

# FCC DTS RF TEST REPORT



|                           |                                                                        |
|---------------------------|------------------------------------------------------------------------|
| Test Report Number.....   | WAP-19052921-LC-FCC-DTS-G4                                             |
| Applicant.....            | <b>Ford Motor Company</b>                                              |
| Applicant Address.....    | Building 5, 20300 Rotunda Dr., Dearborn, Michigan, United States 48124 |
| Product Name.....         | Vehicle Infotainment System                                            |
| Model Number.....         | SYNC-G4                                                                |
| Family Product/Model..... | N/A                                                                    |
| FCC ID.....               | KMH-SYNCG4                                                             |
| ISED ID.....              | 1422A-SYNCG4                                                           |
| Date of EUT received..... | 06/12/2019                                                             |
| Date of Test.....         | 06/12/2019 – 07/29/2019                                                |
| Report Issue Date.....    | 08/02/2019                                                             |
| Test Standards.....       | <b>47CFR Part 15.247</b>                                               |
| Test Result.....          | Pass                                                                   |

Issued By:

**Vista Laboratories**

1261 Puerta Del Sol, San Clemente, CA 92673 USA

[www.vista-compliance.com](http://www.vista-compliance.com)

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Tested by:

Bruce Li/Test Engineer

Approved By:

David Zhang/Technical Manager

|                       |                             |
|-----------------------|-----------------------------|
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## Laboratory Introduction

Vista Labs is an A2LA accredited 17025 compliant regulatory compliance testing laboratories (Cert. number: 4848-01) strategically located in Orange County, providing services in the electrical and telecommunication industries. Vista labs is also recognized testing facility for Australia (ACMA), Chinese Taipei (BSMI), Chinese Taipei (NCC), Hong Kong (OFCA), Israel (MOC), Korea (RRA), Singapore (IMDA), Vietnam (MIC), etc.

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As your partner, Vista investigates appropriate test standards, develops test plans, performs troubleshooting & failure analysis, reviews documentation, and provides test reports for a complete compliance testing and certification package.



**17025 Product Testing Accreditation Certificate**



**17065 Product Certification Accreditation Certificate**

|                       |                             |
|-----------------------|-----------------------------|
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## REVISION HISTORY

| Revision | Issue Date | Description      | Note |
|----------|------------|------------------|------|
| Original | 08/06/2019 | Original release | N/A  |
|          |            |                  |      |
|          |            |                  |      |
|          |            |                  |      |
|          |            |                  |      |

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## 1 General Information

### 1.1 Applicant

|                              |                                                                        |
|------------------------------|------------------------------------------------------------------------|
| <b>Applicant:</b>            | Ford Motor Company                                                     |
| <b>Applicant address:</b>    | Building 5, 20300 Rotunda Dr., Dearborn, Michigan, United States 48124 |
| <b>Manufacturer:</b>         | Ford Motor Company                                                     |
| <b>Manufacturer Address:</b> | Building 5, 20300 Rotunda Dr., Dearborn, Michigan, United States 48124 |

### 1.2 Product information

|                                  |                                                                                                                                                                                                                                                                                                                        |
|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product Name</b>              | Vehicle Infotainment System                                                                                                                                                                                                                                                                                            |
| <b>Model Number</b>              | SYNC-G4                                                                                                                                                                                                                                                                                                                |
| <b>Family Model Number</b>       | N/A                                                                                                                                                                                                                                                                                                                    |
| <b>Serial Number</b>             | 1SN004KB (Conducted), 1SN004K8 (Radiated)                                                                                                                                                                                                                                                                              |
| <b>Frequency Band</b>            | BLE: 2402-2480MHz<br>802.11b/g/n-20MHz: 2412-2462MHz<br>802.11a/n-20MHz: 5180-5320MHz, 5500-5720MHz, 5725-5825MHz<br>802.11n-40MHz: 5190-5310MHz, 5510-5710MHz, 5755-5795MHz<br>802.11ac: 5210-5290MHz, 5530-5690MHz, 5775MHz                                                                                          |
| <b>Type of modulation</b>        | BLE: GFSK<br>802.11b: DSSS (CCK, DQPSK, DBPSK)<br>802.11g: OFDM-CCK (BPSK, QPSK, 16QAM, 64QAM)<br>802.11a/n/ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)                                                                                                                                                                |
| <b>Equipment Class/ Category</b> | DSS, DTS, UNII                                                                                                                                                                                                                                                                                                         |
| <b>Maximum output power</b>      | See test result                                                                                                                                                                                                                                                                                                        |
| <b>Antenna Information</b>       | PCB trace antenna (WiFi1 Antenna, WiFi2 Antenna, Bluetooth Antenna)<br><br>Peak Gain:<br>WiFi1 Antenna: 2.86 dBi @2.4GHz, 8.07 dBi @5GHz<br>WiFi2 Antenna: 0.91 dBi @2.4GHz, 5.04 dBi @5GHz<br>Bluetooth Antenna: 2.68 dBi @2.4GHz<br><br>Directional Gain:<br>WiFi1 & WiFi2 Antenna: 4.95 dBi @2.4GHz, 9.70 dBi @5GHz |
| <b>Clock Frequencies</b>         | N/A                                                                                                                                                                                                                                                                                                                    |
| <b>Port/Connectors</b>           | Micro USB, CAN bus                                                                                                                                                                                                                                                                                                     |
| <b>Input Power</b>               | Vehicle Battery powered: 12 VDC                                                                                                                                                                                                                                                                                        |
| <b>Power Adapter Manu/Model</b>  | N/A                                                                                                                                                                                                                                                                                                                    |
| <b>Power Adapter SN</b>          | N/A                                                                                                                                                                                                                                                                                                                    |
| <b>Hardware version</b>          | N/A                                                                                                                                                                                                                                                                                                                    |
| <b>Software version</b>          | N/A                                                                                                                                                                                                                                                                                                                    |
| <b>Simultaneous Transmission</b> | BT/BLE and WLAN can transmit simultaneously                                                                                                                                                                                                                                                                            |
| <b>Additional Info</b>           | N/A                                                                                                                                                                                                                                                                                                                    |

|                       |                             |
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### 1.3 Test standard and method

|                      |                                                             |
|----------------------|-------------------------------------------------------------|
| <b>Test standard</b> | 47CFR Part 15.247                                           |
| <b>Test method</b>   | ANSI C63.10: 2013<br>558074 D01 15.247 Meas Guidance v05r02 |

### 1.4 Test Purpose and statement

The purpose of this test report is intended to demonstrate the compliance of product listed in section 1.2, received from company listed in section 1.1, to the requirements of standard and method listed in section 1.3. Based on our test results, we conclude that the product tested complies with the requirements of the standards indicated.

## 2 Test site information

|                             |                                                 |
|-----------------------------|-------------------------------------------------|
| <b>Lab performing tests</b> | <b>Vista Laboratories</b>                       |
| <b>Lab Address</b>          | 1261 Puerta Del Sol, San Clemente, CA 92673 USA |
| <b>Phone Number</b>         | +1 (949) 393-1123                               |
| <b>Website</b>              | www.Vista-compliance.com                        |

| Test condition | Test Engineer | Test Environment        | Test Date               |
|----------------|---------------|-------------------------|-------------------------|
| RF conducted   | Bruce Li      | 23.5°C / 58.2%/996 mbar | 06/12/2019 – 07/29/2019 |
| Radiated       | Cameron Wu    | 23.5°C / 58.2%/996 mbar | 06/12/2019 – 07/29/2019 |

## 3 Modification of EUT

The EUT is an engineering test sample loaded with RF testing firmware specifically designed to support the RF TX/RX measurement in different aspects.

## 4 Test configuration and operation

### 4.1 EUT test configuration

EUT is powered by external DC power supply for testing purpose. EUT's RF antenna port is connected to spectrum analyzer through RF test cable for measurement. The test software is used to set EUT to different transmission mode in terms of radio mode (WLAN, BLE), test channel, data rate, etc.

### 4.2 EUT test mode

| Radio       | Channel | Frequency (MHz) |
|-------------|---------|-----------------|
| BLE         | 0       | 2402            |
| BLE         | 20      | 2442            |
| BLE         | 39      | 2480            |
| 802.11-b    | 1       | 2412            |
| 802.11-b    | 6       | 2437            |
| 802.11-b    | 11      | 2462            |
| 802.11-g    | 1       | 2412            |
| 802.11-g    | 6       | 2437            |
| 802.11-g    | 11      | 2462            |
| 802.11-n-20 | 1       | 2412            |
| 802.11-n-20 | 6       | 2437            |
| 802.11-n-20 | 11      | 2462            |

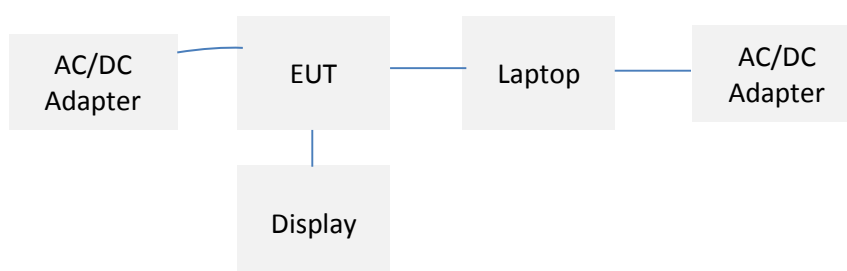
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### 4.3 Supporting Equipment

| Index | Description   | Model         | S/N        | Brand     | Remark |
|-------|---------------|---------------|------------|-----------|--------|
| 1     | AC/DC Adapter | HA45NM140     | 00285K     | DELL      | -      |
| 2     | Laptop        | Inspiron 15   | 245S2F2    | DELL      | -      |
| 3     | Display       | -             | 84007293   | Ford      | -      |
| 4     | AC/DC Adapter | GST 60A12-P15 | EB74QB1066 | MEAN WELL | -      |
|       |               |               |            |           |        |
|       |               |               |            |           |        |

### 4.4 EUT setup diagram



### 4.5 EUT operation

The test software is used to set EUT to different transmission mode in terms of radio mode (WLAN, BLE), test channel, data rate, etc.

### 4.6 Test software

| Index | Description                        | Remark                                                  |
|-------|------------------------------------|---------------------------------------------------------|
| 1     | Diagnostic Engineering Tool V8.4.0 | Load test firmware to EUT and provide basic control     |
| 2     | PuTTY V0.70                        | Establish communication to EUT radio module             |
| 3     | EMISoft Vasona 6.0049              | EMC/Spurious emission test software used during testing |
|       |                                    |                                                         |

|                       |                             |
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## 5 EUT and test setup pictures

[See associated filing](#)

|                       |                             |
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## 6 Test Summary

| FCC Rules        | Test Item                                                               | Section | Verdict |
|------------------|-------------------------------------------------------------------------|---------|---------|
| §15.203          | Antenna Requirement                                                     | 8.1     | Pass    |
| §15.207 (a)      | AC Power Line Conducted Emissions                                       | N/A     | N/A     |
| §15.247 (a)(2)   | DTS (6 dB) Channel Bandwidth                                            | 8.2     | Pass    |
| §15.247(b)(3)    | Conducted Maximum Output Power                                          | 8.3     | Pass    |
| §15.247(e)       | Power Spectral Density                                                  | 8.4     | Pass    |
| §15.247(d)       | Conducted Band-Edge & Unwanted Emissions                                | 8.5     | Pass    |
| §15.205, §15.209 | Radiated Emissions & Unwanted Emissions into Restricted Frequency Bands | 8.6     | Pass    |
|                  |                                                                         |         |         |

Note1: EUT is powered by Vehicle mains. It does not connect to public AC mains. This item is not applicable.

|                       |                             |
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## 7 Uncertainty of Measurement

| Test item                      | Measurement Uncertainty (dB) |
|--------------------------------|------------------------------|
| RF Output Power (Conducted)    | ±1.2 dB                      |
| Power Spectral Density         | ±0.9 dB                      |
| Unwanted Emission (conducted)  | ±2.6 dB                      |
| Occupied Channel Bandwidth     | ±5 %                         |
| Radiated Emission (9KHz-30MHz) | ±3.5 dB                      |
| Radiated Emission (30MHz-1GHz) | ±4.6 dB                      |
| Radiated Emission (1-18GHz)    | ±4.9 dB                      |
| Radiated Emission (18-40GHz)   | ±3.5 dB                      |

|                       |                             |
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## 8 Test summary and result

### 8.1 Antenna Requirement

#### 8.1.1 Requirement

Per § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. 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.

#### 8.1.2 Result

Analysis:

- EUT uses PCB trace antenna. No standard RF connector or coupling is used.

Conclusion:

EUT complies with antenna requirement in § 15.203.

|                       |                             |
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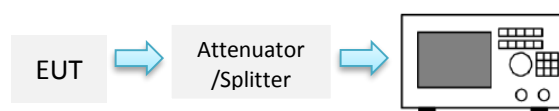
## 8.2 DTS (6 dB) Bandwidth

### 8.2.1 Requirement

§ 15.247 (a)(2)

Systems using digital modulation techniques may operate in the 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz bands. The minimum 6 dB bandwidth shall be at least 500 KHz.

### 8.2.2 Test setup



### 8.2.3 Test Procedure

According to section 8.2, option 2, in KDB 558074 D01 DTS Meas Guidance v05r02 and subclause 11.8 of ANSI C63.10-2013:

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW  $\geq 3 \times$  RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be  $\geq 6$  dB.

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW)  $\geq 3 \times$  RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Use automatic bandwidth measurement capability on instrument to obtain BW result.

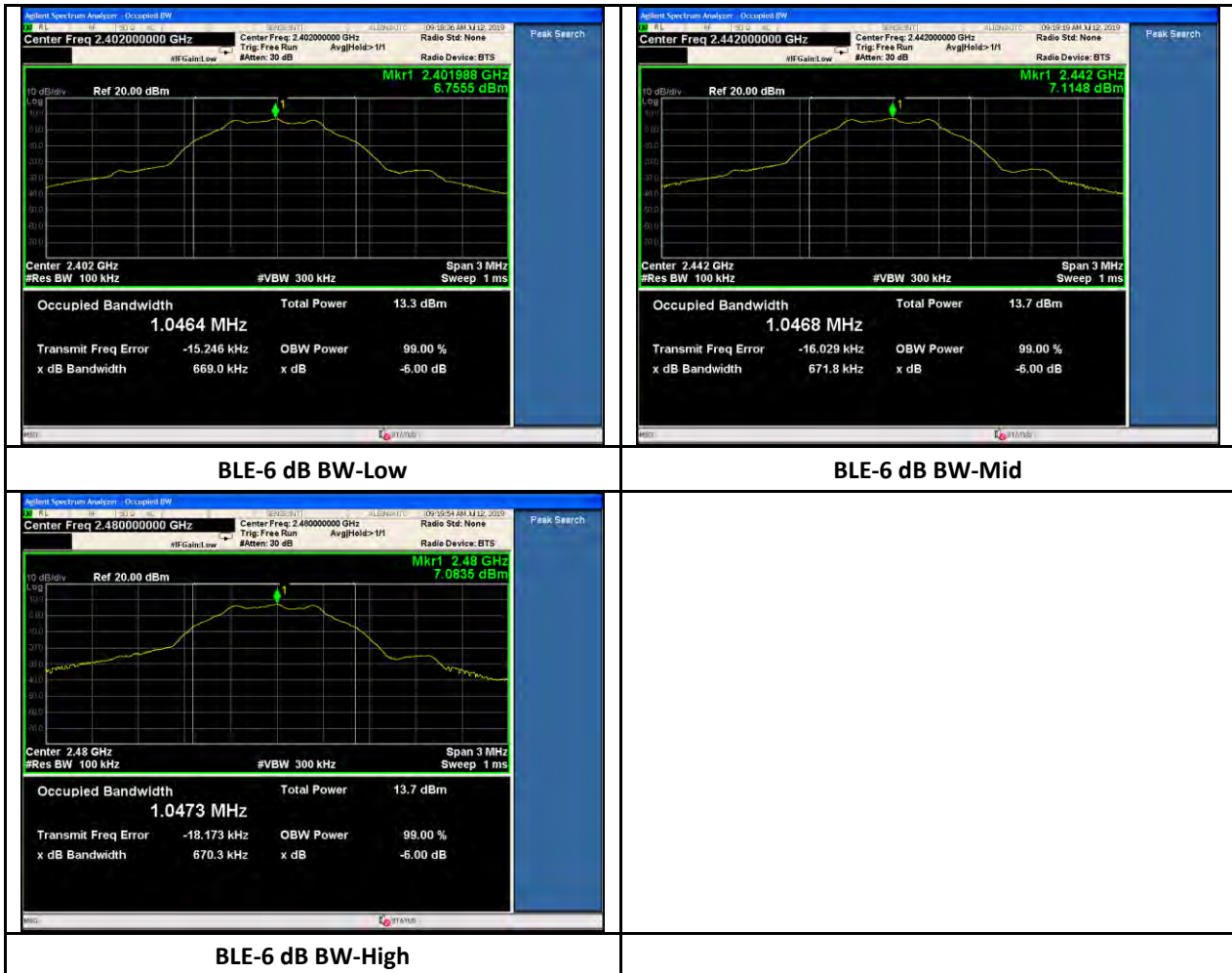
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### 8.2.4 Test Result

| Mode/<br>Bandwidth | Frequency (MHz) | Data rate | Measured<br>Bandwidth<br>(KHz) | Minimum<br>Bandwidth<br>(KHz) | Result |
|--------------------|-----------------|-----------|--------------------------------|-------------------------------|--------|
| BLE                | 2402            | 1Mbps     | 669.0                          | 500                           | Pass   |
| BLE                | 2440            | 1Mbps     | 671.8                          | 500                           | Pass   |
| BLE                | 2480            | 1Mbps     | 670.3                          | 500                           | Pass   |
| 11b                | 2412            | 1Mbps     | 9158                           | 500                           | Pass   |
| 11b                | 2437            | 1Mbps     | 9576                           | 500                           | Pass   |
| 11b                | 2462            | 1Mbps     | 9143                           | 500                           | Pass   |
| 11g                | 2412            | 6Mbps     | 16370                          | 500                           | Pass   |
| 11g                | 2437            | 6Mbps     | 16390                          | 500                           | Pass   |
| 11g                | 2462            | 6Mbps     | 16370                          | 500                           | Pass   |
| 11n-20M            | 2412            | MCS0      | 17550                          | 500                           | Pass   |
| 11n-20M            | 2437            | MCS0      | 17340                          | 500                           | Pass   |
| 11n-20M            | 2462            | MCS0      | 17340                          | 500                           | Pass   |

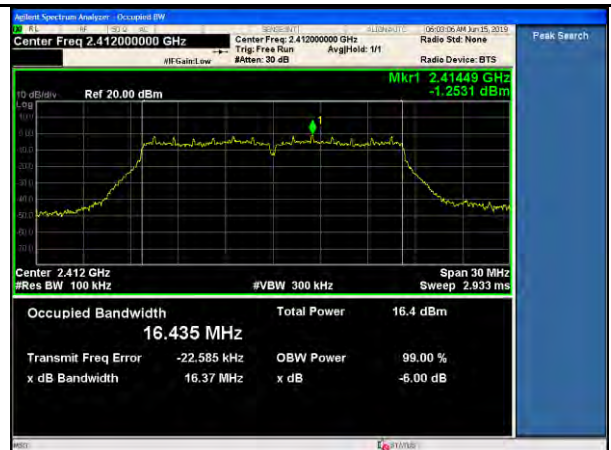
## 8.2.5 Test Plots



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Product: Vehicle Infotainment System  
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11b-6dB BW-Low



11g-6dB BW-Low



11b-6dB BW-Mid



11g-6dB BW-Mid

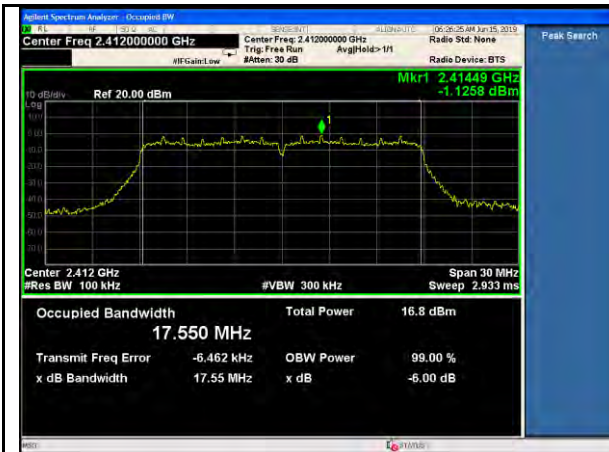


11b-6dB BW-High



11g-6dB BW-High

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11n-20MHz-6dB BW-Low



11n-20MHz-6dB BW-Mid



11n-20MHz-6dB BW-High

|                       |                             |
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## 8.3 Maximum Output Power

### 8.3.1 Requirement

§ 15.247 (b)(3)

or systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: the maximum output power is 1 Watt.

