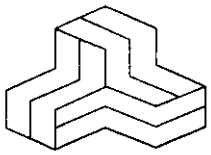

ENGINEERING TEST REPORT

V3000 VALIDATOR
Model No: V3000

FCC ID: NB8V3000

FCC PART 15, SUBPART C, PARA. 15.225
TRANSMIITER OPERATION
IN THE FREQUENCY BAND FROM 13.553-13.567 MHz

UltraTech's FILE NO.: AES-005FTX

TESTED FOR:

AES PRODATA
151 Brunel Road, Unit 18
Mississauga, Ontario
Canada, L4Z 2H6

TESTED BY:

UltraTech Engineering Labs Inc.
4181 Sladeview Crescent, Unit 33
Mississauga, Ontario
Canada L5L 5R2

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

DATE: Aug. 12, 1998

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

FCC PARAGRAPH.	TEST REQUIREMENTS	COMPLIANCE (YES/NO)
15.203	Antenna Requirement	Yes
15.225(a) & (b)	Transmitter Radiated Emissions - Fundamental, Harmonic and Spurious	Yes
15.225	99% Occupied Bandwidth	Yes
15.225(c) & 2.995	Frequency Stability	Yes
1.1310	RF Exposure Limits	Yes
15.107, 15.109	AC Power Conducted Emissions & Radiated Emissions for Transmitter, Receiver and Digital Circuit Portions	Not applicable for battery operated device.

Notes: Although, the digital circuit and radio receiver portions of the AES ProData V3000 VALIDATOR, Model V3000, are exempted from FCC authorization for transportation vehicle (bus mount) and receiver operating at 13.56 MHz, the radiated emission tests have conducted in the frequency range from 30-1000 MHz and found to comply with FCC Part 15, Subpart B, Class B Digital Devices and Radio Receiver. The Engineering report can be provided any time upon FCC request.

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, randomly selected.*

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: Aug. 12, 1998

2. EXHIBIT 2 - GENERAL INFORMATION

2.1. APPLICANT

AES PRODATA
151 Brunel Road, Unit 18
Mississauga, Ontario
Canada, L4Z 2H6

Applicant's Representative: Mr. Harold Steven

2.2. MANUFACTURER

AES PRODATA
151 Brunel Road, Unit 18
Mississauga, Ontario
Canada, L4Z 2H6

2.3. DESCRIPTION OF EQUIPMENT UNDER TEST

PRODUCT NAME:	V3000 VALIDATOR
SERIAL NUMBER:	Pre-Production
TYPE OF EQUIPMENT:	Low Power Transmitters
OPERATING FREQ.:	13.56 MHz
BANDWIDTH (99% OBW):	5.7 KHz
EMISSION DESIGNATION @ 15.201:	5K7A1D
RF OUTPUT POWER:	41.2 µV/m, 13.56 MHz @ 3m
INPUT SUPPLY:	24 Vdc Battery
ASSOCIATED DEVICES:	Please note that this radio transmitter communicate with a load detector device (no associated radio receiver involved).
INTERFACE PORTS:	N/A

2.4. OPERATIONAL OVERVIEW OF EQUIPMENT UNDER TEST

Please refer to the attached technical description of the V3000 for its detailed technical operations.

2.5. RELATED SUBMITTAL(S)/GRANT

Not applicbale.

2.6. 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. 15.225, Low Power Transmitters

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.

2.7. 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).

2.8. UNITS OF MEASUREMENTS

Measurements of conducted emissions are reported in units of dB referenced to one microvolt [dB(uV)].

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

3. EXHIBIT 3 - SYSTEM TEST CONFIGURATION

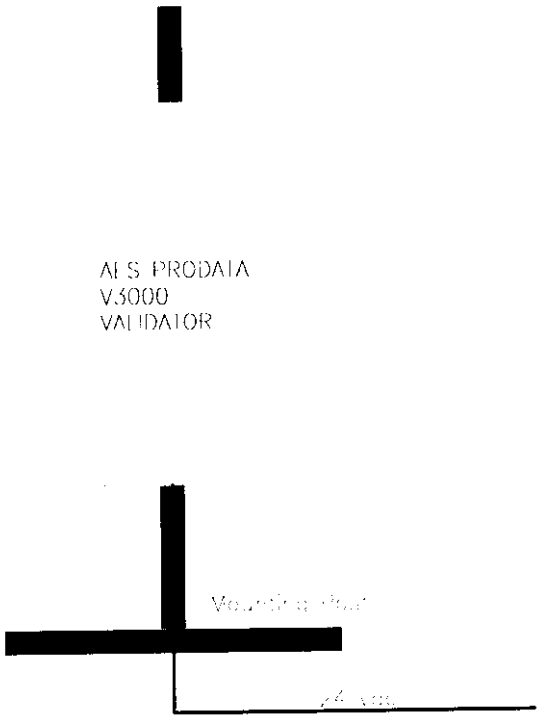
3.1. TEST SYSTEM DETAILS

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

(1) EUT: AES PRODATA, V3000 VALIDATOR, Model : V3000, S/N: Pre-Production.
Power cable: Shielded
I/O Cable: Not applicable

(2) PERIPHERAL: Not required.

