

KTL Dallas, Inc.

Safety - EMC - Telecom - ISO Guide 25

ENGINEERING TEST REPORT

ON

MODEL: NEUROTAG 3.1

IN ACCORDANCE WITH:

CFR 47, PART 15, SUBPART B, CLASS A & SUBPART C

REPORT NO.: 8L0011EUS

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: NEUROTAG 3.1

Section 1. Summary of Test Results

General:

All measurements are traceable to national standards.

These tests are 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 15.209 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	N/A*
Radiated Emissions	15.109	Complies

*The E.U.T. is dc powered; therefore, conducted emissions testing is not required.

Abstract (Subpart C):

Name Of Test	Paragraph No.	Results
Conducted Emissions	15.207	N/A*
Radiated Emissions	15.209	Complies

*The E.U.T. is dc powered; therefore, conducted emissions testing is not required.

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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 15.209 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: **NONE.**

NVLAP LAB CODE: 100426-0

TESTED BY: Mike Sundstrom DATE: 04/22/99
Mike Sundstrom, Senior EMC Technician

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

EQUIPMENT: NEUROTAG 3.1

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

Manufacturer: Axxess, Inc.

Model No.: Neurotag 3.1

Serial No.: 36273



Production Unit



Pre-Production Unit

The E.U.T. was received on March 23, 1999, in good condition.

Description of E.U.T.:

The E.U.T. is a printed circuit board with circuit components mounted in ABS plastic case and plotted. The Tag is for receiving information and transmitting data to the reader.

Clock, Oscillator, Highest Frequencies Utilized:

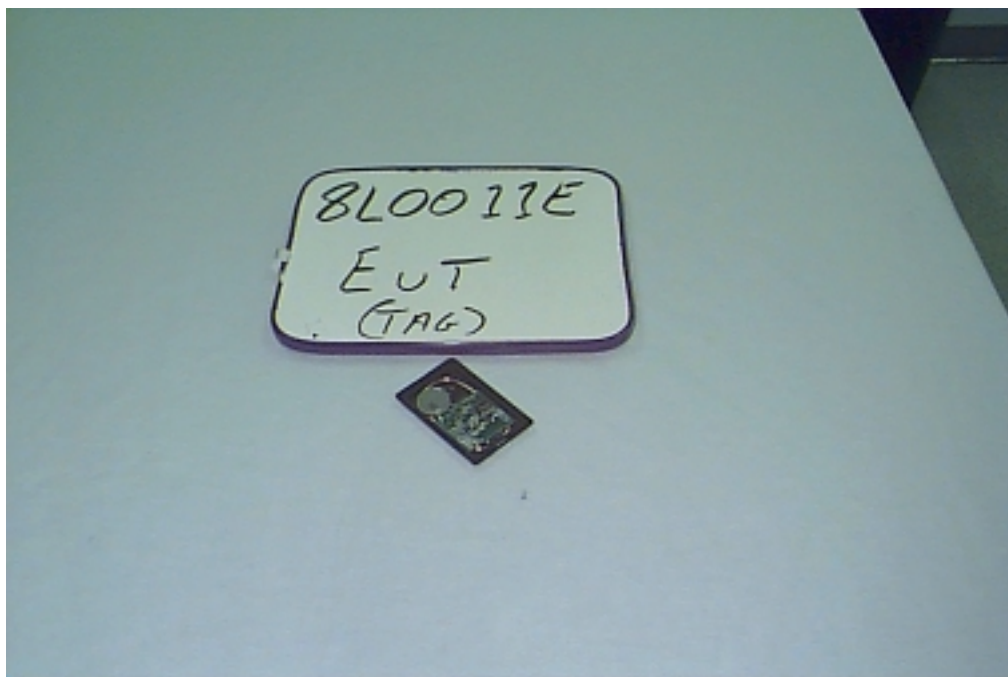
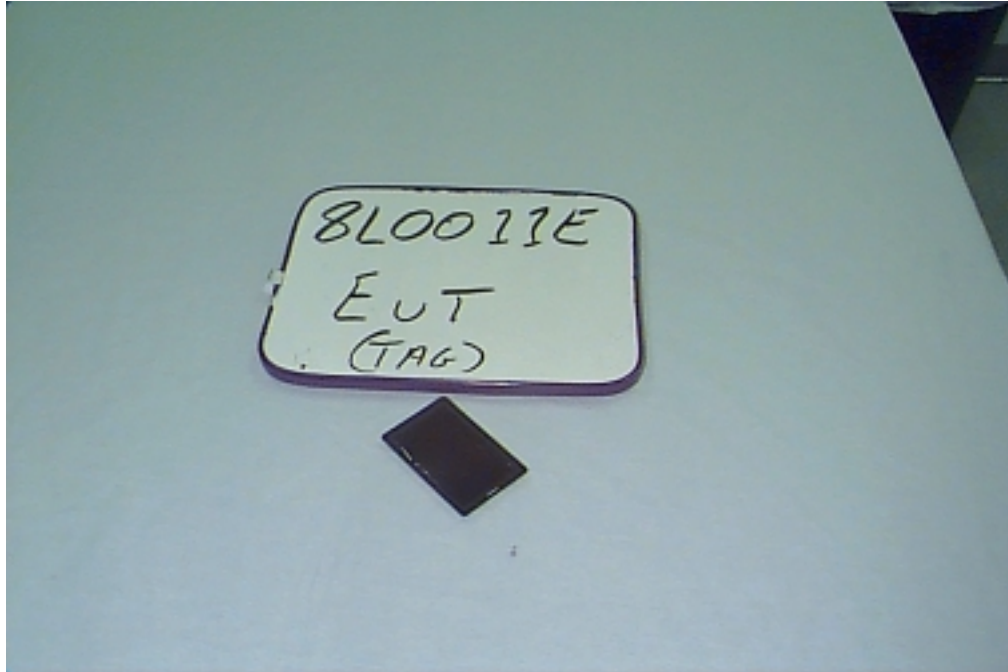
- (1) 5 MHz
- (2) 132 kHz (RX)
- (3) 315 MHz (TX)

