

Cellphone-Mate, Inc.

EMC TEST REPORT FOR
Public Safety Amplifier
Model: RSNGUARD-2QR

Tested to The Following Standard:

FCC Part 90I

Report No.: 101319-7

Date of issue: July 5, 2018



Test Certificate # 803.06

This test report bears the accreditation symbol indicating that the testing performed herein meets the test and reporting requirements of ISO/IEC 17025 under the applicable scope of EMC testing for CKC Laboratories, Inc.

We strive to create long-term, trust based relationships by providing sound, adaptive, customer first testing services. We embrace each of our customers' unique EMC challenges, not as an interruption to set processes, but rather as the reason we are in business.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

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Fremont, CA 94538

REPORT PREPARED BY:

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Representative: Dennis Findley
Customer Reference Number: CKC05242018

Project Number: 101319

DATE OF EQUIPMENT RECEIPT:

Juen 1, 2018

DATE(S) OF TESTING:

June 1 - 7, 2018

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the equipment provided by the client, tested in the agreed upon operational mode(s) and configuration(s) as identified herein. Compliance assessment remains the client's responsibility. This report may not be used to claim product endorsement by A2LA or any government agencies. This test report has been authorized for release under quality control from CKC Laboratories, Inc.

A handwritten signature in black ink that reads "Steve Behm".

Steve Behm
Director of Quality Assurance & Engineering Services
CKC Laboratories, Inc.

Test Facility Information



Our laboratories are configured to effectively test a wide variety of product types. CKC utilizes first class test equipment, anechoic chambers, data acquisition and information services to create accurate, repeatable and affordable test results.

TEST LOCATION(S):
CKC Laboratories, Inc.
1120 Fulton Place
Fremont, CA 94539

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.11
EMITest Immunity	5.03.10

Site Registration & Accreditation Information

Location	NIST CB #	TAIWAN	CANADA	FCC	JAPAN
Fremont, CA	US0082	SL2-IN-E-1148R	3082B-1	US1023	A-0149

SUMMARY OF RESULTS

Standard / Specification: FCC Part(s) 90I

KDB 935210 D05 Indus Booster Basic Meas v01r02, 10/27/2017		FCC Part Section Correlation		Mods	Results
Guidance Sec #	Guidance Description	FCC Sec #	FCC Rule Description		
3.4	Input-versus-output signal comparison	Section 2.1049	Occupied Band width	NA	Pass
4.3	Out-of-band rejection	Part 90 Section 219 (b)	Frequency Bands	NA	Pass
4.4	Input-versus-output signal comparison and Out of Band Emissions	Part 90 Section 219 (b) and Part 90 section 543 (e) Out of Band Emission	Out of Band Emission	NA	Pass
4.5	Input/output power and amplifier/booster gain	Part 90 Section 219 (e)(1)	Power Limit	Mod. #1	Pass
4.6	Noise figure measurements	Part 90 Section 219 (e)(2)	Noise Figure Limit	NA	Pass
4.7.2	Out-of-band/out-of- block emissions conducted measurements	Part 90 Section 219 (e)	Intermodulation Limit	Mod. #1	Pass
4.7.3	EUT spurious emissions conducted measurements	Part 90 Section 219 (e)	Spurious emission	NA	Pass
4.8	Frequency stability measurements	Part 90 Section 219 (e)(4)(i)	Power Limit	NA	NA1
4.9	Radiated Spurious Emission	Part 90 Section 219 (e)	Spurious Emission	NA	Pass
7.13 a) - c)	Spectrum Block Filter		NA	NA	NA1

NA = Not Applicable

NA1 = Not applicable because the EUT does not alter the input signal in ways that can influence the output signal

Modifications During Testing

This list is a summary of the modifications made to the equipment during testing.

Summary of Conditions
Modification #1: Manufacturer changed the firmware from the old firmware name: "SC Gu_public_V1_0.hex" to the new firmware: "SC S1_Public_2QR_1dB.hex" to reduce the output power for Intermodulation section and output power.

Modifications listed above must be incorporated into all production units.

Conditions During Testing

This list is a summary of the conditions noted to the equipment during testing.

Summary of Conditions
None

EQUIPMENT UNDER TEST (EUT)

During testing, numerous configurations may have been utilized. The configurations listed below support compliance to the standard(s) listed in the Summary of Results section.

Configuration 1

Equipment Tested:

Device	Manufacturer	Model #	S/N
Public Safety Amplifier	Cellphone-Mate, Inc.	RSNGUARD-2QR	1

Support Equipment:

Device	Manufacturer	Model #	S/N
None			

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Type of Equipment	Zone Enhancer
Operating Frequency Range:	UL: 788-798, 799-805, 806-816 MHz DL: 758-768, 769-775, 851-861 MHz
Modulation Type(s):	P25-C4FM SC-FMDA (LTE) OFDM (LTE) 10K1F3E
Number of TX Chains:	1
Antenna Type(s) and Gain:	Dedicated, See antenna kitting information
Beamforming Type:	NA
Antenna Connection Type:	UL: 50 Ohm/ N Type DL: 50 Ohm/ N Type
Nominal Input Voltage:	120VAC, 60Hz
Firmware used for Test:	SC Gu_public_V1_0.hex and SC S1_Public_2QR_1dB.hex

FCC PART(S) 90I

General Test Setup

Summary of Conditions

Configuration 1

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 N connector and 50-ohm impedance.

The EUT Donor port is type N connector and 50-ohm impedance.

All switches are in the on position

UL: 788-798, 799-805, 806-816 MHz

DL: 758-768, 769-775, 851-861 MHz

Firmware: SC Gu_public_V1_0.hex and SC S1_Public_2QR_1dB.hex

Test environment conditions: as noted in individual section

Test Procedure: 935210 D05 Indus Booster Basic Meas v01r02 Dated October 27,2017

2.1049 Occupied Bandwidth

Engineer: Hieu Song Nguyenpham

Test Date: 6/1/2018

Test Equipment					
Asset #	Description	Model	Manufacturer	Cal Date	Cal Due
P06797	Attenuator	Narda	766-20	4/10/2017	4/10/2019
03471	Spectrum Analyzer	Agilent	E4440A	1/18/2018	1/18/2020
03418	Signal Generator	Agilent	E4438C	6/19/2017	6/19/2019
P07191	Cable	Astro	32022-29094K-29094K-48TC	10/30/2017	10/30/2019
03362	Cable	Astrolab	32022-2-29094-48TC	1/10/2017	1/10/2019

Environmental Conditions					
Temperature (°C)	22.5	Relative Humidity (%):	49	Atmospheric Pressure (kPa):	101.9

Summary of Results

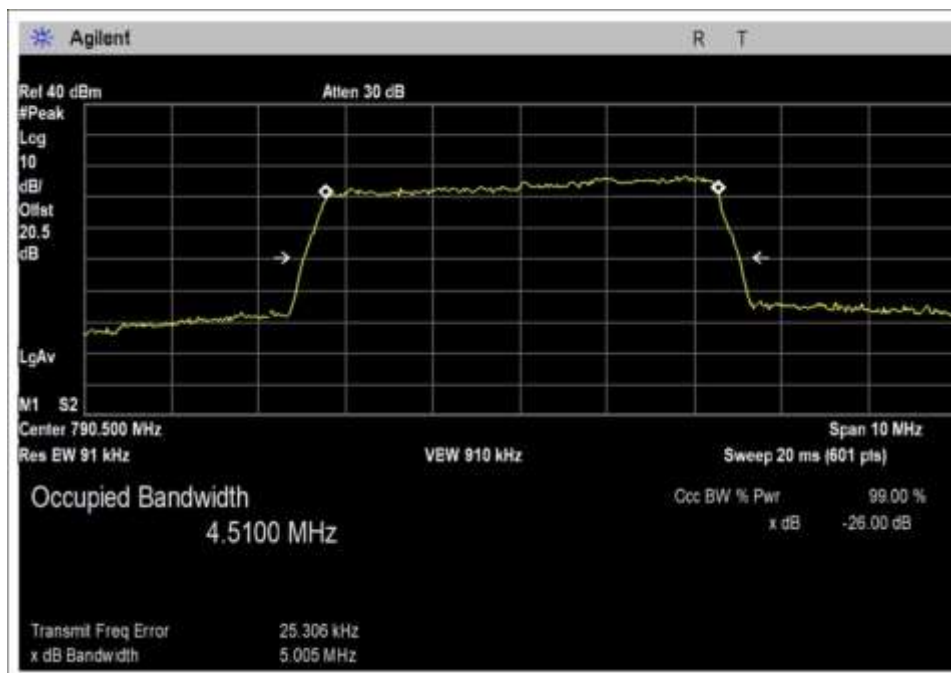
Pass: As summarized in tables and plots below, the spectral shape of the output is similar to input for all modulations.

Worst case results are reported for occupied bandwidth comparison test done with and without AGC circuitry activated.

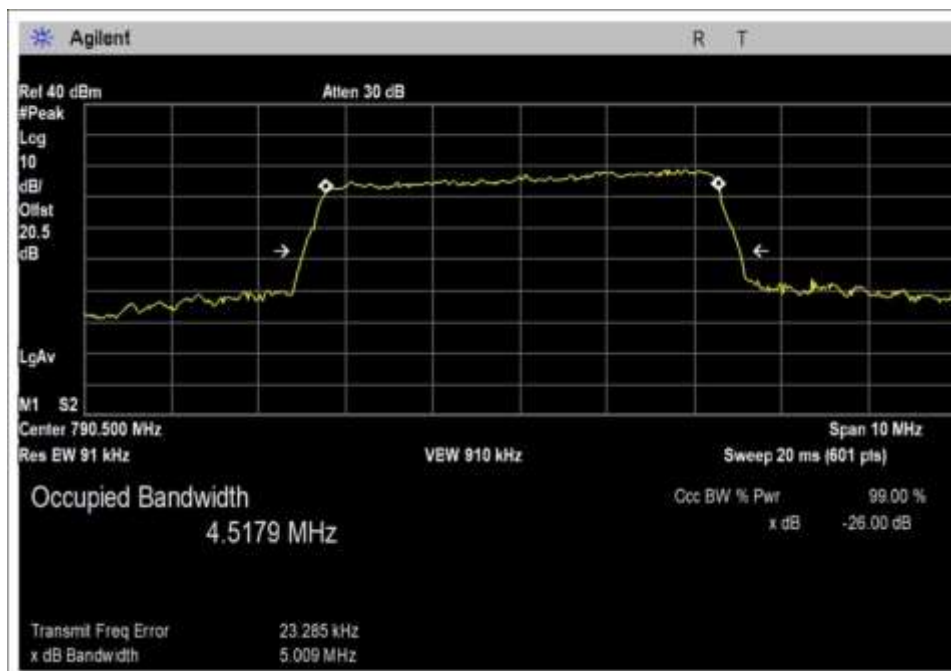
Public Safety 700MHz/800MHz bands

Band	Modulation	Carrier Frequency (MHz)	OBW PreAGC (Hz)	OBW AGC+3 (Hz)	OBW Input (Hz)	Max In&Out Difference (PreAGC)	Max In&Out Difference (AGC)
UL_806-816MHz	P25-C4FM	815.975	8542	8495	8495	0.55%	0.00%
UL_806-816MHz	P25-C4FM	811	8460	8460	8473	0.15%	0.16%
UL_806-816MHz	P25-C4FM	806.0125	8657	8569	8431	2.68%	1.63%
UL_806-816MHz	FM	815.975	10123	10123	10134	0.11%	0.11%
UL_806-816MHz	FM	811	10123	10109	10108	0.14%	0.14%
UL_806-816MHz	FM	806.0125	10123	10123	10133	0.10%	0.10%
UL_799-805MHz	P25-C4FM	804.99375	8551	8477	8430	1.43%	0.55%
UL_799-805MHz	P25-C4FM	802	8487	8487	8458	0.34%	0.35%
UL_799-805MHz	P25-C4FM	799.00625	8486	8595	8486	0.00%	1.29%
UL_788-798MHz	SC-FMDA	790.5	4510000	4517900	4518100	0.18%	0.00%
UL_788-798MHz	SC-FMDA	793	4498000	4510700	4514300	0.36%	0.08%
UL_788-798MHz	SC-FMDA	795.5	4515200	4519000	4513700	0.03%	0.12%
DL_851-861MHz	P25-C4FM	860.975	8423	8464	8477	0.64%	0.16%
DL_851-861MHz	P25-C4FM	856	8431	8430	8456	0.30%	0.30%
DL_851-861MHz	P25-C4FM	851.0125	8435	8438	8448	0.16%	0.13%
DL_851-861MHz	FM	860.975	10123	10123	10149	0.26%	0.26%
DL_851-861MHz	FM	856	10109	10109	10125	0.16%	0.17%
DL_851-861MHz	FM	851.0125	10121	10122	10140	0.19%	0.18%
DL_769-775MHz	P25-C4FM	774.99375	8464	8464	8440	0.29%	0.28%
DL_769-775MHz	P25-C4FM	772	8486	8464	8422	0.76%	0.49%
DL_769-775MHz	P25-C4FM	769.00625	8536	8564	8572	0.42%	0.09%
DL_758-768MHz	OFMA	760.5	4514900	4511200	4522200	0.16%	0.24%
DL_758-768MHz	OFMA	763	4548900	4537900	4508800	0.89%	0.65%
DL_758-768MHz	OFMA	765.5	4472200	4475700	4515700	0.96%	0.89%

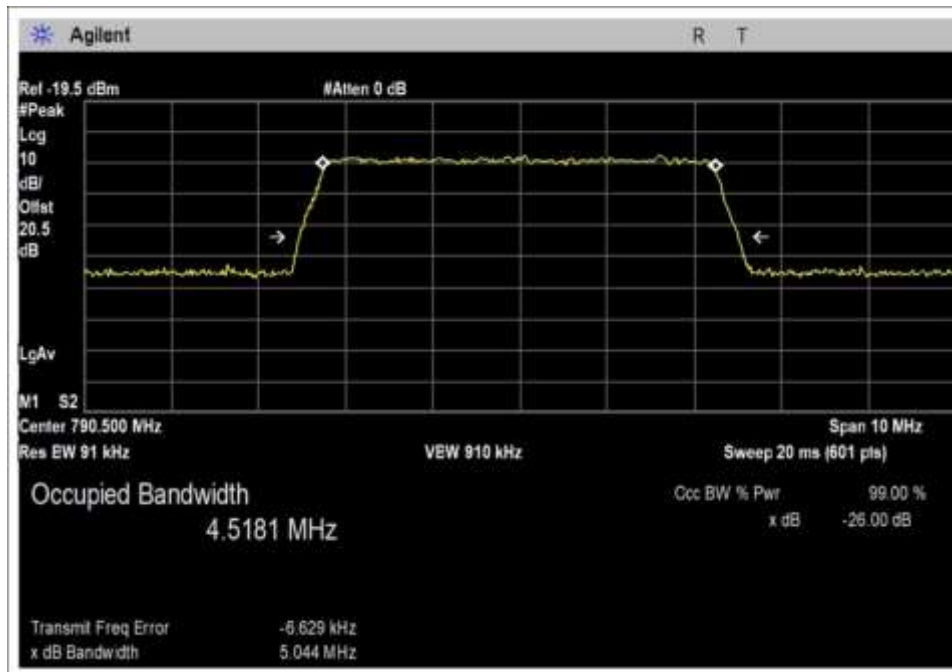
Plots



OBW_UL_788-798_790.5MHz_LC-AGC



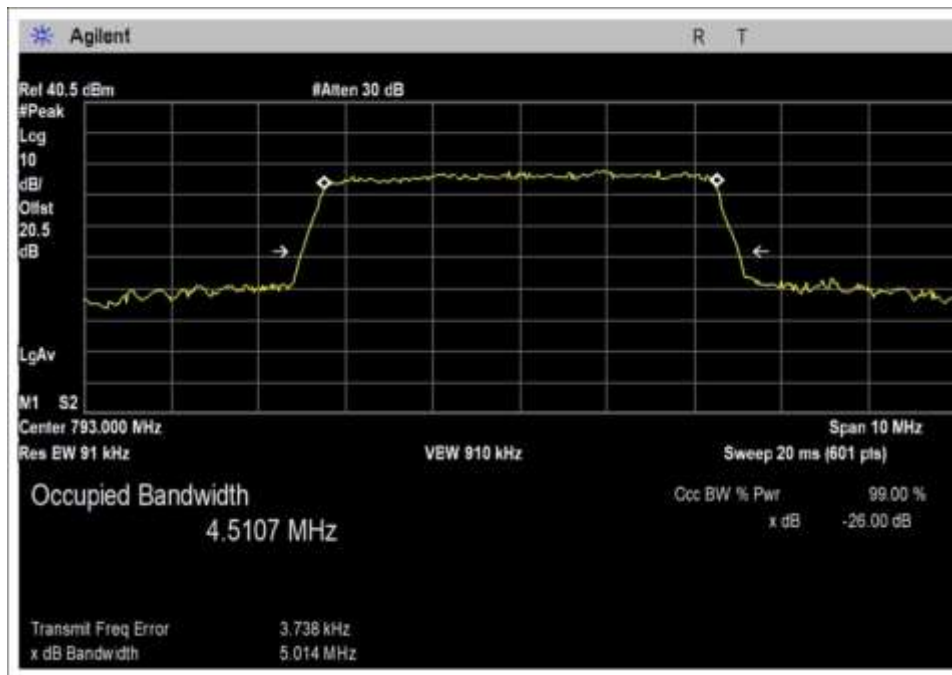
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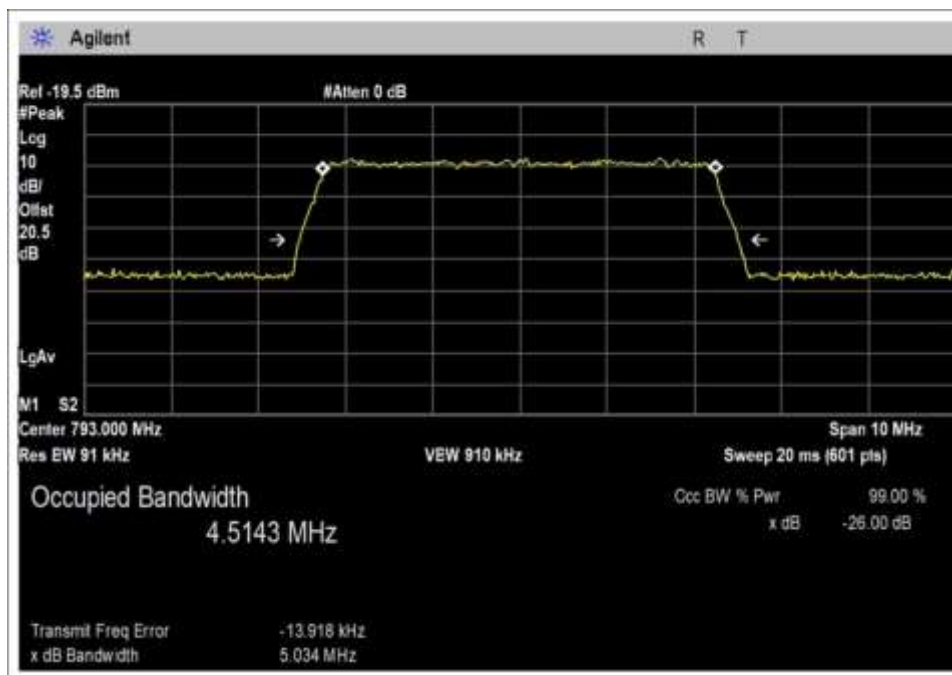
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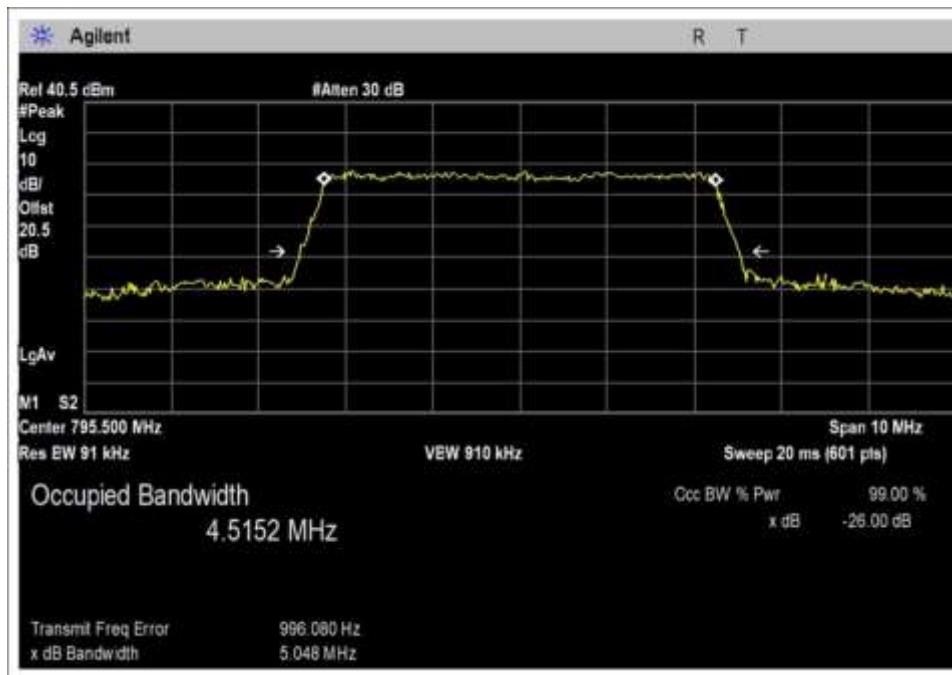
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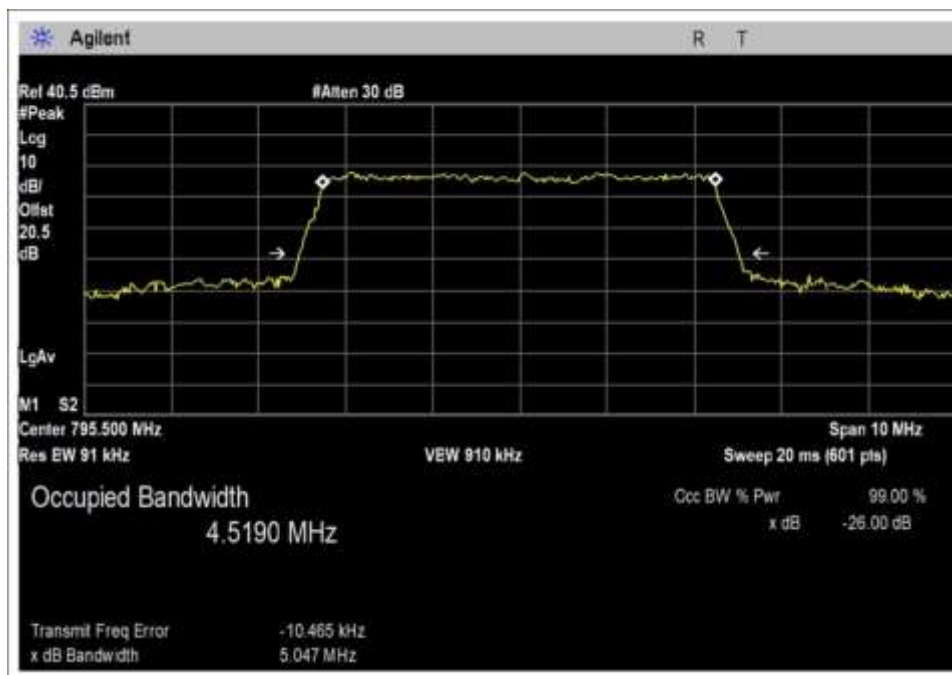
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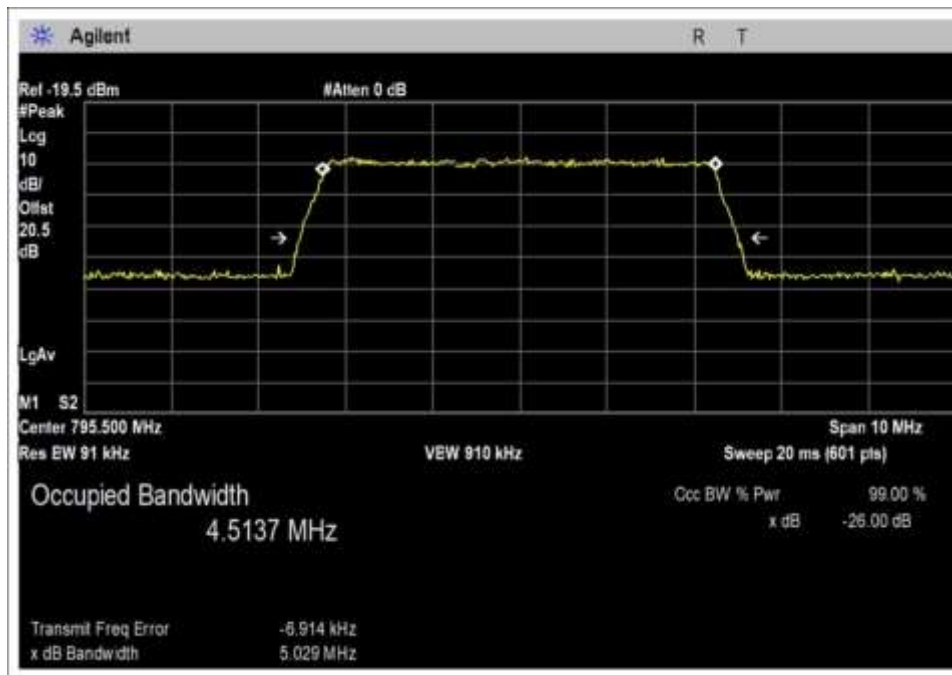
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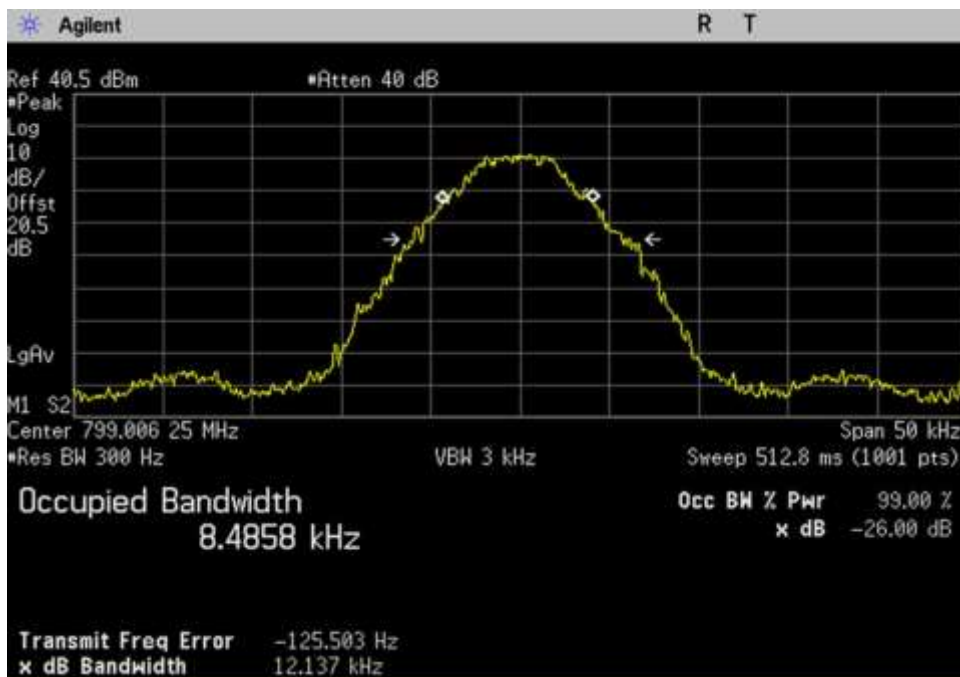
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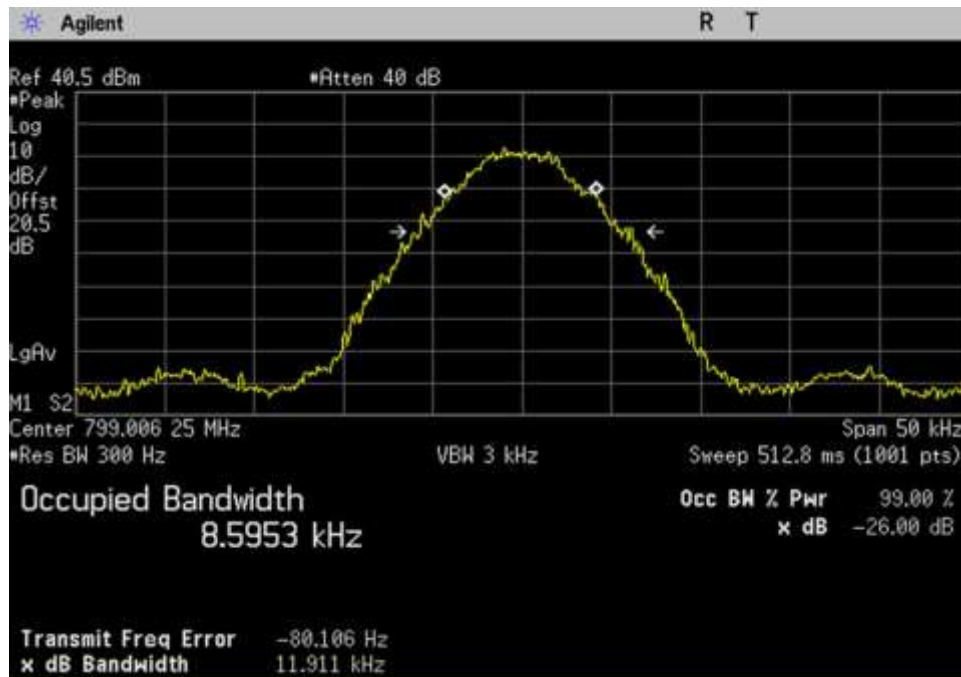
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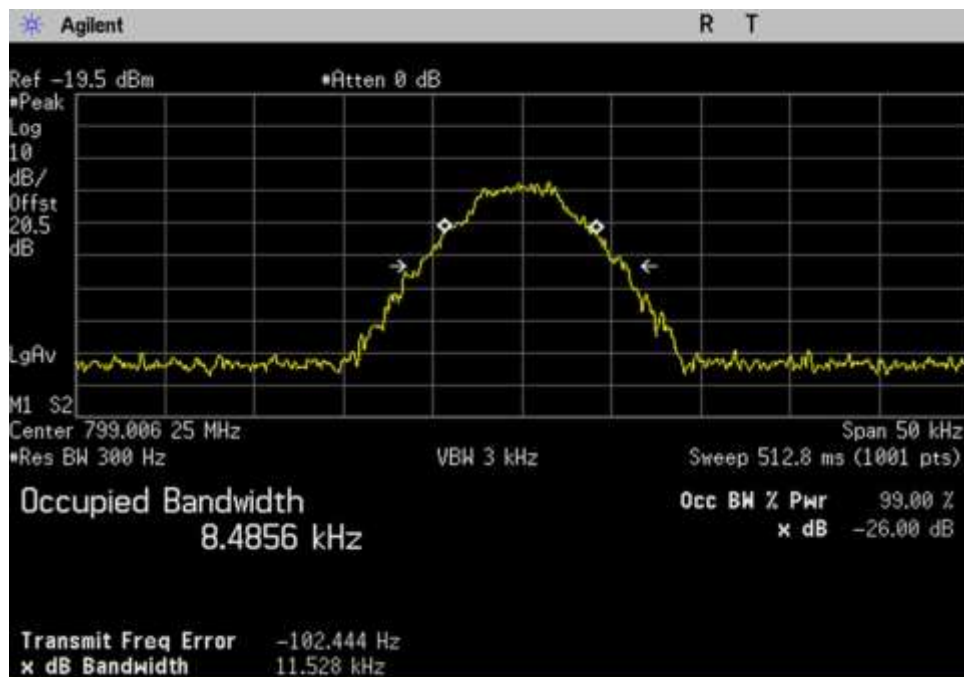
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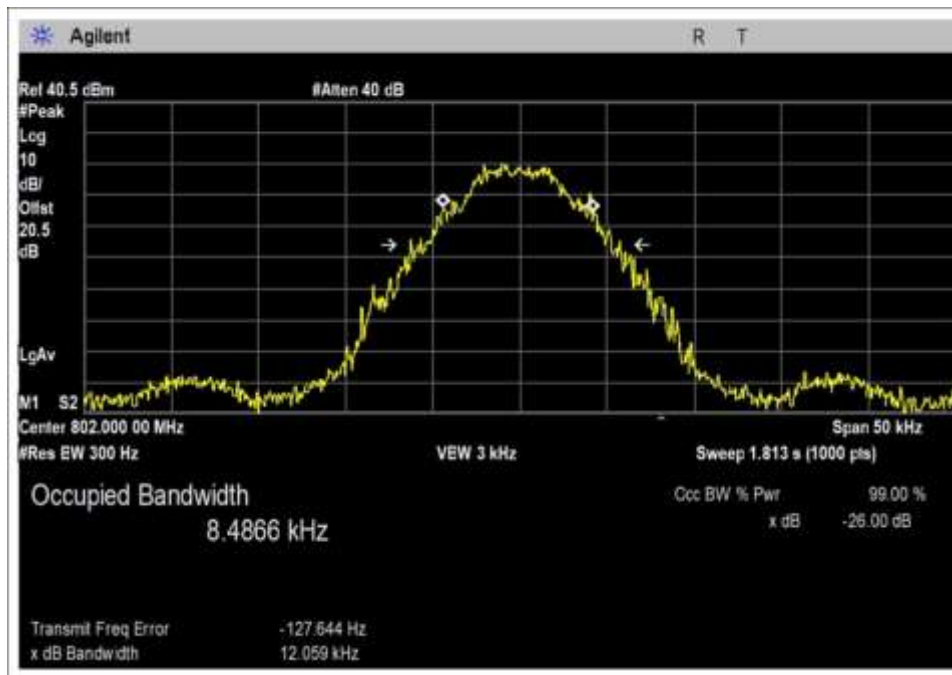
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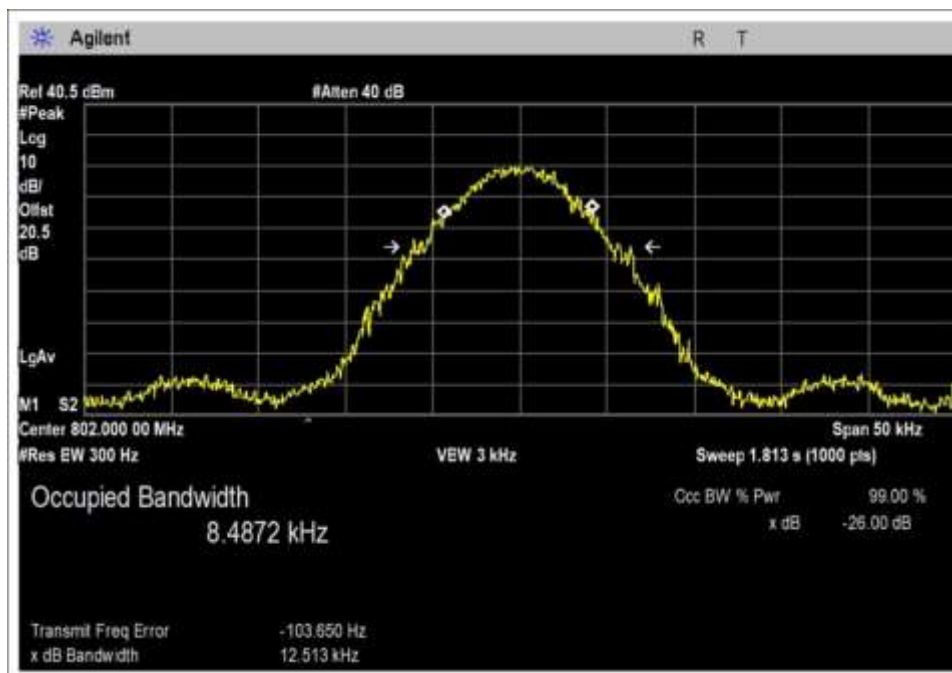
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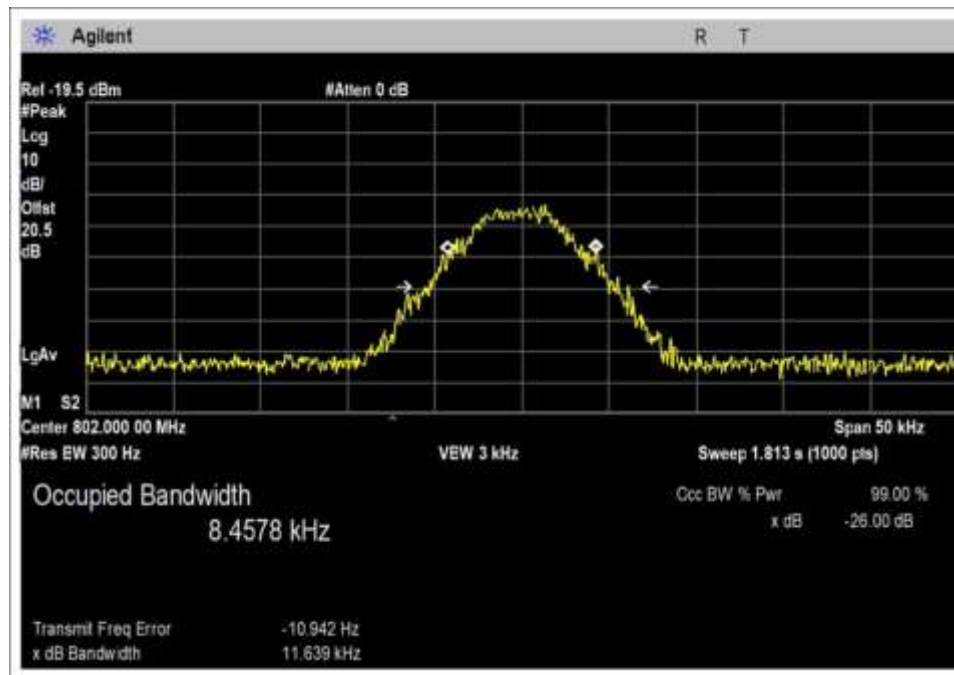
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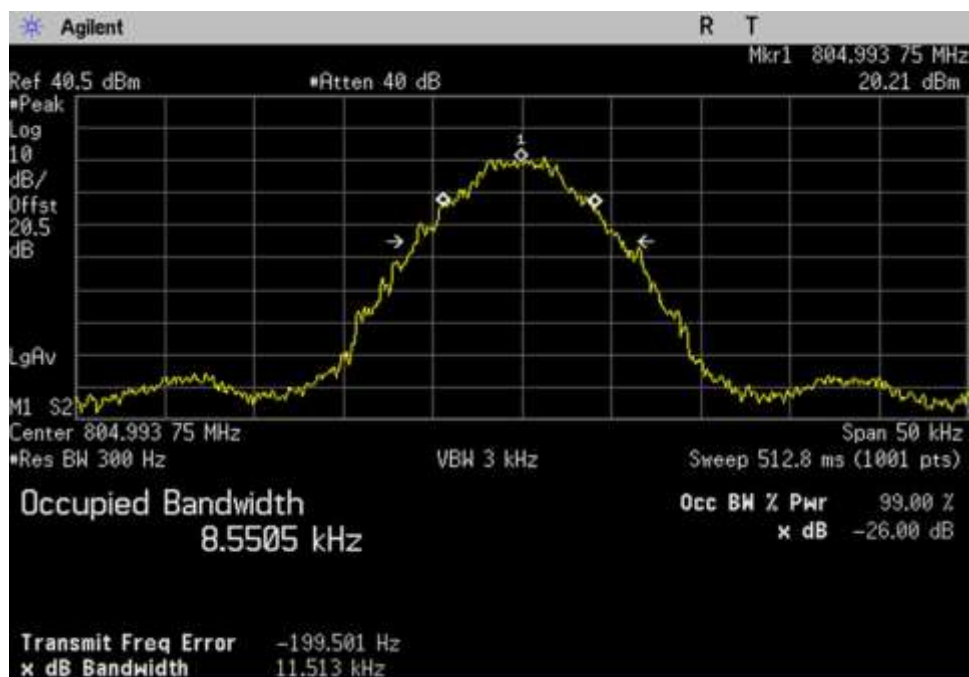
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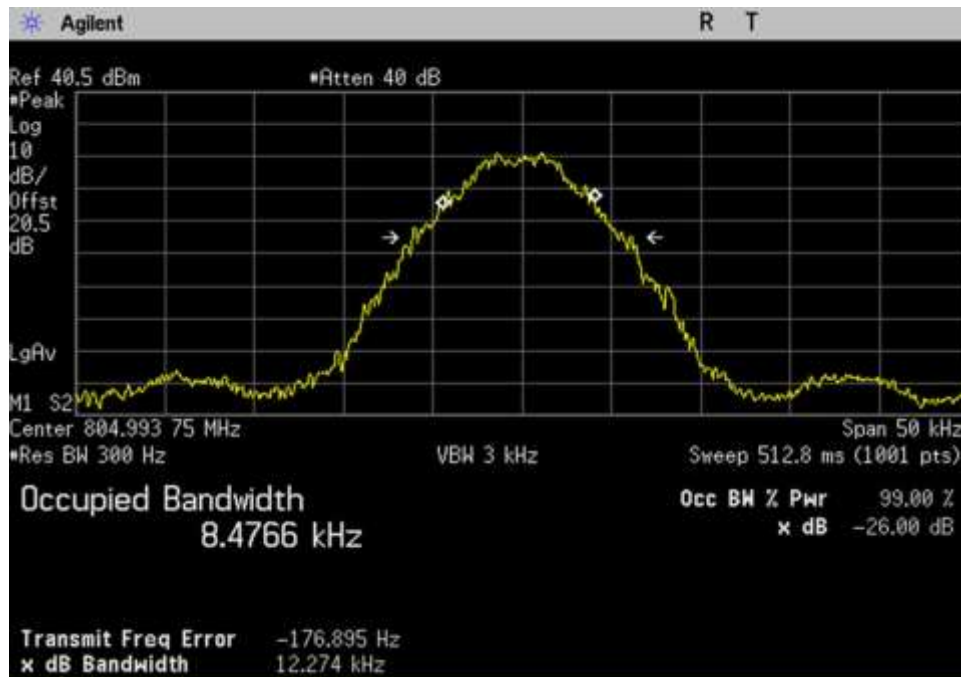
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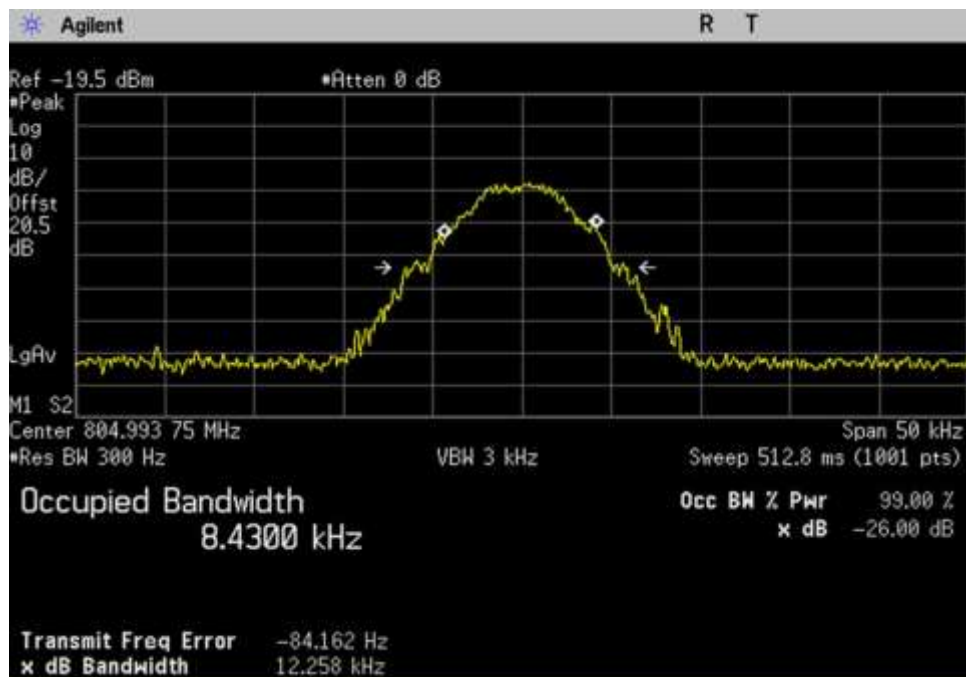
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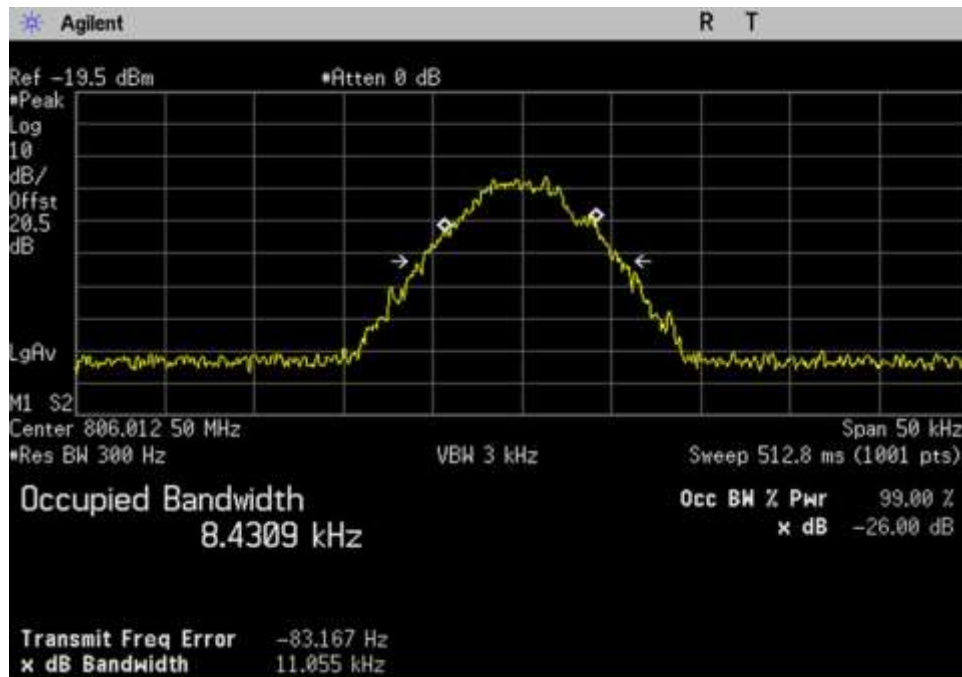
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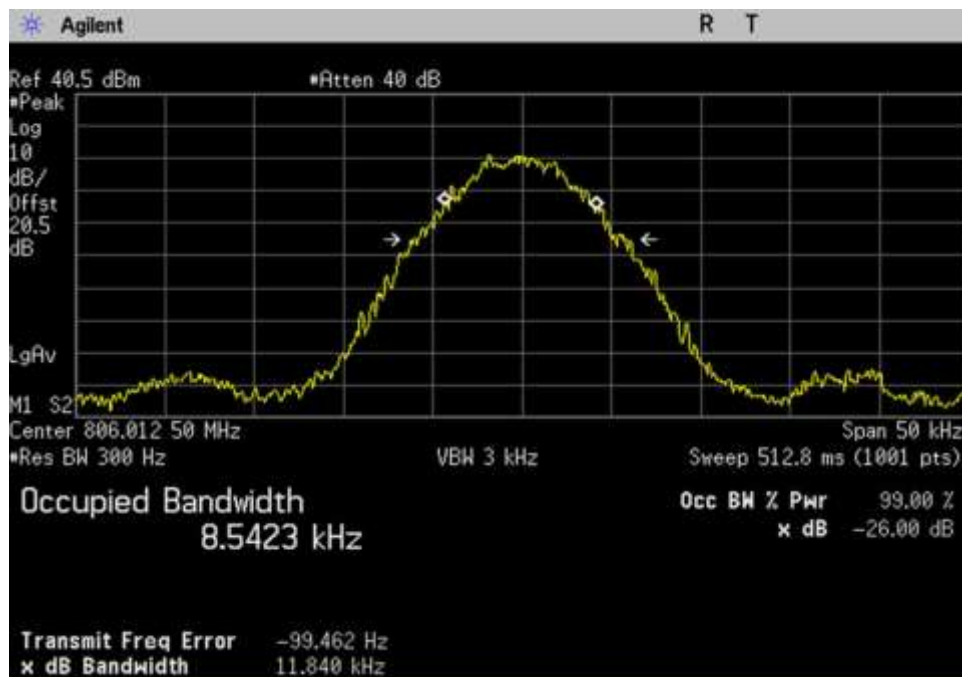
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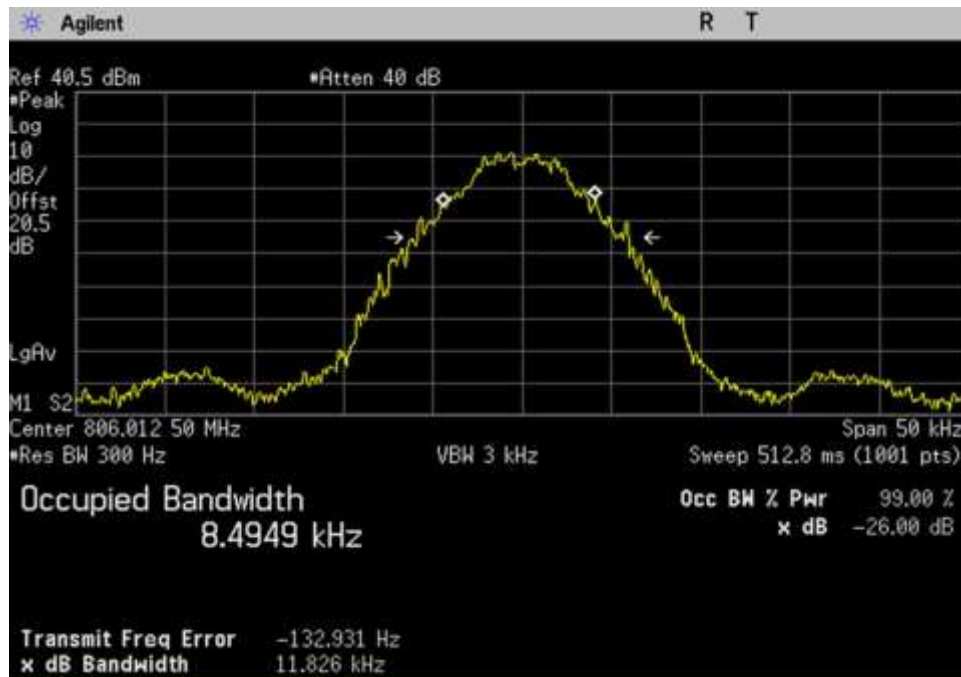
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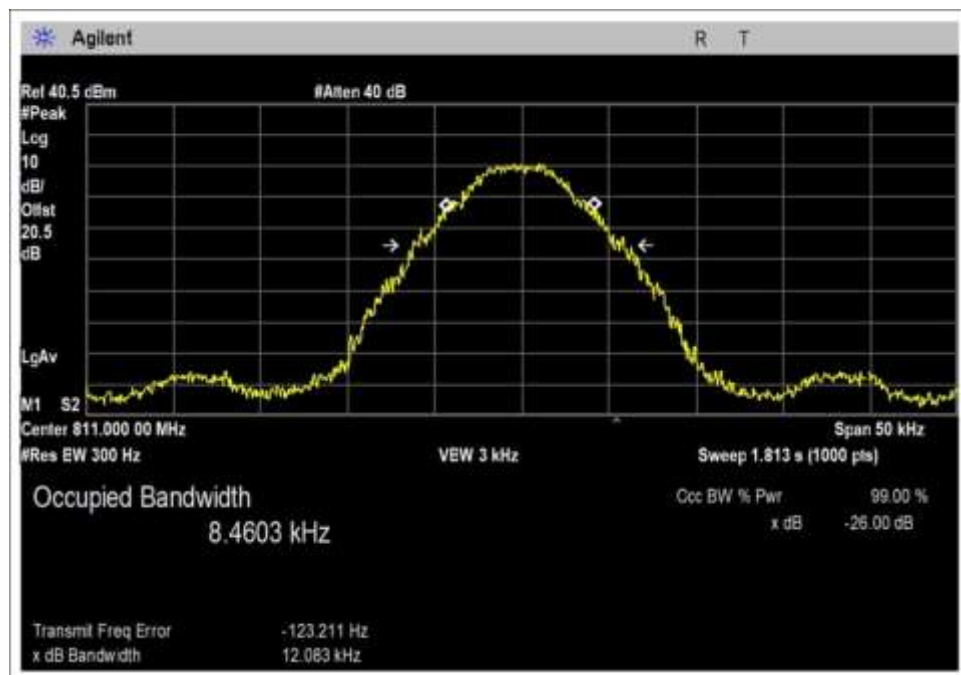
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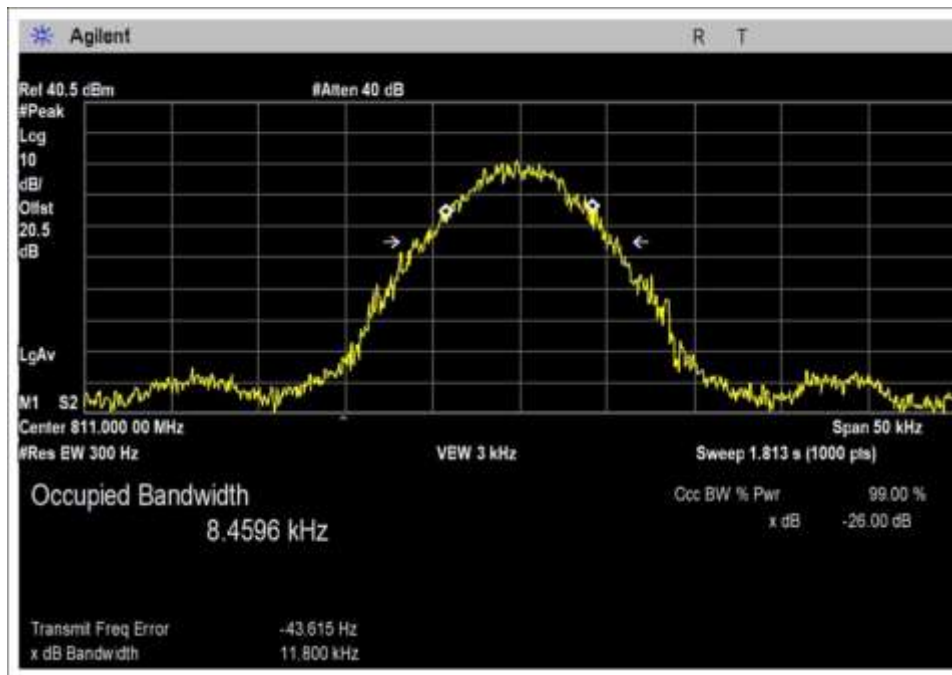
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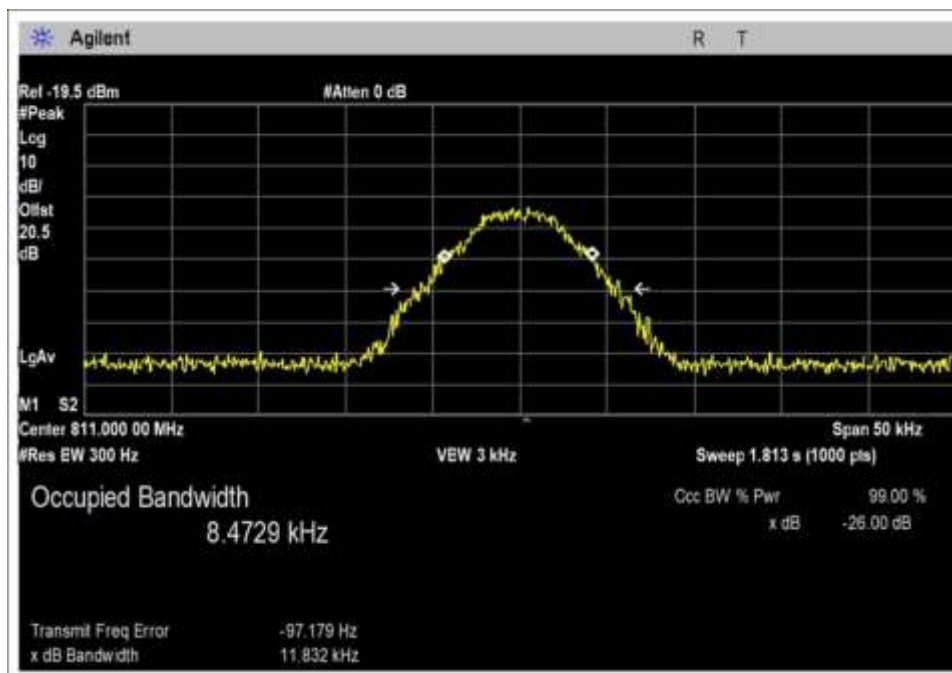
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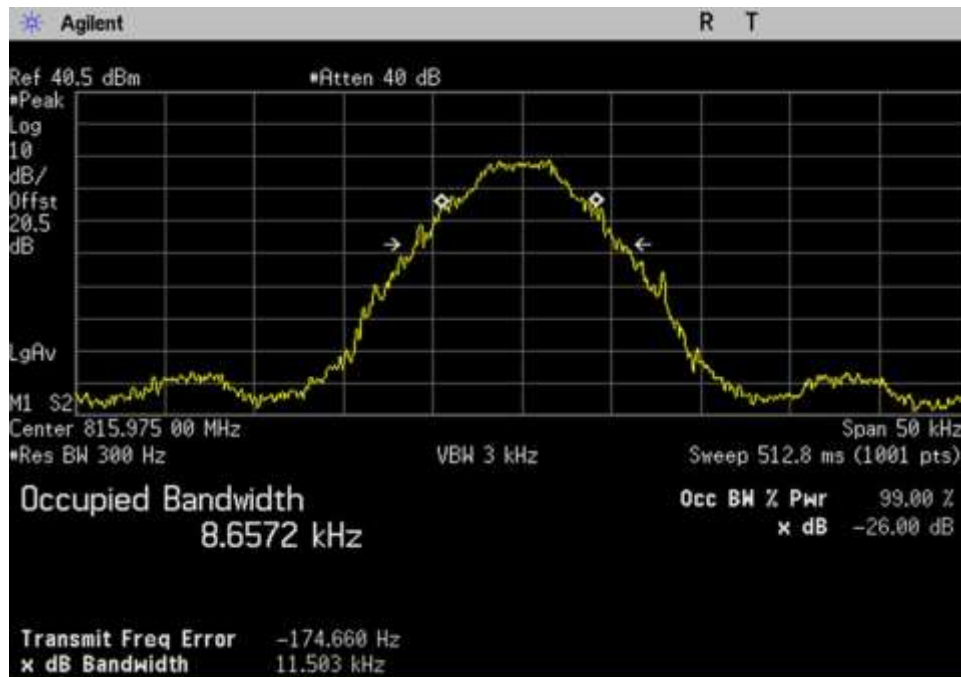
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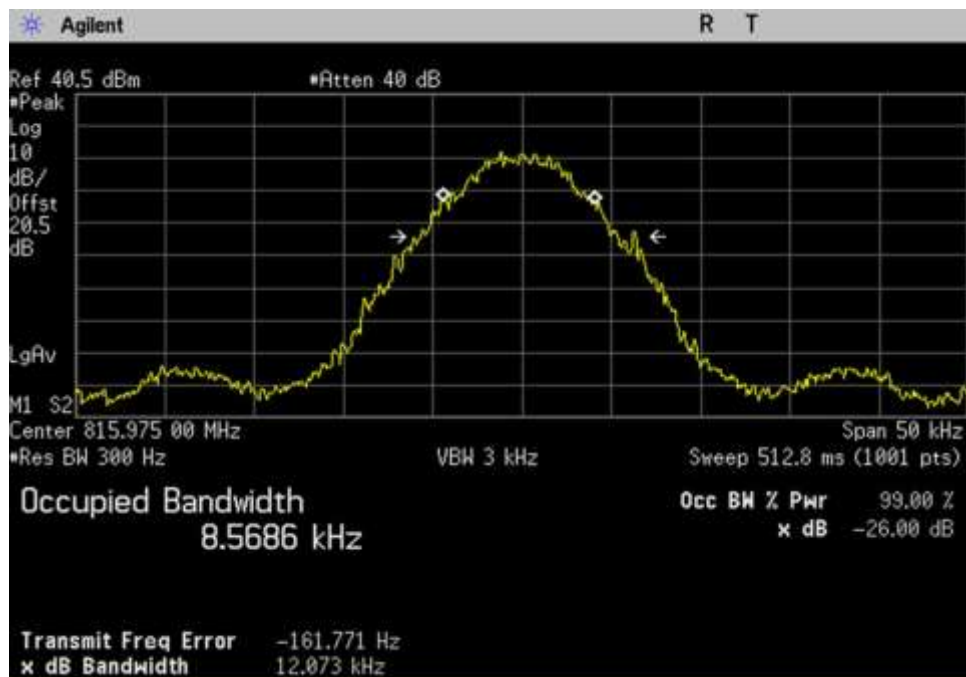
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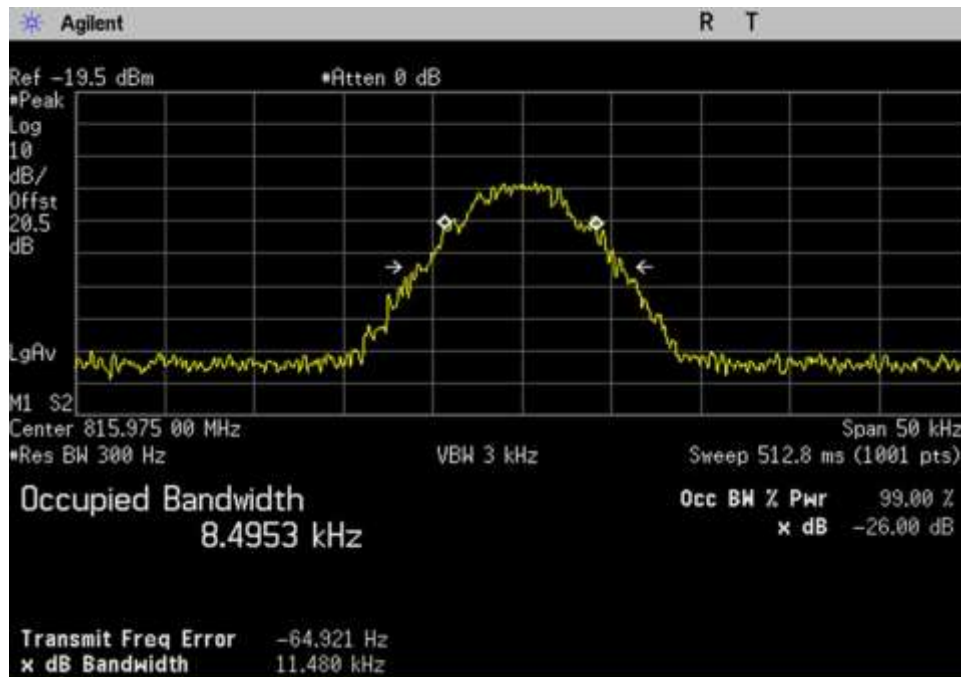
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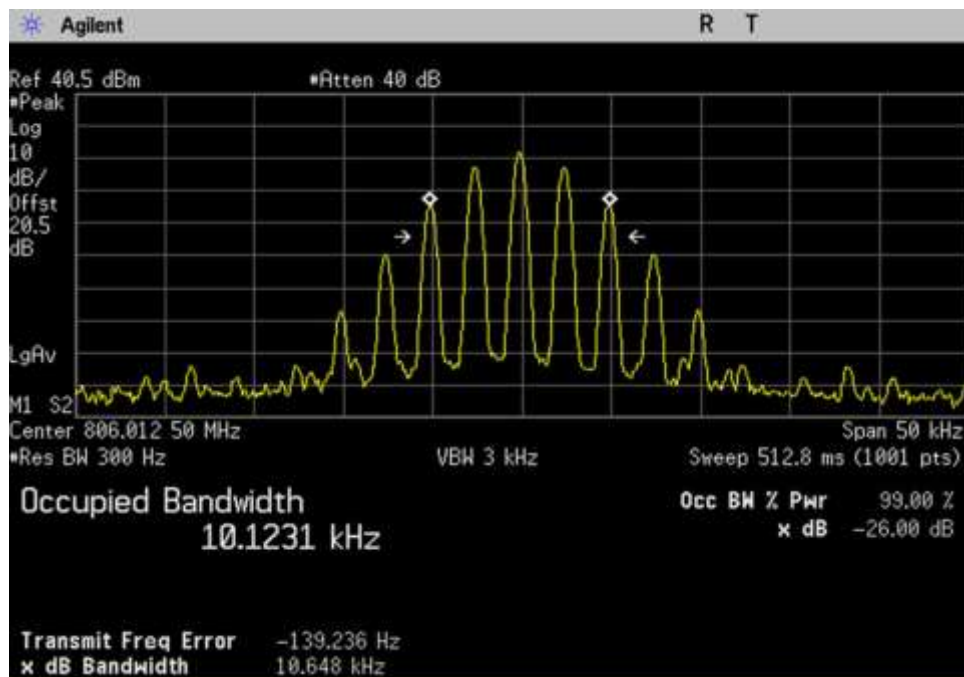
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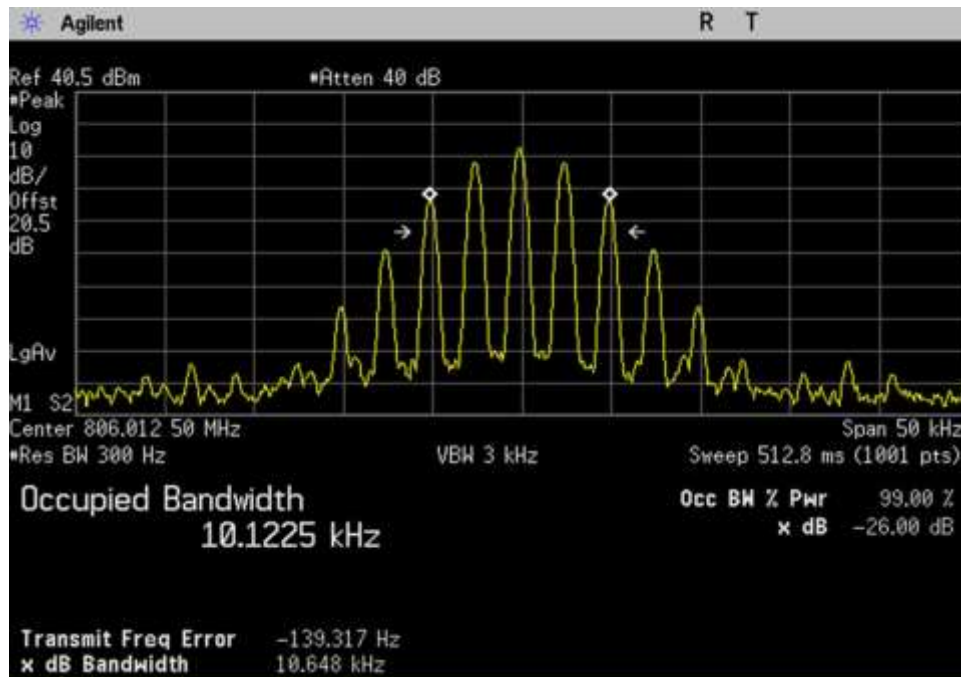
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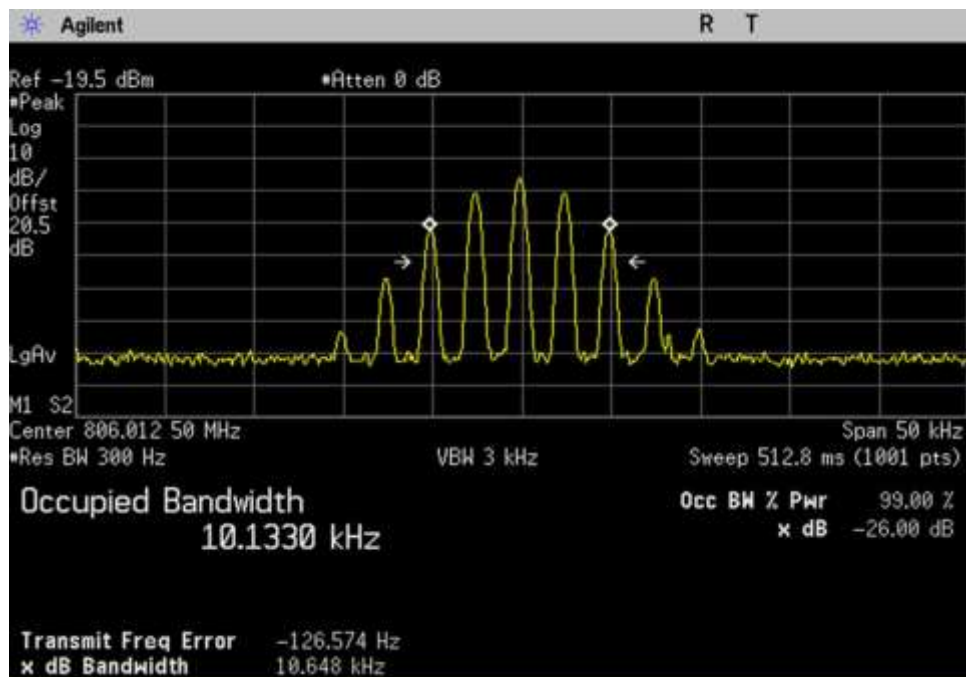
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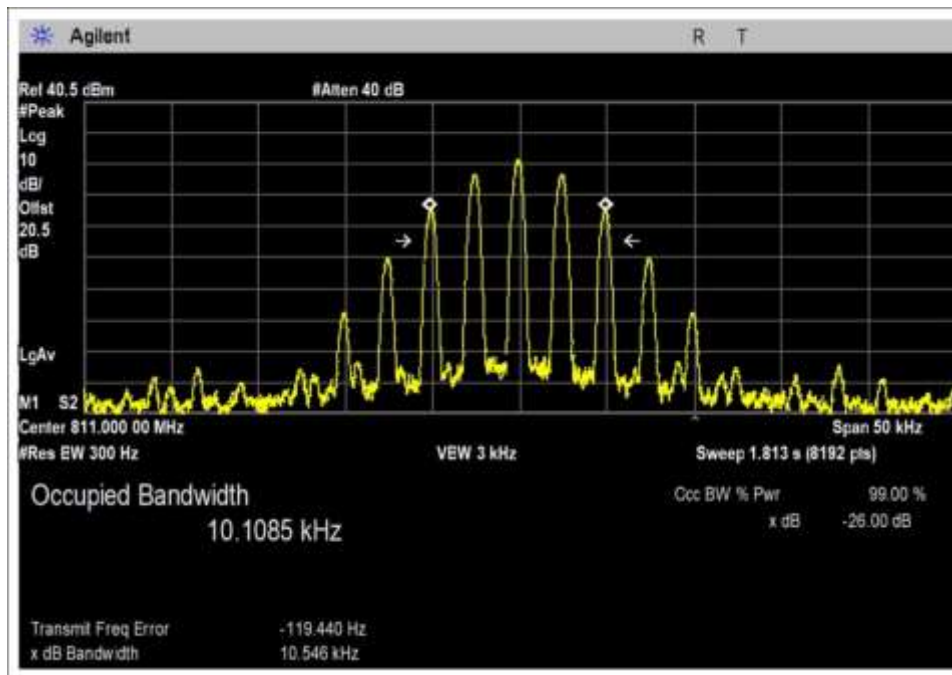
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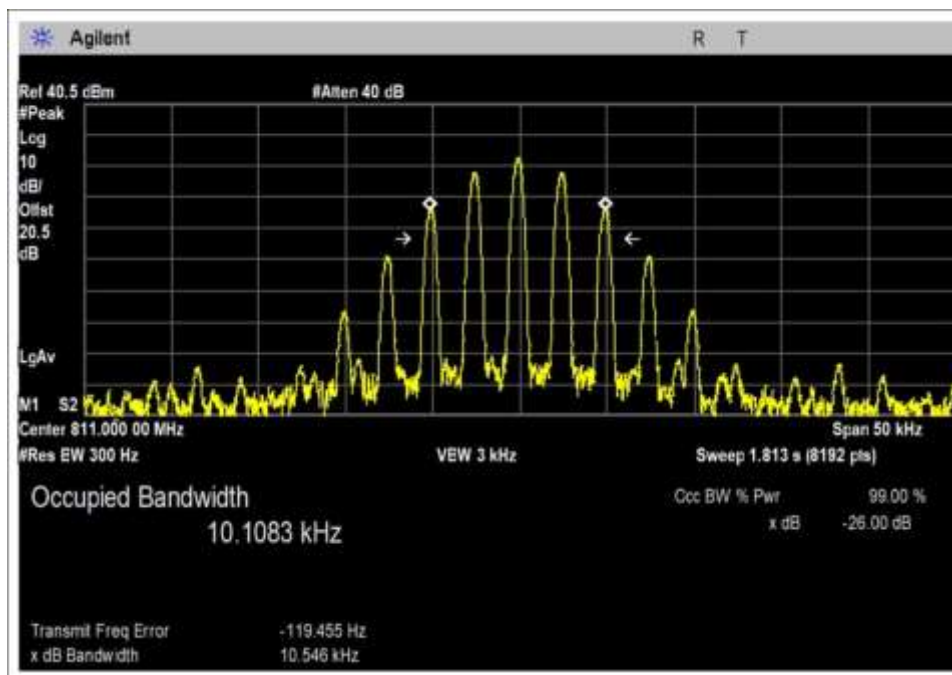
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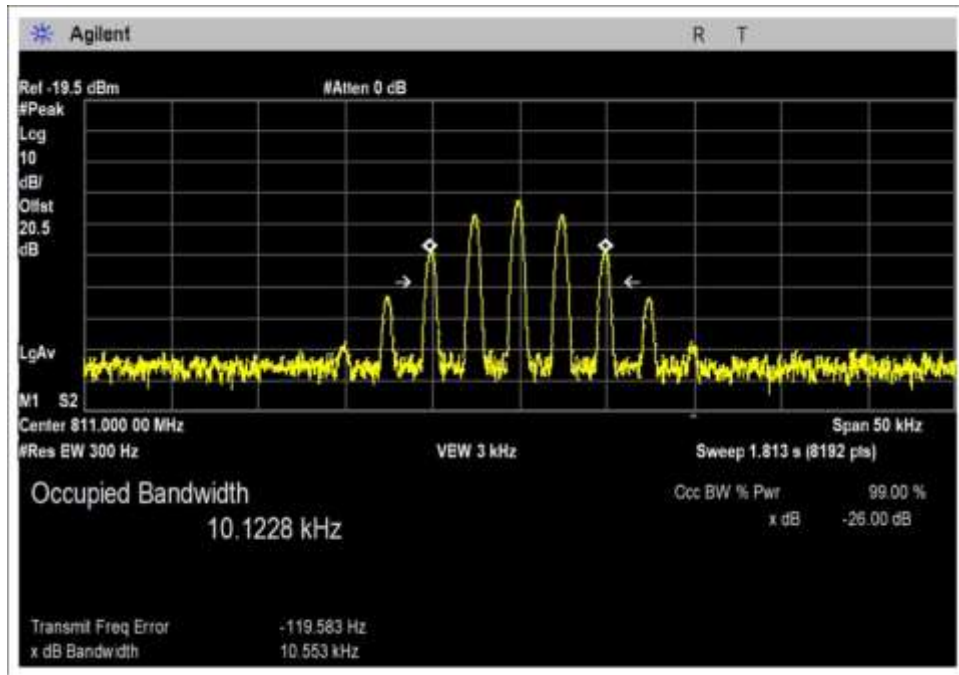
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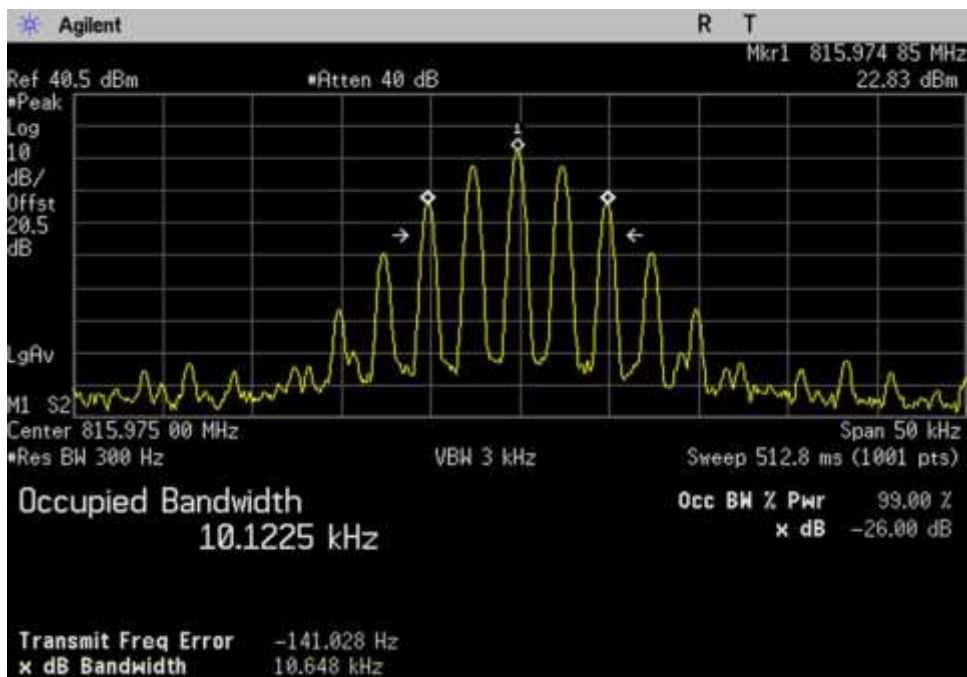
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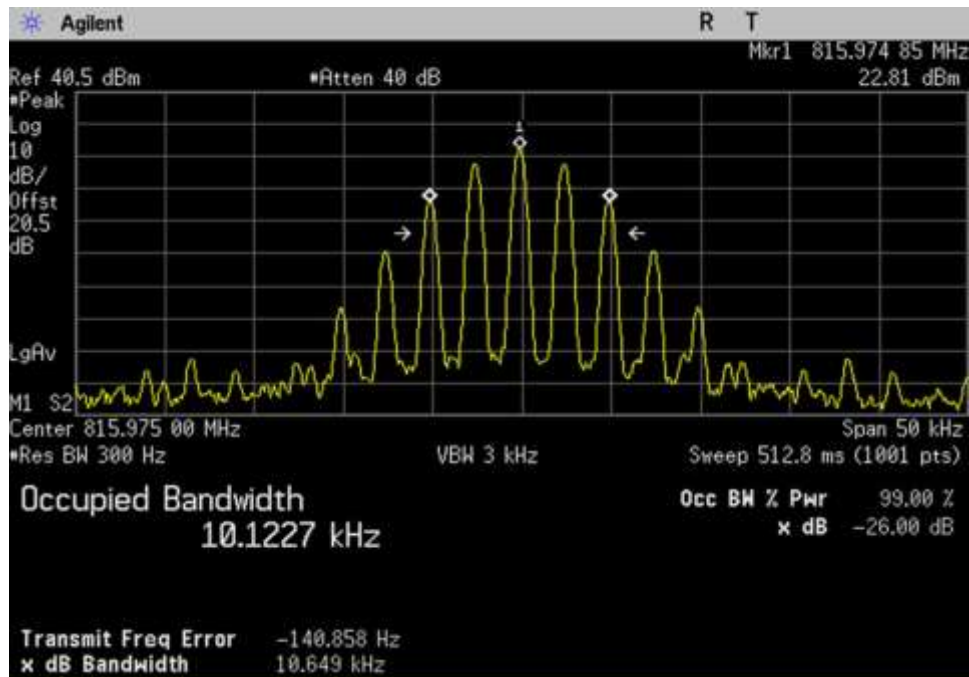
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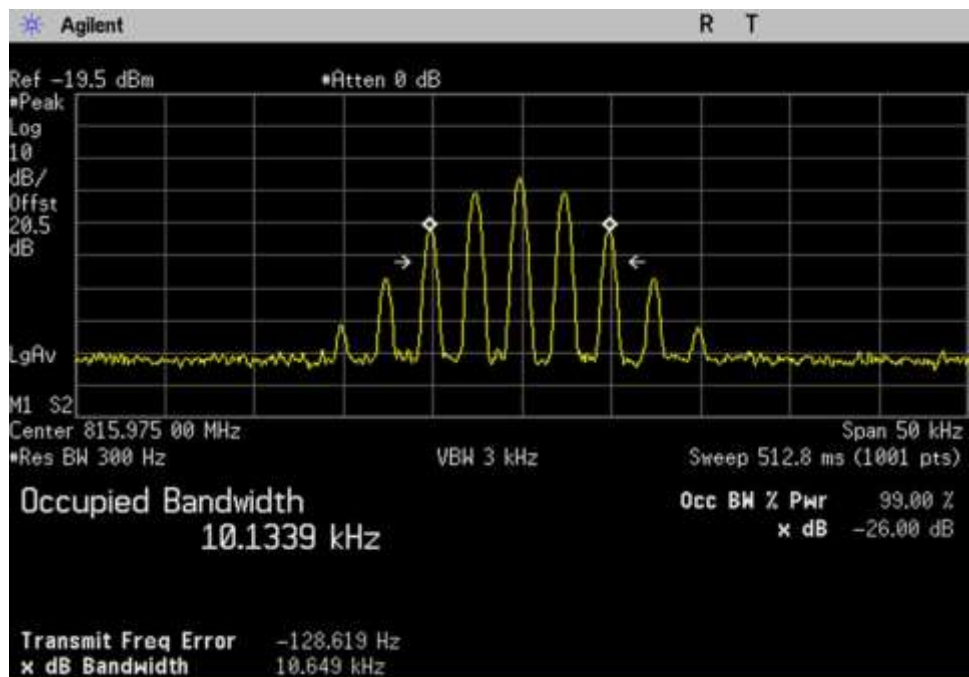
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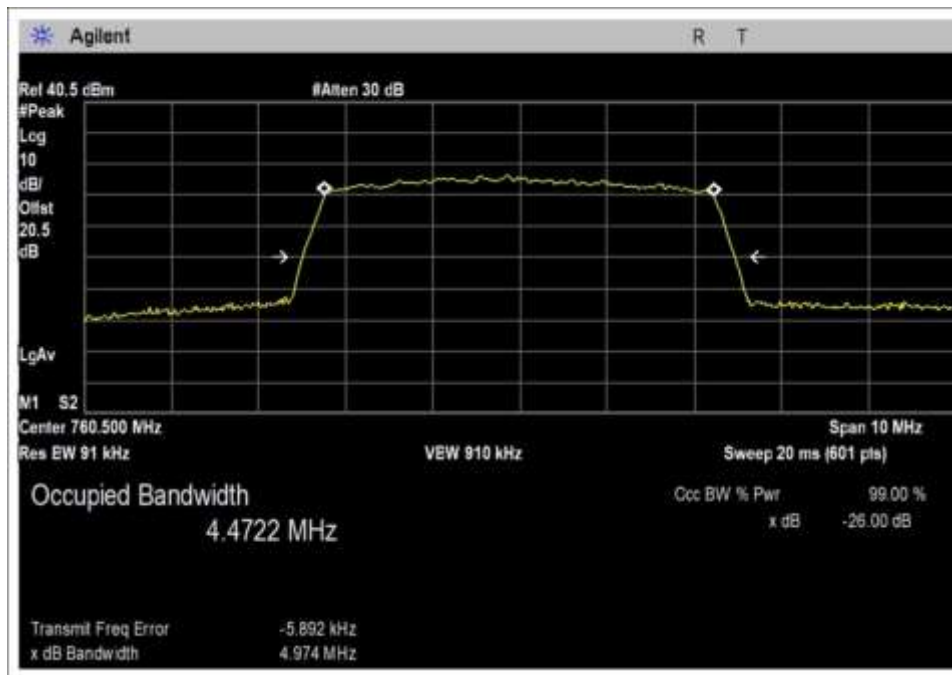
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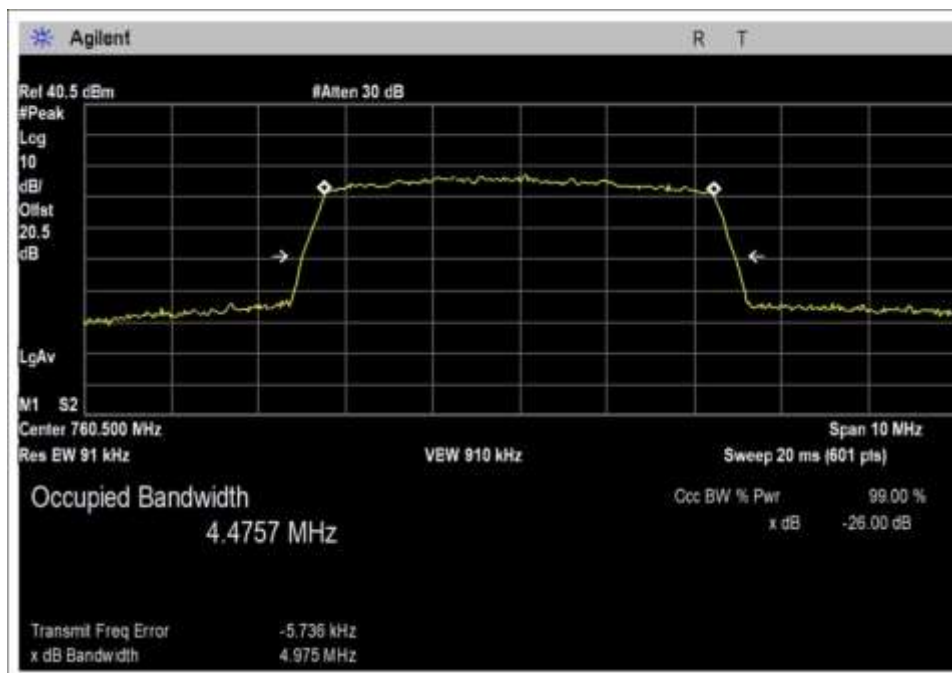
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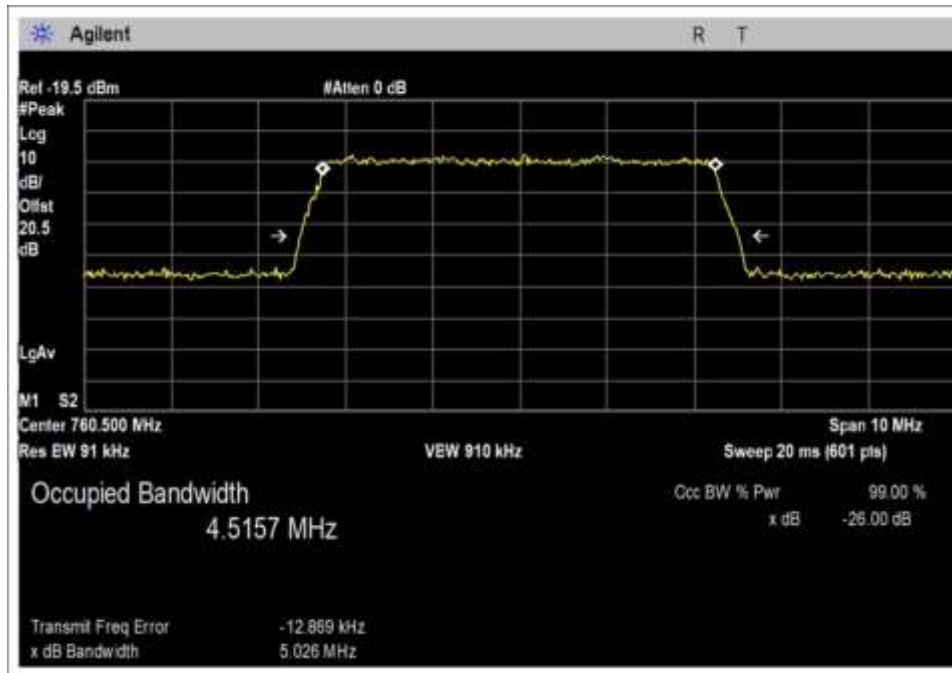
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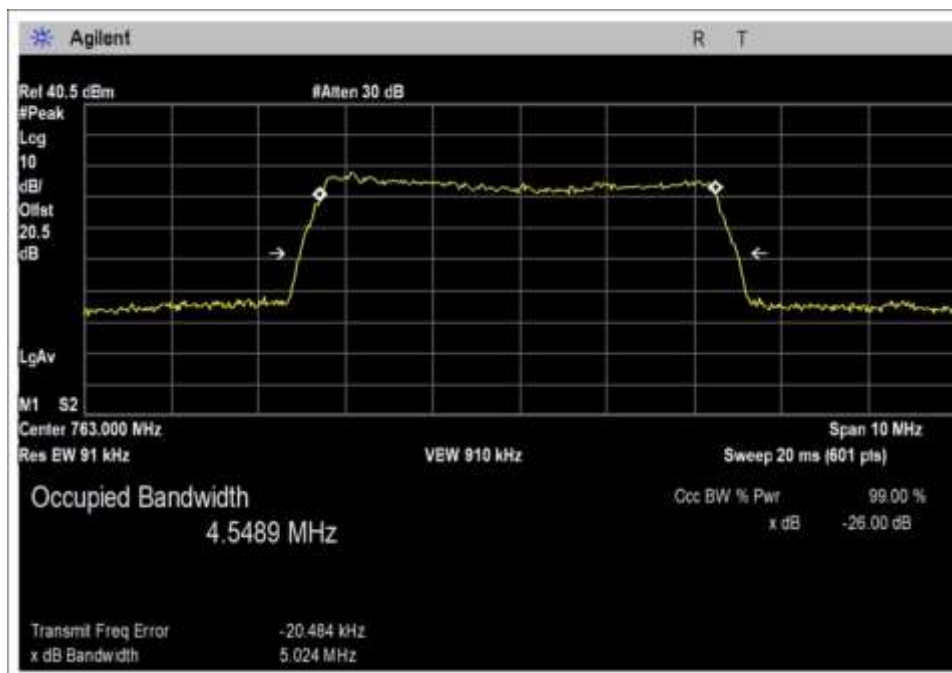
OBW_DL_758-768_ 760.5MHz_LC+AGC



