ENGINEERING TEST REPORT

SCANNING RECEIVER
Model No.: IC-PCR100

FCC ID: AFJIC-PCR100

Applicant: **ICOM Incorporated**
1-6-19 Kamikurazukuri
Hirano-ku, Osaka
Japan, 547

Tested in Accordance With

Federal Communications Commission (FCC)
CFR 47, Part 15, Subpart B
Scanning Receivers operating in the Frequency Band 30-960 MHz
(excluding Cellular RadioTelephone Service Bands: 824-849 MHz & 869-894 MHz)

UltraTech's File No.: ICOM-005FRX

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: Tri M. Luu, P.Eng. ……..	Tested by: Manuel D'Oliveira ……..
Issued Date: Oct. 28, 1999	Test Dates: Oct 26-27, 1999

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

UltraTech

3000 Bristol Circle, Oakville, Ontario, Canada, L6H 6G4
Telephone (905) 829-1570 Facsimile (905) 829-8050
Website: www.ultratech-labs.com Email: vhk.ultratech@sympatico.ca

TABLE OF CONTENTS

EXHIBIT 1. INTRODUCTION

1.1. SCOPE

Reference:	FCC Part 15, Subpart B, Section 15.121
Title	Telecommunication - Code of Federal Regulations, CFR 47, Part 15
Purpose of Test:	To gain FCC Class II Permissive Change Authorization for an existing FCC Certified Scanning Receiver operating in 0.01-823.999, 849.001-868.999 and 894.001-1300 MHz (excluding Cellular RadioTelephone Service Frequency Bands: 824-849 MHz & 869-894 MHz). Note: There is no modification/change applied to this EUT subject to this continuing compliance with FCC new rule 15.121.
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.
Environmental Classification:	Residential Light-industry, Commercial Industry

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

None

1.3. 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	1999	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:	ICOM Incorporated
Address:	1-6-19 Kamikurazukuri Hirano-ku, Osaka Japan, 547
Contact Person:	Mr. A. Asano Phone #: 06-793-5302 Fax #: 06-793-0013

MANUFACTURER:	
Name:	ICOM Incorporated
Address:	1-6-19 Kamikurazukuri Hirano-ku, Osaka Japan, 547
Contact Person:	Mr. A. Asano Phone #: 06-793-5302 Fax #: 06-793-0013

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	ICOM Incorporated
Product Name	SCANNING RECEIVER
Model Name or Number	IC-PCR100
Serial Number	00005
Type of Equipment	Scanning Receivers
External Power Supply	Using an external AC-DC power supply, Icom Model No.: 481210003CO, AC IN: 120VAC 60Hz, DC OUT: 12Vdc
Primary User Functions of EUT:	Scanning and receiving rf signals in the frequency ranges 0.01-823.999 MHz, 849.001-868.999 MHz and 894.001-1300 MHz
Power input source:	AC 120 V 60Hz

2.3. EUT'S TECHNICAL SPECIFICATIONS

RECEIVER	
Equipment Type:	• Base station (fixed use)
Power Supply Requirement:	AC 120 V 60Hz
Operating Frequency Range:	0.01-823.999, 849.001-868.999 and 894.001-1300 MHz
RF Input Impedance:	50 Ohms
Oscillator Frequencies:	10.25 MHz, 9.8304 MHz, 12.8 MHz, 266.7 MHz (1st IF), 255- 257 MHz (2nd IF), Lo-f: 532.4 – 1066.65 MHz, Lo-f: 266.7-532.35 MHz, VCO1: 532.4-749.95 MHz and VCO2: 750.0- 1066.65 MHz

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	RS232 Port	1	DB9	Shielded
2	Antenna Port	1	BNC	N/A. Direct antenna connection
3	DC Power Input Port	1	…	Non-shielded
4	EXT-SP Port	1	Phono	Non-shielded

