



Test Report

Date : 2019-11-07
No. : HM19090032

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Applicant: Xenon Electronic Limited
Room 719, Worldwide Industrial Centre, 43-47 Shan Mei Street, Fo Tan, Hong Kong

Manufacturer: Xenon Electronic Limited
Room 719, Worldwide Industrial Centre, 43-47 Shan Mei Street, Fo Tan, Hong Kong

Description of Sample(s): Submitted sample(s) said to be
Product: HandyScope
Brand Name: DermLite Handyscope
Model No.: FFH2
FCC ID: 2ATBKFFH2

Date Samples Received: 2019-09-25

Date Tested: 2019-10-09 to 2019-10-15

Investigation Requested: Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2018 and ANSI C63.10:2013 for FCC Certification.

Conclusions: The submitted product COMPLIED with the requirements of Federal Communications Commission [FCC] Rules and Regulations Part 15. The tests were performed in accordance with the standards described above and on Section 2.2 in this Test Report.

Remarks: Bluetooth Low Energy (BLE) only



CHEUNG Chi, Kenneth
Authorized Signatory



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1.0 General Details

1.1 Test Laboratory

The Hong Kong Standards and Testing Centre Ltd.
EMC Laboratory
Head Office: 10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong
Telephone: 852 2666 1888
Fax: 852 2664 4353

1.2 Equipment Under Test [EUT]

Description of Sample(s)

| | |
|---------------|---|
| Product: | HandyScope |
| Manufacturer: | Xenon Electronic Limited |
| | Room 719, Worldwide Industrial Centre, 43-47 Shan Mei Street, |
| | Fo Tan, Hong Kong |
| Brand Name: | DermLite Handyscope |
| Model Number: | FFH2 |
| Rating: | DC 3.7V by built-in li-ion battery; DC 5V input via USB Port |

1.2.1 Description of EUT Operation

The Equipment Under Test (EUT) is a 2.4GHz Bluetooth HandyScope. The tests were conducted under RF Test mode to maintain continuous transmission (>98% duty cycle) during test. The transmission signal is digital modulated with channel frequency range 2402-2480MHz. The R.F. signal was modulated by IC; the type of modulation used was GFSK. The Test mode of the EUT was control by the software Smart RF studio 7, while the EUT was set to Highest RF output during Test.

1.3 Date of Order

2019-09-25

1.4 Submitted Sample(s):

2 Samples

1.5 Test Duration

2019-10-09 to 2019-10-15

1.6 Country of Origin

Hong Kong

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1.7 RF Module Details

Module Model Number: CC2541
Module FCC ID: N/A
Module Transmission Type: Bluetooth Low Energy (BLE)
Modulation: GFSK
Data Rates: 1Mbps (Max)
Frequency Range: 2400-2483.5MHz
Carrier Frequencies: 2402MHz – 2480MHz

Module Specification (specification provided by manufacturer)

1.8 Channel List

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|
| 0 | 2402 | 20 | 2442 |
| 1 | 2404 | 21 | 2444 |
| 2 | 2406 | 22 | 2446 |
| 3 | 2408 | 23 | 2448 |
| 4 | 2410 | 24 | 2450 |
| 5 | 2412 | 25 | 2452 |
| 6 | 2414 | 26 | 2454 |
| 7 | 2416 | 27 | 2456 |
| 8 | 2418 | 28 | 2458 |
| 9 | 2420 | 29 | 2460 |
| 10 | 2422 | 30 | 2462 |
| 11 | 2424 | 31 | 2464 |
| 12 | 2426 | 32 | 2466 |
| 13 | 2428 | 33 | 2468 |
| 14 | 2430 | 34 | 2470 |
| 15 | 2432 | 35 | 2472 |
| 16 | 2434 | 36 | 2474 |
| 17 | 2436 | 37 | 2476 |
| 18 | 2438 | 38 | 2478 |
| 19 | 2440 | 39 | 2480 |

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2.0 Technical Details

2.1 Investigations Requested

Perform Electromagnetic Interference measurements in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2018 Regulations and ANSI C63.10:2013 for FCC Certification. According FCC KDB 558074 DTS Measurement Guidance, Duty cycle $\geq 98\%$. The device was realized by test software.

2.2 Test Standards and Results Summary Tables

| EMISSION Results Summary | | | | | | |
|--------------------------------|------------------------|-------------------|---------------------|-------------------------------------|--------------------------|--------------------------|
| Test Condition | Test Requirement | Test Method | Class / Severity | Test Result | | |
| | | | | Pass | Failed | N/A |
| Maximum Peak Output Power | FCC 47CFR 15.247(b)(3) | ANSI C63.10: 2013 | N/A | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Radiated Spurious Emissions | FCC 47CFR 15.209 | ANSI C63.10: 2013 | N/A | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| AC Mains Conducted Emissions | FCC 47CFR 15.207 | ANSI C63.10: 2013 | N/A | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Power Spectral Density | FCC 47CFR 15.247(e) | ANSI C63.10: 2013 | N/A | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6dB Bandwidth | FCC 47CFR 15.247(a)(2) | ANSI C63.10: 2013 | N/A | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Band Edge Emissions (Radiated) | FCC 47CFR 15.247(d) | ANSI C63.10: 2013 | N/A | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Antenna requirement | FCC 47CFR 15.203 | N/A | N/A | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| RF Exposure | FCC 47CFR 15.247(i) | N/A | N/A | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Note: N/A - Not Applicable

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3.0 Test Results

3.1 Emission

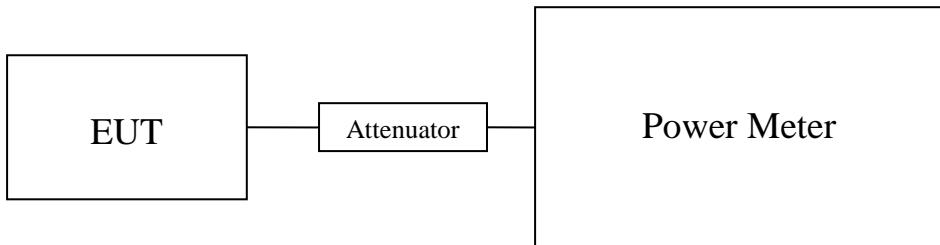
3.1.1 Maximum Peak Output Power

Test Requirement: FCC 47CFR 15.247(b)(3)
Test Method: ANSI C63.10: 2013
Test Date: 2019-10-10
Mode of Operation: Tx mode

Test Method:

The RF output of the EUT was connected to the Power Meter. All the attenuation or cable loss will be added to the measured maximum output power. The results are recorded in Watt.

Test Setup:



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Limits for Peak Output Power of Fundamental & Harmonics Emissions [FCC 47CFR 15.247]:

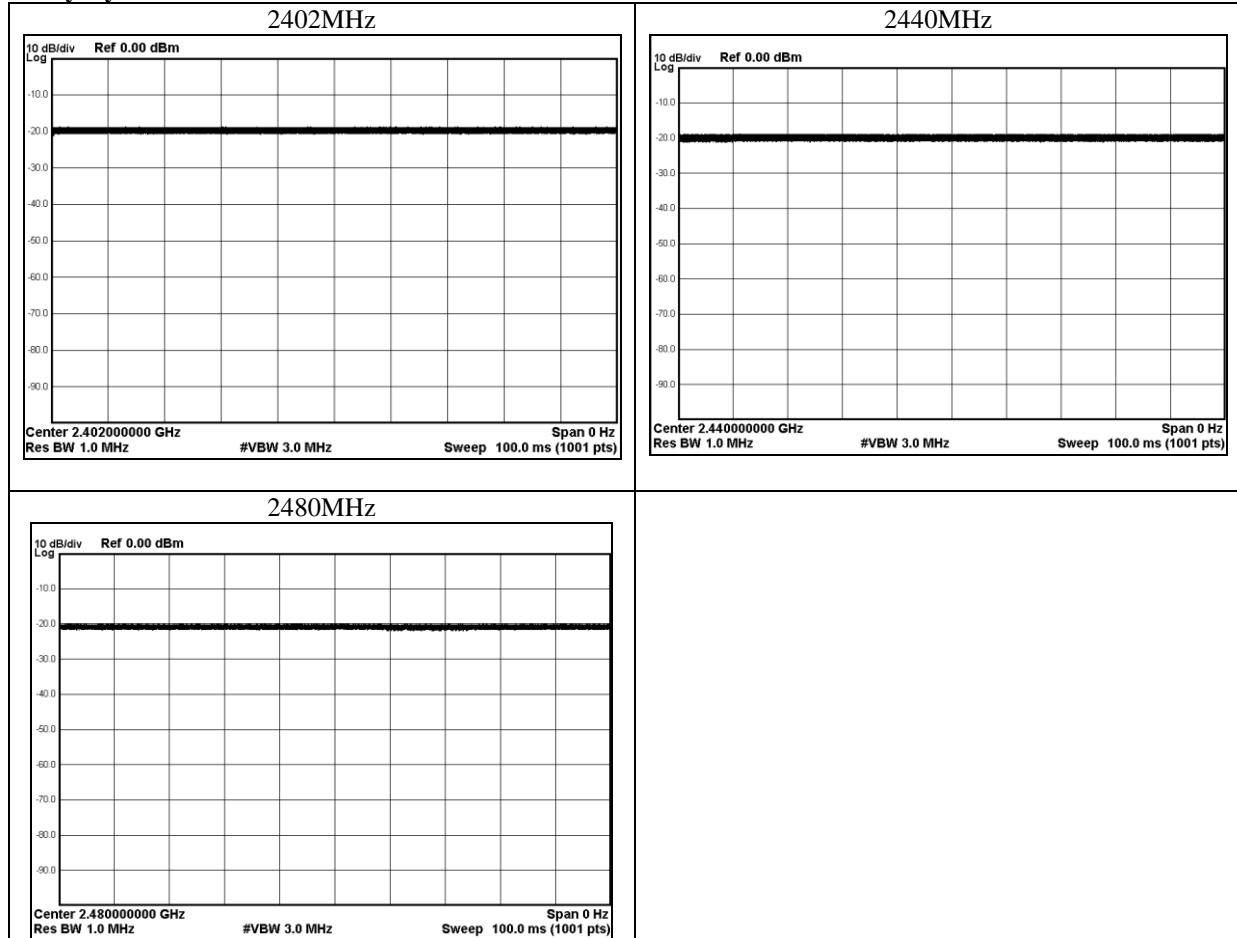
For Digital Transmission systems in 2400-2483.5 MHz Band: 1 Watt (30dBm)

