ENGINEERING TEST REPORT

BI-DIRECTIONAL AMPLIFIER
MODEL NO.: BDA1200

FCC ID: H6M-BDA1200

FCC PART 2 & PART 90, SUBPART I
RADIO SERVICES FOR COMMERCIAL/INDUSTRIAL USES

UltraTech's FILE NO.: KTI-001FCC90

Tested for:

Kaval Telecom Inc.
60 Gough Road
Markham, Ontario
Canada, L3R 8X7

Tested by:

UltraTech - Group of Labs
3000 Bristol Circle
Oakville, Ontario
Canada L6H 6G4

Report Prepared by: Tri M. Luu, P.Eng.

DATE: June 17/1999

UltraTech

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1. EXHIBIT 1 - SUMMARY OF TEST RESULTS & GENERAL STATEMENT OF CERTIFICATION

FCC PARAGRAPH.	TEST REQUIREMENTS	COMPLIANCE (YES/NO)
90.205 & 2.985	RF Power Output	Yes
90.213 & 2.995	Frequency Stability	Not applicable for an RF power amplifier
90.242(b)(8) & 2.987(a)	Audio Frequency Response	Not applicable for an RF power amplifier
90.210 & 2.987(b)	Modulation Limiting	Not applicable for an RF power amplifier
90.210 & 2.989	Emission Masks	Yes
90.210, 2.997 & 2.991	Emission Limits - Spurious Emissions at Antenna Terminal	Yes
90.210, 2.997 & 2.993	Emission Limits - Field Strength of Spurious Emissions	Yes
90.214	Transient Frequency Behavior	Not applicable

BI-DIRECTIONAL AMPLIFIER, **Model No.: BDA1200**, by **Kaval Telecom Inc.** has also been tested and found to comply with **FCC Part 15, Subpart B - Radio Receivers and Class A Digital Devices**. The engineering test report has been documented and kept in file and it is available anytime upon FCC request.

TESTIMONIAL AND STATEMENT OF CERTIFICATION

THIS IS TO CERTIFY:

1) *THAT the application was prepared either by, or under the direct supervision of the undersigned.*

2) *THAT the measurement data supplied with the application was taken under my direction and supervision.*

3) *THAT the data was obtained on representative production units, representative.*

4) *THAT, to the best of my knowledge and belief, the facts set forth in the application and accompanying technical data are true and correct.*

Certified by:

_____

Tri Minh Luu, P. Eng.
V.P., Engineering

DATE: June 17/1999

1.

2. EXHIBIT 2 - GENERAL INFORMATION

2.1. APPLICANT

Kaval Telecom Inc.
60 Gough Road
Markham, Ontario
Canada, L3R 8X7

Applicant's Representative: Mr. Alan Aslett

2.2. MANUFACTURER

Kaval Telecom Inc.
60 Gough Road
Markham, Ontario
Canada, L3R 8X7

2.3. DESCRIPTION OF EQUIPMENT UNDER TESTS

PRODUCT NAME:	BI-DIRECTIONAL AMPLIFIER
MODEL NO.:	BDA1200
SERIAL NUMBER:	Preproduction sample
TYPE OF EQUIPMENT:	Radio Power Amplifier
SERVICES AREAS:	Commercial/Industrial
OPERATING FREQ.:	806-941 MHz (Please refer to the uplink and downlink frequency band pairs on page 6 of the user manual)
RF INPUT RATING:	-40 dBm maximum
RF OUPUT POWER RATING:	10.00 W (1 channel maximum) 0.74 W/channel (2 channels maximum) 0.42 W/channel (3 channels maximum) 0.25 W/channel (4 channels maximum) 0.13 W/channel (6 channels maximum) 0.09 W/channel (8 channels maximum) 0.06 W/channel (10 channels maximum)

AMPLIFIER GAIN:	80 dB Gain
AMPLIFIER 20 dB GAIN BW:	30 MHz
RF INPUT/OUTPUT IMPEDANCE:	50 Ohms
DUTY CYCLE:	Continuous
99% BANDWIDTH:	Not applicable
BAUD RATES:	Not applicable
EMISSION DESIGNATION:	F1D & F3E
CPU SPEED:	4 MHz
INPUT SUPPLY:	120V 60 Hz
ASSOCIATED DEVICES:	Not applicable
FCC ID:	H6M-BDA1200
INTERFACE PORTS:	(1) Roof-Top Antenna Port (Type N Connector, Double shielded coaxial cable is required) (2) In-Building Port (Type N Connector, Double shielded coaxial cable is required) (3) AC input (standard 3-conductor AC power cord)

2.4. RELATED SUBMITTALS)/GRANT

Not applicable

TEST METHODOLOGY

These tests were conducted on a sample of the equipment for the purpose of certification compliance with Code of Federal Regulations, Parts 2 & 90, Subpart I, Radio Services Operating in the Frequency Bands 806-941 MHz.

Both conducted and radiated emissions measurements were conducted in accordance with American National Standards Institute ANSI C63.4 - 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.

2.6. TEST FACILITY

AC Powerline Conducted Emissions were performed in UltraTech's shielded room, 16'(L) by 12'(W) by 12'(H).

Radiated Emissions were performed at the Ultratech's 3 Meter Open Field Test Site (OFTS) situated in the Town of Oakville, province of Ontario.

The above sites have been calibrated in accordance with ANSI C63.4, and found to be in compliance with the requirements of Sec. 2.948 of the FCC Rules. The descriptions and site measurement data of the Oakville Open Field Test Site has been filed with FCC office (FCC File No.: 31040/SIT 1300B3) and Industry Canada office (Industry Canada File No.: IC2049). Last Date of Site Calibration: Sep. 20, 1998.

The above test site is also filed with Interference Technology International Ltd (ITI - An EC Directive on EMC).

2.7. UNITS OF MEASUREMENTS

Measurements of conducted emissions are reported in units of dB referenced to one microvolt [dB(uV)].

Measurements of radiated emissions are reported in units of dB referenced to one microvolt per meter [dB(uV)/m] at the distance specified in the report, wherever it is applicable.

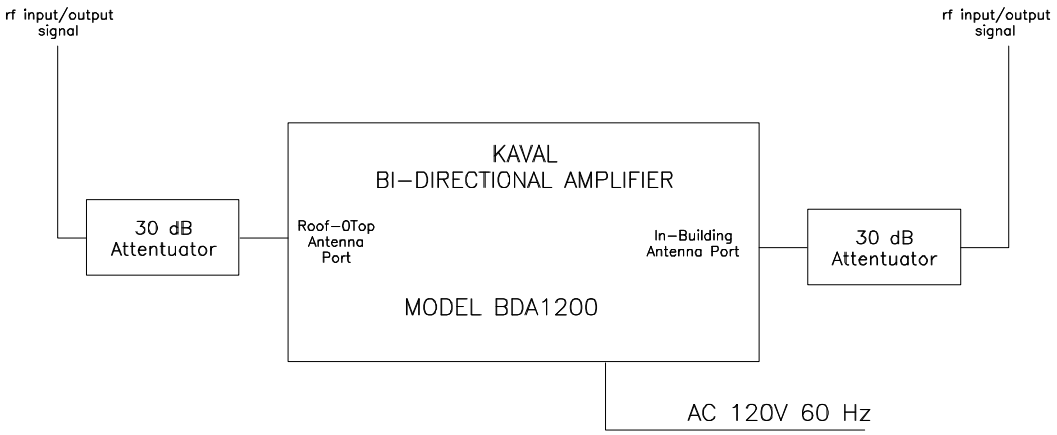
3. EXHIBIT 3 - SYSTEM TEST CONFIGURATION

3.1. TEST SYSTEM DETAILS

The following peripherals, FCC identifiers and types interconnecting cables were used with the EUT for testing:

(1) **EUT**: Kaval Telecom Inc., BI-DIRECTIONAL AMPLIFIER, Model : BDA1200, S/N: Preproduction sample, I/O Cable: All I/O cables were shielded
Power Supply Cable: Non-shielded

