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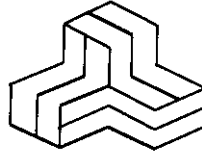


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Exhibit B
Test Report for FCC
Compliance

ENGINEERING TEST REPORT



RADIO TRANSCEIVER
MODEL NO.: MDS 9790

FCC ID: E5MDS9790

FCC PART 2 & PART 101, SUBPART I
FIXED MICROWAVE SERVICES FOR COMMERCIAL/INDUSTRIAL USES
Operating Frequency Band 928-960 MHz

UltraTech's FILE NO.: MIC9F101TX

Tested for:

MICROWAVE DATA SYSTEMS

175 Science Parkway
Rochester, New York
USA, 14620-4261

Tested by:

UltraTech - Group of Labs

4181 Sladeview Crescent, Unit 33
Mississauga, Ontario
Canada L5L 5R2

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

DATE: Nov. 26, 1998

UltraTech

33-4181 Sladeview Crescent, Mississauga, Ontario, Canada, L5L 5R2
Telephone (905) 569-2550 Facsimile (905) 569-2480
Web Site: www.ultratech-labs.com Email: vhk.ultratech@sympatico.ca

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

FCC PARAGRAPH.	TEST REQUIREMENTS	COMPLIANCE (YES/NO)
101.101	Frequency Availability	Yes
101.113	Transmitter Power Limitations	Yes
2.987(b)	Modulation Limiting	Yes
101.107	Frequency Stability	Yes
101.109	Bandwidth	Yes
101.111(5)	Emission Limitations – Transmitter Antenna Conducted Emissions	Yes
101.111(5)	Emission Limitations – Transmitter	Yes

RADIO TRANSCEIVER, Model No.: MDS 9790, by MICROWAVE DATA SYSTEMS has also been tested and found to comply with **FCC Part 15, Subpart B - Radio Receivers and Class B Digital Devices**. However, since the equipment is only marketed for use as a Class A commercial/industrial device, the FCC Class A engineering test report is prepared and kept in file. It is available anytime upon FCC request.

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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: Nov. 26, 1998

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2. EXHIBIT 2 - GENERAL INFORMATION

2.1. APPLICANT

MICROWAVE DATA SYSTEMS
175 Science Parkway
Rochester, New York
USA, 14620-4261

Applicant's Representative: Mr. Jacob Z. Schanker, P.Eng., CPEng., Director of Agency Compliance

2.2. MANUFACTURER

MICROWAVE DATA SYSTEMS
175 Science Parkway
Rochester, New York
USA, 14620-4261

2.3. DESCRIPTION OF EQUIPMENT UNDER TESTS

PRODUCT NAME: RADIO TRANSCEIVER
MODEL NO.: MDS 9790
SERIAL NUMBER: preproduction
TYPE OF EQUIPMENT: Fixed Microwave Services Transmitters
SERVICES AREAS: Commercial/Industrial
OPERATING FREQ.: 928-960 MHz.
CHANNEL SPACINGS 12.5 kHz
POWER RATING: 5.0 Watts max.
OUTPUT IMPEDANCE: 50 Ohms
DUTY CYCLE: Continuous
99% BANDWIDTH: 9.25 kHz nominal
BAUD RATES: 9600 b/s maximum
EMISSION DESIGNATION: 11K2F1D, 11K2F2D, 11K2F3D

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OSC. FREQUENCY (IES): Local Oscillator Frequency = Transmit Frequency

CPU SPEED: 15 MHz, 16 MHz

INPUT SUPPLY: AC 120V 60 Hz

ASSOCIATED DEVICES: N/A

FCC ID: E5MDS9790

INTERFACE PORTS:

- (1) RF Antenna Terminal (N-Type Connector)
- (2) Customer Data Interface Port (DB25). *Note: this one is not a RS-232 type interface.*
- (3) Diagnostic Port (DB9). *Note: This port is for factory or service use only.*
- (4) Alarm/4-Wire Audio Contacts (Terminal block)

2.4. RELATED SUBMITTALS)/GRANT

Not applicable

2.5. 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 & 101, Subpart I, Fixed Microwave Services Operating in the Frequency Bands 928-960 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.

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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/SIT1300F2) 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.

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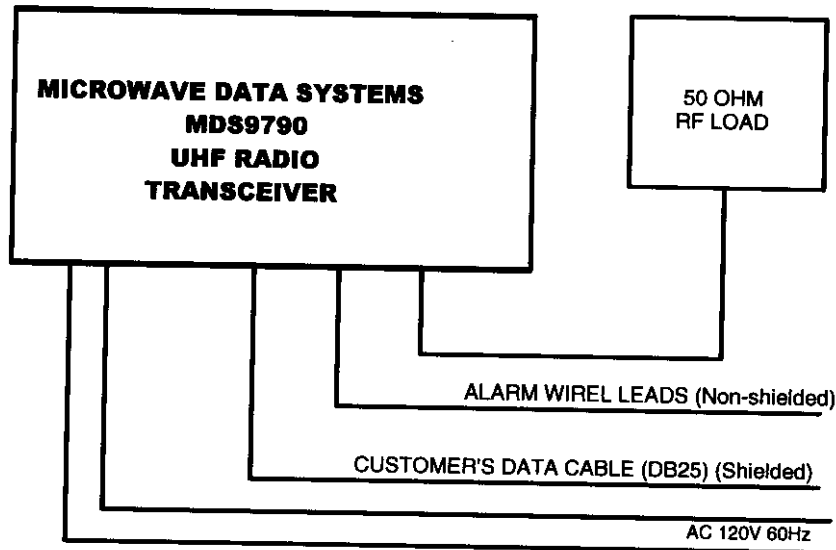
3. EXHIBIT 3 - SYSTEM TEST CONFIGURATION

3.1. TEST SYSTEM DETAILS

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

- (1) **EUT:** MICROWAVE DATA SYSTEMS, RADIO TRANSCEIVER, Model : MDS 9790., S/N: preproduction,
OSC. FREQ: Local Oscillator Frequency = Transmit Frequency,
I/O Cable: All I/O cables were shielded
Power Supply Cable: Non-shielded

3.2. BLOCK DIAGRAMS OF TEST SET-UP



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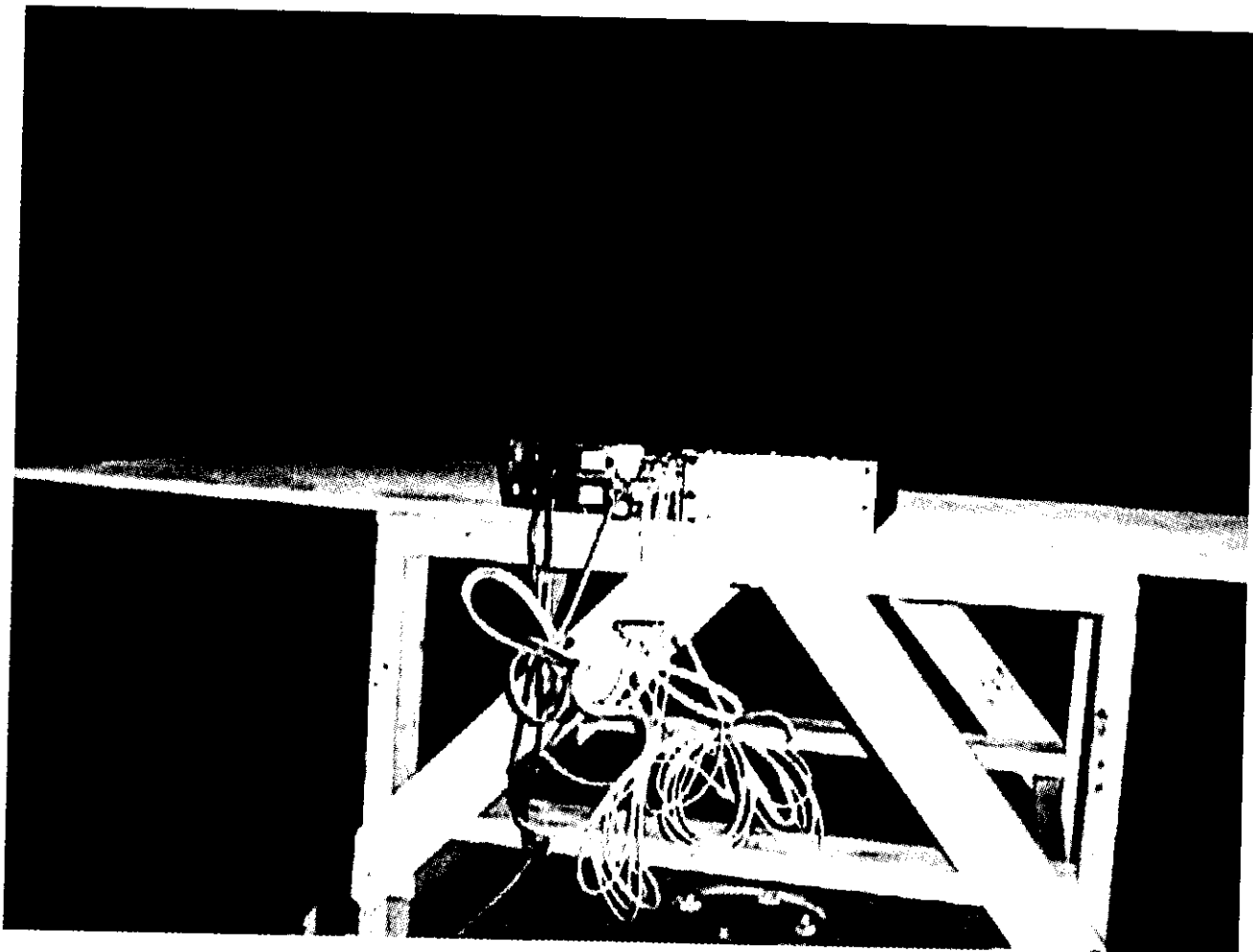
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3.3. PHOTOGRAPHS FOR TEST SETUP AT OFTS FOR RADIATED EMISSIONS MEASUREMENTS

