



**FCC CFR47 PART 24 SUBPART E  
CLASS II PERMISSIVE CHANGE TEST REPORT**

*FOR*

**MCBTS 1900 SINGLE CARRIER POWER AMPLIFIER**

**MODEL: ORIOLE 2**

**FCC ID: I2O-ORIOLE1**  
(GRANTED ON 02/02/1999)

**REPORT NUMBER: 99U0485**

**ISSUE DATE: AUGUST 31, 1999**

*Prepared for*  
**SPECTRIAN, INC.**  
**350 WEST JAVA DRIVE**  
**SUNNYVALE, CA 94089**

*Prepared by*  
**COMPLIANCE CERTIFICATION SERVICES, INC.**  
**d.B.a.**  
**COMPLIANCE CERTIFICATION SERVICES**  
**1366 BORDEAUX DRIVE**  
**SUNNYVALE, CA 94089, USA**  
**TEL: (408) 752-8166**  
**FAX: (408) 752-8168**

**NVLAP<sup>®</sup>**  
**LAB CODE:200065-0**

---

**TABLE OF CONTENTS** **PAGE**

1. VERIFICATION OF COMPLIANCE.....2

2. CLASS II PERMISSIVE CHANGE : .....3

3. FCC CERTIFICATION INFORMATION.....3

4. TEST SETUP AND TEST RESULT : .....5

    SECTION 2.1047 MEASUREMENT REQUIRED: MODULATION CHARACTERISTICS .....6

    SECTION 2.1049 MEASUREMENT REQUIRED: OCCUPIED BANDWIDTH.....6

    SECTION 2.1051 MEASUREMENTS REQUIRED: SPURIOUS AND HARMONIC EMISSION AT ANTENNA TERMINALS ( SECTION 24.238 LIMITS ).....7

    SECTION 2.1053 MEASUREMENT REQUIRED: FIELD STRENGTH OF SPURIOUS AND HARMONIC RADIATION .....13

    SECTION 2.1055 MEASUREMENT REQUIRED: FREQUENCY STABILITY .....16

    SECTION 2.1046: RF POWER OUTPUT.....16

    SECTION 1.1307 ROUTINE ENVIRONMENTAL EVALUATION .....16

    SECTION 15.109 RADIATED EMISSION LIMITS: .....16

5. TEST SETUP PHOTOS .....17



**2. CLASS II PERMISSIVE CHANGE :**

The differences to the previous ( I2O-ORIOLE1) filing include, a replacement device in the output stage, an additional MMIC device on the pre-amplifier located on the correction board, and use of a delay line filter to replace the coaxial delay line used in the correction topology.

**3. FCC CERTIFICATION INFORMATION**

The following information is in accordance with FCC Rules, 47CFR Part 2, Subpart J

**2.1033(c)(1) Applicant:**      Spectrian, Inc.  
   350 West Java Drive  
   Sunnyvale CA 94089

**2.1033(c)(2) FCC ID:**                      I2O-ORIOLE1 GRANTED ON :02/02/1999

**2.1033(c)(3) Instruction Manual**

**2.1033(c)(4) Types of Emissions**

CDMA : F9W

**2.1033(c)(5) Frequency Range**

1931 – 1989 MHZ

**2.1033(c)(6) Range of Operating Power**

40.4- 44.4dB gain ( 42.4 dB nominal)

**2.1033(c)(7) Maximum Power Rating**

The maximum output power is 17.8 Watts.

**2.1033(c)(8) Applied voltages and currents into the final transistor elements**

25.5 – 26.5 Vdc.

**2.1033(c)(9) Tune-up/Optimization Procedure**

Not applicable for this product. This amplifier is Plug-n-Play.

**2.1033(c)(10) Complete Circuit Diagrams and Functional Diagram**

Refer to Schematics Diagram. **Confidentiality is requested for this item.**

**2.1033(c)(10)(a) Means for Frequency Stabilization**

Not applicable for this product.

**2.1033(c)(10)(b) means for suppressing spurious radiation**

Not applicable

**2.1033(c)(10)(c) Means for Limiting Modulation**

Not applicable.

**2.1033(c)(10)(d) Means for Limiting Power**

The output power of this amplifier is 42.5dBm maximum. There are no power level controls within the amplifier. These are controlled by the system. The amplifier does contain a closed loop for correction.

**2.1033(c)(11) Equipment Identification**

Proposed FCC ID label format attached.

