UltraTech
Group of Labs

31040/SIT

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00-034

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Jan. 13, 2003

**BIOSCRYPT INC.**
5805 Sepulveda Blvd, Suite 750
VanNuys, CA
USA, 91411

**Attn.:** **Mr. Thomas Reilly**

**Subject:** **FCC Certification Application Testing under FCC PART 15, Subpart C, Sec. 15.209 – Low Power Transmitters operating at 125 kHz.**

**Product:** **V-STATION**
**Model No.:** **V-STATION, A, P**
**FCC ID:** **QC4-VSTAPROX**

Dear Mr. Reilly,

The product sample, as provided by you, has been tested and found to comply with **FCC PART 15, Subpart C, Sec. 15.209 - Low Power Transmitters operating at 125 kHz.**

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

Yours truly,

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

Encl

# ENGINEERING TEST REPORT

## V-STATION
## Model No.: V-STATION, A, P

**FCC ID: QC4-VSTAPROX**

*Applicant:* **BIOSCRYPT INC.**
*5805 Sepulveda Blvd, Suite 750*
*VanNuys, CA*
*USA, 91411*

***In Accordance With***

**FEDERAL COMMUNICATIONS COMMISSION (FCC)**
**PART 15, SUBPART C, SEC. 15.209**
**Low Power Transmitters operating at 125 kHz**

**UltraTech's File No.: MYT-042F15.209**

| | |
|---|---|
| This Test report is Issued under the Authority of<br>Tri M. Luu, Professional Engineer,<br>Vice President of Engineering<br>UltraTech Group of Labs<br><br>Date: Jan. 13, 2003 |  |
| Report Prepared by: Tri Luu<br><br>Issued Date: Jan. 13, 2003 | Tested by: Hung Trinh, RFI Technician<br><br>Test Dates: Jan. 06-08, 2003 |

- *The results in this Test Report apply only to the sample(s) tested, and the sample tested is randomly selected.*
- *This report must not be used by the client to claim product endorsement by NVLAP or any agency of the US Government.*


**UltraTech**

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# TABLE OF CONTENTS

# EXHIBIT 1. SUBMITTAL CHECK LIST

| Annex No. | Exhibit Type | Description of Contents | Quality Check (OK) |
|---|---|---|---|
| | Test Report | • Exhibit 1: Submittal check lists<br>• Exhibit 2: Introduction<br>• Exhibit 3: Performance Assessment<br>• Exhibit 4: EUT Operation and Configuration during Tests<br>• Exhibit 5: Summary of test Results<br>• Exhibit 6: Measurement Data<br>• Exhibit 7: Measurement Uncertainty<br>• Exhibit 8: Measurement Methods | OK |
| 1 | Test Setup Photos | Photos # 1 to 3 | OK |
| 2 | External Photos of EUT | Photos # 1 to 2 | OK |
| 3 | Internal Photos of EUT | Photos of 1 to 16 | OK |
| 4 | Cover Letters | • Letter from Ultratech for Certification Request<br>• Letter from the Applicant to appoint Ultratech to act as an agent<br>• Letter from the Applicant to request for Confidentiality Filing | OK<br>OK<br>OK |
| 5 | ID Label/Location Info | • ID Label<br>• Location of ID Label | OK<br>OK |
| 6 | Block Diagrams | Block Diagrams | refer FCC ID: QC4-VPROXAH4065 |
| 7 | Schematic Diagrams | Schematic Diagrams | refer FCC ID: QC4-VPROXAH4065 |
| 8 | Parts List/Tune Up Info | Parts List/Tune Up Info | OK |
| 10 | Operational Description | Operational Description | |
| 11 | Users Manual | Users Manual | OK |

# EXHIBIT 2. INTRODUCTION

## 2.1. SCOPE

| | |
|---|---|
| **Reference:** | FCC Part 15, Subpart C, Section 15.209 |
| **Title** | Telecommunication - Code of Federal Regulations, CFR 47, Part 15 |
| **Purpose of Test:** | To gain FCC Certification Authorization for Low Power Transmitters operating at 125 kHz . |
| **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:** | • Light-industry, Commercial<br>• Industry |

## 2.2. RELATED SUBMITAL(S)/GRANT(S)

None

## 2.3. NORMATIVE REFERENCES

| Publication | YEAR | Title |
|---|---|---|
| FCC CFR Parts 0-19 | 2001 | 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 3. PERFORMANCE ASSESSMENT