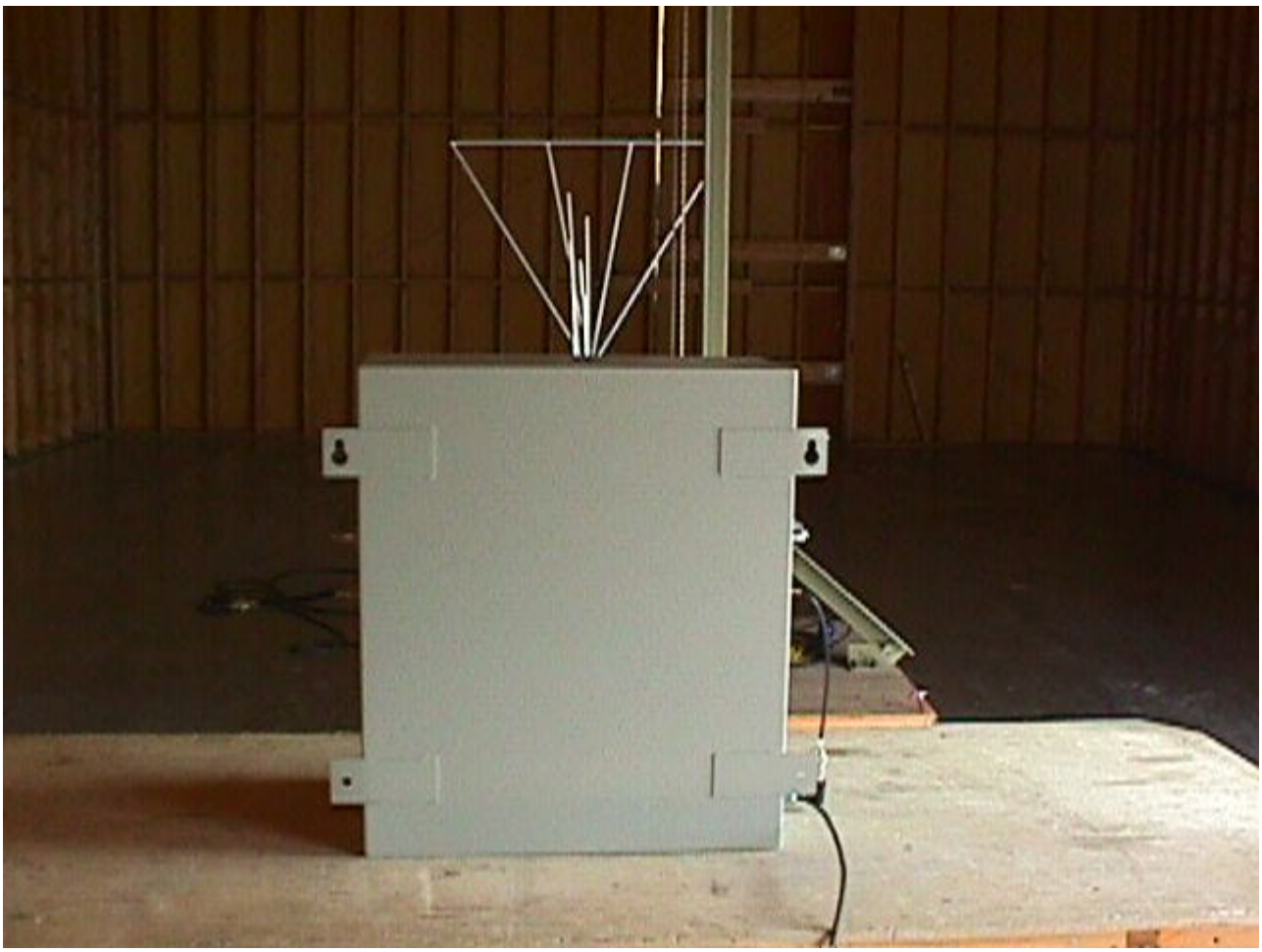
3.2. BLOCK DIAGRAMS OF TEST SET-UP



3.3. PHOTOGRAPHS FOR TEST SETUP AT OFTS FOR RADIATED EMISSIONS

Tests were performed at the Open Field test Site located in Oakville, Ontario, Canada

Oakville, Ontario, Canada L6H 6G4
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: _____, Website



3.4. JUSTIFICATION

3.5.

Normal intended operation with the maximum RF input signal provided , maximum gain setting and rf output as specified in the user manual with respect to the number the channel input.

3.6. SPECIAL ACCESSORIES

No special accessories w

3.7.

Not required.

Oakville, Ontario, Canada L6H 6G4
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: _____, Website

4. EXHIBIT 4 - TEST DATA

4.1. RF POWER OUTPUT, 20DB GAIN BANDWIDTH (BW) & AMPLIFIER GAIN FREQUENCY RESPONSE @ FCC 90.205

PRODUCT NAME: **BI-DIRECTIONAL AMPLIFIER, Model No.: BDA1200**

FCC REQUIREMENTS:

FCC Part 90, Para. 90.205:- Please refer to FCC CFR 47, Part 80 to End, Para. 90.205 for specification details.

CLIMATE CONDITION:

Standard Temperature and Humidity:

- Ambient temperature: 21 ^{o}C
- Relative humidity: 43%

POWER INPUT:

120V 60 Hz.

TEST EQUIPMENT:

- HP EMC Analyzer, Model HP8593EM, 9 kHz-26.5 GHz, S/N: 3412A00103
- Bird Attenuator, 50 Ohm IN/OUT

METHOD OF MEASUREMENTS:

Refer to FCC @ 2.985

(a) For transmitter other than single sideband, independent sideband and controlled carrier radiotelephone, power rf output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of the current and voltage on the circuit elements specified in 2.983(d)(5). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

Two Tone Test:

1. Connect two signal generators to the input of the device under test (DUT), via a proper impedance matching network (and preferably via a variable attenuator) so that the two input signals are equal (and can be raised equally).

2. Connect a dummy load of suitable load rating to the enhancer output point. Connect also a spectrum analyzer to this output point via a coupling network and attenuator, so that only a portion of the output signal is coupled to the spectrum analyzer. The coupling attenuation shall be stated in the test report. Set two signal generator frequencies f_1 and f_2 such as they and their third order intermodulation product frequencies, $f_3 = 2f_1 - f_2$ and $f_4 = 2f_2 - f_1$, are all within the passband of the DUT.

3. Raise the input level to the DUT while observing the output tone levels, P_{01} and P_{02}, and the intermodulation product levels, P_{03} and P_{04}.

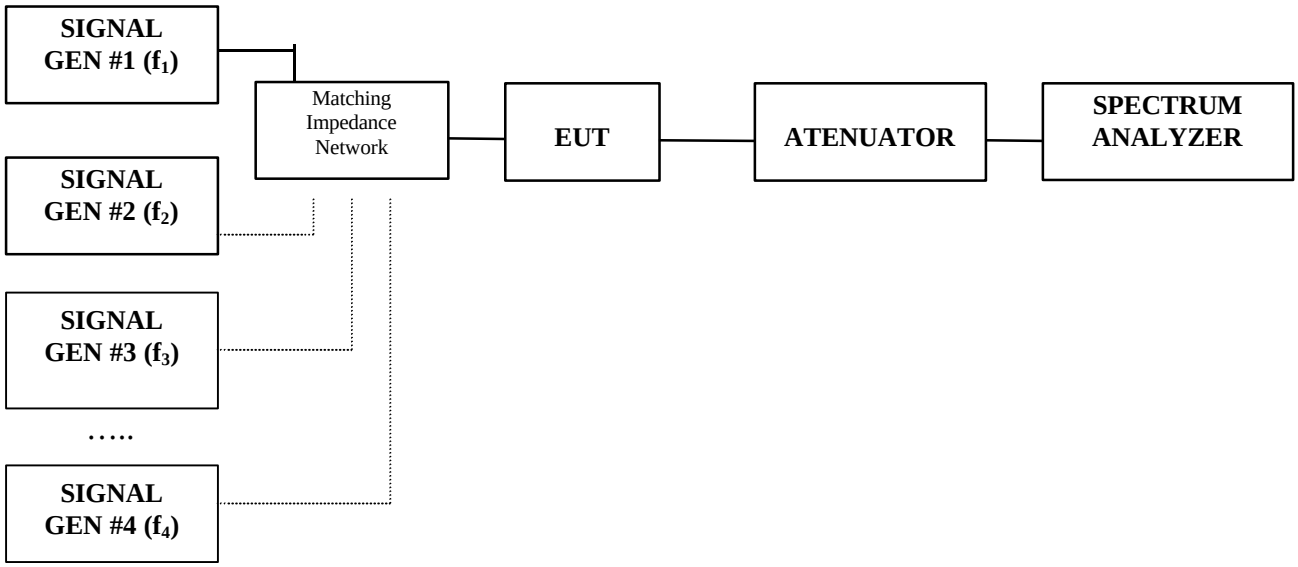
4. Raise the input level to the DUT until the greater level of the I.M. products at the enhancer output terminals, P_{03} and P_{04}, equals -43 dBW or -13 dBm.

5. Record all signal levels and their frequencies. Calculate the mean output power under this testing condition, given by: $P_{mean} = P_{01} + 3$ dB

Multiple Tone Test:

The test procedure is identical with "Two Tone Test" with the number of the input signal sources changed as preferred.

TEST ARRANGEMENT



TEST RESULTS: Conforms.

TESTED PERSONNEL: Mr. Hung Trinh, EMI/RFI Technician

DATE: June 14/99

MEASUREMENT DATA

RF POWER MEASUREMENT AT THE ANTENNA TERMINAL

TEST CONFIGURATION

- *The transmitter terminal was coupled to the Spectrum Analyzer through a 30 dB attenuator*
- *Power of the transmitter channel near the lowest, middle and highest of each frequency block/band were measured using the power meter, and the reading was corrected by added the calibrated attenuator's attenuation value and cable loss.*
- *The RF Output was turned on with no modulation.*

Single Channel Input/Output (Uplink Band 806-824 MHz)

	Maximum Input Power (dBm)		Maximum RF Output Level (dBm)		Maximum Gain (dB)	
Channel Frequency (MHz)	Measured	Rating	Measured	Rating	Measured	Rating
806	-40.0	-40.0	38.8	40.0	78.8	80.0
815	-40.0	-40.0	39.2	40.0	79.2	80.0
824	-40.0	-40.0	38.1	40.0	78.1	80.0

Multiple Channel Input/Output (Uplink Band 806-824 MHz)

Refer to Plots #1 to #3

Number of Channel Input/Output	Channel Frequency (MHz)	Measured Average per Channel RF Output Level (dBm) to provide –13 dBm maximum I.M.C.	Tx Rating
2	815 & 815.025	29.8 (Note 1)	28.7
3	814.975, 815.025 & 815.050	26.2 (Note 1)	26.2
4	814.975, 815, 815.025 & 815.050	25.5 (Note 1)	24.0

Note 1: The measured average RF power level to produce –13 dBm maximum intermodulation component (IMC) is greater than the manufacturer's rating. Therefore, the actual output power less than or equal to the manufacturer's rating will provide less intermodulation components and out-of-band spurious/harmonic emissions. The results are satisfactory.