3.2. BLOCK DIAGRAMS FOR RADIATED EMISSION MEASUREMENTS



3.4. JUSTIFICATION

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

3.5. EUT OPERATING CONDITION

The transmitter was set to operate continuously for testing.

3.6. SPECIAL ACCESSORIES

No special accessories were required.

3.7. EQUIPMENT MODIFICATIONS

To achieve compliance, the following change(s) were made by UltraTech's test house during compliance testing:

- The internal DC power wire leads were looped around a ferrite toroid, Steward P/N: 28A2024-000 or equivalent, for at least to turns and located inside the case.
- The interior surface of the plastic cover was covered by graphite shield paint except for the area where the antenna was located.

4. EXHIBIT 4 - TEST DATA

4.1. ANTENNA REQUIREMENTS @ FCC CFR 47, PARA 15.203

PRODUCT NAME: **V3000 VALIDATOR, Model No.: V3000**

FCC REQUIREMENTS:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Notes: This requirement does not apply to carrier current devices operated under the provisions of @ 15.211, 15.213, 15.217, 17.219 or 15.221.

ENGINEERING ANALYSIS:

Internal integral antenna component mounted on the printed circuit board and located inside the device's case.

TEST RESULTS:

Conforms.

TEST PERSONNEL:

Mr. Phu Luu, EMI Technician

DATE:

Nov. 03, 1997

4.2. TRANSMITTER RADIATED EMISSIONS @ 3 OR 30 METERS, FCC CFR 47, PARA. 15.225(A)&(B), 15.209 & 15.205

PRODUCT NAME: **V3000 VALIDATOR, Model No.: V3000**

FCC REQUIREMENTS:

FCC 15.225(a) - The field strength of any emissions within the 13.553-13.567 MHz band shall not exceed 10,000 μV/m or 80dBμV/m at 30 meters.

FCC 15.225(b) – The field strength of any emissions appearing outside of this band shall not exceed the general radiated emission limits shown in @ 15.209.

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: 23oC
- Relative humidity: 43%

POWER INPUT:

24 Vdc Battery.

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.
- **Active Loop Antenna**, Emco, Model 6502, Frequency Range 1 KHz - 30 MHz, @ 50 Ohms
- **Log Periodic/Bow-Tie Antenna**, Emco, Model 3143, SN 1029, 20 - 1000 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 measurements from 9 KHz to 150 KHz, set RBW = 1 KHz, VBW $\geq$ RBW, SWEEP=AUTO.
- For measurements from 150 KHz to 30 MHz, set RBW = 10 KHz, VBW $\geq$ RBW, SWEEP=AUTO.
- For measurements from 30 MHz to 1 GHz, set RBW = 100 KHz, VBW $\geq$ RBW, SWEEP=AUTO.
- For measurement above 1 GHz, set RBW = 1 MHz, VBW = 1 MHz, 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).

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. Phu Luu, EMI Technician**

DATE: **Nov. 04, 1997**

MEASUREMENT DATA

TEST CONFIGURATION

- For measurements from 9 KHz to 150 KHz, set RBW = 1 kHz, VBW ≥ RBW, SWEEP=AUTO.
- For measurements from 150 KHz to 30 MHz, set RBW = 10 KHz, VBW ≥ RBW, SWEEP=AUTO.
- For measurements from 30 MHz to 1 GHz, set RBW = 100 KHz, VBW ≥ RBW, SWEEP=AUTO.
- For measurement above 1 GHz, set RBW = 1 MHz, VBW = 1 MHz, SWEEP=AUTO.

- No other significant emissions were found in the frequency range from 1 MHz to 1 GHz.

Remarks:

(1) For FCC review, if requires, the estimated minimum 30 meter-3 meter conversion factor for the fundamental = min. measurement at 3 meters – min reading at 30 meters = 66.3 dBuV/m – 32.5 dBuV/m = 33.8 dB

(2) The radiated emissions measurements at 30 meters below the EMI receiver's noise floor level

(3) The spurious emissions from the transmitter, falling inside the restricted band 13.36-13.41 MHz, were below the FCC 15.209 limit at 3 meters OFTS. These emissions were not significant seen at 30 meters OFTS since the 3-30 meter conversion factor was approximately 36 dB based on measurement of the fundamental at 3 meters and 30 meters. The verification tests were repeated again at 3 meters inside the Anechoic enclosure with all walls, floor and ceiling covered by ferrite tiles, and the plot from radiated emissions from 3 & 30 MHz was recorded as enclosed.

