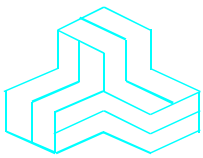
ENGINEERING TEST REPORT



CANPROX PROXIMITY READER
MODEL NO.: RP100

FCC ID: OD5RP100
FCC7310 CONFIRMATION NO.: EA93029

In Accordance With

FCC PART 15, SUBPART C, PARA. 15.209
LOW POWER COMMUNICATION DEVICE TRANSMITTER
OPERATING AT 125 kHz

UltraTech FILE NO.: CSC-003FT

Tested for:

CANSEC SYSTEMS LTD.
3105 Unity Drive, Unit 9
Mississauga, Ontario
Canada, L5L 4L2

Tested by:

ULTRATECH GROUP OF LABS
4181 Sladeview Crescent, Unit 33
Mississauga, Ontario
Canada L5L 5R2

REPORT PREPARED BY: Tri M. Luu, P.Eng.

DATE: Jan 26, 1999

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

FCC PARAGRAPH.	TEST REQUIREMENTS	COMPLIANCE (YES/NO)
**	Spectrum Bandwidth of a Low Power Communication Device Transmitter	Yes
15.209	Transmitter Radiated Emissions	Yes
15.107(a)	Class B AC Power Conducted Emissions	Not applicable for DC supplied device
15.109(a)	Class B Radiated Emissions for Receiver and Digital Circuit Portions	Yes. The receiver is a load detector type, not a rf receiver. Notes (1) & (2)

Note 1: The digital portion of the EUT has been tested and verified to comply with FCC Part 15, Subpart B, Class B Digital Devices. The engineering test report can be provided upon FCC requests.

Note 2: Since the receiver is a load detector type, not a rf receiver, therefore, tests per FCC 15 are not applicable.

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.*

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: Jan 26, 1999

2. EXHIBIT 2 - GENERAL INFORMATION

2.1. APPLICANT

CANSEC SYSTEMS LTD.
3105 Unity Drive, Unit 9
Mississauga, Ontario
Canada, L5L 4L2

Applicant's Representative: Mr. Rick Bourgeois

2.2. MANUFACTURER OF THE RADIO

HID CORPORATION
9292 Jeronimo Road
Irvive, CA
USA, 92618-1905

2.3. DESCRIPTION OF EQUIPMENT UNDER TEST

PRODUCT NAME:	CANPROX PROXIMITY READER
SERIAL NUMBER:	Preproduction
TYPE OF EQUIPMENT:	LOW POWER COMMUNICATION DEVICE TRANSMITTER
OPERATING FREQ.:	125 kHz
BANDWIDTH (26 dB OBW):	1.5 kHz
EMISSION DESIGNATION:	1K5P1D
DUTY CYCLE:	48% maximum
POWER RATING:	0.85 µWatt average
OSC. FREQUENCY(IES):	125 kHz
ANTENNA TYPE:	Internal PCB integrated loop antenna
INPUT SUPPLY:	12 Vdc
ASSOCIATED DEVICES:	N/A
FCC ID:	OD5RP100
INTERFACE PORTS:	(1) Data/Power IN (Terminal block)

2.4. RELATED SUBMITTAL(S)/GRANT

This application is for FCC Certification Authorization for the Cansec RP100 Reader. The Cansec RP100 Reader uses the HID 4065A ProxPoint OEM Transmitter Module which has been certified by FCC HID Corporation as an applicant.

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 (CFR47-1991), Part 15, Subpart C, Para. 15.209, Low Power Communication Device Transmitters operating at 125 kHz.

Both conducted and radiated emissions measurements were conducted in accordance with American National Standards Institute 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.

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 3-10 Meter Open Field Test Site (OFTS) situated in the Town of Oakville, province of Ontario.

The above sites have been calibrated in accordance with ANSI C63.4, and found to be in compliance with the requirements of Sec. 2.948 of the FCC Rules. The descriptions and site measurement data of the Oakville Open Field Test Site has been filed with FCC office (FCC File No.: 31040/SIT 1300B3) and Industry Canada office (Industry Canada File No.: IC2049). Last Date of Site Calibration: July 16, 1997.

