TEST REPORT #300699

STANDARD: FCC PART 15

SUBPART C--INTENTIONAL RADIATORS
SECTION 15.231 PERIODIC OPERATION IN
THE BAND 40.66-40.70 MHZ AND ABOVE 70 MHZ.

EQUIPMENT TESTED:

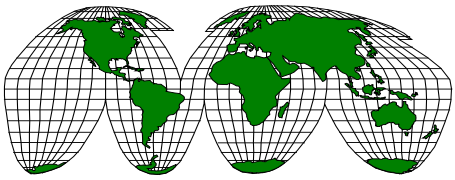
ANALOG TECHNOLOGIES CORP

MODEL: 916.5 MHZ TRANSMITTER

TEST DATE: 30 JUNE 1999

INTERNATIONAL

1100 Falcon Avenue
Glencoe, MN 55336



Tele: 320-864-4444
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CERTIFICATION SERVICES, INC.

Prepared for:

Analog Technologies, Corp.
12140 12th Avenue South
Burnsville, MN 55337

Test agent:

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Test location:

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Prepared by:

International Certification Services, Inc.
1100 Falcon Avenue
Glencoe, MN 55336

INTERNATIONAL

CERTIFICATION SERVICES, INC.

1.0 TEST SUMMARY

TEST REPORT: #300699	
COMPANY:	Analog Technologies, Corp
AGENT:	International Certification Services, Inc.
PHONE:	320-864-4444
TEST DATE:	30 June, 1999
EQUIPMENT UNDER TEST:	916.5 Mhz Hand Held battery powered Intentional Radiator.
GENERAL TEST SUMMARY:	The testing was performed at International Certification Services, Inc. at 1100 Falcon Ave, Glencoe, MN 55336
VERIFICATION / CERTIFICATION STATUS:	The 916.5 Mhz Transmitter was found to be in compliance with the FCC Part 15 Subpart C, Section 15.231 requirements.
MODIFICATIONS NECESSARY:	None

TESTED BY	**WRITTEN BY**
Gerald Heinen	Duane R. Bagdons

Applicable Standards

47 CFR Ch.1 (10-1-98 Edition)

FCC Part 15 Radio Frequency Devices

Subpart C Intentional Radiators

Section 15.231 Periodic operation in the band 40.66-40.70 Mhz and above 70 Mhz.

2.1 Referenced Standards

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.

2.2 Equipment Units Tested

The equipment tested was a 916.5 Mhz ON-OFF KEYED (OOK) modulated hand held battery powered transmitter. This device is a hand held unit with no attached cables or protruding antenna. The antenna is a permanent component and is part of the internal PC board assembly. The unit is programmed to transmit a burst of OOK modulated signal of 35 mS when activated. This device is used as an alarm signal transmitter. When a disturbance is sensed, it will automatically transmitt this above burst for 7 to 10 seconds before automatically shutting OFF. If a disturbance continues, it will remain OFF until the disturbance is removed for at least 30 seconds. This timing is controlled by firmware in the internal microprocessor.

2.3 Equipment and Cable Configuration

See photos of the EUT pc board and schematic and test configuration setup in Attachment A

2.4 List of Test Equipment

Test Equipment	Model	S/N	Calibration Date
Spectrum Analyzer	Hewlett-Packard 8566B	2421A00458	3/10/99
Preamp	MiniCircuits ZKL-2R7	N/A	6/1/99
Biconical Antenna	AH Systems Model SAS-200/540	328	6/16/99
Log Periodic Antenna (200-1000 MHz)	EMCO 3146	9111-3280	6/16/99
Horn Antenna (1-18 Ghz)	EMCO 3115	5697	3/5/99

Measurement cable losses, and antenna correction factors are included in the data sheets. Average detection methods were used in the measurements. The Resolution BW was set at 1 Mhz and the Video BW was set at 1 Hz with a Span of 0 Hz to perform the correct average detected measurements.