**2.1033(c)(12) Photographs**

Photographs of the equipment, internal and external views, are found in the External photos and internal photos files.

**2.1033(c)(13) Description of Digital Modulation**

Not applicable eut is power amplifier.

**2.1033(c)(14) Standard Test Conditions**

The transmitter was tested under the following conditions:

Room Temperature: 20 - 23 °C

Relative Humidity: 35 - 50%

DC Supply Voltage: 25.5 – 26.5 Vdc.

**Section 2.1033 Description of Various Base Station Configurations**

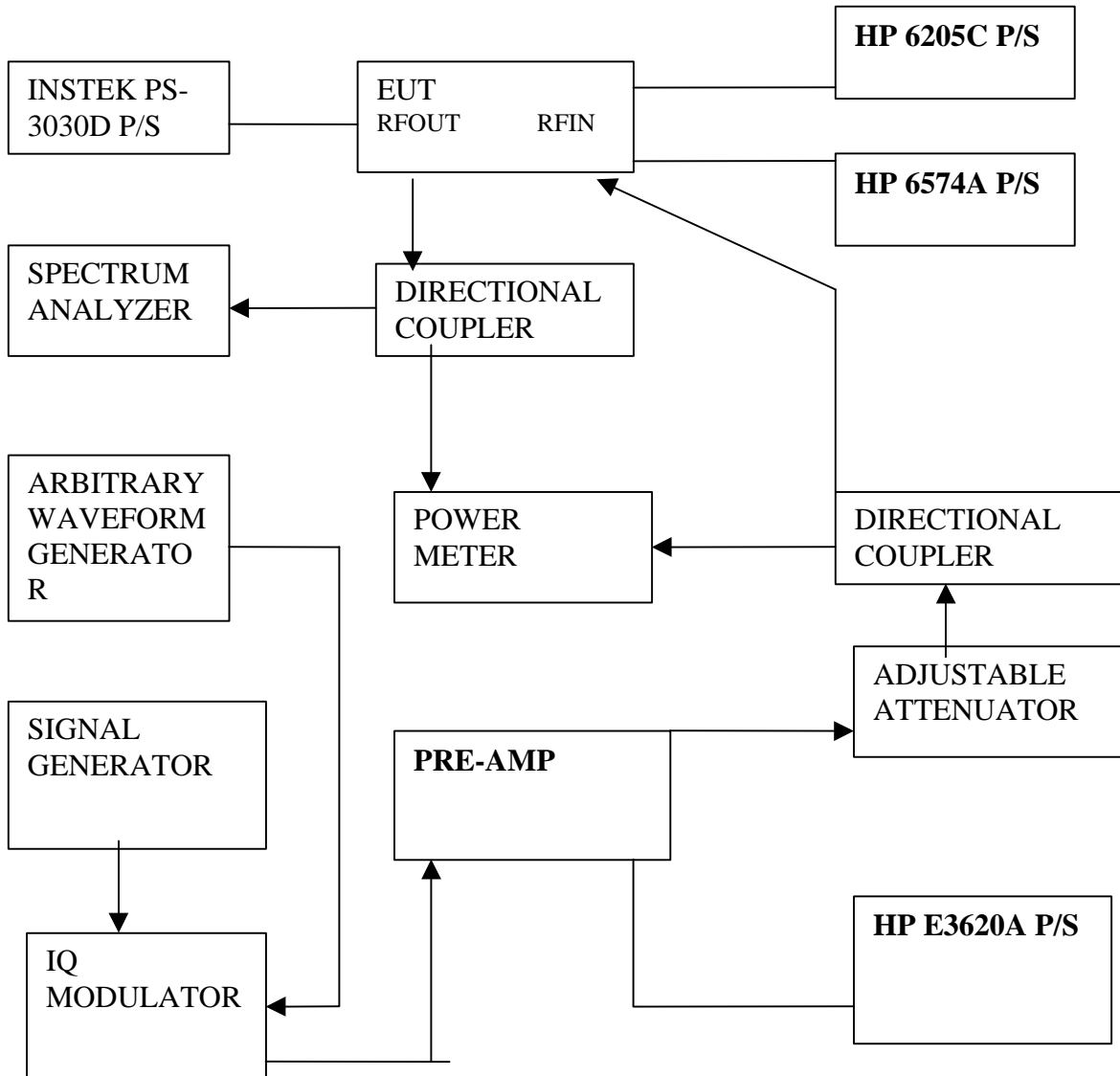
Not Applicable

**Section 2.1033 Use of Various Power Supplies**

Not Applicable.

