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Radio Test Report

FCC Part 90 and RSS-119
(406.1 MHz to 512 MHz)
FCC Part 22
(454 MHz to 512 MHz)
RSS-119
(406.1-430 MHz and 450-470 MHz)

Model: SDM4

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 25, 2015
RE-ISSUED DATE:	August 4, 2015
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REVISION HISTORY

Rev#	Date	Comments	Modified By
-	June 25, 2015	First release	
1	August 4, 2015	Modified model number and updated version references of RSS-119 and ANSI C63.4 and changed the reference to part 22 for spurious emissions to 22.359(a)	

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SCOPE

Tests have been performed on the GE MDS LLC model SDM4, 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 Industry Canada.

- Code of Federal Regulations (CFR) Title 47 Part 2
- RSS-Gen Issue 4, November 2014
- CFR 47 Part 22 Subpart H (Cellular Radiotelephone Service)
- CFR 47 Part 90 (Private Land Mobile Radio Service)
- RSS-119, Issue 12, May 2015 (Land Mobile and Fixed Radio Transmitters and Receivers Operating the Frequency Range 27.41 to 960 MHz)

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-C August 17, 2004

The intentional radiator above has been tested in a simulated typical installation to demonstrate compliance with the relevant Industry 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.

The test results recorded herein are based on a single type test of the GE MDS LLC model SDM4 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 SDM4 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.

TEST RESULTS

FCC Part 90

FCC		Description	Measured	Limit	Result
Transmitter Modulation, output power and other characteristics					
§2.1033 (c) (5) § 90.35		Frequency range(s)	406.1-512 MHz	406.1-512 MHz	Pass
§2.1033 (c) (6) §2.1033 (c) (7) § 2.1046 § 90.205		RF power output at the antenna terminals	30 - 41.1 dBm conducted	Determined based on License	Pass
§2.1033 (c) (4) § 2.1047 § 90.210		Emission types	F1D, F2D, F3D		
		Emission mask	Masks C, D, E	Within Mask	Pass
§ 2.1049 § 90.209		Occupied Bandwidth	3.49 kHz 9.15 kHz 17.0 kHz	6 kHz 11.25 kHz 20.0 kHz	Pass
§ 90.214		Transient Frequency Behavior	Within allowed deviation	Within allowed deviation	Pass
Transmitter spurious emissions					
§ 2.1051 § 2.1057 § 90.210		At the antenna terminals	-32.1 dBm @ 835.945 MHz (-7.1 dB)	-25 dBm	Pass
§ 2.1053 § 2.1057 § 90.210		Field strength	-32.3 dBm @ 4472 MHz	-25 dBm	Pass
Receiver spurious emissions					
§ 15.109		At the antenna terminals	-59.0 dBm (1.3 nW) @ 344.549 MHz	< 1GHz: 2nW > 1GHz: 5nW	Pass
§ 15.109		Field strength	53.9 dBuV/m	See limit table on page 20	Pass
Other details					
§ 2.1055 § 90.213		Frequency stability	0.3 ppm	0.5 ppm	Pass
§ 2.1093		RF Exposure	Complies, see separate exhibit		
§2.1033 (c) (8)		Final radio frequency amplifying circuit's dc voltages and currents for normal operation over the power range	24V DC and 2.5 A		
Notes					

FCC Part 22

FCC		Description	Measured	Limit	Result
Transmitter Modulation, output power and other characteristics					
§2.1033 (c) (5) §22.561 §22.651 §22.725		Frequency range(s)	454-455 MHz 456-460 MHz 470-512 MHz	454-455 MHz 456-460 MHz 470-512 MHz	Pass
§2.1033 (c) (6) §2.1033 (c) (7) §2.1046 §22.565 §22.659		ERP	46.5 dBm to 57.6 dBm	50.0 dBm to 65.4 dBm ERP depending on frequency	Pass
§2.1033 (c) (4) §2.1047 §22.357 §22.359(a)		Emission types	F1D, F2D, F3D		
		Emission limit	Below limit	43 + 10*log(P)	Pass
§2.1049 §22.561 §22.651 §22.725		Occupied Bandwidth	3.49 kHz 9.15 kHz 17.0 kHz	20 kHz	Pass
Transmitter spurious emissions					
§2.1051 §2.1057 §22.359(a)		At the antenna terminals	-32.1 dBm @ 835.945 MHz	-13 dBm	Pass
§2.1053 §2.1057 §22.359(a)		Field strength	-32.3 dBm @ 4472 MHz	-13 dBm	Pass
Receiver spurious emissions					
§ 15.109		At the antenna terminals	-53.5 dBm (1.3 nW) @ 344.549 MHz	< 1GHz: 2nW > 1GHz: 5nW	Pass
§ 15.109		Field strength	53.9 dBuV/m	See limit table on page 20	Pass
Other details					
§ 2.1055 § 22.355		Frequency stability	0.3 ppm	2.5 ppm	Pass
§ 2.1093		RF Exposure	Complies, see separate exhibit		
§2.1033 (c) (8)		Final radio frequency amplifying circuit's dc voltages and currents for normal operation over the power range	24V DC and 2.5 A		
Notes					

RSS-119

	Canada	Description	Measured	Limit	Result
Transmitter Modulation, output power and other characteristics					
	RSS-119	Frequency range(s)	406.1-430 MHz 450-470 MHz	406.1-430 MHz 450-470 MHz	Pass
	RSS-119	RF power output at the antenna terminals	30 - 41.1 dBm conducted	Determined based on License	Pass
	RSS-119	Emission types	F1D--, F2D--, F3D--		
		Emission mask	Masks C, D, E	Within Mask	Pass
	RSS-GEN 6.6 RSS-119	Occupied Bandwidth	3.49 kHz 9.15 kHz 17.0 kHz	6 kHz 11.25 kHz 20.0 kHz	Pass
	RSS-119	Transient Frequency Behaviour	Within allowed deviation	Within allowed deviation	Pass
Transmitter spurious emissions					
	RSS-119	At the antenna terminals	-32.1 dBm @ 835.945 MHz (-7.1 dB)	-25 dBm	Pass
	RSS-119	Field strength	-32.3 dBm @ 4472 MHz	-25 dBm	Pass
Other details					
	RSS-119	Frequency stability	0.3 ppm	0.5 ppm	
	RSS-102	RF Exposure	Complies, see separate exhibit		
Notes					

EXTREME CONDITIONS

Frequency stability is determined over extremes of temperature and voltage. The extremes of voltage were 23 to 25 volts DC.

The extremes of temperature were -30°C to +50°C as specified in FCC §2.1055(a)(1).

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)	dBµV/m	25 to 1,000 MHz 1 to 40 GHz	± 3.6 dB ± 6.0 dB

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The GE MDS LLC model SDM4 is an industrial radio module operating in the 406.1-512 MHz bands and uses CPFSK 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 module is +24 Volts DC, 2.5 Amps max.

The sample was received on May 18, 2015 and tested on May 18, 19, 20 and 21, 2015. The EUT consisted of the following component(s):

Company	Model	Description	Serial Number	FCC ID
GE MDS LLC	SDM4	Industrial Radio Module	Eng. Prototype	E5MDS-SDM4 , IC ID 101D-SDM4

OTHER EUT DETAILS

The following EUT details should be noted: The host product in which this product will be used "Orbit Master Station" is rated from -30°C to +60°C with many AC and DC options power options.

ENCLOSURE

The EUT does not have an enclosure as it is intended to be installed in a complete product. The PCB measures approximately 40 cm wide by 60 cm deep by 15 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
HP	6024A	Power Supply	2430A-03013	-
HP	dv6000	Laptop	CNF73411TR	-

EUT INTERFACE PORTS

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

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
Serial on Adapter Board	Laptop	Multiwire	Shielded	2
Power on Adapter Board	Power Supply	Two Wire	Unshielded	1.5

EUT OPERATION

During emissions testing the EUT was set to transmit at the selected power level or in receive mode on the selected channel.

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.

Radiated spurious emissions measurements were taken at the National Technical Systems - Silicon Valley Anechoic Chambers and/or Open Area Test Site(s) listed below. The sites conform to the requirements of ANSI C63.4: 2014 *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 industry Canada.

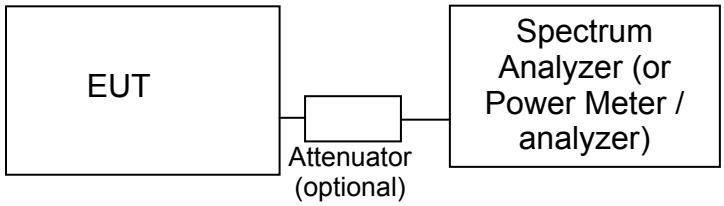
Site	Designation / Registration Numbers		Location
	FCC	Canada	
Chamber 3	US0027	IC 2845B-3	41039 Boyce Road Fremont, CA 94538-2435
Chamber 4	US0027	IC 2845B-4	
Chamber 5	US0027	IC 2845B-5	
Chamber 7	US0027	IC 2845B-7	

In the case of Open Area Test Sites, ambient levels are at least 6 dB below the specification limits with the exception of predictable local TV, radio, and mobile communications traffic.

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.

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 tunes 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.

FREQUENCY STABILITY

The EUT is placed inside a temperature chamber with all support and test equipment located outside of the chamber. The temperature is varied across the specified frequency range in 10 degree increments with frequency measurements made at each temperature step. The EUT is allowed enough time to stabilize at each temperature variation.

The spectrum analyzer is configured to give a 5- or 6-digit display for the marker-frequency function. The spectrum analyzer's built-in frequency counter is used to measure the maximum deviation of the fundamental frequency at each temperature. Where possible the device is set to transmit an unmodulated signal. Where this is not possible the frequency drift is determined by finding a stable point on the signal (e.g. the null at the centre of an OFDM signal) or by calculating a centre frequency based on the upper and lower XdB points (where X is typically 6dB or 10dB) on the signal's skirts.

TRANSIENT FREQUENCY BEHAVIOR:

The TIA/EIA 603 procedure is used to determine compliance with transient frequency timing requirements as the radio is keyed on and off.

The EUTs rf output is connected via a combiner/splitter to the test receiver/spectrum analyzer and to a diode detector. The test receiver or spectrum analyzer video output is connected to an oscilloscope, which is triggered by the output from the diode detector.

Plots showing Ton, T1, and T2 are made when turning on the transmitter and showing T3 when turning off the transmitter.

RADIATED EMISSIONS MEASUREMENTS

Receiver radiated spurious emissions measurements are made in accordance with ANSI C63.4 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 OATS or 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, for receiver spurious emissions, 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 test receivers and 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 centimeters above the floor. Floor mounted equipment is placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material from 3 to 12 mm if the device is normally used on a non-conductive floor. The EUT is positioned on a motorized turntable to allow it to be rotated during testing to determine the angel 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 sued 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.

RECEIVER RADIATED SPURIOUS EMISSIONS SPECIFICATION LIMITS

The table below shows the limits for the spurious emissions from receivers as detailed in FCC Part 15.109, RSS-210 Table 2, RSS-GEN Table 1 and RSS-310 Table 3. Note that receivers operating outside of the frequency range 30 MHz – 960 MHz are exempt from the requirements of 15.109.

Frequency Range (MHz)	Limit (uV/m @ 3m)	Limit (dBuV/m @ 3m)
30 to 88	100	40
88 to 216	150	43.5
216 to 960	200	46.0
Above 960	500	54.0

Appendix A Test Equipment Calibration Data

Manufacturer	Description	Model	Asset #	Calibrated	Cal Due
Radio Antenna Port, 09-Mar-15					
Rohde & Schwarz	Signal Analyzer 20 Hz - 26.5 GHz	FSQ26	2327	4/28/2014	4/28/2015
Radiated Emissions, 30 - 5,000 MHz, 09-Mar-15					
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1630	6/21/2014	6/21/2015
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	2237	8/29/2014	8/29/2016
EMCO	Antenna, Horn, 1-18 GHz	3115	2870	8/20/2013	8/20/2015
Com-Power	Preamplifier, 1-1000 MHz	PAM-103	2885	10/22/2014	10/22/2015
Filtek	Filter, 1 GHz High Pass	HP12/1000-5BA	955	5/13/2014	5/13/2015
Antenna port measurements, 18-May-15					
Rohde & Schwarz	Test Receiver, 20-1300 MHz	ESVP	213	7/31/2014	7/31/2015
Filtek	Filter, 1 GHz High Pass	HP12/1000-5BA	957	5/11/2015	5/11/2016
Rohde & Schwarz	Power Meter, Single Channel	NRVS	1422	1/22/2015	1/22/2016
Tektronix	1 GHz, 4 CH, 5GS/s Oscilloscope	TDS5104	1435	8/1/2014	8/1/2015
Rohde & Schwarz	Power Sensor 100 uW - 2 Watts (w/ 20 dB pad, SN BJ5155)	NRV-Z32	1536	1/15/2015	1/15/2016
Agilent Technologies	PSA, Spectrum Analyzer, (installed options, 111, 115, 123, 1DS, B7J, HYX,	E4446A	2139	4/8/2015	4/8/2016
Rohde & Schwarz	Signal Generator 100KHz-12.75GHz	SMB 100A	3002	N/A	N/A
Frequency stability, 19-May-15					
Watlow	Temp Chamber (w/ F4 Watlow Controller)	F4	2170	7/18/2014	7/18/2015
Micro-Tronics	Band Reject Filter, 5150-5350 MHz	BRC50703-02	2239	9/16/2014	9/16/2015
Radiated Emissions, 30 - 6,000 MHz, 20-May-15					
Filtek	Filter, 1 GHz High Pass	HP12/1000-5BA	955	5/18/2015	5/18/2016
EMCO	Antenna, Horn, 1-18 GHz	3115	1561	6/27/2014	6/27/2016
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1630	6/21/2014	6/21/2015
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	2199	2/20/2015	2/20/2016
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	2237	8/29/2014	8/29/2016
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	2415	3/7/2015	3/7/2016
Radiated Emissions, 30 - 2,500 MHz, 21-May-15					
EMCO	Antenna, Horn, 1-18 GHz	3115	786	12/20/2013	12/20/2015
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	2/20/2015	2/20/2016
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	9/20/2014	9/20/2015
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1538	12/20/2014	12/20/2015
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	2197	2/13/2014	2/13/2016
Hewlett Packard	9KHz-1300MHz pre-amp	8447F	2777	3/4/2015	3/5/2016

Manufacturer	Description	Model	Asset #	Calibrated	Cal Due
Conducted Emissions - AC Power Ports, 21-May-15					
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1538	12/20/2014	12/20/2015
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	1594	5/14/2015	5/14/2016
Com-Power	9KHz-30MHz, 50uH, 15Aac, 10Adc, max	LI-215A	2671	5/24/2014	6/18/2015
Substitution Measurements, 22-May-15					
EMCO	Antenna, Horn, 1-18GHz	3115	868	6/26/2014	6/26/2016
Filtek	Filter, 1 GHz High Pass	HP12/1000-5BA	955	5/18/2015	5/18/2016
EMCO	Antenna, Horn, 1-18 GHz	3115	1561	6/27/2014	6/27/2016
Agilent Technologies	PSG, Vector Signal Generator, (250kHz - 20GHz)	E8267C	1877	6/19/2014	6/19/2015
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	2199	2/20/2015	2/20/2016
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	2415	3/7/2015	3/7/2016

Appendix B Test Data

T97900 Pages 24 - 62

Client:	GE MDS LLC	Job Number:	J97895
Product	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Emissions Standard(s):	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A
Immunity Standard(s):	-	Environment:	Radio

EMC Test Data

For The

GE MDS LLC

Product

SD4 Master Module

Date of Last Test: 5/18/2015

Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

RSS 119 and FCC Part 22 & 90

Power, Occupied Bandwidth, Frequency Stability 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 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: 20-22 °C

Rel. Humidity: 30-35 %

Summary of Results

Run #	Spacing	Data Rate	Test Performed	Limit	Pass / Fail	Result / Margin
1	-	-	Output Power	Determined at time of Licensing	Pass	41.1 dBm conducted
2			Spectral Mask and Band Edge	Masks C, D, E	Pass	Masks C, D, E
3	6.25 kHz 12.5 kHz 25.0 kHz		99% or Occupied Bandwidth	FCC Part 90	Pass	3.49 kHz 9.15 kHz 17.0 kHz
4			Spurious Emissions (conducted)	FCC Part 90	Pass	-32.1 dBm @ 835.945 MHz (-7.1 dB)
5			Spurious emissions (radiated)	FCC Part 90		-32.3 dBm erp @ 4471.99 MHz (-7.3 dB)
6			Transient Frequency Behavior	FCC Part 90	Pass	Within allowed deviation
7			Frequency Stability	0.5 ppm	Pass	0.3 ppm

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.

