MEASUREMENT/TECHNICAL REPORT

Lucent Technologies, Inc.

FCC ID:AS5LTI905A

June 1, 1998

This report concerns (check one): Original grant ☒ Class II change ☐

Equipment type: Cordless Telephone

Request issue of grant (check one):
☒Immediately upon completion of review.

☐ Defer grant per 47 CFR 0.457(d)(1)(ii) until _____. Lucent Technologies, Inc. Name agrees to notify the Commission by _____ of the intended date of announcement of the product so that the grant can be issued on that date.

Measurement procedure used: *(check one)*

ANSI C63.4-1992 ☐ FCC/OET MP-4(1987) ☐ Other ☒

If other, describe:47 CFR 15

Application for Certification prepared by:	Applicant for this device:
Irwin D. Buck	*Lucent Technogolies*

Table of Contents

Exhibit A GENERAL INFORMATION

A.1 Product Description

The equipment under test (EUT) is a Lucent Technologies, Inc. 900 MHz digital cordless telephone. The EUT operates in the ISM frequency band.

The major features of the models are:

FEATURE	BUSINESS CORDLESS 905
16 CHANNEL OPERATION	√
CHANNEL SELECTION FROM THE HANDSET	√
FLASH	
HANDSET VOLUME CONTROL (3 LEVELS)	√
MUTE	√
HOLD	√
REDIAL	√
SELECTABLE PULSE/TOUCH TONE DIALING	
HEARING AID COMPATIBLE	√
WALL MOUNTABLE SPEAKERPHONE	√
DOT MATRIX LCD IN HANDSET WITH BACKLIGHTING	√
LOW BATTERY INDICATOR (AUDIO AND LED)	
LOW BATTERY INDICATOR (AUDIO AND LCD)	√
MEMORY FOR 10 NUMBERS	
MEMORY FOR 20 NUMBERS	
DIGITAL SECURITY (65536 CODES)	√
HANDSET LOCATOR (FIND)	√
2 WAY PAGE	
BASE RINGER	
SPEAKERPHONE	
BASE SPEAKER VOLUME CONTROL (7)	
DIGITAL ANSWERING SYSTEM	
FOUR MAILBOXES	
CALLED ID DISPLAY	
INTERCOM	√
HANDSET DIRECTORY CARD	
REPLACEABLE HANDSET BATTERY	√
3.6V BATTERY BACK-UP (IN BASE W/ SPARE HANDSET BATTERY)	√
OUT OF RANGE ALERT	√

EXHIBIT C SYSTEM TEST CONFIGURATION

C.1 Rational

The system was configured for testing in a typical fashion (as a customer would normally use it). The equipment under test(EUT) a BUSINESS CORDLESS 905 900 MHz cordless telephone system was connected to a Private Branch Exchange (PBX) simulator.

C.2 Equipment Modifications

The EUT required no modifications or the addition of specialized devices to meet compliance with the aforementioned rules.

C.3 Tested System Details

Model Number (Serial Number)	FCC ID	Description	Cable Description
BUSINESS CORDLESS 905	NA	Cordless Telephone	NA
MADB-1 or R75B-1	NA	Power Adapter	NA
848069068	NA	7 ft. 4- Terminal	Merlin Interface Cable
105463012	NA	7 ft. 4- Terminal	Partner Interface Cable

C.4 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4-1992. Radiated testing was performed at an antenna to EUT distance of 3 meters.

C.5 Test Facilities

The open area test site is located Holmdel, NJ at Lucent Technologies, Inc. Global Products Compliance Lab.

All additional testing was performed at Lucent Technologies, Inc. Wired Products R&D center located in Eatontown, NJ.

C.6 Referenced Rules Sections(47 CFR)

Rules Section	Rules Title - Brief Description
15.207	Conducted Emissions
15.209	Radiated Emissions
15.249(b)(c)	Operation within the Bands 902-928 MHz