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(μV)].

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

3. EXHIBIT 3 - SYSTEM TEST CONFIGURATION

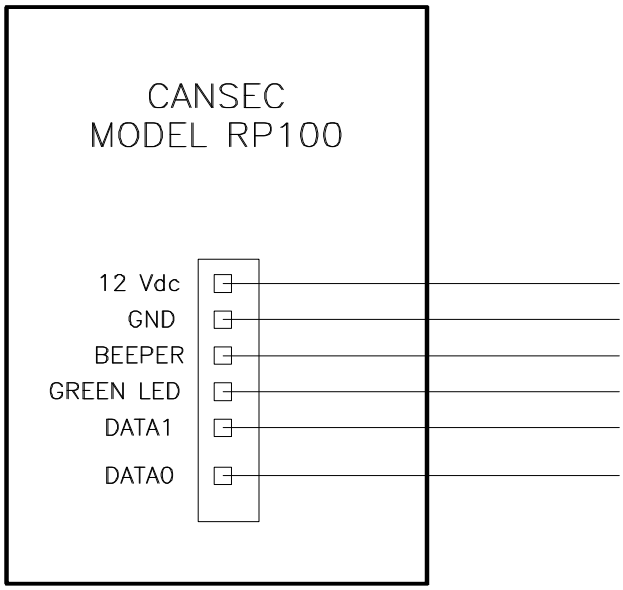
3.1. TEST SYSTEM DETAILS

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

(1) **EUT**: CANSEC SYSTEMS LTD., CANPROX PROXIMITY READER, Model : RP100,, S/N: Preproduction, OSC. FREQ: 125 kHz, ID:
I/O Cable: All I/O cables were shielded
Power Supply Cable: Non-shielded

3.2. BLOCK DIAGRAMS FOR CONDUCTED & RADIATED EMISSION MEASUREMENTS

All wire leads connected to the EUT are non-shielded.



3.3. PHOTOGRAPH FOR RF EMISSION MEASUREMENTS

Please refer to the attached photos.

