d)
 Comment: DC 5V

| |
|--|
| Test Result |
| <input checked="" type="checkbox"/> Passed |
| <input type="checkbox"/> Not Passed |

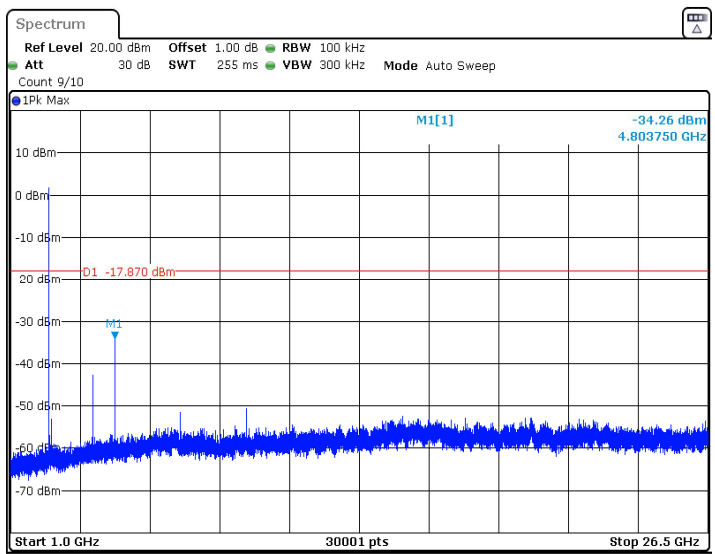
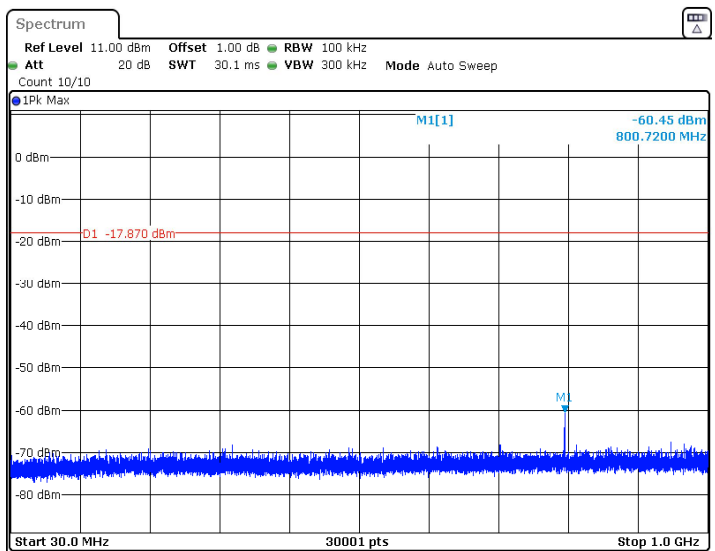
| Channel | FreqRange MHz | RefLevel dBm | Result dBm | Limit dBm | Verdict |
|---------|---------------|--------------|------------|-----------|---------|
| 2402 | 2402 | 2.13 | 2.13 | --- | PASS |
| 2402 | 30~1000 | 2.13 | -60.45 | <=-17.87 | PASS |
| 2402 | 1000~26500 | 2.13 | -34.26 | <=-17.87 | PASS |



Spurious Emissions at Antenna Terminals

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2402MHz, DH5)
 Test Specification: FCC2.1051 & 15.247(d)
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

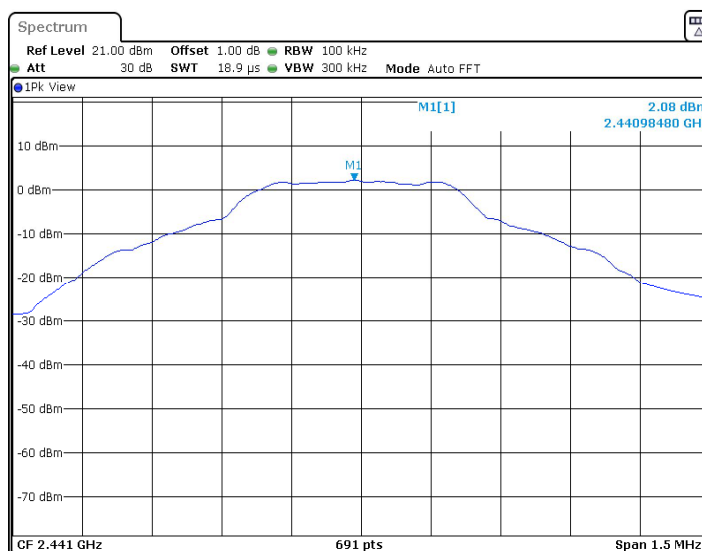


Spurious Emissions at Antenna Terminals

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2441MHz, DH5)
 Test Specification: FCC2.1051 & 15.247(d)
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

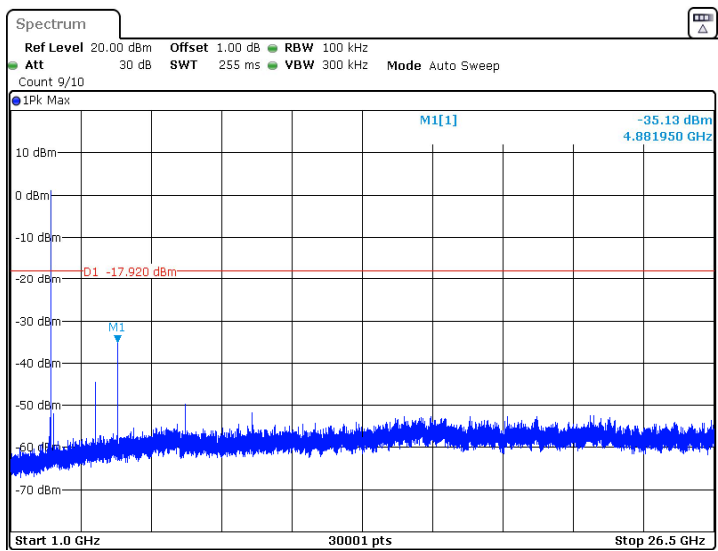
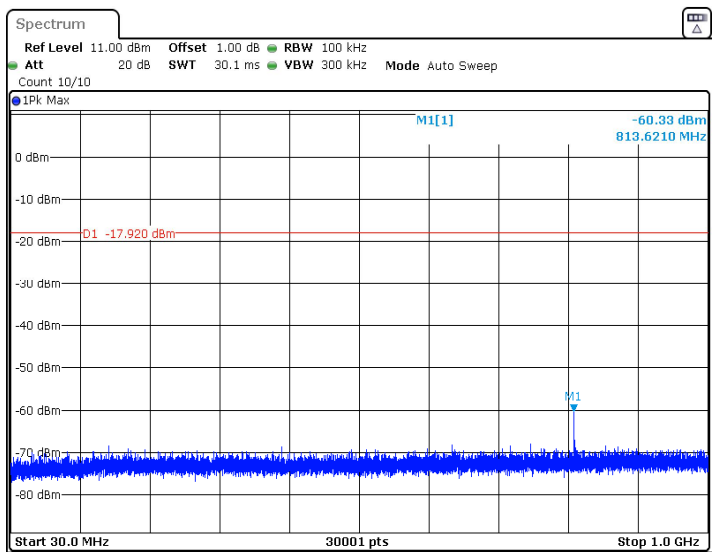
| Channel | FreqRange MHz | RefLevel dBm | Result dBm | Limit dBm | Verdict |
|---------|---------------|--------------|------------|-----------|---------|
| 2441 | 2441 | 2.08 | 2.08 | --- | PASS |
| 2441 | 30~1000 | 2.08 | -60.33 | <=-17.92 | PASS |
| 2441 | 1000~26500 | 2.08 | -35.47 | <=-17.92 | PASS |



Spurious Emissions at Antenna Terminals

EUT: HG09913A-US
Op Condition: Operated, TX Mode (2441MHz, DH5)
Test Specification: FCC2.1051 & 15.247(d)
Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

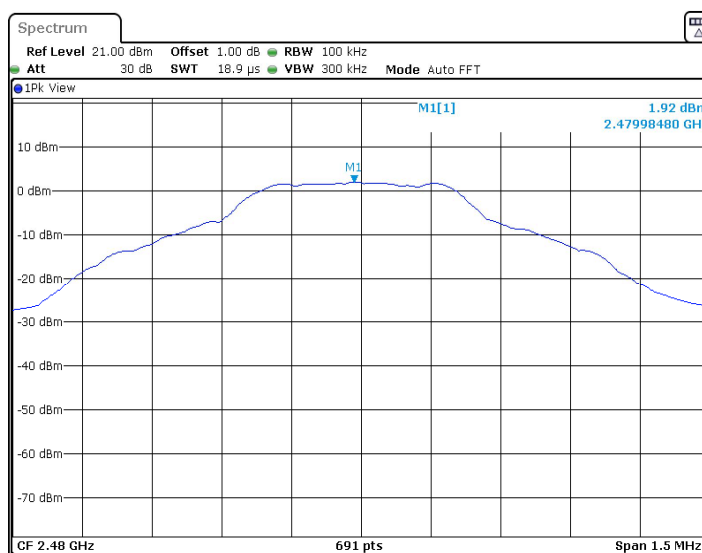


Spurious Emissions at Antenna Terminals

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2480MHz, DH5)
 Test Specification: FCC2.1051 & 15.247(d)
 Comment: DC 5V

| Test Result | |
|-------------------------------------|------------|
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