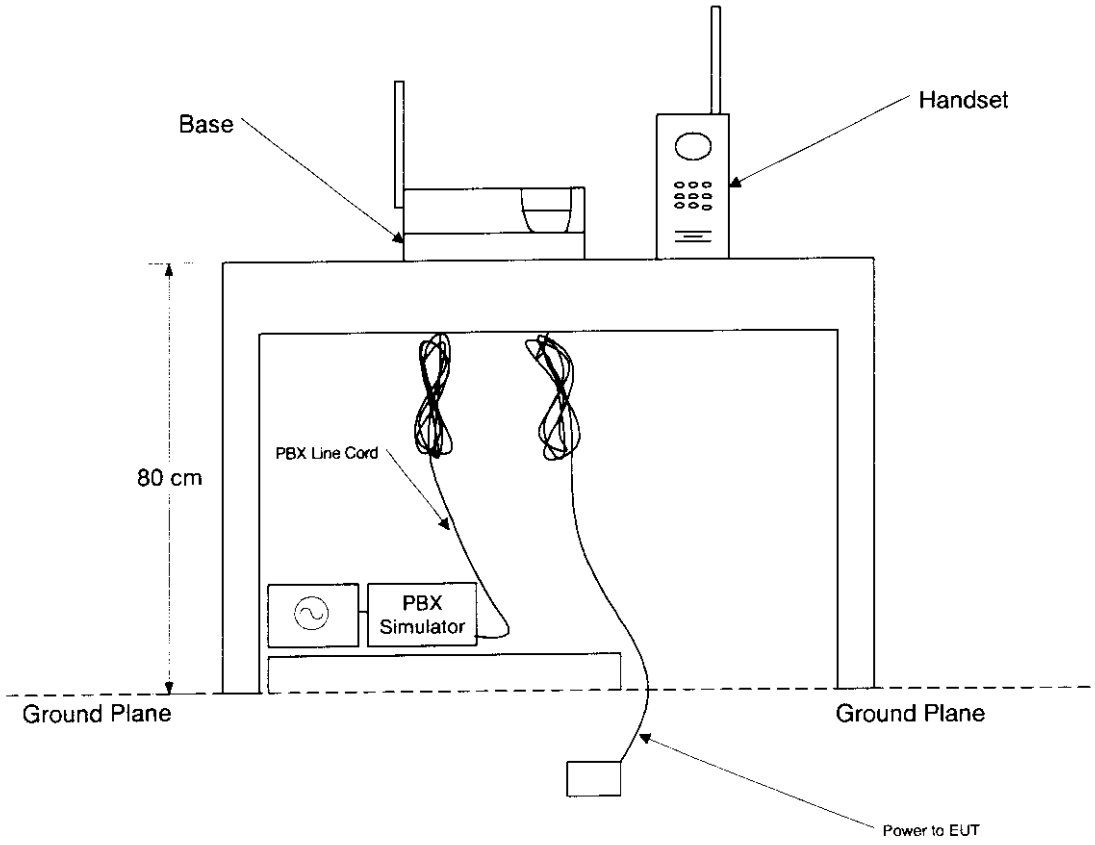
C.7 Configuration of Tested System

All radiated and conducted emissions testing was performed with the EUT in the "off hook" or active call mode.

The EUT test set up was in accordance with ANSI C63.4 1992. Conducted and Radiated Emissions and Measurement of Intentional Radiators.

Configuration of Tested System

Figure C.7.1 Radiated Emissions 47 CFR 15.209 and 15.249



Conducted Emissions 47 CFR 15.207

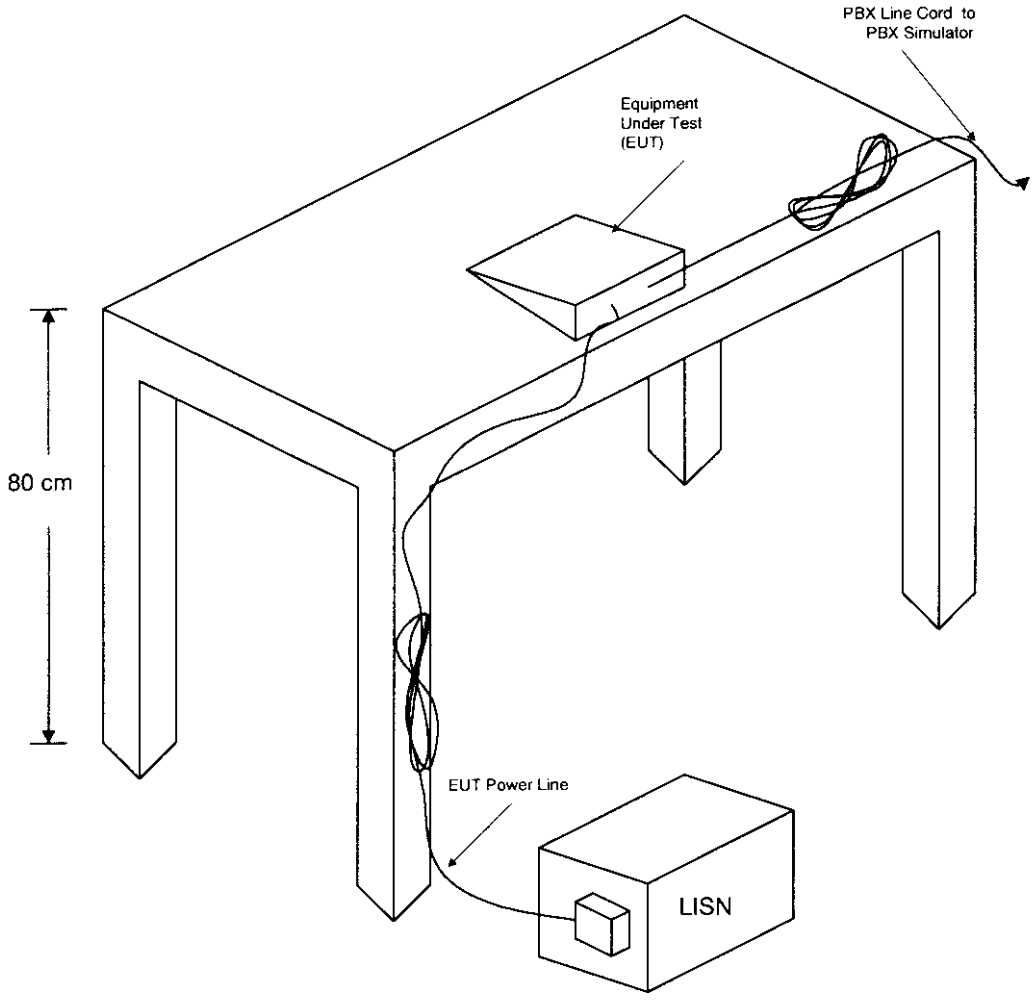

PBX Line Cord to
PBX Simulator
Equipment
Under Test
(EUT)
80 cm
EUT Power Line
LISN

