TEST RESULT SUMMARY

FCC PART 15 Subpart C
Section 15.249

MANUFACTURER'S NAME	Analog Technologies Corporation
NAME OF EQUIPMENT	Wireless Signal Processing Unit (SPU) - Wireless Pool Leak Detector Transmitter
MODEL NUMBER	**LT2200 (P/N LT2SPU)**
MANUFACTURER'S ADDRESS	11441 Rupp Drive Burnsville MN 55345
TEST REPORT NUMBER	W1064
TEST DATE	02 & 14 February 2001

According to testing performed at TÜV Product Service Inc, the above-mentioned unit is in compliance with the electromagnetic compatibility requirements defined in FCC Part 15 Subpart C Section 15.249.

It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics. Any modifications necessary for compliance made during testing on the above mentioned date(s) must be implemented in all production units for compliance to be maintained.

TÜV Product Service Inc, as an independent testing laboratory, declares that the equipment tested as specified above conforms to the requirements of FCC Part 15 Subpart C Section 15.249.

Date: 08 March 2001

Location: Taylors Falls MN USA

J. C. Sausen
Test Engineer

J. T. Schneider
Chief Engineer

Not Transferable

EMC EMISSION - T E S T R E P O R T

Test Report File No.	:	**WC1G106401**	Date of issue:	08 March 2001

Model / Serial No.	:	**LT2200 (P/N LT2SPU) / 001**
Product Type	:	Wireless Signal Processing Unit (SPU) - Wireless Pool Leak Detector Transmitter
Applicant	:	Analog Technologies Corporation
Manufacturer	:	Analog Technologies Corporation
License holder	:	Analog Technologies Corporation
Address	:	11441 Rupp Drive
	:	Burnsville MN 55345
Test Result	:	■ **Positive** ☐ **Negative**
Test Project Number Reference(s)	:	**W1064**
Total pages including Appendices		26

TÜV Product Service Inc is a subcontractor to TÜV Product Service, GmbH according to the principles outlined in ISO/IEC Guide 25 and EN 45001.

TÜV Product Service Inc reports apply only to the specific samples tested under stated test conditions. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. TÜV Product Service Inc shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV Product Service Inc issued reports.

This report is the confidential property of the client. As a mutual protection to our clients, the public and ourselves, extracts from the test report shall not be reproduced except in full without our written approval. This report shall not be used by the client to claim product endorsement by NVLAP or any agency of the US government.

TÜV Product Service Inc and its professional staff hold government and professional organization certifications and are members of AAMI, ACIL, AEA, ANSI, IEEE, NVLAP, and VCCI

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D I R E C T O R Y - EMISSIONS

TÜV PRODUCT SERVICE INC 19333 Wild Mountain Road Taylors Falls MN 55084-1758 Tel: 651 638 0297 Fax: 651 638 0298 Rev.No 1.0

EMISSIONS TEST REGULATIONS :

The emissions tests were performed according to following regulations:

☐ - EN 50081-1 / 1991

☐ - EN 55011 / 1991 ☐ - Group 1 ☐ - Group 2
☐ - Class A ☐ - Class B

☐ - EN 55013 / 1990

☐ - EN 55014 / 1987 ☐ - Household appliances and similar
☐ - Portable tools
☐ - Semiconductor devices

☐ - EN 55014 / A2:1990

☐ - EN 55014 / 1993 ☐ - Household appliances and similar
☐ - Portable tools
☐ - Semiconductor devices

☐ - EN 55015 / 1987

☐ - EN 55015 / A1:1990

☐ - EN 55015 / 1993

☐ - EN 55022 / 1987 ☐ - Class A ☐ - Class B

☐ - EN 55022 / 1994 ☐ - Class A ☐ - Class B

☐ - BS

☐ - VCCI ☐ - Class A ☐ - Class B

■ - FCC Part 15 Subpart C Section 15.249

☐ - AS 3548 (1992) ☐ - Class A ☐ - Class B

☐ - CISPR 11 (1990) ☐ - Group 1 ☐ - Group 2
☐ - Class A ☐ - Class B

☐ - CISPR 22 (1993) ☐ - Class A ☐ - Class B

☐ - RSS-210 Issue 2 Rev. 1 Section 6.1.1 & 7.0

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Environmental conditions in the lab:

	Actual
Temperature	: 18 °C
Relative Humidity	: 24 %
Atmospheric pressure	: 99.5 kPa
Power supply system	: 18 VDC (2 9V Batteries)

Sign Explanations:

☐ - not applicable
■ - applicable

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Emissions Test Conditions: CONDUCTED EMISSIONS (Interference Voltage)

The *CONDUCTED EMISSIONS (INTERFERENCE VOLTAGE)* measurements were performed at the following test location:

■ - Test not applicable

☐ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
☐ - Oakwood Lab (Open Area Test Site)
☐ - Wild River Lab Screen Room
☐ - New Brighton Lab Shielded Room

Test equipment used :

Emissions Test Conditions: RADIATED EMISSIONS (Magnetic Field)

The *RADIATED EMISSIONS (MAGNETIC FIELD)* measurements were performed at the following test location:

■ - Test not applicable

☐ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
☐ - Oakwood Lab (Open Area Test Site)

at a test distance of :

☐ - 3 meters
☐ - 30 meters

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Emissions Test Conditions: RADIATED EMISSIONS (Electric Field)

The *RADIATED EMISSIONS (ELECTRIC FIELD)* measurements, in the frequency range of 30 MHz-1000 MHz, were tested in a horizontal and vertical polarization at the following test location :

☐ - Test not applicable

■ - Wild River Lab Large Test Site (Open Area Test Site) – NSA measurements made 7-00, due 7-01.
☐ - Wild River Lab Small Test Site (Open Area Test Site)
☐ - Oakwood Lab (Open Area Test Site)

at a test distance of :

■ - 3 meters
☐ - 10 meters
☐ - 30 meters

Test equipment used :

	TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
■ -	2543	ZHL-1042J	Mini-Circuits	Preamplifier	H072294-11	3-10-01
■ -	3202	EM-6917B	Electro-Metrics	Biconicalog Periodic	101	9-21-01
■ -	2865	11867A	Hewlett-Packard	Limiter	01972	3-06-01
■ -	2688	8566B	Hewlett-Packard	Spectrum Analyzer (Unit D)	2221A01596	12-04-01
■ -	2676	85662A	Hewlett-Packard	Analyzer Display (Unit D)	2152A03640	12-04-01
■ -	2682	85650A	Hewlett-Packard	Quasi-Peak Adapter (Unit D)	2811A01127	12-05-01

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST) and is calibrated annually.

Emissions Test Conditions: INTERFERENCE POWER

The *INTERFERENCE POWER* measurements were performed by using the absorbing clamp on the mains and interface cables in the frequency range 30 MHz - 300 MHz at the following test location :

■ - Test not applicable

☐ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
☐ - Oakwood Lab (Open Area Test Site)
☐ - Wild River Lab Screen Room
☐ - New Brighton Lab Shielded Room

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Emissions Test Conditions: RADIATED EMISSIONS (Electric Field)

The *EQUIVALENT RADIATED EMISSIONS* measurements in the frequency range 1 GHz - 10 GHz were performed in a horizontal and vertical polarization at the following test location :

■ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
☐ - Oakwood Lab (Open Area Test Site)
☐ - Wild River Lab Screen Room

at a test distance of:

☐ - 1 meters
■ - 3 meters
☐ - 10 meters

☐ - Test not applicable

Test equipment used :

	TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
■ -	2543	ZHL-1042J	Mini-Circuits	Preamplifier	H072294-11	3-10-01
■ -		AWT-18037	Avantek	Preamplifier	1001-9226	3-10-01
■ -		AFT-8434	Avantek	Preamplifier	9112 Z221	3-10-01
■ -	3202	EM-6917B	Electro-Metrics	Biconicalog Periodic	101	9-21-01
■ -	2865	11867A	Hewlett-Packard	Limiter	01972	3-06-01
■ -	2688	8566B	Hewlett-Packard	Spectrum Analyzer (Unit D)	2221A01596	12-04-01
■ -	2676	85662A	Hewlett-Packard	Analyzer Display (Unit D)	2152A03640	12-04-01
■ -	2682	85650A	Hewlett-Packard	Quasi-Peak Adapter (Unit D)	2811A01127	12-05-01
■ -	2075	3115	Electro-Mechanics (EMCO)	Ridge Guide Ant. 1-18 GHz	9001-3275	10-20-01

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST) and is calibrated annually.

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Equipment Under Test (EUT) Test Operation Mode - Emission tests :

The device under test was operated under the following conditions during emissions testing:

☐ - Standby

☐ - Test program (H - Pattern)

☐ - Test program (color bar)

☐ - Test program (customer specific)

☐ - Practice operation

☐ - Normal Operating Mode

■ - Rotate Switch to “LOW” to turn the unit on.