RADIATED EMISSIONS MEASUREMENTS @ 3 METERS DISTANCE

Frequency Range tested: 9 kHz to 30 MHz

FREQUENCY (MHz)	PEAK RF LEVEL (dBuV/m)	EMI RECEIVER DETECTOR (Peak/QP)	ANTENNA PLANE (H/V)	FCC QP. LIMIT (dBuV/m)	MARGIN (dB)	PASS/ FAIL	Measured Distance (m)
13.56	66.3	Peak	V	100.0	-33.7	PASS	3
13.56	63.2	Peak	H	100.0	-36.8	PASS	3
13.64	49.1	Peak	V	49.5	-0.4	PASS	3
13.64	44.8	Peak	H	49.5	-4.7	PASS	3
27.12	36.2	Peak	V	49.5	-13.3	PASS	3
27.12	33.3	Peak	H	49.5	-16.2	PASS	3

RADIATED EMISSIONS MEASUREMENTS @ 30 METERS DISTANCE

Frequency Range tested: 9 kHz to 30 MHz

FREQUENCY (MHz)	PEAK RF LEVEL (dBuV/m)	EMI RECEIVER DETECTOR (Peak/QP)	ANTENNA PLANE (H/V)	FCC QP. LIMIT (dBuV/m)	MARGIN (dB)	PASS/ FAIL	Measured Distance (m)
13.56	31.0	Peak	V	80.0	-49.0	PASS	30
13.56	32.5	Peak	H	80.0	-47.5	PASS	30
13.64	13.4	Peak	V	29.5	-16.1	PASS	30
13.64	9.7	Peak	H	29.5	-19.8	PASS	30
27.12	< 5.0	Peak	V	29.5	< -34.5	PASS	30
27.12	< 5.0	Peak	H	29.5	< -34.5	PASS	30

RADIATED EMISSIONS MEASUREMENTS @ 3 METERS DISTANCE

Frequency Range tested: 30 MHz to 1 GHz

FREQUENCY (MHz)	PEAK RF LEVEL (DbuV/m)	EMI RECEIVER DETECTOR (Peak/QP)	ANTENNA PLANE (H/V)	FCC QP. LIMIT (dBuV/m)	MARGIN (dB)	PASS/ FAIL	Distance (m)
38.90	38.2	QP	V	40.0	-1.8	PASS	3
40.75	37.7	QP	V	40.0	-2.3	PASS	3
40.75	32.4	Peak	H	40.0	-7.6	PASS	3
48.20	21.2	Peak	V	40.0	-18.8	PASS	3
54.30	30.6	Peak	V	40.0	-9.4	PASS	3
54.30	31.1	Peak	H	40.0	-8.9	PASS	3
61.20	26.0	Peak	V	40.0	-14.0	PASS	3
67.80	29.9	Peak	V	40.0	-10.1	PASS	3
67.80	29.6	Peak	H	40.0	-10.4	PASS	3
108.48	31.0	Peak	V	43.5	-12.5	PASS	3
108.48	27.7	Peak	H	43.5	-15.8	PASS	3
122.20	42.1	Peak	V	43.5	-1.4	PASS	3
122.20	32.7	Peak	H	43.5	-10.8	PASS	3
128.50	29.0	Peak	V	43.5	-14.5	PASS	3
128.50	19.4	Peak	H	43.5	-24.1	PASS	3
134.80	24.4	Peak	V	43.5	-19.1	PASS	3
134.80	23.1	Peak	H	43.5	-20.4	PASS	3
149.20	40.4	Peak	V	43.5	-3.1	PASS	3
149.20	33.8	Peak	H	43.5	-9.7	PASS	3
151.10	26.8	Peak	V	43.5	-16.7	PASS	3
151.10	25.2	Peak	H	43.5	-18.3	PASS	3
153.33	21.9	Peak	V	43.5	-21.6	PASS	3
162.70	34.1	Peak	V	43.5	-9.4	PASS	3
162.70	32.8	Peak	H	43.5	-10.7	PASS	3
168.50	27.2	Peak	V	43.5	-16.3	PASS	3
168.50	25.1	Peak	H	43.5	-18.4	PASS	3
170.00	23.5	Peak	V	43.5	-20.0	PASS	3
170.00	29.4	Peak	H	43.5	-14.1	PASS	3
176.30	33.4	Peak	V	43.5	-10.1	PASS	3
176.30	31.4	Peak	H	43.5	-12.1	PASS	3
184.60	36.2	Peak	V	43.5	-7.3	PASS	3
184.60	30.5	Peak	H	43.5	-13.0	PASS	3
189.80	32.8	Peak	V	43.5	-10.7	PASS	3
200.80	27.2	Peak	V	43.5	-16.3	PASS	3
203.50	34.9	Peak	V	43.5	-8.6	PASS	3
203.50	33.9	Peak	H	43.5	-9.6	PASS	3
216.30	24.1	Peak	V	46.0	-21.9	PASS	3

Continued...

FREQUENCY (MHz)	PEAK RF LEVEL (DbuV/m)	EMI RECEIVER DETECTOR (Peak/QP)	ANTENNA PLANE (H/V)	FCC QP. LIMIT (dBuV/m)	MARGIN (dB)	PASS/ FAIL	Distance (m)
216.30	22.1	Peak	H	46.0	-23.9	PASS	3
230.60	34.1	Peak	V	46.0	-11.9	PASS	3
230.60	31.2	Peak	H	46.0	-14.8	PASS	3
244.10	32.4	Peak	V	46.0	-13.6	PASS	3
244.10	31.5	Peak	H	46.0	-14.5	PASS	3
251.20	22.4	Peak	V	46.0	-23.6	PASS	3
251.20	19.5	Peak	H	46.0	-26.5	PASS	3
257.90	32.9	Peak	V	46.0	-13.1	PASS	3
257.90	28.4	Peak	H	46.0	-17.6	PASS	3
271.40	31.3	Peak	V	46.0	-14.7	PASS	3
271.40	29.3	Peak	H	46.0	-16.7	PASS	3
284.79	29.1	Peak	V	46.0	-16.9	PASS	3
284.79	31.6	Peak	H	46.0	-14.4	PASS	3
298.35	29.7	Peak	V	46.0	-16.3	PASS	3
298.35	32.9	Peak	H	46.0	-13.1	PASS	3
311.95	28.1	Peak	V	46.0	-17.9	PASS	3
311.95	29.7	Peak	H	46.0	-16.3	PASS	3
325.47	26.5	Peak	V	46.0	-19.5	PASS	3
325.47	31.8	Peak	H	46.0	-14.2	PASS	3
339.03	29.0	Peak	V	46.0	-17.0	PASS	3
339.03	25.8	Peak	H	46.0	-20.2	PASS	3
341.00	29.6	Peak	V	46.0	-16.4	PASS	3
352.59	31.1	Peak	V	46.0	-14.9	PASS	3
352.59	32.2	Peak	H	46.0	-13.8	PASS	3
366.15	31.7	Peak	V	46.0	-14.3	PASS	3
366.15	27.3	Peak	H	46.0	-18.7	PASS	3
379.71	34.9	Peak	V	46.0	-11.1	PASS	3
379.71	27.4	Peak	H	46.0	-18.6	PASS	3
393.50	28.8	Peak	V	46.0	-17.2	PASS	3
393.50	26.2	Peak	H	46.0	-19.8	PASS	3
436.63	28.8	Peak	V	46.0	-17.2	PASS	3
436.63	25.6	Peak	H	46.0	-20.4	PASS	3
489.15	26.3	Peak	V	46.0	-19.7	PASS	3
489.15	24.7	Peak	H	46.0	-21.3	PASS	3
515.50	31.5	Peak	V	46.0	-14.5	PASS	3
515.50	33.0	Peak	H	46.0	-13.0	PASS	3

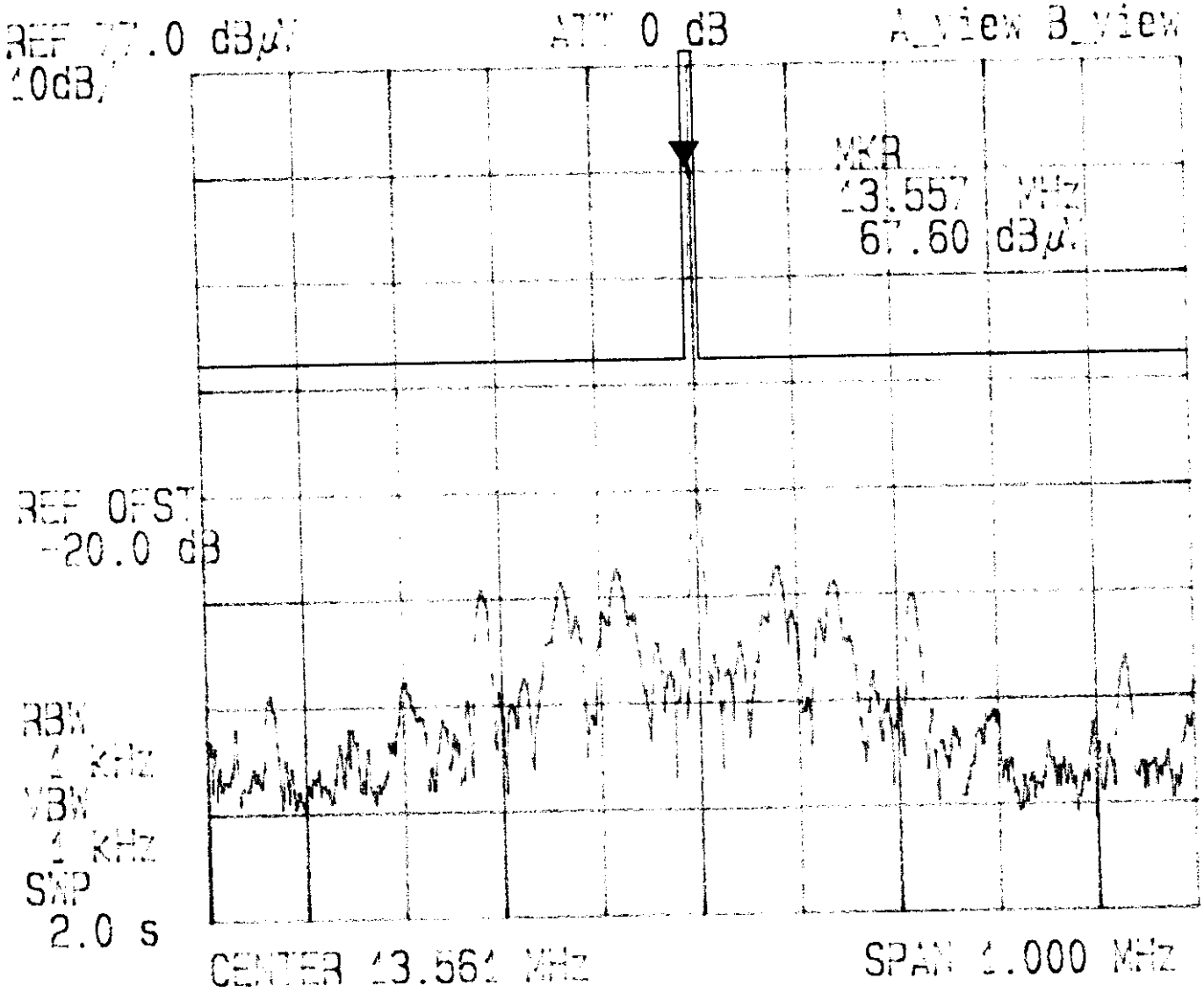
UltraTech Engineering Labs Inc.

AES PRODATA V3000
Rx Ant. Polarization: Horizontal [ ] Vertical [ ]

Date: Nov. _____, 97
Tested by: Tri Luu

TRANSMITTER RADIATED EMISSIONS AT 3 METERS

(Tests were repeated in the anechoic room for measurements of OBW and RF Emissions in the restricted bands)



4.3. 99% OBW @ FCC CFR 47, PARA. 15.225

PRODUCT NAME: **V3000 VALIDATOR, Model No.: V3000**

FCC REQUIREMENTS:

The 99% OBW of the transmitter's rf output emissions shall stayed within the frequency band from 13.553-13.567 MHz.

CLIMATE CONDITION:

Standard Temperature and Humidity:

- Ambient temperature: 23 oC
- Relative humidity: 43%

POWER INPUT:

24 Vdc Battery.

TEST EQUIPMENT:

- Advantest Spectrum Analyzer, Model R3271, S/N: 15050203

TEST RESULTS:

Conforms. Please refer to the attached plots.