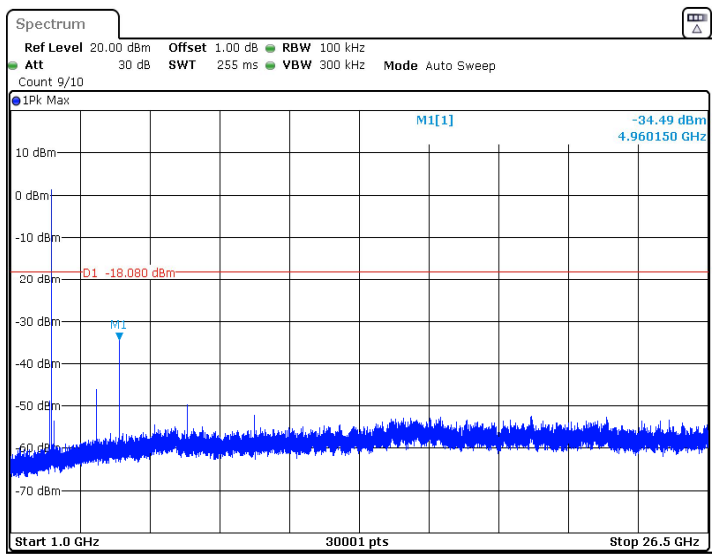
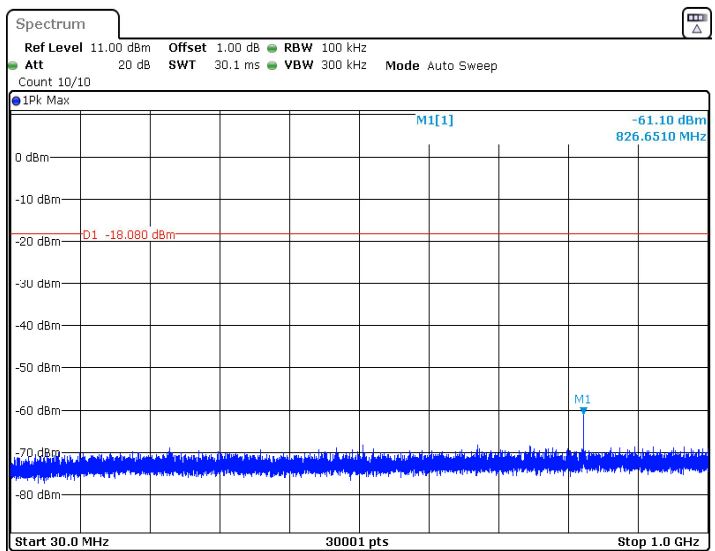
| Channel | FreqRange MHz | RefLevel dBm | Result dBm | Limit dBm | Verdict |
|---------|---------------|--------------|------------|-----------|---------|
| 2480 | 2480 | 1.92 | 1.92 | --- | PASS |
| 2480 | 30~1000 | 1.92 | -61.1 | <=-18.08 | PASS |
| 2480 | 1000~26500 | 1.92 | -34.49 | <=-18.08 | PASS |



Spurious Emissions at Antenna Terminals

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2480MHz, DH5)
 Test Specification: FCC2.1051 & 15.247(d)
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

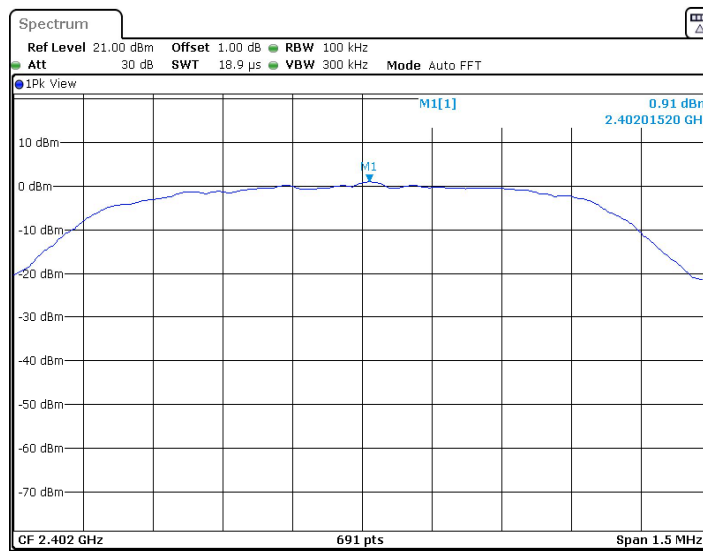


Spurious Emissions at Antenna Terminals

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2402MHz, 2DH5)
 Test Specification: FCC2.1051 & 15.247(d)
 Comment: DC 5V

| Test Result | |
|-------------------------------------|------------|
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

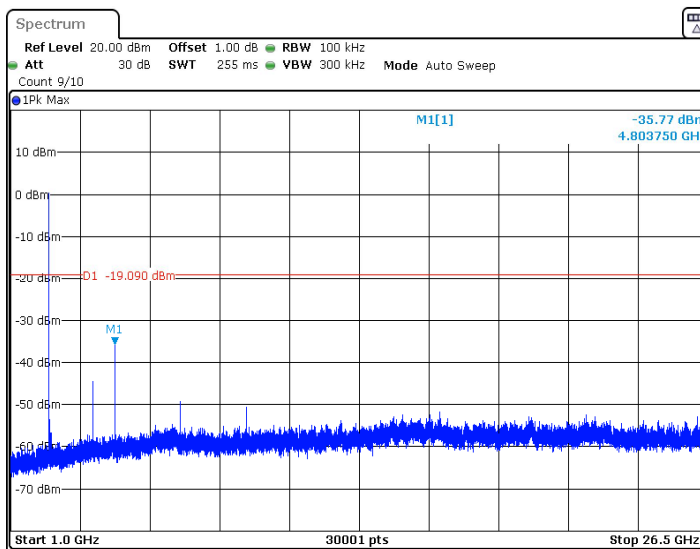
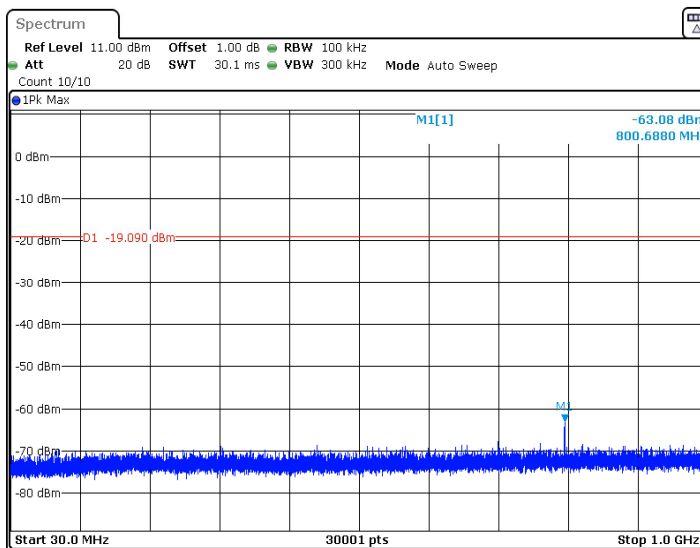
| Channel | FreqRange MHz | RefLevel dBm | Result dBm | Limit dBm | Verdict |
|---------|---------------|--------------|------------|-----------|---------|
| 2402 | 2402 | 0.91 | 0.91 | --- | PASS |
| 2402 | 30~1000 | 0.91 | -63.08 | <=-19.09 | PASS |
| 2402 | 1000~26500 | 0.91 | -35.77 | <=-19.09 | PASS |



Spurious Emissions at Antenna Terminals

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2402MHz, 2DH5)
 Test Specification: FCC2.1051 & 15.247(d)
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

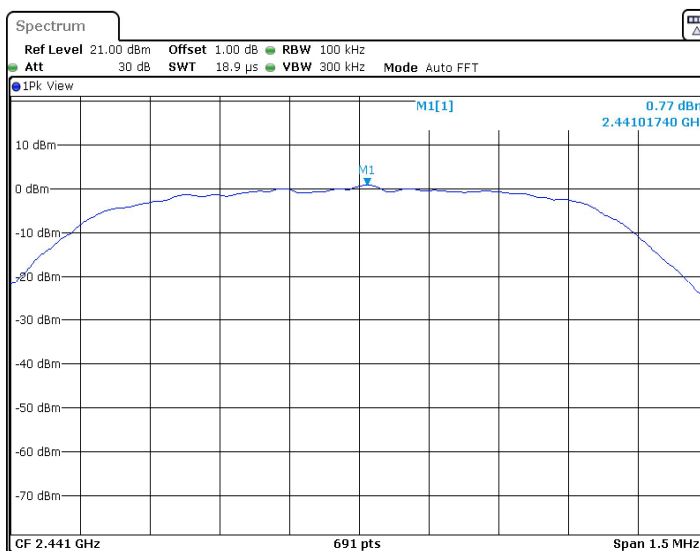


Spurious Emissions at Antenna Terminals

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2441MHz, 2DH5)
 Test Specification: FCC2.1051 & 15.247(d)
 Comment: DC 5V

| Test Result | |
|-------------------------------------|------------|
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