2.5 Units of Measurement.

All measurements were taken in dBuV/m with the antenna located at 3 meters distance from the EUT. Frequency measurements are recorded in Mhz. Input power to the intentional radiator was not recorded---only the radiated emissions with the internal transmitting antenna were recorded.

2.6 Location of Test Site

The open area test site (OATS) measurement facility used to collect the data was International Certification Services, Inc. at 1100 Falcon Ave in Glencoe, MN 55336. This site has been certified to be in spec of the normalized site attenuation per ANSI C63.4-1992**.** See letter of compliance from FCC dated July 23, 1998. (FCC 31040/SIT 1300F2)

2.7 Measurement Procedures

The antenna was placed at a distance of 3 meters from the EUT. The EUT was set on an insulating table in the OATS site and rotated through 360 degrees to determine the worst case EUT orientation. The antenna was then positioned vertical and horizontal to determine which antenna polarity orientation was worst case. Then certification data was recorded at all the transmitter frequencies from the fundamental to the 10^{th} harmonic at an antenna height variation of from 1-4 meters.

2.8 Reporting Measurement Data

See data sheets and plots in Attachment B.

2.9 Radiated Emissions Data

The frequency and amplitude of the tuned frequency of the EUT along with the frequencies and amplitudes of the harmonics up to the 5^{th} harmonic are reported in the data sheets in Attachment B. Signal frequencies above 5499.598 Mhz were below the noise floor of the measurement system. This information is plotted against the limit of section 15.231 of FCC Part 15 subpart C. Both Horizontal and Vertical antenna polarities as well as antenna heights of 1 to 4 meters were observed but all maximum signal strengths occurred in the Horizontal antenna polarity and at 1 meter antenna height.

The Final Level, expressed in dBuV/m, is arrived at by taking the reading from the spectrum analyzer (Level dBuV) and adding the antenna correction factor and cable loss factor (Factor dB) and subtracting the preamp gain. This result then has the FCC limit subtracted from it to provide the margin which gives the tabular data as shown in the data sheets in Attachment B.

Example:

Frequency	**Level**	+	**Factor**	=	**Corr Data**	-	**FCC Limit**	=	**Margin**

(MHz)	(dBuV)	+	(dB)	=	(dBuV/m)	-	(dBuV/m)	=	(dB)
100.0	20.6	+	11.0	=	31.6	-	43.5	=	-11.9

2.10 Operating Frequency Data for Intentional Radiators

All operating frequencies and harmonic frequencies and ambient temperature at which all data was taken at is recorded in the data sheets in Attachment B.

2.11 Occupied Bandwidth Data for Intentional Radiators

The occupied BW data for the EUT is listed in the data sheets in Attachment B.

