



TEST REPORT

APPLICANT : Linkplay Technology Inc.

PRODUCT NAME : WiiM Pro Plus Hi-Res Audio Streamer

MODEL NAME : ASR003

BRAND NAME : WiiM

FCC ID : 2BABF-ASR003

STANDARD(S) : 47 CFR Part 15 Subpart C

RECEIPT DATE : 2023-06-25

TEST DATE : 2023-07-02 to 2023-07-07

ISSUE DATE : 2023-07-19



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| Change History | | |
|----------------|------------|-------------------|
| Version | Date | Reason for change |
| 1.0 | 2023-07-19 | First edition |
| | | |



1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

| | |
|------------------------------|---|
| Applicant: | Linkplay Technology Inc. |
| Applicant Address: | 8000 Jarvis Avenue Suite #130, Newark, CA 94560 |
| Manufacturer: | Linkplay Technology Inc. |
| Manufacturer Address: | 8000 Jarvis Avenue Suite #130, Newark, CA 94560 |

1.2. Equipment Under Test (EUT) Description

| | | |
|-----------------------------------|--|------------------------------------|
| Product Name: | WiiM Pro Plus Hi-Res Audio Streamer | |
| Sample No.: | 3# | |
| Hardware Version: | Main Board V01+Audio Board V03+Touch Board V04 | |
| Software Version: | Linkplay.4.8.518646 | |
| Equipment Type: | Bluetooth classic | |
| Bluetooth Version: | 5.0 | |
| Modulation Type: | FHSS (GFSK(1Mbps), $\pi/4$ -DQPSK(EDR 2Mbps), 8-DPSK(EDR 3Mbps)) | |
| Operating Frequency Range: | 2402MHz–2480MHz | |
| Antenna Type: | PIFA Antenna | |
| Antenna Gain: | 1.90dBi | |
| Accessory Information: | AC Adapter 1 | |
| | Brand Name: | N/A |
| | Model No.: | MDY-08-EZ |
| | Serial No.: | N/A |
| | Rated Output: | 5V $\overline{=}$ 2A |
| | Rated Input: | 100-240V \sim 50/60Hz, 0.35A |
| | Manufacturer: | Jiangsu Chenyang Electron Co.,Ltd. |



| | | |
|-------------------------------|---------------|---------------------------------------|
| Accessory Information: | AC Adapter 2 | |
| | Brand Name: | N/A |
| | Model No.: | TPA-147A050200UU01 |
| | Serial No.: | N/A |
| | Rated Output: | 5V \pm 2A |
| | Rated Input: | 100-240V \sim 50/60Hz, 0.3A |
| | Manufacturer: | SHENZHEN TIANYIN ELECTRONICS CO.,LTD. |

Note 1: The test results of all conducted test items please refer to the module FCC test report (Report No.: SZ20110203W02, FCC ID: 2ANOG-A98M), which issued on December 18, 2020 by Shenzhen Morlab Communications Technology Co., Ltd. We only recorded the radiated test result in this report.



1.3. The Channel Number and Frequency

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|----------|-----------------|-----------|-----------------|---------|-----------------|-----------|-----------------|
| 0 | 2402 | 20 | 2422 | 40 | 2442 | 60 | 2462 |
| 1 | 2403 | 21 | 2423 | 41 | 2443 | 61 | 2463 |
| 2 | 2404 | 22 | 2424 | 42 | 2444 | 62 | 2464 |
| 3 | 2405 | 23 | 2425 | 43 | 2445 | 63 | 2465 |
| 4 | 2406 | 24 | 2426 | 44 | 2446 | 64 | 2466 |
| 5 | 2407 | 25 | 2427 | 45 | 2447 | 65 | 2467 |
| 6 | 2408 | 26 | 2428 | 46 | 2448 | 66 | 2468 |
| 7 | 2409 | 27 | 2429 | 47 | 2449 | 67 | 2469 |
| 8 | 2410 | 28 | 2430 | 48 | 2450 | 68 | 2470 |
| 9 | 2411 | 29 | 2431 | 49 | 2451 | 69 | 2471 |
| 10 | 2412 | 30 | 2432 | 50 | 2452 | 70 | 2472 |
| 11 | 2413 | 31 | 2433 | 51 | 2453 | 71 | 2473 |
| 12 | 2414 | 32 | 2434 | 52 | 2454 | 72 | 2474 |
| 13 | 2415 | 33 | 2435 | 53 | 2455 | 73 | 2475 |
| 14 | 2416 | 34 | 2436 | 54 | 2456 | 74 | 2476 |
| 15 | 2417 | 35 | 2437 | 55 | 2457 | 75 | 2477 |
| 16 | 2418 | 36 | 2438 | 56 | 2458 | 76 | 2478 |
| 17 | 2419 | 37 | 2439 | 57 | 2459 | 77 | 2479 |
| 18 | 2420 | 38 | 2440 | 58 | 2460 | 78 | 2480 |
| 19 | 2421 | 39 | 2441 | 59 | 2461 | | |

Note 1: The black bold channels were selected for test.



1.4. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart C for the EUT FCC ID Certification:

| No. | Identity | Document Title |
|-----|----------------|-------------------------|
| 1 | 47 CFR Part 15 | Radio Frequency Devices |

Test detailed items/section required by FCC rules and results are as below:

| No. | Section | Description | Test Date | Test Engineer | Result | Method Determination /Remark |
|-----|------------------------|--|---------------|----------------------|--------|------------------------------|
| 1 | 15.203 | Antenna Requirement | N/A | N/A _{Note1} | N/A | N/A |
| 2 | 15.247(a) 15.247(h) | Hopping Mechanism | N/A | N/A _{Note1} | N/A | N/A |
| 3 | 15.247(a) | Number of Hopping Frequency | N/A | N/A _{Note1} | N/A | N/A |
| 4 | ANSI C63.10 | Duty Cycle | N/A | N/A _{Note1} | N/A | N/A |
| 5 | 15.247(b) | Maximum Peak Conducted Output Power | N/A | N/A _{Note1} | N/A | N/A |
| 6 | 15.247(b) | Maximum Average Conducted Output Power | N/A | N/A _{Note1} | N/A | N/A |
| 7 | 15.247(a) | 20dB Bandwidth | N/A | N/A _{Note1} | N/A | N/A |
| 8 | 15.247(a) | Carrier Frequency Separation | N/A | N/A _{Note1} | N/A | N/A |
| 9 | 15.247(a) | Time of Occupancy (Dwell time) | N/A | N/A _{Note1} | N/A | N/A |
| 10 | 15.247(d) | Conducted Spurious Emission | N/A | N/A _{Note1} | N/A | N/A |
| 11 | 15.207 | Conducted Emission | Jul. 03, 2023 | Fan Zehang | PASS | No deviation |
| 12 | 15.247(d) | Restricted Frequency Bands | Jul. 01, 2023 | Gao Jianrou | PASS | No deviation |
| 13 | 15.209, 15.247(d) | Radiated Emission | Jul. 02, 2023 | Gao Jianrou | PASS | No deviation |



Note 1: The test results of all conducted test items please refer to the module FCC test report (Report No.: SZ20110203W02, FCC ID: 2ANOG-A98M), which issued on December 18, 2020 by Shenzhen Morlab Communications Technology Co., Ltd.

Note 2: The tests were performed according to the method of measurements prescribed in ANSI C63.10-2013, KDB558074 D01 v05r02 and DA 00-075.

Note 3: Additions to, deviation, or exclusions from the method shall be judged in the "method determination" column of add, deviate or exclude from the specific method shall be explained in the "Remark" of the above table.

Note 4: When the test result is a critical value, we will use the measurement uncertainty give the judgment result based on the 95% confidence intervals.

1.5. Environmental Conditions

During the measurement, the environmental conditions were within the listed ranges:

| | |
|-----------------------------|--------|
| Temperature (°C): | 15-35 |
| Relative Humidity (%): | 30-60 |
| Atmospheric Pressure (kPa): | 86-106 |

2.47 CFR Part 15C Requirements

2.1. Conducted Emission

2.1.1. Requirement

According to FCC section 15.207, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network (LISN).

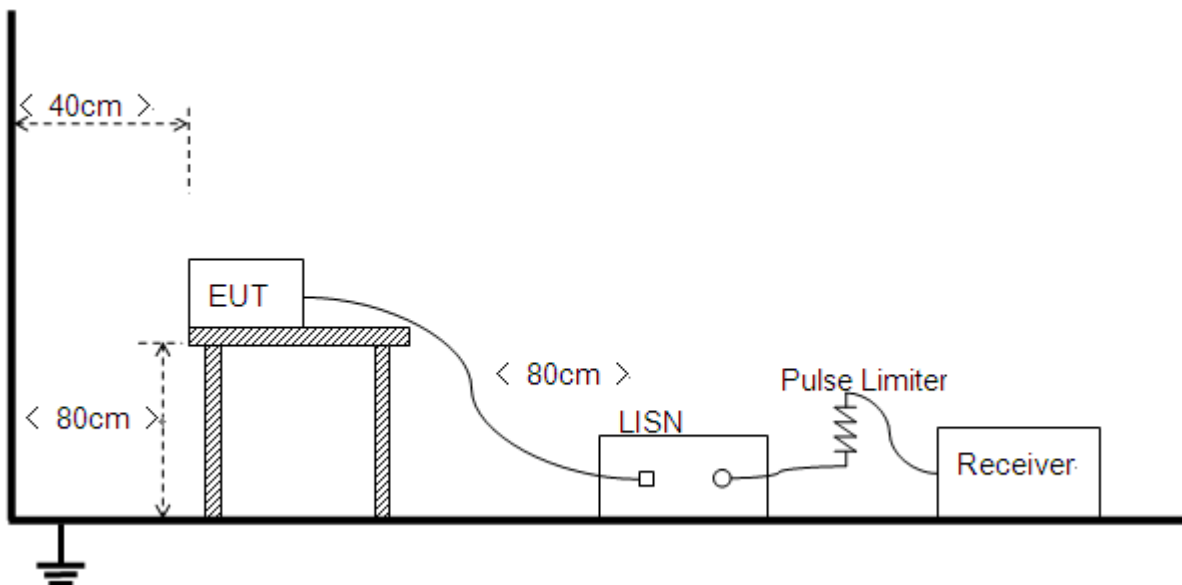
| Frequency Range (MHz) | Conducted Limit (dBμV) | |
|-----------------------|------------------------|----------|
| | Quai-peak | Average |
| 0.15 - 0.50 | 66 to 56 | 56 to 46 |
| 0.50 - 5 | 56 | 46 |
| 5- 30 | 60 | 50 |

Note:

- (a) The lower limit shall apply at the band edges.
- (b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

2.1.2. Test Description

Test Setup:



The Table-top EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference



Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.10: 2013.

2.1.3. Test Result

The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Set RBW=9kHz, VBW=30kHz. Refer to recorded points and plots below.

Note: Both of the test voltage AC 120V/60Hz and AC 230V/50Hz were considered and tested respectively, only the results of the worst case AC 120V/60Hz were recorded in this report.

A. Test Setup:

Test Mode: EUT + Adapter + USB cable + BT TX

Test Voltage: AC 120V/60Hz

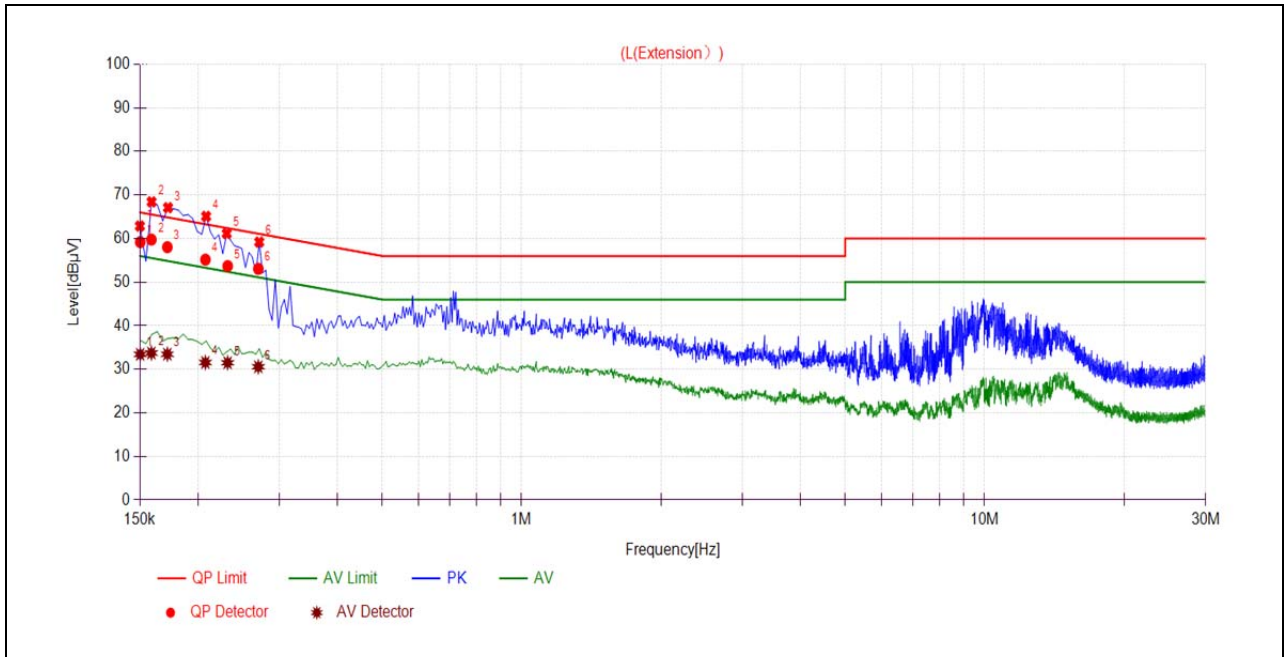
The measurement results are obtained as below:

$$E \text{ [dB}\mu\text{V]} = U_R + L_{\text{Cable loss}} \text{ [dB]} + A_{\text{Factor}}$$

