ENGINEERING TEST REPORT

V-STATION, A, P, R
Model No.: V-STN, A, P, R

FCC ID: QC4-VSTNAPR

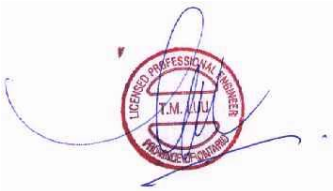
Applicant:

Bioscrypt, Inc.
505 Cochrane Drive
Markham, Ontario
Canada L3R 8E3

In Accordance With

Federal Communications Commission (FCC)
Part 15, Subpart C, Section 15.209
Low Power Transmitters Operating at 125 kHz

UltraTech's File No.: MYT-093F15C209

This Test report is Issued under the Authority of Tri M. Luu, Professional Engineer, Vice President of Engineering UltraTech Group of Labs Date: September 19, 2006	
Report Prepared by: Mr. Dan huynh Issued Date: September 19, 2006	Tested by: Mr. Hung Trinh Test Dates: August 2, 2006

- *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.*

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EXHIBIT 1. INTRODUCTION

1.1. SCOPE

Reference:	FCC Part 15, Subpart C, Section 15.209
Title:	Code of Federal Regulations (CFR) Title 47 - Telecommunication, Part 15
Purpose of Test:	To gain FCC Equipment 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:	Commercial, industrial or business environment

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

None.

1.3. NORMATIVE REFERENCES

Publication	Year	Title
FCC 47 CFR Parts 0-19	2006	Code of Federal Regulations – Telecommunication
ANSI C63.4	2003	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 +A1 EN 55022	2003-04-10 2004-10-14 2003	Limits and Methods of Measurements of Radio Disturbance Characteristics of Information Technology Equipment
CISPR 16-1-1	2003	Specification for radio disturbance and immunity measuring apparatus and methods. Part 1-1: Measuring Apparatus
CISPR 16-2-1	2003	Specification for radio disturbance and immunity measuring apparatus and methods. Part 2-1: Conducted disturbance measurement
CISPR 16-2-3	2003	Specification for radio disturbance and immunity measuring apparatus and methods. Part 2-3: Radiated disturbance measurement

EXHIBIT 2. PERFORMANCE ASSESSMENT

2.1. CLIENT INFORMATION

APPLICANT	
Name:	Bioscrypt Inc.
Address:	505 Cochrane Drive Markham, Ontario Canada L3R 8E3
Contact Person:	Mr. Shiraz Kapadia Phone #: 905-940-7784 Fax #: 905-940-7642 Email Address: shiraz.kapadia@bioscrypt.com

MANUFACTURER	
Name:	Bioscrypt Inc.
Address:	505 Cochrane Drive Markham, Ontario Canada L3R 8E3
Contact Person:	Mr. Shiraz Kapadia Phone #: 905-940-7784 Fax #: 905-940-7642 Email Address: shiraz.kapadia@bioscrypt.com

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:	Bioscrypt Inc.
Product Name:	V-STATION, A, P, R
Model Name or Number:	V-STN, A, P, R
Serial Number:	Pre-production sample
Type of Equipment:	Low Power Transmitters
Input Power Supply Type:	9 to 24 Vdc using a generic external power supply
Primary User Functions of EUT:	Fingerprint reader (enroll, verification, communications output)

2.3. EUT'S TECHNICAL SPECIFICATIONS

TRANSMITTER	
Equipment Type:	Base station (fixed use)
Intended Operating Environment:	Commercial, industrial or business environment
Power Supply Requirement:	9 to 24 VDC
E-Field of the Carrier Signal:	53.68 dBµV/m at 10 m
Operating Frequency:	125 kHz
RF Output Impedance:	50 Ohms
Channel Spacing:	N/A
26 dB Bandwidth:	1.91 kHz
Modulation Type:	ASK 20% duty cycle @ 100 ms
Antenna Connector Type:	Manufacturer: HID Type: LC (Coil), soldered to the printed circuit board Model: Integral Frequency Range: 125KHz Gain: N/A

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	Ethernet 10-BaseT	1	RJ45	Non-shielded
2	Host RS-485	2	RJ45 & Terminal Block	Non-shielded
3	Host RS-232	2	RJ11 & Terminal Block	Non-shielded
4	Power	2	Bullet & Terminal Block	Non-shielded
5	Wiegand I/O	1	Terminal Block	Non-shielded
6	General Purpose I/O	1	Terminal Block	Non-shielded
7	Auxiliary Port	1	USB-Mini-B	Shielded

NOTES:

(1) Ports of the EUT which in normal operation were connected to ancillary equipment through interconnecting cables via a representative interconnecting cable to simulate the input/output characteristics.

