



41039 Boyce Road
Fremont, CA. 94538

510-578-3500 Phone
510-440-9525 Fax

Radio Test Report

***FCC Part 90
(809-824 MHz and 854-869 MHz)***

Model: LN900

FCC ID: E5MDS-LN900-1

COMPANY: GE Digital Energy - MDS
175 Science Pkwy
Rochester, NY 14620

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

PROJECT NUMBER: PR093700

REPORT DATE: March 28, 2019

FINAL TEST DATES: March 11, 12 and 13, 2019

TOTAL NUMBER OF PAGES: 48



This report and the information contained herein represent the results of testing test articles identified and selected by the client performed to specifications and/or procedures selected by the client. National Technical Systems (NTS) makes no representations, expressed or implied, that such testing is adequate (or inadequate) to demonstrate efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article, or similar products, for a particular purpose. This report shall not be reproduced except in full



VALIDATING SIGNATORIES

PROGRAM MGR

David W. Bare
Chief Engineer

TECHNICAL REVIEWER:

David W. Bare
Chief Engineer

FINAL REPORT PREPARER:

David Guidotti
Senior Technical Writer

QUALITY ASSURANCE DELEGATE

Gary Izard
Technical Writer



REVISION HISTORY

Rev#	Date	Comments	Modified By
0	March 28, 2019	First release	

TABLE OF CONTENTS

COVER PAGE.....	1
VALIDATING SIGNATORIES	2
REVISION HISTORY	3
TABLE OF CONTENTS	4
SCOPE.....	5
OBJECTIVE	6
STATEMENT OF COMPLIANCE.....	6
DEVIATIONS FROM THE STANDARDS.....	6
TEST RESULTS.....	7
FCC PART 90.....	7
MEASUREMENT UNCERTAINTIES.....	8
EQUIPMENT UNDER TEST (EUT) DETAILS.....	9
GENERAL.....	9
OTHER EUT DETAILS.....	9
ENCLOSURE.....	9
MODIFICATIONS.....	9
SUPPORT EQUIPMENT.....	9
EUT INTERFACE PORTS	10
EUT OPERATION	10
TESTING	11
GENERAL INFORMATION	11
RF PORT MEASUREMENT PROCEDURES	12
OUTPUT POWER.....	12
BANDWIDTH MEASUREMENTS	13
CONDUCTED SPURIOUS EMISSIONS.....	13
TRANSMITTER MASK MEASUREMENTS.....	13
RADIATED EMISSIONS MEASUREMENTS.....	14
INSTRUMENTATION	15
FILTERS/ATTENUATORS	15
ANTENNAS.....	15
ANTENNA MAST AND EQUIPMENT TURNTABLE.....	15
SAMPLE CALCULATIONS	16
SAMPLE CALCULATIONS - CONDUCTED SPURIOUS EMISSIONS	16
SAMPLE CALCULATIONS –RADIATED FIELD STRENGTH.....	16
SAMPLE CALCULATIONS –RADIATED POWER.....	17
APPENDIX A TEST EQUIPMENT CALIBRATION DATA	18
APPENDIX B TEST DATA	19
END OF REPORT	48

SCOPE

Tests have been performed on the GE Digital Energy - MDS model LN900, 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 and Innovation Science and Economic Development Canada.

- Code of Federal Regulations (CFR) Title 47 Part 2
- CFR 47 Part 90 (Private Land Mobile Radio Service) Subpart S

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 test procedures:

ANSI C63.26:2015

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 Innovation Science and Economic Development Canada 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.

National Technical Systems is accredited by the A2LA, certificate number 0214.26, to perform the test(s) listed in this report, except where noted otherwise.

The test results recorded herein are based on a single type test of the GE Digital Energy - MDS model LN900 and therefore apply only to the tested samples. The samples were selected and prepared by Dennis McCarthy of GE Digital Energy - MDS.

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 samples of GE Digital Energy - MDS model LN900 complied with the requirements of the standards and frequency bands declared in the scope of this test report.

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. Not all tests were performed for this permissive change.

TEST RESULTS

FCC Part 90

FCC		Description	Measured	Limit	Result
Transmitter Modulation, output power and other characteristics					
§2.1033 (c) (5) §90.35 §90.613		Frequency range(s)	809-824 MHz / 854-869 MHz	809-824 MHz / 854-869 MHz	Pass
§2.1033 (c) (6) §2.1033 (c) (7) §2.1046 §90.205 §90.635		RF power output at the antenna terminals	40.4 dBm	Up to 1000W ERP Determined at time of Licensing	Pass
§2.1033 (c) (4) §2.1047 §90.210 §90.221 §90.691		Emission types	D1D		N/A
		Emission mask	Within Mask	Mask D or G and §90.691	Pass
		Adjacent Channel Power	> 65 dBc	-55 or -65 dBc	Pass
§2.1049 §90.209		Occupied Bandwidth	10.4 kHz 10.9 kHz 17.5 kHz 21.8 kHz	11.25 kHz 11.25 kHz 20 kHz 22 kHz	Pass
Transmitter spurious emissions					
§2.1051 §2.1057		At the antenna terminals	All emission < -20 dBm	-20 dBm	Pass
§2.1053 §2.1057		Field strength	-20.9 dBm @7821.3 MHz	-20 dBm	Pass
Other details					
§2.1055 §90.213	RSS-119	Frequency stability	No change from original filing		N/A
§2.1093	RSS-102	RF Exposure			
§2.1033 (c) (8)		Final radio frequency amplifying circuit's dc voltages and currents for normal operation over the power range			
-	-	Antenna Gain			
Notes					

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	1.7×10^{-7}
RF power, conducted	dBm	25 to 7,000 MHz	± 0.52 dB
Conducted emission of transmitter	dBm	25 to 40,000 MHz	± 0.7 dB
Conducted emission of receiver	dBm	25 to 40,000 MHz	± 0.7 dB
Radiated emission (substitution method)	dBm	25 to 40,000 MHz	± 2.5 dB
Radiated emission (field strength)	dB μ V/m	25 to 1,000 MHz 1 to 40 GHz	± 3.6 dB ± 6.0 dB

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

The GE Digital Energy - MDS model LN900 is an industrial radio module operating in 800 MHz bands that uses QAM modulations. 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 samples were received on March 11, 2019 and tested on March 11, 12 and 13, 2019. The following samples of the EUT were used for testing:

Company	Model	Description	Serial Number	FCC ID
GE MDS LLC	LN900	Industrial Radio Module	3319973	E5MDS-LN900-1
GE MDS LLC	LN900	Industrial Radio Module	3319975	E5MDS-LN900-1

OTHER EUT DETAILS

The following EUT details should be noted: 10.5, 10.9, 17.5 and 21.8 kHz D1D emission types depending on frequency band used. Serial # 3319975 used for radiated emissions tests. Serial # 3319973 used for antenna port tests.

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.

SUPPORT EQUIPMENT

The following equipment was used as support equipment for testing:

Test Configuration #1

Company	Model	Description	Serial Number	FCC ID
HP	Probook 6570b	Laptop	5CB2480TRQ	-
Power Designs	6150D	Power Supply	9106013	-
GE MDS	-	Test Fixture	2629712	-

Test Configuration #2

Company	Model	Description	Serial Number	FCC ID
HP	Probook 6570b	Laptop	5CB2480TRQ	-
Power Designs	6150D	Power Supply	9106013	-
Agilent	E3610A	Power Supply	MY40011740	-
GE MDS	-	Test Fixture	2629712	-

No remote support equipment was used during testing.

EUT INTERFACE PORTS

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

Configuration #1

Port	Connected To	Description	Cable(s)	
			Shielded or Unshielded	Length(m)
Test fixture power	Power Supply	two wire	Unshielded	1.5
COM	Unterminated	Cat 5	Unshielded	1

Configuration #2

Port	Connected To	Description	Cable(s)	
			Shielded or Unshielded	Length(m)
Test fixture power	Power Supply	two wire	Unshielded	1.5
Test fixture power (2)	Power Supply	two wire	Unshielded	1.5
COM	Unterminated	Cat 5	Unshielded	1

EUT OPERATION

During emissions testing the EUT was set to transmit continuously at the frequency, power level and modulation indicated.

TESTING

GENERAL INFORMATION

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

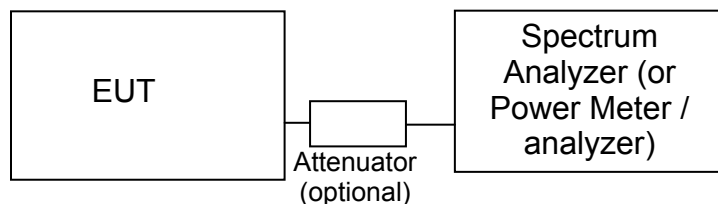
Radiated spurious emissions measurements were taken at the National Technical Systems Anechoic Chambers and/or Open Area Test Site(s) listed below. The sites conform to the requirements of ANSI C63.4 *American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz* and CISPR 16-1-4:2007 - *Specification for radio disturbance and immunity measuring apparatus and methods Part 1-4: Radio disturbance and immunity measuring apparatus Ancillary equipment Radiated disturbances*. They are on file with the FCC and Innovation Science and Economic Development Canada.

Site	Designation / Registration Numbers		Location
	FCC	Canada	
Chamber 7	US0027	US0027	41039 Boyce Road Fremont, CA 94538-2435

ANSI C63.4 recommends that ambient noise at the test site be at least 6 dB below the allowable limits. Ambient levels are below this requirement. The test site(s) contain separate areas for radiated and conducted emissions testing. Results from testing performed in this chamber have been correlated with results from an open area test site. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent requirements of ANSI C63.4.

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.

CONDUCTED SPURIOUS EMISSIONS

Initial scans are made using a peak detector (RBW=VBW) and using scan rates to ensure that the EUT transmits before the sweep moves out of each resolution bandwidth (for transmit mode measurements). Where the limits are expressed as an average power the spectrum analyzer is tuned to that frequency with a narrow span (wide enough to capture the emission and its sidebands) and the resolution and video bandwidths are adjusted as required by the reference measurement standards. For transmitter measurements the appropriate detector (average, peak, normal, sample, quasi-peak) is used when making measurements for licensed devices. For receiver conducted spurious measurements the detector is set to peak.

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.

RADIATED EMISSIONS MEASUREMENTS

Receiver radiated spurious emissions measurements are made in accordance with ANSI C63.26:2015 by measuring the field strength of the emissions from the device at a specific test distance and comparing them to a field strength limit. Where the field strength limit is specified at a longer distance than the measurement distance the measurement is extrapolated to the limit distance.

Transmitter radiated spurious emissions are initially measured as a field strength. The eirp or erp limit as specified in the relevant rule part(s) is converted to a field strength at the test distance and the emissions from the EUT are then compared to that limit. Emissions within 20dB of this limit are the subjected to a substitution measurement.

All radiated emissions measurements are performed in two phases. A preliminary scan of emissions is conducted in either an anechoic chamber or on an OATS during which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed across the complete frequency range of interest and at each operating frequency identified in the reference standard. One or more of these is with the antenna polarized vertically while the one or more of these is with the antenna polarized horizontally. Initial scans are made using a peak detector (RBW=VBW) and using scan rates to ensure that the EUT transmits before the sweep moves out of each resolution bandwidth (for transmit mode).

During the preliminary scans, the EUT is rotated through 360°, the antenna height is varied and cable positions are varied to determine the highest emission relative to the limit. For transmitter spurious emissions, where the limit is expressed as an effective radiated power, the eirp or erp is converted to a field strength limit.

Final measurements are made on an in a semi-anechoic chamber at the significant frequencies observed during the preliminary scan(s) using the same process of rotating the EUT and raising/lowering the measurement antenna to find the highest level of the emission. The field strength is recorded and compared to the field strength limit. For the final measurement the appropriate detectors (average, peak, normal, sample, quasi-peak) are used. For receiver measurements below 1GHz the detector is a Quasi-Peak detector, above 1GHz a peak detector is used and the peak value (RB=VB=1MHz) and average value (RB=1MHz, VB=10Hz) are recorded.

For transmitter spurious emissions, the radiated power of all emissions within 20dB of the calculated field strength limit are determined using a substitution measurement. The substitution measurement is made by replacing the EUT with an antenna of known gain (typically a dipole antenna or a double-ridged horn antenna), connected to a signal source. The output power of the signal generator is adjusted until the maximum field strength from the substitution antenna is similar to the field strength recorded from the EUT. The erp of the EUT is then calculated.

INSTRUMENTATION

An EMI receiver as specified in CISPR 16-1-1 is used for radiated emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 7000 MHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary.

For measurements above the frequency range of the receivers and for all conducted measurements a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis.

Measurement bandwidths for the test instruments are set in accordance with the requirements of the standards referenced in this document.

Software control is used to correct the measurements for transducer factors (e.g. antenna) and the insertion loss of cables, attenuators and other series elements to obtain the final measurement value. This provides faster, more accurate readings by performing the conversions described under Sample Calculations within the Test Procedures section of this report. Results are exported in a graphic and/or tabular format, as appropriate.

FILTERS/ATTENUATORS

External filters and precision attenuators are often connected between the EUT antenna port or receiving antenna and the test receiver. This eliminates saturation effects and non-linear operation due to high amplitude transient events.

ANTENNAS

A combination of biconical, log periodic or bi-log antennas are used to cover the range from 30 MHz to 1000 MHz. Broadband antennas or tuned dipole antennas are used over the entire 25 to 1000 MHz frequency range as the reference antenna for substitution measurements.

Above 1000 MHz, a dual-ridge guide horn antenna or octave horn antenna are used as reference and measurement antennas.

The antenna calibration factors are included in site factors that are programmed into the instrument control software when measuring the radiated field strength.

ANTENNA MAST AND EQUIPMENT TURNTABLE

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor-drive to vary the antenna height.

Table mounted devices are placed on a non-conductive table at a height of 80 or 150 centimeters above the floor. The EUT is positioned on a motorized turntable to allow it to be rotated during testing to determine the angle with the highest level of emissions.