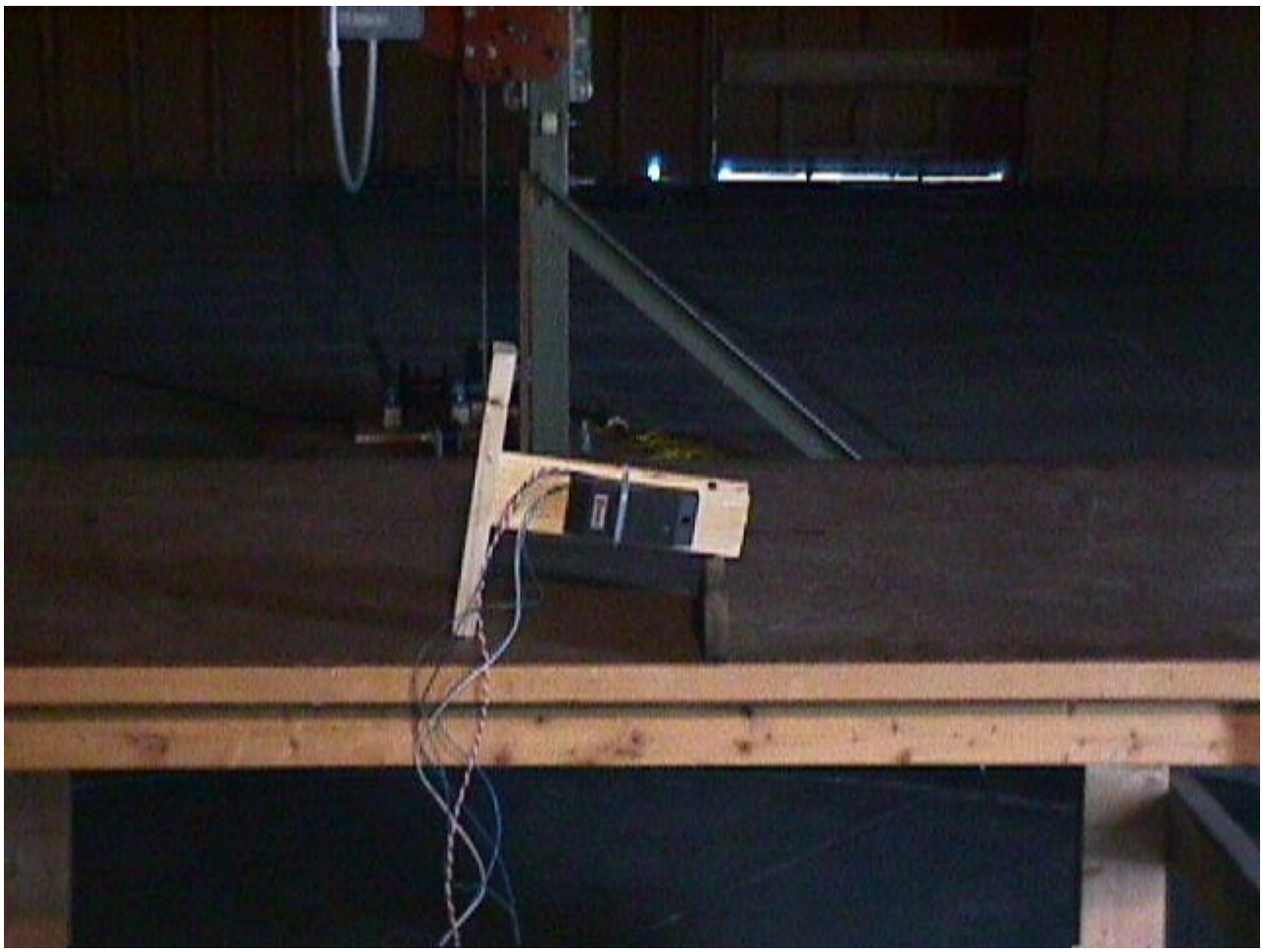
3.3.1. TEST SETUP FOR RADIATED EMISSIONS MEASUREMENTS

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

ORTHOGONAL DIRECTION #1

ORTHOGONAL DIRECTION #2

ORTHOGONAL DIRECTION #3



3.4. JUSTIFICATION

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

3.5. EUT OPERATING CONDITION

Transmitter was turn on at its normal operation

3.6. SPECIAL ACCESSORIES

No special accessories were required.

3.7. EQUIPMENT MODIFICATIONS

Not required.

4. EXHIBIT 4 - TEST DATA

4.1. 26 DB BANDWIDTH

PRODUCT NAME: **CANPROX PROXIMITY READER, Model No.: RP100**

FCC REQUIREMENTS:

The spectrum of the RF signal shall be entirely in FCC permitted band and shall not spread out in the restricted band.

CLIMATE CONDITION:

Standard Temperature and Humidity:

- Ambient temperature: 23 ^{o}C
- Relative humidity: 43 %

POWER INPUT:

12 Vdc.

TEST EQUIPMENT:

- **Spectrum Analyzer**, Advantest, Model R3271, S/N: 15050203, 100 Hz to 32 GHz)
- **Active Loop Antenna**, Emco, Model 6507, SN 8906-1167, Frequency Range 1 KHz - 30 MHz, @ 50 Ohms

TEST RESULTS: Conforms.