Results of Tx Mode: Pass (TX Unit)

Maximum conducted peak power

| Channel | Frequency(MHz) | Output Power(Watt) |
|---------|----------------|--------------------|
| 0 | 2402 | 0.0000058 |
| 19 | 2440 | 0.0000067 |
| 39 | 2480 | 0.0000083 |

Duty Cycle of Test Mode of the EUT



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3.1.2 Radiated Emissions

Test Requirement: FCC 47CFR 15.209

Test Method: ANSI C63.10:2013

Test Date: 2019-09-06

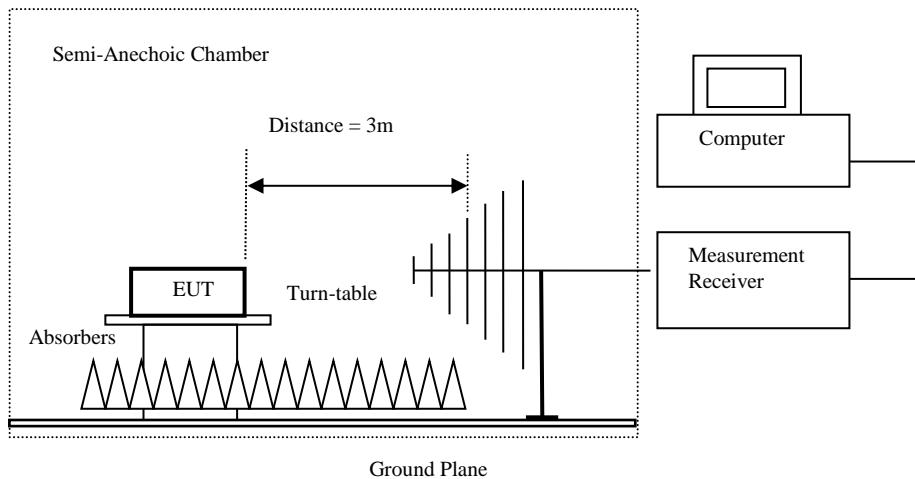
Mode of Operation: Tx mode

Test Method:

For emission measurements at or below 1 GHz, the sample was placed 0.8m above the ground plane of semi-anechoic Chamber*. For emission measurements above 1 GHz, the sample was placed 1.5m above the ground plane of semi-anechoic Chamber*. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages. The measured field strength would be calculated as EIRP.

Semi-anechoic chamber located at STC filed with Industry Canada File Number: 4789A

Test Setup:



- Absorbers placed on top of the ground plane are for measurements above 1000MHz only.
- Measurements between 30MHz to 1000MHz made with Bi-log antennas, above 1000MHz horn antennas are used, 9kHz to 30MHz loop antennas are used.
- For emissions testing at or below 1 GHz, the table height shall be 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m.



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Limits for Radiated Emissions FCC 47 CFR 15.247 Class B]:

| Frequency Range [MHz] | Quasi-Peak Limits [μ V/m] |
|--------------------------|-----------------------------------|
| 0.009-0.490 | 2400/F (kHz) |
| 0.490-1.705 | 24000/F (kHz) |
| 1.705-30 | 30 |
| 30-88 | 100 |
| 88-216 | 150 |
| 216-960 | 200 |
| Above960 | 500 |

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

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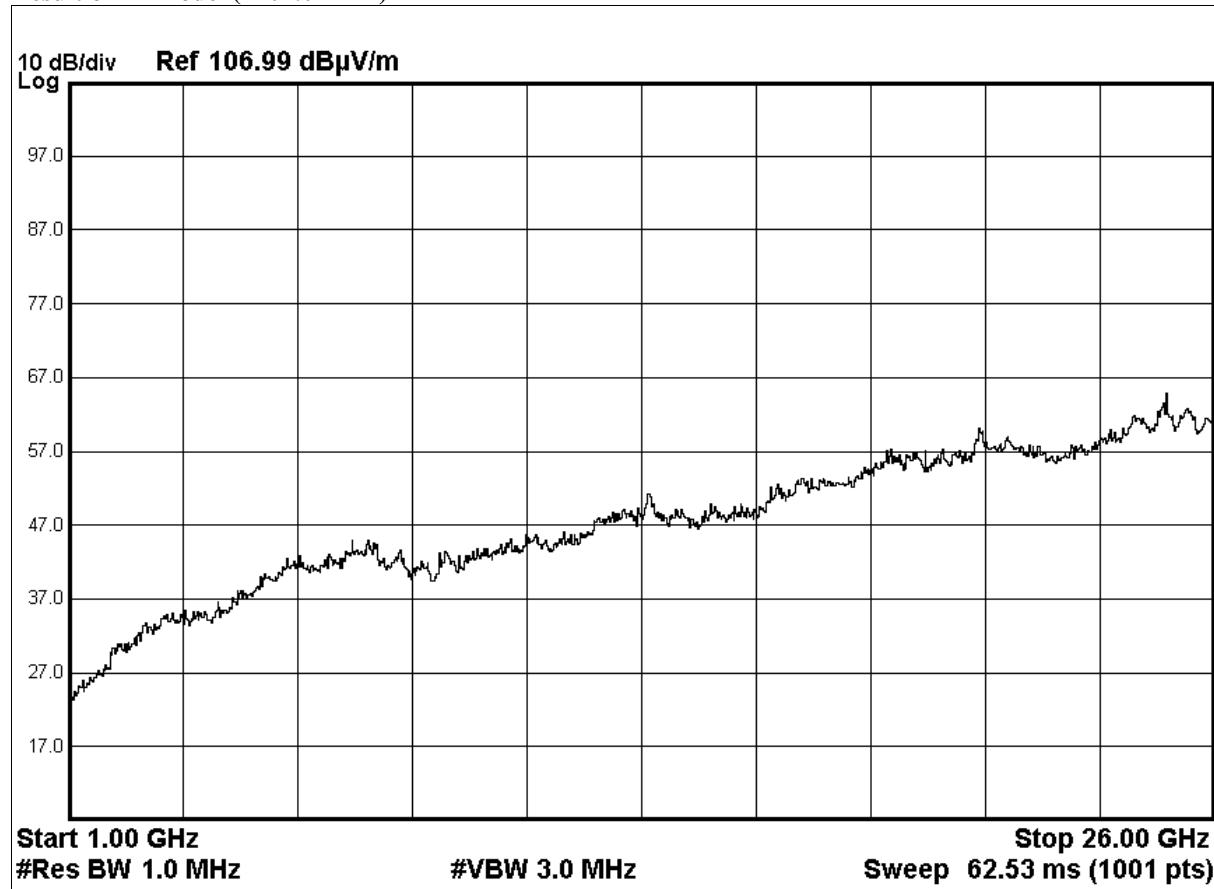


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Result of Tx mode (2402.0 MHz)



Remarks: The fundamental frequency was not included in the pre-scan plot, a 2.4G notch filter was added prior to the Receiver, please refer the band-edge plot for the level of fundamental frequency.

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Result of Tx mode (2402.0 MHz) (9kHz – 30MHz): Pass

| Field Strength of Spurious Emissions | | | | | | |
|---|---------------------------|------------------------------|-----------------------------|---------------------------|---------------|---------------------|
| Peak Value | | | | | | |
| Frequency MHz | Measured Level dBuV | Correction Factor dB/m | Field Strength dBuV/m | Field Strength uV/m | Limit uV/m | E-Field Polarity |
| Emissions detected are more than 20 dB below the Limits | | | | | | |

Result of Tx mode (2402.0 MHz) (Above 1GHz): Pass

| Field Strength of Spurious Emissions | | | | | | |
|--------------------------------------|-------------------------------|------------------------------|-----------------------------|------------------------|--------------|---------------------|
| Peak Value | | | | | | |
| Frequency MHz | Measured Level @3m dBuV | Correction Factor dB/m | Field Strength dBuV/m | Limit @3m dBuV/m | Margin dB | E-Field Polarity |
| 4804.0 | -3.4 | 32.1 | 28.7 | 74.0 | 45.3 | Vertical |
| 7206.0 | -4.6 | 38.6 | 34.0 | 74.0 | 40.0 | Vertical |
| 9608.0 | -4.1 | 41.3 | 37.2 | 74.0 | 36.8 | Vertical |
| 12010.0 | -3.8 | 43.5 | 39.7 | 74.0 | 34.3 | Vertical |
| 4804.0 | -4.3 | 32.1 | 27.8 | 74.0 | 46.2 | Horizontal |
| 7206.0 | -5.1 | 38.6 | 33.5 | 74.0 | 40.5 | Horizontal |
| 9608.0 | -4.3 | 41.3 | 37.0 | 74.0 | 37.0 | Horizontal |
| 12010.0 | -4.1 | 43.5 | 39.4 | 74.0 | 34.6 | Horizontal |

| Field Strength of Spurious Emissions | | | | | | |
|--------------------------------------|-------------------------------|------------------------------|-----------------------------|------------------------|--------------|---------------------|
| Average Value | | | | | | |
| Frequency MHz | Measured Level @3m dBuV | Correction Factor dB/m | Field Strength dBuV/m | Limit @3m dBuV/m | Margin dB | E-Field Polarity |
| 4804.0 | -5.2 | 32.1 | 26.9 | 54.0 | 27.1 | Vertical |
| 7206.0 | -6.3 | 38.6 | 32.3 | 54.0 | 21.7 | Vertical |
| 9608.0 | -6.8 | 41.3 | 34.5 | 54.0 | 19.5 | Vertical |
| 12010.0 | -6.7 | 43.5 | 36.8 | 54.0 | 17.2 | Vertical |
| 4804.0 | -5.4 | 32.1 | 26.7 | 54.0 | 27.3 | Horizontal |
| 7206.0 | -6.2 | 38.6 | 32.4 | 54.0 | 21.6 | Horizontal |
| 9608.0 | -6.6 | 41.3 | 34.7 | 54.0 | 19.3 | Horizontal |
| 12010.0 | -6.7 | 43.5 | 36.8 | 54.0 | 17.2 | Horizontal |

Remarks: the listed correction factors are equal to Antenna factor + cable loss in corresponding to measuring frequency.

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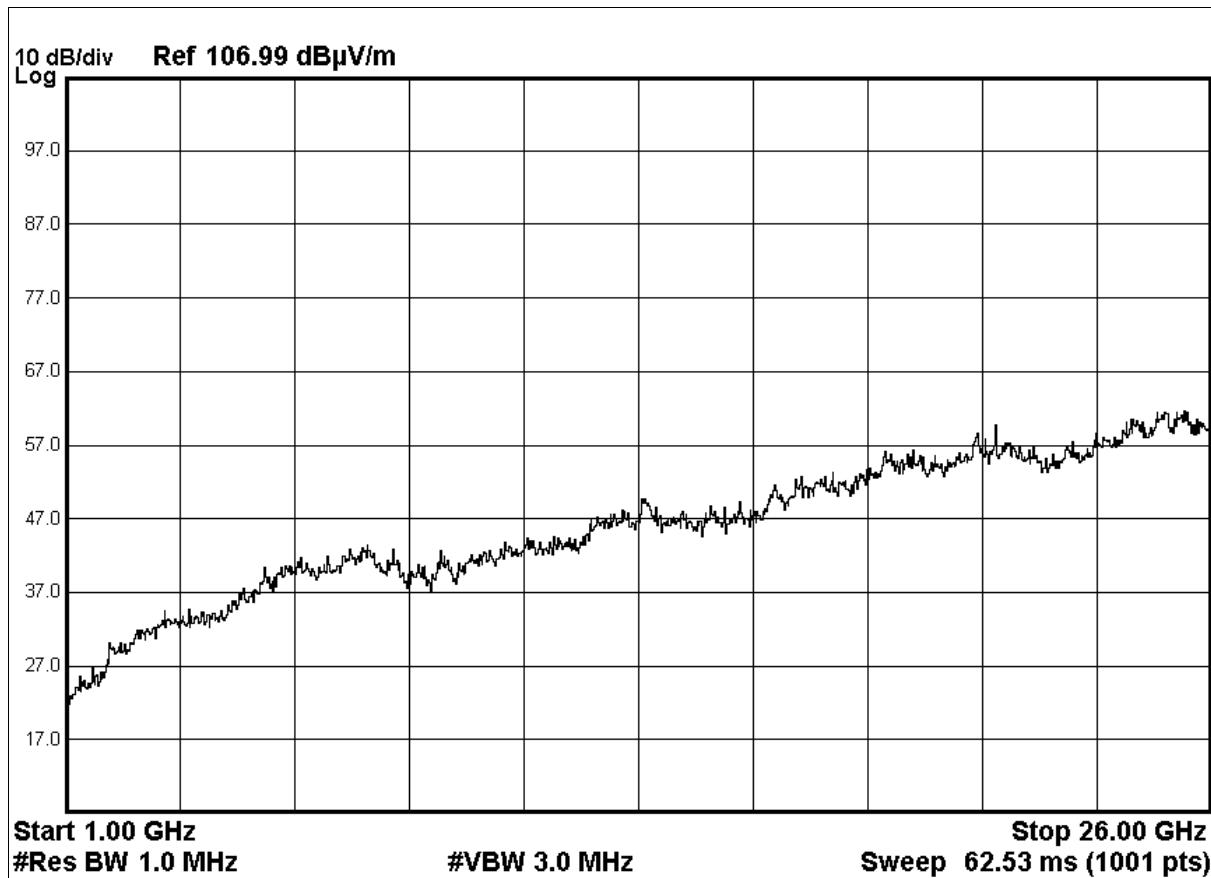


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Result of Tx mode (2440.0 MHz)



Remarks: The fundamental frequency was not included in the pre-scan plot, a 2.4G notch filter was added prior to the Receiver, please refer the band-edge plot for the level of fundamental frequency.

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Result of Tx mode (2440.0 MHz) (9kHz – 30MHz): Pass

| Field Strength of Spurious Emissions Peak Value | | | | | | |
|---|---------------------------|------------------------------|-----------------------------|---------------------------|---------------|---------------------|
| Frequency MHz | Measured Level dBuV | Correction Factor dB/m | Field Strength dBuV/m | Field Strength uV/m | Limit uV/m | E-Field Polarity |
| Emissions detected are more than 20 dB below the Limits | | | | | | |

Result of Tx mode (2440.0 MHz) (Above 1GHz): Pass

| Field Strength of Spurious Emissions Peak Value | | | | | | |
|--|-------------------------------|------------------------------|-----------------------------|------------------------|--------------|---------------------|
| Frequency MHz | Measured Level @3m dBuV | Correction Factor dB/m | Field Strength dBuV/m | Limit @3m dBuV/m | Margin dB | E-Field Polarity |
| 4880.0 | -3.6 | 32.1 | 28.5 | 74.0 | 45.5 | Vertical |
| 7320.0 | -3.8 | 38.6 | 34.8 | 74.0 | 39.2 | Vertical |
| 9760.0 | -4.6 | 41.3 | 36.7 | 74.0 | 37.3 | Vertical |
| 12200.0 | -4.2 | 43.5 | 39.3 | 74.0 | 34.7 | Vertical |
| 4880.0 | -3.8 | 32.1 | 28.3 | 74.0 | 45.7 | Horizontal |
| 7320.0 | -4.1 | 38.6 | 34.5 | 74.0 | 39.5 | Horizontal |
| 9760.0 | -4.5 | 41.3 | 36.8 | 74.0 | 37.2 | Horizontal |
| 12200.0 | -4.3 | 43.5 | 39.2 | 74.0 | 34.8 | Horizontal |

| Field Strength of Spurious Emissions Average Value | | | | | | |
|---|-------------------------------|------------------------------|-----------------------------|------------------------|--------------|---------------------|
| Frequency MHz | Measured Level @3m dBuV | Correction Factor dB/m | Field Strength dBuV/m | Limit @3m dBuV/m | Margin dB | E-Field Polarity |
| 4880.0 | -5.8 | 32.1 | 26.3 | 54.0 | 27.7 | Vertical |
| 7320.0 | -6.3 | 38.6 | 32.3 | 54.0 | 21.7 | Vertical |
| 9760.0 | -5.7 | 41.3 | 35.6 | 54.0 | 18.4 | Vertical |
| 12200.0 | -6.8 | 43.5 | 36.7 | 54.0 | 17.3 | Vertical |
| 4880.0 | -5.9 | 32.1 | 26.2 | 54.0 | 27.8 | Horizontal |
| 7320.0 | -6.2 | 38.6 | 32.4 | 54.0 | 21.6 | Horizontal |
| 9760.0 | -5.6 | 41.3 | 35.7 | 54.0 | 18.3 | Horizontal |
| 12200.0 | -6.1 | 43.5 | 37.4 | 54.0 | 16.6 | Horizontal |

Remarks: the listed correction factors are equal to Antenna factor + cable loss in corresponding to measuring frequency.

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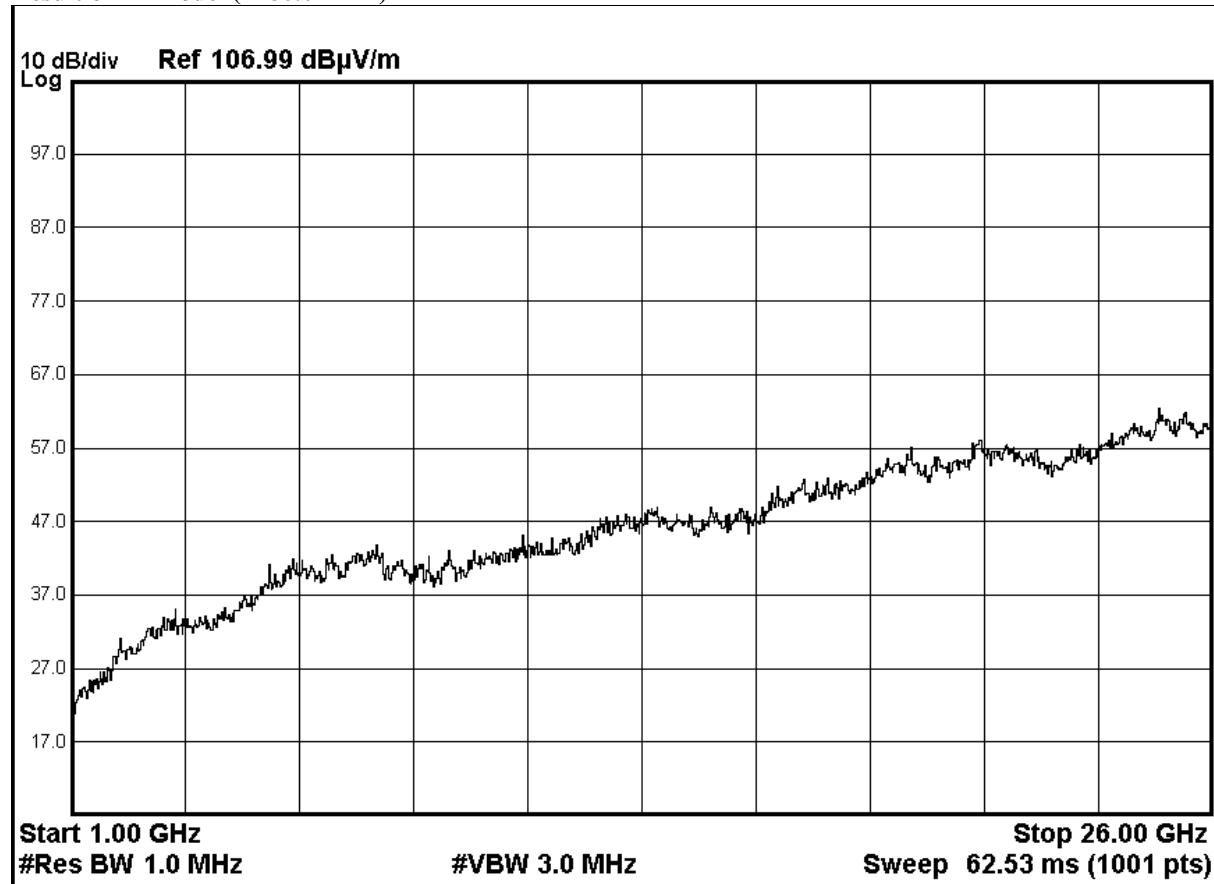


