L. S. Compliance, Inc.
W66 N220 Commerce Court
Cedarburg, Wisconsin 53012

Phone: 414 - 375 - 4400 Fax: 414 - 375 - 4248

L. S. Compliance, Inc.

Compliance Testing of:

GE Marquette Medical Systems

Apex Pro Telemetry Unit

Model 001

Prepared for:

Michael Steinike

Test Report Number: 300112

Date(s) of Testing: January 24 and 26, 2000

All results of this report relate only to the items that were tested.

Table of Contents

FCC ID: OU5418500

DESCRIPTION OF MEASUREMENT FACILITIES

Site on File with the FCC

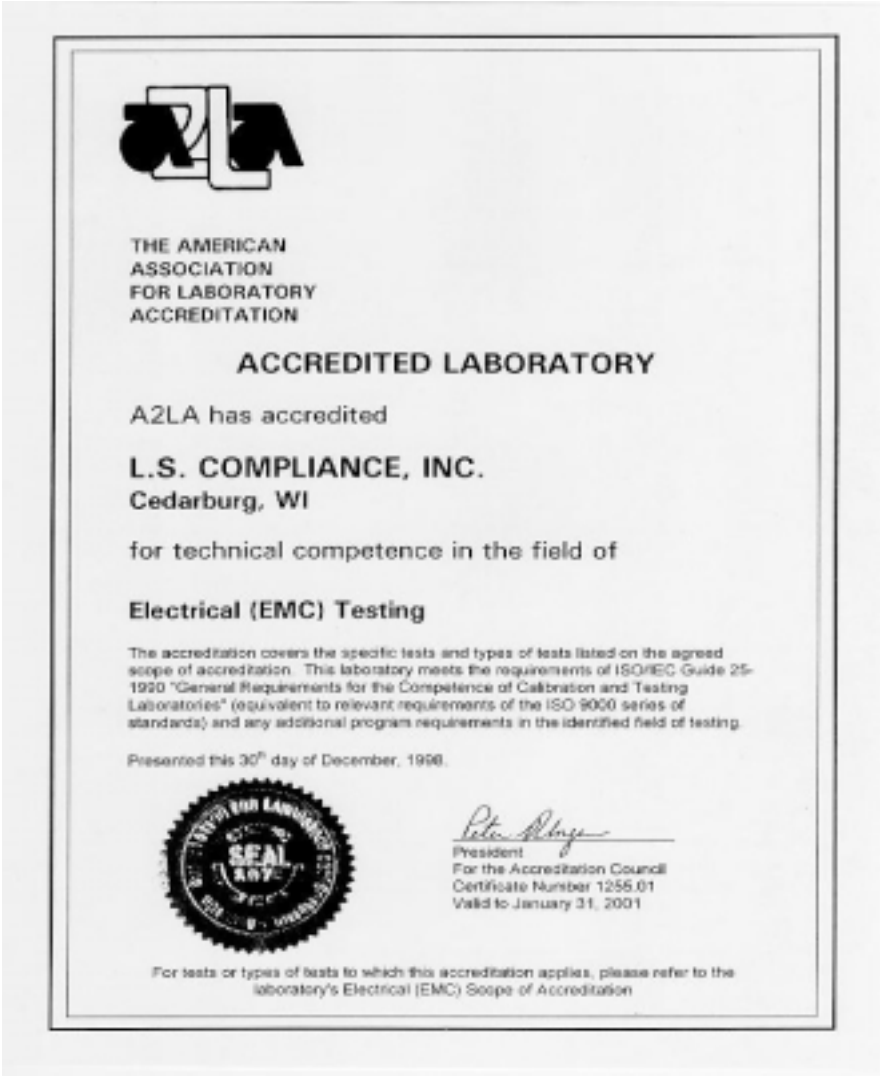
ID Number: 31040 / SIT

1300F2

Site on file with Industry Canada:

ID Number: IC 3088

" The site referenced above has been found to comply with the test site criteria found in ANSI C63.4-1992 and 47CFR Section 2.948."



THE AMERICAN
ASSOCIATION
FOR LABORATORY
ACCREDITATION

ACCREDITED LABORATORY

A2LA has accredited

L.S. COMPLIANCE, INC.
Cedarburg, WI

for technical competence in the field of

Electrical (EMC) Testing

The accreditation covers the specific tests and types of tests listed on the agreed scope of accreditation. This laboratory meets the requirements of ISO/IEC Guide 25-1990 "General Requirements for the Competence of Calibration and Testing Laboratories" (equivalent to relevant requirements of the ISO 9000 series of standards) and any additional program requirements in the identified field of testing.

Presented this 30th day of December, 1998.

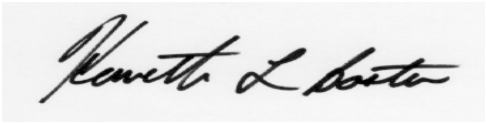
SEAL

President
For the Accreditation Council
Certificate Number 1255.01
Valid to January 31, 2001

For tests or types of tests to which this accreditation applies, please refer to the laboratory's Electrical (EMC) Scope of Accreditation

SIGNATURE PAGE

Tests performed by:  February 28. 2000

Prepared By:  February 28, 2000

Approved By:

Kenneth L. Boston, EMC Lab Manager Date
PE #31926
Registered Professional Engineer
(State of Wisconsin)

1.3 SUMMARY OF TEST REPORT

MANUFACTURER:	General Electric / Marquette Medical
MODEL:	001
SERIAL:	AOTT0017GP
DESCRIPTION:	Medical Telemetry Transmitter
FREQUENCY RANGE:	560-614 MHz

The Apex Pro transmitter was found to **"meet"** the radiated emission specification of Title 47 CFR FCC, Part 15, subpart C. for an intentional radiator

1.4 INTRODUCTION

On January 24 and 26 of 2000, a series of Radiated Emissions tests were performed on one sample model of the GE Marquette Medical Systems Apex Pro transmitter, a medical telemetry device designed to send patient care parameters to a centralized receiver, while located in a hospital or clinic. The device is a GMSK (FM) transmitter, designed to send NiBP, SPO2 and ECG over a narrow channel of spectrum, assigned to 12.5 kHz spaced channels located within the UHF television channels allowed for this type of device. These tests were performed using the test procedures outlined in ANSI C63.4-1992 for intentional radiators, and in accordance with the limits set forth in FCC Part 15.242 for a medical telemetry transmitter. These tests were performed by Thomas T lee, of L. S. Compliance, Inc. and witnessed by Mike Steinike of Marquette Medical, Inc.

1.5 PURPOSE

The above mentioned tests were performed in order to determine the compliance of the Apex Pro with limits contained in various provisions of Title 47 CFR, FCC Part 15, including:

15.209 15.242

All radiated emissions tests were performed to measure the emissions in the frequency bands described by the above sections, and to determine whether said emissions are below the limits established by the above sections. These tests were performed in accordance with the procedure described in the 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 (ANSI C63.4-1992). Another document used as reference for the EMI receiver specification was the International Special Committee on Radio Interference (CISPR) number 16-1 (1993).

1.6 RADIATED EMISSIONS TEST SETUP

The test sample was operated within the 3 meter Semi-Anechoic, FCC listed chamber located at L.S. Compliance in Cedarburg, WI. The sample was placed on an 80cm high wooden table, which was centered on the flush-mounted 2m diameter metal turntable. The test sample was operated on its own [new] internal battery. The battery voltage at the beginning of the tests was measured to be 3.3 volts. The test sample contained modified software, allowing it to transmit a continuous data stream, representative of the data signal that would normally be transmitted.

Please refer to Section 1.11 for pictures of the test setup.

