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Test Report
Industry Canada Radio Standards Specification 119 Issue 6, Industry Canada Radio Standards Specification GEN Issue 2 FCC Part 90 and Part 15 (Receiver)

GE MDS LLC

Model: TRM450

FCC ID NUMBER:	E5MDS-TRM450
UPN:	3738A-TRM450
GRANTEE:	GE MDS LLC 175 Science Parkway Rochester, NY 14620
TEST SITE:	Elliott Laboratories 684 W. Maude Avenue Sunnyvale, CA 94086
REPORT DATE:	June 5, 2009
FINAL TEST DATE:	May 22, May 27, May 28, May 29 and June 1, 2009
AUTHORIZED SIGNATORY:	Mark Briggs Staff Engineer

ACCREDITED

Testing Cert #2016-01

REVISION HISTORY

Rev #	Date	Comments	Modified By
1	June 12, 2009	Initial Release	-

TABLE OF CONTENTS

DECLARATIONS OF COMPLIANCE

Equipment Name and Model:
TRM450

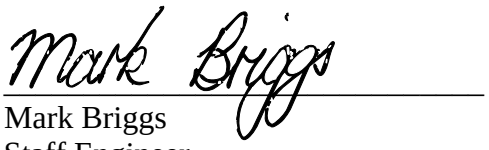
Manufacturer:
GE MDS LLC
175 Science Parkway
Rochester, NY 14620

Tested to applicable standards:
RSS-119, Issue 6 (Land Mobile and Fixed Radio Transmitters and Receivers, 27.41 to 960 MHz)
RSS GEN Issue 2
FCC Part 90 (Private Land Mobile Radio Service)
FCC Part 15 Subpart B (Receiver)

Measurement Facility Description Filed With Department of Industry:

Departmental Acknowledgement Number: IC2845A-2

I declare that the testing was performed or supervised by me; that the test measurements were made in accordance with the above mentioned departmental standards (through the use of TIA/EIA-603 and the specific RSS standards applicable to this device); and that the equipment performed in accordance with the data submitted in this report.

Signature	
Name	Mark Briggs
Title	Staff Engineer
	Elliott Laboratories
Address	684 W. Maude Ave
	Sunnyvale, CA 94086
	USA
Date:	June 5, 2009

Maintenance of compliance with the above standards 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.).

SCOPE

FCC Part 90, Part 15, RSS GEN & IC RSS 119 testing was performed for the equipment mentioned in this report. The equipment was tested in accordance with the procedures specified in Sections 2.1046 to 2.1057 of the FCC Rules & IC RSS-119. TIA-603 was also used as a test procedure guideline to perform the tests required by FCC Part 90 and RSS 119 for the transmitter-related parameters. ANSI C63.4 was used as the procedure for the receiver measurements against RSS GEN limits and FCC Part 15 Subpart B limits.

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

Final system data was gathered in a mode that tended to maximize emissions by varying orientation of EUT, orientation of power and I/O cabling, antenna search height, and antenna polarization.

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.

OBJECTIVE

The primary objective of the manufacturer is compliance with the FCC Part 90 & IC RSS-119. Certification of these devices is required as a prerequisite to marketing as defined in Section 2.1033 & RSP-100.

Certification is a procedure where the manufacturer or a contracted laboratory makes measurements and submits the test data and technical information to FCC & Industry Canada. FCC & Industry Canada issues a grant of equipment authorization and a certification number upon successful completion of their review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units subsequently manufactured.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product that 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.).

SUMMARY OF TEST RESULTS

Part 90 and RSS-119 Test Summary

Measurement Required	FCC Rule Part	RSS-119 Section	Test Performed	Measured Value	Test Method	Result
Modulation Tested	GMSK	GMSK	-	-	-	-
Modulation characteristics	2.1047	5.7	Modulated with appropriated signal	-	H	-
Radiated RF power output (ERP/EIRP)	2.1046 / 90.279 & 90.205(g)	6.2	Radiated Output Power Test	Output power measured at the antenna port directly.		
RF power output	2.1046 / 90.279 & 90.205(g)	6.2	Output Power– High Power	33.5 dBm 2.2 Watts	B	Note 1
			Output Power– Low Power	28.5dBm 0.7 Watts		
Occupied Bandwidth	2.1049/ 90.210(c) & (d)	6.4(c) & 6.4(d)	25kHz Channel Emission Mask C Occupied Bandwidth	Refer to Plots 21.6 kHz	C, D	Pass
			12.5kHz Channel Emission Mask D Occupied Bandwidth	Refer to Plots 11.1 kHz	D, D	Pass
Transmitter spurious emissions 30MHz – 5GHz	2.1053 / 90.210(d)	6.3 & 6.4(d)	Radiated Spurious Emissions	-34.8 dBm erp	N	Pass (14.8dB)
			Conducted Spurious Emission	< -30dBm	J	Pass (> 10dB)
Frequency stability	2.1055 / 90.213	7	vs. Temperature	0.6 ppm	K	Pass
			vs. Voltage		L & M	Pass
Transient Frequency Behavior	90.214	6.5	Transient Behavior	No evaluation performed. Note 2		
Exposure to Mobile devices	2.1091	9	Exposure of Humans to RF Fields	No evaluation performed. Note 2		
Receiver Spurious Emissions	15.109	8 (RSS GEN)	Radiated Spurious Emissions	34.4 dBµV/m @ 40.09MHz	ANSI C63.4 (N)	Pass (5.6dB)
			Conducted Spurious Emissions	-58.8dBm @ 455 MHz		Pass (1.8dB)

Note 1: Power measurements used to confirm output power within 0.5dB of certified power level prior to making transmitter measurements.
Note 2: No evaluation was performed. The proposed changes were not considered to have an effect on the values previously reported during the original application and subsequent permissive change/re-assessments.

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 were calculated using the approach described in CISPR 16-4-2:2003 using a coverage factor of k=2, which gives a level of confidence of approximately 95%. The levels were found to be below levels of *U*cispr and therefore no adjustment of the data for measurement uncertainty is required.

Measurement Type	Frequency Range (MHz)	Calculated Uncertainty (dB)
Conducted Emissions	0.15 to 30	± 2.4
Radiated Emissions	30 to 1000	± 3.6

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The GE MDS LLC model TRM450 is a radio module that operates in the 410-470 MHz range. The module has been modified from the original version to allow a single device to operate across the entire frequency band. The previous model had different hardware configurations for operating in the 410-430 MHz, 430-450 MHz or 450-470 MHz bands.

The EUT was connected to a test fixture in order to test it outside of any host system. The electrical rating of the EUT is 410-470MHz, 3.3 to 3.8Vdc, 2 amps max

The sample was received on May 22, 2009 and tested on May 22, May 27, May 28, May 29 and June 1, 2009. The EUT consisted of the following component(s):

Manufacturer	Model	Description	Serial Number	FCC ID
GE MDS	TRM450	410-470MHz XCVR	-	E5MDS-TRM450

ENCLOSURE

The EUT does not have an enclosure as it is designed to be installed within the enclosure of a host computer or system.

MODIFICATIONS

The EUT did not require modifications during testing in order to comply with the emission specifications.

SUPPORT EQUIPMENT

The following equipment was used as remote support equipment for radiated emissions testing and was located locally for all other tests:

Manufacturer	Model	Description	Serial Number	FCC ID
Dell	Latitude CPx	Laptop Computer	CA asset 212	DoC
-	LFZVC36FS12D	AC/DC Adapter	2550	-
GE MDS	4766A01	Data Node Board	1877478	-

EUT INTERFACE PORTS

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

Port	Connected to	Description	Shielded or Unshielded	Length (m)
USB J4 - Data Note Board	Laptop	Multiconductor	Shielded	0.8*
Power - Data Node Board	AC/DC Adapter	2Wire	Unshielded	0.7
AC Adapter	AC Mains	2wire	Unshielded	1.8
RF Port (SMA)	Antenna	Coax	Shielded	0.3
* Cable length extended to 5m so that the laptop could be located remotely during receiver radiated spurious emissions measurements.				

EUT OPERATION DURING TESTING

During testing for bandwidth and antenna port transmitter conducted emissions, the EUT was configured to transmit continuously on a single channel, at the rated maximum and minimum power level and at both data rates. Radiated transmitter spurious emissions were measured at both data rates at the highest output power level only.

Receiver spurious measurements were made with the device tuned to the lowest, highest and center frequencies. Radiated measurements were made with the antenna port terminated with a 50-ohm load as conducted measurements were also made to demonstrate that the spurious limits at the antenna port were below 2nW (-57dBm).

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TEST SITE

GENERAL INFORMATION

Final test measurements were taken on May 22, May 27, May 28, May 29 and June 1, 2009 at the Elliott Laboratories Open Area Test Site #2 located at 684 West Maude Avenue, Sunnyvale, California. Pursuant to Section 2.948 of the FCC Rules, construction, calibration, and equipment data has been filed with the Commission.

CONDUCTED EMISSIONS CONSIDERATIONS

Conducted emissions testing are performed in conformance with Section 2 of FCC Rules. Measurements are made with the EUT connected to a spectrum analyzer through an attenuator to prevent overloading the analyzer.

RADIATED EMISSIONS CONSIDERATIONS

Radiated measurements are performed in an open field environment or Anechoic Chamber. The test site is maintained free of conductive objects within the CISPR 16-1 defined elliptical area.

MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

An EMI receiver as specified in CISPR 16-1 is used for emissions measurements. The receivers are capable of measuring over the frequency range of 9 kHz up to 2000 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. The receiver automatically sets the required bandwidth for the particular detector used during measurements.

For measurements above the frequency range of the receivers, a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis. If average measurements above 1000MHz are performed, the linear-average method with a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz is used.

INSTRUMENT CONTROL COMPUTER

A personal computer is utilized to record the receiver measurements of the field strength at the antenna, which is then compared directly with the appropriate specification limit. The receiver is programmed with appropriate factors to convert the received voltage into filed strength at the antenna. Results are printed in a graphic and/or tabular format, as appropriate. The test receiver also provides a visual display of the signal being measured.

PEAK POWER METER

A power meter and peak power sensor may be used for output power measurements from transmitters as they provide a broadband indication of the power output.

FILTERS/ATTENUATORS

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

ANTENNAS

A biconical antenna is used to cover the range from 30 MHz to 300 MHz and a log periodic antenna is utilized from 300 MHz to 1000 MHz. Narrowband tuned dipole antennas are used over the 30 to 1000 MHz range for precision measurements of field strength. Above 1000 MHz, a horn antenna is used. The antenna calibration factors are included in site factors programmed into the test receivers

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.

The requirements of ANSI C63.4:2003 were used for configuration of the equipment turntable. It specifies that the test height above ground for table-mounted devices shall be 80 centimeters. Floor mounted equipment shall be 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. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

INSTRUMENT CALIBRATION

All test equipment is regularly checked to ensure that performance is maintained in accordance with the manufacturer's specifications. All antennas are calibrated at regular intervals with respect to tuned half-wave dipoles. An appendix of this report contains the list of test equipment used and calibration information.

TEST PROCEDURES

General: For Transmitters with detachable antenna, direct measurements for output power, modulation characterization, occupied bandwidth, and frequency stability are performed with the antenna port of the EUT connected to either the power meter, modulation analyzer, or spectrum analyzer via a suitable attenuator and/or filter. The attenuators and/or filters are used to ensure that the transmitter fundamental will not overload the front end of the measurement instrument.

Procedure B – Power Measurement (Conducted Method): The following procedure was used for transmitters that do use external antennas.

1) Set the EUT to maximum power and to the lowest channel.
2) Either a power meter or a spectrum analyzer was used to measure the power output.
3) If a spectrum analyzer was used a resolution and video bandwidth 10kHz was used to measure the power output. Corrected for any external attenuation used for the protection of the input of analyzer. In addition, For CDMA or TDMA modulations set spectrum analyzer resolution to 1MHz and video to 30 kHz. Use video averaging with a 100-sample rate.
4) If a power meter was used, corrected for any external attenuation used for the protection of the input of the sensor head. Also set the power sensor correction by setting up the frequency range that will be measured.
5) Repeat this for the high channel and all modulations that will be used and all output ports used for transmission

Procedure C - Occupied Bandwidth (Conducted Method): Either for analog, digital, or data modulations, occupied bandwidth was performed. The EUT was set to transmit the appropriate modulation at maximum power. The bandwidth was measured using following methods:

1) The built-in 99% function of the spectrum analyzer was used.
2) If the built-in 99% is not available then the following method is used:

   26-dB or 20-dB was subtracted to the maximum peak of the emission. Then the display line function was used, in conjunction with the marker delta function, to measure the emissions bandwidth.

3) For the above two methods a resolution and video bandwidth of 100 or 300 Hz was used to measure the emission's bandwidth.

Procedure D - Occupied Bandwidth (Conducted Emission Mask): Either for analog, digital, or data modulations, emission mask was performed. The EUT was set to transmit the appropriate modulation at maximum power. The following method was used:

1) The EUT was connected directly to the spectrum analyzer and used an attenuator to protect the input of the analyzer. The EUT antenna was removable, so conducted measurements was performed. The EUT was set to transmit continuous packets of data and the Fundamental Frequency set to the middle of the EUT frequency range.

2) Since EUT is designed with a 12.5 kHz channel Section 90.210 (d)(1)(2)(3) was used to show compliance to the emission mask.

3) Any emission must be attenuated below the power (P) as follow:

90.210 (d)(1): 5.625 kHz: 0 dB

90.210(d)(2): 5.625 kHz: 20 dB
12.5 kHz: 70 dB

90.210(d)(3): more than 12.5 kHz: -20 dBm (50+10*log(P))

The following Resolution and Video bandwidth was used to show compliance for the above requirement: 100 Hz.

4) Since EUT is designed with a 25 kHz channel Section 90.210 (c)(1)(2)(3) was used to show compliance to the emission mask.

5) Any emission must be attenuated below the power (P) as follow:

90.210 (c)(1): 5 kHz but no more then 10kHz: 83*log(F_d / 5) dB

90.210(c)(2): 10kHz but no more then 250%: At least 29 log (fd 2/11) dB or 50 dB, whichever is the lesser attenuation

90.210(c)(3): more than 250%: -13 dBm (43+10*log(P))

The following Resolution and Video bandwidth was used to show compliance for the above requirement: 300 Hz.

Procedure H - Other Types of Equipment: Either digital or data modulated signals were simulated, by software or external sources, to performed the required tests. The EUT was set to transmit the appropriate digital modulation.

Procedure J – Antenna Conducted Emissions: For spurious emission measurements at the antenna terminal the following procedure was performed:

1) Set the transmitting signal at the middle of the operating range of the transmitter, as specified in the standard. Power is set to maximum and then to minimum.
2) Set the spectrum analyzer display line function to –20-dBm.
3) Set the spectrum analyzer bandwidth to 10kHz <1GHz and 1 MHz >1GHz.
4) For the spectrum analyzer, the start frequency was set to 30 MHz and the stop frequency set to the 10^{th} harmonic of the fundamental. All spurious or inter-modulation emission must not exceed the –20dBm limit.
5) Steps 1 to 4 were repeated for all modulations and output ports that will be used for transmission.

Procedure K - Frequency Stability: The EUT is placed inside a temperature chamber with all support and test equipment located outside of the chamber. The spectrum analyzer is configured to give a 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. The Temperature chamber was varied from –30 to +50° C (or +60° C for some IC RSS standards, if applicable) in 10 degrees increment. The EUT was allowed enough time to stabilize for each temperature variation.

Procedure L - Frequency Stability: For AC or DC operated devices the nominal voltage is varied to 85% and to 115% at either room temperature or at a controlled +20°C temperature.

Procedure M - Frequency Stability: For battery-powered devices the voltage battery end-point is determined by reducing the dc voltage until the unit ceases to function. This is performed at either room temperature or at a controlled +20°C temperature.

Procedure N - Field Strength Measurement: The EUT was set on the turntable and the search antenna position 3 meters away. The output antenna terminal was terminated with a 50-ohm terminator. The EUT was set at the middle of the frequency band and set at maximum output power.

