



Divelbiss Corporation.

Application
For Certification
NightScan Servlite Transmitter

FCC ID: QBS011014803

February 28, 2002



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1.0 GENERAL DESCRIPTION

1.1 Related Submittals Grants

This is single application of the NightScan Servlite Transmitter for Certification under FCC Part 15.249. There are no other simultaneous applications.

1.2 Product Description

NightScan Servlite Transmitter is small hand-held transmitter with push-buttons that sends user commands to the Controller/Receiver in the remote lamp assembly via RF link. It permits rotating the lamps left, right, up, and down. Operating frequencies are: 903.70MHz, 906.37MHz, 907.87MHz, 909.37MHz, 912.37MHz, 915.37MHz, 919.87MHz, and 921.37MHz.

The NightScan Servlite Transmitter Antenna

The antenna on the NightScan Servlite Transmitter is a detachable whip monopole quarter wavelength (80mm) antenna, SWA connector. Antenna part number is ANT-916-CW-QW.

1.3 Test Methodology

Radiated emission measurements were performed according to the procedures in ANSI C63.4 (1992). All measurements were performed in 3m full size Anechoic Chamber. For each scan, the procedure for maximizing emissions in Appendices D and E were followed. All Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "Justification Section" of this Application.

1.4 Test Facility

The test site facility used to collect the radiated and conducted measurement data is located at 7250 Hudson Blvd., Suite 100, Oakdale, Minnesota. This test facility has been fully described in a report dated on January 2000 submitted to your office. Please reference the site registration number: 90706, dated May 19, 2000.

2.0 SYSTEM TEST CONFIGURATION

2.1 Justification

A new fresh 9VDC battery powered the EUT. The EUT was set up as tabletop equipment.

2.2 Mode of Operation

The NightScan Servlite Transmitter was tested in the continuous transmission mode.

2.3 Special Accessories

There are no special accessories necessary for compliance of these products.

2.4 Equipment Modification

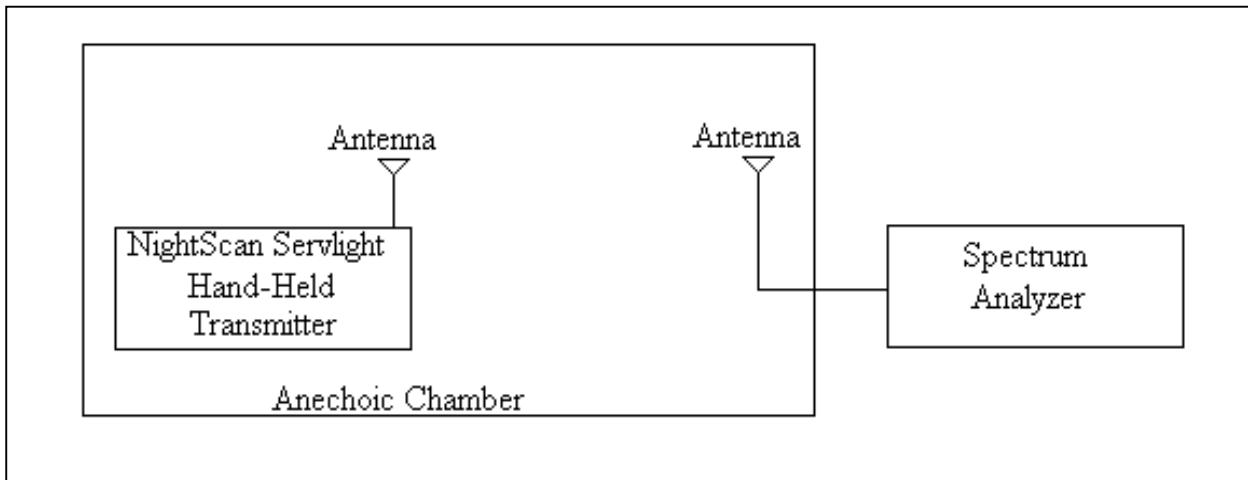
No modifications were installed during the testing.

2.5 Support Equipment List and Description

N/A

2.6 Test Configuration Block Diagrams

Field Strength Measurements



3.0 TEST RESULTS

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs, data tables and graphical representations of the emissions are included.

The EUT is intended for operation under the requirements of Part 15 Subpart C. Specific test requirements include the following:

47 CFR 15.249(a)(b)	Field Strength of Fundamental
47 CFR 15.249(a)(b)	Field Strength of Harmonics
47 CFR 15.249(c), 15.209	Out of Band Spurious Emissions

3.1 Field Strength of Fundamental and Harmonics Emissions, FCC 15.249(a)(b)

Field Strength of Fundamental and Harmonics Emissions measurements were made in the start, center, and end frequency of the frequency range. The Harmonics emissions were tested up to 10th harmonic. The follow Fundamental frequencies and their Harmonics emissions were tested:

903.70MHz

912.37MHz

921.37MHz

Test Procedure

The EUT was placed on a non-conductive table 0.8m above the ground plane inside the Anechoic Chamber. The table was centered on a motorized turntable, which allows 360-degree rotation. The measurement antenna was positioned at distance 3m. The radiated emissions were maximized by configuring the EUT, by rotating the EUT, by changing antenna polarization, and by changing antenna height from 1 to 4m. Field strength was measured and calculated (See Section 3.3).

The Tables and Graphs below show the Field Strength of Fundamental and Harmonics Radiation in the restricted frequency band per FCC 15.205. No emissions above ambient were found at 9th and 10th Harmonics.

Note: Emission level shown in the Graphs does not include the Antenna, Cable and Pre-amplifier correction factors. These factors are shown in the tables (the Antenna and Cable factors combined together).

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Radiated Emissions
Date: 02-28-2002

Company: Divelbiss Corporation

Model: NightScan Servlite Transmitter

Test Engineer: Norman Shpilsher

Special Config. Info: Fundamental Frequency 903.70 MHz

Measurements at fundamental frequency were taken using CISPR Quasi-Peak detector with RBW 100kHz
 Measurements above 1000MHz were taken using Peak detector with RBW 1MHz

Standard: FCC Part 15.249

Test Site: 3 m Anechoic Chamber

Note: The table shows the Field Strength of Fundamental and Harmonics Radiation in the restricted frequency band per FCC 15.205. No emissions above ambient were found at 9th and 10th Harmonics.

Table # 3-1-1

Frequency MHz	Antenna			Ant. Factor dB/m	Amplifier Gain (dB)	Reading dB _u V	Net at 3m. dB _u V/m	Limit dB _u V/m	Margin dB	Comments
	Polarity	Hts(cm)	Dir. (°)							
903.33	V	101	282	25.0		67.5	92.5	94.0	-1.5	Fund.
903.33	H	153	7	25.0		68.8	93.8	94.0	-0.2	Fund.
2709.96	V	140	191	34.5	33.3	49.4	50.6	54.0	-3.4	3rd Harm.
2710.05	H	234	299	34.5	33.3	51.2	52.4	54.0	-1.6	3rd Harm.
3613.35	V	145	226	37.2	32.9	48.7	53.0	54.0	-1.0	4th Harm.
3613.35	H	164	253	37.2	32.9	47.3	51.6	54.0	-2.4	4th Harm.
4516.61	V	151	234	39.3	32.3	45.4	52.4	54.0	-1.6	5th Harm.
4516.61	H	183	56	39.3	32.3	45.8	52.8	54.0	-1.2	5th Harm.
5419.92	V	125	175	41.4	32.3	39.9	49.0	54.0	-5.0	6th Harm.
5419.92	H	111	276	41.4	32.3	37.5	46.6	54.0	-7.4	6th Harm.
8129.00	V	107	89	45.3	32.3	33.5	46.5	54.0	-7.5	9th Harm.
8129.00	H	103	221	45.3	32.3	33.7	46.7	54.0	-7.3	9th Harm.
9033.00	V	101	117	49.7	32.3	33.7	51.1	54.0	-2.9	10th Harm.
9033.20	H	100	33	49.7	32.3	33.8	49.1	54.0	-4.9	10th Harm.

