May 25, 2000

Federal Communications Commission
Authorization and Evaluation Division
7435 Oakland Mills Road, Columbia, MD 21046

Attention: Applications Examiner

Applicant: Airspan Communications Ltd.
Cambridge House, Oxford Road, Uxbridge Middlesex UB8 1UN UK

Equipment: PCS Base Transmitter Station (BTS), Model: AS4000
FCC ID: O2J-AS4000CT-PCS

Specification: 47 CFR 24 Licensed Certification

Dear Examiner:

The following application for Grant of Equipment Authorization is presented on behalf of Airspan Communications Ltd. for the Licensed Certification of their Model: AS4000 PCS Base Transmitter Station (BTS).

Enclosed, please find a complete data and documentation package demonstrating that this device complies with the technical requirements of 47 CFR 24, for a Base Transmitter Station (BTS).

If you have any questions, please contact the undersigned, who is authorized to act as Agent.

Sincerely,

Chris Harvey
EMC Director
MET Laboratories, Inc.

MET Laboratories, Inc. *Safety Certification - EMI - Telecom Environmental Simulation*

914 WEST PATAPSCO AVENUE ! BALTIMORE, MARYLAND 21230-3432 ! PHONE (410) 354-3300 ! FAX (410) 354-3313

ENGINEERING TEST REPORT

in support of the
Application for Grant of Equipment Authorization

EQUIPMENT:	PCS Base Transmitter Station (BTS), Model: AS4000
FCC ID:	O2J-AS4000CT-PCS
Specification:	47 CFR 24
On Behalf of the Applicant:	Airspan Communications Ltd. Cambridge House Oxford Road Uxbridge Middlesex UB8 1UN UK
Manufacturer:	**Same as above**
Manufacturer's Representative	Mr. Mel Nance
Test Date(s):	Mar 1 thru 19, 2000

ENGINEERING STATEMENT

I ATTEST: the measurements shown in this report were made in accordance with the procedures indicated, and that the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements. On the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of Part 24 of the FCC Rules under normal use and maintenance.

_____
Liming Xu
Project Engineer, MET Laboratories

1.0 INTRODUCTION

The following data is presented on behalf of the Applicant, Airspan Communications Ltd.

2.0 TEST SITE

All testing was conducted at MET Laboratories, Inc., 914 West Patapsco Avenue, Baltimore, Maryland 21230-3493. Radiated emissions measurements were performed on a three-meter open area test site (OATS). A complete site description is on file with the FCC Laboratory Division as 31040/SIT/MET.

3.0 TEST EQUIPMENT USED

Manufacturer	**Equipment**	**Calibration Due**	**Cal. Interval**
Hewlett Packard	8563A Spectrum Analyzer	5/29/00	annual
EMCO	Biconical Antenna 3104	1/27/01	annual
EMCO	EMCO Log Periodic Antenna	3/20/01	annual
EMCO	Double Ridge Guided Horn	3/20/01	annual
Hewlett Packard	8591E Analyzer	8/12/00	annual
Solar	LISN	6/30/00	annual

4.0 EQUIPMENT UNDER TEST CONFIGURATION

The Base Transmitter Station (BTS) was configured with DC power supply modules and an external PC to program the EUT to output a PCS (i.e.CDMA Modulation type) cellular RF signal. The EUT with host external computer was configured for maximum signal gain and bandwidth. The EUT was operated in a manner representative of the typical usage of the equipment. During all testing, system components were manipulated within the confines of typical usage to maximize each emission.

5.0 TEST TYPE(S)

5.1 Radiated Emissions: 47CFR2.1053, **, 24.238(a)**
5.2 Occupied Bandwidth: 47CFR2.1049
5.3 RF Power Output: 47CFR 2.1046, **24.232(a), (c)**
5.4 Spurious Emission at Antenna Terminals:(uplink & downlink) 47CFR 2.1051, **24.238(a)**
5.5 Spurious Emission at Antenna Terminals at Frequency Block edges +/- 1 MHz, 47CFR 2.1051, **24.238(b)**
5.6 Frequency Stability over temperature variations: 47CFR **2.1055(a)(1)**
5.7 Frequency Stability over variations in supply voltage: 47CFR **2.1055(d)(1)**
5.8 DC Line Conducted Emissions: 47CFR **15.107**

6.0 TEST RESULTS

6.1 TEST TYPE: Radiated Emissions

6.1.1 TECHNICAL SPECIFICATION: 2.1053; 24.238(a)

6.1.2 TEST DATE(S): 15 Mar 2000

6.1.3 MEASUREMENT PROCEDURES:

As required by §2.1053, *field strength of spurious radiation measurements* were made in accordance with the general procedures of ANSI C63.4-1992 "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40 GHz". Preliminary radiated emission measurements were performed inside a shielded chamber with all digital signal generators on and terminated. The frequency list from the preliminary measurements was used as a guide for making final measurements on a 10 meter open area test site. The unit was scanned over the frequency range of the lowest systme oscillator value to 9 GHz. The Radiated Spurious Emissions *Limit* is obtained by the following:
Based on an output power (as measured at the output of the Amplifier) of 2.8 watts:

$$P_o = 2.8 \text{ W}$$

As per 2.993 (a), it is assumed this power is to be fed to a half-wave tuned dipole. Using a conversion formula for distance, the field strength at one meter can be derived:

$$E(V/m)_{1m} = \frac{\sqrt{49.2 \ X \ 2.8}}{1}$$

$$E(V/m)_{1m} = 11.74 \ V/m \ or \ 141.3 \ db\mu V$$

As per 24.238(a), the spurious emissions must be attenuated by 43 + 10log(P) which is:

$$43 + 10Log(2.8) = 47.47 \ dB$$

Therefore, the limit for spurious emissions is:

$$141.3 \ dB\mu V - 47.47 \ dB = 93.83 \ dB\mu V \ @ \ 1m$$

At 3 meters measurement distance, the limit is;

$$E(V/m)_{3m} = \frac{\sqrt{49.2 \ X \ 2.8}}{3}$$

$$E(V/m)_{3m} = 3.91 \ V/m \ or \ 131.8 \ db\mu V$$

According to 24.238(a), all signals must be attenuated by 47.77 dB. Therefore, the limit for spurious emissions for a test distance of 3 meters is:

$$131.8 - 47.47 = 84.38 \ dB\mu V \ @ \ 3m$$

6.1.4 RESULTS:

Carrier Emission: 2.8 Watts

FREQUENCY (MHZ)	EUT AZIMUTH (Degrees)	ANTENNA		EUT RADIATION (dBµV)	ANTENNA FACTOR (dB/m)	TEST DISTANCE (m)	CABLE LOSS (dB)	AMP GAIN MINUS FILTER LOSS (dBµV)	FIELD STRENGTH (dBuV/m)	LIMITS @ 3m (dBuV/m)
		POL (H/V)	HGT (m)							
54.3	180	H	2	20.5	11.128	3	1.31	n/a	32.9	84.38
54.3	180	V	1	28.8	10.784	3	1.31	n/a	40.9	84.38
57.370	90	H	2	22.6	10.9578	3	1.37	n/a	34.9	84.38
57.370	90	V	1	36.6	10.6052	3	1.37	n/a	48.6	84.38
139.4	180	H	2	11.7	12.624	3	2.208	n/a	26.5	84.38
139.4	180	V	1	12.2	12.276	3	2.208	n/a	26.7	84.38
253.5	180	H	2	14.5	17.02	3	3.09	n/a	34.6	84.38
253.5	180	V	1	12.4	17.7	3	3.09	n/a	33.2	84.38
299.7	180	H	2	11.5	21.688	3	3.315	n/a	36.5	84.38
299.7	180	H	1	11.6	19.518	3	3.315	n/a	34.4	84.38
368.6	0	H	2	16.2	15.772	3	3.719	n/a	35.7	84.38
368.6	0	V	1	22.5	15.772	3	3.719	n/a	42	84.38
914	0	H	2	12.17	24.12	3	6.442	n/a	42.7	84.38
914	0	V	1	12.3	23.66	3	6.442	n/a	42.4	84.38
3894	0	H	1	57	32.4	3	2	n/a	56.4	84.38
3894	0	V	1	53	32.2	3	2	n/a	52.2	84.38