Single Channel Input/Output (Downlink Band 851-869 MHz)

	Maximum Input Power (dBm)		Maximum RF Output Level (dBm)		Maximum Gain (dB)	
Channel Frequency (MHz)	Measured	TX Rating	Measured	Tx Rating	Measured	Tx Rating
851	-40.0	-40.0	39.3	40.0	79.3	80.0
860	-40.0	-40.0	39.6	40.0	79.6	80.0
869	-40.0	-40.0	38.1	40.0	38.1	80.0

Multiple Channel Input/Output (Downlink Band 851-869 MHz)

Refer to Plots #4 to #6

Number of Channel Input/Output	Channel Frequency (MHz)	Measured Average per Channel RF Output Level (dBm) to provide –13 dBm maximum I.M.C.	Tx Rating
2	859.9750 & 860.025	31.6	28.7
3	860, 860.025 & 860.050	27.9	26.2
4	859.975, 860, 860.025 & 860.050	25.1	24.0

Note 1: The measured average RF power level to produce –13 dBm maximum intermodulation component (IMC) is greater than the manufacturer's rating. Therefore, the actual output power less than or equal to the manufacturer's rating will provide less intermodulation components and out-of-band spurious/harmonic emissions. The results are satisfactory.

20 dB GAIN BANDWIDTH

Refer to Plots #7 to #12

FREQUENCY BAND	20 dB BANDWIDTH (BW)
806 – 824 MHz	29.9 MHz
851 – 869 MHz	25.5 MHz

GAIN versus FREQUENCY RESPONSE

Please refer to attached plots # 8 & 11
for Amplifier Gain Frequency Response Characteristics of
806-824 MHz and 851-869 MHz Amplifier Band.

4.2. EMISSION MASKS @ FCC 90.210

PRODUCT NAME: **BI-DIRECTIONAL AMPLIFIER, Model No.: BDA1200**

FCC REQUIREMENTS:

FCC Part 90, Sub. I, Para. 90.210

Emissions shall be attenuated below the mean output power of the transmitter as follows:

FREQUENCY RANGE (MHz)	Recommended OBW (KHz)	CHANNEL SPACING (KHz)	FCC APPLICABLE MASK
806-821/851-866	20.0	25.0	90.210(b): Mask B – Voice 90.210(g): Mask G – Data
821-824/866-869	12.5	20.0	90.210(b): Mask B – Voice 90.210(h): Mask H – Data
896-901/935-940	12.5	13.6	90.210(i): Mask I – Voice 90.210(j): Mask J – Data
902-928	..	..	90.210(k): Mask K – Voice & Data
929-930	25	20	90.210(b): Mask B – Voice 90.210(g): Mask G – Data
Above 940	..	..	90.210(b): Mask B – Voice 90.210(c): Mask C – Data

CLIMATE CONDITION:

Standard Temperature and Humidity:

- Ambient temperature: 21 ^{o}C
- Relative humidity: 43%

POWER INPUT:

120V 60 Hz.

TEST EQUIPMENT:

- HP EMC Analyzer, Model HP8593EM, 9 kHz-26.5 GHz, S/N: 3412A00103
- Bird Attenuator, 50 Ohm IN/OUT
- Audio Oscillator, HP, Model 204C, SN: 0989A08798, Output: 0-1.2 MHz, 5 Vrms.

METHOD OF MEASUREMENTS:

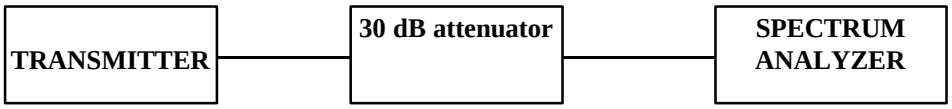
FCC CFR 47, Para. 2.989 - Out-of-Band Emissions:

The Emission Masks was measured with the Spectrum Analyzer controls set as shown on the test results (RBW ≥ 300 Hz, VBW ≥ 300 Hz and SWEEP TIME = AUTO). The transmitter was operated at a full rated power output, and modulated as follows:

Voice or Digital Modulation Through a Voice Input Port @ 2.989(c)(1):- The transmitter was modulated by a 2.5 KHz tone signal at an input level 16 dB greater than that required to produce 50% modulation (e.g.: ±2.5 KHz peak deviation at 1 KHz modulating frequency). The input level was established at the frequency of maximum response of the audio modulating circuit.

Digital Modulation Through a Data Input Port @ 2.989(h):- Transmitters employing digital modulation techniques - when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudo-random generators or other devices required in normal service. Additionally, the Emission Masks shall be shown for operation with any devices used for modifying the spectrum when such devices are operational at the descretion of the user.

TEST ARRANGEMENT



TEST RESULTS: Conforms.

TESTED PERSONNEL: Mr. Hung Trinh, EMI/RFI Technician

DATE: June 08&16/99

MEASUREMENT DATA

Since the EUT is an amplifier, the RF output will be the same as the RF input from a FCC certified FCC transmitter source. Input and out signals in 806-824 MHz and 851-869 MHz amplifier sub-bands will be measured for comparison purposes.

Please see attached plots 13 to 24 for detailed measurements.

4.3. TRANSMITTER ANTENNA POWER SPURIOUS/HARMONIC CONDUCTED EMISSIONS @ FCC 90.210

PRODUCT NAME: **BI-DIRECTIONAL AMPLIFIER, Model No.: BDA1200**

FCC REQUIREMENTS:

FCC Part 90, Sub. I, Para. 90.210

Emissions shall be attenuated below the mean output power of the transmitter as follows:

FREQUENCY RANGE (MHz)	FCC APPLICABLE MASK	Out-of-band Spurious Emissions Limits
806-821/851-866	90.210(b): Mask B – Voice 90.210(g): Mask G – Data	-13 dBm -13 dBm
821-824/866-869	90.210(b): Mask B – Voice 90.210(h): Mask H – Data	-13 dBm -13 dBm
896-901/935-940	90.210(i): Mask I – Voice 90.210(j): Mask J – Data	-13 dBm -20 dBm
902-928	90.210(k): Mask K – Voice & Data	---
929-930	90.210(b): Mask B – Voice 90.210(g): Mask G – Data	-13 dBm
Above 940	90.210(b): Mask B – Voice 90.210(c): Mask C – Data	-13 dBm -13 dBm

Worst case limit = -20 dBm

CLIMATE CONDITION:

Standard Temperature and Humidity:

- Ambient temperature: 21 ^{o}C
- Relative humidity: 43%

POWER INPUT:

120V 60 Hz.

TEST EQUIPMENT:

- HP EMC Analyzer, Model HP8593EM, 9 kHz-26.5 GHz, S/N: 3412A00103
- Bird Attenuator, 50 Ohm IN/OUT
- Hihpass Filter, Microphase, P/N: CR220HIB, S/N: IITI11000AB, cut-off freq.: 600 MHz.
- Audio Oscillator, HP, Model 204C, SN: 0989A08798, Output: 0-1.2 MHz, 5 Vrms.

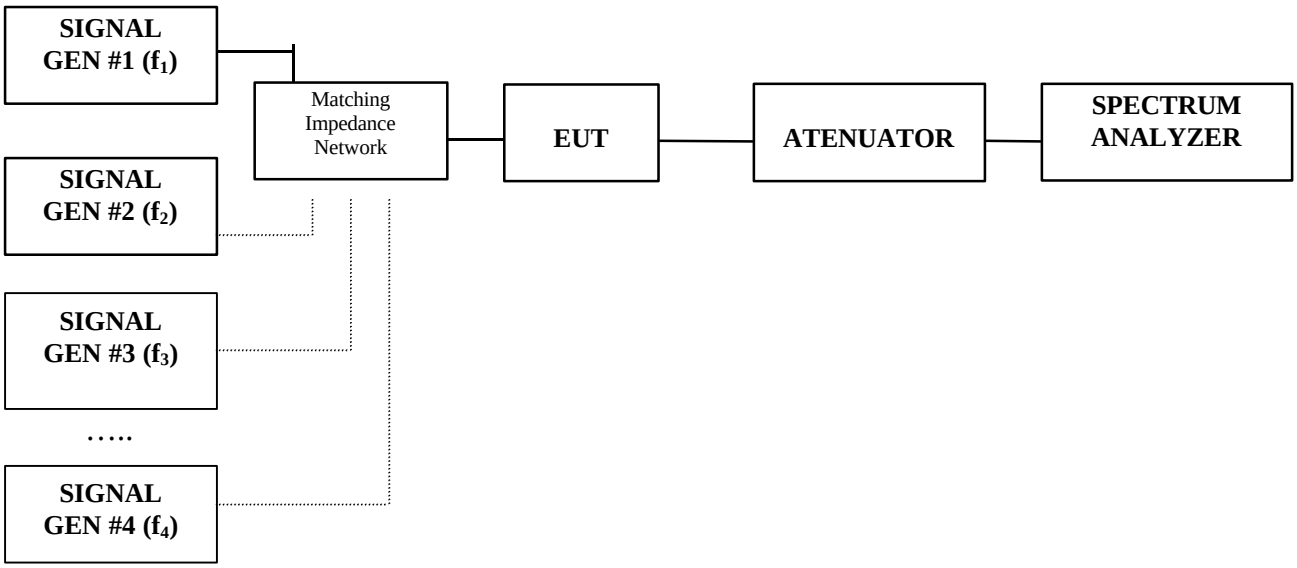
METHOD OF MEASUREMENTS:

With transmitter modulation characteristics described in Out-of-Band Emissions measurements @ 2.989, the transmitter spurious and harmonic emissions were scanned. The spurious and harmonic emissions were measured with the Spectrum Analyzer controls set as RBW = 100 kHz, VBW = 100 kHz and SWEEP TIME = AUTO). The transmitter was operated at a full rated power output, and modulated as follows:

FCC CFR 47, Para. 2.997 - Frequency spectrum to be investigated:- The spectrum was investigated from the lowest radio generated in the equipment up to at least the 10^{th} harmonic of the carrier frequency or to the highest frequency practicable in the present state of the art of measuring techniques, whichever is lower. Particular attention should be paid to harmonics and subharmonics of the carrier frequency. Radiation at the frequencies of multiplier stages should be checked. The
amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported.