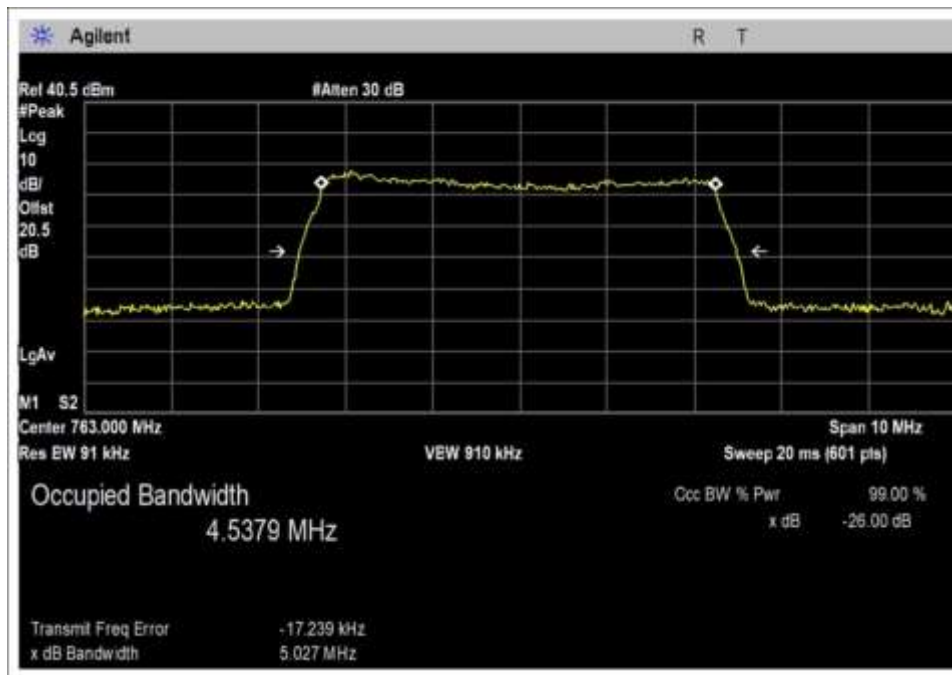
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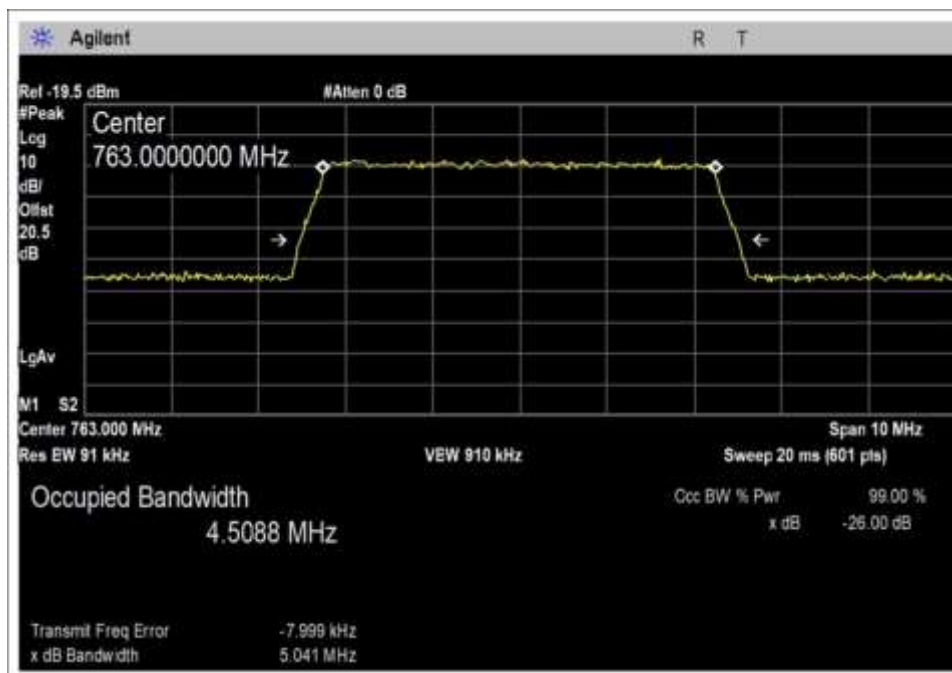
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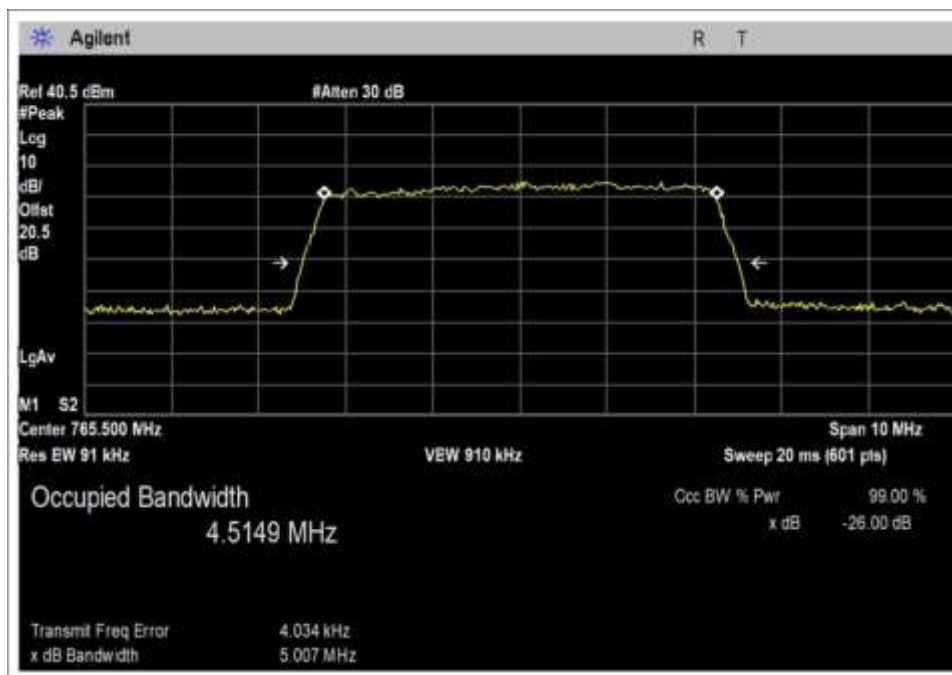
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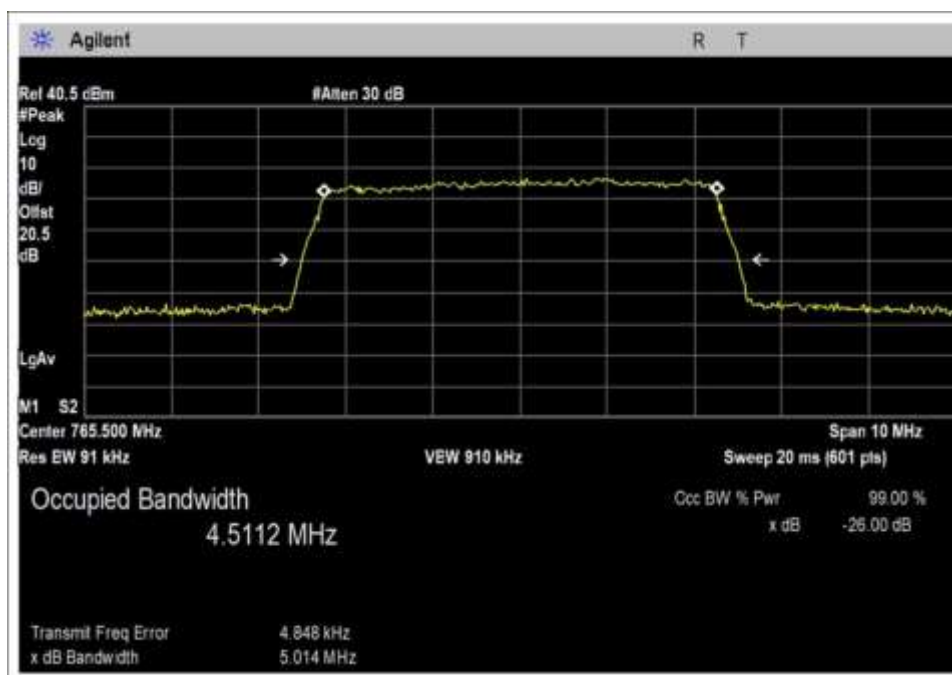
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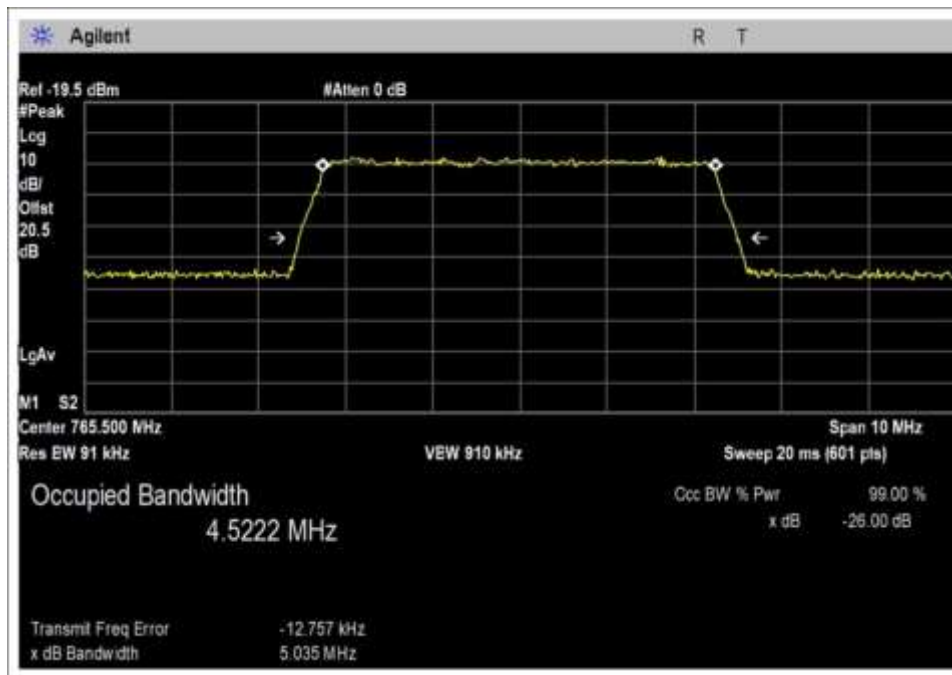
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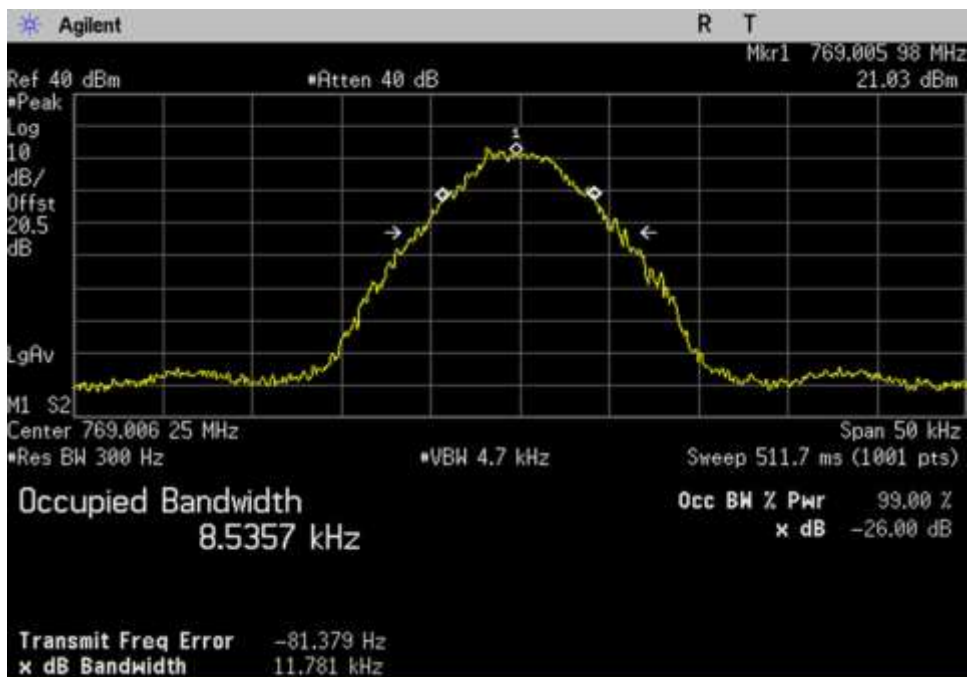
OBW_DL_758-768_ 765.5MHz_HC-AGC