EXHIBIT D TEST AND MEASUREMENT DATA

D.1 CONDUCTED EMISSION DATA 47 CFR §15.207

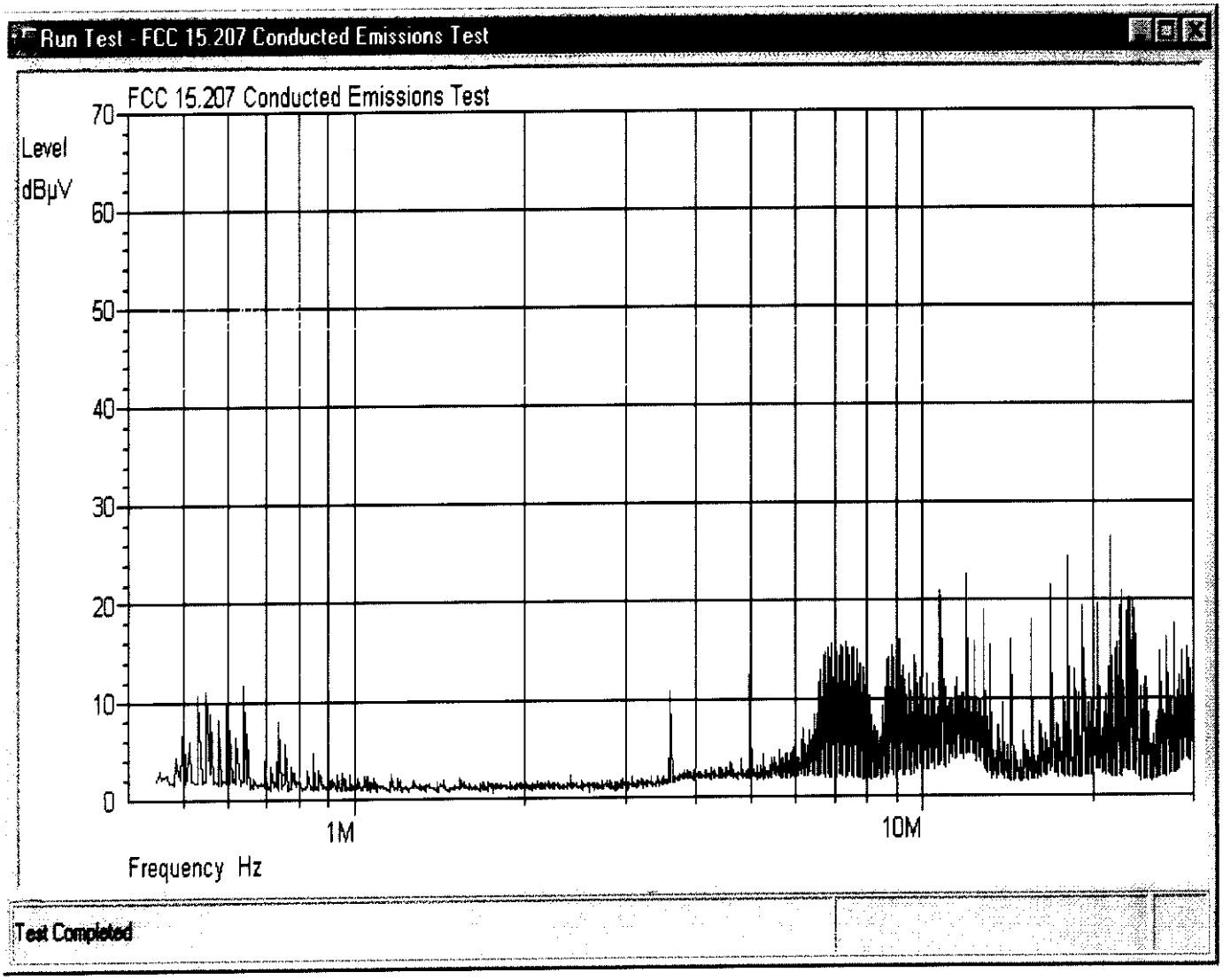
D.2 Test Procedure

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked, and these signals are then quasi-peaked.

