2/F., Garment Centre,
576 Castle Peak Road, Kowloon,
Hong Kong.

Telephone: (852) 2173 8888
Facsimile: (852) 2785 5487
www.intertek.com

# TEST REPORT

**Report Number: 19071647HKG-004R1**

Application for Original Grant of 47 CFR Part 15 Certification

**FCC ID: A2HWT9L11**

This report supersedes previous report with report number 19071647HKG-004 dated September 20, 2019. Please refer HEE-S19-0043 Letter issued on November 05, 2019 for amendment/ supersede notification.

| Tested, Prepared and Checked by: | Approved by: |
|---|---|
| Kelvin Liang<br>Assistant Manager<br>Shenzhen UnionTrust Quality and Technology Co., Ltd. | Digitally signed by Tim Lee<br>Location: Intertek Testing Services Hong Kong Ltd.<br><br>Lee Shui Tim, Tim<br>Senior Lead Engineer<br>Intertek Testing Services Hong Kong<br>Date: November 05, 2019 |

# TEST REPORT

## GENERAL INFORMATION

| | |
|---|---|
| **Applicant Name:** | Alco Electronics Ltd. |
| **Applicant Address:** | 11/F., Metropole Square,<br>2 On Yiu Street, Sha Tin,<br>N.T., Hong Kong. |
| **FCC Specification Standard:** | FCC Part 15, October 1, 2017 Edition |
| **FCC ID:** | A2HWT9L11 |
| **FCC Model(s):** | WT9L11P44GD51<br>100005693 |
| **Type of EUT:** | Spread Spectrum Transmitter |
| **Description of EUT:** | Tablet |
| **Serial Number:** | N/A |
| **Sample Receipt Date:** | July 31, 2019 |
| **Date of Test:** | August 23, 2019 to September 10, 2019 |
| **Report Date:** | November 05, 2019 |
| **Environmental Conditions:** | Temperature: +10 to 40°C<br>Humidity: 10 to 90% |
| **Conclusion:** | Test was conducted by client submitted sample. The submitted sample as received complied with the 47 CFR Part 15 Certification. |

# TEST REPORT

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# TEST REPORT

## 1.0 TEST RESULTS SUMMARY & STATEMENT OF COMPLIANCE

### 1.1 Summary of Test Results

| Test Items | FCC Part 15 Section | Results | Details See Section |
|---|---|---|---|
| Antenna Requirement | 15.203 | Pass | 2.1 |
| Max. Conducted Output Power | 15.247(b)(1) & (4) | Pass | 4.1 |
| Max. 20dB RF Bandwidth | N/A | N/A | 4.2 |
| Min. No. of Hopping Frequencies | 15.247(a)(1)(iii) | Pass | 4.3 |
| Min. Hopping Channel Carrier Frequency Separation | 15.247(a)(1) | Pass | 4.4 |
| Average Time of Occupancy | 15.247(a)(1)(iii) | Pass | 4.5 |
| Out of Band Antenna Conducted Emission | 15.247(d) | Pass | 4.6 |
| Radiated Emission in Restricted Bands and Spurious Emissions | 15.247(d) | Pass | 4.8 |
| AC Power Line Conducted Emission | 15.207 & 15.107 | Pass | 4.9 |

Note: Pursuant to FCC Part 15 Section 15.215(c), the 20dB bandwidth of the emission was contained within the frequency band designated (mentioned as above) which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over expected variations in temperature and supply voltage were considered.

### 1.2 Statement of Compliance

The equipment under test is found to be complying with the following standards:

FCC Part 15, October 1, 2017 Edition

**TEST REPORT**

# 2.0 GENERAL DESCRIPTION

## 2.1 Product Description

The Tablet (WT9L11P44GD51) is a Law enforcement recorder. A wireless mobile phone dock consisting of a base unit and either wireless headset/wireless USB dongle or corded headset.

The Equipment Under Test (EUT) operates at frequency range of 2402MHz to 2480 MHz. There are totally 79 with 1MHz channel separation and 20 active channels out of the 79 channels.

The EUT is power by a battery.

The antenna(s) used in the EUT is integral, and the test sample is a prototype.

The Model: 100005693 is the same as the Model: WT9L11P44GD51 in electronics/electrical designs including software & firmware, PCB layout and construction design/physical design/enclosure as declared by client. The only differences between these models are brand name and model number to be sold for marketing purpose as declared by client.

The circuit description and frequency hopping algorithm are attached in the Appendix and saved with filename: descri.pdf.

## 2.2 Test Methodology

Both AC power line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2014). Preliminary radiated scans and all radiated measurements were performed in radiated emission test sites. All Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application. Antenna port conducted measurements were performed according to ANSI C63.10 (2013). All other measurements were made in accordance with the procedures in 47 CFR Part 2.

## 2.3 Test Facility

The radiated emission test site, AC power line conducted measurement facility and antenna port conducted measurement facility used to collect the radiated data, AC Power Line conducted data, and conductive data are at Intertek Testing Services Hong Kong Ltd., which is located at 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China. This test facility and site measurement data have been fully placed on file with FCC.

## TEST REPORT

# 3.0 SYSTEM TEST CONFIGURATION

3.1 Justification

For radiated emissions testing, the equipment under test (EUT) was setup to transmit / receive continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, all cables (if any) were manipulated to produce worst case emissions.

The EUT was powered by a battery.

For the measurements, the EUT was attached to a plastic stand if necessary and placed on the wooden turntable at 0.8m height from the ground plane for emission testing at or below 1GHz and 1.5m for emission measurements above 1GHz. If the base unit attached to peripherals, they were connected and operational (as typical as possible).

The signal was maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization were varied during the search for maximum signal level. The antenna height was varied from 1 to 4 meters. Radiated emissions were taken at three meters unless the signal level was too low for measurement at that distance. If necessary, a pre-amplifier was used and/or the test was conducted at a closer distance.

For any intentional radiator powered by AC power line, measurements of the radiated signal level of the fundamental frequency component of the emission was performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage.

For transmitter radiated measurement, the spectrum analyzer resolution bandwidth was 100 kHz for frequencies below 1000 MHz. The resolution bandwidth was 1 MHz for frequencies above 1000 MHz.

Radiated emission measurement for transmitter were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower. Receiver was performed from 30MHz to the fifth harmonic of the highest frequency or 40GHz, whichever is lower.

# TEST REPORT

## 3.1 Justification - Cont'd

Emission that are directly caused by digital circuits in the transmit path and transmitter portion were measured, and the limit are according to FCC Part 15 Section 15.209. Digital circuitry used to control additional functions other than the operation of the transmitter is subject to FCC Part Section 15.109 Limits.

Detector function for radiated emissions was in peak mode. Average readings, when required, were taken by measuring the duty cycle of the equipment under test and subtracting the corresponding amount in dB from the measured peak readings. A detailed description for the calculation of the average factor can be found in section 4.3.4.

Determination of pulse desensitization was made according to *Hewlett Packard Application Note 150-2, Spectrum Analysis... Pulsed RF.* The effective period (Teff) was referred to Exhibit 4.3.4. With the resolution bandwidth 1MHz and spectrum analyzer IF bandwidth 3dB, the pulse desensitization factor was 0dB.

For AC line conducted emission test, the EUT along with its peripherals were placed on a 1.0m(W)x1.5m(L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane. The EUT was connected to power mains through a line impedance stabilization network (LISN), which provided 50ohm coupling impedance for measuring instrument. The LISN housing, measuring instrument case, reference ground plane, and vertical ground plane were bounded together. The excess power cable between the EUT and the LISN was bundled.

All connecting cables of EUT and peripherals were manipulated to find the maximum emission.

All relevant operation modes have been tested, and the worst case data is included in this report.

## 3.2 EUT Exercising Software

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use.

## TEST REPORT

3.3 Details of EUT and Description of Accessories

*Details of EUT:*

AC adaptor (provided with the unit) was used to power the device. Their description are listed below.

(1) An AC adaptor (100V to 240V, Model: DBS018A-1201500U) (Provided by Applicant)
(2) An AC adaptor (100V to 240V, Model: DCT18W120150US-A0) (Provided by Applicant)

*Description of Accessories:*

(1) Keyboard (Provided by Applicant)

3.4 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test at a level of confidence of 95% has been considered. The values of the Measurement uncertainty:

| No. | Item | Measurement Uncertainty |
|---|---|---|
| 1 | Conducted emission 9KHz-150KHz | ±3.8 dB |
| 2 | Conducted emission 150KHz-30MHz | ±3.4 dB |
| 3 | Radiated emission 9KHz-30MHz | ±4.9 dB |
| 4 | Radiated emission 30MHz-1GHz | ±4.7 dB |
| 5 | Radiated emission 1GHz-18GHz | ±5.1 dB |
| 6 | Radiated emission 18GHz-26GHz | ±5.2 dB |
| 7 | Radiated emission 26GHz-40GHz | ±5.2 dB |

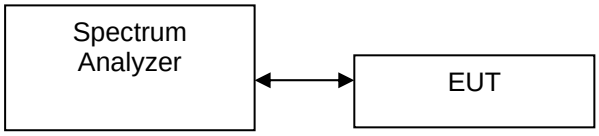
Uncertainty and Compliance - Unless the standard specifically states that measured values are to be extended by the measurement uncertainty in determining compliance, all compliance determinations are based on the actual measured value.

# TEST REPORT

## 4.0 TEST RESULTS

RF Conducted measurement Test Setup by a Spectrum Analyzer.

The figure below shows the test setup, which is utilized to make these measurements.




4.1 Maximum Conducted (peak) Output Power at Antenna Terminals

☐ The antenna power of the EUT was connected to the input of a power meter. Power was read directly and cable loss correction was added to the reading to obtain power at the EUT antenna terminals.

☒ The antenna port of the EUT was connected to the input of a spectrum analyzer. The analyzer was set for RBW>20dB bandwidth and power was read directly in dBm. External attenuation and cable loss were compensated for using the OFFSET function of the analyzer.

Antenna Gain = -0.1 dBi

| Frequency (MHz) | Output in dBm | Output in mWatt |
|---|---|---|
| Low Channel: 2402 | 4.385 | 2.74 |
| Middle Channel: 2441 | 4.388 | 2.75 |
| High Channel: 2480 | 4.370 | 2.74 |

Cable loss : 0.5 dB External Attenuation : 0 dB

Cable loss, external attenuation: ☒ included in OFFSET function
☐ added to SA raw reading

dBm max. output level = 4.4 dBm

Limits:
☒ 0.125W (21dBm) for antennas with gains of 6dBi or less

☐ 0.25W (24dBm) for antennas with gains of 6dBi or less

☐ 1W (30dBm) for antennas with gains of 6dBi or less

☐ ___W (___dBm) for antennas with gains more than 6dBi

The plots of conducted output power are saved as below.

