Engineering and Testing for EMC and Safety Compliance

APPLICATION FOR FCC CLASS B CERTIFICATION

SCANNING RECEIVER

Vertex Standard Co., Ltd.
4-8-8, Nakameguro
Meguro-ku, Tokyo 153-8644
Japan

MODEL: FT-7100M
FCC ID: K66FT-7100M

January 12, 2001

This report concerns (check one): Original Grant: X **Class II Change:** **Equipment Type**: **Scanning Receiver**
Deferred grant requestedper 47 CFR 0.457 (d) (1) (ii)? Yes: No: X **If yes, defer until:** _____ ***Date*** **Company name agrees to notify the Commission by: _____(date) of the intended date of announcement of the product so that the grant can be issued on that date.**

Transition Rules Request per 15.37? Yes: No: X **If no, assumed Part 15, subpart B for unintentional radiators - the new 47 CFR [10-1-90 Edition] provision..**

REPORT PREPARED BY:

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APPENDIX LISTING

1.0 GENERAL INFORMATION

The following Application for FCC Type Certification of a Scanning Receiver is prepared on behalf of Vertex Standard in accordance with Part 2, and Part 15, Subparts A and B of the Federal Communications Commissions rules and regulations and Industry Canada RSS-210. The Equipment Under Test (EUT) was the FT-7100M, FCC ID: K66FT-7100M. The test results reported in this document relate only to the item that was tested.

All measurements contained in this Application were conducted in accordance with ANSI C63.4 Methods of Measurement of Radio Noise Emissions, 1992. The instrumentation utilized for the measurements conforms to the ANSI C63.4 standard for EMI and Field Strength Instrumentation. Some accessories are used to increase sensitivity and prevent overloading of the measuring instrument. Calibration checks are performed regularly on the instruments, and all accessories including the high pass filter, preamplifier and cables.

All radiated emissions measurement were performed manually at Rhein Tech, Incorporated. The radiated emissions measurements required by the rules were performed on the three-meter, open field; test range maintained by Rhein Tech Laboratories, Inc., 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. Complete description and site attenuation measurement data have been placed on file with the Federal Communications Commission. The power line conducted emission measurements were performed in a shielded enclosure also located at the Herndon, Virginia facility. The FCC accepts Rhein Tech Laboratories, Inc. as a facility available to do measurement work for others on a contractual basis.

1.1 STANDARDS REFERENCED

STANDARDS REFERENCED FOR THIS REPORT	
FCC RULES AND REGULATION	PART 2 SUBPART J
FCC RULES AND REGULATION	PART 15 §15.109
FCC RULES AND REGULATION	PART 15 §15.111
FCC RULES AND REGULATION	PART 15 § 15.121
ANSI	C63.4:1992
INDUSTRY CANADA	RSS-210

1.2 BASIC INFORMATION ON THE EUT

FREQUENCY RANGE MHZ	OUTPUT POWER (W)	FREQUENCY TOLERANCE	EMISSION DESIGNATOR
108 - 180	N/A	N/A	N/A
320 - 480	N/A	N/A	N/A
810 – 960	N/A	N/A	N/A

1.3 MODIFICATIONS

No modifications were made to the EUT during testing.

1.4 RELATED SUBMITTAL(S)/GRANT(S)

This is an original certification submission.

1.5 TEST METHODOLOGY

Radiated testing was performed according to the procedures in ANSI C63.4 1992. Radiated testing was performed at an antenna to EUT distance of 3 meters. The EUT is battery operated. No conducted emissions.

1.6 TEST FACILITY

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of Rhein Tech Laboratories, Inc. 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report, submitted to and approved by the Federal Communication Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 1992).

2.0 SYSTEM TEST CONFIGURATION

2.1 JUSTIFICATION

To complete the test configuration required by the FCC, the receiver was connected to an external antenna, which receives a signal from a signal generator output. With the antenna installed, the receiver indicator was used to determine optimal reception. The EUT's IF, local oscillators, and crystal oscillators and harmonics of each were investigated. All modes were investigated and tested including standby mode and scanning mode. The final radiated data was taken with the EUT locked to a set frequency.