For the first scan, a preliminary measurement is performed. A preliminary scan of emissions is conducted in which all significant EUT frequencies are identified with the system in a nominal configuration. One or more of these is with the antenna polarized vertically while the one or more of these are with the antenna polarized horizontally. 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 the final measurements for transmitter spurious emissions the substitution method is performed for all signals not being 20-dB below the calculated radiated limit. Substitution method is performed by replacing the EUT with a horn antenna and signal generator. The horn antenna factors can be reference to a half-wave dipole in dBi. The signal generator power level was adjusted until a similar level, which was measured on the first scan, is achieved on the spectrum analyzer. The level on the signal generator is than added to the antenna factor, in dBi, which will give the corrected value.

Receiver spurious emissions limits are specified as a field strength limit so the measured field strength from the EUT is compared directly to this limit.

Procedure I – Transient Frequency Behavior: The TIA/EIA 603 procedure was used to determine compliance to radio being keyed on and off.

1) Connected the Test Receiver DOP or Video Output to Channel 1 of the oscilloscope. The output of the RF crystal detector was connected to Auxiliary channel 1, which served as a trigger input. The output of the combiner was connected to the Test Receiver.

2) Set the EUT to maximum power and connected as illustrated above. Set the signal generator to the assigned transmitter frequency and modulate it with a 1 kHz tone at 6.25kHz, 12.5 kHz, or 25 kHz deviation and set its output to –100 dBm, then turn on the EUT.

3) The Combiner output side was connected to the Test Receiver, which was used to measure the Power. Used enough external attenuation so that the output at the combiner was set to 40 dB below the maximum input of the Test Receiver, then turn off the EUT.

4) Set the signal generator output to the same level in step 3. This level was maintained for the remainder of the test.

5) Set the horizontal sweep rate on the storage oscilloscope to 10 milliseconds per division and adjusted the display to continuously view the 1 kHz tone from the DOP or Video Output. Adjusted the vertical amplitude control to display the 1 kHz at +/- 4 divisions vertically centered on the display.

6) Set the oscilloscope to trigger at the AUX channel 1 input port.

7) Removed enough external attenuation so that the input to the RF detector and combiner is increased by 30 dB.

8) Turn on the transmitter and plotted the result for **Ton**, **T1**, and **T2**.

9) Set the oscilloscope to trigger in decreasing magnitude from the RF crystal detector.

10) Turn off the transmitter and plotted the result for **T3**.

SPECIFICATION LIMITS AND SAMPLE CALCULATIONS

RADIATED EMISSIONS SPECIFICATION LIMITS

The limits for radiated emissions are based on the power of the transmitter at the operating frequency. Data is measured in the logarithmic form of decibels relative to one milliwatt (dBm) or one microvolt/meter (dBuV/m,). The field strength of the emissions from the EUT is measured on a test site with a receiver.

Below is a formula example used to calculate the attenuation requirement, relative to the transmitters power output, in dBuV/m. For this example an operating power range of 3 watts is used. The radiated emissions limit for spurious signals outside of the assigned frequency block is $43+10\text{Log}_{10}$ (mean output power in watts) dB below the measured amplitude at the operating power.

CALCULATIONS – EFFECTIVE RADIATED POWER

$$E(V/m) = \frac{\sqrt{30 * P * G}}{d}$$

E= Field Strength in V/m
P= Power in Watts (for this example we use 3 watts)
G= Gain of antenna in numeric gain (Assume 1.64 for ERP)
d= distance in meters

$$E(V/m) = \frac{\sqrt{30 * 3 \text{ watts} * 1.64 \text{ dB}}}{3 \text{ meters}}$$

20 * log (4.049 V/m * 1,000,000) = 132.14 dBuV/m @ 3 meters

Note: Substitution Method is performed for spurious emission not being 20-dB below the calculated field strength.

EXHIBIT 1: Test Equipment Calibration Data

Radio Antenna Port (Power and Spurious Emissions), 22-May-09

Manufacturer	Description	Model #	Asset #	Cal Due
Rohde & Schwarz	Power Meter, Dual Channel	NRVD	1071	01-Jul-09
Rohde & Schwarz	Power Sensor 100 uW - 2 Watts (w/ 20 dB pad, SN BJ5155)	NRV-Z32	1536	12-Sep-09
Agilent	PSA, Spectrum Analyzer, (installed options, 111, 115, 123, 1DS, B7J, HYX,	E4446A	2139	30-Dec-09

Radiated Emissions, 30 - 5,000 MHz, 27/28/29-May-09

Manufacturer	Description	Model #	Asset #	Cal Due
Elliott Laboratories	Biconical Antenna, 30-300 MHz	EL30.300	54	03-Apr-11
Elliott Laboratories	Log Periodic Antenna 300-1000 MHz	EL300.1000	55	03-Apr-10
EMCO	Log Periodic Antenna, 0.3-1 GHz	3146A	364	23-Dec-09
Hewlett Packard	EMC Spectrum Analyzer, 9 kHz - 6.5 GHz	8595EM	780	30-Dec-09
EMCO	Biconical Antenna, 30-300 MHz	3110B	801	19-Sep-09
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	09-Oct-09
Hewlett Packard	EMC Spectrum Analyzer, 9 KHz-26.5 GHz	8593EM	1141	29-Dec-09
EMCO	Antenna, Horn, 1-18 GHz (SA40-Red)	3115	1142	15-Jul-10
Rohde & Schwarz	Test Receiver, 0.009-2750 MHz	ESN	1332	14-Apr-10
EMCO	Antenna, Horn, 1-18 GHz	3117	1662	11-Apr-10
Hewlett Packard	Preamplifier, 100 kHz - 1.3 GHz	8447D OPT 010	1826	29-May-09

Environmental Test, 01-Jun-09

Manufacturer	Description	Model #	Asset #	Cal Due
Agilent	PSA, Spectrum Analyzer, (installed options, 111, 115, 123, 1DS, B7J, HYX,	E4446A	2139	30-Dec-09

EXHIBIT 2: Test Data Log Sheets

ELECTROMAGNETIC EMISSIONS

TEST LOG SHEETS

AND

MEASUREMENT DATA

T75434 28 Pages

Client:	GE MDS	Job Number:	J75317
Model:	TRM450SB Single Band	T-Log Number:	T75434
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy	Project Manager:	Mark Briggs
Emissions Standard(s):	FCC Part 90, RSS-210	Class:	-
Immunity Standard(s):	-	Environment:	-

EMC Test Data

For The

GE MDS

Model

TRM450SB Single Band

Date of Last Test: 6/2/2009

Client:	GE MDS	Job Number:	J75317
Model:	TRM450SB Single Band	T-Log Number:	T75434
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC Part 90, RSS-210	Class:	-

Radiated 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

Conducted measurements are made with the EUT's rf port connected to the measurement instrument via an attenuator or dc-block if necessary.

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

Ambient Conditions:

Temperature: 21-24 °C
Rel. Humidity: 30-40 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	Antenna port measurements	2nW (-57dBm)	Pass	-58.8dBm @ 455.00MHz (-1.8dB)
2	RE, 30 - 2000MHz Maximized Emissions	FCC Class B	Pass	34.4dBµV/m @ 40.09MHz (-5.6dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

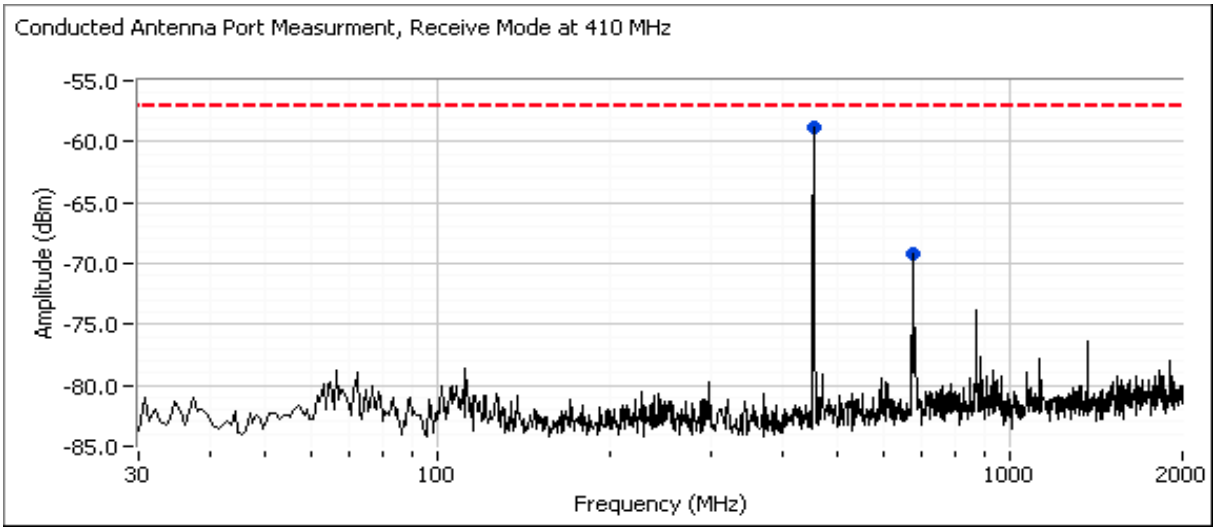
No deviations were made from the requirements of the standard.
Note that the radiated measurements were made with the antenna port temrinated based on the measurements in run #1 showing that the level of emissions at the antenna terminal were below 2nW.

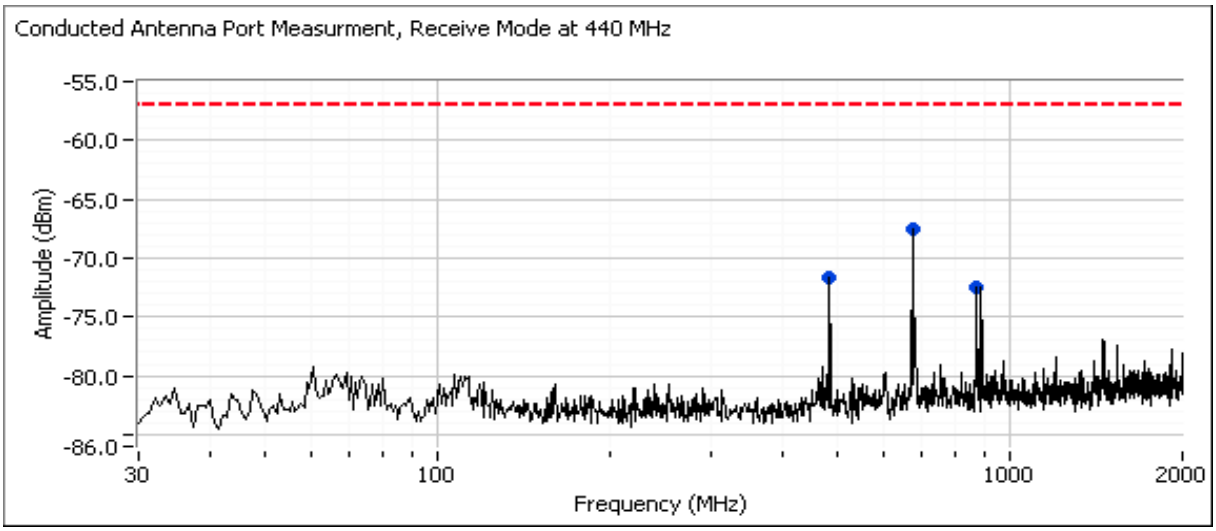
Client:	GE MDS	Job Number:	J75317
Model:	TRM450SB Single Band	T-Log Number:	T75434
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC Part 90, RSS-210	Class:	-

Run #1 - Receiver Spurious Emissions - Antenna Port

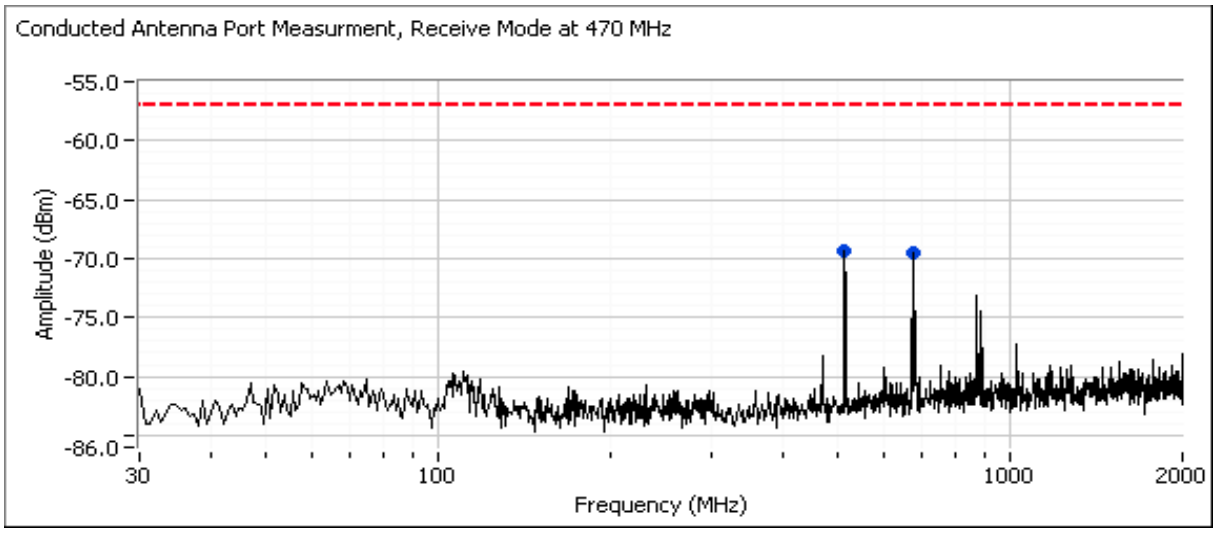
Date of Test: 5/28/2009 Test Engineer: Mehran Birgani

Test Location: Chamber #2





Client:	GE MDS	Job Number:	J75317
Model:	TRM450SB Single Band	T-Log Number:	T75434
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC Part 90, RSS-210	Class:	-



Frequency	Level	RF			Detector	Azimuth	Height	Comments	Frequency
MHz	dBm	Port	Limit	Margin	Pk/QP/Avg	degrees	meters	(bps, kHz)	(MHz)
454.999	**-58.8**	**RF Port**	**-57.0**	**-1.8**	Peak	-	-		410
484.972	-71.6	RF Port	-57.0	-14.6	Peak	-	-		440
514.992	-69.4	RF Port	-57.0	-12.4	Peak	-	-		470
675.216	-69.2	RF Port	-57.0	-12.2	Peak	-	-		410
675.224	-67.5	RF Port	-57.0	-10.5	Peak	-	-		440
675.225	-69.5	RF Port	-57.0	-12.5	Peak	-	-		470
871.591	-72.5	RF Port	-57.0	-15.5	Peak	-	-		440

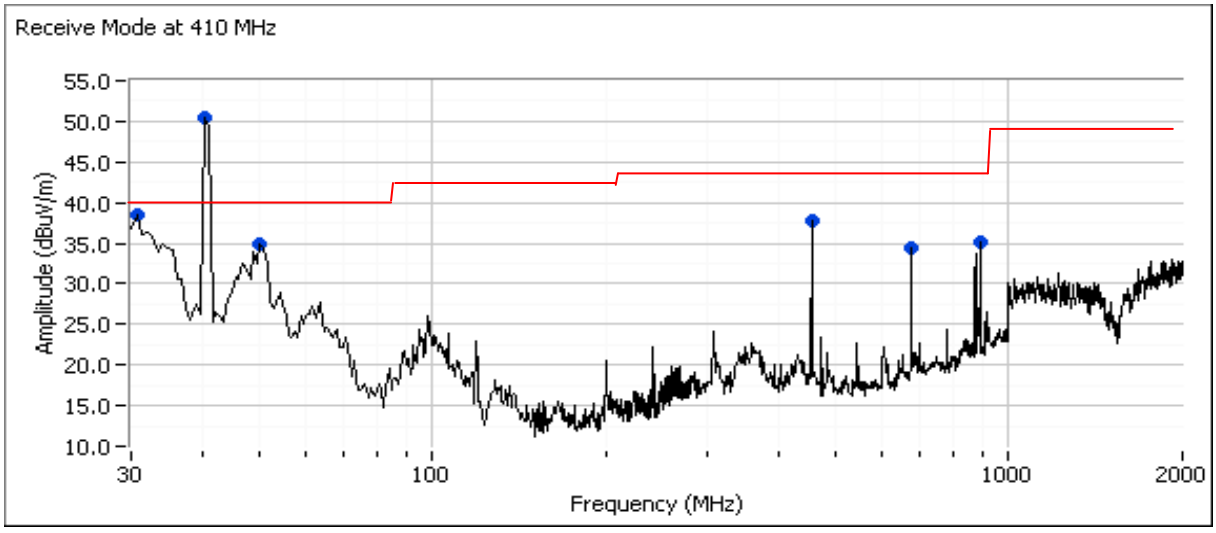
Client:	GE MDS	Job Number:	J75317
Model:	TRM450SB Single Band	T-Log Number:	T75434
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC Part 90, RSS-210	Class:	-

