



FCC - TEST REPORT

| | | |
|----------------------------------|---|----------------------------------|
| Report Number | : 68.950.21.0547.01 | Date of Issue: 2021-09-08 |
| Model | : PG915420U, PG912696U, PG911040U, PG912689U, PG915697, PG918520, PG916045, PG918537, PG911040, PG918506, PG918544, PG912696, PG912689, PG915420 | |
| FCC ID | : 2AKMJ-PG915420 | |
| Product Type | : PEBBLE GEAR™ 7" KIDS TABLET | |
| Applicant | : SNAKEBYTE ASIA Ltd. | |
| Address | : Unit 907-908, 9th/F, Lu Plaza 2 Wing Yip Street, Kwun Tong, Hong Kong | |
| Manufacturer | : SNAKEBYTE ASIA Ltd. | |
| Address | : Unit 907-908, 9th/F, Lu Plaza 2 Wing Yip Street, Kwun Tong, Hong Kong | |
| Test Result | : ■ Positive <input type="checkbox"/> Negative | |
| Total pages including Appendices | : <u>63</u> | |

Any use for advertising purposes must be granted in writing. This technical report may only be quoted in full. This report is the result of a single examination of the object in question and is not generally applicable evaluation of the quality of other products in regular production. For further details please see testing and certification regulation, chapter A-3.4.

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2 Details about the Test Laboratory

Details about the Test Laboratory

Test 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, Nanshan District,
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FCC Designation Number: CN5009

FCC Registration No.: 514049

Telephone: 86 755 8828 6998

Fax: 86 755 8828 5299

Report Version:

| Revision | Release Date | History/Memo. |
|----------|--------------|-----------------|
| N/A | 2021-09-08 | Initial Release |

3 Description of the Equipment Under Test

| | |
|----------------------------|---|
| Product: | PEBBLE GEAR™ 7" KIDS TABLET |
| Model no.: | PG915420U, PG912696U, PG911040U, PG912689U, PG915697, PG918520, PG916045, PG918537, PG911040, PG918506, PG918544, PG912696, PG912689, PG915420 |
| FCC ID: | 2AKMJ-PG915420 |
| Rating: | 3.7VDC, 2700mAh, (Supplied by Rechargeable Li-ion Battery) or 5VDC (Supplied by external adapter for Charging rechargeable battery) |
| RF Transmission Frequency: | 2402MHz-2480MHz |
| No. of Operated Channel: | 79 |
| Modulation: | GFSK, π/4-DQPSK, 8DPSK |
| Antenna Type: | Internal antenna |
| Antenna Gain: | 3.02dBi max for 2.4GHz |
| Description of the EUT: | The equipment supports Bluetooth Low Energy/Bluetooth BR+EDR /WIFI functions. The TX and RX range is 2402MHz-2480MHz for Bluetooth, 2412MHz – 2462MHz for 2.4GHzWIFI, 5180MHz – 5240MHz, 5745MHz – 5825MHz for 5GHzWIFI |

4 Summary of Test Standards

| Test Standards | |
|--|--|
| FCC Part 15 Subpart C 10-1-2020 Edition | PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators |

All the test methods were according to Public Notice DA 00-705 -Frequency Hopper Spread Spectrum Test Procedure, KDB558074 D01 v05r02 and ANSI C63.10-2013.

5 Summary of Test Results

| Technical Requirements | | | |
|--------------------------------|--|------------|-------------|
| FCC Part 15 Subpart C | | | |
| Test Condition | | Test Site | Test Result |
| §15.207 | Conducted emission AC power port | -- | N/A |
| §15.247(b)(1) | Conducted peak output power | Site 1 | PASS |
| §15.247(e) | Power spectral density | -- | N/A |
| §15.247(a)(2) | 6dB bandwidth | -- | N/A |
| §15.247(a)(1) | 20dB bandwidth and 99% Occupied Bandwidth | Site 1 | PASS |
| §15.247(a)(1) | Carrier frequency separation | Site 1 | PASS |
| §15.247(a)(1)(iii) | Number of hopping frequencies | Site 1 | PASS |
| §15.247(a)(1)(iii) | Dwell Time | Site 1 | PASS |
| §15.247(d) | Spurious RF conducted emissions | Site 1 | PASS |
| §15.247(d) | Band edge | Site 1 | PASS |
| §15.247(d) & §15.209 & §15.205 | Spurious radiated emissions for transmitter and receiver | Site 1 | PASS |
| §15.203 | Antenna requirement | See note 2 | PASS |

Note 1: N/A=Not Applicable.

Note 2: The EUT uses an Internal antenna, which gain is 3.02dBi. In accordance to §15.203, it is considered sufficiently to comply with the provisions of this section.



6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2AKMJ-PG915420, complies with Section 15.205, 15.209, 15.247 of the FCC Part 15, Subpart C.

The Equipment Under Test (EUT) is TABLET with Bluetooth Low Energy/Bluetooth BDR+EDR/WIFI functions.

The difference among all models is only model name.

Unless otherwise specified the model PG915420 was chosen as the representative model to perform full tests, and others model was deemed to fulfil relevant RF requirements without further testing.

Note: The report is for BDR+EDR only.

SUMMARY:

All tests according to the regulations cited on page 5 were

- Performed
- **Not** Performed

The Equipment Under Test

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

Sample Received Date: 2021-08-17

Testing Start Date: 2021-08-17

Testing End Date: 2021-09-06

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

Reviewed by:

Prepared by:

Tested by:

John Zhi
Project Manager



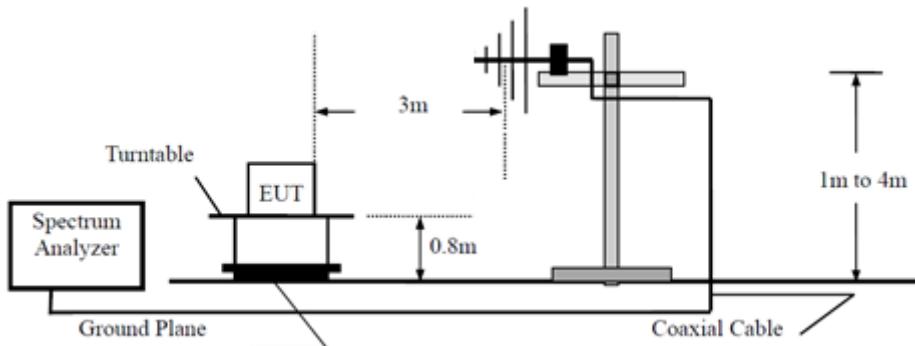
Joe Gu
Project Engineer

Carry Cai
Test Engineer

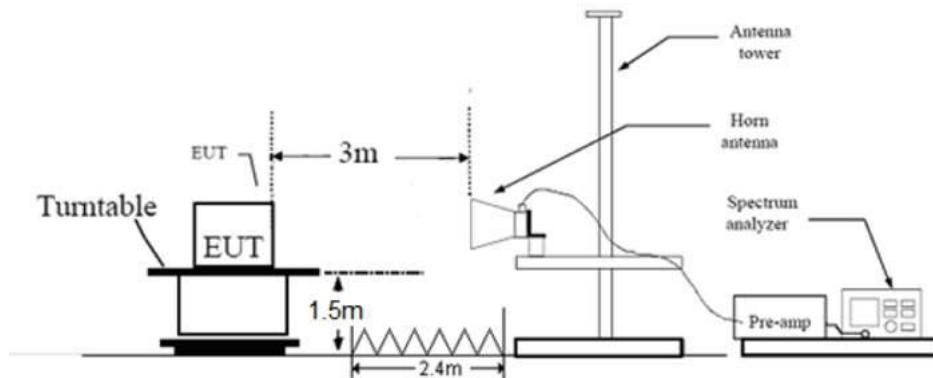
7 Test Setups

7.1 Radiated test setups

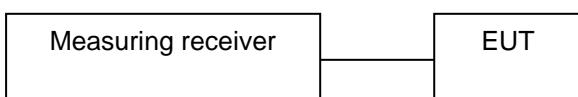
Below 1GHz



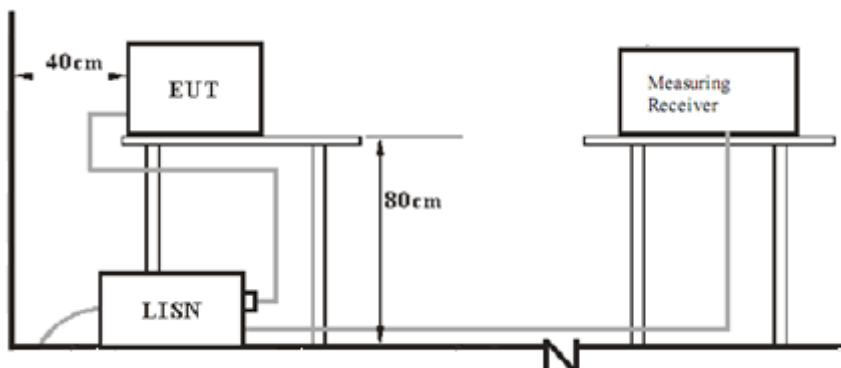
Above 1GHz



7.2 Conducted RF test setups



7.3 AC Power Line Conducted Emission test setups



8 Systems test configuration

Auxiliary Equipment Used during Test:

| Name | Model | Manufacturer | S/N | Cal Due Date |
|----------|-------|--------------|-----|--------------|
| Notebook | X220 | Lenovo | -- | -- |
| Adaptor | A1357 | Apple | -- | -- |

The system was configured to hopping mode and non-hopping mode.

Hopping mode: typical working mode (normal hopping status)

Non-hopping mode: The system was configured to operate at a signal channel transmitting. The test software allows the configuration and operation at the worst-case duty and the highest transmit power.

9 Technical Requirement

9.1 Conducted Emission

Test Method

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. Both sides of AC line were checked for maximum conducted interference.
6. The frequency range from 150 kHz to 30 MHz was searched.
7. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

Limit

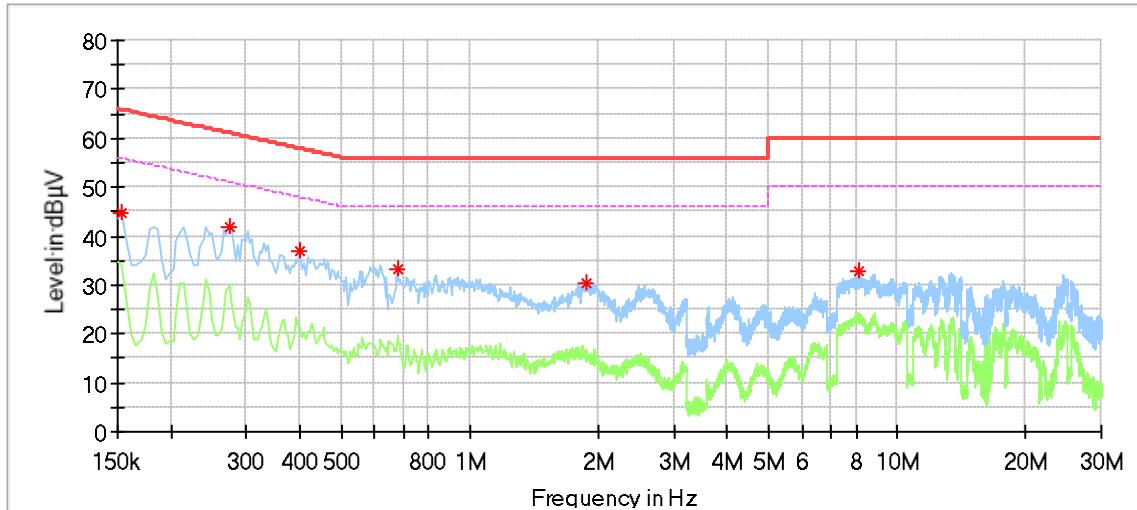
According to §15.207, conducted emissions limit as below:

| 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 |

*Decreasing linearly with logarithm of the frequency

Conducted Emission

Product Type : PEBBLE GEAR™ 7" KIDS TABLET
 M/N : PG915420
 Operating Condition : Charging + Transmit
 Test Specification : Power Line, Live
 Comment : AC 120V/60Hz (External adapter)



| Frequency (MHz) | MaxPeak (dBµV) | Average (dBµV) | Limit (dBµV) | Margin (dB) | Line | Corr. (dB) |
|-----------------|----------------|----------------|--------------|-------------|------|------------|
| 0.154000 | 44.71 | --- | 65.78 | 21.07 | L1 | 9.25 |
| 0.274000 | 41.97 | --- | 61.00 | 19.02 | L1 | 9.22 |
| 0.402000 | 36.73 | --- | 57.81 | 21.09 | L1 | 9.21 |
| 0.678000 | 33.32 | --- | 56.00 | 22.68 | L1 | 9.20 |
| 1.870000 | 30.18 | --- | 56.00 | 25.82 | L1 | 9.22 |
| 8.134000 | 32.62 | --- | 60.00 | 27.38 | L1 | 9.38 |

Remark :

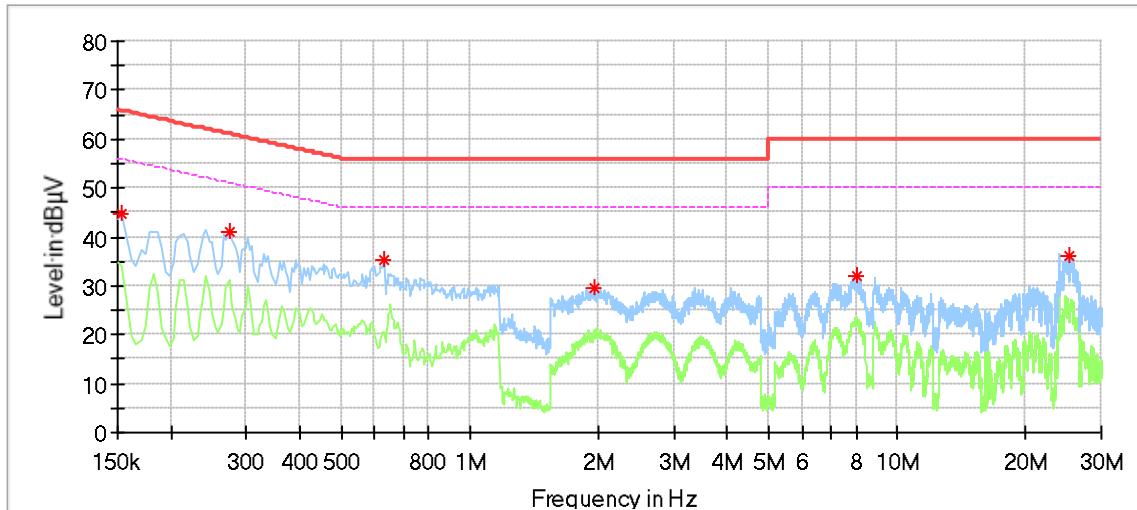
Level=Reading Level + Correction Factor

Correction Factor=Cable Loss + LISN Factor

(The Reading Level is recorded by software which is not shown in the sheet)

Conducted Emission

Product Type : PEBBLE GEAR™ 7" KIDS TABLET
 M/N : PG915420
 Operating Condition : Charging + Transmit
 Test Specification : Power Line, Neutral
 Comment : AC 120V/60Hz (External adapter)



| Frequency (MHz) | MaxPeak (dBµV) | Average (dBµV) | Limit (dBµV) | Margin (dB) | Line | Corr. (dB) |
|-----------------|----------------|----------------|--------------|-------------|------|------------|
| 0.154000 | 44.88 | --- | 65.78 | 20.90 | N | 9.40 |
| 0.274000 | 41.10 | --- | 61.00 | 19.90 | N | 9.39 |
| 0.630000 | 35.10 | --- | 56.00 | 20.90 | N | 9.39 |
| 1.946000 | 29.51 | --- | 56.00 | 26.49 | N | 9.41 |
| 8.014000 | 32.16 | --- | 60.00 | 27.84 | N | 9.58 |
| 25.310000 | 36.15 | --- | 60.00 | 23.85 | N | 9.83 |

Remark :

Level=Reading Level + Correction Factor

Correction Factor=Cable Loss + LISN Factor

(The Reading Level is recorded by software which is not shown in the sheet)

9.2 Conducted peak output power

Test Method

1. The EUT was placed on 0.8m height table, the RF output of EUT was connected to the test receiver by RF cable. The path loss was compensated to the results for each measurement.
2. Use the following spectrum analyzer settings:
Span = approximately 5 times the 20dB bandwidth, centered on a hopping channel
RBW > the 20dB bandwidth of the emission being measured, $VBW \geq RBW$,
Sweep = auto, Detector function = peak, Trace = max hold
3. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power

Limits

Conducted Peak Output Power:

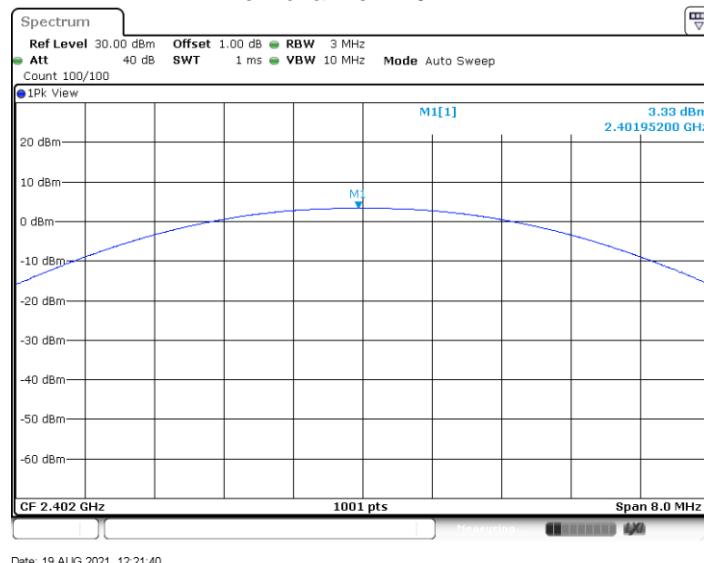
| Frequency Range MHz | Limit W | Limit dBm |
|------------------------|------------|--------------|
| 2400-2483.5 | ≤ 1 | ≤ 30 |

