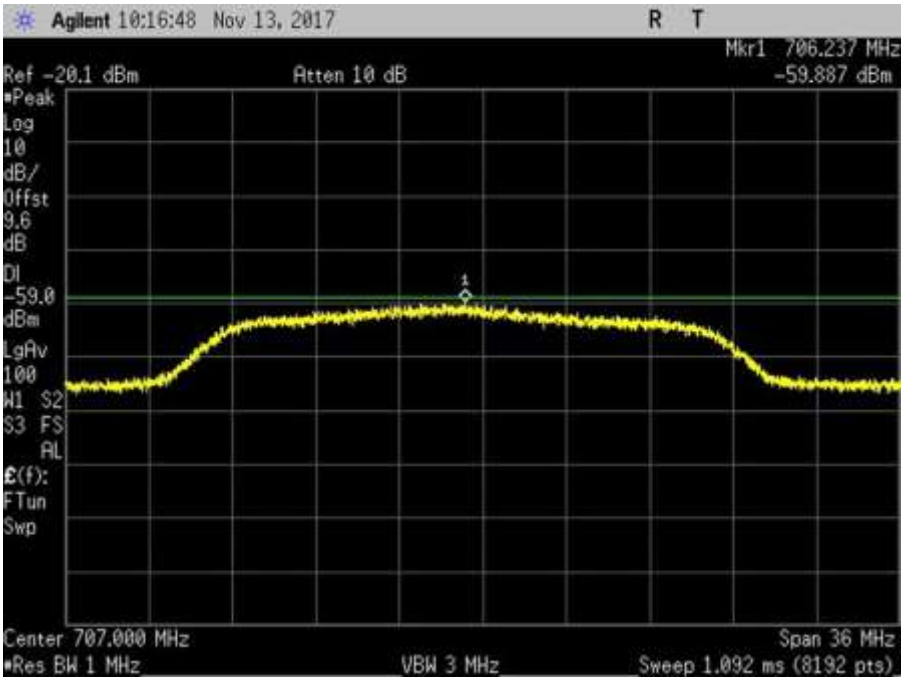
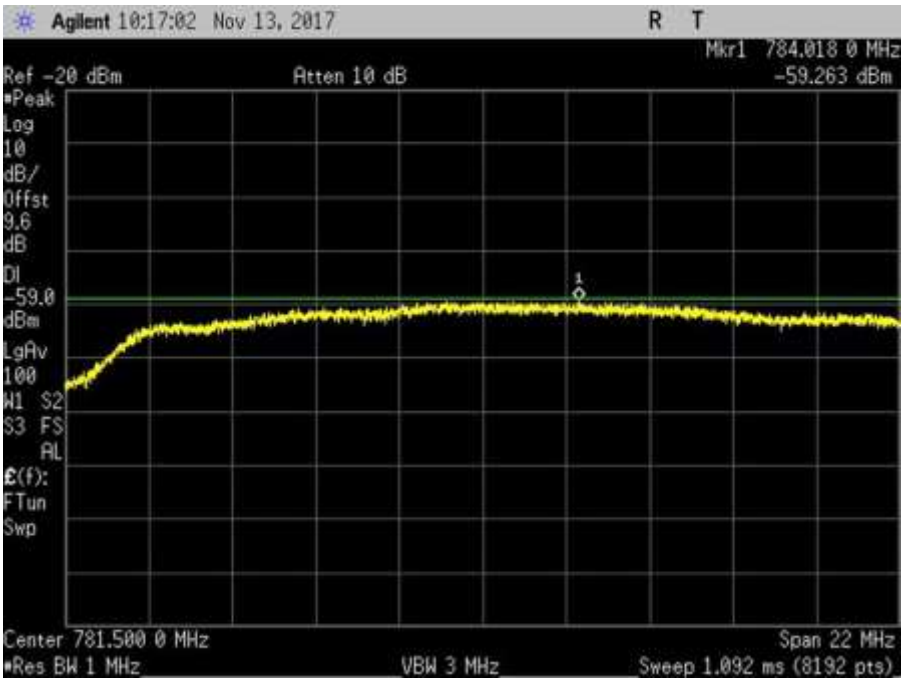
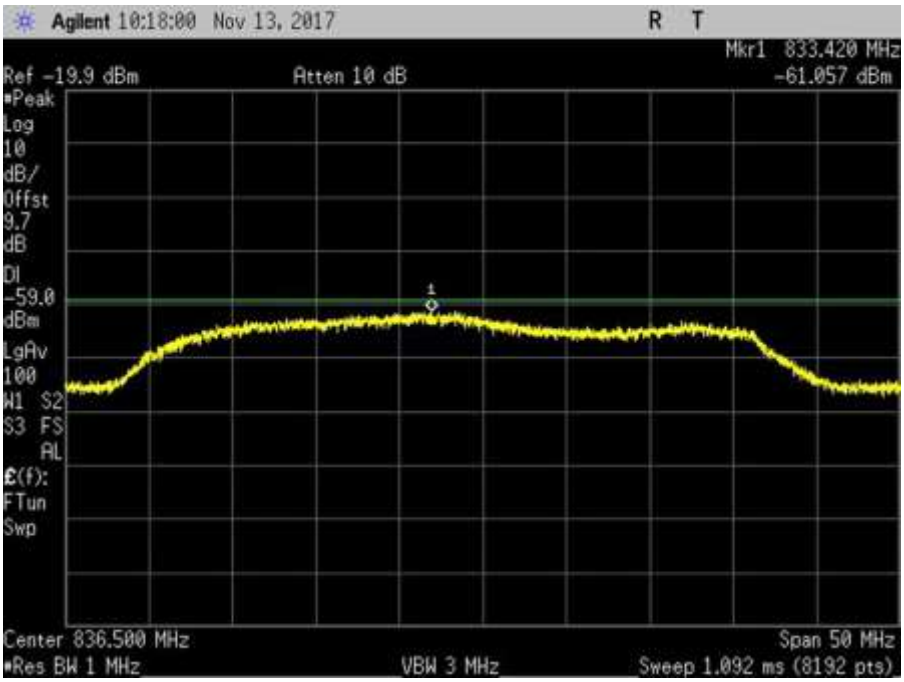
**UL**



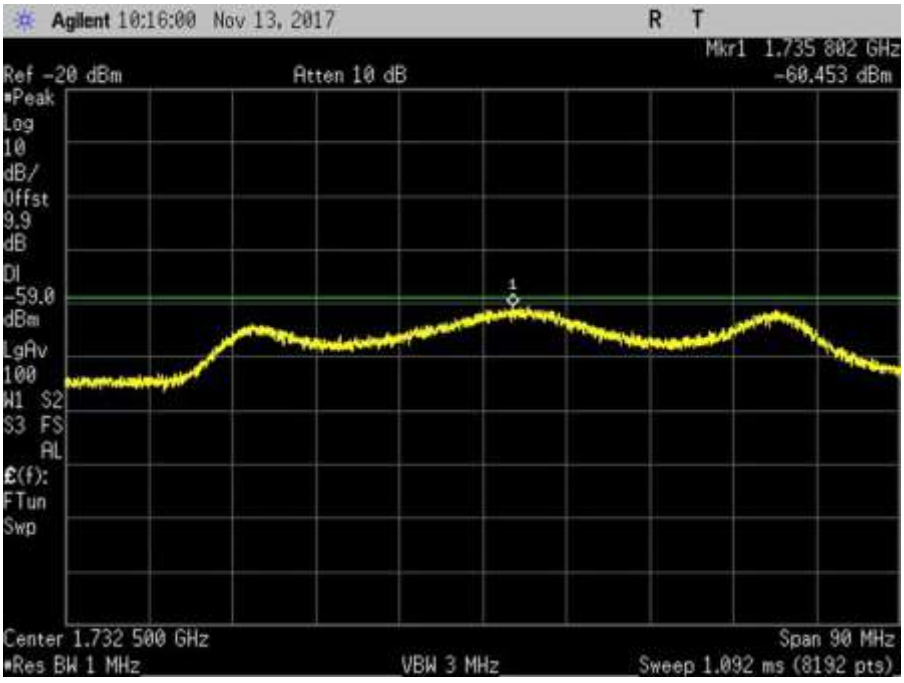

7.7.1_Noise_UL_698-716MHz



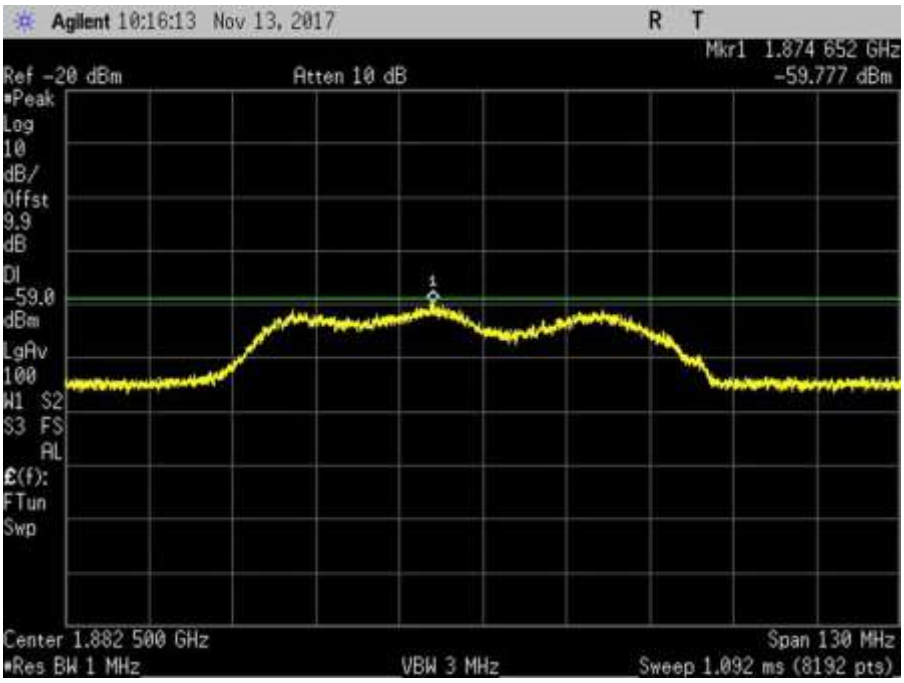

7.7.1_Noise_UL_776-787MHz




7.7.1_Noise_UL_824-849MHz




7.7.1_Noise_UL_1710-1755MHz

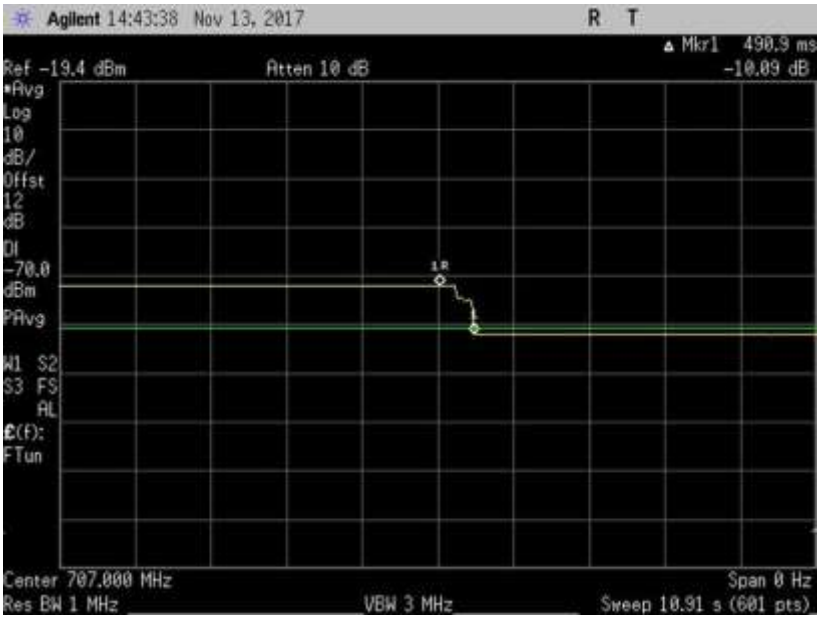



7.7.1_Noise_UL_1850-1915MHz

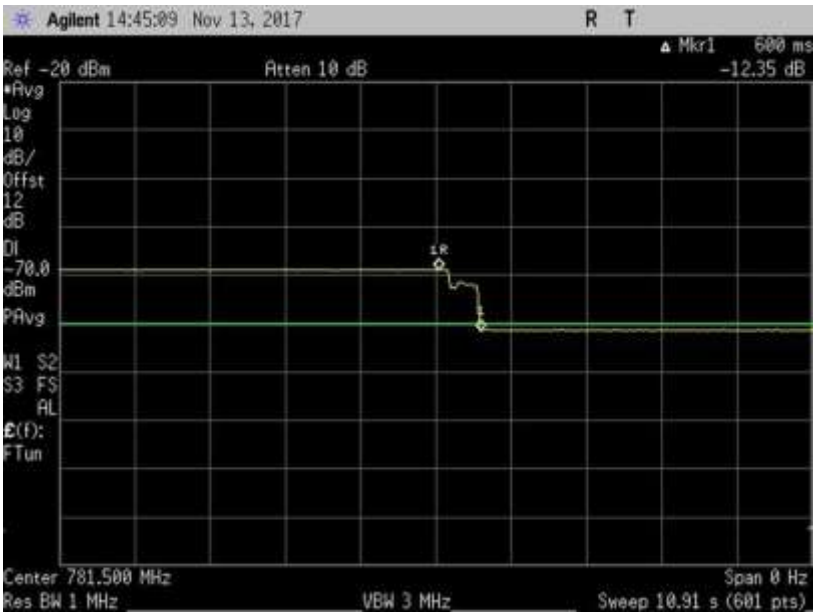
## 7.7.2 Variable UL Noise Timing

### Plots

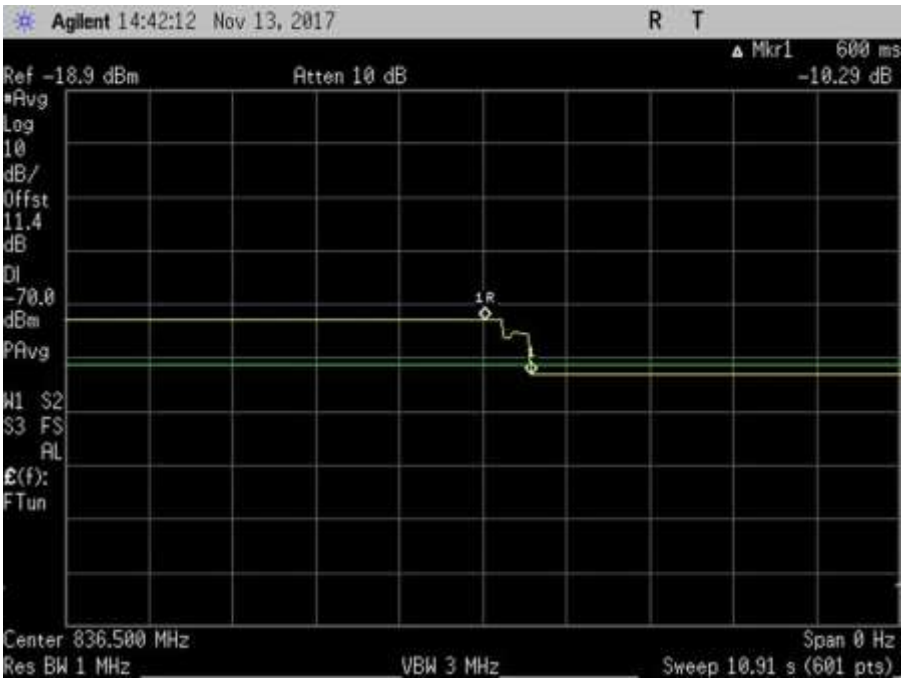
**UL**



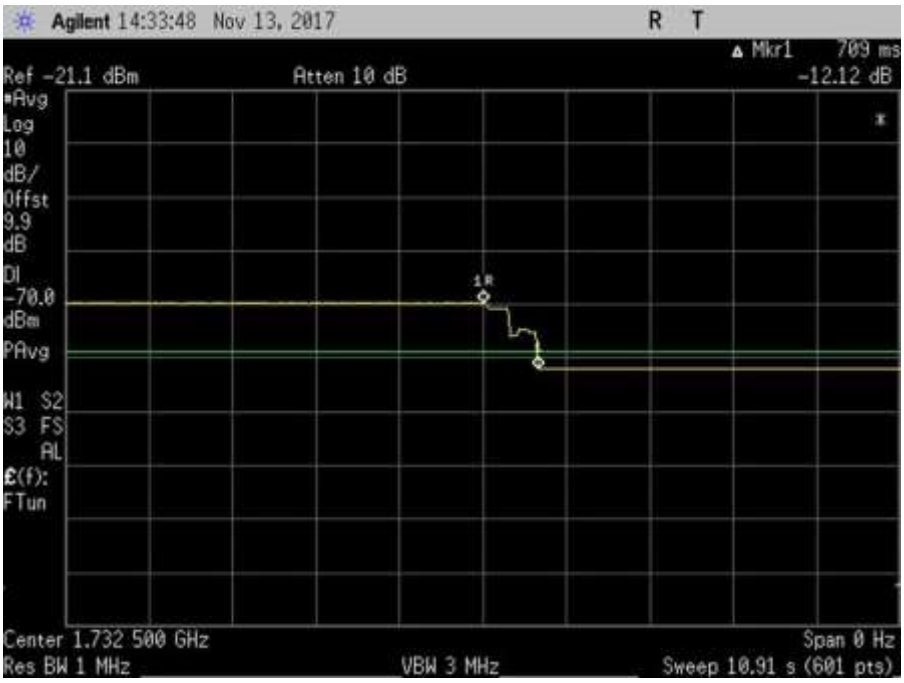

7.7.2_VarNoise_UL_698-716MHz



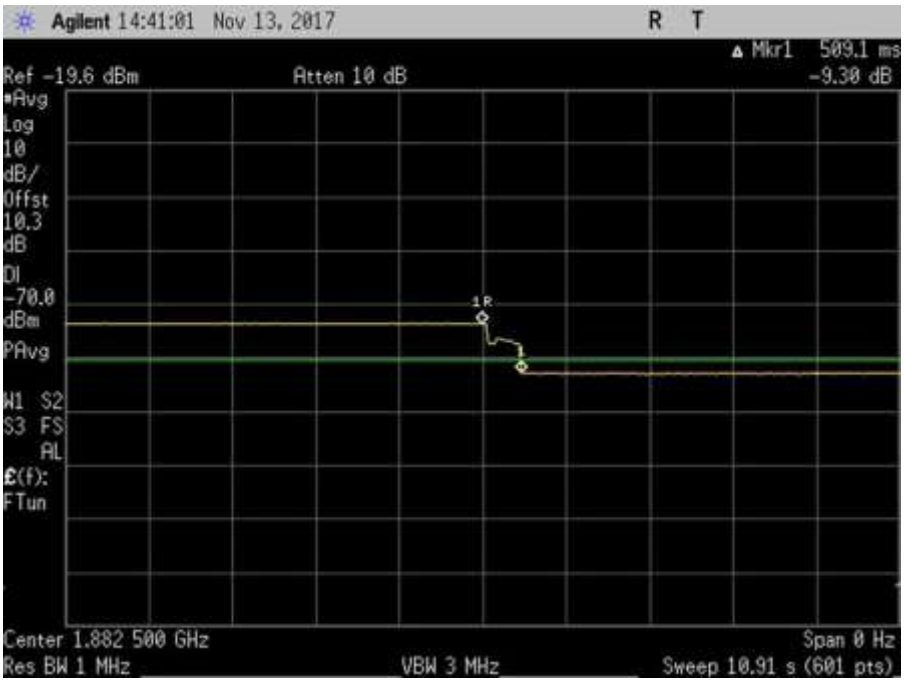

7.7.2_VarNoise_UL_776-787MHz




7.7.2_VarNoise_UL_824-849MHz




7.7.2_VarNoise_UL_1710-1755MHz




7.7.2_VarNoise_UL_1850-1915MHz

# 7.8 Uplink Inactivity

## Test Conditions / Setup

| | | | |
|---|---|---|---|
| Test Location: | CKC Laboratories, Inc • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170 | | |
| Customer: | Cellphone-Mate, Inc | | |
| Specification: | **7.8 Uplink Inactivity** | | |
| Work Order #: | **100637** | Date: | 11/13/2017 |
| Test Type: | **Conducted Emissions** | Time: | 3:18:00 PM |
| Tested By: | **Daniel Bertran** | Sequence#: | 1 |
| Software: | EMITest 5.03.11 | | |

***Equipment Tested:***

| Device | Manufacturer | Model # | S/N |
|---|---|---|---|
| Configuration 1 | | | |

***Support Equipment:***

| Device | Manufacturer | Model # | S/N |
|---|---|---|---|
| | | | |

***Test Conditions / Notes:***

The equipment under test (EUT) is a Mobile Wideband Consumer Booster.
The EUT is placed on the test bench. Evaluation performed at the Outside (Donor) and Inside (Server) antenna port.
The EUT Server port is a type FME connector and 50-ohm impedance.
The EUT Donor port is type FME connector and 50-ohm impedance.

Part 22
UL: 824-849MHz
DL: 869-894MHz
Part 24
UL: 1850-1915MHz
DL: 1930-1995MHz
Part 27
UL: 1710-1755MHz, 698-716MHz, 776-787MHz
DL: 2110-2155MHz, 728-746MHz, 746-757MHz

Test procedure:
The test was performed in accordance with section 7.8 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04r01 Dated October 27, 2017
Firmware: V 3.0
Test environment conditions: 22°C, 40% Relative Humidity,102 kPa

***Test Equipment:***

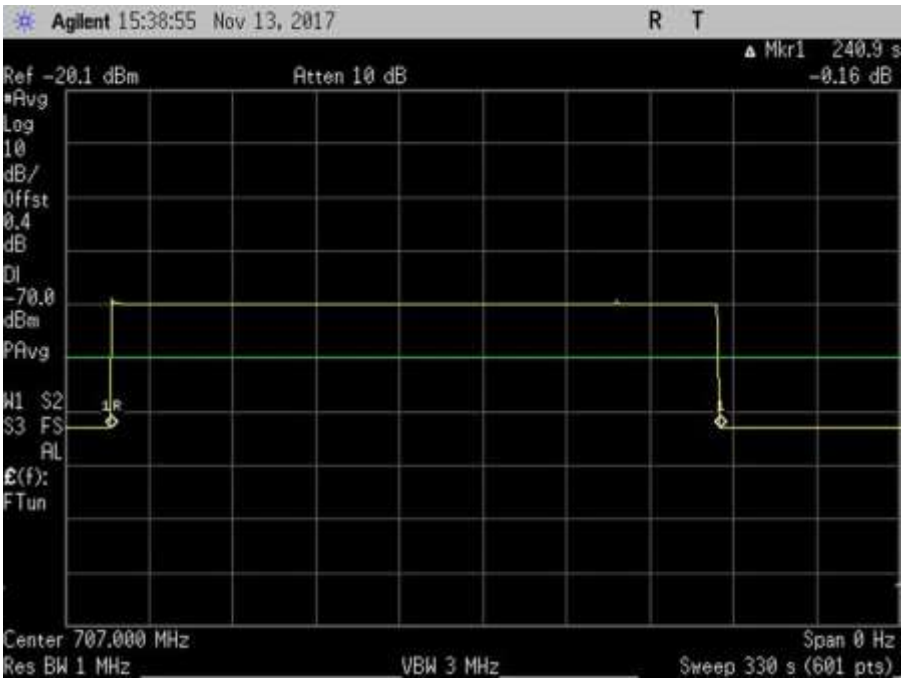
| ID | Asset # | Description | Model | Calibration Date | Cal Due Date |
|---|---|---|---|---|---|
| | AN03418 | Signal Generator | E4438C | 6/19/2017 | 6/19/2019 |
| | ANP06239 | Attenuator | 54A-10 | 8/8/2016 | 8/8/2018 |
| | ANP06897 | Cable | 32022-29094K-29094K-48TC | 12/30/2015 | 12/30/2017 |
| | ANP06898 | Cable | 32022-29094K-29094K-48TC | 12/30/2015 | 12/30/2017 |
| | ANP05411 | Attenuator | 54A-10 | 1/18/2016 | 1/18/2018 |
| | AN03471 | Spectrum Analyzer | E4440A | 12/9/2015 | 12/9/2017 |

## Summary of Results

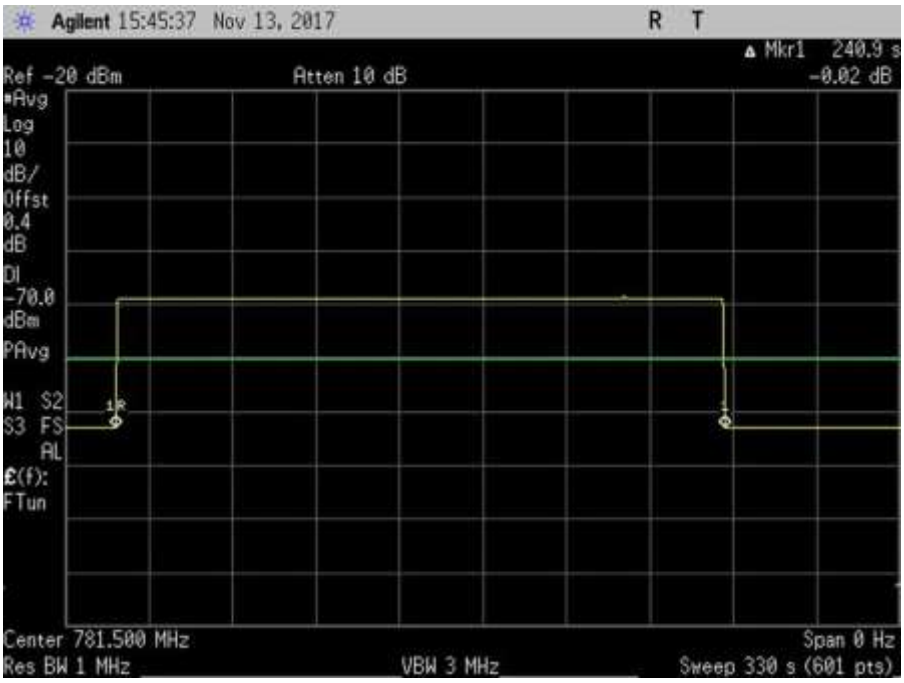
Pass: As demonstrated, when the booster is not serving an active device connection after 5 minutes the uplink noise power does not exceed -70dBm/MHz

| Uplink Inactivity | | |
|---|---|---|
| **Freq** | **Measured** | **Limit** |
| **MHz** | **Min** | **Min** |
| UL1710-1755 | 4.0 | 5.0 |
| UL1850-1915 | 4.0 | 5.0 |
| UL824-849 | 4.0 | 5.0 |
| UL 698-716 | 4.0 | 5.0 |
| UL776-787 | 4.0 | 5.0 |

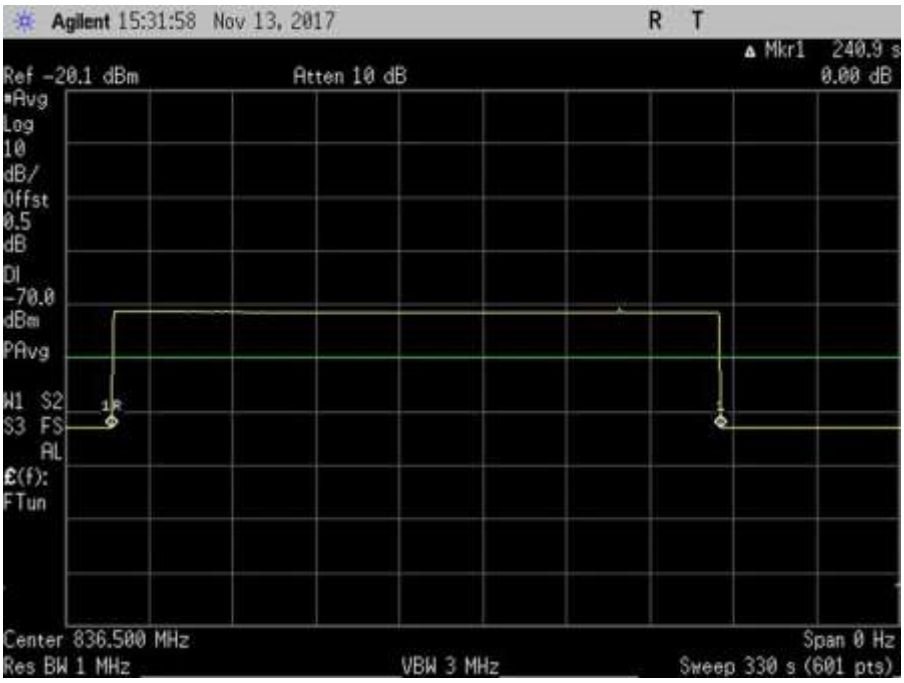
## Plots



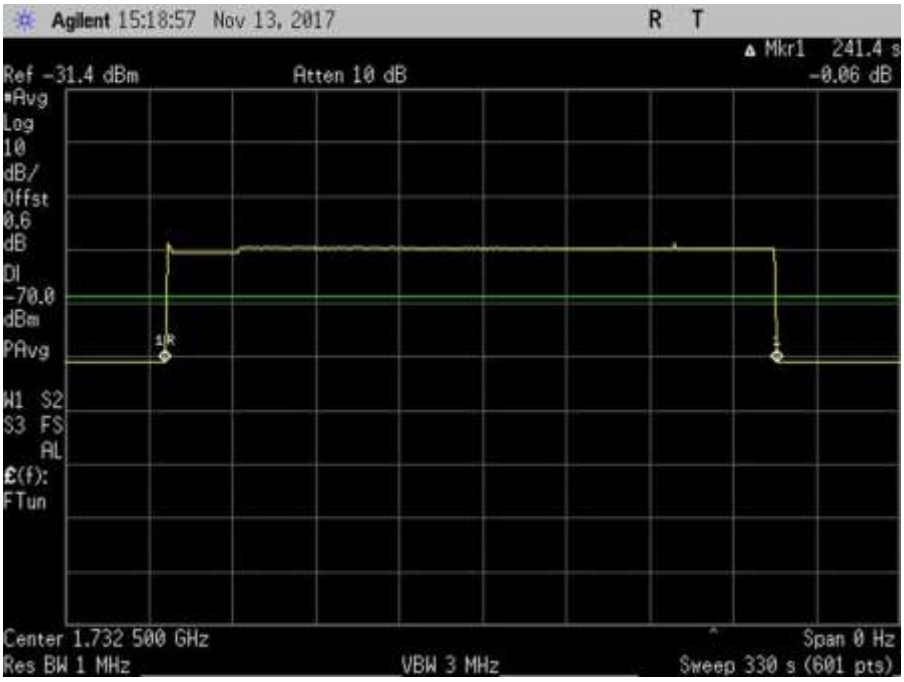

7.8_Inactivity_UL_698-716MHz



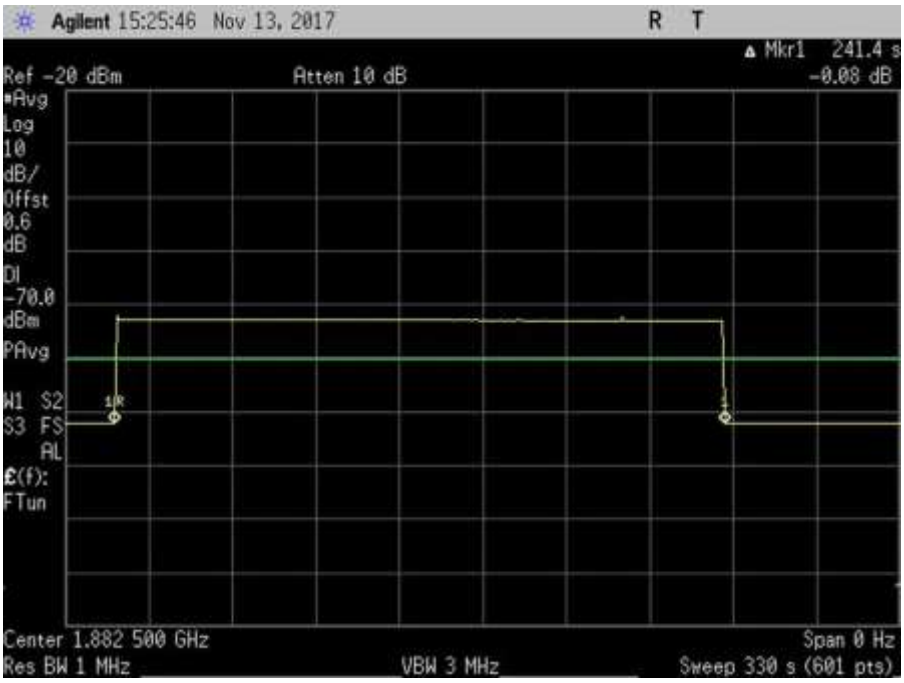

7.8_Inactivity_UL_776-787MHz




7.8_Inactivity_UL_824-849MHz




7.8_Inactivity_UL_1710-1755MHz




7.8_Inactivity_UL_1850-1915MHz

# 7.9 Booster Gain Limit

## Test Conditions / Setup

| | | | |
|---|---|---|---|
| Test Location: | CKC Laboratories, Inc • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170 | | |
| Customer: | Cellphone-Mate, Inc | | |
| Specification: | **7.9 Variable Booster gain( Max Gain / Variable Uplink Gain Timing)** | | |
| Work Order #: | **100637** | Date: | 11/15/2017 |
| Test Type: | **Conducted Emissions** | Time: | 3:32:00 PM |
| Tested By: | **Daniel Bertran** | Sequence#: | 1 |
| Software: | EMITest 5.03.11 | | |

***Equipment Tested:***

| Device | Manufacturer | Model # | S/N |
|---|---|---|---|
| Configuration 1 | | | |

***Support Equipment:***

| Device | Manufacturer | Model # | S/N |
|---|---|---|---|
| | | | |

***Test Conditions / Notes:***

The equipment under test (EUT) is a Mobile Wideband Consumer Booster.
The EUT is placed on the test bench. Evaluation performed at the Outside (Donor) and Inside (Server) antenna port.
The EUT Server port is a type FME connector and 50-ohm impedance.
The EUT Donor port is type FME connector and 50-ohm impedance.

Part 22
UL: 824-849MHz
DL: 869-894MHz
Part 24
UL: 1850-1915MHz
DL: 1930-1995MHz
Part 27
UL: 1710-1755MHz, 698-716MHz, 776-787MHz
DL: 2110-2155MHz, 728-746MHz, 746-757MHz

Test procedure:
The test was performed in accordance with section 7.9 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04r01 Dated October 27, 2017.
Firmware: V 3.0
Test environment conditions: 22°C, 40% Relative Humidity,101.5 kPa
Note:
Used MSCL provided by the manufacturer's antenna kitting.

***Mobile station coupling loss (MSCL):*** *the minimum coupling loss (in dB) between the wireless device and the input (server) port of the consumer booster. MSCL must be calculated or measured for each band of operation and provided in compliance test reports. MSCL includes the path loss from the wireless device, and the booster's server antenna gain and cable loss. The wireless device is assumed to be an isotropic (0 dBi) antenna reference. Minimum standoff distances from inside wireless devices to the booster's server antenna must be reasonable and specified by the manufacturer in customer provided installation manuals.*

L P = 20logf + 20logd – 27.5

Where:

L P = basic free space path loss,
f = Center frequency,
d = 0.6, 1.0 and 1.5 meters

| Frequency (MHz) | MSCL (dB) |
|---|---|
| PCS (1850-1915) | 37.8 |
| Cellular(824-849) | 32.5 |
| LTE(698-716) | 30.6 |
| LTE(776-787) | 31.5 |
| AWS(1710-1755) | 37 |

Note:

PCS(1850-1915) 37.8 is from Desk top RV-1 Kit d=1m
Cellular(824-849) 32.5 is from Vehicle Kit2 d=0.6m
LTE(698-716) 30.6 from Vehicle Kit2 d=0.6m
LTE(776-787) 31.5 from Vehicle Kit2 d=0.6m
AWS(1710-1755) 37 is from Marine-1 Kit d=1.5m

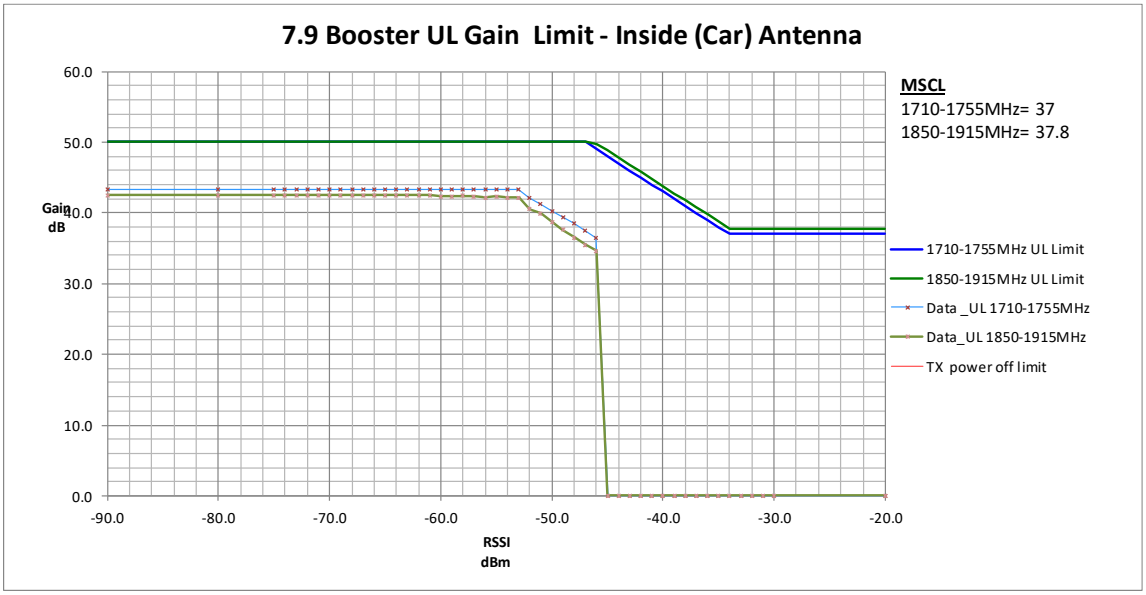
***Test Equipment:***

| ID | Asset # | Description | Model | Calibration Date | Cal Due Date |
|---|---|---|---|---|---|
| | AN03418 | Signal Generator | E4438C | 6/19/2017 | 6/19/2019 |
| | ANP06239 | Attenuator | 54A-10 | 8/8/2016 | 8/8/2018 |
| | ANP06897 | Cable | 32022-29094K-29094K-48TC | 12/30/2015 | 12/30/2017 |
| | ANP06898 | Cable | 32022-29094K-29094K-48TC | 12/30/2015 | 12/30/2017 |
| | ANP05411 | Attenuator | 54A-10 | 1/18/2016 | 1/18/2018 |
| | AN03471 | Spectrum Analyzer | E4440A | 12/9/2015 | 12/9/2017 |

## Summary of Results

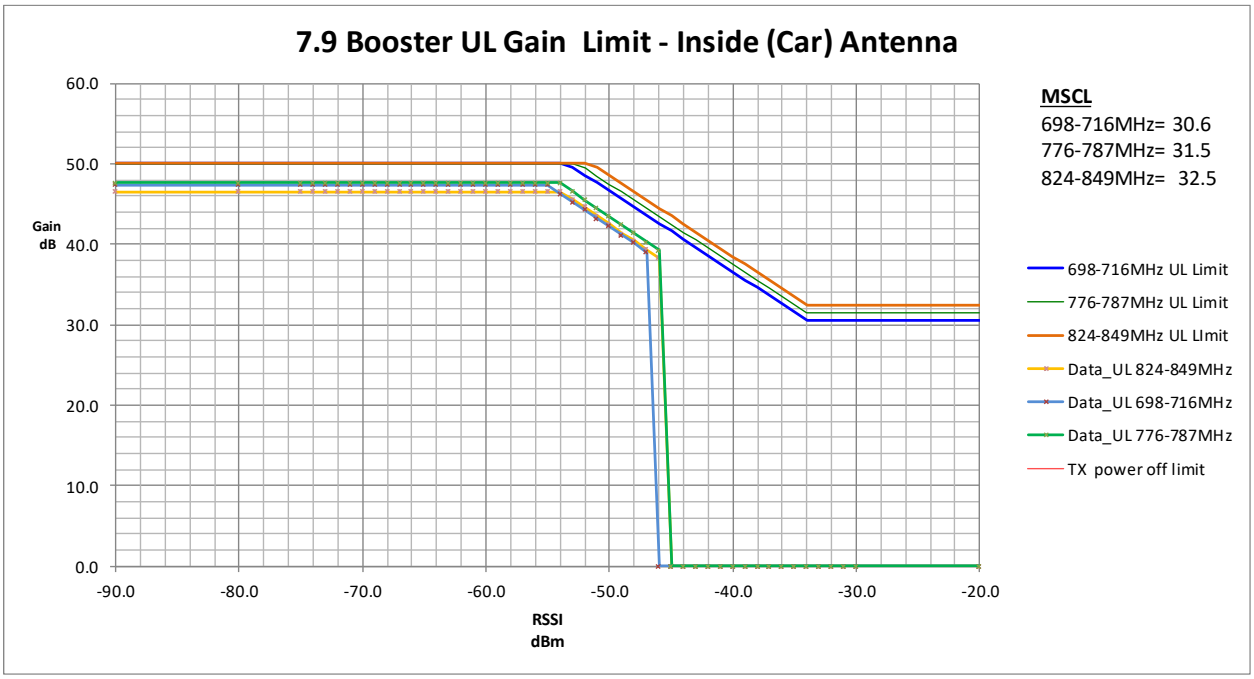
Pass: As demonstrated, computed gains are within the gain limit. All maximum variable uplink gain timings are within 1 second limit.

### 7.9.1 Maximum gain




| 1710.0 | | | 1755.0 MHz | | | | |
|---|---|---|---|---|---|---|---|
| | | | | Limit | | | Margin |
| RSSI (dBm) | Input (dBm) | Measured Output (dBm) | Measured Gain (dBm) | RSSI Dependent | Mobile Booster Limit | TX off | |
| -67.0 | -25.1 | 18.2 | 43.3 | | 50.0 | | -6.7 |
| -55.0 | -25.1 | 18.2 | 43.3 | | 50.0 | | -6.7 |
| -46.0 | -25.1 | 11.4 | 36.5 | 49.0 | | | -12.5 |
| -37.0 | -25.1 | -57.4 | 0.0 | 40.0 | | | -40.0 |
| -36.0 | -25.1 | -57.4 | 0.0 | 39.0 | | | -39.0 |
| -35.0 | -25.1 | -57.4 | 0.0 | 38.0 | | | -38.0 |

| 1850.0 | | | 1915.0 MHz | | | | |
|---|---|---|---|---|---|---|---|
| | | | | Limit | | | Margin |
| RSSI (dBm) | Input (dBm) | Measured Output (dBm) | Measured Gain (dBm) | RSSI Dependent | Mobile Booster Limit | TX off | |
| -75.0 | -25.5 | 17.0 | 42.5 | | 50.0 | | -7.5 |
| -55.0 | -25.5 | 16.8 | 42.3 | | 50.0 | | -7.7 |
| -46.0 | -25.5 | 9.1 | 34.6 | 49.8 | | | -15.2 |
| -37.0 | -25.5 | -60.6 | 0.0 | 40.8 | | | -40.8 |
| -36.0 | -25.5 | -60.6 | 0.0 | 39.8 | | | -39.8 |
| -35.0 | -25.5 | -60.6 | 0.0 | 38.8 | | | -38.8 |



| 824.0 | | | | 849.0 MHz | | | |
|---|---|---|---|---|---|---|---|
| | | | | Limit | | | Margin |
| RSSI (dBm) | Input (dBm) | Measured Output (dBm) | Measured Gain (dBm) | RSSI Dependent | Mobile Booster Limit | TX off | |
| -72.0 | -27.1 | 19.4 | 46.5 | | 50.0 | | -3.5 |
| -58.0 | -27.1 | 19.4 | 46.5 | | 50.0 | | -3.5 |
| -51.0 | -27.1 | 16.4 | 43.5 | 49.5 | | | -6.0 |
| -50.0 | -27.1 | 15.4 | 42.5 | 48.5 | | | -6.0 |
| -49.0 | -27.1 | 14.2 | 41.3 | 47.5 | | | -6.2 |
| -48.0 | -27.1 | 13.3 | 40.4 | 46.5 | | | -6.1 |

| 698.0 | | | | 716.0 MHz | | | |
|---|---|---|---|---|---|---|---|
| | | | | Limit | | | Margin |
| RSSI (dBm) | Input (dBm) | Measured Output (dBm) | Measured Gain (dBm) | RSSI Dependent | Mobile Booster Limit | TX off | |
| -80.0 | -27.9 | 19.5 | 47.4 | | 50.0 | | -2.6 |
| -60.0 | -27.9 | 19.5 | 47.4 | | 50.0 | | -2.6 |
| -53.0 | -27.9 | 17.3 | 45.2 | 49.6 | | | -4.4 |
| -52.0 | -27.9 | 16.4 | 44.3 | 48.6 | | | -4.3 |
| -51.0 | -27.9 | 15.3 | 43.2 | 47.6 | | | -4.4 |
| -50.0 | -27.9 | 14.3 | 42.2 | 46.6 | | | -4.4 |

| 776.0 | | | | 787.0 MHz | | | |
|---|---|---|---|---|---|---|---|
| | | | | Limit | | | Margin |
| RSSI (dBm) | Input (dBm) | Measured Output (dBm) | Measured Gain (dBm) | RSSI Dependent | Mobile Booster Limit | TX off | |
| -73.0 | -27.9 | 19.7 | 47.6 | | 50.0 | | -2.4 |
| -58.0 | -27.9 | 19.7 | 47.6 | | 50.0 | | -2.4 |
| -52.0 | -27.9 | 17.6 | 45.5 | 49.5 | | | -4.0 |
| -51.0 | -27.9 | 16.6 | 44.5 | 48.5 | | | -4.0 |
| -50.0 | -27.9 | 15.5 | 43.4 | 47.5 | | | -4.1 |
| -49.0 | -27.9 | 14.5 | 42.4 | 46.5 | | | -4.1 |

**7.9.2 Variable uplink gain timing**

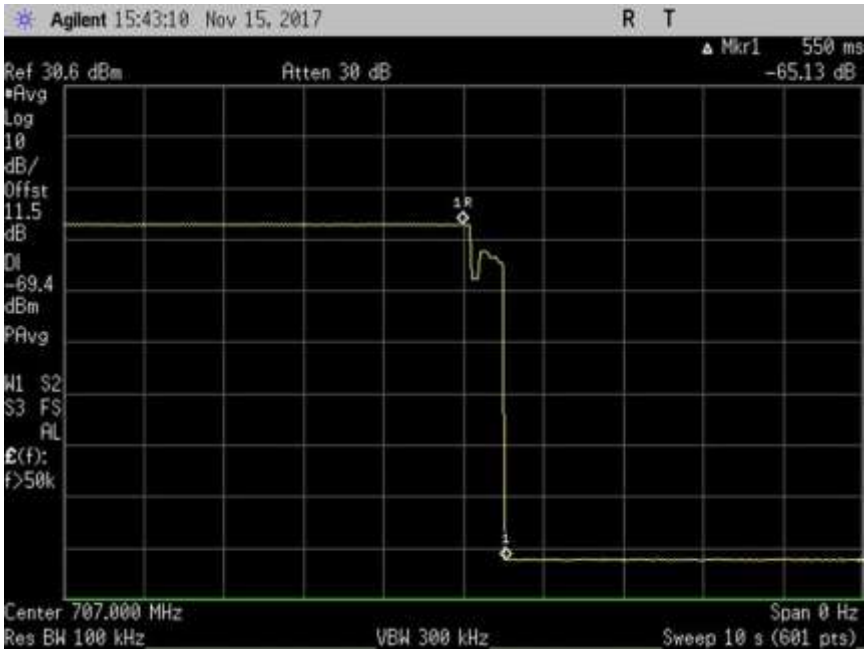
| Uplink Gain Timing | | |
|---|---|---|
| **Frequency (MHz)** | **Measured (Sec)** | **Limit (Sec)** |
| UL 1710-1755 | 0.70 | 1 |
| UL 1850-1915 | 0.70 | 1 |
| UL 824-849 | 0.63 | 1 |
| UL 698-716 | 0.55 | 1 |
| UL 776-787 | 0.57 | 1 |

## 7.9.1 Maximum Gain

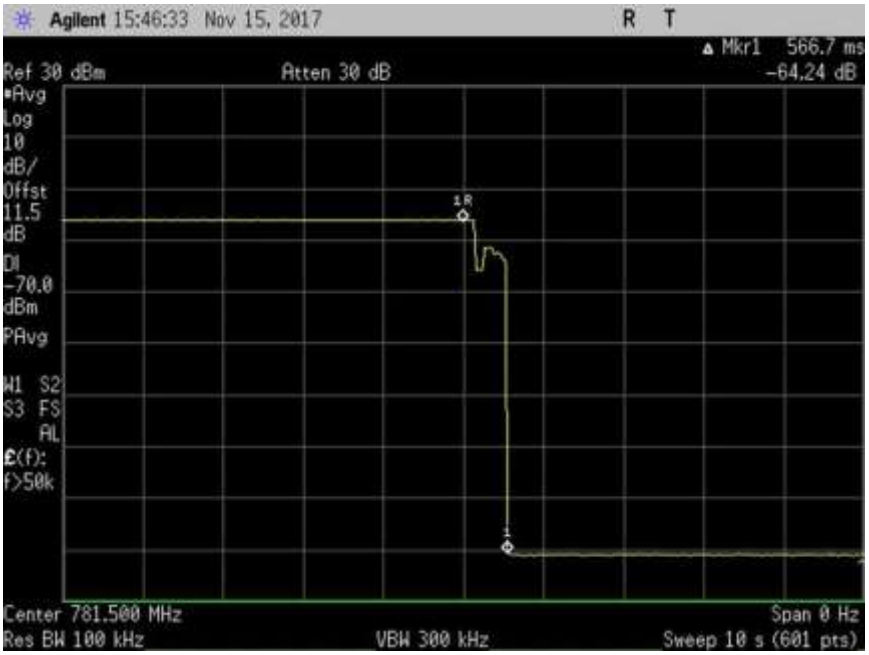
For this subsection, see summary of results of 7.9
7.9.1 Maximum gain

## 7.9.2 Variable uplink Gain Timing

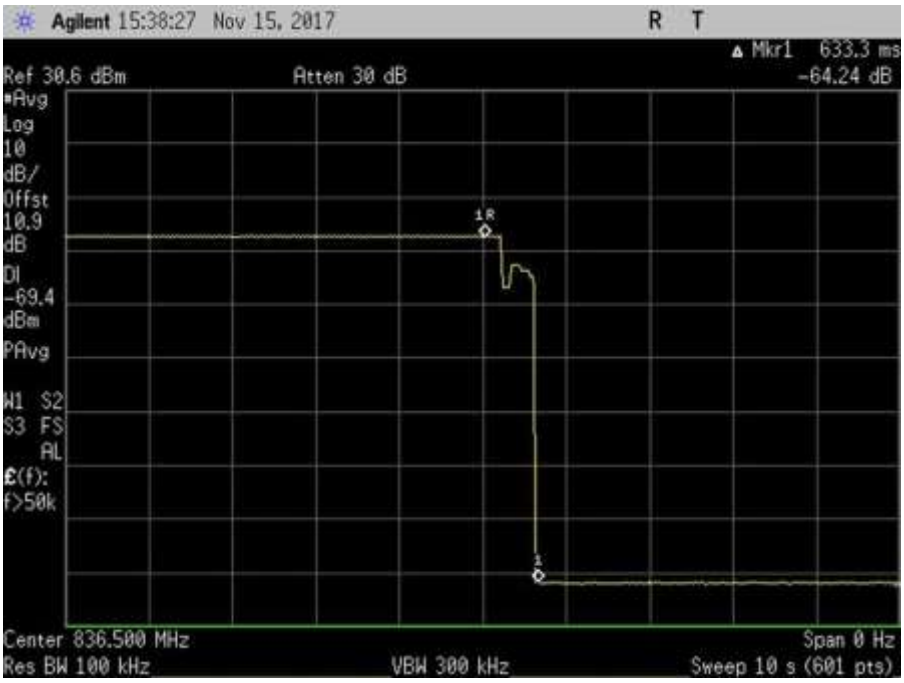
### Plots



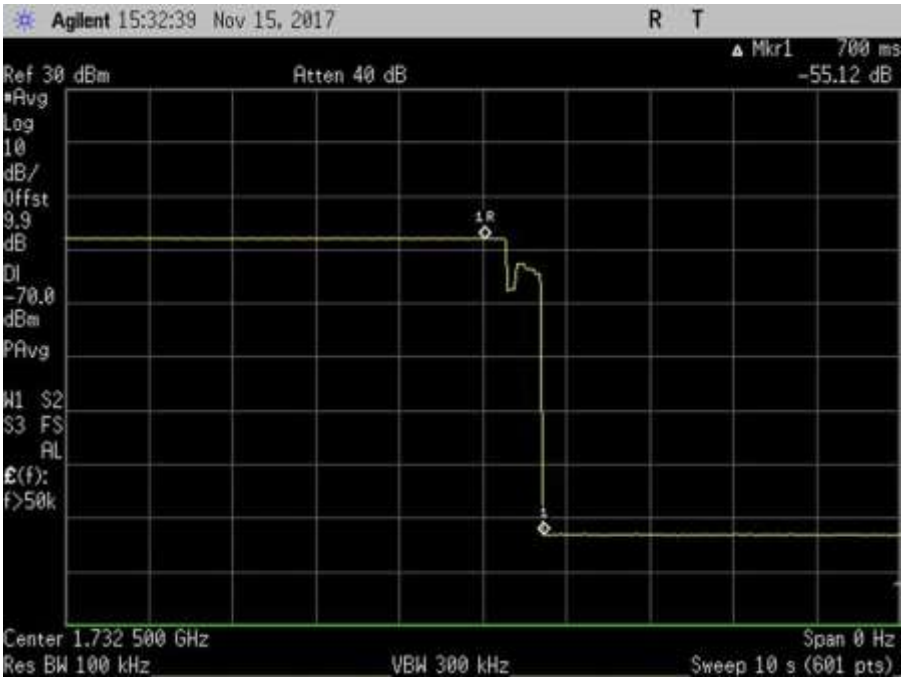

7.9.2_VarULGainTiming_UL_698-716MHz




7.9.2_VarULGainTiming_UL_776-787MHz




7.9.2_VarULGainTiming_UL_824-849MHz




7.9.2_VarULGainTiming_UL_1710-1755MHz


7.9.2_VarULGainTiming_UL_1850-1915MHz

# 7.10 Occupied Band Width

## Test Conditions / Setup

| | | | |
|---|---|---|---|
| Test Location: | CKC Laboratories, Inc • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170 | | |
| Customer: | Cellphone-Mate, Inc | | |
| Specification: | **7.10 Occupied Band Width / 47 CFR §2.1049 Occupied Band Width** | | |
| Work Order #: | **100637** | Date: | 11/13/2017 |
| Test Type: | **Conducted Emissions** | Time: | 11:12:00 AM |
| Tested By: | **Daniel Bertran** | Sequence#: | 1 |
| Software: | EMITest 5.03.11 | | |

***Equipment Tested:***

| Device | Manufacturer | Model # | S/N |
|---|---|---|---|
| Configuration 1 | | | |

***Support Equipment:***

| Device | Manufacturer | Model # | S/N |
|---|---|---|---|
| | | | |

***Test Conditions / Notes:***

The equipment under test (EUT) is a Mobile Wideband Consumer Booster.
The EUT is placed on the test bench. Evaluation performed at the Outside (Donor) and Inside (Server) antenna port.
The EUT Server port is a type FME connector and 50-ohm impedance.
The EUT Donor port is type FME connector and 50-ohm impedance.