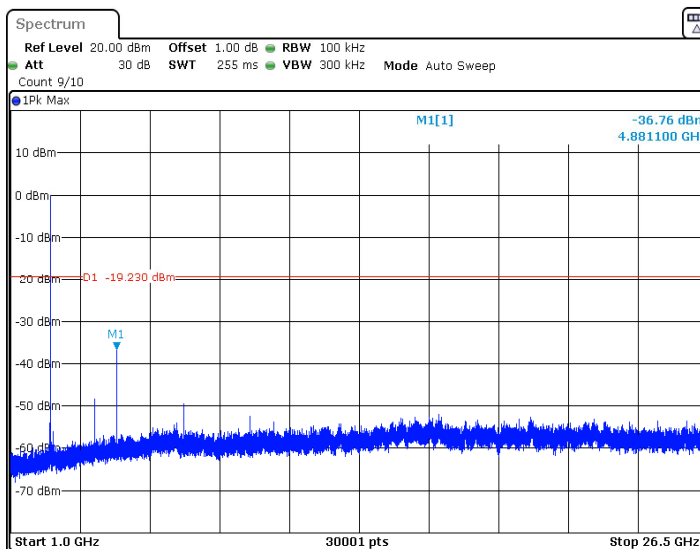
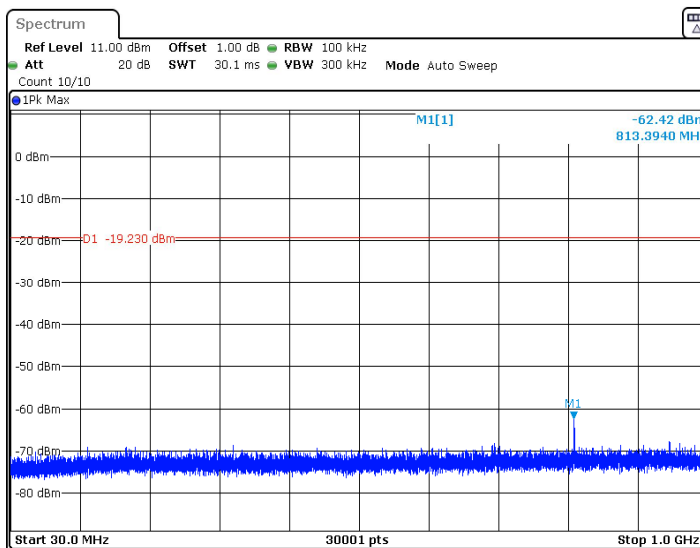
| Channel | FreqRange MHz | RefLevel dBm | Result dBm | Limit dBm | Verdict |
|---------|---------------|--------------|------------|-----------|---------|
| 2441 | 2441 | 0.77 | 0.77 | --- | PASS |
| 2441 | 30~1000 | 0.77 | -62.42 | <=-19.23 | PASS |
| 2441 | 1000~26500 | 0.77 | -36.76 | <=-19.23 | PASS |



Spurious Emissions at Antenna Terminals

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2441MHz, 2DH5)
 Test Specification: FCC2.1051 & 15.247(d)
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

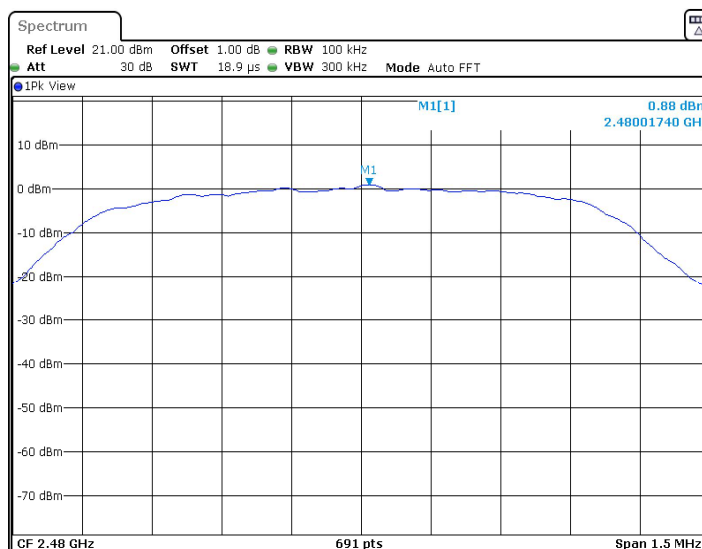


Spurious Emissions at Antenna Terminals

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2480MHz, 2DH5)
 Test Specification: FCC2.1051 & 15.247(d)
 Comment: DC 5V

| Test Result | |
|-------------------------------------|------------|
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

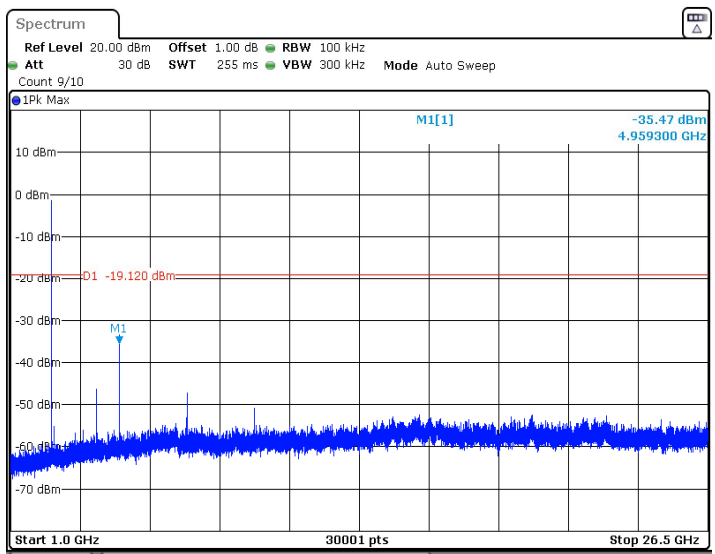
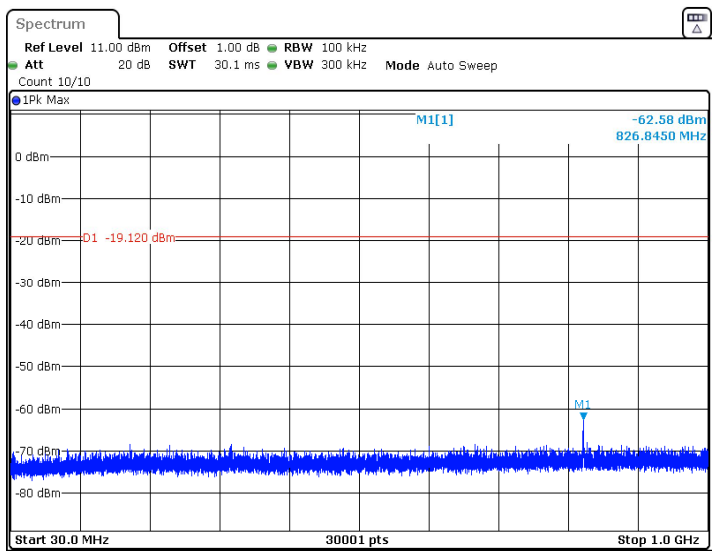
| Channel | FreqRange MHz | RefLevel dBm | Result dBm | Limit dBm | Verdict |
|---------|---------------|--------------|------------|-----------|---------|
| 2480 | 2480 | 0.88 | 0.88 | --- | PASS |
| 2480 | 30~1000 | 0.88 | -62.58 | <=-19.12 | PASS |
| 2480 | 1000~26500 | 0.88 | -35.47 | <=-19.12 | PASS |



Spurious Emissions at Antenna Terminals

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2480MHz, 2DH5)
 Test Specification: FCC2.1051 & 15.247(d)
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

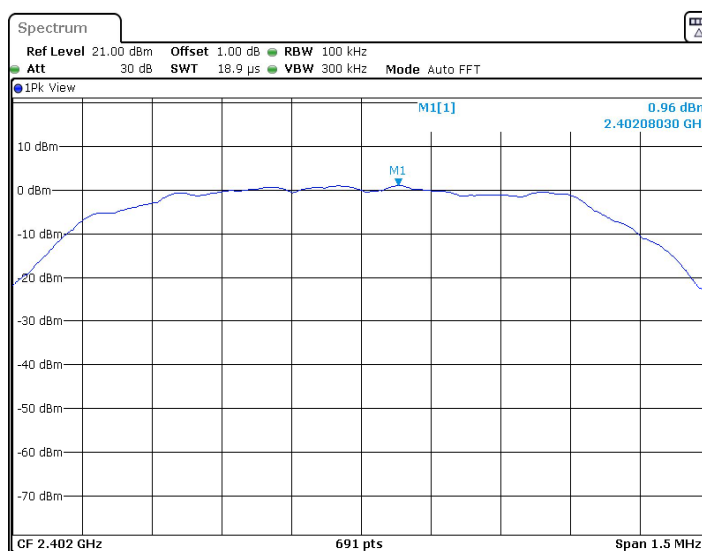


Spurious Emissions at Antenna Terminals

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2402MHz, 3DH5)
 Test Specification: FCC2.1051 & 15.247(d)
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