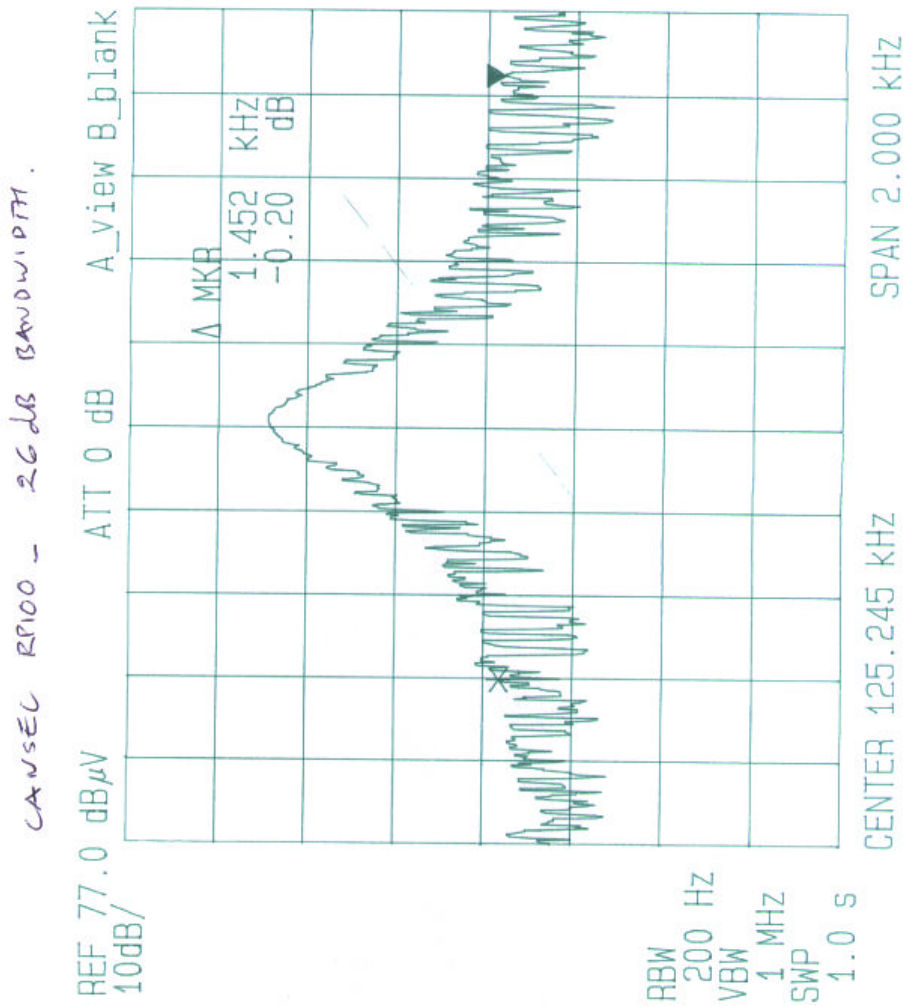
TEST PERSONNEL: Mr. Mike Tom, EMI/RFI Technician

DATE: Jan. 25, 1999

MEASUREMENT DATA:

26 dB OBW = 1.5 kHz

See attached plot for detailed OBW measurements. No rf signal was found to be spread out in the adjacent restricted bands,


CANSEC RP100 - 26 dB BANDWIDTH.
REF 77.0 dBµV
10dB/
ATT 0 dB
A_view B_blank
Δ MKR
1.452 kHz
-0.20 dB
CENTER 125.245 kHz
SPAN 2.000 kHz
RBW
200 Hz
VBW
1 MHz
SWP
1.0 s

4.2. TRANSMITTER RADIATED EMISSIONS @ 3 METERS, FCC CFR 47, PARA. 15.209

PRODUCT NAME: **CANPROX PROXIMITY READER, Model No.: RP100**

FCC REQUIREMENTS:

- The rf spectrum carrier shall not fall inside the restricted bands specified in the following table.

FCC CFR 47, Part 15, Subpart C, Para. 15.205(a) - Restricted Frequency Bands

MHz	MHz	MHz	GHz
0.090 - 0.110	162.0125 - 167.17	2310 - 2390	9.3 - 9.5
0.49 - 0.51	167.72 - 173.2	2483.5 - 2500	10.6 - 12.7
2.1735 - 2.1905	240 - 285	2655 - 2900	13.25 - 13.4
8.362 - 8.366	322 - 335.4	3260 - 3267	14.47 - 14.5
13.36 - 13.41	399.9 - 410	3332 - 3339	14.35 - 16.2
25.5 - 25.67	608 - 614	3345.8 - 3358	17.7 - 21.4
37.5 - 38.25	960 - 1240	3600 - 4400	22.01 - 23.12
73 - 75.4	1300 - 1427	4500 - 5250	23.6 - 24.0
108 - 121.94	1435 - 1626.5	5350 - 5460	31.2 - 31.8
123 - 138	1660 - 1710	7250 - 7750	36.43 - 36.5
149.9 - 150.05	1718.8 - 1722.2	8025 - 8500	Above 38.6
156.7 - 156.9	2200 - 2300	9000 - 9200	