Conducted peak output power

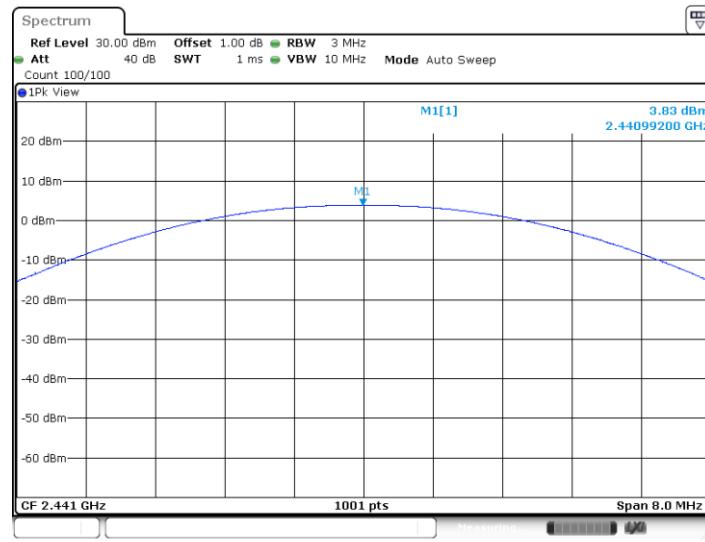
Bluetooth Mode GFSK modulation Test Result

| Frequency MHz | Conducted Peak Output Power dBm | Result |
|------------------------|---------------------------------------|--------|
| Low channel 2402MHz | 3.33 | Pass |
| Middle channel 2441MHz | 3.83 | Pass |
| High channel 2480MHz | 3.91 | Pass |

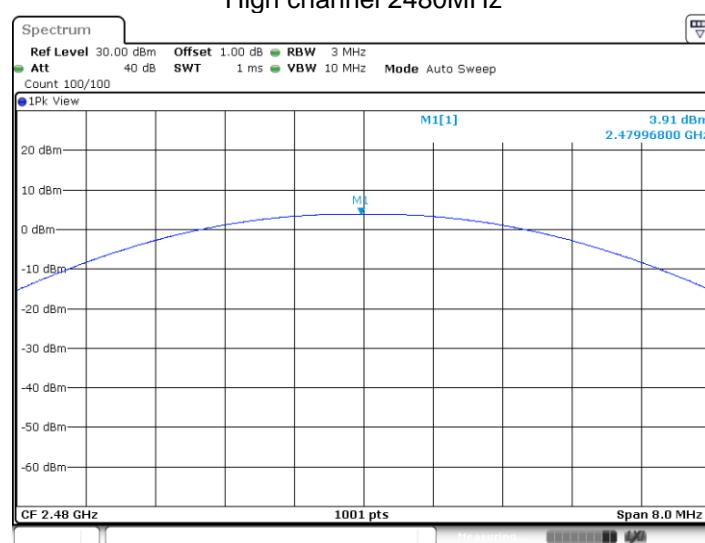
Low channel 2402MHz



Middle channel 2441MHz



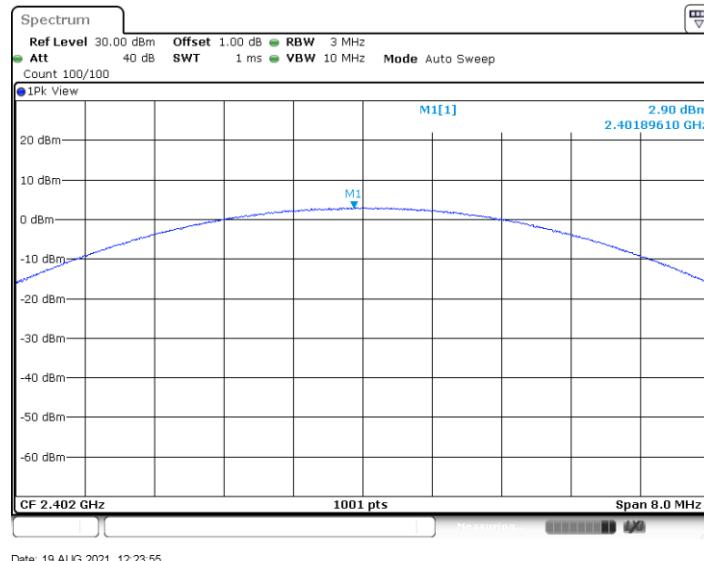
High channel 2480MHz



Bluetooth Mode $\pi/4$ -DQPSK modulation Test Result

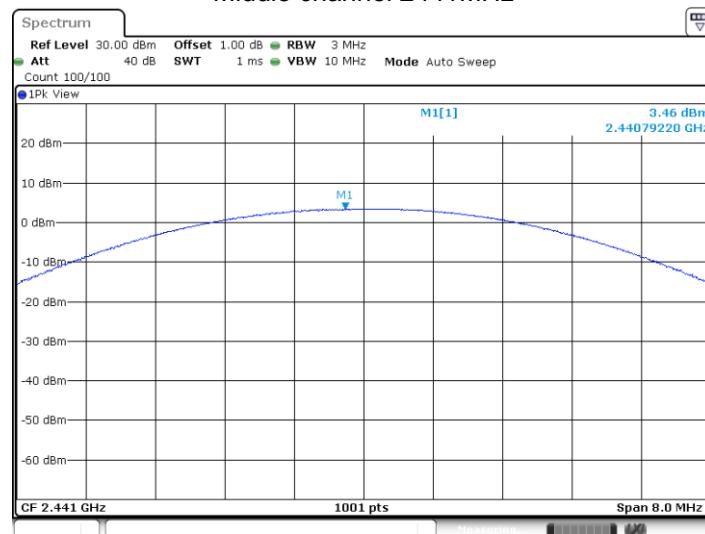
| Frequency | Conducted Peak Output Power | Result |
|------------------------|-----------------------------|--------|
| MHz | dBm | |
| Low channel 2402MHz | 2.90 | Pass |
| Middle channel 2441MHz | 3.46 | Pass |
| High channel 2480MHz | 3.56 | Pass |

Low channel 2402MHz

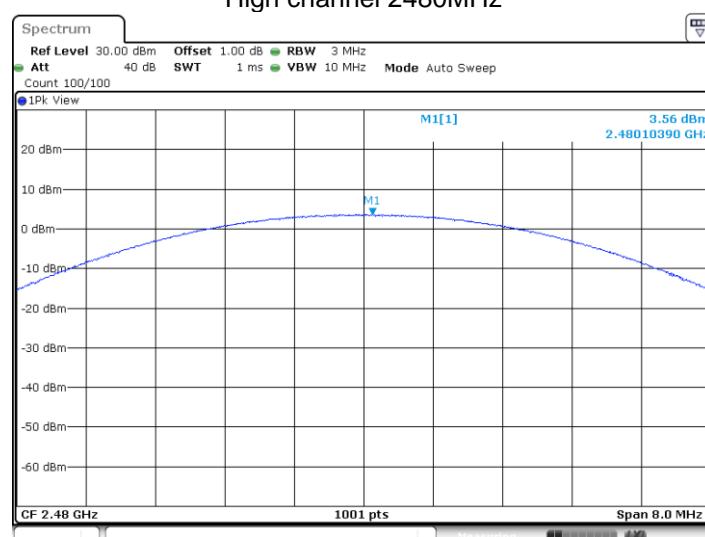




Middle channel 2441MHz



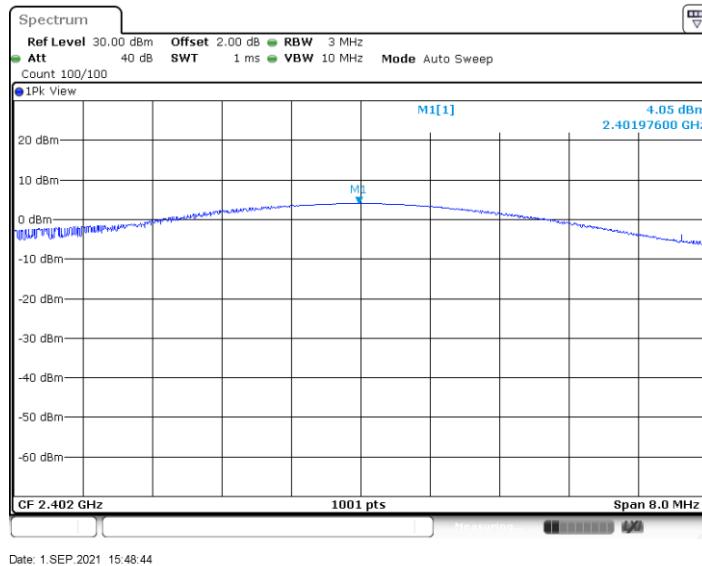
High channel 2480MHz



Bluetooth Mode 8DPSK modulation Test Result

| Frequency | Conducted Peak Output Power | Result |
|------------------------|-----------------------------|--------|
| MHz | dBm | |
| Low channel 2402MHz | 4.05 | Pass |
| Middle channel 2441MHz | 4.84 | Pass |
| High channel 2480MHz | 5.18 | Pass |

Low channel 2402MHz



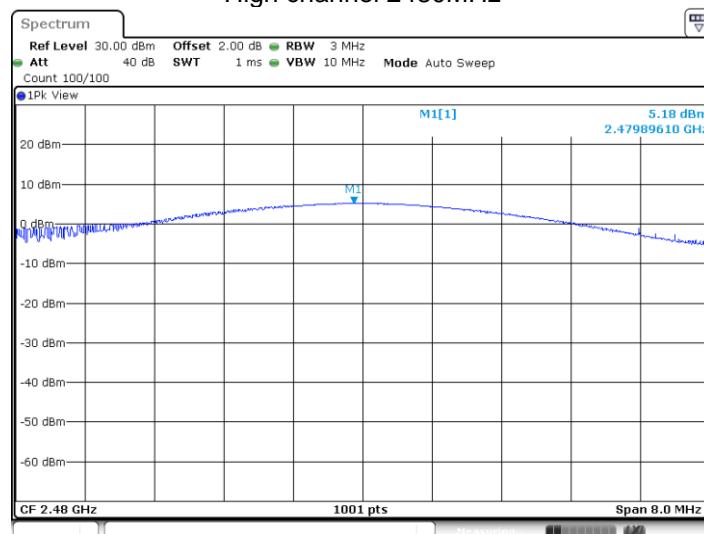


Middle channel 2441MHz



Date: 1.SEP.2021 15:50:26

High channel 2480MHz



Date: 1.SEP.2021 15:54:38

9.3 20 dB bandwidth and 99% Occupied Bandwidth

Test Method

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Limit

Limit [kHz]

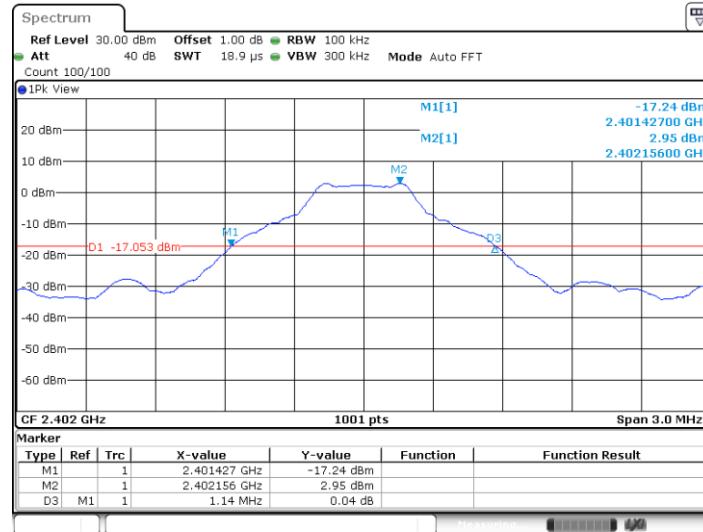
N/A

20 dB bandwidth and 99% Occupied Bandwidth

Bluetooth Mode GFSK Modulation test result

| Frequency MHz | 20 dB Bandwidth kHz | 99% Bandwidth kHz | Limit kHz | Result |
|------------------|------------------------|----------------------|--------------|--------|
| 2402 | 1140 | 893 | -- | Pass |
| 2441 | 1134 | 896 | -- | Pass |
| 2480 | 1128 | 899 | -- | Pass |

Low channel 2402MHz

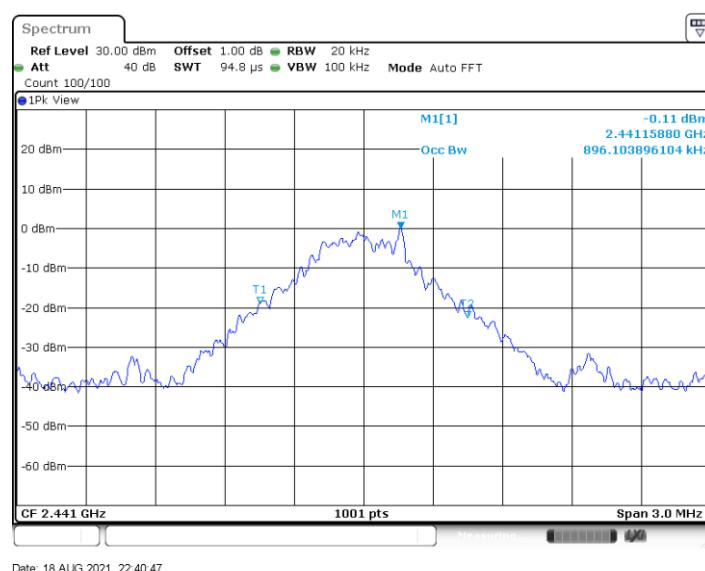
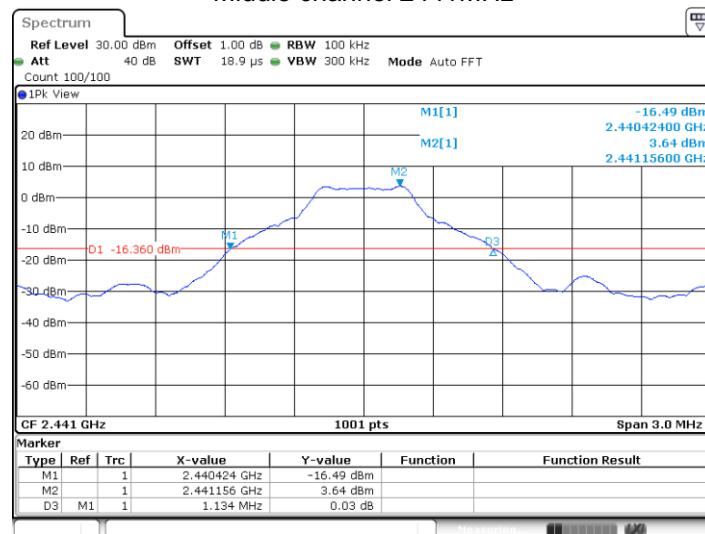


Date: 18 AUG 2021 22:36:51

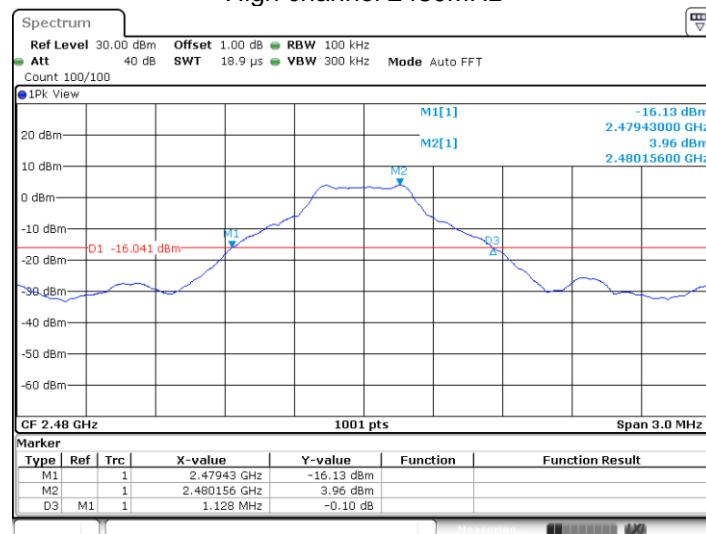


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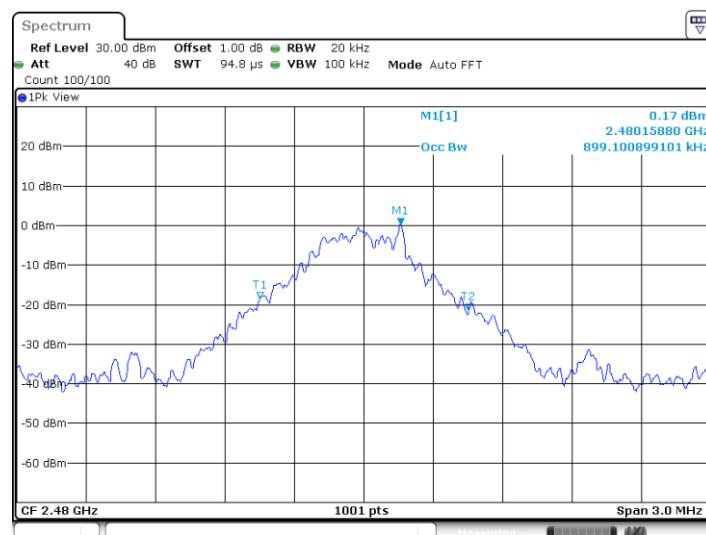
Middle channel 2441MHz