Part 22
UL: 824-849MHz
DL: 869-894MHz
Part 24
UL: 1850-1915MHz
DL: 1930-1995MHz
Part 27
UL: 1710-1755MHz, 698-716MHz, 776-787MHz
DL: 2110-2155MHz, 728-746MHz, 746-757MHz

Test procedure:
The test was performed in accordance with section 7.10 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04r01 Dated October 27, 2017.
Firmware: V 3.0
Test environment conditions: 22°C, 40% Relative Humidity,102 kPa

***Test Equipment:***

| ID | Asset #/Serial # | Description | Model | Calibration Date | Cal Due Date |
|---|---|---|---|---|---|
| | AN03418 | Signal Generator | E4438C | 6/19/2017 | 6/19/2019 |
| | ANP06239 | Attenuator | 54A-10 | 8/8/2016 | 8/8/2018 |
| | ANP06897 | Cable | 32022-29094K-29094K-48TC | 12/30/2015 | 12/30/2017 |
| | ANP06898 | Cable | 32022-29094K-29094K-48TC | 12/30/2015 | 12/30/2017 |
| | ANP05411 | Attenuator | 54A-10 | 1/18/2016 | 1/18/2018 |
| | AN03471 | Spectrum Analyzer | E4440A | 12/9/2015 | 12/9/2017 |

## Summary of Results

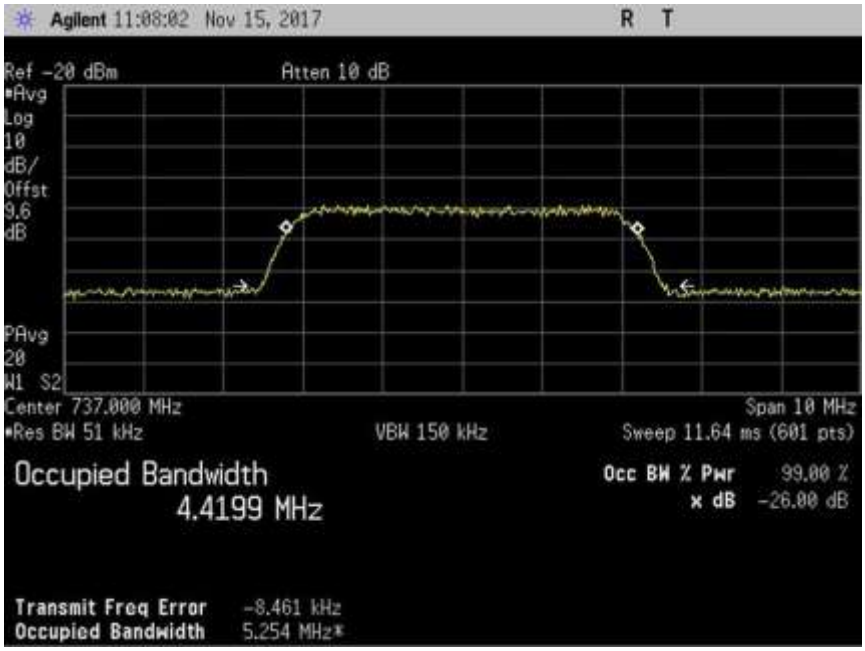
Pass: As summarized in plots and tables below, the uniformity of the output signal relative to the input signal are practically identical. Therefore, the comparison is within limits.

| OBW-Input (Hz) | | | | | | OBW-Output (Hz) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **EDGE** | **GSM** | **CDMA** | **WCDMA** | **LTE** | | **EDGE** | **GSM** | **CDMA** | **WCDMA** | **LTE** |
| 244655 | 245180 | 1213862 | 4346087 | 4461993 | | 246124 | 245982 | 1216799 | 4351620 | 4453649 |
| 244788 | 244592 | 1208479 | 4354318 | 4454206 | | 245514 | 245897 | 1210237 | 4371112 | 4457154 |
| 244960 | 246511 | 1208113 | 4337957 | 4451246 | | 243747 | 245211 | 1214282 | 4360490 | 4442727 |
| 244827 | 245609 | 1213216 | 4358675 | 4455535 | | 243509 | 246514 | 1209799 | 4358746 | 4456366 |
| 245006 | 246593 | 1210949 | 4360001 | 4459303 | | 243544 | 245517 | 1208145 | 4348904 | 4453717 |
| 246079 | 249014 | 1206826 | 4448446 | 4470159 | | 244948 | 245496 | 1206850 | 4331799 | 4466085 |
| 246307 | 248086 | 1214503 | 4421260 | 4483061 | | 244757 | 246504 | 1212193 | 4340462 | 4462137 |
| 247021 | 248207 | 1208743 | 4430952 | 4474680 | | 245256 | 245077 | 1208535 | 4328437 | 4464499 |
| 246757 | 248817 | 1215548 | 4419857 | 4476132 | | 244724 | 245355 | 1209735 | 4329867 | 4467423 |
| 247116 | 248698 | 1212425 | 4422816 | 4480149 | | 244816 | 246211 | 1211139 | 4326310 | 4460842 |

| Max Difference In&Out<br>Occ BW 99% Pwr | | | | | |
|---|---|---|---|---|---|
| **Frequency Range** | **EDGE** | **GSM** | **CDMA** | **WCDMA** | **LTE** |
| UL_1710-1755MHz | 0.60% | 0.33% | 0.24% | 0.13% | 0.19% |
| UL_1850-1915MHz | 0.30% | 0.53% | 0.15% | 0.39% | 0.07% |
| UL_824-849MHz | 0.50% | 0.53% | 0.51% | 0.52% | 0.19% |
| UL_698-716MHz | 0.54% | 0.37% | 0.28% | 0.00% | 0.02% |
| UL_777-787MHz | 0.60% | 0.44% | 0.23% | 0.25% | 0.13% |
| DL_2110-2155MHz | 0.46% | 1.41% | 0.00% | 2.62% | 0.09% |
| DL_1930-1995MHz | 0.63% | 0.64% | 0.19% | 1.83% | 0.47% |
| DL_869-894MHz | 0.71% | 1.26% | 0.02% | 2.31% | 0.23% |
| DL_728-746MHz | 0.82% | 1.39% | 0.48% | 2.04% | 0.19% |
| DL_746-756MHz | 0.93% | 1.00% | 0.11% | 2.18% | 0.43% |