#### 4. TEST SETUP AND TEST RESULT :

##### Test Set-up

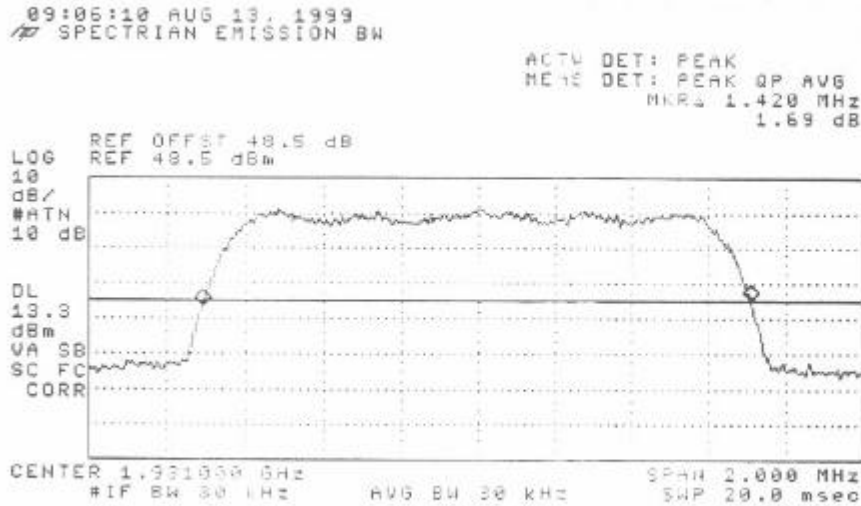


SECTION 2.1047 MEASUREMENT REQUIRED: MODULATION CHARACTERISTICS

Not Applicable

SECTION 2.1049 MEASUREMENT REQUIRED: OCCUPIED BANDWIDTH

Data on the bandwidth occupied by this transmitter is presented in graphical form using spectrum analyzer plots. Emission bandwidth ( per 24.238b, the 26dB BW) was measured with RBW=30KHz, VBW=30KHz. Spectrum plot is supplied. Measured occupied bandwidth was 1.42MHz.



SECTION 2.1051 MEASUREMENTS REQUIRED: SPURIOUS AND HARMONIC EMISSION AT ANTENNA TERMINALS ( SECTION 24.238 LIMITS )

Minimum standard: The magnitude of each spurious and harmonic emission that can be detected when the equipment is operated under conditions specified in the instruction manual and/or alignment procedure, shall not be less than  $43+10 \log(\text{mean output power in watts})$  dBc below the mean power output outside a licensee's frequency block.

24.238 (b) & (c) Compliance with out of band emissions requirement is based on test being performed with 1MHz analyzer RES BW. At block edges, RES BW may be adjusted to a level at least as large as 1% of emission bandwidth. For the EUT this is at least

For CDMA

.01 \* 1.42MHz = 14.2kHz. A RES BW of 30kHz was used for measurement.

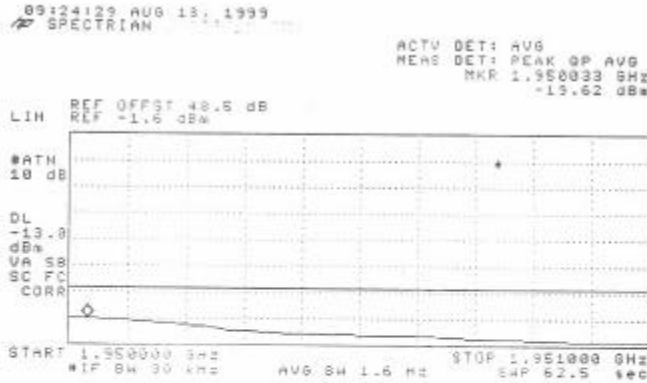
**Test Results**

Please refer to the following table which indicates the chart number.