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Radiated Emissions
Date: 02-28-2002

Company: Divelbiss Corporation

Model: NightScan Servlite Transmitter

Test Engineer: Norman Shpilsher

Special Config. Info: Fundamental Frequency 912.33 MHz

Measurements at fundamental frequency were taken using CISPR Quasi-Peak detector with RBW 100kHz

Measurements above 1000MHz were taken using Peak detector with RBW 1MHz

Standard: FCC Part 15.249

Test Site: 3 m Anechoic Chamber

Note: The table shows the Field Strength of Fundamental and Harmonics Radiation in the restricted frequency band per FCC 15.205. No emissions above ambient were found at 9th and 10th Harmonics.

Table # 3-1-2

Frequency MHz	Antenna			Ant. Factor dB/m	Amplifier Gain (dB)	Reading dB μ V	Net at 3m dB μ V/m	Limit dB μ V/m	Margin dB	Comments
	Polarity	Hts(cm)	Dir. (°)							
912.33	V	117	310	25.0		66.8	91.8	94.0	-2.2	Fund.
912.33	H	156	4	25.0		67.7	92.7	94.0	-1.3	Fund.
2736.97	V	133	207	34.5	33.3	48.7	49.9	54.0	-4.1	3rd Harm.
2736.97	H	194	295	34.5	33.3	50.1	51.3	54.0	-2.7	3rd Harm.
3649.30	V	140	229	37.3	32.9	47.1	51.5	54.0	-2.5	4th Harm.
3649.30	H	143	261	37.3	32.9	47.0	51.4	54.0	-2.6	4th Harm.
4561.67	V	139	237	39.3	32.3	44.7	51.7	54.0	-2.3	5th Harm.
4561.67	H	190	60	39.3	32.3	45.5	52.5	54.0	-1.5	5th Harm.
5473.91	V	109	201	41.4	32.3	39.4	48.5	54.0	-5.5	6th Harm.
5473.91	H	119	248	41.4	32.3	37.0	46.1	54.0	-7.9	6th Harm.
8210.94	V	111	84	45.3	32.3	33.1	46.2	54.0	-7.8	9th Harm.
8210.94	H	101	209	45.3	32.3	32.9	46.0	54.0	-8.0	9th Harm.
9123.27	V	100	129	49.7	32.3	33.5	50.9	54.0	-3.1	10th Harm.
9123.27	H	100	39	49.7	32.3	33.7	49.1	54.0	-4.9	10th Harm.

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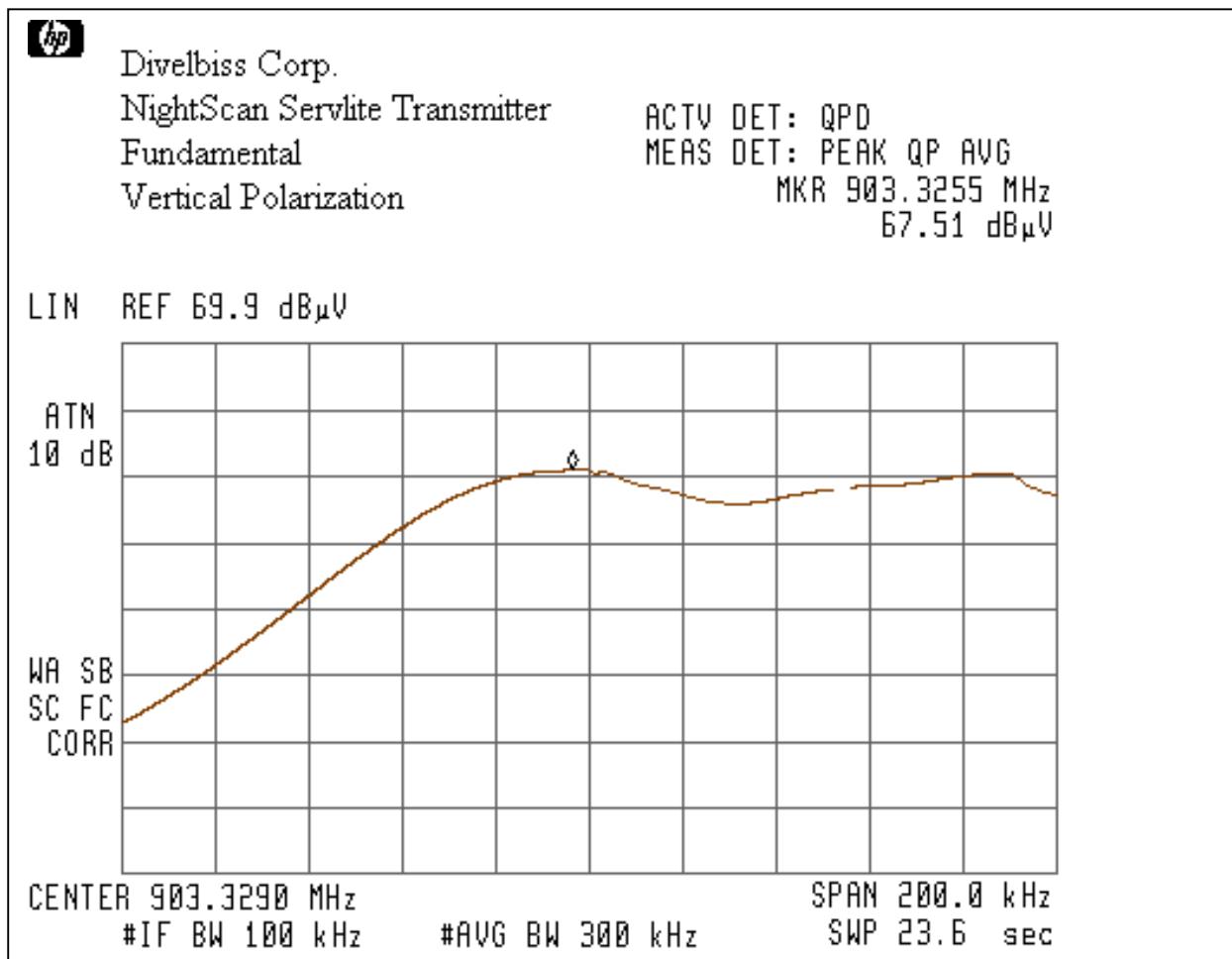
Radiated Emissions **Date:** 02-28-2002
Company: Divelbiss Corporation
Model: NightScan Servlite Transmitter
Test Engineer: Norman Shpilsher
Special Config. Info: Fundamental Frequency 921.33 MHz
 Measurements at fundamental frequency were taken using CISPR Quasi-Peak detector with RBW 100kHz
 Measurements above 1000MHz were taken using Peak detector with RBW 1MHz
Standard: FCC Part 15.249
Test Site: 3 m Anechoic Chamber
Note: The table shows the Field Strength of Fundamental and Harmonics Radiation in the restricted frequency band per FCC 15.205. No emissions above ambient were found at 9th and 10th Harmonics.