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

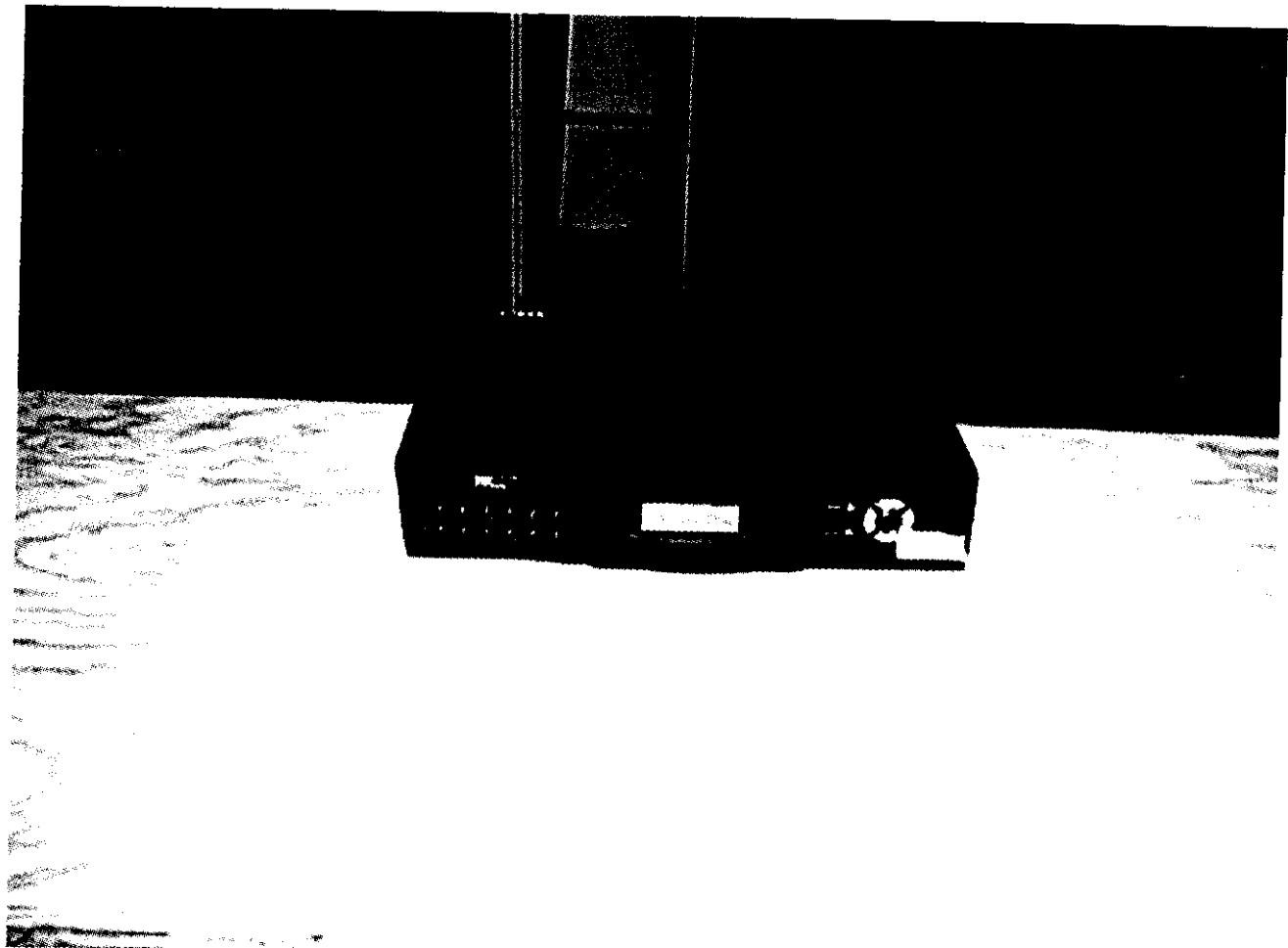


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3.4. JUSTIFICATION

No deviation, in both configuration and operation manners, different from normal operation were required.

3.5. EUT OPERATING CONDITION

The transmitter output was turned with FM data modulation with 9600 b/s random data. Tests are repeated with at near lowest, middle and near highest frequencies.

3.6. SPECIAL ACCESSORIES

No special accessories were required.

3.7. EQUIPMENT MODIFICATIONS

Not required

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4. EXHIBIT 4 - TEST DATA

4.1. FREQUENCY AVAILABILITY @ FCC 101.101

PRODUCT NAME: RADIO TRANSCEIVER, Model No.: MDS 9790

FCC REQUIREMENTS: Frequency availability is as listed below

Frequency Band (MHz)	Frequency Availability		
	Common Carrier (Part 101)	Private Radio (Part 101)	Broadcast Auxiliary (Part 74)
928 - 929	-	MAS	MAS
932.0 - 932.5	MAS	MAS	-
932.5 - 935.0	CC	OFS	-
941.0 - 941.5	MAS	MAS	-
941.5 - 944.0	CC	OFS	Aural BAS
952 - 960	-	OFS/MAS	-

MAS: Multipoint Adress System - (Part 101)

CC: Common Carrier Fixed Point-to-Point Microwave Services - (Part 101, Subparts C & I)

OFS: Private Operational Fixed Point-to-Point Microwave Service - (Part 101, Subparts C & H)

BAS: Broadcast Auxiliary Service - (Part 74)

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4.2. TRANSMITTER POWER LIMITATIONS @ FCC 101.113

PRODUCT NAME: RADIO TRANSCEIVER, Model No.: MDS 9790

FCC REQUIREMENTS:

- (a) On any authorized frequency, the average power delivered to an antenna in this device must be minimum amount of power necessary to carry out the communication desired. Application of this principle includes, but is not limited to, requiring a licensee who replaces one or more of its antennas with larger antennas to reduce its antenna input power by an amount appropriate to compensate for the increased primary lobe gain of the replacement antenna(s). In no event shall the average equivalent isotropically radiated power (EIRP), as referenced to an isotropic radiator, exceed the values specified below. In cases of harmful interference, the Commission may, after notice and opportunity for hearing, order a change in the effective radiated power of this station. Further, the output power of a transmitter on any authorized frequency in this service may not exceed the following:

Frequency Band (MHz)	Maximum allowable EIRP ⁽¹⁾⁽²⁾	
	(dBW)	(Watts)
928 - 929	+17	50
932.0 - 932.5	+17	50
932.5 - 935.0	+40	10,000
941.0 - 941.5	+30	1000
941.5 - 944.0	+40	10,000
952 - 960	+40	10,000

(1) Per polarization

(2) For multiple address operations, see @101.147. Remote alarm units are part of a multiple address central station protection system are authorized a maximum of 2 Watts

CLIMATE CONDITION:

Standard Temperature and Humidity:

- Ambient temperature: 21 °C
- Relative humidity: 43%

POWER INPUT:

120 Vac, 60 Hz Nominal.

TEST EQUIPMENT:

- Advantest Spectrum Analyzer, Model R3271, S/N: 15050203
- Bird Attenuator, 50 Ohm IN/OUT

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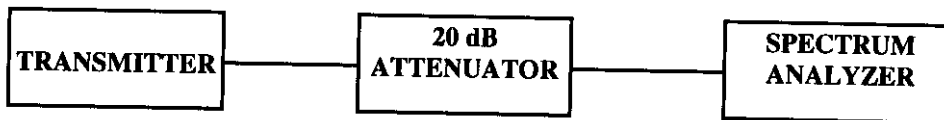
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METHOD OF MEASUREMENTS:

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.

TEST ARRANGEMENT



TEST RESULTS: Conforms.

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

DATE: Nov. 23, 1998

MEASUREMENT DATA

PEAK POWER MEASUREMENT AT THE ANTENNA TERMINAL

<u>TEST CONFIGURATION</u>			
<ul style="list-style-type: none"> • The transmitter terminal was coupled to the Spectrum Analyzer through a 20 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. 			
TRANSMITTER CHANNEL OUTPUT	FUNDAMENTAL FREQUENCY (MHz)	MEASURED PEAK POWER (Watts)	PEAK POWER RATING (Watts)
Near Lowest	929.05	5.0	Shall not exceed the power rating @ 5.0 Watts
Middle	944.05	5.0	Shall not exceed the power rating @ 5.0 Watts
Near Highest	953.05	5.0	Shall not exceed the power rating @ 5.0 Watts

ERP Measurements: -Appropriate antenna type, and adjustment of power output for effective radiated power (ERP) to meet FCC limits will be performed by the manufacturer at location of installation.

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4.3. MODULATION LIMITING @ FCC 2.987(B)

PRODUCT NAME: RADIO TRANSCEIVER, Model No.: MDS 9790

FCC REQUIREMENTS: Not applicable. Tests will be performed to confirm the manufacturer's maximum setting of the frequency deviation.

CLIMATE CONDITION:

Standard Temperature and Humidity:

- Ambient temperature: 21 °C
- Relative humidity: 43%

POWER INPUT:

AC 120V 60 Hz.

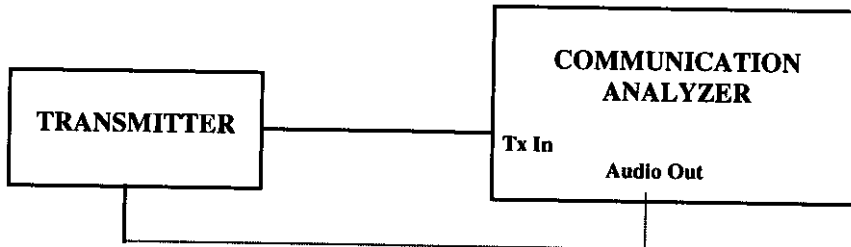
TEST EQUIPMENT:

- Communication Analyzer, Rohde & Schawrz, Model SMFO2, S/N: 879988/057, 0.4 - 1000 MHz including AF & RF Signal Generators, SINAD, DISTORTION, DEVIATION meters and etc...

METHOD OF MEASUREMENTS:

For Data Transmitter with Maximum Frequency Deviation set by Factory:- The EUT was set at maximum frequency deviation, and its peak frequency deviation was then measured using EUT's internal random data source.

TEST ARRANGEMENT



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TEST RESULTS: Conforms.