TEST PERSONNEL: **Mr. Phu Luu, EMI Technician**

DATE: **Aug. 12, 1998**

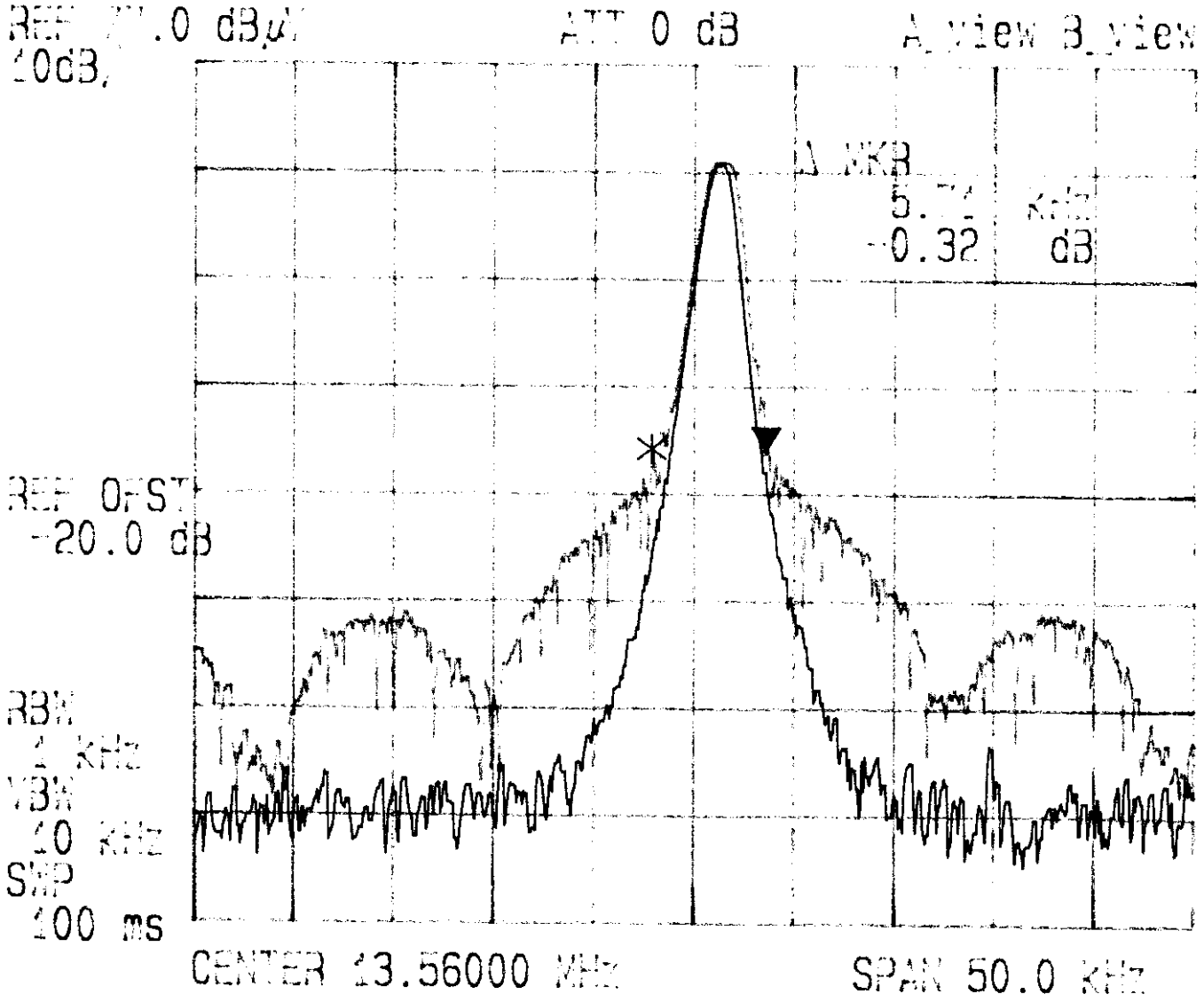
UltraTech Engineering Labs Inc.

AES PRODATA V3000
Rx Ant. Polarization: Horizontal [ ] Vertical [ ]

Date: Nov. _____, 97
Tested by: Tri Luu

TRANSMITTER RADIATED EMISSIONS AT 3 METERS

(Tests were repeated in the anechoic room for measurements of OBW and RF Emissions in the restricted bands)



4.4. FREQUENCY STABILITY @ FCC CFR 47, PARA. 15.225(C)

PRODUCT NAME: **V3000 VALIDATOR, Model No.: V3000**

FCC REQUIREMENTS:

FCC 15.225(c) – The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency over the temperature variation of – 20°C to +50°C at normal supply voltage, and for the variation from 85% to 115% of the rated supply voltage at a temperature of +20°C. For battery operated equipment, the equipment tests shall be performed using a new battery.

CLIMATE CONDITION/POWER INPUT:

Standard Temperature and Humidity: Please refer to Measurement Data

TEST EQUIPMENT:

- Advantest Spectrum Analyzer, Model R3271, S/N: 15050203
- Tenney Temp. & Humidity Chamber, Model T5, S/N: 9723B
- RF probe

METHOD OF MEASUREMENTS:

Refer to FCC @ 2.995

The frequency stability shall be measured with variation of ambient temperature as follows:

- From -20 to +50 centigrade except that specified in subparagraph (2) & (3) of this paragraph.

(b) Frequency measurements shall be made at extremes of the specified temperature range and at intervals of not more than 10 centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stability circuitry need be subjected to the temperature variation test.