EUT:

Ser# 2651771 B band radio (406.1 - 450.0 MHz)

Ser# 2651776 C band radio (460.0 - 512.0 MHz)

Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

Run #1: Output Power

Date of Test: 18-May-15 Config. Used: 1

Test Engineer: Deniz Demirci Config Change: None

Test Location: FT Lab #4b EUT Voltage: 24 Vdc

Cable Loss: 0.0 dB Attenuator: 36.0 dB Total Loss: 36.0 dB

Cable ID(s): - Attenuator IDs: #1878, #2097 and #1690

Power Setting[2]	Frequency (MHz)	Output Power (dBm) [1]	Output Power mW	Antenna Gain (dBi)	Result	EIRP dBm	EIRP W
High power							
dvga60fp55	406.1	41.1	12882.5	16.5	Pass	57.6	575.440
dvga60fp55	418.0	41.1	12882.5	16.5	Pass	57.6	575.440
dvga60fp52	428.0	41.1	12882.5	16.5	Pass	57.6	575.440
dvga60fp73	450.0	41.1	12882.5	16.5	Pass	57.6	575.440
dvga60fp21	460.0	41.1	12882.5	16.5	Pass	57.6	575.440
dvga60fp24	470.0	41.1	12882.5	16.5	Pass	57.6	575.440
dvga60fp26	491.0	41.1	12882.5	16.5	Pass	57.6	575.440
dvga60fp29	512.0	41.1	12882.5	16.5	Pass	57.6	575.440
Low power							
dvga36fp46	406.1	30.0	1000.0	16.5	Pass	46.5	44.668
dvga36fp43	418.0	30.0	1000.0	16.5	Pass	46.5	44.668
dvga36fp44	428.0	30.0	1000.0	16.5	Pass	46.5	44.668
dvga36fp51	450.0	30.0	1000.0	16.5	Pass	46.5	44.668
dvga36fp22	460.0	30.0	1000.0	16.5	Pass	46.5	44.668
dvga36fp24	470.0	30.0	1000.0	16.5	Pass	46.5	44.668
dvga36fp27	491.0	30.0	1000.0	16.5	Pass	46.5	44.668
dvga36fp29	512.0	30.0	1000.0	16.5	Pass	46.5	44.668

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:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

Run #2: Spectral Mask, FCC Part 90 Emission Mask c, d, e and FCC Part 22 Band edge

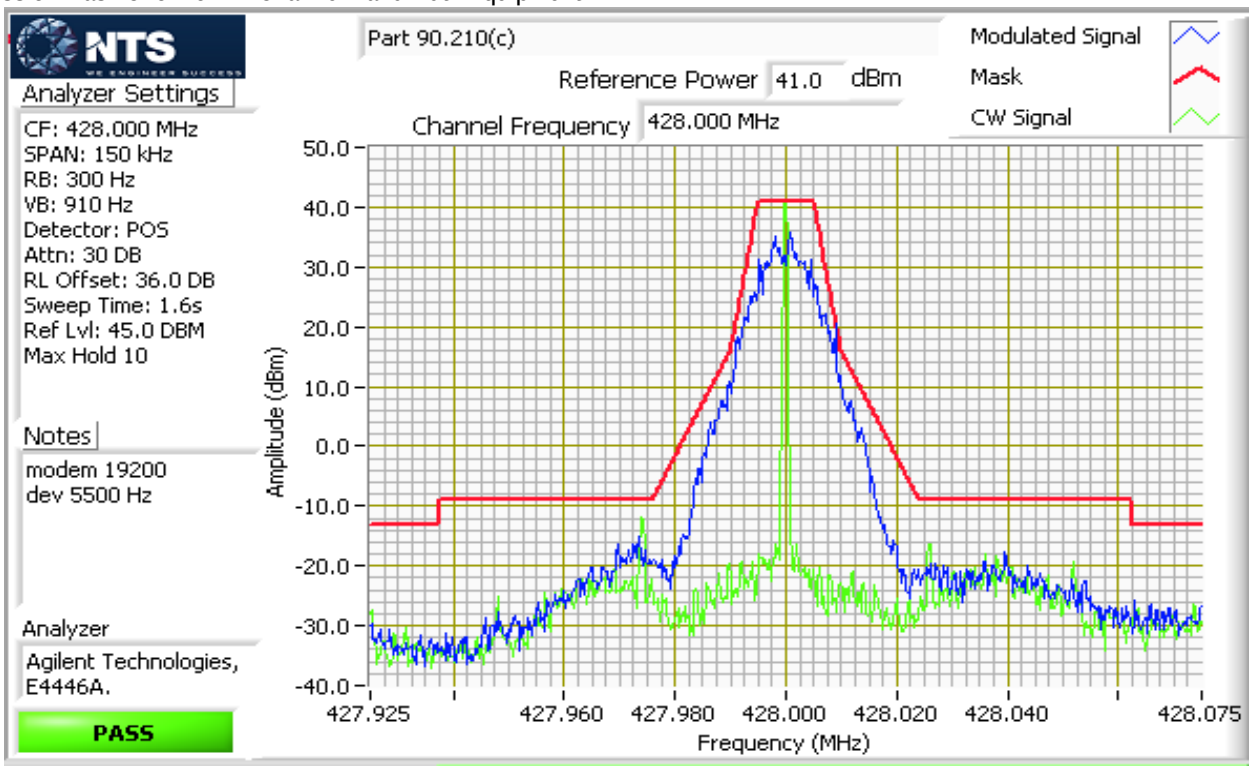
Date of Test: 18-May-15 Config. Used: 1

Test Engineer: Deniz Demirci Config Change: None

Test Location: FT Lab #4b EUT Voltage: 24 Vdc

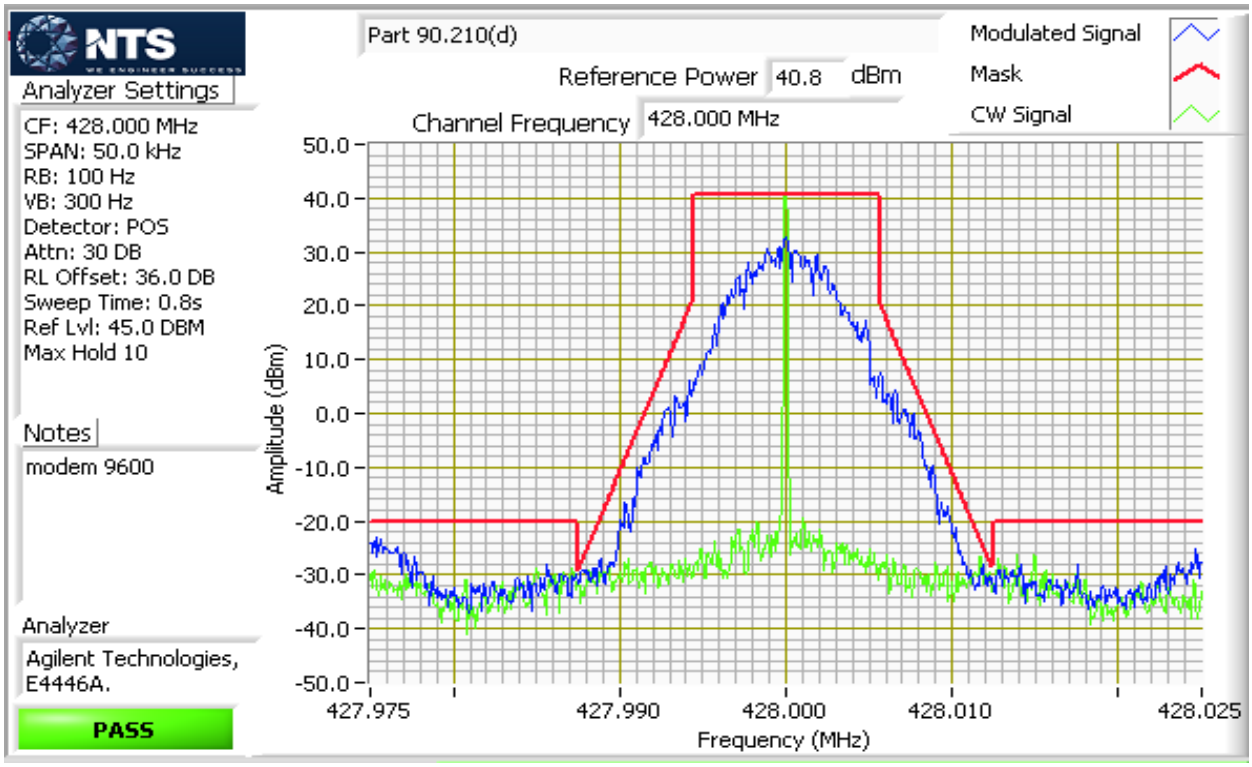
Note 1:	Un-modulated carrier signal level was used as e emission mask reference.

Emission Mask C for 25 kHz Channel Bandwidth Equipment



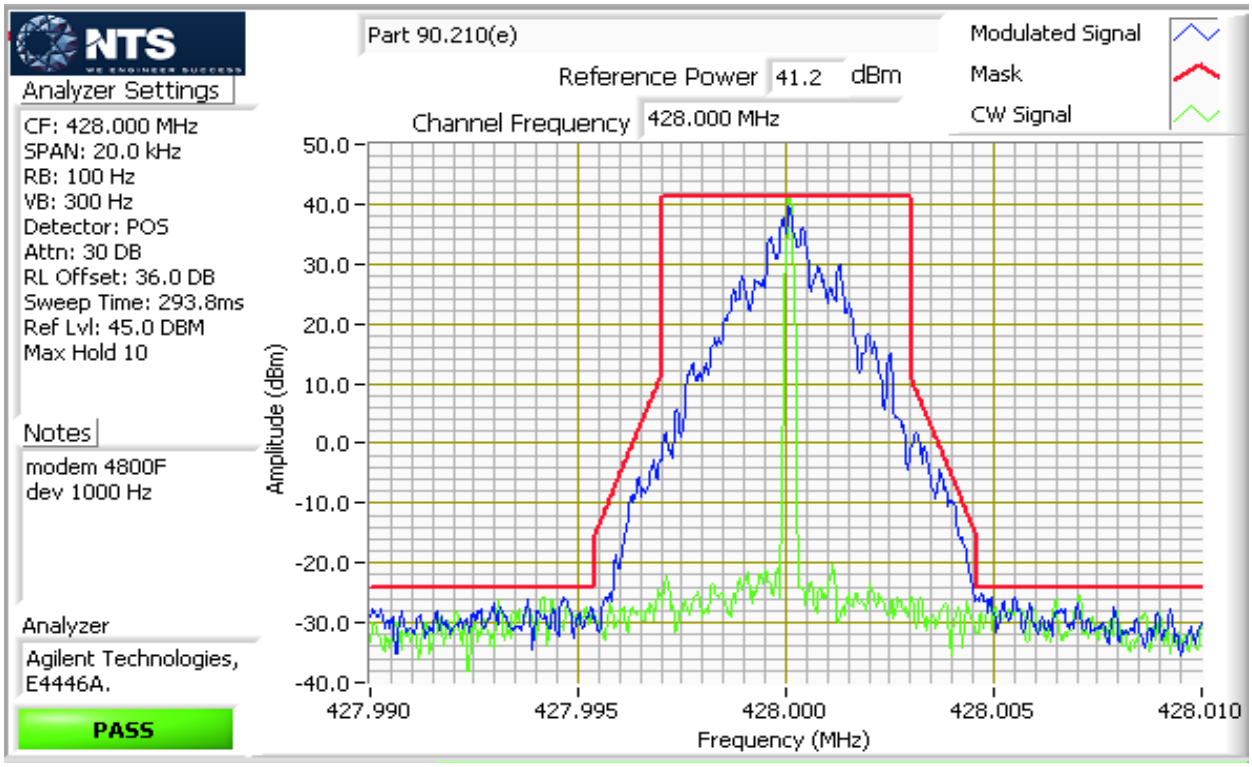
Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

Emission Mask D for 12.5 kHz Channel Bandwidth Equipment



Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

Emission Mask E for 6.25 kHz (or less) Channel Bandwidth Equipment



Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

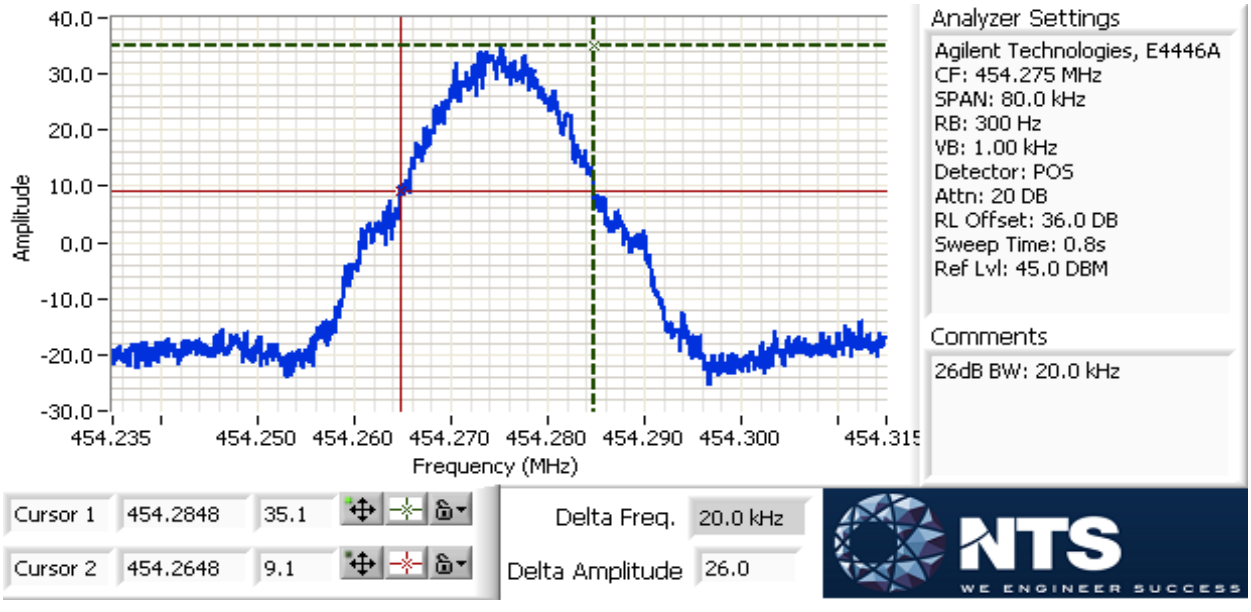
FCC Part 22 Band Edge

For Part 22, Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 30 kHz or more. In the 60 kHz bands immediately outside and adjacent to the authorized frequency range or channel, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.
A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e., 30 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

Bands : 454 MHz to 455 MHz, 456 MHz to 460 MHz and 470 MHz to 512 MHz

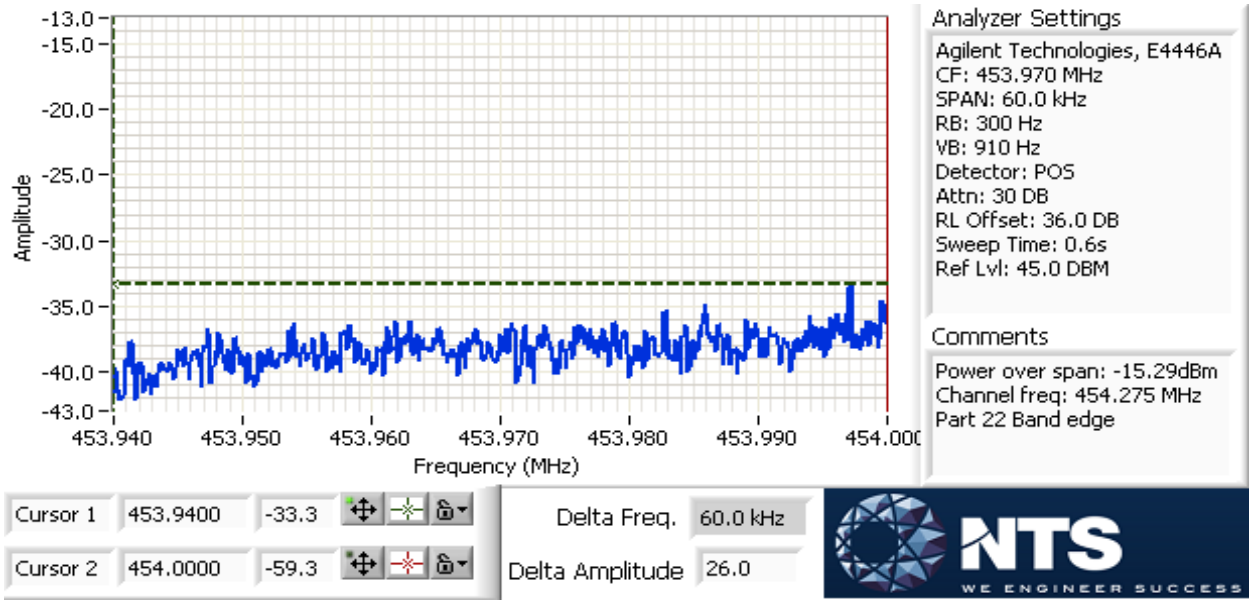
Channel frequency MHz		Ch. BW kHz	Band edge frequency (MHz)		Worst case spurious dBm	Limit (dBm)	Margin (dB)
Low	454.27500	25	Low	454.0000	-15.3	-13.0	-2.3
High	454.75000	25	High	455.0000	-13.3	-13.0	-0.3
Low	456.27500	25	Low	456.0000	-17.3	-13.0	-4.3
High	459.65000	25	High	460.0000	-22.0	-13.0	-9.0
Low	470.27500	25	Low	470.0000	-16.57	-13.0	-3.6
High	511.72500	25	High	512.0000	-16.45	-13.0	-3.5

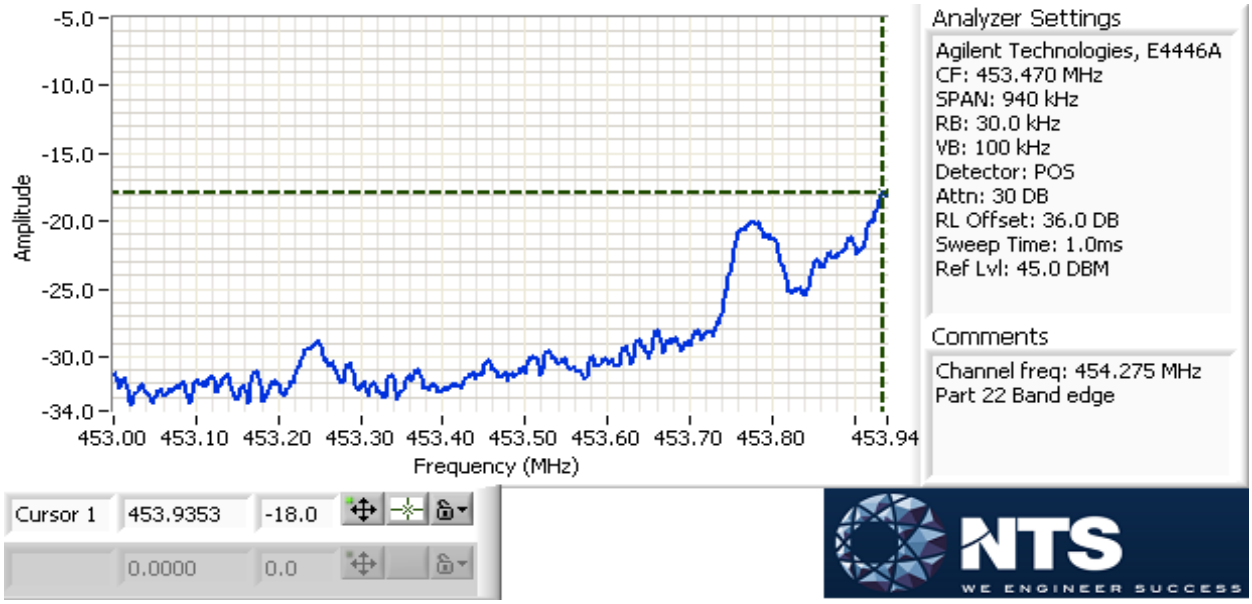
26 dB BW



Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

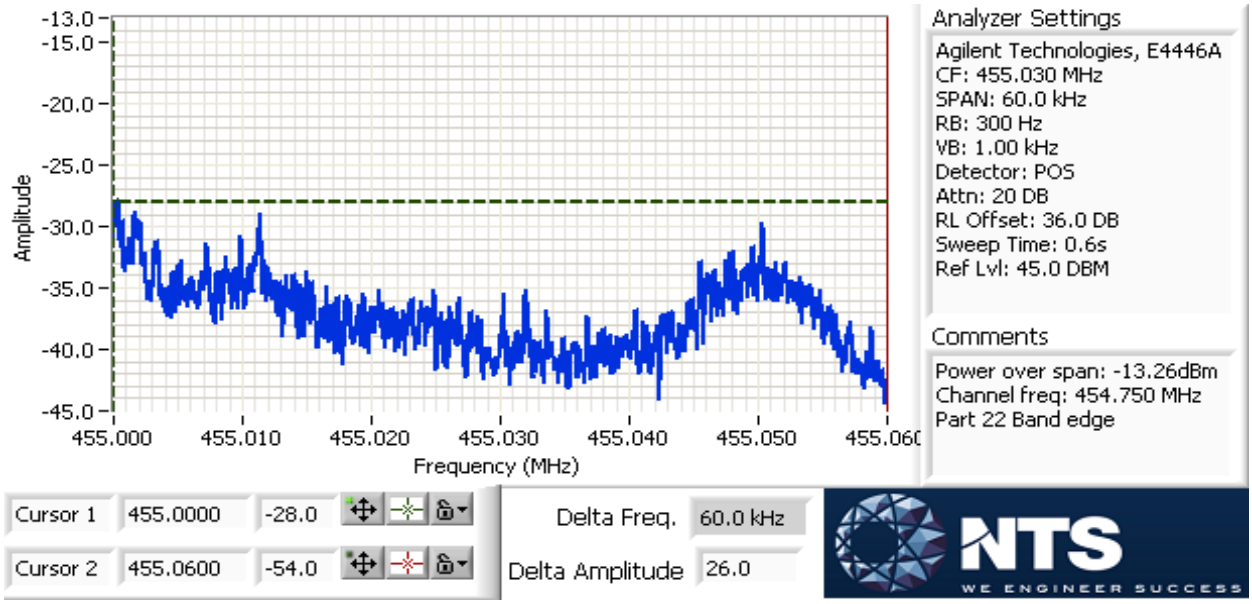
Channel frequency: 454.275 MHz (25 kHz BW), Band edge at 454.0 MHz