(2) Ports which are not connected to cables during normal intended operation (for factory/technical services uses only):

Aux-port USB Mini B port used for Administrator purposes only, this port is NOT intended for normal operation.

2.5. ANCILLARY EQUIPMENT

None.

2.6. GENERAL TEST SETUP

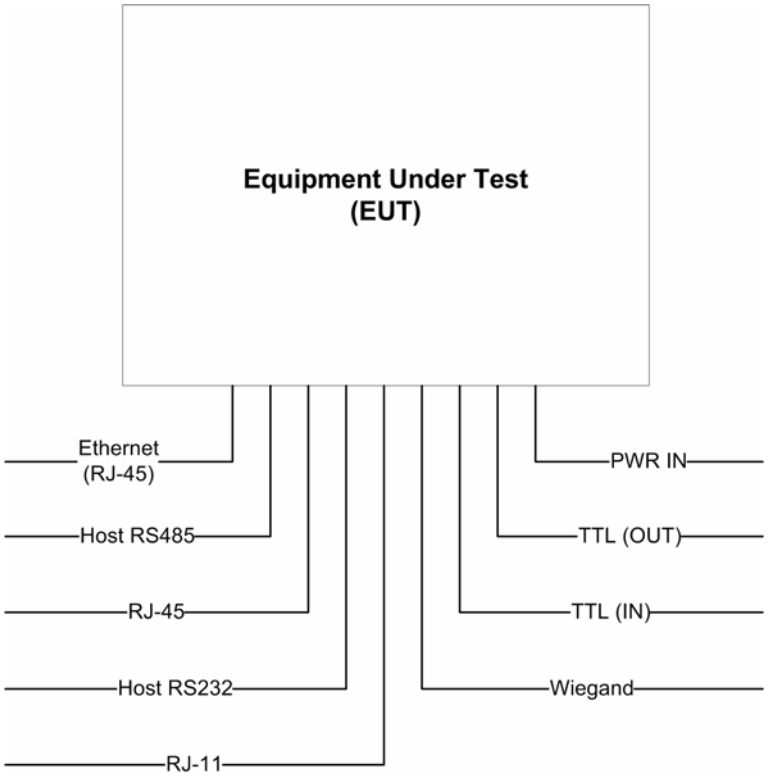


EXHIBIT 3. EUT OPERATING CONDITIONS AND CONFIGURATIONS DURING TESTS

3.1. CLIMATE TEST CONDITIONS

The climate conditions of the test environment are as follows:

Temperature:	21°C
Humidity:	51%
Pressure:	102 kPa
Power input source:	9 to 24 VDC

3.2. OPERATIONAL TEST CONDITIONS & ARRANGEMENT FOR TESTS

Operational test condition 1 (transmitter tests):

The EUT was set to transmit continuously for duration of the tests.

Operational test condition 2 (all other tests):

The EUT represented a fully functional device using a special firmware load “FCC-Test” where all operations of the device were fully automated requiring no user intervention. The device would verify against a template pre-loaded onto the unit and perform this activity for each cycle.

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.

- 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. This test site has 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: Jan. 10, 2006.

4.2. APPLICABILITY & SUMMARY OF EMC EMISSION TEST RESULTS

FCC Section(s)	Test Requirements	Compliance (Yes/No)
15.203	Antenna Requirement	Yes.
15.207	Power Lines Conducted Emissions	Yes
15.209 & 15.205	Transmitter Radiated Emissions - Fundamental, Harmonic and Spurious	Yes
--	26 dB Bandwidth	Yes
The digital circuit portion of the EUT has been tested and verified to comply with FCC Part 15, Subpart B, Class B Digital Devices, the associated Radio Receiver operating at 125 kHz is exempted from FCC authorization. The engineering test report can be provided upon FCC requests.		

4.3. MODDIFICATIONS INCORPORATED IN THE EUT FOR COMPLIANCE PURPOSES

None.

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

5.1. TEST PROCEDURES

This section contains test results only. Details of test methods and procedures can be found in ANSI C63.4 and ULTR-P001-2004.

5.2. MEASUREMENT UNCERTAINTIES

The measurement uncertainties stated were calculated in accordance with requirements of UKAS Document LAB 34 with a confidence level of 95%. Please refer to Exhibit 6 for Measurement Uncertainties.

5.3. MEASUREMENT EQUIPMENT USED

The measurement equipment used complied with the requirements of the Standards referenced in the Methods & Procedures ANSI C63.4 and CISPR 16-1.

5.4. POWER LINES CONDUCTED EMISSIONS [47 CFR 15.207]

5.4.1. Limits

The equipment shall meet the limits of the following table:

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

*Decreases with the logarithm of the frequency.

5.4.2. Method of Measurements

Refer to Ultratech Test Procedures, File # ULTR P001-2004 and ANSI C63.4 for measurement methods

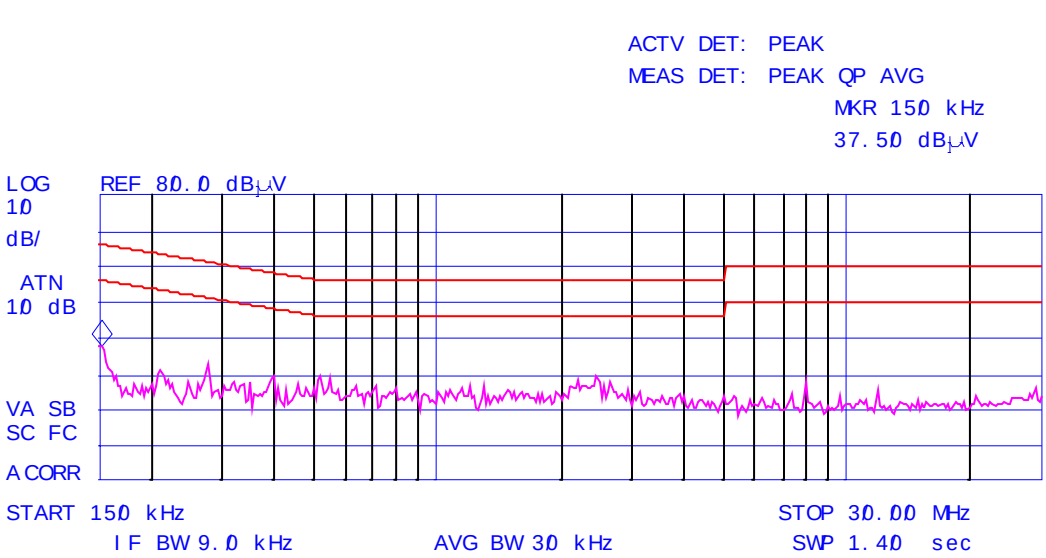
5.4.3. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
EMI Receiver System/ Spectrum Analyzer with built-in Amplifier	Hewlett Packard	HP 8546A	3520A00248	9KHz-5.6GHz, 50 Ohms
Transient Limiter	Hewlett Packard	11947A	310701998	9 kHz – 200 MHz 10 dB attenuation
L.I.S.N.	EMCO	3825/2	89071531	9 kHz – 200 MHz 50 Ohms / 50 μH
RF Shielded Chamber	RF Shielding	…	..	…