FCC CFR 47, Para. 2.991 - Spurious Emissions at Antenna Terminal:- The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of the harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in 2.989 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

TEST ARRANGEMENT



TEST RESULTS: Conforms.

TESTED PERSONNEL: Mr. Hung Trinh, EMI/RFI Technician

DATE: June 07-16/99

MEASUREMENT DATA

SPURIOUS & HARMONIC EMISSIONS AT THE TRANSMITTER ANTENNA TERMINAL

REFER TO PLOTS # 25 THROUGH 36 FOR DETAILED INFORMATION OF TEST RESULTS

TEST CONFIGURATION

- *The transmitter was coupled to the Spectrum Analyzer through a 30 dB attenuator.*
- *The insertion loss between the transmitter output terminal and the spectrum analyzer was measured to be 30 dB*
- *The channel frequencies (Low, Middle and High) was established on the extreme edges of the operating band, both upper and lower at its full rated output power. The emissions was investigated up to the tenth harmonic of the fundamental emissions in each case.*

806-824 UPLINK BAND

RF Input/Output Frequency: 806 MHz (Single input/output)
RF Power Input: -40 dBm (maximum input level)
RF Power Output: 7.6 Watts
Modulation: FM modulation with 2.5 kHz sine signal, frequency deviation = ±4 kHz

FREQUENCY (MHz)	RF LEVEL 30 kHz BW (dBm)	LIMIT (dBm) Note 2	MARGIN (dB)	PASS/ FAIL
2418.0	-13.4	-13.0	-0.4	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 40 dB below the limits were recorded.

Note 2: Since the 3rd harmonic emission of the 806 MHz carrier at the antenna terminal does not meet the worst case limit, the actual limit is applied for compliance evaluation.

RF Input/Output Frequency: 815 MHz (Single input/output)
RF Power Input: -40 dBm (maximum input level)
RF Power Output: 8.3 Watts
Modulation: FM modulation with external 9600 b/s random data source, frequency deviation = ±4 kHz

FREQUENCY (MHz)	RF LEVEL 30 kHz BW (dBm)	LIMIT (dBm) Note 1	MARGIN (dB)	PASS/ FAIL
210.0	-30.6	-20.0	-10.6	PASS
1630.0	-25.8	-20.0	-5.8	PASS
2445.0	-37.7	-20.0	-17.7	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 40 dB below the limits were recorded.

- *Note 1: Worst limit = -20 dBm of all FCC available bands from 806-941 MHz was applied to all tests*

RF Input/Output Frequency: 824 MHz (single input/output)
RF Power Input: -40 dBm (maximum input level)
RF Power Output: 6.5 Watts
Modulation: FM modulation with 2.5 kHz sine signal, frequency deviation = ±4 kHz

FREQUENCY (MHz)	**RF LEVEL 30 kHz BW (dBm)**	**LIMIT (dBm) Note 1**	**MARGIN (dB)**	**PASS/ FAIL**
210.0	-31.3	-20.0	-11.3	PASS
1648.0	-27.5	-20.0	-7.5	PASS
2472.0	-36.6	-20.0	-16.6	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 40 dB below the limits were recorded.

- *Note 1: Worst limit = -20 dBm of all FCC available bands from 806-941 MHz was applied to all tests*

RF Input/Output Frequencies: 815 & 815.025 MHz (2 in/out channels)
RF Power Output: 28.7 dBm/channel as rated
Modulation: FM modulation with 2.5 kHz sine signal, frequency deviation = ±4 kHz

***2-signal* FREQUENCY (MHz)**	**RF LEVEL 30 kHz BW (dBm)**	**LIMIT (dBm) Note 1**	**MARGIN (dB)**	**PASS/ FAIL**
210.0	-44.4	-20.0	-24.4	PASS
1630.0	-32.3	-20.0	-12.3	PASS
2445.0	-46.3	-20.0	-26.3	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 40 dB below the limits were recorded.

- *Note 1: Worst limit = -20 dBm of all FCC available bands from 806-941 MHz was applied to all tests*

RF Input/Output Frequencies: 814.975, 815.025 & 815.050 MHz (3 in/out channels)
RF Power Output: 26.2 dBm/channel as rated
Modulation: FM modulation with 2.5 kHz sine signal, frequency deviation = ±4 kHz

***3-signal* FREQUENCY (MHz)**	**RF LEVEL 30 kHz BW (dBm)**	**LIMIT (dBm) Note 1**	**MARGIN (dB)**	**PASS/ FAIL**
210.0	-43.9	-20.0	-23.9	PASS
1630.0	-33.1	-20.0	-13.1	PASS
2445.0	-46.4	-20.0	-26.4	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 40 dB below the limits were recorded.

- *Note 1: Worst limit = -20 dBm of all FCC available bands from 806-941 MHz was applied to all tests*

RF Input/Output Frequencies: 814.975, 815, 815.025 & 815.050 MHz (4 in/out channels)
RF Power Output: 24 dBm/channel as rated
Modulation: FM modulation with 2.5 kHz sine signal, frequency deviation = ±4 kHz

***4-signal* FREQUENCY (MHz)**	**RF LEVEL 30 kHz BW (dBm)**	**LIMIT (dBm) Note 1**	**MARGIN (dB)**	**PASS/ FAIL**
210.0	-44.7	-20.0	-24.7	PASS
1630.0	-33.5	-20.0	-13.5	PASS
2445.0	-46.6	-20.0	-26.6	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 40 dB below the limits were recorded.

- *Note 1: Worst limit = -20 dBm of all FCC available bands from 806-941 MHz was applied to all tests*

851-869 DOWNLINK BAND

RF Input/Output Frequency: 851 MHz (Single input/output)
RF Power Input: -40 dBm (maximum input level)
RF Power Output: 8.5 Watts
Modulation: FM modulation with 2.5 kHz sine signal, frequency deviation = ±4 kHz

FREQUENCY (MHz)	RF LEVEL 30 kHz BW (dBm)	LIMIT (dBm) Note 1	MARGIN (dB)	PASS/ FAIL
210.0	-29.5	-20.0	-9.5	PASS
1702.0	-27.7	-20.0	-7.7	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 40 dB below the limits were recorded.

- *Note 1: Worst limit = -20 dBm of all FCC available bands from 806-941 MHz was applied to all tests*

RF Input/Output Frequency: 860 MHz (Single input/output)
RF Power Input: -40 dBm (maximum input level)
RF Power Output: 9.1 Watts
Modulation: FM modulation with external 9600 b/s random data source, frequency deviation = ±4 kHz

FREQUENCY (MHz)	RF LEVEL 30 kHz BW (dBm)	LIMIT (dBm) Note 1	MARGIN (dB)	PASS/ FAIL
210.0	-28.6	-20.0	-8.6	PASS
1720.0	-27.7	-20.0	-7.7	PASS
2580.0	-37.9	-20.0	-17.9	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 40 dB below the limits were recorded.

- *Note 1: Worst limit = -20 dBm of all FCC available bands from 806-941 MHz was applied to all tests*

RF Input/Output Frequency: 869 MHz (single input/output)
RF Power Input: -40 dBm (maximum input level)
RF Power Output: 6.5 Watts
Modulation: FM modulation with 2.5 kHz sine signal, frequency deviation = ±4 kHz

FREQUENCY (MHz)	RF LEVEL 30 kHz BW (dBm)	LIMIT (dBm) Note 1	MARGIN (dB)	PASS/ FAIL
210.0	-31.0	-20.0	-11.0	PASS
1738.0	-29.9	-20.0	-9.9	PASS
2607.0	-29.4	-20.0	-9.4	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 40 dB below the limits were recorded.