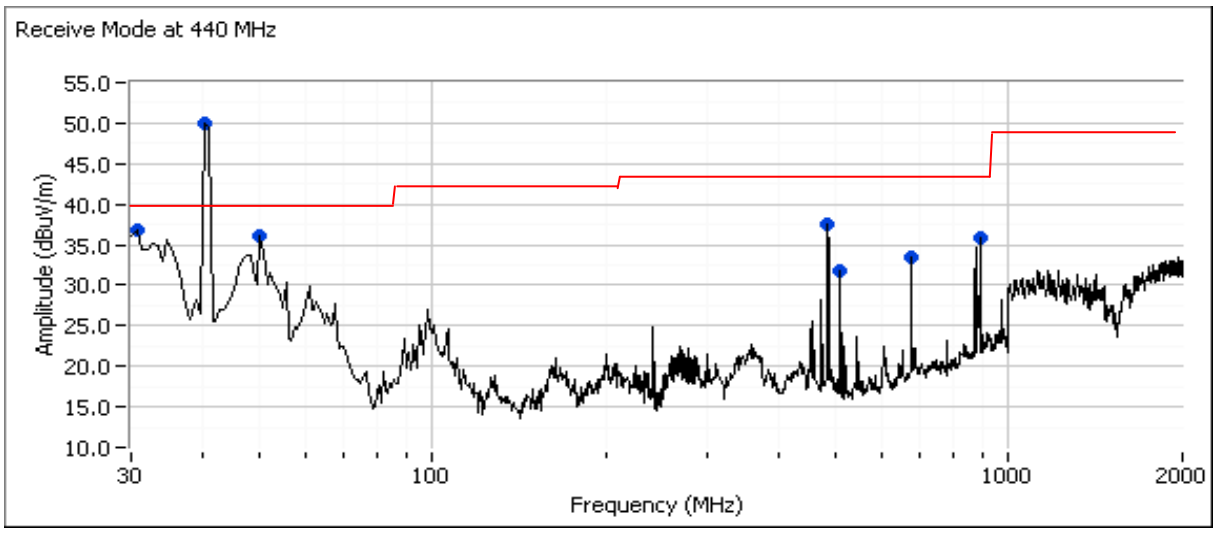
Run #2 - Radiated emissions (Receiver spurious), 30 - 2000 MHz

Run #2a - Preliminary measurements - anechoic chamber

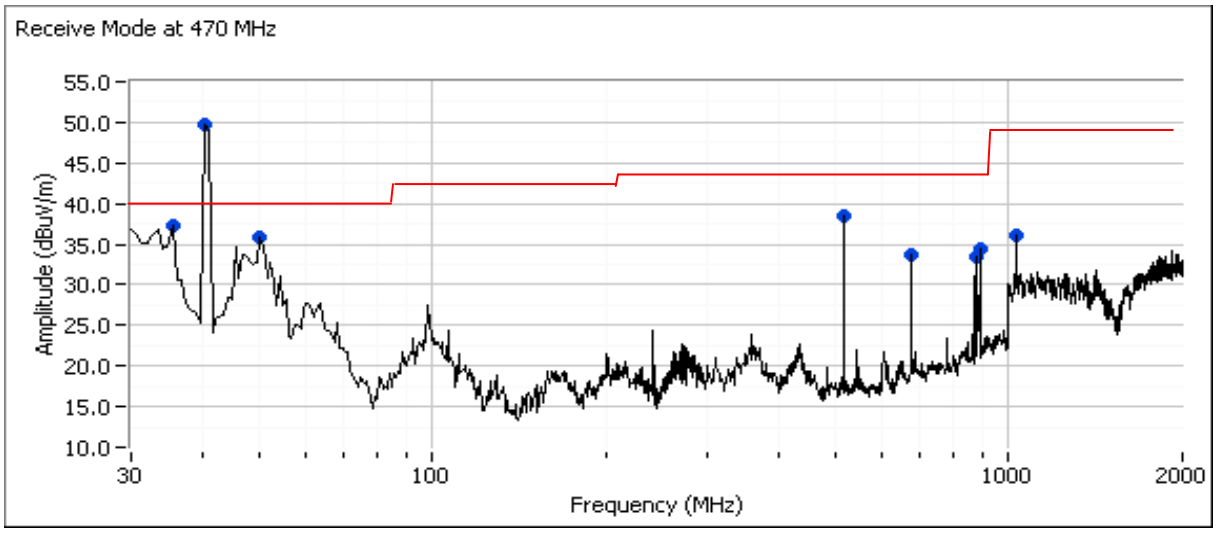
Date of Test: 5/28/2009 Test Engineer: Mehran Birgani

Test Location: Chamber #2





Client:	GE MDS	Job Number:	J75317
Model:	TRM450SB Single Band	T-Log Number:	T75434
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC Part 90, RSS-210	Class:	-



Frequency	Level	Pol	FCC Class B		Detector	Azimuth	Height	Comments	Frequency
MHz	dBm	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	(bps, kHz)	(MHz)
30.106	38.5	V	40.0	-1.5	Peak	61	1.7		410
31.284	36.9	V	40.0	-3.1	Peak	360	1.7		440
35.084	37.2	V	40.0	-2.8	Peak	271	1.7		470
40.095	50.5	V	40.0	**10.5**	Peak	181	1.7		410
40.095	50.0	V	40.0	10.0	Peak	208	1.7		440
40.095	49.8	V	40.0	9.8	Peak	211	1.7		470
50.001	35.8	V	40.0	-4.2	Peak	31	1.7		470
50.119	36.2	V	40.0	-3.8	Peak	179	1.7		440
50.162	35.0	V	40.0	-5.0	Peak	61	1.7		410
455.000	37.8	H	46.0	-8.2	Peak	141	1.7		410
485.016	37.5	H	46.0	-8.5	Peak	335	1.7		440
507.801	31.7	H	46.0	-14.3	Peak	92	1.7		440
515.001	38.1	H	46.0	-7.9	Peak	350	1.7		470
675.229	34.7	H	46.0	-11.3	Peak	70	1.7		470
675.238	34.3	H	46.0	-11.7	Peak	137	1.7		410
675.255	33.4	H	46.0	-12.6	Peak	21	1.7		440
874.467	35.6	H	46.0	-10.4	Peak	61	1.7		470
890.937	35.2	H	46.0	-10.8	Peak	52	1.7		410
890.946	35.9	H	46.0	-10.1	Peak	201	1.7		440
891.033	36.0	H	46.0	-10.0	Peak	131	1.7		470
1030.000	36.1	H	54.0	-17.9	Peak	212	1.7		470

Note 1:	Measurements are made with the antenna port terminated.

Client:	GE MDS	Job Number:	J75317
Model:	TRM450SB Single Band	T-Log Number:	T75434
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy		
Standard:	FCC Part 90, RSS-210	Class:	-

Run #2b - Final OATS EUT Field Strength Measurements

Date of Test: 5/29/2009 Test Engineer: Mehran Birgani

Test Location: SV OATS #2

EUT Field Strength

Frequency	Level	Pol	FCC Class B		Detector	Azimuth	Height	Comments	Frequency
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	(bps, kHz)	(MHz)
1029.970	29.9	H	54.0	-24.1	AVG	208	1.0		470
675.229	32.8	H	46.0	-13.2	Peak	201	1.0		470
874.467	33.1	H	46.0	-12.9	Peak	199	1.0		470
891.033	32.0	H	46.0	-14.0	Peak	155	1.0		470
1029.580	45.8	H	74.0	-28.2	PK	208	1.0		470
30.106	21.6	V	40.0	-18.4	QP	231	1.0		410
35.084	30.7	V	40.0	-9.3	QP	201	1.0		470
40.093	**34.4**	**V**	**40.0**	**-5.6**	QP	197	1.0		410
50.158	25.0	V	40.0	-15.0	QP	210	1.0		440
454.998	39.1	H	46.0	-6.9	QP	155	1.0		410
484.998	34.1	H	46.0	-11.9	QP	168	1.0		440
507.801	19.3	H	46.0	-26.7	QP	15	1.0		440
514.998	35.4	H	46.0	-10.6	QP	169	1.0		470

Note 1:	Measurements are made with the antenna port terminated.

Client:	GE MDS	Job Number:	J75317
Model:	TRM450SB Single Band	T-Log Number:	T75434
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy	Priject Manager:	Mark Briggs
Standard:	FCC Part 90, RSS-210	Class:	N/A

RSS 119 and FCC Part 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: 21-24 °C

Rel. Humidity: 30-40 %

Summary of Results

Run #	Spacing	Data Rate	Test Performed	Limit	Pass / Fail	Result / Margin
1	25.0 kHz	9.6kbps	Output Power (Low Power)	30dBm	Pass	28.5dBm
1	25.0 kHz	9.6kbps	Output Power (High Power)	33.4dBm	Pass	33.5dBm
2	12.5 kHz	4.8kbps	Spectral Mask 90.210 D	-	Pass	-
2	25.0 kHz	9.6kbps	Spectral Mask 90.210 C	-	Pass	-
3	12.5 kHz	4.8kbps	26dB Occupied Bandwidth	12.5 kHz	Pass	11.1 kHz
3	25.0 kHz	9.6kbps	26dB Occupied Bandwidth	25.0 kHz	Pass	21.6 kHz
3	12.5 kHz	4.8kbps	99% or Occupied Bandwidth	-	-	9.2 kHz
3	25.0 kHz	9.6kbps	99% or Occupied Bandwidth	-	-	16.1 kHz
4	12.5 kHz	4.8kbps	Spurious Emissions (conducted)	-13 dBm	Pass	> 20dB Margin
4	25.0 kHz	9.6kbps	Spurious Emissions (conducted)	-20 dBm	Pass	> 15dB Margin
5	12.5 kHz	4.8kbps	Spurious emissions (radiated)	-20 dBm	Pass	> 20dB margin
5	25.0 kHz	9.6kbps	Spurious emissions (radiated)	-20 dBm	Pass	-34.8dBm erp (-14.8 dB margin)
6	N/A	N/A	Frequency Stability	-	Pass	0.6ppm

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	GE MDS	Job Number:	J75317
Model:	TRM450SB Single Band	T-Log Number:	T75434
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy	Priject Manager:	Mark Briggs
Standard:	FCC Part 90, RSS-210	Class:	N/A

Run #1: Output Power

Date of Test: 5/22/2009 Test Engineer: Mehran Birgani
Test Location: Radio Lab

Run #1a: Output Power (Baud rate: 4.8kbps, Bandwidth: 12.5kHz)

Power Setting[2]	Frequency (MHz)	Output Power (dBm) [1]	Output Power mW	Antenna Gain (dBi)	Result	EIRP dBm	EIRP W
L	410.0	26.5	446.7		Pass	26.5	0.447
L	440.0	27.4	549.5		Pass	27.4	0.550
L	470.0	27.0	501.2		Pass	27.0	0.501
H	410.0	32.7	1862.1		Pass	32.7	1.862
H	440.0	33.2	2089.3		Pass	33.2	2.089
H	470.0	33.0	1972.4		Pass	33.0	1.972

Run #1b: Output Power (Baud rate: 9.6kbps, Bandwidth: 25.0kHz)

Power Setting[2]	Frequency (MHz)	Output Power (dBm) [1]	Output Power mW	Antenna Gain (dBi)	Result	EIRP dBm	EIRP W
L	410.0	26.4	436.5		Pass	26.4	0.437
L	440.0	27.3	537.0		Pass	27.3	0.537
L	470.0	27.0	501.2		Pass	27.0	0.501
H	410.0	32.8	1905.5		Pass	32.8	1.905
H	440.0	33.4	2187.8		Pass	33.4	2.188
H	470.0	33.0	1981.5		Pass	33.0	1.982

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.

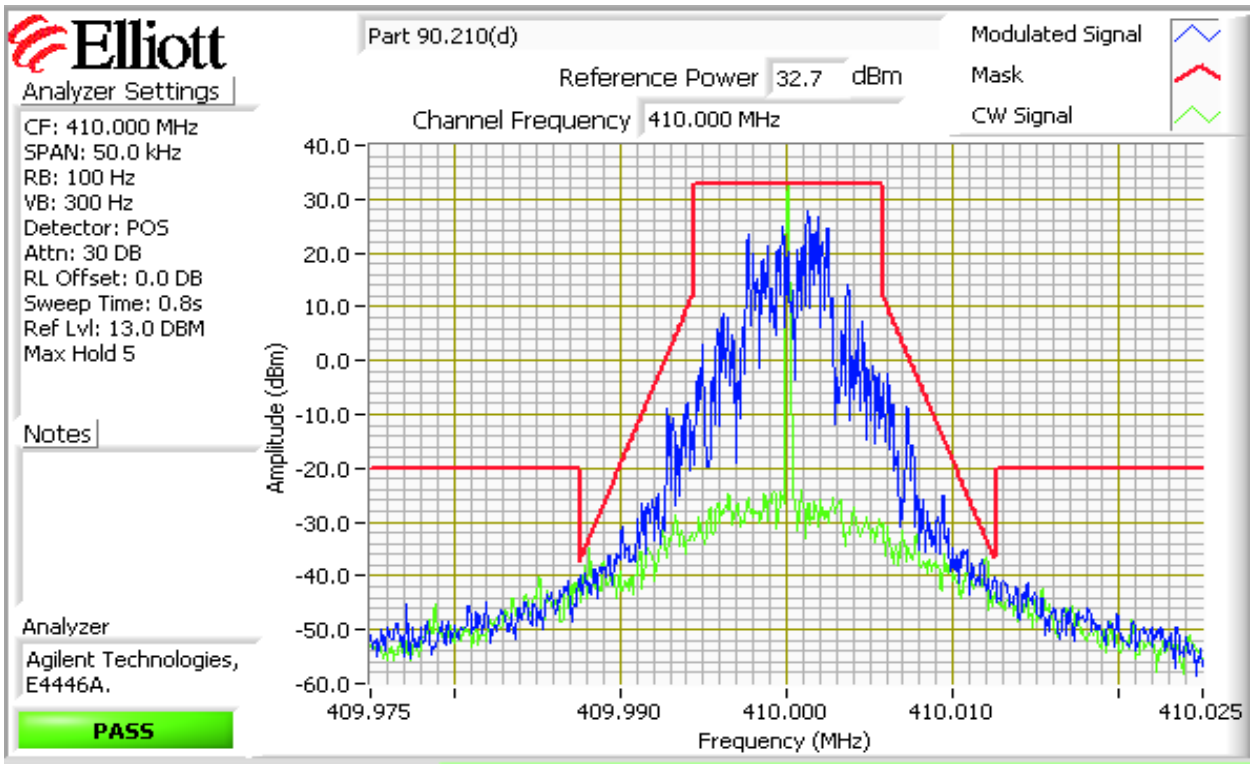
Client:	GE MDS	Job Number:	J75317
Model:	TRM450SB Single Band	T-Log Number:	T75434
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy	Priject Manager:	Mark Briggs
Standard:	FCC Part 90, RSS-210	Class:	N/A