1.7 RADIATED EMISSION TEST PROCEDURE

The fundamental and spurious (harmonic) emissions of the transmitter were tested for compliance to Title 47 CFR, FCC Part 15.242 and 15.209b, limits for a medical telemetry device. For the calculations used to determine the limits applicable for the test sample (at the respective operating frequency) refer to Appendix A. These limits are expressed in decibels (dB) above 1 microvolt per meter (μV/m). The samples were tested from the lowest frequency generated by the transmitter (without going below 9 kHz, and for this design; 1.84 MHz) to the 10th harmonic of the fundamental frequency generated by the device. (6.2 GHz) The appropriate limits were also observed when the fundamental or spurious signals were located within any of the restricted bands as described in Part 15.205a. These frequencies, and their associated limits, are referenced in Section 1.10. The samples were placed on a nonconductive (wooden) table in the 3 Meter chamber and the antenna mast was placed such that the antenna was 3m from the test object. A loop antenna was used to observe emissions from 1.8 MHz to 30 MHz, a biconical antenna or tuned dipole was used to measure emissions from 30 to 200 MHz, a log periodic or tuned dipole was used to measure emissions from 200 to 1000 MHz, and a double ridged waveguide horn was used to measure emissions above 1 GHz. The test object was programmed to operate in continuous transmit, and the resultant signals were maximized by rotating the turntable 360 degrees, and by raising and lowering the antenna between 1 and 4 meters. The test object was also given several different orientations to determine the maximum signal levels, using both horizontal and vertical antenna polarities.

No significant emissions were found aside from the transmitter fundamental, weak harmonics, and some spurious digital products. The unit was scanned for emissions while in continuous transmit, over the range 1.8 to 6200 MHz to establish compliance with Part 15.209 and 15.242. No other spurious signals, other than the noise floor of the system at the band edges, could be found within 20 dB of the limits.

1.8 TEST EQUIPMENT UTILIZED FOR RADIATED EMISSIONS TEST

A list of the test equipment, cables and antennas used for the tests can be found in Section 1.13, which includes the calibration information as well as the equipment description. All equipment is calibrated and used according to the user manuals supplied by the manufacturer. All antenna calibrations were performed at a N.I.S.T traceable site, and the resultant correction factors were entered into the Hewlett Packard 8546A EMI receiver software database. The connecting cables used were also measured for loss using a calibrated signal generator and the HP 8546A EMI receiver. The resulting loss factors were entered into the HP 8546A database. This allowed for automatic changes in the antenna correction factor, as well as cable loss or other corrections, to be added to the EMI receiver display while taking measurements. Thus, the resulting data taken from the HP 8546A is an actual reading and can be entered into the database as a corrected meter reading. The HP 8546A EMI receiver was operated with a bandwidth of 120 kHz when receiving signals below 1 GHz, and with a bandwidth of 1 MHz when receiving signals above 1 GHz, in accordance with CISPR 16. Both the peak and Quasi-peak detector functions were used.

1.9 CONDUCTED EMISSION TEST

Due to the fact that this product operated on its own internal battery power, as opposed to using a power cord, it was not necessary to perform a test for Conducted Emissions.

FCC ID: OU5418500

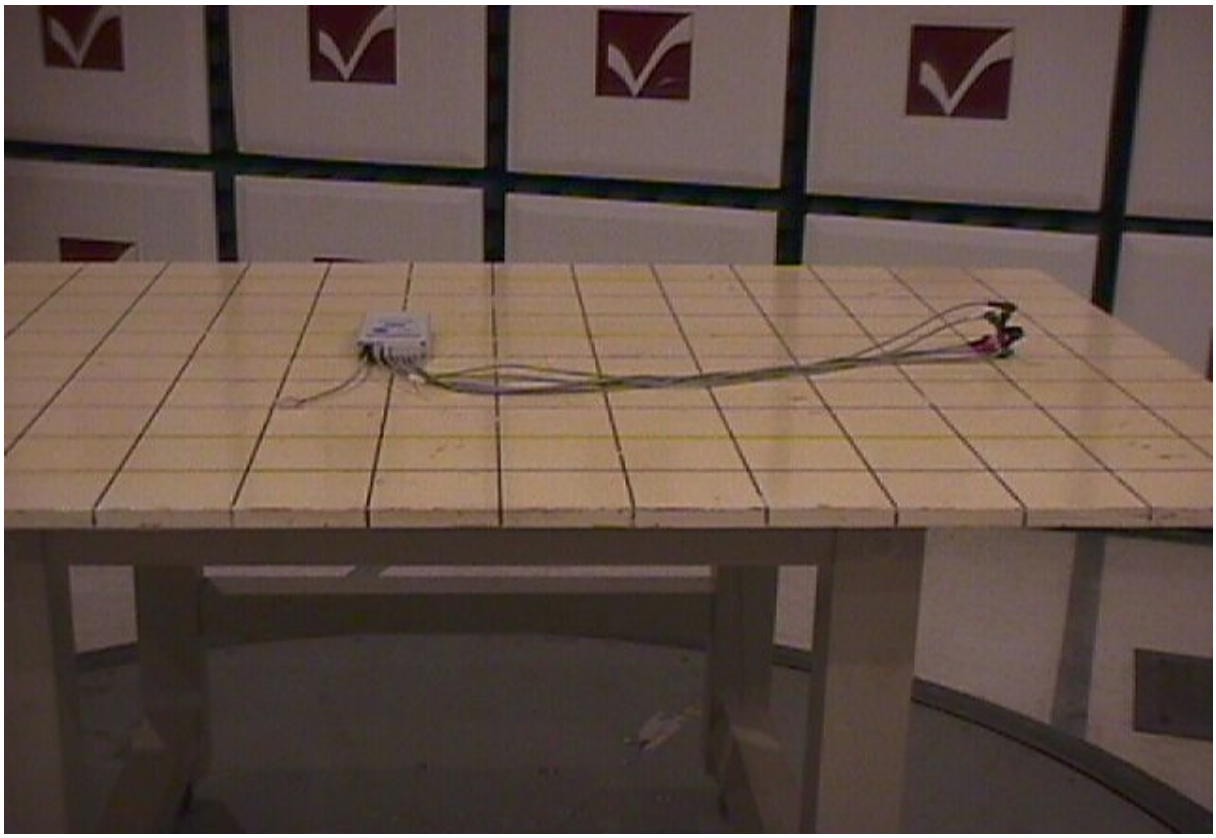
Manufacturer: GE Marquette Medical Systems
Model: 001
Serial Number(s): AOTT0017GP

1.10 - Restricted Bands affecting this product

** Higher levels allowed in this restricted band ONLY.

Frequency (MHz)	Limit (µV)	Limit (dB/µV/m)
608-614**	200	46.0
960-1240	500	54.0
1300-1427	500	54.0
1435-1626.5	500	54.0
1645.5-1646.5	500	54.0
1660-1710	500	54.0
1718.8-1722.2	500	54.0
2200-2300	500	54.0
2310-2390	500	54.0
2483.5-2500	500	54.0
2655-2900	500	54.0
3260-3267	500	54.0
3332-3339	500	54.0
3345.8-3358	500	54.0
3600-4400	500	54.0
4500-5150	500	54.0
5350-5460	500	54.0

1.11 – Photos taken during testing



View of the Apex Pro transmitter during the Radiated Emissions tests. This view shows the orientation of the product corresponding to zero degrees azimuth in position. (horizontal polarity).

1.12 SUMMARY OF RESULTS AND CONCLUSIONS

Based on the procedures outlined in this report, and the test results included in appendices B and C, it can be determined that the Apex Pro medical telemetry transmitter does **"meet"** the emission requirements of Title 47 CFR, FCC Part 15 Subpart C for an intentional radiator.