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

DATE: Nov. 24, 1998

MEASUREMENT DATA

MODULATION LIMITING FOR DATA TRANSMITTER

Modulation: FM modulation with random data and Modulation Limiter set at a Maximum Frequency Deviation (Factory Setting): 3.5 kHz

DATA BAUD RATE	PEAK DEVIATION (KHz)	MAXIMUM LIMIT (KHz)
9600	3.5 kHz	Not applicable

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4.4. FREQUENCY STABILITY @ FCC 101.107

PRODUCT NAME: RADIO TRANSCEIVER, Model No.: MDS 9790

FCC REQUIREMENTS:

FCC Part 101, Sub. I, Para. 101.107

The carrier frequency of each transmitter authorized in these services must maintain within the following percentage of the reference frequency except as otherwise provided in paragraph (b) of this section or in the applicable subpart of this part (unless otherwise specified in the instrument of station authorization the reference frequency will be deemed to be the assigned frequency):

Frequency Band (MHz)	Frequency Tolerance (percent)
	All Fixed and Base Stations
928 – 929 ⁽⁵⁾	0.0005
932.0 – 932.5	0.00015
932.5 – 935.0	0.00025
941.0 – 941.5	0.00015
941.5 – 944.0	0.00025
952 – 960	(7)

(5) For remote stations with 12.5 kHz bandwidth, the tolerance is $\pm 0.00015\%$

(7) For private operational fixed point-to-point microwave systems, with a channel greater than or equal to 50 kHz Bandwidth, $\pm 0.0005\%$; for multiple address master stations, regardless of bandwidth, $\pm 0.00015\%$; for multiple address remote stations with 12.5 kHz bandwidths, $\pm 0.00015\%$; for multiple address remote stations with channels greater than 12.5 kHz bandwidth, $\pm 0.0005\%$.

CLIMATE CONDITION:

Standard Temperature and Humidity: Please refer to Measurement Data

POWER INPUT:

120 Vac, 60 Hz Nominal.

TEST EQUIPMENT:

- Advantest Spectrum Analyzer, Model R3271, S/N: 15050203
- Tenney Temp. & Humidity Chamber, Model T5, S/N: 9723B
- Bird Attenuator, 50 Ohm IN/OUT

METHOD OF MEASUREMENTS:

Refer to FCC @ 2.995

(a) The frequency stability shall be measured with variation of ambient temperature as follows:

- From -30 to +50 centigrade except that specified in subparagraph (2) & (3) of this paragraph.

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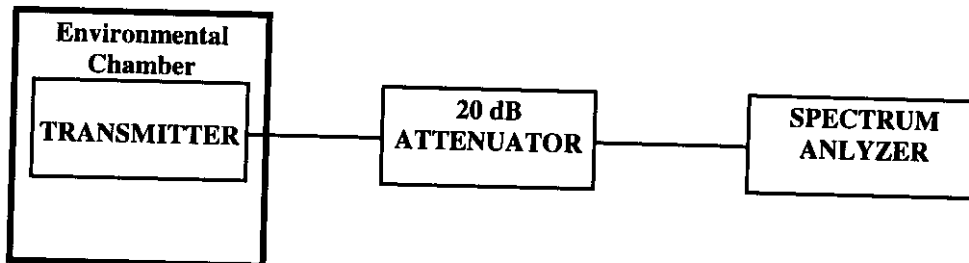
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Nov. 26, 1998

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- (b) Frequency measurements shall be made at extremes of the specified temperature range and at intervals of not more than 10 centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stability circuitry need be subjected to the temperature variation test.
- (d) The frequency stability supply shall be measured with variation of primary supply voltage as follows:
- (1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.
 - (2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.
 - (3) The supply voltage shall be measured at the input to the cable normally provide with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.
- (e) When deemed necessary, the Commission may require tests of frequency stability under conditions in addition to those specifically set out in paragraphs (a), (b), (c) and (d) of this section. (For example, measurements showing the effect of proximity to large metal objects, or of various types of antennas, may be required for portable equipment).

TEST ARRANGEMENT



TEST RESULTS: Conforms.

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

DATE: Nov. 25, 1998

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MEASUREMENT DATA

FREQUENCY STABILITY

TEST CONFIGURATION

- The transmitter was placed inside the environmental chamber, and its output terminal was coupled to the Spectrum Analyzer through a 20 dB attenuator.
- One transmitter channel frequency was tested.
- The DUT was supplied by a variable power supply.
- The environmental chamber was cycled down to -30° C. When the chamber reaches -30° C, the EUT was powered on with the nominal voltage level, with the transmitter keyed off. The terminal remained in the chamber at -30° C for a period of 1 hour. After 1 hour the transmitter was continuously keyed on, at full power. The transmitter frequency of the terminal was measured from the spectrum analyzer every minute for a period of 10 minutes.
- After 10 minutes the variable power supply was adjusted to supply the EUT with voltage of 85% nominal voltage level and measurement was repeated.
- After 10 minutes the variable power supply was adjusted to supply the EUT with voltage of 115% nominal voltage level and measurement was repeated.
- When the measurement complete, the transmitter was keyed off and the chamber was cycled up to 10° C steps. The EUT remained powered up (unkeyed) at -20° C for a minimum period of 1 hour, after which the measurements will be made as outlined above.
- The above was repeated for -10, 0, 20, 30, 40 and 50 degrees Celsius.

Product Name	RADIO TRANSCEIVER
Model No.	MDS 9790
Center Frequency	929.05 MHz
Full Power Level	5 Watts
Frequency Tolerance Limit	0.00015 % or 1393.6 Hz at 929.05 MHz
Max. Frequency Tolerance Measured	-0.000086 %
Input Voltage Rating	120 V 60 Hz

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FREQUENCY STABILITY TEST
Nominal Freq. = 936.0500 MHz

Temperature Degrees C	Frequency Error Hz.	Frequency Error %	
-30	-756	-0.000081	
-20	-800	-0.000085	
-10	-802	-0.000086	
0	-720	-0.000077	
10	-527	-0.000056	
20	-295	-0.000032	
30	-246	-0.000026	
40	-216	-0.000023	
50	-317	-0.000034	

MDS 9790 S/N 00795553

Measurement was performed at Microwave Data Systems 12/3/98
after radio became inoperative during temperature testing
at Ultratech Labs.

AMBIENT TEMP. (°C)	KEYED-ON TIME (Minutes)	CENTER FREQUENCY & RF POWER OUTPUT VARIATION					
		Supply Voltage (Nominal) 120 Volts		Supply Voltage (85% of Nominal) 102 Volts		Supply Voltage (115% of Nominal) 138 Volts	
		Hz	dB	Hz	dB	Hz	dB
-30	0		N/A	N/A	N/A	N/A	N/A
	1		N/A	N/A	N/A	N/A	N/A
	2		N/A	N/A	N/A	N/A	N/A
	3		N/A	N/A	N/A	N/A	N/A
	4		N/A	N/A	N/A	N/A	N/A
	5		N/A	N/A	N/A	N/A	N/A
	6		N/A	N/A	N/A	N/A	N/A
	7		N/A	N/A	N/A	N/A	N/A
	8		N/A	N/A	N/A	N/A	N/A
	9		N/A	N/A	N/A	N/A	N/A
	10		N/A	N/A	N/A	N/A	N/A
-20	0		N/A	N/A	N/A	N/A	N/A
	1		N/A	N/A	N/A	N/A	N/A
	2		N/A	N/A	N/A	N/A	N/A
	3		N/A	N/A	N/A	N/A	N/A
	4		N/A	N/A	N/A	N/A	N/A
	5		N/A	N/A	N/A	N/A	N/A
	6		N/A	N/A	N/A	N/A	N/A
	7		N/A	N/A	N/A	N/A	N/A
	8		N/A	N/A	N/A	N/A	N/A
	9		N/A	N/A	N/A	N/A	N/A
	10		N/A	N/A	N/A	N/A	N/A
-10	0		N/A	N/A	N/A	N/A	N/A
	1		N/A	N/A	N/A	N/A	N/A
	2		N/A	N/A	N/A	N/A	N/A
	3		N/A	N/A	N/A	N/A	N/A
	4		N/A	N/A	N/A	N/A	N/A
	5		N/A	N/A	N/A	N/A	N/A
	6		N/A	N/A	N/A	N/A	N/A
	7		N/A	N/A	N/A	N/A	N/A
	8		N/A	N/A	N/A	N/A	N/A
	9		N/A	N/A	N/A	N/A	N/A
	10		N/A	N/A	N/A	N/A	N/A
0	0	-197	N/A	N/A	N/A	N/A	N/A
	1	-200	N/A	N/A	N/A	N/A	N/A
	2	-226	N/A	N/A	N/A	N/A	N/A
	3	-221	N/A	N/A	N/A	N/A	N/A
	4	-223	N/A	N/A	N/A	N/A	N/A
	5	-197	N/A	N/A	N/A	N/A	N/A
	6	-234	N/A	N/A	N/A	N/A	N/A
	7	-203	N/A	N/A	N/A	N/A	N/A
	8	-231	N/A	N/A	N/A	N/A	N/A
	9	-169	N/A	N/A	N/A	N/A	N/A
	10	-189	N/A	N/A	N/A	N/A	N/A

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AMBIENT TEMP. (°C)	KEYED-ON TIME (Minutes)	CENTER FREQUENCY & RF POWER OUTPUT VARIATION					
		Supply Voltage (Nominal) 120 Volts		Supply Voltage (85% of Nominal) 102 Volts		Supply Voltage (115% of Nominal) 138 Volts	
		Hz	dB	Hz	dB	Hz	dB
+10	0	-74	N/A	N/A	N/A	N/A	N/A
	1	-57	N/A	N/A	N/A	N/A	N/A
	2	-100	N/A	N/A	N/A	N/A	N/A
	3	-66	N/A	N/A	N/A	N/A	N/A
	4	-71	N/A	N/A	N/A	N/A	N/A
	5	-91	N/A	N/A	N/A	N/A	N/A
	6	-77	N/A	N/A	N/A	N/A	N/A
	7	-57	N/A	N/A	N/A	N/A	N/A
	8	-97	N/A	N/A	N/A	N/A	N/A
	9	-69	N/A	N/A	N/A	N/A	N/A
	10	-78	N/A	N/A	N/A	N/A	N/A
+20	0	-10	+0.3	-31	+0.3	-54	+0.3
	1	-40	+0.3	-26	+0.3	-31	+0.3
	2	-60	+0.3	-46	+0.3	-40	+0.3
	3	-40	+0.3	-51	+0.3	-54	+0.3
	4	-30	+0.3	-29	+0.3	-34	+0.3
	5	-60	+0.3	-43	+0.3	-23	+0.3
	6	-40	+0.3	-54	+0.3	-57	+0.3
	7	-60	+0.3	-34	+0.3	-49	+0.3
	8	-29	+0.3	-63	+0.3	-26	+0.3
	9	-43	+0.3	-43	+0.3	-49	+0.3
	10	-43	+0.3	-45	+0.3	-45	+0.3
+30	0	-37	N/A	N/A	N/A	N/A	N/A
	1	-40	N/A	N/A	N/A	N/A	N/A
	2	-63	N/A	N/A	N/A	N/A	N/A
	3	-37	N/A	N/A	N/A	N/A	N/A
	4	-57	N/A	N/A	N/A	N/A	N/A
	5	-63	N/A	N/A	N/A	N/A	N/A
	6	-34	N/A	N/A	N/A	N/A	N/A
	7	-46	N/A	N/A	N/A	N/A	N/A
	8	-69	N/A	N/A	N/A	N/A	N/A
	9	-40	N/A	N/A	N/A	N/A	N/A
	10	-37	N/A	N/A	N/A	N/A	N/A
+40	0	-231	N/A	N/A	N/A	N/A	N/A
	1	-226	N/A	N/A	N/A	N/A	N/A
	2	-260	N/A	N/A	N/A	N/A	N/A
	3	-237	N/A	N/A	N/A	N/A	N/A
	4	-220	N/A	N/A	N/A	N/A	N/A
	5	-249	N/A	N/A	N/A	N/A	N/A
	6	-237	N/A	N/A	N/A	N/A	N/A
	7	-214	N/A	N/A	N/A	N/A	N/A
	8	-254	N/A	N/A	N/A	N/A	N/A
	9	-246	N/A	N/A	N/A	N/A	N/A
	10	-252	N/A	N/A	N/A	N/A	N/A

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		Supply Voltage (Nominal) 120 Volts		Supply Voltage (85% of Nominal) 102 Volts		Supply Voltage (115% of Nominal) 138 Volts	
		Hz	dB	Hz	dB	Hz	dB
+50	0	-383	N/A	N/A	N/A	N/A	N/A
	1	-400	N/A	N/A	N/A	N/A	N/A
	2	-404	N/A	N/A	N/A	N/A	N/A
	3	-389	N/A	N/A	N/A	N/A	N/A
	4	-429	N/A	N/A	N/A	N/A	N/A
	5	-420	N/A	N/A	N/A	N/A	N/A
	6	-397	N/A	N/A	N/A	N/A	N/A
	7	-434	N/A	N/A	N/A	N/A	N/A
	8	-400	N/A	N/A	N/A	N/A	N/A
	9	-429	N/A	N/A	N/A	N/A	N/A
	10	-409	N/A	N/A	N/A	N/A	N/A

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4.5. BANDWIDTH @ FCC 101.109

PRODUCT NAME: RADIO TRANSCEIVER, Model No.: MDS 9790

FCC REQUIREMENTS:

- @ 101.109(a) Each emission authorization issued pursuant to these rules will show, as the emission designator, a symbol representing the class of emission which must be prefixed by a number specifying the necessary bandwidth. This figure does not necessarily indicate the bandwidth actually occupied by the emission at any instant. In those cases where Part 2 of this chapter does not provide a formula for the computation of the necessary bandwidth, the occupied bandwidth may be used in the emission designator.
- @ 101.109(b) Station in this service will be authorized any type of emission, method of modulation, and transmission characteristics, consistent with efficient use of the spectrum and good engineering practice, except that Type B, damped-wave emission will not be authorized.
- @ 101.109(c) The maximum bandwidth which will be authorized per assigned is set out in the table that follows. Regardless of the maximum authorized of the maximum authorized bandwidth specified for each frequency band, the Commission reserves the right to issue a license for less than the maximum bandwidth if it appears that a lesser bandwidth would be sufficient to support an applicant's intended communications.

Frequency Band (MHz)	Maximum Authorized Bandwidth
928 to 929	25 kHz
932 to 932.5, 941 to 941.5	12.5 kHz
932.5 to 935, 941.5 to 944	200 kHz
952 to 960	200 kHz

CLIMATE CONDITION:

Standard Temperature and Humidity:

- Ambient temperature: 21 °C
- Relative humidity: 43%

POWER INPUT:

120 Vac, 60 Hz Nominal.

ENGINEERING ANALYSIS:

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4.6. EMISSION LIMITATION @ FCC 101.111(5)

PRODUCT NAME: RADIO TRANSCEIVER, Model No.: MDS 9790

FCC REQUIREMENTS:

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

FREQUENCY RANGE (MHz)	MAXIMUM OBW (KHz)	CHANNEL SPACING (KHz)	MAX. FREQ. DEVIATION (KHz)	FCC APPLICABLE MASK
928 - 960	11.250	12.5	N/A	Refer to FCC 101.111(5)

CLIMATE CONDITION:

Standard Temperature and Humidity:

- Ambient temperature: 21 °C
- Relative humidity: 43%

POWER INPUT:

120 Vac, 60 Hz Nominal.

TEST EQUIPMENT:

- Advantest Spectrum Analyzer, Model R3271, S/N: 15050203
- 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 = 100 Hz, VBW ≥ 100 Hz and SWEEP TIME = AUTO). The transmitter was operated at a full rated power output, and modulated as follows:

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.

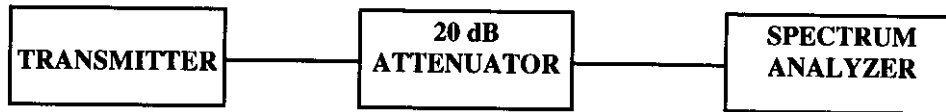
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TEST ARRANGEMENT



TEST RESULTS: Conforms.

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

DATE: Nov. 24, 1998

MEASUREMENT DATA

Please see attached plots for detailed measurements.

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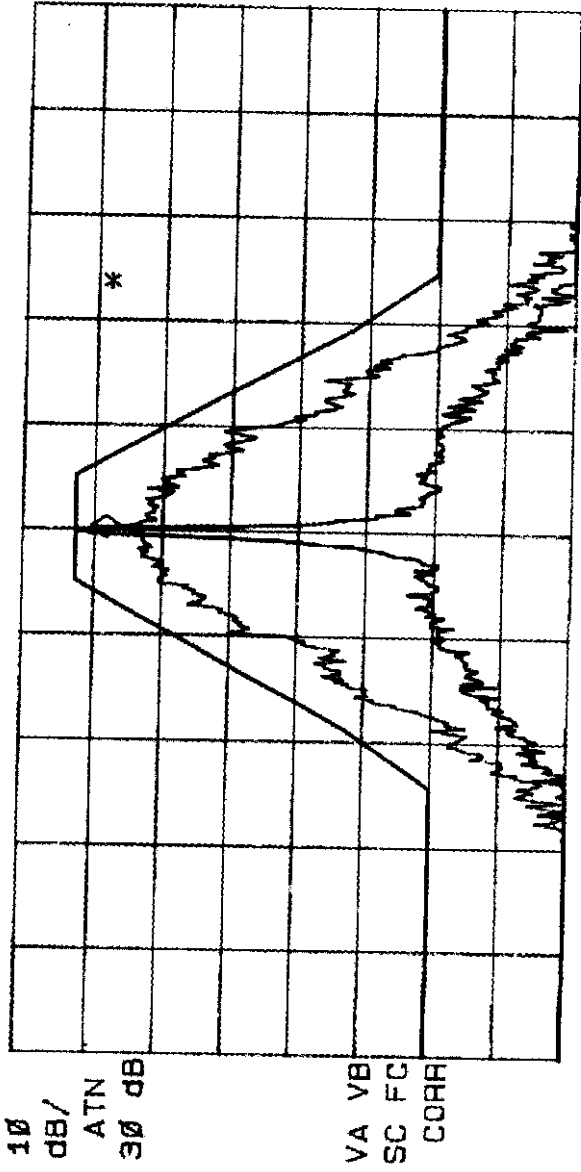
Date: Nov 24, 1998
 Tester by: Hong Chieh

MICROWAVE DATA SYSTEMS - MDS9790RADIO TRANSCEIVER
 Tx Frequency: 136.05 MHz, RF Output Power: 5 Watts
 Modulation: FM Modulation with random data @ 1600 bps
 Peak Dev: 5.5 kHz



ACTV DET: PEAK
 MEAS DET: PEAK QP AVG
 MKR 936.05013 MHz
 25.58 dBm

FCC + IC 135-940 MHz
 MASK 5
 REF OFFST 20.0 dB
 REF 40.0 dBm



CENTER 936.05000 MHz
 #IF BW 100 Hz
 #AVG BW 100 kHz
 SPAN 50.00 kHz
 SWP 15.0 sec

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Date: Nov. 24, 1998
 Tested By: Thang Trinh

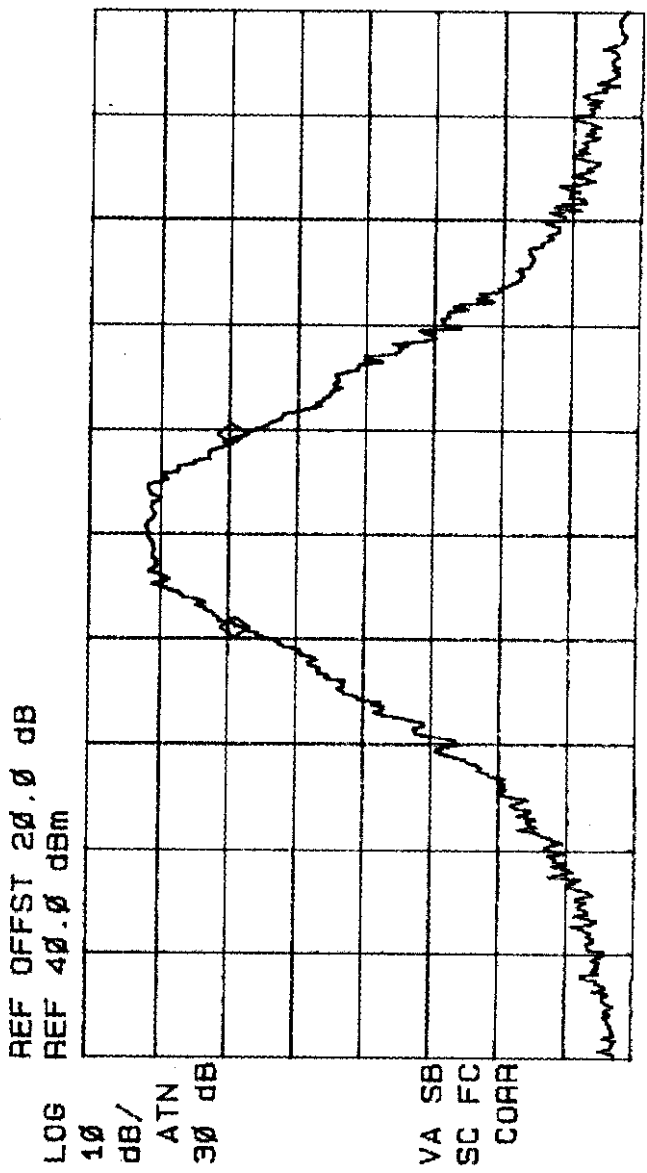
MICROWAVE DATA SYSTEMS -- MDS9790RADIO TRANSCEIVER
 Tx Frequency: 936.05 MHz, RF Output Power: 2 Watts
 Modulation: FM Modulation with random data @ 4.68 kbps



