EMC TEST REPORT

COMPANY: AXCESS Inc.

PRODUCT(S): AT-132, Activator

FCC ID: N6EACTIVATOR

REPORT No: J20033561.021

APPROVED BY: *Yuriy Litvinov*

TEST ENGINEER: *Norman Shpilsher*

DATE: August 8, 2001 *TOTAL PAGES: 23*

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1.0 GENERAL DESCRIPTION

1.1 Related Submittals Grants

This is single application of the AT-132, Activator for Certification under Part 15.209
There are no other simultaneous applications.

1.2 Product Description

Purpose of the AT-132, Activator

The Activator is a stand-alone transmitter that connects directly to an application-specific antenna to provide a low frequency activation signal that awakens tags as they pass through antenna's field.

AT-132, Activator Transmitter

The AT-132 Activator has 126kHz transmitter tuned by sampling the output transmitter voltage and switching in tuning capacitors, via a triac bank, to obtain the best match to the antenna.

AT-132, Activator Antenna

The AT-132 Activator external antenna consists of a number of turns of wire, wound to achieve 100µH of inductance. A capacitance is added to resonate the antenna to the proper frequency. The activator connects to antenna via coax cable with BNC connectors.

1.3 Test Methodology

Radiated emission measurements were performed according to the procedures in ANSI C63.4 (1992). All measurements were performed in 3m full size Anechoic Chamber. Preliminary scans were performed in the 3m full size Anechoic Chamber only to determine worst case modes. For each scan, the procedure for maximizing emissions in Appendices D and E were followed. All Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

1.4 Test Facility

The test site facility used to collect the radiated and conducted measurement data is located at 7250 Hudson Blvd., Oakdale, Minnesota. This test facility has been fully described in a report dated on May 2000

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submitted to your office. Please reference the Registration number: 90706, dated May 19,2000.

2.0 SYSTEM TEST CONFIGURATION

2.1 Justification

N/A

2.2 EUT Exercising Software

N/A

2.3 Special Accessories

There are no special accessories necessary for compliance of these products.

2.4 Equipment Setup

The EUT was setup as tabletop equipment, the EUT transmitting antenna was mounted on the plastic foam board. The EUT was powered at 120VAC/60Hz through Sceptre AC Adapter PD2410APL6A 120VAC/24VDC. The Activator was connected to the Antenna via coax cable 6' length. The non-terminated serial cable 6' length was connected to RS232 Port of the EUT. The EUT transmitting mode was monitored during testing with visual observation of the TX Output LED's.

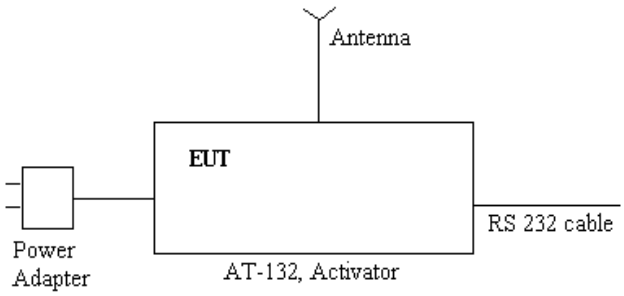
2.5 Equipment Modification

No modifications were installed during the testing.

2.6 Support Equipment List and Description

N/A

2.6 Test Configuration Block Diagrams



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3.0 EMISSION RESULTS

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs, data tables and graphical representations of the emissions are included.

3.1 Field Strength Calculation

The field strength is calculated by adding the Peak reading on the EMI Receiver to the factors associated with preamplifiers (if any), antennas and cables. A sample calculation is included below.

FS = RA + AF + CF

Where FS = Field Strength in dBµV/m
RA = Receiver Amplitude (including preamplifier) in dBµV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB/m
DF = Distance Extrapolation Factor in dB

Assume a receiver reading of 28.8 dBµV at frequency 0.5050MHz is obtained. The antenna factor of 44.4 dB/m is added. The Cable Attenuation Factor was ignored because of very small value. The net field strength for comparison to the appropriate emission limit is 73.2 dBµV/m.
The result was extrapolated with Distance Extrapolating Factor. According to FCC 15.31(f)(2) at frequencies below 30MHz the Distance Extrapolating Factor is 40 dB/decade. For measurement distance 3m DF is 80dB in frequency below 0.49 MHz (compare limits at 300m distance) and 40dB in frequency range from 0.49 to 30MHz (compare limits at 30m distance).

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3.2 Radiated Emission Data (see Exhibit II)

The fundamental output power and harmonic emissions limits are outlined in paragraph 15.209. The fundamental field strength allowed at the distance of 3 meters was calculated to be 105.6 dBμV/m. The second harmonic field strength allowed at the distance of 3 meters was calculated to be 99.5 dBμV/m. The fourth harmonic field strength allowed at the distance of 3 meters was calculated to be 73.5 dBμV/m.

Calculation of the field strength of the fundamental frequency:
Limit at 300m = 20log (2400/F(kHz))
Limit at 300m = 20log (2400/126.7)
Limit at 300m = 20 log (18.97) = 25.6 dBμV/m
Limit at 3m = 25.6 dBμV/m + Distance Factor = 25.6 dBμV/m + 80 dB = 105.6 dBμV/m

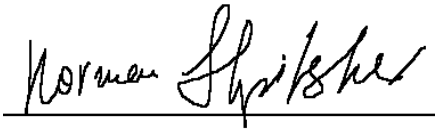
Calculation of the field strength of the second harmonic emissions:
Limit at 300m = 20log (2400/F(kHz))
Limit at 300m = 20log (2400/253.3)
Limit at 300m = 20 log (9.47) = 19.5 dBμV/m
Limit at 3m = 19.6 dBμV/m + Distance Factor = 19.5 dBμV/m + 80 dB = 99.5 dBμV/m

Calculation of the field strength of the fourth harmonic emissions:
Limit at 30m = 20log (24000/F(kHz))
Limit at 30m = 20log (24000/505)
Limit at 30m = 20 log (47.5) = 33.5 dBμV/m
Limit at 3m = 33.5 dBμV/m + Distance Factor = 33.5 dBμV/m + 40 dB = 73.5 dBμV/m

The maximum level of the measured emissions at restricted frequency band according to FCC 15.205 at 0.5050 MHz was 28.8 dBμV, total signal was 73.2 dBμV/m which is 0.3 dB margin below the FCC limit (73.5 dBμV/m).

Tested by:
Norman Shpilsher
EMC Project Engineer
Intertek Testing Services NA, Inc.

Agent for AXCESS Inc.



Signature

Date: 08/07/2001

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3.3 TEST EQUIPMENT

Receivers/Spectrum Analyzers

DESCRIPTION	SERIAL NO.	LAST CAL DATE	CAL DUE	TICK IF USED
HP85462A Receiver RF Section	3325A00106	07/00	07/01	X
HP85460A RF Filter Section	3330A00109	07/00	07/01	X
HP85462A Receiver RF Section	3549A00306	12/00	12/01	
HP85460A RF Filter Section	3448A00276	12/00	12/01	
Advantest Spectrum Analyzer R3271A	55050084	05/00	05/01	

Antennas

DESCRIPTION	SERIAL NO	LAST CAL DATE	CAL DUE	TICK IF USED
Schaffner-Chase Bicono-Log Antenna	2468	10/00	10/01	
Schaffner-Chase Bicono-Log Antenna	2630	03/00	03/01	
A.H. Systems SAS-200/562B Loop Antenna	215	11/00	11/01	X
EMCO Horn Antenna 3115	9507-4513	09/00	09/01	
EMCO Log Periodic Antenna 3146	9606-4515	04/01	04/02	

Artificial Mains Networks/Absorbing Clamps

DESCRIPTION	SERIAL NO	LAST CAL DATE	CAL DUE	TICK IF USED
FCC LISN-2	316	11/00	11/01	X
FCC-LISN-50-4	115	11/00	11/01	
FCC-LISN-50-25-2	2014	04/01	04/02	
FCC-LISN-50-32-2-01	97-01	11/00	11/01	
Farnell 1EXLSN930A	136	04/00	04/01	

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4.0 TEST PROCEDURES

Radiated emission measurements were performed according to the procedures in ANSI C63.4 (1992). Measurements were performed in 3m Anechoic Chamber or Open Area Test Sites. Preliminary scans were performed to determine worst case modes. For each scan, the procedure for maximizing emissions in Appendices D and E were followed.

The Open Area Test Sites test facility is a specially designed and constructed building measuring 30 meters by 50 meters. Two test sites are used (Distances: 3 meters, 10 meters, 30 meters) for CISPR testing.

The 3m Anechoic Chamber test facility is a specially designed chamber measuring 20' by 3' for 3m distance CISPR testing.

All test sites include a metal ground plane constructed of 22-gauge sheet metal. Each site contains a 2.5 meter diameter turntable for floor standing equipment, and a wooden table measuring 1.5 x 1.5 x 0.8 meters for table top equipment to facilitate testing, also it has heat and air conditioning systems to control environmental test conditions.

Measurements from 30 MHz to 1000 MHz are taken with biconical and log-periodic antennas. A horn antenna is used above 1000 MHz. A loop antenna is used in frequency range below 30MHz.The mast to support the antennas is capable of a 1 to 4 meter height range, which meets CISPR requirements. The antenna mast is non-conductive and remotely controllable.

Since radiated emissions, and to a lesser extent, conducted emissions, are a function of cable placement, the cable placement is varied to encompass all configurations that an end user would encounter to determine the configuration resulting in maximum emissions. At least one cable for each I/O port type is attached to the EUT. If peripherals or modules are available, at least one of each available type is installed and noted in the report. Generally, only one of each type is used unless good engineering judgment dictates that the use of more will affect emission levels. Excess cable lengths are arranged into a 30 x 40-cm bundle. Cables requiring non-standard lead dress are recorded in the report.

For conducted emissions testing, the equipment is moved to an insulating platform over the ground plane, and the EUT is powered from a LISN. Both sides of the AC line are measured and the results are compared to the applicable limits. Measurements are taken using CISPR quasi-peak and average detectors when the peak readings approach or exceed the average limit. Only quasi-peak readings are taken when the EUT's emissions meet the average limit as measured with the quasi-peak detector. The Activator antenna was placed outside of the test site during conduced emissions testing to reduce cross talk from the antenna to power line.

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EXHIBIT I

TEST SET UP PHOTOS

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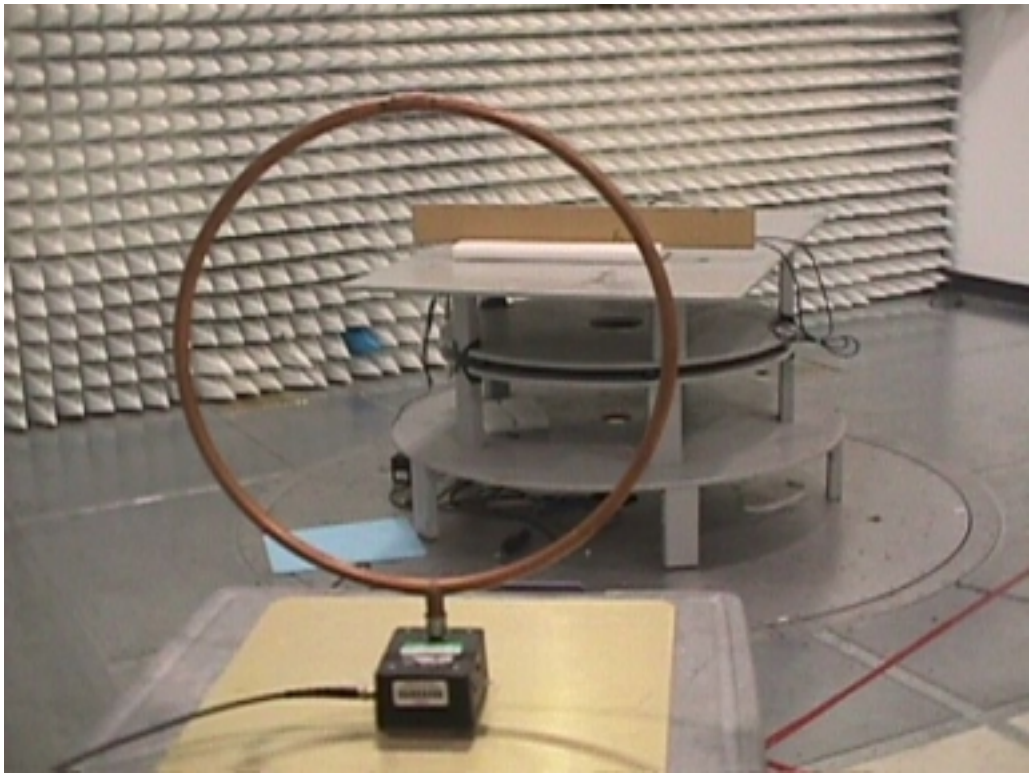

Radiated Emissions Test Configuration for Activator

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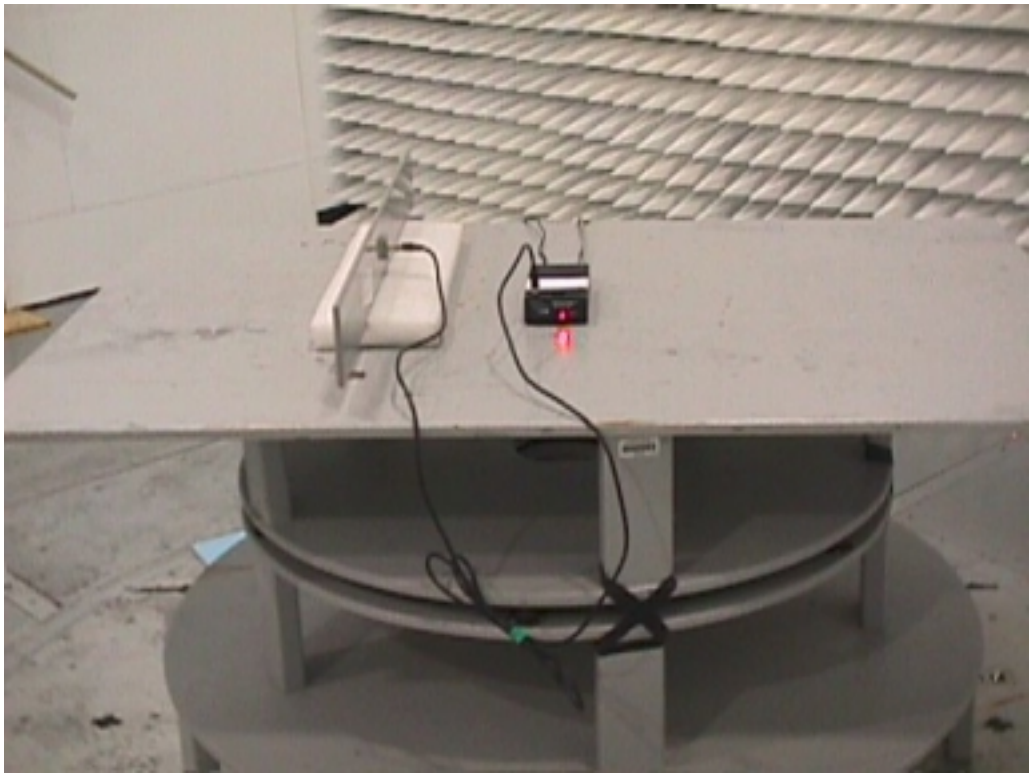

Radiated Emissions Test Configuration for Activator

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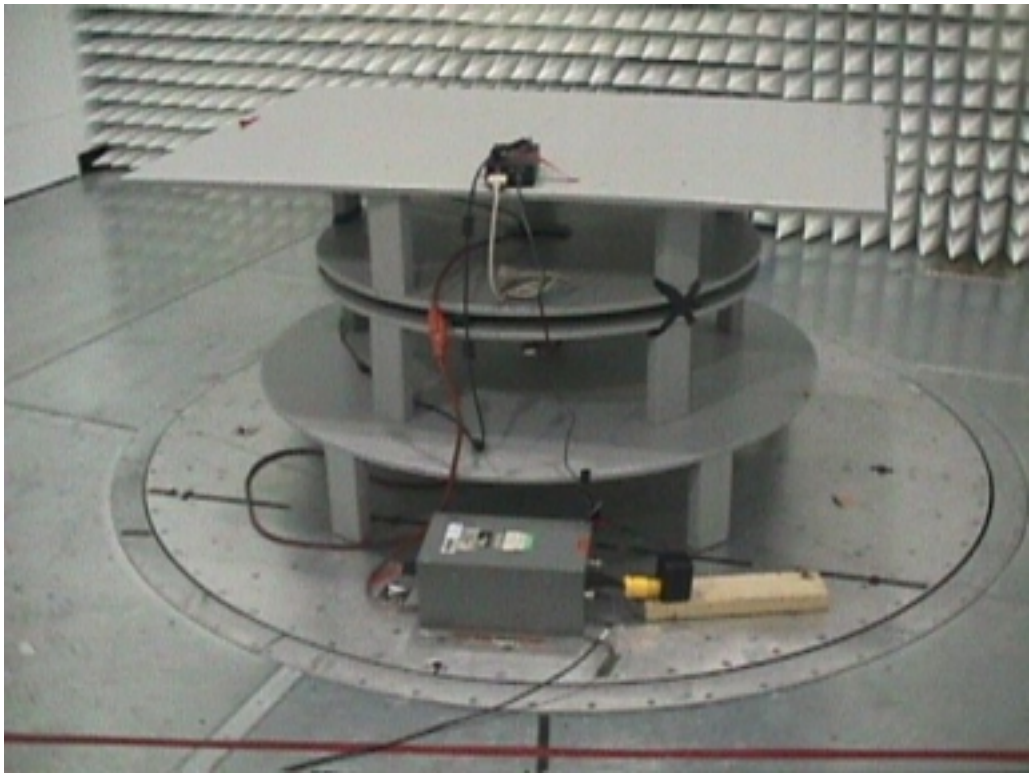

Conducted Emissions Test Configuration for Activator

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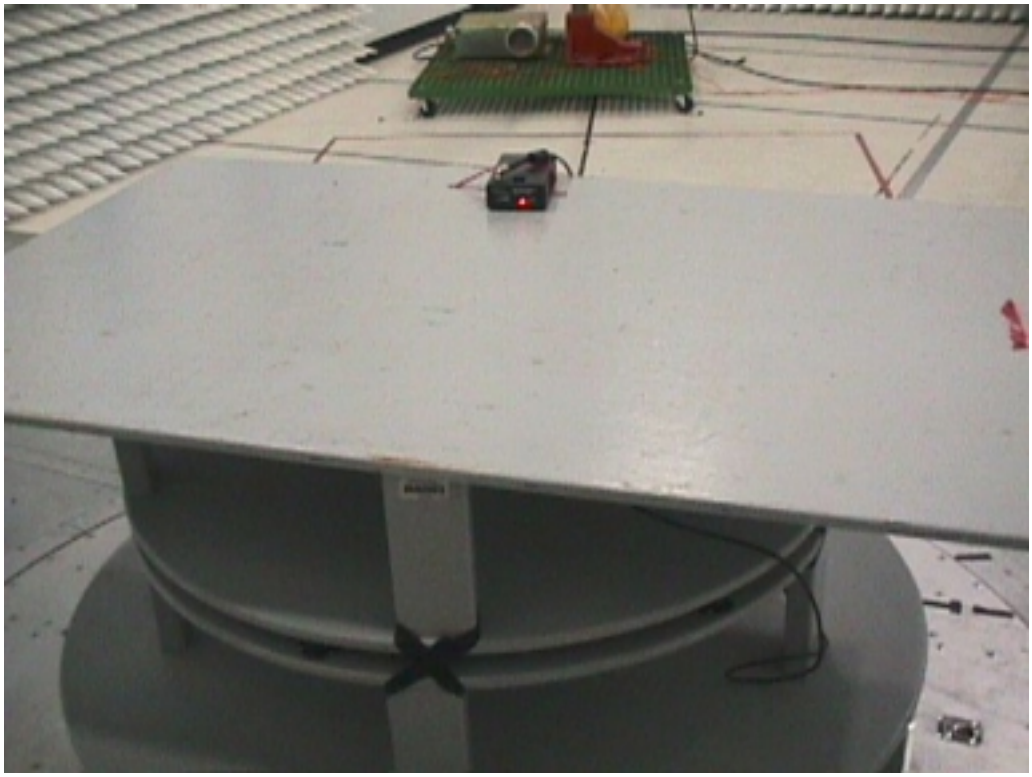

Conducted Emissions Test Configuration for Activator

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EXHIBIT II

EMISSONS TEST DATA

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Radiated Emissions from 9kHz to 30MHz **Date:** 06-25-2001

Company: Axcess Inc.
Model: AT-132, Activator, s/n 03002815
Test Engineer: Norman Shpilsher
Special Config. Info: Continuous operation mode
Fundumental operating frequency 0.12615MHz
Standard: CFR47, Part15, Subpart C, 15.209
Note: Measurement distance 3m with Loop antenna SAS 200/562B
Distance Factor 80dB from 9kHz to 490kHz, and 40dB from 490kHz to 30MHz.
The table shows the worst case radiated emissions.
Measurements from 0.110 to 0.490MHz were taken using Average detector. Measurements at other frequencies were taken using a CISPR Quasi-Peak detector.
Measurements below 0.150MHz were taken with RBW 100Hz
Measurements above 0.150MHz were taken with RBW 9kHz

Table # 1

Frequency MHz	Reading dBµV	Antenna Factor dB/m	Net at 3m. dBµV	Distance Factor dB	15.209 Limit dBµV	Limit at 3m dBµV	Margin dB	Comments
0.1094	26.4	57.8	84.2	80.0	26.8	106.8	-22.7	1
0.1267	53.1	56.8	109.9	80.0	25.6	105.6	4.3	Fund. Freq.
0.2533	22.9	50.8	73.7	80.0	19.5	99.5	-25.8	
0.3804	22.5	47.0	69.5	80.0	16.0	96.0	-26.5	
0.5050	28.8	44.4	73.2	40.0	33.5	73.5	-0.3	1
0.5076	31.2	44.4	75.6	40.0	33.5	73.5	2.1	
0.6347	42.7	42.5	85.2	40.0	31.6	71.6	13.7	
0.7609	40.9	41.0	81.9	40.0	30.0	70.0	12.0	
0.8878	33.9	39.7	73.6	40.0	28.6	68.6	5.0	
1.0152	37.4	38.7	76.1	40.0	27.5	67.5	8.6	
1.1426	34.7	37.9	72.6	40.0	26.4	66.4	6.2	
1.2694	37.9	37.2	75.1	40.0	25.5	65.5	9.6	
2.1584	11.2	32.2	43.4	40.0	29.5	69.5	-26.1	
2.1735	5.6	32.2	37.8	40.0	29.5	69.5	-31.7	1

Comments: 1. Restricted frequency band per Section 15.205

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Conducted Emissions **Date:** 12-20-2000

Company: Axcess Inc.
Model: AT-132, Activator
Test Engineer: Norman Shpilsher
Special Config. Info:
Standard: FCC Part 15, Subpart C, 15.207
Note: The table shows the worst case conducted emissions
All measurements were taken using a CISPR Quasi-peak detector

Table # 2

Frequency MHz	QP, Line 1 dBµV	QP, Line 2 dBµV	AVG, Line 1 dBµV	AVG, Line 2 dBµV	Correction Factor (dB)	Limit dBµV	Margin dB
0.450	53.1	49.8	20.4	19.9	13	48.0	-7.9
0.510	50.0	48.2	18.2	15.0	13	48.0	-11.0
0.529	49.2	48.1	15.6	14.9	13	48.0	-11.8
0.768	34.9	33.2	N/A	N/A	0	48.0	-13.1
1.018	49.8	49.2	27.5	27.2	13	48.0	-11.2
4.699	34.5	32.1	N/A	N/A	0	48.0	-13.5
10.67	39.4	32.8	N/A	N/A	0	48.0	-8.6

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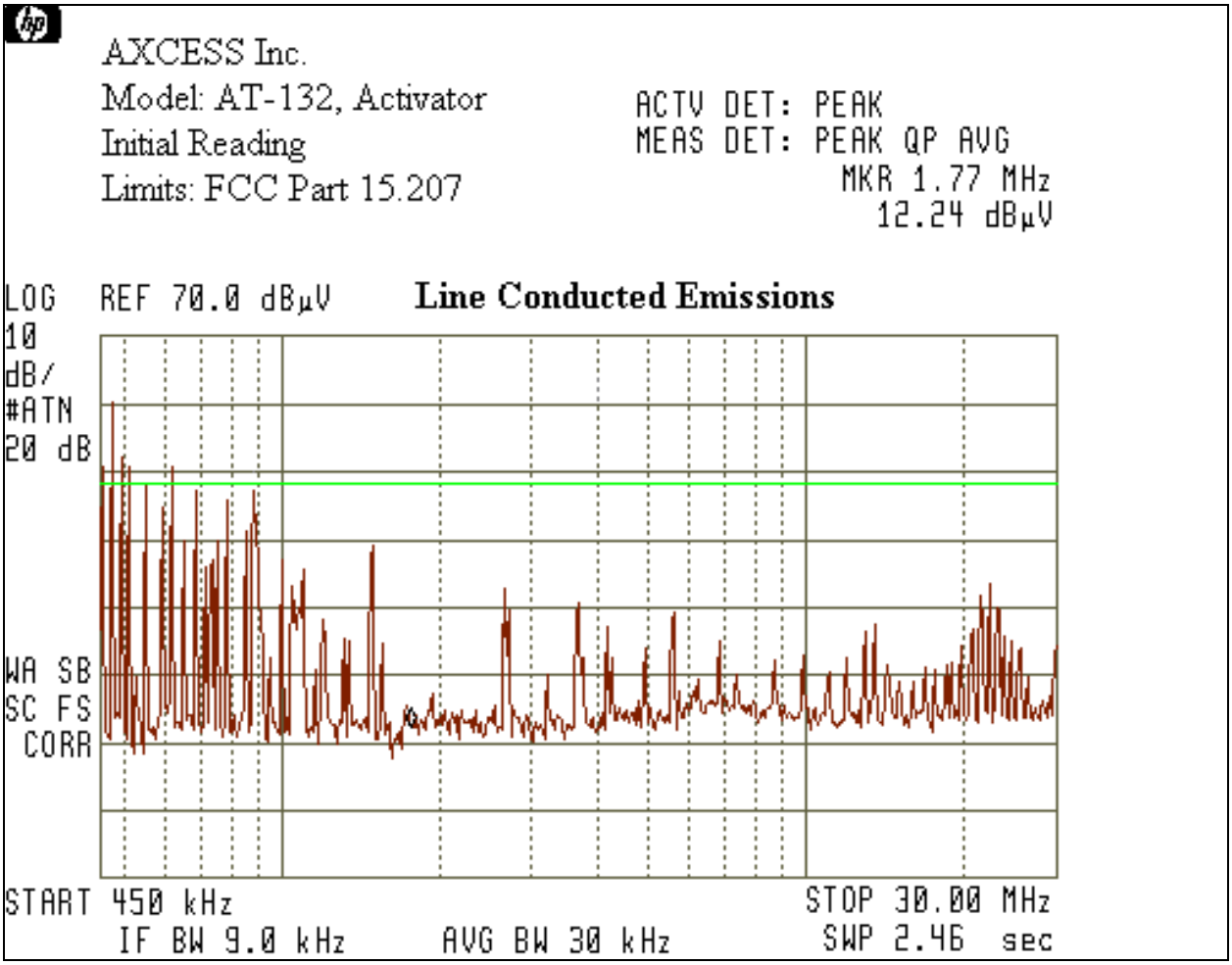
Graph #1 – Line Conducted Emissions



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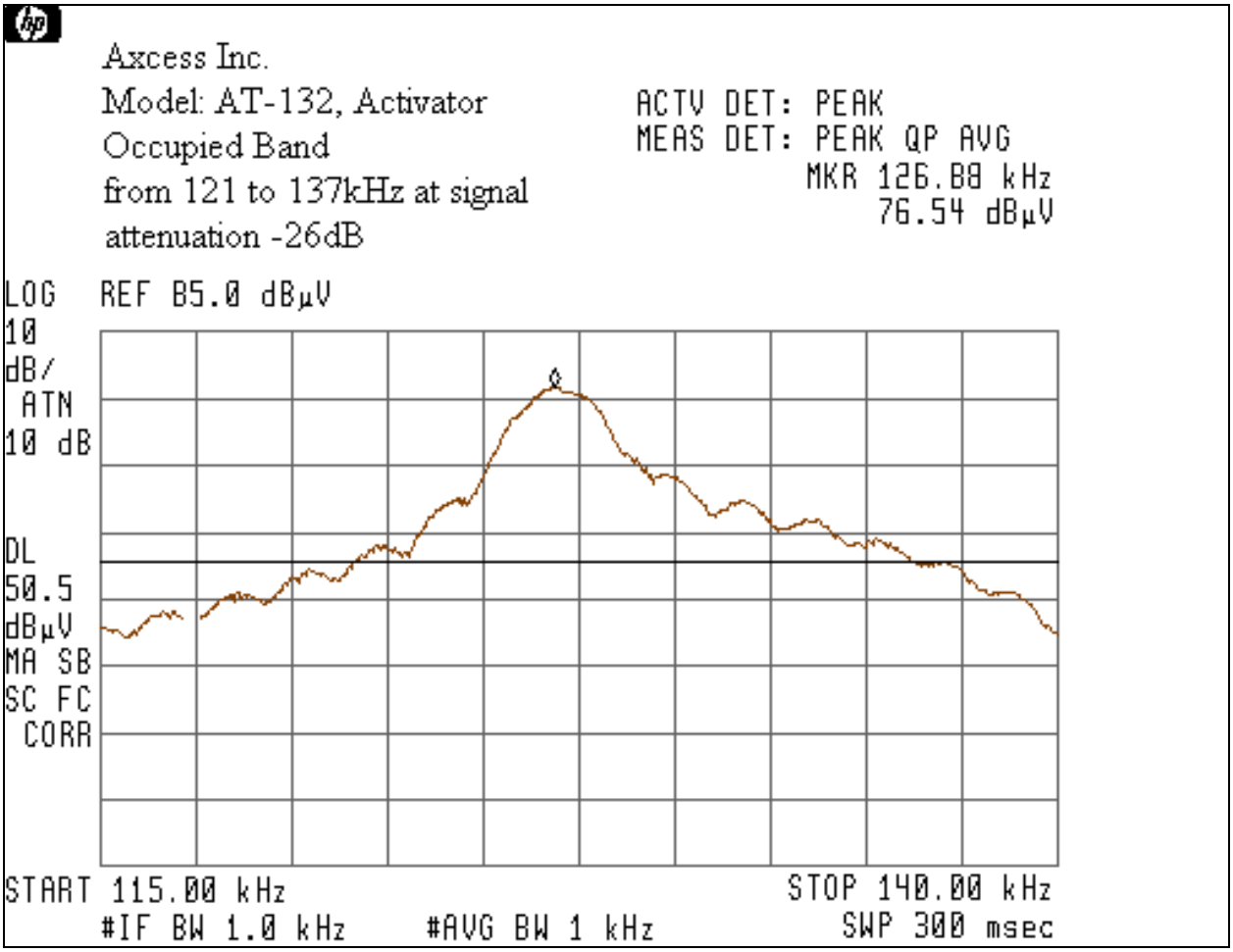
Graph #2 – Frequency 0.1265 MHz
Occupied Band of the Fundamental Frequency



Occupied Band:

From 0.121 to 0.137 MHz

Closest Restricted Band of Operation (FCC 15.205):
From 0.090 to 0.110 MHz and
From 0.495 to 0.505 MHz

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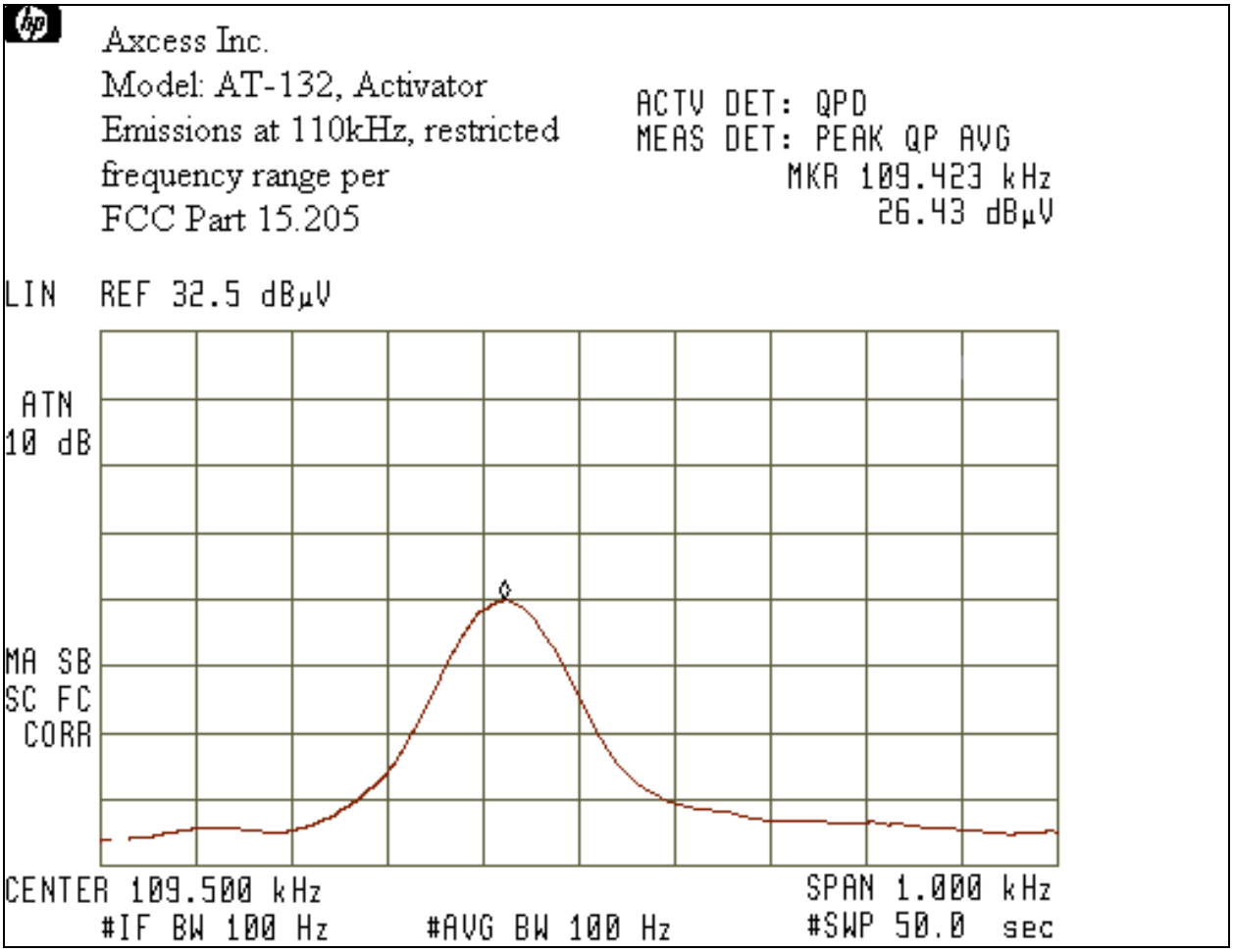
Graph #3 – Frequency 0.110MHz
Restricted Frequency Band



Limits Calculation:

Measured Emissions = 26.4dBµV

ΔLimit = 46.4dBµV + 57.8dB/m(Antenna Factor)-80dB(Distance Factor) – 26.8dBµV/m(Limit)

ΔLimit = -22.7dB

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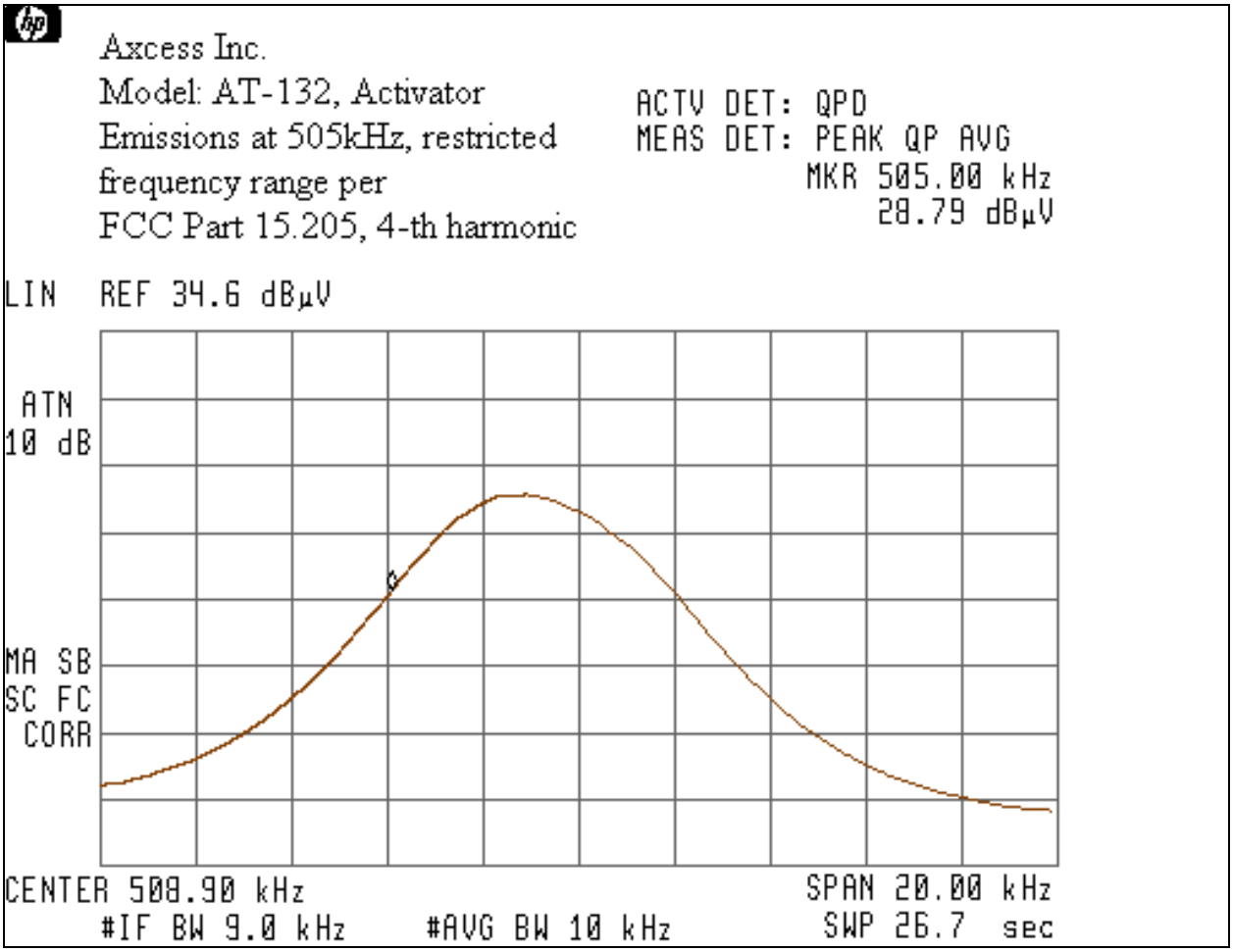
Graph #4 – Frequency 0.505 MHz
Restricted Frequency Band - 4th Harmonic



Limits Calculation:

Measured Emissions = 28.8dBµV

ΔLimit = 28.8dBµV + 44.4dB/m(Antenna Factor)-40dB(Distance Factor) – 33.5dBµV/m(Limit)

ΔLimit = -0.3dB

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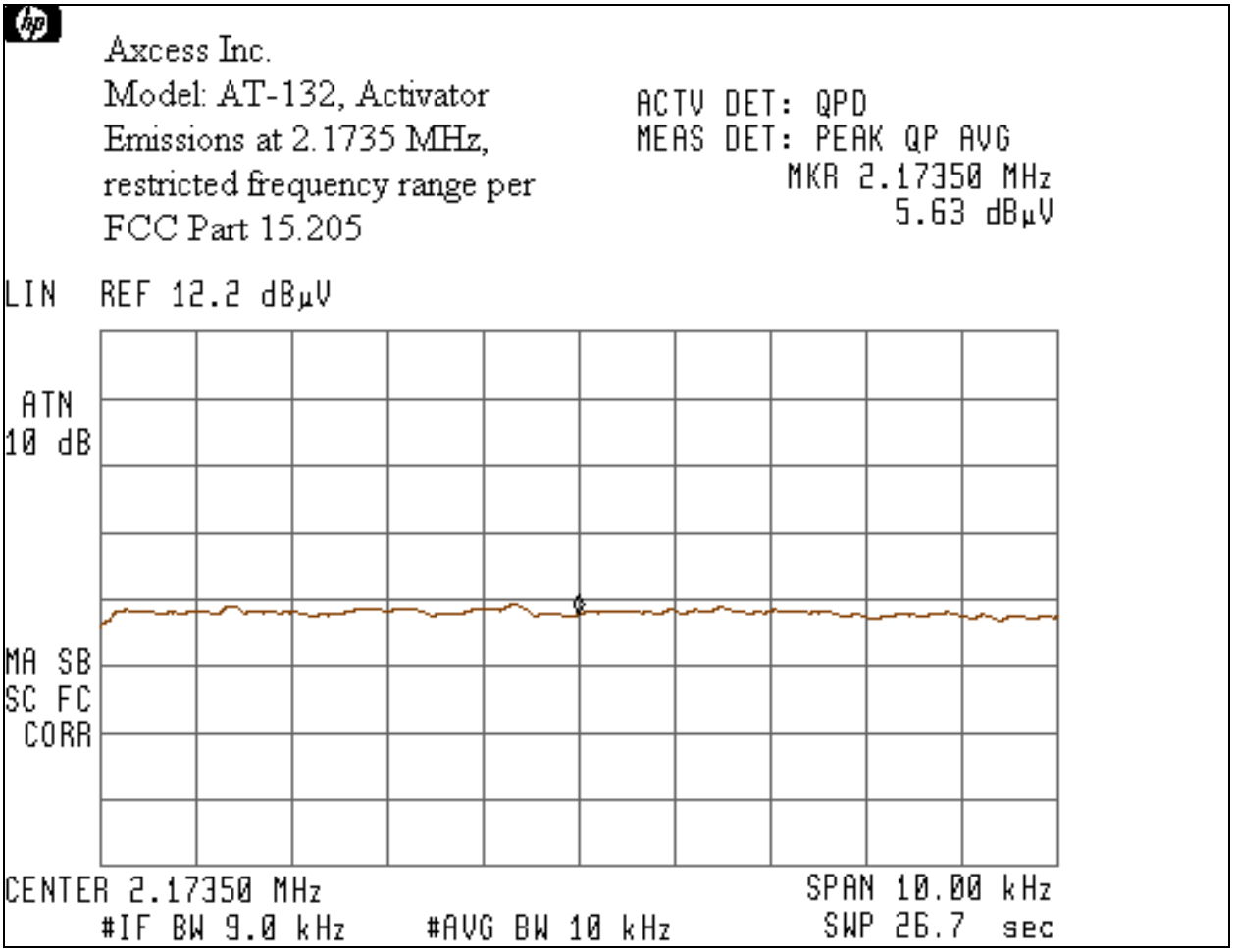
Graph #5 – Frequency 2.1735 MHz
Restricted Frequency Band



Limits Calculation:

Measured Emissions = 5.6dBµV

ΔLimit = 5.6dBµV + 32.2dB/m(Antenna Factor)-40dB(Distance Factor) – 29.5dBµV/m(Limit)

ΔLimit = -31.7dB

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EXHIBIT III

FCC ID LABEL LOCATION

(See Attachments)

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EXHIBIT IV

EXTERNAL AND INTERNAL PHOTOS

(See Attachments)

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EXHIBIT V

ELECTRICAL SCHEMATICS AND BLOCK DIAGRAM

(See Attachments)

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EXHIBIT VI

USER MANUAL AND OPERATIONAL DESCRIPTION

(See Attachments)