- *Note 1: Worst limit = -20 dBm of all FCC available bands from 806-941 MHz was applied to all tests*

RF Input/Output Frequencies: 859.975 & 860.025 MHz (2 in/out channels)
RF Power Output: 28.7 dBm/channel as rated
Modulation: FM modulation with 2.5 kHz sine signal, frequency deviation = ±4 kHz

2-signal **FREQUENCY (MHz)**	**RF LEVEL 30 kHz BW (dBm)**	**LIMIT (dBm) Note 1**	**MARGIN (dB)**	**PASS/ FAIL**
210.0	-48.3	-20.0	-28.3	PASS
1720.0	-31.7	-20.0	-11.7	PASS
2580.0	-45.0	-20.0	-25.0	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 40 dB below the limits were recorded.

- *Note 1: Worst limit = -20 dBm of all FCC available bands from 806-941 MHz was applied to all tests*

RF Input/Output Frequencies: 860, 860.025 & 860.050 MHz (3 in/out channels)
RF Power Output: 26.2 dBm /channel as rated
Modulation: FM modulation with 2.5 kHz sine signal, frequency deviation = ±4 kHz

3-signal **FREQUENCY (MHz)**	**RF LEVEL 30 kHz BW (dBm)**	**LIMIT (dBm) Note 1**	**MARGIN (dB)**	**PASS/ FAIL**
210.0	-45.9	-20.0	-25.9	PASS
1720.0	-31.7	-20.0	-11.7	PASS
2580.0	-44.0	-20.0	-24.0	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 40 dB below the limits were recorded.

- *Note 1: Worst limit = -20 dBm of all FCC available bands from 806-941 MHz was applied to all tests*

RF Input/Output Frequencies: 859.975, 860, 860.025 & 860.05 MHz (4 in/out channels)
RF Power Output: 24 dBm/channel as rated
Modulation: FM modulation with 2.5 kHz sine signal, frequency deviation = ±4 kHz

4-signal **FREQUENCY (MHz)**	**RF LEVEL 30 kHz BW (dBm)**	**LIMIT (dBm) Note 1**	**MARGIN (dB)**	**PASS/ FAIL**
210.0	-34.0	-20.0	-14.0	PASS
1720.0	-45.8	-20.0	-25.8	PASS
2580.0	-45.5	-20.0	-25.5	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 40 dB below the limits were recorded.

- *Note 1: Worst limit = -20 dBm of all FCC available bands from 806-941 MHz was applied to all tests*

4.4. TRANSMITTER SPURIOUS/HARMONIC RADIATED EMISSIONS @ FCC 90.210

PRODUCT NAME: **BI-DIRECTIONAL AMPLIFIER, Model No.: BDA1200**

FCC REQUIREMENTS:

FCC Part 90, Sub. I, Para. 90.210

Emissions shall be attenuated below the mean output power of the transmitter as follows:

FREQUENCY RANGE (MHz)	FCC APPLICABLE MASK	Out-of-band Spurious Emissions Limits
806-821/851-866	90.210(b): Mask B – Voice 90.210(g): Mask G – Data	-13 dBm -13 dBm
821-824/866-869	90.210(b): Mask B – Voice 90.210(h): Mask H – Data	-13 dBm -13 dBm
896-901/935-940	90.210(i): Mask I – Voice 90.210(j): Mask J – Data	-13 dBm -20 dBm
902-928	90.210(k): Mask K – Voice & Data	---
929-930	90.210(b): Mask B – Voice 90.210(g): Mask G – Data	-13 dBm
Above 940	90.210(b): Mask B – Voice 90.210(c): Mask C – Data	-13 dBm -13 dBm

Worst case limit = -20 dBm

CLIMATE CONDITION:

Standard Temperature and Humidity:

- Ambient temperature: 21 ^{o}C
- Relative humidity: 43%

POWER INPUT:

120V 60 Hz.

TEST EQUIPMENT:

1. EMI Receiver System/Spectrum Analyzer, Hewlett Packard, Model 8546A, Input +25dBm max., 9KHz-5.6GHz, 50 Ohms, built-in Peak, Quasi-Peak & Average Detectors, Pre-Amplifier and Tracking Signal Generator. This System includes: (1) HP 85460A RF Filter Section, S/N: 3448A00236 and (2) HP 85462A Receiver RF Section/Display, S/N: 3520A00248.
2. HP EMC Analyzer, Model HP8593EM, 9 kHz-26.5 GHz, S/N: 3412A00103

3. Microwave Amplifier, HP, Model 83017A, Frequency Range 1 to 22GHz, 30dB gain nominal, low noise floor type.
4. Active Loop Antenna, Emco, Model 6502, SN 9104-2611, Frequency Range 1 KHz - 30 MHz, @ 50 Ohms.
5. BiconiLog Antenna, Emco, Model 3142, SN 10005, 30-2000 MHz @ 50 Ohms.
6. Log Periodic Antenna, AH System, Model SAS-200/518, SN: 343, Frequency Range: 1GHz-18GHz.
7. FCC Listed Open Field Test Site.
8. Audio Oscillator, HP, Model 204C, SN: 0989A08798, Output: 0-1.2 MHz, 5 Vrms.

METHOD OF MEASUREMENTS:

Refer to **ANSI 63.4**, Para. 8 for detailed radiated emissions measurement procedures.

With transmitter modulation characteristics described in Out-of-Band Emissions measurements @ 2.989, the transmitter spurious and harmonic emissions were scanned. The spurious and harmonic emissions were measured with the Spectrum Analyzer controls set as RBW = 100 kHz, VBW = 100 kHz and SWEEP TIME = AUTO). The transmitter was operated at a full rated power output, and modulated as follows:

FCC CFR 47, Para. 2.997 - Frequency spectrum to be investigated

The spectrum was investigated from the lowest radio generated in the equipment up to at least the 10^{th} harmonic of the carrier frequency or to the highest frequency practicable in the present state of the art of measuring techniques, whichever is lower. Particular attention should be paid to harmonics and subharmonics of the carrier frequency. Radiation at the frequencies of multiplier stages should be checked. The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported.

FCC CFR 47, Para. 2.993 - Field Strength Spurious Emissions

(a) Measurements was made to detect spurious emissions radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data were supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph 2.989(c) as appropriate. For equipment operating on frequencies below 1 GHz , an Open Field Test is normally required, with the measuring instrument antenna located in the far field at all test frequencies. In event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurement will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with the reference to the rated power output of the transmitter, assuming all emissions are radiated from half-wave dipole antennas.

(b) Measurements specified in paragraph (a) of this section shall be made for the following equipment:

(1) Those in which the spurious emission are required to be 60 dB or more below the mean power of the transmitter.
(2) All equipment operating on frequencies higher than 25 MHz
(3) All equipment where the antenna is an integral part of, and attached directly to the transmitter.
(4) Other types of equipment as required, when deemed necessary by the Commission.

METHOD OF CALCULATION FOR TRANSMITTED POWER (P) FROM THE MEASURED FIELD STRENGTH LEVEL (E):

According to IEC 801-3, the power density can be calculated as follows:

$S = P / (4xPIxD^2)$ Where: S: Power density in watts per square feet
P: Transmitted power in watts
PI: 13.1415
D: Distance in meters

The power density S (W/m^2) and electric field E (V/m) is related by:

$S = E^2/(120xPI)$

Accordingly, the field intensity of isotropic radiator in free space can be expressed as follows:

$E = (30xP)^{1/2}/D = 5.5x(P)^{1/2}/D$

For Halfwave dipole antenna or other antennas correlated to dipole in direction of maximum radiation:

$S = (1.64xP)/(4xPIxD^2)$
$E = (49.2xP)^{1/2}xD = 7.01x(P)^{1/2}/D$

$$P = (ExD/7.01)^2$$

Calculation of transmitted power P (dBm) given a measured field intensity E (dBuV/m):

$P(W) = [E(V/m)xD/7.01]^2$
$P(mW) = P(W)x1000$
=> $P(dBm) = 10logP(mW)$
$= 20logE(V/m) + 20log(D) - 20log(7.01) + 10log1000$
$= E(dBV/m) + 20logD + 13$
$= E(dBuV/m) - 120 + 20log(D) + 13$
$= E(dBuV/m) + 20log(D) - 107$

The Transmitted Power @ D = 3 Meters

P(dBm) = E(dBuV/m) - 97.5

TEST RESULTS: Conforms.

TESTED PERSONNEL: Mr. Hung Trinh, EMI/RFI Technician

DATE: June 07/99

MEASUREMENT DATA

RADIATED EMISSIONS MEASUREMENTS @ 3 METERS

TEST CONFIGURATION

- *The channel frequencies (Low, Middle and High) was established at its full rated output power. The emissions was investigated up to the tenth harmonic of the fundamental emissions in each case. the measured level of the carrier was recorded and compared to the level of the emissions as required in Part 90.238(a). The absolute level of each emission shall not be greater than -20 dBm.*
- *For measuring radiated emissions at frequencies below 1 GHz, the Spectrum Analyzer was set as 100 kHz RBW, 100 KHz VBW, SWEEP TIME: AUTO, PEAK DETECTOR.*
- *For measuring radiated emissions at frequencies above 1 GHz, the Spectrum Analyzer was set as 1 MHz RBW, 1 MHz VBW, SWEEP TIME: AUTO, PEAK DETECTOR.*
- *All rf emissions from the lowest frequency generated by the transmitter (...) upto the 10^{th} harmonic of fundamental were scanned, and only emissions less than 20 dB below the limits (-20 dBm) were recorded.*
- *Note 1: Worst limit = -20 dBm of all FCC available bands from 806-941 MHz was applied to all tests*

Remarks: According to the transmitter conducted test results, the single channel operations are worst case of spurious/harmonic rf emissions since the transmitter operated at highest rf input /output power. Therefore, the single channel input/output test configuration will be performed in the following tests, and their results shall represented the worst case of rf interference.