- Fundamental and Spurious/harmonic emissions shall not exceed the limits specified in the following table:
-

FCC CFR 47, Part 15, Subpart C, Para. 15.209(a)
-- Field Strength Limits within Restricted Frequency Bands --

FREQUENCY (MHz)	FIELD STRENGTH LIMITS (microvolts/m)	DISTANCE (Meters)
0.009 - 0.490	2,400 / F (KHz)	300
0.490 - 1.705	24,000 / F (KHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 – 960	200	3
Above 960	500	3

CLIMATE CONDITION:

Standard Temperature and Humidity:

- Ambient temperature: 23 ^{o}C
- Relative humidity: 43 %

POWER INPUT: 12 Vdc.

TEST EQUIPMENT:

- **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.
- **RF Preselector,** Advantest Model R3551, SN 92970002, 9KHz-1GHz, 50 Ohms input/output, input +25 dBm max, 30 dB gain.
- **Active Loop Antenna**, Emco, Model 6502, Frequency Range 1 KHz - 30 MHz, @ 50 Ohms

METHOD OF MEASUREMENTS:

Refer to **ANSI 63.4-1992, Para. 8** for detailed radiated emissions measurement procedures.

Applies to harmonics/spurious that fall in the restricted bands listed in Section 15.205. the maximum permitted average field strength is listed in Section 15.209. A Pre-Amp and highpass filter are used for this measurement.

For measurement below 1 GHz, set RBW = 100 KHz, VBW $\geq$ 100 KHz, SWEEP=AUTO.

For measurement above 1 GHz, set RBW = 1 MHz, VBW = 1 MHz (Peak)

If the emission is pulsed, modified the unit for continuous operation, then use the settings above for measurements, then correct the reading by subtracting the peak-average correction factor derived from the appropriate duty cycle calculation. See Section 15.35(b) and (c).

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

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

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

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

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

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

TEST RESULTS: Conforms.