High channel 2480MHz



Date: 18.AUG.2021 22:43:25



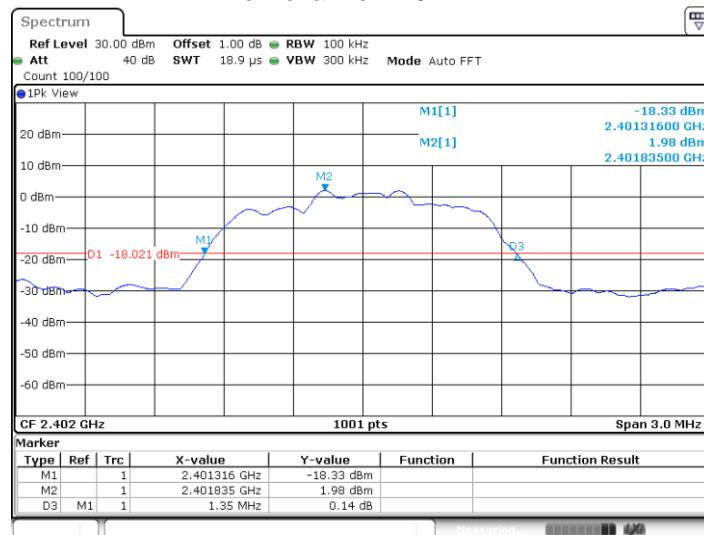
Date: 18.AUG.2021 22:43:35

20 dB bandwidth and 99% Occupied Bandwidth

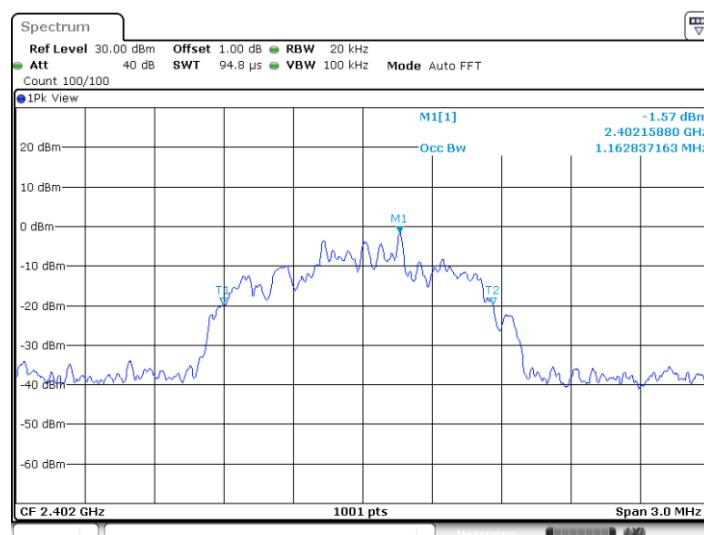
Bluetooth Mode π/4-DQPSK Modulation test result

| Frequency MHz | 20 dB Bandwidth kHz | 99% Bandwidth kHz | Limit kHz | Result |
|------------------|------------------------|----------------------|--------------|--------|
| 2402 | 1350 | 1163 | -- | Pass |
| 2441 | 1362 | 1157 | -- | Pass |
| 2480 | 1365 | 1166 | -- | Pass |

Low channel 2402MHz

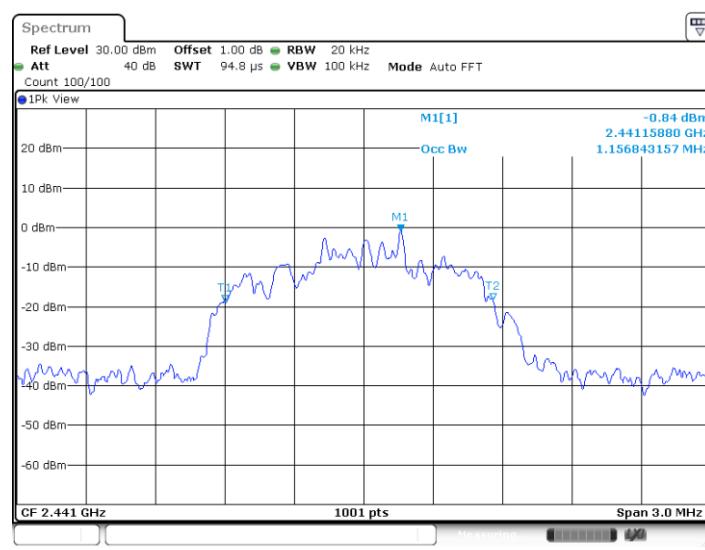
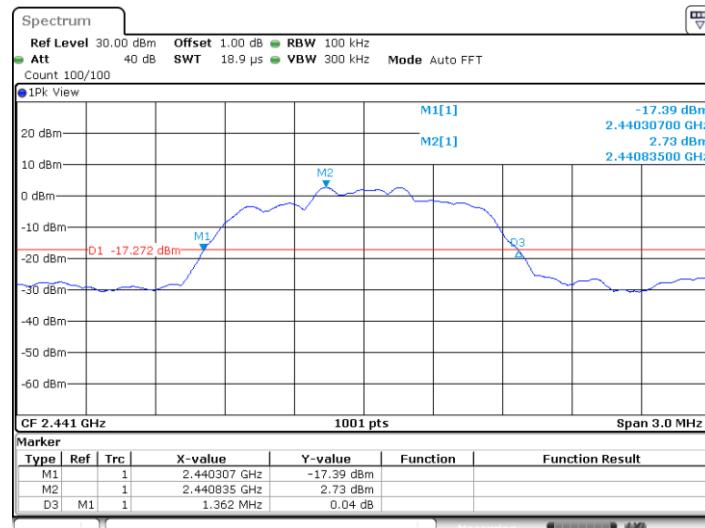


Date: 18.AUG.2021 22:46:36

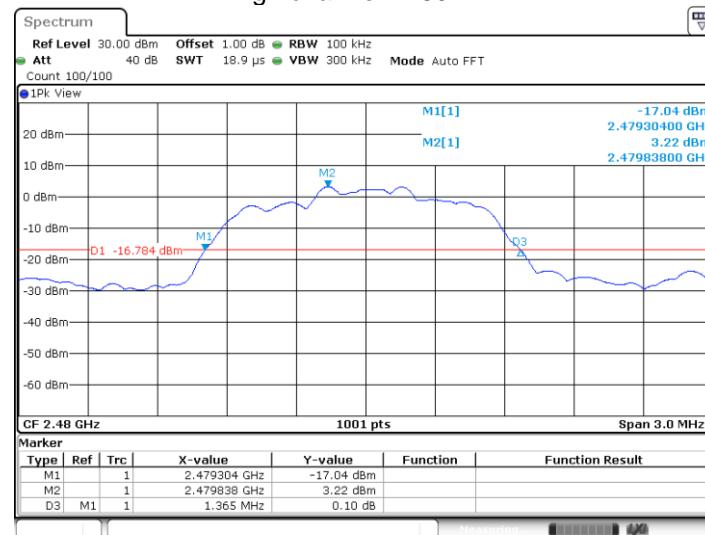


Date: 18.AUG.2021 22:46:47

Middle channel 2441MHz



High channel 2480MHz



Date: 18.AUG.2021 22:52:05



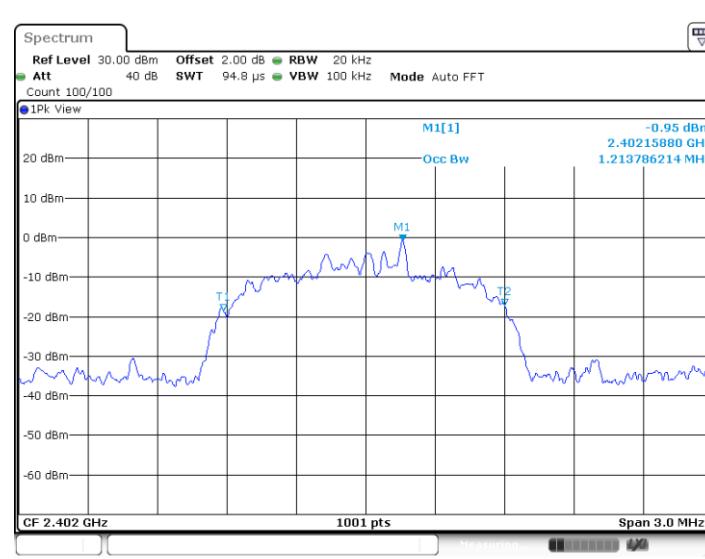
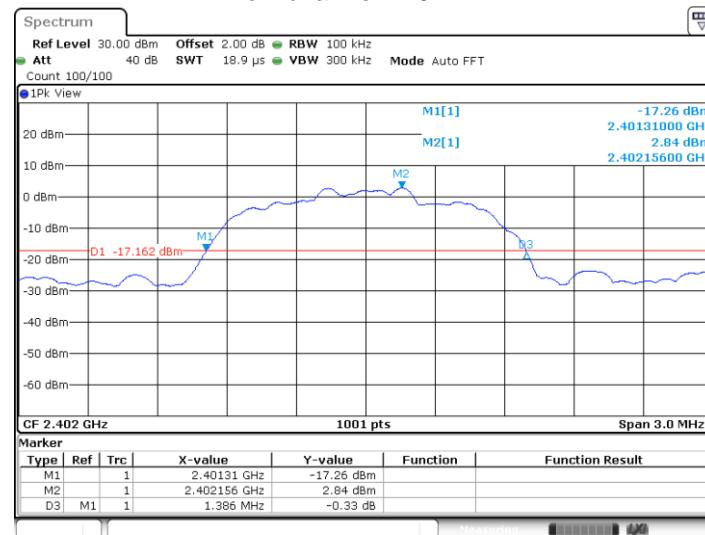
Date: 18.AUG.2021 22:52:15

20 dB bandwidth and 99% Occupied Bandwidth

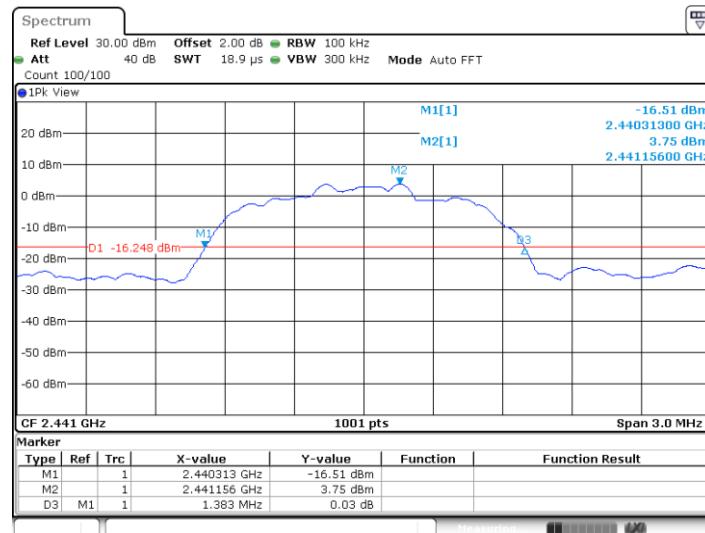
Bluetooth Mode 8DPSK Modulation test result

| Frequency MHz | 20 dB Bandwidth kHz | 99% Bandwidth kHz | Limit kHz | Result |
|------------------|------------------------|----------------------|--------------|--------|
| 2402 | 1386 | 1214 | -- | Pass |
| 2441 | 1383 | 1220 | -- | Pass |
| 2480 | 1389 | 1220 | -- | Pass |

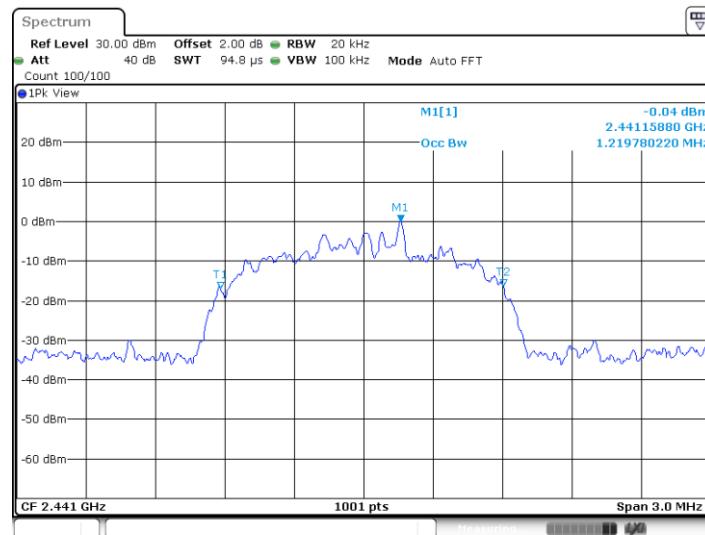
Low channel 2402MHz



Middle channel 2441MHz

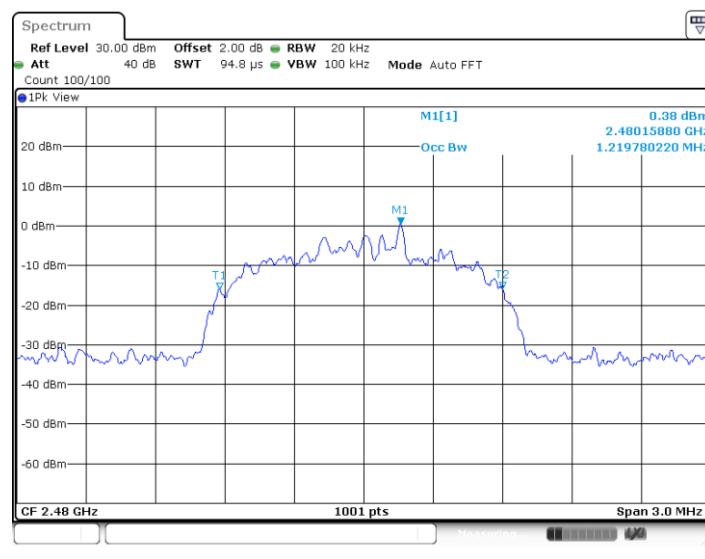
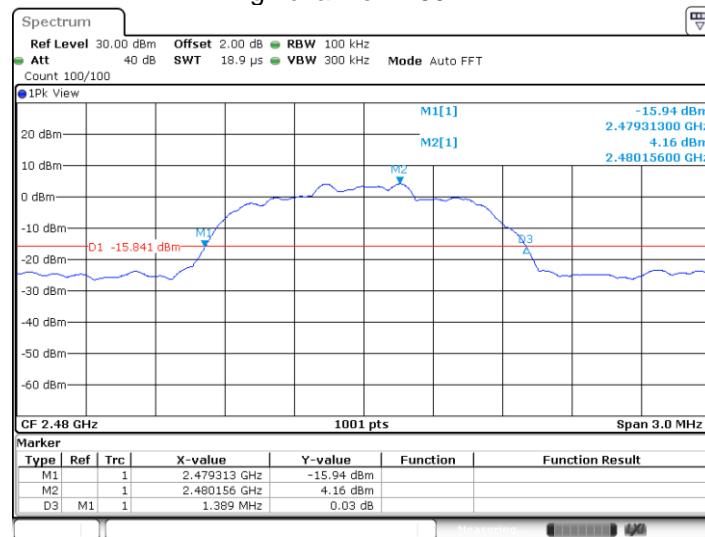


Date: 1.SEP.2021 15:49:50



Date: 1.SEP.2021 15:50:01

High channel 2480MHz



9.4 Carrier Frequency Separation

Test Method

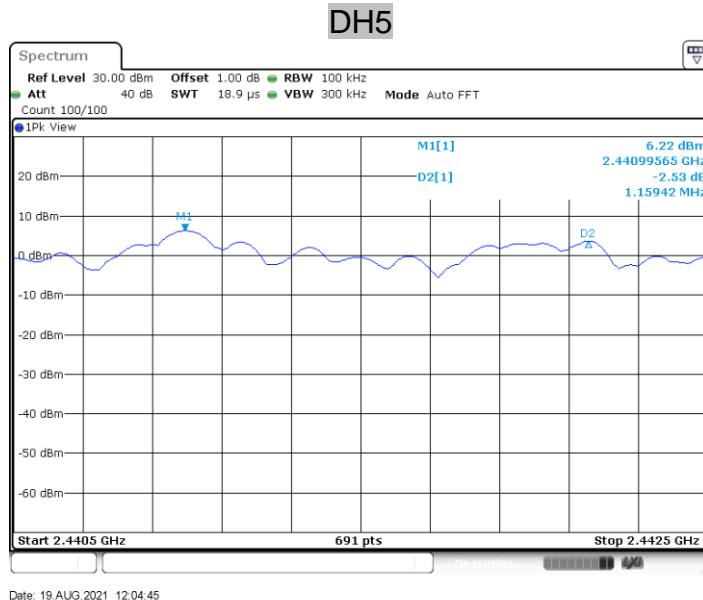
1. Use the following spectrum analyzer settings:
Span = wide enough to capture the peaks of two adjacent channels, RBW \geq 1% of the span, VBW \geq RBW, Sweep = auto, Detector function = peak
2. By using the Max-Hold function record the separation of two adjacent channels.
3. Measure the frequency difference of these two adjacent channels by spectrum analyzer marker function.
4. Repeat above procedures until all frequencies measured were complete.