Run #2: Spectral Mask, FCC Part 90

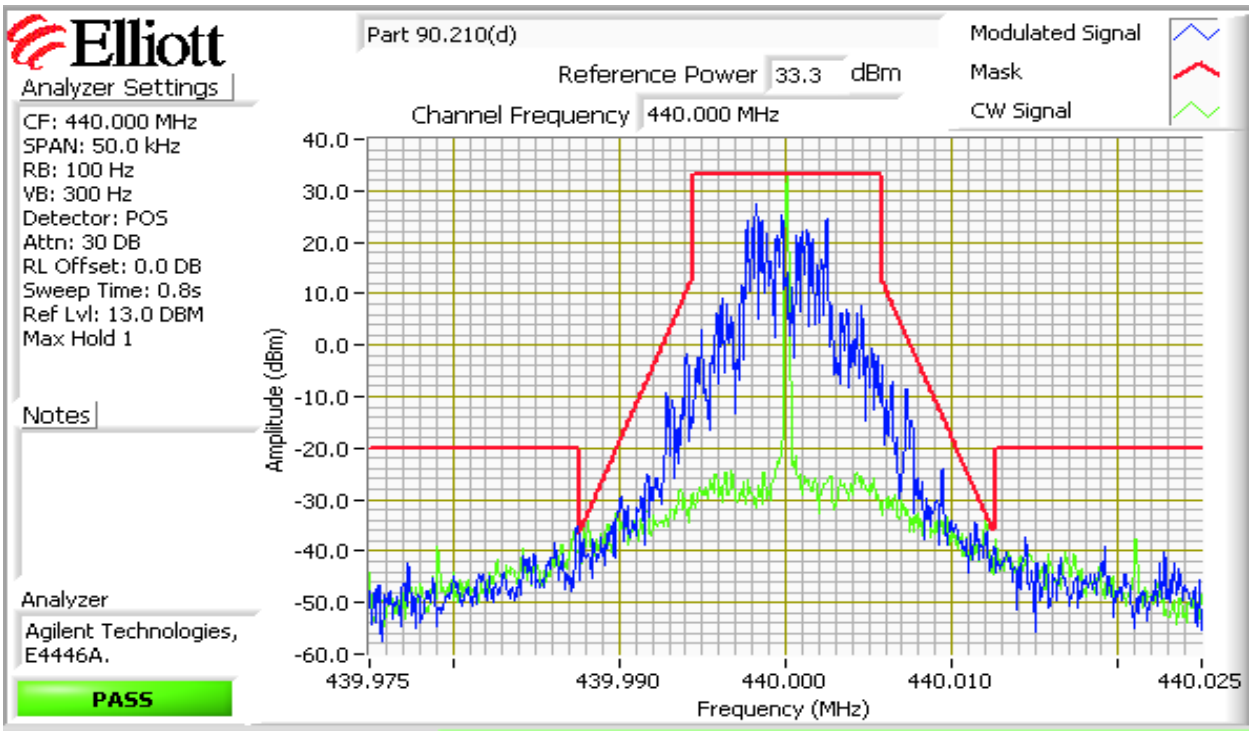
Date of Test: 5/22/2009 Test Engineer: Mehran Birgani

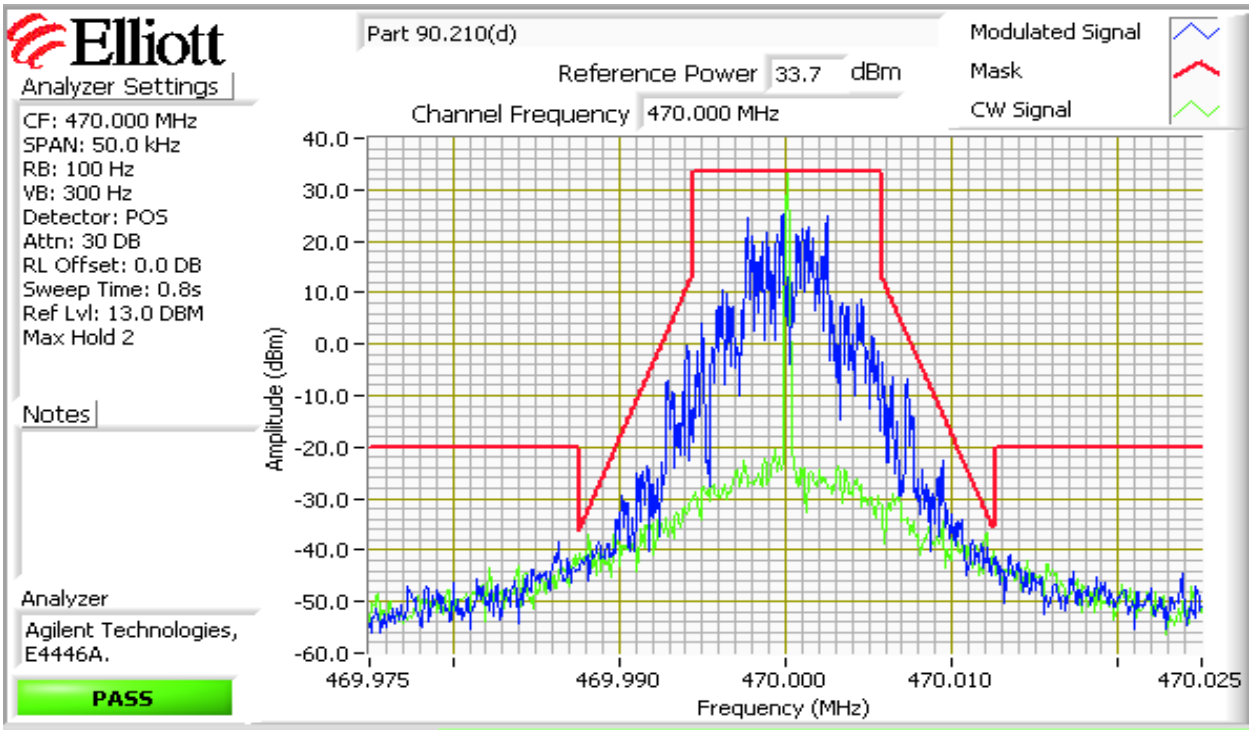
Test Location: Radio Lab

Run #2a: Spectral Mask, FCC Part 90 Mask D (Baud Rate: 4.8kbps and Bandwidth: 12.5kHz)



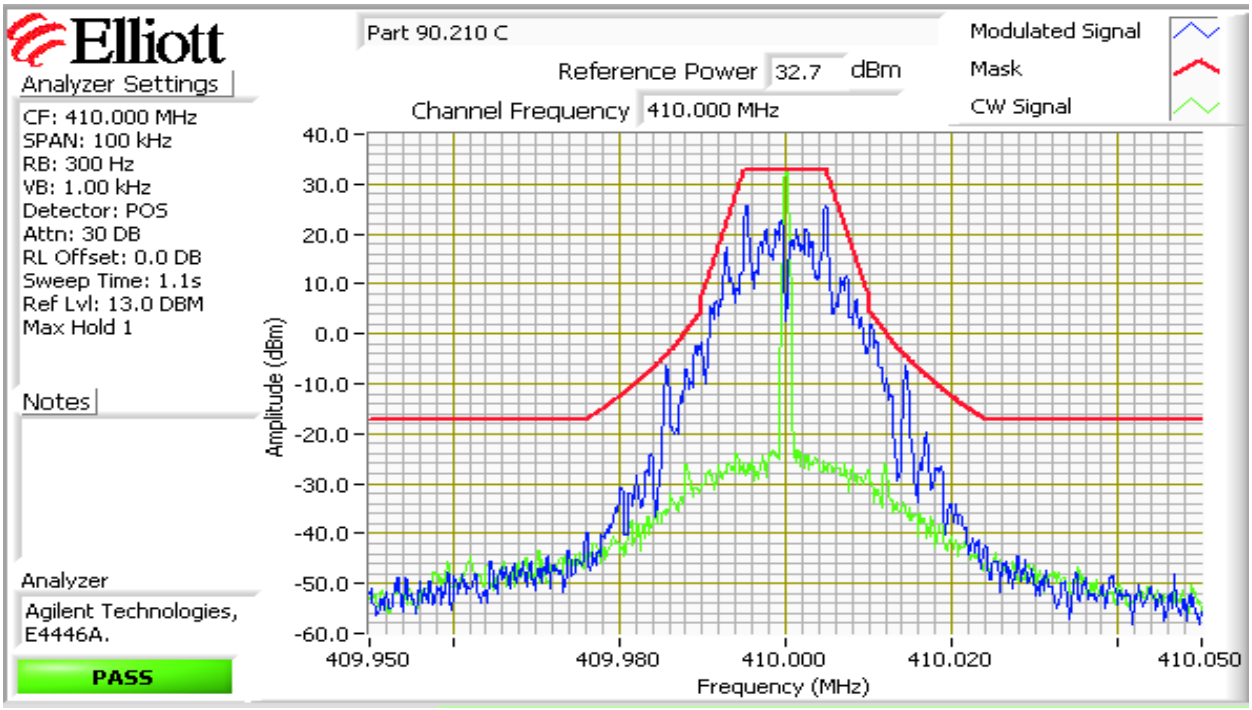
Client:	GE MDS	Job Number:	J75317
Model:	TRM450SB Single Band	T-Log Number:	T75434
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy	Priject Manager:	Mark Briggs
Standard:	FCC Part 90, RSS-210	Class:	N/A

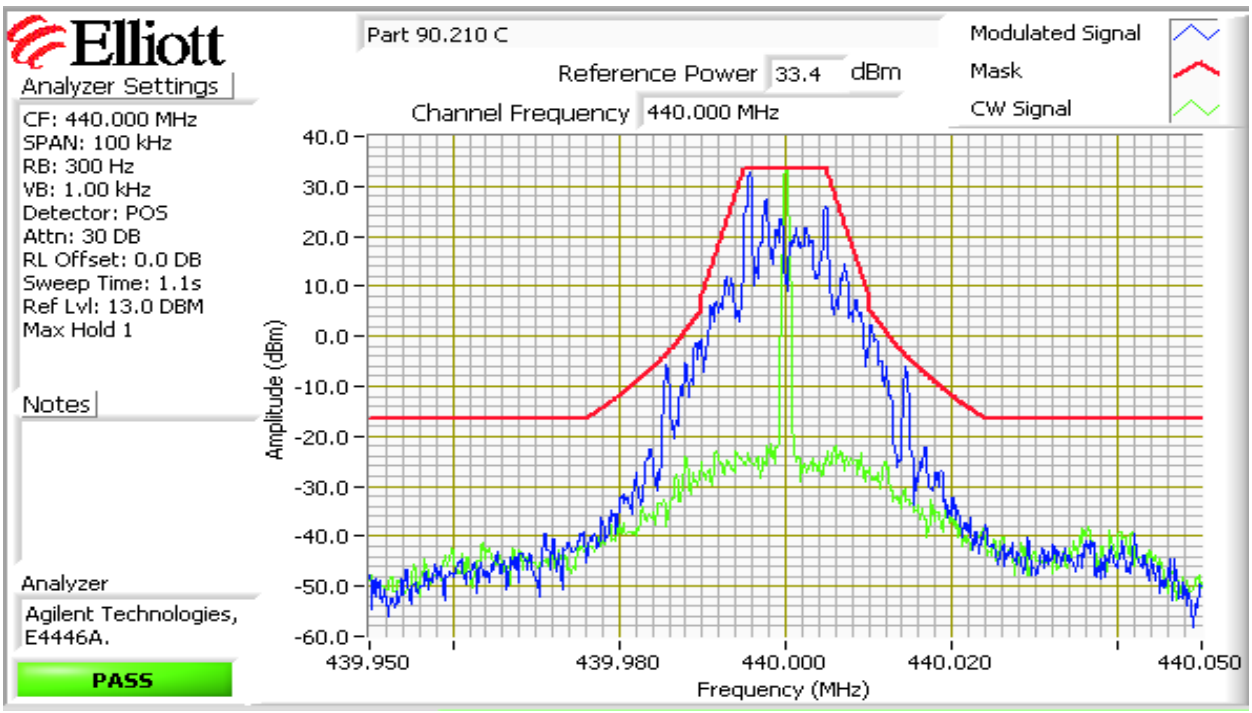




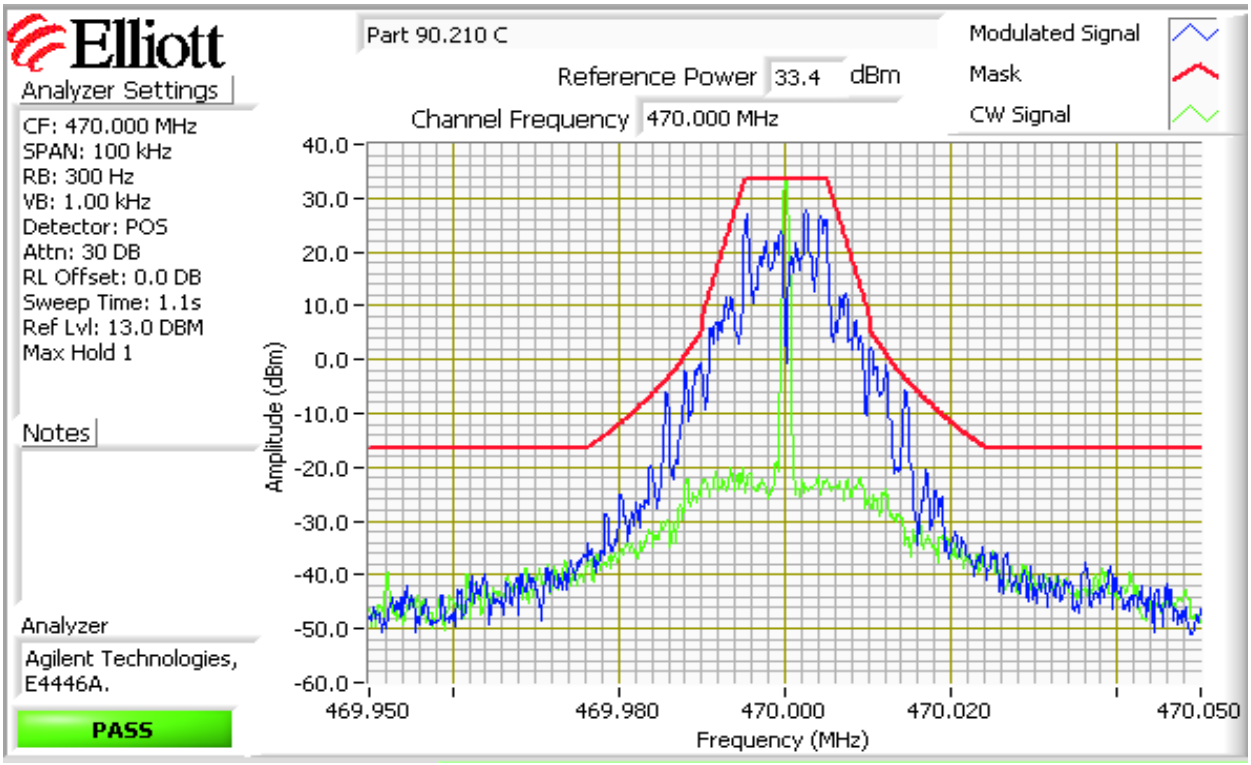
Client:	GE MDS	Job Number:	J75317
Model:	TRM450SB Single Band	T-Log Number:	T75434
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy	Priject Manager:	Mark Briggs
Standard:	FCC Part 90, RSS-210	Class:	N/A

Run #2b: Spectral Mask, FCC Part 90 Mask C (Baud Rate: 9.6kbps and Bandwidth: 25.0kHz)





Client:	GE MDS	Job Number:	J75317
Model:	TRM450SB Single Band	T-Log Number:	T75434
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy	Priject Manager:	Mark Briggs
Standard:	FCC Part 90, RSS-210	Class:	N/A



Note 1:	Describe settings used and how the reference for the top of the mask was determined.