Table # 3-1-3

Frequency MHz	Antenna			Ant. Factor dB/m	Amplifier Gain (dB)	Reading dB _u V	Net at 3m, dB _u V/m	Limit dB _u V/m	Margin dB	Comments
	Polarity	Hts(cm)	Dir. (°)							
921.33	V	112	305	25.0		67.7	92.7	94.0	-1.3	Fund.
921.33	H	152	20	25.0		68.5	93.5	94.0	-0.5	Fund.
2763.97	V	133	167	34.6	33.3	48.7	50.0	54.0	-4.0	3rd Harm.
2763.97	H	199	316	34.6	33.3	50.9	52.2	54.0	-1.8	3rd Harm.
3685.30	V	141	214	37.3	32.9	47.1	51.5	54.0	-2.5	4th Harm.
3685.30	H	178	308	37.3	32.9	46.9	51.3	54.0	-2.7	4th Harm.
4606.71	V	160	266	39.4	32.3	44.7	51.8	54.0	-2.2	5th Harm.
4606.71	H	204	41	39.4	32.3	45.0	52.1	54.0	-1.9	5th Harm.
5527.93	V	119	109	42.0	32.3	37.9	47.6	54.0	-6.4	6th Harm.
5527.93	H	106	216	42.0	32.3	37.1	46.8	54.0	-7.2	6th Harm.
8291.97	V	104	91	45.4	32.3	33.3	46.4	54.0	-7.6	9th Harm.
8291.97	H	103	234	45.4	32.3	33.6	46.7	54.0	-7.3	9th Harm.
9213.30	V	106	107	49.8	32.3	33.4	50.9	54.0	-3.1	10th Harm.
9213.30	H	101	56	49.8	32.3	33.2	49.1	54.0	-4.9	10th Harm.

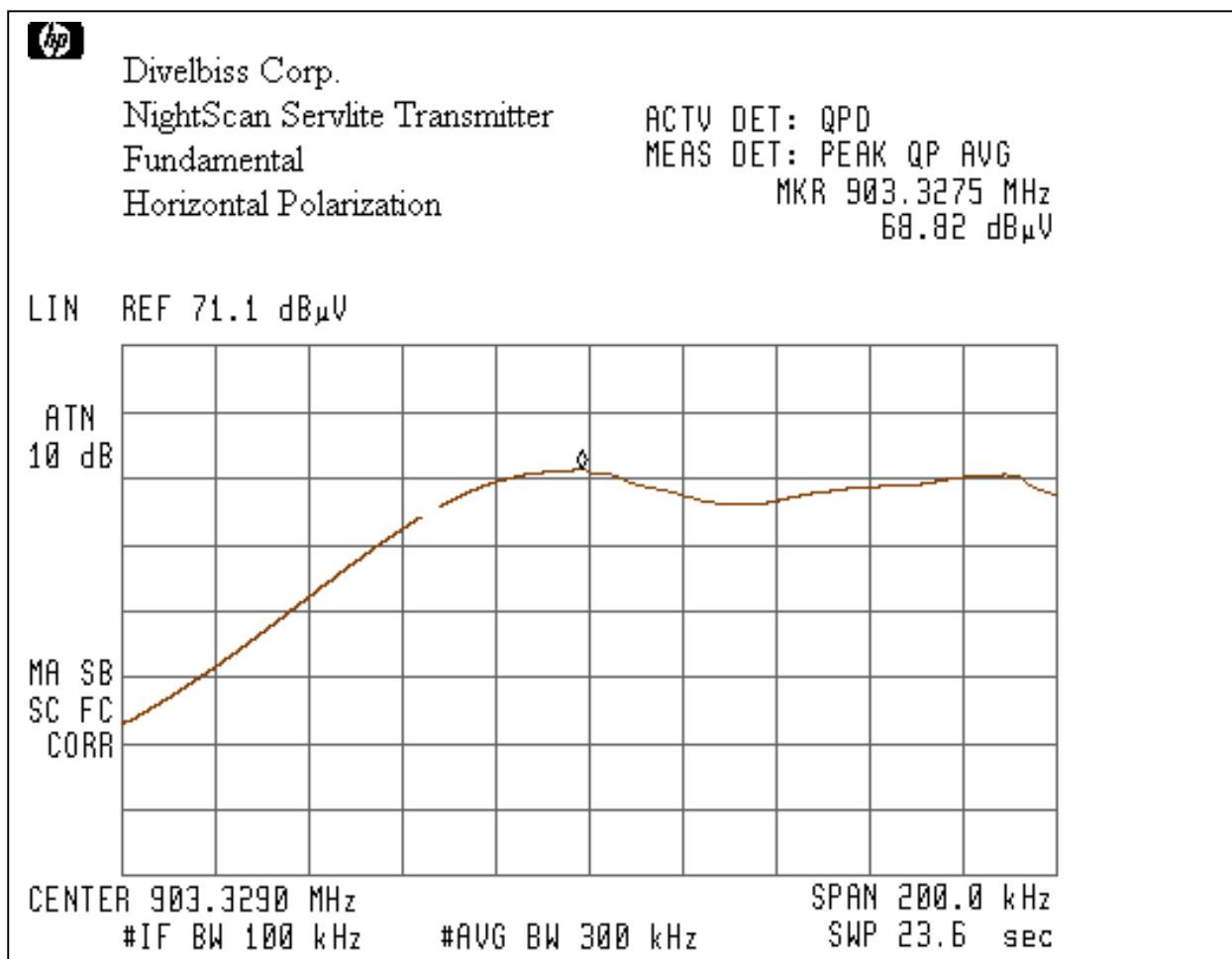
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Graph # 3-1-1



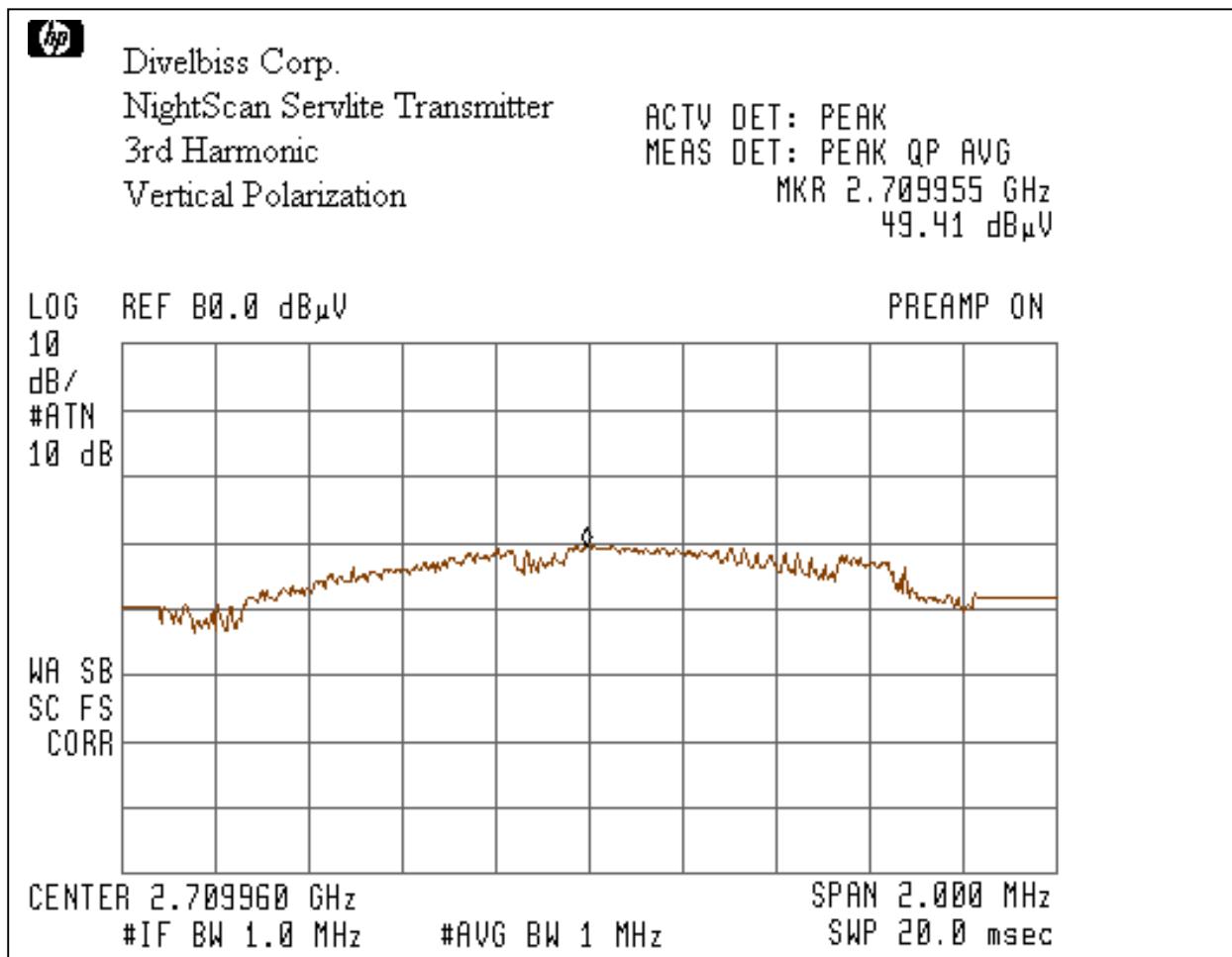
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Graph # 3-1-2