MARKER Δ
 9.25 KHZ
 .58 dB

ACTV DET: PEAK
 MEAS DET: PEAK QP AVG
 MKR 9.25 KHZ
 .58 dB

NO USER MENU



CENTER 936.05000 MHz
 #IF BW 1.0 KHZ #AVG BW 100 KHZ
 SPAN 50.00 KHZ SWP 300 msec

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MICROWAVE DATA SYSTEMS - MDS9790RADIO TRANSCIVER
 Tx Frequency: 944.05 MHz, RF Output Power: 5 Watts
 Modulation: FM Modulation with random data @ 1 kbps

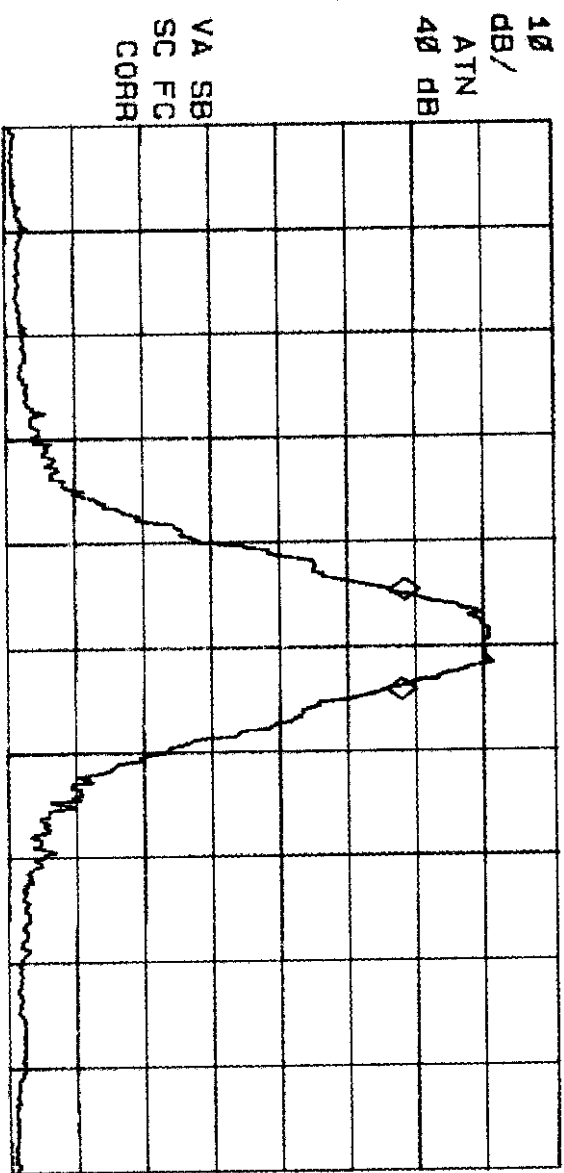
Date: Nov 26, 1998
 Tested By: Ilang Tsai

MARKER Δ
 9.5 KHZ
 -.56 DB

ACTV DET: PEAK
 MEAS DET: PEAK GP AVG
 MKR 9.5 KHZ
 -.56 DB

REF OFFST 20.0 DB
 REF 45.4 dBm

CLEAR
 WRITE A
 MAX
 HOLD A



CENTER 944.0510 MHz
 #IF BW 1.0 KHZ
 #AVG BW 1 KHZ
 SPAN 100.0 KHZ
 SWP 300 msec

Trace
 A B C
 More
 1 of 4

VIEW A
 BLANK A

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ULTRATECH GROUP OF LABS



MICROWAVE DATA SYSTEMS - MDS9790RADIO TRANSCIEVER
Tx Frequency: 929.05 MHz, RF Output Power: _____ Watts
Modulation: FM Modulation with random data @ 1600 bits

Date: Nov 27 1998
Tested by: ESM

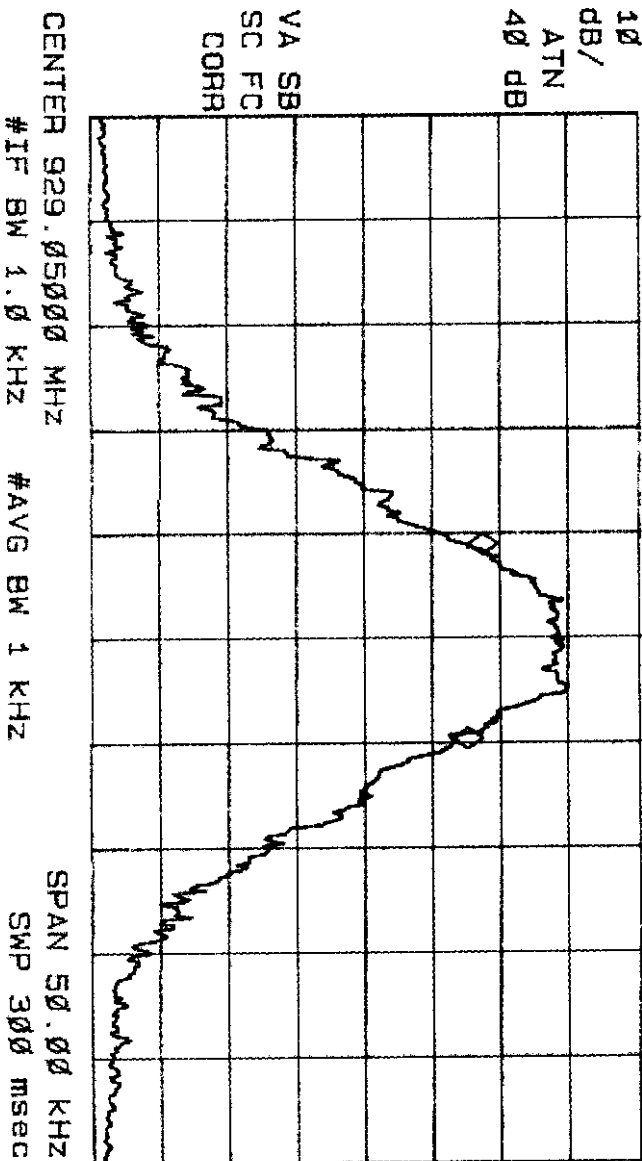
MARKER Δ
9.25 KHZ
-2.25 DB

ACTV DET: PEAK
MEAS DET: PEAK QP AVG

MKR 9.25 KHZ
-2.25 DB

NO USER
MENU

LOG REF 45.4 dBm
REF OFFST 20.0 DB



4.7. TRANSMITTER ANTENNA POWER SPURIOUS/HARMONIC CONDUCTED EMISSIONS @ FCC (101.111(5))

PRODUCT NAME: RADIO TRANSCIEVER, Model No.: MDS 9790

FCC REQUIREMENTS:

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

FREQUENCY RANGE (MHz)	MAXIMUM ORBW (KHz)	CHANNEL SPACING (KHz)	MAX. FREQ. DEVIATION (KHz)	FCC SPECIFICATION LIMITS (Para. No.)
928 - 960	11.25	12.5	N/A	50+10log ₁₀ (P) or -20 dBm

CLIMATE CONDITION:

Standard Temperature and Humidity:

- Ambient temperature: 21 °C
- Relative humidity: 43%

POWER INPUT:

120 Vac, 60 Hz Nominal.

TEST EQUIPMENT:

- Advantest Spectrum Analyzer, Model R3271, S/N: 15050203
- Bird Attenuator, 50 Ohm IN/OUT
- Highpass Filter, Microphase, P/N: CR220HIB, S/N: I7T11000AB, cut-off freq.: 1800 MHz.

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 10th 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.

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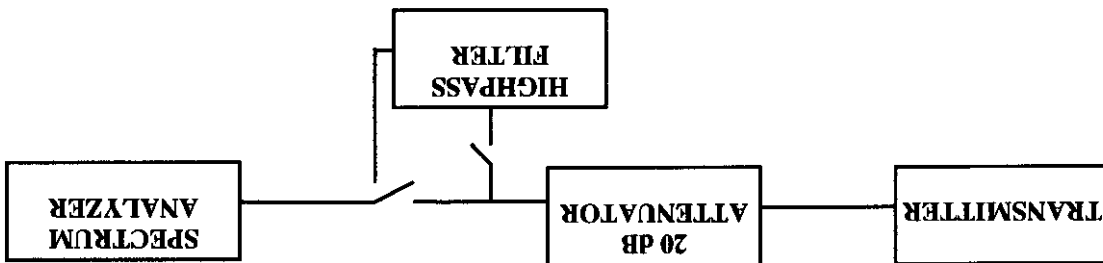
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FCC CFR 47, Para. 2.991 - Spurious Emissions at Antenna Terminal:- The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with 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: Nov. 23, 1998

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FCC PARTS 2 & 101, SUBPART 1, FIXED MICROWAVE SERVICES TRANSMITTERS

RADIO TRANSCIEVER, Model MDS 9790

MEASUREMENT DATA

SPURIOUS & HARMONIC EMISSIONS
AT THE TRANSMITTER ANTENNA TERMINAL

TEST CONFIGURATION

- 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 (near low, middle and near 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.

FREQUENCY (MHz)	RF LEVEL (dbm)	DETECTOR USED (PEAK/QP)	LIMIT (dbm)	MARGIN (db)	PASS/FAIL
3704.20	-61.6	PEAK	-20.0	-41.6	PASS
2779.15	-61.9	PEAK	-20.0	-41.9	PASS
1854.10	-27.4	PEAK	-20.0	-7.4	PASS

Modulation: FM modulation with internal random data @ 9600 b/s

Fundamental Frequency: 929.05 MHz
RF Output Power: 5.0 Watts

No other significant rf spurious/harmonic emissions found in the frequency range from 10 MHz to 10 GHz; all emissions must be more than 20 dB below the specified limits. Please refer to the attached plot.

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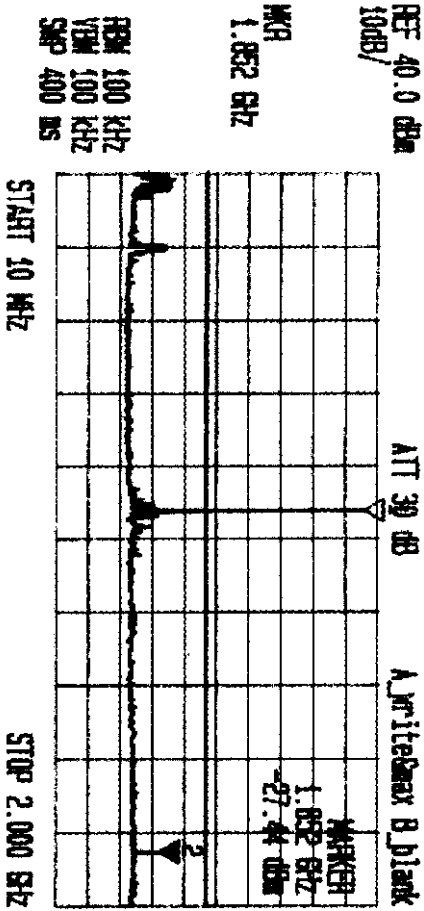
MICROWAVE DATA SYSTEMS - MDS9790RADIO TRANSCIEVER
 Tx Frequency: 925.05 MHz, RF Output Power: 5.5 Watts
 Modulation: FM Modulation with random data @ 9.6k kbps

Date: Nov. 23, 1998
 Total No. Lang: 988

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 Nov. 26, 1998



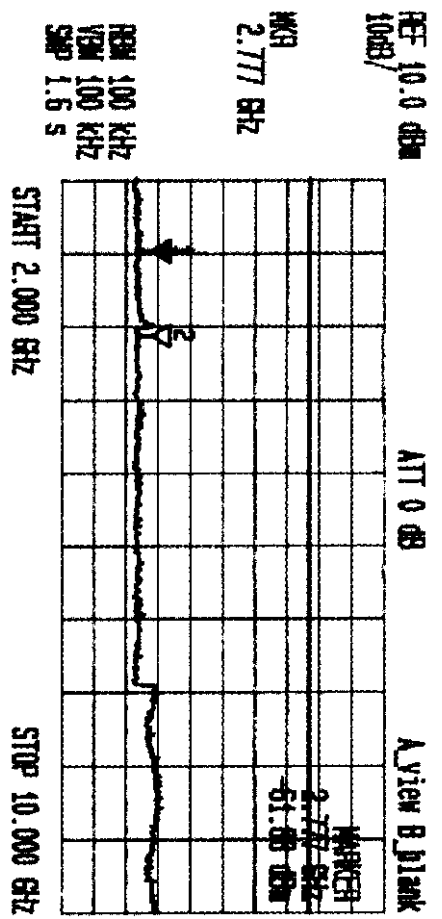
*** Multi Marker List ***
 No. 1: 925 MHz 36.56 dBm A
 No. 2: 1.852 GHz -27.44 dBm A

No. 1:
 No. 2:
 No. 3:
 No. 4:
 No. 5:
 No. 6:
 No. 7:
 No. 8:
 A:



MICROWAVE DATA SYSTEMS - MDS9790RADIO TRANSCIEVER
 Tx Frequency: 427.05 MHz, RF Output Power: 5.5 Watts
 Modulation: FM Modulation with random data @ 1600 Hz

Date: Nov. 23, 1998
 Tested by: Ilang malik



*** Multi Marker List ***
 2.777 GHz -51.88 dBm A
 3.703 GHz -51.53 dBm A

- NO.1: A
- NO.2: A
- NO.3: A
- NO.4: A
- NO.5: A
- NO.6: A
- NO.7: A
- NO.8: A

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RF FREQUENCY (MHz)	RF LEVEL (dbm)	USED DETECTOR (PEAK/QP)	LIMIT (dbm)	MARGIN (dB)	PASS/FAIL
1888.10	-28.3	PEAK	-20.0	-8.3	PASS
2832.15	-58.3	PEAK	-20.0	-38.3	PASS

Fundamental Frequency: 944.05 MHz
 RF Output Power: 5.0 Watts
 Modulation: FM modulation with internal random data @ 9600 b/s

No other significant rf spurious/harmonic emissions found in the frequency range from 10 MHz to 10 GHz; all emissions must be more than 20 dB below the specified limits. Please refer to the attached plot.

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File #: MIC9F101TX

Nov. 26, 1998

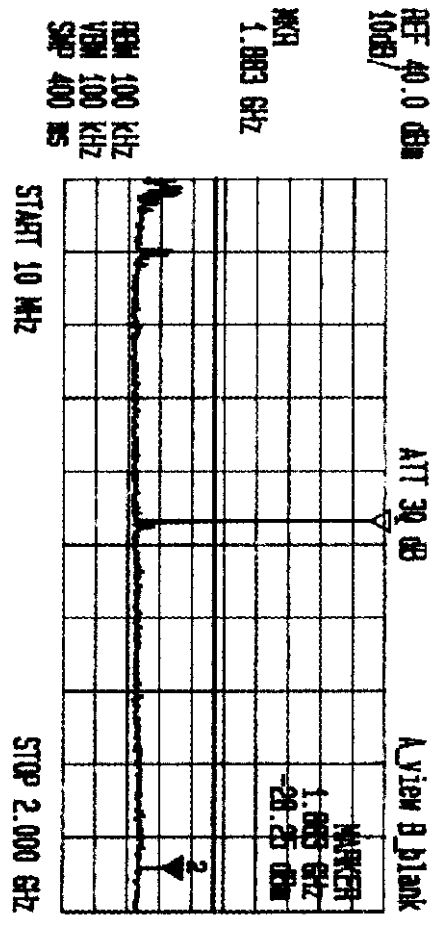
FCC PARTS 2 & 101, SUBPART I, FIXED MICROWAVE SERVICES TRANSMITTERS

RADIO TRANSCIEVER, Model MDS 9790



MICROWAVE DATA SYSTEMS - MDS9790RADIO TRANSCIEVER
 Tx Frequency: 940 MHz, RF Output Power: 5.2 Watts
 Modulation: FM Modulation with random data @ 9.6kbps

Date: Nov. 23, 1998
 Traced by: Hong Wang



*** Multi Marker List ***
 940 MHz 36.13 dBm A
 1.883 GHz -28.25 dBm A

- No. 1:
- No. 2:
- No. 3:
- No. 4:
- No. 5:
- No. 6:
- No. 7:
- No. 8:
- A:

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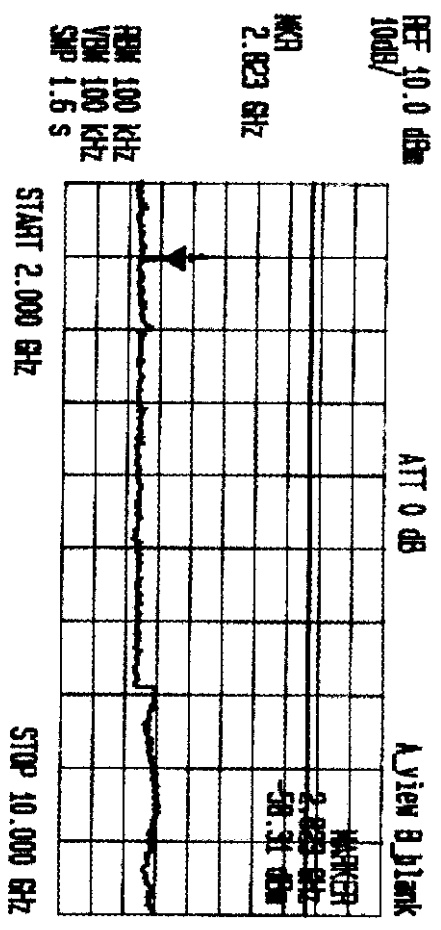


MICROWAVE DATA SYSTEMS - MDS9790RADIO TRANSCIEVER
 Tx Frequency: 2.823 GHz MHz, RF Output Power: 5.2 Watts
 Modulation: FM Modulation with random data @ 4 kbps

Date: Nov 23 1998
 Tested by: Wang shou

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File #: MIC9F101TX
 Nov. 26, 1998



*** Multi Marker List ***
 2.823 GHz -58.31 dBm A

1: NO
 2: NO
 3: NO
 4: NO
 5: NO
 6: NO
 7: NO
 8: NO
 A: NO

FCC PARTS 2 & 101, SUBPART I, FIXED MICROWAVE SERVICES TRANSMITTERS

RADIO TRANSMITTER, Model MDS 9790

FREQUENCY (MHz)	RF LEVEL (dbm)	USED DETECTOR (PEAK/QP)	LIMIT (dbm)	MARGIN (db)	PASS/FAIL
1906.10	-29.6	PEAK	-20.0	-9.6	PASS
2859.15	-62.2	PEAK	-20.0	-42.2	PASS
4765.25	-55.7	PEAK	-20.0	-35.7	PASS
5718.30	-57.1	PEAK	-20.0	-37.1	PASS
6671.35	-60.3	PEAK	-20.0	-40.3	PASS

Fundamental Frequency: 953.05 MHz
 RF Output Power: 5.0 Watts
 Modulation: FM modulation with internal random data @ 9600 b/s

No other significant rf spurious/harmonic emissions found in the frequency range from 10 MHz to 10 GHz ; all emissions must be more than 20 dB below the specified limits. Please refer to the attached plot.

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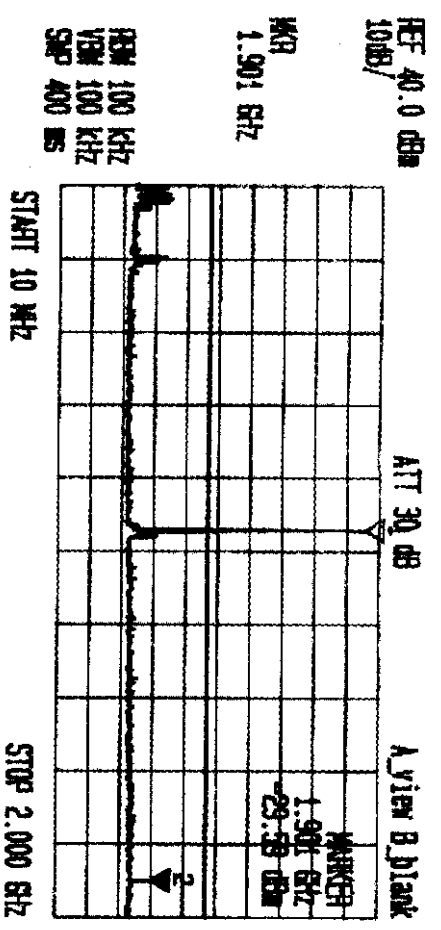
All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

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MICROWAVE DATA SYSTEMS - MDS9790RADIO TRANSCIEVER
 Tx Frequency: 948 MHz, RF Output Power: 5.5 Watts
 Modulation: FM Modulation with random data @ 4 kbps

Date: Nov 23 1998
 Tested by: Mike Vink



*** Multi Marker List ***

No.	Freq (MHz)	Power (dBm)	Label
1:	948 MHz	36.31 dBm	A
2:	1.901 GHz	-29.59 dBm	A

- NO. 1:
- NO. 2:
- NO. 3:
- NO. 4:
- NO. 5:
- NO. 6:
- NO. 7:
- NO. 8:
- NO. A:

File #: MIC9F101TX
 Nov. 26, 1998

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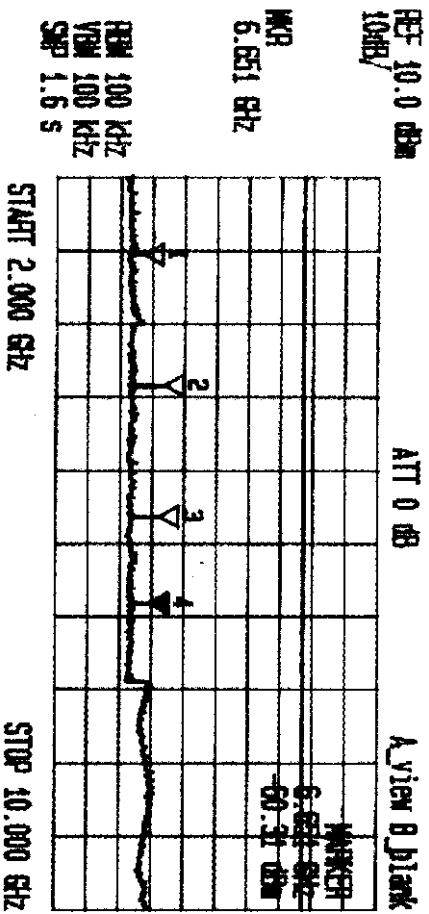
All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)



UltraTech
Engineering Labs Inc.

MICROWAVE DATA SYSTEMS - MDS9790RADIO TRANSCIEVER
Tx Frequency: 9.523 GHz MHz, RF Output Power: 5.5 Watts
Modulation: FM Modulation with random data @ 9.523 MHz

Date: 12/11/98
Tested by: Steve Smith



*** Multi Marker List ***

NO.	Frequency (GHz)	Power (dBm)	Marker
1	2.846	-62.16	A
2	4.274	-55.72	A
3	5.703	-57.09	A
4	6.651	-60.31	A

- NO. 1:
- NO. 2:
- NO. 3:
- NO. 4:
- NO. 5:
- NO. 6:
- NO. 7:
- NO. 8:
- NO. A:

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FCC PARTS 2 & 101, SUBPART I, FIXED MICROWAVE SERVICES TRANSMITTERS

RADIO TRANSCIEVER, Model MDS 9790

4.8. TRANSMITTER SPURIOUS/HARMONIC RADIATED EMISSIONS @ FCC 101.111(5)

PRODUCT NAME: RADIO TRANSCIEVER, Model No.: MDS 9790

FCC REQUIREMENTS:

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

FREQUENCY RANGE (MHz)	MAXIMUM OBW (KHz)	CHANNEL SPACING (KHz)	MAX. FREQ. DEVIATION (KHz)	FCC SPECIFICATION LIMITS (Para. No.)
928 - 960	11.25	12.5	N/A	50+10log ₁₀ (P) or -20 dbm

CLIMATE CONDITION:

Standard Temperature and Humidity:

- Ambient temperature: 21 °C
- Relative humidity: 43%

POWER INPUT:

120 Vac, 60 Hz Nominal.

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. Spectrum Analyzer, Advantest, Model R3271, S/N: 15050203, 100 Hz to 32 GHz
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.

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:

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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 10th 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:

$$S = P / (4\pi X D^2)$$

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/m²) and electric field E (V/m) is related by:

$$S = E^2 / (120\pi)$$

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:

$$S = (1.64 \times P) / (4 \times \pi \times D^2)$$

$$E = (49.2 \times P)^{1/2} \times D = 7.01 \times (P)^{1/2} / D$$

$$P = (E \times D / 7.01)^2$$

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

$$P(W) = [E(V/m) \times D / 7.01]^2$$

$$P(mW) = P(W) \times 1000$$

$$P(dBm) = 10 \log P(mW)$$

$$= 20 \log E(V/m) + 20 \log(D) - 20 \log(7.01) + 10 \log 1000$$

$$= E(dB V/m) + 20 \log D + 13$$

$$= E(dB \mu V/m) - 120 + 20 \log(D) + 13$$

$$= E(dB \mu V/m) + 20 \log(D) - 107$$

The Transmitted Power @ D = 3 Meters

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

TEST RESULTS: Conforms.

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

DATE: Nov. 23, 1998

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File #: MIC9F101TX
 Nov. 26, 1998

FCC PARTS 2 & 101, SUBPART I, FIXED MICROWAVE SERVICES TRANSMITTERS

RADIO TRANSCIEVER, Model MDS 9790

MEASUREMENT DATA

TRANSMITTER RADIATED EMISSIONS MEASUREMENTS @ 3 METERS

TEST CONFIGURATION

- The channel frequencies (Low, Middle and High) was established at its full rated output power. The level of the carrier was recorded and compared to the level of the emissions as required in Part 101.210. 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 10th harmonic of fundamental were scanned, and only emissions less than 20 dB below the limits (-20 dBm) were recorded.

Fundamental Frequency: 929.05 MHz

RF Output Power: 5.0 Watts

Modulation: FM modulation with internal random data @ 9600 b/s

FREQUENCY (MHz)	RF LEVEL @3m (dBuV/m)	RF LEVEL (dbm)	RF DETECTOR USED (PEAK/QP)	ANTENNA PLANE (H/V)	LIMIT (dbm)	MARGIN (dB)	PASS/ FAIL
1858.10	63.4	-34.1	PEAK	V	-20.0	-14.1	PASS
1858.10	60.4	-37.1	PEAK	H	-20.0	-17.1	PASS
2787.15	59.8	-37.7	PEAK	V	-20.0	-17.7	PASS
2787.15	62.2	-35.3	PEAK	H	-20.0	-15.3	PASS
3716.20	49.6	-47.9	PEAK	V	-20.0	-27.9	PASS
3716.20	47.6	-49.9	PEAK	H	-20.0	-29.9	PASS
4645.25	56.3	-41.2	PEAK	V	-20.0	-21.2	PASS
4645.25	56.8	-40.7	PEAK	H	-20.0	-20.7	PASS
5574.30	50.8	-46.7	PEAK	V	-20.0	-26.7	PASS
5574.30	48.1	-49.4	PEAK	H	-20.0	-29.4	PASS
6503.35	48.9	-48.6	PEAK	V	-20.0	-28.6	PASS
6503.35	44.0	-53.5	PEAK	H	-20.0	-33.5	PASS
7432.40	49.2	-48.3	PEAK	V	-20.0	-28.3	PASS
7432.40	48.8	-48.7	PEAK	H	-20.0	-28.7	PASS
8361.45	46.7	-50.8	PEAK	V	-20.0	-30.8	PASS
8361.45	46.1	-51.4	PEAK	H	-20.0	-31.4	PASS
9290.50	47.4	-50.1	PEAK	V	-20.0	-30.1	PASS
9290.50	45.9	-51.6	PEAK	H	-20.0	-31.6	PASS

No significant spurious/harmonic emissions found in the frequency range from 10 MHz to 10 GHz ; all emissions must be more than 30 dB (approx.) below the specified limits. Please refer to the attached plot.

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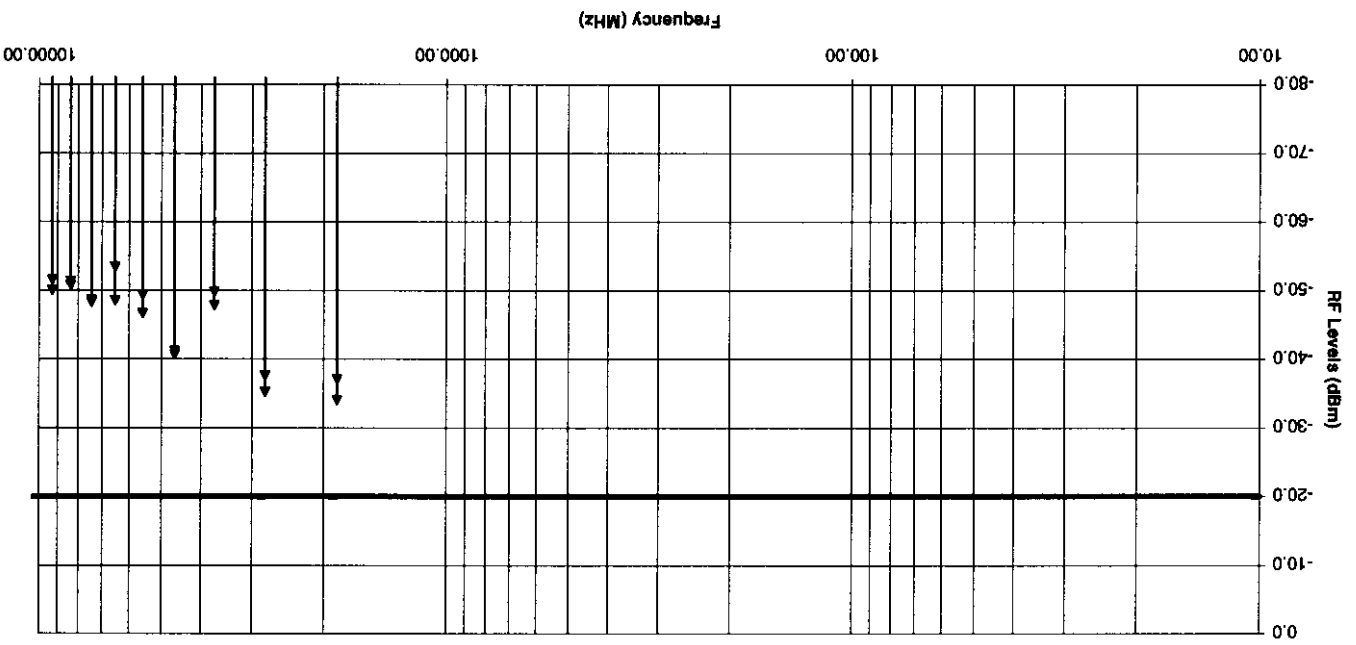
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Transmitter Antenna Conducted Emissions Measurements
 Microwave Data Systems - MDS 9790 Radio Transmitter
 Transmit Freq.: 929.05 Mhz, FM Modulation with 9600 B/s Internal random data source



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FCC PARTS 2 & 101, SUBPART I, FIXED MICROWAVE SERVICES TRANSMITTERS

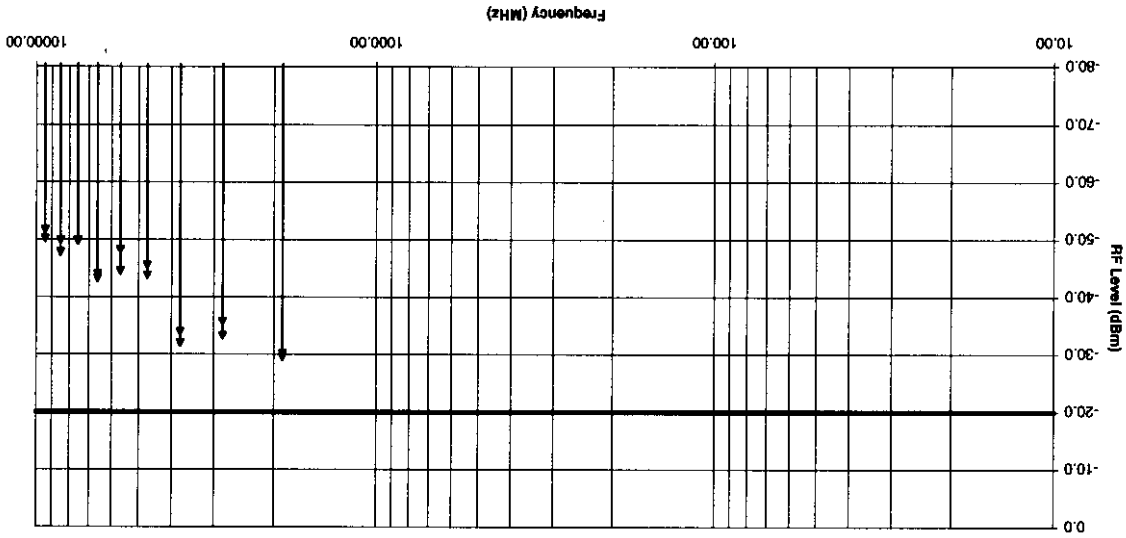
RADIO TRANSCIVER, Model MDS 9790

Fundamental Frequency: 944.05 MHz
 RF Output Power: 5.0 Watts
 Modulation: FM modulation with internal random data @ 9600 b/s

FREQUENCY (MHz)	RF LEVEL @3m (dBuV/m)	RF LEVEL (dBm)	DETECTOR USED (PEAK/QP)	ANTENNA PLANE (H/V)	LIMIT (dBm)	MARGIN (dB)	PASS/FAIL
1888.10	67.9	-29.6	PEAK	V	-20.0	-9.6	PASS
1888.10	67.3	-30.2	PEAK	H	-20.0	-10.2	PASS
2832.15	61.8	-35.7	PEAK	V	-20.0	-15.7	PASS
2832.15	64.2	-33.3	PEAK	H	-20.0	-13.3	PASS
3776.20	65.5	-32.0	PEAK	V	-20.0	-12.0	PASS
3776.20	63.5	-34.0	PEAK	H	-20.0	-14.0	PASS
4720.25	53.7	-43.8	PEAK	V	-20.0	-23.8	PASS
4720.25	52.0	-45.5	PEAK	H	-20.0	-25.5	PASS
5664.30	53.0	-44.5	PEAK	V	-20.0	-24.5	PASS
5664.30	49.3	-48.2	PEAK	H	-20.0	-28.2	PASS
6608.35	53.5	-44.0	PEAK	V	-20.0	-24.0	PASS
6608.35	54.3	-43.2	PEAK	H	-20.0	-23.2	PASS
7552.40	47.8	-49.7	PEAK	V	-20.0	-29.7	PASS
7552.40	47.6	-49.9	PEAK	H	-20.0	-29.9	PASS
8496.45	49.7	-47.8	PEAK	V	-20.0	-27.8	PASS
8496.45	47.6	-49.9	PEAK	H	-20.0	-29.9	PASS
9440.50	47.3	-50.2	PEAK	V	-20.0	-30.2	PASS
9440.50	45.8	-51.7	PEAK	H	-20.0	-31.7	PASS

No significant spurious/harmonic emissions found in the frequency range from 10 MHz to 10 GHz ; all emissions must be more than 30 dB (approx.) below the specified limits. Please refer to the attached plot.

Transmitter Antenna Conducted Emissions Measurements
 Microwave Data Systems - MDS 9790 Radio Transmitter
 Transmit Freq.: 944.05 MHz, FM Modulation with 9600 b/s internal random data source



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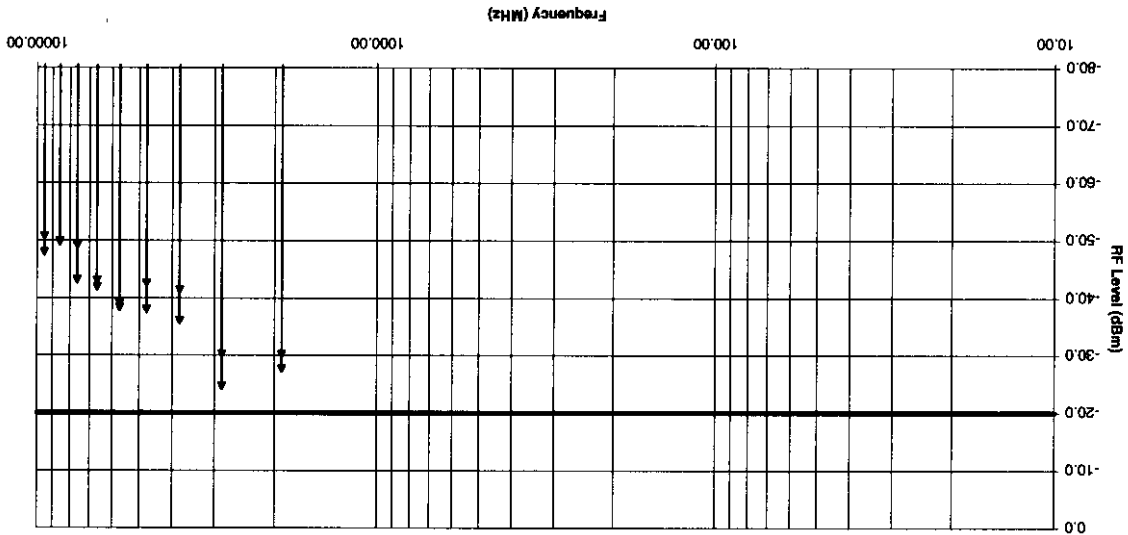
File #: MIC9F101TX
 Nov. 26, 1998

Fundamental Frequency: 953.05 MHz
 RF Output Power: 5.0 Watts
 Modulation: FM modulation with internal random data @ 9600 b/s

FREQUENCY (MHz)	RF LEVEL @ 3m (dBuV/m)	RF LEVEL (dBm)	RF DETECTOR (PEAK/QP)	ANTENNA PLANE (H/V)	LIMIT (dBm)	MARGIN (dB)	PASS/FAIL
1906.10	69.8	-27.7	PEAK	V	-20.0	-7.7	PASS
1906.10	67.3	-30.2	PEAK	H	-20.0	-10.2	PASS
2859.15	72.8	-24.7	PEAK	V	-20.0	-4.7	PASS
2859.15	67.2	-30.3	PEAK	H	-20.0	-10.3	PASS
3812.20	61.4	-36.1	PEAK	V	-20.0	-16.1	PASS
3812.20	56.0	-41.5	PEAK	H	-20.0	-21.5	PASS
4765.25	59.4	-38.1	PEAK	V	-20.0	-18.1	PASS
4765.25	54.9	-42.6	PEAK	H	-20.0	-22.6	PASS
5718.30	59.1	-38.4	PEAK	V	-20.0	-18.4	PASS
5718.30	58.3	-39.2	PEAK	H	-20.0	-19.2	PASS
6671.35	54.4	-43.1	PEAK	V	-20.0	-23.1	PASS
6671.35	55.5	-42.0	PEAK	H	-20.0	-22.0	PASS
7624.40	54.3	-43.2	PEAK	V	-20.0	-23.2	PASS
7624.40	48.3	-49.2	PEAK	H	-20.0	-29.2	PASS
8577.45	47.7	-49.8	PEAK	V	-20.0	-29.8	PASS
8577.45	47.6	-49.9	PEAK	H	-20.0	-29.9	PASS
9530.50	49.5	-48.0	PEAK	V	-20.0	-28.0	PASS
9530.50	46.7	-50.8	PEAK	H	-20.0	-30.8	PASS

No significant spurious/harmonic emissions found in the frequency range from 10 MHz to 10 GHz; all emissions must be more than 30 dB (approx.) below the specified limits. Please refer to the attached plot.

Transmitter Antenna Conducted Emissions Measurements
 MicroWave Data Systems - MDS 9790 Radio Transmitter
 Transmit Freq.: 953.05 MHz, FM Modulation with 9600 b/s internal random data source



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5. EXHIBIT 5 - GENERAL TEST PROCEDURES

5.1. 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 biconilog 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 and 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:

- Step 1: Monitor the frequency range of interest at a fixed antenna height and EUT azimuth.
- Step 2: Manipulate the system cables to produce highest amplitude signal relative to the limit. Note the amplitude and frequency of the suspect signal.
- Step 3: 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 = Receiver/Analyzer Reading
 RA = Antenna Factor
 AF = Cable Attenuation Factor
 CF = 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:

$$\text{Field Level} = 60 + 7.0 + 1.0 - 30 = 38.0 \text{ dBuV/m}$$

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

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

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