Equipment meets the specifications of 2.993; 24.238(a)

Photograph of Radiated Emissions Test Configuration

6.2 TEST TYPE: Occupied Bandwidth

6.2.1 TECHNICAL SPECIFICATION: 47CFR2.1049

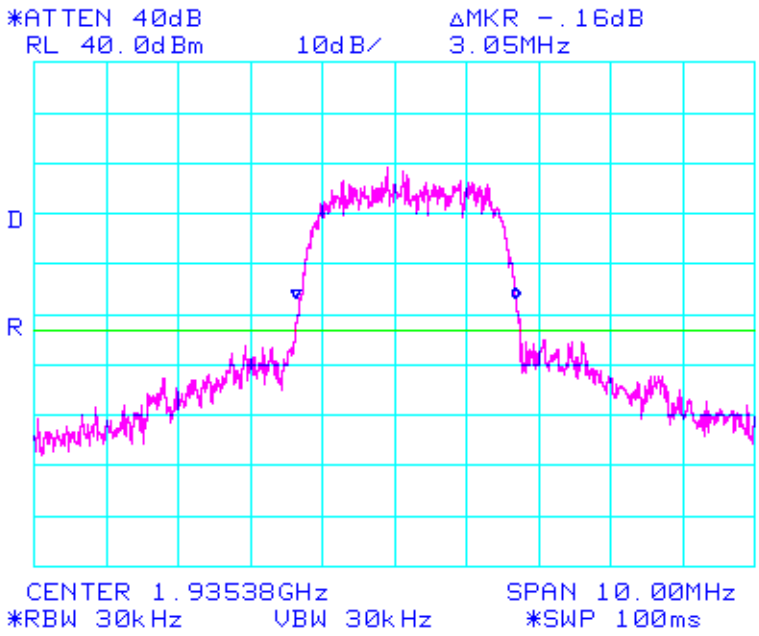
6.2.2 TEST DATE(S): 10 Mar 1999

6.2.3 MEASUREMENT PROCEDURES:

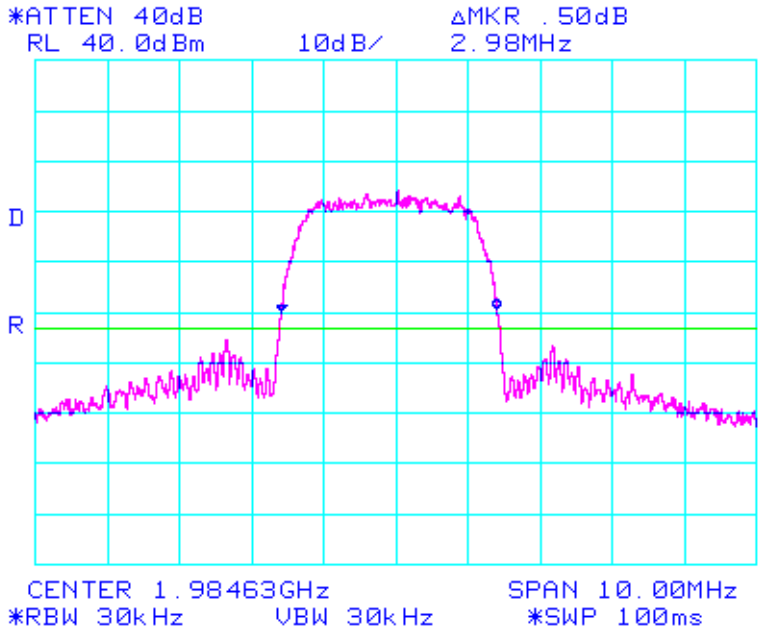
As required by §2.1049 of CFR 47, *occupied bandwidth measurements* were made on the Base Transmitter Station (BTS). The EUT was configured to transmit a digitally modulated carrier signal. Using a bandwidth of 30KHz (1% of Occupied BW), we determined the occupied bandwidth of the emission at the center of the selectable channel range. The Occupied Bandwidth is the spectrum used that is greater than 20dB below the Peak of the measured Signal.

6.2.4 RESULTS:

Equipment complies with Section 2.1049. Plots of the occupied bandwidth, as measured at the RF output port are on the following pages. The Occupied Bandwidth has been measured as 3.05 MHz. This number will be used as the Necessary Bandwidth for the Emission Designator for the modulation type utilized in this device.



Occupied B/W emi1298



Occupied B/W block C
emi1298

6.3 TEST TYPE: RF Power Output

6.3.1 TECHNICAL SPECIFICATION: 47CFR2.1046 and 24.232(a), (c)

6.3.2 TEST DATE(S): 10 Mar 2000

6.3.3 MEASUREMENT PROCEDURES:

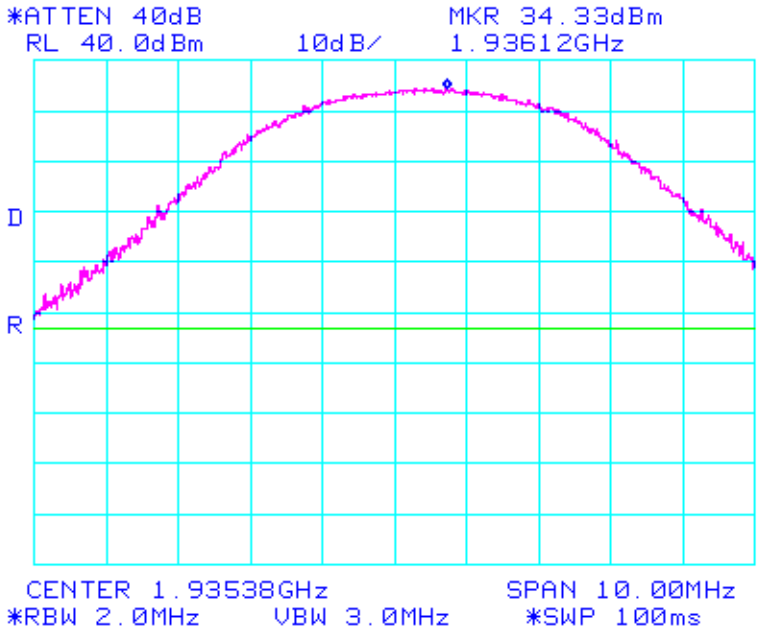
As required by §2.1046 of CFR 47, *RF power output measurements* were made at the RF output terminals using an attenuator and spectrum analyzer. This test was performed with carrier modulated by an PCS CDMA modulation signal.

Plots of the RF output Power level of the Digitally modulated carrier, as measured at the RF output are included on the following page .

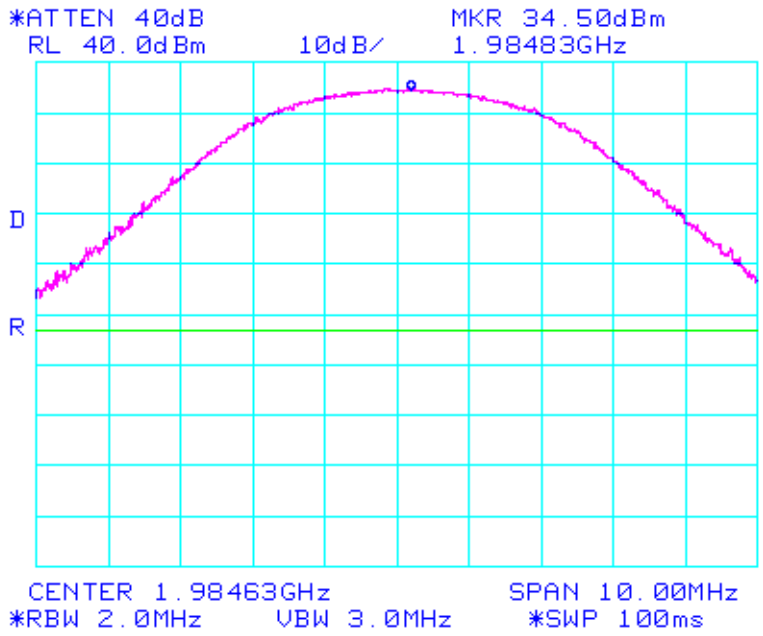
6.3.4 RESULTS:

Equipment complies with 47CFR 2.1046 and 24.232(a). The Base Transmitter Station (BTS) does not exceed 100 W (or 50 dBm) at the carrier frequency.