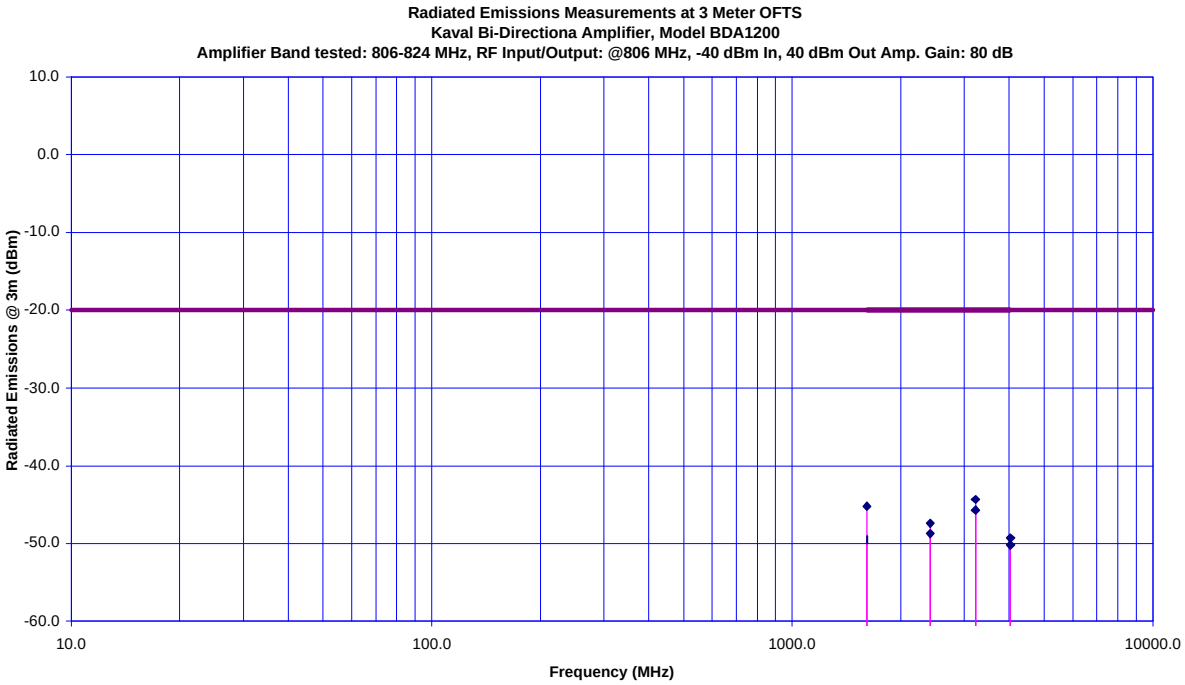
806-824 UPLINK BAND

RF Input/Output Frequency: 806 MHz (Single input/output)
RF Power Input: -40 dBm (maximum input level)
RF Power Output: 7.6 Watts
Modulation: FM modulation with 2.5 kHz sine signal, frequency deviation = ±4 kHz

FREQUENCY (MHz)	RF Field Strength Level (dBuV/m)	RF Power Level (dBm)	DETECTOR USED (PEAK/QP)	ANTENNA PLANE (H/V)	(Note 1) LIMIT (dBm)	MARGIN (dB)	PASS/ FAIL
1612.00	52.3	-45.2	PEAK	V	-20.0	-25.2	PASS
1612.00	48.0	-49.5	PEAK	H	-20.0	-29.5	PASS
2418.00	48.8	-48.7	PEAK	V	-20.0	-28.7	PASS
2418.00	50.1	-47.4	PEAK	H	-20.0	-27.4	PASS
3224.00	51.8	-45.7	PEAK	V	-20.0	-25.7	PASS
3224.00	53.2	-44.3	PEAK	H	-20.0	-24.3	PASS
4030.00	48.2	-49.3	PEAK	V	-20.0	-29.3	PASS
4030.00	47.3	-50.2	PEAK	H	-20.0	-30.2	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 40 dB below the limits were recorded.

- *Note 1: Worst limit = -20 dBm of all FCC available bands from 806-941 MHz was applied to all tests*

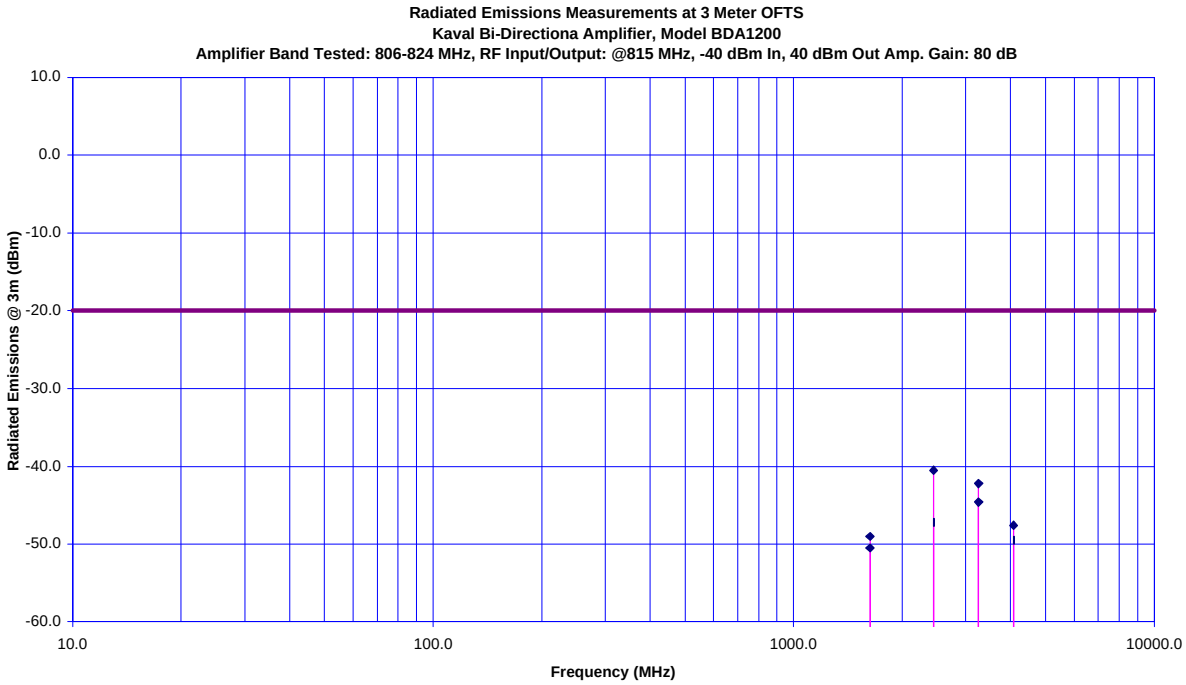

Radiated Emissions Measurements at 3 Meter OFTS
Kaval Bi-Directiona Amplifier, Model BDA1200
Amplifier Band tested: 806-824 MHz, RF Input/Output: @806 MHz, -40 dBm In, 40 dBm Out Amp. Gain: 80 dB
Radiated Emissions @ 3m (dBm)
10.0
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
10.0
100.0
1000.0
10000.0
Frequency (MHz)

RF Input/Output Frequency: 815 MHz (Single input/output)
RF Power Input: -40 dBm (maximum input level)
RF Power Output: 8.3 Watts
Modulation: FM modulation with external 9600 b/s random data source, frequency deviation = ±4 kHz

FREQUENCY (MHz)	RF Field Strength Level (dBuV/m)	RF Power Level (dBm)	DETECTOR USED (PEAK/QP)	ANTENNA PLANE (H/V)	(Note 1) LIMIT (dBm)	MARGIN (dB)	PASS/ FAIL
1630.00	48.5	-49.0	PEAK	V	-20.0	-29.0	PASS
1630.00	47.0	-50.5	PEAK	H	-20.0	-30.5	PASS
2445.00	57.0	-40.5	PEAK	V	-20.0	-20.5	PASS
2445.00	50.3	-47.2	PEAK	H	-20.0	-27.2	PASS
3260.00	55.3	-42.2	PEAK	V	-20.0	-22.2	PASS
3260.00	52.9	-44.6	PEAK	H	-20.0	-24.6	PASS
4075.00	49.9	-47.6	PEAK	V	-20.0	-27.6	PASS
4075.00	48.0	-49.5	PEAK	H	-20.0	-29.5	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 40 dB below the limits were recorded.