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Result of Tx mode (2480.0 MHz)



Remarks: The fundamental frequency was not included in the pre-scan plot, a 2.4G notch filter was added prior to the Receiver, please refer the band-edge plot for the level of fundamental frequency.

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Result of Tx mode (2480.0 MHz) (9kHz – 30MHz): Pass

| Field Strength of Spurious Emissions Peak Value | | | | | | |
|---|---------------------------|------------------------------|-----------------------------|---------------------------|---------------|---------------------|
| Frequency MHz | Measured Level dBuV | Correction Factor dB/m | Field Strength dBuV/m | Field Strength uV/m | Limit uV/m | E-Field Polarity |
| Emissions detected are more than 20 dB below the Limits | | | | | | |

Result of Tx mode (2480.0 MHz) (Above 1GHz): Pass

| Field Strength of Spurious Emissions Peak Value | | | | | | |
|--|-------------------------------|------------------------------|-----------------------------|------------------------|--------------|---------------------|
| Frequency MHz | Measured Level @3m dBuV | Correction Factor dB/m | Field Strength dBuV/m | Limit @3m dBuV/m | Margin dB | E-Field Polarity |
| 4960.0 | -3.4 | 32.2 | 28.8 | 74.0 | 45.2 | Vertical |
| 7440.0 | -4.9 | 38.6 | 33.7 | 74.0 | 40.3 | Vertical |
| 9920.0 | -5.1 | 42.1 | 37.0 | 74.0 | 37.0 | Vertical |
| 12400.0 | -5.6 | 44.1 | 38.5 | 74.0 | 35.5 | Vertical |
| 4960.0 | -3.6 | 32.2 | 28.6 | 74.0 | 45.4 | Horizontal |
| 7440.0 | -4.7 | 38.6 | 33.9 | 74.0 | 40.1 | Horizontal |
| 9920.0 | -5.3 | 42.1 | 36.8 | 74.0 | 37.2 | Horizontal |
| 12400.0 | -5.5 | 44.1 | 38.6 | 74.0 | 35.4 | Horizontal |

| Field Strength of Spurious Emissions Average Value | | | | | | |
|---|-------------------------------|------------------------------|-----------------------------|------------------------|--------------|---------------------|
| Frequency MHz | Measured Level @3m dBuV | Correction Factor dB/m | Field Strength dBuV/m | Limit @3m dBuV/m | Margin dB | E-Field Polarity |
| 4960.0 | -5.3 | 32.2 | 26.9 | 54.0 | 27.1 | Vertical |
| 7440.0 | -6.7 | 38.6 | 31.9 | 54.0 | 22.1 | Vertical |
| 9920.0 | -6.1 | 42.1 | 36.0 | 54.0 | 18.0 | Vertical |
| 12400.0 | -6.3 | 44.1 | 37.8 | 54.0 | 16.2 | Vertical |
| 4960.0 | -5.6 | 32.2 | 26.6 | 54.0 | 27.4 | Horizontal |
| 7440.0 | -6.5 | 38.6 | 32.1 | 54.0 | 21.9 | Horizontal |
| 9920.0 | -6.4 | 42.1 | 35.7 | 54.0 | 18.3 | Horizontal |
| 12400.0 | -6.7 | 44.1 | 37.4 | 54.0 | 16.6 | Horizontal |

Remarks: the listed correction factors are equal to Antenna factor + cable loss in corresponding to measuring frequency.

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Remarks:

No additional spurious emissions found between lowest internal used/generated frequency and 30 MHz

* Denotes restricted band of operation.

Measurements were made using a peak detector. Any emission less than 1000MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 and the limits of FCC Rules Part 15 Section 15.209 were applied.

Correction Factor included Antenna Factor and Cable Attenuation.

| | | | |
|------------------------------------|---|-------------|-------|
| Calculated measurement uncertainty | : | 9kHz-30MHz | 3.3dB |
| | | 30MHz -1GHz | 4.6dB |
| | | 1GHz -26GHz | 4.4dB |

Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.

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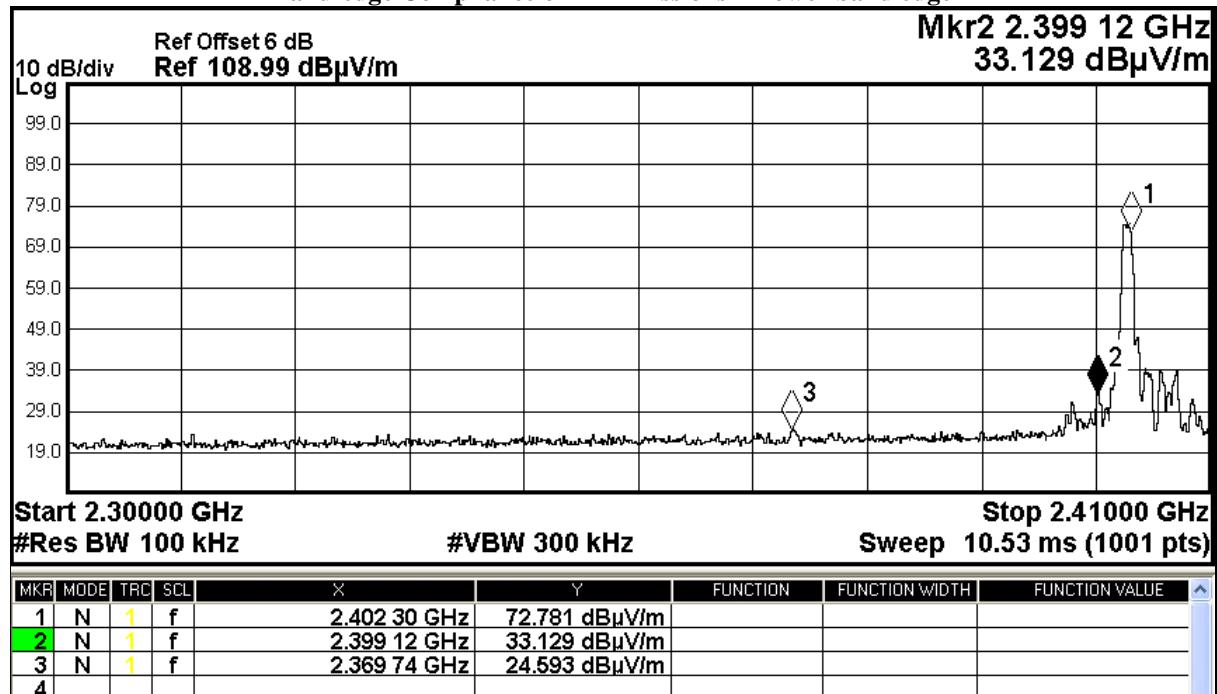
Band Edge Measurement:

Limit :

In any 100 kHz 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 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. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 5.205(c)).

| Frequency Range [MHz] | Emission Attenuated below the Fundamental [dB] |
|----------------------------------|---|
| 2400 – Lowest Fundamental (2402) | 39.7 |

Band-edge Compliance of RF Emissions – Lower band edge



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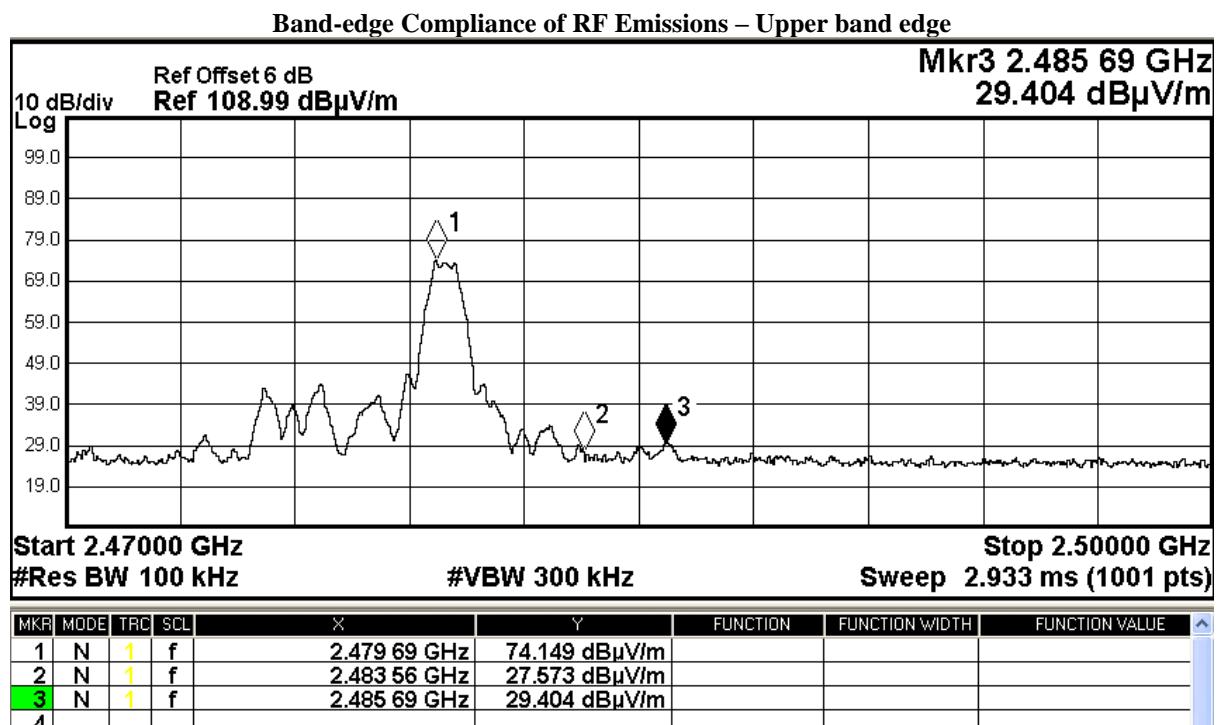
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Band-edge Compliance of RF Emissions Measurement:

| Frequency Range [MHz] | Emission Attenuated below the Fundamental [dB] |
|-------------------------------------|---|
| 2483.5 - Highest Fundamental (2480) | 46.6 |





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Radiated Emissions Band-edge and Restricted Band Result:

| Field Strength of Band-edge Compliance | | | | | | |
|--|-------------------------------|------------------------------|-----------------------------|------------------------|--------------|---------------------|
| Peak Value | | | | | | |
| Frequency MHz | Measured Level @3m dBuV | Correction Factor dB/m | Field Strength dBuV/m | Limit @3m dBuV/m | Margin dB | E-Field Polarity |
| 2369.7 | -3.3 | 27.9 | 24.6 | 74.0 | 49.4 | Vertical |
| 2485.7 | 1.5 | 27.9 | 29.4 | 74.0 | 44.6 | Vertical |

| Field Strength of Band-edge Compliance | | | | | | |
|--|-------------------------------|------------------------------|-----------------------------|------------------------|--------------|---------------------|
| Average Value | | | | | | |
| Frequency MHz | Measured Level @3m dBuV | Correction Factor dB/m | Field Strength dBuV/m | Limit @3m dBuV/m | Margin dB | E-Field Polarity |
| 2369.7 | -3.8 | 27.9 | 24.1 | 54.0 | 29.9 | Vertical |
| 2485.7 | 0.3 | 27.9 | 28.2 | 54.0 | 25.8 | Vertical |

Remarks:

The listed correction factors are equal to Antenna factor + cable loss in corresponding to measuring frequency.

Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.

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Limits for Radiated Emissions FCC 47 CFR 15.247 Class B]:

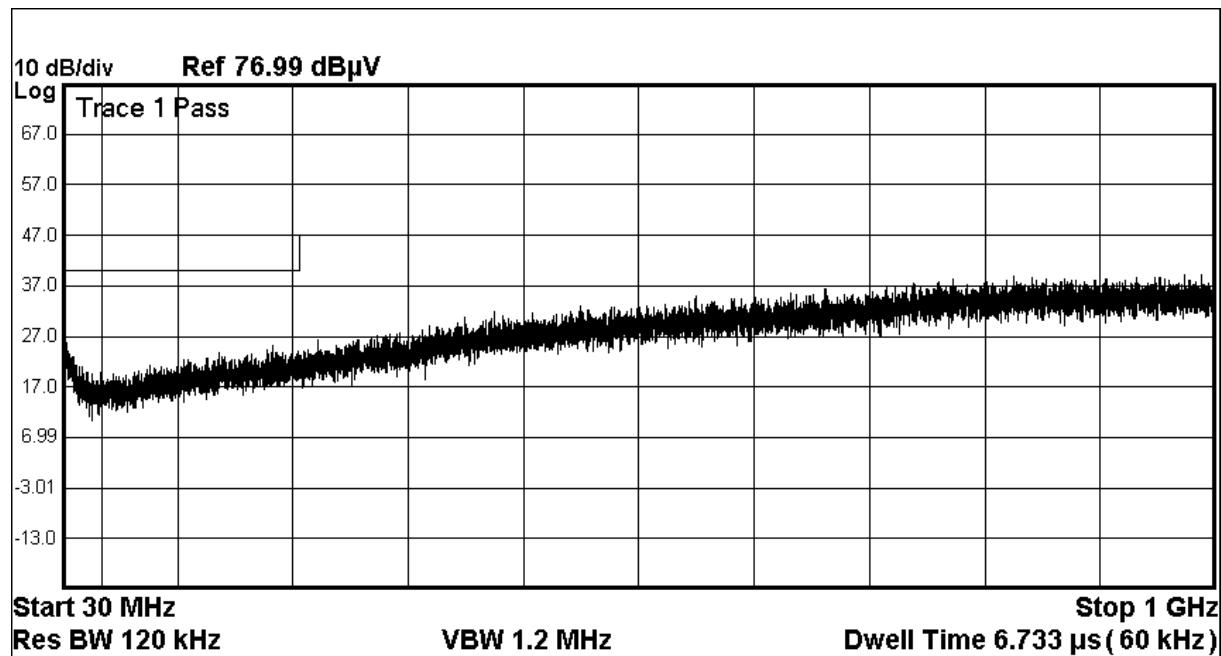
| Frequency Range [MHz] | Quasi-Peak Limits [μ V/m] |
|--------------------------|-----------------------------------|
| 0.009-0.490 | 2400/F (kHz) |
| 0.490-1.705 | 24000/F (kHz) |
| 1.705-30 | 30 |
| 30-88 | 100 |
| 88-216 | 150 |
| 216-960 | 200 |
| Above 960 | 500 |

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Results of Tx mode (30MHz – 1GHz): Pass

Please refer to the following table for result details(The data is the worst cases)

Horizontal



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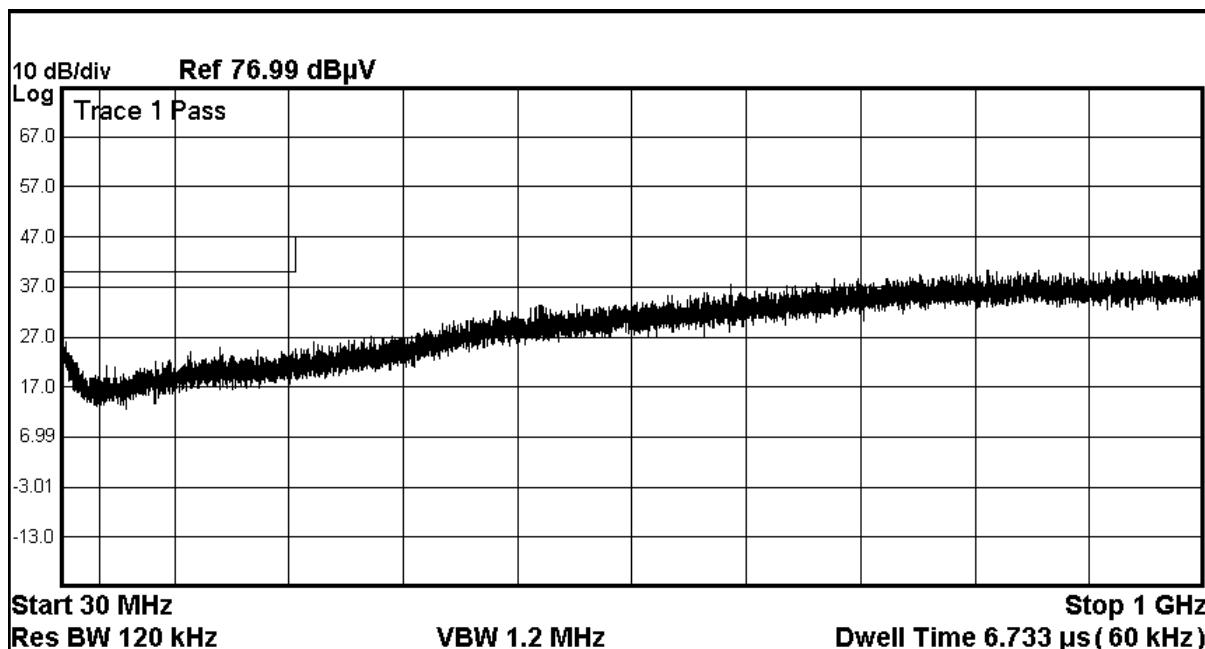
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Results of Tx mode (30MHz – 1GHz): Pass

Please refer to the following table for result details(The data is the worst cases)

Vertical



| Radiated Emissions Quasi-Peak | | | | | |
|----------------------------------|------------------|------------------------|------------------------|---------------------|---------------------|
| Emission Frequency MHz | E-Field Polarity | Level @3m dB μ V/m | Limit @3m dB μ V/m | Level @3m μ V/m | Limit @3m μ V/m |
| 43.5 | Vertical | 9.7 | 40.0 | 3.1 | 100 |
| 99.8 | Vertical | 13.5 | 43.5 | 4.7 | 150 |
| 130.5 | Vertical | 9.8 | 43.5 | 3.1 | 150 |
| 335.8 | Horizontal | 19.7 | 46.0 | 9.7 | 200 |
| 436.5 | Horizontal | 23.4 | 46.0 | 14.8 | 200 |
| 548.9 | Horizontal | 24.5 | 46.0 | 16.8 | 200 |

Remarks:

Calculated measurement uncertainty (30MHz – 1GHz): 4.6dB

Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.