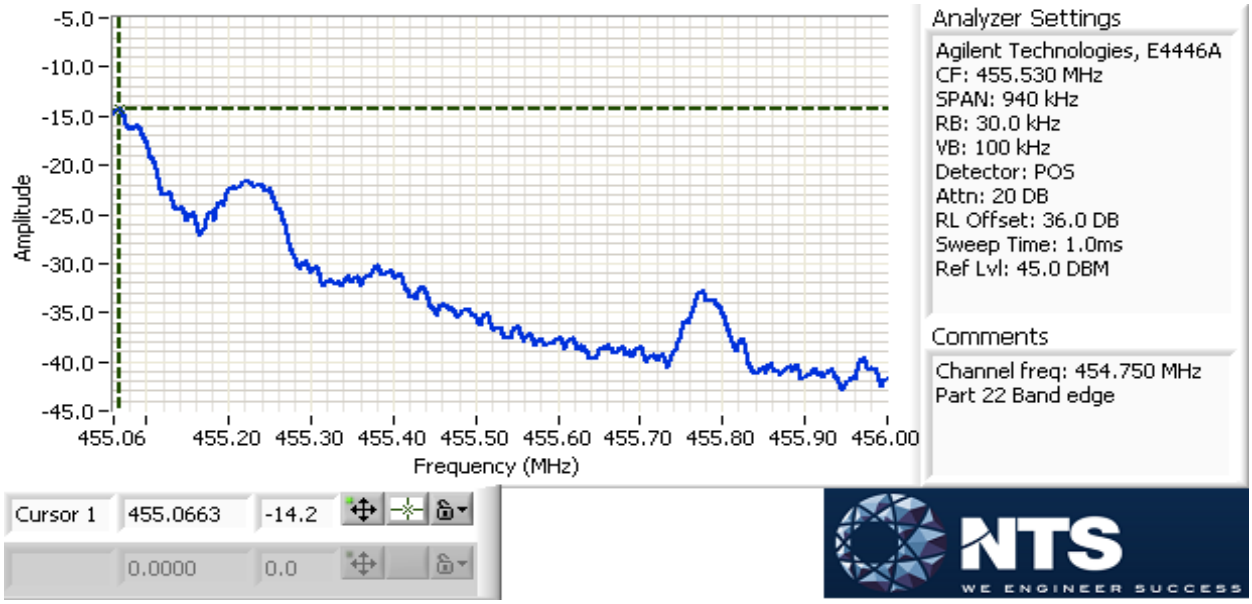




Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

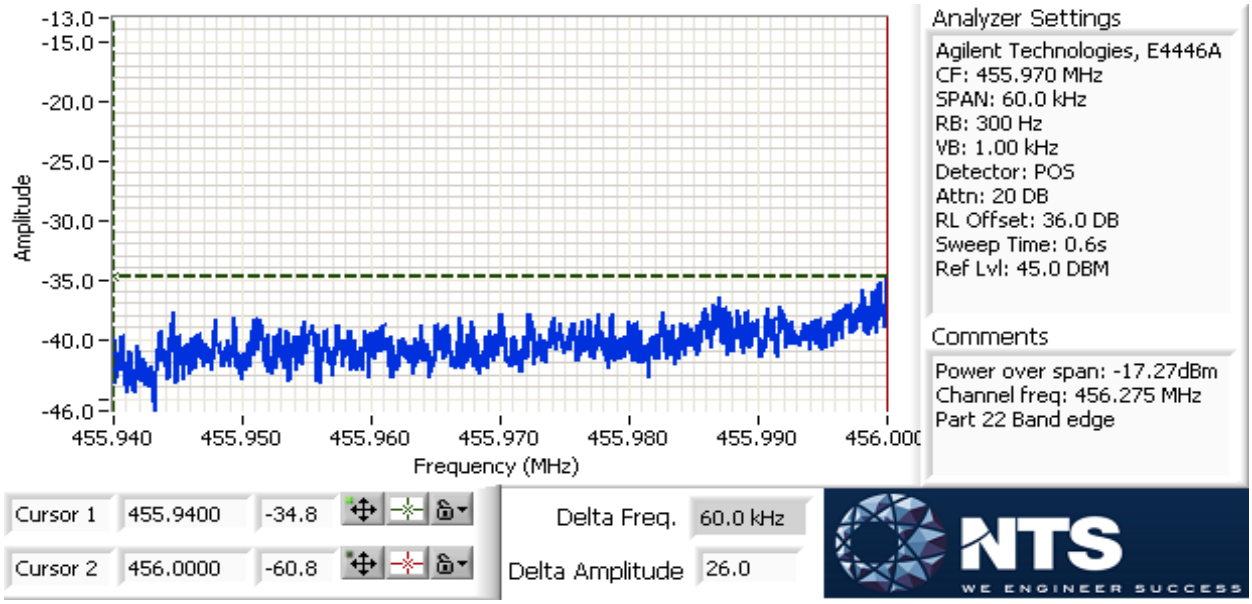
Channel frequency: 454.750 MHz (25 kHz BW), Band edge at 455.0 MHz

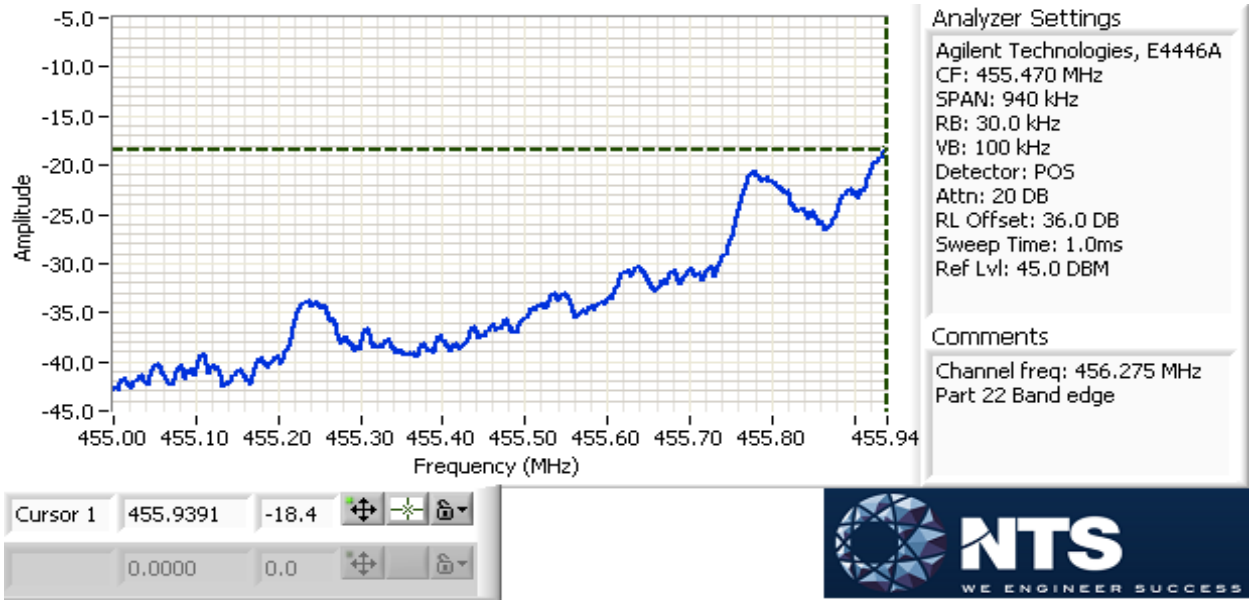




Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

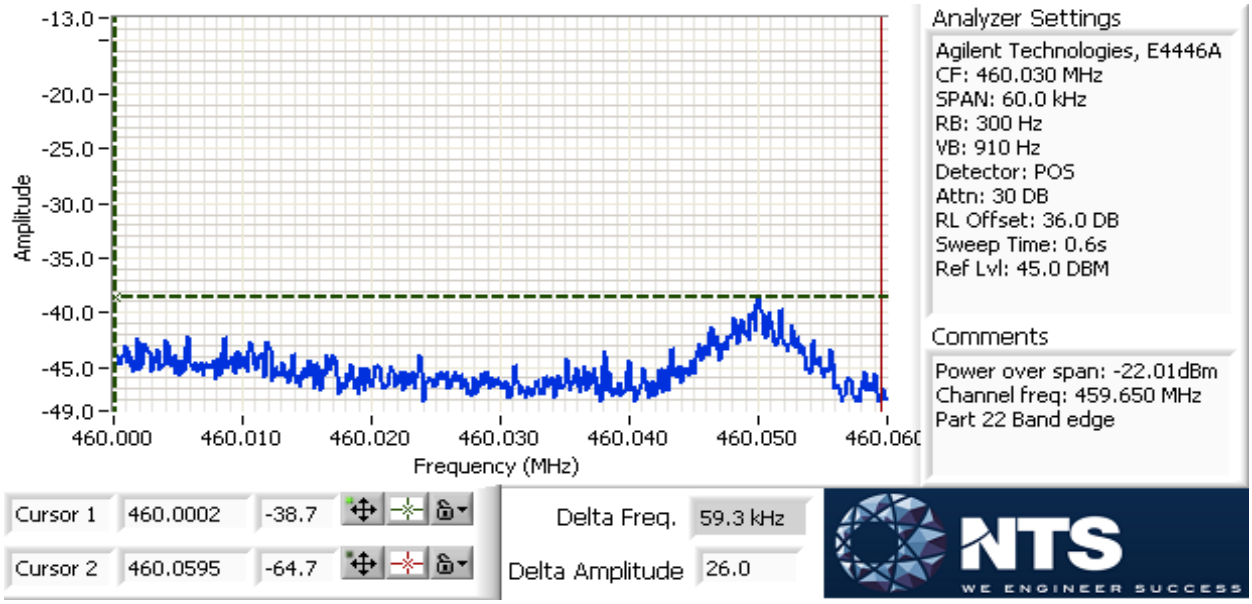
Channel frequency: 456.275 MHz (25 kHz BW), Band edge at 456.0 MHz

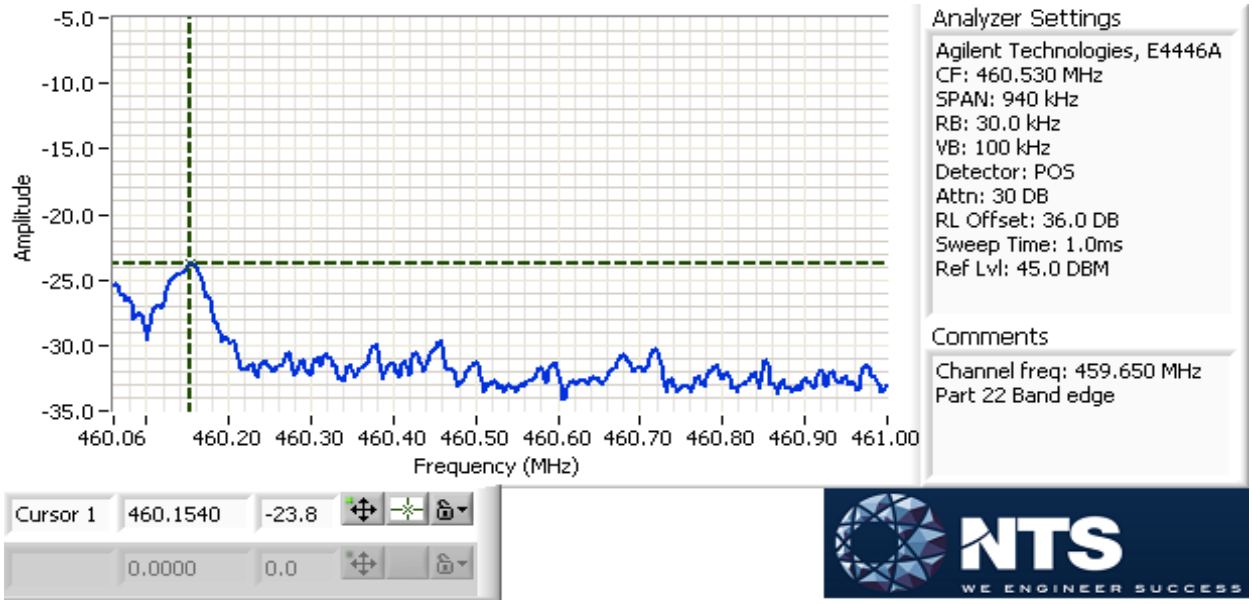




Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

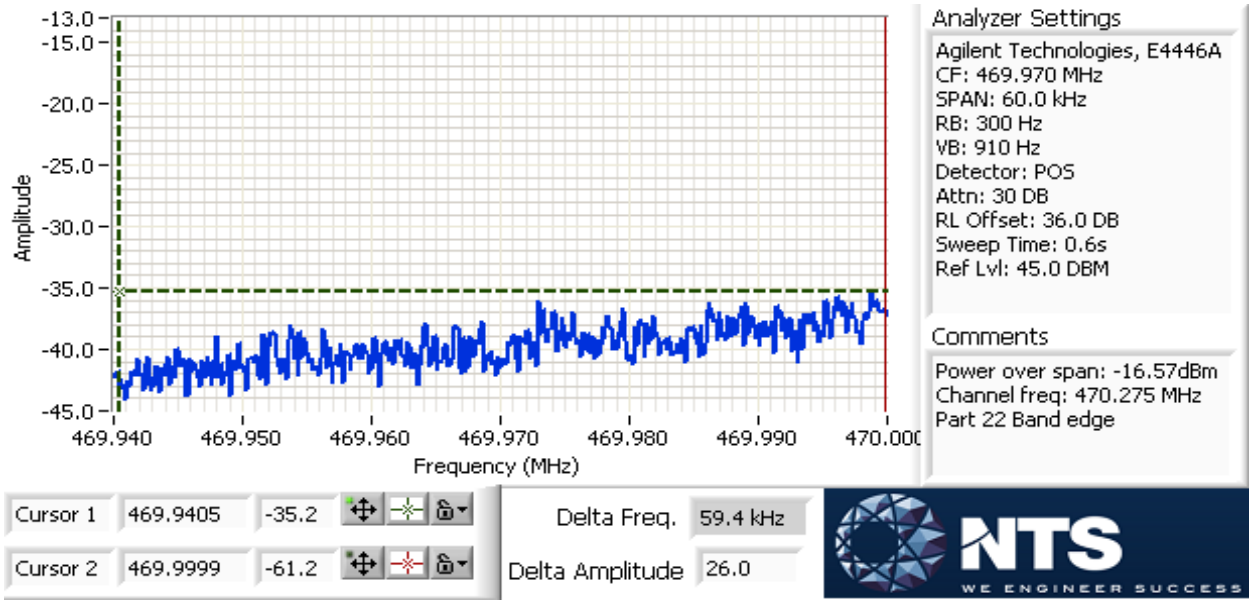
Channel frequency: 459.650 MHz (25 kHz BW), Band edge at 460 MHz

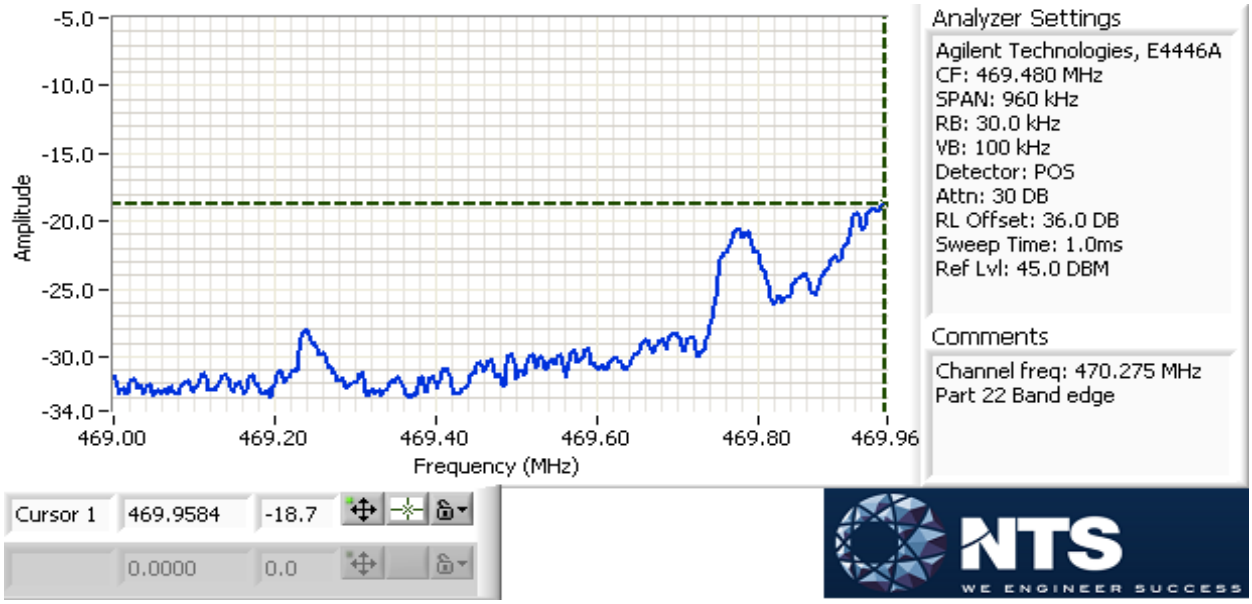




Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

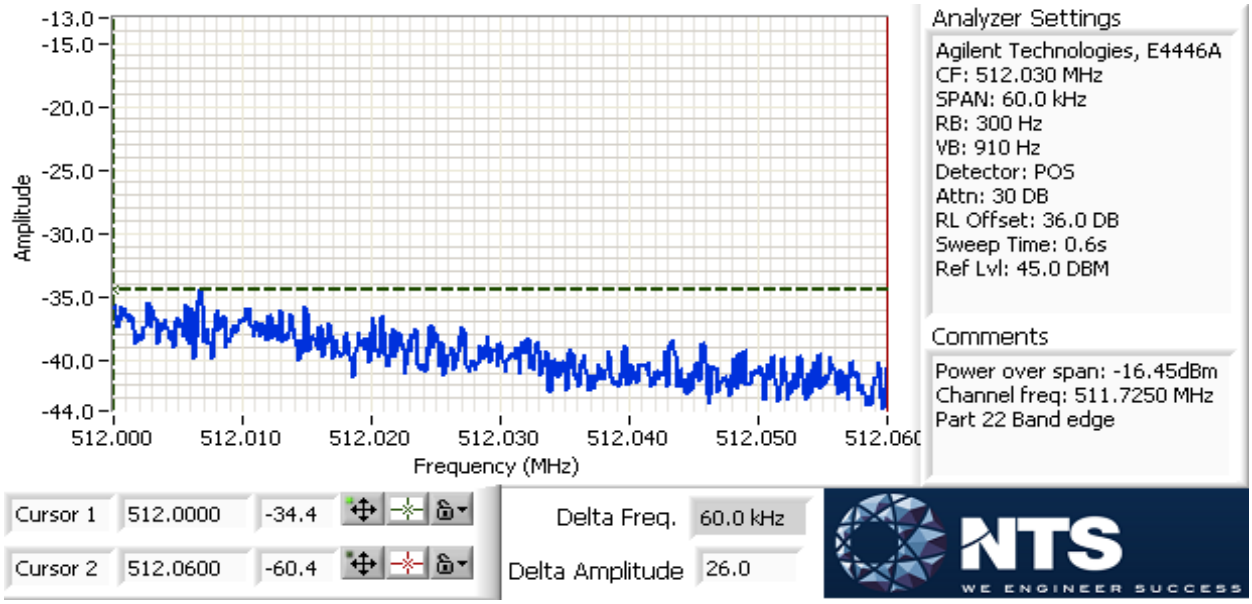
Channel frequency: 470.275 MHz (25 kHz BW), Band edge at 470 MHz