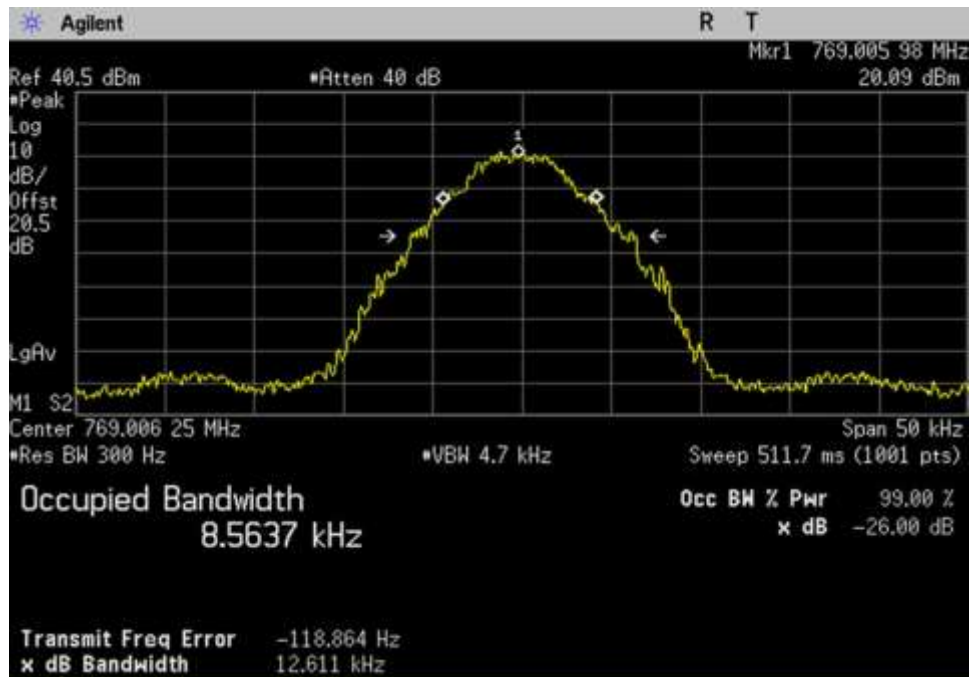
OBW_DL_758-768_ 765.5MHz_HC-AGC+3



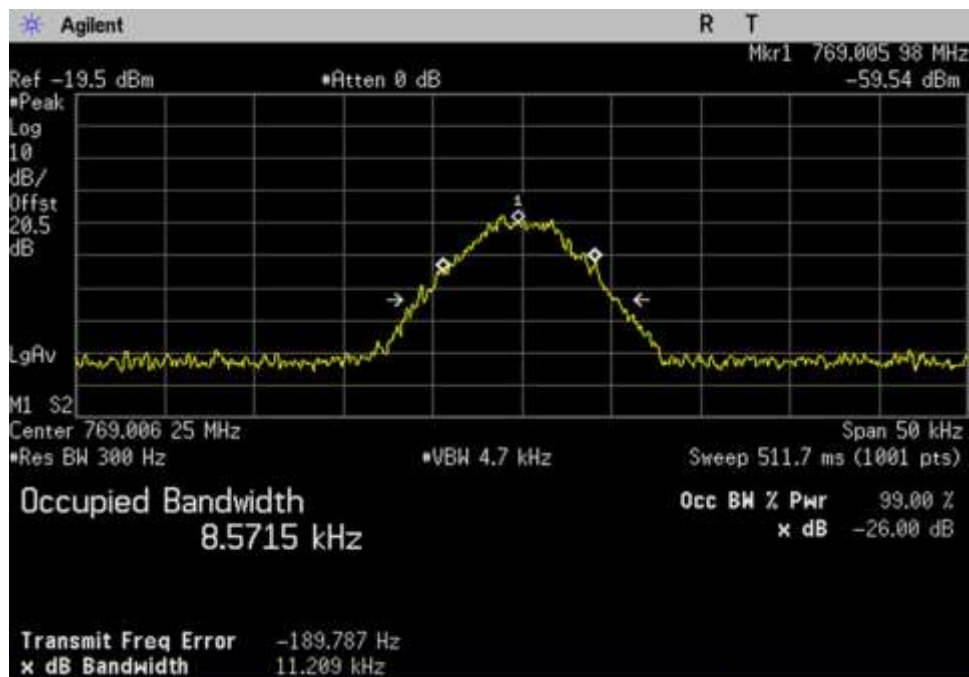
OBW_DL_758-768_765.5MHz_HC-Input



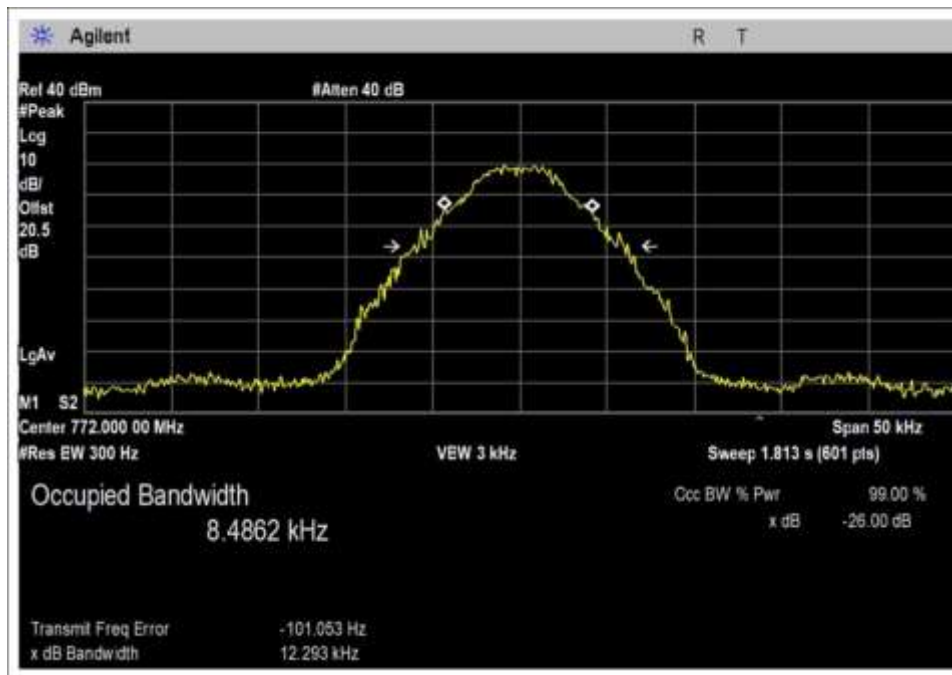
OBW_DL_769-775_769.00625MHz_LC-AGC



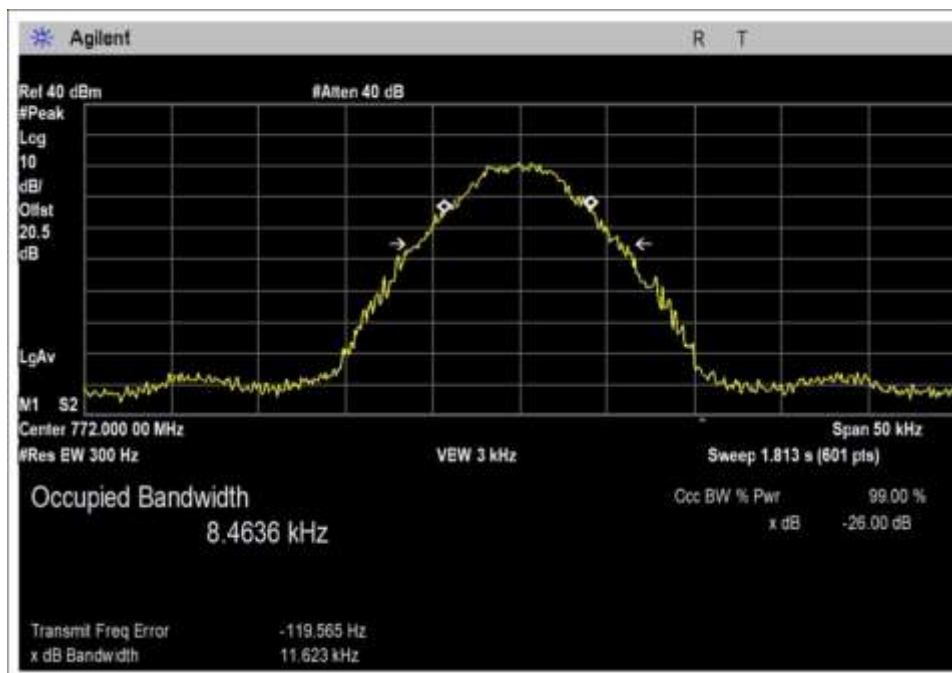
OBW_DL_769-775_ 769.00625MHz_LC-AGC+3



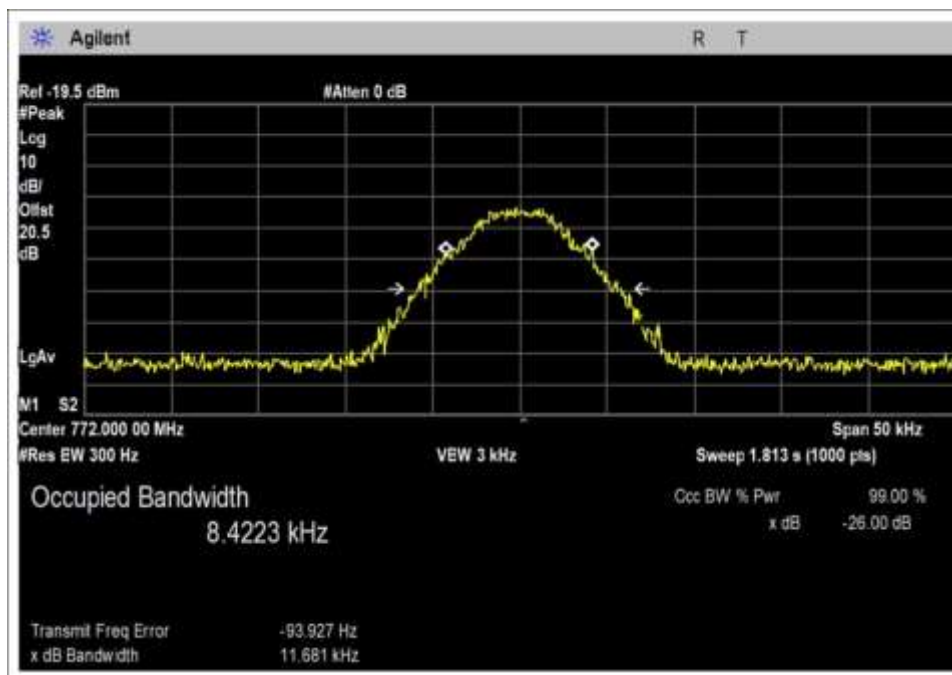
OBW_DL_769-775_ 769.00625MHz_LC-Input



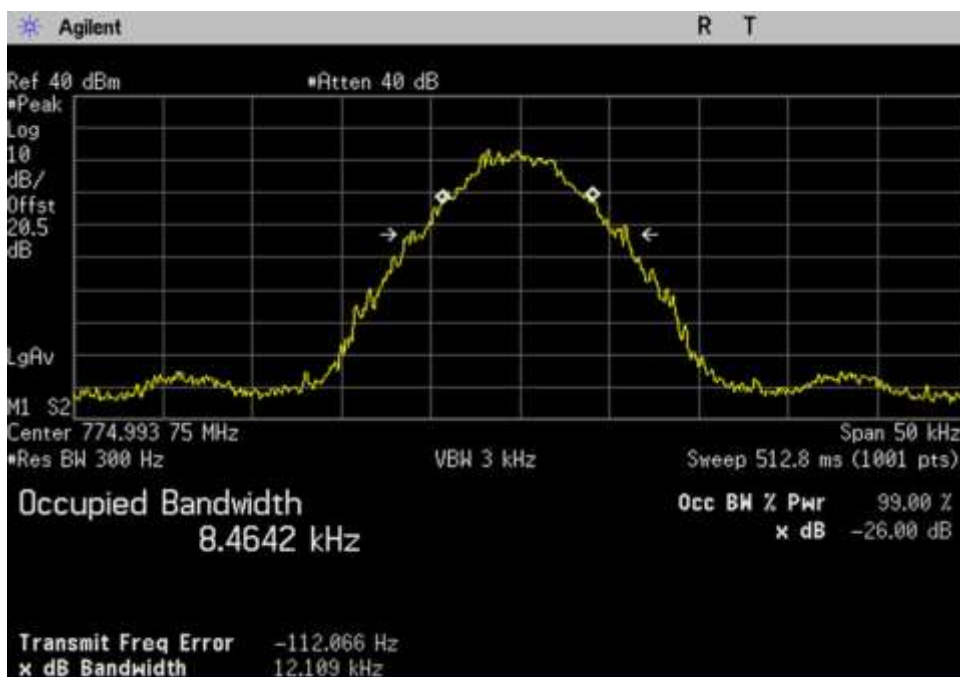
OBW_DL_769-775_772MHz_MC-AGC



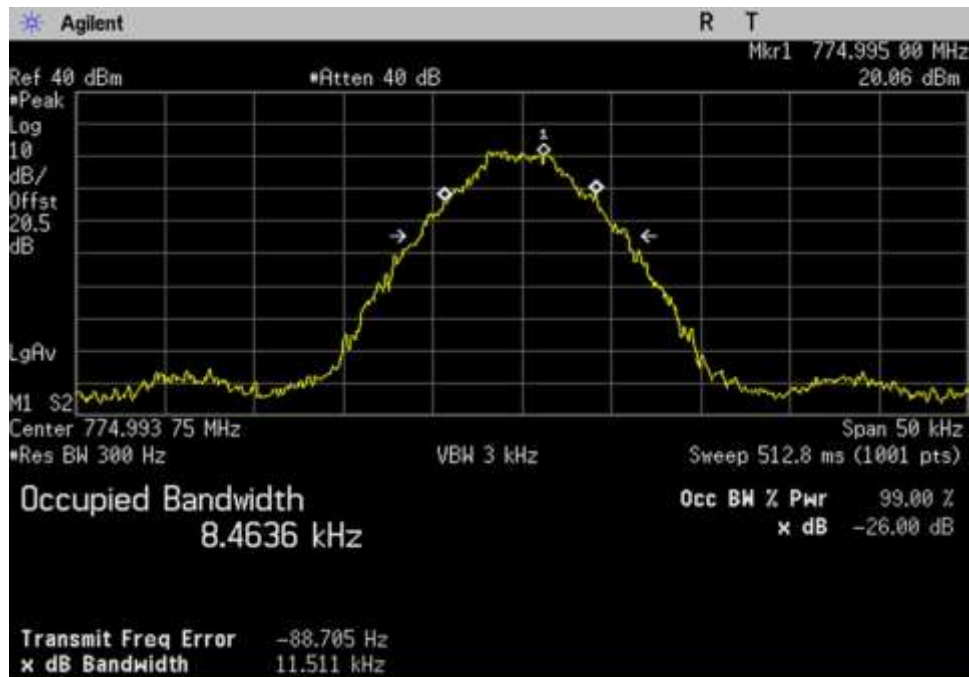
OBW_DL_769-775_772MHz_MC-AGC+3



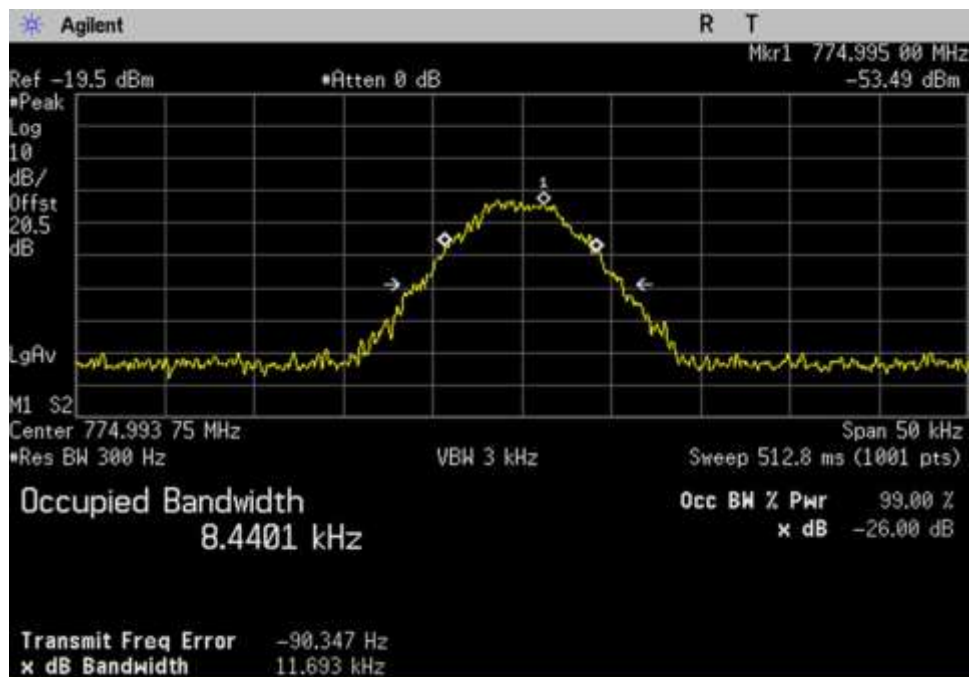
OBW_DL_769-775_ 772MHz_MC-Input



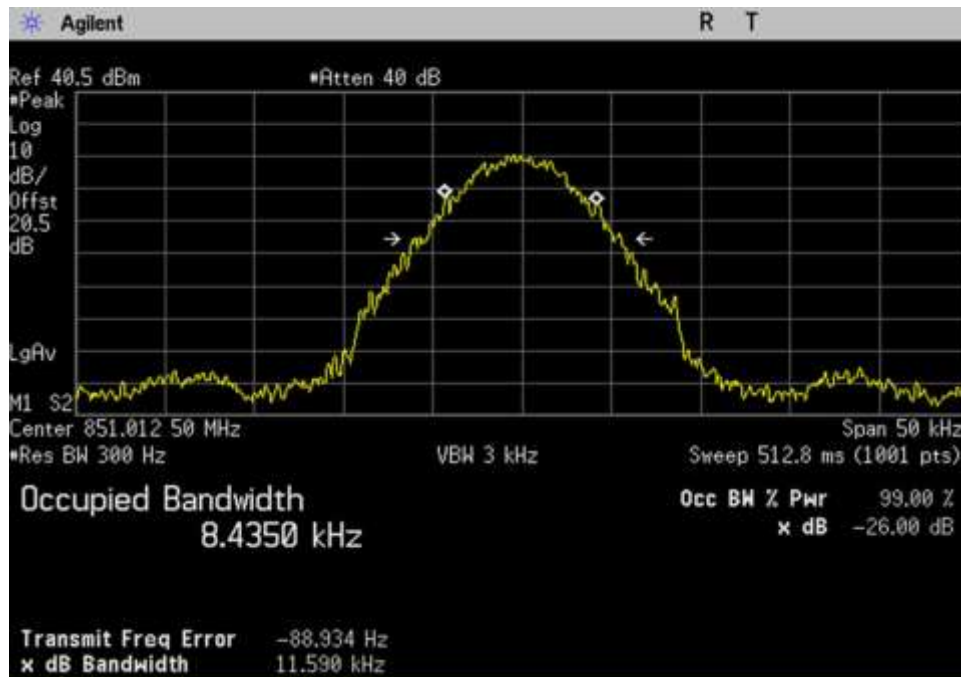
OBW_DL_769-775_ 774.99375MHz_HC-AGC



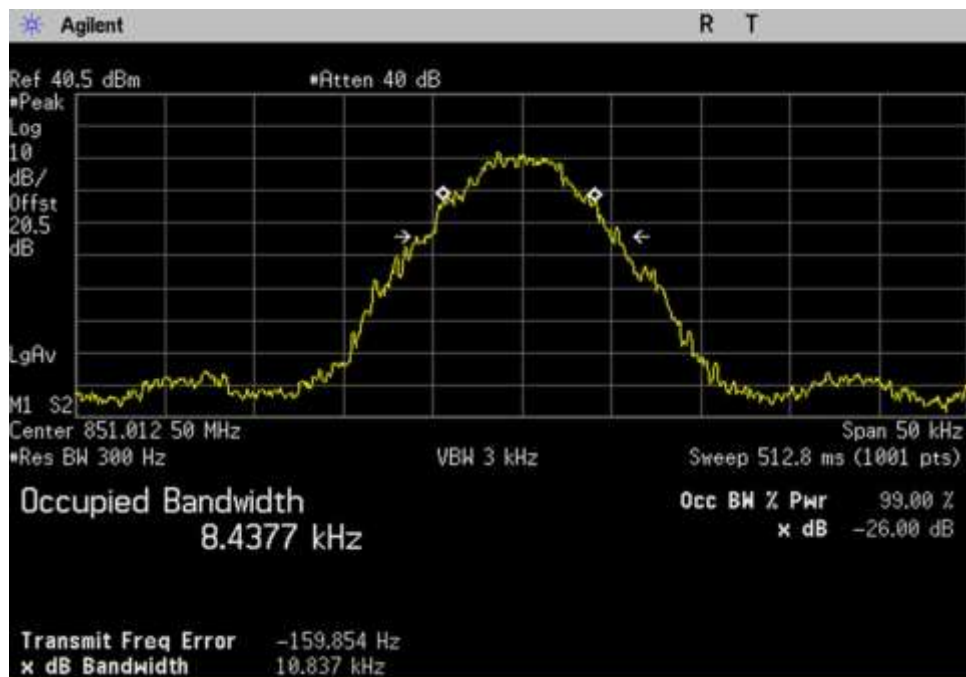
OBW_DL_769-775_774.99375MHz_HC-AGC+3



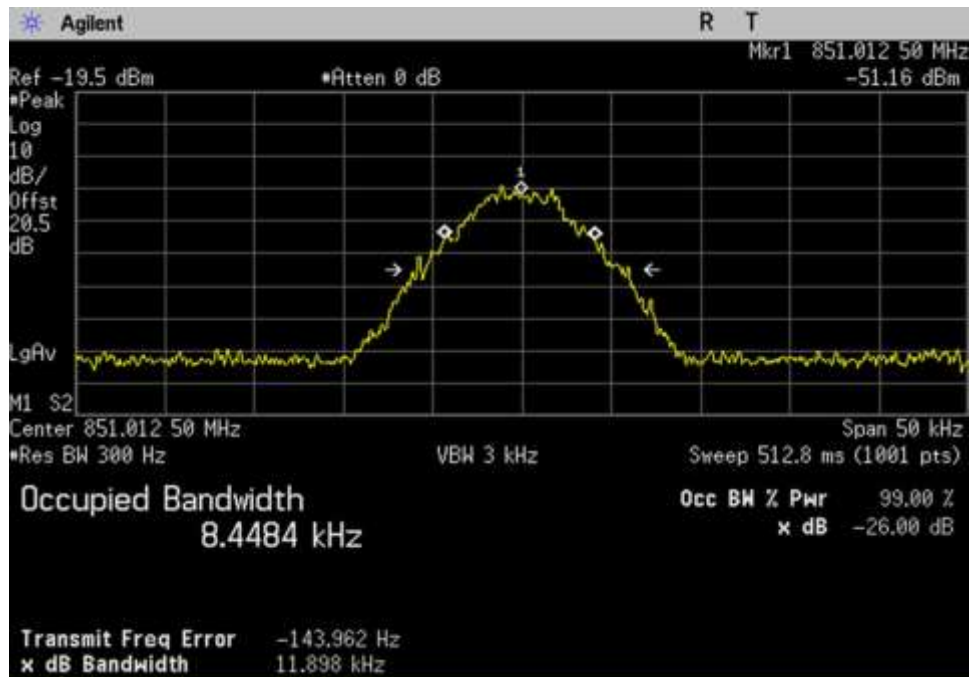
OBW_DL_769-775_774.99375MHz_HC-Input



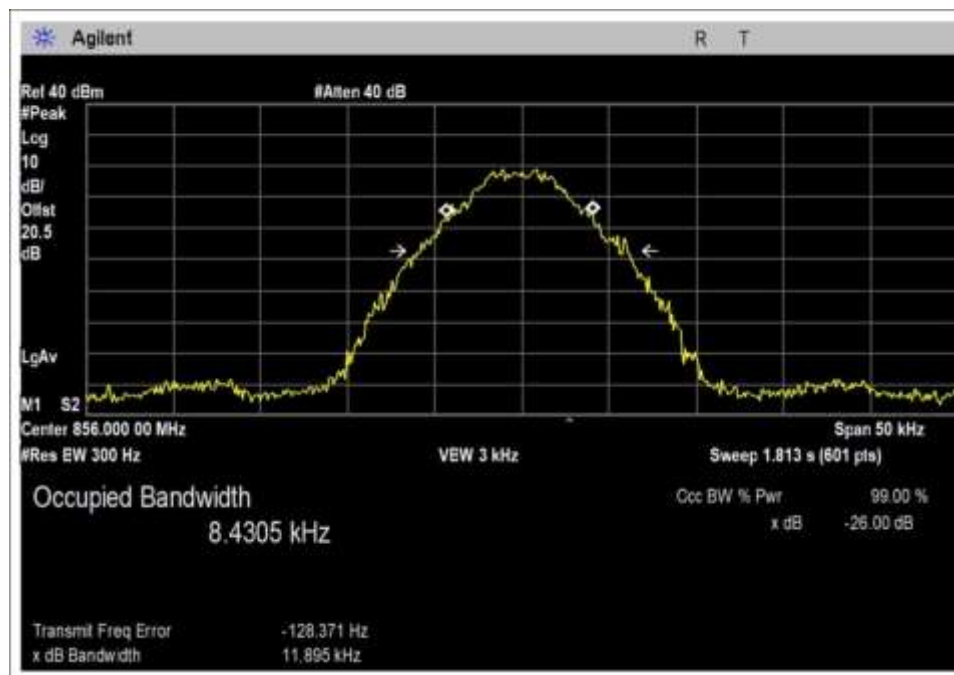
OBW_DL_851-861-CF4_ 851.0125MHz_LC-AGC



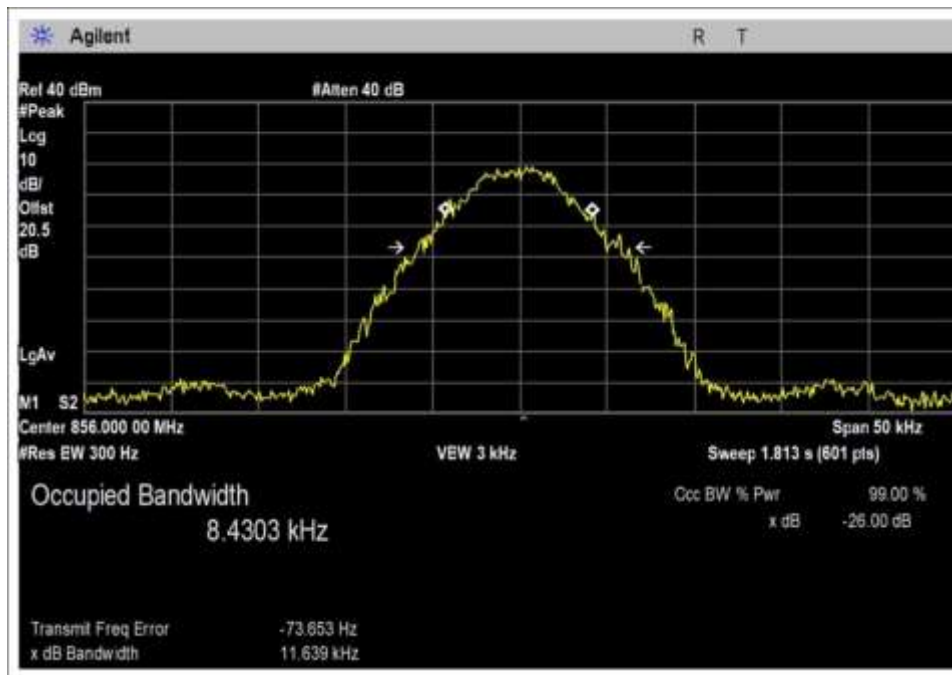
OBW_DL_851-861-CF4_ 851.0125MHz_LC-AGC+3



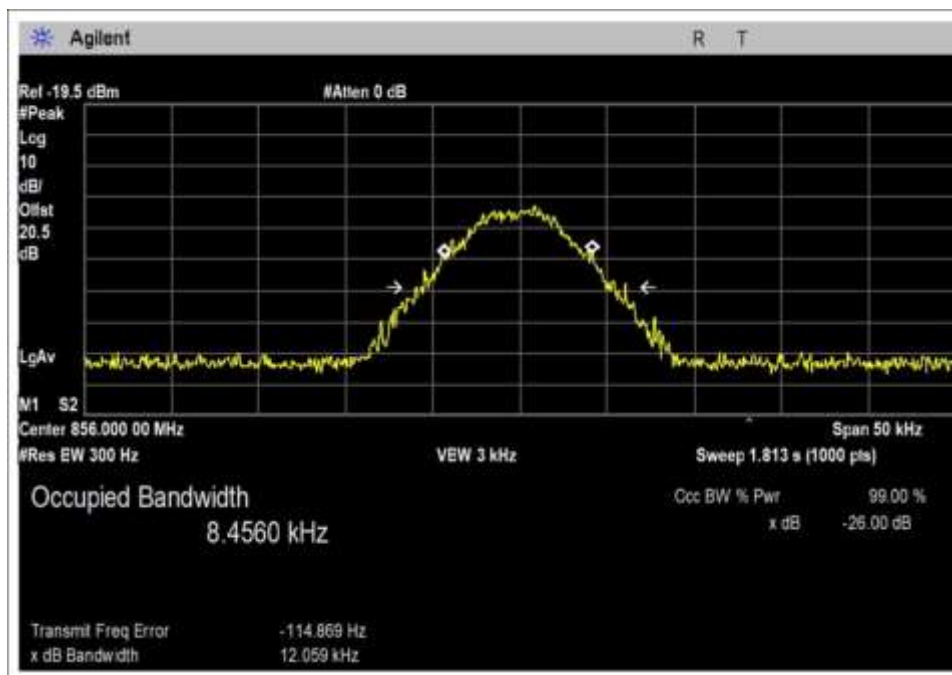
OBW_DL_851-861-CF4_ 851.0125MHz_LC-Input



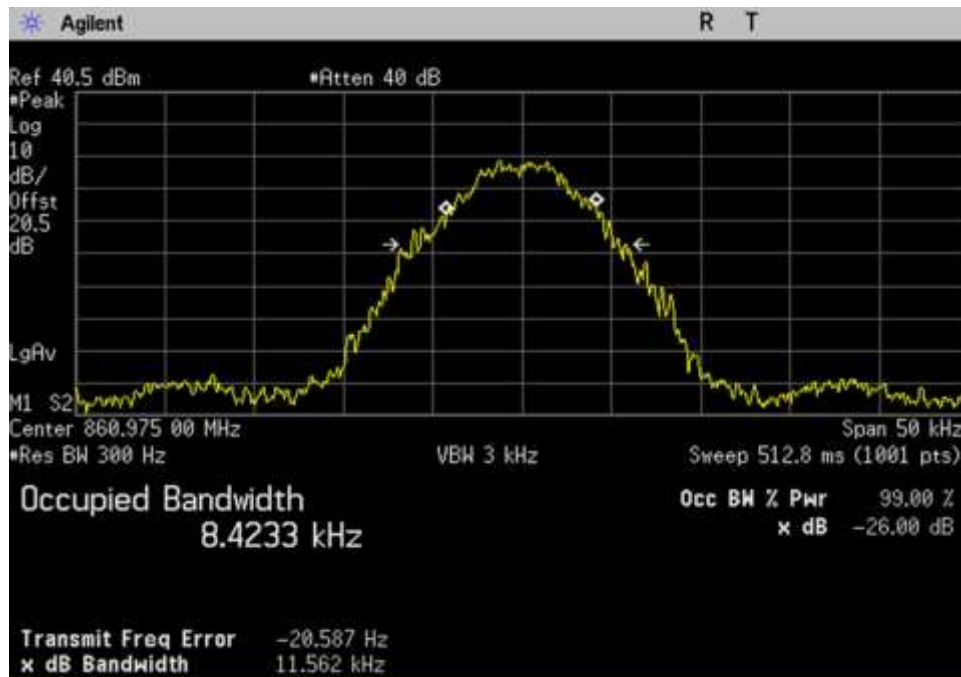
OBW_DL_851-861-CF4_ 856MHz_MC-AGC



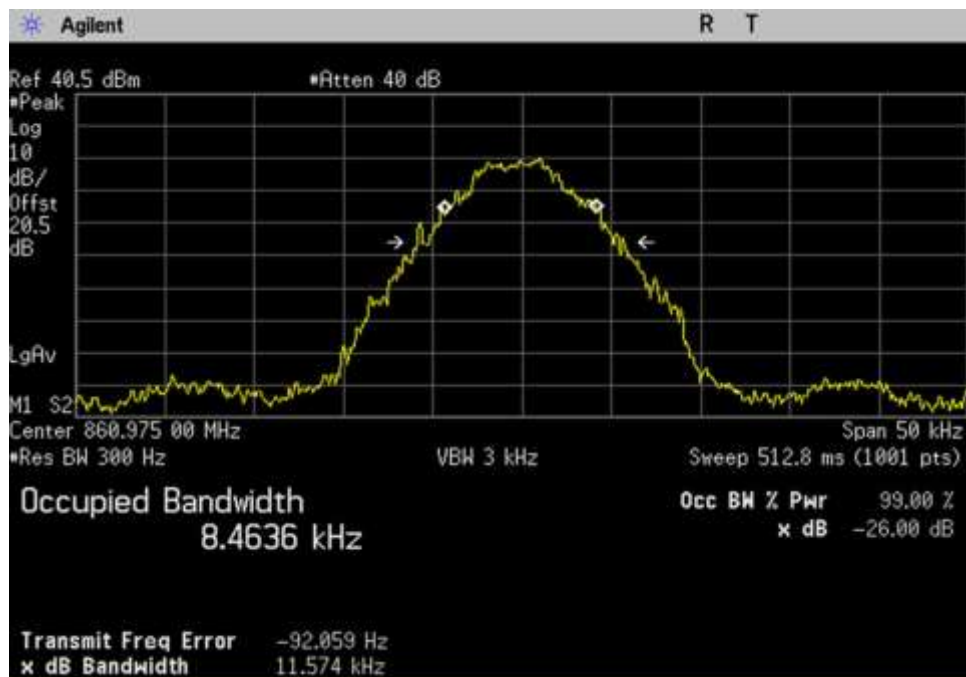
OBW_DL_851-861-CF4_856MHz_MC-AGC+3



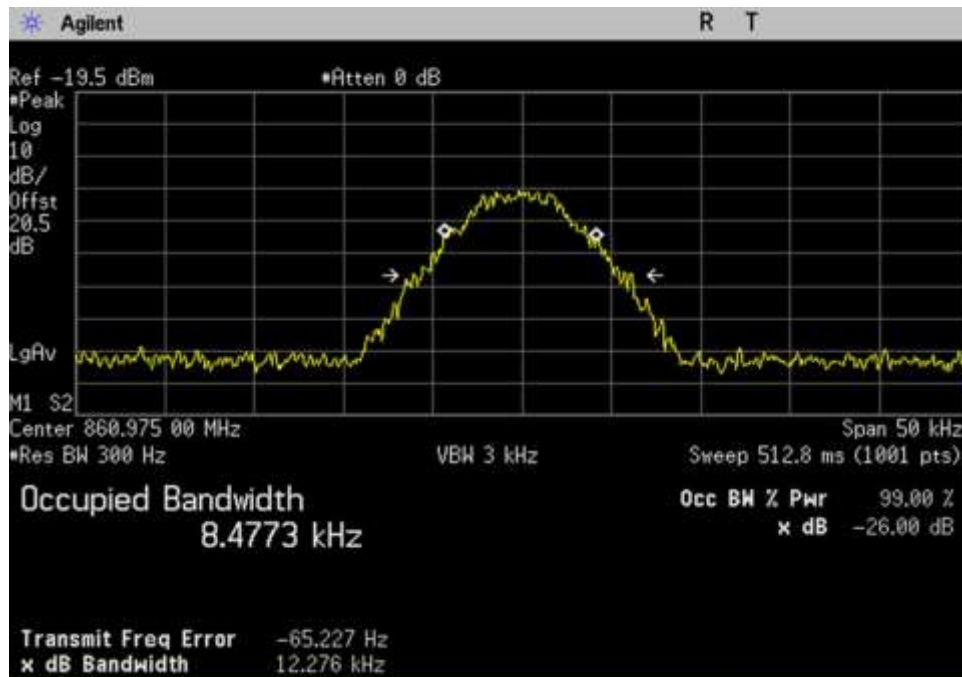
OBW_DL_851-861-CF4_856MHz_MC-Input



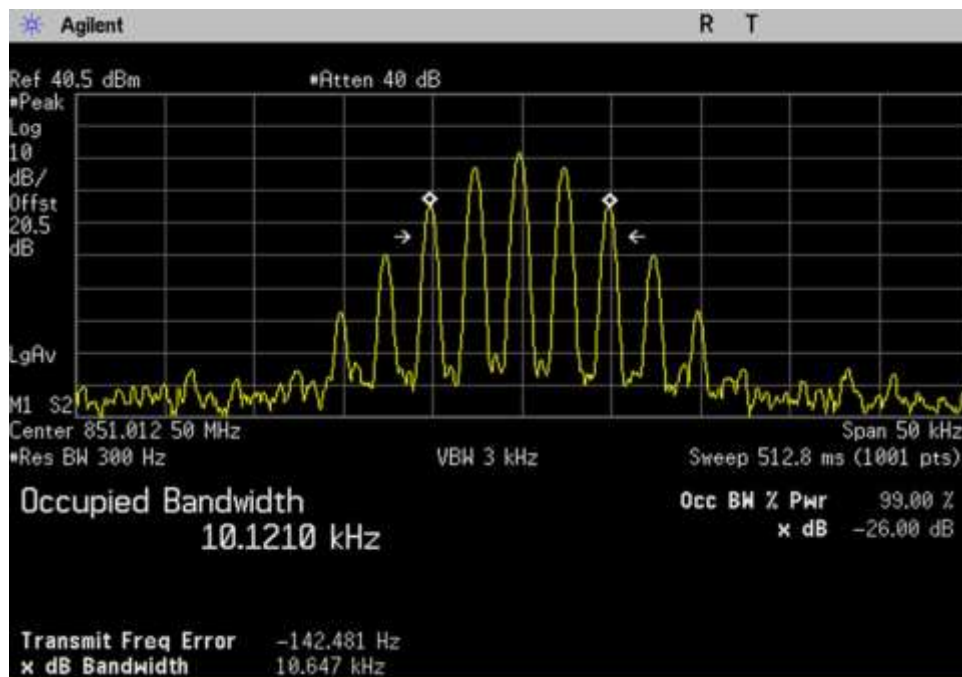
OBW_DL_851-861-CF4_860.975MHz_HC-AGC



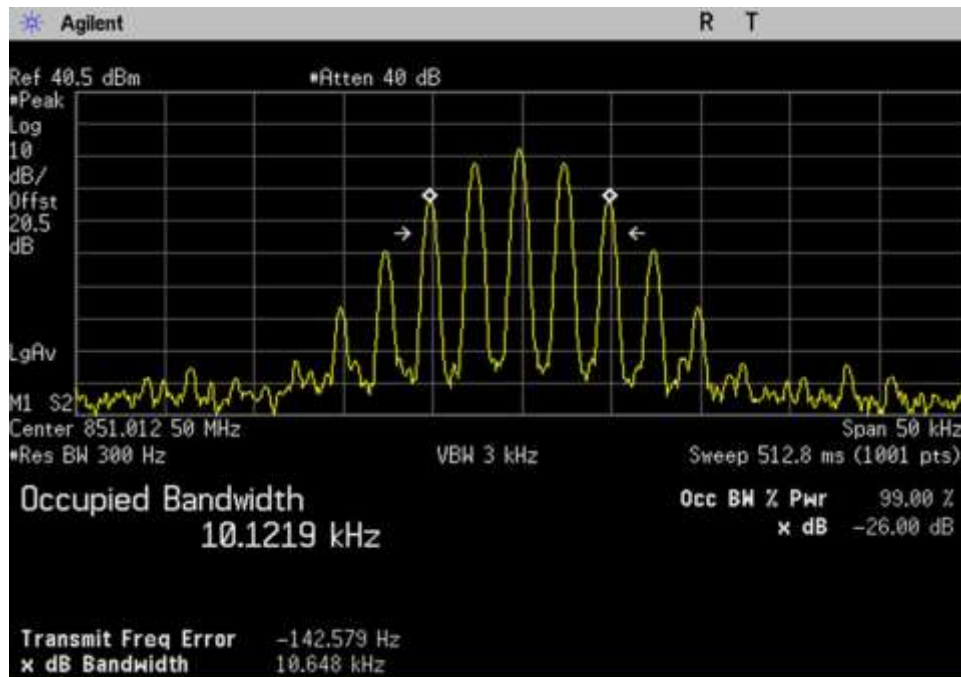
OBW_DL_851-861-CF4_860.975MHz_HC-AGC+3



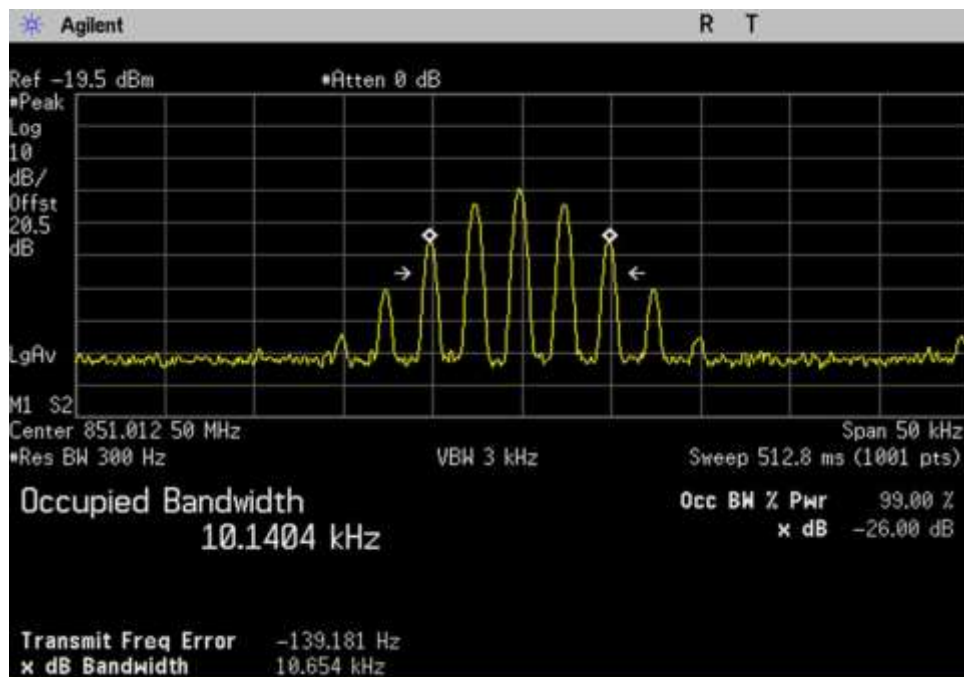
OBW_DL_851-861-CF4_ 860.975MHz_HC-Input



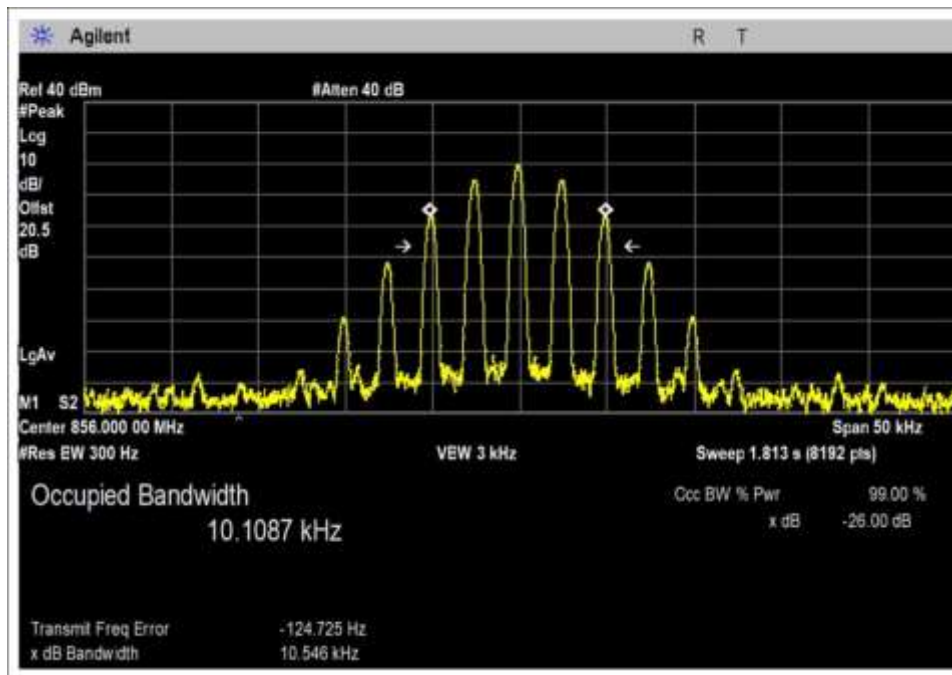
OBW_DL_851-861-FM_ 851.0125MHz_LC-AGC



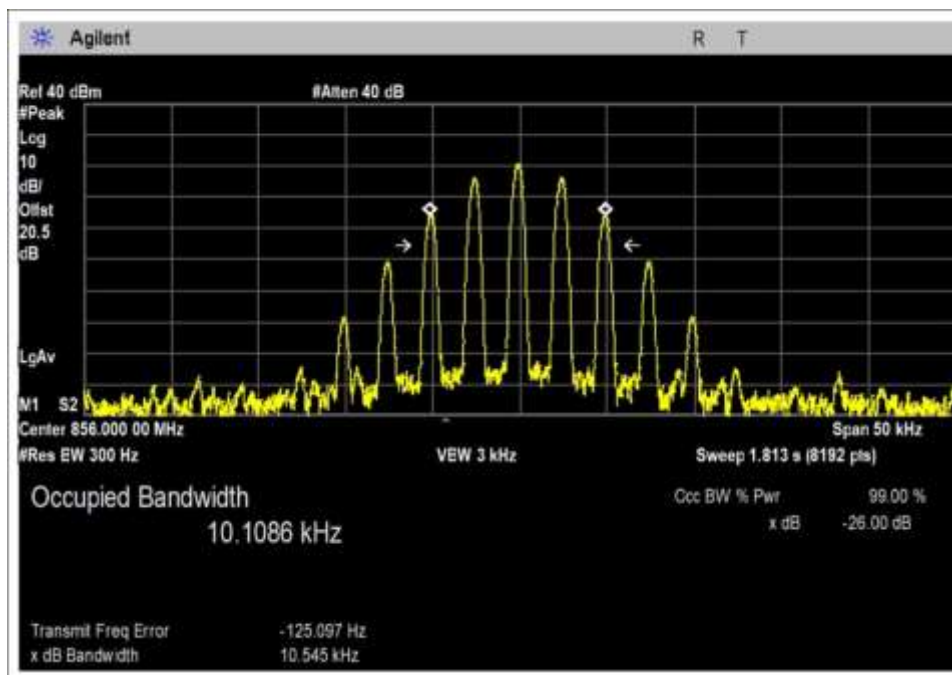
OBW_DL_851-861-FM_ 851.0125MHz_LC-AGC+3



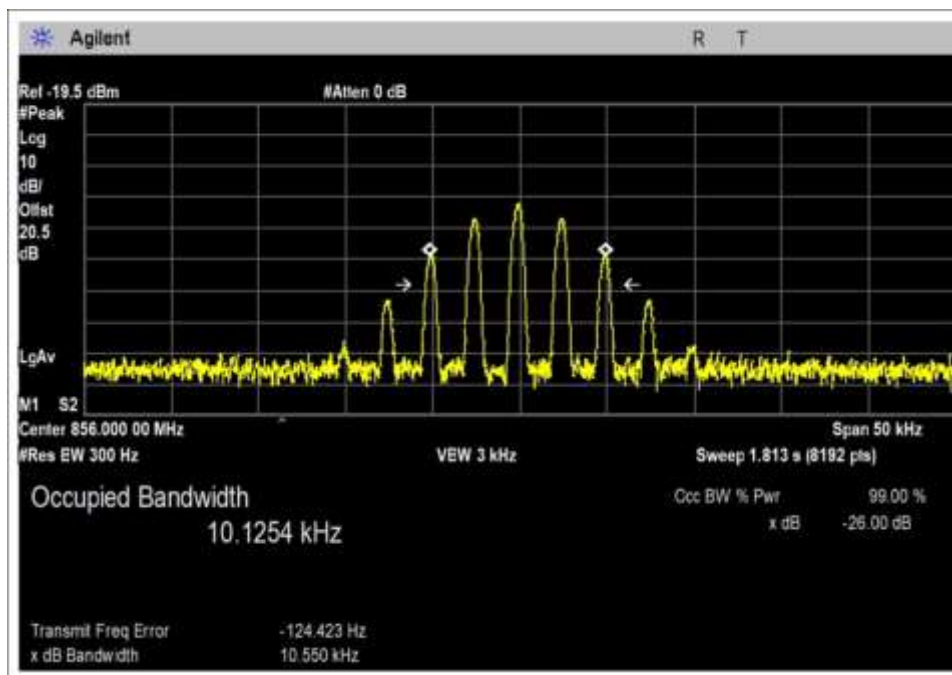
OBW_DL_851-861-FM_ 851.0125MHz_LC-Input



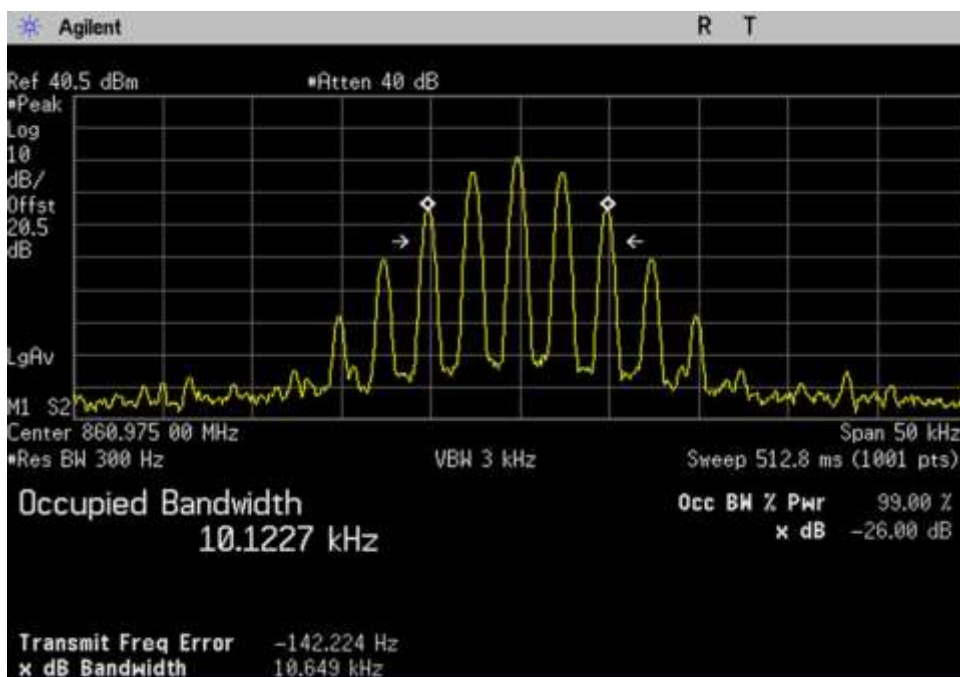
OBW_DL_851-861-FM_856MHz_MC-AGC



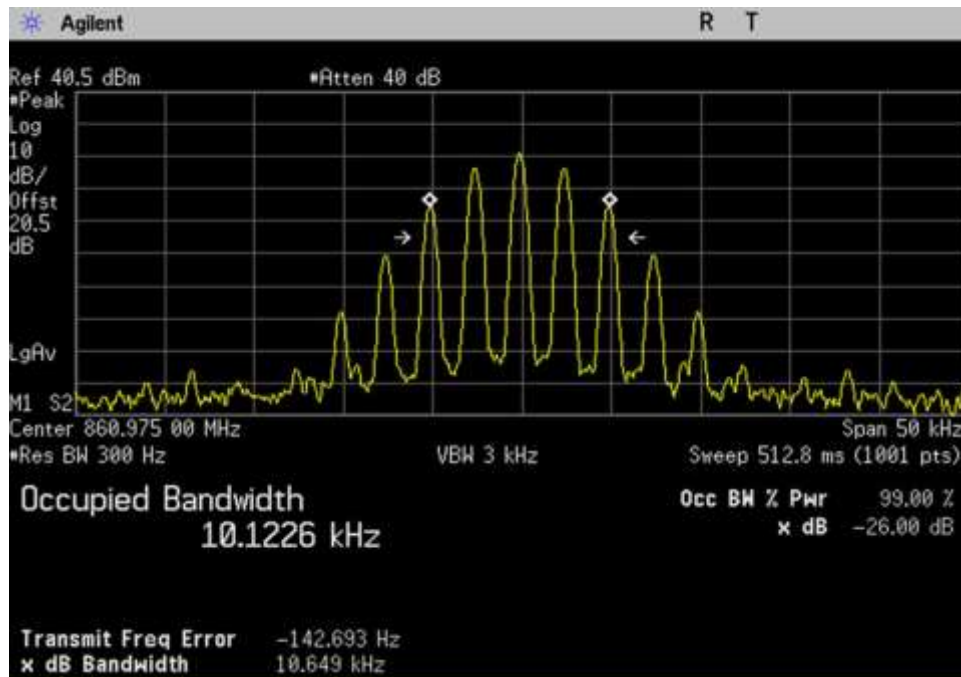
OBW_DL_851-861-FM_856MHz_MC-AGC+3



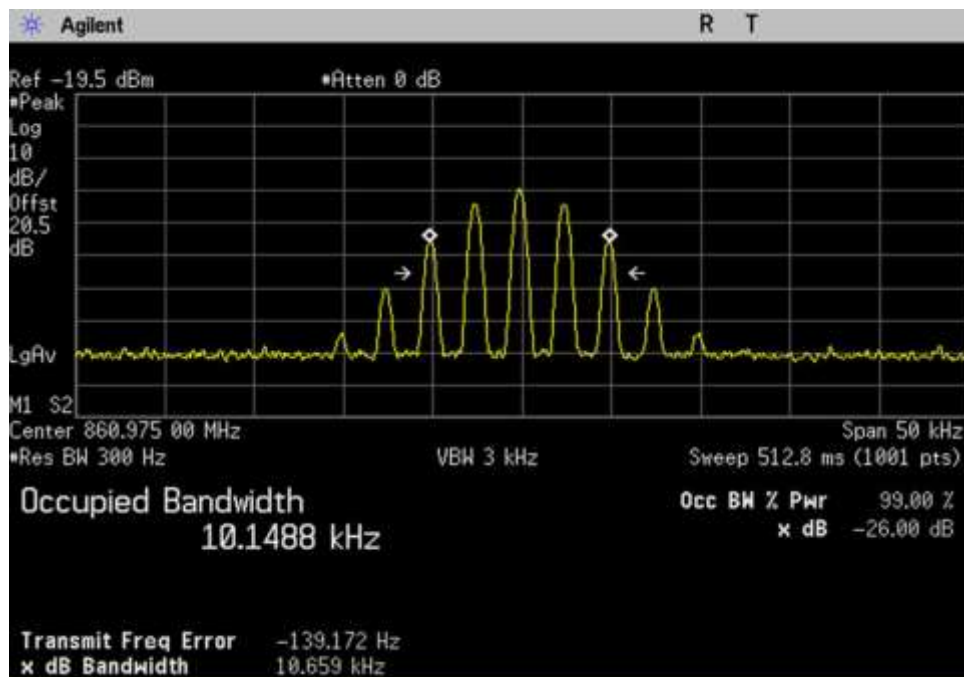
OBW_DL_851-861-FM_ 856MHz_MC-Input



OBW_DL_851-861-FM_ 860.975MHz_HC-AGC

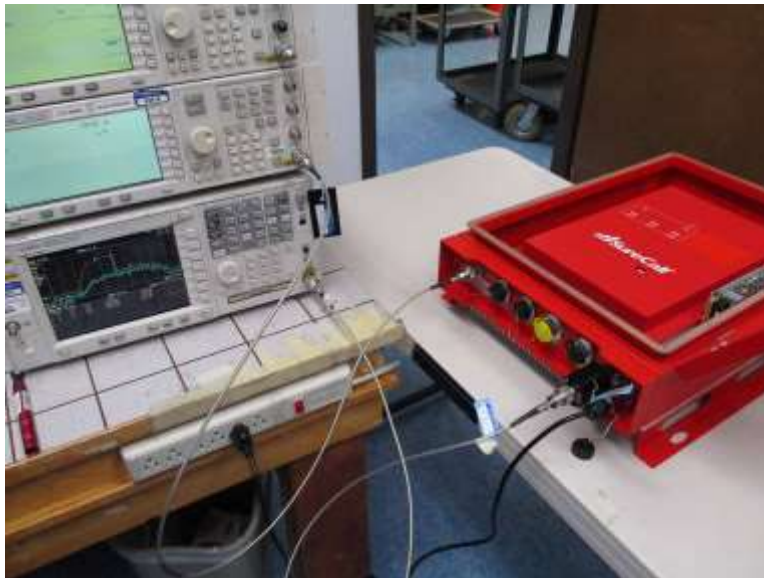


OBW_DL_851-861-FM_ 860.975MHz_HC-AGC+3



OBW_DL_851-861-FM_ 860.975MHz_HC-Input

Test Setup Photo



Part 90: 219(b) Frequency Bands

Engineer: Hieu Song Nguyenpham

Test Date: 5/30/2018

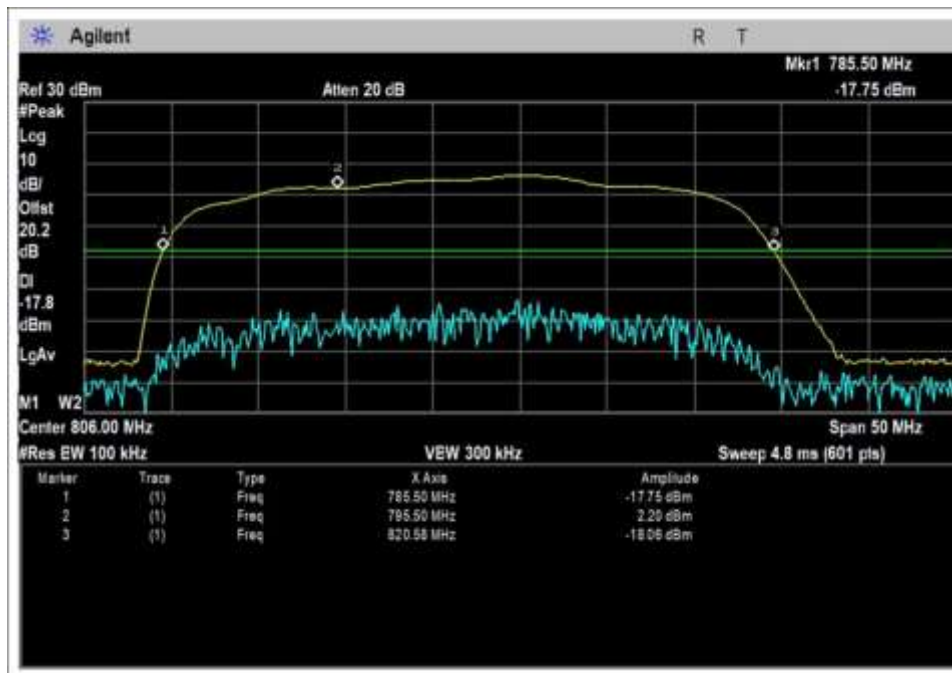
Test Equipment					
Asset #	Description	Model	Manufacturer	Cal Date	Cal Due
P06797	Attenuator	Narda	766-20	4/10/2017	4/10/2019
03471	Spectrum Analyzer	Agilent	E4440A	1/18/2018	1/18/2020
03418	Signal Generator	Agilent	E4438C	6/19/2017	6/19/2019
P07191	Cable	Astro	32022-29094K-29094K-48TC	10/30/2017	10/30/2019
03362	Cable	Astrolab	32022-2-29094-48TC	1/10/2017	1/10/2019

Environmental Conditions					
Temperature (°C)	21.3	Relative Humidity (%):	47	Atmospheric Pressure (kPa):	102.3

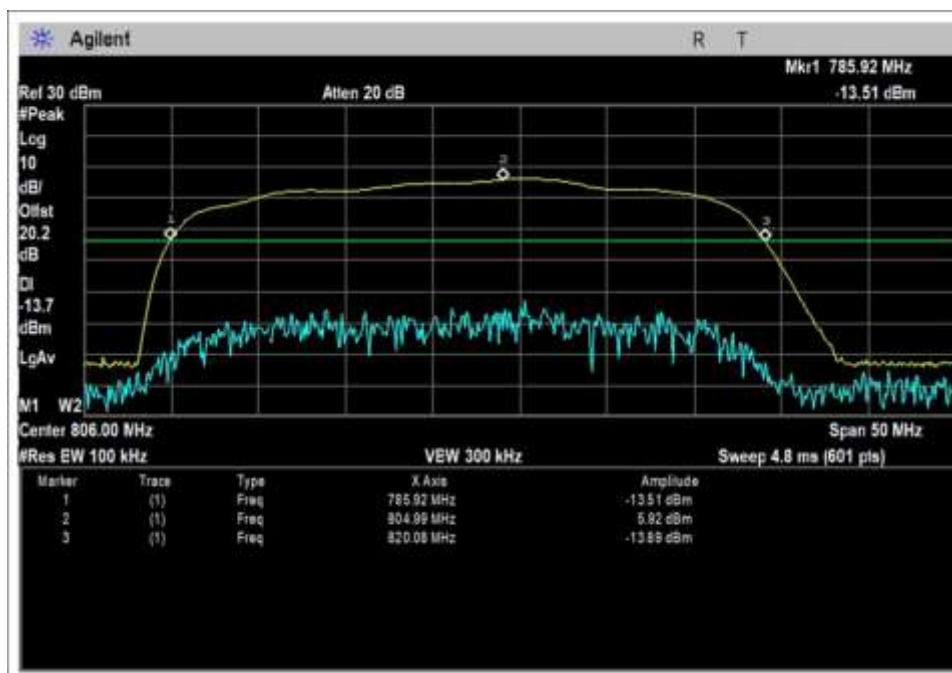
Summary of Results

Pass: Plots show that gain out of band does not increase beyond that value which is present at the edge of each band.