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3.1.3 Conducted Emissions (0.15MHz to 30MHz)

Test Requirement: FCC 47CFR 15.207 Class B

Test Method: ANSI C63.10: 2013

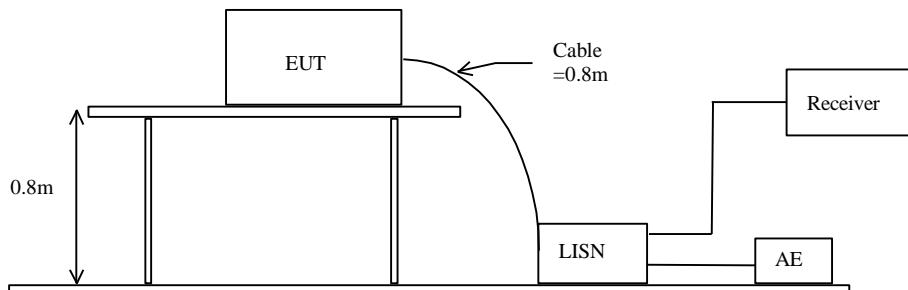
Test Date: 2019-10-16

Mode of Operation: Tx mode

Test Method:

The test was performed in accordance with ANSI C63.10: 2013, with the following: initial measurements were performed in peak and average detection modes on the live line, any emissions recorded within 30dB of the relevant limit lines were re-measured using quasi-peak and average detection on the live and neutral lines with the worst case recorded in the table of results.

Test Setup:



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Limits for Conducted Emissions (FCC 47 CFR 15.207):

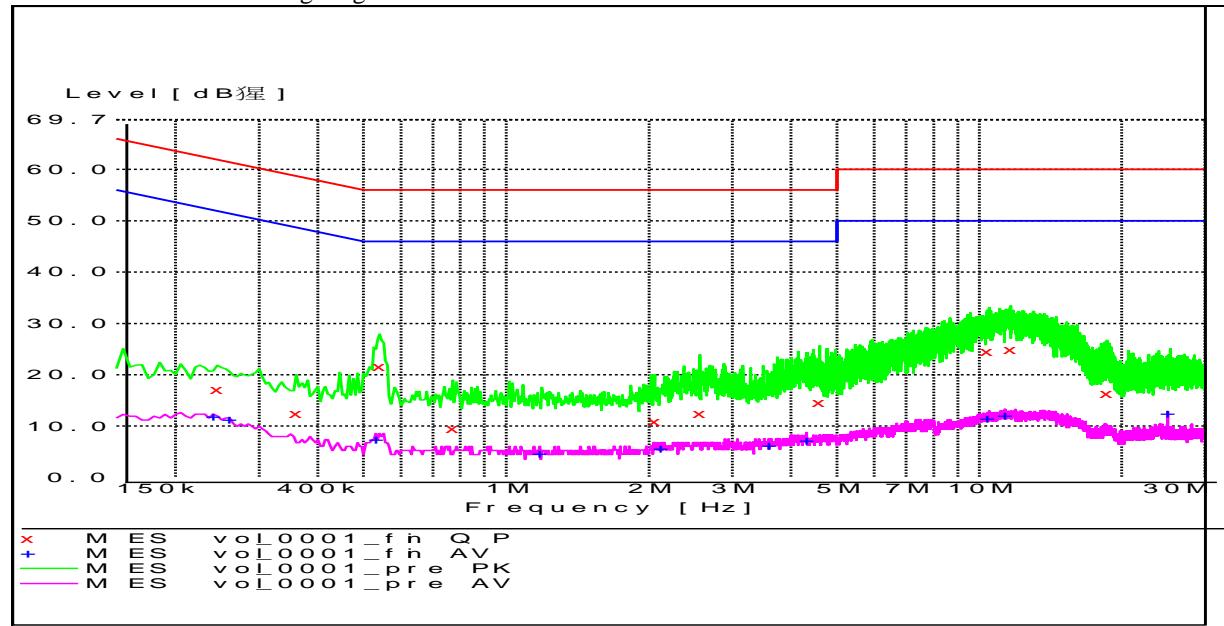
| Frequency Range [MHz] | Quasi-Peak Limits [dB μ V] | Average [dB μ V] |
|--------------------------|-----------------------------------|-------------------------|
| 0.15-0.5 | 66 to 56* | 56 to 46* |
| 0.5-5.0 | 56 | 46 |
| 5.0-30.0 | 60 | 50 |

* Decreases with the logarithm of the frequency.

Limits for Conducted Emissions Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram.

Results of Tx mode (Live and Neutral): PASS

Please refer to the following diagram for individual results.





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MEASUREMENT RESULT: "vol_0001_fin_QP"

| Frequency MHz | Level dB μ V | Transd dB | Limit dB μ V | Margin dB | Line | PE |
|------------------|---------------------|--------------|---------------------|--------------|------|-----|
| 0.245000 | 17.20 | 9.9 | 62 | 44.7 | N | GND |
| 0.360000 | 12.40 | 10.0 | 59 | 46.4 | L1 | GND |
| 0.540000 | 21.60 | 10.0 | 56 | 34.4 | L1 | GND |
| 0.770000 | 9.50 | 10.0 | 56 | 46.5 | L1 | GND |
| 2.060000 | 10.90 | 10.1 | 56 | 45.1 | L1 | GND |
| 2.570000 | 12.50 | 10.1 | 56 | 43.5 | L1 | GND |
| 4.595000 | 14.50 | 10.3 | 56 | 41.5 | N | GND |
| 10.380000 | 24.40 | 10.5 | 60 | 35.6 | N | GND |
| 11.655000 | 24.90 | 10.5 | 60 | 35.1 | N | GND |
| 18.670000 | 16.40 | 10.4 | 60 | 43.6 | L1 | GND |

MEASUREMENT RESULT: "vol_0001_fin_AV"

| Frequency MHz | Level dB μ V | Transd dB | Limit dB μ V | Margin dB | Line | PE |
|------------------|---------------------|--------------|---------------------|--------------|------|-----|
| 0.240000 | 11.80 | 9.9 | 52 | 40.3 | N | GND |
| 0.260000 | 11.20 | 9.9 | 51 | 40.3 | L1 | GND |
| 0.530000 | 7.30 | 10.0 | 46 | 38.7 | N | GND |
| 1.175000 | 4.70 | 10.0 | 46 | 41.3 | L1 | GND |
| 2.120000 | 5.70 | 10.1 | 46 | 40.3 | L1 | GND |
| 3.590000 | 6.20 | 10.2 | 46 | 39.8 | L1 | GND |
| 4.315000 | 7.10 | 10.2 | 46 | 38.9 | L1 | GND |
| 10.385000 | 11.50 | 10.5 | 50 | 38.5 | L1 | GND |
| 11.360000 | 12.10 | 10.6 | 50 | 37.9 | N | GND |
| 25.060000 | 12.50 | 10.7 | 50 | 37.5 | N | GND |

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3.1.4 Power Spectral Density

Test Requirement: FCC 47CFR 15.247(e)
Test Method: ANSI C63.10:2013
Test Date: 2019-10-11
Mode of Operation: Tx mode

Test Method:

The RF output of the EUT was connected to the spectrum analyzer. Set the fundamental frequency as the center frequency of the spectral analyzer. Use RBW=3kHz , VBW= 10kHz , Set the span to 1.5 times the DTS channel bandwidth. Detector = peak, Sweep time = auto couple , Trace mode = max hold.

Test Setup:

As Test Setup of clause 3.1.1 in this test report.

Test Limit:

The maximum power spectral density (PSD) shall not exceed 8dBm in any 3kHz band.

Results of Tx mode : Pass

Maximum power spectral density

| Transmitter Frequency (MHz) | Maximum Power spectral density level (dBm/3kHz) | Maximum Power spectral density limit (dBm/3kHz) |
|-----------------------------|---|---|
| 2402.0 | -39.9 | 8dBm/3kHz |
| 2440.0 | -40.1 | 8dBm/3kHz |
| 2480.0 | -41.6 | 8dBm/3kHz |

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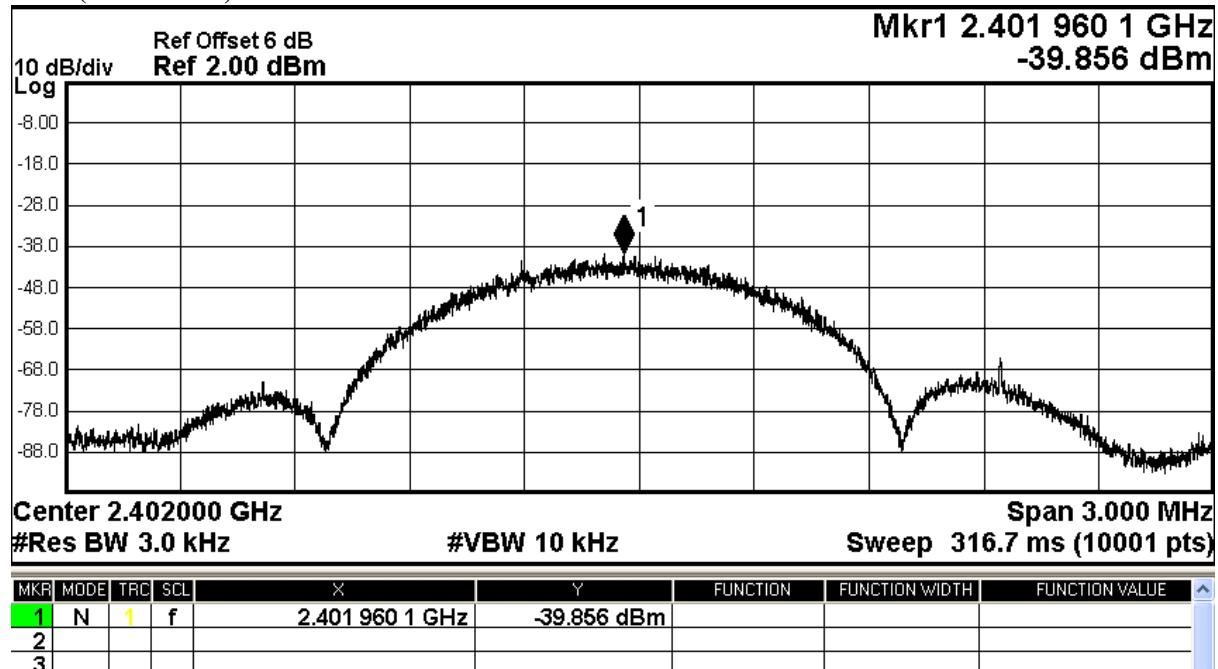