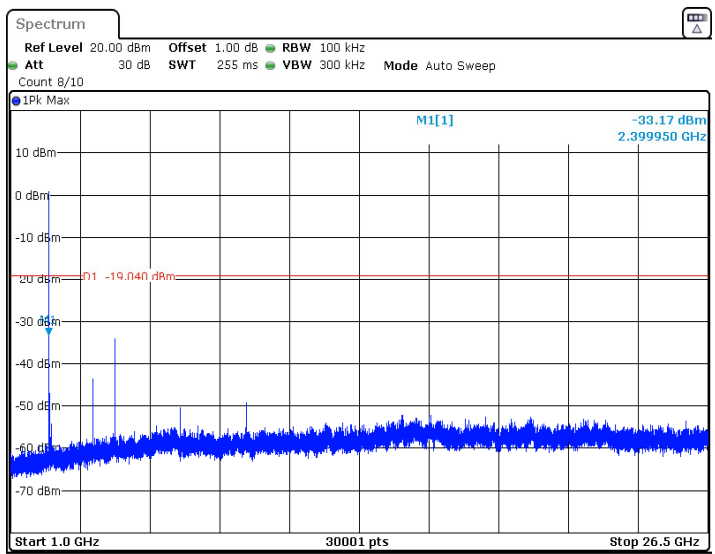
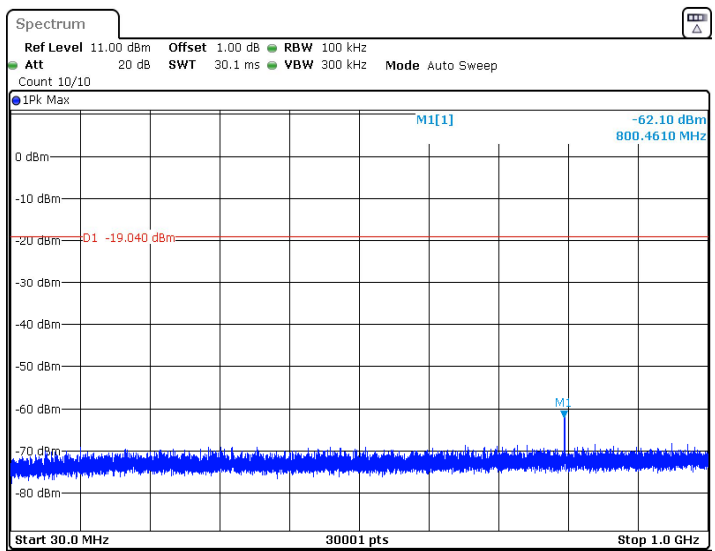
| Channel | FreqRange MHz | RefLevel dBm | Result dBm | Limit dBm | Verdict |
|---------|---------------|--------------|------------|-----------|---------|
| 2402 | 2402 | 0.96 | 0.96 | --- | PASS |
| 2402 | 30~1000 | 0.96 | -62.1 | <=-19.04 | PASS |
| 2402 | 1000~26500 | 0.96 | -33.17 | <=-19.04 | PASS |



Spurious Emissions at Antenna Terminals

EUT: HG09913A-US
Op Condition: Operated, TX Mode (2402MHz, 3DH5)
Test Specification: FCC2.1051 & 15.247(d)
Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

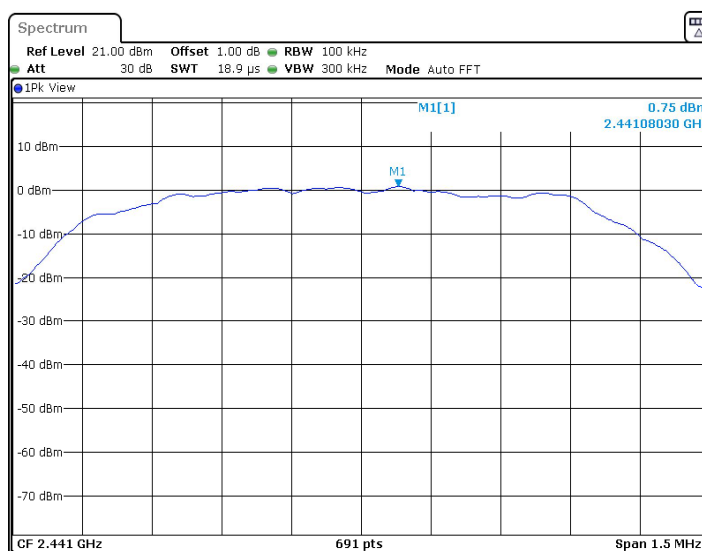


Spurious Emissions at Antenna Terminals

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2441MHz, 3DH5)
 Test Specification: FCC2.1051 & 15.247(d)
 Comment: DC 5V

| Test Result | |
|-------------------------------------|------------|
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

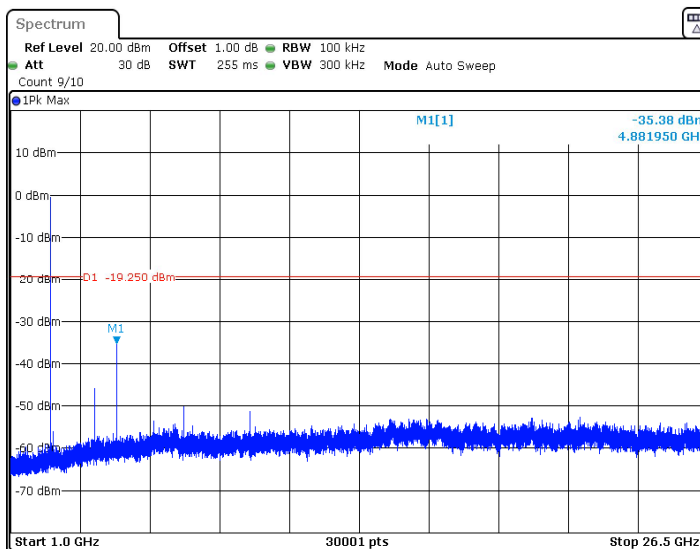
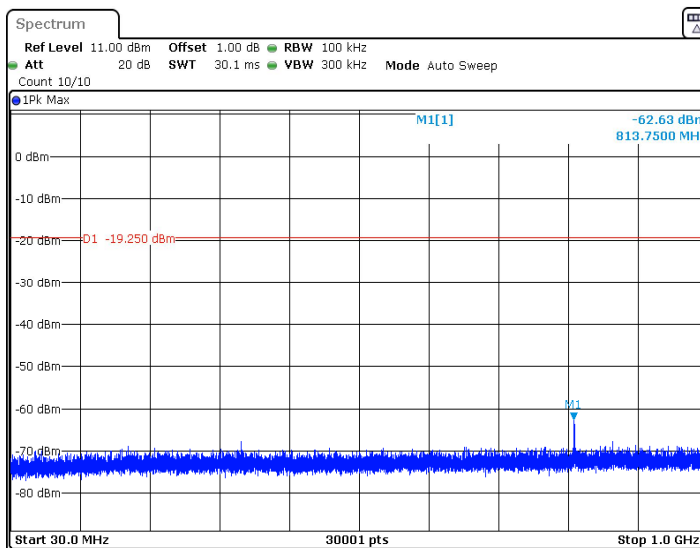
| Channel | FreqRange MHz | RefLevel dBm | Result dBm | Limit dBm | Verdict |
|---------|---------------|--------------|------------|-----------|---------|
| 2441 | 2441 | 0.75 | 0.75 | --- | PASS |
| 2441 | 30~1000 | 0.75 | -62.63 | <=-19.25 | PASS |
| 2441 | 1000~26500 | 0.75 | -35.38 | <=-19.25 | PASS |



Spurious Emissions at Antenna Terminals

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2441MHz, 3DH5)
 Test Specification: FCC2.1051 & 15.247(d)
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

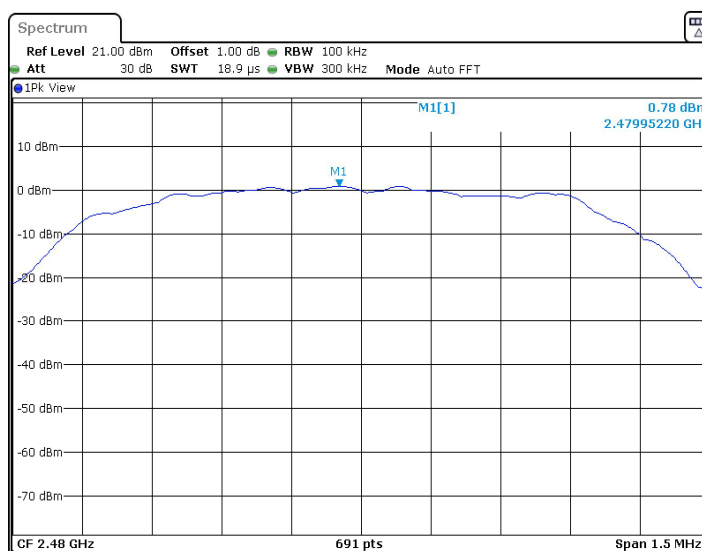


Spurious Emissions at Antenna Terminals

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2480MHz, 3DH5)
 Test Specification: FCC2.1051 & 15.247(d)
 Comment: DC 5V

| Test Result | |
|-------------------------------------|------------|
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

