UltraTech
Group of Labs

January 11, 2000

FEDERAL COMMUNICATIONS COMMISSION
7435 Oakland Mills Road
Columbia, MD 21046
USA

Subject: **Type Acceptance Application under FCC CFR 47, Parts 2 and 90 (Subpart I) - Radio Services Transmitters Operating in the frequency bands 806-824 MHz and 851-869 MHz.**

Applicant: **Kaval Telecom Inc.**
Product: **800 MHz Trunking "Micro" BDA**
Model: **BDA1250-T**
FCC ID: **H6M-BDA1250**

Dear Sir/Madam,

As appointed agent for **Kaval Telecom Inc.**, please find enclosed copies of the engineering report, authorization form, application form and a cheque of US $610.00.

Please refer to User's Manual for antenna installation instructions and RF Safety warning for compliance with FCC RF Exposure Requirement @ 2.1093.

If you have any queries, please do not hesitate to contact us by our TOLL FREE numbers:

OUR TELEPHONE NO.: 1-877-765-4173

Yours truly,

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

TML/AK

Encl.

3000 Bristol Circle,
Oakville, Ontario, Canada
L6H 6G4

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UltraTech
Group of Labs

January 11, 2000

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

Attn.: **Mr. Alan Aslett**

Subject: **Certification Testing in accordance with FCC CFR 47, Parts 2 and 90 (Subpart I) - Radio Services Transmitters Operating in the frequency bands 806-824 MHz and 851-869 MHz.**

Product: **800 MHz Trunking "Micro" BDA**
Model: **BDA1250-T**
FCC ID: **H6M-BDA1250**

Dear Mr. Aslett,

The product sample has been tested in accordance with **FCC CFR 47, Parts 2 and 90 (Subpart I) - Radio Services Transmitters Operating in the frequency bands 806-824 MHz and 851-869 MHz,** and the results and observation were recorded in the engineering report, Our File No.: KTI04_F90

Enclosed you will find copies of the engineering report. If you have any queries, please do not hesitate to contact us.

Yours truly,

Tri Minh Luu, P.Eng
Vice President - Engineering

Encl.

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ENGINEERING TEST REPORT

800 MHz Trunking "Micro" BDA
Model No.: BDA1250-T
FCC ID: H6M-BDA1250

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

Tested in Accordance With

Federal Communications Commission (FCC)
CFR 47, PARTS 2 and 90 (Subpart I)
(Operating Frequency Bands: 806-824 MHz and 851-869 MHz)

UltraTech's File No.: KTI04_F90

This Test report is Issued under the Authority of Tri M. Luu, Professional Engineer, Vice President of Engineering UltraTech Group of Labs …… Date: ……	
Report Prepared by: Mike Tom ……	Tested by: Hung Trinh, RFI/EMI Technician ……
Issued Date: January 11, 2000	Test Dates: Dec. 21/99 to Jan. 10/2000

The results in this Test Report apply only to the sample(s) tested, and the sample tested is randomly selected.

UltraTech

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EXHIBIT 1. INTRODUCTION

1.1. SCOPE

Reference:	FCC Parts 2 and 90 (Subpart 90): 1999
Title	Telecommunication - Code of Federal Regulations, CFR 47, Parts 2 & 90
Purpose of Test:	To gain FCC Certification Authorization for Radio operating in the frequency bands 806-824 MHz and 851-869 MHz ..
Test Procedures	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.

1.2. NORMATIVE REFERENCES

***Note**: When the international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.*

Publication	Year	Title
FCC CFR Parts 0-19, 80-End	1998	Code of Federal Regulations – Telecommunication
ANSI C63.4	1992	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
CISPR 22 & EN 55022	1997 1998	Limits and Methods of Measurements of Radio Disturbance Characteristics of Information Technology Equipment
CISPR 16-1		Specification for Radio Disturbance and Immunity measuring apparatus and methods

EXHIBIT 2. PERFORMANCE ASSESSMENT

2.1. CLIENT INFORMATION

APPLICANT:	
Name:	Kaval Telecom Inc.
Address:	60 Gough Road Markham, Ontario Canada, L3R 8X7
Contact Person:	Mr. Alan Aslett Phone #: 905-946-3397 Fax #: 905-946-3392

MANUFACTURER:	
Name:	Kaval Telecom Inc.
Address:	60 Gough Road Markham, Ontario Canada, L3R 8X7
Contact Person:	Mr. Alan Aslett Phone #: 905-946-3397 Fax #: 905-946-3392

2.2. EQUIPMENT UNDER TEST (EUT) INFORMATION

The following information (with the exception of the Date of Receipt) has been supplied by the applicant.

Brand Name	Kaval Telecom Inc.
Product Name	800 MHz Trunking "Micro" BDA
Model Name or Number	BDA1250-T
Serial Number	Pre-Production
Type of Equipment	Radio Communication Equipment – Bi-directional Amplifier
External Power Supply	12 Vdc using the Kaval external power supply, Model MKD-142000B
Transmitting/Receiving Antenna Type	Non-Integral
Primary User Functions of EUT:	None

2.3. EUT'S TECHNICAL SPECIFICATIONS

TRANSMITTER	
Equipment Type:	▪ Portable ▪ Mobile ▪ Base station (fixed use)
Intended Operating Environment:	▪ Commercial, light industry & heavy industry
Power Supply Requirement:	▪ 120V/230V AC Adapter, 12Vdc Out
RF Output Power Rating:	▪ 806-824 MHz Band: 430.0 mWatts/channel (1 Channel) ▪ 806-824 MHz Band: 67.6 mWatts/channel (2 Channels) ▪ 806-824 MHz Band: 38.9 mWatts/channel (3 Channels) ▪ 806-824 MHz Band: 30.2 mWatts/channel (4 Channels) ▪ 851-869 MHz Band: 400.0 mWatts/channel (1 Channel) ▪ 851-869 MHz Band: 37.2 mWatts/channel (2 Channels) ▪ 851-869 MHz Band: 31.6 mWatts/channel (3 Channels) ▪ 851-869 MHz Band: 28.2 mWatts/channel (4 Channels)
Maximum Input Power Rating	▪ -34.69 dBm
Operating Frequency Range:	▪ 806-824 MHz and 851-869 MHz
Amplifier 20 dB Bandwidth	▪ 39.0 MHz in 806-824 MHz Band ▪ 37.3 MHz in 851-869 MHz Band
RF Output Impedance:	▪ 50 Ohms
Channel Spacing:	▪ N/A
Emission Designation:	▪ F1D & F3E
Antenna Connector Type:	▪ N
Antenna Description:	▪ User supplied

2.4. LIST OF EUT'S PORTS

Port Number	EUT's Port Description	Number of Identical Ports	Connector Type	Cable Type (Shielded/Non-shielded)
1	Roof-Top Antenna Port	1	Type N	Double shielded coaxial cable
2	In-Building Port	1	Type N	Double shielded coaxial cable
3	AC Adapter power in	1	Mini-plug	Non-shielded

NOTES:

(1) ***Ports of the EUT which in normal operation*** *were connected to ancillary equipment through interconnecting cables via a representative interconnecting cable to simulate the input/output characteristics. RF input/output was correctly terminated to the 50 Ohm RF Load.*

(2) ***Ports which are not connected to cables during normal intended operation*** *(for factory/technical services uses only) None.*

2.5. SPECIAL CHANGES ON THE EUT'S HARDWARE/SOFTWARE FOR TESTING PURPOSES

None

2.6. MODIFICATIONS INCORPORATED IN THE EUT FOR COMPLIANCE PURPOSES

None

2.7. RELATED SUBMITAL(S)/GRANT(S)

None

2.8. ANCILLARY EQUIPMENT

The EUT was tested while connected to the following representative configuration of ancillary equipment necessary to exercise the ports during tests:

No ancillary equipment was required.

EXHIBIT 3. EUT OPERATING CONDITIONS AND CONFIGURATIONS DURING TESTS

3.1. CLIMATE TEST CONDITIONS

The climate conditions of the test environment are as follows:

Temperature:	21°C
Humidity:	51%
Pressure:	102 kPa
Power input source:	120V/230V AC Adapter, 12Vdc Out

3.2. OPERATIONAL TEST CONDITIONS & ARRANGEMENT FOR TEST SIGNALS

Operating Modes:	The transmitter was operated in a continuous transmission mode with the carrier modulated as specified in the Test Data.
Special Test Software:	None
Special Hardware Used:	None
Transmitter Test Antenna:	The EUT is tested with the transmitter antenna port terminated to a 50 Ohm RF Load.

Transmitter Test Signals:	
Frequencies: ▪ 806 - 824 MHz band: ▪ 851 - 869 MHz band:	Near lowest, near middle & near highest frequencies each frequency bands that the transmitter covers: ▪ 806 MHz, 815 MHz and 824 MHz ▪ 851 MHz, 860 MHz and 869 MHz
Maximum Input Test Signals	▪ -34.69 dBm
Transmitter Wanted Output Test Signals: ▪ RF Power Output (measured maximum output power): ▪ Normal Test Modulation ▪ Modulating signal source:	 ▪ 0.43 Watts ▪ Standard Data and Voice FM modulation. ▪ external

3.3. BLOCK DIAGRAM OF TEST SETUP

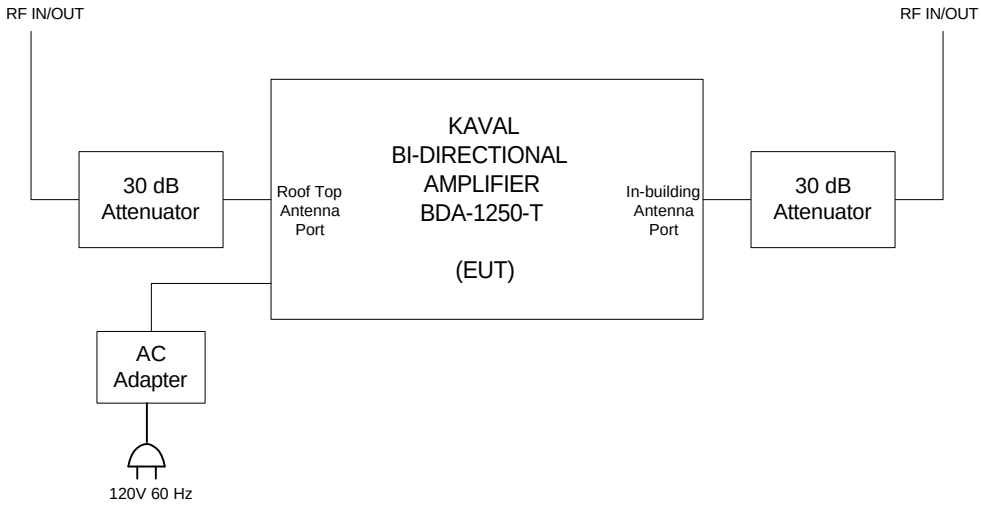


EXHIBIT 4. SUMMARY OF TEST RESULTS

4.1. LOCATION OF TESTS

All of the measurements described in this report were performed at UltraTech Group of Labs located in the city of Oakville, Province of Ontario, Canada.

- 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, 1999.