## 3.1. CLIENT INFORMATION

| **APPLICANT**: | |
|---|---|
| **Name:** | BIOSCRYPT INC. |
| **Address:** | 5805 Sepulveda Blvd, Suite 750<br>VanNuys, CA<br>USA, 91411 |
| **Contact Person:** | Mr. Thomas Reilly - VP Engineering<br>Phone #: 818-304-7150 (x7173)<br>Fax #: 818-461-0843<br>Email Address: tom.reilly@bioscrypt.com |

| **MANUFACTURER:** | |
|---|---|
| **Name:** | Creation Technologies Inc. |
| **Address:** | 7055 Financial Drive<br>Mississauga, Ontario<br>Canada L5N 6V8 |
| **Contact Person:** | Mr. Jeff Lambkin<br>Phone #: (905) 814-6323<br>Fax #: (905) 814-6324<br>Email Address: jlambkin@creationtech.com |

## 3.2. EQUIPMENT UNDER TEST (EUT) INFORMATION

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

| | |
|---|---|
| **Brand Name** | BIOSCRYPT INC. |
| **Product Name** | V-STATION |
| **Model Name or Number** | V-STATION, A, P |
| **Serial Number** | Preproduction |
| **Type of Equipment** | Low Power Transmitters |
| **Input Power Supply Type** | • External DC Sources 12 - 24 Volts |
| **Primary User Function:** | Fingerprint Recognition accessory for Access Control Systems. This device uses the HID 125 kHz OEM Radio Module, Model 4065 PROX |

## 3.3. DESCRIPTION OF EQUIPMENT UNDER TEST -- V-STATION, A, P

Please refer to the attached Technical Description for details of the equipment operation.

## 3.4. EUT'S TECHNICAL SPECIFICATIONS

| TRANSMITTER | |
|---|---|
| **Equipment Type:** | ▪ Base station (fixed use) |
| **Intended Operating Environment:** | ▪ Commercial, light industry & heavy industry |
| **Power Supply Requirement:** | External DC Source 12 - 24 Vdc |
| **RF Output Power Rating:** | 54.7 dBuV/m measured at 10m |
| **Operating Frequency Range:** | 125 kHz |
| **RF Output Impedance:** | 50 Ohms |
| **Channel Spacing:** | 1 |
| **Duty Cycle:** | 19.9% |
| **26 dB Bandwidth:** | 6.3 kHz |
| **Modulation Type:** | On-off pulse |
| **Channel Spacing** | N/A |
| **Emission Designation:** | 6K3N0N |
| **Oscillator Frequencies:** | 25 MHz, 50 MHz, 100 MHz, 10.59 MHz, 21.08 MHz, 7.37 MHz, 20 MHz, 14.7 MHz, 16 MHz, 4 MHz |
| **Antenna Connector Type:** | • Integral, permanently attached |
| **Antenna Description:** | Small loop antenna integral to HID reader |

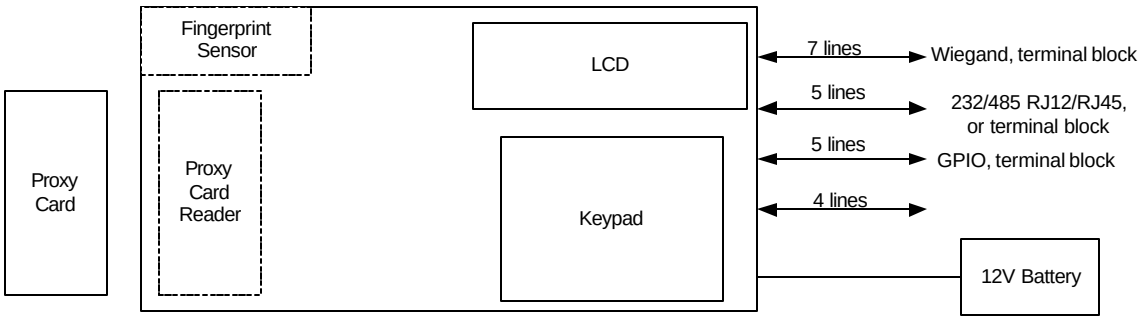
## 3.5. LIST OF EUT'S PORTS

| Port Number | EUT's Port Description | Number of Identical Ports | Connector Type | Cable Type (Shielded/Non-shielded) |
|---|---|---|---|---|
| 1 | Wiegand lines (7) | 1 | terminal block | N/S |
| 2 | RS-232/RS-485 (selectable), 5 lines | 1 | RJ12/RJ45 or terminal block | N/S |
| 3 | General Purpose I/O (5 lines) | 1 | terminal block | N/S |
| 4 | Ethernet 10BaseT (4 lines) | 1 | RJ-45 | N/S (CAT5) |
| 5 | Service RS-232 Port | 1 | RJ12 | Behind secure door, N/S |