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Tx mode
CH 1 (2402.0 MHz)



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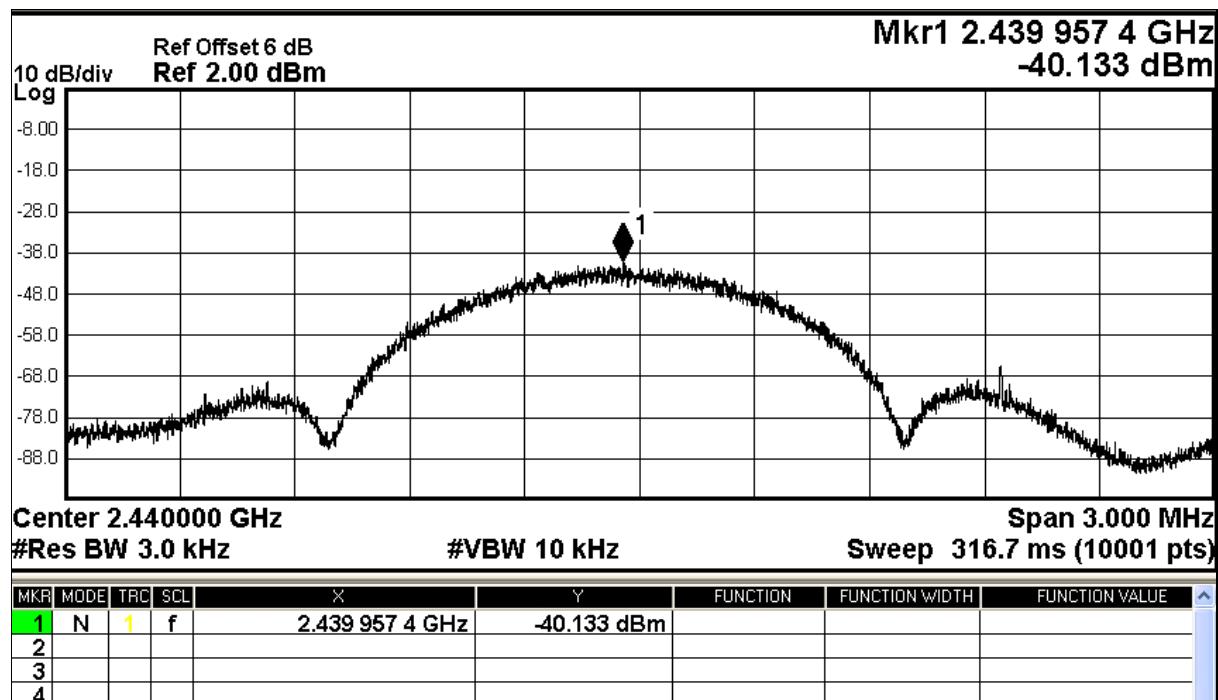


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Tx mode
CH 19 (2440.0 MHz)



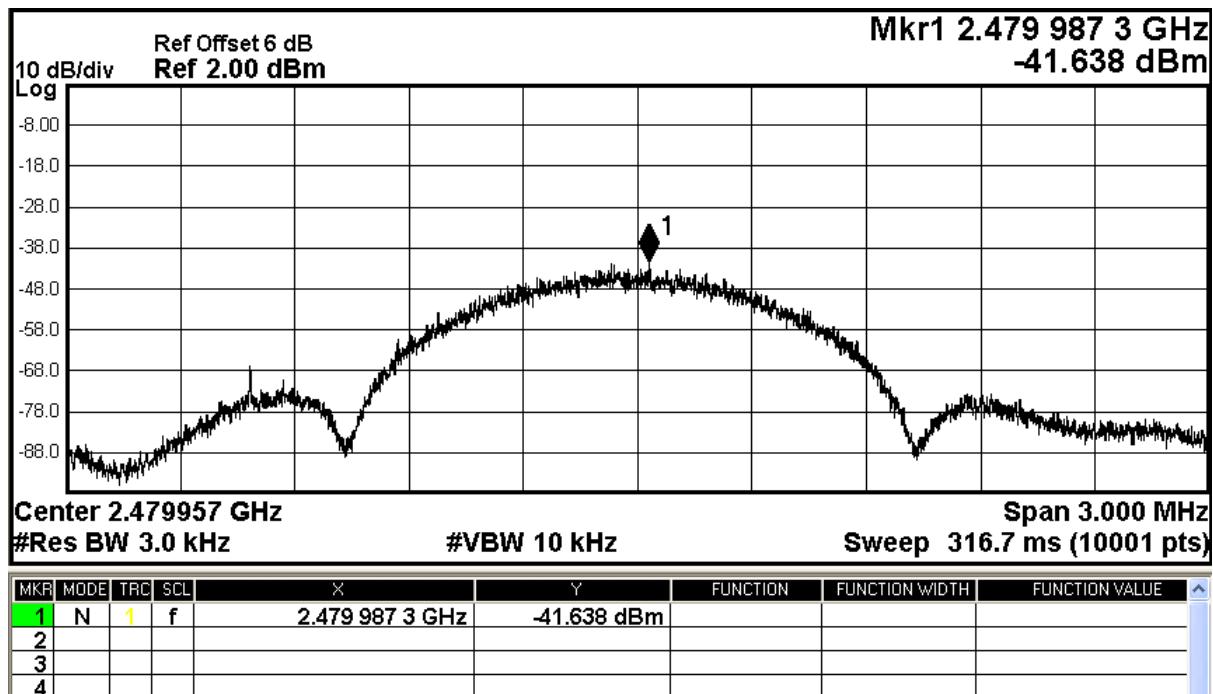


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Tx mode
CH 39 (2480.0 MHz)



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3.1.5 6dB Spectrum Bandwidth Measurement

| | |
|--------------------|------------------------|
| Test Requirement: | FCC 47CFR 15.247(a)(2) |
| Test Method: | ANSI C63.10:2013 |
| Test Date: | 2019-10-11 |
| Mode of Operation: | Tx mode |

Test Method:

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

Test Setup:

As Test Setup of clause 3.1.1 in this test report.

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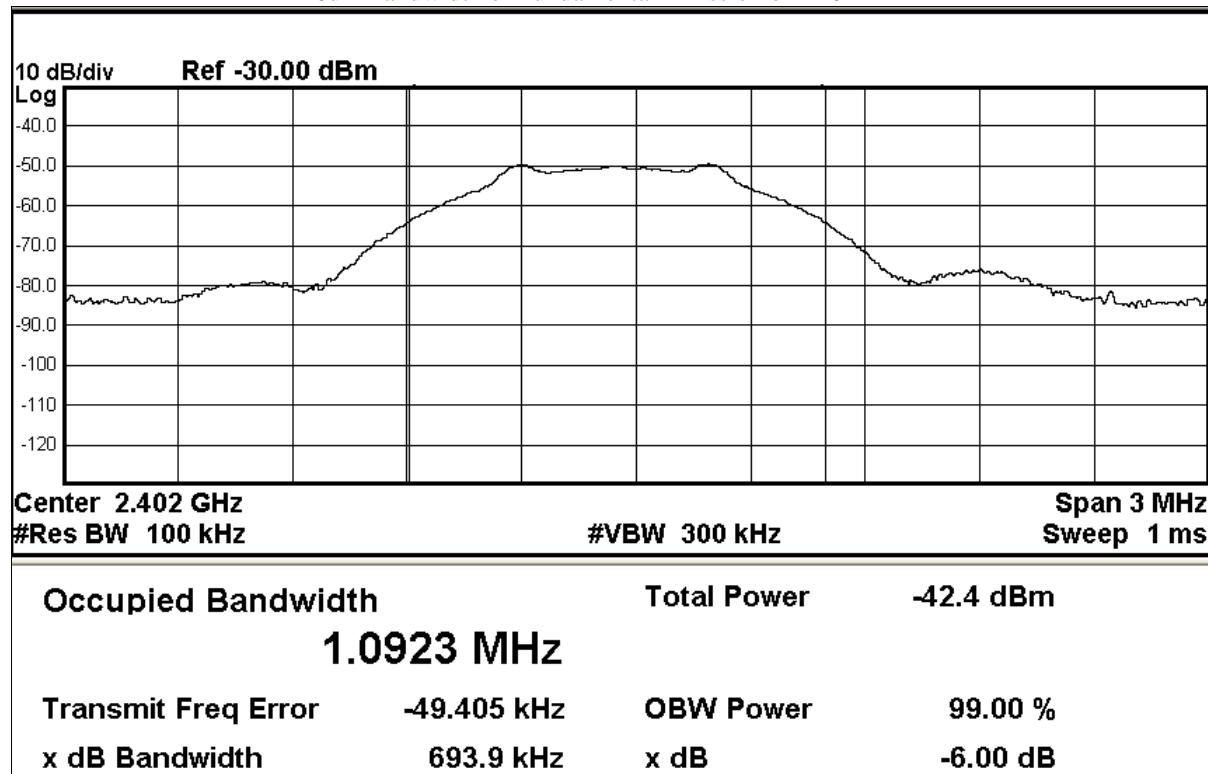
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Limits for 6dB Spectrum Bandwidth Measurement:

| Center Frequency [MHz] | 6dB Bandwidth [kHz] | FCC Limits [kHz] |
|---------------------------|------------------------|---------------------|
| 2402.0 | 693.9 | > 500 |