SAMPLE CALCULATIONS**SAMPLE CALCULATIONS - CONDUCTED SPURIOUS EMISSIONS**

Measurements are compared directly to the conducted emissions specification limit (decibel form). The calculation is as follows:

$$R_r - S = M$$

where:

R_r = Measured value in dBm

S = Specification Limit in dBm

M = Margin to Specification in +/- dB

SAMPLE CALCULATIONS - RADIATED FIELD STRENGTH

Measurements of radiated field strength are compared directly to the specification limit (decibel form). The receiver and/or control software corrects for cable loss, preamplifier gain, and antenna factor. The calculations are in the reverse direction of the actual signal flow, thus cable loss is added and the amplifier gain is subtracted. The Antenna Factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

A distance factor is used when measurements are made at a test distance that is different to the specified limit distance by using the following formula:

$$F_d = 20 * \log_{10} (D_m/D_s)$$

where:

F_d = Distance Factor in dB

D_m = Measurement Distance in meters

D_s = Specification Distance in meters

For electric field measurements below 30MHz the extrapolation factor is either determined by making measurements at multiple distances or a theoretical value is calculated using the formula:

$$F_d = 40 * \log_{10} (D_m/D_s)$$

The margin of a given emission peak relative to the limit is calculated as follows:

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

R_r = Receiver Reading in dBuV/m

F_d = Distance Factor in dB

R_c = Corrected Reading in dBuV/m

L_s = Specification Limit in dBuV/m

M = Margin in dB Relative to Spec

SAMPLE CALCULATIONS –RADIATED POWER

The erp/eirp limits for transmitter spurious measurements are converted to a field strength in free space using the following formula:

$$E = \frac{\sqrt{30 P G}}{d}$$

where:

E = Field Strength in V/m

P = Power in Watts

G = Gain of isotropic antenna (numeric gain) = 1

D = measurement distance in meters

The field strength limit is then converted to decibel form (dBuV/m) and the margin of a given emission peak relative to the limit is calculated (refer to *SAMPLE CALCULATIONS –RADIATED FIELD STRENGTH*).

When substitution measurements are required (all signals with less than 20dB of margin relative to the calculated field strength limit) the eirp of the spurious emission is calculated using:

$$P_{EUT} = P_s - (E_s - E_{EUT})$$

and

$$P_s = G + P_{in}$$

where:

P_s = effective isotropic radiated power of the substitution antenna (dBm)

P_{in} = power input to the substitution antenna (dBm)

G = gain of the substitution antenna (dBi)

E_s = field strength the substitution antenna (dBm) at eirp P_s

E_{EUT} = field strength measured from the EUT

Where necessary the effective isotropic radiated power is converted to effective radiated power by subtracting the gain of a dipole (2.2dBi) from the eirp value.

Appendix A Test Equipment Calibration Data

<u>Manufacturer</u>	<u>Description</u>	<u>Model</u>	<u>Asset #</u>	<u>Calibrated</u>	<u>Cal Due</u>
Radio Antenna Port (Power and Spurious Emissions), 11-Mar-19					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	0		N/A
National Technical Systems	NTS Mask Software (rev 3.8)	N/A	0		N/A
National Technical Systems	NTS Capture Analyzer Software (rev 3.8)	N/A	0		N/A
Rohde & Schwarz	Power Meter, Dual Channel	NRVD	1071	4/4/2018	4/4/2019
Rohde & Schwarz	Peak Power Sensor 100 uW - 2 Watts (w/ 20 dB pad, SN BJ5155)	NRV-Z32	1536	6/21/2018	6/21/2019
Agilent Technologies	PSA, Spectrum Analyzer, (installed options, 111, 115, 123, 1DS, B7J, HX,	E4446A	2139	7/27/2018	7/27/2019
Radiated Emissions, 30 - 9,000 MHz, 12-Mar-19					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	0		N/A
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	9/5/2018	9/5/2019
EMCO	Antenna, Horn, 1-18GHz	3115	868	7/9/2018	7/9/2020
Hewlett Packard	Spectrum Analyzer (SA40) Red 30 Hz -40 GHz	8564E (84125C)	1148	9/27/2018	9/27/2019
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	2237	7/3/2018	7/3/2020
Rohde & Schwarz	EMI Test Receiver, 20 Hz-40 GHz	ESI 40	2493	3/22/2018	3/22/2019
Substitution Measurements, 12-Mar-19					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	0		N/A
Rohde & Schwarz	Power Meter, Single Channel, +1795+1796	NRVS	1534	7/25/2018	7/25/2019
Rohde & Schwarz	Power Sensor, 1 nW-20 mW, 10 MHz-18 GHz, 50ohms	NRV-Z1	2114	11/7/2018	11/7/2019
EMCO	Antenna, Horn, 1-18 GHz	3115	2870	8/24/2017	8/24/2019
Agilent Technologies	PSG, Vector Signal Generator, (250kHz - 20GHz)	E8267D	3011	2/28/2019	2/28/2020
Radiated Emissions, 9 kHz - 30 MHz, 13-Mar-19					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	0		N/A
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB 7	9482	10/13/2018	10/13/2019
Rhode & Schwarz	Magnetic Loop Antenna, 9 kHz-30 MHz	HFH2-Z2	WC062 457	1/5/2018	1/5/2020



Appendix B Test Data

TL093700-RA Pages 20 – 47



EMC Test Data

Client:	GE MDS LLC	PR Number:	PR093700
Product	LN900	T-Log Number:	TL093700-RA
System Configuration:	-	Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Engineer:	David Bare
Emissions Standard(s):	FCC Part 90	Class:	
Immunity Standard(s):		Environment:	Radio

EMC Test Data

For The

GE MDS LLC

Product

LN900

Date of Last Test: 3/11/2019



EMC Test Data

Client:	GE MDS LLC	Job Number:	PR093700
Model:	LN900	T-Log Number:	TL093700-RA
Contact:	Dennis McCarthy	Project Manager:	Christine Krebill
Standard:	FCC Part 90	Project Coordinator:	David Bare
		Class:	N/A

FCC Part 90 Power and Spurious Emissions

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.

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

Ambient Conditions:

Temperature: 19-21 °C
Rel. Humidity: 38-40 %

Summary of Results

Run #		Test Performed	Limit	Pass / Fail	Result / Margin
1		Output Power	Determined at time of Licensing	Pass	40.4 dBm
2		Spectral Mask	Within Mask	-	
3		99% or Occupied Bandwidth	11.25/20 kHz	-	21.8 kHz
4		Spurious Emissions (conducted)	-20 dBm	Pass	all emission < the limit
5		Spurious emissions (radiated)	-20 dBm	Pass	-20.9 dBm@7821.3 MHz (-0.9 dB)

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.



EMC Test Data

Client:	GE MDS LLC	Job Number:	PR093700
Model:	LN900	T-Log Number:	TL093700-RA
Contact:	Dennis McCarthy	Project Manager:	Christine Krebill
Standard:	FCC Part 90	Project Coordinator:	David Bare
		Class:	N/A

Run #1: Output Power

Date of Test: 3/11/2018

Config. Used: 1

Test Engineer: David Bare

Fixture Voltage: 13.8 VDC

Test Location: Fremont EMC Lab #4A

Cable Loss: 0.0 dB

Attenuator: 20.0 dB

Total Loss: 20.0 dB

Cable ID(s): -

Attenuator IDs: WC068107

Power Setting ²	Frequency (MHz)	Output Power		Antenna Gain (dBi)	Result	EIRP		
		(dBm) ¹	mW			dBm	W	
40	809	40.1	10233	16.5	Pass	56.6	457.09	FB 23
40	816	40.1	10233	16.5	Pass	56.6	457.09	FB 23
40	824	40.2	10471	16.5	Pass	56.7	467.74	FB 23
40	854	40.4	10965	16.5	Pass	56.9	489.78	FB 23
40	861	40.3	10715	16.5	Pass	56.8	478.63	FB 23
40	869	40.1	10233	16.5	Pass	56.6	457.09	FB 23

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.

Note 3: Power and antenna selection are set by licensee and power is reduced as necessary to meet the limits for the rule part for which the device is used. 16.5 dBi is the highest gain mentioned in the install manual.



EMC Test Data

Client:	GE MDS LLC	Job Number:	PR093700
Model:	LN900	T-Log Number:	TL093700-RA
Contact:	Dennis McCarthy	Project Manager:	Christine Krebill
Standard:	FCC Part 90	Project Coordinator:	David Bare
		Class:	N/A

Run #2: Spectral Mask, FCC Part 90 Masks D, G for 809 - 824 & 854 - 869 MHz

Mask D for 12.5 kHz channels and Mask G for 25 kHz channels, ACP for 22 kHz Channel Bandwidth

Date of Test: 3/11/2018

Config. Used: 1

Test Engineer: David Bare

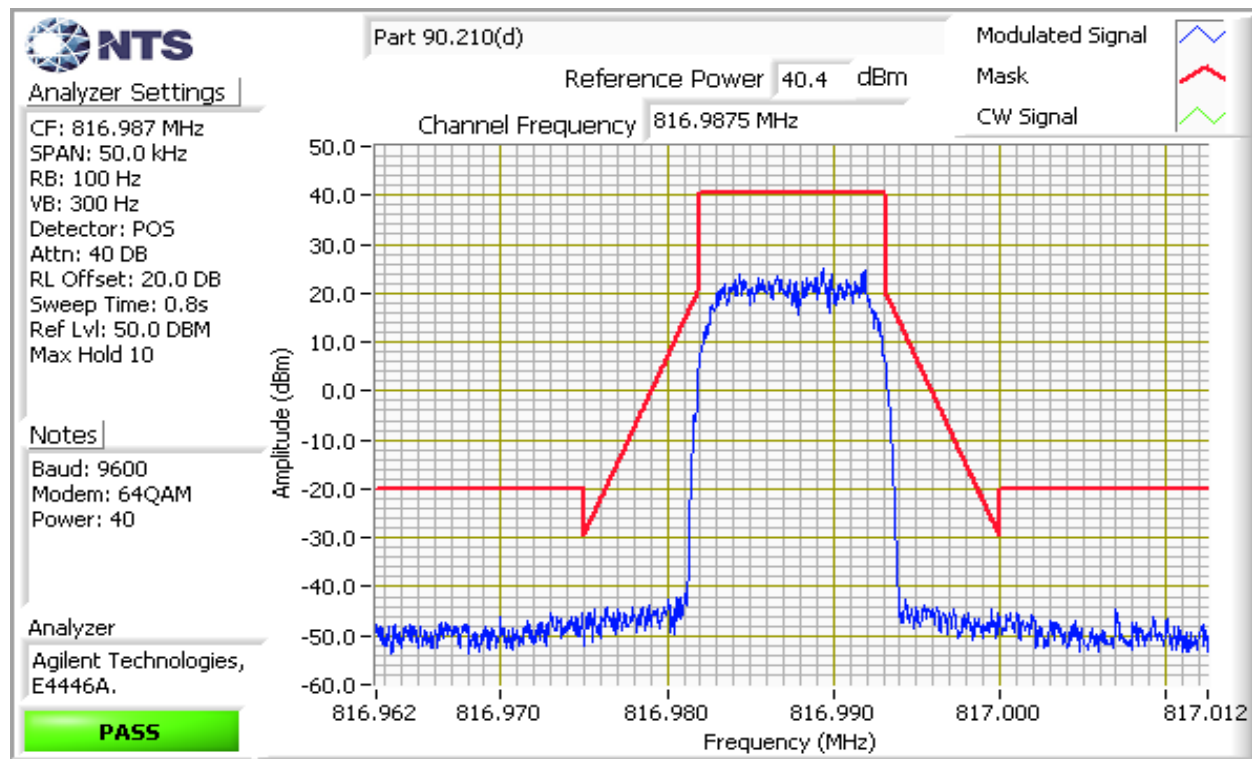
Fixture Voltage: 13.8 VDC

Test Location: Fremont EMC Lab #4A

Note 1: EUT does not transmit unmodulated carrier with full power setting. The measured power levels (using peak power meter) are higher than the declared nominal power for every channel frequency. Nominal 40 dBm reference power level used for spectral mask measurements as worst case results.

Run #2a: Spectral Mask for 809 - 824 & 854-869 MHz bands (FCC Part 90)

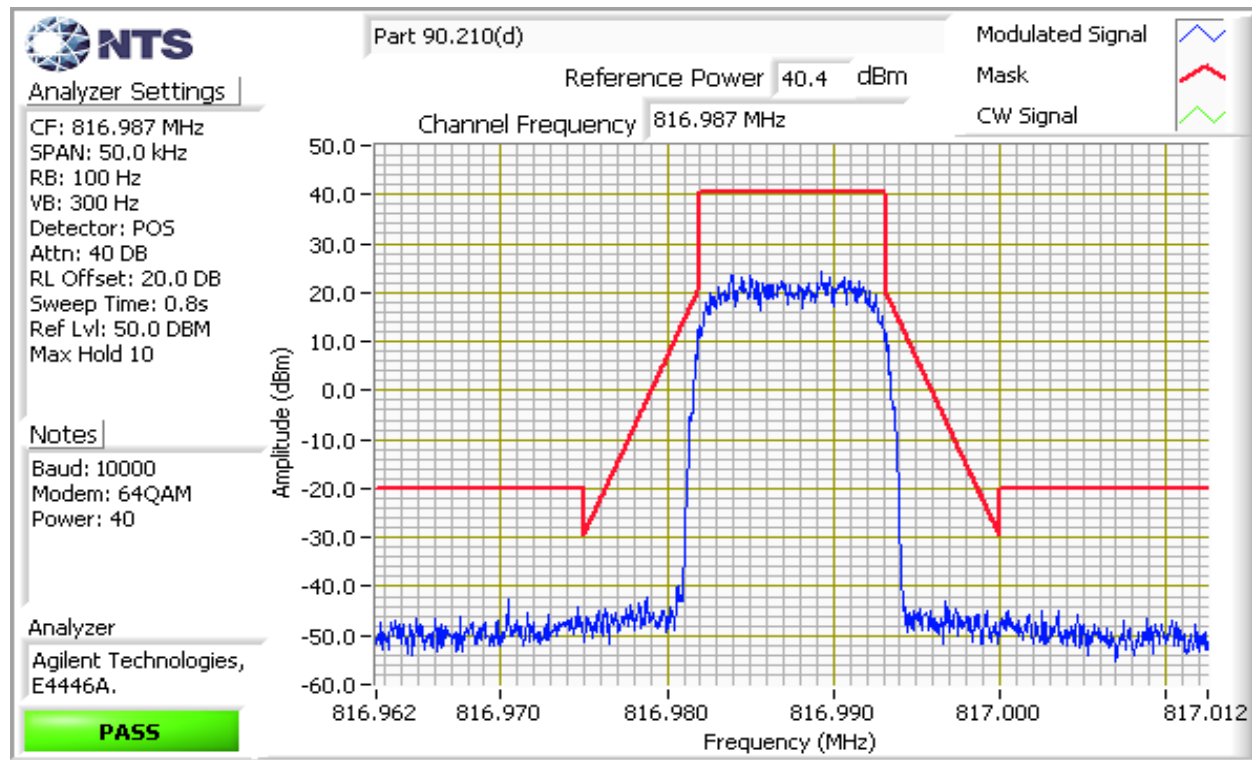
Power setting	Data rate	Channel plan	Modulation	Frequency (MHz)	Emission mask	Result
40	9.6 kbps	12.5 kHz	64QAM	816.9875	D	Pass
40	10 kbps	12.5 kHz	64QAM	816.9875	D	Pass
40	16 kbps	25 kHz	64QAM	816.975	G	Pass
40	20 kbps	25 kHz	64QAM	816.975	§90.221	Pass