Photograph of Antenna Conducted Spurious Emissions and
RF Power Output Test Configuration



RF power output at antenna terminal block A
emi1298



RF power output at antenna terminal block C
emi1298

6.4 TEST TYPE: Spurious Emissions at Antenna Terminals

6.4.1 TECHNICAL SPECIFICATION: 2.1051; 24.238(a)

6.4.2 TEST DATE(S): 10 Mar 1999

6.4.3 MEASUREMENT PROCEDURES:

As required by §2.1051 of CFR 47, *spurious emissions at antenna terminal measurements* were made at the RF output terminals using a 50 Ω attenuator and spectrum analyzer set for a 30 kHz bandwidth. This test was performed with Digitally modulated carrier signals. The Digital signal generator was adjusted for continuous transmit on frequencies in both the uplink and down-link frequency bands. The frequency spectrum was investigated from 9.0 KHz to 20.0 GHz. For measuring emissions above 2 GHz, a high-pass filter was used to eliminate the fundamental transmit frequency to prevent possible saturation effects on the front end of the spectrum analyzer.

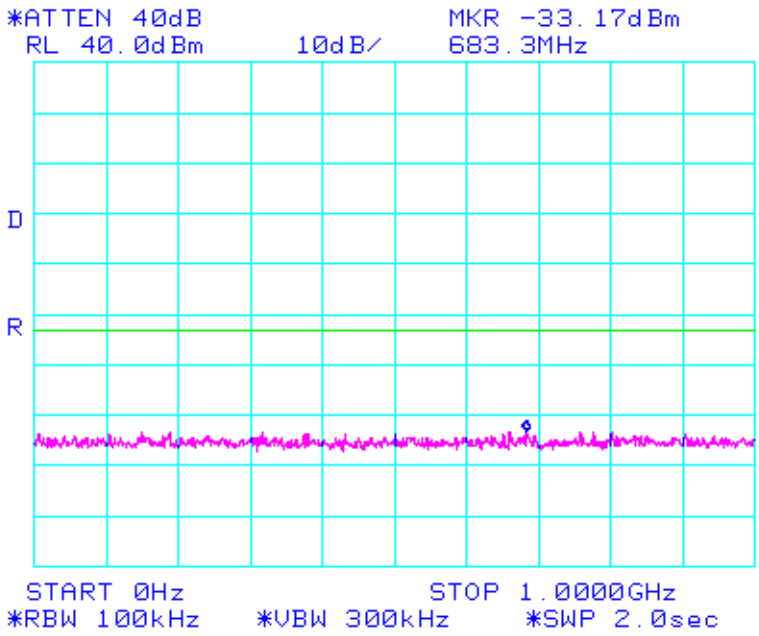
6.4.4 RESULTS:

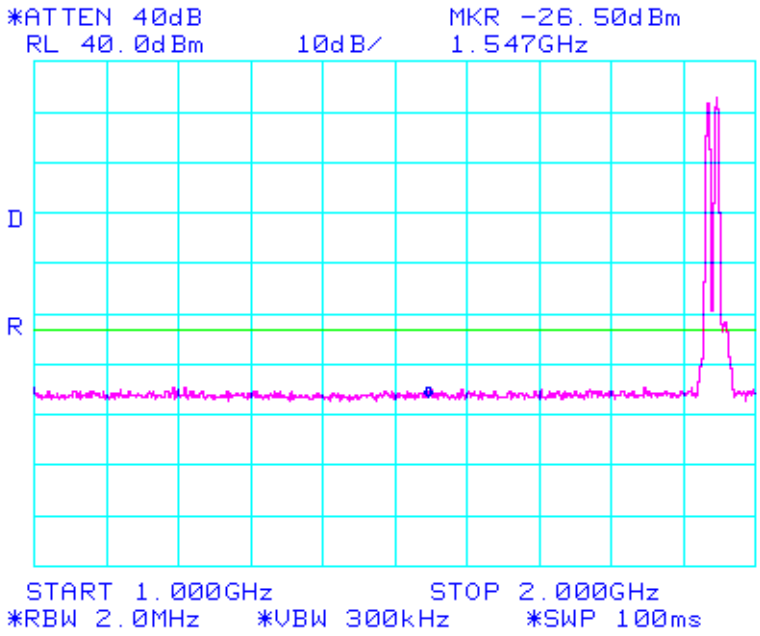
Equipment complies with Section 2.1051and 24.238(a)

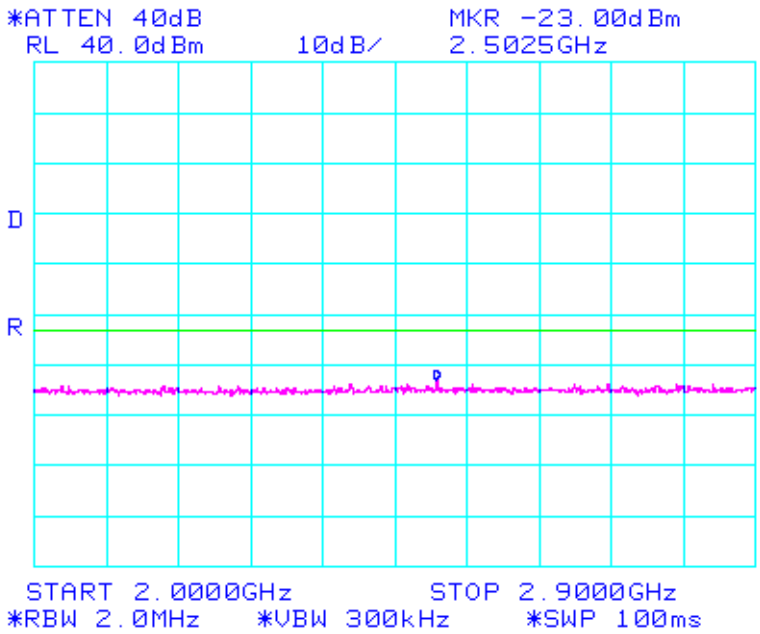
SUMMARY OF SPURIOUS EMISSIONS AT ANTENNA TERMINALS - DownLink

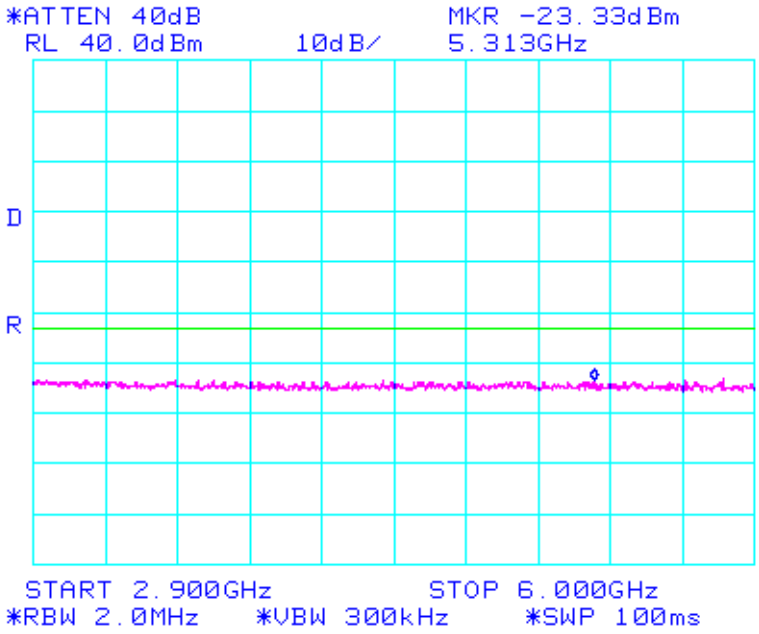
Frequency Range	Emission Frequency	Emission Level (dBm)	Limit (dBm)
9k - 1 GHz	none	none	-13.1
1 - 2 GHz	none	none	-13.1
2 - 6 GHz	none	none	-13.1
6 - 11 GHz	none	none	-13.1
11-15 GHz	none	none	-13.1
15 - 20 GHz	none	none	-13.1