Limit

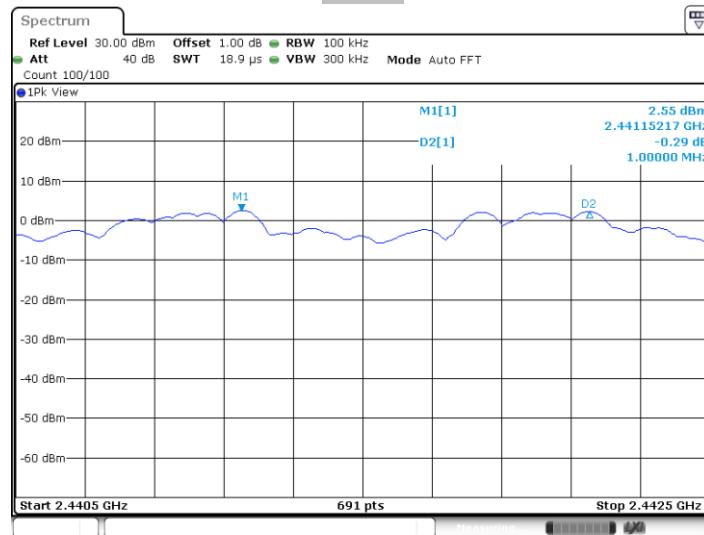
| Limit kHz |
|--|
| $\geq 25\text{KHz}$ or $2/3$ of the 20 dB bandwidth which is greater |

Carrier Frequency Separation

| TestMode | Channel | Result[MHz] | Limit[MHz] | Verdict |
|----------|---------|-------------|------------|---------|
| DH5 | Hop | 1.159 | >=1.140 | PASS |
| 2DH5 | Hop | 1.000 | >=0.910 | PASS |
| 3DH5 | Hop | 1.322 | >=0.926 | PASS |

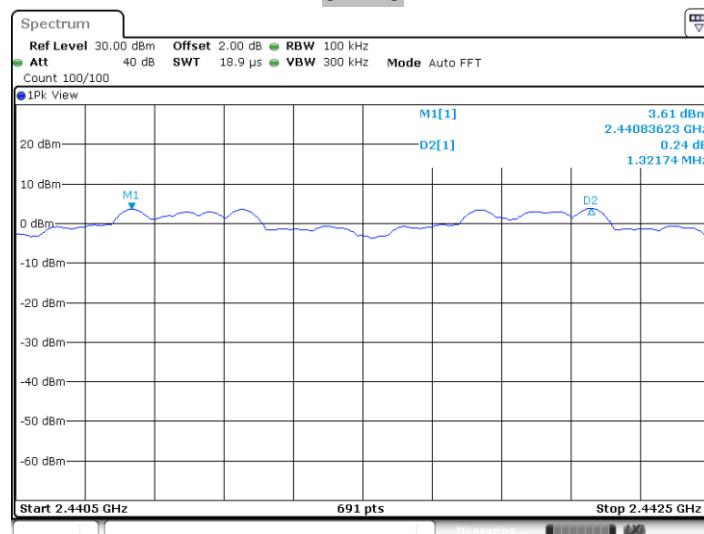


2DH5



Date: 19.AUG.2021 12:33:48

3DH5



Date: 1.SEP.2021 15:59:14

9.5 Number of hopping frequencies

Test Method

1. Use the following spectrum analyzer settings:
Span = wide enough to capture the peaks of two adjacent channels, RBW $\geq 1\%$ of the span, VBW) \geq RBW, Sweep = auto, Detector function = peak
2. Set the spectrum analyzer on Max-Hold Mode, and then keep the EUT in hopping mode.
3. Record all the signals from each channel until each one has been recorded.
4. Repeat above procedures until all frequencies measured were complete.

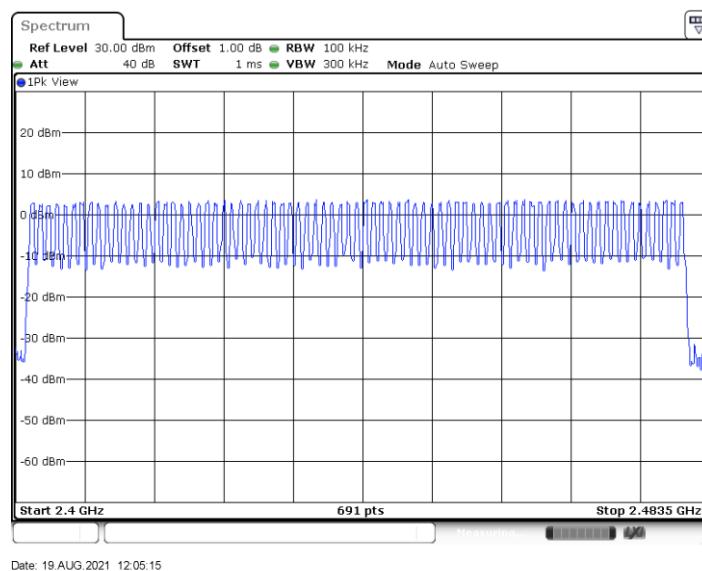
Limit

| Limit number |
|-----------------|
| ≥ 15 |

Number of hopping frequencies

Test result: The measurement was performed with the typical configuration (normal hopping status), and the total hopping channels is constant for the all modulation mode according with the Bluetooth Core Specification. Here GFSK modulation mode was used to show compliance.

| Number of hopping frequencies | Result |
|-------------------------------|--------|
| 79 | Pass |



9.6 Dwell Time

Test Method

1. Connect EUT antenna terminal to the spectrum analyzer with a low loss cable.
Equipment mode: Spectrum analyzer
2. RBW: 1MHz; VBW: 1MHz; SPAN: Zero Span
3. Adjust the center frequency of spectrum analyzer on any frequency to be measured.
4. Measure the Dwell Time by spectrum analyzer Marker function.
5. Repeat above procedures until all frequencies measured were complete.

Limit

The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

Dwell Time

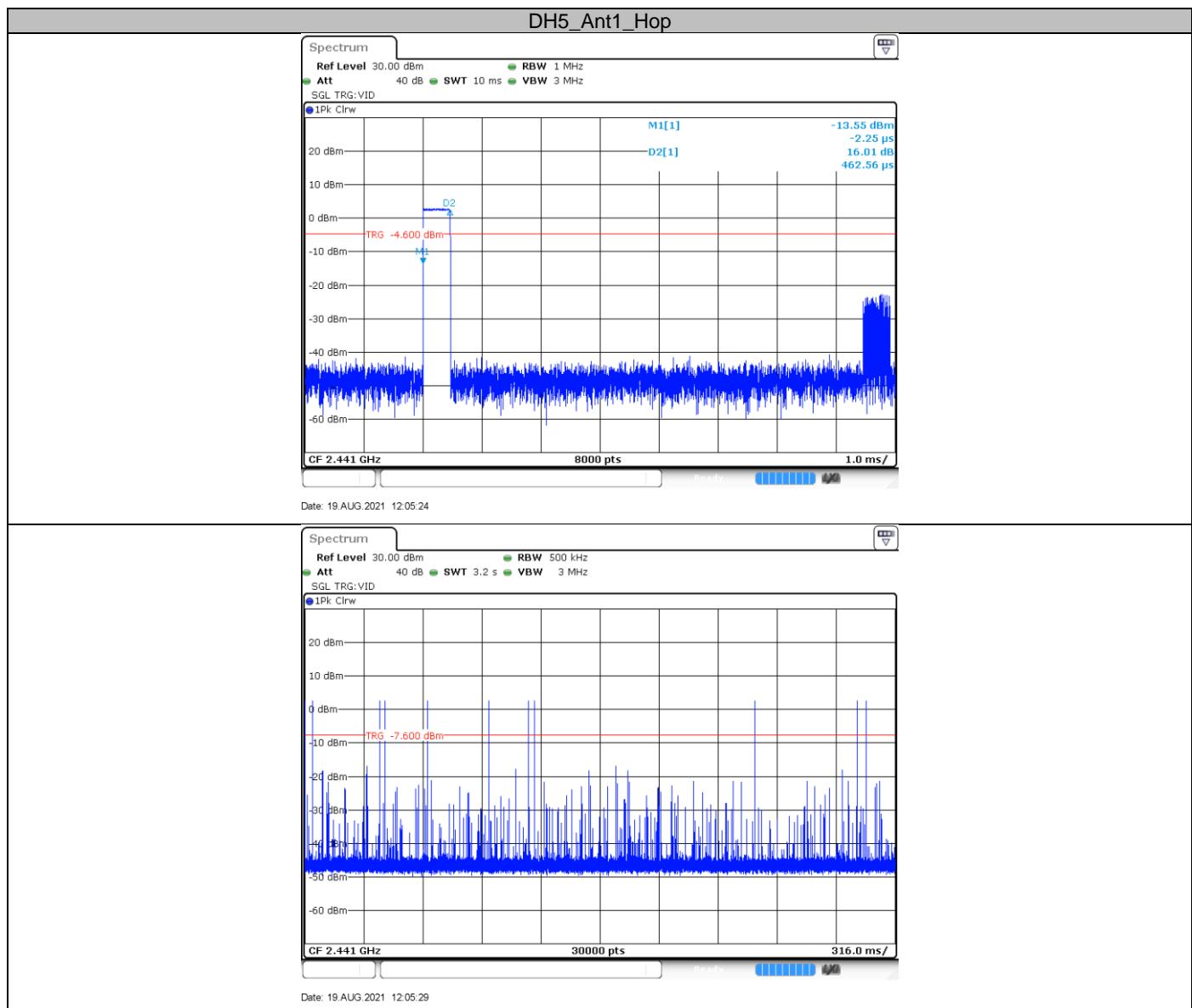
Dwell time

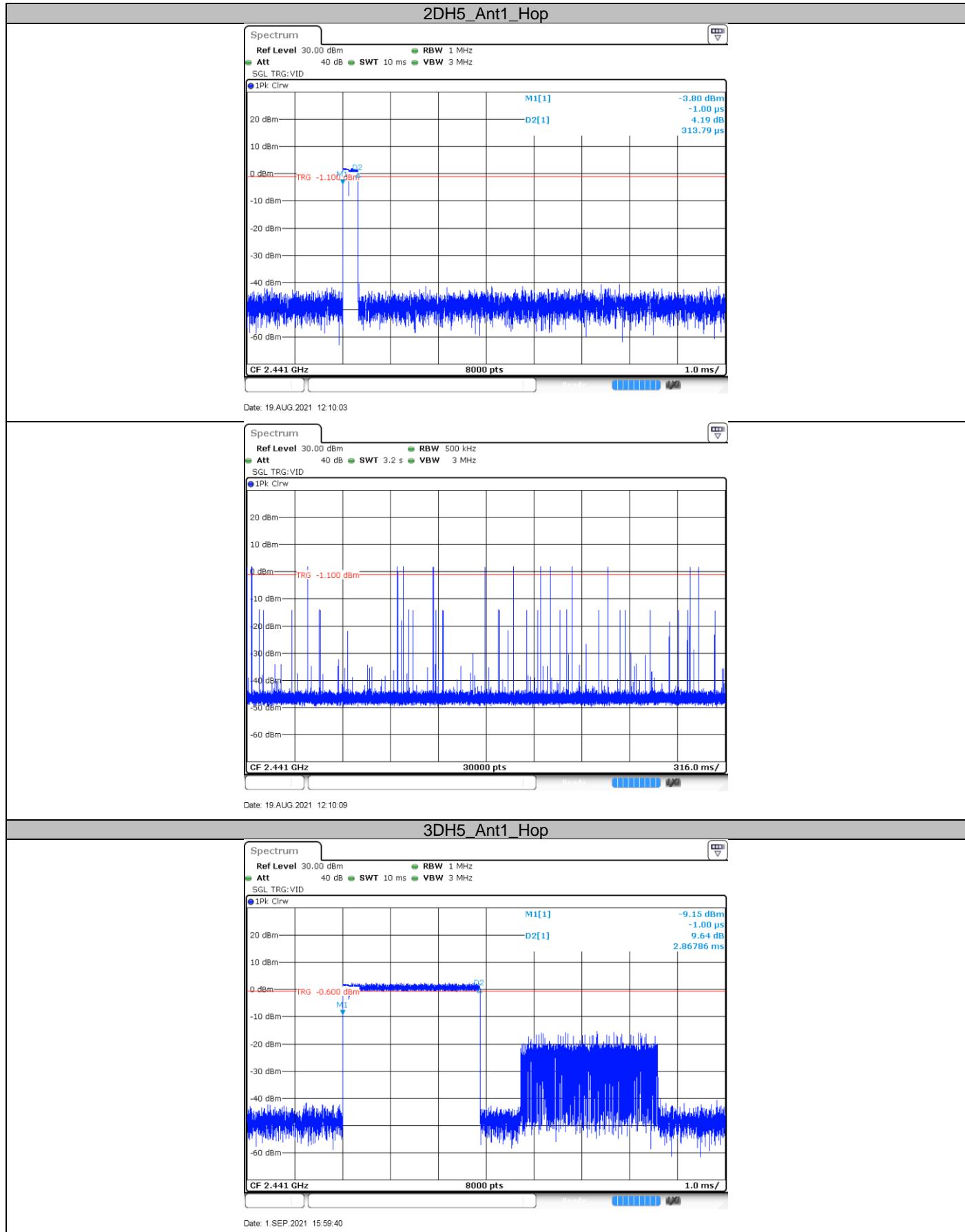
The maximum dwell time shall be 0.4 s.

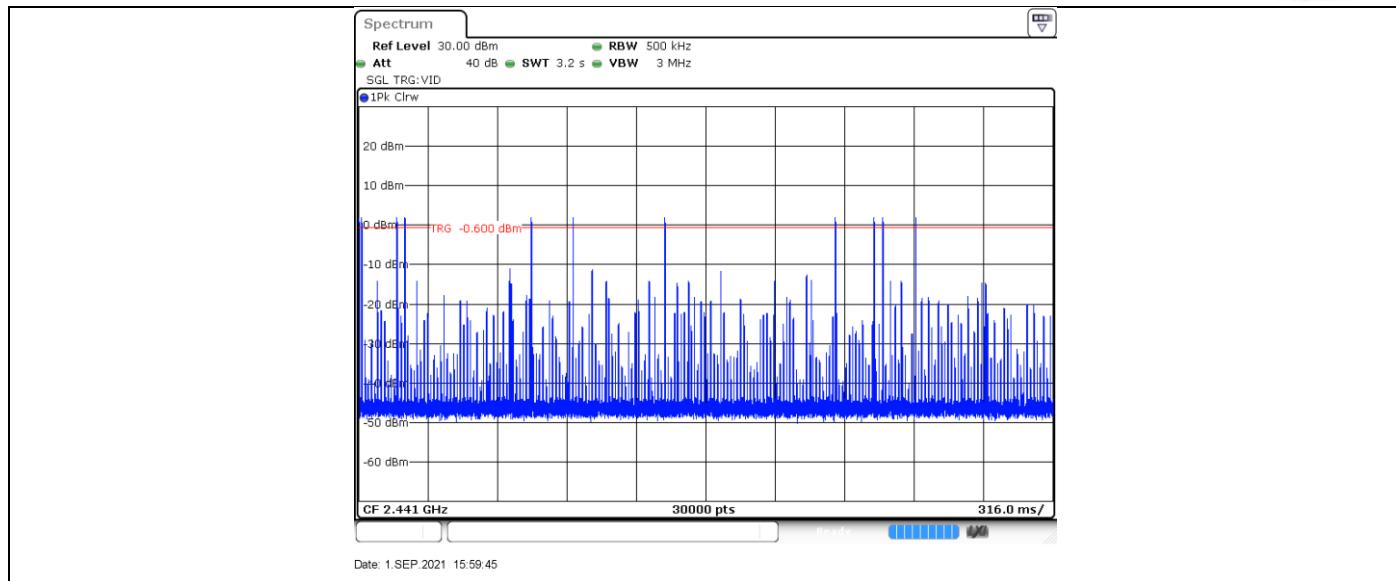
The Dwell Time = Burst Width * Total Hops. The detailed calculations are showed as follows:
 The duration for dwell time calculation: $0.4 \text{ [s]} * \text{hopping number} = 0.4 \text{ [s]} * 79 \text{ [ch]} = 31.6 \text{ [s*ch]}$;

Test Result

| TestMode | Channel | BurstWidth (ms) | TotalHops | Result(s) | Limit(s) | Verdict |
|----------|---------|-----------------|-----------|-----------|----------|---------|
| DH5 | Hop | 0.46 | 110 | 0.051 | <=0.4 | PASS |
| 2DH5 | Hop | 0.31 | 140 | 0.044 | <=0.4 | PASS |
| 3DH5 | Hop | 2.87 | 110 | 0.315 | <=0.4 | PASS |







9.7 Spurious RF conducted emissions

Test Method

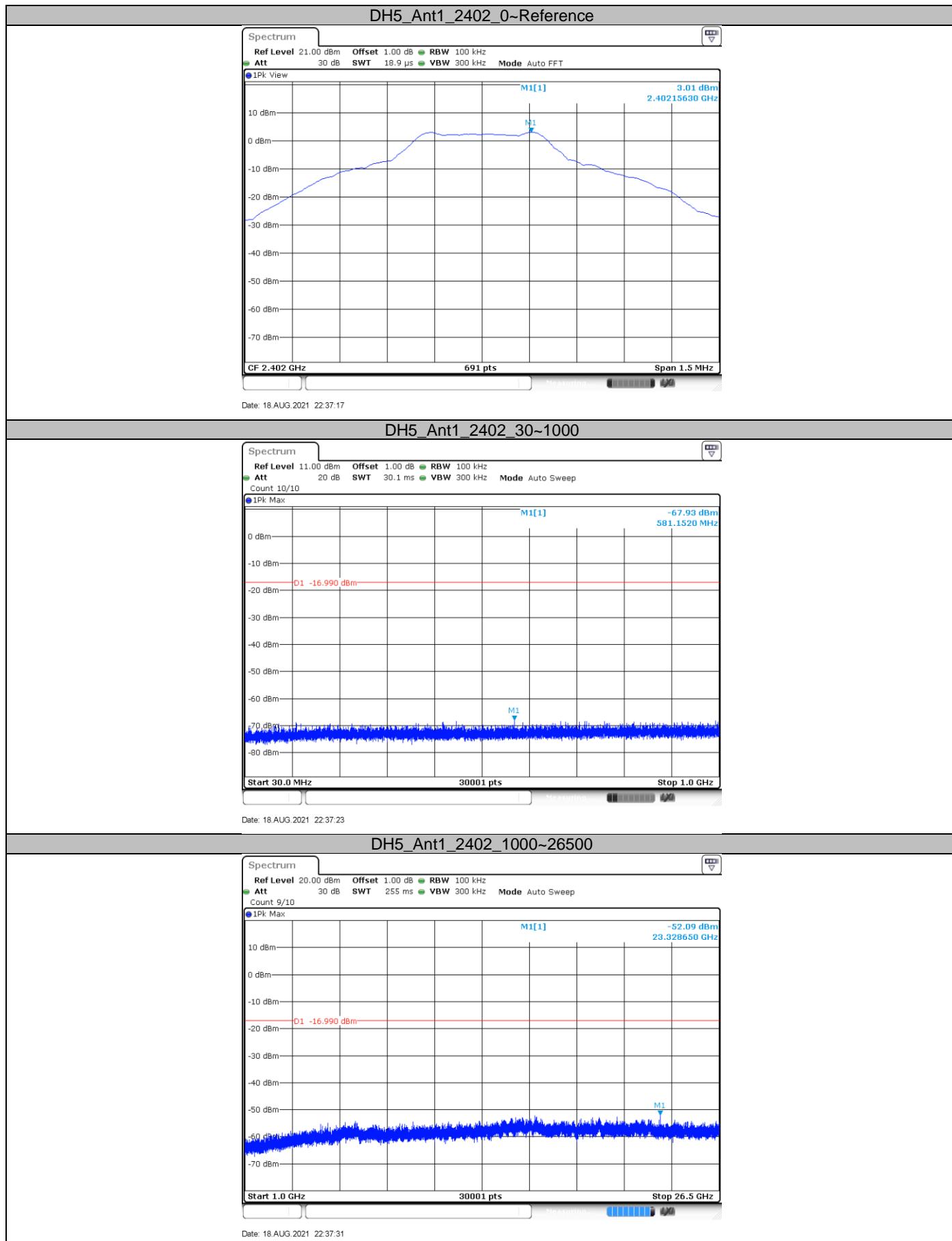
1. Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
RBW = 100 kHz, VBW≥RBW, Sweep = auto, Detector function = peak, Trace = max hold
2. Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded.
3. The level displayed must comply with the limit specified in this Section. Submit these plots.
4. Repeat above procedures until all frequencies measured were complete.

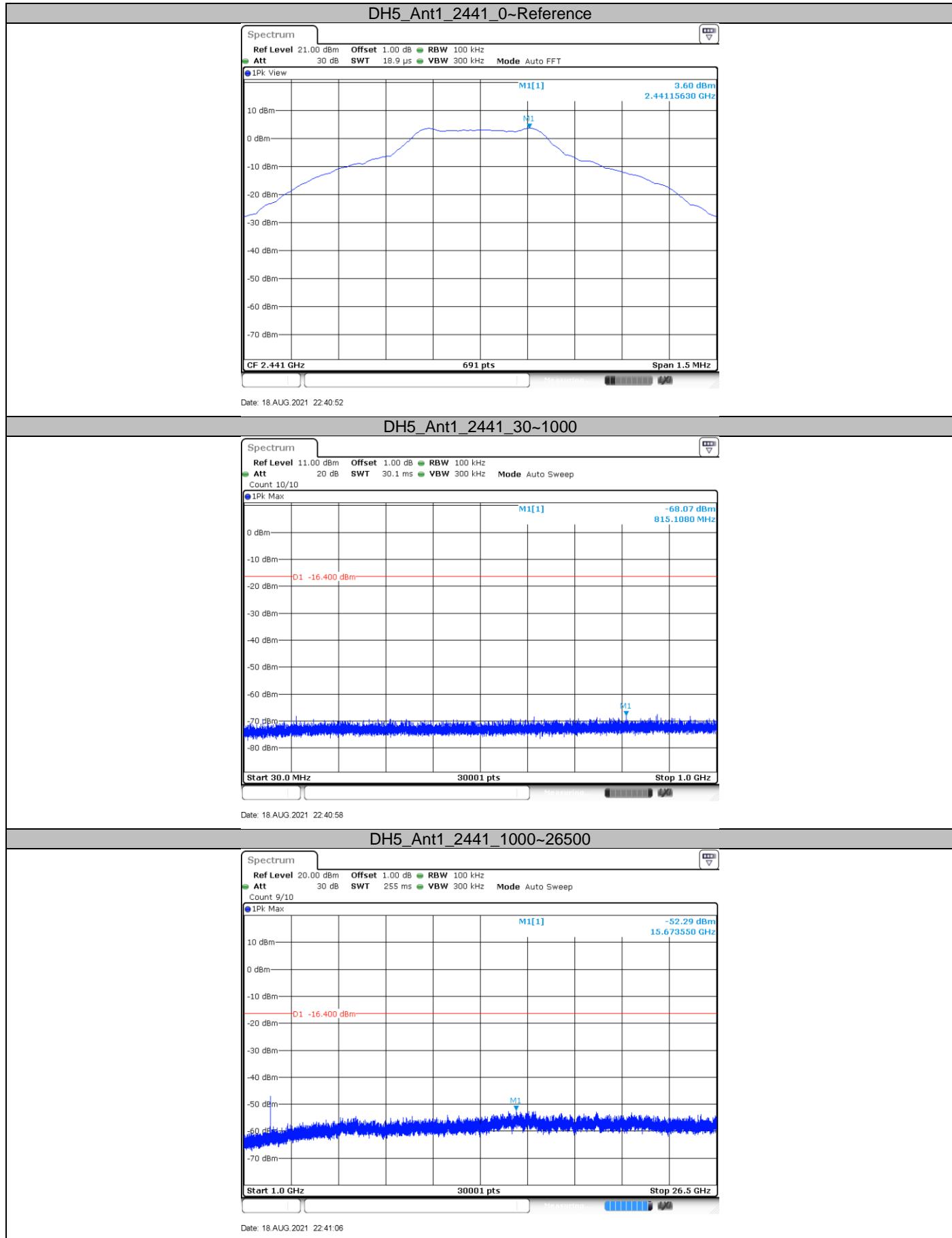
Limit

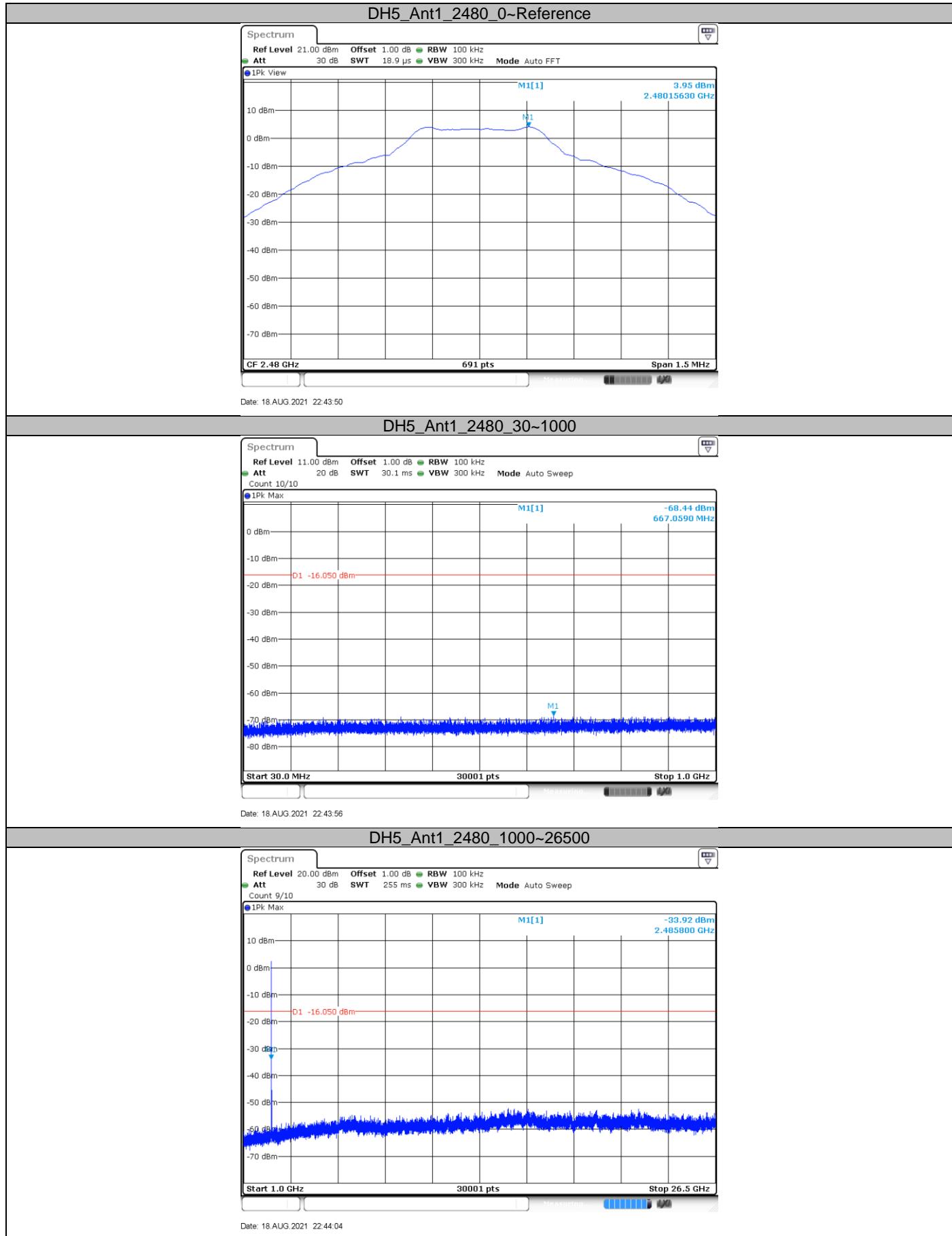
| Frequency Range MHz | Limit (dBc) |
|------------------------|-------------|
| 30-25000 | -20 |

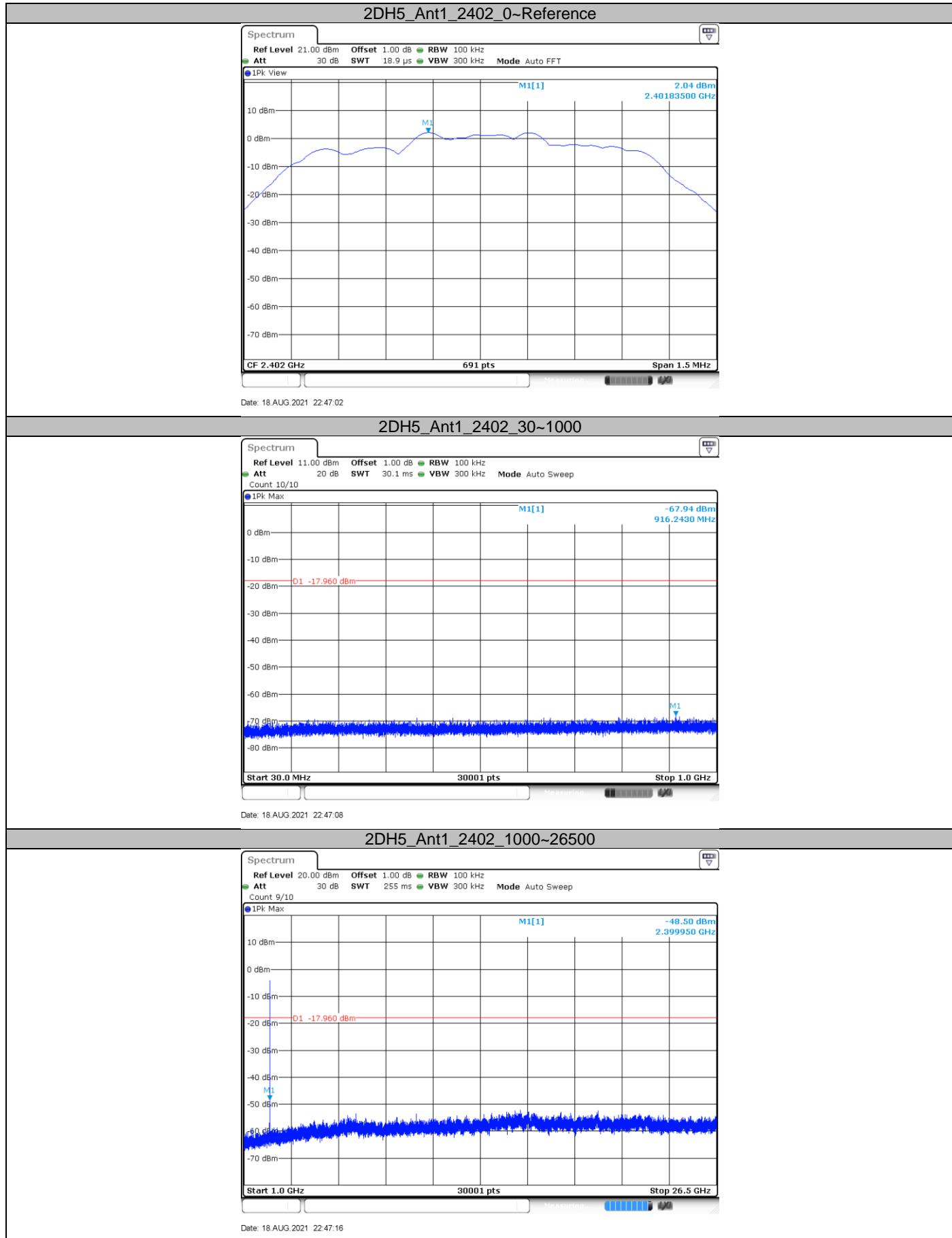
Spurious RF conducted emissions

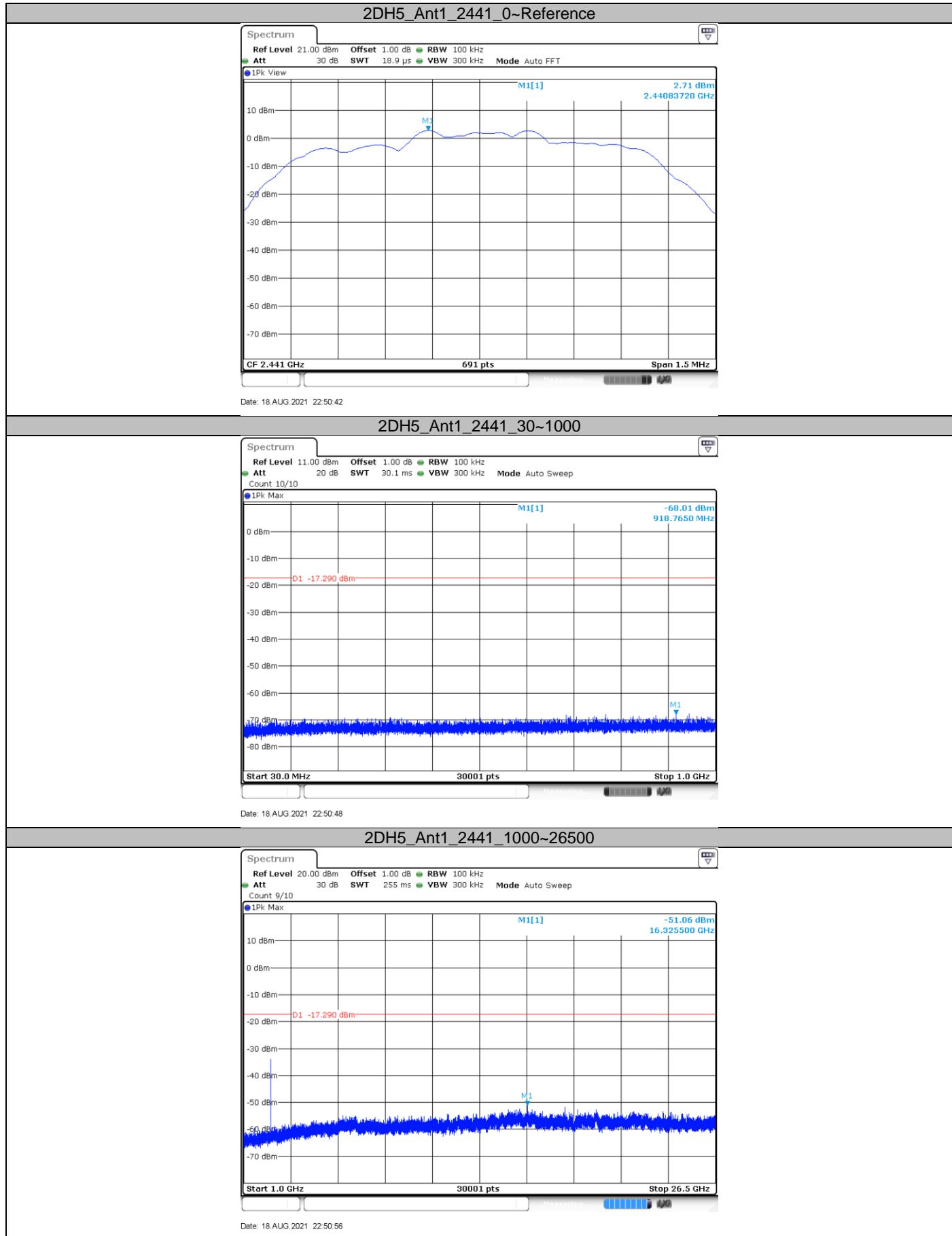
| TestMode | Antenna | Channel(MHz) | FreqRange(MHz) | RefLevel | Result(dBm) | Limit(dBm) | Verdict |
|----------|---------|--------------|----------------|-----------------|-------------|------------|---------|
| DH5 | Ant1 | 2402 | Reference | 3.01(dBm) | 3.01 | --- | PASS |
| | | | 30~1000 | 30~1000(MHz) | -67.93 | <=-16.99 | PASS |
| | | | 1000~26500 | 1000~26500(MHz) | -52.09 | <=-16.99 | PASS |
| | | 2441 | Reference | 3.60(dBm) | 3.60 | --- | PASS |
| | | | 30~1000 | 30~1000(MHz) | -68.07 | <=-16.4 | PASS |
| | | | 1000~26500 | 1000~26500(MHz) | -52.29 | <=-16.4 | PASS |
| | | 2480 | Reference | 3.95(dBm) | 3.95 | --- | PASS |
| | | | 30~1000 | 30~1000(MHz) | -68.44 | <=-16.05 | PASS |
| | | | 1000~26500 | 1000~26500(MHz) | -33.92 | <=-16.05 | PASS |
| 2DH5 | Ant1 | 2402 | Reference | 2.04(MHz) | 2.04 | --- | PASS |
| | | | 30~1000 | 30~1000(MHz) | -67.94 | <=-17.96 | PASS |
| | | | 1000~26500 | 1000~26500(MHz) | -48.5 | <=-17.96 | PASS |
| | | 2441 | Reference | 2.71(dBm) | 2.71 | --- | PASS |
| | | | 30~1000 | 30~1000(MHz) | -68.01 | <=-17.29 | PASS |
| | | | 1000~26500 | 1000~26500(MHz) | -51.06 | <=-17.29 | PASS |
| | | 2480 | Reference | 3.22(dBm) | 3.22 | --- | PASS |
| | | | 30~1000 | 30~1000(MHz) | -68.39 | <=-16.78 | PASS |
| | | | 1000~26500 | 1000~26500(MHz) | -52.5 | <=-16.78 | PASS |
| 3DH5 | Ant1 | 2402 | Reference | 2.89(dBm) | 2.89 | --- | PASS |
| | | | 30~1000 | 30~1000(MHz) | -67.03 | <=-17.11 | PASS |
| | | | 1000~26500 | 1000~26500(MHz) | -30.4 | <=-17.11 | PASS |
| | | 2441 | Reference | 3.74(dBm) | 3.74 | --- | PASS |
| | | | 30~1000 | 30~1000(MHz) | -66.81 | <=-16.26 | PASS |
| | | | 1000~26500 | 1000~26500(MHz) | -51.09 | <=-16.26 | PASS |
| | | 2480 | Reference | 4.14(dBm) | 4.14 | --- | PASS |
| | | | 30~1000 | 30~1000(MHz) | -67.18 | <=-15.86 | PASS |
| | | | 1000~26500 | 1000~26500(MHz) | -28.99 | <=-15.86 | PASS |

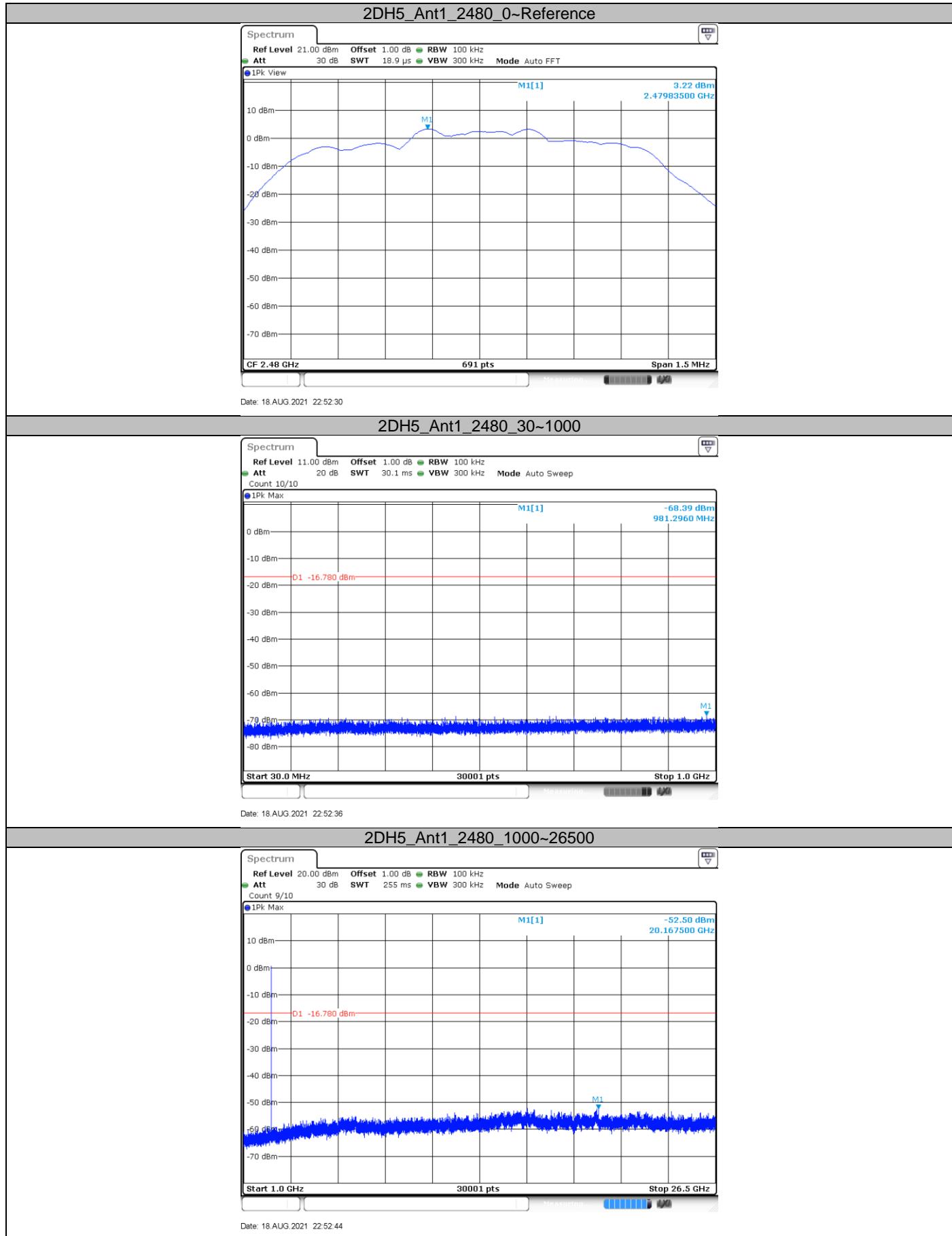


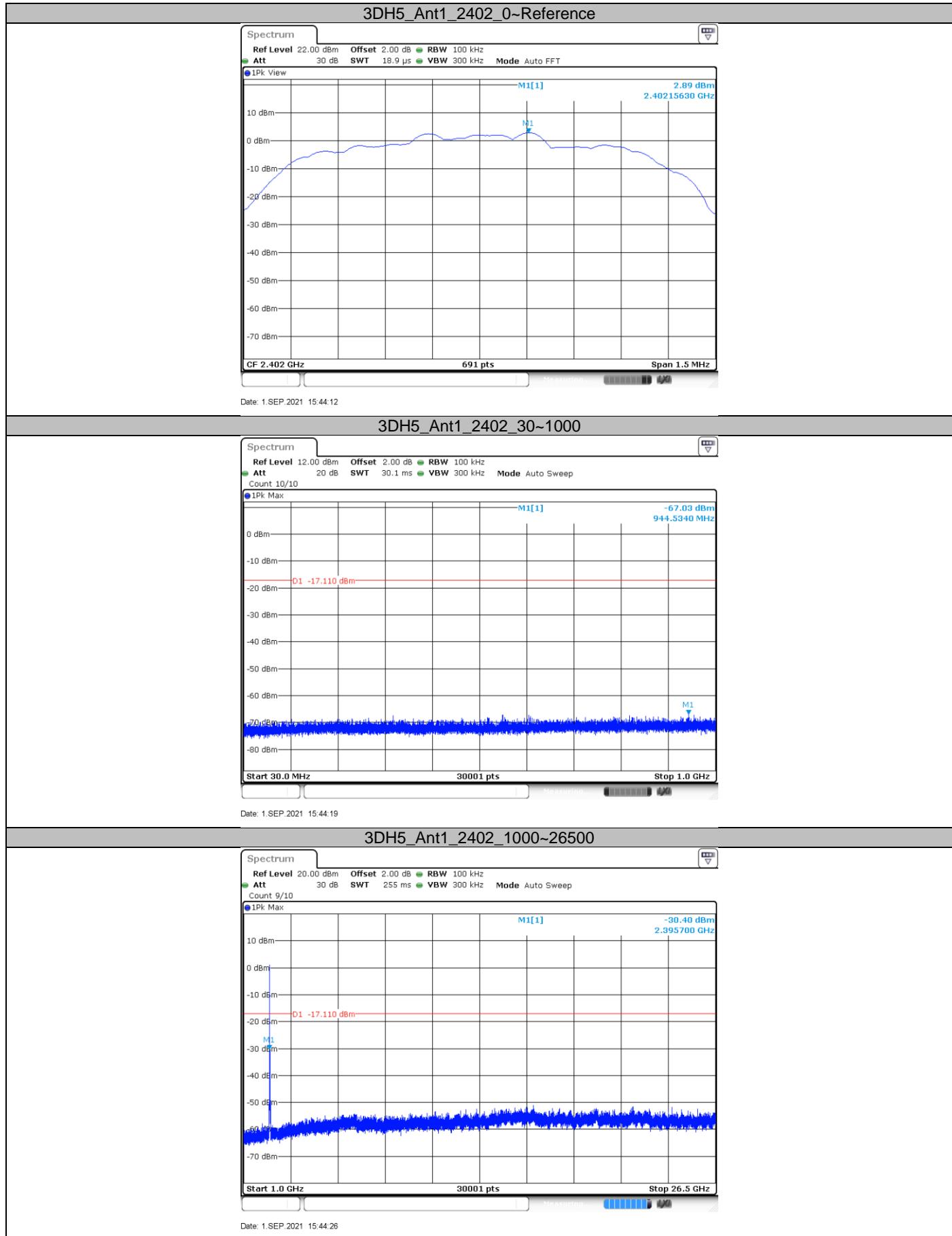


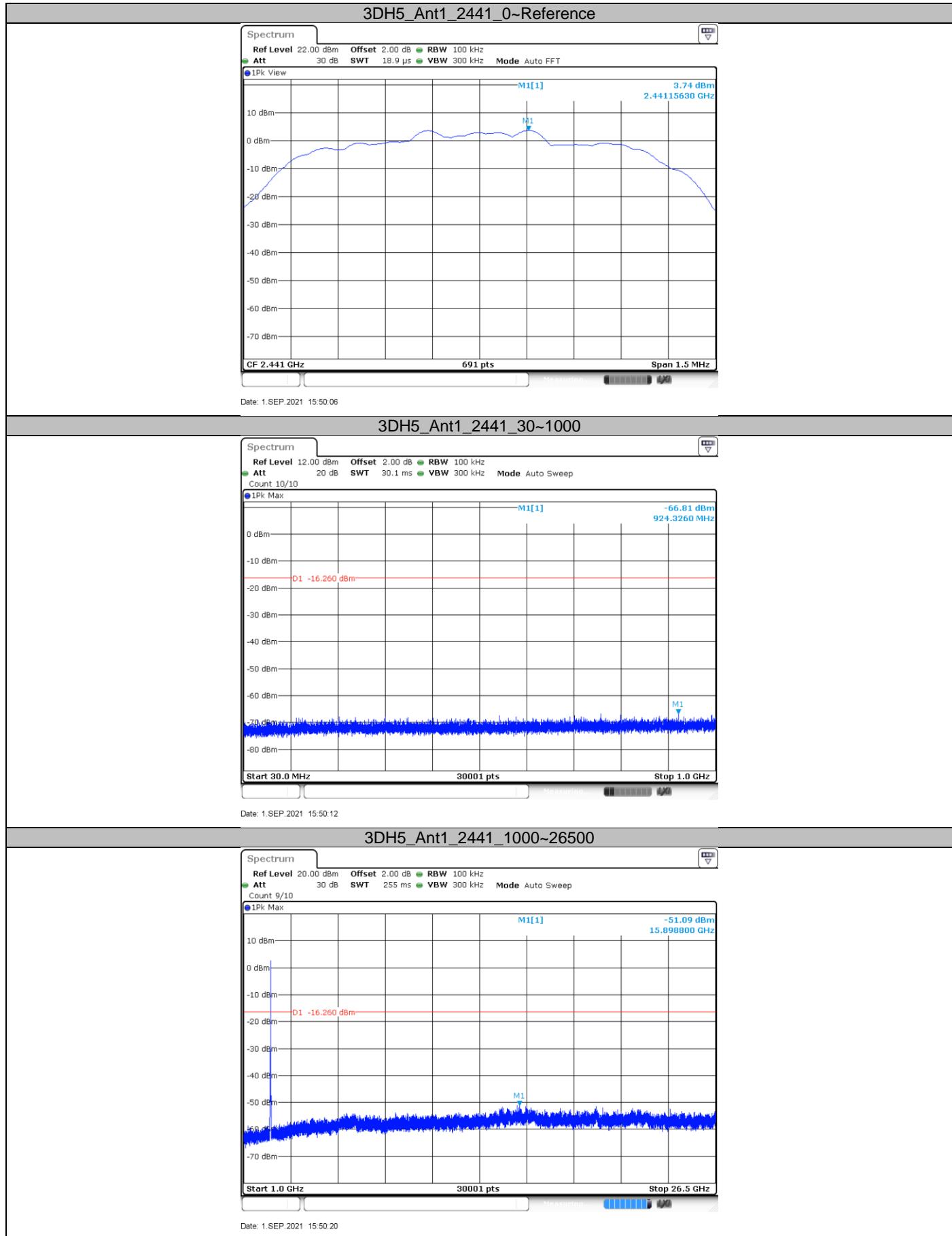


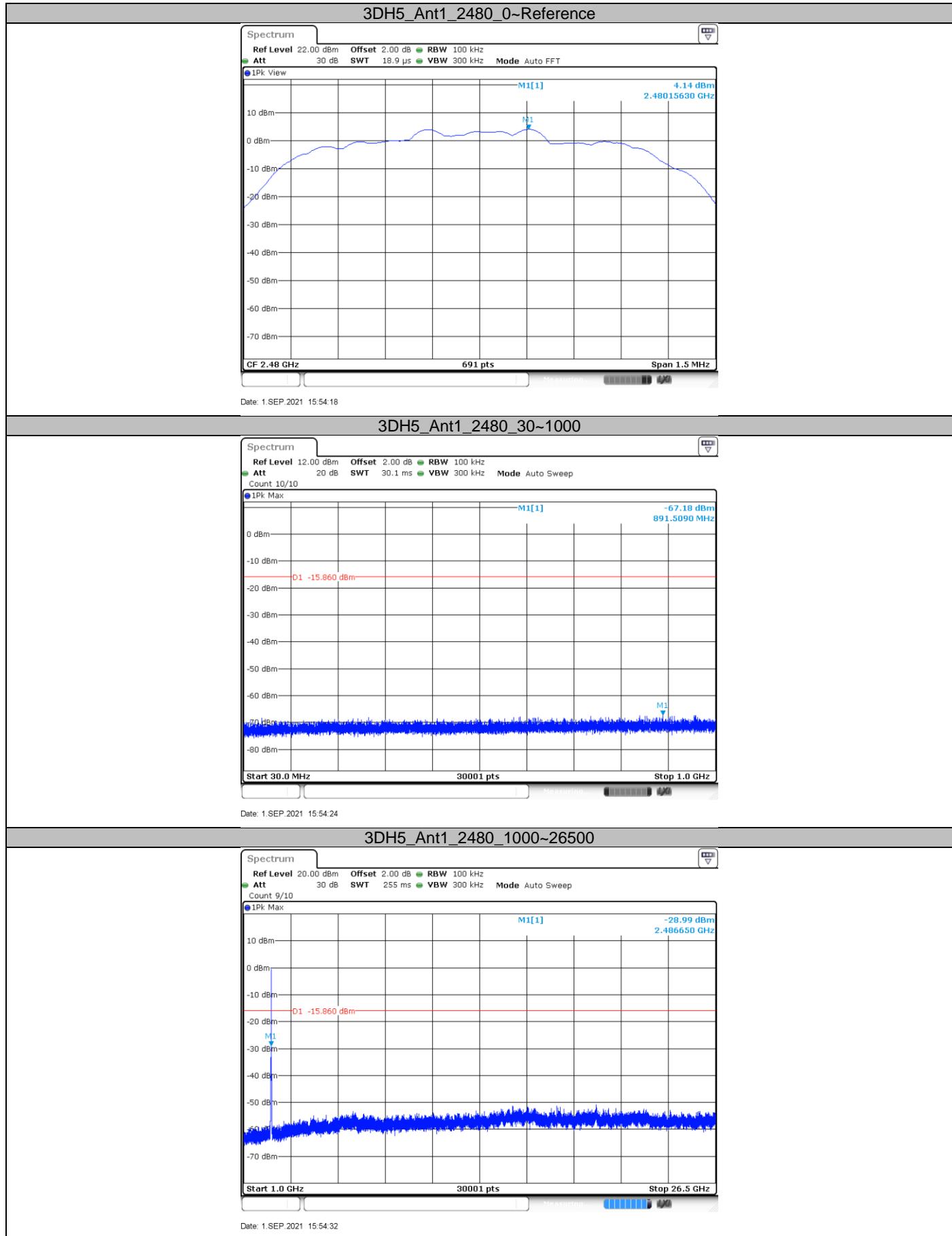












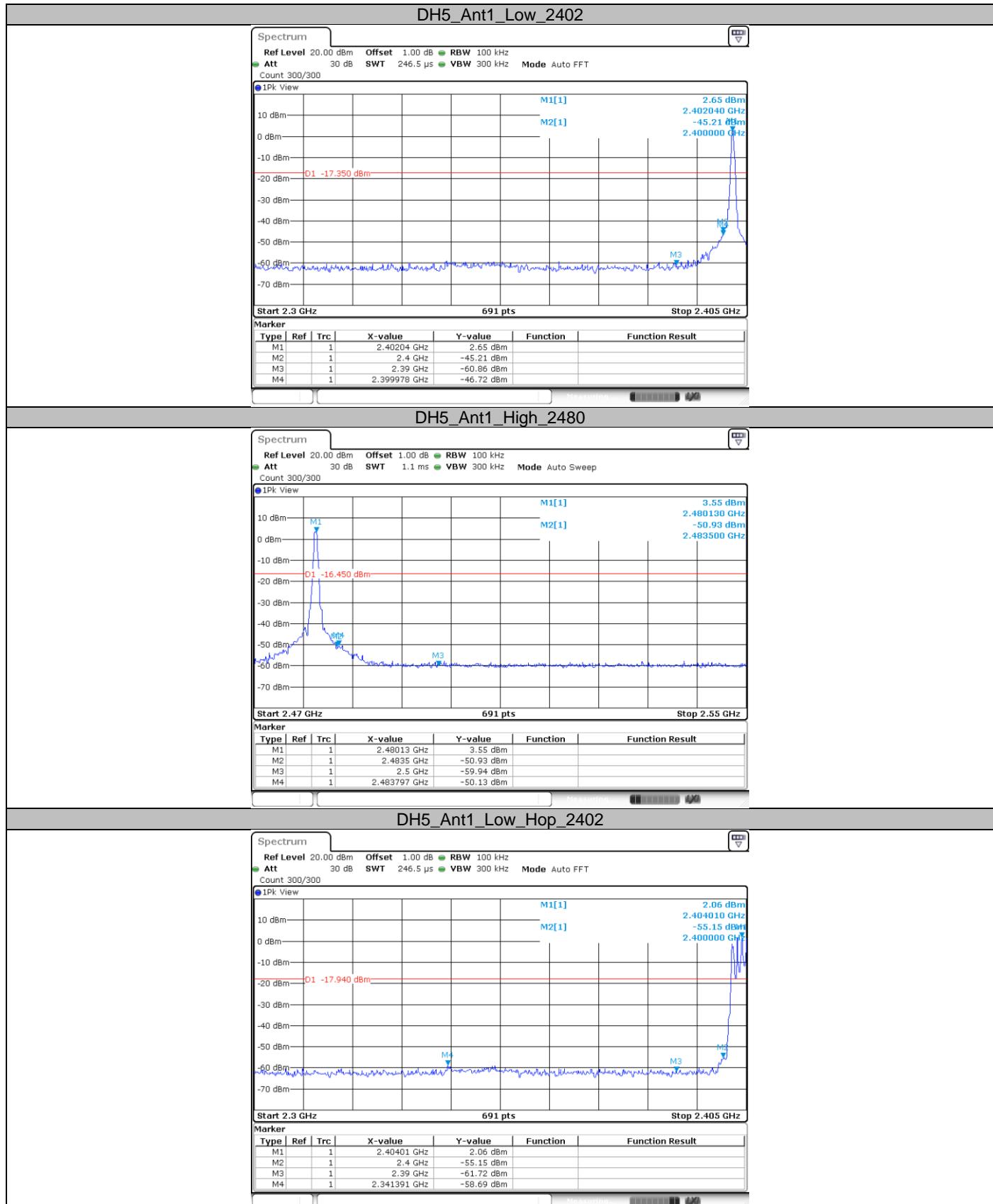
9.8 Band edge testing

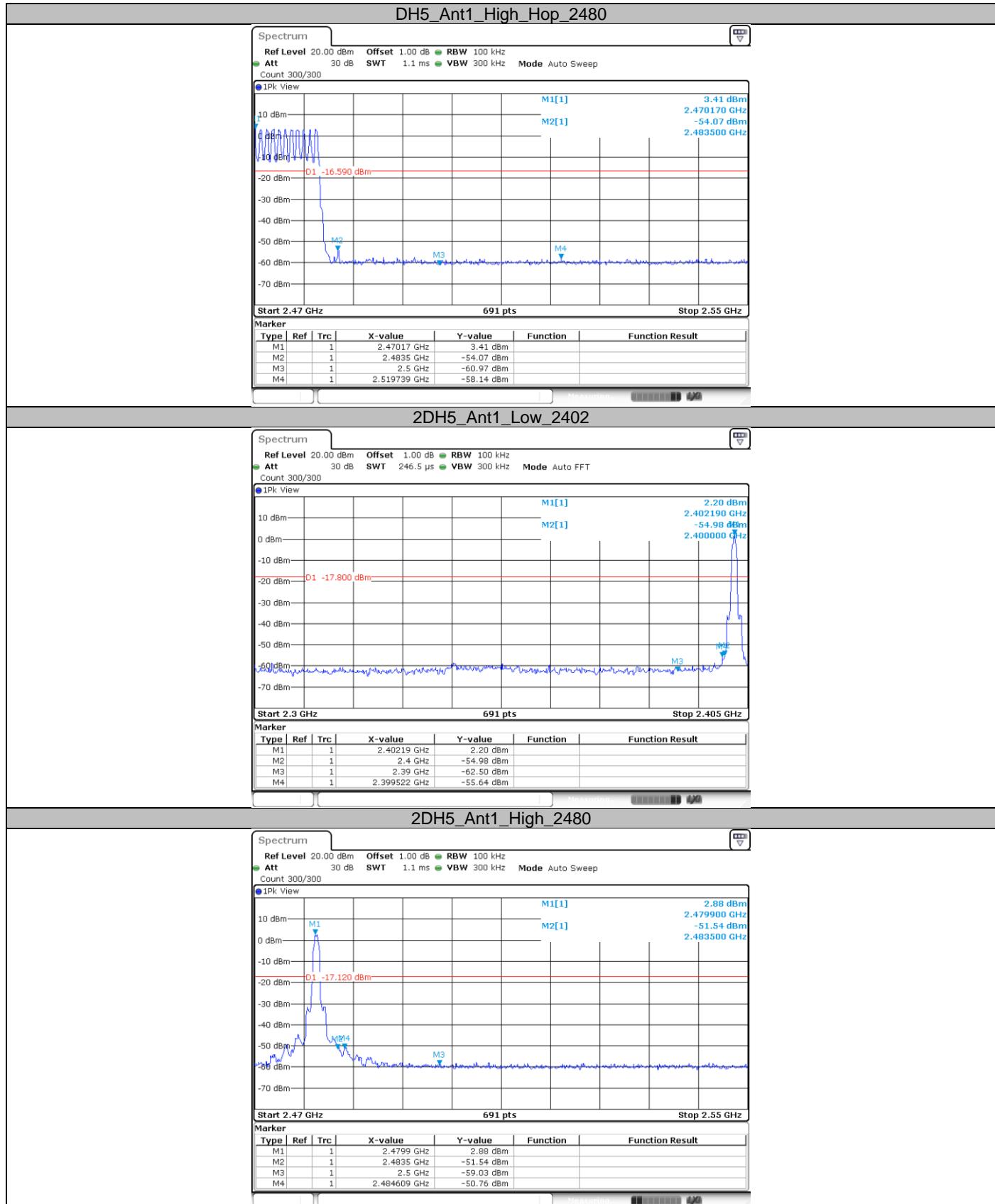
Test Method

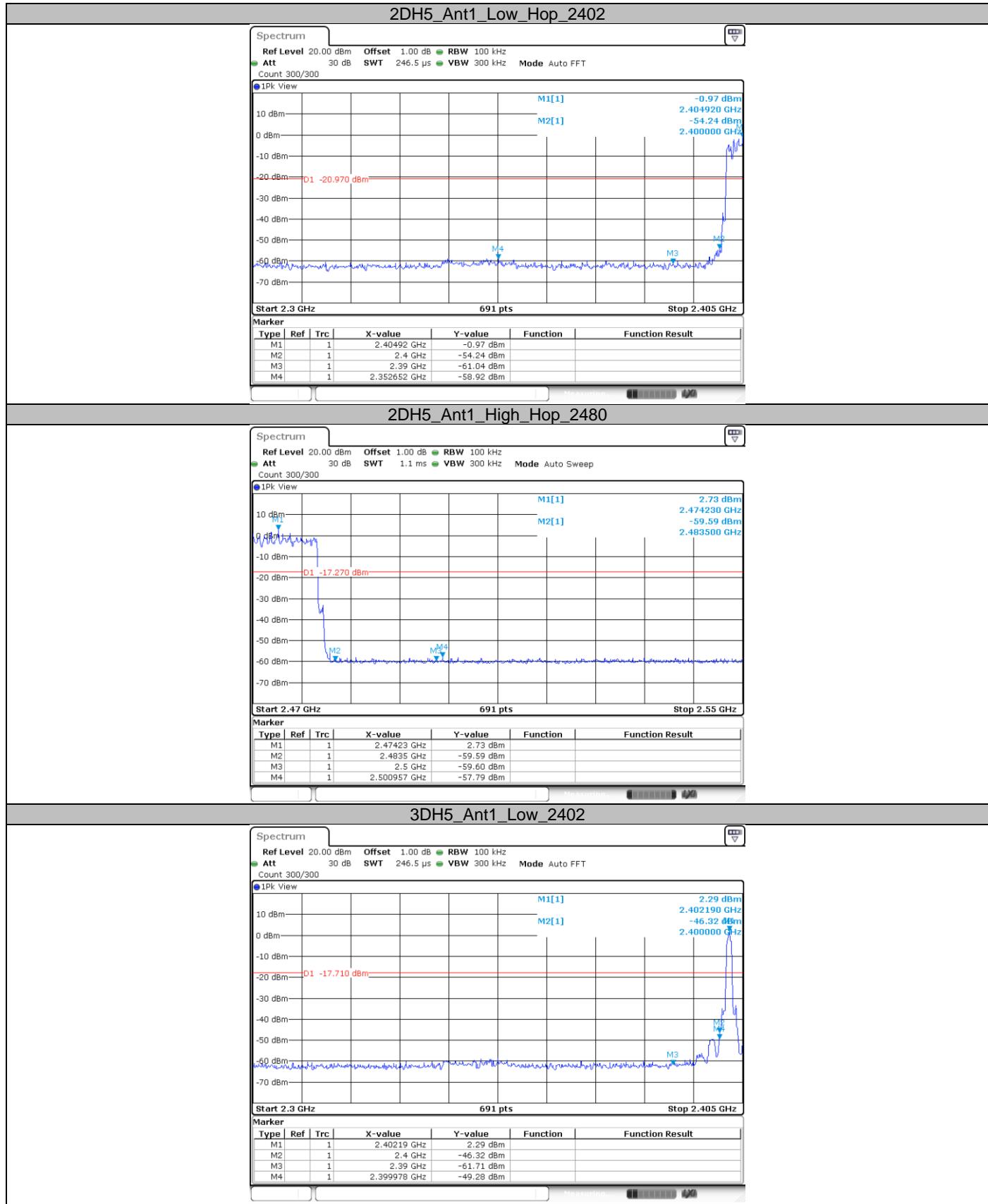
- 1 Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 kHz, VBW \geq RBW, Sweep = auto, Detector function = peak, Trace = max
hold
- 2 Allow the trace to stabilize, use the peak and delta measurement to record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

Limit:

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.









9.9 Spurious radiated emissions for transmitter

Test Method

- 1: The EUT was place 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≥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≥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 correct factor, derived from the appropriate the duty cycle calculation.

The setting method can refer to DA00-705.

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.

| 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 |

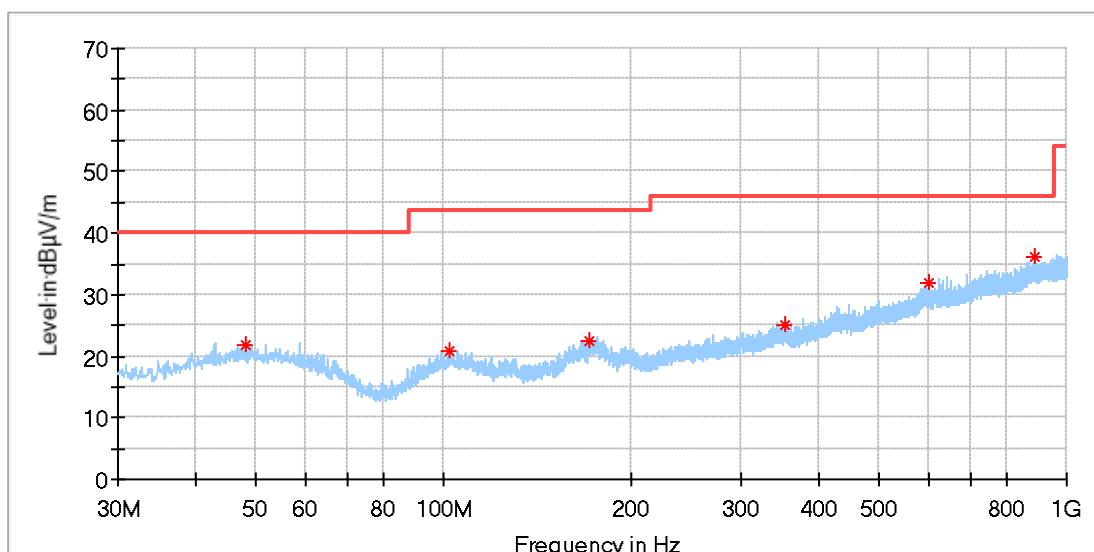
Spurious radiated emissions for transmitter

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.

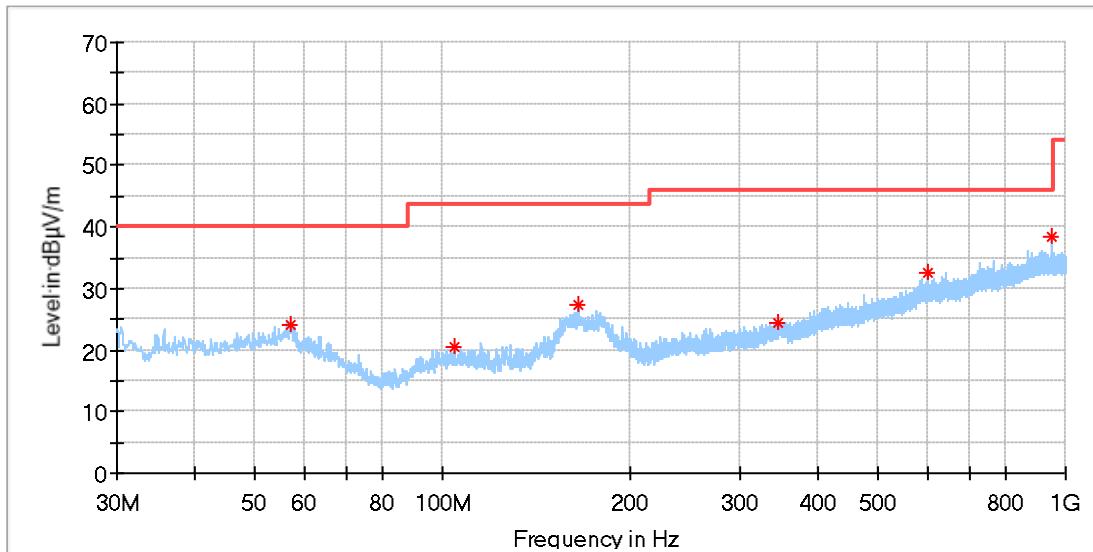
The only worse case (8DPSK mode) test result is listed in the report.

Transmitting spurious emission test result as below:

Below 1G:

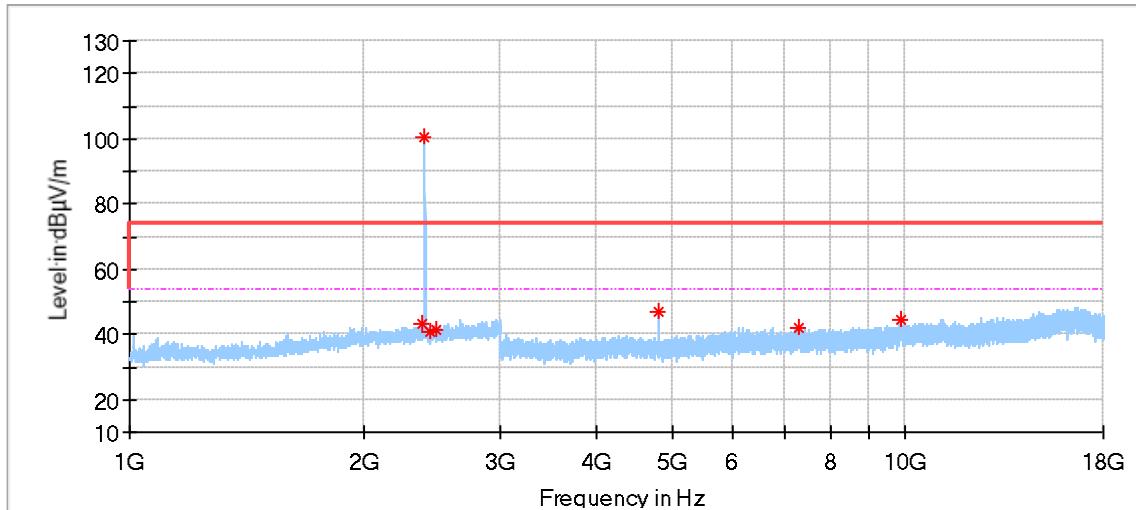


| Frequency (MHz) | MaxPeak (dB μ V/m) | Limit (dB μ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------------|----------------------|-------------|-------------|-----|---------------|--------------|
| 48.066250 | 21.93 | 40.00 | 18.07 | 100.0 | H | 355.0 | 18.03 |
| 102.083125 | 20.76 | 43.50 | 22.74 | 200.0 | H | 0.0 | 16.62 |
| 170.831875 | 22.49 | 43.50 | 21.01 | 200.0 | H | 38.0 | 13.77 |
| 352.403750 | 25.17 | 46.00 | 20.83 | 100.0 | H | 0.0 | 20.83 |
| 601.026875 | 31.88 | 46.00 | 14.12 | 100.0 | H | 163.0 | 25.83 |
| 887.722500 | 36.06 | 46.00 | 9.94 | 100.0 | H | 139.0 | 29.47 |

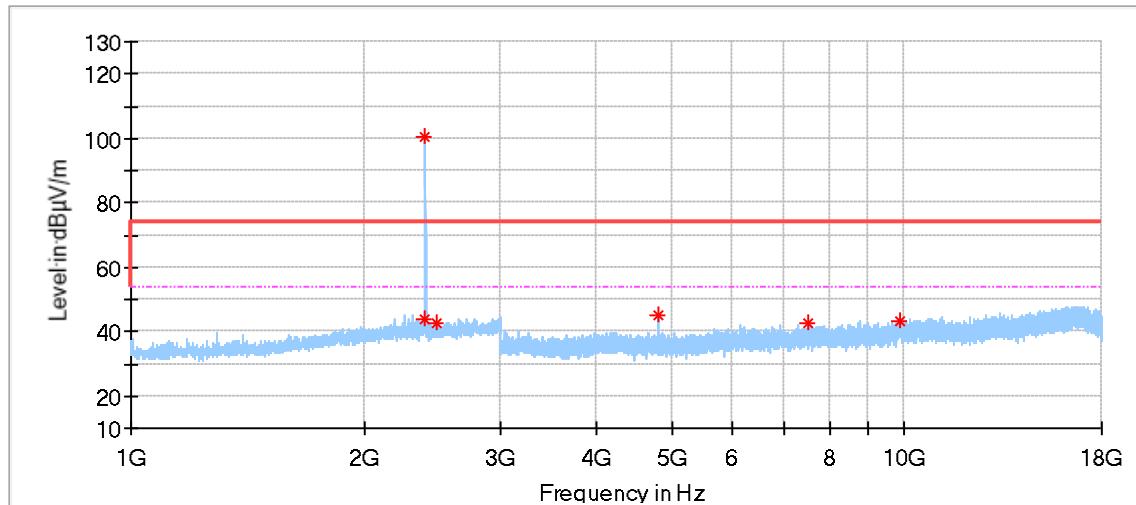


| Frequency (MHz) | MaxPeak (dB μ V/m) | Limit (dB μ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------------|----------------------|-------------|-------------|-----|---------------|--------------|
| 56.917500 | 24.15 | 40.00 | 15.85 | 100.0 | V | 0.0 | 17.69 |
| 104.326250 | 20.35 | 43.50 | 23.15 | 200.0 | V | 0.0 | 16.60 |
| 164.708750 | 27.29 | 43.50 | 16.21 | 100.0 | V | 134.0 | 13.61 |
| 345.310625 | 24.57 | 46.00 | 21.43 | 200.0 | V | 0.0 | 20.58 |
| 602.845625 | 32.45 | 46.00 | 13.55 | 100.0 | V | 209.0 | 25.85 |
| 948.590000 | 38.46 | 46.00 | 7.54 | 100.0 | V | 5.0 | 29.94 |

Low channel 2402MHz

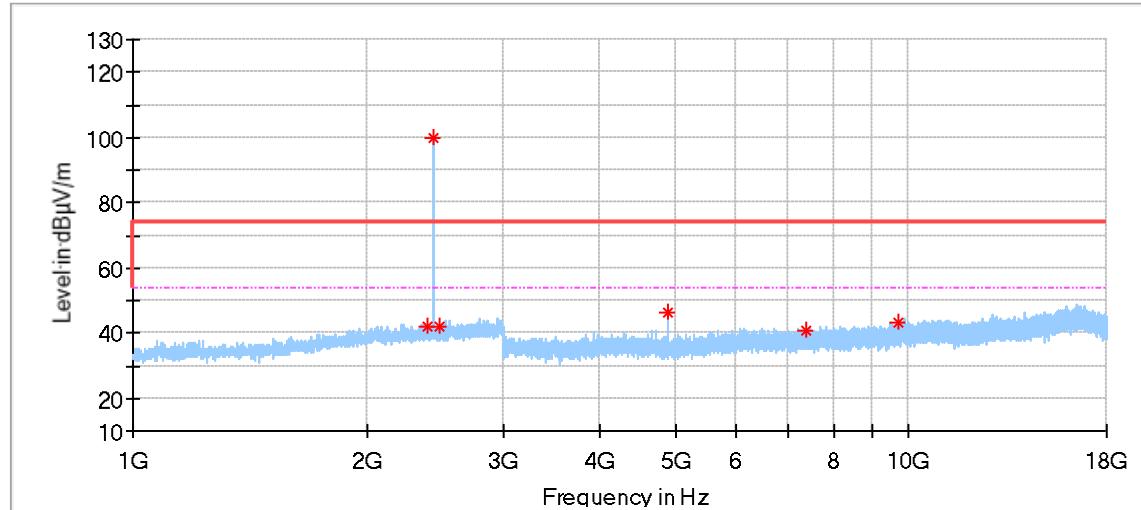


| Frequency (MHz) | MaxPeak (dB μ V/m) | Limit (dB μ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------------|----------------------|-------------|-------------|-----|---------------|--------------|
| 2387.142857 | 43.18 | 74.00 | 30.82 | 150.0 | H | 256.0 | -2.95 |
| 2402.380952 | 100.59 | 74.00 | -26.59 | 150.0 | H | 307.0 | -2.99 |
| 2438.571429 | 40.94 | 74.00 | 33.06 | 150.0 | H | 18.0 | -2.91 |
| 2488.095238 | 41.26 | 74.00 | 32.74 | 150.0 | H | 185.0 | -2.69 |
| 4804.000000 | 46.81 | 74.00 | 27.19 | 150.0 | H | 172.0 | 2.18 |
| 7281.000000 | 42.27 | 74.00 | 31.73 | 150.0 | H | 301.0 | 6.99 |
| 9885.500000 | 44.64 | 74.00 | 29.36 | 150.0 | H | 249.0 | 11.00 |

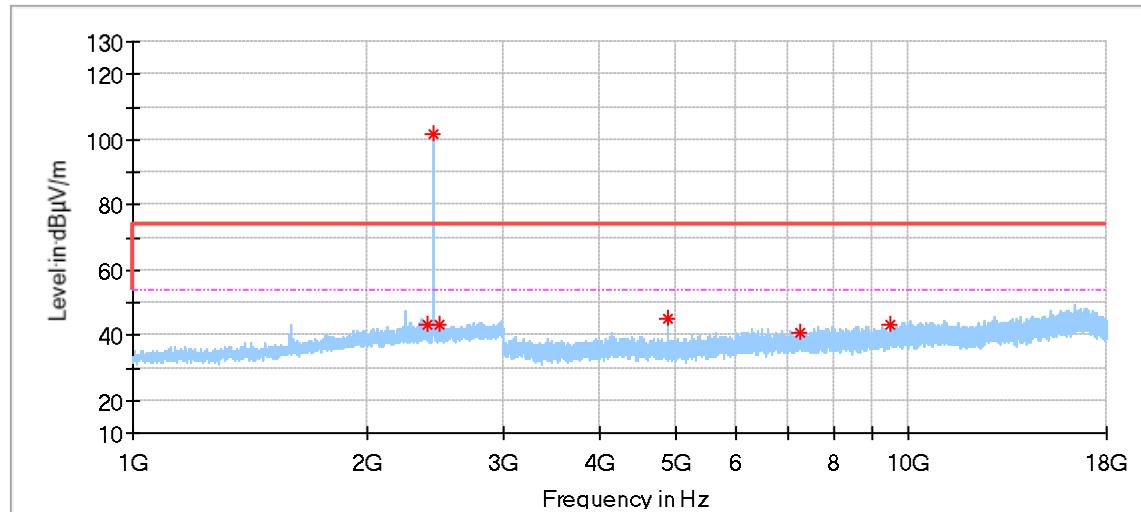


| Frequency (MHz) | MaxPeak (dB μ V/m) | Limit (dB μ V/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------------|----------------------|-------------|-------------|-----|---------------|--------------|
| 2390.000000 | 43.68 | 74.00 | 30.32 | 150.0 | V | 353.0 | -2.96 |
| 2402.380952 | 100.46 | 74.00 | -26.46 | 150.0 | V | 121.0 | -2.99 |
| 2479.523810 | 42.56 | 74.00 | 31.44 | 150.0 | V | 31.0 | -2.69 |
| 4804.000000 | 44.95 | 74.00 | 29.05 | 150.0 | V | 356.0 | 2.18 |
| 7498.500000 | 42.54 | 74.00 | 31.46 | 150.0 | V | 75.0 | 7.45 |
| 9898.500000 | 43.13 | 74.00 | 30.87 | 150.0 | V | 199.0 | 10.76 |

Middle channel 2441MHz

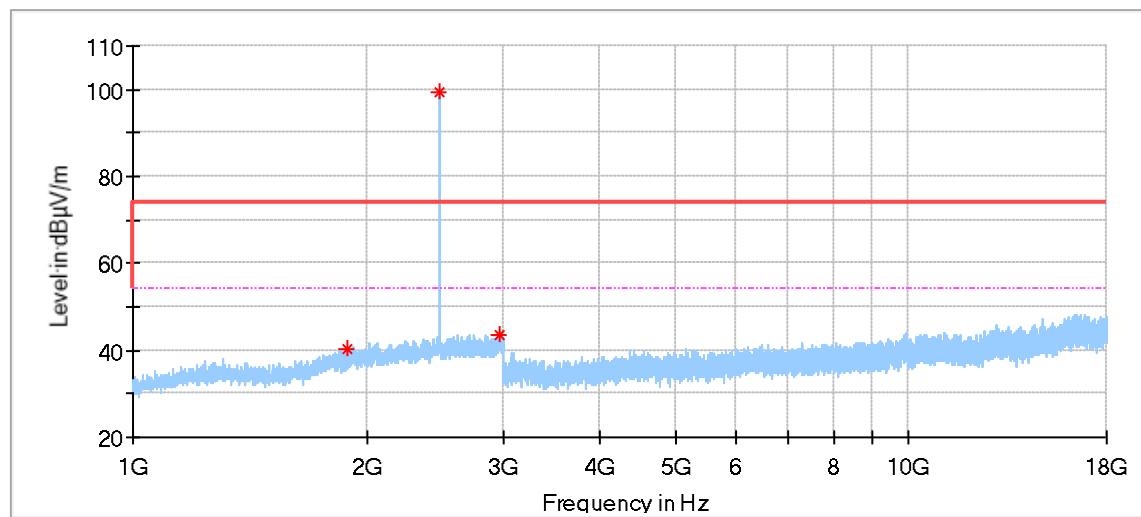


| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 2394.761905 | 42.22 | 74.00 | 31.78 | 150.0 | H | 0.0 | -2.97 |
| 2440.952381 | 99.58 | 74.00 | -25.58 | 150.0 | H | 314.0 | -2.90 |
| 2485.238095 | 41.97 | 74.00 | 32.03 | 150.0 | H | 346.0 | -2.69 |
| 4882.000000 | 46.47 | 74.00 | 27.53 | 150.0 | H | 169.0 | 2.37 |
| 7390.500000 | 41.02 | 74.00 | 32.98 | 150.0 | H | 145.0 | 7.19 |
| 9707.500000 | 43.37 | 74.00 | 30.63 | 150.0 | H | 221.0 | 9.47 |

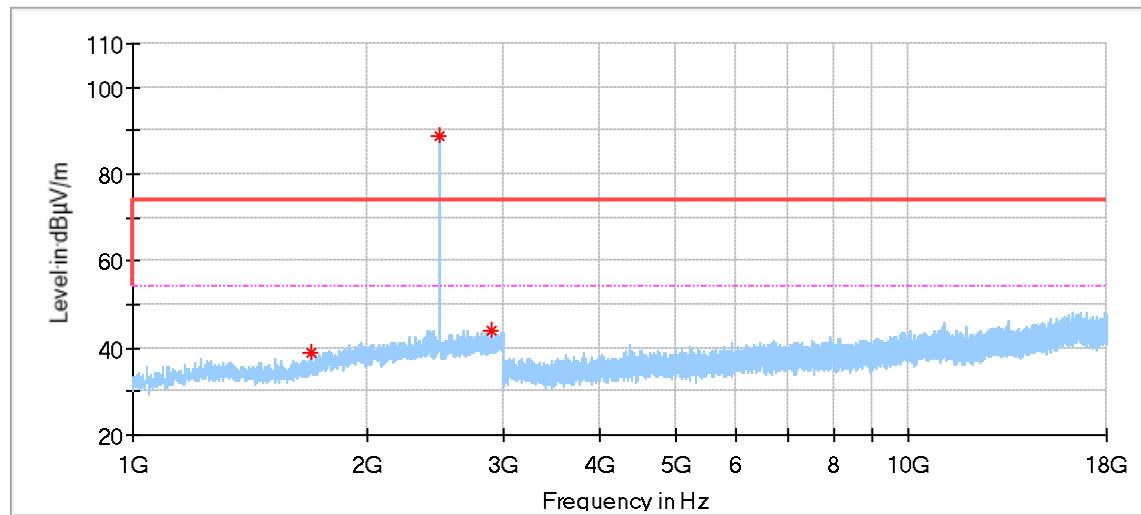


| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 2390.952381 | 42.96 | 74.00 | 31.04 | 150.0 | V | 346.0 | -2.96 |
| 2441.428571 | 101.85 | 74.00 | -27.85 | 150.0 | V | 115.0 | -2.90 |
| 2479.523810 | 43.19 | 74.00 | 30.81 | 150.0 | V | 108.0 | -2.69 |
| 4882.000000 | 45.08 | 74.00 | 28.92 | 150.0 | V | 249.0 | 2.37 |
| 7259.000000 | 40.78 | 74.00 | 33.22 | 150.0 | V | 301.0 | 6.96 |
| 9459.500000 | 43.05 | 74.00 | 30.95 | 150.0 | V | 145.0 | 9.57 |

High channel 2480MHz



| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 1885.714286 | 40.15 | 74.00 | 33.85 | 150.0 | H | 138.0 | -5.09 |
| 2480.476191 | 99.19 | 74.00 | -25.19 | 150.0 | H | 177.0 | -2.70 |
| 2961.904762 | 43.68 | 74.00 | 30.32 | 150.0 | H | 171.0 | -1.49 |



| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|----------------|-------------|-------------|-----|---------------|--------------|
| 1695.714286 | 39.14 | 74.00 | 34.86 | 150.0 | V | 320.0 | -7.52 |
| 2480.476191 | 88.84 | 74.00 | -14.84 | 150.0 | V | 336.0 | -2.70 |
| 2903.333333 | 44.20 | 74.00 | 29.80 | 150.0 | V | 0.0 | -1.94 |

Remark:

- (1) Data of measurement within frequency range 18-26GHz are the noise floor or attenuated more than 20dB below the permissible limits or the field strength is too small to be measured, so test data does not present in this report.
- (2) Frequencies which exceed the limit are carrier frequency.
- (3) Level= Reading Level + Correction Factor.
- (4) 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)

10 Test Equipment List

Conducted Emission Test

| Description | Manufacturer | Model no. | Equipment ID | Serial no. | cal interval (year) | cal. due date |
|-------------------|-------------------|-----------|--------------------|-----------------|---------------------|---------------|
| EMI Test Receiver | Rohde & Schwarz | ESR 3 | 68-4-74-19-002 | 102590 | 1 | 2022-6-4 |
| LISN | Rohde & Schwarz | ENV216 | 68-4-87-19-001 | 102472 | 1 | 2022-6-5 |
| Attenuator | Shanghai Huaxiang | TS2-26-3 | 68-4-81-16-003 | 080928189 | 1 | 2022-6-3 |
| Test software | Rohde & Schwarz | EMC32 | 68-4-90-19-005-A01 | Version10.35.02 | N/A | N/A |
| Shielding Room | TDK | CSR #2 | 68-4-90-19-005 | ---- | 1 | 2022-11-07 |

Radiated Emission Test

| Description | Manufacturer | Model no. | Equipment ID | Serial no. | cal interval (year) | cal. due date |
|-------------------------------------|-----------------|-------------------|--------------------|-----------------|---------------------|---------------|
| EMI Test Receiver | Rohde & Schwarz | ESR 26 | 68-4-74-14-002 | 101269 | 1 | 2022-6-4 |
| Trilog Super Broadband Test Antenna | Schwarzbeck | VULB 9162 | 68-4-80-19-003 | 284 | 1 | 2022-2-2 |
| Wave Guide Antenna | ETS | 3117 | 68-4-80-19-001 | 00218954 | 1 | 2022-5-24 |
| Pre-amplifier | Rohde & Schwarz | SCU 18F | 68-4-29-19-001 | 100745 | 1 | 2021-10-25 |
| Pre-amplifier | Rohde & Schwarz | SCU 08F2 | 68-4-29-19-004 | 08400018 | 1 | 2021-10-25 |
| Sideband Horn Antenna | Q-PAR | QWH-SL-18-40-K-SG | 68-4-80-14-008 | 12827 | 1 | 2022-7-21 |
| Pre-amplifier | Rohde & Schwarz | SCU 40A | 68-4-29-14-002 | 100432 | 1 | 2022-7-27 |
| 3m Semi-anechoic chamber | TDK | SAC-3 #2 | 68-4-90-19-006 | ---- | 3 | 2022-12-29 |
| Test software | Rohde & Schwarz | EMC32 | 68-4-90-19-006-A01 | Version10.35.02 | N/A | N/A |

RF Conducted Test

| Description | Manufacturer | Model no. | Equipment ID | Serial no. | cal interval (year) | cal. due date |
|-----------------|-----------------|-----------|----------------|------------|---------------------|---------------|
| Signal Analyzer | Rohde & Schwarz | FSV40 | 68-4-74-14-004 | 101030 | 1 | 2022-6-3 |

11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

| System Measurement Uncertainty | |
|---|---|
| Test Items | Extended Uncertainty |
| Uncertainty for Conducted Emission 150kHz-30MHz (for test using AMN ENV432 or ENV4200) | 3.62dB |
| Uncertainty for Radiated Emission 25MHz-3000MHz | Horizontal: 4.63dB; Vertical: 4.61dB; |
| Uncertainty for Radiated Emission 3000MHz- 18000MHz | Horizontal: 4.65dB; Vertical: 4.64dB; |
| Uncertainty for Radiated Emission 18000MHz- 40000MHz | Horizontal: 4.89dB; Vertical: 4.87dB; |
| Uncertainty for Conducted RF test | RF Power Conducted: 1.16dB Frequency test involved: 0.6×10^{-7} or 1% |

---THE END OF REPORT---