EMC Test Data

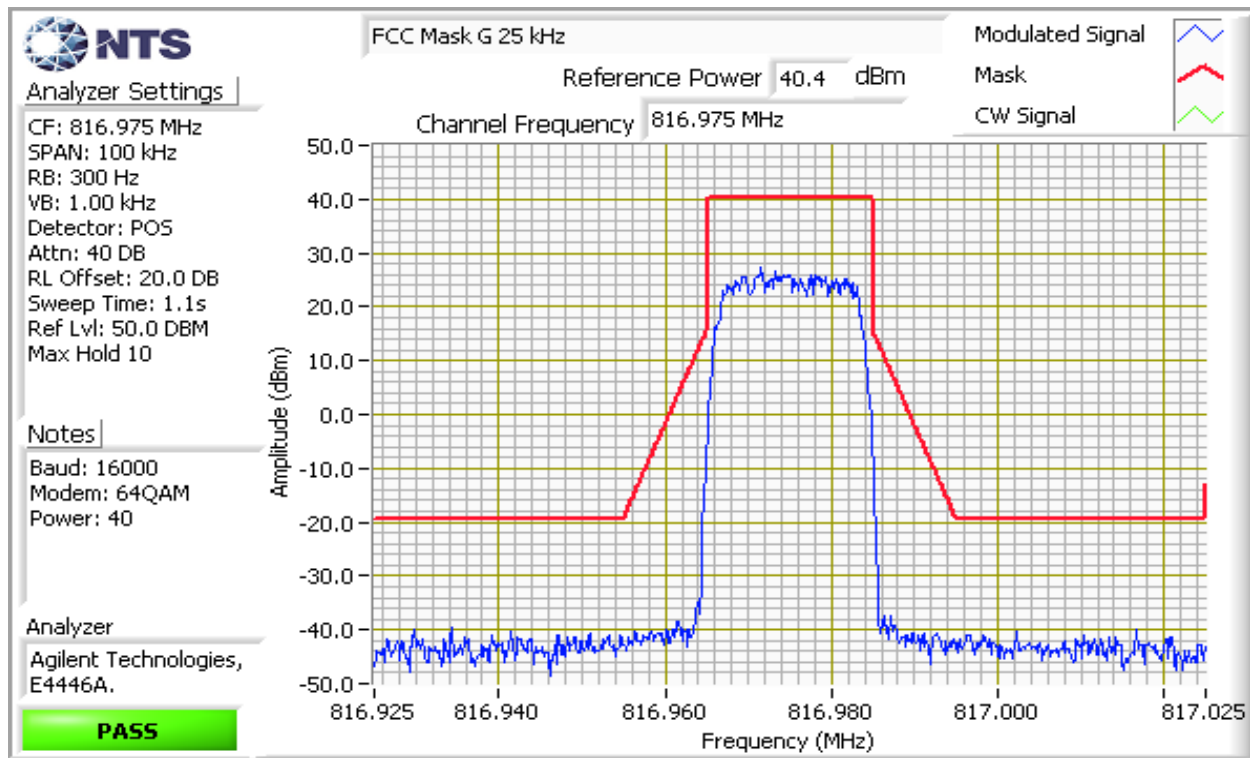
Client:	GE MDS LLC	Job Number:	PR093700
Model:	LN900	T-Log Number:	TL093700-RA
Contact:	Dennis McCarthy	Project Manager:	Christine Krebill
Standard:	FCC Part 90	Project Coordinator:	David Bare
		Class:	N/A





EMC Test Data

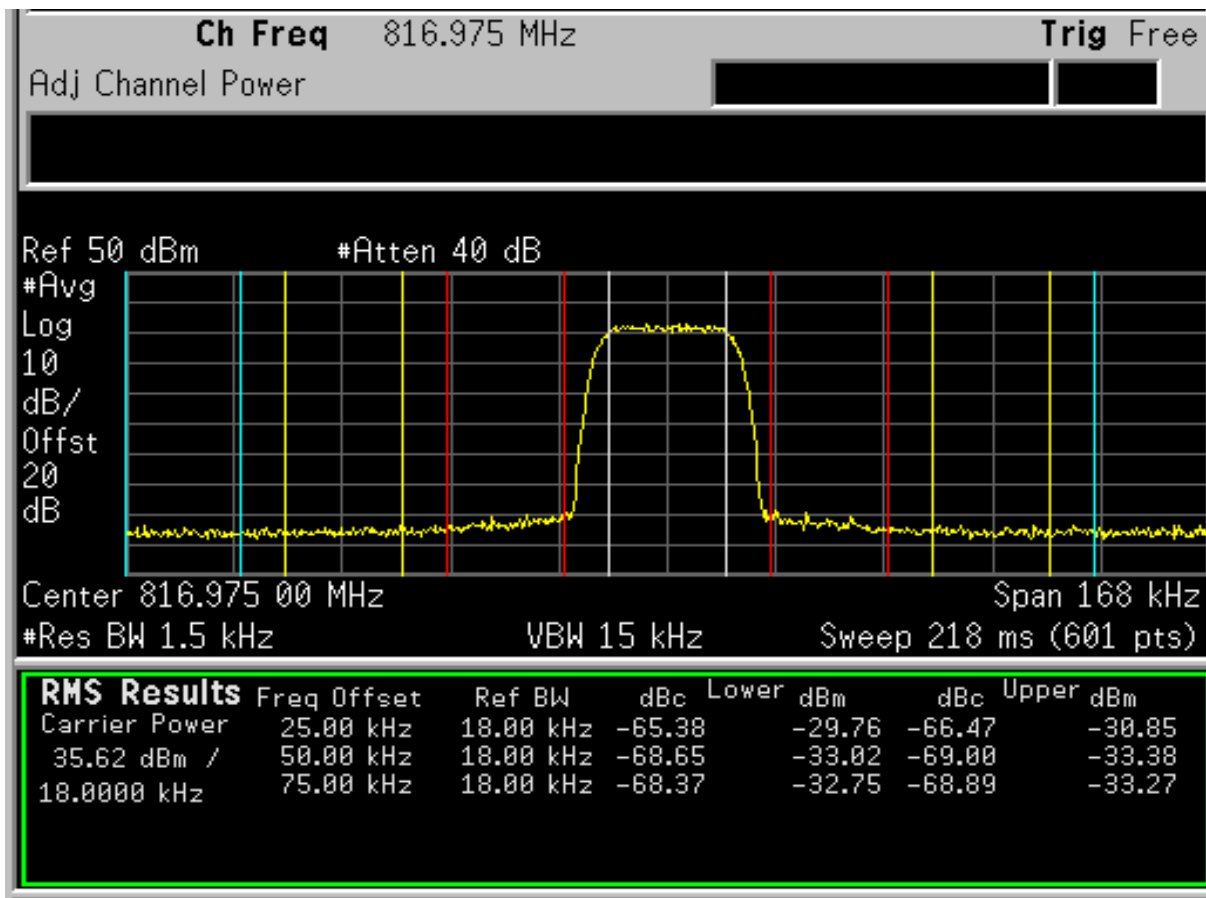
Client:	GE MDS LLC	Job Number:	PR093700
Model:	LN900	T-Log Number:	TL093700-RA
Contact:	Dennis McCarthy	Project Manager:	Christine Krebill
Standard:	FCC Part 90	Project Coordinator:	David Bare
		Class:	N/A





EMC Test Data

Client:	GE MDS LLC	Job Number:	PR093700
Model:	LN900	T-Log Number:	TL093700-RA
Contact:	Dennis McCarthy	Project Manager:	Christine Krebill
Standard:	FCC Part 90	Project Coordinator:	David Bare
		Class:	N/A



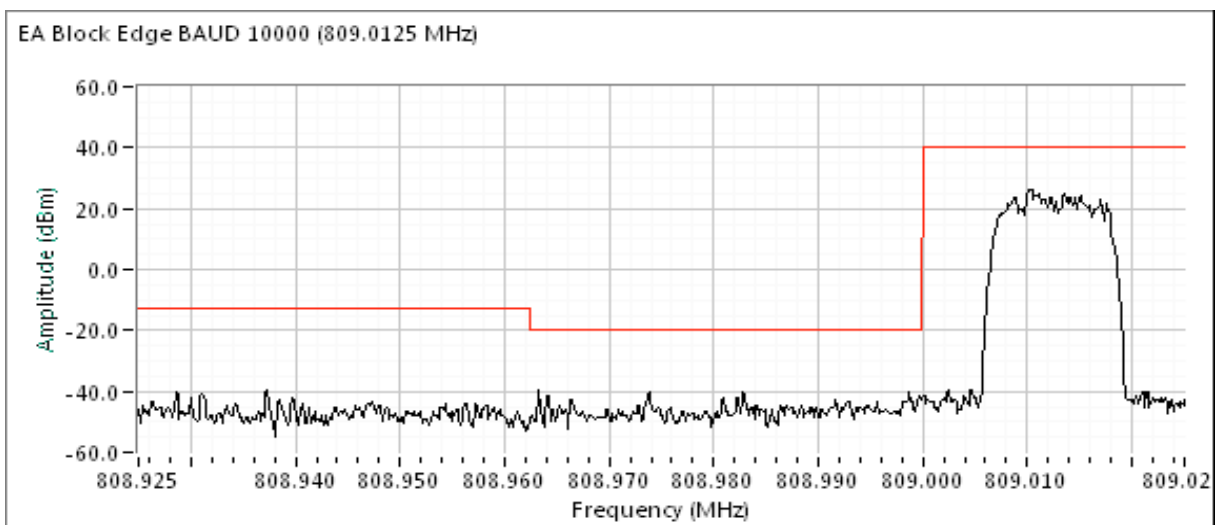
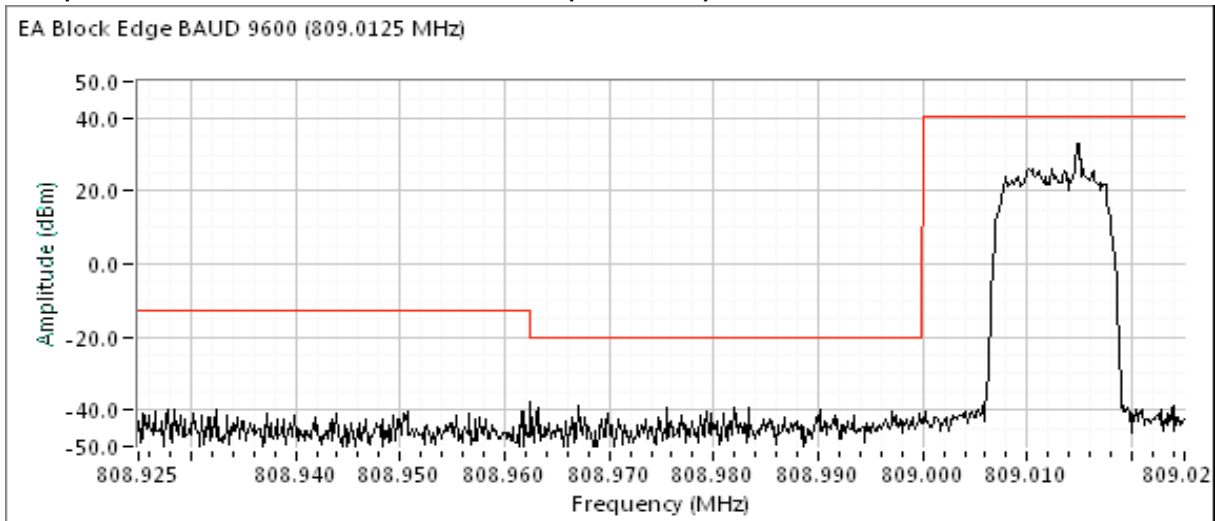
BAUD: 20000
Modem: 64QAM
Power: 40



EMC Test Data

Client:	GE MDS LLC	Job Number:	PR093700
Model:	LN900	T-Log Number:	TL093700-RA
Contact:	Dennis McCarthy	Project Manager:	Christine Krebill
Standard:	FCC Part 90	Project Coordinator:	David Bare
		Class:	N/A

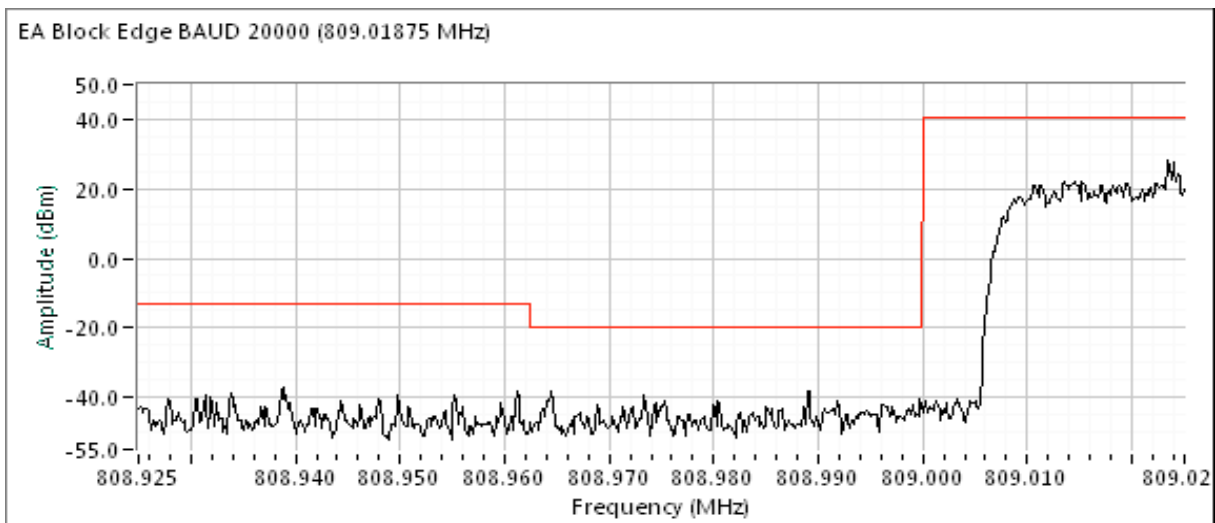
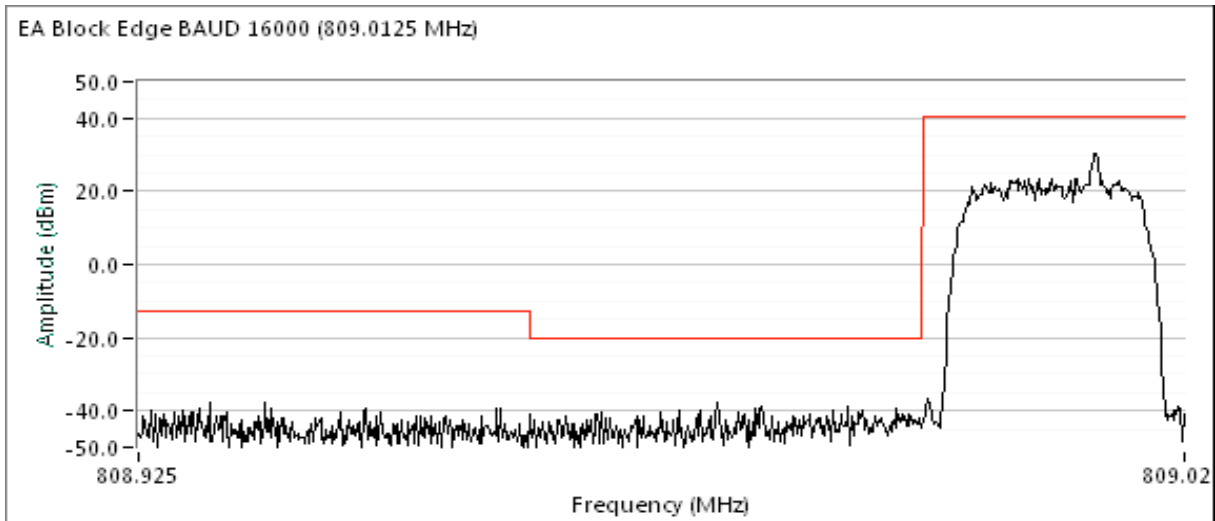
Run #2b: Spectral Mask for 809 - 824 & 854-869 MHz bands (FCC §90.691)