(d) The frequency stability supply shall be measured with variation of primary supply voltage as follows:

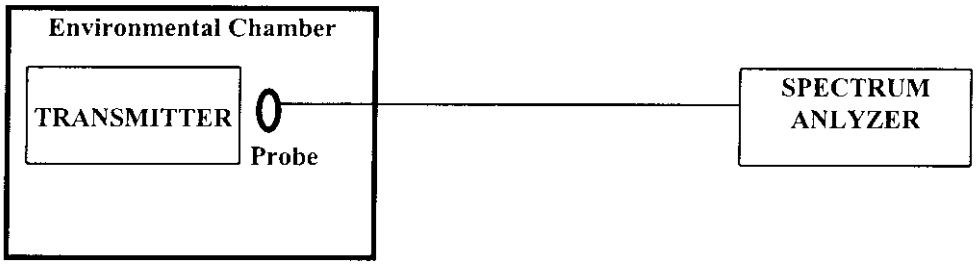
(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.

(3) The supply voltage shall be measured at the input to the cable normally provide with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

(e) When deemed necessary, the Commission may require tests of frequency stability under conditions in addition to those specifically set out in paragraphs (a), (b), (c) and (d) of this section. (For example, measurements showing the effect of proximity to large metal objects, or of various types of antennas, may be required for portable equipment).

TEST ARRANGEMENT



TEST RESULTS: Conforms.

TESTED PERSONNEL: Mr. Mike Tome, EMI Technician

Date: Nov. 10, 1997

MEASUREMENT DATA

FREQUENCY STABILITY

TEST CONFIGURATION

- *The transmitter was placed inside the environmental chamber, and its output terminal was loosely coupled to the Spectrum Analyzer using an RF probe.*
- *One transmitter channel frequency was tested.*
- *The DUT was supplied by a variable power supply.*
- *The above was repeated for –20, -10, 0, 20, 30, 40 and 50 degrees Celsius.*

Product Name **Model No.**	V3000 VALIDATOR, MODEL V3000
Carrier Frequency	13.56 MHz
Frequency Tolerance Limit	±0.01% or ± 1356 Hz
Max. Frequency Tolerance Measured	-14 Hz or 0.00010%

	CENTRE FREQUENCY VARIATION		
AMBIENT TEMP. (°C)	**Supply Voltage (Nominal) 24 Volts dc Hz**	**Supply Voltage (85% of Nominal) 20.4 Volts dc Hz**	**Supply Voltage (115% of Nominal) 27.6 Volts dc Hz**
-20	+6	N/A	N/A
-10	+6	N/A	N/A
0	-3	N/A	N/A
+10	-3	N/A	N/A
+20	0	0	0
+30	-9	N/A	N/A
+40	-14	N/A	N/A
+50	-11	N/A	N/A

4.5. RF EXPOSURE LIMIT FCC 1.1310

PRODUCT NAME: **V3000 VALIDATOR, Model No.: V3000**

FCC REQUIREMENTS:

FCC 1.1310:- The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in 1.1307(b).

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (minutes)
(A) Limits for Occupational/Control Exposures				
3.0-30	1842/f	4.89/f	($900/f^2$)	6
(B) Limits for General Population/Uncontrolled Exposure				
1.34-30	824/f	2.19/f	($180/f^2$)	30

F = Frequency in MHz
* = Plane-wave equivalent power density

CLIMATE CONDITION:

Standard Temperature and Humidity:

- Ambient temperature: 23 oC
- Relative humidity: 43 %

POWER INPUT: 24 Vdc Battery.

TEST RESULTS:

Not applicable since the power output is too low and the transmitter's antenna is not user accessible.

TEST PERSONNEL: **Mr. Phu Luu, EMI Technician**

DATE: **Nov. 04, 1997**

4.6. AC POWERLINE CONDUCTED EMISSIONS, FCC CFR 47, PARA. 15.107(A)

PRODUCT NAME: **V3000 VALIDATOR, Model No.: V3000**

NAME OF TEST: **AC Powerline Conducted Emissions.**

FCC LIMIT:

The RF voltage conducted back onto the public utility lines shall not exceed 250 uV or 48.0 dBuV measured from 450 KHz to 30 MHz.

CLIMATE CONDITION:

Standard Temperature and Humidity:

- Ambient temperature: 23 oC
- Relative humidity: 43%

POWER INPUT:

24 Vdc Battery.

TEST EQUIPMENT:

- Advantest R3271 Spectrum Analyzer, Frequency Range: 100Hz-26.5GHz, with built-in Peak, Quasi-Peak and Average Detectors.
- HP 11947A Transient Limiter, HP, Model 11947A, Frequency Range: 9KHz-200MHz, Attenuation: 10dB HP.
- HP 7475 Plotter
- EMCO 3825/2 LISN, Frequency Range: 9KHz-200MHz
- RF Shielded Enclosure (12x16x12 feet)

METHOD OF MEASUREMENTS:

Refer to ANSI C63.4-1992.