Modifications Incorporated in E.U.T.:

The E.U.T. has not been modified from what is described by the brand name and unique type identification stated above.

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E.U.T. Photographs:



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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: NEUROTAG 3.1

Section 3. Equipment Configuration

Equipment Configuration List:

Item	Manufacturer	Description	FCC ID:	Model No.	Serial No.
(A)*	Acess, Inc.	Tag	None**	Neurotag 3.1	36273

*E.U.T.

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

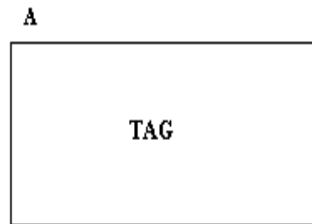
Inter-connection Cables:

Item	Description	Model No. / Manufacturer	Connectors	Length (m)	Shielded	
					Yes	No
(1)	None	None	None	N/A		

NOTE: Please see block diagram on the following page.

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



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Section 4. Notes

EQUIPMENT: NEUROTAG 3.1

Section 5. Powerline Conducted Emissions

N/A

The E.U.T. is dc powered; therefore, powerline conducted emissions testing is not required.

EQUIPMENT: NEUROTAG 3.1

Section 6. Radiated Emissions

TESTED BY: Mike Sundstrom

Test Conditions:

Test #	Date of Test	Test Voltage	Temperature	Humidity
RE 3B	04/21/99	115 Vac @ 60 Hz	20°C	55%
MW 1A	04/22/99	115 Vac @ 60 Hz	22°C	71%
RE4	04/22/99	115 Vac @ 60 Hz	21°C	68%
RE 3A	04/21/99	115 Vac @ 60 Hz	20°C	55%
MW 1	04/22/99	115 Vac @ 60 Hz	22°C	71%

Purpose:

The tests are 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 3B (30 MHz to 1 GHz):**

The worst case radiated emission is 49.4 dB μ V/m at 629.8 MHz at a distance of 3 meters in Horizontal polarization. This is 6.22 dB below the quasi-peak specification limit of 55.7 dB μ V/m.

Test # MW 1A (1 GHz to 5 GHz):

The worst case microwave radiation emission is 27 dB μ V/m at 1.257 GHz at a distance of 3 meters in Horizontal polarization. This is 32.5 dB below the average specification limit of 59.5 dB μ V/m.

Measurement Data:

See test data on pages 15 and 18.

*EQUIPMENT: NEUROTAG 3.1***Specification Limits (CFR 47, Subpart B, 15.109):**

Frequency (MHz)	Maximum Field Strength at 3m and 10m (Unintentional)			
	3 m ($\mu\text{V/m}$)	3 m (dB $\mu\text{V/m}$)	10 m ($\mu\text{V/m}$)	10 m (dB $\mu\text{V/m}$)
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 # RE4 and RE 3A (100 kHz to 1 GHz):***

The worst case radiated emission is 49.4 dB $\mu\text{V/m}$ at 629.8 MHz at a distance of 3 meters in Horizontal polarization. This is 6.17 dB below the quasi-peak specification limit of 55.6 dB $\mu\text{V/m}$.

Test # MW 1 (1 GHz to 5 GHz):

The worst case microwave radiation emission is 27 dB $\mu\text{V/m}$ at 1.257 GHz at a distance of 3 meters in Horizontal polarization. This is 28.65 dB below the average specification limit of 55.65 dB $\mu\text{V/m}$.

Measurement Data:

See test data on pages 20, 21 and 24.

EQUIPMENT: NEUROTAG 3.1

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

Frequency (MHz)	Maximum Field Strength (Intentional)	
	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	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 (MHz)	Maximum Field Strength at 3 m (Intentional)			
	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(a).