Configuration of the device under test:

■ - See Constructional Data Form in Appendix B - Page B2

☐ - See Product Information Form in Appendix B - beginning on Page B3

The following peripheral devices and interface cables were connected during the measurement:

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - unshielded power cable

■ - unshielded cables

☐ - shielded cables MPS.No.: _____

☐ - customer specific cables

☐ - _____

☐ - _____

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Emission Test Results:

Conducted emissions 10/150 kHz - 30 MHz

The requirements are ☐ - MET ☐ - NOT MET

Minimum limit margin _____ dB at _____ MHz

Maximum limit exceeding _____ dB at _____ MHz

Remarks: _____

Radiated emissions (magnetic field) 10 kHz - 30 MHz

The requirements are ☐ - MET ☐ - NOT MET

Minimum limit margin _____ dB at _____ MHz

Maximum limit exceeding _____ dB at _____ MHz

Remarks: _____

Radiated emissions (electric field) 30 MHz - 1000 MHz

The requirements are ■ - MET ☐ - NOT MET

Minimum margin of compliance for fundamental 0.5 dB at 916.29 MHz

Minimum margin of compliance for spurious >10 dB at _____ MHz

Remarks: The fundamental was measured to be 93.5 dBuV/m (47315 uV/m) in quasi-peak mode compared to a quasi-peak limit of 94.0 dBuV/m (50118 uV/m). No spurious emissions were detected from 30 to 1000 MHz.

Interference Power at the mains and interface cables 30 MHz - 300 MHz

The requirements are ☐ - MET ☐ - NOT MET

Minimum limit margin _____ dB at _____ MHz

Maximum limit exceeding _____ dB at _____ MHz

Remarks: _____

Equivalent Radiated emissions 1 GHz - 10 GHz

The requirements are ■ - MET ☐ - NOT MET

Minimum margin of compliance 5 dB at 2748.9 MHz

Maximum limit exceeding _____ dB at _____ MHz

Remarks: At 2748.9 MHz, average analyzer reading of 55.6 dBuV/m, minus 6.6 dB duty cycle correction factor to give a final average reading of 49.0 dBuV/m (281 uV/m), compared to an average limit of 54 dBuV/m (500 uV/m). The duty cycle correction factor is calculated by 20 log (46.6/100 msec), or –6.6 dB. See page A5 for duty cycle correction plot. The peak levels are all less than 6 dB above the average levels (must be less than 20 dB higher).

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DEVIATIONS FROM STANDARD:

None.

GENERAL REMARKS:

The duty cycle plot is shown on page A5. The bandwidth of the fundamental is shown on page A6 demonstrating band edge compliance.

SUMMARY:

The requirements according to the technical regulations are

■ - met

☐ - **not** met.

The device under test does

■ - fulfill the general approval requirements mentioned on page 3.

☐ - **not** fulfill the general approval requirements mentioned on page 3.

Testing Start Date: 02 February 2001

Testing End Date: 14 February 2001

- TÜV PRODUCT SERVICE INC -

J. T. Schneider
Chief Engineer

Tested by:
J. C. Sausen

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Test-setup photo(s):
Radiated emission 30 MHz - 10 GHz

See Test Setup Exhibit

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Appendix A

Test Data Sheets

and

Test Setup Drawing(s)

TÜV PRODUCT SERVICE INC 19333 Wild Mountain Road Taylors Falls MN 55084-1758 Tel: 651 638 0297 Fax: 651 638 0298 Rev.No 1.0

TEST SETUP FOR EMISSIONS TESTING

See Test Setup Exhibit

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Radiated Electromagnetic Emissions

TÜV PRODUCT SERVICE

Test Report #:	**W1064 Run 05**	Test Area:	LTS 3m			
Test Method:	FCC Part 15	Test Date:	14-Feb-2001			
EUT Model #:		EUT Power:	18 VDC BATTERIES			
EUT Serial #:	TRANSMITTER #6			Temperature:	18	°C
Manufacturer:	ANALOG TECHNOLOGIES			Relative Humidity:	24	%
EUT Description:	WIRELESS LEAK DETECTOR with Sensor & Headset.			Air Pressure:	99.5	kPa