D.3 Measured Data

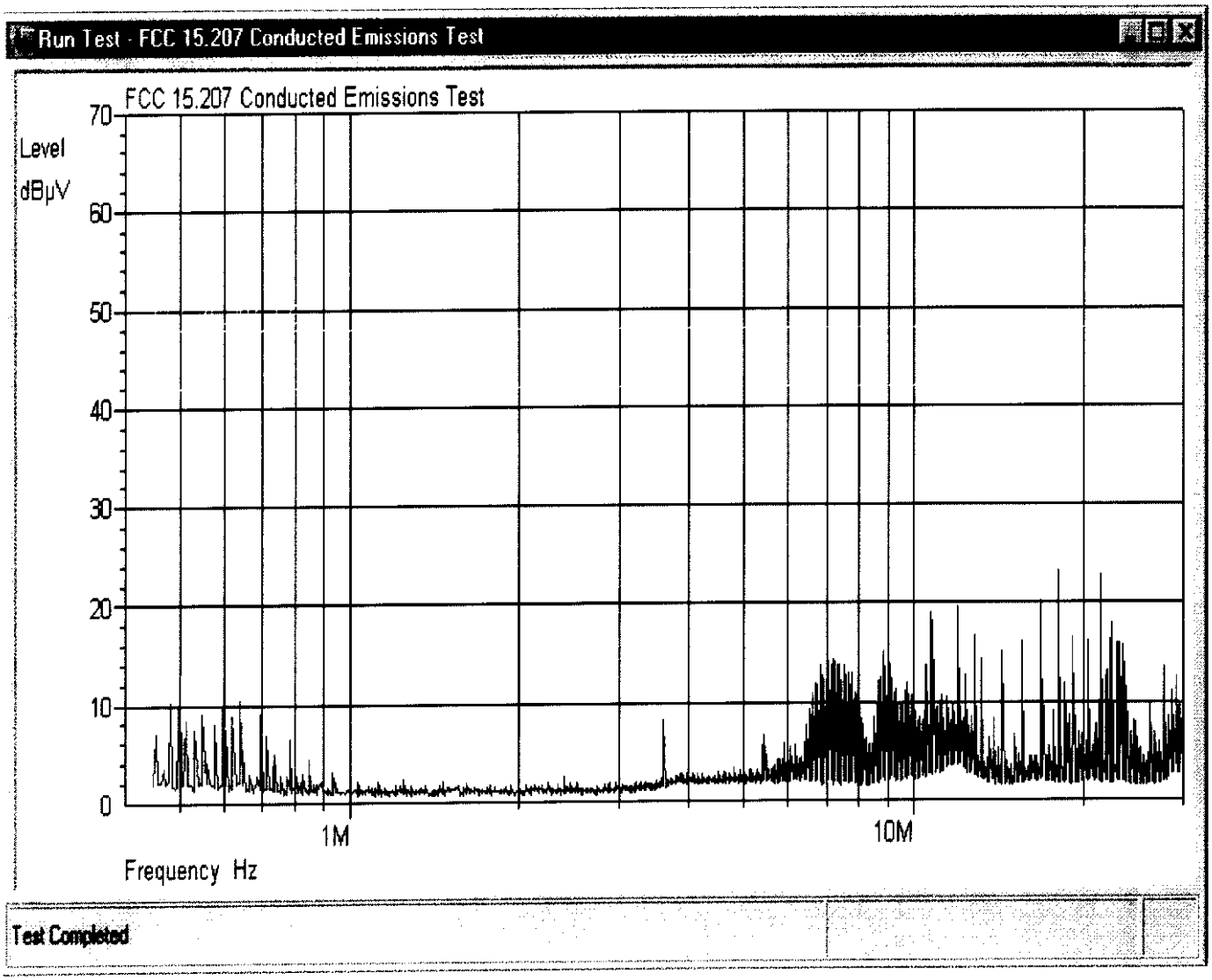
Date:	April 30, 1998
Humidity:	45%
Temperature:	23°C
Test Engineer:	C. Robinson
Test Specification:	47 CFR 15.207 Conducted Emissions
EUT:	BUSINESS CORDLESS 905

Line 1



Date:	April 30, 1998
Humidity:	45%
Temperature:	23°C
Test Engineer:	C. Robinson
Test Specification:	47 CFR 15.207 Conducted Emissions
EUT:	BUSINESS CORDLESS 905

Line 2



D.4 RADIATED EMISSION DATA 47 CFR §15.209 and 15.249

D.5 Test Procedure

The following data lists the significant emission frequencies, measured levels, correction factor (includes cable correction and antenna factors), the corrected reading, plus the limit. Explanation of the Correction Factor is given in paragraph D.7. The frequency range investigated was 30 MHz to 1000 MHz.

D.6 Test Data

Radiated Emissions OATS

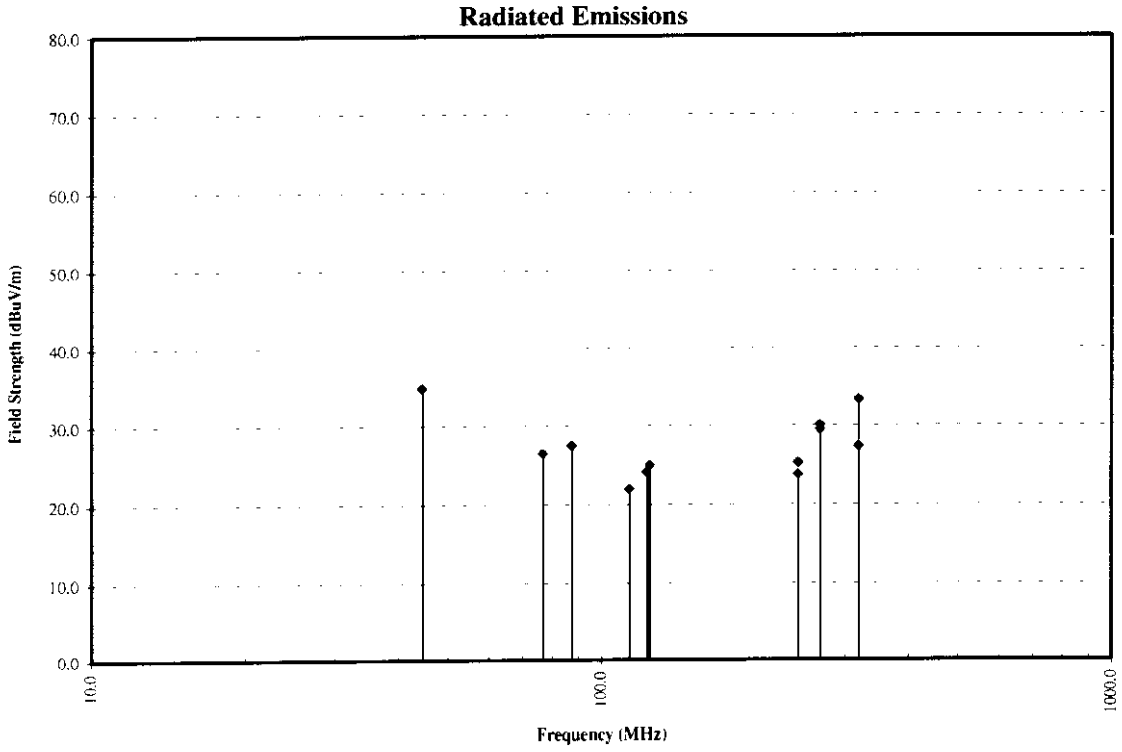
Name of EUT:	905		
Serial Number:		Date of Test:	May 19, 1998
Temperature:	22°C	Relative Humidity:	42%
Product Class:	B	Test Facility:	Open Area Test Site
Test Specification:	CFR 47, Part 15	Measurement Distance:	3 Meters
File Number:	98022	Test Engineer:	T. Donnelly