# TEST REPORT

## PLOTS OF CONDUCTED OUTPUT POWER

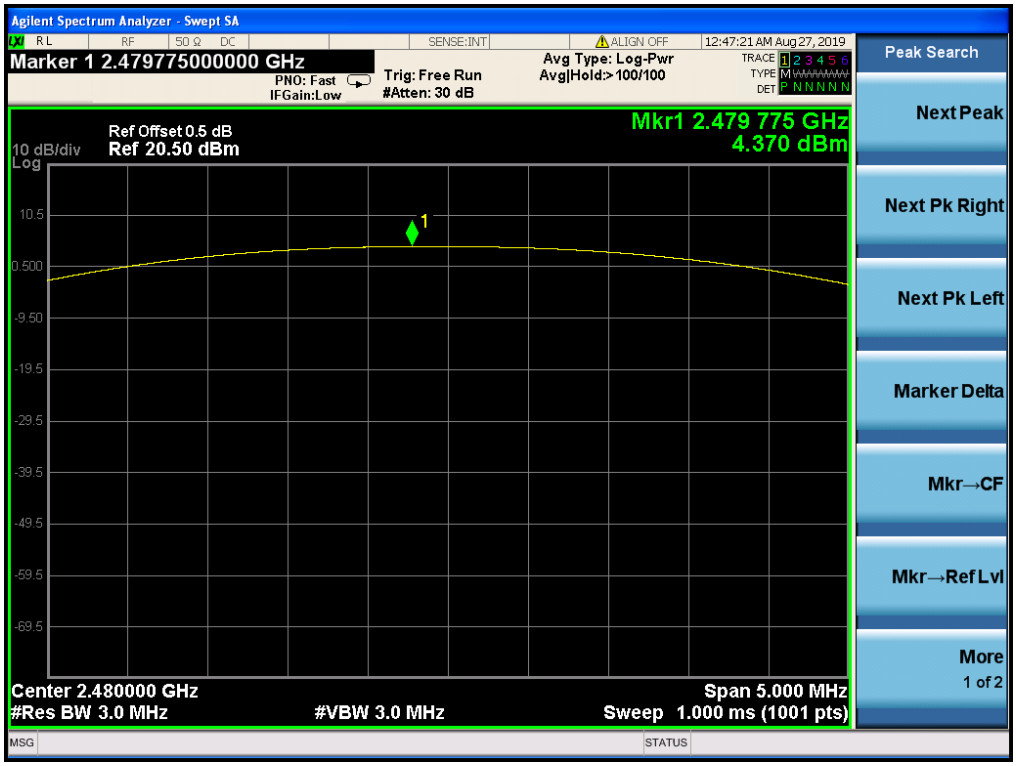
Lowest Channel


Middle Channel

# TEST REPORT

## PLOTS OF CONDUCTED OUTPUT POWER

Highest Channel



## TEST REPORT

4.2 Maximum 20 dB RF Bandwidth

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RES BW was chosen so that the display was a result of the hopping channel modulation. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A PEAK output reading was taken, a DISPLAY line was drawn 20 dB lower than PEAK level. The 20 dB bandwidth was determined from where the channel output spectrum intersected the display line.

| Frequency (MHz) | 20 dB Bandwidth (kHz) |
|---|---|
| Low Channel: 2402 | 0.9607 |
| Middle Channel: 2441 | 0.9625 |
| High Channel: 2480 | 0.9627 |

Limits

☐ ≤500kHz for 902-928MHz

☒ N/A for 2400-2483.5MHz

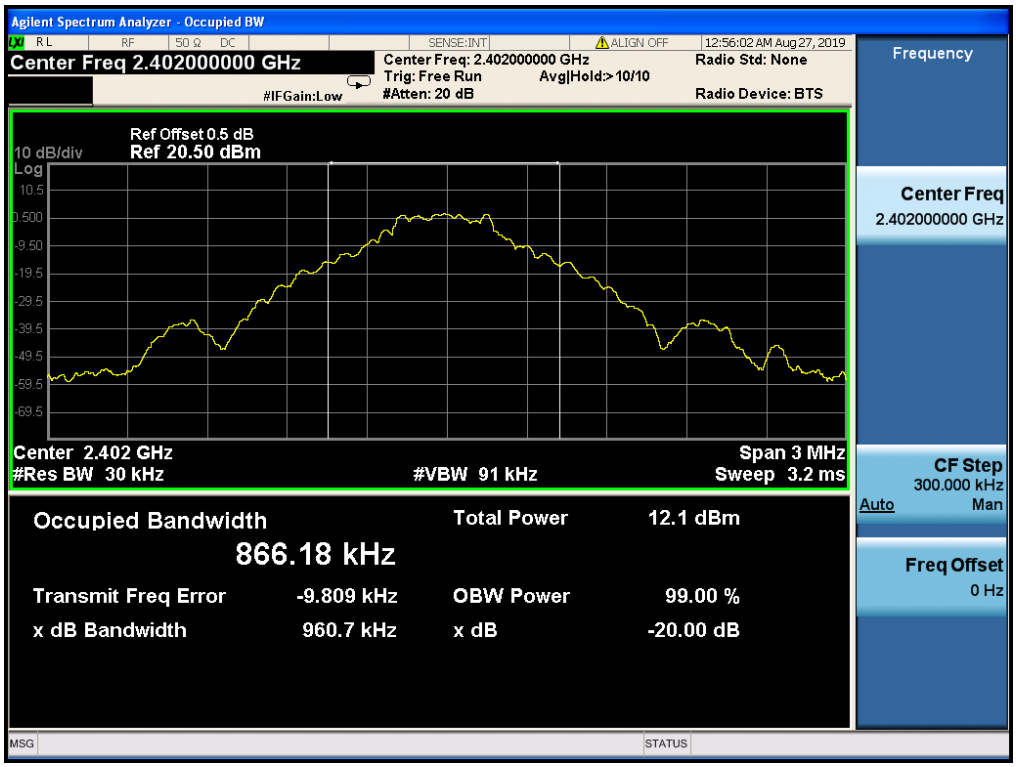
☐ ≤1MHz for 5725-5850MHz

The plots of 20dB RF bandwidth are saved as below.

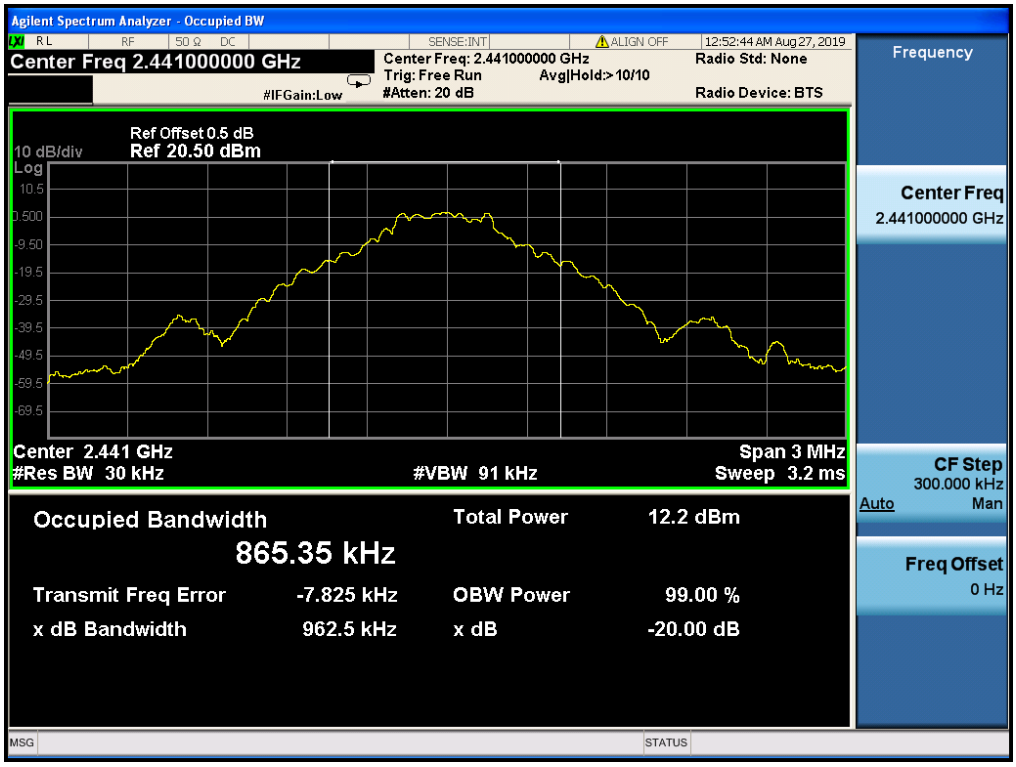
# TEST REPORT

## PLOTS OF 20dB RF BANDWIDTH

Lowest Channel



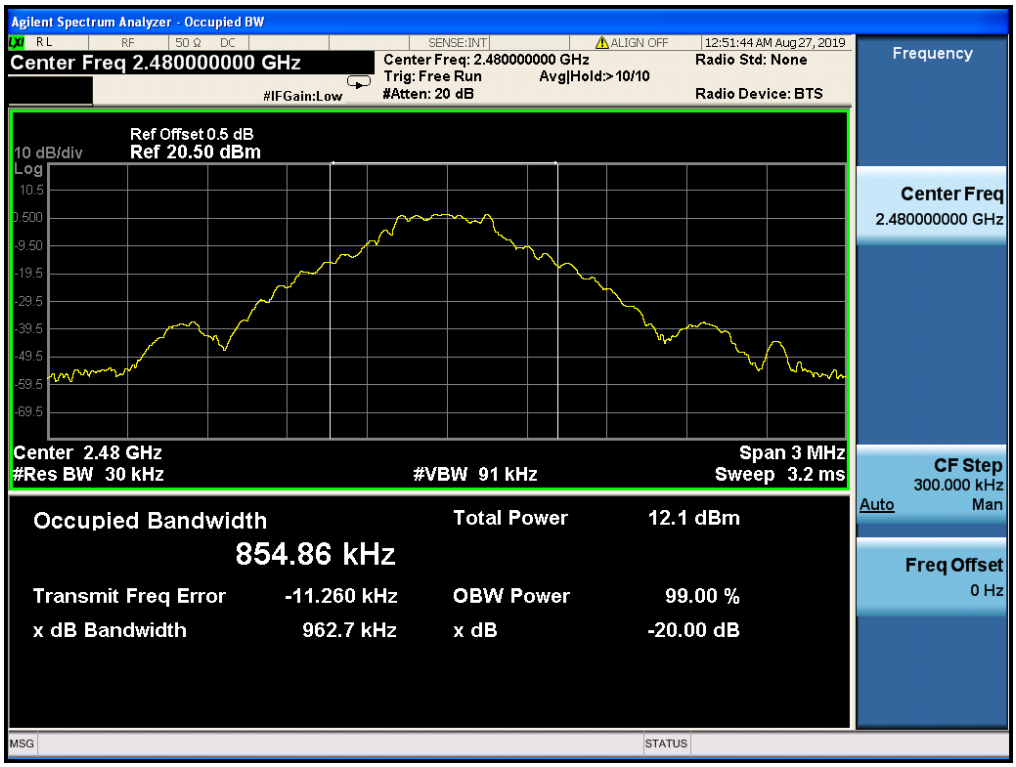

Middle Channel



# TEST REPORT

## PLOTS OF 20dB RF BANDWIDTH

Highest Channel



## TEST REPORT

4.3 Minimum Number of Hopping Frequencies

With the analyzer set to MAX HOLD readings were taken for 2-3 minutes in each band. The channel peaks so recorded were added together, and the total number compared to the minimum number of channels required in the regulation.

| | |
|---|---|
| No. of Hopping Channels | 79 |

Minimum Requirements:

☐ at least 50 hopping channels for 902MHz-928MHz (20 dB bandwidth of hopping channel < 250kHz)

☐ at least 25 hopping channels for 902MHz-928MHz (20 dB bandwidth of hopping channel ≥ 250kHz)

☒ at least 15 hopping channels for 2400MHz-2483.5MHz.