The enclosed test results pertain to the samples of the test item listed, and only for the tests performed on the data sheets. Any subsequent modification or changes to the test items could invalidate the data contained herein, and could therefore invalidate the findings of this report.

1.13 - Test Equipment, cables used

Asset #	Manufacturer	Model #	Serial#	Description	Due Date
AA960004	EMCO	3146	9512-4276	Log Periodic Antenna	3aug2000
AA960005	EMCO	3110B	9601/2280	Biconical Antenna	3aug2000
AA960007	EMCO	3115	99111-4198	Double Ridge Horn Antenna	1aug2000
AA960006	EMCO	6502	9205-2753	Active Loop antenna	3aug2000
EE960004	EMCO	2090	9607-1164	Mast/Ttable controller	I.O.
EE960014	HP	85460	3617A00320	EMI receiver Display section	23aug2000
EE960013	HP	85462	3205A00103	EMI receiver Preselector section	23aug2000
CC000221	HP	E4407b	Us39160256	26.5 GHz Spectrum Analyzer	16june2000
	LSC	Cable	0011	3 meter heliax	23 feb2000
	LSC	Cable	0038	1 meter RG214	30june2000
	LSC	cable	0050	10 meter RG214	30dec2000

APPENDIX A:

CALCULATIONS

FCC ID: OU5418500

Manufacturer: GE Marquette Medical Systems
Model: 001
Serial Number(s): AOTT0017GP

Calculation of Radiated Emissions limits for FCC Part 15.242

FIELD STRENGTH OF FUNDAMENTAL FREQUENCIES:

- 15.242(b) limit for the fundamental emission is 200 millivolts per meter = 106 dBuV/m at 3 meters

FIELD STRENGTH OF SPURIOUS/HARMONIC FREQUENCIES:

The following table depicts the general limits for an intentional radiator: These limits are obtained from Title 47CFR, Part 15.209, for radiated emissions measurements:

Frequency (MHz)	uV/m at 30 meters	30m limit (dBuV/m)
1.7-30	30	29.5

Adding a 20 db per decade correction to the above and adding to the table below gives:

Frequency (MHz)	uV/m at 3 meters	3m limit (dBuV/m)
1.7-30	300	49.5
30-88	100	40.0
88-216	150	43.5
216-960	200	46
960-6200	500	54

APPENDIX B:

DATA CHARTS

FCC ID: OU5418500

Measurement of Electromagnetic Radiated Emission within 3 Meter FCC Listed Chamber

Frequency Range inspected: 1.8 to 6200 MHz

Date of Test:	January 24 and 26, 2000	Manufacturer:	GE Marquette Medical
Location:	L.S. Compliance, Inc.	Model No.:	001
	W66 N220 Commerce Court		
	Cedarburg, WI 53012		
Specifications:	Title 47CFR, FCC Part 15.209	Serial No.:	AOTT0017GP
Distance:	3 meters	Configuration:	Active,
Equipment:	HP 8546A EMI Receiver	Detector(s) Used:	Quasi-peak below 1 GHz
	EMCO 6502 active loop		
	EMCO 3115 Double Ridged Waveguide		average above 1 GHz
	EMCO 3146A Log Periodic		
Laboratory	Temperature: 72 deg F		
Conditions:	Humidity: 35% ,		Pressure; 680-1060mbr

The following table depicts the level of significant spurious emissions found:

Signals greater than 20 dB below the limit were not reported.

channel	Frequency (MHz)	Antenna Polarity	Height (meters)	Azimuth (0° - 360°)	EMI Meter Reading (dB uV/m)	Limit (dB uV/m)	Margin (dB)
Low	115.2	H	1.5	0	31.4	43.5	12.1
Low	280.0	H	1.0	235	42.1	46.0	3.9
Low	574.4	H	1.6	155	36.4	46.0	9.6
Low	588.0	H	1.5	215	33.6	46.0	12.4
Low	603.2	H	1.6	260	28.8	46.0	17.2
Mid	110.0	H	2.7	185	32.4	43.5	11.1
Mid	115.2	H	2.7	180	31.2	43.5	12.3
Mid	293.5	H	1.2	85	41.6	46.0	4.4
Mid	575.3	H	1.4	150	32.9	46.0	13.1
Mid	601.4	H	1.4	145	36.2	46.0	9.8
Mid	615.0	H	1.4	145	32.2	46.0	13.8
Mid	630.2	H	1.4	145	26.6	46.0	19.4
High	100.8	H	2.6	175	28.7	43.5	14.8

High	115.2	H	2.6	160	32.9	43.5	10.6
High	129.6	H	2.5	0	30.6	43.5	12.9
High	153.5	H	2.4	205	28.7	43.5	14.8
High	306.5	H	1.0	75	30.4	46.0	15.6
High	316.3	H	1.1	75	36.0	46.0	10.0
High	629.0	H	1.4	145	31.5	46.0	14.5

FCC ID: OU5418500

Measurement of Electromagnetic Radiated Emission within 3 Meter FCC Listed Chamber

Frequency Range inspected: 1.8 to 6200 MHz

Date of Test:	January 24, 26, 2000	Manufacturer:	GE Marquette Medical
Location:	L.S. Compliance, Inc.	Model No.:	001
	W66 N220 Commerce Court		
	Cedarburg, WI 53012		
Specifications:	Title 47CFR, FCC Part 15.242, 15.209	Serial No.:	AOTT0017GP
Distance:	3 meters	Configuration:	Active,
Equipment:	HP 8546A EMI Receiver	Detector(s) Used:	Quasi-peak below 1 GHz
	EMCO 3115 Double Ridged Waveguide		average above 1 GHz
	EMCO 3146A Log Periodic		
Laboratory	Temperature: 72 deg F		
Conditions:	Humidity: 35% ,		Pressure; 680-1060mbr

The following table depicts the level of significant fundamental and harmonic emissions found:

Harmonics greater than 20 dB below the limit were not reported.

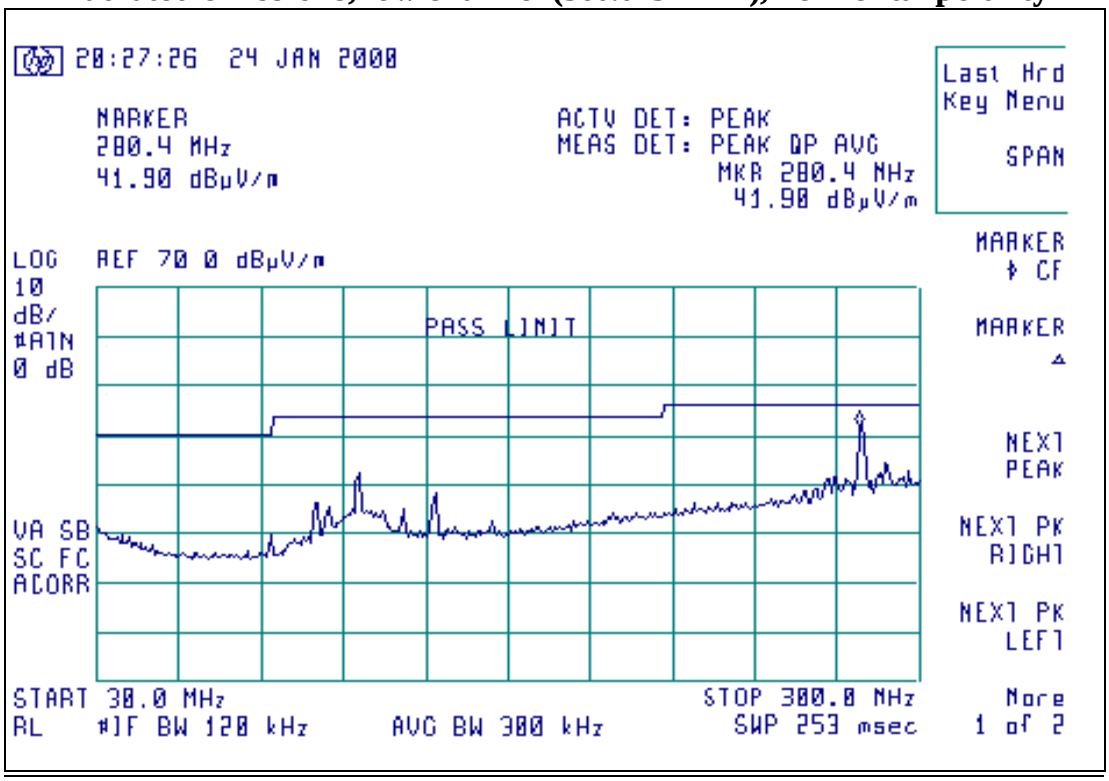
channel	Frequency (MHz)	Antenna Polarity	Height (meters)	Azimuth (0° - 360°)	Qpeak Meter Reading (dB uV/m)	Average Meter Reading (dB uV/m)	15.242 Limit (dB uV/m)	15.209b Limit (dB uV/m)	Margin (dB)
Low	560.025	H	1.7	100	94.95		106.0		11.1
Medium	587.00	H	1.5	70	97.7		106.0		8.3
High	613.975	H	1.35	70	90.7		106.0		15.3
High	2456.0	V	1.0	260		39.3		54.0	14.7