Freq. (MHz)	EUT Azimuth (Degrees)	Antenna Height (cm)	Antenna Polarity (H/V)	Meter Reading (dBuV)	Cable Loss (dB)	Antenna Factor (dB/m)	Ambient Level (dBuV/m)	Field Intensity (dBuV/m)	Spec Limit (dBuV/m)	Margin (dB)
Channel 2										
44.54	58.2	100	V	21.6	1.8	11.7	0*	35.1	40.0	4.9
76.80	229.2	118	V	16.8	2.2	7.7	0*	26.7	40.0	13.3
87.55	291.6	147	V	17.4	2.3	8.0	0*	27.7	40.0	12.3
113.66	309.0	122	V	7.9	2.6	11.5	0*	22.1	43.5	21.4
122.88	0.0	100	V	9.4	2.7	12.2	0*	24.3	43.5	19.2
124.42	219.0	100	V	10.2	2.7	12.3	0*	25.2	43.5	18.3
243.20	31.2	100	V	9.2	3.7	12.6	0*	25.5	46.1	20.6
243.20	130.2	118	H	7.7	3.7	12.6	0*	24.0	46.1	22.1

268.80	61.2	101	V	11.9	3.9	13.9	0*	29.7	46.1	16.4
268.80	78.0	100	H	12.4	3.9	13.9	0*	30.2	46.1	15.9
320.00	319.8	100	H	8.6	4.3	14.7	0*	27.6	46.1	18.5
320.00	238.8	149	V	14.6	4.3	14.7	0*	33.6	46.1	12.5

Name of EUT:	905		
Serial Number:		Date of Test:	May 19, 1998
Temperature:	22°C	Relative Humidity:	42%
Product Class:	B	Test Facility:	Open Area Test Site
Test Specification:	CFR 47, Part 15	Measurement Distance:	3 Meters
File Number:	98022	Test Engineer:	T. Donnelly

Channel 2



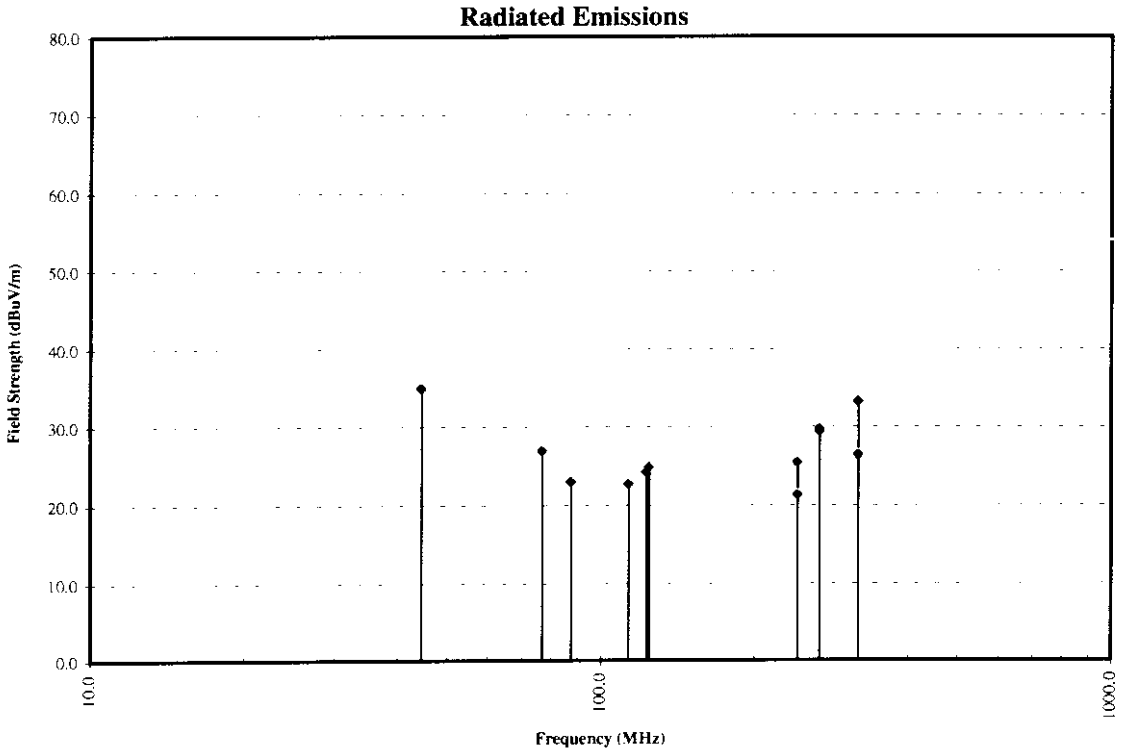
FCC ID:AS5LTI905A

Name of EUT:	905		
Serial Number:		Date of Test:	May 19, 1998
Temperature:	22°C	Relative Humidity:	42%
Product Class:	B	Test Facility:	Open Area Test Site
Test Specification:	CFR 47, Part 15	Measurement Distance:	3 Meters
File Number:	98022	Test Engineer:	T. Donnelly

