

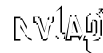
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Tarus Products Inc.

Application
For Certification
Radio Remote Control Transmitter

(FCC ID: QKFREMOTEASSM)

August 21, 2002

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1.0 GENERAL DESCRIPTION

1.1 Related Submittals Grants

This is single application of the *RADIO REMOTE CONTROL* Transmitter for Certification under Part 15 Subpart C.

There are no other simultaneous applications.

1.2 Product Description

The *RADIO REMOTE CONTROL* Transmitter is transmitter with attached antenna. The intended use of the *RADIO REMOTE CONTROL* Transmitter is to generate and transmit a RF encoded binary data signal. The *RADIO REMOTE CONTROL* Transmitter powered at 12VDC from the SCEPTRE PD1210APL06 120VAC, 60Hz/12VDC Power Adapter or from rechargeable battery located with the Transmitter in the plastic enclosure.

The *RADIO REMOTE CONTROL* Transmitter operates in frequency range from 903.37 to 921.37MHz in eight frequency channels:

- channel 0 – 903.37MHz;
- channel 1 – 906.37MHz;
- channel 2 – 907.87MHz;
- channel 3 – 909.37MHz;
- channel 4 – 912.37MHz;
- channel 5 – 915.37MHz;
- channel 6 – 919.877MHz;
- channel 7 – 921.37MHz.

The *RADIO REMOTE CONTROL* Transmitter Antenna is ¼ wave rubber duck antenna, SMA-type connector.

1.3 Test Methodology

Emission measurements were performed according to the procedures in ANSI C63.4-1992. All field strength radiated emissions measurements were performed in the semi-anechoic chamber, and for each scan, the procedure for maximizing emissions in Appendices D and E were followed. All field strength 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.

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2.0 SYSTEM TEST CONFIGURATION

2.1 Justification

N/A

2.2 EUT Exercising Software

N/A

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

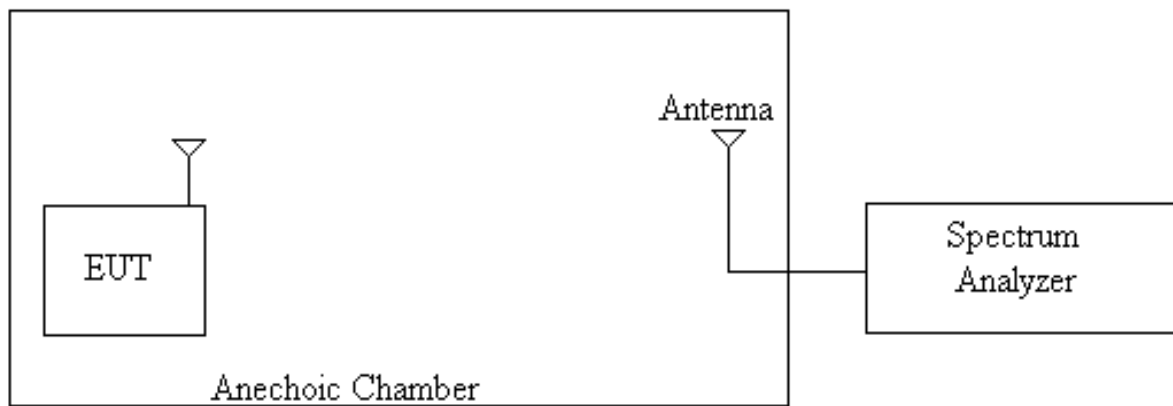
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2.6 Test Setup and Test Configuration Block Diagrams

The EUT was setup as tabletop equipment.

The EUT was powered at 12VDC from the SCEPTRE PD1210APL06 120VAC, 60Hz/12VDC Power Adapter.

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), 15.205	Field Strength of Harmonics
47 CFR 15.249(c), 15.209	Out of Band Spurious Emissions
47 CFR 15.207	Line Conducted Emissions

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3.1 Field Strength of Fundamental and Harmonics Emissions, FCC 15.249(a)(b), 15.205

Field Strength of Fundamental and Harmonics Emissions measurements were made in the start, center, and end frequency of the frequency range (Channel 0, Channel 4, and Channel 7). The Harmonics emissions were tested up to 10th harmonic. The follow Fundamental frequencies and their Harmonics emissions were tested:

903.37MHz
912.37MHz
921.37MHz

The Tables ## 3-1-1, 3-1-2, and 3-1-3 and Graphs ## 3-1-1 to 3-1-5 below show the Field Strength of Fundamental Radiation and Harmonics Emissions in the Restricted Bands of Operation according to FCC 15.205 (Graphs show Fundamental Radiation and Harmonicas Emissions for Channel 0). No emissions above the floor noise were detected at the 6th and higher harmonics.

Note: Emission level shown on the Graphs does not include the Antenna and Cable correction factors and Pre-amplifier gain.

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Radiated Emissions
Company: Tarus Products
Model: Radio Remote Control Transmitter
Test Engineer: Norman Shpilsher
Special Config. Info: Channel 0.
Standard: FCC Part 15.249, 15.205
Test Site: 3 m Anechoic Chamber
Note: Measurements were taking using a CISPR Quasi-Peak Detector for frequencies below 1GHz with 100kHz Resolution Bandwidth
 For frequencies above 1GHz measurements were taking using a Peak Detector with 1MHz Resolution Bandwidth
 No emissions were found above ambient at 6th and higher harmonics.

Table # 3-1-1

Frequency MHz	Antenna			Total Factor(dB/m)	Reading dB μ V	Net at 3m. dB μ V/m	Limit dB μ V/m	Margin dB	Comments
	Polarity	Hts(m)	Dir (°)						
903.31	V	187	234	25.03	60.98	86.01	93.98	-7.97	Fund.
903.31	H	153	312	25.03	66.36	91.39	93.98	-2.59	Fund.
1806.74	V	100	92	-2.90	51.34	48.44	N/A	N/A	2nd harm.
1806.74	H	100	173	-2.90	49.12	46.22	N/A	N/A	2nd harm.
2710.08	V	207	349	0.75	47.29	48.04	53.98	-5.94	3rd harm.
2709.98	H	212	240	0.75	46.12	46.87	53.98	-7.11	3rd harm.
3613.31	V	163	311	4.90	42.52	47.42	53.98	-6.56	4th harm.
3613.31	H	184	40	4.90	39.15	44.05	53.98	-9.93	4th harm.
4516.82	V	163	68	6.94	42.07	49.01	53.98	-4.97	5th harm.
4516.82	H	176	251	6.94	40.21	47.15	53.98	-6.83	5th harm.
5420.10	V	152	181	9.23	35.12	44.35	53.98	-9.63	6th harm.
5420.33	H	174	226	9.23	34.31	43.54	53.98	-10.44	6th harm.