TEST PERSONNEL: Mr. Mike Tom, EMI/RFI Technician

DATE: Jan. 22, 1999

MEASUREMENT DATA

RADIATED EMISSIONS MEASUREMENTS

TEST CONFIGURATION

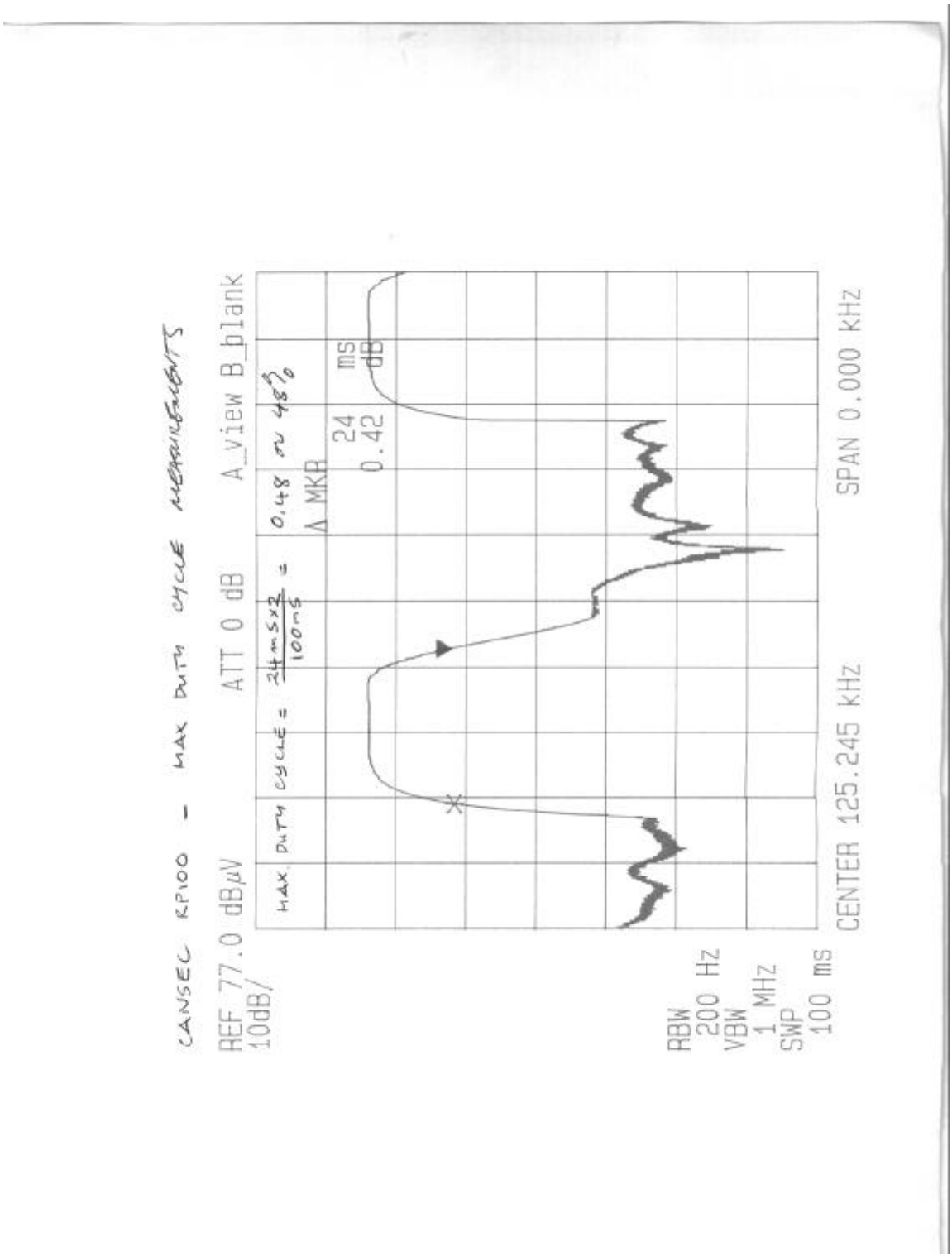
- *For measuring radiated emissions at frequencies from 9 kHz to 150 kHz, the Spectrum Analyzer was set as 1KHz RBW, VBW ≥ RBW, SWEEP TIME: AUTO, PEAK DETECTOR.*
- *For measuring radiated emissions at frequencies from 150 kHz to 30 MHz, the Spectrum Analyzer was set as 10 KHz RBW, VBW ≥ RBW, SWEEP TIME: AUTO, PEAK DETECTOR.*
- *For measuring radiated emissions at frequencies from 30 MHz to 1 GHz, the Spectrum Analyzer was set as 100 KHz RBW, VBW ≥ RBW, SWEEP TIME: AUTO, PEAK DETECTOR.*
- *For measuring radiated emissions at frequencies above 1 GHz, the Spectrum Analyzer was set as 1 MHz RBW, VBW ≥ RBW, SWEEP TIME: AUTO, PEAK DETECTOR.*
- *The following measurements were the worst cases when the radiating antenna was placed in both horizontal and vertical polarization, and the EUT was placed in three different orthogonal directions.*
- ***RF Average Level**: the average rf levels were calculated by subtracting the Peak readings added by the duty cycle correction factor. **MAX. DUTY CYCLE FACTOR = $20LOG_{10}(0.48)$ = -6.4 dB***

CALCULATION OF WORST CASE DUTY CYCLE: Since the maximum duty cycle is hard to obtain during normal transmission, the maximum duty cycle from the manufacturer's specification of 48% is used for calculating the average rf levels.