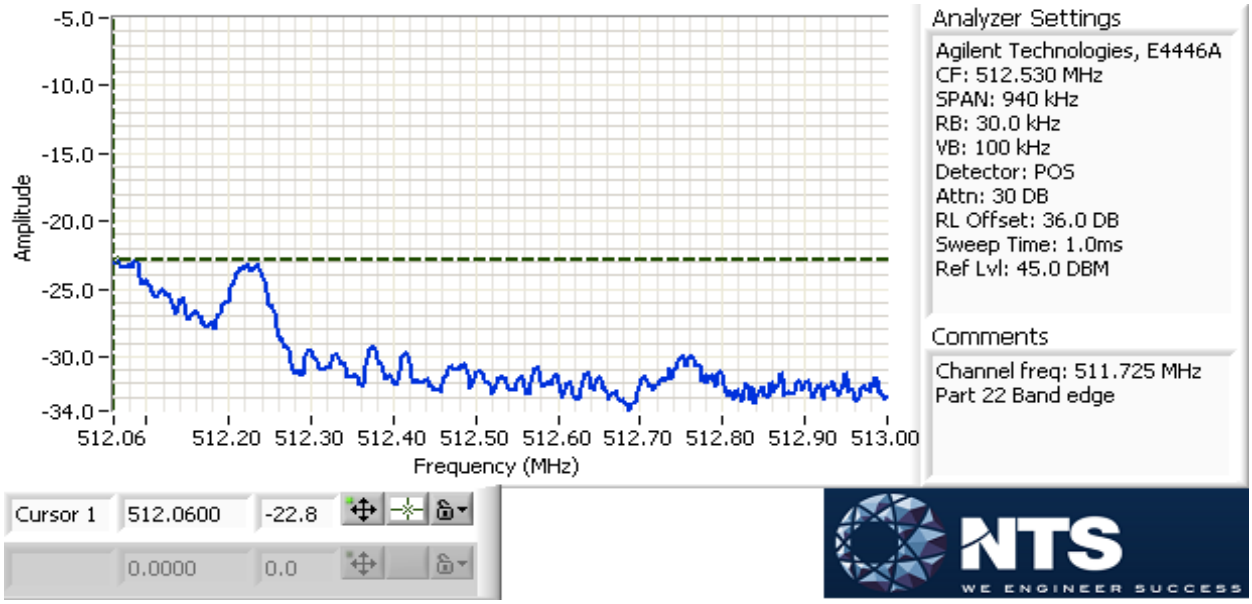




Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

Channel frequency: 511.7250 MHz (25 kHz BW), Band edge at 512 MHz





Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

Run #3: Signal Bandwidth

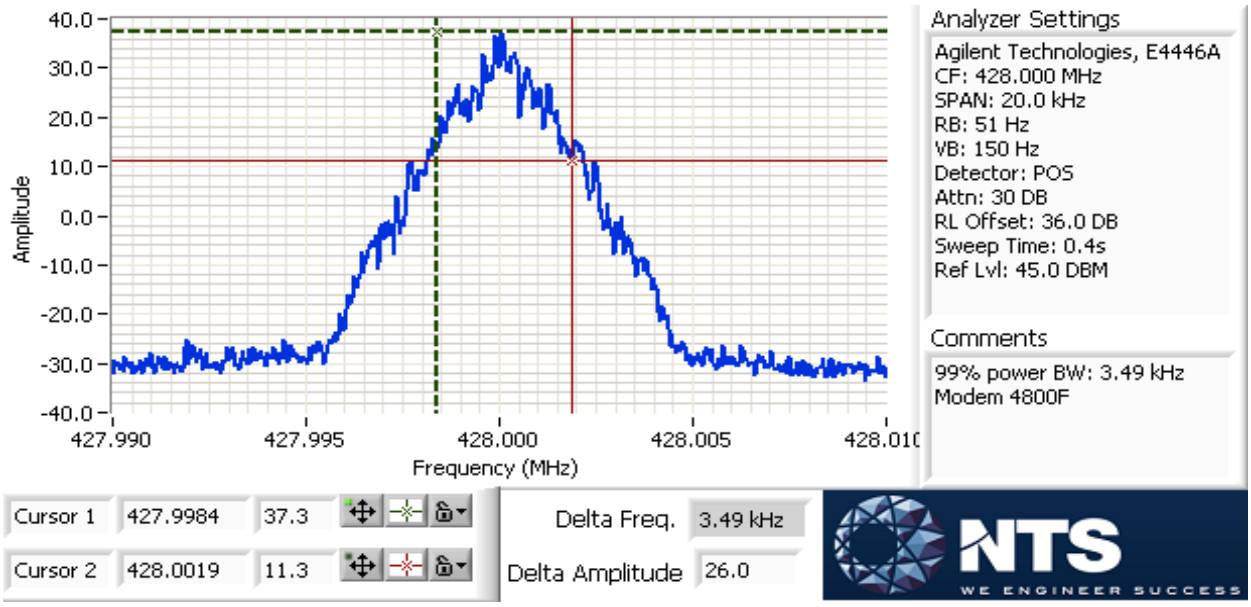
Date of Test: 18-May-15 Config. Used: 1

Test Engineer: Deniz Demirci Config Change: None

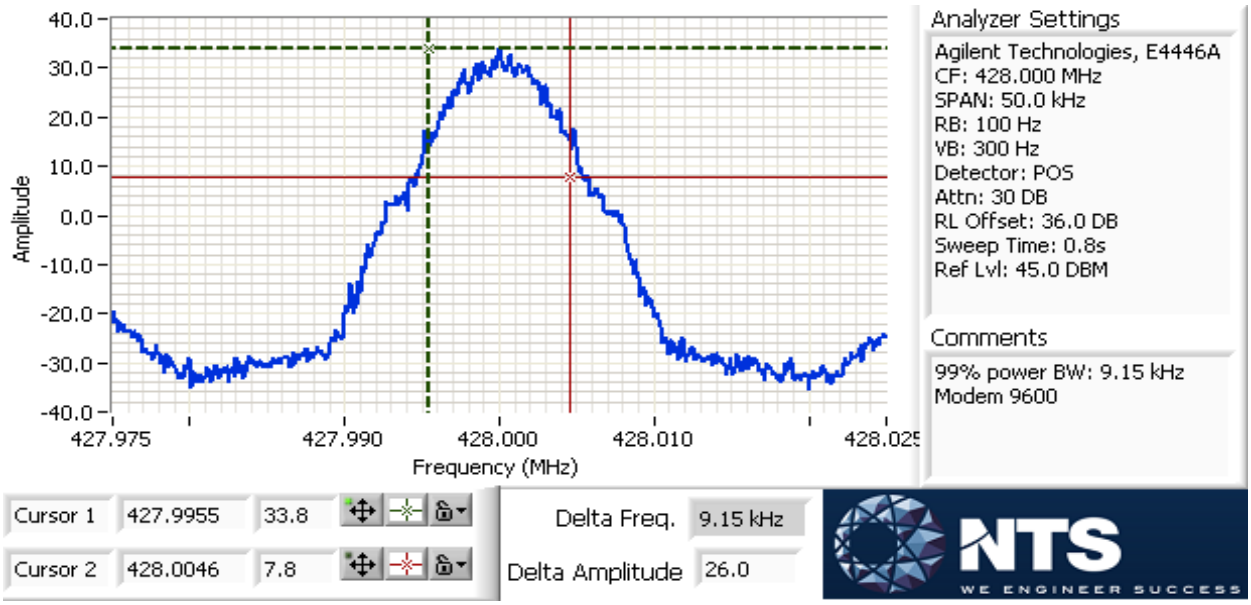
Test Location: FT Lab #4b EUT Voltage: 24 Vdc

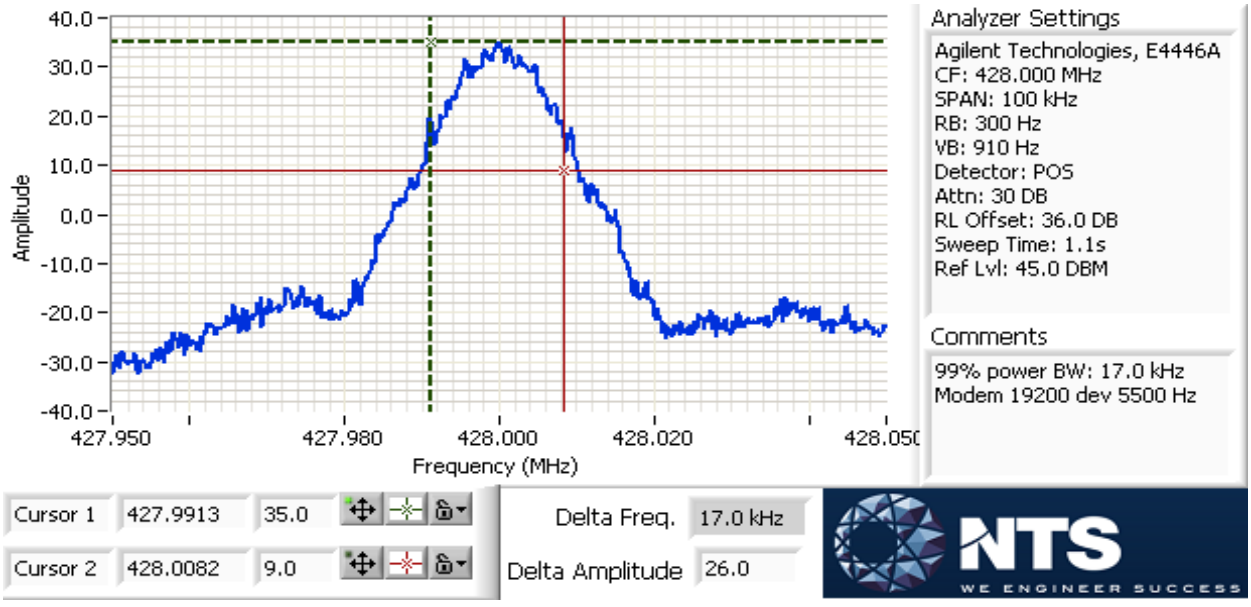
Power Setting	Frequency (MHz)	Modem	RB Hz	Bandwidth (MHz) 26dB	99%
dvga60fp63	428.000	4800F	51		3.49
dvga60fp63	428.000	9600	100		9.15
dvga60fp63	428.000	19200	300		17.0

Note 1:	99% bandwidth measured in accordance with RSS GEN, with RB > 1% of the span and VB > 3xRB



Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A





Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

Run #4: Out of Band Spurious Emissions, Conducted

Date of Test: 18-May-15 Config. Used: 1

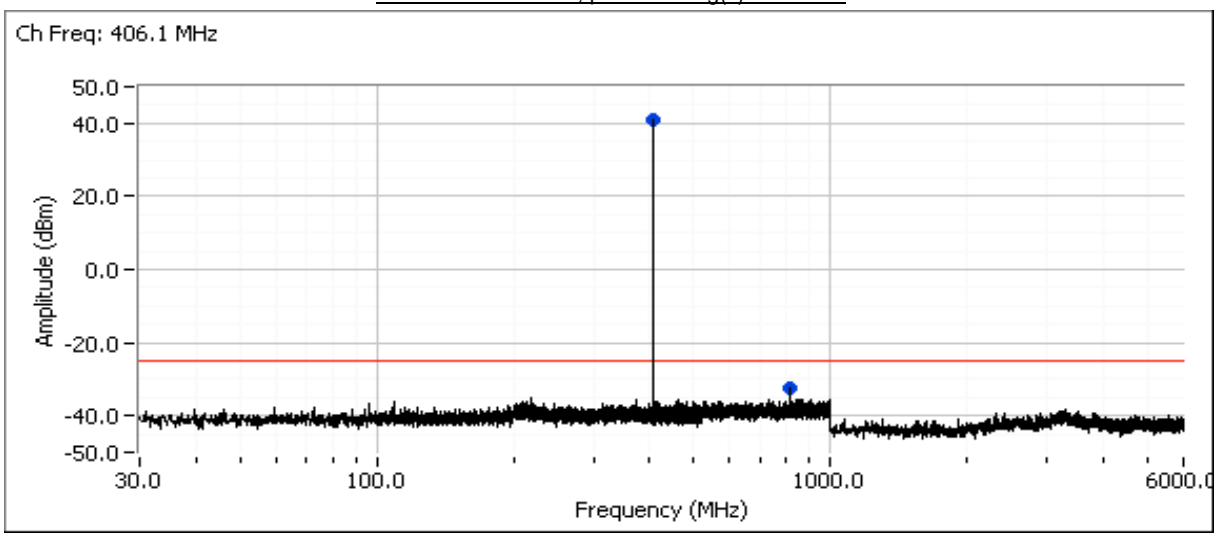
Test Engineer: Deniz Demirci Config Change: None

Test Location: FT Lab #4b EUT Voltage: 24 Vdc

Frequency	Level	Pol	FCC Part 90		Detector	Azimuth	Height	Comments	Channel
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters		
406.103	41.2	RF Port	-	-	Peak			406.1 MHz fundamental signal	
812.257	-32.3	RF Port	-25.0	-7.3	Peak			406.1 MHz	
418.008	41.0	RF Port	-	-	Peak			418 MHz fundamental signal	
835.945	-32.1	RF Port	-25.0	-7.1	Peak			418 MHz	
436.015	-33.3	RF Port	-25.0	-8.3	Peak			428 MHz	
428.002	41.2	RF Port	-	-	Peak			428 MHz fundamental signal	
855.952	-32.2	RF Port	-25.0	-7.2	Peak			428 MHz	
449.991	41.0	RF Port	-	-	Peak			450 MHz fundamental signal	
899.967	-32.4	RF Port	-25.0	-7.4	Peak			450 MHz	
459.995	40.9	RF Port	-	-	Peak			460 MHz fundamental signal	
469.999	40.9	RF Port	-	-	Peak			470 MHz fundamental signal	
458.975	-32.4	RF Port	-25.0	-7.4	Peak			491 MHz	
490.998	40.8	RF Port	-	-	Peak			491 MHz fundamental signal	
480.033	-34.3	RF Port	-25.0	-9.3	Peak			512 MHz	
511.997	41.2	RF Port	-	-	Peak			512 MHz fundamental signal	

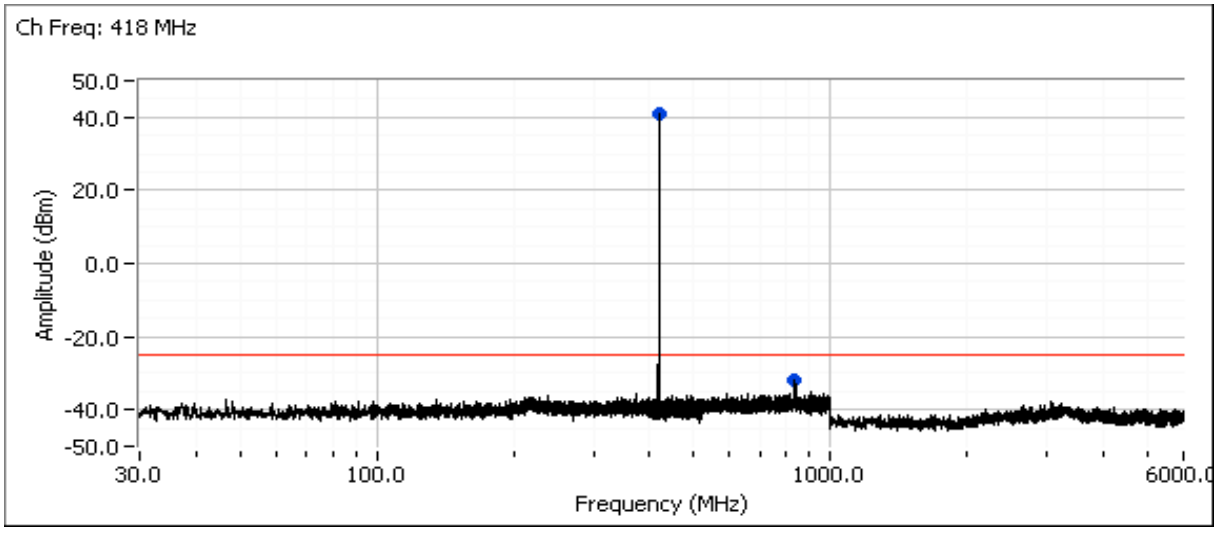
The limit is taken from FCC Part 90 Mask e