If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### 8.3.2 Test setup



### 8.3.3 Test Procedure

For BLE, power measurement is according to subclause 11.9.1.1 of ANSI C63.10-2013:

1. Set the RBW  $\geq$  DTS bandwidth
2. Set VBW  $\geq 3 \times$  RBW.
2. Set SPAN  $\geq 3 \times$  RBW.
3. Sweep time = auto couple.
4. Detector = peak.
5. Trace mode = max hold
6. Allow trace to fully stabilize.
7. Use peak marker function to determine the peak amplitude level.

|                       |                             |
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For WLAN, power measurement is according to subclause 11.9.2.2.2 of ANSI C63.10-2013:

1. Set span to at least 1.5 times of the OBW.
2. Set the RBW = 1% to 5% of the OBW, not to exceed 1 MHz.
2. Set VBW  $\geq 3 \times$  RBW.
3. Set number of points in sweep  $\geq [2 \times \text{span} / \text{RBW}]$
4. Sweep time = auto couple.
5. Detector = RMS
6. If transmit duty cycle < 98%, use a sweep trigger with the level set to enable triggering only on full power pulses. The transmitter shall operate at the maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no OFF intervals) or at duty cycle 98%, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run."
7. Trace average at least 100 traces in power averaging (rms) mode.
8. Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function, with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

|                       |                             |
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### 8.3.4 Test Result

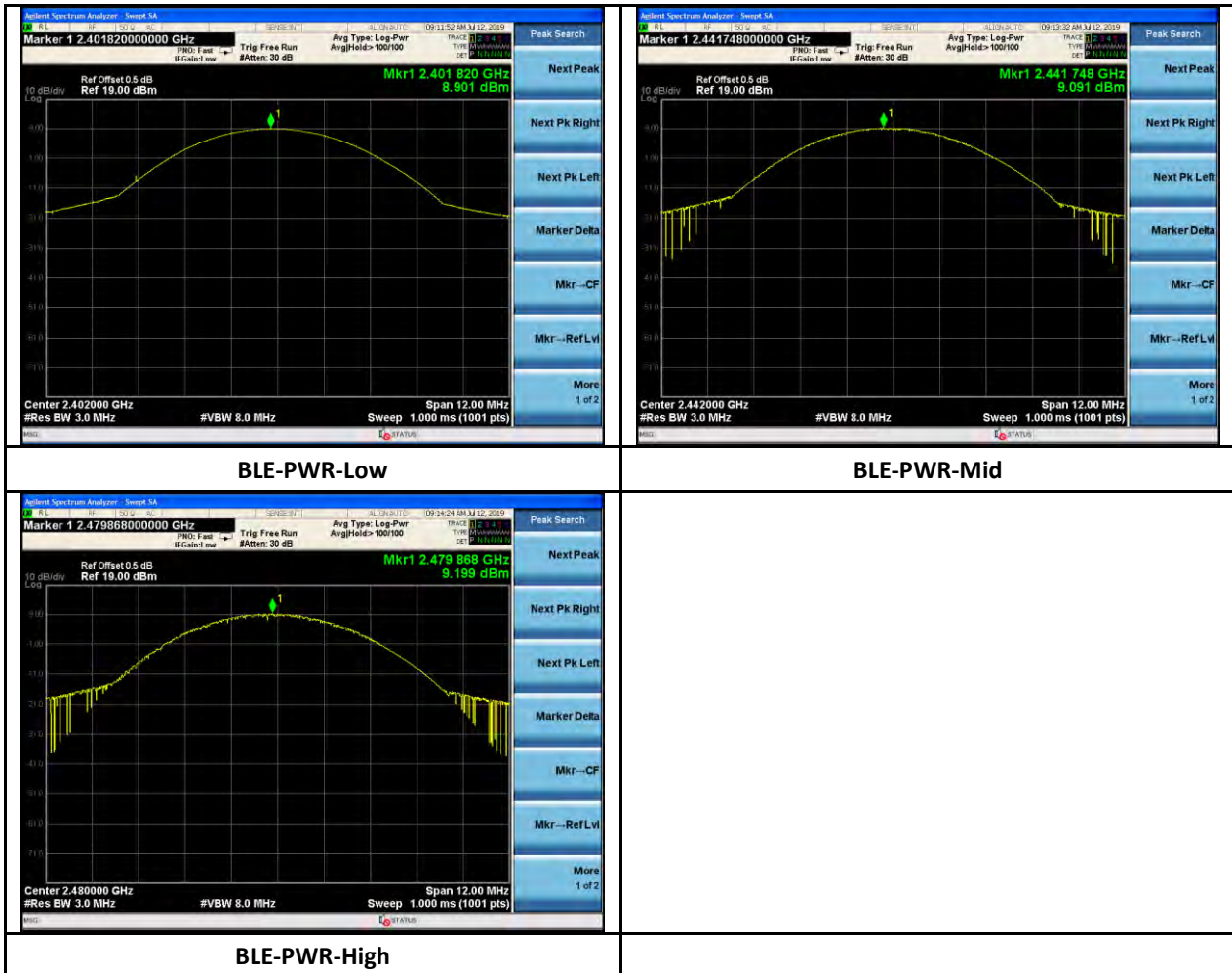
| Mode/<br>Bandwidth | Frequency<br>(MHz) | Data rate | Measured<br>Output Power<br>(dBm) | Max Output<br>Power (dBm) | Result |
|--------------------|--------------------|-----------|-----------------------------------|---------------------------|--------|
| BLE                | 2402               | 1Mbps     | 8.901                             | 30                        | Pass   |
| BLE                | 2440               | 1Mbps     | 9.090                             | 30                        | Pass   |
| BLE                | 2480               | 1Mbps     | 9.199                             | 30                        | Pass   |

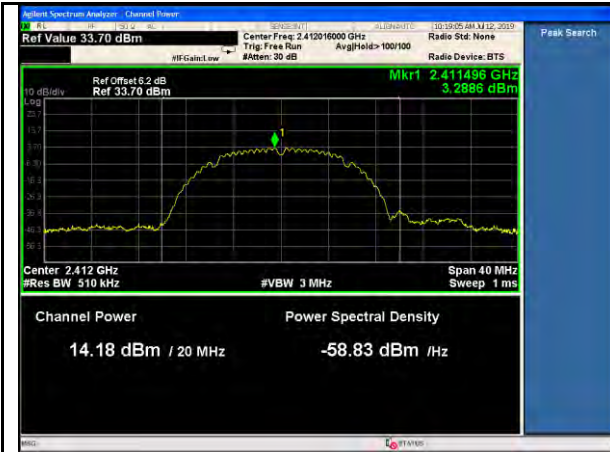
| Mode/<br>Bandwidth | Frequency<br>(MHz) | Data rate | TX1 power<br>(dBm) | TX2 power<br>(dBm) | Highest or<br>Total power<br>(dBm) | Max Output<br>Power (dBm) | Result |
|--------------------|--------------------|-----------|--------------------|--------------------|------------------------------------|---------------------------|--------|
| 11b                | 2412               | 1Mbps     | 14.18              | 12.37              | 14.18                              | 30                        | Pass   |
| 11b                | 2437               | 1Mbps     | 16.14              | 15.08              | 16.14                              | 30                        | Pass   |
| 11b                | 2462               | 1Mbps     | 14.44              | 13.63              | 14.44                              | 30                        | Pass   |
| 11g                | 2412               | 6Mbps     | 15.42              | 12.55              | 15.42                              | 30                        | Pass   |
| 11g                | 2437               | 6Mbps     | 15.77              | 14.61              | 15.77                              | 30                        | Pass   |
| 11g                | 2462               | 6Mbps     | 13.06              | 12.15              | 13.06                              | 30                        | Pass   |
| 11n-20M            | 2412               | MCS1      | 14.14              | 12.60              | 16.45                              | 30                        | Pass   |
| 11n-20M            | 2437               | MCS1      | 16.10              | 14.39              | 18.34                              | 30                        | Pass   |
| 11n-20M            | 2462               | MCS1      | 13.31              | 12.23              | 15.81                              | 30                        | Pass   |

Note:

- 1) For 802.11b/g, the highest output power is recorded.
- 2) For 802.11n mode, it's under 2x2 MIMO mode, the output power is combined together to compare to limit.
- 3) For 2.4GHz, directional gain is calculated per KDB 662911 D01. For 2.4GHz WiFi, directional gain = 4.95 dBi.

### 8.3.5 Test Plots

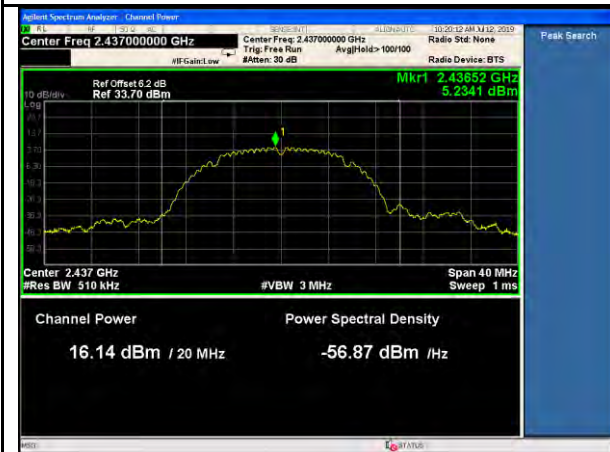




11b-PWR-Low-TX1



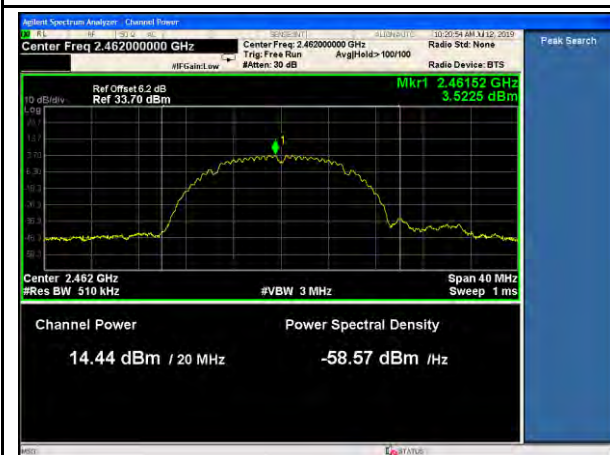
11b-PWR-Low-TX2



11b-PWR-Mid-TX1



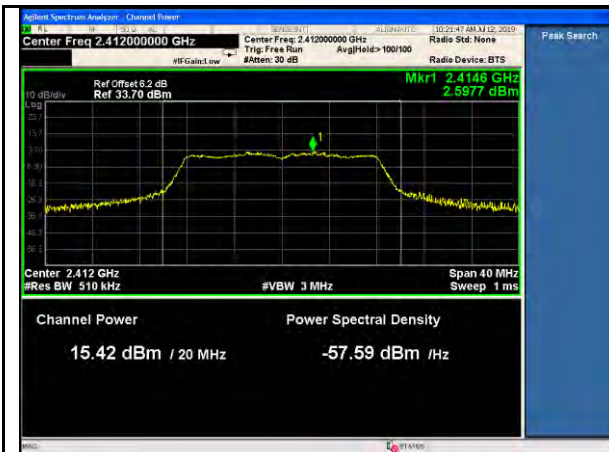
11b-PWR-Mid-TX2



11b-PWR-High-TX1



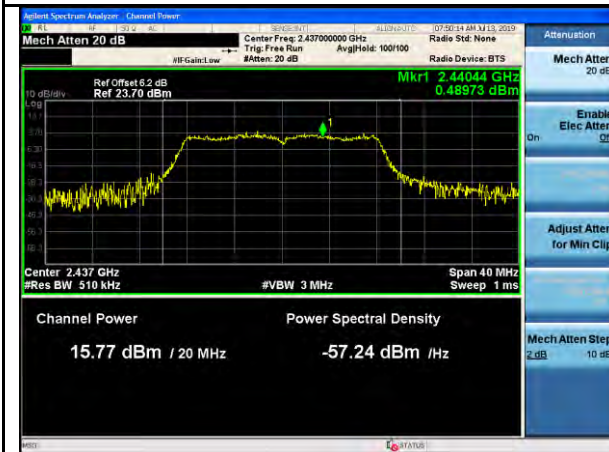
11b-PWR-High-TX2



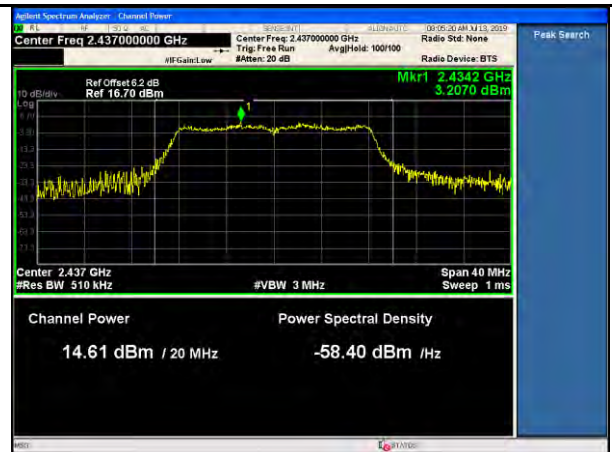
11g-PWR-Low-TX1



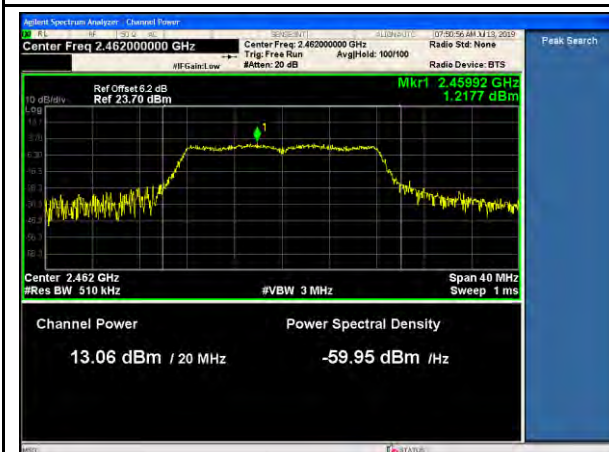
11g-PWR-Low-TX2



11g-PWR-Mid-TX1



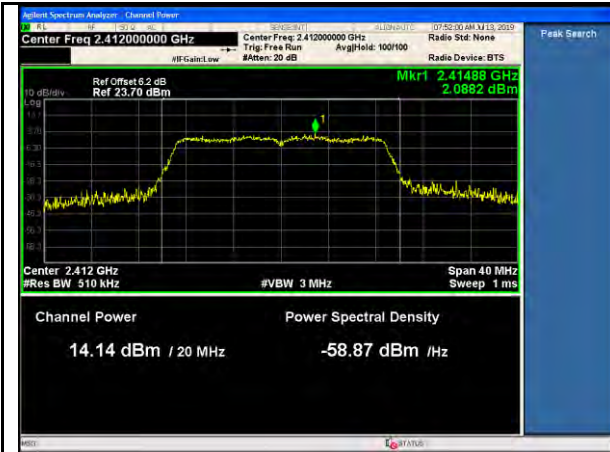
11g-PWR-Mid-TX2



11g-PWR-High-TX1



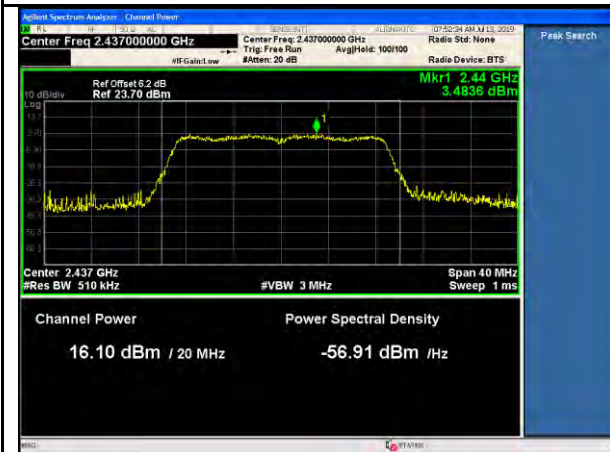
11g-PWR-High-TX2



11n-20MHz-PWR-Low-TX1



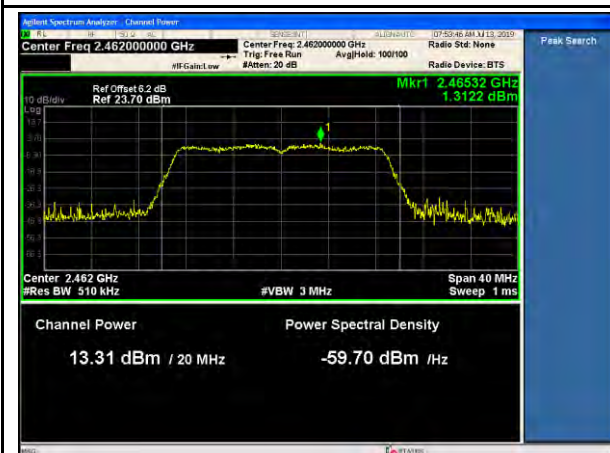
11n-20MHz-PWR-Low-TX2



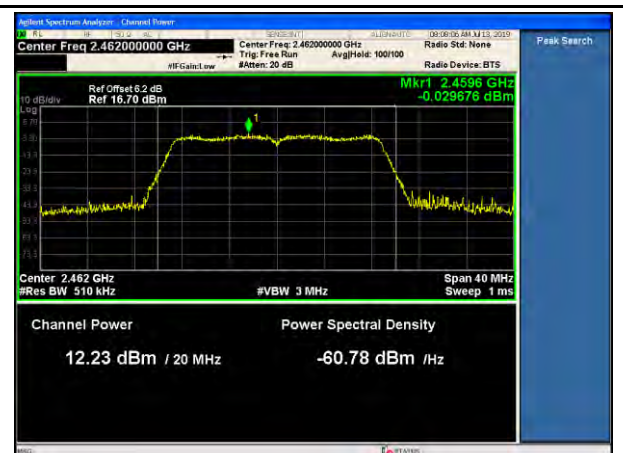
11n-20MHz-PWR-Mid-TX1



11n-20MHz-PWR-Mid-TX2



11n-20MHz-PWR-High-TX1



11n-20MHz-PWR-High-TX2

|                       |                             |
|-----------------------|-----------------------------|
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| <b>Model Number:</b>  | SYNC-G4                     |



## 8.4 Power Spectral Density

### 8.4.1 Requirement

§ 15.247 (e)

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power is used to determine the power spectral density.