## 3.6. ANCILLARY EQUIPMENT

| Ancillary Equipment # 1 | |
|---|---|
| Description: | Laptop or LAN Connection: use command ping 10.10.1.140 –t<br>If laptop, crossed Ethernet cable is to be used |
| Brand name: | Toshiba Tecra 730 CDT |
| Model Name or Number: | PA1228U CXCD |
| FCC Certification | FCC DoC & CE Compliance |
| Serial Number: | 09612932 |
| Connected to EUT's Port: | Ethernet |

## 3.7. GENERAL TEST SETUP

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# EXHIBIT 4. EUT OPERATING CONDITIONS AND CONFIGURATIONS DURING TESTS

## 4.1. CLIMATE TEST CONDITIONS

The climate conditions of the test environment are as follows:

| | |
|---|---|
| Temperature: | 21°C |
| Humidity: | 51% |
| Pressure: | 102 kPa |
| Power input source: | 12 - 24 Vdc |

## 4.2. OPERATIONAL TEST CONDITIONS & ARRANGEMENT FOR TESTS

| | |
|---|---|
| **Operating Modes:** | ▪ User presents Prox Card (RFOD) close to the reader, based on which device selects template from the memory. Device signals to user to put finger on the fingerprint sensor, grabs fingerprint image and compares it with the template. If matched, device signals (audio/LED/LCD) the outcome, and sends information to an Access Control System |
| **Special Test Software:** | ▪ To avoid human presence during testing, modified S/W is used which does following: DUT reads template from the Prox card, grabs an image from the fingerprint sensor, qualifies the image, and then replaces it with locally stored image that corresponds to the template on smart card. Matching process (verification) takes place, and the outcome is signaled as described above. During the testing, outcome has to be positive every time.<br>▪ Described process cycles with interval 4-6sec. |
| **Special Hardware Used:** | To exercise full functionality Ethernet connection should be active, either using LAN or dedicated PC/laptop. Device should be pinged in the loop by: ping 10.10.1.140 –t from DOS prompt. |
| **Transmitter Test Antenna:** | The EUT is tested with the antenna fitted in a manner typical of normal intended use as an integral antenna equipment. |

# EXHIBIT 5. SUMMARY OF TEST RESULTS

## 5.1. 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.

- Radiated Emissions were performed at the Ultratech's 3 Meter Open Field Test Site (OFTS) situated in the Town of Oakville, province of Ontario.

  The above sites have been calibrated in accordance with ANSI C63.4, and found to be in compliance with the requirements of Sec. 2.948 of the FCC Rules. The descriptions and site measurement data of the Oakville Open Field Test Site has been filed with FCC office (FCC File No.: 31040/SIT 1300B3) and Industry Canada office (Industry Canada File No.: IC2049). Last Date of Site Calibration: Aug. 08, 2001.

## 5.2. APPLICABILITY & SUMMARY OF EMC EMISSION TEST RESULTS

| FCC PARAGRAPH. | TEST REQUIREMENTS | COMPLIANCE (YES/NO) |
|---|---|---|
| 15.203 | Antenna Requirement | Yes. Permanently attached small loop antenna. |
| 15.209 & 15.205 | Transmitter Radiated Emissions - Fundamental, Harmonic and Spurious | Yes |
| | 26 dB Bandwidth | Yes |
| 15.107(a) | AC Power Line Conducted Emissions Measurements (Transmit & Receive) | N/A for DC supplied device |
| The digital circuit portion of the EUT has been tested and verified to comply with FCC Part 15, Subpart B, Class A Digital Devices, the associated Radio Receiver operating in 125 kHz is exempted from FCC authorization . The engineering test report can be provided upon FCC requests. | | |

## 5.3. MODIFICATIONS INCORPORATED IN THE EUT FOR COMPLIANCE PURPOSES

None

# EXHIBIT 6. MEASUREMENTS, EXAMINATIONS & TEST DATA FOR EMC EMISSIONS

## 6.1. TEST PROCEDURES

This section contains test results only. Details of test methods and procedures can be found in Exhibit 8 of this report, ANSI C63-4:1992.

## 6.2. MEASUREMENT UNCERTAINTIES

The measurement uncertainties stated were calculated in accordance with requirements of UKAS Document NIS 81 with a confidence level of 95%. Please refer to Exhibit 7 for Measurement Uncertainties.

## 6.3. MEASUREMENT EQUIPMENT USED:

The measurement equipment used complied with the requirements of the Standards referenced in the Methods & Procedures ANSI C64-3:1992, FCC 15.209 and CISPR 16-1.

## 6.4. ESSENTIAL/PRIMARY FUNCTIONS AS DECLARED BY THE MANUACTURER:

The essential function of the EUT is to correctly communicate data to and from radios over RF link.