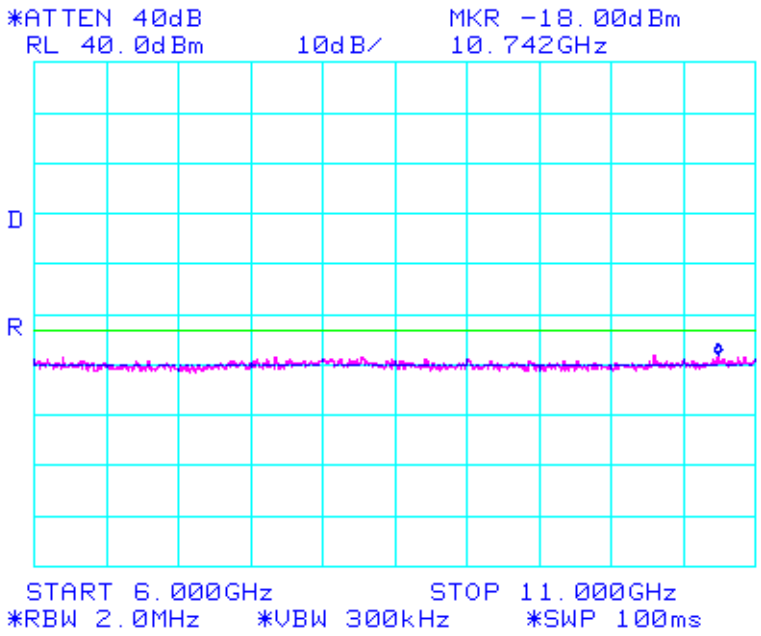
The following plots are included to illustrate compliance with the requirements of 47 CFR Part 24.238(a):

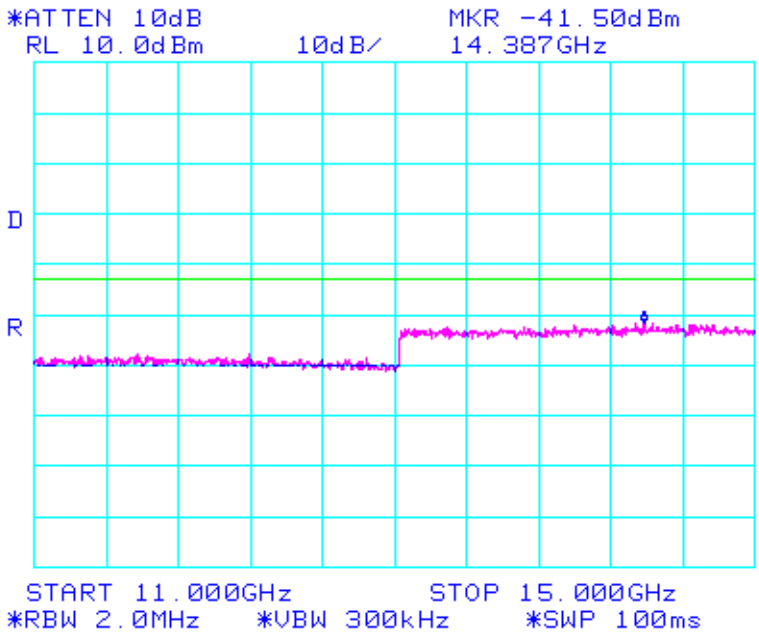

*ATTEN 40dB
MKR -33.17dBm
RL 40.0dBm
10dB/
683.3MHz
D
R
START 0Hz
STOP 1.0000GHz
*RBW 100kHz
*VBW 300kHz
*SWP 2.0sec

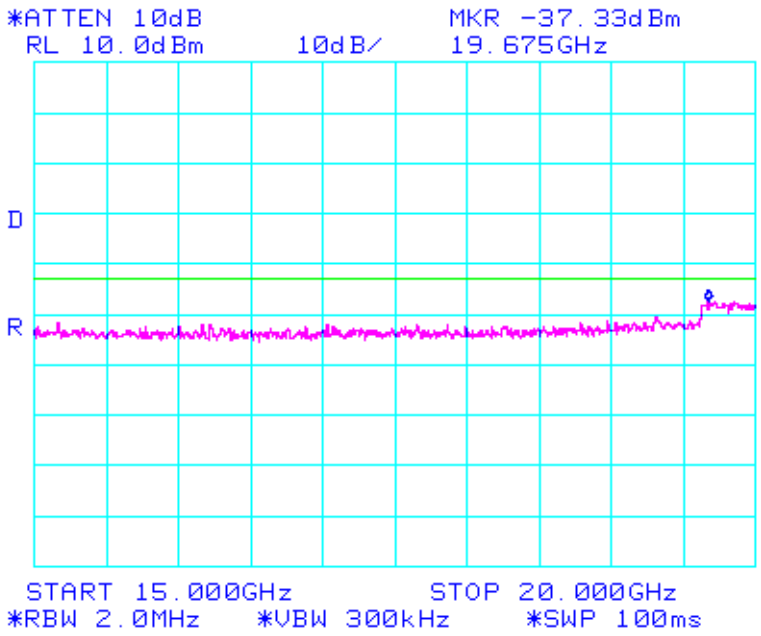

*ATTEN 40dB
MKR -26.50dBm
RL 40.0dBm
10dB/
1.547GHz
D
R
START 1.000GHz
STOP 2.000GHz
*RBW 2.0MHz
*VBW 300kHz
*SWP 100ms


*ATTEN 40dB
MKR -23.00dBm
RL 40.0dBm
10dB/
2.5025GHz
D
R
START 2.0000GHz
STOP 2.9000GHz
*RBW 2.0MHz
*VBW 300kHz
*SWP 100ms


*ATTEN 40dB
MKR -23.33dBm
RL 40.0dBm
10dB/
5.313GHz
D
R
START 2.900GHz
STOP 6.000GHz
*RBW 2.0MHz
*VBW 300kHz
*SWP 100ms


*ATTEN 40dB
MKR -18.00dBm
RL 40.0dBm
10dB/
10.742GHz
D
R
START 6.000GHz
STOP 11.000GHz
*RBW 2.0MHz
*VBW 300kHz
*SWP 100ms


*ATTEN 10dB
MKR -41.50dBm
RL 10.0dBm
10dB/
14.387GHz
D
R
START 11.000GHz
STOP 15.000GHz
*RBW 2.0MHz
*VBW 300kHz
*SWP 100ms


*ATTEN 10dB
MKR -37.33dBm
RL 10.0dBm
10dB/
19.675GHz
D
R
START 15.000GHz
STOP 20.000GHz
*RBW 2.0MHz
*VBW 300kHz
*SWP 100ms

6.5 TEST TYPE: Spurious Emissions at Antenna Terminals at Block Edges +/- 1 MHz

6.5.1 TECHNICAL SPECIFICATION: 2.1051; 24.238(b)

6.5.2 TEST DATE(S): 10 Mar 1999

6.5.3 MEASUREMENT PROCEDURES:

As recommended in FCC Part 24, 1% of the 26dB bandwidth was chosen to measure the peak of any emission inside the 1.0 MHz frequency band adjacent to each frequency block edge. All other frequencies were measured using a 30 KHz RBW. The unit was exercised using signal types required by §2.1051.

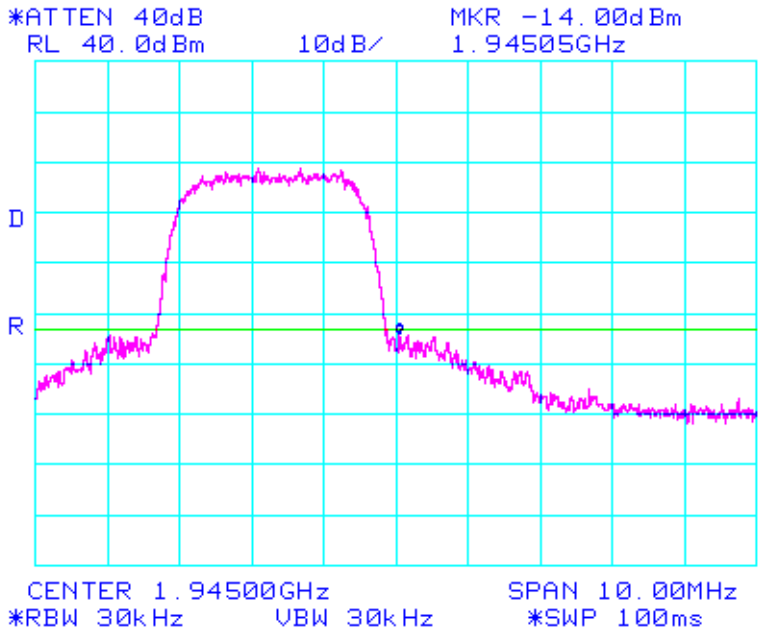
6.5.4 Results:

Modulation products outside of this band are attenuated at least 43 + 10 Log (P) below the level of the modulated carrier. A Plot of the spurious emissions at +/- 1 MHz around the transmit frequency, as measured at the antenna port, appears on the following page.