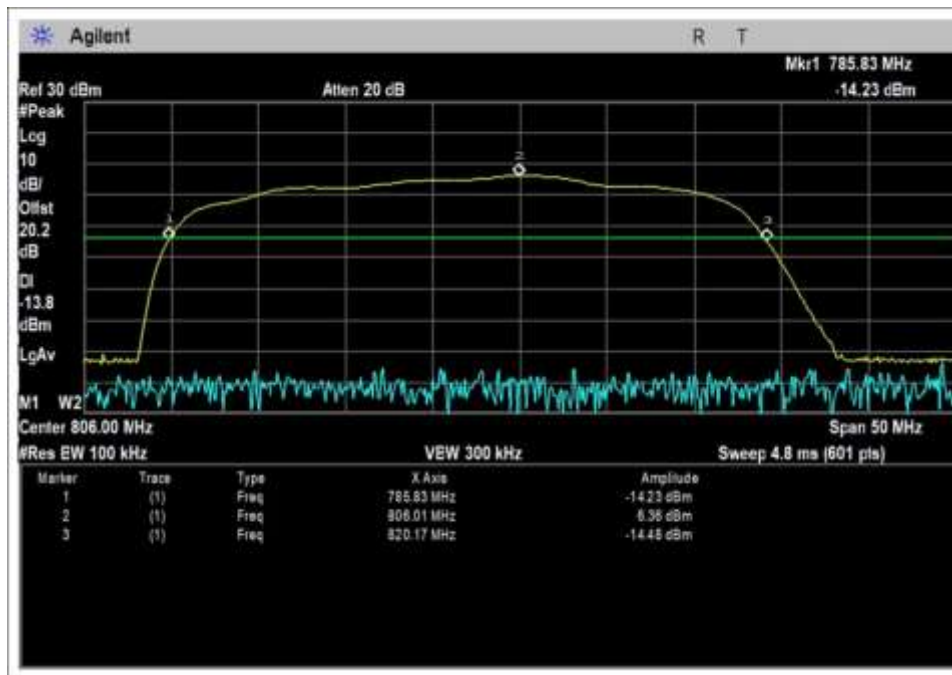
Plots



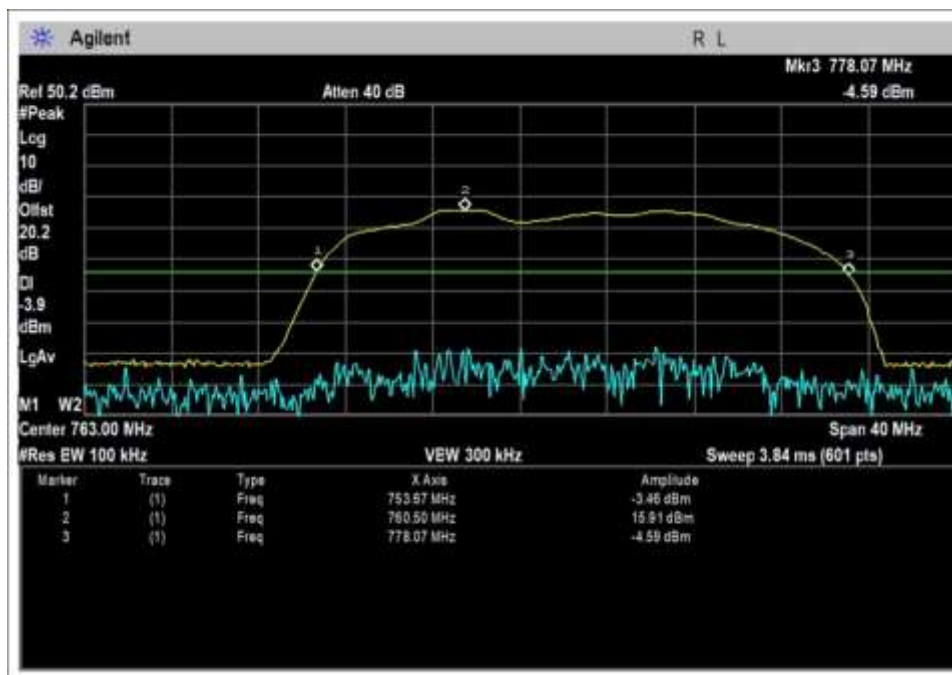
UL 788_798



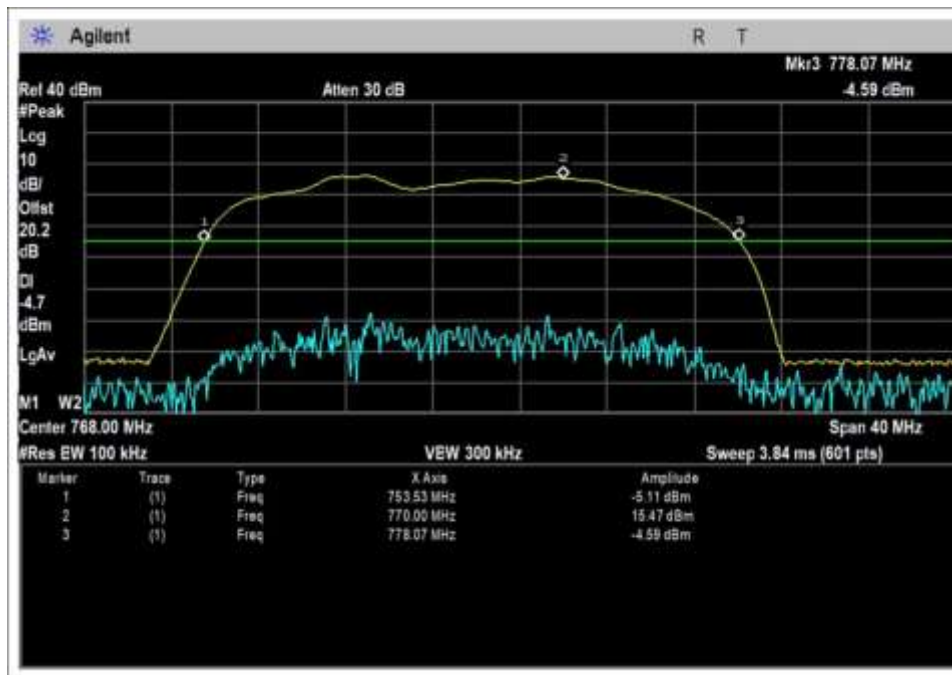
UL 799_805



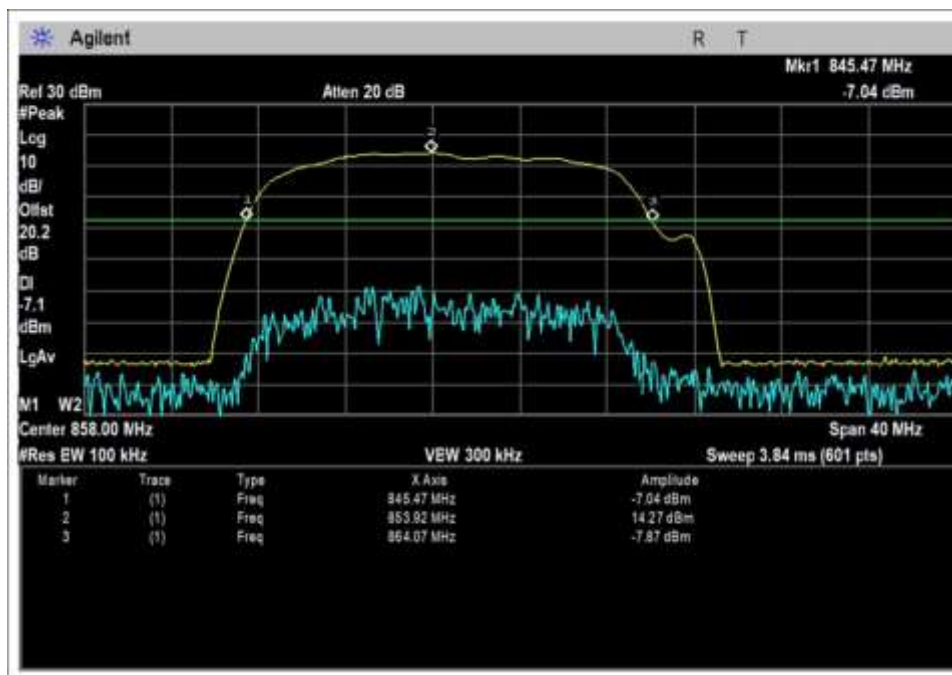
UL 806_816



DL 758_768

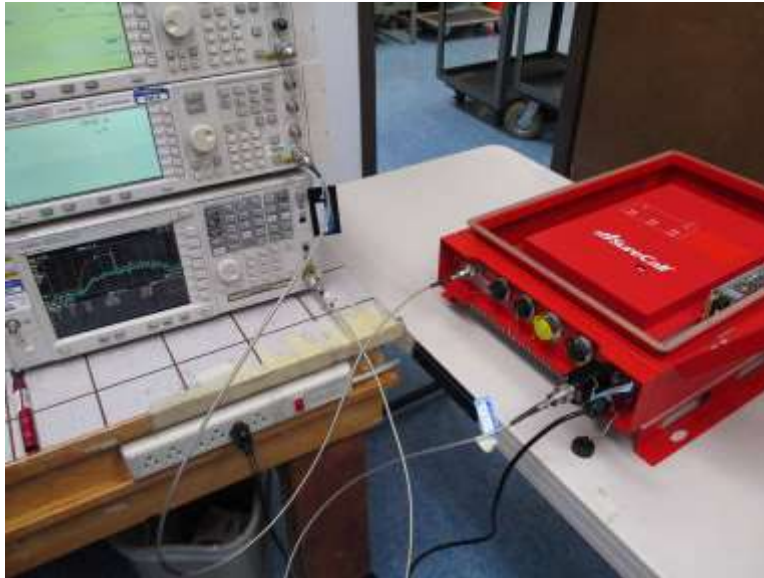


DL 769-775



DL 851-861

Test Setup Photo



Part 90: 219(b) EMask Out of Band Emissions

Engineer: Hieu Song Nguyenpham

Test Date: 6/4/2018

Test Equipment					
Asset #	Description	Model	Manufacturer	Cal Date	Cal Due
P06797	Attenuator	Narda	766-20	4/10/2017	4/10/2019
03471	Spectrum Analyzer	Agilent	E4440A	1/18/2018	1/18/2020
03418	Signal Generator	Agilent	E4438C	6/19/2017	6/19/2019
P07191	Cable	Astro	32022-29094K-29094K-48TC	10/30/2017	10/30/2019
03362	Cable	Astrolab	32022-2-29094-48TC	1/10/2017	1/10/2019

Environmental Conditions					
Temperature (°C)	23.5	Relative Humidity (%):	46	Atmospheric Pressure (kPa):	101.5

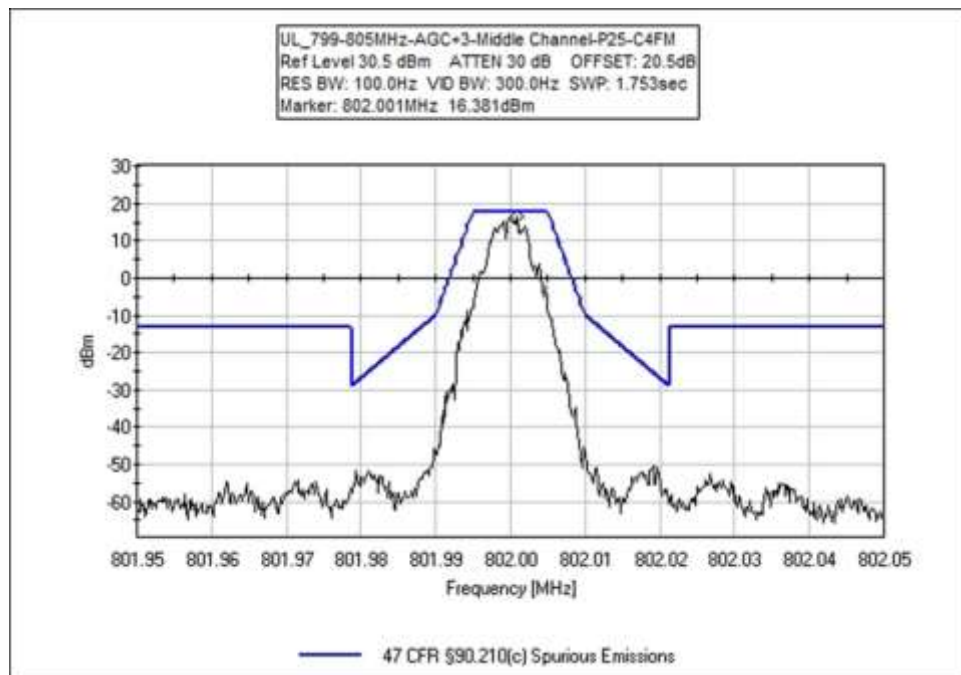
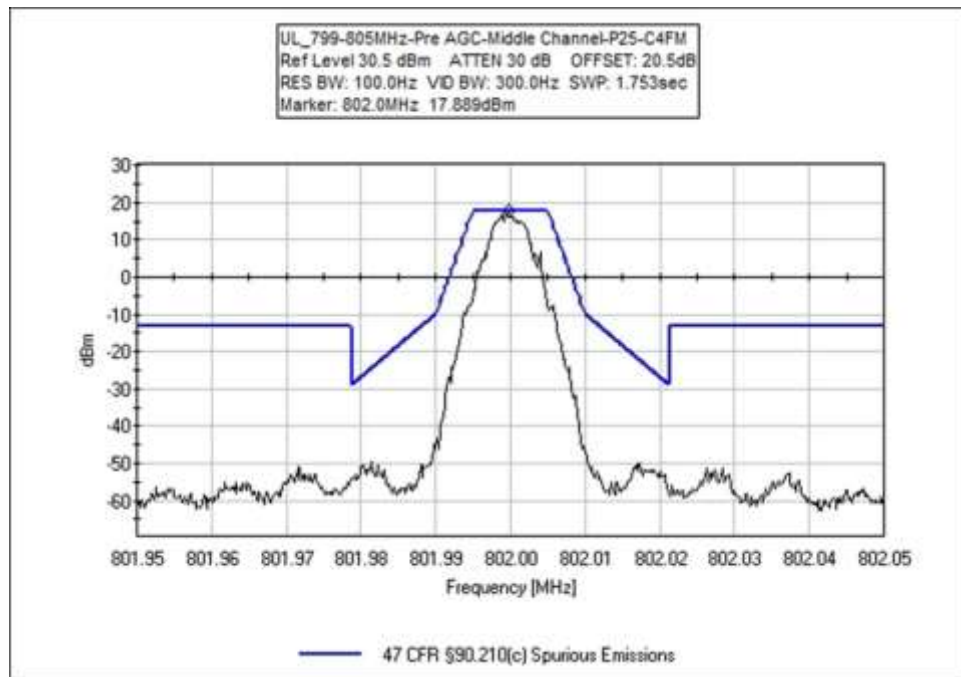
Summary of Results

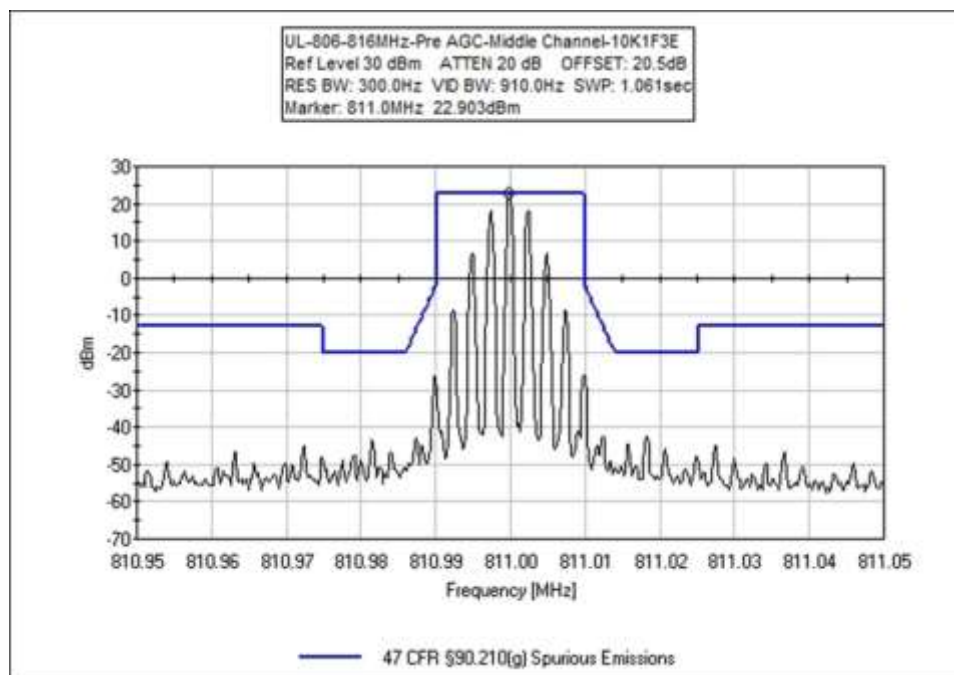
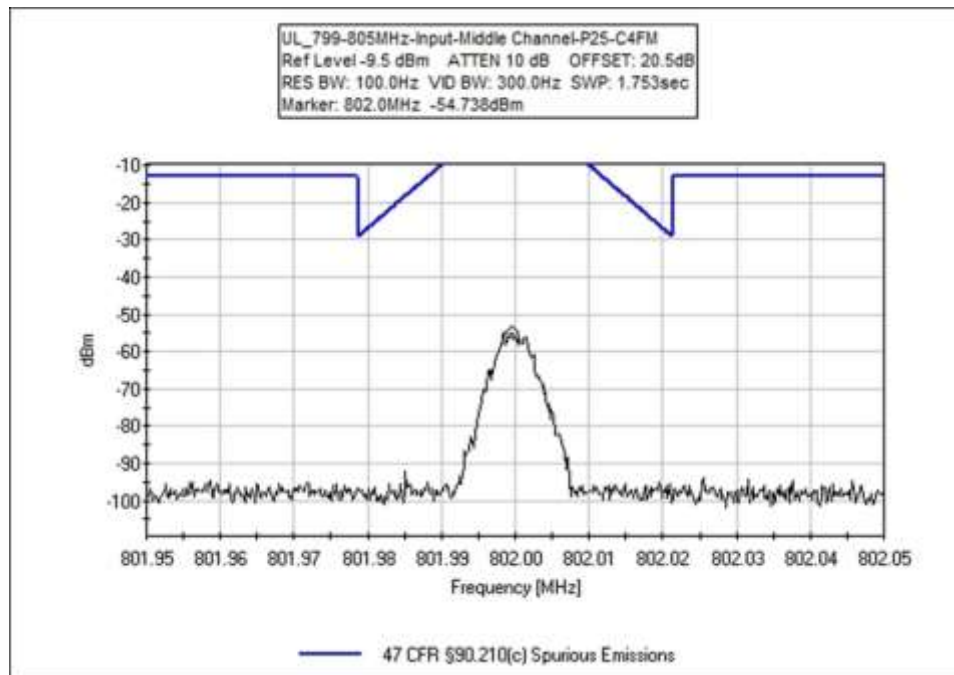
Pass: As indicated in plots below, all emissions are under the applicable masks.

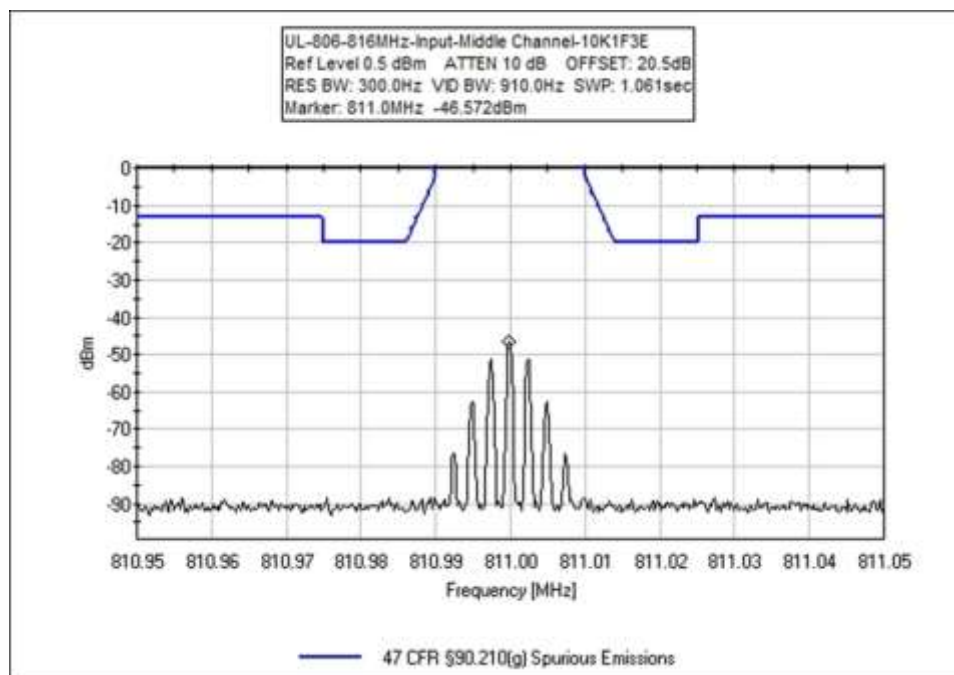
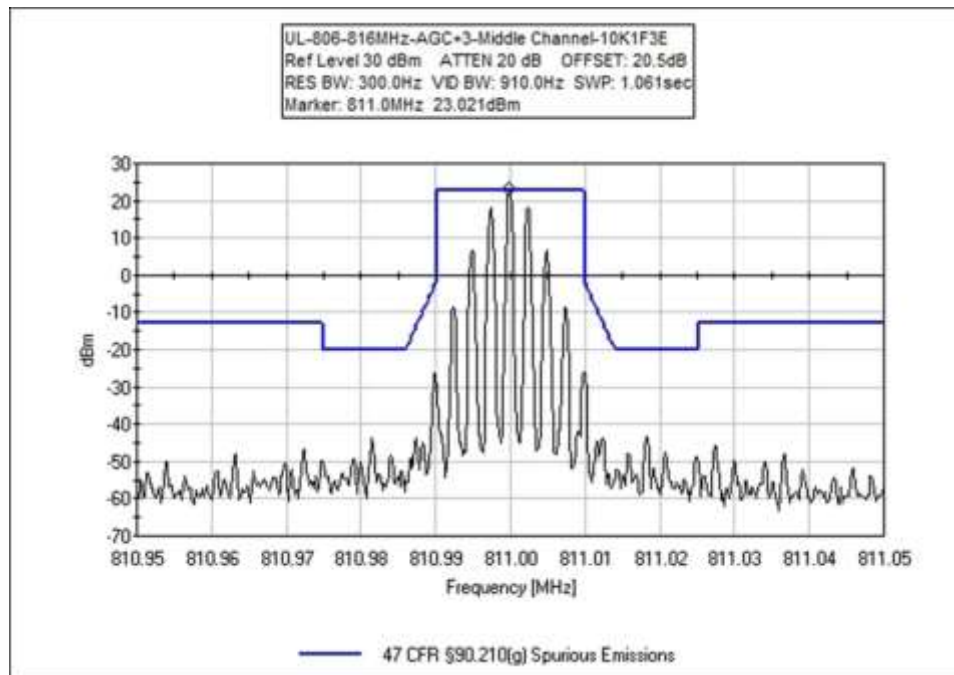
Applicable Masks / OOB Public safety					
	UL		DL		
	788-805		758-775		
	788-798	799-805	758-768	769-775	
OOB	LMH		LMH		
Mask C		LMH		LMH	
Mask H					LMH
Mask G					LMH

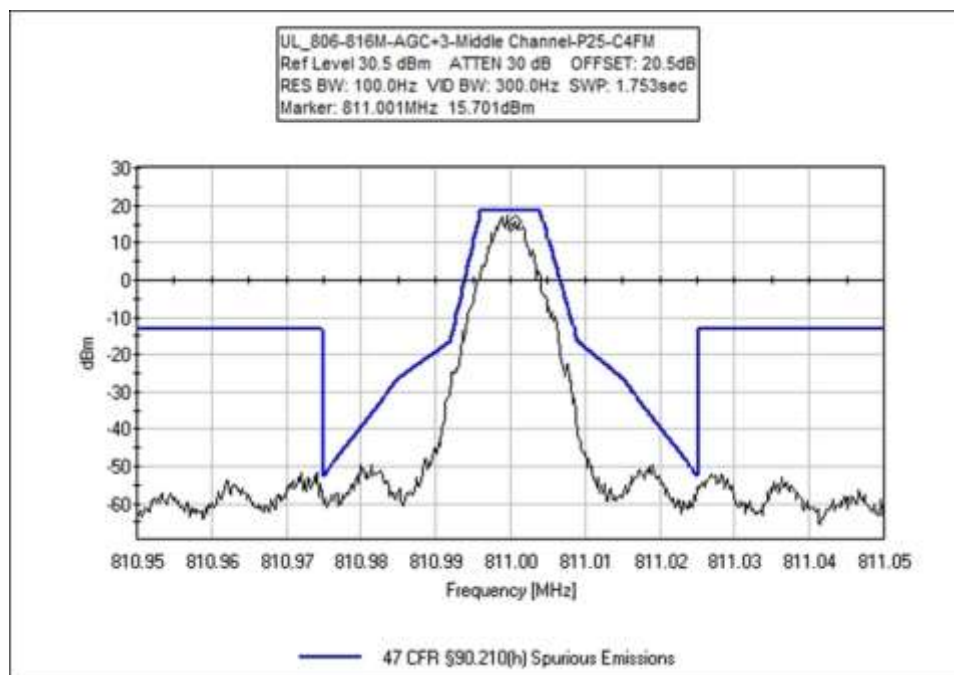
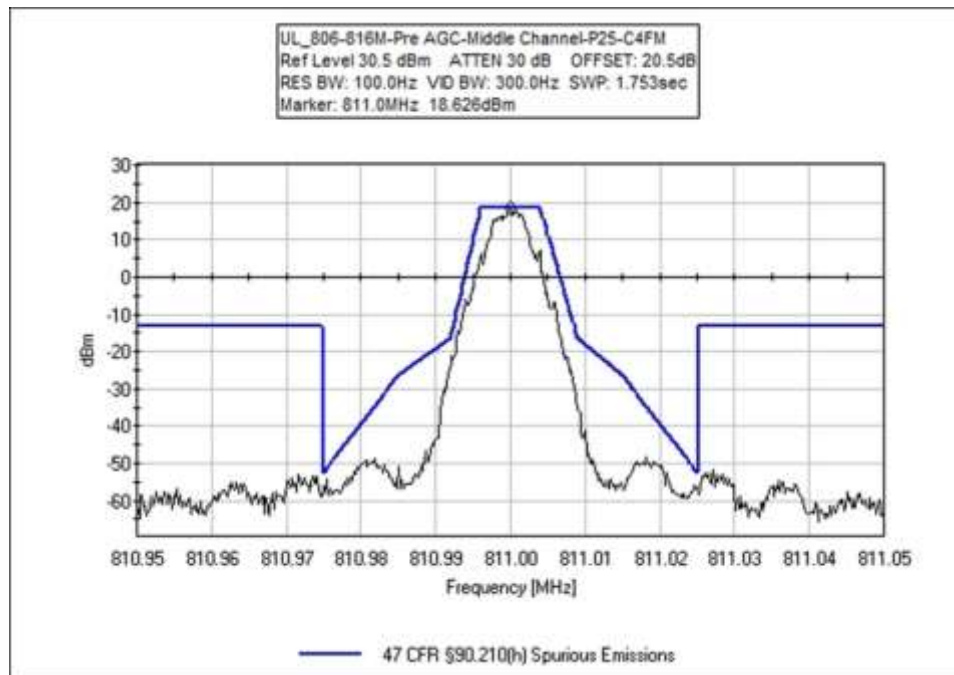
LMH: Low, Middle and High channels

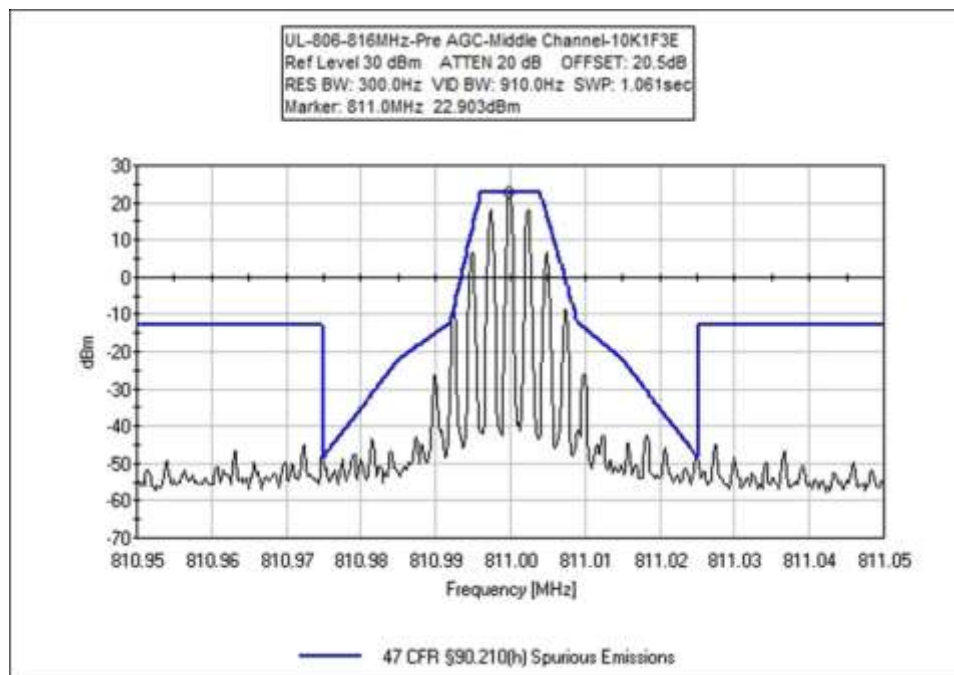
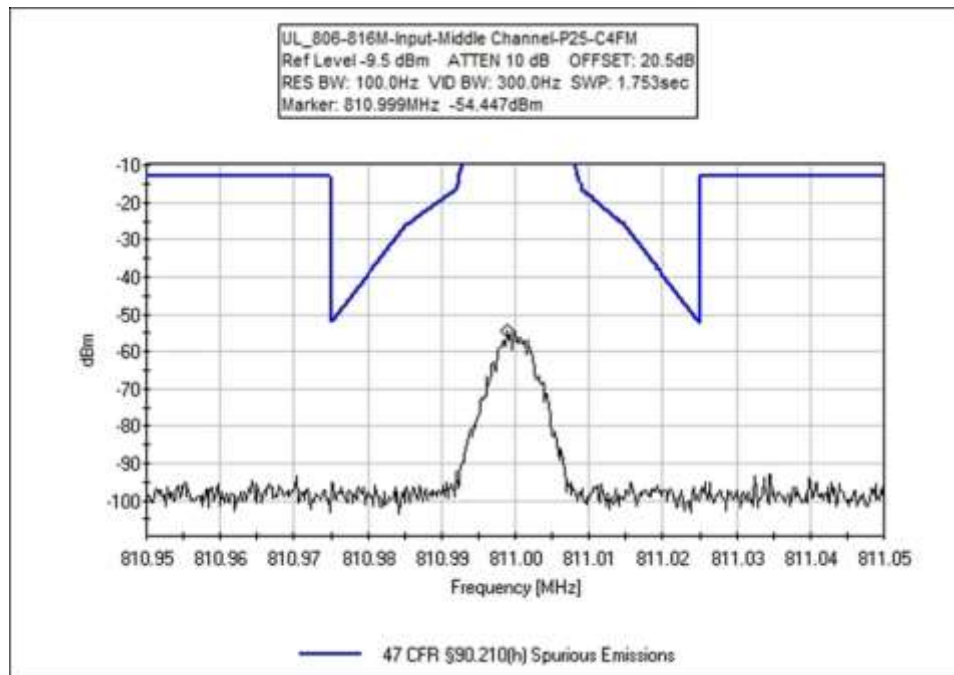
Plots

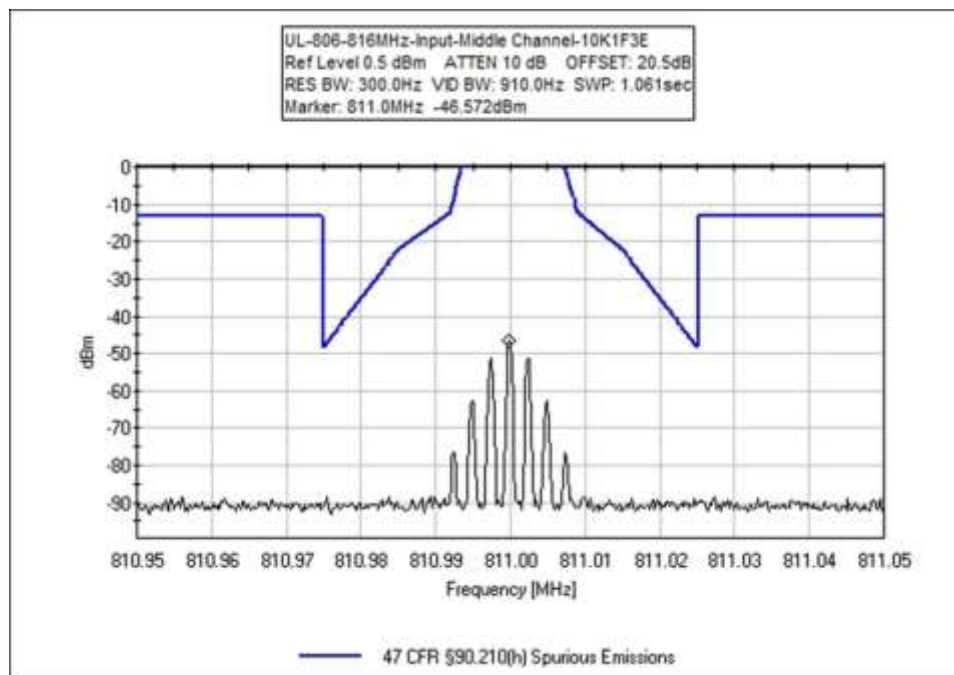
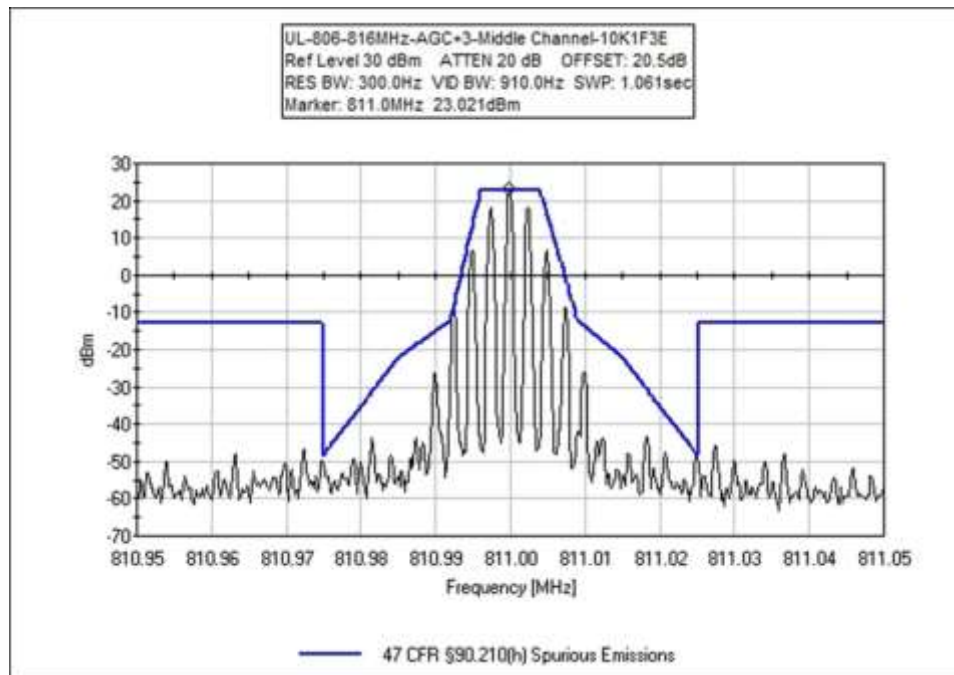


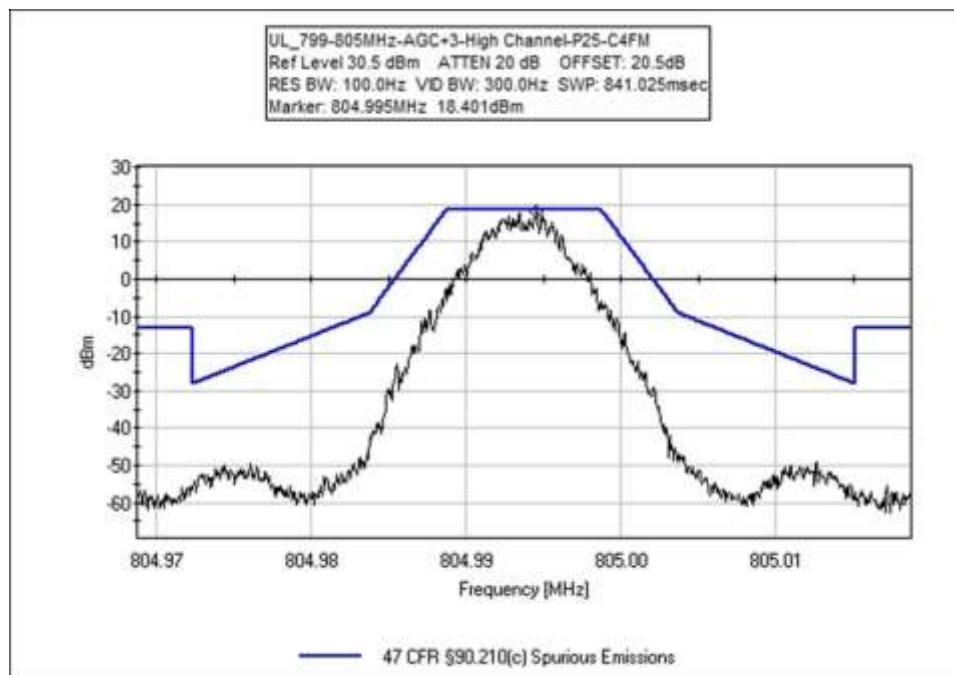
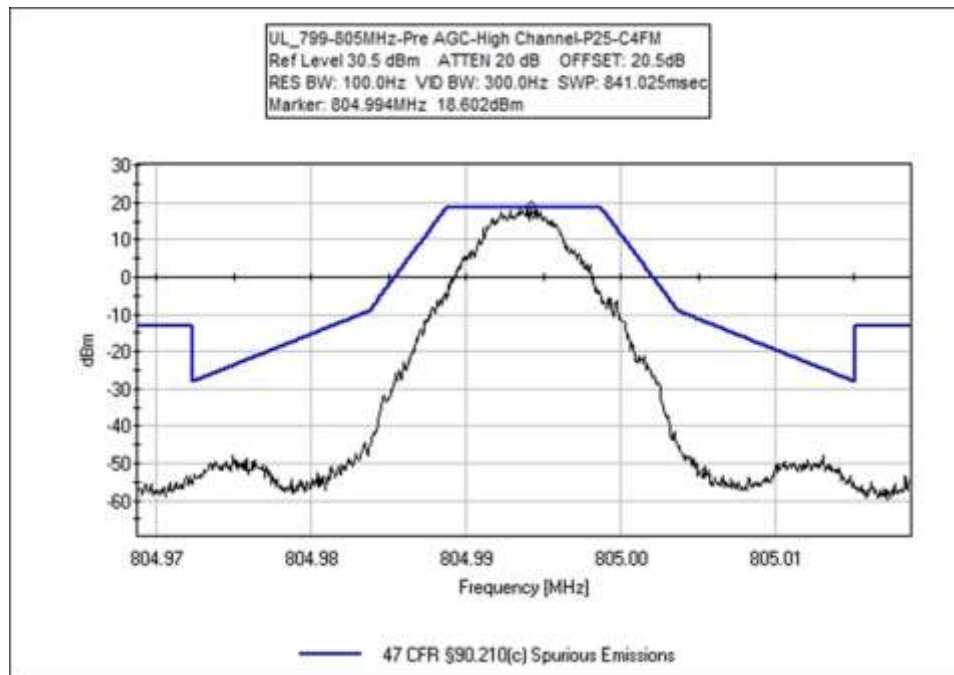


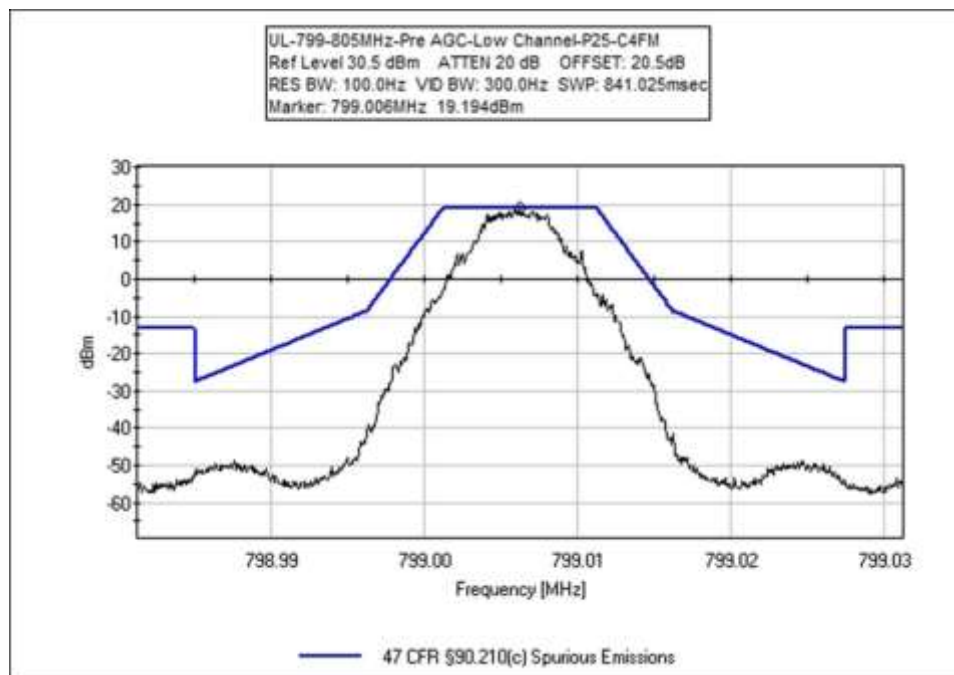
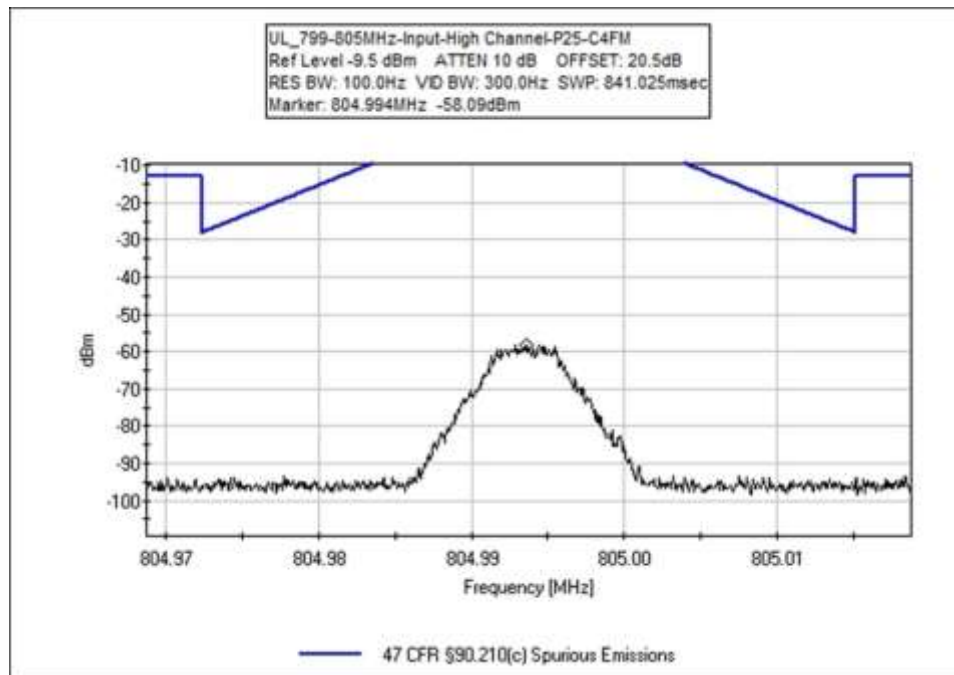


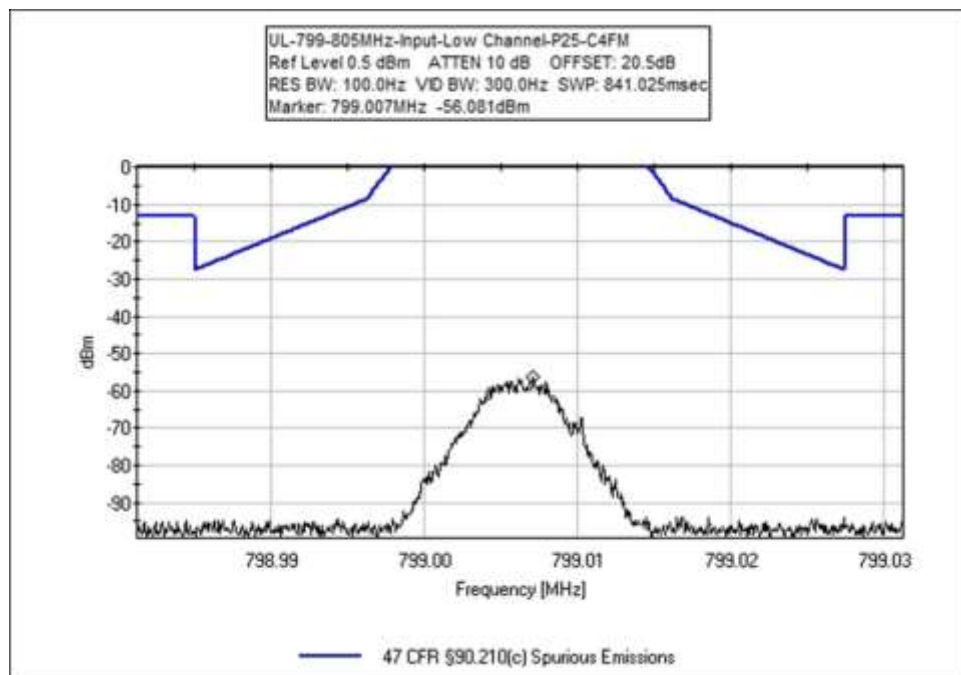
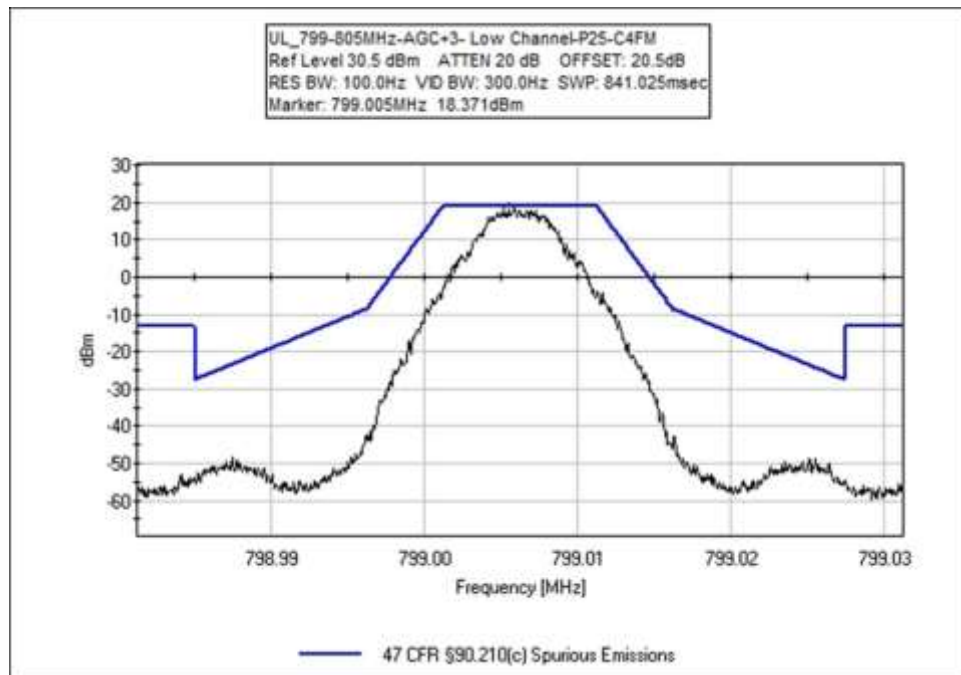


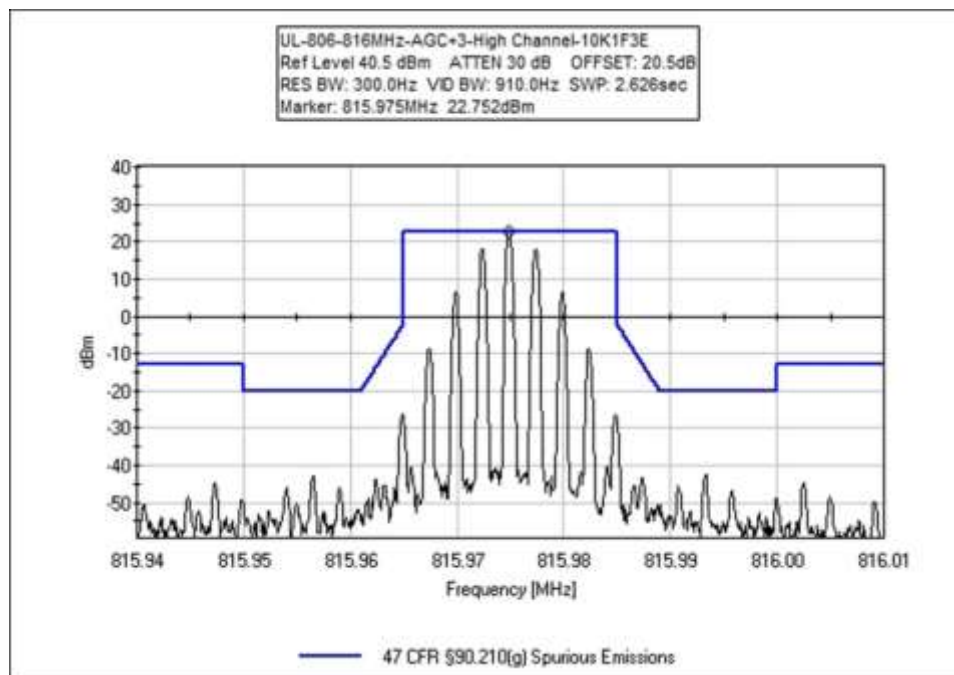
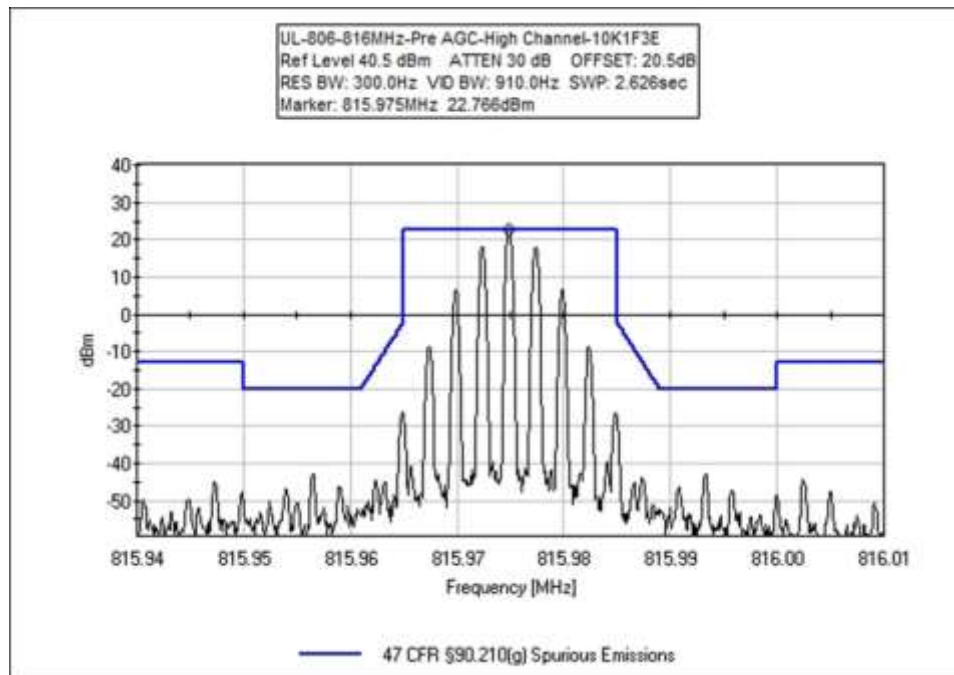


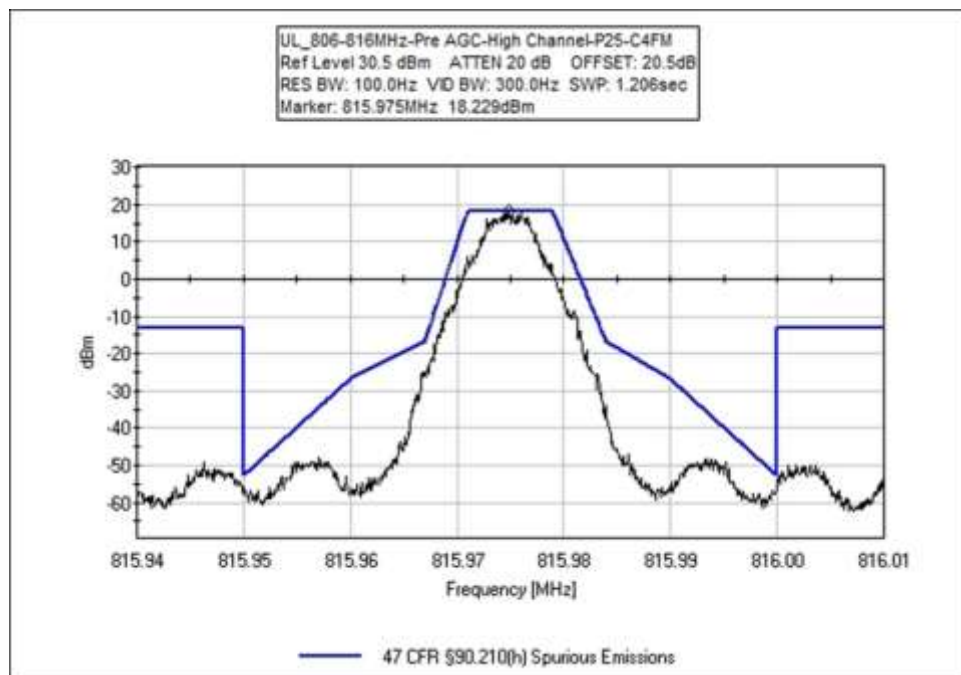
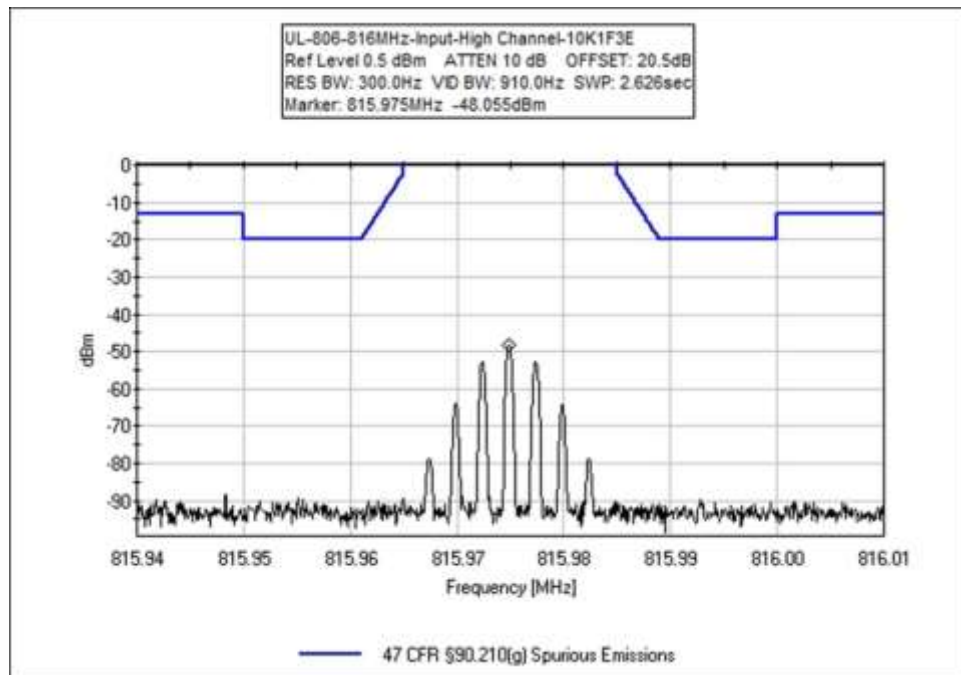


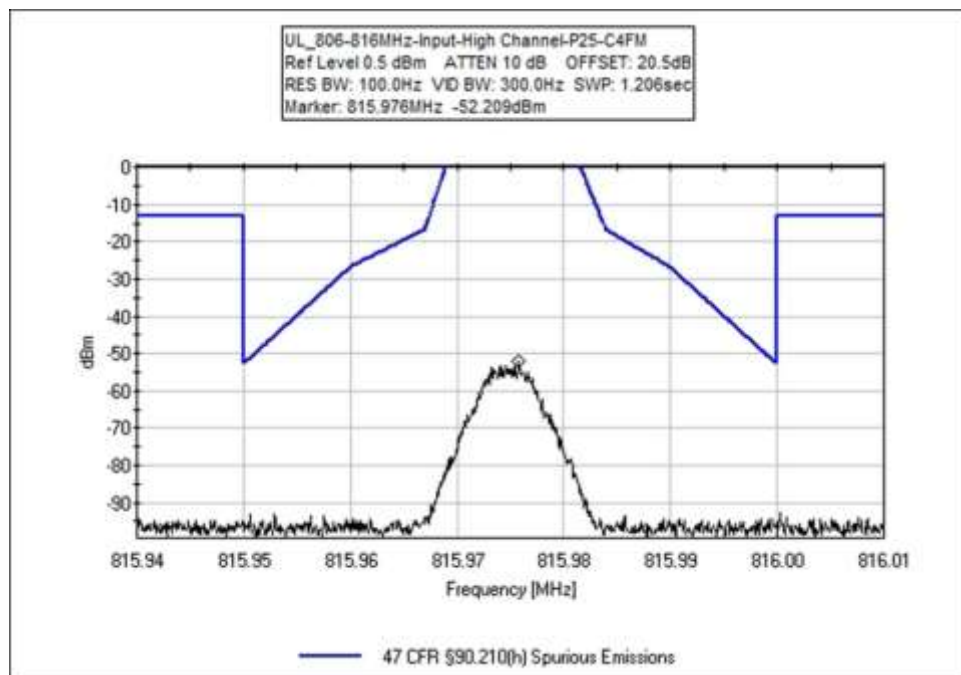
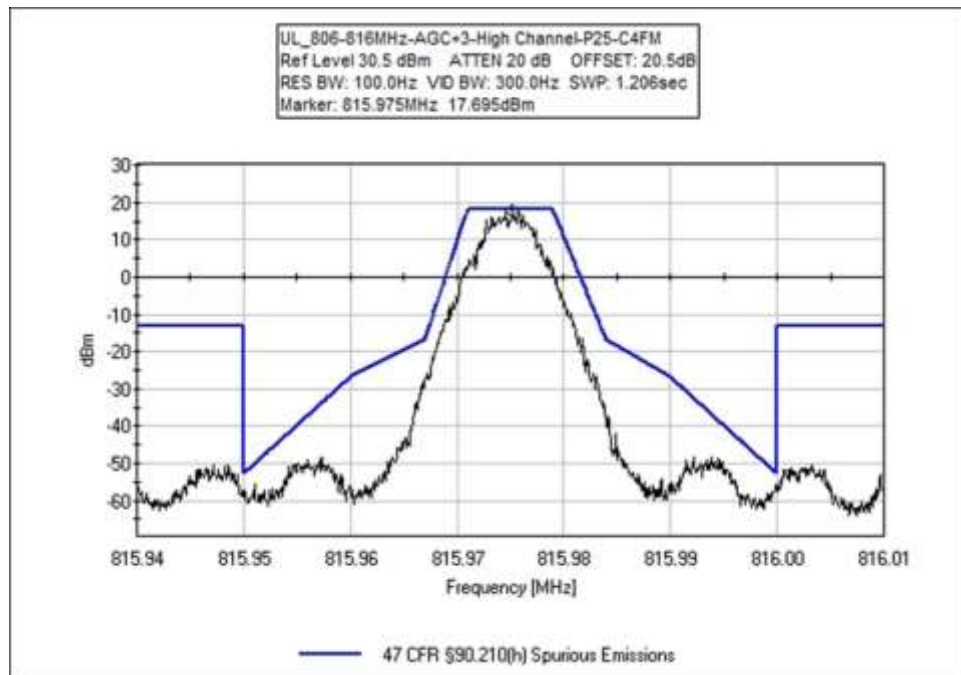


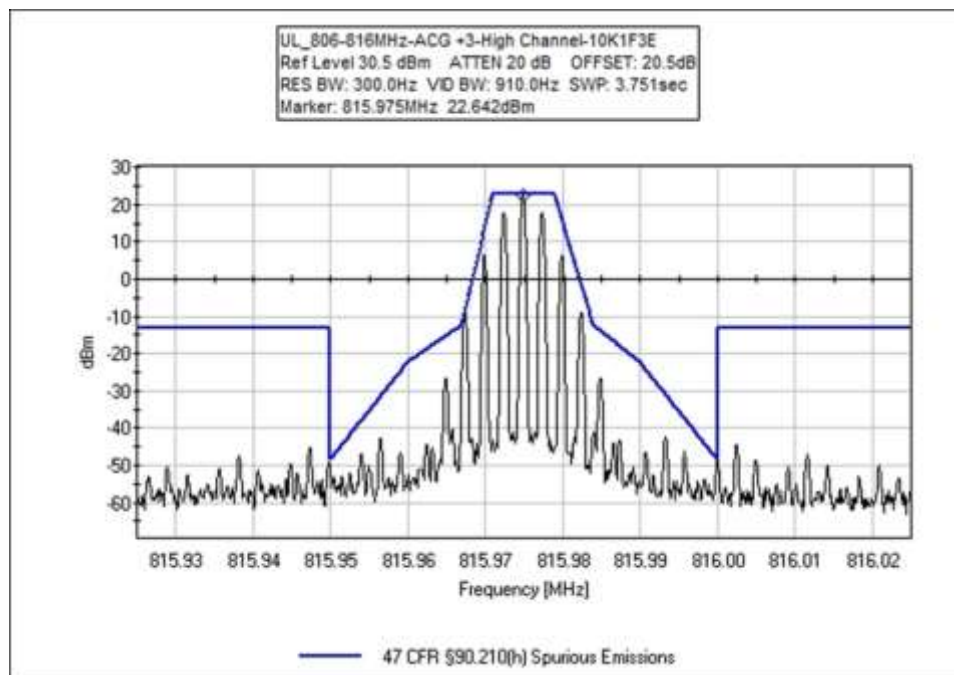
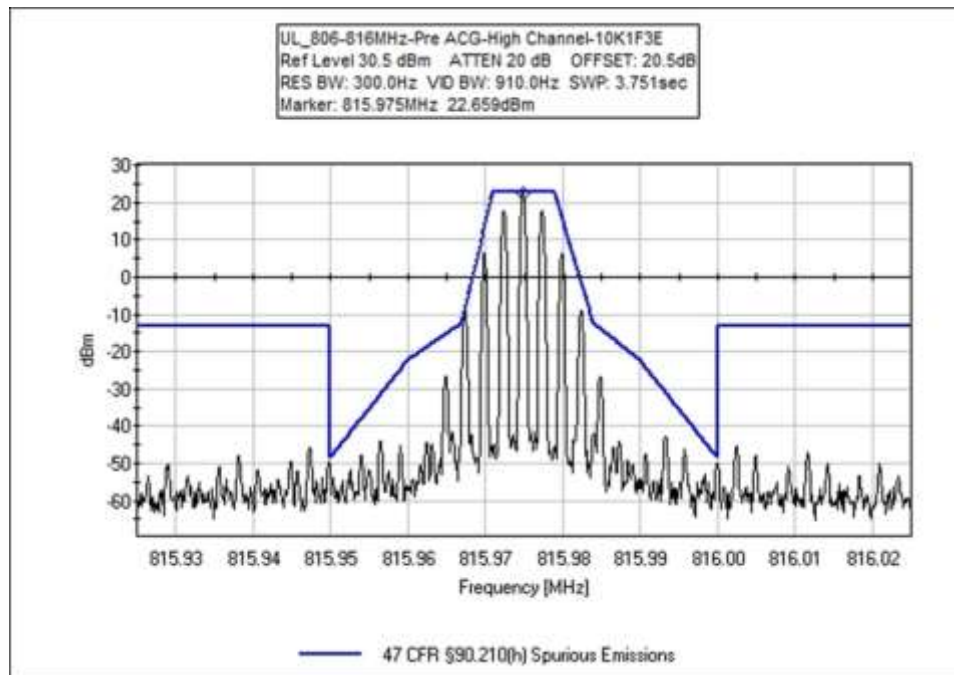


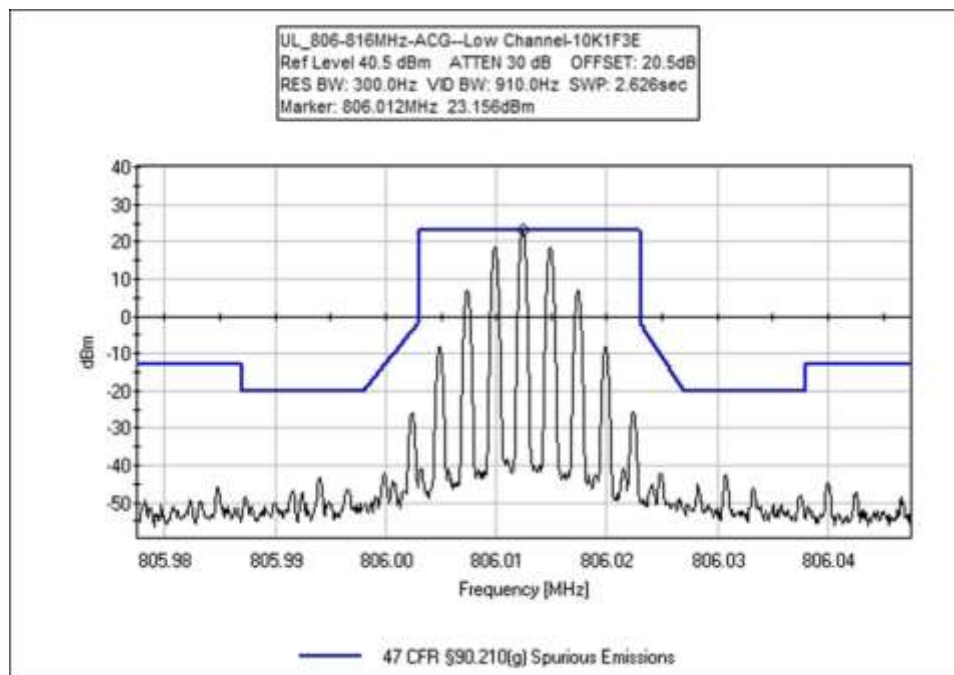
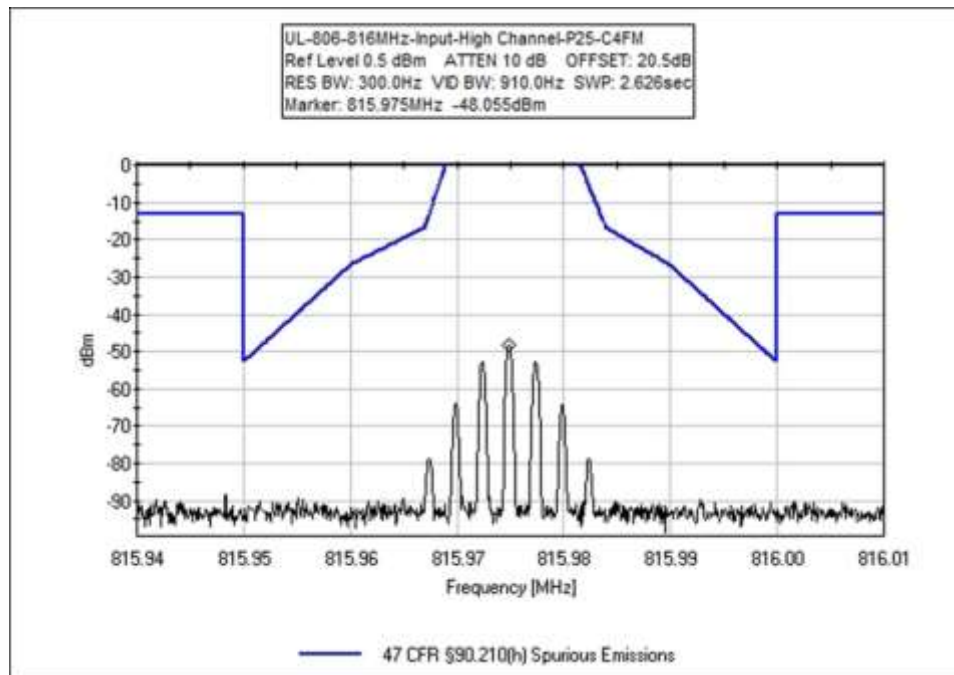


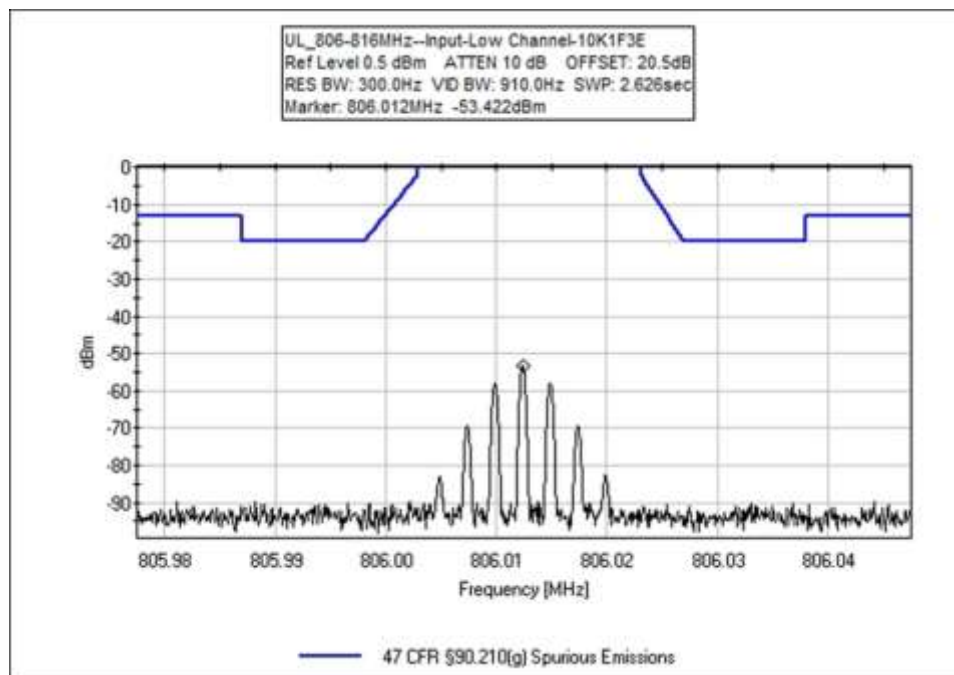
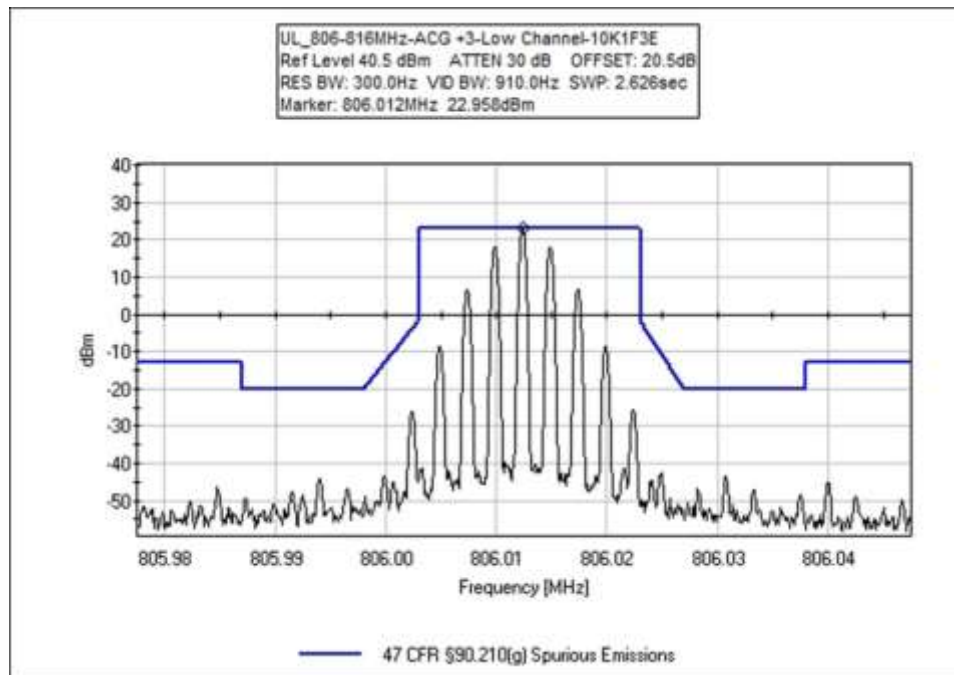


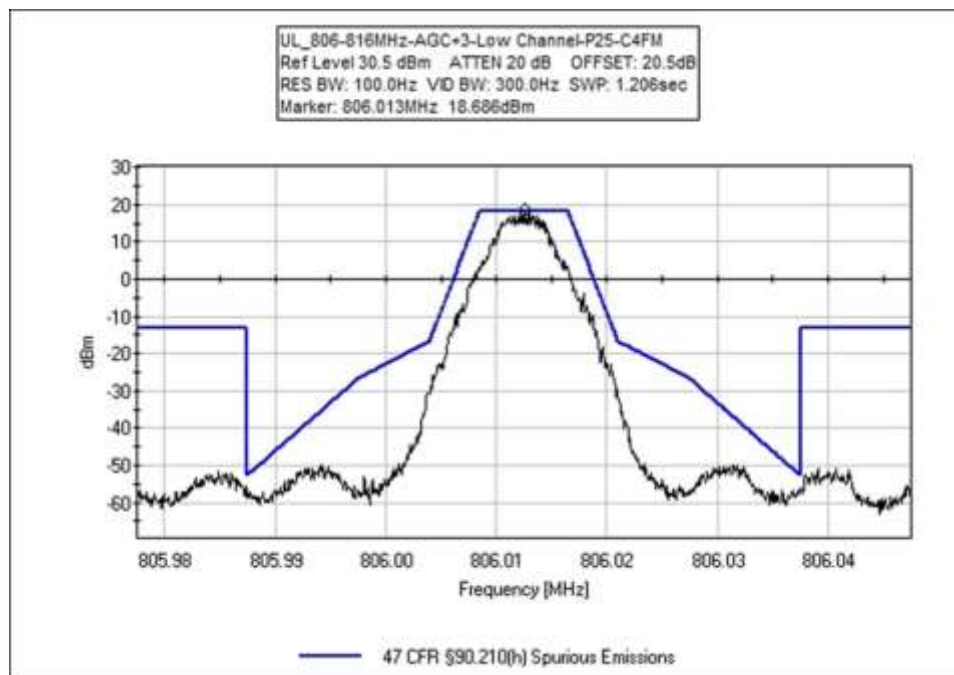
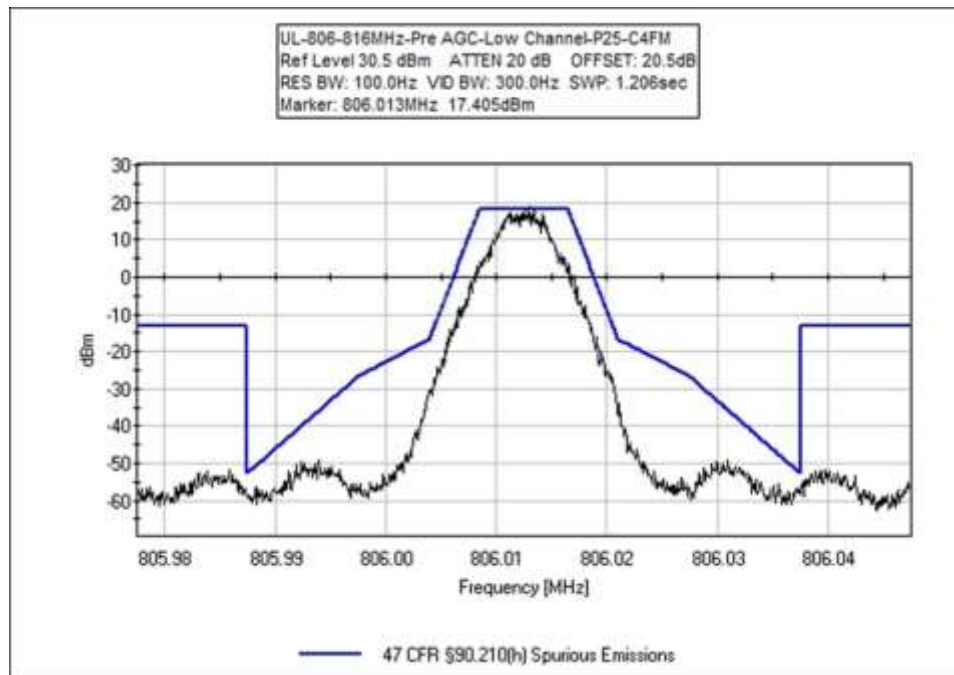


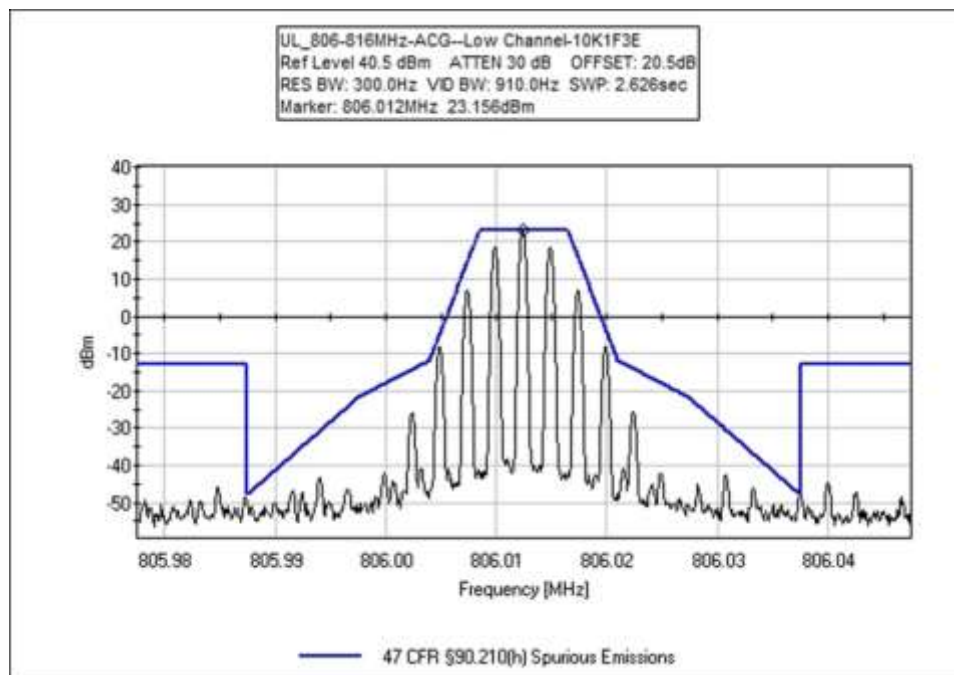
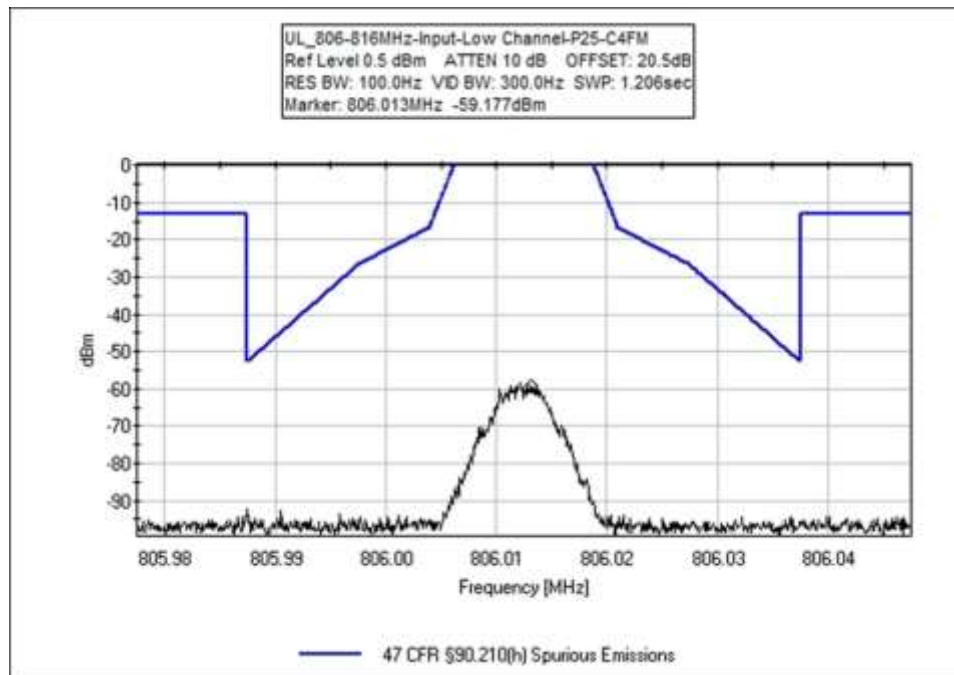


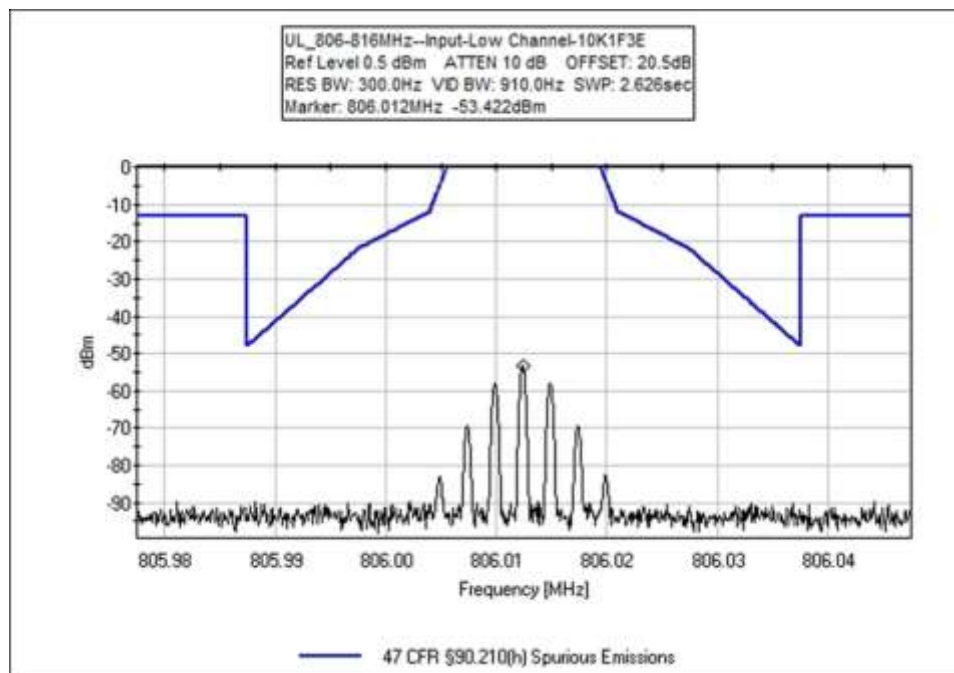
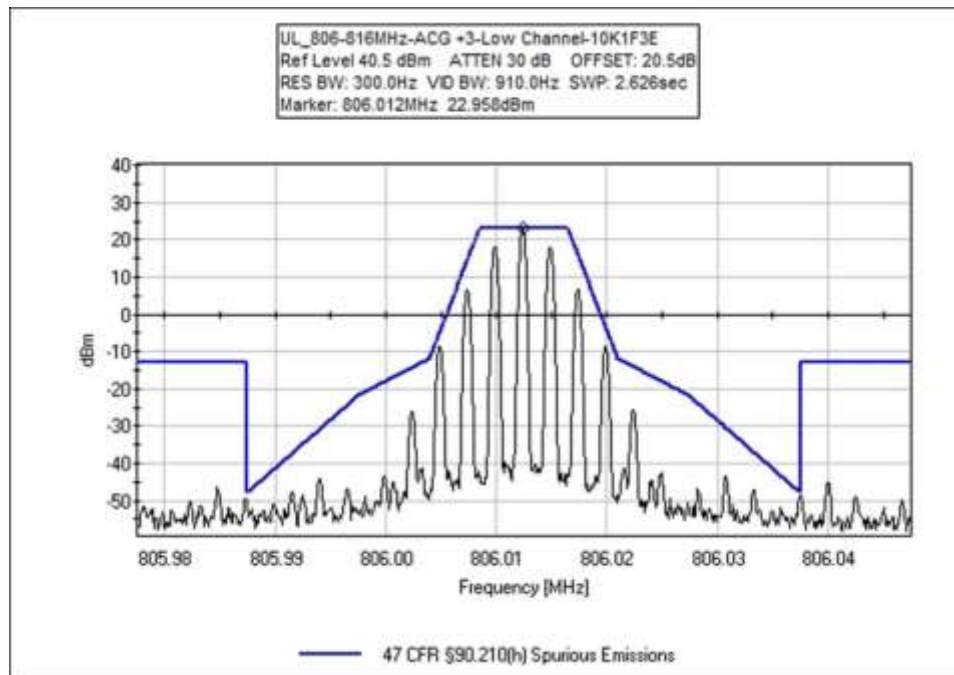


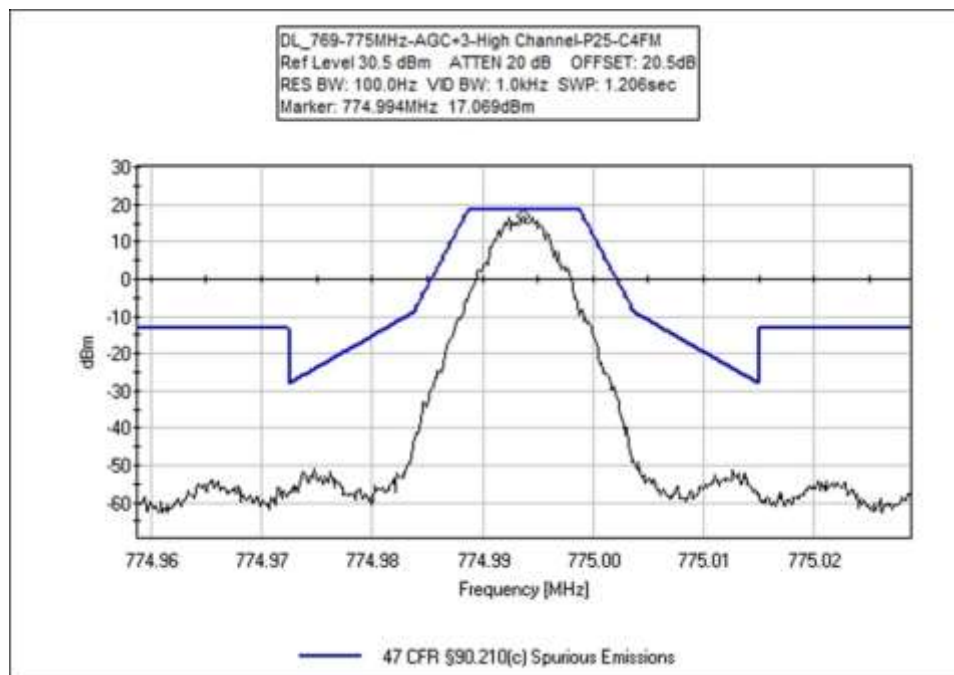
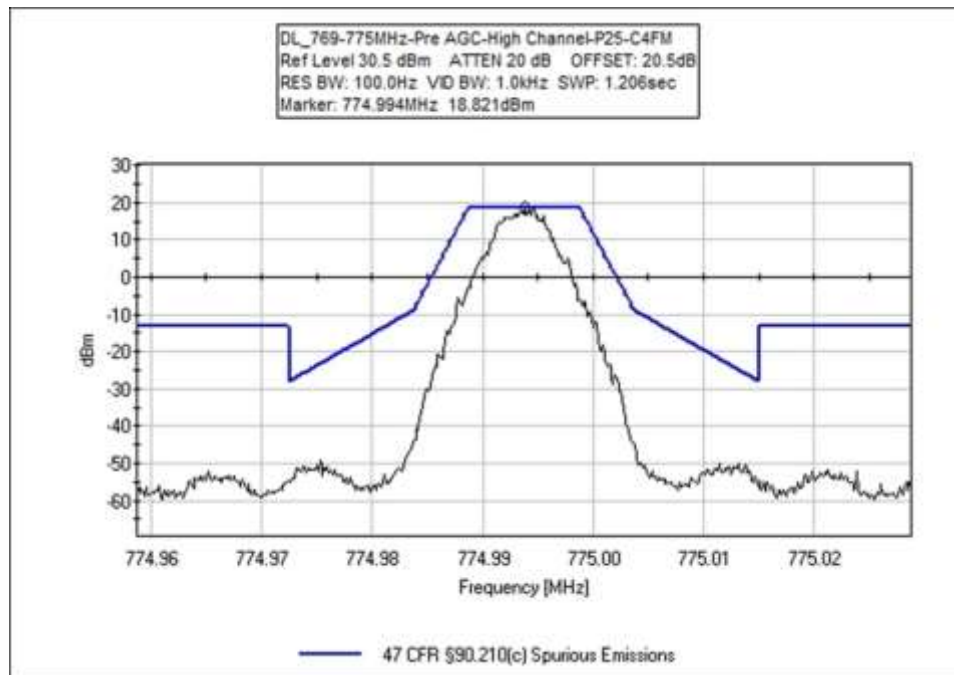


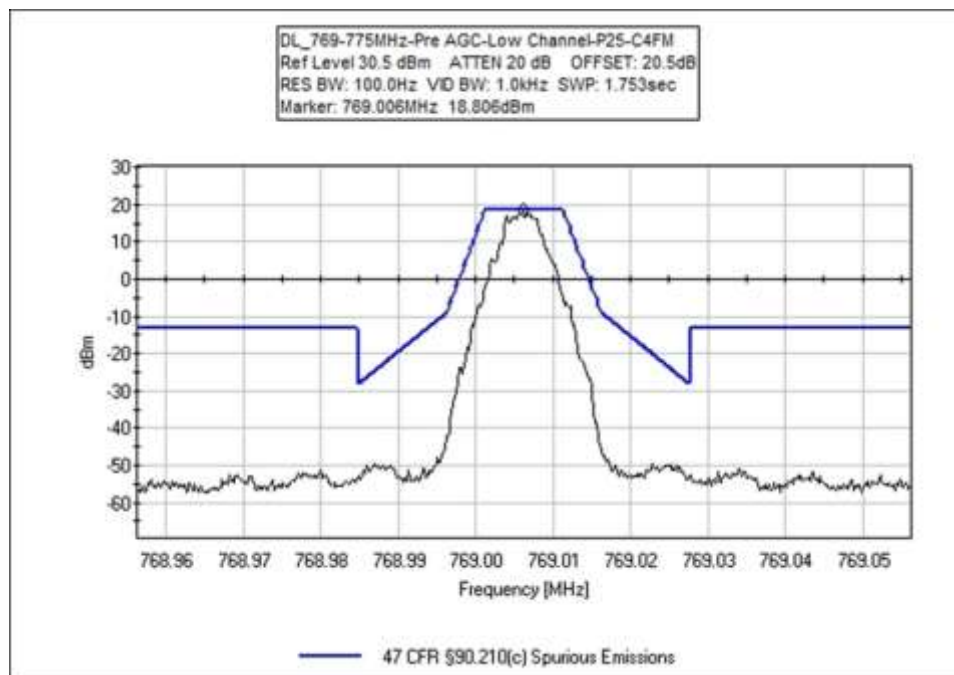
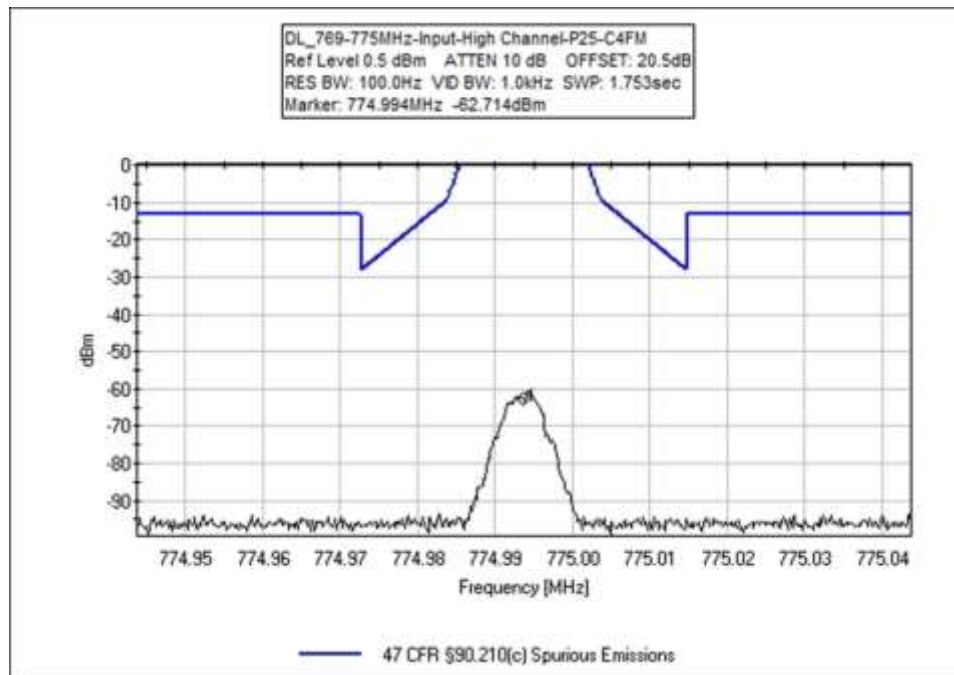


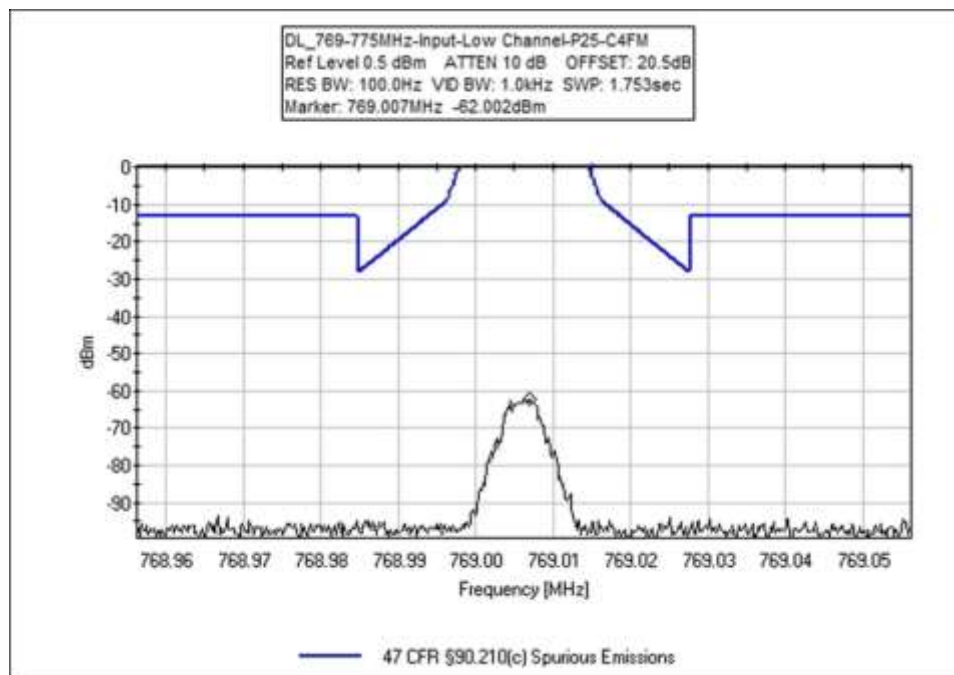
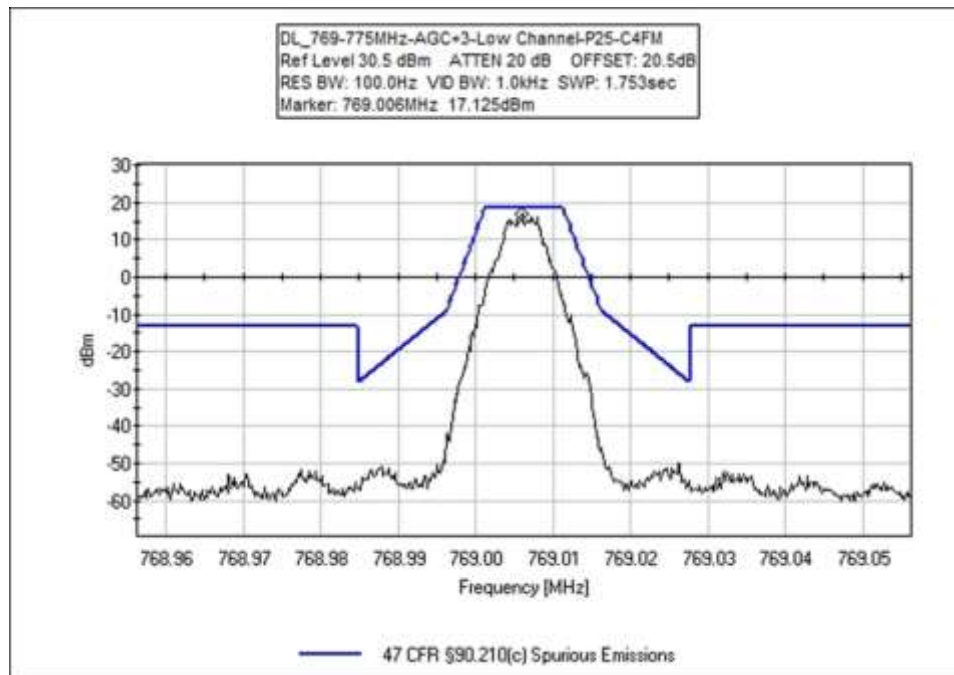


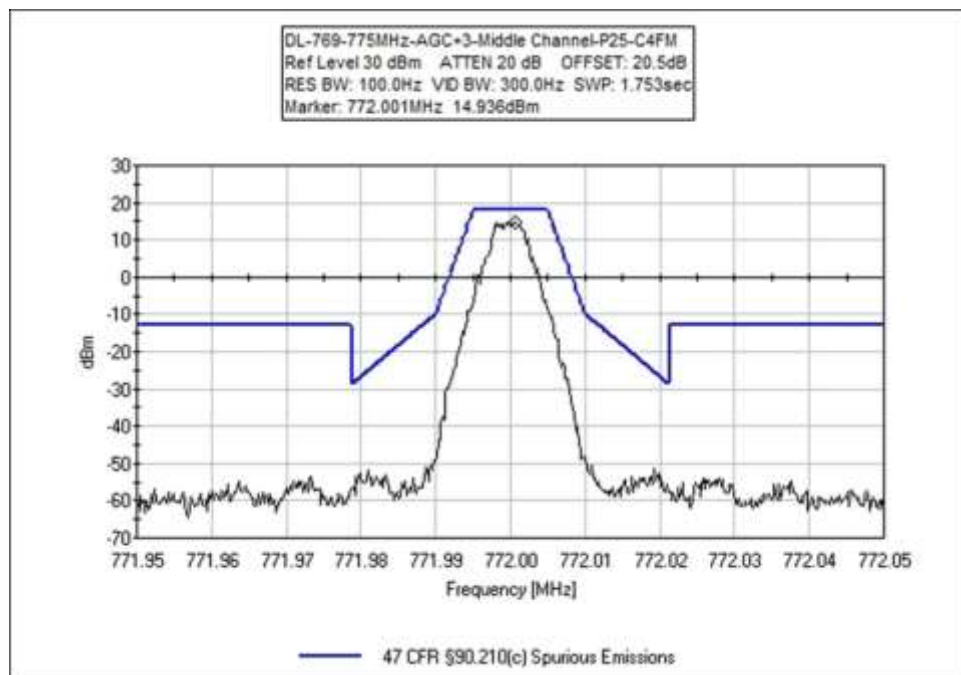
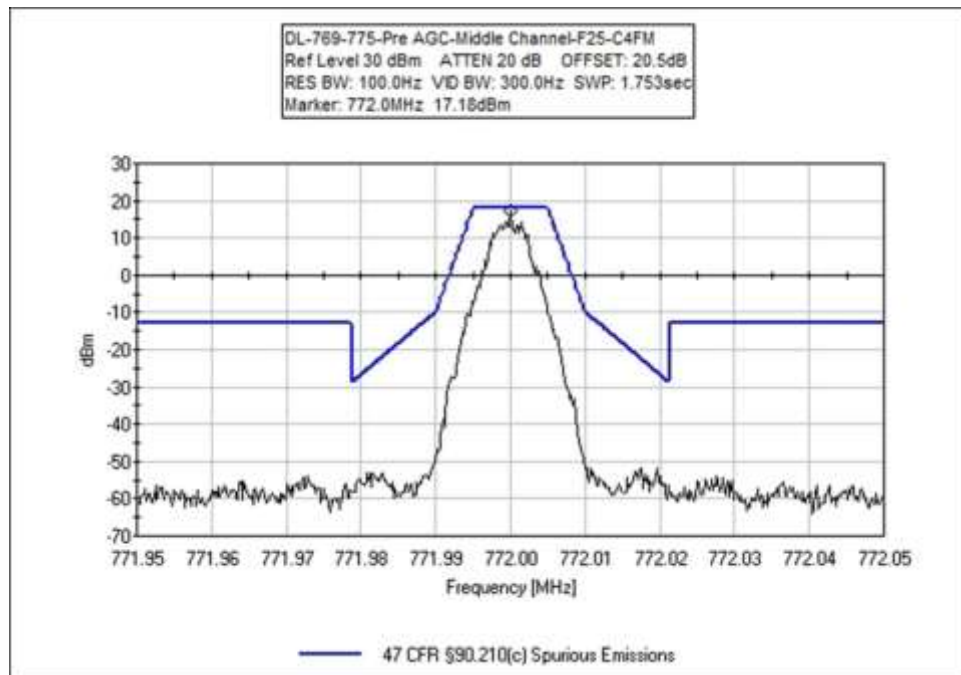


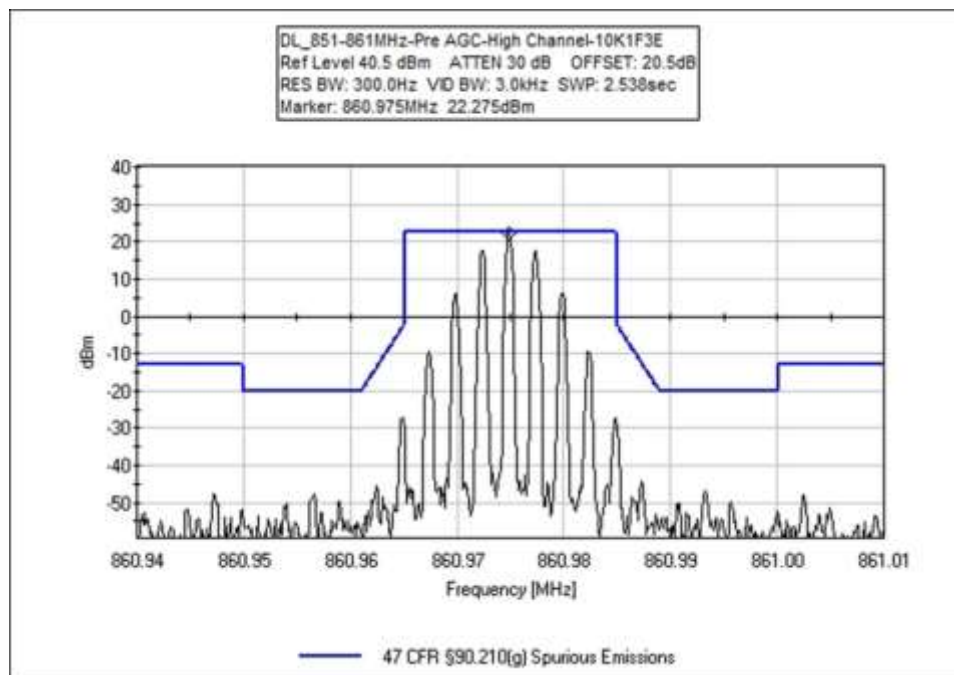
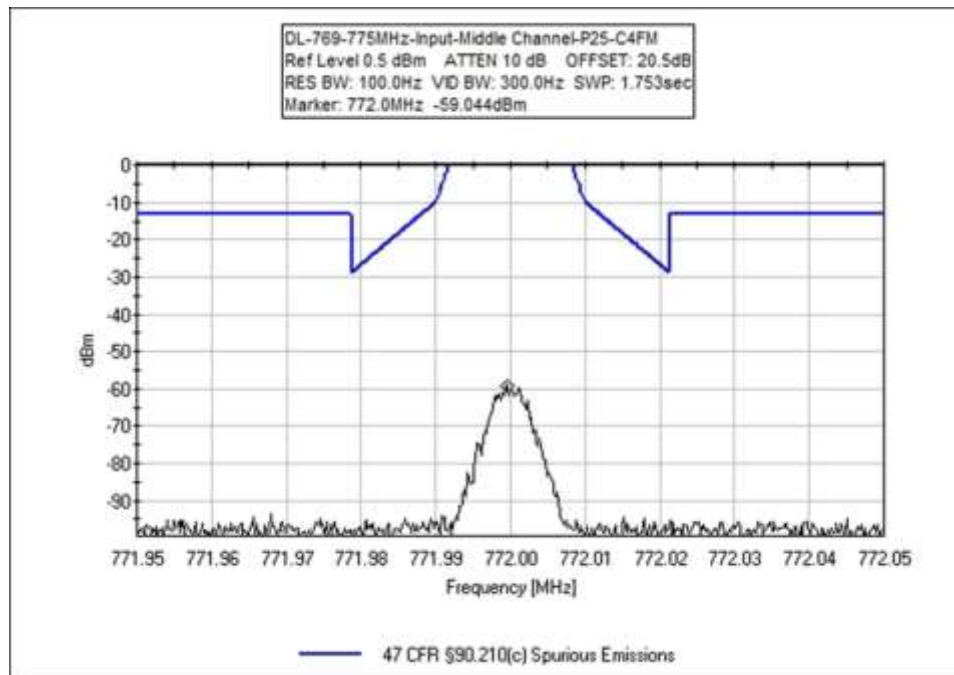


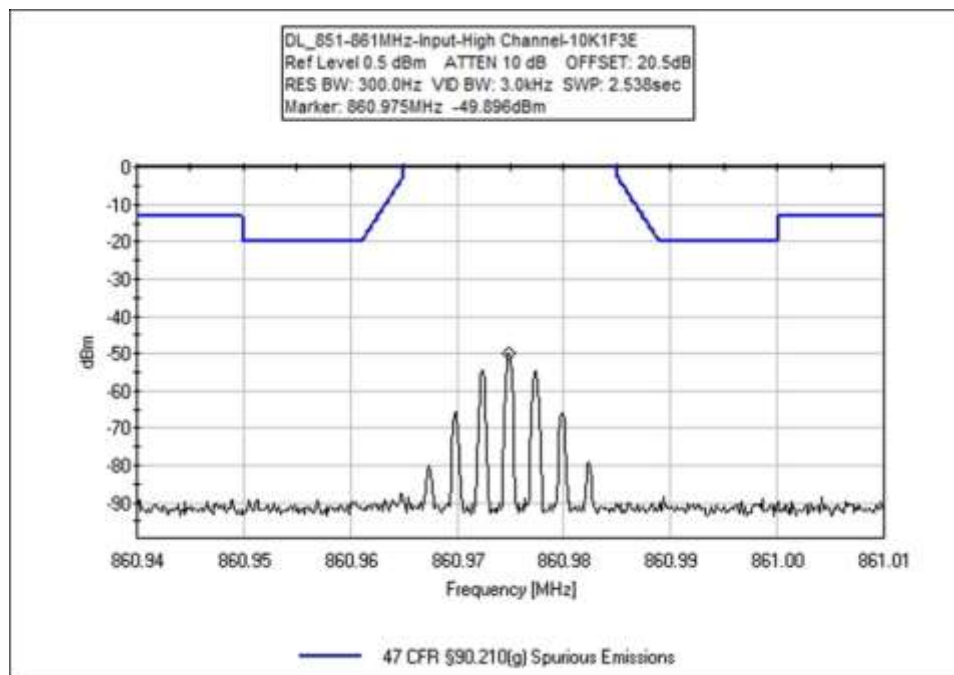
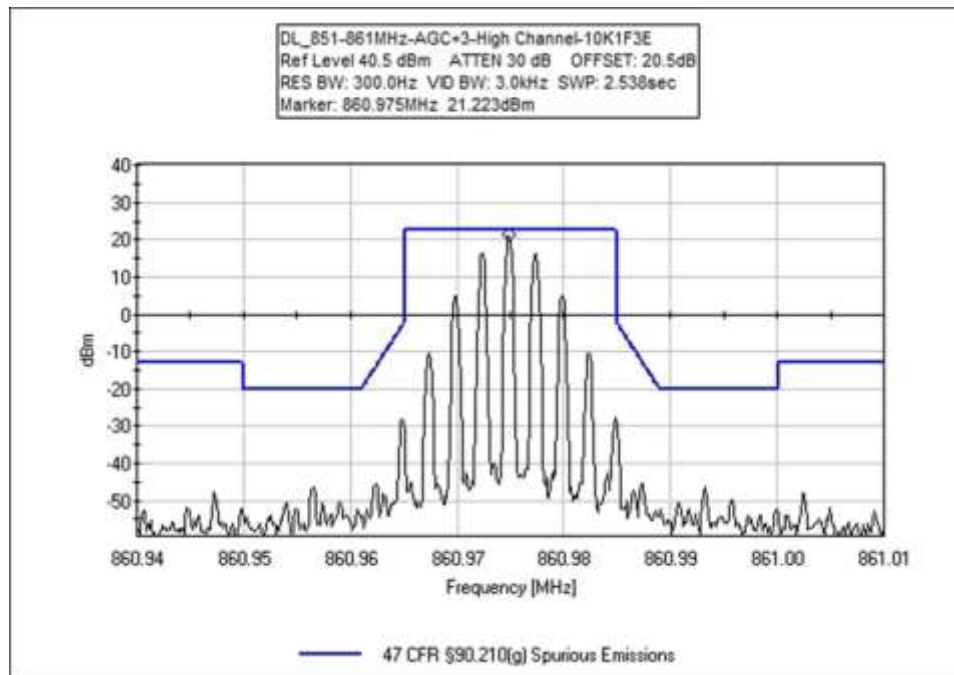


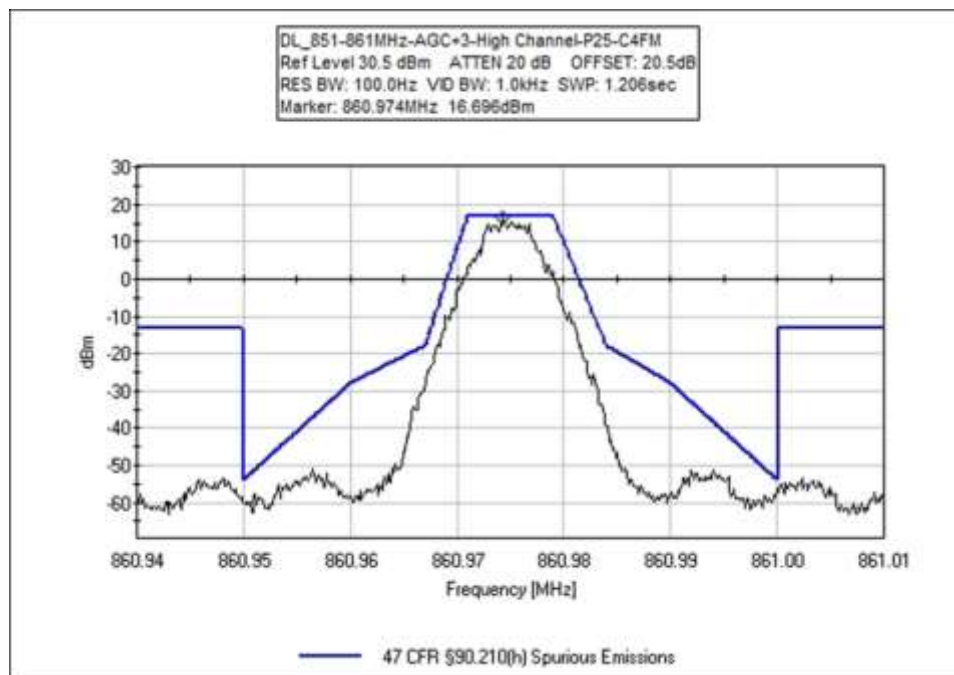
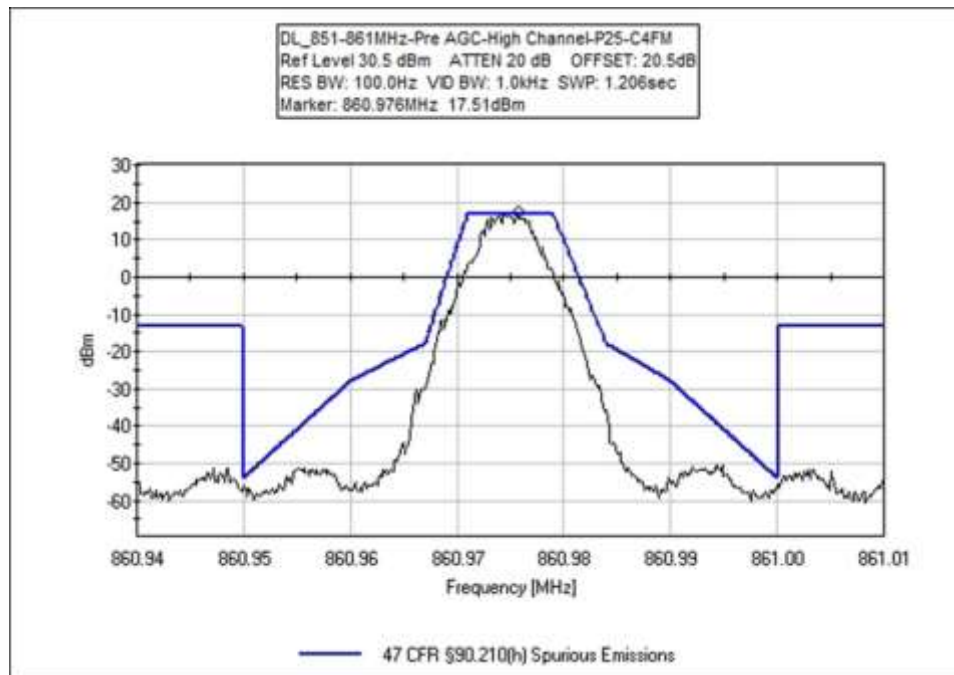


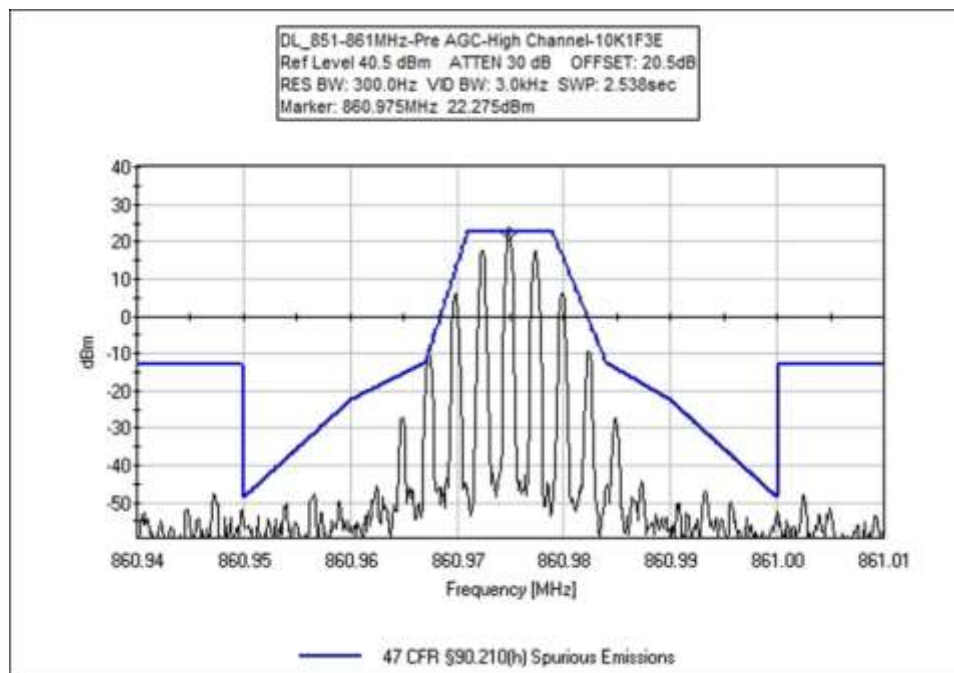
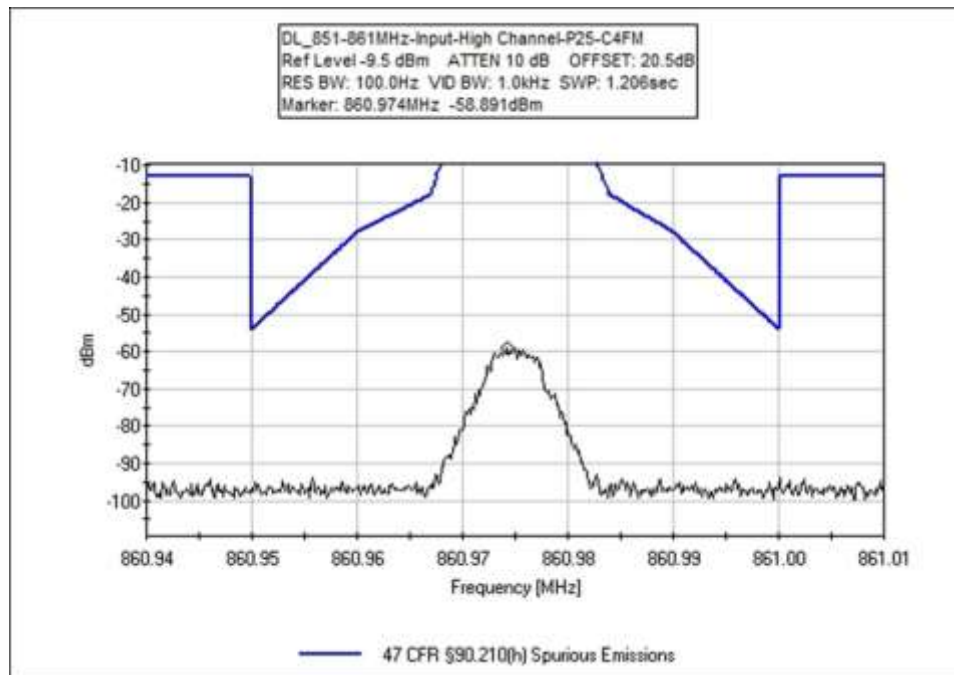


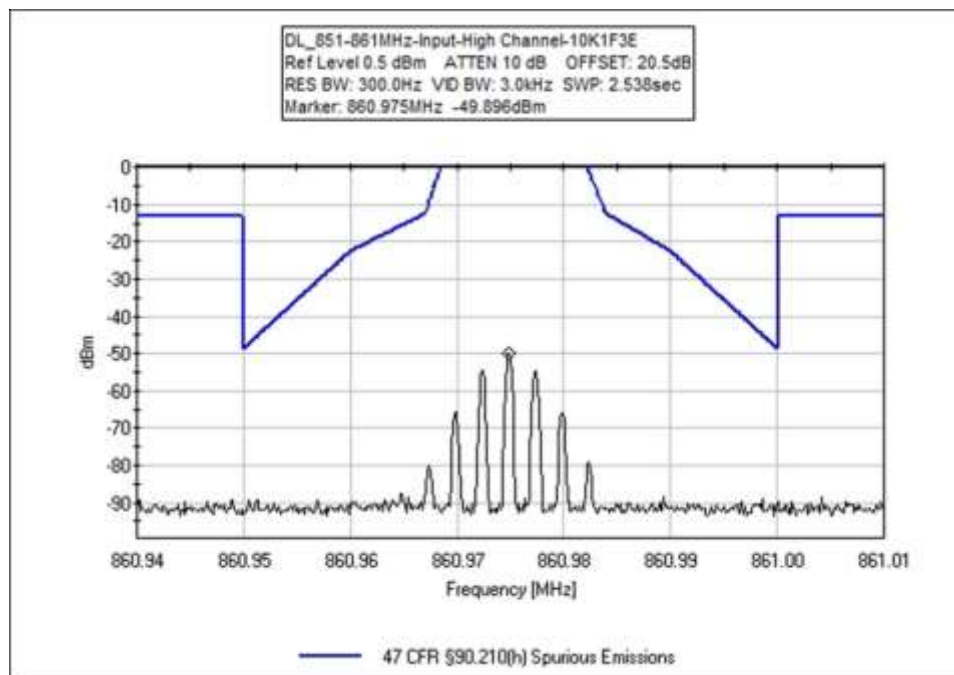
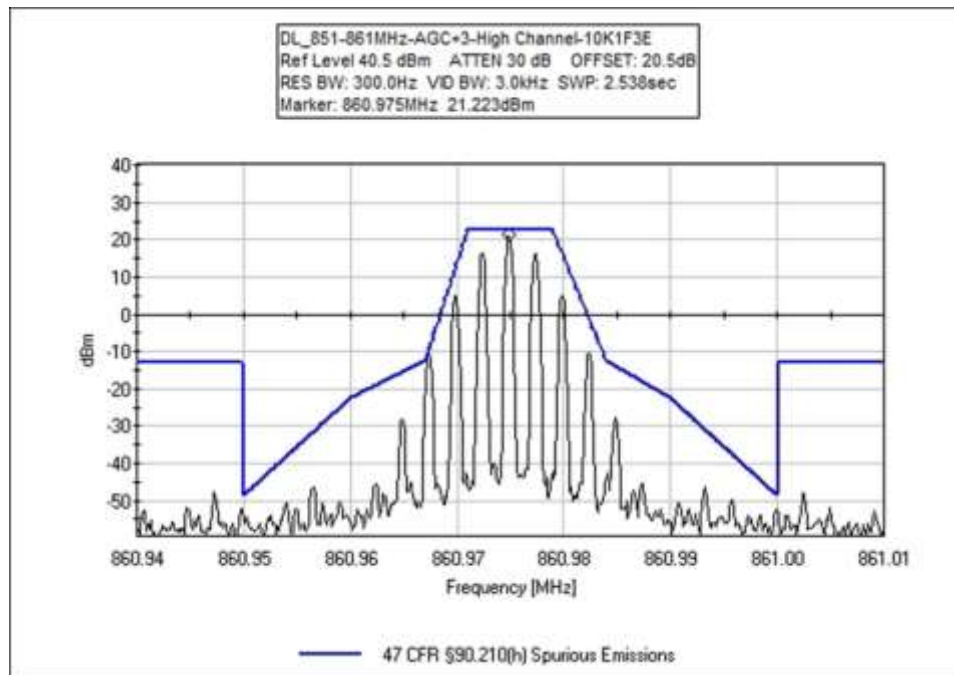


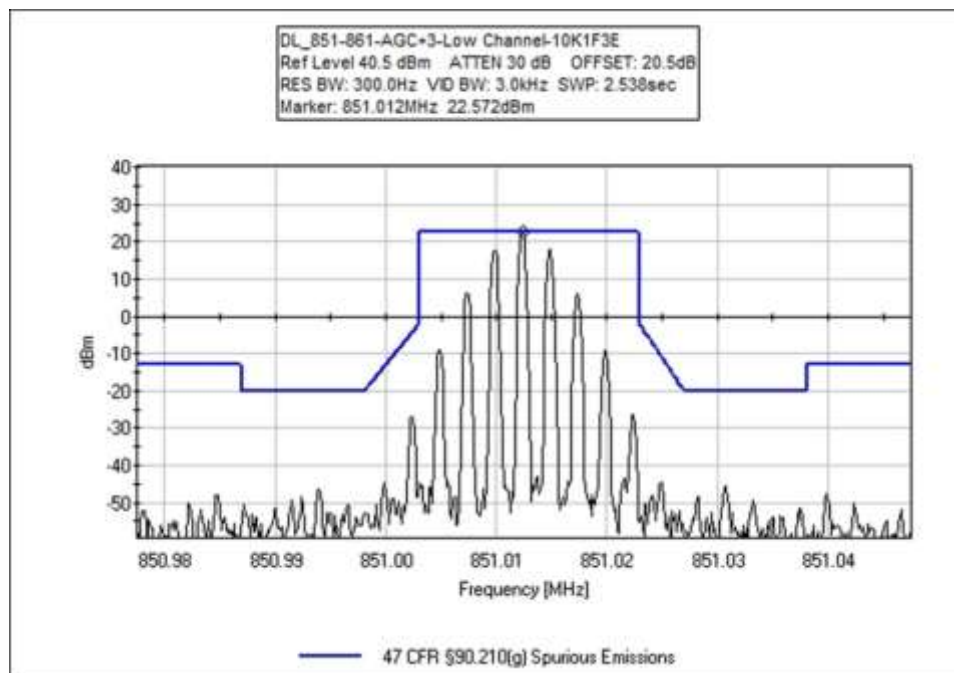
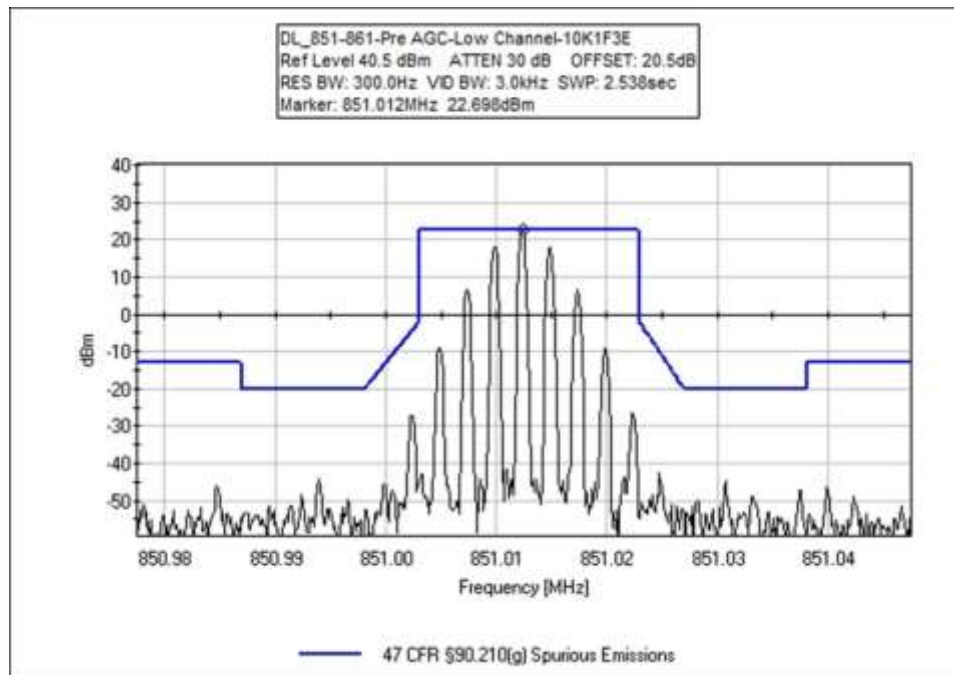


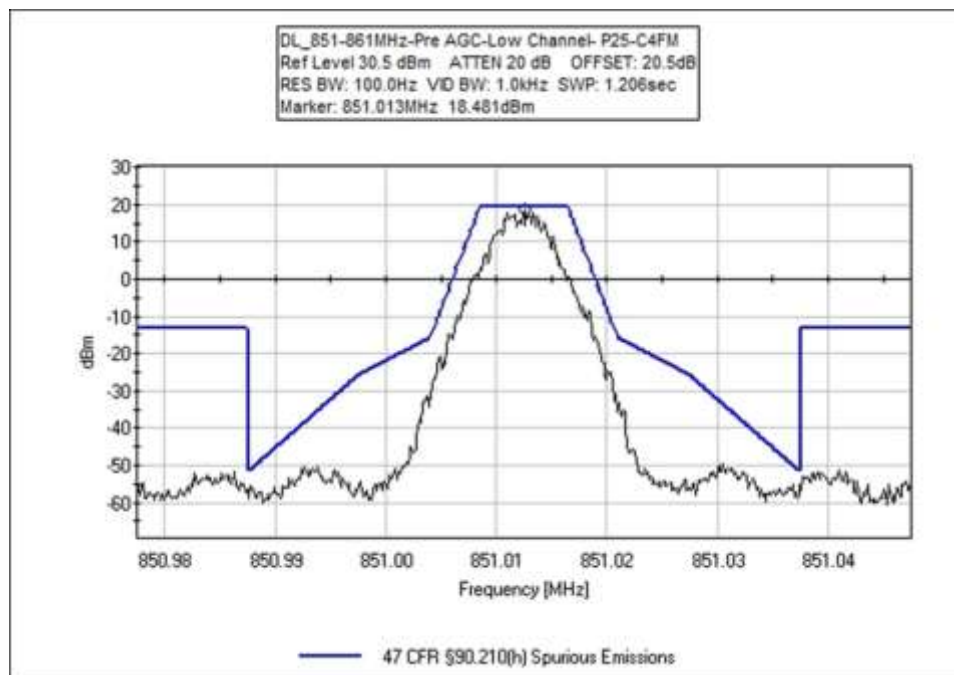
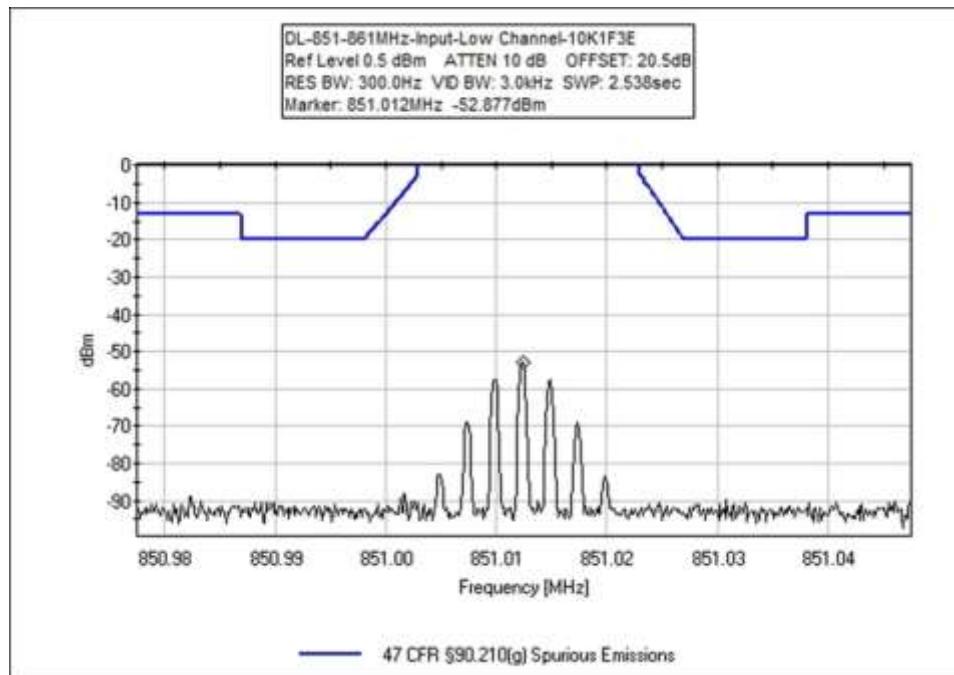


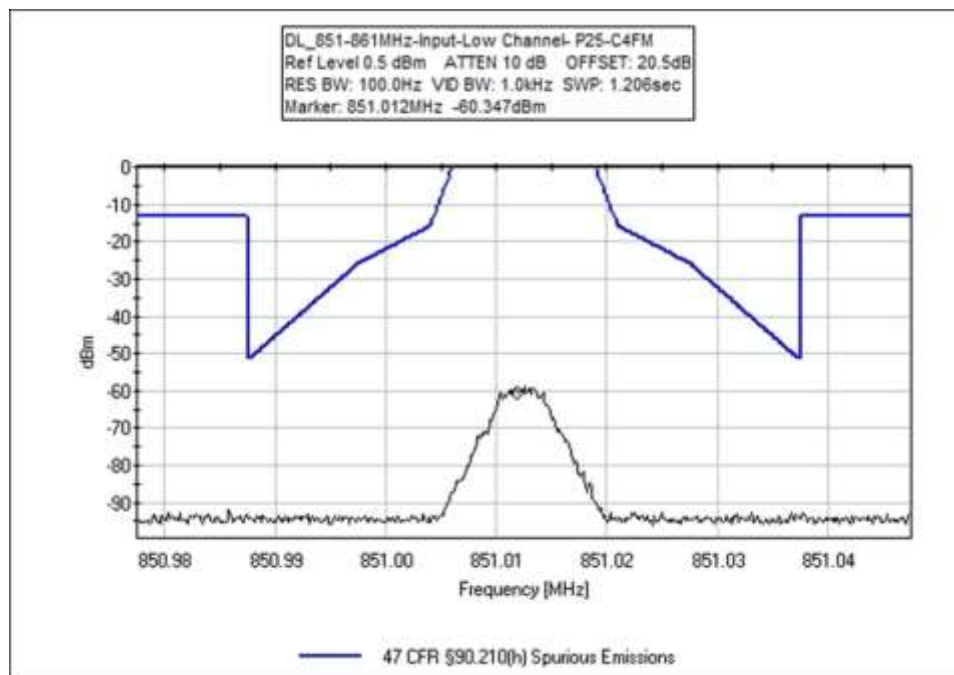
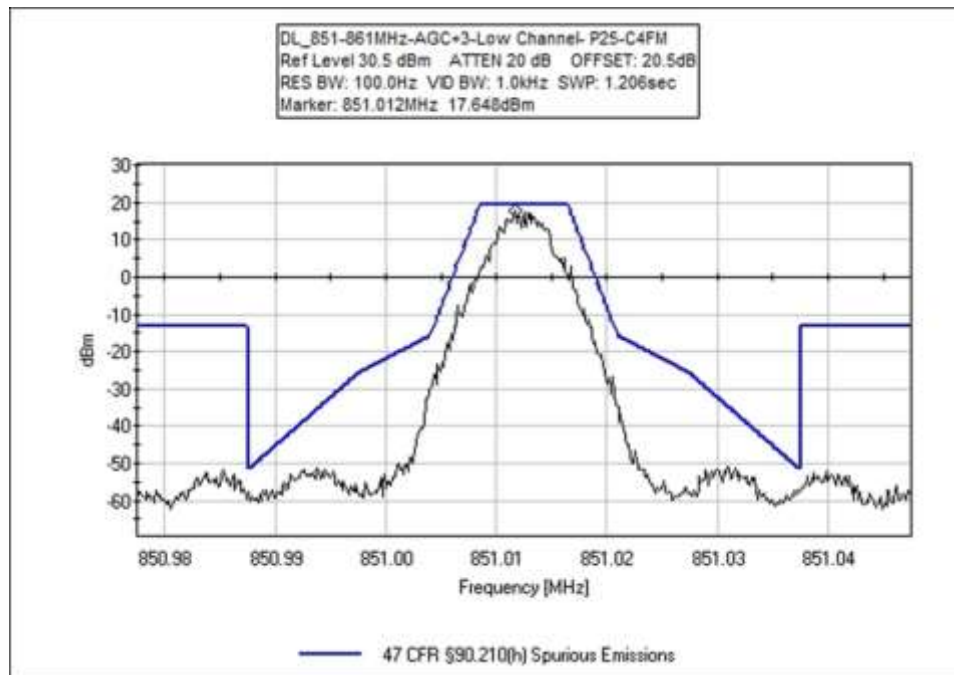


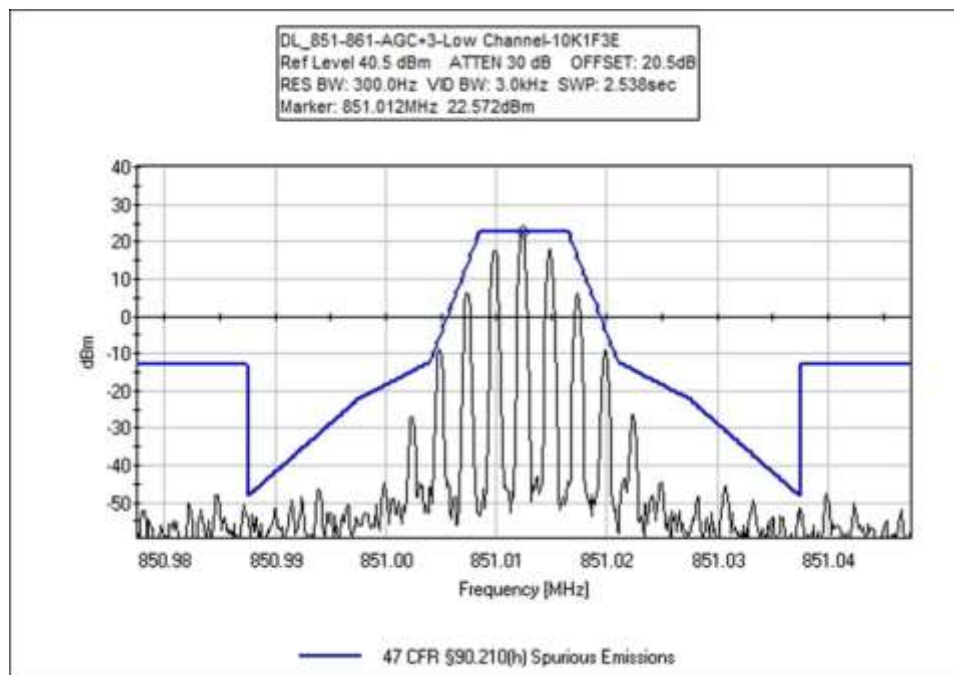
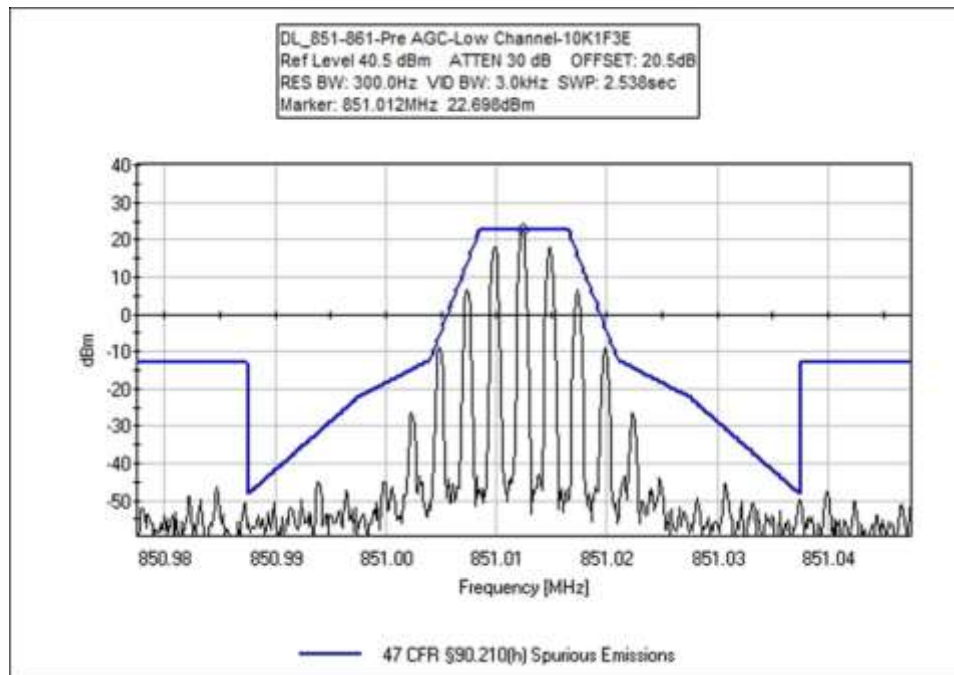


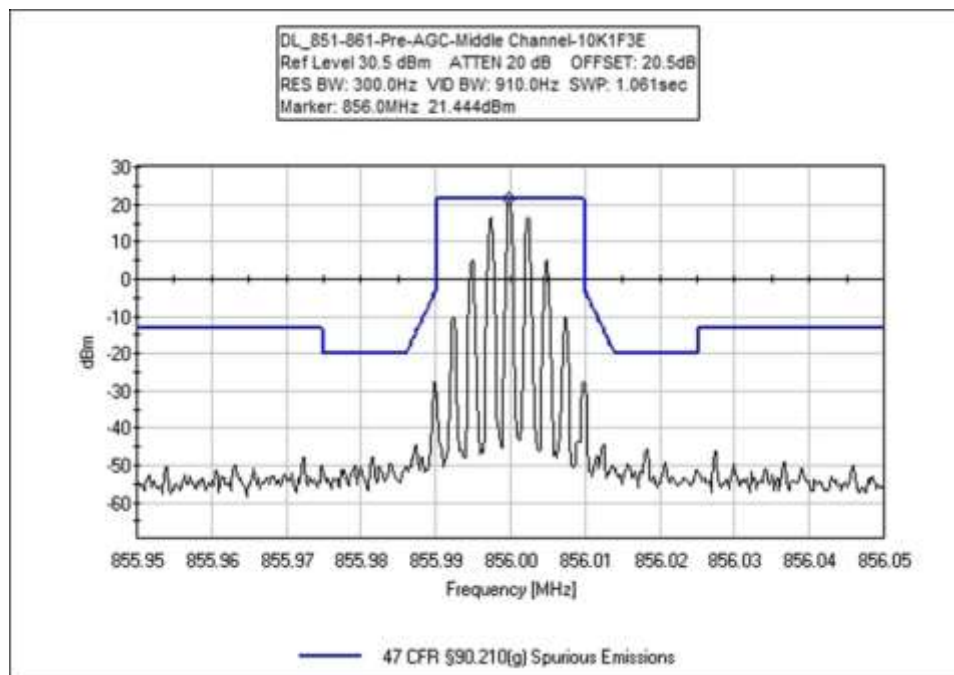
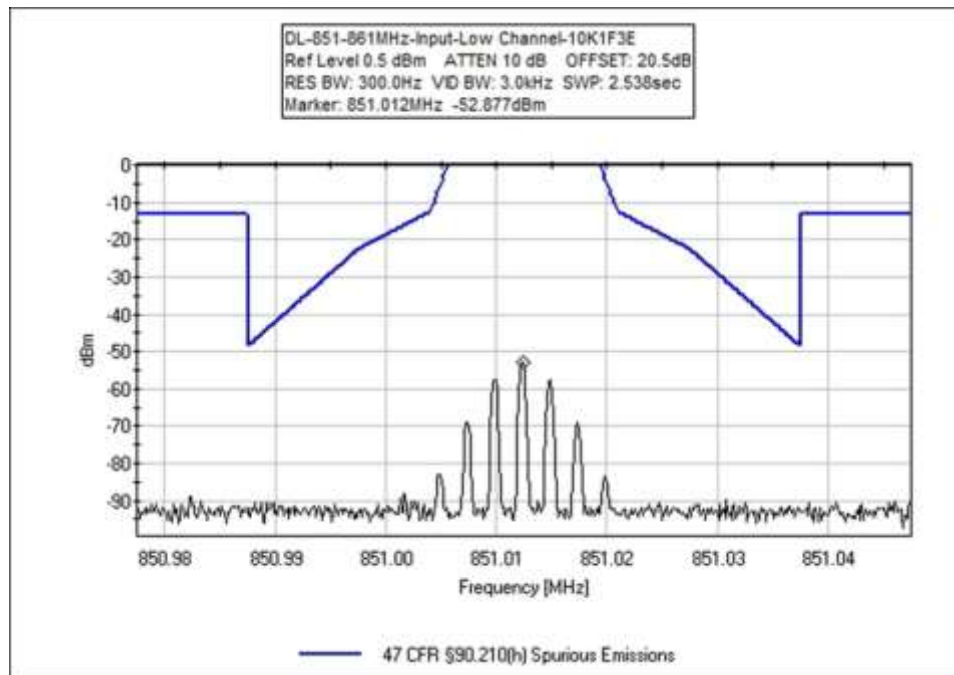


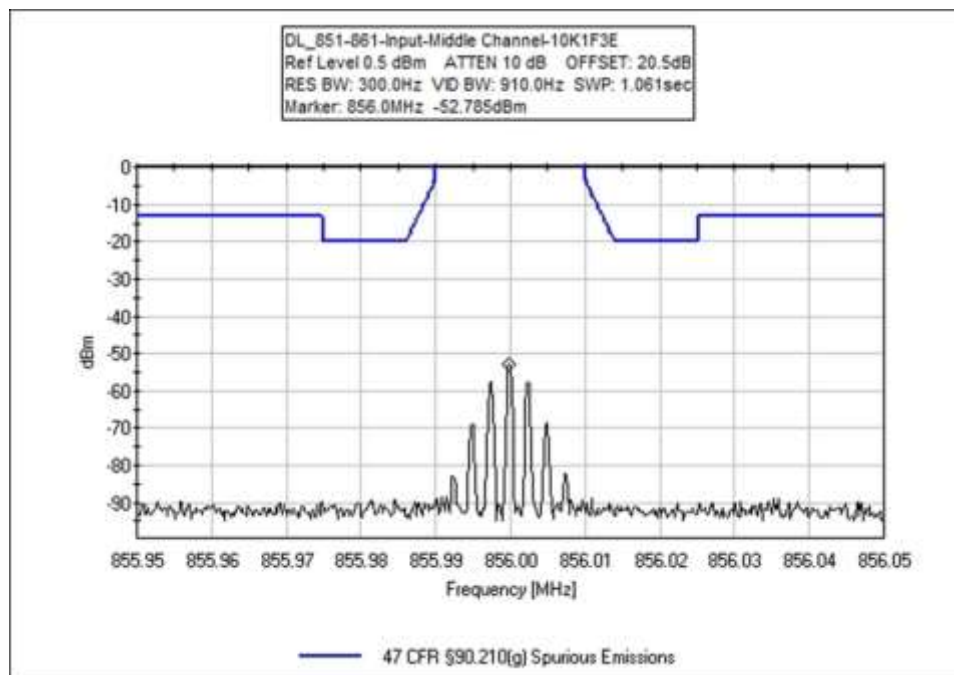
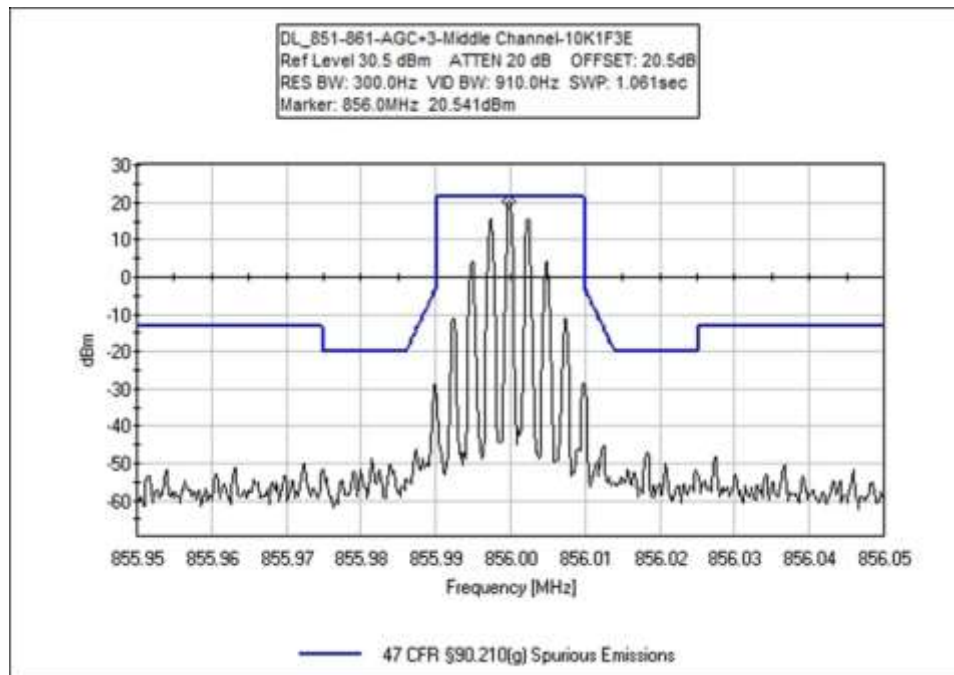


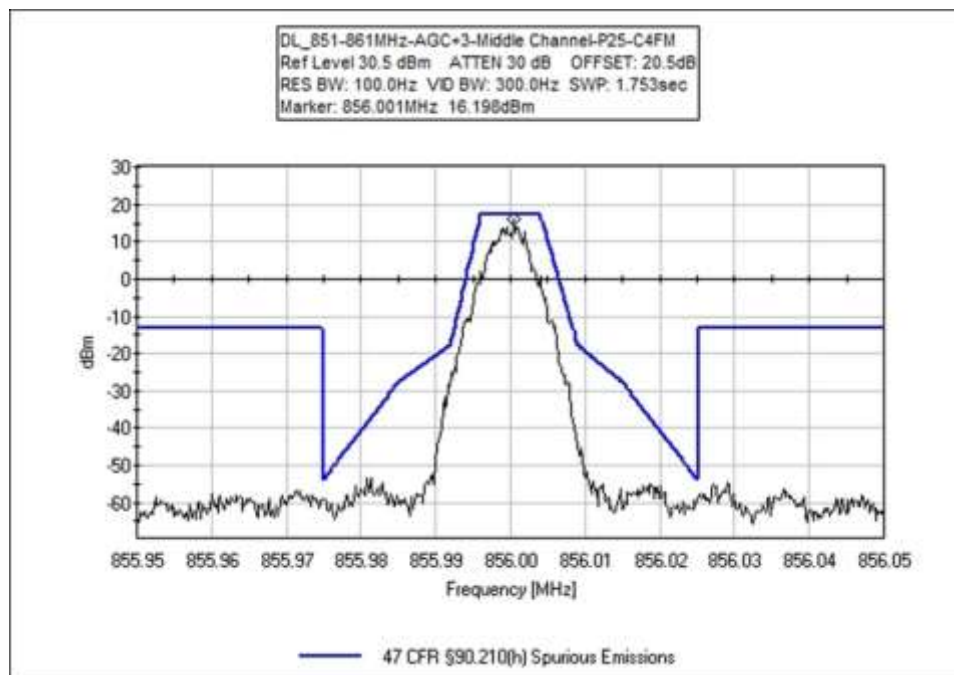
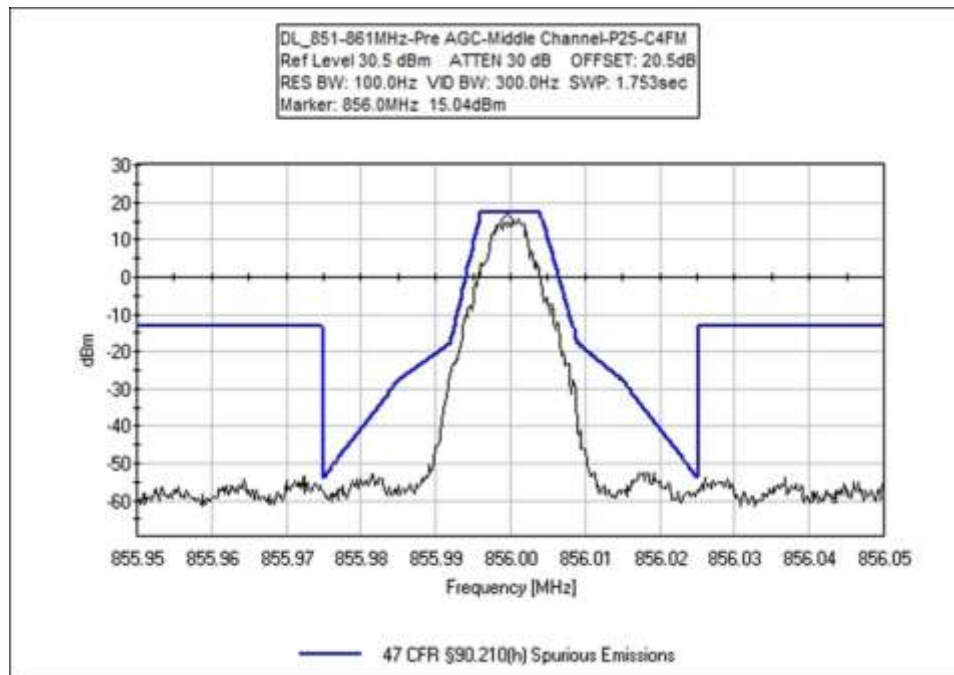


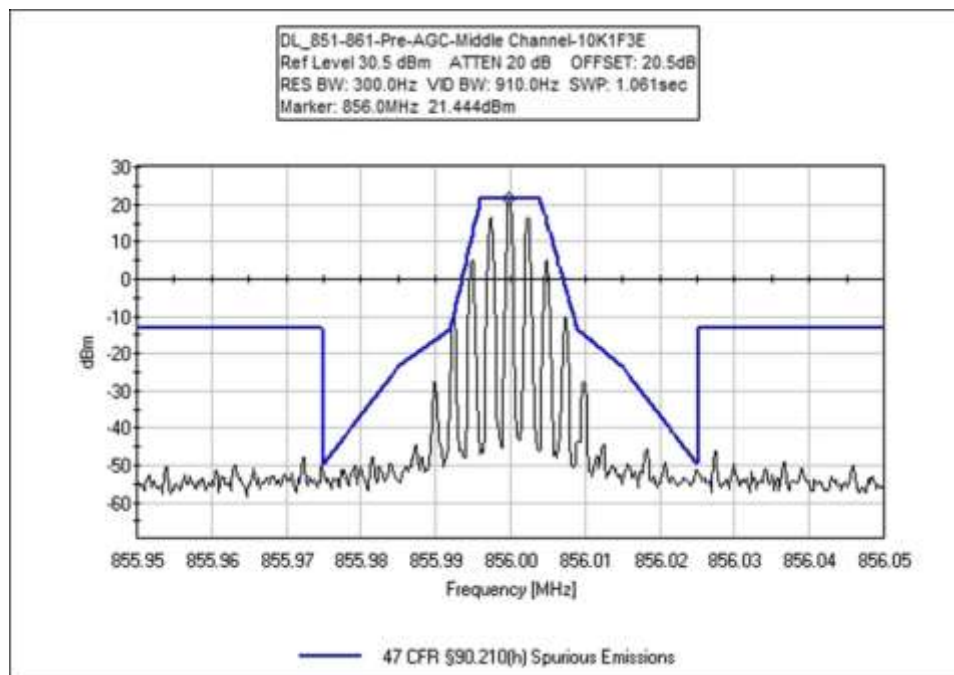
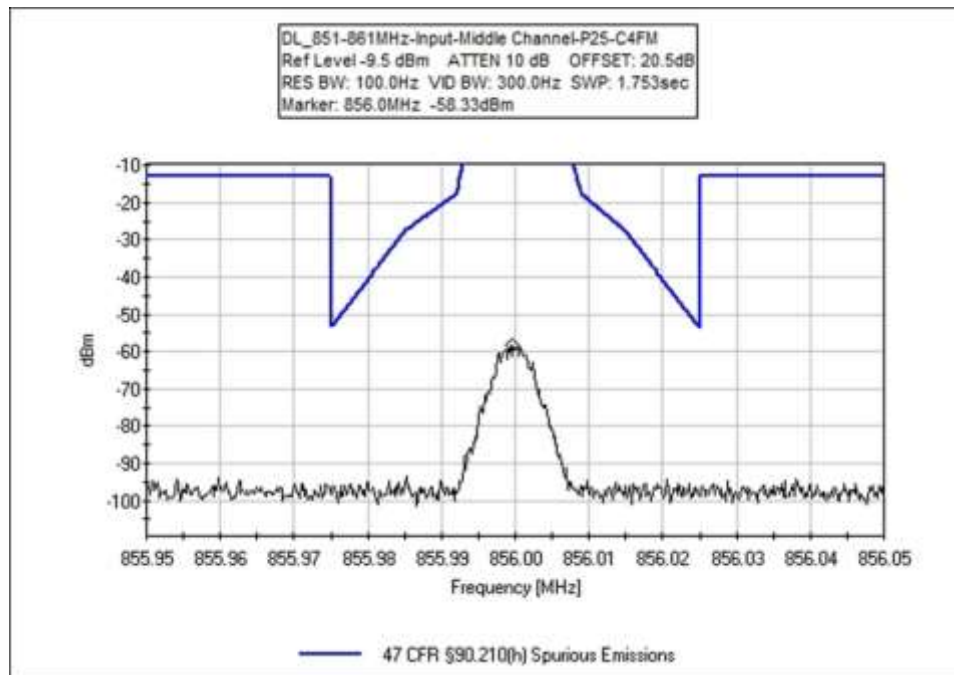


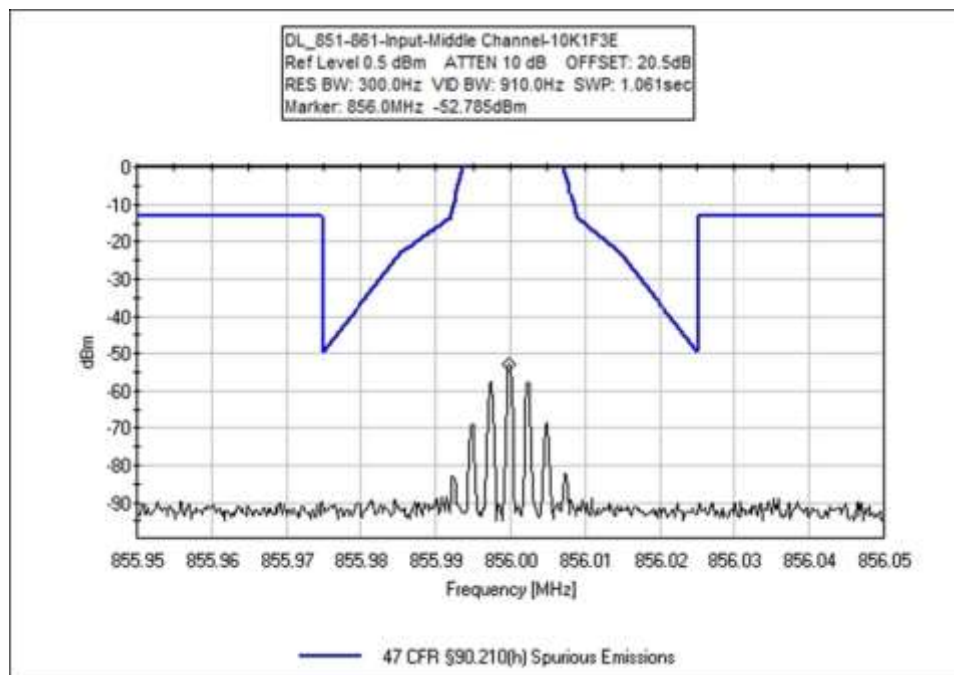
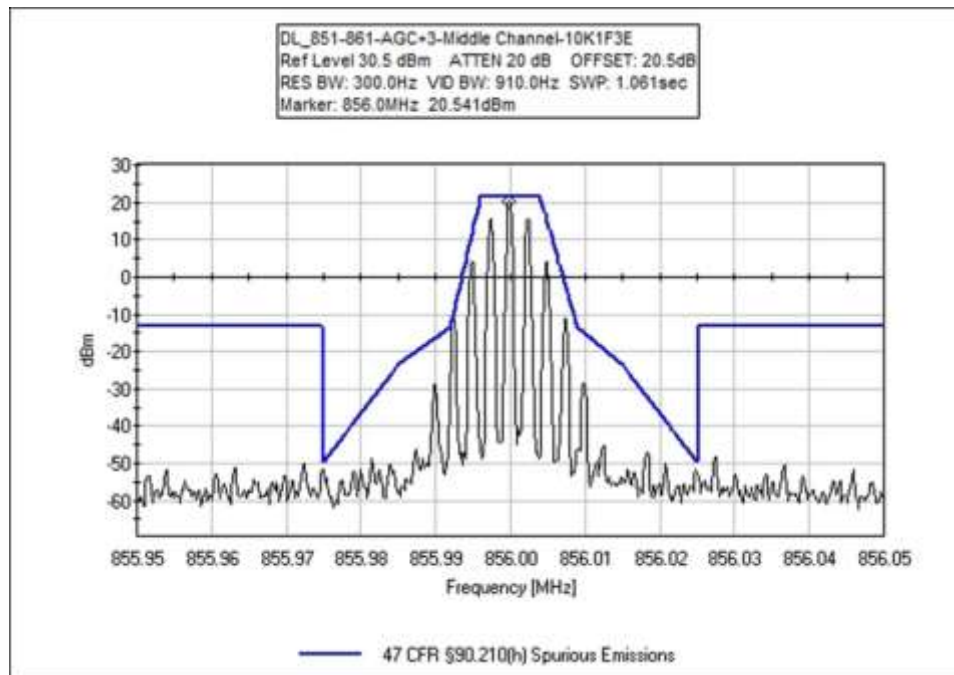




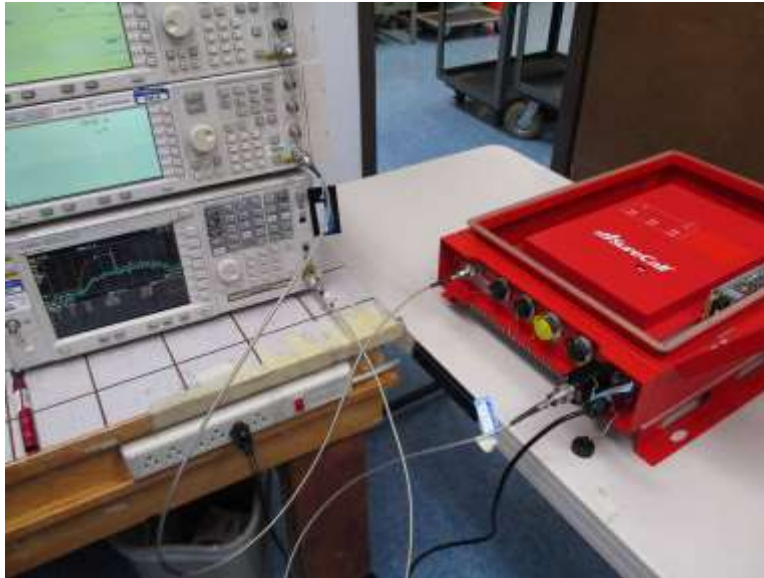








Test Setup Photo



Part 90: 543(e) Out of Band Emissions

Engineer: Hieu Song Nguyenpham

Test Date: 6/4/2018

Test Equipment					
Asset #	Description	Model	Manufacturer	Cal Date	Cal Due
P06797	Attenuator	Narda	766-20	4/10/2017	4/10/2019
03471	Spectrum Analyzer	Agilent	E4440A	1/18/2018	1/18/2020
03418	Signal Generator	Agilent	E4438C	6/19/2017	6/19/2019
P07191	Cable	Astro	32022-29094K-29094K-48TC	10/30/2017	10/30/2019
03362	Cable	Astrolab	32022-2-29094-48TC	1/10/2017	1/10/2019

Environmental Conditions					
Temperature (°C)	23.5	Relative Humidity (%):	46	Atmospheric Pressure (kPa):	101.5

Summary of Results

Pass: As indicated in plots below, all OBE are under the limit of -13dBm.

LTE

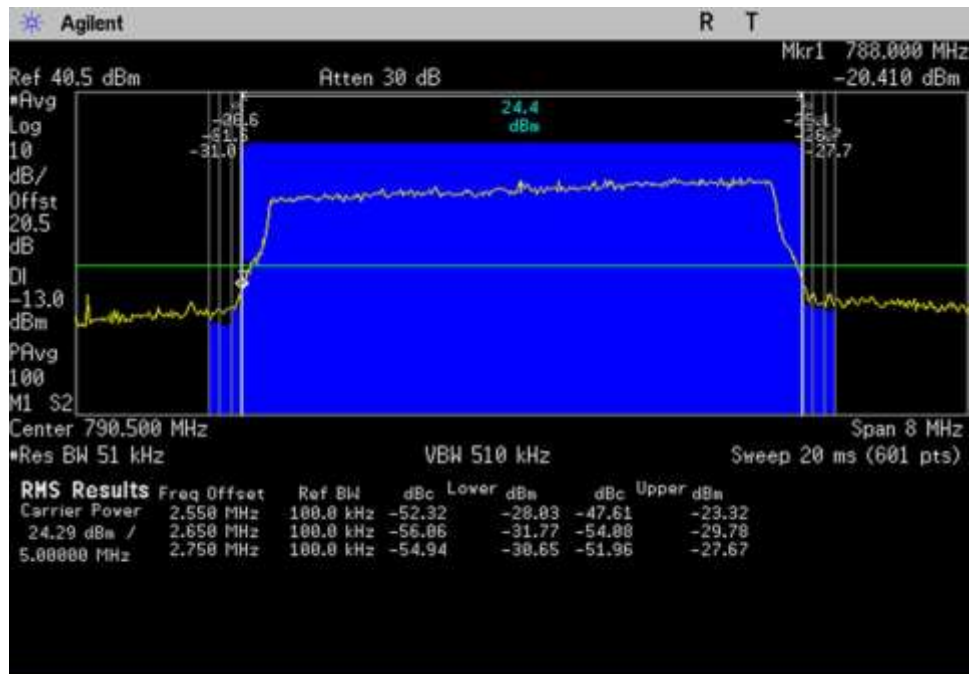
Low

Out of Band Emission			
Frequency	AGC	AGC + 3dB	Limit
MHz	dBm	dBm	dBm
UL 788-798	-20.410	--21.950	-13.0
DL 758-768	-30.273	-30.115	-13.0

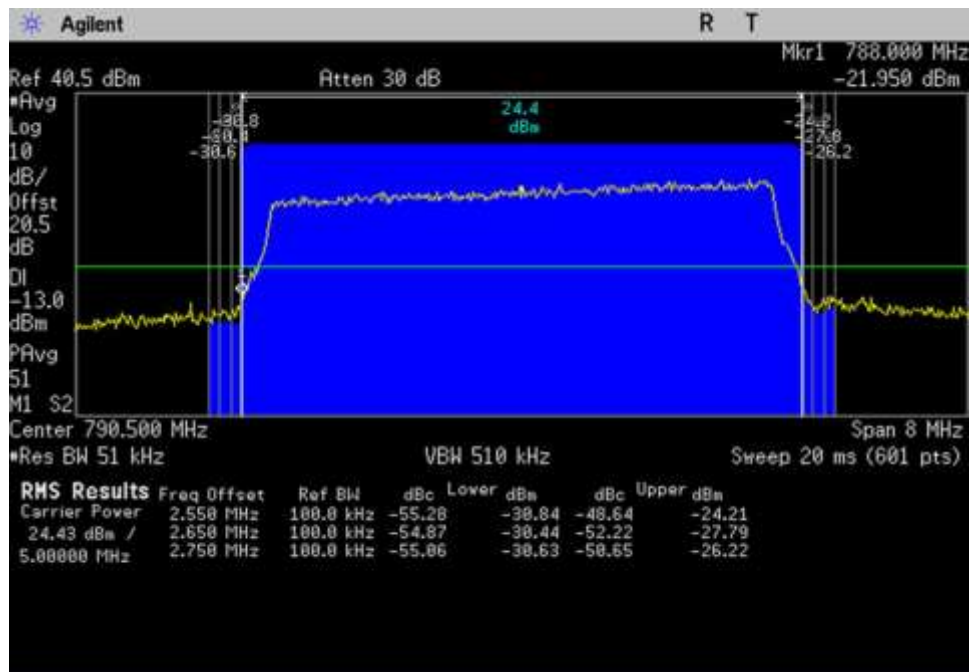
High

Out of Band Emission			
Frequency	AGC	AGC + 3dB	Limit
MHz	dBm	dBm	dBm
UL 788-798	-18.494	-24.618	-13.0
DL 758-768	-26.196	-26.519	-13.0

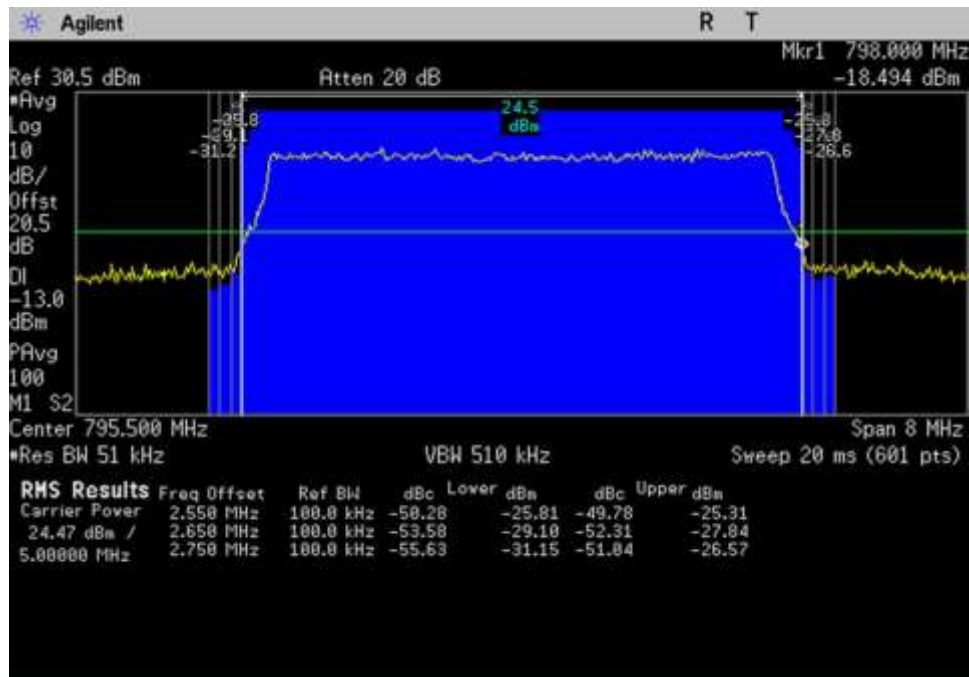
Plots



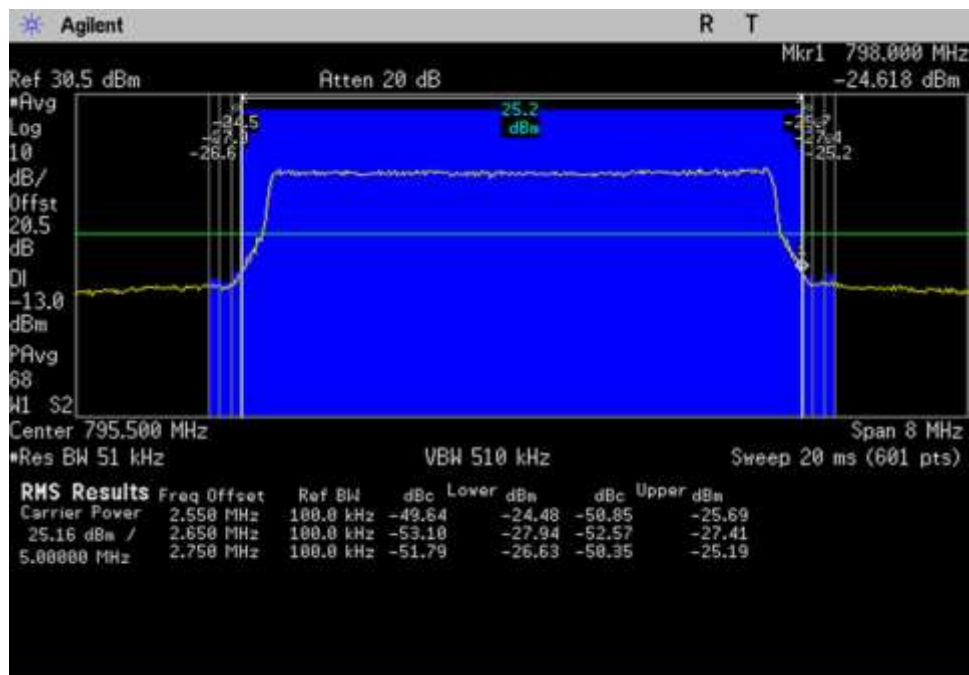
OBE_UL788-798_786.5-794.5MHz_LC-AGC



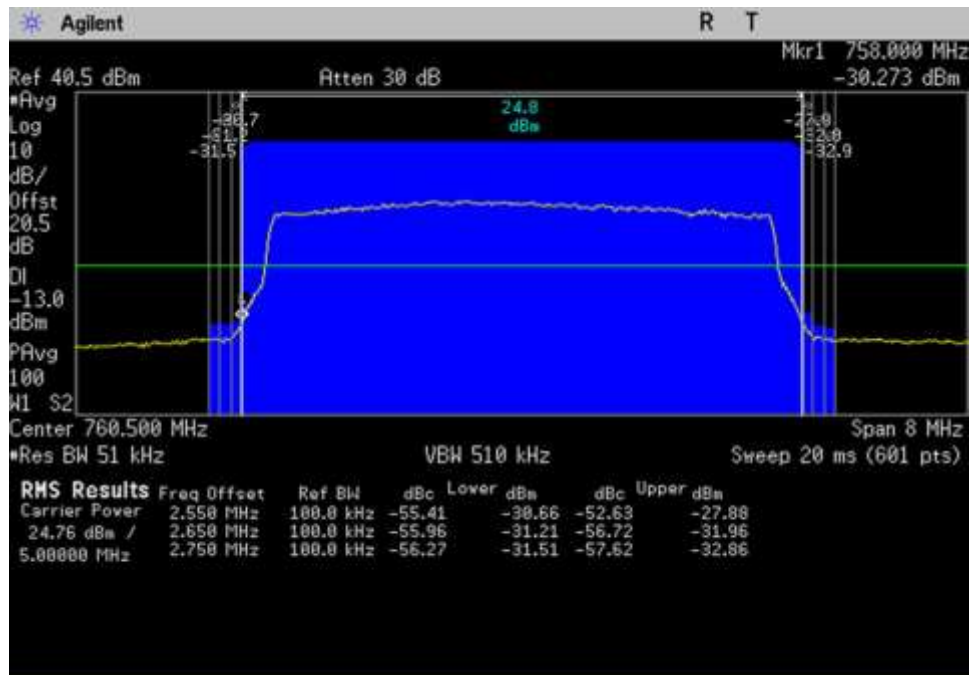
OBE_UL788-798_786.5-794.5MHz_LC-AGC+3



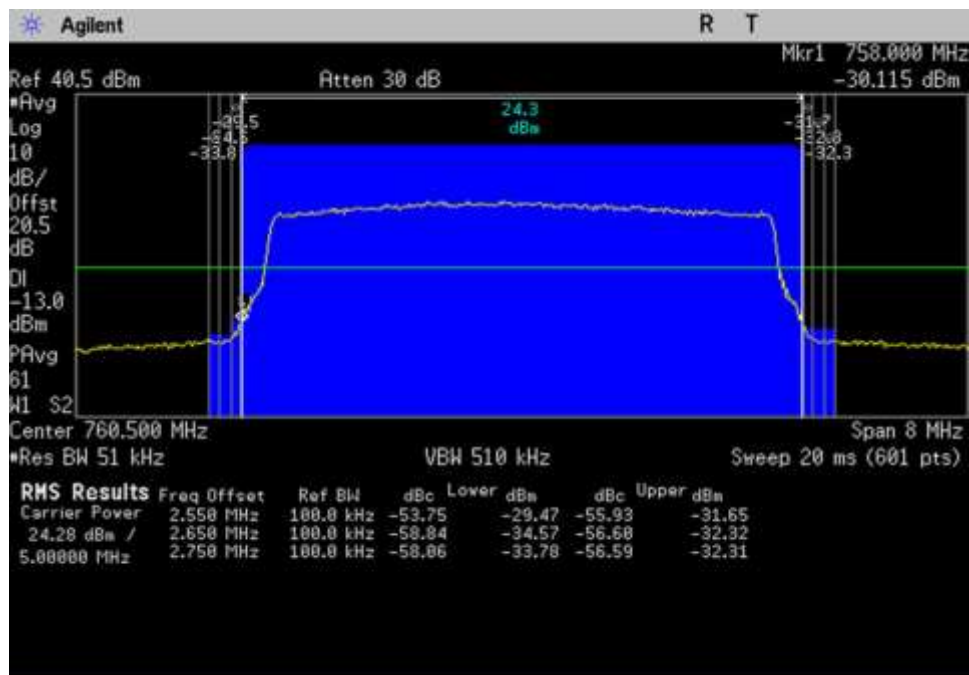
OBE_UL788-798_ 791.5- 799.5MHz_HC-AGC



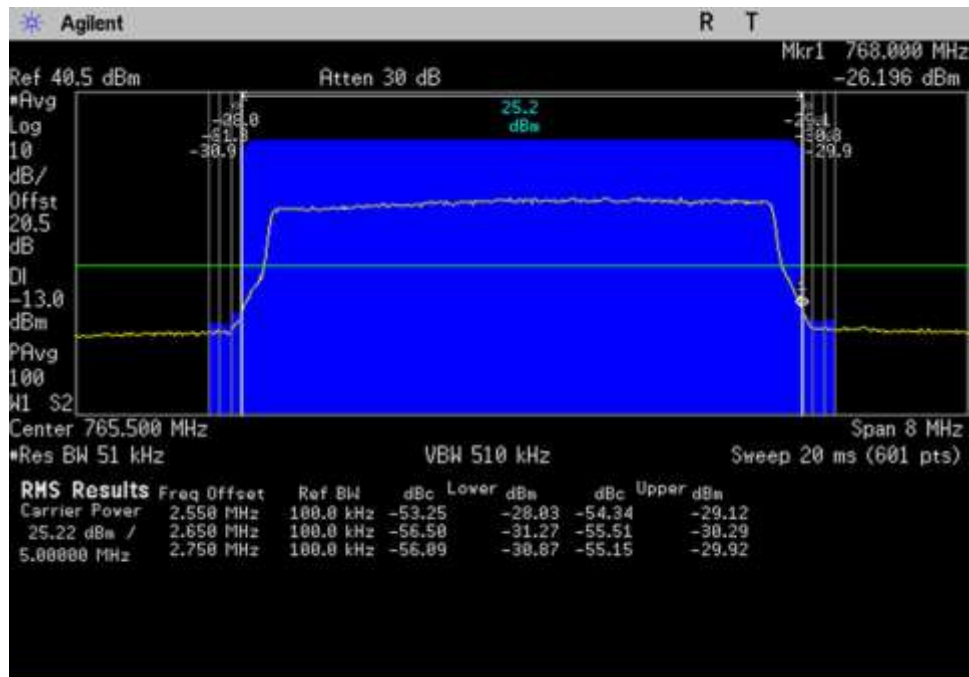
OBE_UL788-798_ 791.5- 799.5MHz_HC-AGC+3



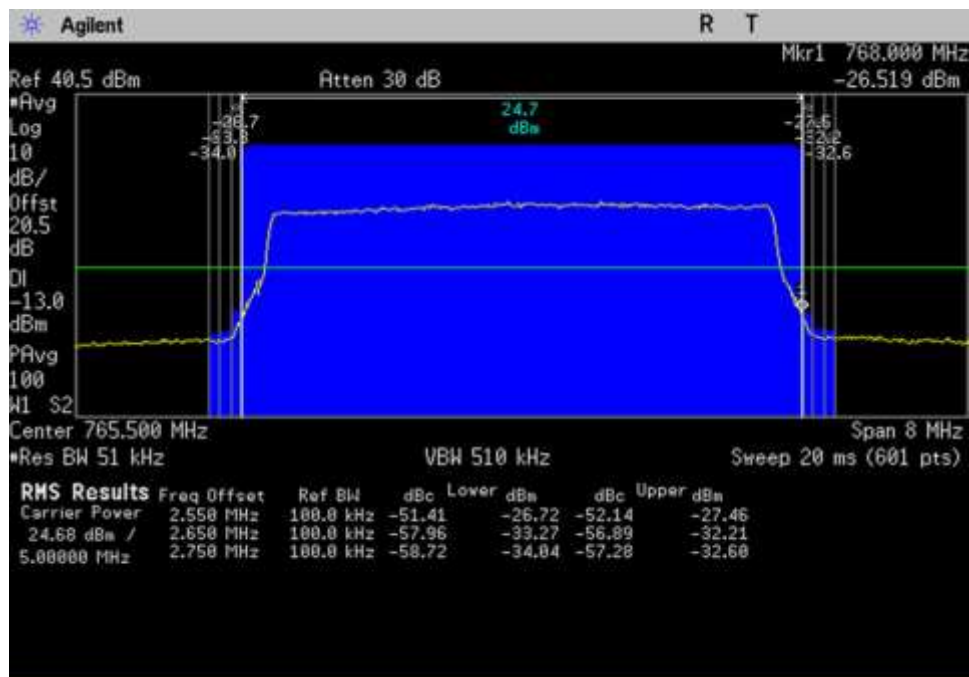
OBE_DL_758-768_756.5-764.5MHz_LC-AGC



OBE_DL_758-768_756.5-764.5MHz_LC-AGC+3

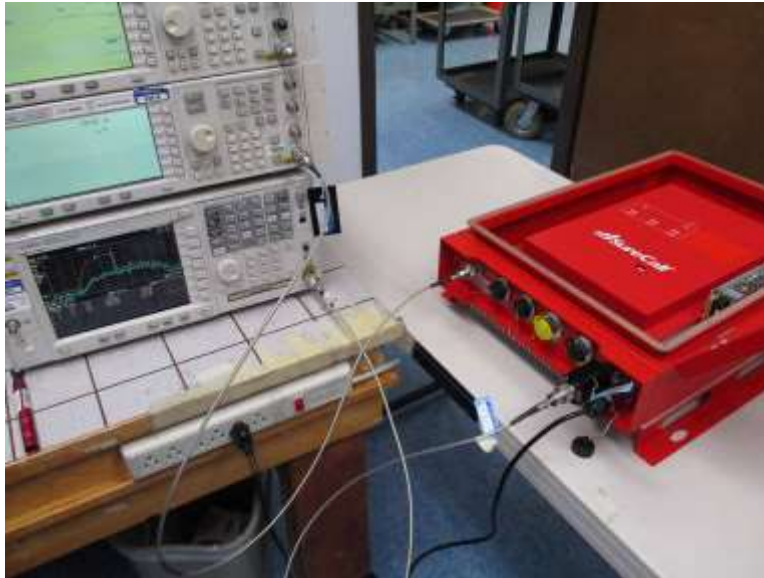


OBE_DL_758-768_ 761.5- 769.5MHz_HC-AGC



OBE_DL_758-768_ 761.5- 769.5MHz_HC-AGC+3

Test Setup Photo



Part 90: 219(e)(1) Power Limit

Engineer: Hieu Song Nguyenpham

Test Date: 5/30/2018

Modification #1 was in place during testing.

Test Equipment					
Asset #	Description	Model	Manufacturer	Cal Date	Cal Due
P06797	Attenuator	Narda	766-20	4/10/2017	4/10/2019
03471	Spectrum Analyzer	Agilent	E4440A	1/18/2018	1/18/2020
03418	Signal Generator	Agilent	E4438C	6/19/2017	6/19/2019
P07191	Cable	Astro	32022-29094K-29094K-48TC	10/30/2017	10/30/2019
03362	Cable	Astrolab	32022-2-29094-48TC	1/10/2017	1/10/2019

Environmental Conditions					
Temperature (°C)	21.3	Relative Humidity (%):	47	Atmospheric Pressure (kPa):	102.3

Summary of Results

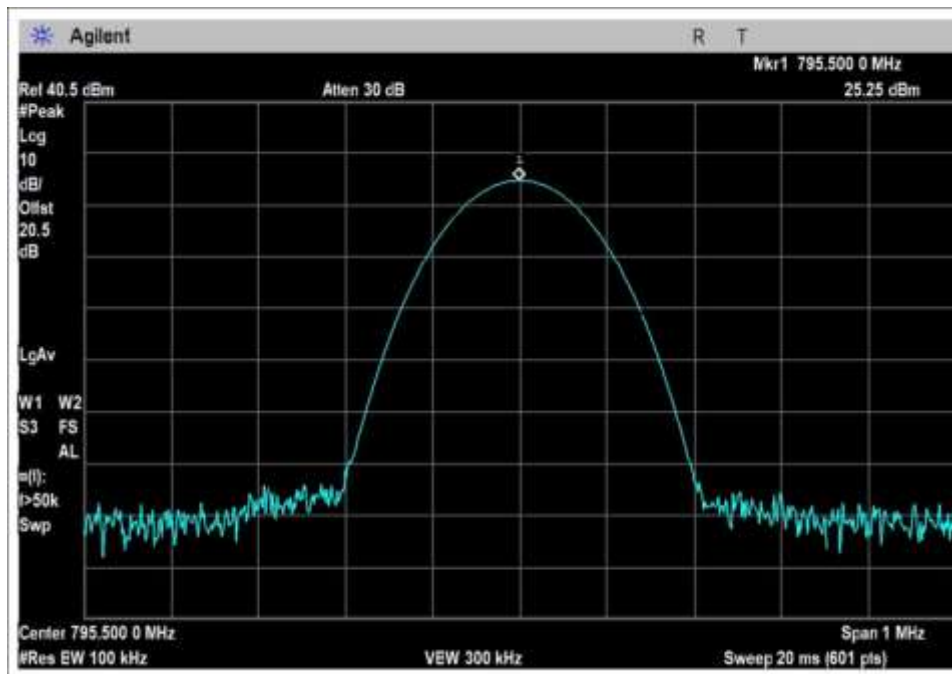
Pass: As summarized in tables below, calculated ERP from measured Conducted Power and Gain, are within limits.

Public Safety 700MHz/800MHz bands

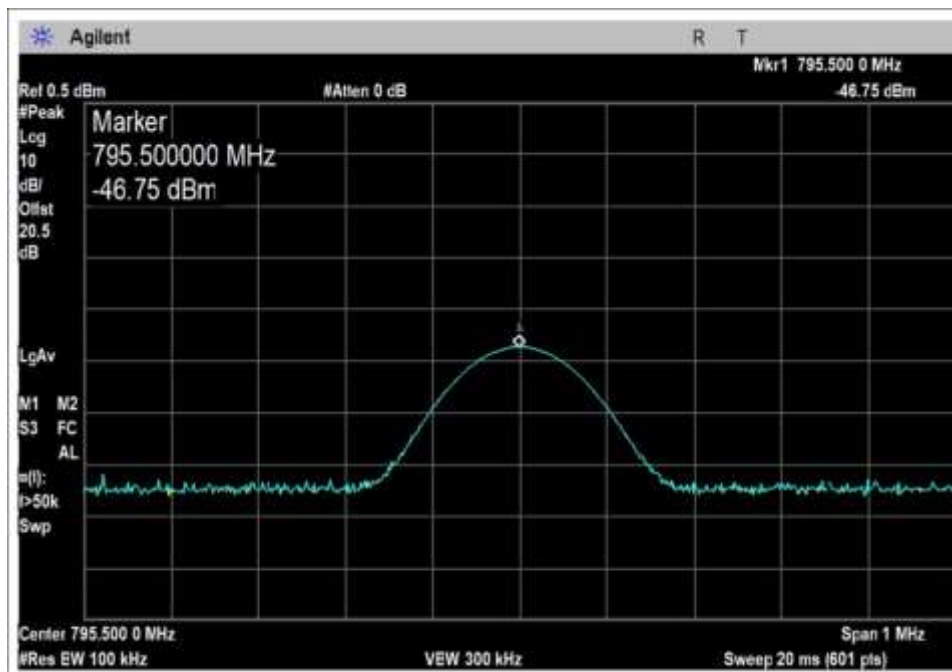
Pre AGC-CW				
Frequency	Input(dBm)	Output (dBm)	Gain (dB)	Limit (dBm)
UL_806-816MHz	-50.6	25.6	76.2	37
UL_799-805MHz	-50.4	25.5	75.9	37
UL_788-798MHz	-46.8	25.3	72.0	37
DL_851-861MHz	-52.3	26.4	78.7	37
DL_769-775MHz	-56.9	23.1	80.0	37
DL_758-768MHz	-56.6	23.8	80.5	37

AGC+3-CW				
Frequency	Input(dBm)	Output (dBm)	Gain (dB)	Limit (dBm)
UL_806-816MHz	-47.6	25.4	73.0	37
UL_799-805MHz	-47.4	25.4	72.8	37
UL_788-798MHz	-43.8	25.3	69.0	37
DL_851-861MHz	-49.8	25.4	75.2	37
DL_769-775MHz	-53.9	22.8	76.7	37
DL_758-768MHz	-53.5	23.7	77.2	37

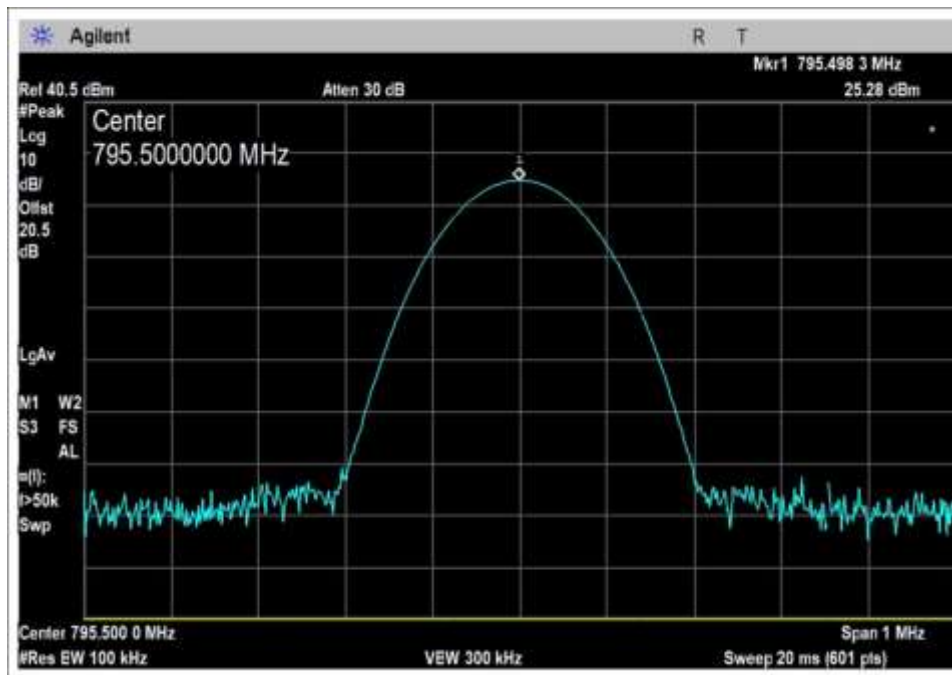
Plots



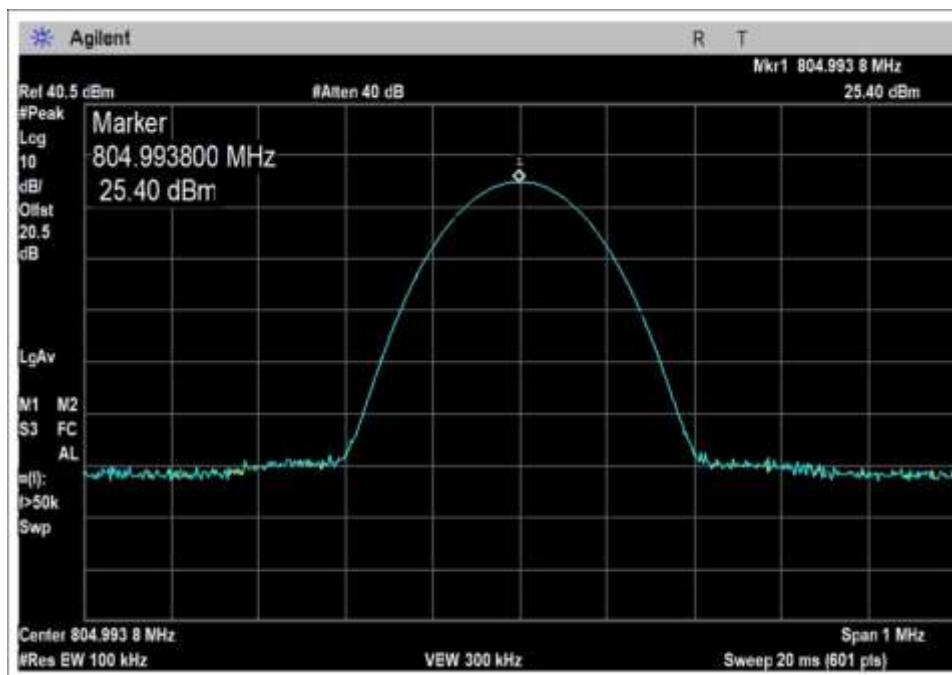
UL 788_798_ 795.5MHz_AGC+3



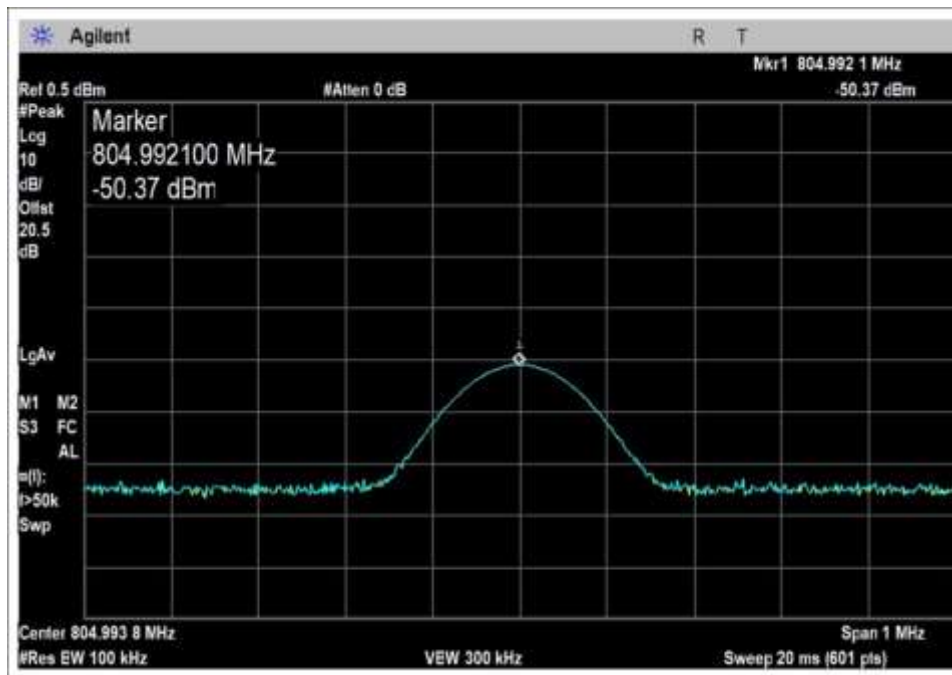
UL 788_798_ 795.5MHz_Input



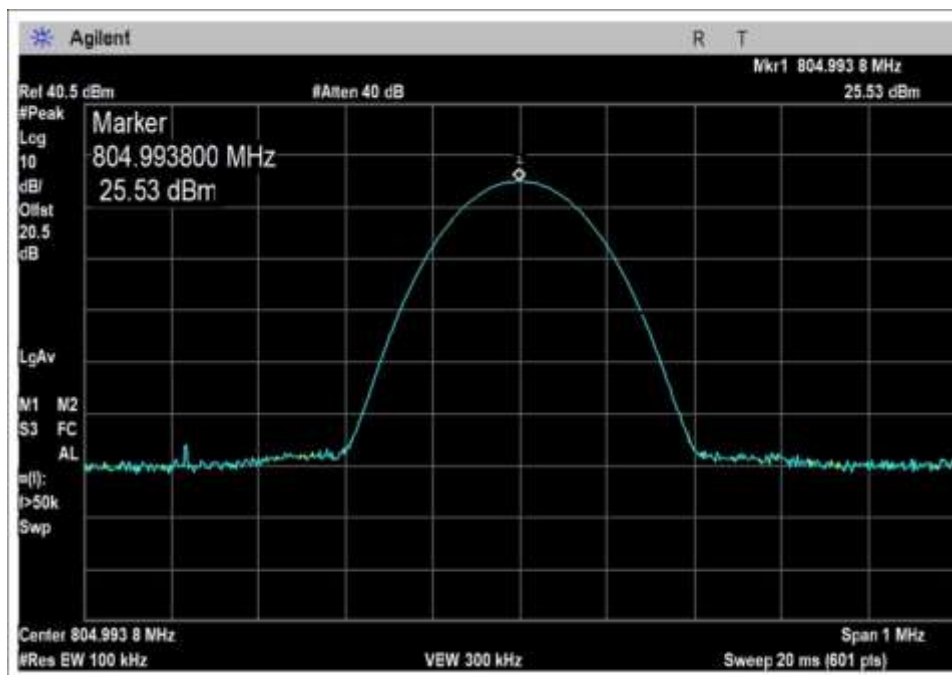
UL 788_798_ 795.5MHz_Pre AGC



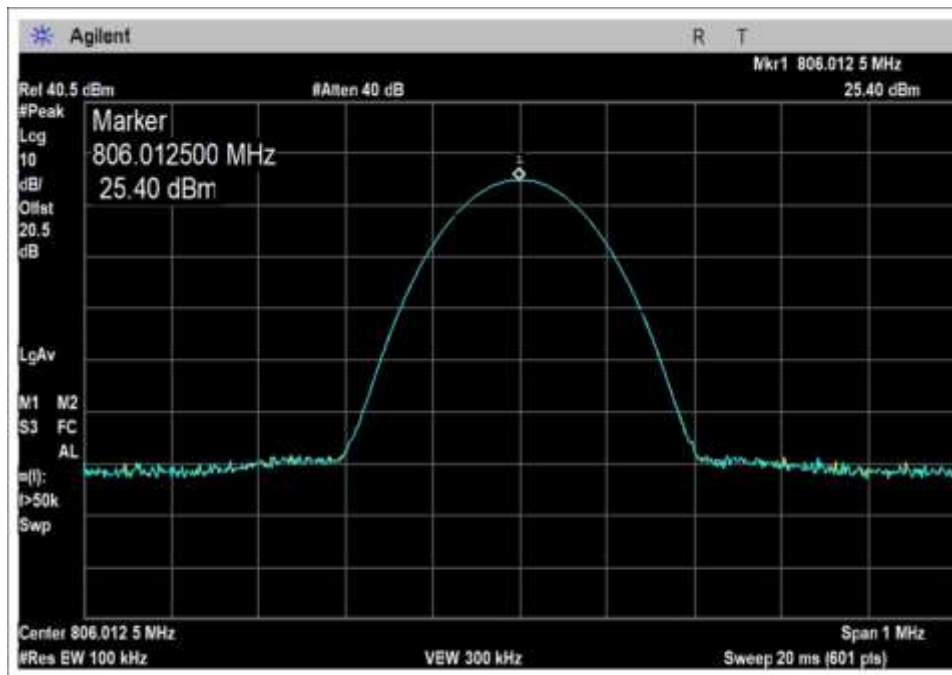
UL 799-805_ 804.99375MHz_AGC+3



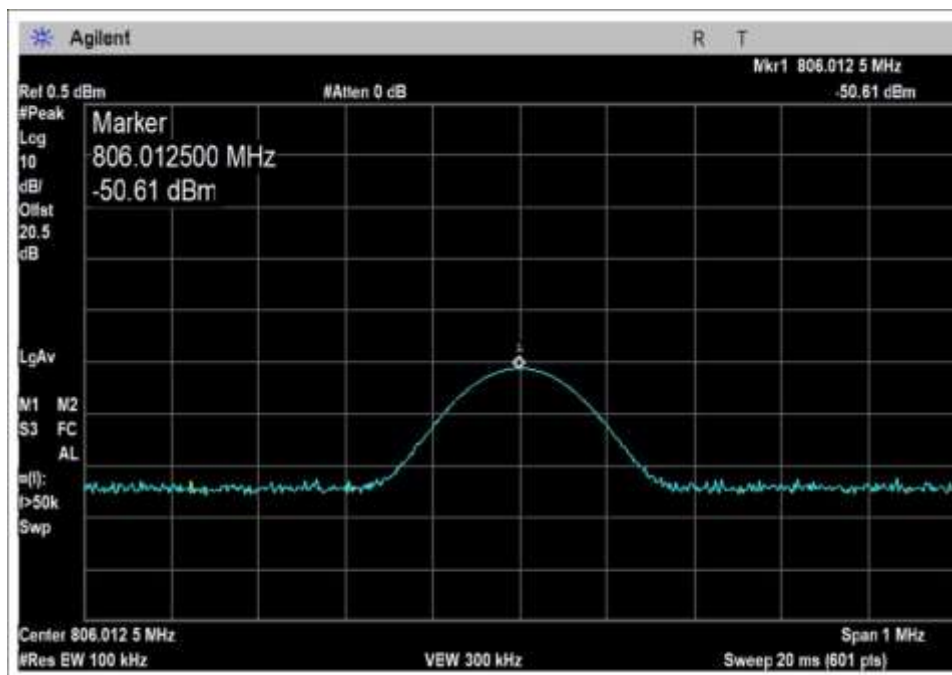
UL 799-805_ 804.99375MHz_Input



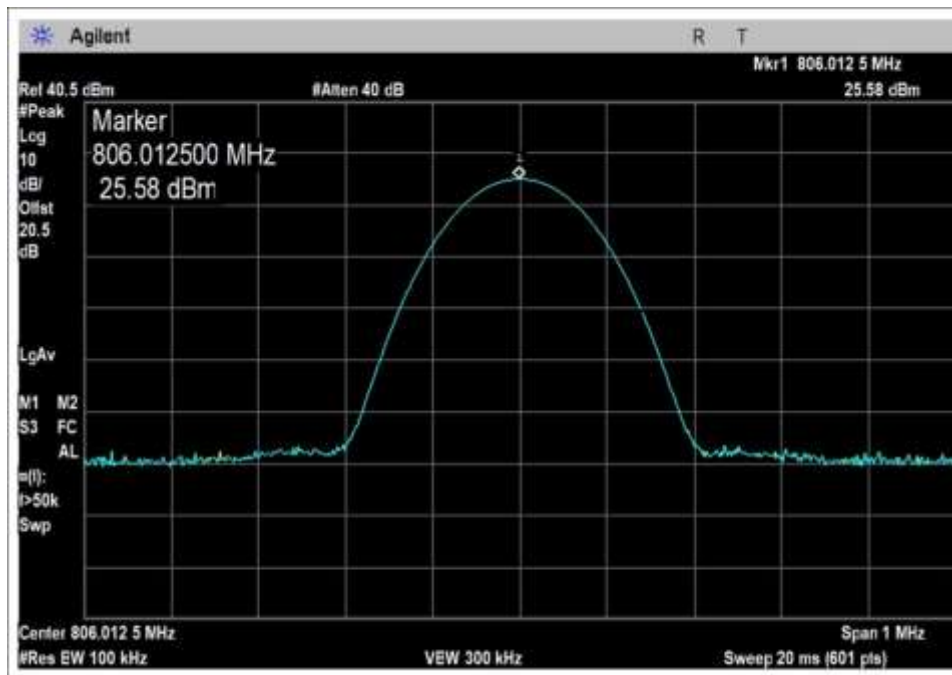
UL 799-805_ 804.99375MHz_Pre AGC.



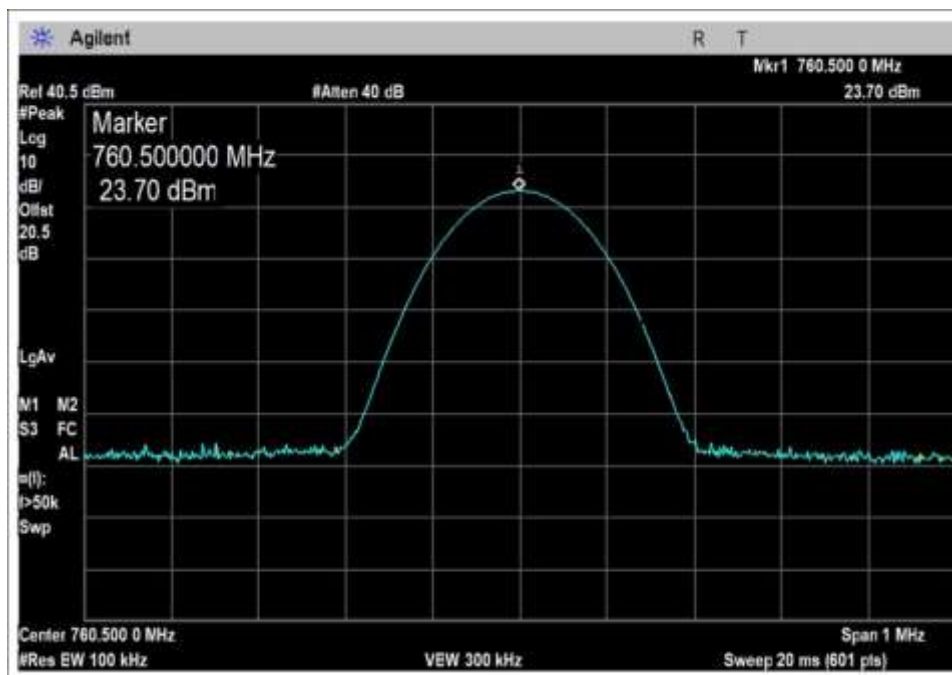
UL 806-816_ 806.0125MHz_AGC+3



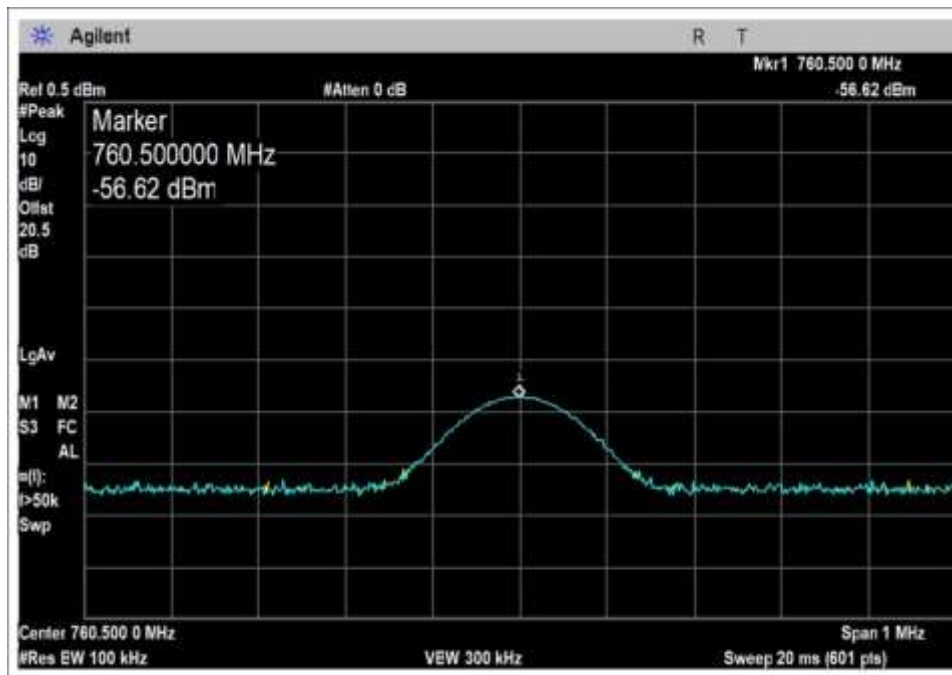
UL 806-816_ 806.0125MHz_Input



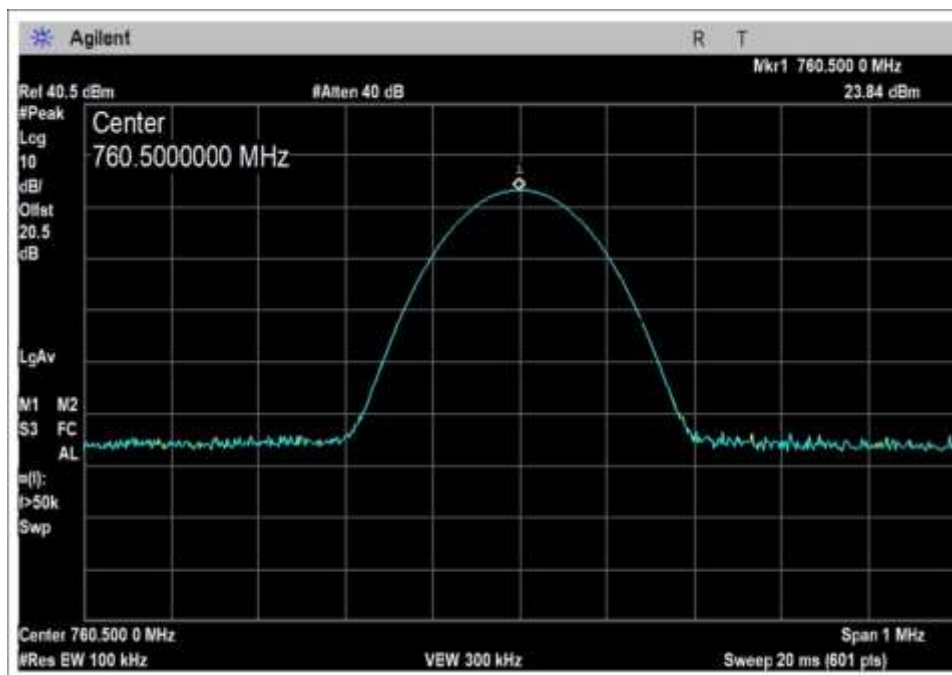
UL 806-816_ 806.0125MHz_Pre AGC



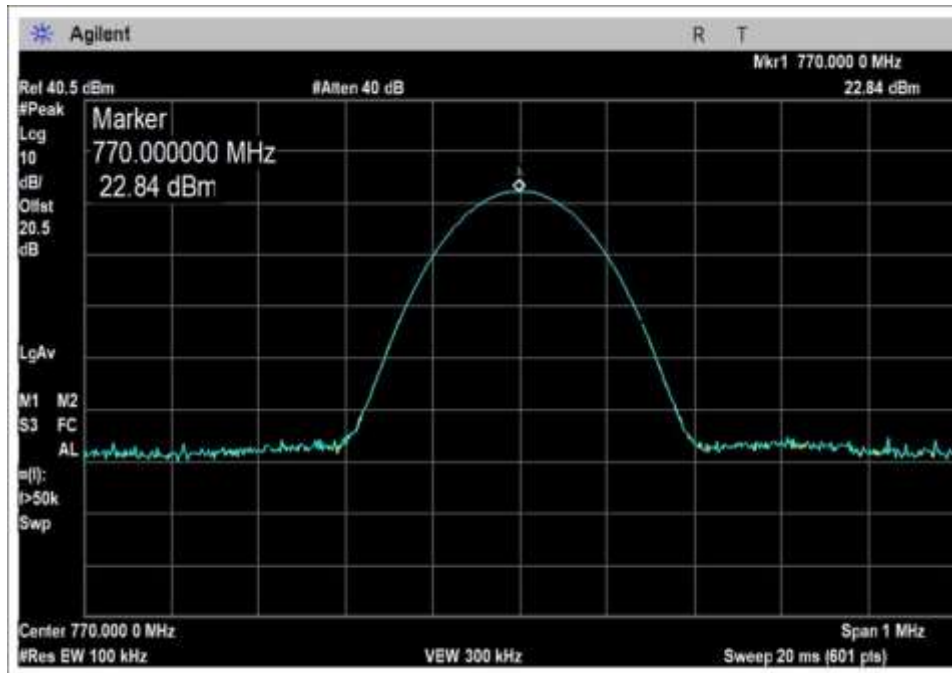
DL 758-768_ 760.5MHz_AGC+3



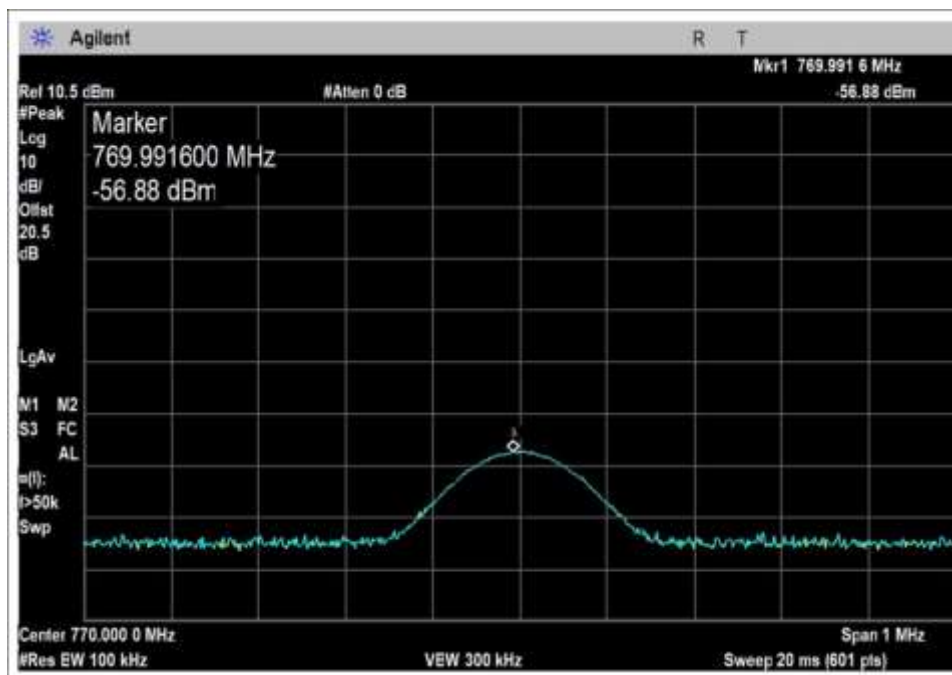
DL 758-768_ 760.5MHz_Input



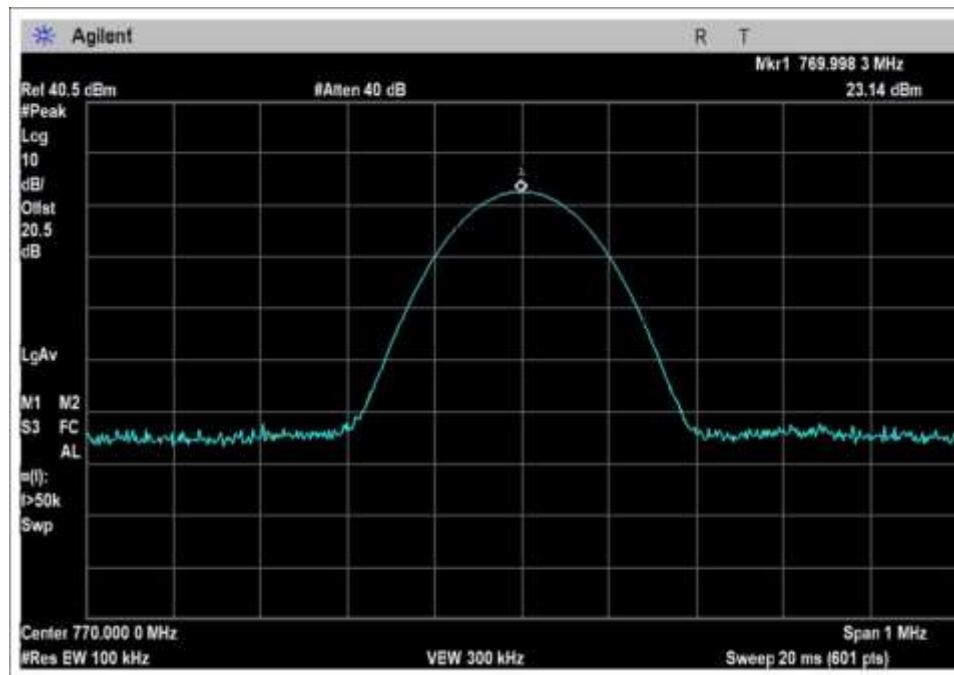
DL 758-768_ 760.5MHz_Pre AGC



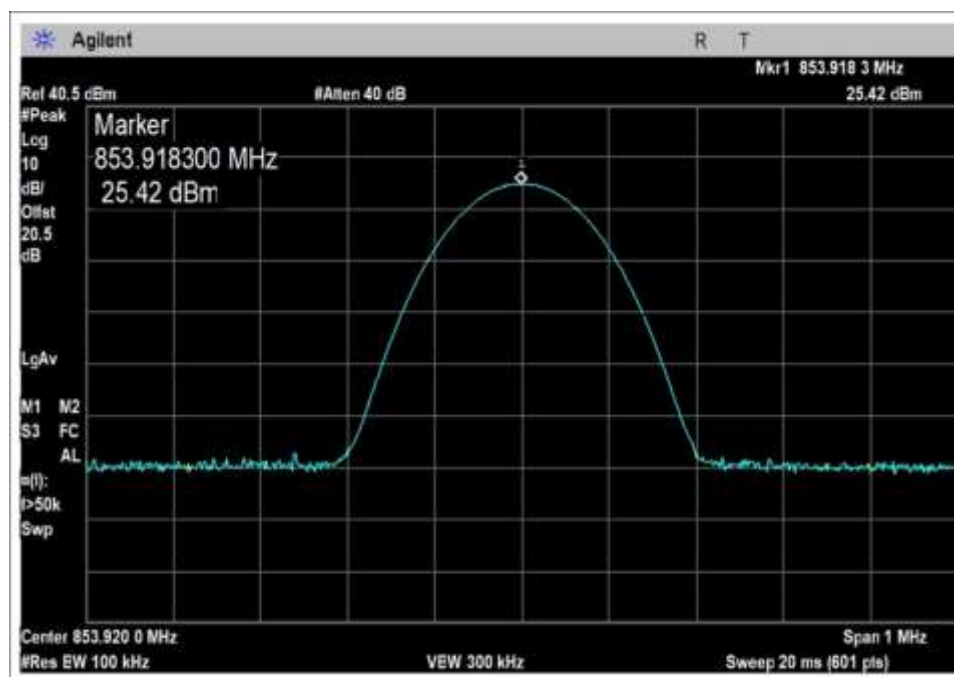
DL 769-775_ 770MHz_AGC+3



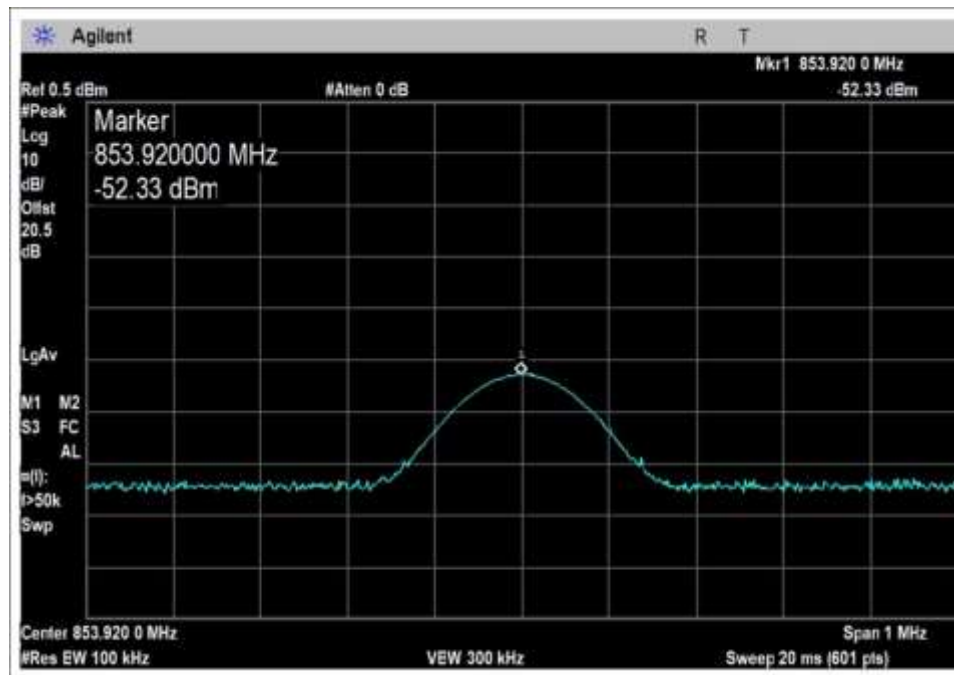
DL 769-775_ 770MHz_Input



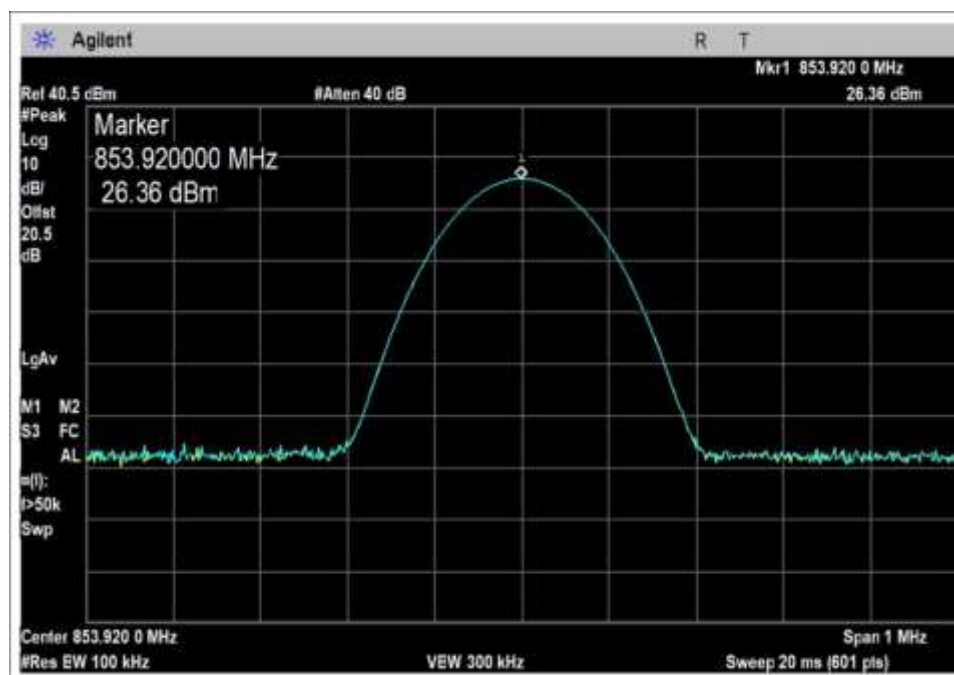
DL 769-775_ 770MHz_Pre AGC



DL 851-861_ 853.92MHz_AGC+3

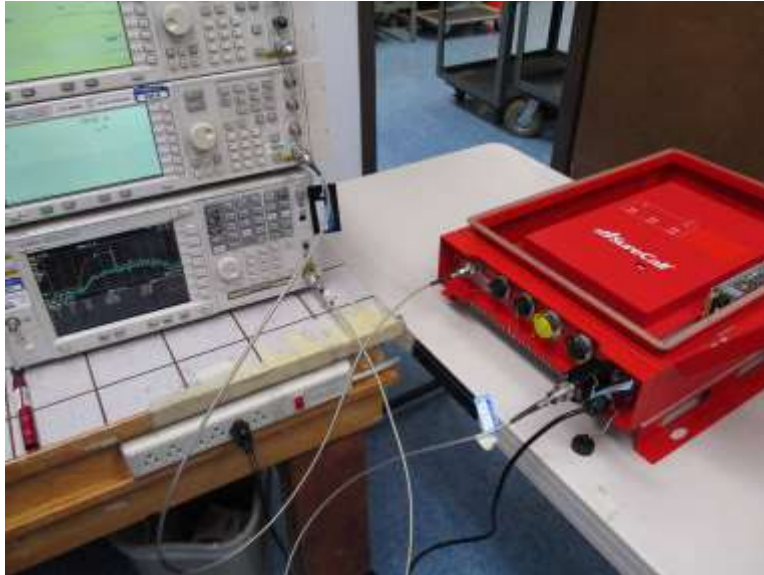


DL 851-861_ 853.92MHz_Input



DL 851-861_ 853.92MHz_Pre AGC

Test Setup Photo



Part 90: 219(e)(2) Noise Figure Limit

Engineer: Hieu Song Nguyenpham

Test Date: 6/6/2018

Test Equipment					
Asset #	Description	Model	Manufacturer	Cal Date	Cal Due
03537	Site Equipment	HP	346A	7/14/2017	7/14/2019
03471	Spectrum Analyzer	Agilent	E4440A	1/18/2018	1/18/2020
P07191	Cable	Astro	32022-29094K-29094K-48TC	10/30/2017	10/30/2019

Environmental Conditions					
Temperature (°C)	21.3	Relative Humidity (%):	47	Atmospheric Pressure (kPa):	102.3

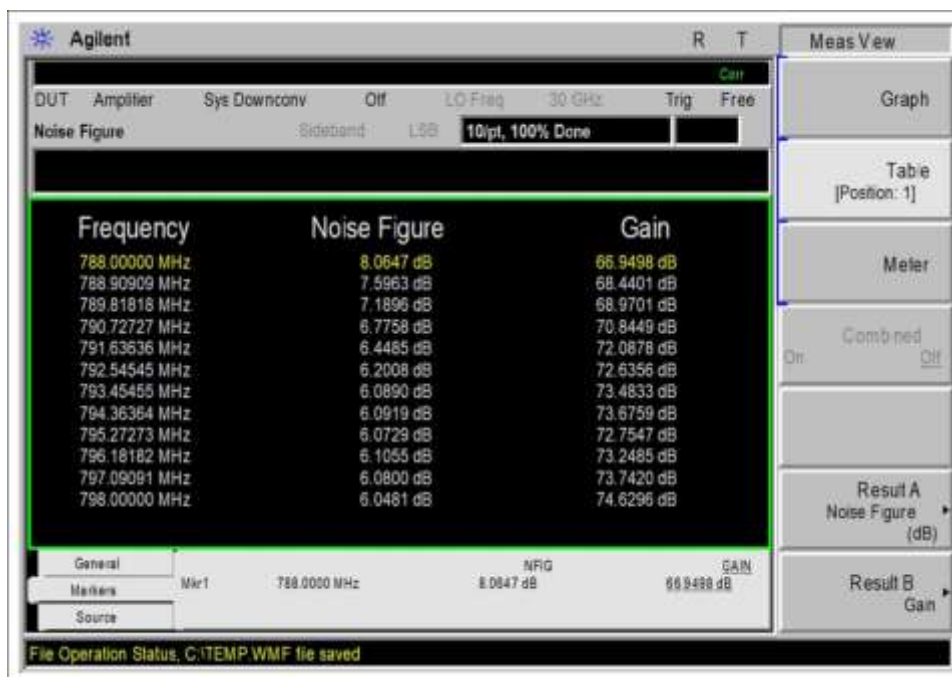
Summary of Results

Pass: As summarized in tables and plots below, the noise figure are within limits.

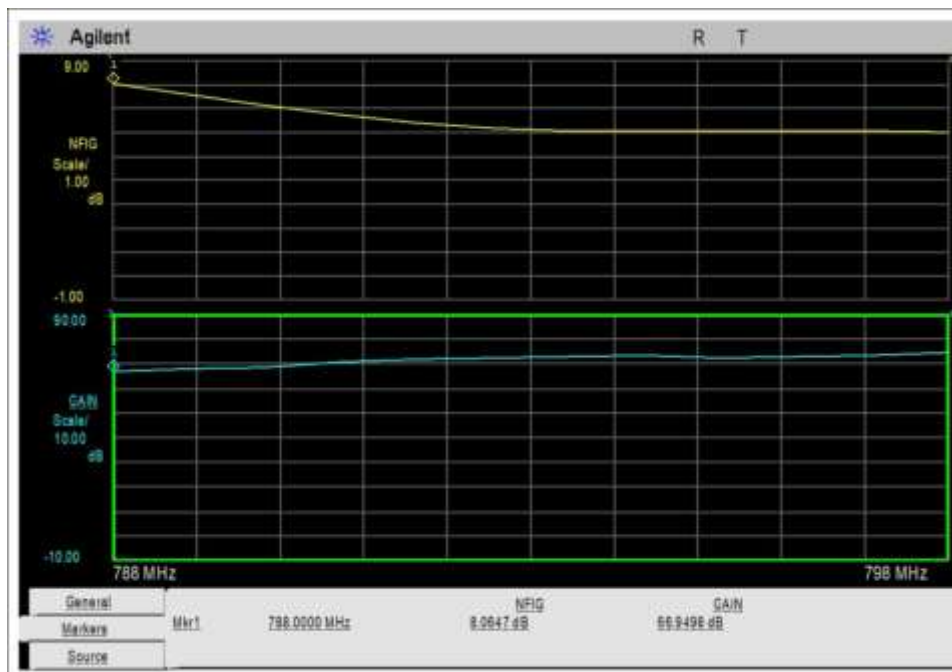
Noise figure measurements was made with AGC circuitry be disabled over the duration of the measurement.

Link	Band	Noise Figure (dB)	Limit (dB)	Margin (dB)
UL	788-798	8.0647	9	0.9353
UL	799-805	6.0054	9	2.9946
UL	806-816	6.3957	9	2.6043
DL	758-768	6.2756	9	2.7244
DL	769-775	7.6498	9	1.3502
DL	851-861	6.6939	9	2.3061

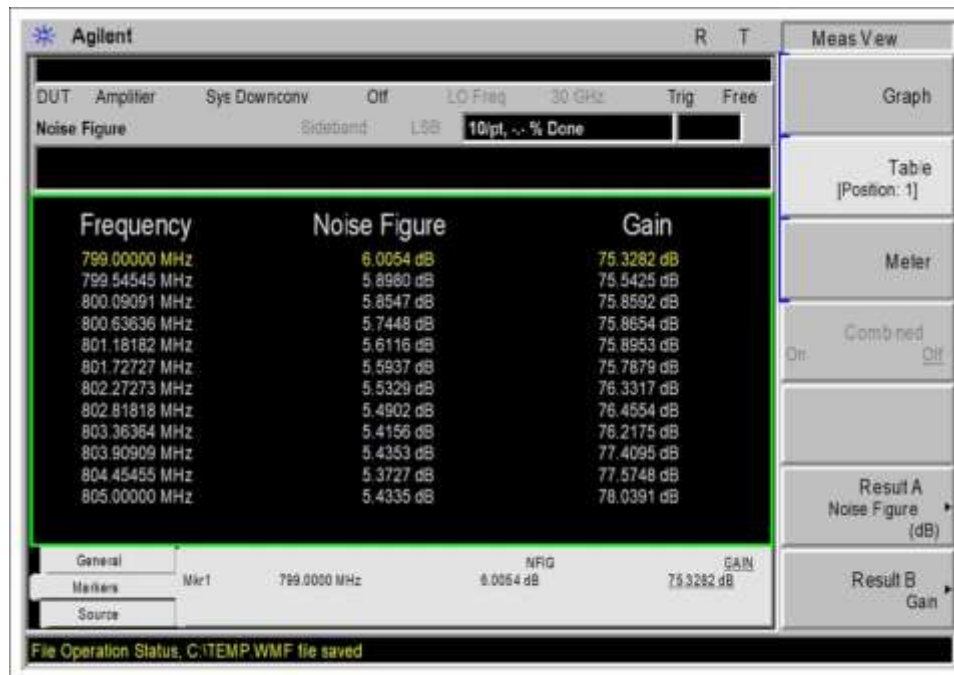
Plots



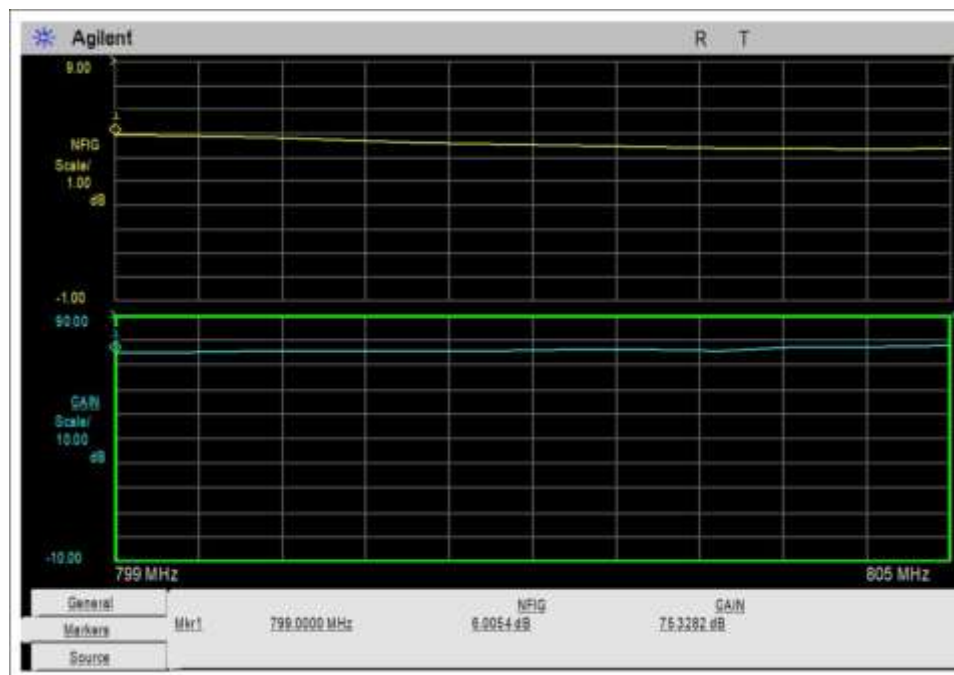
UL_788-798M-Data



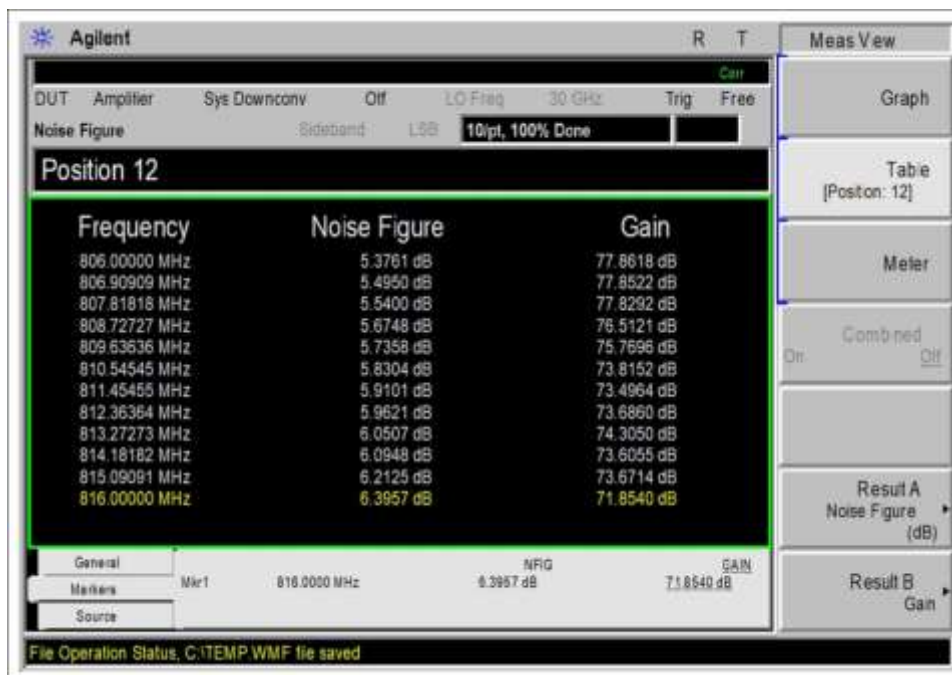
UL_788-798M-Graph



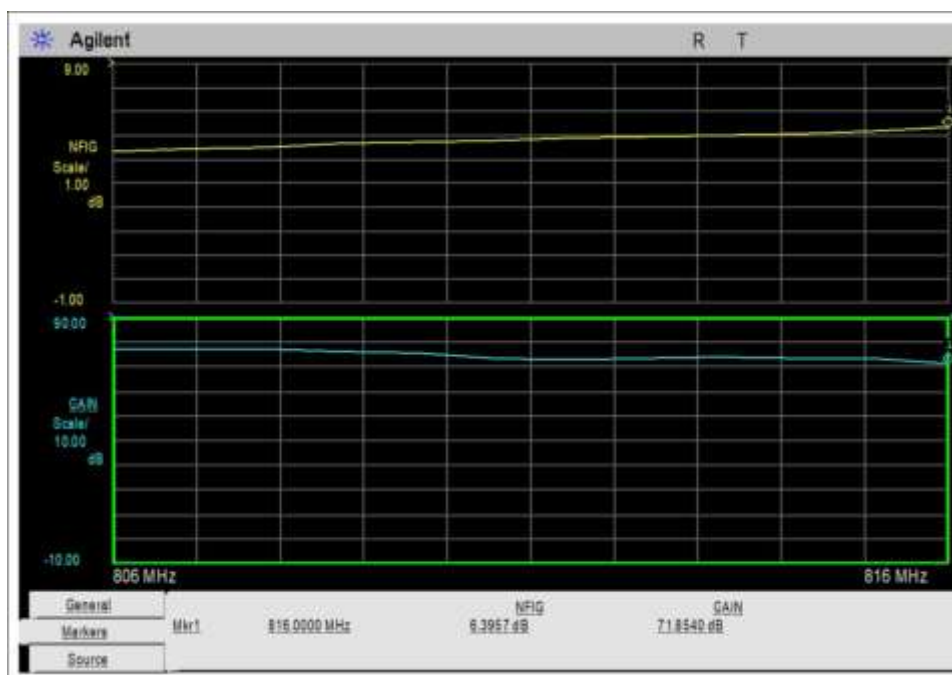
UL_799-805M-Data



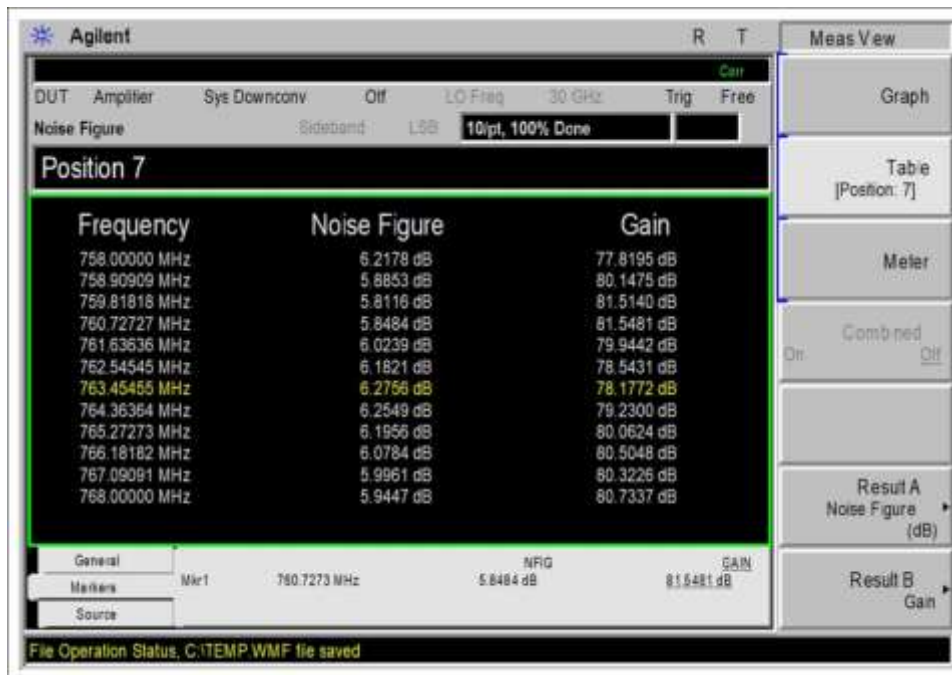
UL_799-805M-Graph



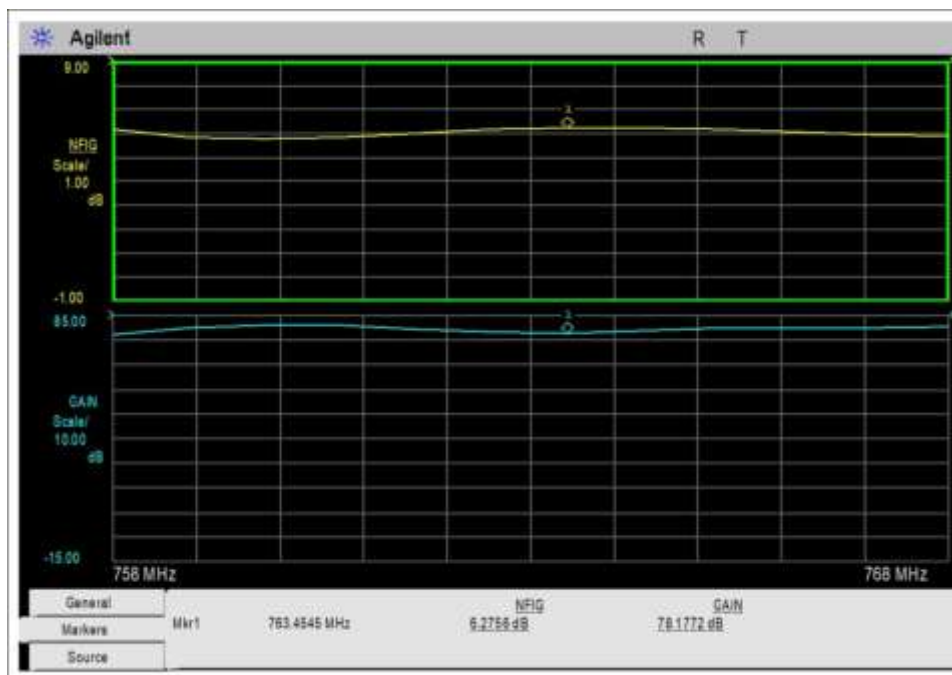
UL_806-816M-Data



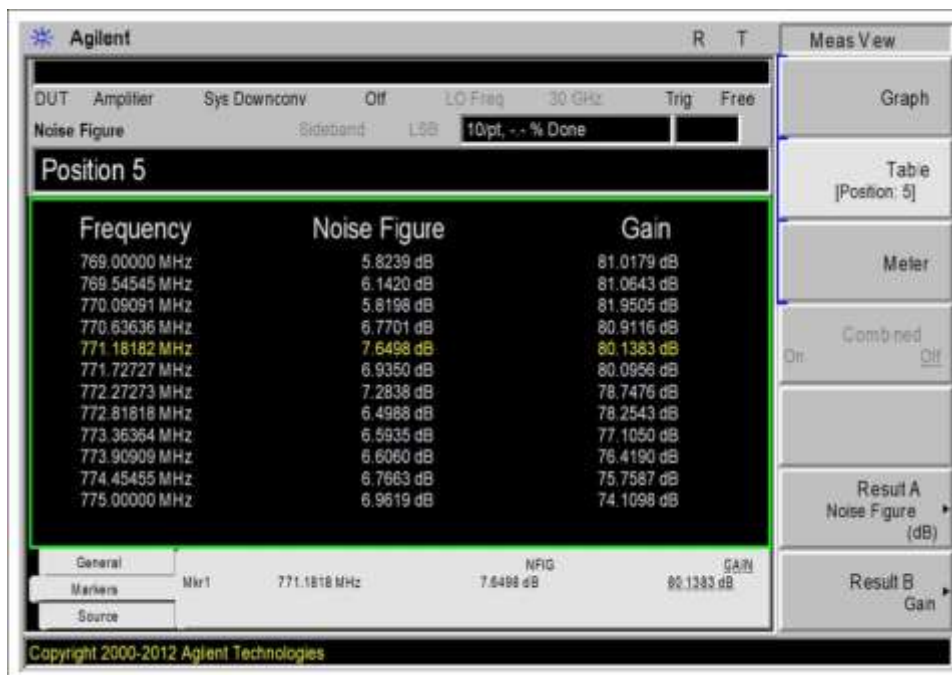
UL_806-816M-Graph



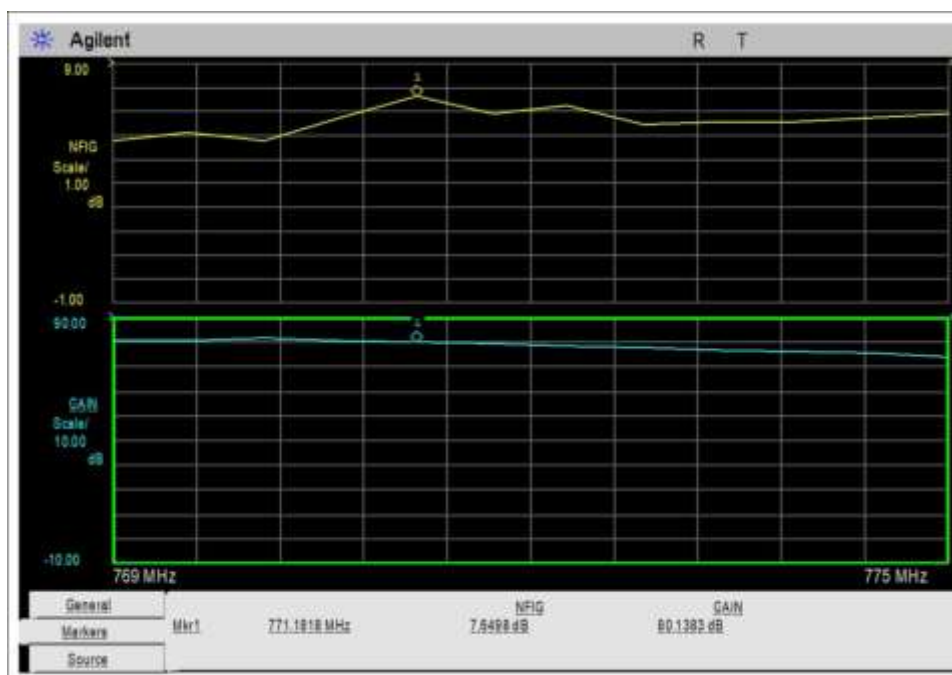
DL_758-768M-Data



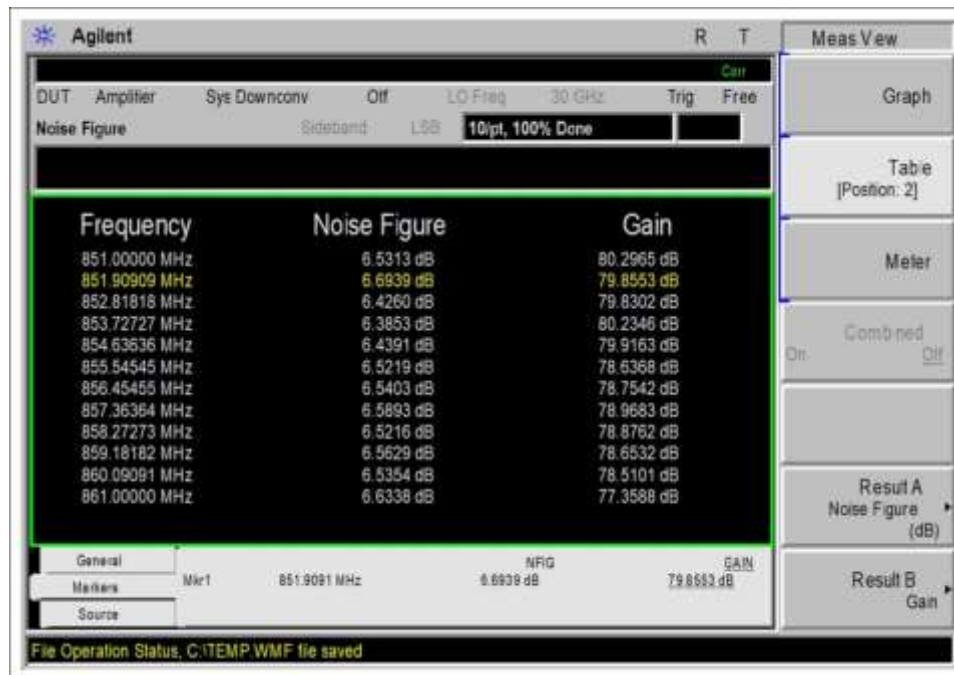
DL_758-768M-Graph



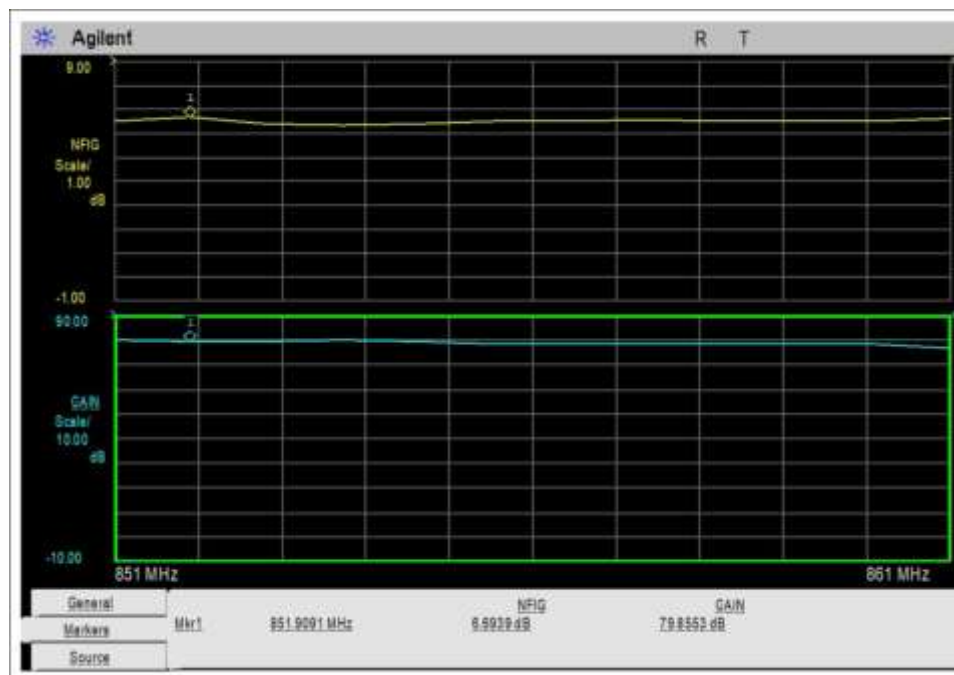
DL_769-775M-Data



DL_769-775M-Graph



DL_851-861M-Data



DL_851-861M-Graph

Test Setup Photo



Part 90: 219(e) Intermodulation Limit

Engineer: Hieu Song Nguyenpham

Test Date: 6/6/2018

Modification #1 was in place during testing.

Test Equipment					
Asset #	Description	Model	Manufacturer	Cal Date	Cal Due
P06797	Attenuator	Narda	766-20	4/10/2017	4/10/2019
03471	Spectrum Analyzer	Agilent	E4440A	1/18/2018	1/18/2020
03418	Signal Generator	Agilent	E4438C	6/19/2017	6/19/2019
P07191	Cable	Astro	32022-29094K-29094K-48TC	10/30/2017	10/30/2019
03362	Cable	Astrolab	32022-2-29094-48TC	1/10/2017	1/10/2019

Environmental Conditions					
Temperature (°C)	23.2	Relative Humidity (%):	43	Atmospheric Pressure (kPa):	101.8

Summary of Results

Pass: As summarized in tables and plots below, all intermodulation products are measured below -13dBm
Worst case results are reported for intermodulation test, done with and without AGC circuitry activated.

Public Safety 700MHz/800MHz bands

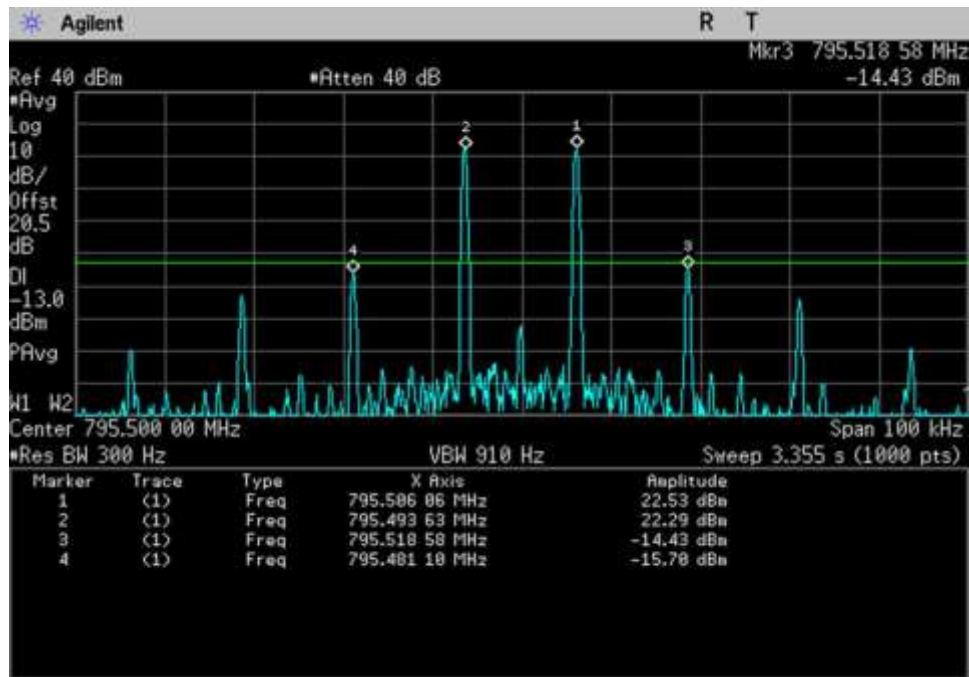
Channel Spacing=12.5kHz

Band	Frequency (MHz)	PreAGC (dBm)	AGC+3dB (dBm)	Limit (dBm)	Result
UL_806-816MHz	815.99375	-13.54	-13.58	-13.0	Pass
UL_806-816MHz	806.01215	-13.24	-13.94	-13.0	Pass
UL_806-816MHz	806.01875	-13.23	-16.20	-13.0	Pass
UL_799-805MHz	804.98438	-13.68	-15.81	-13.0	Pass
UL_799-805MHz	804.9875	-13.90	-14.27	-13.0	Pass
UL_799-805MHz	799.015625	-16.24	-15.93	-13.0	Pass
UL_788-798MHz	797.984375	-14.27	-13.75	-13.0	Pass
UL_788-798MHz	795.5	-14.43	-14.10	-13.0	Pass
UL_788-798MHz	788.015625	-19.27	-18.76	-13.0	Pass
DL_851-861MHz	860.99375	-20.68	-17.64	-13.0	Pass
DL_851-861MHz	853.92	-13.49	-13.71	-13.0	Pass
DL_851-861MHz	851.01875	-14.88	-19.09	-13.0	Pass
DL_769-775MHz	774.99375	-26.17	-26.31	-13.0	Pass
DL_769-775MHz	770	-25.27	-25.57	-13.0	Pass
DL_769-775MHz	769.01875	-25.38	-25.45	-13.0	Pass
DL_758-768MHz	767.99375	-25.3	-25.16	-13.0	Pass
DL_758-768MHz	760.5	-26.59	-26.64	-13.0	Pass
DL_758-768MHz	758.01875	-26.17	-26.19	-13.0	Pass

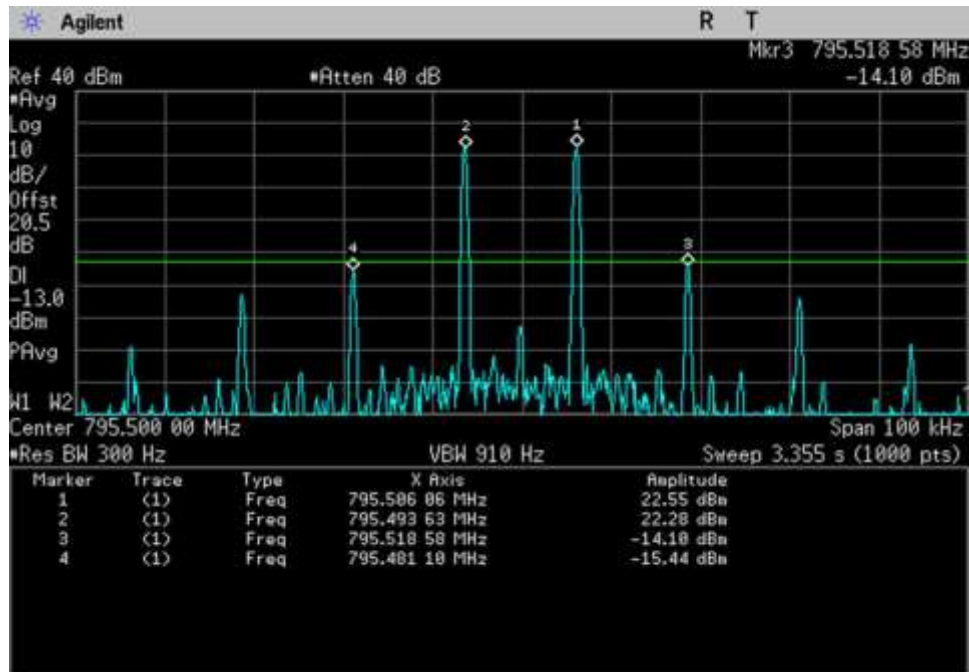
Channel Spacing=25kHz

Band	Frequency (MHz)	PreAGC (dBm)	AGC+3dB (dBm)	Limit (dBm)	Result
UL_806-816MHz	815.9875	-16.80	-16.74	-13.0	Pass
UL_806-816MHz	806.0125	-15.43	-15.90	-13.0	Pass
UL_806-816MHz	806.0375	-15.22	-15.25	-13.0	Pass
UL_799-805MHz	804.9625	-16.75	-16.46	-13.0	Pass
UL_799-805MHz	804.9875	-15.68	-15.62	-13.0	Pass
UL_799-805MHz	799.0375	-17.63	-17.43	-13.0	Pass
UL_788-798MHz	797.9625	-19.22	-19.12	-13.0	Pass
UL_788-798MHz	795.5	-17.26	-16.52	-13.0	Pass
UL_788-798MHz	788.0375	-18.70	-18.39	-13.0	Pass
DL_851-861MHz	860.9875	-19.75	-19.6	-13.0	Pass
DL_851-861MHz	853.92	-13.23	-16.98	-13.0	Pass
DL_851-861MHz	851.0375	-17.78	-17.78	-13.0	Pass
DL_769-775MHz	774.9875	-28.78	-28.15	-13.0	Pass
DL_769-775MHz	770	-27.49	-27.75	-13.0	Pass
DL_769-775MHz	769.0375	-27.99	-28.21	-13.0	Pass
DL_758-768MHz	767.9875	-27.61	-27.72	-13.0	Pass
DL_758-768MHz	760.5	-29.2	-28.73	-13.0	Pass
DL_758-768MHz	758.0375	-28.60	-28.90	-13.0	Pass

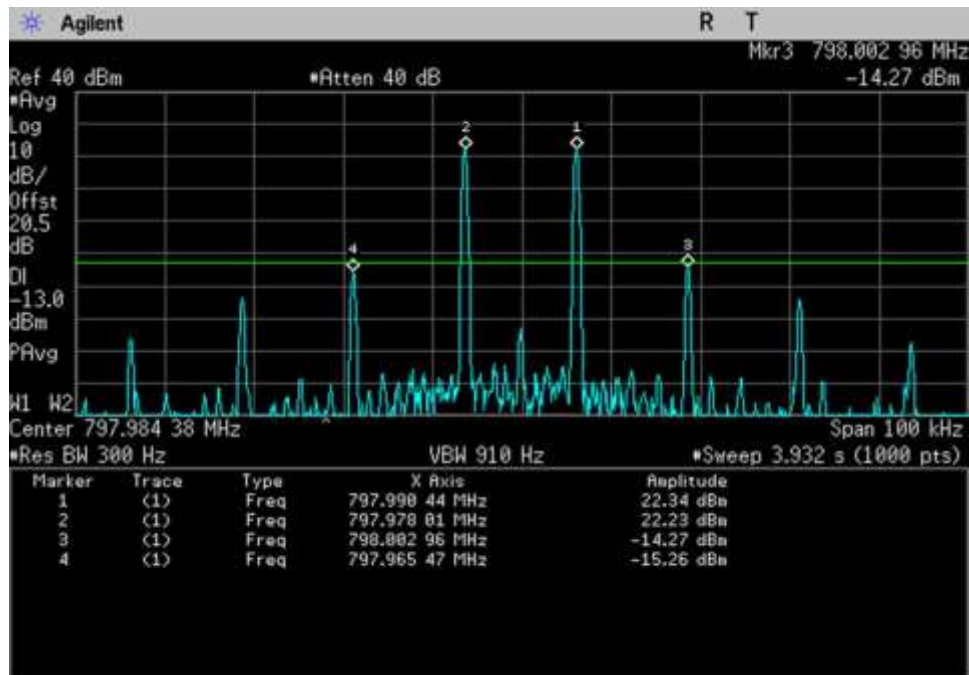
Plots



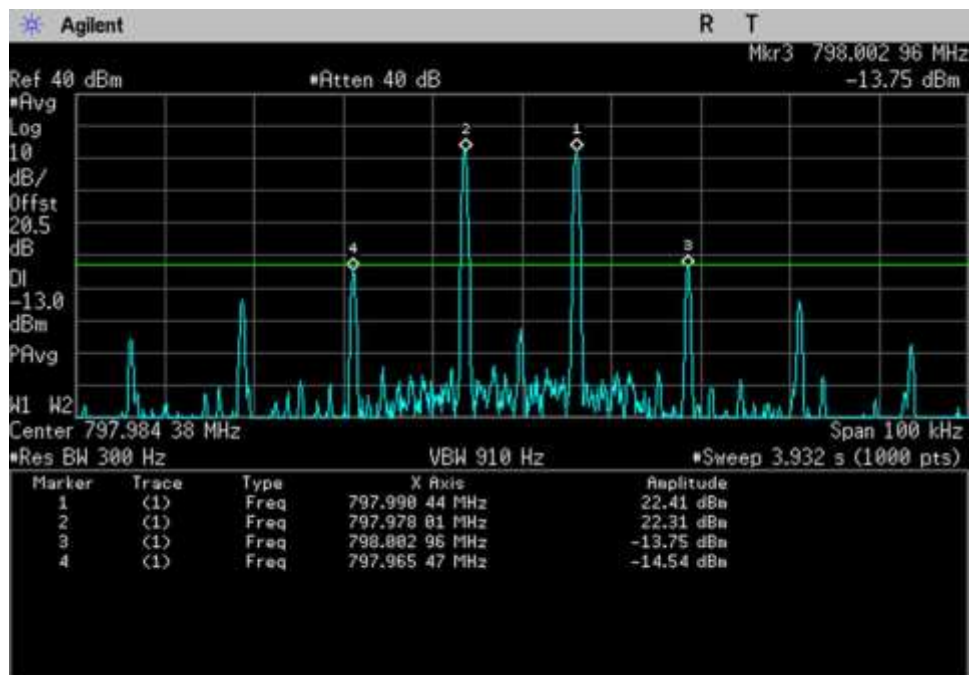
Intermodulation _UL_788-798-F0-AGC_ 795.5MHz_12.5kHz



Intermodulation _UL_788-798-F0-AGC+3_ 795.5MHz_12.5kHz



Intermodulation_UL_788-798-HC-AGC_ 797.984375MHz_12.5kHz



Intermodulation_UL_788-798-HC-AGC+3_ 797.984375MHz_12.5kHz