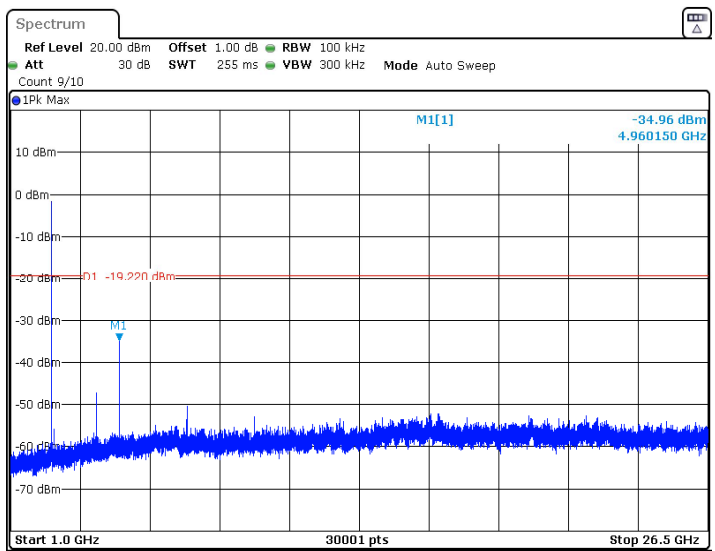
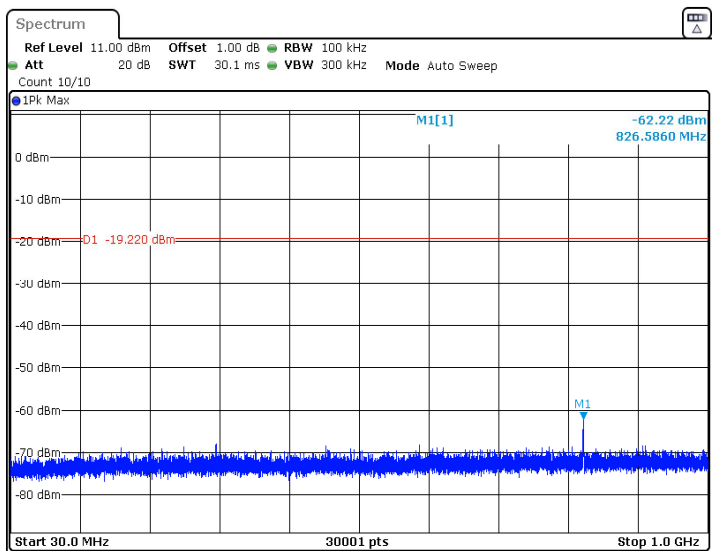
| Channel | FreqRange MHz | RefLevel dBm | Result dBm | Limit dBm | Verdict |
|---------|---------------|--------------|------------|-----------|---------|
| 2480 | 2480 | 0.78 | 0.78 | --- | PASS |
| 2480 | 30~1000 | 0.78 | -62.22 | <=-19.22 | PASS |
| 2480 | 1000~26500 | 0.78 | -35 | <=-19.22 | PASS |



Spurious Emissions at Antenna Terminals

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2480MHz, 3DH5)
 Test Specification: FCC2.1051 & 15.247(d)
 Comment: DC 5V

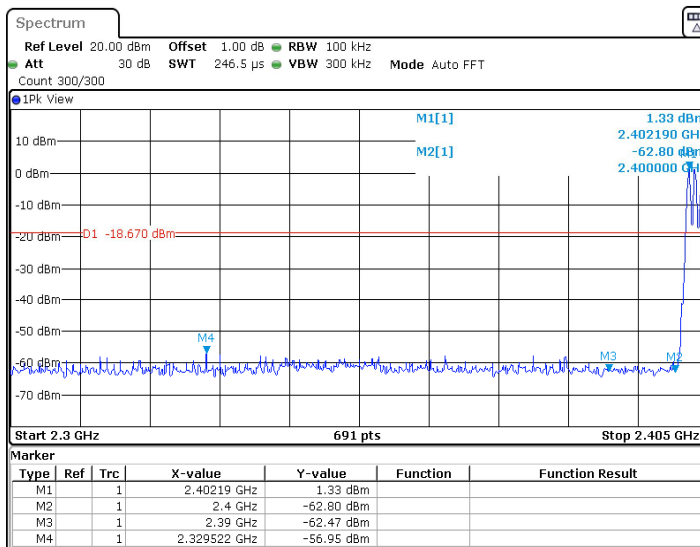
| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |



8.6 100kHz Bandwidth of band edges

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2402MHz, DH5)
 Test Specification: FCC15.247(d), Conducted
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

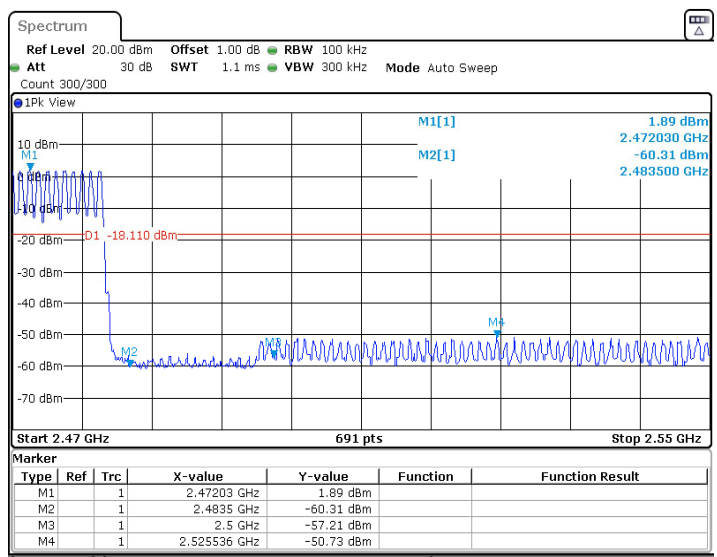


| | |
|-------------------|--------------|
| Band edges | Limit |
| 56.95 dB | > 20dB |

100kHz Bandwidth of band edges

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2480MHz, DH5)
 Test Specification: FCC15.247(d), Conducted
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

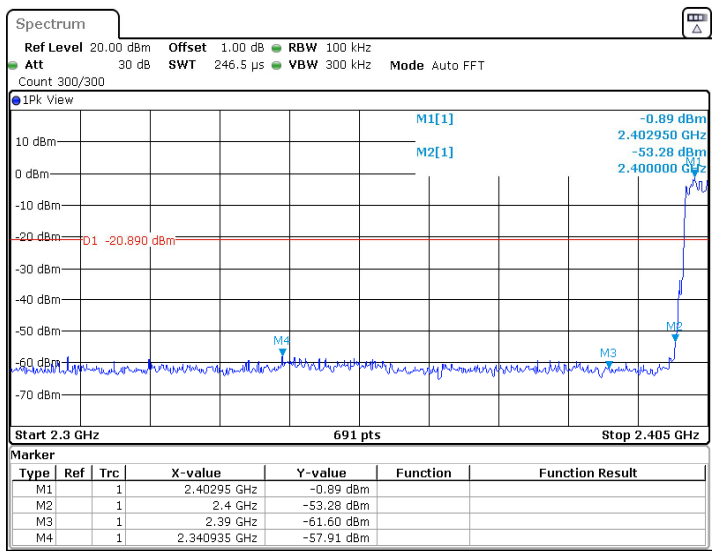


| | |
|-------------------|--------------|
| Band edges | Limit |
| 50.73 dB | > 20dB |

100kHz Bandwidth of band edges

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2402MHz, 2DH5)
 Test Specification: FCC15.247(d), Conducted
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

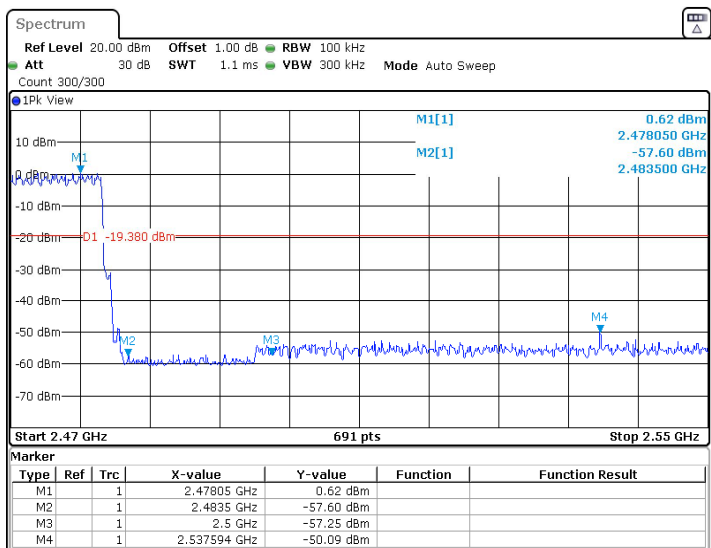


| | |
|-------------------|--------------|
| Band edges | Limit |
| 57.91 dB | > 20dB |

100kHz Bandwidth of band edges

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2480MHz, 2DH5)
 Test Specification: FCC15.247(d), Conducted
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

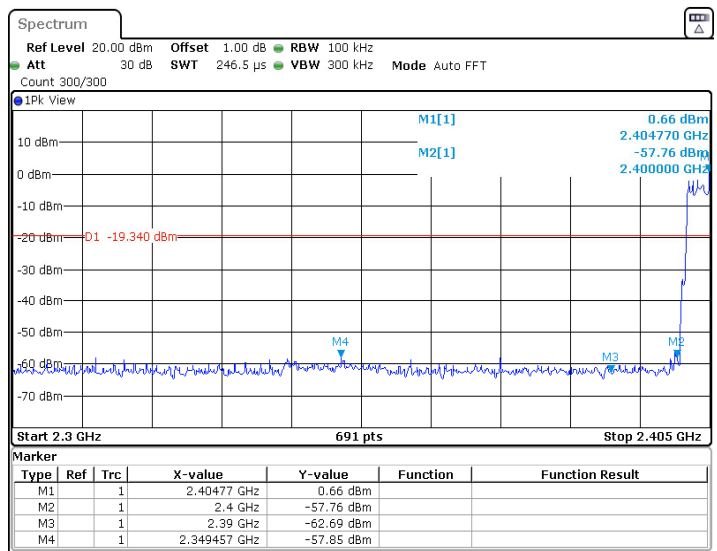


| | |
|-------------------|--------------|
| Band edges | Limit |
| 50.09 dB | > 20dB |

100kHz Bandwidth of band edges

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2402MHz, 3DH5)
 Test Specification: FCC15.247(d), Conducted
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

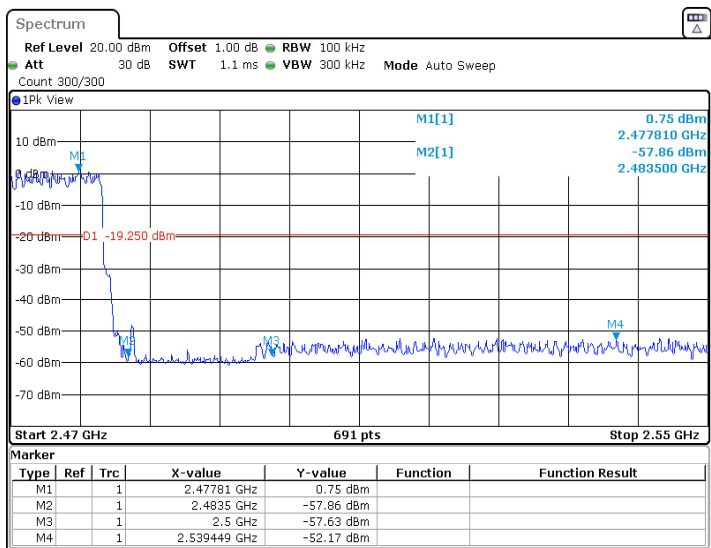


| | |
|-------------------|--------------|
| Band edges | Limit |
| 57.85 dB | > 20dB |

100kHz Bandwidth of band edges

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2480MHz, 3DH5)
 Test Specification: FCC15.247(d), Conducted
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

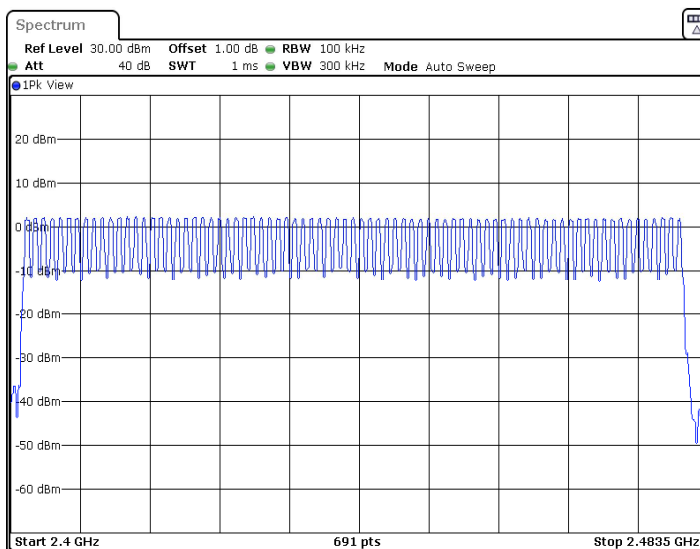


| | |
|-------------------|--------------|
| Band edges | Limit |
| 52.17 dB | > 20dB |

8.7 Minimum. Number of Hopping Frequencies

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2402-2480MHz, DH5)
 Test Specification: FCC15.247(a)(1)
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

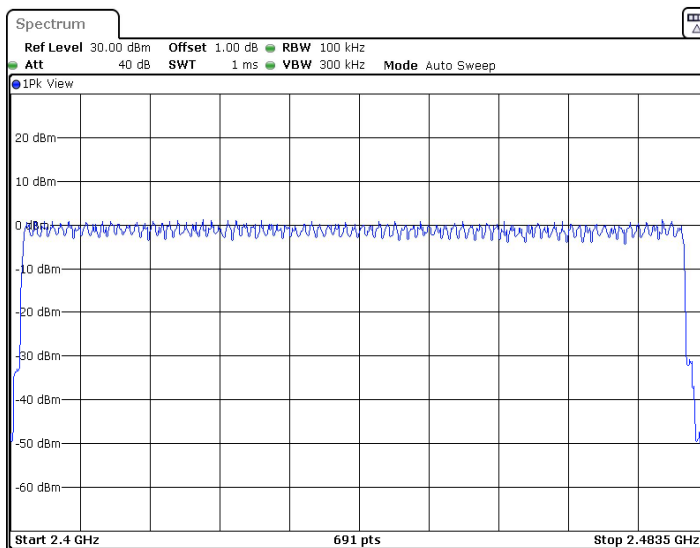


| Hopping Channels | Limit |
|------------------|-------|
| 79 | ≥ 15 |

Minimum. Number of Hopping Frequencies

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2402-2480MHz, 2DH5)
 Test Specification: FCC15.247(a)(1)
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

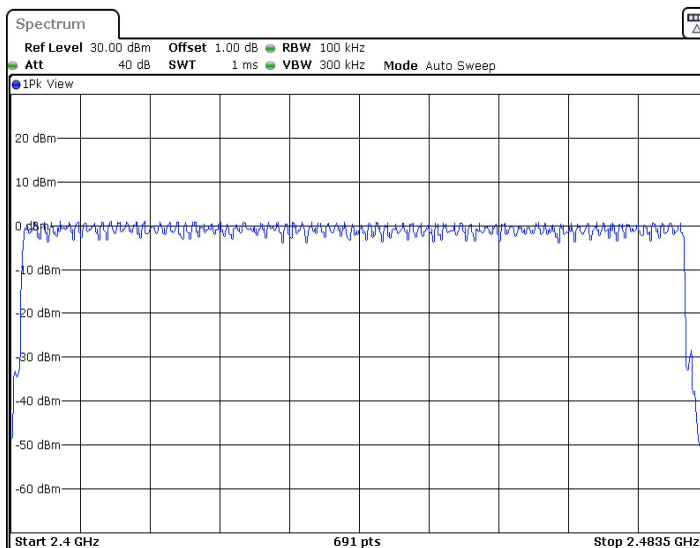


| Hopping Channels | Limit |
|------------------|-------|
| 79 | ≥ 15 |

Minimum. Number of Hopping Frequencies

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2402-2480MHz, 3DH5)
 Test Specification: FCC15.247(a)(1)
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

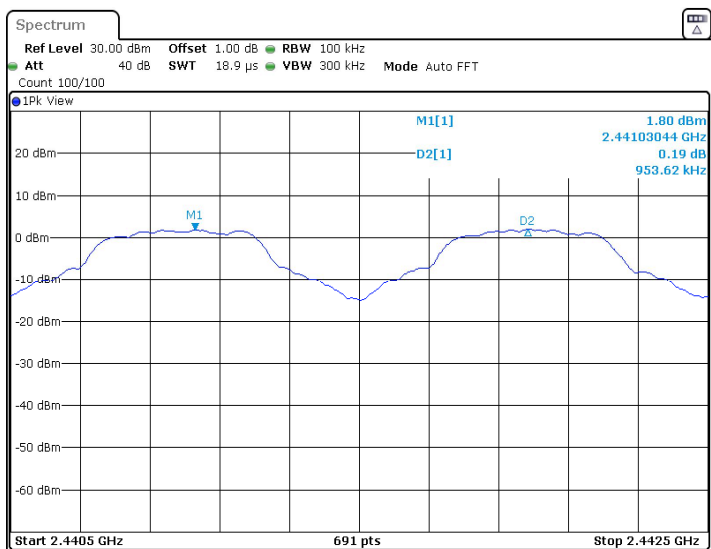


| Hopping Channels | Limit |
|------------------|-------|
| 79 | ≥ 15 |

8.8 Minimum Hopping Channel Carrier Frequency Separation

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2441MHz, DH5)
 Test Specification: FCC15.247(a)(1)
 Comment: DC 5V

| |
|--|
| Test Result |
| <input checked="" type="checkbox"/> Passed |
| <input type="checkbox"/> Not Passed |



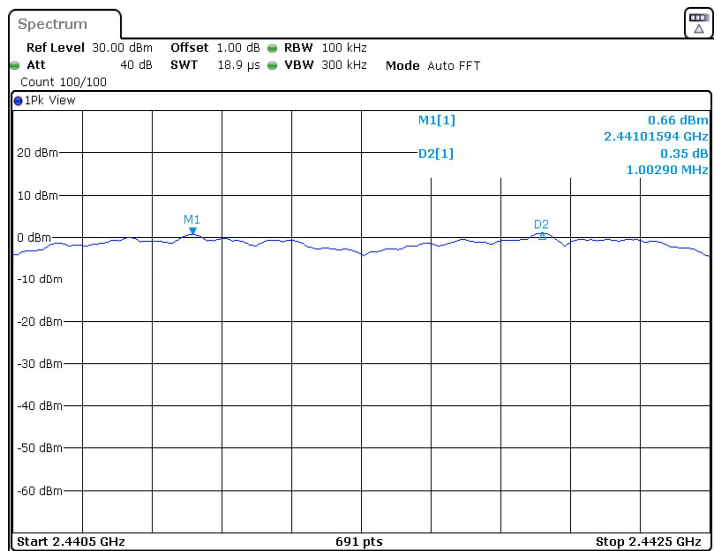
| Chanel Separation | Limit |
|-------------------|-----------|
| 954 kHz | ≥ 768 kHz |

Limit: 2/3 of 20dB bandwidth of hopping channel

Minimum Hopping Channel Carrier Frequency Separation

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2441MHz, 2DH5)
 Test Specification: FCC15.247(a)(1)
 Comment: DC 5V

| Test Result | |
|-------------------------------------|------------|
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |



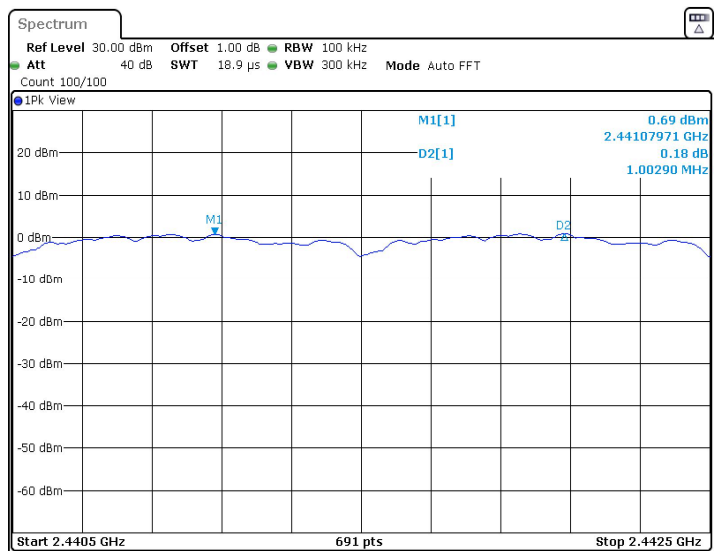
| Chanel Separation | Limit |
|-------------------|-----------|
| 1003 kHz | ≥ 950 kHz |

Limit: 2/3 of 20dB bandwidth of hopping channel

Minimum Hopping Channel Carrier Frequency Separation

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2441MHz, 2DH5)
 Test Specification: FCC15.247(a)(1)
 Comment: DC 5V

| Test Result | |
|-------------------------------------|------------|
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |



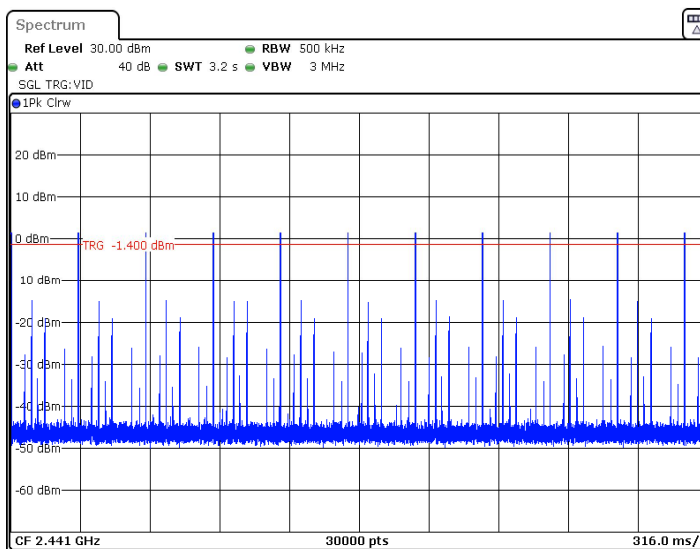
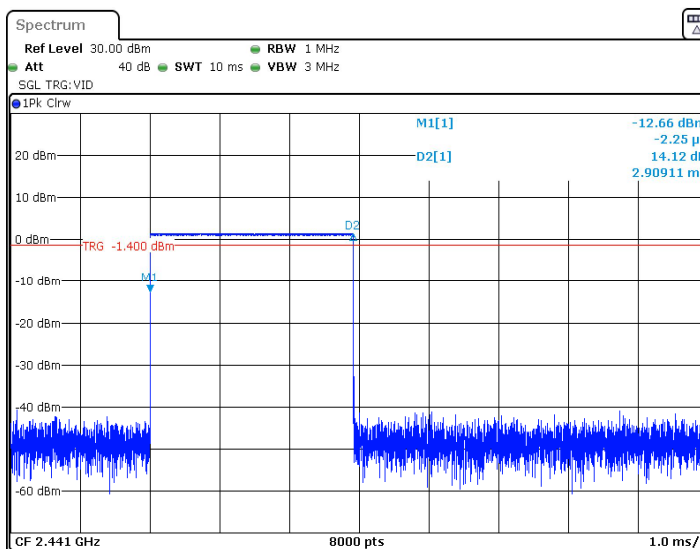
| Channel Separation | Limit |
|--------------------|-----------|
| 1003 kHz | ≥ 956 kHz |

Limit: 2/3 of 20dB bandwidth of hopping channel

8.9 Average Channel Occupancy Time

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2441MHz, DH5)
 Test Specification: FCC15.247(a)(1)
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

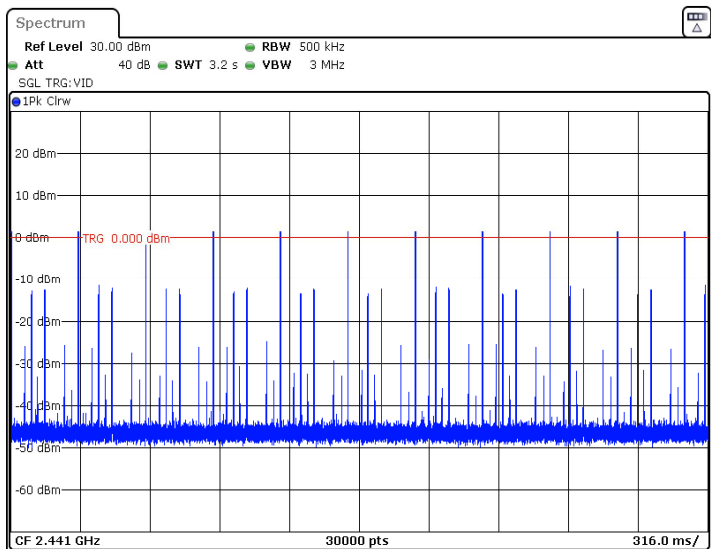
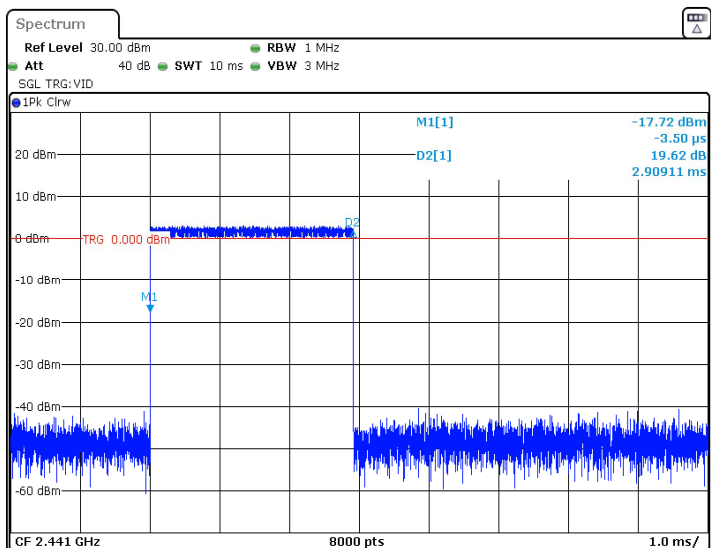


| TestMode | BurstWidth | TotalHops | Result | Limit | Verdict |
|----------|------------|-----------|--------|---------|---------|
| DH5 | 2.91 ms | 110 | 0.32 s | <=0.4 s | PASS |

Average Channel Occupancy Time

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2441MHz, 2DH5)
 Test Specification: FCC15.247(a)(1)
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

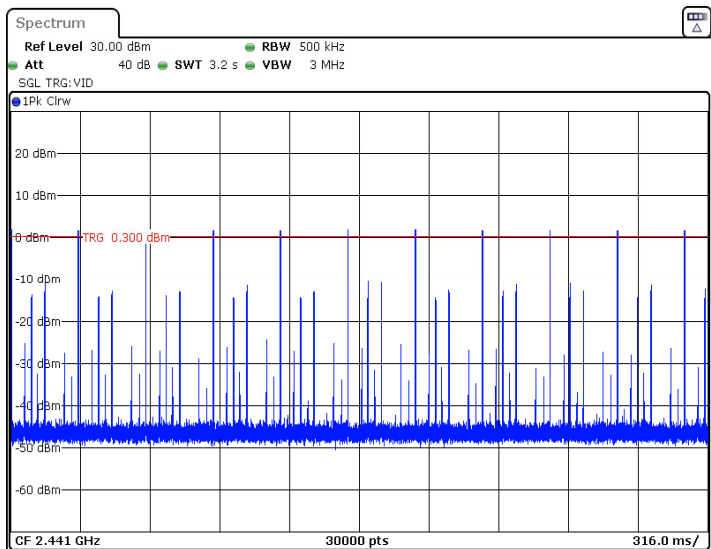
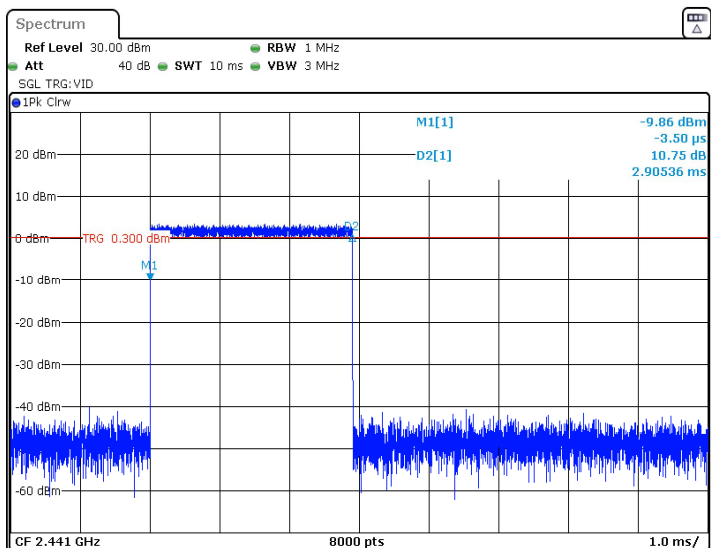


| TestMode | BurstWidth | TotalHops | Result | Limit | Verdict |
|----------|------------|-----------|--------|---------|---------|
| 2DH5 | 2.91 ms | 110 | 0.32 s | <=0.4 s | PASS |

Average Channel Occupancy Time

EUT: HG09913A-US
 Op Condition: Operated, TX Mode (2441MHz, 3DH5)
 Test Specification: FCC15.247(a)(1)
 Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |



| TestMode | BurstWidth | TotalHops | Result | Limit | Verdict |
|----------|------------|-----------|--------|---------|---------|
| 3DH5 | 2.91ms | 110 | 0.32 s | <=0.4 s | PASS |

8.10 Antenna Requirement

EUT: HG09913A-US
Op Condition: Operated, TX Mode
Test Specification: FCC15.203 & 15.247(b)
Comment: DC 5V

| | |
|-------------------------------------|------------|
| Test Result | |
| <input checked="" type="checkbox"/> | Passed |
| <input type="checkbox"/> | Not Passed |

Limit

For intentional device, according to FCC Title 47 Part 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC Title 47 Part 15.247(b), if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The antenna used in this product is an integrated antenna on PCB, and the maximum gain of this antenna is 0dBi.

9 Test setup procedure

9.1 Spurious Radiated Emission

Test Method

- 1: The EUT was placed on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- 2: The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.
- 3: The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 4: For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- 5: Use the following spectrum analyzer settings According to C63.10:

For Below 1GHz

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 KHz to 120KHz, VBW \geq RBW for peak measurement, Sweep = auto,
Detector function = peak, Trace = max hold.

For Peak unwanted emissions Above 1GHz:

Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 1MHz, VBW \geq RBW for peak measurement, Sweep = auto,
Detector function = peak, Trace = max hold.

Procedures for average unwanted emissions measurements above 1000 MHz:

Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 1MHz, VBW=10Hz, Sweep = auto, Detector function = peak, Trace = max hold.
If the dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a “duty cycle correction factor”, derived from $20\log(\text{dwell time}/100 \text{ ms})$, in an effort to demonstrate compliance with the 15.209 limit.

If the emission is pulsed, modify the unit for continuous operation; use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation.

The setting method can refer to DA00-705.

Spurious Radiated Emission

Limit

The radio emission outside the operating frequency band shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Radiated emissions which fall in the restricted bands, as defined in section 15.205, must comply with the radiated emission limits specified in section 15.209.

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

| Frequency MHz | Field Strength uV/m | Field Strength dB μ V/m | Detector |
|------------------|------------------------|--------------------------------|----------|
| 30-88 | 100 | 40 | QP |
| 88-216 | 150 | 43.5 | QP |
| 216-960 | 200 | 46 | QP |
| 960-1000 | 500 | 54 | QP |
| Above 1000 | 500 | 54 | AV |
| Above 1000 | 5000 | 74 | PK |

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

9.2 Conducted Emission at AC Power line

Test Method

1. The EUT was placed on a table, which is 0.8m above ground plane
2. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.).
3. Maximum procedure was performed to ensure EUT compliance
4. A EMI test receiver is used to test the emissions from both sides of AC line

Limit

According to §15.207 & RSS-GEN 8.8, conducted emissions limit as below:

| Frequency MHz | QP Limit dB μ V | AV Limit dB μ V |
|------------------|------------------------|------------------------|
| 0.150-0.500 | 66-56* | 56-46* |
| 0.500-5 | 56 | 46 |
| 5-30 | 60 | 50 |

Remark: "*" Decreasing linearly with logarithm of the frequency

9.3 20dB & 99% Bandwidth

Test Method

1. Use the following spectrum analyzer settings:
RBW=100K, VBW \geq 3RBW, Sweep = auto, Detector function = peak, Trace = max hold
2. Use the automatic bandwidth measurement capability of an instrument, may be employed using the X dB bandwidth mode with X set to 20 dB, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be \geq 20 dB.
3. Allow the trace to stabilize, record the X dB Bandwidth value.

Limit

Limit [kHz]

NA

9.4 Peak Output Power

Test Method

1. Connect the spectrum analyzer to the EUT
 - a) The EUT is configured to transmit continuously, or to transmit with a constant duty factor.
 - b) At all times the EUT is transmitting at its maximum power control level.
 - c) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.
2. Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
3. Adjust the measurement in dBm by adding $10\log(1/x)$, where x is the duty cycle to the measurement result.

Limits

According to §15.247 (b) (1) & RSS-247 5.4(d), conducted peak output power limit as below:

| Frequency Range MHz | Limit W | Limit dBm |
|------------------------|------------|--------------|
| 2400-2483.5 | ≤ 1 | ≤ 30 |

For e.i r.p:

| Frequency Range MHz | Limit W | Limit dBm |
|------------------------|------------|--------------|
| 2400-2483.5 | ≤ 4 | ≤ 36 |

9.5 Spurious Emissions at Antenna Terminals

Test Method

1. Establish a reference level by using the following procedure:
 - a. Set RBW=100 kHz. VBW \geq 3RBW. Detector =peak, Sweep time = auto couple, Trace mode = max hold.
 - b. Allow trace to fully stabilize, use the peak marker function to determine the maximum PSD level.
2. Use the maximum PSD level to establish the reference level.
 - a. Set the center frequency and span to encompass frequency range to be measured.
 - b. Use the peak marker function to determine the maximum amplitude level. Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements, report the three highest emissions relative to the limit.
3. Repeat above procedures until other frequencies measured were completed.

Limit

| Frequency Range MHz | Limit (dBc) |
|------------------------|-------------|
| 30-25000 | -20 |

9.6 100kHz Bandwidth of band edges

Test Method

- 1 Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 kHz, VBW \geq RBW, Sweep = auto, Detector function = peak, Trace = max hold.
- 2 Allow the trace to stabilize, use the peak and delta measurement to record the result.
- 3 The level displayed must comply with the limit specified in this Section.

Limit

| Frequency Range MHz | Limit (dBc) |
|------------------------|-------------|
| 30-25000 | -20 |

9.7 Number of hopping frequencies

Test Method

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

- a) Span: The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
- b) RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
- c) VBW \geq RBW.
- d) Sweep: Auto.
- e) Detector function: Peak.
- f) Trace: Max hold.
- g) Allow the trace to stabilize.
- h) Count the number of hopping frequencies

Limit

Limit

≥ 15

9.8 Minimum Hopping Channel Carrier Frequency Separation

Test Method

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

- a) Span: Wide enough to capture the peaks of two adjacent channels.
- b) RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
- c) Video (or average) bandwidth (VBW) \geq RBW.
- d) Sweep: Auto.
- e) Detector function: Peak.
- f) Trace: Max hold.
- g) Allow the trace to stabilize.

Use the marker-delta function to determine the separation between the peaks of the adjacent channels. Compliance of an EUT with the appropriate regulatory limit shall be determined. A plot of the data shall be included in the test report.

Limit

Limit

$\geq 2/3$ of 20dB bandwidth of hopping channel

9.9 Average Channel Occupancy Time

Test Method

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

- a) Span: Zero span, centered on a hopping channel.
- b) RBW shall be \leq channel spacing and where possible RBW should be set $\gg 1 / T$, where T is the expected dwell time per channel.
- c) Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel.
- d) Detector function: Peak.
- e) Trace: Max hold.

Use the marker-delta function to determine the transmit time per hop. If this value varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation in transmit time.

Repeat the measurement using a longer sweep time to determine the number of hops over the period specified in the requirements. The sweep time shall be equal to, or less than, the period specified in the requirements. Determine the number of hops over the sweep time and calculate the total number of hops in the period specified in the requirements, using the following equation:

(Number of hops in the period specified in the requirements) =
(number of hops on spectrum analyzer) \times (period specified in the requirements / analyzer sweep time)

The average time of occupancy is calculated from the transmit time per hop multiplied by the number of hops in the period specified in the requirements. If the number of hops in a specific time varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation.

The measured transmit time and time between hops shall be consistent with the values described in the operational description for the EUT.

Limit

Limit

$\leq 0.4s$

10 Appendix A - General Product Information

Radiofrequency radiation exposure evaluation

This exposure evaluation is intended for **FCC ID: 2AJ90-HG9913**

According to KDB 447498 D01v06 section 4.3.1, For frequencies between 100 MHz to 6GHz and test separation distances ≤ 50 mm, the Numeric threshold is determined as:

Step a)

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR

>> The fundamental frequency of the EUT is 2402-2480MHz, the test separation distance is ≤ 50 mm.
(Manufacturer specified the separation distance is: 5mm)
(5mm is the worst case according to the KDB)

Step b)

>> Numeric threshold (2402MHz), $\text{mW} / 5\text{mm} * \sqrt{2.402\text{GHz}} \leq 3.0$
Numeric threshold (2402MHz) $\leq 9.678\text{mW}$

>> Numeric threshold (2441MHz), $\text{mW} / 5\text{mm} * \sqrt{2.440\text{GHz}} \leq 3.0$
Numeric threshold (2441MHz) $\leq 9.602\text{mW}$

>> Numeric threshold (2480MHz), $\text{mW} / 5\text{mm} * \sqrt{2.480\text{GHz}} \leq 3.0$
Numeric threshold (2480MHz) $\leq 9.525\text{mW}$

>> The power (measured + tune up tolerance) of EUT at 2402MHz is: 4.96dBm = 3.13mW
The power (measured + tune up tolerance) of EUT at 2441MHz is: 4.88dBm = 3.07mW
The power (measured + tune up tolerance) of EUT at 2480MHz is: 4.74dBm = 2.98mW

Which is smaller than the Numeric threshold.

Therefore, the device is exempt from stand-alone SAR test requirements.

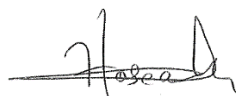
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