### 8.4.2 Test setup



### 8.4.3 Test Procedure

According to section 8.4 in KDB 558074 D01 DTS Meas Guidance v05r02 and subclause 11.10.2 PKPSD of ANSI C63.10-2013:

1. Set analyser centre frequency to DTS channel centre frequency.
2. Set the span to 1.5 X DTS bandwidth.
3. Set the RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
4. Set the VBW  $\geq 3 \times \text{RBW}$ .
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

|                       |                             |
|-----------------------|-----------------------------|
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| <b>Model Number:</b>  | SYNC-G4                     |



#### 8.4.4 Test Result

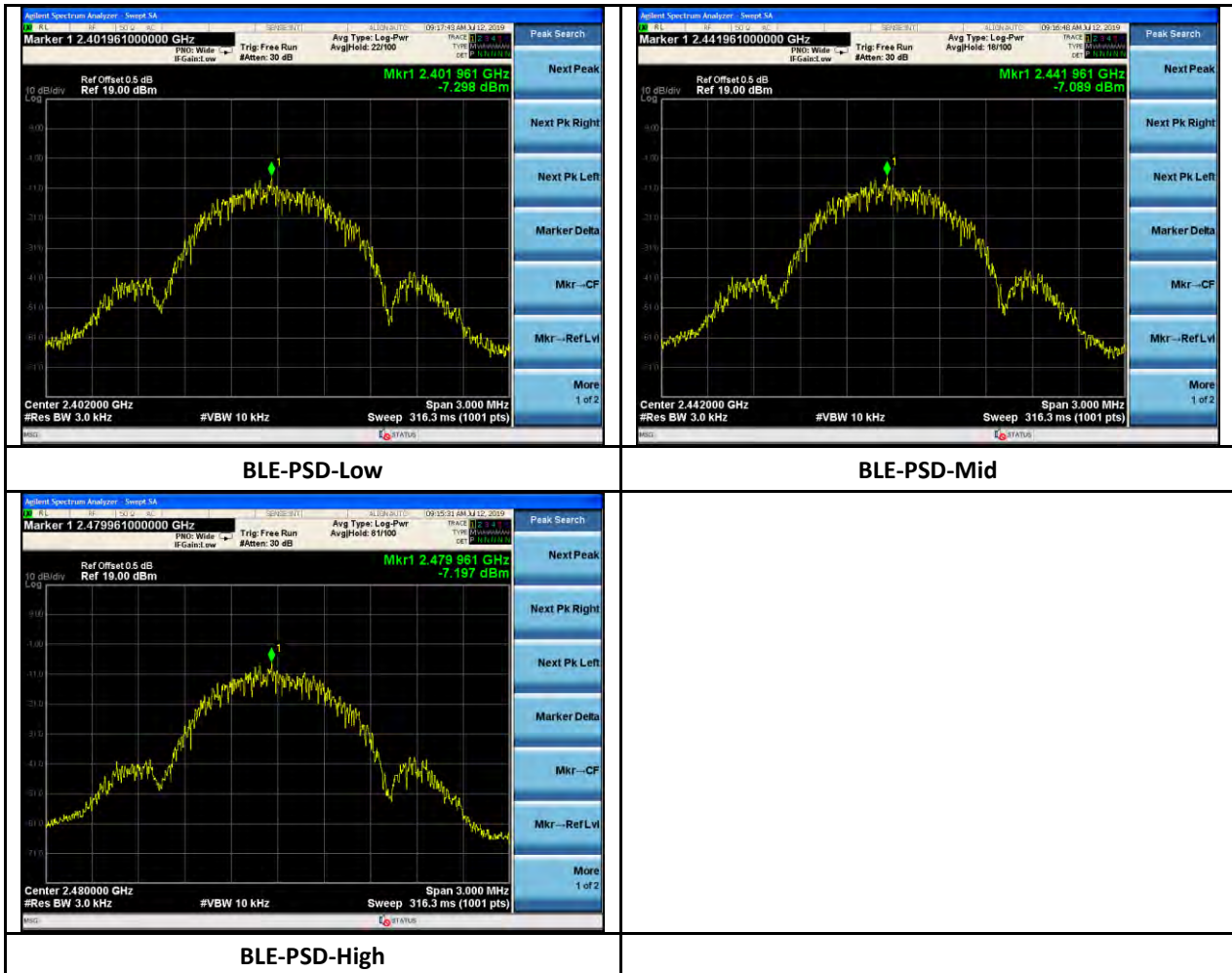
| Mode/<br>Bandwidth | Frequency<br>(MHz) | Data rate | Measured PSD<br>(dBm/3KHz) | Max PSD<br>(dBm/3KHz) | Result |
|--------------------|--------------------|-----------|----------------------------|-----------------------|--------|
| BLE                | 2402               | 1Mbps     | -7.298                     | 8                     | Pass   |
| BLE                | 2440               | 1Mbps     | -7.089                     | 8                     | Pass   |
| BLE                | 2480               | 1Mbps     | -7.197                     | 8                     | Pass   |

| Mode/<br>Bandwidth | Frequency<br>(MHz) | Data<br>rate | TX1 PSD<br>(dBm/3KHz) | TX2 PSD<br>(dBm/3KHz) | Highest or<br>Total PSD<br>(dBm/3KHz) | Max PSD<br>(dBm/3KHz) | Result |
|--------------------|--------------------|--------------|-----------------------|-----------------------|---------------------------------------|-----------------------|--------|
| 11b                | 2412               | 1Mbps        | -11.582               | -13.861               | -11.582                               | 8                     | Pass   |
| 11b                | 2437               | 1Mbps        | -9.571                | -11.948               | -9.571                                | 8                     | Pass   |
| 11b                | 2462               | 1Mbps        | -10.799               | -13.244               | -10.799                               | 8                     | Pass   |
| 11g                | 2412               | 6Mbps        | -12.785               | -14.499               | -12.785                               | 8                     | Pass   |
| 11g                | 2437               | 6Mbps        | -11.365               | -12.734               | -11.365                               | 8                     | Pass   |
| 11g                | 2462               | 6Mbps        | -13.021               | -14.752               | -13.021                               | 8                     | Pass   |
| 11n-20M            | 2412               | MCS1         | -15.076               | -18.969               | -13.59                                | 8                     | Pass   |
| 11n-20M            | 2437               | MCS1         | -14.837               | -16.631               | -12.63                                | 8                     | Pass   |
| 11n-20M            | 2462               | MCS1         | -18.018               | -18.958               | -15.45                                | 8                     | Pass   |

Note:

- 1) For 802.11b/g, the highest PSD is recorded.
- 2) For 802.11n mode, it's under 2x2 MIMO mode, the PSD is combined together to compare to limit.
- 3) For 2.4GHz, directional gain is calculated per KDB 662911 D01. For 2.4GHz WiFi, directional gain = 4.95 dBi.

#### 8.4.5 Test Plots





11b-PSD-Low-TX1



11b-PSD-Low-TX2



11b-PSD-Mid-TX1



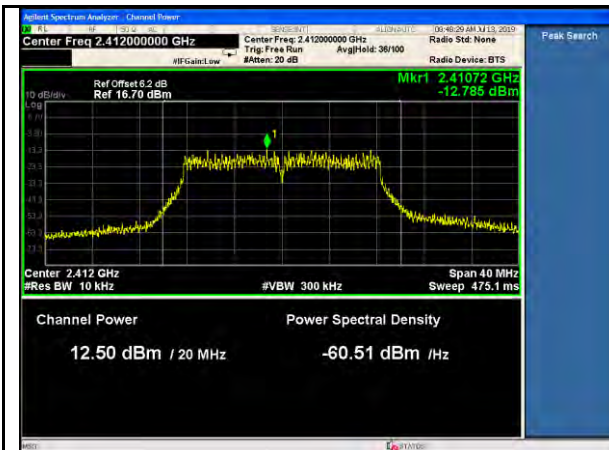
11b-PSD-Mid-TX2



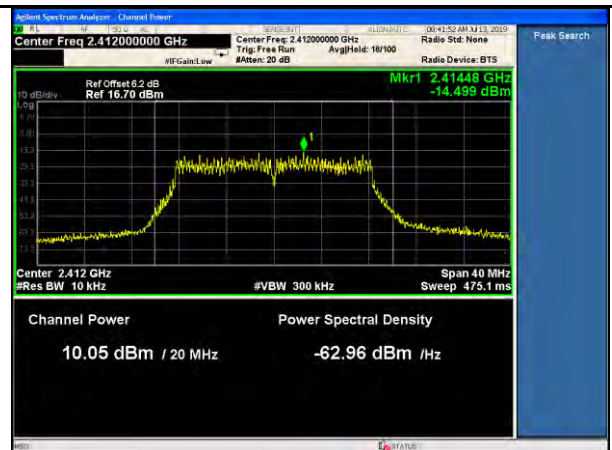
11b-PSD-High-TX1



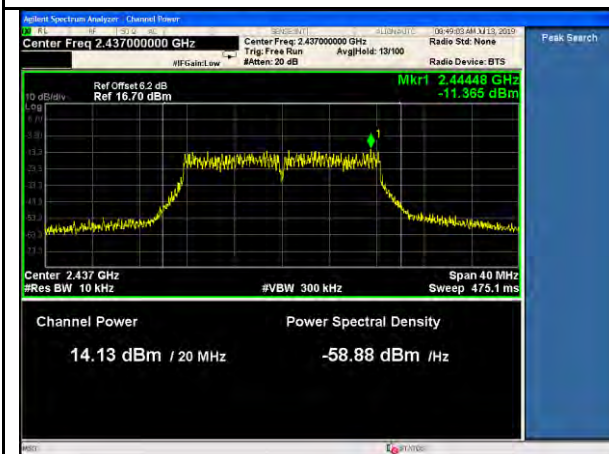
11b-PSD-High-TX2



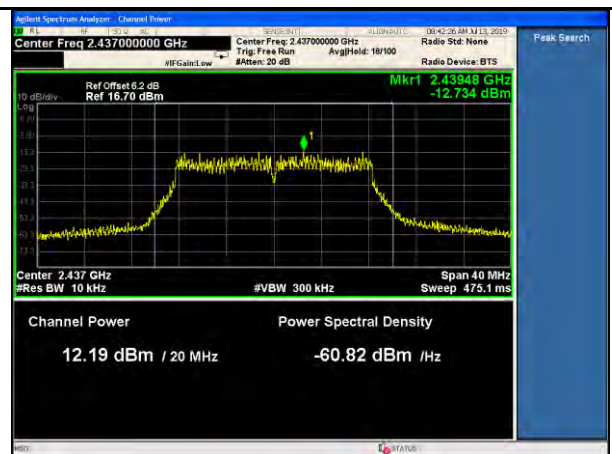
11g-PSD-Low-TX1



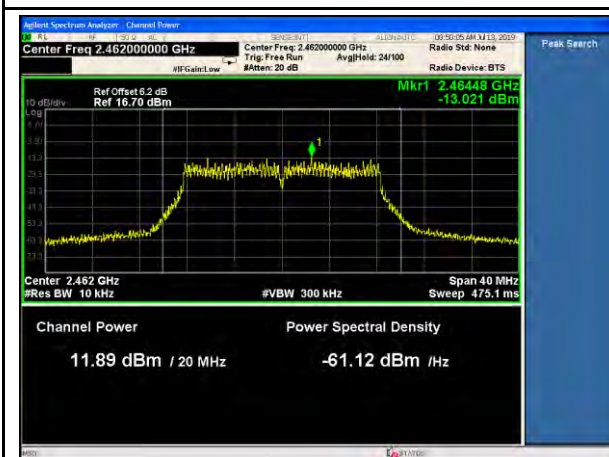
11g-PSD-Low-TX2



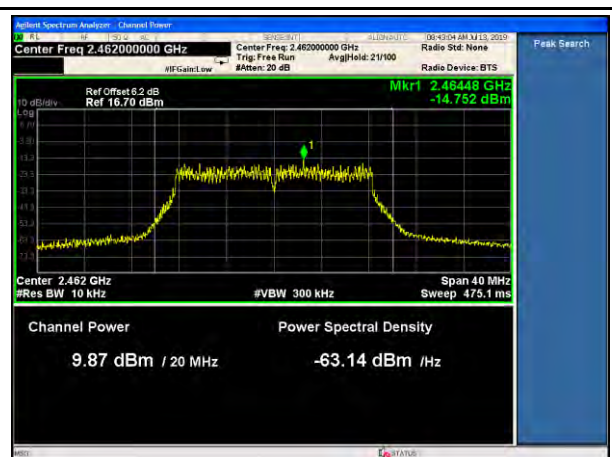
11g-PSD-Mid-TX1



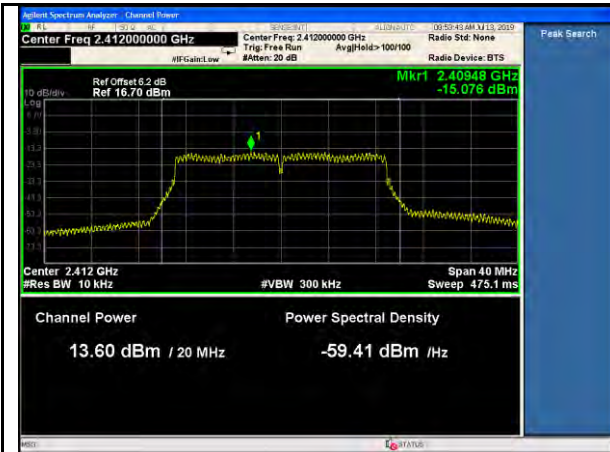
11g-PSD-Mid-TX2



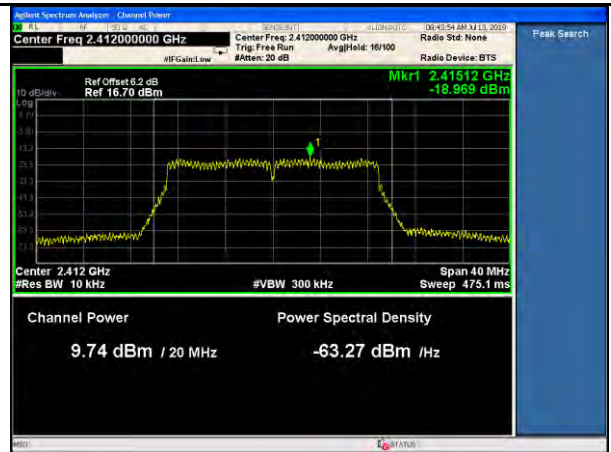
11g-PSD-High-TX1



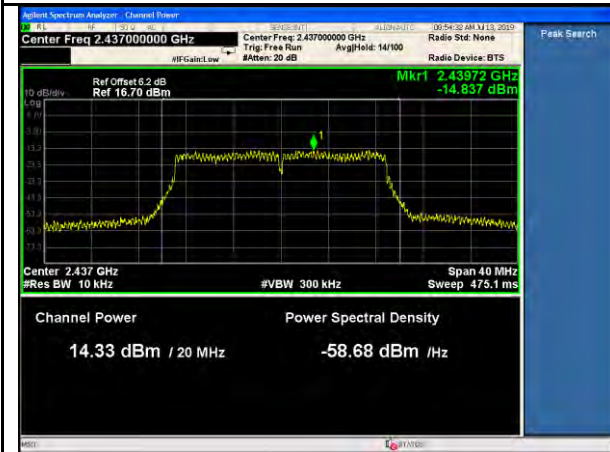
11g-PSD-High-TX2



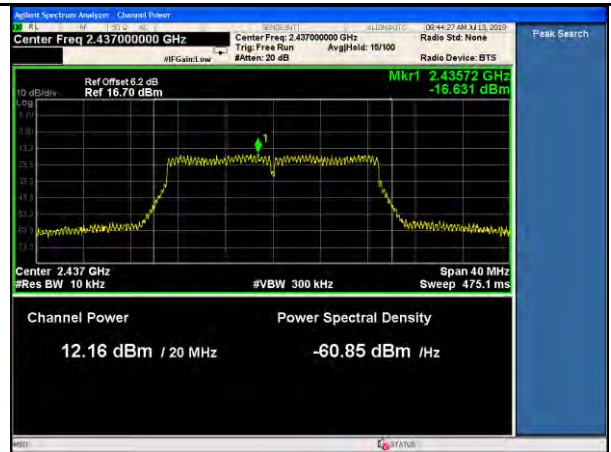
11n-20MHz-PSD-Low-TX1



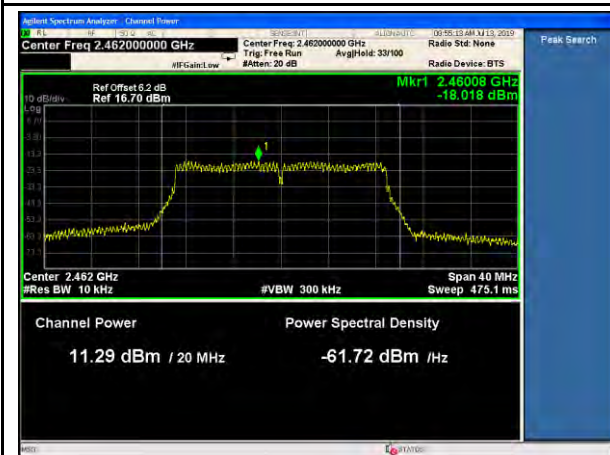
11n-20MHz-PSD-Low-TX2



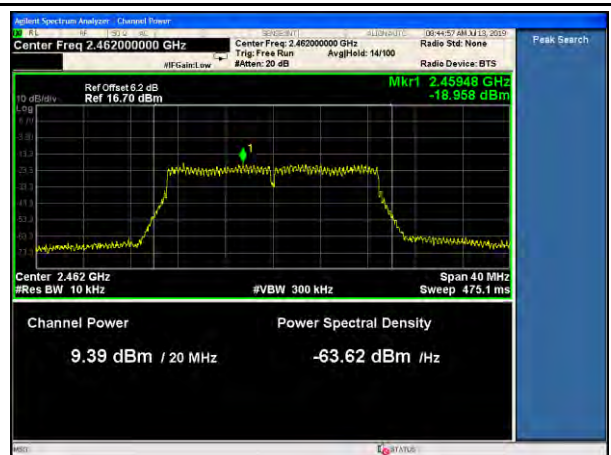
11n-20MHz-PSD-Mid-TX1



11n-20MHz-PSD-Mid-TX2



11n-20MHz-PSD-High-TX1



11n-20MHz-PSD-High-TX2

|                       |                             |
|-----------------------|-----------------------------|
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| <b>Model Number:</b>  | SYNC-G4                     |



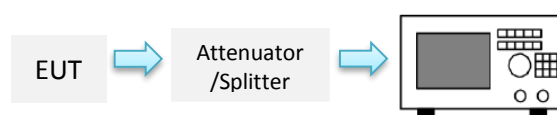
## 8.5 Conducted Band-Edge & Unwanted Emissions Measurement

### 8.5.1 Requirement

§ 15.247 (d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

### 8.5.2 Test setup



### 8.5.3 Test Procedure

According to section 8.5 Emission level measurement, in KDB 558074 D01 DTS Meas Guidance v05r02 and subclause 11.11.3 in ANSI C63.10-2013:

1. Set the centre frequency and span to encompass frequency range to be measured.
2. Set the RBW = 100 kHz.
3. Set the VBW  $\geq 3 \times$  RBW.
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the peak marker function to determine the maximum amplitude level.

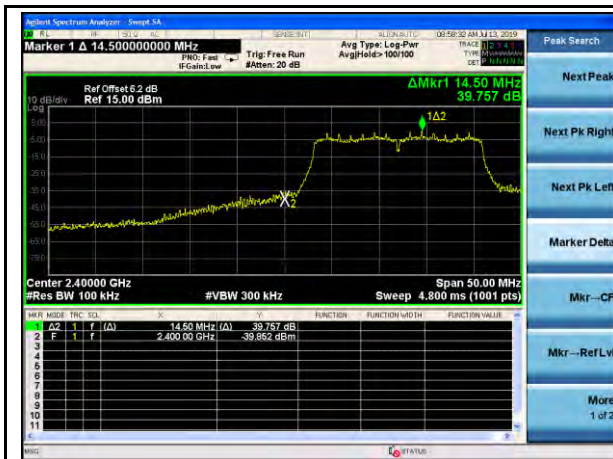
### 8.5.4 Test Result

See test plots

### 8.5.5 Test Plots



Report Number: WAP-19052921-LC-FCC-DTS-G4  
Product: Vehicle Infotainment System  
Model Number: SYNC-G4

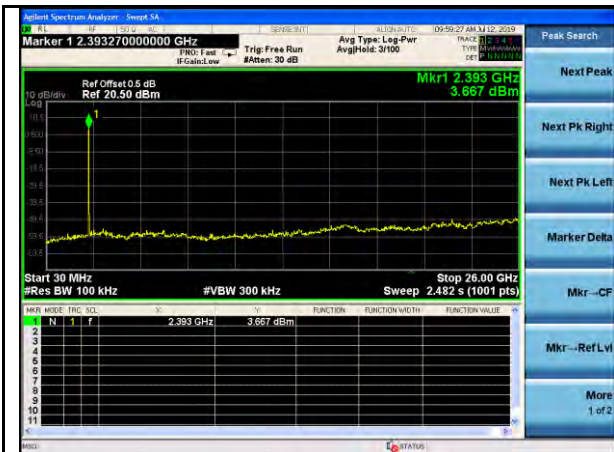


11n-20MHz-Band Edge-Low

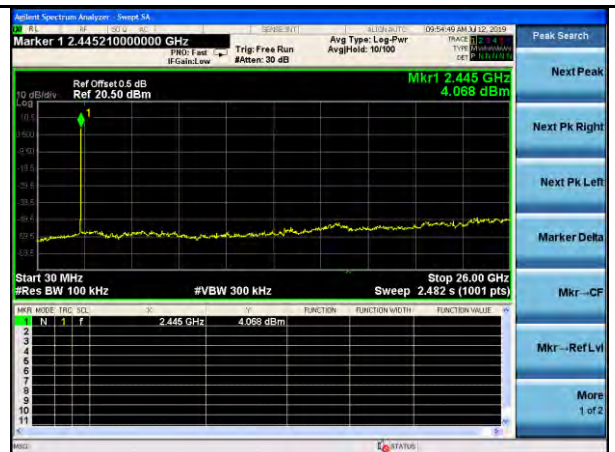


11n-20MHz-Band Edge-High

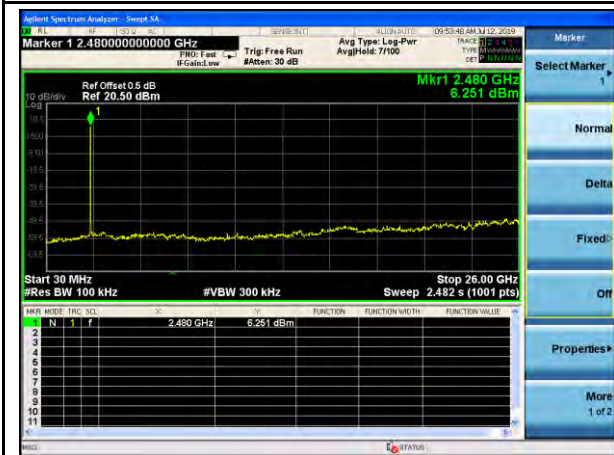
Report Number: WAP-19052921-LC-FCC-DTS-G4  
Product: Vehicle Infotainment System  
Model Number: SYNC-G4



BLE-Out Of Band Emission-Low



BLE-Out Of Band Emission-Mid



BLE-Out Of Band Emission-High



11b-Out Of Band Emission-Low



11g-Out Of Band Emission-Low



11b-Out Of Band Emission-Mid



11g-Out Of Band Emission-Mid

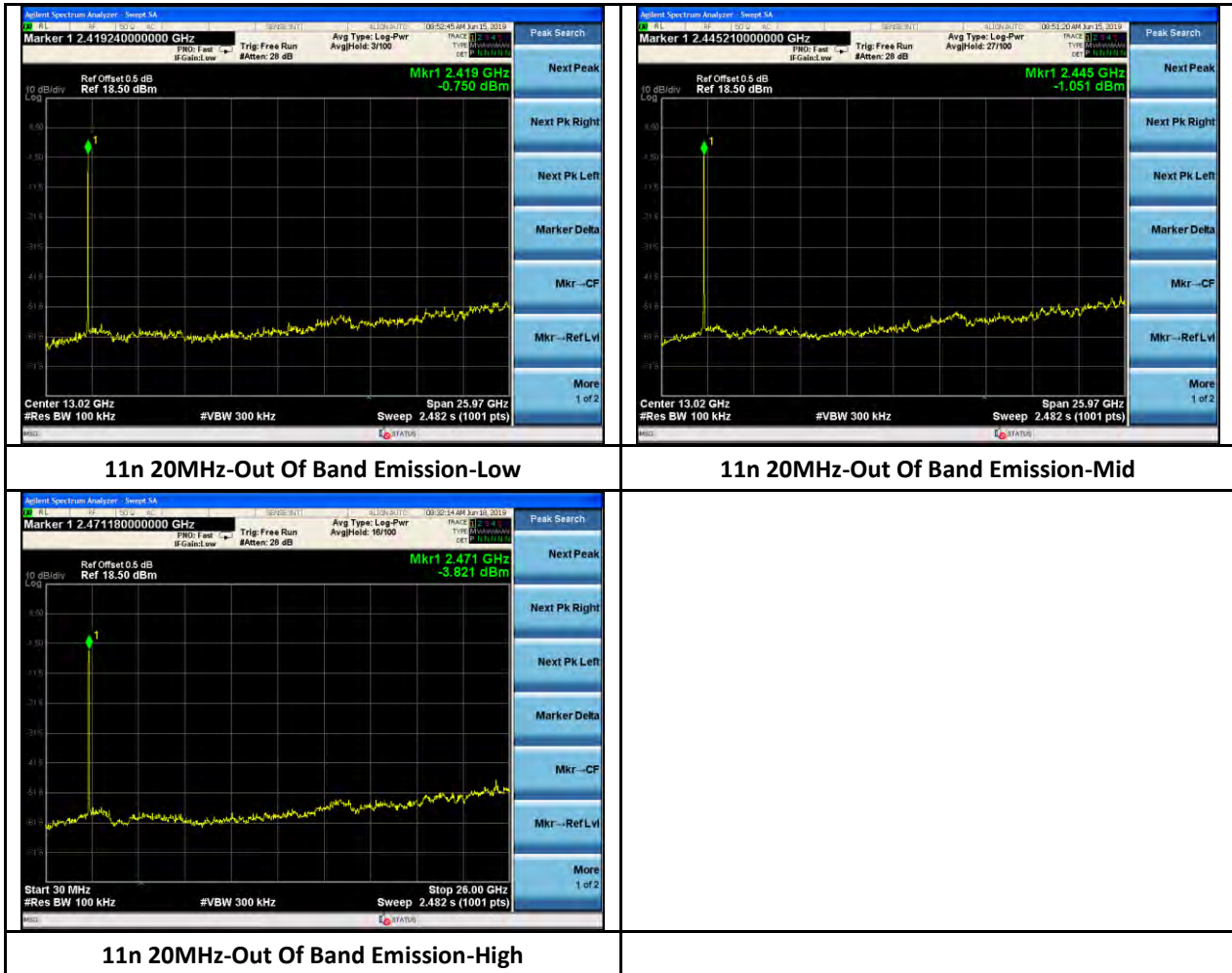


11b-Out Of Band Emission-High



11g-Out Of Band Emission-High

|                |                             |
|----------------|-----------------------------|
| Report Number: | WAP-19052921-LC-FCC-DTS-G4  |
| Product:       | Vehicle Infotainment System |
| Model Number:  | SYNC-G4                     |



## 8.6 Radiated Band-Edge & Spurious Emissions into Restricted Frequency Bands

### 8.6.1 Requirement

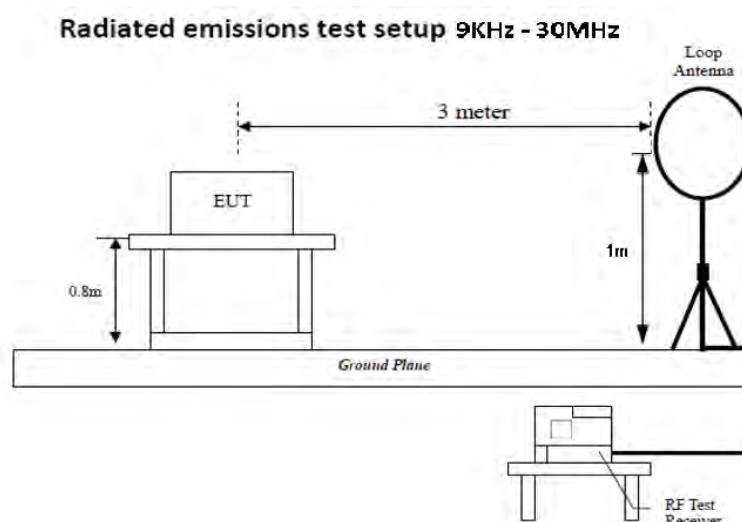
§ 15.247 (d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

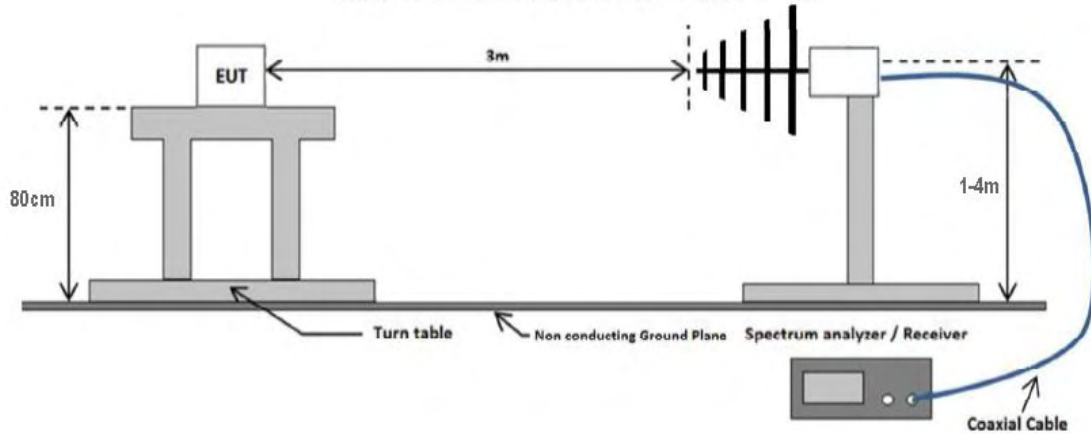
Attenuation below the general limits specified in §15.209(a) and RSS-Gen is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

| Frequency range (MHz) | Field Strength ( $\mu\text{V/m}$ ) |
|-----------------------|------------------------------------|
| 0.009~0.490           | 2400/F(KHz)                        |
| 0.490~1.705           | 24000/F(KHz)                       |
| 1.705~30.0            | 30                                 |
| 30 – 88               | 100                                |
| 88 – 216              | 150                                |
| 216 960               | 200                                |
| Above 960             | 500                                |

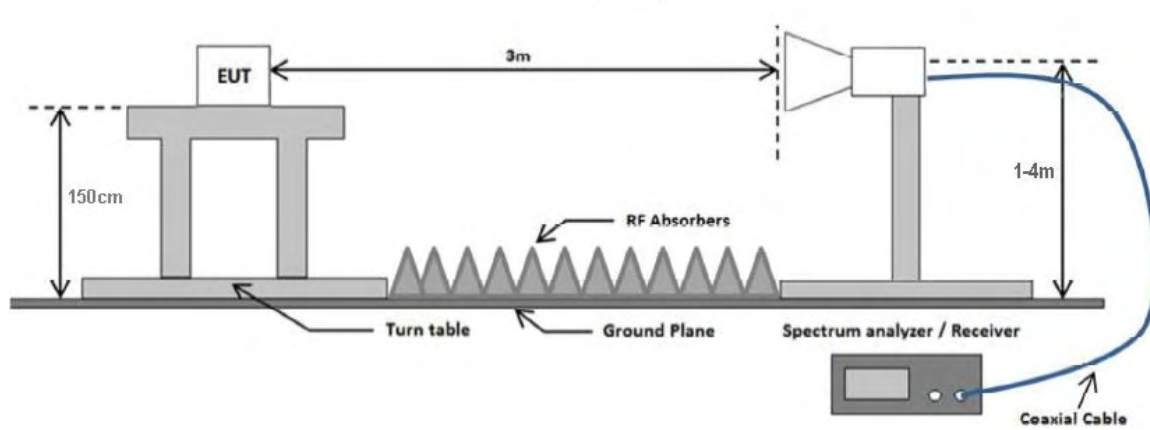
### 8.6.2 Test setup



Radiated emissions test setup 30 MHz - 1 GHz



Radiated emissions test setup above 1 GHz



|                       |                             |
|-----------------------|-----------------------------|
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| <b>Model Number:</b>  | SYNC-G4                     |



### 8.6.3 Test Procedure

According to section 8.6 in KDB 558074 D01 DTS Meas Guidance v05r02 and subclause 11.12.2.7 Radiated spurious emission measurements in ANSI C62.10-2013 as well as the procedures for maximizing and measuring radiated emissions that are described in ANSI C63.10 was followed. Boresight antenna mast was used during the scanning to point to EUT to maximize the emission. The process will be repeated in 3 EUT orientations.

1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. The test was carried out at the selected frequency points obtained from the EUT characterization. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:
  - a. Vertical or horizontal polarization (whichever gave the higher emission level over a full rotation of the EUT) was chosen.
  - b. The EUT was then rotated to the direction that gave the maximum emission.
  - c. Finally, the antenna height was adjusted to the height that gave the maximum emission.
3. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 300 Hz for frequency below 150KHz.
4. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 10 kHz for frequency between 150KHz – 30MHz.
5. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-Peak detection at frequency between 30MHz - 1GHz.
6. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz with Peak detection for Peak and average measurement at frequency above 1GHz.
7. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.

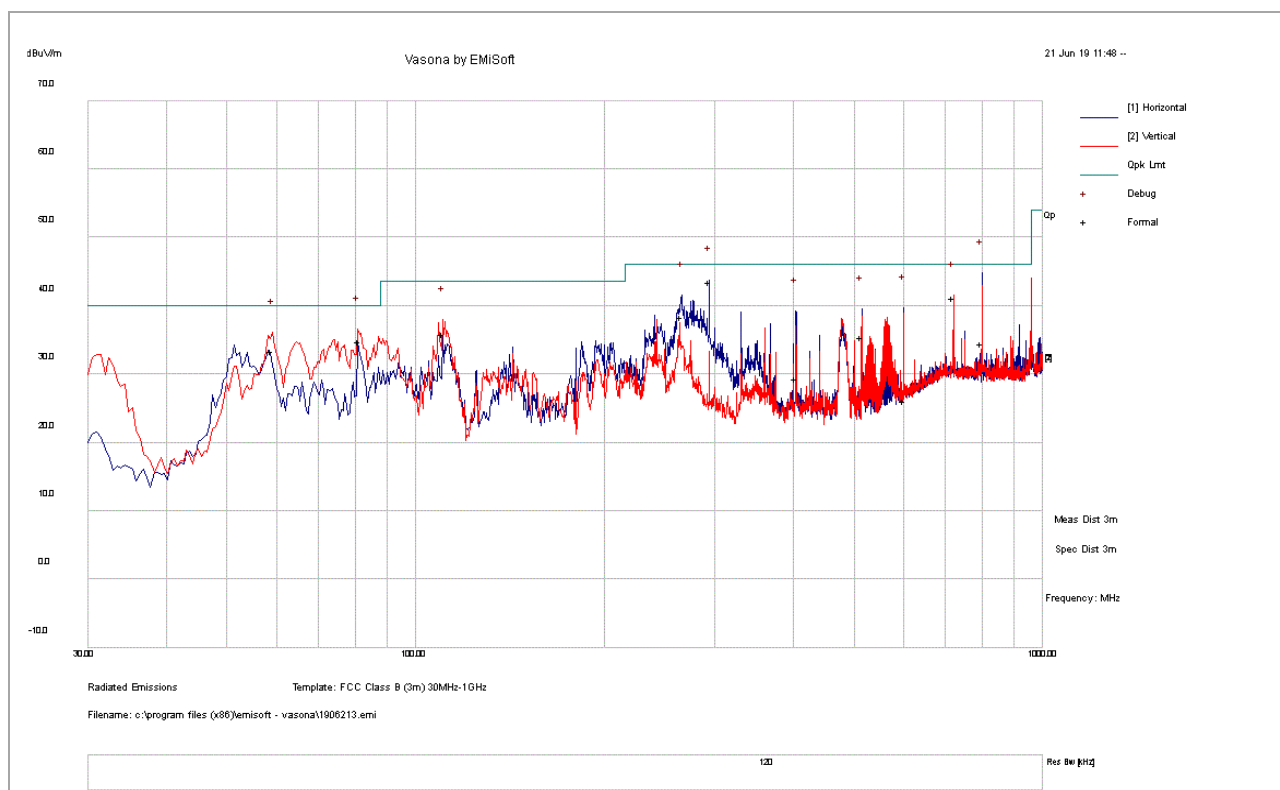
|                       |                             |
|-----------------------|-----------------------------|
| <b>Report Number:</b> | WAP-19052921-LC-FCC-DTS-G4  |
| <b>Product:</b>       | Vehicle Infotainment System |
| <b>Model Number:</b>  | SYNC-G4                     |



### 8.6.4 Test Result

#### 30-1000MHz test result

|                               |                  |                        |            |
|-------------------------------|------------------|------------------------|------------|
| <b>Test Standard:</b>         | 15.209, 15.247   | <b>Mode:</b>           | BLE Mode   |
| <b>Frequency Range:</b>       | 30-1000MHz       | <b>Test Date:</b>      | 06/27/2019 |
| <b>Antenna Type/Polarity:</b> | Bi-Log/Hor & Ver | <b>Test Personnel:</b> | Cameron Wu |
| <b>Remark:</b>                | N/A              | <b>Test Result:</b>    | Pass       |



| Frequency MHz | Raw dB | Cable dB | AF dB  | Level dBuV/m | Det | Pol deg | Height cm | Table deg | Limit dBuV/m | Margin dB |
|---------------|--------|----------|--------|--------------|-----|---------|-----------|-----------|--------------|-----------|
| 799.98        | 34.10  | 7.20     | -6.80  | 34.60        | QP  | H       | 359       | 47        | 46.00        | -11.40    |
| 293.90        | 56.60  | 5.60     | -18.80 | 43.50        | QP  | H       | 101       | 203       | 46.00        | -2.50     |
| 81.17         | 56.00  | 3.30     | -24.60 | 34.80        | QP  | V       | 125       | 289       | 40.00        | -5.20     |
| 58.85         | 55.10  | 3.00     | -24.70 | 33.40        | QP  | V       | 110       | 140       | 40.00        | -6.60     |
| 720.00        | 40.50  | 7.30     | -6.50  | 41.30        | QP  | V       | 100       | 328       | 46.00        | -4.70     |
| 265.59        | 52.10  | 5.40     | -19.10 | 38.40        | QP  | H       | 100       | 194       | 46.00        | -7.60     |
| 110.76        | 55.60  | 3.70     | -23.40 | 35.90        | QP  | V       | 139       | 109       | 43.50        | -7.60     |
| 600.00        | 28.80  | 7.20     | -9.90  | 26.10        | QP  | H       | 100       | 282       | 46.00        | -19.90    |
| 514.52        | 41.40  | 6.20     | -12.30 | 35.40        | QP  | H       | 109       | 35        | 46.00        | -10.60    |
| 404.17        | 36.50  | 6.40     | -13.50 | 29.40        | QP  | H       | 113       | 342       | 46.00        | -16.60    |

Note:

- 1) For below 1GHz, all different channel and modes were verified but only the worst case result is shown here.



Electromagnetic Compatibility  
Radio Frequency  
Product Certification  
International Approval

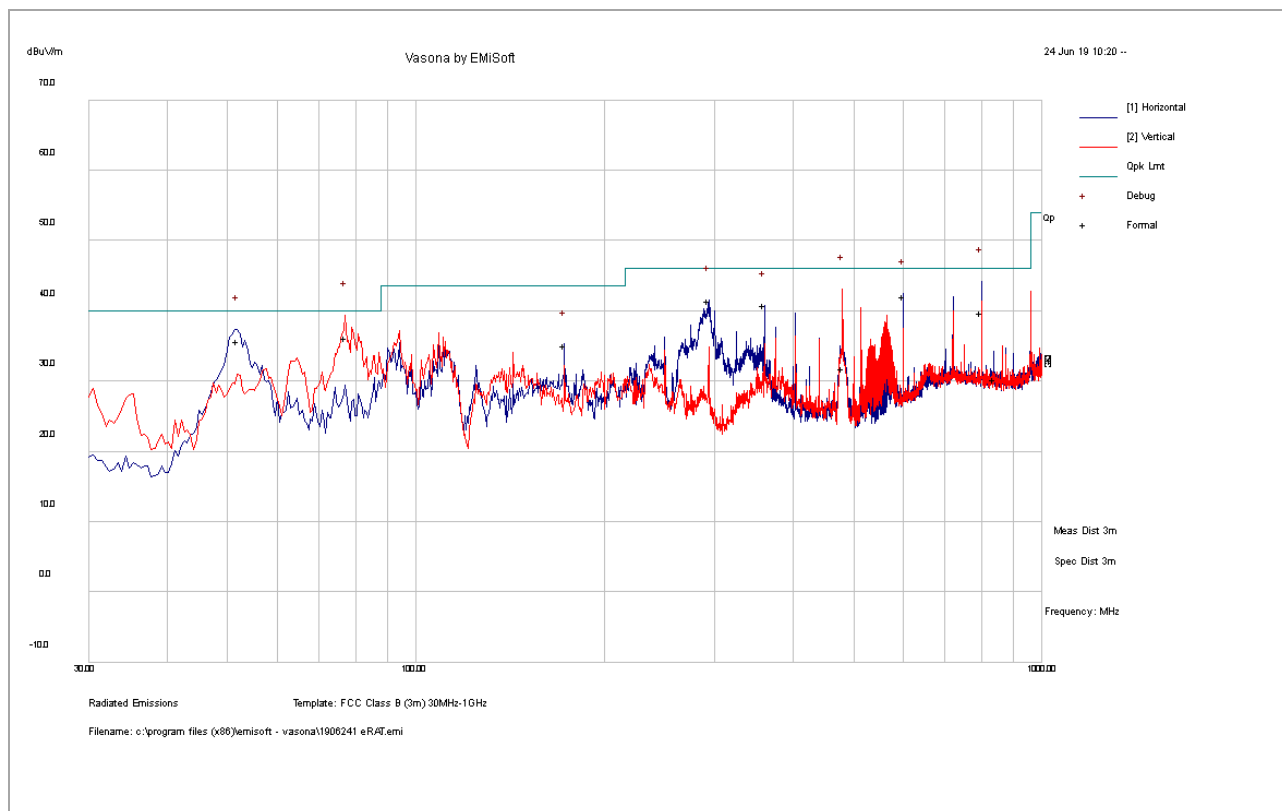
1261 Puerta Del Sol  
San Clemente, CA, 92673  
+1 (949) 393-1123  
[www.vista-compliance.com](http://www.vista-compliance.com)

|                       |                             |
|-----------------------|-----------------------------|
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| <b>Product:</b>       | Vehicle Infotainment System |
| <b>Model Number:</b>  | SYNC-G4                     |



### 30-1000MHz test result

|                               |                  |                        |                  |
|-------------------------------|------------------|------------------------|------------------|
| <b>Test Standard:</b>         | 15.209, 15.247   | <b>Mode:</b>           | 2.4GHz WLAN mode |
| <b>Frequency Range:</b>       | 30-1000MHz       | <b>Test Date:</b>      | 06/27/2019       |
| <b>Antenna Type/Polarity:</b> | Bi-Log/Hor & Ver | <b>Test Personnel:</b> | Cameron Wu       |
| <b>Remark:</b>                | N/A              | <b>Test Result:</b>    | Pass             |



| Frequency MHz | Raw dB | Cable dB | AF dB  | Level dBuV/m | Det | Pol deg | Height cm | Table deg | Limit dBuV/m | Margin dB |
|---------------|--------|----------|--------|--------------|-----|---------|-----------|-----------|--------------|-----------|
| 293.36        | 54.71  | 5.63     | -18.79 | 41.55        | QP  | H       | 124       | 348       | 46.00        | -4.45     |
| 77.18         | 57.41  | 3.28     | -24.50 | 36.19        | QP  | V       | 136       | 295       | 40.00        | -3.81     |
| 799.98        | 39.35  | 7.24     | -6.76  | 39.83        | QP  | H       | 157       | 318       | 46.00        | -6.17     |
| 51.76         | 57.59  | 2.83     | -24.74 | 35.69        | QP  | H       | 392       | 14        | 40.00        | -4.31     |
| 480.02        | 38.99  | 6.13     | -13.26 | 31.86        | QP  | V       | 176       | 265       | 46.00        | -14.14    |
| 600.00        | 44.81  | 7.16     | -9.91  | 42.06        | QP  | H       | 101       | 62        | 46.00        | -3.94     |

Note:

- 1) For below 1GHz, all different channel and modes were verified but only the worst case result is shown here.



Electromagnetic Compatibility  
Radio Frequency  
Product Certification  
International Approval

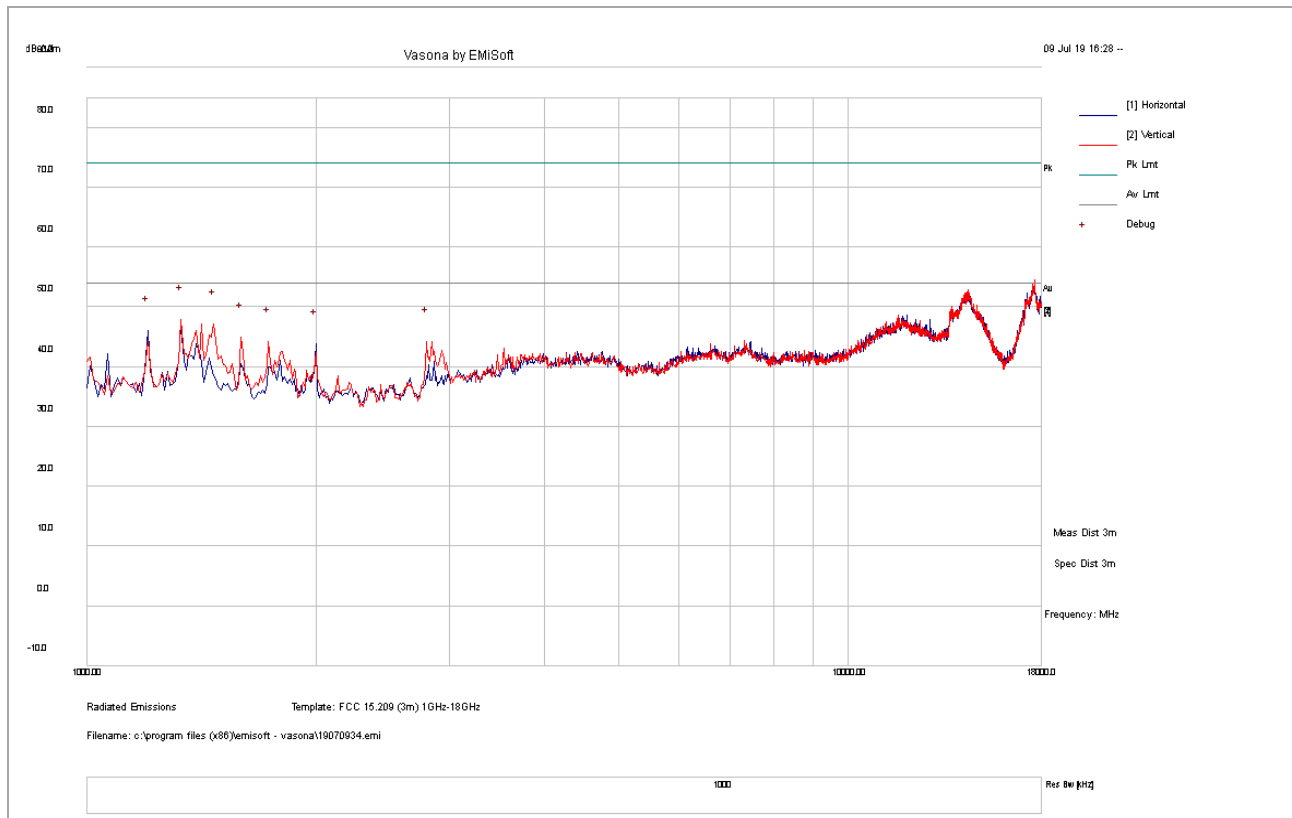
1261 Puerta Del Sol  
San Clemente, CA, 92673  
+1 (949) 393-1123  
[www.vista-compliance.com](http://www.vista-compliance.com)

|                       |                             |
|-----------------------|-----------------------------|
| <b>Report Number:</b> | WAP-19052921-LC-FCC-DTS-G4  |
| <b>Product:</b>       | Vehicle Infotainment System |
| <b>Model Number:</b>  | SYNC-G4                     |



## 1GHz – 18GHz test result

|                               |                           |                        |                   |
|-------------------------------|---------------------------|------------------------|-------------------|
| <b>Test Standard:</b>         | <b>15.209, 15.247</b>     | <b>Mode:</b>           | <b>BLE-Low CH</b> |
| <b>Frequency Range:</b>       | <b>1GHz-18GHz</b>         | <b>Test Date:</b>      | <b>06/27/2019</b> |
| <b>Antenna Type/Polarity:</b> | <b>Horn/Hor &amp; Ver</b> | <b>Test Personnel:</b> | <b>Cameron Wu</b> |
| <b>Remark:</b>                | <b>N/A</b>                | <b>Test Result:</b>    | <b>Pass</b>       |



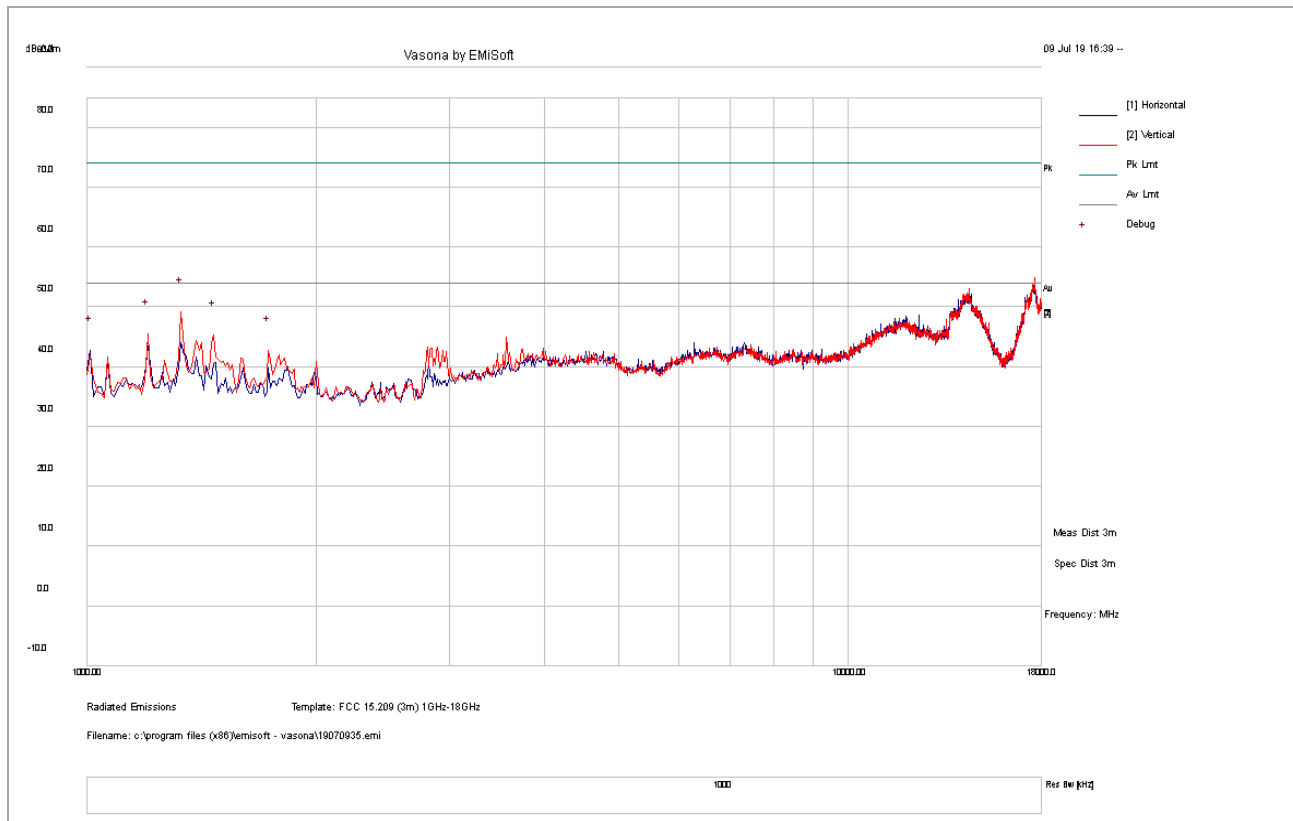
| Frequency MHz | Raw dB | Cable dB | AF dB | Level dBuV/m | Det | Pol deg | Height cm | Table deg | Limit dBuV/m | Margin dB |
|---------------|--------|----------|-------|--------------|-----|---------|-----------|-----------|--------------|-----------|
| 1201.88       | 39.81  | 10.31    | -4.18 | 45.94        | PK  | H       | 104       | 344       | 54           | -8.06     |
| 1329.38       | 41.16  | 10.56    | -3.81 | 47.90        | PK  | V       | 350       | 287       | 54           | -6.10     |
| 1467.50       | 40.12  | 10.81    | -3.75 | 47.19        | PK  | V       | 120       | 164       | 54           | -6.82     |
| 1595.00       | 37.47  | 10.73    | -3.37 | 44.83        | PK  | V       | 249       | 254       | 54           | -9.17     |
| 1733.13       | 36.27  | 10.56    | -2.68 | 44.15        | PK  | V       | 224       | 219       | 54           | -9.85     |
| 1998.75       | 34.26  | 10.25    | -0.73 | 43.79        | PK  | H       | 211       | 44        | 54           | -10.21    |
| 2795.63       | 31.26  | 11.12    | 1.77  | 44.15        | PK  | V       | 288       | 0         | 54           | -9.85     |

**Report Number:** WAP-19052921-LC-FCC-DTS-G4  
**Product:** Vehicle Infotainment System  
**Model Number:** SYNC-G4



## 1GHz – 18GHz test result

|                               |                           |                        |                   |
|-------------------------------|---------------------------|------------------------|-------------------|
| <b>Test Standard:</b>         | <b>15.209, 15.247</b>     | <b>Mode:</b>           | <b>BLE-Mid CH</b> |
| <b>Frequency Range:</b>       | <b>1GHz-18GHz</b>         | <b>Test Date:</b>      | <b>06/27/2019</b> |
| <b>Antenna Type/Polarity:</b> | <b>Horn/Hor &amp; Ver</b> | <b>Test Personnel:</b> | <b>Cameron Wu</b> |
| <b>Remark:</b>                | <b>N/A</b>                | <b>Test Result:</b>    | <b>Pass</b>       |



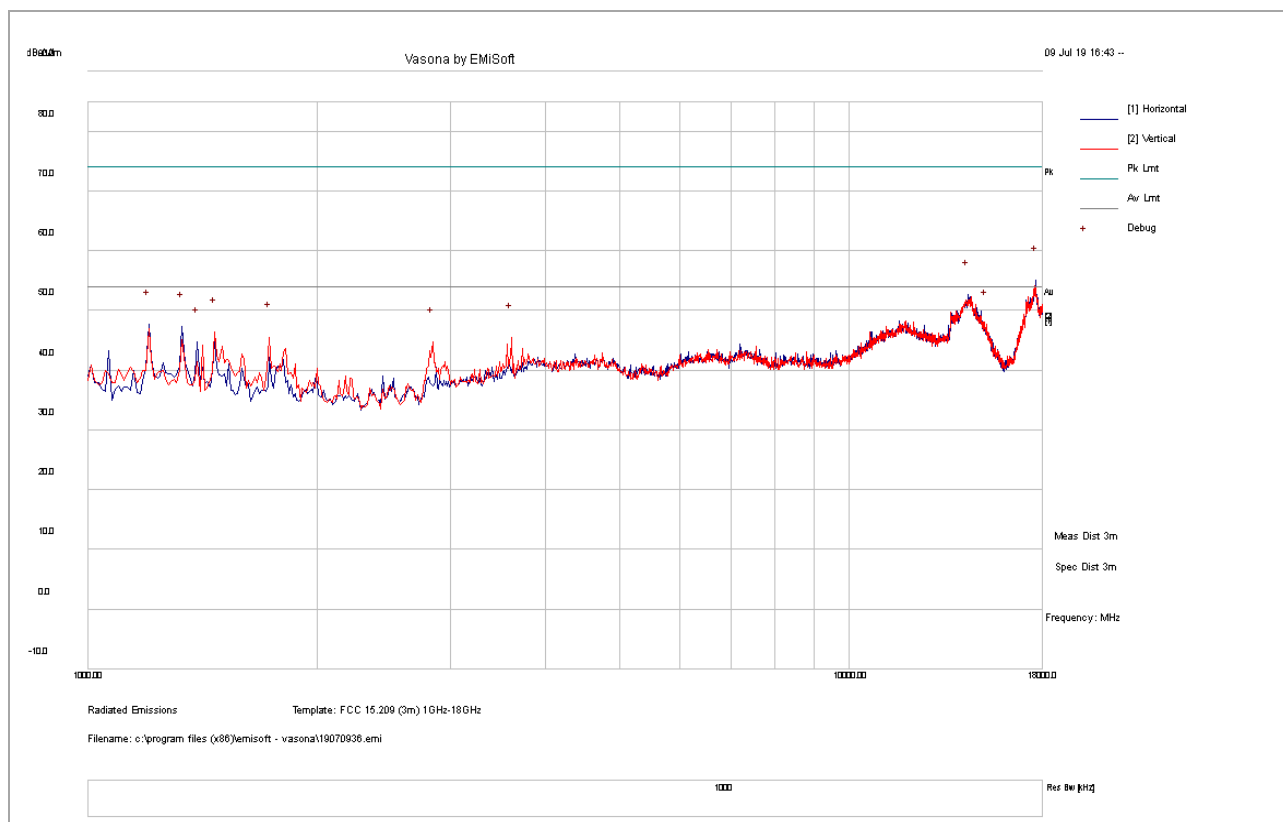
| Frequency MHz | Raw dB | Cable dB | AF dB | Level dBuV/m | Det | Pol deg | Height cm | Table deg | Limit dBuV/m | Margin dB |
|---------------|--------|----------|-------|--------------|-----|---------|-----------|-----------|--------------|-----------|
| 1010.63       | 38.30  | 9.87     | -5.57 | 42.60        | PK  | H       | 211       | 44        | 54           | -11.40    |
| 1201.88       | 39.27  | 10.31    | -4.18 | 45.40        | PK  | V       | 288       | 0         | 54           | -8.60     |
| 1329.38       | 42.43  | 10.56    | -3.81 | 49.17        | PK  | V       | 165       | 202       | 54           | -4.83     |
| 1467.50       | 38.12  | 10.81    | -3.75 | 45.18        | PK  | V       | 182       | 71        | 54           | -8.82     |
| 1733.13       | 34.79  | 10.56    | -2.68 | 42.67        | PK  | V       | 200       | 113       | 54           | -11.33    |

|                       |                             |
|-----------------------|-----------------------------|
| <b>Report Number:</b> | WAP-19052921-LC-FCC-DTS-G4  |
| <b>Product:</b>       | Vehicle Infotainment System |
| <b>Model Number:</b>  | SYNC-G4                     |



## 1GHz – 18GHz test result

|                               |                |                        |             |
|-------------------------------|----------------|------------------------|-------------|
| <b>Test Standard:</b>         | 15.209, 15.247 | <b>Mode:</b>           | BLE-High CH |
| <b>Frequency Range:</b>       | 1GHz-18GHz     | <b>Test Date:</b>      | 06/27/2019  |
| <b>Antenna Type/Polarity:</b> | Horn/Hor & Ver | <b>Test Personnel:</b> | Cameron Wu  |
| <b>Remark:</b>                | N/A            | <b>Test Result:</b>    | Pass        |



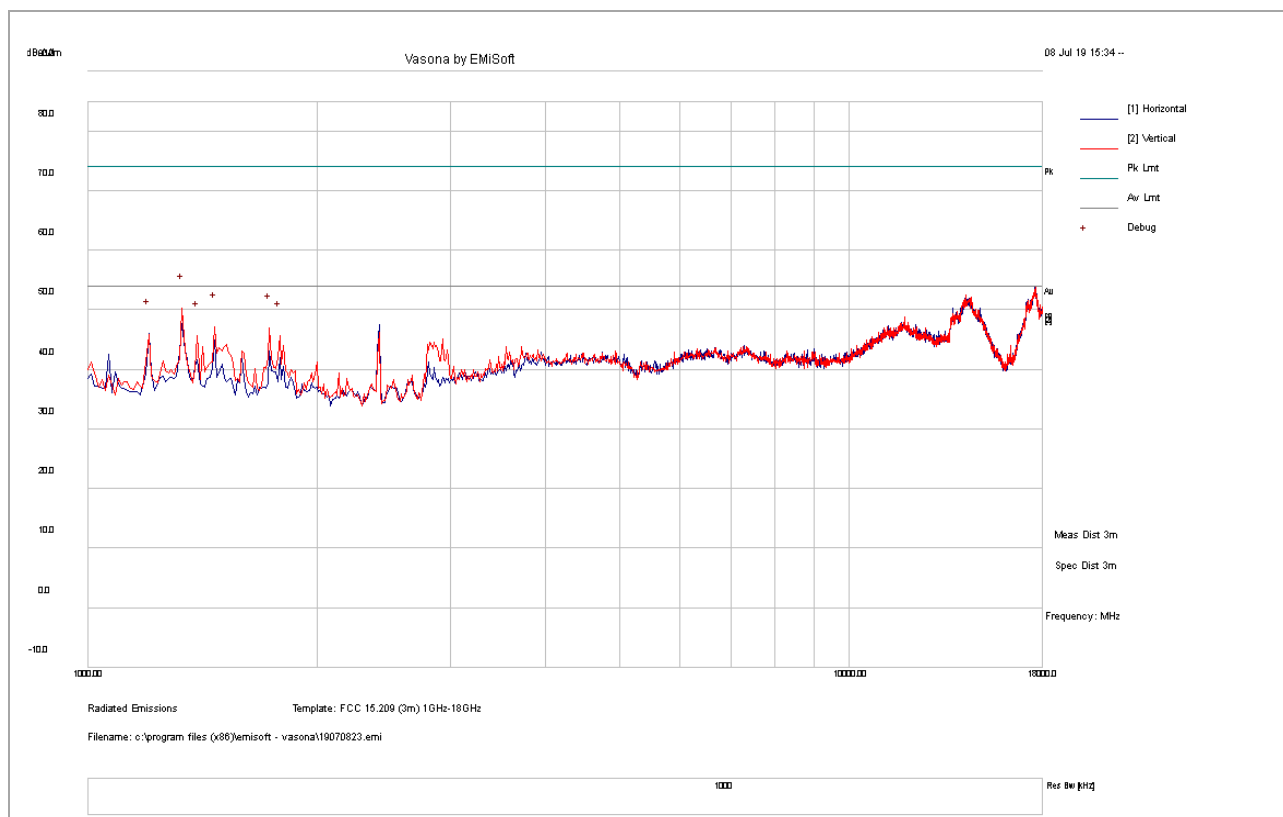
| Frequency MHz | Raw dB | Cable dB | AF dB | Level dBuV/m | Det | Pol deg | Height cm | Table deg | Limit dBuV/m | Margin dB |
|---------------|--------|----------|-------|--------------|-----|---------|-----------|-----------|--------------|-----------|
| 1201.88       | 41.55  | 10.31    | -4.18 | 47.68        | PK  | H       | 318       | 350       | 54           | -6.32     |
| 1329.38       | 40.53  | 10.56    | -3.81 | 47.28        | PK  | H       | 222       | 340       | 54           | -6.72     |
| 1393.13       | 37.64  | 10.68    | -3.55 | 44.77        | PK  | H       | 114       | 202       | 54           | -9.23     |
| 1467.50       | 39.37  | 10.81    | -3.75 | 46.43        | PK  | V       | 400       | 134       | 54           | -7.57     |
| 1733.13       | 37.66  | 10.56    | -2.68 | 45.53        | PK  | V       | 137       | 182       | 54           | -8.47     |
| 2838.13       | 31.54  | 11.16    | 2.04  | 44.75        | PK  | V       | 160       | 196       | 54           | -9.25     |

|                       |                             |
|-----------------------|-----------------------------|
| <b>Report Number:</b> | WAP-19052921-LC-FCC-DTS-G4  |
| <b>Product:</b>       | Vehicle Infotainment System |
| <b>Model Number:</b>  | SYNC-G4                     |



## 1GHz – 18GHz test result

|                               |                |                        |             |
|-------------------------------|----------------|------------------------|-------------|
| <b>Test Standard:</b>         | 15.209, 15.247 | <b>Mode:</b>           | 11b-2412MHz |
| <b>Frequency Range:</b>       | 1GHz-18GHz     | <b>Test Date:</b>      | 06/27/2019  |
| <b>Antenna Type/Polarity:</b> | Horn/Hor & Ver | <b>Test Personnel:</b> | Cameron Wu  |
| <b>Remark:</b>                | N/A            | <b>Test Result:</b>    | Pass        |



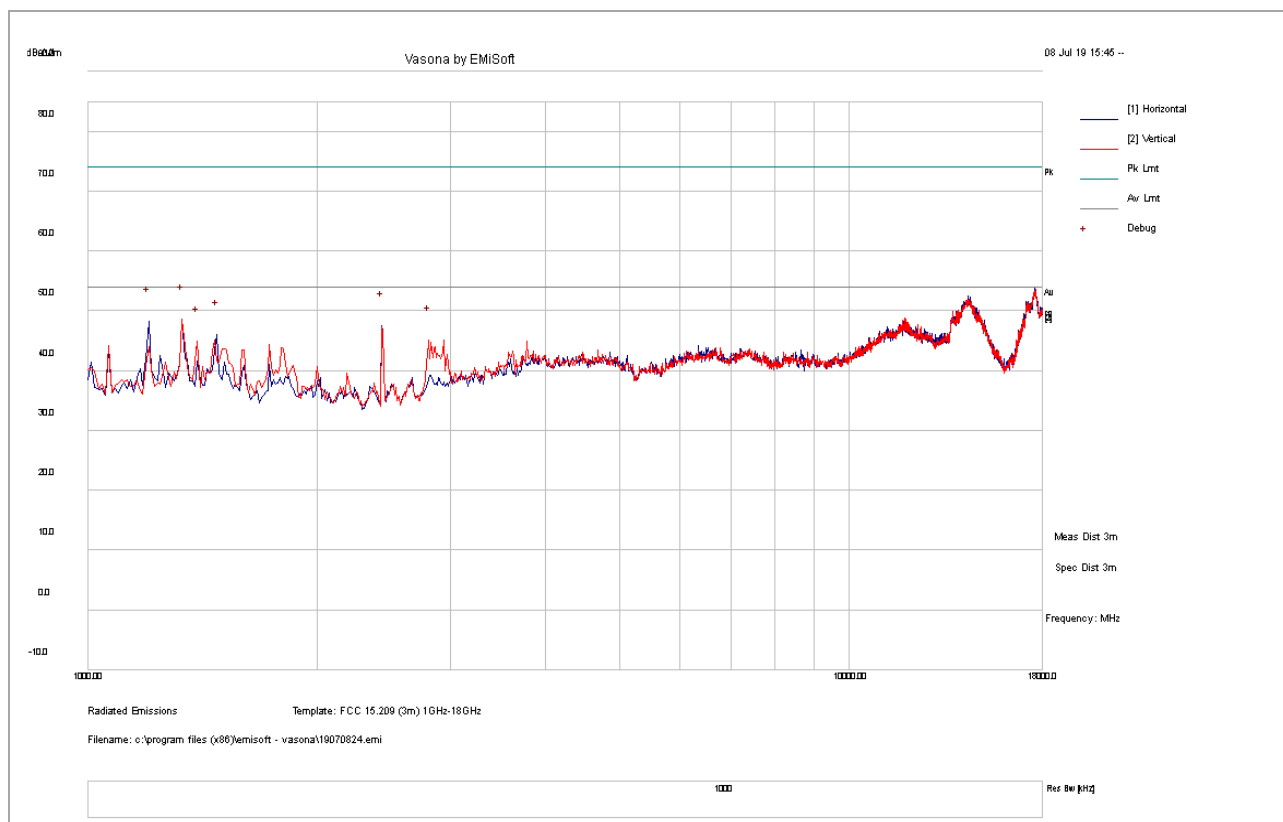
| Frequency MHz | Raw dB | Cable dB | AF dB | Level dBuV/m | Det | Pol deg | Height cm | Table deg | Limit dBuV/m | Margin dB |
|---------------|--------|----------|-------|--------------|-----|---------|-----------|-----------|--------------|-----------|
| 1201.88       | 39.81  | 10.31    | -4.18 | 45.94        | PK  | H       | 258       | 357       | 54           | -8.06     |
| 1329.38       | 43.47  | 10.56    | -3.81 | 50.22        | PK  | V       | 131       | 324       | 54           | -3.78     |
| 1393.13       | 38.55  | 10.68    | -3.55 | 45.68        | PK  | V       | 124       | 185       | 54           | -8.32     |
| 1467.50       | 40.08  | 10.81    | -3.75 | 47.14        | PK  | V       | 229       | 114       | 54           | -6.86     |
| 1733.13       | 39.09  | 10.56    | -2.68 | 46.97        | PK  | V       | 115       | 257       | 54           | -7.03     |
| 1786.25       | 37.10  | 10.49    | -1.91 | 45.69        | PK  | V       | 279       | 118       | 54           | -8.31     |

|                       |                             |
|-----------------------|-----------------------------|
| <b>Report Number:</b> | WAP-19052921-LC-FCC-DTS-G4  |
| <b>Product:</b>       | Vehicle Infotainment System |
| <b>Model Number:</b>  | SYNC-G4                     |



## 1GHz – 18GHz test result

|                               |                |                        |             |
|-------------------------------|----------------|------------------------|-------------|
| <b>Test Standard:</b>         | 15.209, 15.247 | <b>Mode:</b>           | 11b-2437MHz |
| <b>Frequency Range:</b>       | 1GHz-18GHz     | <b>Test Date:</b>      | 06/27/2019  |
| <b>Antenna Type/Polarity:</b> | Horn/Hor & Ver | <b>Test Personnel:</b> | Cameron Wu  |
| <b>Remark:</b>                | N/A            | <b>Test Result:</b>    | Pass        |



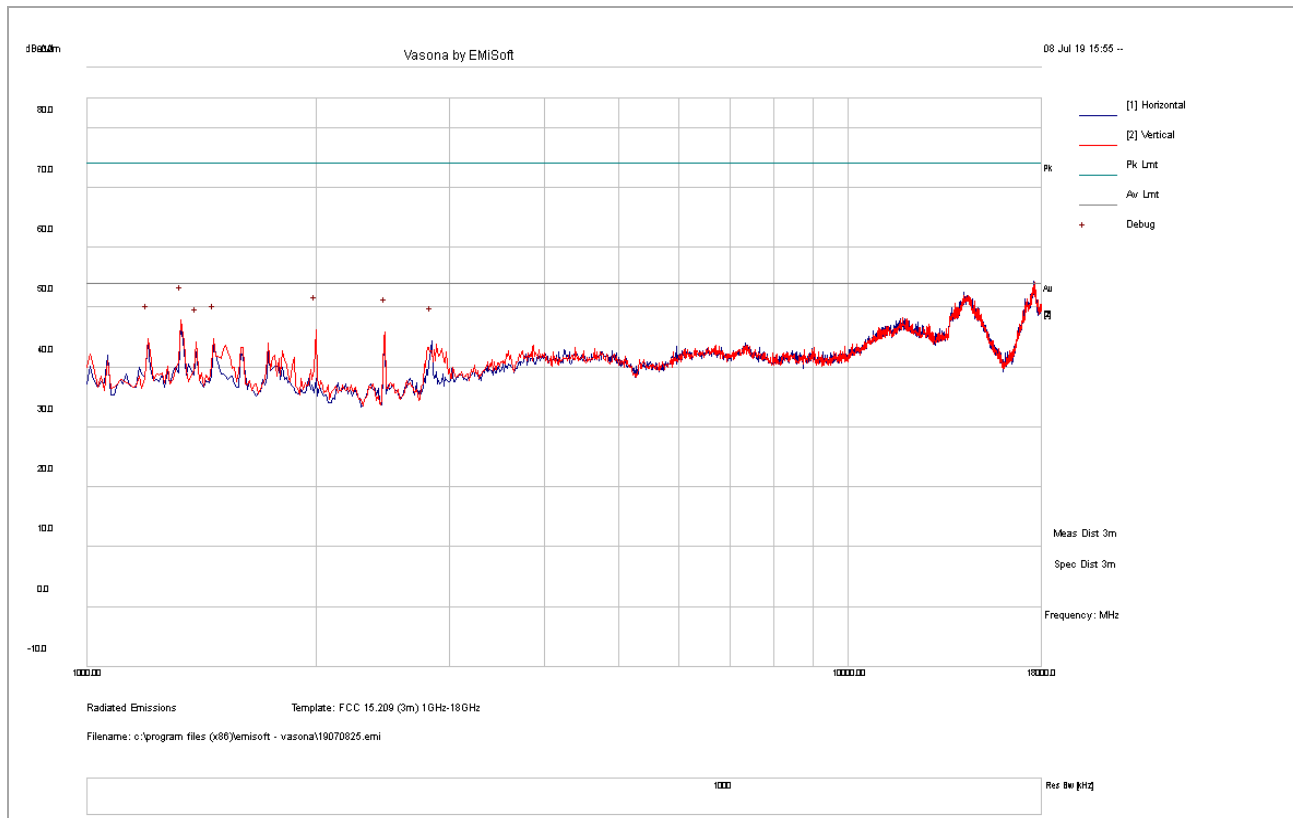
| Frequency MHz | Raw dB | Cable dB | AF dB | Level dBuV/m | Det | Pol deg | Height cm | Table deg | Limit dBuV/m | Margin dB |
|---------------|--------|----------|-------|--------------|-----|---------|-----------|-----------|--------------|-----------|
| 1201.88       | 42.04  | 10.31    | -4.18 | 48.17        | PK  | H       | 362       | 142       | 54           | -5.83     |
| 1329.38       | 41.81  | 10.56    | -3.81 | 48.56        | PK  | V       | 248       | 212       | 54           | -5.44     |
| 1393.13       | 37.74  | 10.68    | -3.55 | 44.87        | PK  | V       | 341       | 238       | 54           | -9.13     |
| 1478.13       | 38.90  | 10.83    | -3.76 | 45.96        | PK  | H       | 205       | 166       | 54           | -8.04     |
| 2434.38       | 36.52  | 10.75    | 0.13  | 47.39        | PK  | H       | 334       | 282       | 54           | -6.61     |
| 2806.25       | 32.11  | 11.13    | 1.83  | 45.08        | PK  | V       | 304       | 266       | 54           | -8.92     |

|                       |                             |
|-----------------------|-----------------------------|
| <b>Report Number:</b> | WAP-19052921-LC-FCC-DTS-G4  |
| <b>Product:</b>       | Vehicle Infotainment System |
| <b>Model Number:</b>  | SYNC-G4                     |



## 1GHz – 18GHz test result

|                               |                           |                        |                    |
|-------------------------------|---------------------------|------------------------|--------------------|
| <b>Test Standard:</b>         | <b>15.209, 15.247</b>     | <b>Mode:</b>           | <b>11b-2462MHz</b> |
| <b>Frequency Range:</b>       | <b>1GHz-18GHz</b>         | <b>Test Date:</b>      | <b>06/27/2019</b>  |
| <b>Antenna Type/Polarity:</b> | <b>Horn/Hor &amp; Ver</b> | <b>Test Personnel:</b> | <b>Cameron Wu</b>  |
| <b>Remark:</b>                | <b>N/A</b>                | <b>Test Result:</b>    | <b>Pass</b>        |



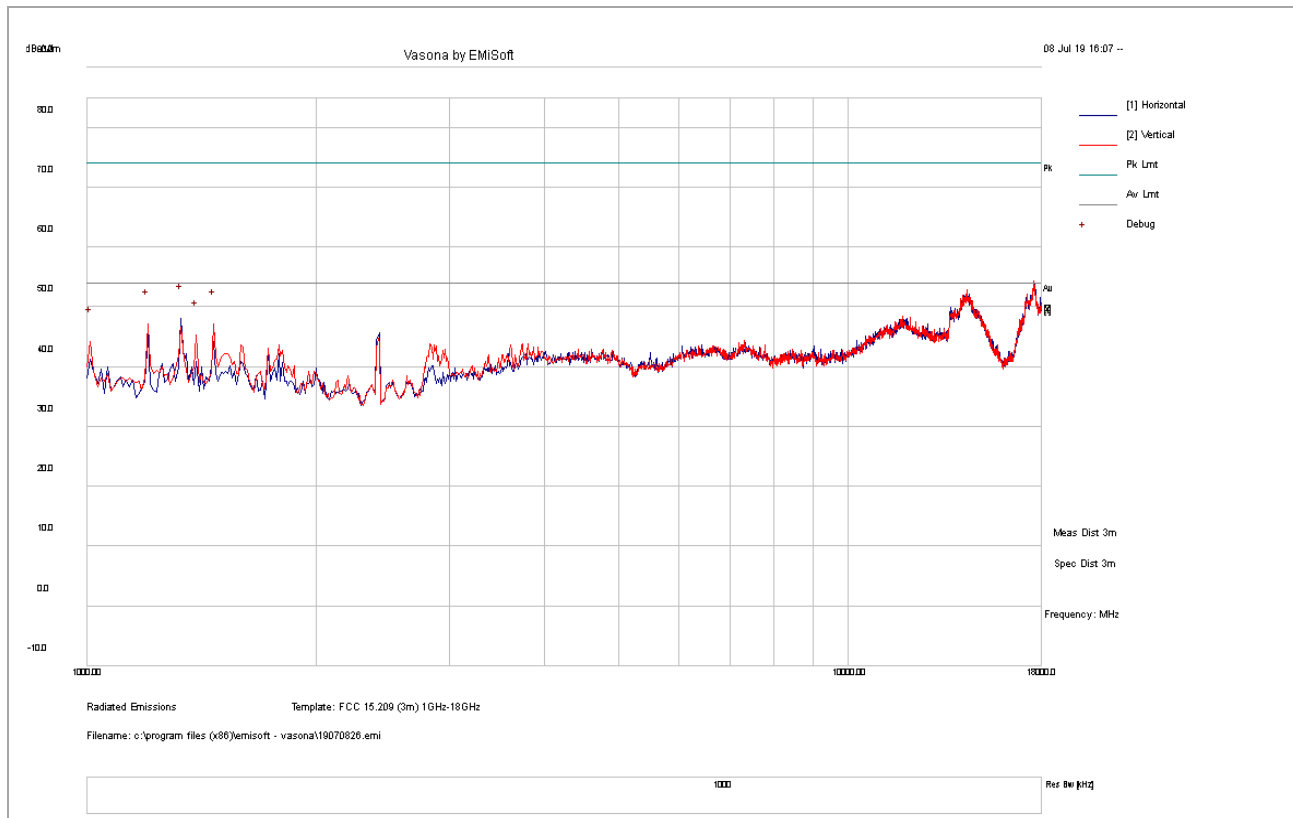
| Frequency MHz | Raw dB | Cable dB | AF dB | Level dBuV/m | Det | Pol deg | Height cm | Table deg | Limit dBuV/m | Margin dB |
|---------------|--------|----------|-------|--------------|-----|---------|-----------|-----------|--------------|-----------|
| 1201.88       | 38.61  | 10.31    | -4.18 | 44.75        | PK  | V       | 297       | 276       | 54           | -9.26     |
| 1329.38       | 41.06  | 10.56    | -3.81 | 47.81        | PK  | V       | 281       | 45        | 54           | -6.19     |
| 1393.13       | 36.99  | 10.68    | -3.55 | 44.11        | PK  | V       | 352       | 231       | 54           | -9.89     |
| 1467.50       | 37.73  | 10.81    | -3.75 | 44.79        | PK  | V       | 164       | 70        | 54           | -9.21     |
| 1998.75       | 36.67  | 10.25    | -0.73 | 46.20        | PK  | V       | 198       | 22        | 54           | -7.80     |
| 2466.25       | 34.67  | 10.78    | 0.29  | 45.75        | PK  | V       | 124       | 142       | 54           | -8.25     |
| 2838.13       | 31.17  | 11.16    | 2.04  | 44.37        | PK  | H       | 269       | 303       | 54           | -9.63     |

**Report Number:** WAP-19052921-LC-FCC-DTS-G4  
**Product:** Vehicle Infotainment System  
**Model Number:** SYNC-G4



## 1GHz – 18GHz test result

|                               |                           |                        |                    |
|-------------------------------|---------------------------|------------------------|--------------------|
| <b>Test Standard:</b>         | <b>15.209, 15.247</b>     | <b>Mode:</b>           | <b>11n-2412MHz</b> |
| <b>Frequency Range:</b>       | <b>1GHz-18GHz</b>         | <b>Test Date:</b>      | <b>06/27/2019</b>  |
| <b>Antenna Type/Polarity:</b> | <b>Horn/Hor &amp; Ver</b> | <b>Test Personnel:</b> | <b>Cameron Wu</b>  |
| <b>Remark:</b>                | <b>N/A</b>                | <b>Test Result:</b>    | <b>Pass</b>        |



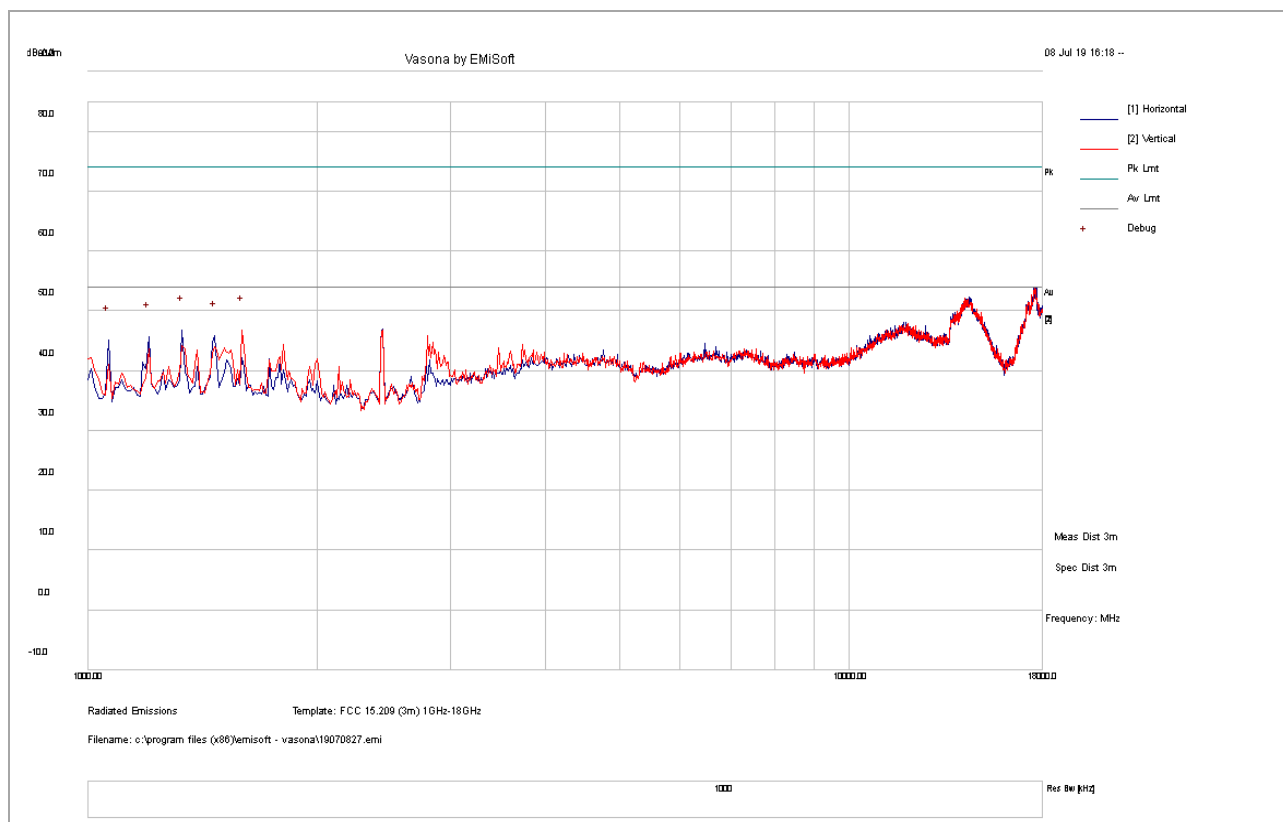
| Frequency MHz | Raw dB | Cable dB | AF dB | Level dBuV/m | Det | Pol deg | Height cm | Table deg | Limit dBuV/m | Margin dB |
|---------------|--------|----------|-------|--------------|-----|---------|-----------|-----------|--------------|-----------|
| 1010.63       | 39.93  | 9.87     | -5.57 | 44.23        | PK  | V       | 130       | 91        | 54           | -9.77     |
| 1201.88       | 41.01  | 10.31    | -4.18 | 47.14        | PK  | V       | 198       | 22        | 54           | -6.86     |
| 1329.38       | 41.24  | 10.56    | -3.81 | 47.98        | PK  | H       | 124       | 142       | 54           | -6.02     |
| 1393.13       | 38.08  | 10.68    | -3.55 | 45.21        | PK  | V       | 269       | 303       | 54           | -8.79     |
| 1467.50       | 40.02  | 10.81    | -3.75 | 47.08        | PK  | V       | 130       | 91        | 54           | -6.92     |

|                       |                             |
|-----------------------|-----------------------------|
| <b>Report Number:</b> | WAP-19052921-LC-FCC-DTS-G4  |
| <b>Product:</b>       | Vehicle Infotainment System |
| <b>Model Number:</b>  | SYNC-G4                     |



## 1GHz – 18GHz test result

|                               |                |                        |             |
|-------------------------------|----------------|------------------------|-------------|
| <b>Test Standard:</b>         | 15.209, 15.247 | <b>Mode:</b>           | 11n-2437MHz |
| <b>Frequency Range:</b>       | 1GHz-18GHz     | <b>Test Date:</b>      | 06/27/2019  |
| <b>Antenna Type/Polarity:</b> | Horn/Hor & Ver | <b>Test Personnel:</b> | Cameron Wu  |
| <b>Remark:</b>                | N/A            | <b>Test Result:</b>    | Pass        |



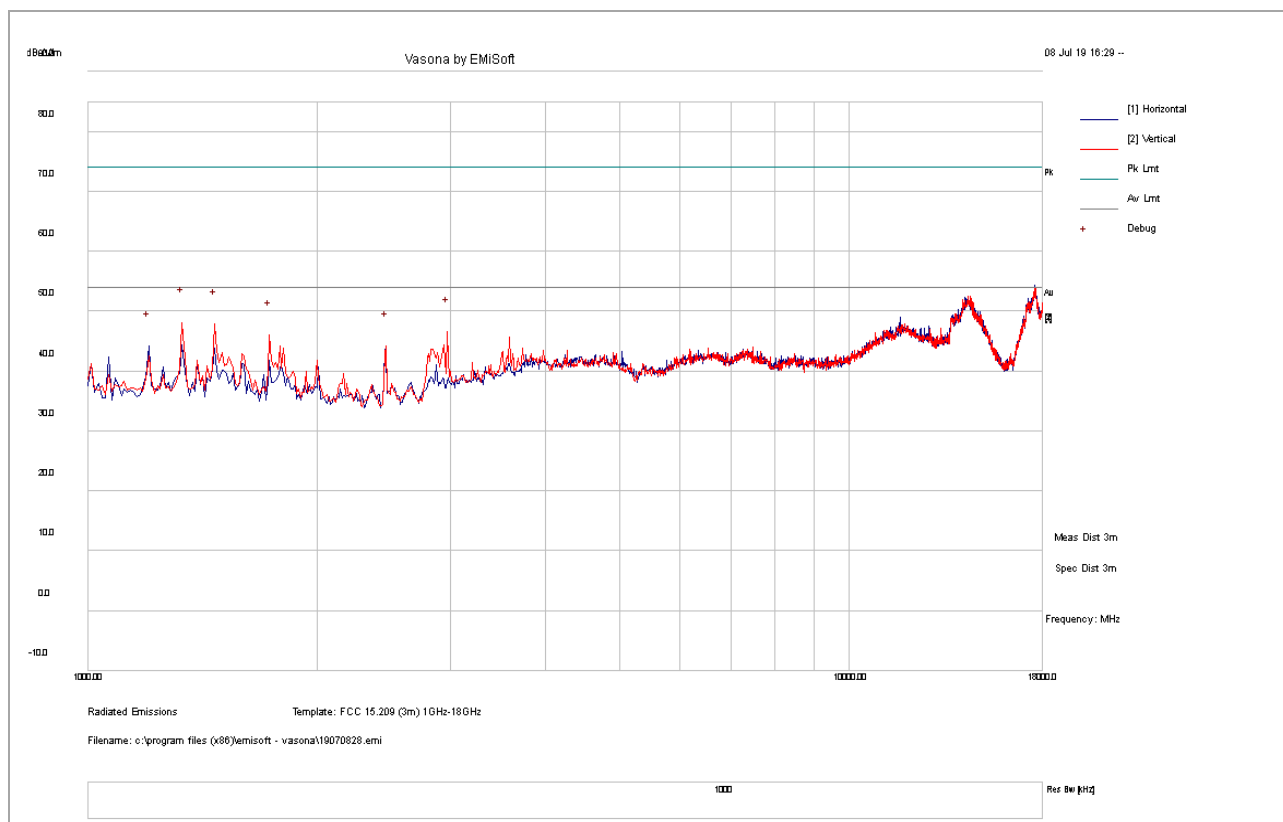
| Frequency MHz | Raw dB | Cable dB | AF dB | Level dBuV/m | Det | Pol deg | Height cm | Table deg | Limit dBuV/m | Margin dB |
|---------------|--------|----------|-------|--------------|-----|---------|-----------|-----------|--------------|-----------|
| 1063.75       | 40.00  | 10.00    | -4.90 | 45.10        | PK  | H       | 300       | 121       | 54           | -8.90     |
| 1201.88       | 39.46  | 10.31    | -4.18 | 45.59        | PK  | H       | 252       | 167       | 54           | -8.41     |
| 1329.38       | 40.04  | 10.56    | -3.81 | 46.78        | PK  | H       | 122       | 137       | 54           | -7.22     |
| 1467.50       | 38.67  | 10.81    | -3.75 | 45.74        | PK  | H       | 358       | 243       | 54           | -8.27     |
| 1595.00       | 39.36  | 10.73    | -3.37 | 46.72        | PK  | V       | 240       | 135       | 54           | -7.28     |

|                       |                             |
|-----------------------|-----------------------------|
| <b>Report Number:</b> | WAP-19052921-LC-FCC-DTS-G4  |
| <b>Product:</b>       | Vehicle Infotainment System |
| <b>Model Number:</b>  | SYNC-G4                     |



## 1GHz – 18GHz test result

|                               |                |                        |             |
|-------------------------------|----------------|------------------------|-------------|
| <b>Test Standard:</b>         | 15.209, 15.247 | <b>Mode:</b>           | 11n-2462MHz |
| <b>Frequency Range:</b>       | 1GHz-18GHz     | <b>Test Date:</b>      | 06/27/2019  |
| <b>Antenna Type/Polarity:</b> | Horn/Hor & Ver | <b>Test Personnel:</b> | Cameron Wu  |
| <b>Remark:</b>                | N/A            | <b>Test Result:</b>    | Pass        |



| Frequency MHz | Raw dB | Cable dB | AF dB | Level dBuV/m | Det | Pol deg | Height cm | Table deg | Limit dBuV/m | Margin dB |
|---------------|--------|----------|-------|--------------|-----|---------|-----------|-----------|--------------|-----------|
| 1201.88       | 38.02  | 10.31    | -4.18 | 44.15        | PK  | H       | 236       | 324       | 54           | -9.85     |
| 1329.38       | 41.37  | 10.56    | -3.81 | 48.12        | PK  | V       | 336       | 111       | 54           | -5.88     |
| 1467.50       | 40.74  | 10.81    | -3.75 | 47.80        | PK  | V       | 225       | 90        | 54           | -6.20     |
| 1733.13       | 38.04  | 10.56    | -2.68 | 45.92        | PK  | V       | 380       | 0         | 54           | -8.08     |
| 2466.25       | 33.10  | 10.78    | 0.29  | 44.18        | PK  | V       | 113       | 224       | 54           | -9.82     |

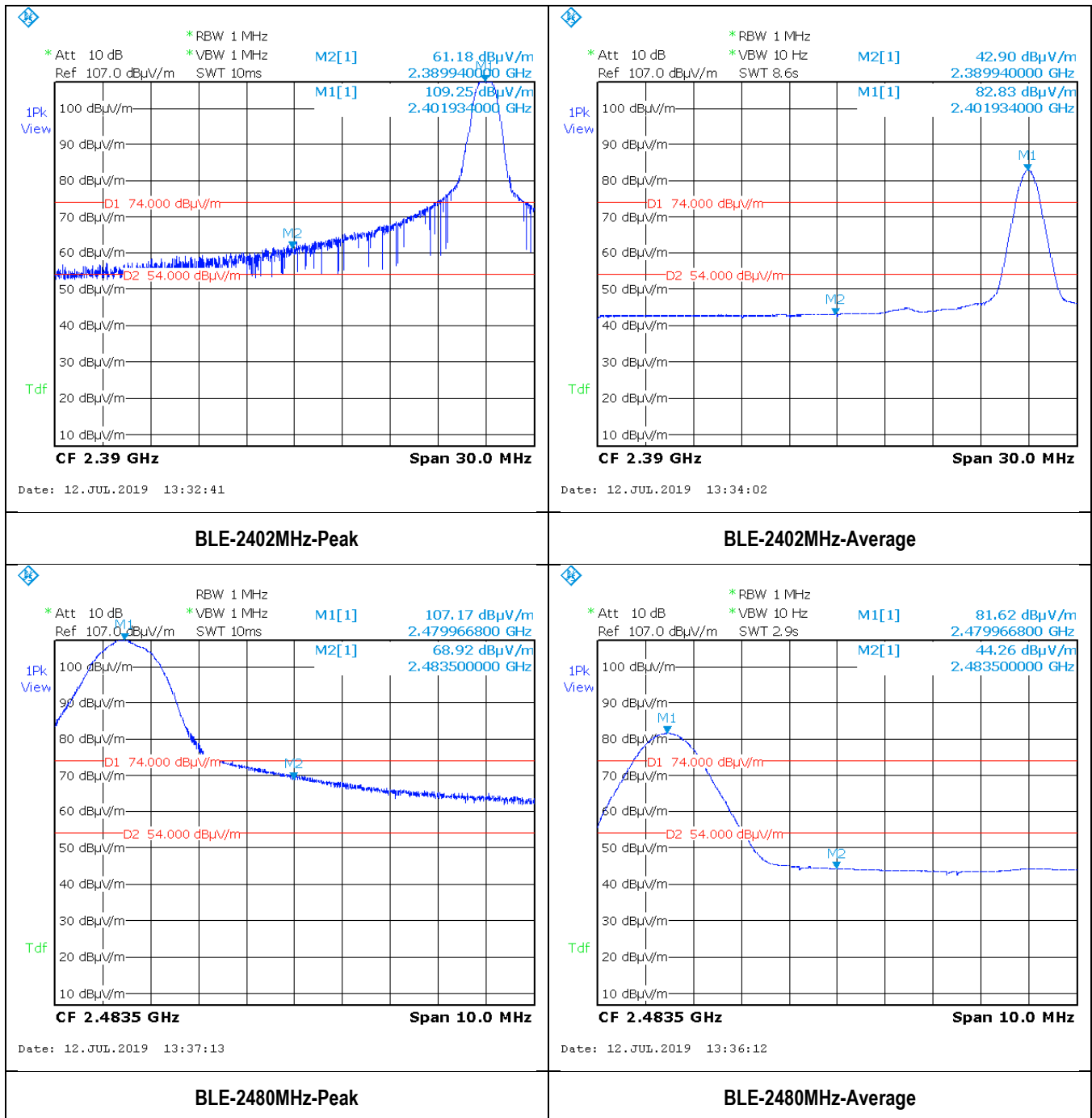
|                       |                             |
|-----------------------|-----------------------------|
| <b>Report Number:</b> | WAP-19052921-LC-FCC-DTS-G4  |
| <b>Product:</b>       | Vehicle Infotainment System |
| <b>Model Number:</b>  | SYNC-G4                     |