2.5. ANCILLARY EQUIPMENT

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

EUT: ICOM INC., Communications Receiver, Model: IC-PCR100, OSC. FREQ: 9.8304 MHz, 10.25 MHz, 12.8 MHz,
I/O Cable: RS232 (shielded), All other cables are non-shielded
Power Supply Cable: Non-shielded

PERIPHERAL: Compag Labtop, Model: ARMADA4120T, FCC ID: CNT75MB36C
I /O Cable: Shielded
Power Supply Cable: Non-shielded

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:	101 kPa
Power input source:	AC 120 V 60Hz

3.2. OPERATIONAL TEST CONDITIONS & ARRANGEMENT FOR TEST SIGNALS

Operating Modes:	The receiver was operated in the normal intended during testing
Special Test Software:	Icom application window software was used to operate the EUT
Special Hardware Used:	None
Receiver Test Antenna:	None

Receiver Test Signals:	
Frequencies:	Near lowest, near middle & near highest frequencies each frequency bands of the cellular band were applied to tests @ FCC15.121 ▪ 824, 836.5 & 849 MHz for 824-849 MHz cellular band ▪ 869, 881.5 and 894 MHz for 869-894 MHz cellular band

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.

4.2. APPLICABILITY & SUMMARY OF EMC EMISSION TEST RESULTS

FCC PART 15, SUBPART B	TEST REQUIREMENTS	MEASUREMENTS	COMPLAINCE (YES/NO)
15.121	Restricted Cellular Signal / Rx Allowable Signal Ratio @12 SINAD	40.3 dB minimum @ 807.6 MHz image	Yes

4.3. MODIFICATIONS REQUIRED FOR COMPLIANCE

None

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

5.1. RESTRICTION FOR USES AND MODIFICATION OF THE SCANNING RECEIVERS @ FCC PART 15, SUBPART B, PARA.15.121

5.1.1. Limits

Please refer to FCC CFR 47:1999, Section 15.121 and test data below

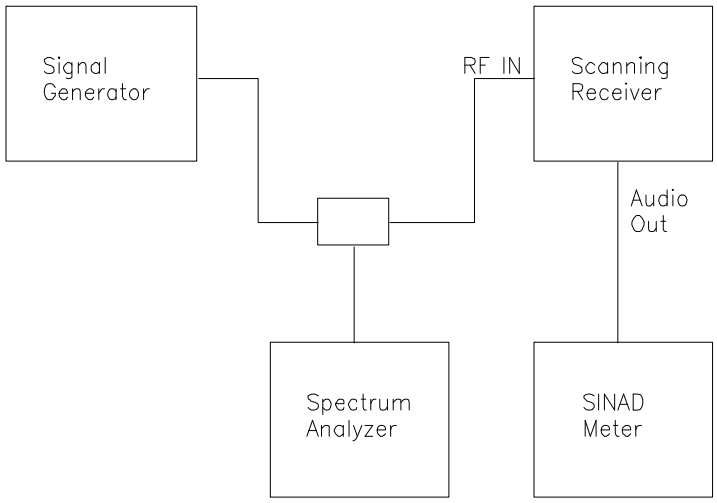
5.1.2. Method of Measurements

1. Set the signal generator at the frequency within the scanning receiver operational band and outside the 824-849 MHz and 869-894 MHz.
2. Adjust the RF input level until the Distortion meter read 12 dB SINAD. Record the RF input level A1 at the receiver input port.
3. Set the signal generator to deliver an rf signal at the frequency 824 MHz, and the level of at least A1+60 dB
4. Set the scanner to sweep through its operating frequency bands, and record the image frequencies during sweeping. The image frequencies can be detected by listening to the scanner's audio output speaker and also their appearance on the spectrum analyzer (EMI receiver).
5. Tune the scanner at each image frequency received in step 4, then adjust the signal generator output level until the 12 dB SINAD is read on the distortion meter. Record the RF input level A2 at the receiver input port.
6. The difference between A1 and A2 shall be greater or equal to 38 dB.
7. Repeat steps 3 through 6 with the receiver input signal at frequencies 836.5 MHz, 849 MHz, 869 MHz, 881.5 MHz and 894 MHz.