APPENDIX C:

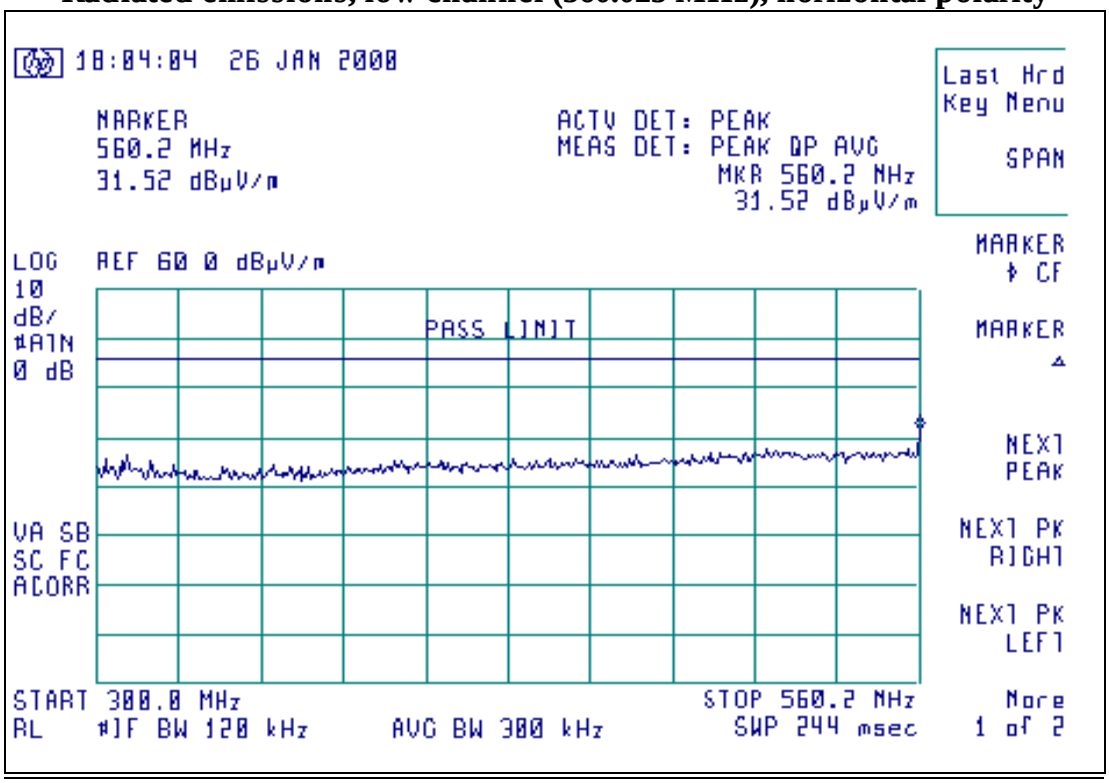
GRAPHS

FCC ID: OU5418500

Radiated emissions, low channel (560.025 MHz), horizontal polarity



Radiated emissions, low channel (560.025 MHz), horizontal polarity



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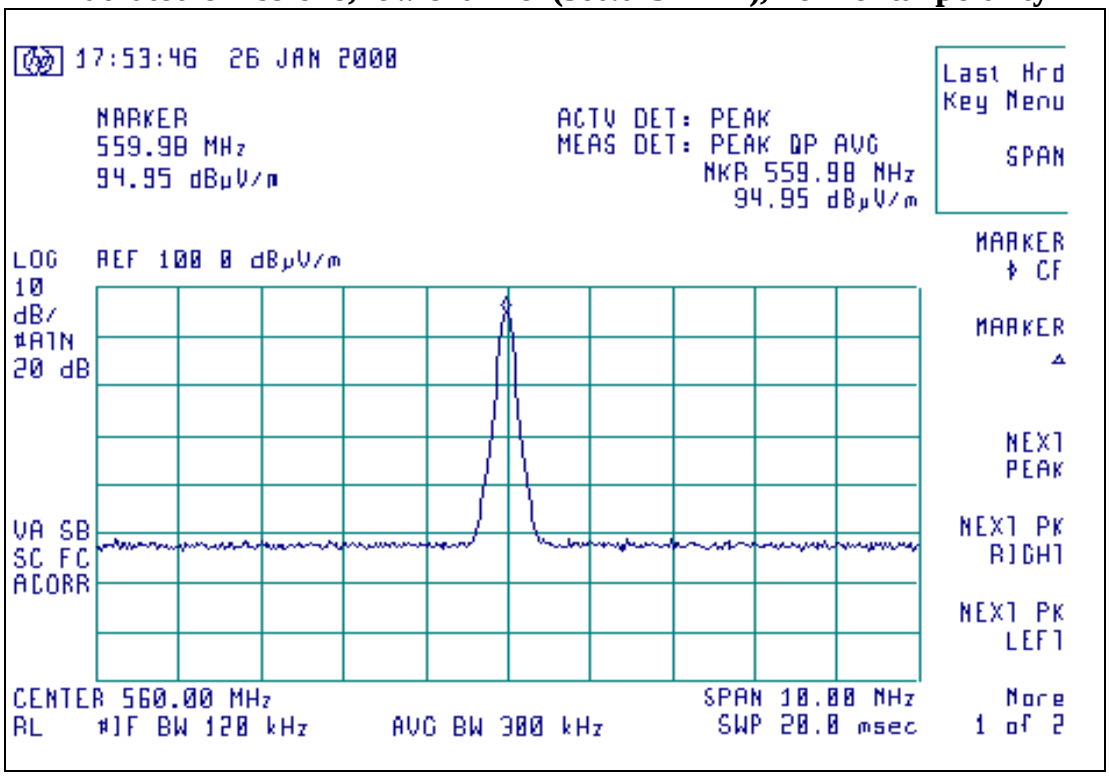
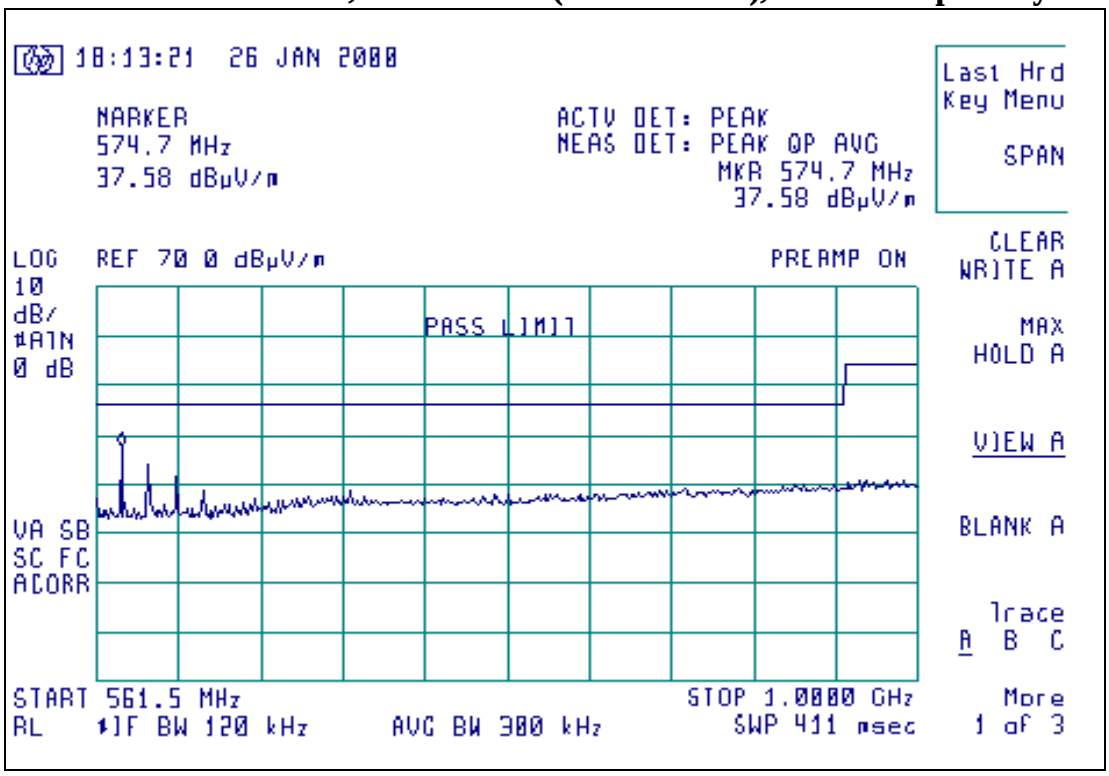
Radiated emissions, low channel (560.025 MHz), horizontal polarity