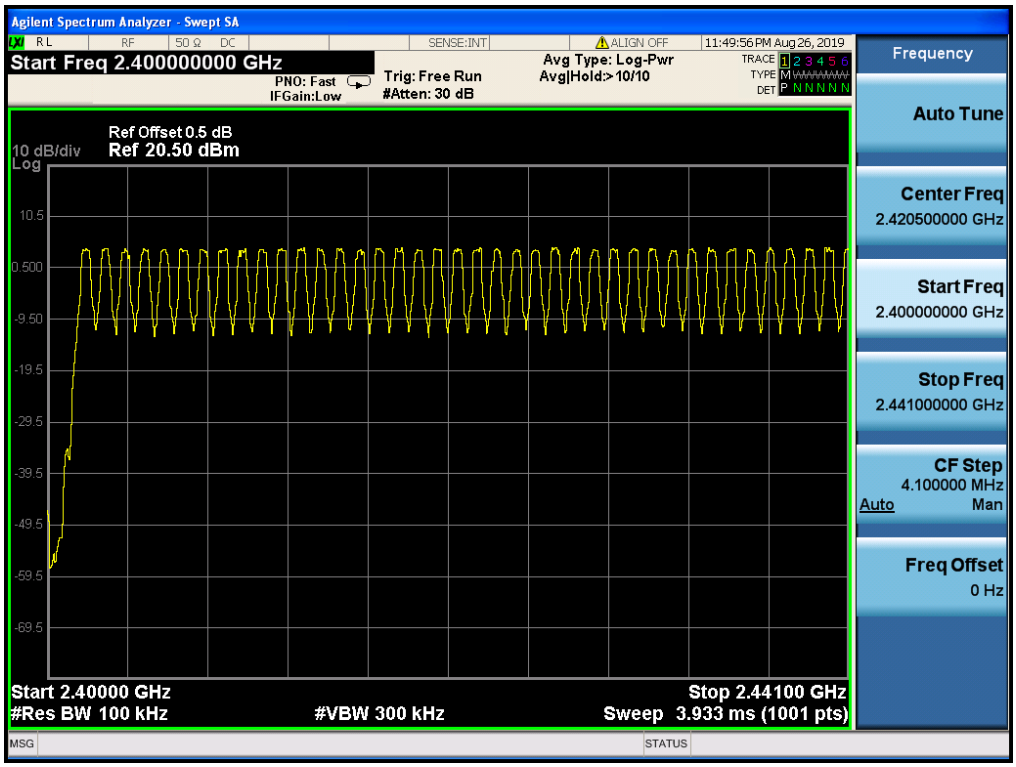
☐ at least 75 hopping channels for 5725MHz-5850MHz.

The plots of number of hopping frequencies are saved as below.

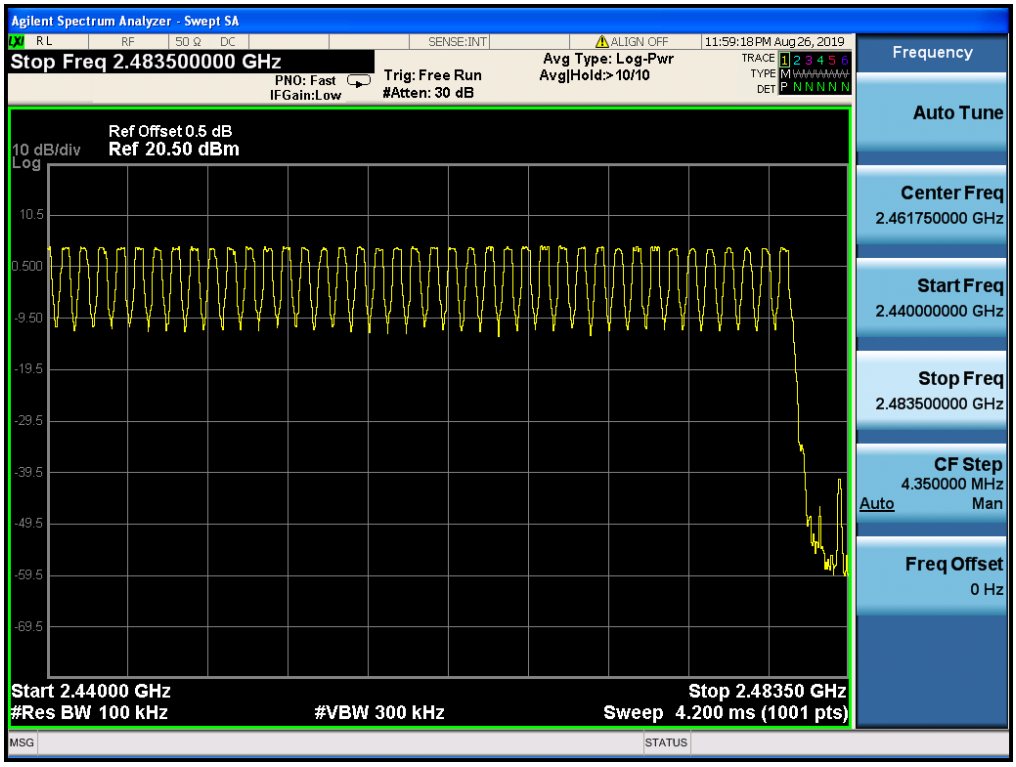
# TEST REPORT

## PLOTS OF NUMBER OF HOPPING FREQUENCIES

Plot A




Plot B



## TEST REPORT

4.4 Minimum Hopping Channel Carrier Frequency Separation

Using the DELTA MARKER function of the analyzer, the frequency separation between two adjacent channels was measured and met the requirement.

| | |
|---|---|
| Channel Separation (2441MHz and 2442MHz) | 1.00MHz |

Limits:
The channel separation must be larger than:

☐ 25 kHz

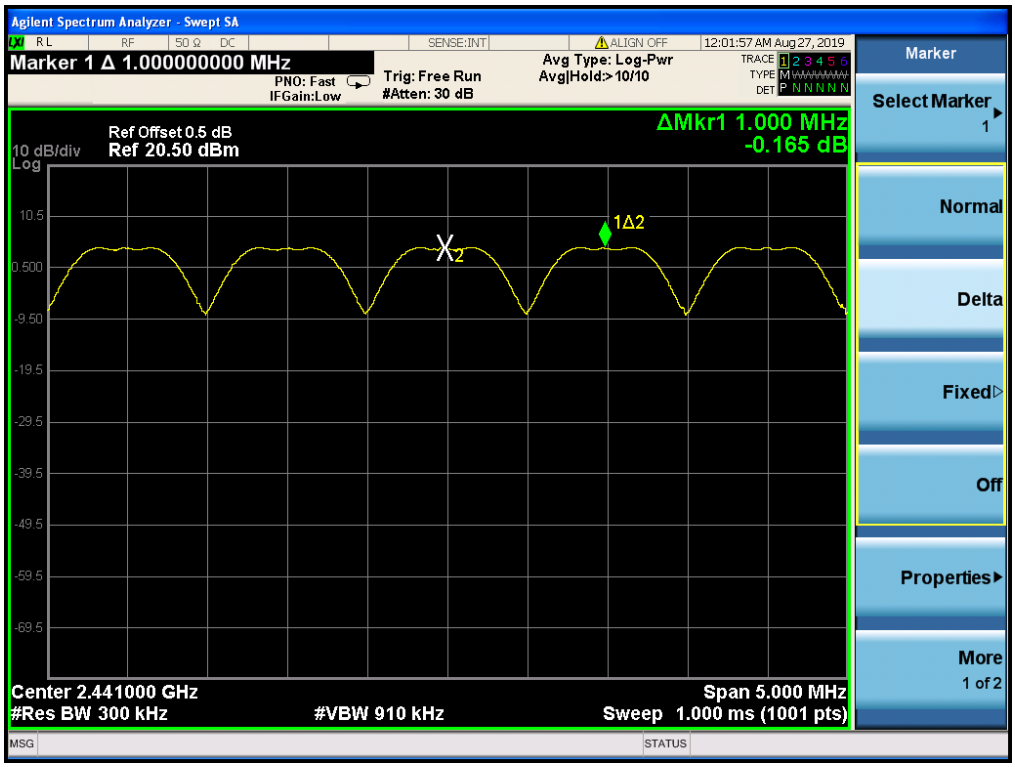
☐ 20 dB bandwidth of hopping channel: ___Hz

☒ 2/3 of 20dB bandwidth of hopping channel: ___ kHz

The plot(s) of hopping channel carrier frequency separation is saved as below.

# TEST REPORT

## PLOTS OF HOPPING CHANNEL CARRIER FREQUENCY SEPARATION




| DUT Frequency (MHz) | Frequency Separation (MHz) | Limit Min (MHz) |
|---|---|---|
| 2441.000000 | 1.000 | 0.64046 |

## TEST REPORT

4.5 Average Channel Occupancy Time

The spectrum analyzer center frequency was set to one of the known hopping channels. The SWEEP was set to 1ms, the SPAN was set to ZERO SPAN, and the TRIGGER was set to VIDEO. The time duration of the transmission so captured was measured with the MARKER DELTA function.

The SWEEP was then set to the time required by the regulation (20 seconds for 902-928 MHz devices, if the 20dB bandwidth is less than 250kHz, 10 seconds for 902-928 MHz if the 20dB bandwidth is or greater than 250kHz, "0.4 seconds x Number of hopping channels employed" seconds for 2400-2483.5 MHz, 30 seconds for 5725-5850 MHz). The analyzer was set to SINGLE SWEEP, the total ON time was added and compared against the limit (0.4 seconds).

| | |
|---|---|
| Average Occupancy Time<br>(Traffic – in a clear RF environment) = | 276.384 |

Limits:
Average 0.4 seconds maximum occupancy in:

☒ 31.6 seconds (0.4 sec. x 79) for 2400MHz-2483.5MHz
(Traffic – in a clear RF environment)

☐ 20 seconds for 902MHz-928MHz ≥ 50 hopping channels

☐ 10 seconds for 902MHz-928MHz ≥ 25 hopping channels

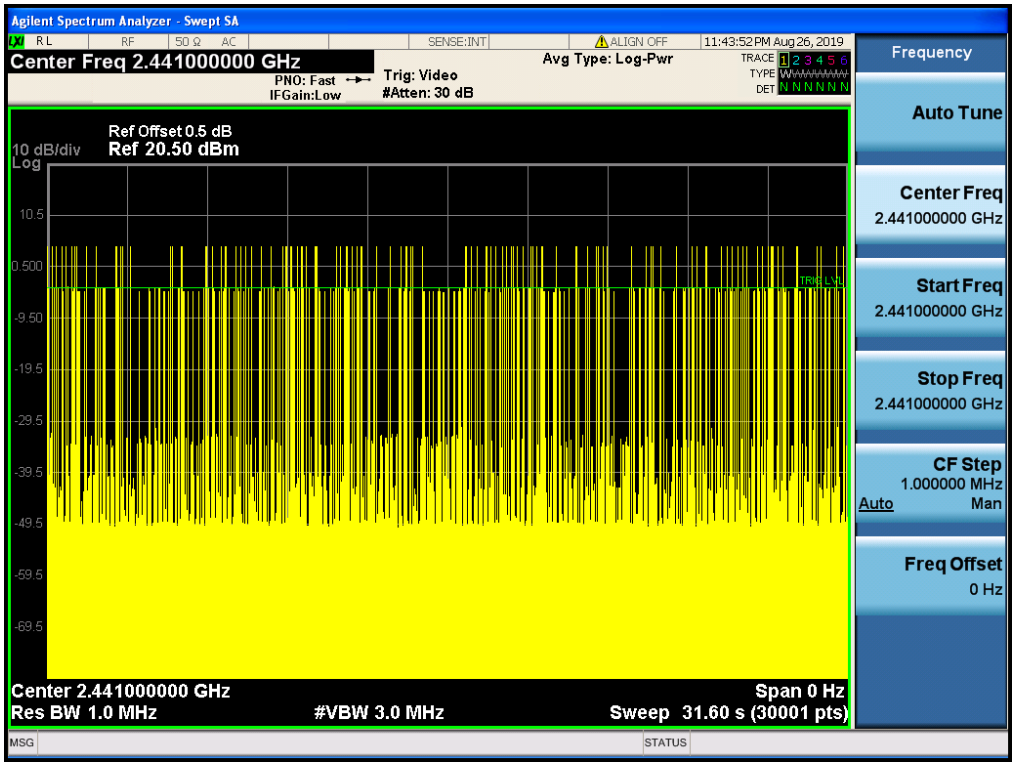
☐ 30 seconds for 5725-5850MHz

The plots of average channel occupancy time are saved as below.