5.1.3. 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
RF Signal Generator	Fluke	6061A	…	10 kHz – 1050 MHz
Combining Network	Lucas	1890	…	DC – 2000 MHz
Communication Analyzer	Rohde & Schawrz	SMF02	879988/057	400 kHz - 1000 MHz including AF & RF Signal Generators, SINAD, DISTORTION, DEVIATION meters and etc

5.1.4. Test Equipment List



5.1.5. Test Data / Engineering Analysis

FCC Rules/Limits	Comments
@ 15.121(a)(1): – Be incapable of operating (tuning), or readily being altered by the user to operate, within the frequency bands allocated to the Cellular Radiotelephone Service in part 22 of this chapter (cellular telephone bands 824-849 MHz and 869-894 MHz); scanning receivers capable of "readily being altered by the user" include, but are not limited to, those for which the ability to receive transmissions in the cellular telephone bands can be added by clipping the leads of, or installing, a simple component such as a diode, resistor or jumper wire, replacing a plug-in semiconductor chip, or programming a semiconductor chip using special access codes or an external device, such as a personal computer. Scanning receivers and frequency converters designed for use with scanning receivers, also shall be incapable of converting digital cellular communication transmissions to analog voice audio	The EUT is designed with security software to reject the device to receive any rf signal in the cellular bands. For example, the EUT reset itself to the last enter channel frequency which is outside the cellular band
@ 15.121(a)(1): – Scanning receivers and frequency converters designed for use with scanning receivers, also shall be incapable of converting digital cellular communication transmissions to analog voice audio	The EUT is designed without the capability to convert the digital cellular communication transmissions to analog voice audio
@ 15.121(a)(2): - Be designed so that the tuning, control and filtering circuitry is inaccessible. The design must be such that any attempts to modify the equipment to receive transmissions from the cellular Radiotelephone Service likely will render the receiver inoperative.	The EUT is completely housed by a plastic case, which has no accessibility to inside circuitry to avoid any attempts to modify the equipment.
@ 15.121(b):- Scanning receivers shall reject any signals from the Cellular. Radiotelephone Service frequency bands that are 38 dB or higher based upon a 12 dB SINAD measurements, which is considered the threshold where a signal can be clearly discerned from any interference that me be present.	Conforms. The following tests were conducted to confirm the compliance with this rule of FCC's
@ 15.121(d) & (f)(1) Modification of a scanning receiver to receive transmissions from Cellular RadioTelephone Service frequency bands will be considered to constitute manufacture of such equipment. This includes any individual, individuals, entity or organization that modifies one or more scanners. Any modification to a scanning receiver to receive transmissions from the Cellular Radiotelephone Service frequency bands voids the certification of the scanning receiver, regardless of the date of manufacture of the original unit. In addition, the provisions of sec. 15.323 shall not be interpreted as permitting modification of a scanning receiver to receive Cellular Radiotelephone Service transmissions.	Users are informed in the User's Manual that modifications are not allowed. **WARNING:** **MODIFICATION OF THIS DEVICE TO RECEIVE CELLULAR RADIOTELEPHONE SERVICE SIGNALS IS PROHIBITED UNDER FCC RULES AND FEDERAL LAW.**
@ 15.121(e):- Scanning receivers and frequency converters designed for use with scanning receivers shall not be assembled from kits or marketed in kit form unless they comply with the requirements in paragraph (a) through (c) of this section.	Conform. Complete assembled product is sold by the manufacturer.

Reference:
Measured reference RF input level (A1) at the receiver input port = **-93.7 dBm**
Where the rf frequency is 80 MHz and Audio output signal-to-noise is 12 dB SINAD

5.1.5.1. Receiver Input Signal @ 824 MHz

Note: The EUT scanned from 0.01 to 1,300 MHz and the RF input @ 824 MHz was measured and recorded at each image frequency detected @ 12 dB SINAD.

Image Frequency Detected (MHz)	RF Input Level @ Rx Input Port (dBm)	Audio Output Distortion (SINAD)	Difference of RF Level @ 12 dB SINAD (A2-A1) dB	FCC Minimum Limit (dB)	Comments
412.0	-11.8	12.0	81.9	38.0	Pass
811.6	-32.9	12.0	60.8	38.0	Pass
819.6	-22.9	12.0	70.8	38.0	Pass
968.0	-16.1	12.0	77.6	38.0	Pass
989.4	-17.3	12.0	76.4	38.0	Pass

Remarks:

- Other detected image signals where the 12 dB SINAD can not be obtained (usually 0 dB SINAD) with the reduction of the RF Input level are not recorded in this table.
- No images were found to fall within Cellular Bands 824-849 MHz and 869-894 MHz

5.1.5.2. Receiver Input Signal @ 836.5 MHz

Note: The EUT scanned from 0.01 to 1,300 MHz and the RF input @ 836.5 MHz was measured and recorded at each image frequency detected @ 12 dB SINAD.

Image Frequency Detected (MHz)	RF Input Level @ Rx Input Port (dBm)	Audio Output Distortion (SINAD)	Difference of RF Level @ 12 dB SINAD (A2-A1) dB	FCC Minimum Limit (dB)	Comments
303.1	-12.9	12.0	80.8	38.0	Pass
418.2	-13.7	12.0	80.0	38.0	Pass
807.6	-53.4	12.0	40.3	38.0	Pass
813.4	-26.6	12.0	67.1	38.0	Pass
818.3	-45.8	12.0	47.9	38.0	Pass
820.8	-27.8	12.0	65.9	38.0	Pass
960.8	-23	12.0	70.7	38.0	Pass
1014.3	-9.9	12.0	83.8	38.0	Pass
1236.6	-22.2	12.0	71.5	38.0	Pass
1254.8	-10.2	12.0	83.5	38.0	Pass

Remarks:

- Other detected image signals where the 12 dB SINAD can not be obtained (usually 0 dB SINAD) with the reduction of the RF Input level are not recorded in this table.
- No images were found to fall within Cellular Bands 824-849 MHz and 869-894 MHz

5.1.5.3. Receiver Input Signal @ 849 MHz

Note: The EUT scanned from 0.01 to 1,300 MHz and the RF input @ 849 MHz was measured and recorded at each image frequency detected @ 12 dB SINAD.

Image Frequency Detected (MHz)	RF Input Level @ Rx Input Port (dBm)	Audio Output Distortion (SINAD)	Difference of RF Level @ 12 dB SINAD (A2-A1) dB	FCC Minimum Limit (dB)	Comments
105.2	-22.45	12.0	71.3	38.0	Pass
849.9	-47.2	12.0	46.5	38.0	Pass
854.4	-35.2	12.0	58.5	38.0	Pass
894.6	-20.7	12.0	73.0	38.0	Pass
921.6	-39.5	12.0	54.2	38.0	Pass
964.6	-27.4	12.0	66.3	38.0	Pass

Remarks:

- Other detected image signals where the 12 dB SINAD can not be obtained (usually 0 dB SINAD) with the reduction of the RF Input level are not recorded in this table.
- No images were found to fall within Cellular Bands 824-849 MHz and 869-894 MHz

5.1.5.4. Receiver Input Signal @ 869 MHz

Note: The EUT scanned from 0.01 to 1,300 MHz and the RF input @ 869 MHz was measured and recorded at each image frequency detected @ 12 dB SINAD.