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: NEUROTAG 3.1

Test Data - Radiated Emissions Test # RE 3B (Subpart B):

CLIENT NAME:		AXCESS				W.O.#: 8L0011E		DATE:		04/21/99				
EUT MODEL:		NT 132 / 315 Reader				SERIAL #:		0101099017		TIME:		0700		
EUT CONFIG.:		ON WITH TAG [Tag 2# 51110]						TECH.:		M.SUNDSTROM				
TEST SPECIFICATION:		FCC A RAD 3m						TEST NUMBER:		RE 3B				
ROD ANT. #:		CABLE #:		2B		DETECT. TYPE:		PEAK		LOCATION:		B OATS		
BICON ANT. #:		2013		PREAMP. #:		401		RES. BW (kHz):		100		DISTANCE (m):	3	
LOG ANT. #:		2027		LIMITER#		181		VIDEO BW (kHz):		100		EUT VOLTAGE:		115 VAC
HORN ANT. #:				ATTEN.#:		N/A		TEMP. (deg. C):		20		EUT FREQ. (Hz):		60
DIPOLE ANT #:				DETECTOR#:		2619		HUMIDITY (%):		55		PHOTO ID:		8L0011E RE 3B 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			
33.0	V	0.0	41.0	11.6	1.9	24.6	29.8	49.5	-19.68	Pass				
49.8	V	0.0	43.0	12.4	1.9	24.6	32.6	49.5	-16.88	Pass				
64.8	V	0.0	47.0	11.1	2.5	24.6	36.0	49.5	-13.5	Pass				
69.8	V	0.0	54.0	8.9	2.5	24.6	40.8	49.5	-8.65	Pass				
74.8	V	0.0	52.0	7.9	2.5	24.6	37.8	49.5	-11.7	Pass				
79.8	V	0.0	49.0	7.1	2.5	24.6	34.0	49.5	-15.5	Pass				
84.8	V	0.0	44.0	9.7	2.5	24.6	31.7	49.5	-17.82	Pass				
130.0	V	0.0	34.0	11.7	3.3	24.6	24.4	54.0	-29.62	Pass				
135.0	V	0.0	36.0	12.0	3.3	24.6	26.7	54.0	-27.32	Pass				
140.0	V	0.0	40.0	12.3	3.3	24.6	31.0	54.0	-23.02	Pass				
150.0	V	0.0	39.0	13.2	3.3	24.6	30.9	54.0	-23.12	Pass				
30.1	H	0.0	34.0	11.8	1.9	24.6	23.1	49.5	-26.44	Pass				
39.1	H	0.0	36.0	11.5	1.9	24.6	24.7	49.5	-24.76	Pass				
50.0	H	0.0	39.0	12.5	2.5	24.6	29.4	49.5	-20.08	Pass				
65.0	H	0.0	39.0	10.7	2.5	24.6	27.6	49.5	-21.93	Pass				
70.0	H	0.0	44.0	8.5	2.5	24.6	30.4	49.5	-19.06	Pass				
75.0	H	0.0	46.0	7.7	2.5	24.6	31.6	49.5	-17.86	Pass				
85.0	H	0.0	37.0	10.4	2.5	24.6	25.4	49.5	-24.11	Pass				
110.0	H	0.0	33.0	15.2	2.9	24.6	26.5	54.0	-27.46	Pass				
115.0	H	0.0	32.0	14.8	2.9	24.6	25.1	54.0	-28.91	Pass				
120.0	H	0.0	34.0	14.3	2.9	24.6	26.6	54.0	-27.36	Pass				
130.0	H	0.0	40.0	11.7	3.3	24.6	30.4	54.0	-23.62	Pass				
140.0	H	0.0	39.0	12.3	3.3	24.6	30.0	54.0	-24.02	Pass				
150.0	H	0.0	38.0	13.2	3.3	24.6	29.9	54.0	-24.12	Pass				
230.0	H	0.0	37.0	15.1	4.1	24.6	31.6	56.9	-25.32	Pass				
235.0	H	0.0	37.0	15.5	4.1	24.6	32.1	56.9	-24.85	Pass				
240.0	H	0.0	32.0	16.0	4.1	24.6	27.5	56.9	-29.37	Pass				
											Added ferrite P# 2643801002 to Wiegad line			
70.0	V	0.0	42.0	8.5	2.5	24.6	28.4	49.5	-21.06	Pass				
33.0	V	0.0	43.0	11.6	1.9	24.6	31.8	49.5	-17.68	Pass				
49.8	V	0.0	37.0	12.4	1.9	24.6	26.6	49.5	-22.88	Pass				
64.8	V	0.0	40.0	11.1	2.5	24.6	29.0	49.5	-20.5	Pass				
69.8	V	0.0	42.0	8.9	2.5	24.6	28.8	49.5	-20.65	Pass				
74.8	V	0.0	42.0	7.9	2.5	24.6	27.8	49.5	-21.7	Pass				
79.8	V	0.0	42.0	7.1	2.5	24.6	27.0	49.5	-22.5	Pass				
84.8	V	0.0	43.0	9.7	2.5	24.6	30.7	49.5	-18.82	Pass				
130.0	V	0.0	36.0	11.7	3.3	24.6	26.4	54.0	-27.62	Pass				
135.0	V	0.0	31.0	12.0	3.3	24.6	21.7	54.0	-32.32	Pass				
140.0	V	0.0	32.0	12.3	3.3	24.6	23.0	54.0	-31.02	Pass				
150.0	V	0.0	32.0	13.2	3.3	24.6	23.9	54.0	-30.12	Pass				
30.1	H	0.0	36.0	11.8	1.9	24.6	25.1	49.5	-24.44	Pass				
39.1	H	0.0	38.0	11.5	1.9	24.6	26.7	49.5	-22.76	Pass				

EQUIPMENT: NEUROTAG 3.1

Test Data - Radiated Emissions Test # RE 3B (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
50.0	H	0.0	32.0	12.5	2.5	24.6	22.4	49.5	-27.08	Pass	
65.0	H	0.0	38.0	10.7	2.5	24.6	26.6	49.5	-22.93	Pass	
70.0	H	0.0	40.0	8.5	2.5	24.6	26.4	49.5	-23.06	Pass	
75.0	H	0.0	41.0	7.7	2.5	24.6	26.6	49.5	-22.86	Pass	
85.0	H	0.0	35.0	10.4	2.5	24.6	23.4	49.5	-26.11	Pass	
110.0	H	0.0	33.0	15.2	2.9	24.6	26.5	54.0	-27.46	Pass	
115.0	H	0.0	31.0	14.8	2.9	24.6	24.1	54.0	-29.91	Pass	
120.0	H	0.0	33.0	14.3	2.9	24.6	25.6	54.0	-28.36	Pass	
130.0	H	0.0	37.0	11.7	3.3	24.6	27.4	54.0	-26.62	Pass	
140.0	H	0.0	33.0	12.3	3.3	24.6	24.0	54.0	-30.02	Pass	
150.0	H	0.0	33.0	13.2	3.3	24.6	24.9	54.0	-29.12	Pass	
230.0	H	0.0	30.0	15.1	4.1	24.6	24.6	56.9	-32.32	Pass	
235.0	H	0.0	26.0	15.5	4.1	24.6	21.1	56.9	-35.85	Pass	NOISE FLOOR
240.0	H	0.0	29.0	16.0	4.1	24.6	24.5	56.9	-32.37	Pass	
314.9	V	0.0	66.0	14.0	5.1	24.7	60.4	N/A	N/A	N/A	[Tag 1 TX]
629.8	V	0.0	44.0	20.3	7.2	25.1	46.4	55.7	-9.22	Pass	[Tag 1 2ND]
944.9	V	0.0	26.0	24.0	9.1	24.9	34.2	55.7	-21.41	Pass	[Tag 1 3RD]
314.9	H	0.0	68.0	14.0	5.1	24.7	62.4	N/A	N/A	N/A	[Tag 1 TX]
629.8	H	0.0	50.0	20.3	7.2	25.1	52.4	55.7	-3.22	Pass	[Tag 1 2ND]
629.8	H	0.0	47.0	20.3	7.2	25.1	49.4	55.7	-6.22	Pass	QP [Tag 1 2ND]
629.8	H	0.0	50.0	20.3	7.2	25.1	52.4	55.7	-3.22	Pass	[Tag 2]
629.8	H	0.0	47.0	20.3	7.2	25.1	49.4	55.7	-6.22	Pass	QP [Tag 2]
944.8	H	0.0	37.0	24.0	9.1	24.9	45.2	55.7	-10.41	Pass	[Tag 1 3RD]
											Scanned 30MHz to 1GHz

EQUIPMENT: NEUROTAG 3.1

Radiated Emissions Photographs for Test # RE 3B (Subpart B):

FRONT VIEW:



REAR VIEW:



The test setup for Test # RE 3B was identical to the test setup in Test # RE 3.

EQUIPMENT: NEUROTAG 3.1

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

FRONT VIEW:



REAR VIEW:



The test setup for Test # MW 1A was identical to the test setup for Test # MW 1.

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Test Data - Radiated Emissions Test # RE4 (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> 8L0011E </u>		Date:	<u> 04/22/99 </u>	
EUT:	<u> NT 132/315 Reader </u>		S/N:	<u> 0101099017 </u>		Specification:	<u> 15.231 / 15.209 </u>	
Tech:	<u> M.Sundstrom </u>		Test #:	<u> RE4 </u>		Lab:	<u> ANC 2 </u> Photo ID: <u> 8L0011 RE4 </u>	
Equipment Used:	<u> 099,c60,c45,g2037 </u>					Antenna Distance:	<u> 3 </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> 68 </u> %			<u> </u> 230 V.A.C.		<u> </u> 50 Hz	<u> </u> 3 Phase	
Atmospheric Pressure:	<u> 1008 </u> mbar			<u> </u> Other <u> </u>				
Freq. (MHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	RF Gain (dB)	Corrected Reading (dBuV)	Spec.limit (dBuV) FCC	Pol.	Comments: VR = Vertical Rod Antenna
0.1315	13	-2.4	0	0	10.6	105.2	VR	
0.263	11	-2.4	0	0	8.6	99.21	VR	
2.894	16	-2.4	0	0	13.6	69.54	VR	
3.026	22	-2.4	0	0	19.6	69.54	VR	
3.157	32	-2.4	0	0	29.6	69.54	VR	
3.289	28	-2.4	0	0	25.6	69.54	VR	
20.131	21	-2.4	0	0	18.6	69.54	VR	
20.394	22	-2.4	0	0	19.6	69.54	VR	
21.447	22	-2.4	0	0	19.6	69.54	VR	
27.368	26	-2.4	0	0	23.6	69.54	VR	
27.63	28	-2.4	0	0	25.6	69.54	VR	
27.762	30	-2.4	0	0	27.6	69.54	VR	
27.894	31	-2.4	0	0	28.6	69.54	VR	
28.026	32	-2.4	0	0	29.6	69.54	VR	
28.157	33	-2.4	0	0	30.6	69.54	VR	
28.946	34	-2.4	0	0	31.6	69.54	VR	
29.99	33	-2.4	0	0	30.6	69.54	VR	
Scanned 0.1MHz to 30MHz								