EMC Test Data

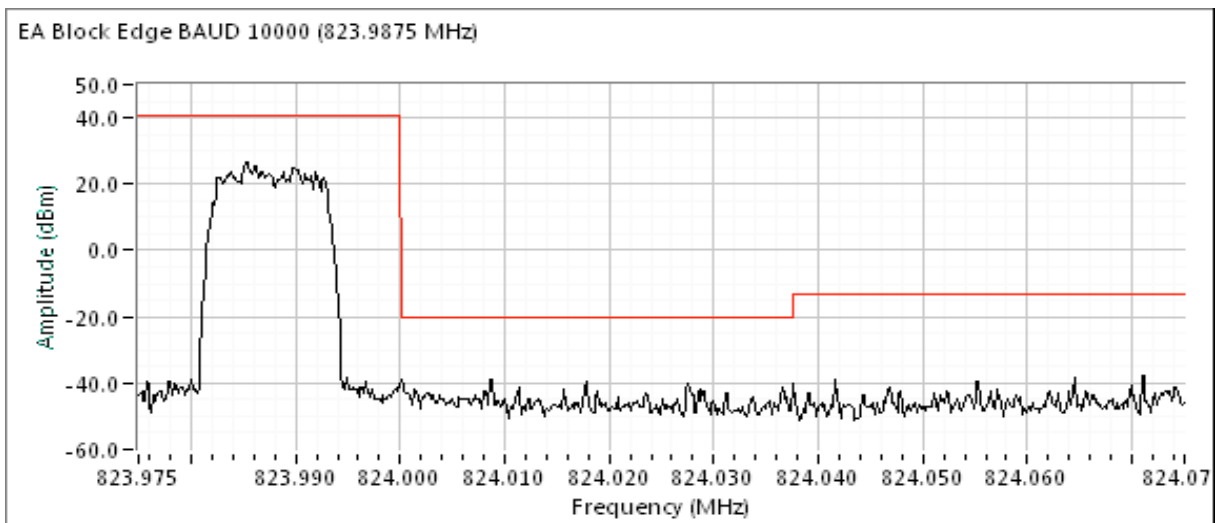
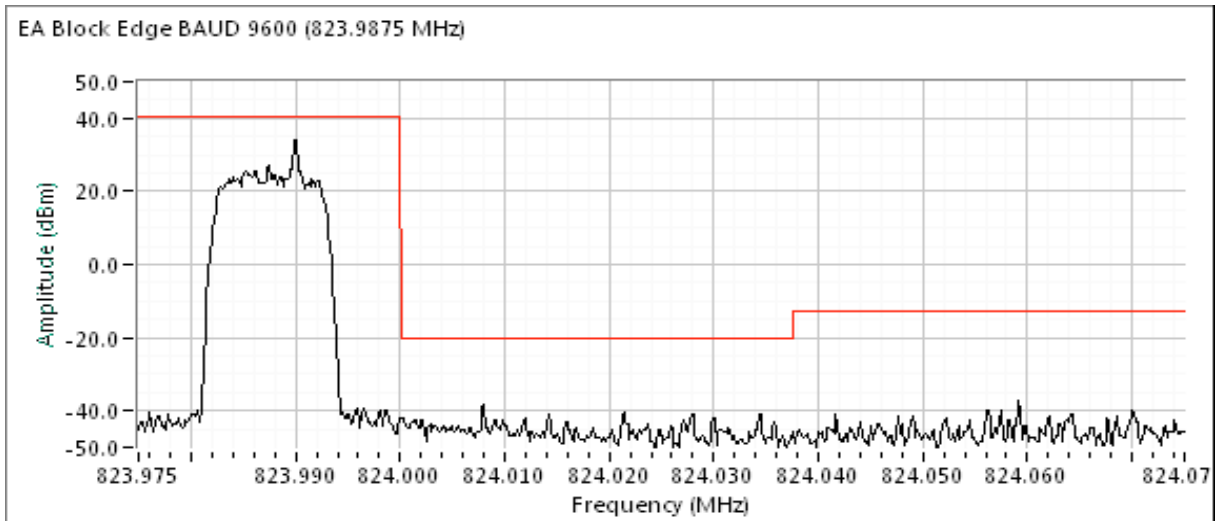
Client:	GE MDS LLC	Job Number:	PR093700
Model:	LN900	T-Log Number:	TL093700-RA
Contact:	Dennis McCarthy	Project Manager:	Christine Krebill
Standard:	FCC Part 90	Project Coordinator:	David Bare
		Class:	N/A





EMC Test Data

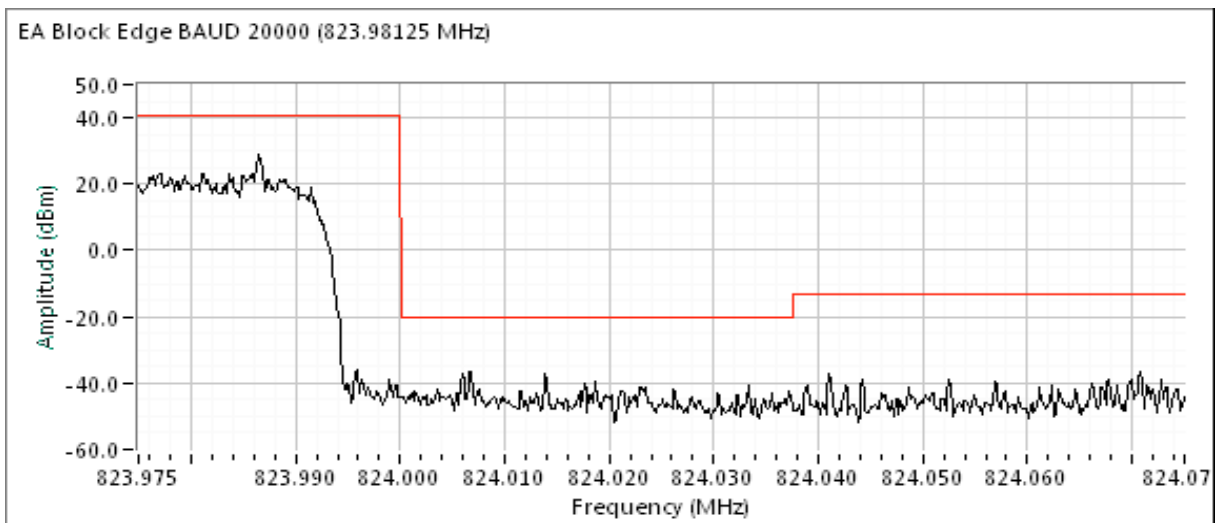
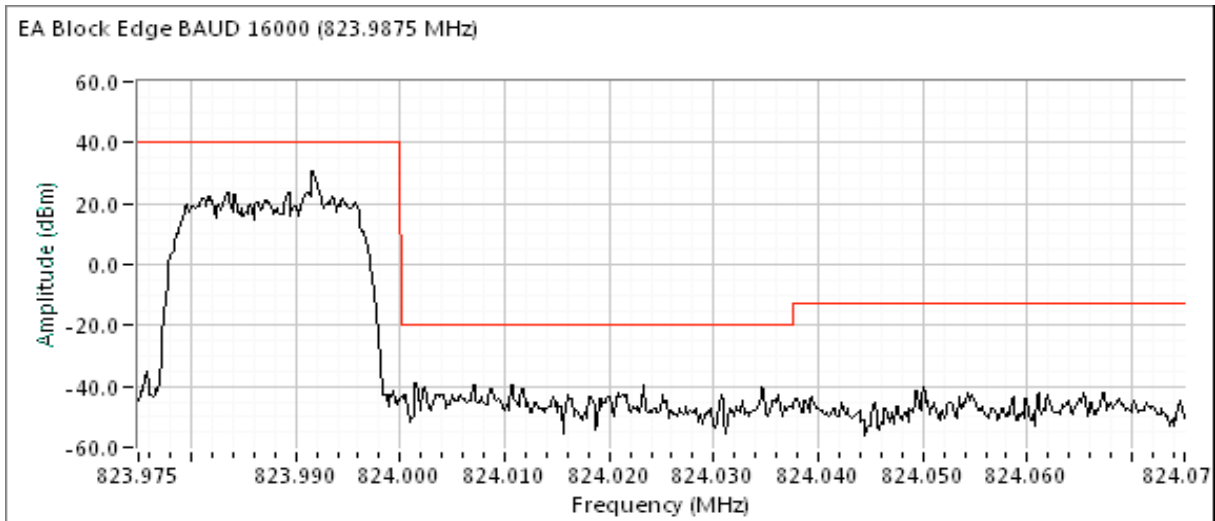
Client:	GE MDS LLC	Job Number:	PR093700
Model:	LN900	T-Log Number:	TL093700-RA
Contact:	Dennis McCarthy	Project Manager:	Christine Krebill
Standard:	FCC Part 90	Project Coordinator:	David Bare
		Class:	N/A





EMC Test Data

Client:	GE MDS LLC	Job Number:	PR093700
Model:	LN900	T-Log Number:	TL093700-RA
Contact:	Dennis McCarthy	Project Manager:	Christine Krebill
Standard:	FCC Part 90	Project Coordinator:	David Bare
		Class:	N/A





EMC Test Data

Client:	GE MDS LLC	Job Number:	PR093700
Model:	LN900	T-Log Number:	TL093700-RA
Contact:	Dennis McCarthy	Project Manager:	Christine Krebill
Standard:	FCC Part 90	Project Coordinator:	David Bare
		Class:	N/A

Run #3: Signal Bandwidth

Date of Test: 3/11/2018

Config. Used: 1

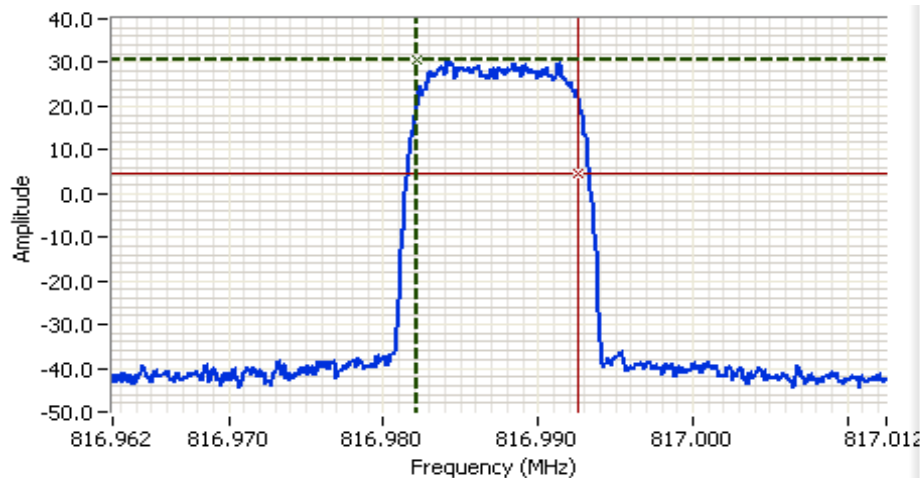
Test Engineer: David Bare

Fixture Voltage: 13.8 VDC

Test Location: Fremont EMC Lab #4A

Power setting	Data rate	Channel plan	Modulation	Frequency (MHz)	Resolution Bandwidth	Bandwidth (kHz)	99%
40 dBm	9.6 ksps	12.5 kHz	64QAM	816.9875	300 Hz		10.4
40 dBm	10.0 ksps	12.5 kHz	64QAM	816.9875	300 Hz		10.9
40 dBm	16.0 ksps	25.0 kHz	64QAM	816.975	500 Hz		17.5
40 dBm	20.0 ksps	25.0 kHz	64QAM	816.975	500 Hz		21.8

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.