# TEST REPORT

## PLOTS AVERAGE CHANNEL OCCUPANCY TIME

Plot A




| DUT Frequency (MHz) | Time (ms) | Limit Max (ms) | Limit Min (ms) | Threshold (dBm) | Result |
|---|---|---|---|---|---|
| 2441.000000 | 276.384 | 400.000 | 0.000 | -6.0 | PASS |

## TEST REPORT

### 4.6 Out of Band Conducted Emissions

In any 100 kHz bandwidth outside the EUT passband, the RF power produced by the modulation products of the spreading sequence, the information sequence, and the carrier frequency shall be at least 20 dB below that of the maximum in-band 100 kHz emission.

The plot(s) of bandedge compliance is shown the worst-case which has been already considered between enable and disable the hopping function of the EUT.

Furthermore, delta measurement technique for measuring bandedge emissions was incorporated in the test of the edge at 2483.5MHz.

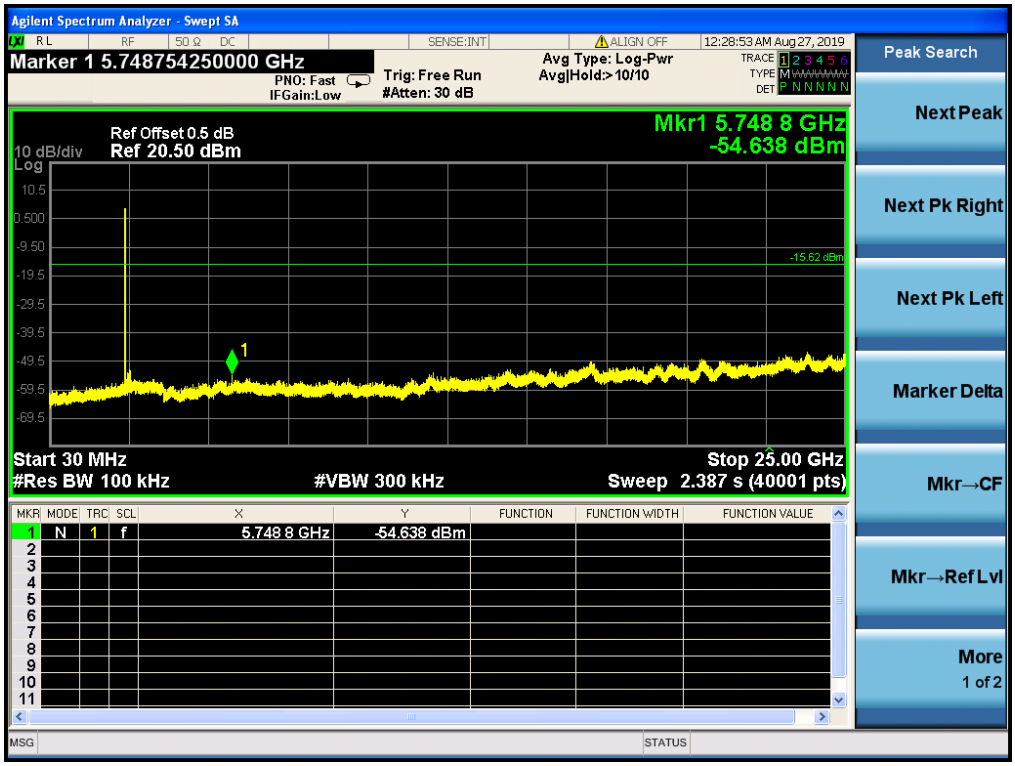
Limits:
All spurious emission and up to the tenth harmonic was measured and they were found to be at least 20 dB below the highest level of the desired power in the passband.

The plots of out of band conducted emissions are saved as below.