2.2 EXERCISING THE EUT

The EUT was exercised using a Hewlett Packard Signal Generator to generate a continuous wave frequency, which was received by and activated the EUT receiver portion under test.

2.3 TEST SYSTEM DETAILS

The FCC Identifiers for all equipment, plus descriptions of all cables used in the tested system (including inserted cards, which have grants) are:

EXTERNAL PERIPHERALS

PART	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID	CABLE DESCRIPTION	RTL BAR CODE
SPEAKER	BOSTON ACOUSTICS	BA265	0000143	N/A	UNSHIELDED I/O UNSHIELDED POWER	011996
SIGNAL GENERATOR	HEWLETT PACKARD	8660C SYNTHESIZED SIGNAL GENERATOR	1947A02956	N/A	SHIELDED POWER	900059
MICROPHONE, HAND HELD (EUT)	**VERTEX STANDARD CORPORATION LTD.**	**MH-48**	**9M*****	**N/A**	**Shielded**	**012912**
TRANSCEIVER (EUT)	**VERTEX STANDARD CORPORATION LTD.**	**FT-7100M**	**N/A**	**SAMPLE**		**012911**

2.4 TEST SYSTEM CONFIGURATION PHOTOGRAPH

2.5 EMISSIONS EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. LAB
AMPLIFIER	HEWLETT PACKARD	11975A	2304A00348	TEST EQUITY
AMPLIFIER (S/A 1)	RHEIN TECH	PR-1040	00001	RTL
AMPLIFIER (S/A 2)	RHEIN TECH	RTL2	900723	RTL
AMPLIFIER (S/A 3)	RHEIN TECH	8447F	2944A03783	RTL
AMPLIFIER (S/A 4)	RHEIN TECH	8447D	2727A05397	RTL
BICONICAL/LOG ANTENNA 1	ANTENNA RESEARCH	LPB-2520	1037	LIBERTY LABS
BICONICAL/LOG ANTENNA 2	ANTENNA RESEARCH	LPB-2520	1036	LIBERTY LABS
FIELD SITE SOURCE	EMCO	4610	9604-1313	RTL
FILTER (ROOM 1)	SOLAR	8130	947305	RTL
FILTER (ROOM 2)	SOLAR	8130	947306	RTL
HARMONIC MIXER 1	HEWLETT PACKARD	11970K	2332A00563	TELOGY
HARMONIC MIXER 2	HEWLETT PACKARD	11970A	2332A01199	TELOGY
HORN ANTENNA 1	EMCO	3160-10	9606-1033	EMCO
HORN ANTENNA 2	EMCO	3160-9	9605-1051	EMCO
HORN ANTENNA 3	EMCO	3160-7	9605-1054	EMCO
HORN ANTENNA 4	EMCO	3160-8	9605-1044	EMCO
HORN ANTENNA 5	EMCO	3160-03	9508-1024	EMCO
LISN (ROOM 1/L1)	SOLAR	7225-1	900727	ACUCAL
LISN (ROOM 1/L2)	SOLAR	7225-1	900726	ACUCAL
LISN (ROOM 2/L1)	SOLAR	7225-1	900078	ACUCAL
LISN (ROOM 2/L2)	SOLAR	7225-1	900077	ACUCAL
PRE-AMPLIFIER	HEWLETT PACKARD	8449B OPT	3008A00505	TELOGY
QUASI-PEAK ADAPTER (S/A 1)	HEWLETT PACKARD	85650A	3145A01599	ACUCAL
QUASI-PEAK ADAPTER (S/A 2)	HEWLETT PACKARD	85650A	2811A01276	ACUCAL
QUASI-PEAK ADAPTER (S/A 3)	HEWLETT PACKARD	85650A	2521A00473	ACUCAL
QUASI-PEAK ADAPTER (S/A 4)	HEWLETT PACKARD	85650A	2521A01032	ACUCAL
RF PRESELECTOR (S/A 1)	HEWLETT PACKARD	85685A	3146A01309	ACUCAL
SIGNAL GENERATOR (HP)	HEWLETT PACKARD	8660C	1947A02956	ACUCAL
SIGNAL GENERATOR (WAVETEK)	WAVETEK	3510B	4952044	ACUCAL
SPECTRUM ANALYZER 1	HEWLETT PACKARD	8566B	3138A07771	ACUCAL
SPECTRUM ANALYZER 2	HEWLETT PACKARD	8567A	2841A00614	ACUCAL
SPECTRUM ANALYZER 4	HEWLETT PACKARD	8567A	2727A00535	ACUCAL
TUNABLE DIPOLE	EMCO	3121	274	LIBERTY LABS
ANTENNA	ATM	WR08	08443-6	ATM
MIXER	OLESON	M08HW	F80814-1	OLESON
MIXER	OLESON	M05HW	G80814-1	OLESON
DIPLEXER	OLESON	M05HW	G80814-1	OLESON
MIXER	HEWLETT PACKARD	11970U	2332A01110	ACUCAL
MIXER	HEWLETT PACKARD	11970V	2521A00512	TELOGY
MIXER	HEWLETT PACKARD	11970W	2521A00710	TELOGY
ANTENNA	ATM	WR15	15-443-6	ATM
ANTENNA	ATM	WR10	10-443-6	ATM
ANTENNA	ATM	WR05	05-443-6	ATM
SWEEP GENERATOR	HEWLETT PACKARD	83752A	3610A00866	HEWLETT PACKARD

