# TEST REPORT

| | | |
|---|---|---|
| **Product** | : | UWB Kbeacon |
| **Trade mark** | : | Kbeacon |
| **Model/Type reference** | : | K7W, C3, C3W |
| **Serial Number** | : | N/A |
| **Report Number** | : | EED32Q80655102 |
| **FCC ID** | : | 2AXZL-K7W |
| **Date of Issue** | : | Jul. 30, 2024 |
| **Test Standards** | : | 47 CFR Part 15 Subpart F |
| **Test result** | : | PASS |

Prepared for:

**KKM Company Limited**
**3CDE, Building6, Baoneng Science&Technology Park, Qingxiang Rd, Longhua Street, Longhua District, Shenzhen City, Guangdong Province, China**

Prepared by:

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Date: Jul. 30, 2024

Check No.: 6317170524

# 1 Contents

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## 2 Version

| Version No. | Date | Description |
|---|---|---|
| 00 | Jul. 30, 2024 | Original |
| | | |
| | | |

# 3 Test Summary

| Test Item | Test Requirement | Result |
|---|---|---|
| **Antenna Requirement** | 47 CFR Part 15 Subpart F Section 15.519(a2) & Section 15.521(b) & Section 15.203 | PASS |
| **AC power-line conducted emissions** | 47 CFR Part 15 Subpart F Section 15.207 & Section 15.505 & Section 15.521(j) | N/A |
| **Cessation Time** | 47 CFR Part 15 Subpart F Section 15.519(a)(1) | PASS |
| **UWB Bandwidth (-10dB Bandwidth)** | 47 CFR Part 15 Subpart F Section 15.503 & Section 15.521(e) | PASS |
| **EIRP (Equivalent Isotropic Radiated Power)** | 47 CFR Part 15 Subpart F Section 15.519 (c)&(e) & Section 15.521(g) | PASS |
| **Spurious Emissions Below 1GHz** | 47 CFR Part 15 Subpart F Section 15.519(c) & Section 15.209 & Section 15.521(c)&(d)&(h) | PASS |
| **Spurious Emissions Above 1GHz** | 47 CFR Part 15 Subpart F Section 15.519 (c)&(d) & Section 15.521(d)&(h) | PASS |

Remark:

N/A : Only battery supply is supported and this item is not considered.
Company Name and Address shown on Report, the sample(s) and sample Information were provided by the applicant who should be responsible for the authenticity which CTI hasn't verified.
Model No.: K7W, C3, C3W
Only the model K7W was tested. Their electrical circuit design, layout, components used and internal wiring are identical. Only the case design is different.

# 4 General Information

## 4.1 Client Information

| | |
|---|---|
| Applicant: | KKM Company Limited |
| Address of Applicant: | 3CDE, Building6, Baoneng Science&Technology Park, Qingxiang Rd, Longhua Street, Longhua District, Shenzhen City, Guangdong Province, China |
| Manufacturer: | KKM Company Limited |
| Address of Manufacturer: | 3CDE, Building6, Baoneng Science&Technology Park, Qingxiang Rd, Longhua Street, Longhua District, Shenzhen City, Guangdong Province, China |
| Factory: | KKM Company Limited |
| Address of Factory: | 3CDE, Building6, Baoneng Science&Technology Park, Qingxiang Rd, Longhua Street, Longhua District, Shenzhen City, Guangdong Province, China |

## 4.2 General Description of EUT

| | |
|---|---|
| Product Name: | UWB Kbeacon |
| Model No.: | K7W, C3, C3W |
| Test Model No.: | K7W |
| Trade Mark: | Kbeacon |
| Product Type: | Hand Held UWB systems |
| Operation Frequency: | UWB Channels 5: 6489.6MHz<br>UWB Channels 9 :7987.2MHz |
| Modulation Type: | OFDM |
| Antenna Type: | PCB Antenna |
| Antenna Gain: | UWB Channels 5: 1.96dBi,<br>UWB Channels 9 : 0.52dBi; |
| Power Supply: | Battery DC 3.0V,850mAh |
| Test Voltage: | DC 3.0V |
| Sample Received Date: | May 17, 2024 |
| Sample tested Date: | May 25, 2024 to Jul. 06, 2024 |

## 4.3 Test Configuration

| EUT Test Software Settings: | |
|---|---|
| Software: | RF Test |
| EUT Power Grade: | Default (Power level is built-in set parameters and cannot be changed and selected) |

## 4.4 Test Environment

| Operating Environment: | |
|---|---|
| **Radiated Spurious Emissions:** | |
| Temperature: | 22~25.0 °C |
| Humidity: | 50~55 % RH |
| Atmospheric Pressure: | 1010mbar |
| **RF Conducted:** | |
| Temperature: | 22~25.0 °C |
| Humidity: | 50~55 % RH |
| Atmospheric Pressure: | 1010mbar |

## 4.5 Description of Support Units

N/A

## 4.6 Test Location

All tests were performed at:

Centre Testing International Group Co., Ltd
Building C, Hongwei Industrial Park Block 70, Bao'an District, Shenzhen, China
Telephone: +86 (0) 755 33683668 Fax:+86 (0) 755 33683385
No tests were sub-contracted.
FCC Designation No.: CN1164

## 4.7 Measurement Uncertainty (95% confidence levels, k=2)

| No. | Item | Measurement Uncertainty |
|---|---|---|
| 1 | RF power, conducted | 0.46dB (30MHz-1GHz) |
| | | 0.55dB (1GHz-40GHz) |
| 2 | Radiated Spurious emission test | 3.3dB (9kHz-30MHz) |
| | | 4.3dB (30MHz-1GHz) |
| | | 4.5dB (1GHz-18GHz) |
| | | 3.4dB (18GHz-40GHz) |
| 3 | Conduction emission | 3.5dB (9kHz to 150kHz) |
| | | 3.1dB (150kHz to 30MHz) |
| 4 | Temperature test | 0.64°C |
| 5 | Humidity test | 3.8% |
| 6 | DC power voltages | 0.026% |

## 4.8 Equipment List

| 3M Semi-anechoic Chamber (2)- Radiated disturbance Test | | | | | |
|---|---|---|---|---|---|
| **Equipment** | **Manufacturer** | **Model** | **Serial No.** | **Cal. Date (mm-dd-yyyy)** | **Cal. Due date (mm-dd-yyyy)** |
| 3M Chamber & Accessory Equipment | TDK | SAC-3 | --- | 05/22/2022 | 05/21/2025 |
| Receiver | R&S | ESCI7 | 100938-003 | 09/22/2023 | 09/21/2024 |
| Spectrum Analyzer | R&S | FSV40 | 101200 | 07/25/2023 | 07/24/2024 |
| TRILOG Broadband Antenna | schwarzbeck | VULB 9163 | 9163-618 | 05/22/2022 | 05/21/2025 |
| Loop Antenna | Schwarzbeck | FMZB 1519B | 1519B-076 | 04/16/2024 | 04/15/2025 |
| Microwave Preamplifier | Tonscend | EMC051845SE | 980380 | 12/14/2023 | 12/13/2024 |
| Horn Antenna | A.H.SYSTEMS | SAS-574 | 374 | 07/02/2023 | 07/01/2026 |
| Horn Antenna | ETS-LINGREN | BBHA 9120D | 9120D-1869 | 04/16/2024 | 04/15/2025 |
| Preamplifier | Agilent | 11909A | 12-1 | 03/22/2024 | 03/21/2025 |
| Preamplifier | CD | PAP-1840-60 | 6041.6042 | 07/03/2023<br>06/19/2024 | 07/02/2024<br>06/18/2025 |
| Test software | Fara | EZ-EMC | EMEC-3A1-Pre | --- | --- |
| Cable line | Fulai(7M) | SF106 | 5219/6A | --- | --- |
| Cable line | Fulai(6M) | SF106 | 5220/6A | --- | --- |
| Cable line | Fulai(3M) | SF106 | 5216/6A | --- | --- |
| Cable line | Fulai(3M) | SF106 | 5217/6A | --- | --- |

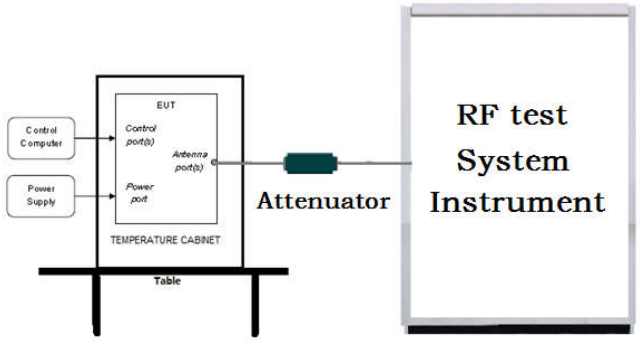
| 3M full-anechoic Chamber | | | | | |
|---|---|---|---|---|---|
| **Equipment** | **Manufacturer** | **Model No.** | **Serial Number** | **Cal. Date (mm-dd-yyyy)** | **Cal. Due date (mm-dd-yyyy)** |
| RSE Automatic test software | JS Tonscend | JS36-RSE | 10166 | --- | --- |
| Receiver | Keysight | N9038A | MY57290136 | 01-09-2024 | 01-08-2025 |
| Spectrum Analyzer | Keysight | N9020B | MY57111112 | 01-19-2024 | 01-18-2025 |
| Spectrum Analyzer | Keysight | N9030B | MY57140871 | 01-13-2024 | 01-12-2025 |
| TRILOG Broadband Antenna | Schwarzbeck | VULB 9163 | 9163-1148 | 04-28-2024 | 04-27-2025 |
| Horn Antenna | Schwarzbeck | BBHA 9170 | 9170-832 | 04-16-2024 | 04-15-2025 |
| Horn Antenna | ETS-LINDGREN | 3117 | 57407 | 07-04-2021<br>07-03-2024 | 07-03-2024<br>07-02-2025 |
| Preamplifier | EMCI | EMC184055SE | 980597 | 04-12-2024 | 04-11-2025 |
| Preamplifier | EMCI | EMC001330 | 980563 | 03-08-2024 | 03-07-2025 |
| Preamplifier | JS Tonscend | TAP-011858 | AP21B806112 | 07-25-2023 | 07-24-2024 |
| Communication test set | R&S | CMW500 | 102898 | 12-14-2023 | 12-13-2024 |
| Temperature/ Humidity Indicator | biaozhi | GM1360 | EE1186631 | 04-07-2024 | 04-06-2025 |
| Fully Anechoic Chamber | TDK | FAC-3 | --- | 01-09-2024 | 01-08-2027 |
| Cable line | Times | SFT205-NMSM-2.50M | 394812-0001 | --- | --- |
| Cable line | Times | SFT205-NMSM-2.50M | 394812-0002 | --- | --- |
| Cable line | Times | SFT205-NMSM-2.50M | 394812-0003 | --- | --- |
| Cable line | Times | SFT205-NMSM-2.50M | 393495-0001 | --- | --- |
| Cable line | Times | EMC104-NMNM-1000 | SN160710 | --- | --- |
| Cable line | Times | SFT205-NMSM-3.00M | 394813-0001 | --- | --- |
| Cable line | Times | SFT205-NMNM-1.50M | 381964-0001 | --- | --- |
| Cable line | Times | SFT205-NMSM-7.00M | 394815-0001 | --- | --- |
| Cable line | Times | HF160-KMKM-3.00M | 393493-0001 | --- | --- |

# 5 Test results and Measurement Data

## 5.1 Antenna Requirement

| | |
|---|---|
| **Standard requirement:** | 47 CFR Part 15 Subpart F Section 15.519(a2) & Section 15.521(b) & Section 15.203 |
| 15.203 requirement:<br>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, 15.221, or 15.236. 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.<br>15.519 requirement:<br>The use of antennas mounted on outdoor structures, e.g., antennas mounted on the outside of a building or on a telephone pole, or any fixed outdoors infrastructure is prohibited. Antennas may be mounted only on the hand held UWB device. | |
| **EUT Antenna:** | Please see Internal photos |
| The antenna is PCB Antenna. The best case gain of the antenna is UWB Channels 5: 1.96dBi, UWB Channels 9 : 0.52dBi; | |

## 5.2 Cessation Time

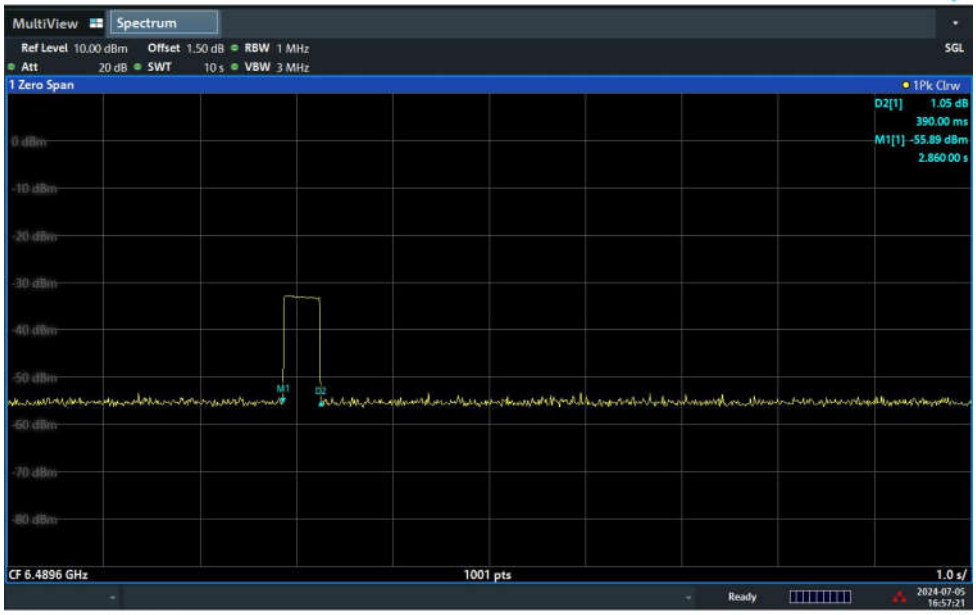
| | |
|---|---|
| Test Requirement: | 47 CFR Part 15 Subpart F Section 15.519(a)(1) |
| Test Method: | / |
| Test Setup: |  <br>Remark: Offset=Cable loss+ attenuation factor. |
| Test Procedure: | EUT and receiving pairing device keep UWB normal connection.<br>a. Set RBW of spectrum analyzer to 1 MHz and VBW to 3 MHz.<br>b. Use a video trigger with the trigger level set to enable triggering only on full pulses.<br>c. Set the center frequency on any frequency would be measure and set the frequency span to zero span.<br>d. Measure the maximum time duration of one single pulse. |
| Limit: | ≤10 seconds |
| Test Mode: | Normal |
| Test Results: | Pass |

## Test Result

| Test Channel | Center Frequency (MHz) | Transmit Time (ms) | Limit (s) | Results |
|---|---|---|---|---|
| 5 | 6489.6 | 390.00 | ⩽10 | pass |
| 9 | 7987.2 | 220.00 | ⩽10 | pass |

## Test Graph

Transmit Time

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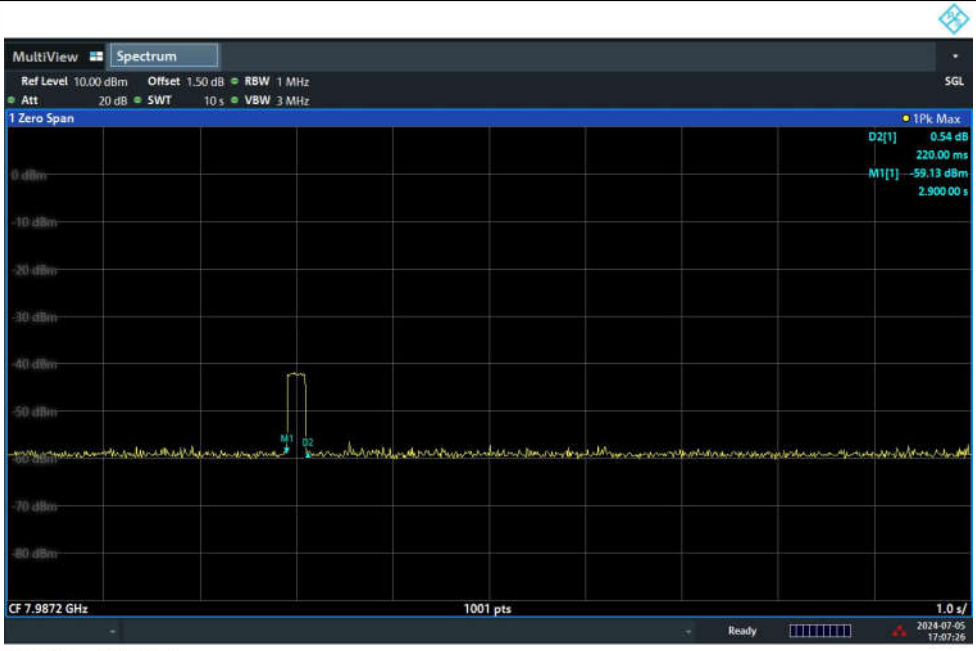
Transmit Time

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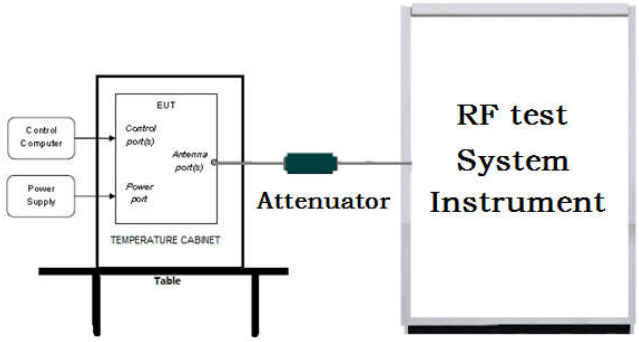
## 5.3 UWB Bandwidth (-10dB Bandwidth)

| | |
|---|---|
| Test Requirement: | 47 CFR Part 15 Subpart F Section 15.503 & Section 15.521(e) |
| Test Method: | ANSI C63.10:2013 Section 10.1 |
| Test Setup: |  <br>Remark: Offset=Cable loss+ attenuation factor. |
| Test Procedure: | The frequency at which the maximum power level is measured with the peak detector is designated fM. The peak power measurements shall be made using a spectrum analyzer or EMI receiver with a 1 MHz resolution bandwidth and a video bandwidth of 1 MHz or greater. The instrument shall be set to peak detection using the maximum-hold trace mode.<br>The outermost 1 MHz segments above and below fM, where the peak power falls by 10 dB relative to the level at fM, are designated as fH and fL, respectively:<br>b) For the lowest frequency bound fL, the emission is searched from a frequency lower than fM that has, by inspection, a peak power much lower than 10 dB less than the power at fM and increased toward fM until the peak power indicates 10 dB less than the power at fM. The frequency of that segment is recorded.<br>b) This process is repeated for the highest frequency bound fH, beginning at a frequency higher than fM that has, by inspection, a peak power much lower than 10 dB below the power at fM. The frequency of that segment is recorded.<br>c) The two recorded frequencies represent the highest fH and lowest fL bounds of the UWB transmission, and the -10 dB bandwidth (B - 10) is defined as (fH - fL). The center frequency(fc) is mathematically determined from (fH - fL) /2.<br>d) The fractional bandwidth is defined as 2(fH - fL) / (fH + fL).e) Determine whether the -10 dB bandwidth (fH - fL) is ≧500 MHz, or whether the fractional bandwidth 2(fH - fL)/ (fH + fL) is ≧0.2. |
| Limit: | ≧500MHz |
| Test Mode: | Continuous Tx Mode, Keep the EUT Transmitting with Modulation |
| Test Results: | Pass |

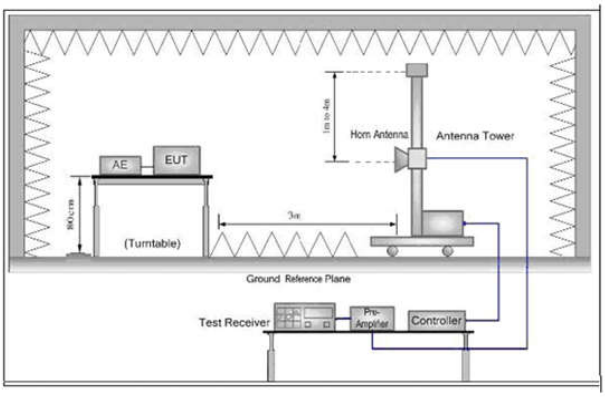
## Test Result

| Test Frequency (MHz) | FM(MHz) | FL (MHz) | FH (MHz) | 10dB bandwidth(MHz) | Limit (MHz) | Results |
|---|---|---|---|---|---|---|
| 6489.6 | 6333.800 | 6195.900 | 6767.300 | 571.400 | ≧500 | pass |
| 7987.2 | 7832.550 | 7639.250 | 8266.82 | 627.570 | ≧500 | pass |

## Test Graph

| Graphs | |
|---|---|
| 6489.6MHz |  |
| 7987.2MHz |  |

## 5.4 EIRP (Equivalent Isotropic Radiated Power)

| | |
|---|---|
| Test Requirement: | 47 CFR Part 15 Subpart F Section 15.519 (c)&(e) & Section 15.521(g) |
| Test Method: | ANSI C63.10: 2013 Section 10.3 |
| Test Setup: |  <br>Remark:<br>Due to some spectrum analyzer does not support 50MHz RBW setting, RBW set to the maximum value, and add a correction factor is allowed for Max Peak EIRP measurement. According to ANSI 63.10 Clause 10.3.9, the EIRP to field strength at a specified measurement distance of 3 m is below:<br>E (dBuV/m) = EIRP(dBm) + 95.3<br>For peak power test, the spectrum anylyzer was set to RBW=8MHz, VBW=10MHz, and add a conversion factor of 20*log(50MHz/8MHz)=15.92dB. |
| Test Procedure: | 1) The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semianechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.<br>2) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.<br>3) The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength.Both horizontal and vertical polarizations of the antenna are set to make the measurement.<br>4) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from O degrees to 360 degrees to find the maximum reading.<br>5) The test-receiver system was set to Peak detector with Maximum Hold Mode for Max Peak EIRP measurement and AV detector for Average EIRP measurement.<br>6) Test the EUT in the lowest channel, the Highest channel<br>7) The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case.<br>8) Repeat above procedures until all frequencies measured was complete.<br>Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor |

Limit:

Measurement Distance: 3m

Limit:

| Frequency | Limit | Detector | Measurement distance (m) |
|---|---|---|---|
| 960MHz-1610MHz | -75.3 dBm (EIRP, RBW=1MHz) | AV | 3 |
| 1610MHz-1990MHz | -63.3 dBm (EIRP, RBW=1MHz) | AV | 3 |
| 1990MHz-3100MHz | -61.3 dBm (EIRP, RBW=1MHz) | AV | 3 |
| 3100MHz-10600MHz | -41.3 dBm (EIRP, RBW=1MHz) | AV | 3 |
| Above 10600MHz | -61.3 dBm (EIRP, RBW=1MHz) | AV | 3 |
| Fundamental | 0 dBm (EIRP, RBW=50MHz) | Peak | 3 |

