

## *Radio Test Report*

### *FCC Part 80, Part 90 and Part 95 (216-222 MHz)*

#### *Model: LN200*

IC CERTIFICATION #: 101D-LN200  
FCC ID: E5MDS-LN200

COMPANY: GE MDS LLC  
175 Science Parkway  
Rochester, NY 14620

TEST SITE(S): National Technical Systems - Silicon Valley  
41039 Boyce Road.  
Fremont, CA. 94538-2435

REPORT DATE: June 30, 2017

RE-ISSUED DATE: July 21, 2017

FINAL TEST DATES: June 15 and 20, 2017

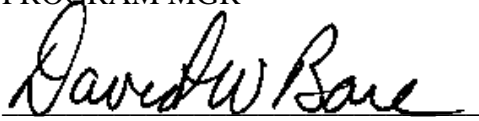
TOTAL NUMBER OF PAGES: 39



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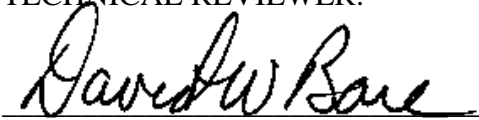
### VALIDATING SIGNATORIES

PROGRAM MGR

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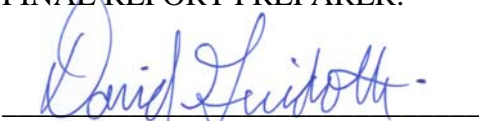
David W. Bare  
Chief Engineer

TECHNICAL REVIEWER:

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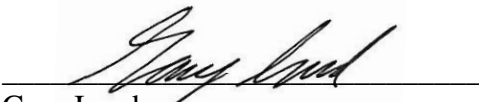
David W. Bare  
Chief Engineer

FINAL REPORT PREPARER:

A handwritten signature in blue ink, reading "David Guidotti", written over a horizontal line.

David Guidotti  
Senior Technical Writer

QUALITY ASSURANCE DELEGATE

A handwritten signature in black ink, reading "Gary Izard", written over a horizontal line.

Gary Izard  
Technical Writer



***REVISION HISTORY***

Rev#	Date	Comments	Modified By
	June 30, 2017	First release	
1	July 11, 2017	Corrected frequency on pages 25 and 26, added note about modulations and removed test setup photographs.	DWB
2	July 21, 2017	Added band edge results for FCC Part 80	DWB

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## SCOPE

Tests have been performed on the GE MDS LLC model LN200, pursuant to the relevant requirements of the following standard(s) in order to obtain device certification against the regulatory requirements of the Federal Communications Commission.

- Code of Federal Regulations (CFR) Title 47 Part 2
- CFR 47 Part 80 (Stations In The Maritime Services), Subpart J—Public Coast Stations (AMTS)
- CFR 47 Part 90 (Private Land Mobile Radio Service), Subparts K and T
- CFR 47 Part 95 (Personal Radio Service), Subpart F – 218-219 MHz Service

Conducted and radiated emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in the following reference standards and as outlined in National Technical Systems - Silicon Valley test procedures:

ANSI C63.4:2014

ANSI TIA-603-D June 2010

FCC KDB 971168 Licensed Digital Transmitters

The intentional radiator above has been tested in a simulated typical installation to demonstrate compliance with the relevant FCC performance and procedural standards.

Every practical effort was made to perform an impartial test using appropriate test equipment of known calibration. All pertinent factors have been applied to reach the determination of compliance.

The test results recorded herein are based on a single type test of the GE MDS LLC model LN200 and therefore apply only to the tested sample. The sample was selected and prepared by Dennis McCarthy of GE MDS LLC.

## **OBJECTIVE**

The primary objective of the manufacturer is compliance with the regulations outlined in the previous section.

Prior to marketing in the USA, the device requires certification. Prior to marketing in Canada, Class I transmitters, receivers and transceivers require certification.

Certification is a procedure where the manufacturer submits test data and technical information to a certification body and receives a certificate or grant of equipment authorization upon successful completion of the certification body's review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units, which are subsequently manufactured.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

## **STATEMENT OF COMPLIANCE**

The tested sample of GE MDS LLC model LN200 complied with the requirements of the standards and frequency bands declared in the scope of this test report. The LN200 has an existing FCC Certification. This report covers the addition of new channel bandwidths only.

Maintenance of compliance is the responsibility of the manufacturer. Any modifications to the product should be assessed to determine their potential impact on the compliance status of the device with respect to the standards detailed in this test report.

## **DEVIATIONS FROM THE STANDARDS**

No deviations were made from the published requirements listed in the scope of this report for the tests performed.

## TEST RESULTS

### FCC Parts 80, 90, 95

FCC		Description	Measured	Limit	Result
<b>Transmitter Modulation, output power and other characteristics</b>					
§2.1033 (c) (5) § 90.35		Frequency range(s)	216 to 220MHz 220 to 222MHz	216 to 220MHz 220 to 222MHz	Complied
§2.1033 (c) (5) § 80.385		Frequency range(s)	216 to 220MHz	216 to 220MHz	Complied
§2.1033 (c) (5) § 95.853		Frequency range(s)	218 to 219MHz	218 to 219MHz	Complied
§2.1033 (c) (6) §2.1033 (c) (7) § 2.1046 § 90.205 § 90.259 216-220 MHz		RF power output at the antenna terminals	20 - 33 dBm	33 dBm	Complied
§2.1033 (c) (6) §2.1033 (c) (7) § 2.1046 § 90.205 220-222 MHz		RF power output at the antenna terminals	20 – 41.3 dBm	47 dBm	Complied
§2.1033 (c) (6) §2.1033 (c) (7) § 2.1046 § 90.205 §90.729 220-222 MHz		ERP	27.1 dBm to 50.3 dBm	57 dBm	Complied
§2.1033 (c) (6) §2.1033 (c) (7) § 2.1046 §80.213(h)		ERP	27.1 dBm to 50.3 dBm	60 dBm	Complied
§2.1033 (c)(4) § 2.1047 § 90.210 25 kHz		Emission types	D1D	-	-
		Emission mask	F <sup>3</sup>	Within mask	Complies
§2.1033 (c)(4) § 2.1047 § 90.210 50 kHz		Emission types	D1D	-	-
		Emission mask	C, F	Within mask	Complies
§2.1033 (c)(4) § 2.1047 § 80.211(f) 50 kHz		Emission types	D1D	-	-
		Emission mask	F <sup>2</sup>	Within mask	Complies
§2.1033 (c)(4) § 2.1047 § 95.857 50 kHz		Emission types	D1D	-	-
		Emission mask	Per §95.857	Within mask	Complies
§ 2.1049 § 90.209		Occupied Bandwidth (216-220 MHz)	43.2 kHz	6, 11.25, 20 kHz <sup>1</sup>	Complied
§ 2.1049 § 90.209		Occupied Bandwidth (220-222 MHz)	17.3, 21.5 and 43.2 kHz	4 kHz <sup>1</sup>	Complied

FCC		Description	Measured	Limit	Result
Transmitter spurious emissions					
§ 2.1051 § 2.1057		At the antenna terminals	Compliance demonstrated via previous testing for other channel bandwidths		
§ 2.1053 § 2.1057		Field strength	Compliance demonstrated via previous testing for other channel bandwidths		
Other details					
§ 2.1055 § 90.213		Frequency stability	Compliance demonstrated via previous testing for other channel bandwidths		
§ 2.1093		RF Exposure	Compliance demonstrated via previous testing for other channel bandwidths		
§2.1033 (c) (8)		Final radio frequency amplifying circuit's dc voltages and currents for normal operation over the power range	35.5 VDC, 755 mA (Full power)		
-	-	Antenna Gain	Max 11.1 dBi	-	-
Notes					
1. May be aggregated.					
2. Per FCC §80.481 AMTS transmitters may utilize any modulation or channelization scheme so long as emissions are attenuated in accordance with §80.211 at the band edges of each station's assigned channel group or groups.					
3. Per FCC §90.717(a) multiple channel blocks of 5 kHz may be used.					

#### MEASUREMENT UNCERTAINTIES

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2) and were calculated in accordance with NAMAS document NIS 81 and M3003.

Measurement Type	Measurement Unit	Frequency Range	Expanded Uncertainty
RF frequency	Hz	25 to 7,000 MHz	$1.7 \times 10^{-7}$
RF power, conducted	dBm	25 to 7,000 MHz	$\pm 0.52$ dB
Conducted emission of transmitter	dBm	25 to 40,000 MHz	$\pm 0.7$ dB



## ***EQUIPMENT UNDER TEST (EUT) DETAILS***

### ***GENERAL***

The GE MDS LLC model LN200 is an industrial radio module operating in the 216-222 MHz bands and uses CPFSK and QAM modulation. Since the EUT could be placed in any position during operation, the EUT was treated as table-top equipment during testing to simulate the end-user environment. The electrical rating of the EUT is 10.0-60.0 Volts DC, 1.5 Amps max.

The sample was received on June 14, 2017 and tested on June 15 and 20, 2017. The following samples were used during testing:

Company	Model	Description	Serial Number	FCC ID
GE MDS LLC	LN200	Industrial Radio Module	2811323	E5MDS-LN200
GE MDS LLC	LN200	Industrial Radio Module	2791304	E5MDS-LN200

### ***OTHER EUT DETAILS***

The highest internal source of an EUT is defined as the highest frequency generated or used within the EUT or on which the EUT operates or tunes. In some cases, the highest internal source determines the frequency range of test for radiated emissions. The highest internal source of the EUT was declared as: 696.3 MHz. There is also a switch mode power operating at 350 kHz.

216 - 220 MHz Part 80, 90, 95F and

220 - 222 MHz Part 90

The following EUT details should be noted: The host product in which this product will be used "Orbit MCR" or "Orbit ECR" is rated from -40°C to +70°C, 10-60 VDC input.

### ***PROPOSED PRODUCT CHANGES***

The EUT is identical to the previously tested product except that an additional selection for operation in 25 and 50 kHz channel bandwidths for QAM modulation have been added to the software.

### ***ENCLOSURE***

The EUT does not have an enclosure as it is intended to be installed in a complete product. The PCB measures approximately 11 cm wide by 3.8 cm deep 0.6 cm high.

### ***MODIFICATIONS***

No modifications were made to the EUT during the time the product was at National Technical Systems - Silicon Valley.

**SUPPORT EQUIPMENT**

The following equipment was used as support equipment for testing:

Company	Model	Description	Serial Number	FCC ID
Mastech	HY6020ES	DC Power Supply	NTS 2317	-
HP	Probook 6555b	Laptop	CNU0502BCT	-

**EUT INTERFACE PORTS**

The I/O cabling configuration during testing was as follows:

Port	Connected To	Description	Cable(s)	Length(m)
			Shielded or Unshielded	
RF out	Load	Direct	-	-
DC power	Power Source	two wire	Unshielded	1.2
Com1	RJ45 to DB9 adapter	Cat 5	Unshielded	1.0

**Additional on Support Equipment**

Port	Connected To	Description	Cable(s)	Length(m)
			Shielded or Unshielded	
Laptop Serial	RJ45 to DB9 adapter	Multiwire	Shielded	2.0

**EUT OPERATION**

During testing the EUT was placed into continuous transmit mode at the selected frequency, power bandwidth and modulation using terminal software. 64QAM modulation was considered representative of QPSK and 16QAM as the RF characteristics of all three modulations are the same.

## TESTING

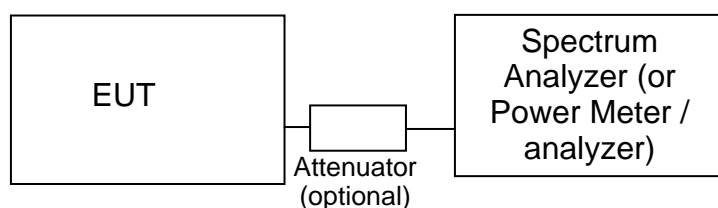
### GENERAL INFORMATION

Antenna port measurements were taken at the National Technical Systems - Silicon Valley test site located at 41039 Boyce Road, Fremont, CA 94538-2435.

Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent requirements.

### RF PORT MEASUREMENT PROCEDURES

Conducted measurements are performed with the EUT's rf input/output connected to the input of a spectrum analyzer, power meter or modulation analyzer. When required an attenuator, filter and/or dc block is placed between the EUT and the spectrum analyzer to avoid overloading the front end of the measurement device. Measurements are corrected for the insertion loss of the attenuators and cables inserted between the rf port of the EUT and the measurement equipment.



Test Configuration for Antenna Port Measurements

For devices with an integral antenna the output power and spurious emissions are measured as a field strength at a test distance of (typically) 3m and then converted to an eirp using a substitution measurement (refer to Radiated Emissions Measurements). All other measurements are made as detailed below but with the test equipment connected to a measurement antenna directed at the EUT.

### OUTPUT POWER

Output power is measured using a power meter and an average sensor head, a spectrum analyzer or a power meter and peak power sensor head as required by the relevant rule part(s). Where necessary measurements are gated to ensure power is only measured over periods that the device is transmitting.

Power measurements made directly on the rf power port are, when appropriate, converted to an EIRP by adding the gain of the highest gain antenna that can be used with the device under test, as specified by the manufacturer.

***BANDWIDTH MEASUREMENTS***

The 6dB, 20dB and/or 26dB signal bandwidth is measured in using the bandwidths recommended by ANSI C63.4. When required, the 99% bandwidth is measured using the methods detailed in RSS-GEN. The measurement bandwidth is set to be at least 1% of the instrument's frequency span.

***TRANSMITTER MASK MEASUREMENTS***

The transmitter mask measurements are made using resolution bandwidths as specified in the pertinent rule part(s). Where narrower bandwidths are used the measurement is corrected to account for the reduced bandwidth by either using the adjacent channel power function of the spectrum analyzer to sum the power across the required measurement bandwidth. The frequency span of the analyzer is set to ensure the fundamental signal and all significant sidebands are displayed.

The top of the mask may be set by the total output power of the signal, the power of the unmodulated signal or the peak value of the signal in the reference bandwidth being used for the mask measurement.