U_R : Receiver Reading

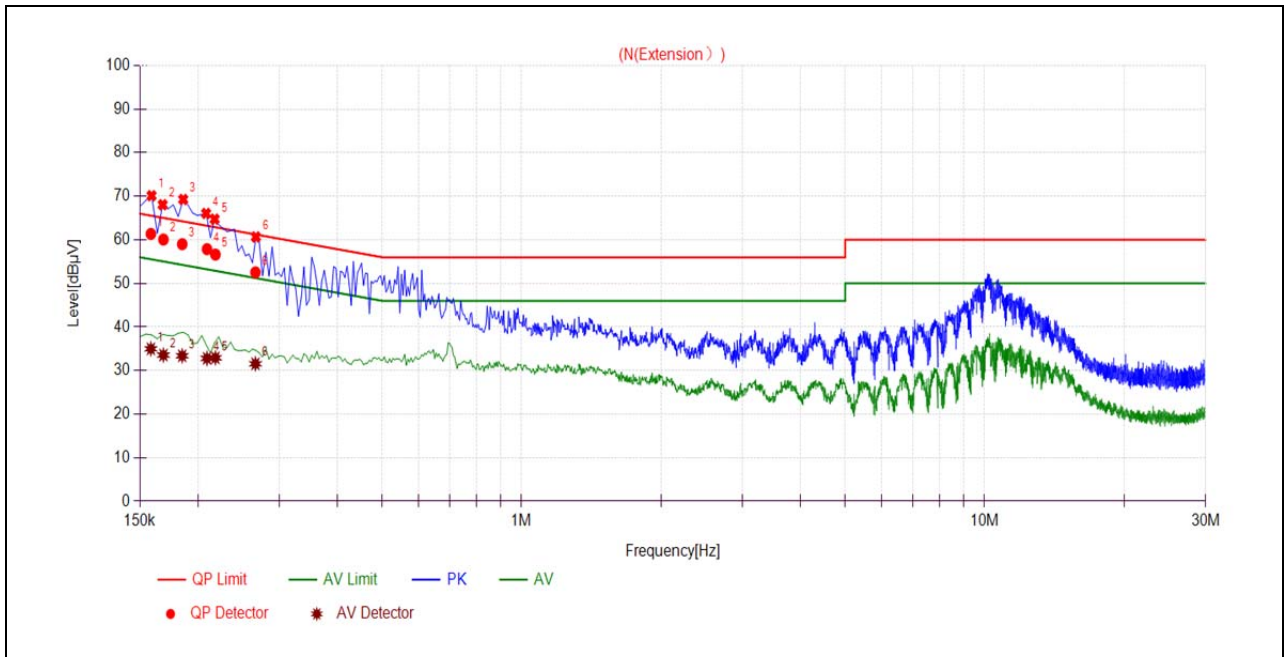
A_{Factor} : Voltage division factor of LISN

B. Test Plot:



(L Phase)

| No. | Fre. (MHz) | Emission Level (dBµV) | | Limit (dBµV) | | Power-line | Verdict |
|-----|------------|-----------------------|---------|--------------|---------|------------|---------|
| | | Quai-peak | Average | Quai-peak | Average | | |
| 1 | 0.1502 | 59.18 | 33.43 | 65.99 | 55.99 | Line | PASS |
| 2 | 0.1588 | 59.77 | 33.72 | 65.52 | 55.52 | | PASS |
| 3 | 0.1719 | 58.02 | 33.46 | 64.87 | 54.87 | | PASS |
| 4 | 0.2077 | 55.16 | 31.56 | 63.30 | 53.30 | | PASS |
| 5 | 0.2320 | 53.69 | 31.49 | 62.38 | 52.38 | | PASS |
| 6 | 0.2702 | 53.06 | 30.57 | 61.11 | 51.11 | | PASS |



(N Phase)

| No. | Fre. (MHz) | Emission Level (dBµV) | | Limit (dBµV) | | Power-line | Verdict |
|-----|------------|-----------------------|---------|--------------|---------|------------|---------|
| | | Quai-peak | Average | Quai-peak | Average | | |
| 1 | 0.1584 | 61.36 | 34.98 | 65.54 | 55.54 | Neutral | PASS |
| 2 | 0.1686 | 60.08 | 33.55 | 65.03 | 55.03 | | PASS |
| 3 | 0.1851 | 59.00 | 33.38 | 64.25 | 54.25 | | PASS |
| 4 | 0.2094 | 57.87 | 32.79 | 63.23 | 53.23 | | PASS |
| 5 | 0.2183 | 56.63 | 32.92 | 62.88 | 52.88 | | PASS |
| 6 | 0.2664 | 52.53 | 31.55 | 61.23 | 51.23 | | PASS |

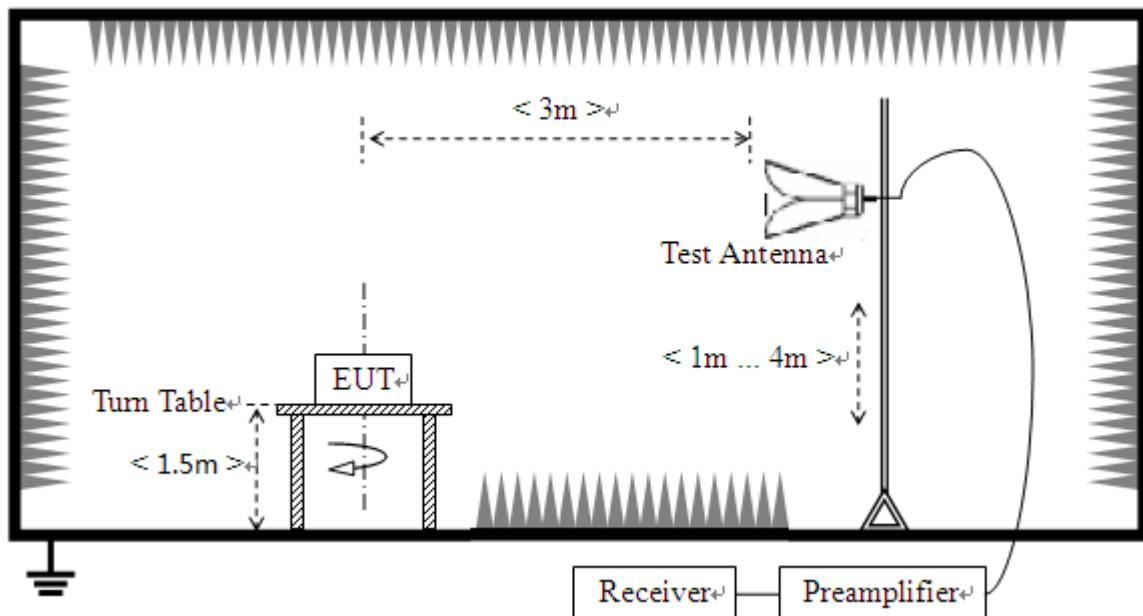
2.2. Restricted Frequency Bands

2.2.1. Requirement

According to FCC section 15.247(d), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, In addition, radiated emissions which fall in the restricted bands, as defined in 15.205(a), must also comply with the radiated emission limits specified in 15.209(a).

2.2.2. Test Description

Test Setup:



The EUT is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading.

For the Test Antenna:

Horn Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.



2.2.3. Test Procedure

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for $f \geq 1\text{GHz}$, 100 kHz for $f < 1\text{GHz}$

VBW = 3 MHz

Sweep = auto

Detector function = peak/average

Trace = max hold

Allow the trace to stabilize

2.2.4. Test Result

The lowest and highest channels are tested to verify Restricted Frequency Bands.

The measurement results are obtained as below:

$$E \text{ [dB}\mu\text{V/m]} = U_R + A_T + A_{\text{Factor}} \text{ [dB]}; A_T = L_{\text{Cable loss}} \text{ [dB]} - G_{\text{preamp}} \text{ [dB]}$$

AT: Total correction Factor except Antenna

UR: Receiver Reading

G_{preamp} : Preamplifier Gain

A_{Factor} : Antenna Factor at 3m

Note: Restricted Frequency Bands were performed when antenna was at vertical and horizontal polarity, and only the worse test condition (vertical) was recorded in this test report.

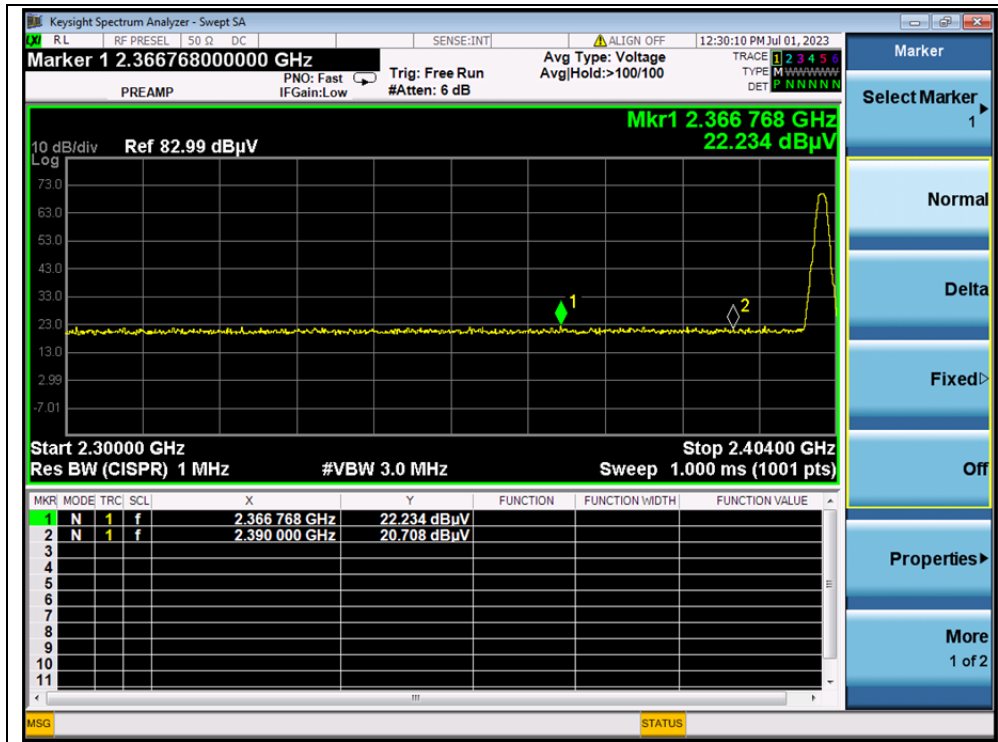
GFSK Mode

A. Test Verdict:

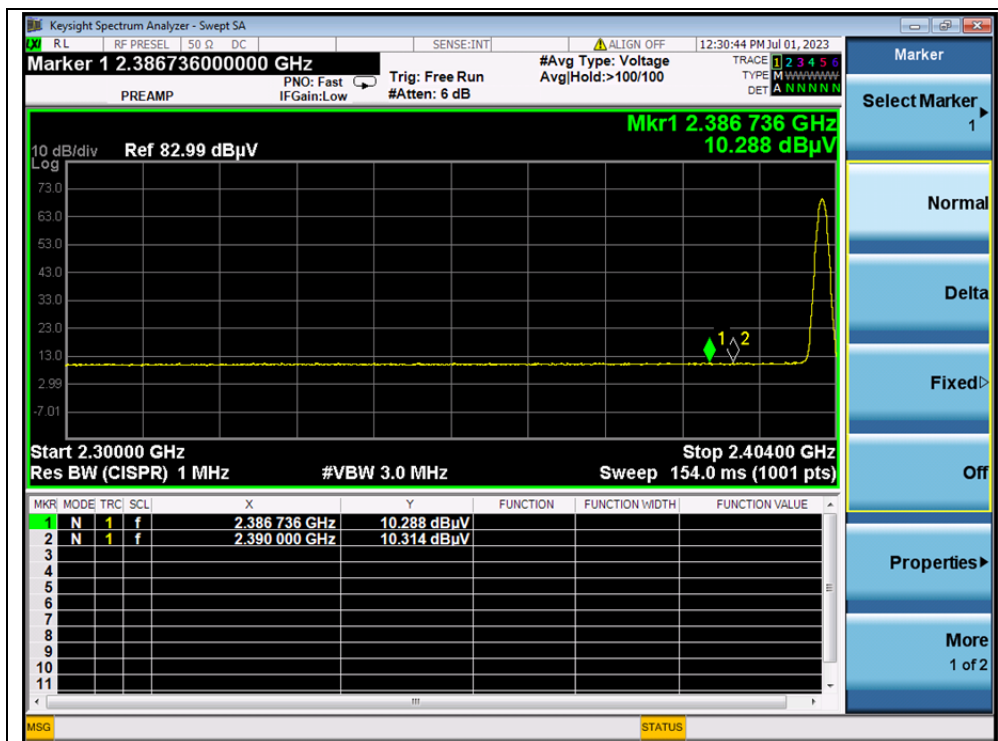
| Channel | Frequency (MHz) | Detector | Receiver Reading U_R (dB μ V) | A_T (dB) | A_{Factor} (dB@3m) | Max. Emission E (dB μ V/m) | Limit (dB μ V/m) | Verdict |
|---------|-----------------|----------|-------------------------------------|------------|-----------------------------|--------------------------------|----------------------|---------|
| | | PK/ AV | | | | | | |
| 0 | 2366.77 | PK | 22.23 | 6.74 | 27.20 | 56.17 | 74 | PASS |
| 0 | 2390.00 | AV | 10.31 | 6.74 | 27.20 | 44.25 | 54 | PASS |
| 78 | 2484.05 | PK | 21.81 | 6.74 | 27.20 | 55.75 | 74 | PASS |
| 78 | 2483.61 | AV | 11.68 | 6.74 | 27.20 | 45.62 | 54 | PASS |



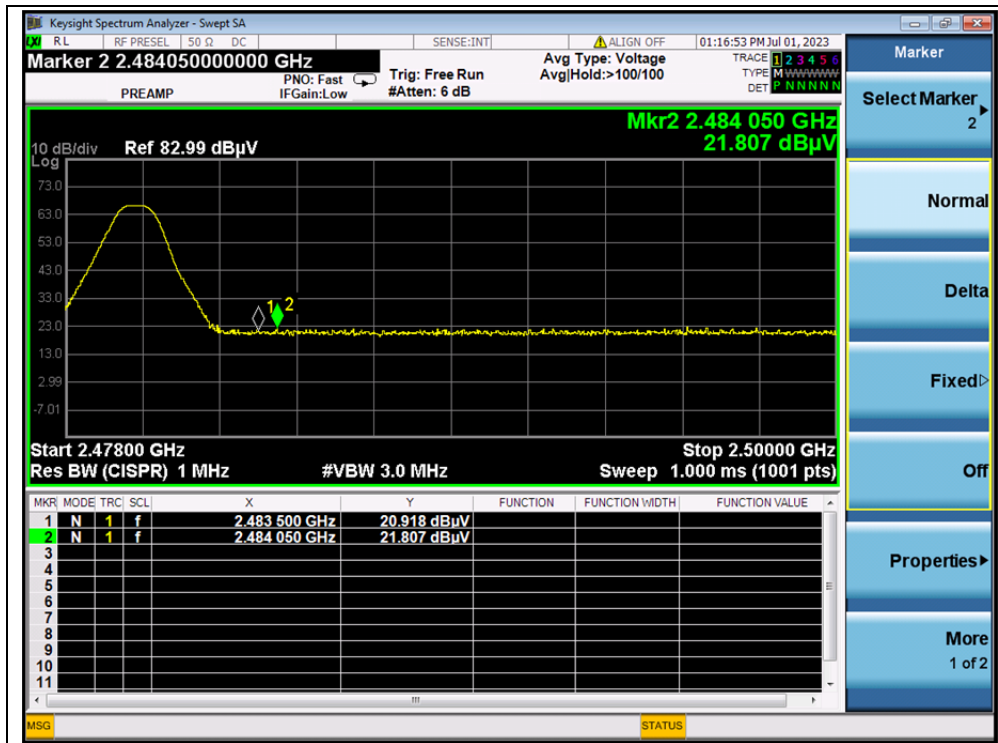
B. Test Plot:



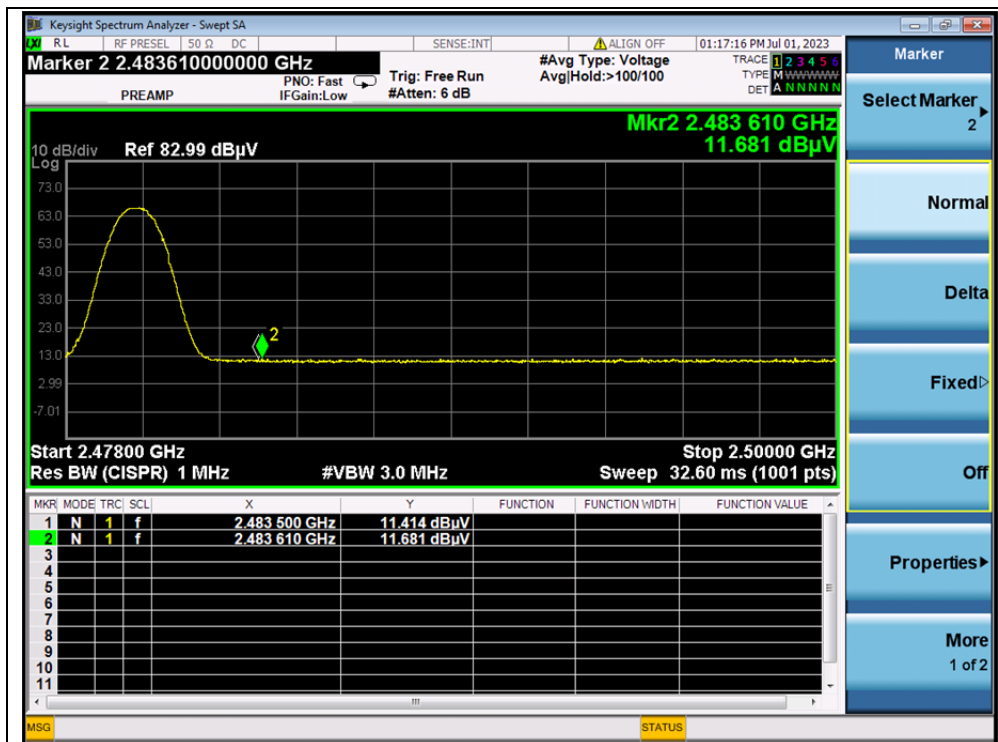
(PEAK, Channel 0, GFSK)



(AVERAGE, Channel 0, GFSK)



(PEAK, Channel 78, GFSK)



(AVERAGE, Channel 78, GFSK)

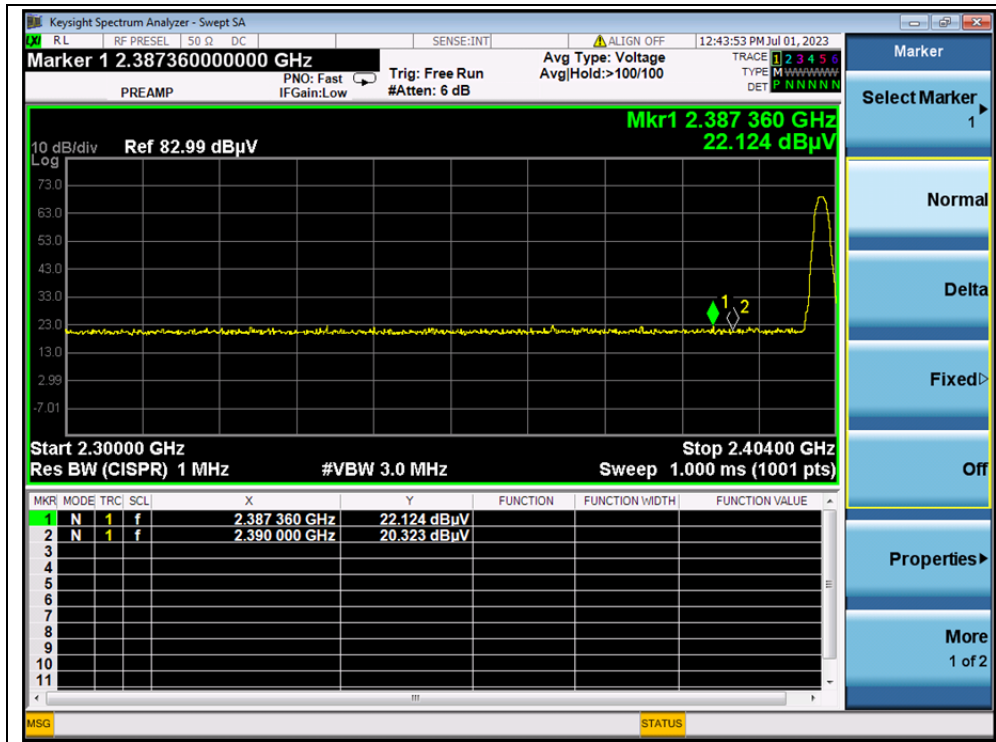


$\pi/4$ -DQPSK Mode

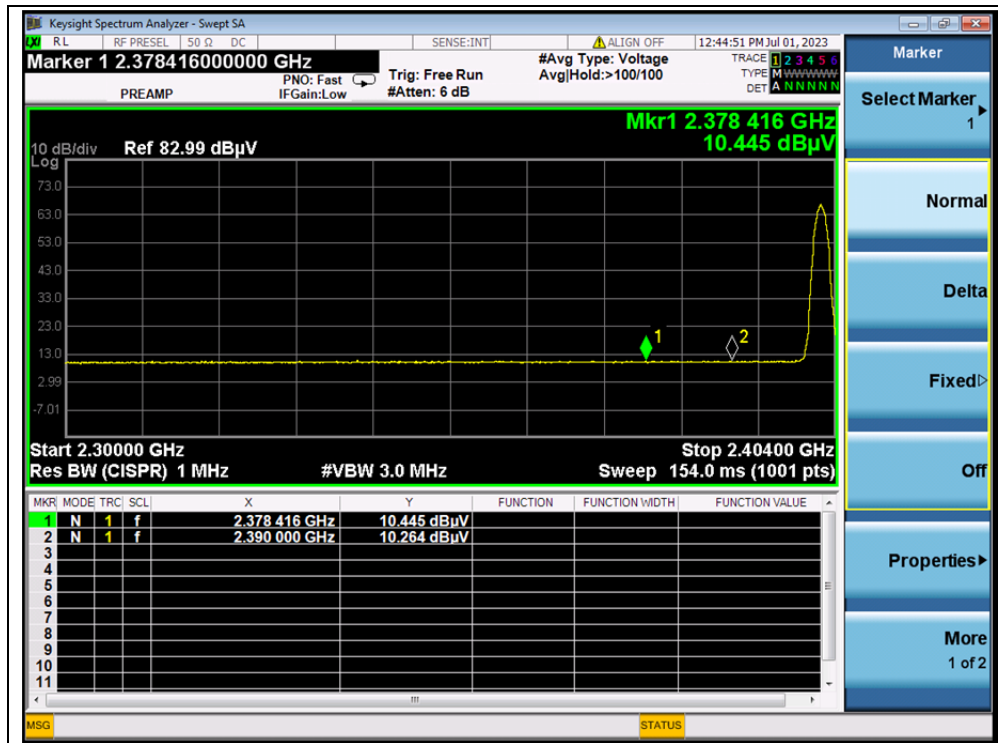
A. Test Verdict:

| Channel | Frequency (MHz) | Detector | Receiver Reading | A _T (dB) | A _{Factor} (dB@3m) | Max. Emission E (dBμV/m) | Limit (dBμV/m) | Verdict |
|---------|-----------------|----------|-----------------------|---------------------|-----------------------------|--------------------------|----------------|---------|
| | | PK/ AV | U _R (dBμV) | | | | | |
| 0 | 2387.36 | PK | 22.12 | 6.74 | 27.20 | 56.06 | 74 | PASS |
| 0 | 2378.42 | AV | 10.45 | 6.74 | 27.20 | 44.39 | 54 | PASS |
| 78 | 2492.74 | PK | 22.59 | 6.74 | 27.20 | 56.53 | 74 | PASS |
| 78 | 2487.59 | AV | 12.13 | 6.74 | 27.20 | 46.07 | 54 | PASS |

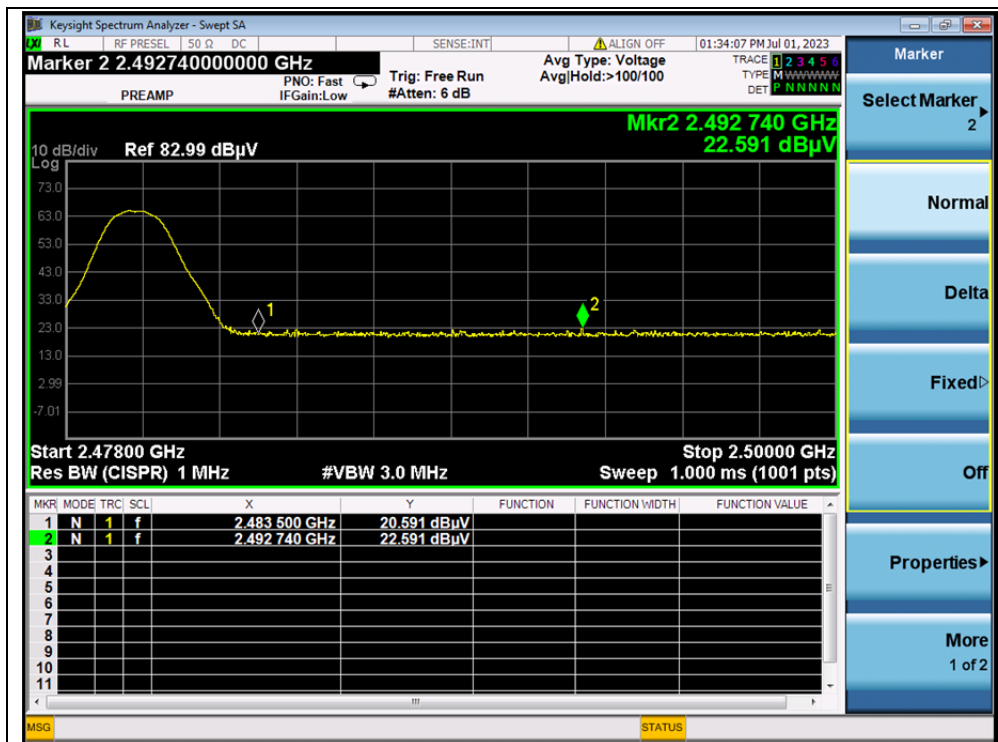
B. Test Plot:



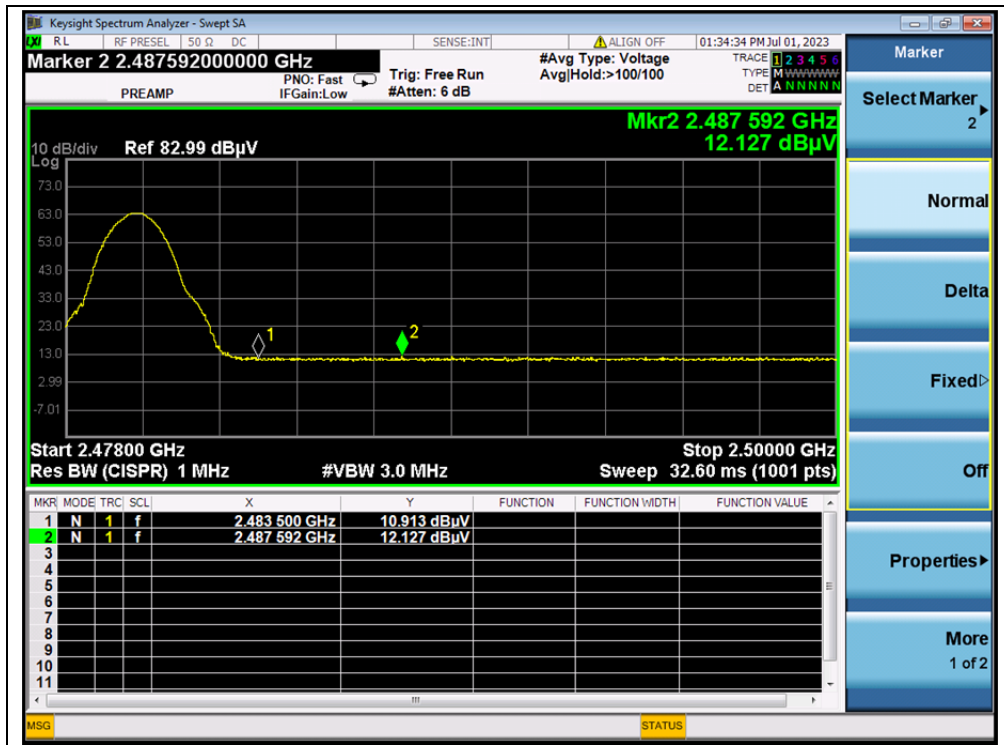
(PEAK, Channel 0, $\pi/4$ -DQPSK)



(AVERAGE, Channel 0, $\pi/4$ -DQPSK)



(PEAK, Channel 78, $\pi/4$ -DQPSK)



(AVERAGE, Channel 78, π/4-DQPSK)

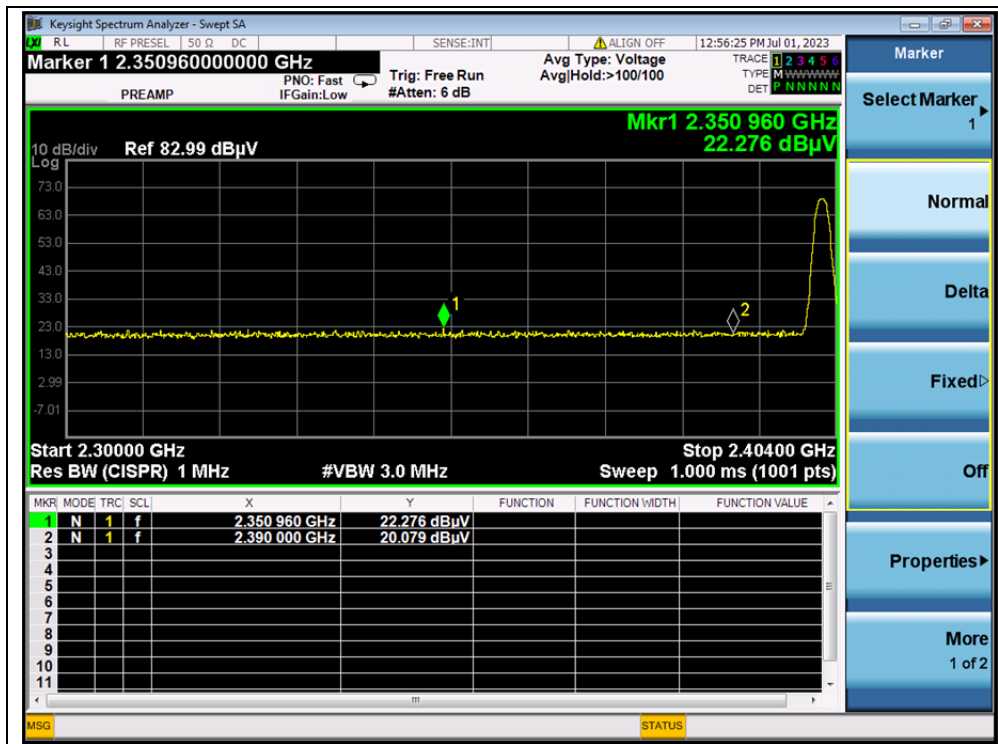


8-DPSK Mode

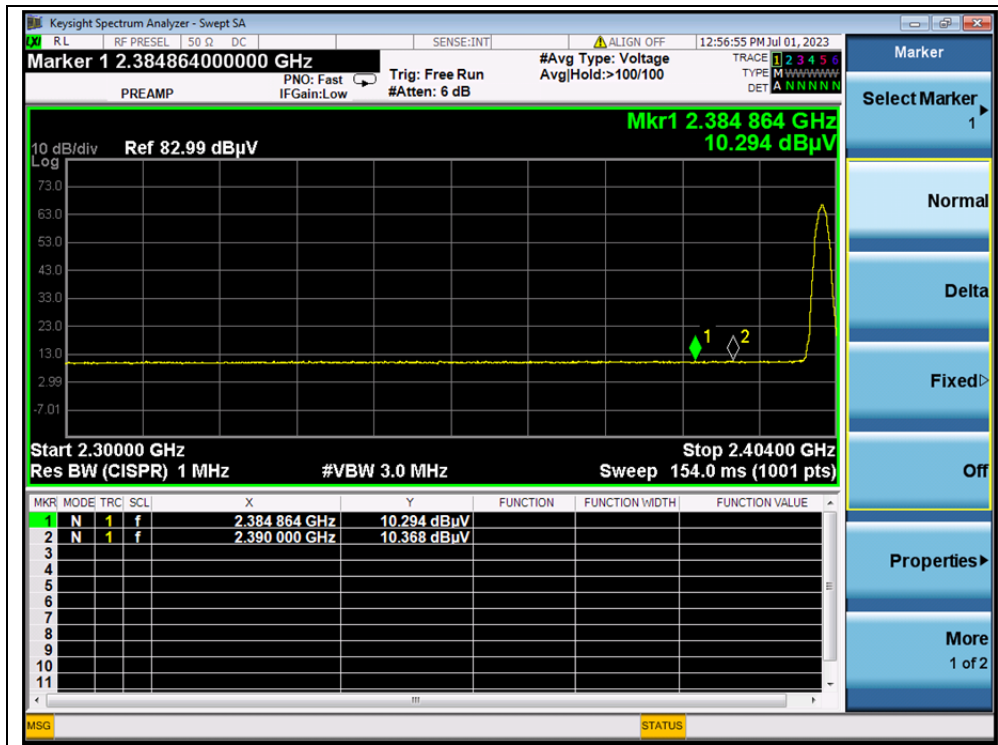
A. Test Verdict:

| Channel | Frequency (MHz) | Detector | Receiver Reading | A _T (dB) | A _{Factor} (dB@3m) | Max. Emission E (dBμV/m) | Limit (dBμV/m) | Verdict |
|---------|-----------------|----------|-----------------------|---------------------|-----------------------------|--------------------------|----------------|---------|
| | | PK/ AV | U _R (dBμV) | | | | | |
| 0 | 2350.96 | PK | 22.28 | 6.74 | 27.20 | 56.22 | 74 | PASS |
| 0 | 2390.00 | AV | 10.37 | 6.74 | 27.20 | 44.31 | 54 | PASS |
| 78 | 2483.74 | PK | 22.17 | 6.74 | 27.20 | 56.11 | 74 | PASS |
| 78 | 2490.85 | AV | 11.68 | 6.74 | 27.20 | 45.62 | 54 | PASS |

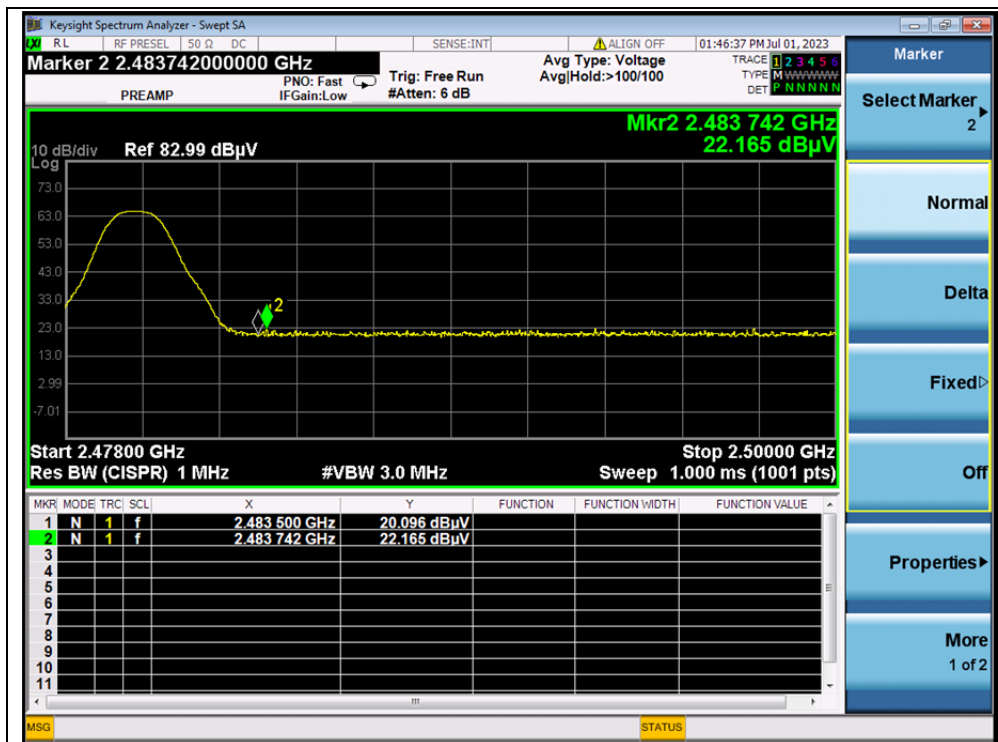
B. Test Plot:



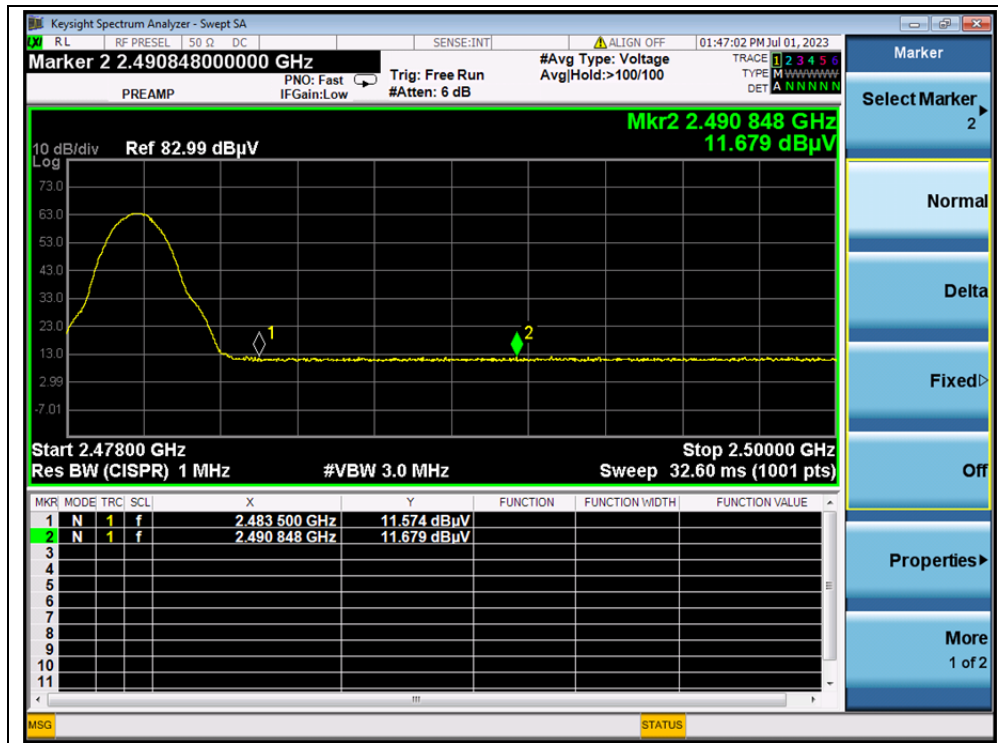
(PEAK, Channel 0, 8-DPSK)



(AVERAGE, Channel 0, 8-DPSK)



(PEAK, Channel 78, 8-DPSK)



(AVERAGE, Channel 78, 8-DPSK)

2.3. Radiated Emission

2.3.1. Requirement

According to FCC section 15.247(d), radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency (MHz) | Field Strength ($\mu\text{V}/\text{m}$) | Measurement Distance (m) |
|-----------------|---|--------------------------|
| 0.009 - 0.490 | 2400/F(kHz) | 300 |
| 0.490 - 1.705 | 24000/F(kHz) | 30 |
| 1.705 - 30.0 | 30 | 30 |
| 30 - 88 | 100 | 3 |
| 88 - 216 | 150 | 3 |
| 216 - 960 | 200 | 3 |
| Above 960 | 500 | 3 |

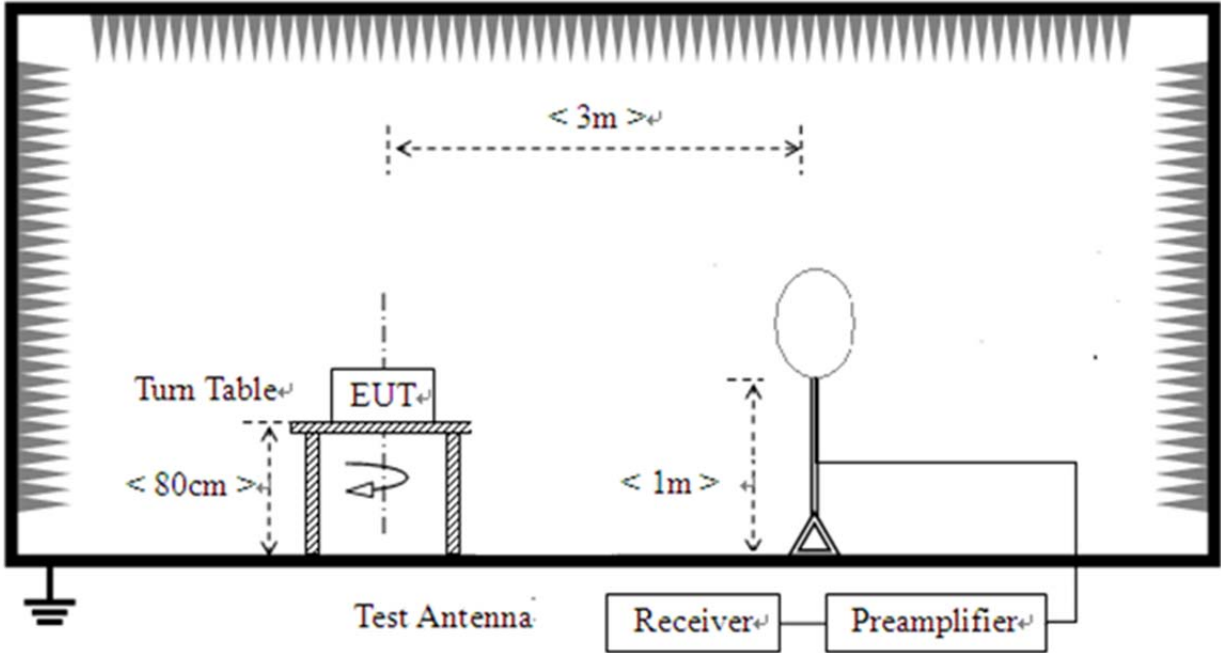
Note1: For above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.

Note2: For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK). In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table).

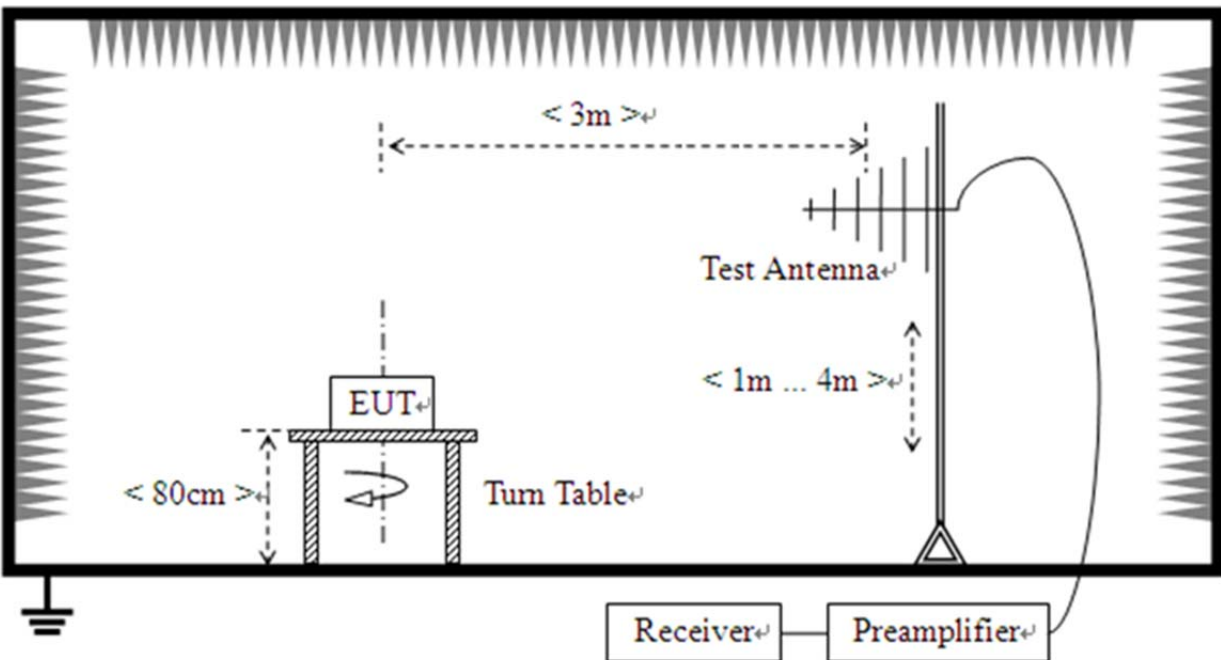
2.3.2. Test Description

Test Setup:

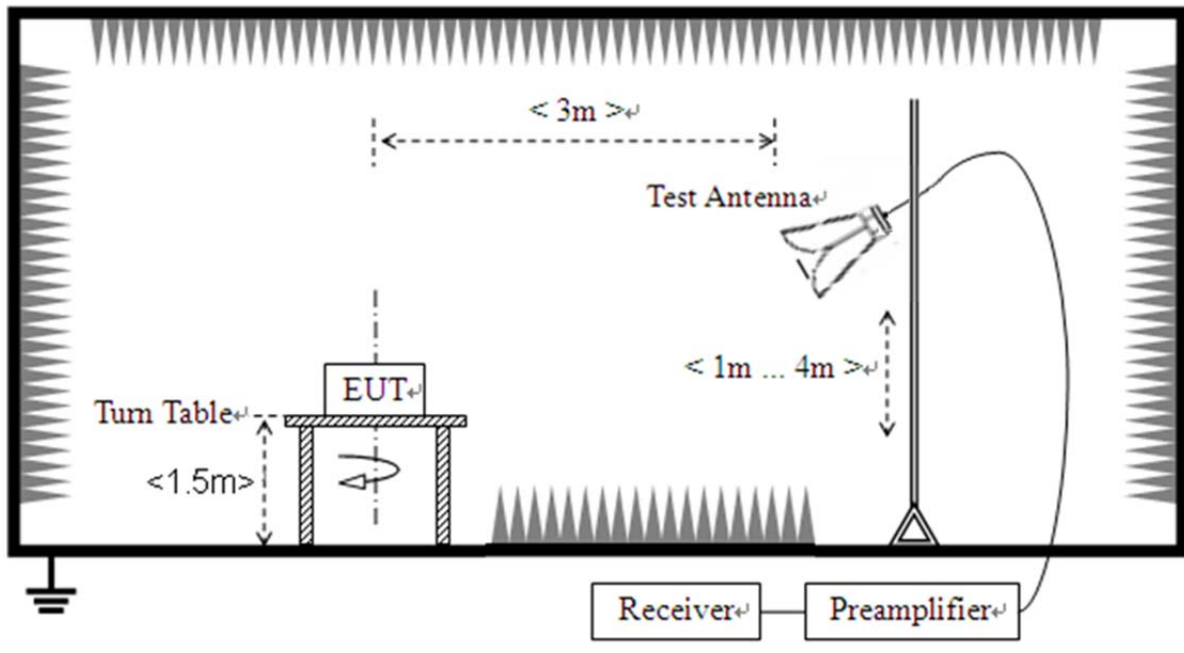
1) For radiated emissions from 9kHz to 30MHz



2) For radiated emissions from 30MHz to 1GHz



3) For radiated emissions above 1GHz



The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 30MHz, the emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9kHz-90 kHz, 110kHz-490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.

For measurements below 1GHz the resolution bandwidth is set to 100kHz for peak detection measurements or 120kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1GHz the resolution bandwidth is set to 1MHz, the video band width is set to 3MHz for peak measurements and as applicable for average measurements.

The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions. For measurements above 1 GHz, keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response.



2.3.3. Test Result

According to ANSI C63.10, because of peak detection will yield amplitudes equal to or greater than amplitudes measured with the quasi-peak (or average) detector, the measurement data from a spectrum analyzer peak detector will represent the worst-case results, if the peak measured value complies with the quasi-peak (or average) limit, it is unnecessary to perform an quasi-peak measurement (or average).

The measurement results are obtained as below:

$$E \text{ [dB}\mu\text{V/m]} = U_R + A_T + A_{\text{Factor}} \text{ [dB]}; A_T = L_{\text{Cable loss}} \text{ [dB]} - G_{\text{preamp}} \text{ [dB]}$$

A_T : Total correction Factor except Antenna

U_R : Receiver Reading

G_{preamp} : Preamplifier Gain

A_{Factor} : Antenna Factor at 3m

During the test, the total correction Factor A_T and A_{Factor} were built in test software.

Note 1: All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

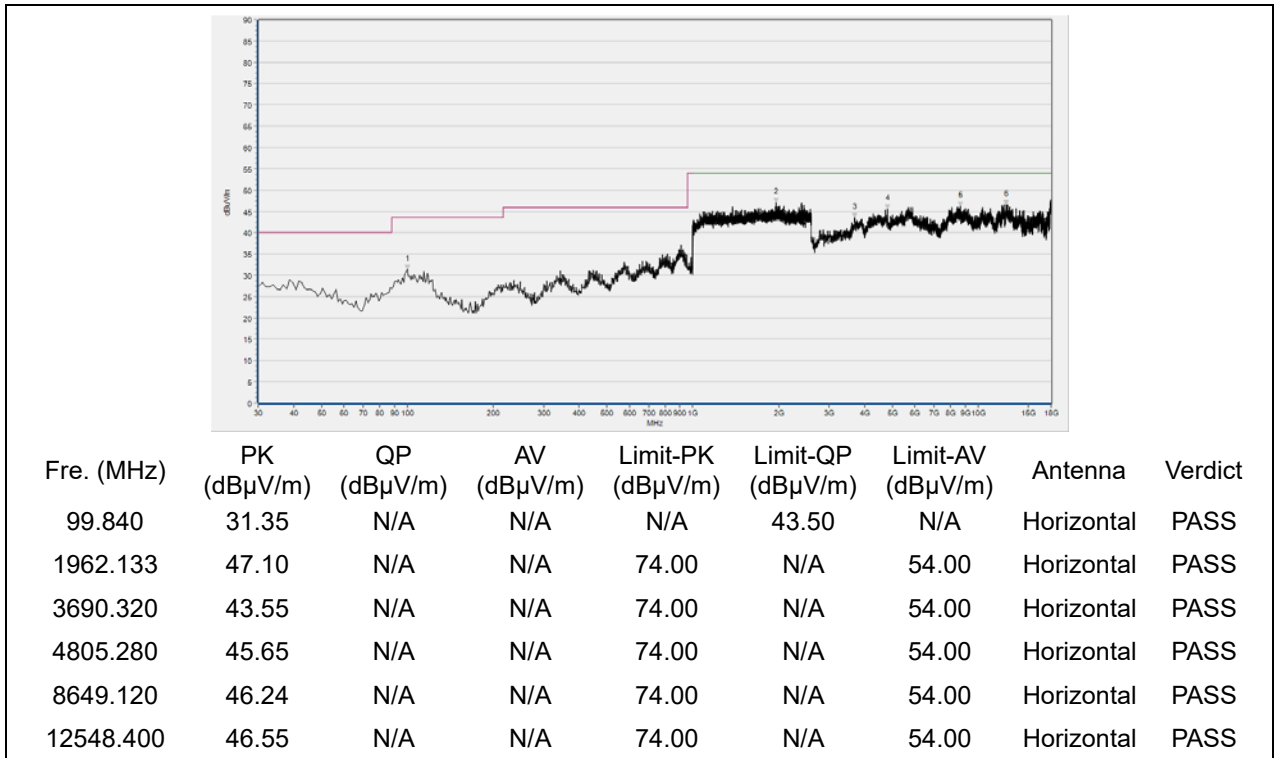
Note 2: For the frequency, which started from 9kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit was not recorded.

Note3: For the frequency, which started from 18GHz to 10th harmonic of the highest frequency, was pre-scanned and the result which was 20dB lower than the limit was not recorded.