Analyzer Settings

Agilent Technologies, E4446A
CF: 816.987 MHz
SPAN: 50.0 kHz
RB: 300 Hz
VB: 1.00 kHz
Detector: POS
Attn: 40 DB
RL Offset: 20.0 DB
Sweep Time: 0.5s
Ref Lvl: 50.0 DBM

Comments

99% power BW: 10.4 kHz
BAUD: 9600
Modem: 64QAM

Cursor 1	816.982217	30.6	
Cursor 2	816.992616	4.6	

Delta Freq. 10.4 kHz

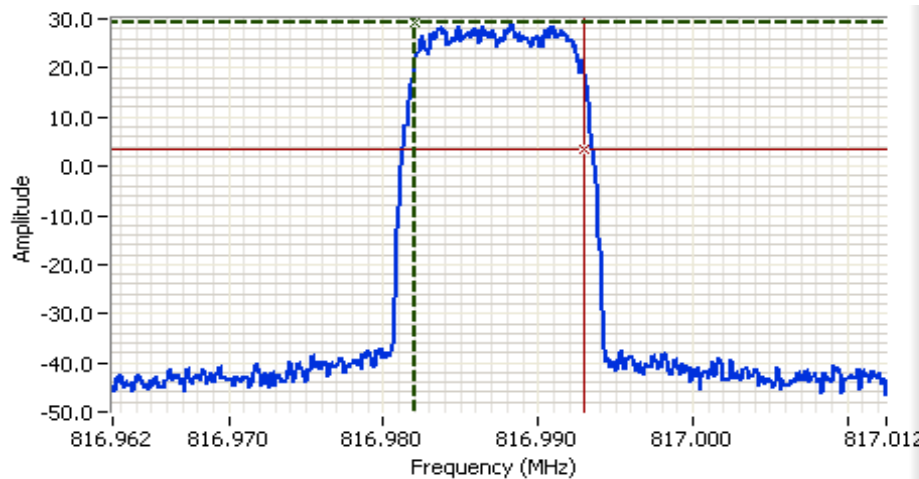
Delta Amplitude 26.0





EMC Test Data

Client:	GE MDS LLC	Job Number:	PR093700
Model:	LN900	T-Log Number:	TL093700-RA
Contact:	Dennis McCarthy	Project Manager:	Christine Krebill
Standard:	FCC Part 90	Project Coordinator:	David Bare
		Class:	N/A



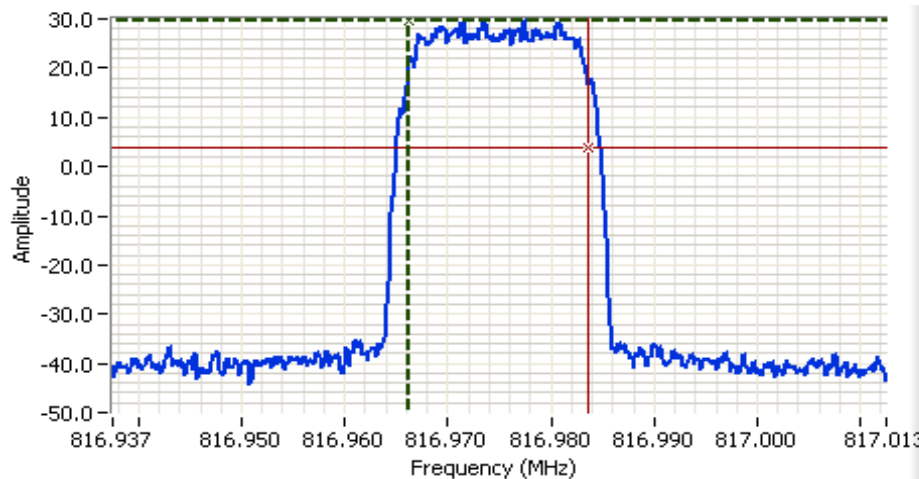
Analyzer Settings

Agilent Technologies, E4446A
CF: 816.987 MHz
SPAN: 50.0 kHz
RB: 300 Hz
VB: 1.00 kHz
Detector: POS
Attn: 40 DB
RL Offset: 20.0 DB
Sweep Time: 0.5s
Ref Lvl: 50.0 DBM

Comments

99% power BW: 10.9 kHz
BAUD: 10000
Modem: 64QAM

Cursor 1	816.982051	29.4		Delta Freq.	10.9 kHz
Cursor 2	816.992949	3.4		Delta Amplitude	26.0



Analyzer Settings

Agilent Technologies, E4446A
CF: 816.975 MHz
SPAN: 75.0 kHz
RB: 510 Hz
VB: 1.50 kHz
Detector: POS
Attn: 40 DB
RL Offset: 20.0 DB
Sweep Time: 276.0ms
Ref Lvl: 50.0 DBM

Comments

99% power BW: 17.5 kHz
Baud: 16000
Modem: 64QAM

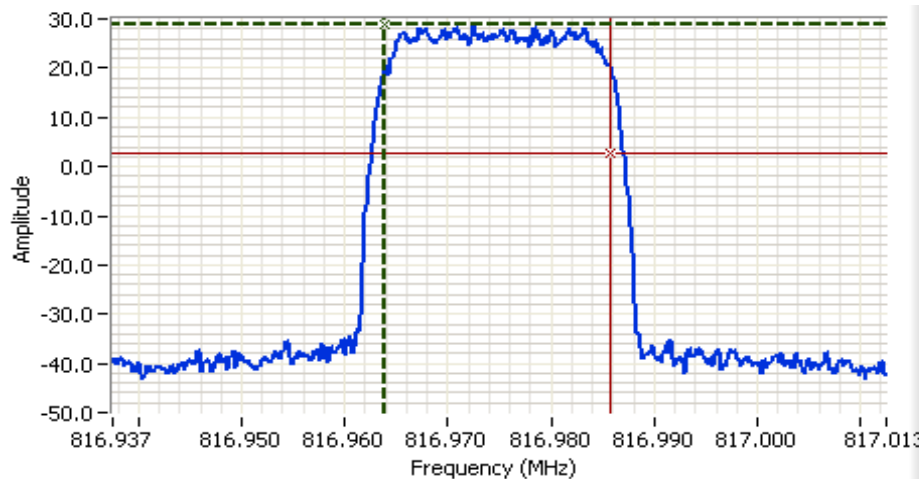
Cursor 1	816.966202	29.7		Delta Freq.	17.5 kHz
Cursor 2	816.983673	3.7		Delta Amplitude	26.0





EMC Test Data

Client:	GE MDS LLC	Job Number:	PR093700
Model:	LN900	T-Log Number:	TL093700-RA
Contact:	Dennis McCarthy	Project Manager:	Christine Krebill
Standard:	FCC Part 90	Project Coordinator:	David Bare
		Class:	N/A



Analyzer Settings

Agilent Technologies, E4446A
CF: 816.975 MHz
SPAN: 75.0 kHz
RB: 510 Hz
VB: 1.50 kHz
Detector: POS
Attn: 40 DB
RL Offset: 20.0 DB
Sweep Time: 276.0ms
Ref Lvl: 50.0 DBM

Comments

99% power BW: 21.8 kHz
BAUD: 20000
Modem: 64QAM

Cursor 1	816.963956	28.8	
Cursor 2	816.985795	2.8	

Delta Freq. 21.8 kHz

Delta Amplitude 26.0





EMC Test Data

Client:	GE MDS LLC	Job Number:	PR093700
Model:	LN900	T-Log Number:	TL093700-RA
Contact:	Dennis McCarthy	Project Manager:	Christine Krebill
Standard:	FCC Part 90	Project Coordinator:	David Bare
		Class:	N/A

Run #4: Out of Band Spurious Emissions, Conducted

Date of Test: 3/11/2018

Test Engineer: Mehran Birgani

Test Location: Fremont EMC Lab #4A

Config. Used: 1

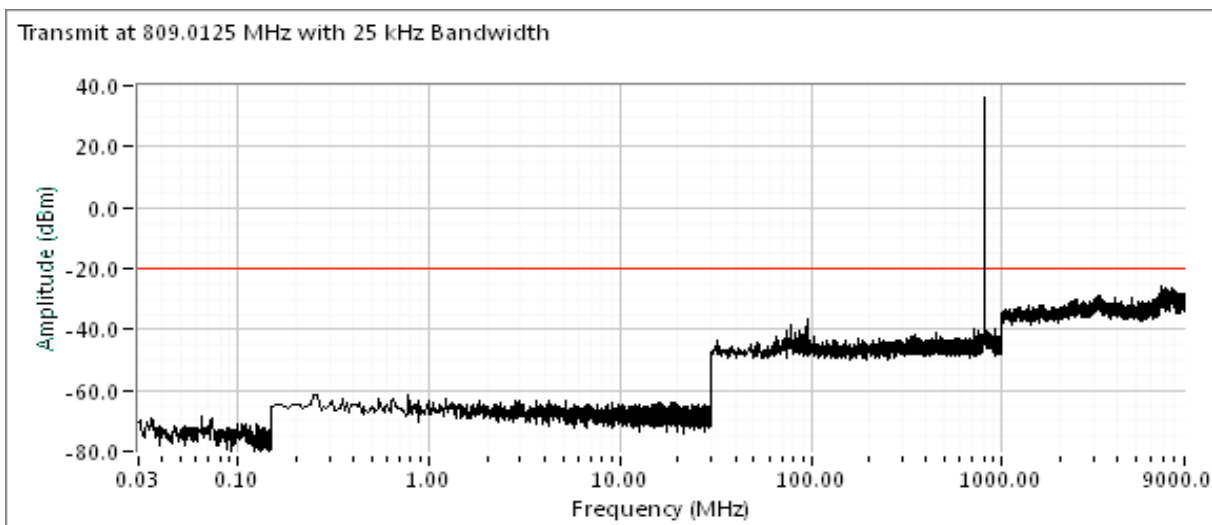
Fixture Voltage: 13.8 VDC

Frequency (MHz)	Limit	Result
809.0125	$50+10\log(P)$	Pass
816.0000	$50+10\log(P)$	Pass
823.9875	$50+10\log(P)$	Pass
854.0125	$50+10\log(P)$	Pass
861.0000	$50+10\log(P)$	Pass
868.9875	$50+10\log(P)$	Pass

The limit is taken from FCC Part 90 Mask D.

SA settings: Peak detector, RBW = 1 kHz below 150 kHz, 9 kHz below 30 MHz and 100 kHz above 30 MHz with video bandwidth 3x the resolution BW. Any emissions observed above 1 GHz were measured using a 1 MHz RBW.

Plots for 809.0125 MHz, power setting(s) = 40

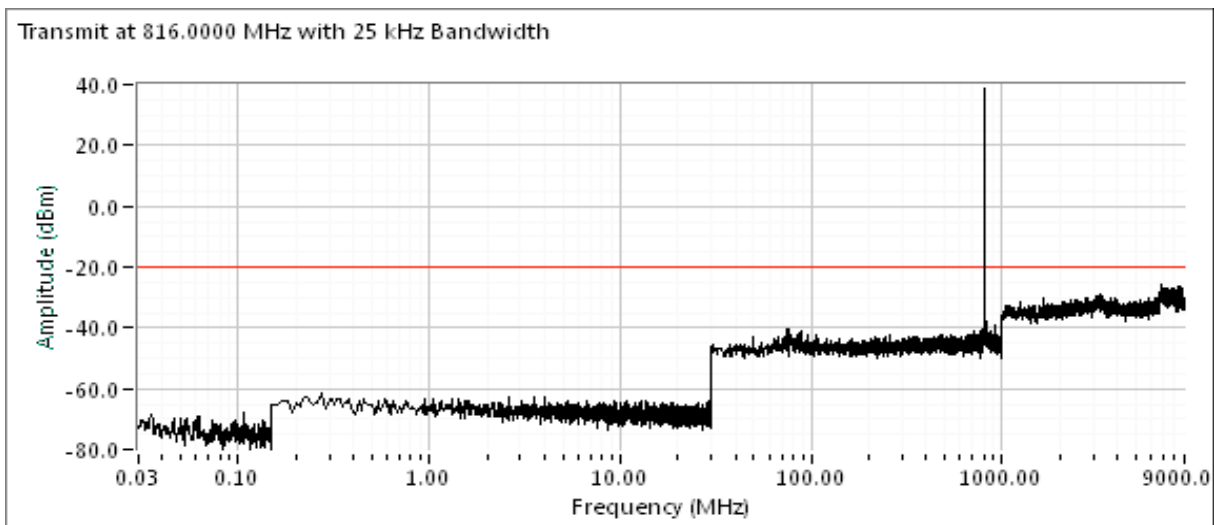




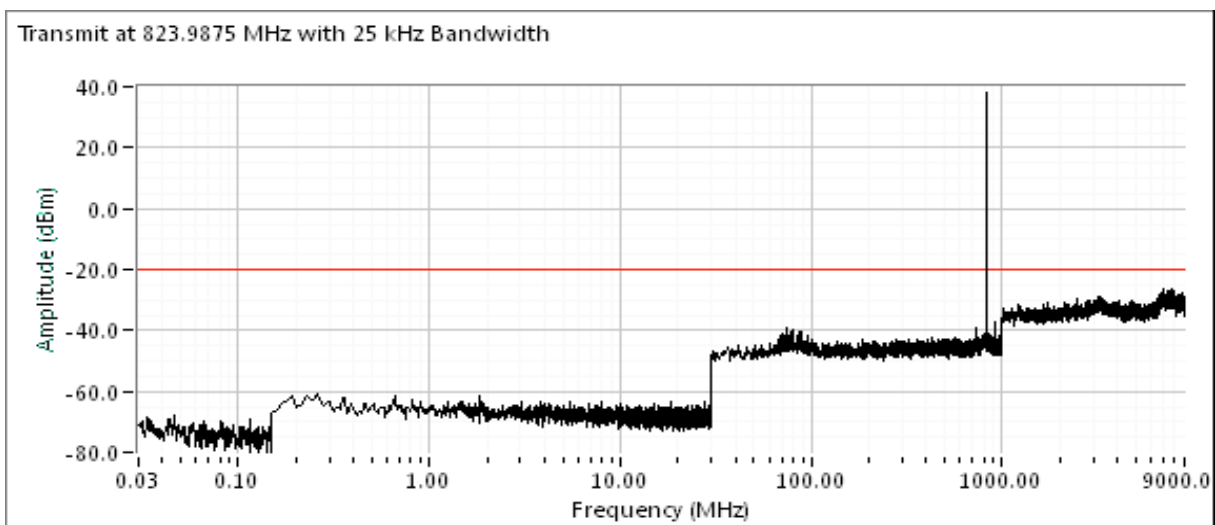
EMC Test Data

Client:	GE MDS LLC	Job Number:	PR093700
Model:	LN900	T-Log Number:	TL093700-RA
Contact:	Dennis McCarthy	Project Manager:	Christine Krebill
Standard:	FCC Part 90	Project Coordinator:	David Bare
		Class:	N/A

Plots for 816 MHz, power setting(s) = 40



Plots for 823.9875 MHz, power setting(s) = 40

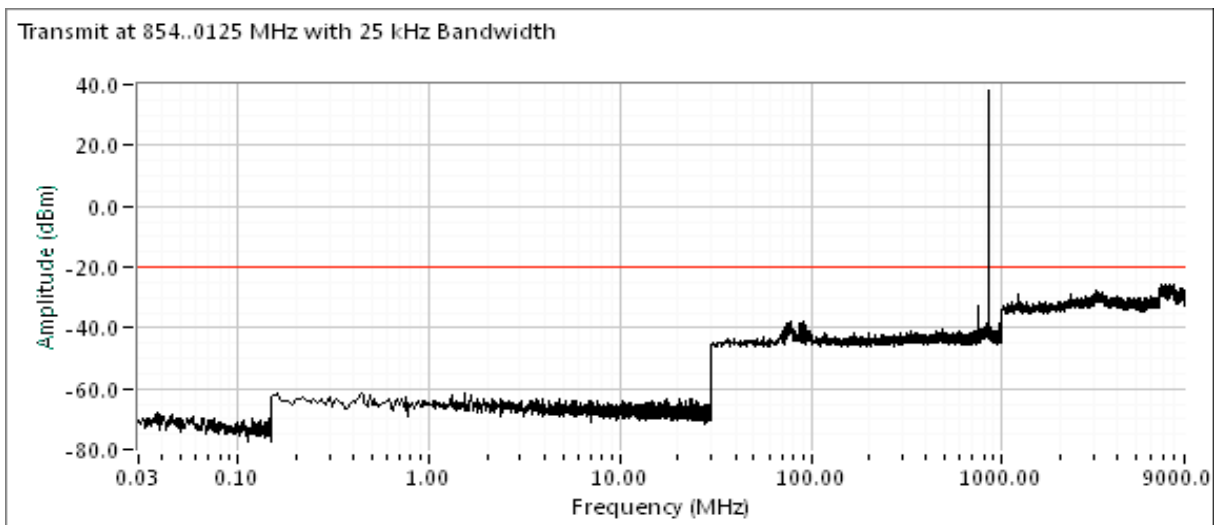




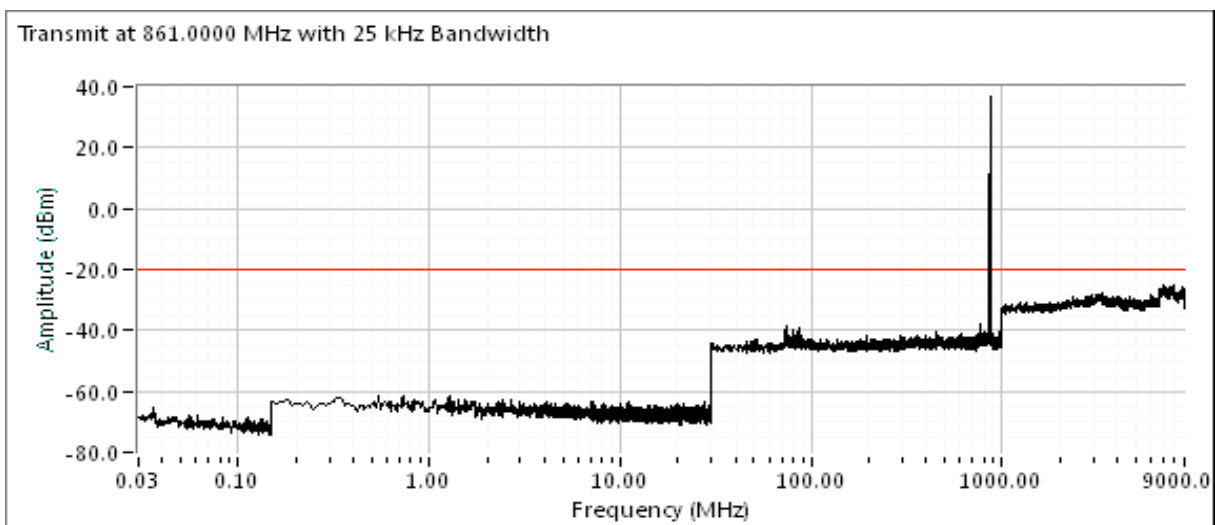
EMC Test Data

Client:	GE MDS LLC	Job Number:	PR093700
Model:	LN900	T-Log Number:	TL093700-RA
Contact:	Dennis McCarthy	Project Manager:	Christine Krebill
Standard:	FCC Part 90	Project Coordinator:	David Bare
		Class:	N/A

Plots for 854.0125 MHz, power setting(s) = 40



Plots for 861 MHz, power setting(s) = 40

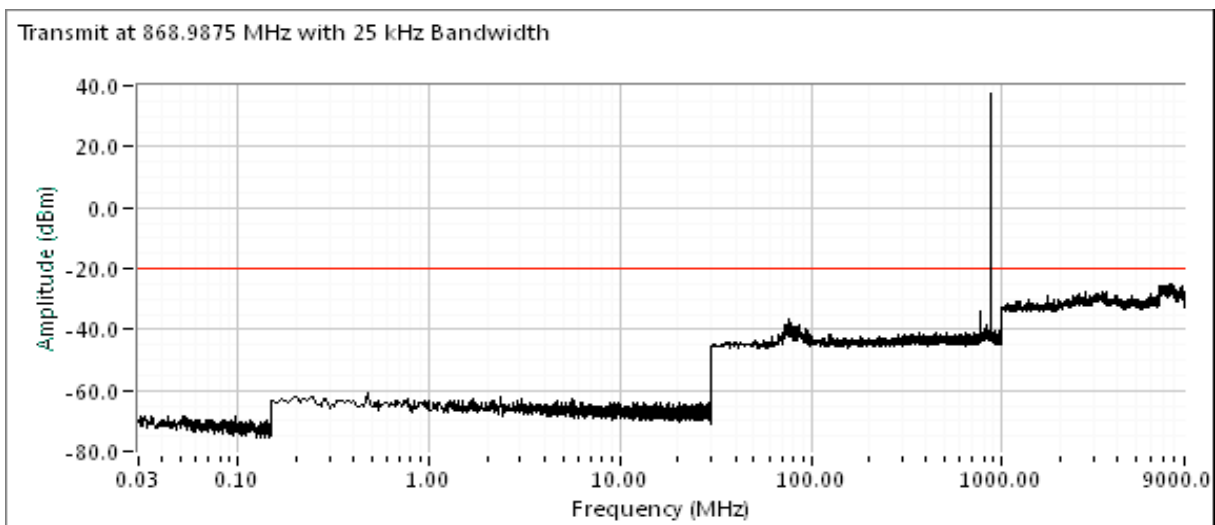




EMC Test Data

Client:	GE MDS LLC	Job Number:	PR093700
Model:	LN900	T-Log Number:	TL093700-RA
Contact:	Dennis McCarthy	Project Manager:	Christine Krebill
Standard:	FCC Part 90	Project Coordinator:	David Bare
		Class:	N/A

Plots for 868.9875 MHz, power setting(s) = 40





EMC Test Data

Client:	GE MDS LLC	Job Number:	PR093700
Model:	LN900	T-Log Number:	TL093700-RA
Contact:	Dennis McCarthy	Project Manager:	Christine Krebill
Standard:	FCC Part 90	Project Coordinator:	David Bare
		Class:	N/A

Run #5: Out of Band Spurious Emissions, Radiated

Conducted limit (dBm): -20 The limit is taken from FCC Part 90 Mask D
 Approximate field strength limit @ 3m: 77.5

Run #5a - Preliminary measurements

Date of Test: 3/12/2019 Config. Used: 2
 Test Engineer: David W. Bare Fixture Voltage: 13.8 VDC and 5.25 VDC
 Test Location: Fremont Chamber #7

Frequency	Level	Pol	FCC Part 90		Detector	Azimuth	Height	Comments	Channel
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters		
736.273	44.2	V	75.3	-31.1	Peak	63	1.0	Noise floor	
30.000	41.5	V	75.3	-33.8	Peak	145	3.0	Noise floor	
1000.000	54.3	V	75.3	-21.0	Peak	360	1.0	Noise floor	
1618.000	60.6	V	75.3	-14.7	Peak	200	1.0		809 MHz
2427.000	48.2	V	75.3	-27.1	Peak	232	2.2		809 MHz
4045.000	48.4	V	75.3	-26.9	Peak	214	2.5		809 MHz
7281.000	70.3	V	75.3	-5.0	Peak	176	2.2		809 MHz
8090.000	71.5	V	75.3	-3.8	Peak	195	1.9		809 MHz
1632.000	61.0	V	75.3	-14.3	Peak	254	1.9		816 MHz
7344.000	74.2	V	75.3	-1.1	Peak	12	2.5		816 MHz
8160.000	71.1	V	75.3	-4.2	Peak	194	1.9		816 MHz
1648.000	55.0	V	75.3	-20.3	Peak	248	1.6		824 MHz
6592.000	64.4	V	75.3	-10.9	Peak	198	1.9		824 MHz
7416.000	66.9	V	75.3	-8.4	Peak	8	1.3		824 MHz
8240.000	64.7	V	75.3	-10.6	Peak	58	2.5		824 MHz
1708.000	55.9	V	75.3	-19.4	Peak	253	2.5		854 MHz
3416.000	56.2	V	75.3	-19.1	Peak	240	2.2		854 MHz
6832.000	71.0	V	75.3	-4.3	Peak	8	2.2		854 MHz
7686.000	69.1	V	75.3	-6.2	Peak	69	1.9		854 MHz
8540.000	65.6	V	75.3	-9.7	Peak	238	2.2		854 MHz
3444.000	57.4	V	75.3	-17.9	Peak	240	2.5		861 MHz
6888.000	67.1	V	75.3	-8.2	Peak	195	1.6		861 MHz
7749.000	72.7	V	75.3	-2.6	Peak	321	1.0		861 MHz
8610.000	67.7	V	75.3	-7.6	Peak	16	2.2		861 MHz
6083.000	56.7	V	75.3	-18.6	Peak	190	2.2		869 MHz
7821.000	71.3	H	75.3	-4.0	Peak	208	1.3		869 MHz
8690.000	69.8	V	75.3	-5.5	Peak	231	1.9		869 MHz
6952.000	67.7	V	75.3	-7.6	Peak	174	2.2		869 MHz



EMC Test Data

Client:	GE MDS LLC	Job Number:	PR093700
Model:	LN900	T-Log Number:	TL093700-RA
Contact:	Dennis McCarthy	Project Manager:	Christine Krebill
Standard:	FCC Part 90	Project Coordinator:	David Bare
		Class:	N/A

Frequency	Level	Pol	FCC Part 90		Detector	Azimuth	Height	Comments	Channel
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters		
3476.000	58.5	V	75.3	-16.8	Peak	234	1.3		869 MHz
4345.000	57.2	V	75.3	-18.1	Peak	154	2.2		869 MHz

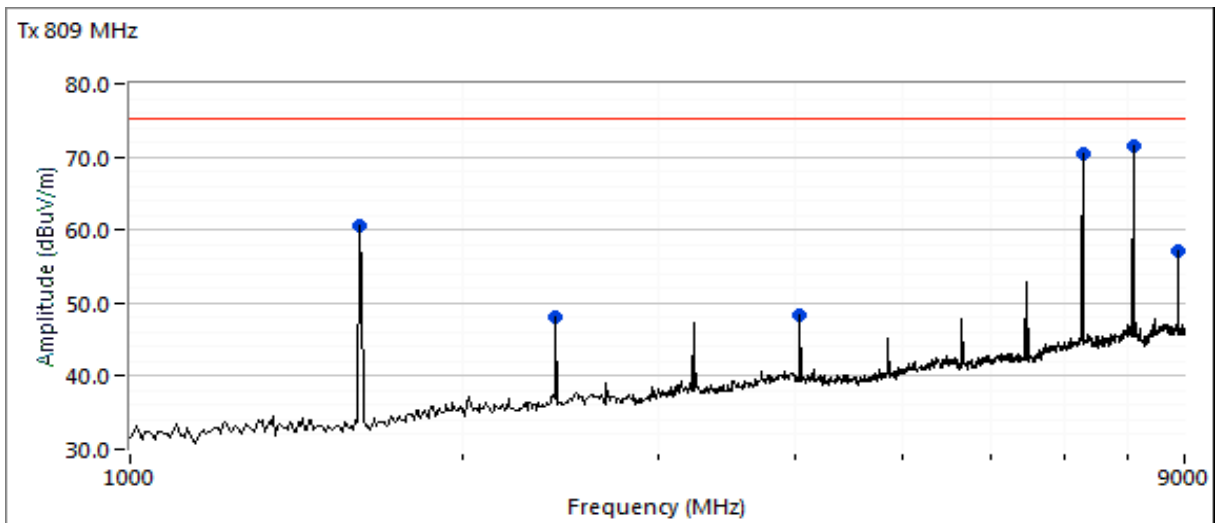
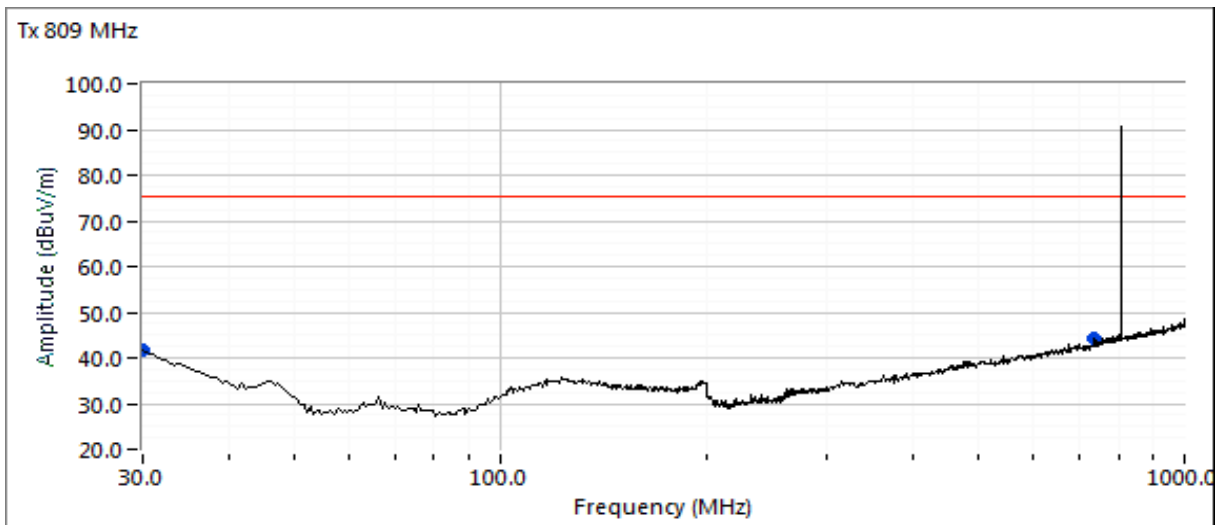
Note 1:	The field strength limit in the tables above was calculated from the erp/eirp limit detailed in the standard using the free space propagation equation: $E = \sqrt{(30PG)/d}$. This limit is conservative - it does not consider the presence of the ground plane and, for erp limits, the dipole gain (2.2dBi) has not been included. The erp or eirp for all signals with less than 20dB of margin relative to this field strength limit is determined using substitution measurements.
Note 2:	Measurements are made with the antenna port terminated.
Note 3:	No emissions above 10 dB μ V/m were observed from 30 kHz to 30 MHz.



EMC Test Data

Client:	GE MDS LLC	Job Number:	PR093700
Model:	LN900	T-Log Number:	TL093700-RA
Contact:	Dennis McCarthy	Project Manager:	Christine Krebill
Standard:	FCC Part 90	Project Coordinator:	David Bare
		Class:	N/A

Plots for 809 MHz, power setting(s) = 40

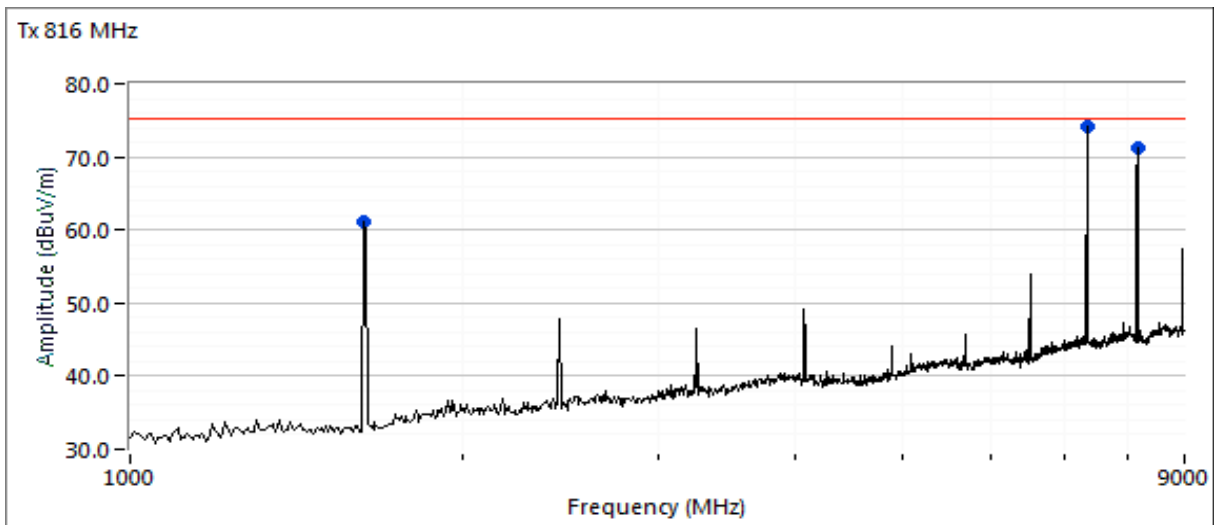
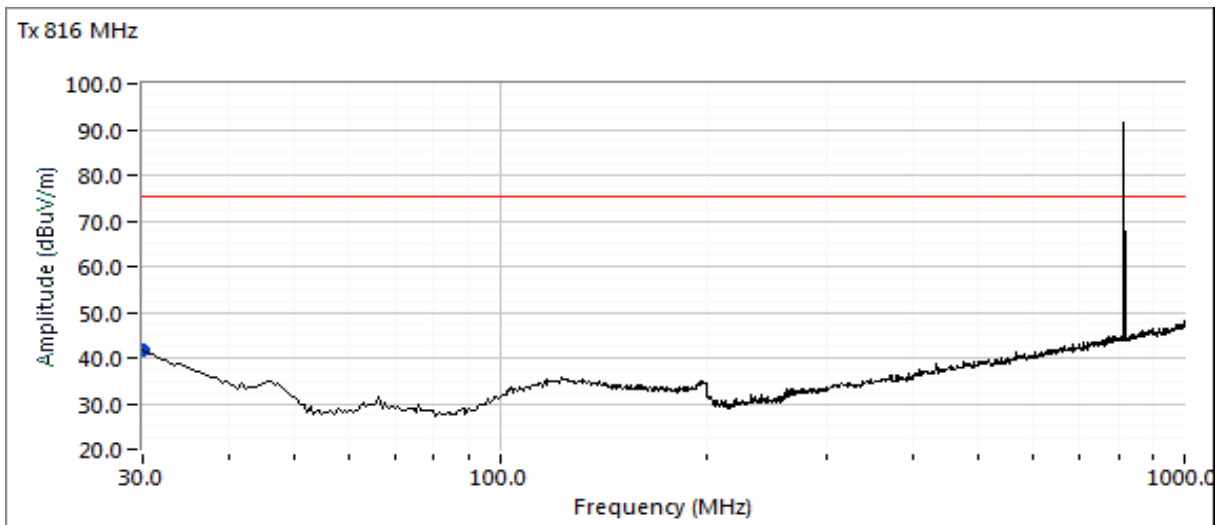




EMC Test Data

Client:	GE MDS LLC	Job Number:	PR093700
Model:	LN900	T-Log Number:	TL093700-RA
Contact:	Dennis McCarthy	Project Manager:	Christine Krebill
Standard:	FCC Part 90	Project Coordinator:	David Bare
		Class:	N/A

Plots for 816 MHz, power setting(s) = 40

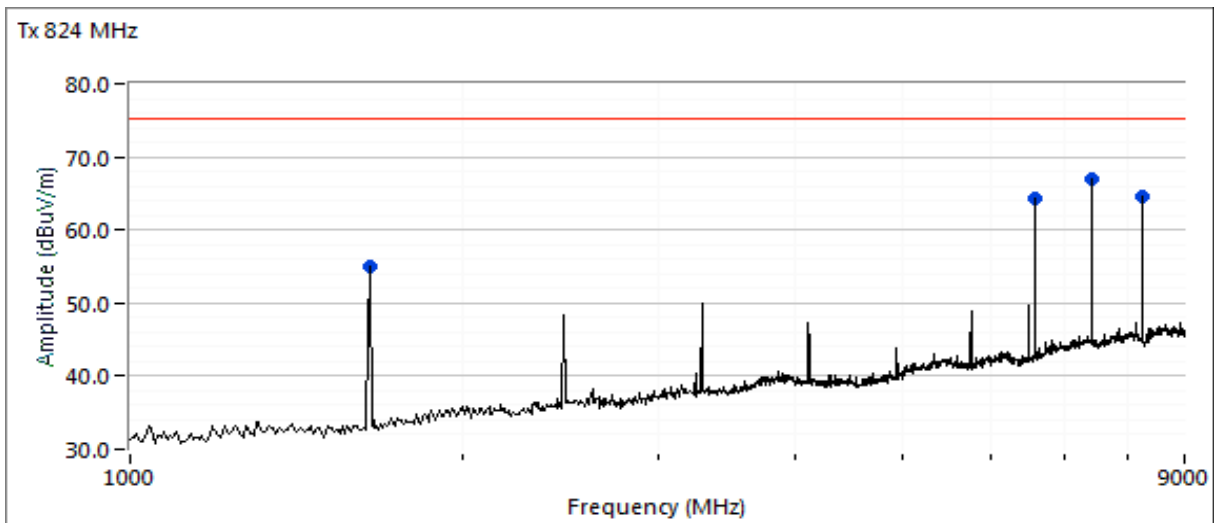
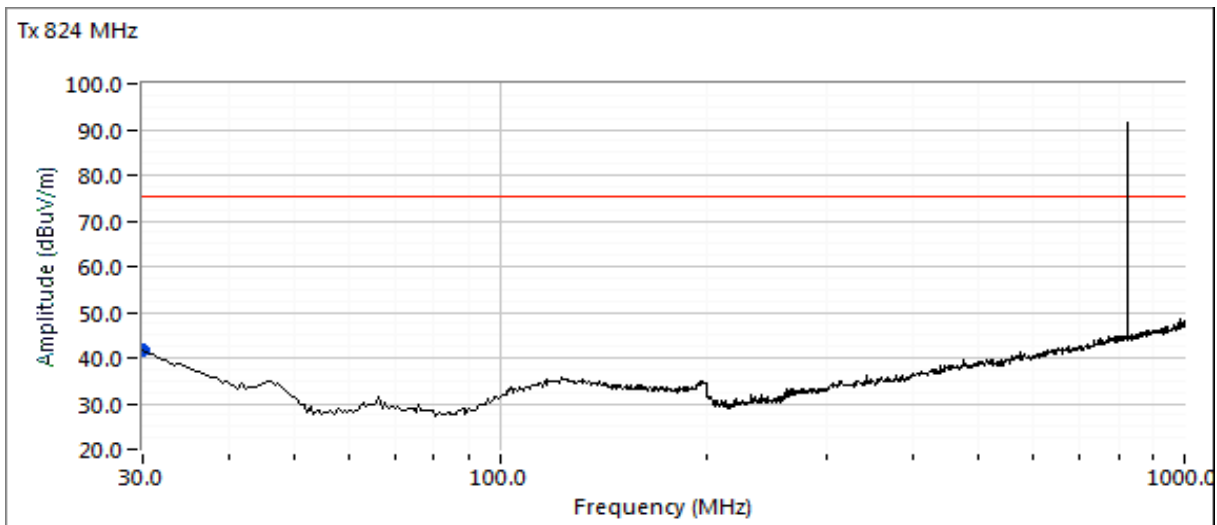




EMC Test Data

Client:	GE MDS LLC	Job Number:	PR093700
Model:	LN900	T-Log Number:	TL093700-RA
Contact:	Dennis McCarthy	Project Manager:	Christine Krebill
Standard:	FCC Part 90	Project Coordinator:	David Bare
		Class:	N/A

Plots for 824 MHz, power setting(s) = 40

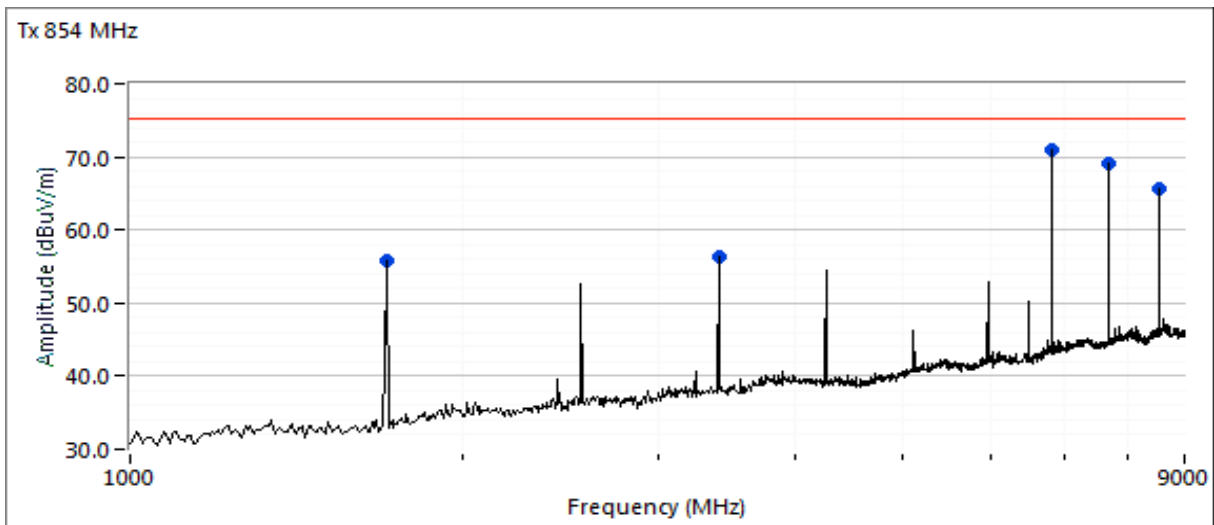
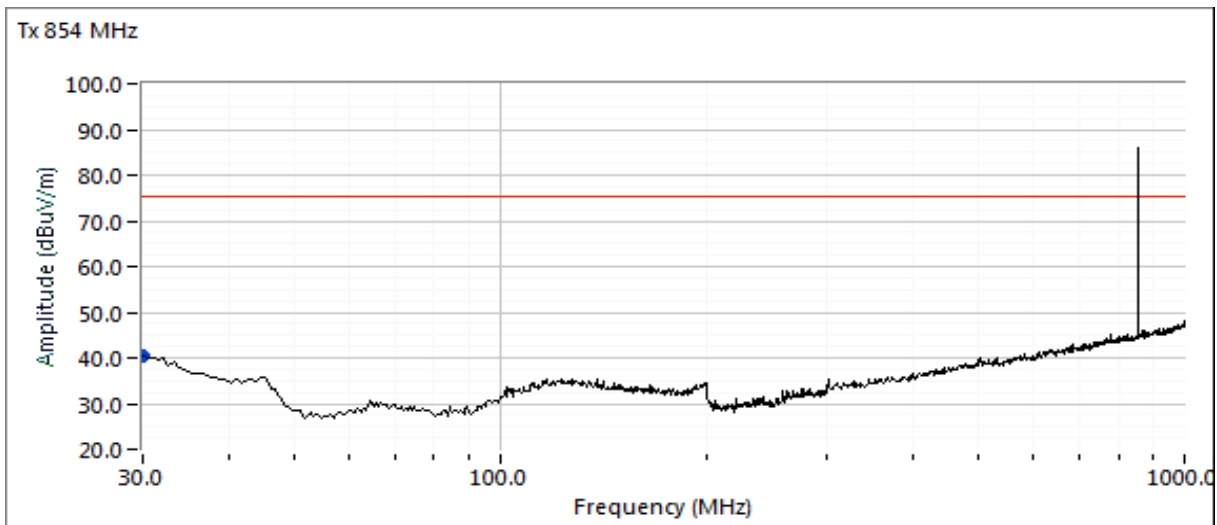




EMC Test Data

Client:	GE MDS LLC	Job Number:	PR093700
Model:	LN900	T-Log Number:	TL093700-RA
Contact:	Dennis McCarthy	Project Manager:	Christine Krebill
Standard:	FCC Part 90	Project Coordinator:	David Bare
		Class:	N/A

Plots for 854 MHz, power setting(s) = 40

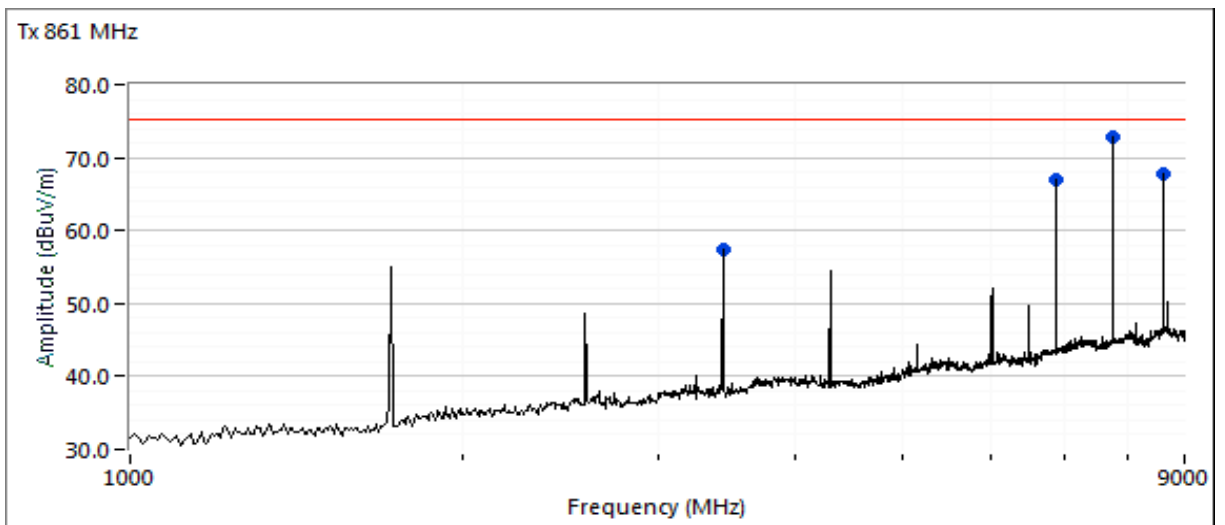
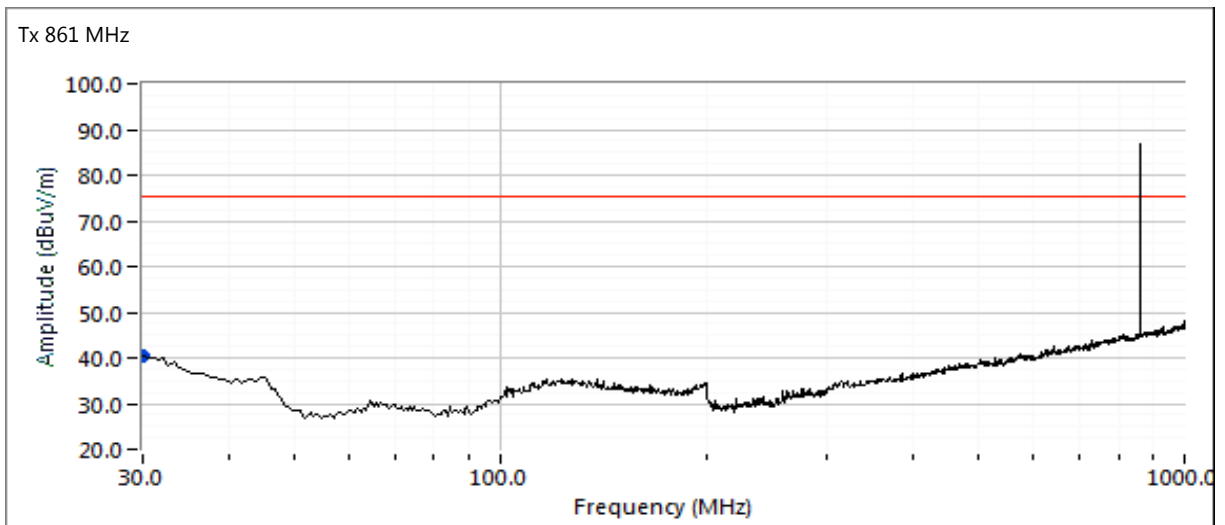