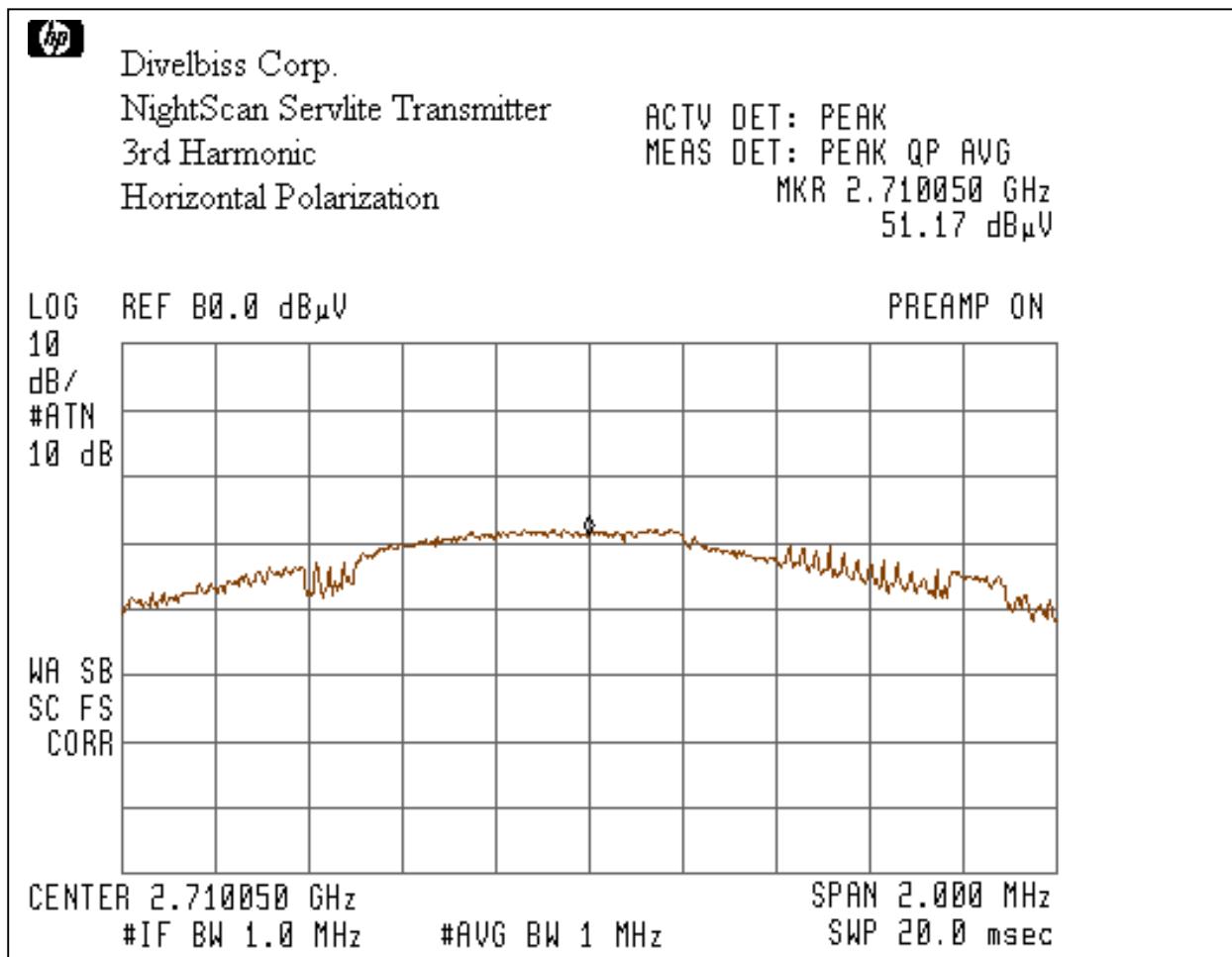
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Graph # 3-1-3



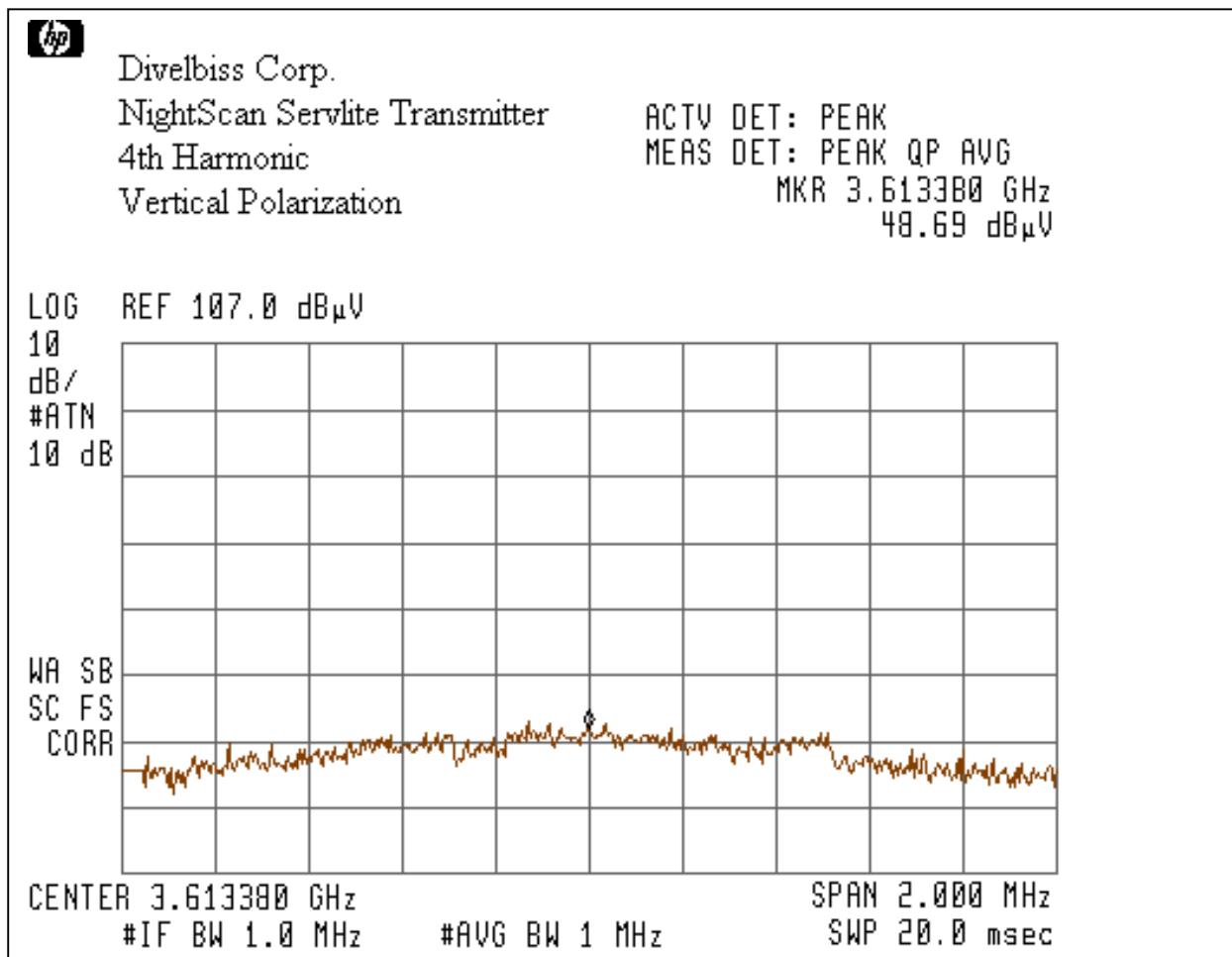
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Graph # 3-1-4



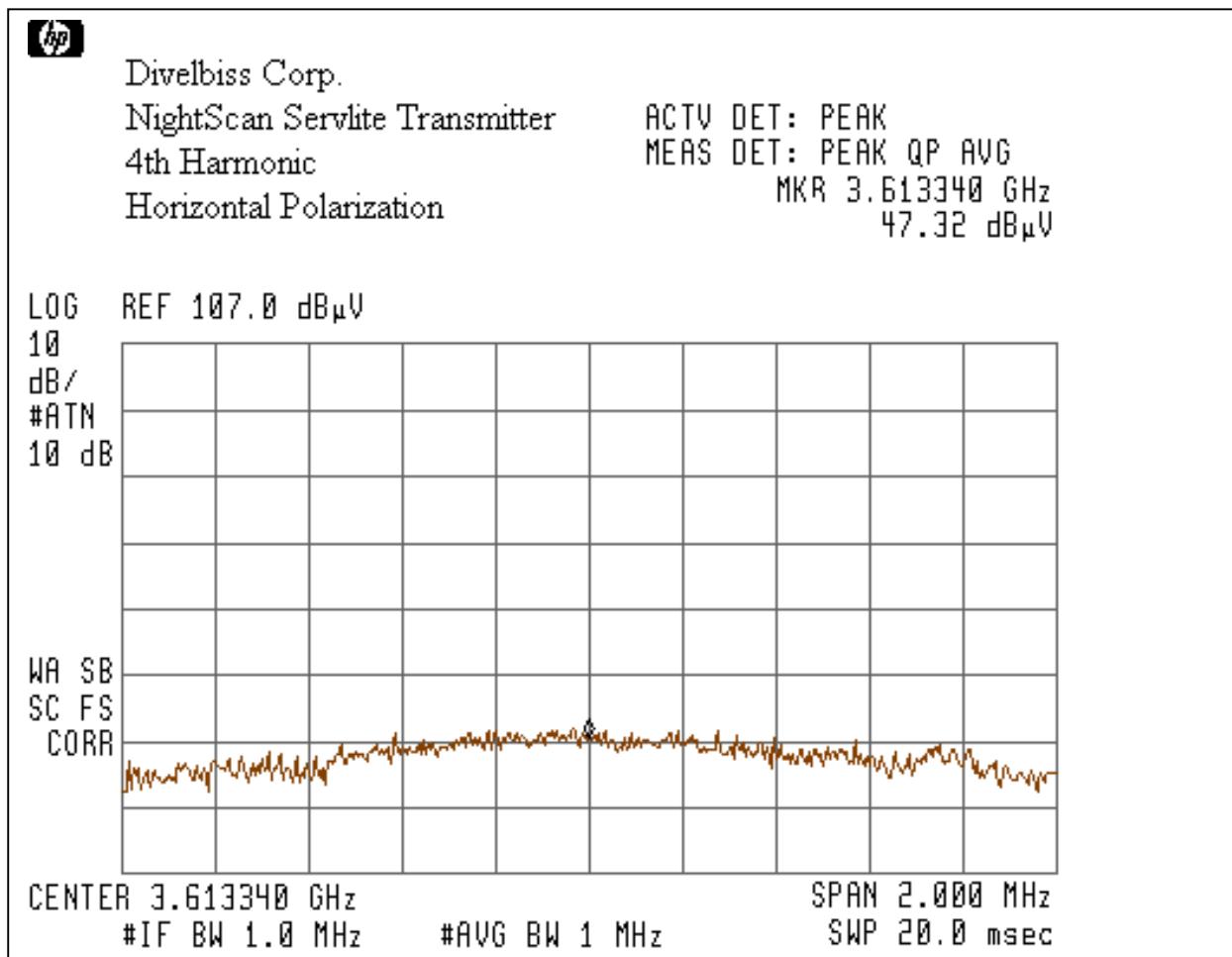
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Graph # 3-1-5



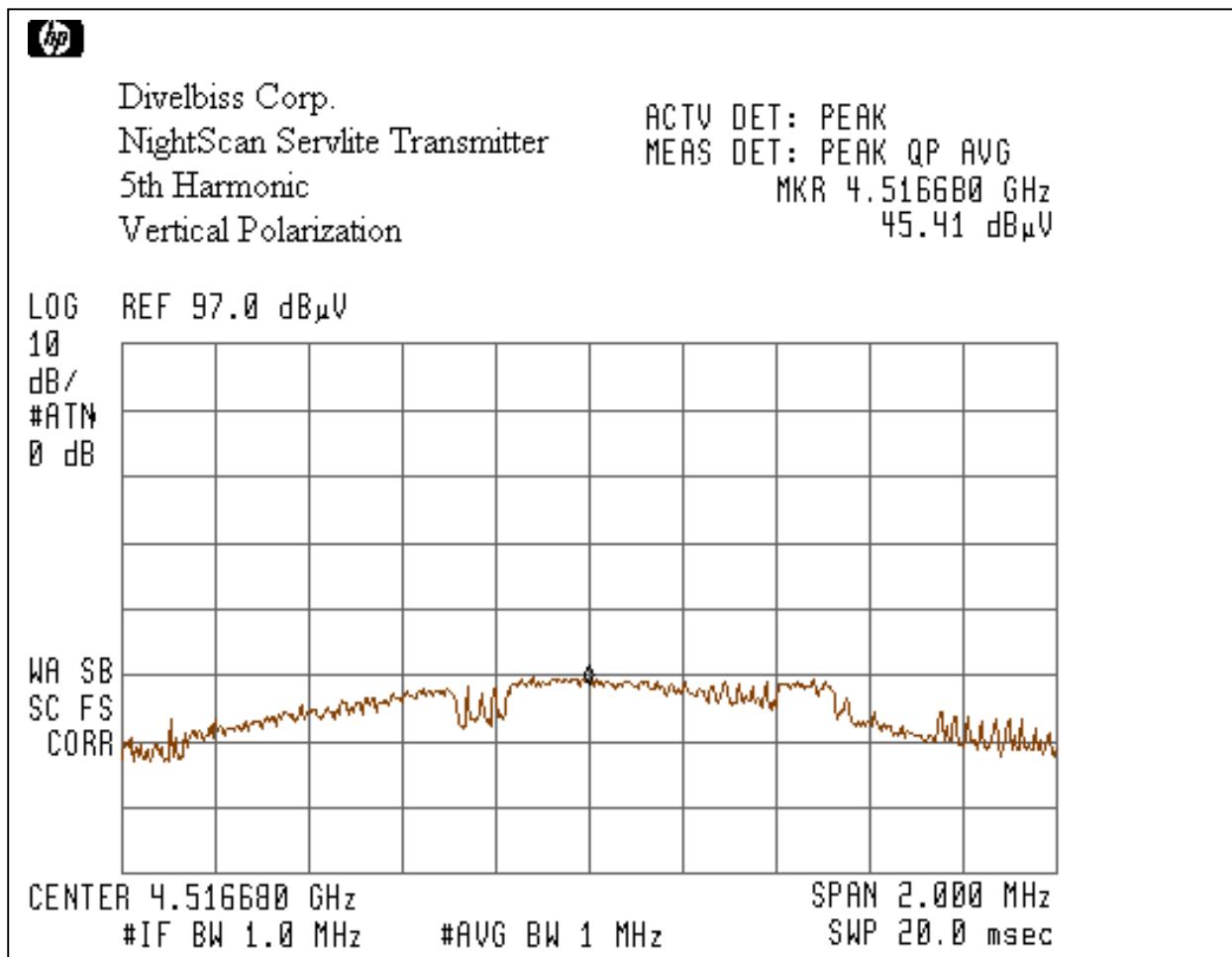
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Graph # 3-1-6



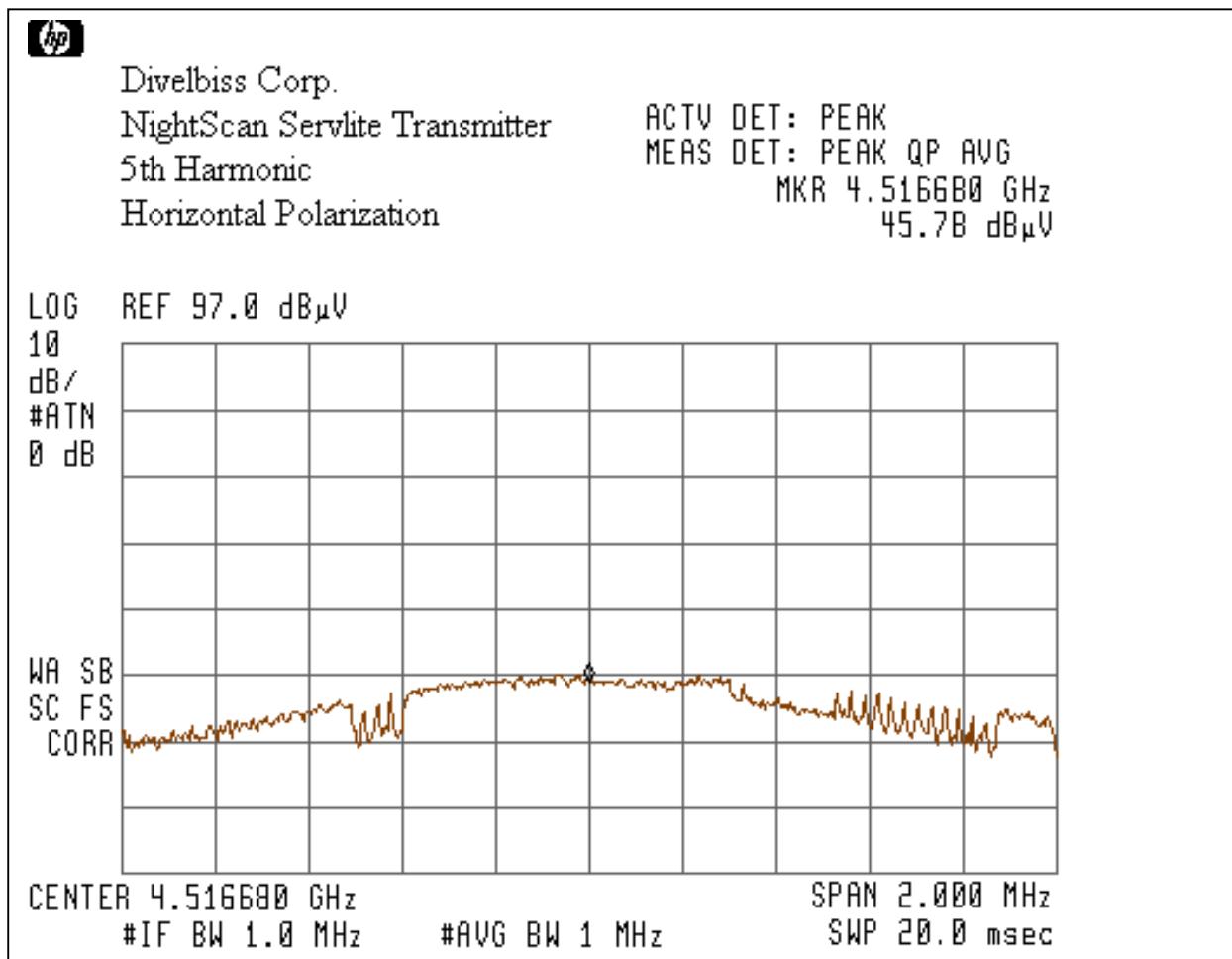
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Graph # 3-1-7



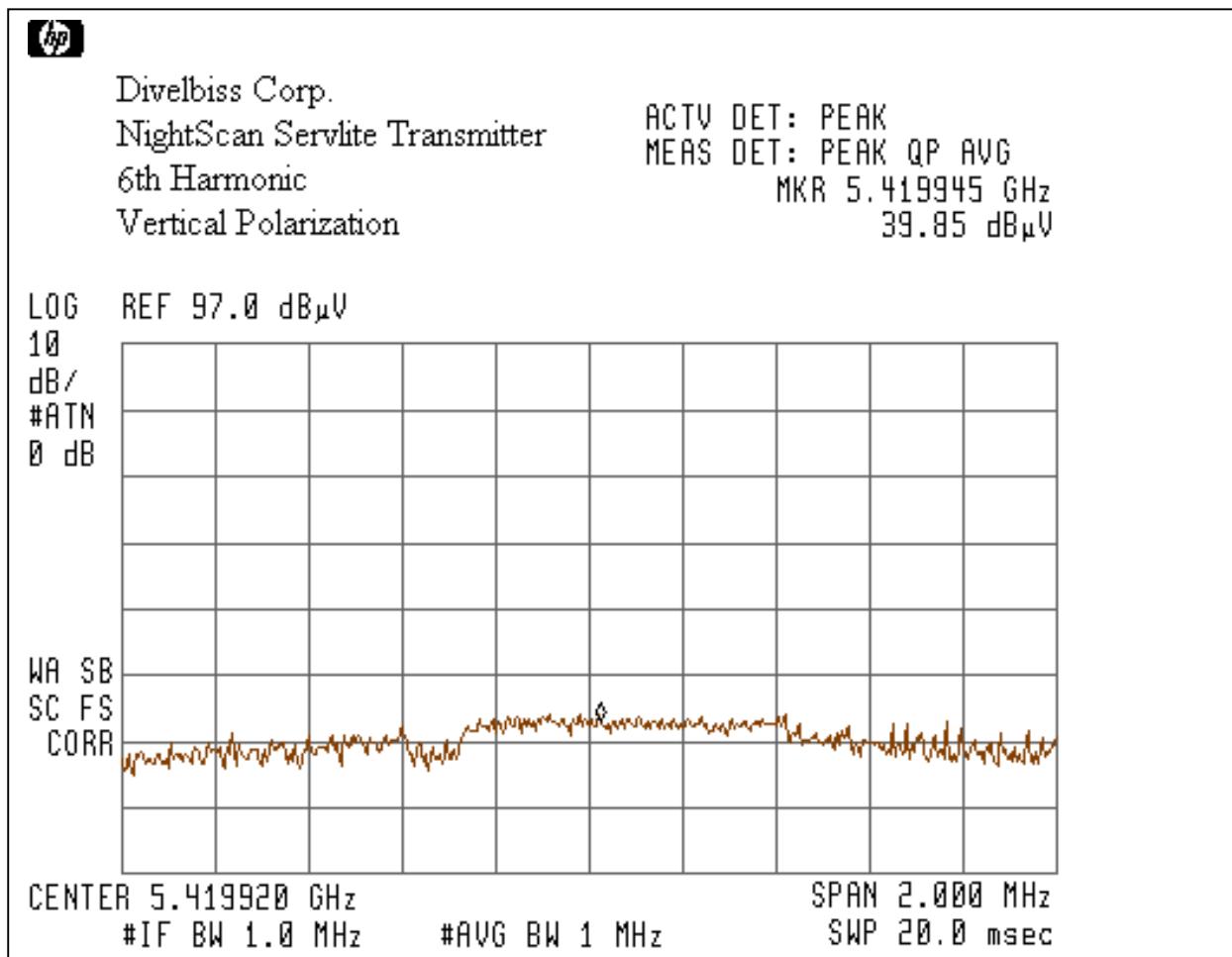
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Graph # 3-1-8