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

EQUIPMENT: NEUROTAG 3.1

Test Data - Radiated Emissions Test # RE 3A (Subpart C):

CLIENT NAME:	ACCESS		W.O.#:	8L0011E	DATE:	04/21/99	
EUT MODEL:	NT 132 / 315 Reader		SERIAL #:	0101099017	TIME:	0700	
EUT CONFIG:	ON WITH TAG [Tag 1# 36273] [Tag 2# 51110]				TECH:	M.SUNDSTROM	
TEST SPECIFICATION:	FCC 15.231 3M (Tx 315 MHz)			TEST NUMBER:	RE 3A		
ROD ANT. #:	CABLE #:	2B	DETECT. TYPE:	PEAK	LOCATION:	B OATS	
BICON ANT. #:	2013	PREAMP. #:	401	RES. BW (kHz):	100	DISTANCE (m):	3
LOG ANT. #:	2027	LIMITER#:	181	VIDEO BW (kHz):	100	EUT VOLTAGE:	115 VAC
HORN ANT. #:		ATTEN.#:	N/A	TEMP. (deg. C):	20	EUT FREQ. (Hz):	60
DIPOLE ANT #:		DETECTOR#:	2619	HUMIDITY (%):	55	PHOTO ID:	8L0011E RE 3A 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
33.0	V	0.0	41.0	11.6	1.9	24.6	29.8	55.6	-25.78	Pass	
49.8	V	0.0	43.0	12.4	1.9	24.6	32.6	55.6	-22.98	Pass	
64.8	V	0.0	47.0	11.1	2.5	24.6	36.0	55.6	-19.6	Pass	
69.8	V	0.0	54.0	8.9	2.5	24.6	40.8	55.6	-14.75	Pass	
74.8	V	0.0	52.0	7.9	2.5	24.6	37.8	55.6	-17.8	Pass	
79.8	V	0.0	49.0	7.1	2.5	24.6	34.0	55.6	-21.6	Pass	
84.8	V	0.0	44.0	9.7	2.5	24.6	31.7	55.6	-23.92	Pass	
130.0	V	0.0	34.0	11.7	3.3	24.6	24.4	55.6	-31.22	Pass	
135.0	V	0.0	36.0	12.0	3.3	24.6	26.7	55.6	-28.92	Pass	
140.0	V	0.0	40.0	12.3	3.3	24.6	31.0	55.6	-24.62	Pass	
150.0	V	0.0	39.0	13.2	3.3	24.6	30.9	55.6	-24.72	Pass	
30.1	H	0.0	34.0	11.8	1.9	24.6	23.1	55.6	-32.54	Pass	
39.1	H	0.0	36.0	11.5	1.9	24.6	24.7	55.6	-30.86	Pass	
50.0	H	0.0	39.0	12.5	2.5	24.6	29.4	55.6	-26.18	Pass	
65.0	H	0.0	39.0	10.7	2.5	24.6	27.6	55.6	-28.03	Pass	
70.0	H	0.0	44.0	8.5	2.5	24.6	30.4	55.6	-25.16	Pass	
75.0	H	0.0	46.0	7.7	2.5	24.6	31.6	55.6	-23.96	Pass	
85.0	H	0.0	37.0	10.4	2.5	24.6	25.4	55.6	-30.21	Pass	
110.0	H	0.0	33.0	15.2	2.9	24.6	26.5	55.6	-29.06	Pass	
115.0	H	0.0	32.0	14.8	2.9	24.6	25.1	55.6	-30.51	Pass	
120.0	H	0.0	34.0	14.3	2.9	24.6	26.6	55.6	-28.96	Pass	
130.0	H	0.0	40.0	11.7	3.3	24.6	30.4	55.6	-25.22	Pass	
140.0	H	0.0	39.0	12.3	3.3	24.6	30.0	55.6	-25.62	Pass	
150.0	H	0.0	38.0	13.2	3.3	24.6	29.9	55.6	-25.72	Pass	
230.0	H	0.0	37.0	15.1	4.1	24.6	31.6	55.6	-24.02	Pass	
235.0	H	0.0	37.0	15.5	4.1	24.6	32.1	55.6	-23.55	Pass	
240.0	H	0.0	32.0	16.0	4.1	24.6	27.5	55.6	-28.07	Pass	
											Added ferrite P# 2643801002 to Wiegad line
70.0	V	0.0	42.0	8.5	2.5	24.6	28.4	55.6	-27.16	Pass	
33.0	V	0.0	43.0	11.6	1.9	24.6	31.8	55.6	-23.78	Pass	
49.8	V	0.0	37.0	12.4	1.9	24.6	26.6	55.6	-28.98	Pass	
64.8	V	0.0	40.0	11.1	2.5	24.6	29.0	55.6	-26.6	Pass	
69.8	V	0.0	42.0	8.9	2.5	24.6	28.8	55.6	-26.75	Pass	
74.8	V	0.0	42.0	7.9	2.5	24.6	27.8	55.6	-27.8	Pass	
79.8	V	0.0	42.0	7.1	2.5	24.6	27.0	55.6	-28.6	Pass	
84.8	V	0.0	43.0	9.7	2.5	24.6	30.7	55.6	-24.92	Pass	
130.0	V	0.0	36.0	11.7	3.3	24.6	26.4	55.6	-29.22	Pass	
135.0	V	0.0	31.0	12.0	3.3	24.6	21.7	55.6	-33.92	Pass	
140.0	V	0.0	32.0	12.3	3.3	24.6	23.0	55.6	-32.62	Pass	
150.0	V	0.0	32.0	13.2	3.3	24.6	23.9	55.6	-31.72	Pass	
30.1	H	0.0	36.0	11.8	1.9	24.6	25.1	55.6	-30.54	Pass	
39.1	H	0.0	38.0	11.5	1.9	24.6	26.7	55.6	-28.86	Pass	
50.0	H	0.0	32.0	12.5	2.5	24.6	22.4	55.6	-33.18	Pass	
65.0	H	0.0	38.0	10.7	2.5	24.6	26.6	55.6	-29.03	Pass	
70.0	H	0.0	40.0	8.5	2.5	24.6	26.4	55.6	-29.16	Pass	
75.0	H	0.0	41.0	7.7	2.5	24.6	26.6	55.6	-28.96	Pass	
85.0	H	0.0	35.0	10.4	2.5	24.6	23.4	55.6	-32.21	Pass	
110.0	H	0.0	33.0	15.2	2.9	24.6	26.5	55.6	-29.06	Pass	
115.0	H	0.0	31.0	14.8	2.9	24.6	24.1	55.6	-31.51	Pass	
120.0	H	0.0	33.0	14.3	2.9	24.6	25.6	55.6	-29.96	Pass	

EQUIPMENT: NEUROTAG 3.1

Test Data - Radiated Emissions Test # RE 3A (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
130.0	H	0.0	37.0	11.7	3.3	24.6	27.4	55.6	-28.22	Pass	
140.0	H	0.0	33.0	12.3	3.3	24.6	24.0	55.6	-31.62	Pass	
150.0	H	0.0	33.0	13.2	3.3	24.6	24.9	55.6	-30.72	Pass	
230.0	H	0.0	30.0	15.1	4.1	24.6	24.6	55.6	-31.02	Pass	
235.0	H	0.0	26.0	15.5	4.1	24.6	21.1	55.6	-34.55	Pass	NOISE FLOOR
240.0	H	0.0	29.0	16.0	4.1	24.6	24.5	55.6	-31.07	Pass	
314.9	V	0.0	66.0	14.0	5.1	24.7	60.4	75.6	-15.24	Pass	[Tag 1 TX]
629.8	V	0.0	44.0	20.3	7.2	25.1	46.4	55.6	-9.17	Pass	[Tag 1 2ND]
944.9	V	0.0	26.0	24.0	9.1	24.9	34.2	55.6	-21.36	Pass	[Tag 1 3RD]
314.9	H	0.0	68.0	14.0	5.1	24.7	62.4	75.6	-13.24	Pass	[Tag 1 TX]
629.8	H	0.0	50.0	20.3	7.2	25.1	52.4	55.6	-3.17	Pass	[Tag 1 2ND]
629.8	H	0.0	47.0	20.3	7.2	25.1	49.4	55.6	-6.17	Pass	QP [Tag 1 2ND]
629.8	H	0.0	50.0	20.3	7.2	25.1	52.4	55.6	-3.17	Pass	[Tag 2]
629.8	H	0.0	47.0	20.3	7.2	25.1	49.4	55.6	-6.17	Pass	QP [Tag 2]
944.8	H	0.0	37.0	24.0	9.1	24.9	45.2	55.6	-10.36	Pass	[Tag 1 3RD]
											Scanned 30MHz to 1GHz

EQUIPMENT: NEUROTAG 3.1

Radiated Emissions Photographs for Test # RE4 and Test # RE 3A (Subpart C):

FRONT VIEW:



REAR VIEW:



The test set-up for Test # RE4 and Test # RE 3A was identical to the test set-up for Test # RE 3.