Radiated emissions, low channel (560.025 MHz), horizontal polarity



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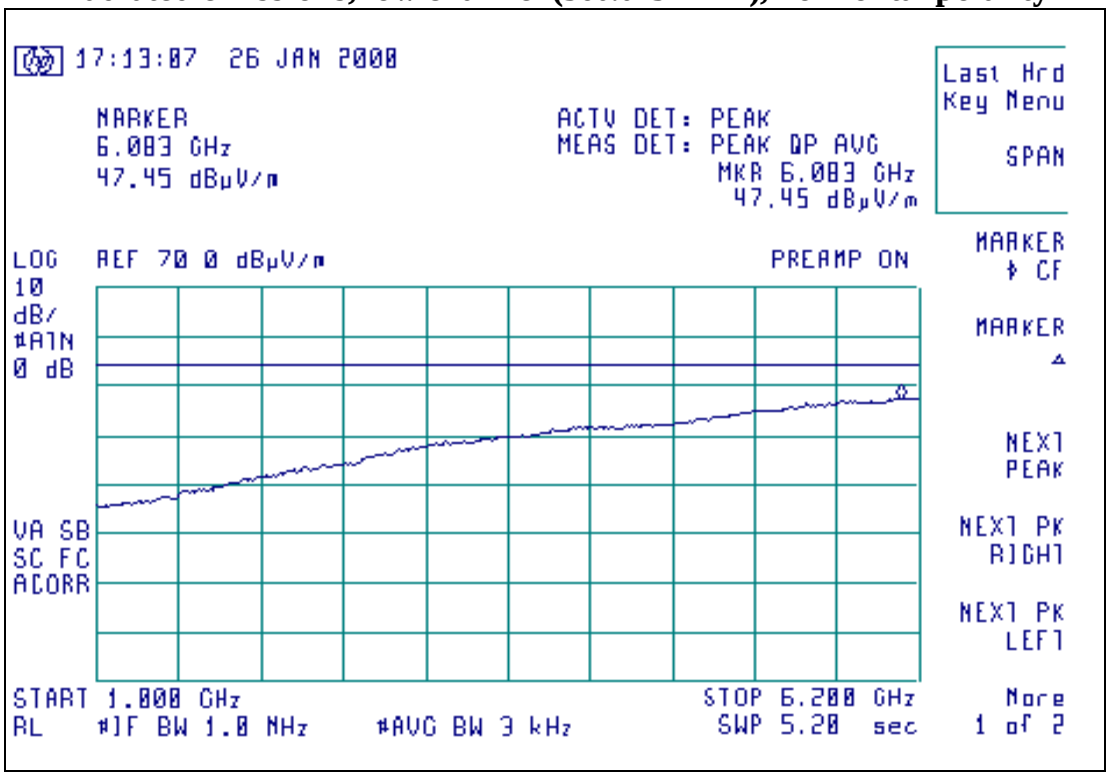
Radiated emissions, low channel (560.025 MHz), horizontal polarity