Run #3: Signal Bandwidth

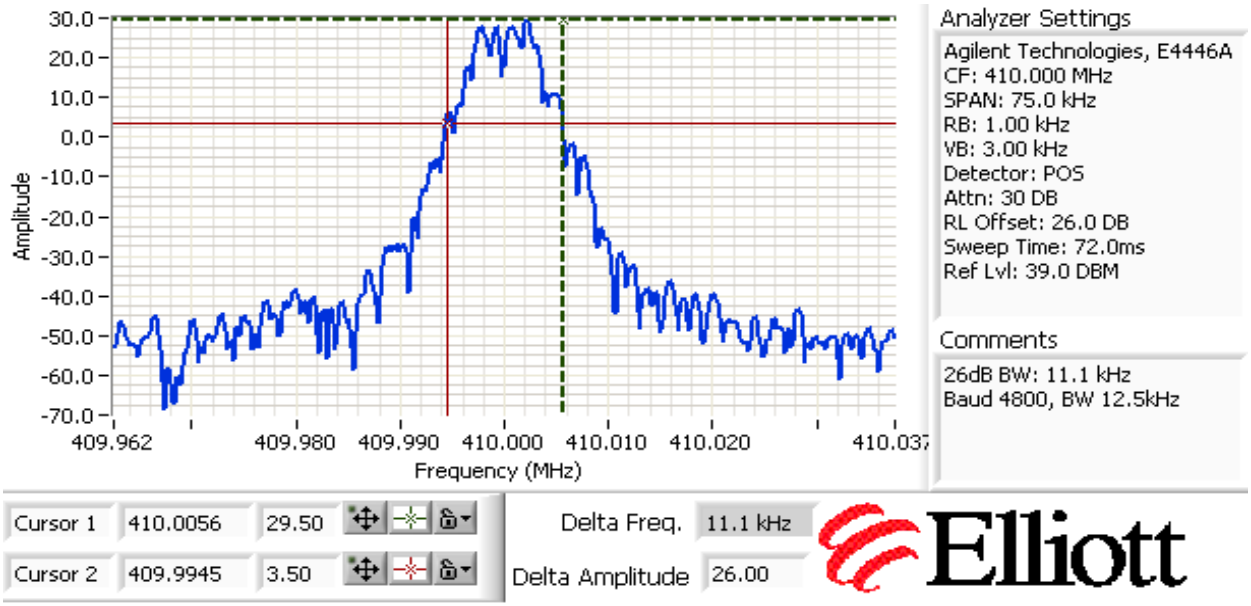
Date of Test: 5/22/2009
Test Location: Radio Lab

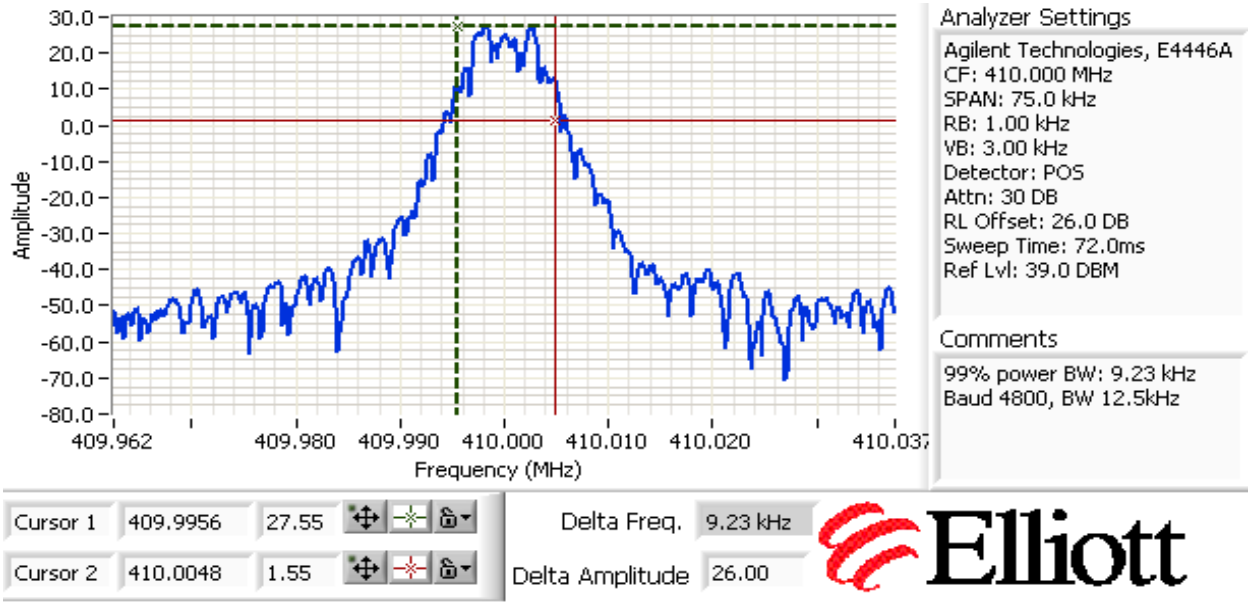
Test Engineer: Mehran Birgani

Power Setting	Frequency (MHz)	Resolution Bandwidth	Bandwidth (kHz) 26dB	99%
Baud 4.8kbps, BW 12.5kHz, 2 Watts				
High	410.0	1kHz	11.1	9.2
High	440.0	1kHz	11.1	8.2
High	470.0	1kHz	9.5	8.1
Baud 9.6kbps, BW 25.0kHz, 2 Watts				
High	410.0	1kHz	21.6	15.1
High	440.0	1kHz	21.6	16.1
High	470.0	1kHz	21.4	15.2

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

Client:	GE MDS	Job Number:	J75317
Model:	TRM450SB Single Band	T-Log Number:	T75434
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy	Priject Manager:	Mark Briggs
Standard:	FCC Part 90, RSS-210	Class:	N/A





Client:	GE MDS	Job Number:	J75317
Model:	TRM450SB Single Band	T-Log Number:	T75434
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy	Priject Manager:	Mark Briggs
Standard:	FCC Part 90, RSS-210	Class:	N/A

Analyzer Settings

Agilent Technologies, E4446A
CF: 440.000 MHz
SPAN: 75.0 kHz
RB: 1.00 kHz
VB: 3.00 kHz
Detector: POS
Attn: 30 DB
RL Offset: 26.0 DB
Sweep Time: 72.0ms
Ref Lvl: 39.0 DBM

Comments

26dB BW: 11.1 kHz
Baud 4800, BW 12.5kHz

Cursor 1	440.0056	29.93	Delta Freq.	11.1 kHz	
Cursor 2	439.9945	3.93	Delta Amplitude	26.00	

Elliott

Analyzer Settings

Agilent Technologies, E4446A
CF: 440.000 MHz
SPAN: 75.0 kHz
RB: 1.00 kHz
VB: 3.00 kHz
Detector: POS
Attn: 30 DB
RL Offset: 26.0 DB
Sweep Time: 72.0ms
Ref Lvl: 39.0 DBM

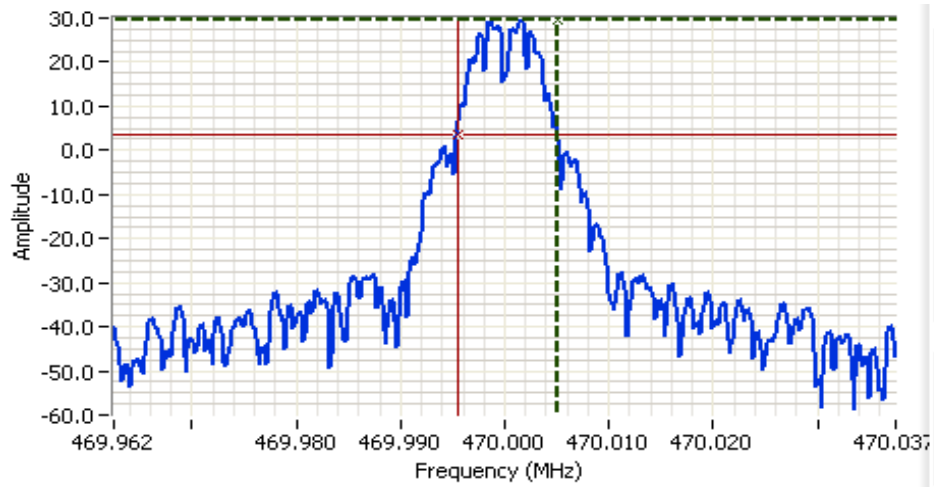
Comments

99% power BW: 8.24 kHz
Baud 4800, BW 12.5kHz

Cursor 1	439.9962	29.51	Delta Freq.	8.24 kHz	
Cursor 2	440.0044	3.51	Delta Amplitude	26.00	

Elliott

Client:	GE MDS	Job Number:	J75317
Model:	TRM450SB Single Band	T-Log Number:	T75434
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy	Priject Manager:	Mark Briggs
Standard:	FCC Part 90, RSS-210	Class:	N/A



Analyzer Settings
Agilent Technologies, E4446A
CF: 470.000 MHz
SPAN: 75.0 kHz
RB: 1.00 kHz
VB: 3.00 kHz
Detector: POS
Attn: 30 DB
RL Offset: 26.0 DB
Sweep Time: 72.0ms
Ref Lvl: 39.0 DBM

Comments
26dB BW: 9.50 kHz
Baud 4800, BW 12.5kHz

Cursor 1	470.0050	29.45	Delta Freq.	9.50 kHz
Cursor 2	469.9955	3.45	Delta Amplitude	26.00

Elliott

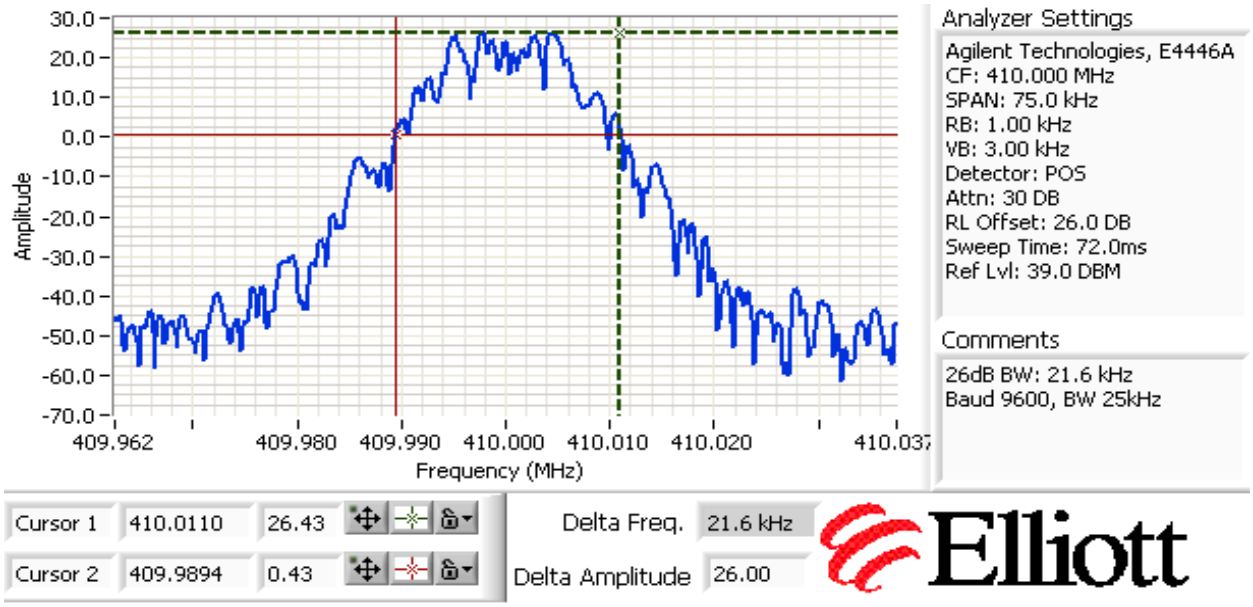
Analyzer Settings
Agilent Technologies, E4446A
CF: 470.000 MHz
SPAN: 75.0 kHz
RB: 1.00 kHz
VB: 3.00 kHz
Detector: POS
Attn: 30 DB
RL Offset: 26.0 DB
Sweep Time: 72.0ms
Ref Lvl: 39.0 DBM

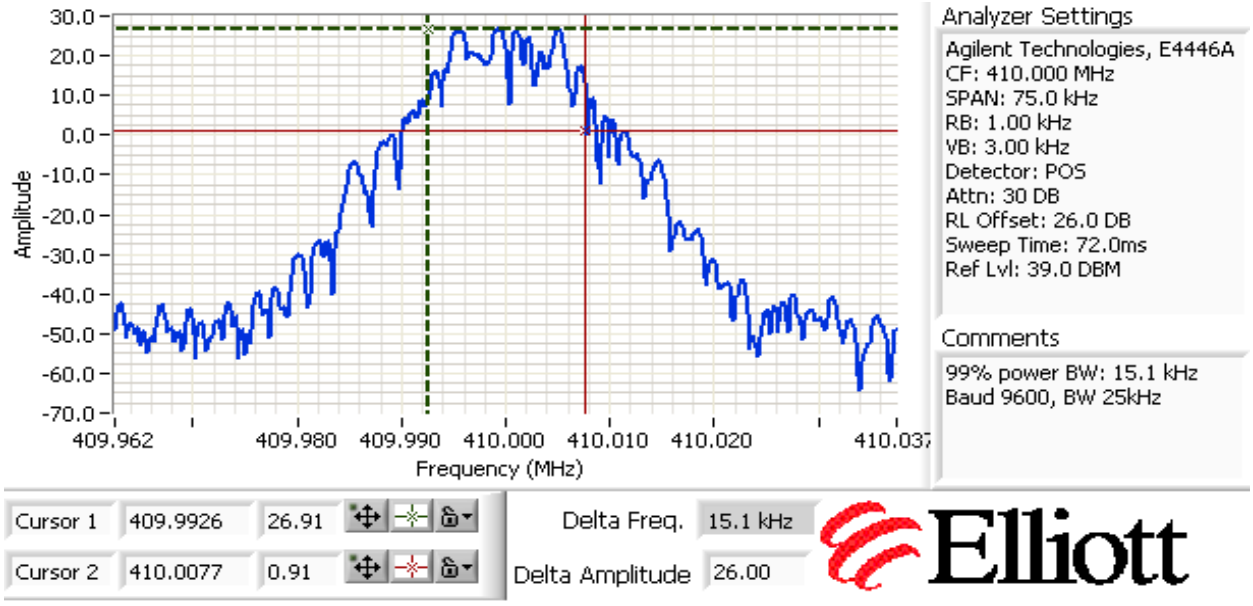
Comments
99% power BW: 8.11 kHz
Baud 4800, BW 12.5kHz

Cursor 1	469.9963	29.65	Delta Freq.	8.11 kHz
Cursor 2	470.0044	3.65	Delta Amplitude	26.00