Notes: MODIFIED FOR LOWER OUTPUT

CHANGED R4 TO 100 OHMS

CHANGED R3 TO 300 OHMS

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dBm) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	FINAL Less Duty Cycle Correction Factor (6.6 dB) (dBuV/m)	DELTA FCC Pt. 15.249
PreAmp: LTS Preamp						
Eut set at 'high' setting:						
916 MHz maxed:						
916.30	89.5 Qp	3.4 / 22.8 / 25.6	90.1	V / 1.1 / 225.0	N/A	3.9
PreAmp: None						
916.30	63.9 Qp	3.4 / 22.8 / 0.0	90.0	V / 1.1 / 225.0	N/A	4.0
916.30	67.3 Qp	3.4 / 22.8 / 0.0	93.5	H / 1.0 / 200.0	N/A	0.5
PreAmp: LTS Preamp						
ALL OF THE FOLLOWING MEASUREMENTS ARE MAXIMIZED AS TO ROTATION AND ANTENNA HEIGHT.						
1832.64	48.4 Pk	6.2 / 27.9 / 25.9	56.6	H / 1.0 / 0.0	N/A	N/A
1832.65	46.0 Av	6.2 / 27.9 / 25.9	54.2	H / 1.0 / 0.0	47.6	6.4
1832.64	48.9 Pk	6.2 / 27.9 / 25.9	57.0	V / 1.0 / 0.0	N/A	N/A
1832.65	46.5 Av	6.2 / 27.9 / 25.9	54.7	V / 1.0 / 0.0	48.1	5.9
Antenna: LTS Horn Antenna						
2748.97	44.4 Pk	6.0 / 31.2 / 26.6	55.1	V / 1.0 / 0.0	N/A	N/A
2748.99	41.1 Av	6.0 / 31.2 / 26.6	51.8	V / 1.0 / 0.0	45.2	8.8
2748.97	47.5 Pk	6.0 / 31.2 / 26.6	58.1	H / 1.0 / 0.0	N/A	N/A
2748.99	45.0 Av	6.0 / 31.2 / 26.6	55.6	H / 1.0 / 0.0	49.0	5.0
3665.31	32.8 Pk	6.5 / 33.5 / 26.7	46.1	H / 1.0 / 0.0	N/A	N/A
3665.33	30.3 Av	6.5 / 33.5 / 26.7	43.6	H / 1.0 / 0.0	37.0	17.0
3665.31	34.5 Pk	6.5 / 33.5 / 26.7	47.8	V / 1.0 / 0.0	N/A	N/A
3665.33	31.8 Av	6.5 / 33.5 / 26.7	45.1	V / 1.0 / 0.0	38.5	15.5
PreAmp: #1591Preamp(4-8GHZ)						
4581.64	55.1 Pk	7.6 / 34.1 / 40.8	55.9	V / 1.0 / 0.0	N/A	N/A
4581.65	52.6 Av	7.6 / 34.1 / 40.8	53.4	V / 1.0 / 0.0	46.8	7.2
4581.64	53.4 Pk	7.6 / 34.1 / 40.8	54.2	H / 1.0 / 0.0	N/A	N/A

Tested by: J. C. Sausen

Printed

J C Sausen

Signature

Reviewed by: T. K. Swanson

Printed

Thomas K. Swanson

Signature

Radiated Electromagnetic Emissions

Test Report #:	**W1064 Run 05**	Test Area:	LTS 3m			
Test Method:	FCC Part 15	Test Date:	14-Feb-2001			
EUT Model #:		EUT Power:	18 VDC BATTERIES			
EUT Serial #:	TRANSMITTER #6			Temperature:	18	°C
Manufacturer:	ANALOG TECHNOLOGIES			Relative Humidity:	24	%
EUT Description:	WIRELESS LEAK DETECTOR with Sensor & Headset.			Air Pressure:	99.5	kPa

Notes: MODIFIED FOR LOWER OUTPUT

CHANGED R4 TO 100 OHMS

CHANGED R3 TO 300 OHMS

Page: 2 of 2

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dBm) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	FINAL Less Duty Cycle Correction Factor (6.6 dB) (dBuV/m)	DELTA FCC Pt. 15.249
4581.65	51.1 Av	7.6 / 34.1 / 40.8	52.0	H / 1.0 / 0.0	45.4	8.6
5497.96	45.0 Pk	10.8 / 35.9 / 40.0	51.6	H / 1.0 / 0.0	N/A	N/A
5497.99	42.6 Av	10.8 / 35.9 / 40.0	49.3	H / 1.0 / 0.0	42.7	11.3
5497.96	46.0 Pk	10.8 / 35.9 / 40.0	52.7	V / 1.0 / 0.0	N/A	N/A
5497.99	44.6 Av	10.8 / 35.9 / 40.0	51.2	V / 1.0 / 0.0	44.6	9.4
6414.22	41.4 Pk	10.5 / 36.4 / 40.5	47.8	V / 1.0 / 0.0	N/A	N/A
6414.20	36.4 Av	10.5 / 36.4 / 40.5	42.8	V / 1.0 / 0.0	36.2	17.8
6414.22	39.9 Pk	10.5 / 36.4 / 40.5	46.2	H / 1.0 / 0.0	N/A	N/A
6414.20	37.9 Av	10.5 / 36.4 / 40.5	44.3	H / 1.0 / 0.0	37.7	16.3
PreAmp: #2478 Preamp(8-18G)						
NO FURTHER EUT EMISSIONS DETECTED IN THE RANGE OF 6414 MHZ TO 9163 MHZ, VERT AND HOR ANT.						