2.12 Summary of Results

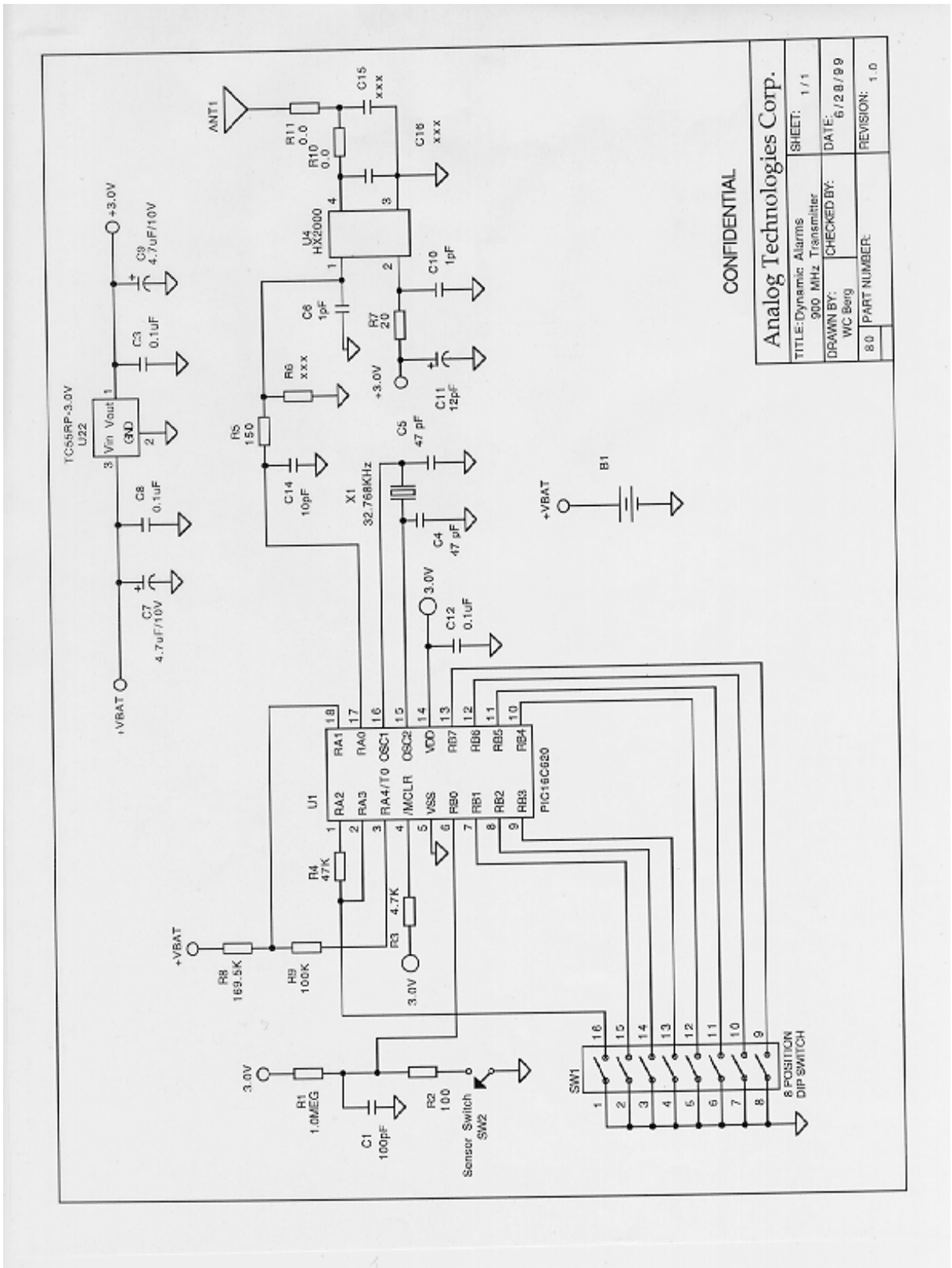
The EUT passed the requirements of FCC Part 15 Subpart C, Section 15.231 with a minimum passing margin of –5.17457 dB (Average Detected signal) at the fundamental frequency of 916.587 Mhz. No modifications were necessary to accomplish this compliance.