Plots for low channel, power setting(s) = 41 dBm

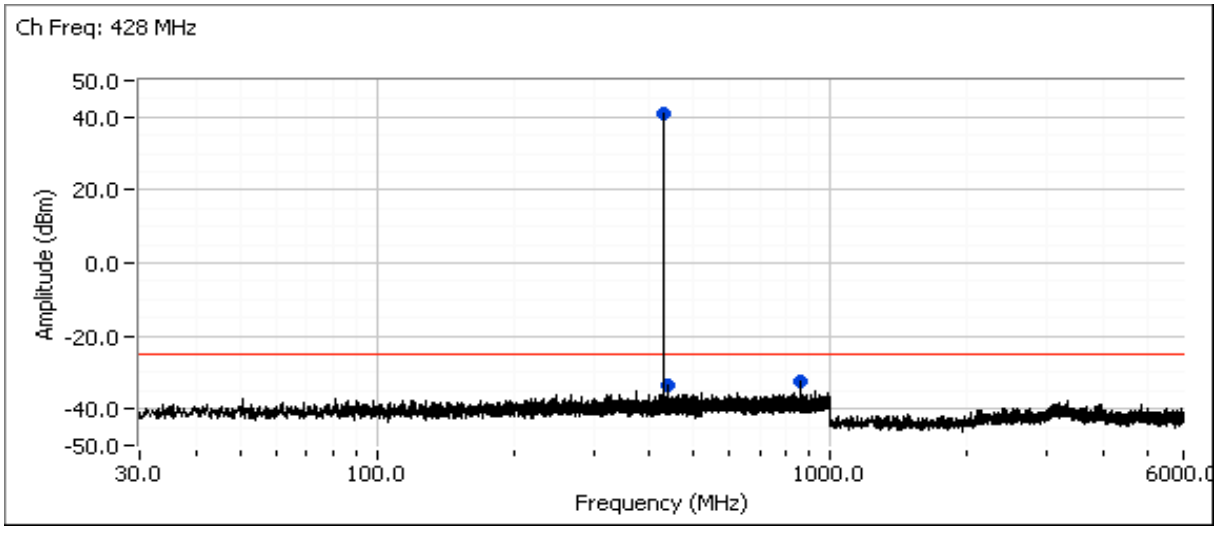


Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

Plots for center channel, power setting(s) = 41 dBm

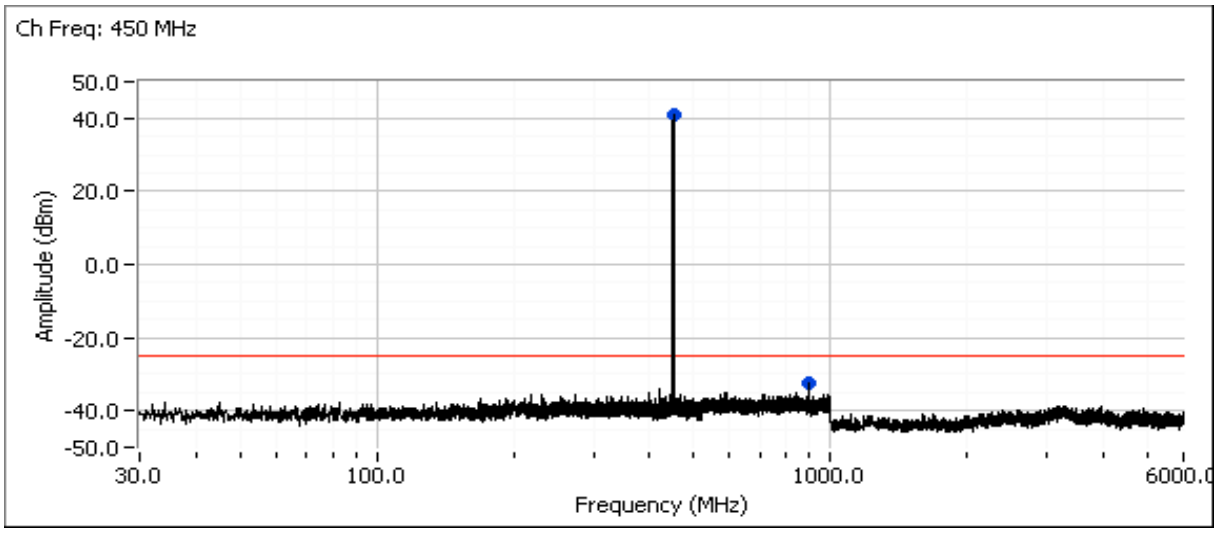


Plots for high channel, power setting(s) = 41 dBm

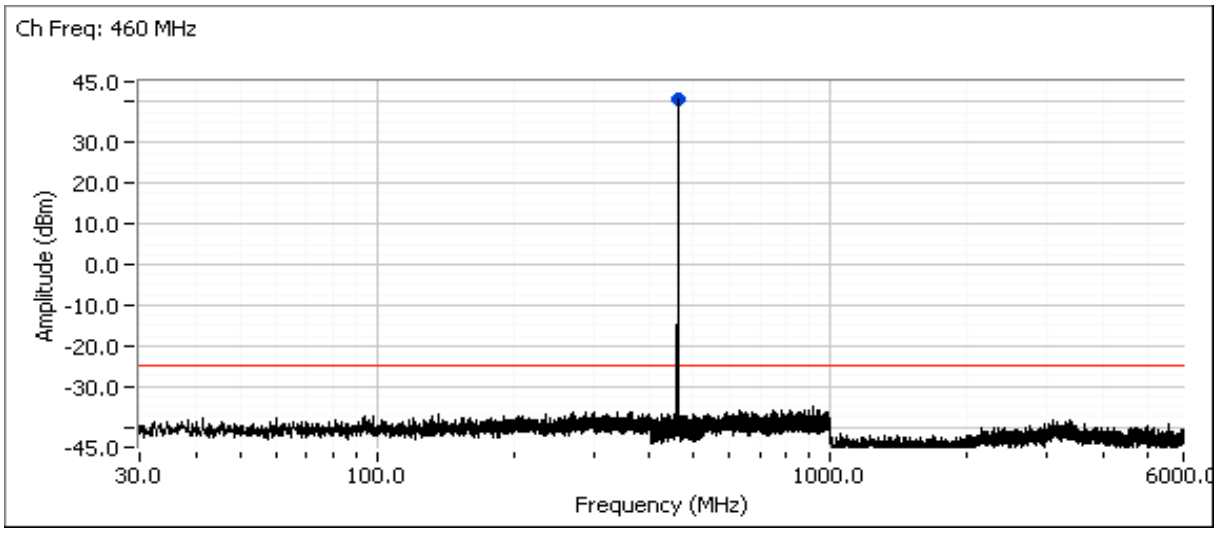


Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

Plots for low channel, power setting(s) = 41 dBm

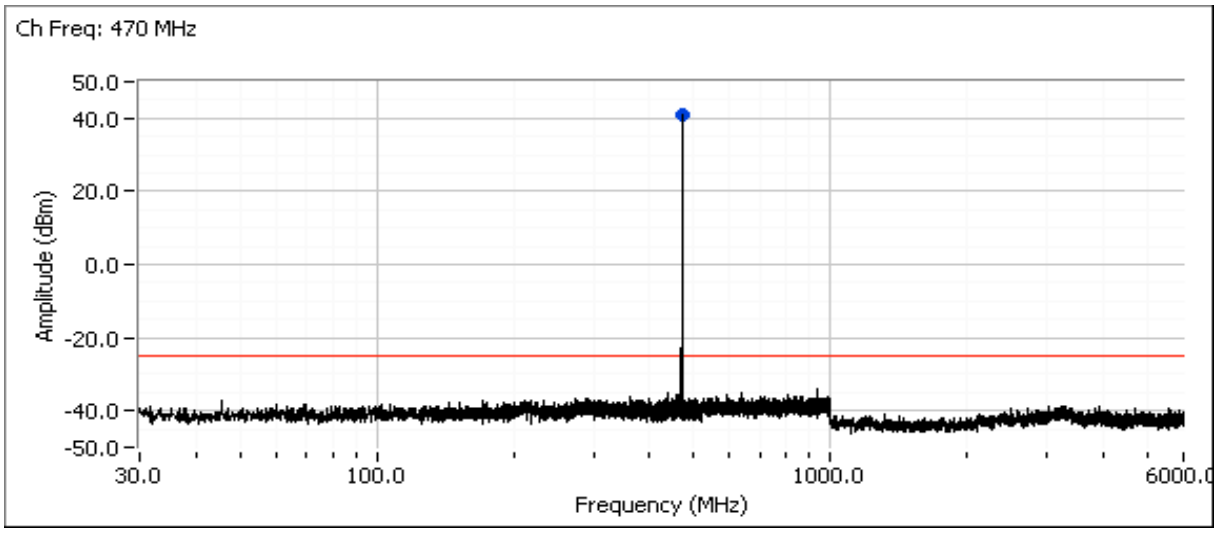


Plots for center channel, power setting(s) = 41 dBm

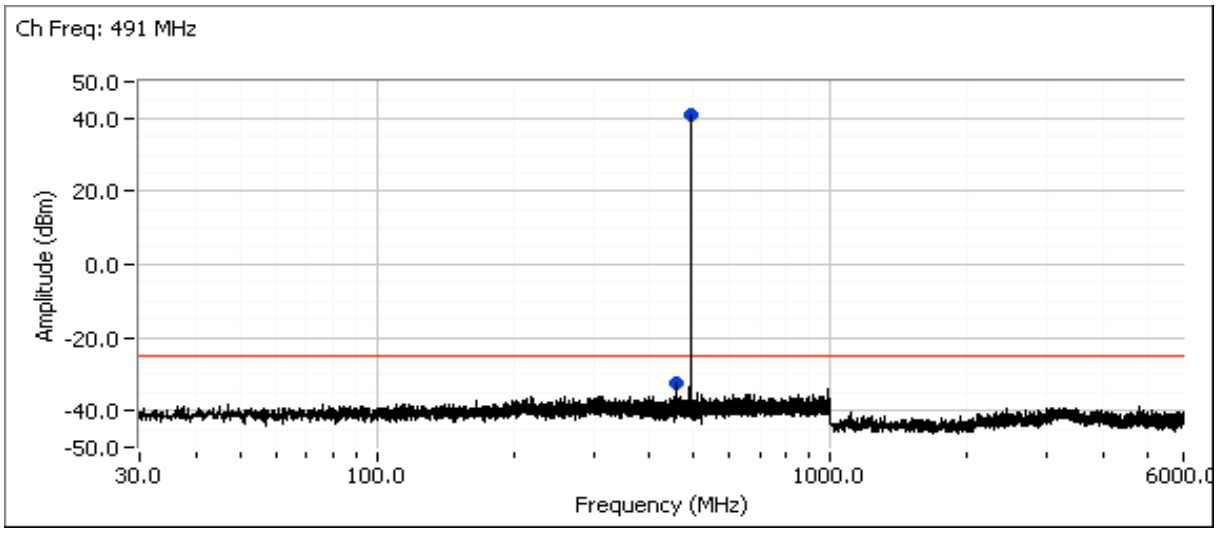


Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

Plots for center channel, power setting(s) = 41 dBm

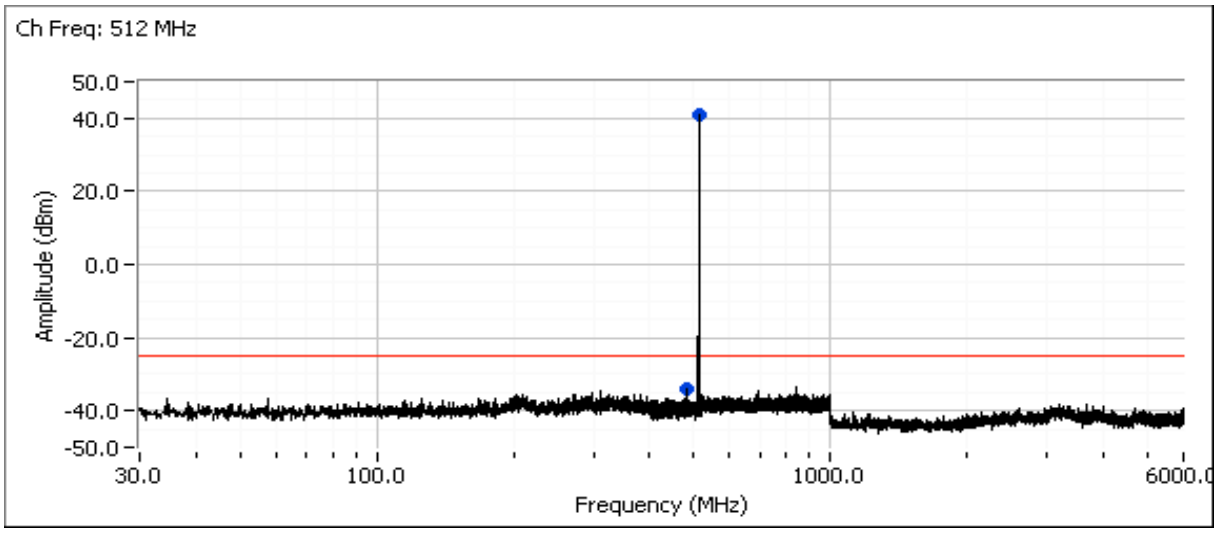


Plots for high channel, power setting(s) = 41 dBm



Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

Plots for high channel, power setting(s) = 41 dBm



Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

Run #5: Out of Band Spurious Emissions, Radiated

Conducted limit (dBm): -25
Approximate field strength limit @ 3m: 70.3
The limit is taken from FCC Part 90 Mask e

Run #5a - Preliminary measurements - 8 channels

Date of Test: 20-May-15 Config. Used: 1
Test Engineer: Deniz Demirci Config Change: None
Test Location: FT Ch #4 EUT Voltage: 24 Vdc

Frequency	Level	Pol	FCC Part 90		Detector	Azimuth	Height	Comments	Channel
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters		
406.114	*82.5*	*H*	-	-	*Peak*	*45*	*1.0*	*406.1 MHz carrier*	*406.1*
751.182	*47.5*	*H*	*70.2*	*-22.7*	*Peak*	*358*	*1.5*		*406.1*
813.387	*43.8*	*H*	*70.2*	*-26.4*	*Peak*	*71*	*1.0*		*406.1*
1216.670	*52.5*	*V*	*72.4*	*-19.9*	*Peak*	*54*	*1.0*		*406.1*
1500.000	*48.8*	*H*	*72.4*	*-23.6*	*Peak*	*130*	*1.0*		*406.1*
1625.000	*51.0*	*V*	*72.4*	*-21.4*	*Peak*	*54*	*1.0*		*406.1*
2575.000	*48.4*	*H*	*72.4*	*-24.0*	*Peak*	*301*	*2.0*		*406.1*
3608.330	*50.1*	*V*	*72.4*	*-22.3*	*Peak*	*254*	*2.0*		*406.1*
4125.000	*55.4*	*V*	*72.4*	*-17.0*	*Peak*	*198*	*1.5*		*406.1*
4641.670	*52.6*	*V*	*72.4*	*-19.8*	*Peak*	*263*	*1.0*		*406.1*
5666.670	*56.2*	*V*	*72.4*	*-16.2*	*Peak*	*254*	*2.0*		*406.1*
				0.0					
418.078	*82.5*	*H*	*70.2*	-	*Peak*	*46*	*1.0*	*418 MHz carrier*	*418*
751.182	*47.4*	*H*	*70.2*	*-22.8*	*Peak*	*218*	*1.0*		*418*
1500.000	*51.8*	*H*	*72.4*	*-20.6*	*Peak*	*112*	*1.0*		*418*
1666.670	*49.2*	*V*	*72.4*	*-23.2*	*Peak*	*12*	*1.5*		*418*
3691.670	*49.8*	*H*	*72.4*	*-22.6*	*Peak*	*263*	*1.0*		*418*
4216.670	*56.3*	*V*	*72.4*	*-16.1*	*Peak*	*210*	*2.0*		*418*
4750.000	*57.9*	*V*	*72.4*	*-14.5*	*Peak*	*143*	*1.5*		*418*
5800.000	*54.1*	*V*	*72.4*	*-18.3*	*Peak*	*258*	*1.0*		*418*
428.027	*85.1*	*H*	-	-	*Peak*	*49*	*1.0*	*428 MHz carrier*	*428*
751.182	*47.6*	*H*	*70.2*	*-22.6*	*Peak*	*227*	*2.0*		*428*
1500.000	*50.3*	*H*	*72.4*	*-22.1*	*Peak*	*114*	*1.0*		*428*
3758.330	*52.2*	*H*	*72.4*	*-20.2*	*Peak*	*246*	*1.0*		*428*
4300.000	*58.7*	*V*	*72.4*	*-13.7*	*Peak*	*151*	*1.0*		*428*
4833.330	*58.4*	*V*	*72.4*	*-14.0*	*Peak*	*151*	*1.5*		*428*
5375.000	*49.9*	*V*	*72.4*	*-22.5*	*Peak*	*250*	*1.5*		*428*
5908.330	*55.1*	*V*	*72.4*	*-17.3*	*Peak*	*250*	*1.5*		*428*

Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

Frequency	Level	Pol	FCC Part 90		Detector	Azimuth	Height	Comments	Channel
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters		
449.997	81.6	V	70.2	-	Peak	93	1.0	450 MHz carrier	450
751.182	47.7	H	70.2	-22.5	Peak	332	2.0		450
1800.000	54.8	V	72.4	-17.6	Peak	360	2.5		450
3358.330	53.5	V	72.4	-18.9	Peak	351	1.0		450
3916.670	52.0	V	72.4	-20.4	Peak	234	1.0		450
4475.000	64.4	V	72.4	-8.0	Peak	252	1.5		450
5033.330	55.7	V	72.4	-16.7	Peak	223	1.5		450
5591.670	50.9	V	72.4	-21.5	Peak	250	2.0		450
150.521	41.8	H	70.2	-28.4	Peak	42	2.0		460
459.999	76.3	V	-	-	Peak	90	1.0	460 MHz carrier	460
3150.000	50.9	V	72.4	-21.5	Peak	94	1.5		460
3416.670	51.5	V	72.4	-20.9	Peak	342	1.0		460
3983.330	51.7	V	72.4	-20.7	Peak	126	1.5		460
4558.330	62.5	V	72.4	-9.9	Peak	259	1.0		460
5125.000	55.2	V	72.4	-17.2	Peak	243	1.0		460
150.521	41.4	H	70.2	-28.8	Peak	20	2.0		470
470.063	76.8	V	-	-	Peak	93	1.0	470 MHz carrier	470
1050.000	49.5	V	72.4	-22.9	Peak	330	2.5		470
3150.000	51.5	V	72.4	-20.9	Peak	96	1.5		470
3475.000	50.0	V	72.4	-22.4	Peak	345	1.0		470
4058.330	52.5	H	72.4	-19.9	Peak	310	1.5		470
4633.330	60.3	V	72.4	-12.1	Peak	262	1.0		470
5216.670	55.2	V	72.4	-17.2	Peak	251	1.0		470
5641.670	56.0	H	72.4	-16.4	Peak	299	1.0		470
150.521	42.0	H	70.2	-28.2	Peak	23	2.0		491
490.991	79.3	H	-	-	Peak	53	2.0	491 MHz carrier	491
1800.000	49.5	V	72.4	-22.9	Peak	37	2.0		491
3141.670	50.0	V	72.4	-22.4	Peak	94	1.5		491
4200.000	54.0	V	72.4	-18.4	Peak	333	1.0		491
4808.330	60.0	V	72.4	-12.4	Peak	127	1.5		491
5408.330	54.5	V	72.4	-17.9	Peak	245	1.5		491

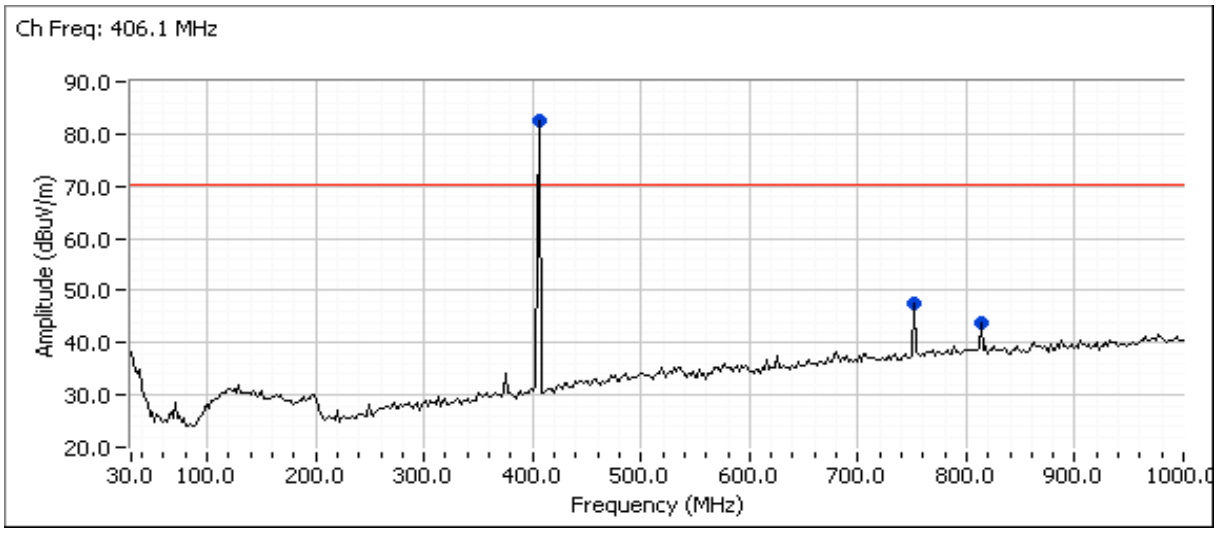
Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