Freq. (MHz)	EUT Azimuth (Degrees)	Antenna Height (cm)	Antenna Polarity (H/V)	Meter Reading (dBuV)	Cable Loss (dB)	Antenna Factor (dB/m)	Ambient Level (dBuV/m)	Field Intensity (dBuV/m)	Spec Limit (dBuV/m)	Margin (dB)
Channel 8										
44.54	0.0	100	V	21.7	1.8	11.7	0*	35.2	40.0	4.8
76.80	238.8	102	V	17.2	2.2	7.7	0*	27.1	40.0	12.9
87.55	240.0	140	V	12.8	2.3	8.0	0*	23.1	40.0	16.9
113.66	310.2	100	V	8.6	2.6	11.5	0*	22.8	43.5	20.7
122.88	0.0	100	V	9.4	2.7	12.2	0*	24.3	43.5	19.2
124.42	0.0	100	V	10.0	2.7	12.3	0*	25.0	43.5	18.5
243.20	130.2	121	H	5.1	3.7	12.6	0*	21.4	46.1	24.7
243.20	40.2	100	V	9.3	3.7	12.6	0*	25.6	46.1	20.5
268.80	94.8	100	V	11.8	3.9	13.9	0*	29.6	46.1	16.5
268.80	88.8	100	H	12.1	3.9	13.9	0*	29.9	46.1	16.2
320.00	311.4	100	H	7.6	4.3	14.7	0*	26.6	46.1	19.5
320.00	239.4	149	V	14.5	4.3	14.7	0*	33.5	46.1	12.6

Name of EUT:	905		
Serial Number:		Date of Test:	May 19, 1998
Temperature:	22°C	Relative Humidity:	42%
Product Class:	B	Test Facility:	Open Area Test Site
Test Specification:	CFR 47, Part 15	Measurement Distance:	3 Meters
File Number:	98022	Test Engineer:	T. Donnelly

Channel 8

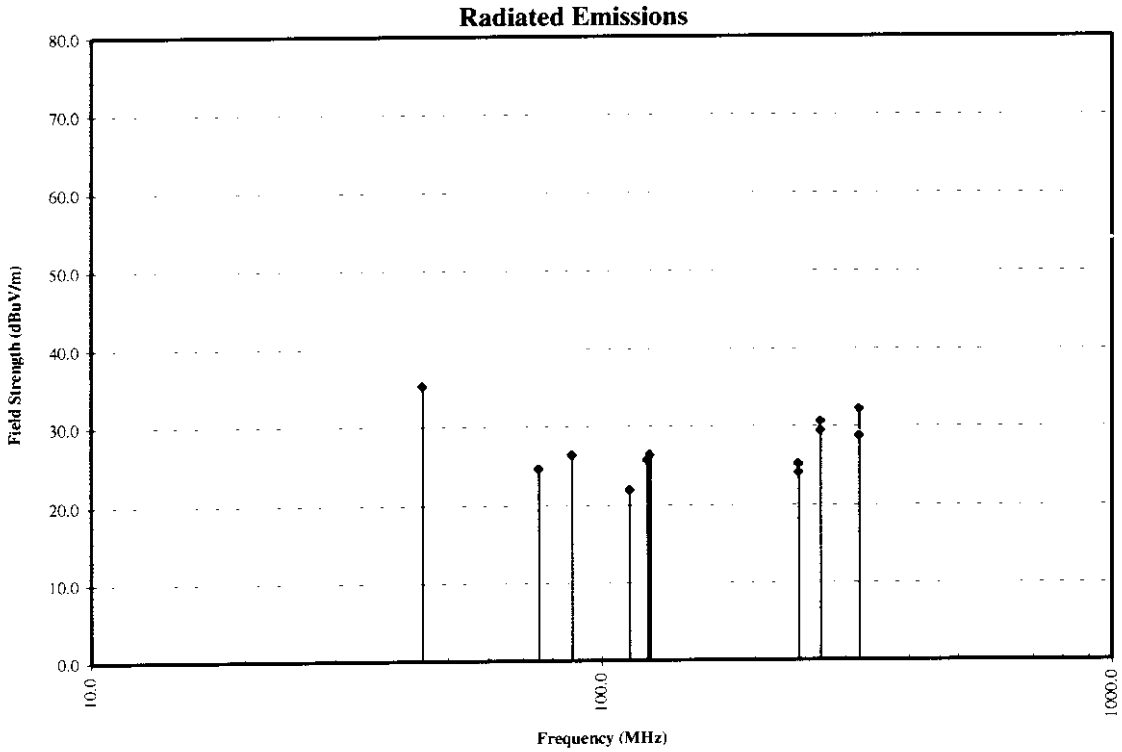


Name of EUT:	905		
Serial Number:		Date of Test:	May 19, 1998
Temperature:	22°C	Relative Humidity:	42%
Product Class:	B	Test Facility:	Open Area Test Site
Test Specification:	CFR 47, Part 15	Measurement Distance:	3 Meters
File Number:	98022	Test Engineer:	T. Donnelly