5.4.4. Test Data

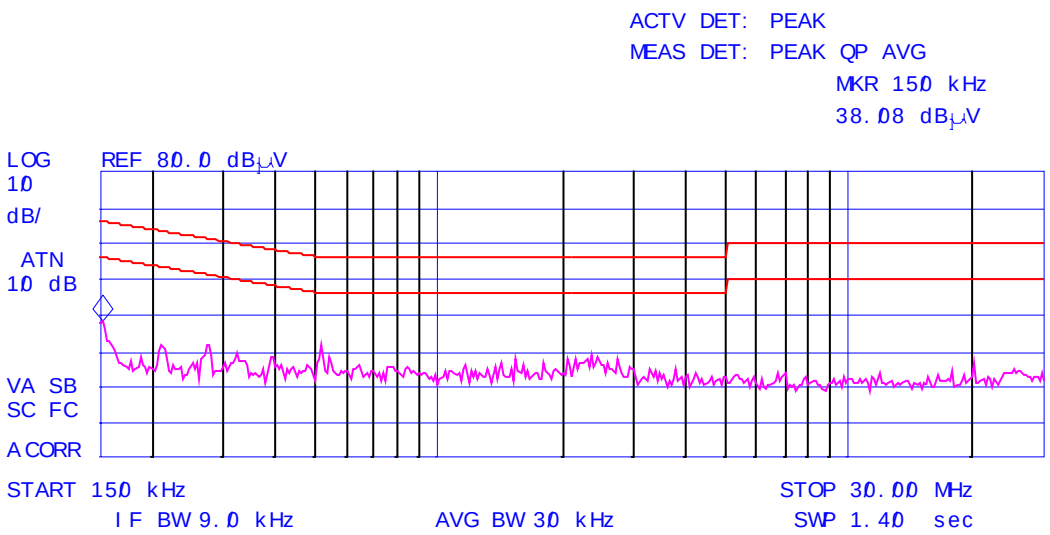
Plot 5.4.4.1 Power Lines Conducted Emissions
Line Voltage: 9 VDC
Line Tested: Positive

Signal	Freq (MHz)	PK Amp	QP Amp	AV Amp	AV△L2
1	0.152500	39.2	37.3	32.6	-23.3
2	0.277800	32.8	30.3	27.5	-23.4



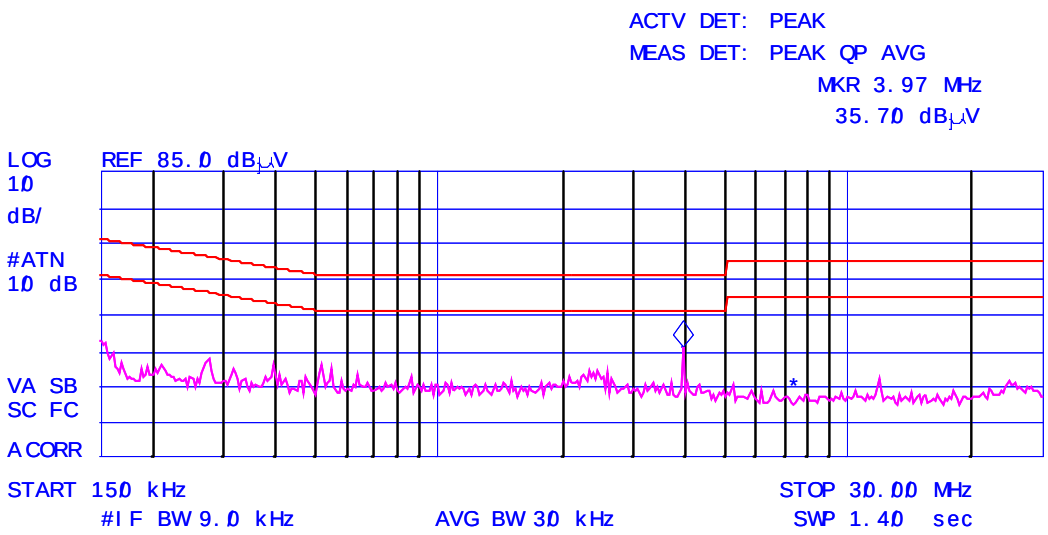
Plot 5.4.4.2 Power Lines Conducted Emissions
Line Voltage: 9 VDC
Line Tested: Negative

Signal	Freq (MHz)	PK Amp	QP Amp	AV Amp	AV△L2
1	0.152434	40.3	36.5	32.4	-23.5
2	0.214275	32.1	29.8	27.1	-26.0



