

KTL Dallas, Inc.
Safety - EMC - Telecom - ISO Guide 25

ENGINEERING TEST REPORT
ON
MODEL: NT 132 / 315 FTT READER

IN ACCORDANCE WITH:
CFR 47, PART 15, SUBPART B, CLASS A & SUBPART C

REPORT NO.: 9L0068EUS

TESTED FOR:
AXCESS, INC.
3208 COMMANDER DRIVE
CARROLLTON, TEXAS 75006

TESTED BY:
KTL DALLAS, INC.
802 N. KEALY
LEWISVILLE, TEXAS 75057-3136



NVLAP LAB CODE: 100426-0

AUGUST 1999

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This report applies only to the item/s tested and does not constitute endorsement by the United States of America.

EQUIPMENT: NT 132 / 315 FTT READER

The equipment has been tested by KTL Dallas, Inc. for verification of compliance with CFR 47, Part 15, Subpart B for Class A requirements for Digital Devices. Each unit manufactured, imported or marketed will conform to the sample(s) tested within the variations that can be expected due to quantity production and testing on a statistical basis.

BY: _____
SIGNATURE PRINTED

TITLE:

COMPANY:

Axcess, Inc.
3208 Commander Drive
Carrollton, Texas 75006

DATE:

EQUIPMENT: NT 132 / 315 FTT READER

Section 1. Summary of Test Results

General:

All measurements are traceable to national standards.

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with CFR 47, Part 15, Subpart B, for Class A Digital Devices, Paragraph Numbers 15.107 and 15.109 & Subpart C, Paragraph Numbers 15.207, 15.209 and 15.231.

The equipment was tested for conducted emissions from 0.45 MHz to 30 MHz using a 50 μ h line impedance stabilization network (L.I.S.N.) as described in ANSI C63.4-1992. Peripheral equipment was also operated through a 50 μ h L.I.S.N.

The equipment was tested for radiated emissions from 30 MHz to 1000 MHz with extension to the 10th harmonic of any fundamental clock frequency in accordance with the requirements of CFR 47, Part 15, Subpart B for Class A Digital Devices and Subpart C. Frequencies were initially identified in a large shielded room. Amplitude measurements were made on an outdoor Open Area Test Site. Details of the outdoor site are on file with the FCC.

These tests were conducted using measurement procedures of ANSI C63.4-1992.

Abstract (Subpart B):

Name Of Test	Paragraph No.	Results
Conducted Emissions	15.107	Complies
Radiated Emissions	15.109	Complies

Abstract (Subpart C):

Name Of Test	Paragraph No.	Results
Conducted Emissions	15.207	Complies
Radiated Emissions	15.209, 15.231	Complies

EQUIPMENT: NT 132 / 315 FTT READER

In the configuration tested, the E.U.T. complies with the requirements of CFR 47, Part 15, Subpart B, for Class A Digital Devices, Paragraph Numbers 15.107 and 15.109 & Subpart C, Paragraph Numbers 15.207, 15.209 and 15.231.

THIS REPORT APPLIES ONLY TO THE ITEM(S) TESTED AND DOES NOT
CONSTITUTE ENDORSEMENT BY THE UNITED STATES OF AMERICA.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE
TEST SPECIFICATIONS HAVE BEEN MADE: EXCLUSIONS: **NONE**.

NVLAP LAB CODE: 100426-0

TESTED BY: Mike Sundstrom DATE: 04/30/99
Mike Sundstrom, EMC Technician

APPROVED BY: Dale L. Reynolds, EMC Division Manager DATE: _____

EQUIPMENT: NT 132 / 315 FTT READER

Section 2. Equipment Under Test (E.U.T.)

Manufacturer: Axxess, Inc.

Model No.: NT 132 / 315 FTT Reader

Serial No.: 0101099017



Production Unit



Pre-Production Unit

The E.U.T was received on April 28, 1999, in good condition.

Description of E.U.T.:

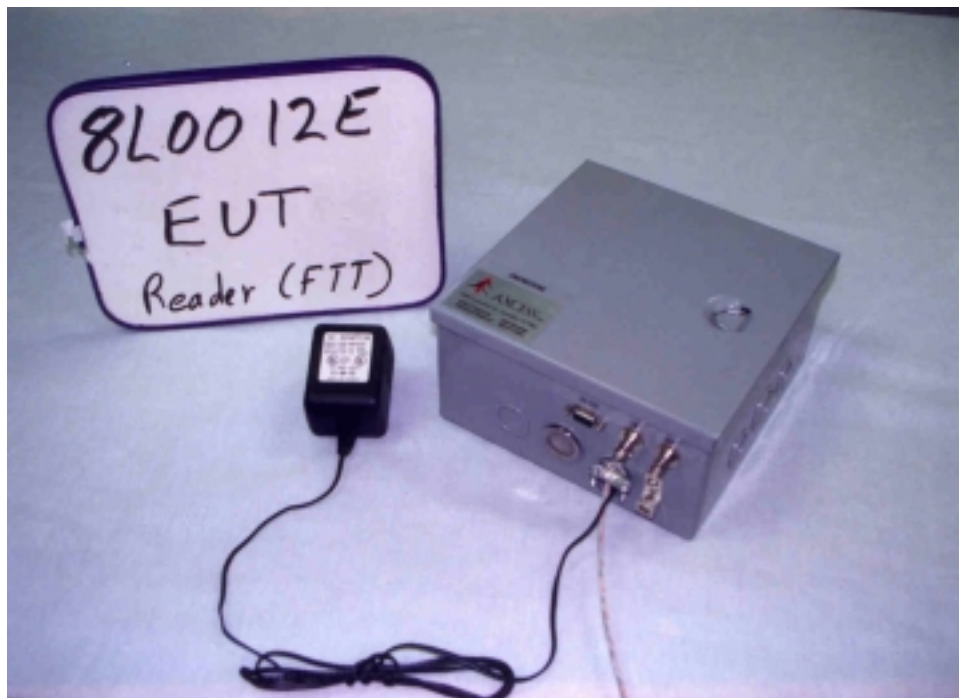
The E.U.T. is a metal, NEMA enclosure with PCB's and FTT PCB. The intended use of the E.U.T. is to transmit and receive data from a tag and communicate with a computer through a twisted pair connection.

Clock, Oscillator, Highest Frequencies Utilized:

- (1) 5 MHz
- (2) 132 kHz (RX)
- (3) 315 MHz (TX)

EQUIPMENT: NT 132 / 315 FTT READER

E.U.T. Photographs:



EQUIPMENT: NT 132 / 315 FTT READER

Modifications Incorporated in E.U.T.:

To achieve compliance the following change(s) were made by KTL Dallas, Inc. and Axxcess, Inc. during compliance testing: Two ferrites were added:

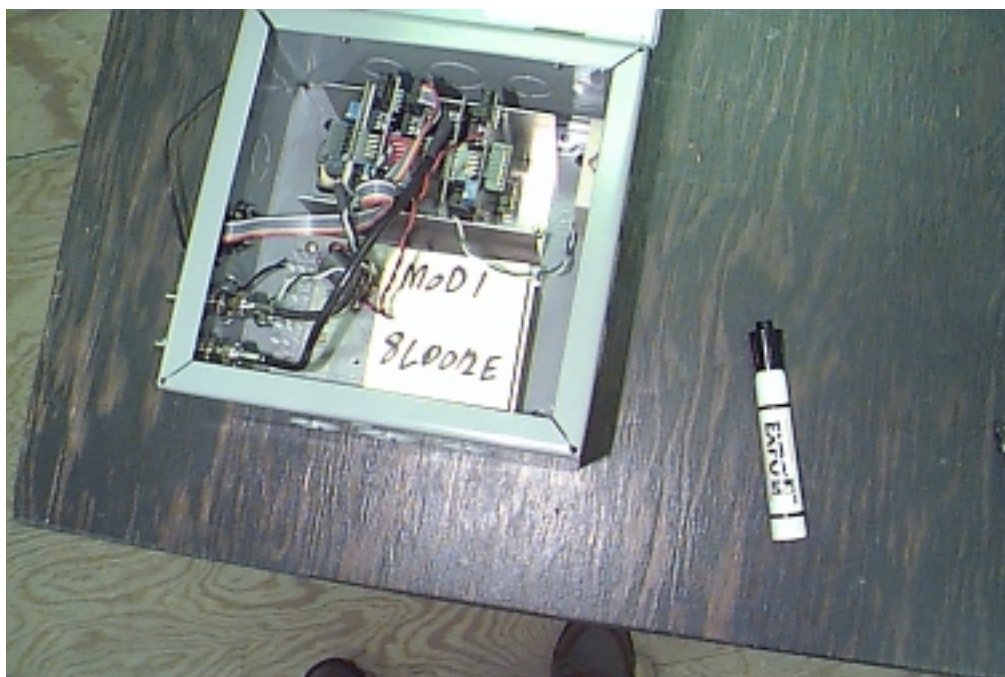
MOD 1: A ferrite was added, (Fair Rite P/N 2643665702) to the DC power line (common mode).

MOD 2: A ferrite was added, (Fair Rite P/N 2643801002) to Wiegand data line (FTT).

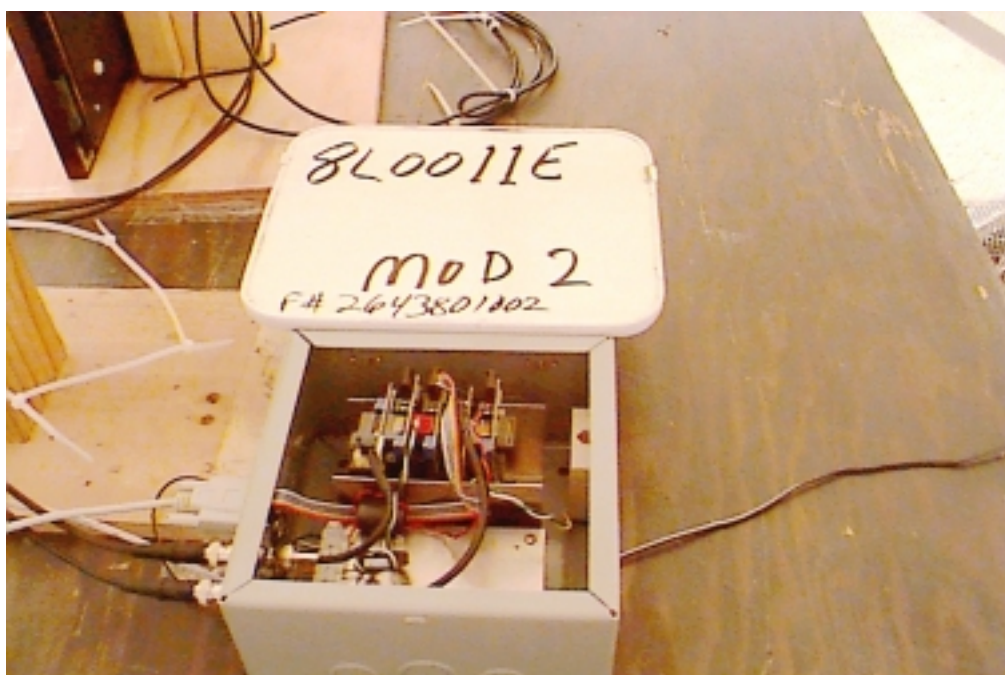
EQUIPMENT: NT 132 / 315 FTT READER

Modification Photographs:

MOD 1:



MOD 2:



EQUIPMENT: NT 132 / 315 FTT READER

Justification:

The E.U.T. was configured for testing as per typical installation. Position and bundling of cables were investigated to establish maximum amplitude of emissions.

The following combinations were investigated to establish worst case configuration:

- (1) On, no Tag (Reader TX off).
- (2) On, with Tag (Reader TX on).

Exercise Program:

The E.U.T. exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to typical use.

Exercise Mode:

- (1) Normal operation, Tag outside reader effect field (Transmit mode, Receiver idle).
Known as “No Tag”.
- (2) Normal operation, Tag within reader effect field (Transceiver mode, TX – RX active).
Known as “With Tag”.

EQUIPMENT: NT 132 / 315 FTT READER

Section 3. Equipment Configuration

Equipment Configuration List:

Item	Manufacturer	Description	FCC ID:	Model No.	Part Number	Serial No.
(A)	Axcess, Inc.	Tag	None	Neurotag 3.1	800-039-XXX	36273
(B)*	Axcess, Inc.	Reader	None**	NT 132/315 FTT Reader	800.035.002	0101099017
(C)*	Axcess, Inc.	Antenna Tuning Unit	None	ATU	800.009.000	None
(D)*	Ault	Transformer	None	24 V at 500 mA	D48240500A000G	None
(E)*	Axcess, Inc.	Antenna Picture Frame	None	None	800.026.009	None
(F)	Axcess, Inc.	Serial Gateway	None	None	800.017.000	None

*E.U.T.

**The compliance status of this product is being determined by the results in this report.

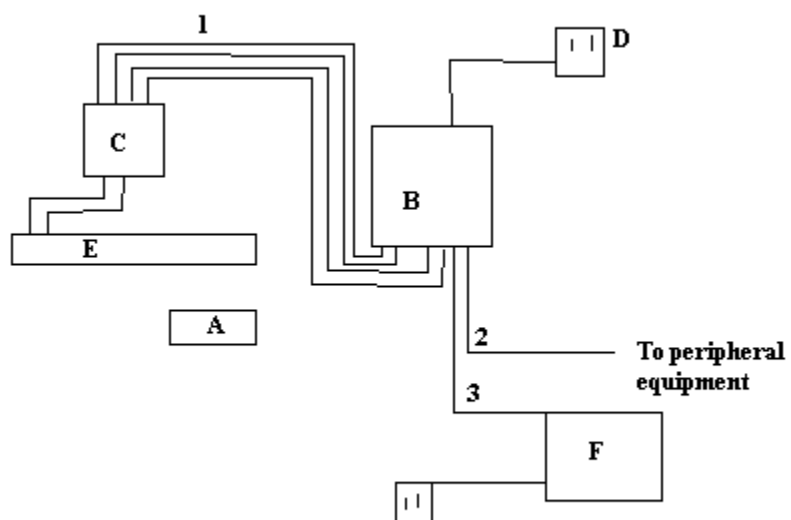
Inter-connection Cables:

Item	Description	Model No. / Manufacturer	Connectors	Length (m)	Shielded	
					Yes	No
(1)	Coax (qty: 4)	RG58 / Belden	BNC	1.7	X	
(2)	Serial	128-06 / Link	DB9	7.6		X
(3)	Gateway	N/A / General Cable	Bare	23		X

NOTE: Please see block diagram on the following page.

EQUIPMENT: NT 132 / 315 FTT READER

Configuration of the Equipment Under Test (E.U.T.):



EQUIPMENT: NT 132 / 315 FTT READER

Section 4. Notes

EQUIPMENT: NT 132 / 315 FTT READER

Section 5. Conducted Emissions

TESTED BY: Mike Sundstrom	DATE OF TESTS: 04/30/99
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Test Conditions:

Test Voltage: 115 Vac @ 60 Hz

Temperature: 21°C

Humidity: 54%

Purpose:

The tests are intended to demonstrate the compliance of the Equipment Under Test (E.U.T.) to the limits for conducted emissions as defined by CFR 47, Part 15, Subpart B, for Class A Digital Devices, Paragraph Number 15.107 and Subpart C, Paragraph Number 15.207.

Test Results:

The E.U.T. complies.

Test # CE1 (CFR 47, Part 15, Subpart B, Class A, Paragraph Number 15.107):

The worst case emission is 45 dBμV at 0.45 MHz on the L1 side of the line. This is 15 dB below the quasi-peak specification limit of 60 dBμV.

Test # CE1 (CFR 47, Part 15, Subpart C, Paragraph Number 15.207):

The worst case emission is 45 dBμV at 0.45 MHz on the Hot (L1) side of the line. This is 3 dB below the quasi-peak specification limit of 48 dBμV.

Measurement Data:

See test data on pages 15 and 16.

EQUIPMENT: NT 132 / 315 FTT READER

Specification Limits:**CFR 47, Subpart B, 15.107:**

Frequency(MHz)	Maximum Powerline Conducted RF Voltage	
	μV	$\text{dB}\mu\text{V}$
0.45-1.705	1000	60.0
1.705-30.0	3000	69.5

CFR 47, Subpart C, 15.207:

Frequency(MHz)	Maximum Powerline Conducted RF Voltage	
	μV	$\text{dB}\mu\text{V}$
0.45 - 30.0	250	48

Method of Measurement (Procedure ANSI C63.4-1992):

Measurements were made using a spectrum analyzer with 10 kHz RBW, CISPR Quasi-Peak detector.

Broadband emissions are identified by switching the receiver detector function from Quasi-Peak to Average. If the amplitude of the emission drops by 6 dB or more then the emission is classified as broadband and the Quasi-Peak level is reduced by a factor of 13 dB.

Test Data - Conducted Emissions Test # CE1 (Subpart B):

Conducted Emissions Data			
(CISPR Quasi-Peak Detector)			
FCC (CFR 47)			
Complete _____	X		
Preliminary _____			
		Page <u> 1 </u> of <u> 1 </u>	
Client: <u>AXCESS</u>	W.O.#: <u>9L0068E</u>	Date: <u>04/30/99</u>	
EUT: <u>NT132/315 READER (FTT)</u>	S/N: <u>0101099017</u>	Specification: <u>CFR47,15,B,A(15.107)</u>	
Tech: <u>M.Sundstrom</u>	Test #: <u>CE1</u>	Lab: <u>4</u>	Photo ID: <u>9L0068 CE1</u>
Equipment Used: <u>213,C66,G1709,C79,099,G1504,G2619</u>			
Configuration: <u>ON, With Tag (Tag # 36273)</u>			
IF Bandwidth: <u>10kHz</u>	Video Bandwidth <u>N/A</u>	Detector: _____ Peak <u>X</u> CISPR	
Ambient Temperature: <u>21</u> C	EUT Power: <u>X</u>	<u>115 V.A.C.</u>	<u>X</u> 60 Hz <u>X</u> 1 Phase
Relative Humidity: <u>54</u> %		<u>230 V.A.C.</u>	<u>50 Hz</u> <u>3</u> Phase
Atmospheric Pressure: <u>1005</u> mbar		<u>Other</u>	

Freq. (MHz)	Meter Reading (dBuV)	Attn. (dB)	Cable Loss (dB)	Probe Factor (dB)	Corrected Reading (dBuV)	Spec.limit (dBuV)	Pol.	Comments:
0.45	15	30	0	0	45	60	L1	
0.5	14	30	0	0	44	60	L1	
3.15	19	20	0	0	39	69.5	L1	
5.132	10	20	0	0	30	69.5	L1	
8.29	15	20	0	0	35	69.5	L1	
0.45	14	30	0	0	44	60	L2	
0.5	12	30	0	0	42	60	L2	
0.658	20	20	0	0	40	60	L2	
0.922	16	20	0	0	36	60	L2	
3.157	17	20	0	0	37	69.5	L2	
8.68	16	20	0	0	36	69.5	L2	
10.39	12	20	0	0	32	69.5	L2	
15.65	17	20	0	0	37	69.5	L2	
								Scanned 0.45MHz to 30MHz

Note: Verify that the IF Bandwidth is in the proper setting.

Test Data - Conducted Emissions Test # CE1 (Subpart C):

Conducted Emissions Data			
(CISPR Quasi-Peak Detector)			
FCC (CFR 47)			
Complete _____	X		
Preliminary _____			
		Page <u> 1 </u> of <u> 1 </u>	
Client: <u>AXCESS</u>	W.O.#: <u>9L0068E</u>	Date: <u>04/30/99</u>	
EUT: <u>NT132/315 READER (FTT)</u>	S/N: <u>0101099017</u>	Specification: <u>CFR47,15,C,A(15.207)</u>	
Tech: <u>M.Sundstrom</u>	Test #: <u>CE1</u>	Lab: <u>4</u>	Photo ID: <u>9L0068 CE1</u>
Equipment Used: <u>213,C66,G1709,C79,099,G1504,G2619</u>			
Configuration: <u>ON, With Tag (Tag # 36273)</u>			
IF Bandwidth: <u>10kHz</u>	Video Bandwidth <u>N/A</u>	Detector: _____ Peak <u>X</u>	CISPR
Ambient Temperature: <u>21</u> C	EUT Power: <u>X</u>	<u>115</u> V.A.C.	<u>X</u> 60 Hz <u>X</u> 1 Phase
Relative Humidity: <u>54</u> %		<u>230</u> V.A.C.	<u> </u> 50 Hz <u> </u> 3 Phase
Atmospheric Pressure: <u>1005</u> mbar		<u> </u> Other <u> </u>	

Freq. (MHz)	Meter Reading (dBuV)	Attn. (dB)	Cable Loss (dB)	Probe Factor (dB)	Corrected Reading (dBuV)	Spec.limit (dBuV)	Pol.	Comments:
0.45	15	30	0	0	45	48	L1	
0.5	14	30	0	0	44	48	L1	
3.15	19	20	0	0	39	48	L1	
5.132	10	20	0	0	30	48	L1	
8.29	15	20	0	0	35	48	L1	
0.45	14	30	0	0	44	48	L2	
0.5	12	30	0	0	42	48	L2	
0.658	20	20	0	0	40	48	L2	
0.922	16	20	0	0	36	48	L2	
3.157	17	20	0	0	37	48	L2	
8.68	16	20	0	0	36	48	L2	
10.39	12	20	0	0	32	48	L2	
15.65	17	20	0	0	37	48	L2	
								Scanned 0.45MHz to 30MHz

Note: Verify that the IF Bandwidth is in the proper setting.

EQUIPMENT: NT 132 / 315 FTT READER

Conducted Emissions Photographs for Test # CE1 (Subpart B) and Test # CE1 (Subpart C):

FRONT VIEW:



SIDE VIEW:



EQUIPMENT: NT 132 / 315 FTT READER

Section 6. Radiated Emissions

TESTED BY: Mike Sundstrom

Test Conditions:

Test #	Date of Test	Test Voltage	Temperature	Humidity
RE 1	04/28/99	115 Vac @ 60 Hz	19°C	50%
RE 2	04/29/99	115 Vac @ 60 Hz	17°C	48%
MW 1A	04/30/99	115 Vac @ 60 Hz	21°C	51%
RE LF	04/30/99	115 Vac @ 60 Hz	21°C	45%
RE 4	04/28/99	115 Vac @ 60 Hz	19°C	50%
RE 5	04/29/99	115 Vac @ 60 Hz	17°C	48%
MW 1	04/22/99	115 Vac @ 60 Hz	22°C	71%

Purpose:

The test is intended to demonstrate the compliance of the Equipment Under Test (E.U.T.) to the limits for radiated emissions as defined by CFR 47, Part 15, Subpart B, for Class A Digital Devices, Paragraph Number 15.109 and Subpart C, Paragraph Numbers 15.209 and 15.231.

Test Results (CFR 47, Part 15, Subpart B, Class A, Paragraph Number 15.109):

The E.U.T. complies.

Test # RE 1 and RE 2 (30 MHz to 1000 MHz):

The worst case radiated emission is 43.5 dB μ V/m at 50.0 MHz at a distance of 3 meters in the Vertical polarization. This is 5.99 dB below the quasi-peak specification limit of 49.5 dB μ V/m.

Test # MW 1A (1G Hz to 4 GHz):

The worst case microwave radiation emission is a Noise Floor reading of 47 dB μ V/m at 3.2 GHz at a distance of 3 meters in the Horizontal polarization. This is 13 dB below the average specification limit of 60 dB μ V/m.

Measurement Data:

See test data on pages 21, 24 and 26.

*EQUIPMENT: NT 132 / 315 FTT READER***Specification Limits (CFR 47, Subpart B, 15.109):**

Frequency(MHz)	Maximum Field Strength at 3m and 10m (Unintentional)			
	3m (μ V/m)	3m (dB μ V/m)	10m (μ V/m)	10m (dB μ V/m)
30 – 88	300	49.5	90	39.1
88 – 216	500	54	150	43.5
216 – 960	700	56.9	210	46.4
Above 960	1000	60	300	49.5

Test Results (CFR 47, Part 15, Subpart C, Paragraph Numbers 15.209 and 15.231):

The E.U.T. complies.

Test # RE LF, RE 4 and RE 5 (100 kHz to 1000 MHz):

The worst case radiated emission is 47.9 dB μ V/m at 130 MHz at a distance of 3 meters in the Vertical polarization. This is 7.7 dB below the quasi-peak specification limit of 55.6 dB μ V/m.

Test # MW 1 (1 G Hz to 4 GHz):

The worst case microwave radiation emission is a Noise Floor reading of 47 dB μ V/m at 3.2 GHz at a distance of 3 meters in the Horizontal polarization. This is 8.6 dB below the average specification limit of 55.6 dB μ V/m.

Measurement Data:

See test data on pages 28, 30, 32 and 34.

EQUIPMENT: NT 132 / 315 FTT READER

Specification Limits (CFR 47, Subpart C, 15.209):

Frequency	Maximum Field Strength (Intentional)	
(MHz)	Field strength ($\mu\text{V/m}$)	Measurement distance (meters)
0.009-0.490	2400/F (kHz)	300
0.490-1.705	24000/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

Specification Limits (CFR 47, Subpart C, 15.231):

Frequency	Maximum Field Strength at 3 m (Intentional)			
(MHz)	Fundamental 3 m ($\mu\text{V/m}$)	Fundamental 3 m (dB $\mu\text{V/m}$)	Spurious 3 m ($\mu\text{V/m}$)	Spurious 3 m (dB $\mu\text{V/m}$)
315	6060	75.65	606	55.65

The spectrum was searched to the 10th harmonic of the highest fundamental clock frequencies per CFR 47, Part 15, Subpart C, Paragraph 15.209.

Method of Measurement (Procedure ANSI C63.4-1992):

The equipment was prescanned in a shielded room using a spectrum analyzer and broadband antenna. A list of frequencies was compiled for investigation in the open field. The equipment was then moved to an open area test site where amplitude measurements were made at a distance of 10 meters for Subpart B and 3 meters for Subpart C. The bandwidth was set to 100 kHz and the detector function was Peak. Any emission within 6 dB of the specification limit is re-measured using a reference tuned dipole antenna per ANSI C63.4.

For L-F radiated emissions measurements, the equipment is scanned in an anechoic chamber where amplitude measurements are made at a distance of 3 meters. The bandwidth is set to 10 kHz and the detector function is quasi-peak.

Any emission above 1 GHz was measured with horn antenna and low noise pre-amplifier at a distance of 3 meters.

EQUIPMENT: NT 132 / 315 FTT READER

Test Data - Radiated Emissions Test # RE 1 (Subpart B):

CLIENT NAME:		ACCESS					W.O.#: 9I0068e		DATE:		04/28/99				
EUT MODEL:		NT 132 / 315 Reader (FTT)					SERIAL #:		0101099017		TIME:		0730		
EUT CONFIG.:		ON, With Tag (Tag # 36273)									TECH.:		M.SUNDSTROM		
TEST SPECIFICATION:		FCC A RAD 3M									TEST NUMBER:		RE 1		
ROD ANT. #:		CABLE #:		4C		DETECT. TYPE:		PEAK		LOCATION:		C OATS			
BICON ANT. #:		2021		PREAMP. #:		398		RES. BW (kHz):		100		DISTANCE (m):		3	
LOG ANT. #:		2026		LIMITER#		181		VIDEO BW (kHz):		100		EUT VOLTAGE:		115 VAC	
HORN ANT. #:				ATTEN.#:		N/A		TEMP. (deg. C):		19		EUT FREQ. (Hz):		60	
DIPOLE ANT #:				DETECTOR#:		2407		HUMIDITY (%):		50		PHOTO ID:		9I0068e RE 1 RAD. EM.	
Emission Frequency (MHz)	Ant. Pol. (H/V)	Det. Atten. (dB)	Meter Reading (dBuV)	Antenna Factor (dB)	Path Loss (dB)	RF Gain (dB)	Corrected Reading (dBuV/m)	Spec. Limit (dBuV/m)	CR/SL Delta (dB)	Pass Fail Marginal	Notes				
30.0	V	0.0	44.0	12.9	2.4	25.0	34.3	49.5	-15.22	Pass					
30.9	V	0.0	45.0	12.9	2.4	25.0	35.3	49.5	-14.22	Pass					
31.1	V	0.0	44.0	12.8	2.4	25.0	34.2	49.5	-15.28	Pass					
31.5	V	0.0	49.0	12.8	2.4	25.0	39.2	49.5	-10.28	Pass					
31.6	V	0.0	48.0	12.8	2.4	25.0	38.2	49.5	-11.28	Pass					
31.8	V	0.0	47.0	12.8	2.4	25.0	37.2	49.5	-12.28	Pass					
32.2	V	0.0	47.0	12.8	2.4	25.0	37.2	49.5	-12.34	Pass					
32.5	V	0.0	50.0	12.8	2.4	25.0	40.2	49.5	-9.34	Pass					
33.7	V	0.0	50.0	12.7	2.4	25.0	40.1	49.5	-9.4	Pass					
33.9	V	0.0	51.0	12.7	2.4	25.0	41.1	49.5	-8.4	Pass					
34.7	V	0.0	52.0	12.7	2.4	25.0	42.0	49.5	-7.46	Pass					
34.9	V	0.0	51.0	12.7	2.4	25.0	41.0	49.5	-8.46	Pass					
35.2	V	0.0	50.0	12.6	2.4	25.0	40.0	49.5	-9.52	Pass					
37.2	V	0.0	49.0	12.4	2.4	25.0	38.8	49.5	-10.72	Pass					
40.4	V	0.0	54.0	12.1	2.4	25.0	43.5	49.5	-6.02	Pass					
40.8	V	0.0	50.0	12.1	2.4	25.0	39.5	49.5	-10.02	Pass					
42.5	V	0.0	47.0	12.1	2.4	25.0	36.4	49.5	-13.06	Pass					
45.0	V	0.0	42.0	12.0	2.4	25.0	31.4	49.5	-18.12	Pass					
47.5	V	0.0	48.0	12.1	2.4	25.0	37.4	49.5	-12.06	Pass					
50.0	V	0.0	53.0	12.1	3.4	24.9	43.5	49.5	-5.99	Pass					
52.5	V	0.0	52.0	11.7	3.4	24.9	42.1	49.5	-7.39	Pass					
55.0	V	0.0	51.0	11.1	3.4	24.9	40.5	49.5	-8.99	Pass					
57.5	V	0.0	50.0	10.7	3.4	24.9	39.1	49.5	-10.39	Pass					
60.0	V	0.0	53.0	10.1	3.4	24.9	41.5	49.5	-7.99	Pass					
62.5	V	0.0	53.0	10.0	3.4	24.9	41.5	49.5	-8.05	Pass					
65.0	V	0.0	56.0	10.0	3.4	24.9	44.4	49.5	-5.14	Pass					
65.0	V	10.0	44.0	10.0	3.4	24.9	42.4	49.5	-7.14	Pass	QP G2407				
70.0	V	0.0	55.0	9.8	3.6	24.9	43.5	49.5	-6.02	Pass					
72.5	V	0.0	54.0	9.7	3.6	24.9	42.3	49.5	-7.16	Pass					
75.0	V	0.0	54.0	9.4	3.6	24.9	42.1	49.5	-7.37	Pass					
80.0	V	0.0	47.0	9.1	3.9	24.9	35.1	49.5	-14.44	Pass					
82.5	V	0.0	40.0	9.2	3.9	24.9	28.2	49.5	-21.3	Pass					
85.0	V	0.0	54.0	9.5	3.9	24.9	42.4	49.5	-7.09	Pass					
87.5	V	0.0	52.0	9.6	3.9	24.9	40.6	49.5	-8.95	Pass					
110.0	V	0.0	52.0	10.9	4.4	24.9	42.4	54.0	-11.64	Pass					
112.5	V	0.0	53.0	11.0	4.4	24.9	43.4	54.0	-10.56	Pass					
115.0	V	0.0	47.0	11.1	4.4	24.9	37.6	54.0	-16.44	Pass					
117.5	V	0.0	52.0	11.2	4.4	24.9	42.6	54.0	-11.36	Pass					
120.0	V	0.0	54.0	11.3	4.4	24.9	44.8	54.0	-9.22	Pass					
122.5	V	0.0	52.0	11.4	4.4	24.9	42.9	54.0	-11.1	Pass					
125.0	V	0.0	50.0	11.6	4.9	24.9	41.6	54.0	-12.4	Pass					
127.5	V	0.0	52.0	11.7	4.9	24.9	43.7	54.0	-10.28	Pass					
130.0	V	0.0	56.0	11.9	4.9	24.9	47.9	54.0	-6.1	Pass					
132.5	V	0.0	51.0	12.0	4.9	24.9	43.0	54.0	-10.96	Pass					
135.0	V	0.0	52.0	12.2	4.9	24.9	44.2	54.0	-9.75	Pass					
137.5	V	0.0	40.0	12.4	4.9	24.9	32.4	54.0	-21.61	Pass					