# 6.5. TRANSMITTER SPURIOUS EMISSIONS (RADIATED @ 3 METERS), FCC CFR 47, PARA. 15.209 & 15.205

## 6.5.1. Limits

The fundamental frequency shall not fall within any restricted frequency band specified in 15.205
All rf other emissions shall not exceed the general radiated emission limits specified in @ 15.209(a).

**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 | |

**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 |

### 6.5.2. Method of Measurements

Refer to Exhibit 8, Sec. 8.2 of this test report and **ANSI 63.4-1992, Para. 8** for detailed radiated emissions measurement procedures.

The following measurement procedures were also applied:

- 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 9 kHz ≤ frequencies ≤ 150 kHz: RBW = 1 KHz, VBW ≥ 1 KHz, SWEEP=AUTO.
- For 150 MHz ≤ frequencies ≤ 30 MHz: RBW = 10 KHz, VBW ≥ 10 KHz, SWEEP=AUTO.
- For 30 MHz ≤ frequencies ≤ 1 GHz: RBW = 100 KHz, VBW ≥ 100 KHz, SWEEP=AUTO.
- For frequencies ≥ 1 GHz: RBW = 1 MHz, VBW = 1 MHz (Peak) & VBW = 10 Hz (Average), SWEEP=AUTO.
- 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).

### 6.5.3. Test Equipment List

| Test Instruments | Manufacturer | Model No. | Serial No. | Frequency Range |
|---|---|---|---|---|
| Spectrum Analyzer/ EMI Receiver | Advantest | R3271 | 15050203 | 100 Hz to 32 GHz with external mixer for frequency above 32 GHz |
| Microwave Amplifier | Hewlett Packard | HP 83017A | | 1 GHz to 26.5 GHz |
| Active Loop Antenna | EMCO | 6507 | 8906-1167 | 1 kHz – 30 MHz |
| Biconilog Antenna | EMCO | 3143 | 1029 | 20 MHz to 2 GHz |

### 6.5.4. Photographs of Test Setup

Refer to the Photographs #1 to #3 in Annex 1 for setup and arrangement of equipment under tests and its ancillary equipment.

### 6.5.5. Test Data

| FREQUENCY (MHz) | RF LEVEL @ 10m (dBuV/m) | DETECTOR USED (PEAK/QP/AVG) | ANTENNA PLANE (H/V) | LIMIT @10m (dBuV/m) | MARGIN (dB) | PASS/ FAIL |
|---|---|---|---|---|---|---|
| 0.125 | 54.7 | PEAK | 0 degree | 84.7 | -30.0 | PASS |
| 0.125 | 40.7 | AVG | 0 degree | 84.7 | -44.0 | PASS |
| 0.125 | 44.4 | PEAK | 90 degree | 84.7 | -40.3 | PASS |
| 0.125 | 30.4 | AVG | 90 degree | 84.7 | -54.3 | PASS |
| 31.00 | 22.8 | PEAK | V | 29.5 | -6.7 | PASS |
| 31.00 | 21.2 | PEAK | H | 29.5 | -8.3 | PASS |
| 34.30 | 22.0 | PEAK | V | 29.5 | -7.5 | PASS |
| 34.30 | 22.4 | PEAK | H | 29.5 | -7.1 | PASS |
| 39.30 | 18.9 | PEAK | V | 29.5 | -10.6 | PASS |
| 39.30 | 20.9 | PEAK | H | 29.5 | -8.6 | PASS |
| 44.50 | 19.5 | PEAK | V | 29.5 | -10.0 | PASS |
| 44.50 | 15.1 | PEAK | H | 29.5 | -14.4 | PASS |
| 48.30 | 18.4 | PEAK | V | 29.5 | -11.1 | PASS |
| 48.30 | 13.4 | PEAK | H | 29.5 | -16.1 | PASS |
| 52.50 | 18.1 | PEAK | V | 29.5 | -11.4 | PASS |
| 52.50 | 15.9 | PEAK | H | 29.5 | -13.6 | PASS |
| 57.30 | 19.4 | PEAK | V | 29.5 | -10.1 | PASS |
| 57.30 | 13.8 | PEAK | H | 29.5 | -15.7 | PASS |
| 74.00 | 18.1 | PEAK | V | 29.5 | -11.4 | PASS |
| 74.00 | 13.4 | PEAK | H | 29.5 | -16.1 | PASS |
| 80.30 | 19.4 | PEAK | V | 29.5 | -10.1 | PASS |
| 80.30 | 12.9 | PEAK | H | 29.5 | -16.6 | PASS |
| 88.80 | 20.1 | PEAK | V | 33.1 | -13.0 | PASS |
| 88.80 | 13.9 | PEAK | H | 33.1 | -19.2 | PASS |
| 111.00 | 19.0 | PEAK | V | 33.1 | -14.1 | PASS |
| 111.00 | 14.4 | PEAK | H | 33.1 | -18.7 | PASS |
| 154.80 | 19.6 | PEAK | V | 33.1 | -13.5 | PASS |
| 154.80 | 14.6 | PEAK | H | 33.1 | -18.5 | PASS |
| 157.00 | 19.8 | PEAK | V | 33.1 | -13.3 | PASS |
| 157.00 | 15.4 | PEAK | H | 33.1 | -17.7 | PASS |
| 162.40 | 20.3 | PEAK | V | 33.1 | -12.8 | PASS |
| 162.40 | 14.7 | PEAK | H | 33.1 | -18.4 | PASS |
| 167.20 | 20.2 | PEAK | V | 33.1 | -12.9 | PASS |
| 167.20 | 15.2 | PEAK | H | 33.1 | -17.9 | PASS |

Continued …

| FREQUENCY (MHz) | RF LEVEL @ 10m (dBuV/m) | DETECTOR USED (PEAK/QP/AVG) | ANTENNA PLANE (H/V) | LIMIT @10m (dBuV/m) | MARGIN (dB) | PASS/ FAIL |
|---|---|---|---|---|---|---|
| 171.30 | 19.8 | PEAK | V | 33.1 | -13.3 | PASS |
| 171.30 | 15.1 | PEAK | H | 33.1 | -18.0 | PASS |
| 175.10 | 20.5 | PEAK | V | 33.1 | -12.6 | PASS |
| 175.10 | 15.4 | PEAK | H | 33.1 | -17.7 | PASS |
| 185.10 | 18.1 | PEAK | V | 33.1 | -15.0 | PASS |
| 185.10 | 16.0 | PEAK | H | 33.1 | -17.1 | PASS |
| 189.10 | 18.6 | PEAK | V | 33.1 | -14.5 | PASS |
| 189.10 | 15.4 | PEAK | H | 33.1 | -17.7 | PASS |
| 193.70 | 20.0 | PEAK | V | 33.1 | -13.1 | PASS |
| 193.70 | 16.0 | PEAK | H | 33.1 | -17.1 | PASS |
| 197.50 | 19.9 | PEAK | V | 33.1 | -13.2 | PASS |
| 197.50 | 16.8 | PEAK | H | 33.1 | -16.3 | PASS |
| 199.40 | 22.0 | PEAK | V | 33.1 | -11.1 | PASS |
| 199.40 | 17.9 | PEAK | H | 33.1 | -15.2 | PASS |
| 210.70 | 18.5 | PEAK | V | 33.1 | -14.6 | PASS |
| 210.70 | 17.4 | PEAK | H | 33.1 | -15.7 | PASS |
| 351.60 | 23.4 | PEAK | V | 35.6 | -12.2 | PASS |
| 351.60 | 24.5 | PEAK | H | 35.6 | -11.1 | PASS |
| 409.60 | 24.1 | PEAK | V | 35.6 | -11.5 | PASS |
| 409.60 | 23.2 | PEAK | H | 35.6 | -12.4 | PASS |
| 430.50 | 24.9 | PEAK | V | 35.6 | -10.7 | PASS |
| 430.50 | 24.3 | PEAK | H | 35.6 | -11.3 | PASS |
| 451.40 | 24.1 | PEAK | V | 35.6 | -11.5 | PASS |
| 451.40 | 26.5 | PEAK | H | 35.6 | -9.1 | PASS |
| 521.70 | 25.8 | PEAK | V | 35.6 | -9.8 | PASS |
| 521.70 | 29.5 | PEAK | H | 35.6 | -6.1 | PASS |

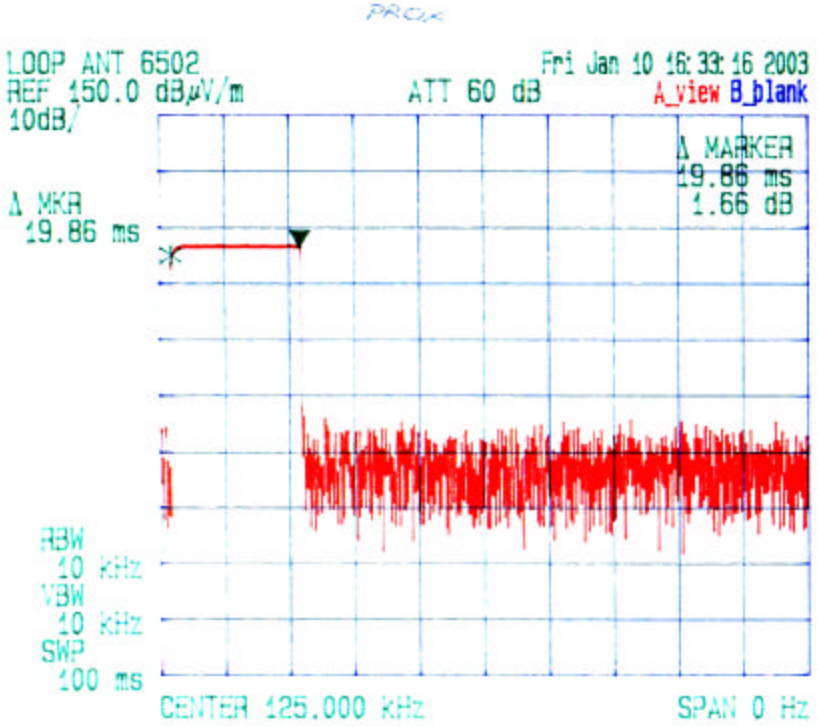
- The emissions were scanned from 10 kHz to 1 GHz . Except for the fundamental, all spurious/harmonic emissions (from the transmitters) within 40 dB below the limits were recorded.
- Highest measurements were recorded when the transmitter was tested with 3 different orthogonal positions as shown in Photos # 1 to 3 in Annex 1.

**Remarks**:

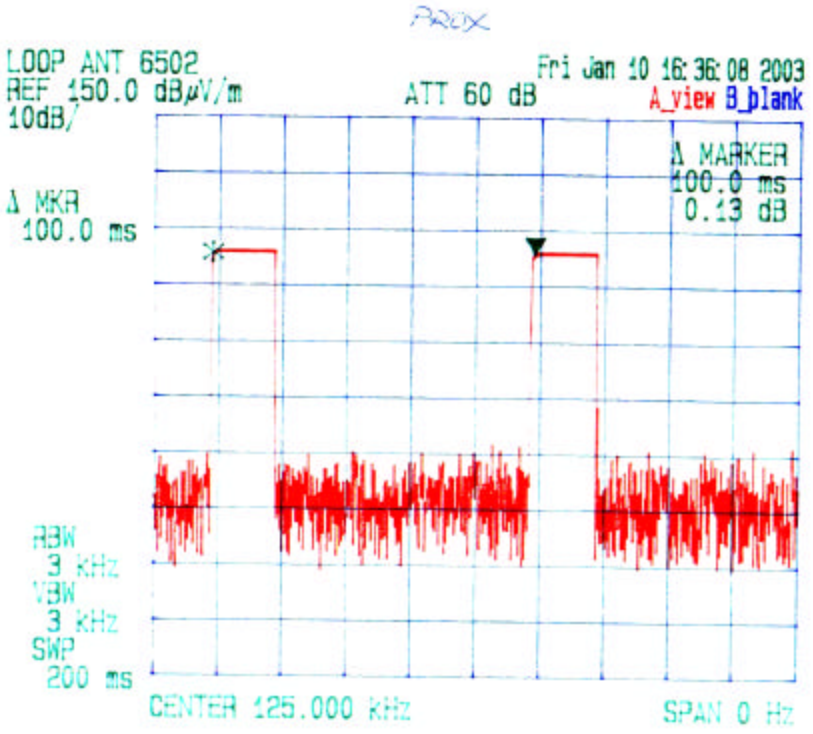
(1) Duty Cycle = 19.86 mS/100 mS = 0.1986
Peak-to-Average factor = 20*log (0.1986) = -14.0 dB
Please refer to Plots # 1 & 2 below for detailed measurements.

(2) The 300m limit was converted to 10m Limit using square factor (x) as it was found by measurements as follows:
- Limit at 10m = limit at 300 m + $20*\log(300/10)^2$ = 20*log(2400/125) + 59.0 dB = 84.7 dB

PLOT #1: DUTY CYCLE MEASUREMENTS - PULSE WIDTH



PLOT #2: DUTY CYCLE MEASUREMENT - PULSE TRAIN



**BIOSCRYPT INC.**
**Model No.: V-STATION, A B (with HID Proxy 125 kHz MHz Radio Module)**
**Radiated Emissions Measurements at 10 Meter OFTS**
**Ultratech Engineering Labs Inc.**

# 6.6. 26 DB OCCUPIED BANDWIDTH

## 6.6.1. Limits

The rf spectrum shall not stay in the restricted band specified in FCC 15.205

## 6.6.2. Method of Measurements

Refer to Exhibit 8, Sec. 8.4 & ANSI C63-4:1992

The transmitter output was loosely coupled to the spectrum analyzer through a receiving antenna and the bandwidth of bandwidth of the fundamental frequency was measured with the spectrum analyzer with the resolution bandwidth of the spectrum analyzer set per ANSI 63-4:1992, Sec. 13.1.6.2

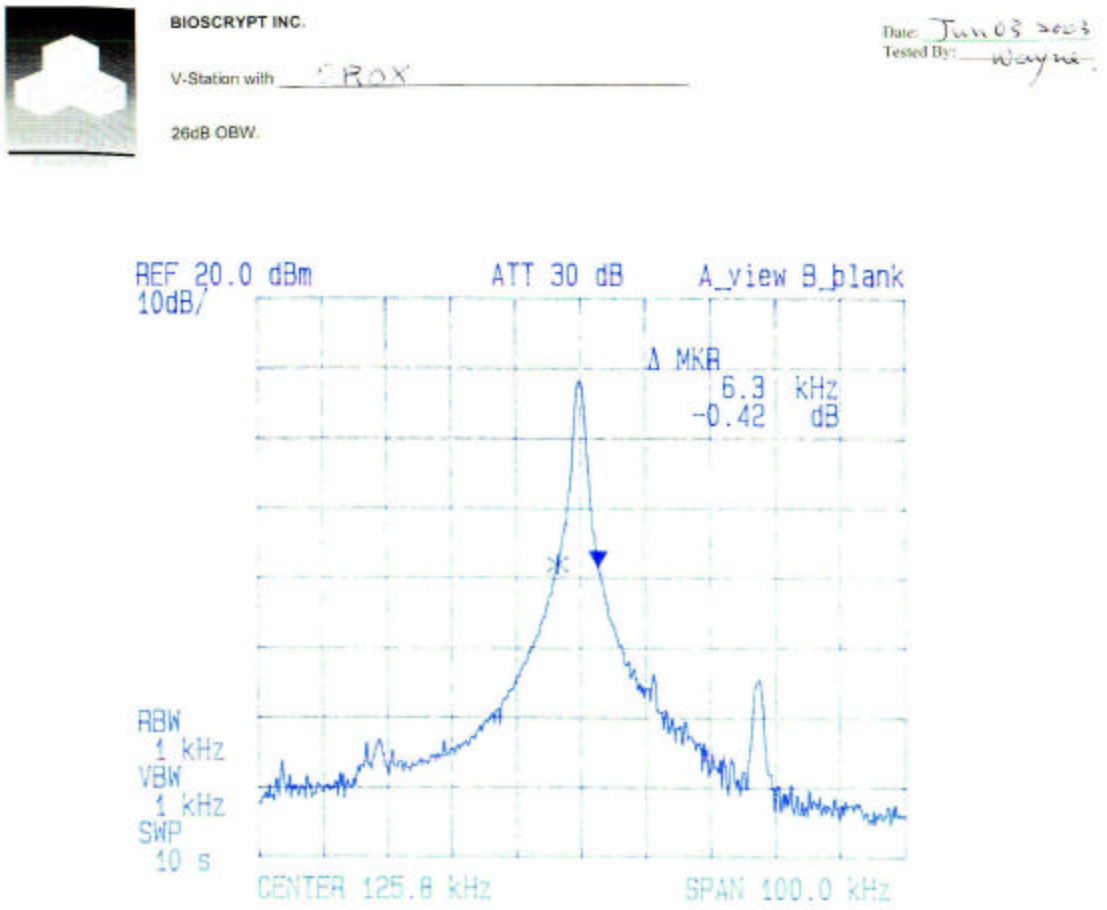
## 6.6.3. Test Equipment List

| Test Instruments | Manufacturer | Model No. | Serial No. | Frequency Range |
|---|---|---|---|---|
| Spectrum Analyzer/ EMI Receiver | Hewlett Packard | HP 8593EM | 3412A00103 | 9 kHz – 26.5 GHz |

## 6.6.4. Test Data

| CHANNEL FREQUENCY (MHz) | 26 dB BANDWIDTH (kHz) | MAXIMUM LIMIT (kHz) | PASS/FAIL |
|---|---|---|---|
| 125 | 6.3 | 38 (stay outside of the adjacent restricted band @ 15.205) | PASS |

PLOT #3: 26 dB BANDWIDTH



# EXHIBIT 7. MEASUREMENT UNCERTAINTY

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

## 7.1. RADIATED EMISSION MEASUREMENT UNCERTAINTY

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

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

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

# EXHIBIT 8. MEASUREMENT METHODS

## 8.1. GENERAL TEST CONDITIONS

The following test conditions shall be applied throughout the tests covered in this report.

### 8.1.1. Normal temperature and humidity

- Normal temperature: +15°C to +35°C
- Relative Humidity: +20% to 75%

The actual values during tests shall be recorded in the test report.

### 8.1.2. Normal power source

#### *8.1.2.1. Mains Voltage*

The nominal test voltage of the equipment to be connected to mains shall be the nominal mains voltage which is the declared voltage or any of the declared voltages for which the equipment was designed.

The frequency of test power source corresponding to the AC mains shall be between 59 Hz and 61 Hz.

#### *8.1.2.2. Battery Power Source.*

For operation from battery power sources, the nominal test voltage shall be as declared by the equipment manufacturer. This shall be recorded in the test report.

### 8.1.3. Operating Condition of Equipment under Test

- All tests were carried out while the equipment operated at the following frequencies:
  - The lowest operating frequency,
  - The middle operating frequency and
  - The highest operating frequency

- Modulation were applied using the Test Data sequence
- The transmitter was operated at the highest output power, or in the case the equipment able to operate at more than one power level, at the lowest and highest output powers

## 8.2. SPURIOUS EMISSIONS

For both conducted and radiated measurements, the spurious emissions were scanned from the lowest frequency generated by the EUT or 10 MHz whichever is lower to 10th harmonic of the highest frequency generated by the EUT.

- The radiated emission measurements were performed at the UltraTech's 3 Meter Open Field Test Site (OFTS) situated in the Town of Oakville, province of Ontario. The Attenuation Characteristics of OFTS have been filed to FCC, Industry Canada, ACA/Austel, NVLap and ITI.
- Radiated emissions measurements were made using the following test instruments:

1. Calibrated EMCO BiconiLog antenna in the frequency range from 30 MHz to 2000 MHz.
2. Calibrated Emco Horn antennas in the frequency range above 1000 MHz (1GHz - 40 GHz).
3. The test is required for any spurious emission or modulation product that falls in a Restricted Band, as defined in Section 15.205. It must be performed with the highest gain of each type of antenna proposed for use with the EUT. Use the following spectrum analyzer settings:

   - RBW = 100 kHz for f < 1GHz and RBW = 1 MHz for f ≥ 1 GHz
   - VBW = RBW
   - Sweep = auto
   - Detector function = peak
   - Trace = max hold
   - Follows the guidelines in ANSI C63.4-1992 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization, etc.. A pre-amp and highpass filter are required for this test, in order to provide the measuring system with sufficient sensitivity.
   - Allow the trace to stabilize.
   - The peak reading of the emission, after being corrected by the antenna correction factor, cable loss, pre-amp gain, etc…. is the peak field strength which comply with the limit specified in Section 15.35(b)

   **Calculation of Field Strength**:

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

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

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

Example: If a receiver reading of 60.0 dBuV is obtained, the antenna factor of 7.0 dB/m and cable factor of 1.0 dB are added, and the amplifier gain of 30 dB is subtracted. The actual field strength will be:
Field Level = 60 + 7.0 + 1.0 - 30 = 38.0 dBuV/m.

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

- Submit this test data
- Now set the VBW to 10Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the dwell time per channel of the hopping signal is less than 100ms, then the reading obtained may be further adjusted by a "duty cycle correction factor", derived from 10log(dwell time/100mS) in an effort to demonstrate compliance with the 15.209.
- Submit test data

## Maximizing The Radiated Emissions:

- The frequencies of emissions was first detected. Then the amplitude of the emissions was measured at the specified measurement distance using required antenna height, polarization, and detector characteristics.
- During this process, cables and peripheral devices were manipulated within the range of likely configuration.
- For each mode of operation required to be tested, the frequency spectrum was monitored. Variations in antenna heights (from 1 meter to 4 meters above the ground plane), antenna polarization (horizontal plane and vertical plane), cable placement and peripheral placement were explored to produce the highest amplitude signal relative to the limit.

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

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

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

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

Step4: Move the antenna over its full allowable 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.

## 8.3. 26 DB BANDWIDTH MEASUREMENTS

- Couple the RF output signal to the spectrum analyzer by means of direct connection or by a receiving antenna.
- The spectrum analyzer shall be se as follows:
  - Span: Minimum span to fully display the entire emission, apProximately 3 x emission BW.
  - Resolution RBW: 1% to 3% of the apProximate emission BW
  - Video VBW: 3 x RBW
  - EMI Detector: Peak
  - Sweep Time: Coupled or set to a slow rate
  - Trace: Max-hold
- Place the marker at both sides of the emission slope and at -26 dB down from the peak value.
- The difference of frequencies of 2 markers will be the 26 dB bandwidth
- Record and plot the test results.