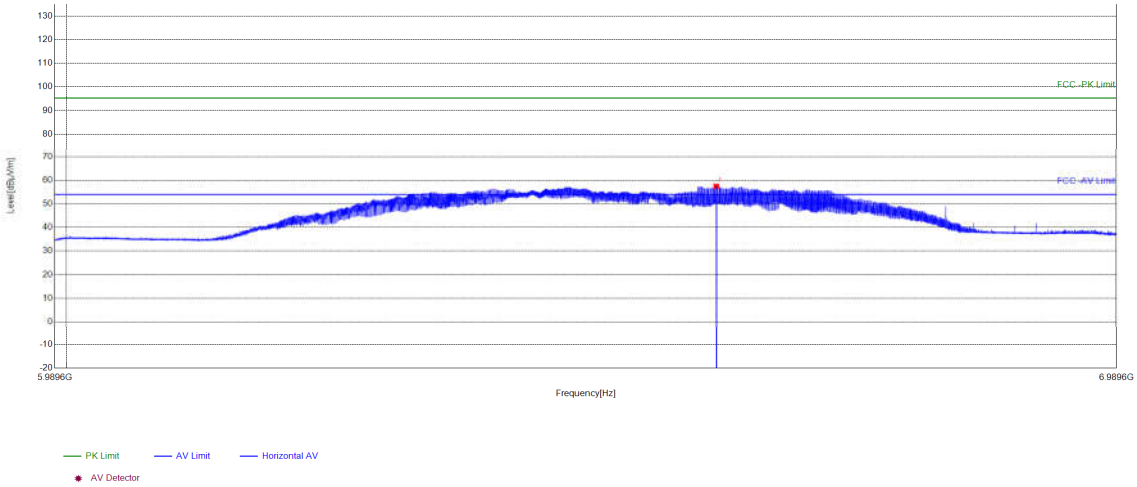
Thus, the field strength limit for the test above 1GHz is below:

| Frequency | Limit | Detector | Measurement Distance |
|---|---|---|---|
| | Field Strength (dBuV/m) | | |
| 960MHz-1610MHz | 20.00 | AV | 3 |
| 1610MHz-1990MHz | 32.00 | AV | 3 |
| 1990MHz-3100MHz | 34.00 | AV | 3 |
| 3100MHz-10600MHz | 54.00 | AV | 3 |
| Above 10600MHz | 34.00 | AV | 3 |
| Fundamental | 95.30 | Peak | 3 |

| | |
|---|---|
| Test Mode: | Continuous Tx Mode, Keep the EUT Transmitting with Modulation |
| Test Results: | Pass |

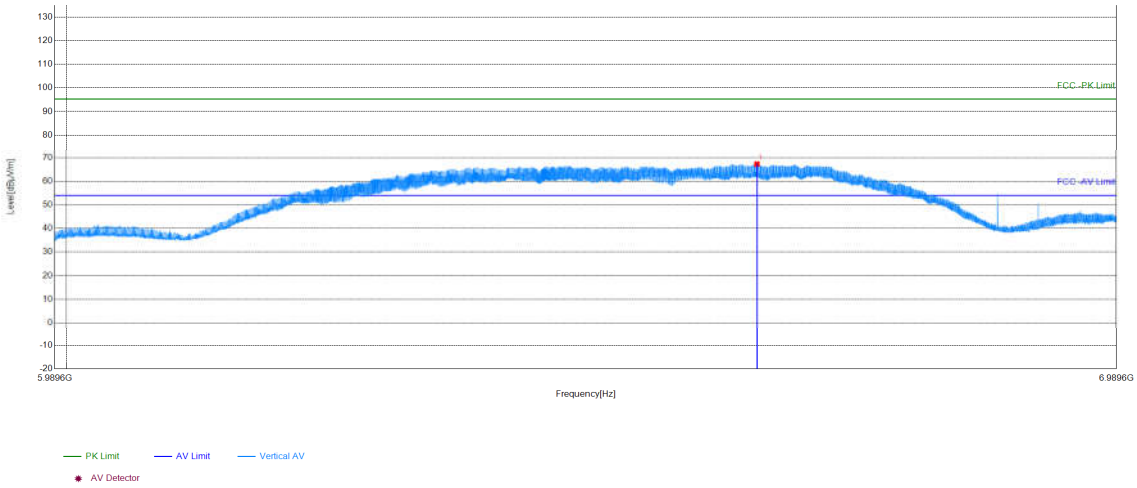
**Test Result**

**(1)Channel 5:**



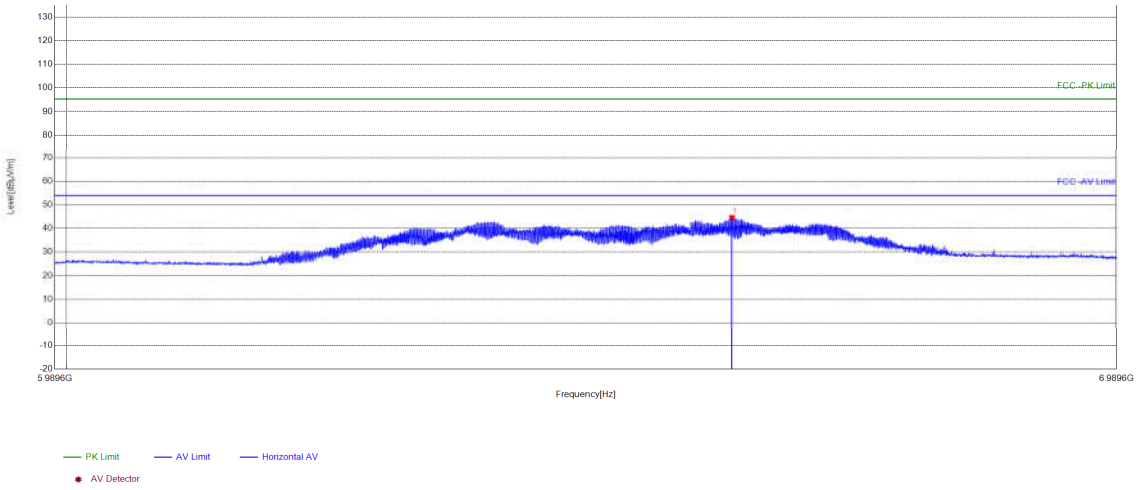

| Peak Field Strength for fundamental @ RBW=8MHz | | | | | |
|---|---|---|---|---|---|
| Freq.[MHz] | Factor[dB] | Reading[dBμV] | Level [dBμV/m] | Polarity | Remark |
| 6594.4403 | -8.98 | 66.38 | 57.40 | Horizontal | PK |

| Calculated Peak Field Strength of fundamental @ RBW=50MHz | | | | | | |
|---|---|---|---|---|---|---|
| Freq. [MHz] | Measured Field Strength of fundamental (FSM) (dBuV/m) | Calculated Field Strength of fundamental (FSc) (dBuV/m) | Limit (dBuV/m) | Margin [dB] | Result | Polarity |
| 6594.44 | 57.40 | 73.32 | 95.30 | 21.98 | pass | Horizontal |
| Note: FSc = FSM + 20log(50MHz/8MHz) = FSM + 15.92 | | | | | | |

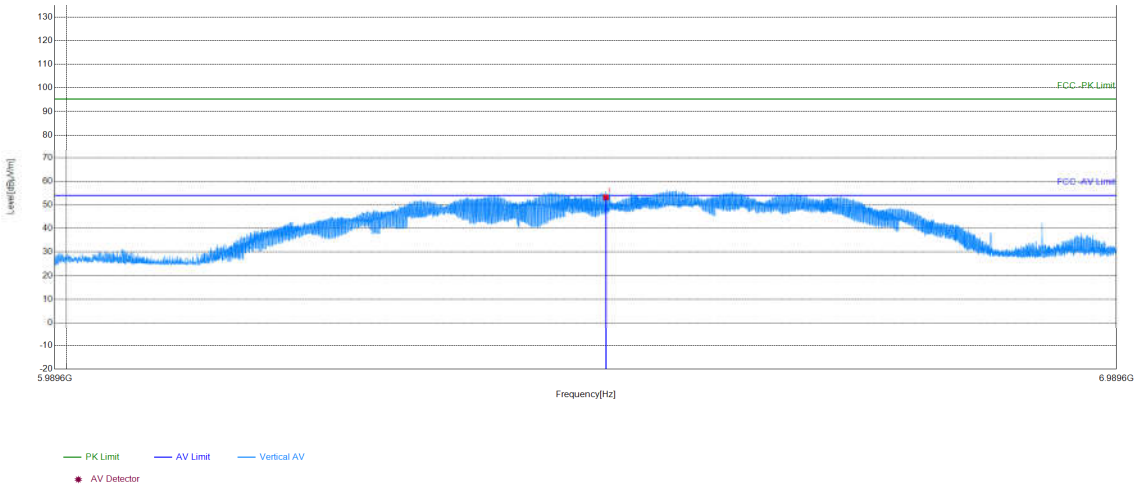



| Peak Field Strength for fundamental @ RBW=8MHz | | | | | |
|---|---|---|---|---|---|
| Freq.[MHz] | Factor[dB] | Reading[dBμV] | Level [dBμV/m] | Polarity | Remark |
| 6633.5763 | -8.60 | 75.89 | 67.29 | Vertical | PK |

| Calculated Peak Field Strength of fundamental @ RBW=50MHz | | | | | | |
|---|---|---|---|---|---|---|
| Freq. [MHz] | Measured Field Strength of fundamental (FSM) (dBuV/m) | Calculated Field Strength of fundamental (FSc) (dBuV/m) | Limit (dBuV/m) | Margin [dB] | Result | Polarity |
| 6633.57 | 67.29 | 83.21 | 95.30 | 12.09 | Pass | Vertical |
| Note: FSc = FSM + 20log(50MHz/8MHz) = FSM + 15.92 | | | | | | |



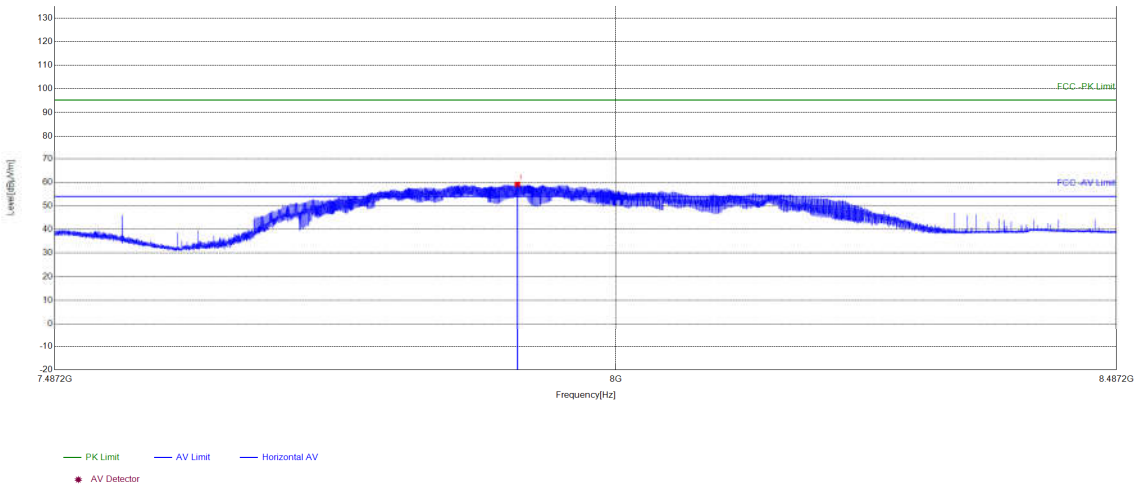

| Average Field Strength for fundamental @ RBW=1 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| NO | Freq. [MHz] | Factor [dB] | Reading [dBµV] | Level [dBµV/m] | Limit [dBµV/m] | Margin [dB] | Result | Polarity | Remark |
| 1 | 6609.52 | -8.83 | 53.38 | 44.55 | 54.00 | 9.45 | PASS | Horizontal | AV |




| Average Field Strength for fundamental @ RBW=1 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| NO | Freq. [MHz] | Factor [dB] | Reading [dBµV] | Level [dBµV/m] | Limit [dBµV/m] | Margin [dB] | Result | Polarity | Remark |
| 1 | 6489.5 | -9.82 | 63.00 | 53.18 | 54.00 | 0.82 | PASS | Vertical | AV |

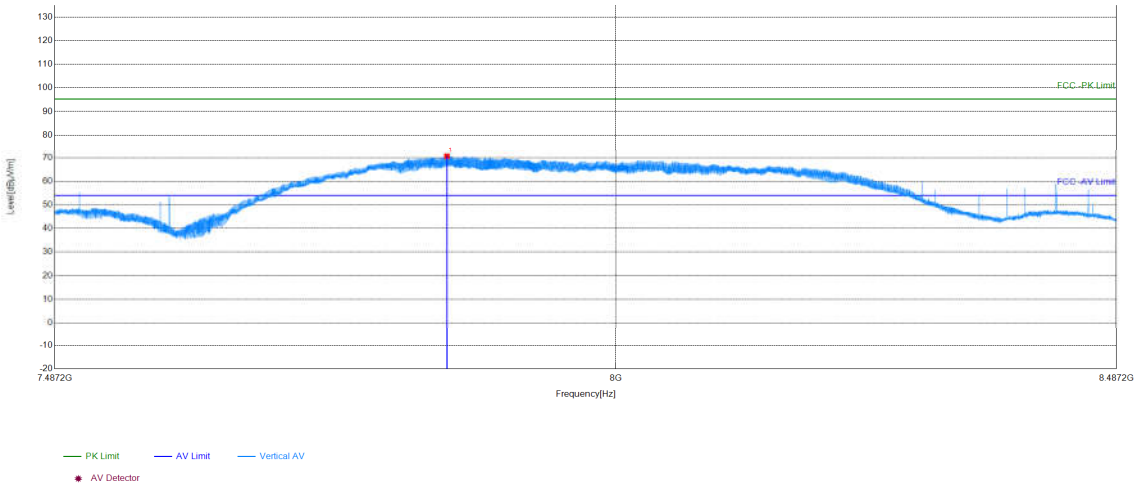
**Test Result**

**(2)Channel 9:**



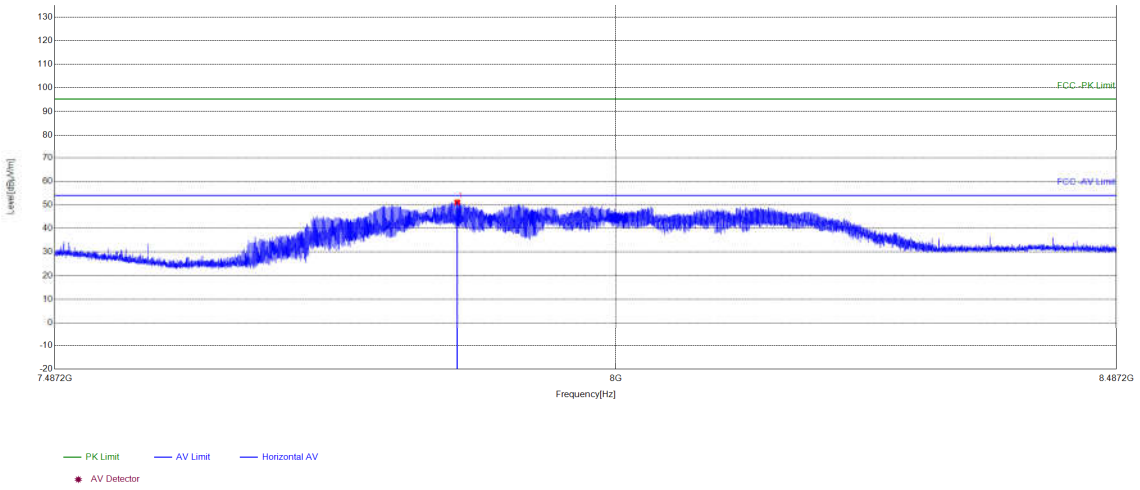

| Peak Field Strength for fundamental @ RBW=8MHz | | | | | |
|---|---|---|---|---|---|
| Freq.[MHz] | Factor[dB] | Reading[dBμV] | Level [dBμV/m] | Polarity | Remark |
| 7907.5614 | -4.30 | 63.36 | 59.06 | Horizontal | PK |

| Calculated Peak Field Strength of fundamental @ RBW=50MHz | | | | | | |
|---|---|---|---|---|---|---|
| Freq. [MHz] | Measured Field Strength of fundamental (FSM) (dBuV/m) | Calculated Field Strength of fundamental (FSc) (dBuV/m) | Limit (dBuV/m) | Margin [dB] | Result | Polarity |
| 7907.56 | 59.06 | 74.98 | 95.30 | 20.32 | pass | Horizontal |
| Note: FSc = FSM + 20log(50MHz/8MHz) = FSM + 15.92 | | | | | | |

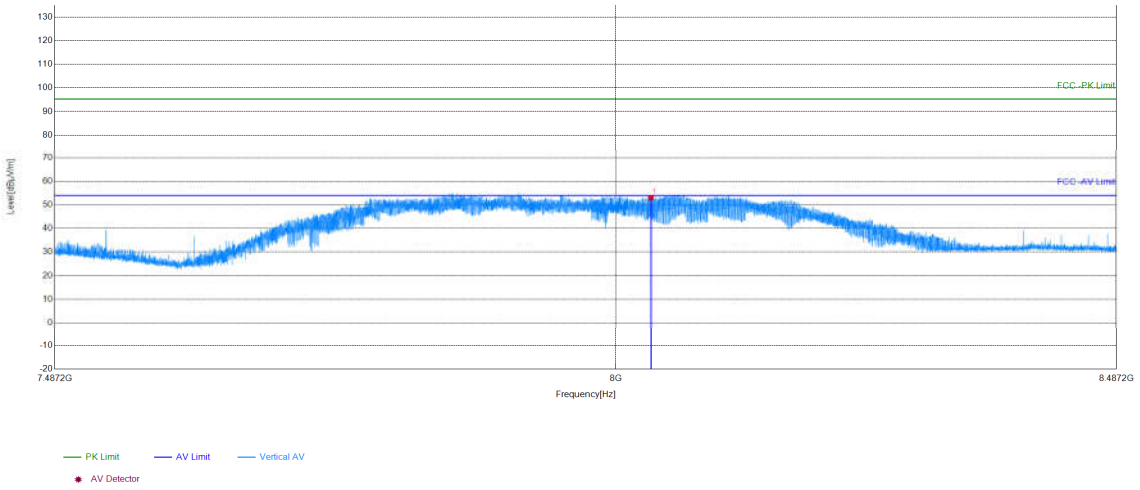



| Peak Field Strength for fundamental @ RBW=8MHz | | | | | |
|---|---|---|---|---|---|
| Freq.[MHz] | Factor[dB] | Reading[dBμV] | Level [dBμV/m] | Polarity | Remark |
| 7842.0903 | -4.21 | 74.83 | 70.62 | Vertical | PK |

| Calculated Peak Field Strength of fundamental @ RBW=50MHz | | | | | | |
|---|---|---|---|---|---|---|
| Freq. [MHz] | Measured Field Strength of fundamental (FSM) (dBuV/m) | Calculated Field Strength of fundamental (FSc) (dBuV/m) | Limit (dBuV/m) | Margin [dB] | Result | Polarity |
| 7842.09 | 70.62 | 86.54 | 95.30 | 8.76 | Pass | Vertical |
| Note: FSc = FSM + 20log(50MHz/8MHz) = FSM + 15.92 | | | | | | |

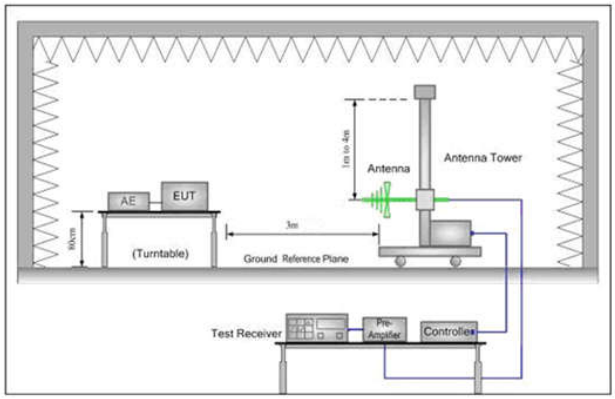



| Average Field Strength for fundamental @ RBW=1 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| NO | Freq. [MHz] | Factor [dB] | Reading [dBµV] | Level [dBµV/m] | Limit [dBµV/m] | Margin [dB] | Result | Polarity | Remark |
| 1 | 7851.62 | -4.21 | 55.34 | 51.13 | 54.00 | 2.87 | PASS | Horizontal | AV |




| Average Field Strength for fundamental @ RBW=1 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| NO | Freq. [MHz] | Factor [dB] | Reading [dBµV] | Level [dBµV/m] | Limit [dBµV/m] | Margin [dB] | Result | Polarity | Remark |
| 1 | 8033.36 | -4.06 | 56.96 | 52.90 | 54.00 | 1.10 | PASS | Vertical | AV |

## 5.5 Spurious Emissions Below 1GHz

| | |
|---|---|
| Test Requirement: | 47 CFR Part 15 Subpart F Section 15.519(c) & Section 15.209 & Section 15.521(c)&(d)&(h) |
| Test Method: | ANSI C63.10: 2013 Section 10.2 |
| Test Setup: |  |
| Test Procedure: | 1) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.<br>2) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.<br>3) The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength.Both horizontal and vertical polarizations of the antenna are set to make the measurement.<br>4) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.<br>5) The test-receiver system was set to Peak detector with Maximum Hold Mode. And use Quasi-Peak to measure the six highest frequencies.<br>6) Test the EUT in the lowest channel, the Highest channel and only recorded worst channel--Lowest channel in the test report.<br>7) The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case.<br>8) Repeat above procedures until all frequencies measured was completeRemark 1: Level= Read Level+ Cable Loss+ Antenna Factor-Preamp Factor 2. According to FCC Part 15.521(h), test was performed from 9kHz to 40GHz for the EUT. Emission below 30MHz was very low, so it's not recorded in the test report. |
| Limit: | |

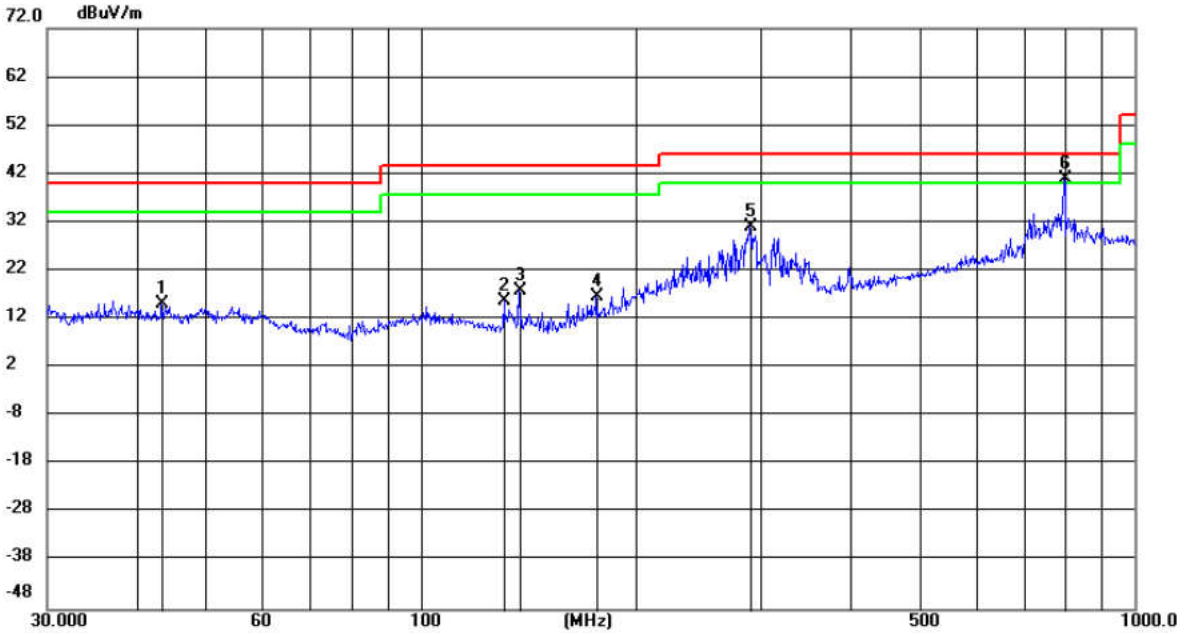
| Frequency | Field strength (microvolt/meter) | Limit (dBuV/m) | Remark | Measurement distance (m) |
|---|---|---|---|---|
| 0.009MHz-0.490MHz | 2400/F(kHz) | - | - | 300 |
| 0.490MHz-1.705MHz | 24000/F(kHz) | - | - | 30 |
| 1.705MHz-30MHz | 30 | - | - | 30 |
| 30MHz-88MHz | 100 | 40.0 | Quasi-peak | 3 |
| 88MHz-216MHz | 150 | 43.5 | Quasi-peak | 3 |
| 216MHz-960MHz | 200 | 46.0 | Quasi-peak | 3 |
| 960MHz-1000MHz | - | 20 | AV | 3 |

| Test Mode: | Continuous Tx Mode, Keep the EUT Transmitting with Modulation |
|---|---|
| Test Results: | Pass |

## Test Result

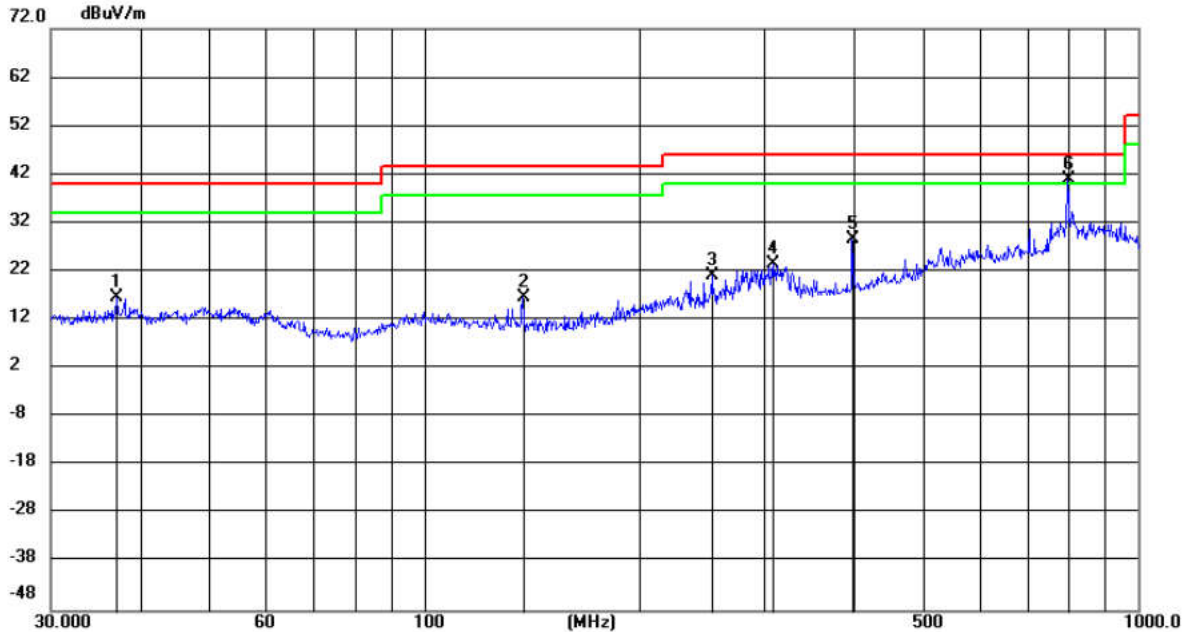
Remark:Only the worst case data of channel 5 was recorded in the report.

### Polarity: Horizontal



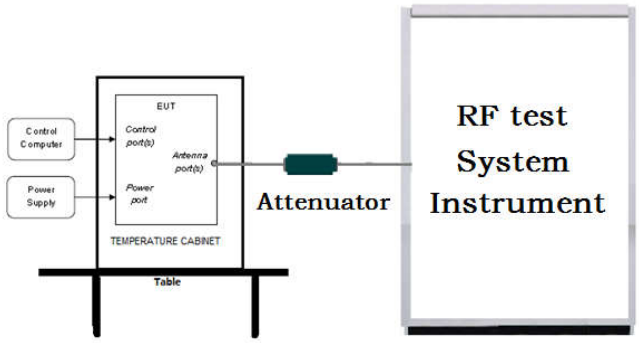

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Margin | | Antenna Height | Table Degree | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | cm | degree | Comment |
| 1 | | 43.4371 | 1.17 | 14.05 | 15.22 | 40.00 | -24.78 | QP | 100 | 53 | |
| 2 | | 131.2504 | 5.69 | 10.02 | 15.71 | 43.50 | -27.79 | QP | 100 | 218 | |
| 3 | | 137.4924 | 8.21 | 9.71 | 17.92 | 43.50 | -25.58 | QP | 100 | 63 | |
| 4 | | 176.7947 | 4.84 | 11.81 | 16.65 | 43.50 | -26.85 | QP | 100 | 208 | |
| 5 | | 289.3569 | 14.71 | 16.25 | 30.96 | 46.00 | -15.04 | QP | 100 | 311 | |
| 6 | * | 798.2796 | 15.18 | 25.79 | 40.97 | 46.00 | -5.03 | QP | 100 | 208 | |

**Polarity: Vertical**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Margin | | Antenna Height | Table Degree | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | cm | degree | Comment |
| 1 | | 37.1418 | 3.16 | 13.61 | 16.77 | 40.00 | -23.23 | QP | 200 | 321 | |
| 2 | | 137.4924 | 7.07 | 9.71 | 16.78 | 43.50 | -26.72 | QP | 200 | 238 | |
| 3 | | 253.0812 | 6.33 | 14.81 | 21.14 | 46.00 | -24.86 | QP | 200 | 238 | |
| 4 | | 308.6419 | 6.73 | 16.85 | 23.58 | 46.00 | -22.42 | QP | 200 | 197 | |
| 5 | | 398.6806 | 10.06 | 18.64 | 28.70 | 46.00 | -17.30 | QP | 200 | 146 | |
| 6 | * | 797.1607 | 15.17 | 25.78 | 40.95 | 46.00 | -5.05 | QP | 100 | 7 | |

## 5.6 Spurious Emissions Above 1GHz

| | |
|---|---|
| Test Requirement: | 47 CFR Part 15 Subpart F Section 15.519 (c)&(d) & Section 15.521(d)&(h) |
| Test Method: | ANSI C63.10: 2013 Section 10.3 |
| Test Setup: |  <br>Remark: Offset=Cable loss+ attenuation factor. |
| Test Procedure: | 1) The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meters semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.<br>2) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.<br>3) The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength.Both horizontal and vertical polarizations of the antenna are set to make the measurement.<br>4) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.<br>5) The test-receiver system was set to Peak detector with Maximum Hold Mode.<br>6) Test the EUT in the lowest channel, the Highest channel<br>7) The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case.<br>8) Repeat above procedures until all frequencies measured was complete<br>Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor2;<br>As the EUT operate at 6489.6MHz and 7987.2MHz, according to Part 15.521(h), test was performed at frequency up to 40GHz.<br>For frequency above 18GHz, emission was very low, so it's not recorded in the test report. |
| Limit: | Frequency / Limit (dBuV/m) / RBW / Detector / Measurement distance (m)<br>1000MHz-1610MHz / 20.0 / 1MHz / AV / 3<br>1610MHz-1990MHz / 32.0 / 1MHz / AV / 3<br>1990MHz-3100MHz / 34.0 / 1MHz / AV / 3<br>3100MHz-10600MHz / 54.0 / 1MHz / AV / 3<br>Above 10600MHz / 34.0 / 1MHz / AV / 3<br>1164MHz-1240MHz / 10.0 / 1KHz / AV / 3<br>1559MHz-1610MHz / 10.0 / 1KHz / AV / 3 |
| Test Mode: | Continuous Tx Mode, Keep the EUT Transmitting with Modulation |
| Test Results: | Pass |

**Test Result**

| Transmitting with modulation Mode at 6489.6MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1164MHz ≤ f ≤1240MHz & 1559MHz ≤ f ≤ 1610MHz | | | | | | | | | |
| NO | Freq. [MHz] | Factor [dB] | Reading [dBμV] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Result | Polarity | Remark |
| 1 | 1176.02 | -25.69 | 28.26 | 2.57 | 10.00 | 7.43 | PASS | Horizontal | AV |
| 2 | 1592.94 | -25.31 | 28.51 | 3.20 | 10.00 | 6.80 | PASS | Horizontal | AV |
| 3 | 1164.00 | -25.69 | 28.03 | 2.34 | 10.00 | 7.66 | PASS | Vertical | AV |
| 4 | 1570.79 | -25.30 | 27.73 | 2.43 | 10.00 | 7.57 | PASS | Vertical | AV |
| frequency out of 1164MHz ≤ f ≤ 1240MHz & 1559MHz≤ f ≤1610MHz band | | | | | | | | | |
| 1 | 1215.54 | -25.67 | 44.37 | 18.70 | 20.00 | 1.30 | PASS | Horizontal | AV |
| 2 | 1806.27 | -24.73 | 50.22 | 25.49 | 32.00 | 6.51 | PASS | Horizontal | AV |
| 3 | 2174.44 | -22.72 | 43.78 | 21.06 | 34.00 | 12.94 | PASS | Horizontal | AV |
| 4 | 4215.36 | -15.75 | 40.02 | 24.27 | 54.00 | 29.73 | PASS | Horizontal | AV |
| 5 | 8991.08 | -2.75 | 35.34 | 32.59 | 54.00 | 21.41 | PASS | Horizontal | AV |
| 6 | 11268.2 | -1.32 | 34.87 | 33.55 | 34.00 | 0.45 | PASS | Horizontal | AV |
| 7 | 1187.45 | -25.70 | 42.58 | 16.88 | 20.00 | 3.12 | PASS | Vertical | AV |
| 8 | 1816.92 | -24.67 | 45.35 | 20.68 | 32.00 | 11.32 | PASS | Vertical | AV |
| 9 | 2173.33 | -22.72 | 43.82 | 21.10 | 34.00 | 12.90 | PASS | Vertical | AV |
| 10 | 4609.90 | -14.55 | 40.13 | 25.58 | 54.00 | 28.42 | PASS | Vertical | AV |
| 11 | 9634.65 | -2.12 | 34.97 | 32.85 | 54.00 | 21.15 | PASS | Vertical | AV |
| 12 | 11269.7 | -1.32 | 31.94 | 30.62 | 34.00 | 3.38 | PASS | Vertical | AV |

| Transmitting with modulation Mode at 7987.2MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1164MHz ≤ f ≤1240MHz & 1559MHz ≤ f ≤ 1610MHz | | | | | | | | | |
| NO | Freq. [MHz] | Factor [dB] | Reading [dBμV] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Result | Polarity | Remark |
| 1 | 1214.21 | -25.67 | 27.83 | 2.16 | 10.00 | 7.84 | PASS | Horizontal | AV |
| 2 | 1579.21 | -25.30 | 28.23 | 2.93 | 10.00 | 7.07 | PASS | Horizontal | AV |
| 3 | 1187.58 | -25.70 | 28.73 | 3.03 | 10.00 | 6.97 | PASS | Vertical | AV |
| 4 | 1601.67 | -25.31 | 27.86 | 2.55 | 10.00 | 7.45 | PASS | Vertical | AV |
| frequency out of 1164MHz ≤ f ≤ 1240MHz & 1559MHz≤ f ≤1610MHz band | | | | | | | | | |
| 1 | 1216.15 | -25.66 | 42.29 | 20.63 | 20.00 | 3.37 | PASS | Horizontal | AV |
| 2 | 1807.03 | -24.73 | 50.56 | 25.83 | 32.00 | 6.17 | PASS | Horizontal | AV |
| 3 | 2830 | -20.15 | 42.61 | 22.46 | 34.00 | 11.54 | PASS | Horizontal | AV |
| 4 | 4117.10 | -16.04 | 40.34 | 24.30 | 54.00 | 29.70 | PASS | Horizontal | AV |
| 5 | 9667.65 | -2.69 | 35.00 | 32.31 | 54.00 | 21.69 | PASS | Horizontal | AV |
| 6 | 11967.6 | -0.73 | 31.72 | 31.99 | 34.00 | 3.01 | PASS | Horizontal | AV |
| 7 | 1187.45 | -25.70 | 42.50 | 16.80 | 20.00 | 3.20 | PASS | Vertical | AV |
| 8 | 1808.17 | -24.72 | 45.53 | 20.81 | 32.00 | 11.19 | PASS | Vertical | AV |
| 9 | 2815.55 | -20.18 | 42.77 | 22.59 | 34.00 | 11.41 | PASS | Vertical | AV |
| 10 | 4803.42 | -13.55 | 39.37 | 25.82 | 54.00 | 28.18 | PASS | Vertical | AV |
| 11 | 10041.9 | -0.93 | 33.42 | 32.49 | 54.00 | 21.51 | PASS | Vertical | AV |
| 12 | 11734.5 | -0.79 | 31.26 | 30.47 | 34.00 | 3.53 | PASS | Vertical | AV |

Remark:

1) Scan from 9kHz to 40GHz, disturbance above 18GHz 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.

# 7 PHOTOGRAPHS OF EUT Constructional Details

Refer to Report No.EED32Q80655101 for EUT external and internal photos.



*** End of Report ***