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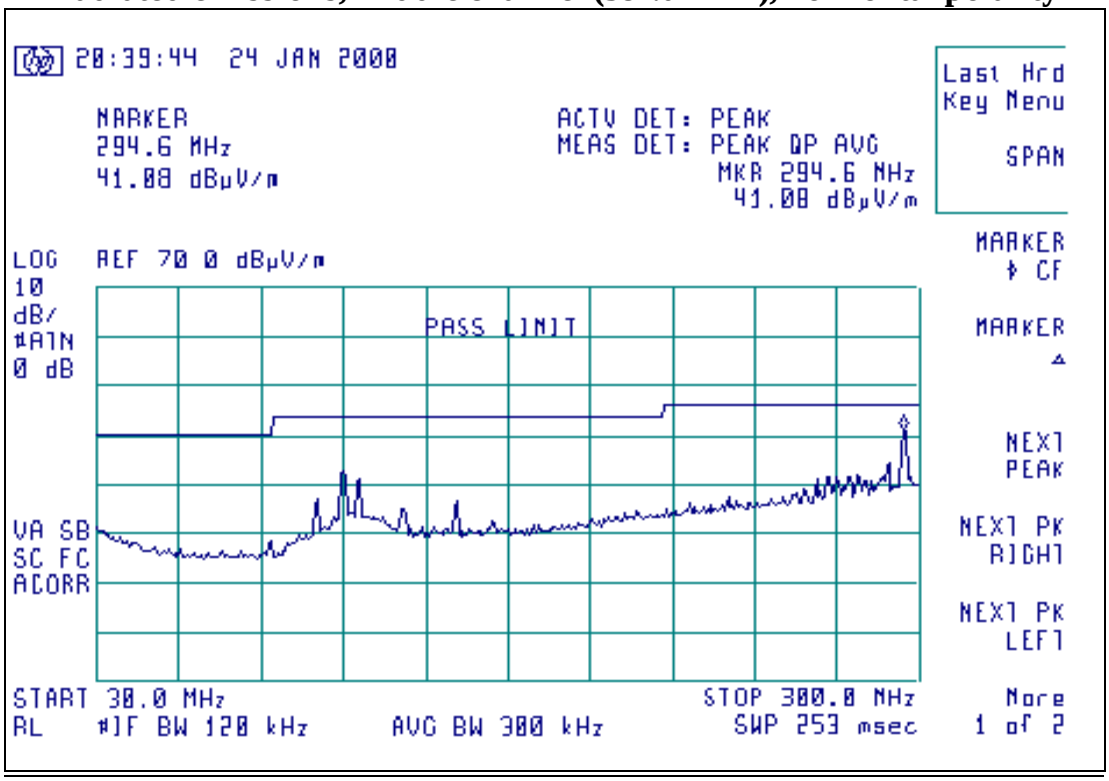
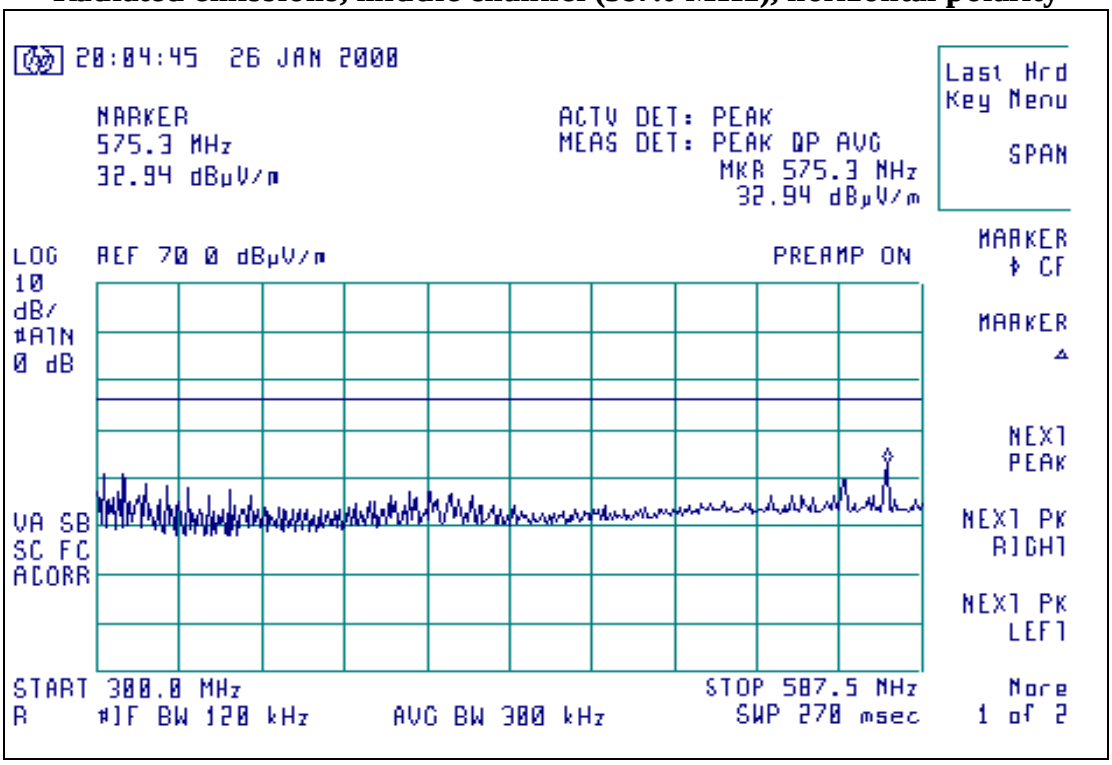
Radiated emissions, middle channel (587.0 MHz), horizontal polarity



Radiated emissions, middle channel (587.0 MHz), horizontal polarity



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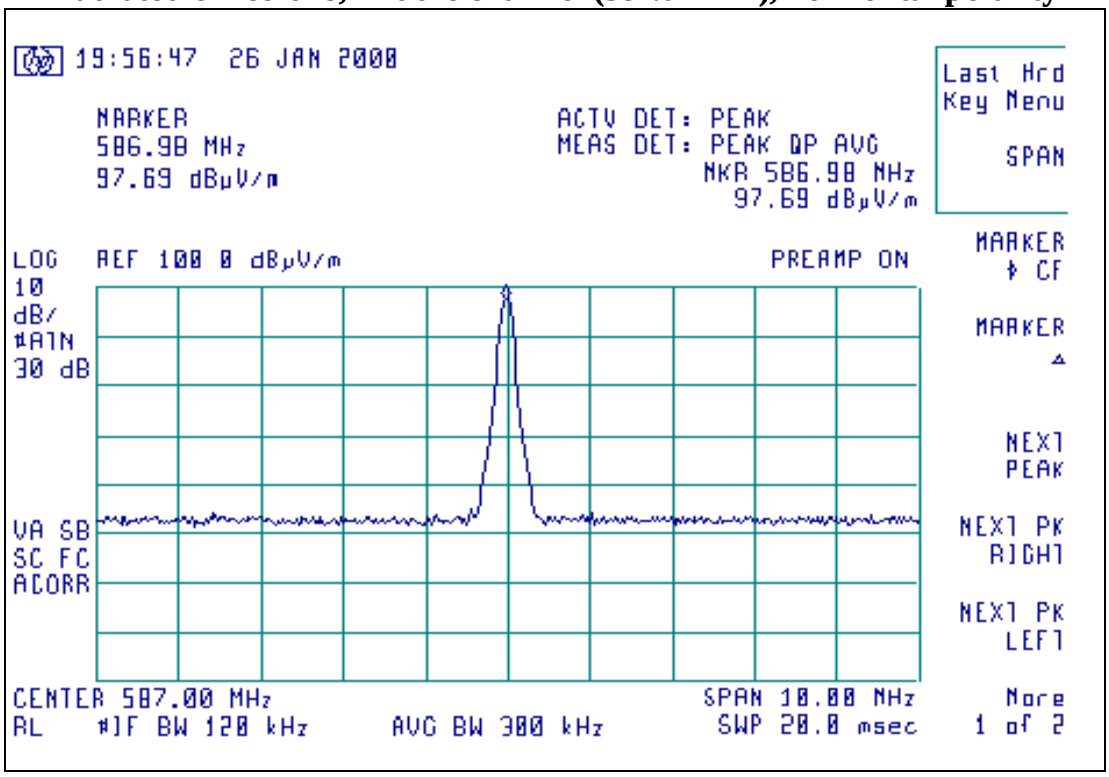
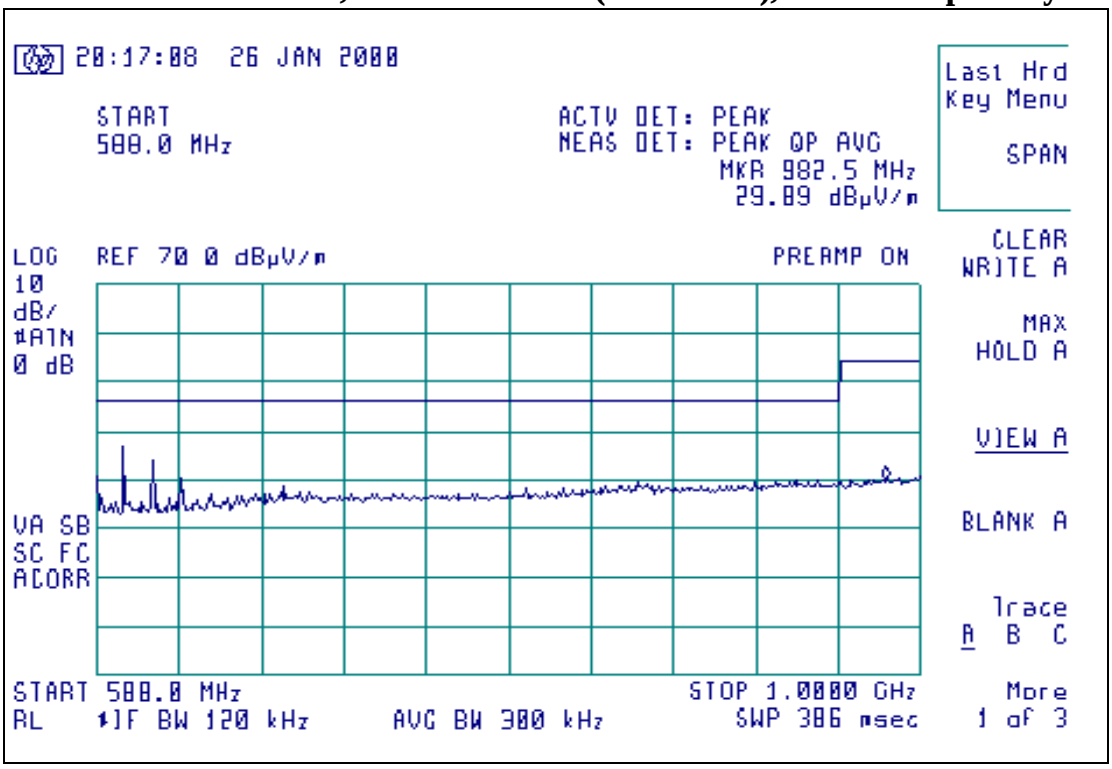
Radiated emissions, middle channel (587.0 MHz), horizontal polarity