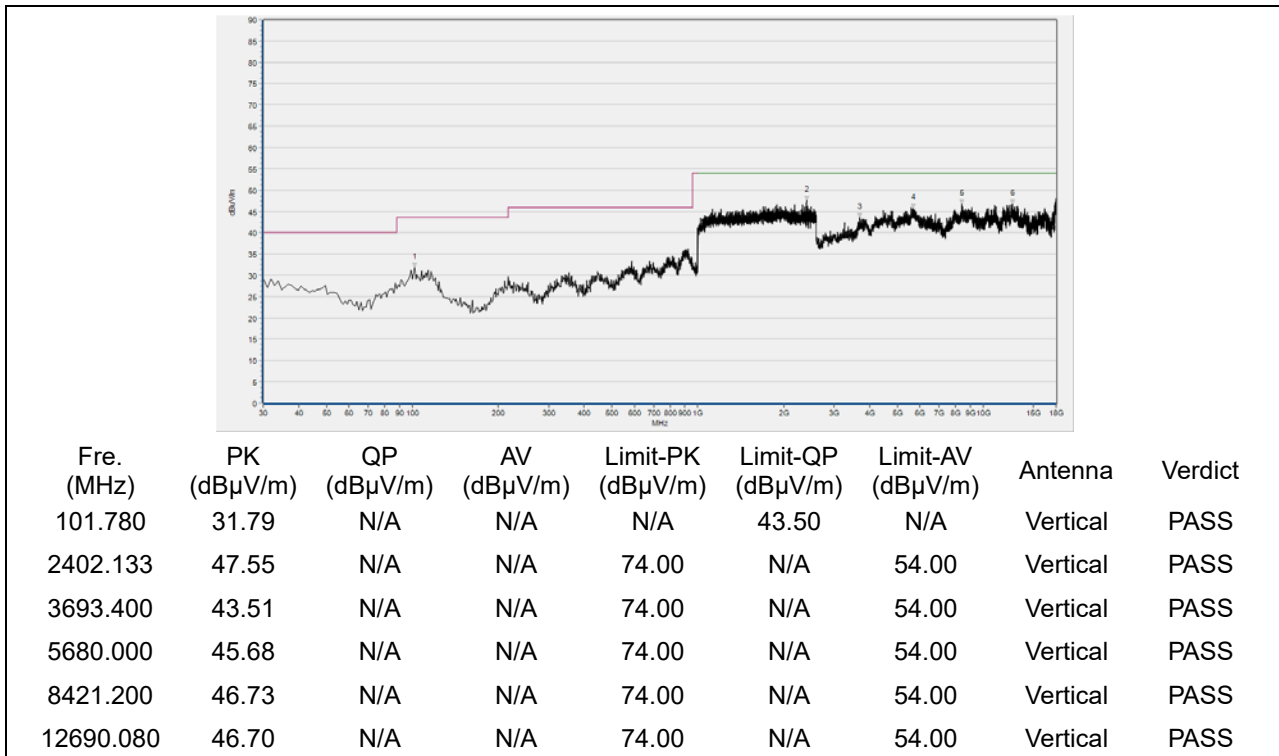


GFSK Mode

Plots for Channel 0

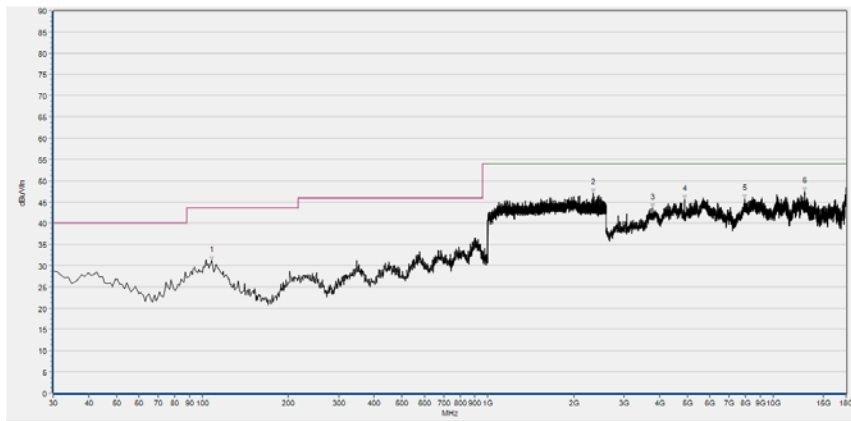


(Antenna Horizontal, 30MHz to 18GHz)



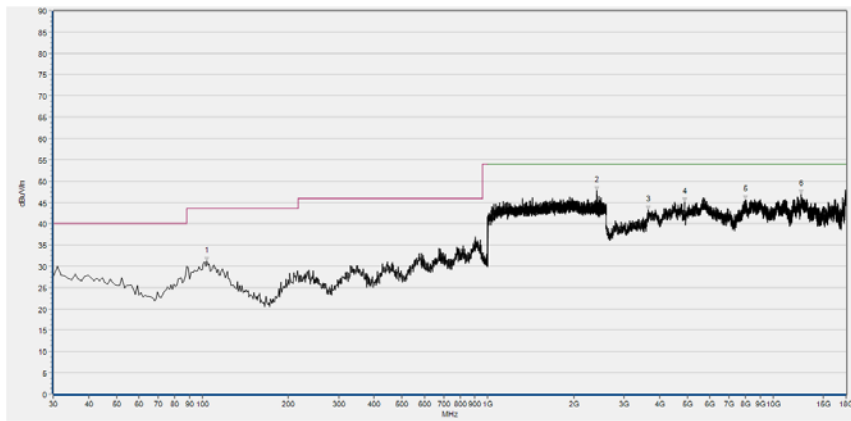
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 39



| Fre. (MHz) | PK (dBμV/m) | QP (dBμV/m) | AV (dBμV/m) | Limit-PK (dBμV/m) | Limit-QP (dBμV/m) | Limit-AV (dBμV/m) | Antenna | Verdict |
|------------|-------------|-------------|-------------|-------------------|-------------------|-------------------|------------|---------|
| 107.600 | 31.24 | N/A | N/A | N/A | 43.50 | N/A | Horizontal | PASS |
| 2341.867 | 47.08 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 3779.640 | 43.66 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 4882.280 | 45.65 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 7962.280 | 45.78 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 12884.120 | 47.50 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |

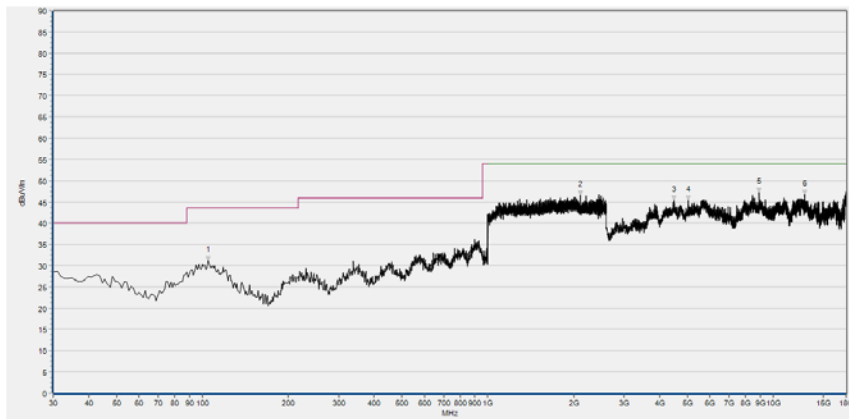
(Antenna Horizontal, 30MHz to 18GHz)



| Fre. (MHz) | PK (dBμV/m) | QP (dBμV/m) | AV (dBμV/m) | Limit-PK (dBμV/m) | Limit-QP (dBμV/m) | Limit-AV (dBμV/m) | Antenna | Verdict |
|------------|-------------|-------------|-------------|-------------------|-------------------|-------------------|------------|---------|
| 103.720 | 31.10 | N/A | N/A | N/A | 43.50 | N/A | Horizontal | PASS |
| 2403.733 | 47.73 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 3656.440 | 43.25 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 4882.280 | 45.06 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 7974.600 | 45.59 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 12542.240 | 46.99 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |

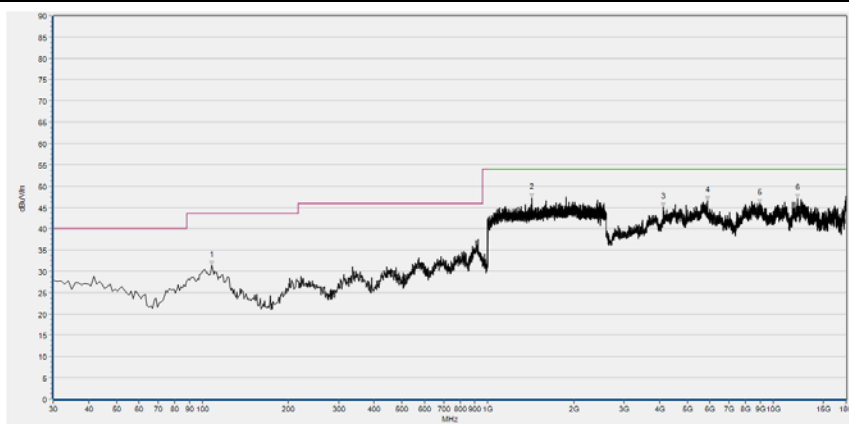
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 78



| Fre. (MHz) | PK (dBµV/m) | QP (dBµV/m) | AV (dBµV/m) | Limit-PK (dBµV/m) | Limit-QP (dBµV/m) | Limit-AV (dBµV/m) | Antenna | Verdict |
|------------|-------------|-------------|-------------|-------------------|-------------------|-------------------|------------|---------|
| 104.690 | 31.10 | N/A | N/A | N/A | 43.50 | N/A | Horizontal | PASS |
| 2106.667 | 46.56 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 4500.360 | 45.37 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 5036.280 | 45.34 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 8935.560 | 47.27 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 12890.280 | 46.76 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |

(Antenna Horizontal, 30MHz to 18GHz)

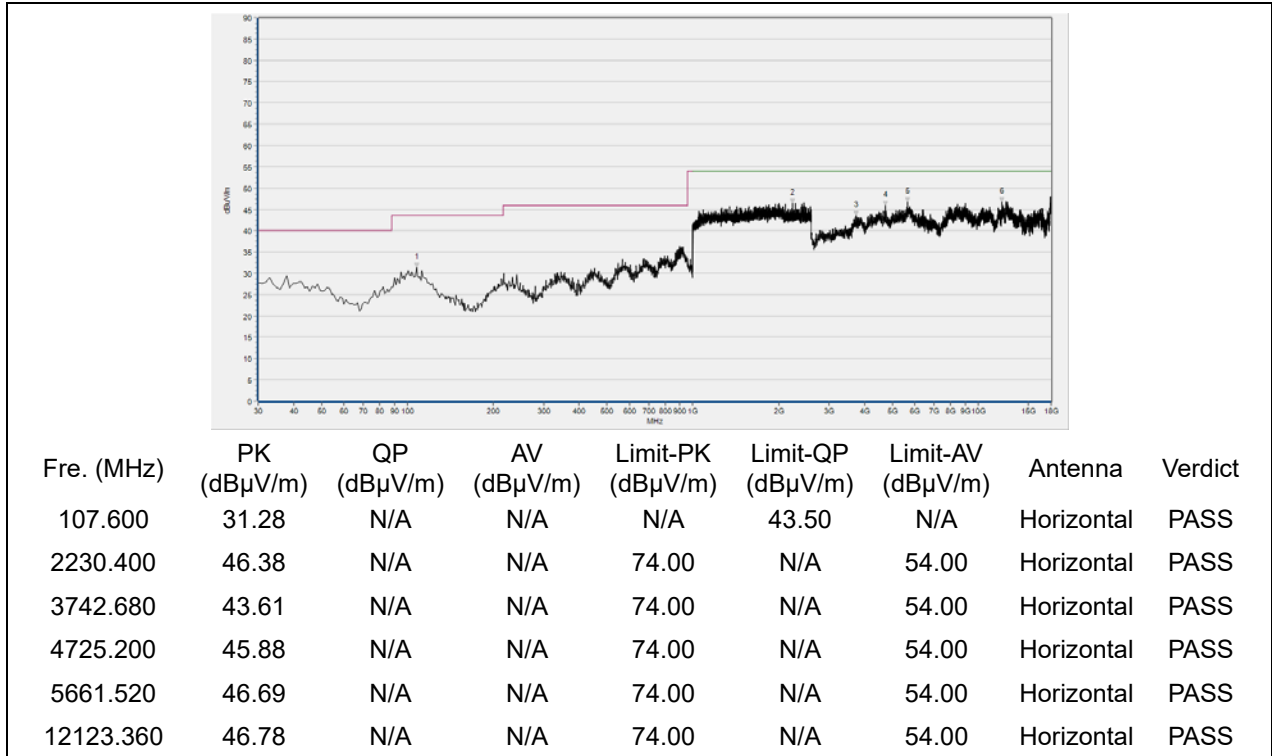


| Fre. (MHz) | PK (dBµV/m) | QP (dBµV/m) | AV (dBµV/m) | Limit-PK (dBµV/m) | Limit-QP (dBµV/m) | Limit-AV (dBµV/m) | Antenna | Verdict |
|------------|-------------|-------------|-------------|-------------------|-------------------|-------------------|----------|---------|
| 107.600 | 31.36 | N/A | N/A | N/A | 43.50 | N/A | Vertical | PASS |
| 1428.800 | 47.23 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 4112.280 | 45.08 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 5880.200 | 46.55 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 8960.200 | 45.85 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 12157.240 | 47.06 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |

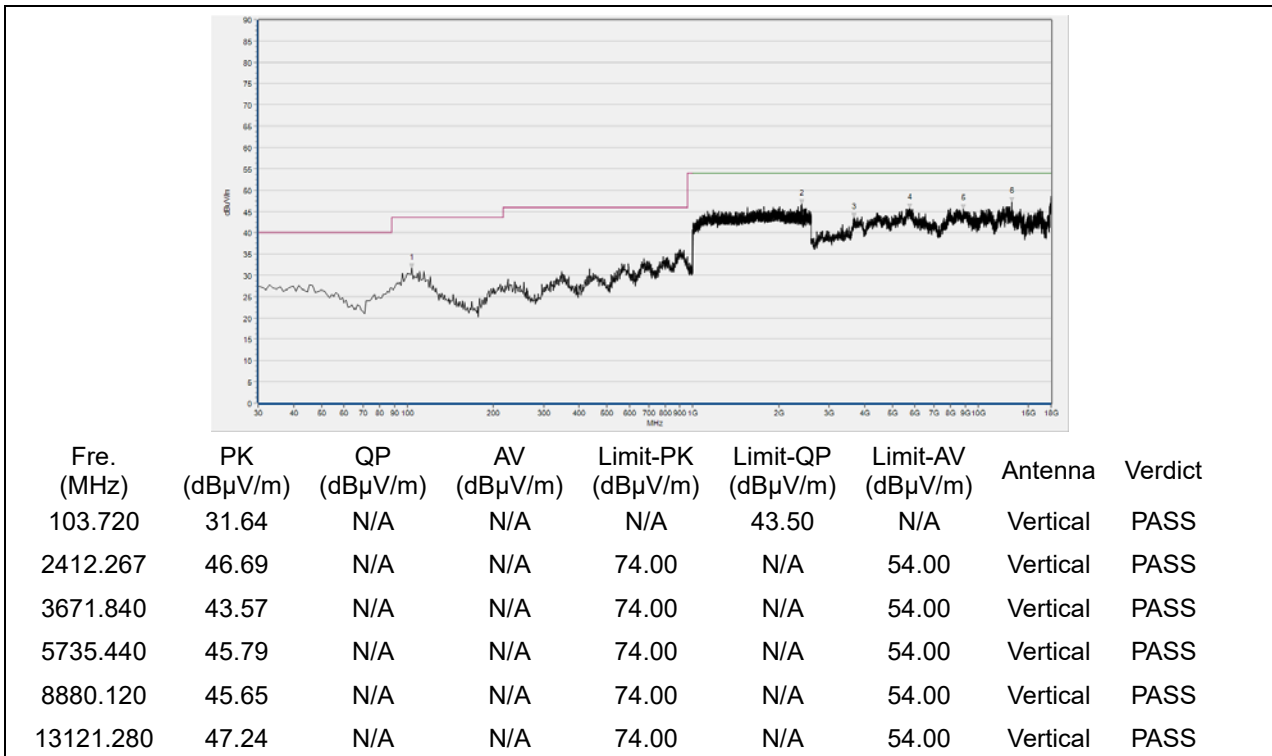
(Antenna Vertical, 30MHz to 18GHz)

$\pi/4$ -DQPSK Mode

Plots for Channel 0

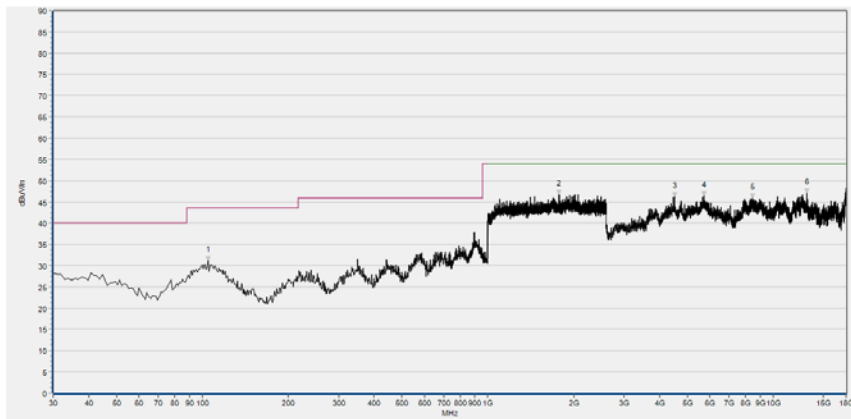


(Antenna Horizontal, 30MHz to 18GHz)



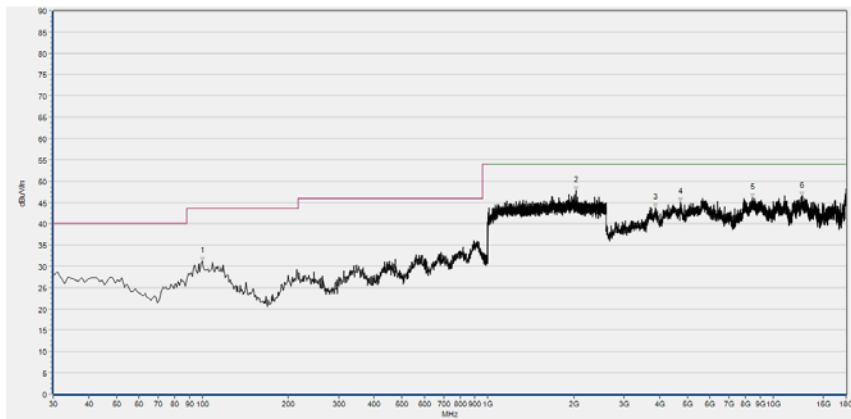
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 39



| Fre. (MHz) | PK (dBµV/m) | QP (dBµV/m) | AV (dBµV/m) | Limit-PK (dBµV/m) | Limit-QP (dBµV/m) | Limit-AV (dBµV/m) | Antenna | Verdict |
|------------|-------------|-------------|-------------|-------------------|-------------------|-------------------|------------|---------|
| 104.690 | 31.15 | N/A | N/A | N/A | 43.50 | N/A | Horizontal | PASS |
| 1779.733 | 46.70 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 4503.440 | 46.27 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 5710.800 | 46.35 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 8442.760 | 45.95 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 13084.320 | 47.06 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |

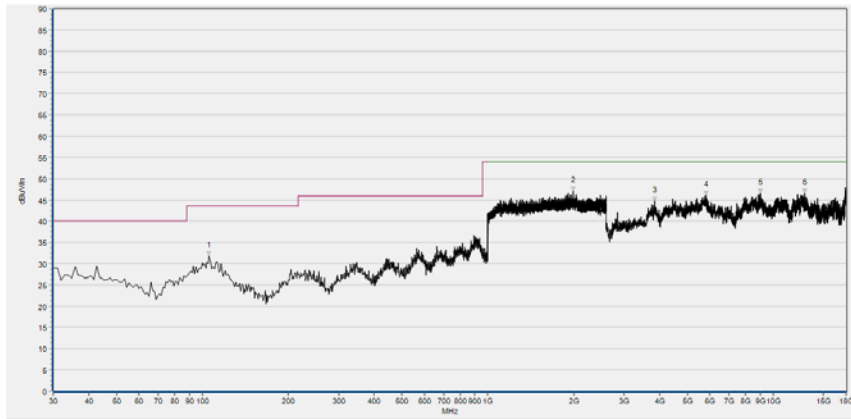
(Antenna Horizontal, 30MHz to 18GHz)



| Fre. (MHz) | PK (dBµV/m) | QP (dBµV/m) | AV (dBµV/m) | Limit-PK (dBµV/m) | Limit-QP (dBµV/m) | Limit-AV (dBµV/m) | Antenna | Verdict |
|------------|-------------|-------------|-------------|-------------------|-------------------|-------------------|----------|---------|
| 99.840 | 31.10 | N/A | N/A | N/A | 43.50 | N/A | Vertical | PASS |
| 2042.667 | 47.69 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 3856.640 | 43.78 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 4740.600 | 45.11 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 8482.800 | 46.13 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 12585.360 | 46.36 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |

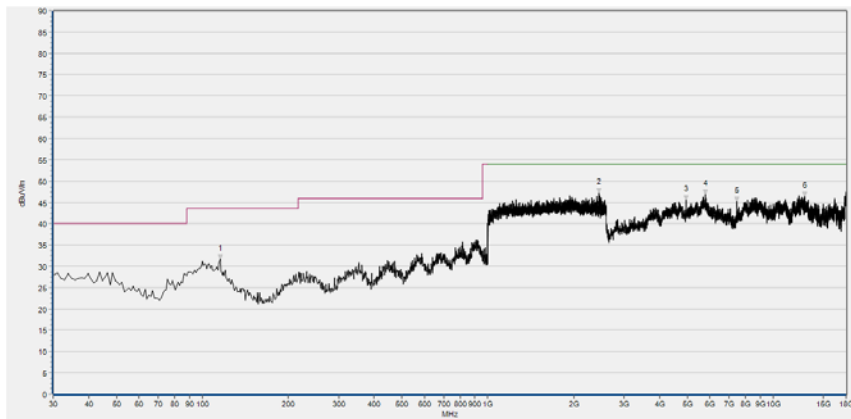
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 78



| Fre. (MHz) | Pk (dBµV/m) | QP (dBµV/m) | AV (dBµV/m) | Limit-PK (dBµV/m) | Limit-QP (dBµV/m) | Limit-AV (dBµV/m) | Antenna | Verdict |
|------------|-------------|-------------|-------------|-------------------|-------------------|-------------------|------------|---------|
| 105.660 | 31.82 | N/A | N/A | N/A | 43.50 | N/A | Horizontal | PASS |
| 1991.467 | 47.16 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 3844.320 | 44.67 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 5821.680 | 46.04 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 9040.280 | 46.67 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 12881.040 | 46.52 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |

(Antenna Horizontal, 30MHz to 18GHz)

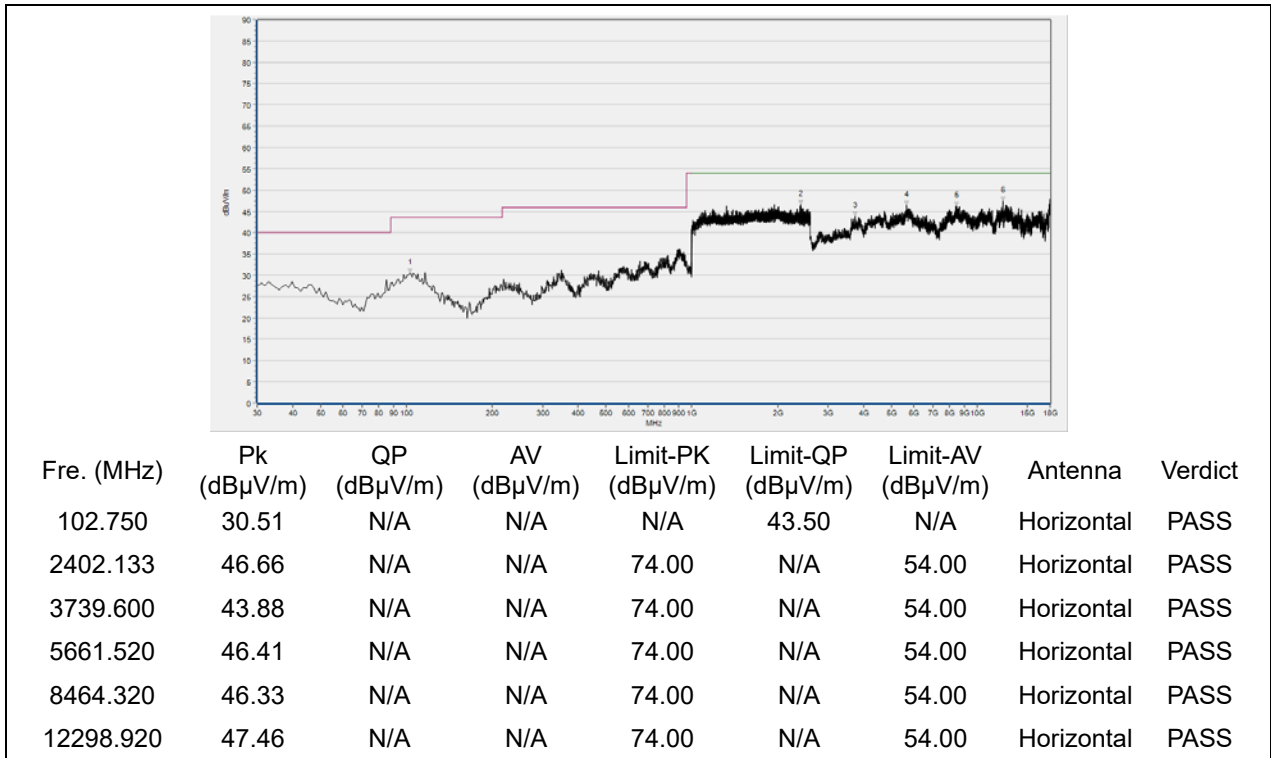


| Fre. (MHz) | Pk (dBµV/m) | QP (dBµV/m) | AV (dBµV/m) | Limit-PK (dBµV/m) | Limit-QP (dBµV/m) | Limit-AV (dBµV/m) | Antenna | Verdict |
|------------|-------------|-------------|-------------|-------------------|-------------------|-------------------|----------|---------|
| 115.360 | 31.66 | N/A | N/A | N/A | 43.50 | N/A | Vertical | PASS |
| 2444.800 | 47.31 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 4959.280 | 45.52 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 5790.880 | 46.95 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 7438.680 | 45.30 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 12896.440 | 46.46 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |

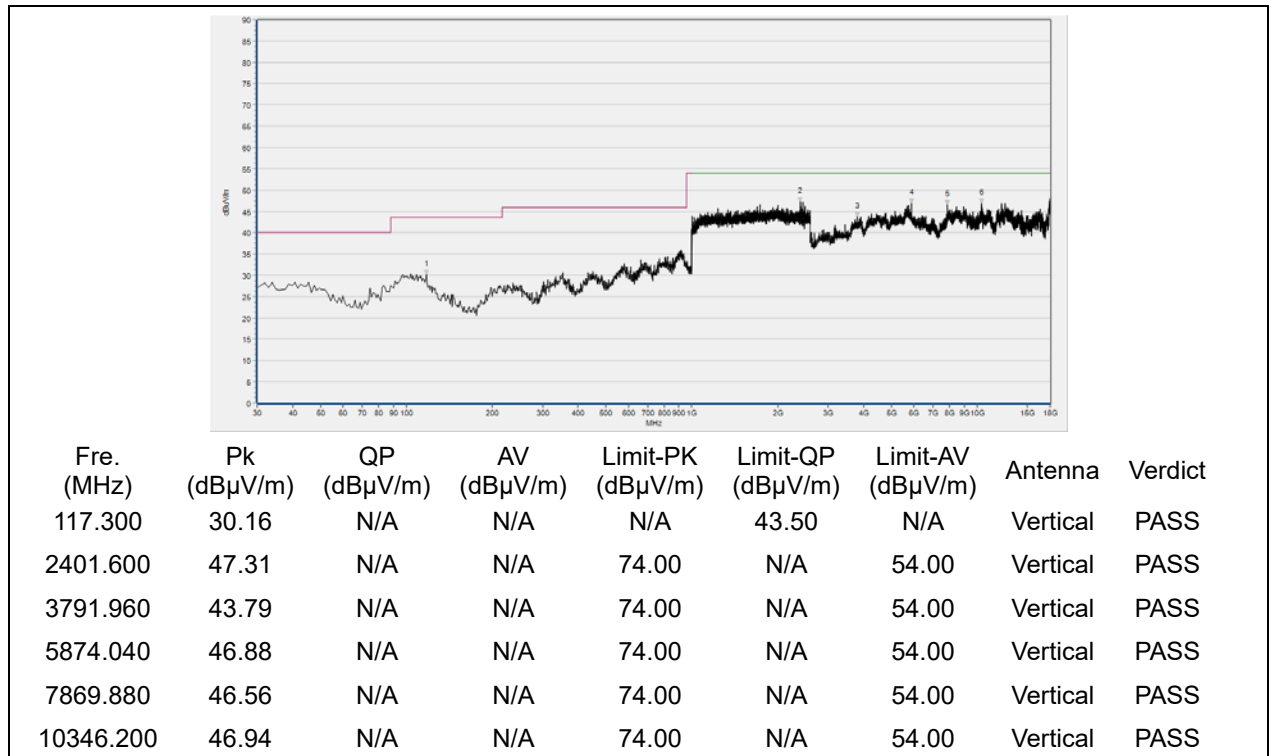
(Antenna Vertical, 30MHz to 18GHz)