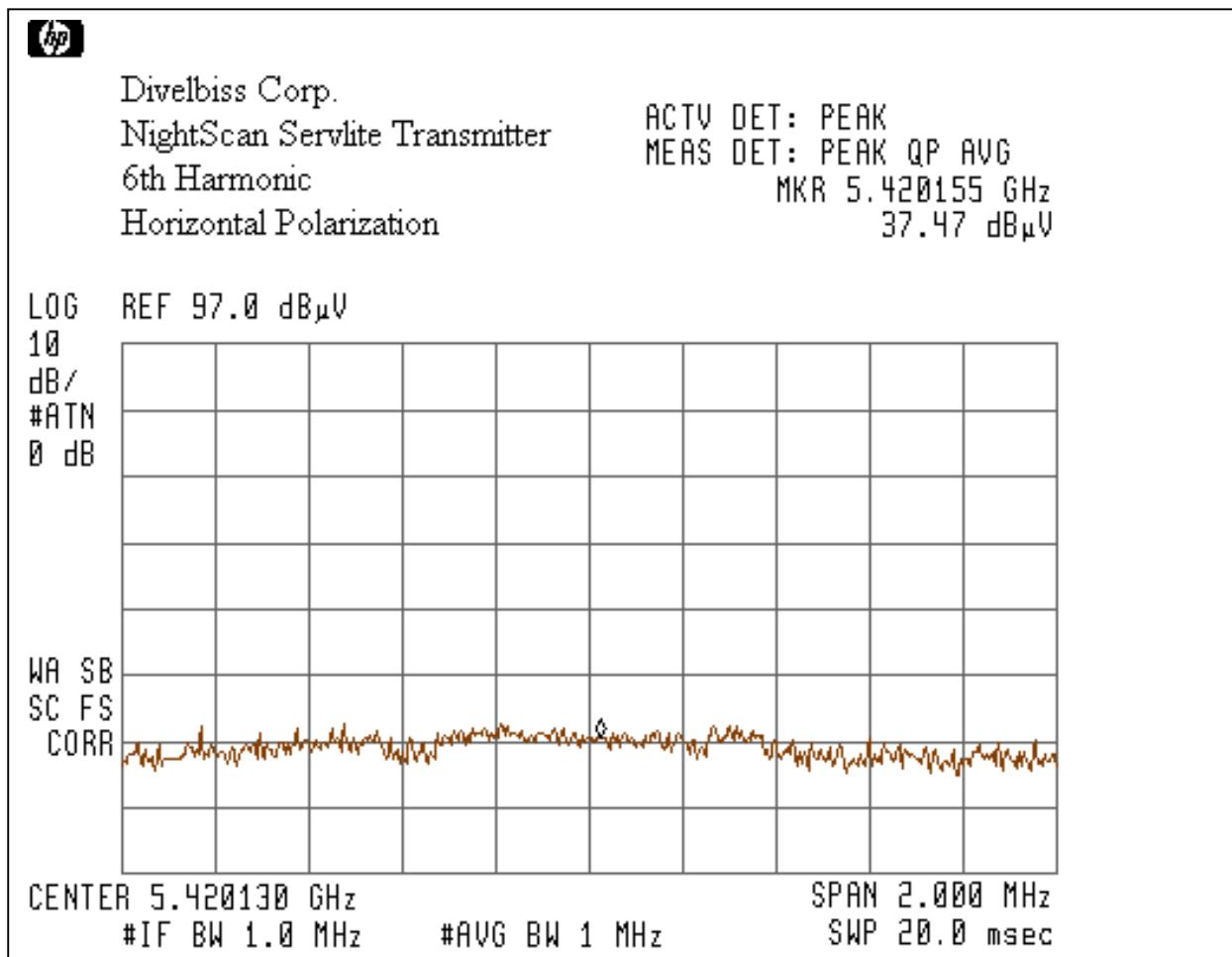
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Graph # 3-1-9



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Graph # 3-1-10



3.2 Out of Band Spurious Emissions, FCC 15.249(c), 15.209

Out-of-band measurements were made for frequencies:

- 902MHz
- 928MHz.

Output frequencies of the EUT was set to:

- 903.70MHz
- 921.37MHz

Test Procedure

The Spurious Emissions was measured at the maximum power transmission condition. The EUT was placed on a non-conductive table 0.8m above the ground plane inside the Anechoic Chamber. The table was centered on a motorized turntable, which allows 360-degree rotation. The measurement antenna was positioned at distance 3m. The radiated emissions were maximized by configuring the EUT, by rotating the EUT, by changing antenna polarization, and by changing antenna height from 1 to 4m. Field strength was measured and calculated (See Section 3.3).

The Out of band spurious emissions were measured to comply with FCC 15.249(c) requirements of 50dB minimum attenuation of spurious emissions below the level of the fundamental.

The Table and Graphs below show the Out of Band Spurious Emissions.

Note: Emission level shown in the Graphs does not include the Antenna, Cable and Pre-amplifier correction factors. These factors are shown in the tables (the Antenna and Cable factors combined together).

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Radiated Emissions: Out of Band Emissions

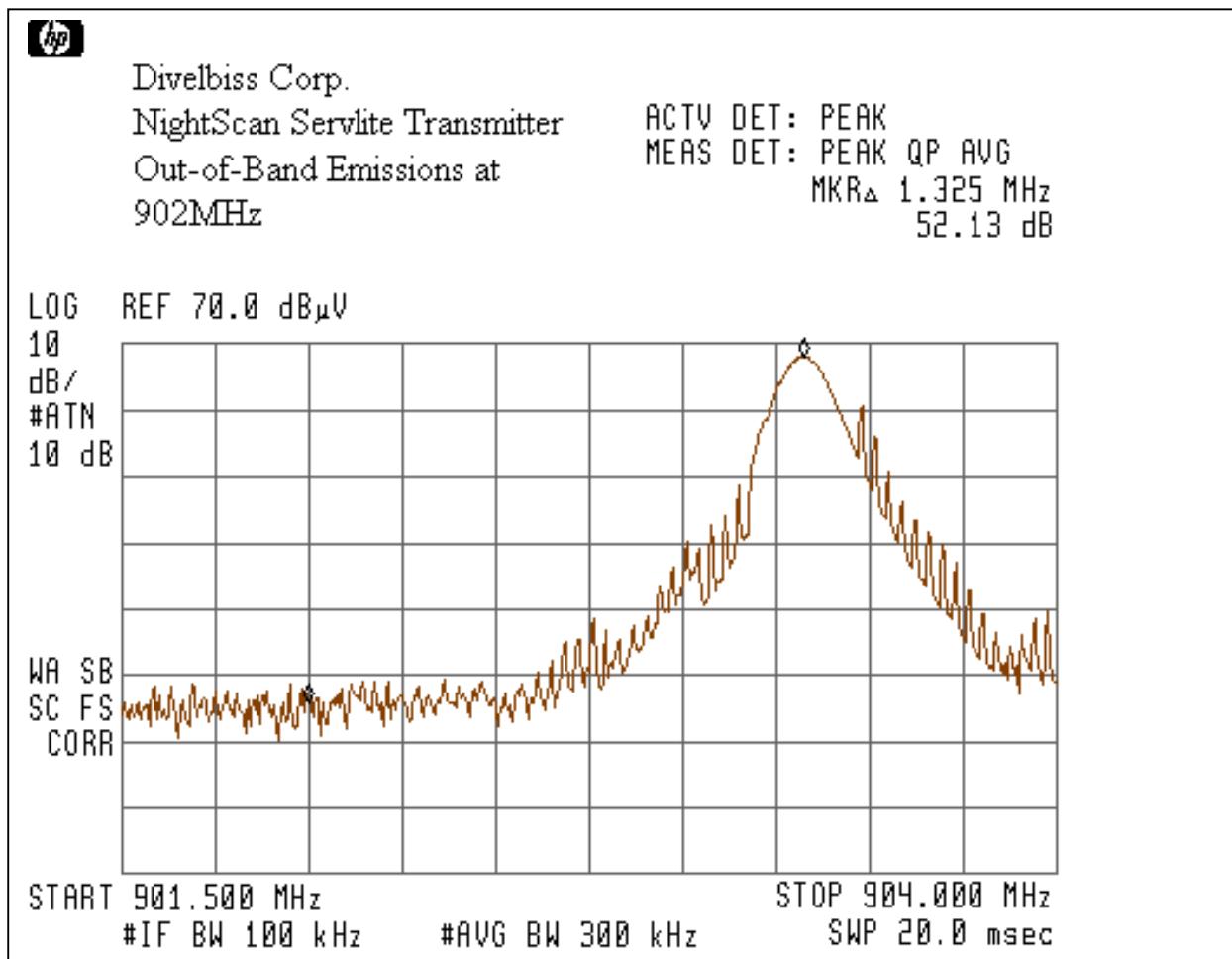
Date: 02-28-2002
Company: Divelbiss Corporation
Model: NightScan Servlite Transmitter
Test Engineer: Norman Shpilsher
Special Config. Info: Frequency range 902 to 928MHz
Standard: FCC Part 15.249
Test Site: 3 m Anechoic Chamber