Freq. (MHz)	EUT Azimuth (Degrees)	Antenna Height (cm)	Antenna Polarity (H/V)	Meter Reading (dBuV)	Cable Loss (dB)	Antenna Factor (dB/m)	Ambient Level (dBuV/m)	Field Intensity (dBuV/m)	Spec Limit (dBuV/m)	Margin (dB)
Channel 16										
44.54	4.8	100	V	22.0	1.8	11.7	0*	35.5	40.0	4.5
75.26	319.8	100	V	14.8	2.2	7.9	0*	24.9	40.0	15.1
87.55	266.4	133	V	16.3	2.3	8.0	0*	26.6	40.0	13.4
113.66	310.2	100	V	7.9	2.6	11.5	0*	22.1	43.5	21.4
122.88	57.6	100	V	11.0	2.7	12.2	0*	25.9	43.5	17.6
124.42	0.0	100	V	11.6	2.7	12.3	0*	26.6	43.5	16.9
243.20	130.8	122	H	8.0	3.7	12.6	0*	24.3	46.1	21.8
243.20	40.8	101	V	9.1	3.7	12.6	0*	25.4	46.1	20.7
268.80	299.4	232	V	13.0	3.9	13.9	0*	30.8	46.1	15.3
268.80	60.6	100	H	11.8	3.9	13.9	0*	29.6	46.1	16.5
320.00	15.6	101	H	9.9	4.3	14.7	0*	28.9	46.1	17.2
320.00	0.0	194	V	13.4	4.3	14.7	0*	32.4	46.1	13.7

Name of EUT:	905		
Serial Number:		Date of Test:	May 19, 1998
Temperature:	22°C	Relative Humidity:	42%
Product Class:	B	Test Facility:	Open Area Test Site
Test Specification:	CFR 47, Part 15	Measurement Distance:	3 Meters
File Number:	98022	Test Engineer:	T. Donnelly

Channel 16



Name of EUT:	905		
Serial Number:		Date of Test:	May 20, 1998
Temperature:	23°C	Relative Humidity:	46%
Product Class:	B	Test Facility:	Open Area Test Site
Test Specification:	CFR 47, Part 15	Measurement Distance:	3 Meters
File Number:	98022	Test Engineer:	T. Donnelly

Freq. (MHz)	EUT Azimuth (Degrees)	Antenna Height (cm)	Antenna Polarity (H/V)	Meter Reading (dBuV)	Cable Loss (dB)	Antenna Factor (dB/m)	Ambient Level (dBuV/m)	Field Intensity (dBuV/m)	Spec Limit (dBuV/m)	Margin (dB)
Channel 2, Base										
1804	184	161	H	18.0	0.0	26.9	0*	44.9	54.0	9.1
1804	6	209	V	13.0	0.0	26.9	0*	39.9	54.0	14.1
2707	232	100	V	14.0	0.0	29.1	0*	43.1	54.0	10.9
3612	259	161	H	8.0	0.0	31.1	0*	39.1	54.0	14.9
3612	319	149	V	9.0	0.0	31.1	0*	40.1	54.0	13.9
4510	266	209	V	18.0	0.0	31.6	0*	49.6	54.0	4.4
Channel 2, Handset										
1829	346	209	V	26.0	0.0	26.9	0*	52.9	54.0	1.1
1829	170	333	H	20.0	0.0	26.9	0*	46.9	54.0	7.1
2739	167	100	H	21.0	0.0	29.1	0*	50.1	54.0	3.9
2739	38	100	V	20.0	0.0	29.1	0*	49.1	54.0	4.9
3654	104	100	V	8.0	0.0	31.1	0*	39.1	54.0	14.9
4563	315	117	V	14.0	0.0	31.6	0*	45.6	54.0	8.4
4563	310	100	H	16.0	0.0	31.6	0*	47.6	54.0	6.4

Name of EUT:	905		
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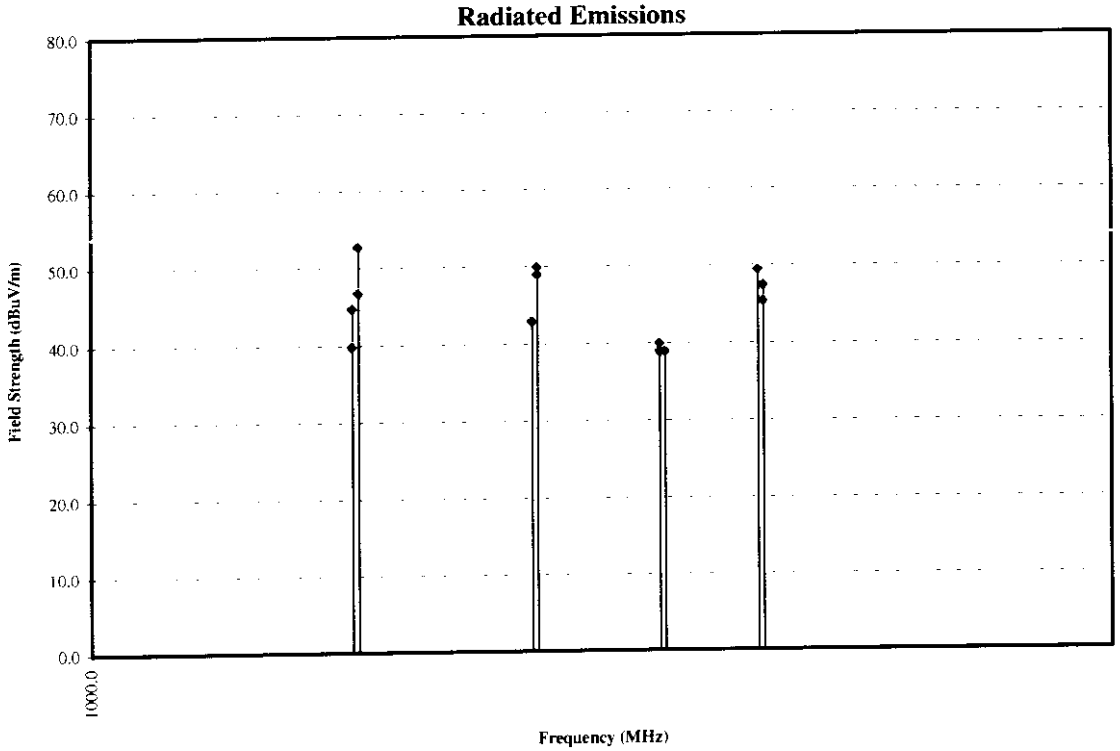
Test Specification:	CFR 47, Part 15	Measurement Distance:	3 Meters
File Number:	98022	Test Engineer:	T. Donnelly