Radiated emissions, middle channel (587.0 MHz), horizontal polarity



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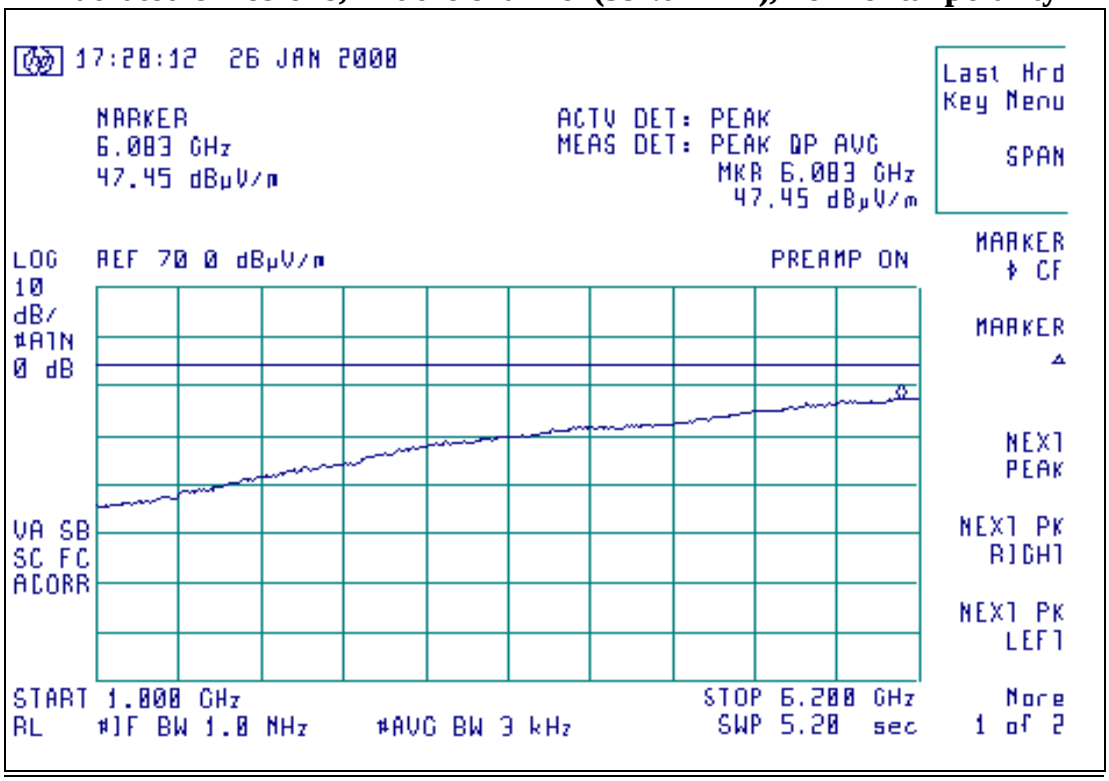
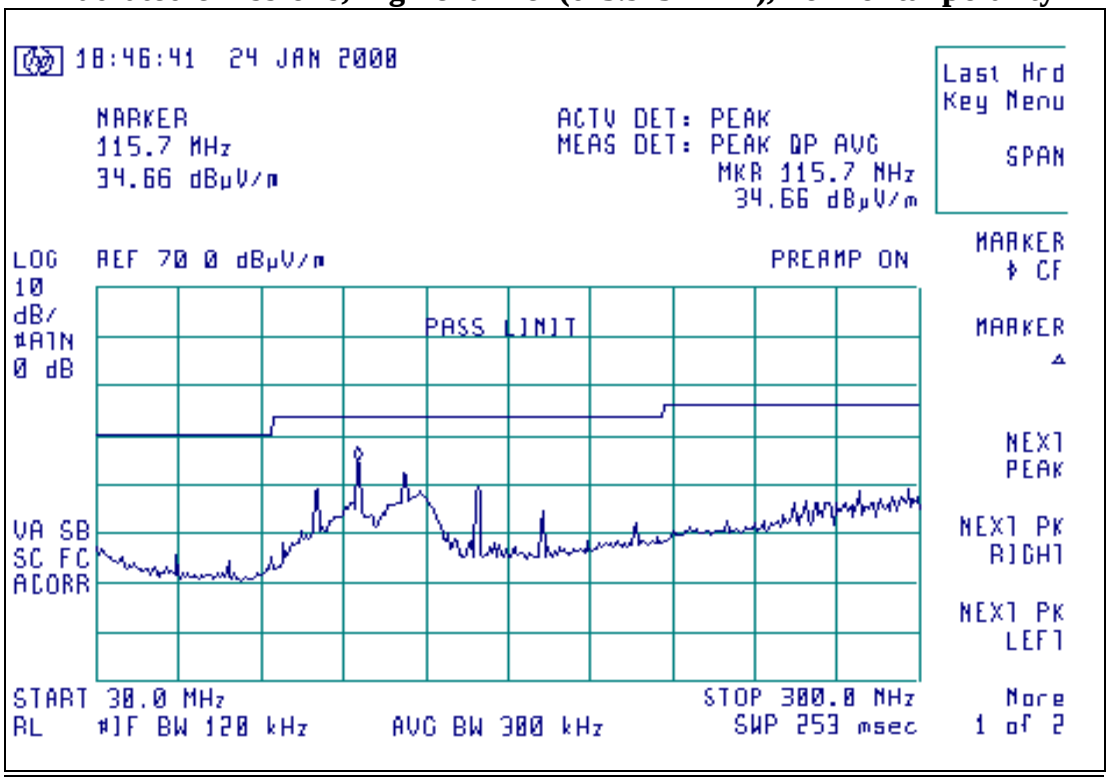
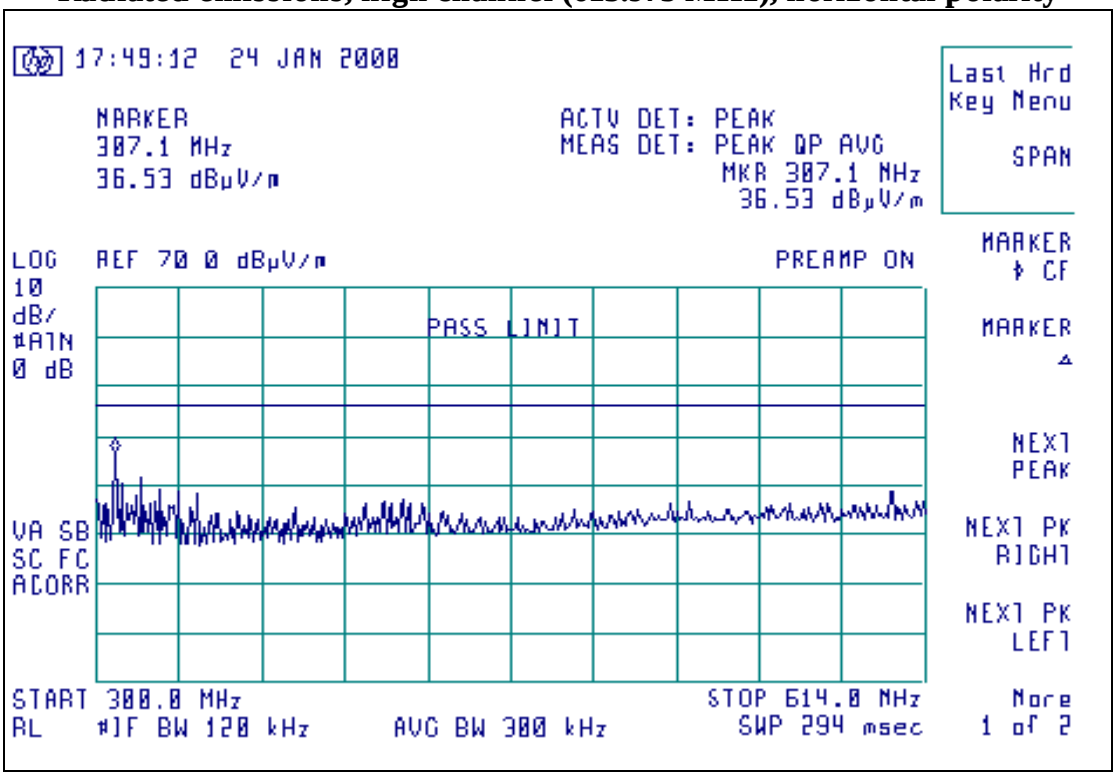