2.6 TEST METHODOLOGY

RADIATED EMISSIONS MEASUREMENTS

Before final measurements of radiated emissions were made on the open-field three/ten meter range, the EUT was scanned indoors at one meter and three meter distances, in order to determine its emissions spectrum signature. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. This process was repeated during final radiated emissions measurements on the open-field range, at each frequency, in order to insure that maximum emission amplitudes were attained.

Final radiated emissions measurements were made on the three-meter, open-field test site. The EUT was placed on a nonconductive turntable approximately 0.8 meters above the ground plane. The spectrum was examined from 30 MHz to 1000 MHz using a Hewlett Packard 8566B spectrum analyzer, a Hewlett Packard 85650A quasi-peak adapter, and EMCO log periodic and biconical antenna. In order to gain sensitivity, a New Circuits ZHL-4240W preamplifier was connected in series between the antenna and the input of the spectrum analyzer.

At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters in order to determine the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarizations. The spectrum analyzer's 6 dB bandwidth was set to 120 kHz, and the analyzer was operated in the CISPR quasi-peak detection mode. No video filter less than 10 times the resolution bandwidth was used. When any clock exceeds 108 MHz, the EUT was tested between 1 to 2 Gigahertz in peak mode with the resolution bandwidth set at 1 MHz as stated in ANSI C63.4. The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report.

Note: Rhein Tech Laboratories, Inc. has implemented procedures to minimize errors that occur from test instruments, calibration, procedures, and test setups. Test instrument and calibration errors are documented from the manufacturer or calibration lab. Other errors have been defined and calculated within the Rhein Tech quality manual, section 6.1. Rhein Tech implements the following procedures to minimize errors that may occur: yearly as well as daily calibration methods, technician training, and emphasis to employees on avoiding error.

3.0 RADIATED EMISSION DATA

TABLE 1: Radiated Emissions: (Channel set at 108.0 MHz)

(Temperature: 35°F, Humidity: 42%)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
129.700	Qp	V	345	1.0	46.9	-9.9	37.0	43.5	-6.5
233.750	Qp	H	15	1.4	44.1	-9.6	34.5	46.0	-11.5
255.000	Qp	H	185	1.3	45.8	-7.5	38.3	46.0	-7.7
276.250	Qp	H	170	1.2	41.2	-6.8	34.4	46.0	-11.6
297.500	Qp	H	190	1.2	43.5	-6.4	37.1	46.0	-8.9
518.800	Qp	H	155	1.0	33.0	0.9	33.9	46.0	-12.1

**All readings are quasi-peak, unless stated otherwise.*

TEST PERSONNEL:

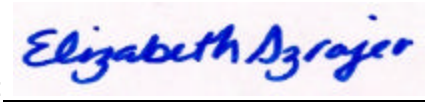
Signature:  Date: January 6, 2001

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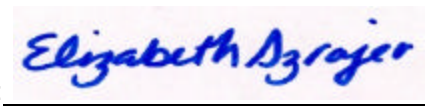
TABLE 2: Radiated Emissions: (Channel set at 144.0 MHz)

(Temperature: 34°F, Humidity: 45%)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
122.300	Qp	V	325	1.0	39.5	-10.1	29.4	43.5	-14.1
233.750	Qp	H	195	1.4	42.1	-9.6	32.5	46.0	-13.5
244.600	Qp	H	290	1.8	39.1	-8.4	30.7	46.0	-15.3
255.000	Qp	H	200	1.4	45.0	-7.5	37.5	46.0	-8.5
297.500	Qp	H	190	1.3	44.6	-6.4	38.2	46.0	-7.8
611.500	Qp	V	265	1.0	32.8	3.0	35.8	46.0	-10.2

**All readings are quasi-peak, unless stated otherwise.*

TEST PERSONNEL:

Signature:  Date: January 6, 2001

Typed/Printed Name: E. Szrajer

TABLE 3: Radiated Emissions: (Channel set at 180.0 MHz)

(Temperature: 35°F, Humidity: 44%)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
158.300	Qp	V	145	1.0	45.0	-11.3	33.7	43.5	-9.8
233.750	Qp	H	255	1.6	45.0	-9.6	35.4	46.0	-10.6
255.000	Qp	H	190	1.4	45.6	-7.5	38.1	46.0	-7.9
297.500	Qp	H	180	1.0	42.1	-6.4	35.7	46.0	-10.3
316.600	Qp	H	265	1.0	37.4	-5.2	32.2	46.0	-13.8
949.800	Qp	H	270	1.0	31.6	9.0	40.6	46.0	-5.4

**All readings are quasi-peak, unless stated otherwise.*

TEST PERSONNEL:

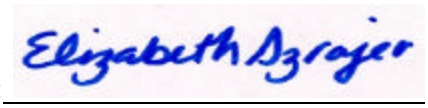
Signature:  Date: January 6, 2001

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TABLE 4: Radiated Emissions: (Channel set at 320.0 MHz)

(Temperature: 35°F, Humidity: 45%)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
233.750	Qp	H	240	1.5	48.5	-9.6	38.9	46.0	-7.1
255.000	Qp	H	265	1.4	47.1	-7.5	39.6	46.0	-6.4
276.250	Qp	H	270	1.3	48.7	-6.8	41.9	46.0	-4.1
297.500	Qp	H	90	1.2	46.2	-6.4	39.8	46.0	-6.2
365.050	Qp	H	255	1.0	47.6	-3.4	44.2	46.0	-1.8
730.100	Qp	H	315	1.0	31.4	4.9	36.3	46.0	-9.7

**All readings are quasi-peak, unless stated otherwise.*

TEST PERSONNEL:

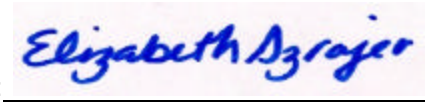
Signature:  Date: January 6, 2001

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TABLE 5: Radiated Emissions: (Channel set at 400.0 MHz)

(Temperature: 34°F, Humidity: 45%)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
233.750	Qp	H	265	1.6	49.5	-9.6	39.9	46.0	-6.1
255.000	Qp	H	270	1.5	47.4	-7.5	39.9	46.0	-6.1
276.250	Qp	H	260	1.4	48.5	-6.8	41.7	46.0	-4.3
297.500	Qp	H	100	1.4	45.2	-6.4	38.8	46.0	-7.2
445.050	Qp	H	260	1.0	42.4	-1.1	41.3	46.0	-4.7
890.100	Qp	V	255	1.0	31.8	6.9	38.7	46.0	-7.3

**All readings are quasi-peak, unless stated otherwise.*

TEST PERSONNEL:

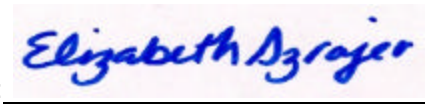
Signature:  Date: January 6, 2001

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TABLE 6: Radiated Emissions: (Channel set at 480.0 MHz)