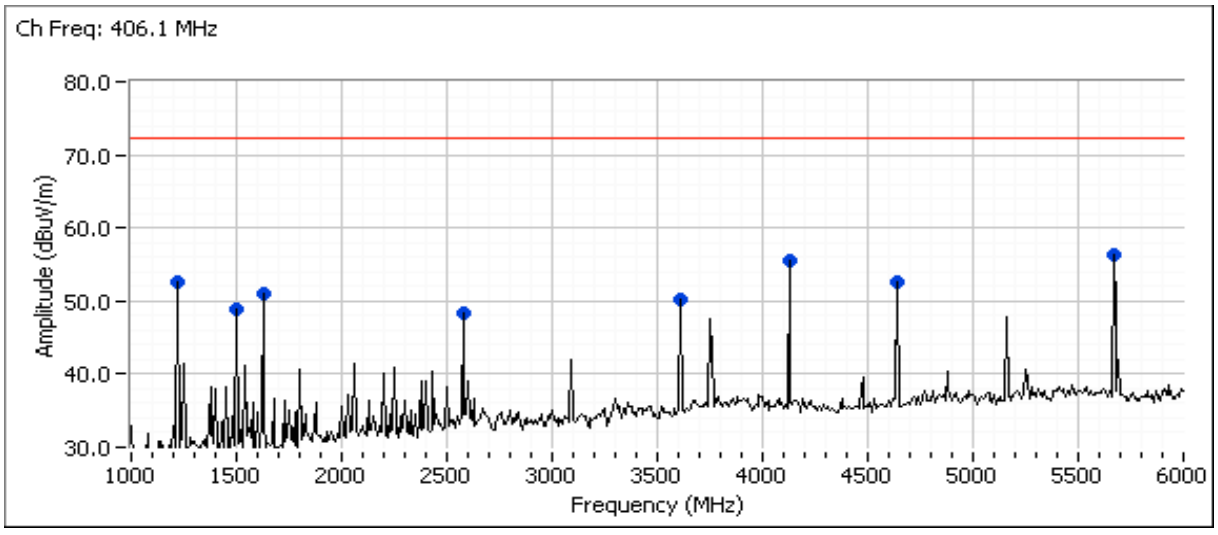
Frequency	Level	Pol	FCC Part 90		Detector	Azimuth	Height	Comments	Channel
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters		
150.521	*41.4*	*H*	*70.2*	*-28.8*	*Peak*	*23*	*2.0*		*512*
512.084	*79.0*	*H*	*70.2*	*-*	*Peak*	*162*	*2.0*	*512 MHz carrier*	*512*
1047.810	*49.3*	*V*	*72.4*	*-23.1*	*Peak*	*320*	*1.0*		*512*
1862.940	*53.7*	*V*	*72.4*	*-18.7*	*Peak*	*36*	*1.0*		*512*
3105.050	*52.9*	*V*	*72.4*	*-19.5*	*Peak*	*258*	*1.0*		*512*
3142.940	*52.0*	*V*	*72.4*	*-20.4*	*Peak*	*123*	*1.0*		*512*
3726.050	*54.9*	*V*	*72.4*	*-17.5*	*Peak*	*227*	*1.4*		*512*
4346.970	*55.9*	*V*	*72.4*	*-16.5*	*Peak*	*201*	*1.6*		*512*
4968.010	*61.1*	*V*	*72.4*	*-11.3*	*Peak*	*142*	*1.0*		*512*
5589.060	*60.5*	*V*	*72.4*	*-11.9*	*Peak*	*255*	*1.1*		*512*
5631.940	*60.6*	*H*	*72.4*	*-11.8*	*Peak*	*300*	*1.0*		*512*

Note 2: Measurements are made with the antenna port terminated.

Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

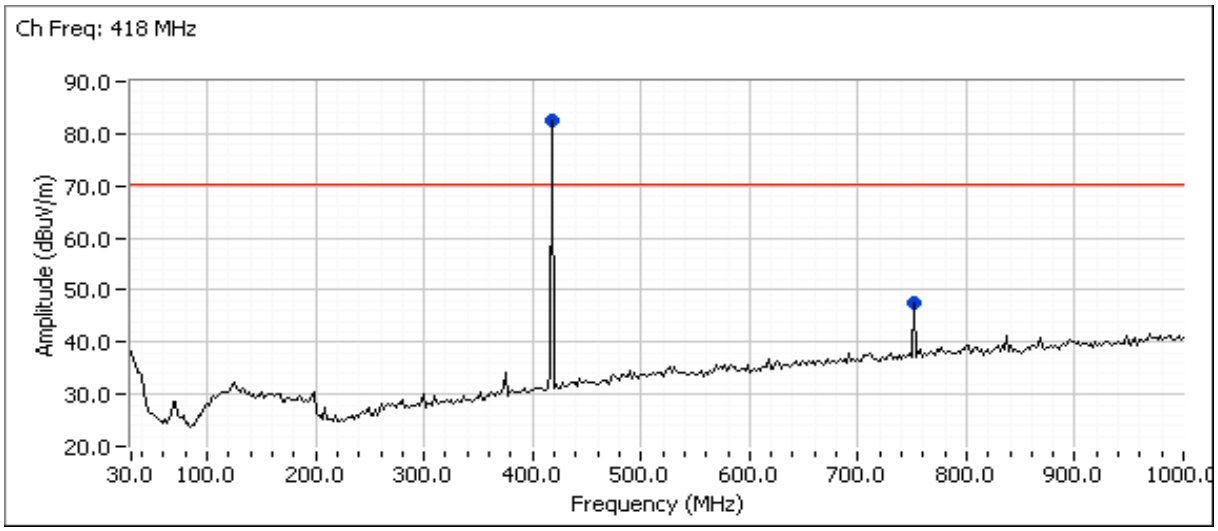
Plots for low channel, power setting(s) = 41 dBm

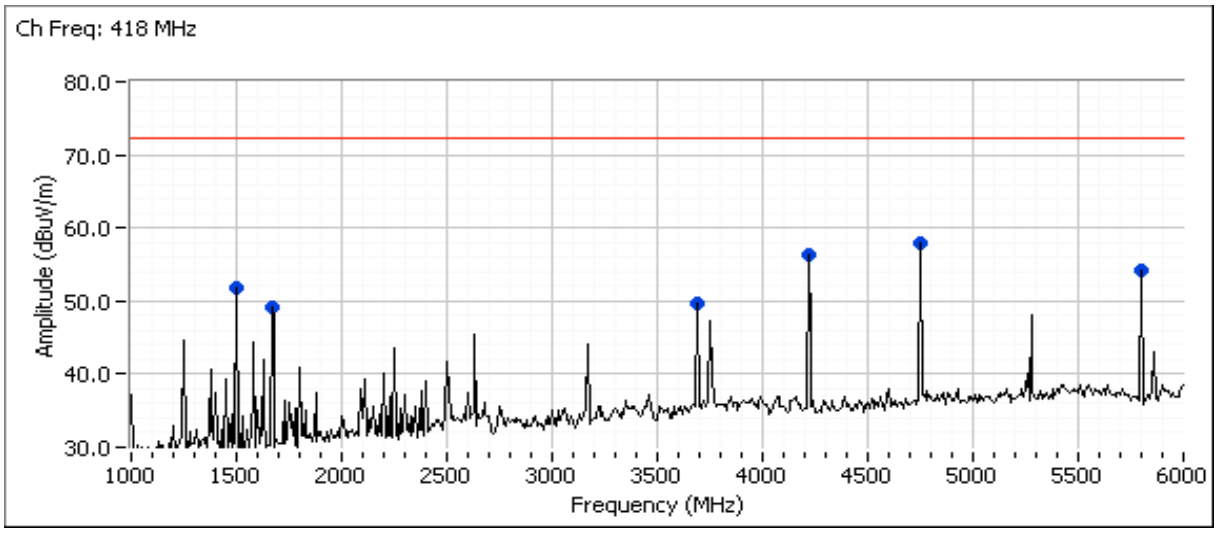




Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

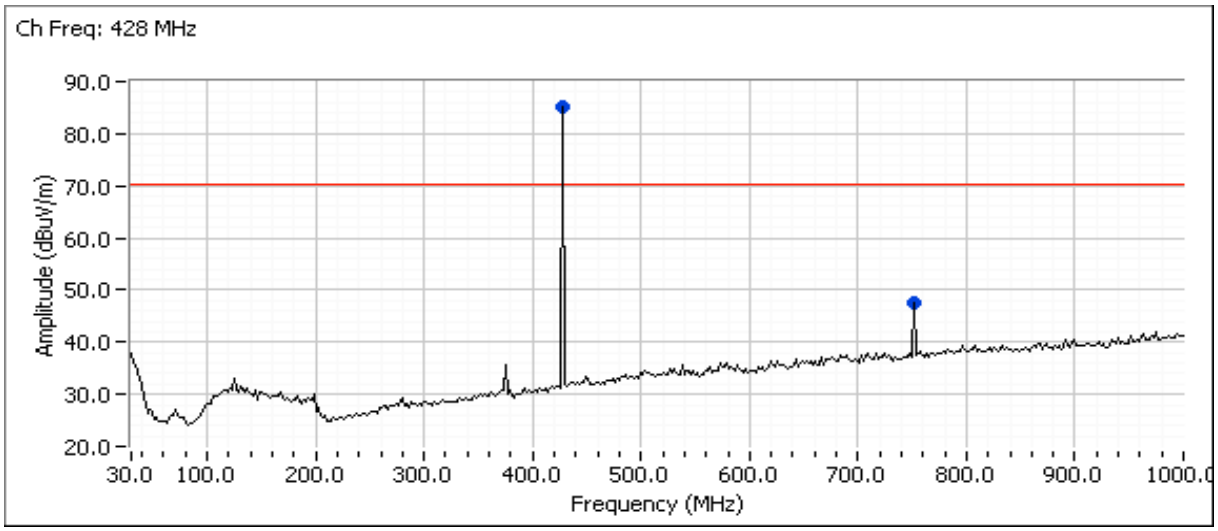
Plots for center channel, power setting(s) = 41 dBm

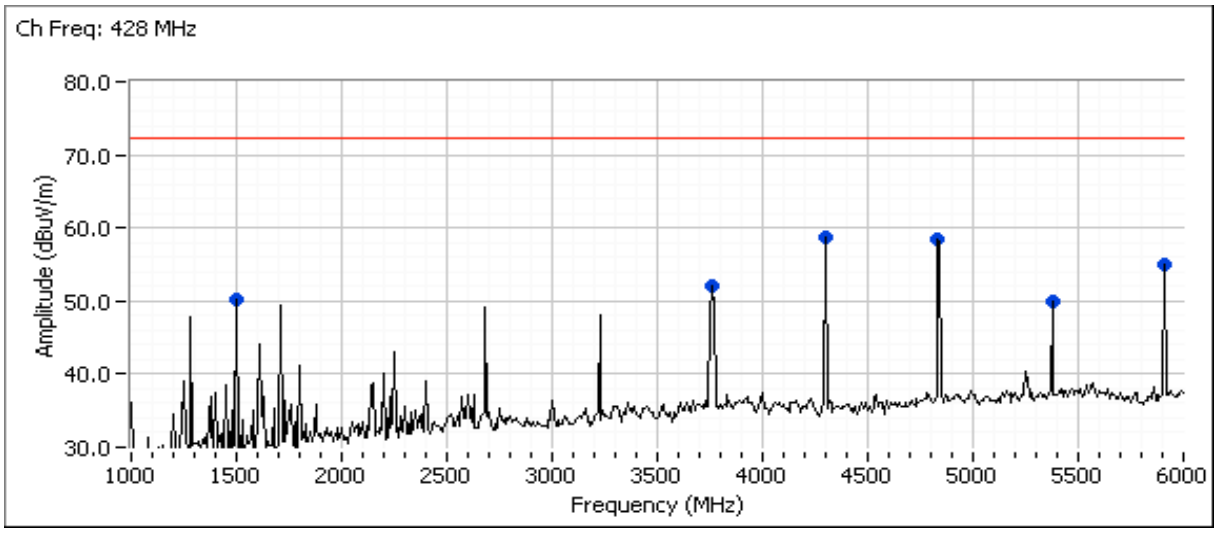




Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

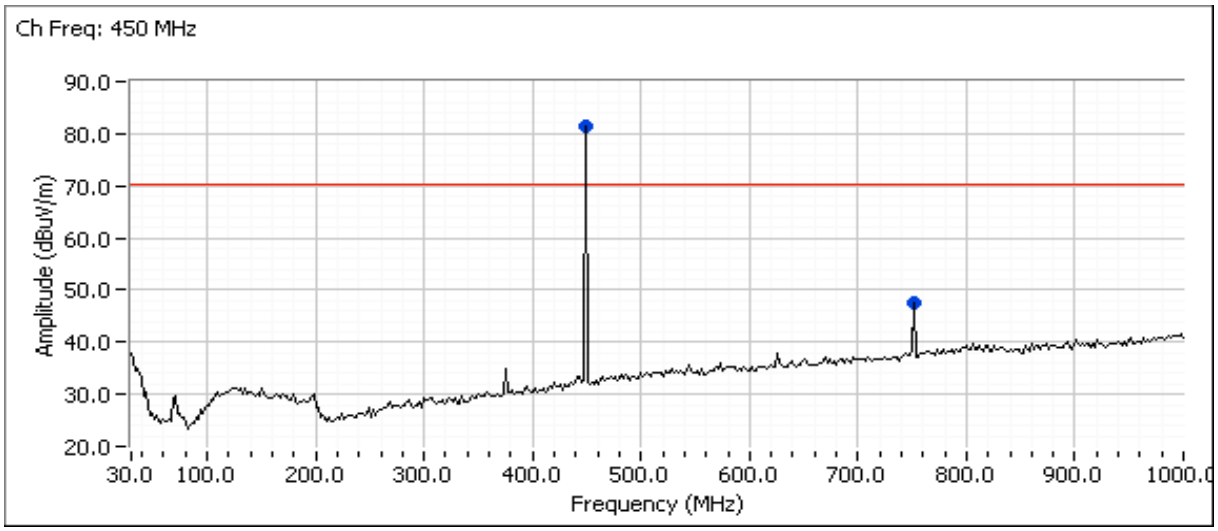
Plots for high channel, power setting(s) = 41 dBm

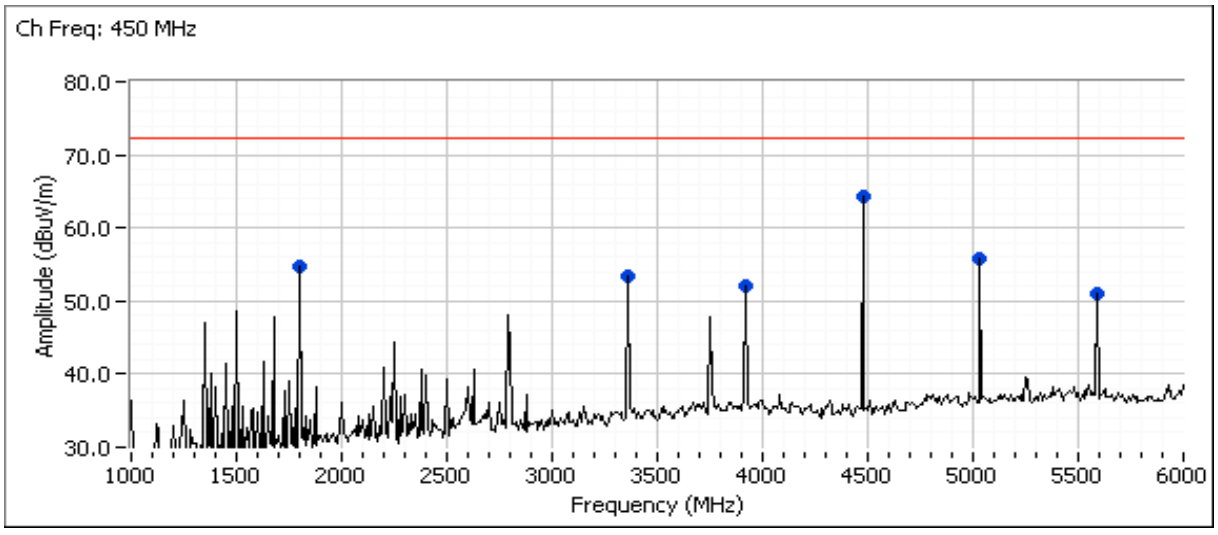




Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

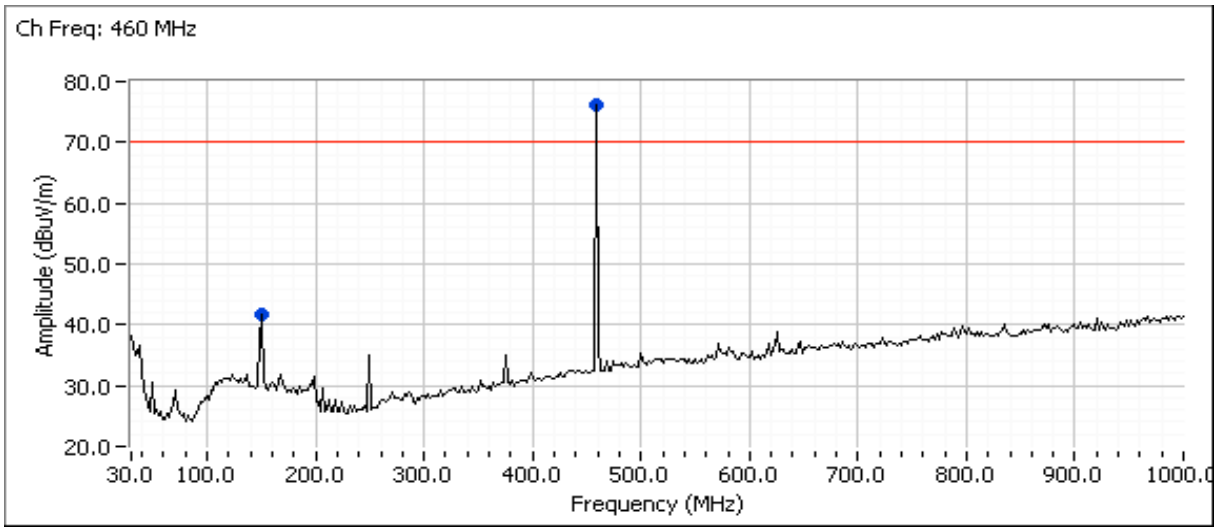
Plots for low channel, power setting(s) = 41 dBm