### *Appendix A Test Equipment Calibration Data*

**Radio Antenna Port (Power, Mask and Bandwidth), 15-Jun-17**

<u>Manufacturer</u>	<u>Description</u>	<u>Model</u>	<u>Asset #</u>	<u>Calibrated</u>	<u>Cal Due</u>
Rohde & Schwarz	Power Meter, Single Channel	NRVS	1422	3/10/2017	3/10/2018
Rohde & Schwarz	Peak Power Sensor 100 uW - 2 Watts (w/ 20 dB pad, SN BJ5155)	NRV-Z32	1536	4/19/2017	4/21/2018
Rohde & Schwarz	Signal Analyzer 20 Hz - 26.5 GHz	FSQ26	2327	6/17/2016	7/17/2017

**Radio Antenna Port (Mask), 20-Jun-17**

<u>Manufacturer</u>	<u>Description</u>	<u>Model</u>	<u>Asset #</u>	<u>Calibrated</u>	<u>Cal Due</u>
Agilent Technologies	3Hz -44GHz PSA Spectrum Analyzer	E4446A	2796	5/22/2017	5/22/2018

**Radio Antenna Port (Band Edge Emissions), 21-Jul-17**

<u>Manufacturer</u>	<u>Description</u>	<u>Model</u>	<u>Asset #</u>	<u>Calibrated</u>	<u>Cal Due</u>
Rohde & Schwarz	Signal Analyzer 20 Hz - 26.5 GHz	FSQ26	2327	6/24/2017	6/24/2018

## *Appendix B Test Data*

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## *EMC Test Data*

Client:	GE MDS LLC	Job Number:	JD105105
Product	LN200	T-Log Number:	T105211
System Configuration:	50 kHz Channel BW	Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	
Emissions Standard(s):	FCC Parts 80, 90 and 95	Class:	
Immunity Standard(s):		Environment:	Radio

## **EMC Test Data**

For The

**GE MDS LLC**

Product

LN200

Date of Last Test: 7/21/2017

Client:	GE MDS LLC	Job Number:	JD105105
Model:	LN200	T-Log Number:	T105211
Contact:	Dennis McCarthy	Project Manager:	Christine Krebill
Standard:	FCC Parts 80, 90 and 95	Project Coordinator:	-
		Class:	N/A

## FCC Part 90 Mask and Occupied Bandwidth

### Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

### General Test Configuration

With the exception of the radiated spurious emissions tests, all measurements are made with the EUT's rf port connected to the measurement instrument via an attenuator or dc-block if necessary. All amplitude measurements are adjusted to account for the attenuation between EUT and measuring instrument. For frequency stability measurements the EUT was place inside an environmental chamber.

Radiated measurements are made with the EUT located on a non-conductive table, 3m from the measurement antenna.

Ambient Conditions:                      Temperature:            22 °C  
    Rel. Humidity:            43 %

### Summary of Results

Run #			Test Performed	Limit	Pass / Fail	Result / Margin
1			Spectral Mask	Part 90 F multichannel	Pass	Within Mask
2			99% or Occupied Bandwidth	25 kHz	Pass	21.5 kHz, 17.3 kHz

### Modifications Made During Testing

No modifications were made to the EUT during testing

### Deviations From The Standard

No deviations were made from the requirements of the standard.



Client:	GE MDS LLC	Job Number:	JD105105
Model:	LN200	T-Log Number:	T105211
Contact:	Dennis McCarthy	Project Manager:	Christine Krebill
Standard:	FCC Parts 80, 90 and 95	Project Coordinator:	-
		Class:	N/A

## Run #1: Spectral Mask, FCC Part 90 Mask F

Date of Test: 6/20/2017

Test Engineer: David Bare

Test Location: Fremont EMC Lab #3

Config. Used: 1

Config Change: None

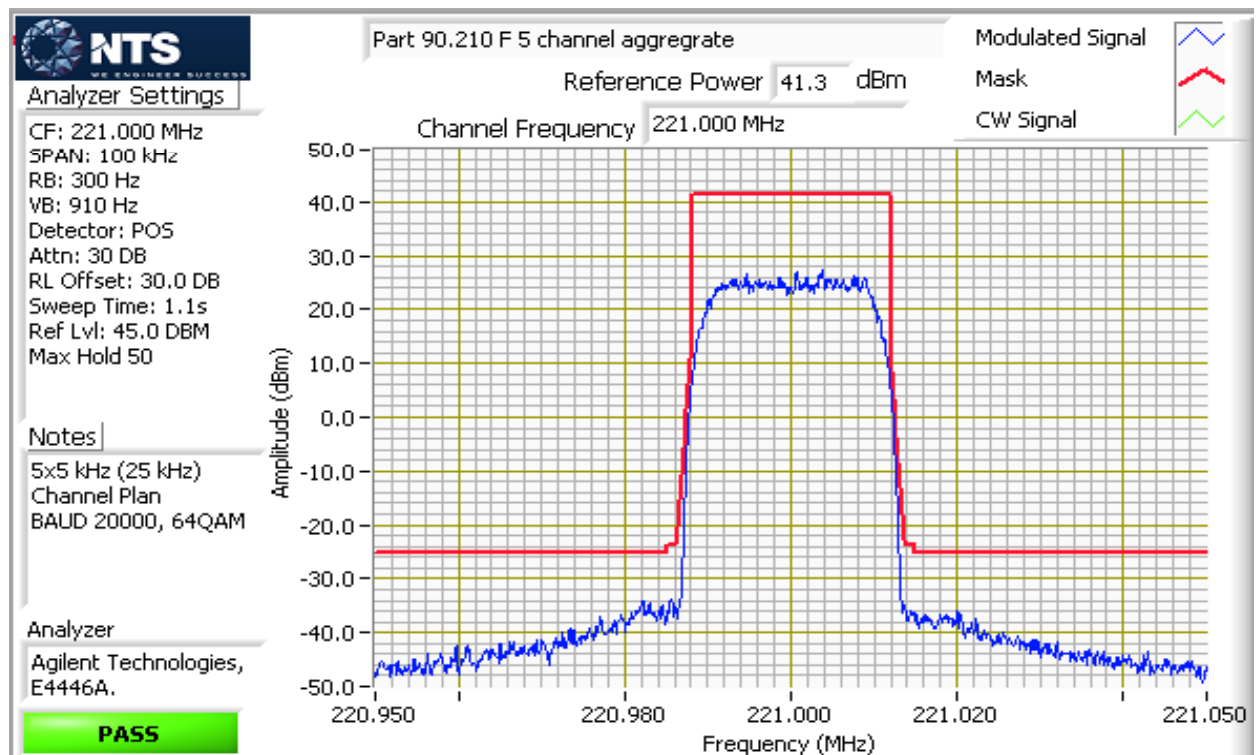
EUT Voltage: 13.8 VDC

Power setting	Baud	Modem	Channel plan		Channel Frequency (MHz)	Mask	Result Pass/Fail
40	20 kbps	64QAM	25 kHz		221.000000	F <sup>3</sup>	Pass
40	16 kbps	64QAM	25 kHz		221.000000	F <sup>3</sup>	Pass

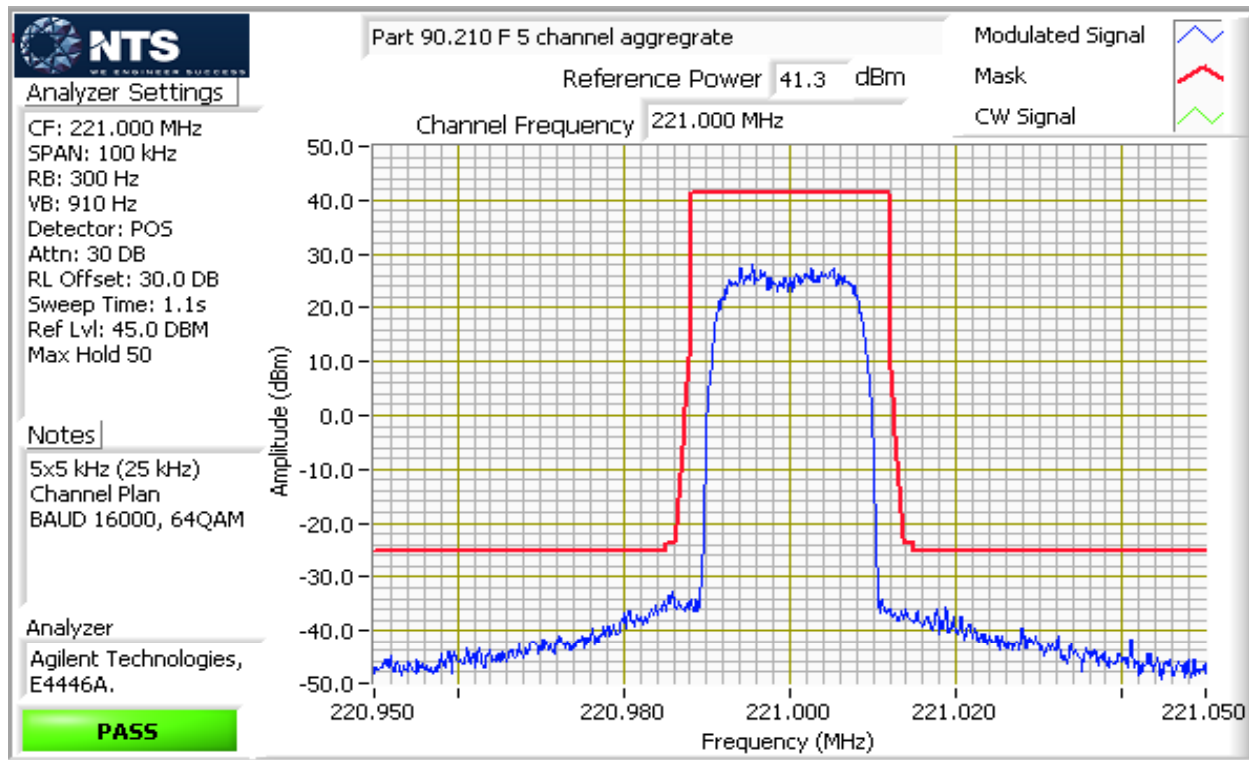
Note 1: Reference RF power was measured with peak power meter.

Note 2: Per §90.717(a) 220-222 MHz band, 5 and 10 channel blocks may be used. Since channel bandwidth is 5 kHz, a 5 channel block uses 25 kHz channel bandwidth.

Note 3: 5x5 kHz aggregated channels.



Client:	GE MDS LLC	Job Number:	JD105105
Model:	LN200	T-Log Number:	T105211
Contact:	Dennis McCarthy	Project Manager:	Christine Krebill
Standard:	FCC Parts 80, 90 and 95	Project Coordinator:	-
		Class:	N/A



## Run #2: Signal Bandwidth

Date of Test: 6/20/2017

Test Engineer: David Bare

Test Location: Fremont EMC Lab #3

Config. Used: 1

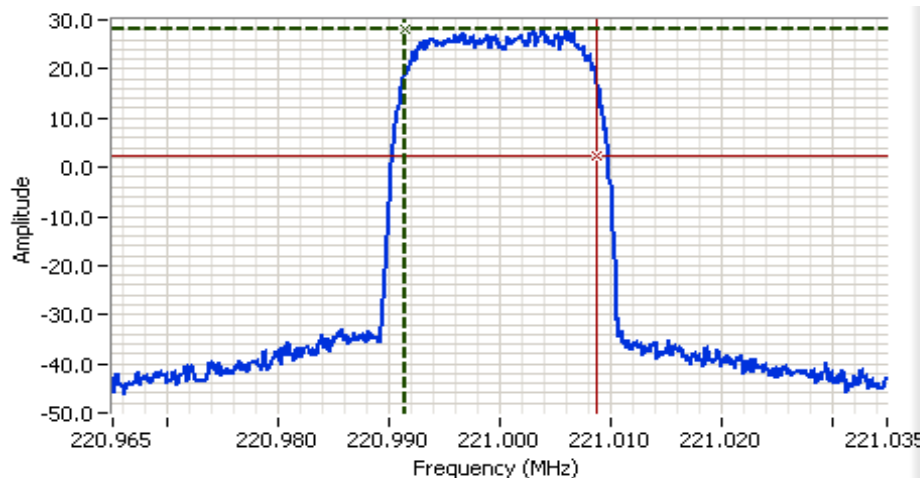
Config Change: None

EUT Voltage: 13.8 VDC

Power Setting	Frequency (MHz)	Resolution Bandwidth	Bandwidth (kHz)	Baud	Modem
			99%		
40	221	300 Hz	21.50	20 kbps	64QAM
40	221	300 Hz	17.30	16 kbps	64QAM

Note 1: 99% bandwidth measured in accordance with ANSI C63.10, with RB between 1% and 5% of the measured bandwidth and VB  $\geq 3 \times$  RB and Span  $\geq 1.5\%$  and  $\leq 5\%$  of measured bandwidth.

Client:	GE MDS LLC	Job Number:	JD105105
Model:	LN200	T-Log Number:	T105211
Contact:	Dennis McCarthy	Project Manager:	Christine Krebill
Standard:	FCC Parts 80, 90 and 95	Project Coordinator:	-
		Class:	N/A

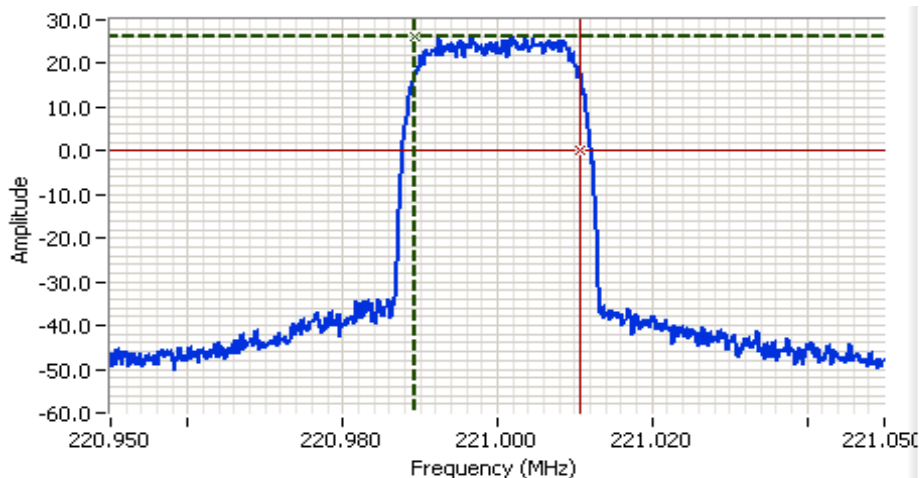


## Analyzer Settings

Agilent Technologies, E4446A  
 CF: 221.000 MHz  
 SPAN: 70.0 kHz  
 RB: 300 Hz  
 VB: 910 Hz  
 Detector: POS  
 Attn: 30 DB  
 RL Offset: 30.0 DB  
 Sweep Time: 0.7s  
 Ref Lvl: 45.0 DBM

## Comments

99% power BW: 17.3 kHz  
 BAUD 16000, 64QAM



## Analyzer Settings

Agilent Technologies, E4446A  
 CF: 221.000 MHz  
 SPAN: 100 kHz  
 RB: 300 Hz  
 VB: 910 Hz  
 Detector: POS  
 Attn: 30 DB  
 RL Offset: 30.0 DB  
 Sweep Time: 1.1s  
 Ref Lvl: 45.0 DBM

## Comments

99% power BW: 21.5 kHz  
 BAUD 20000, 64QAM



Client: GE MDS LLC	Job Number: JD105105
Model: LN200	T-Log Number: T105211
Contact: Dennis McCarthy	Project Manager: Christine Krebill
Standard: FCC Parts 80, 90 and 95	Project Coordinator: -
	Class: N/A

## FCC Parts 80, 90 and 95 Power, Mask and Occupied Bandwidth

### Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

### General Test Configuration

With the exception of the radiated spurious emissions tests, all measurements are made with the EUT's rf port connected to the measurement instrument via an attenuator or dc-block if necessary. All amplitude measurements are adjusted to account for the attenuation between EUT and measuring instrument. For frequency stability measurements the EUT was placed inside an environmental chamber.