(Temperature: 34°F, Humidity: 46%)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
233.750	Qp	H	265	1.5	48.2	-9.6	38.6	46.0	-7.4
255.000	Qp	H	275	1.5	47.6	-7.5	40.1	46.0	-5.9
276.250	Qp	H	270	1.3	46.5	-6.8	39.7	46.0	-6.3
297.500	Qp	H	195	1.3	45.0	-6.4	38.6	46.0	-7.4
434.950	Qp	H	270	1.0	41.0	-1.5	39.5	46.0	-6.5
869.900	Qp	H	245	1.0	31.8	7.5	39.3	46.0	-6.7

**All readings are quasi-peak, unless stated otherwise.*

TEST PERSONNEL:

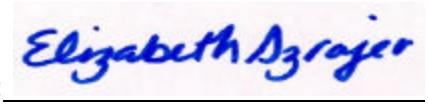
Signature:  Date: January 6, 2001

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TABLE 7: Radiated Emissions: (Channel set at 810.0 MHz)

(Temperature: 24°F, Humidity: 37%)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
191.250	Qp	H	180	2.9	36.8	-12.1	24.7	43.5	-18.8
233.750	Qp	H	180	1.5	38.8	-9.6	29.2	46.0	-16.8
255.000	Qp	H	210	1.4	33.9	-7.5	26.4	46.0	-19.6
297.500	Qp	H	270	1.3	35.1	-6.4	28.7	46.0	-17.3
382.500	Qp	H	270	1.0	40.5	-3.5	37.0	46.0	-9.0
764.949	Qp	H	255	1.0	31.2	4.9	36.1	46.0	-9.9

**All readings are quasi-peak, unless stated otherwise.*

TEST PERSONNEL:

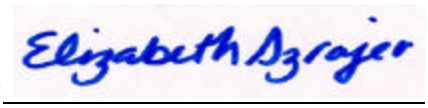
Signature:  Date: January 10, 2001

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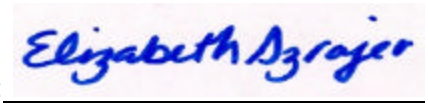
TABLE 8: Radiated Emissions: (Channel set at 865.0 MHz)

(Temperature: 29°F, Humidity: 38%)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
212.500	Qp	V	90	1.5	36.2	-11.1	25.1	43.5	-18.4
233.750	Qp	V	265	1.4	39.6	-9.6	30.0	46.0	-16.0
276.250	Qp	H	165	1.2	33.3	-6.8	26.5	46.0	-19.5
297.500	Qp	H	0	1.4	33.9	-6.4	27.5	46.0	-18.5
361.250	Qp	H	0	1.0	33.4	-3.5	29.9	46.0	-16.1
819.950	Qp	H	90	1.0	37.8	6.6	44.4	46.0	-1.6

**All readings are quasi-peak, unless stated otherwise.*

TEST PERSONNEL:

Signature:  Date: January 10, 2001

Typed/Printed Name: E. Szrajer

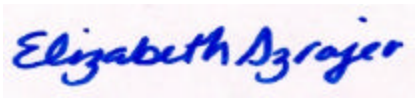
TABLE 9: Radiated Emissions: (Channel set at 959.0 MHz)

(Temperature: 32°F, Humidity: 38%)

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
212.500	Qp	H	240	1.5	36.7	-10.9	25.8	43.5	-17.7
233.750	Qp	H	270	1.3	38.9	-9.6	29.3	46.0	-16.7
255.000	Qp	H	90	1.0	33.5	-7.5	26.0	46.0	-20.0
276.250	Qp	H	270	1.2	33.9	-6.8	27.1	46.0	-18.9
297.500	Qp	H	90	1.1	34.1	-6.4	27.7	46.0	-18.3
382.500	Qp	H	275	1.0	33.5	-3.5	30.0	46.0	-16.0

**All readings are quasi-peak, unless stated otherwise.*

TEST PERSONNEL:

Signature:  Date: January 10, 2001

Typed/Printed Name: E. Szrajer