ATTACHMENT A

RADIATED MEASUREMENT SCHEMATIC AND PHOTOS

Model: 916.5 Mhz Transmitter Radiated Emissions
Test Configuration

916.5 Mhz Transmitter Electrical Schematic



ATTACHMENT B

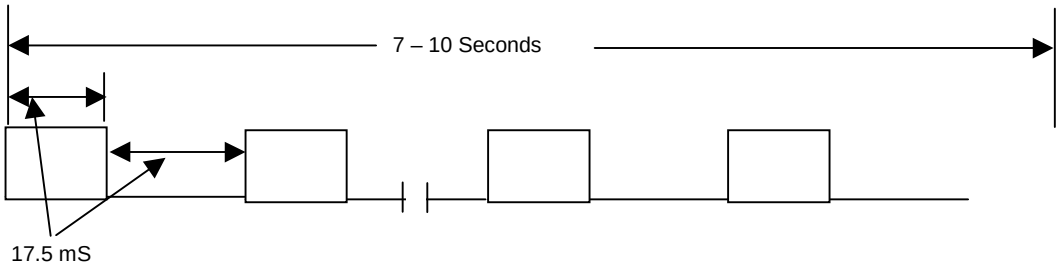
DETAILED TEST DATA SHEETS

Each radiated emissions plot indicates the receiving antenna measurement distance in meters and the emission amplitudes with respect to their applicable limits. The associated tabulation for each radiated plot lists the emission frequency, the final emission level, and the margin from the limit.

Analog Technologies, Corp
Model: 916.5 Mhz Transmitter
Temperature: 73 Deg F.
Humidity: 52 % R.H.

Test Technician: Gerald Heinen

Center Frequency: 916.5 Mhz



Transmit Burst Sequence Timing

Preliminary testing was done to determine what antenna polarity and antenna height generated the highest signal levels. Tests were performed at this test configuration and then each frequency was maximized to 0-360 degrees orientation and antenna height of 1-4 meters.

Transmit signal total BW = 946.6 Khz at 20 dBuV down from peak carrier amplitude

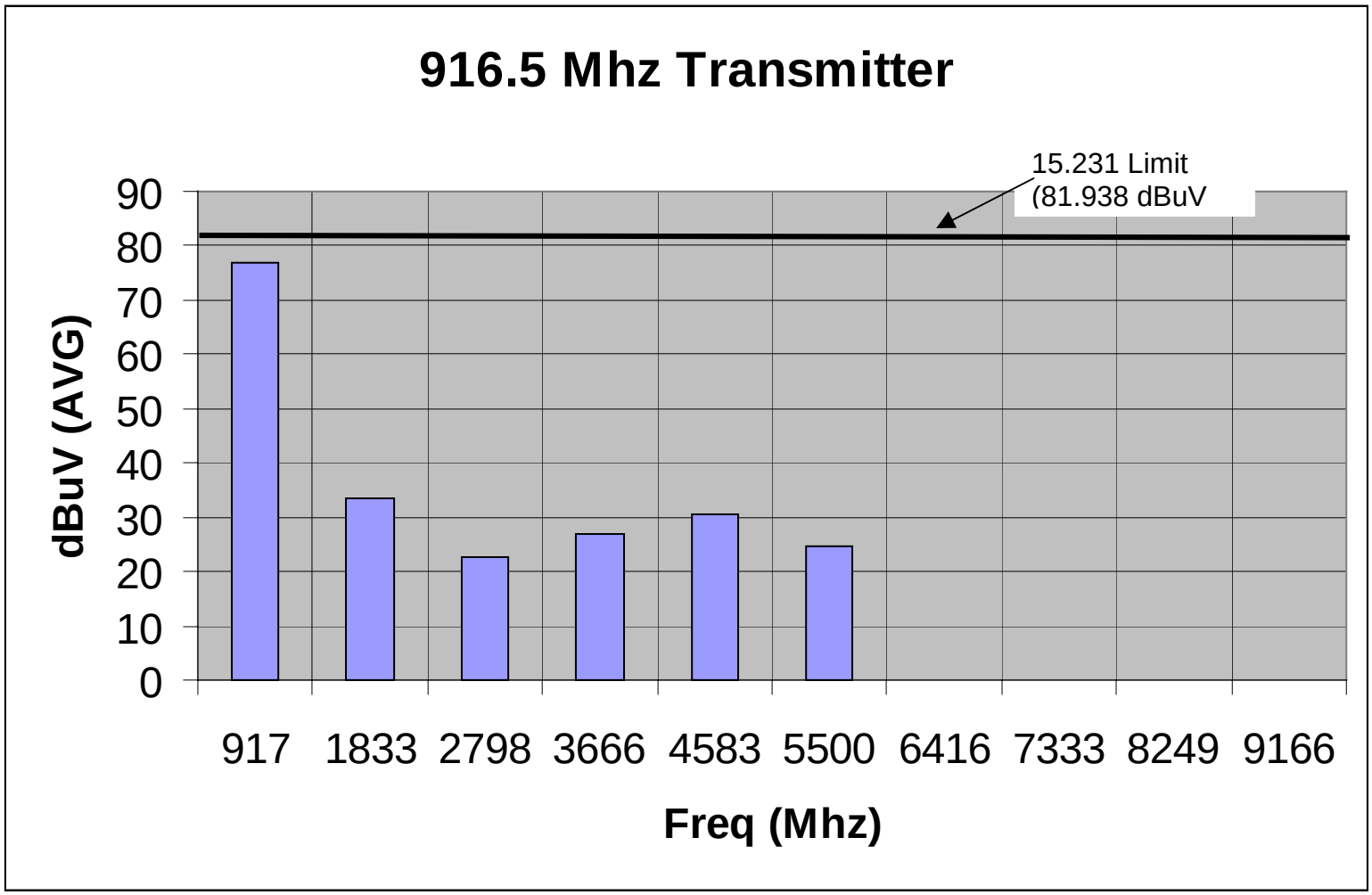
Initial testing was performed in the anechoic shield room to determine if there were any other spurious emissions other than the fundamental and its harmonics. No other emissions were found.