Tested by: J. C. Sausen

Printed

J C Sausen

Signature

Reviewed by: T. K. Swanson

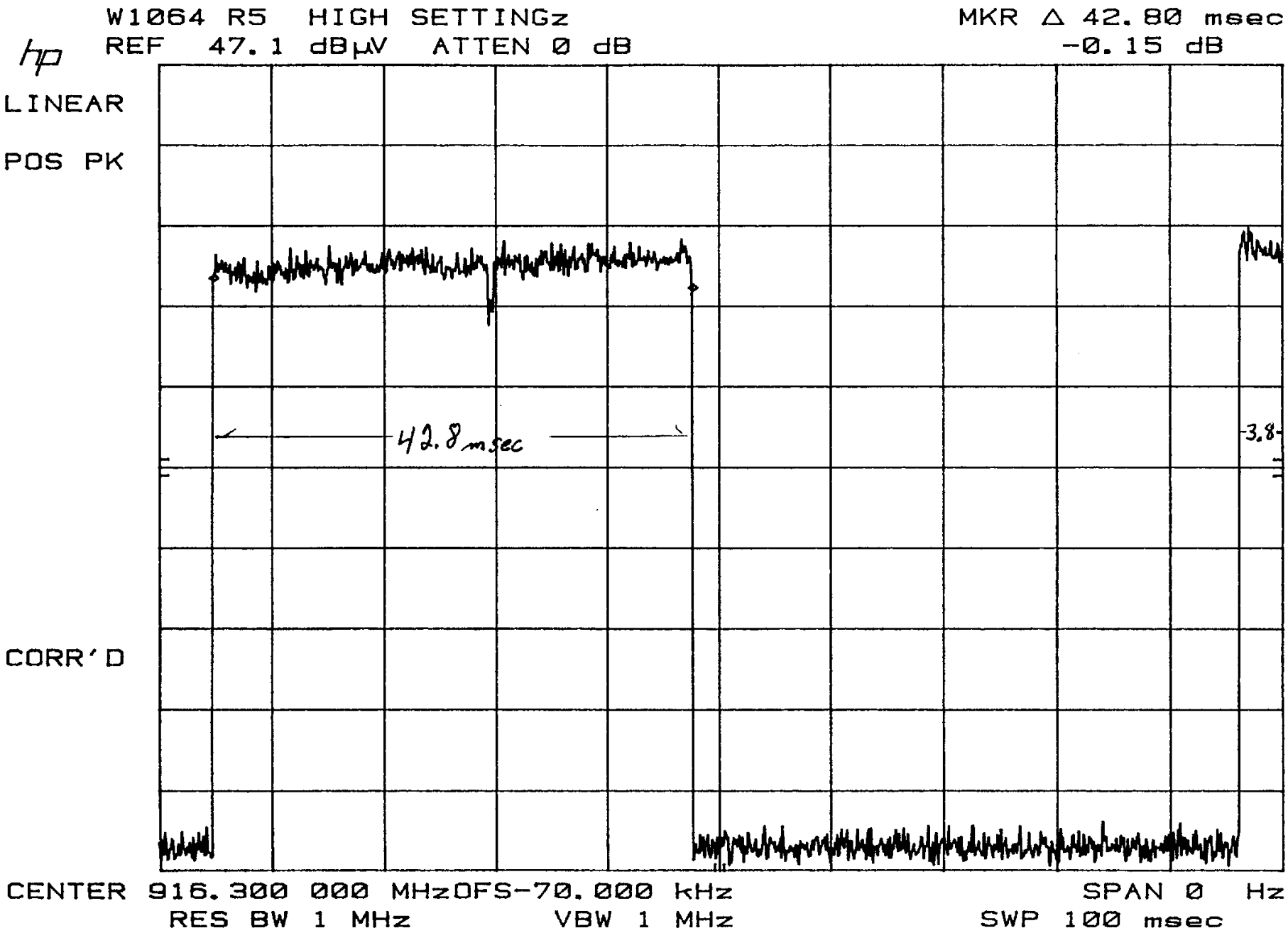
Printed

Thomas K. Swanson

Signature

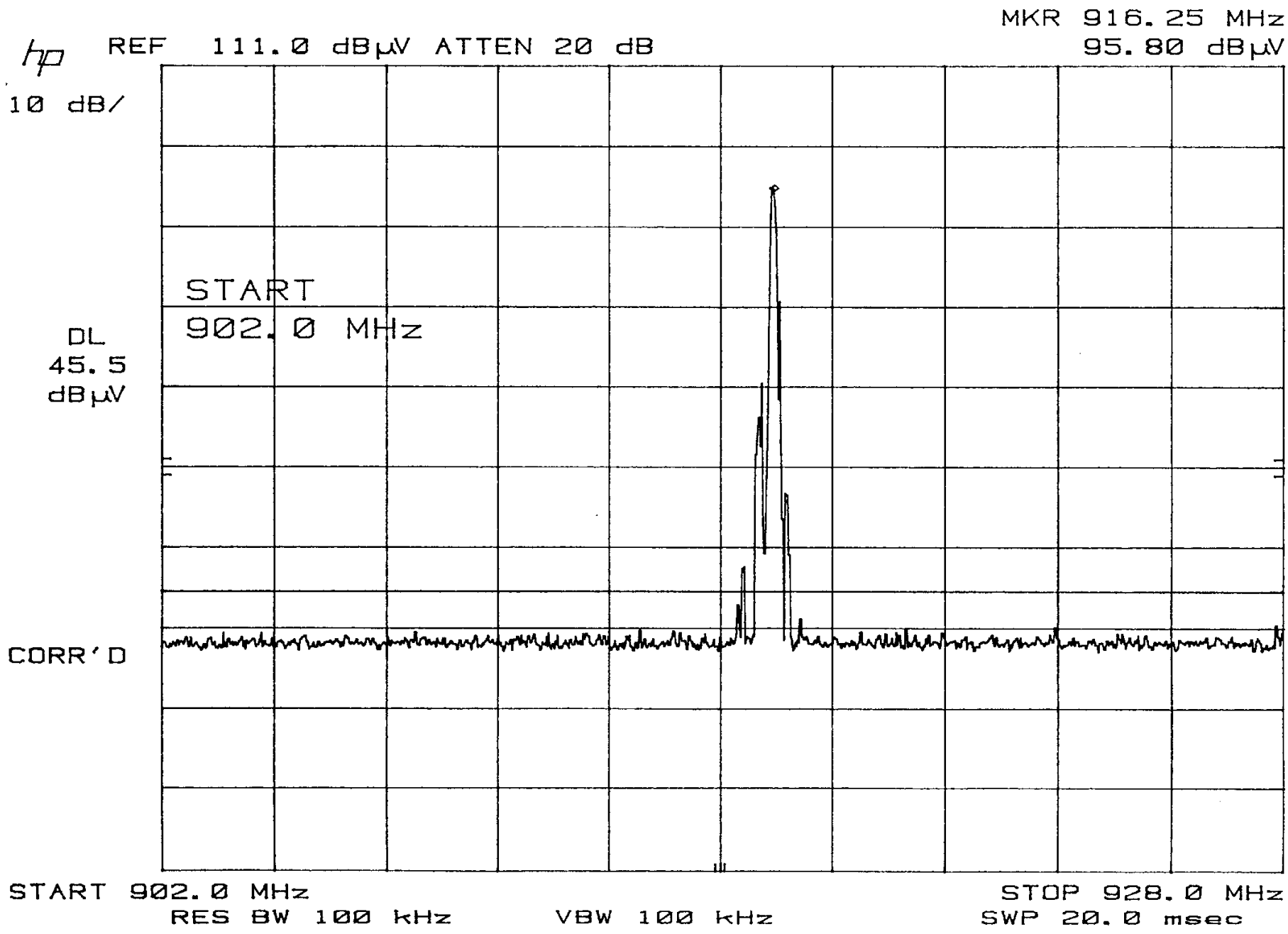
DUTY CYCLE

Duty Cycle



File No. WC1G106401, Page A5 of A6

BANDWIDTH Bandwidth



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Appendix B

Constructional Data Form

TÜV PRODUCT SERVICE INC 19333 Wild Mountain Road Taylors Falls MN 55084-1758 Tel: 651 638 0297 Fax: 651 638 0298 Rev.No 1.0

Form

EMC Test Plan and Constructional Data Form

PRODUCT SERVICE

PLEASE COMPLETE THIS DOCUMENT IN FULL, ENTERING N/A IF THE FIELD IS NOT APPLICABLE.

Applicant -- ***NOTE: This information will be input into your test report as shown below.***
Press the F1 key at any time to get HELP for the current field selected.

Company: Analog Technologies Corp.

Address: 11441 Rupp Drive

Burnsville

MN

Contact: Bill Berg Position: President

Phone: 952-894-9228 Fax: 952-894-2966

E-mail Address: wberg@analog-tech.com

General Equipment Description -- ***NOTE: This information will be input into your test report as shown below.***

EUT Description: Wireless Pool Leak Detector Transmitter

EUT Name: LT2200 Wireless Signal Processing Unit (SPU)

Model No.: LT2200 PN LT2SPU Serial No.: 001

Product Options:

Configurations to be tested:

Test Objective

- ☐ EMC Directive 89/336/EEC (EMC) Std:
- ☐ Machinery Directive 89/392/EEC (EMC Std:
- ☐ Medical Device Directive 93/42/EEC (EMC) Std:
- ☐ Vehicle Directive 72/245/EEC (EMC) Std:
- ☐ FDA Reviewers Guidance for Premarket Notification Submissions (EMC)

- ☒ FCC: Class ☐ A ☐ B Part 15
- ☐ VCCI: Class ☐ A ☐ B
- ☐ BCIQ: Class ☐ A ☐ B
- ☐ Canada: Class ☐ A ☐ B
- ☐ Australia: Class ☐ A ☐ B
- ☒ Other: FCC through TCB for Wireless Product

TÜV Product Service Certification Requested

- ☐ Attestation of Conformity (AoC)
- ☐ Certificate of Conformity (CoC)
- ☐ International EMC Mark (IEM)
- ☐ Compliance Document

Protection Class (N/A for vehicles) ☐ Class I ☐ Class II ☐ Class III

(Press **F1** when field is selected to show additional information on Protection Class.)

Attendance

Test will be: ☐ Attended by the customer ☒ Unattended by the customer

Form

EMC Test Plan and Constructional Data Form

TÜV PRODUCT SERVICE

Failure - ***Complete this section if testing will not be attended by the customer.***

If a failure occurs, TUV Product Service should:

☒ Call contact listed above, if not available then stop testing. (After hrs phone): _____

☐ Continue testing to complete test series.

☐ Continue testing to define corrective action.

☐ Stop testing.

EUT Specifications and Requirements

Length: 5.25" Width: 5.0" Height: 1.6" Weight: 1 lbs.

Power Requirements

Regulations require testing to be performed at typical power ratings in the countries of intended use. (i.e., European power is typically 230 VAC 50 Hz or 400 VAC 50 Hz, single and three phase, respectively)

Voltage: Batteries, 2-9V batteries (18VDC) (If battery powered, make sure battery life is sufficient to complete testing.)

# of Phases: _____

Current (Amps/phase(max)): _____ Current (Amps/phase(nominal)): _____

Other _____

Other Special Requirements

Typical Installation and/or Operating Environment

(ie. Hospital, Small Business, Industrial/Factory, etc.)
Used to find leaks in vinyl lined swimming pools.

EUT Power Cable

☐ Permanent OR ☐ Removable Length (in meters): _____

☐ Shielded OR ☐ Unshielded

☒ Not Applicable

EMC Test Plan and Constructional Data Form

TÜV PRODUCT SERVICE

EUT Interface Ports and Cables

Interface				Shielding								
Type	Analog	Digital	Qty	Yes	No	Type	Termination	Connector Type	Port Termination	Length (in meters)	Removable	Permanent
EXAMPLE: *RS232*	☐	☒	*2*	☒	☐	*Foil over braid*	*Coaxial*	*Metallized 9-pin D-Sub*	*Characteristic Impedance*	*6*	☒	☐
Probe	☒	☐	1	☐	☒	none	BNC	BNC	na	3	☒	☐
Head Phones	☒	☐	1	☐	☒	none	mini phone jack	mini phone jack	na	3	☒	☐
	☐	☐		☐	☐						☐	☐
	☐	☐		☐	☐						☐	☐
	☐	☐		☐	☐						☐	☐
	☐	☐		☐	☐						☐	☐
	☐	☐		☐	☐						☐	☐
	☐	☐		☐	☐						☐	☐
	☐	☐		☐	☐						☐	☐
	☐	☐		☐	☐						☐	☐
	☐	☐		☐	☐						☐	☐
	☐	☐		☐	☐						☐	☐

Form

EMC Test Plan and Constructional Data Form

EUT Software.

Revision Level: na

Description: none used

EUT Operating Modes to be Tested -- list the operating modes to be used during test. It is recommended the equipment be tested while operating in a typical operation mode. FCC testing of personal computers and/or peripherals requires that a simple program generate a complete line of upper case H's. Provide a general description of all software, firmware, and PLD algorithms used in the equipment. List all code modules as described above, with the revision level used during testing. Consult with your TÜV Product Service Representative if additional assistance is required.

1. Rotate Switch to "LOW" to turn the unit on.

2.

3.

EUT System Components -- List and describe all components which are part of the EUT. For FCC testing a minimum configuration is required. (ie. Mouse, Printer, Monitor, External Disk Drive, Motherboard, etc.)