Ambient Conditions:                      Temperature:      23-25 °C  
   Rel. Humidity:      40-45 %

### Summary of Results

Run #	Spacing	Data Rate	Test Performed	Limit	Pass / Fail	Result / Margin
1			Output Power	2 W conducted and 500W erp depending on	Pass	33 - 41.3 dBm
2			Spectral Mask	Masks Pat 90 C and F, Part 80.211 and Part 95.857	Pass	Within Mask
3			99% or Occupied Bandwidth	50 kHz	Pass	43.2 kHz

### Modifications Made During Testing

No modifications were made to the EUT during testing

### Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	GE MDS LLC	Job Number:	JD105105
Model:	LN200	T-Log Number:	T105211
Contact:	Dennis McCarthy	Project Manager:	Christine Krebill
Standard:	FCC Parts 80, 90 and 95	Project Coordinator:	-
		Class:	N/A

## Run #1: Output Power

Date of Test: 6/15/2017

Config. Used: 1

Test Engineer: David Bare

Config Change: None

Test Location: Fremont EMC Lab #4A

EUT Voltage: 13.8 VDC

Cable Loss:           

Attenuator: 20.0 dB

Total Loss: 20.0 dB

Cable ID(s): -

Attenuator IDs: 1878.0

Power Setting <sup>2</sup>	Frequency (MHz)	Output Power		Antenna Gain (dBd)	Result	ERP		
		(dBm) <sup>1</sup>	mW			dBm	W	
40	216	41.3	13489.6	9.0	Pass	50.3	107.152	Part 80
40	218.25	41.3	13489.6	9.0	Pass	50.3	107.152	Part 95F
40	220	41.3	13489.6	9.0	Pass	50.3	107.152	Part 80/90
40	222	41.3	13489.6	9.0	Pass	50.3	107.152	Part 90
31	216	33.0	1995.3	9.0	Pass	42.0	15.849	Part 90
31	220	33.0	1995.3	9.0	Pass	42.0	15.849	Part 90

Note 1: Output power measured using a peak power meter

Note 2: Power setting - the software power setting used during testing, included for reference only.

Client: GE MDS LLC	Job Number: JD105105
Model: LN200	T-Log Number: T105211
Contact: Dennis McCarthy	Project Manager: Christine Krebill
Standard: FCC Parts 80, 90 and 95	Project Coordinator: -
	Class: N/A

## Run #2: Spectral Mask, FCC Part 90 Mask C (Aggregate)

Date of Test: 6/15/2017

Test Engineer: David Bare

Test Location: Fremont EMC Lab #4A

Config. Used: 1

Config Change: None

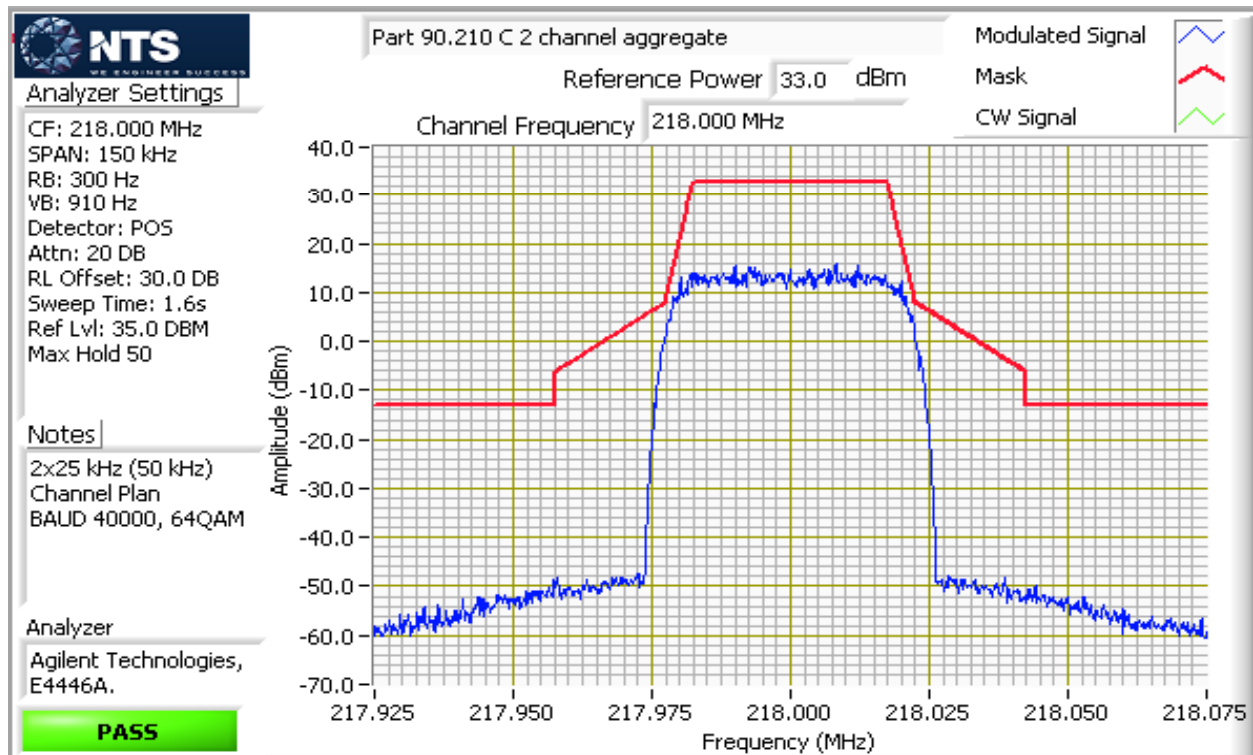
EUT Voltage: 13.8 VDC

Power setting	Baud / Modem	Modem	Channel plan	Modulation	Channel Frequency (MHz)	Mask	Result Pass/Fail
31	40 kbps	64QAM	50 kHz	QAM	218.000000	C <sup>3</sup>	Pass

Note 1: Reference RF power was measured with peak power meter.

Note 2: Per §90.259 (a) 216-220 MHz band (7) Frequencies will be assigned with a 6.25 kHz, 12.5 kHz, 25 kHz or 50 kHz channel bandwidth.

Note 3: 2x25 kHz aggregated channels.



Client: GE MDS LLC	Job Number: JD105105
Model: LN200	T-Log Number: T105211
Contact: Dennis McCarthy	Project Manager: Christine Krebill
Standard: FCC Parts 80, 90 and 95	Project Coordinator: -
	Class: N/A

## Run #2: Spectral Mask, FCC Part 90 Mask F (Aggregate)

Date of Test: 6/20/2017

Config. Used: 1

Test Engineer: David Bare

Config Change: None

Test Location: Fremont EMC Lab #4A

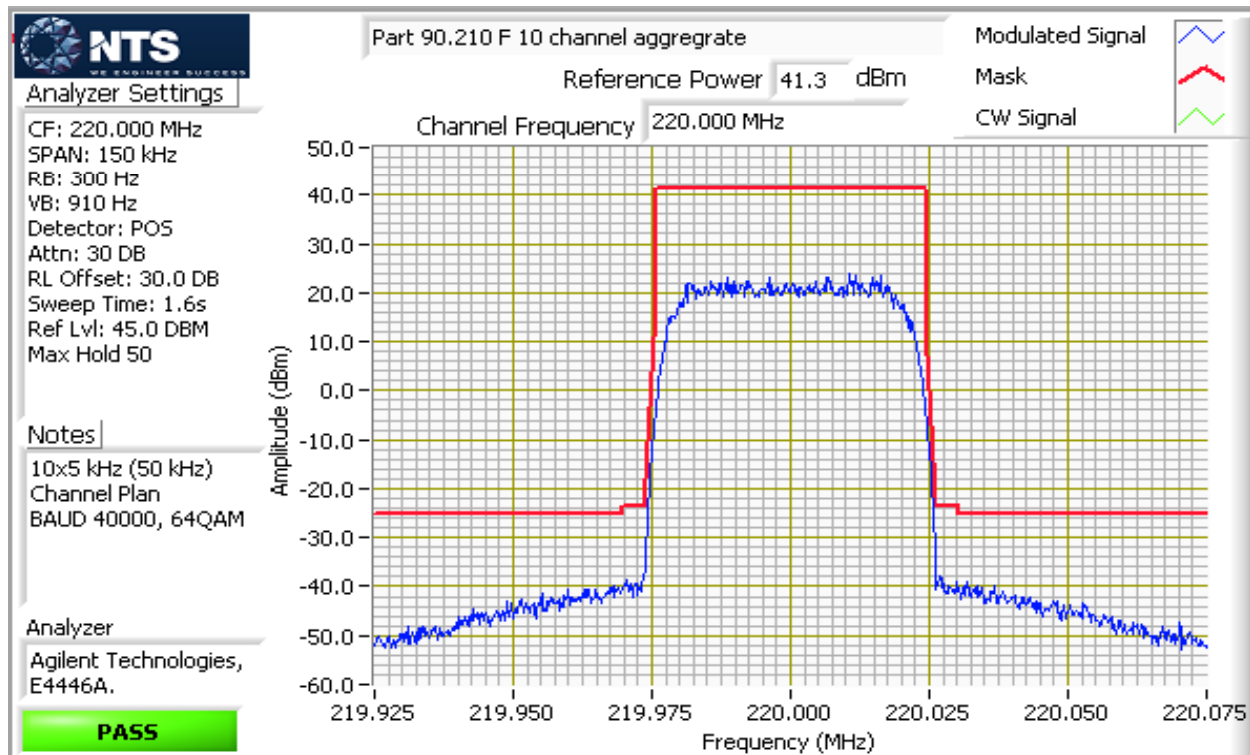
EUT Voltage: 13.8 VDC

Power setting	Baud / Modem	Modem	Channel plan	Modulation	Channel Frequency (MHz)	Mask	Result Pass/Fail
40	40 kbps	64QAM	50 kHz	QAM	220.000000	F <sup>3</sup>	Pass

Note 1: Reference RF power was measured with peak power meter.

Note 2: Per §90.717(a) 220-222 MHz band, 10 channel blocks may be used. Since channel bandwidth is 5 kHz, a 10 channel block uses 50 kHz channel bandwidth.

Note 3: 10x5 kHz aggregated channels. Although the selected frequency is actually at the band edge, which would never be used by a licensee, it demonstrates that for this band the radio complies with the mask requirement.



Client:	GE MDS LLC	Job Number:	JD105105
Model:	LN200	T-Log Number:	T105211
Contact:	Dennis McCarthy	Project Manager:	Christine Krebill
Standard:	FCC Parts 80, 90 and 95	Project Coordinator:	-
		Class:	N/A

## Run #2: Spectral Mask, FCC Part 80.211 Band Edge

Date of Test: 7/21/2017

Test Engineer: David Bare

Test Location: Fremont EMC Lab #4A

Config. Used: 1

Config Change: None

EUT Voltage: 13.8 VDC

Power setting	Baud / Modem	Modem	Channel plan	Modulation	Channel Frequency (MHz)	Mask	Result Pass/Fail	
40	40.0 kbps	40000	50.0 kHz	QAM	217.025000	80.211	Pass	Group B
40	40.0 kbps	40000	50.0 kHz	QAM	217.475000	80.211	Pass	Group B
40	40.0 kbps	40000	50.0 kHz	QAM	217.525000	80.211	Pass	Group A
40	40.0 kbps	40000	50.0 kHz	QAM	217.975000	80.211	Pass	Group A
40	40.0 kbps	40000	50.0 kHz	QAM	219.025000	80.211	Pass	Group B
40	40.0 kbps	40000	50.0 kHz	QAM	219.475000	80.211	Pass	Group B
40	40.0 kbps	40000	50.0 kHz	QAM	219.525000	80.211	Pass	Group A
40	40.0 kbps	40000	50.0 kHz	QAM	219.975000	80.211	Pass	Group A
40	40.0 kbps	40000	50.0 kHz	QAM	216.025000	80.211	Pass	Group D
40	40.0 kbps	40000	50.0 kHz	QAM	216.475000	80.211	Pass	Group D
40	40.0 kbps	40000	50.0 kHz	QAM	216.525000	80.211	Pass	Group C
40	40.0 kbps	40000	50.0 kHz	QAM	216.975000	80.211	Pass	Group C