FCC ID: OU5418500

Radiated emissions, high channel (613.975 MHz), horizontal polarity



Radiated emissions, high channel (613.975 MHz), horizontal polarity



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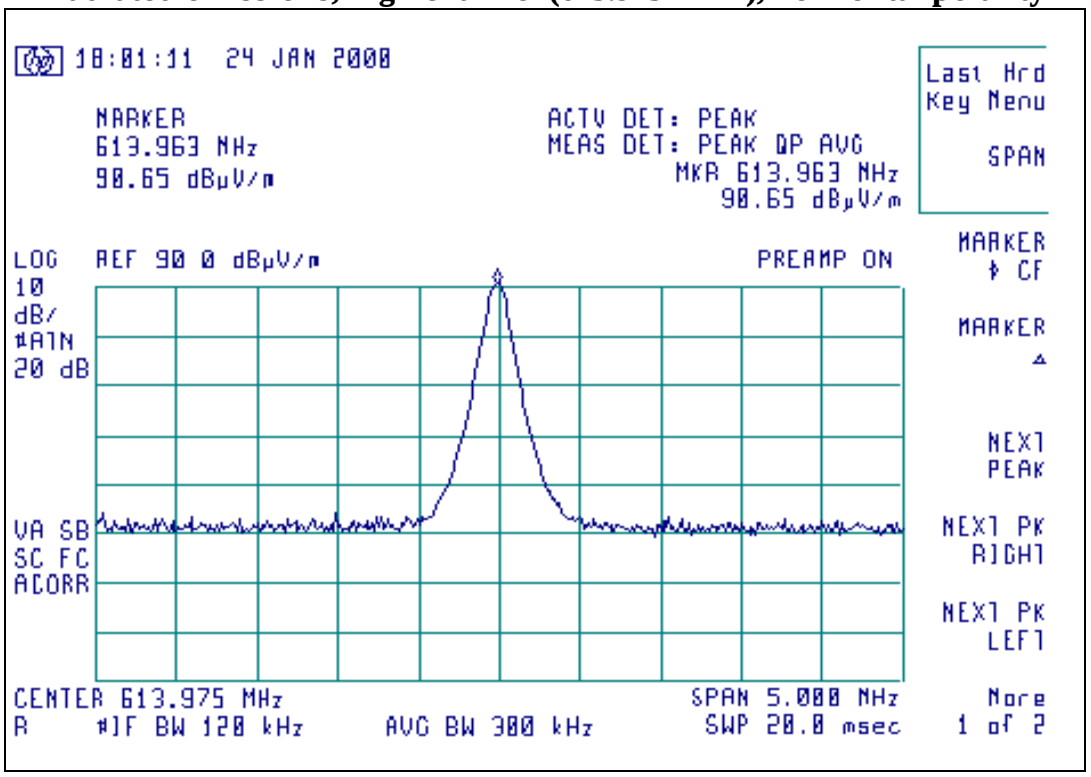
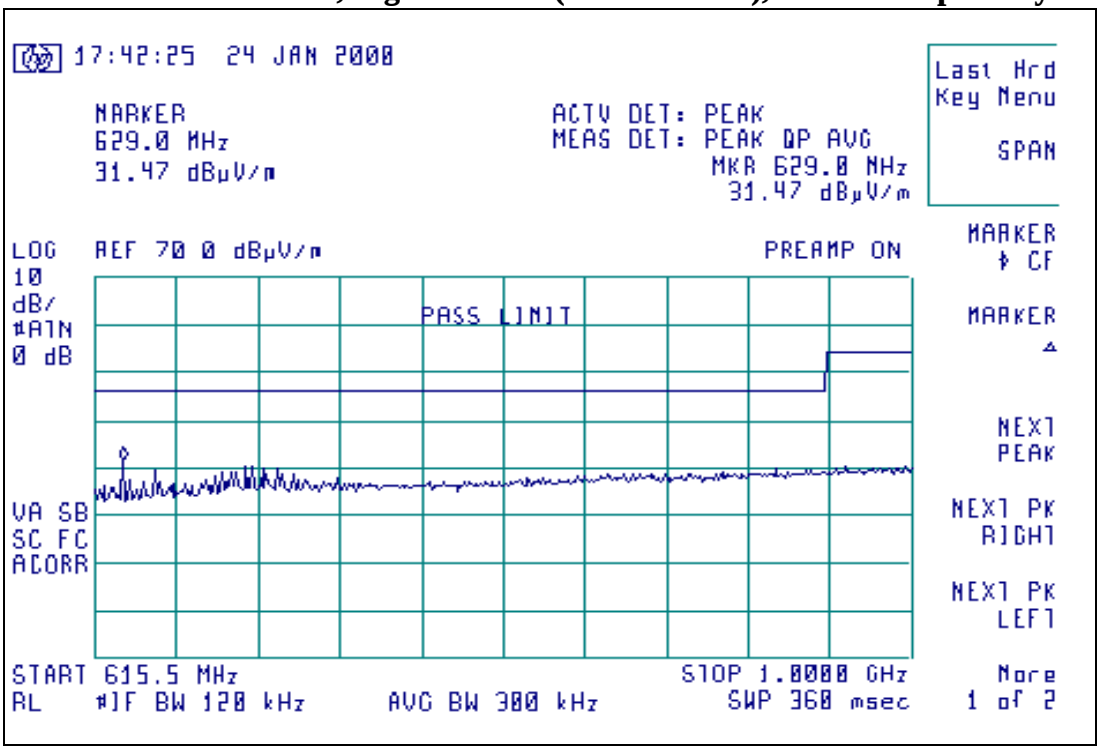
Radiated emissions, high channel (613.975 MHz), horizontal polarity



Radiated emissions, high channel (613.975 MHz), horizontal polarity



FCC ID: OU5418500

Radiated emissions, high channel (613.975 MHz), vertical polarity