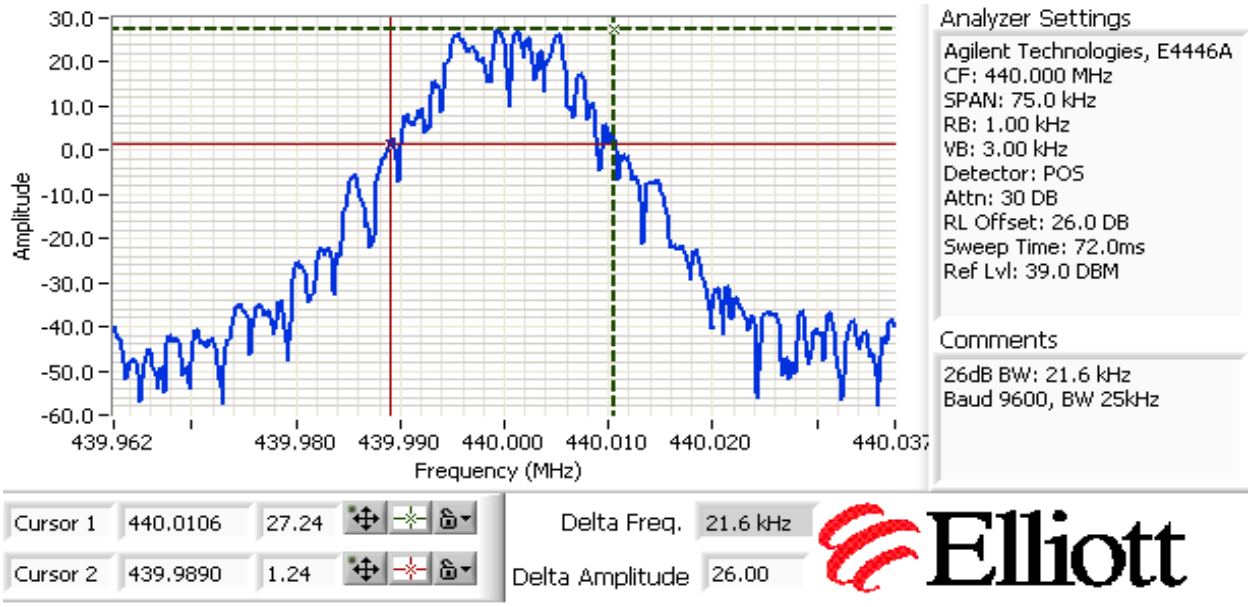
Elliott

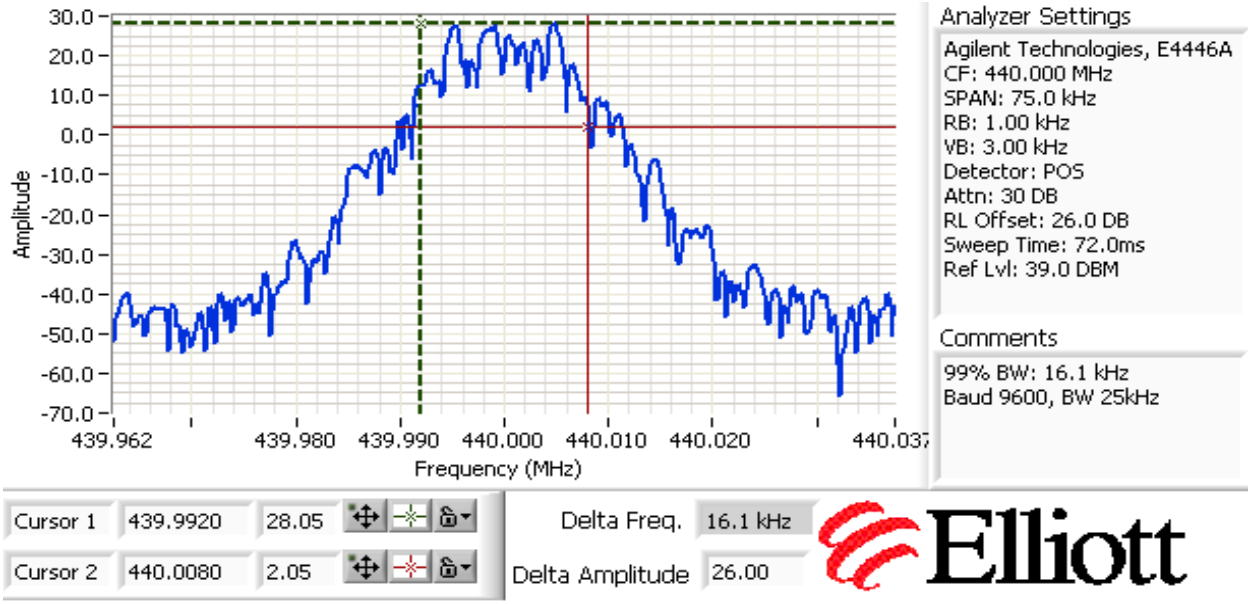
Client:	GE MDS	Job Number:	J75317
Model:	TRM450SB Single Band	T-Log Number:	T75434
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy	Priject Manager:	Mark Briggs
Standard:	FCC Part 90, RSS-210	Class:	N/A



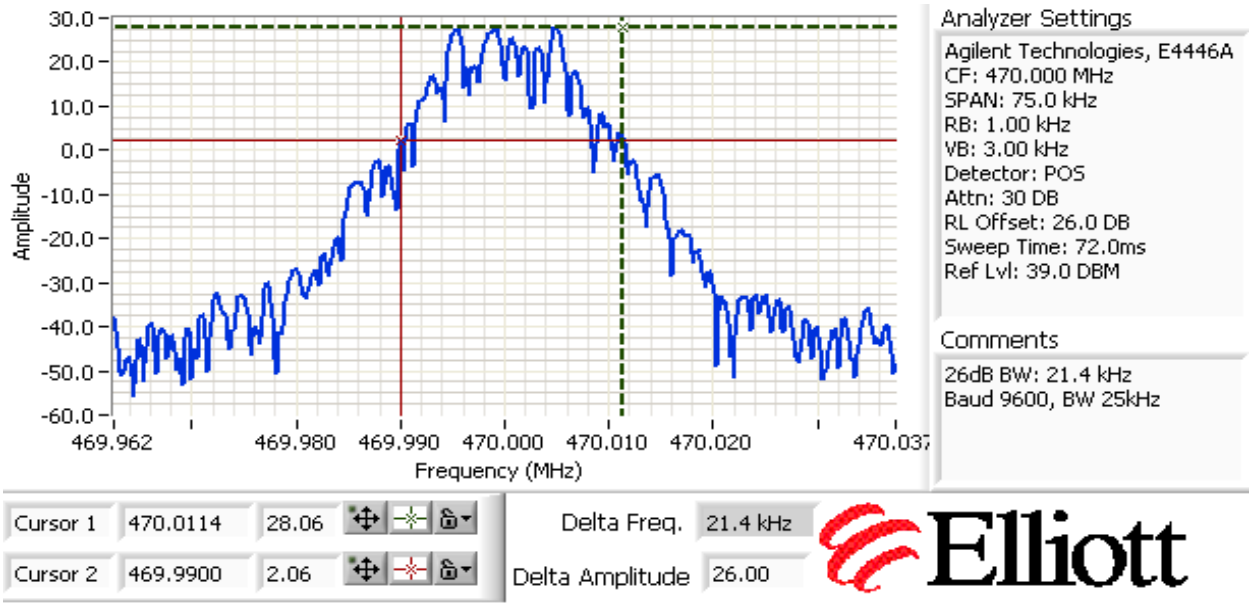


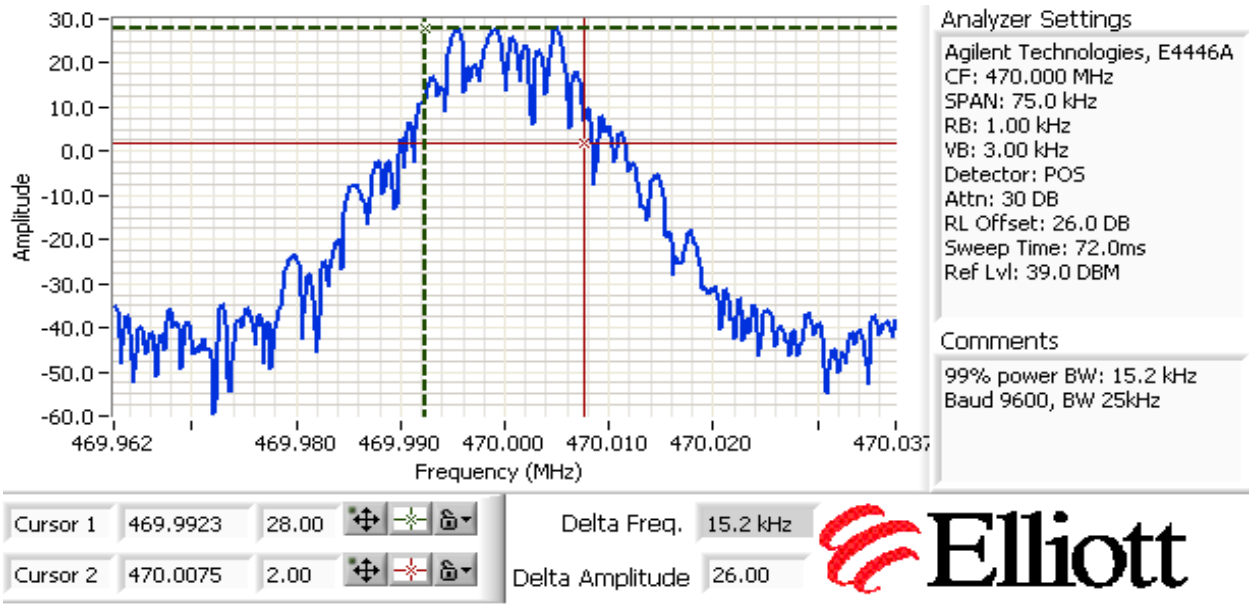
Client:	GE MDS	Job Number:	J75317
Model:	TRM450SB Single Band	T-Log Number:	T75434
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy	Priject Manager:	Mark Briggs
Standard:	FCC Part 90, RSS-210	Class:	N/A





Client:	GE MDS	Job Number:	J75317
Model:	TRM450SB Single Band	T-Log Number:	T75434
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy	Priject Manager:	Mark Briggs
Standard:	FCC Part 90, RSS-210	Class:	N/A





Client:	GE MDS	Job Number:	J75317
Model:	TRM450SB Single Band	T-Log Number:	T75434
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy	Priject Manager:	Mark Briggs
Standard:	FCC Part 90, RSS-210	Class:	N/A

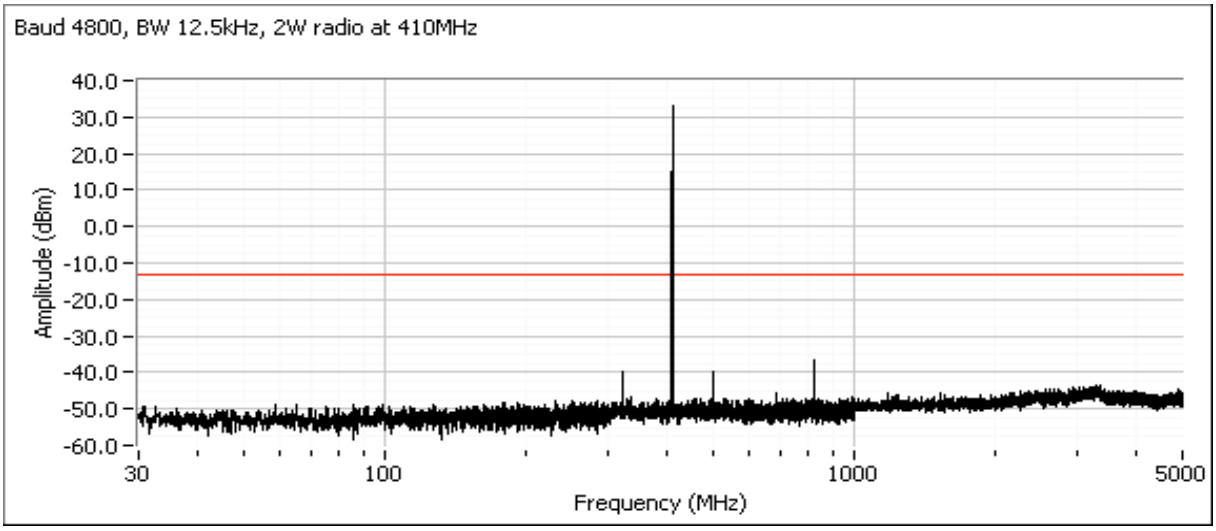
Run #4: Out of Band Spurious Emissions, Conducted

Date of Test: 5/22/2009 Test Engineer: Mehran Birgani
Test Location: Radio Lab

Frequency (MHz)	Limit	Result
Baud 4.8kbps, BW 12.5kHz, 2 Watts		
410.0	-13 dBm	Pass
440.0	-13 dBm	Pass
470.0	-13 dBm	Pass
Baud 9.6kbps, BW 25.0kHz, 2 Watts		
410.0	-20 dBm	Pass
440.0	-20 dBm	Pass
470.0	-20 dBm	Pass

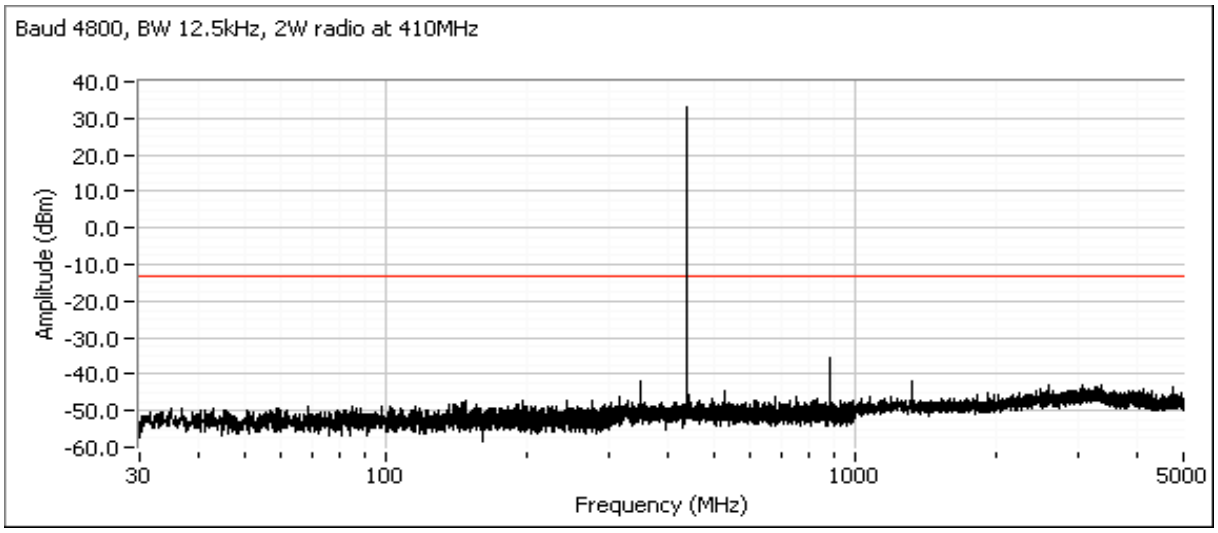
The limit is taken from FCC Part 90.210 Mask D (for 12.5kHz bandwidth) and Mask C (for 25kHz bandwidth).

Plots for low channel, power setting(s) = High

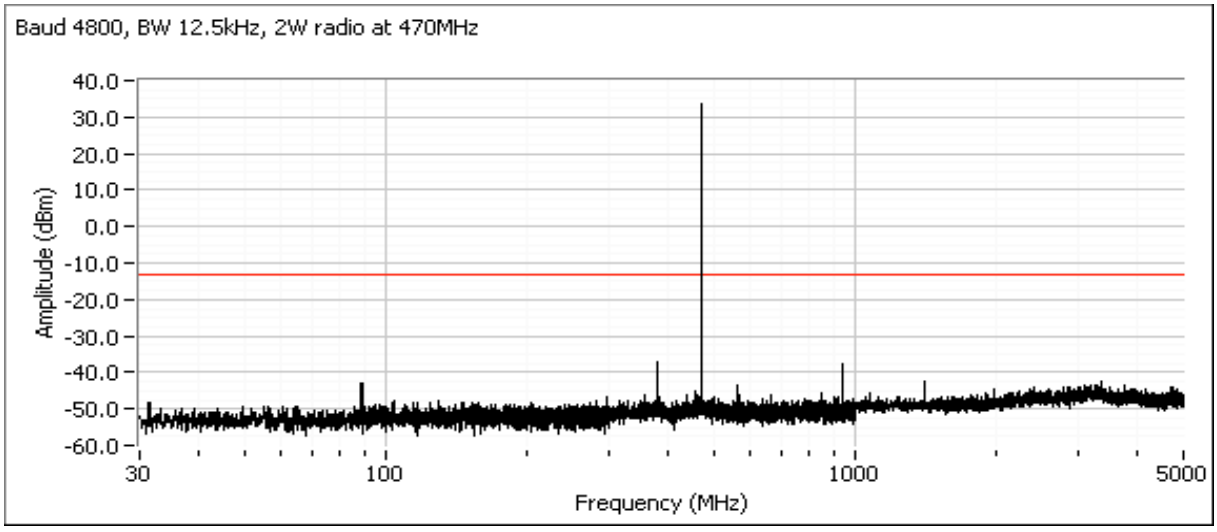


Client:	GE MDS	Job Number:	J75317
Model:	TRM450SB Single Band	T-Log Number:	T75434
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy	Priject Manager:	Mark Briggs
Standard:	FCC Part 90, RSS-210	Class:	N/A

Plots for center channel, power setting(s) = High



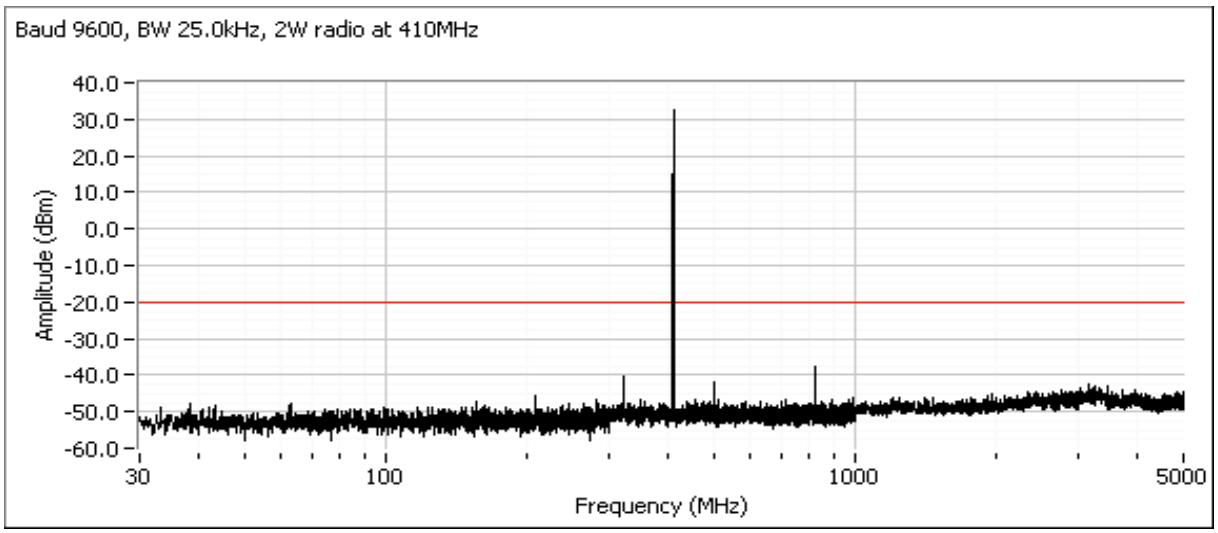
Plots for high channel, power setting(s) = High



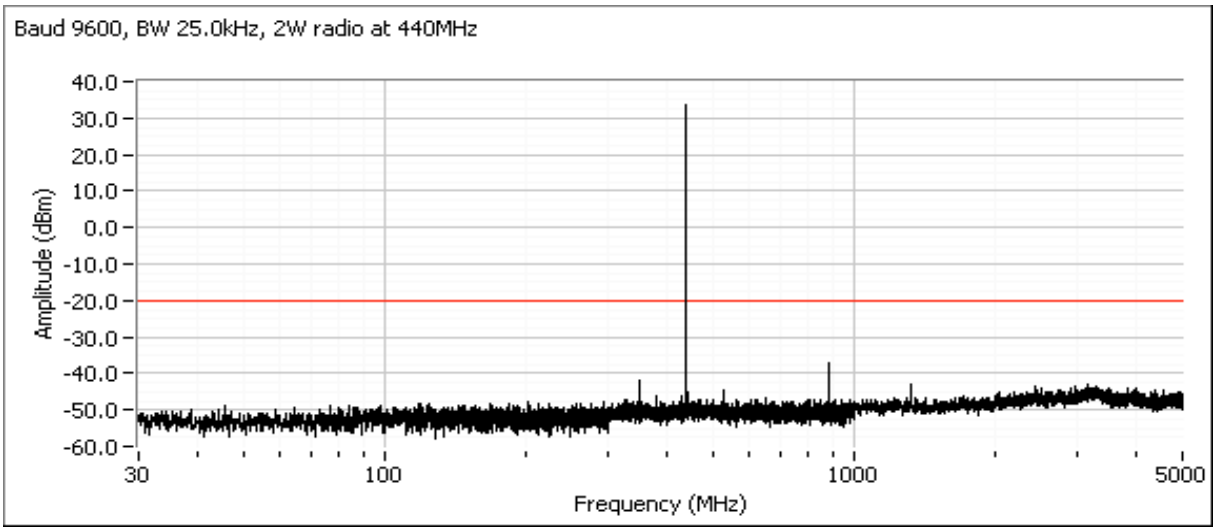
Client:	GE MDS	Job Number:	J75317
Model:	TRM450SB Single Band	T-Log Number:	T75434
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy	Priject Manager:	Mark Briggs
Standard:	FCC Part 90, RSS-210	Class:	N/A

The limit is taken from FCC Part 90.210 Mask C

Plots for low channel, power setting(s) = High

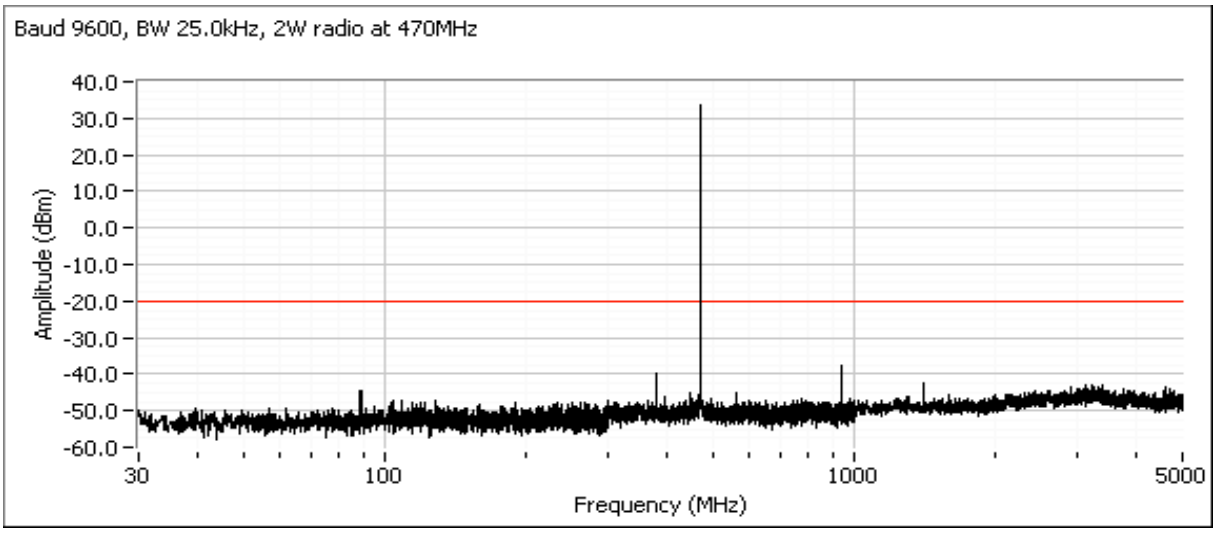


Plots for center channel, power setting(s) = High



Client:	GE MDS	Job Number:	J75317
Model:	TRM450SB Single Band	T-Log Number:	T75434
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy	Priject Manager:	Mark Briggs
Standard:	FCC Part 90, RSS-210	Class:	N/A

Plots for high channel, power setting(s) = High



Client:	GE MDS	Job Number:	J75317
Model:	TRM450SB Single Band	T-Log Number:	T75434
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy	Priject Manager:	Mark Briggs
Standard:	FCC Part 90, RSS-210	Class:	N/A

Run #5: Out of Band Spurious Emissions, Radiated

The limit is taken from FCC Part 90.210 Mask C

Conducted limit (dBm): -20

Approximate field strength limit @ 3m: 75.3

Run #5a - Preliminary measurements - chamber scans

Date of Test: 5/27/2009 Test Engineer: Mehran Birgani

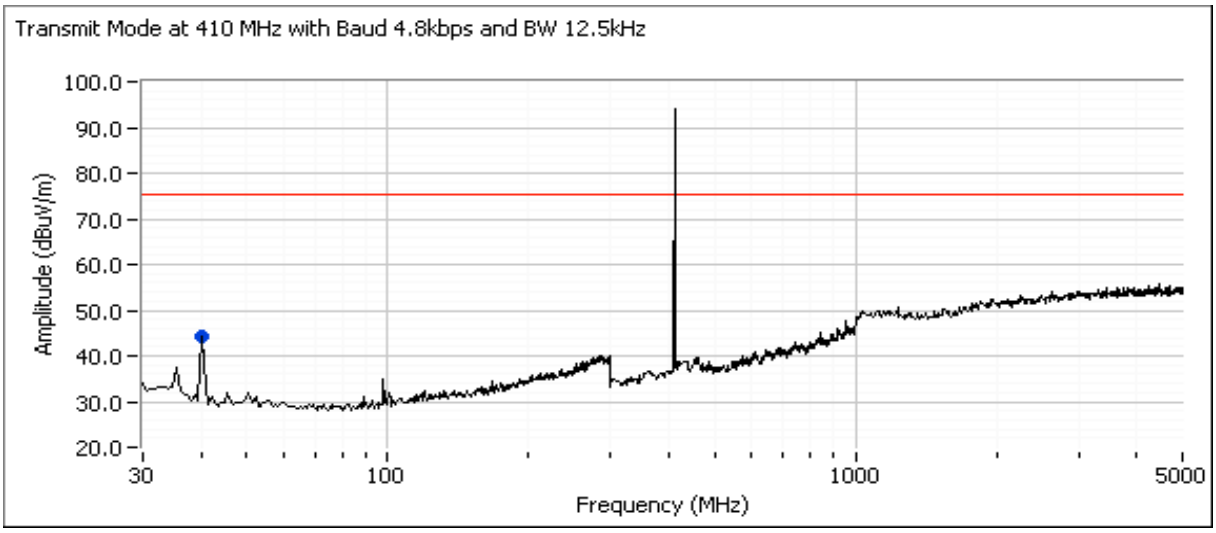
Test Location: Radio Lab

Frequency	Level	Pol	FCC 90.210		Detector	Azimuth	Height	Comments	Frequency
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	(bps, kHz)	(MHz)
40.095	44.3	V	75.3	-31.0	Peak	178	1.7	Baud 4800, BW 12.5	410
40.091	43.7	V	75.3	-31.6	Peak	181	1.7	Baud 4800, BW 12.5	440
40.095	44.1	V	75.3	-31.2	Peak	179	1.7	Baud 4800, BW 12.5	470
1410.050	53.8	V	75.3	-21.5	Peak	87	1.7	Baud 4800, BW 12.5	470
40.095	44.1	V	75.3	-31.2	Peak	181	1.7	Baud 9600, BW 25.0	410
40.095	44.1	V	75.3	-31.2	Peak	208	1.7	Baud 9600, BW 25.0	440
40.095	43.8	V	75.3	-31.5	Peak	181	1.7	Baud 9600, BW 25.0	470
940.003	50.6	H	75.3	-24.7	Peak	52	1.7	Baud 9600, BW 25.0	470
1410.100	55.8	V	75.3	-19.5	Peak	69	1.7	Baud 9600, BW 25.0	470

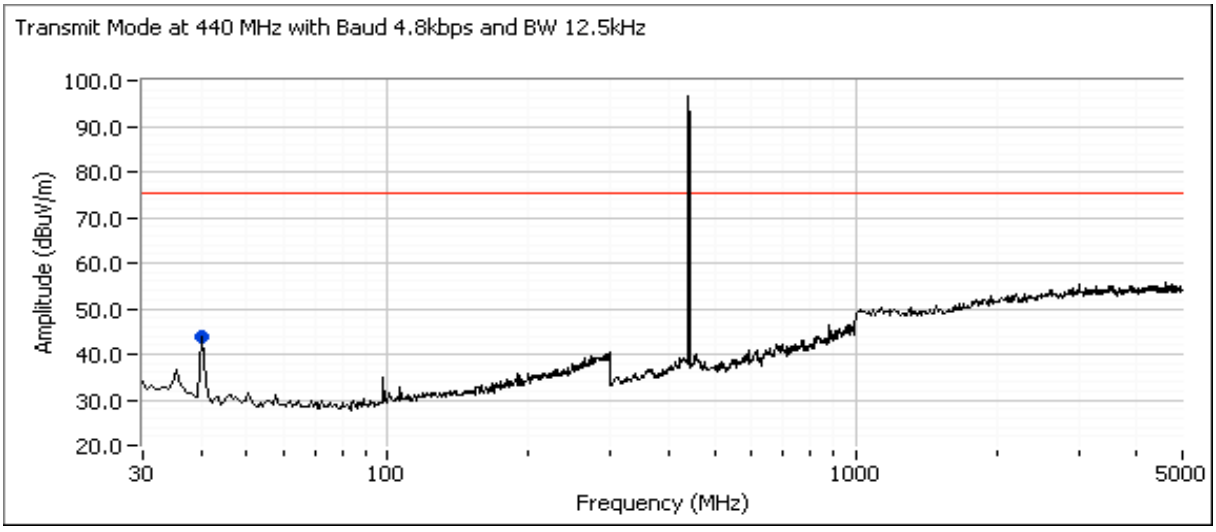
Note 1:	The field strength limit in the tables above was calculated from the erp/eirp limit detailed in the standard using the free space propagation equation: E=√(30PG)/d. This limit is conservative - it does not consider the presence of the ground plane and, for erp limits, the dipole gain (2.2dBi) 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	Job Number:	J75317
Model:	TRM450SB Single Band	T-Log Number:	T75434
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy	Priject Manager:	Mark Briggs
Standard:	FCC Part 90, RSS-210	Class:	N/A

Plots for low channel, power setting(s) = High (Baud: 4800bps, BW: 12.5kHz)

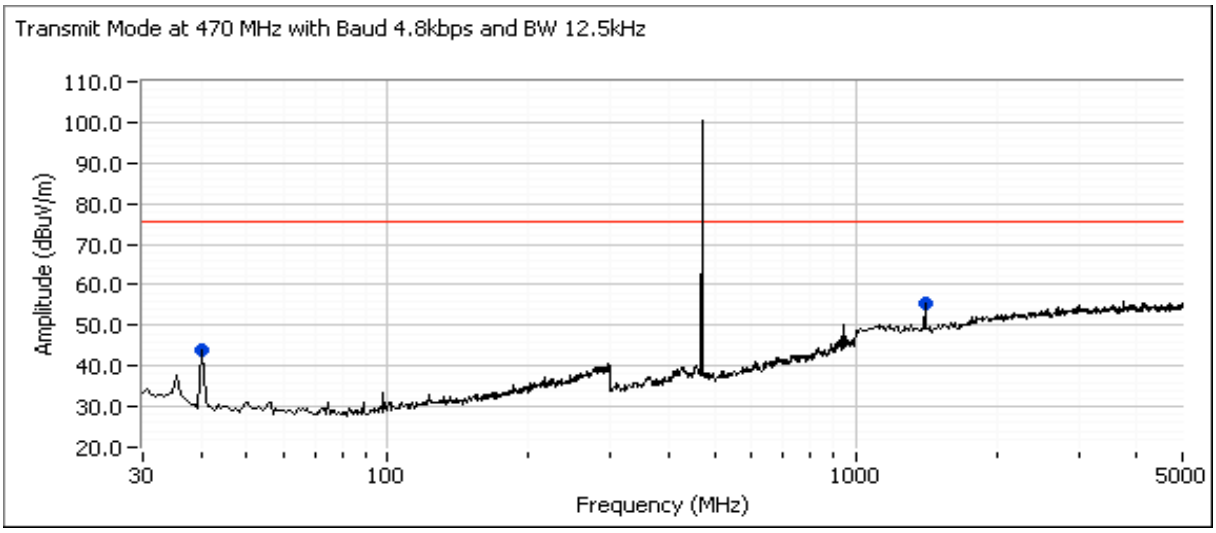


Plots for center channel, power setting(s) = High (Baud: 4800bps, BW: 12.5kHz)

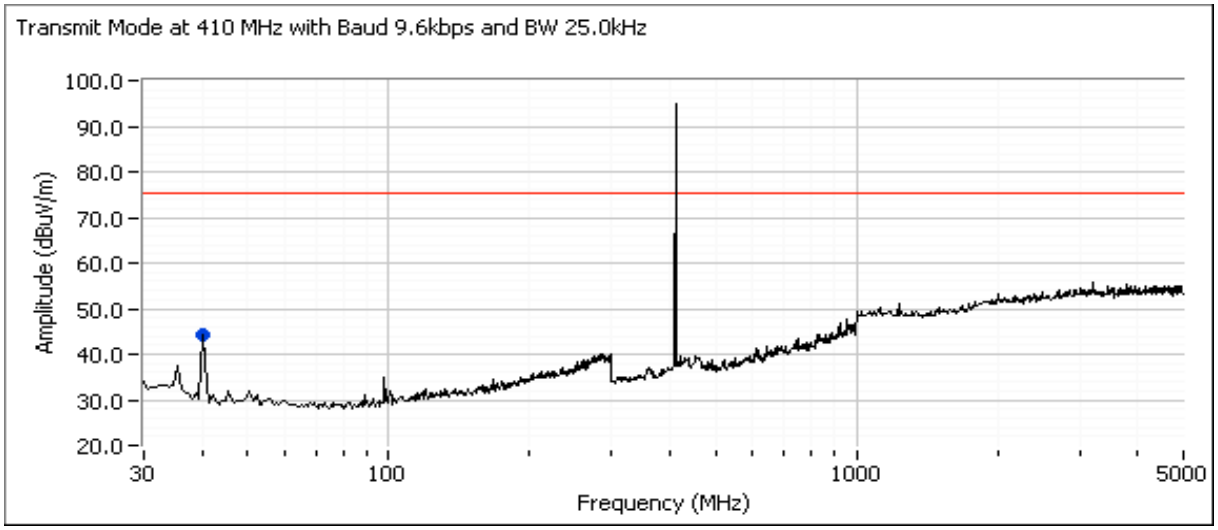


Client:	GE MDS	Job Number:	J75317
Model:	TRM450SB Single Band	T-Log Number:	T75434
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy	Priject Manager:	Mark Briggs
Standard:	FCC Part 90, RSS-210	Class:	N/A

