



FCC RADIO TEST REPORT

FCC ID : 2ARF9CSG1K3K
Equipment : Cloud Service Gateway
Brand Name : Versa Networks
Model Name : CSG1300,CSG1500,CSG3300,CSG3500
Applicant : Versa Networks
6001 America Center Dr, 4th floor, Suite 400, San Jose, CA 95002, USA
Manufacturer : Accton Technology Corporation
1, Creation Road3, Hsinchu Science Park Hsinchu 20077, Taiwan
Standard : 47 CFR FCC Part 15.247

The product was received on Aug. 10, 2020, and testing was started from Aug. 12, 2020 and completed on Sep. 01, 2020. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.


Approved by: Cliff Chang

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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TEL : 886-3-656-9065
FAX : 886-3-656-9085
Report Template No.: CB-A10_6 Ver1.2



Summary of Test Result

| Report Clause | Ref Std. Clause | Test Items | Result (PASS/FAIL) | Remark |
|---------------|-----------------|---|--------------------|--------|
| 1.1.2 | 15.203 | Antenna Requirement | PASS | - |
| 3.1 | 15.207 | AC Power-line Conducted Emissions | PASS | - |
| 3.2 | 15.247(a) | DTS Bandwidth | PASS | - |
| 3.3 | 15.247(b) | Maximum Conducted Output Power | PASS | - |
| 3.4 | 15.247(e) | Power Spectral Density | PASS | - |
| 3.5 | 15.247(d) | Emissions in Non-restricted Frequency Bands | PASS | - |
| 3.6 | 15.247(d) | Emissions in Restricted Frequency Bands | PASS | - |

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Sam Chen

Report Producer: Viola Huang



1 General Description

1.1 Information

1.1.1 RF General Information

| Frequency Range (MHz) | Bluetooth Mode | Ch. Frequency (MHz) | Channel Number |
|-----------------------|----------------|---------------------|----------------|
| 2400-2483.5 | LE | 2402-2480 | 0-39 [40] |

| Band | Mode | BWch (MHz) | Nant |
|---------------|--------------|------------|------|
| 2.4-2.4835GHz | BT-LE(1Mbps) | 1 | 1 |

Note:

- ♦ Bluetooth LE uses a GFSK modulation.
- ♦ BWch is the nominal channel bandwidth.
- ♦ This device contains transmitter module (WLAN FCC ID:2ARF9CSG-W1, WWAN FCC ID: N7NEM75).



1.1.2 Antenna Information

For WLAN / BT antenna

| Ant. | Port | Brand | P/N | Antenna Type | Connector | Gain (dBi) |
|------|------|-----------|----------------------|----------------|-------------|------------|
| 1 | 1 | WIESON | GY121HT0330-016 | Dipole Antenna | RP SMA Plug | Note 1 |
| 2 | 2 | WIESON | GY121HT0330-016 | Dipole Antenna | RP SMA Plug | |
| 3 | 1 | MAGLAYERS | PCA-3210-2G4C6-A1-TN | PIFA Antenna | MHF | |

For WWAN antenna

| Ant. | Port | Brand | Model Name | Antenna Type | Connector | Gain (dBi) |
|------|------|--------|-----------------|----------------|-----------|------------|
| 4 | 1 | WIESON | GY115HT0330-038 | Dipole Antenna | SMA Plug | Note1 |
| 5 | 2 | WIESON | GY115HT0330-038 | Dipole Antenna | SMA Plug | |

Note 1:

| Ant. | Port | Antenna Gain (dBi) | | | Cable Loss (dB) | | | True Gain (dBi) | | |
|------|------|--------------------|------|-----------|-----------------|------|-----------|-----------------|------|-----------|
| | | 2.4G | 5G | Bluetooth | 2.4G | 5G | Bluetooth | 2.4G | 5G | Bluetooth |
| 1 | 1 | 3.10 | 4.55 | - | 0.84 | 1.72 | - | 2.26 | 2.83 | - |
| 2 | 2 | 3.10 | 4.55 | - | 1.06 | 1.89 | - | 2.04 | 2.66 | - |
| 3 | 1 | - | - | -5.59 | - | - | - | - | - | - |

| WWAN Antenna Gain (dBi) | | | | | | | | | | |
|-------------------------|------|---------------|--|--|--|-----------------|--|--|--|--|
| Ant. | Port | 698MHz~960MHz | | | | 1710MHz~2170MHz | | | | |
| 4 | 1 | 3.20 | | | | 3.02 | | | | |
| 5 | 2 | 3.20 | | | | 3.02 | | | | |

Note2: The above information was declared by manufacturer.

For BT function (1TX/1RX):

Only Port 1 can be used as transmitting/receiving antenna.

For WWAN function (1TX/2RX):

Only Port 1 can be use as transmitting antenna

Port 1 and Port 2 could receive simultaneously.

For WiFi function (1TX/1RX):**2.4GHz Function****For IEEE 802.11b/g/n/VHT mode (2TX, 2RX):**

Port 1 and Port 2 could transmit/receive simultaneously.

5GHz Function**For IEEE 802.11a/n/ac mode (2TX, 2RX):**

Port 1 and Port 2 could transmit/receive simultaneously.

**1.1.3 Mode Test Duty Cycle**

| Mode | DC | DCF(dB) | T(s) | VBW(Hz) $\geq 1/T$ |
|--------------|-------|---------|------|--------------------|
| BT-LE(1Mbps) | 0.633 | 1.99 | 405u | 3k |

Note:

- ♦ DC is Duty Cycle.
- ♦ DCF is Duty Cycle Factor.

1.1.4 EUT Operational Condition

| | | | |
|-----------------------|---|---|--|
| EUT Power Type | From Slide-in power supply | | |
| Function | <input checked="" type="checkbox"/> Point-to-multipoint | <input type="checkbox"/> Point-to-point | |
| Test Software Version | Tera Term | | |
| Support Mode | <input checked="" type="checkbox"/> LE 1M PHY: 1 Mb/s | | |
| | <input type="checkbox"/> LE Coded PHY (S=2): 500 Kb/s | | |
| | <input type="checkbox"/> LE Coded PHY (S=8): 125 Kb/s | | |
| | <input type="checkbox"/> LE 2M PHY: 2 Mb/s | | |

Note: The above information was declared by manufacturer.

1.1.5 Table for Multiple Listing

| EUT | Model Name | CPU | RAM |
|-----|------------|-------------------------------------|------------|
| 1 | CSG1300 | Intel Denvention 16 cores C3958 Soc | DDR4 64GB |
| 2 | CSG1500 | Intel Skylake D14 cores D2177NT Soc | DDR4 128GB |
| 3 | CSG3300 | Intel Denvention 16 cores C3958 Soc | DDR4 64GB |
| 4 | CSG3500 | Intel Skylake D14 cores D2177NT Soc | DDR4 128GB |

From the above models, model: CSG1300 was selected as representative model for the test and its data was recorded in this report.

1.1.6 The telecommunication ports of the EUT is shown as below

| EUT | Telecommunication Port | Description |
|-----|------------------------------|-----------------|
| 1~4 | RJ-45 10GbE ports*2 | 1Gbps/10Gbps |
| | SFP+ 10GbE ports*2 | 1Gbps/10Gbps |
| | SFP+ 10GbE ports*4 | 1Gbps/10Gbps |
| | RJ-45 1GbE PoE (30W) ports*8 | 10/100/1000Mbps |
| | RJ-45 1G Ethernet | 10/100/1000Mbps |
| | RJ-45 Serial console port *1 | - |
| | 2.0 USB port*2 | - |

**1.1.7 Table of WLAN & WWAN Module Function**

| Brand Name | Model Name | FCC ID | Function |
|----------------|------------|-------------|--------------------------------------|
| VERSA NETWORKS | CSG-W1 | 2ARF9CSG-W1 | WiFi: 2.4GHz / 5GHz Band 1~Band 4 |
| Sierra | EM7565 | N7NEM75 | LTE: B2/B4/B5/B12/B13 & WCDMA: B2/B5 |



1.2 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ 47 CFR FCC Part 15
- ♦ ANSI C63.10-2013

The following reference test guidance is not within the scope of accreditation of TAF.

- ♦ FCC KDB 558074 D01 v05r02
- ♦ FCC KDB 414788 D01 v01r01

1.3 Testing Location Information

| Testing Location | | | | |
|-------------------------------------|--------|-----|--|----------------------|
| <input type="checkbox"/> | HWA YA | ADD | No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) | |
| | | TEL | 886-3-327-3456 | FAX : 886-3-327-0973 |
| <input checked="" type="checkbox"/> | JHUBEI | ADD | No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C. | |
| | | TEL | 886-3-656-9065 | FAX : 886-3-656-9085 |

| Test Condition | Test Site No. | Test Engineer | Test Environment | Test Date |
|---------------------|---------------|---------------|----------------------|-----------------------------|
| RF Conducted | TH01-CB | Owen Hsu | 24.1~24.8°C / 54~56% | Aug. 18, 2020~Aug. 27, 2020 |
| Radiated below 1GHz | 03CH05-CB | Eason Chen | 24.4~25.3°C / 54~56% | Sep. 01, 2020 |
| Radiated above 1GHz | 03CH02-CB | Eason Chen | 25.1~26.5°C / 53~57% | Aug. 18, 2020~Sep. 01, 2020 |
| AC Conduction | CO01-CB | GH Hou | 21~23°C / 61~63% | Aug. 12, 2020 |

Test site Designation No. TW0006 with FCC.

Test site registered number IC 4086D with Industry Canada.

1.4 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2))

| Test Items | Uncertainty | Remark |
|--------------------------------------|-------------|--------------------------|
| Conducted Emission (150kHz ~ 30MHz) | 2.0 dB | Confidence levels of 95% |
| Radiated Emission (30MHz ~ 1,000MHz) | 5.6 dB | Confidence levels of 95% |
| Radiated Emission (1GHz ~ 18GHz) | 4.9 dB | Confidence levels of 95% |
| Radiated Emission (18GHz ~ 40GHz) | 4.6 dB | Confidence levels of 95% |
| Conducted Emission | 2.8 dB | Confidence levels of 95% |
| Output Power Measurement | 1.4 dB | Confidence levels of 95% |
| Power Density Measurement | 2.8 dB | Confidence levels of 95% |
| Bandwidth Measurement | 0.39% | Confidence levels of 95% |



2 Test Configuration of EUT

2.1 Test Channel Mode

| Mode | Power Setting |
|--------------|---------------|
| BT-LE(1Mbps) | - |
| 2402MHz | 8 |
| 2440MHz | 8 |
| 2480MHz | 8 |

2.2 The Worst Case Measurement Configuration

| The Worst Case Mode for Following Conformance Tests | |
|---|--|
| Tests Item | AC power-line conducted emissions |
| Condition | AC power-line conducted measurement for line and neutral |
| Operating Mode | CTX |
| 1 | EUT 1- Left power connect with power cord 1, right power connect with power cord 2 |

| The Worst Case Mode for Following Conformance Tests | |
|---|--|
| Tests Item | DTS Bandwidth Maximum Conducted Output Power Power Spectral Density Emissions in Non-restricted Frequency Bands |
| Test Condition | Conducted measurement at transmit chains |

| The Worst Case Mode for Following Conformance Tests | |
|---|---|
| Tests Item | Emissions in Restricted Frequency Bands |
| Test Condition | Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type. |
| Operating Mode < 1GHz | CTX |
| 1 | EUT 1 |
| Operating Mode > 1GHz | CTX |
| 1 | EUT 1 |



| The Worst Case Mode for Following Conformance Tests | |
|--|---|
| Tests Item | Simultaneous Transmission Analysis - Co-location RF Exposure Evaluation |
| Operating Mode | |
| 1 | WLAN 2.4GHz + WLAN 5GHz + Bluetooth + LTE |
| 2 | WLAN 2.4GHz + WLAN 5GHz + Bluetooth + WCDMA |
| Refer to Sporton Test Report No.: FA072432 for Co-location RF Exposure Evaluation. | |

Note: The EUT can only use at Z axis position.

2.3 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.



2.4 Accessories

| Accessories | | | |
|--|------------|-------------|--|
| Equipment Name | Brand Name | Model Name | Rating |
| Power supply*2 | DELTA | DPS-920AB B | INPUT: 100-240V~, 50-60Hz, 12-6.5A OUTPUT: +54.5V, 16.88A |
| Others | | | |
| Power cord 1*1, non-shielded, 1.8m (Brand: XIE KANG / Model: XK-06) | | | |
| Power cord 2*1, non-shielded, 1.8m (Brand: SELF-MAN / Model: SM-006) | | | |
| Console cable*1, non-shielded, 1.5m | | | |
| Fan*4 (Brand: Nidec / Model: CP3VS1510001A) | | | |
| Wall Bracket*1 | | | |

2.5 Support Equipment

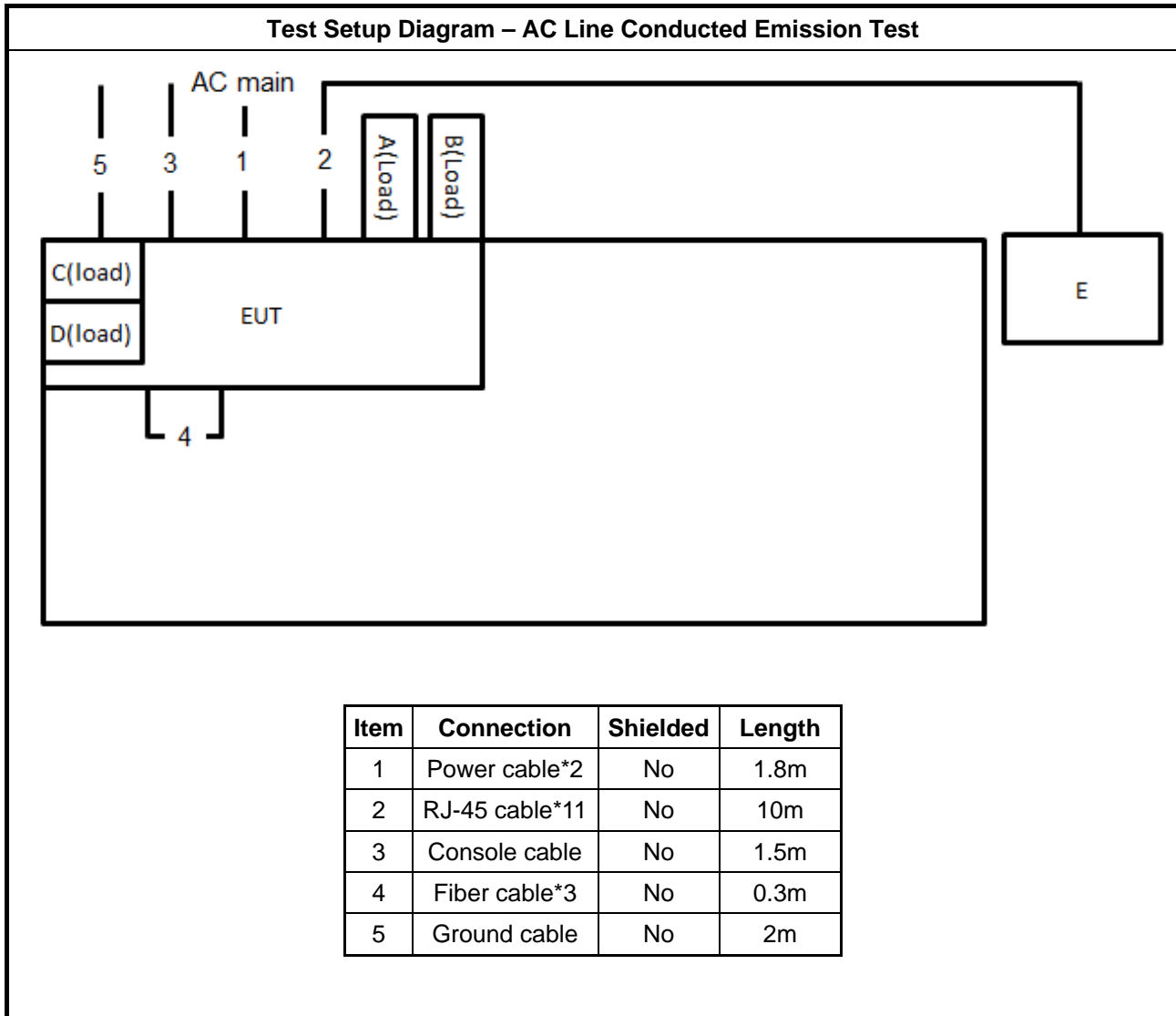
For AC Conduction:

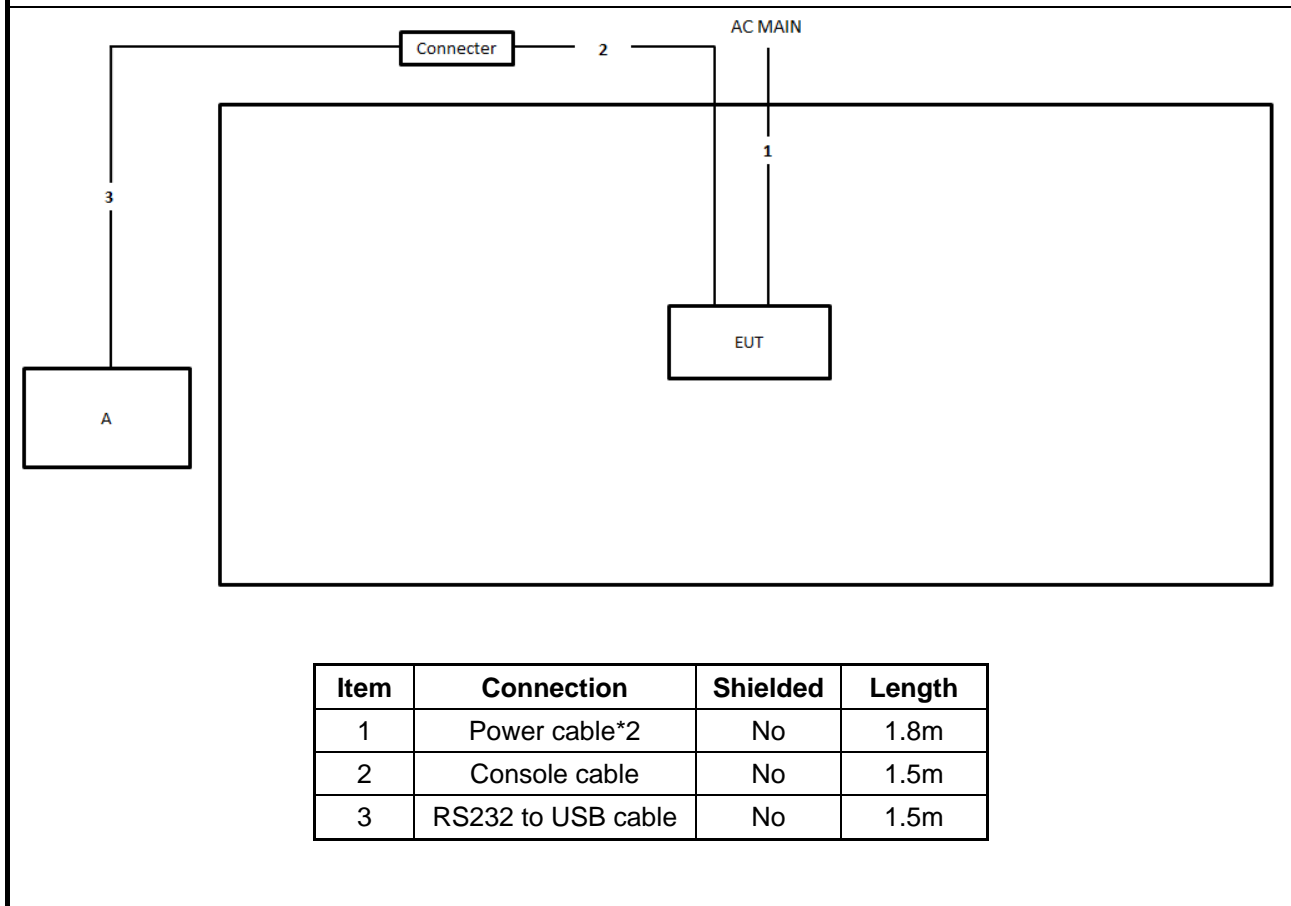
| Support Equipment | | | | |
|-------------------|---------------|------------|------------------|--------|
| No. | Equipment | Brand Name | Model Name | FCC ID |
| A | Flash disk3.0 | TOSHIBA | UHYBS-008GH | N/A |
| B | Flash disk3.0 | TOSHIBA | UHYBS-008GH | N/A |
| C | SIM card | N/A | N/A | N/A |
| D | SIM card | N/A | N/A | N/A |
| E | PoE Load | Accton | PoEPlus Tester-B | N/A |

For Radiated and RF Conducted:

| Support Equipment | | | | |
|-------------------|-----------|------------|------------|--------|
| No. | Equipment | Brand Name | Model Name | FCC ID |
| A | NB | DELL | E4300 | N/A |

2.6 Test Setup Diagram



Test Setup Diagram - Radiated Test




3 Transmitter Test Result

3.1 AC Power-line Conducted Emissions

3.1.1 AC Power-line Conducted Emissions Limit

| AC Power-line Conducted Emissions Limit | | |
|---|------------|-----------|
| Frequency Emission (MHz) | Quasi-Peak | Average |
| 0.15-0.5 | 66 - 56 * | 56 - 46 * |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |

Note 1: * Decreases with the logarithm of the frequency.

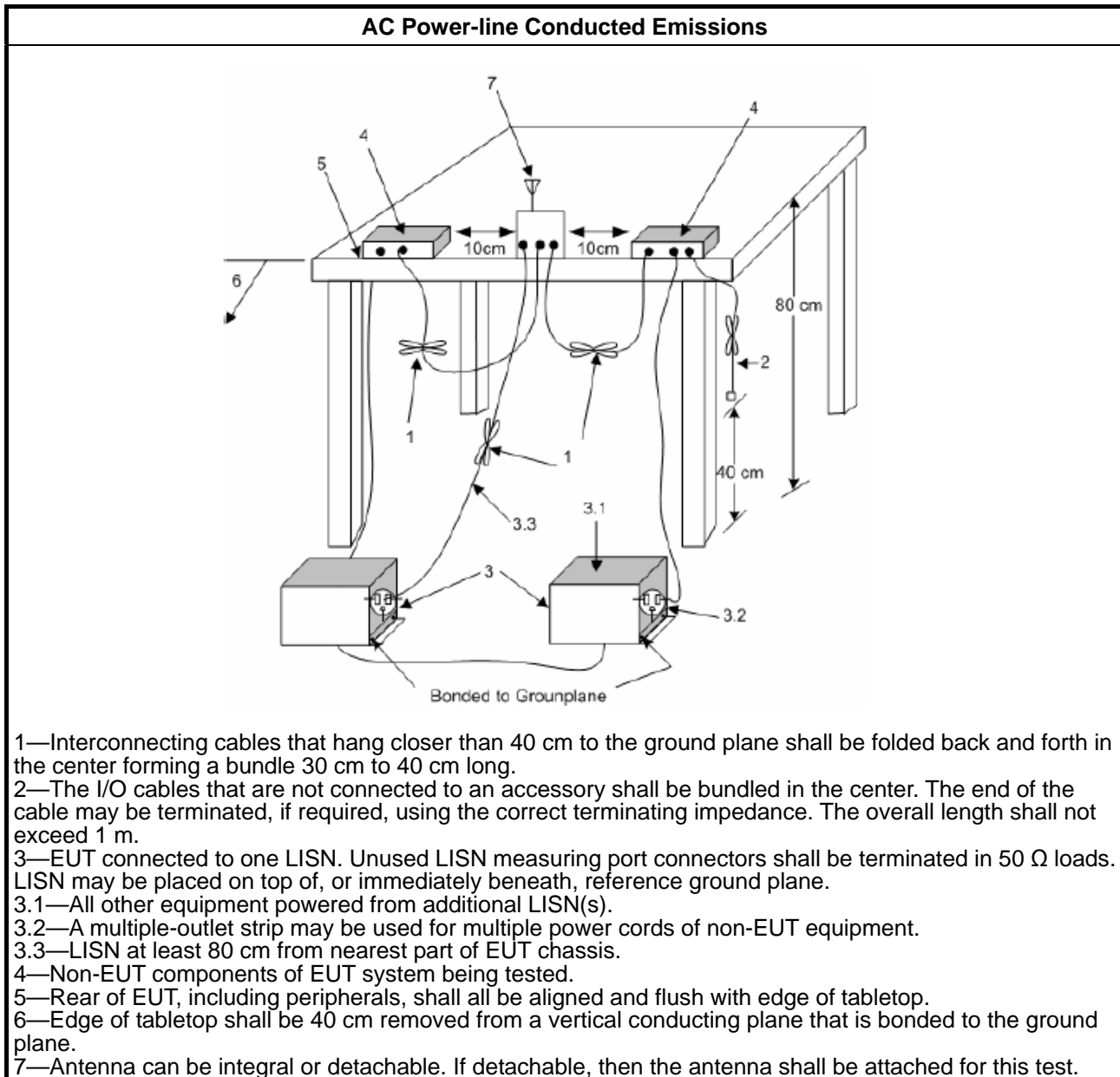
3.1.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.1.3 Test Procedures

| Test Method |
|--|
| ▪ Refer as ANSI C63.10-2013, clause 6.2 for AC power-line conducted emissions. |

3.1.4 Test Setup



1.1.1. Measurement Results Calculation

The measured Level is calculated using:

- a. Corrected Reading: LISN Factor (LISN) + Attenuator (AT/AUX) + Cable Loss (CL) + Read Level (Raw) = Level
- b. Margin = -Limit + Level

3.1.5 Test Result of AC Power-line Conducted Emissions

Refer as Appendix A

3.2 DTS Bandwidth

3.2.1 6dB Bandwidth Limit

| 6dB Bandwidth Limit | |
|---|--------------------------------|
| Systems using digital modulation techniques: | |
| ▪ | 6 dB bandwidth \geq 500 kHz. |

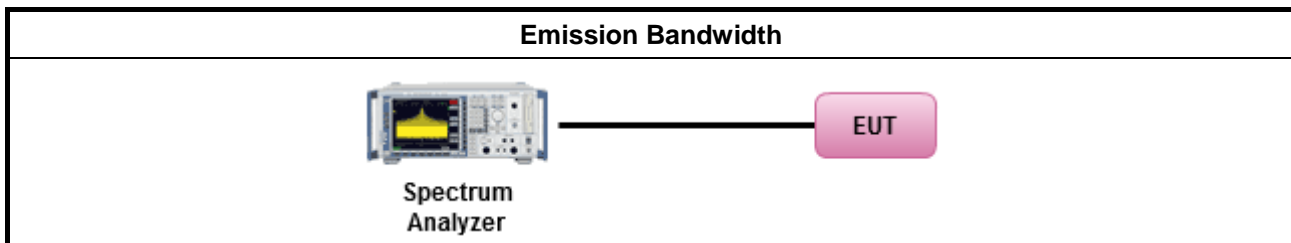
3.2.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.2.3 Test Procedures

| Test Method | |
|-------------------------------------|---|
| ▪ | For the emission bandwidth shall be measured using one of the options below: |
| <input checked="" type="checkbox"/> | Refer as FCC KDB 558074, clause 8.2 & C63.10 clause 11.8.1 Option 1 for 6 dB bandwidth measurement. |
| <input type="checkbox"/> | Refer as FCC KDB 558074, clause 8.2 & C63.10 clause 11.8.2 Option 2 for 6 dB bandwidth measurement. |
| <input type="checkbox"/> | Refer as ANSI C63.10, clause 6.9.1 for occupied bandwidth testing. |

3.2.4 Test Setup



3.2.5 Test Result of Emission Bandwidth

Refer as Appendix B

3.3 Maximum Conducted Output Power

3.3.1 Maximum Conducted Output Power Limit

| Maximum Conducted Output Power Limit | |
|---|--|
| | ▪ If $G_{TX} \leq 6$ dBi, then $P_{Out} \leq 30$ dBm (1 W) |
| | ▪ Point-to-multipoint systems (P2M): If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)$ dBm |
| | ▪ Point-to-point systems (P2P): If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)/3$ dBm |
| | ▪ Smart antenna system (SAS): |
| | - Single beam: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)/3$ dBm |
| | - Overlap beam: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)/3$ dBm |
| | - Aggregate power on all beams: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)/3 + 8$ dB dBm |
| P_{Out} = maximum peak conducted output power or maximum conducted output power in dBm, G_{TX} = the maximum transmitting antenna directional gain in dBi. | |

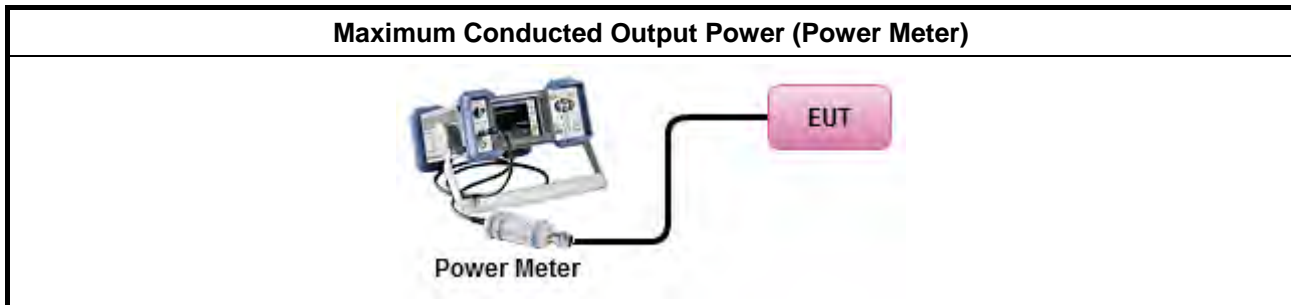
3.3.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.3.3 Test Procedures

| Test Method | |
|--|---|
| <ul style="list-style-type: none"> Maximum Peak Conducted Output Power | |
| <input type="checkbox"/> | Refer as FCC KDB 558074, clause 8.3.1.1 & C63.10 clause 11.9.1.1 (RBW ≥ EBW method). |
| <input type="checkbox"/> | Refer as FCC KDB 558074, clause 8.3.1.3 & C63.10 clause 11.9.1.3 (peak power meter). |
| <ul style="list-style-type: none"> Maximum Conducted Output Power | |
| [duty cycle ≥ 98% or external video / power trigger] | |
| <input type="checkbox"/> | Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.2 Method AVGSA-1. |
| <input type="checkbox"/> | Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.3 Method AVGSA-1A. (alternative) |
| duty cycle < 98% and average over on/off periods with duty factor | |
| <input type="checkbox"/> | Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.4 Method AVGSA-2. |
| <input type="checkbox"/> | Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.5 Method AVGSA-2A (alternative) |
| <input type="checkbox"/> | Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.6 Method AVGSA-3 |
| <input type="checkbox"/> | Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.7 Method AVGSA-3A (alternative) |
| Measurement using a power meter (PM) | |
| <input type="checkbox"/> | Refer as FCC KDB 558074, clause 8.3.2.3 & C63.10 clause 11.9.2.3.1 Method AVGPM (using an RF average power meter). |
| <input checked="" type="checkbox"/> | Refer as FCC KDB 558074, clause 8.3.2.3 & C63.10 clause 11.9.2.3.2 Method AVGPM-G (using an gate RF average power meter). |
| <ul style="list-style-type: none"> For conducted measurement. | |
| <ul style="list-style-type: none"> If the EUT supports multiple transmit chains using options given below: Refer as FCC KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them. | |
| <ul style="list-style-type: none"> If multiple transmit chains, EIRP calculation could be following as methods: $P_{total} = P_1 + P_2 + \dots + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = P_{total} + DG$ | |

3.3.4 Test Setup



3.3.5 Test Result of Maximum Conducted Output Power

Refer as Appendix C



3.4 Power Spectral Density

3.4.1 Power Spectral Density Limit

| Power Spectral Density Limit |
|--|
| ▪ Power Spectral Density (PSD) ≤ 8 dBm/3kHz |

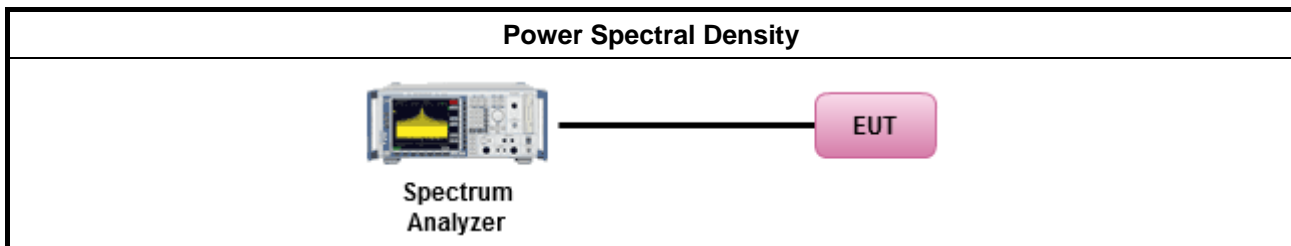
3.4.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.4.3 Test Procedures

| Test Method | |
|--|--|
| ▪ Peak power spectral density procedures that the same method as used to determine the conducted output power. If maximum peak conducted output power was measured to demonstrate compliance to the output power limit, then the peak PSD procedure below (Method PKPSD) shall be used. If maximum conducted output power was measured to demonstrate compliance to the output power limit, then one of the average PSD procedures shall be used, as applicable based on the following criteria (the peak PSD procedure is also an acceptable option). | |
| <input checked="" type="checkbox"/> | Refer as FCC KDB 558074, clause 8.4 & C63.10 clause 11.10 Method Max. PSD. [duty cycle $\geq 98\%$ or external video / power trigger] |
| ▪ For conducted measurement. | |
| ▪ If The EUT supports multiple transmit chains using options given below: | |
| <input type="checkbox"/> | Option 1: Measure and sum the spectra across the outputs. Refer as FCC KDB 662911, In-band power spectral density (PSD). Sample all transmit ports simultaneously using a spectrum analyzer for each transmit port. Where the trace bin-by-bin of each transmit port summing can be performed. (i.e., in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3, and so on up to the NTX output to obtain the value for the first frequency bin of the summed spectrum.). Add up the amplitude (power) values for the different transmit chains and use this as the new data trace. |
| <input type="checkbox"/> | Option 2: Measure and sum spectral maxima across the outputs. With this technique, spectra are measured at each output of the device at the required resolution bandwidth. The maximum value (peak) of each spectrum is determined. These maximum values are then summed mathematically in linear power units across the outputs. These operations shall be performed separately over frequency spans that have different out-of-band or spurious emission limits, |
| <input type="checkbox"/> | Option 3: Measure and add $10 \log(N)$ dB, where N is the number of transmit chains. Refer as FCC KDB 662911, In-band power spectral density (PSD). Performed at each transmit chains and each transmit chains shall be compared with the limit have been reduced with $10 \log(N)$. Or each transmit chains shall be add $10 \log(N)$ to compared with the limit. |

3.4.4 Test Setup



3.4.5 Test Result of Power Spectral Density

Refer as Appendix D

3.5 Emissions in Non-restricted Frequency Bands

3.5.1 Emissions in Non-restricted Frequency Bands Limit

| Un-restricted Band Emissions Limit | |
|---|-------------|
| RF output power procedure | Limit (dBc) |
| Peak output power procedure | 20 |
| Average output power procedure | 30 |
| <p>Note 1: If the peak output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum measured in-band peak PSD level.</p> <p>Note 2: If the average output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the power in any 100 kHz outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured in-band average PSD level.</p> | |

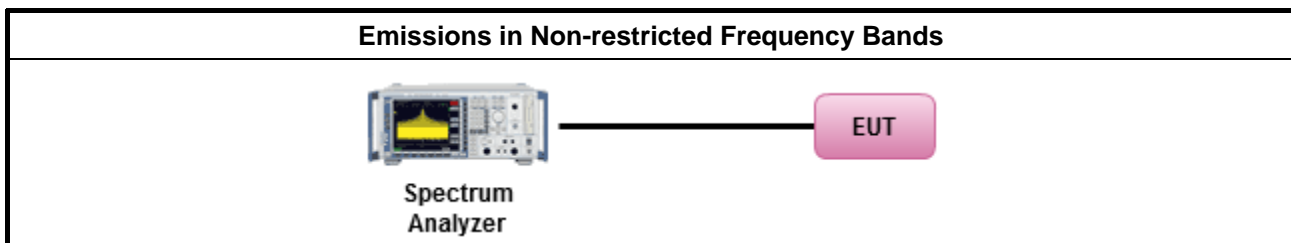
3.5.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.5.3 Test Procedures

| Test Method |
|---|
| <ul style="list-style-type: none"> Refer as FCC KDB 558074, clause 8.5 for unwanted emissions into non-restricted bands. |

3.5.4 Test Setup



3.5.5 Test Result of Emissions in Non-restricted Frequency Bands

Refer as Appendix E

3.6 Emissions in Restricted Frequency Bands

3.6.1 Emissions in Restricted Frequency Bands Limit

| Restricted Band Emissions Limit | | | |
|---------------------------------|-----------------------|-------------------------|----------------------|
| Frequency Range (MHz) | Field Strength (uV/m) | Field Strength (dBuV/m) | Measure Distance (m) |
| 0.009~0.490 | 2400/F(kHz) | 48.5 - 13.8 | 300 |
| 0.490~1.705 | 24000/F(kHz) | 33.8 - 23 | 30 |
| 1.705~30.0 | 30 | 29 | 30 |
| 30~88 | 100 | 40 | 3 |
| 88~216 | 150 | 43.5 | 3 |
| 216~960 | 200 | 46 | 3 |
| Above 960 | 500 | 54 | 3 |

Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB / decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

Note 3: Using the distance of 1m during the test for above 18 GHz, and the test value to correct for the distance factor at 3m.

3.6.2 Measuring Instruments

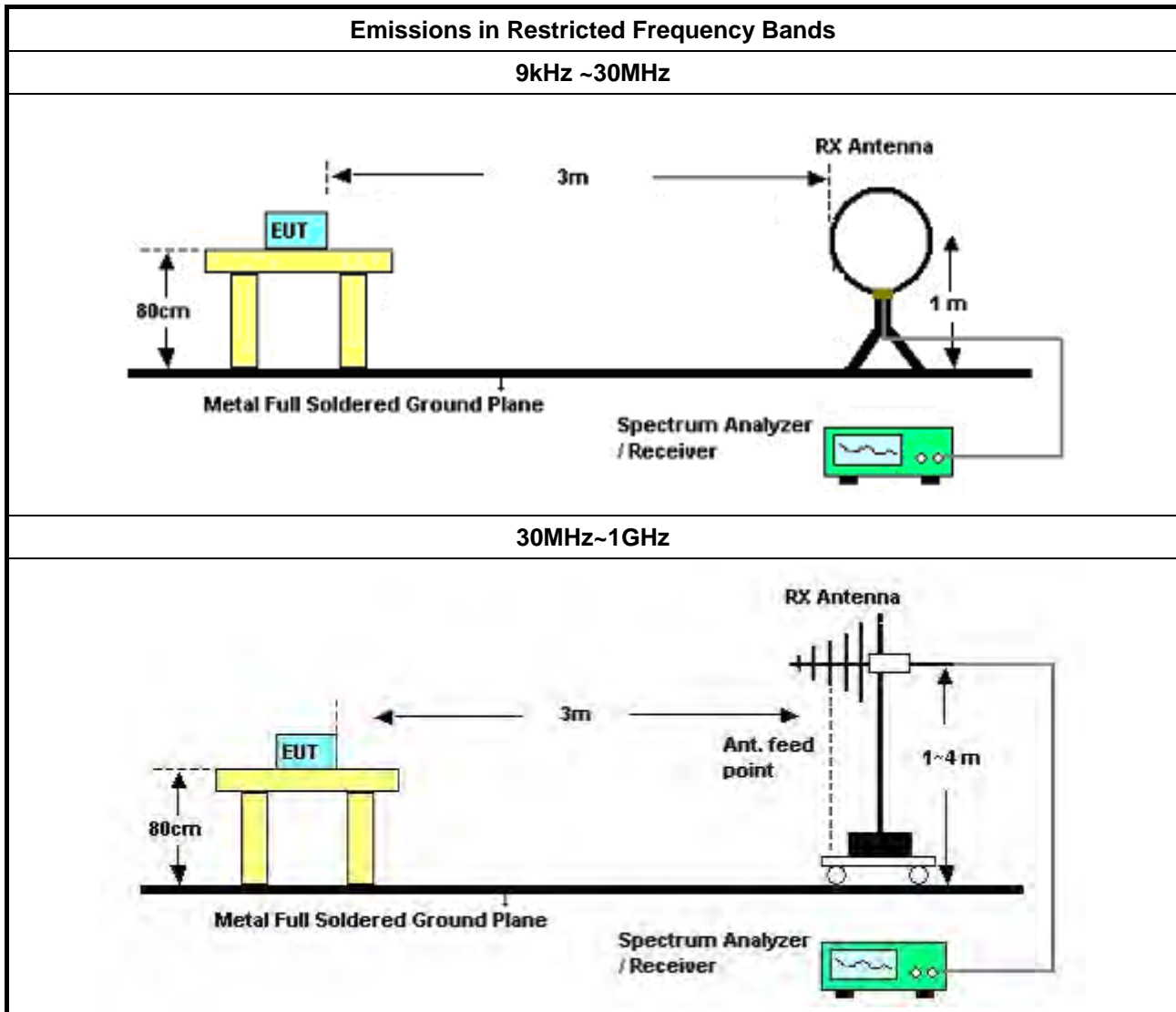
Refer a test equipment and calibration data table in this test report.

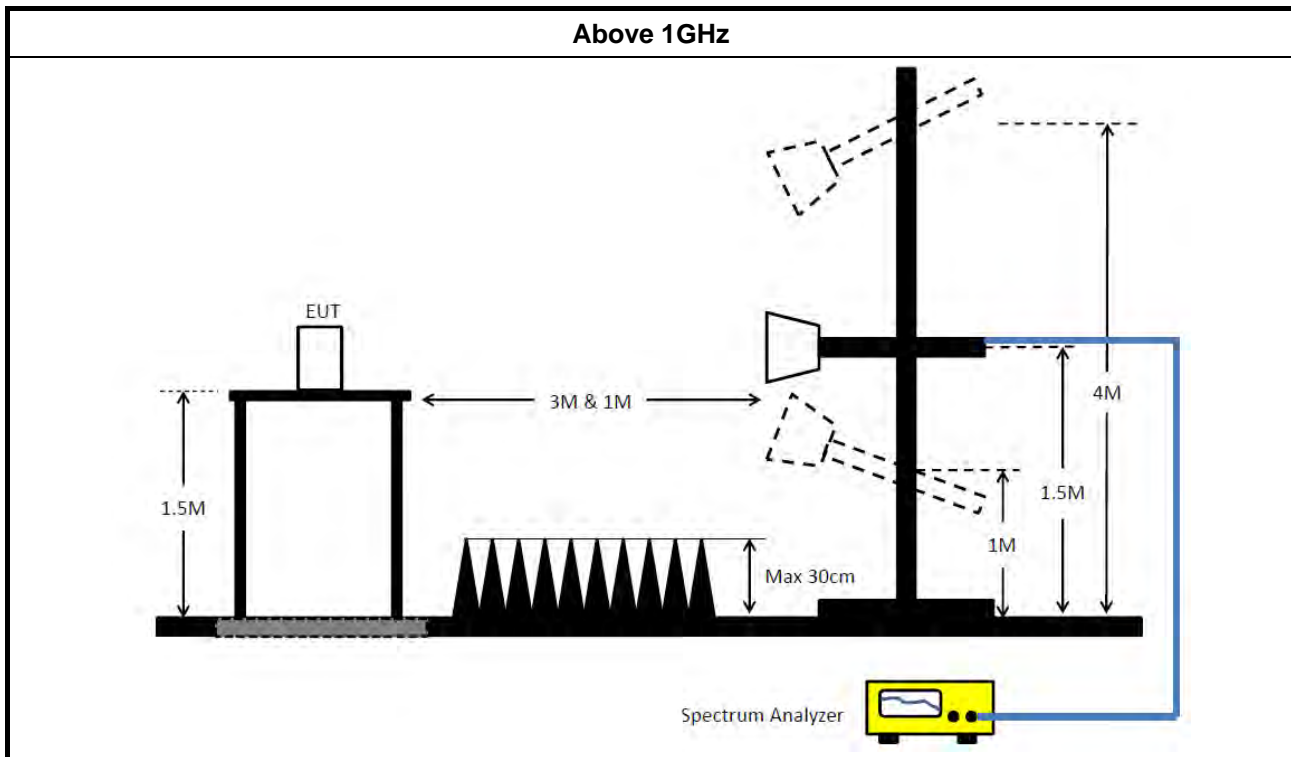


3.6.3 Test Procedures

| Test Method | |
|---|--|
| <ul style="list-style-type: none"> The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor]. | |
| <ul style="list-style-type: none"> Refer as ANSI C63.10, clause 6.10.3 band-edge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band. | |
| <ul style="list-style-type: none"> For the transmitter unwanted emissions shall be measured using following options below: | |
| | <ul style="list-style-type: none"> Refer as FCC KDB 558074, clause 8.6 for unwanted emissions into restricted bands. |
| <input type="checkbox"/> | Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.1(trace averaging for duty cycle $\geq 98\%$). |
| <input type="checkbox"/> | Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.2(trace averaging + duty factor). |
| <input checked="" type="checkbox"/> | Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.3(Reduced VBW $\geq 1/T$). |
| <input type="checkbox"/> | Refer as ANSI C63.10, clause 11.12.2.5.3 (Reduced VBW). VBW $\geq 1/T$, where T is pulse time. |
| <input type="checkbox"/> | Refer as ANSI C63.10, clause 7.5 average value of pulsed emissions. |
| <input checked="" type="checkbox"/> | Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.4 measurement procedure peak limit. |
| <ul style="list-style-type: none"> For the transmitter band-edge emissions shall be measured using following options below: | |
| | <ul style="list-style-type: none"> Refer as FCC KDB 558074 clause 8.7 & c63.10 clause 11.13.1, When the performing peak or average radiated measurements, emissions within 2 MHz of the authorized band edge may be measured using the marker-delta method described below. |
| | <ul style="list-style-type: none"> Refer as FCC KDB 558074, clause 8.7 (ANSI C63.10, clause 6.10.6) for marker-delta method for band-edge measurements. |
| | <ul style="list-style-type: none"> Refer as FCC KDB 558074, clause 8.7 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz). |
| | <ul style="list-style-type: none"> For conducted unwanted emissions into restricted bands (absolute emission limits). Devices with multiple transmit chains using options given below: (1) Measure and sum the spectra across the outputs or (2) Measure and add 10 log(N) dB |
| | <ul style="list-style-type: none"> For FCC KDB 662911 The methodology described here may overestimate array gain, thereby resulting in apparent failures to satisfy the out-of-band limits even if the device is actually compliant. In such cases, compliance may be demonstrated by performing radiated tests around the frequencies at which the apparent failures occurred. |

3.6.4 Test Setup





3.6.5 Measurement Results Calculation

The measured Level is calculated using:

Corrected Reading: Antenna factor (AF) + Cable loss (CL) + Read level (Raw) - Preamp factor (PA)(if applicable) = Level.

3.6.6 Emissions in Restricted Frequency Bands (Below 30MHz)

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to KDB414788 Radiated Test Site, and the result came out very similar.

All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

The radiated emissions were investigated from 9 kHz or the lowest frequency generated within the device, up to the 10th harmonic or 40 GHz, whichever is appropriate.

3.6.7 Test Result of Emissions in Restricted Frequency Bands

Refer as Appendix F



4 Test Equipment and Calibration Data

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Calibration Due Date | Remark |
|-----------------------------------|---------------|--------------------|------------------|-----------------|------------------|----------------------|-----------------------|
| EMI Receiver | Agilent | N9038A | My52260123 | 9kHz ~ 8.45GHz | Feb. 26, 2020 | Feb. 25, 2021 | Conduction (CO01-CB) |
| LISN | F.C.C. | FCC-LISN-50-16-2 | 04083 | 150kHz ~ 100MHz | Dec. 25, 2019 | Dec. 24, 2020 | Conduction (CO01-CB) |
| LISN | Schwarzbeck | NSLK 8127 | 8127647 | 9kHz ~ 30MHz | Feb. 25, 2020 | Feb. 24, 2021 | Conduction (CO01-CB) |
| Pulse Limiter | Rohde&Schwarz | ESH3-Z2 | 100430 | 9kHz ~ 30MHz | Jan. 31, 2020 | Jan. 30, 2021 | Conduction (CO01-CB) |
| COND Cable | Woken | Cable | Low cable-CO01 | 9kHz ~ 30MHz | May 20, 2020 | May 19, 2021 | Conduction (CO01-CB) |
| Software | SPORTON | SENSE | V5.10 | - | N.C.R. | N.C.R. | Conduction (CO01-CB) |
| Loop Antenna | Teseq | HLA 6120 | 24155 | 9kHz - 30 MHz | Apr. 13, 2020 | Apr. 12, 2021 | Radiation (03CH05-CB) |
| Bilog Antenna with 6dB Attenuator | TESEQ & EMCI | CBL 6112D & N-6-06 | 35236 & AT-N0610 | 30MHz ~ 2GHz | Mar. 27, 2020 | Mar. 26, 2021 | Radiation (03CH05-CB) |
| Pre-Amplifier | EMCI | EMC330N | 980331 | 20MHz ~ 3GHz | Apr. 28, 2020 | Apr. 27, 2021 | Radiation (03CH05-CB) |
| Signal Analyzer | R&S | FSV40 | 101904 | 9kHz ~ 40GHz | May 12, 2020 | May 11, 2021 | Radiation (03CH05-CB) |
| EMI Test Receiver | R&S | ESCS | 826547/017 | 9kHz ~ 2.75GHz | May 13, 2020 | May 12, 2021 | Radiation (03CH05-CB) |
| RF Cable-low | Woken | RG402 | LOW Cable-04+23 | 30MHz~1GHz | Oct. 07, 2019 | Oct. 06, 2020 | Radiation (03CH05-CB) |
| Test Software | SPORTON | SENSE | V5.10 | - | N.C.R. | N.C.R. | Radiation (03CH05-CB) |
| Horn Antenna | EMCO | 3115 | 9610-4976 | 1GHz ~ 18GHz | Apr. 21, 2020 | Apr. 20, 2021 | Radiation (03CH02-CB) |
| Horn Antenna | Schwarzbeck | BBHA 9170 | BBHA9170252 | 15GHz ~ 40GHz | Jul. 21, 2020 | Jul. 20, 2021 | Radiation (03CH02-CB) |
| Pre-Amplifier | Agilent | 83017A | MY39501305 | 1GHz ~ 26.5GHz | Jul. 13, 2020 | Jul. 12, 2021 | Radiation (03CH02-CB) |
| Pre-Amplifier | MITEQ | TTA1840-35-H G | 1864479 | 18GHz ~ 40GHz | Jul. 08, 2020 | Jul. 07, 2021 | Radiation (03CH02-CB) |
| Signal Analyzer | R&S | FSV40 | 101904 | 9kHz ~ 40GHz | May 12, 2020 | May 11, 2021 | Radiation (03CH02-CB) |
| High Cable | Woken | RG402 | High Cable-18 | 1GHz ~ 18GHz | Oct. 07, 2019 | Oct. 06, 2020 | Radiation (03CH02-CB) |
| High Cable | Woken | RG402 | High Cable-18+19 | 1GHz ~ 18GHz | Oct. 07, 2019 | Oct. 06, 2020 | Radiation (03CH02-CB) |
| RF Cable-high | Woken | RG402 | High Cable-40G#1 | 18GHz ~ 40 GHz | Jul. 16, 2020 | Jul. 15, 2021 | Radiation (03CH02-CB) |
| RF Cable-high | Woken | RG402 | High Cable-40G#2 | 18GHz ~ 40 GHz | Jul. 16, 2020 | Jul. 15, 2021 | Radiation (03CH02-CB) |



| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Calibration Due Date | Remark |
|-------------------|--------------|-----------|---------------|------------------|------------------|----------------------|-----------------------|
| Test Software | SPORTON | SENSE | V5.10 | - | N.C.R. | N.C.R. | Radiation (03CH02-CB) |
| Spectrum analyzer | R&S | FSV40 | 100979 | 9kHz~40GHz | May 05, 2020 | May 04, 2021 | Conducted (TH01-CB) |
| RF Cable-high | Woken | RG402 | High Cable-06 | 1 GHz – 26.5 GHz | Oct. 07, 2019 | Oct. 06, 2020 | Conducted (TH01-CB) |
| RF Cable-high | Woken | RG402 | High Cable-07 | 1 GHz –26.5 GHz | Oct. 07, 2019 | Oct. 06, 2020 | Conducted (TH01-CB) |
| RF Cable-high | Woken | RG402 | High Cable-08 | 1 GHz –26.5 GHz | Oct. 07, 2019 | Oct. 06, 2020 | Conducted (TH01-CB) |
| RF Cable-high | Woken | RG402 | High Cable-09 | 1 GHz –26.5 GHz | Oct. 07, 2019 | Oct. 06, 2020 | Conducted (TH01-CB) |
| RF Cable-high | Woken | RG402 | High Cable-10 | 1 GHz –26.5 GHz | Oct. 07, 2019 | Oct. 06, 2020 | Conducted (TH01-CB) |
| RF Cable-high | Woken | RG402 | High Cable-28 | 1 GHz –26.5 GHz | Nov. 18, 2019 | Nov. 17, 2020 | Conducted (TH01-CB) |
| Power Sensor | Agilent | E9327A | US40442088 | 50MHz~18GHz | Feb. 07, 2020 | Feb. 06, 2021 | Conducted (TH01-CB) |
| Power Meter | Agilent | E4416A | GB41291199 | 50MHz~18GHz | Feb. 07, 2020 | Feb. 06, 2021 | Conducted (TH01-CB) |
| Test Software | SPORTON | SENSE | V5.10 | - | N.C.R. | N.C.R. | Conducted (TH01-CB) |

Note: Calibration Interval of instruments listed above is one year.

N.C.R. means Non-Calibration required.



Conducted Emissions at Powerline

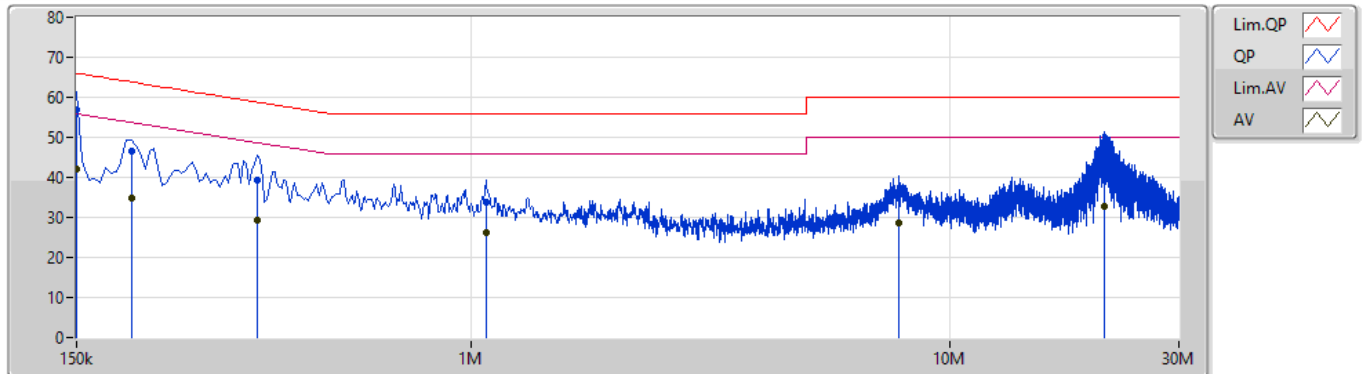
Appendix A

Summary

| Mode | Result | Type | Freq (Hz) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Condition |
|--------|--------|------|--------------|-----------------|-----------------|----------------|-----------|
| Mode 1 | Pass | QP | 150k | 56.84 | 66.00 | -9.16 | Line |

Mode 1

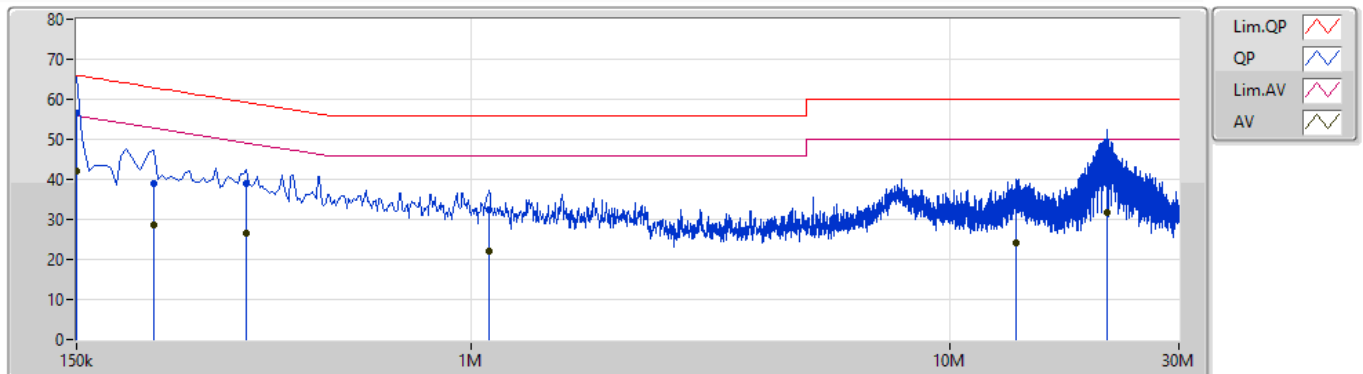
12/08/2020



| Type | Freq (Hz) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Factor (dB) | Condition | Comment | Raw (dBuV) | AF (dB) | CL (dB) | AT (dB) | | | |
|------|--------------|-----------------|-----------------|----------------|----------------|-----------|---------|---------------|------------|------------|------------|--|--|--|
| QP | 150k | 56.84 | 66.00 | -9.16 | 9.87 | Line | "Worst" | 46.97 | 0.05 | 0.03 | 9.79 | | | |
| AV | 150k | 42.20 | 56.00 | -13.80 | 9.87 | Line | - | 32.33 | 0.05 | 0.03 | 9.79 | | | |
| QP | 195k | 46.64 | 63.82 | -17.18 | 9.86 | Line | - | 36.78 | 0.04 | 0.03 | 9.79 | | | |
| AV | 195k | 34.85 | 53.82 | -18.97 | 9.86 | Line | - | 24.99 | 0.04 | 0.03 | 9.79 | | | |
| QP | 357k | 39.48 | 58.79 | -19.31 | 9.88 | Line | - | 29.60 | 0.04 | 0.03 | 9.81 | | | |
| AV | 357k | 29.26 | 48.79 | -19.53 | 9.88 | Line | - | 19.38 | 0.04 | 0.03 | 9.81 | | | |
| QP | 1.073M | 33.86 | 56.00 | -22.14 | 9.91 | Line | - | 23.95 | 0.05 | 0.04 | 9.82 | | | |
| AV | 1.073M | 26.28 | 46.00 | -19.72 | 9.91 | Line | - | 16.37 | 0.05 | 0.04 | 9.82 | | | |
| QP | 7.818M | 35.44 | 60.00 | -24.56 | 10.18 | Line | - | 25.26 | 0.15 | 0.14 | 9.89 | | | |
| AV | 7.818M | 28.55 | 50.00 | -21.45 | 10.18 | Line | - | 18.37 | 0.15 | 0.14 | 9.89 | | | |
| QP | 20.904M | 46.86 | 60.00 | -13.14 | 10.58 | Line | - | 36.28 | 0.25 | 0.33 | 10.00 | | | |
| AV | 20.904M | 32.87 | 50.00 | -17.13 | 10.58 | Line | - | 22.29 | 0.25 | 0.33 | 10.00 | | | |

Mode 1

12/08/2020



| Type | Freq (Hz) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Factor (dB) | Condition | Comment | Raw (dBuV) | AF (dB) | CL (dB) | AT (dB) | | | |
|------|--------------|-----------------|-----------------|----------------|----------------|-----------|---------|---------------|------------|------------|------------|--|--|--|
| QP | 150k | 56.57 | 66.00 | -9.43 | 9.86 | Neutral | "Worst" | 46.71 | 0.04 | 0.03 | 9.79 | | | |
| AV | 150k | 41.98 | 56.00 | -14.02 | 9.86 | Neutral | - | 32.12 | 0.04 | 0.03 | 9.79 | | | |
| QP | 217.5k | 39.11 | 62.92 | -23.81 | 9.86 | Neutral | - | 29.25 | 0.04 | 0.03 | 9.79 | | | |
| AV | 217.5k | 28.56 | 52.92 | -24.36 | 9.86 | Neutral | - | 18.70 | 0.04 | 0.03 | 9.79 | | | |
| QP | 339k | 38.90 | 59.23 | -20.33 | 9.88 | Neutral | - | 29.02 | 0.04 | 0.03 | 9.81 | | | |
| AV | 339k | 26.56 | 49.23 | -22.67 | 9.88 | Neutral | - | 16.68 | 0.04 | 0.03 | 9.81 | | | |
| QP | 1.091M | 32.51 | 56.00 | -23.49 | 9.92 | Neutral | - | 22.59 | 0.06 | 0.04 | 9.82 | | | |
| AV | 1.091M | 21.97 | 46.00 | -24.03 | 9.92 | Neutral | - | 12.05 | 0.06 | 0.04 | 9.82 | | | |
| QP | 13.722M | 34.67 | 60.00 | -25.33 | 10.32 | Neutral | - | 24.35 | 0.19 | 0.21 | 9.92 | | | |
| AV | 13.722M | 24.26 | 50.00 | -25.74 | 10.32 | Neutral | - | 13.94 | 0.19 | 0.21 | 9.92 | | | |
| QP | 21.228M | 45.99 | 60.00 | -14.01 | 10.56 | Neutral | - | 35.43 | 0.23 | 0.33 | 10.00 | | | |
| AV | 21.228M | 31.88 | 50.00 | -18.12 | 10.56 | Neutral | - | 21.32 | 0.23 | 0.33 | 10.00 | | | |



Summary

| Mode | Max-N dB (Hz) | Max-OBW (Hz) | ITU-Code | Min-N dB (Hz) | Min-OBW (Hz) |
|---------------|------------------|-----------------|----------|------------------|-----------------|
| 2.4-2.4835GHz | - | - | - | - | - |
| BT-LE(1Mbps) | 645k | 997.001k | 997KF1D | 640k | 987.006k |

Max-N dB = Maximum 6dB down bandwidth; **Max-OBW** = Maximum 99% occupied bandwidth;
Min-N dB = Minimum 6dB down bandwidth; **Min-OBW** = Minimum 99% occupied bandwidth;

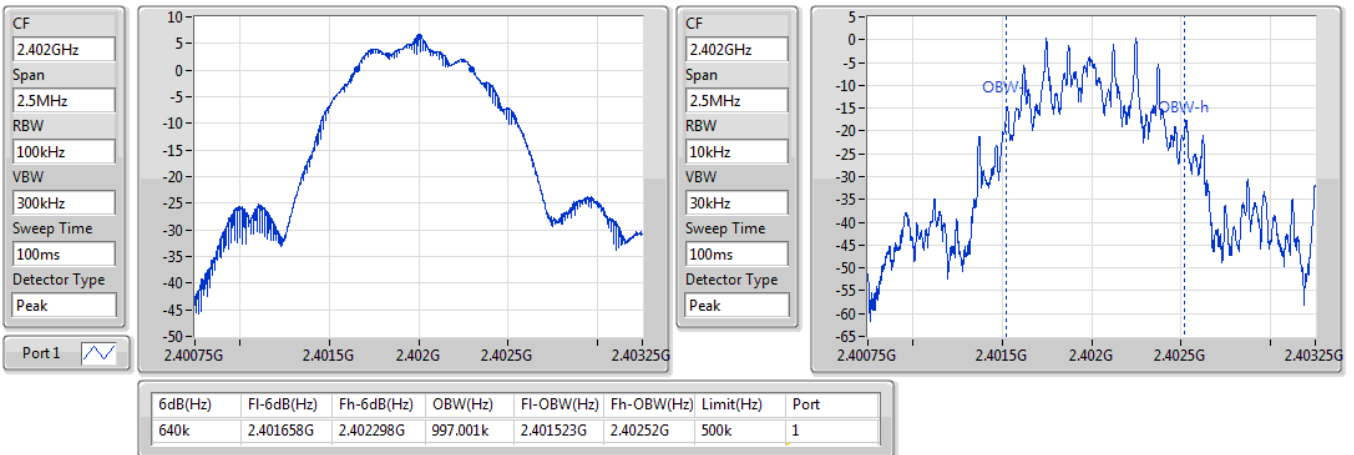
Result

| Mode | Result | Limit (Hz) | Port 1-N dB (Hz) | Port 1-OBW (Hz) |
|--------------|--------|---------------|---------------------|--------------------|
| BT-LE(1Mbps) | - | - | - | - |
| 2402MHz | Pass | 500k | 640k | 997.001k |
| 2440MHz | Pass | 500k | 645k | 989.505k |
| 2480MHz | Pass | 500k | 643.75k | 987.006k |

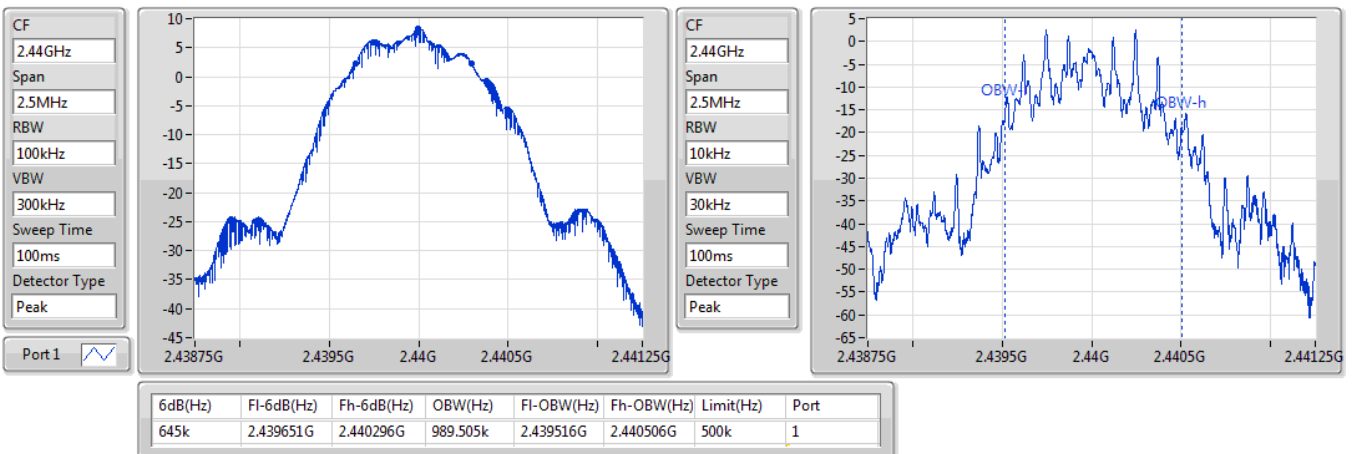
Port X-N dB = Port X 6dB down bandwidth; **Port X-OBW** = Port X 99% occupied bandwidth;

BT-LE(1Mbps)
2402MHz

19/08/2020

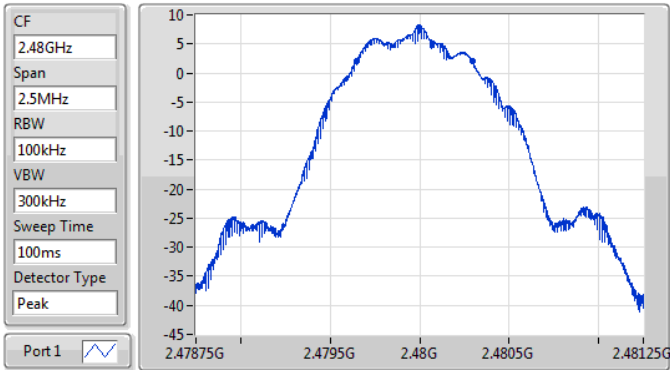

BT-LE(1Mbps)
2440MHz

19/08/2020



BT-LE(1Mbps)

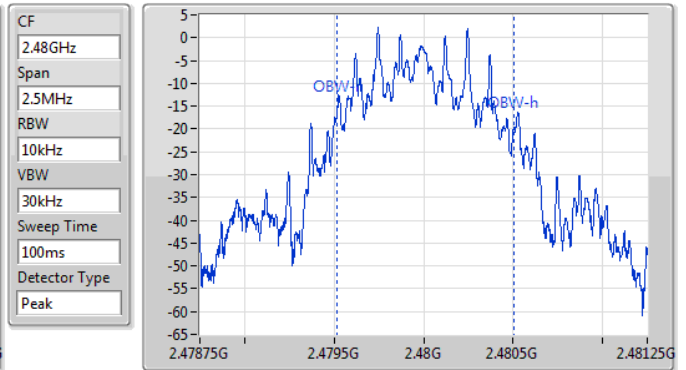
2480MHz



| 6dB(Hz) | Fl-6dB(Hz) | Fh-6dB(Hz) | OBW(Hz) | Fl-OBW(Hz) | Fh-OBW(Hz) | Limit(Hz) | Port |
|---------|------------|------------|----------|------------|------------|-----------|------|
| 643.75k | 2.47965G | 2.480294G | 987.006k | 2.479518G | 2.480505G | 500k | 1 |

EBW

19/08/2020





Average Power-DTS

Appendix C

Summary

| Mode | Power (dBm) | Power (W) |
|---------------|----------------|--------------|
| 2.4-2.4835GHz | - | - |
| BT-LE(1Mbps) | 8.34 | 0.00682 |



Average Power-DTS

Appendix C

Result

| Mode | Result | Gain (dBi) | Power (dBm) | Power Limit (dBm) |
|--------------|--------|---------------|----------------|----------------------|
| BT-LE(1Mbps) | - | - | - | - |
| 2402MHz | Pass | -5.59 | 6.17 | 30.00 |
| 2440MHz | Pass | -5.59 | 8.34 | 30.00 |
| 2480MHz | Pass | -5.59 | 7.94 | 30.00 |

DG = Directional Gain; **Port X** = Port X output power



Summary

| Mode | PD (dBm/RBW) |
|---------------|-----------------|
| 2.4-2.4835GHz | - |
| BT-LE(1Mbps) | 1.33 |

RBW=3 kHz.



Result

| Mode | Result | Gain (dBi) | PD (dBm/RBW) | PD Limit (dBm/RBW) |
|--------------|--------|---------------|-----------------|-----------------------|
| BT-LE(1Mbps) | - | - | - | - |
| 2402MHz | Pass | -5.59 | -0.37 | 8.00 |
| 2440MHz | Pass | -5.59 | 1.33 | 8.00 |
| 2480MHz | Pass | -5.59 | 0.25 | 8.00 |

DG = Directional Gain; RBW=3 kHz;

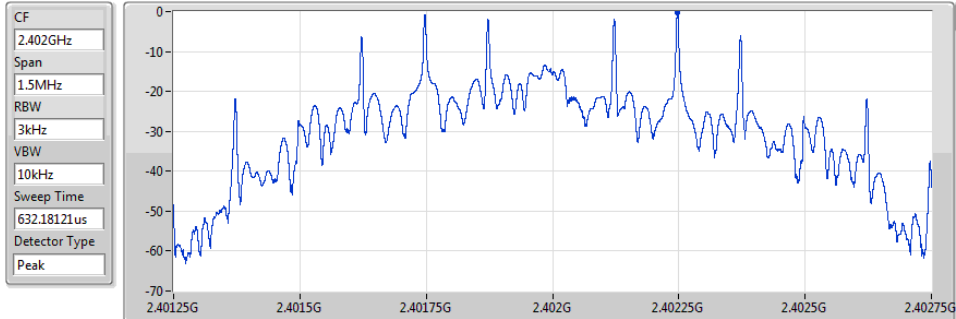
PD = trace bin-by-bin of each transmits port summing can be performed maximum power density; **Port X** = Port X power density;

BT-LE(1Mbps)

PSD

2402MHz

19/08/2020



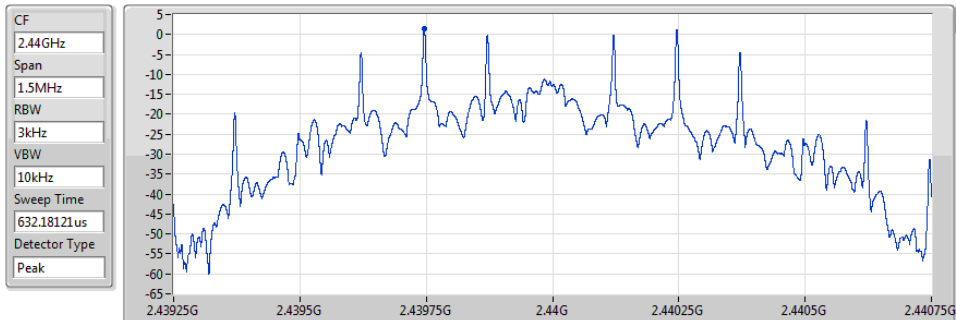
| Sum | PD | Port 1 |
|----------|----------|----------|
| (dBm/Hz) | (dBm/Hz) | (dBm/Hz) |
| -0.37 | -0.37 | -0.37 |

BT-LE(1Mbps)

PSD

2440MHz

19/08/2020



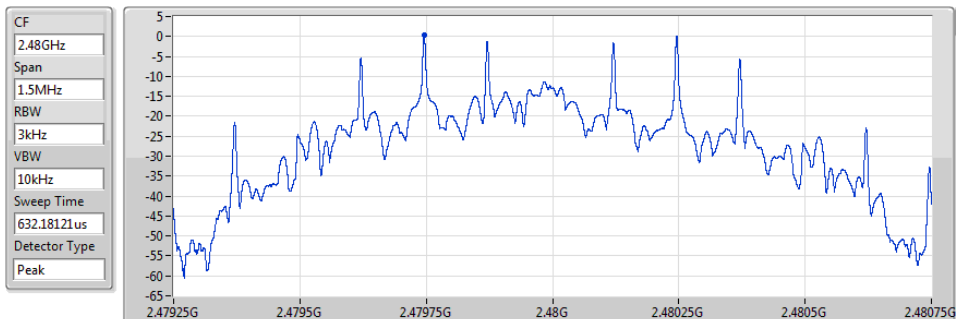
| Sum | PD | Port 1 |
|----------|----------|----------|
| (dBm/Hz) | (dBm/Hz) | (dBm/Hz) |
| 1.33 | 1.33 | 1.33 |

BT-LE(1Mbps)

PSD

2480MHz

19/08/2020



| Sum | PD | Port 1 |
|----------|----------|----------|
| (dBm/Hz) | (dBm/Hz) | (dBm/Hz) |
| 0.25 | 0.25 | 0.25 |



Summary

| Mode | Result | Ref (Hz) | Ref (dBm) | Limit (dBm) | Freq (Hz) | Level (dBm) | Freq (Hz) | Level (dBm) | Freq (Hz) | Level (dBm) | Freq (Hz) | Level (dBm) | Freq (Hz) | Level (dBm) | Port |
|---------------|--------|-------------|--------------|----------------|--------------|----------------|--------------|----------------|--------------|----------------|--------------|----------------|--------------|----------------|------|
| 2.4-2.4835GHz | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| BT-LE(1Mbps) | Pass | 2.44G | 8.35 | -21.65 | 2.01928G | -52.34 | 2.4G | -37.28 | 2.4G | -38.62 | 2.48539G | -51.88 | 24.87065G | -46.63 | 1 |

Result

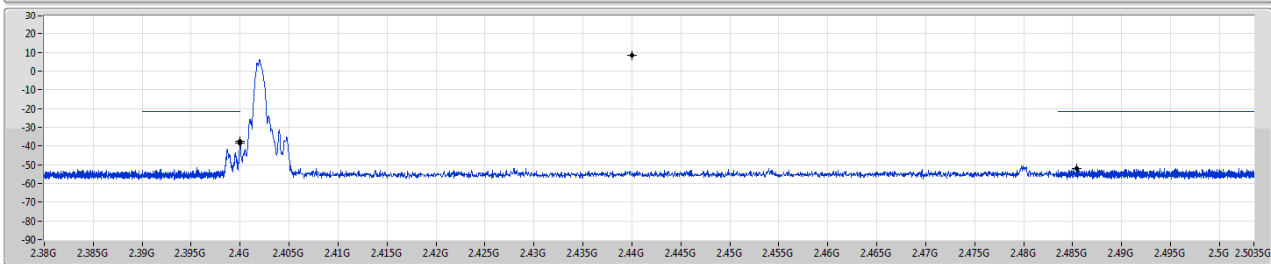
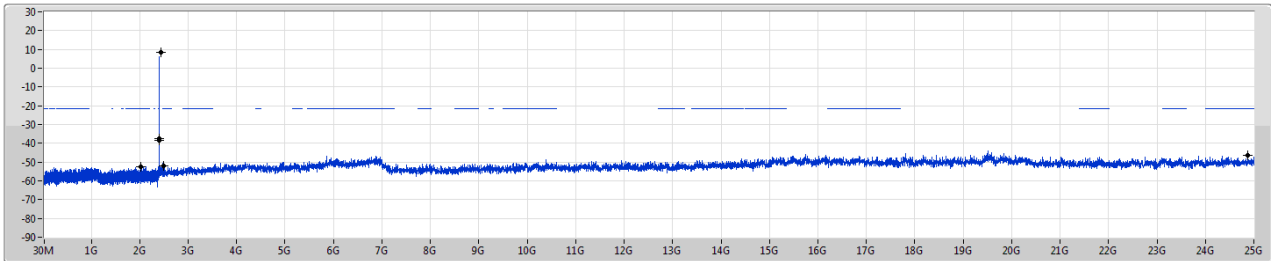
| Mode | Result | Ref (Hz) | Ref (dBm) | Limit (dBm) | Freq (Hz) | Level (dBm) | Freq (Hz) | Level (dBm) | Freq (Hz) | Level (dBm) | Freq (Hz) | Level (dBm) | Freq (Hz) | Level (dBm) | Port |
|--------------|--------|-------------|--------------|----------------|--------------|----------------|--------------|----------------|--------------|----------------|--------------|----------------|--------------|----------------|------|
| BT-LE(1Mbps) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 2402MHz | Pass | 2.44G | 8.35 | -21.65 | 2.01928G | -52.34 | 2.4G | -37.28 | 2.4G | -38.62 | 2.48539G | -51.88 | 24.87065G | -46.63 | 1 |
| 2440MHz | Pass | 2.44G | 8.35 | -21.65 | 2.12767G | -51.94 | 2.39792G | -51.83 | 2.4835G | -55.28 | 2.49938G | -50.20 | 24.87065G | -46.33 | 1 |
| 2480MHz | Pass | 2.44G | 8.35 | -21.65 | 461.81M | -52.08 | 2.39341G | -52.01 | 2.4835G | -52.00 | 2.48397G | -48.38 | 16.47945G | -46.40 | 1 |

BT-LE(1Mbps)

2402MHz

CSE NdB

19/08/2020



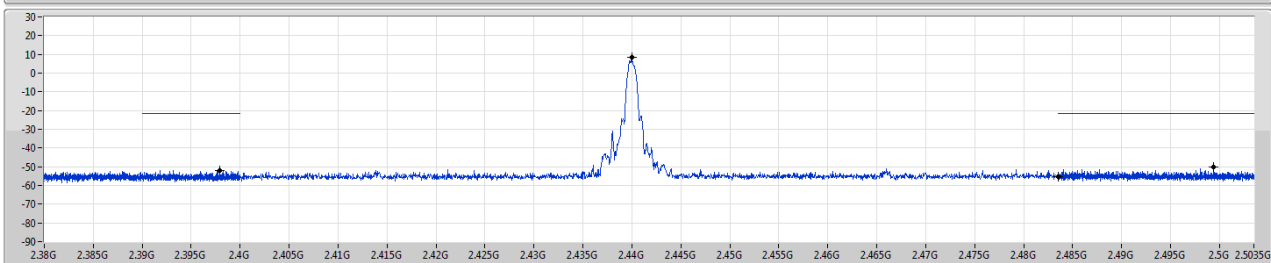
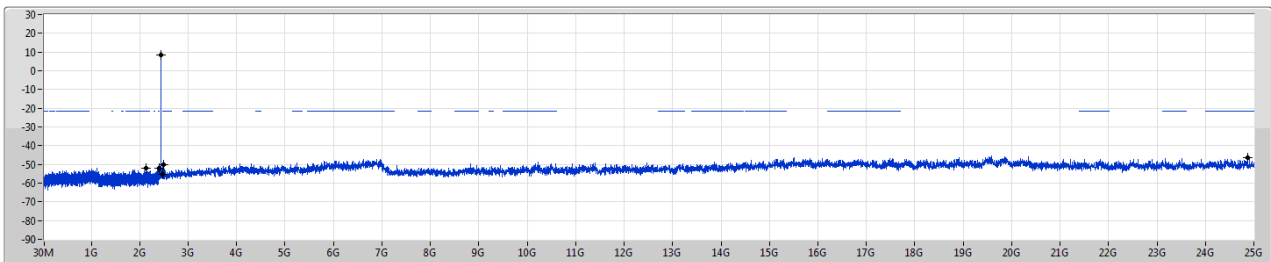
| Ref(Hz) | Ref(dBm) | Limit(dBm) | Freq(Hz) | Level(dBm) | Freq(Hz) | Level(dBm) | Freq(Hz) | Level(dBm) | Freq(Hz) | Level(dBm) | Freq(Hz) | Level(dBm) | Port |
|---------|----------|------------|----------|------------|----------|------------|----------|------------|----------|------------|----------|------------|------|
| 2.44G | 8.35 | -21.65 | 2.01928G | -52.34 | 2.4G | -37.28 | 2.4G | -38.62 | 2.48539G | -51.88 | 2.47065G | -46.63 | 1 |

BT-LE(1Mbps)

2440MHz

CSE NdB

19/08/2020



| Ref(Hz) | Ref(dBm) | Limit(dBm) | Freq(Hz) | Level(dBm) | Freq(Hz) | Level(dBm) | Freq(Hz) | Level(dBm) | Freq(Hz) | Level(dBm) | Freq(Hz) | Level(dBm) | Port |
|---------|----------|------------|----------|------------|----------|------------|----------|------------|----------|------------|----------|------------|------|
| 2.44G | 8.35 | -21.65 | 2.12767G | -51.94 | 2.39792G | -51.83 | 2.4835G | -55.28 | 2.49938G | -50.20 | 2.47065G | -46.33 | 1 |

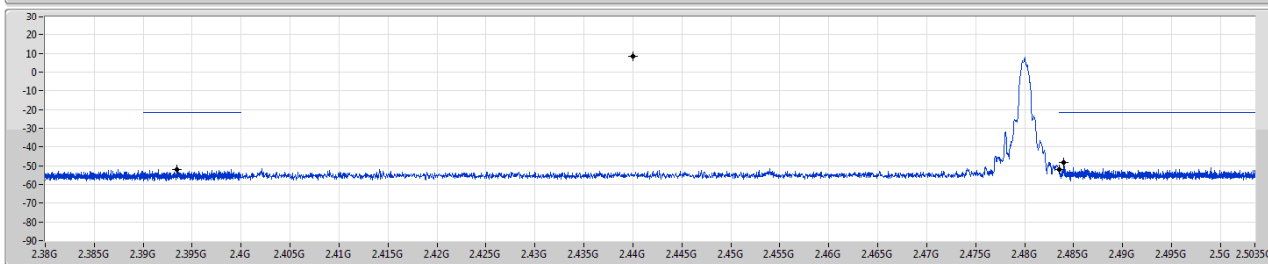
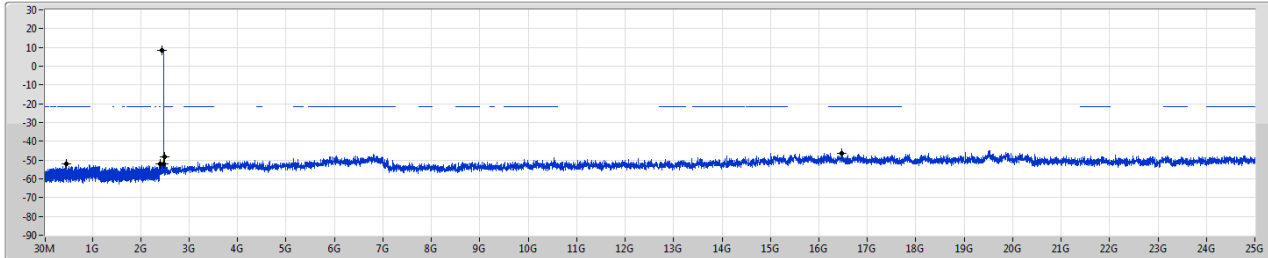
BT-LE(1Mbps)

2480MHz

CSE NdB

19/08/2020

Port 1



RBW (Hz)
100k
VBW (Hz)
300k
Detector
Peak

| Ref(Hz) | Ref(dBm) | Limit(dBm) | Freq(Hz) | Level(dBm) | Freq(Hz) | Level(dBm) | Freq(Hz) | Level(dBm) | Freq(Hz) | Level(dBm) | Freq(Hz) | Level(dBm) | Port |
|---------|----------|------------|----------|------------|----------|------------|----------|------------|----------|------------|-----------|------------|------|
| 2.44G | 8.35 | -21.65 | 461.81M | -52.08 | 2.39341G | -52.01 | 2.4835G | -52.00 | 2.48397G | -48.38 | 16.47945G | -46.40 | 1 |



Radiated Emissions below 1GHz

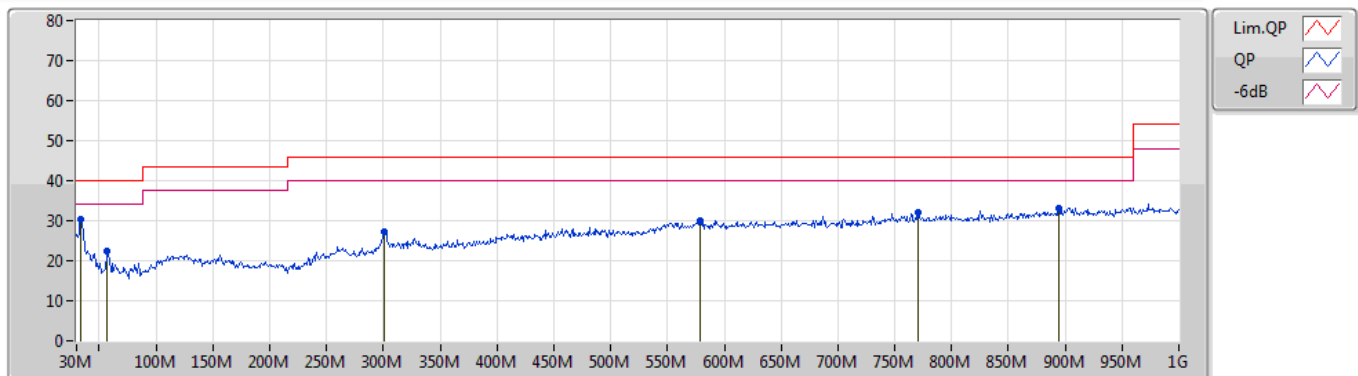
Appendix F.1

Summary

| Mode | Result | Type | Freq (Hz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Condition |
|--------|--------|------|--------------|-------------------|-------------------|----------------|-----------|
| Mode 1 | Pass | PK | 33.88M | 30.23 | 40.00 | -9.77 | Vertical |

Mode 1

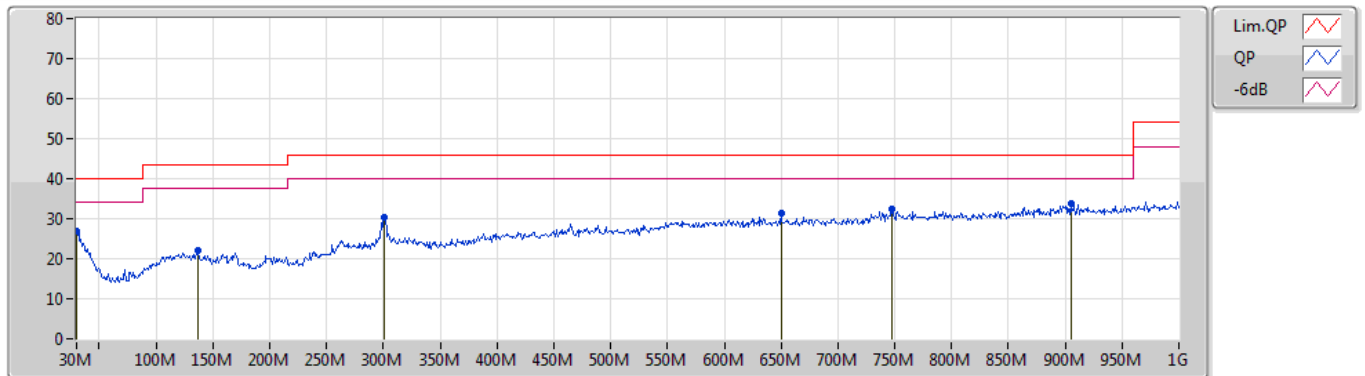
01/09/2020



| Type | Freq (Hz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Factor (dB) | Dist (m) | Condition | Azimuth (°) | Height (m) | Comment | Raw (dBuV/m) | AF (dB/m) | CL (dB) | PA (dB) |
|------|--------------|-------------------|-------------------|----------------|----------------|-------------|-----------|----------------|---------------|---------|-----------------|--------------|------------|------------|
| PK | 33.88M | 30.23 | 40.00 | -9.77 | -7.92 | 3 | Vertical | 118 | 2.00 | "Worst" | 38.15 | 22.30 | 1.28 | 31.50 |
| PK | 57.16M | 22.58 | 40.00 | -17.42 | -17.85 | 3 | Vertical | 360 | 1.00 | - | 40.43 | 12.79 | 1.14 | 31.78 |
| PK | 300.63M | 27.25 | 46.00 | -18.75 | -10.90 | 3 | Vertical | 360 | 2.00 | - | 38.15 | 18.62 | 2.50 | 32.02 |
| PK | 579.02M | 29.99 | 46.00 | -16.01 | -4.83 | 3 | Vertical | 115 | 1.25 | - | 34.82 | 24.03 | 3.42 | 32.28 |
| PK | 770.11M | 32.16 | 46.00 | -13.84 | -3.18 | 3 | Vertical | 148 | 1.50 | - | 35.34 | 25.15 | 3.96 | 32.29 |
| PK | 894.27M | 33.24 | 46.00 | -12.76 | -1.91 | 3 | Vertical | 356 | 1.25 | - | 35.15 | 25.89 | 4.55 | 32.35 |

Mode 1

01/09/2020



| Type | Freq (Hz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Factor (dB) | Dist (m) | Condition | Azimuth (°) | Height (m) | Comment | Raw (dBuV/m) | AF (dB/m) | CL (dB) | PA (dB) |
|------|--------------|-------------------|-------------------|----------------|----------------|-------------|------------|----------------|---------------|---------|-----------------|--------------|------------|------------|
| PK | 30M | 27.02 | 40.00 | -12.98 | -6.17 | 3 | Horizontal | 31 | 1.50 | - | 33.19 | 24.19 | 1.20 | 31.56 |
| PK | 136.7M | 22.09 | 43.50 | -21.41 | -12.69 | 3 | Horizontal | 0 | 1.50 | - | 34.78 | 17.50 | 1.78 | 31.97 |
| PK | 300.63M | 30.40 | 46.00 | -15.60 | -10.90 | 3 | Horizontal | 103 | 1.25 | - | 41.30 | 18.62 | 2.50 | 32.02 |
| PK | 649.83M | 31.29 | 46.00 | -14.71 | -4.48 | 3 | Horizontal | 88 | 2.00 | - | 35.77 | 24.44 | 3.60 | 32.52 |
| PK | 748M | 32.37 | 46.00 | -13.63 | -3.28 | 3 | Horizontal | 237 | 2.00 | - | 35.65 | 25.03 | 3.99 | 32.30 |
| PK | 904.94M | 33.92 | 46.00 | -12.08 | -1.85 | 3 | Horizontal | 46 | 1.25 | "Worst" | 35.77 | 25.89 | 4.59 | 32.33 |



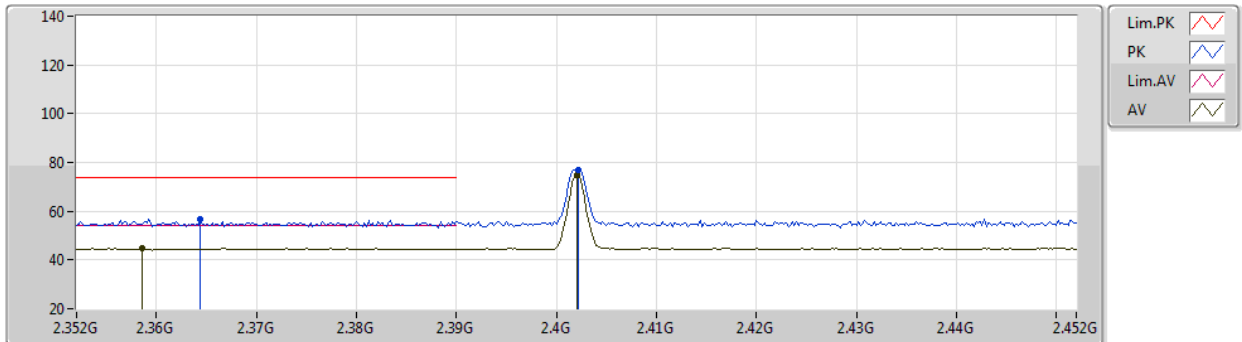
Summary

| Mode | Result | Type | Freq (Hz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Dist (m) | Condition | Azimuth (°) | Height (m) | Comments |
|---------------|--------|------|--------------|-------------------|-------------------|----------------|-------------|-----------|----------------|---------------|----------|
| 2.4-2.4835GHz | - | - | - | - | - | - | - | - | - | - | - |
| BT-LE(1Mbps) | Pass | AV | 2.493G | 45.21 | 54.00 | -8.79 | 3 | Vertical | 112 | 1.83 | - |

BT-LE(1Mbps)

2402MHz_TX

01/09/2020



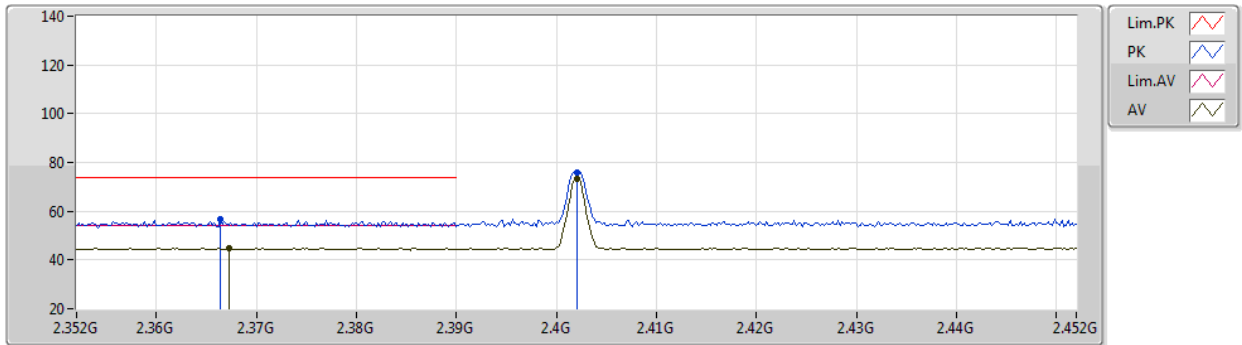
EUT_Z_1TX
Setting 8
02-C-K-4

| Type | Freq (Hz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Raw (dBuV) | Dist (m) | Condition | Azimuth (°) | Height (m) | Comment | AF (dB) | CL (dB) | PA (dB) |
|------|--------------|-------------------|-------------------|----------------|---------------|-------------|-----------|----------------|---------------|---------|------------|------------|------------|
| PK | 2.3644G | 56.78 | 74.00 | -17.22 | 25.09 | 3 | Vertical | 122 | 1.78 | - | 28.19 | 3.50 | - |
| AV | 2.3586G | 44.78 | 54.00 | -9.22 | 13.10 | 3 | Vertical | 122 | 1.78 | - | 28.18 | 3.50 | - |
| PK | 2.4022G | 77.10 | Inf | -Inf | 45.29 | 3 | Vertical | 122 | 1.78 | - | 28.31 | 3.50 | - |
| AV | 2.402G | 74.68 | Inf | -Inf | 42.87 | 3 | Vertical | 122 | 1.78 | - | 28.31 | 3.50 | - |

BT-LE(1Mbps)

2402MHz_TX

01/09/2020



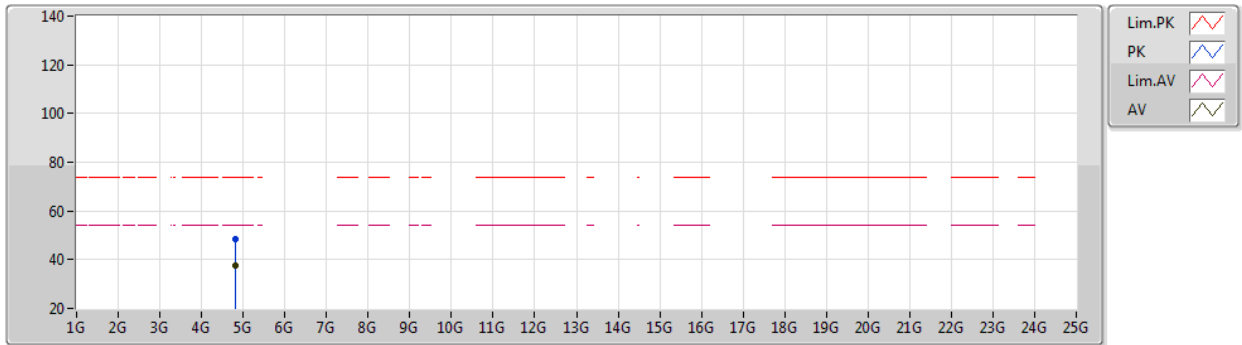
EUT Z_1TX
Setting 8
02-C-K-4

| Type | Freq (Hz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Raw (dBuV) | Dist (m) | Condition | Azimuth (°) | Height (m) | Comment | AF (dB) | CL (dB) | PA (dB) |
|------|--------------|-------------------|-------------------|----------------|---------------|-------------|------------|----------------|---------------|---------|------------|------------|------------|
| PK | 2.3664G | 56.62 | 74.00 | -17.38 | 24.92 | 3 | Horizontal | 61 | 1.39 | - | 28.20 | 3.50 | - |
| AV | 2.3672G | 45.00 | 54.00 | -9.00 | 13.30 | 3 | Horizontal | 61 | 1.39 | - | 28.20 | 3.50 | - |
| PK | 2.402G | 75.83 | Inf | -Inf | 44.02 | 3 | Horizontal | 61 | 1.39 | - | 28.31 | 3.50 | - |
| AV | 2.402G | 73.25 | Inf | -Inf | 41.44 | 3 | Horizontal | 61 | 1.39 | - | 28.31 | 3.50 | - |

BT-LE(1Mbps)

2402MHz_TX

01/09/2020



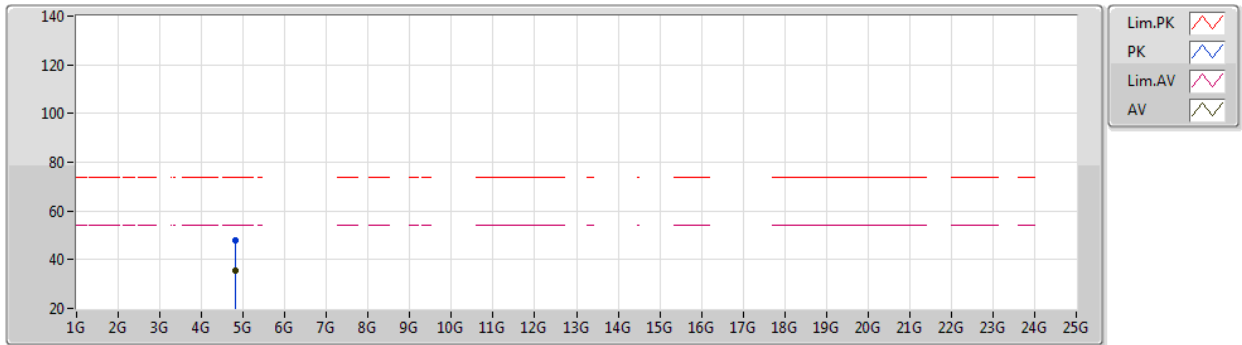
EUT Z_1TX
Setting 8
02-C-K-4

| Type | Freq (Hz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Raw (dBuV) | Dist (m) | Condition | Azimuth (°) | Height (m) | Comment | AF (dB) | CL (dB) | PA (dB) |
|------|--------------|-------------------|-------------------|----------------|---------------|-------------|-----------|----------------|---------------|---------|------------|------------|------------|
| PK | 4.80016G | 48.36 | 74.00 | -25.64 | 41.53 | 3 | Vertical | 32 | 2.37 | - | 32.80 | 5.80 | 31.77 |
| AV | 4.79996G | 37.70 | 54.00 | -16.30 | 30.87 | 3 | Vertical | 32 | 2.37 | - | 32.80 | 5.80 | 31.77 |

BT-LE(1Mbps)

2402MHz_TX

01/09/2020



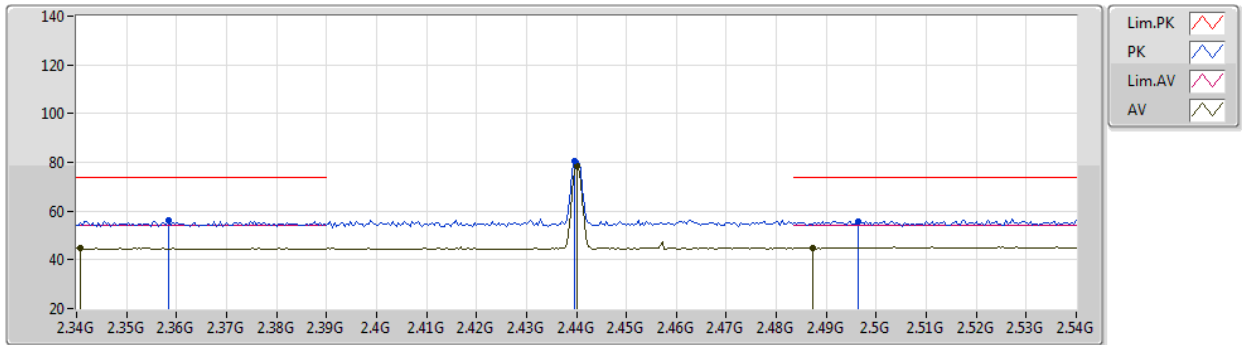
EUT Z_1TX
Setting 8
02-C-K-4

| Type | Freq (Hz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Raw (dBuV) | Dist (m) | Condition | Azimuth (°) | Height (m) | Comment | AF (dB) | CL (dB) | PA (dB) |
|------|--------------|-------------------|-------------------|----------------|---------------|-------------|------------|----------------|---------------|---------|------------|------------|------------|
| PK | 4.80377G | 47.96 | 74.00 | -26.04 | 41.11 | 3 | Horizontal | 19 | 2.77 | - | 32.82 | 5.80 | 31.77 |
| AV | 4.80351G | 35.72 | 54.00 | -18.28 | 28.88 | 3 | Horizontal | 19 | 2.77 | - | 32.81 | 5.80 | 31.77 |

BT-LE(1Mbps)

2440MHz_TX

01/09/2020



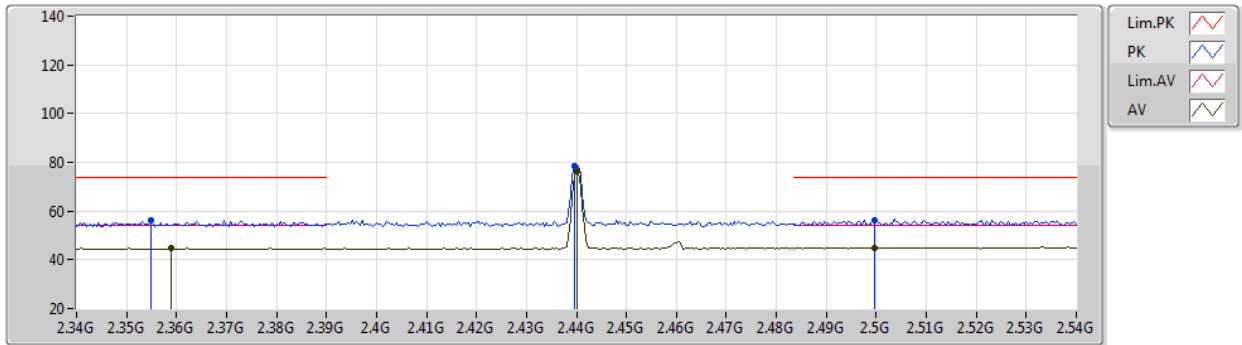
EUT Z_1TX
Setting 8
02-C-K-4

| Type | Freq (Hz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Raw (dBuV) | Dist (m) | Condition | Azimuth (°) | Height (m) | Comment | AF (dB) | CL (dB) | PA (dB) |
|------|--------------|-------------------|-------------------|----------------|---------------|-------------|-----------|----------------|---------------|---------|------------|------------|------------|
| PK | 2.3584G | 56.22 | 74.00 | -17.78 | 24.54 | 3 | Vertical | 104 | 1.00 | - | 28.18 | 3.50 | - |
| AV | 2.3408G | 44.81 | 54.00 | -9.19 | 13.19 | 3 | Vertical | 104 | 1.00 | - | 28.12 | 3.50 | - |
| PK | 2.4396G | 80.66 | Inf | -Inf | 48.70 | 3 | Vertical | 104 | 1.00 | - | 28.42 | 3.54 | - |
| AV | 2.44G | 78.48 | Inf | -Inf | 46.52 | 3 | Vertical | 104 | 1.00 | - | 28.42 | 3.54 | - |
| PK | 2.4964G | 55.89 | 74.00 | -18.11 | 23.70 | 3 | Vertical | 104 | 1.00 | - | 28.59 | 3.60 | - |
| AV | 2.4872G | 44.99 | 54.00 | -9.01 | 12.84 | 3 | Vertical | 104 | 1.00 | - | 28.56 | 3.59 | - |

BT-LE(1Mbps)

2440MHz_TX

01/09/2020



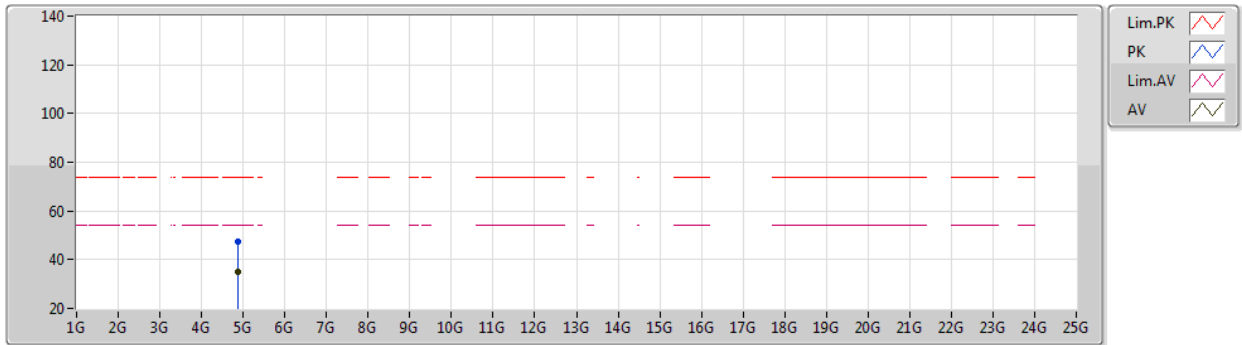
EUT Z_1TX
Setting 8
02-C-K-4

| Type | Freq (Hz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Raw (dBuV) | Dist (m) | Condition | Azimuth (°) | Height (m) | Comment | AF (dB) | CL (dB) | PA (dB) |
|------|--------------|-------------------|-------------------|----------------|---------------|-------------|------------|----------------|---------------|---------|------------|------------|------------|
| PK | 2.3548G | 56.35 | 74.00 | -17.65 | 24.69 | 3 | Horizontal | 123 | 1.32 | - | 28.16 | 3.50 | - |
| AV | 2.3588G | 44.89 | 54.00 | -9.11 | 13.21 | 3 | Horizontal | 123 | 1.32 | - | 28.18 | 3.50 | - |
| PK | 2.4396G | 78.48 | Inf | -Inf | 46.52 | 3 | Horizontal | 123 | 1.32 | - | 28.42 | 3.54 | - |
| AV | 2.44G | 76.27 | Inf | -Inf | 44.31 | 3 | Horizontal | 123 | 1.32 | - | 28.42 | 3.54 | - |
| PK | 2.4996G | 56.25 | 74.00 | -17.75 | 24.05 | 3 | Horizontal | 123 | 1.32 | - | 28.60 | 3.60 | - |
| AV | 2.4996G | 45.02 | 54.00 | -8.98 | 12.82 | 3 | Horizontal | 123 | 1.32 | - | 28.60 | 3.60 | - |

BT-LE(1Mbps)

2440MHz_TX

01/09/2020



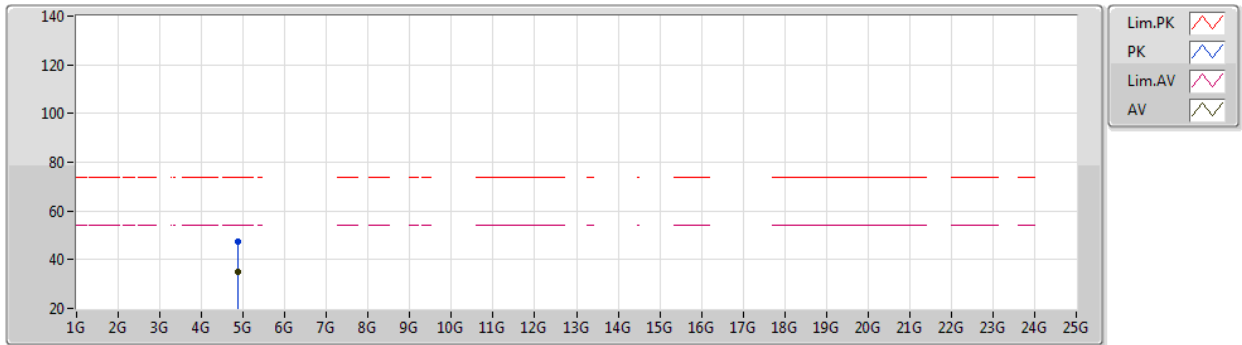
EUT Z_1TX
Setting 8
02-C-K-4

| Type | Freq (Hz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Raw (dBuV) | Dist (m) | Condition | Azimuth (°) | Height (m) | Comment | AF (dB) | CL (dB) | PA (dB) |
|------|--------------|-------------------|-------------------|----------------|---------------|-------------|-----------|----------------|---------------|---------|------------|------------|------------|
| PK | 4.88712G | 47.30 | 74.00 | -26.70 | 40.11 | 3 | Vertical | 10 | 1.80 | - | 33.15 | 5.84 | 31.80 |
| AV | 4.88756G | 34.89 | 54.00 | -19.11 | 27.71 | 3 | Vertical | 10 | 1.80 | - | 33.15 | 5.84 | 31.81 |

BT-LE(1Mbps)

2440MHz_TX

01/09/2020



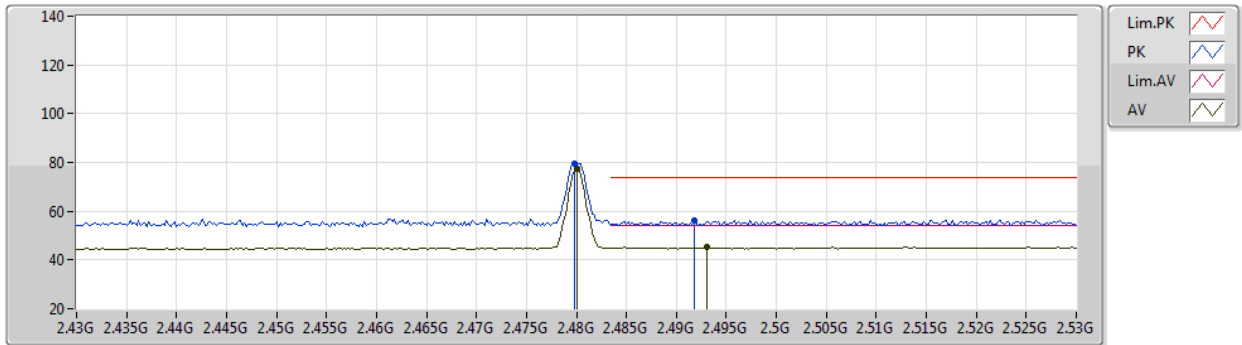
EUT Z_1TX
Setting 8
02-C-K-4

| Type | Freq (Hz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Raw (dBuV) | Dist (m) | Condition | Azimuth (°) | Height (m) | Comment | AF (dB) | CL (dB) | PA (dB) |
|------|--------------|-------------------|-------------------|----------------|---------------|-------------|------------|----------------|---------------|---------|------------|------------|------------|
| PK | 4.88564G | 47.21 | 74.00 | -26.79 | 40.03 | 3 | Horizontal | 353 | 1.80 | - | 33.14 | 5.84 | 31.80 |
| AV | 4.88048G | 35.00 | 54.00 | -19.00 | 27.84 | 3 | Horizontal | 353 | 1.80 | - | 33.12 | 5.84 | 31.80 |

BT-LE(1Mbps)

2480MHz_TX

01/09/2020



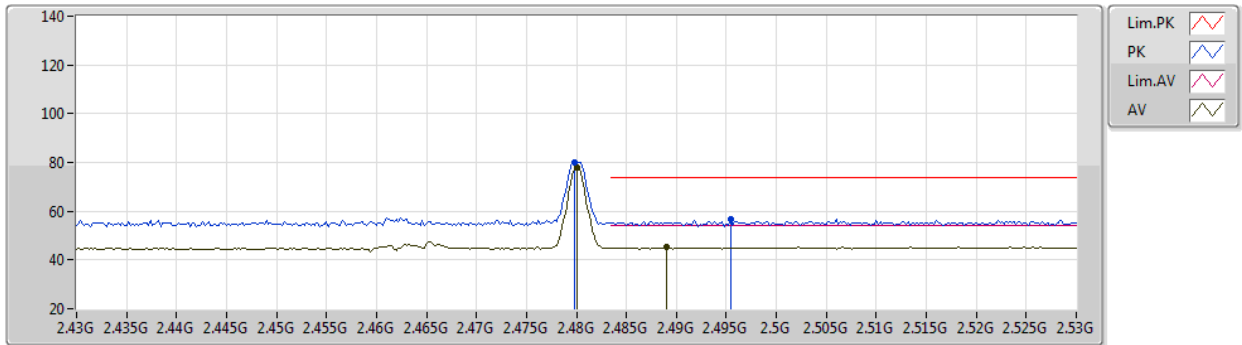
EUT Z_1TX
Setting 8
02-C-K-4

| Type | Freq (Hz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Raw (dBuV) | Dist (m) | Condition | Azimuth (°) | Height (m) | Comment | AF (dB) | CL (dB) | PA (dB) |
|------|--------------|-------------------|-------------------|----------------|---------------|-------------|-----------|----------------|---------------|---------|------------|------------|------------|
| PK | 2.4798G | 79.41 | Inf | -Inf | 47.29 | 3 | Vertical | 112 | 1.83 | - | 28.54 | 3.58 | - |
| AV | 2.48G | 77.18 | Inf | -Inf | 45.06 | 3 | Vertical | 112 | 1.83 | - | 28.54 | 3.58 | - |
| PK | 2.4918G | 56.46 | 74.00 | -17.54 | 24.29 | 3 | Vertical | 112 | 1.83 | - | 28.58 | 3.59 | - |
| AV | 2.493G | 45.21 | 54.00 | -8.79 | 13.04 | 3 | Vertical | 112 | 1.83 | - | 28.58 | 3.59 | - |

BT-LE(1Mbps)

2480MHz_TX

01/09/2020



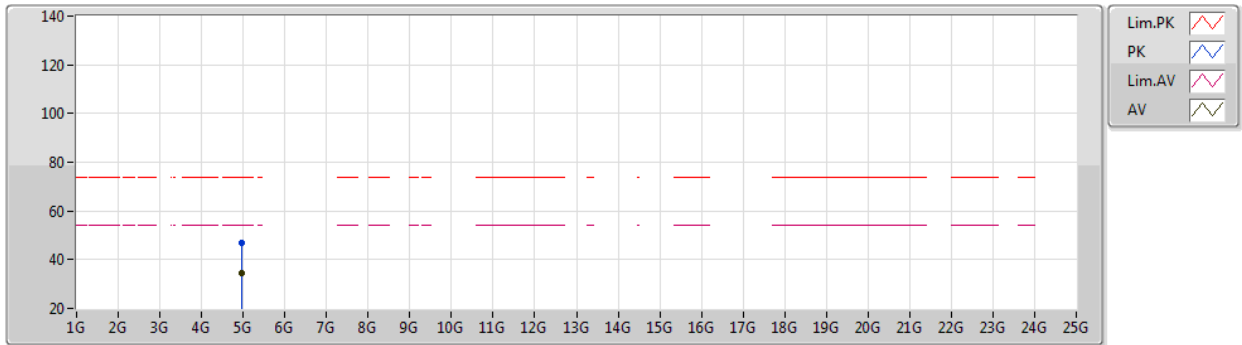
EUT Z_1TX
Setting 8
02-C-K-4

| Type | Freq (Hz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Raw (dBuV) | Dist (m) | Condition | Azimuth (°) | Height (m) | Comment | AF (dB) | CL (dB) | PA (dB) | |
|------|--------------|-------------------|-------------------|----------------|---------------|-------------|------------|----------------|---------------|---------|------------|------------|------------|--|
| PK | 2.4798G | 80.17 | Inf | -Inf | 48.05 | 3 | Horizontal | 63 | 1.40 | - | 28.54 | 3.58 | - | |
| AV | 2.48G | 78.04 | Inf | -Inf | 45.92 | 3 | Horizontal | 63 | 1.40 | - | 28.54 | 3.58 | - | |
| PK | 2.4954G | 56.59 | 74.00 | -17.41 | 24.40 | 3 | Horizontal | 63 | 1.40 | - | 28.59 | 3.60 | - | |
| AV | 2.489G | 45.17 | 54.00 | -8.83 | 13.01 | 3 | Horizontal | 63 | 1.40 | - | 28.57 | 3.59 | - | |

BT-LE(1Mbps)

2480MHz_TX

01/09/2020



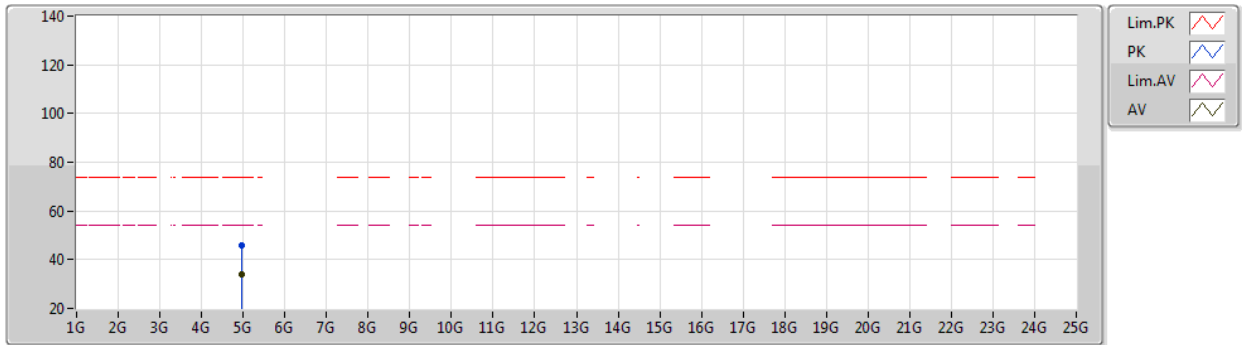
EUT Z_1TX
Setting 8
02-C-K-4

| Type | Freq (Hz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Raw (dBuV) | Dist (m) | Condition | Azimuth (°) | Height (m) | Comment | AF (dB) | CL (dB) | PA (dB) |
|------|--------------|-------------------|-------------------|----------------|---------------|-------------|-----------|----------------|---------------|---------|------------|------------|------------|
| PK | 4.967G | 46.83 | 74.00 | -27.17 | 39.51 | 3 | Vertical | 215 | 1.65 | - | 33.27 | 5.88 | 31.83 |
| AV | 4.9662G | 34.32 | 54.00 | -19.68 | 27.00 | 3 | Vertical | 215 | 1.65 | - | 33.27 | 5.88 | 31.83 |

BT-LE(1Mbps)

2480MHz_TX

01/09/2020



EUT Z_1TX
Setting 8
02-C-K-4

| Type | Freq (Hz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Raw (dBuV) | Dist (m) | Condition | Azimuth (°) | Height (m) | Comment | AF (dB) | CL (dB) | PA (dB) |
|------|--------------|-------------------|-------------------|----------------|---------------|-------------|------------|----------------|---------------|---------|------------|------------|------------|
| PK | 4.95908G | 45.99 | 74.00 | -28.01 | 38.68 | 3 | Horizontal | 47 | 1.59 | - | 33.26 | 5.88 | 31.83 |
| AV | 4.95832G | 34.15 | 54.00 | -19.85 | 26.84 | 3 | Horizontal | 47 | 1.59 | - | 33.26 | 5.88 | 31.83 |