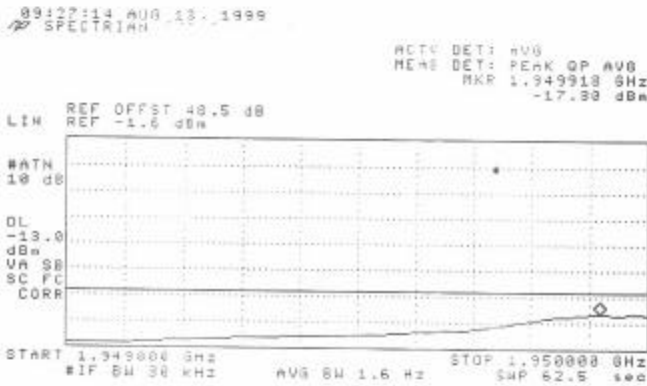
<b>PLOT DESCRIPTION</b>	<b>PLOT NUMBER</b>
BOTTOM BLOCK A	1
TOP BLOCK A	2
BOTTOM BLOCK D	3
TOP BLOCK D	4
BOTTOM BLOCK B	5
TOP BLOCK B	6
BOTTOM BLOCK E	7
TOP BLOCK E	8
BOTTOM BLOCK F	9
TOP BLOCK F	10
BOTTOM BLOCK C	11
TOP BLOCK C	12
OUT OF BAND LOW	13
OUT OF BAND HI	14
2 <sup>ND</sup> HARMONIC AVERAGE READING	15
INPUT PLOT	16

**Plots at band edges use average.**

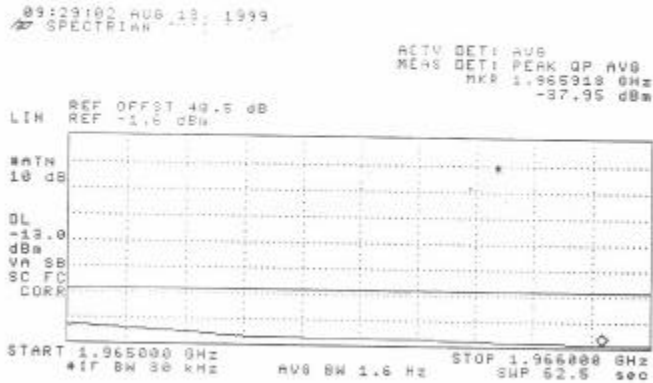




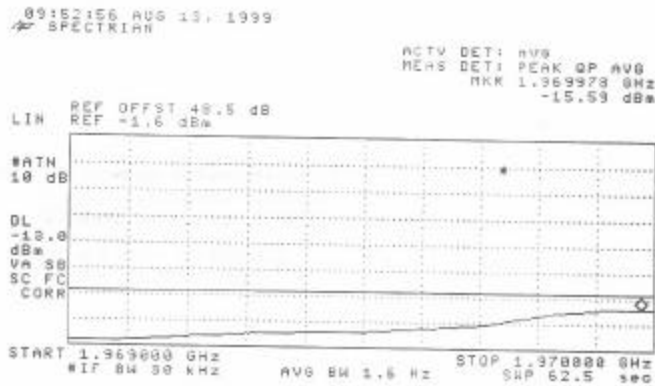
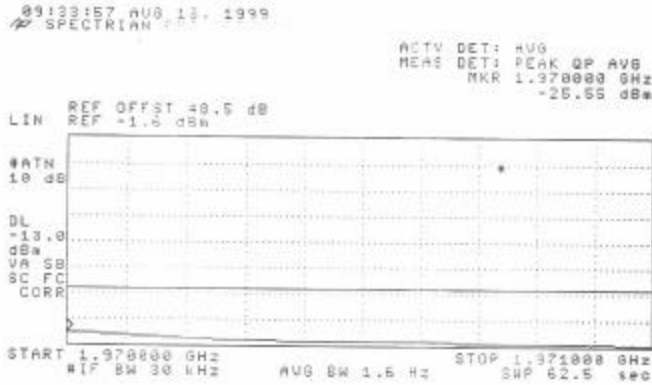
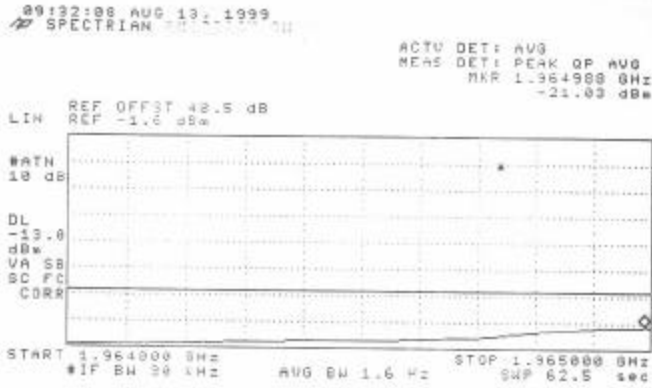
4