Plots for high channel, power setting(s) = High (Baud: 4800bps, BW: 12.5kHz)

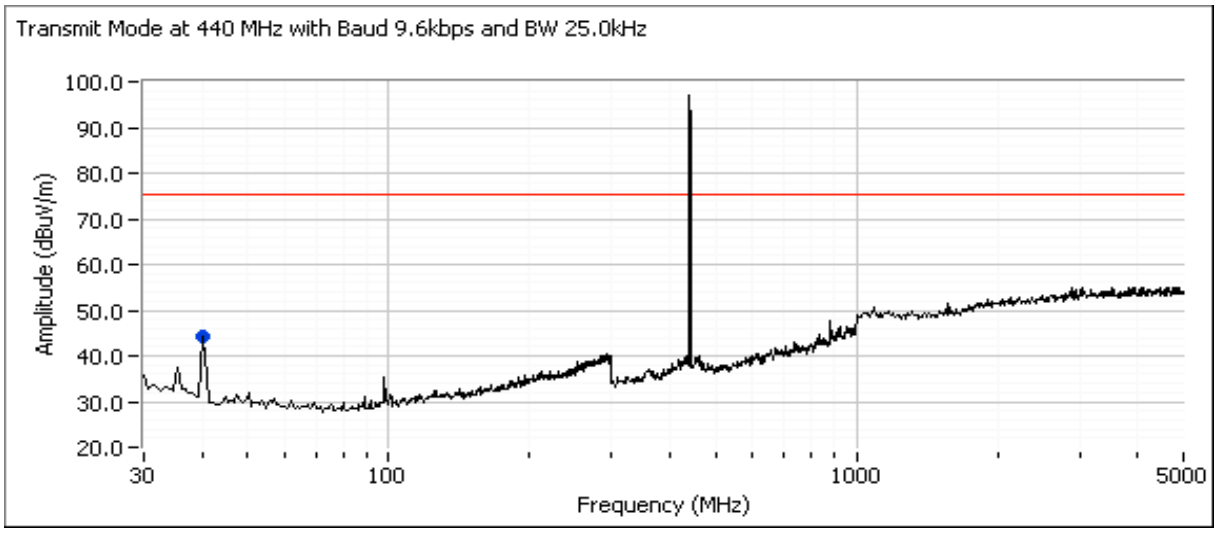


Plots for low channel, power setting(s) = High (Baud: 9600bps, BW: 25.0kHz)

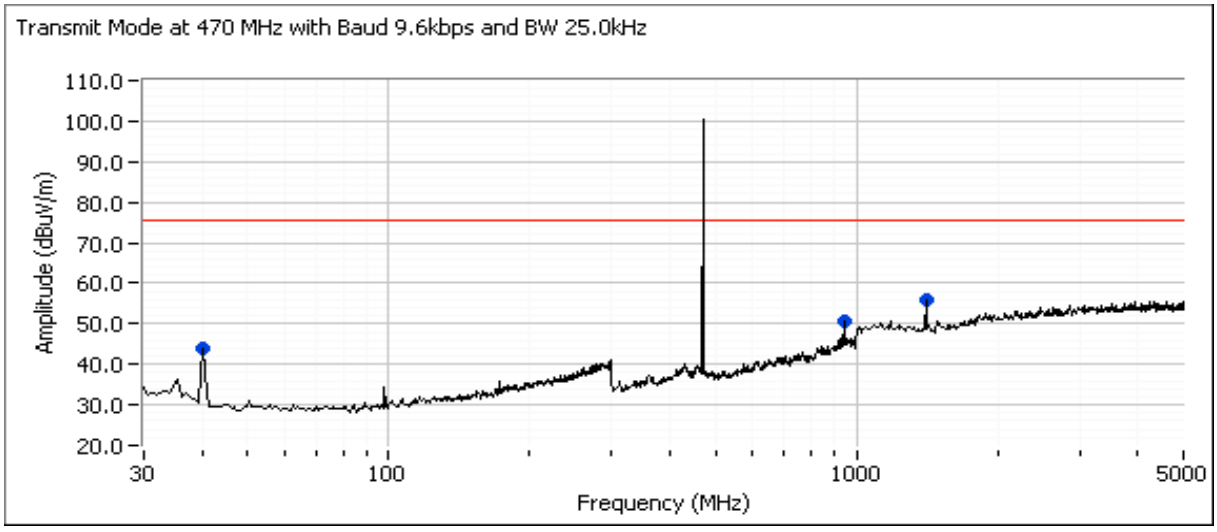


Client:	GE MDS	Job Number:	J75317
Model:	TRM450SB Single Band	T-Log Number:	T75434
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy	Priject Manager:	Mark Briggs
Standard:	FCC Part 90, RSS-210	Class:	N/A

Plots for center channel, power setting(s) = High (Baud: 9600bps, BW: 25.0kHz)



Plots for high channel, power setting(s) = High (Baud: 9600bps, BW: 25.0kHz)



Client:	GE MDS	Job Number:	J75317
Model:	TRM450SB Single Band	T-Log Number:	T75434
		Account Manager:	Susan Pelzl
Contact:	Dennis McCarthy	Priject Manager:	Mark Briggs
Standard:	FCC Part 90, RSS-210	Class:	N/A

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

Date of Test: 5/28/2009 Test Engineer: Mehran Birgani
Test Location: Radio Lab

EUT Field Strength

Frequency	Level	Pol	FCC 90.210		Detector	Azimuth	Height	Comments	Frequency
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	(bps, kHz)	(MHz)
1409.960	64.3	V	75.3	-11.0	Peak	215	1.0	Baud 9600, BW 25.0	470
1409.920	59.8	H	75.3	-15.5	Peak	6	1.0	Baud 9600, BW 25.0	470
939.993	46.5	V	75.3	-28.8	Peak	165	1.0	Baud 9600, BW 25.0	470
939.993	50.3	H	75.3	-25.0	Peak	180	1.0	Baud 9600, BW 25.0	470

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.

Substitution measurements
Vertical

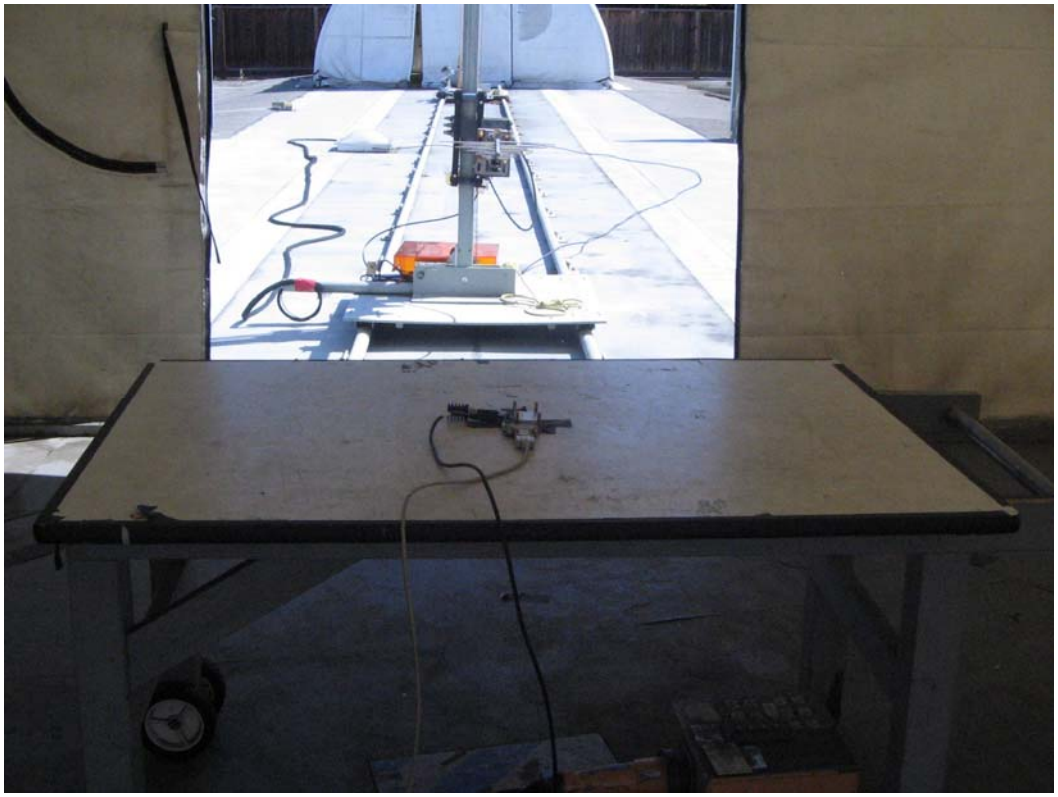
Frequency	Substitution measurements			Site	EUT measurements			eirp Limit	erp Limit	Margin
MHz	Pin[1]	Gain[2]	FS[3]	Factor[4]	FS[5]	eirp (dBm)	erp (dBm)	dBm	dBm	dB
1409.920	-15.0	7.6	89.5	96.9	64.3	-32.6	-34.8		-20.0	-14.8

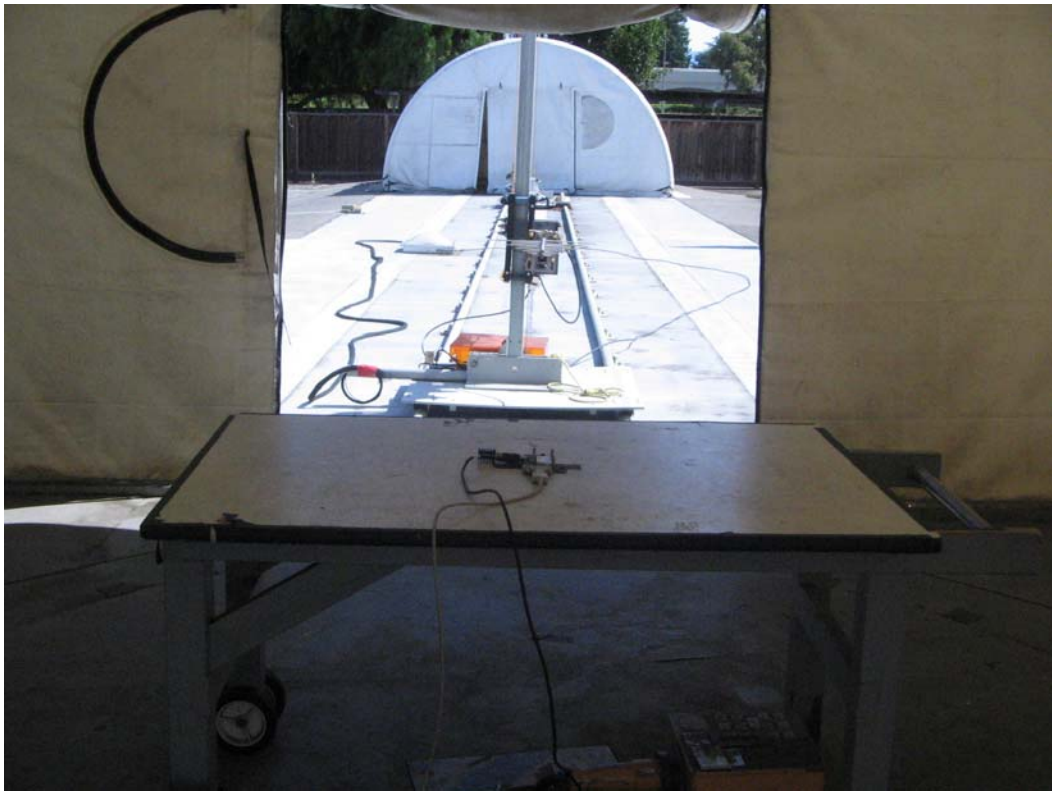
Horizontal

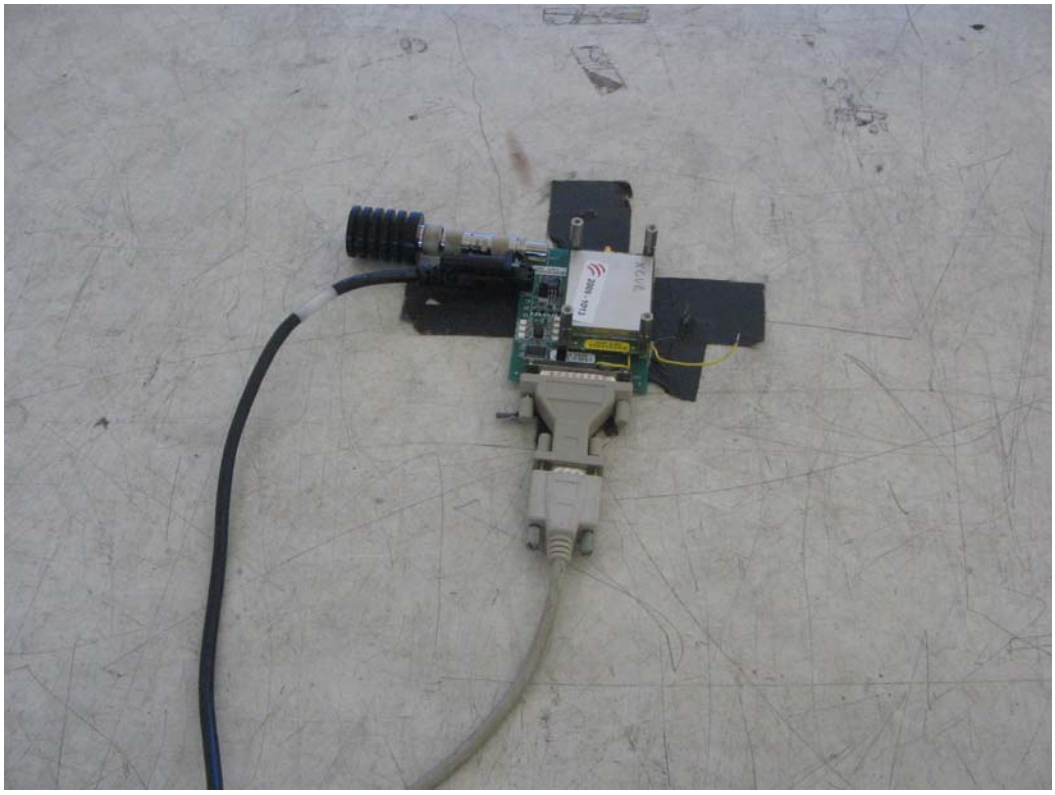
Frequency	Substitution measurements			Site	EUT measurements			eirp Limit	erp Limit	Margin
MHz	Pin[1]	Gain[2]	FS[3]	Factor[4]	FS[5]	eirp (dBm)	erp (dBm)	dBm	dBm	dB
1409.920	-15.0	7.6	89.5	96.9	59.8	-37.1	-39.3		-20.0	-19.3

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.

EXHIBIT 3: Test Configuration Photographs







Close-up of the EUT on test card

EXHIBIT 4: Theory of Operation

Uploaded as A Separate Attachment

EXHIBIT 5: Proposed FCC ID Label & Label Location

Unchanged from original application

EXHIBIT 6: Detailed Photographs

Uploaded as A Separate Attachment

EXHIBIT 7: Installation Guide

Uploaded as A Separate Attachment

EXHIBIT 8: Block Diagram

Uploaded as A Separate Attachment