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Radiated Emissions
Company: Tarus Products
Model: Radio Remote Control Transmitter
Test Engineer: Norman Shpilsher
Special Config. Info: Channel 4.
Standard: FCC Part 15.249, 15.205
Test Site: 3 m Anechoic Chamber
Note: Measurements were taking using a CISPR Quasi-Peak Detector for frequencies below 1GHz with 100kHz Resolution Bandwidth
 For frequencies above 1GHz measurements were taking using a Peak Detector with 1MHz Resolution Bandwidth
 No emissions were found above ambient at 6th and higher harmonics.

Table # 3-1-2

Frequency MHz	Antenna			Total Factor(dB/m)	Reading dB μ V	Net at 3m. dB μ V/m	Limit dB μ V/m	Margin dB	Comments
	Polarity	Hts(cm)	Dir (°)						
912.31	V	100	344	25.12	57.94	83.06	93.98	-10.92	Fund.
912.31	H	100	354	25.12	65.07	90.19	93.98	-3.79	Fund.
1824.68	V	100	88	-2.90	49.71	46.81	N/A	N/A	2nd harm.
1824.68	H	100	1	-2.90	47.98	45.08	N/A	N/A	2nd harm.
2737.06	V	100	302	0.80	47.15	47.95	53.98	-6.03	3rd harm.
2737.06	H	209	242	0.80	42.36	43.16	53.98	-10.82	3rd harm.
3649.39	V	160	302	4.96	42.51	47.47	53.98	-6.51	4th harm.
3649.39	H	180	39	4.96	42.15	47.11	53.98	-6.87	4th harm.
4561.72	V	156	69	7.01	41.89	48.90	53.98	-5.08	5th harm.
4561.72	H	174	40	7.01	39.24	46.25	53.98	-7.73	5th harm.
5474.15	V	149	157	9.29	34.12	43.41	53.98	-10.57	6th harm.
5474.15	H	180	44	9.29	32.84	42.13	53.98	-11.85	6th harm.

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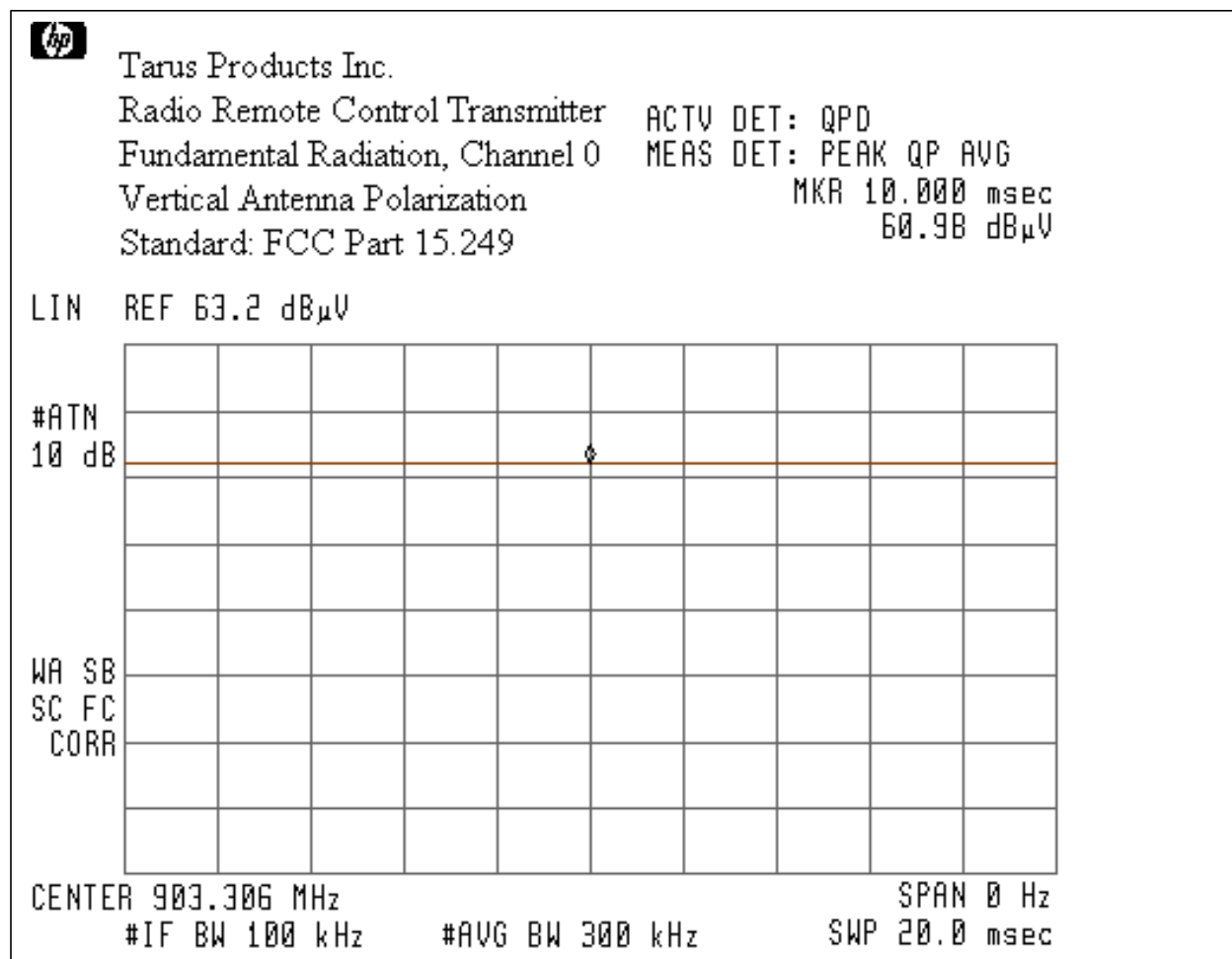
Radiated Emissions
Company: Tarus Products
Model: Radio Remote Control Transmitter
Test Engineer: Norman Shpilsher
Special Config. Info: Channel 7.
Standard: FCC Part 15.249, 15.205
Test Site: 3 m Anechoic Chamber
Note: Measurements were taking using a CISPR Quasi-Peak Detector for frequencies below 1GHz with 100kHz Resolution Bandwidth
 For frequencies above 1GHz measurements were taking using a Peak Detector with 1MHz Resolution Bandwidth
 No emissions were found above ambient at 6th and higher harmonics.