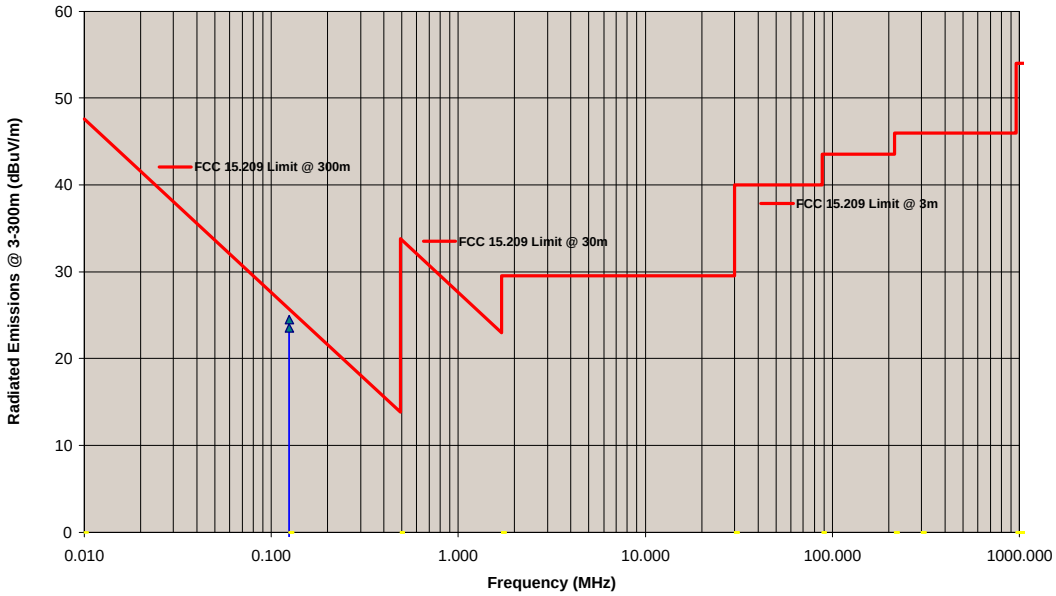
The following are worst test data recorded with the EUT placed in three different orthogonal positions.

FREQUENCY (MHz)	RF PEAK (1) LEVEL (dBuV/m)	RF AVG AT (dBuV/m)	ANTENNA PLANE (H/V)	LIMIT 15.209 (dBuV/m)	Disatnce (meters)	MARGIN (dB)	PASS/ FAIL
0.125	29.9	23.5	V	25.7	300	-2.2	PASS
0.125	30.9	24.5	H	25.7	300	-1.2	PASS
No other spurious/harmonic significant emissions were found in the frequency range from 9 kHz to 1 GHz							

Note 1: The rf emission level was measured at 3m distance and than reduced by 40 dB per FCC 15.31(f)(2)


CANSEC RP100 - MAX DUTY CYCLE MEASUREMENTS
REF 77.0 dBµV
10dB/
ATT 0 dB
A_view B_blank
MAX DUTY CYCLE = 24ms x 2 / 100ms =
Δ MKR 24 ms
0.42 dB
0.48 or 48%
CENTER 125.245 kHz
SPAN 0.000 kHz
RBW 200 Hz
VBW 1 MHz
SWP 100 ms

Transmitter Radiated Emissions Measurements at OFTS
CANSEC SYSTEMS LTD. - MODEL RP100 READER
TRANSMIT Freq.: 125 kHz



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 active loop antenna in the frequency range from 10 KHz to 1 MHz
    2) Calibrated EMCO biconilog antenna in the frequency range from 30 MHz to 2000 MHz.
    3) Horn Antennas:
        a) Horn Antenna, Emco, Model 3115, 1 – 18 GHz
        b) Horn Antenna, Emco, Model 3160-09, 18-26.5GHz
        c) Horn Antenna, Emco, Model 3160-10, 26.5-40GHz
        d) Mixer, Tektronix, P/N 118-0098-00, 18-26.5GHz
        e) Mixer, Tektronix, P/N 119-0098-00, 26.5-40GHz
    4) Calibrated Advantest spectrum analyzer and pre-selector/pre-amplifier. 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 (1 KHz RBW and 1 KHz VBW for frequency below 150 kHz, 10 KHz RBW and VBW $\geq$ RBW for Frequency above 150kHz and below 30 MHz, 100 KHz RBW and VBW $\geq$ RBW for Frequency below 1 GHz and 1 MHz RBW and 1 MHz VBW for frequency greater than 1 GHz).

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Calculation of Field Strength:

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

$$\mathbf{FS = RA + AF + CF - AG}$$

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

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

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

Field Level in µV/m = $10^{(38/20)}$ = 79.43 µV/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 LABELING 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