# TEST REPORT

## PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

Lowest Channel, Plot 1

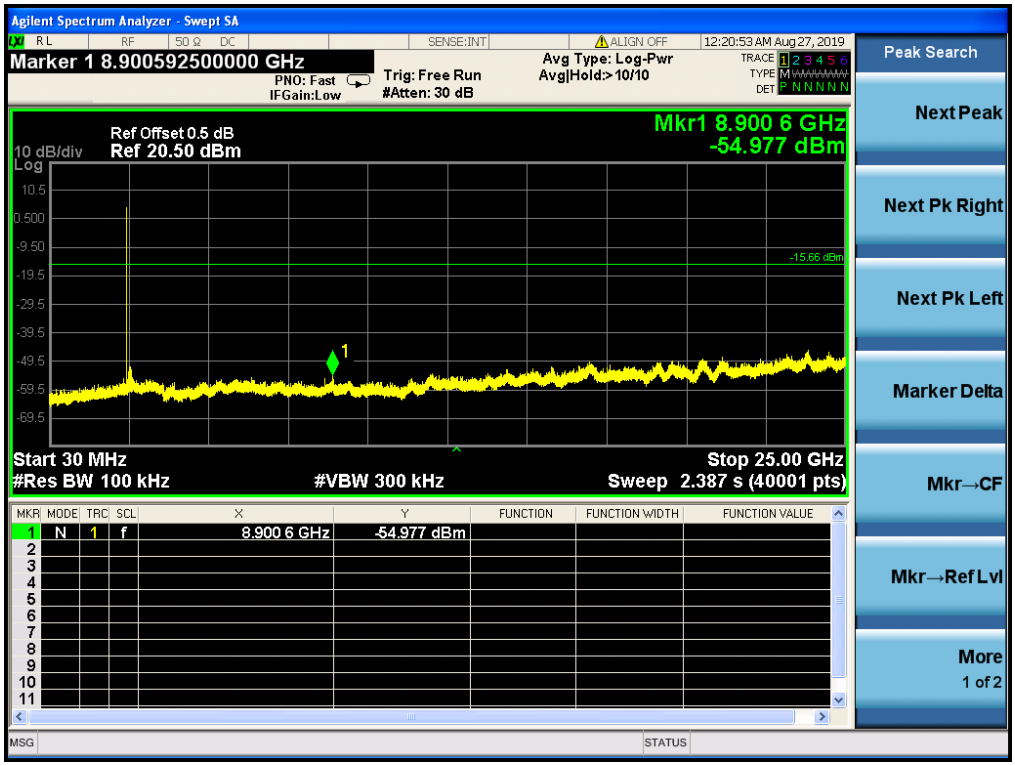



| DUT Frequency (MHz) | Result |
|---|---|
| 2402.000000 | PASS |

# TEST REPORT

## PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

Middle Channel, Plot 1

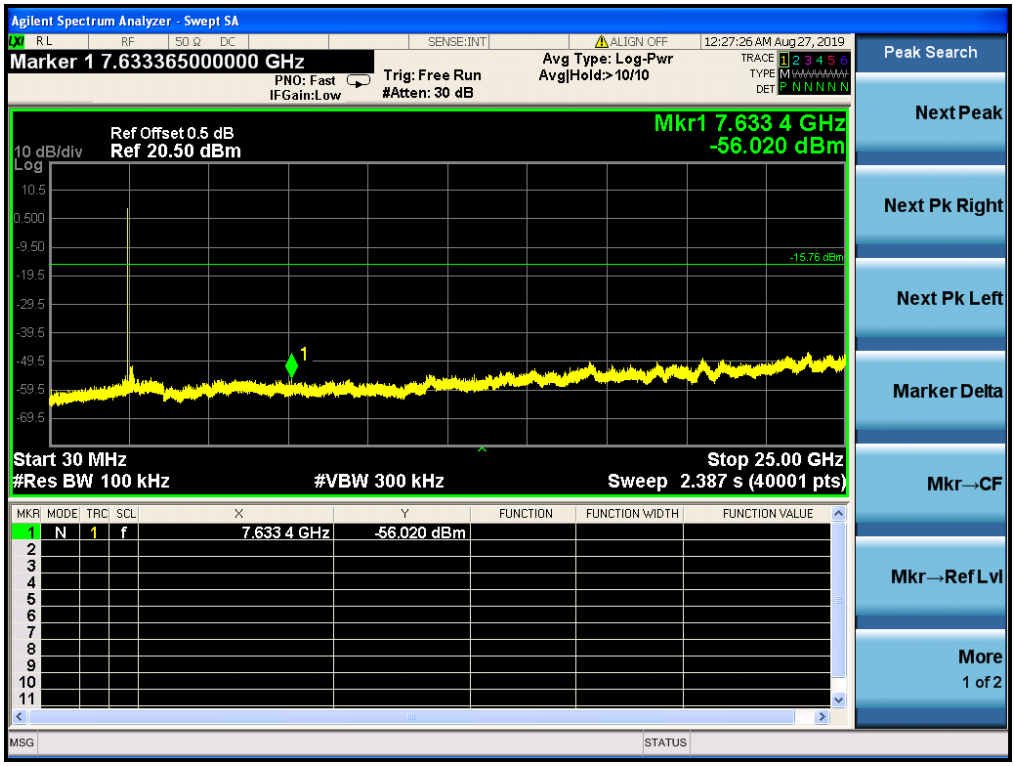



| DUT Frequency (MHz) | Result |
|---|---|
| 2440.000000 | PASS |

# TEST REPORT

## PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

Highest Channel, Plot 1

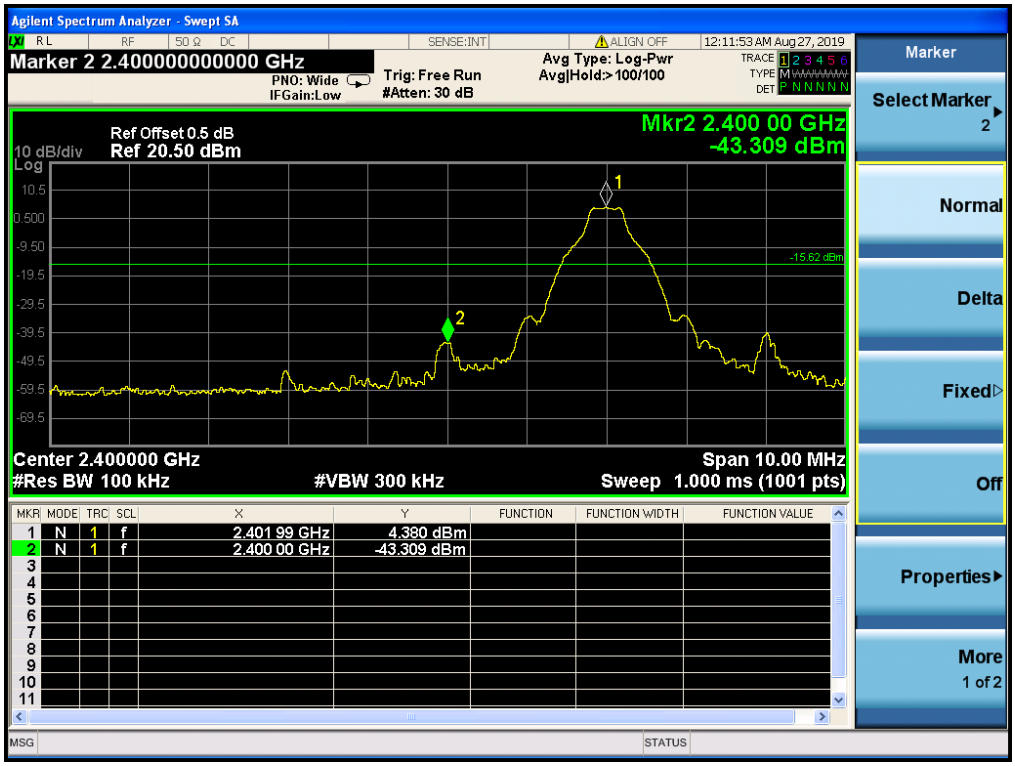



| DUT Frequency (MHz) | Result |
|---|---|
| 2480.000000 | PASS |

# TEST REPORT

## PLOTS OF BANDEDGE

Lowest Bandedge

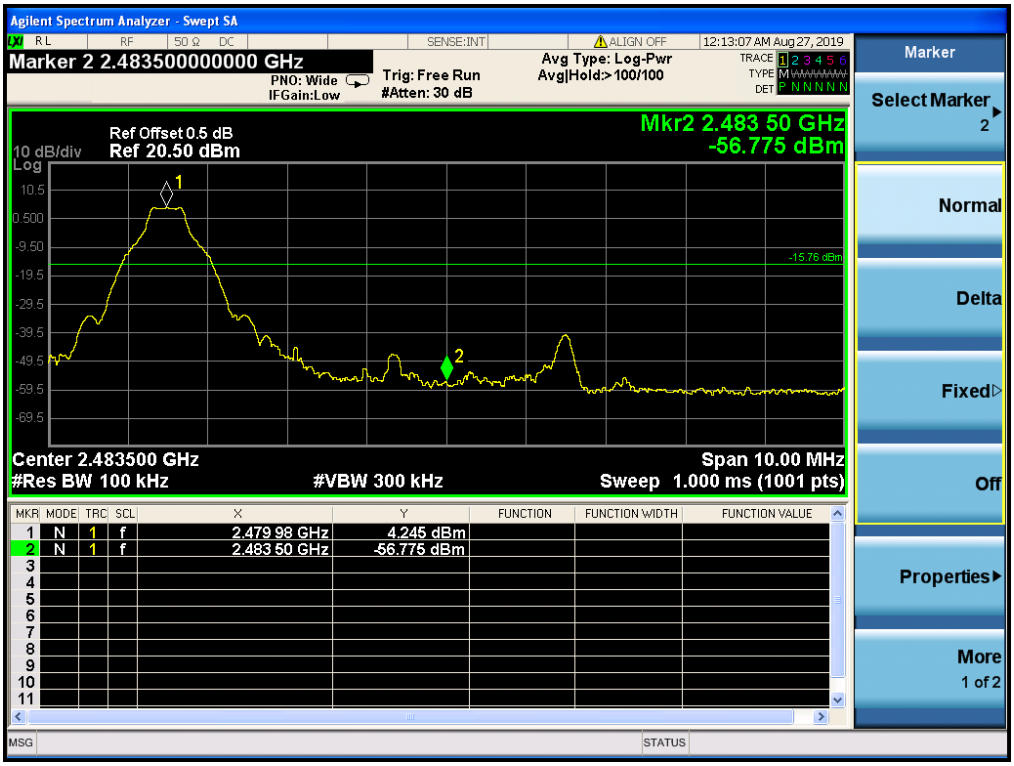



| DUT Frequency (MHz) | Result |
|---|---|
| 2402.000000 | PASS |

# TEST REPORT

## PLOTS OF BANDEDGE

Highest Bandedge




| DUT Frequency (MHz) | Result |
|---|---|
| 2480.000000 | PASS |

## TEST REPORT

4.7 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

FS = RA + AF + CF - AG + PD + AV

where FS = Field Strength in dBμV/m
RA = Receiver Amplitude (including preamplifier) in dBμV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB
PD = Pulse Desensitization in dB
AV = Average Factor in -dB

In the radiated emission table which follows, the reading shown on the data table may reflects the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

FS = RA + AF + CF - AG + PD +AV

Example
Assume a receiver reading of 62.0 dBμV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB, and the resultant average factor was -10 dB. The net field strength for comparison to the appropriate emission limit is 32 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 62.0 dBμV
AF = 7.4 dB
CF = 1.6 dB
AG = 29 dB
PD = 0 dB
AV = -10 dB
FS = 62 + 7.4 +1.6 -29 +0 + (-10) = 32 dBμV/m

Level in μV/m = Common Antilogarithm [(32 dBμV/m)/20] = 39.8 μV/m

## TEST REPORT

4.8 Transmitter Radiated Emissions in Restricted Bands and Spurious Emissions

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

## TEST REPORT

4.8.1 Radiated Emission Configuration Photograph

Worst Case Restricted Band Radiated Emission
at

2483.5 MHz

The worst case radiated emission configuration photographs are attached in the Appendix and saved with filename: config photos.pdf

4.8.2 Radiated Emission Data

The data in tables 1-4 list the significant emission frequencies, the limit and the margin of compliance.

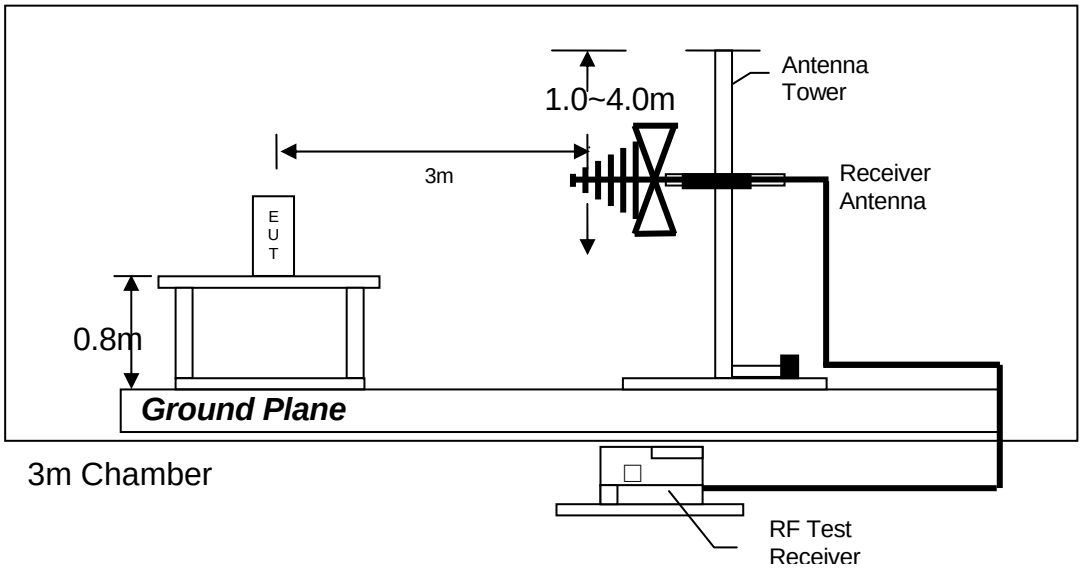
Judgement -

Passed by 0.4 dB

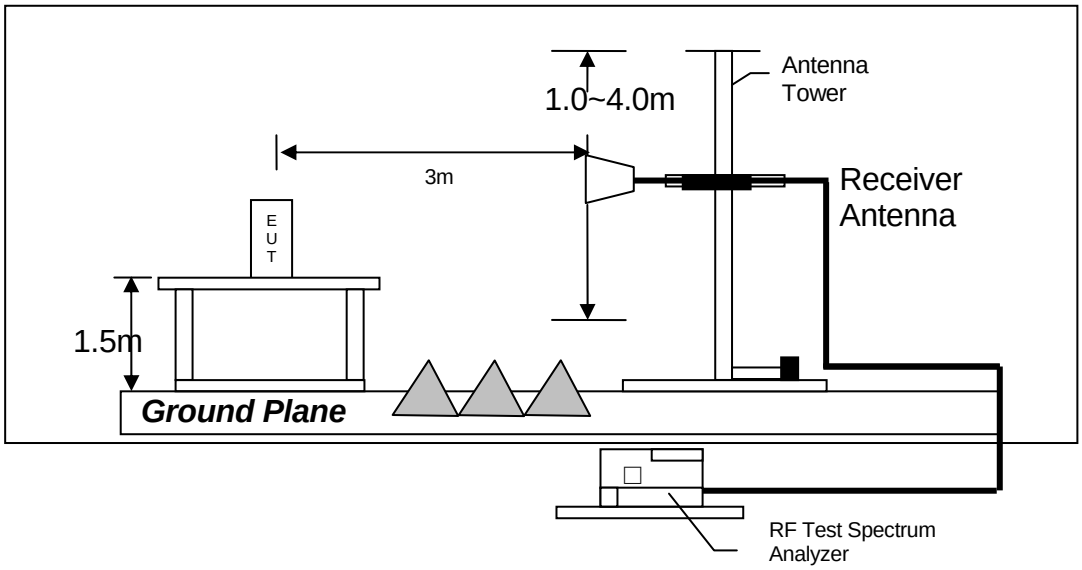
## TEST REPORT

4.8.3 Radiated Emission Test Setup

The figure below shows the test setup, which is utilized to make these measurements.




Test setup of radiated emissions up to 1GHz




Test setup of radiated emissions above 1GHz

## TEST REPORT

## RADIATED EMISSION DATA

Mode: TX-Channel 1

Table 1

**Radiated Emission Test Data (Above 1GHz):**

**Lowest Channel:**

| No. | Frequency (MHz) | Reading (dBuV/m) | Correction factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Antenna Polaxis |
|---|---|---|---|---|---|---|---|---|
| 1 | 4804.00 | 35.8 | 3.9 | 39.7 | 74.0 | 34.3 | Peak | Horizontal |
| 2 | 4804.00 | 24.6 | 3.9 | 28.5 | 54.0 | 25.5 | Average | Horizontal |
| 3 | 7206.00 | 38.7 | 6.8 | 45.5 | 74.0 | 28.5 | Peak | Horizontal |
| 4 | 7206.00 | 26.7 | 6.8 | 33.5 | 54.0 | 20.5 | Average | Horizontal |
| 5 | 4804.00 | 35.5 | 4.9 | 40.4 | 74.0 | 33.6 | Peak | Vertical |
| 6 | 4804.00 | 25.1 | 4.9 | 30.0 | 54.0 | 24.0 | Average | Vertical |
| 7 | 7206.00 | 38.5 | 6.3 | 44.8 | 74.0 | 29.2 | Peak | Vertical |
| 8 | 7206.00 | 26.7 | 6.3 | 33.0 | 54.0 | 21.0 | Average | Vertical |