Table # 3-1-3

Frequency MHz	Antenna			Total Factor(dB/m)	Reading dB μ V	Net at 3m. dB μ V/m	Limit dB μ V/m	Margin dB	Comments
	Polarity	Hts(cm)	Dir (°)						
921.31	V	118	235	25.21	57.12	82.33	93.98	-11.65	Fund.
921.31	H	100	142	25.21	62.52	87.73	93.98	-6.25	Fund.
1842.68	V	100	221	-2.90	54.51	51.61	N/A	N/A	2nd harm.
1842.68	H	106	87	-2.90	54.98	52.08	N/A	N/A	2nd harm.
2764.08	V	117	0	0.85	43.32	44.17	53.98	-9.81	3rd harm.
2764.08	H	229	216	0.85	41.68	42.53	53.98	-11.45	3rd harm.
3685.35	V	159	299	5.02	42.39	47.41	53.98	-6.57	4th harm.
3685.35	H	184	41	5.02	42.29	47.31	53.98	-6.67	4th harm.
4606.71	V	172	72	7.07	41.91	48.98	53.98	-5.00	5th harm.
4606.71	H	161	85	7.07	40.11	47.18	53.98	-6.80	5th harm.
5528.09	V	167	93	9.65	35.49	45.14	53.98	-8.84	6th harm.
5528.09	H	152	17	9.65	33.95	43.60	53.98	-10.38	6th harm.

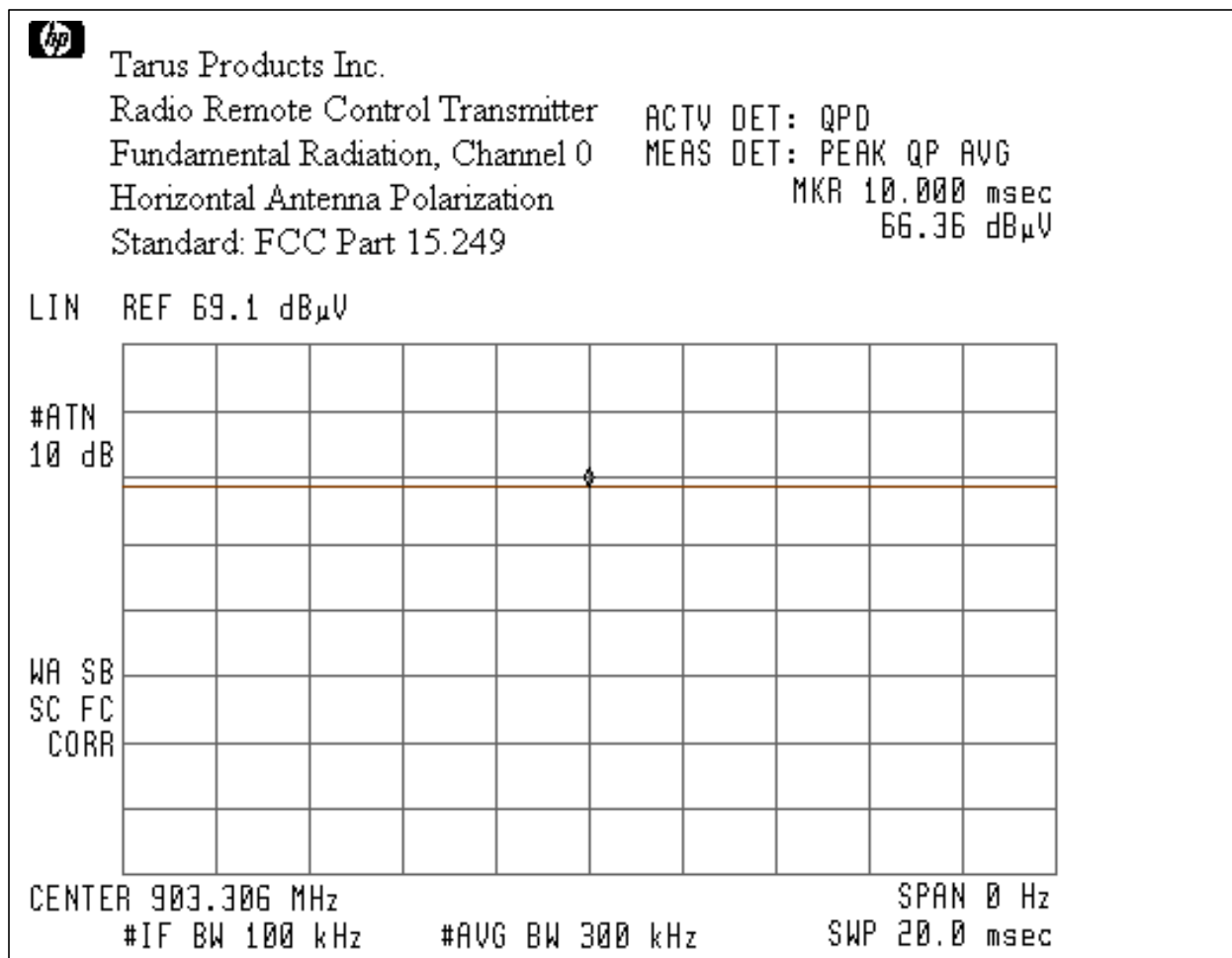
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Graph # 3-1-1