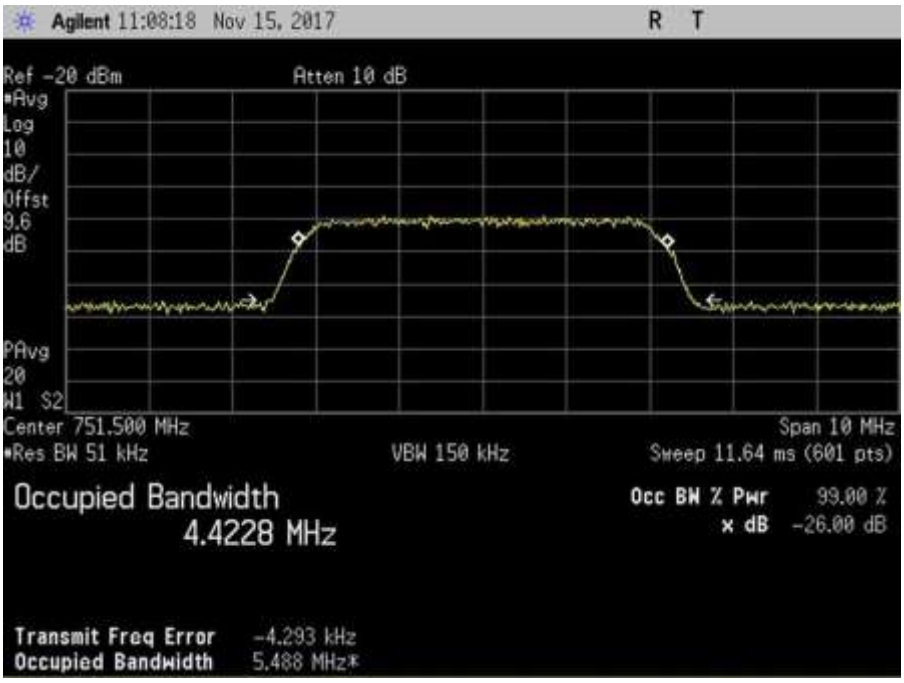
## Plots

**AWGN, DL**

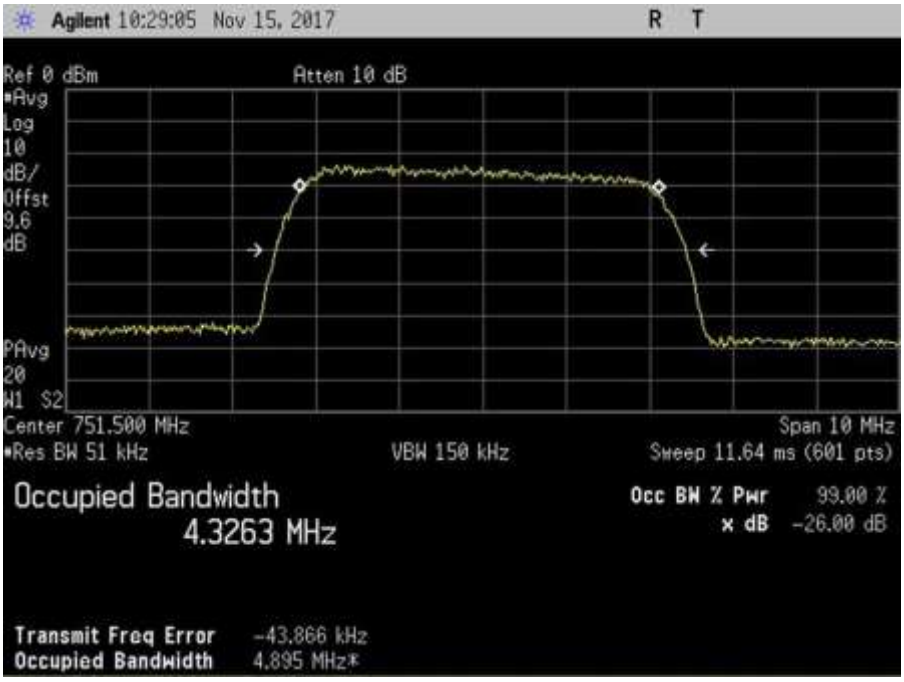



7.10_OBW_DL_728-746MHz_AWGN_In

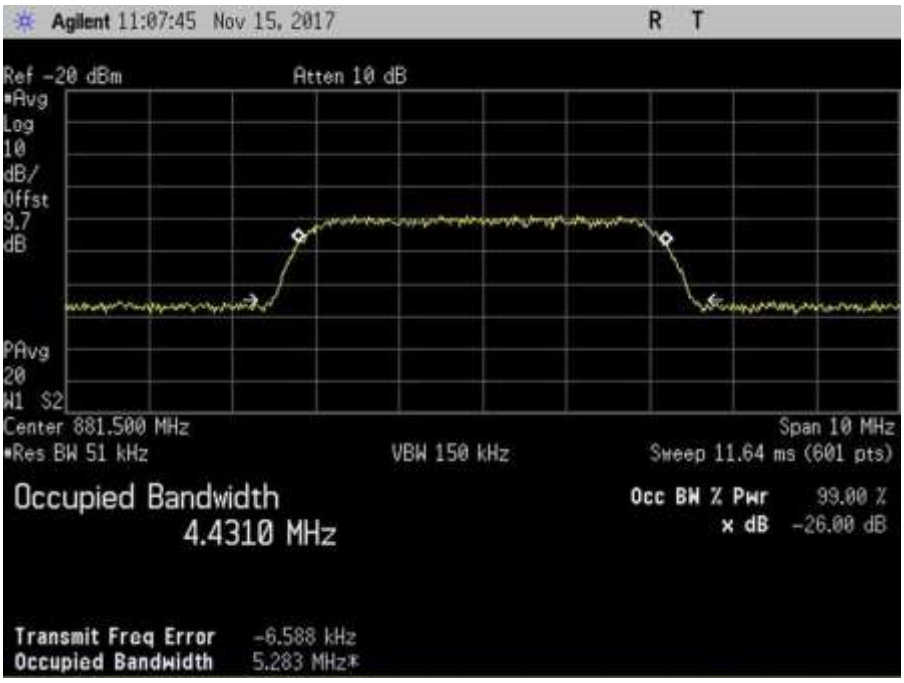

7.10_OBW_DL_728-746MHz_AWGN_Out



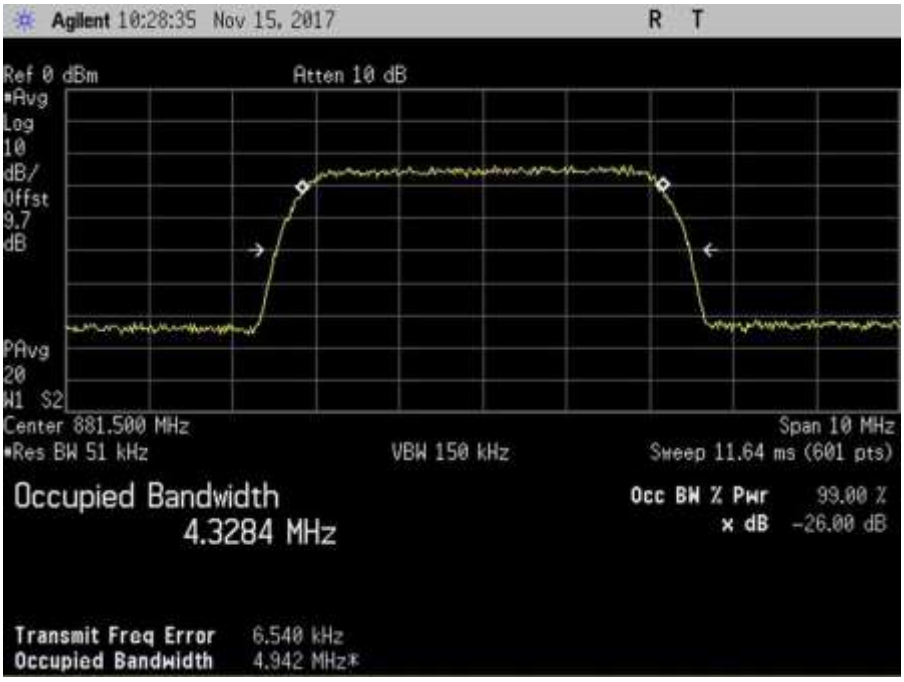

7.10_OBW_DL_746-757MHz_AWGN_In



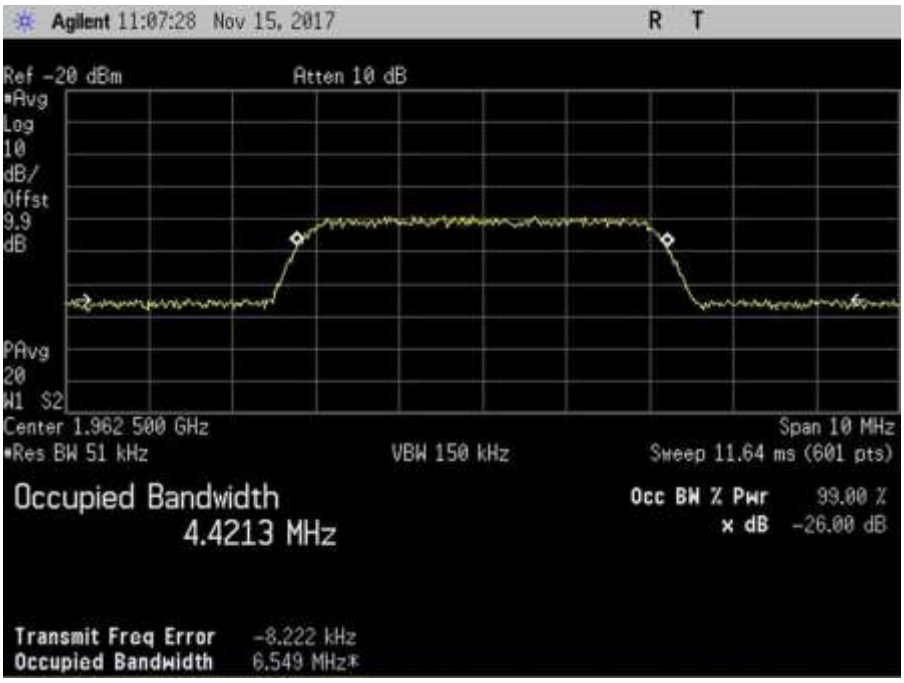

7.10_OBW_DL_746-757MHz_AWGN_Out



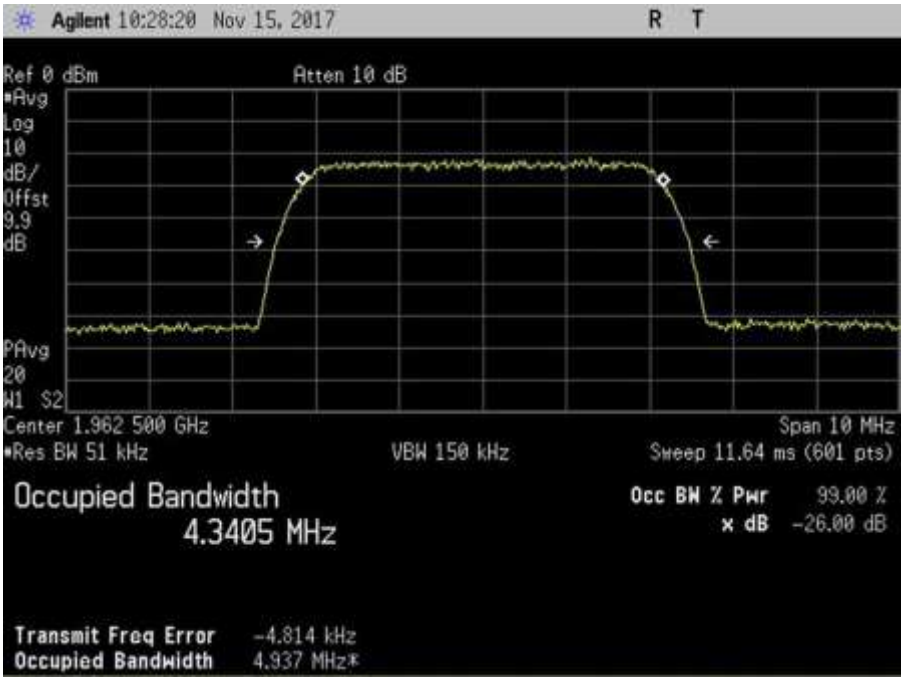

7.10_OBW_DL_869-894MHz_AWGN_In



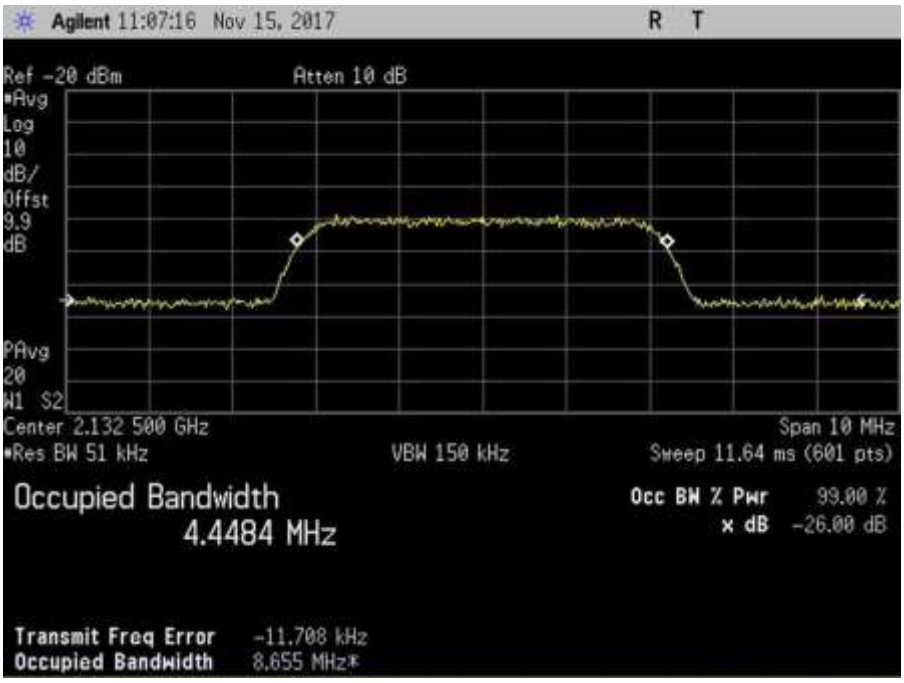

7.10_OBW_DL_869-894MHz_AWGN_Out



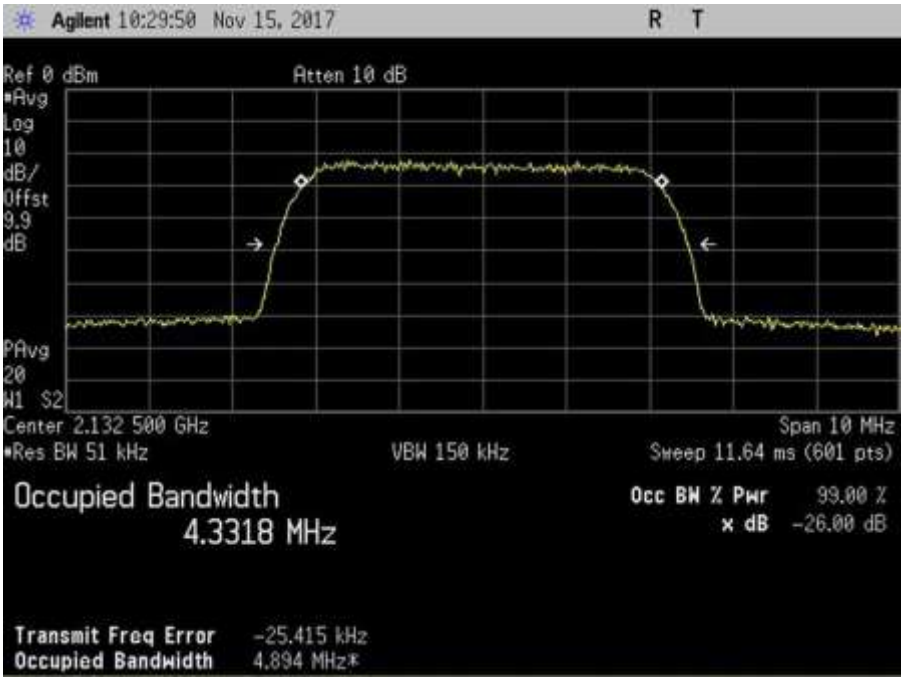

7.10_OBW_DL_1930-1995MHz_AWGN_In




7.10_OBW_DL_1930-1995MHz_AWGN_Out

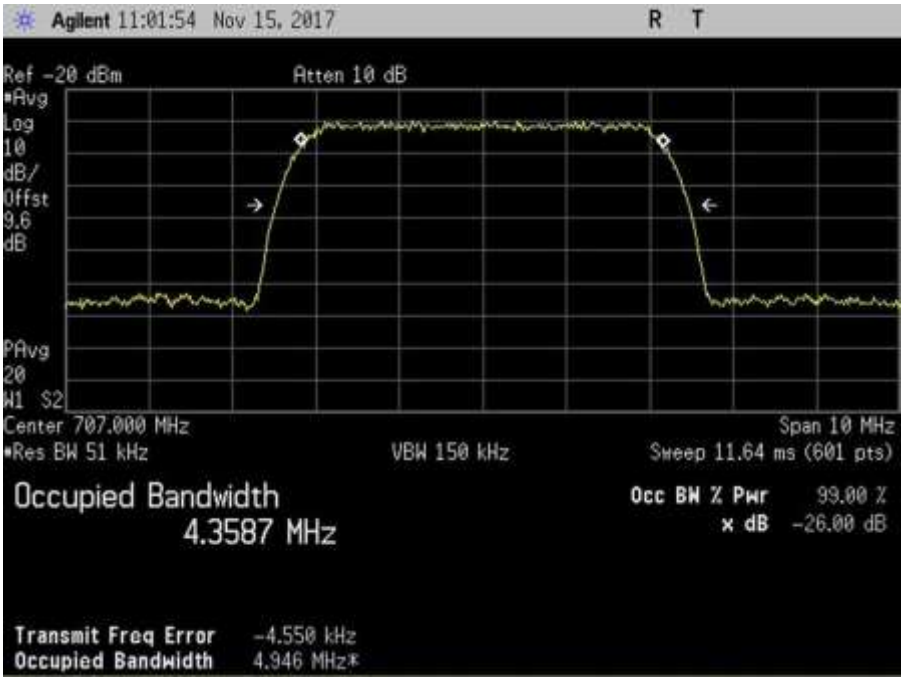



7.10_OBW_DL_2110-2155MHz_AWGN_In

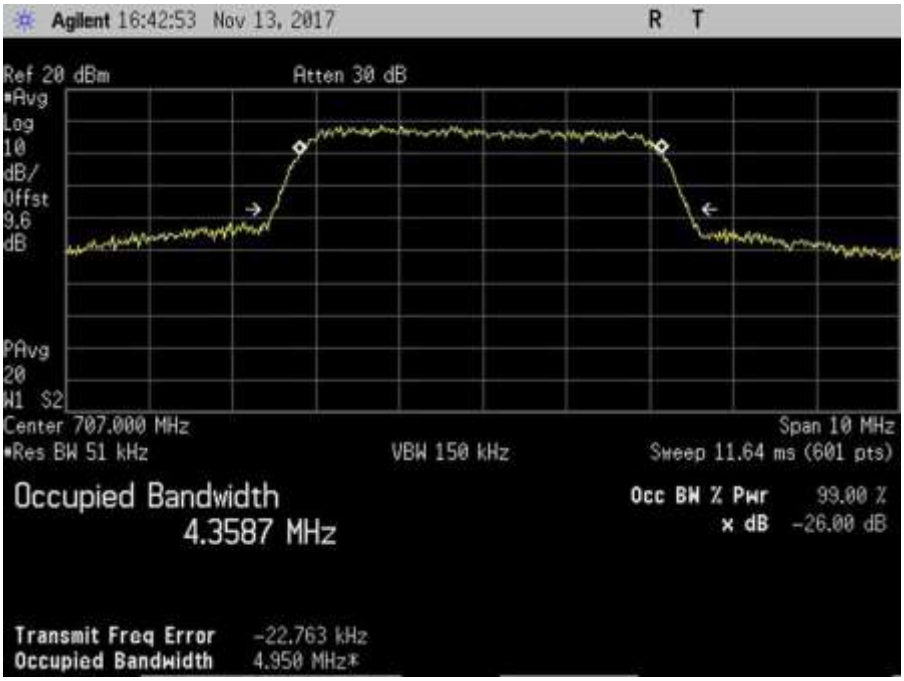



7.10_OBW_DL_2110-2155MHz_AWGN_Out

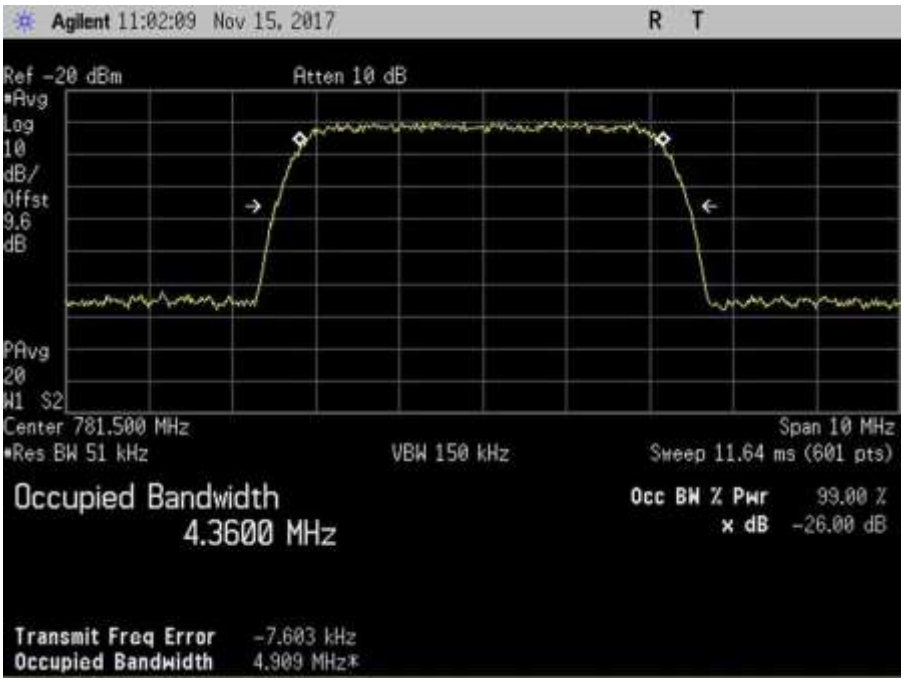
**AWGN, UL**



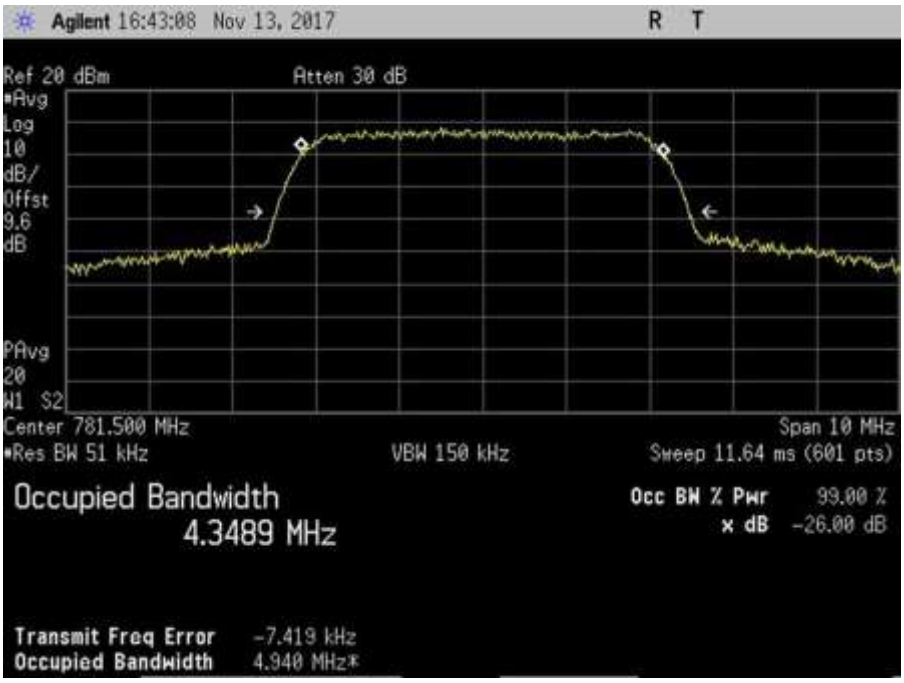

7.10_OBW_UL_698-716MHz_AWGN_In



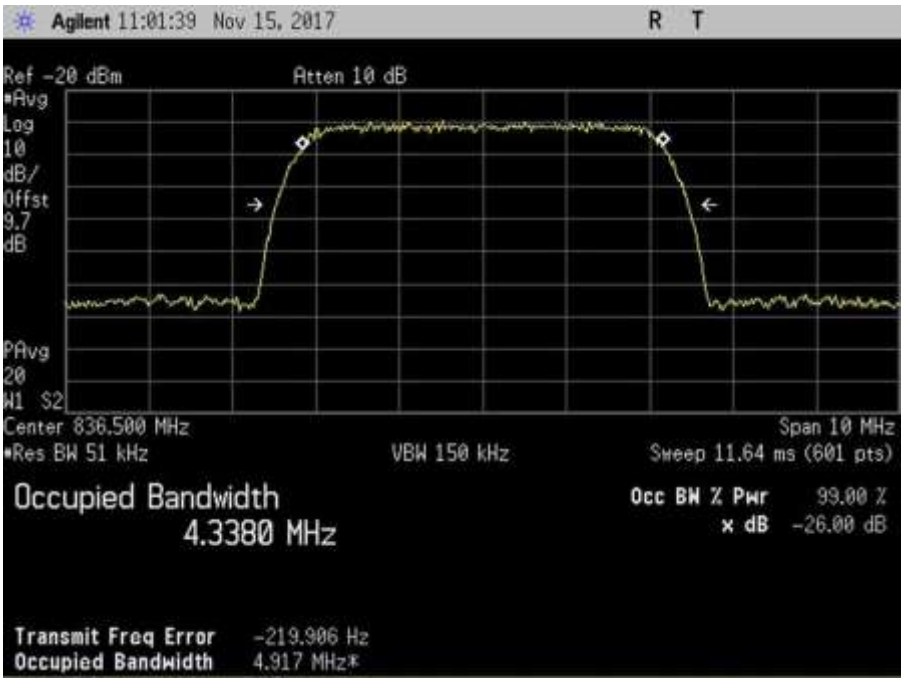

7.10_OBW_UL_698-716MHz_AWGN_Out



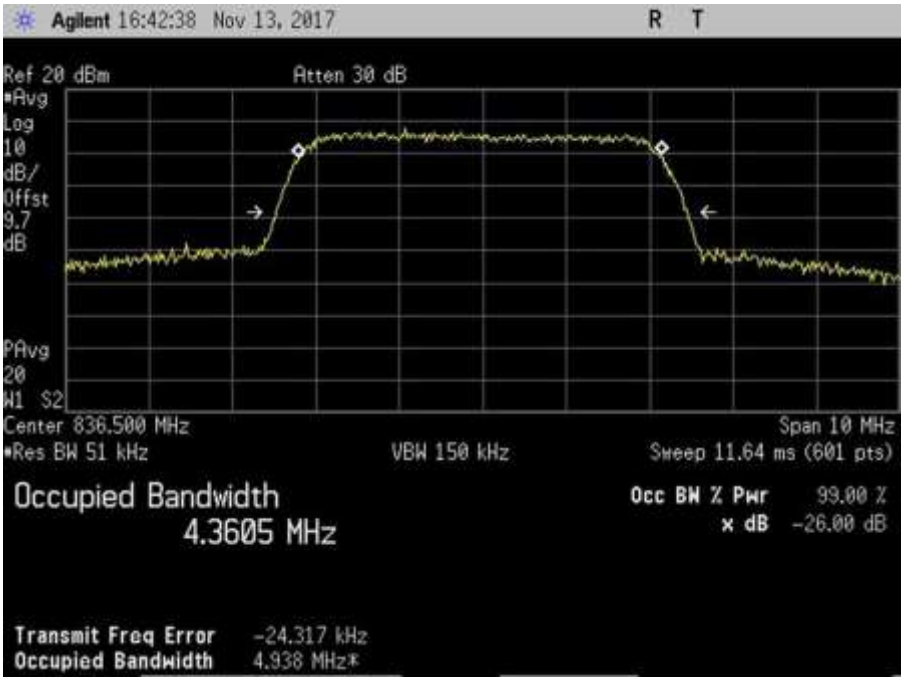

7.10_OBW_UL_776-787MHz_AWGN_In



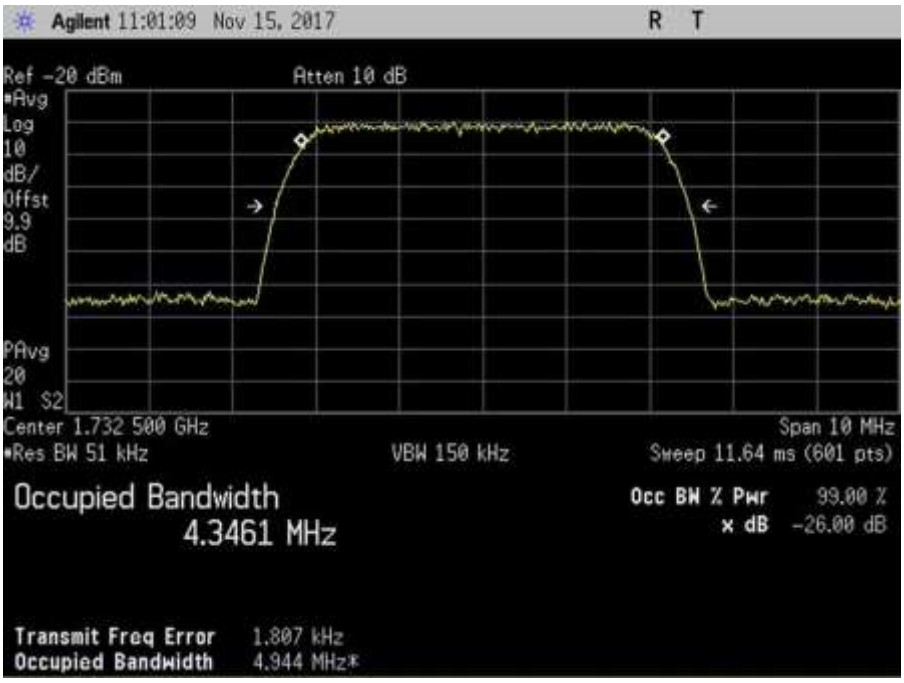

7.10_OBW_UL_776-787MHz_AWGN_Out



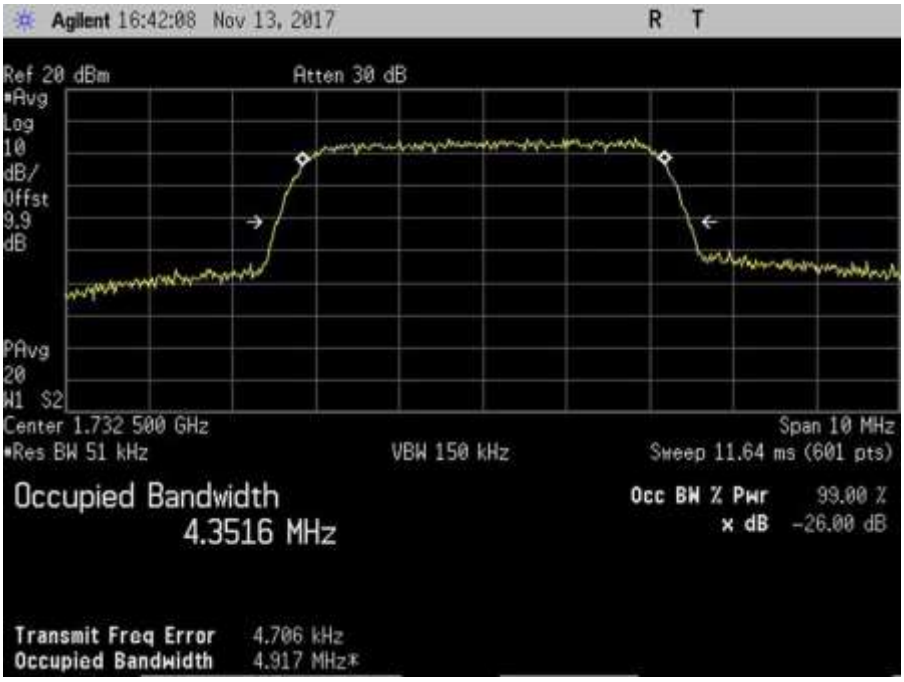

7.10_OBW_UL_824-849MHz_AWGN_In



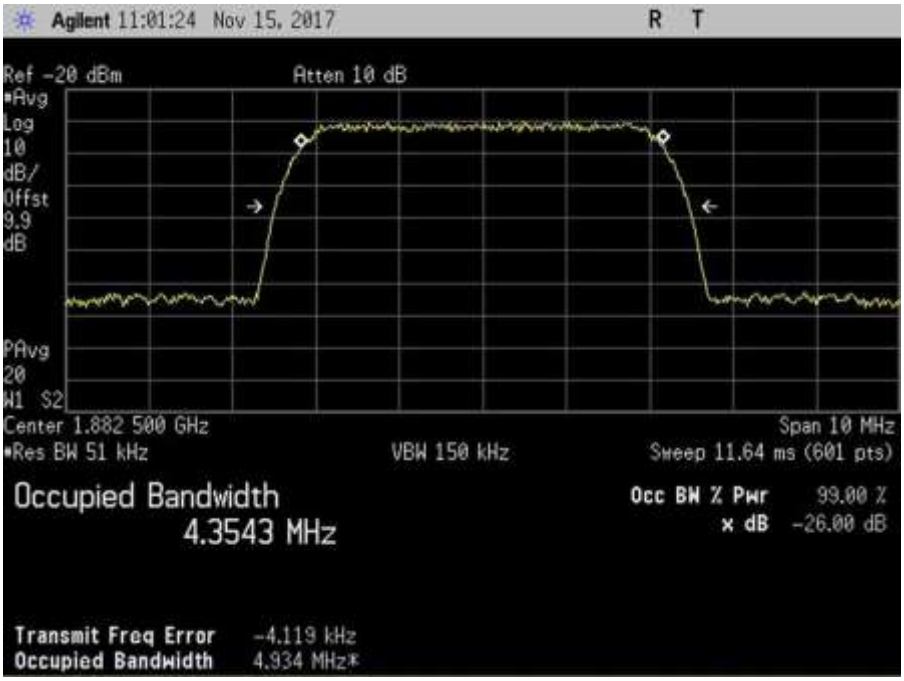

7.10_OBW_UL_824-849MHz_AWGN_Out



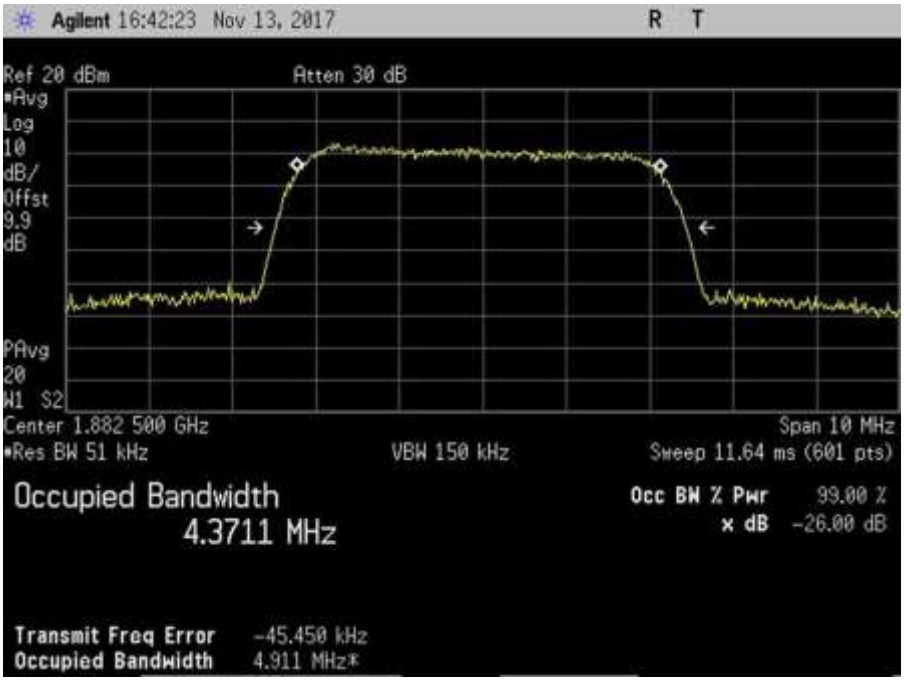

7.10_OBW_UL_1710-1755MHz_AWGN_In




7.10_OBW_UL_1710-1755MHz_AWGN_Out

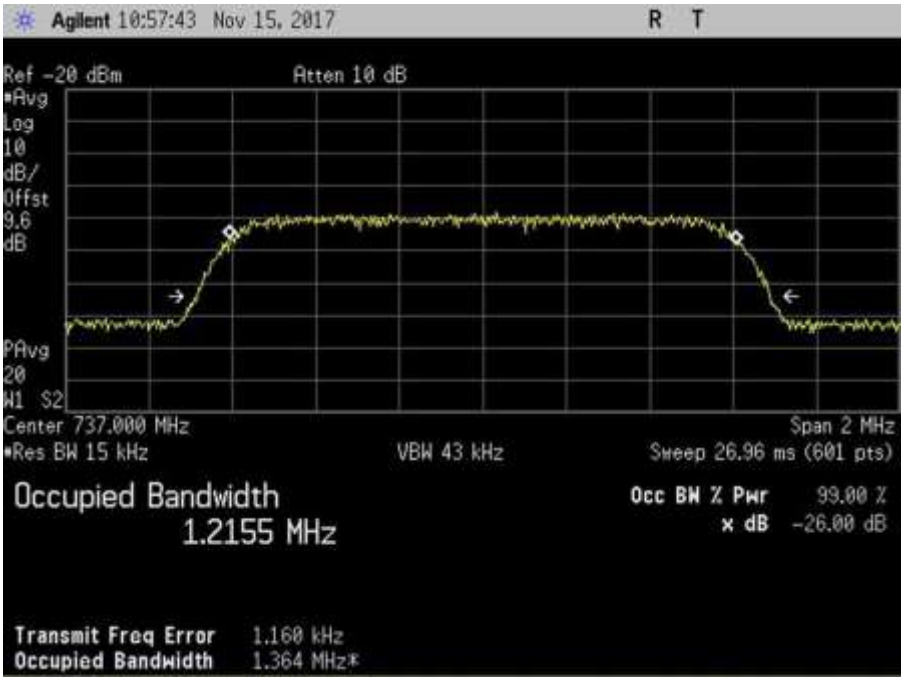



7.10_OBW_UL_1850-1915MHz_AWGN_In



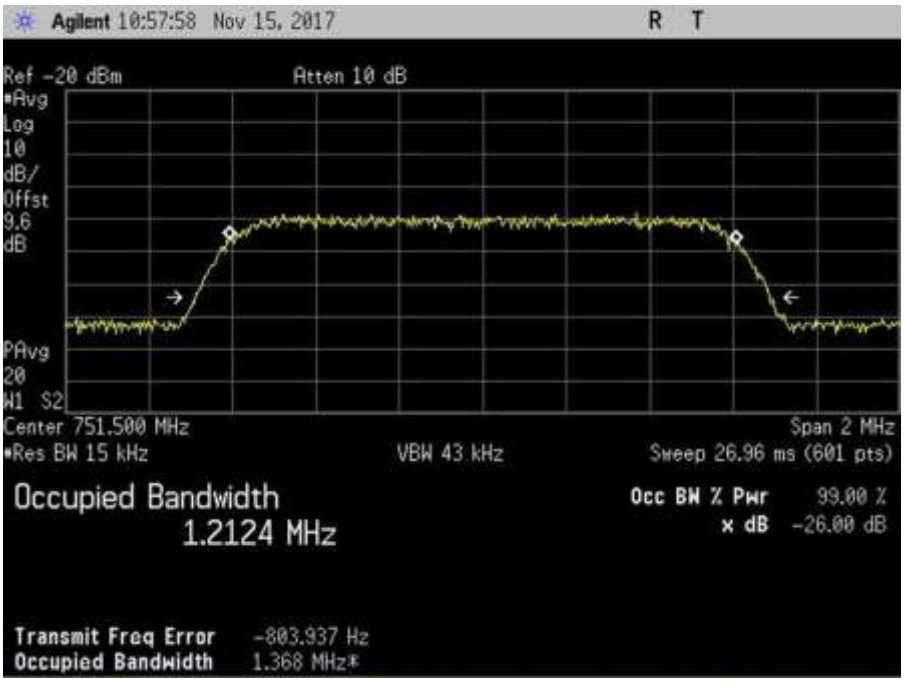

7.10_OBW_UL_1850-1915MHz_AWGN_Out

## CDMA, DL

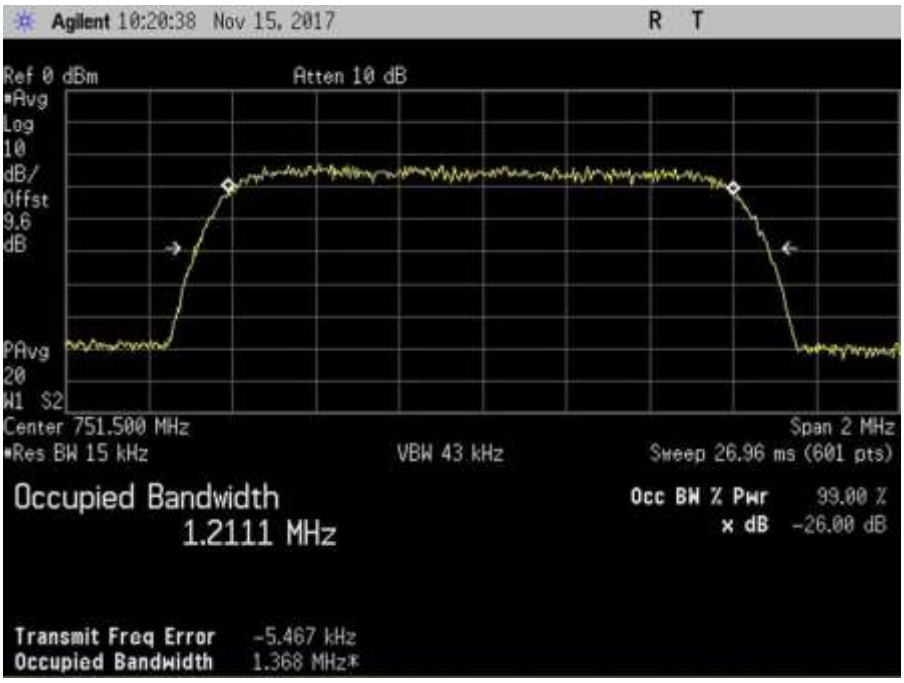



7.10_OBW_DL_728-746MHz_CDMA_In

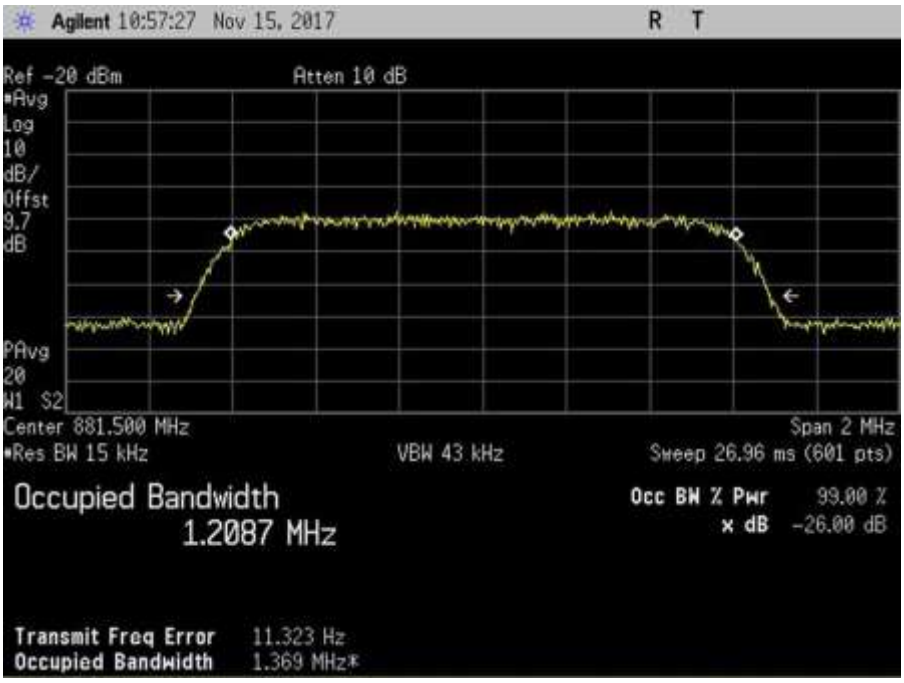

7.10_OBW_DL_728-746MHz_CDMA_Out




7.10_OBW_DL_746-757MHz_CDMA_In

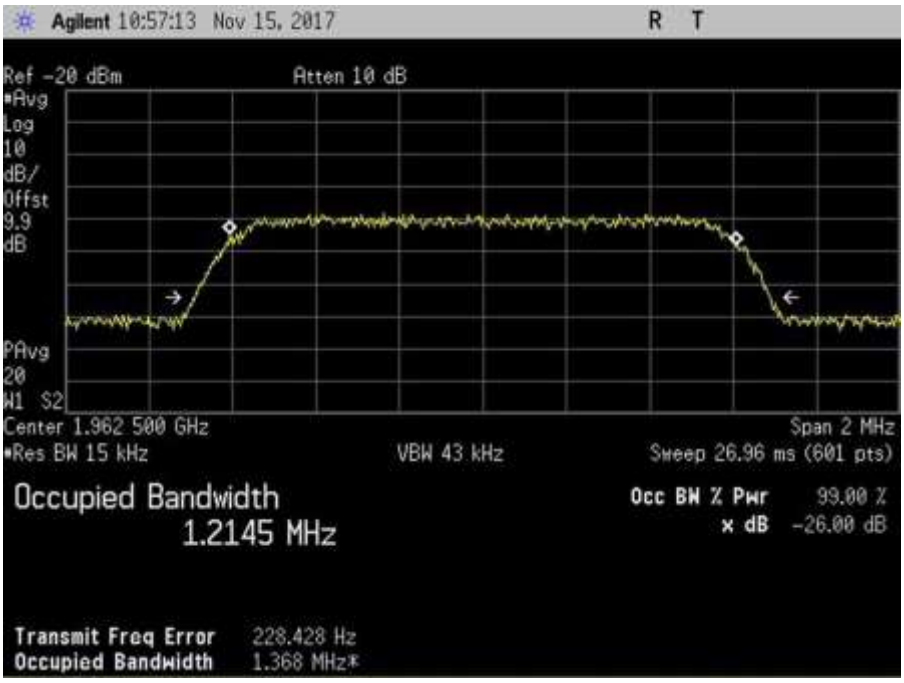



7.10_OBW_DL_746-757MHz_CDMA_Out

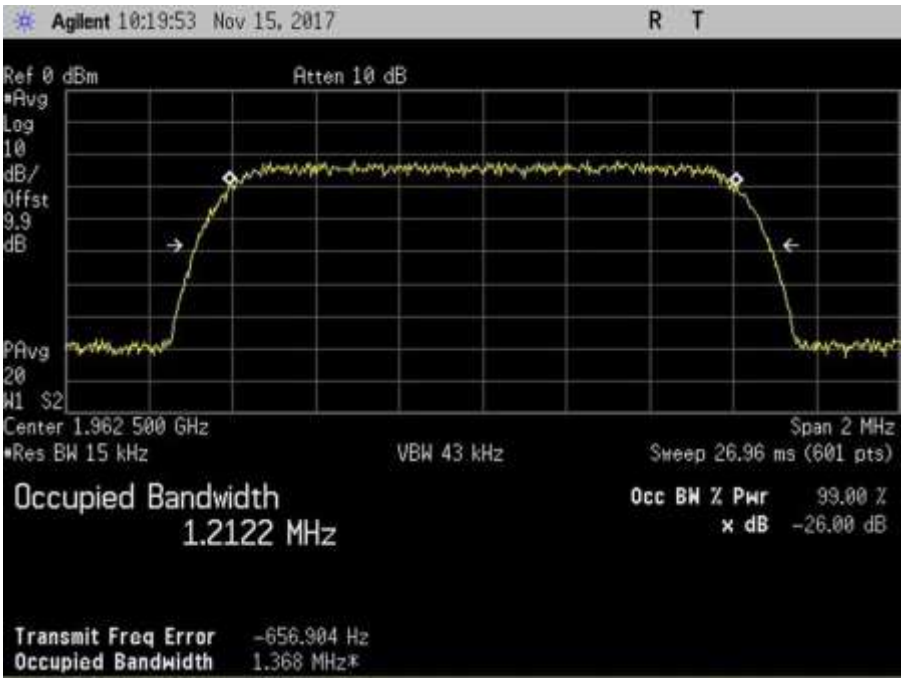



7.10_OBW_DL_869-894MHz_CDMA_In


7.10_OBW_DL_869-894MHz_CDMA_Out




7.10_OBW_DL_1930-1995MHz_CDMA_In

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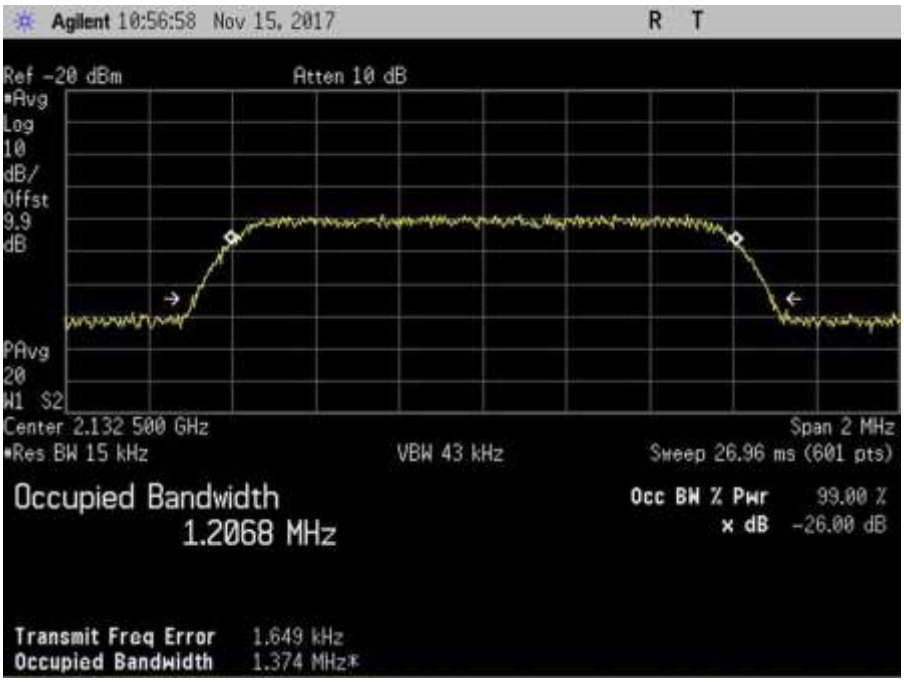
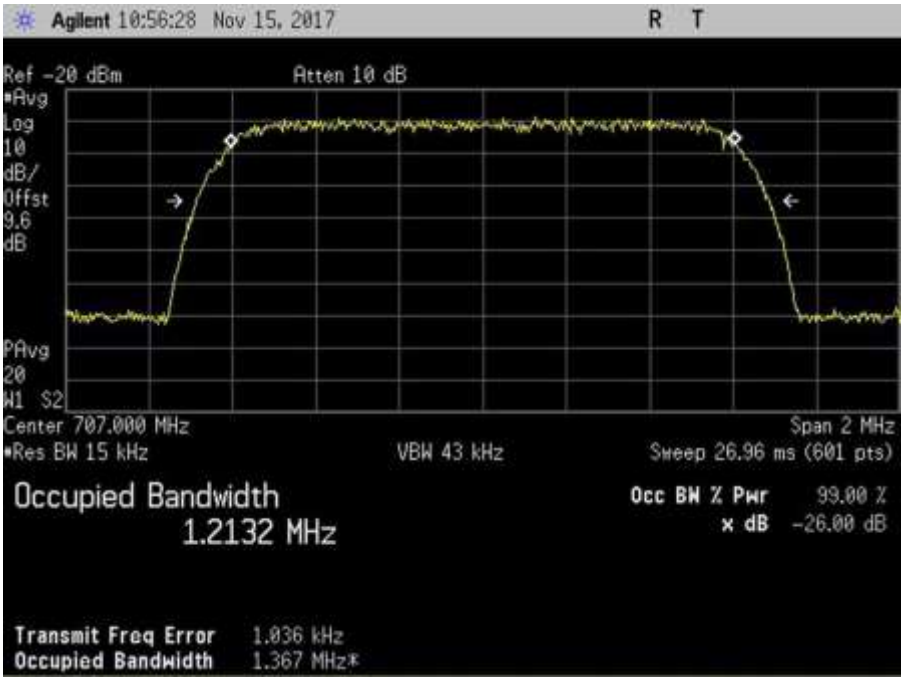



7.10_OBW_DL_2110-2155MHz_CDMA_In

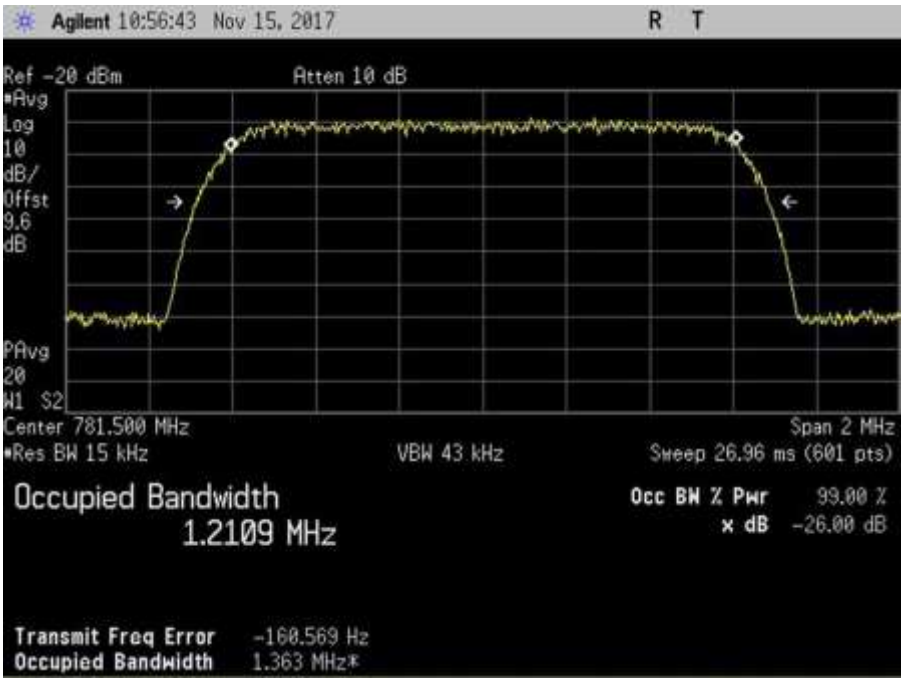

7.10_OBW_DL_2110-2155MHz_CDMA_Out

## CDMA, UL

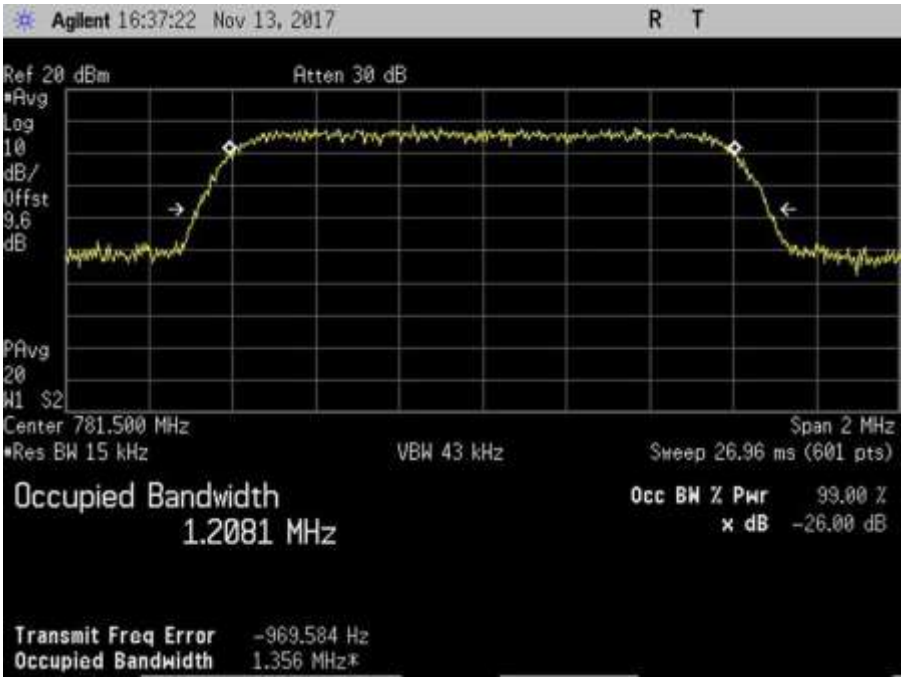



7.10_OBW_UL_698-716MHz_CDMA_In

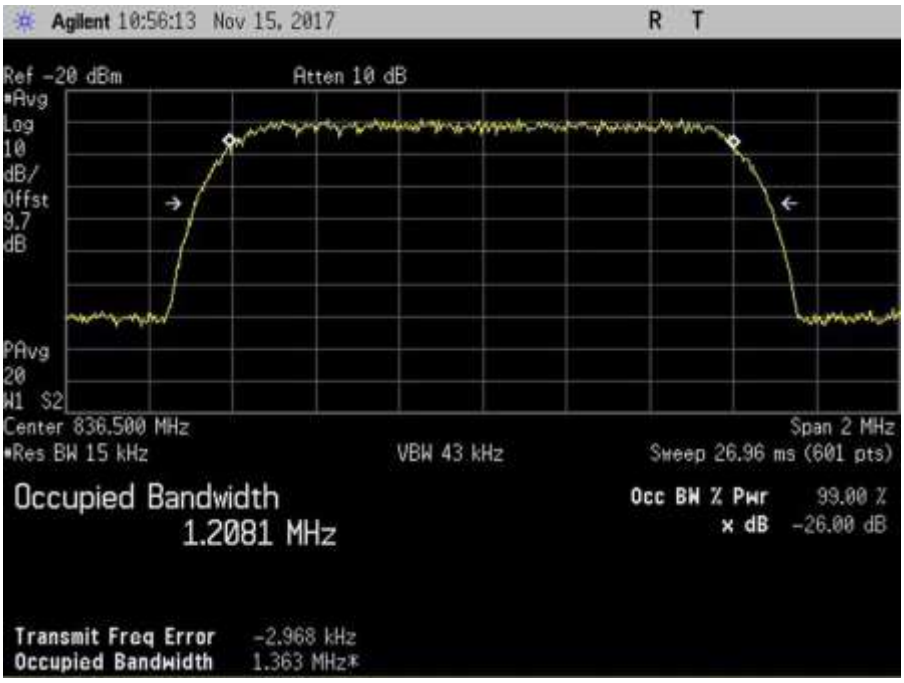

7.10_OBW_UL_698-716MHz_CDMA_Out



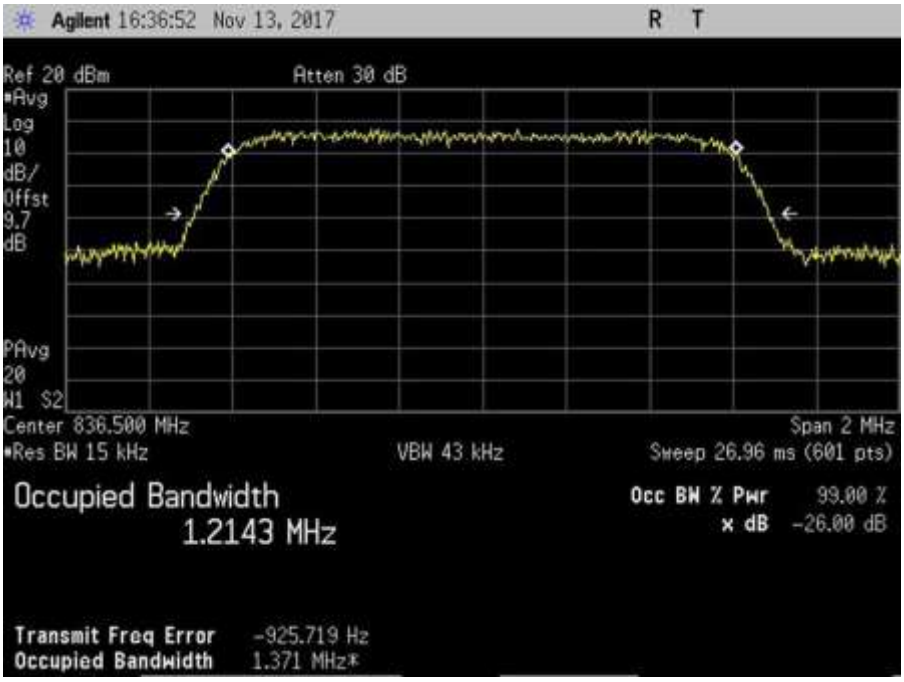

7.10_OBW_UL_776-787MHz_CDMA_In



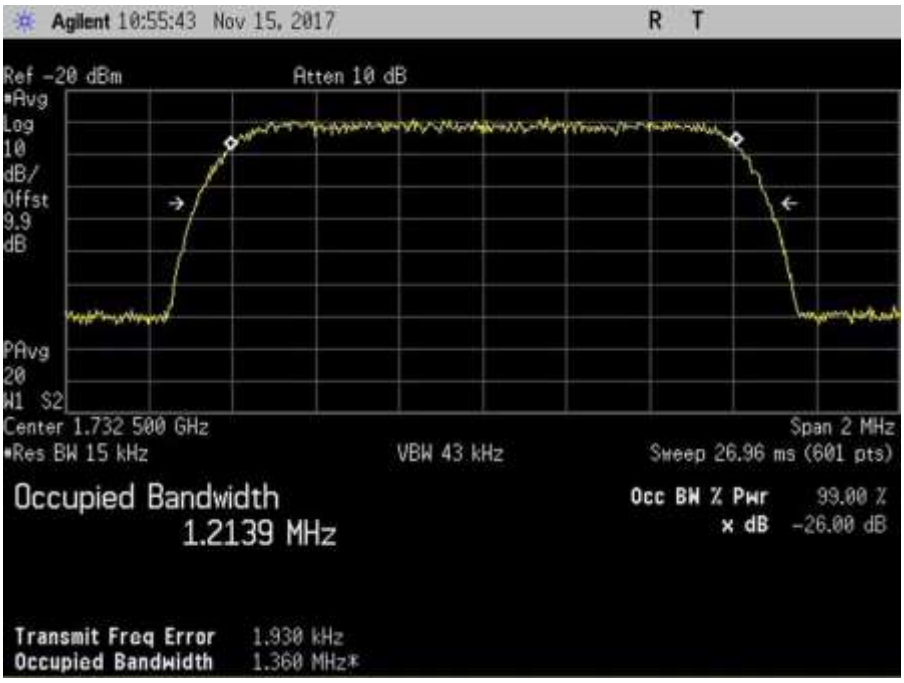

7.10_OBW_UL_776-787MHz_CDMA_Out



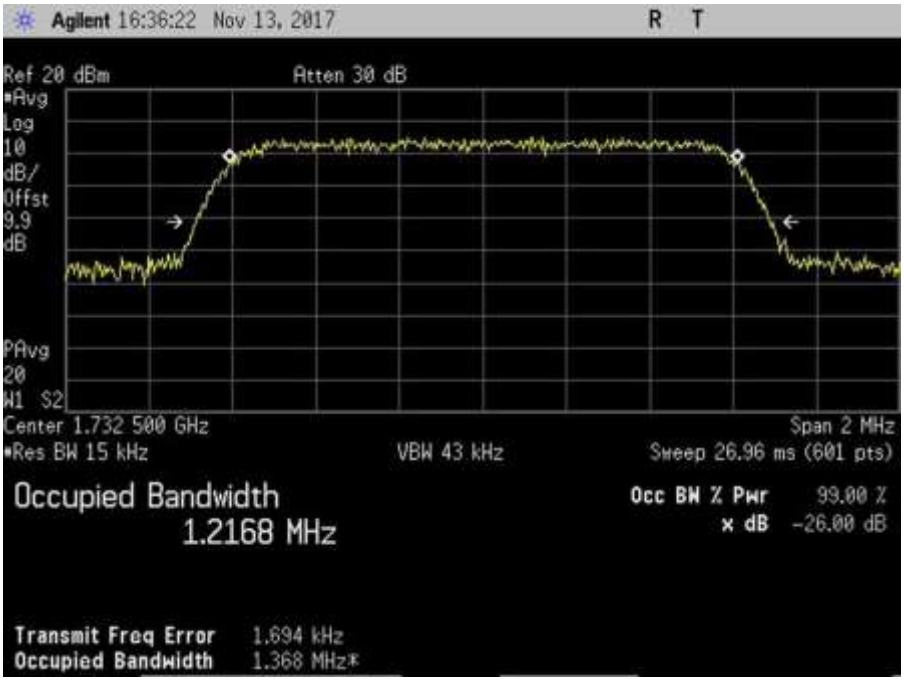

7.10_OBW_UL_824-849MHz_CDMA_In



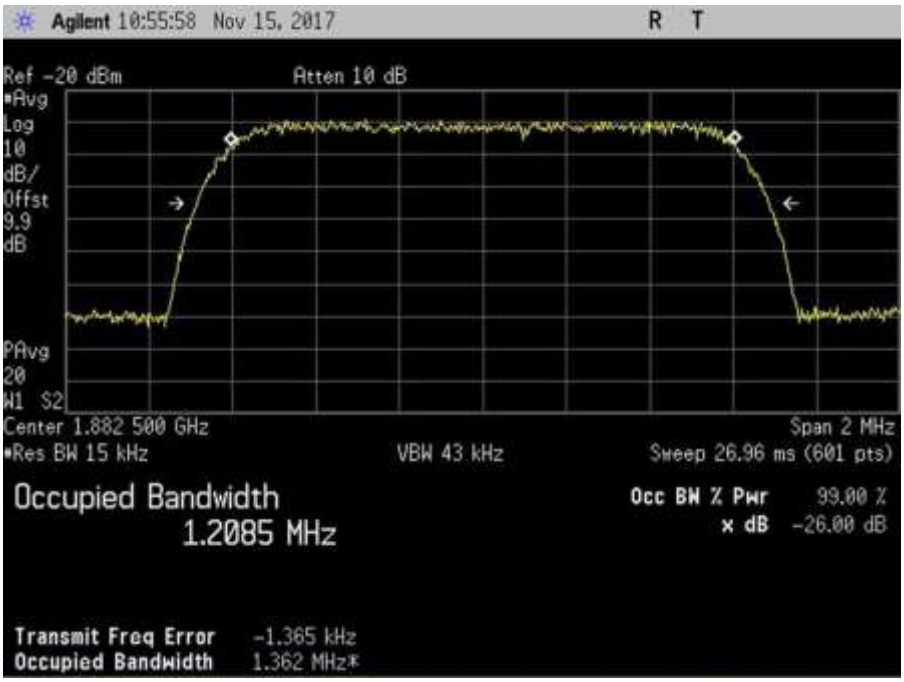

7.10_OBW_UL_824-849MHz_CDMA_Out



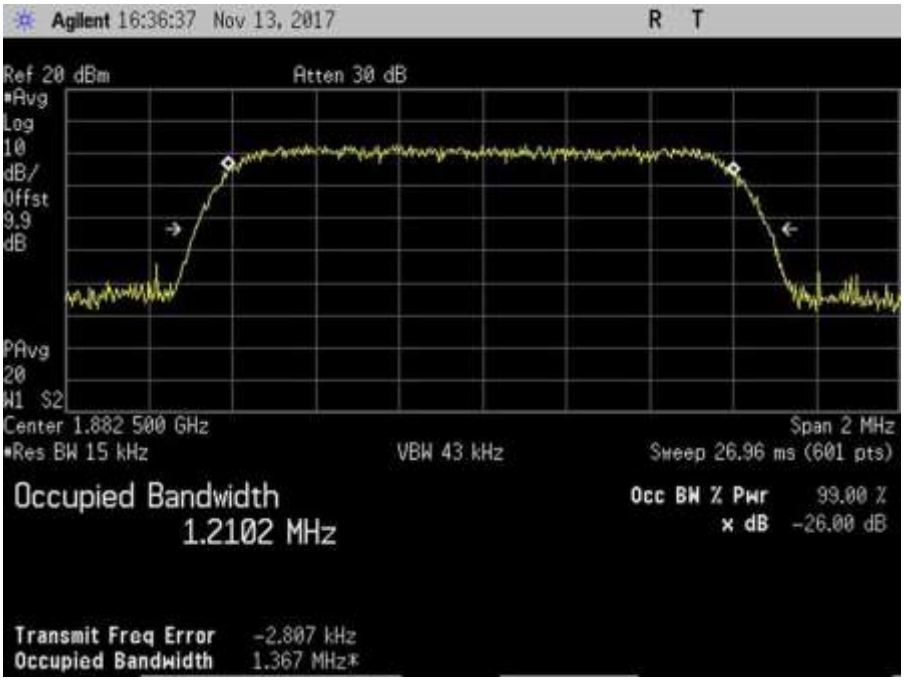

7.10_OBW_UL_1710-1755MHz_CDMA_In




7.10_OBW_UL_1710-1755MHz_CDMA_Out

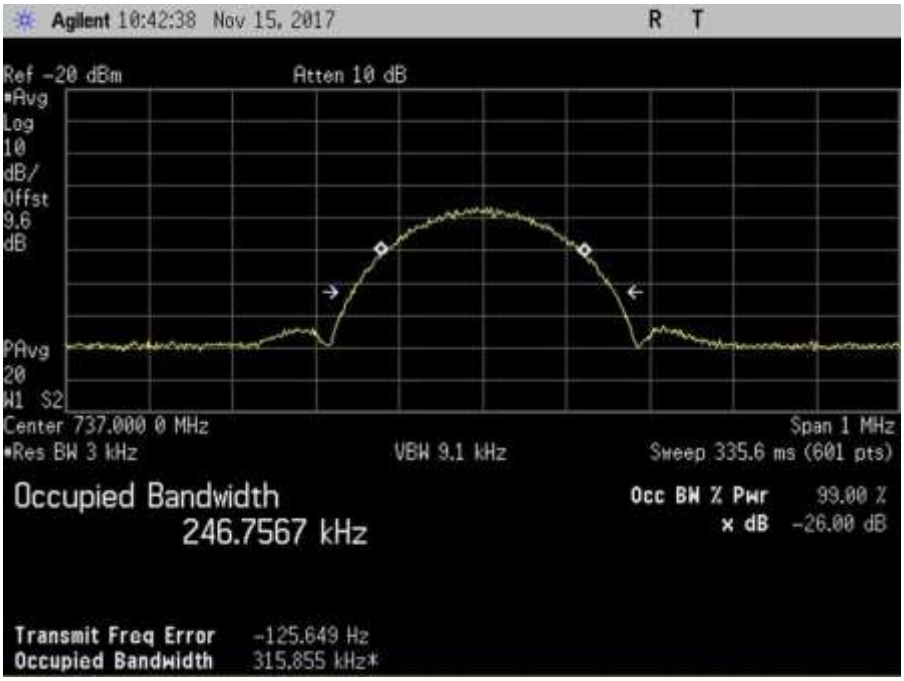



7.10_OBW_UL_1850-1915MHz_CDMA_In

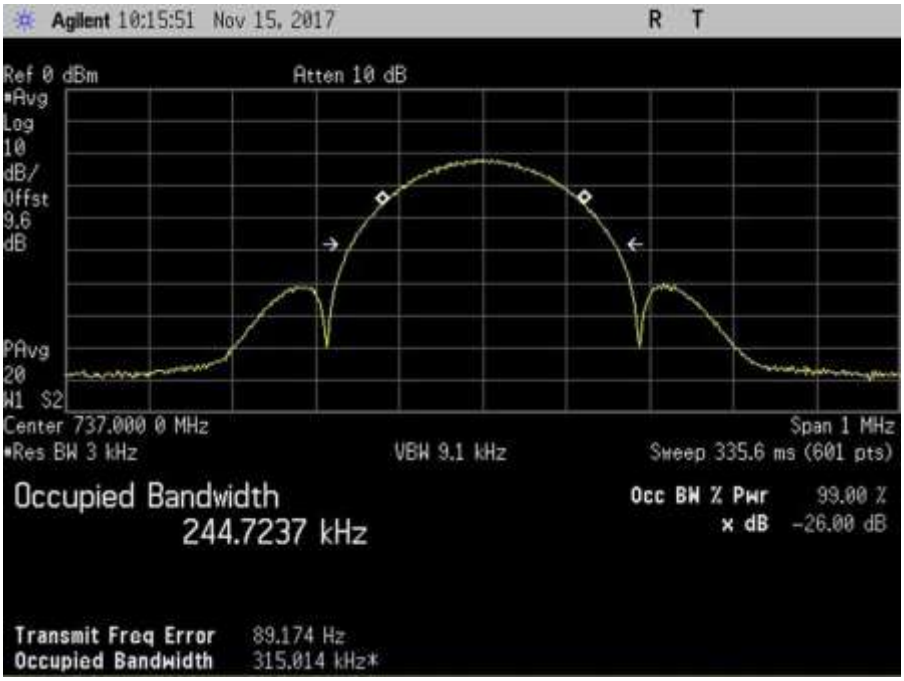



7.10_OBW_UL_1850-1915MHz_CDMA_Out

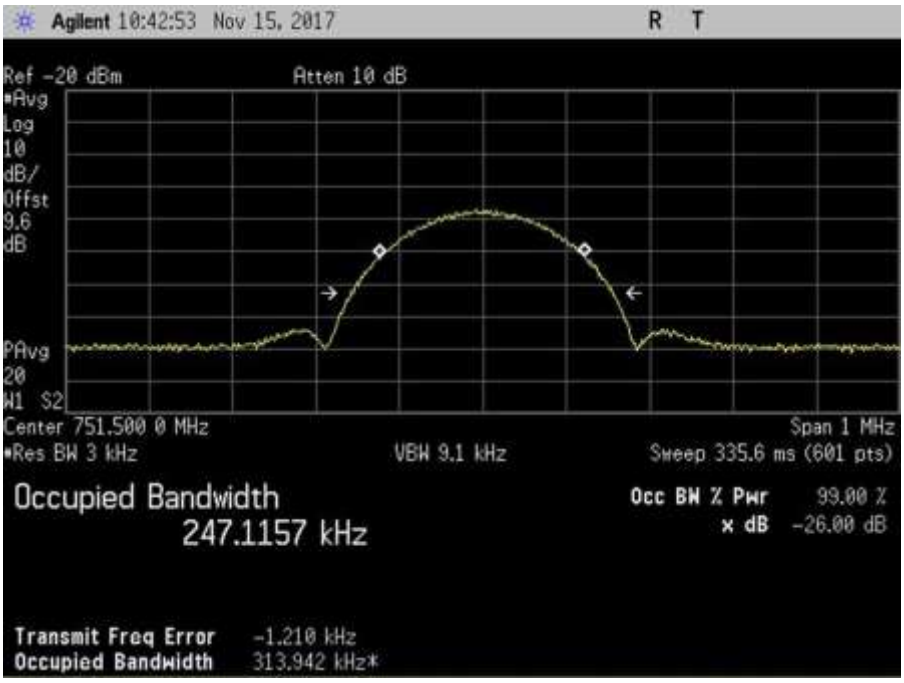
## EDGE, DL



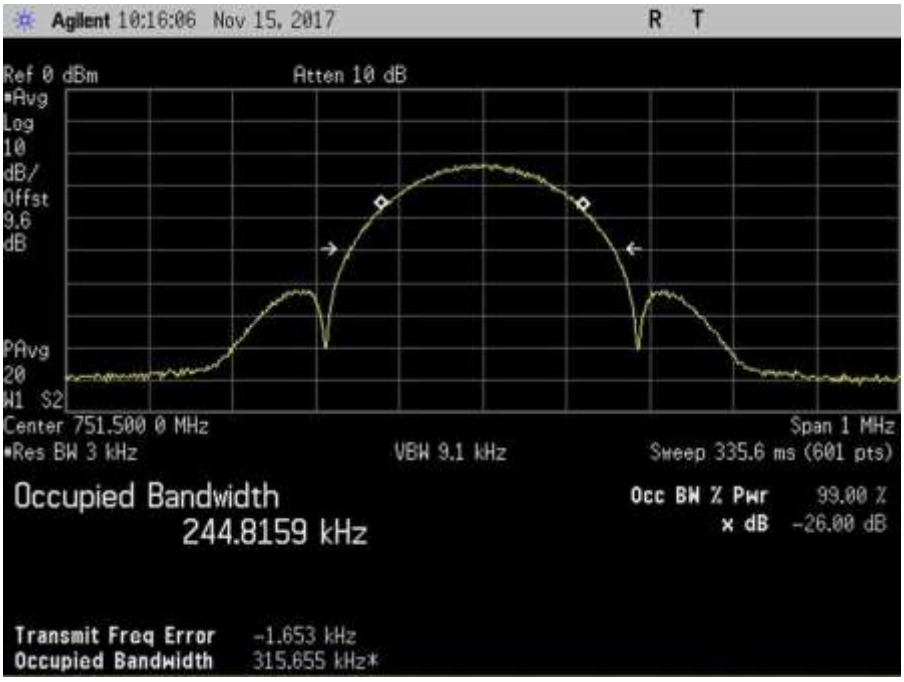

7.10_OBW_DL_728-746MHz_EDGE_In



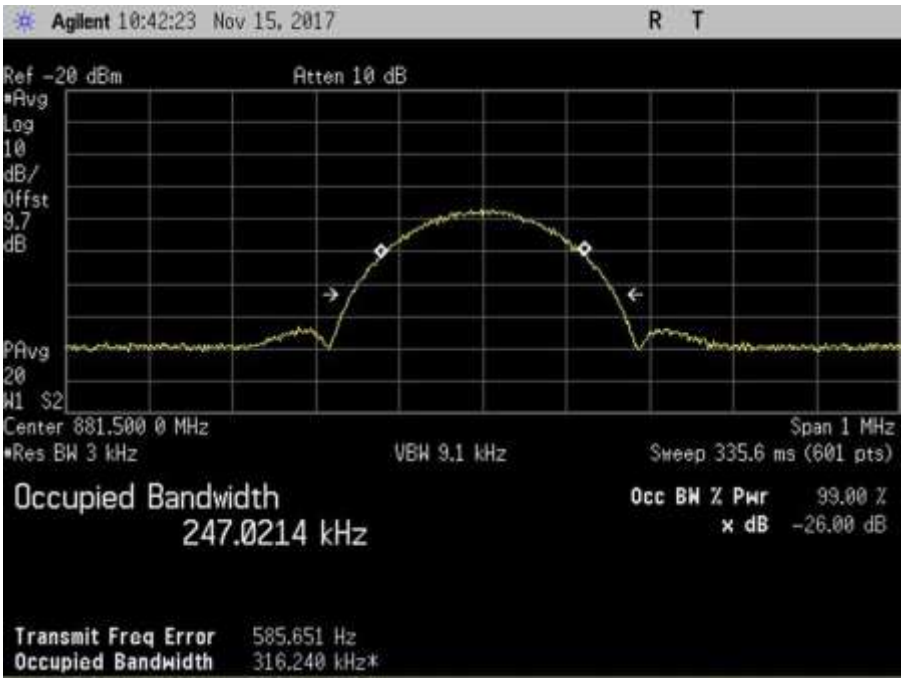

7.10_OBW_DL_728-746MHz_EDGE_Out



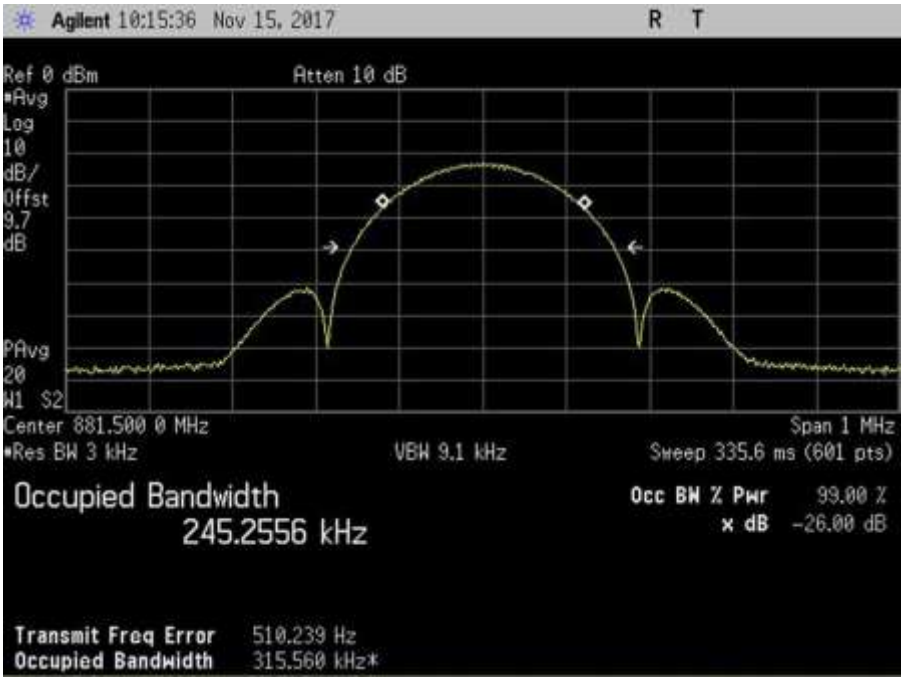

7.10_OBW_DL_746-757MHz_EDGE_In



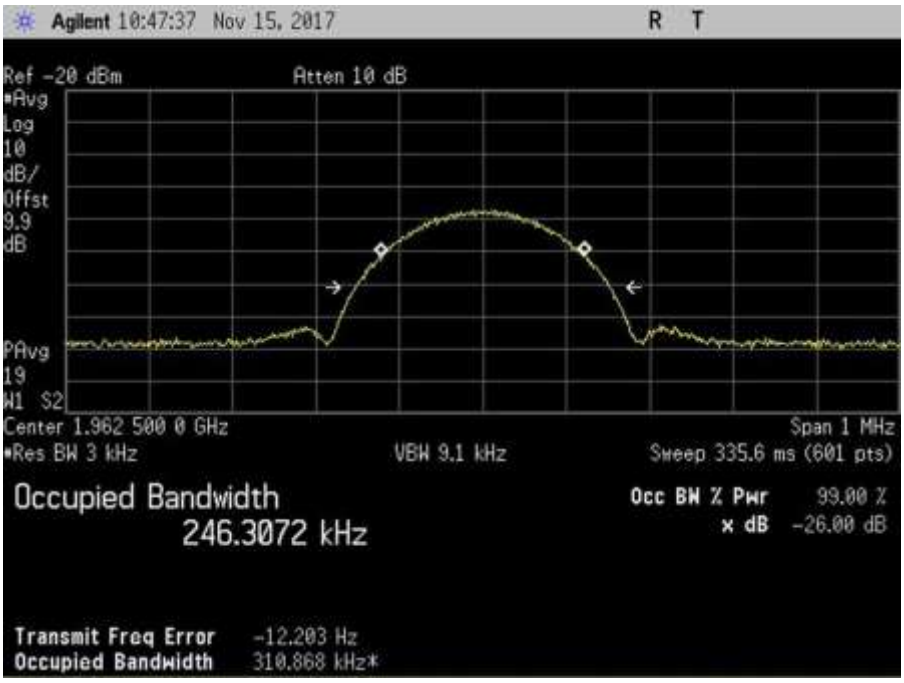

7.10_OBW_DL_746-757MHz_EDGE_Out



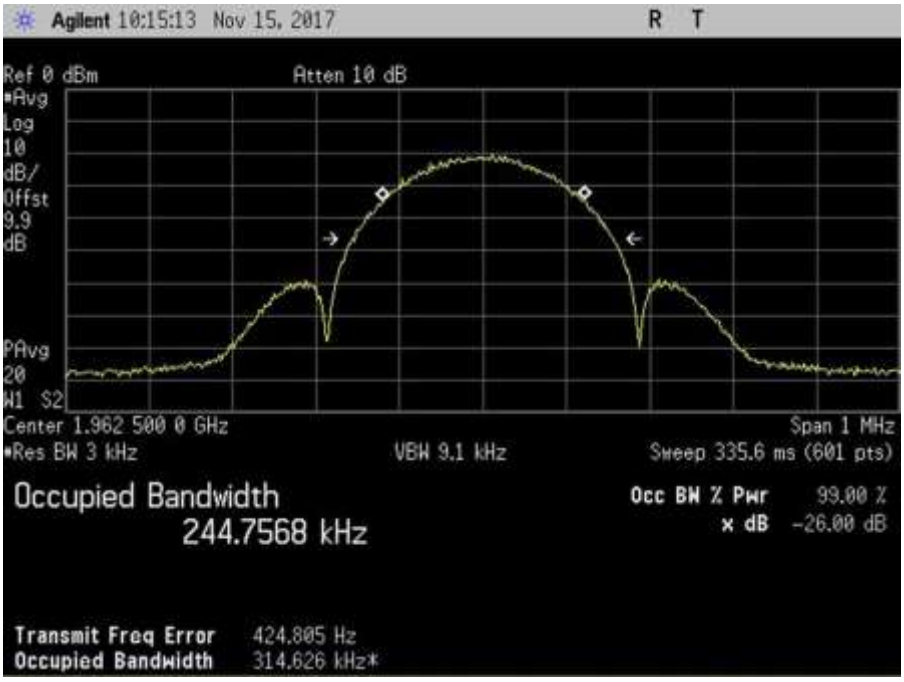

7.10_OBW_DL_869-894MHz_EDGE_In



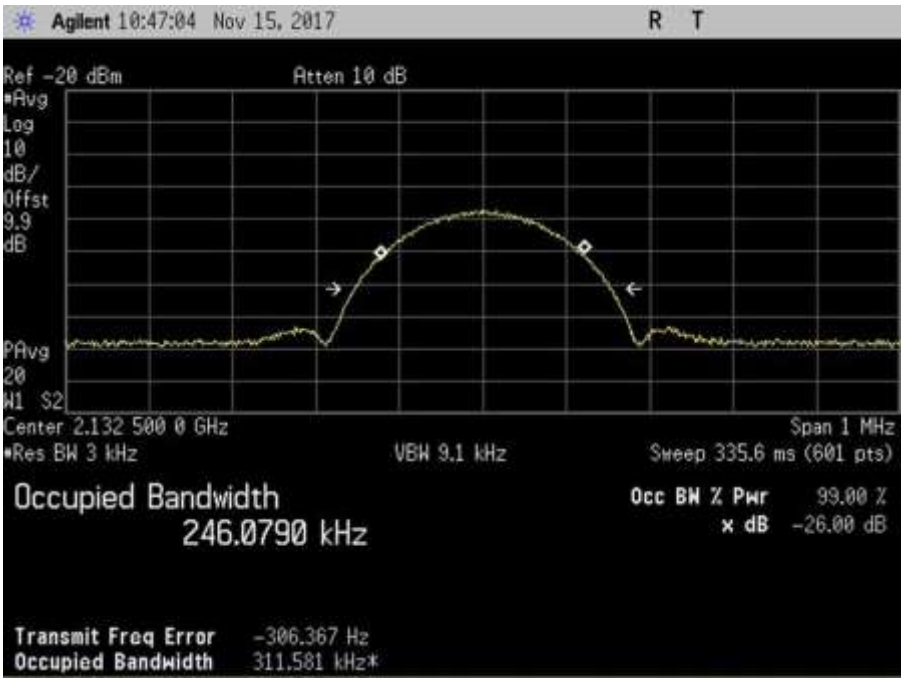

7.10_OBW_DL_869-894MHz_EDGE_Out



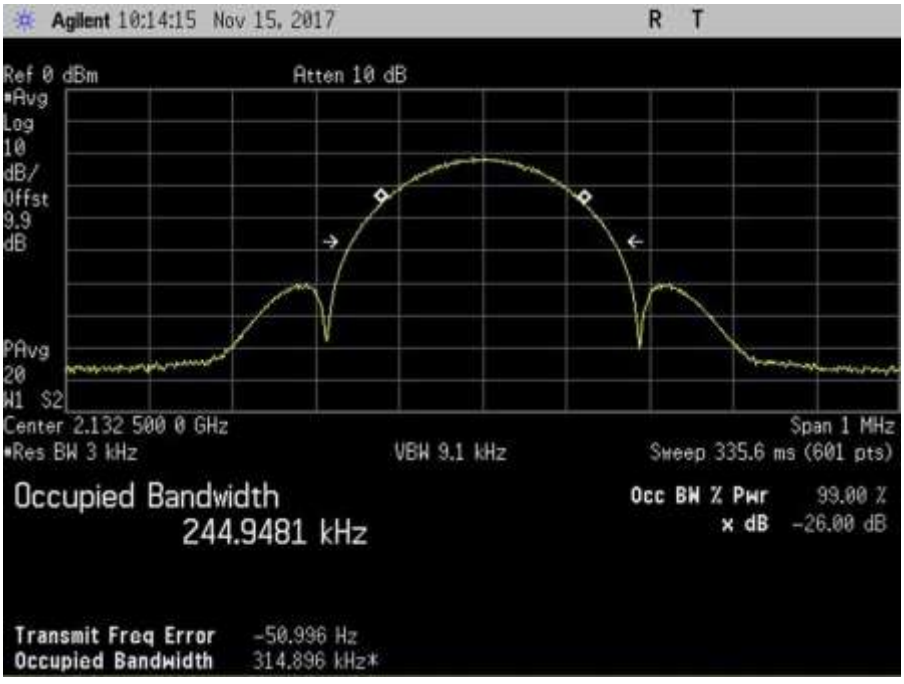

7.10_OBW_DL_1930-1995MHz_EDGE_In




7.10_OBW_DL_1930-1995MHz_EDGE_Out

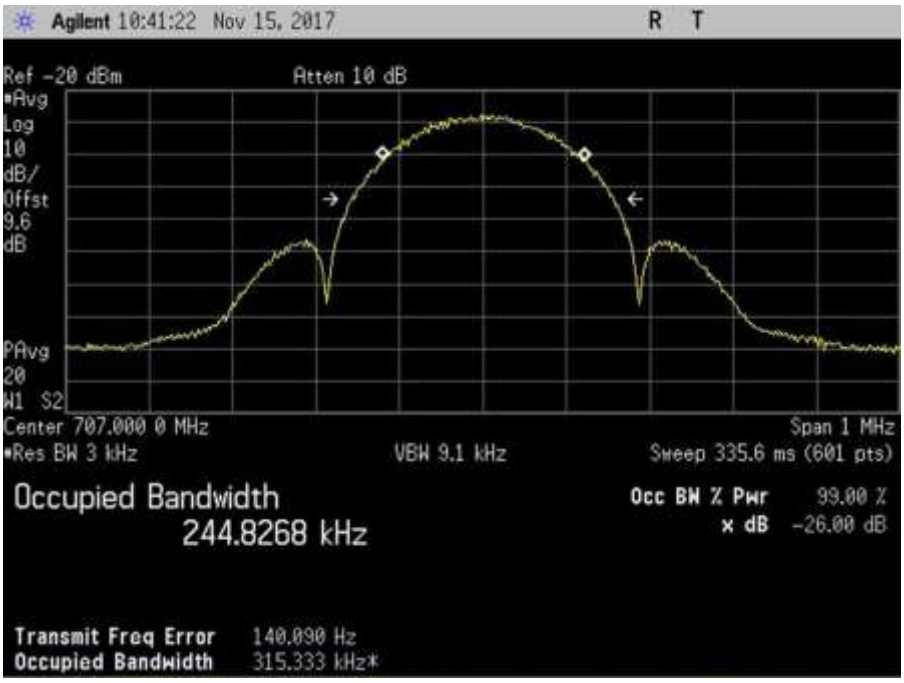



7.10_OBW_DL_2110-2155MHz_EDGE_In

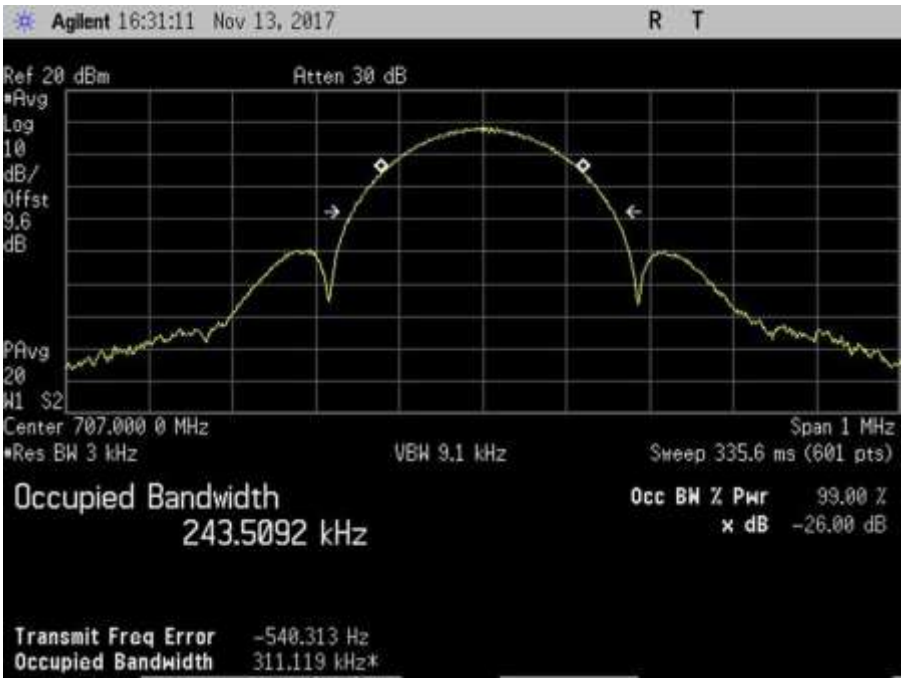



7.10_OBW_DL_2110-2155MHz_EDGE_Out

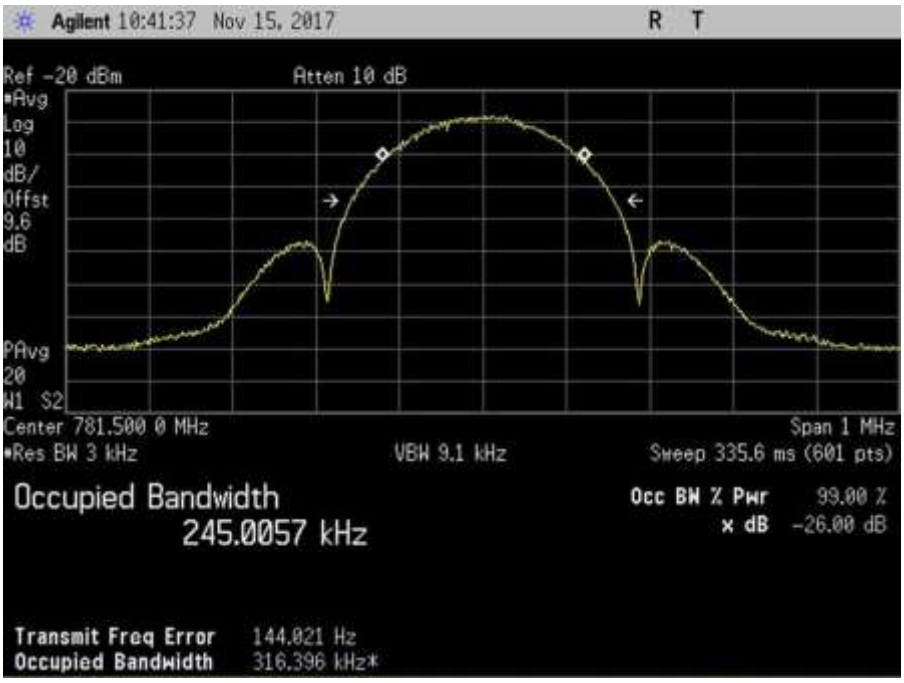
## EDGE, UL



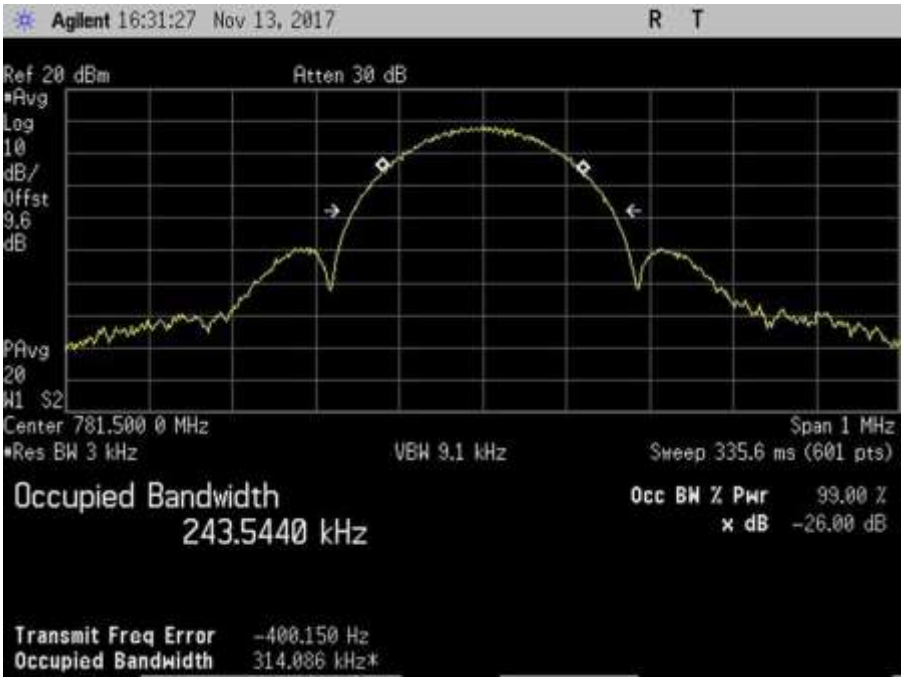

7.10_OBW_UL_698-716MHz_EDGE_In



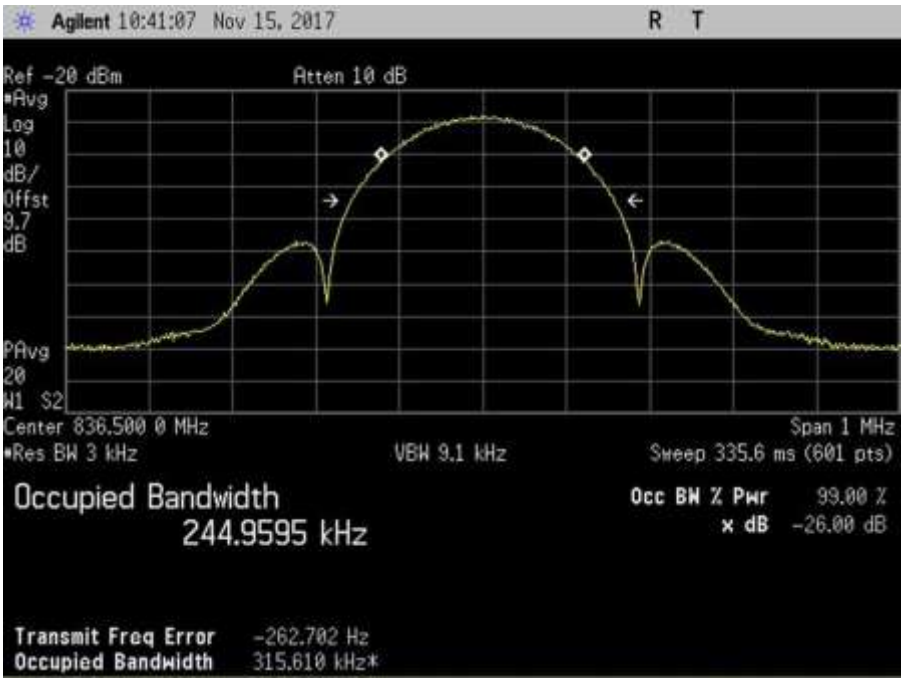

7.10_OBW_UL_698-716MHz_EDGE_Out



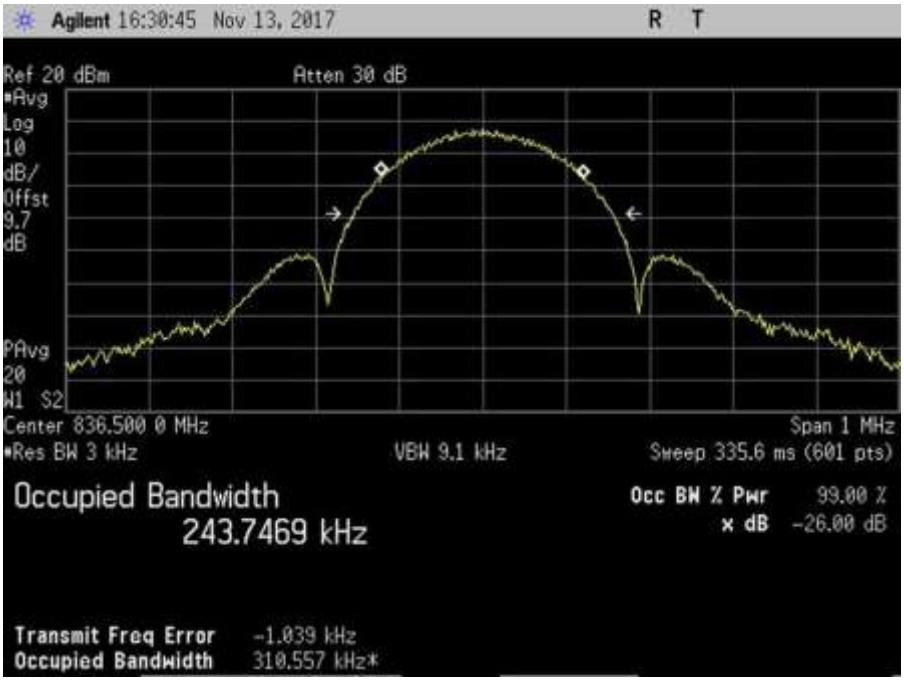

7.10_OBW_UL_776-787MHz_EDGE_In



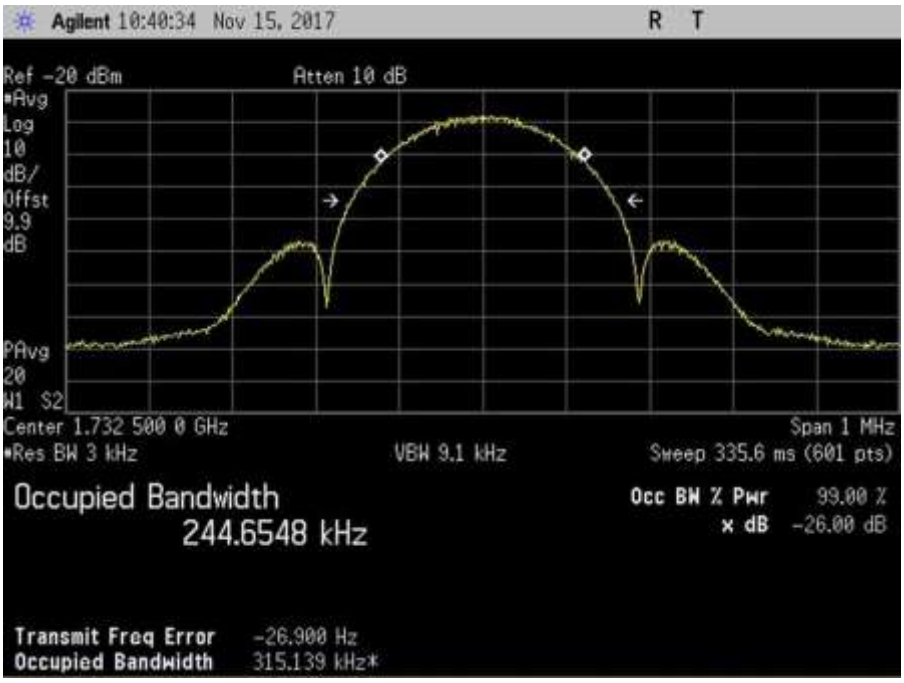

7.10_OBW_UL_776-787MHz_EDGE_Out



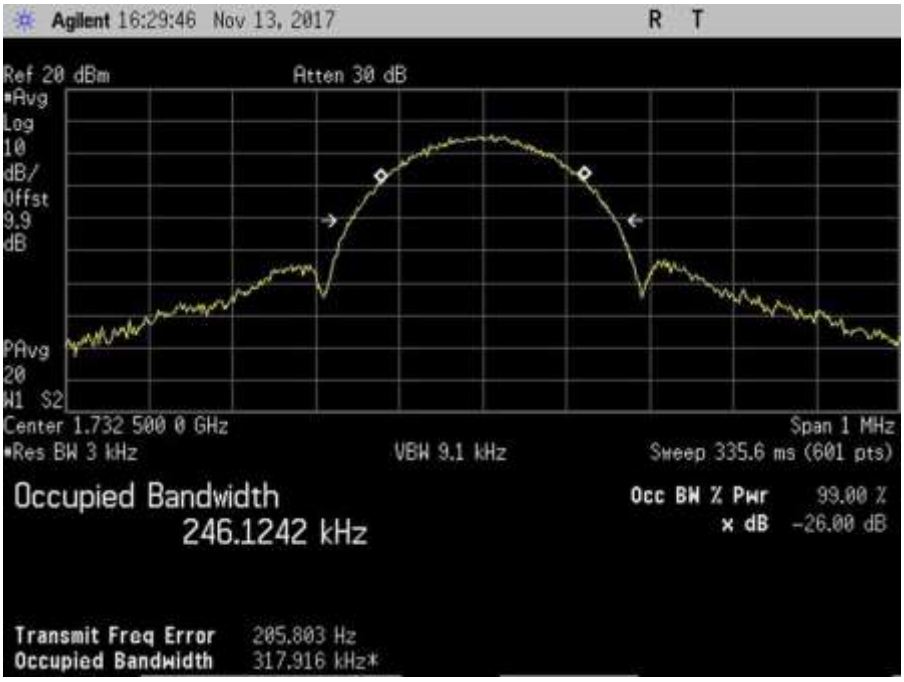

7.10_OBW_UL_824-849MHz_EDGE_In



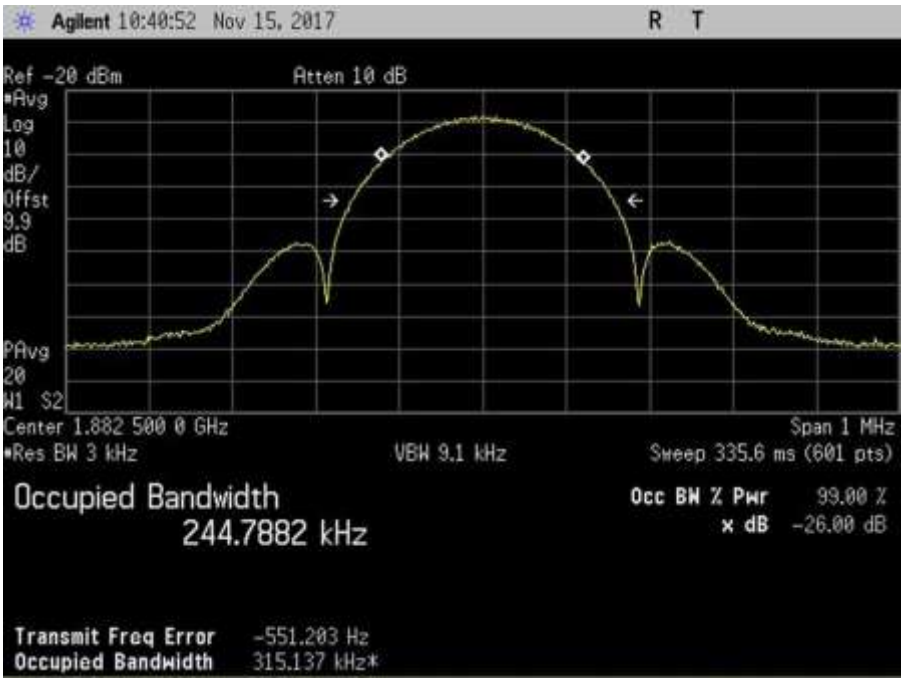

7.10_OBW_UL_824-849MHz_EDGE_Out




7.10_OBW_UL_1710-1755MHz_EDGE_In



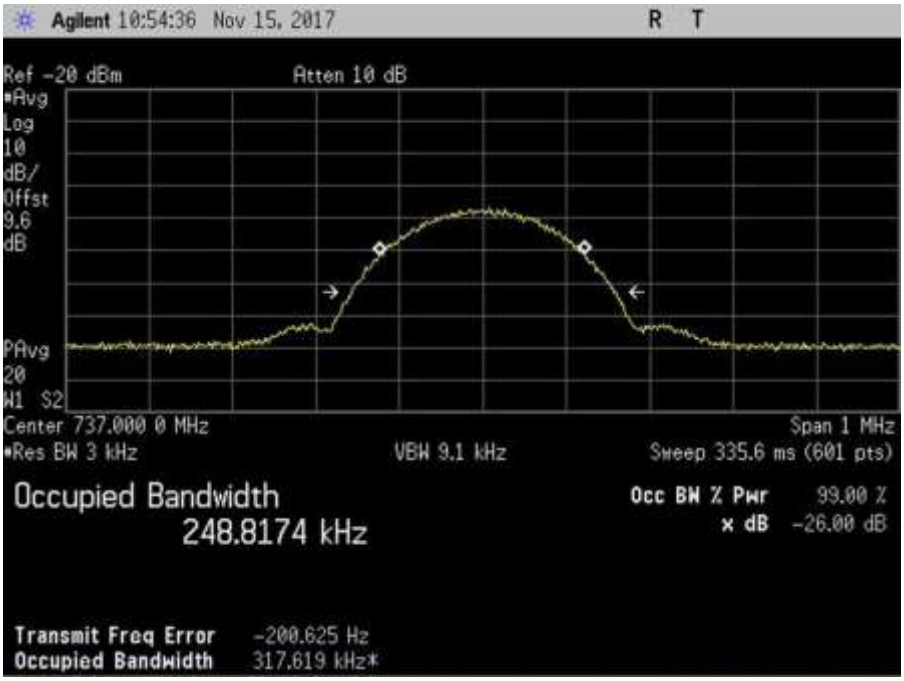

7.10_OBW_UL_1710-1755MHz_EDGE_Out



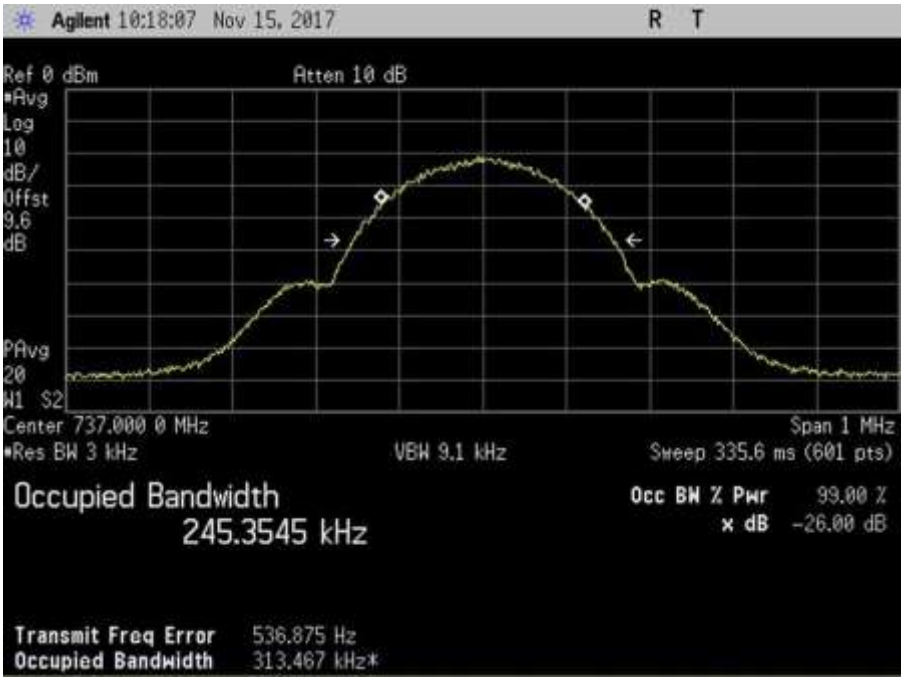

7.10_OBW_UL_1850-1915MHz_EDGE_In


7.10_OBW_UL_1850-1915MHz_EDGE_Out

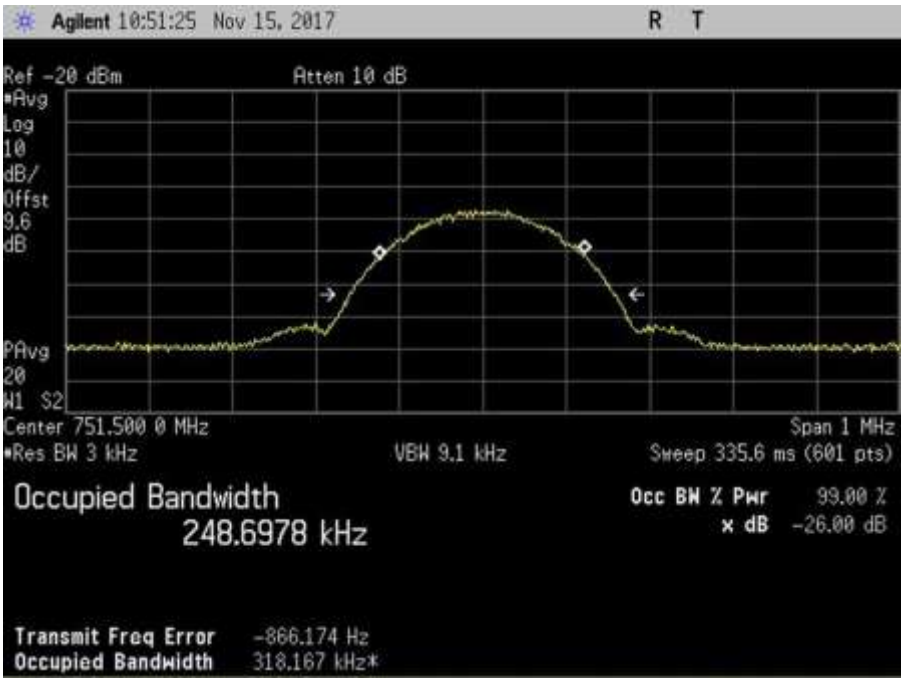
## GSM, DL



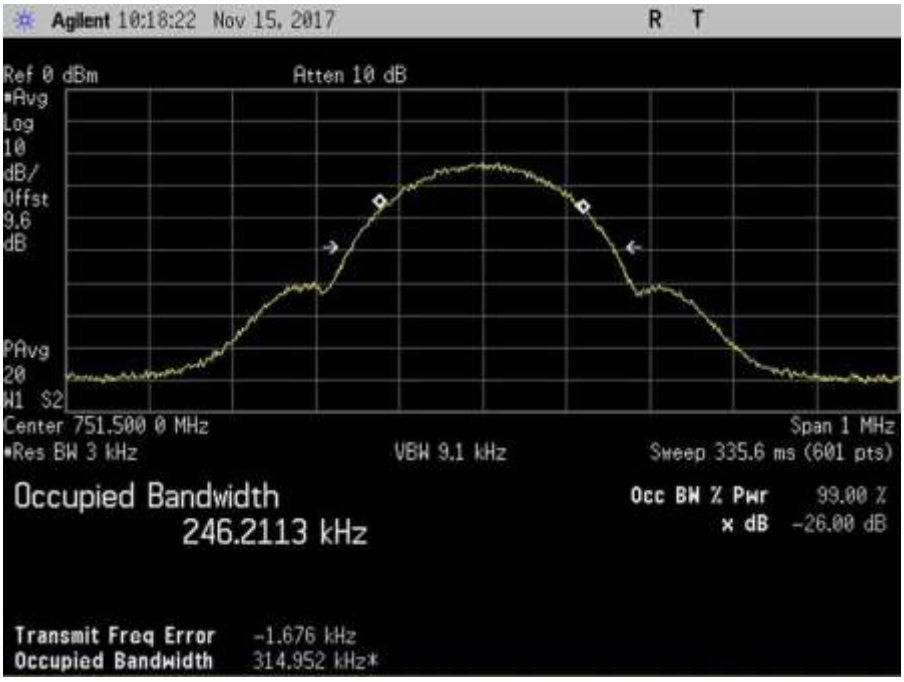

7.10_OBW_DL_728-746MHz_GSM_In



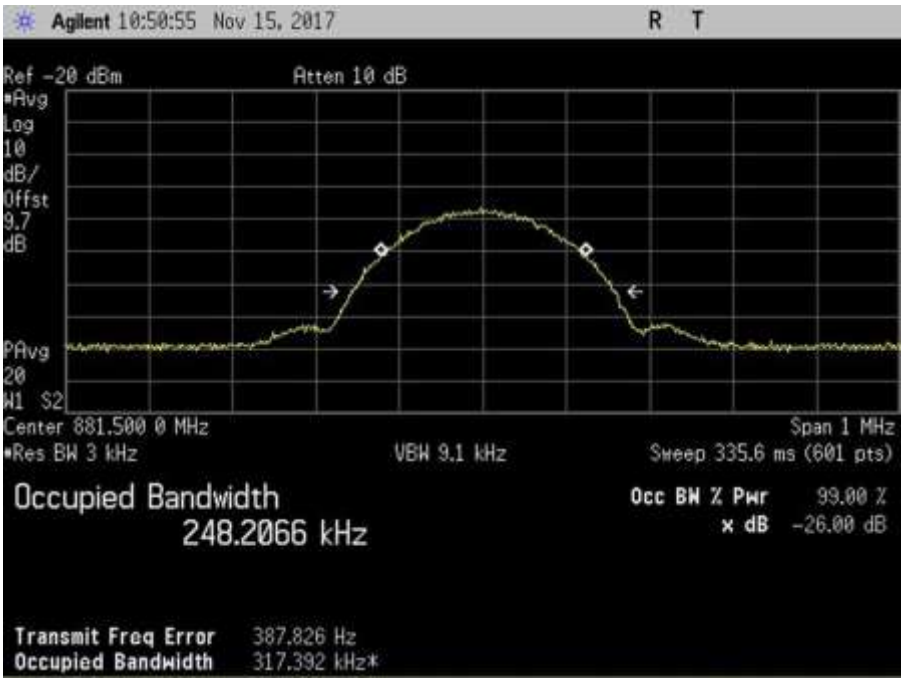

7.10_OBW_DL_728-746MHz_GSM_Out



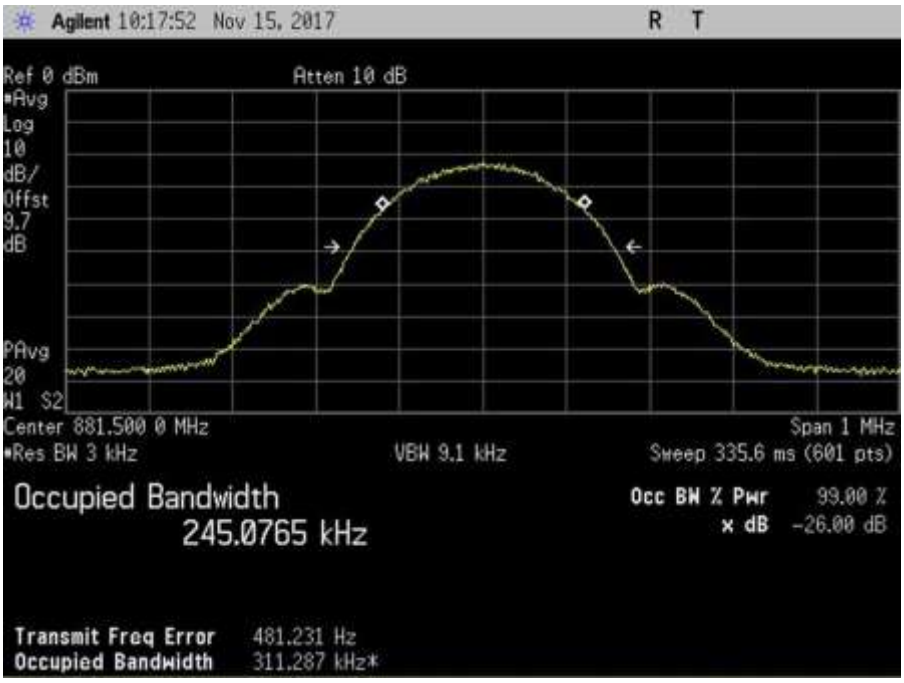

7.10_OBW_DL_746-757MHz_GSM_In



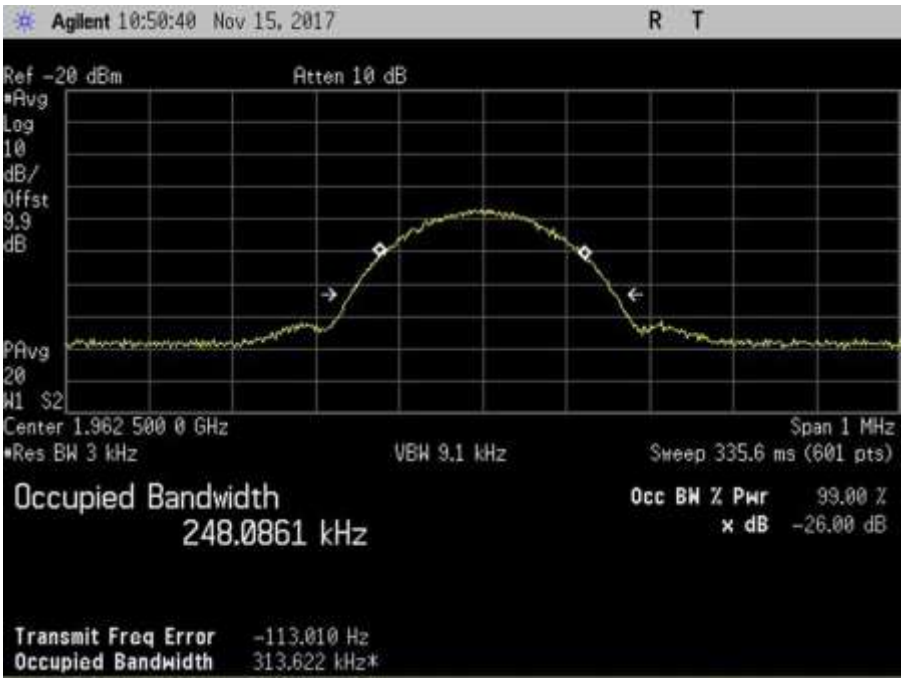

7.10_OBW_DL_746-757MHz_GSM_Out




7.10_OBW_DL_869-894MHz_GSM_In

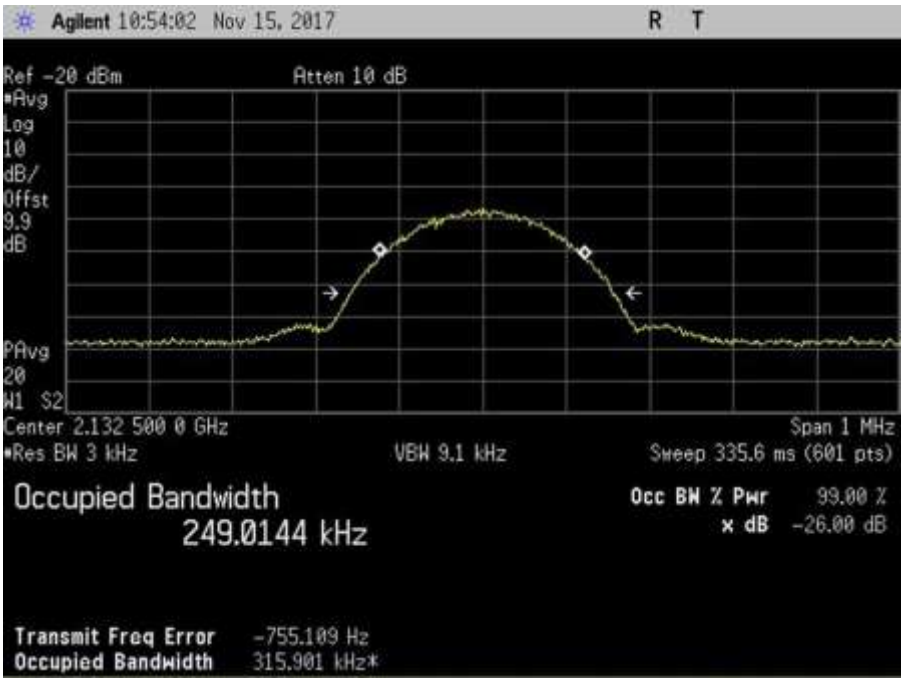



7.10_OBW_DL_869-894MHz_GSM_Out

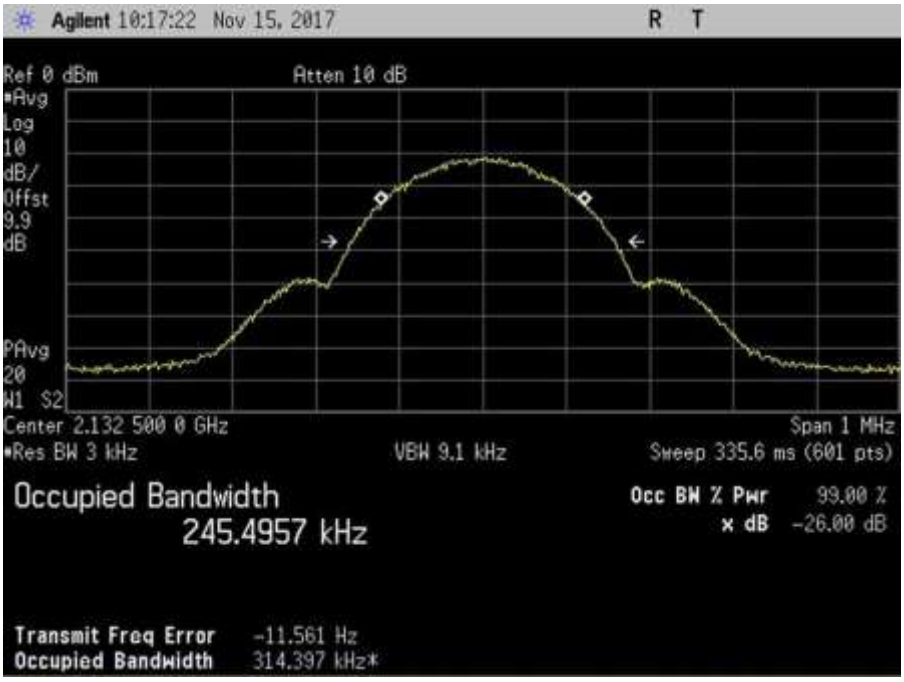



7.10_OBW_DL_1930-1995MHz_GSM_In


7.10_OBW_DL_1930-1995MHz_GSM_Out



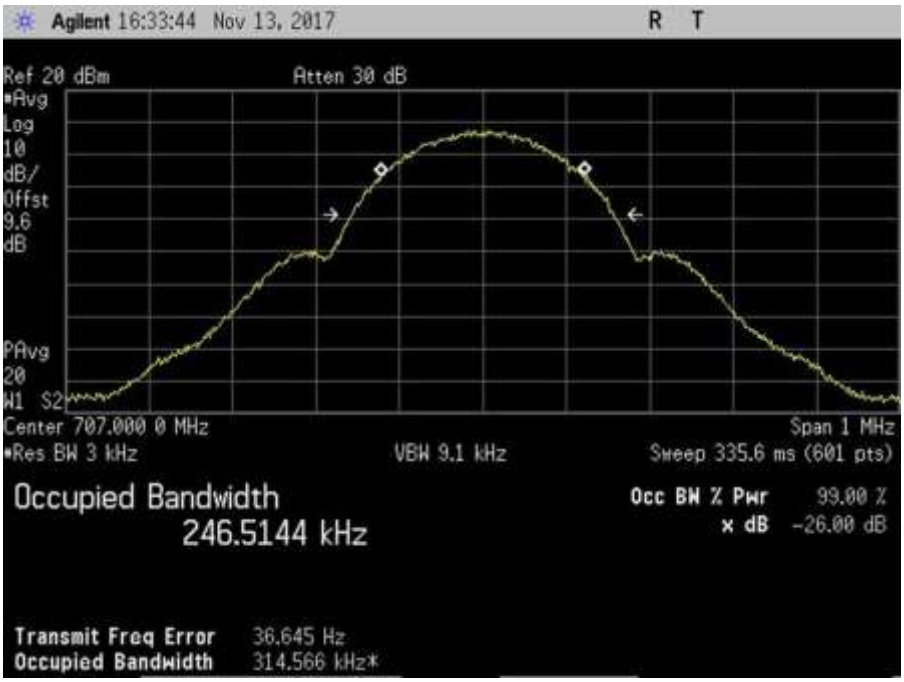

7.10_OBW_DL_2110-2155MHz_GSM_In




7.10_OBW_DL_2110-2155MHz_GSM_Out

## GSM, UL


7.10_OBW_UL_698-716MHz_GSM_In

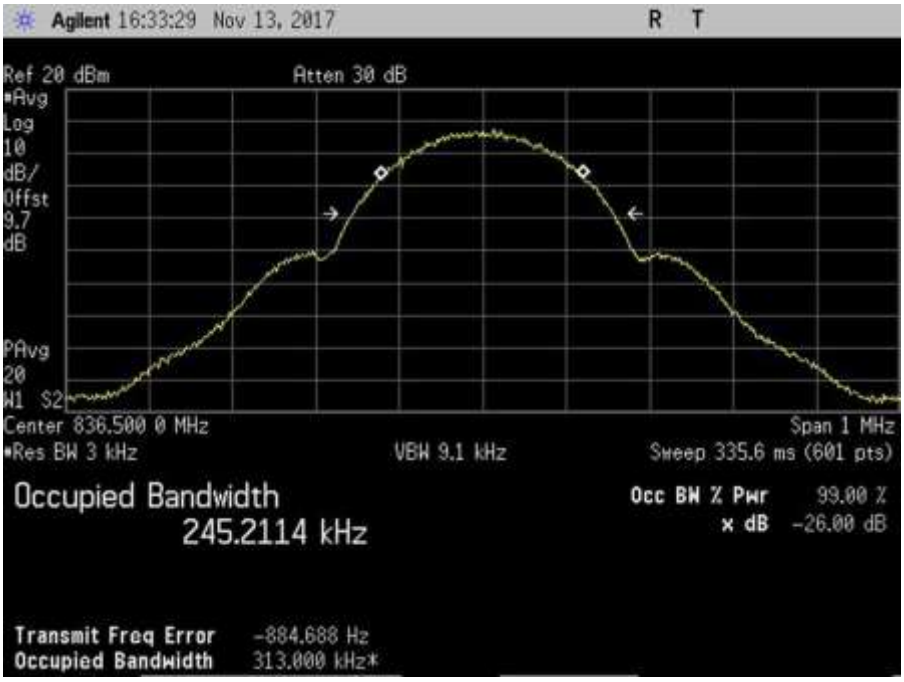



7.10_OBW_UL_698-716MHz_GSM_Out

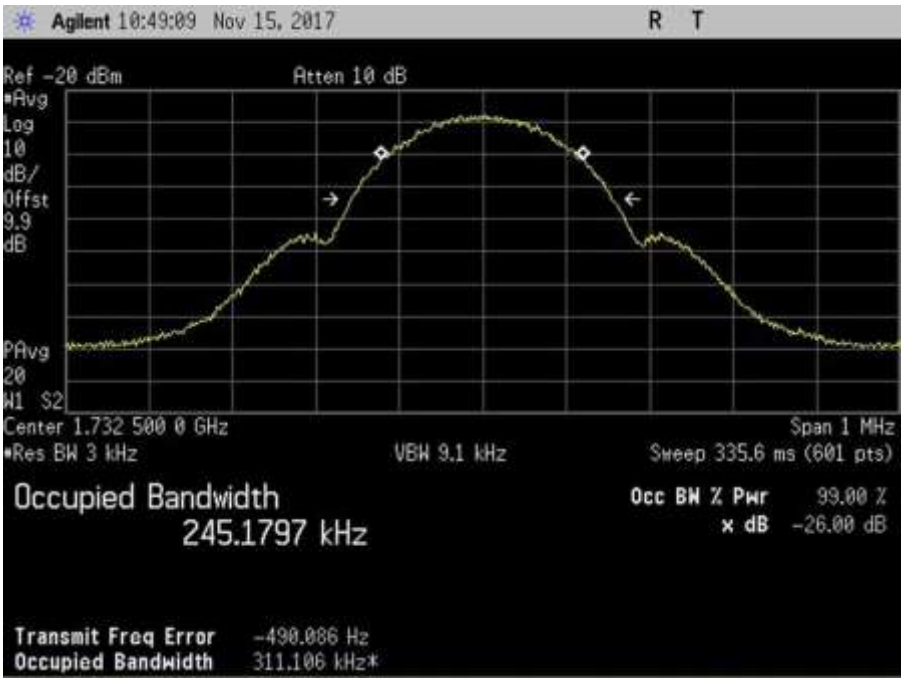

7.10_OBW_UL_776-787MHz_GSM_In


7.10_OBW_UL_776-787MHz_GSM_Out

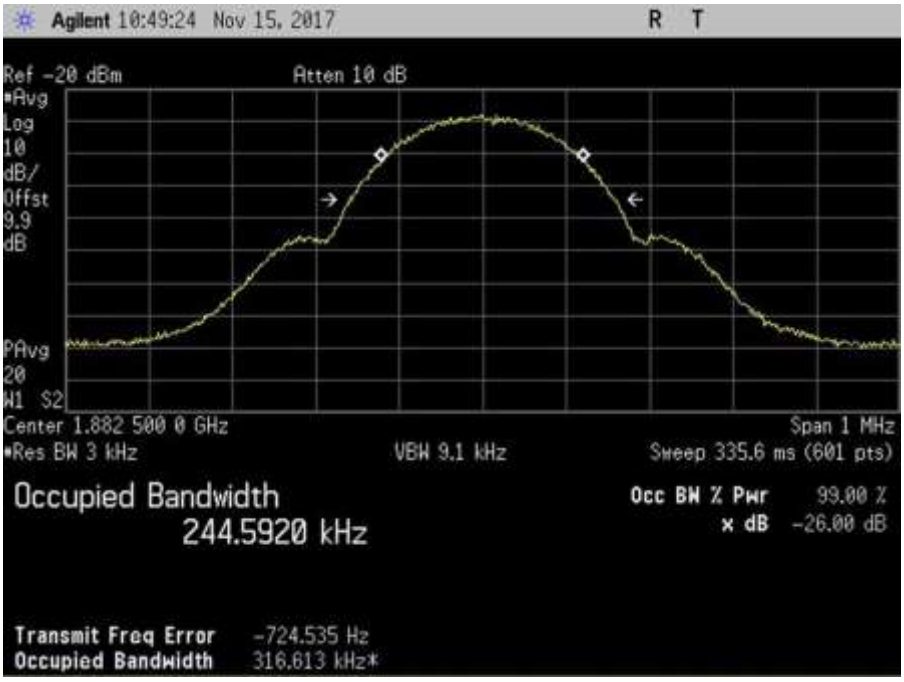

7.10_OBW_UL_824-849MHz_GSM_In



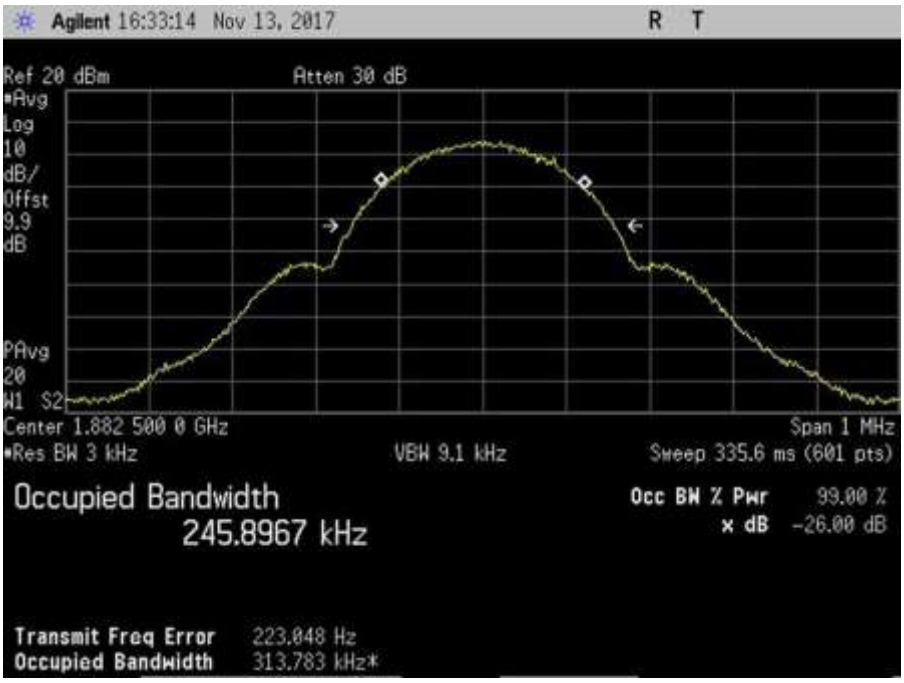

7.10_OBW_UL_824-849MHz_GSM_Out



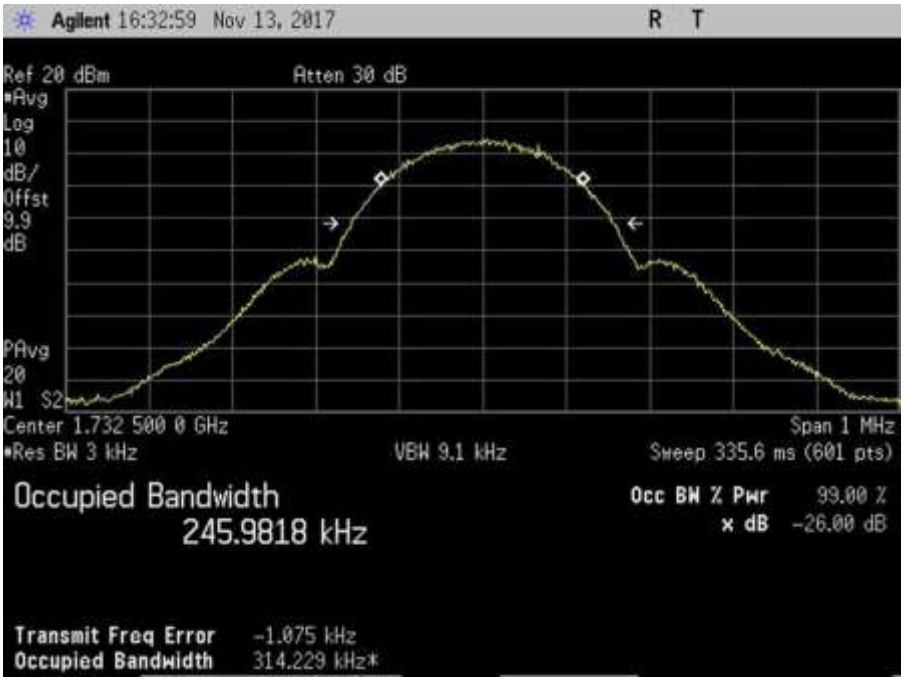

7.10_OBW_UL_1710-1755MHz_GSM_In



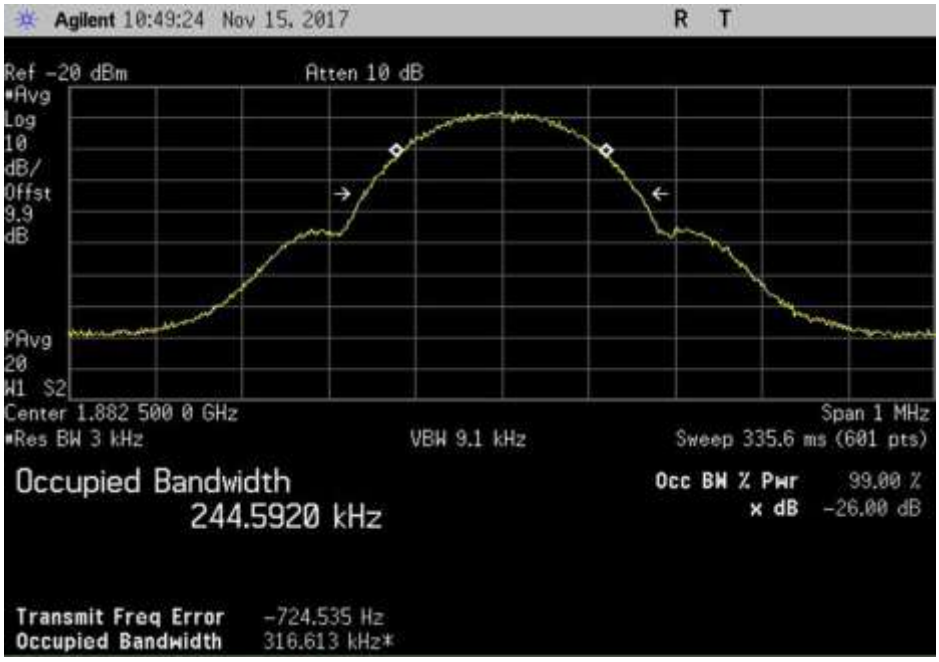

7.10_OBW_UL_1850-1915MHz_GSM_In




7.10_OBW_UL_1850-1915MHz_GSM_Out



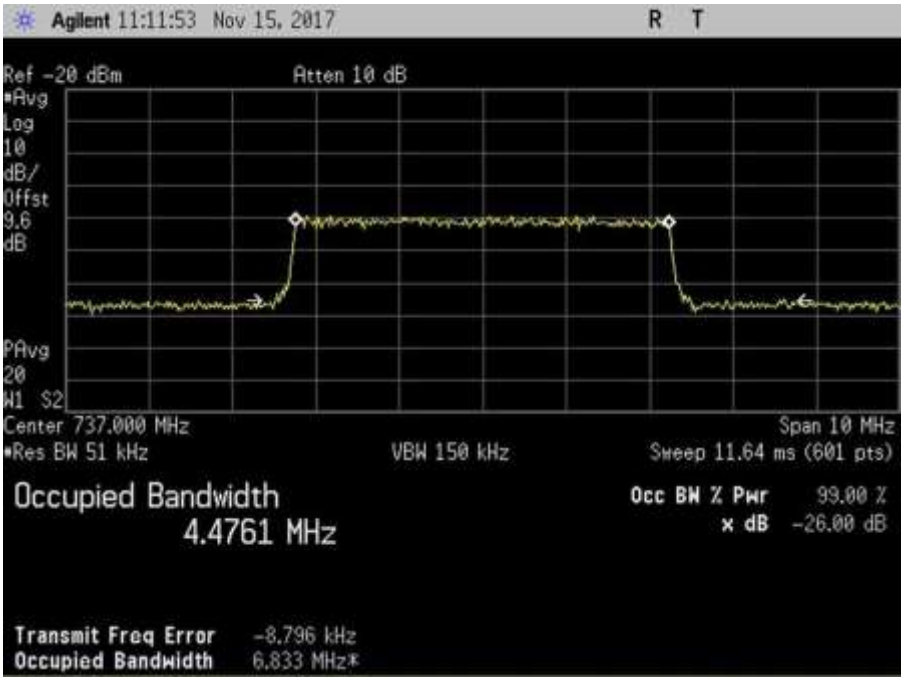

7.10_OBW_UL_1710-1755MHz_GSM_Out



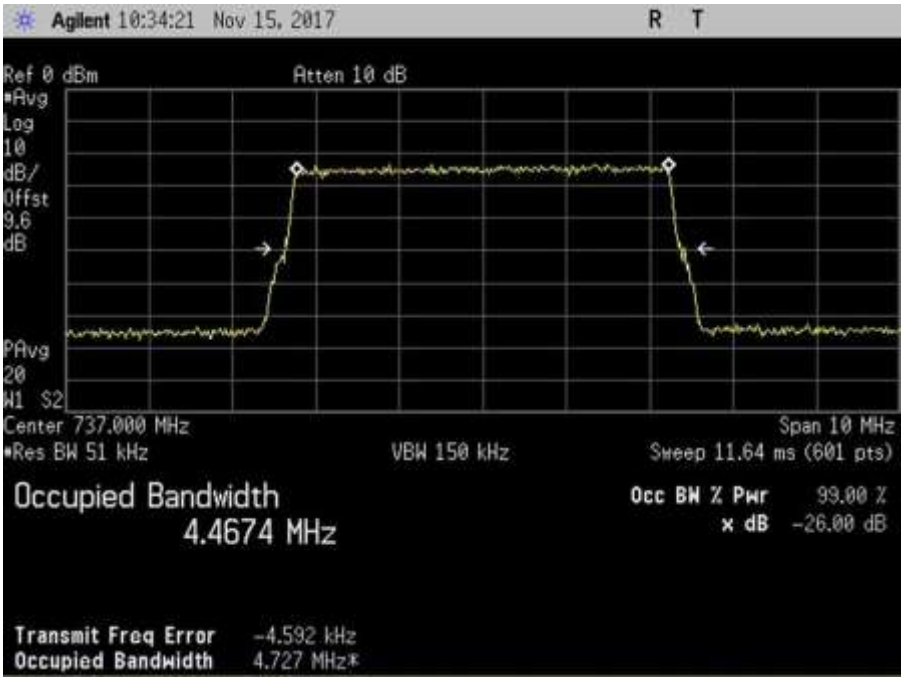

7.10_OBW_UL_1850-1915MHz_GSM_In


7.10_OBW_UL_1850-1915MHz_GSM_Out

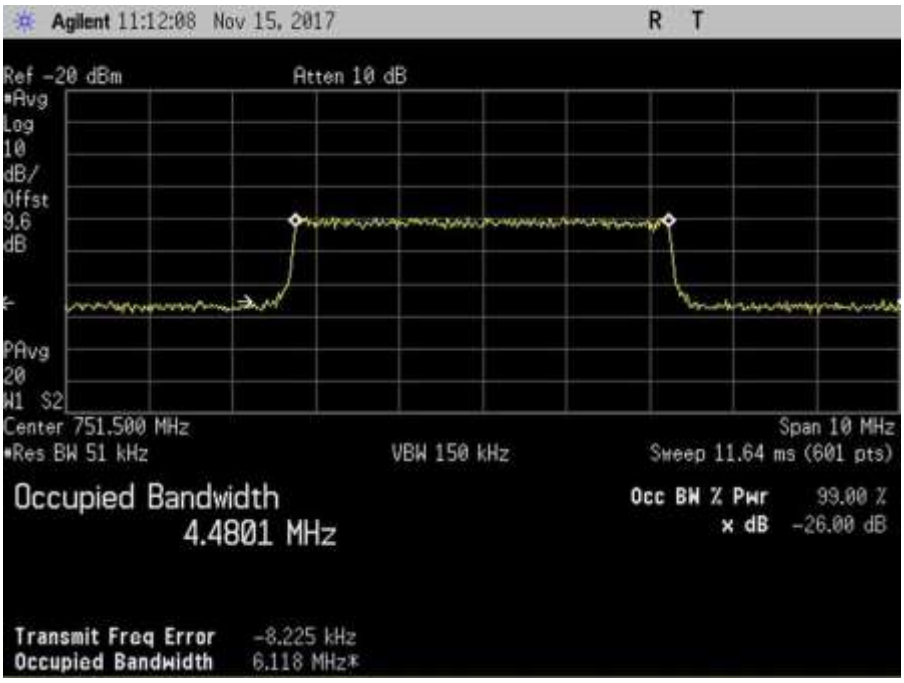
## LTE, DL



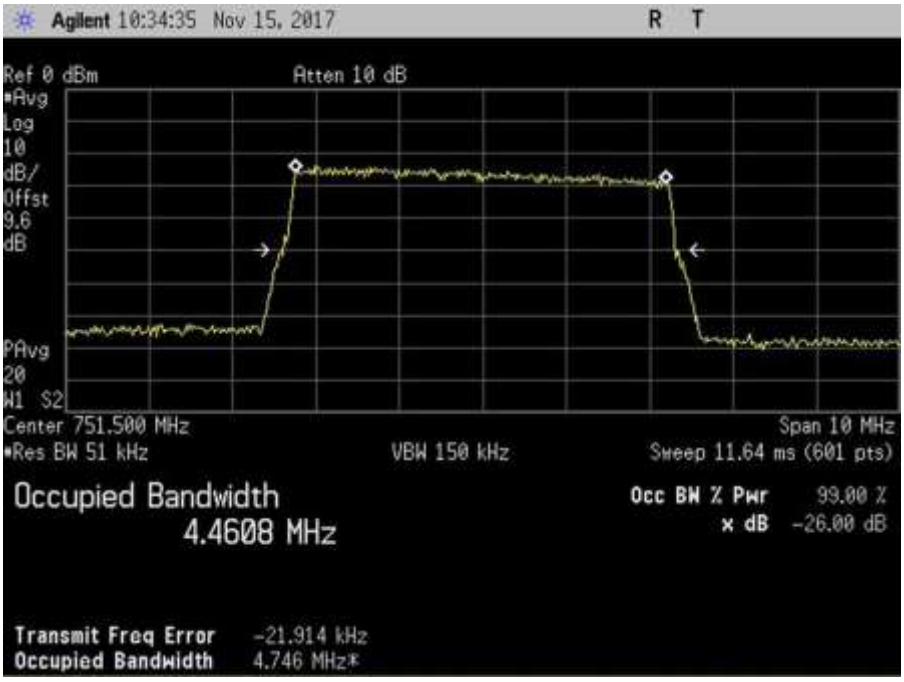

7.10_OBW_DL_728-746MHz_LTE_In



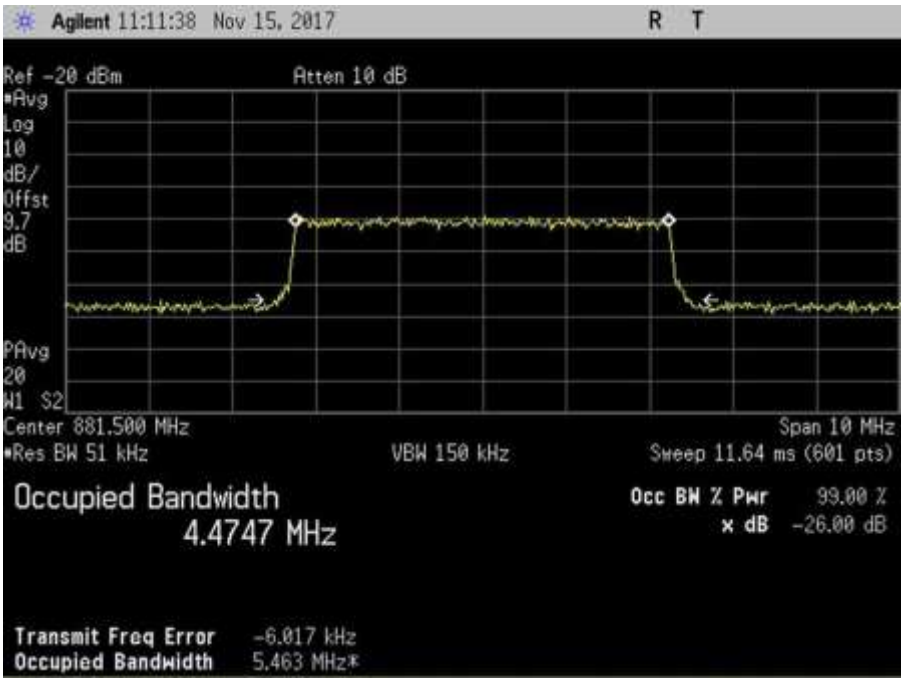

7.10_OBW_DL_728-746MHz_LTE_Out



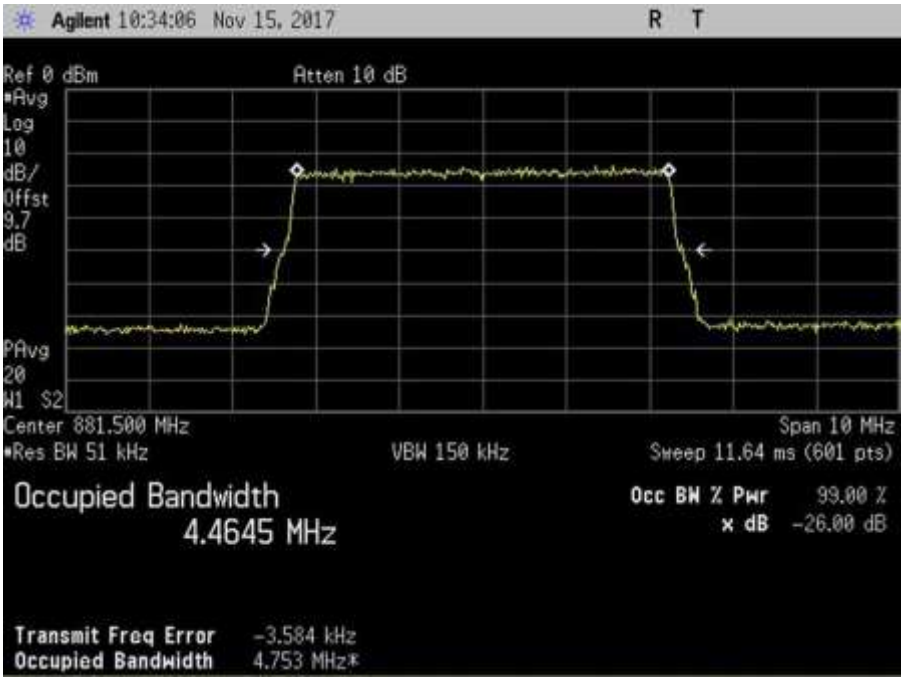

7.10_OBW_DL_746-757MHz_LTE_In



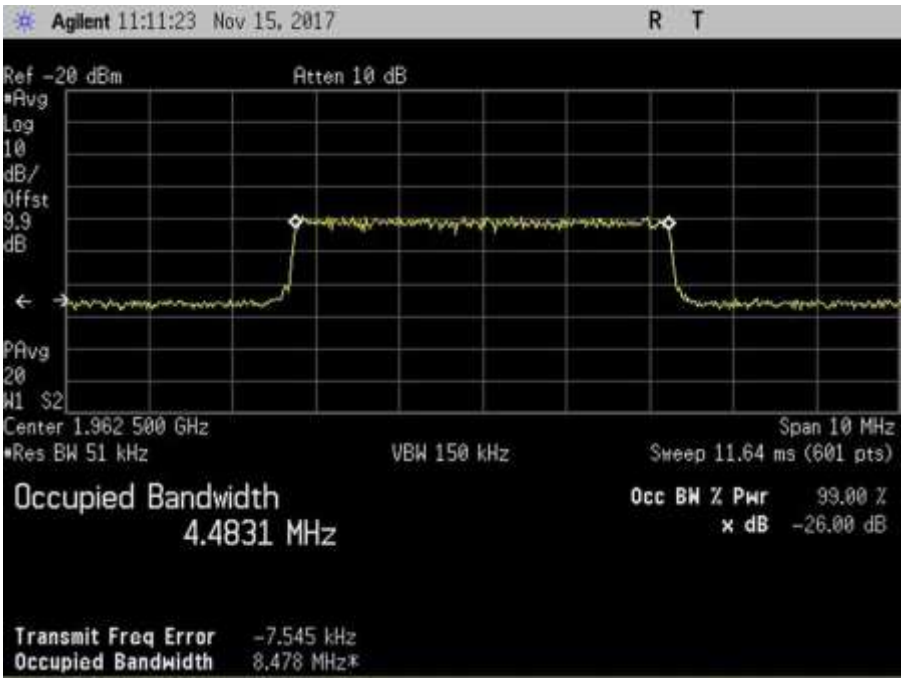

7.10_OBW_DL_746-757MHz_LTE_Out



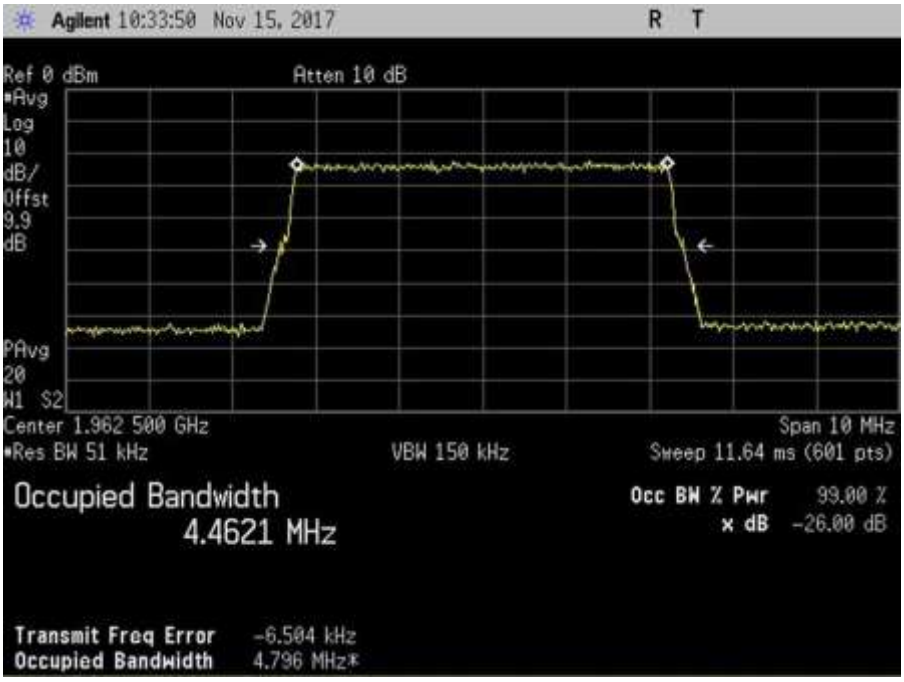

7.10_OBW_DL_869-894MHz_LTE_In



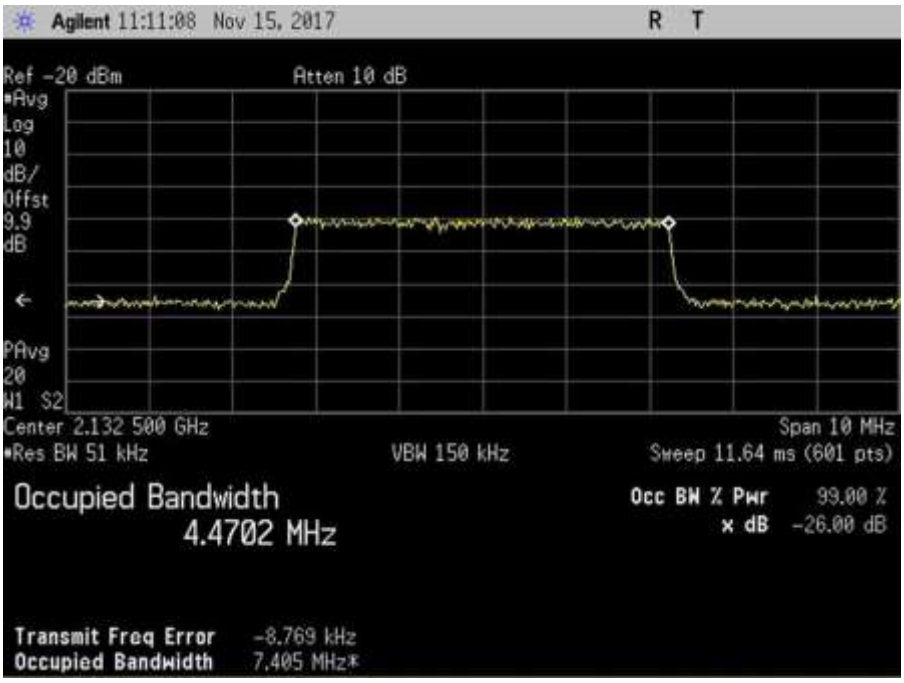

7.10_OBW_DL_869-894MHz_LTE_Out



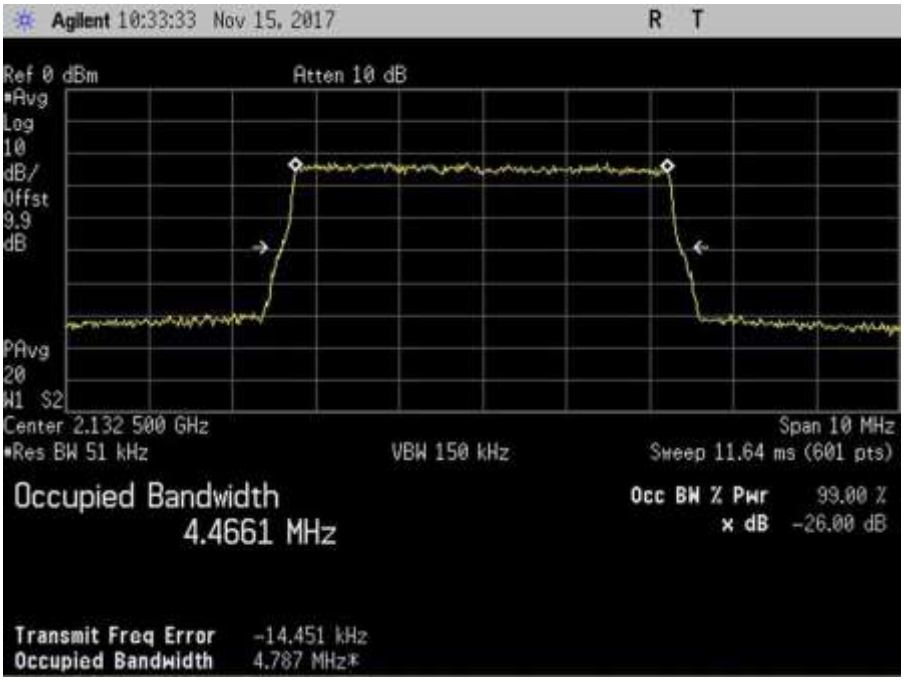

7.10_OBW_DL_1930-1995MHz_LTE_In




7.10_OBW_DL_1930-1995MHz_LTE_Out

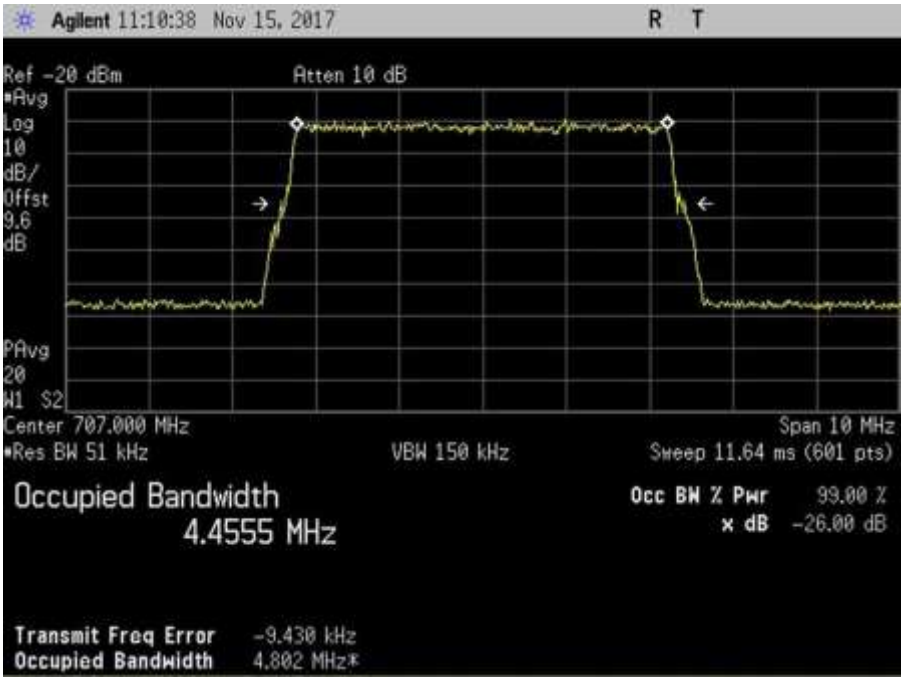



7.10_OBW_DL_2110-2155MHz_LTE_In

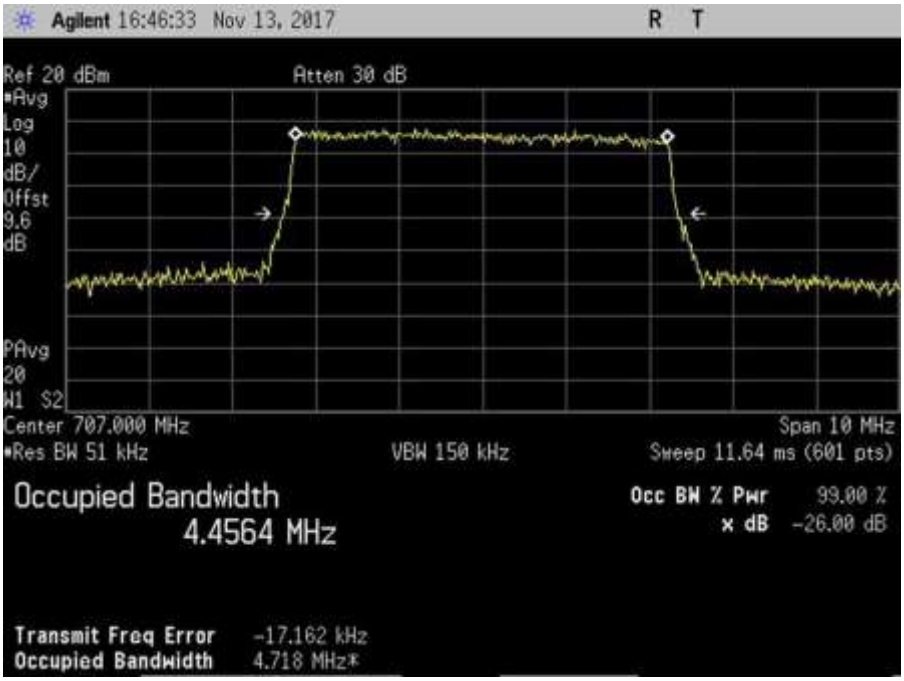



7.10_OBW_DL_2110-2155MHz_LTE_Out

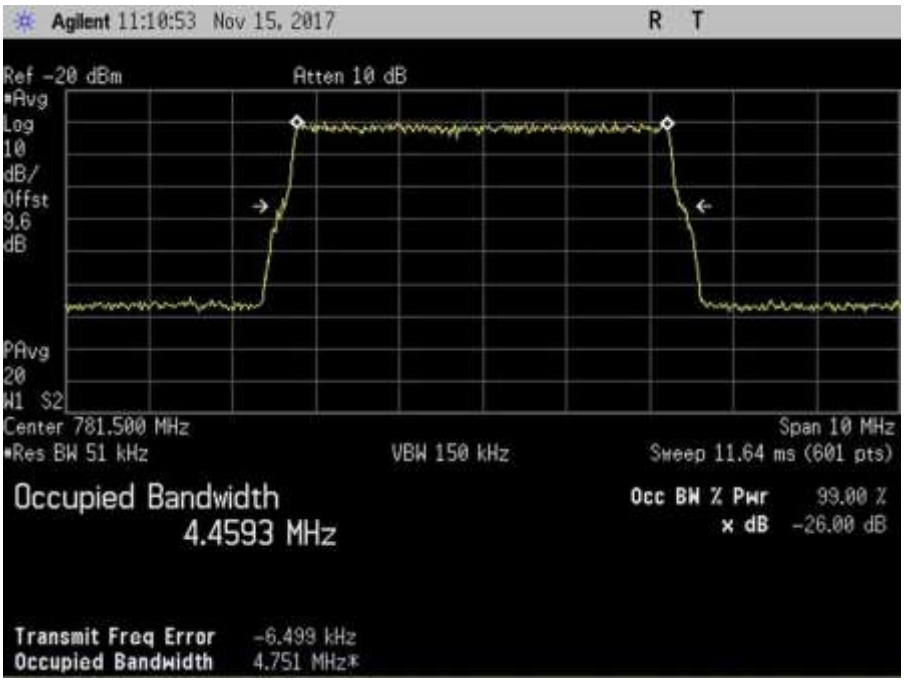
## LTE, UL



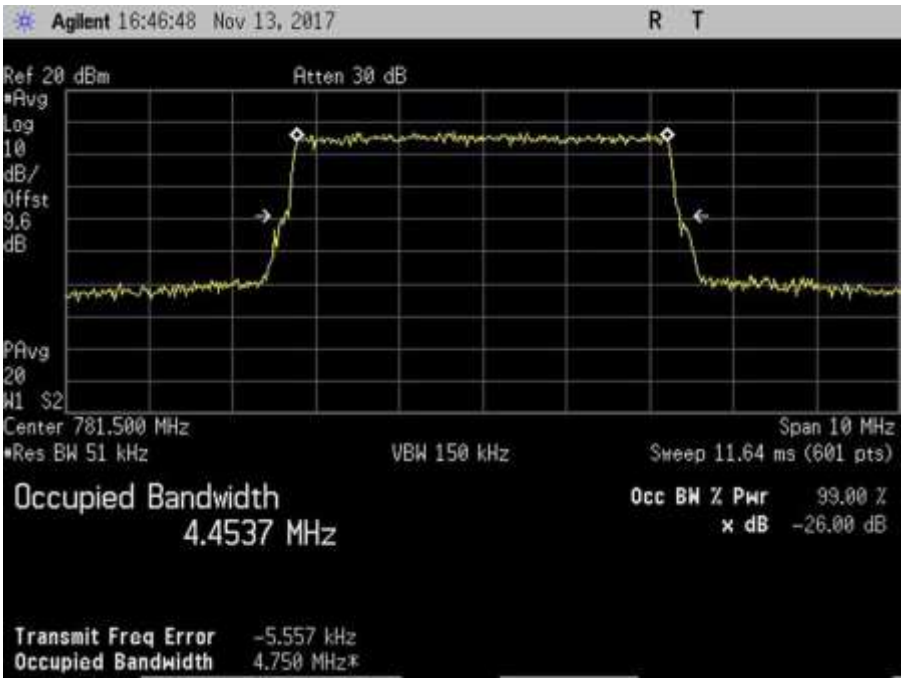

7.10_OBW_UL_698-716MHz_LTE_In



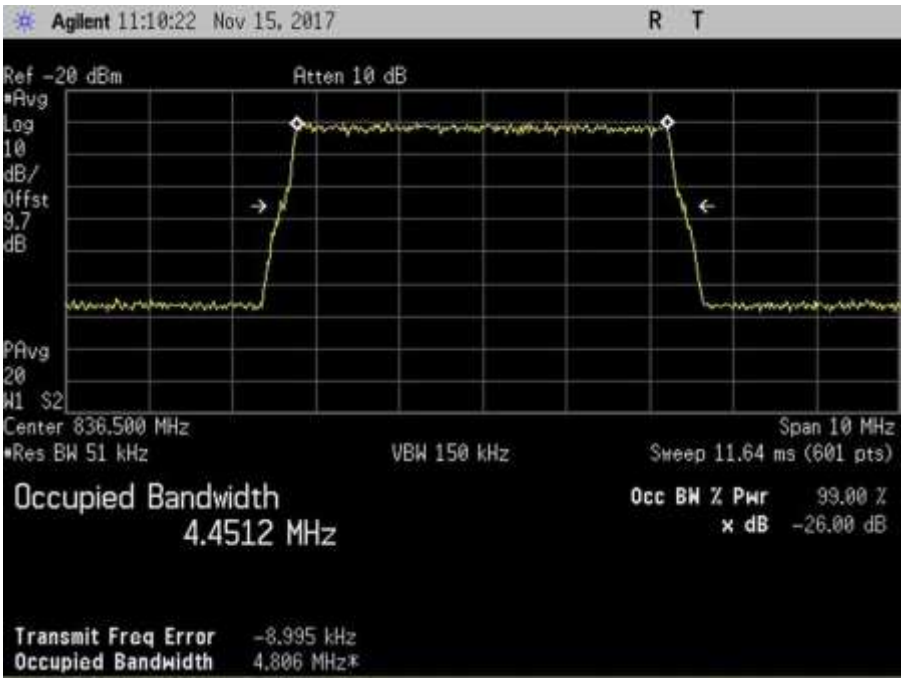

7.10_OBW_UL_698-716MHz_LTE_Out



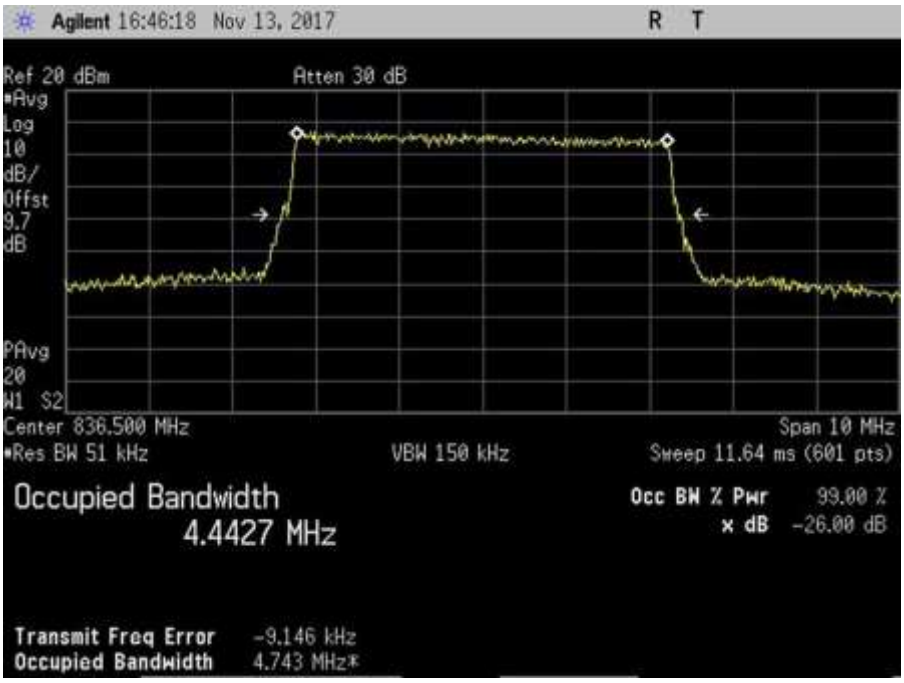

7.10_OBW_UL_776-787MHz_LTE_In



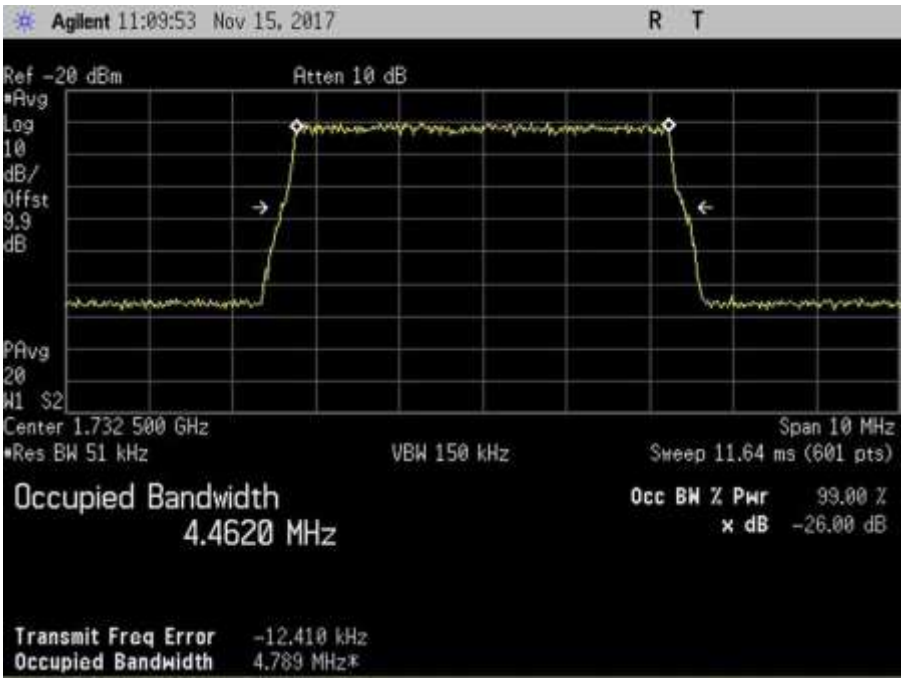

7.10_OBW_UL_776-787MHz_LTE_Out



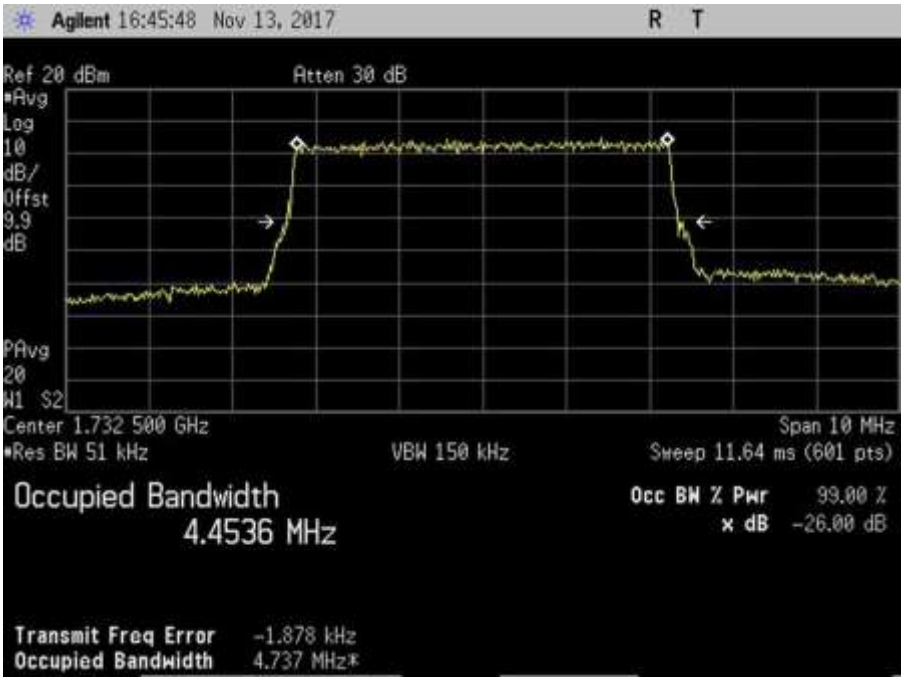

7.10_OBW_UL_824-849MHz_LTE_In



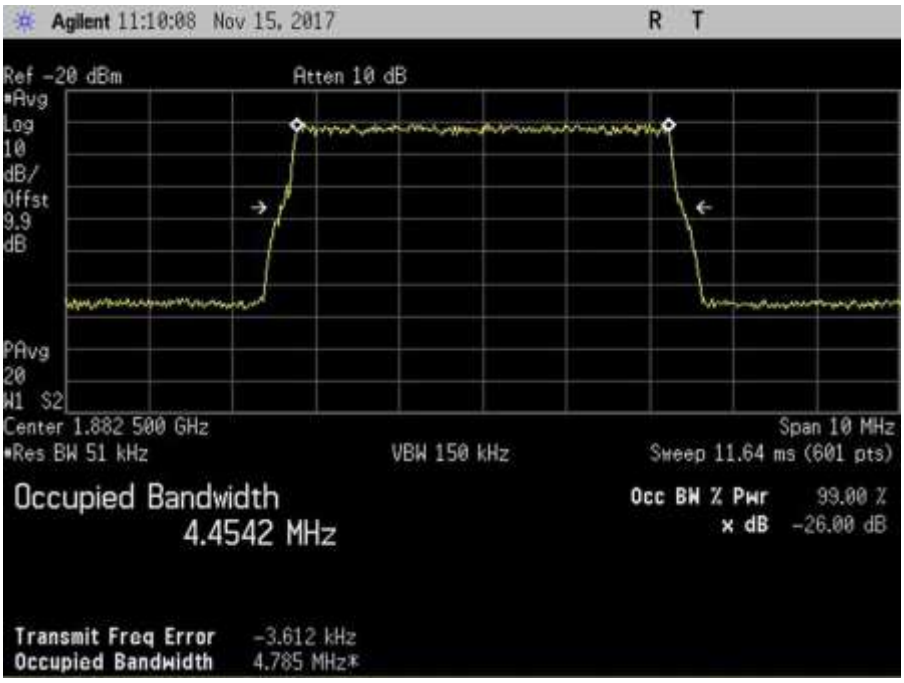

7.10_OBW_UL_824-849MHz_LTE_Out



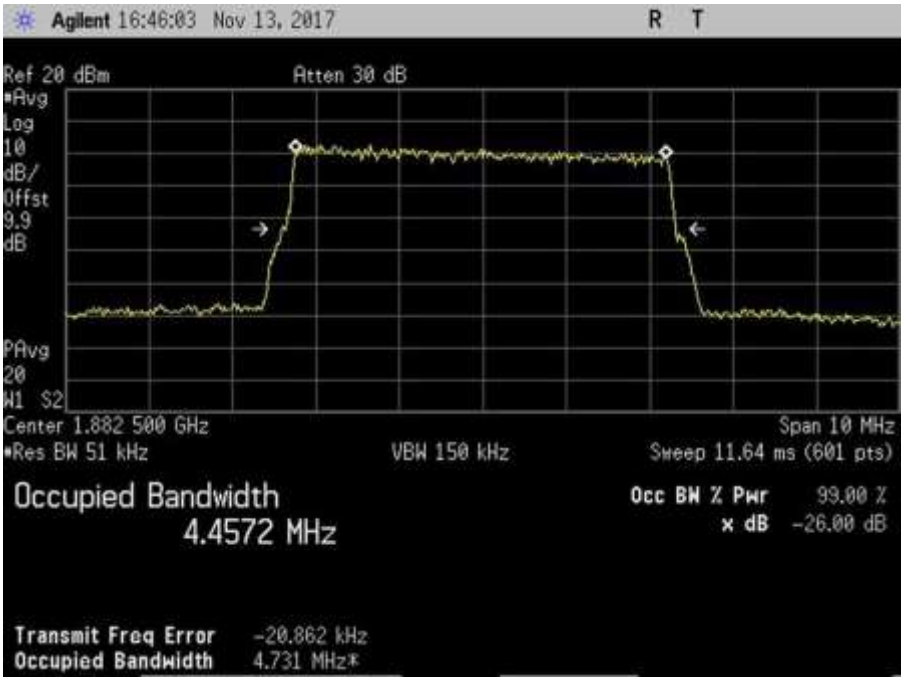

7.10_OBW_UL_1710-1755MHz_LTE_In




7.10_OBW_UL_1710-1755MHz_LTE_Out




7.10_OBW_UL_1850-1915MHz_LTE_In




7.10_OBW_UL_1850-1915MHz_LTE_Out

# 7.11 Oscillation Detection

## Test Conditions / Setup

| | | | |
|---|---|---|---|
| Test Location: | CKC Laboratories, Inc • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170 | | |
| Customer: | Cellphone-Mate, Inc | | |
| Specification: | **7.11 Anti-Oscillation (Oscillation Restarts / Oscillation mitigation or shutdown)** | | |
| Work Order #: | **100637** | Date: | 11/16/2017 |
| Test Type: | **Conducted Emissions** | Time: | 10:02:00 AM |
| Tested By: | **Daniel Bertran** | Sequence#: | 1 |
| Software: | EMITest 5.03.11 | | |

***Equipment Tested:***

| Device | Manufacturer | Model # | S/N |
|---|---|---|---|
| Configuration 1 | | | |

***Support Equipment:***

| Device | Manufacturer | Model # | S/N |
|---|---|---|---|
| | | | |

***Test Conditions / Notes:***

The equipment under test (EUT) is a Mobile Wideband Consumer Booster.
The EUT is placed on the test bench. Evaluation performed at the Outside (Donor) and Inside (Server) antenna port.
The EUT Server port is a type FME connector and 50-ohm impedance.
The EUT Donor port is type FME connector and 50-ohm impedance.

Part 22
UL: 824-849MHz
DL: 869-894MHz
Part 24
UL: 1850-1915MHz
DL: 1930-1995MHz
Part 27
UL: 1710-1755MHz, 698-716MHz, 776-787MHz
DL: 2110-2155MHz, 728-746MHz, 746-757MHz

Test procedure:
The test was performed in accordance with section 7.11 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04r01 Dated October 27, 2017
Firmware: V 3.2
Test environment conditions: 21.3°C, 48% Relative Humidity,101.3 kPa
Note: UL1850-1915MHz -AWGNL+5:
- AWGNL denotes a 4.1MHz AWGN signal (99% occupied bandwidth) tuned to the frequency of 2.5 MHz above the lower edge of the operating band 1850-1915MHz
- +5 denotes a variable attenuator adjusted such that the insertion loss for center of band under test (isolation) between the booster's donor and server ports is 5 dB greater than the maximum gain, as recorded in the maximum gain test procedure, for the band under test.

***Test Equipment:***

| ID | Asset # | Description | Model | Calibration Date | Cal Due Date |
|---|---|---|---|---|---|
| | ANP06897 | Cable | 32022-29094K-29094K-48TC | 12/30/2015 | 12/30/2017 |
| | ANP06898 | Cable | 32022-29094K-29094K-48TC | 12/30/2015 | 12/30/2017 |
| | AN03470 | Spectrum Analyzer | E4440A | 12/9/2015 | 12/9/2017 |
| | AN03412 | Band Pass Filter | PE8705 | 8/16/2017 | 8/16/2019 |
| | AN03413 | Band Pass Filter | PE8706 | 8/16/2017 | 8/16/2019 |
| | AN03414 | Band Pass Filter | PE8707 | 8/16/2017 | 8/16/2019 |
| | AN03415 | Band Pass Filter | PE8708 | 8/16/2017 | 8/16/2019 |
| | AN03447 | Band Pass Filter | PE8710 | 8/16/2017 | 8/16/2019 |
| | AN03448 | Band Pass Filter | PE8711 | 8/16/2017 | 8/16/2019 |
| | AN03446 | Band Pass Filter | 4FV50-707/H18-O/O | 8/16/2017 | 8/16/2019 |
| | AN03467 | Band Pass Filter | 4FV50-731/H30-O/O | 8/16/2017 | 8/16/2019 |
| | AN03468 | Band Pass Filter | 4CS10-781.5/E12.2-O/O | 8/16/2017 | 8/16/2019 |
| | AN03469 | Band Pass Filter | 4CS10-751.5/E12-O/O | 8/16/2017 | 8/16/2019 |
| | AN02475 | 1 dB step Attenuator | 8494B | 6/8/2017 | 6/8/2019 |
| | AN03429 | 10dB step Attenuator | 8496B | 11/8/2017 | 11/8/2019 |
| | ANC00082 | RF Coupler | 722-10-1.500V | 9/18/2017 | 9/18/2019 |
| | ANC00087 | Combiner | 44000 | 1/7/2016 | 1/7/2018 |

## Summary of Results

Pass: All oscillations detections and mitigations occur within 0.3 seconds in uplink bands, within 1 second in the downlink bands and the noise level is below the -70dBm/MHz limit.

### 7.11.2 Oscillation Restart Tests

| Oscillation detection | | | | Time Between restart | | Number of restart | |
|---|---|---|---|---|---|---|---|
| Freq | Measured | Limit | Peak Level | Measured | Limit | Measured | Limit |
| MHz | Sec | Sec | dBm | Sec | At least sec | | |
| UL1710-1755 | 0.27 | 0.30 | 26.8 | 70 | 60 | 1 | 5 |
| UL1850-1915 | 0.15 | 0.30 | 29.4 | 70 | 60 | 1 | 5 |
| UL824-894 | 0.25 | 0.30 | 30.8 | 71 | 60 | 1 | 5 |
| UL 698-716 | 0.14 | 0.30 | 31.5 | 70 | 60 | 1 | 5 |
| UL776-787 | 0.23 | 0.30 | 32.0 | - | 60 | 0 | 5 |
| | | | | | | | |
| DL2110-2155 | 0.32 | 1.00 | 21.0 | 69 | 60 | 1 | 5 |
| DL1930-1995 | 0.57 | 1.00 | 16.9 | 69 | 60 | 1 | 5 |
| DL869-894 | 0.32 | 1.00 | 18.9 | 70 | 60 | 1 | 5 |
| DL:728-746 | 0.31 | 1.00 | 19.5 | 69 | 60 | 1 | 5 |
| DL 746-757 | 0.57 | 1.00 | 17.9 | 70 | 60 | 1 | 5 |

The booster continues to mitigate at least 1 minute before restarting. The plots demonstrate after 1 restart (the limit is 5 restart), the booster does not resume operation until manually reset.

### 7.11.3 Test Procedure for Measuring Oscillation Mitigation or Shutdown

| Max Gain Isolation dB | UL 1710-1755 Pk-Pk Difference dB | UL1850-1915 Pk-Pk Difference dB | UL 824-894 Pk-Pk Difference dB | UL 698-716 Pk-Pk Difference dB | UL 776-787 Pk-Pk Difference dB | Limit dB |
|---|---|---|---|---|---|---|
| +5dB | 11.5 | 11.9 | 10.1 | 11.7 | (12)* | 12.0 |
| +4dB | (12)* | (12.8)* | 11.4 | (13.3)* | (15.4)* | 12.0 |
| +3dB | (15)* | (14)* | (13.1)* | (15.7)* | (17.7)* | 12.0 |
| +2dB | (15.6)* | (15.8)* | (14.4)* | (17.2)* | (19.8)* | 12.0 |
| +1dB | (17.9)* | (18.2)* | (17.2)* | (21.5)* | (25.4)* | 12.0 |
| 0dB | (20.3)* | (26.9)* | (20.5)* | (28.4)* | (36.4)* | 12.0 |
| -1dB | (24.2)* | (80.8)* | (27.7)* | ** | ** | 12.0 |
| -2dB | (31.2)* | ** | ** | ** | ** | 12.0 |
| -3dB | (89.5)* | ** | ** | ** | ** | 12.0 |
| -4dB | ** | ** | ** | ** | ** | 12.0 |
| -5dB | ** | ** | ** | ** | ** | 12.0 |

| Max Gain Isolation dB | DL 2110-2155 Pk-Pk Difference dB | DL 1930-1995 Pk-Pk Difference dB | DL 869-894 Pk-Pk Difference dB | DL 728-746 Pk-Pk Difference dB | DL 746-775 Pk-Pk Difference dB | Limit dB |
|---|---|---|---|---|---|---|
| +5dB | 10.3 | 8.3 | 10.5 | 9.6 | 10.4 | 12.0 |
| +4dB | 11.1 | 9.0 | 11.4 | 11.4 | 11.5 | 12.0 |
| +3dB | (12.5)* | 10.0 | (12.7)* | (12.6)* | (13.1)* | 12.0 |
| +2dB | (14)* | 10.3 | (14.5)* | (14.5)* | (14.4)* | 12.0 |
| +1dB | (15.4)* | 11.7 | (15.2)* | (16.2)* | (16.3)* | 12.0 |
| 0dB | (17.9)* | (12.6)* | (20.2)* | (18.6)* | (20.6)* | 12.0 |
| -1dB | (22.4)* | (15.4)* | (24.6)* | (24)* | (21.7)* | 12.0 |
| -2dB | (30)* | (19.3)* | ** | (40.6)* | ** | 12.0 |
| -3dB | ** | (25.8)* | ** | ** | ** | 12.0 |
| -4dB | ** | ** | ** | ** | ** | 12.0 |
| -5dB | ** | ** | ** | ** | ** | 12.0 |

Note:

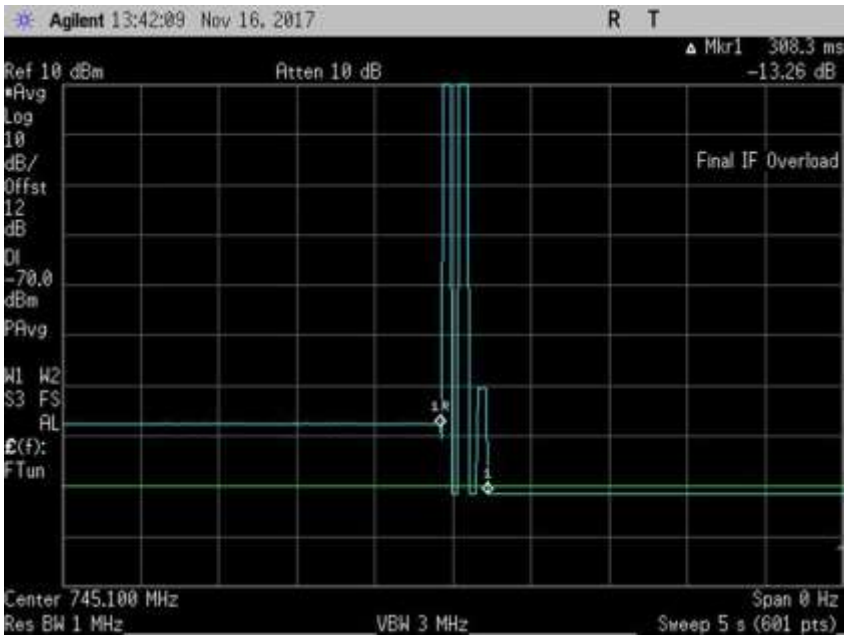
* The measured difference exceeds the limit for a period of less than 300 second before device mitigates or shuts down. The maximum recorded time prior to shutdown was 196 seconds for the Uplink bands and 200 seconds for the Downlink bands.

** The device shuts down immediately.

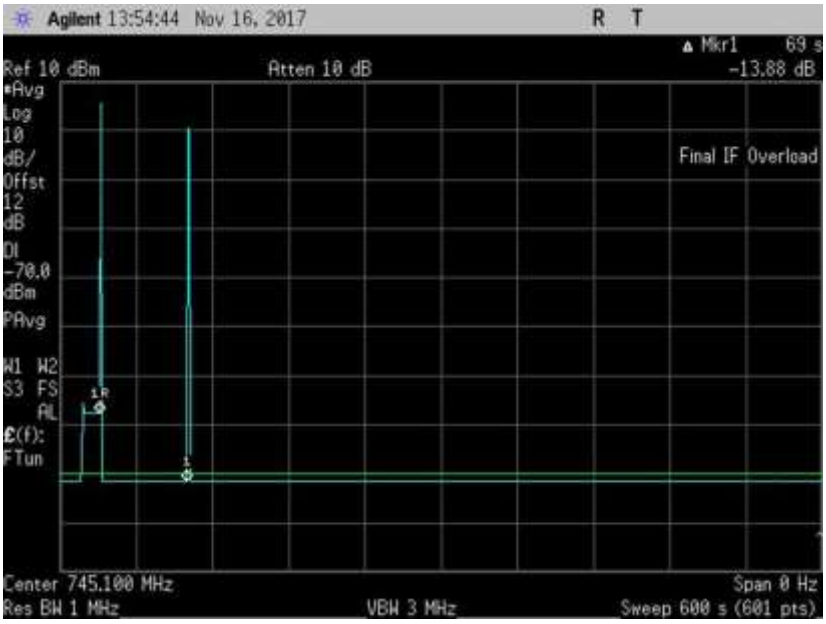
## 7.11.2 Oscillation Restart Tests

### Plots

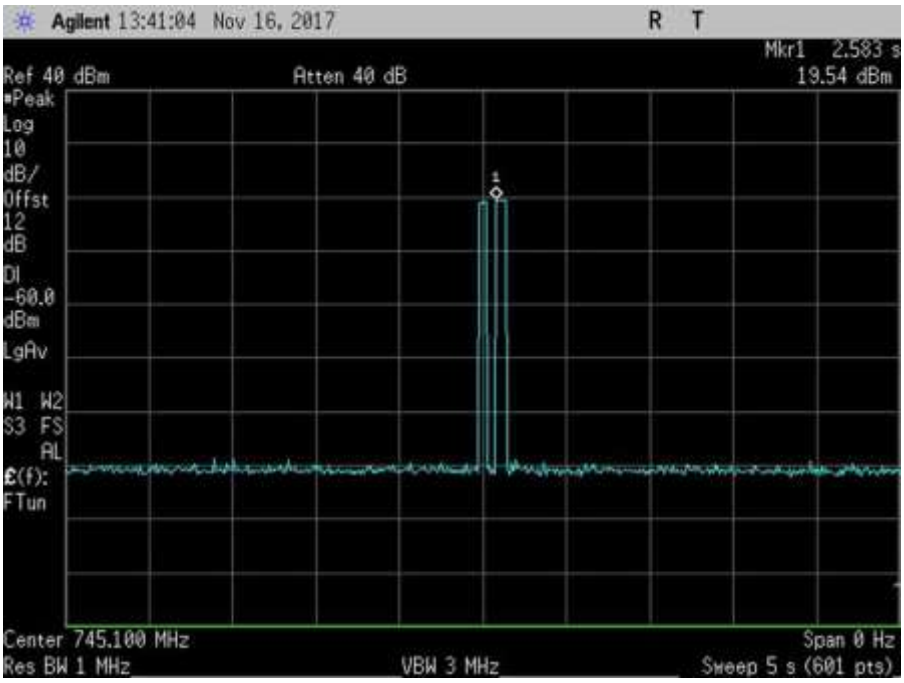
**DL**



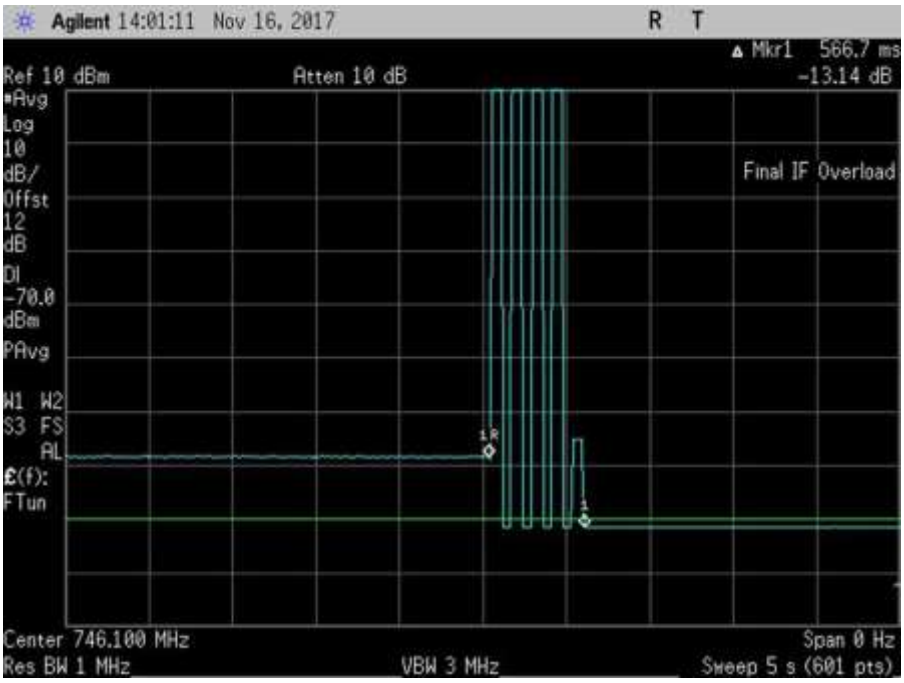

7.11.2_osc_DL_728-746MHz



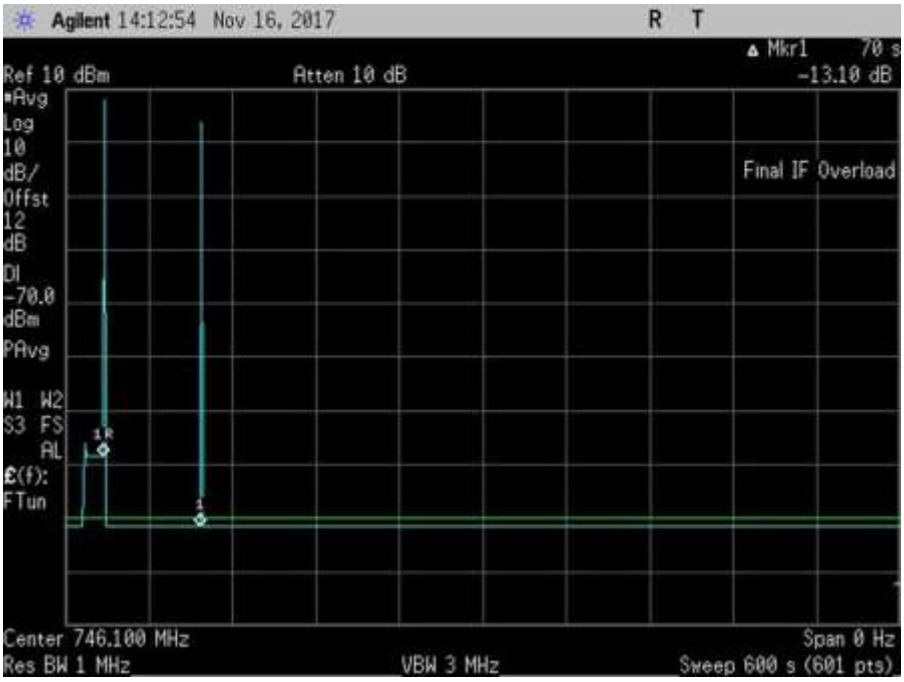

7.11.2_osc_DL_728-746MHz_600sec



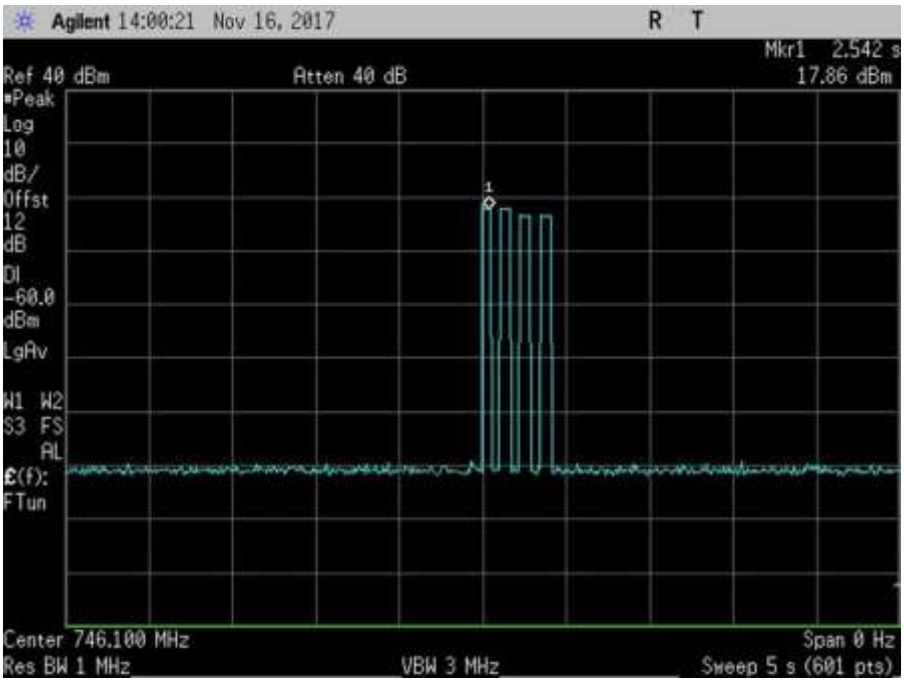

7.11.2_osc_DL_728-746MHz_Pk



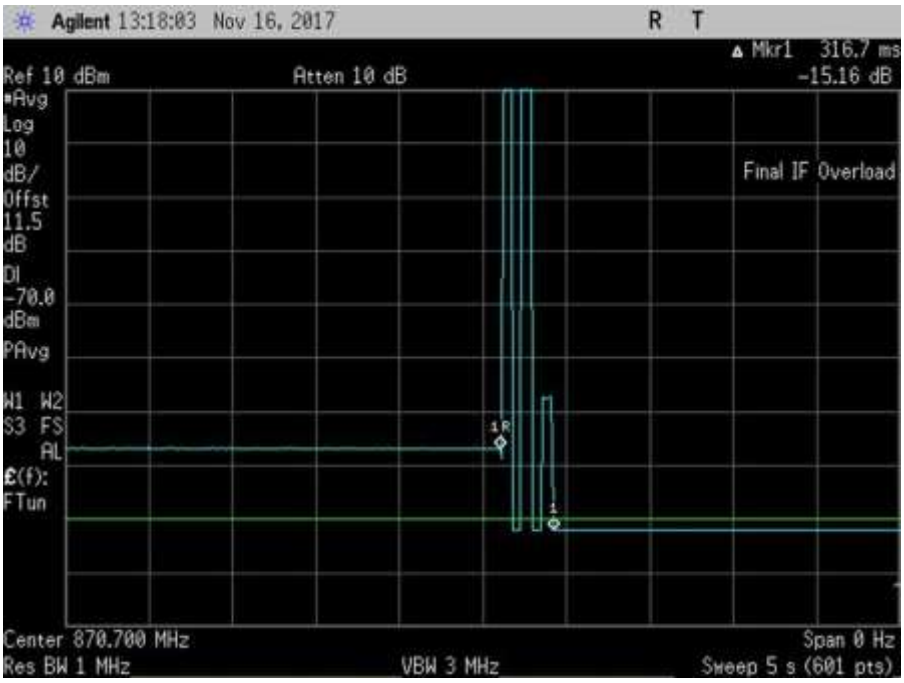

7.11.2_osc_DL_746-757MHz



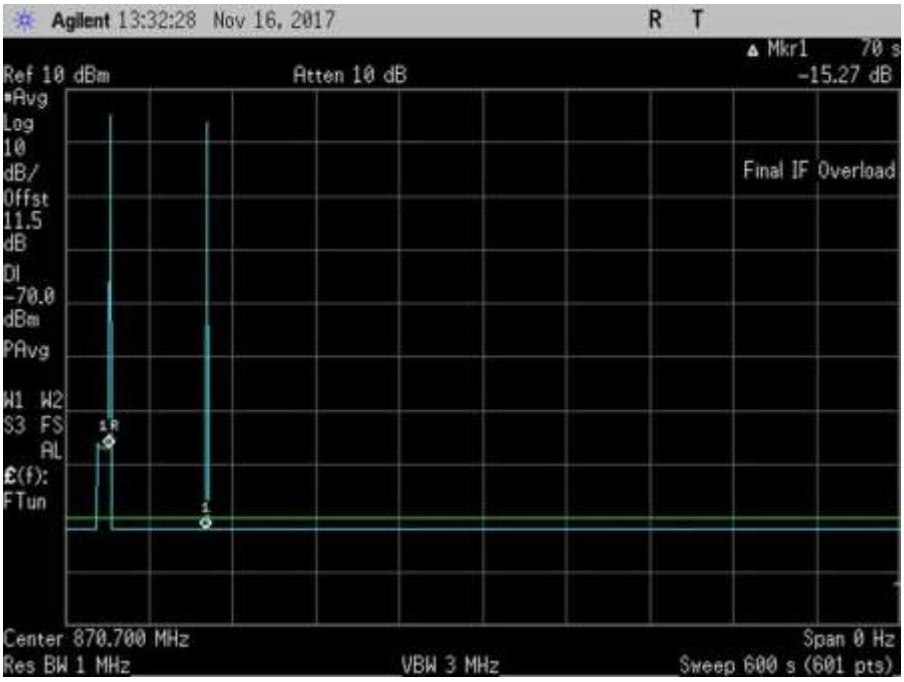

7.11.2_osc_DL_746-757MHz_600sec



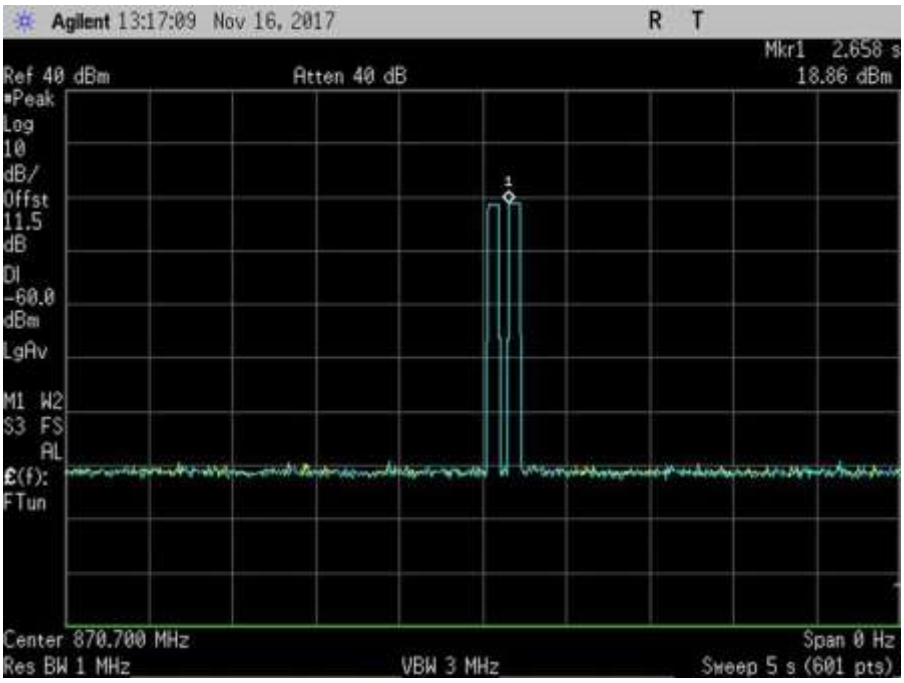

7.11.2_osc_DL_746-757MHz_Pk



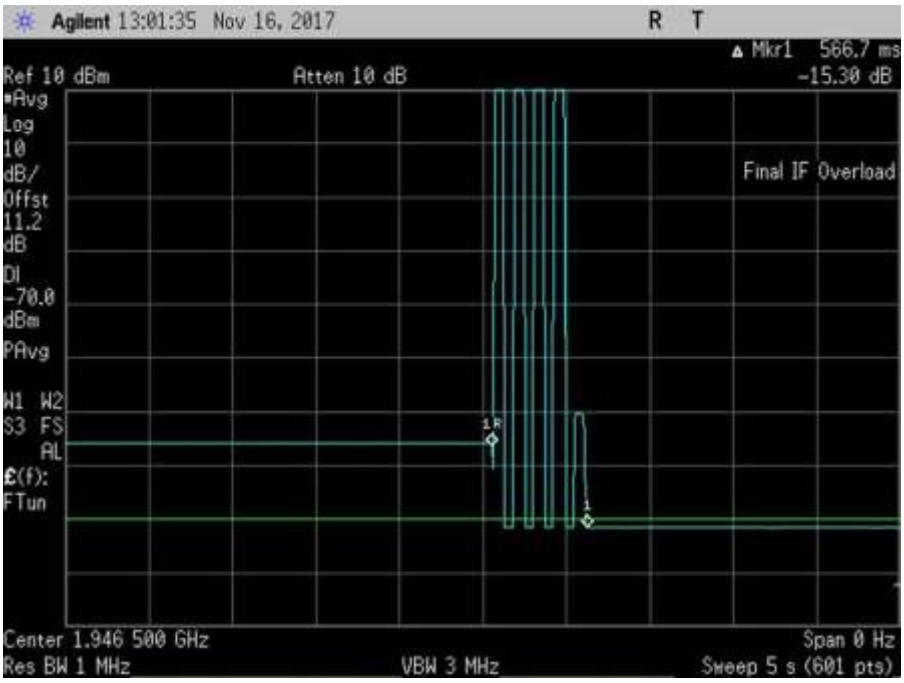

7.11.2_osc_DL_869-894MHz



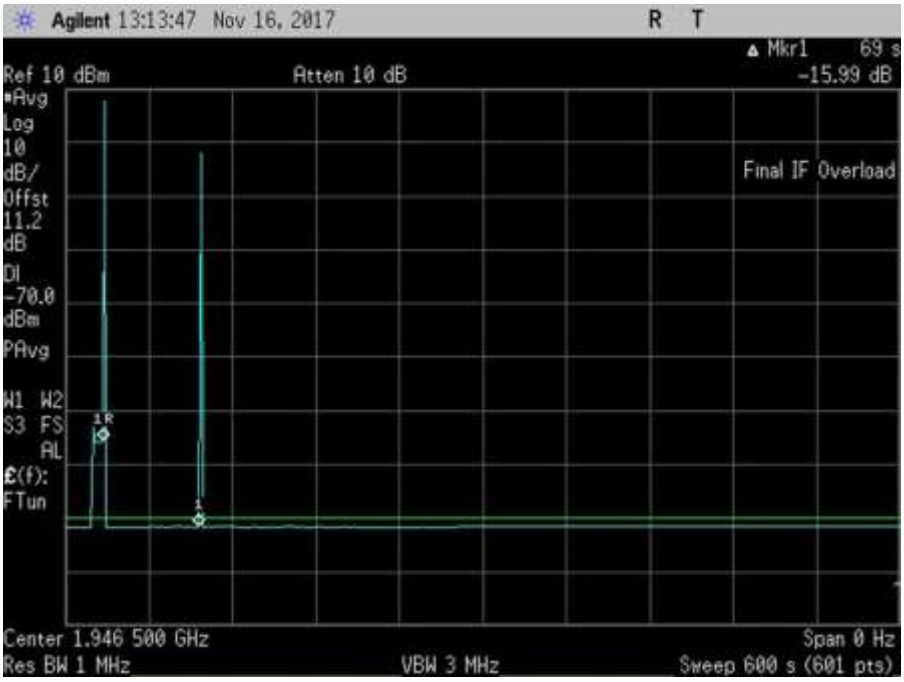

7.11.2_osc_DL_869-894MHz_600sec



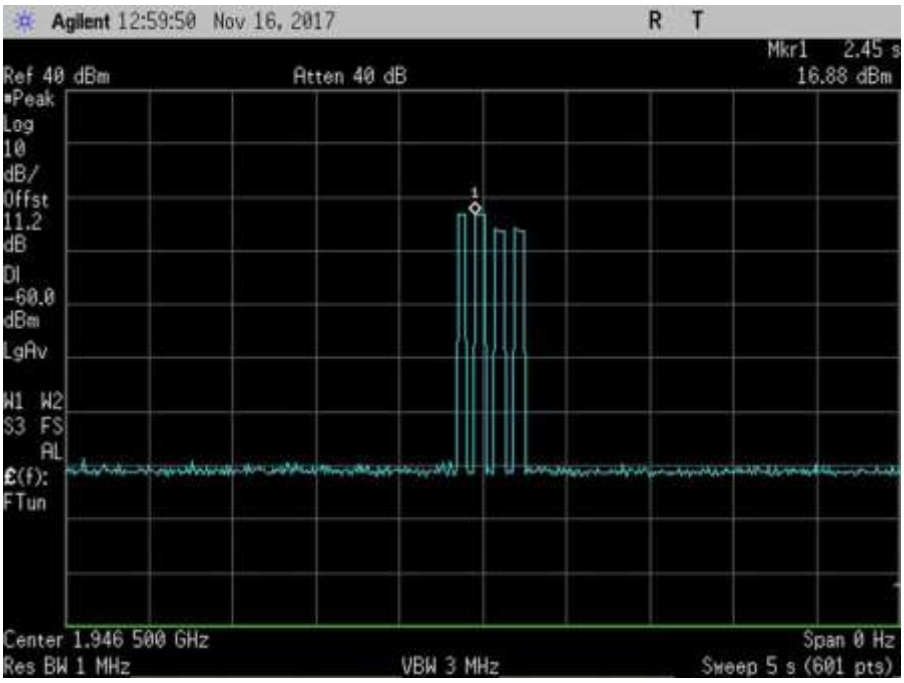

7.11.2_osc_DL_869-894MHz_Pk



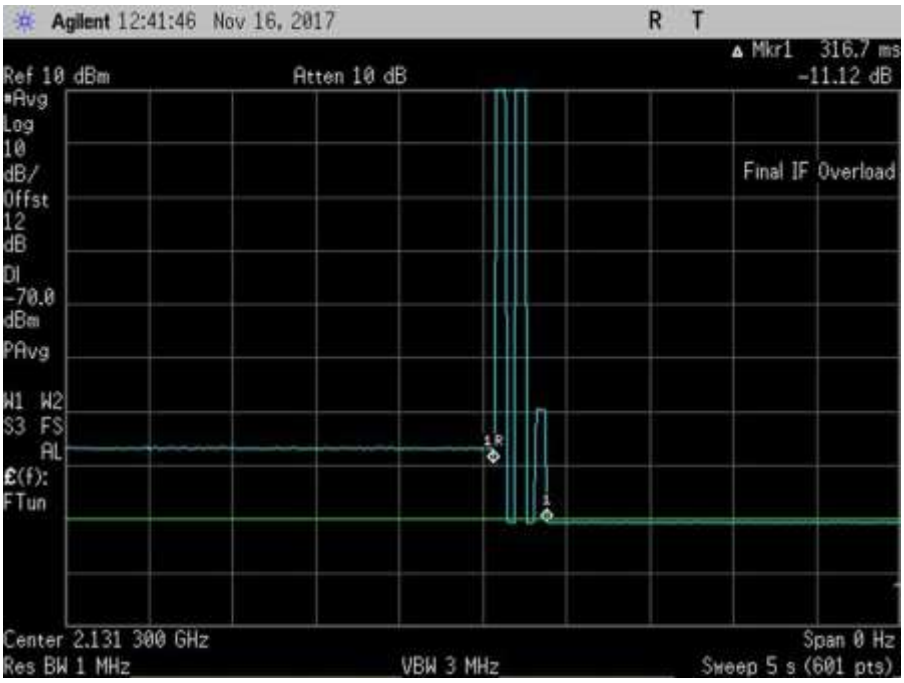

7.11.2_osc_DL_1930-1995MHz



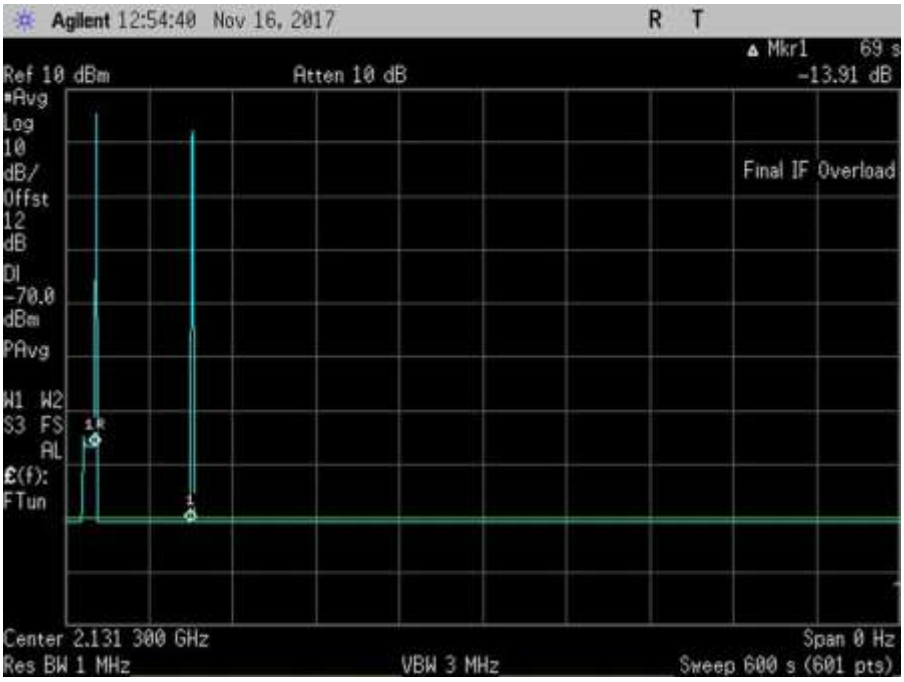

7.11.2_osc_DL_1930-1995MHz_600sec



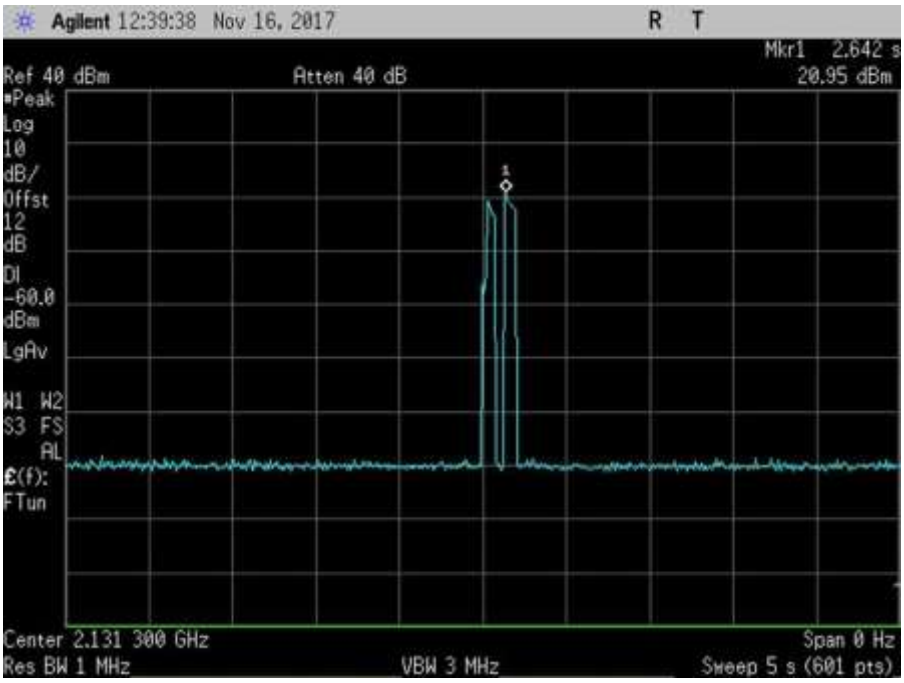

7.11.2_osc_DL_1930-1995MHz_Pk




7.11.2_osc_DL_2110-2155MHz

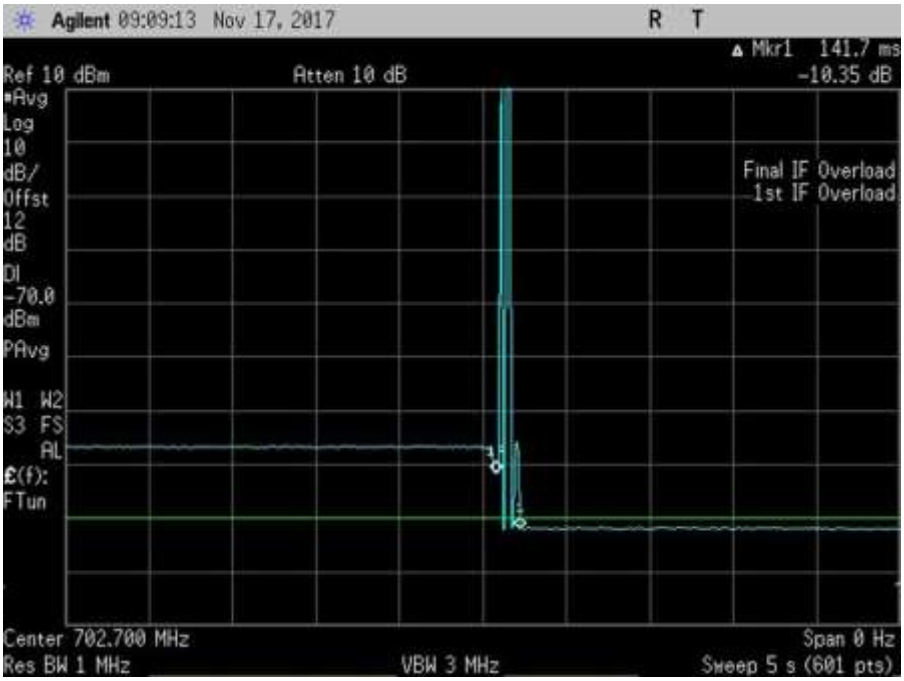



7.11.2_osc_DL_2110-2155MHz_600sec

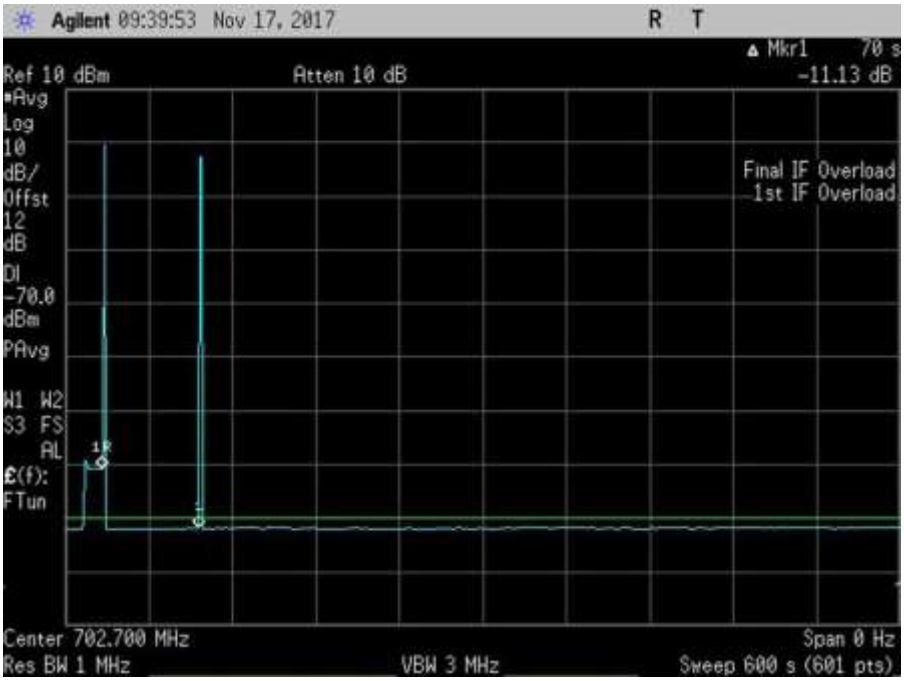



7.11.2_osc_DL_2110-2155MHz_Pk

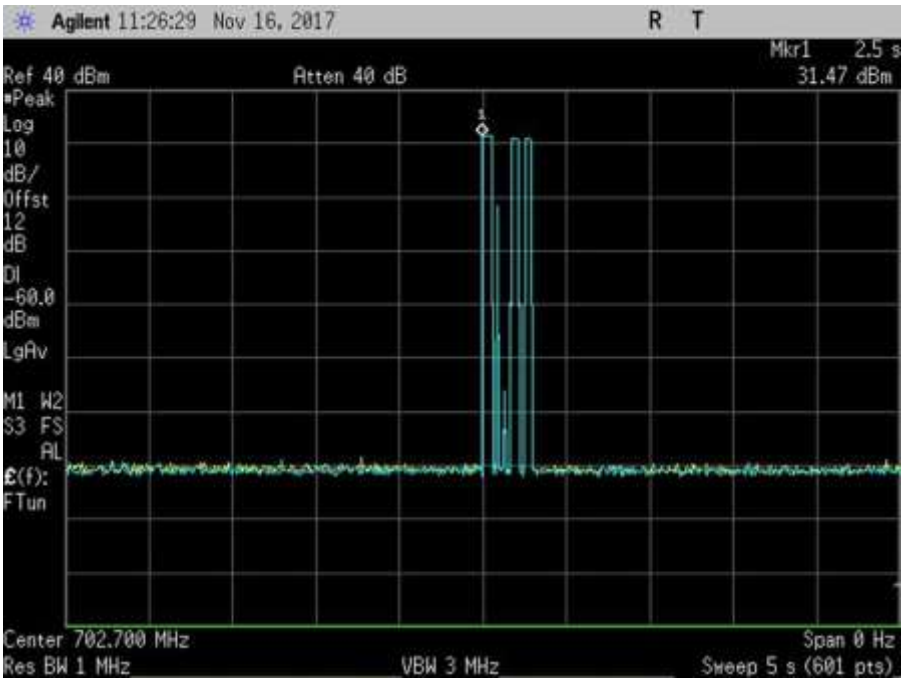
**UL**



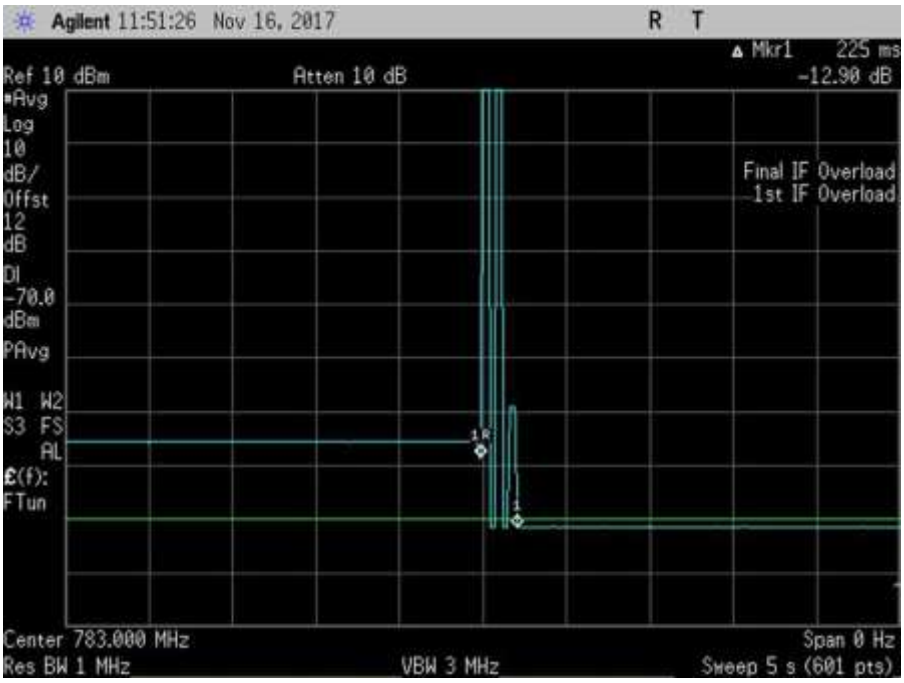

7.11.2_osc_UL_698-716MHz




7.11.2_osc_UL_698-716MHz_600sec

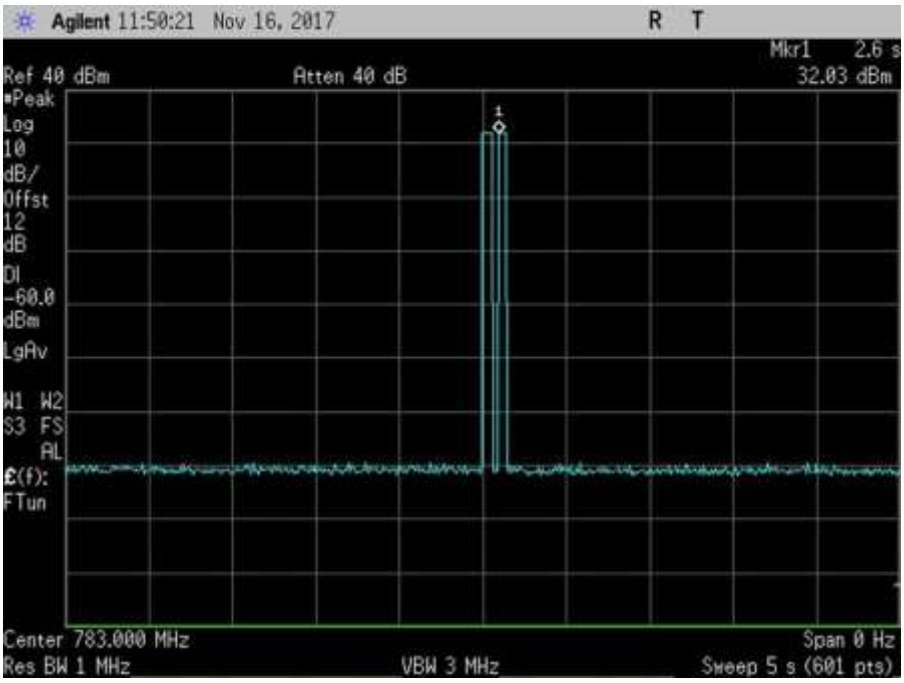



7.11.2_osc_UL_698-716MHz_Pk

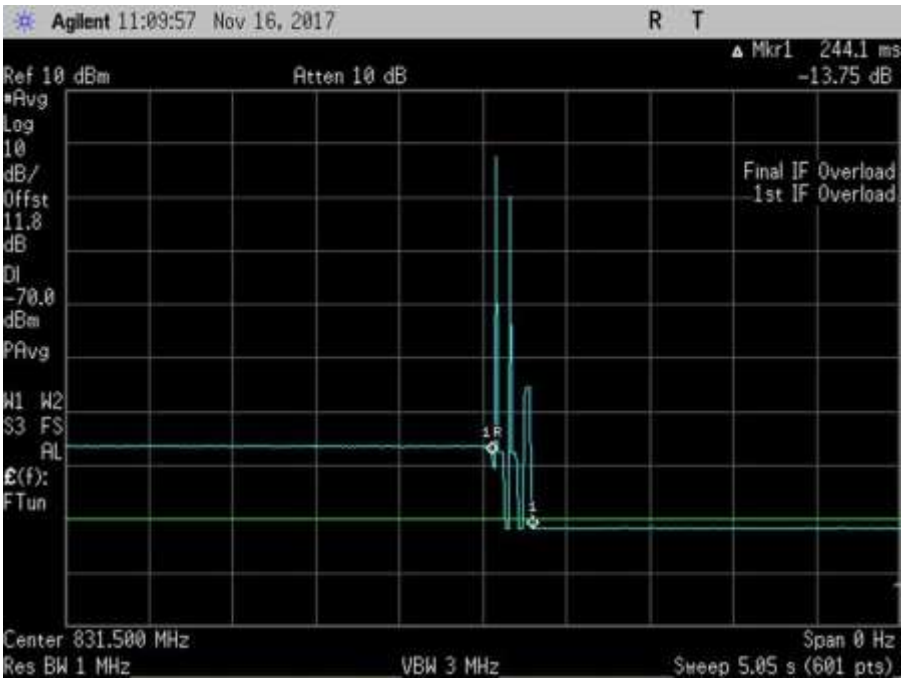



7.11.2_osc_UL_776-787MHz

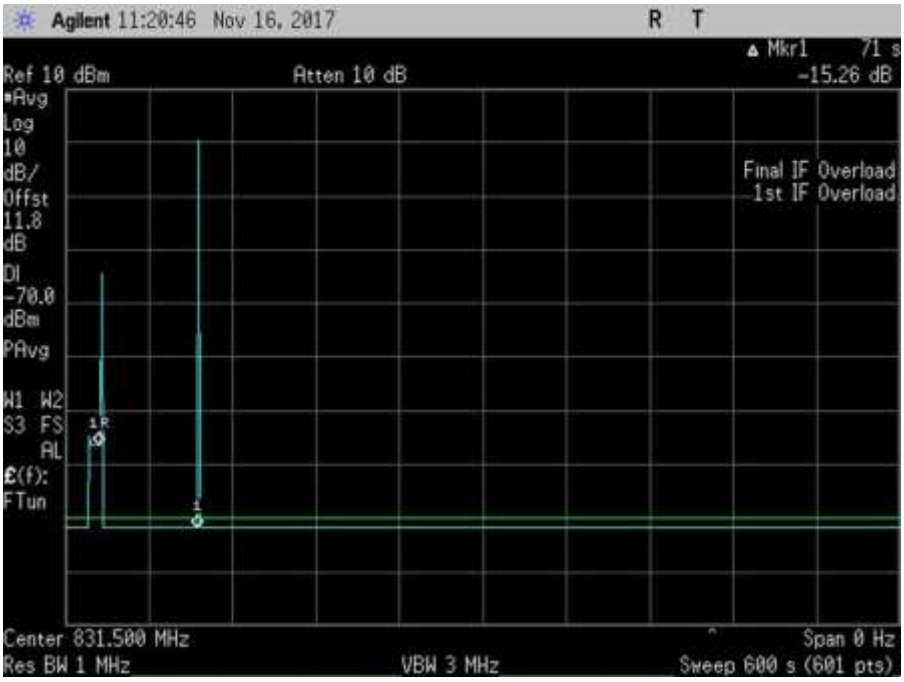

7.11.2_osc_UL_776-787MHz_600sec



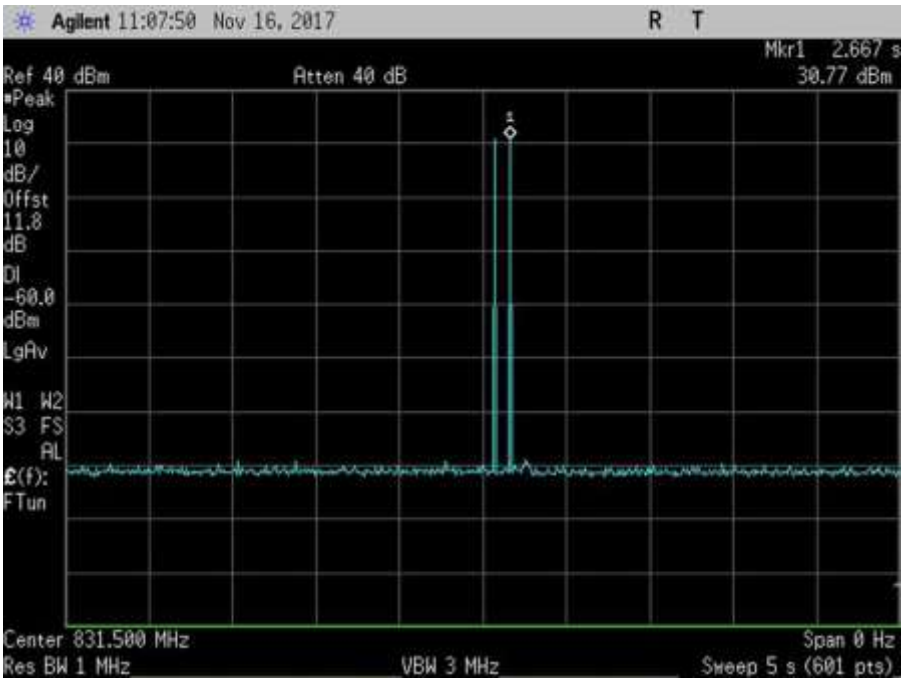

7.11.2_osc_UL_776-787MHz_Pk



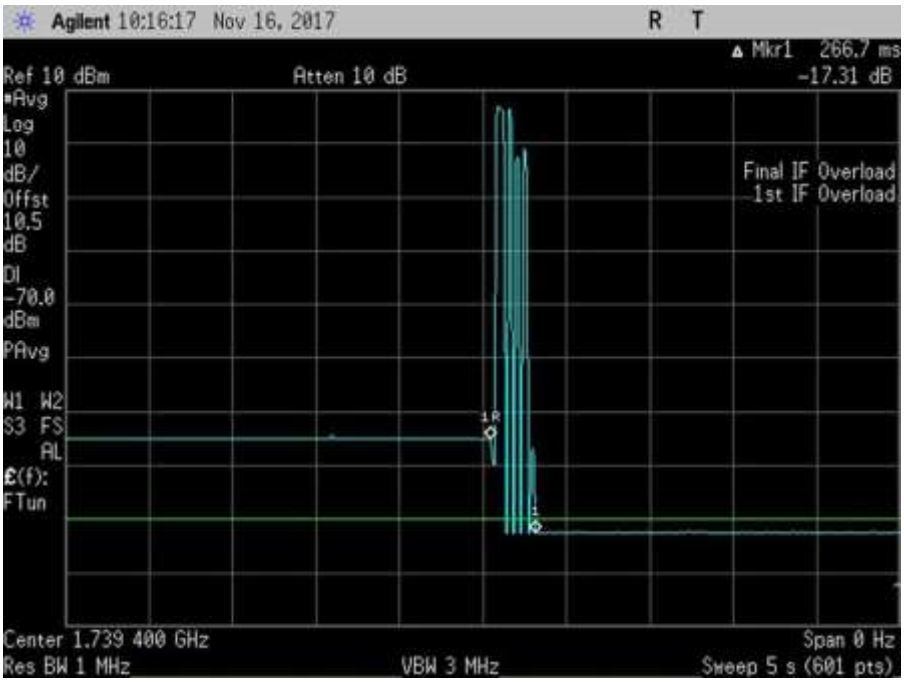

7.11.2_osc_UL_824-849MHz



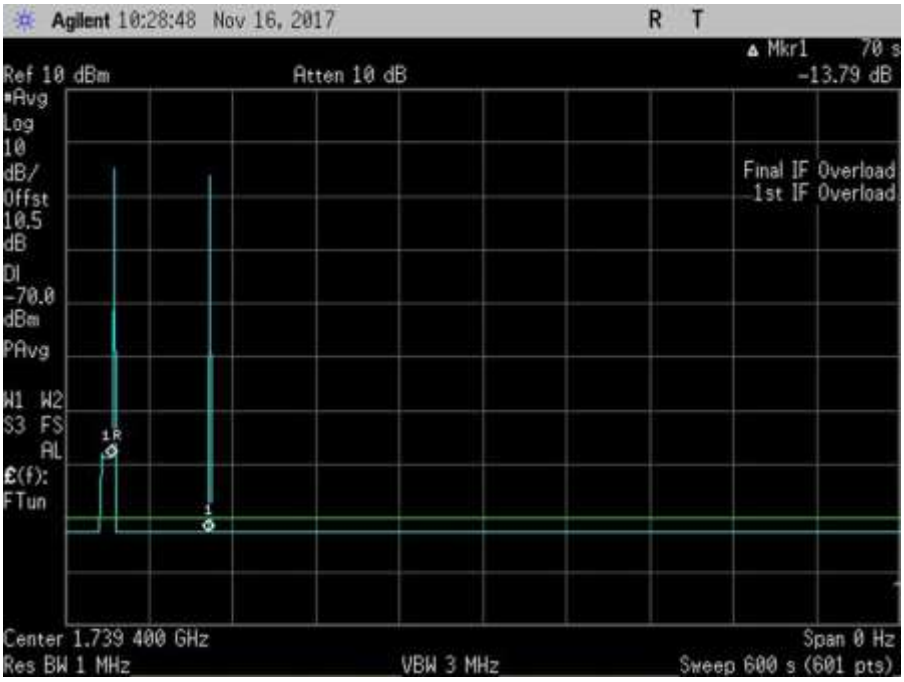

7.11.2_osc_UL_824-849MHz_600sec



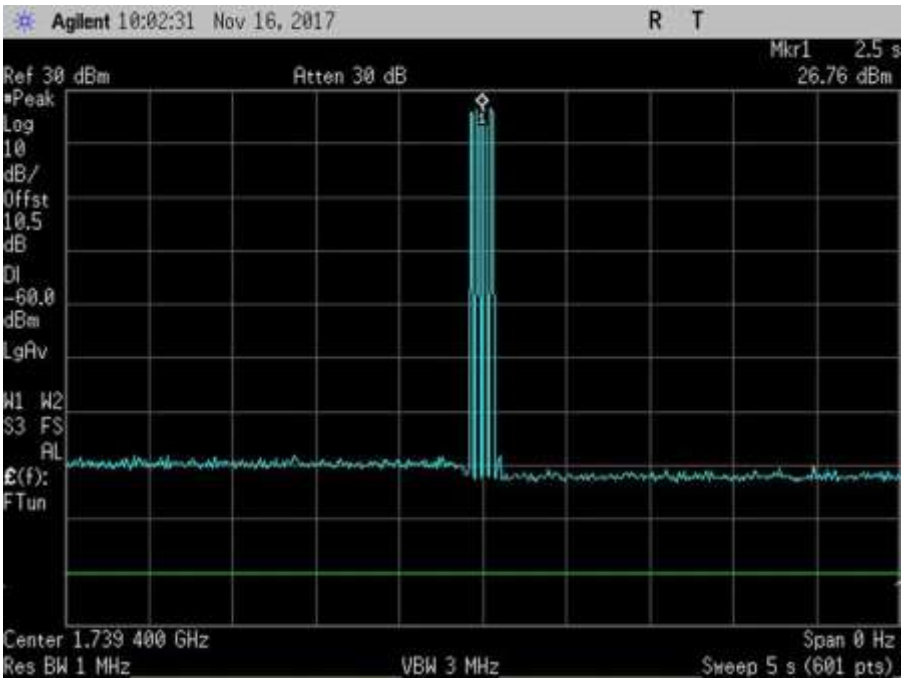

7.11.2_osc_UL_824-849MHz_Pk



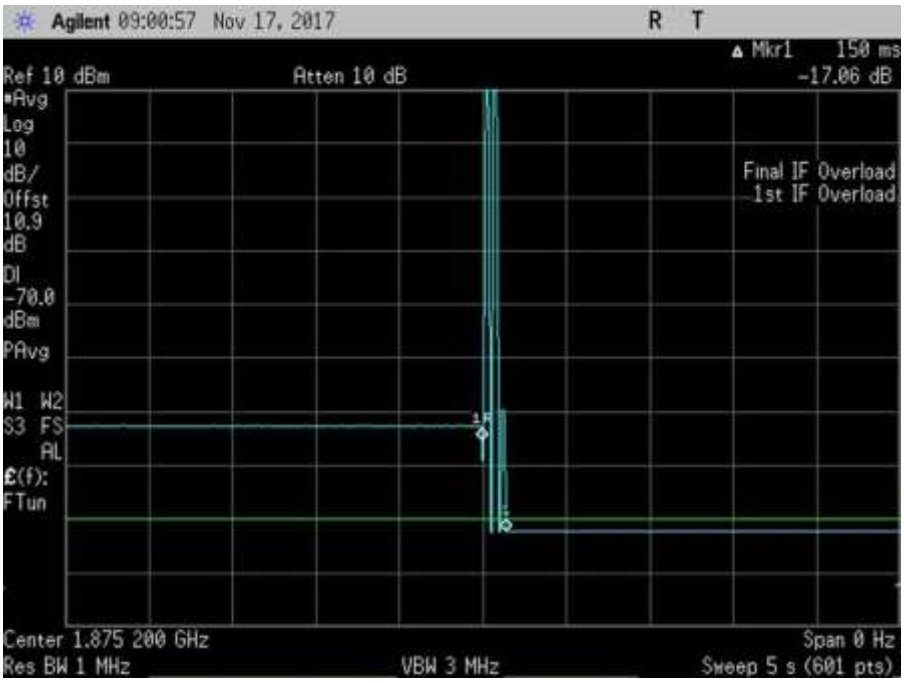

7.11.2_osc_UL_1710-1755MHz



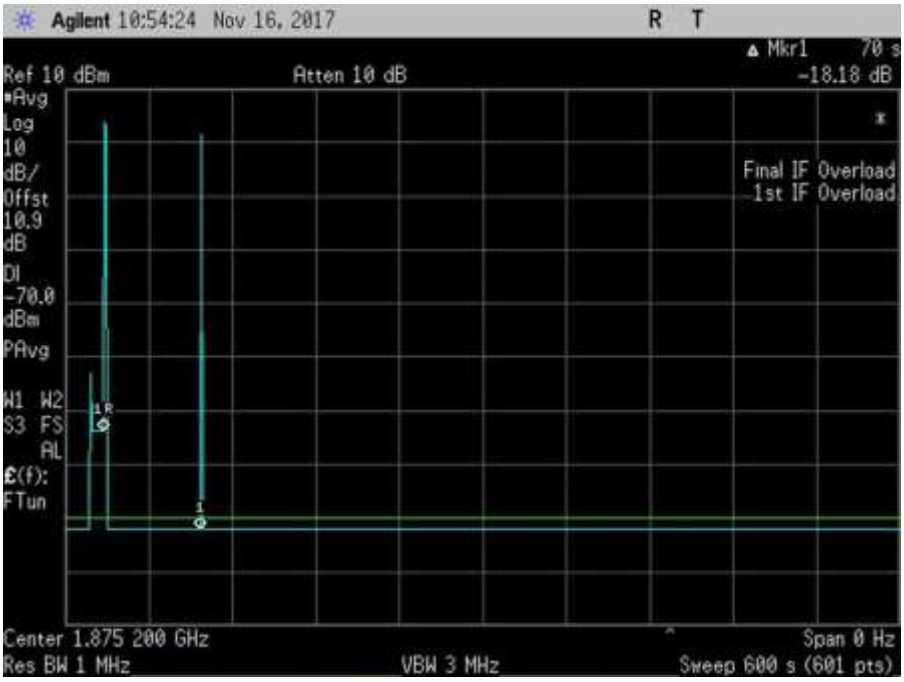

7.11.2_osc_UL_1710-1755MHz_600sec



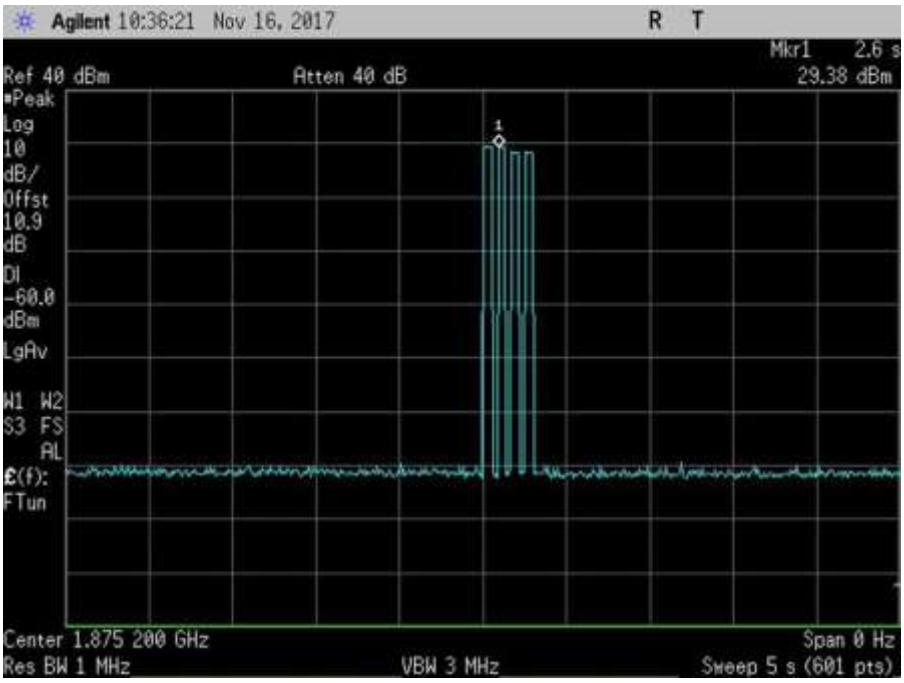

7.11.2_osc_UL_1710-1755MHz_Pk




7.11.2_osc_UL_1850-1915MHz




7.11.2_osc_UL_1850-1915MHz_600sec

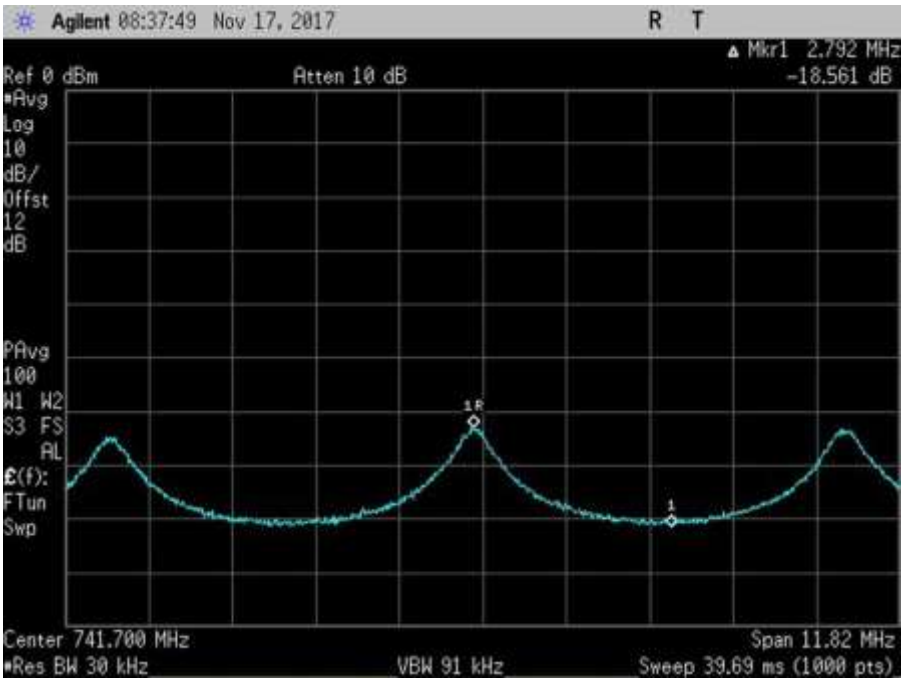



7.11.2_osc_UL_1850-1915MHz_Pk

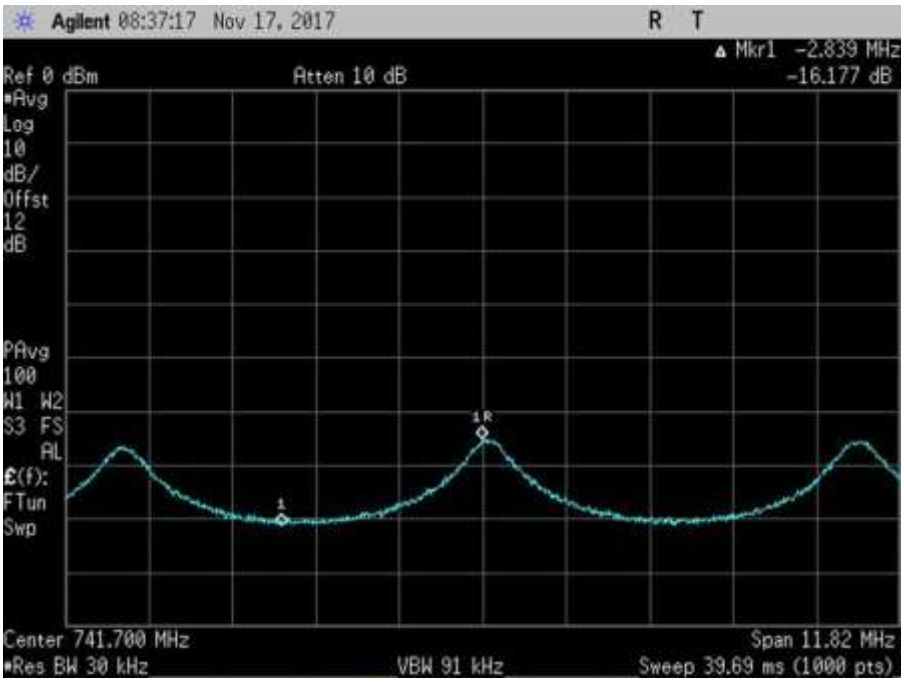
## 7.11.3 Measuring Oscillation Mitigation or Shutdown

### Plots

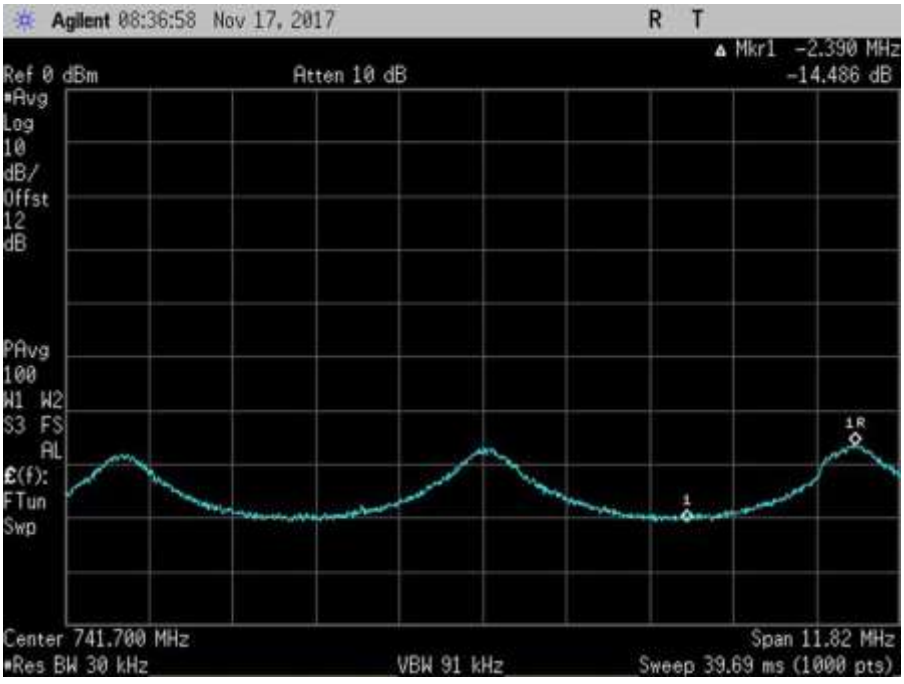
**DL**



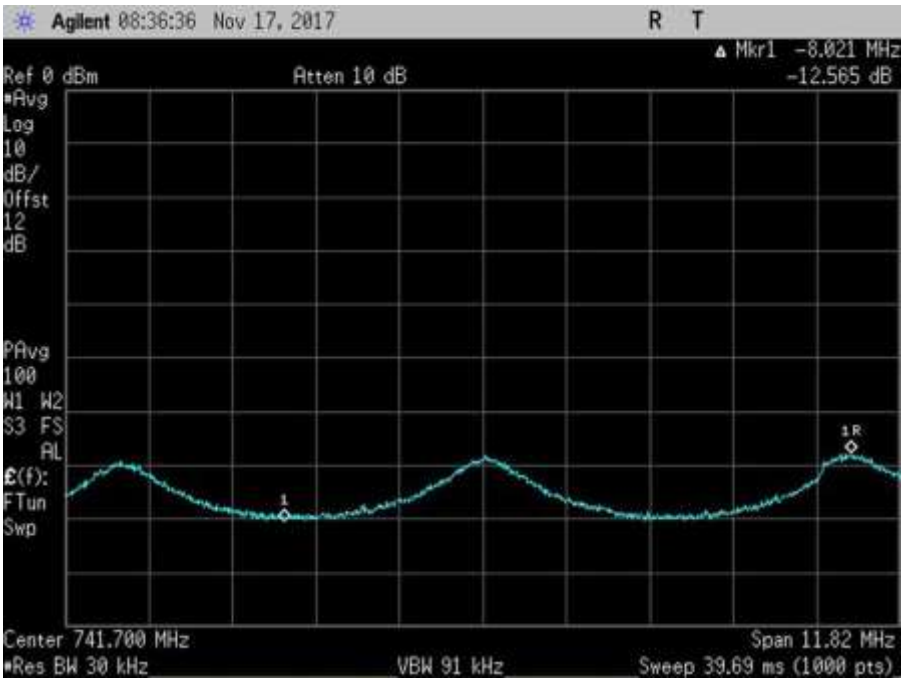

7.11.3_Osc_DL_728-746MHz+0_AWGNL



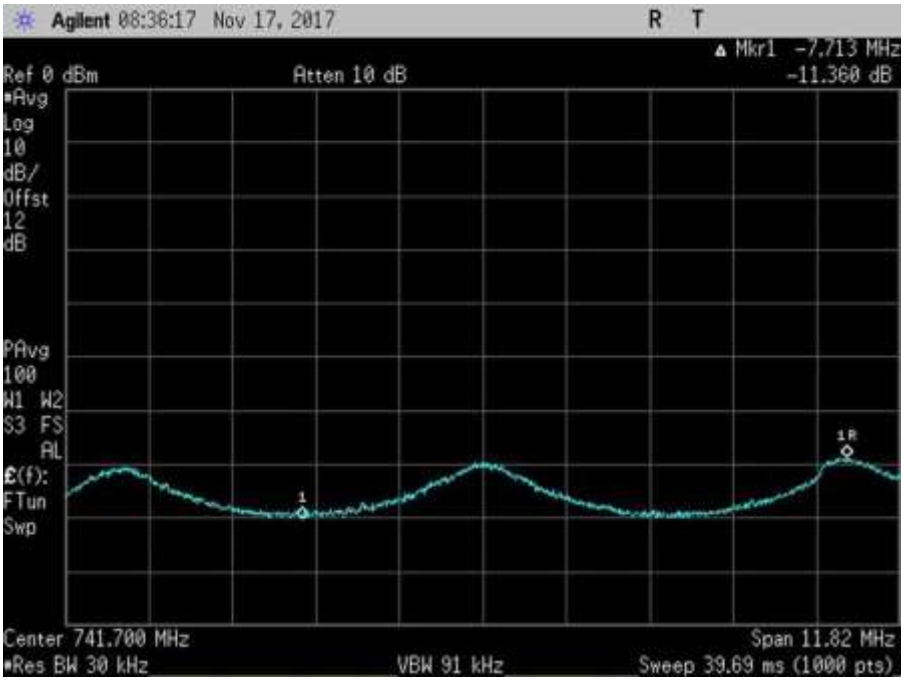

7.11.3_Osc_DL_728-746MHz+1_AWGNL



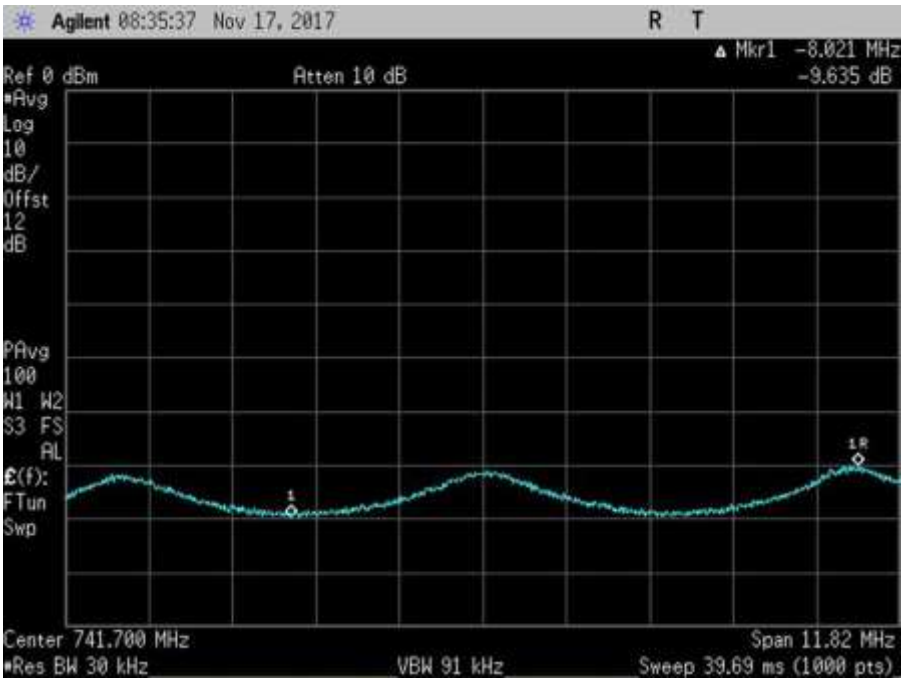

7.11.3_Osc_DL_728-746MHz+2_AWGNL



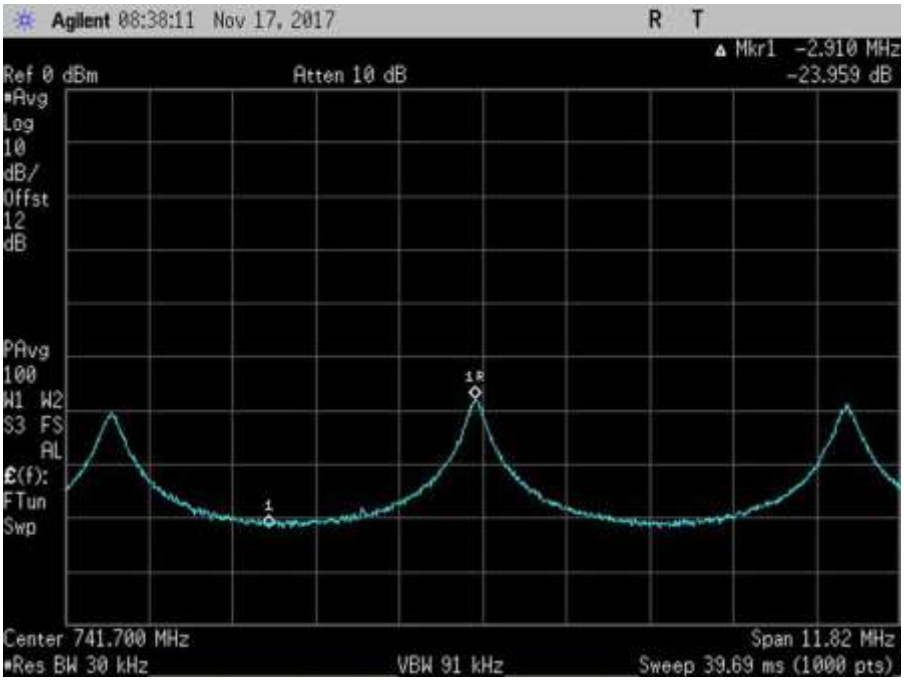

7.11.3_Osc_DL_728-746MHz+3_AWGNL



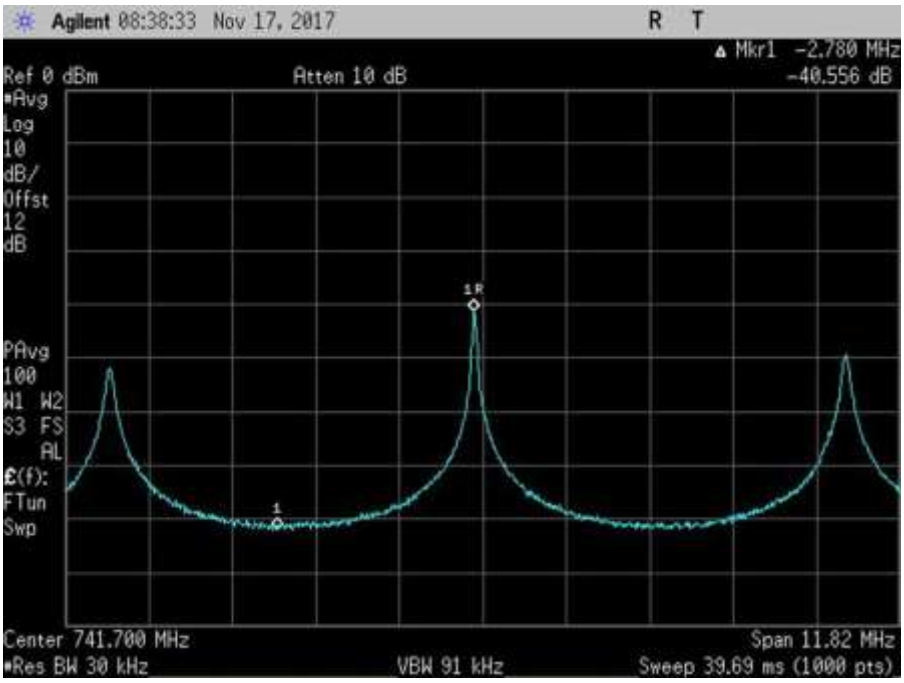

7.11.3_Osc_DL_728-746MHz+4_AWGNL



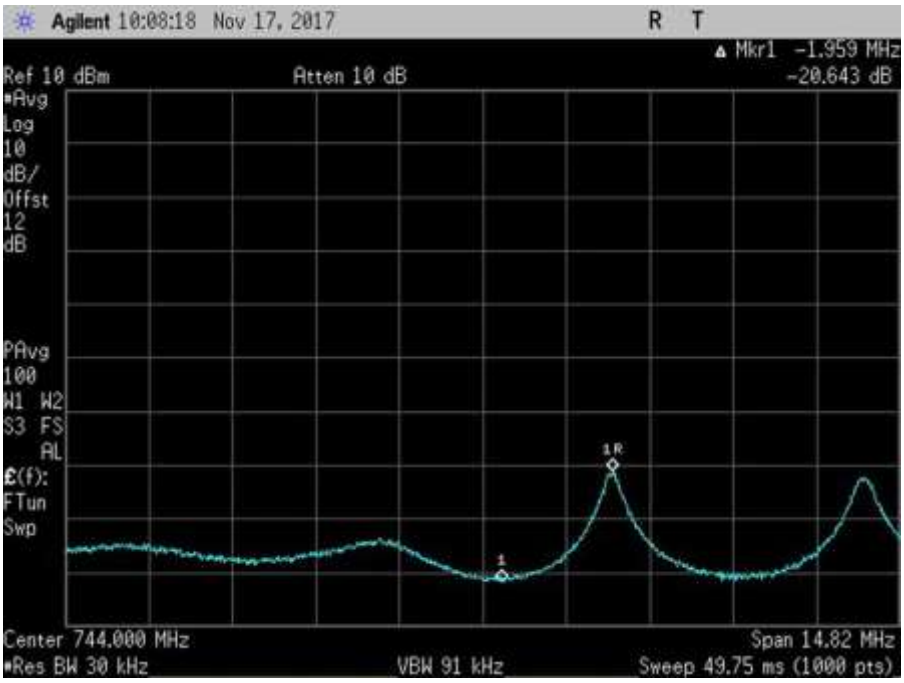

7.11.3_Osc_DL_728-746MHz+5_AWGNL



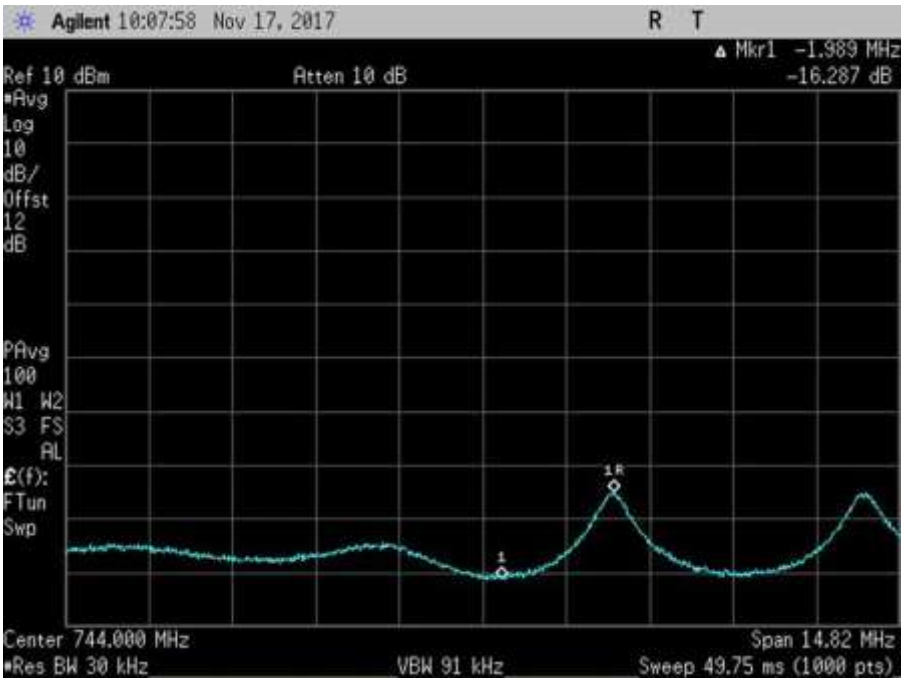

7.11.3_Osc_DL_728-746MHz-1_AWGNL



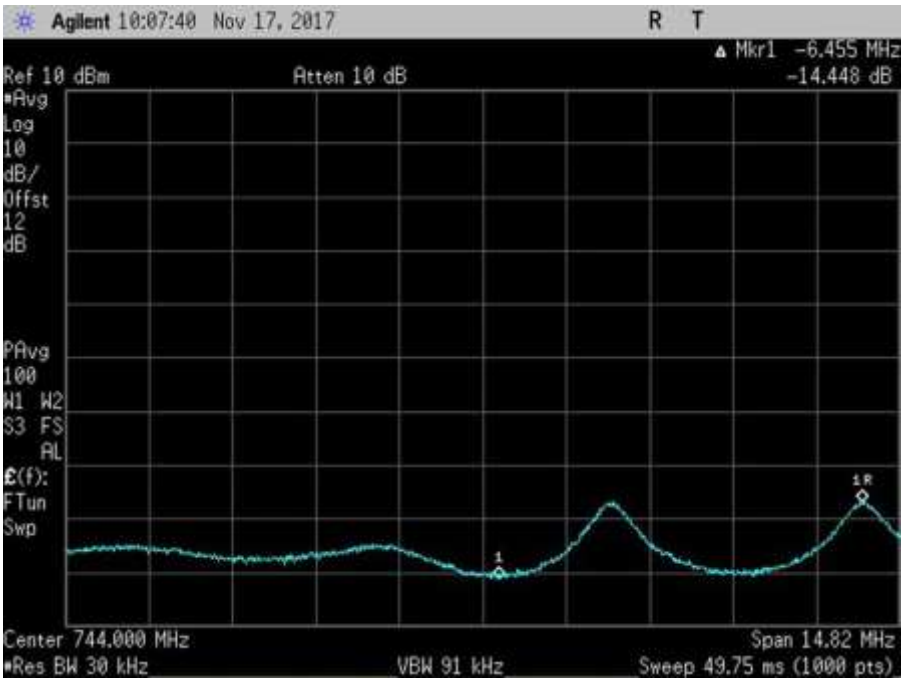

7.11.3_Osc_DL_728-746MHz-2_AWGNL



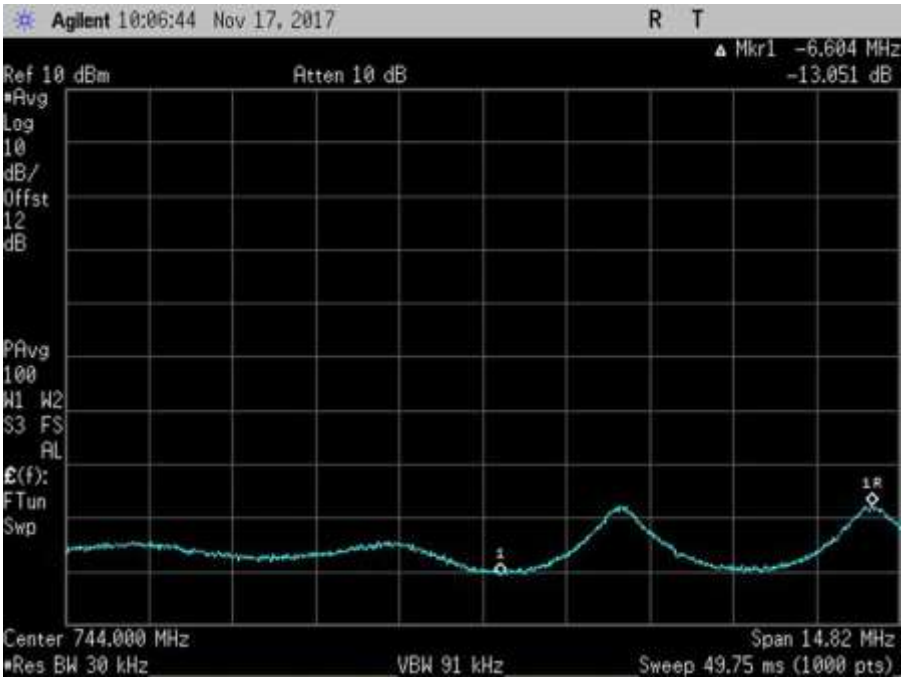

7.11.3_Osc_DL_746-757MHz+0_AWGNR



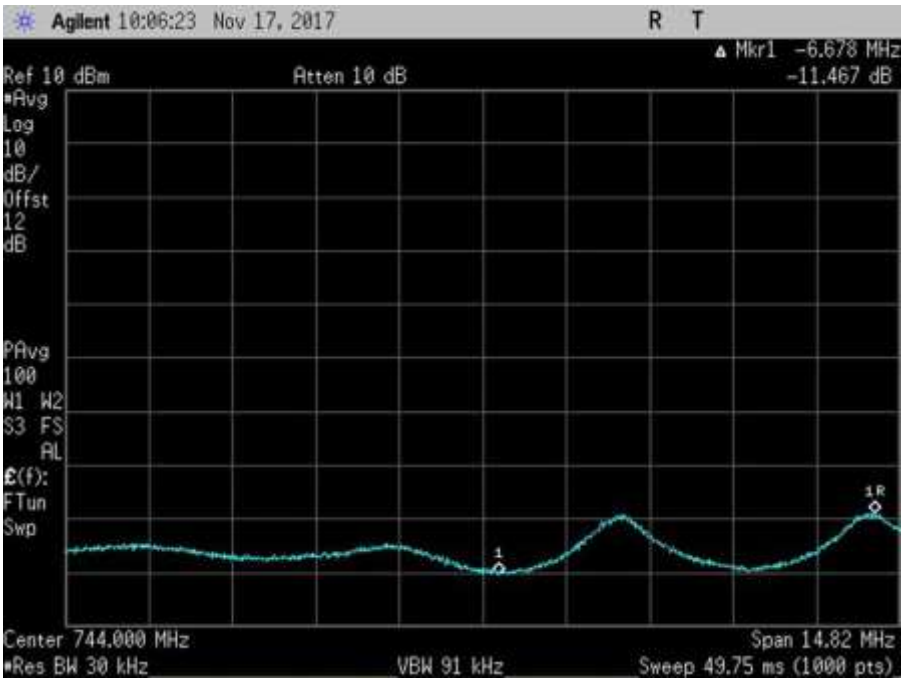

7.11.3_Osc_DL_746-757MHz+1_AWGNR



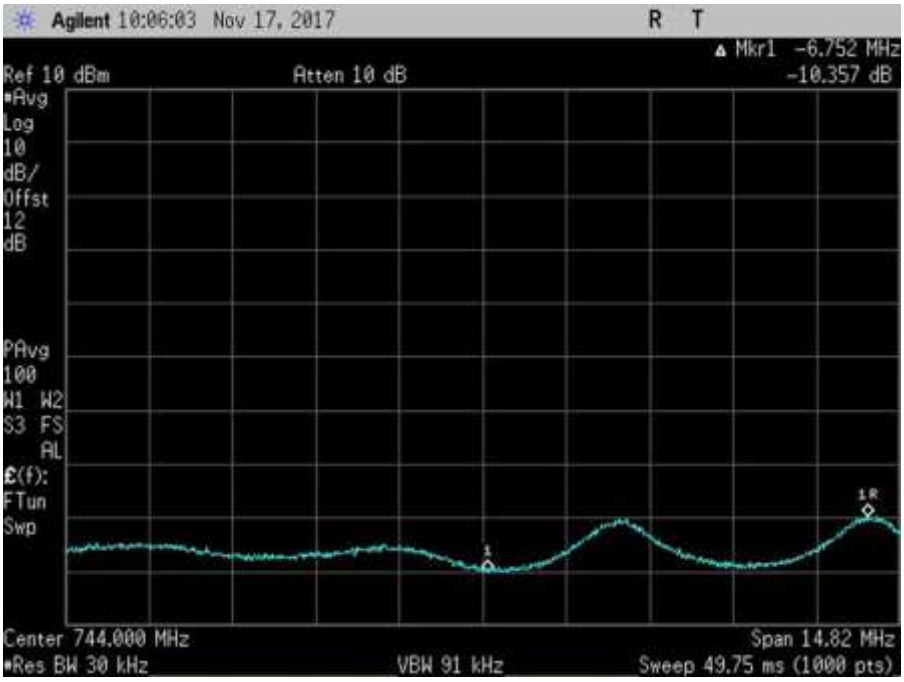

7.11.3_Osc_DL_746-757MHz+2_AWGNR



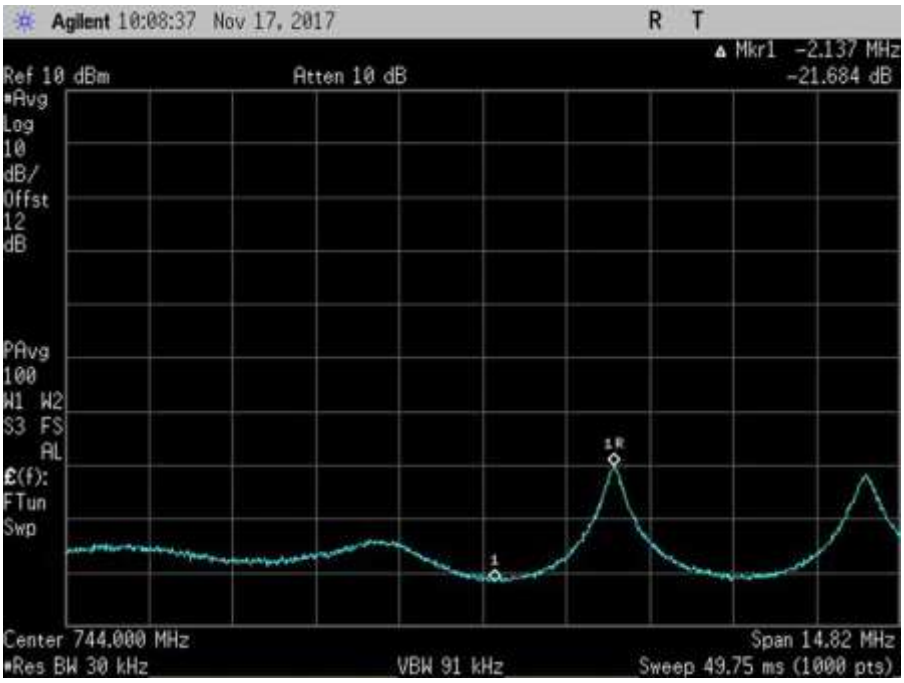

7.11.3_Osc_DL_746-757MHz+3_AWGNR



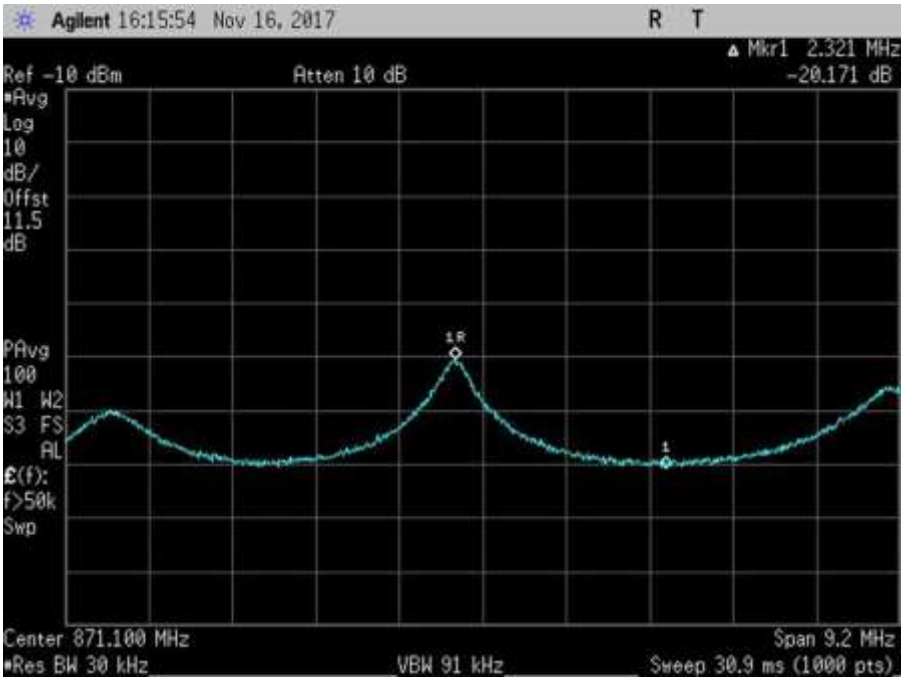

7.11.3_Osc_DL_746-757MHz+4_AWGNR



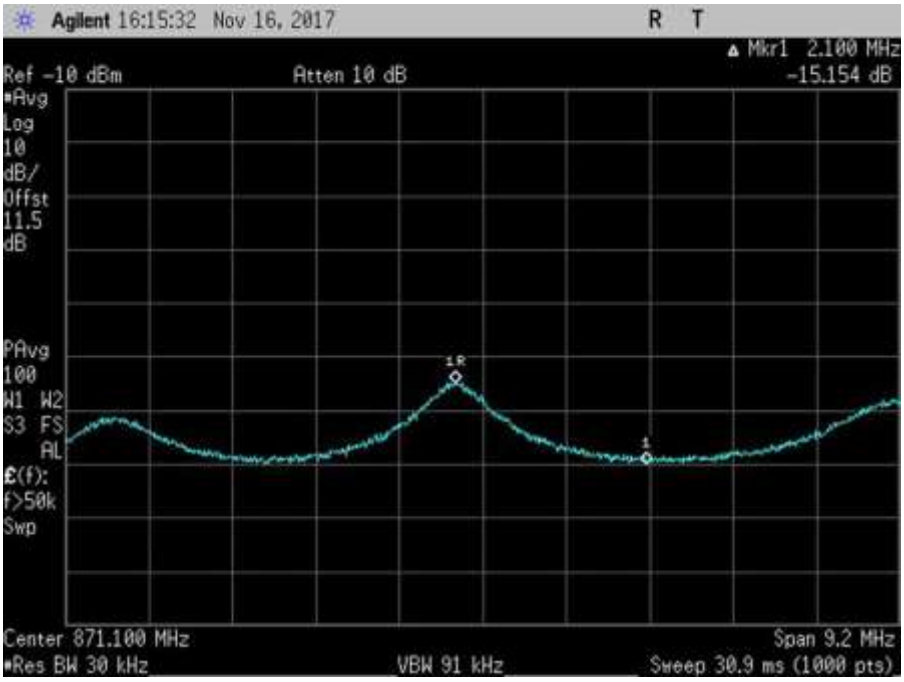

7.11.3_Osc_DL_746-757MHz+5_AWGNR



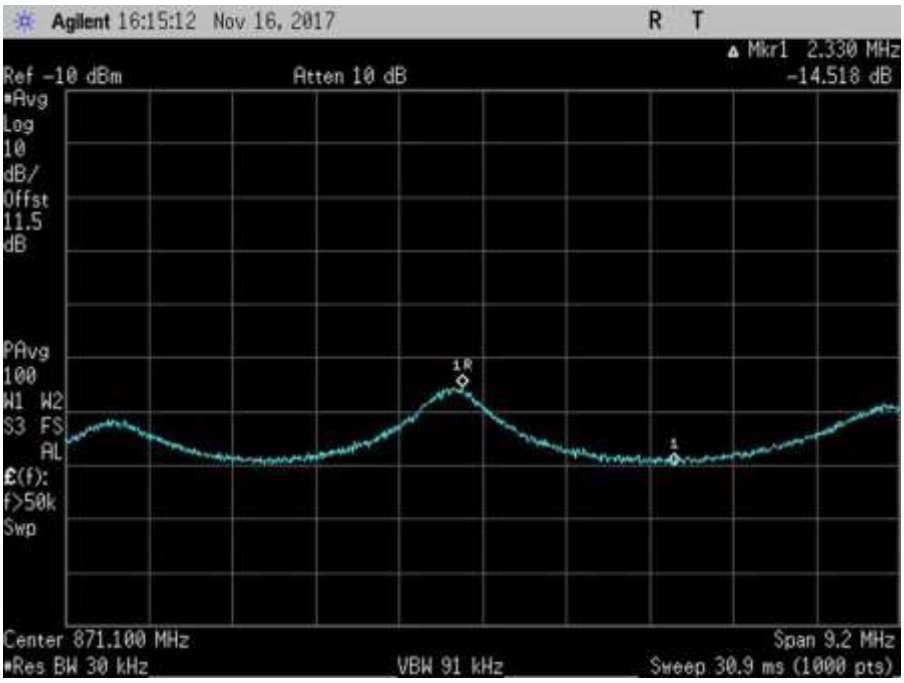

7.11.3_Osc_DL_746-757MHz-1_AWGNR



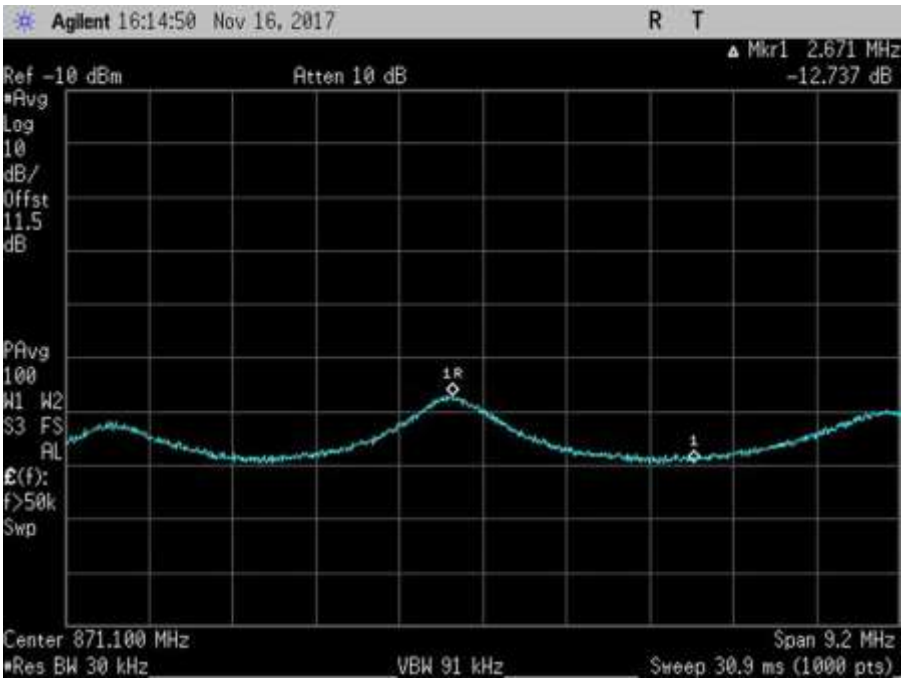

7.11.3_Osc_DL_869-894MHz+0_AWGNR



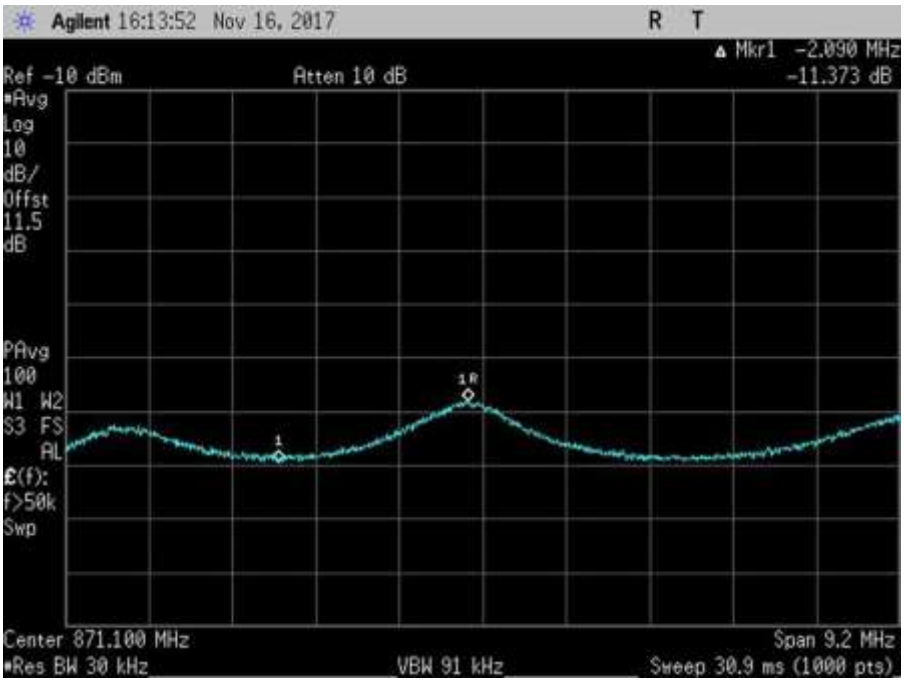

7.11.3_Osc_DL_869-894MHz+1_AWGNR



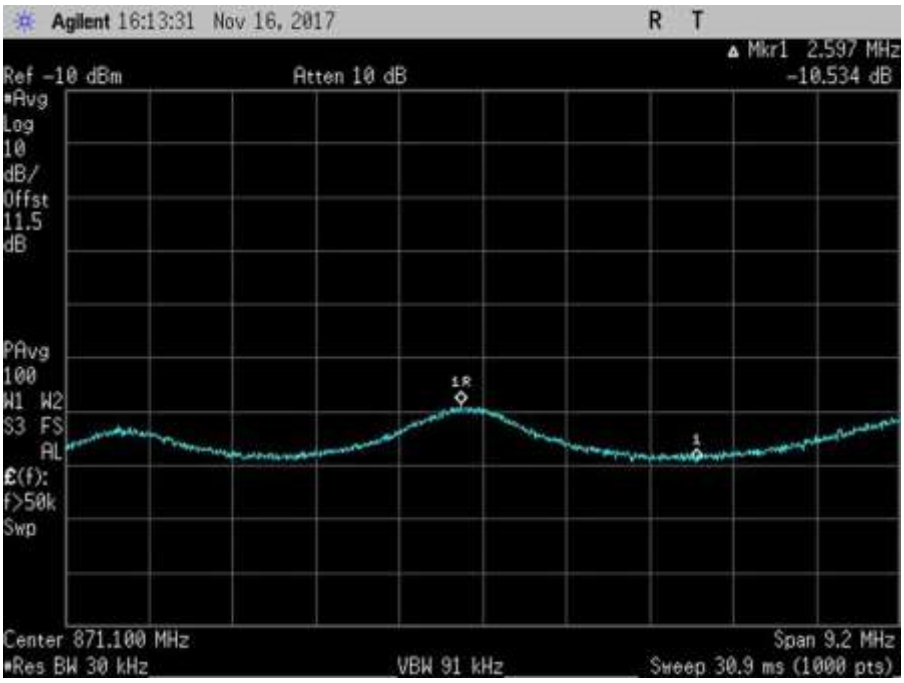

7.11.3_Osc_DL_869-894MHz+2_AWGNR



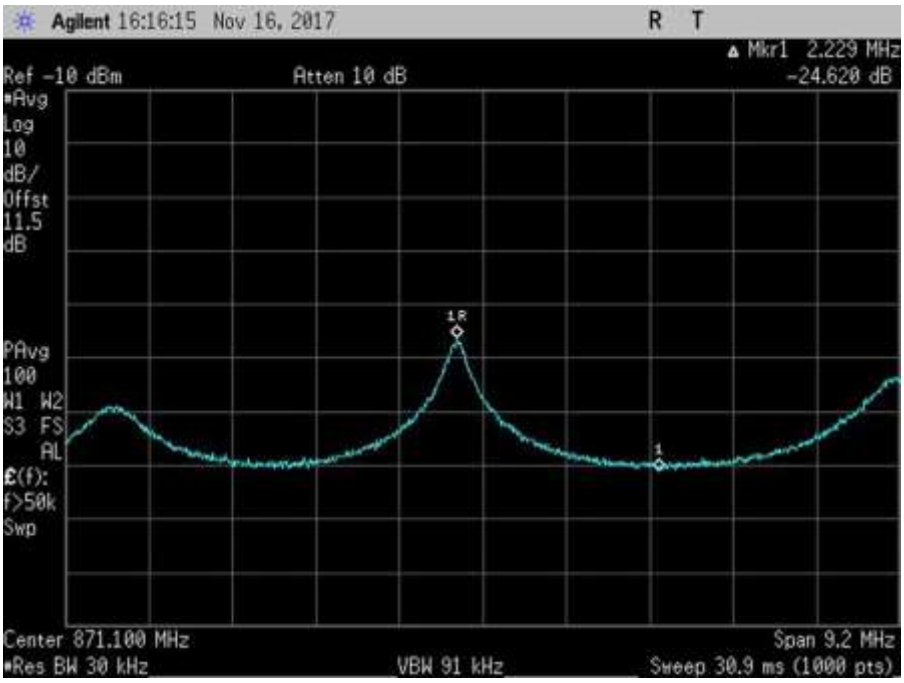

7.11.3_Osc_DL_869-894MHz+3_AWGNR



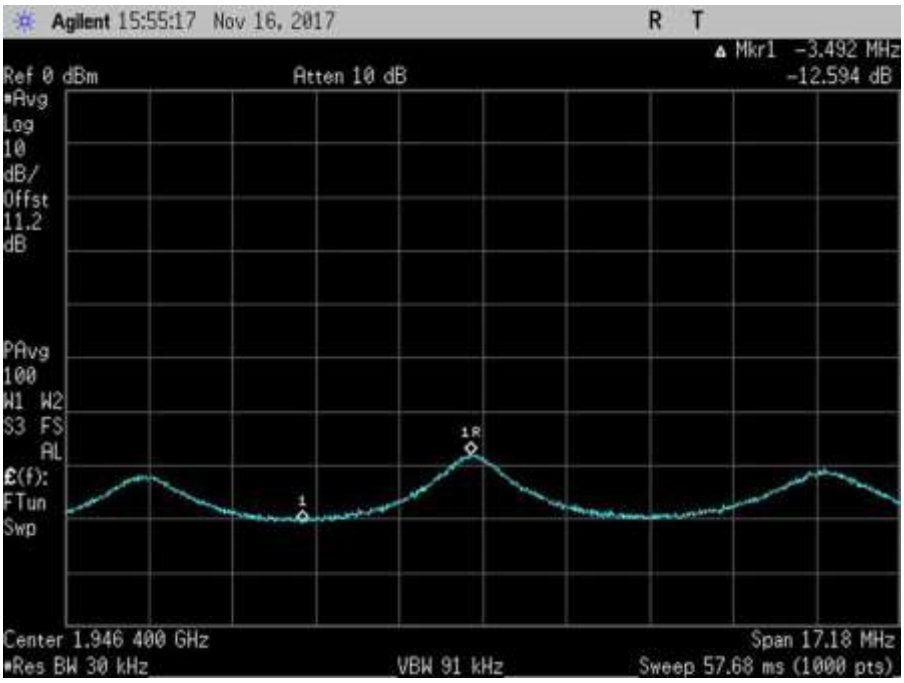

7.11.3_Osc_DL_869-894MHz+4_AWGNR



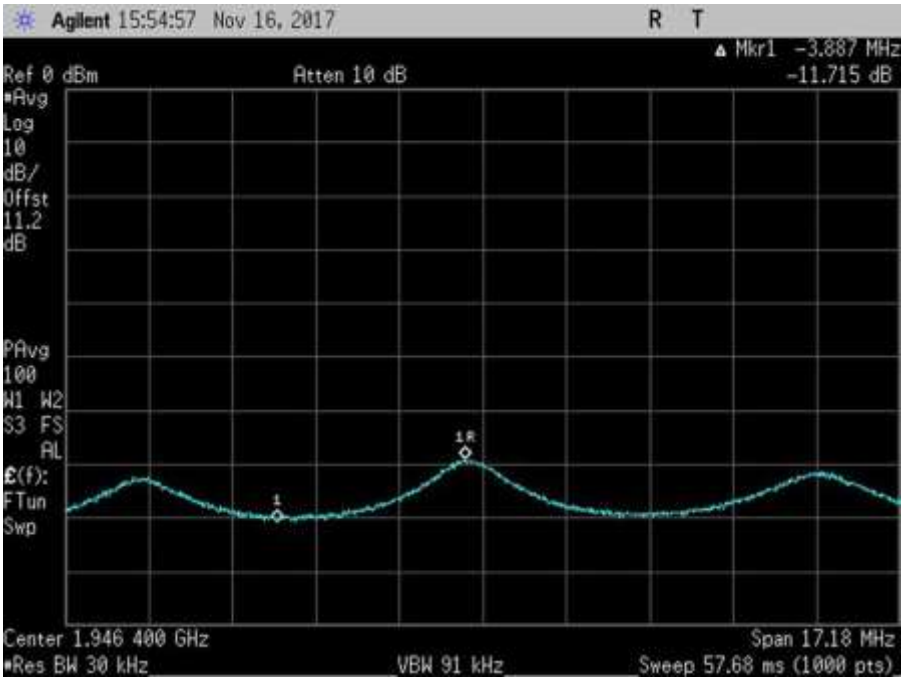

7.11.3_Osc_DL_869-894MHz+5_AWGNR



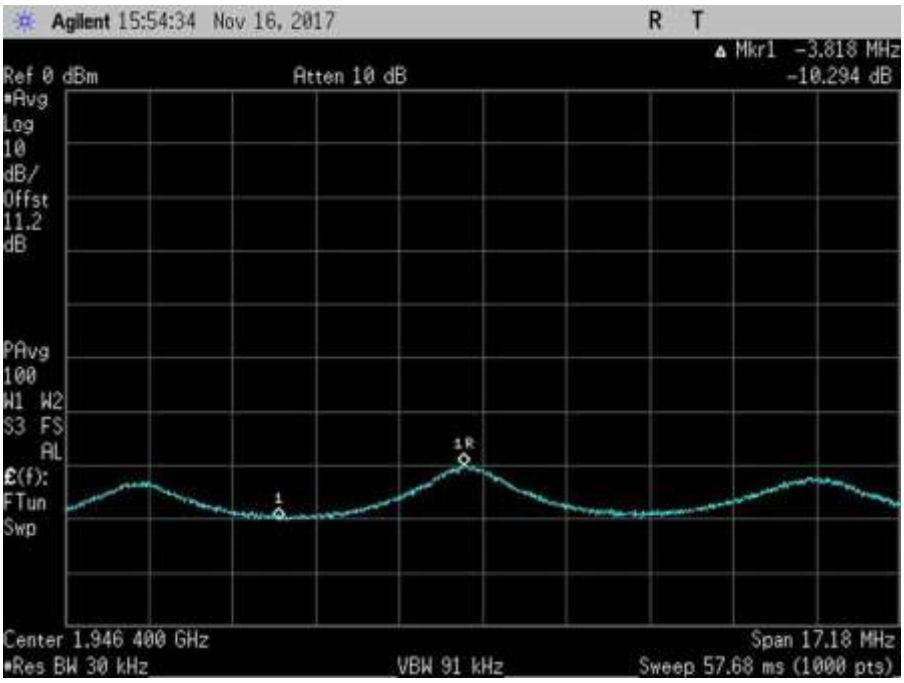

7.11.3_Osc_DL_869-894MHz-1_AWGNR



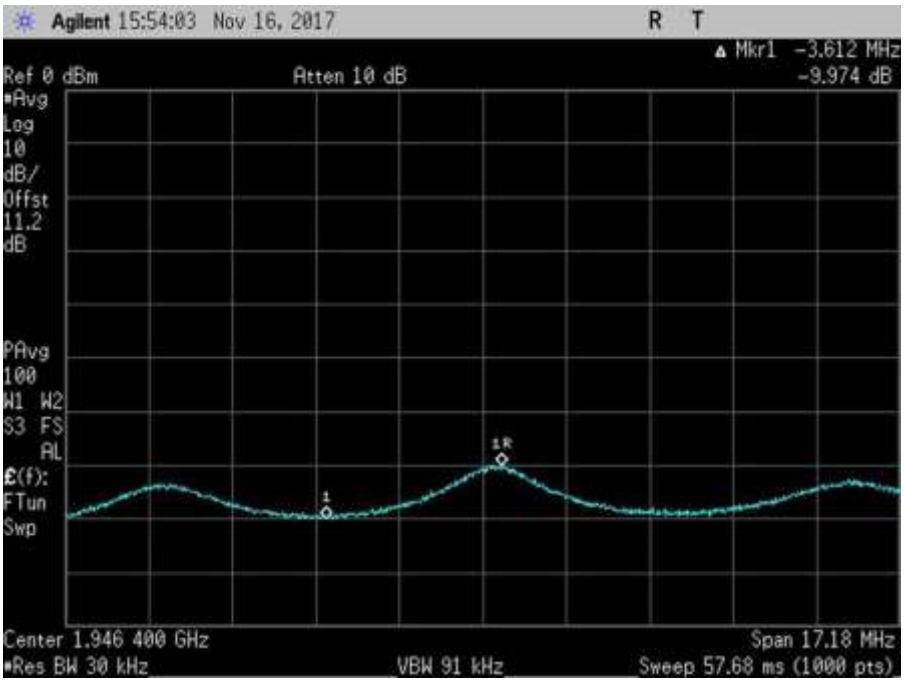

7.11.3_Osc_DL_1930-1995MHz+0_AWGNR



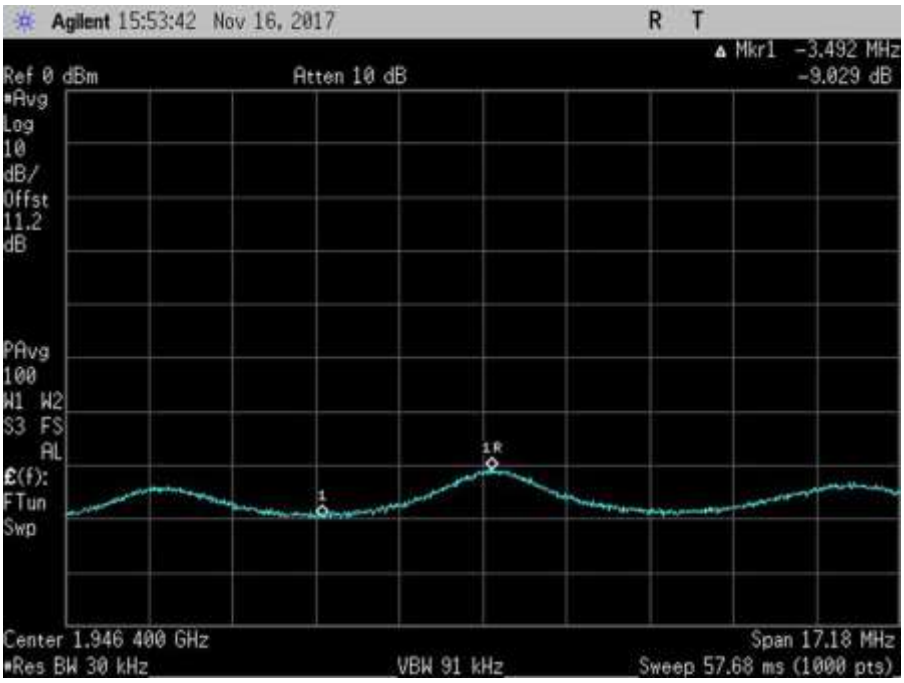

7.11.3_Osc_DL_1930-1995MHz+1_AWGNR



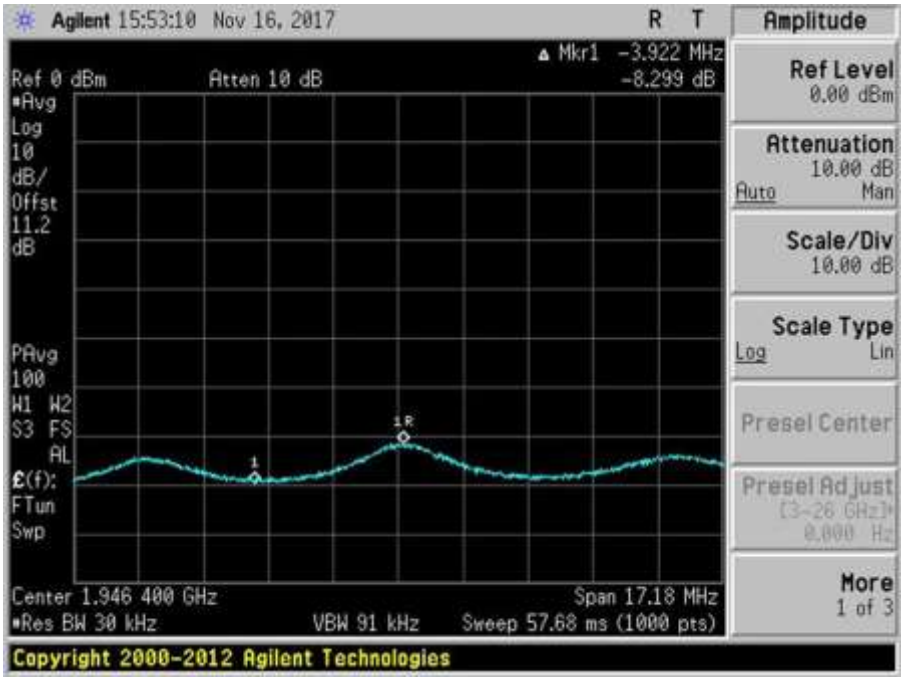

7.11.3_Osc_DL_1930-1995MHz+2_AWGNR



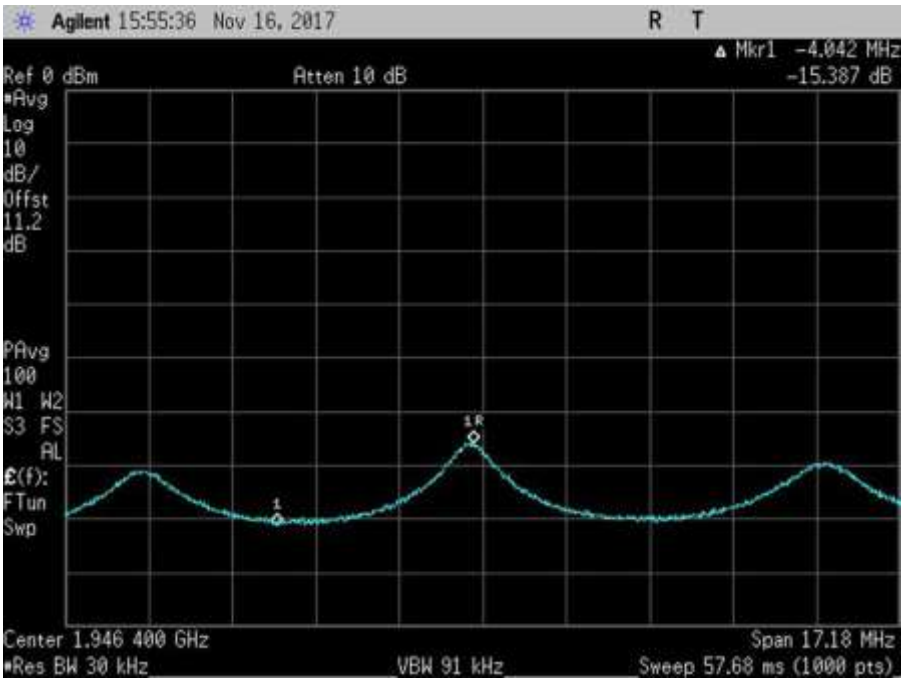

7.11.3_Osc_DL_1930-1995MHz+3_AWGNR



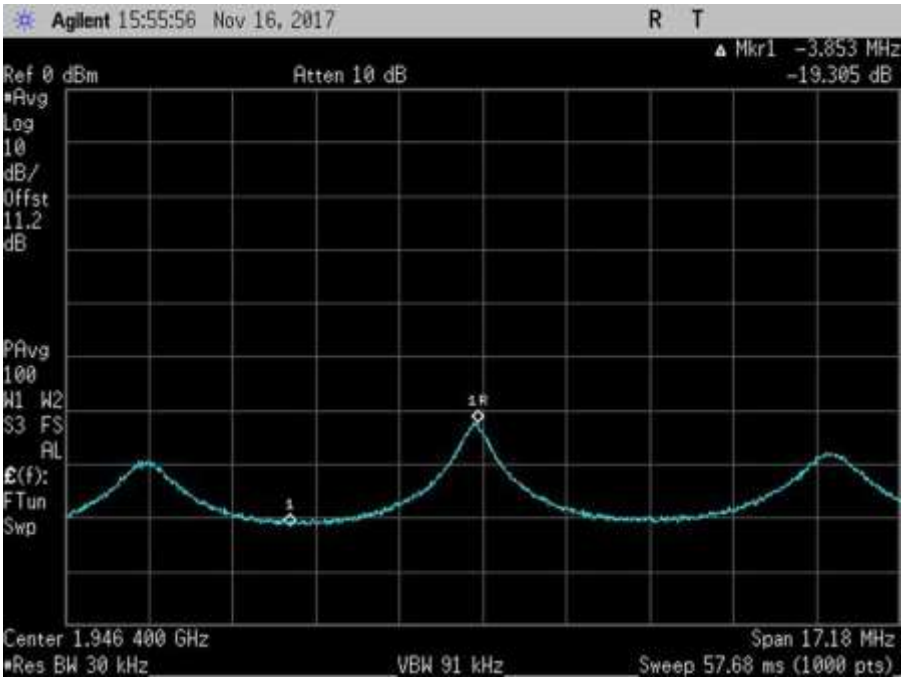

7.11.3_Osc_DL_1930-1995MHz+4_AWGNR



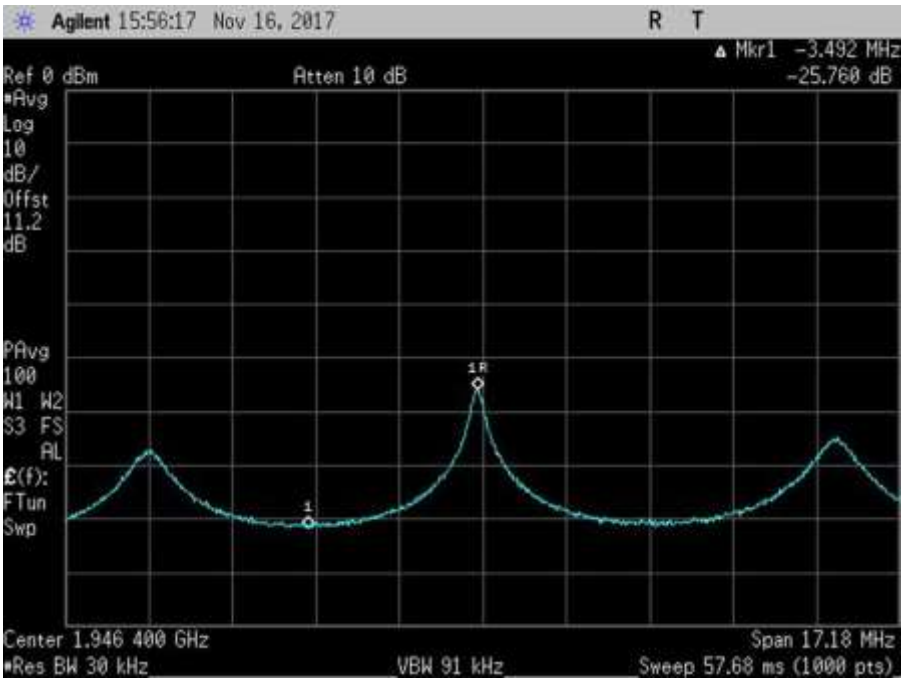

7.11.3_Osc_DL_1930-1995MHz+5_AWGNR



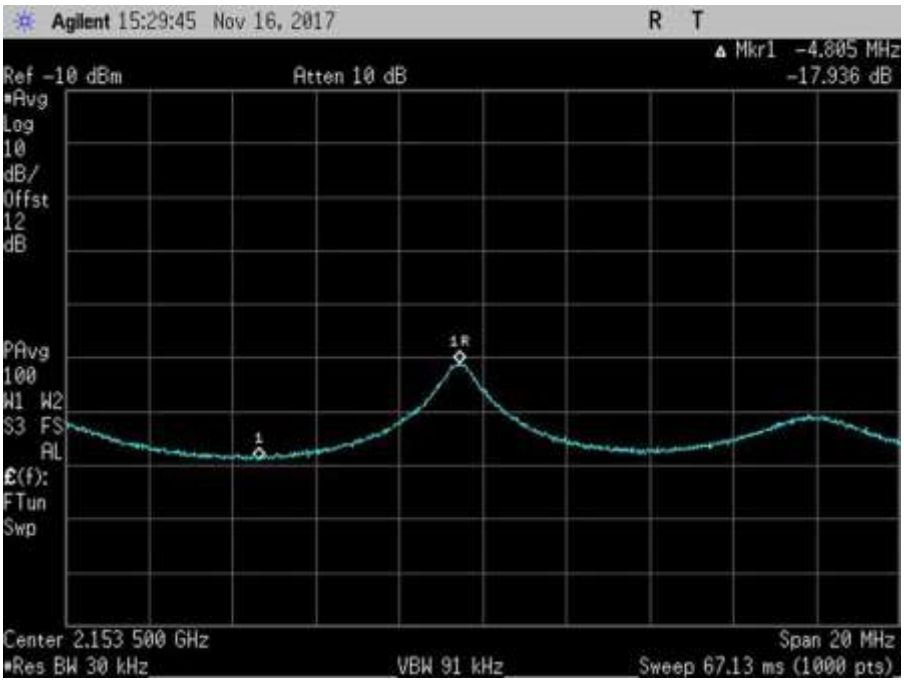

7.11.3_Osc_DL_1930-1995MHz-1_AWGNR



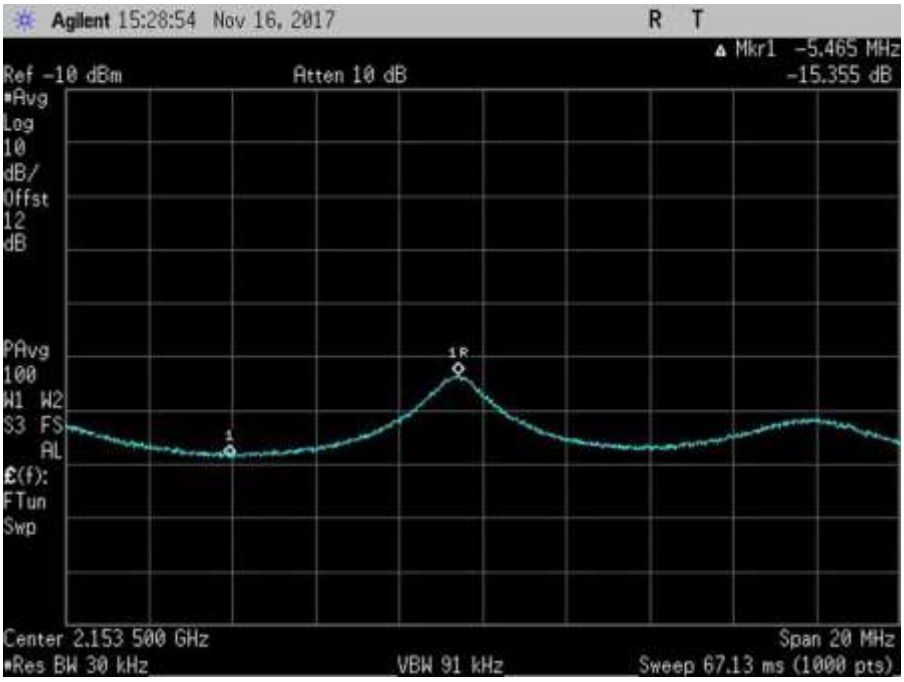

7.11.3_Osc_DL_1930-1995MHz-2_AWGNR



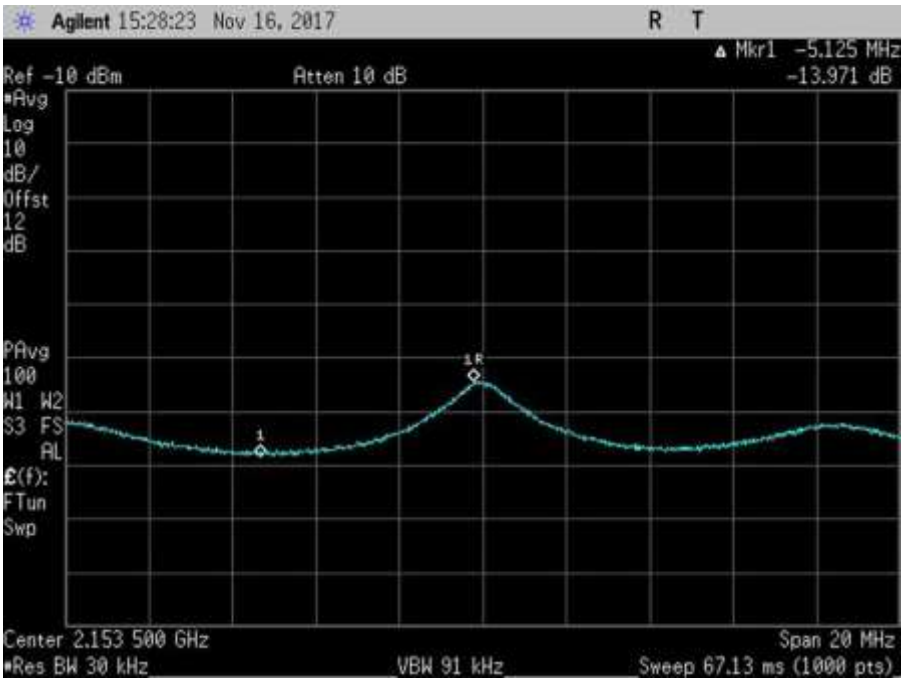

7.11.3_Osc_DL_1930-1995MHz-3_AWGNR



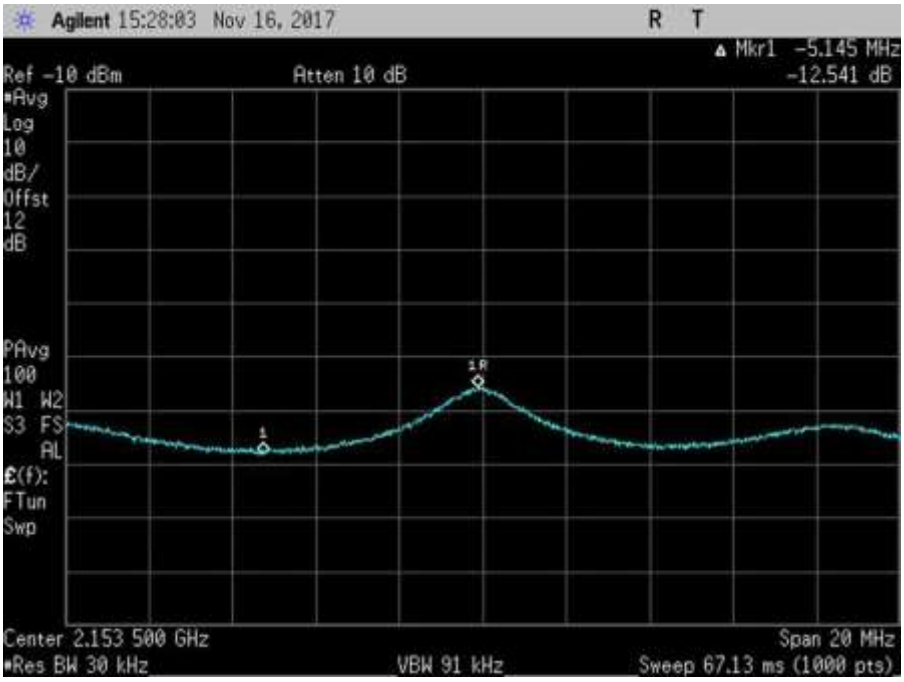

7.11.3_Osc_DL_2110-2155MHz+0_AWGNL



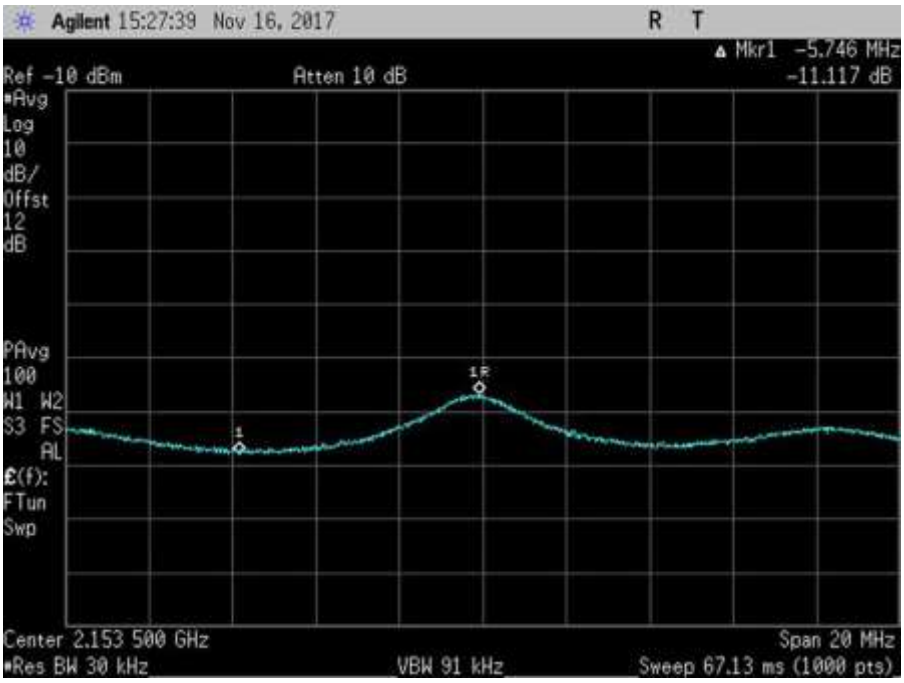

7.11.3_Osc_DL_2110-2155MHz+1_AWGNL



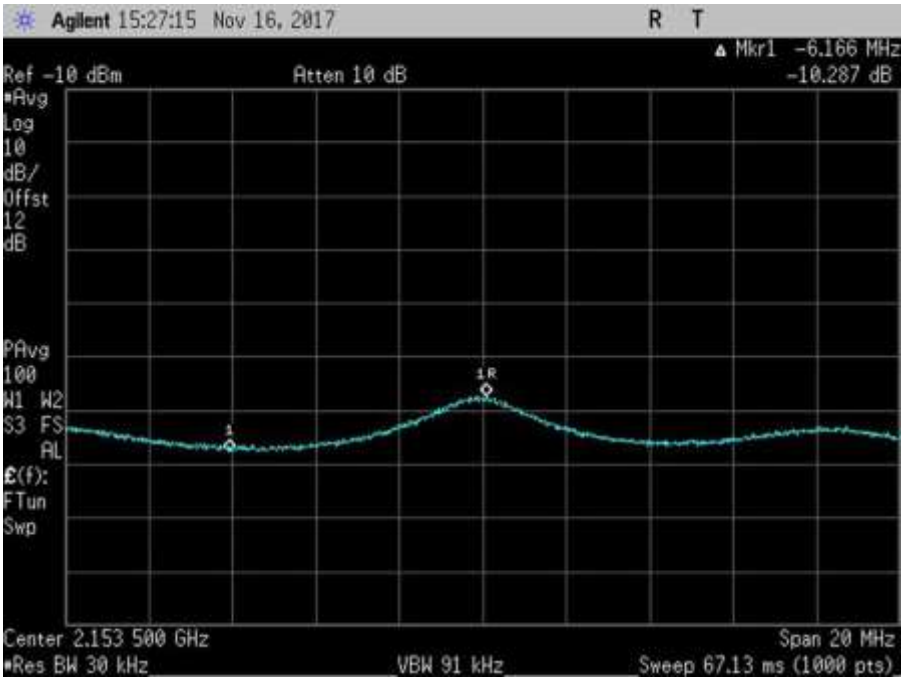

7.11.3_Osc_DL_2110-2155MHz+2_AWGNL



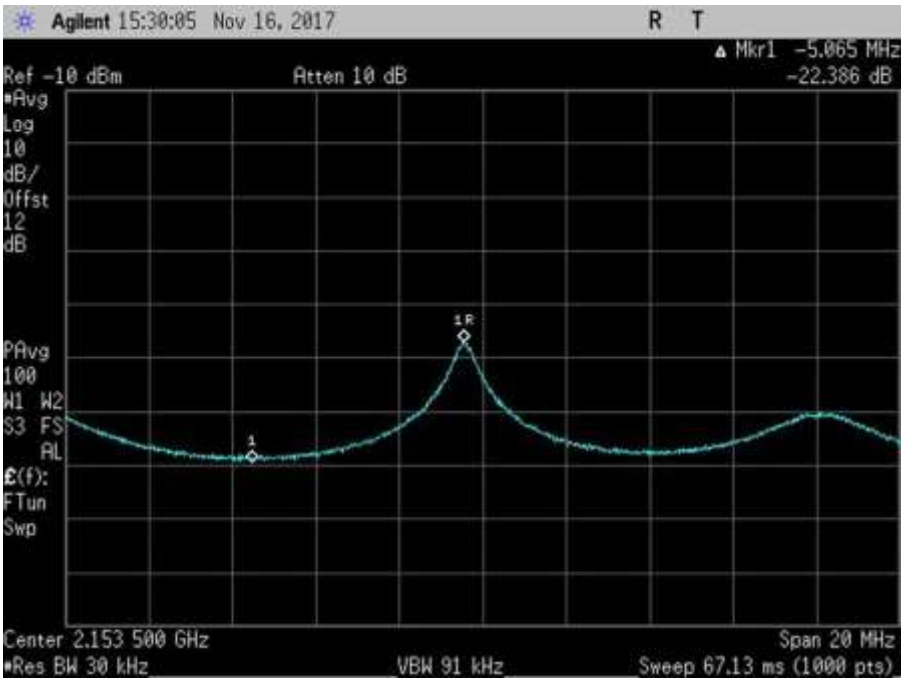

7.11.3_Osc_DL_2110-2155MHz+3_AWGNL



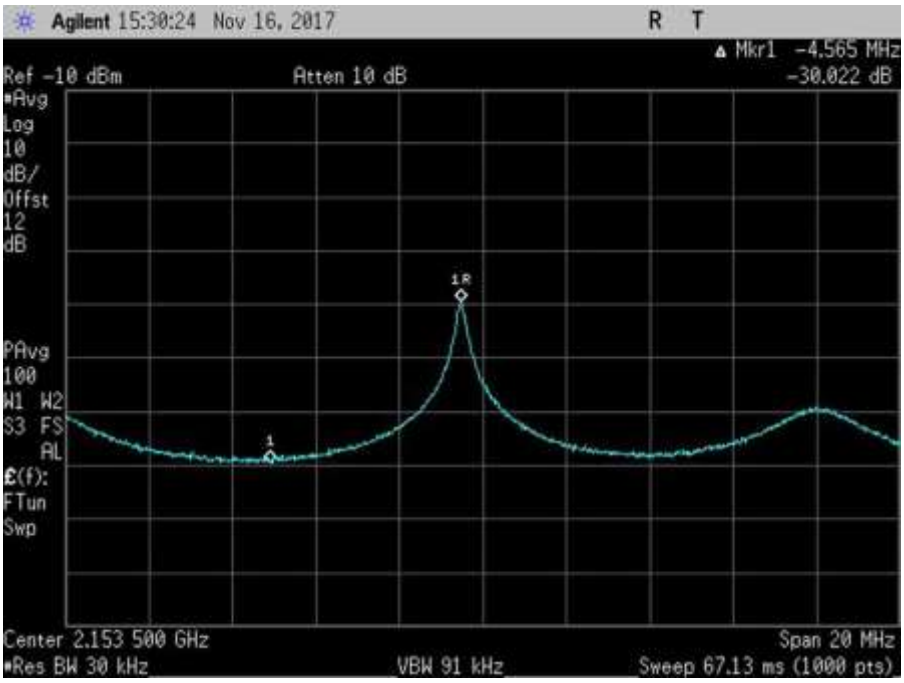

7.11.3_Osc_DL_2110-2155MHz+4_AWGNL




7.11.3_Osc_DL_2110-2155MHz+5_AWGNL

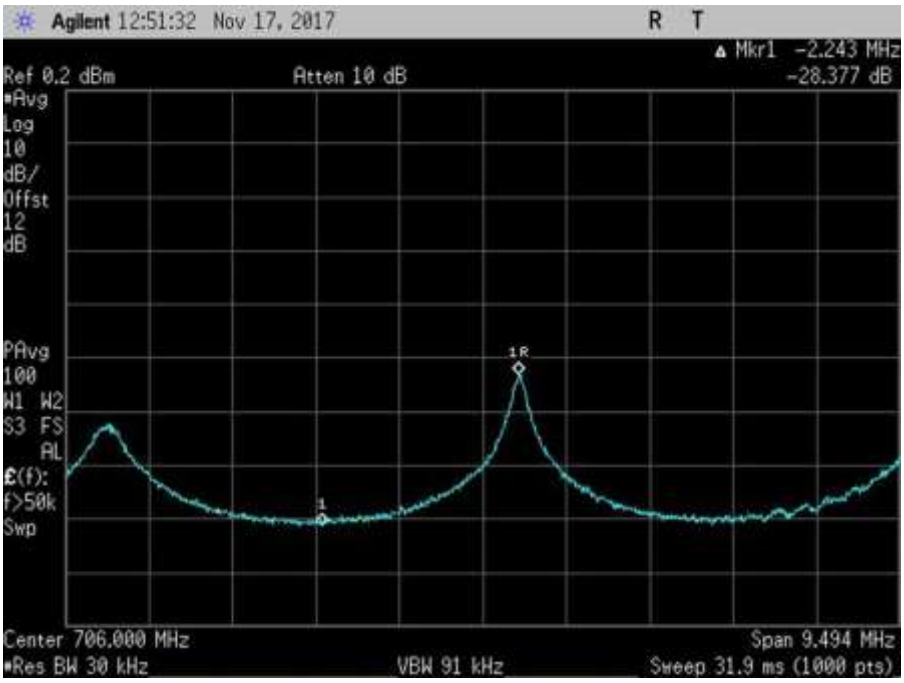



7.11.3_Osc_DL_2110-2155MHz-1_AWGNL

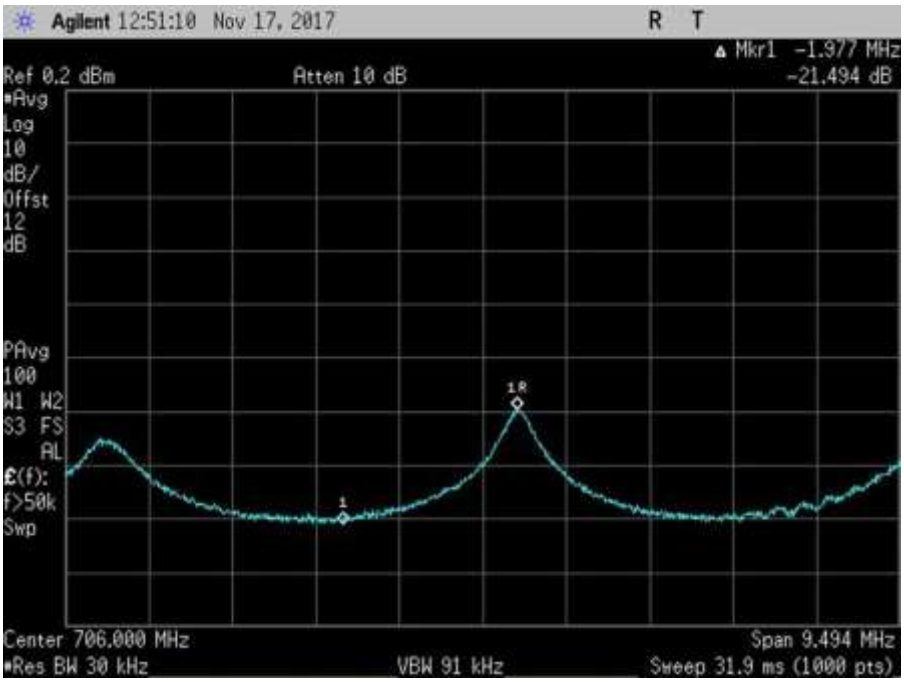



7.11.3_Osc_DL_2110-2155MHz-2_AWGNL

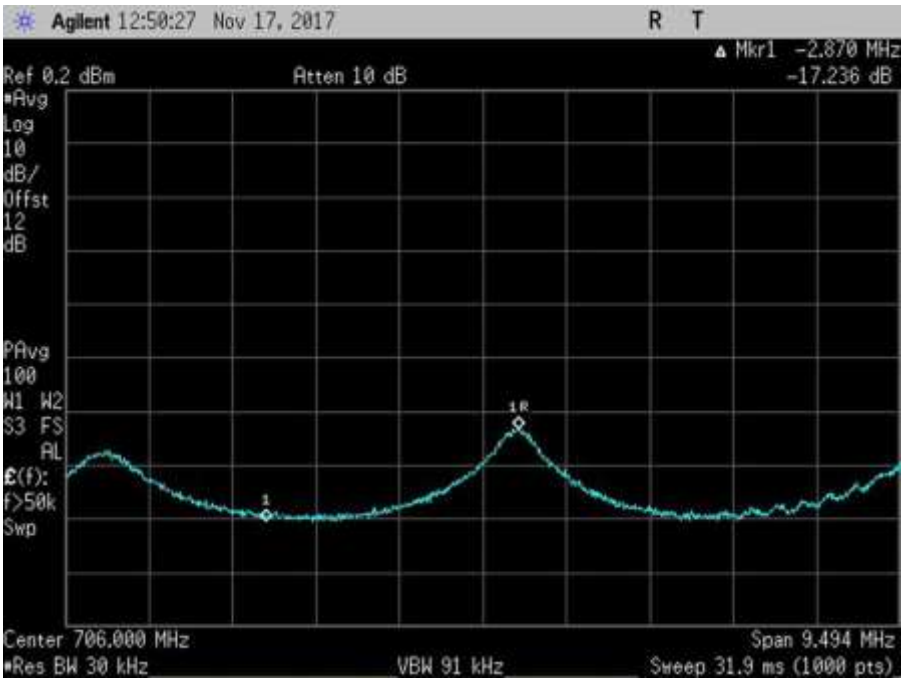
**UL**



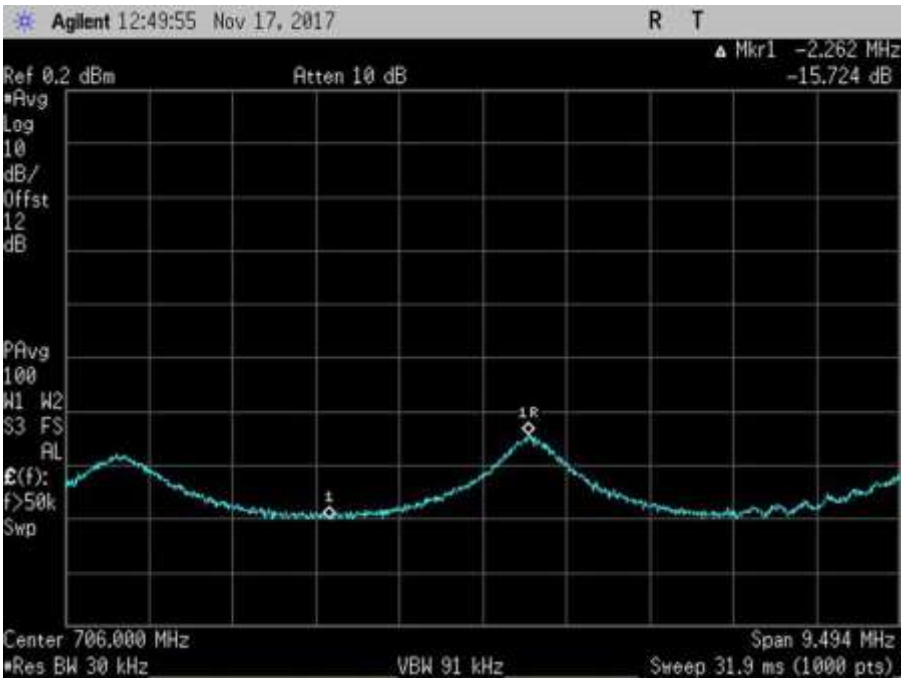

7.11.3_Osc_UL_698-716MHz+0_AWGNR



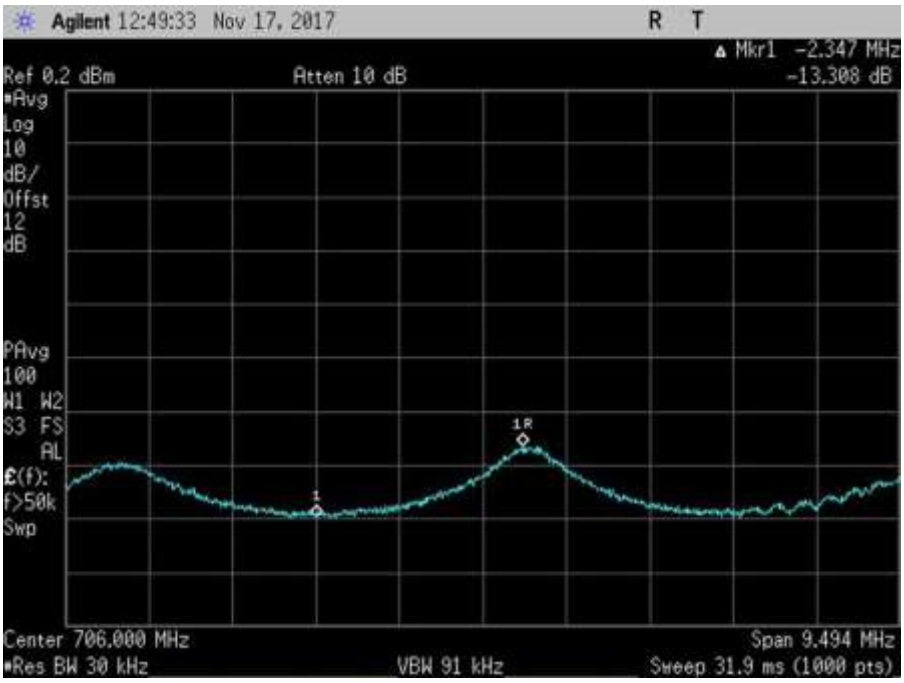

7.11.3_Osc_UL_698-716MHz+1_AWGNR



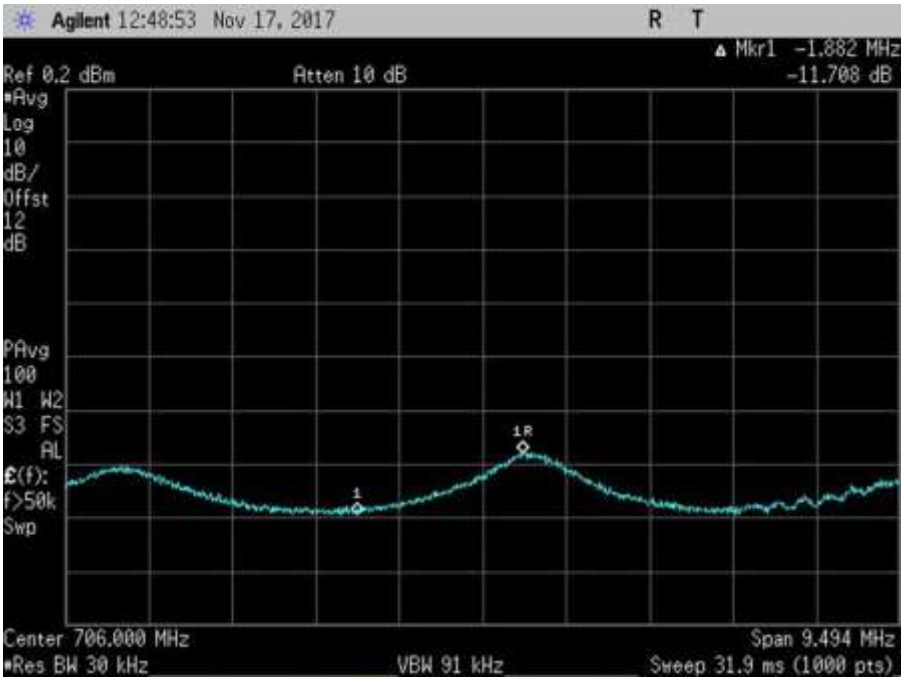

7.11.3_Osc_UL_698-716MHz+2_AWGNR



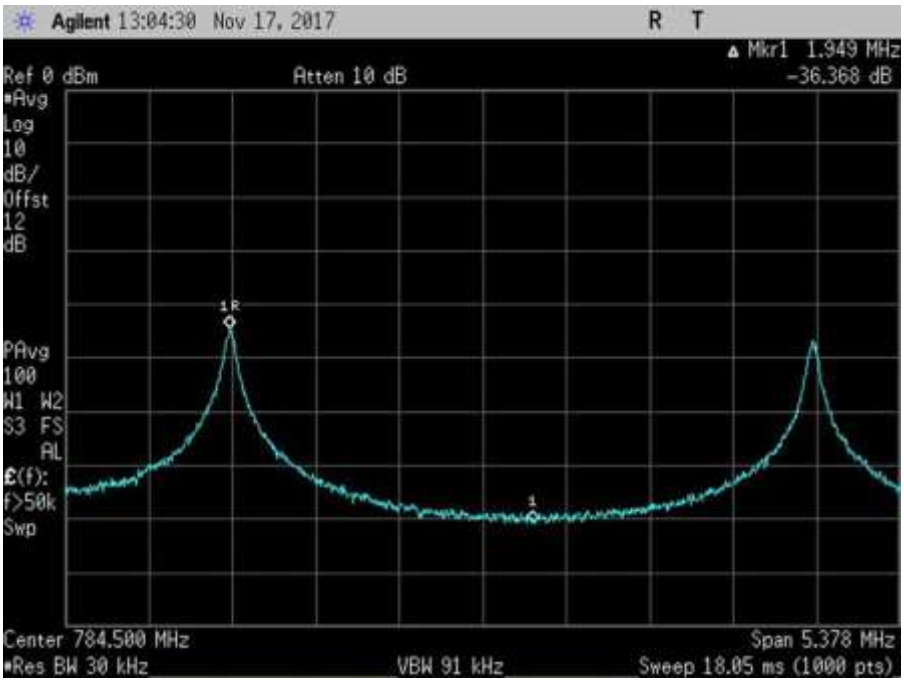

7.11.3_Osc_UL_698-716MHz+3_AWGNR



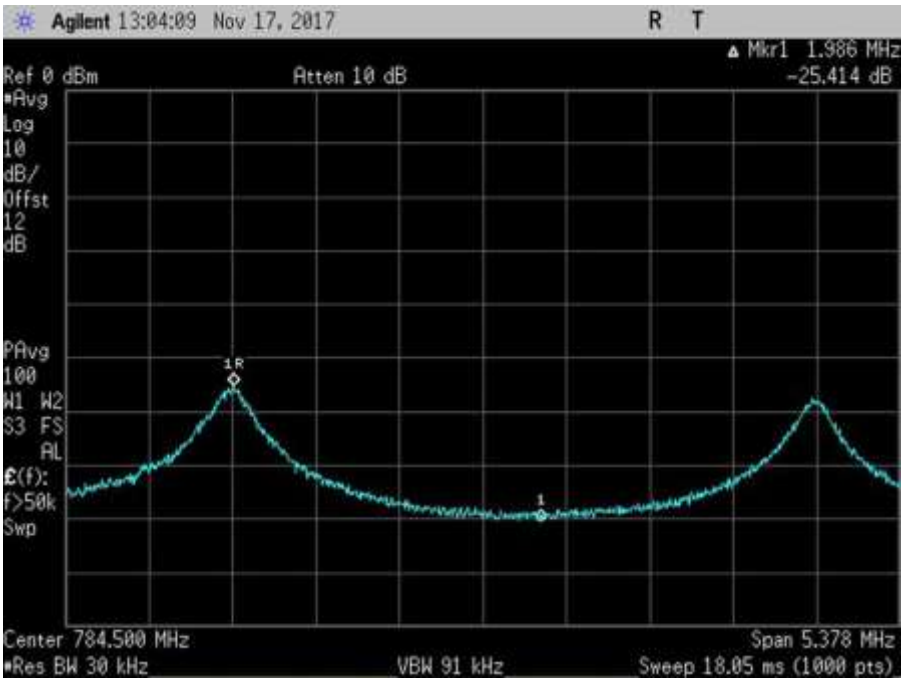

7.11.3_Osc_UL_698-716MHz+4_AWGNR



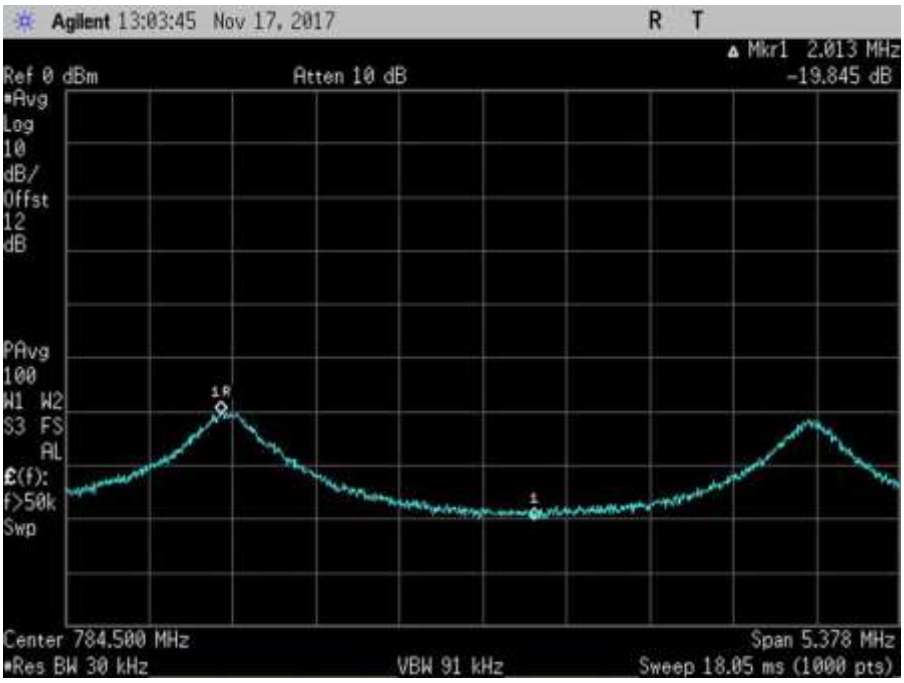

7.11.3_Osc_UL_698-716MHz+5_AWGNR



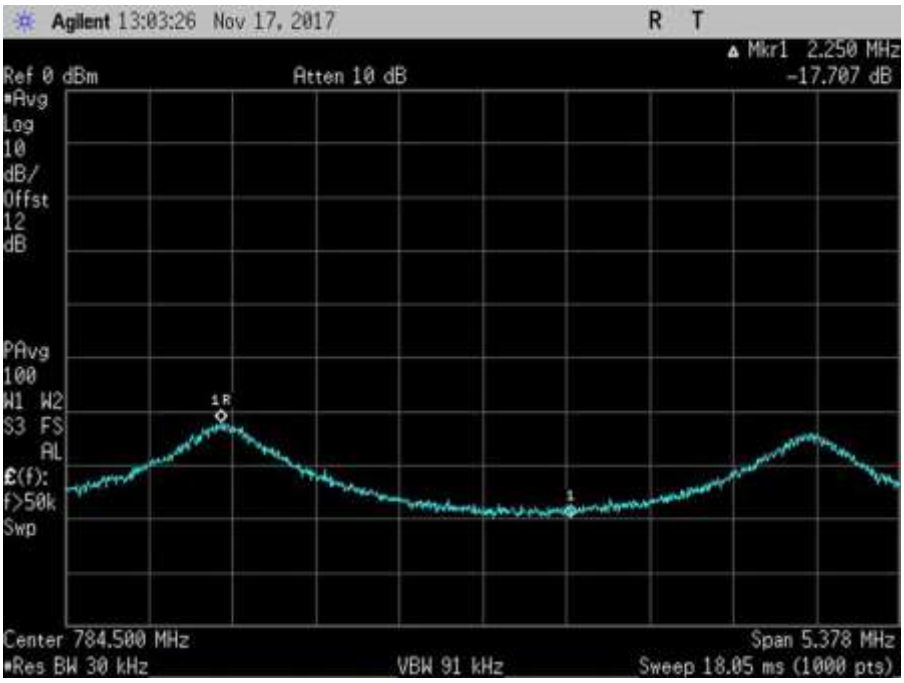

7.11.3_Osc_UL_776-787MHz+0_AWGNL




7.11.3_Osc_UL_776-787MHz+1_AWGNL




7.11.3_Osc_UL_776-787MHz+2_AWGNL




7.11.3_Osc_UL_776-787MHz+3_AWGNL