- *Note 1: Worst limit = -20 dBm of all FCC available bands from 806-941 MHz was applied to all tests*

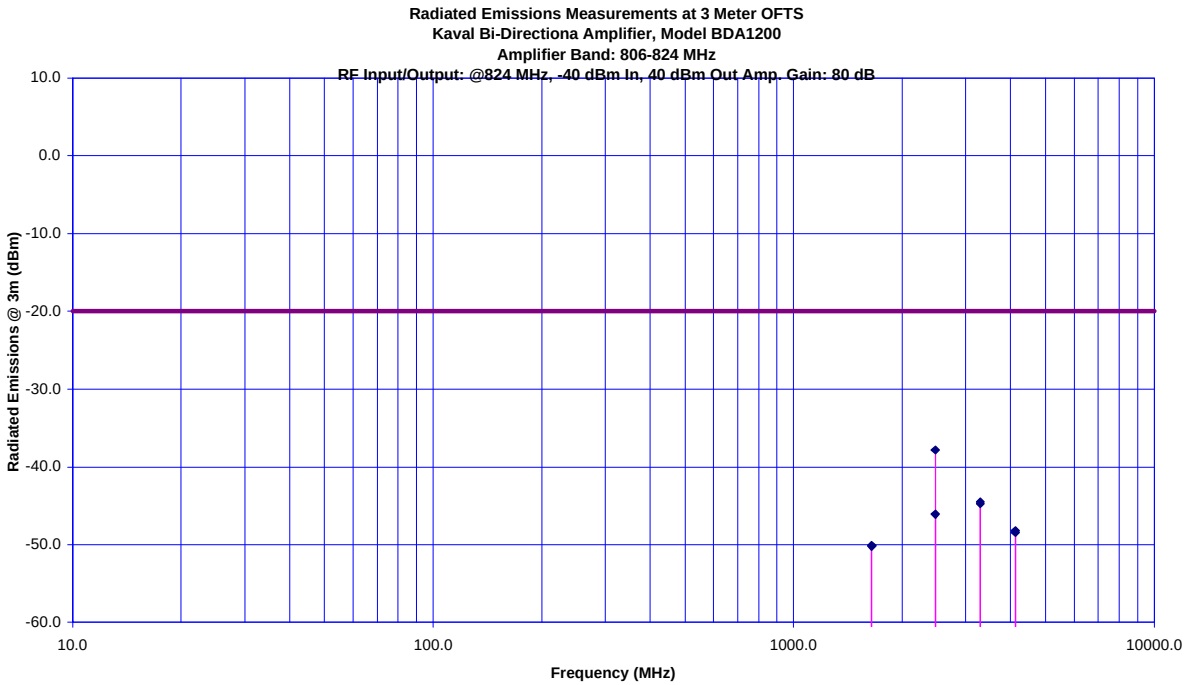


RF Input/Output Frequency: 824 MHz (single input/output)
RF Power Input: -40 dBm (maximum input level)
RF Power Output: 6.5 Watts
Modulation: FM modulation with 2.5 kHz sine signal, frequency deviation = ±4 kHz

FREQUENCY (MHz)	RF Field Strength Level (dBuV/m)	RF Power Level (dBm)	DETECTOR USED (PEAK/QP)	ANTENNA PLANE (H/V)	(Note 1) LIMIT (dBm)	MARGIN (dB)	PASS/ FAIL
1648.00	47.4	-50.1	PEAK	V	-20.0	-30.1	PASS
1648.00	47.3	-50.2	PEAK	H	-20.0	-30.2	PASS
2472.00	59.7	-37.8	PEAK	V	-20.0	-17.8	PASS
2472.00	51.4	-46.1	PEAK	H	-20.0	-26.1	PASS
3296.00	52.8	-44.7	PEAK	V	-20.0	-24.7	PASS
3296.00	53.0	-44.5	PEAK	H	-20.0	-24.5	PASS
4120.00	49.1	-48.4	PEAK	V	-20.0	-28.4	PASS
4120.00	49.3	-48.2	PEAK	H	-20.0	-28.2	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 40 dB below the limits were recorded.

- *Note 1: Worst limit = -20 dBm of all FCC available bands from 806-941 MHz was applied to all tests*



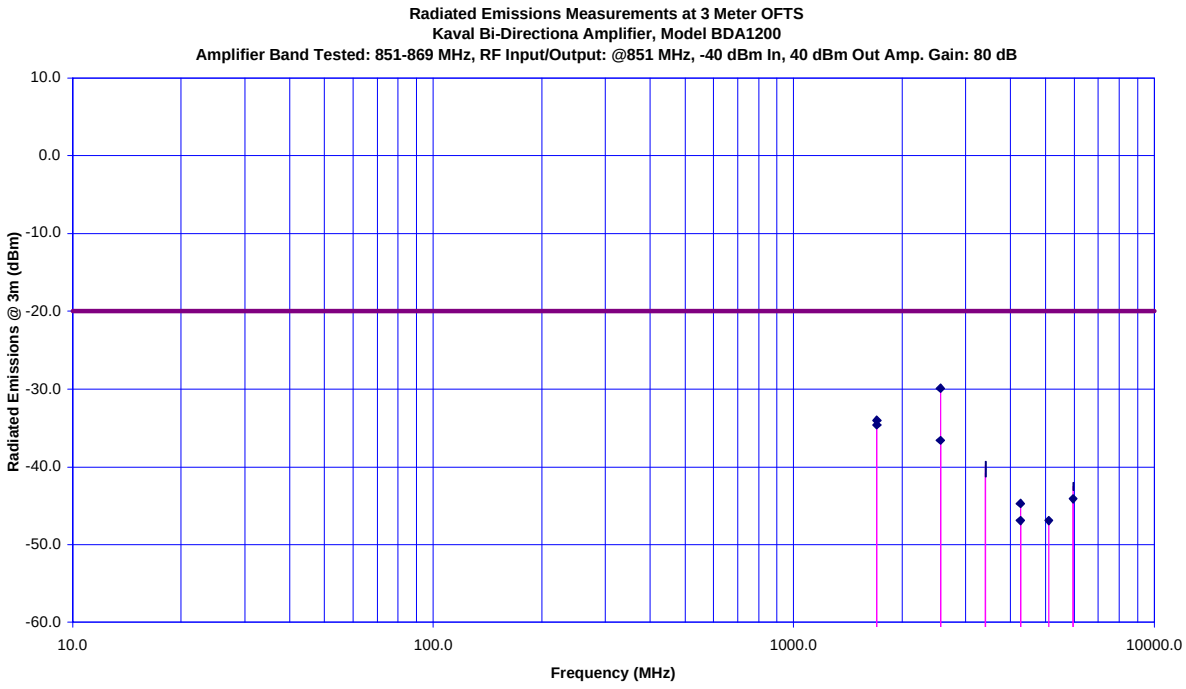
851-869 DOWNLINK BAND

RF Input/Output Frequency: 851 MHz (Single input/output)
RF Power Input: -40 dBm (maximum input level)
RF Power Output: 8.5 Watts
Modulation: FM modulation with 2.5 kHz sine signal, frequency deviation = ±4 kHz

FREQUENCY (MHz)	RF Field Strength Level (dBuV/m)	RF Power Level (dBm)	DETECTOR USED (PEAK/QP)	ANTENNA PLANE (H/V)	(Note 1) LIMIT (dBm)	MARGIN (dB)	PASS/ FAIL
1702.00	62.9	-34.6	PEAK	V	-20.0	-14.6	PASS
1702.00	63.5	-34.0	PEAK	H	-20.0	-14.0	PASS
2553.00	67.6	-29.9	PEAK	V	-20.0	-9.9	PASS
2553.00	60.9	-36.6	PEAK	H	-20.0	-16.6	PASS
3404.00	57.7	-39.8	PEAK	V	-20.0	-19.8	PASS
3404.00	56.7	-40.8	PEAK	H	-20.0	-20.8	PASS
4255.00	52.8	-44.7	PEAK	V	-20.0	-24.7	PASS
4255.00	50.6	-46.9	PEAK	H	-20.0	-26.9	PASS
5106.00	50.6	-46.9	PEAK	H	-20.0	-26.9	PASS
5957.00	55.0	-42.5	PEAK	V	-20.0	-22.5	PASS
5957.00	53.4	-44.1	PEAK	H	-20.0	-24.1	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 40 dB below the limits were recorded.

- *Note 1: Worst limit = -20 dBm of all FCC available bands from 806-941 MHz was applied to all tests*

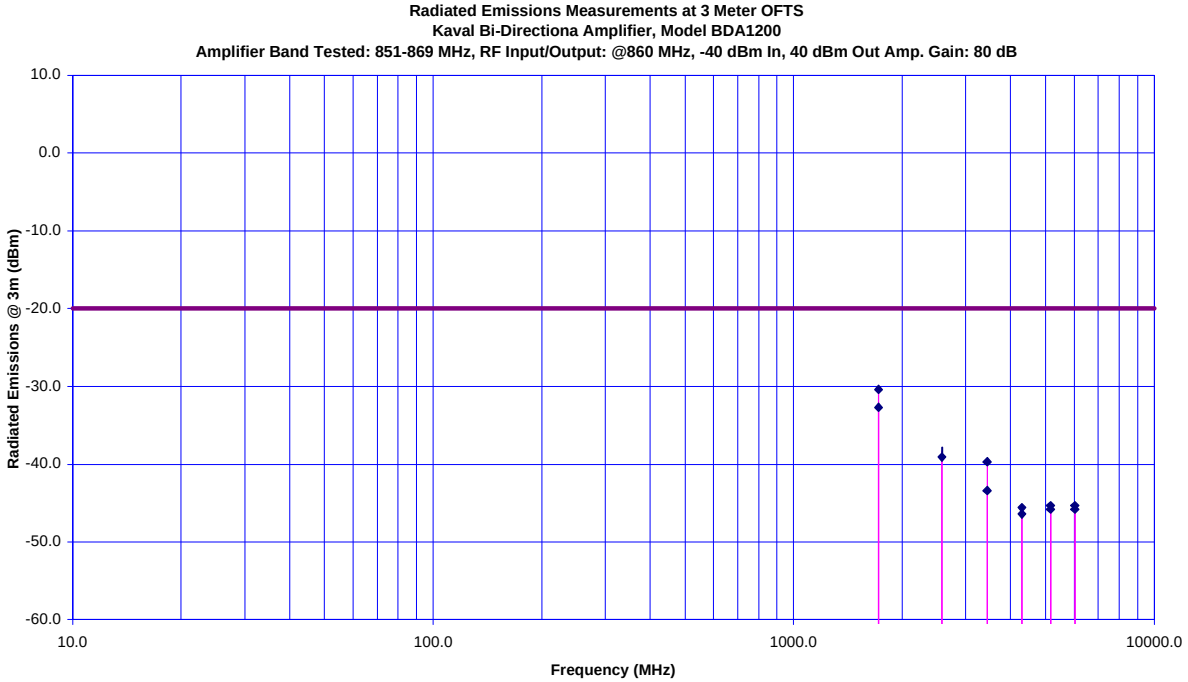


RF Input/Output Frequency: 860 MHz (Single input/output)
RF Power Input: -40 dBm (maximum input level)
RF Power Output: 9.1 Watts
Modulation: FM modulation with external 9600 b/s random data source, frequency deviation = ±4 kHz

FREQUENCY (MHz)	RF Field Strength Level (dBuV/m)	RF Power Level (dBm)	DETECTOR USED (PEAK/QP)	ANTENNA PLANE (H/V)	(Note 1) LIMIT (dBm)	MARGIN (dB)	PASS/ FAIL
1720.00	67.1	-30.4	PEAK	V	-20.0	-10.4	PASS
1720.00	64.8	-32.7	PEAK	H	-20.0	-12.7	PASS
2580.00	58.4	-39.1	PEAK	V	-20.0	-19.1	PASS
2580.00	59.2	-38.3	PEAK	H	-20.0	-18.3	PASS
3440.00	57.8	-39.7	PEAK	V	-20.0	-19.7	PASS
3440.00	54.1	-43.4	PEAK	H	-20.0	-23.4	PASS
4300.00	51.1	-46.4	PEAK	V	-20.0	-26.4	PASS
4300.00	51.9	-45.6	PEAK	H	-20.0	-25.6	PASS
5160.00	52.2	-45.3	PEAK	H	-20.0	-25.3	PASS
5160.00	51.7	-45.8	PEAK	V	-20.0	-25.8	PASS
6020.00	51.7	-45.8	PEAK	V	-20.0	-25.8	PASS
6020.00	52.2	-45.3	PEAK	H	-20.0	-25.3	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 40 dB below the limits were recorded.

- *Note 1: Worst limit = -20 dBm of all FCC available bands from 806-941 MHz was applied to all tests*



RF Input/Output Frequency: 869 MHz (single input/output)
RF Power Input: -40 dBm (maximum input level)
RF Power Output: 6.5 Watts
Modulation: FM modulation with 2.5 kHz sine signal, frequency deviation = ±4 kHz

FREQUENCY (MHz)	RF Field Strength Level (dBuV/m)	RF Power Level (dBm)	DETECTOR USED (PEAK/QP)	ANTENNA PLANE (H/V)	(Note 1) LIMIT (dBm)	MARGIN (dB)	PASS/ FAIL
1738.00	74.8	-22.7	PEAK	V	-20.0	-2.7	PASS
1738.00	69.2	-28.3	PEAK	H	-20.0	-8.3	PASS
2607.00	55.0	-42.5	PEAK	V	-20.0	-22.5	PASS
2607.00	54.4	-43.1	PEAK	H	-20.0	-23.1	PASS
3476.00	50.2	-47.3	PEAK	V	-20.0	-27.3	PASS
3476.00	54.0	-43.5	PEAK	H	-20.0	-23.5	PASS
4345.00	50.8	-46.7	PEAK	V	-20.0	-26.7	PASS
4345.00	50.2	-47.3	PEAK	H	-20.0	-27.3	PASS
5214.00	51.3	-46.2	PEAK	H	-20.0	-26.2	PASS
5214.00	50.8	-46.7	PEAK	V	-20.0	-26.7	PASS
6083.00	51.8	-45.7	PEAK	V	-20.0	-25.7	PASS
6083.00	52.6	-44.9	PEAK	H	-20.0	-24.9	PASS
6952.00	51.9	-45.6	PEAK	V	-20.0	-25.6	PASS
6952.00	52.3	-45.2	PEAK	H	-20.0	-25.2	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 40 dB below the limits were recorded.

- *Note 1: Worst limit = -20 dBm of all FCC available bands from 806-941 MHz was applied to all tests*

5. EXHIBIT 5 - Electrical Field Radiated Emissions Measurements - General Test Method

- The radiated emission measurements were performed at the Ultratech's 3 Meter Open Field Test Site (OFTS) situated in the Town of Oakville, province of Ontario. The Attenuation Characteristics of OFTS have been filed to FCC.

- Radiated emissions measurements were made using the following test instruments:

  1. Calibrated EMCO biconilogl antenna in the frequency range from 30 MHz to 2000 MHz.
  2. Calibrated A.H. Systems log periodic antenna in the frequency range above 1000 MHz (1GHz - 18 GHz).
  3. Calibrated EMI receiver or spectrum analyzer and pre-selector. In general, the spectrum analyzer would be used as follows:

     – The rf electric field levels were measured with the spectrum analyzer set to PEAK detector (100 KHz RBW and 100 KHz VBW).

     – If any rf emission was observed to be a broadBand noise, the spectrum analyzer's CISPR QUASI-PEAK detector (120 KHz RBW and 1MHz VBW) was then set to measure the signal level.

     – If the signal being measured was narrowband and the ambient field was broadBand, the bandwidth of the spectrum analyzer was reduced.

- The EUT was set-up in its typical configuration and operated in its various modes as described in 3.2 of the test report.

- The frequencies of emissions was first detected. Then the amplitude of the emissions was measured at the specified measurement distance using required antenna height, polarization, and detector characteristics.

- During this process, cables and peripheral devices were manipulated within the range of likely configuration.

- For each mode of operation required to be tested, the frequency spectrum was monitored. Variations in antenna heights (from 1 meter to 4 meters above the ground plane), antenna polarization (horizontal plane and vertical plane), cable placement and peripheral placement (each variable within bounds specified elsewhere) were explored to produce the highest amplitude signal relative to the limit.

  The maximum radiated emission for a given mode of operation was found by using the following step-by-step procedure:

  Step1: Monitor the frequency range of interest at a fixed antenna height and EUT azimuth.

  Step2: Manipulate the system cables to produce highest amplitude signal relative to the limit. Note the amplitude and frequency of the suspect signal.

  Step3: Rotate the EUT 360 degrees to maximize the suspected highest amplitude signal. If the signal or another at a different frequency is observed to exceed the previously noted highest amplitude signal by 1 dB or more, go back to the azimuth and repeat Step 2. Otherwise, orient the EUT azimuth to repeat the highest amplitude observation and proceed.

Step4: Move the antenna over its full allowed range of travel (1 to 4 meters) to maximize the suspected highest amplitude signal. If the signal or another at a different frequency is observed to exceed the previously noted highest amplitude signal by 1 dB or more, return to Step 2 with the highest amplitude observation and proceed.

Step5: Change the polarization of the antenna and repeat Step 2 through 4. Compare the resulting suspected highest amplitude signal with that found for the other polarization. Select and note the higher of the two signals. This signal is termed the highest observed signal with respect to the limit for this EUT operational mode.

Step6: The effects of various modes of operation is examined. This is done by varying the equipment modes as steps 2 through 5 are being performed.

Step7: After completing steps 1 through 6, record the final highest emission level, frequency, antenna polarization and detector mode of the measuring instrument.

Calculation of Field Strength:

The field strength is calculated by adding the calibrated antenna factor and cable factor, and subtracting the Amplifier gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG

Where	FS	=	Field Strength
	RA	=	Receiver/Analyzer Reading
	AF	=	Antenna Factor
	CF	=	Cable Attenuation Factor
	AG	=	Amplifier Gain

Example: If a receiver reading of 60.0 dBuV is obtained, the antenna factor of 7.0 dB/m and cable factor of 1.0 dB are added, and the amplifier gain of 30 dB is subtracted. The actual field strength will be:.

Field Level = 60 + 7.0 + 1.0 - 30 = 38.0 dBuV/m.

Field Level = $10^{(38/20)}$ = 79.43 uV/m.

Notes: The frequency and amplitude of at least six highest conducted emissions relative to the limit are recorded unless such emissions are more than 20 dB below the limit. If less than six emissions are within 20dB of the limit, the background or receiver noise level shall be reported at representative frequencies.

6. EXHIBIT 6 - INFORMATION RELATED TO EQUIPMENT UNDER TESTS

6.1. FCC ID LABELLING AND SKETCH OF FCC LABEL LOCATION

Refer to the attached sheets

6.2. PHOTOGRAPHS OF EQUIPMENT UNDER TEST

Refer to the attached photographs

6.3. SYSTEM BLOCK DIAGRAM(S)

Refer to the attached sheets

6.4. SCHEMATIC DIAGRAMS

Refer to the attached sheets

6.5. USER'S MANUAL WITH "FCC INFORMATION TO USER STATEMENTS"

Refer to the attached Users' manual