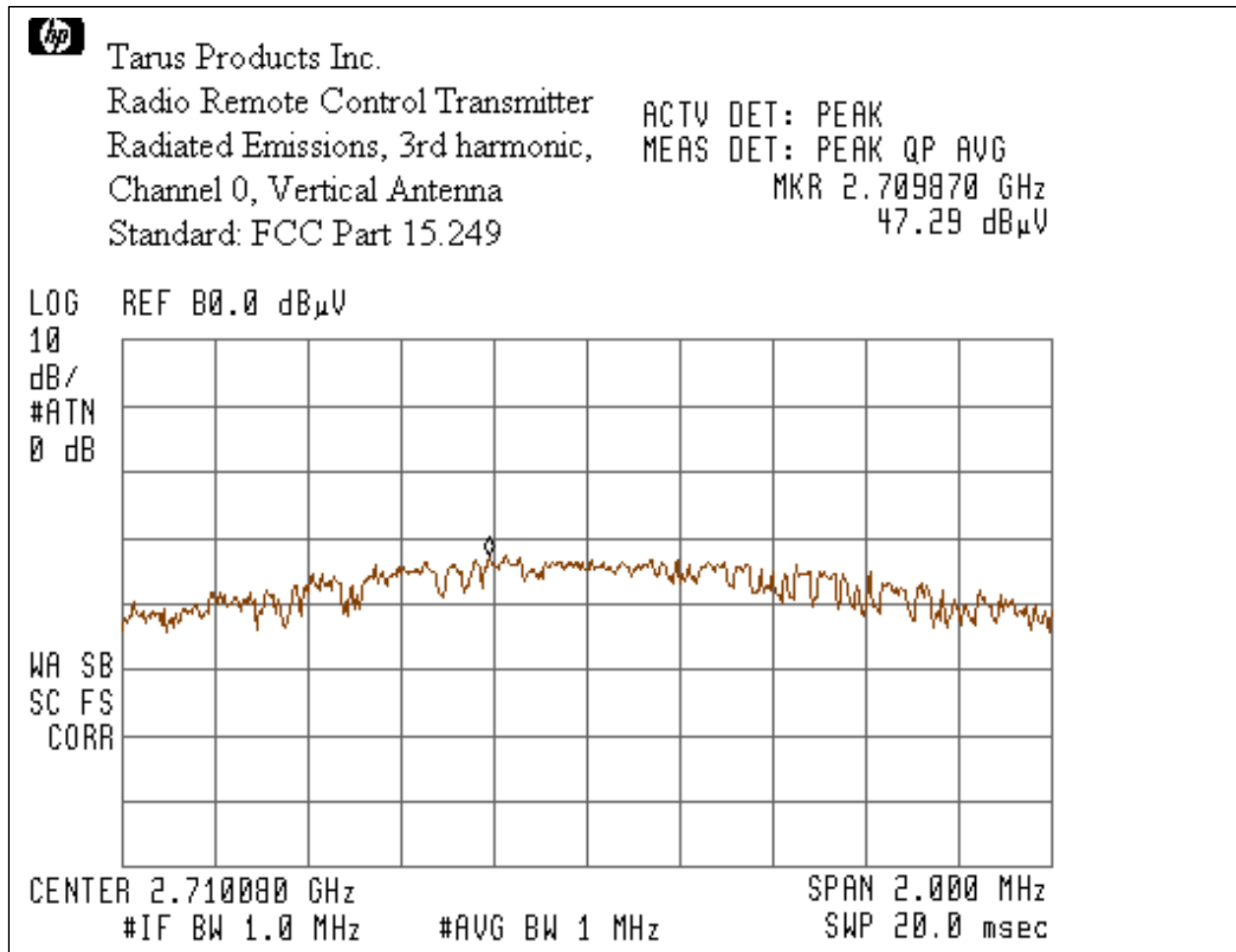
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Graph # 3-1-2



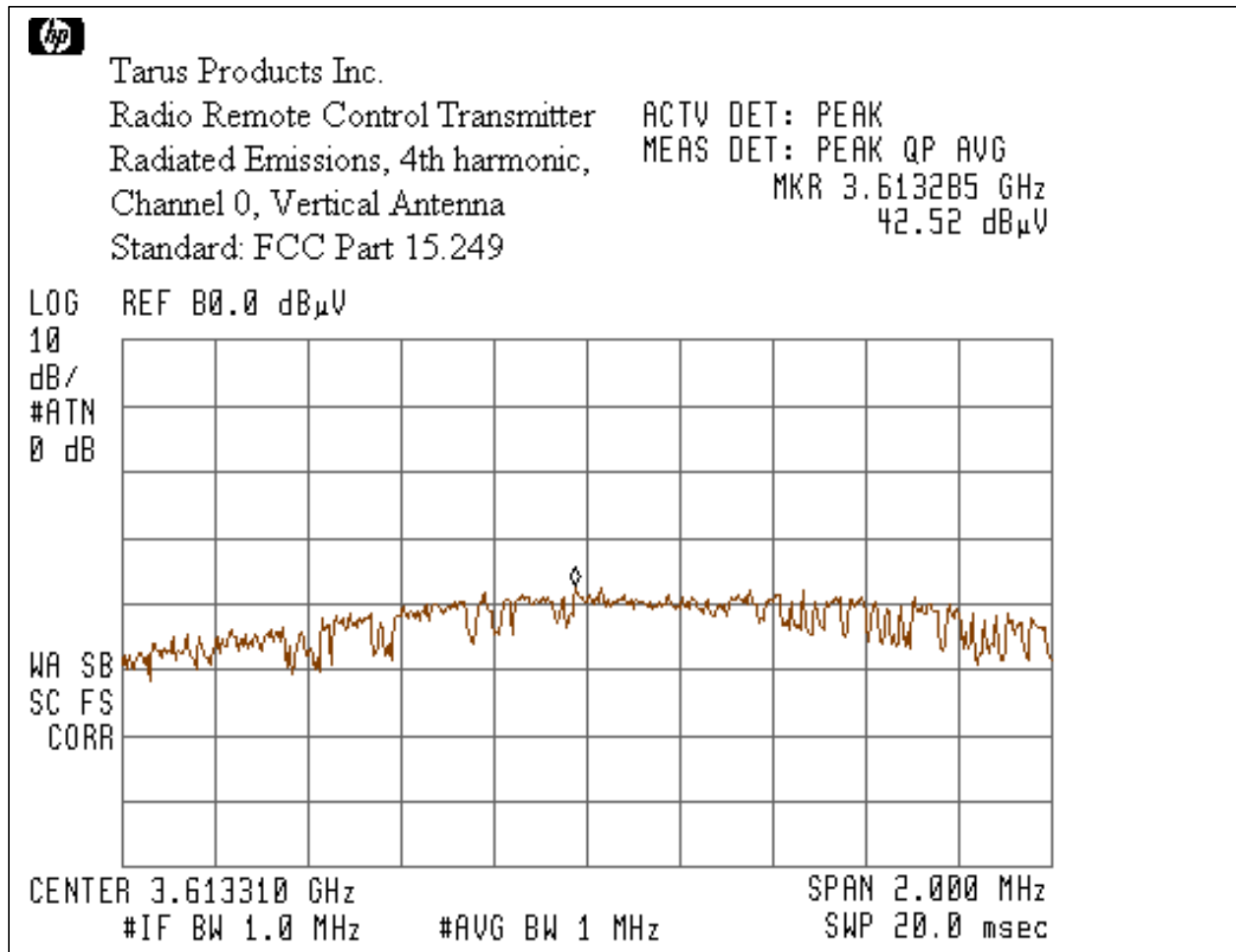
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Graph # 3-1-3