Image Frequency Detected (MHz)	RF Input Level @ Rx Input Port (dBm)	Audio Output Distortion (SINAD)	Difference of RF Level @ 12 dB SINAD (A2-A1) dB	FCC Minimum Limit (dB)	Comments
335.6	-20.2	12.0	73.5	38.0	Pass
434.5	-32.3	12.0	61.4	38.0	Pass
814.9	-21.5	12.0	72.2	38.0	Pass
823.9	-32	12.0	61.7	38.0	Pass
935.0	-38	12.0	55.7	38.0	Pass
1013.1	-1	12.0	92.7	38.0	Pass
1046.8	0.6	12.0	94.3	38.0	Pass
1090.6	9.4	12.0	103.1	38.0	Pass
1125.0	10.7	12.0	104.4	38.0	Pass
1224.6	11.3	12.0	105.0	38.0	Pass
1229.0	18.4	12.0	112.1	38.0	Pass
1268.6	15	12.0	108.7	38.0	Pass
1269.0	12.5	12.0	106.2	38.0	Pass
1289.0	17.2	12.0	110.9	38.0	Pass

Remarks:

- Other detected image signals where the 12 dB SINAD can not be obtained (usually 0 dB SINAD) with the reduction of the RF Input level are not recorded in this table.
- No images were found to fall within Cellular Bands 824-849 MHz and 869-894 MHz

5.1.5.5. Receiver Input Signal @ 881.5 MHz

Note: The EUT scanned from 0.01 to 1,300 MHz and the RF input @ 881.5 MHz was measured and recorded at each image frequency detected @ 12 dB SINAD.

Image Frequency Detected (MHz)	RF Input Level @ Rx Input Port (dBm)	Audio Output Distortion (SINAD)	Difference of RF Level @ 12 dB SINAD (A2-A1) dB	FCC Minimum Limit (dB)	Comments
40.70	-40.6	12.0	53.1	38.0	Pass
41.20	14.8	12.0	108.5	38.0	Pass
307.40	-10.5	12.0	83.2	38.0	Pass
418.70	0.7	12.0	94.4	38.0	Pass
440.70	-0.8	12.0	92.9	38.0	Pass
440.78	-8	12.0	85.7	38.0	Pass
481.45	13.3	12.0	107.0	38.0	Pass
681.50	16.8	12.0	110.5	38.0	Pass
703.70	7.9	12.0	101.6	38.0	Pass
821.18	-9	12.0	84.7	38.0	Pass
861.15	-29.5	12.0	64.2	38.0	Pass
902.90	-20.7	12.0	73.0	38.0	Pass
994.50	-18.2	12.0	75.5	38.0	Pass
1025.29	-7.9	12.0	85.8	38.0	Pass

Remarks:

- Other detected image signals where the 12 dB SINAD can not be obtained (usually 0 dB SINAD) with the reduction of the RF Input level are not recorded in this table.
- No images were found to fall within Cellular Bands 824-849 MHz and 869-894 MHz

5.1.5.6. Receiver Input Signal @ 894 MHz

Note: The EUT scanned from 0.01 to 1,300 MHz and the RF input @ 894 MHz was measured and recorded at each image frequency detected @ 12 dB SINAD.

Image Frequency Detected (MHz)	RF Input Level @ Rx Input Port (dBm)	Audio Output Distortion (SINAD)	Difference of RF Level @ 12 dB SINAD (A2-A1) dB	FCC Minimum Limit (dB)	Comments
47.0	-28.9	12.0	64.8	38.0	Pass
120.2	-21.1	12.0	72.6	38.0	Pass
360.6	-22	12.0	71.7	38.0	Pass
894.9	-47.1	12.0	46.6	38.0	Pass
909.6	-27.1	12.0	66.6	38.0	Pass
910.1	-16.7	12.0	77.0	38.0	Pass
915.4	-51.4	12.0	42.3	38.0	Pass
919.6	-42.7	12.0	51.0	38.0	Pass
951.6	-45	12.0	48.7	38.0	Pass

Remarks:

- Other detected image signals where the 12 dB SINAD can not be obtained (usually 0 dB SINAD) with the reduction of the RF Input level are not recorded in this table.
- No images were found to fall within Cellular Bands 824-849 MHz and 869-894 MHz