5



6



09:57:32 AUG 13, 1999  
SPECTRUM

ACTV DET: AVG  
MENS DET: PEAK QP AVG  
MKR 1.975028 GHz  
-19.40 dBm

LIN REF OFFSET 40.5 dB  
REF -1.6 dBm

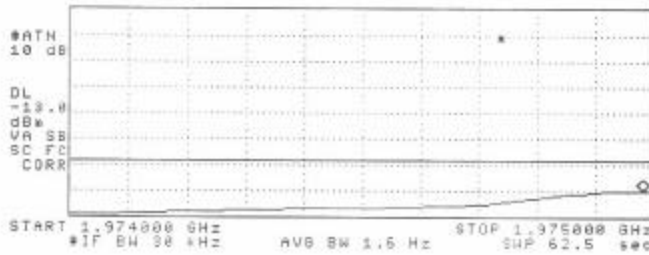


10

10:11:24 AUG 13, 1999  
SPECTRUM

ACTV DET: AVG  
MENS DET: PEAK QP AVG  
MKR 1.974980 GHz  
-19.72 dBm

LIN REF OFFSET 40.5 dB  
REF -1.6 dBm

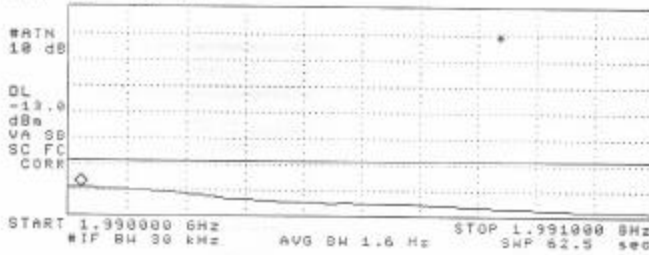


11

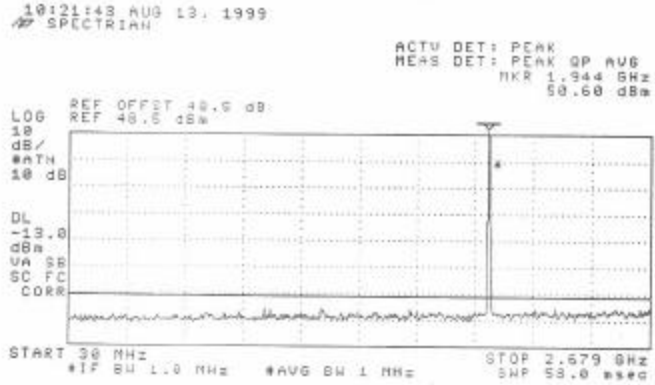
10:13:19 AUG 13, 1999  
SPECTRUM

ACTV DET: AVG  
MENS DET: PEAK QP AVG  
MKR 1.990023 GHz  
-19.72 dBm

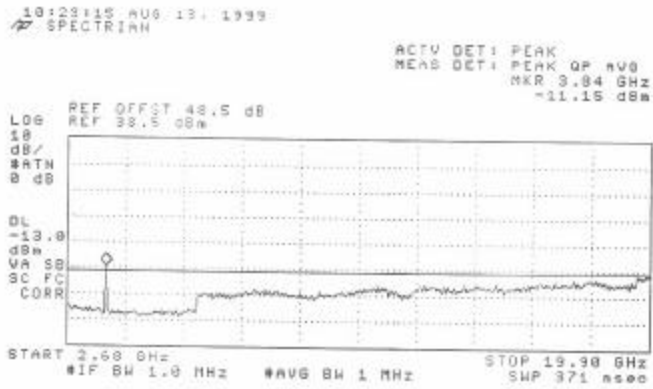
LIN REF OFFSET 40.5 dB  
REF -1.6 dBm



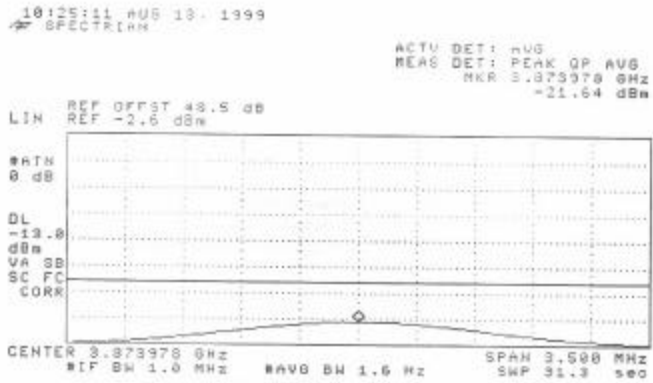
12



13



14



15

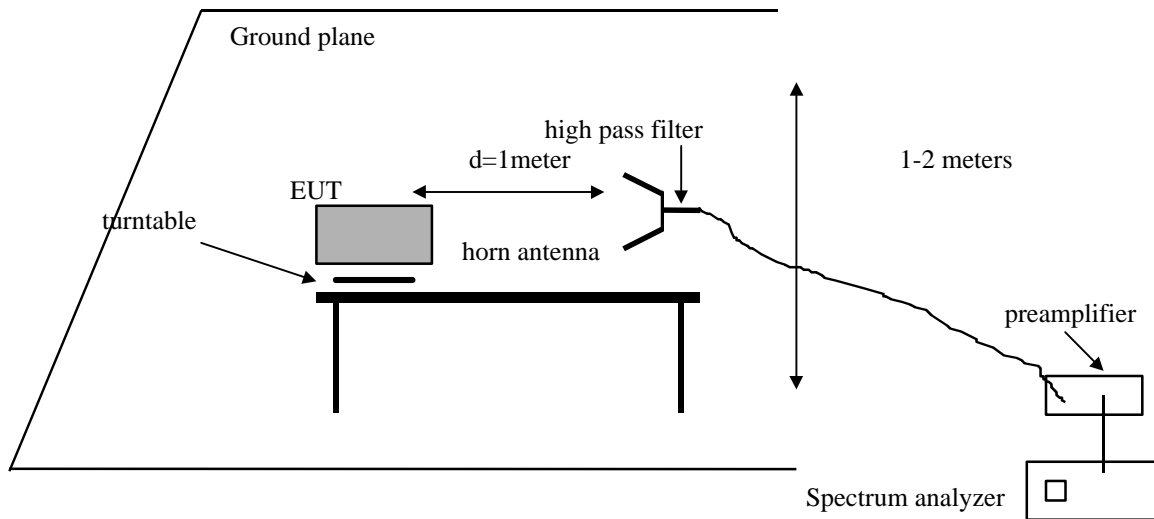


SECTION 2.1053 MEASUREMENT REQUIRED: FIELD STRENGTH OF SPURIOUS AND HARMONIC RADIATION

**Measurement Equipment Used:**

HP 8593EM Spectrum Analyzer  
HP 8449 B Preamplifier, 1-26 GHz  
EMCO/3115 Double Ridged Horn antenna, 1 - 18 GHz  
QIM "The Workhorse" low loss cable, 9 ft (loss: 0.85 dB/ft@ 26 GHz)

**Test Set-Up**



**Minimum Requirement**

The magnitude of each spurious and harmonic emission detected as being radiated from the EUT must be at a level more than  $43 + 10 \log(\text{mean output power, watts})$  dB below the mean power output ( $= -13$  dBm).

Using the relationship between field strength and RF power into an isotropic transmit antenna:

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{D}$$

P= Amplifiers Maximum Power (Watts)  
G= Antenna in Numeric Gain (Assume 1)  
D= Distance (Meters)

$$E = \frac{\sqrt{30 \times 17.8 \times 1}}{3} = 7.703 \text{ V/m}$$

$$20 * \log(7.703 \times 1,000,000) = 137.73 \text{ dBuV/m @ 3 meters}$$

$$\text{Emission Mask: } 43 + 10 * \log(P) \text{ dB} \quad P = \text{Amplifiers Maximum Power (Watts)}$$

$$43 + 10 * \log(17.8) = 55.504 \text{ dB}$$

137.73 – 55.504 = **82.2 dBuV/m @ 3 meters**

Resultant radiated field at 3 meters from –13d Bm source feeding isotropic antenna: **82 dBuV/m**

**Test Method**

The antenna output port of the EUT was terminated with a 50 ohm shielded termination. With the transmitter operating at full power, the EUT was rotated 360° and the search antenna was raised and lowered in both polarities, all in an attempt to maximize the levels of the received emission for each harmonic and spurious emission up to 10 fo.