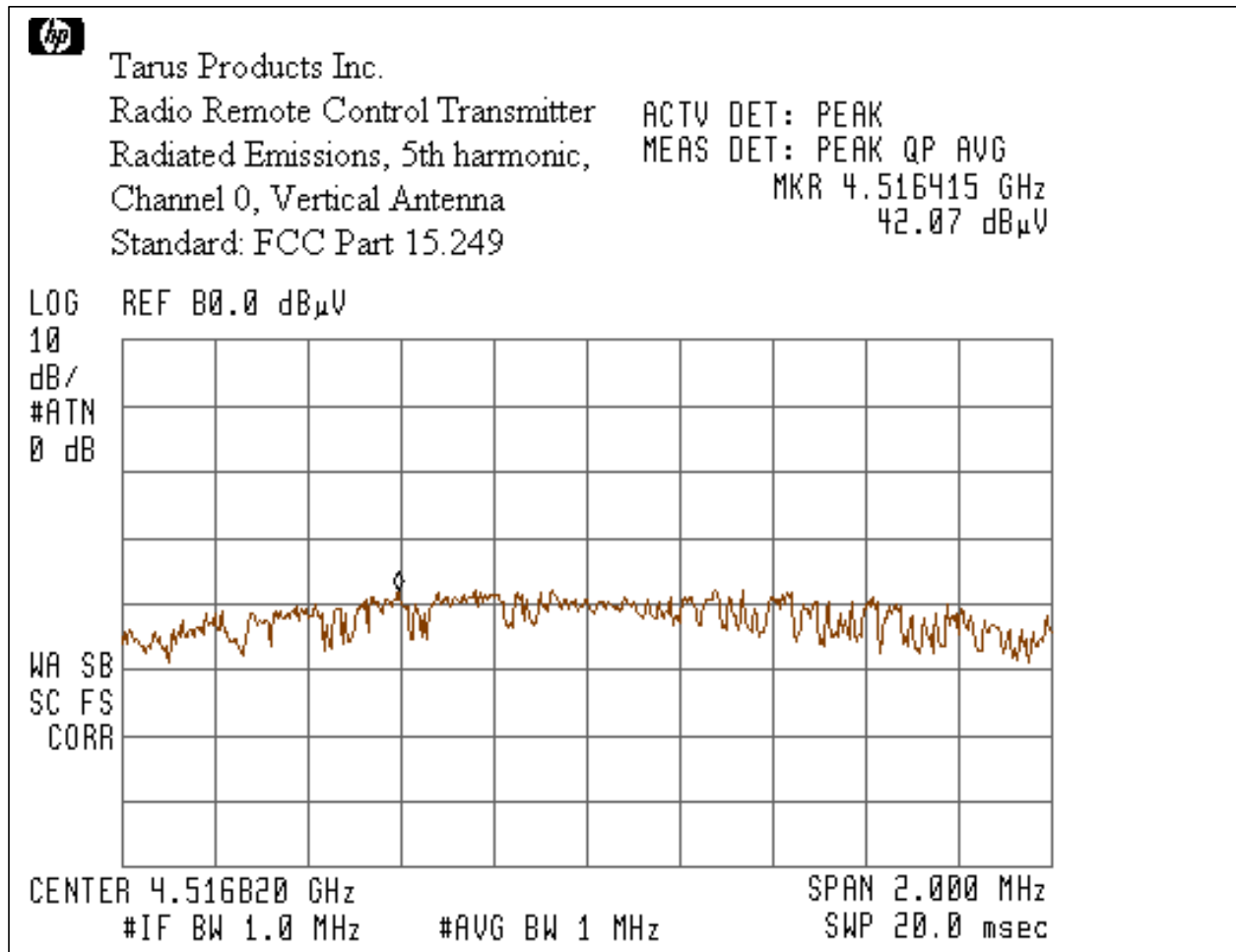
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Graph # 3-1-4



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Graph # 3-1-5



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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:

- 903.37MHz (Channel 0)
- 921.37MHz (Channel 7)

The Table # 3-2-1 and Graphs ## 3-2-1 and 3-2-2 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.

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Radiated Emissions: Out of Band Emissions

Date: 07/23-31/2002

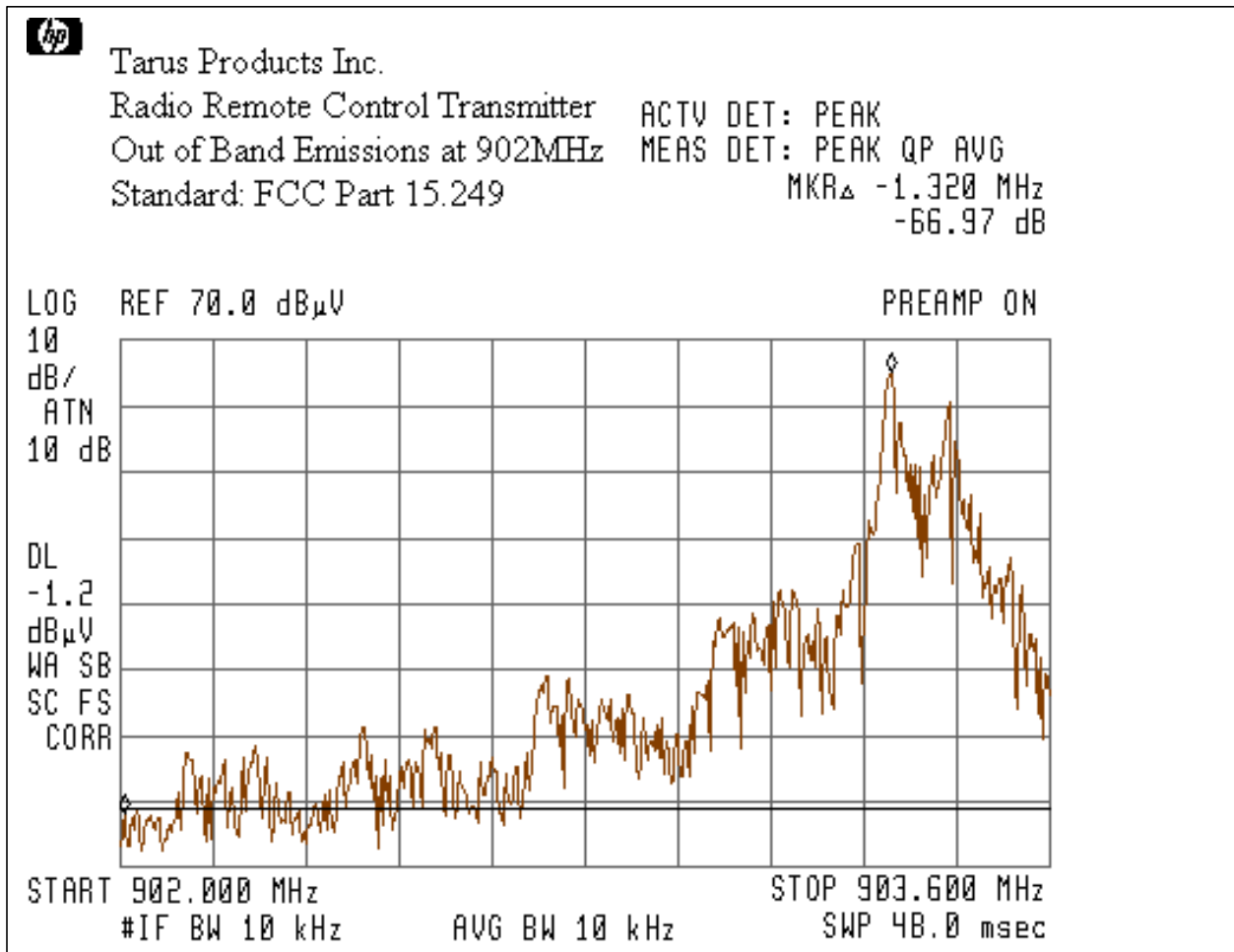
Company: Tarus Products
Model: Radio Remote Control Transmitter
Test Engineer: Norman Shpilsher
Special Config. Info: Frequency range 902 to 928MHz
Standard: FCC Part 15.249, 15.209
Test Site: 3 m Anechoic Chamber
Note: Measurements were taken using a Peak detector

Table # 3-2-1

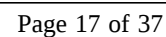
Frequency MHz	Reading dB μ V	Total Factor dB/m	Net at 3m. dB μ V /m	15.249 Attenuation dB	15.249 Limit dB μ V /m	15.249 Margin dB	15.209 Limit dB μ V /m	15.209 Margin dB
903.31								
902.00	0.4	25.0	25.4	67.0	50.0	-17.0	46	-20.6
921.31								
928.00	7.5	25.3	32.8	55.4	50.0	-5.4	46	-13.2

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Graph # 3-2-1



Graph # 3-2-2



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3.3 Line Conducted Emissions, FCC 15.207

Line Conducted Emissions testing was performed in frequency range from 150kHz to 30MHz.

The Table # 3-3-1 and Graphs ## 3-3-1 and 3-3-2 show the Line Conducted Emissions.
Graph # 3-3-2 shows emissions from 450kHz to 30MHz for transition period.

Table # 3-3-1

Line 1

Frequency	OP dB _μ V	AVG dB _μ V	OP Limit dB _μ V	AVG Limit dB _μ V	OP Margin dB	AVG Margin dB
152.8 KHz	48.1	N/A	65.8	55.8	-17.7	N/A
178.5 KHz	46.7	N/A	64.6	54.6	-17.9	N/A
203.75 KHz	45.9	N/A	63.4	53.4	-17.5	N/A
229.5 KHz	45.0	N/A	62.5	52.5	-17.5	N/A
255.75 KHz	44.1	N/A	61.6	51.6	-17.5	N/A
331.75 KHz	42.0	N/A	59.4	49.4	-17.4	N/A
481.75 KHz	37.1	N/A	56.3	46.3	-19.2	N/A