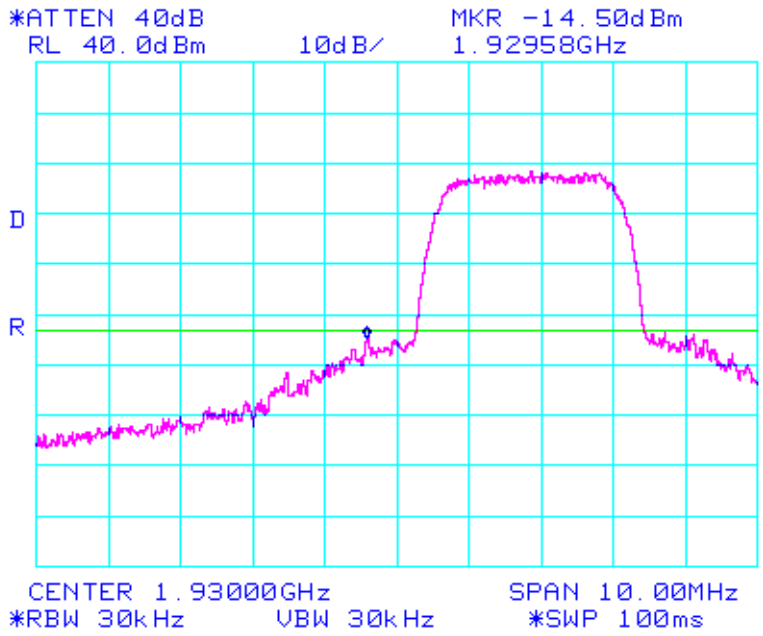
SPURIOUS EMISSION FREQUENCY BLOCKS

Channel Number	3 User Power (dBm)	CT Tx Value	CT Tx Frequency (MHz)	Description		Downlink Block Frequency (MHz)	ST Tx Frequency (MHz)	Uplink Block Frequency (MHz)
181	24.77	2980	1931.75	Block Edge	A	1930	1851.75	1850
182	24.8	29.65	1935.5		A		1855.5	
183	24.72	2955	1937.5		A		1857.5	
184	24.76	2955	1939.5		A		1859.5	
185	24.78	2955	1943.25	Block Edge	A	1945	1863.25	1865
188	24.7	2960	1946.75	Block Edge	D	1945	1866.75	1865
189	24.76	2965	1947.5		D		1867.5	
190	24.78	2970	1948.25	Block Edge	D	1950	1868.25	1870
193	24.76	2980	1951.75	Block Edge	B	1950	1871.75	1870
194			1955.5		B		1875.5	
195			1957.5		B		1877.5	
196			1959.5		B		1879.5	
197	24.76	3005	1963.25	Block Edge	B	1965	1883.25	1885
200	24.7	3010	1966.75	Block Edge	E	1965	1886.75	1885
201			1967.5		E		1887.5	
202	24.76	3015	1968.25	Block Edge	E	1970	1888.25	1890
205	24.99	3045	1971.75	Block Edge	F	1970	1891.75	1890
206			1972.25		F		1892.25	
207	24.72	3042	1973.25	Block Edge	F	1975	1893.25	1895
210	24.78	3070	1976.75	Block Edge	C	1975	1896.75	1895
211			1980.5		C		1900.5	
212			1982.5		C		1902.5	
213	25.69	32.05	1984.5		C		1904.5	
214	24.75	32.35	1988.25	Block Edge	C	1990	1908.25	1910

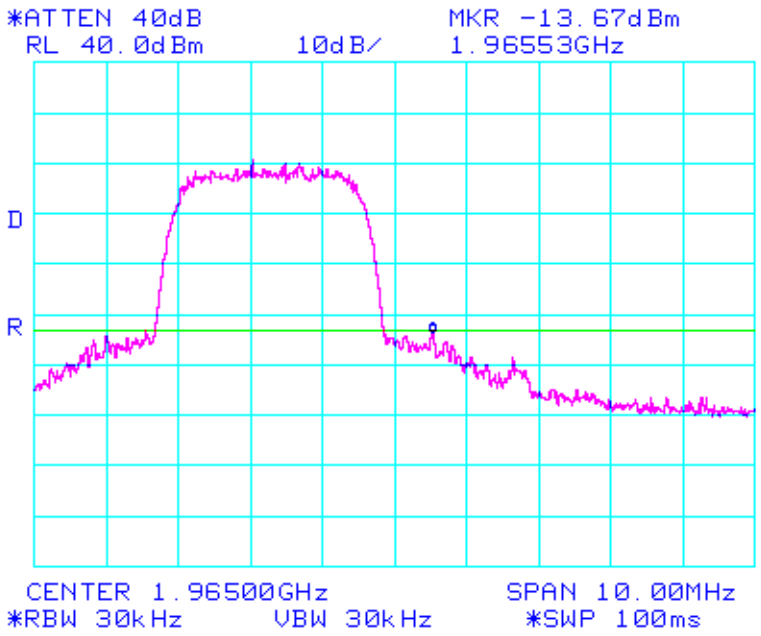
Plots of the spurious emissions as measured at the extremes of each frequency block appear on the following pages.



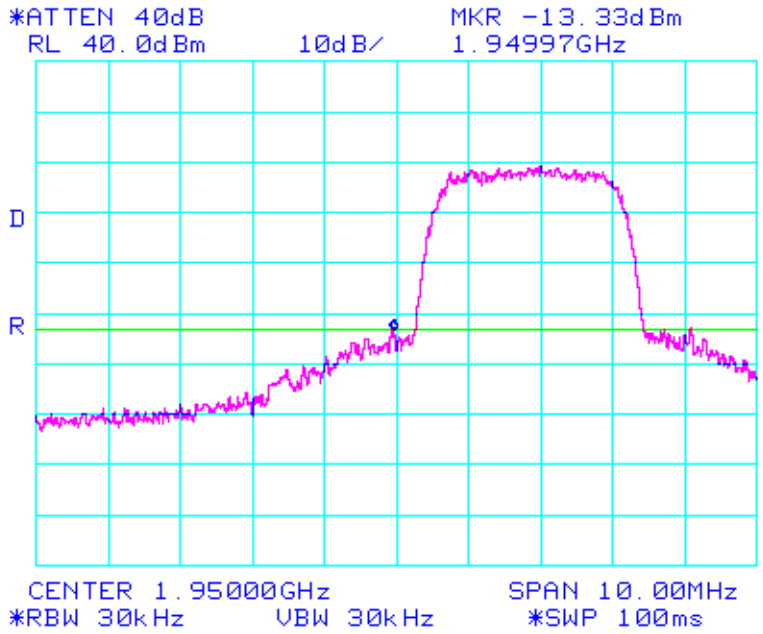
Conducted spur emissions at frequency blockedge +/-1 MHz at high side of A emi1298



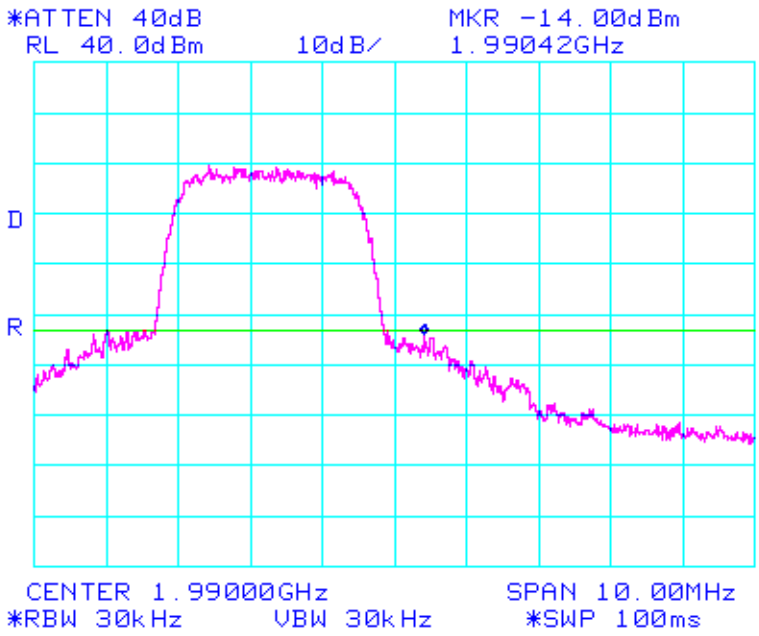
Conducted spur emissions at frequency blockedge +/- 1MHz at Low side of A emi1298



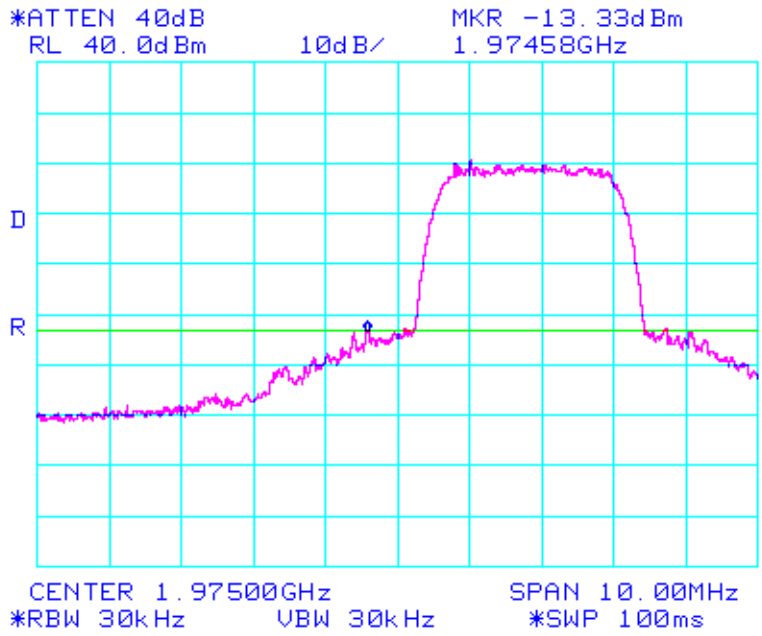
Conducted spur emissions at frequency blockedge +/- 1MHz High side of B emi1298



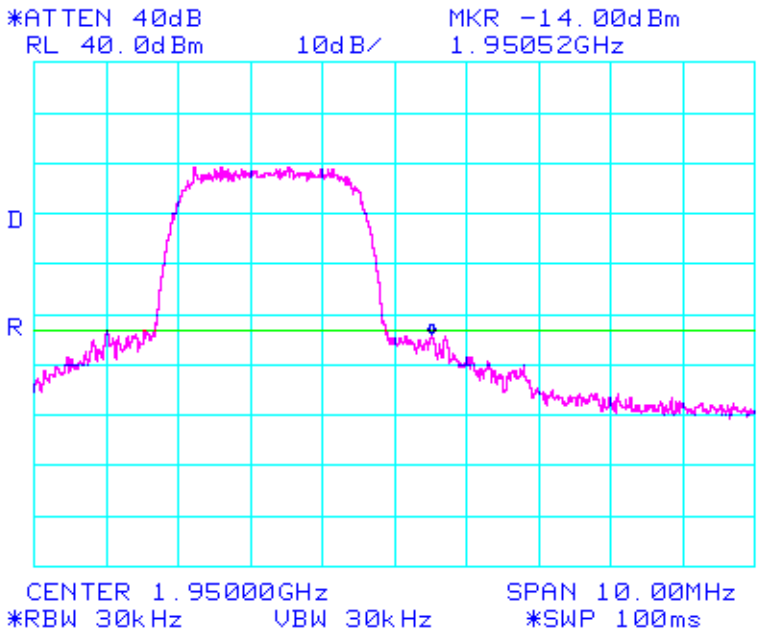
Conducted spur emissions at frequency blockedge +/- 1MHz at Low side B emi1298



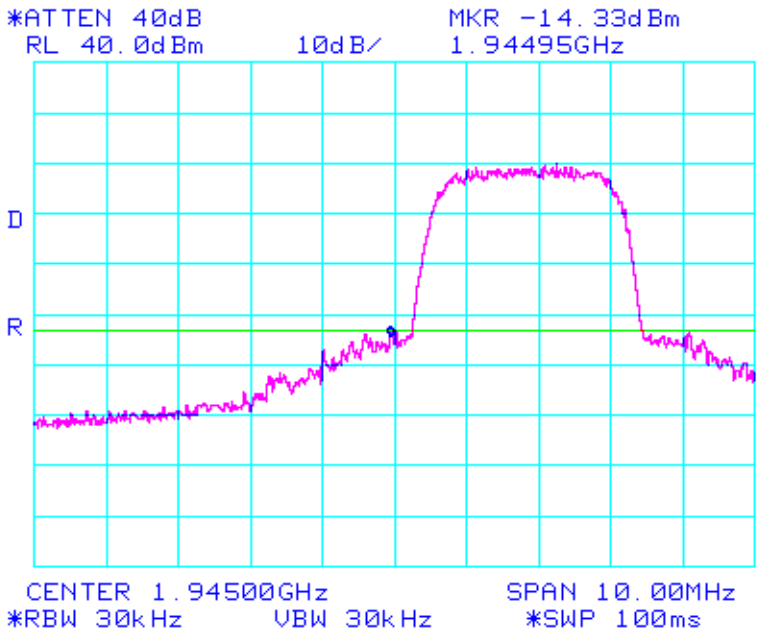
Conducted spur emissions at frequency blockedge +/- 1MHz High side of block C emi1298



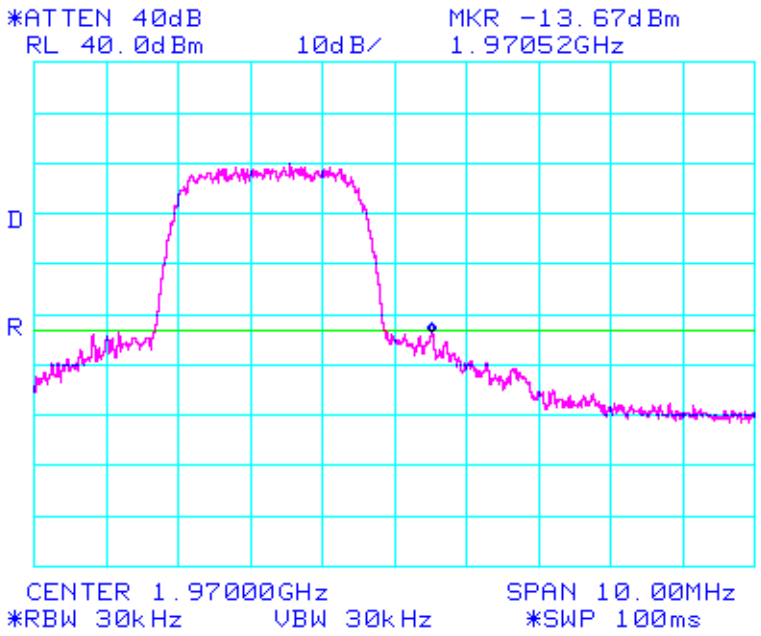
Conducted spur emissions at frequency blockedge +/- 1MHz Low side of block C
emi1298



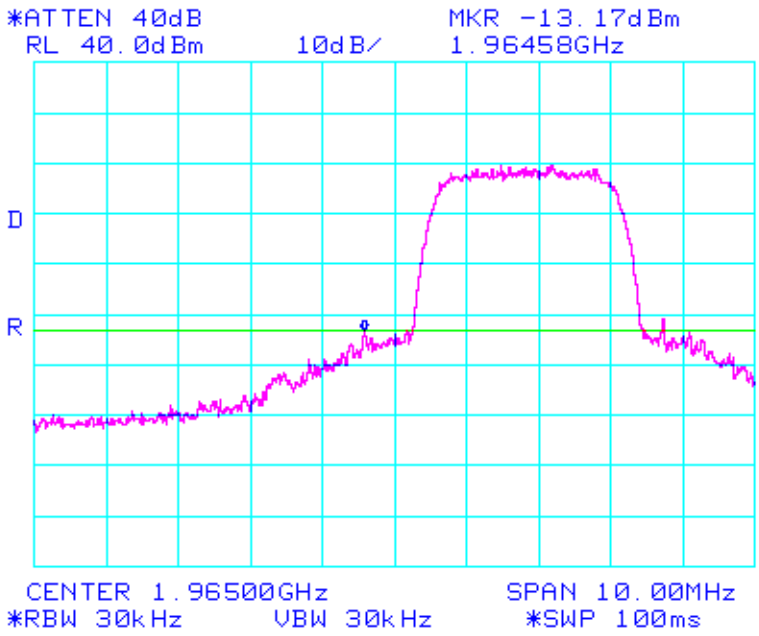
Conducted spur emissions at frequency blockedge +/- 1MHz at High side of D emi1298



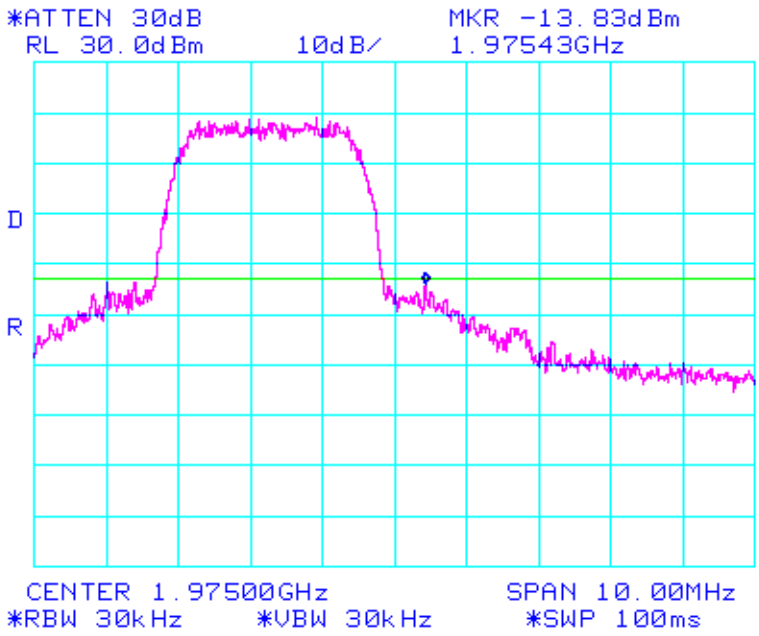
Conducted spur emissions at frequency blockedge +/- 1MHz at Low side of D
emi1298



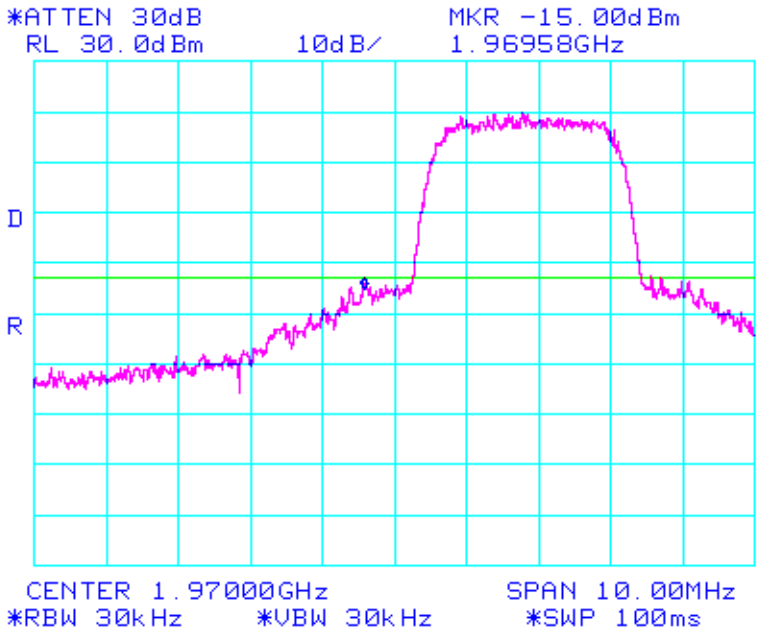
Conduted spur emissions at frequency blockedge 1 +/- MHz High side of E emi1298



Conducted spur emissions at frequency blockedge +/- 1 MHz Low side of E emi1298



Conducted spur emissions at frequency blockedge +/- 1MHz High side of block F emi1298



conductrd spur emissions at frequency blockedge +/- 1 MHz Low side of block F
emi1298

6.6 TEST TYPE: Frequency Stability over Temperature Variations

6.6.1 TECHNICAL SPECIFICATION: 2.1055(a)(1)

6.6.2 TEST DATE(S): 12 Mar 2000

6.6.3 MEASUREMENT PROCEDURES:

As required by §2.1055(a)(1) of CFR 47, *frequency tolerance measurements* were made over the temperature range of -30°C to +50°C. The frequency measurements were made using direct input to a spectrum analyzer. Climatic control was accomplished using an environmental simulation chamber. The temperature was first lowered to -30°C and then raised hourly in 10° increments. The unit remained
in the chamber during temperature transitions and during the measurement process.

6.5.4 Results:

In accordance with 47 CFR 24.235, the Frequency tolerance of the carrier signal must be such that the resulting shift due to changes in supply voltage or ambient temperature must not drive it outside of the block edges. The frequency deviations of the EUT that were noted during testing were less than what would be required to drive the carrier frequency outside of the block edges.
Carrier Frequency = 1.9374980 GHz

CARRIER FREQUENCY DEVIATIONS DUE TO TEMPERATURE INSTABILITY

Temperature (°C)	Carrier Frequency (GHz)	Recorded Frequency Deviation (kHz)
-30	1.9374962	-1.800
-20	1.9374955	-2.500
-10	1.9374959	-2.100
0	1.9374966	-1.400
+10	1.9374980	0.000
+20	1.9374986	+0.600
+30	1.9374986	+0.600
+40	1.9374983	+0.300
+50	1.9374983	+0.300

The unit meets the requirements of 2.1055 (a)(1)

6.7 TEST TYPE: Frequency Stability over Voltage Variations

6.7.1 TECHNICAL SPECIFICATION: 2.1055(d)(1)

6.7.2 TEST DATE(S): 12 Mar 2000

6.7.3 MEASUREMENT PROCEDURES:

As required by §2.1055(d)(1) of CFR 47, *frequency tolerance measurements* were made over changes in the supply voltage to the EUT from 85% to 115% of the nominal supply voltage using a variac to vary the DC supply. The frequency measurements were made using direct input to a spectrum analyzer.

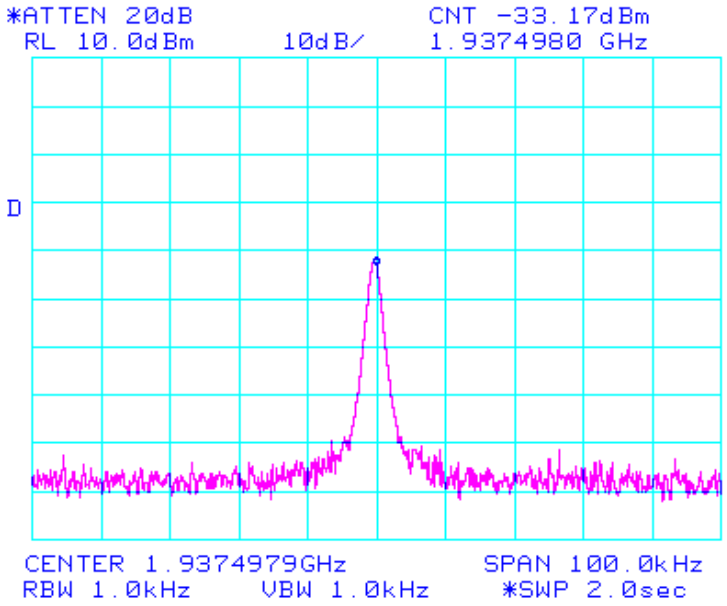
6.7.4 Results:

In accordance with 47 CFR 24.235, the Frequency tolerance of the carrier signal must be such that the resulting shift due to changes in supply voltage or ambient temperature must not drive it outside of the block edges. The frequency deviations of the EUT that were noted during testing were less than what would be required to drive the carrier frequency outside of the block edges.

Voltage (Volts)	Carrier Frequency Recorded (GHz)	Recorded Frequency Deviation (kHz)
55.2 (115% of Nominal)	1.9374980	0
48.0 (100% of Nominal)	1.9374980	0
40.8 (85% of Nominal)	1.9374980	0

The unit meets the requirements of 2.1055 (d)(1)

Photograph of Antenna Conducted
Spurious Emissions Test Configuration


*ATTEN 20dB
CNT -33.17dBm
RL 10.0dBm
10dB/
1.9374980 GHz
D
CENTER 1.9374979GHz
SPAN 100.0kHz
RBW 1.0kHz
VBW 1.0kHz
*SWP 2.0sec

6.8 TEST TYPE: Line Conducted Emissions

6.8.1 TECHNICAL SPECIFICATION: 15.107(b)

6.8.2 TEST DATE(S): 13 Mar 2000

6.8.3 MEASUREMENT PROCEDURES:

The measurements were performed over the frequency range of 0.45 MHz to 30 MHz using a 50 Ω/50 µH LISN as the input transducer to an EMI/Field Intensity Meter. The measurements were made with the detector set for "peak", “quasi-peak”, and “average” amplitude within an IF bandwidth of 9 kHz. The tests were conducted in a RF-shielded enclosure.

6.8.4 RESULTS:

Equipment complies with Section 15.107(b)

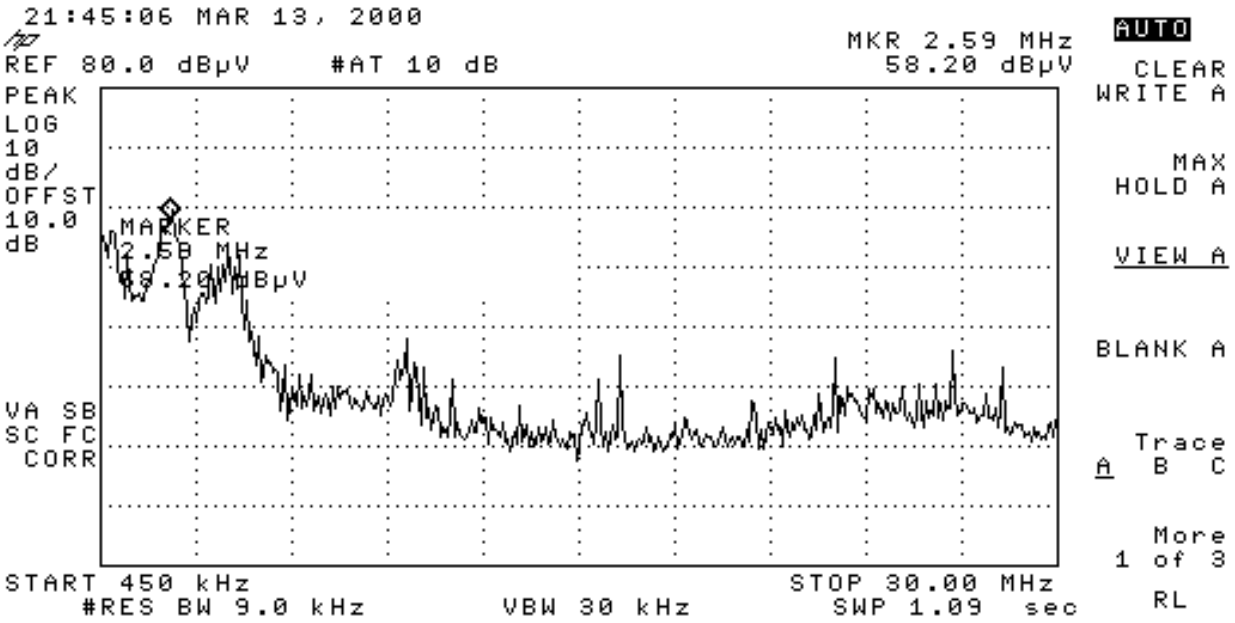
SUMMARY OF SPURIOUS EMISSIONS AT DC Mains Terminals - Phase

Frequency (MHz)	Quasi-Peak Measurement	Quasi-Peak Limit
4.463	45.7	69.5
4.464	45.7	69.5
15.774	33.8	69.5
24.196	31.1	69.5
27.390	31.5	69.5
27.393	32.7	69.5

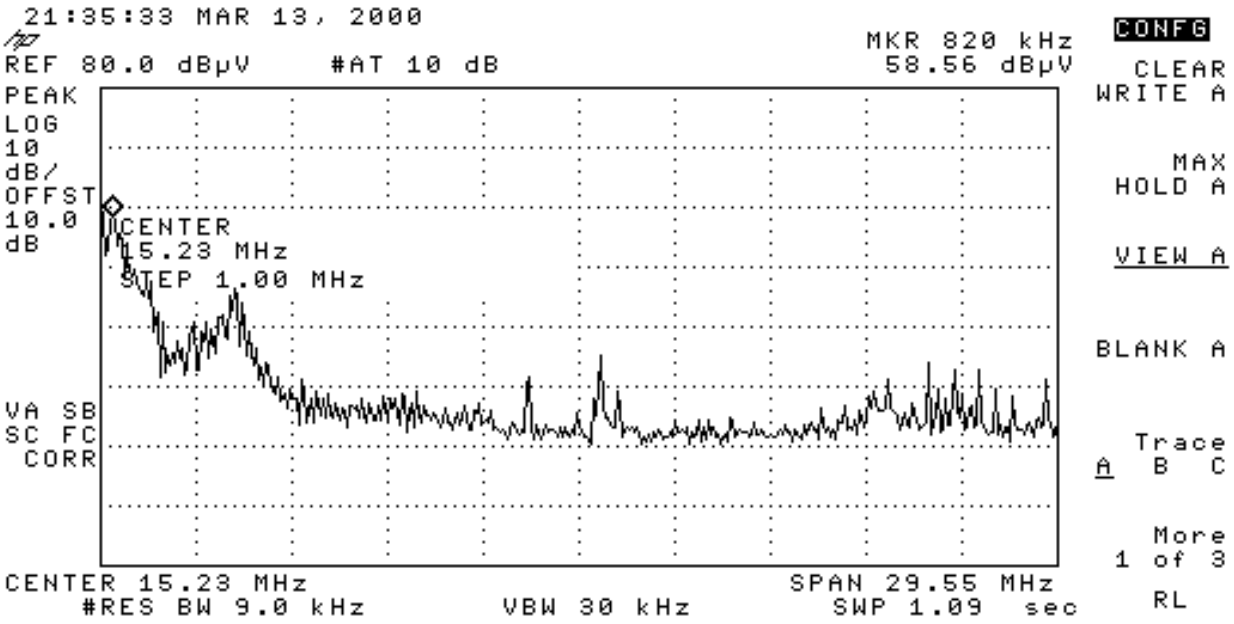
SUMMARY OF SPURIOUS EMISSIONS AT DC Mains Terminals - Neutral

Frequency (MHz)	Quasi-Peak Measurement	Quasi-Peak Limit
2.281	56.9	69.5
4.050	56.6	69.5
4.467	57.1	69.5
9.859	42.0	69.5
9.860	42.3	69.5
16.384	39.7	69.5

The following plots illustrate compliance with the applicable specification.



Negtive CT
emi1298



Positive CT
emi1298

TEST SETUP OF LINE CONDUCTED EMISSIONS