**Middle Channel:**

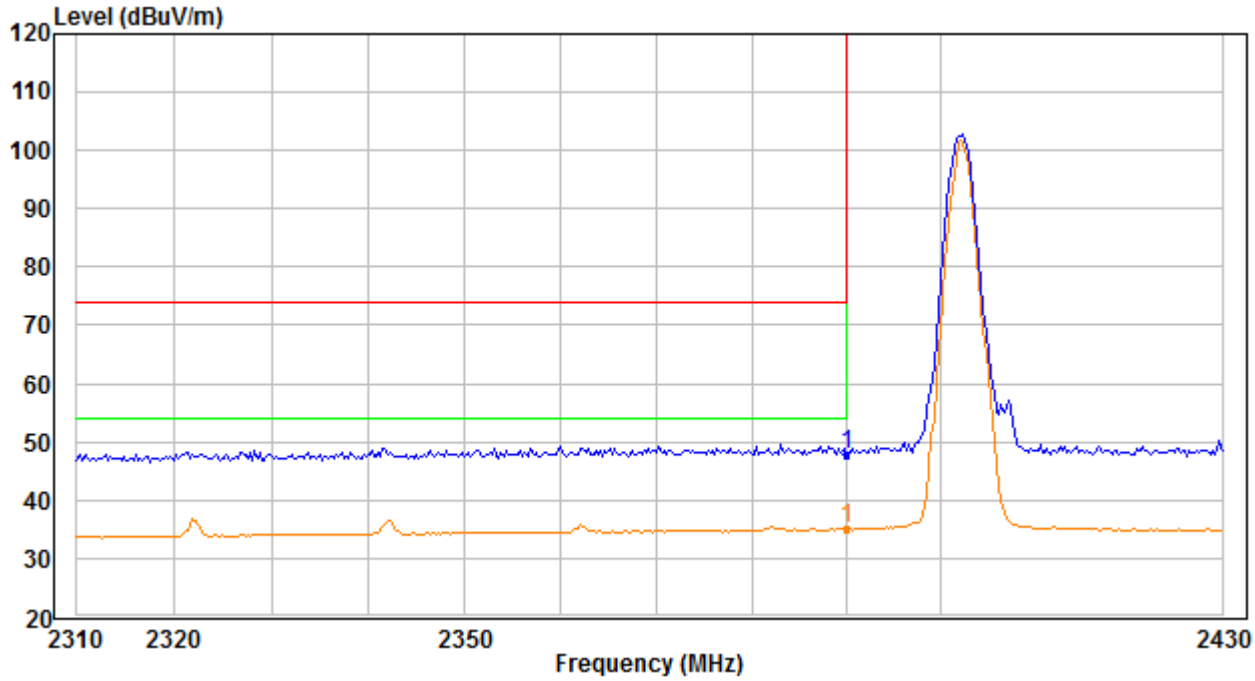
| No. | Frequency (MHz) | Reading (dBuV/m) | Correction factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Antenna Polaxis |
|---|---|---|---|---|---|---|---|---|
| 1 | 4882.00 | 36.2 | 4.0 | 40.2 | 74.0 | 33.8 | Peak | Horizontal |
| 2 | 4882.00 | 24.8 | 4.0 | 28.8 | 54.0 | 25.2 | Average | Horizontal |
| 3 | 7323.00 | 38.4 | 7.0 | 45.4 | 74.0 | 28.6 | Peak | Horizontal |
| 4 | 7323.00 | 27.0 | 7.0 | 34.0 | 54.0 | 20.0 | Average | Horizontal |
| 5 | 4882.00 | 37.1 | 5.0 | 42.1 | 74.0 | 31.9 | Peak | Vertical |
| 6 | 4882.00 | 25.5 | 5.0 | 30.5 | 54.0 | 23.5 | Average | Vertical |
| 7 | 7323.00 | 38.7 | 6.5 | 45.2 | 74.0 | 28.8 | Peak | Vertical |
| 8 | 7323.00 | 27.1 | 6.5 | 33.6 | 54.0 | 20.4 | Average | Vertical |

**Highest Channel:**

| No. | Frequency (MHz) | Reading (dBuV/m) | Correction factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Antenna Polaxis |
|---|---|---|---|---|---|---|---|---|
| 1 | 4960.00 | 35.6 | 4.1 | 39.7 | 74.0 | 34.3 | Peak | Horizontal |
| 2 | 4960.00 | 25.0 | 4.1 | 29.1 | 54.0 | 24.9 | Average | Horizontal |
| 3 | 7440.00 | 37.9 | 7.3 | 45.2 | 74.0 | 28.8 | Peak | Horizontal |
| 4 | 7440.00 | 26.8 | 7.3 | 34.1 | 54.0 | 19.9 | Average | Horizontal |
| 5 | 4960.00 | 37.5 | 5.1 | 42.6 | 74.0 | 31.4 | Peak | Vertical |
| 6 | 4960.00 | 25.2 | 5.1 | 30.3 | 54.0 | 23.7 | Average | Vertical |
| 7 | 7440.00 | 38.2 | 8.7 | 46.9 | 74.0 | 27.1 | Peak | Vertical |
| 8 | 7440.00 | 24.9 | 8.7 | 33.6 | 54.0 | 20.4 | Average | Vertical |

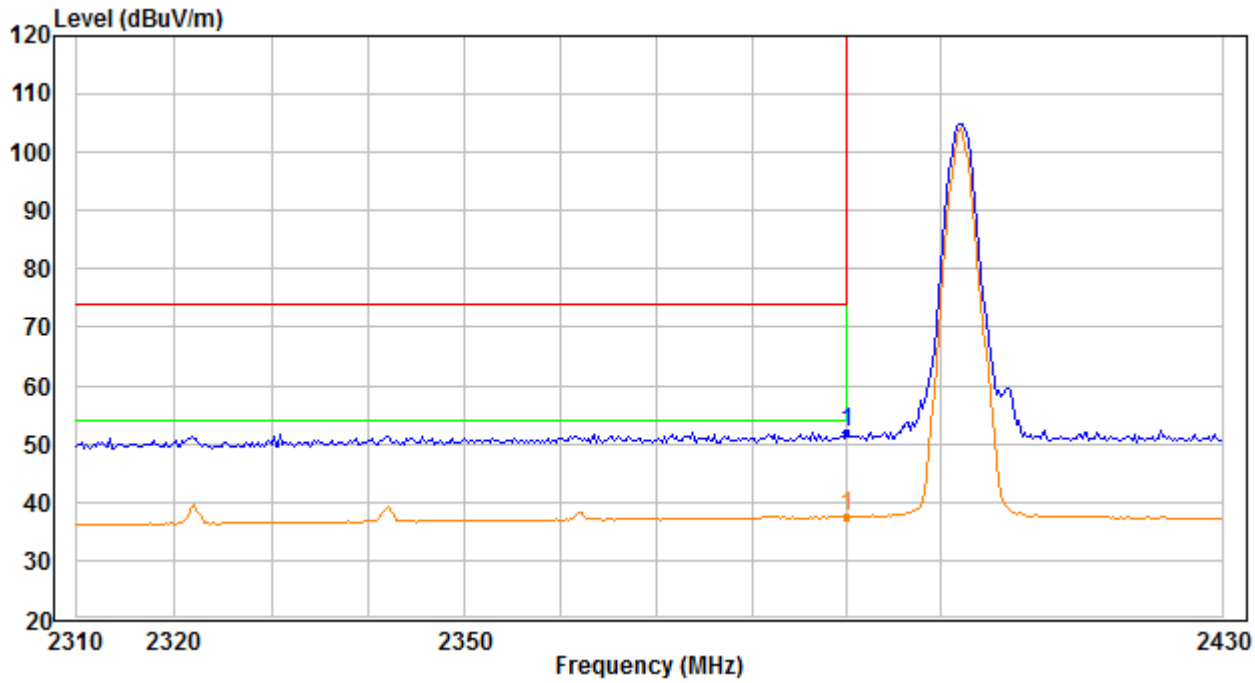
## TEST REPORT

| Test Channel: | Lowest Channel | Ant. Polar. : | Horizontal |
|---|---|---|---|




| Frequency (MHz) | Peak level (dBuv/m) | Peak Limit (dBuv/m) | AV level (dBuv/m) | AV Limit (dBuv/m) | Conclusion |
|---|---|---|---|---|---|
| 2390.0000 | 48.0 | 74.00 | 35.0 | 54.00 | Pass |

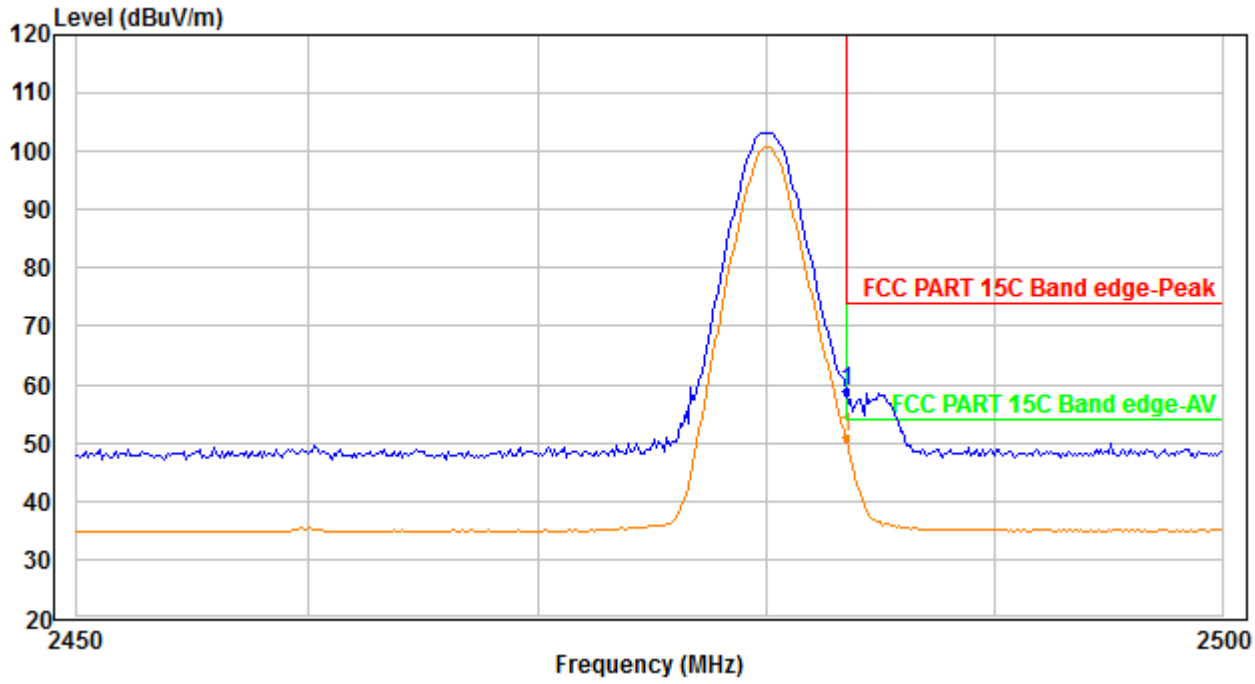
| Test Channel: | Lowest Channel | Ant. Polar. : | Vertical |
|---|---|---|---|




| Frequency (MHz) | Peak level (dBuv/m) | Peak Limit (dBuv/m) | AV level (dBuv/m) | AV Limit (dBuv/m) | Conclusion |
|---|---|---|---|---|---|
| 2390.0000 | 52.0 | 74.00 | 37.4 | 54.00 | Pass |

## TEST REPORT

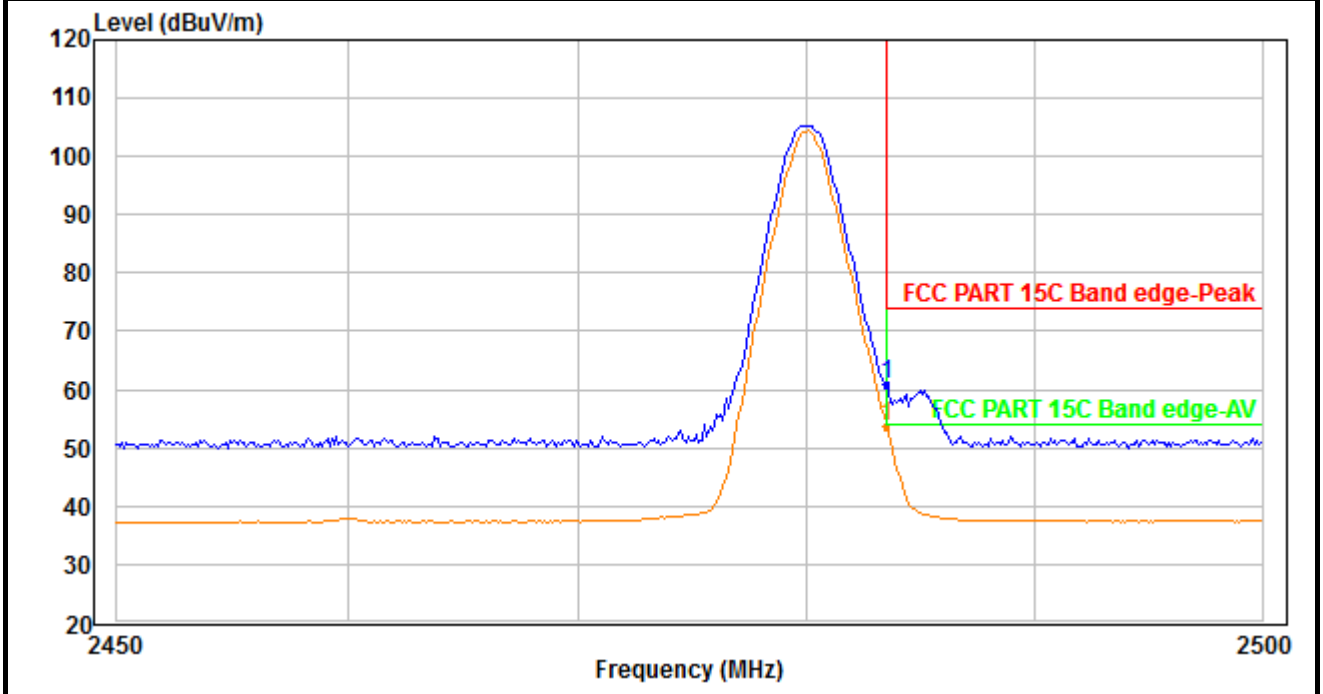
| Test Channel: | Highest Channel | Ant. Polar. : | Horizontal |
|---|---|---|---|




| Frequency (MHz) | Peak level (dBuv/m) | Peak Limit (dBuv/m) | AV level (dBuv/m) | AV Limit (dBuv/m) | Conclusion |
|---|---|---|---|---|---|
| 2483.5000 | 60.9 | 74.00 | 53.6 | 54.00 | Pass |

## TEST REPORT

| Test Channel: | Highest Channel | Ant. Polar. : | Vertical |
|---|---|---|---|




| Frequency (MHz) | Peak level (dBuv/m) | Peak Limit (dBuv/m) | AV level (dBuv/m) | AV Limit (dBuv/m) | Conclusion |
|---|---|---|---|---|---|
| 2483.5000 | 58.9 | 74.00 | 50.8 | 54.00 | Pass |

NOTES:

1. Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna is used for the emission over 1000MHz.
5. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205.

## TEST REPORT

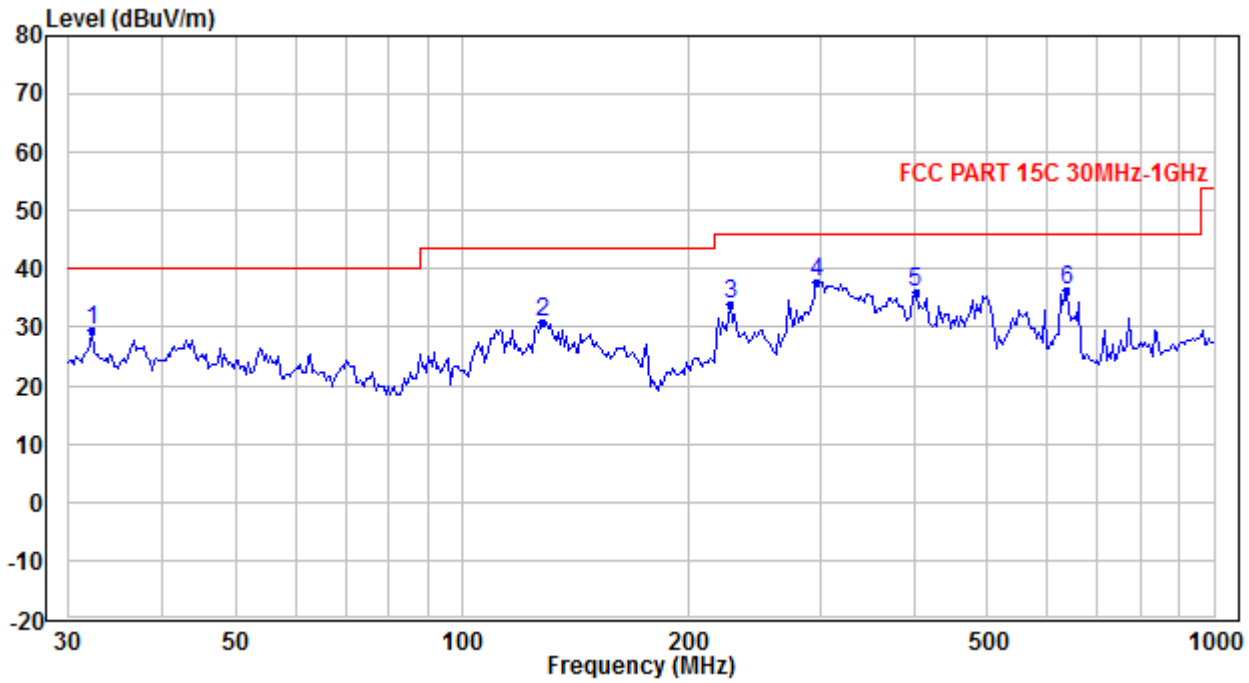
Mode: On

Table 2

**Radiated Emission Test Data (30 MHz ~ 1 GHz):**

**Worst-Case Configuration**

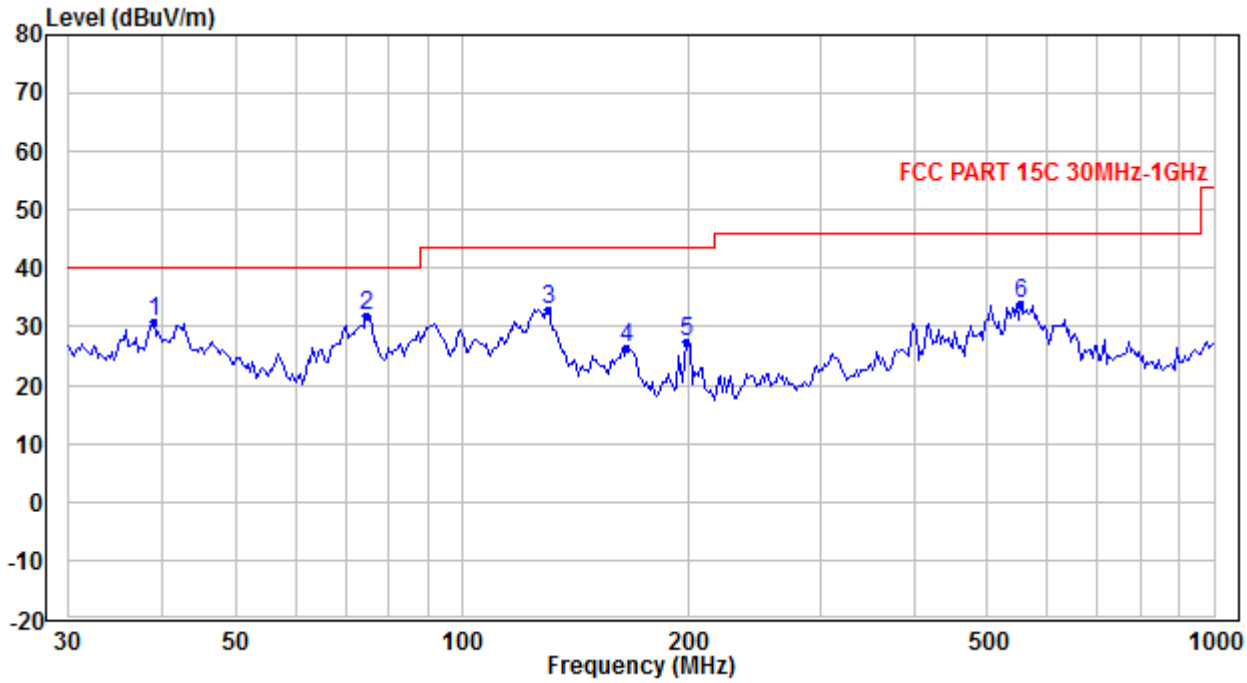
**Horizontal**




| No. | Frequency (MHz) | Reading (dBuV/m) | Correction factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 1 | 32.184 | 35.2 | -5.6 | 29.6 | 40.0 | 10.4 | Peak |
| 2 | 127.586 | 42.6 | -11.6 | 31.0 | 43.5 | 12.5 | Peak |
| 3 | 227.016 | 43.5 | -9.5 | 34.0 | 46.0 | 12.0 | Peak |
| 4 | 296.502 | 44.8 | -7.1 | 37.7 | 46.0 | 8.3 | Peak |
| 5 | 401.105 | 41.1 | -5.0 | 36.1 | 46.0 | 9.9 | Peak |
| 6 | 637.795 | 37.3 | -0.9 | 36.4 | 46.0 | 9.6 | Peak |

## TEST REPORT

**Vertical**




| No. | Frequency (MHz) | Reading (dBuV/m) | Correction factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 1 | 38.908 | 40.7 | -9.8 | 30.9 | 40.0 | 9.1 | Peak |
| 2 | 74.793 | 45.4 | -13.4 | 32.0 | 40.0 | 8.0 | Peak |
| 3 | 130.305 | 44.8 | -11.7 | 33.1 | 43.5 | 10.4 | Peak |
| 4 | 165.472 | 37.0 | -10.5 | 26.5 | 43.5 | 17.0 | Peak |
| 5 | 198.642 | 37.6 | -10.2 | 27.4 | 43.5 | 16.1 | Peak |
| 6 | 554.171 | 36.9 | -2.9 | 34.0 | 46.0 | 12.0 | Peak |

NOTES:

1. Peak Detector Data unless otherwise stated.
2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative sign in the column shows value below limit.
4. Horn antenna is used for the emission over 1000MHz.
5. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205.
6. Measurement Uncertainty is ±5.3dB at a level of confidence of 95%.

## TEST REPORT

4.9 AC Power Line Conducted Emission

☐ Not applicable – EUT is only powered by battery for operation.

☒ EUT connects to AC power line. Emission Data is listed in following pages.

☐ Base Unit connects to AC power line and has transmission. Handset connects to AC power line but has no transmission. Emission Data of Base Unit is listed in following pages.

4.9.1 AC Power Line Conducted Emission Configuration Photograph

Worst Case Line-Conducted Configuration
at

15.013 MHz

The worst case line conducted configuration photographs are attached in the Appendix and saved with filename: config photos.pdf

4.9.2 AC Power Line Conducted Emission Data

The plot(s) and data in the following pages list the significant emission frequencies, the limit and the margin of compliance.

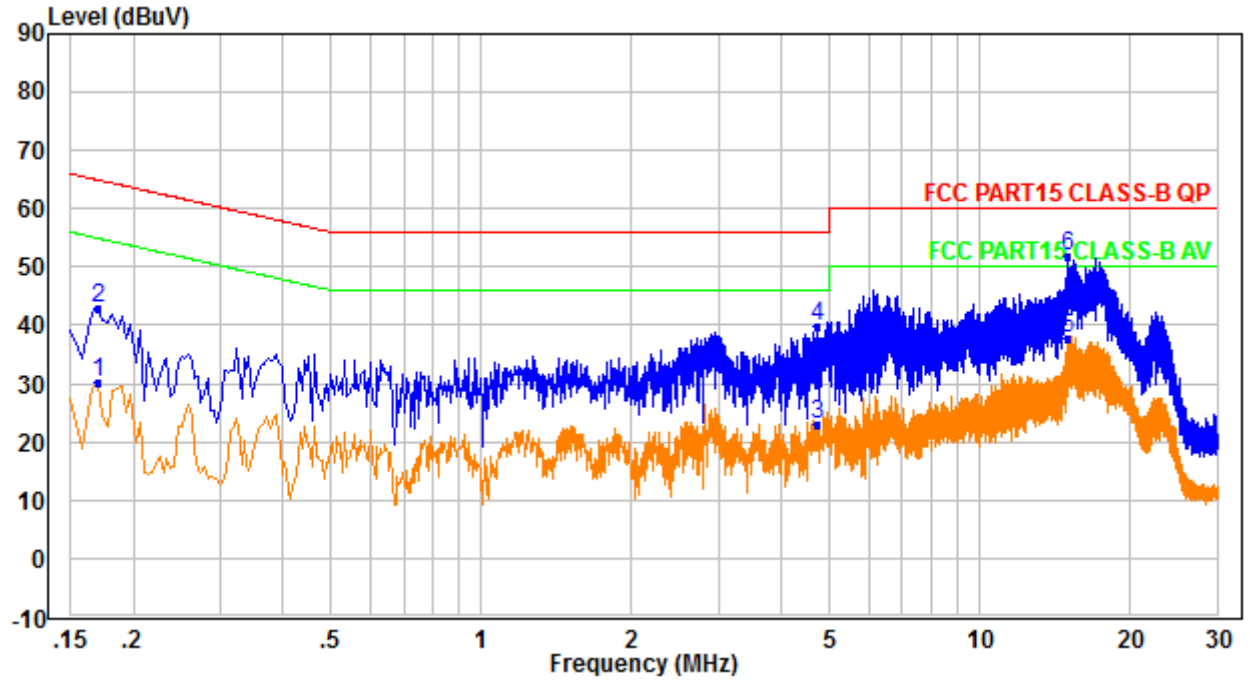
Passed by 8.3 dB margin compare with Quasi-peak limit

## TEST REPORT

## AC POWER LINE CONDUCTED EMISSION

Worst Case: Bluetooth On mode with Full Load

**Live Line**

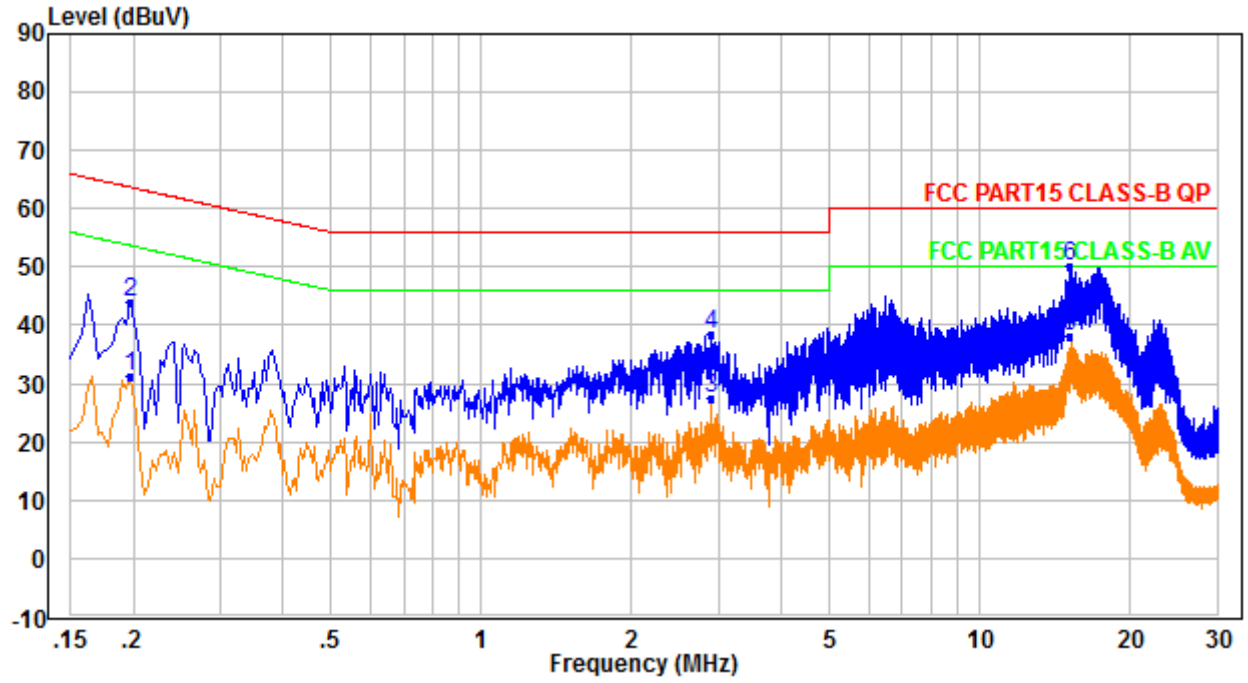



| No. | Frequency (MHz) | Reading (dBuV) | Correction factor (dB) | Result (dBuV) | Limit (dBuV) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 1 | 0.170 | 20.02 | 10.02 | 30.04 | 54.96 | 24.92 | Average |
| 2 | 0.170 | 33.02 | 10.02 | 43.04 | 64.96 | 21.92 | QP |
| 3 | 4.730 | 12.33 | 10.59 | 22.92 | 46.00 | 23.08 | Average |
| 4 | 4.730 | 29.33 | 10.59 | 39.92 | 56.00 | 16.08 | QP |
| 5 | 15.013 | 24.60 | 13.10 | 37.70 | 50.00 | 12.30 | Average |
| 6 | 15.013 | 38.60 | 13.10 | 51.70 | 60.00 | 8.30 | QP |

## TEST REPORT

Worst Case: Bluetooth On mode with Full Load

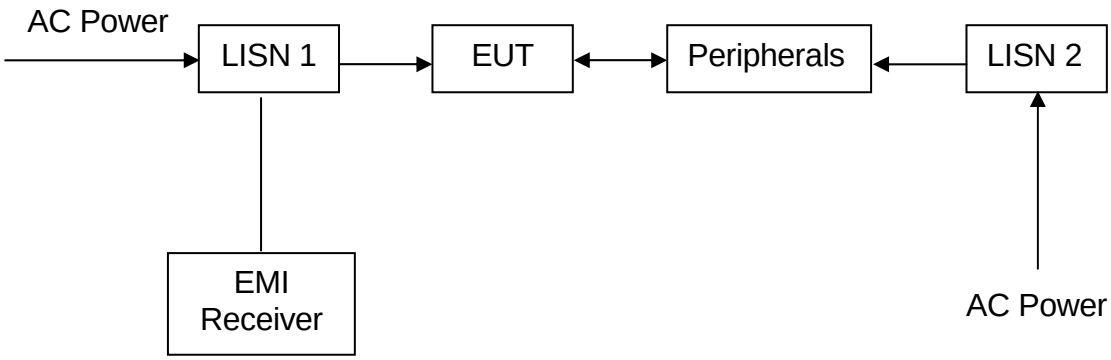
**Neutral Line**




| No. | Frequency (MHz) | Reading (dBuV) | Correction factor (dB) | Result (dBuV) | Limit (dBuV) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 1 | 0.198 | 21.10 | 9.99 | 31.09 | 53.69 | 22.60 | Average |
| 2 | 0.198 | 34.10 | 9.99 | 44.09 | 63.69 | 19.60 | QP |
| 3 | 2.886 | 16.94 | 10.37 | 27.31 | 46.00 | 18.69 | Average |
| 4 | 2.886 | 27.94 | 10.37 | 38.31 | 56.00 | 17.69 | QP |
| 5 | 15.233 | 25.19 | 12.99 | 38.18 | 50.00 | 11.82 | Average |
| 6 | 15.233 | 37.19 | 12.99 | 50.18 | 60.00 | 9.82 | QP |

## TEST REPORT

4.9.3 AC Line Conducted Emission Test Setup




The EUT along with its peripherals were placed on a 1.0m(W)×1.5m(L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane. The EUT was connected to power mains through a line impedance stabilization network (LISN), which provided 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room. The excess power cable between the EUT and the LISN was bundled.

All connecting cables of EUT and peripherals were moved to find the maximum emission.

# TEST REPORT

## 5.0 EQUIPMENT LIST

1) Radiated Emissions Test

| Used | Registration No. | Equipment | Manufacturer | Model No. | Serial Number | Cal. date (mm dd, yyyy) | Cal. Due date (mm dd, yyyy) |
|---|---|---|---|---|---|---|---|
| ☒ | UTTL-E010 | 3M Chamber & Accessory Equipment | ETS-LINDGREN | 3M | N/A | Dec. 03, 2018 | Dec. 03, 2021 |
| ☒ | UTTL-E026 | Receiver | R&S | ESIB26 | 100114 | Nov. 24, 2018 | Nov. 24, 2019 |
| ☒ | UTTL-E013 | Loop Antenna | ETS-LINDGREN | 6502 | 00202525 | Dec. 03, 2018 | Dec. 03, 2019 |
| ☒ | UTTL-E014 | Broadband Antenna | ETS-LINDGREN | 3142E | 00201566 | Dec. 08, 2018 | Dec. 08, 2019 |
| ☒ | UTTL-E039 | 6dB Attenuator | Talent | RA6A5-N-18 | 18103001 | Dec. 08, 2018 | Dec. 08, 2019 |
| ☒ | UTTL-E043 | Preamplifier | HP | 8447F | 2805A02960 | Nov. 24, 2018 | Nov. 24, 2019 |
| ☒ | UTTL-E017 | Horn Antenna (Pre-amplifier) | ETS-LINDGREN | 3117-PA | 00201874 | May 22, 2018 | May 18, 2020 |
| ☒ | N/A | Multi device Controller | ETS-LINDGREN | 7006-001 | 00160105 | N/A | N/A |
| ☒ | N/A | Test Software | Audix | e3 | Software Version: 9.160333 | | |

2) Conducted Emissions Test

| Used | Registration No. | Equipment | Manufacturer | Model No. | Serial Number | Cal. date (mm dd, yyyy) | Cal. Due date (mm dd, yyyy) |
|---|---|---|---|---|---|---|---|
| ☒ | UTTL-E005 | Receiver | R&S | ESR7 | 1316.3003K07-101181-K3 | Nov. 24, 2018 | Nov. 24, 2019 |
| ☒ | UTTL-E007 | Pulse Limiter | R&S | ESH3-Z2 | 0357.8810.54 | Nov. 24, 2018 | Nov. 24, 2019 |
| ☒ | UTTL-E003 | LISN | R&S | ESH2-Z5 | 860014/024 | Nov. 24, 2018 | Nov. 24, 2019 |
| ☒ | N/A | Test Software | Audix | e3 | Software Version: 9.160323 | | |

# TEST REPORT

3) Conductive Measurement Test

| Used | Registration No. | Equipment | Manufacturer | Model No. | Serial Number | Cal. date (mm dd, yyyy) | Cal. Due date (mm dd, yyyy) |
|---|---|---|---|---|---|---|---|
| ☒ | UTTL-E032 | EXA Spectrum Analyzer | KEYSIGHT | N9010A | MY51440197 | Nov. 24, 2018 | Nov. 24, 2019 |
| ☒ | UTTL-E033 | USB Wideband Power Sensor | KEYSIGHT | U2021XA | MY55430035 | Nov. 24, 2018 | Nov. 24, 2019 |

**END OF TEST REPORT**