TEST RESULTS:

Not applicable for battery supplied device

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. Calibrated A.H. Systems log periodic antenna in the frequency range above 1000 MHz (1GHz - 18 GHz).
  4. Calibrated Advantest spectrum analyzer and pre-selector. In general, the spectrum aalyzer would be used as follows:

     – The rf electric field levels were measured with the spectrum analyzer set to PEAK detector (1 KHz RBW and VBW $\geq$ RBW for frequency 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 polarity of the antenna and repeat Step 2 through 4. Compare the resulting suspected highest amplitude signal with that found for the other polarity. 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:

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

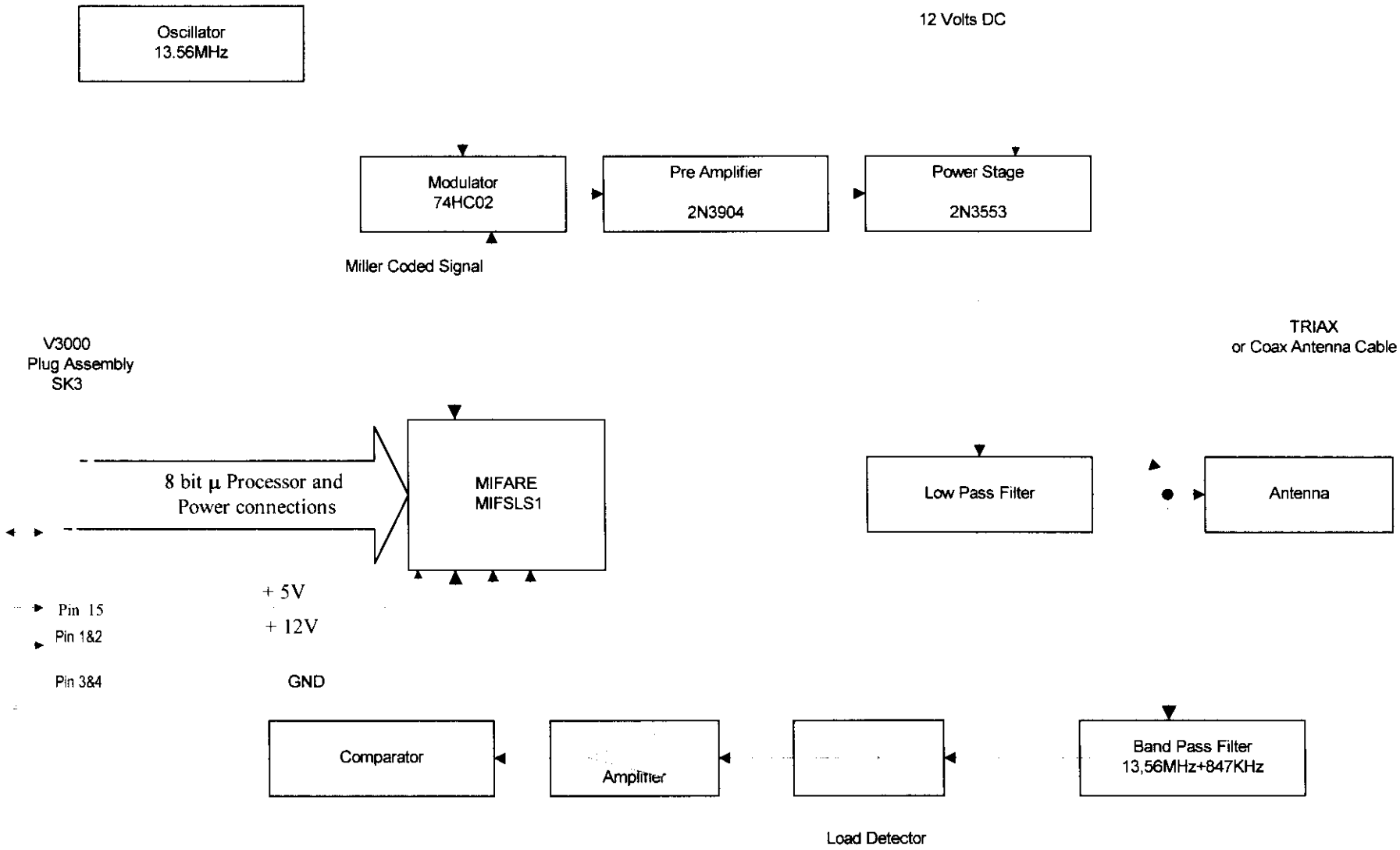
Where FS = Field Strength
RA = Receiver/Analyzer Reading
AF = Antenna Factor
CF = Cable Attenuation Factor
AG = Amplifier Gain

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

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

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



Philips Mifare ® Core Module Incorporated into AES Prodata V3000 Validator

FIG .1

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