EMC Test Data

Client:	GE MDS LLC	Job Number:	PR093700
Model:	LN900	T-Log Number:	TL093700-RA
Contact:	Dennis McCarthy	Project Manager:	Christine Krebill
Standard:	FCC Part 90	Project Coordinator:	David Bare
		Class:	N/A

Plots for 861 MHz, power setting(s) = 40

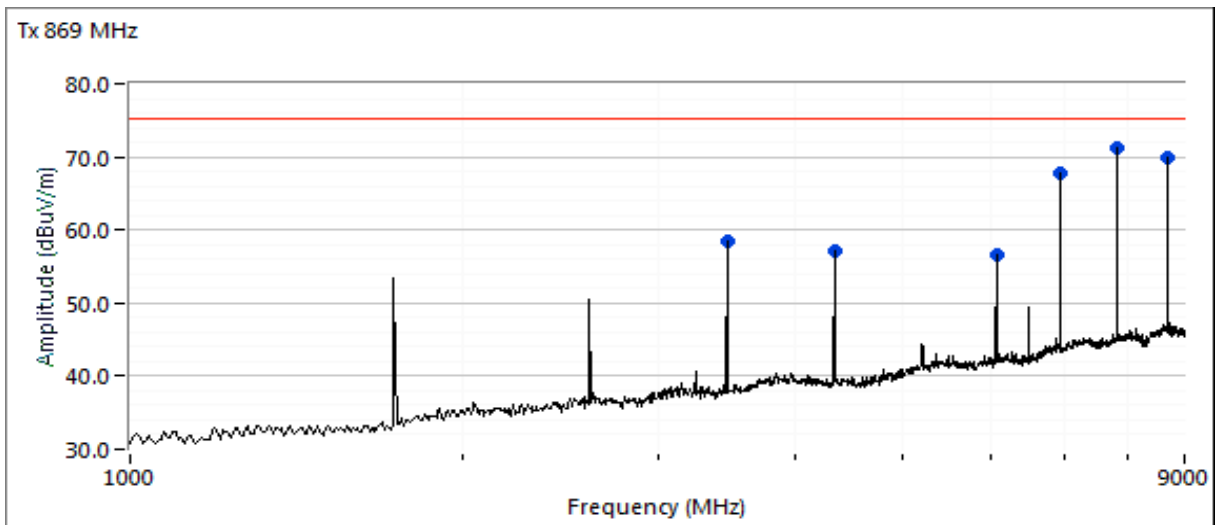
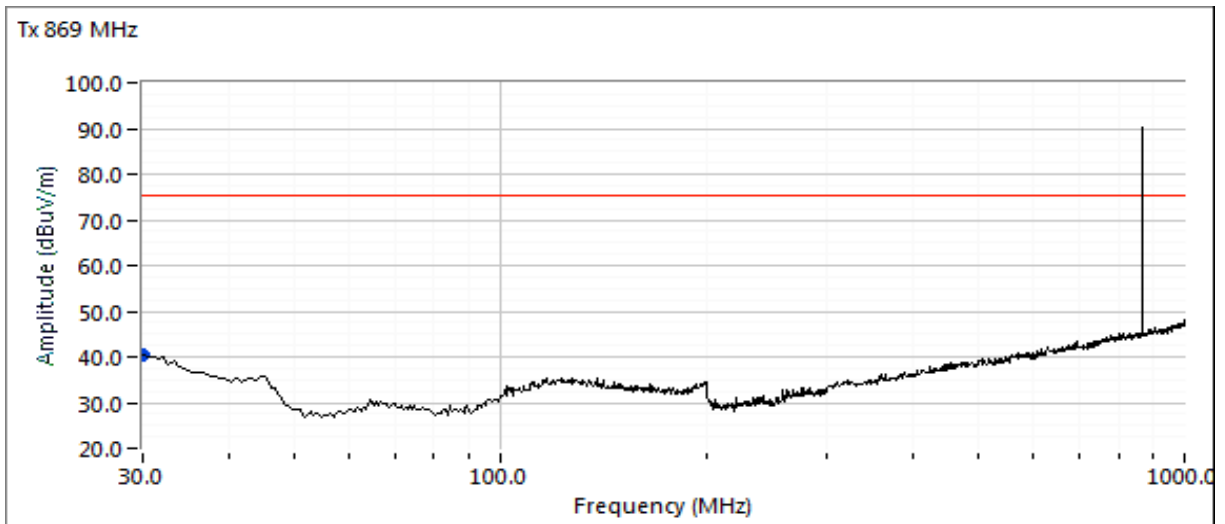




EMC Test Data

Client:	GE MDS LLC	Job Number:	PR093700
Model:	LN900	T-Log Number:	TL093700-RA
Contact:	Dennis McCarthy	Project Manager:	Christine Krebill
Standard:	FCC Part 90	Project Coordinator:	David Bare
		Class:	N/A

Plots for 869 MHz, power setting(s) = 40





EMC Test Data

Client:	GE MDS LLC	Job Number:	PR093700
Model:	LN900	T-Log Number:	TL093700-RA
Contact:	Dennis McCarthy	Project Manager:	Christine Krebill
Standard:	FCC Part 90	Project Coordinator:	David Bare
		Class:	N/A

Run #5b: - Final Field Strength and Substitution Measurements

Date of Test: 3/12/2019

Config. Used: 2

Test Engineer: David W. Bare

Fixture Voltage: 13.8 VDC and 5.25 VDC

Test Location: Fremont Chamber #7

EUT Field Strength

Frequency	Level	Pol	FCC Part 90		Detector	Azimuth	Height	Comments	Channel
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters		
30.000	48.0	V	75.3	-27.3	PK	360	1.0	PK (0.10s)	
736.273	50.6	V	75.3	-24.7	PK	360	1.0	PK (0.10s)	
1000.000	54.9	V	75.3	-20.4	PK	360	1.0	PK (0.10s)	
1618.680	61.2	V	75.3	-14.1	PK	200	1.0	RB 1 MHz;VB 3 MHz;Peak	
7282.330	71.6	V	75.3	-3.7	PK	168	2.0	RB 1 MHz;VB 3 MHz;Peak	
8090.290	73.4	V	75.3	-1.9	PK	195	1.9	RB 1 MHz;VB 3 MHz;Peak	
1631.220	61.6	V	75.3	-13.7	PK	245	1.9	RB 1 MHz;VB 3 MHz;Peak	
7344.100	75.6	V	75.3	0.3	PK	6	2.4	RB 1 MHz;VB 3 MHz;Peak	
8160.170	71.8	V	75.3	-3.5	PK	194	1.9	RB 1 MHz;VB 3 MHz;Peak	
6592.260	69.9	V	75.3	-5.4	PK	198	1.9	RB 1 MHz;VB 3 MHz;Peak	
7416.020	74.7	V	75.3	-0.6	PK	6	2.4	RB 1 MHz;VB 3 MHz;Peak	
8239.960	69.6	V	75.3	-5.7	PK	58	2.5	RB 1 MHz;VB 3 MHz;Peak	
1708.030	56.9	V	75.3	-18.4	PK	253	2.5	RB 1 MHz;VB 3 MHz;Peak	
3415.940	60.0	V	75.3	-15.3	PK	240	2.2	RB 1 MHz;VB 3 MHz;Peak	
6832.230	73.1	V	75.3	-2.2	PK	8	2.5	RB 1 MHz;VB 3 MHz;Peak	
7686.200	73.4	V	75.3	-1.9	PK	67	1.9	RB 1 MHz;VB 3 MHz;Peak	
8539.830	74.1	V	75.3	-1.2	PK	238	2.2	RB 1 MHz;VB 3 MHz;Peak	
3442.590	60.1	V	75.3	-15.2	PK	240	2.5	RB 1 MHz;VB 3 MHz;Peak	
6888.260	73.1	V	75.3	-2.2	PK	195	1.6	RB 1 MHz;VB 3 MHz;Peak	
7749.030	73.8	V	75.3	-1.5	PK	321	1.1	RB 1 MHz;VB 3 MHz;Peak	
8609.920	71.9	V	75.3	-3.4	PK	16	2.2	RB 1 MHz;VB 3 MHz;Peak	
3475.530	60.6	V	75.3	-14.7	PK	234	1.3	RB 1 MHz;VB 3 MHz;Peak	
4344.790	65.2	V	75.3	-10.1	PK	154	2.2	RB 1 MHz;VB 3 MHz;Peak	
6952.060	74.7	V	75.3	-0.6	PK	174	2.2	RB 1 MHz;VB 3 MHz;Peak	
7821.270	78.0	H	75.3	2.7	PK	208	1.3	RB 1 MHz;VB 3 MHz;Peak	
8689.870	76.5	V	75.3	1.2	PK	231	1.9	RB 1 MHz;VB 3 MHz;Peak	

Note 1:	The field strength limit in the tables above was calculated from the erp/eirp limit detailed in the standard using the free space propagation equation: $E = \sqrt{(30PG)/d}$. This limit is conservative - it does not consider the presence of the ground plane and, for erp limits, the dipole gain (2.2 dBi) has not been included. The erp or eirp for all signals with less than 20 dB of margin relative to this field strength limit is determined using substitution measurements.
Note 2:	Measurements are made with the antenna port terminated.



EMC Test Data

Client:	GE MDS LLC	Job Number:	PR093700
Model:	LN900	T-Log Number:	TL093700-RA
Contact:	Dennis McCarthy	Project Manager:	Christine Krebill
Standard:	FCC Part 90	Project Coordinator:	David Bare
		Class:	N/A

Substitution measurements

Vertical

Frequency MHz	Substitution measurements			Site Factor ⁴	EUT measurements			eirp Limit dBm	erp Limit dBm	Margin dB
	Pin ¹	Gain ²	FS ³		FS ⁵	eirp (dBm)	erp (dBm)			
1618.680	-20.0	8.6	84.6	96.0	61.2	-34.8	-37.0		-20.0	-17.0
7282.330	-20.0	11.0	87.4	96.4	71.6	-24.8	-27.0		-20.0	-7.0
8090.290	-20.0	11.3	88.0	96.7	73.4	-23.3	-25.5		-20.0	-5.5
1631.220	-20.0	8.8	84.7	95.9	61.6	-34.3	-36.5		-20.0	-16.5
7344.100	-20.0	10.8	87.3	96.5	75.6	-20.9	-23.1		-20.0	-3.1
8160.170	-20.0	11.4	88.1	96.7	71.8	-24.9	-27.1		-20.0	-7.1
6592.260	-20.0	12.0	87.4	95.4	69.9	-25.5	-27.7		-20.0	-7.7
7416.020	-20.0	10.9	88.0	97.1	74.7	-22.4	-24.6		-20.0	-4.6
8239.960	-20.0	11.5	88.2	96.7	69.6	-27.1	-29.3		-20.0	-9.3
1708.030	-20.0	8.9	84.8	95.9	56.9	-39.0	-41.2		-20.0	-21.2
3415.940	-20.0	9.8	85.0	95.2	60.0	-35.2	-37.4		-20.0	-17.4
6832.230	-20.0	11.5	87.4	95.9	73.1	-22.8	-25.0		-20.0	-5.0
7686.200	-20.0	11.5	88.2	96.7	73.4	-23.3	-25.5		-20.0	-5.5
8539.830	-20.0	11.4	88.3	96.9	74.1	-22.8	-25.0		-20.0	-5.0
3442.590	-20.0	9.9	85.4	95.5	60.1	-35.4	-37.6		-20.0	-17.6
6888.260	-20.0	11.6	87.6	96.0	73.1	-22.9	-25.1		-20.0	-5.1
7749.030	-20.0	11.4	88.1	96.7	73.8	-22.9	-25.1		-20.0	-5.1
8609.920	-20.0	11.3	88.5	97.2	71.9	-25.3	-27.5		-20.0	-7.5
3475.530	-20.0	9.9	85.8	95.9	60.6	-35.3	-37.5		-20.0	-17.5
4344.790	-20.0	10.9	86.7	95.8	65.2	-30.6	-32.8		-20.0	-12.8
6952.060	-20.0	11.6	88.2	96.6	74.7	-21.9	-24.1		-20.0	-4.1
8689.870	-20.0	11.4	88.7	97.3	76.5	-20.8	-23.0		-20.0	-3.0

Horizontal

Frequency MHz	Substitution measurements			Site Factor ⁴	EUT measurements			eirp Limit dBm	erp Limit dBm	Margin dB
	Pin ¹	Gain ²	FS ³		FS ⁵	eirp (dBm)	erp (dBm)			
7821.270	-20.0	11.6	88.3	96.7	78.0	-18.7	-20.9		-20.0	-0.9

Note 1: Pin is the input power (dBm) to the substitution antenna

Note 2: Gain is the gain (dBi) for the substitution antenna.

Note 3: FS is the field strength (dBuV/m) measured from the substitution antenna.

Note 4: Site Factor - this is the site factor to convert from a field strength in dBuV/m to an eirp in dBm.

Note 5: EUT field strength as measured during initial run.

End of Report

This page is intentionally blank and marks the last page of this test report.