**Test Results**

Corrected field strength readings extrapolated to 3m.

**Compliance Certification Services**  
**24.238(b)**

8/13/1999

Pete Krebill  
 A-site (1Meter)

Spectrian  
 1900 MHz Amplifier

fo=1931MHz

<b>F(MHz)</b>	<b>PK</b> dBuv	<b>AF</b> (dB)	<b>CL</b> (dB)	<b>AMP</b> (dB)	<b>DIST</b> (dB)	<b>OTHER</b> (dB)	<b>TOTAL</b> (dBuV/m) <b>PK</b>	<b>LIMIT</b> (dBuV/m) <b>PK</b>	<b>MARGIN</b> (dB) <b>PK</b>
<b><u>Vertical</u></b>									
3862	69.6	32.3	4.86	-35.5	-9.5	1	62.76	82	-19
5793	54.8	35.1	5.94	-35.5	-9.5	1	51.84	82	-30
7724	52.9	36.9	6.48	-35.5	-9.5	1	52.28	82	-30
9655	46.6	38.2	8.1	-35.5	-9.5	1	48.9	82	-33
11586	49.5	38.9	8.64	-35.5	-9.5	1	53.04	82	-29
13517	50.6	41.3	9.54	-35.5	-9.5	1	57.44	82	-25
15448	50.9	39.5	10.8	-35.5	-9.5	1	57.2	82	-25
17379	53	45.9	12.24	-35.5	-9.5	1	67.14	82	-15
19310	60	23.7	13.14	-35.5	-9.5	1	52.84	82	-29
<b><u>Horizontal</u></b>									
3862	71.8	32.3	4.86	-35.5	-9.5	1	64.96	82	-17
5793	52	35.1	5.94	-35.5	-9.5	1	49.04	82	-33
7724	51.1	36.9	6.48	-35.5	-9.5	1	50.48	82	-32
9655	46.3	38.2	8.1	-35.5	-9.5	1	48.6	82	-33
11586	48.9	38.9	8.64	-35.5	-9.5	1	52.44	82	-30
13517	51.2	41.3	9.54	-35.5	-9.5	1	58.04	82	-24
15448	50.7	39.5	10.8	-35.5	-9.5	1	57	82	-25
17379	52.9	45.9	12.24	-35.5	-9.5	1	67.04	82	-15
19310	61.1	23.7	13.14	-35.5	-9.5	1	53.94	82	-28

**Spectrum Analyzer**

n.f.: Noise Floor      OTHER: High pass filter insertion loss  
 AF: Antenna Factor      \*FSY Microwave high pass filter (1.804GHz)  
 AMP: Pre-amp gain  
 CL: Cable loss  
 DIST: Distance Correction(-9.5dB, 1 meter)  
 $20 * \log (1 \text{ M} / 3\text{M}) = -9.5 \text{ dB}$

**RES**    **VBW**  
**PK:** 1MHz 1MHz  
**PK: Peak**



SECTION 2.1055 MEASUREMENT REQUIRED: FREQUENCY STABILITY

Not applicable

SECTION 2.1046: RF POWER OUTPUT

Measured with power meter. All outputs were adjusted between 42.4 and 42.8dBm, during testing.

SECTION 1.1307 ROUTINE ENVIRONMENTAL EVALUATION

Not applicable

SECTION 15.109 RADIATED EMISSION LIMITS:

Compliance Engineering Services Inc.	Project No. : 99U0485
	Report No. : 990816A1
	Date : 08/16/1999
	Time : 10:07
>> 3 M RADIATED EMISSION DATA <<	Test Engr : PETE K

Company : SPECTRIAN  
Equipment Under Test : 1900MHZ AMP  
Test Configuration : EUT/4-POWER SUPPLIES/WAVEFORM GENERATOR/SIGNAL  
GENERATOR/IQ MODULATOR/PRE-AMP  
Type of Test : FCC CLASS B  
Mode of Operation : IDLE

Freq.    dBuV    PreAmp    Ant    Cable    dBuV/m    Limit    Margin    Pol    Hgt(m)    Az  
Bilog 2049 ; Pre-amp = 8447D-P1 2944A06833:  
NO EMISSIONS DETECTED WITHIN 20dB OF LIMITS.

Total # of data 0  
V. a2.2

**5. TEST SETUP PHOTOS**