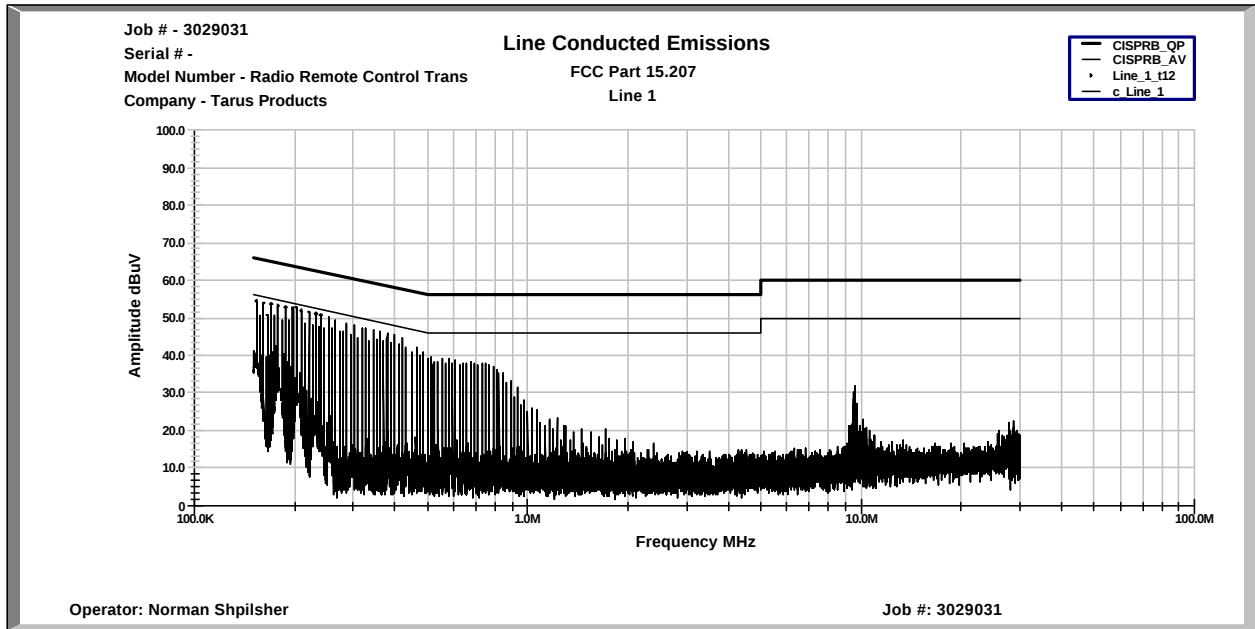
Line 2

Frequency	QP dB _μ V	AVG dB _μ V	QP Limit dB _μ V	AVG Limit dB _μ V	QP Margin dB	AVG Margin dB
152.8 KHz	47.4	N/A	65.8	55.8	-18.4	N/A
178.5 KHz	46.2	N/A	64.6	54.6	-18.4	N/A
203.75 KHz	45.4	N/A	63.4	53.4	-18.0	N/A
229.5 KHz	44.7	N/A	62.5	52.5	-17.8	N/A
255.75 KHz	43.8	N/A	61.6	51.6	-17.8	N/A
331.75 KHz	41.7	N/A	59.4	49.4	-17.7	N/A
481.75 KHz	36.9	N/A	56.3	46.3	-19.4	N/A

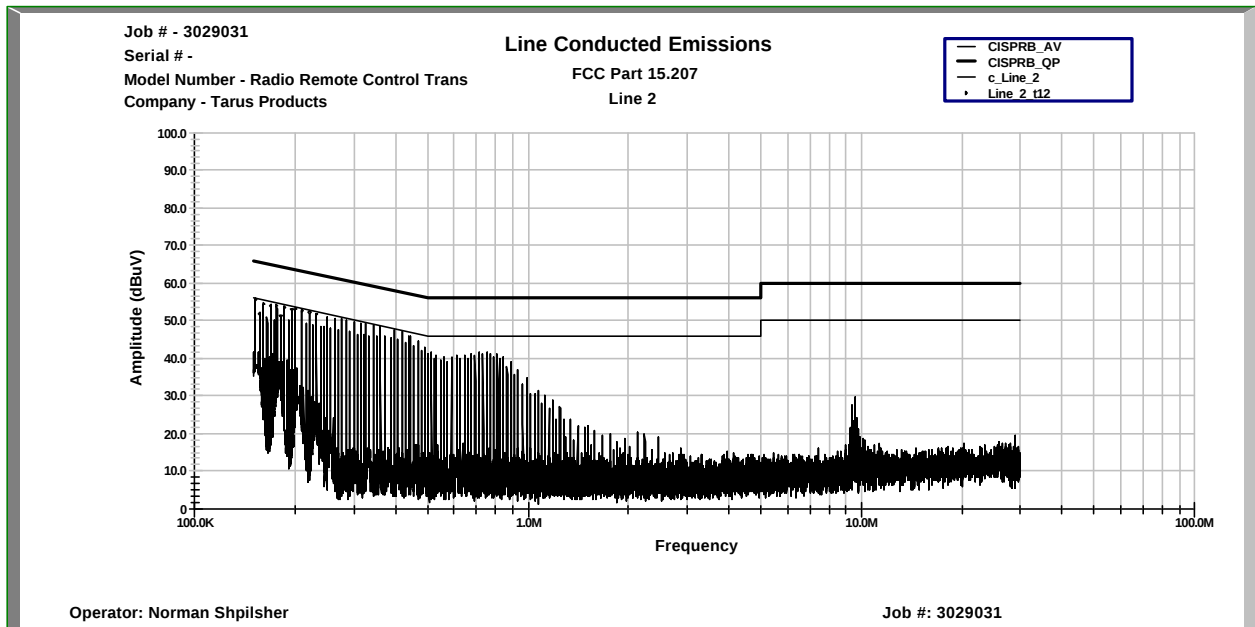
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Graph #3-3-1