4.2. APPLICABILITY & SUMMARY OF EMC EMISSION TEST RESULTS

FCC PARAGRAPH.	TEST REQUIREMENTS	APPLICABILITY (YES/NO)
90.205 & 2.985	RF Power Output	Yes
90.213 & 2.995	Frequency Stability	Not applicable for RF Amplifier
90.242(b)(8) & 2.987(a)	Audio Frequency Response	Not applicable for RF Amplifier
90.210 & 2.987(b)	Modulation Limiting	Not applicable for RF Amplifier
90.209, 90.210 & 2.989	Emission Limitation & 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

800 MHz Trunking "Micro" BDA, **Model No.: BDA1250-T**, 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 is on file and is available upon FCC request.

EXHIBIT 5. MEASUREMENTS, EXAMINATIONS & TEST DATA FOR EMC EMISSIONS

5.1. TEST PROCEDURES

This section contains test results only. Details of test methods and procedures can be found in Exhibit 7 of this report

5.2. MEASUREMENT UNCERTAINTIES

The measurement uncertainties stated were calculated in accordance with requirements of UKAS Document NIS 81 with a confidence level of 95%. Please refer to Exhibit 6 for Measurement Uncertainties.

5.3. MEASUREMENT EQUIPMENT USED:

The measurement equipment used complied with the requirements of the Standards referenced in the Methods & Procedures ANSI C63.4:1992 and CISPR 16-1.

5.4. ESSENTIAL/PRIMARY FUNCTIONS AS DECLARED BY THE MANUACTURER:

The BDA is intended to extend Cellular coverage into areas with coverage deficiency such as inside office buildings, shopping malls, etc. It is designed to be located independent of the donor site and must be equipped with its own antenna systems.

5.5. RF POWER OUTPUT, 20DB GAIN BANDWIDTH (BW) & AMPLIFIER GAIN FREQUENCY RESPONSE @ FCC 2.985 & 90.205

5.5.1. Limits @ FCC 90.205

Please refer to FCC CFR 47, Part 90, Subpart I, Para. 90.205 for specification details.

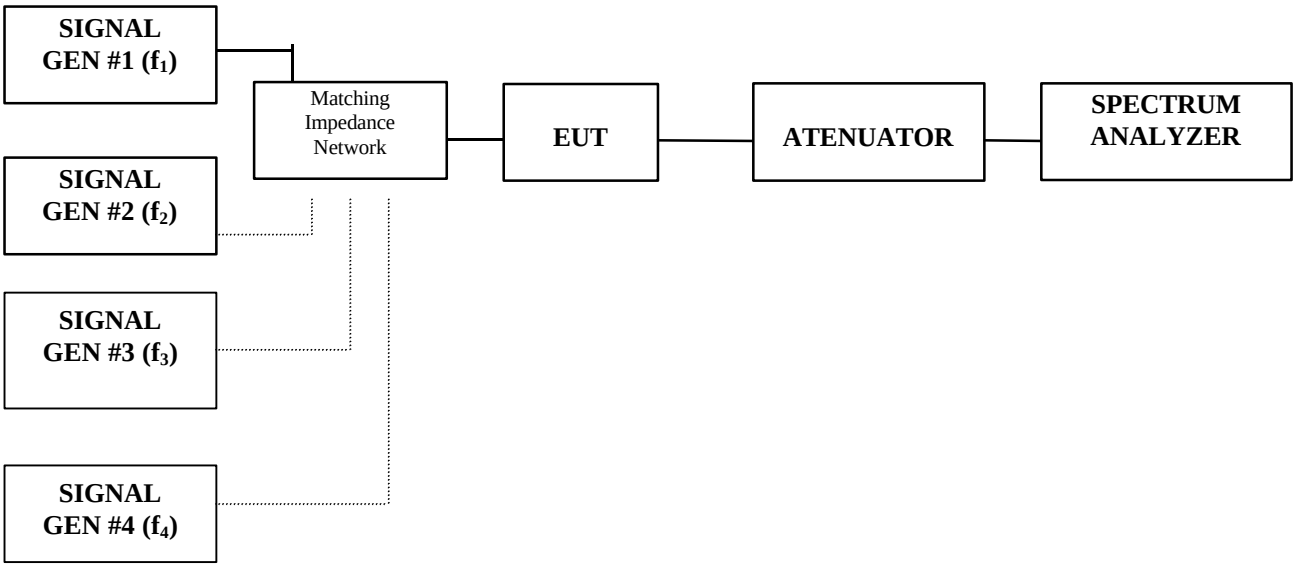
5.5.2. Method of Measurements

(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.

5.5.3. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer/ EMI Receiver	Hewlett Packard	HP 8593EM	3412A00103	9 kHz – 26.5 GHz
Attenuator(s)	Bird	..	…	DC – 22 GHz
Synthesized Signal Generators	Fluke	6061A	….	10 kHz – 1050 MHz, 13 dBm output max.

5.5.4. Test Arrangement



5.5.5. Test data

5.5.5.1. 806-824 MHz Uplink Band

Single Channel Input/Output

	Maximum Input Power (dBm)		Maximum RF Output Level (dBm)		Maximum Gain (dB)	
Channel Frequency (MHz)	Measured	Rating	Measured	Rating	Measured	Rating
806	-34.68	-34.68	24.93	27.78	59.61	60.00
815	-34.68	-34.68	26.34	27.78	61.02	60.00
824	-34.68	-34.68	23.80	27.78	58.50	60.00

Refer to Plots #9 to 11 in Exhibit 8 of this report for details of measurement.

Multiple Channel Input/Output

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	814.975 & 815.025	18.3 (Note 1)	
3	814.950, 815.000 & 815.050	15.9 (Note 1)	
4	814.90, 814.95, 815.00 & 815.05	14.8 (Note 1)	

Refer to Plots #1 to 3 in Exhibit 8 of this report for details of measurement results.

5.5.5.2. 851-869 MHz Downlink Band

Single Channel Input/Output

	Maximum Input Power (dBm)		Maximum RF Output Level (dBm)		Maximum Gain (dB)	
Channel Frequency (MHz)	Measured	Rating	Measured	Rating	Measured	Rating
851	-34.69	-34.69	24.20	27.78	58.90	60.00
860	-34.69	-34.69	26.02	27.78	60.71	60.00
869	-34.69	-34.69	23.90	27.78	58.60	60.00

Refer to Plots #12 to 14 in Exhibit 8 of this report for details of measurement results.

Multiple Channel Input/Output

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	15.7	
3	859.95, 860.00 & 860.05	15.1	
4	859.90, 859.95, 860.00 & 860.05	14.5	

Please refer to plots #4 to #6 in this report for details of measurement results.

5.5.5.3. 20 dB Bandwidth

FREQUENCY BAND	20 dB BANDWIDTH (BW)
806 – 824 MHz	39.03 MHz
851 – 869 MHz	37.28 MHz

Please refer to plots #7 to #10 and #12 and #13 in this report for the data plots of the above measurement data.

5.5.5.4. Gain Vs. Frequency Response Graphs

Please refer to plots #11 and #14 in this report for Amplifier Gain Frequency Response Characteristics of 806 - 824 MHz and 851 - 869 MHz Amplifier Bands.

5.6. EMISSION LIMITATION & EMISSION MASK @ FCC 2.989, 90.209 & 90.910

5.6.1. Limits @ 90.209 & 90.910

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

FREQUENCY RANGE (MHz)	Maximum Authorized BW (kHz)	Channel Spacing (kHz)	Recommended Max. Freq. Deviation (kHz)	FCC APPLICABLE MASK @ FCC 90.210
806-821/ 851-866	20	25	5	MASK B (Voice) & MASK G (Data)

Note 1: See note 4 of 90.209 for non-multilateration and multilateration LMS operations

5.6.2. 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:

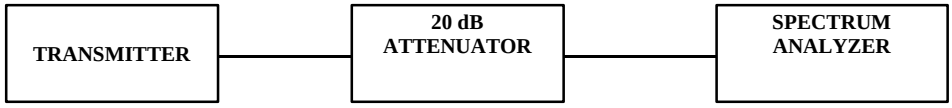
Voice or Digital Modulation Through a Voice Input Port @ 2.989(c)(i):- The transmitter was modulated by a 2.5 kHz tone signal at an input level 16 dB greater than that required to produce 50% modulation (e.g.: ±2.5 kHz peak deviation at 1 kHz modulating frequency). The input level was established at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

5.6.3. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer/ EMI Receiver	Hewlett Packard	HP 8593EM	3412A00103	9 kHz – 26.5 GHz
Attenuator(s)	Bird	..	…	DC – 22 GHz
Audio Oscillator	Hewlett Packard	HP 204C	0989A08798	DC to 1.2 MHz

5.6.4. Test Arrangement



5.6.5. Test 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 #15 to #26 (Mask B) in Exhibit 8 of this report for details of measurement results, and plots #27 to #38 (Mask G) in Exhibit 8 of this report for details of measurement results.

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

5.7.1. Limits @ 90.210

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

FCC RULES	WORST CASE EMISSIONS LIMIT	ATTENUATION LIMIT (dBc)
FCC 90.210 (b) & (g)	-13 dBm	39.3

5.7.2. 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 = 30 kHz minimum , VBW $\geq$ RBW 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.

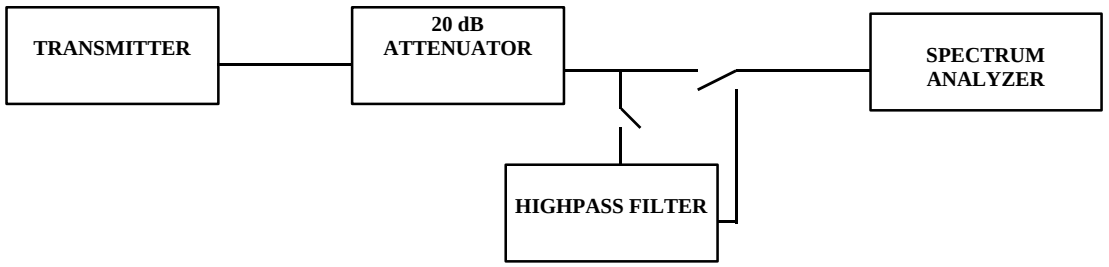
FCC CFR 47, Para. 2.991 - Spurious Emissions at Antenna Terminal:- The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent 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.

5.7.3. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer/ EMI Receiver	Hewlett Packard	HP 8593EM	3412A00103	9 kHz – 26.5 GHz
Attenuator(s)	Bird	..	…	DC – 22 GHz
Audio Oscillator	Hewlett Packard	HP 204C	0989A08798	DC to 1.2 MHz
Highpass Filter, Microphase	Microphase	CR220HID	IITI11000AC	Cut-off Frequency at 600 MHz, 1.3 GHz or 4 GHz

5.7.4. Test Arrangement

- *The transmitter was coupled to the Spectrum Analyzer through a 20 dB attenuator.*
- *The insertion loss between the transmitter output terminal and the spectrum analyzer was measured to be 20 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*



5.7.5. Test Data

5.7.5.1. UPLINK BAND 806-824 MHz

5.7.5.1.1. Near Lowest Frequency (806 MHz)

Fundamental Frequency: 806 MHz
RF Output Power: 0.31 Watts
Modulation: FM modulation with 2.5 kHz Sine Wave Signal

FREQUENCY (MHz)	RF LEVEL 30 kHz BW (dBm)	LIMIT (dBm) Note 1	MARGIN (dB)	PASS/ FAIL
202	-47.34	-13.0	-34.34	PASS
1607	-46.28	-13.0	-33.28	PASS
4836	-44.59	-13.0	-31.59	PASS
5643	-46.78	-13.0	-33.78	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 20 dB below the limits were recorded.

Fundamental Frequency: 806 MHz
RF Output Power: 0.31 Watts
Modulation: FM modulation with 9600b/s internal random data source.

FREQUENCY (MHz)	RF LEVEL 30 kHz BW (dBm)	LIMIT (dBm)	MARGIN (dB)	PASS/ FAIL
1607	-46.31	-13.0	-33.31	PASS
5636	-45.69	-13.0	-32.69	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 20 dB below the limits were recorded.

5.7.5.1.2. Near Middle Frequency (815 MHz)

Fundamental Frequency: 805 MHz
RF Output Power: 0.43 Watts
Modulation: FM modulation with 2.5 kHz Sine Wave Signal

FREQUENCY (MHz)	RF LEVEL 30 kHz BW (dBm)	LIMIT (dBm)	MARGIN (dB)	PASS/ FAIL
1621.0	-45.81	-13.0	-27.81	PASS
6514.0	-45.91	-13.0	-32.91	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 20 dB below the limits were recorded.

Fundamental Frequency: 815 MHz
RF Output Power: 0.43 Watts
Modulation: FM modulation with 9600 b/s internal random data Source.

FREQUENCY (MHz)	RF LEVEL 30 kHz BW (dBm)	LIMIT (dBm)	MARGIN (dB)	PASS/ FAIL
1628.0	-43.28	-13.0	-30.28	PASS
6521.0	-45.75	-13.0	-32.75	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 20 dB below the limits were recorded.

5.7.5.1.3. Near Highest Frequency (824 MHz)

Fundamental Frequency: 824 MHz
RF Output Power: 0.24 Watts
Modulation: FM modulation with 2.5 kHz Sine Wave Signal

FREQUENCY (MHz)	RF LEVEL 30 kHz BW (dBm)	LIMIT (dBm)	MARGIN (dB)	PASS/ FAIL
8657.0	-42.97	-13.0	-29.97	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 20 dB below the limits were recorded.

Fundamental Frequency: 824 MHz
RF Output Power: 0.24 Watts
Modulation: FM modulation with 9600 b/s internal random data source.

FREQUENCY (MHz)	RF LEVEL 30 kHz BW (dBm)	LIMIT (dBm)	MARGIN (dB)	PASS/ FAIL
1642.0	-43.31	-13.0	-30.31	PASS
8664.0	-43.59	-13.0	-30.59	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 20 dB below the limits were recorded.

Please refer to plots #39 to #44 in exhibit 8 of this report for details on the above test data.

5.7.5.2. DOWNLINK BAND 851-869 MHz

5.7.5.2.1. Near Lowest Frequency (851 MHz)

Fundamental Frequency: 851 MHz
RF Output Power: 0.26 Watts
Modulation: FM modulation with 2.5 kHz Sine Wave Signal

FREQUENCY (MHz)	RF LEVEL 30 kHz BW (dBm)	LIMIT (dBm)	MARGIN (dB)	PASS/ FAIL
1707.0	-41.44	-13.0	-28.44	PASS
2555.0	-29.63	-13.0	-17.63	PASS
4252.0	-27.09	-13.0	-14.09	PASS
5100.0	-35.56	-13.0	-22.56	PASS
5957.0	-28.63	-13.0	-15.63	PASS
6807.0	-27.34	-13.0	-14.34	PASS
7664.0	-28.88	-13.0	-15.88	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 20 dB below the limits were recorded.

Fundamental Frequency: 851 MHz
RF Output Power: 0.26 Watts
Modulation: FM modulation with 9600 b/s internal random data source.

FREQUENCY (MHz)	RF LEVEL 30 kHz BW (dBm)	LIMIT (dBm)	MARGIN (dB)	PASS/ FAIL
1707.0	-41.44	-13.0	-28.44	PASS
2555.0	-29.63	-13.0	-16.63	PASS
4252.0	-27.09	-13.0	-14.09	PASS
5100.0	-34.94	-13.0	-21.94	PASS
5957.0	-27.53	-13.0	-14.53	PASS
6814.0	-30.28	-13.0	-17.28	PASS
7671.0	-30.47	-13.0	-17.47	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 20 dB below the limits were recorded.

5.7.5.2.2. Near Middle Frequency (860 MHz)

Fundamental Frequency: 860 MHz
RF Output Power: 0.40 Watts
Modulation: FM modulation with 2.5 kHz Sine Wave Signal

FREQUENCY (MHz)	RF LEVEL 30 kHz BW (dBm)	LIMIT (dBm)	MARGIN (dB)	PASS/ FAIL
1714.0	-39.25	-13.0	-26.25	PASS
2576.0	-23.78	-13.0	-10.78	PASS
4294.0	-24.06	-13.0	-11.06	PASS
5157.0	-34.19	-13.0	-21.19	PASS
6021.0	-27.91	-13.0	-14.91	PASS
6879.0	-23.19	-13.0	-10.19	PASS
7750.0	-26.63	-13.0	-13.63	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 20 dB below the limits were recorded.

Fundamental Frequency: 851 MHz
RF Output Power: 0.40 Watts
Modulation: FM modulation with 9600 b/s internal random data Source.

FREQUENCY (MHz)	RF LEVEL 30 kHz BW (dBm)	LIMIT (dBm)	MARGIN (dB)	PASS/ FAIL
1714.0	-38.16	-13.0	-25.16	PASS
2576.0	-23.91	-13.0	-10.91	PASS
4294.0	-24.75	-13.0	-11.75	PASS
5157.0	-36.97	-13.0	-13.97	PASS
6014.0	-26.50	-13.0	-13.50	PASS
6879.0	-23.28	-13.0	-10.28	PASS
7750.0	-26.34	-13.0	-13.34	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 20 dB below the limits were recorded.

5.7.5.2.3. Near Highest Frequency (869 MHz)

Fundamental Frequency: 869 MHz
RF Output Power: 0.25 Watts
Modulation: FM modulation with 2.5 kHz Sine Wave Signal

FREQUENCY (MHz)	RF LEVEL 30 kHz BW (dBm)	LIMIT (dBm) Note 1	MARGIN (dB)	PASS/ FAIL
1735.0	-42.75	-13.0	-29.75	PASS
2605.0	-29.66	-13.0	-16.66	PASS
4337.0	-22.56	-13.0	-9.56	PASS
5207.0	-36.53	-13.0	-23.53	PASS
6079.0	-28.56	-13.0	-15.56	PASS
6950.0	-34.97	-13.0	-21.97	PASS
7829.0	-29.94	-13.0	-16.94	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 20 dB below the limits were recorded.

Fundamental Frequency: 869 MHz
RF Output Power: 0.25 Watts
Modulation: FM modulation with 9600 b/s internal random data source.

FREQUENCY (MHz)	RF LEVEL 30 kHz BW (dBm)	LIMIT (dBm) Note 1	MARGIN (dB)	PASS/ FAIL
1735.0	-41.63	-13.0	-28.63	PASS
2605.0	-27.69	-13.0	-14.69	PASS
4337.0	-23.16	-13.0	-10.16	PASS
5207.0	-35.72	-13.0	-22.72	PASS
6079.0	-27.31	-13.0	-14.31	PASS
6950.0	-38.03	-13.0	-25.03	PASS
7829.0	-30.28	-13.0	-17.28	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 20 dB below the limits were recorded.

Please refer to plots #45 to #50 in exhibit 8 of this report for details on the above test data.

5.7.5.3. UPLINK BAND 806-824 MHz

RF Input/Output Frequencies: 814.975 & 815.025 MHz (2 in/out channels)
RF Power Output: 67.6 mW
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)**	**MARGIN (dB)**	**PASS/ FAIL**
202.0	-46.59	-13.0	-33.59	PASS
1621.0	-44.59	-13.0	-31.59	PASS
6514.0	-35.31	-13.0	-22.31	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 20 dB below the limits were recorded.

RF Input/Output Frequencies: 814.95 & 815.00 & 815.05 MHz (3 in/out channels)
RF Power Output: 38.9 mW
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)**	**MARGIN (dB)**	**PASS/ FAIL**
1628.0	-46.56	-13.0	-33.56	PASS
6514.0	-40.81	-13.0	-27.81	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 20 dB below the limits were recorded.

RF Input/Output Frequencies: 814.90 & 814.95 & 815.00 & 815.05 MHz (4 in/out channels)
RF Power Output: 30.2 mW
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)**	**MARGIN (dB)**	**PASS/ FAIL**
210.0	-48.03	-13.0	-35.03	PASS
1628.0	-44.88	-13.0	-31.88	PASS
6514.0	-41.59	-13.0	-28.59	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 20 dB below the limits were recorded.

Please refer to plots #51 to #53 for measurement plots of the above test data.

5.7.5.4. DOWNLINK BAND 851-869 MHz

RF Input/Output Frequencies: 859.975 & 860.025 MHz (2 in/out channels)
RF Power Output: 400 mW
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)**	**MARGIN (dB)**	**PASS/ FAIL**
1714.0	-40.69	-13.0	-27.69	PASS
2583.0	-25.84	-13.0	-12.84	PASS
4301.0	-22.88	-13.0	-9.88	PASS
5157.0	-25.78	-13.0	-12.78	PASS
6014.0	-31.00	-13.0	-18.00	PASS
6879.0	-29.88	-13.0	-16.88	PASS
7750.0	-23.47	-13.0	-10.47	PASS
8607.0	-40.19	-13.0	-27.19	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 20 dB below the limits were recorded.

RF Input/Output Frequencies: 814.95 & 815.00 & 815.05 MHz (3 in/out channels)
RF Power Output: 37.2 mW
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)**	**MARGIN (dB)**	**PASS/ FAIL**
1714.0	-40.69	-13.0	-27.69	PASS
2583.0	-26.50	-13.0	-13.50	PASS
4301.0	-18.88	-13.0	-5.88	PASS
5157.0	-27.06	-13.0	-14.06	PASS
6014.0	-27.53	-13.0	-14.53	PASS
6886.0	-31.00	-13.0	-18.00	PASS
7750.0	-27.06	-13.0	-14.06	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 20 dB below the limits were recorded.

RF Input/Output Frequencies: 814.90 & 814.95 & 815.00 & 815.05 MHz (4 in/out channels)
RF Power Output: 28.2 mW
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)**	**MARGIN (dB)**	**PASS/ FAIL**
1714.0	-42.25	-13.0	-29.25	PASS
2576.0	-26.44	-13.0	-13.44	PASS
4294.0	-15.59	-13.0	-2.59	PASS
5157.0	-26.72	-13.0	-13.72	PASS
6021.0	-24.91	-13.0	-11.91	PASS
6879.0	-22.38	-13.0	-9.38	PASS
7750.0	-24.47	-13.0	-11.47	PASS
8607.000	-39.00	-13.0	-26.00	PASS

The emissions were scanned from 10 MHz to 10 GHz and all emissions less 30 dB below the limits were recorded.

Please refer to plots #54 to #56 for measurement plots of the above test data.

5.8. TRANSMITTER SPURIOUS/HARMONIC RADIATED EMISSIONS @ FCC 90.210

5.8.1. Limits @ FCC 90.210

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

FCC RULES	WORST CASE EMISSIONS LIMIT	ATTENUATION LIMIT (dBc)
FCC 90.210 (b) & (g)	-13 dBm	39.3

5.8.2. Method of Measurements

Please refer to the Exhibit 7 of this test report and ANSI C63-4:1992 for radiated emissions test method.

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 minimum , VBW $\geq$ RBW 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 (dBμV/m):

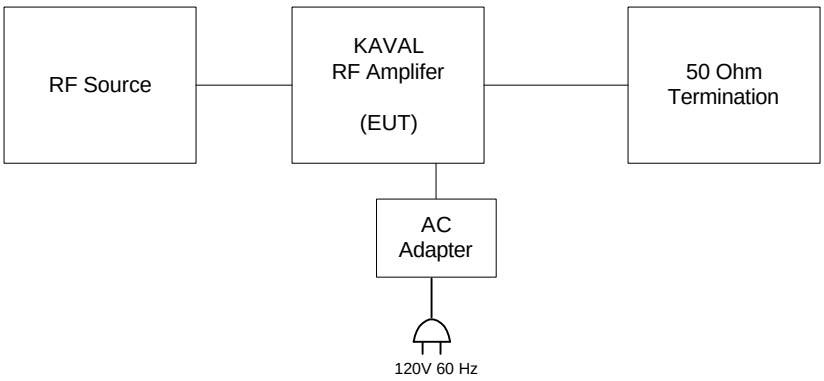
$P(W) = [E(V/m)xD/7.01]^2$
$P(mW) = P(W)x1000$
=> $P(dBm) = 10logP(mW)$
$= 20logE(V/m) + 20log(D) - 20log(7.01) + 10log1000$
$= E(dBV/m) + 20logD + 13$
$= E(dB\mu V/m) - 120 + 20log(D) + 13$
$= E(dB\mu V/m) + 20log(D) - 107$

The Transmitted Power @ D = 3 Meters

$P(dBm) = E(dB\mu V/m) - 97.5$

5.8.3. Test Arrangement

The following drawing show details of the test setup for radiated emissions measurements



5.8.4. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer/ EMI Receiver	Advantest	R3271	15050203	100 Hz to 32 GHz with external mixer for frequency above 32 GHz
Microwave Amplifier	Hewlett Packard	HP 83017A		1 GHz to 26.5 GHz
Active Loop Antenna	EMCO	6507	8906-1167	1 kHz – 30 MHz
Biconilog Antenna	EMCO	3143	1029	20 MHz to 2 GHz
Horn Antenna	EMCO	3155	9701-5061	1 GHz – 18 GHz
Horn Antenna	EMCO	3160-09	..	18 GHz – 26.5 GHz
Horn Antenna	EMCO	3160-10	..	26.5 GHz – 40 GHz
Mixer	Tektronix	118-0098-00	..	18 GHz – 26.5 GHz
Mixer	Tektronix	119-0098-00	..	26.5 GHz – 40 GHz

5.8.5. Test Data

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.

5.8.5.1. UPLINK BAND 806-824 MHz

5.8.5.1.1. Near Lowest Frequency (806 MHz)

Fundamental Frequency: 806 MHz
RF Output Power: 0.31 Watts
Modulation: FM modulation with 2.5 kHz Sine Wave Signal

FREQUENCY (MHz)	RF Field Strength Level (dBuV/m)	RF Power Level (dBm)	DETECTOR USED (PEAK/QP)	ANTENNA PLANE (H/V)	LIMIT (dBm)	MARGIN (dB)	PASS/ FAIL
1612.00	68.1	-29.4	PEAK	V	-13.0	-16.4	PASS
1612.00	56.6	-40.9	PEAK	H	-13.0	-27.9	PASS
2418.00	67.2	-30.3	PEAK	V	-13.0	-17.3	PASS
2418.00	62.0	-35.5	PEAK	H	-13.0	-22.5	PASS
3224.00	69.5	-28.0	PEAK	V	-13.0	-15.0	PASS
3224.00	66.4	-31.1	PEAK	H	-13.0	-18.1	PASS
4030.00	64.8	-32.7	PEAK	V	-13.0	-19.7	PASS
4030.00	61.5	-36.0	PEAK	H	-13.0	-23.0	PASS
4836.00	56.3	-41.2	PEAK	V	-13.0	-28.2	PASS
4836.00	55.4	-42.1	PEAK	H	-13.0	-29.1	PASS
5642.00	61.1	-36.4	PEAK	V	-13.0	-23.4	PASS
5642.00	61.2	-36.3	PEAK	H	-13.0	-23.3	PASS
6448.00	57.4	-40.1	PEAK	V	-13.0	-27.1	PASS
6448.00	59.1	-38.4	PEAK	H	-13.0	-25.4	PASS
7254.00	56.2	-41.3	PEAK	V	-13.0	-28.3	PASS
7254.00	55.7	-41.8	PEAK	H	-13.0	-28.8	PASS
8060.00	58.0	-39.5	PEAK	V	-13.0	-26.5	PASS
8060.00	58.3	-39.2	PEAK	H	-13.0	-26.2	PASS

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

5.8.5.1.2. Near Middle Frequency (815 MHz)

Fundamental Frequency: 815 MHz
RF Output Power: 0.43 Watts
Modulation: FM modulation with 9600 b/s internal random data source

FREQUENCY (MHz)	RF Field Strength Level (dBuV/m)	RF Power Level (dBm)	DETECTOR USED (PEAK/QP)	ANTENNA PLANE (H/V)	LIMIT (dBm)	MARGIN (dB)	PASS/ FAIL
1630.00	66.0	-31.5	PEAK	V	-13.0	-18.5	PASS
1630.00	57.6	-39.9	PEAK	H	-13.0	-26.9	PASS
2445.00	64.7	-32.8	PEAK	V	-13.0	-19.8	PASS
2445.00	60.6	-36.9	PEAK	H	-13.0	-23.9	PASS
3260.00	68.4	-29.1	PEAK	V	-13.0	-16.1	PASS
3260.00	66.5	-31.0	PEAK	H	-13.0	-18.0	PASS
4075.00	62.5	-35.0	PEAK	V	-13.0	-22.0	PASS
4075.00	57.7	-39.8	PEAK	H	-13.0	-26.8	PASS
4890.00	55.5	-42.0	PEAK	V	-13.0	-29.0	PASS
4890.00	53.9	-43.6	PEAK	H	-13.0	-30.6	PASS
5705.00	62.3	-35.2	PEAK	V	-13.0	-22.2	PASS
5705.00	63.6	-33.9	PEAK	H	-13.0	-20.9	PASS
6520.00	55.9	-41.6	PEAK	V	-13.0	-28.6	PASS
6520.00	55.6	-41.9	PEAK	H	-13.0	-28.9	PASS
7335.00	53.3	-44.2	PEAK	V	-13.0	-31.2	PASS
7335.00	52.0	-45.5	PEAK	H	-13.0	-32.5	PASS
8150.00	58.9	-38.6	PEAK	V	-13.0	-25.6	PASS
8150.00	60.1	-37.4	PEAK	H	-13.0	-24.4	PASS

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

5.8.5.1.3. Near Highest Frequency (824 MHz)

Fundamental Frequency: 824 MHz
RF Output Power: 0.24 Watts
Modulation: FM modulation with 2.5 kHz Sine Wave Signal

FREQUENCY (MHz)	RF Field Strength Level (dBuV/m)	RF Power Level (dBm)	DETECTOR USED (PEAK/QP)	ANTENNA PLANE (H/V)	LIMIT (dBm)	MARGIN (dB)	PASS/ FAIL
1648.00	62.6	-34.9	PEAK	V	-13.0	-21.9	PASS
1648.00	54.4	-43.1	PEAK	H	-13.0	-30.1	PASS
2472.00	60.6	-36.9	PEAK	V	-13.0	-23.9	PASS
2472.00	58.4	-39.1	PEAK	H	-13.0	-26.1	PASS
3296.00	62.5	-35.0	PEAK	V	-13.0	-22.0	PASS
3296.00	61.8	-35.7	PEAK	H	-13.0	-22.7	PASS
4120.00	57.1	-40.4	PEAK	V	-13.0	-27.4	PASS
4120.00	57.2	-40.3	PEAK	H	-13.0	-27.3	PASS
4944.00	54.5	-43.0	PEAK	V	-13.0	-30.0	PASS
4944.00	55.3	-42.2	PEAK	H	-13.0	-29.2	PASS
5768.00	56.2	-41.3	PEAK	V	-13.0	-28.3	PASS
5768.00	58.3	-39.2	PEAK	H	-13.0	-26.2	PASS
6592.00	52.3	-45.2	PEAK	V	-13.0	-32.2	PASS
6592.00	54.9	-42.6	PEAK	H	-13.0	-29.6	PASS
7416.00	53.8	-43.7	PEAK	V	-13.0	-30.7	PASS
7416.00	56.7	-40.8	PEAK	H	-13.0	-27.8	PASS
8240.00	56.5	-41.0	PEAK	V	-13.0	-28.0	PASS
8240.00	56.5	-41.0	PEAK	H	-13.0	-28.0	PASS

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

5.8.5.2. DOWNLINK BAND 851-869 MHz

5.8.5.2.1. Near Lowest Frequency (851 MHz)

Fundamental Frequency: 851 MHz
RF Output Power: 0.26 Watts
Modulation: FM modulation with 2.5 kHz Sine Wave Signal

FREQUENCY (MHz)	RF Field Strength Level (dBuV/m)	RF Power Level (dBm)	DETECTOR USED (PEAK/QP)	ANTENNA PLANE (H/V)	LIMIT (dBm)	MARGIN (dB)	PASS/ FAIL
1702.00	60.8	-36.7	PEAK	V	-13.0	-23.7	PASS
1702.00	50.3	-47.2	PEAK	H	-13.0	-34.2	PASS
2553.00	71.9	-25.6	PEAK	V	-13.0	-12.6	PASS
2553.00	68.1	-29.4	PEAK	H	-13.0	-16.4	PASS
3404.00	70.8	-26.7	PEAK	V	-13.0	-13.7	PASS
3404.00	71.1	-26.4	PEAK	H	-13.0	-13.4	PASS
4255.00	51.3	-46.2	PEAK	V	-13.0	-33.2	PASS
4255.00	50.7	-46.8	PEAK	H	-13.0	-33.8	PASS
5106.00	57.2	-40.3	PEAK	V	-13.0	-27.3	PASS
5106.00	61.0	-36.5	PEAK	H	-13.0	-23.5	PASS
5957.00	61.5	-36.0	PEAK	V	-13.0	-23.0	PASS
5957.00	62.9	-34.6	PEAK	H	-13.0	-21.6	PASS
6808.00	53.1	-44.4	PEAK	V	-13.0	-31.4	PASS
6808.00	53.5	-44.0	PEAK	H	-13.0	-31.0	PASS
7659.00	56.7	-40.8	PEAK	V	-13.0	-27.8	PASS
7659.00	58.5	-39.0	PEAK	H	-13.0	-26.0	PASS
8510.00	59.8	-37.7	PEAK	V	-13.0	-24.7	PASS
8510.00	60.5	-37.0	PEAK	H	-13.0	-24.0	PASS

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

5.8.5.2.2. Near Middle Frequency (860 MHz)

Fundamental Frequency: 860 MHz
RF Output Power: 0.40 Watts
Modulation: FM modulation with 2.5 kHz Sine Wave Signal

FREQUENCY (MHz)	RF Field Strength Level (dBuV/m)	RF Power Level (dBm)	DETECTOR USED (PEAK/QP)	ANTENNA PLANE (H/V)	LIMIT (dBm)	MARGIN (dB)	PASS/ FAIL
1720.00	60.3	-37.2	PEAK	V	-13.0	-24.2	PASS
1720.00	55.3	-42.2	PEAK	H	-13.0	-29.2	PASS
2580.00	69.1	-28.4	PEAK	V	-13.0	-15.4	PASS
2580.00	66.2	-31.3	PEAK	H	-13.0	-18.3	PASS
3440.00	71.8	-25.7	PEAK	V	-13.0	-12.7	PASS
3440.00	72.2	-25.3	PEAK	H	-13.0	-12.3	PASS
4300.00	52.4	-45.1	PEAK	V	-13.0	-32.1	PASS
4300.00	53.9	-43.6	PEAK	H	-13.0	-30.6	PASS
5160.00	55.3	-42.2	PEAK	V	-13.0	-29.2	PASS
5160.00	59.1	-38.4	PEAK	H	-13.0	-25.4	PASS
6020.00	60.8	-36.7	PEAK	V	-13.0	-23.7	PASS
6020.00	61.4	-36.1	PEAK	H	-13.0	-23.1	PASS
6880.00	50.4	-47.1	PEAK	V	-13.0	-34.1	PASS
6880.00	52.7	-44.8	PEAK	H	-13.0	-31.8	PASS
7740.00	60.1	-37.4	PEAK	V	-13.0	-24.4	PASS
7740.00	61.6	-35.9	PEAK	H	-13.0	-22.9	PASS
8600.00	60.9	-36.6	PEAK	V	-13.0	-23.6	PASS
8600.00	63.0	-34.5	PEAK	H	-13.0	-21.5	PASS

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

5.8.5.2.3. Near Highest Frequency (869 MHz)

Fundamental Frequency: 869 MHz
RF Output Power: 0.25 Watts
Modulation: FM modulation with 2.5 kHz Sine Wave Signal

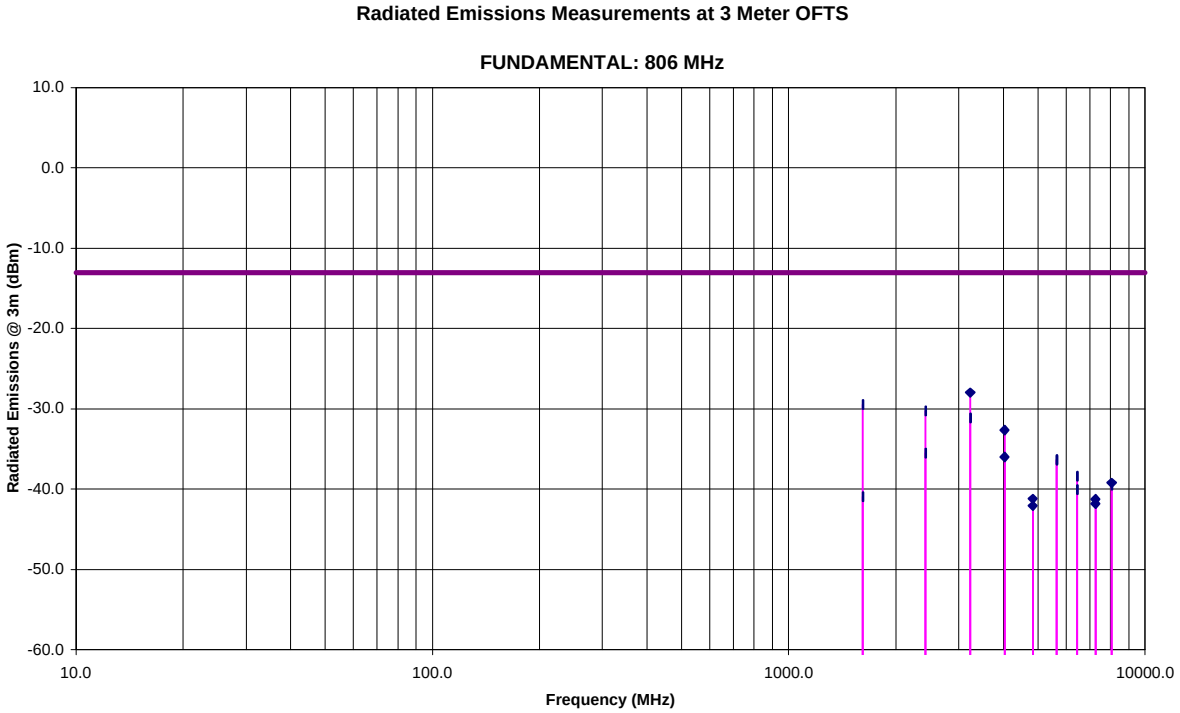
FREQUENCY (MHz)	RF Field Strength Level (dBuV/m)	RF Power Level (dBm)	DETECTOR USED (PEAK/QP)	ANTENNA PLANE (H/V)	LIMIT (dBm)	MARGIN (dB)	PASS/ FAIL
1738.00	64.6	-32.9	PEAK	V	-13.0	-19.9	PASS
1738.00	57.4	-40.1	PEAK	H	-13.0	-27.1	PASS
2607.00	67.2	-30.3	PEAK	V	-13.0	-17.3	PASS
2607.00	63.1	-34.4	PEAK	H	-13.0	-21.4	PASS
3476.00	65.9	-31.6	PEAK	V	-13.0	-18.6	PASS
3476.00	66.2	-31.3	PEAK	H	-13.0	-18.3	PASS
4345.00	51.8	-45.7	PEAK	V	-13.0	-32.7	PASS
4345.00	50.0	-47.5	PEAK	H	-13.0	-34.5	PASS
5214.00	52.1	-45.4	PEAK	V	-13.0	-32.4	PASS
5214.00	54.9	-42.6	PEAK	H	-13.0	-29.6	PASS
6083.00	57.4	-40.1	PEAK	V	-13.0	-27.1	PASS
6083.00	59.2	-38.3	PEAK	H	-13.0	-25.3	PASS
6952.00	51.7	-45.8	PEAK	V	-13.0	-32.8	PASS
6952.00	50.4	-47.1	PEAK	H	-13.0	-34.1	PASS
7821.00	58.0	-39.5	PEAK	V	-13.0	-26.5	PASS
7821.00	59.4	-38.1	PEAK	H	-13.0	-25.1	PASS
8690.00	57.1	-40.4	PEAK	V	-13.0	-27.4	PASS
8690.00	57.2	-40.3	PEAK	H	-13.0	-27.3	PASS

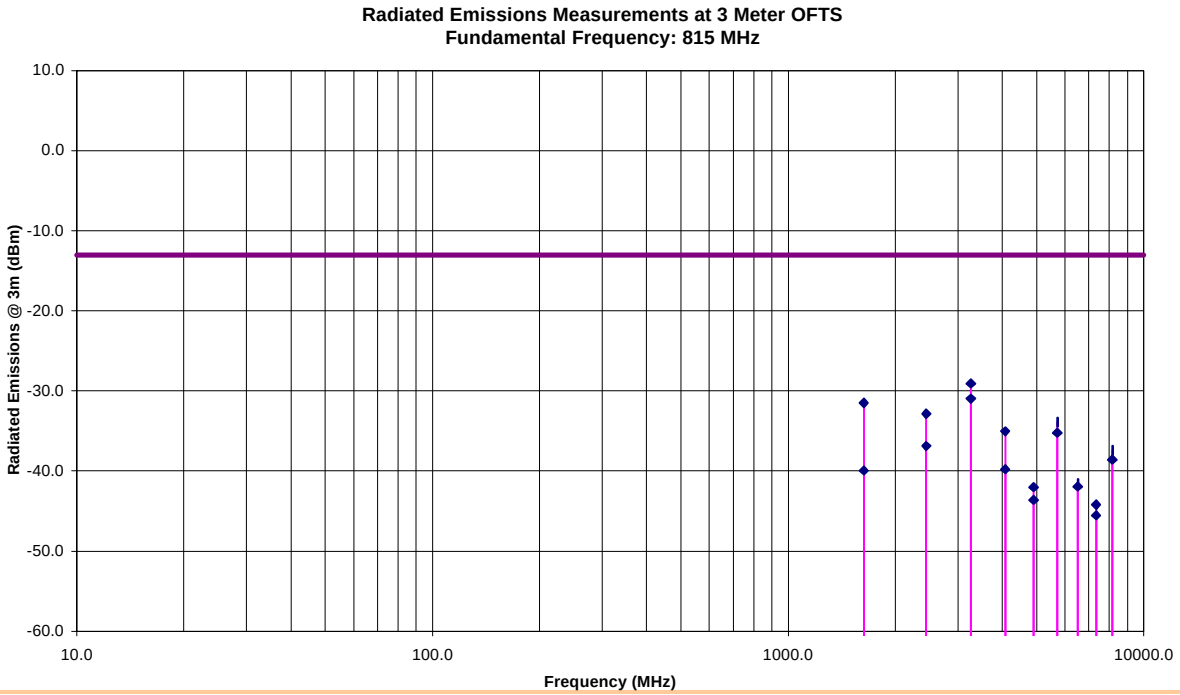
The emissions were scanned from 10 MHz to 10 GHz and all emissions less 40 dB below the limits were recorded.

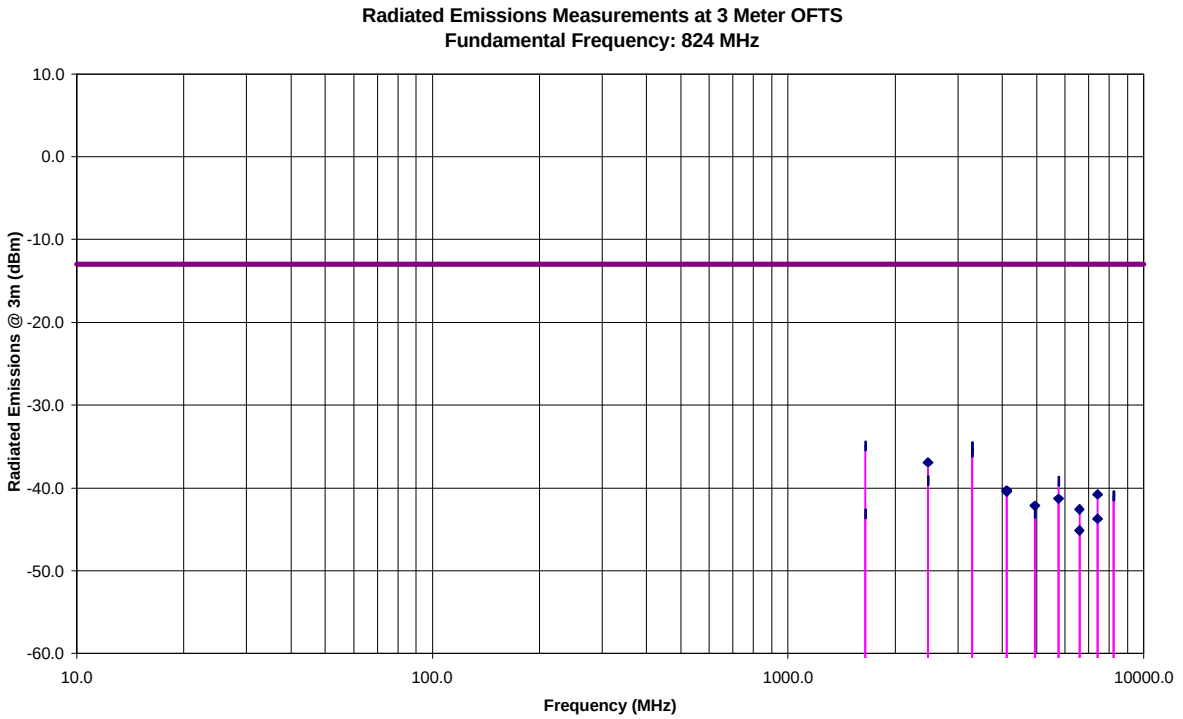
5.8.6. Plots

The following plots graphically represent the test results recorded in the above Test Data Table.

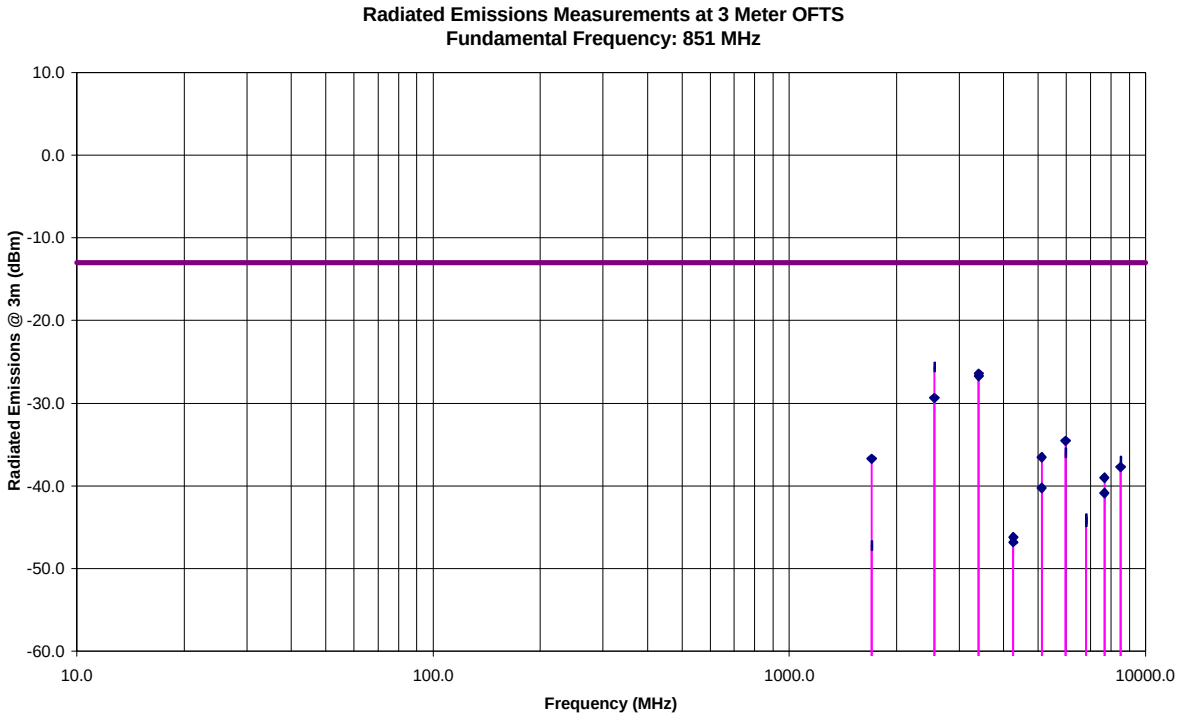
UPLINK BAND 806-824 MHz



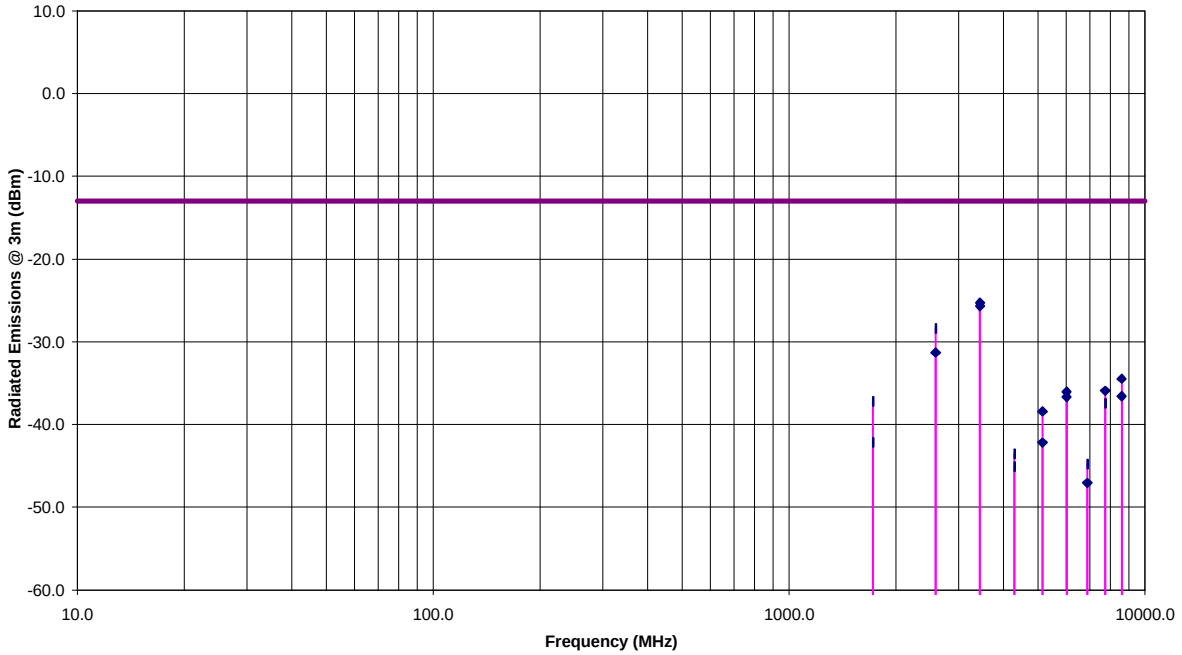




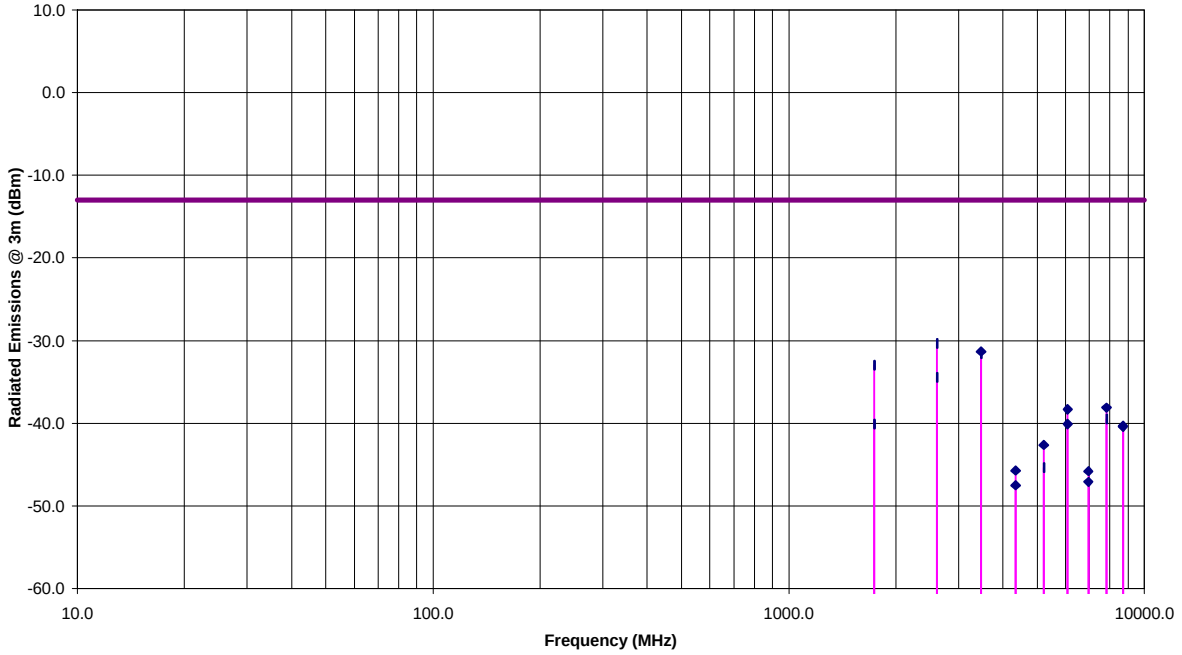
DOWNLINK BAND 851-869 MHz



Radiated Emissions Measurements at 3 Meter OFTS
Fundamental Frequency: 860 MHz



Radiated Emissions Measurements at 3 Meter OFTS
Fundamental Frequency: 869 MHz



5.8.7. Photographs of Test Setup

The following is a photograph of the test setup for radiated emissions measurements

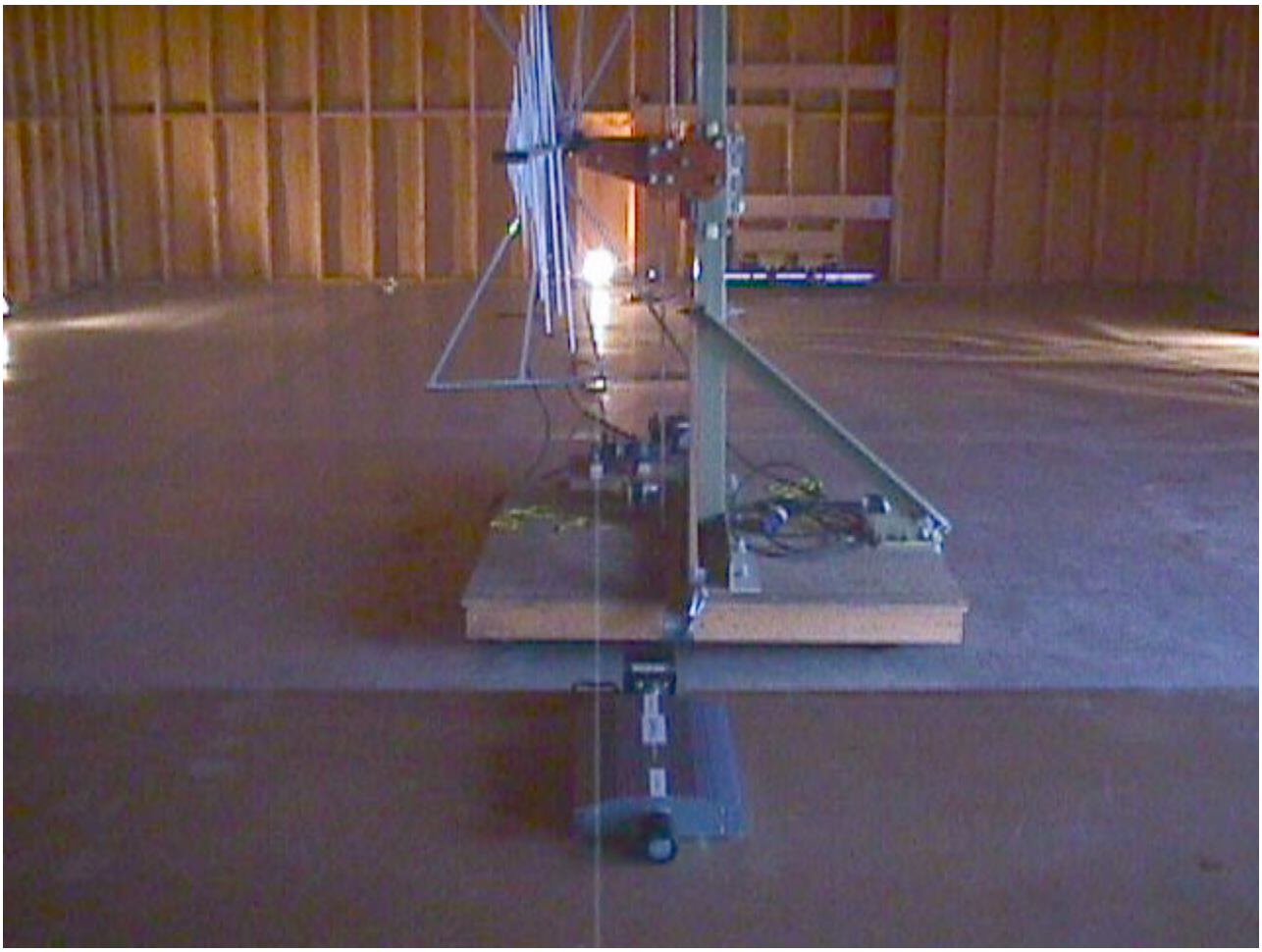


EXHIBIT 6. MEASUREMENT UNCERTAINTY

The measurement uncertainties stated were calculated in accordance with the requirements of NIST Technical Note 1297 and NIS 81 (1994)

6.1. LINE CONDUCTED EMISSION MEASUREMENT UNCERTAINTY

CONTRIBUTION (Line Conducted)	PROBABILITY DISTRIBUTION	UNCERTAINTY (dB)	
		9-150 kHz	0.15-30 MHz
EMI Receiver specification	Rectangular	±1.5	±1.5
LISN coupling specification	Rectangular	±1.5	±1.5
Cable and Input Transient Limiter calibration	Normal (k=2)	±0.3	±0.5
Mismatch: Receiver VRC Γ_1 = 0.03 LISN VRC Γ_R = 0.8(9 kHz) 0.2 (30 MHz) Uncertainty limits 20Log(1±$\Gamma_1\Gamma_R$)	U-Shaped	±0.2	±0.3
System repeatability	Std. deviation	±0.2	±0.05
Repeatability of EUT	--	--	--
Combined standard uncertainty	Normal	±1.25	±1.30
Expanded uncertainty U	Normal (k=2)	±2.50	±2.60

Sample Calculation for Measurement Accuracy in 150 kHz to 30 MHz Band:

$u_c(y) = \sqrt{\sum_{I=1}^{m} u_i^2(y)} = \pm \sqrt{(1.5^2 + 1.5^2)/3 + (0.5/2)^2 + (0.05/2)^2 + 0.35^2} = \pm 1.30$ dB

$U = 2u_c(y) = \pm 2.6$ dB

6.2. RADIATED EMISSION MEASUREMENT UNCERTAINTY

CONTRIBUTION (Radiated Emissions)	PROBABILITY DISTRIBUTION	UNCERTAINTY (± dB)	
		3 m	10 m
Antenna Factor Calibration	Normal (k=2)	±1.0	±1.0
Cable Loss Calibration	Normal (k=2)	±0.3	±0.5
EMI Receiver specification	Rectangular	±1.5	±1.5
Antenna Directivity	Rectangular	+0.5	+0.5
Antenna factor variation with height	Rectangular	±2.0	±0.5
Antenna phase center variation	Rectangular	0.0	±0.2
Antenna factor frequency interpolation	Rectangular	±0.25	±0.25
Measurement distance variation	Rectangular	±0.6	±0.4
Site imperfections	Rectangular	±2.0	±2.0
Mismatch: Receiver VRC Γ_1 = 0.2 Antenna VRC Γ_R = 0.67(Bi) 0.3 (Lp) Uncertainty limits 20Log(1±$\Gamma_1\Gamma_R$)	U-Shaped	+1.1 -1.25	±0.5
System repeatability	Std. Deviation	±0.5	±0.5
Repeatability of EUT		-	-
Combined standard uncertainty	Normal	+2.19 / -2.21	+1.74 / -1.72
Expanded uncertainty U	Normal (k=2)	+4.38 / -4.42	+3.48 / -3.44

Calculation for maximum uncertainty when 3m biconical antenna including a factor of k=2 is used:

$U = 2u_c(y) = 2x(+2.19) = +4.38$ dB And $U = 2u_c(y) = 2x(-2.21) = -4.42$ dB

EXHIBIT 7. MEASUREMENT METHODS

7.1. GENERAL TEST CONDITIONS

7.1.1. Test Conditions

- The measurement shall be made in the operational mode producing the largest emission in the frequency band being investigated consistent with normal applications.
- An attempt shall be made to maximize the detected radiated emissions, for example moving cables of the equipment, rotating the equipment by 360^{o} and moving the measuring receiving antenna up and down within 1 to 4 meters high.
- Where appropriate, a single tone or a bit stream shall be used to modulate the transmitter. The manufacturer shall define the modulation with the highest emission in transmit mode.

7.1.2. Method of Measurements - AC Mains Conducted Emissions

- AC Mains conducted emissions measurements were performed in accordance with the standard against appropriate limits for each detector function.
- The test was performed in the shielded room, 16'(L) by 16'(W) by 12'(H).
- The test was performed were made over the frequency range from 150 kHz to 30 MHz to determine the line-to-ground radio noise voltage which was conducted from the EUT power-input terminals that were directly connected to a public power network.
- The EUT normally received power from another device that connects to the public utility ac power lines, measurements would be made on that device with the EUT in operation to ensure that the device continues to comply with the appropriate limits while providing the EUT with power.
- If the EUT operates only from internal or dedicated batteries, with no provisions for connection to the public utility ac power lines, AC Mains conducted measurements are not required.
- Table-top devices were placed on a platform of nominal size 1 m by 1.5m raised 80 cm above the conducting ground plane.
- The EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN to the power source. All unused 50-Ohm connectors of the LISN was terminated in 50-ohm when not connected to the measuring instruments.
- The line cord of the EUT connected to one LISN which was connected to the measuring instrument. Those power cords for the units of devices not under measurement were connected to a separate multiple ac outlet through a second LISN. Drawings and photographs of typically conducted emission test setups were shown in the Test Report. Each current-carrying conductor of the EUT shall be individually tested.
- The EUT was normally operated with a ground (safety) connection, the EUT was connected to the ground at the LISN through a conductor provided in the lead from the ac power mains to the LISN.
- The excess length of the power cord was folded back and forth in an 8-shape on a wooden strip with a vertical prong located on the top of the LISN case.
- The EUT was set-up in its typical configuration and operated in its various modes as described in 3.2 of the test report.
- A preliminary scan was made by using spectrum analyzer system with the detector function set to PEAK mode (9 kHz RBW, VBW > RBW), frequency span 150 kHz - 30MHz.

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

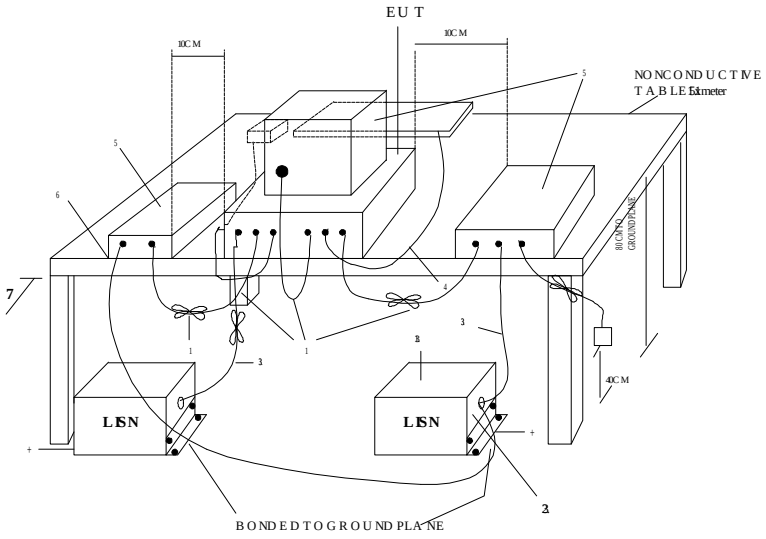
  Step1. Monitor the frequency range of interest at a fixed EUT azimuth.

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

Step3. The effects of various modes of operation is examined. This is done by varying equipment operation modes as step 2 is being performed.

Step4. After completing step 1 through 3, record EUT and peripheral device configuration, mode of operation, cable configuration, signal levels and frequencies for final test.

- Each highest signal level at the maximized test configuration was zoomed in a small frequency span on the spectrum analyzer's display (the manipulation of cables and peripheral devices and EUT operation modes might have to be repeated to obtain the highest signal level with the spectrum analyzer set to PEAK detector mode 9 KHz RBW and VBW > RBW). The spectrum analyzer was then set to CISPR QUASI-PEAK detector mode (9 KHz RBW, 1 MHz VBW) and AVERAGE detector mode (9 kHz RBW, 1 MHz VBW). The final highest RF signal levels and frequencies were record.



+ LISNs may have to be moved to the side to meet 3a below

LEGEND:

1. The connecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth forming a bundle 30 to 40 cm long hanging approximately in the middle between ground plane and table.

2. I/O cables that are connected to a peripherals shall be bundled in center. If the end of the cable may be terminated if required using correct terminating impedance. The total length shall not exceed 1 m.

3. EUT connected to one LISN 50 Ohm/50 uH coupling impedance. The unused LISN connectors shall be terminated in 50 Ohm. LISN can be placed on top of, or immediately beside the ground plane.
   a. All other equipment powered from second LISN.
   b. Multiple outlet strip can be used for multiple power cords of non-EUT equipment.
   c. LISN at least 80 cm from nearest part of EUT chassis.

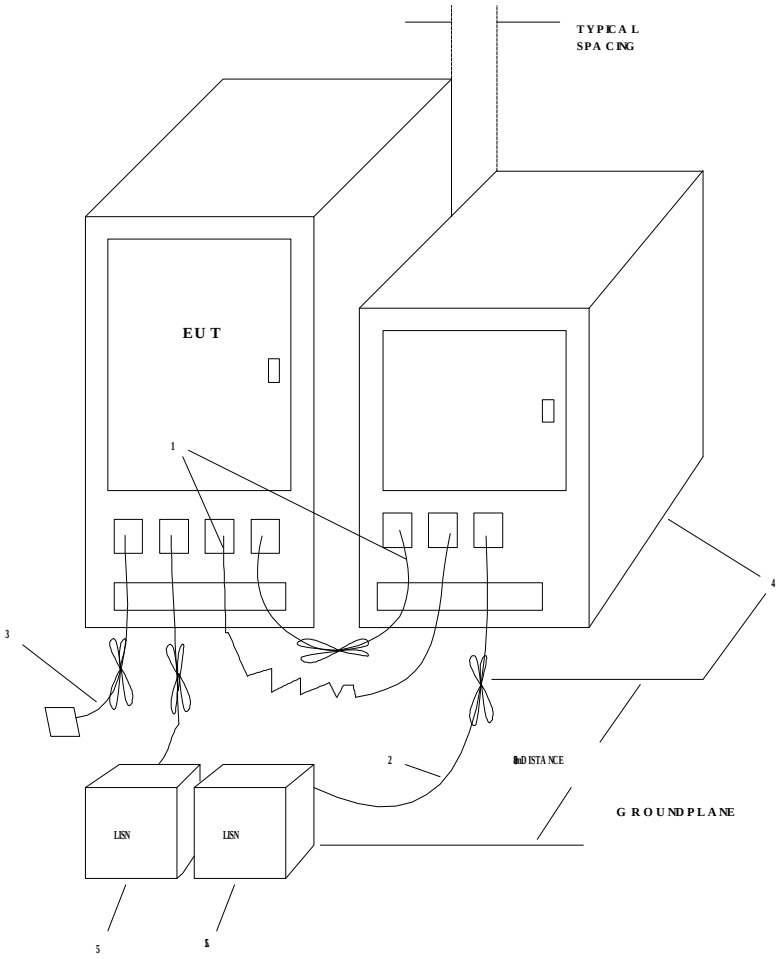
4. Cables of floor standing devices, such as keyboards, mouses, shall be placed as close as possible to the host.

5. Non-EUT components being tested.

6. Rear of EUT, including peripherals, shall be all aligned and flush with rear of table.

7. Rear of table shall be 40 cm removed from vertical conducting plane that is bonded to the ground plane (see 2).

Table 8: Test Equipment List for Conducted Emissions



LEGENEND:

1. Excess I/O cables shall be bundled in center. If bundling is not possible, the cables shall be arranged in serpentine fashion. Bundling shall not exceed 40 cm in length.

2. Excess power cords shall be bundled in the center or shortened to appropriate length.

3. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated if required using correct terminating impedance. If bundling is not possible, the cable shall be arranged in serpentine fashion.

4. EUT and all cables shall be insulated from ground plane by 3 to 12 mm thick insulating material.

5. EUT connected to one LISN. LISN can be placed on top of, immediately beneath ground plane.

6. All other equipment powered from second LISN.

Floor-Standing Equipment Conducted Emissions

7.1.3. Method of Measurements - Electric Field Radiated Disturbance

- 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, Industry Canada, ACA/Austel, NVLap and ITI.
- Radiated emissions measurements were made using the following test instruments:

  1. Calibrated EMCO BiconiLog antenna in the frequency range from 30 MHz to 2000 MHz.
  2. Calibrated Emco Horn antennas in the frequency range above 1000 MHz (1GHz - 40 GHz).
  3. Calibrated Advantest 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 (120 KHz VBW and VBW $\geq$ RBW).

     – If any rf emission was observed to be a broadband noise, the spectrum analyzer's CISPR QUASI-PEAK detector (120 KHz RBW and VBW $\geq$ RBW) 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 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:

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

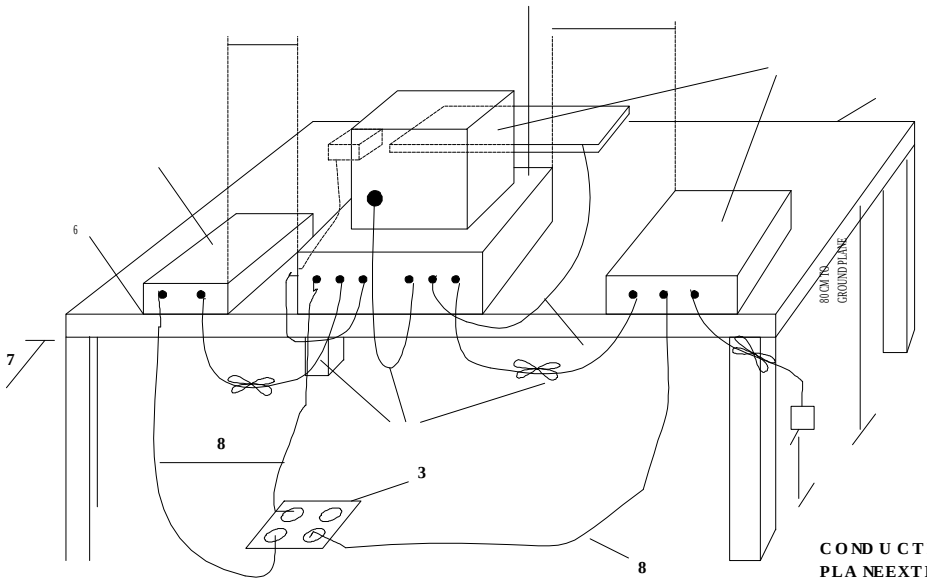
Where	FS	=	Field Strength
	RA	=	Receiver/Analyzer Reading
	AF	=	Antenna Factor
	CF	=	Cable Attenuation Factor
	AG	=	Amplifier Gain

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.

NOTE: 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.



CONDUCTING GROUND PLANE EXTENDS 30cm BEYOND EUT SYSTEM FOOTPRINT

LEGEND:

1. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth forming a bundle 30 to 40 cm long, hanging approximately in the middle between ground plane and table.

2. I/O cables that are not connected to a peripheral shall be bundled in the middle. The end of the cable may be terminated if required using correct terminating impedance. The total length shall not exceed 1 m.

3. If EUTs are kept in the test setup for radiated emissions, it is preferred that they be installed under the ground plane with the receptacle flush with the ground plane.

4. Cables to hand operated devices, such as keyboards, mouse, etc., shall be placed as close as possible to the controller.

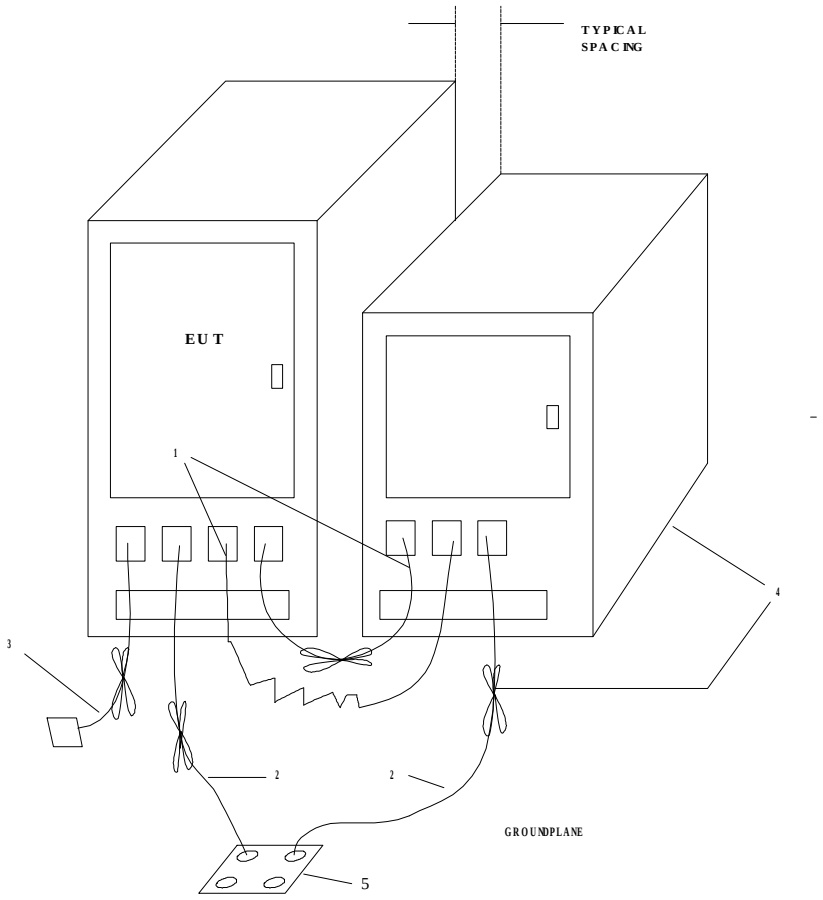
5. Non-EUT components of EUT system being tested.

6. Where applicable, the system under test shall be located flush with the rear of the table.

7. Non-vertical conducting wall used.

8. Power cords draped to floor and are routed over to receptacle.

Tabletop Equipment Radiated Emissions



LEGEND:

1. Excess I/O cables shall be bundled in center of bundling is not possible the cables shall be arranged in serpentine fashion.

2. Excess power cords shall be bundled in the center or shortened to appropriated length.

3. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated if required using correct terminating impedance. If bundling is not possible the cable shall be arranged in serpentine fashion.

4. EUT and all cables shall be insulated from ground plane by 3 to 12 mm thick insulating material.

5. If LISNs are kept in the test set up for radiated emissions it is preferred that they be installed under the ground plane with the receptacle flush with the ground plane.

Floor Standing Equipment Radiated Emissions

EXHIBIT 8. PLOTS OF MEASUREMENT DATA

Plot number written on each data plot are referenced in order of test data appearance within this report as follows:

Plots #1 to #6 & #9 to #14: Amplifier Gain Frequency Response, Single and multiple input signals (Uplink and Downlink Bands) and Gain Vs. Frequency Response Graphs

Plots #7 and 8: 20 dB Bandwidth

Plots #15 to 26 Emission Masks B (Uplink and Downlink Bands)

Plots #27 to 38 Emission Masks G (Uplink and Downlink Bands)

Plots #39 to 50: Transmitter Conducted Emissions (Voice and Data)

Plots #51 to 56: Transmitter Spurious Emissions, Multiple input signals

Plots #57 to 58: Receiver Radiated Emissions

EXHIBIT 9. FCC FORM 731, APPLICANT'S LETTERS & STATEMENT

9.1. FCC FORM 731

9.2. APPLICANT'S AUTHORIZATION TO APPOINT ULTRATECH ENGINEERING LABS INC. TO ACT AS AN AGENT

9.3. LETTER REQUEST FOR FCC CONFIDENTIALITY FILING

EXHIBIT 10. FCC ID LABEL & SKETCH OF LABEL LOCATION

EXHIBIT 11. "FCC INFORMATION TO USER"

3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vhk.ultratech@sympatico.ca, Website: http://www.ultratech-labs.com

EXHIBIT 12. PHOTOGRAPHS OF EQUIPMENT UNDER TEST

EXHIBIT 13. SYSTEM BLOCK DIAGRAM(S) & SCHEMATIC DIAGRAMS

EXHIBIT 14. USER'S MANUAL