Certification testing was performed at the OATS site with an antenna distance of 3 meters and the EUT at 90 Degrees to the antenna.

The limit for section 15.231 is 12,500 uV/m with an Average Detector. This converted to dBuV is 81.938 dBuV/m which is the limit shown in the next table.

Freq (Mhz)	**Avg Det**	**Preamp gain**	**Cable loss**	**Ant Corr Fac**	**Corr Data**	**FCC Limit (15.231)**	**Margin**
	dBuV	**dB**	**dB**	**dB**	**dBuV/m**	**dBuV/m**	**dB**
916.587	85.343	33	1.32	23.1	76.763	81.938	-5.175
1833.191	38.201	33	1.55	26.6	33.351	81.938	-48.587
2798.04	34.082	33	1.68	30	32.762	81.938	-49.176
3666.381	25.296	33	1.83	32.7	26.826	81.938	-55.112
4582.994	28.818	33	2	32.6	30.418	81.938	-51.52
5499.598	20.749	33	2.18	34.8	24.729	81.938	-57.209
6416.095		33	2.27	35.3		81.938	
7332.877		33	2.4	36.6		81.938	
8249.32		33	2.55	37.55		81.938	
9165.514		33	2.7	38.3		81.938	

Signal frequencies above 5499.598 Mhz were in the ground floor noise and could not be recorded.



Transmitter Harmonic output levels at 3 meters

ATTACHMENT C

PRODUCT DATA SHEET OR PRODUCT INFORMATION FORM AS SUPPLIED BY THE CUSTOMER

COMPANY NAME: Analog Technologies, Corp

CUSTOMER REPRESENTATIVE: International Certification Services, Inc.

EQUIPMENT DESCRIPTION: 916.5 Mhz hand held (ON- OFF KEYED OOK) modulated Transmitter

MODEL NUMBER:

SERIAL NUMBER: Engineering Unit

TYPE OF TEST:

_____Development
_____Initial Design Verification
_____Design Change (Please describe exact changes below)
__X__Production Sample (Audit Test)

Changes made: NONE

OSCILLATOR FREQUENCIES:

916.5 Mhz

PRODUCT SHIELDING PROVISION:

Plastic enclosure

SOFTWARE AND / OR OPERATING MODES:

The unit tested automatically transmitted a burst of pulses for 17.5 mS every 35 mS for a period of 7 to 10 seconds.

I/O CABLES: **NONE**