Line 1



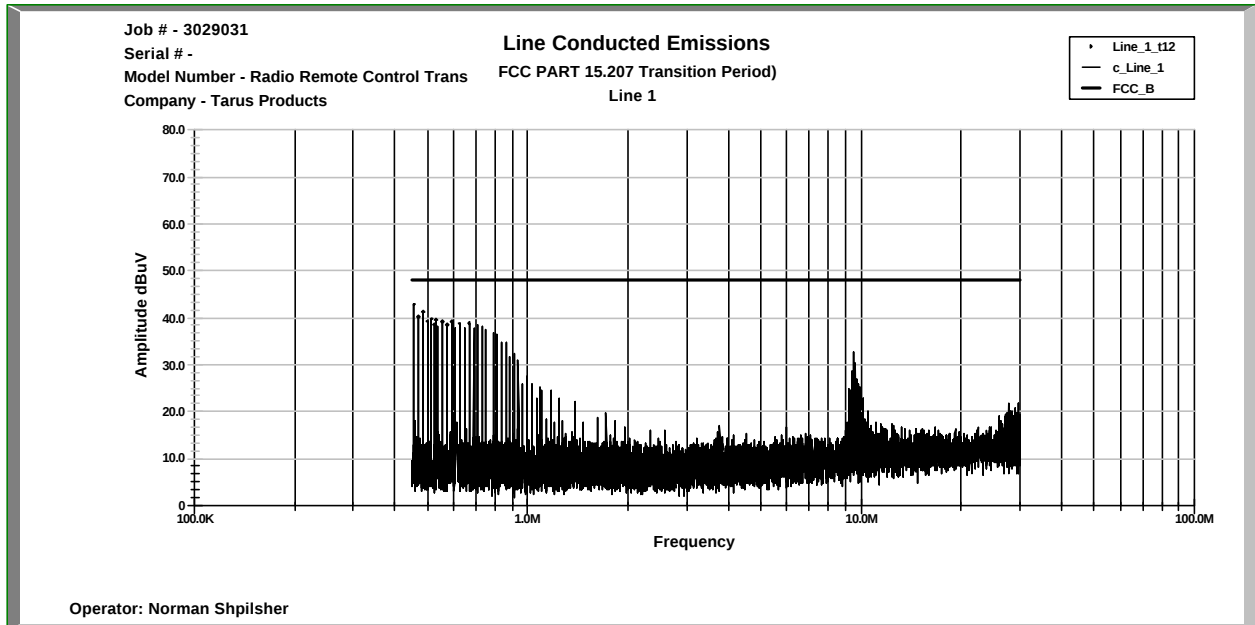
Line 2



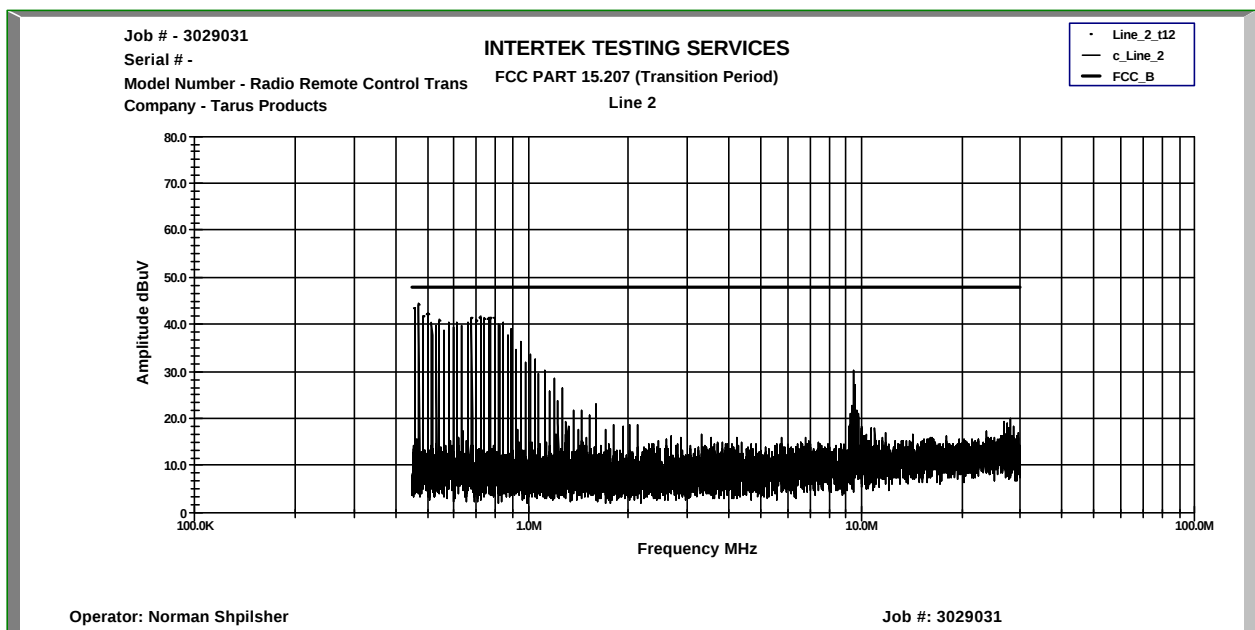
Graph #3-3-2

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Line 1



Line 2



3.4 Test Procedure

Field Strength Measurements

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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 3m distance. The Bicono-Log antenna was used in frequency range from 30MHz to 1GHz. The Horn antenna with the pre-amplifier was used in frequency range above 1GHz. 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. Method of the direct Field Strength Calculation is shown in Section 3.5.



3.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured emissions reading on the EMI Receiver.

The basic equation with a sample calculation is as follows:

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

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

RA = Receiver Amplitude in dB(μ V)

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB(m^{-1})

AG = Amplifier Gain in dB

Assume a receiver reading of 48.1 dB(μ V) is obtained. The antenna factor of 7.4 dB(m^{-1}) and cable factor of 1.6 dB is added and amplifier gain of 16.0 dB is subtracted giving field strength of 41.1 dB(μ V/m).

$$RA = 48.1 \text{ dB}(\mu V)$$

$$AF = 7.4 \text{ dB}(m^{-1})$$

$$CF = 1.6 \text{ dB}$$

$$AG = 16.0 \text{ dB}$$

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

$$FS = 48.1 + 7.4 + 1.6 - 16.0$$

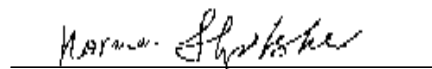
$$FS = 41.1 \text{ dB}(\mu V/m)$$

In the tables the Cable Factors and Amplifier Gain are included to the Antenna Factors.

Tested by:

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

Signature



Signature

Date: August 21, 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	3549A00306	11/01	11/02	X
HP85460A RF Filter Section	3448A00276	11/01	11/02	X
Advantest Spectrum Analyzer R3271A	55050084	06/02	06/03	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
A.H. Systems SAS-200/562B Loop antenna	215	11/01	11/02	
EMCO Horn antenna 3115	9507-4513	09/01	09/02	X
EMCO Horn antenna 3115	6579	12/01	12/02	
EMCO Horn antenna 3116	9904-2423	10/01	10/02	

Artificial Mains Networks/Absorbing Clamps

DESCRIPTION	SERIAL NO.	LAST CAL DATE	CAL DUE	TICK IF USED
FCC LISN-2	316	01/02	01/03	X
FCC-LISN-50-25-2	2014	04/02	04/03	