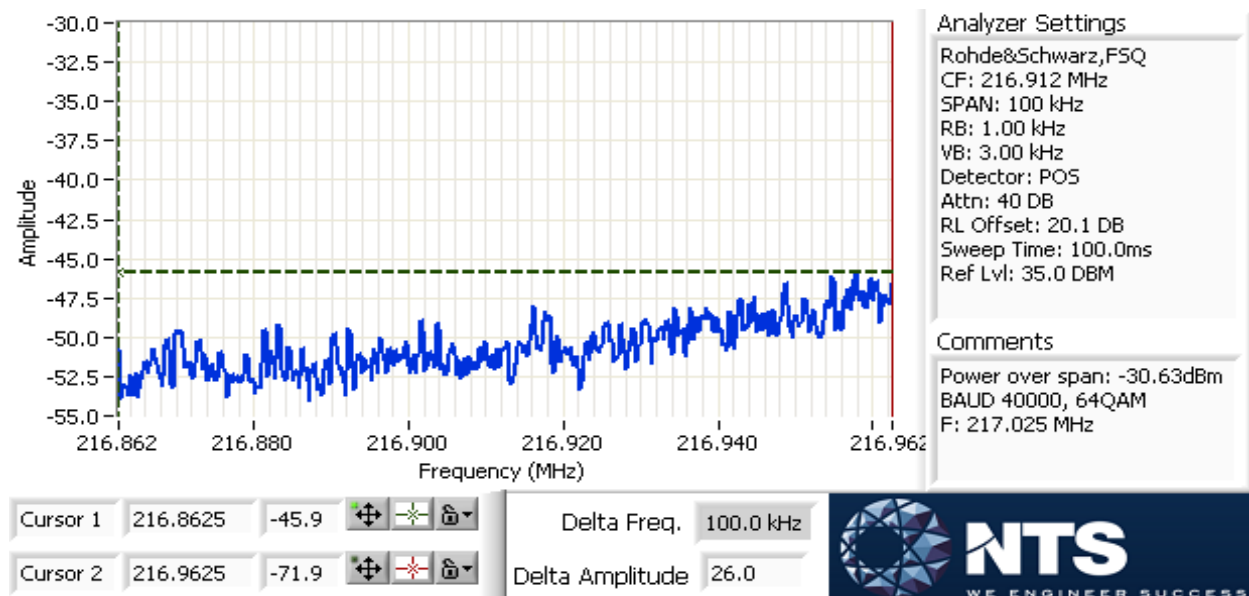
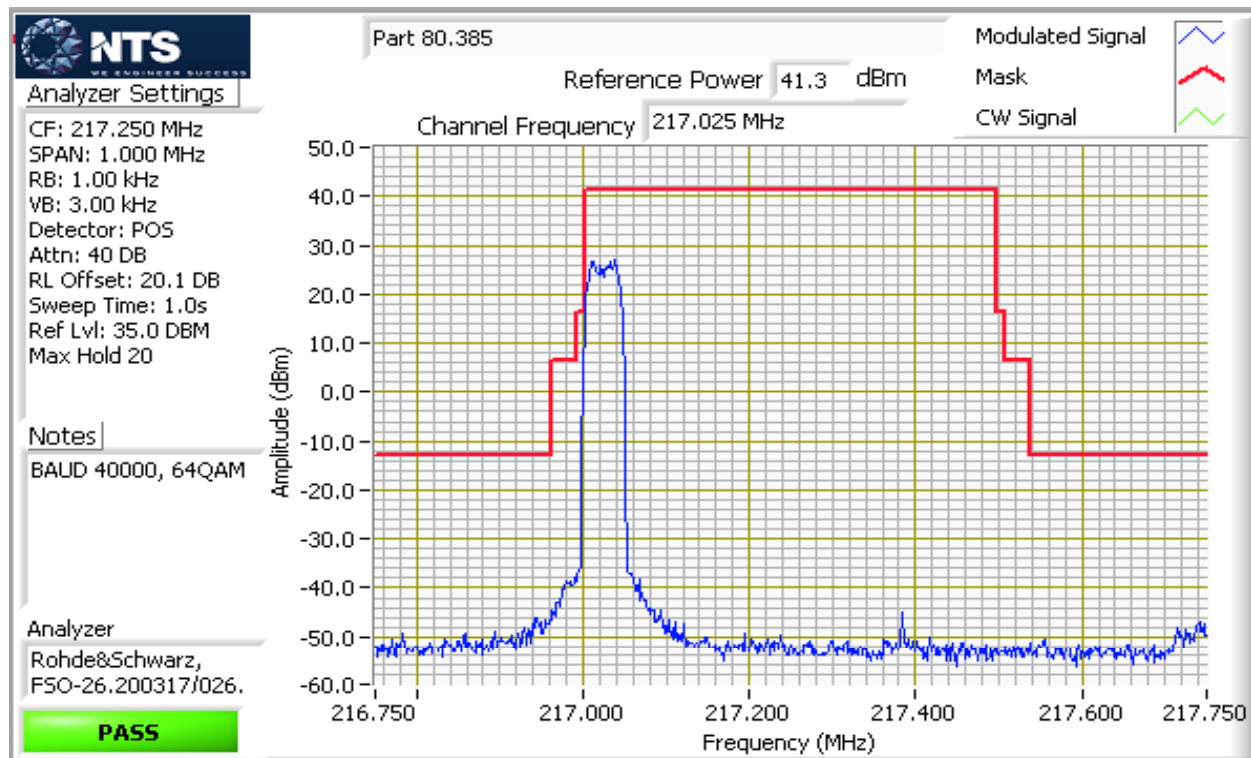
Note 1: Reference RF power was measured with peak power meter.

Note 2: -13 dBm band edge frequencies were calculated as 216.9625 MHz and 217.5375 MHz or 218.9625 MHz and 219.5375 MHz for Group B channels and 217.4625 MHz and 218.0375 MHz or 219.4625 MHz and 220.0375 MHz for Group A channels

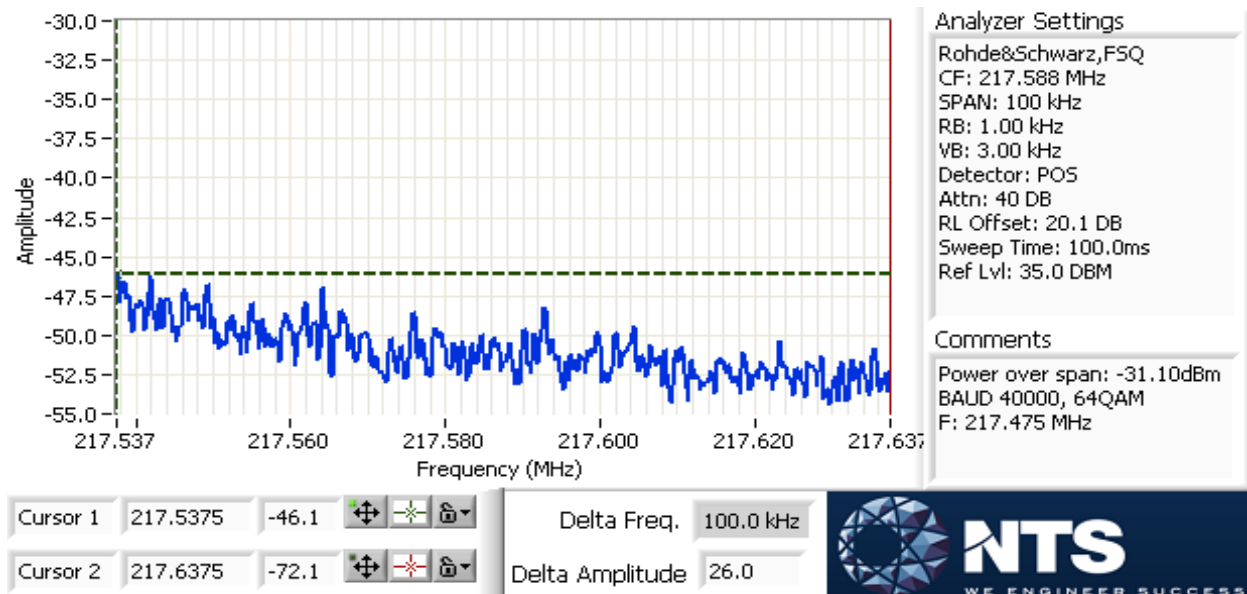
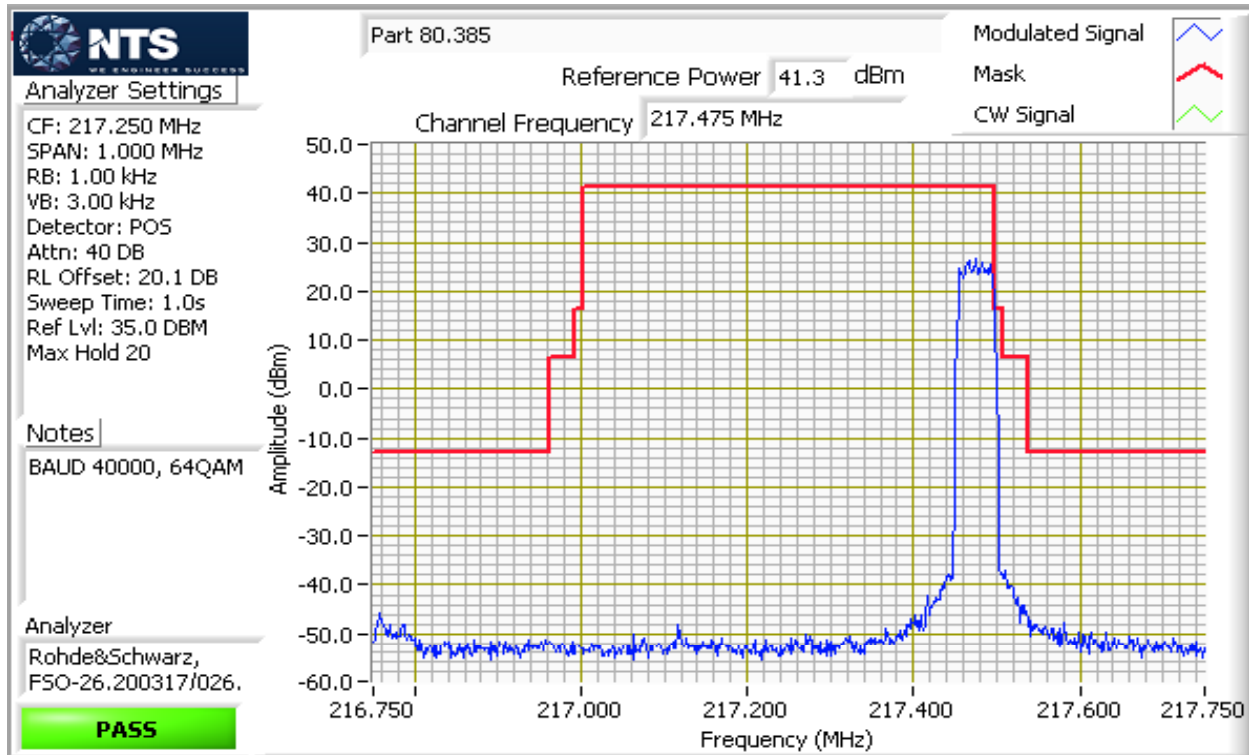
Note 3: -13 dBm band edge frequencies were calculated as 215.9625 MHz and 216.5375 MHz for Group D channels and 216.4625 MHz and 217.0375 MHz for Group C channels



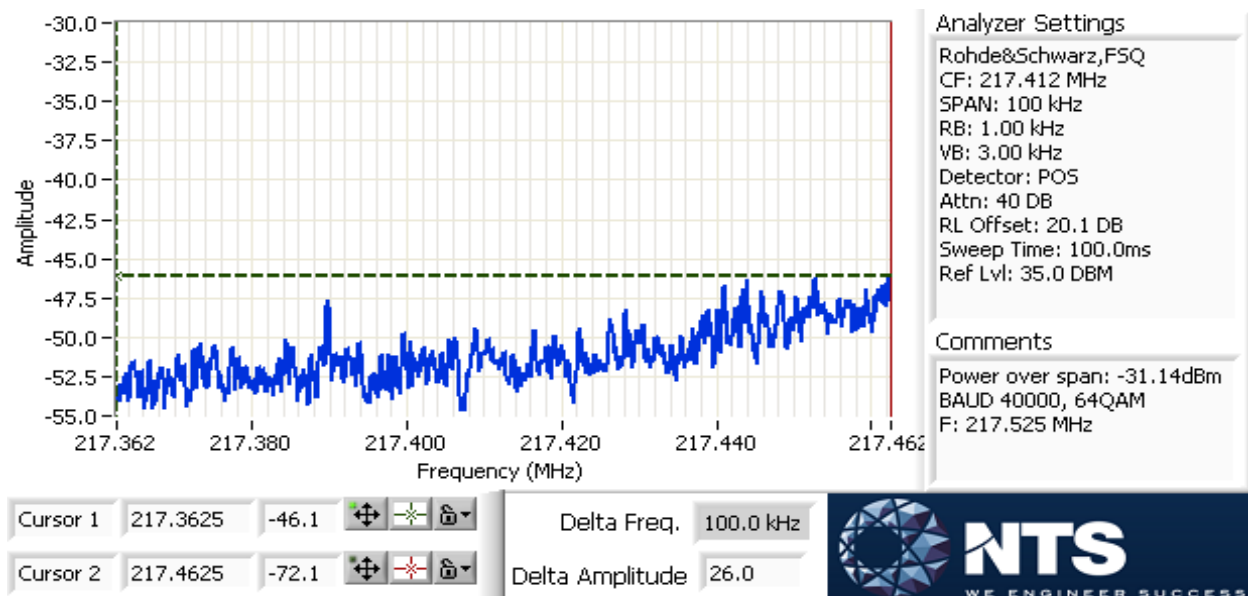
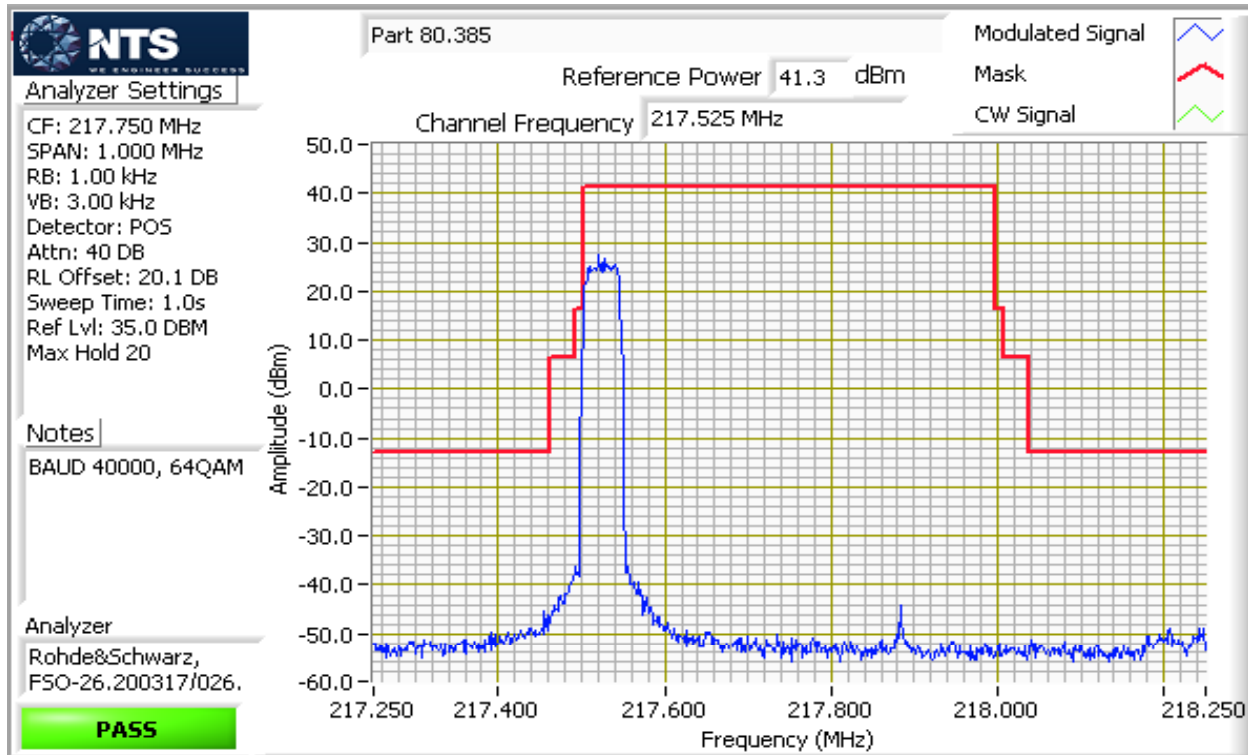
Client: GE MDS LLC	Job Number: JD105105
Model: LN200	T-Log Number: T105211
Contact: Dennis McCarthy	Project Manager: Christine Krebill
Standard: FCC Parts 80, 90 and 95	Project Coordinator: -
	Class: N/A



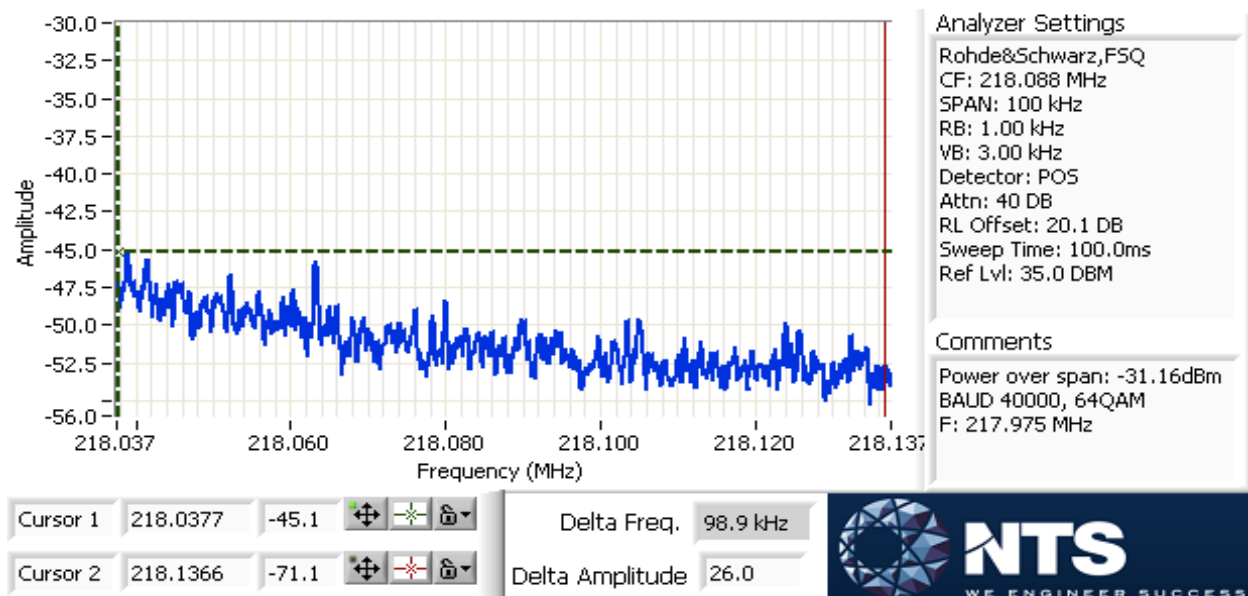
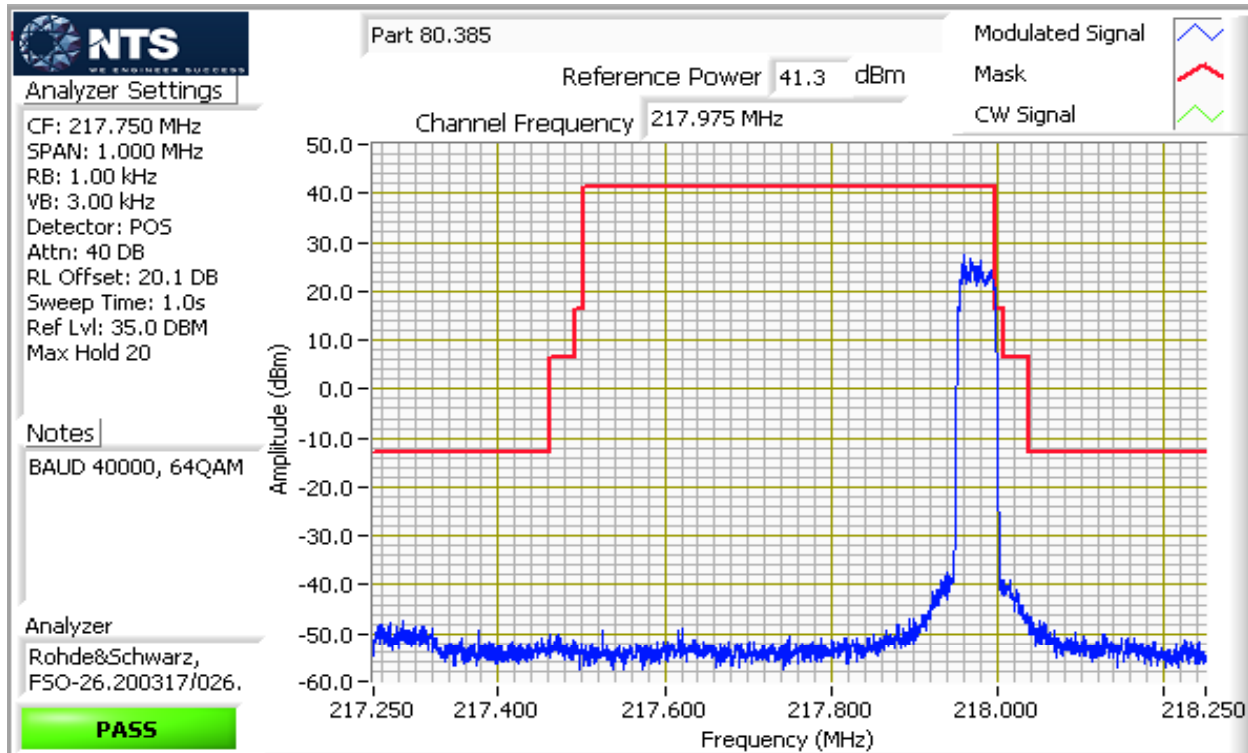
Client: GE MDS LLC	Job Number: JD105105
Model: LN200	T-Log Number: T105211
Contact: Dennis McCarthy	Project Manager: Christine Krebill
Standard: FCC Parts 80, 90 and 95	Project Coordinator: -
	Class: N/A



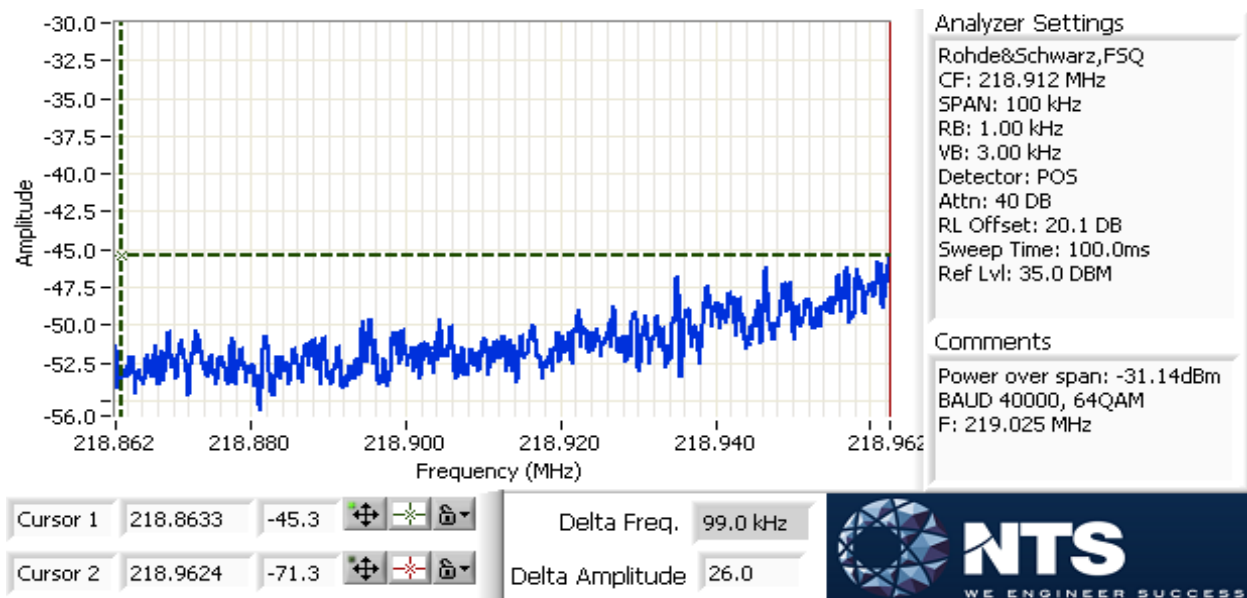
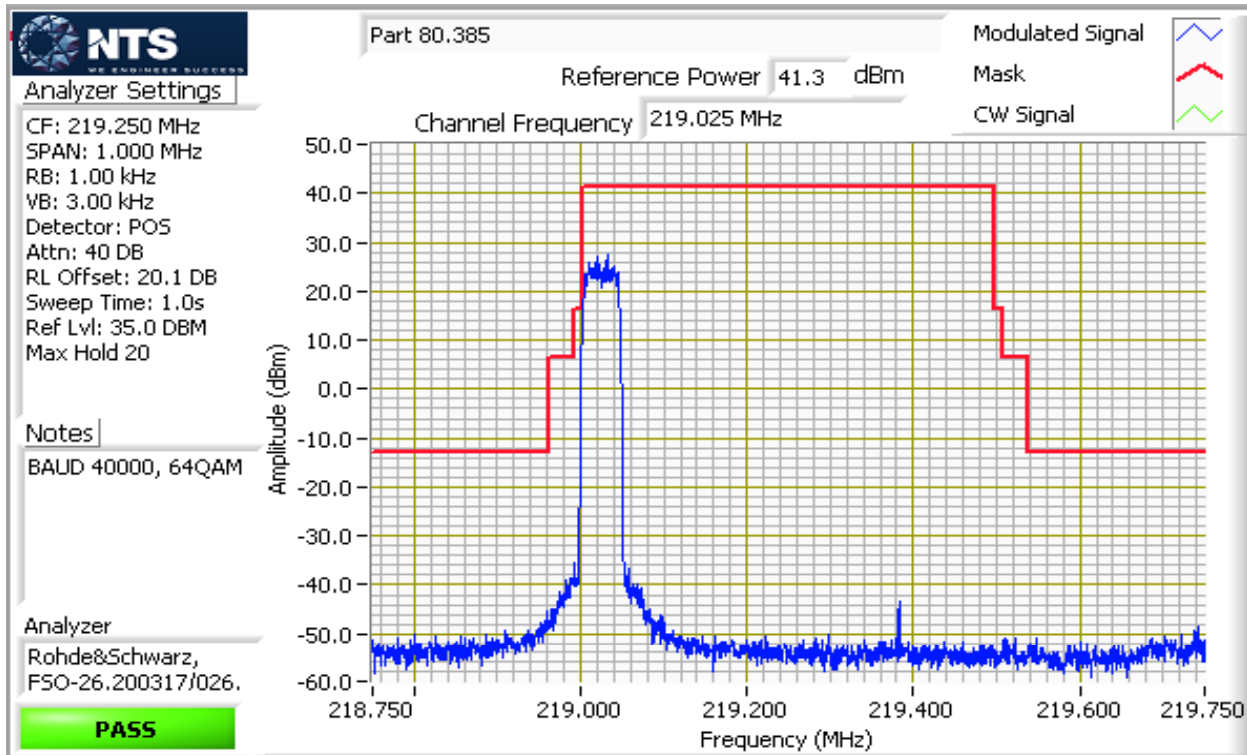
Client: GE MDS LLC	Job Number: JD105105
Model: LN200	T-Log Number: T105211
Contact: Dennis McCarthy	Project Manager: Christine Krebill
Standard: FCC Parts 80, 90 and 95	Project Coordinator: -
	Class: N/A



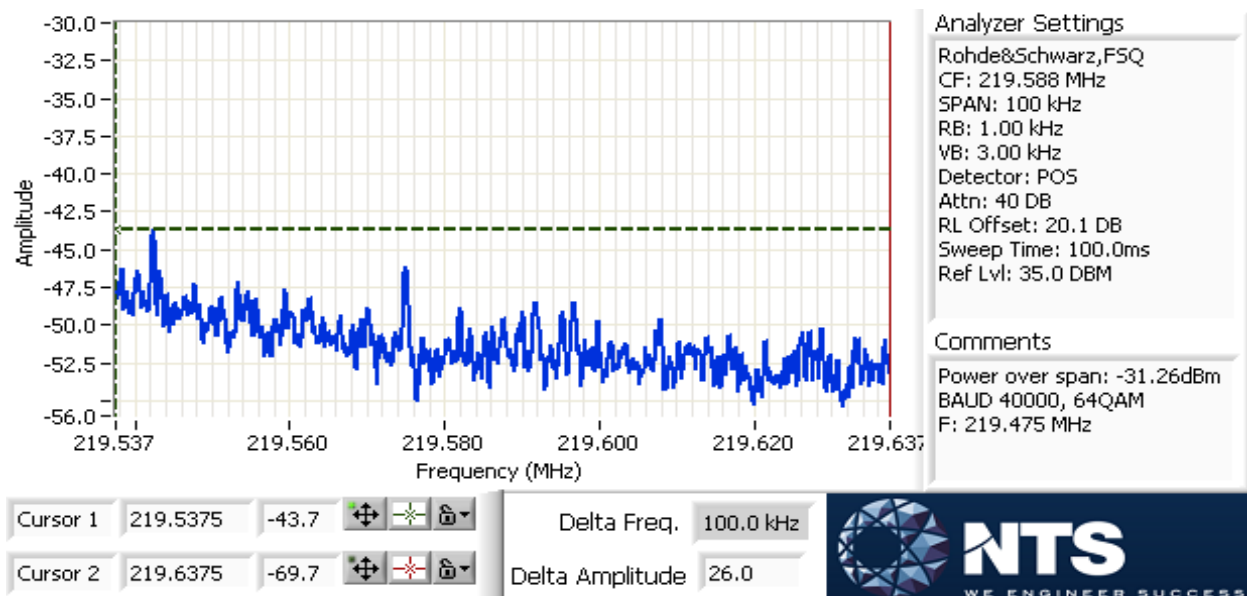
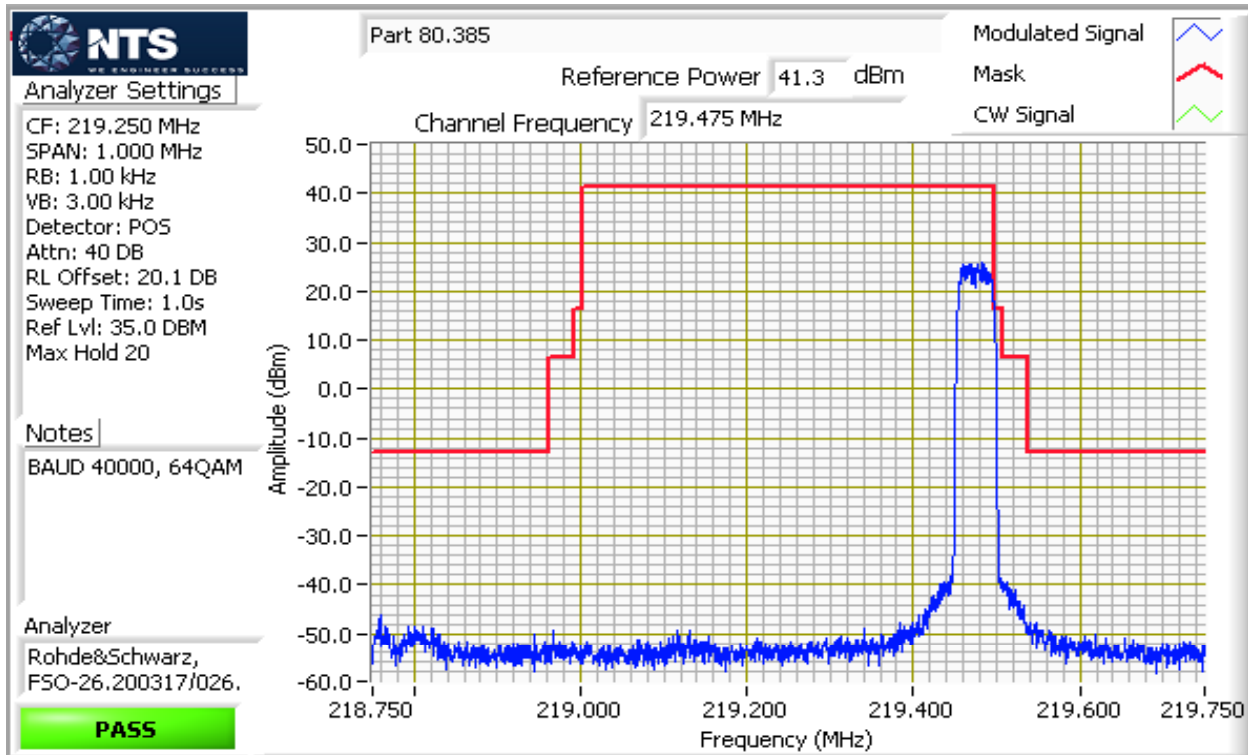
Client: GE MDS LLC	Job Number: JD105105
Model: LN200	T-Log Number: T105211
Contact: Dennis McCarthy	Project Manager: Christine Krebill
Standard: FCC Parts 80, 90 and 95	Project Coordinator: -
	Class: N/A



Client: GE MDS LLC	Job Number: JD105105
Model: LN200	T-Log Number: T105211
Contact: Dennis McCarthy	Project Manager: Christine Krebill
Standard: FCC Parts 80, 90 and 95	Project Coordinator: -
	Class: N/A

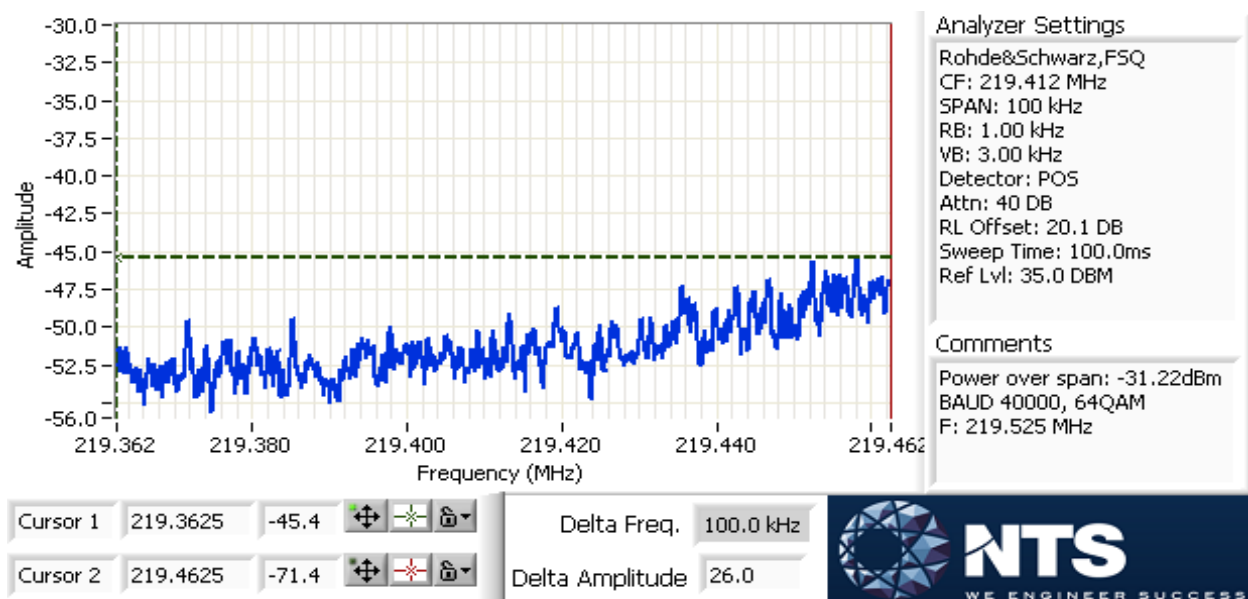
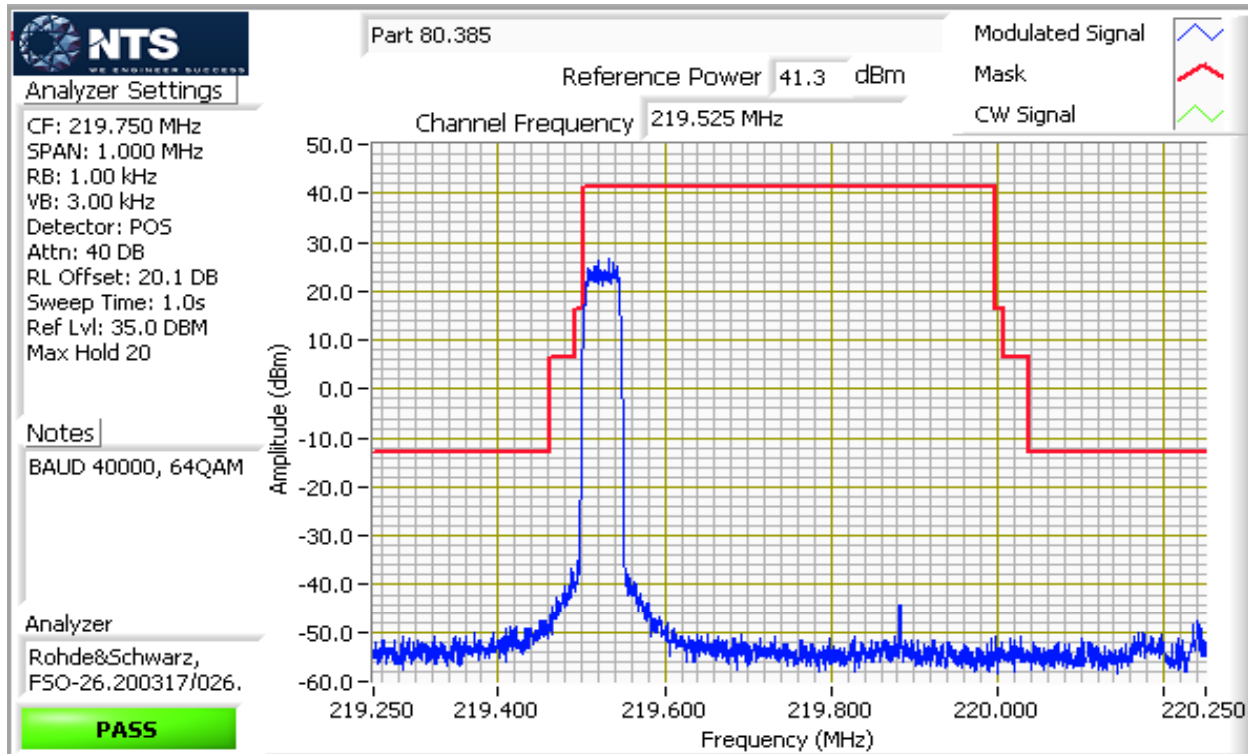


Client: GE MDS LLC	Job Number: JD105105
Model: LN200	T-Log Number: T105211
Contact: Dennis McCarthy	Project Manager: Christine Krebill
Standard: FCC Parts 80, 90 and 95	Project Coordinator: -
	Class: N/A

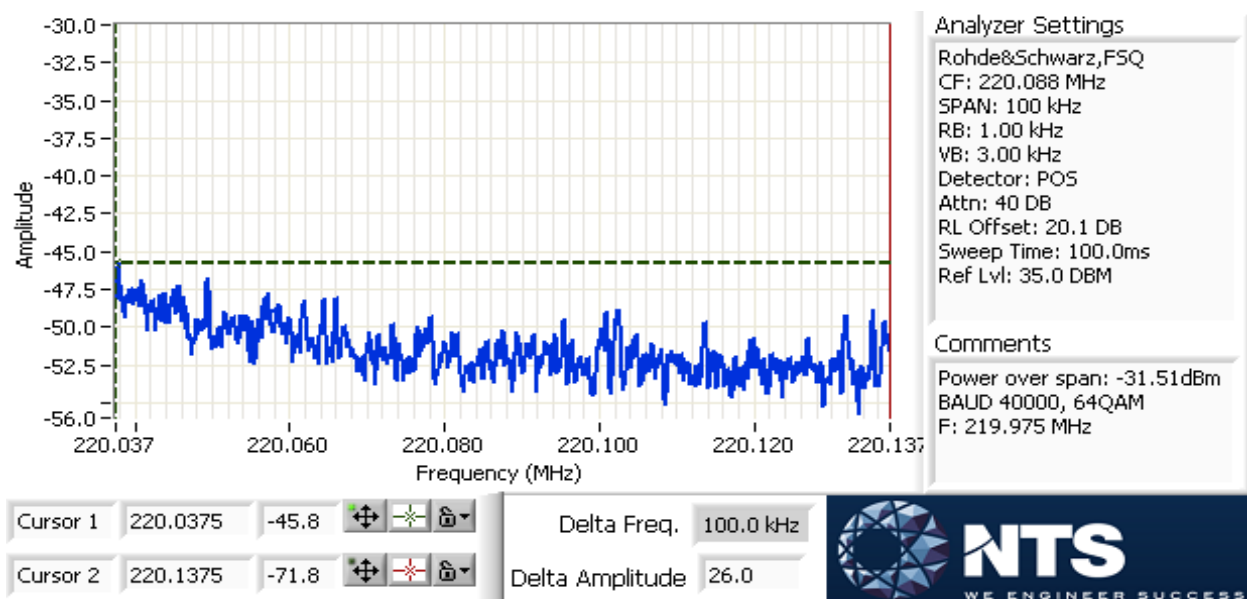
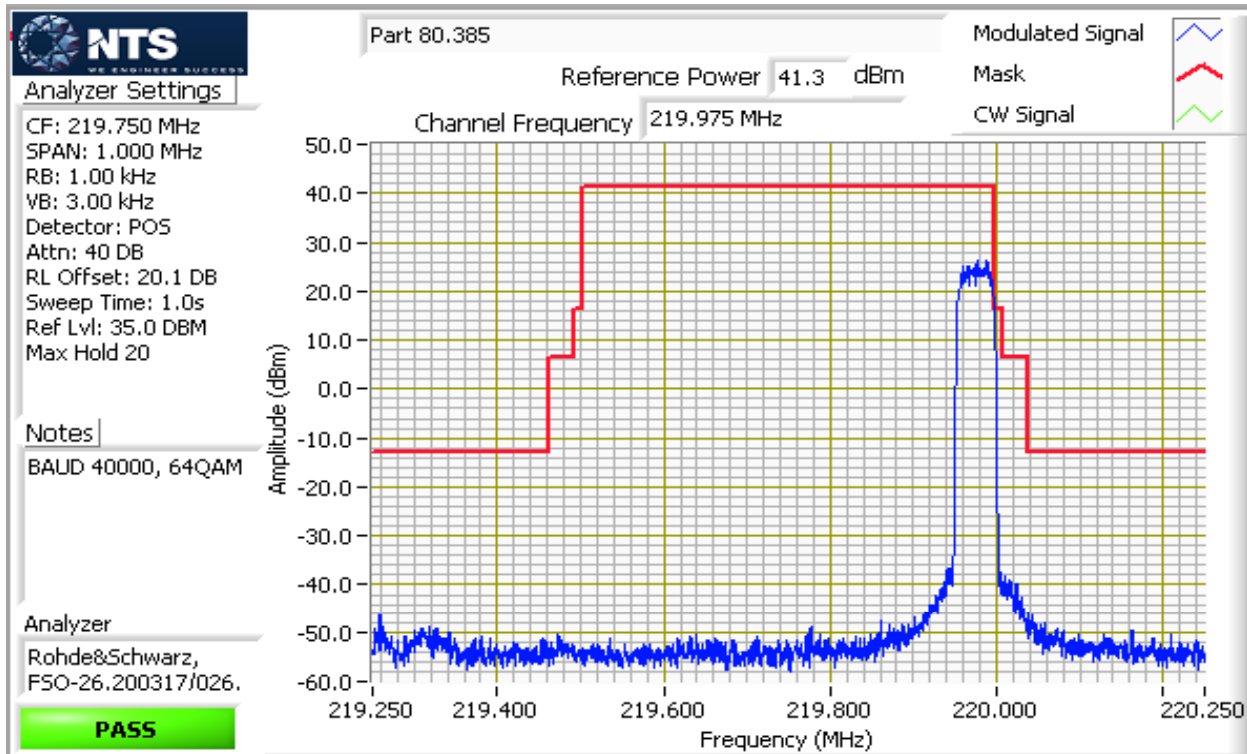




Client: GE MDS LLC	Job Number: JD105105
Model: LN200	T-Log Number: T105211
Contact: Dennis McCarthy	Project Manager: Christine Krebill
Standard: FCC Parts 80, 90 and 95	Project Coordinator: -
	Class: N/A

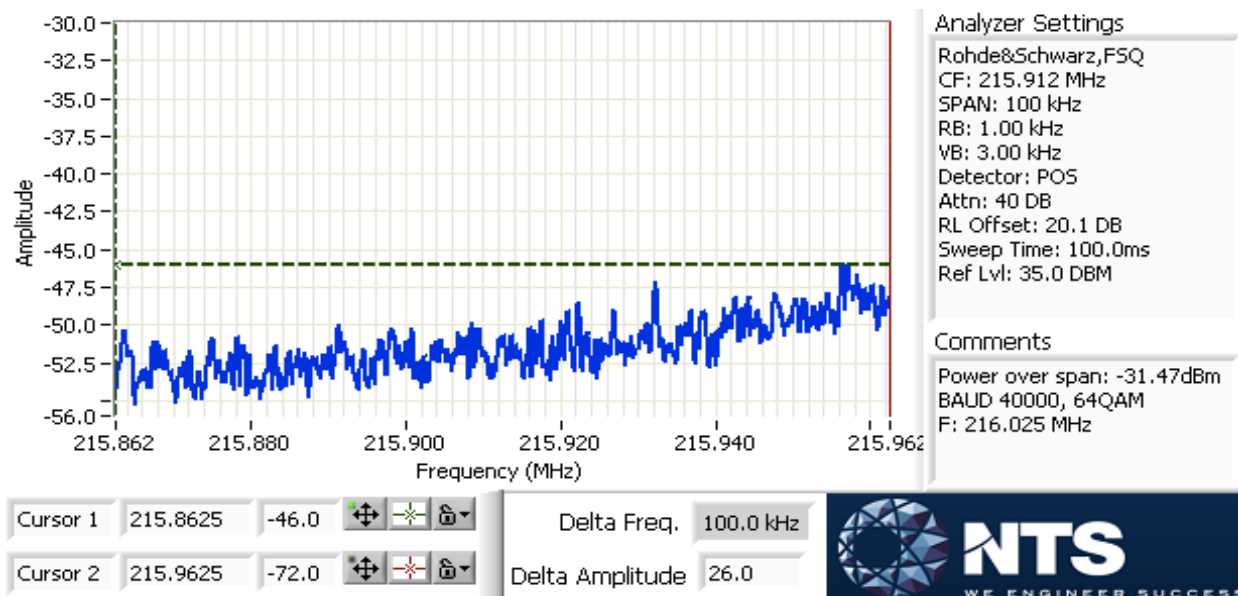
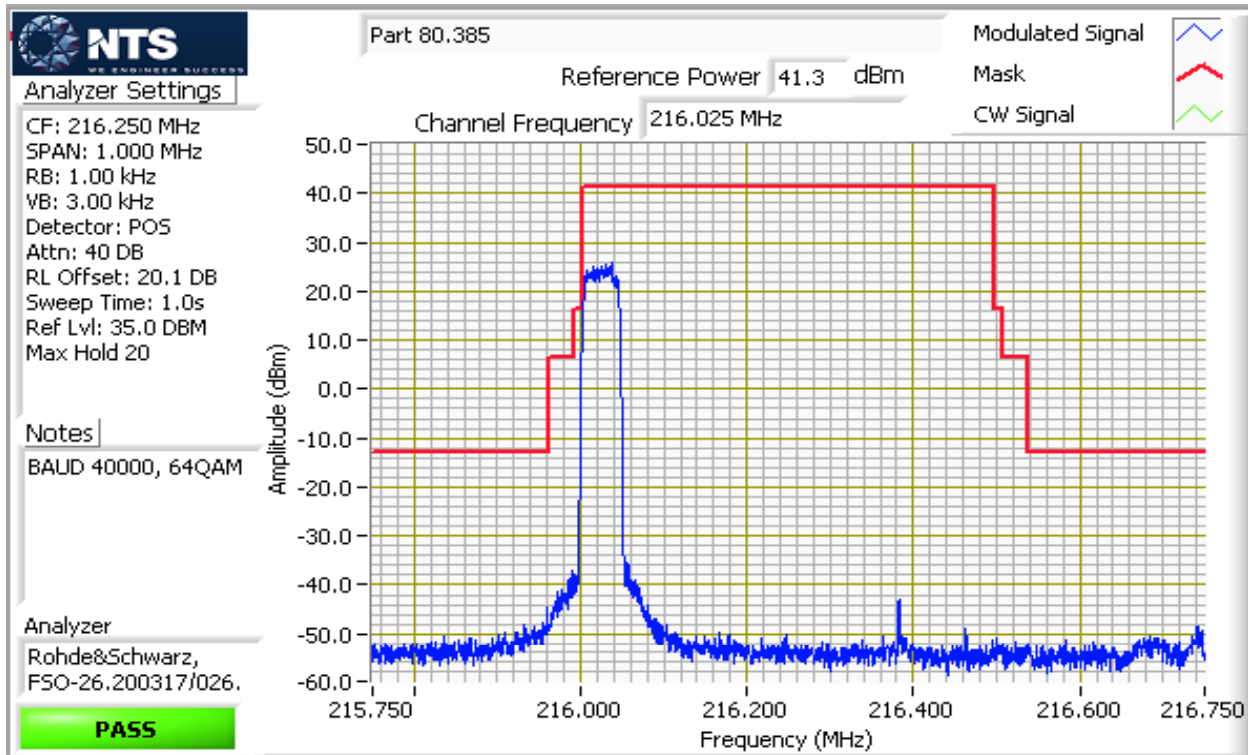


Client: GE MDS LLC	Job Number: JD105105
Model: LN200	T-Log Number: T105211
Contact: Dennis McCarthy	Project Manager: Christine Krebill
Standard: FCC Parts 80, 90 and 95	Project Coordinator: -
	Class: N/A

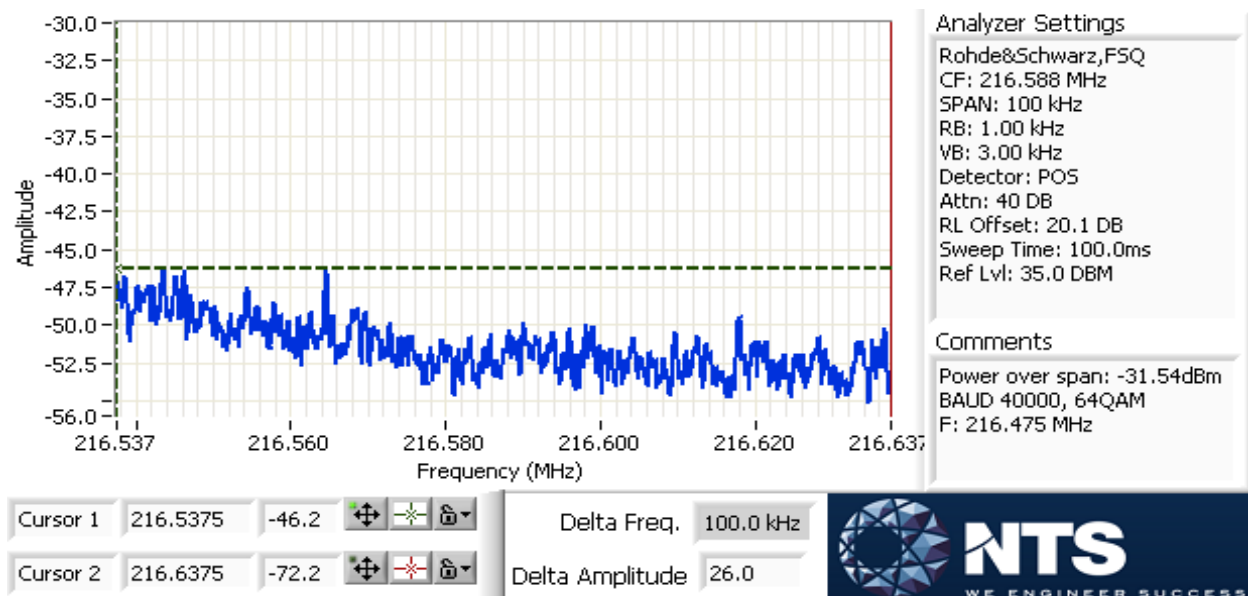
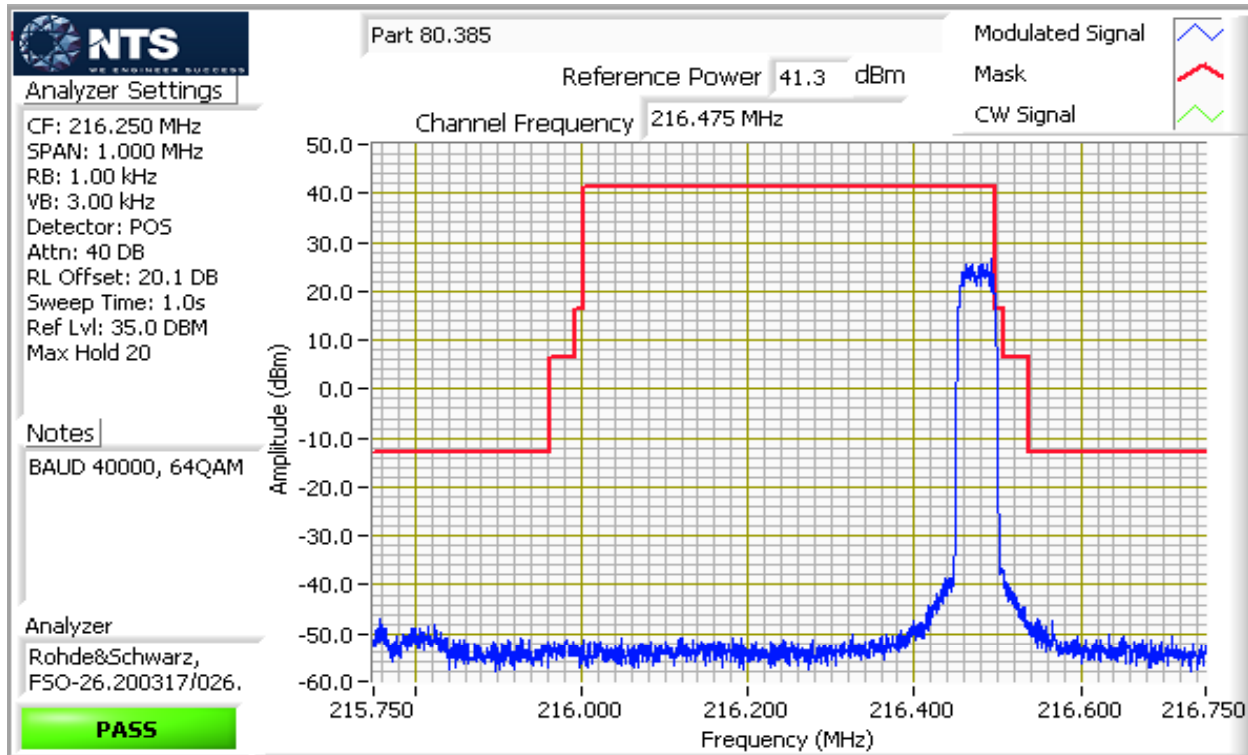




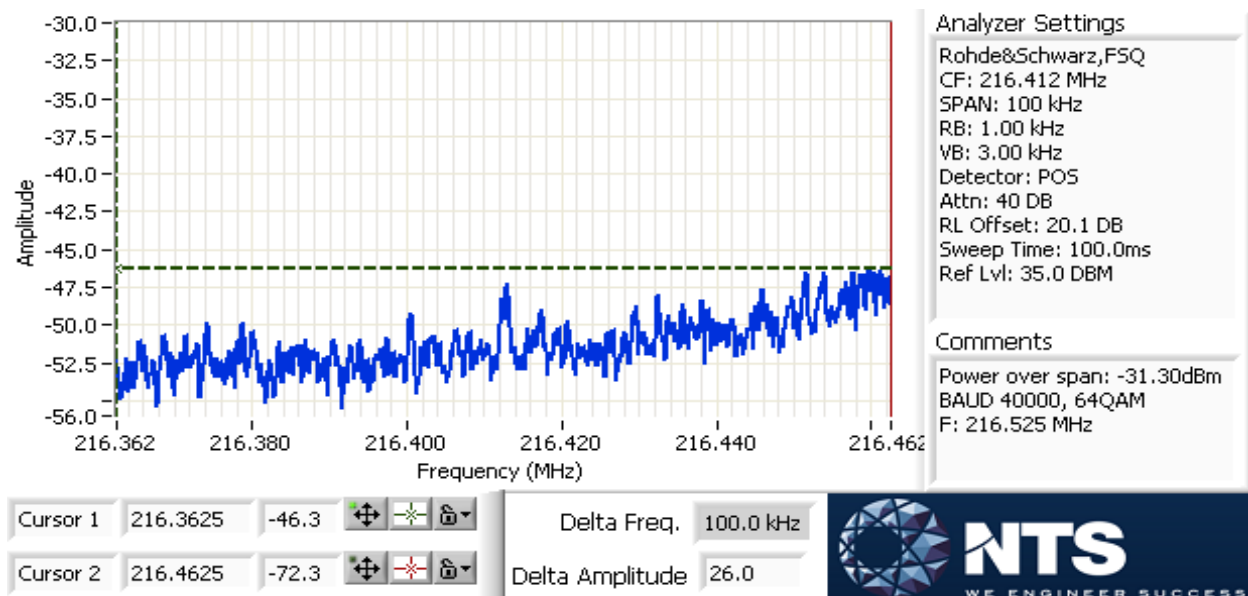
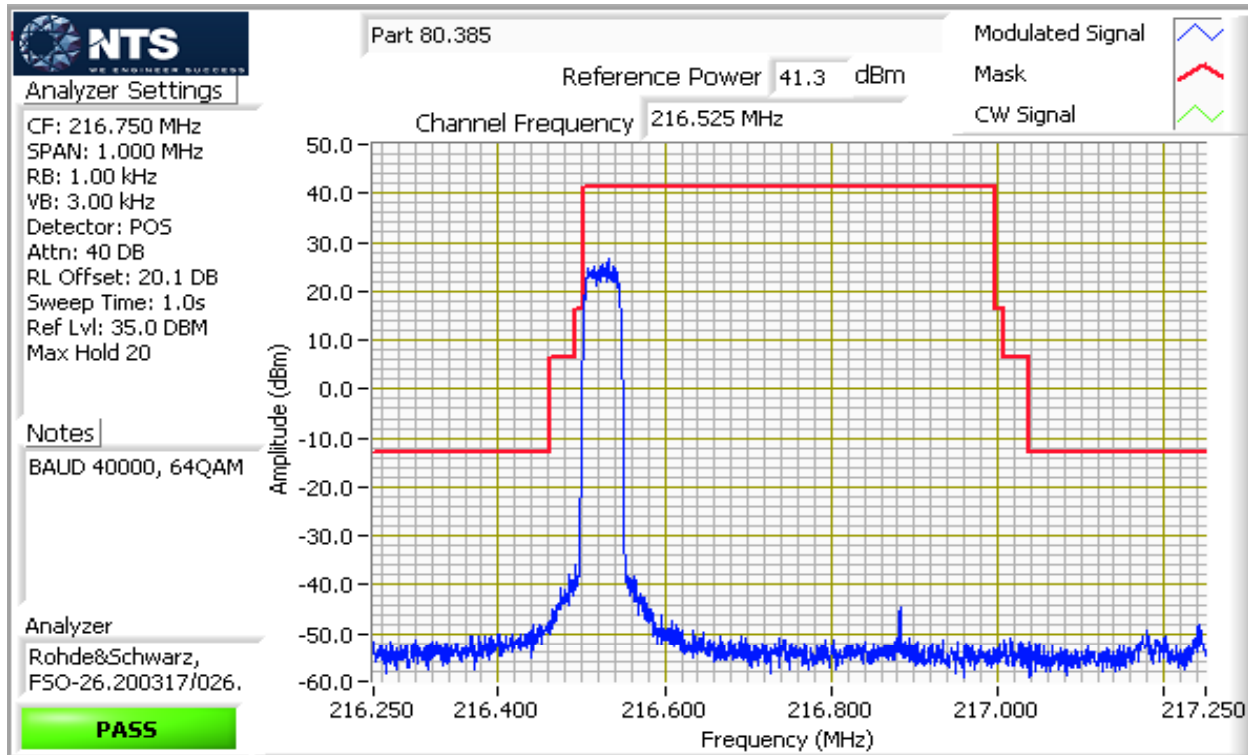
Client: GE MDS LLC	Job Number: JD105105
Model: LN200	T-Log Number: T105211
Contact: Dennis McCarthy	Project Manager: Christine Krebill
Standard: FCC Parts 80, 90 and 95	Project Coordinator: -
	Class: N/A



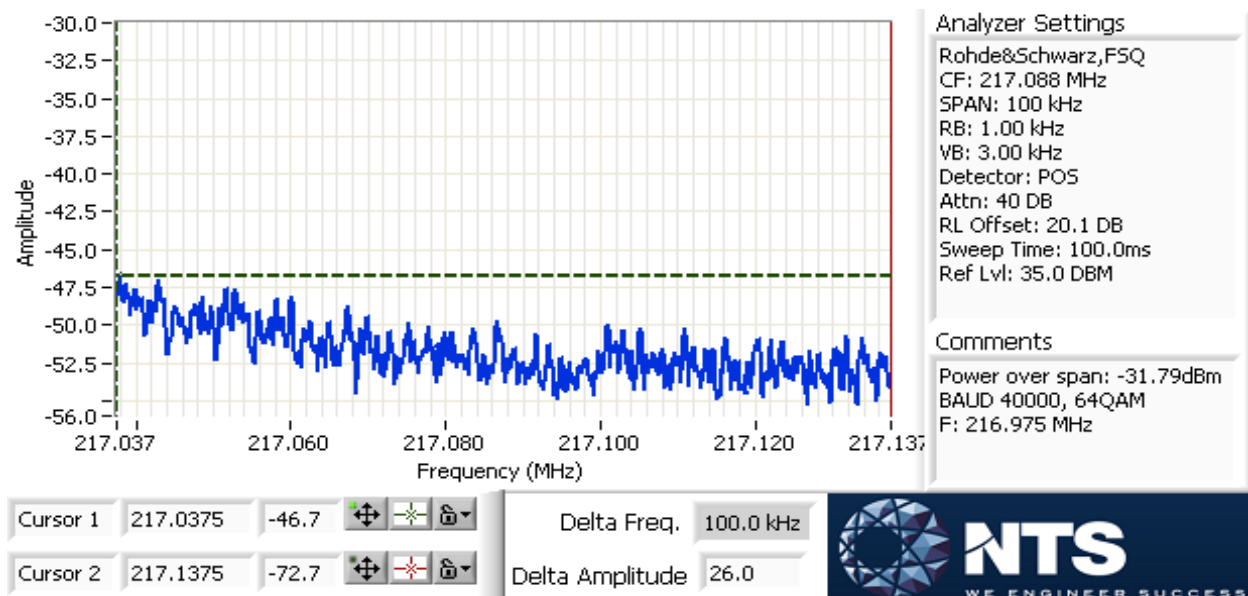
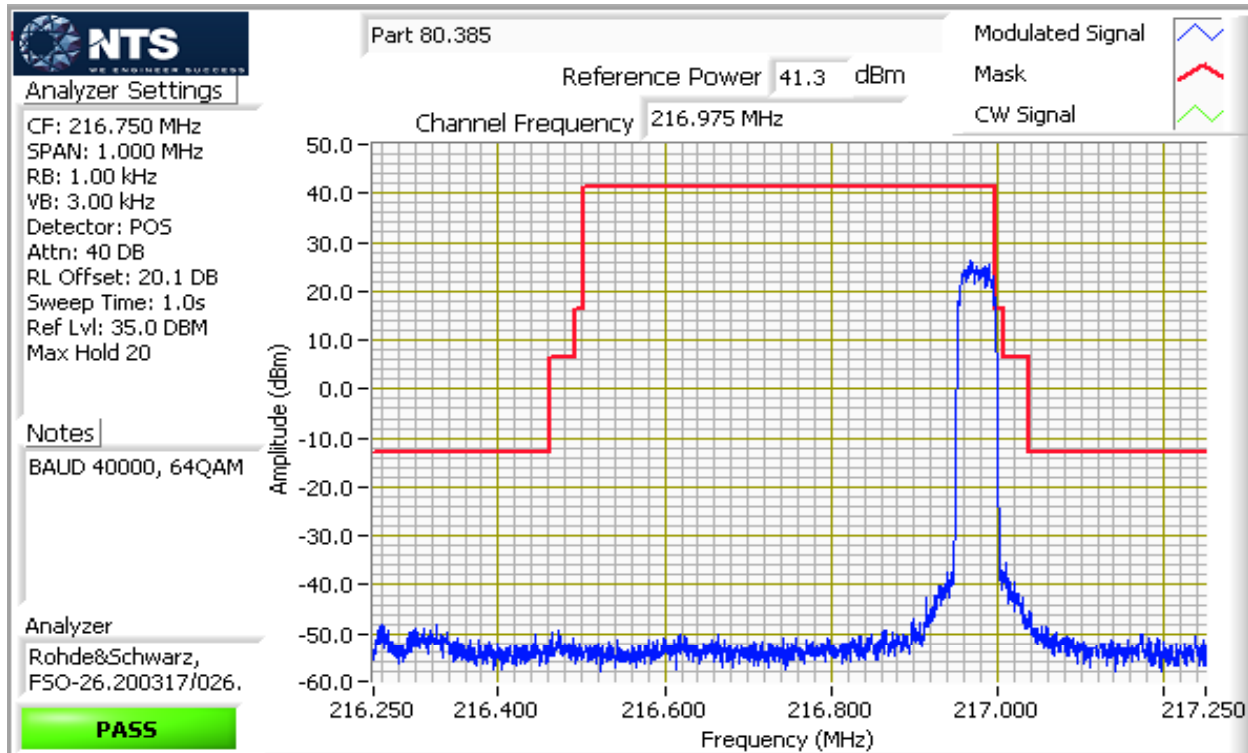
Client: GE MDS LLC	Job Number: JD105105
Model: LN200	T-Log Number: T105211
Contact: Dennis McCarthy	Project Manager: Christine Krebill
Standard: FCC Parts 80, 90 and 95	Project Coordinator: -
	Class: N/A



Client: GE MDS LLC	Job Number: JD105105
Model: LN200	T-Log Number: T105211
Contact: Dennis McCarthy	Project Manager: Christine Krebill
Standard: FCC Parts 80, 90 and 95	Project Coordinator: -
	Class: N/A



Client: GE MDS LLC	Job Number: JD105105
Model: LN200	T-Log Number: T105211
Contact: Dennis McCarthy	Project Manager: Christine Krebill
Standard: FCC Parts 80, 90 and 95	Project Coordinator: -
	Class: N/A



Client: GE MDS LLC	Job Number: JD105105
Model: LN200	T-Log Number: T105211
Contact: Dennis McCarthy	Project Manager: Christine Krebill
Standard: FCC Parts 80, 90 and 95	Project Coordinator: -
	Class: N/A

## Run #2: Spectral Mask, FCC Part 95.857 Mask

Date of Test: 6/15/2017

Test Engineer: David Bare

Test Location: Fremont EMC Lab #4A

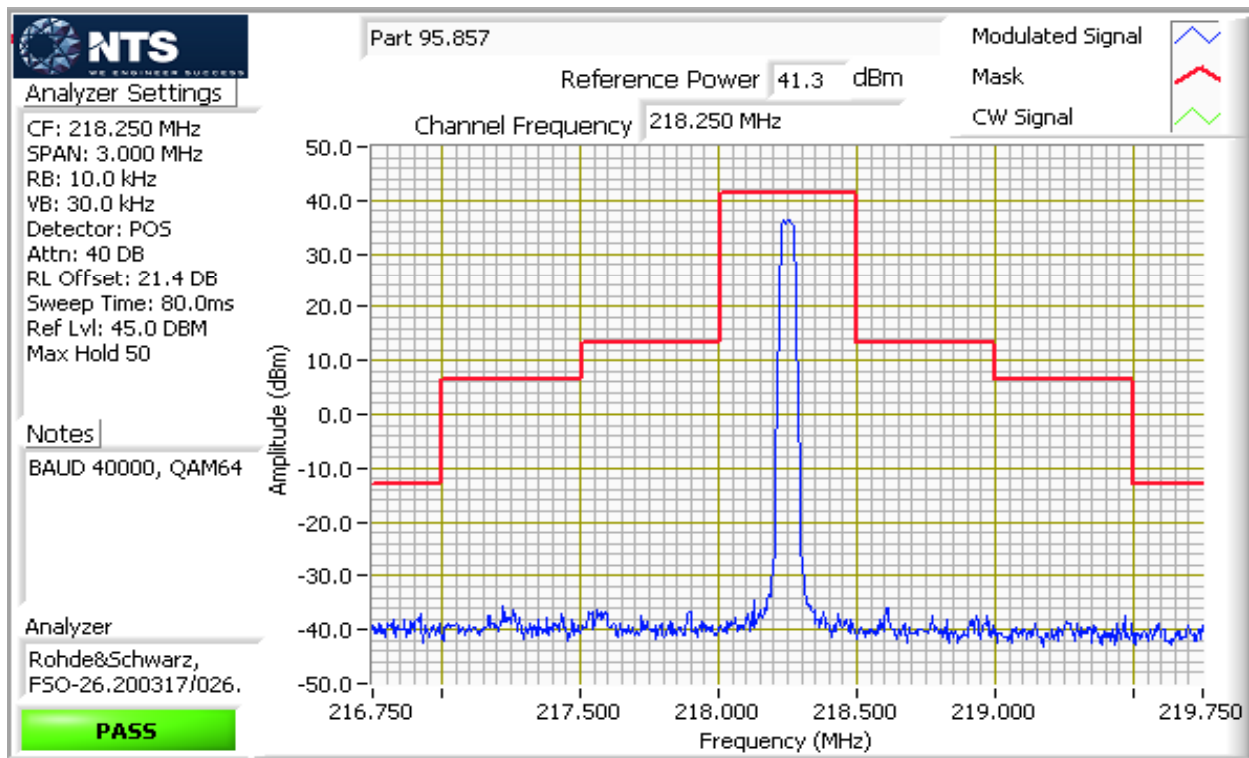
Config. Used: 1

Config Change: None

EUT Voltage: 13.8 VDC

Power setting	Baud / Modem	Modem	Channel plan	Modulation	Channel Frequency (MHz)	Mask	Result Pass/Fail
40	40.0 kbps	40000	50.0 kHz	QAM	218.250000		Pass

Note 1: Reference RF power was measured with peak power meter.



Client: GE MDS LLC	Job Number: JD105105
Model: LN200	T-Log Number: T105211
Contact: Dennis McCarthy	Project Manager: Christine Krebill
Standard: FCC Parts 80, 90 and 95	Project Coordinator: -
	Class: N/A

## Run #3: Signal Bandwidth

Date of Test: 6/15/2017

Config. Used: 1

Test Engineer: David Bare

Config Change: None

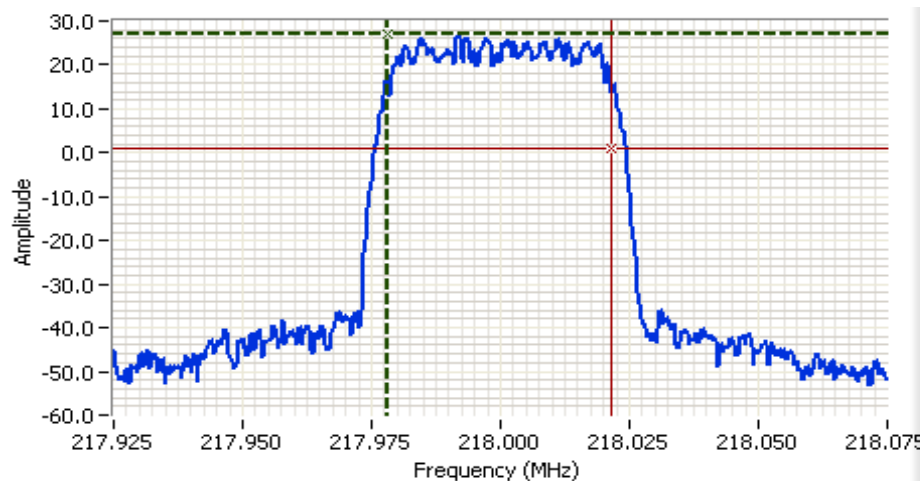
Test Location: Fremont EMC Lab #4A

EUT Voltage: 13.8 VDC

Power Setting	Frequency (MHz)	Resolution Bandwidth	Bandwidth (kHz)
40	218	1 kHz	99%
			43.20

Note 1:

99% bandwidth measured in accordance with ANSI C63.10, with RB between 1% and 5% of the measured bandwidth and  $VB \geq 3 \cdot RB$  and Span  $\geq 1.5\%$  and  $\leq 5\%$  of measured bandwidth.





### Analyzer Settings

Rohde&Schwarz,FSQ  
 CF: 218.000 MHz  
 SPAN: 150 kHz  
 RB: 1.00 kHz  
 VB: 3.00 kHz  
 Detector: POS  
 Attn: 40 DB  
 RL Offset: 21.4 DB  
 Sweep Time: 150.0ms  
 Ref Lvl: 45.0 DBM

### Comments

99% power BW: 43.2 kHz  
 BAUD 40000, 64QAM

Cursor 1	217.9783	26.9	
Cursor 2	218.0215	0.9	

Delta Freq. 43.2 kHz

Delta Amplitude 26.0

### *End of Report*

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