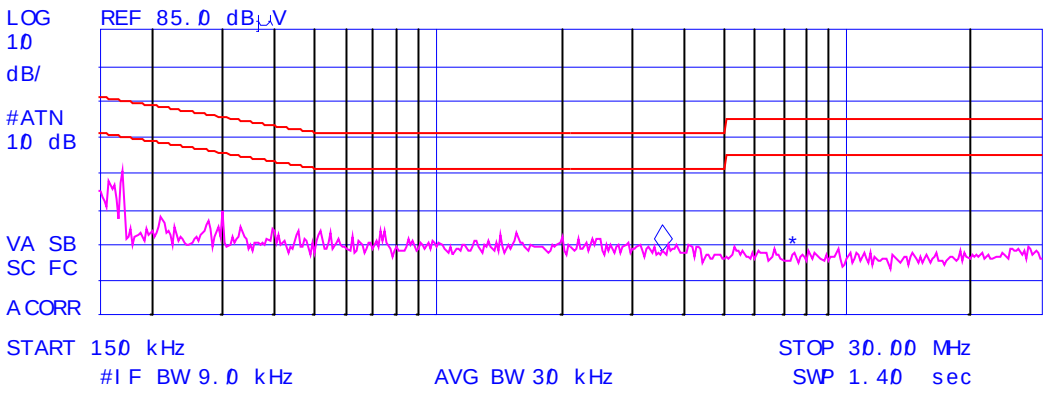
Plot 5.4.4.3 Power Lines Conducted Emissions
Line Voltage: 24 VDC
Line Tested: Positive

Signal	Freq (MHz)	PK Amp	QP Amp	AV Amp	AV△L2
1	0.152733	39.8	35.5	31.2	
2	4.000017	24.1	35.6	10.8	



Plot 5.4.4.4 Power Lines Conducted Emissions
Line Voltage: 24 VDC
Line Tested: Negative

Signal	Freq (MHz)	PK Amp	QP Amp	AV Amp	AV△L2
1	0.157738	52.0	42.6	21.8	
2	0.232298	26.7	27.0	17.6	
3	0.907249	27.0	21.1	14.7	
4	3.554980	25.1	20.6	14.2	



5.5. 26 dB BANDWIDTH

5.5.1. Limits

The rf spectrum shall not be in the restricted frequency bands shown in § 15.205.

5.5.2. Method of Measurements

Refer to ANSI C63.4

The bandwidth of the fundamental frequency was measured with the spectrum analyzer using RBW = 1% of approximate 26dB BW, VBW > RBW, Span = approx. 3 x 26 dB BW. The 26 dB Bandwidth was measured and recorded.

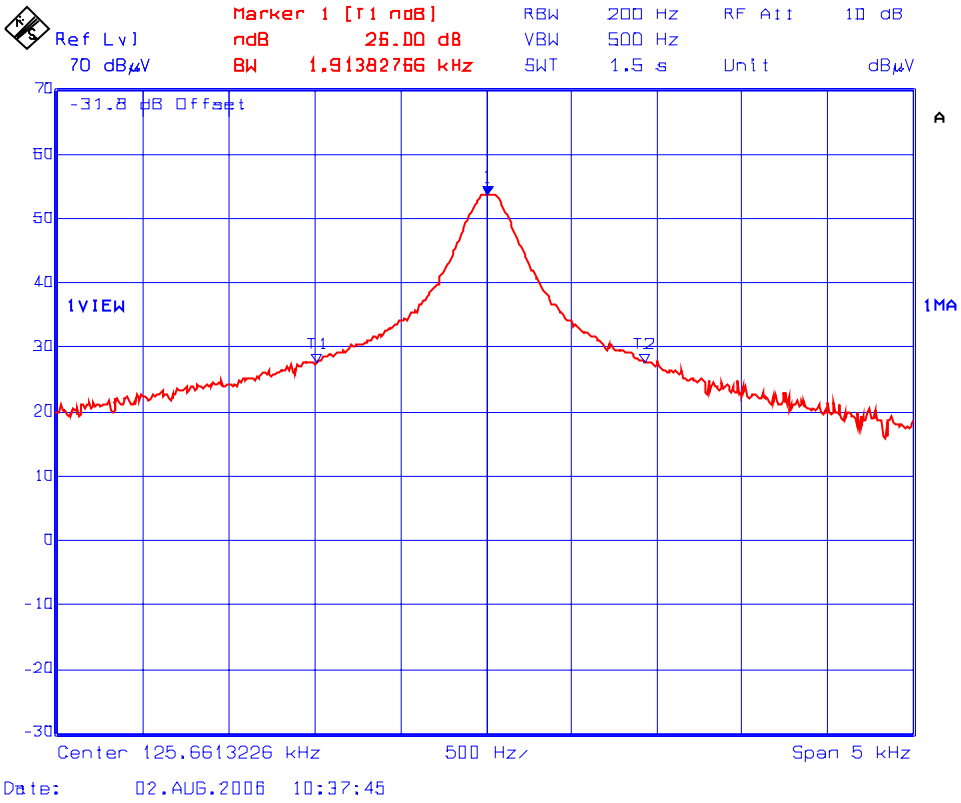
5.5.3. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer	Rohde & Schwarz	FSEK20/B4/B21	834157/005	9 kHz – 40 GHz with external mixer