Description	Model #	Serial #	FCC ID #
SPU Transmitter Unit	LT2200 PN LT2SPU	001	
Probe w/cable			
Headphones w/cable			

Form

EMC Test Plan and Constructional Data Form

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Support Equipment -- List and describe all support equipment which is not part of the EUT. (i.e. peripherals, simulators, etc)

Description	*Model #*	*Serial #*	*FCC ID #*
none needed			

Oscillator Frequencies

Frequency	*Derived Frequency*	*Component # / Location*	*Description of Use*
10 Hz		U1, C1, R6	Modulation Signal Source

Power Supply

Manufacturer	*Model #*	*Serial #*	*Type*
na			☐ Switched-mode: (Frequency) _____ ☐ Linear ☒ Other: 16 Alkaline Batteries
			☐ Switched-mode: (Frequency) _____ ☐ Linear ☐ Other: _____

Power Line Filters

Manufacturer	*Model #*	*Location in EUT*

Form

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Critical EMI Components (Capacitors, ferrites, etc.)

Description	*Manufacturer*	*Part # or Value*	*Qty*	*Component # / Location*
Power supply bypass	Panasonic	33pF	1	C10
Power supply bypass	Panasonic	.01uF	1	C9
Power supply bypass	Panasonic	0.1uF	1	C3
Power Supply Choke	Toko	5.6nH	1	L1

EMC Critical Detail -- Describe other EMC Design details used to reduce high frequency noise.

(PLEASE INSERT "**ELECTRONIC SIGNATURE**" BELOW IF POSSIBLE)

Authorization Signatures

Customer authorization to perform tests according to this test plan.	Date
Test Plan/CDF Prepared By (please print)	Date
Reviewed by TÜV Product Service Associate	Date

Appendix C

MEASUREMENT PROTOCOL

GENERAL INFORMATION

Measurement Uncertainty

The test system for conducted emissions is defined as the LISN, tuned receiver or spectrum analyzer, and coaxial cable. The test system for radiated emissions is defined as the antenna, the pre-amplifier, the spectrum analyzer and the coaxial cable. These test systems have a measurement uncertainty of ±4.5 dB. The equipment comprising the test systems are calibrated on an annual basis.

Justification

The Equipment Under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral into it's characteristic impedance or left unterminated. When appropriate, the cables are manually manipulated with respect to each other to obtain maximum emissions from the unit.

CONDUCTED EMISSIONS

The final level, expressed in dBµV, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the FCC limit.

To convert between dBµV and µV, the following conversions apply:

dBµV = 20(log µV)
µV = Inverse log(dBµV/20)

RADIATED EMISSIONS

The final level, expressed in dBµV/m, is arrived at by taking the reading from the spectrum analyzer (Level dBµV) and adding the antenna correction factor and cable loss factor (Factor dB) to it. This result then has the FCC limit subtracted from it to provide the Delta which gives the tabular data as shown in the data sheets in Attachment B. The amplifier gain is automatically accounted for by using an analyzer offset.

Example:

FREQ (MHz)	LEVEL (dBuV)		CABLE (dB)		ANT/PREAMP (dB)		FINAL (dBuV/m)		POL	HGT (m)	AZ (deg)		DELTA1 LIMIT
60.80	42.5Qp	+	1.2	+	10.9	- 25.5 =	29.1		V	1.0	0.0	-	10.9

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DETAILS OF TEST PROCEDURES

General Standard Information

The test methods used comply with ANSI C63.4-1992 - "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz."

Conducted Emissions

Conducted emissions on the 60 Hz power interface of the EUT are measured in the frequency range of 450 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection, and a Line Impedance Stabilization Network (LISN), with 50 Ω/50 μH (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimeters above the floor and is positioned 40 centimeters from the vertical ground plane (wall) of the screen room. In some cases, a pre-scan using a spectrum analyzer is initially performed on the units comprising the system under test to locate the highest emissions. If the minimum passing margin appears to be less than 20 dB with a peak mode measurement, the emissions are re-measured using a tuned receiver or spectrum analyzer with quasi-peak and average detection and recorded on the data sheets.

Radiated Emissions

Radiated emissions from the EUT are measured in the frequency range of 30 to 10000 MHz using a spectrum analyzer and appropriate broadband linearly polarized antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection and measurements above 1000 MHz are made with a 1 MHz/6 dB bandwidth and peak detection. Average detection measurements above 1 GHz are obtained by maintaining a 1 MHz resolution bandwidth but changing the video bandwidth to 10 Hz. Table top equipment is placed on a 1.0 X 1.5 meter non-conducting table 80 centimeters above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Interface cables that are closer than 40 centimeters to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimeters from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the test area. The antenna is positioned 3 meters horizontally from the EUT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarizations and the EUT are rotated 360 degrees. Intentional radiators are rotated through three orthogonal axes to determine the attitude that maximizes the emissions.

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