8-DPSK Mode

Plots for Channel 0

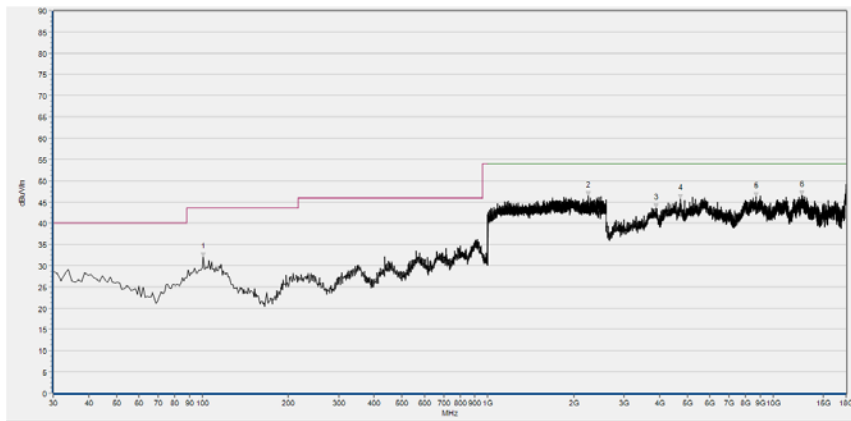


(Antenna Horizontal, 30MHz to 18GHz)



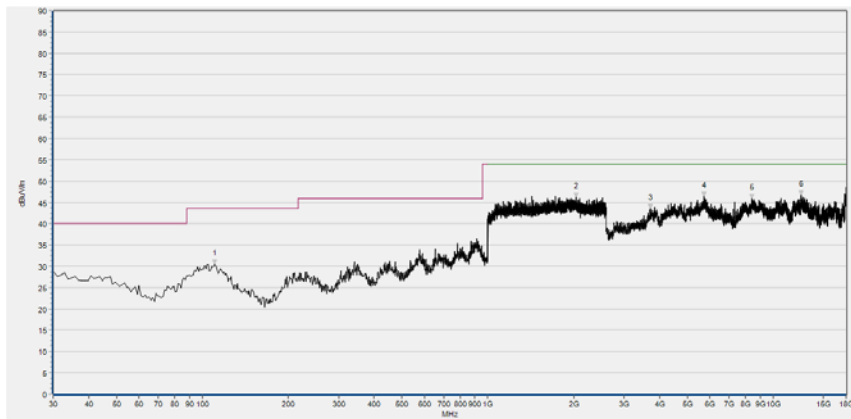
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 39



| Fre. (MHz) | Pk (dBμV/m) | QP (dBμV/m) | AV (dBμV/m) | Limit-PK (dBμV/m) | Limit-QP (dBμV/m) | Limit-AV (dBμV/m) | Antenna | Verdict |
|------------|-------------|-------------|-------------|-------------------|-------------------|-------------------|------------|---------|
| 100.810 | 31.94 | N/A | N/A | N/A | 43.50 | N/A | Horizontal | PASS |
| 2242.133 | 46.37 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 3890.520 | 43.63 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 4740.600 | 45.74 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 8723.040 | 46.19 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 12573.040 | 46.63 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |

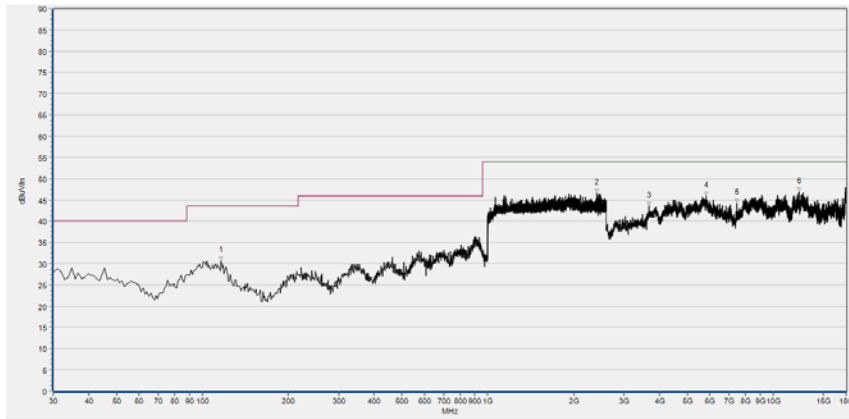
(Antenna Horizontal, 30MHz to 18GHz)



| Fre. (MHz) | Pk (dBμV/m) | QP (dBμV/m) | AV (dBμV/m) | Limit-PK (dBμV/m) | Limit-QP (dBμV/m) | Limit-AV (dBμV/m) | Antenna | Verdict |
|------------|-------------|-------------|-------------|-------------------|-------------------|-------------------|----------|---------|
| 110.510 | 30.47 | N/A | N/A | N/A | 43.50 | N/A | Vertical | PASS |
| 2042.133 | 46.19 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 3705.720 | 43.62 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 5716.960 | 46.50 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 8418.120 | 45.86 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 12526.840 | 46.72 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |

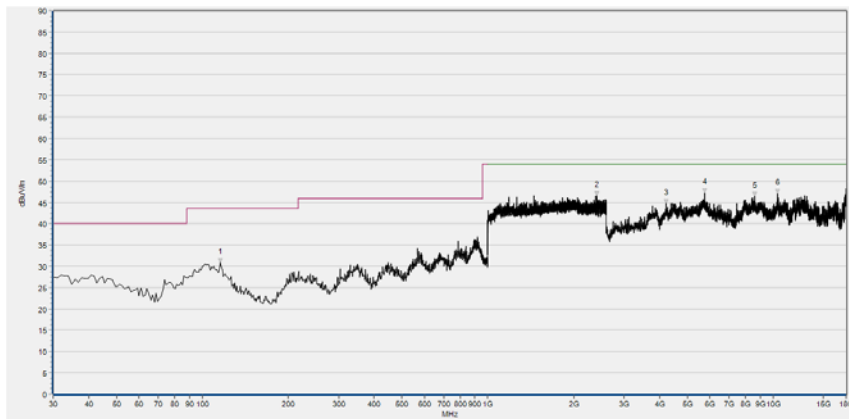
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 78



| Fre. (MHz) | Pk (dBµV/m) | QP (dBµV/m) | AV (dBµV/m) | Limit-PK (dBµV/m) | Limit-QP (dBµV/m) | Limit-AV (dBµV/m) | Antenna | Verdict |
|------------|-------------|-------------|-------------|-------------------|-------------------|-------------------|------------|---------|
| 116.330 | 30.74 | N/A | N/A | N/A | 43.50 | N/A | Horizontal | PASS |
| 2413.867 | 46.53 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 3668.760 | 43.65 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 5806.280 | 45.85 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 7441.760 | 44.21 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |
| 12280.440 | 46.95 | N/A | N/A | 74.00 | N/A | 54.00 | Horizontal | PASS |

(Antenna Horizontal, 30MHz to 18GHz)



| Fre. (MHz) | Pk (dBµV/m) | QP (dBµV/m) | AV (dBµV/m) | Limit-PK (dBµV/m) | Limit-QP (dBµV/m) | Limit-AV (dBµV/m) | Antenna | Verdict |
|------------|-------------|-------------|-------------|-------------------|-------------------|-------------------|----------|---------|
| 115.360 | 30.84 | N/A | N/A | N/A | 43.50 | N/A | Vertical | PASS |
| 2410.667 | 46.56 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 4210.840 | 44.77 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 5738.520 | 47.31 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 8615.240 | 46.37 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |
| 10358.520 | 47.06 | N/A | N/A | 74.00 | N/A | 54.00 | Vertical | PASS |

(Antenna Vertical, 30MHz to 18GHz)



Annex A Test Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for test performed on the EUT as specified in CISPR 16-1-2:

| Test Items | Uncertainty |
|----------------------------|-------------|
| Restricted Frequency Bands | ±5% |
| Radiated Emission | ±2.95dB |
| Conducted Emission | ±2.44dB |

This uncertainty represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



Annex B Testing Laboratory Information

1. Identification of the Responsible Testing Laboratory

| | |
|----------------------------|--|
| Laboratory Name: | Shenzhen Morlab Communications Technology Co., Ltd. |
| Laboratory Address: | FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China |
| Telephone: | +86 755 36698555 |
| Facsimile: | +86 755 36698525 |

2. Identification of the Responsible Testing Location

| | |
|-----------------|--|
| Name: | Shenzhen Morlab Communications Technology Co., Ltd. |
| Address: | FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China |

3. Facilities and Accreditations

All measurement facilities used to collect the measurement data are located at FL.3, Building A, FeiYang Science Park, Block 67, BaoAn District, Shenzhen, 518101 P. R. China. The test site is constructed in conformance with the requirements of ANSI C63.10-2013 and CISPR Publication 22; the FCC designation number is CN1192, the test firm registration number is 226174.



4. Test Equipments Utilized

4.1 Conducted Emission Test Equipments

| Equipment Name | Serial No. | Type | Manufacturer | Cal. Date | Due Date |
|---------------------------------|-----------------------|----------------|--------------|------------|------------|
| Receiver | MY56400093 | N9038A | KEYSIGHT | 2023.02.09 | 2024.02.08 |
| LISN | 8127449 | NSLK 8127 | Schwarzbeck | 2023.02.21 | 2024.02.20 |
| Pulse Limiter (10dB) | VTSD 9561 F-B #206 | VTSD 9561-F | Schwarzbeck | 2022.06.27 | 2024.06.26 |
| RF Coaxial Cable (DC-100MHz) | BNC | MRE04 | Qualwave | 2022.07.08 | 2023.07.07 |

4.2 List of Software Used

| Description | Manufacturer | Software Version |
|------------------|--------------|------------------|
| Morlab EMCR V1.2 | Morlab | V1.0 |
| TS+ -[JS32-CE] | Tonscend | V2.5.0.0 |

**4.3 Radiated Test Equipments**

| Equipment Name | Serial No. | Type | Manufacturer | Cal. Date | Due Date |
|-----------------------------|---------------|-----------------------|--------------|------------|------------|
| Receiver | MY54130016 | N9038A | Agilent | 2023.06.21 | 2024.06.20 |
| Test Antenna - Bi-Log | 9163-519 | VULB 9163 | Schwarzbeck | 2022.05.25 | 2025.05.24 |
| Test Antenna - Loop | 1519-022 | FMZB1519 | Schwarzbeck | 2022.02.11 | 2025.02.10 |
| Test Antenna – Horn | 01774 | BBHA 9120D | Schwarzbeck | 2022.07.13 | 2025.07.12 |
| Test Antenna – Horn | BBHA9170 #773 | BBHA9170 | Schwarzbeck | 2022.07.14 | 2025.07.13 |
| Preamplifier (10MHz-6GHz) | 46732 | S10M100L38 02 | LUCIX CORP. | 2022.07.08 | 2023.07.07 |
| Preamplifier (2GHz-18GHz) | 61171/61172 | S020180L32 03 | LUCIX CORP. | 2022.07.08 | 2023.07.07 |
| Preamplifier (18GHz-40GHz) | DS77209 | DCLNA0118-40C-S | Decentest | 2022.07.23 | 2023.07.22 |
| RF Coaxial Cable (DC-18GHz) | MRE001 | PE330 | Pasternack | 2022.07.08 | 2023.07.07 |
| RF Coaxial Cable (DC-18GHz) | MRE002 | CLU18 | Pasternack | 2022.07.08 | 2023.07.07 |
| RF Coaxial Cable (DC-18GHz) | MRE003 | CLU18 | Pasternack | 2022.07.08 | 2023.07.07 |
| RF Coaxial Cable (DC-40GHz) | 22290045 | QA360-40-K K-0.5 | Qualwave | 2022.07.08 | 2023.07.07 |
| RF Coaxial Cable (DC-40GHz) | 22290046 | QA360-40-K KF-2 | Qualwave | 2022.07.08 | 2023.07.07 |
| RF Coaxial Cable (DC-18GHz) | 22120181 | QA500-18-N N-5 | Qualwave | 2022.07.08 | 2023.07.07 |
| Notch Filter | N/A | WRCG-2400-2483.5-60SS | Wainwright | 2022.07.08 | 2023.07.07 |
| Anechoic Chamber | N/A | 9m*6m*6m | CRT | 2022.05.10 | 2025.05.09 |

END OF REPORT