EQUIPMENT: NT 132 / 315 FTT READER

Test Data - Radiated Emissions Test # RE 1 (Subpart B) (Continued):

Emission Frequency (MHz)	Ant. Pol. (H/V)	Det. Atten. (dB)	Meter Reading (dBuV)	Antenna Factor (dB)	Path Loss (dB)	RF Gain (dB)	Corrected Reading (dBuV/m)	Spec. Limit (dBuV/m)	CR/SL Delta (dB)	Pass Fail Marginal	Notes
140.0	V	0.0	51.0	12.6	4.9	24.8	43.6	54.0	-10.37	Pass	
142.5	V	0.0	40.0	12.6	4.9	24.8	32.6	54.0	-21.41	Pass	
145.0	V	0.0	50.0	12.5	4.9	24.8	42.5	54.0	-11.47	Pass	
147.5	V	0.0	46.0	12.5	4.9	24.8	38.5	54.0	-15.51	Pass	
150.0	V	0.0	52.0	12.4	5.4	24.8	44.9	54.0	-9.07	Pass	
152.5	V	0.0	46.0	12.4	5.4	24.8	39.0	54.0	-15.03	Pass	
155.0	V	0.0	44.0	12.5	5.4	24.8	37.0	54.0	-16.97	Pass	
157.5	V	0.0	41.0	12.5	5.4	24.8	34.1	54.0	-19.93	Pass	
160.0	V	0.0	43.0	12.6	5.4	24.8	36.2	54.0	-17.81	Pass	
162.5	V	0.0	39.0	12.6	5.4	24.8	32.2	54.0	-21.83	Pass	
165.0	V	0.0	36.0	12.6	5.4	24.8	29.1	54.0	-24.86	Pass	
170.0	V	0.0	36.0	12.5	5.4	24.8	29.1	54.0	-24.91	Pass	
172.5	V	0.0	39.0	12.8	5.4	24.8	32.3	54.0	-21.65	Pass	
175.0	V	0.0	40.0	13.1	5.4	24.8	33.7	54.0	-20.26	Pass	
30.0	H	0.0	47.0	12.9	2.4	25.0	37.3	49.5	-12.22	Pass	
31.1	H	0.0	44.0	12.8	2.4	25.0	34.2	49.5	-15.28	Pass	
34.9	H	0.0	47.0	12.7	2.4	25.0	37.0	49.5	-12.46	Pass	
37.0	H	0.0	46.0	12.5	2.4	25.0	35.9	49.5	-13.62	Pass	
40.0	H	0.0	50.0	12.1	2.4	25.0	39.5	49.5	-10.02	Pass	
42.5	H	0.0	48.0	12.1	2.4	25.0	37.4	49.5	-12.06	Pass	
50.0	H	0.0	53.0	12.1	3.4	24.9	43.5	49.5	-5.99	Pass	
52.5	H	0.0	53.0	11.7	3.4	24.9	43.1	49.5	-6.39	Pass	
57.5	H	0.0	46.0	10.7	3.4	24.9	35.1	49.5	-14.39	Pass	
60.0	H	0.0	54.0	10.1	3.4	24.9	42.5	49.5	-6.99	Pass	
62.5	H	0.0	54.0	10.0	3.4	24.9	42.5	49.5	-7.05	Pass	
65.0	H	0.0	58.0	10.0	3.4	24.9	46.4	49.5	-3.14	Pass	
65.0	H	0.0	42.0	10.0	3.4	24.9	30.4	49.5	-19.14	Pass	QP G2407
70.0	H	0.0	53.0	9.8	3.6	24.9	41.5	49.5	-8.02	Pass	
75.0	H	0.0	55.0	9.4	3.6	24.9	43.1	49.5	-6.37	Pass	
80.0	H	0.0	50.0	9.1	3.9	24.9	38.1	49.5	-11.44	Pass	
85.0	H	0.0	55.0	9.5	3.9	24.9	43.4	49.5	-6.09	Pass	
87.5	H	0.0	50.0	9.6	3.9	24.9	38.6	49.5	-10.95	Pass	
100.0	H	0.0	50.0	10.7	4.4	24.9	40.2	54.0	-13.84	Pass	
105.0	H	0.0	54.0	10.8	4.4	24.9	44.3	54.0	-9.74	Pass	
110.0	H	0.0	54.0	10.9	4.4	24.9	44.4	54.0	-9.64	Pass	
112.5	H	0.0	57.0	11.0	4.4	24.9	47.4	54.0	-6.56	Pass	
115.0	H	0.0	57.0	11.1	4.4	24.9	47.6	54.0	-6.44	Pass	
117.5	H	0.0	54.0	11.2	4.4	24.9	44.6	54.0	-9.36	Pass	
120.0	H	0.0	53.0	11.3	4.4	24.9	43.8	54.0	-10.22	Pass	
122.5	H	0.0	56.0	11.4	4.4	24.9	46.9	54.0	-7.1	Pass	
125.0	H	0.0	45.0	11.6	4.9	24.9	36.6	54.0	-17.4	Pass	
125.0	H	0.0	42.0	11.6	4.9	24.9	33.6	54.0	-20.4	Pass	QP G2407
127.5	H	0.0	36.0	11.7	4.9	24.9	27.7	54.0	-26.28	Pass	
130.0	H	0.0	44.0	11.9	4.9	24.9	35.9	54.0	-18.1	Pass	
135.0	H	0.0	46.0	12.2	4.9	24.9	38.2	54.0	-15.75	Pass	
140.0	H	0.0	47.0	12.6	4.9	24.8	39.6	54.0	-14.37	Pass	
145.0	H	0.0	48.0	12.5	4.9	24.8	40.5	54.0	-13.47	Pass	
150.0	H	0.0	46.0	12.4	5.4	24.8	38.9	54.0	-15.07	Pass	
											Scanned 30MHz to 300MHz

EQUIPMENT: NT 132 / 315 FTT READER

Radiated Emissions Photographs for Test # RE 1 (Subpart B):

FRONT VIEW:



REAR VIEW:



EQUIPMENT: NT 132 / 315 FTT READER

Test Data - Radiated Emissions Test # RE 2 (Subpart B):

CLIENT NAME:		AXCESS				W.O.#: 9I0068e			DATE:		04/29/99				
EUT MODEL:		NT 132 / 315 Reader (FTT)				SERIAL #:			0101099017		TIME:		0730		
EUT CONFIG.:		ON, With Tag (Tag # 36273)							TECH.:		M.SUNDSTROM				
TEST SPECIFICATION:		FCC A RAD 3M							TEST NUMBER:		RE 2				
ROD ANT. #:		CABLE #:		4C		DETECT. TYPE:		PEAK		LOCATION:		C OATS			
BICON ANT. #:		2021		PREAMP. #:		398		RES. BW (kHz):		100		DISTANCE (m):		3	
LOG ANT. #:		2026		LIMITER#		181		VIDEO BW (kHz):		100		EUT VOLTAGE:		115 VAC	
HORN ANT. #:				ATTEN.#:		N/A		TEMP. (deg. C):		17		EUT FREQ. (Hz):		60	
DIPOLE ANT #:				DETECTOR#:		2407		HUMIDITY (%):		48		PHOTO ID:		9I0068e RE 2 RAD. EM.	
Emission Frequency (MHz)	Ant. Pol. (H/V)	Det. Atten. (dB)	Meter Reading (dBuV)	Antenna Factor (dB)	Path Loss (dB)	RF Gain (dB)	Corrected Reading (dBuV/m)	Spec. Limit (dBuV/m)	CR/SL Delta (dB)	Pass Fail Marginal	Notes				
300.1	V	0.0	20.0	20.9	5.3	24.7	21.5	56.9	-35.39	Pass					
305.0	V	0.0	19.0	20.1	5.3	24.7	19.7	56.9	-37.22	Pass					
314.9	V	0.0	56.0	19.3	5.3	24.7	55.9	56.9	-1.04	Marginal	FUNDAMENTAL(F1)				
317.5	V	0.0	30.0	18.4	5.3	24.7	29.0	56.9	-27.86	Pass					
322.1	V	0.0	24.0	17.6	5.3	24.7	22.2	56.9	-34.69	Pass					
325.0	V	0.0	30.0	17.4	5.3	24.7	28.0	56.9	-28.89	Pass					
629.8	V	0.0	44.0	20.5	11.7	24.8	51.4	56.9	-5.48	Pass	(F2)				
975.0	V	0.0	21.0	24.0	15.7	25.0	35.6	60.0	-24.38	Pass	NOISE FLOOR				
300.1	H	0.0	22.0	20.9	5.3	24.7	23.5	56.9	-33.39	Pass					
305.0	H	0.0	21.0	20.1	5.3	24.7	21.7	56.9	-35.22	Pass					
310.0	H	0.0	26.0	19.3	5.3	24.7	25.9	56.9	-31.04	Pass					
314.9	H	0.0	62.0	19.3	5.3	24.7	61.9	56.9	4.96	Fail	(F1)				
335.0	H	0.0	27.0	17.0	5.3	24.7	24.6	56.9	-32.29	Pass					
629.8	H	0.0	45.0	20.5	11.7	24.8	52.4	56.9	-4.48	Pass	(F2)				
944.7	H	0.0	27.0	23.2	15.1	25.0	40.2	56.9	-16.71	Pass	(F3)				
											Scanned 300MHz to 1000MHz				

Legend:

- F1 Fundamental Tx
 F2 Second Harmonic
 F3 Third Harmonic Signal

These are intentional signals and are addressed under CFR 47, Subpart C, 15.231(b) which follow(s) in the Test Data for Test # RE 4 and Test # RE 5 page 30 and 33.

EQUIPMENT: NT 132 / 315 FTT READER

Radiated Emissions Photographs for Test # RE 2 (Subpart B):

FRONT VIEW:



REAR VIEW:



Test Data – Microwave Radiated Emissions Test # MW 1A (Subpart B):

Complete X Preliminary Page 1 of 1

Client: AXCESS Test #: MW 1A W.O.#: 9L0068E

EUT: NT 132/315 READER (FTT) S/N: 0101099017 Photo ID: 9L0068EMW1

Technician: M.Sundstrom Specification: CFR 47,15.109(b) Lab: C OATS Date: 04/30/99

Equipment Used: G2624,CF32,G2230,CF33,494

Configuration: ON With Tag (Tag # 36273)

Bandwidth: 1MHz Video Bandwidth: 1MHz Antenna Distance 3 m Detector:

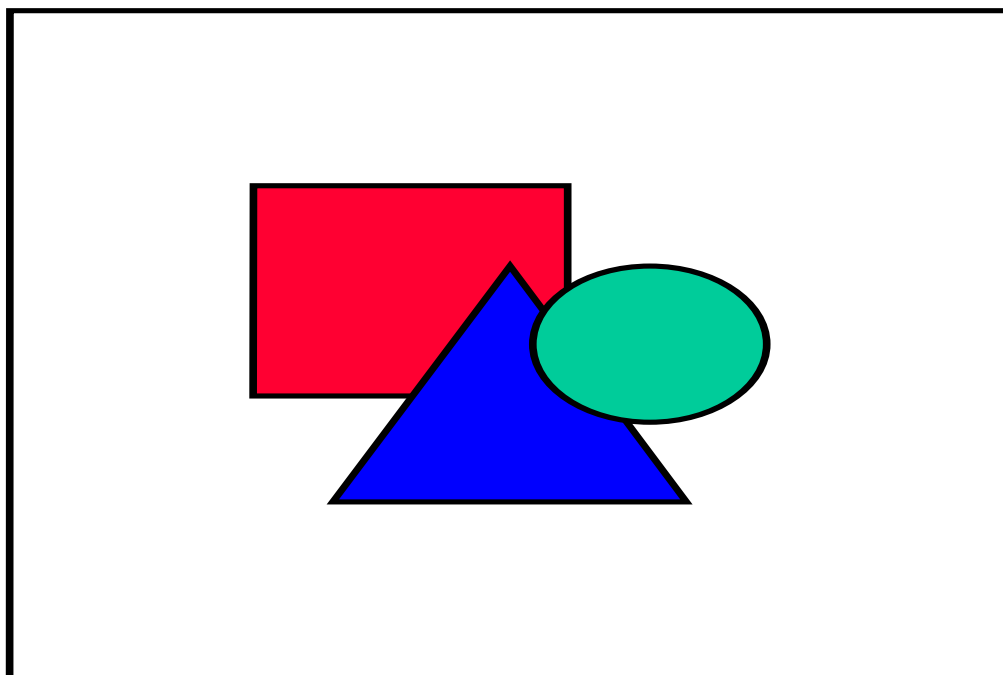
Climatic Conditions:	EUT Power:	<u>X</u> 115 V.A.C.	<u>X</u> 60 Hz	<u>X</u> Peak
Temperature: <u>21</u> C		<u> </u> 208 V.A.C.	<u> </u> 50 Hz	<u> </u> Average
Relative Humidity: <u>51</u> %		<u> </u> 230 V.A.C.		
Atmospheric Pressure: <u>1005</u> mbar		<u> </u> Other _____	<u>X</u> 1 Phase	<u> </u> 3 Phase

[illegible]

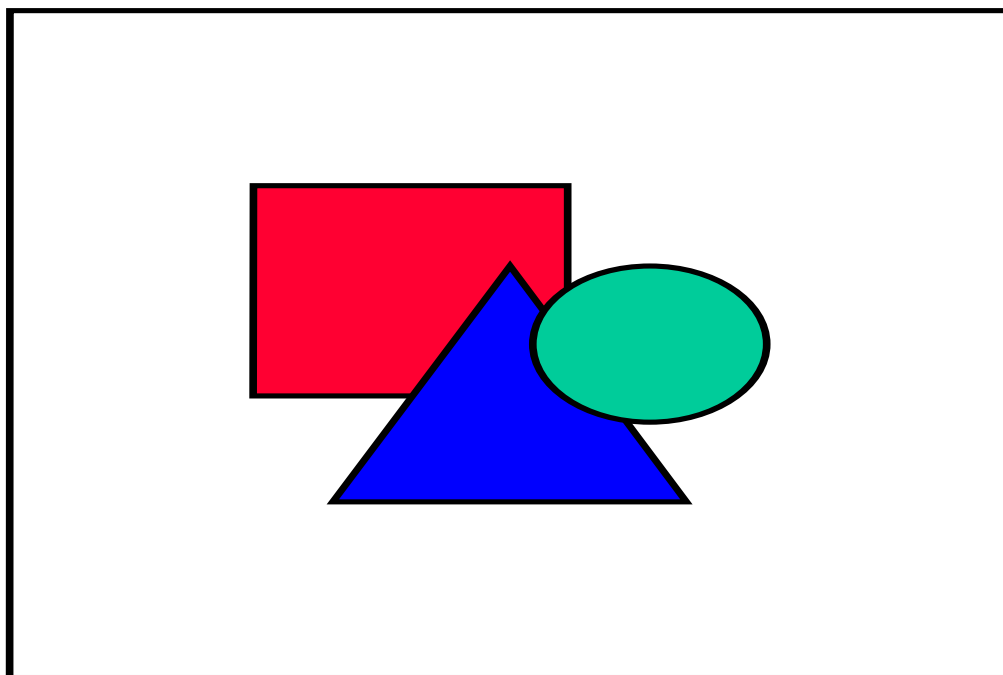
EQUIPMENT: NT 132 / 315 FTT READER

Radiated Emissions Photographs for Test # MW 1A (Subpart B):

FRONT VIEW:



REAR VIEW:



The test set-up for Test # MW 1A was identical to the test set-up for Test # MW 1.

EQUIPMENT: NT 132 / 315 FTT READER

Test Data – Radiated Emissions Test # RE LF (Subpart C):

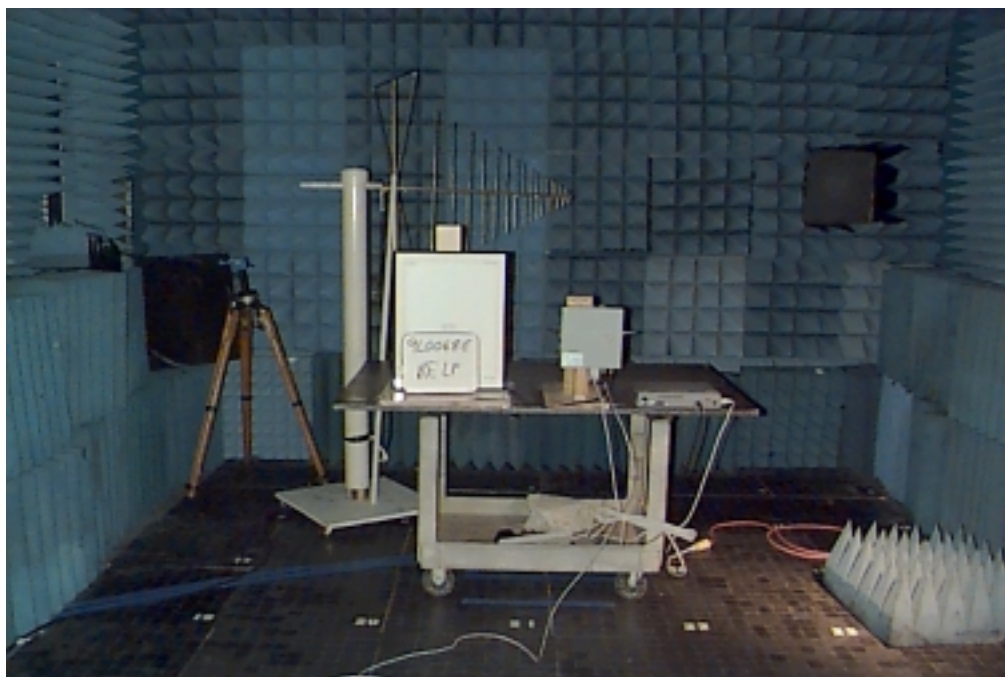
Radiated Emissions FCC								
Complete	<u> X </u>							
Preliminary	<u> </u>		Page <u> 1 </u> of <u> 1 </u>					
Client: <u> AXCESS </u>		W.O.#: <u> 9L0068E </u>		Date: <u> 04/30/99 </u>				
EUT: <u> NT 132/315 READER (FTT) </u>		S/N: <u> 0101099017 </u>		Specification: <u> CFR47,15.209,15.231 </u>				
Tech: <u> M.Sundstrom </u>		Test #: <u> RE LF </u>		Lab: <u> ANC 2 </u>		Photo ID: <u> 9L0068 RE LF </u>		
Equipment Used: <u> 099,C79,G2037 </u>				Antenna Distance: <u> 3 Meters </u>				
Configuration: <u> ON WITH TAG (Tag # 36273) </u>								
IF Bandwidth: <u> 10kHz </u>		Video Bandwidth <u> N/A </u>		Detector: <u> </u> Peak <u> X </u> Quasi Peak				
Ambient Temperature: <u> 21 </u> C		EUT Power: <u> X </u> 115 V.A.C.		<u> X </u> 60 Hz		<u> X </u> 1 Phase		
Relative Humidity: <u> 45 </u> %		<u> </u> 230 V.A.C.		<u> </u> 50 Hz		<u> </u> 3 Phase		
Atmospheric Pressure: <u> 1005 </u> mbar		<u> </u> Other <u> </u>						
Freq. (MHz)	Meter Reading (dBuV)	Attenuation (dB)	Cable Loss (dB)	Antenna Factor (dB)	Corrected Reading (dBuV)	Spec.limit (dBuV) FCC	Pol.	Comments:
0.1318	17	20	0	-2.4	34.6	98.18	V	
0.263	12	10	0	-2.4	19.6	89.13	V	
0.394	16	10	0	-2.4	23.6	86.09	V	
0.657	14	10	0	-2.4	21.6	76.53	V	
3.16	10	10	0	-2.4	17.6	69.5	V	
3.288	15	10	0	-2.4	22.6	69.5	V	
5.788	13	10	0	-2.4	20.6	69.5	V	
5.92	14	10	0	-2.4	21.6	69.5	V	
13.82	13	10	0	-2.4	20.6	69.5	V	
13.947	15	10	0	-2.4	22.6	69.5	V	
20.13	14	20	0	-2.4	31.6	69.5	V	
20.26	14	20	0	-2.4	31.6	69.5	V	
20.657	16	20	0	-2.4	33.6	69.5	V	
20.79	16	20	0	-2.4	33.6	69.5	V	
21.05	16	20	0	-2.4	33.6	69.5	V	
								Scanned 100kHz to 30MHz

Note: Verify that the IF Bandwidth is in the proper setting.

EQUIPMENT: NT 132 / 315 FTT READER

Radiated Emissions Photograph for Test # RE LF (Subpart C):

FRONT VIEW:



EQUIPMENT: NT 132 / 315 FTT READER

Test Data – Radiated Emissions Test # RE 4 (Subpart C):

CLIENT NAME:		AXCESS					W.O.#: 9I0068e		DATE:		04/28/99				
EUT MODEL:		NT 132 / 315 Reader (FTT)					SERIAL #:		0101099017		TIME:		0730		
EUT CONFIG.:		ON, With Tag (Tag # 36273)							TECH.:		M.SUNDSTROM				
TEST SPECIFICATION:		FCC 15.231 3M (Tx 315 MHz)							TEST NUMBER:		RE 4				
ROD ANT. #:		CABLE #:		4C		DETECT. TYPE:		PEAK		LOCATION:		C OATS			
BICON ANT. #:		2021		PREAMP. #:		398		RES. BW (kHz):		100		DISTANCE (m):		3	
LOG ANT. #:		2026		LIMITER#		181		VIDEO BW (kHz):		100		EUT VOLTAGE:		115 VAC	
HORN ANT. #:				ATTEN.#:		N/A		TEMP. (deg. C):		19		EUT FREQ. (Hz):		60	
DIPOLE ANT #:				DETECTOR#:		2407		HUMIDITY (%):		50		PHOTO ID:		9I0068e RE 4 RAD. EM.	
Emission Frequency (MHz)	Ant. Pol. (H/V)	Det. Atten. (dB)	Meter Reading (dBuV)	Antenna Factor (dB)	Path Loss (dB)	RF Gain (dB)	Corrected Reading (dBuV/m)	Spec. Limit (dBuV/m)	CR/SL Delta (dB)	Pass Fail Marginal	Notes				
30.0	V	0.0	44.0	12.9	2.4	25.0	34.3	55.6	-21.32	Pass					
30.9	V	0.0	45.0	12.9	2.4	25.0	35.3	55.6	-20.32	Pass					
31.1	V	0.0	44.0	12.8	2.4	25.0	34.2	55.6	-21.38	Pass					
31.5	V	0.0	49.0	12.8	2.4	25.0	39.2	55.6	-16.38	Pass					
31.6	V	0.0	48.0	12.8	2.4	25.0	38.2	55.6	-17.38	Pass					
31.8	V	0.0	47.0	12.8	2.4	25.0	37.2	55.6	-18.38	Pass					
32.2	V	0.0	47.0	12.8	2.4	25.0	37.2	55.6	-18.44	Pass					
32.5	V	0.0	50.0	12.8	2.4	25.0	40.2	55.6	-15.44	Pass					
33.7	V	0.0	50.0	12.7	2.4	25.0	40.1	55.6	-15.5	Pass					
33.9	V	0.0	51.0	12.7	2.4	25.0	41.1	55.6	-14.5	Pass					
34.7	V	0.0	52.0	12.7	2.4	25.0	42.0	55.6	-13.56	Pass					
34.9	V	0.0	51.0	12.7	2.4	25.0	41.0	55.6	-14.56	Pass					
35.2	V	0.0	50.0	12.6	2.4	25.0	40.0	55.6	-15.62	Pass					
37.2	V	0.0	49.0	12.4	2.4	25.0	38.8	55.6	-16.82	Pass					
40.4	V	0.0	54.0	12.1	2.4	25.0	43.5	55.6	-12.12	Pass					
40.8	V	0.0	50.0	12.1	2.4	25.0	39.5	55.6	-16.12	Pass					
42.5	V	0.0	47.0	12.1	2.4	25.0	36.4	55.6	-19.16	Pass					
45.0	V	0.0	42.0	12.0	2.4	25.0	31.4	55.6	-24.22	Pass					
47.5	V	0.0	48.0	12.1	2.4	25.0	37.4	55.6	-18.16	Pass					
50.0	V	0.0	53.0	12.1	3.4	24.9	43.5	55.6	-12.09	Pass					
52.5	V	0.0	52.0	11.7	3.4	24.9	42.1	55.6	-13.49	Pass					
55.0	V	0.0	51.0	11.1	3.4	24.9	40.5	55.6	-15.09	Pass					
57.5	V	0.0	50.0	10.7	3.4	24.9	39.1	55.6	-16.49	Pass					
60.0	V	0.0	53.0	10.1	3.4	24.9	41.5	55.6	-14.09	Pass					
62.5	V	0.0	53.0	10.0	3.4	24.9	41.5	55.6	-14.15	Pass					
65.0	V	0.0	56.0	10.0	3.4	24.9	44.4	55.6	-11.24	Pass					
65.0	V	10.0	44.0	10.0	3.4	24.9	42.4	55.6	-13.24	Pass	QP G2407				
70.0	V	0.0	55.0	9.8	3.6	24.9	43.5	55.6	-12.12	Pass					
72.5	V	0.0	54.0	9.7	3.6	24.9	42.3	55.6	-13.26	Pass					
75.0	V	0.0	54.0	9.4	3.6	24.9	42.1	55.6	-13.47	Pass					
80.0	V	0.0	47.0	9.1	3.9	24.9	35.1	55.6	-20.54	Pass					
82.5	V	0.0	40.0	9.2	3.9	24.9	28.2	55.6	-27.4	Pass					
85.0	V	0.0	54.0	9.5	3.9	24.9	42.4	55.6	-13.19	Pass					
87.5	V	0.0	52.0	9.6	3.9	24.9	40.6	55.6	-15.05	Pass					
110.0	V	0.0	52.0	10.9	4.4	24.9	42.4	55.6	-13.24	Pass					
112.5	V	0.0	53.0	11.0	4.4	24.9	43.4	55.6	-12.16	Pass					
115.0	V	0.0	47.0	11.1	4.4	24.9	37.6	55.6	-18.04	Pass					
117.5	V	0.0	52.0	11.2	4.4	24.9	42.6	55.6	-12.96	Pass					
120.0	V	0.0	54.0	11.3	4.4	24.9	44.8	55.6	-10.82	Pass					
122.5	V	0.0	52.0	11.4	4.4	24.9	42.9	55.6	-12.7	Pass					
125.0	V	0.0	50.0	11.6	4.9	24.9	41.6	55.6	-14	Pass					
127.5	V	0.0	52.0	11.7	4.9	24.9	43.7	55.6	-11.88	Pass					
130.0	V	0.0	56.0	11.9	4.9	24.9	47.9	55.6	-7.7	Pass					
132.5	V	0.0	51.0	12.0	4.9	24.9	43.0	55.6	-12.56	Pass					
135.0	V	0.0	52.0	12.2	4.9	24.9	44.2	55.6	-11.35	Pass					

EQUIPMENT: NT 132 / 315 FTT READER

Test Data – Radiated Emissions Test # RE 4 (Subpart C) (Continued):

Emission Frequency (MHz)	Ant. Pol. (H/V)	Det. Atten. (dB)	Meter Reading (dBuV)	Antenna Factor (dB)	Path Loss (dB)	RF Gain (dB)	Corrected Reading (dBuV/m)	Spec. Limit (dBuV/m)	CR/SL Delta (dB)	Pass Fail Marginal	Notes
137.5	V	0.0	40.0	12.4	4.9	24.9	32.4	55.6	-23.21	Pass	
140.0	V	0.0	51.0	12.6	4.9	24.8	43.6	55.6	-11.97	Pass	
142.5	V	0.0	40.0	12.6	4.9	24.8	32.6	55.6	-23.01	Pass	
145.0	V	0.0	50.0	12.5	4.9	24.8	42.5	55.6	-13.07	Pass	
147.5	V	0.0	46.0	12.5	4.9	24.8	38.5	55.6	-17.11	Pass	
150.0	V	0.0	52.0	12.4	5.4	24.8	44.9	55.6	-10.67	Pass	
152.5	V	0.0	46.0	12.4	5.4	24.8	39.0	55.6	-16.63	Pass	
155.0	V	0.0	44.0	12.5	5.4	24.8	37.0	55.6	-18.57	Pass	
157.5	V	0.0	41.0	12.5	5.4	24.8	34.1	55.6	-21.53	Pass	
160.0	V	0.0	43.0	12.6	5.4	24.8	36.2	55.6	-19.41	Pass	
162.5	V	0.0	39.0	12.6	5.4	24.8	32.2	55.6	-23.43	Pass	
165.0	V	0.0	36.0	12.6	5.4	24.8	29.1	55.6	-26.46	Pass	
170.0	V	0.0	36.0	12.5	5.4	24.8	29.1	55.6	-26.51	Pass	
172.5	V	0.0	39.0	12.8	5.4	24.8	32.3	55.6	-23.25	Pass	
175.0	V	0.0	40.0	13.1	5.4	24.8	33.7	55.6	-21.86	Pass	
30.0	H	0.0	47.0	12.9	2.4	25.0	37.3	55.6	-18.32	Pass	
31.1	H	0.0	44.0	12.8	2.4	25.0	34.2	55.6	-21.38	Pass	
34.9	H	0.0	47.0	12.7	2.4	25.0	37.0	55.6	-18.56	Pass	
37.0	H	0.0	46.0	12.5	2.4	25.0	35.9	55.6	-19.72	Pass	
40.0	H	0.0	50.0	12.1	2.4	25.0	39.5	55.6	-16.12	Pass	
42.5	H	0.0	48.0	12.1	2.4	25.0	37.4	55.6	-18.16	Pass	
50.0	H	0.0	53.0	12.1	3.4	24.9	43.5	55.6	-12.09	Pass	
52.5	H	0.0	53.0	11.7	3.4	24.9	43.1	55.6	-12.49	Pass	
57.5	H	0.0	46.0	10.7	3.4	24.9	35.1	55.6	-20.49	Pass	
60.0	H	0.0	54.0	10.1	3.4	24.9	42.5	55.6	-13.09	Pass	
62.5	H	0.0	54.0	10.0	3.4	24.9	42.5	55.6	-13.15	Pass	
65.0	H	0.0	58.0	10.0	3.4	24.9	46.4	55.6	-9.24	Pass	
65.0	H	0.0	42.0	10.0	3.4	24.9	30.4	55.6	-25.24	Pass	QP G2407
70.0	H	0.0	53.0	9.8	3.6	24.9	41.5	55.6	-14.12	Pass	
75.0	H	0.0	55.0	9.4	3.6	24.9	43.1	55.6	-12.47	Pass	
80.0	H	0.0	50.0	9.1	3.9	24.9	38.1	55.6	-17.54	Pass	
85.0	H	0.0	55.0	9.5	3.9	24.9	43.4	55.6	-12.19	Pass	
87.5	H	0.0	50.0	9.6	3.9	24.9	38.6	55.6	-17.05	Pass	
100.0	H	0.0	50.0	10.7	4.4	24.9	40.2	55.6	-15.44	Pass	
105.0	H	0.0	54.0	10.8	4.4	24.9	44.3	55.6	-11.34	Pass	
110.0	H	0.0	54.0	10.9	4.4	24.9	44.4	55.6	-11.24	Pass	
112.5	H	0.0	57.0	11.0	4.4	24.9	47.4	55.6	-8.16	Pass	
115.0	H	0.0	57.0	11.1	4.4	24.9	47.6	55.6	-8.04	Pass	
117.5	H	0.0	54.0	11.2	4.4	24.9	44.6	55.6	-10.96	Pass	
120.0	H	0.0	53.0	11.3	4.4	24.9	43.8	55.6	-11.82	Pass	
122.5	H	0.0	56.0	11.4	4.4	24.9	46.9	55.6	-8.7	Pass	
125.0	H	0.0	45.0	11.6	4.9	24.9	36.6	55.6	-19	Pass	
125.0	H	0.0	42.0	11.6	4.9	24.9	33.6	55.6	-22	Pass	QP G2407
127.5	H	0.0	36.0	11.7	4.9	24.9	27.7	55.6	-27.88	Pass	
130.0	H	0.0	44.0	11.9	4.9	24.9	35.9	55.6	-19.7	Pass	
135.0	H	0.0	46.0	12.2	4.9	24.9	38.2	55.6	-17.35	Pass	
140.0	H	0.0	47.0	12.6	4.9	24.8	39.6	55.6	-15.97	Pass	
145.0	H	0.0	48.0	12.5	4.9	24.8	40.5	55.6	-15.07	Pass	
150.0	H	0.0	46.0	12.4	5.4	24.8	38.9	55.6	-16.67	Pass	
											Scanned 30MHz to 300MHz

EQUIPMENT: NT 132 / 315 FTT READER

Test Data – Radiated Emissions Test # RE 5 (Subpart C):

CLIENT NAME:		AXCESS				W.O.#: 9I0068e		DATE:		04/29/99						
EUT MODEL:		NT 132 / 315 Reader (FTT)				SERIAL #:		0101099017		TIME:		0730				
EUT CONFIG.:		ON, With Tag (Tag # 36273)						TECH.:		M.SUNDSTROM						
TEST SPECIFICATION:		FCC 15.231 3M (Tx 315 MHz)						TEST NUMBER:		RE 5						
ROD ANT. #:		CABLE #:		4C		DETECT. TYPE:		PEAK		LOCATION:		C OATS				
BICON ANT. #:		2021		PREAMP. #:		398		RES. BW (kHz):		100		DISTANCE (m):		3		
LOG ANT. #:		2026		LIMITER#		181		VIDEO BW (kHz):		100		EUT VOLTAGE:		115 VAC		
HORN ANT. #:				ATTEN. #:		N/A		TEMP. (deg. C):		17		EUT FREQ. (Hz):		60		
DIPOLE ANT #:				DETECTOR#:		2407		HUMIDITY (%):		48		PHOTO ID:			9I0068e RE 5 RAD. EM.	
Emission Frequency (MHz)	Ant. Pol. (H/V)	Det. Atten. (dB)	Meter Reading (dBuV)	Antenna Factor (dB)	Path Loss (dB)	RF Gain (dB)	Corrected Reading (dBuV/m)	Spec. Limit (dBuV/m)	CR/SL Delta (dB)	Pass Fail Marginal	Notes					
300.1	V	0.0	20.0	20.9	5.3	24.7	21.5	55.6	-34.09	Pass						
305.0	V	0.0	19.0	20.1	5.3	24.7	19.7	55.6	-35.92	Pass						
314.9	V	0.0	56.0	19.3	5.3	24.7	55.9	75.6	-19.74	Pass	FUNDAMENTAL(F1)					
317.5	V	0.0	30.0	18.4	5.3	24.7	29.0	55.6	-26.57	Pass						
322.1	V	0.0	24.0	17.6	5.3	24.7	22.2	55.6	-33.39	Pass						
325.0	V	0.0	30.0	17.4	5.3	24.7	28.0	55.6	-27.59	Pass						
629.8	V	0.0	44.0	20.5	11.7	24.8	51.4	55.6	-4.18	Pass	(F2)					
975.0	V	0.0	21.0	24.0	15.7	25.0	35.6	55.6	-19.98	Pass	NOISE FLOOR					
300.1	H	0.0	22.0	20.9	5.3	24.7	23.5	55.6	-32.09	Pass						
305.0	H	0.0	21.0	20.1	5.3	24.7	21.7	55.6	-33.92	Pass						
310.0	H	0.0	26.0	19.3	5.3	24.7	25.9	55.6	-29.74	Pass						
314.9	H	0.0	62.0	19.3	5.3	24.7	61.9	75.6	-13.74	Pass	(F1)					
335.0	H	0.0	27.0	17.0	5.3	24.7	24.6	55.6	-30.99	Pass						
629.8	H	0.0	45.0	20.5	11.7	24.8	52.4	55.6	-3.18	Pass	(F2)					
944.7	H	0.0	27.0	23.2	15.1	25.0	40.2	55.6	-15.41	Pass	(F3)					
											Scanned 300MHz to 1000MHz					

Legend:

- F1 Fundamental Tx
F2 Second Harmonic
F3 Third Harmonic Signal

These are intentional signals and are addressed under CFR 47, Subpart C, 15.231(b) which follow(s) in the Test Data for Test # RE 4 and Test # RE 5 page 30 and 33.

EQUIPMENT: NT 132 / 315 FTT READER

Radiated Emissions Photographs for Test # RE 4 and Test # RE 5 (Subpart C):

FRONT VIEW:



REAR VIEW:



The test set-up for Test # RE 4 and Test # RE 5 was identical to the test set-up for Test # RE 3.

Test Data – Radiated Emissions Test # MW 1 (Subpart C):

Complete X Preliminary Page 1 of 1

Client: AXCESS Test #: MW 1 W.O.#: 9L0068E

EUT: NT 132/315 READER (FTT) S/N: 0101099017 Photo ID: 9L0068EMW1

Technician: M.Sundstrom Specification: CFR 47,15.231 Lab: C OATS Date: 04/30/99

Equipment Used: G2624,CF32,G2230,CF33,494

Configuration: ON With Tag (Tag # 36273)

Bandwidth: 1MHz Video Bandwidth: 1MHz Antenna Distance 3 m Detector:

Climatic Conditions:	EUT Power:	<u>X</u> 115 V.A.C.	<u>X</u> 60 Hz	<u>X</u> Peak
Temperature: <u>21</u> C		<u> </u> 208 V.A.C.	<u> </u> 50 Hz	<u> </u> Average
Relative Humidity: <u>51</u> %		<u> </u> 230 V.A.C.		
Atmospheric Pressure: <u>1005</u> mbar		<u> </u> Other _____	<u>X</u> 1 Phase	<u> </u> 3 Phase

[illegible]

EQUIPMENT: NT 132 / 315 FTT READER

Radiated Emissions Photographs for Test # MW 1 (Subpart C):

REAR VIEW:



FRONT VIEW:



EQUIPMENT: NT 132 / 315 FTT READER

Section 7. Sample Calculations

Conducted Emissions:

If the Quasi-Peak to Average ratio is greater than 6 dB, then the emission is classified as broadband and its Quasi-Peak level is reduced by 13 dB for comparison to the limit.

- i.e. Quasi-Peak level = 40 dB μ V
 Average level = 34 dB μ V
 Corrected level = 40 – 13 = 27 dB μ V

Radiated Emissions:

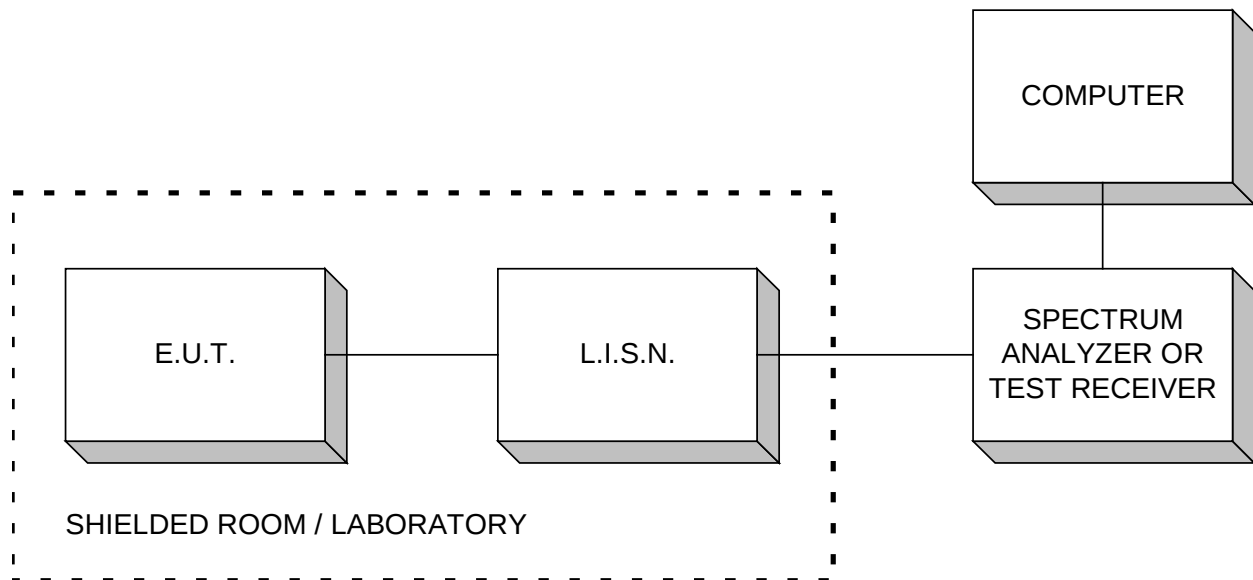
Emissions are measured at a distance of 10 meters and corrected for antenna factor and cable loss.

- i.e. Received Signal = 25 dB μ V @ 100 MHz
 Antenna Factor & Cable Loss = 9.8 dB
 Field Intensity = 25 + 9.8 = 34.8 dB μ V/m @ 10 m

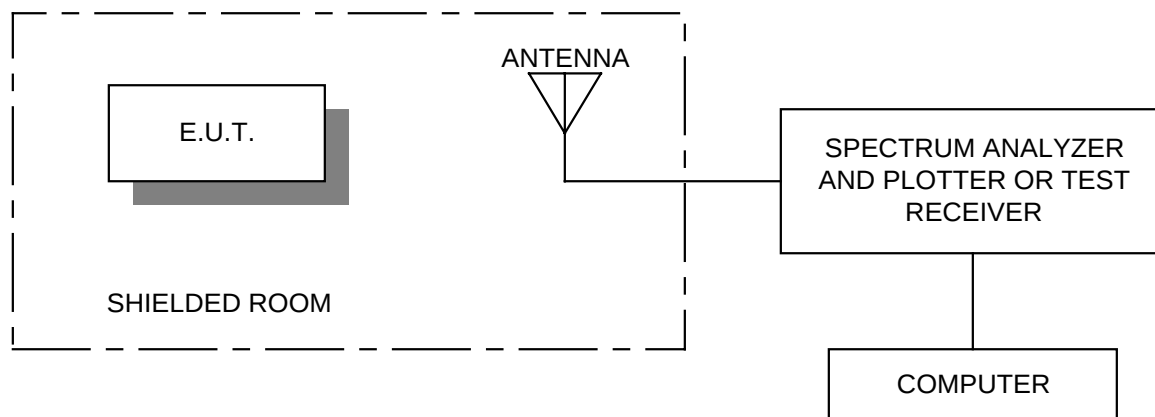
EQUIPMENT: NT 132 / 315 FTT READER

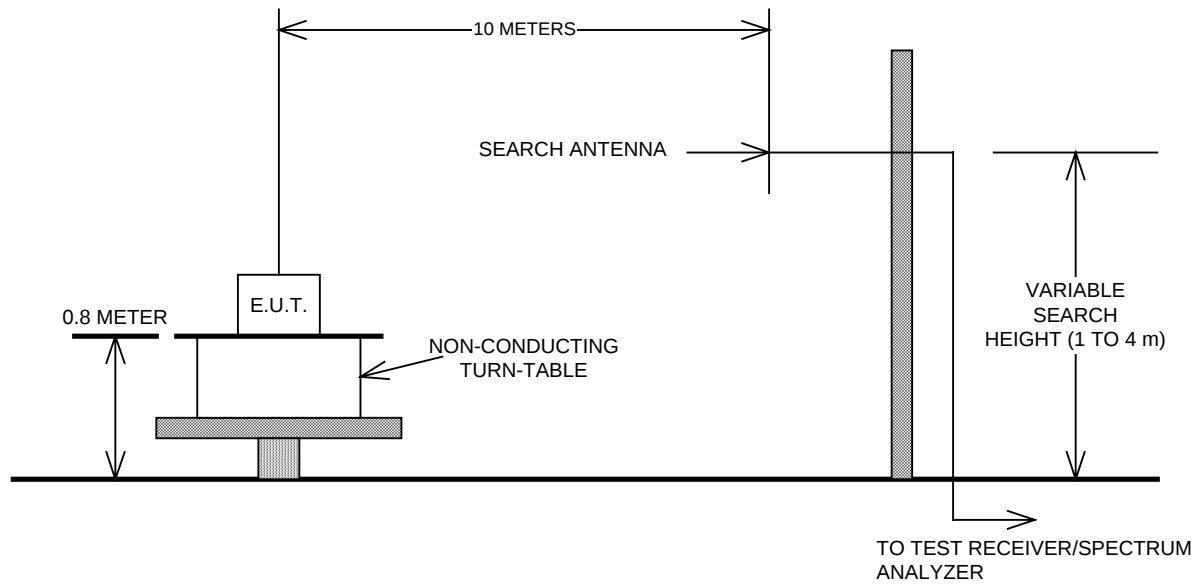
Section 8. Block Diagrams

Conducted Emissions:



Radiated Prescan:



*EQUIPMENT: NT 132 / 315 FTT READER***Outdoor Test Site for Radiated Emissions:**

The spectrum was scanned per CFR 47, Part 15, Subpart A, Paragraph Number 15.33.

EQUIPMENT: NT 132 / 315 FTT READER

Section 9. Test Equipment List

The listing below indicates the test equipment utilized for the test (s). Calibration interval on all items is typically 12 months from the calibration date shown.

<u>KTL ID</u>	<u>Nomenclature</u>	<u>Manufacturer Model Number</u>	<u>Serial Number</u>	<u>Calibration Date</u>
C4C	C O.A.T.S. Cable Set			07/27/99
C66	RG223 Cable (10 meter)			08/07/98
C79	RG223 Cable (12.0 meters)			08/07/99
CF32	Cable (1 meter)			01/29/99
CF33	Cable (4.6 meter)			09/22/98
099	Receiver	Polarad ESH2	879342/005	07/06/99
181	Limiter	Fischer FCC-45013-1.2	NSN	02/05/99
213	LISN (10 kHz – 100 MHz)	Schwarzbeck 8120	8120350	11/04/98
398	Preamplifier, 25dB (30 MHz - 1.5 GHz)	ICC LNA25	398	06/18/98
494	Horn Antenna	A.H. Systems SAS-200/571	162	CBU
G1504	Limiter	Fischer FCC-45013-1.2	184	02/05/99
G1709	High Pass Filter	Solar 7930-5.0	197	11/16/98
G2021	Biconical Antenna (20 MHz – 230 MHz)	SAS-200/540 2052	496	01/21/99
G2026	Antenna, LP	A.H. Systems SAS-200/510	121	01/25/99
G2037	Active Monopole Antenna	A.H. Systems SAS 200/550-1	718	08/27/98
G2230	RF Amplifier	ICC LN1-5	421	04/26/99
G2407	Receiver (20-1000 MHz)	Rhode & Schwarz ESVS 30	843710/0001	04/01/99
G2619	Spectrum Analyzer (10 kHz - 3.5 GHz)	Advantest R4131D	00350640	11/04/98
G2624	Spectrum Analyzer	Hewlett Packard 8563E	3551A04428	10/05/98

*EQUIPMENT: NT 132 / 315 FTT READER***Test Equipment List (Continued):**

The listing below indicates the test equipment utilized for the test (s). Calibration interval on all items is typically 12 months from the calibration date shown.

<u>KTL ID</u>	<u>Nomenclature</u>	<u>Manufacturer Model Number</u>	<u>Serial Number</u>	<u>Calibration Date</u>
		LAB # 4 (INDOOR)		
		ANECHOIC CHAMBER		
	Antenna Tripod	Polarad HFU-2		CNR
		SITE C O.A.T.S. (OPEN AREA TEST SITE) 30 Meter Site		
	Turntable Flush Mounted, Metal Covered, 12 Foot	A.H. Systems (Automated)		CNR
	Antenna Mast, 5 Foot	ICC (Automated)		CNR

Calibration interval on all items is typically 12 months from the calibration date shown. Where relevant, measuring equipment is subjected to in-service checks between testing. Should any measurement equipment be utilized beyond its scheduled calibration date, the measuring equipment is subjected to in-service checks prior to use. KTL shall notify clients promptly, in writing, of identification of defective measuring equipment that casts doubt on the validity of results given in this report.

Legend:

CNR Calibration not required
N/A Not applicable
CBU Calibrated before use