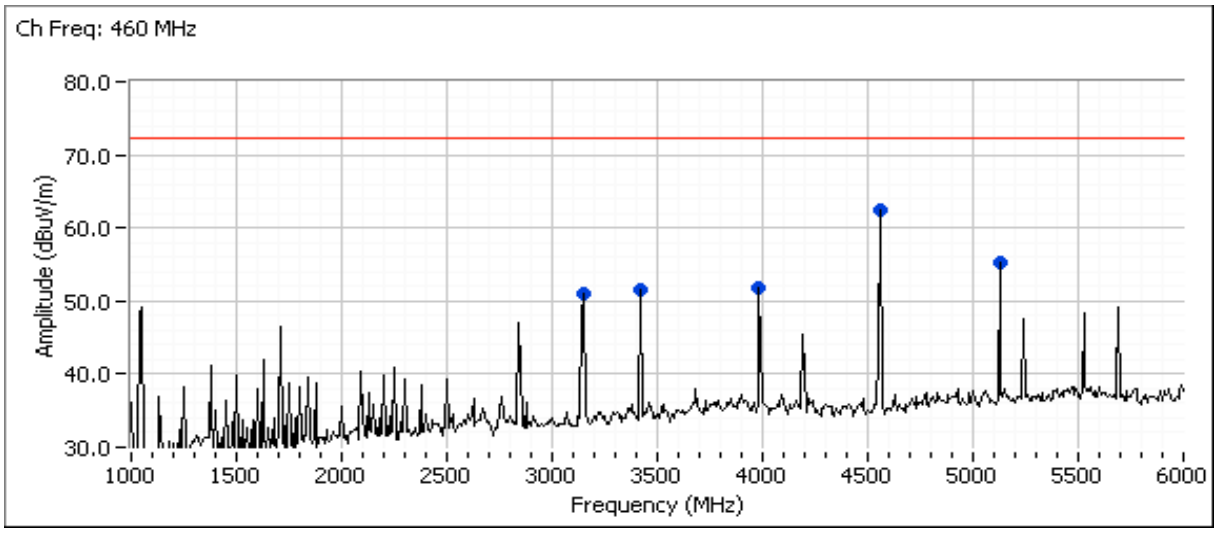




Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

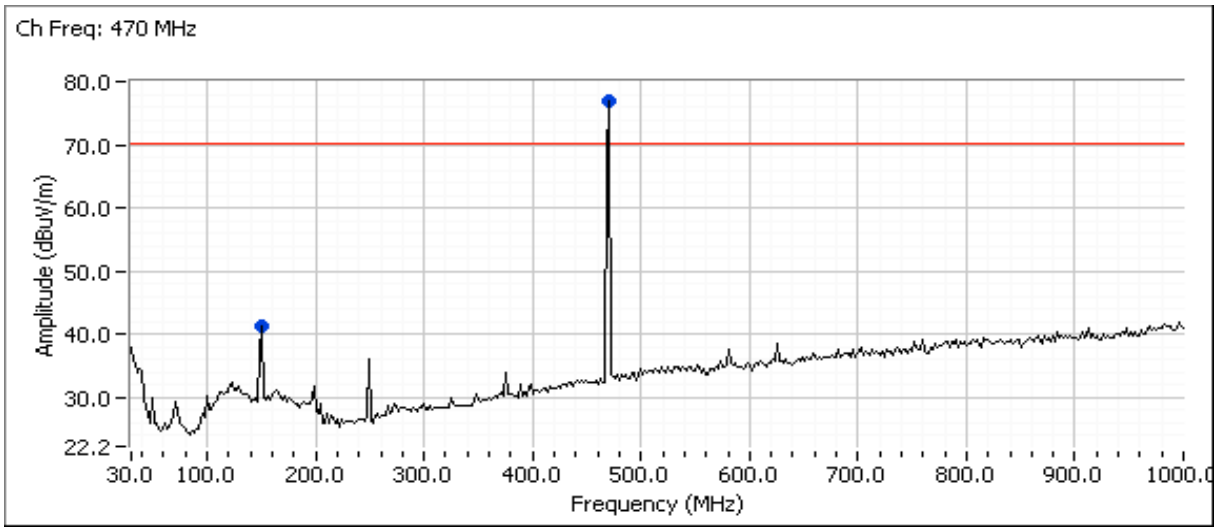
Plots for center channel, power setting(s) = 41 dBm

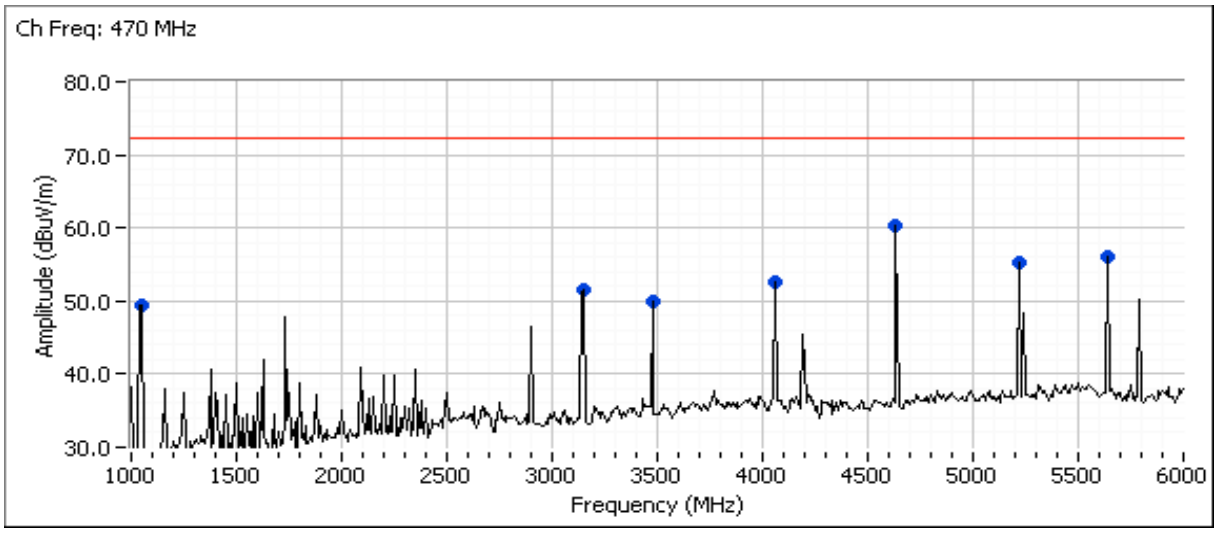




Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

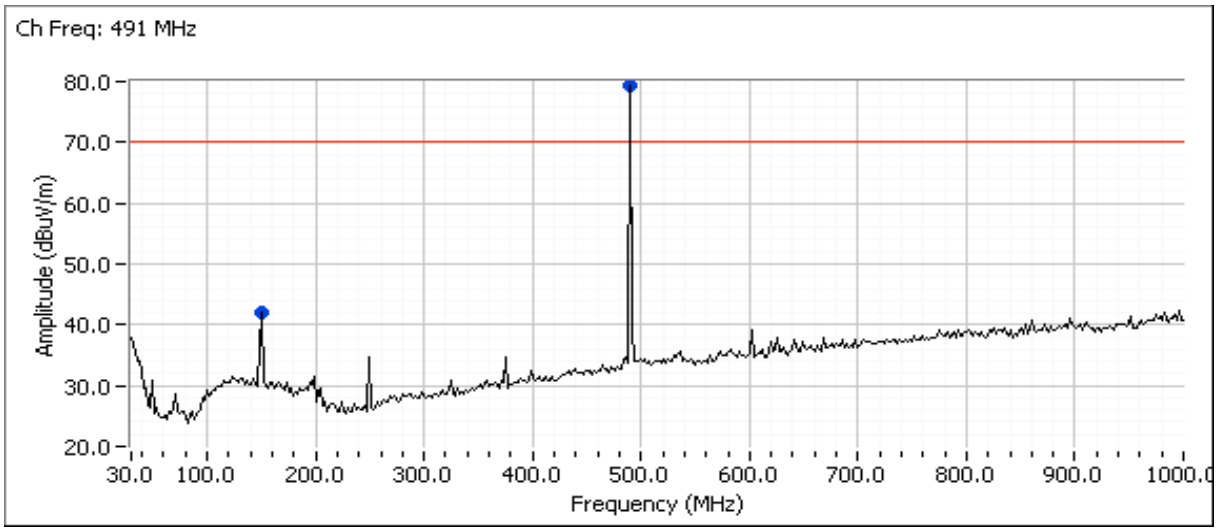
Plots for high channel, power setting(s) = 41 dBm

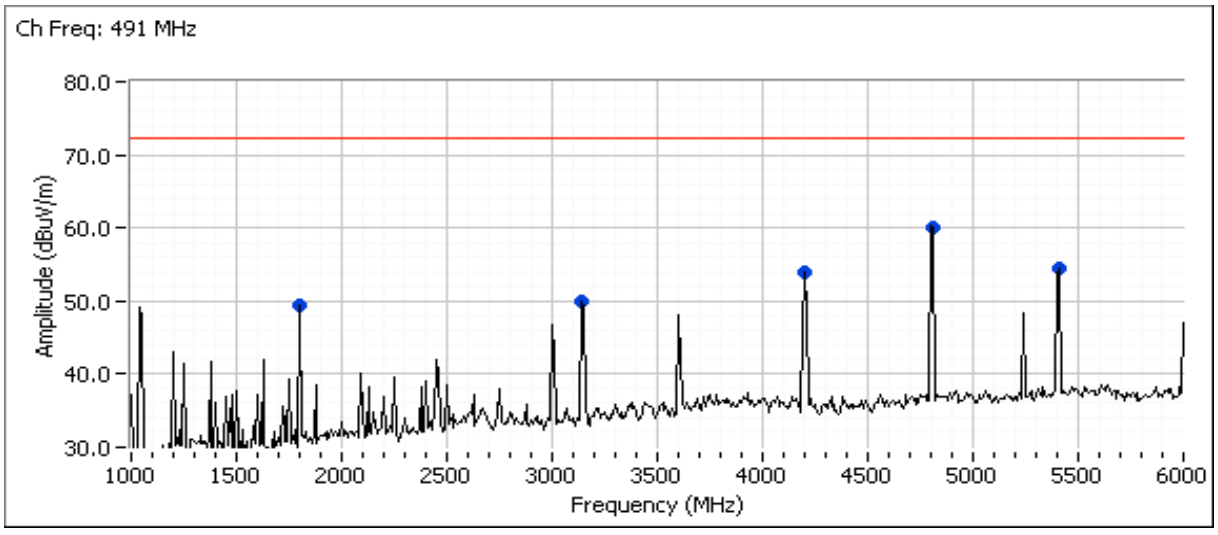




Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

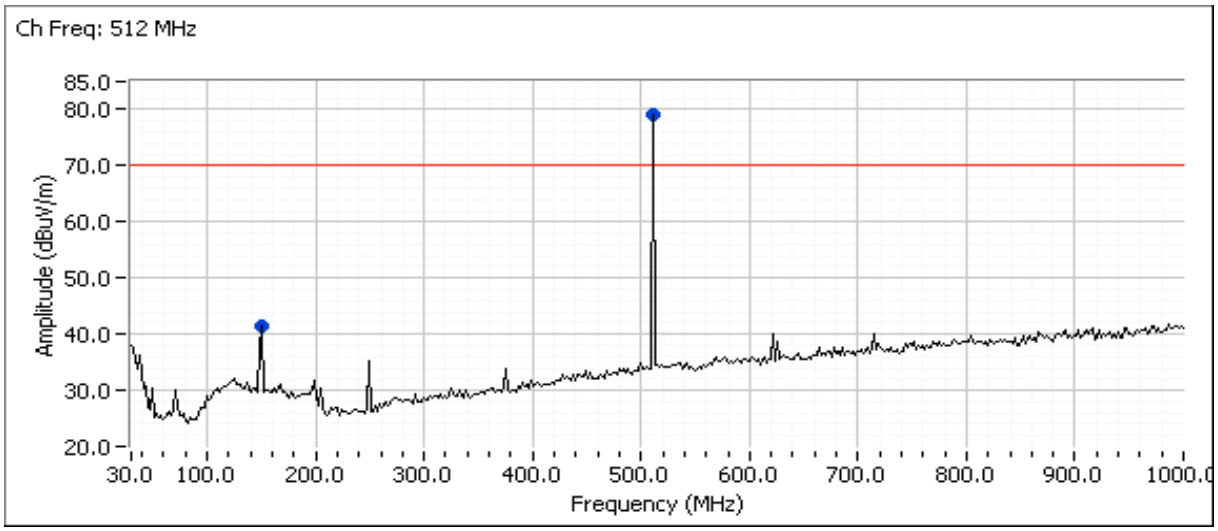
Plots for high channel, power setting(s) = 41 dBm

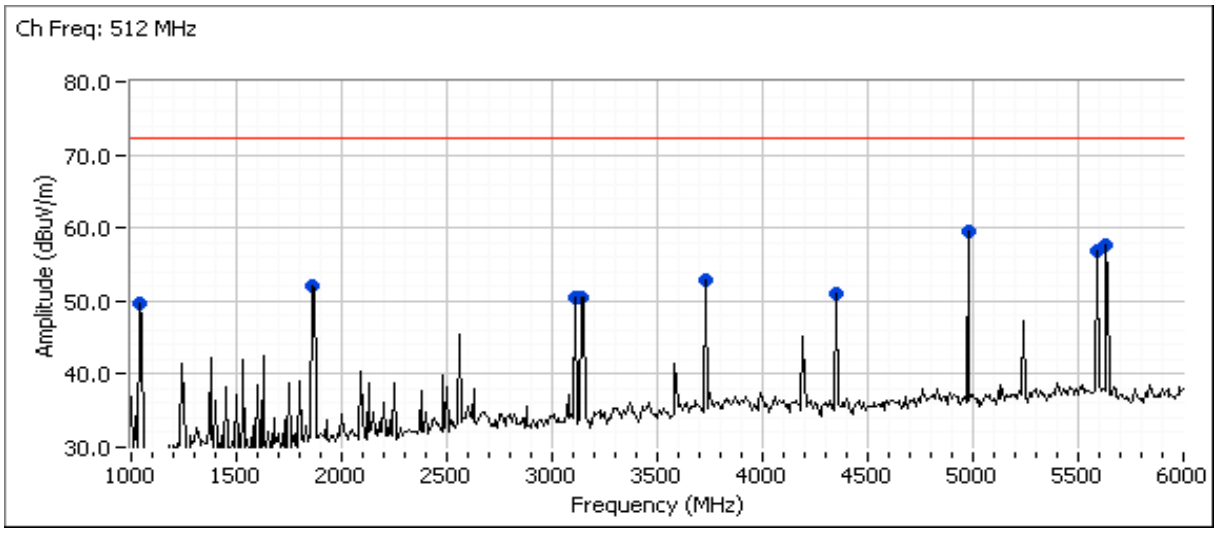




Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

Plots for high channel, power setting(s) = 41 dBm





Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

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

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		
750.010	49.4	H	70.2	-20.8	PK	344	1.1	RB 100 kHz; VB: 300 kH	406.1
812.186	45.4	H	70.2	-24.8	PK	58	1.0	RB 100 kHz; VB: 300 kH	406.1
1218.320	53.7	V	72.4	-18.7	PK	38	1.0	RB 1 MHz;VB 3 MHz;Pe	406.1
1500.010	53.1	H	72.4	-19.3	PK	118	1.0	RB 1 MHz;VB 3 MHz;Pe	406.1
1624.420	55.2	V	72.4	-17.2	PK	34	1.1	RB 1 MHz;VB 3 MHz;Pe	406.1
2575.500	53.0	H	72.4	-19.4	PK	300	1.7	RB 1 MHz;VB 3 MHz;Pe	406.1
3605.660	54.3	V	72.4	-18.1	PK	252	1.5	RB 1 MHz;VB 3 MHz;Pe	406.1
4120.810	57.0	V	72.4	-15.4	PK	203	1.5	RB 1 MHz;VB 3 MHz;Pe	406.1
4635.930	56.0	V	72.4	-16.4	PK	256	1.0	RB 1 MHz;VB 3 MHz;Pe	406.1
5666.080	59.0	V	72.4	-13.4	PK	248	1.0	RB 1 MHz;VB 3 MHz;Pe	406.1
749.994	49.5	H	70.2	-20.7	PK	212	1.2	RB 100 kHz; VB: 300 kH	418
1500.050	53.1	H	72.4	-19.3	PK	117	1.0	RB 1 MHz;VB 3 MHz;Pe	418
1672.030	55.1	V	72.4	-17.3	PK	1	1.2	RB 1 MHz;VB 3 MHz;Pe	418
3689.080	52.4	H	72.4	-20.0	PK	265	1.4	RB 1 MHz;VB 3 MHz;Pe	418
4216.000	58.6	V	72.4	-13.8	PK	208	1.4	RB 1 MHz;VB 3 MHz;Pe	418
4743.070	60.1	V	72.4	-12.3	PK	142	1.1	RB 1 MHz;VB 3 MHz;Pe	418
5797.010	57.3	V	72.4	-15.1	PK	253	1.0	RB 1 MHz;VB 3 MHz;Pe	418
750.002	49.5	H	70.2	-20.7	PK	213	1.1	RB 100 kHz; VB: 300 kH	428
1500.070	53.7	H	72.4	-18.7	PK	121	1.1	RB 1 MHz;VB 3 MHz;Pe	428
3759.070	54.7	H	72.4	-17.7	PK	248	1.0	RB 1 MHz;VB 3 MHz;Pe	428
4296.020	60.2	V	72.4	-12.2	PK	147	1.0	RB 1 MHz;VB 3 MHz;Pe	428
4833.010	60.5	V	72.4	-11.9	PK	142	1.1	RB 1 MHz;VB 3 MHz;Pe	428
5370.130	53.8	V	72.4	-18.6	PK	244	1.2	RB 1 MHz;VB 3 MHz;Pe	428
5907.060	56.9	V	72.4	-15.5	PK	253	1.0	RB 1 MHz;VB 3 MHz;Pe	428
749.994	49.5	H	70.2	-20.7	PK	343	1.2	RB 100 kHz; VB: 300 kH	450
1800.020	57.6	V	72.4	-14.8	PK	356	1.5	RB 1 MHz;VB 3 MHz;Pe	450
3353.870	55.1	V	72.4	-17.3	PK	347	1.0	RB 1 MHz;VB 3 MHz;Pe	450
3912.890	54.6	V	72.4	-17.8	PK	245	1.1	RB 1 MHz;VB 3 MHz;Pe	450
4471.990	65.5	V	72.4	-6.9	PK	253	1.5	RB 1 MHz;VB 3 MHz;Pe	450
5030.960	58.1	V	72.4	-14.3	PK	221	1.1	RB 1 MHz;VB 3 MHz;Pe	450
5590.000	55.8	V	72.4	-16.6	PK	249	1.2	RB 1 MHz;VB 3 MHz;Pe	450

Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

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		
150.000	41.7	H	70.2	-28.5	PK	33	1.9	RB 100 kHz; VB: 300 kH	460
3143.750	53.0	V	72.4	-19.4	PK	91	1.1	RB 1 MHz;VB 3 MHz;Pe	460
3413.990	54.0	V	72.4	-18.4	PK	343	1.0	RB 1 MHz;VB 3 MHz;Pe	460
3983.060	54.0	V	72.4	-18.4	PK	122	1.7	RB 1 MHz;VB 3 MHz;Pe	460
4552.020	63.5	V	72.4	-8.9	PK	255	1.0	RB 1 MHz;VB 3 MHz;Pe	460
5121.020	58.1	V	72.4	-14.3	PK	245	1.3	RB 1 MHz;VB 3 MHz;Pe	460
150.000	42.0	H	70.2	-28.2	PK	25	1.9	RB 100 kHz; VB: 300 kH	470
1047.790	50.1	V	72.4	-22.3	PK	326	1.6	RB 1 MHz;VB 3 MHz;Pe	470
3143.550	54.0	V	72.4	-18.4	PK	88	1.1	RB 1 MHz;VB 3 MHz;Pe	470
3473.960	53.9	V	72.4	-18.5	PK	344	1.6	RB 1 MHz;VB 3 MHz;Pe	470
4053.050	55.8	H	72.4	-16.6	PK	310	1.2	RB 1 MHz;VB 3 MHz;Pe	470
4632.070	61.7	V	72.4	-10.7	PK	261	1.0	RB 1 MHz;VB 3 MHz;Pe	470
5210.970	56.9	V	72.4	-15.5	PK	248	1.0	RB 1 MHz;VB 3 MHz;Pe	470
5640.060	57.9	H	72.4	-14.5	PK	303	1.0	RB 1 MHz;VB 3 MHz;Pe	470
150.000	42.6	H	70.2	-27.6	PK	21	1.9	RB 100 kHz; VB: 300 kH	491
1800.030	52.7	V	72.4	-19.7	PK	28	2.0	RB 1 MHz;VB 3 MHz;Pe	491
3143.260	53.4	V	72.4	-19.0	PK	91	1.0	RB 1 MHz;VB 3 MHz;Pe	491
4200.020	56.0	V	72.4	-16.4	PK	329	1.3	RB 1 MHz;VB 3 MHz;Pe	491
4800.010	61.2	V	72.4	-11.2	PK	123	1.2	RB 1 MHz;VB 3 MHz;Pe	491
5400.060	57.3	V	72.4	-15.1	PK	249	1.1	RB 1 MHz;VB 3 MHz;Pe	491
150.000	42.2	H	70.2	-28.0	PK	25	1.9	RB 100 kHz; VB: 300 kH	512
1047.810	49.3	V	72.4	-23.1	PK	320	1.0	RB 1 MHz;VB 3 MHz;Pe	512
1862.940	53.7	V	72.4	-18.7	PK	36	1.0	RB 1 MHz;VB 3 MHz;Pe	512
3105.050	52.9	V	72.4	-19.5	PK	258	1.0	RB 1 MHz;VB 3 MHz;Pe	512
3142.940	52.0	V	72.4	-20.4	PK	123	1.0	RB 1 MHz;VB 3 MHz;Pe	512
3726.050	54.9	V	72.4	-17.5	PK	227	1.4	RB 1 MHz;VB 3 MHz;Pe	512
4346.970	55.9	V	72.4	-16.5	PK	201	1.6	RB 1 MHz;VB 3 MHz;Pe	512
4968.010	61.1	V	72.4	-11.3	PK	142	1.0	RB 1 MHz;VB 3 MHz;Pe	512
5589.060	60.5	V	72.4	-11.9	PK	255	1.1	RB 1 MHz;VB 3 MHz;Pe	512
5631.940	60.6	H	72.4	-11.8	PK	300	1.0	RB 1 MHz;VB 3 MHz;Pe	512

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=√(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.

Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

Substitution measurements
Horizontal

Frequency	Substitution measurements			Site	EUT measurements			eirp Limit	erp Limit	Margin
MHz	Pin[1]	Gain[2]	FS[3]	Factor[4]	FS[5]	eirp (dBm)	erp (dBm)	dBm	dBm	dB
1500.070	-30.0	8.3	74.2	95.9	53.7	-42.2	-44.4		-25.0	-19.4
2575.500	-30.0	8.9	74.0	95.1	53.0	-42.1	-44.3		-25.0	-19.3
3689.080	-30.0	9.5	75.5	96.0	52.4	-43.6	-45.8		-25.0	-20.8
3759.070	-30.0	9.2	75.4	96.2	54.7	-41.5	-43.7		-25.0	-18.7
4053.050	-30.0	9.7	75.4	95.7	55.8	-39.9	-42.1		-25.0	-17.1
4296.020	-30.0	10.4	76.0	95.6	60.2	-35.4	-37.6		-25.0	-12.6
4833.010	-30.0	10.6	76.1	95.5	60.5	-35.0	-37.2		-25.0	-12.2
5640.060	-30.0	10.8	76.9	96.1	57.9	-38.2	-40.4		-25.0	-15.4

Vertical

Frequency	Substitution measurements			Site	EUT measurements			eirp Limit	erp Limit	Margin
MHz	Pin[1]	Gain[2]	FS[3]	Factor[4]	FS[5]	eirp (dBm)	erp (dBm)	dBm	dBm	dB
1047.810	-30.0	5.8	72.3	96.5	49.3	-47.2	-49.4		-25.0	-24.4
1218.320	-30.0	6.5	72.5	96.0	53.7	-42.3	-44.5		-25.0	-19.5
1624.420	-30.0	8.5	74.2	95.7	55.2	-40.5	-42.7		-25.0	-17.7
1672.030	-30.0	8.6	74.2	95.6	55.1	-40.5	-42.7		-25.0	-17.7
1800.020	-30.0	8.7	74.8	96.1	57.6	-38.5	-40.7		-25.0	-15.7
1862.940	-30.0	8.7	74.7	96.0	53.7	-42.3	-44.5		-25.0	-19.5
3105.050	-30.0	8.9	74.6	95.7	52.9	-42.8	-45.0		-25.0	-20.0
3142.940	-30.0	8.9	74.4	95.5	52.0	-43.5	-45.7		-25.0	-20.7
3143.550	-30.0	9.0	74.4	95.4	54.0	-41.4	-43.6		-25.0	-18.6
3353.870	-30.0	9.4	74.9	95.5	55.1	-40.4	-42.6		-25.0	-17.6
3413.990	-30.0	9.5	75.2	95.7	54.0	-41.7	-43.9		-25.0	-18.9
3473.960	-30.0	9.6	75.4	95.8	53.9	-41.9	-44.1		-25.0	-19.1
3605.660	-30.0	9.6	75.4	95.8	54.3	-41.5	-43.7		-25.0	-18.7
3726.050	-30.0	9.3	75.2	95.9	54.9	-41.0	-43.2		-25.0	-18.2
3912.890	-30.0	9.2	75.2	96.0	54.6	-41.4	-43.6		-25.0	-18.6
3983.060	-30.0	9.7	75.4	95.7	54.0	-41.7	-43.9		-25.0	-18.9
4120.810	-30.0	10.1	75.7	95.6	57.0	-38.6	-40.8		-25.0	-15.8
4200.020	-30.0	10.4	75.7	95.3	56.0	-39.3	-41.5		-25.0	-16.5
4216.000	-30.0	10.4	75.9	95.5	58.6	-36.9	-39.1		-25.0	-14.1
4346.970	-30.0	10.6	76.0	95.4	55.9	-39.5	-41.7		-25.0	-16.7
4471.990	-30.0	10.7	76.3	95.6	65.5	-30.1	-32.3		-25.0	-7.3
4552.020	-30.0	10.8	76.0	95.2	63.5	-31.7	-33.9		-25.0	-8.9
4632.070	-30.0	10.8	76.5	95.7	61.7	-34.0	-36.2		-25.0	-11.2
4635.930	-30.0	10.8	76.7	95.9	56.0	-39.9	-42.1		-25.0	-17.1

Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

Vertical

Frequency	Substitution measurements			Site	EUT measurements			eirp Limit	erp Limit	Margin
MHz	Pin[1]	Gain[2]	FS[3]	Factor[4]	FS[5]	eirp (dBm)	erp (dBm)	dBm	dBm	dB
4743.070	-30.0	10.7	76.7	96.0	60.1	-35.9	-38.1		-25.0	-13.1
4800.010	-30.0	10.5	76.4	95.9	61.2	-34.7	-36.9		-25.0	-11.9
4968.010	-30.0	10.4	76.4	96.0	61.1	-34.9	-37.1		-25.0	-12.1
5030.960	-30.0	10.4	76.3	95.9	58.1	-37.8	-40.0		-25.0	-15.0
5121.020	-30.0	10.3	76.0	95.7	58.1	-37.6	-39.8		-25.0	-14.8
5210.970	-30.0	10.3	76.0	95.7	56.9	-38.8	-41.0		-25.0	-16.0
5370.130	-30.0	10.3	75.8	95.5	53.8	-41.7	-43.9		-25.0	-18.9
5400.060	-30.0	10.3	76.4	96.1	57.3	-38.8	-41.0		-25.0	-16.0
5589.060	-30.0	10.5	76.9	96.4	60.5	-35.9	-38.1		-25.0	-13.1
5590.000	-30.0	10.6	76.9	96.3	55.8	-40.5	-42.7		-25.0	-17.7
5631.940	-30.0	10.7	76.6	95.9	60.6	-35.3	-37.5		-25.0	-12.5
5666.080	-30.0	10.9	76.6	95.7	59.0	-36.7	-38.9		-25.0	-13.9
5797.010	-30.0	11.2	76.4	95.2	57.3	-37.9	-40.1		-25.0	-15.1
5907.060	-30.0	11.3	76.7	95.4	56.9	-38.5	-40.7		-25.0	-15.7

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.

Tx Horn #868 EMCO 3115 sn-5584

Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

Run #6: Transient Frequency Behavior

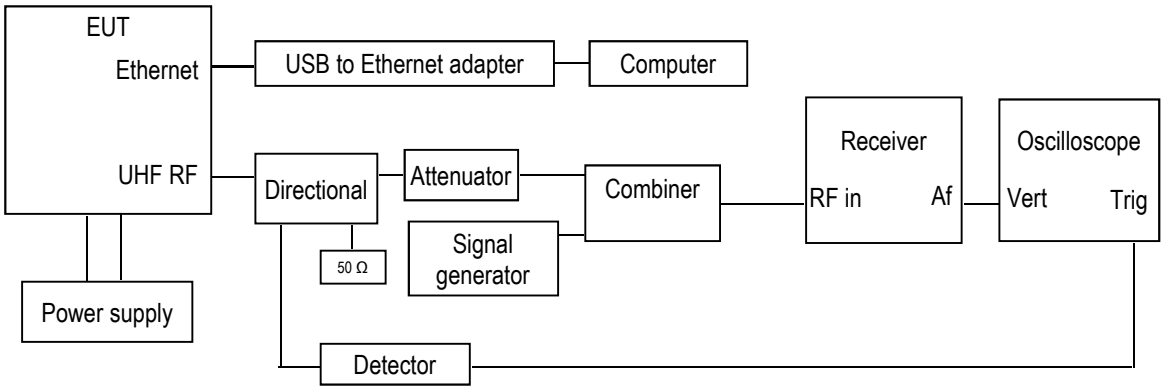
Date of Test: 18-May-15 Config. Used: 1

Test Engineer: Deniz Demirci Config Change: None

Test Location: FT Lab #4b EUT Voltage: 24 Vdc

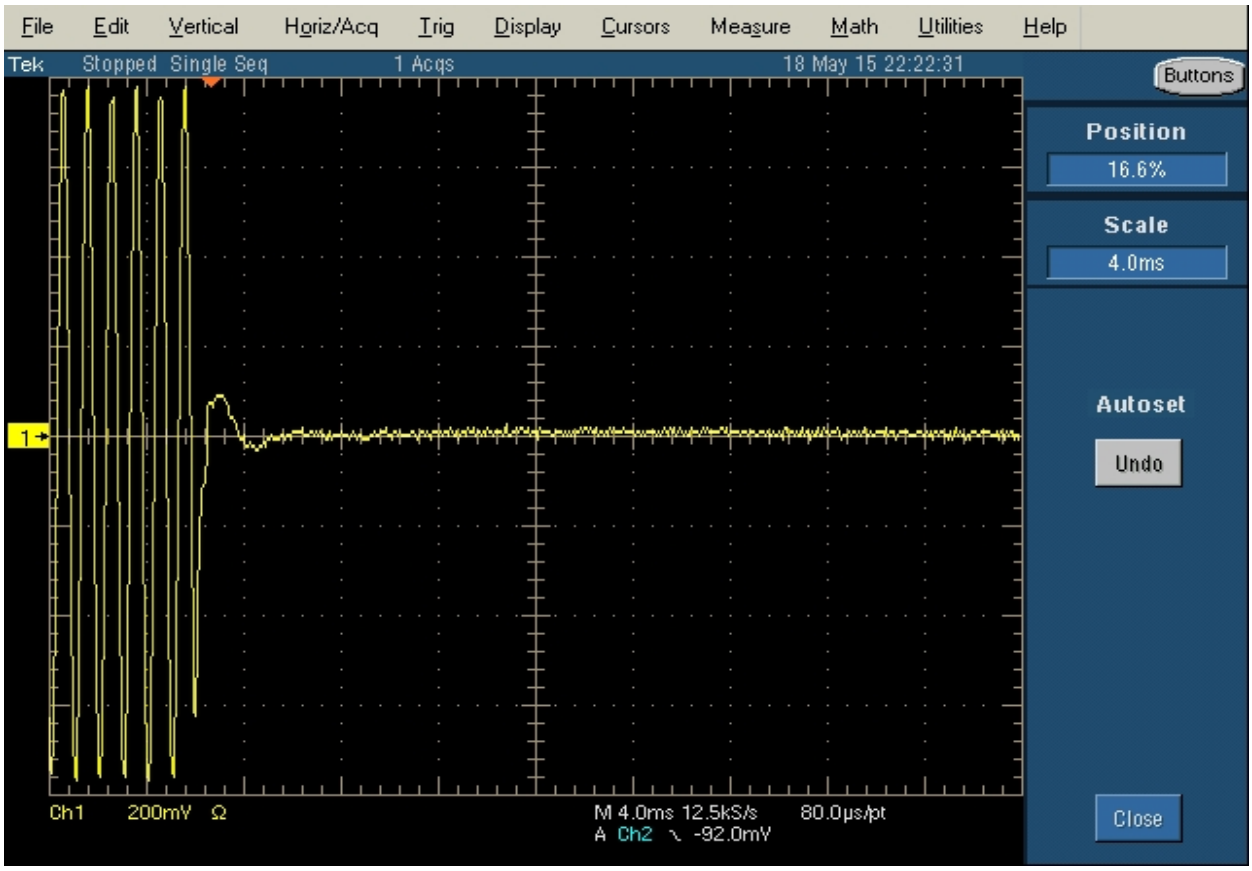
Transient frequency Behavior measurements setup

Note: The test has been performed using the method given in ANSI / TIA 603-C (2.2.19)



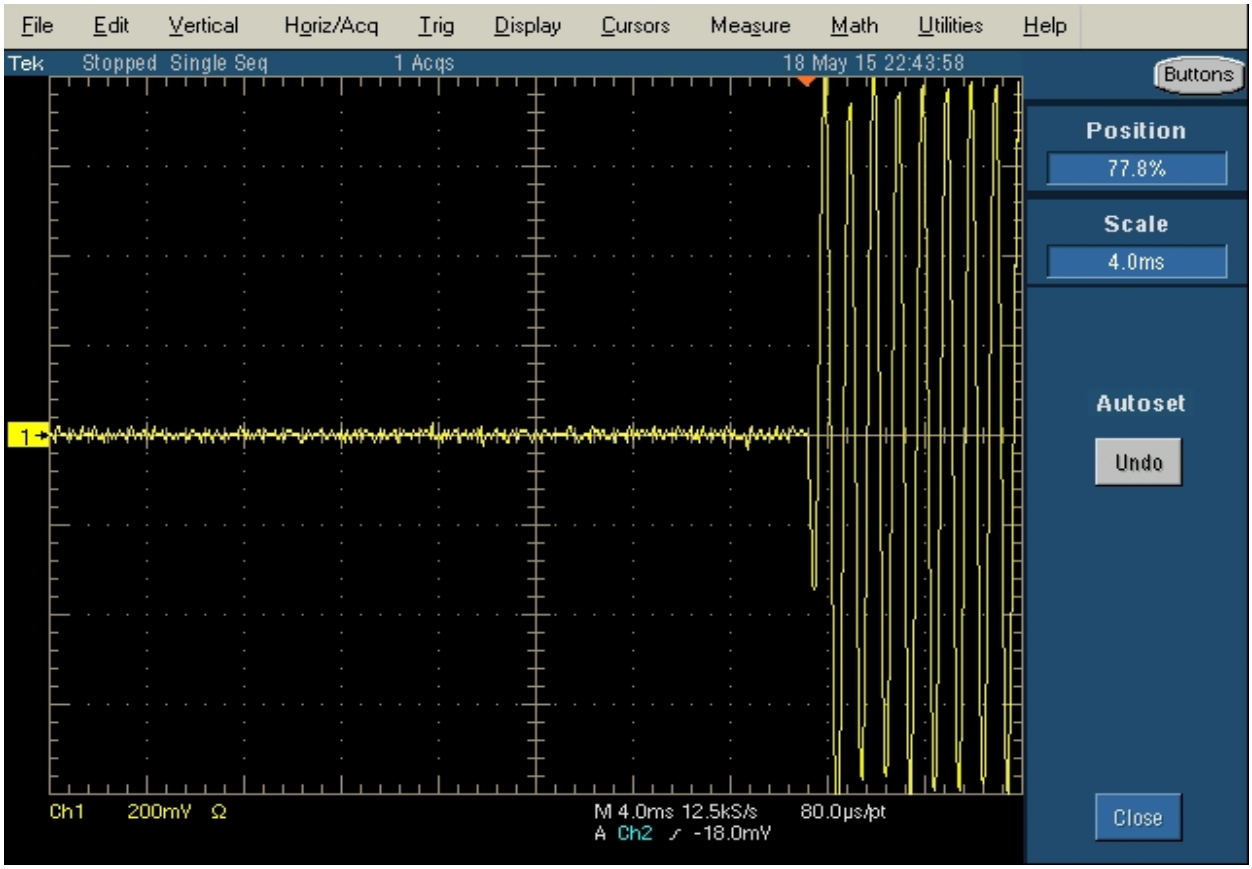
Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

Run #6a
Carrier Frequency: 428 MHz
Channel Spacing: 25 kHz
Modulation: CW
Description: Switch on condition ton, t1, and t2



Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

Run #6b
Carrier Frequency: 428 MHz
Channel Spacing: 25 kHz
Modulation: CW
Description: Switch off condition t3 and toff



Client:	GE MDS LLC	Job Number:	J97895
Model:	SD4 Master Module	T-Log Number:	T97900
		Project Manager:	Christine Krebill
Contact:	Dennis McCarthy	Project Coordinator:	-
Standard:	FCC Part 15, 22 & 90, EN 300 113-2	Class:	A

Run #7: Frequency Stability

Date of Test: 19-May-15 Config. Used: 1
Test Engineer: Deniz Demirci Config Change: None
Test Location: FT Lab #4b EUT Voltage: 24 Vdc

Nominal Frequency: 427.999996 MHz

Frequency Stability Over Temperature

The EUT was soaked at each temperature for a minimum of 30 minutes prior to making the measurements to ensure the EUT and chamber had stabilized at that temperature.

Temperature	Frequency Measured	Drift	
(Celsius)	(MHz)	(Hz)	(ppm)
-30	427.999972	-24	-0.1
-20	427.999953	-43	-0.1
-10	427.999999	3	0.0
0	428.000068	72	0.2
10	428.000094	98	0.2
20	427.999996	0	0.0
30	427.999988	-8	0.0
40	428.000072	76	0.2
50	428.000137	141	0.3
60	428.000160	164	0.4
	Worst case:	141	0.3

Frequency Stability Over Input Voltage

Nominal Voltage is 24 Vdc.

Voltage	Frequency Measured	Drift	
(DC)	(MHz)	(Hz)	(ppm)
23.0	427.999941	-55	-0.1
25.0	427.999947	-49	-0.1
	Worst case:	-55	0.3

Note 1:	Maximum drift of fundamental frequency before it shut down at 20.1 Vdc was 0.1 ppm .
Note 2:	Extreme voltages are ±4% of nominal voltage (Grant notes)

End of Report

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