6dB Bandwidth of Fundamental Emission on 2402MHz



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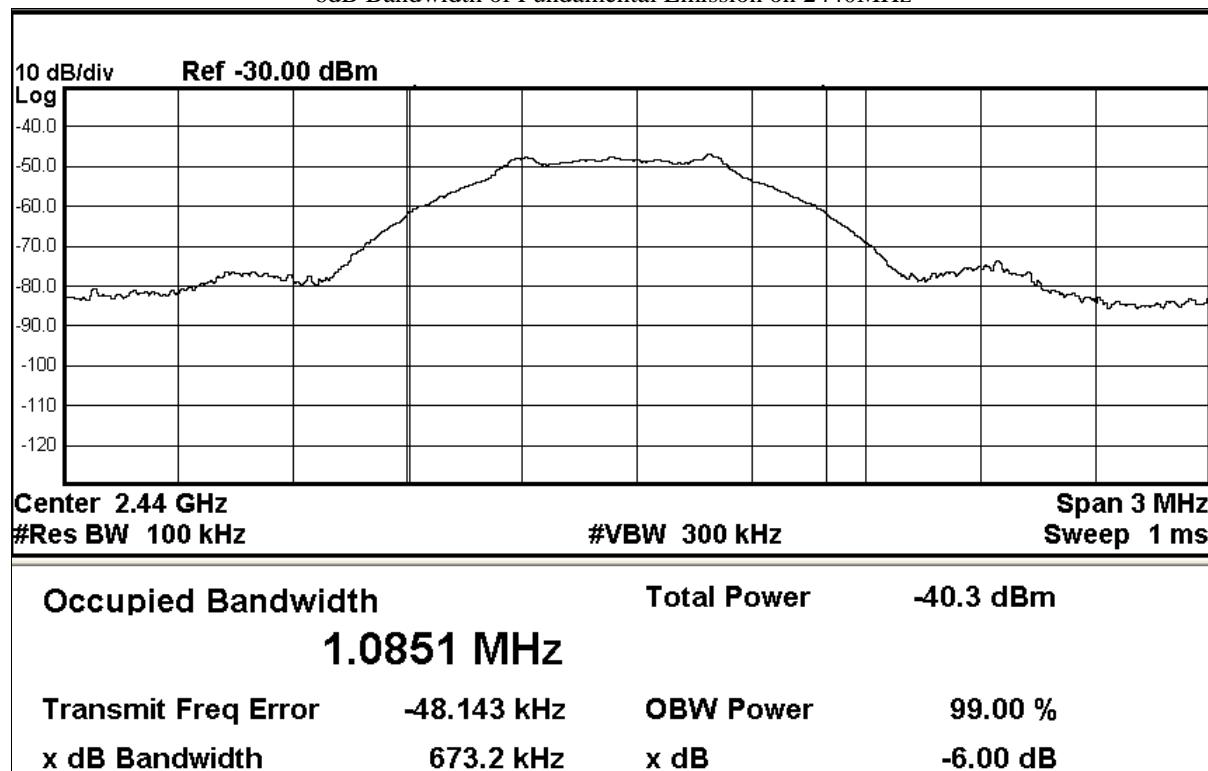
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Limits for 6dB Spectrum Bandwidth Measurement:

| Frequency Range [MHz] | 6dB Bandwidth [kHz] | FCC Limits [kHz] |
|--------------------------|------------------------|---------------------|
| 2440.0 | 673.2 | > 500 |

6dB Bandwidth of Fundamental Emission on 2440MHz



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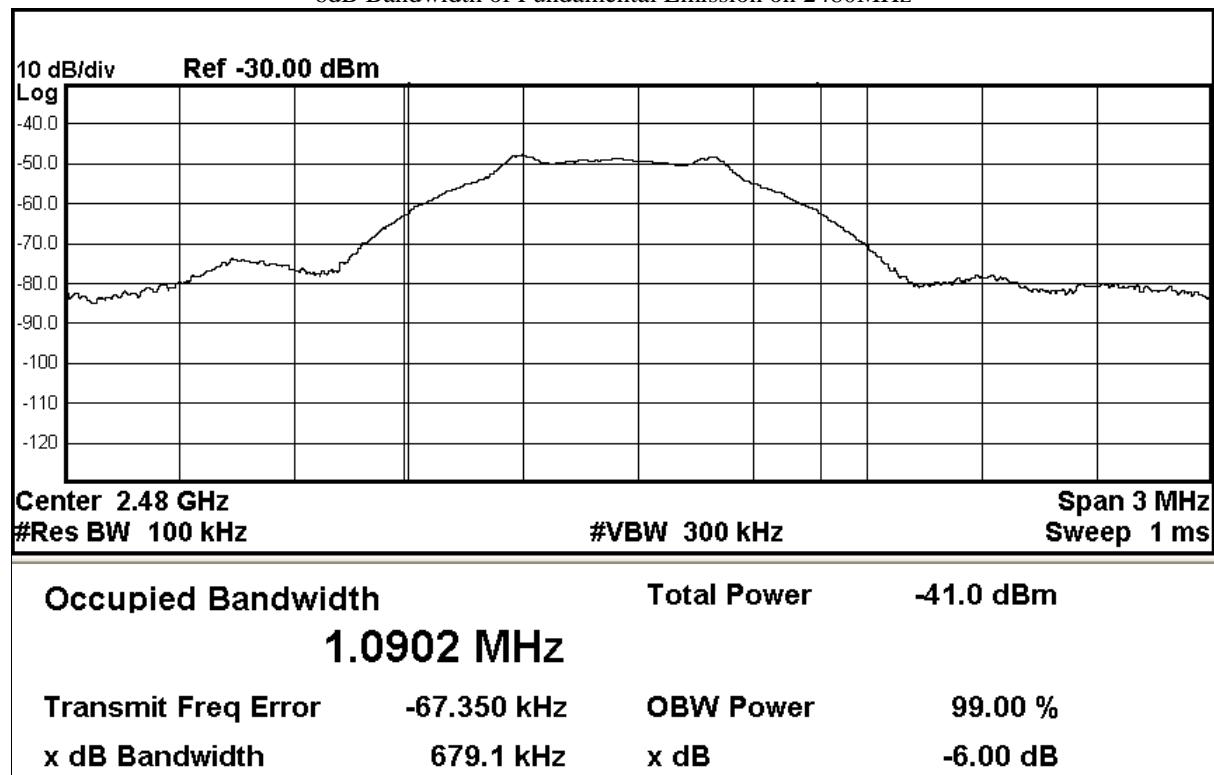
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Limits for 6dB Spectrum Bandwidth Measurement:

| Frequency Range [MHz] | 6dB Bandwidth [kHz] | FCC Limits [kHz] |
|--------------------------|------------------------|---------------------|
| 2480.0 | 710.3 | > 500 |

6dB Bandwidth of Fundamental Emission on 2480MHz



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3.1.6 RF Exposure

RF Exposure

Test Requirement: FCC 47CFR 15.247(i)
Test Date: 2019-10-15
Mode of Operation: Tx mode

Requirements:

In 15.247(i), an equipment shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the limits in §§ 1.1310 and 2.1093 of this chapter. Applications to the Commission for construction permits, licenses to transmit or renewals thereof, equipment authorizations or modifications in existing facilities must contain a statement confirming compliance with the limits unless the facility, operation, or transmitter is categorically excluded, as discussed below. Technical information showing the basis for this statement must be submitted to the Commission upon request.

According to KDB447498 D01 General RF Exposure Guidance v06, unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Exclusion Threshold condition.

Test Results:

RF Exposure Evaluation

The highest measured power = 0.0083mW (-20.8dBm)@2.48GHz

Max. duty factor is 100%

Antenna gain = 0dBi

The Maximum tune-up power = 0.0123mW (-19.1dBm)

The test separation distances is \geq 5 mm

For 100 MHz to 6 GHz and test separation distances \leq 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR, and ≤ 7.5 for 10-g extremity SAR,

$= 0.003875 < 3.0$

therefore SAR is not applicable for the EUT

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Appendix A

List of Measurement Equipment

Radiated Emission

| EQP NO. | DESCRIPTION | MANUFACTURER | MODEL NO. | SERIAL NO. | LAST CAL | DUE CAL |
|---------|----------------------------|--------------|-----------------|----------------|------------|------------|
| EM215 | MULTIDEVICE CONTROLLER | EMCO | 2090 | 00024676 | N/A | N/A |
| EM217 | ELECTRIC POWERED TURNTABLE | EMCO | 2088 | 00029144 | N/A | N/A |
| EM218 | ANECHOIC CHAMBER | ETS-LINDGREN | FACT-3 | -- | 2019/01/24 | 2020/01/24 |
| EM356 | ANTENNA POSITIONING TOWER | ETS-LINDGREN | 2171B | 00150346 | N/A | N/A |
| EM354 | BICONILOG ANTENNA | ETS-LINDGREN | 3143B | 00142073 | 2018/03/29 | 2020/03/29 |
| EM229 | EMI TEST RECEIVER | R&S | ESIB40 | 100248 | 2019/06/11 | 2020/06/11 |
| EM276 | BROADBAND HORN ANTENNA | A-INFOMW | JXTXLB-10180-SF | J2031090903007 | 2018/04/27 | 2020/04/27 |
| EM318 | USB WIDEBAND POWER SENSOR | AGILENT | U2022XA | MY53470001 | 2019/03/23 | 2021/03/23 |
| EM353 | LOOP ANTENNA | ETS_LINDGREN | 6502 | 00206533 | 2018/04/16 | 2020/04/16 |

Remarks:-

CM Corrective Maintenance
N/A Not Applicable
TBD To Be Determined

***** End of Test Report *****

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5. The results in Report apply only to the sample as received and do not apply to the bulk, unless the sampling has been carried out by the Company and is stated as such in the Report.
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