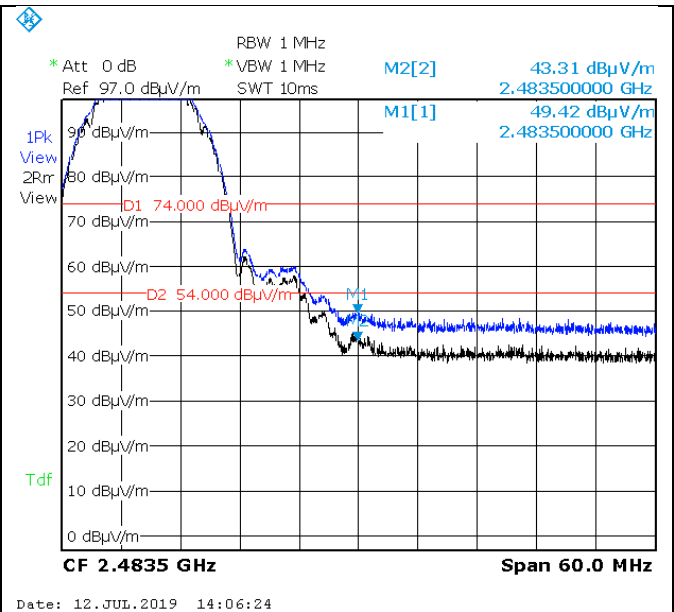
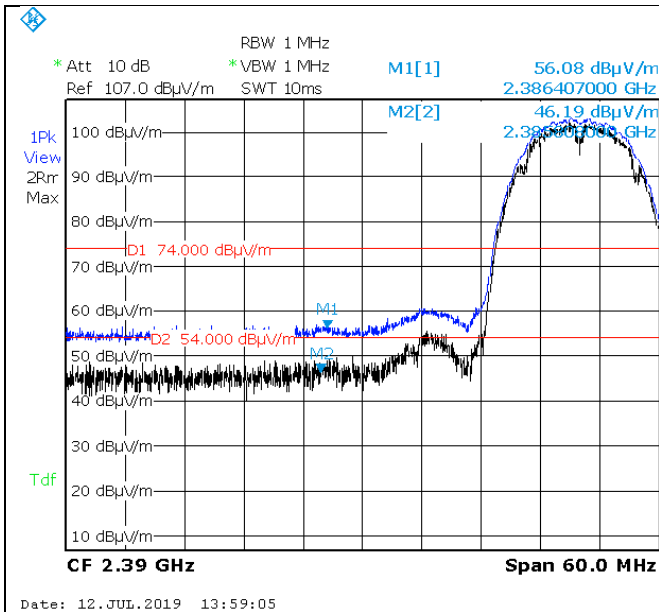
### **18GHz – 40GHz test result**

Note: no substantial emission is found other than the noise floor. Different modes have been verified.

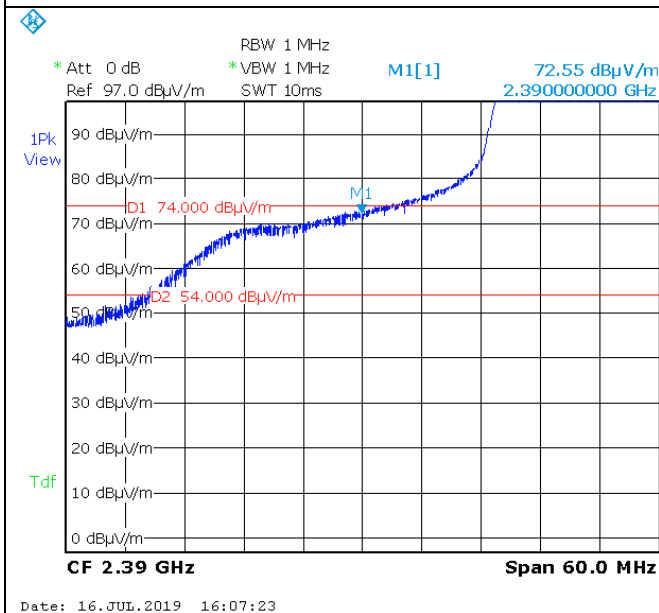
## Restricted Band Measurement Result



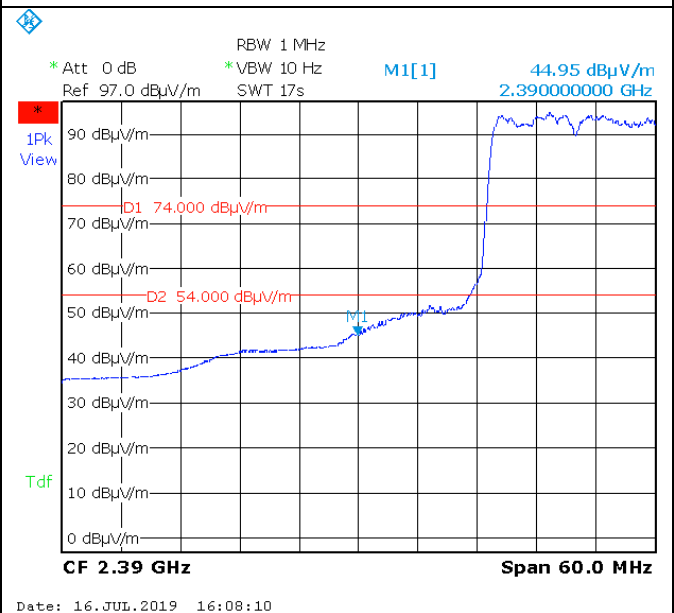
**Report Number:** WAP-19052921-LC-FCC-DTS-G4  
**Product:** Vehicle Infotainment System  
**Model Number:** SYNC-G4



### 802.11b-2412MHz



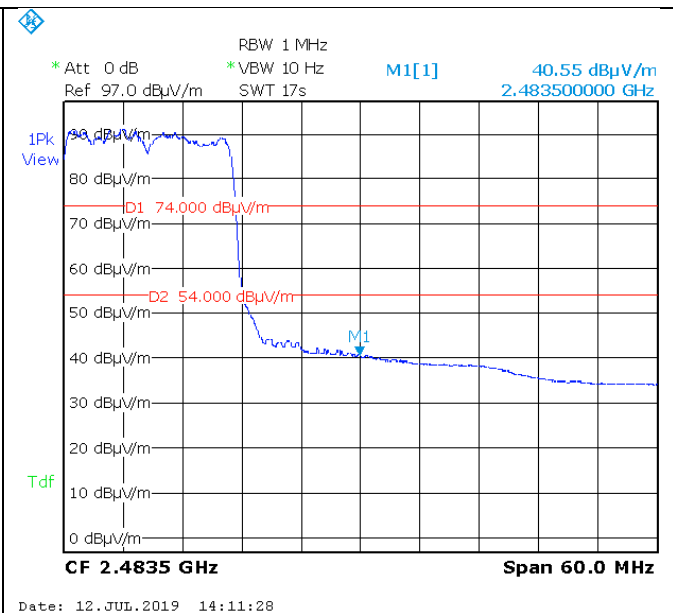
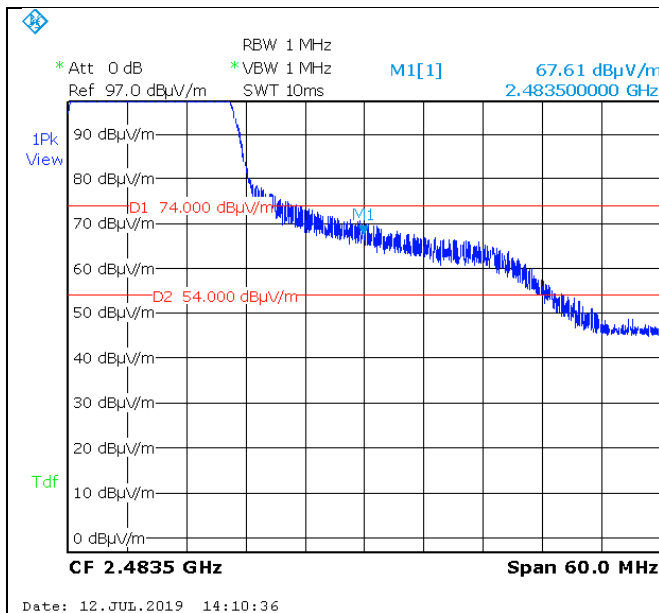
### 802.11b-2462MHz



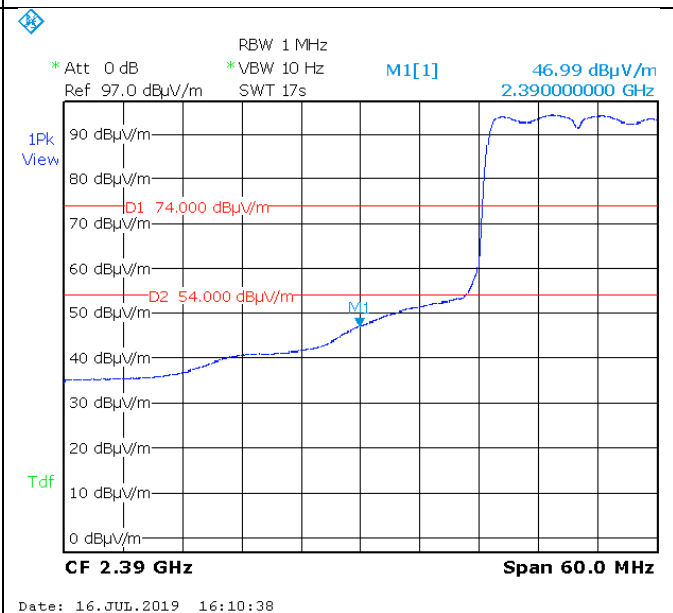
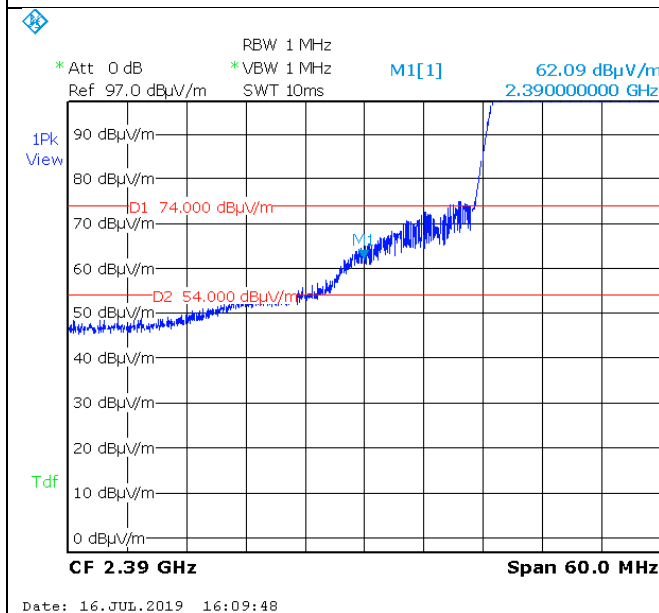
### 802.11g-2412MHz-Peak

### 802.11g-2412MHz-Aveage

**Report Number:** WAP-19052921-LC-FCC-DTS-G4  
**Product:** Vehicle Infotainment System  
**Model Number:** SYNC-G4



802.11g-2462MHz-Peak



802.11n-2412MHz-Peak

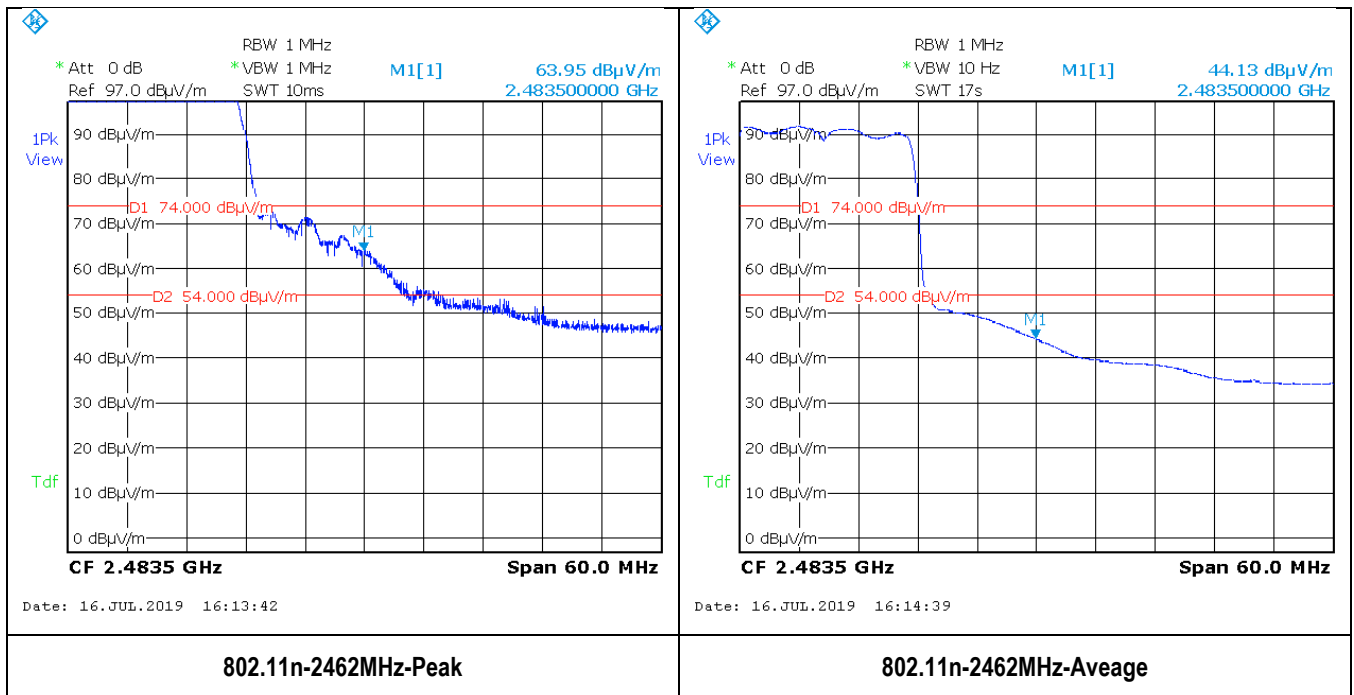
802.11n-2412MHz-Aveage



Electromagnetic Compatibility  
Radio Frequency  
Product Certification  
International Approval

1261 Puerta Del Sol  
San Clemente, CA, 92673  
+1 (949) 393-1123  
[www.vista-compliance.com](http://www.vista-compliance.com)

Report Number: WAP-19052921-LC-FCC-DTS-G4  
Product: Vehicle Infotainment System  
Model Number: SYNC-G4



|                       |                             |
|-----------------------|-----------------------------|
| <b>Report Number:</b> | WAP-19052921-LC-FCC-DTS-G4  |
| <b>Product:</b>       | Vehicle Infotainment System |
| <b>Model Number:</b>  | SYNC-G4                     |



## 9 Test instrument list

| Equipment                        | Manufacturer    | Model              | Serial Number | Cal. Date  | Cal. Due   |
|----------------------------------|-----------------|--------------------|---------------|------------|------------|
| Semi-Anechoic Chamber            | ETS-Lindgren    | 10M                | VL001         | 5/11/2019  | 5/11/2020  |
| Shielding Control Room           | ETS-Lindgren    | Series 81          | VL006         | N/A        | N/A        |
| Spectrum Analyzer                | Keysight        | N9020A             | MY50110074    | 5/4/2019   | 5/4/2020   |
| EMC Test Receiver                | R&S             | ESL6               | 100230        | 5/7/2019   | 5/7/2020   |
| LISN (9KHz – 30MHz)              | EMCO            | 3816/2             | 9705-1066     | 5/4/2019   | 5/4/2020   |
| Bi-Log Antenna                   | ETS-Lindgren    | 3142E              | 217921        | 11/15/2018 | 11/15/2019 |
| Horn Antenna (1-18GHz)           | Electro-Metrics | EM-6961            | 6292          | 5/2/2019   | 5/2/2020   |
| Horn Antenna (18-40GHz)          | Com-Power       | AH-840             | 101109        | 5/2/2019   | 5/2/2020   |
| Preamplifier                     | RF Bay, Inc.    | LPA-10-20          | 11180621      | 5/10/2019  | 5/10/2020  |
| True RMS Multi-meter             | UNI-T           | UT181A             | C173014829    | 5/10/2019  | 5/10/2020  |
| Temp / Humidity / Pressure Meter | PCE Instruments | PCE-THB 40         | R062028       | 5/9/2019   | 5/9/2020   |
| RF Attenuator                    | Pasternack      | PE7005-3           | VL061         | 5/10/2019  | 5/10/2020  |
| Preamplifier 100KHz - 40GHz      | Aeroflex        | 33711-392-77150-11 | 064           | 5/10/2019  | 5/10/2020  |
| EM Center Control                | ETS-Lindgren    | 7006-001           | 160136        | N/A        | N/A        |
| Turn Table                       | ETS-Lindgren    | 2181-3.03          | VL002         | N/A        | N/A        |
| Boresight Antenna Tower          | ETS-Lindgren    | 2171B              | VL003         | N/A        | N/A        |
| Loop Antenna (9k-30MHz)          | Com-Power       | AL-130             | 121012        | 5/9/2019   | 5/9/2020   |
| RE test cable(below 6GHz)        | Vista           | RE-6GHz-01         | RE-6GHz-01    | 5/10/2019  | 5/10/2020  |
| RE test cable (1-18GHz)          | PhaseTrack      | II-240             | RE-18GHz-01   | 5/10/2019  | 5/10/2020  |
| RE test cable (>18GHz)           | Sucoflex        | 104                | 344903/4      | 5/10/2019  | 5/10/2020  |
| Pulse limiter                    | Com-Power       | LIT-930A           | 531727        | 5/15/2019  | 5/15/2020  |
| CE test cable #1                 | FIRST RF        | FRF-C-1002-001     | CE-6GHz-01    | 5/10/2019  | 5/10/2020  |
| CE test cable#2                  | FIRST RF        | FRF-C-1002-001     | CE-6GHz-02    | 5/9/2019   | 5/9/2020   |
| Wideband Communication           | R&S             | CMW500             | 147508        | 5/8/2019   | 5/8/2020   |