EQUIPMENT: NEUROTAG 3.1

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

Microwave Radiated Emissions Data									
Complete <u>X</u>		Preliminary <u> </u>			Page <u>1</u> of <u>1</u>				
Client: <u>Axcess</u>				Test #: <u>MW 1</u>		W.O.#: <u>8L0011E</u>			
EUT: <u>NT 132 / 315 Reader</u>				S/N: <u>0101099017</u>		Photo ID: <u>8L0011EMW1</u>			
Technician: <u>M.Sundstrom</u>		Specification: <u>15.231</u>		Lab: <u>B OATS</u>		Date: <u>04/22/99</u>			
Equipment Used: <u>G2616,CF26,421,CF34,216</u>									
Configuration: <u>On with Tag (tag # 36273)</u>									
Bandwidth: <u>1 MHz</u>		Video Bandwidth: <u>Narrow</u>		Antenna Distance <u>3</u> m		Detector:			
Climatic Conditions:		EUT Power: <u>x</u> 115 V.A.C.		<u>x</u> 60 Hz		<u> </u> Peak			
Temperature: <u>22</u> C		<u> </u> 208 V.A.C.		<u> </u> 50 Hz		<u>x</u> Average			
Relative Humidity: <u>71</u> %		<u> </u> 230 V.A.C.		<u> </u> Other <u> </u>		<u>x</u> 1 Phase		<u> </u> 3 Phase	
Atmospheric Pressure: <u>1005</u> mbar		<u> </u> Other <u> </u>		<u> </u> Other <u> </u>		<u>x</u> 1 Phase		<u> </u> 3 Phase	
Freq. (GHz)	Meter Reading (dBm)	Antenna Factor (dB)	Cable Loss (dB)	RF Gain (dB)	Conver. Factor	Corrected Reading (dBuV/m)	Spec. Limit (dBuV/m)	Pol.	Comments:
1.093	-58	24.2	1.31	22.93	107	52	55.65	V	AMBIENT
1.273*	-84	24.5	1.66	22.81	107	26	55.65	V	
3	-83	30.4	2.48	21.9	107	35	55.65	V	Noise Floor
4.5	-83	32.4	3.16	20.43	107	39	55.65	V	Noise Floor
1.257*	-83	24.5	1.66	22.81	107	27	55.65	H	
1.588*	-84	24.7	2.1	22.49	107	27	55.65	H	
4	-83	32.5	2.76	19.75	107	40	55.65	H	Noise Floor
Scanned 1GHz to 5GHz									
(*) denotes a spur / harmonic									

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EQUIPMENT: NEUROTAG 3.1

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

FRONT VIEW:



REAR VIEW:



EQUIPMENT: NEUROTAG 3.1

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:

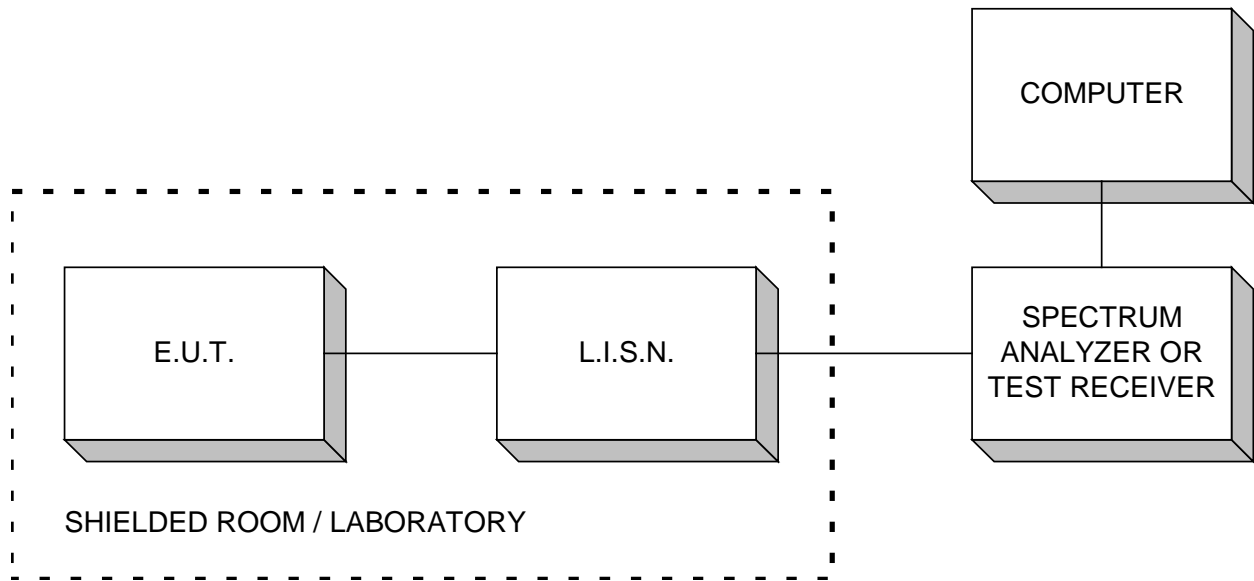
Emissions are measured at a distance of 10 meters and corrected for antenna factor and cable loss.

- 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

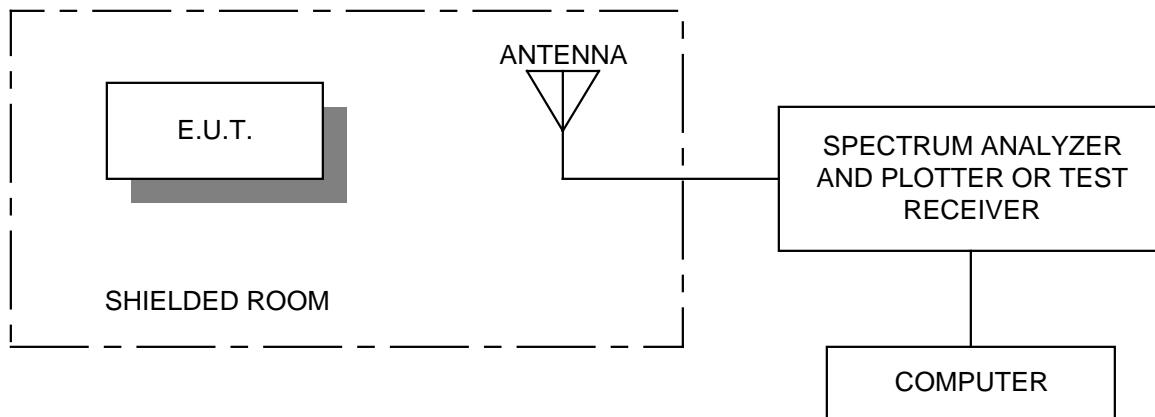
EQUIPMENT: NEUROTAG 3.1

Section 8. Block Diagrams

Conducted Emissions:

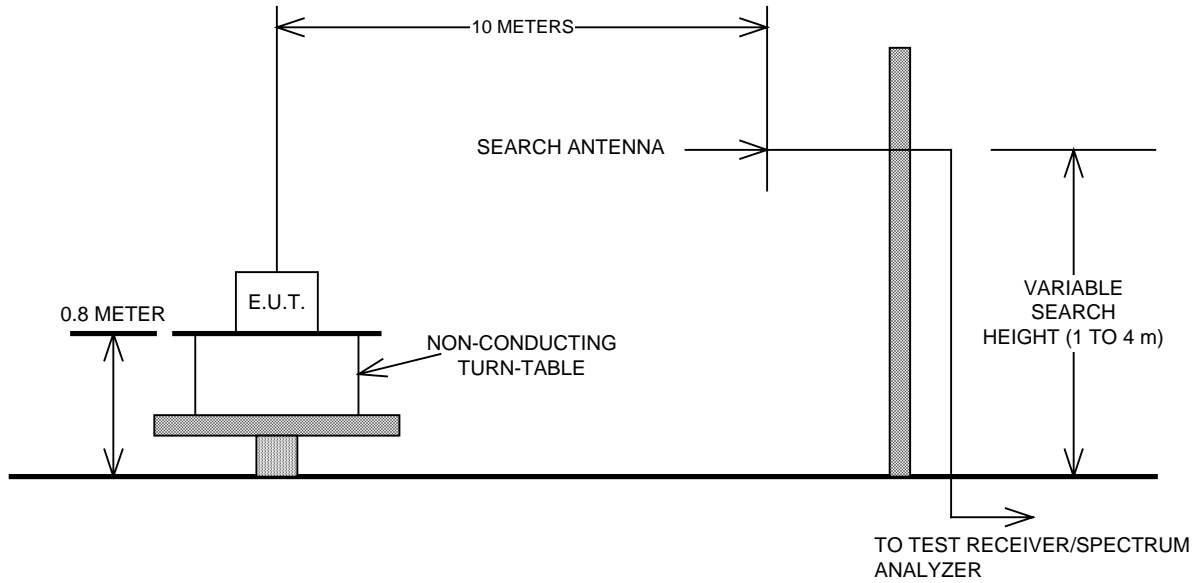


Radiated Prescan:



EQUIPMENT: NEUROTAG 3.1

Outdoor Test Site for Radiated Emissions:



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

EQUIPMENT: NEUROTAG 3.1

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>KTLID</u>	<u>Nomenclature</u>	<u>Manufacturer Model Number</u>	<u>Serial Number</u>	<u>Calibration Date</u>
C2B	B O.A.T.S. Cable Set			12/07/98
C45	RG223 Cable (8.5 meters)			08/10/98
C60	RG223 Cable (3.4 meters)			08/7/98
CF26	Semi Flex Cable (1 meter)			01/13/99
CF34	Storm Cable (3.65 meter)			04/01/99
099	Receiver	Polarad ESH2	879342/005	07/06/98
181	Limitter	Fischer FCC-45013-1.2	NSN	02/05/99
216	Horn Antenna (1GHz - 18 GHz)	EMCO 3115	8812-3035	05/19/98
401	Low Noise Preamplifier (1 MHz - 1 GHz)	RF Consultants LNA-14	020	08/13/98
421	Low Noise Preamplifier (1 MHz - 1 GHz)	International Compliance Corporation		04/26/99
G2013	Antenna, Biconical	Emco 3104	3243	01/21/99
G2027	Antenna, LP	Emco 3146	1349	01/26/99
G2037	Active Monopole Antenna	A.H. Systems SAS-200/550-1	718	08/27/98
G2616	Spectrum Analyzer	Tektronix 492P	B043496	11/11/98
G2619	Spectrum Analyzer	Advantest R4131D	00350640	11/04/98
G2626	Spectrum Analyzer	Hewlett Packard 8566B	2618A02843	04/21/99
		SITE B O.A.T.S. (OPEN AREA TEST SITE) 10 Meter Site		
	Turntable Flush Mounted, Metal Covered, 8 Foot	RF Consultants Model AT-8 (Automated)		CNR
	Antenna Mast, 4 Meter	ICC (Automated)		CNR

EQUIPMENT: NEUROTAG 3.1

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>KTLID</u>	<u>Nomenclature</u>	<u>Manufacturer Model Number</u>	<u>Serial Number</u>	<u>Calibration Date</u>
		ANECHOIC CHAMBER # 2		
	Antenna Tripod	Polarad HFU-2		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