Channel 2, Base and Handset



Name of EUT:	905		
Serial Number:		Date of Test:	May 20, 1998
Temperature:	23°C	Relative Humidity:	46%
Product Class:	B	Test Facility:	Open Area Test Site
Test Specification:	CFR 47, Part 15	Measurement Distance:	3 Meters
File Number:	98022	Test Engineer:	T. Donnelly

Freq. (MHz)	EUT Azimuth (Degrees)	Antenna Height (cm)	Antenna Polarity (H/V)	Meter Reading (dBuV)	Cable Loss (dB)	Antenna Factor (dB/m)	Ambient Level (dBuV/m)	Field Intensity (dBuV/m)	Spec Limit (dBuV/m)	Margin (dB)
Channel 8, Base										
1806	233	100	V	21.0	0.0	26.9	0*	47.9	54.0	6.1
1806	169	114	H	12.0	0.0	26.9	0*	38.9	54.0	15.1
2710	314	226	H	13.0	0.0	29.1	0*	42.1	54.0	11.9
2710	331	225	V	12.0	0.0	29.1	0*	41.1	54.0	12.9
3615	66	200	V	9.0	0.0	31.1	0*	40.1	54.0	13.9
Channel 8, Handset										
1828	300	117	H	19.0	0.0	26.9	0*	45.9	54.0	8.1
1828	271	209	V	22.0	0.0	26.9	0*	48.9	54.0	5.1
2743	224	163	V	23.0	0.0	29.1	0*	52.1	54.0	1.9
2743	314	178	H	22.0	0.0	29.1	0*	51.1	54.0	2.9
4568	256	185	V	19.0	0.0	31.6	0*	50.6	54.0	3.4
4568	313	117	H	20.0	0.0	31.6	0*	51.6	54.0	2.4

Name of EUT:	905		
Serial Number:		Date of Test:	May 20, 1998
Temperature:	23°C	Relative Humidity:	46%
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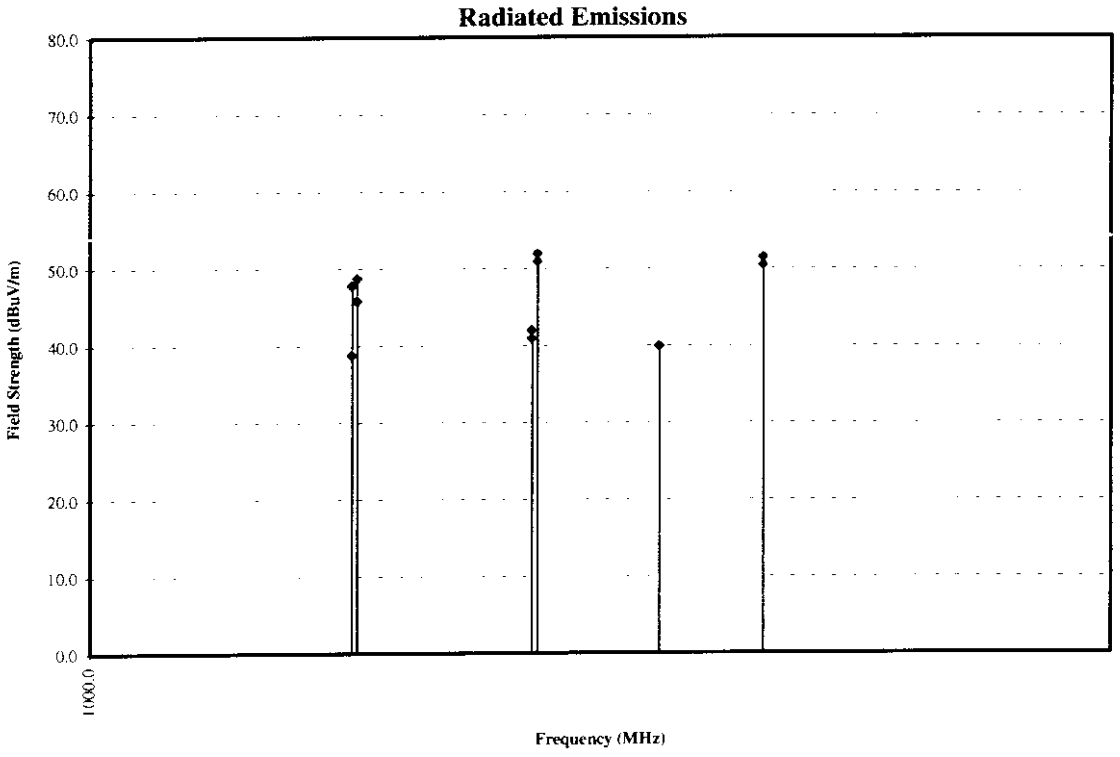
File Number:	98022	Test Engineer:	T. Donnelly

Channel 8, Base and Handset



Name of EUT:	905		
Serial Number:		Date of Test:	May 20, 1998
Temperature:	23°C	Relative Humidity:	46%
Product Class:	B	Test Facility:	Open Area Test Site
Test Specification:	CFR 47, Part 15	Measurement Distance:	3 Meters
File Number:	98022	Test Engineer:	T. