

TEST REPORT

| | |
|------------------------------------|---|
| Report Number..... | 90476-25-72-25-PP001 |
| Date of issue | 2025.05.27 |
| Prepared by (+signature) | Pale |
| Reviewer (+signature) | Duke |
| Approved by (+signature) | Jason |
| Testing Laboratory name | SLG-CPC Testlaboratory Co., Ltd. |
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| Applicant's name | MOKO TECHNOLOGY LIMITED |
| Address | Factory 201, 107 Pinshun Rd Guixiang community, Guanlan Street, Longhua, Shenzhen, China 518110 |
| Manufacturer's name | MOKO TECHNOLOGY LIMITED |
| Address | Factory 201, 107 Pinshun Rd Guixiang community, Guanlan Street, Longhua, Shenzhen, China 518110 |
| Factory's name | MOKO TECHNOLOGY LIMITED |
| Address | Factory 201, 107 Pinshun Rd Guixiang community, Guanlan Street, Longhua, Shenzhen, China 518110 |
| Standard(s) | FCC 47 CFR Part 15, Subpart C |
| EUT | Bluetooth Module |
| Trade Mark..... | MOKO SMART |
| Model/Type reference | MK19A, MK19B |
| FCC ID | 2AO94-MK19 |
| Date of receipt of test item | 2025.05.14 |
| Date (s) of performance of test: | 2025.05.14- 2025.05.23 |
| Summary of Test Results..... | Pass |

The Summary of Test Results based on a technical opinion belongs to the standard(s).

General disclaimer:

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Modified Information

| Report No. | Revision Data | Summary |
|----------------------|---------------|------------------|
| 90476-25-72-25-PP001 | 2025.05.27 | Original Version |
| | | |

1 EUT TECHNICAL DESCRIPTION

| | |
|---------------------|---|
| Product: | Bluetooth Module |
| Model Number: | MK19A, MK19B |
| Power supply: | <input checked="" type="checkbox"/> DC 3.3V <input type="checkbox"/> Adapter information |
| Modulation: | BLE(GFSK) |
| Frequency Range: | 2402MHz~2480MHz |
| Number of Channels: | 40channels |
| Antenna Gain: | MK19A :PCB antenna , 5.03dBi Gain MK19B :FPC antenna , 3.28dBi Gain |
| Antenna: | MK19A :PCB antenna MK19B :FPC antenna |

Note: for more details, please refer to the User's manual of the EUT.

2 SUMMARY OF TEST RESULT

| FCC Part Clause | Test Parameter | Verdict | Remark |
|---------------------|---|---------|--------|
| 15.247(a)(2) | DTS (6dB) Bandwidth | PASS | |
| 15.247(b)(3) | Maximum Peak Conducted Output Power | PASS | |
| 15.247(e) | Maximum Power Spectral Density Level | PASS | |
| 15.247(d) | Unwanted Emission Into Non-Restricted Frequency Bands | PASS | |
| 15.247(d) 15.209 | Radiated Spurious Emission | PASS | |
| 15.207 | Conducted Emission Test | N/A | |
| 15.247(b) | Antenna Application | PASS | |
| | NOTE1: N/A (Not Applicable) NOTE2: According to FCC OET KDB 558074, the report use radiated measurements in the restricted frequency bands. In addition, the radiated test is also performed to ensure the emissions emanating from the device cabinet also comply with the applicable limits. NOTE3: The verified conducted power is of the same power level, so only one set of data is provided. | | |

RELATED SUBMITTAL(S) / GRANT(S):

This submittal(s) (test report) is intended for FCC ID: 2AO94-MK19 filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

3 TEST METHODOLOGY

3.1 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to its specifications, the EUT must comply with the requirements of the following standards:
 FCC 47 CFR Part 2, Subpart J
 FCC 47 CFR Part 15, Subpart C
 FCC KDB 558074 D01 15.247 Meas Guidance v05r02

3.2 MEASUREMENT EQUIPMENT USED

| Equipment | Model | Manufacturer | S/N | Last Cal. | Due Cal. |
|-------------------------------------|-----------------|--------------|------------------|------------|----------|
| RF Connected Test | | | | | |
| Vector Signal Generator | Rohde & Schwarz | SMBV100B(6G) | 101166 | 2025/04/16 | 1 year |
| Analog Signal Generator | Rohde & Schwarz | SMB100A(40G) | 181333 | 2024/07/25 | 1 year |
| Signal Analyzer | Rohde & Schwarz | FSV40 | 101527 | 2025/03/26 | 1 year |
| Power Analyzer | Rohde & Schwarz | OSP-B157W8 | N/A | 2025/04/16 | 1 year |
| Wideband Radio Communication Tester | R&S | CMW270 | 101985 | 2025/04/18 | 1 year |
| Wideband Radio Communication Tester | Rohde & Schwarz | CMW500 | 166898 | 2025/04/14 | 1 year |
| Spectrum Analyzer | Agilent | E4408B | MY44211139 | 2024/11/05 | 1 year |
| Temperature&Humidity test chamber | ESPEC | VC 4018 | / | 2025/03/26 | 1 year |
| Radiated Emission Test | | | | | |
| EMI Test Receiver | KEYSIGHT | N9010A | MY56070465 | 2024/12/03 | 1 year |
| EMI Test Receiver | Rohde & Schwarz | FSV40 | 101511 | 2025/01/10 | 1 year |
| Bilog Antenna | Schwarzbeck | VULB 9163 | 01335 | 2023/04/21 | 3 year |
| Power Amplifier | EMEC | EM330 | 060676 | 2022/12/07 | 3 year |
| Cable | Tuyue | F4309 | L-400-NmNm-12000 | 2024/12/03 | 1 year |
| Horn Antenna | Schwarzbeck | BBHA9120D | 1779 | 2025/03/28 | 3 year |
| Horn Antenna | Schwarzbeck | BBHA9170 | 00954 | 2022/09/13 | 3 year |
| Power Amplifier | Rohde & Schwarz | SCU08F2 | 08400019 | 2025/03/24 | 3 year |
| Power Amplifier | Rohde & Schwarz | SCU-18F | 180118 | 2025/03/24 | 3 year |
| Power Amplifier | Rohde & Schwarz | SCU40A | 100499 | 2023/06/21 | 3 year |
| Active Loop Antenna | ETS LINDGREN | 6512 | 41623 | 2025/03/19 | 3 year |
| Test Software | Farad | EZ-EMC | Ver.CPC-3A1 | / | / |
| Conducted Emission Test | | | | | |
| LISN | Schwarzbeck | NSLK 8127 | 8127-892 | 2025/03/17 | 1 year |
| LISN | Schwarzbeck | NSLK 8127 | 8127-437 | 2024/07/02 | 1 year |
| EMI Test Receiver | R&S | ESR3 | 102124 | 2024/12/03 | 1 year |
| Pulse Limiter | R&S | ESH3-Z2 | 357.8810.52 | 2024/12/03 | 1 year |
| Test Software | Farad | EZ-EMC | Ver.CPC-3A1 | / | / |

3.3 DESCRIPTION OF TEST MODES

The EUT has been tested under its typical operating condition.

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

Those data rates (BLE :1Mbps, 2Mbps) were used for all test.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Frequency and Channel list for BLE:

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|---------|-----------------|
| 0 | 2402 | 19 | 2440 | ... | ... |
| 1 | 2404 | 20 | 2442 | 37 | 2476 |
| 2 | 2406 | 21 | 2444 | 38 | 2478 |
| ... | ... | ... | ... | 39 | 2480 |

Note: $f_c = 2402\text{MHz} + k \times 1\text{MHz}$ k=1 to 39

Test Frequency and channel for BLE:

| Lowest Frequency | | Middle Frequency | | Highest Frequency | |
|------------------|-----------------|------------------|-----------------|-------------------|-----------------|
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 0 | 2402 | 19 | 2440 | 39 | 2480 |

4 FACILITIES AND ACCREDITATIONS

4.1 FACILITIES

All measurement facilities used to collect the measurement data are located at
No. 11, Wu Song Road, Dongcheng District Dongguan, Guangdong Province, 523117, People's Republic of China
The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.10 and CISPR Publication 32.

4.2 LABORATORY ACCREDITATIONS AND LISTINGS

Site Description

EMC Lab. : Accredited by ISED, October 31 2023
CAB identifier: CN0126
Company Number: 27767

Accredited by A2LA, October 31 2023
The Certificate Registration Number is 6325.01

Accredited by FCC
Designation Number: CN1287
Test Firm Registration Number: 394054

Name of Firm

: SLG-CPC Testlaboratory Co., Ltd.

Site Location

: No. 11, Wu Song Road, Dongcheng District Dongguan, Guangdong Province, 523117, People's Republic of China

5 TEST SYSTEM UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the apparatus:

| Parameter | Uncertainty |
|--------------------------------|--|
| Radio Frequency | $\pm 1 \times 10^{-5}$ |
| Maximum Peak Output Power Test | $\pm 1.0\%$ |
| Conducted Emissions Test | 3.68dB |
| Radiated Emission Test | 4.80dB (below 1G) 3.26dB (above 1GHz) |
| Power Density | $\pm 0.9\%$ |
| Occupied Bandwidth Test | $\pm 2.3\%$ |
| Band Edge Test | $\pm 1.2\%$ |
| Antenna Port Emission | $\pm 3\text{dB}$ |
| Temperature | $\pm 3.2\%$ |
| Humidity | $\pm 2.5\%$ |

Measurement Uncertainty for a level of Confidence of 95%

6 SETUP OF EQUIPMENT UNDER TEST

6.1 RADIO FREQUENCY TEST SETUP 1

The BLE component's antenna port(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.

EUT

6.2 RADIO FREQUENCY TEST SETUP 2

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10. The test distance is 3m. The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 22.

Below 30MHz:

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The Antenna should be positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. The center of the loop shall be 1 m above the ground. For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the EUT.

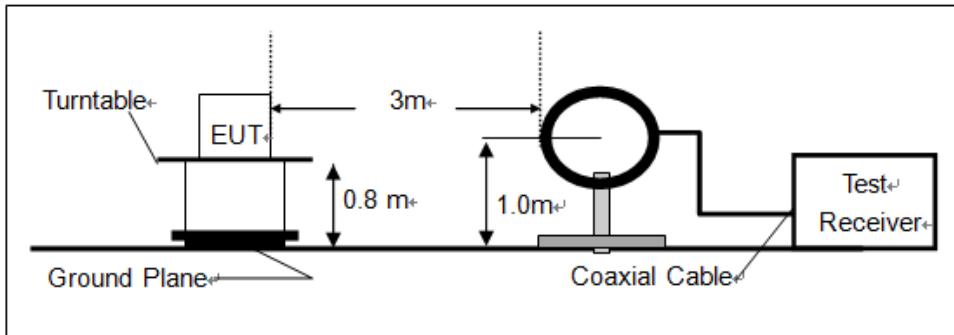
30MHz-1GHz:

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

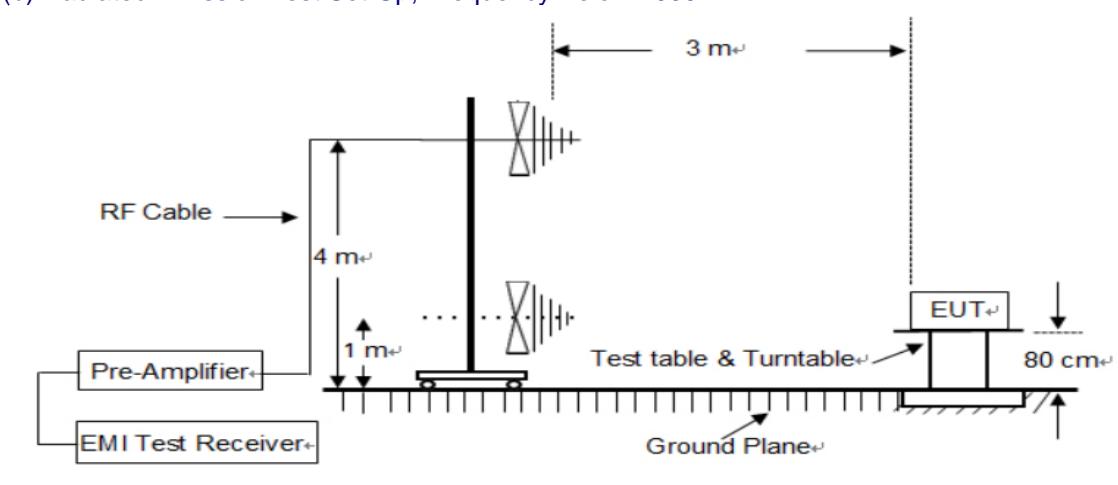
Above 1GHz:

The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

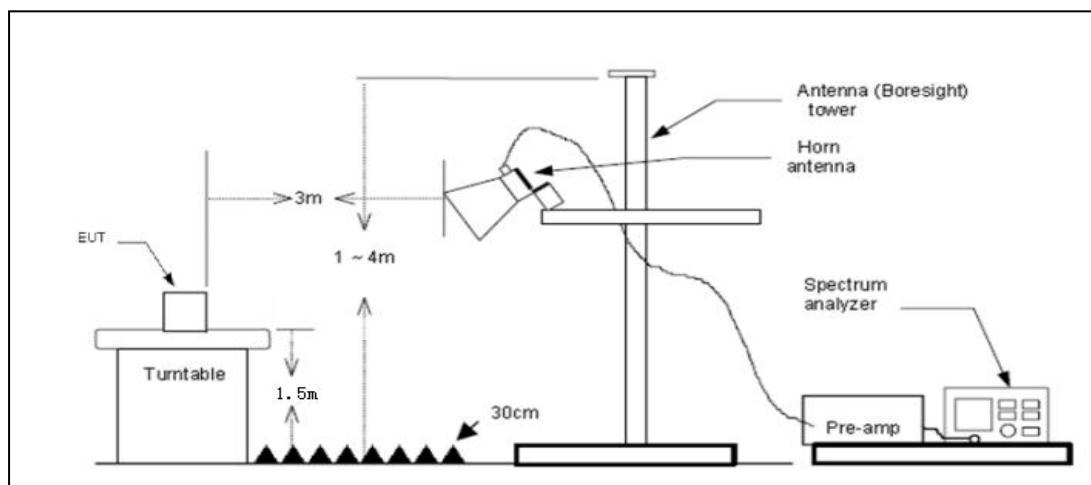
(a) Radiated Emission Test Set-Up, Frequency Below 30MHz



(b) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(c) Radiated Emission Test Set-Up, Frequency above 1000MHz



7 TEST REQUIREMENTS

7.1 DTS 6DB BANDWIDTH

7.1.1 Applicable Standard

According to FCC Part 15.247(a)(2) and KDB 558074 D01 15.247 Meas Guidance v05r02

7.1.2 Conformance Limit

The minimum -6 dB bandwidth shall be at least 500 kHz.

7.1.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

7.1.4 Test Procedure

The EUT was operating in BLE mode and controlled its channel. Printed out the test result from the spectrum by hard copy function.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously

Set RBW = 100 kHz.

Set the video bandwidth (VBW) =300 kHz.

Set Span=2 times OBW

Set Detector = Peak.

Set Trace mode = max hold.

Set Sweep = auto couple.

Allow the trace to stabilize.

Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

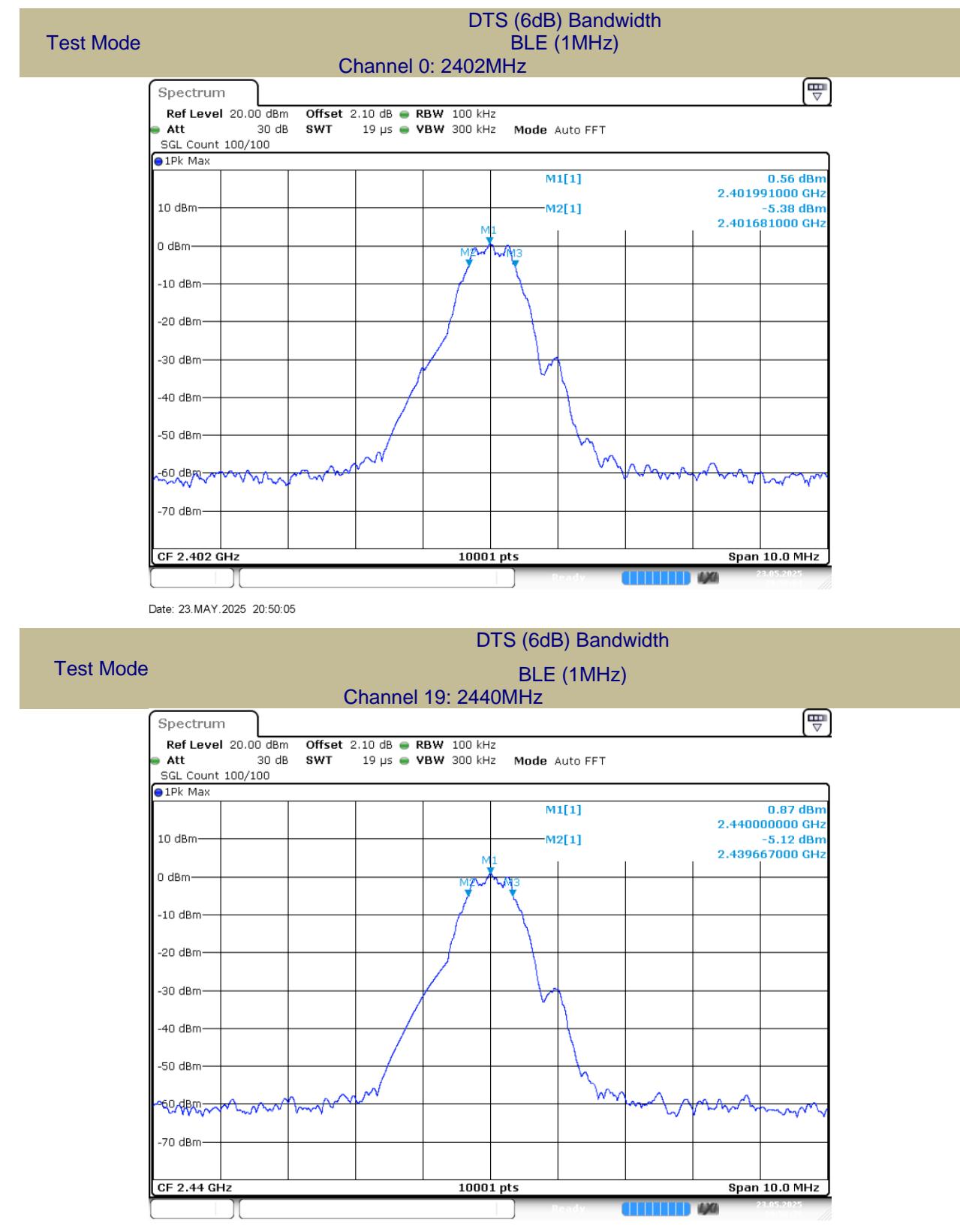
Measure and record the results in the test report.

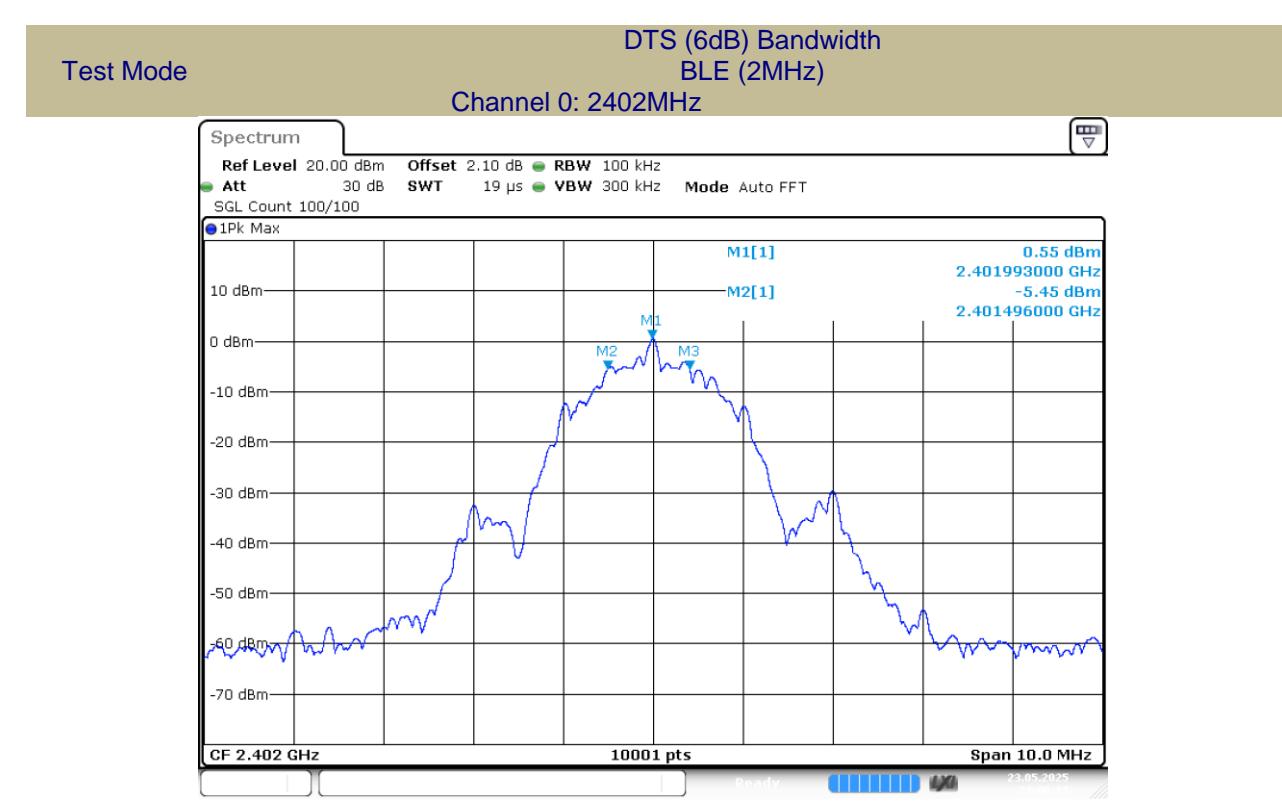
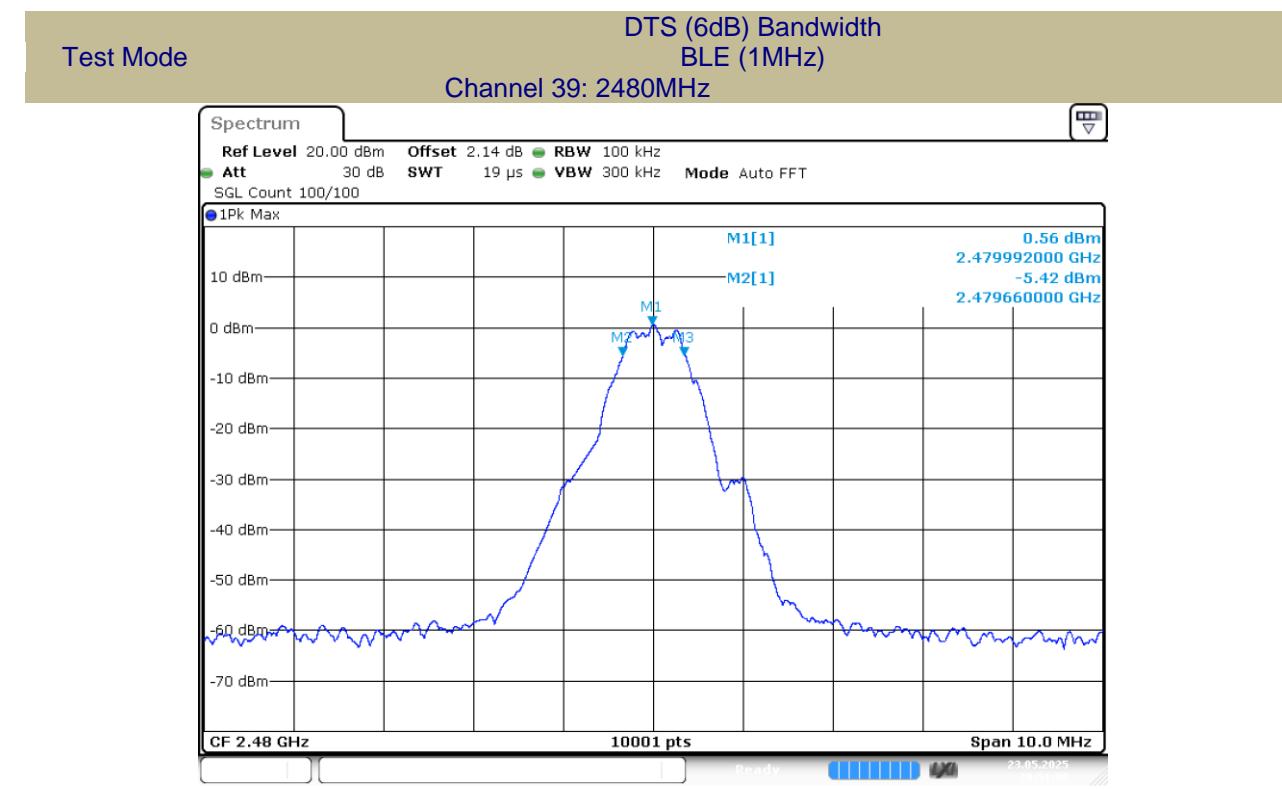
Test Results

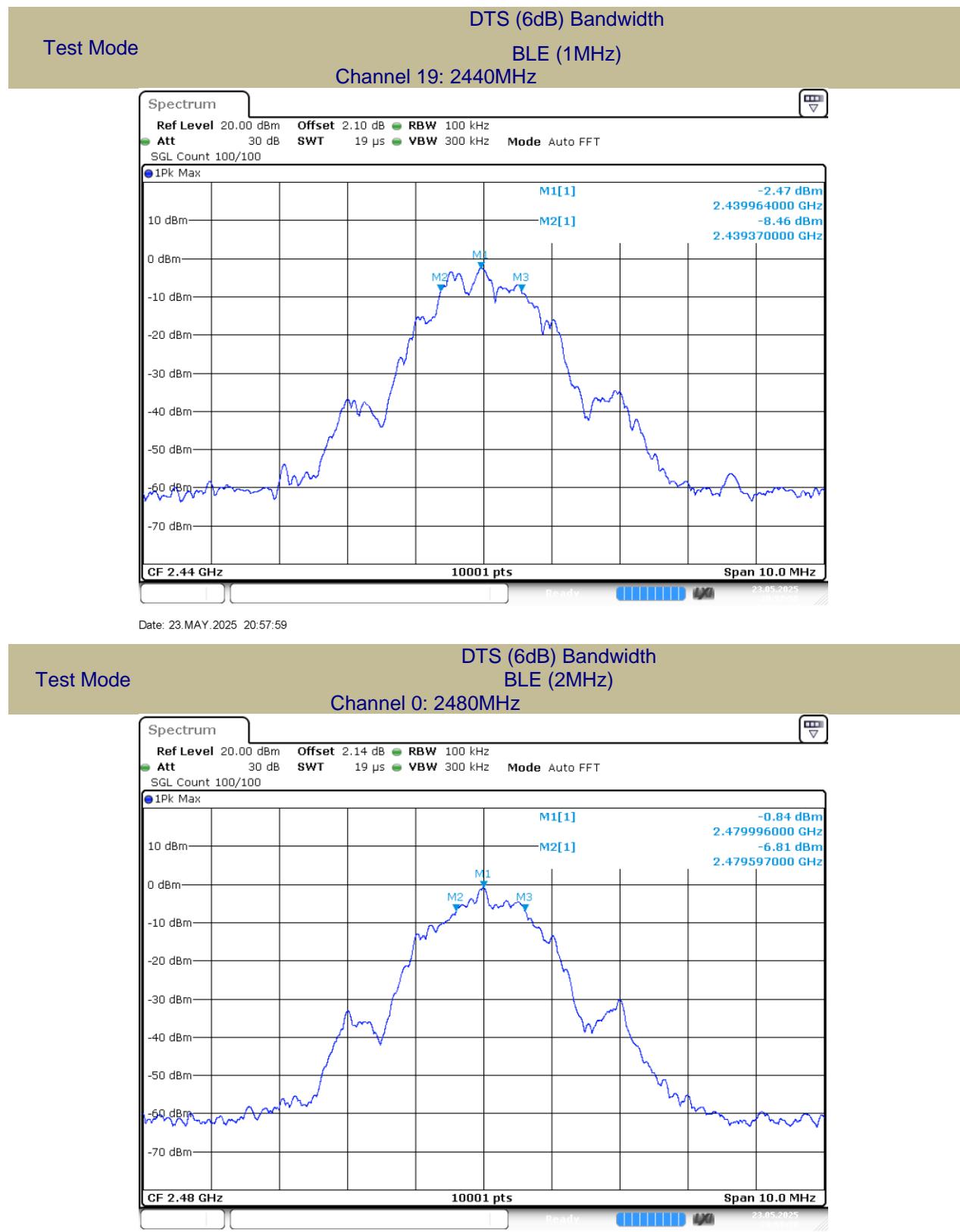
| | |
|--------------------|-----------|
| Temperature: | 24° C |
| Relative Humidity: | 54% |
| ATM Pressure: | 1011 mbar |

| Operation Mode | Channel Number | Channel Frequency (MHz) | Measurement Bandwidth (MHz) | Limit (kHz) | Verdict |
|----------------|----------------|-------------------------|-----------------------------|-------------|---------|
| BLE (1MHz) | 0 | 2402 | 0.686 | >500 | PASS |
| | 19 | 2440 | 0.668 | >500 | PASS |
| | 39 | 2480 | 0.688 | >500 | PASS |

| Operation Mode | Channel Number | Channel Frequency (MHz) | Measurement Bandwidth (MHz) | Limit (kHz) | Verdict |
|----------------|----------------|-------------------------|-----------------------------|-------------|---------|
| BLE (2MHz) | 0 | 2402 | 0.906 | >500 | PASS |
| | 19 | 2440 | 1.181 | >500 | PASS |
| | 39 | 2480 | 1.005 | >500 | PASS |







7.2 MAXIMUM PEAK CONDUCTED OUTPUT POWER

7.2.1 Applicable Standard

According to FCC Part 15.247(b)(3) and KDB 558074 D01 15.247 Meas Guidance v05r02

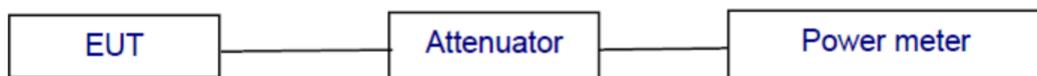
7.2.2 Conformance Limit

The maximum peak conducted output power of the intentional radiator for systems using digital modulation in the 2400 - 2483.5 MHz bands shall not exceed: 1 Watt (30dBm).

7.2.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

7.2.4 Test Procedure



■ According to FCC Part15.247(b)(3)

As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. For smart system, Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

Set the RBW \geq DTS bandwidth (about 1MHz).

Set VBW = 3*RBW (about 3MHz)

Set the span \geq 3*RBW

Set Sweep time = auto couple.

Set Detector = peak.

Set Trace mode = max hold.

Allow trace to fully stabilize. Use peak marker function to determine the peak amplitude level.

■ According to FCC Part 15.247(b)(4):

Conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Test Results

| | |
|--------------------|-----------|
| Temperature: | 23° C |
| Relative Humidity: | 54% |
| ATM Pressure: | 1011 mbar |

| Test Mode | CH | Result (dBm) | Limit (dBm) |
|------------------|------|--------------|-------------|
| BLE(1MHz) | CH0 | 3.59 | 30 |
| | CH19 | 4.01 | 30 |
| | CH39 | 4.35 | 30 |
| BLE(2MHz) | CH0 | 3.00 | 30 |
| | CH19 | 2.98 | 30 |
| | CH39 | 3.26 | 30 |
| Conclusion: PASS | | | |

7.3 MAXIMUM POWER SPECTRAL DENSITY

7.3.1 Applicable Standard

According to FCC Part 15.247(e) and KDB 558074 D01 15.247 Meas Guidance v05r02

7.3.2 Conformance Limit

The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

7.3.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

7.3.4 Test Procedure

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance

The transmitter output (antenna port) was connected to the spectrum analyzer

Set analyzer center frequency to DTS channel center frequency.

Set the span to 1.5 times the DTS bandwidth.

Set the RBW to: 3 kHz

Set the VBW to: 10 kHz.

Set Detector = peak.

Set Sweep time = auto couple.

Set Trace mode = max hold.

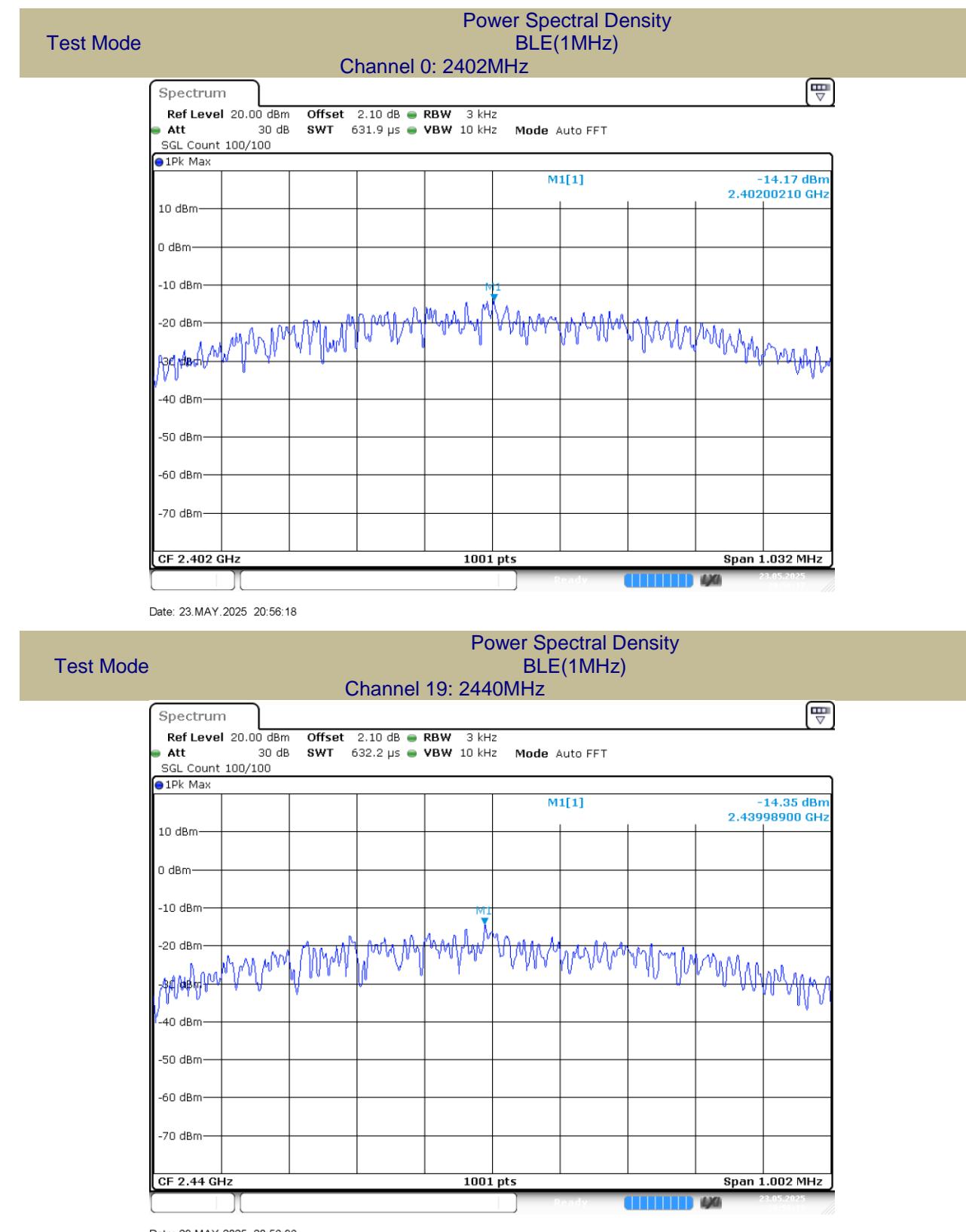
Allow trace to fully stabilize.

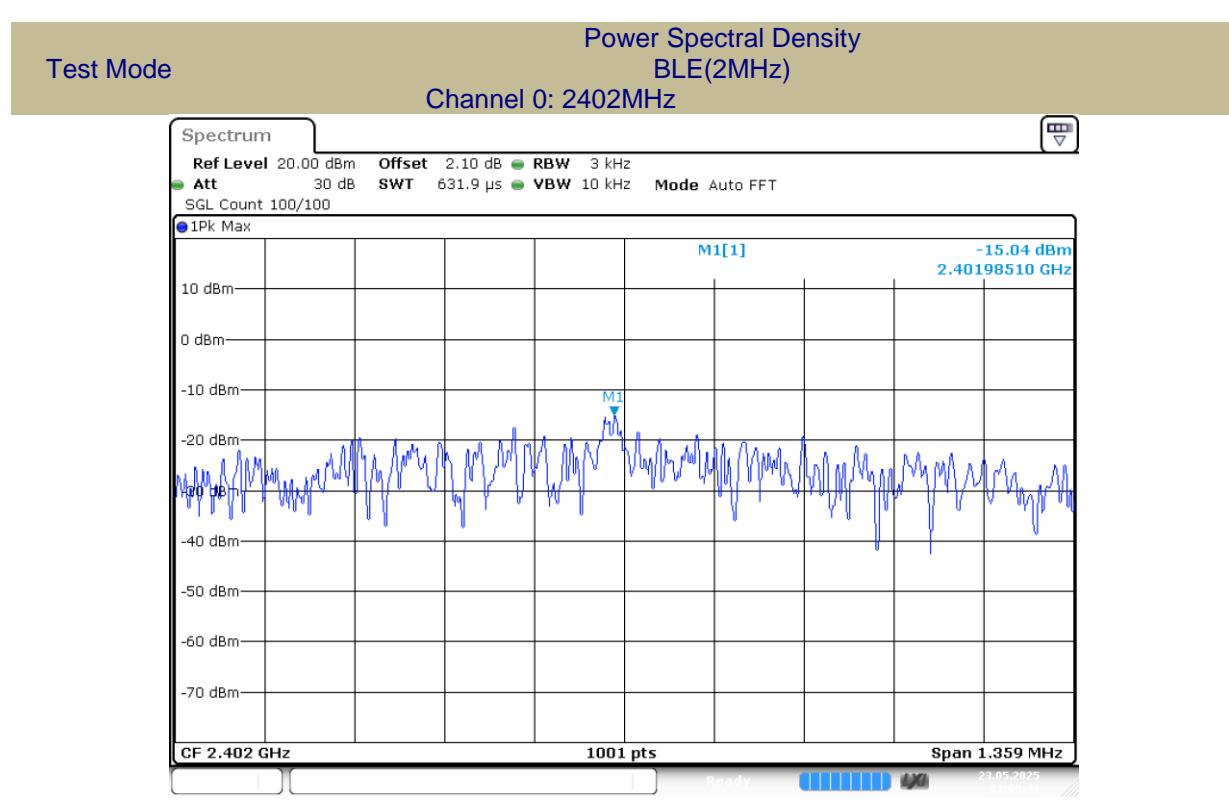
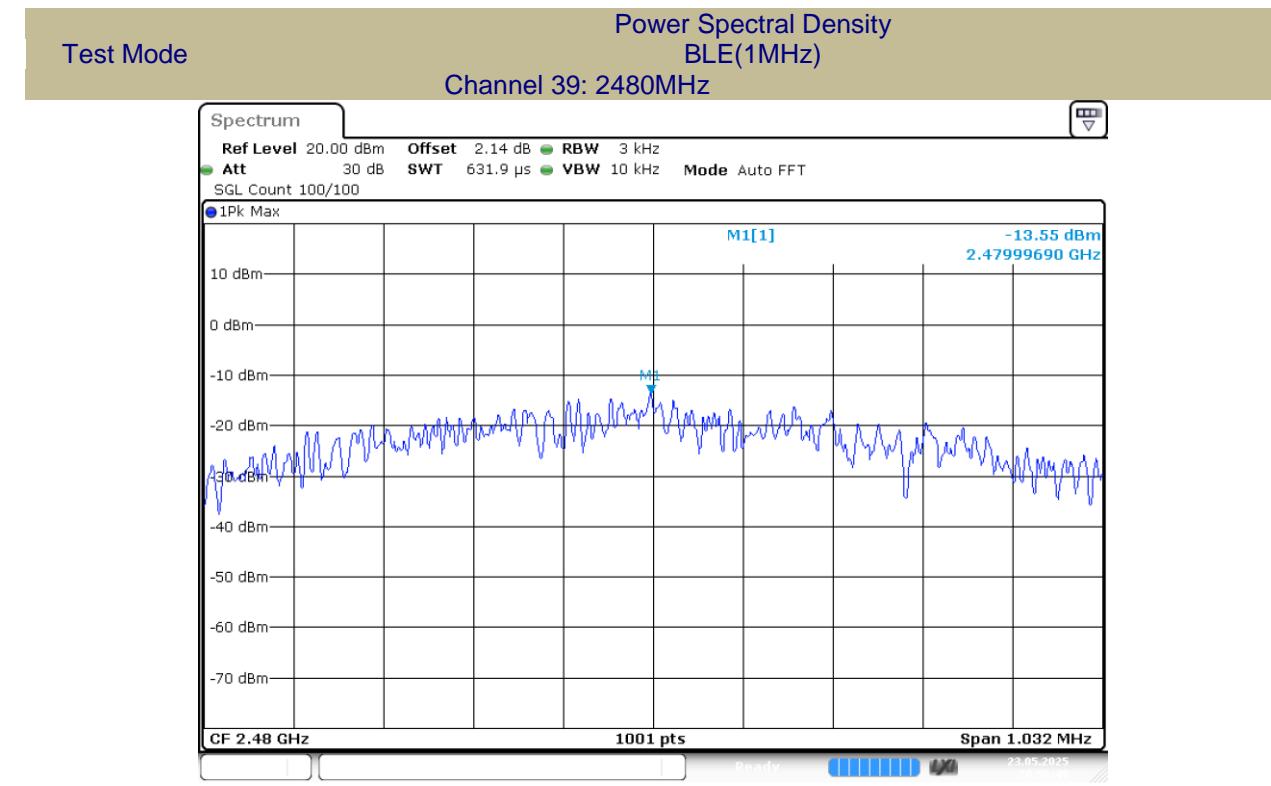
Use the peak marker function to determine the maximum amplitude level within the RBW.

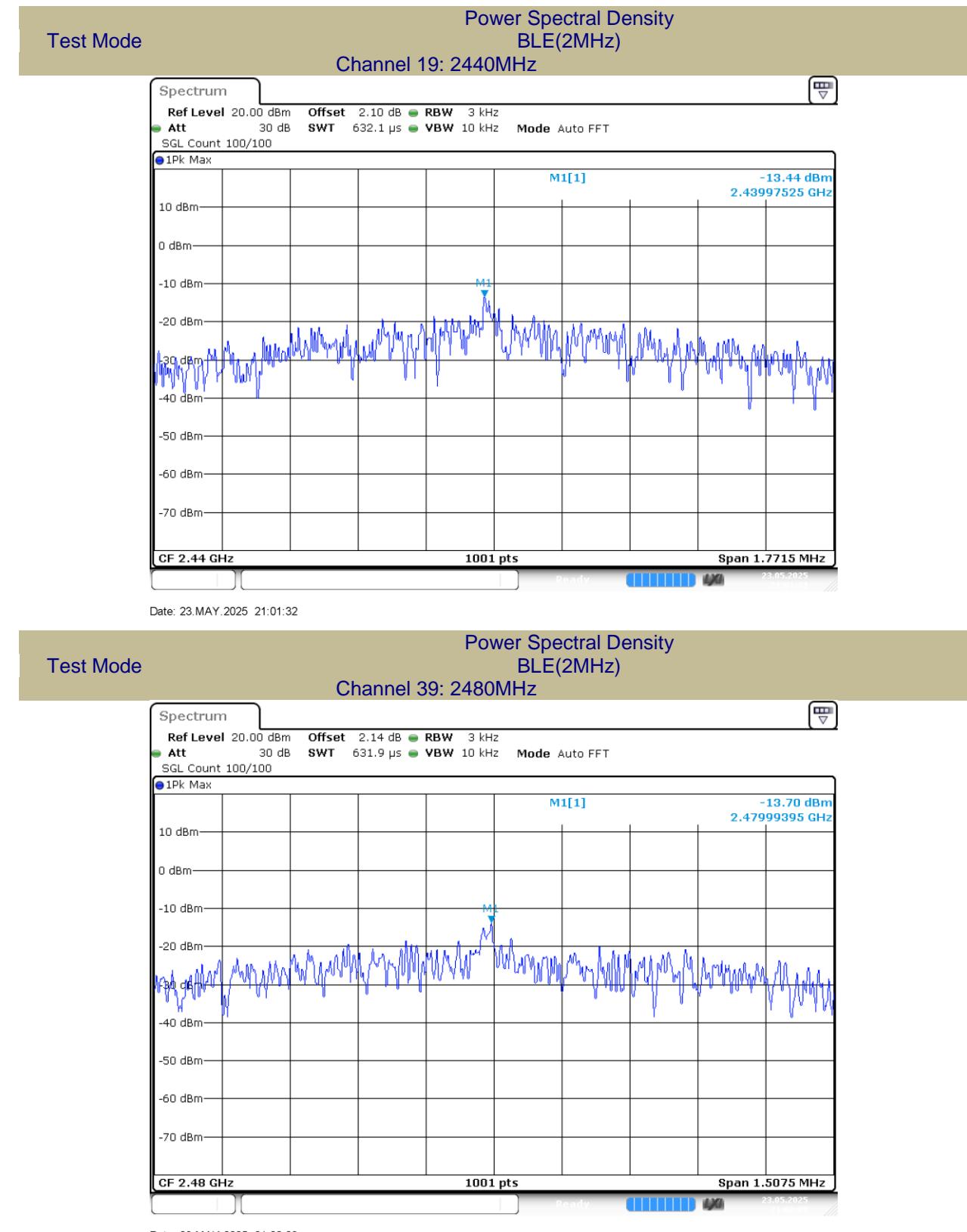
7.3.5 Test Results

| | |
|--------------------|-----------|
| Temperature: | 23° C |
| Relative Humidity: | 54% |
| ATM Pressure: | 1011 mbar |

| Test Mode | CH | Power density (dBm/3kHz) | (dBm/3kHz) Limit |
|------------------|------|-----------------------------|------------------|
| BLE(1MHz) | CH0 | -14.165 | 8 |
| | CH19 | -14.346 | 8 |
| | CH39 | -13.549 | 8 |
| BLE(2MHz) | CH0 | -15.037 | 8 |
| | CH19 | -13.439 | 8 |
| | CH39 | -13.701 | 8 |
| Conclusion: PASS | | | |







7.4 RADIATED SPURIOUS EMISSION

7.4.1 Applicable Standard

According to FCC Part 15.247(d) and 15.209 and KDB 558074 D01 15.247 Meas Guidance v05r02

7.4.2 Conformance Limit

According to FCC Part 15.247(d): 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) (see §15.205(c)).
According to FCC Part 15.205, Restricted bands

| MHz | MHz | MHz | GHz |
|-------------------|---------------------|---------------|-------------|
| 0.090-0.110 | 16.42-16.423 | 399.9-410 | 4.5-5.15 |
| 10.495-0.505 | 16.69475-16.69525 | 608-614 | 5.35-5.46 |
| 2.1735-2.1905 | 16.80425-16.80475 | 960-1240 | 7.25-7.75 |
| 4.125-4.128 | 25.5-25.67 | 1300-1427 | 8.025-8.5 |
| 4.17725-4.17775 | 37.5-38.25 | 1435-1626.5 | 9.0-9.2 |
| 4.20725-4.20775 | 73-74.6 | 1645.5-1646.5 | 9.3-9.5 |
| 6.215-6.218 | 74.8-75.2 | 1660-1710 | 10.6-12.7 |
| 6.26775-6.26825 | 123-138 | 2200-2300 | 14.47-14.5 |
| 8.291-8.294 | 149.9-150.05 | 2310-2390 | 15.35-16.2 |
| 8.362-8.366 | 156.52475-156.52525 | 2483.5-2500 | 17.7-21.4 |
| 8.37625-8.38675 | 156.7-156.9 | 2690-2900 | 22.01-23.12 |
| 8.41425-8.41475 | 162.0125-167.17 | 3260-3267 | 23.6-24.0 |
| 12.29-12.293 | 167.72-173.2 | 3332-3339 | 31.2-31.8 |
| 12.51975-12.52025 | 240-285 | 3345.8-3358 | 36.43-36.5 |
| 12.57675-12.57725 | 322-335.4 | 3600-4400 | (2) |
| 13.36-13.41 | | | |

According to FCC Part 15.205, the level of any transmitter spurious emission in Restricted bands shall not exceed the level of the emission specified in the following table

| Restricted Frequency(MHz) | Field Strength (μ V/m) | Field Strength ($\text{dB}\mu$ V/m) | Measurement Distance |
|---------------------------|-----------------------------|--------------------------------------|----------------------|
| 0.009-0.490 | 2400/F(KHz) | 20 log (μ V/m) | 300 |
| 0.490-1.705 | 2400/F(KHz) | 20 log (μ V/m) | 30 |
| 1.705-30 | 30 | 29.5 | 30 |
| 30-88 | 100 | 40 | 3 |
| 88-216 | 150 | 43.5 | 3 |
| 216-960 | 200 | 46 | 3 |
| Above 960 | 500 | 54 | 3 |

7.4.3 Test Configuration

Test according to clause 7.2 radio frequency test setup 2

7.4.4 Test Procedure

This test is required for any spurious emission that falls in a Restricted Band, as defined in Section 15.205. It must be performed with the highest gain of each type of antenna proposed for use with the EUT. Use the following spectrum analyzer settings:

The EUT was placed on a turn table which is 0.8m above ground plane.

Maximum procedure was performed on the highest emissions to ensure EUT compliance.

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for $f \geq 1$ GHz (1GHz to 25GHz), 100 kHz for $f < 1$ GHz (30MHz to 1GHz)

VBW \geq RBW

Sweep = auto

Detector function = peak

Trace = max hold

Follow the guidelines in ANSI C63.10-2013 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization, etc. A pre-amp and a high pass filter are required

for this test, in order to provide the measuring system with sufficient sensitivity. Allow the trace to stabilize. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, which must comply with the limit specified in Section 15.35(b). Submit this data.

Now set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. 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. Submit this data.

Repeat above procedures until all frequency measured was complete.

7.4.5 Test Results

| | |
|--------------------|-----------|
| Temperature: | 23° C |
| Relative Humidity: | 54% |
| ATM Pressure: | 1011 mbar |

■ Spurious Emission below 30MHz (9KHz to 30MHz)

Note: the amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

Distance extrapolation factor = $40\log(\text{Specific distance/ test distance})(\text{ dB})$;

Limit line=Specific limits(dBuV) + distance extrapolation factor

■ Spurious Emission Above 1GHz (1GHz to 25GHz)

BLE (1MHz) mode have been tested, and the worst result was report as below:

M/N:MK19B

Test mode: BLE

Frequency:

Channel 0: 2402MHz

| Frequency | Meter Reading | Factor | Emission Level | Limits | Over | Detector Type | Ant. Pol. |
|-----------|---------------|--------|----------------|----------------|--------|---------------|-----------|
| (MHz) | (dB μ V) | (dB) | (dB μ V/m) | (dB μ V/m) | (dB) | | |
| 4804 | 57.55 | -4.33 | 53.22 | 74 | -20.78 | Peak | H |
| 7206 | 51.89 | 1.01 | 52.90 | 74 | -21.10 | Peak | H |
| 4804 | 58.02 | -4.33 | 53.69 | 74 | -20.31 | Peak | V |
| 7206 | 52.00 | 1.01 | 53.01 | 74 | -20.99 | Peak | V |

M/N:MK19B

Test mode: BLE

Frequency:

Channel 19: 2440MHz

| Frequency | Meter Reading | Factor | Emission Level | Limits | Over | Detector Type | Ant. Pol. |
|-----------|---------------|--------|----------------|----------------|--------|---------------|-----------|
| (MHz) | (dB μ V) | (dB) | (dB μ V/m) | (dB μ V/m) | (dB) | | |
| 4880 | 57.55 | -4.11 | 53.44 | 74 | -20.56 | peak | H |
| 7320 | 52.11 | 1.51 | 53.62 | 74 | -20.38 | peak | H |
| 4880 | 56.58 | -4.11 | 52.47 | 74 | -21.53 | peak | V |
| 7320 | 51.54 | 1.51 | 53.05 | 74 | -20.95 | peak | V |

M/N:MK19B

Test mode: BLE

Frequency:

Channel 39: 2480MHz

| Frequency | Meter Reading | Factor | Emission Level | Limits | Over | Detector Type | Ant. Pol. |
|-----------|---------------|--------|----------------|----------------|--------|---------------|-----------|
| (MHz) | (dB μ V) | (dB) | (dB μ V/m) | (dB μ V/m) | (dB) | | |
| 4960 | 56.87 | -4.04 | 52.83 | 74 | -21.17 | Peak | H |
| 7440 | 51.20 | 1.57 | 52.77 | 74 | -21.23 | Peak | H |
| 4960 | 56.98 | -4.04 | 52.94 | 74 | -21.06 | Peak | V |
| 7440 | 50.45 | 1.57 | 52.02 | 74 | -21.98 | Peak | V |

BLE (1MHz) mode have been tested, and the worst result was report as below:

M/N:MK19A

Test mode: BLE

Frequency:

Channel 0: 2402MHz

| Frequency (MHz) | Meter Reading (dB μ V) | Factor (dB) | Emission Level (dB μ V/m) | Limits (dB μ V/m) | Over (dB) | Detector Type | Ant. Pol. |
|--------------------|----------------------------------|----------------|-------------------------------------|--------------------------|--------------|------------------|--------------|
| | | | | | | | H/V |
| 4804 | 56.83 | -4.33 | 52.50 | 74 | -21.50 | Peak | H |
| 7206 | 50.01 | 1.01 | 51.02 | 74 | -22.98 | Peak | H |
| 4804 | 57.24 | -4.33 | 52.91 | 74 | -21.09 | Peak | V |
| 7206 | 51.20 | 1.01 | 52.21 | 74 | -21.79 | Peak | V |

M/N:MK19A

Test mode: BLE

Frequency:

Channel 19: 2440MHz

| Frequency (MHz) | Meter Reading (dB μ V) | Factor (dB) | Emission Level (dB μ V/m) | Limits (dB μ V/m) | Over (dB) | Detector Type | Ant. Pol. |
|--------------------|----------------------------------|----------------|-------------------------------------|--------------------------|--------------|------------------|--------------|
| | | | | | | | H/V |
| 4880 | 56.45 | -4.11 | 52.34 | 74 | -21.66 | peak | H |
| 7320 | 50.52 | 1.51 | 52.03 | 74 | -21.97 | peak | H |
| 4880 | 55.10 | -4.11 | 50.99 | 74 | -23.01 | peak | V |
| 7320 | 48.69 | 1.51 | 50.20 | 74 | -23.80 | peak | V |

M/N:MK19A

Test mode: BLE

Frequency:

Channel 39: 2480MHz

| Frequency (MHz) | Meter Reading (dB μ V) | Factor (dB) | Emission Level (dB μ V/m) | Limits (dB μ V/m) | Over (dB) | Detector Type | Ant. Pol. |
|--------------------|----------------------------------|----------------|-------------------------------------|--------------------------|--------------|------------------|--------------|
| | | | | | | | H/V |
| 4960 | 54.87 | -4.04 | 50.83 | 74 | -23.17 | Peak | H |
| 7440 | 49.98 | 1.57 | 51.55 | 74 | -22.45 | Peak | H |
| 4960 | 55.02 | -4.04 | 50.98 | 74 | -23.02 | Peak | V |
| 7440 | 49.00 | 1.57 | 50.57 | 74 | -23.43 | Peak | V |

Remark:

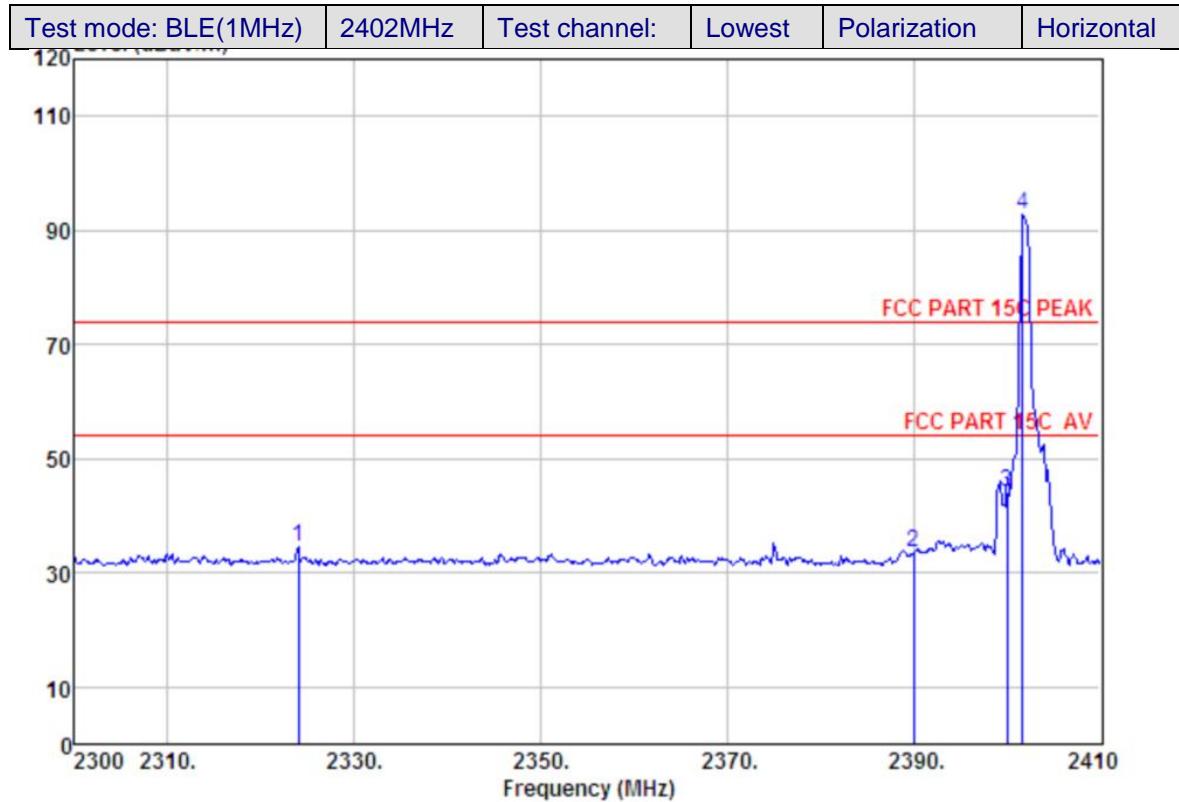
1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

2) Scan from 9kHz to 25GHz, The disturbance above 13GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

- Spurious Emission in Restricted Band 2310-2390MHz and 2483.5-2500MHz
- BLE (1MHz) mode have been tested, and the worst result was report as below:

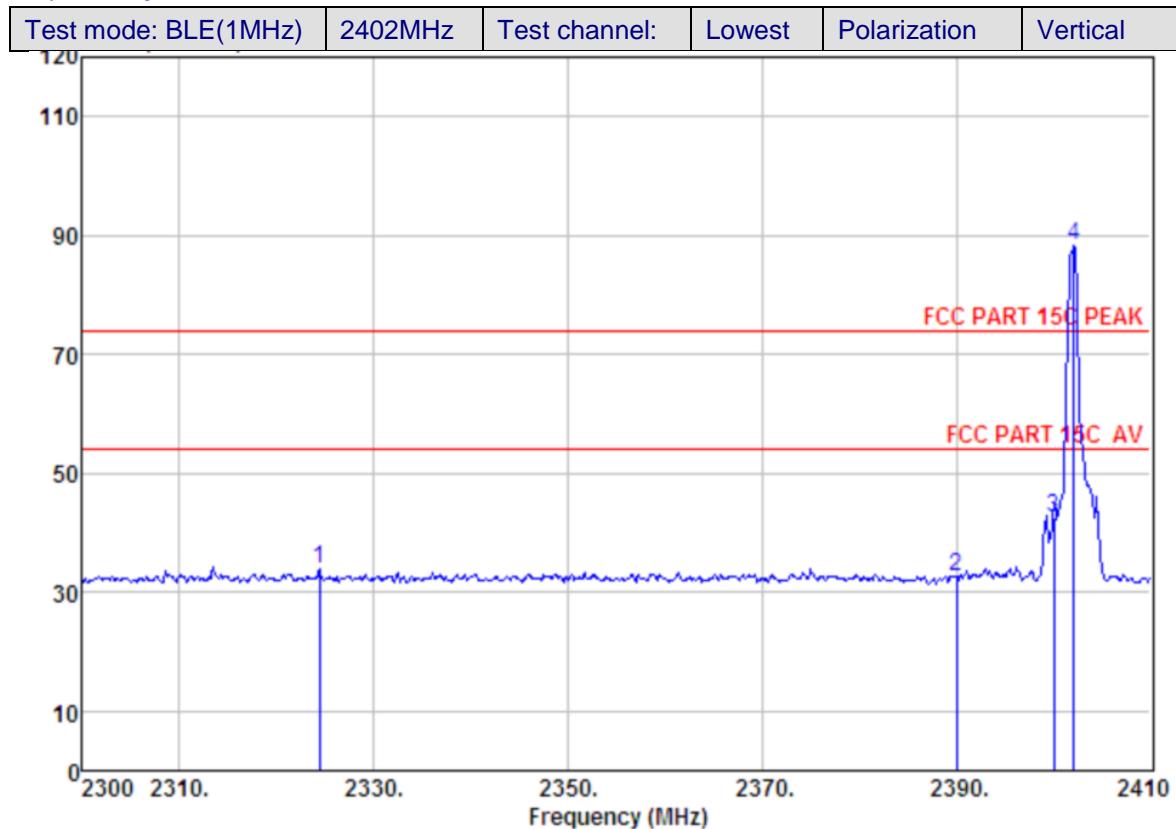
M/N: MK19B



| | Ant. | Cable | Amp | Emission | | | | Margin | Remark |
|----------------|------------------|--------------|----------------|-------------------|-------------------|--------------------|--------|--------|--------|
| Freq. (MHz) | Factor (dB/m) | Loss (dB) | Factor (dB) | Reading (dBuV) | Level (dBuV/m) | Limits (dBuV/m) | | (dB) | |
| 1 2323.98 | 27.73 | 6.54 | 34.60 | 35.03 | 34.70 | 74.00 | 39.30 | | Peak |
| 2 2390.00 | 27.64 | 6.62 | 34.62 | 33.80 | 33.44 | 74.00 | 40.56 | | Peak |
| 3 2400.00 | 27.61 | 6.62 | 34.64 | 44.43 | 44.02 | 74.00 | 29.98 | | Peak |
| 4 2401.75 | 27.61 | 6.62 | 34.64 | 93.36 | 92.95 | 74.00 | -18.95 | | Peak |

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

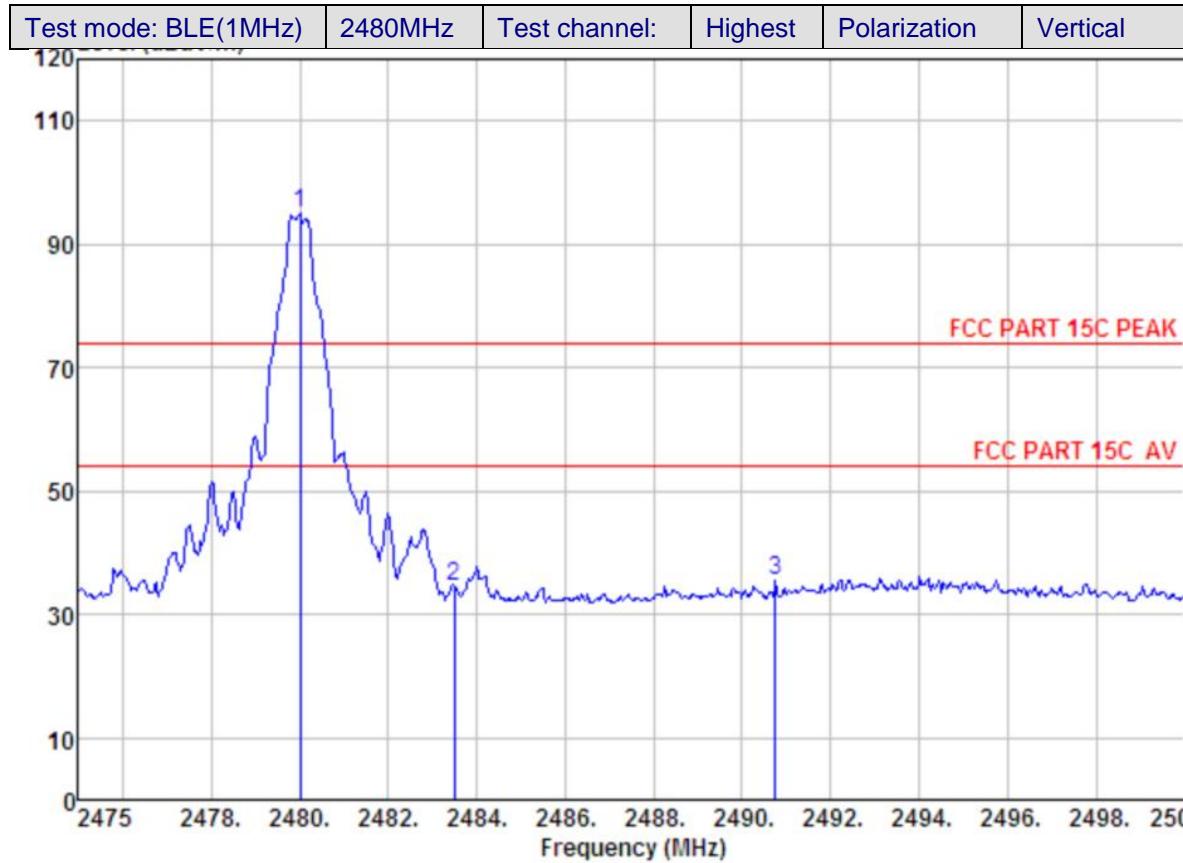
M/N:MK19B



| Freq. (MHz) | Ant. Factor | Cable Loss | Amp Factor | Emission | | Limits (dBuV/m) | Margin (dB) | Remark |
|----------------|----------------|---------------|---------------|-------------------|-------------------|--------------------|----------------|--------|
| | (dB/m) | (dB) | (dB) | Reading (dBuV) | Level (dBuV/m) | | | |
| 1 2324.42 | 27.73 | 6.54 | 34.60 | 34.18 | 33.85 | 74.00 | 40.15 | Peak |
| 2 2390.00 | 27.64 | 6.62 | 34.62 | 32.97 | 32.61 | 74.00 | 41.39 | Peak |
| 3 2400.00 | 27.61 | 6.62 | 34.64 | 42.99 | 42.58 | 74.00 | 31.42 | Peak |
| 4 2402.08 | 27.61 | 6.62 | 34.64 | 88.58 | 88.17 | 74.00 | -14.17 | Peak |

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

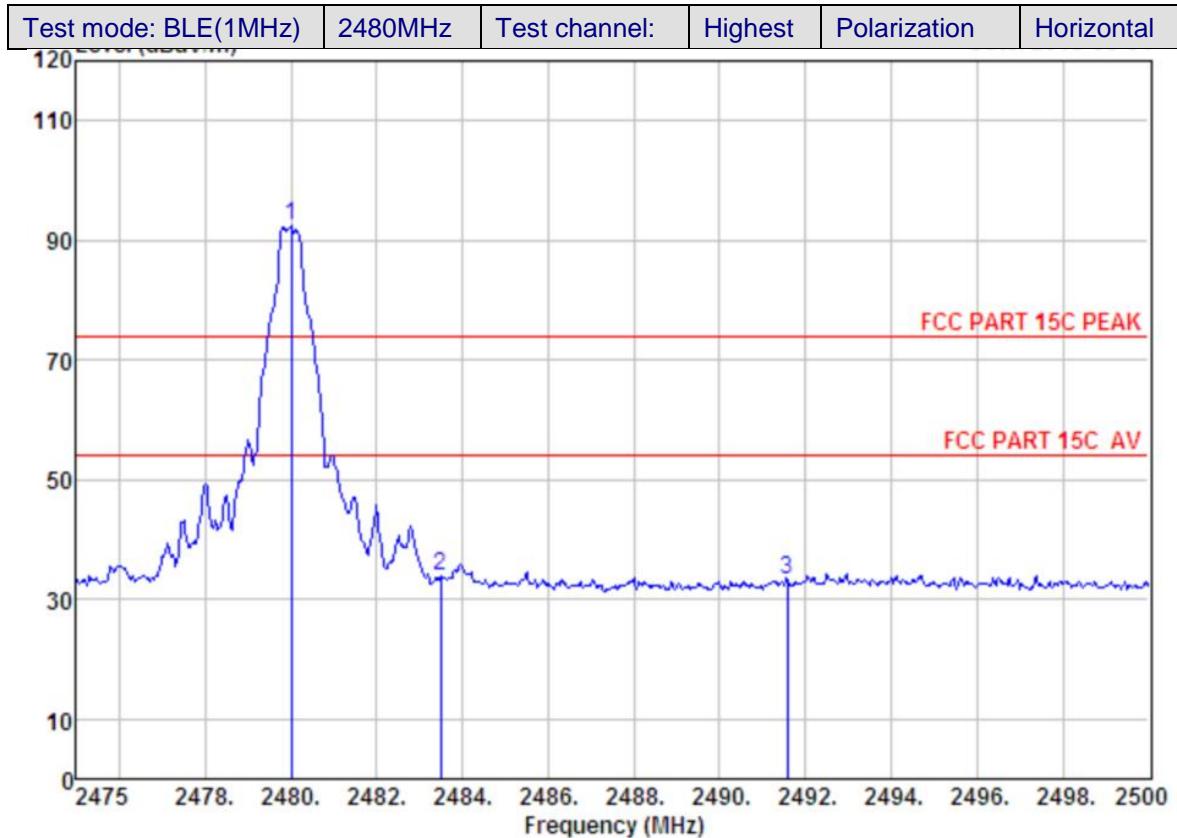
M/N:MK19B



| | Freq. (MHz) | Ant. Factor (dB/m) | Cable Loss (dB) | Amp Factor (dB) | Reading (dBuV) | Emission Level (dBuV/m) | Limits (dBuV/m) | Margin (dB) | Remark |
|---|----------------|--------------------------|-----------------------|-----------------------|-------------------|-------------------------------|--------------------|----------------|--------|
| 1 | 2480.00 | 27.58 | 6.71 | 35.11 | 95.86 | 95.04 | 74.00 | -21.04 | Peak |
| 2 | 2483.50 | 27.58 | 6.71 | 35.11 | 35.52 | 34.70 | 74.00 | 39.30 | Peak |
| 3 | 2490.75 | 27.58 | 6.73 | 35.24 | 36.42 | 35.49 | 74.00 | 38.51 | Peak |

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

M/N:MK19B

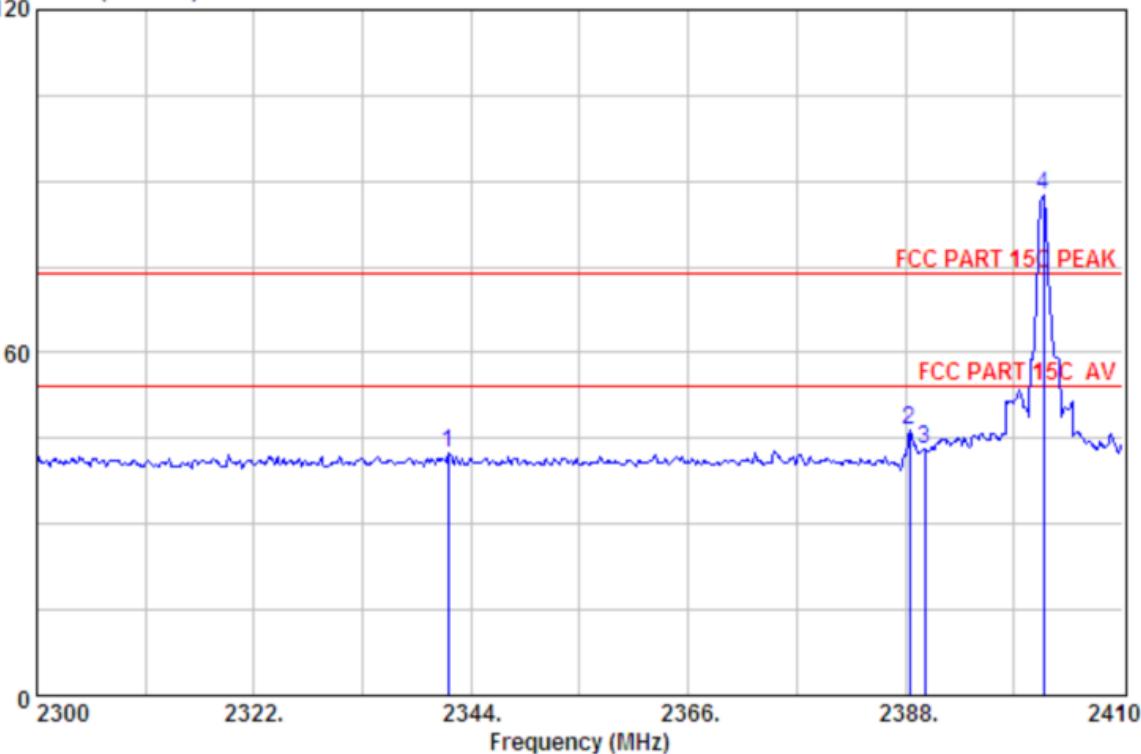


| Freq. (MHz) | Ant. | Cable | Amp | Emission | | | Margin (dB) | Remark |
|----------------|------------------|--------------|----------------|-------------------|-------------------|--------------------|----------------|--------|
| | Factor (dB/m) | Loss (dB) | Factor (dB) | Reading (dBuV) | Level (dBuV/m) | Limits (dBuV/m) | | |
| 1 2480.00 | 27.58 | 6.71 | 35.11 | 93.41 | 92.59 | 74.00 | -18.59 | Peak |
| 2 2483.50 | 27.58 | 6.71 | 35.11 | 34.81 | 33.99 | 74.00 | 40.01 | Peak |
| 3 2491.58 | 27.58 | 6.73 | 35.24 | 34.12 | 33.19 | 74.00 | 40.81 | Peak |

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

M/N:MK19A

| | | | | | |
|----------------------|---------|---------------|--------|--------------|------------|
| Test mode: BLE(1MHz) | 2402MHz | Test channel: | Lowest | Polarization | Horizontal |
|----------------------|---------|---------------|--------|--------------|------------|

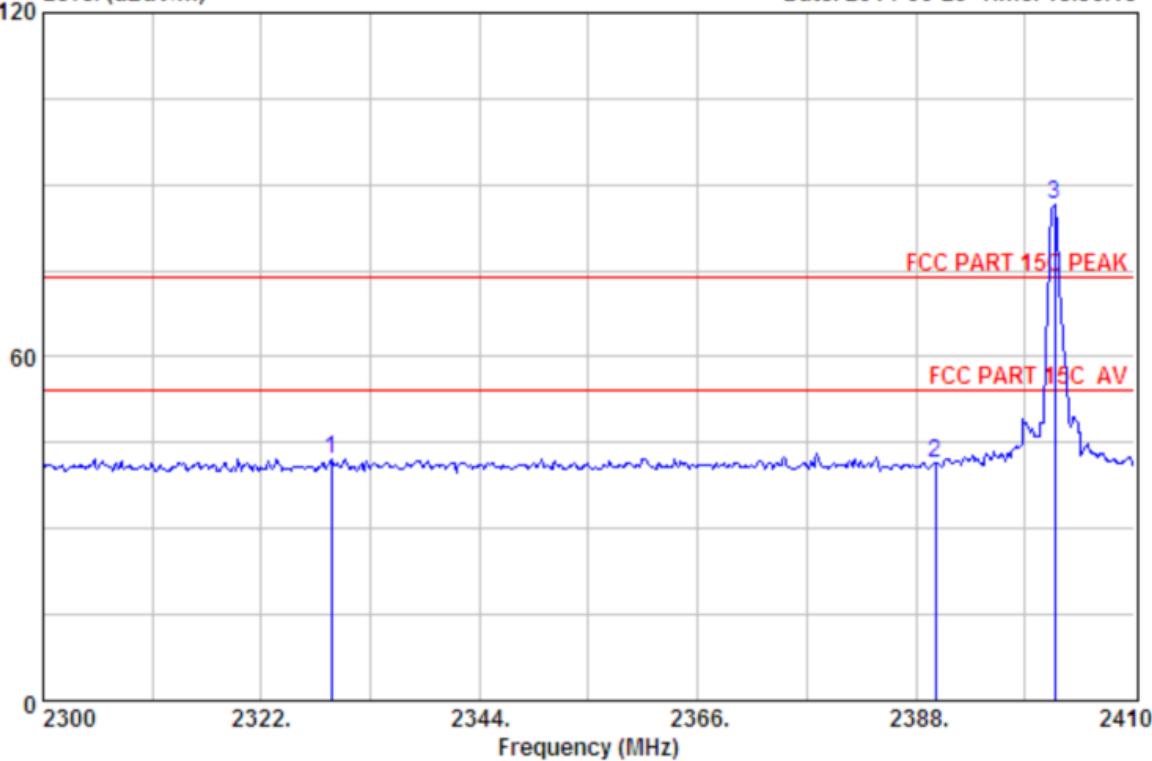


| Freq. (MHz) | Ant. Factor (dB/m) | Cable Loss (dB) | Amp Factor (dB) | Emission | | | | | Remark |
|----------------|--------------------------|-----------------------|-----------------------|-------------------|-------------------|--------------------|----------------|--------|--------|
| | | | | Reading (dBuV) | Level (dBuV/m) | Limits (dBuV/m) | Margin (dB) | Remark | |
| 1 2341.69 | 27.70 | 6.56 | 34.22 | 42.49 | 42.53 | 74.00 | 31.47 | Peak | |
| 2 2388.44 | 27.64 | 6.62 | 34.19 | 46.24 | 46.31 | 74.00 | 27.69 | Peak | |
| 3 2390.00 | 27.64 | 6.62 | 34.19 | 43.03 | 43.10 | 74.00 | 30.90 | Peak | |
| 4 2401.97 | 27.61 | 6.62 | 34.18 | 87.45 | 87.50 | 74.00 | -13.50 | Peak | |

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

M/N:MK19A

| | | | | | |
|----------------------|---------|---------------|--------|--------------|----------|
| Test mode: BLE(1MHz) | 2402MHz | Test channel: | Lowest | Polarization | Vertical |
|----------------------|---------|---------------|--------|--------------|----------|

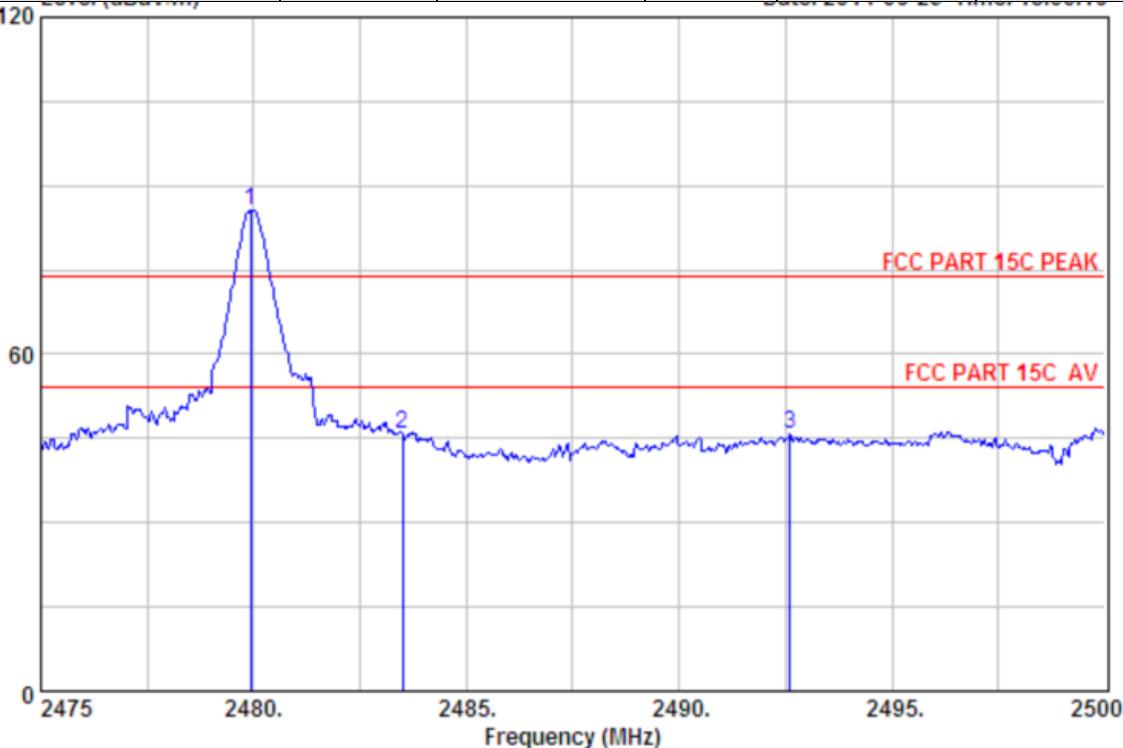


| Freq. (MHz) | Ant. Factor (dB/m) | Cable Loss (dB) | Amp Factor (dB) | Emission | | | | | Remark |
|----------------|--------------------------|-----------------------|-----------------------|-------------------|-----------------|--------------------|--------------------|--------|--------|
| | | | | Reading (dBuV) | Level (dBuV) | Limits (dBuV/m) | Margin (dBuV/m) | Remark | |
| 1 2329.04 | 27.73 | 6.54 | 34.23 | 42.14 | 42.18 | 74.00 | 31.82 | Peak | |
| 2 2390.00 | 27.64 | 6.62 | 34.19 | 41.45 | 41.52 | 74.00 | 32.48 | Peak | |
| 3 2401.97 | 27.61 | 6.62 | 34.18 | 86.47 | 86.52 | 74.00 | -12.52 | Peak | |

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

M/N:MK19A

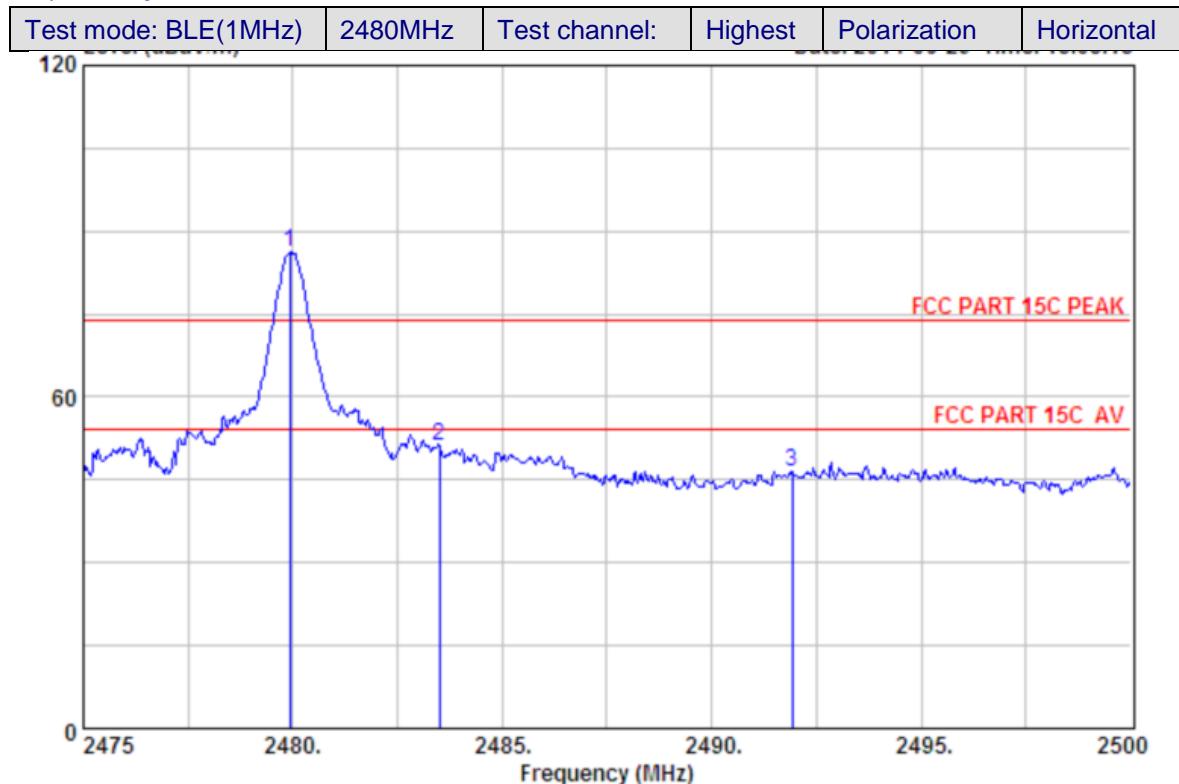
| | | | | | |
|----------------------|---------|---------------|---------|--------------|----------|
| Test mode: BLE(1MHz) | 2480MHz | Test channel: | Highest | Polarization | Vertical |
|----------------------|---------|---------------|---------|--------------|----------|



| Freq. (MHz) | Ant. Factor (dB/m) | Cable Loss (dB) | Amp Factor (dB) | Emission | | | | | Remark |
|----------------|--------------------------|-----------------------|-----------------------|-------------------|-----------------|--------------------|--------------------|--------|--------|
| | | | | Reading (dBuV) | Level (dBuV) | Limits (dBuV/m) | Margin (dBuV/m) | Remark | |
| <hr/> | | | | | | | | | |
| 1 2479.93 | 27.58 | 6.71 | 34.03 | 85.45 | 85.71 | 74.00 | -11.71 | Peak | |
| 2 2483.50 | 27.58 | 6.71 | 34.03 | 45.51 | 45.77 | 74.00 | 28.23 | Peak | |
| 3 2492.60 | 27.58 | 6.73 | 34.03 | 45.38 | 45.66 | 74.00 | 28.34 | Peak | |

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

M/N:MK19A

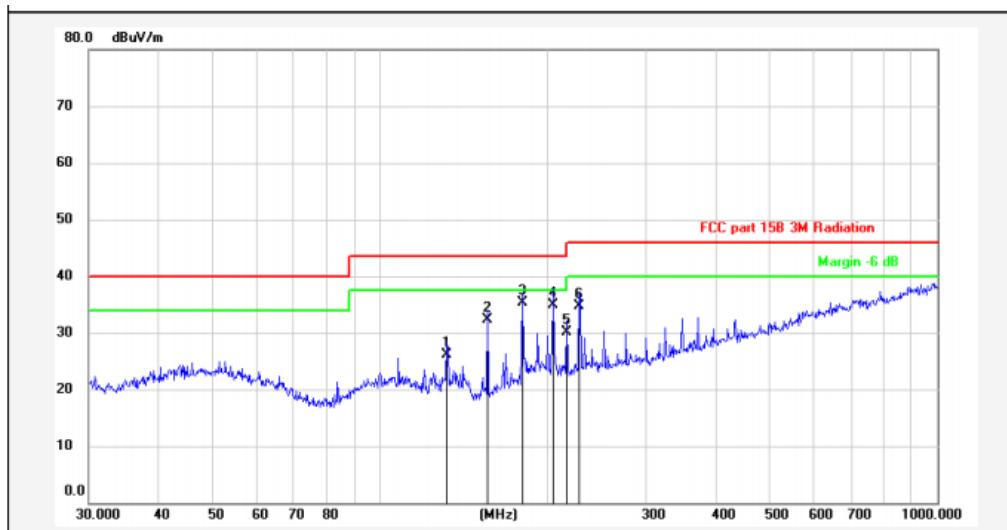


| Freq. (MHz) | Ant. Factor (dB/m) | Cable Loss (dB) | Amp Factor (dB) | Emission | | | | | Remark |
|----------------|--------------------------|-----------------------|-----------------------|-------------------|-------------------|--------------------|----------------|------|--------|
| | | | | Reading (dBuV) | Level (dBuV/m) | Limits (dBuV/m) | Margin (dB) | | |
| 1 2479.93 | 27.58 | 6.71 | 34.03 | 85.88 | 86.14 | 74.00 | -12.14 | Peak | |
| 2 2483.50 | 27.58 | 6.71 | 34.03 | 50.85 | 51.11 | 74.00 | 22.89 | Peak | |
| 3 2491.93 | 27.58 | 6.73 | 34.03 | 46.29 | 46.57 | 74.00 | 27.43 | Peak | |

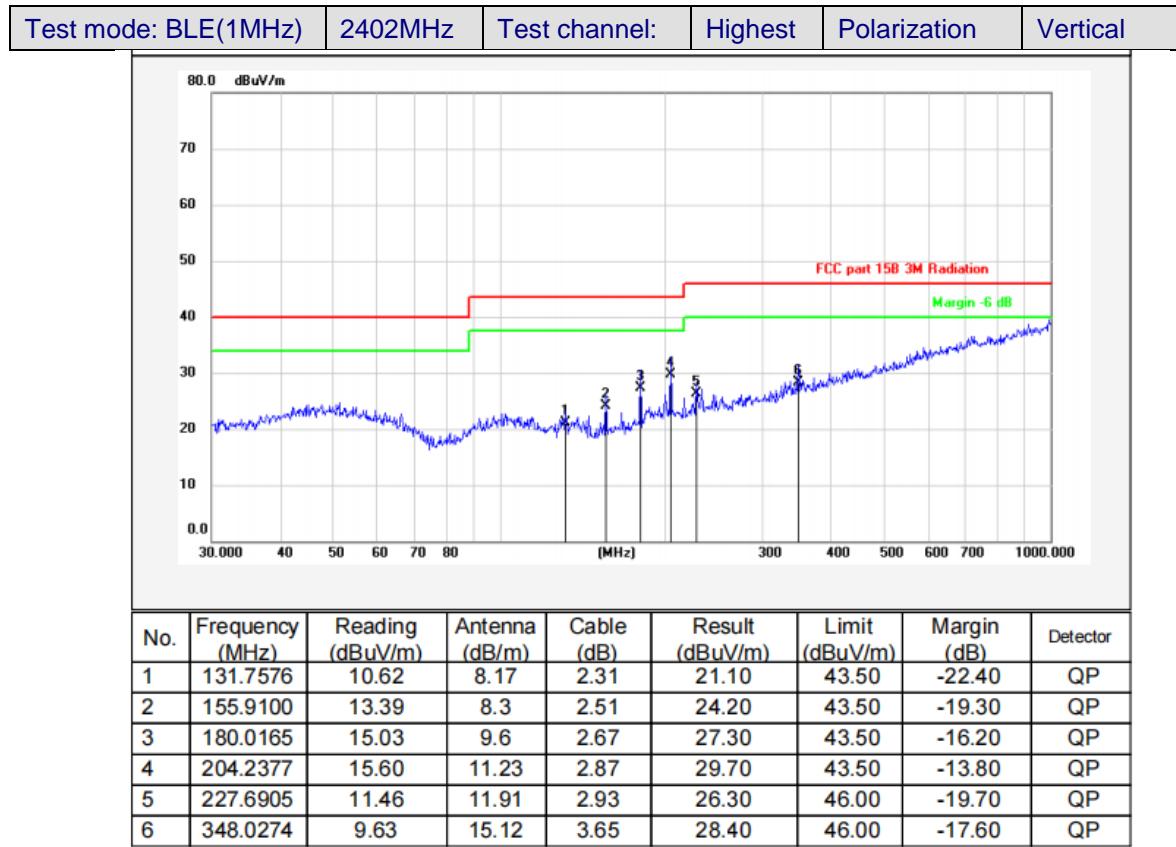
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

- Spurious Emission below 1GHz (30MHz to 1GHz)
- Only the worst numbers are in the report

| | | | | | |
|----------------------|---------|---------------|---------|--------------|------------|
| Test mode: BLE(1MHz) | 2402MHz | Test channel: | Highest | Polarization | Horizontal |
|----------------------|---------|---------------|---------|--------------|------------|



| No. | Frequency (MHz) | Reading (dBuV/m) | Antenna (dB/m) | Cable (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|-----|-----------------|------------------|----------------|------------|-----------------|----------------|-------------|----------|
| 1 | 131.7576 | 15.62 | 8.17 | 2.31 | 26.10 | 43.50 | -17.40 | QP |
| 2 | 155.9100 | 21.49 | 8.3 | 2.51 | 32.30 | 43.50 | -11.20 | QP |
| 3 | 180.0165 | 23.13 | 9.6 | 2.67 | 35.40 | 43.50 | -8.10 | QP |
| 4 | 204.2376 | 20.80 | 11.23 | 2.87 | 34.90 | 43.50 | -8.60 | QP |
| 5 | 216.0240 | 16.04 | 11.24 | 2.92 | 30.20 | 46.00 | -15.80 | QP |
| 6 | 227.6906 | 19.96 | 11.91 | 2.93 | 34.80 | 46.00 | -11.20 | QP |



7.5 ANTENNA APPLICATION

7.5.1 Antenna Requirement

| Standard | Requirement |
|---------------------|---|
| FCC CRF Part 15.203 | <p>An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.</p> |

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

7.5.2 Result

PASS.

The EUT has 1 antenna: MK19A :PCB antenna , 5.03dBi Gain;
MK19B :FPC antenna , 3.28dBi Gain

Note:

- Antenna use a permanently attached antenna which is not replaceable.
- Not using a standard antenna jack or electrical connector for antenna replacement
- The antenna has to be professionally installed (please provide method of installation)

which in accordance to section 15.203, please refer to the internal photos.

----- END OF REPORT -----

声明

Statement

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Objections shall be raised within 20 days from the date receiving the report.