5.5.4. Test Data

Frequency (kHz)	26 dB Bandwidth (kHz)
125	1.91

Plot 5.5.4.1 26 dB Bandwidth
Frequency: 125 kHz



5.6. TRANSMITTER FUNDAMENTAL & SPURIOUS RADIATED EMISSIONS [47 CFR §§ 15.209 & 15.205]

5.6.1. Limits

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

47 CFR 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	

47 CFR 15.209(a) Radiated Emission Limits; General Requirements

Frequency (MHz)	Field Strength (microvolts/m)	Measurement 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

5.6.2. Method of Measurements

Refer to Ultratech Test Procedures, File # ULTR P001-2004 and ANSI C63.4 for measurement methods

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 $\leq$ frequencies $\leq$ 150 kHz: RBW = 1 KHz, VBW $\geq$ 1 KHz, SWEEP=AUTO.
- For 150 MHz $\leq$ frequencies $\leq$ 30 MHz: RBW = 10 KHz, VBW $\geq$ 10 KHz, SWEEP=AUTO.
- For 30 MHz $\leq$ frequencies $\leq$ 1 GHz: RBW = 100 KHz, VBW $\geq$ 100 KHz, SWEEP=AUTO.
- For frequencies $\geq$ 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).

5.6.3. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer/ EMI Receiver	Rohde & Schwarz	FSEK20/B4/B21	834157/005	9 kHz – 40 GHz with external mixer
Microwave Amplifier	Hewlett Packard	HP 83017A		1 GHz to 26.5 GHz
Microwave Amplifier	Hewlett Packard	HP 83051A	3332A00471	1 GHz to 50 GHz
Active Loop Antenna	EMCO	6507	8906-1167	1 kHz – 30 MHz
Biconilog Antenna	EMCO	3143	1029	20 MHz to 2 GHz

5.6.4. Test Data

Note(s):

Since, the RF emissions from 9 kHz to 30 MHz are too small to be tested at 300 m, we chose to test it at 10 meters. The limits are linearly interpolated to 10 m distance, except for limits in the frequency range 9 - 490 kHz.

In the frequency range 9 kHz to 490 kHz, the limit is converted from 300 m to 10 m using the following formula:

Limit at 10 meters in 9 to 490 KHz band = $[(2400*300/10) / F\ (KHz)]^2 = [72{,}000 / F\ (KHz)]^2$

Equivalently, the limits at 10 meters are converted as below:

Frequency (MHz)	Field Strength (microvolts/m)	Measurement Distance (meters)
0.009 - 0.490	$[72{,}000 / F\ (KHz)]^2$	10
0.490 - 1.705	72,000 / F (KHz)	10
1.705 - 30.0	90	10
30 – 88	30	10
88 – 216	45	10
216 – 960	60	10
Above 960	150	10

5.6.4.1. Radiated Emissions from 9 KHz to 30 MHz at 10 Meters Distance Using Active Loop Antenna

Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (Degree)	15.209 (a) Limit at 10m (dBµV/m)	Margin (dB)
0.125	47.88	N/A	0	110.4	-62.5
0.125	53.68	N/A	90	110.4	-56.7
The emissions were scanned from 9 kHz to 30 MHz, all significant emissions were recorded.					

5.6.4.2. Radiated Emissions from 30 MHz to 1 GHz at 10 Meters Distance Using Biconilog Antenna

Frequency (MHz)	RF Peak Level at 10m (dBµV/m)	EMI Detector (Peak/QP)	Antenna Plane (V/H)	15.209 (a) Limit at 10m (dBµV/m)	Margin (dB)
34.0	21.61	Peak	V	29.5	-7.9
34.0	21.94	Peak	H	29.5	-7.6
37.0	18.87	Peak	V	29.5	-10.6
37.0	19.14	Peak	H	29.5	-10.4
44.8	18.20	Peak	V	29.5	-11.3
48.0	20.47	Peak	V	29.5	-9.0
57.3	19.00	Peak	V	29.5	-10.5
64.0	18.20	Peak	V	29.5	-11.3
76.5	17.16	Peak	V	29.5	-12.3
148.1	20.70	Peak	V	33.1	-12.4
448.3	24.20	Peak	V	35.6	-11.4
448.3	28.80	Peak	H	35.6	-6.8
480.8	25.44	Peak	V	35.6	-10.2
480.8	25.00	Peak	H	35.6	-10.6
487.2	27.03	Peak	V	35.6	-8.6
487.2	23.13	Peak	H	35.6	-12.5
512.0	28.66	Peak	V	35.6	-6.9
512.0	28.73	Peak	H	35.6	-6.9
519.0	27.28	Peak	V	35.6	-8.3
519.0	27.93	Peak	H	35.6	-7.7
524.8	25.28	Peak	V	35.6	-10.3
524.8	26.64	Peak	H	35.6	-9.0
535.0	25.15	Peak	V	35.6	-10.5
535.0	28.36	Peak	H	35.6	-7.2
545.2	24.05	Peak	V	35.6	-11.6
545.2	29.90	Peak	H	35.6	-5.7
The emissions were scanned from 30 - 1000 MHz and all emissions within 20 dB below the permissible limits were recorded.					

EXHIBIT 6. MEASUREMENT UNCERTAINTY

The measurement uncertainties stated were calculated in accordance with the requirements of NIST Technical Note 1297 and LAB 34

6.1. LINE CONDUCTED EMISSION MEASUREMENT UNCERTAINTY

CONTRIBUTION (Line Conducted)	PROBABILITY DISTRIBUTION	UNCERTAINTY (dB)	
		9-150 kHz	0.15-30 MHz
EMI Receiver specification	Rectangular	±1.5	±1.5
LISN coupling specification	Rectangular	±1.5	±1.5
Cable and Input Transient Limiter calibration	Normal (k=2)	±0.3	±0.5
Mismatch: Receiver VRC Γ_1 = 0.03 LISN VRC Γ_R = 0.8(9 kHz) 0.2 (30 MHz) Uncertainty limits 20Log(1±$\Gamma_1\Gamma_R$)	U-Shaped	±0.2	±0.3
System repeatability	Std. deviation	±0.2	±0.05
Repeatability of EUT	--	--	--
Combined standard uncertainty	Normal	±1.25	±1.30
Expanded uncertainty U	Normal (k=2)	±2.50	±2.60

Sample Calculation for Measurement Accuracy in 150 kHz to 30 MHz Band:

$u_c(y) = \sqrt{\sum_{I=1}^{m} u_i^2(y)} = \pm \sqrt{(1.5^2 + 1.5^2)/3 + (0.5/2)^2 + (0.05/2)^2 + 0.35^2} = \pm 1.30$ dB

$U = 2u_c(y) = \pm 2.6$ dB

6.2. 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 Directivity	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 Γ_1 = 0.2 Antenna VRC Γ_R = 0.67(Bi) 0.3 (Lp) Uncertainty limits 20Log(1±$\Gamma_1\Gamma_R$)	U-Shaped	+1.1 -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