

# FCC TEST REPORT

**Product Name:** FleetOne Shipborne Satellite Broadband Terminal  
**Trade Mark:** N/A  
**Model No.:** Fleet One  
**Add. Model No.:** N/A  
**Report Number:** 190522008RFC-1  
**Test Standards:** FCC 47 CFR Part 25  
**FCC ID:** 2AT37FLEETONE  
**Test Result:** PASS  
**Date of Issue:** July 23, 2019

Prepared for:

**Chengdu Spaceon Technology Co., Ltd.**  
**No.88, Xinye Road, Scientific Industry Park, Chengdu Hi-tech**  
**Industry Zone,Chendu,China**

Prepared by:

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## Version

| Version No. | Date          | Description |
|-------------|---------------|-------------|
| V1.0        | July 23, 2019 | Original    |



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## 1. GENERAL INFORMATION

### 1.1 CLIENT INFORMATION

|                                 |                                                                                         |
|---------------------------------|-----------------------------------------------------------------------------------------|
| <b>Applicant:</b>               | Chengdu Spaceon Technology Co., Ltd.                                                    |
| <b>Address of Applicant:</b>    | No.88, Xinye Road, Scientific Industry Park, Chengdu Hi-tech Industry Zone,Chendu,China |
| <b>Manufacturer:</b>            | Chengdu Spaceon Technology Co., Ltd.                                                    |
| <b>Address of Manufacturer:</b> | No.88, Xinye Road, Scientific Industry Park, Chengdu Hi-tech Industry Zone,Chendu,China |

### 1.2 EUT INFORMATION

#### 1.2.1 General Description of EUT

|                               |                                                              |                          |
|-------------------------------|--------------------------------------------------------------|--------------------------|
| <b>Product Name:</b>          | FleetOne Shipborne Satellite Broadband Terminal              |                          |
| <b>Model No.:</b>             | Fleet One                                                    |                          |
| <b>Add. Model No.:</b>        | N/A                                                          |                          |
| <b>Trade Mark:</b>            | N/A                                                          |                          |
| <b>DUT Stage:</b>             | Identical Prototype                                          |                          |
| <b>Rating:</b>                | DC 12/24V form External Power<br>DC 7.4V form inside battery |                          |
| <b>EUT Supports Function:</b> | MSS frequency bands                                          | 1626.5 MHz to 1660.5 MHz |
| <b>Software Version:</b>      | v1.1                                                         |                          |
| <b>Hardware Version:</b>      | v1.0                                                         |                          |
| <b>Sample Received Date:</b>  | May 22, 2019                                                 |                          |
| <b>Sample Tested Date:</b>    | May 27, 2019 to May 31, 2019                                 |                          |

#### 1.2.2 Description of Accessories

| Battery                        |                             |
|--------------------------------|-----------------------------|
| <b>Model No.:</b>              | 1808                        |
| <b>Battery Type:</b>           | Rechargeable Li-ion Battery |
| <b>Rated Voltage:</b>          | 7.4 Vdc                     |
| <b>Limited Charge Voltage:</b> | 8.4 Vdc                     |
| <b>Rated Capacity:</b>         | 6 Ah                        |

### 1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

|                                  |                                                   |                 |
|----------------------------------|---------------------------------------------------|-----------------|
| <b>Frequency Bands:</b>          | 1626.5 MHz to 1660.5 MHz                          |                 |
| <b>Type of Modulation:</b>       | QPSK, Pi/4 QPSK, 16QAM, 32QAM, 64QAM              |                 |
| <b>Nominated Bandwidth:</b>      | 30 kHz/ 50 kHz/ 90 kHz/ 100 kHz/ 190 kHz/ 200 kHz |                 |
| <b>Antenna Type:</b>             | Antenna 1                                         | Helical Antenna |
|                                  | Antenna 2                                         | Helical Antenna |
| <b>Antenna Gain:</b>             | Antenna 1                                         | 10 dBi          |
|                                  | Antenna 2                                         | 10 dBi          |
| <b>Maximum EIRP:</b>             | 17.342 dBW / 54.23 W                              |                 |
| <b>Normal Test Voltage:</b>      | 24 Vdc                                            |                 |
| <b>Extreme Test Voltage:</b>     | 20.4 to 27.6Vdc                                   |                 |
| <b>Extreme Test Temperature:</b> | -30 ℃ to +50 ℃                                    |                 |

## 1.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

### 1) Support Equipment

| Description | Manufacturer | Model No. | Serial Number | Supplied by |
|-------------|--------------|-----------|---------------|-------------|
| Notebook    | Lenovo       | E450      | SL10G10780    | UnionTrust  |
| mouse       | DELL         | MS111     | CN-011D3V-738 | UnionTrust  |
| USB disk    | Kingston     | DTSE9     | N/A           | UnionTrust  |
| Battery * 2 | Camel        | 6-QWLZ-48 | N/A           | UnionTrust  |

### 2) Support Cable

| Cable No. | Description       | Connector | Length     | Supplied by |
|-----------|-------------------|-----------|------------|-------------|
| 1         | Antenna Cable * 2 | SMA       | 0.30 Meter | UnionTrust  |

## 1.5 TEST LOCATION

### Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China 518109

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## 1.6 TEST FACILITY

The test facility is recognized, certified, or accredited by the following organizations:

### CNAS-Lab Code: L9069

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC/EN 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

### A2LA-Lab Certificate No.: 4312.01

Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

### ISED Wireless Device Testing Laboratories

CAB identifier: CN0032

### FCC Accredited Lab.

Designation Number: CN1194

Test Firm Registration Number: 259480

## 1.7 DEVIATION FROM STANDARDS

No deviations from the applicable test standard were made during testing.

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## 1.8 ABNORMALITIES FROM STANDARD CONDITIONS

None.

## 1.9 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

## 1.10 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

| No. | Item                                                                                                             | Measurement Uncertainty                                         |
|-----|------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| 1   | Frequency Tolerance                                                                                              | $\pm 6.3 \times 10^{-8}$                                        |
| 2   | Occupied Bandwidth                                                                                               | $\pm 2.3 \%$                                                    |
| 3   | Radiated Spurious Emissions (30MHz-1GHz)                                                                         | $\pm 4.7$ dB                                                    |
| 4   | Radiated Spurious Emissions (1GHz-18GHz)                                                                         | $\pm 5.1$ dB                                                    |
| 5   | Equivalent Isotropic Radiated Power                                                                              | Radiated: $\pm 5.1$ dB (1GHz-18GHz)<br>Conducted: $\pm 0.52$ dB |
| 6   | Spurious Emissions at Antenna Terminals                                                                          | $\pm 1.48$ dB                                                   |
| 7   | Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radio navigation-Satellite Service | Radiated: $\pm 5.1$ dB (1GHz-18GHz)<br>Conducted: $\pm 1.48$ dB |

## 2. TEST SUMMARY

| FCC 47 CFR Part 25 Test Cases                                                                                    |                                                     |        |
|------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|--------|
| Test Item                                                                                                        | Test Requirement                                    | Result |
| Occupied Bandwidth                                                                                               | FCC 47 CFR Part 2.1049                              | PASS   |
| Frequency Tolerance                                                                                              | FCC 47 CFR Part 25.202(d)<br>FCC 47 CFR Part 2.1055 | PASS   |
| Spurious Emissions at Antenna Terminals                                                                          | FCC 47 CFR Part 25.202(f)                           | PASS   |
| Radiated Spurious Emissions                                                                                      | FCC 47 CFR Part 25.202(f)                           | PASS   |
| Equivalent Isotropic Radiated Power                                                                              | FCC 47 CFR Part 25.204                              | PASS   |
| Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radio navigation-Satellite Service | FCC 47 CFR Part 25.216                              | PASS   |

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### 3. EQUIPMENT LIST

| Radiated Emission Test Equipment List |                                   |               |            |                            |                         |                             |
|---------------------------------------|-----------------------------------|---------------|------------|----------------------------|-------------------------|-----------------------------|
| Used                                  | Equipment                         | Manufacturer  | Model No.  | Serial Number              | Cal. date (mm dd, yyyy) | Cal. Due date (mm dd, yyyy) |
| <input checked="" type="checkbox"/>   | 3M Chamber & Accessory Equipment  | ETS-LINDGREN  | 3M         | N/A                        | Dec. 03, 2018           | Dec. 03, 2021               |
| <input checked="" type="checkbox"/>   | Receiver                          | R&S           | ESIB26     | 100114                     | Nov. 24, 2018           | Nov. 24, 2019               |
| <input type="checkbox"/>              | Loop Antenna                      | ETS-LINDGREN  | 6502       | 00202525                   | Dec. 03, 2018           | Dec. 03, 2019               |
| <input checked="" type="checkbox"/>   | Broadband Antenna                 | ETS-LINDGREN  | 3142E      | 00201566                   | Dec. 08, 2018           | Dec. 08, 2019               |
| <input checked="" type="checkbox"/>   | 6dB Attenuator                    | Talent        | RA6A5-N-18 | 18103001                   | Dec. 08, 2018           | Dec. 08, 2019               |
| <input checked="" type="checkbox"/>   | Preamplifier                      | HP            | 8447F      | 2805A02960                 | Nov. 24, 2018           | Nov. 24, 2019               |
| <input type="checkbox"/>              | Broadband Antenna (Pre-amplifier) | ETS-LINDGREN  | 3142E-PA   | 00201891                   | May 18, 2019            | May 18, 2020                |
| <input type="checkbox"/>              | 6dB Attenuator                    | Talent        | RA6A5-N-18 | 18103002                   | Nov. 24, 2018           | Nov. 24, 2019               |
| <input type="checkbox"/>              | Horn Antenna                      | ETS-LINDGREN  | 3117       | 00164202                   | Dec. 08, 2018           | Dec. 08, 2019               |
| <input checked="" type="checkbox"/>   | Horn Antenna (Pre-amplifier)      | ETS-LINDGREN  | 3117-PA    | 00201874                   | May 18, 2019            | May 18, 2020                |
| <input checked="" type="checkbox"/>   | Multi device Controller           | ETS-LINDGREN  | 7006-001   | 00160105                   | N/A                     | N/A                         |
| <input type="checkbox"/>              | Highpass Filter (1.2GHz~18GHz)    | Micro-Tronics | HPM50108   | G552                       | Nov. 29, 2018           | Nov. 29, 2019               |
| <input checked="" type="checkbox"/>   | Highpass Filter (3GHz~18GHz)      | Micro-Tronics | HPM50117   | G005                       | Nov. 29, 2018           | Nov. 29, 2019               |
| <input checked="" type="checkbox"/>   | Test Software                     | Audix         | e3         | Software Version: 9.160333 |                         |                             |

| Conducted RF test Equipment List    |                         |              |              |                        |                         |                             |
|-------------------------------------|-------------------------|--------------|--------------|------------------------|-------------------------|-----------------------------|
| Used                                | Equipment               | Manufacturer | Model No.    | Serial Number          | Cal. date (mm dd, yyyy) | Cal. Due date (mm dd, yyyy) |
| <input checked="" type="checkbox"/> | EXA Spectrum Analyzer   | KEYSIGHT     | N9010A       | MY51440197             | Nov. 24, 2018           | Nov. 24, 2019               |
| <input type="checkbox"/>            | Receiver                | R&S          | ESR7         | 1316.3003K07-101181-K3 | Nov. 24, 2018           | Nov. 24, 2019               |
| <input checked="" type="checkbox"/> | DC Source               | KIKUSUI      | PWR400L      | LK003024               | Sep. 18, 2018           | Sep. 18, 2019               |
| <input checked="" type="checkbox"/> | Temp & Humidity chamber | Espec        | GL(U)04KA(W) | 16921H201P3            | Sep. 18, 2018           | Sep. 18, 2019               |
| <input type="checkbox"/>            | Temp & Humidity chamber | Votisch      | VT4002       | 58566133290020         | Jun. 05, 2018           | Jun. 05, 2019               |

## 4. TEST CONFIGURATION

### 4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

#### 4.1.1 Normal or Extreme Test Conditions

| Test Environment | Selected Values During Tests |             |                       |
|------------------|------------------------------|-------------|-----------------------|
| Test Condition   | Ambient                      |             |                       |
|                  | Temperature (°C)             | Voltage (V) | Relative Humidity (%) |
| TN/VN            | +15 to +35                   | 24          | 20 to 75              |
| TL/VL            | -30                          | 20.4        | 20 to 75              |
| TH/VL            | +50                          | 20.4        | 20 to 75              |
| TL/VH            | -30                          | 27.6        | 20 to 75              |
| TH/VH            | +50                          | 27.6        | 20 to 75              |

**Remark:**

- The EUT just work in such extreme temperature of -30 °C to +50 °C and the extreme voltage of 20.4 V to 27.6 V, so here the EUT is tested in the temperature of -30 °C to +50 °C and the voltage of 20.4 V to 27.6 V.
- VN: Normal Voltage; TN: Normal Temperature;  
TL: Low Extreme Test Temperature; TH: High Extreme Test Temperature;  
VL: Low Extreme Test Voltage; VH: High Extreme Test Voltage.

#### 4.1.2 Record of Normal Environment

| Test Item                                                                                                        | Temperature (°C) | Relative Humidity (%) | Pressure (kPa) | Tested by |
|------------------------------------------------------------------------------------------------------------------|------------------|-----------------------|----------------|-----------|
| Occupied Bandwidth                                                                                               | 25.6             | 44                    | 100.01         | Hank Wu   |
| Frequency Tolerance                                                                                              | 25.6             | 44                    | 100.01         | Hank Wu   |
| Spurious Emissions at Antenna Terminals                                                                          | 25.6             | 44                    | 100.01         | Hank Wu   |
| Radiated Spurious Emissions                                                                                      | 25.2             | 52                    | 100.02         | Fire Huo  |
| Equivalent Isotropic Radiated Power                                                                              | 25.2             | 52                    | 100.02         | Fire Huo  |
| Limits on Emissions from Mobile Earth Stations for Protection of Aeronautical Radio navigation-Satellite Service | 25.6             | 44                    | 100.01         | Hank Wu   |

## 4.2 TEST CHANNELS

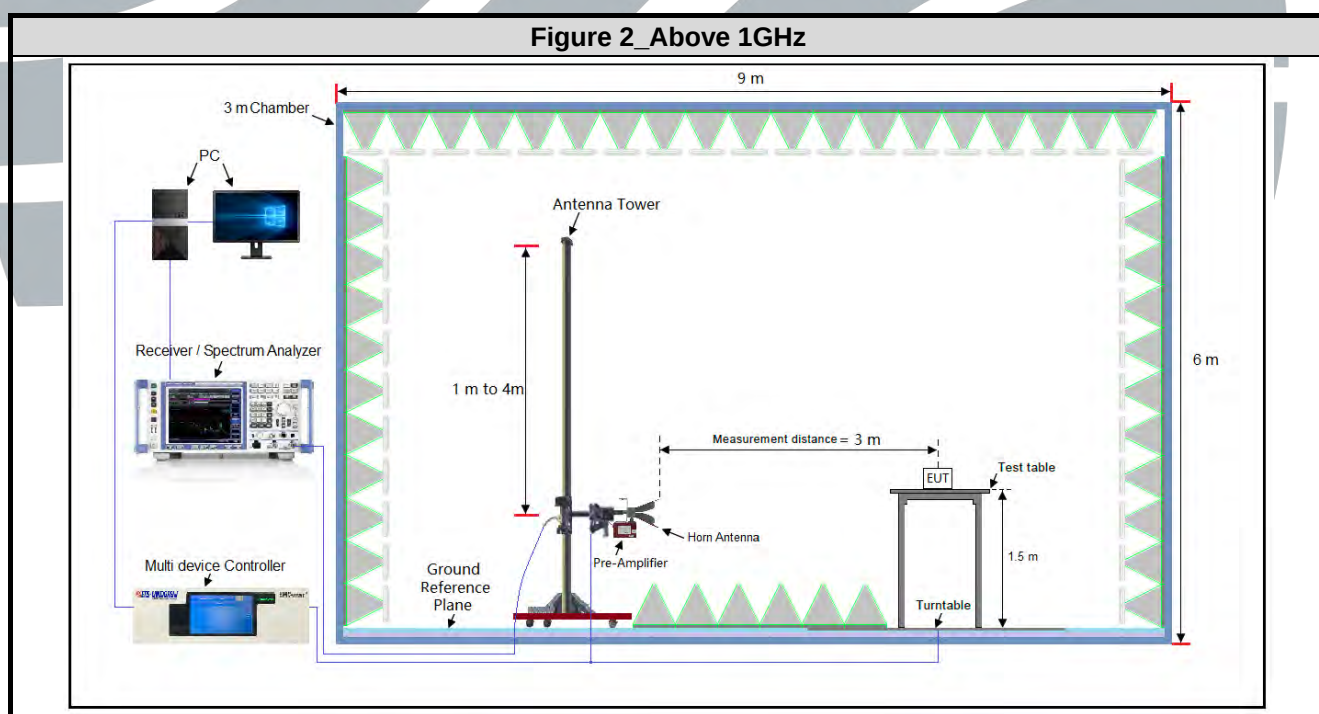
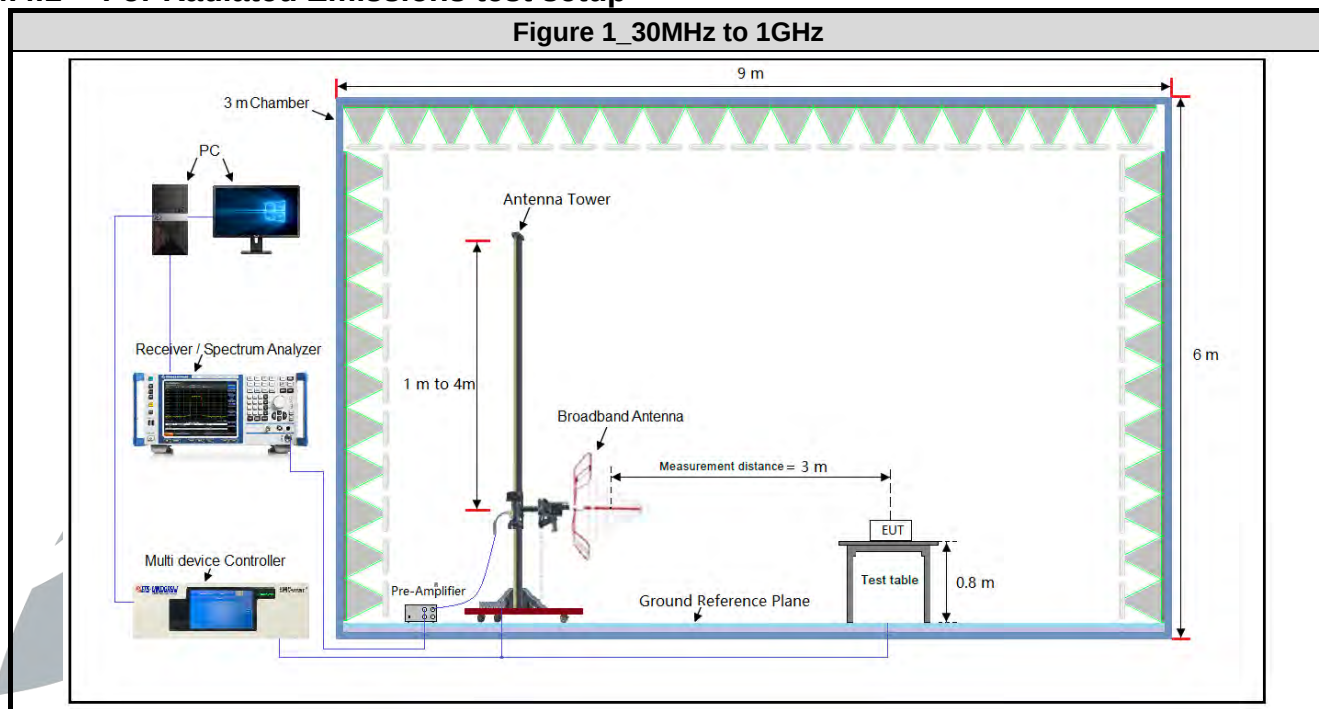
| Test RF Channel Lists |            |            |
|-----------------------|------------|------------|
| Lowest                | Middle     | Highest    |
| 1626.6 MHz            | 1643.5 MHz | 1660.4 MHz |

## 4.3 EUT TEST STATUS

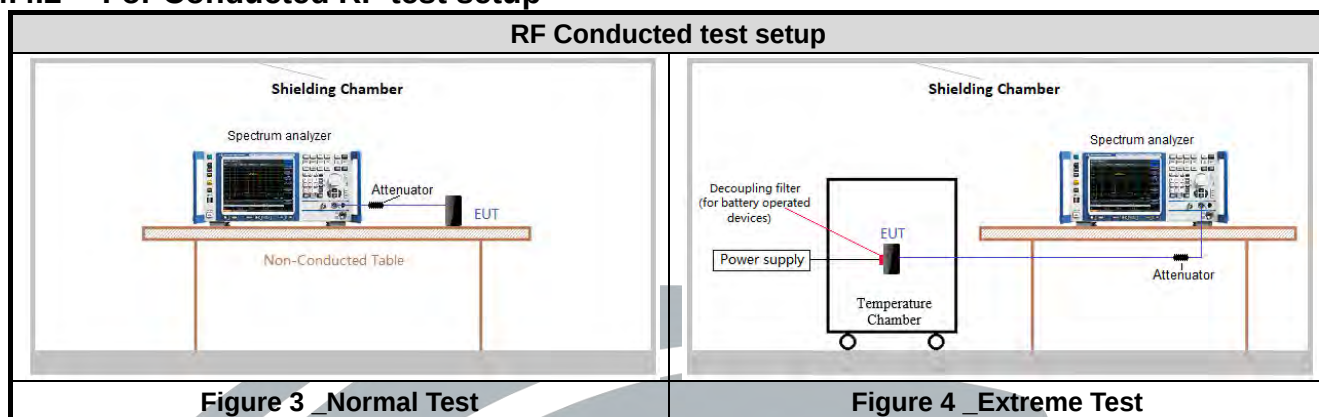
| Description                                                                  |
|------------------------------------------------------------------------------|
| 1. Keep the EUT in continuously transmitting with modulation test single.    |
| 2. Keep the EUT in continuously transmitting with Un-modulation test single. |

## 4.4 TEST SETUP

### 4.4.1 For Radiated Emissions test setup



#### 4.4.2 For Conducted RF test setup



### 4.5 SYSTEM TEST CONFIGURATION

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, radiated emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario. It was powered by a 24Vdc (2 x 12V batteries). Only the worst case data were recorded in this test report.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance. Therefore, all final radiated testing was performed with the EUT in (see table below) orientation.

| Frequency  | Mode | Antenna Port | Worst-case axis positioning |
|------------|------|--------------|-----------------------------|
| Above 1GHz | 1TX  | Chain 0      | Y axis                      |

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

## 5. RADIO TECHNICAL REQUIREMENTS SPECIFICATION

### 5.1 REFERENCE DOCUMENTS FOR TESTING

| No. | Identity           | Document Title                                                                                    |
|-----|--------------------|---------------------------------------------------------------------------------------------------|
| 1   | FCC 47 CFR Part 2  | Frequency allocations and radio treaty matters; general rules and regulations                     |
| 2   | FCC 47 CFR Part 25 | Satellite Communications                                                                          |
| 3   | ANSI C63.26-2015   | American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services |

### 5.2 OCCUPIED BANDWIDTH

**Test Requirement:** FCC 47 CFR Part 2.1049

**Test Method:** FCC 47 CFR Part 2.1049

**Limit:** None specified.

**Test Setup:** Refer to section 4.4.2 for details.

**Instruments Used:** Refer to section 3 for details

**Test Results:**

| BW     | Channel | Frequency  | Occupied Bandwidth (kHz) |           |
|--------|---------|------------|--------------------------|-----------|
|        |         |            | Antenna 1                | Antenna 2 |
| Type 1 | Lowest  | 1626.6 MHz | 18.756                   | 18.944    |
|        | Middle  | 1643.5 MHz | 18.809                   | 18.760    |
|        | Highest | 1660.4 MHz | 18.967                   | 18.947    |
| Type 2 | Lowest  | 1626.6 MHz | 36.959                   | 37.187    |
|        | Middle  | 1643.5 MHz | 37.335                   | 37.257    |
|        | Highest | 1660.4 MHz | 37.336                   | 37.144    |
| Type 3 | Lowest  | 1626.6 MHz | 74.065                   | 74.219    |
|        | Middle  | 1643.5 MHz | 74.428                   | 74.519    |
|        | Highest | 1660.4 MHz | 74.631                   | 74.133    |
| Type 4 | Lowest  | 1626.6 MHz | 87.144                   | 87.126    |
|        | Middle  | 1643.5 MHz | 87.002                   | 86.815    |
|        | Highest | 1660.4 MHz | 87.044                   | 86.952    |
| Type 5 | Lowest  | 1626.6 MHz | 166.510                  | 167.470   |
|        | Middle  | 1643.5 MHz | 166.860                  | 167.320   |
|        | Highest | 1660.4 MHz | 166.720                  | 166.730   |
| Type 6 | Lowest  | 1626.6 MHz | 174.260                  | 174.730   |
|        | Middle  | 1643.5 MHz | 174.190                  | 174.760   |
|        | Highest | 1660.4 MHz | 174.490                  | 174.320   |

The test plots as follows:

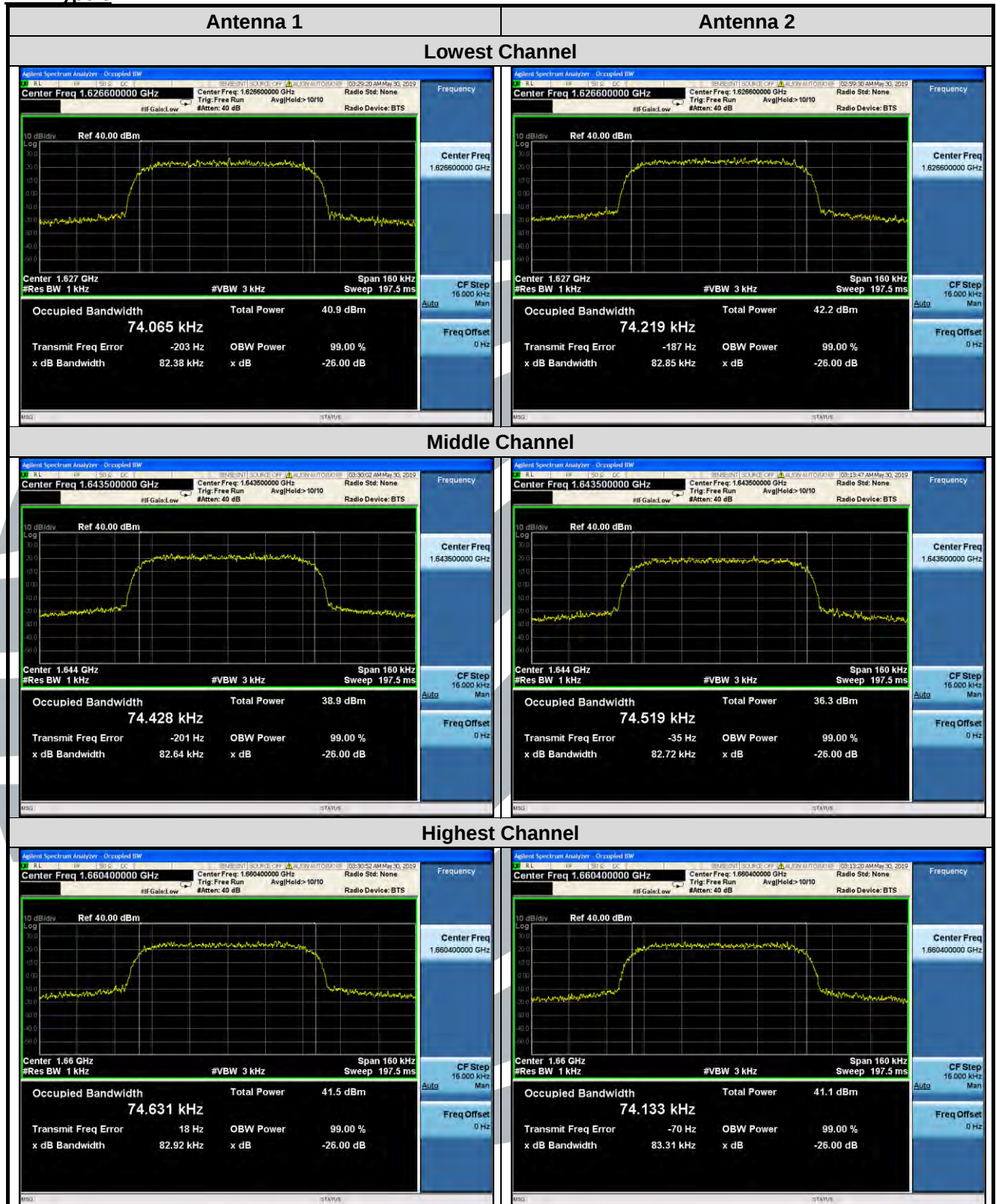
BW: Type 1



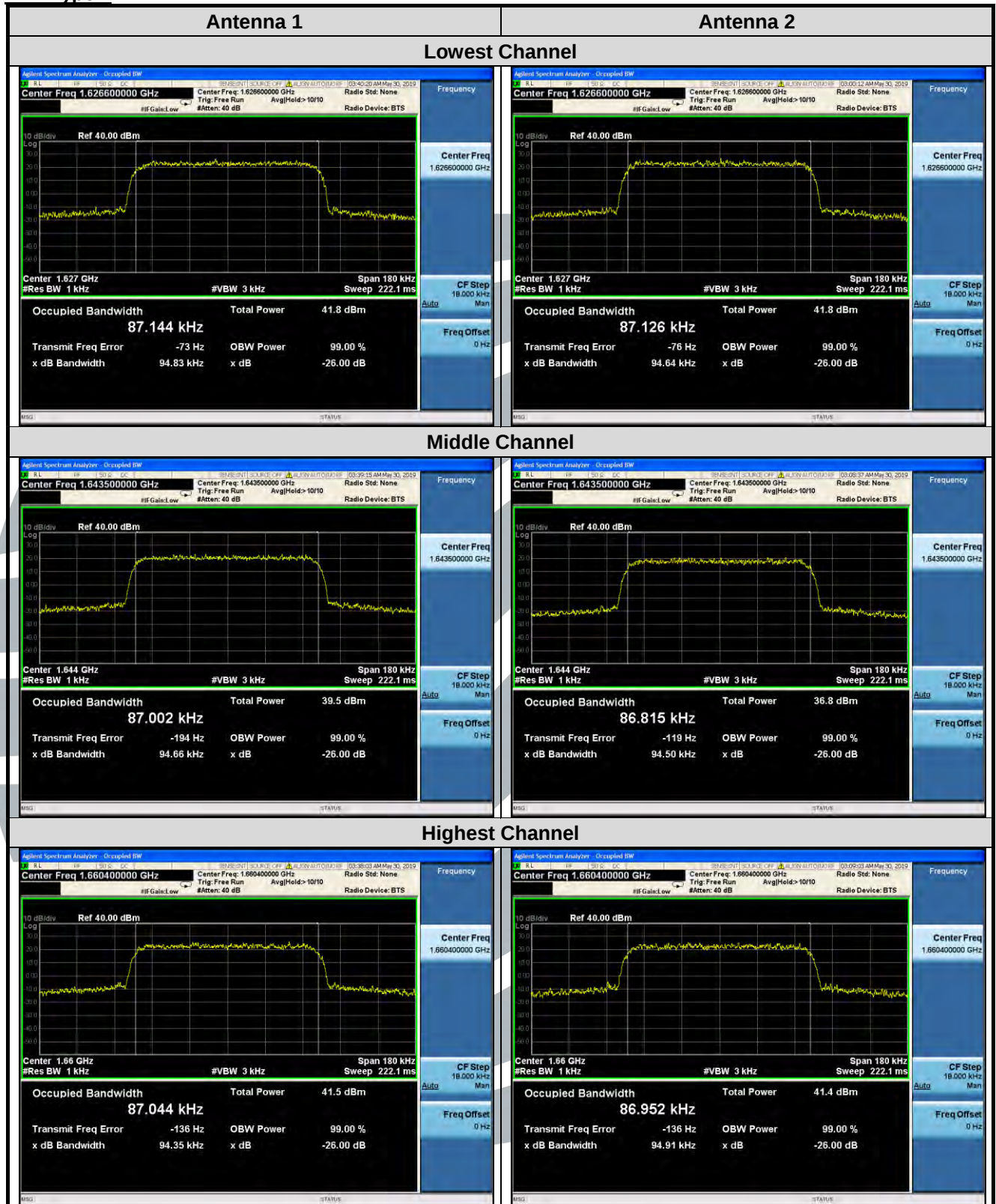
BW: Type 2



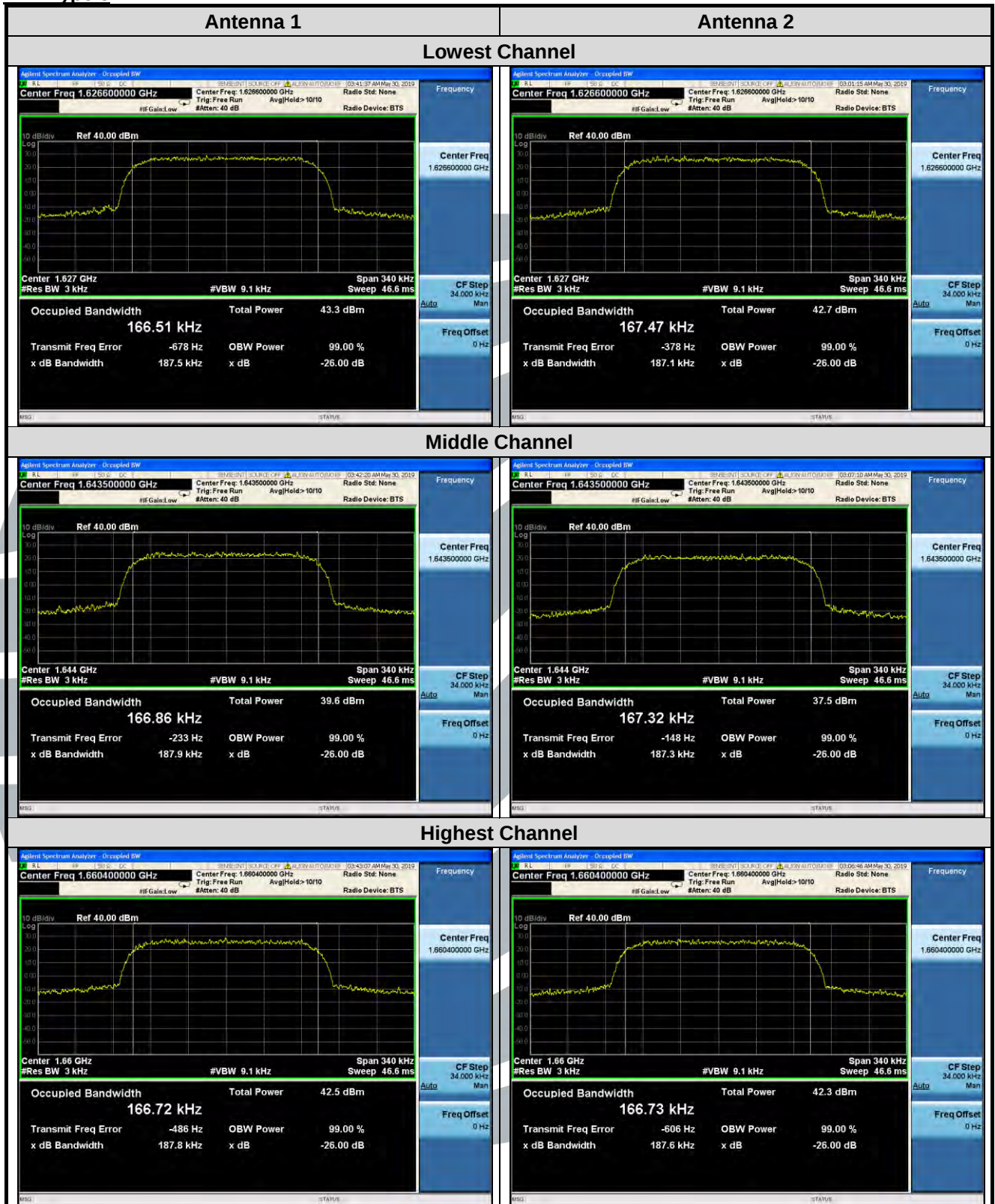
BW: Type 3



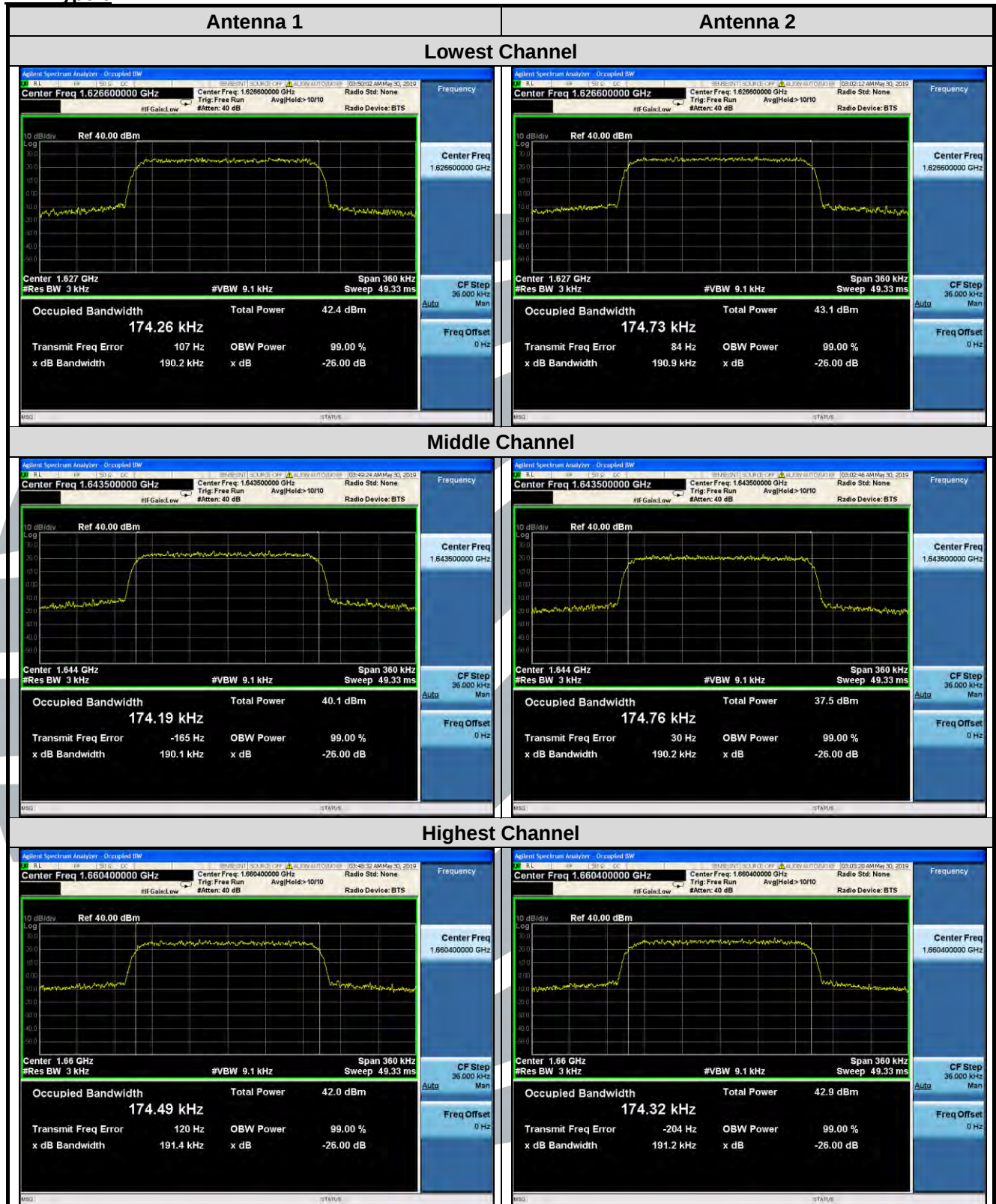
BW: Type 4



BW: Type 5



BW: Type 6



### 5.3 FREQUENCY TOLERANCE

**Test Requirement:** FCC 47 CFR Part 25.202(d)

**Test Method:** FCC 47 CFR Part 2.1055

**Limit:** The carrier frequency of each earth station transmitter authorized in these services shall be maintained within 0.001 percent (10 ppm) of the reference frequency.

**Test Setup:** Refer to section 4.4.2 for details.

**Instruments Used:** Refer to section 3 for details

**Test Results:**

| Frequency | Voltage | Temperature | Measured value | Deviation |       | Limit | Results |
|-----------|---------|-------------|----------------|-----------|-------|-------|---------|
| (MHz)     | (Vdc)   | (°C)        | (MHz)          | (%)       | (ppm) | (%)   |         |
| 1643.5    | VL      | TN          | 1643.49973     | -0.000017 | -0.17 | 0.001 | Pass    |
|           | VN      |             | 1643.49973     | -0.000017 | -0.17 | 0.001 | Pass    |
|           | VH      |             | 1643.49973     | -0.000016 | -0.16 | 0.001 | Pass    |
|           | VN      | 50          | 1643.4997      | -0.000019 | -0.19 | 0.001 | Pass    |
|           |         | 40          | 1643.49971     | -0.000018 | -0.18 | 0.001 | Pass    |
|           |         | 30          | 1643.49971     | -0.000018 | -0.18 | 0.001 | Pass    |
|           |         | 20          | 1643.49972     | -0.000017 | -0.17 | 0.001 | Pass    |
|           |         | 10          | 1643.49972     | -0.000017 | -0.17 | 0.001 | Pass    |
|           |         | 0           | 1643.49973     | -0.000017 | -0.17 | 0.001 | Pass    |
|           |         | -10         | 1643.49972     | -0.000017 | -0.17 | 0.001 | Pass    |
|           |         | -20         | 1643.49972     | -0.000017 | -0.17 | 0.001 | Pass    |
|           |         | -30         | 1643.49972     | -0.000017 | -0.17 | 0.001 | Pass    |

## 5.4 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

**Test Requirement:** FCC 47 CFR Part 25.202(f)

**Test Method:** KDB 971168 D01v03r01, clause 6

The authorized emissions bandwidth used for measurements below was declared by the manufacturer as 30 kHz/ 50 kHz/ 90 kHz/ 100 kHz/ 190 kHz/ 200 kHz.

Measurements have been made in a bandwidth greater than 4 kHz which was considered worst case.

**Limit:**

(1) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: 25 dB;

(2) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: 35 dB;

(3) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 250 percent of the authorized bandwidth: An amount equal to 43 dB plus 10 times the logarithm (to the base 10) of the transmitter power in watts;

(4) In any event, when an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in paragraphs (f) (1), (2) and (3) of this section.

**Test Setup:**

Refer to section 4.4.2 for details.

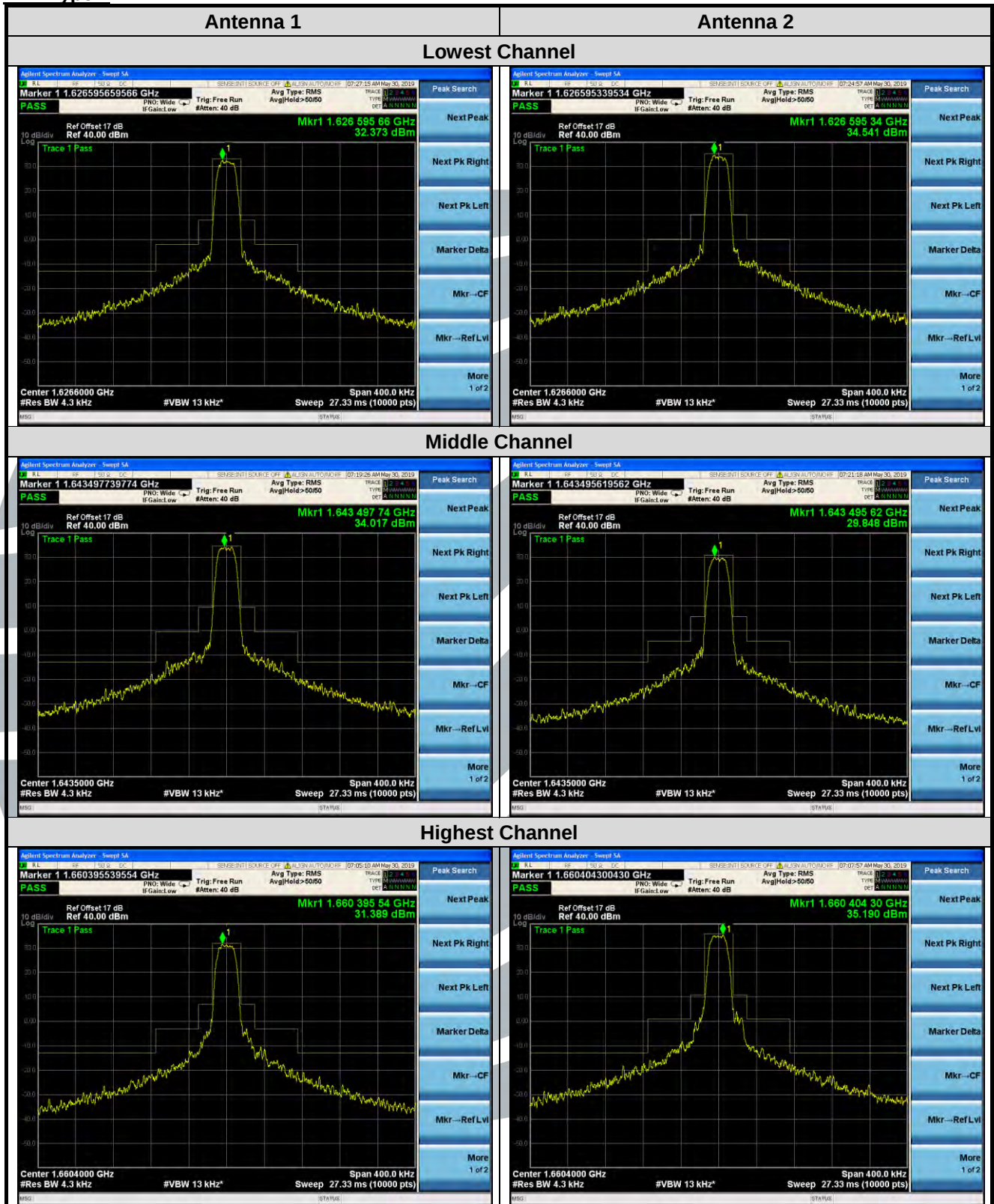
**Instruments Used:**

Refer to section 3 for details

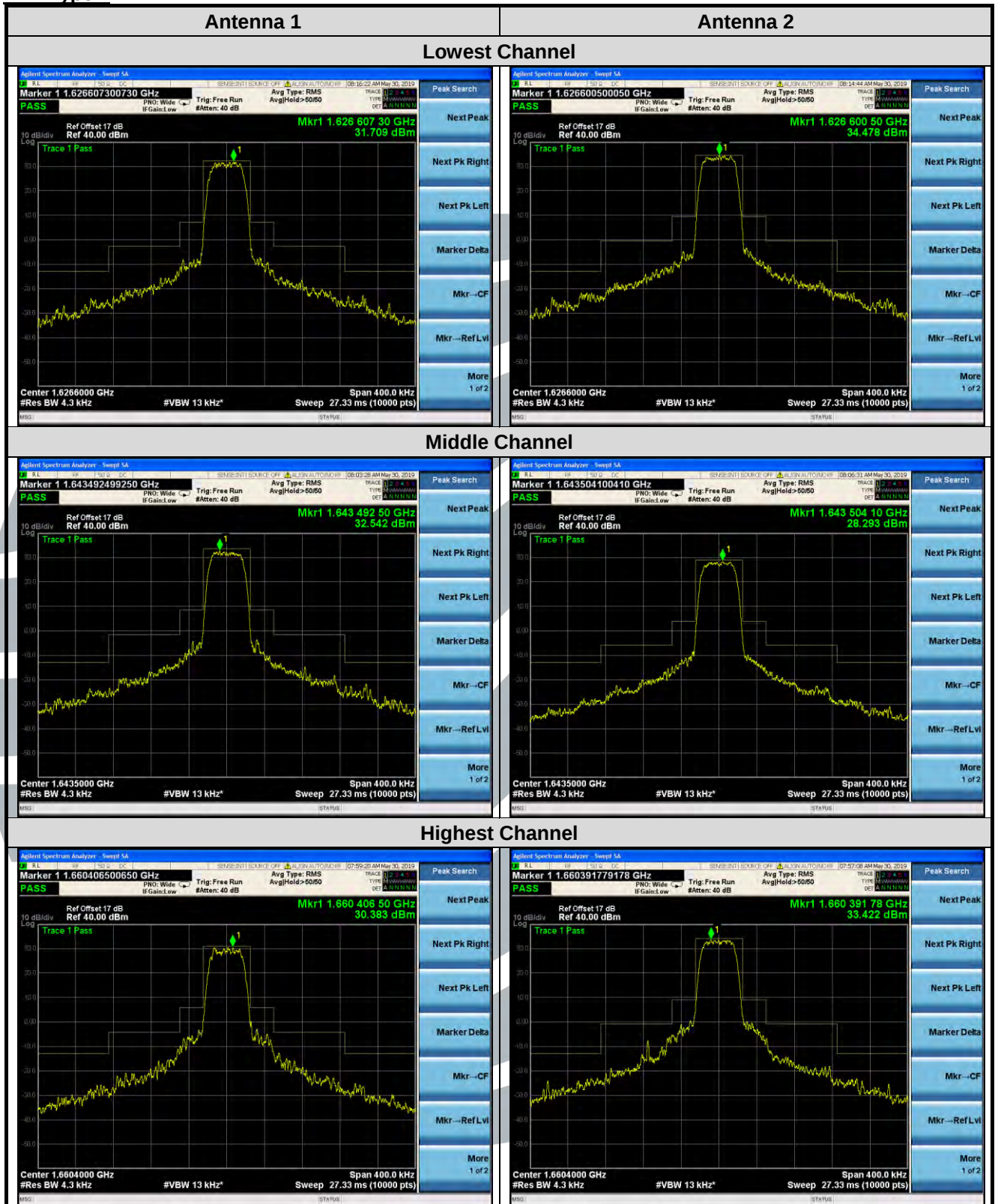
**Test Results:**

### Spurious emission within the bands

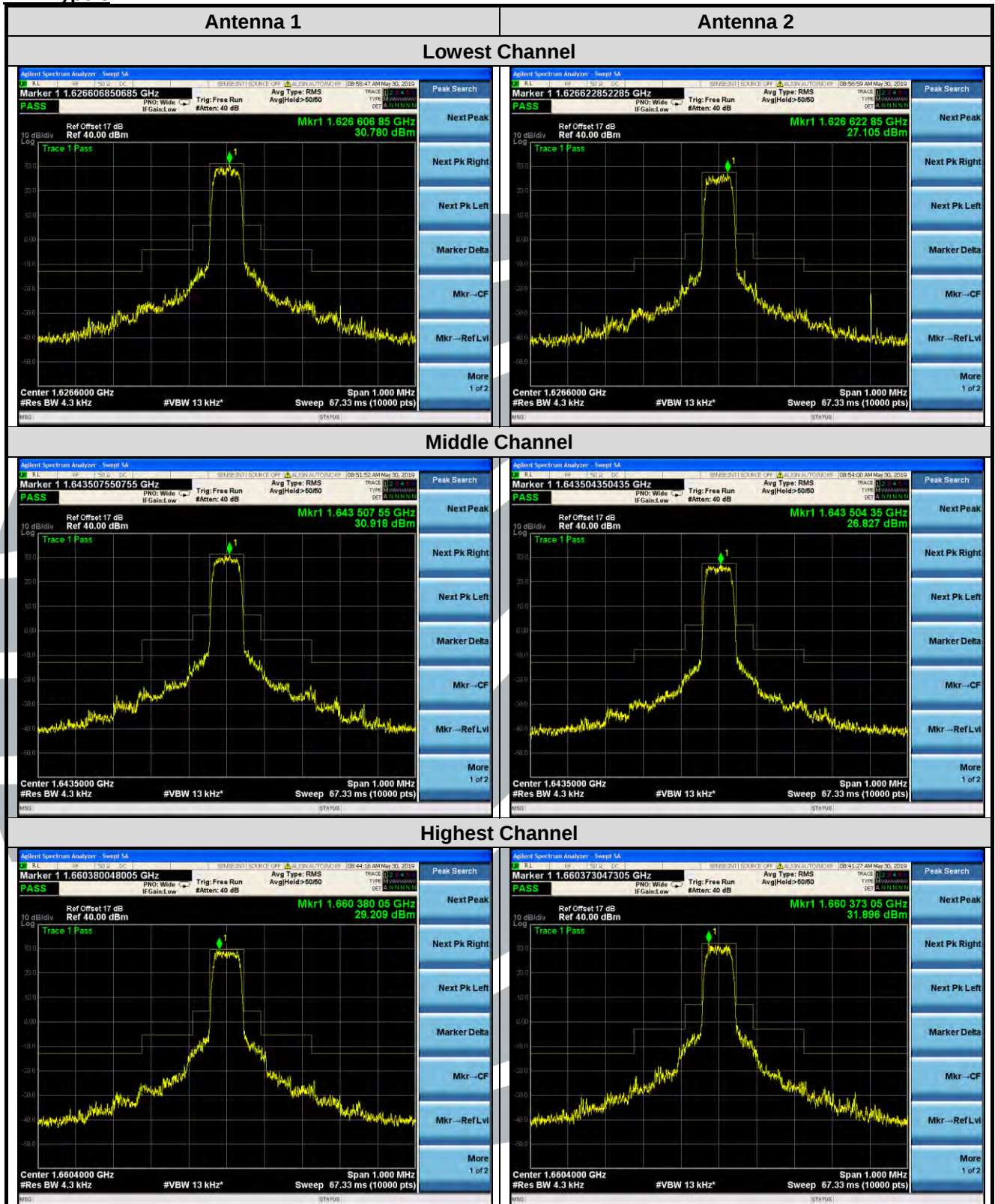
BW: Type 1



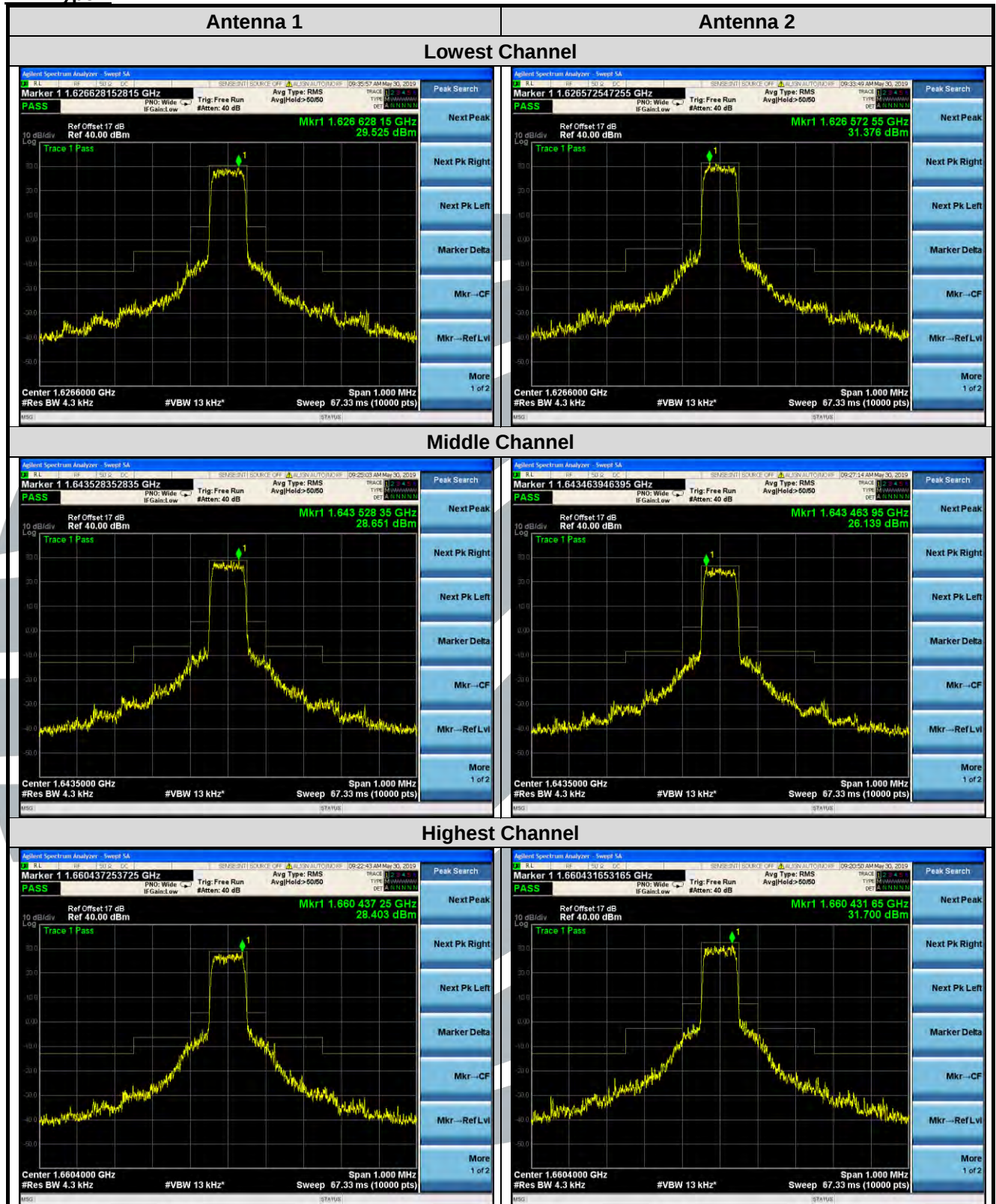
BW: Type 2



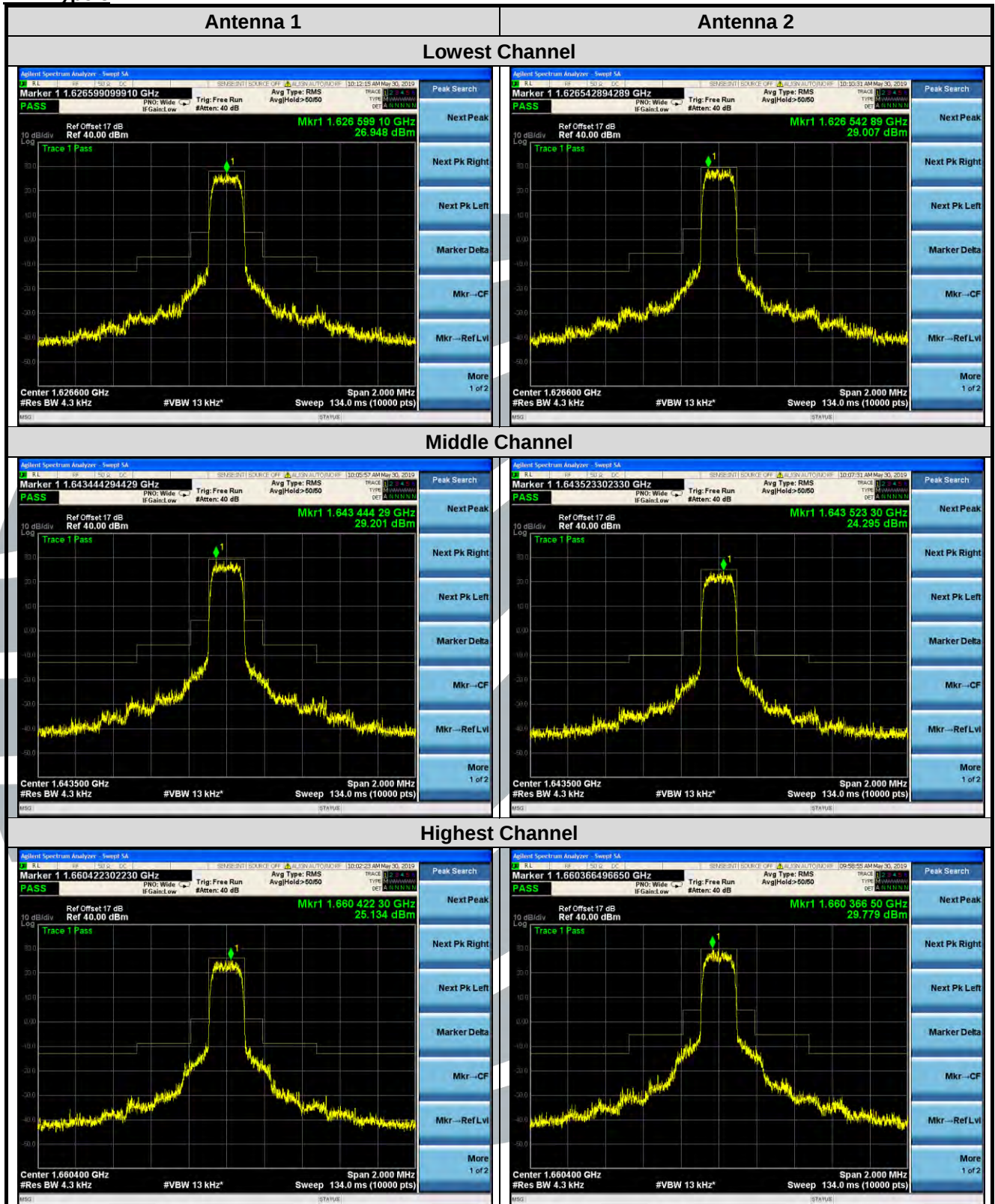
BW: Type 3



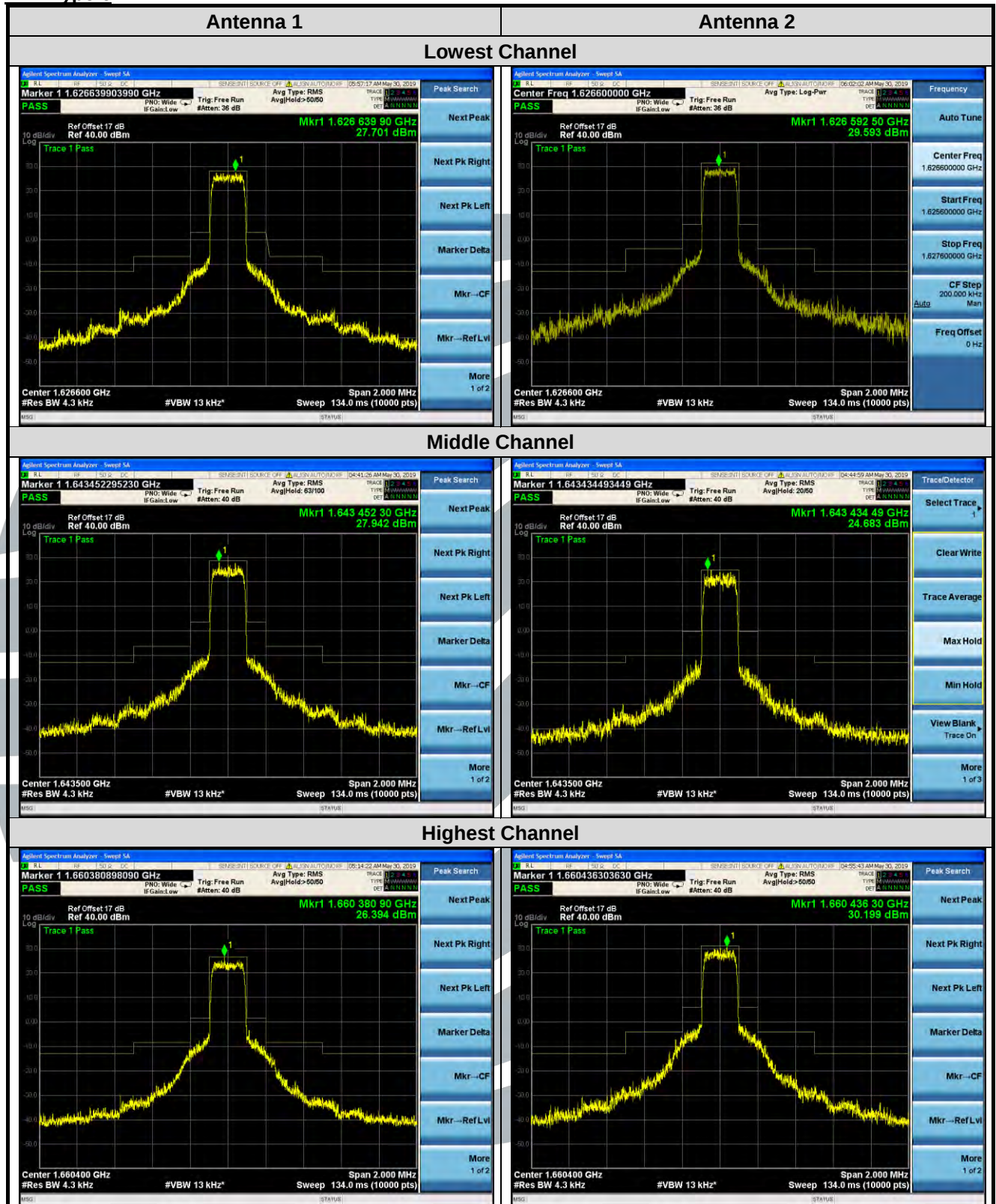
BW: Type 4



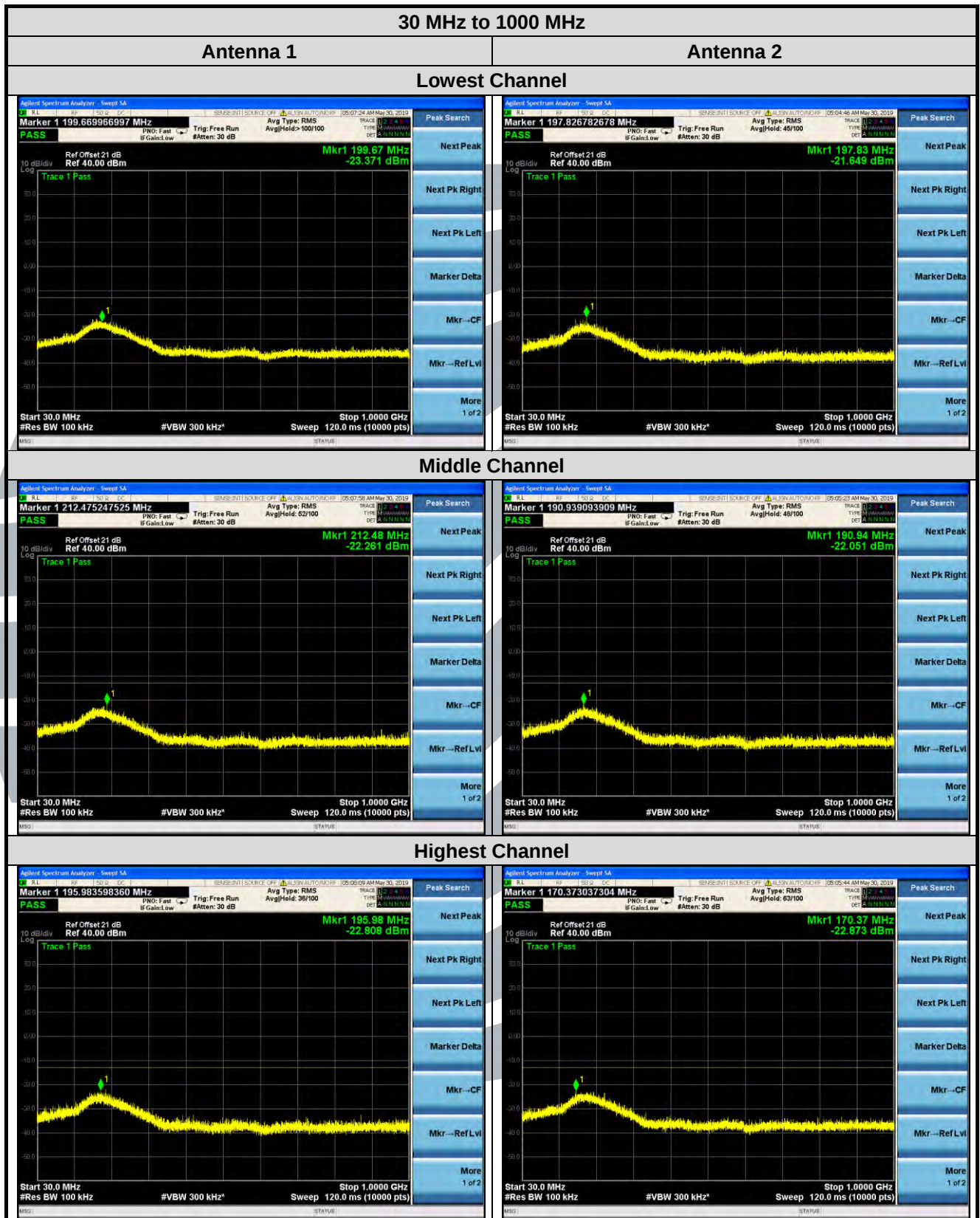
BW: Type 5

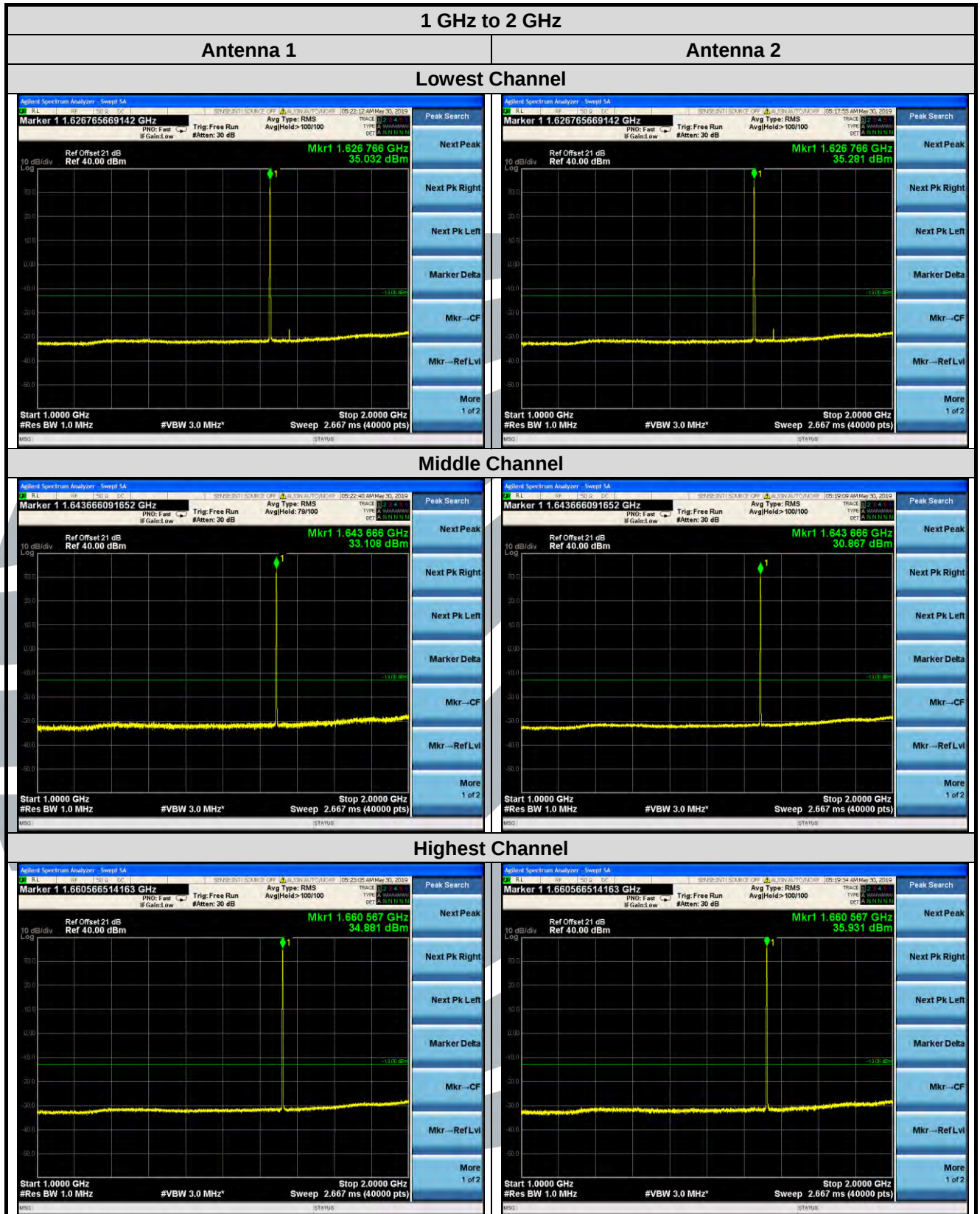


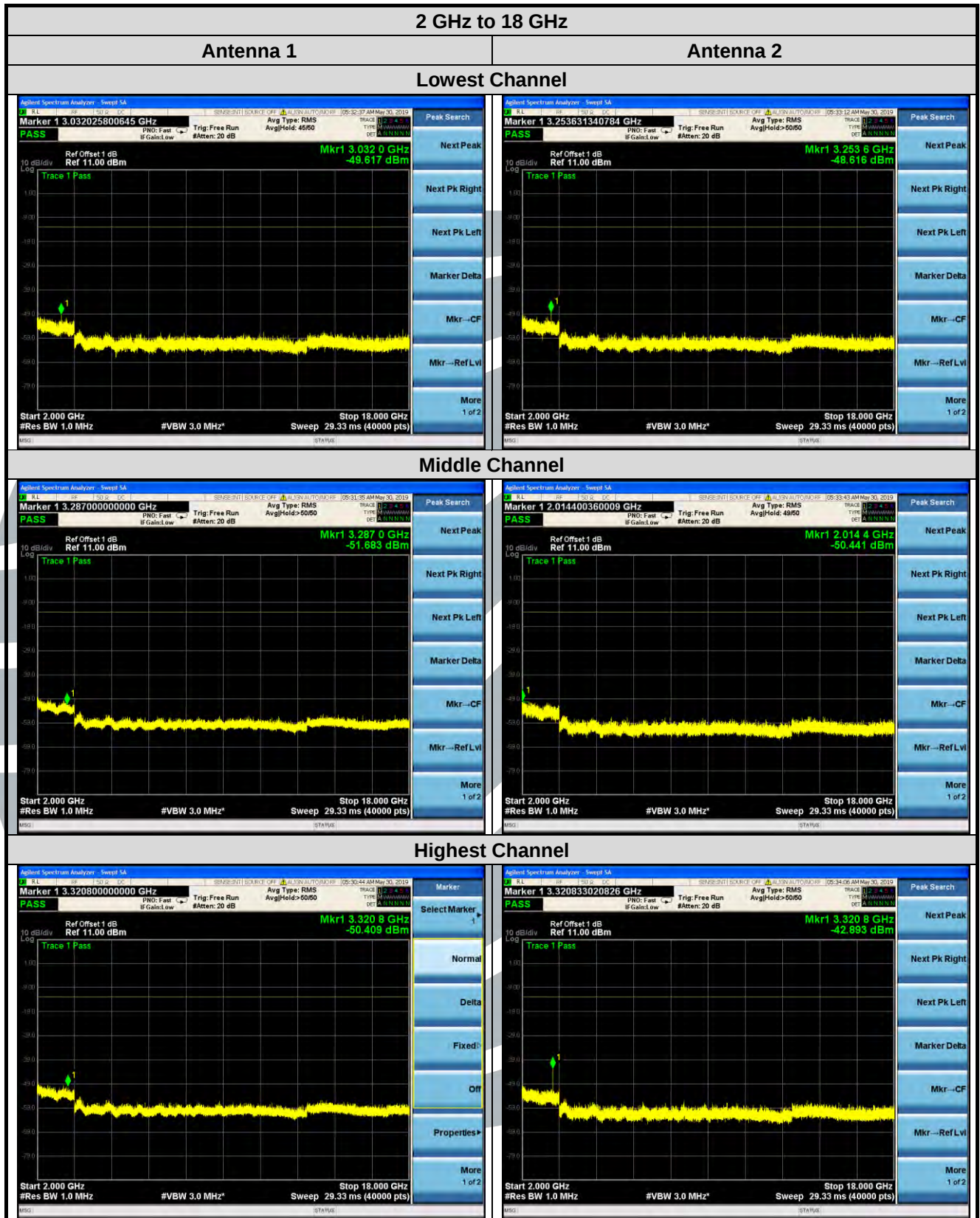
BW: Type 6



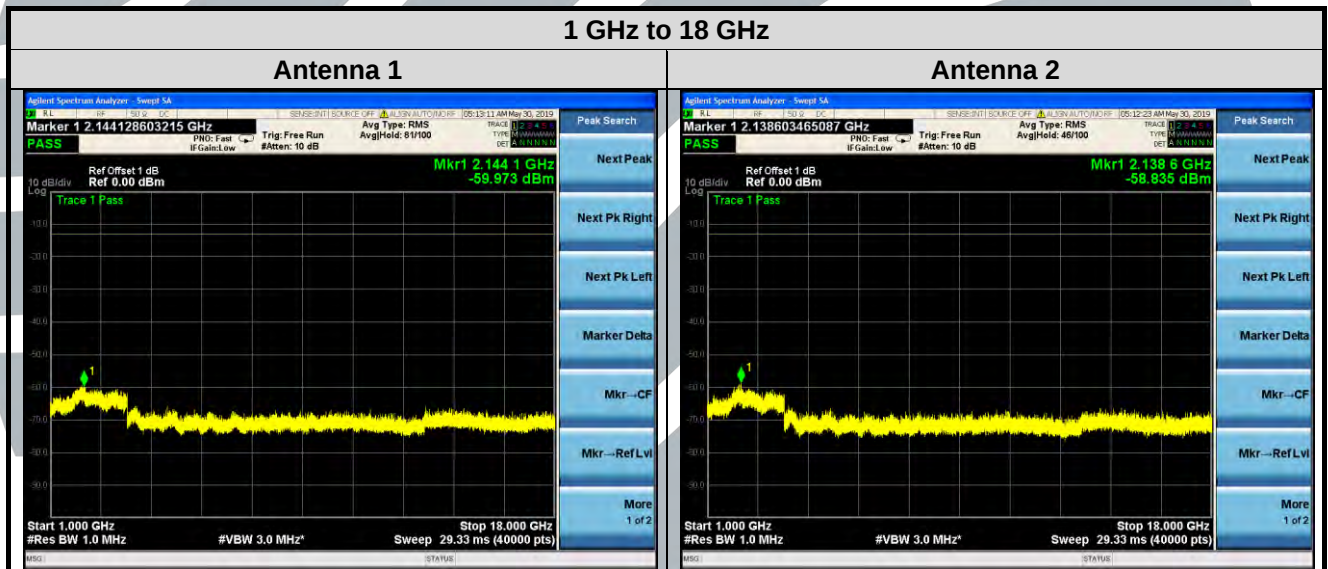
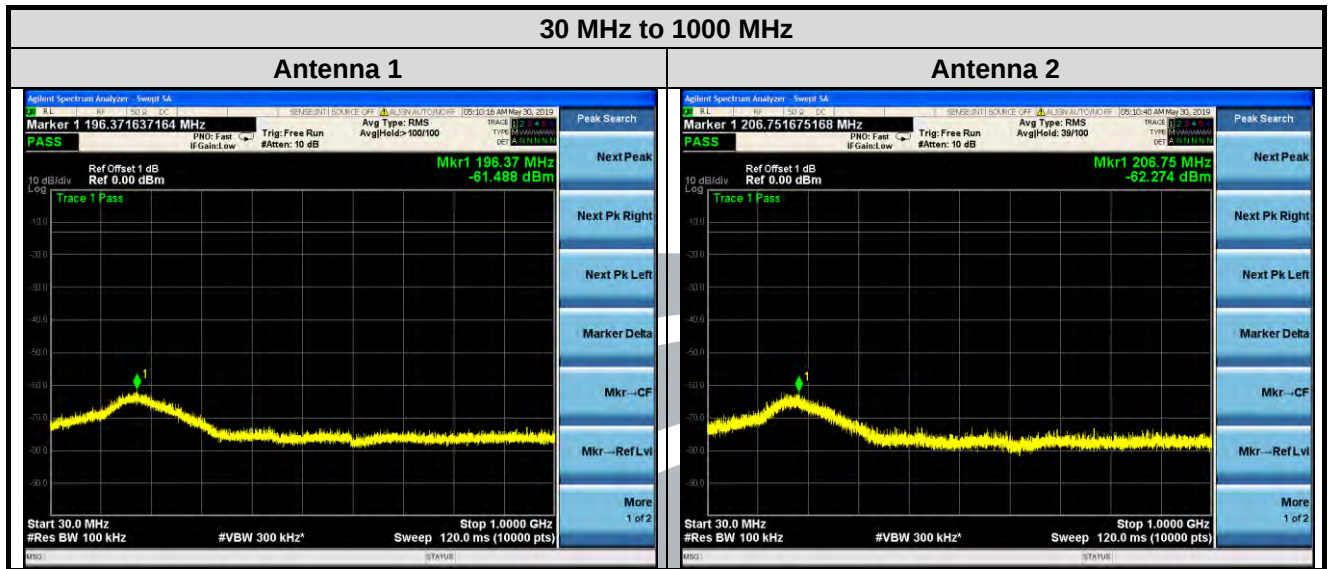
**Spurious emissions outside the bands: Carrier ON**  
**Worst results: Type 1**







**Spurious emissions outside the bands: Carrier OFF**



## 5.5 RADIATED SPURIOUS EMISSIONS

**Test Requirement:** FCC 47 CFR Part 25.202(f)

**Test Method:** ANSI C63.26-2015, clause 5.5

**Limit:**

(1) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: 25 dB;

(2) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: 35 dB;

(3) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 250 percent of the authorized bandwidth: An amount equal to 43 dB plus 10 times the logarithm (to the base 10) of the transmitter power in watts;

(4) In any event, when an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in paragraphs (f) (1), (2) and (3) of this section.

**Test Setup:** Refer to section 4.4.1 for details.

**Instruments Used:** Refer to section 3 for details

**Test Results:** Pass

### Carrier ON, worst results: Type 1

#### Lowest Channel

| No. | Frequency (MHz) | Reading (dBm) | Correction factor (dB) | Result (dBm) | Limit (dBm) | Margin (dB) | Antenna Polaxis |
|-----|-----------------|---------------|------------------------|--------------|-------------|-------------|-----------------|
| 1   | 3253.20         | -57.92        | 11.74                  | -46.18       | -13.00      | -33.18      | Horizontal      |
| 2   | 4879.80         | -61.55        | 15.77                  | -45.78       | -13.00      | -32.78      | Horizontal      |
| 3   | 3253.20         | -36.06        | 13.09                  | -22.97       | -13.00      | -9.97       | Vertical        |
| 4   | 4879.80         | -34.23        | 12.40                  | -21.83       | -13.00      | -8.83       | Vertical        |

#### Middle Channel

| No. | Frequency (MHz) | Reading (dBm) | Correction factor (dB) | Result (dBm) | Limit (dBm) | Margin (dB) | Antenna Polaxis |
|-----|-----------------|---------------|------------------------|--------------|-------------|-------------|-----------------|
| 1   | 3287.00         | -58.61        | 11.86                  | -46.75       | -13.00      | -33.75      | Horizontal      |
| 2   | 4930.50         | -63.95        | 15.81                  | -48.14       | -13.00      | -35.14      | Horizontal      |
| 3   | 3287.00         | -33.88        | 13.18                  | -20.70       | -13.00      | -7.70       | Vertical        |
| 4   | 4930.50         | -35.67        | 16.81                  | -18.86       | -13.00      | -5.86       | Vertical        |

#### Highest Channel

| No. | Frequency (MHz) | Reading (dBm) | Correction factor (dB) | Result (dBm) | Limit (dBm) | Margin (dB) | Antenna Polaxis |
|-----|-----------------|---------------|------------------------|--------------|-------------|-------------|-----------------|
| 1   | 3320.80         | -59.98        | 11.98                  | -48.00       | -13.00      | -35.00      | Horizontal      |
| 2   | 4981.20         | -61.93        | 15.84                  | -46.09       | -13.00      | -33.09      | Horizontal      |
| 3   | 3320.80         | -34.51        | 13.29                  | -21.22       | -13.00      | -8.22       | Vertical        |
| 4   | 4981.20         | -35.21        | 16.84                  | -18.37       | -13.00      | -5.37       | Vertical        |

## 5.6 EQUIVALENT ISOTROPIC RADIATED POWER

**Test Requirement:** FCC 47 CFR Part 25.204

**Test Method:** KDB 971168 D01v03r01, clause 5.2

**Limit:**  
+ 40 dBW in any 4 kHz band for  $\theta \leq 0^\circ$   
+ 40 + 3 $\theta$  dBW in any 4 kHz band for  $0^\circ < \theta \leq 5^\circ$

where  $\theta$  is the angle of elevation of the horizon viewed from the center of radiation of the antenna of the earth station and measured in degrees as positive above the horizontal plane and negative below it.

**Test Setup:** Refer to section 4.4.2 for details.

**Instruments Used:** Refer to section 3 for details

**Test Results:** Pass

| BW     | Channel | EIRP      |           |        |           |           |        | Limit |
|--------|---------|-----------|-----------|--------|-----------|-----------|--------|-------|
|        |         | (dBm)     |           |        | (dBW)     |           |        |       |
|        |         | Antenna 1 | Antenna 2 | Total  | Antenna 1 | Antenna 2 | Total  | (dBW) |
| Type 1 | Lowest  | 43.012    | 45.122    | 47.204 | 13.012    | 15.122    | 17.204 | 40    |
|        | Middle  | 44.420    | 40.627    | 45.935 | 14.420    | 10.627    | 15.935 | 40    |
|        | Highest | 41.930    | 45.869    | 47.342 | 11.930    | 15.869    | 17.342 | 40    |
| Type 2 | Lowest  | 42.217    | 44.503    | 46.519 | 12.217    | 14.503    | 16.519 | 40    |
|        | Middle  | 43.473    | 39.038    | 44.809 | 13.473    | 9.038     | 14.809 | 40    |
|        | Highest | 40.848    | 44.137    | 45.807 | 10.848    | 14.137    | 15.807 | 40    |
| Type 3 | Lowest  | 41.004    | 42.295    | 44.708 | 11.004    | 12.295    | 14.708 | 40    |
|        | Middle  | 41.359    | 37.450    | 42.841 | 11.359    | 7.450     | 12.841 | 40    |
|        | Highest | 39.562    | 42.080    | 44.011 | 9.562     | 12.080    | 14.011 | 40    |
| Type 4 | Lowest  | 40.248    | 41.422    | 43.885 | 10.248    | 11.422    | 13.885 | 40    |
|        | Middle  | 41.868    | 36.553    | 42.988 | 11.868    | 6.553     | 12.988 | 40    |
|        | Highest | 38.773    | 42.454    | 44.003 | 8.773     | 12.454    | 14.003 | 40    |
| Type 5 | Lowest  | 38.012    | 39.502    | 41.831 | 8.012     | 9.502     | 11.831 | 40    |
|        | Middle  | 39.329    | 35.083    | 40.716 | 9.329     | 5.083     | 10.716 | 40    |
|        | Highest | 36.196    | 39.862    | 41.415 | 6.196     | 9.862     | 11.415 | 40    |
| Type 6 | Lowest  | 38.069    | 41.303    | 42.991 | 8.069     | 11.303    | 12.991 | 40    |
|        | Middle  | 38.613    | 34.837    | 40.133 | 8.613     | 4.837     | 10.133 | 40    |
|        | Highest | 36.516    | 41.064    | 42.370 | 6.516     | 11.064    | 12.370 | 40    |

## 5.7 LIMITS ON EMISSIONS FROM MOBILE EARTH STATIONS FOR PROTECTION OF AERONAUTICAL RADIO NAVIGATION-SATELLITE SERVICE

**Test Requirement:** FCC 47 CFR Part 25.216

**Test Method:** ANSI C63.26-2015, clause 5.7

### Limits:

25.216 (c) The e.i.r.p. density of emissions from mobile earth stations placed in service after July 21, 2002 with assigned uplink frequencies between 1610 MHz and 1660.5 MHz shall not exceed -70 dBW/MHz, averaged over any 2 millisecond active transmission interval, in the band 1559-1605 MHz. The e.i.r.p. of discrete emissions of less than 700 Hz bandwidth from such stations shall not exceed -80 dBW, averaged over any 2 millisecond active transmission interval, in the 1559-1605 MHz band.

25.216 (i) The e.i.r.p density of carrier-off state emissions from mobile earth stations manufactured more than six months after Federal Register publication of the rule changes adopted in FCC 03-283 with assigned uplink frequencies between 1 and 3 GHz shall not exceed -80 dBW/MHz in the 1559-1610 MHz band averaged over any two millisecond interval.

**Test Setup:** Refer to section 4.4.2 for details.

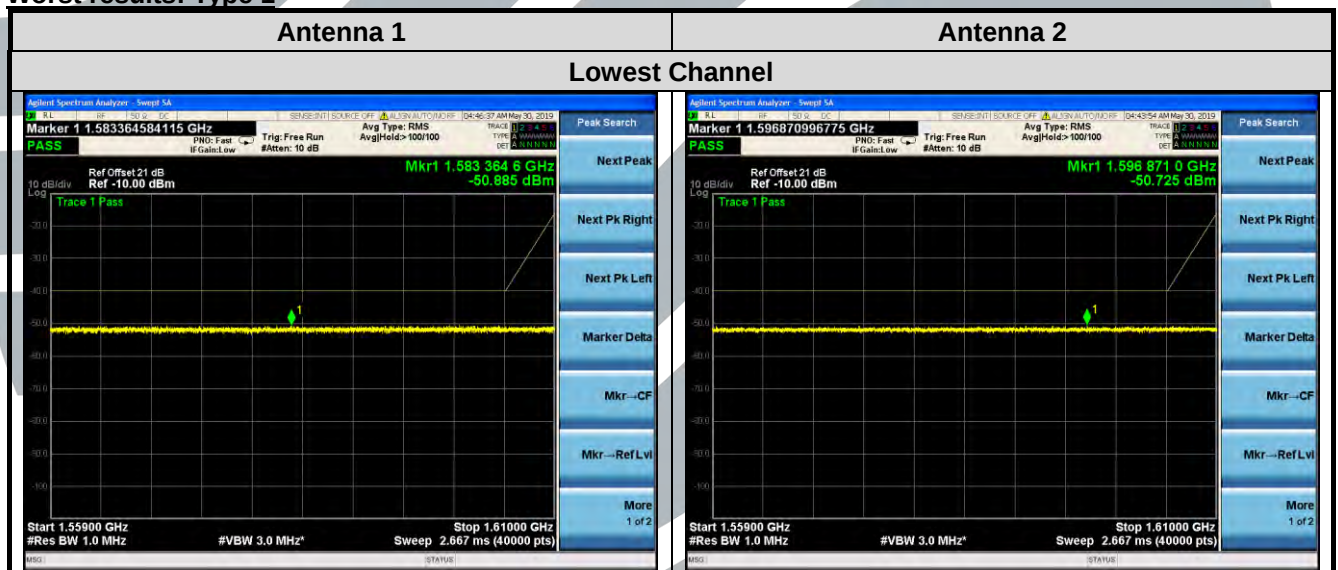
**Equipment Used:** Refer to section 3 for details.

**Test Results:** Pass

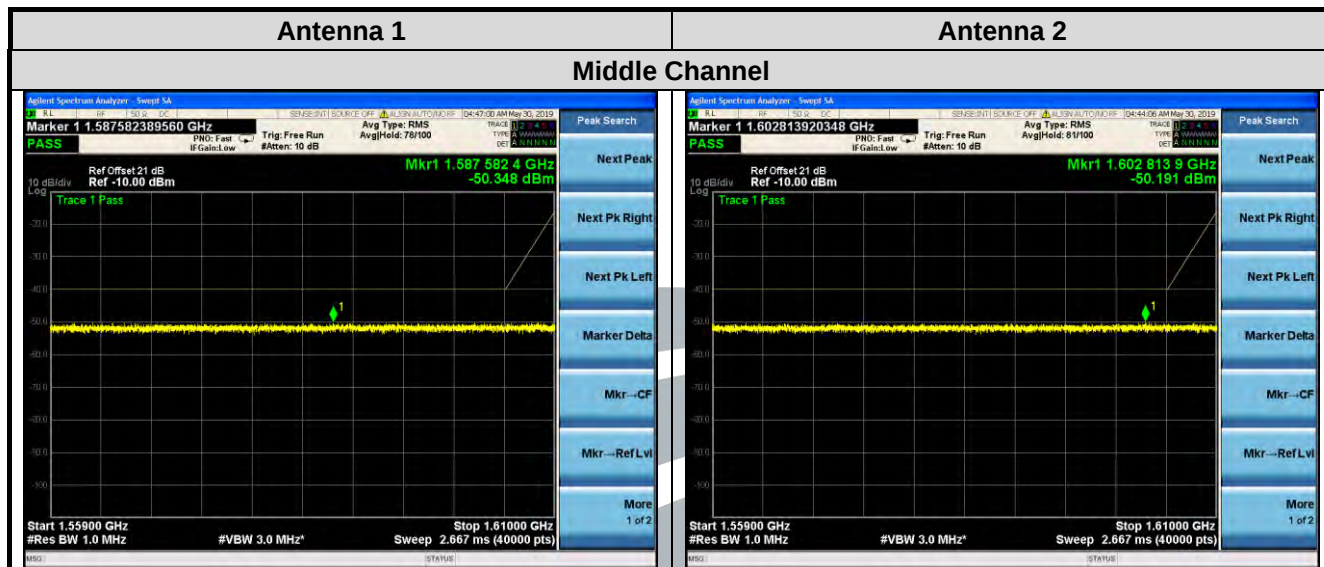
### Broadband Emission Results

#### Carrier ON

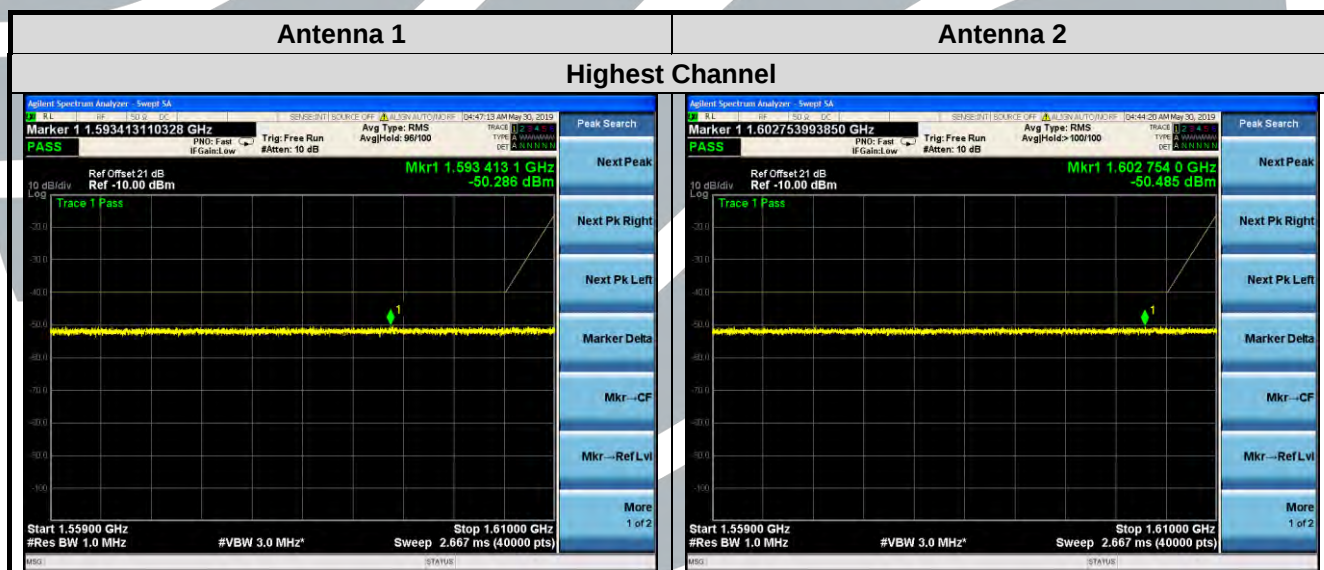
Worst results: Type 1



| No.       | Frequency | Level   |         | Limit |
|-----------|-----------|---------|---------|-------|
|           | (MHz)     | (dBm)   | (dBW)   | (dBW) |
| Antenna 1 | 1583.3646 | -50.885 | -80.885 | -70   |
| Antenna 2 | 1596.8710 | -50.725 | -80.725 | -70   |

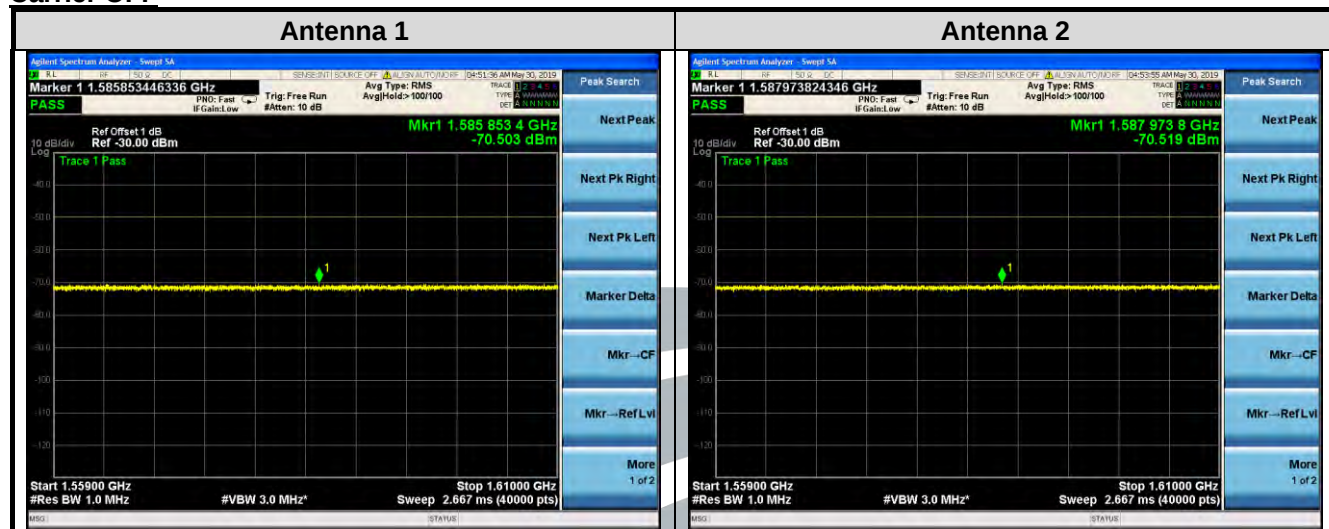


| No.       | Frequency | Level   |         | Limit |
|-----------|-----------|---------|---------|-------|
|           | (MHz)     | (dBm)   | (dBW)   | (dBW) |
| Antenna 1 | 1587.5824 | -50.348 | -80.348 | -70   |
| Antenna 2 | 1602.8139 | -50.191 | -80.191 | -70   |



| No.       | Frequency | Level   |         | Limit |
|-----------|-----------|---------|---------|-------|
|           | (MHz)     | (dBm)   | (dBW)   | (dBW) |
| Antenna 1 | 1593.4131 | -50.286 | -80.286 | -70   |
| Antenna 2 | 1602.7540 | -50.485 | -80.485 | -70   |

# Carrier OFF



| No.       | Frequency | Level   |          | Limit |
|-----------|-----------|---------|----------|-------|
|           | (MHz)     | (dBm)   | (dBW)    | (dBW) |
| Antenna 1 | 1585.8534 | -70.503 | -100.503 | -80   |
| Antenna 2 | 1587.9738 | -70.519 | -100.519 | -80   |

### Discrete Emission Results

#### Carrier ON

| Lowest Channel |           |       |       |         |
|----------------|-----------|-------|-------|---------|
| No.            | Frequency | Level |       | Results |
|                | (MHz)     | (dBm) | (dBW) |         |
| Antenna 1      | *         | *     | *     | Pass    |
| Antenna 2      | *         | *     | *     | Pass    |

| Middle Channel |           |       |       |         |
|----------------|-----------|-------|-------|---------|
| No.            | Frequency | Level |       | Results |
|                | (MHz)     | (dBm) | (dBW) |         |
| Antenna 1      | *         | *     | *     | Pass    |
| Antenna 2      | *         | *     | *     | Pass    |

| Highest Channel |           |       |       |         |
|-----------------|-----------|-------|-------|---------|
| No.             | Frequency | Level |       | Results |
|                 | (MHz)     | (dBm) | (dBW) |         |
| Antenna 1       | *         | *     | *     | Pass    |
| Antenna 2       | *         | *     | *     | Pass    |

\*No emissions were detected within 10 dB of the limit.

#### Carrier OFF

| No.       | Frequency | Level |       | Results |
|-----------|-----------|-------|-------|---------|
|           | (MHz)     | (dBm) | (dBW) |         |
| Antenna 1 | *         | *     | *     | Pass    |
| Antenna 2 | *         | *     | *     | Pass    |

\*No emissions were detected within 10 dB of the limit.

## APPENDIX 1 PHOTOS OF TEST SETUP

See test photos attached in Appendix 1 for the actual connections between Product and support equipment.

## APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal photos.

\*\*\* End of Report \*\*\*

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The test report is effective only with both signature and specialized stamp. The result(s) shown in this report refer only to the sample(s) tested. Without written approval of UnionTrust, this report can't be reproduced except in full.

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