Table # 3-2-1

Edge Frequency MHz	Emissions Frequency MHz	Measured Attenuation dB	15.249 Minimum Attenuation dB	Result
902.00	903.3	52.13	50.0	Pass
928.00	921.3	51.5	50.0	Pass

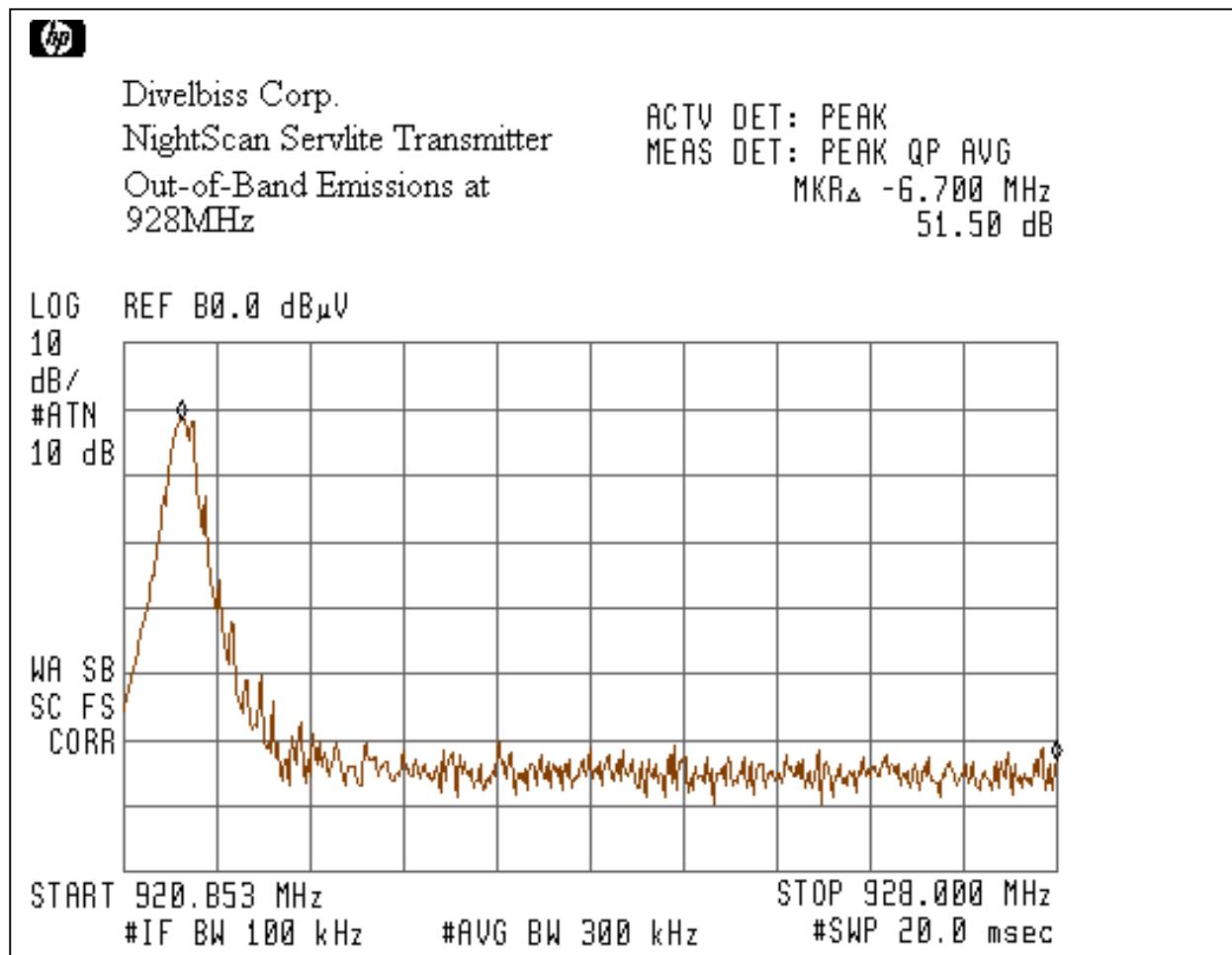
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Graph # 3-2-1



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Graph # 3-2-2



3.3 Field Strength Calculation

The field strength is calculated by adding the emissions reading on the EMI Receiver to the factors associated with preamplifiers (if any), antennas and cables. A sample calculation is included below.

$$FS = RA - AG + AF + CF$$

Where: FS = Field Strength in dB μ V/m

RA = Reading of the Receiver Amplitude (including receiver preamplifier) in dB μ V

AG = Pre-Amplifier Gain in dBi

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB/m

Assume a receiver reading of 47.3 dB μ V is obtained. The amplifier gain of 28.1 dBi is subtracted. The antenna factor of 27.5 dB/m and cable factor of 3.5 dB is added. The Antenna and Cable factors combined together and equal 31.0dB. The net field strength for comparison to the appropriate limit is 50.2 dB μ V/m.

Tested by:

Norman Shpilsher
EMC Project Engineer
Intertek Testing Services NA, Inc.

Norman Shpilsher _____ Signature

Date: February 28, 2002

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4.0 TEST EQUIPMENT

Receivers/Spectrum Analyzers

DESCRIPTION	SERIAL NO.	LAST CAL DATE	CAL DUE	TICK IF USED
HP85462A Receiver RF Section	3325A00106	07/01	07/02	X
HP85460A RF Filter Section	3330A00109	07/01	07/02	X
Advantest Spectrum Analyzer R3271A	55050084	05/01	05/02	X
HP 83017A Microwave Amplifier	3123A00475	09/01	09/02	X

Antennas

DESCRIPTION	SERIAL NO.	LAST CAL DATE	CAL DUE	TICK IF USED
Schaffner-Chase Bicono-Log Antenna	2468	11/01	11/02	X
EMCO Horn antenna 3115	9507-4513	09/01	09/02	X
EMCO Horn antenna 3115	6579	12/01	12/02	

EXHIBIT I

TEST SET UP PHOTOS

EXHIBIT II

FCC ID LABEL LOCATION

(See ID Label/Location Info. Attachments)

EXHIBIT III

EXTERNAL PHOTOS

EXHIBIT IV

INTERNAL PHOTOS

EXHIBIT V

ELECTRICAL SCHEMATICS AND BLOCK DIAGRAM

(See Block Diagram and Schematic Attachments)

EXHIBIT VI

USER MANUAL AND OPERATIONAL DESCRIPTION

(See User Manual and Operational Description Attachments)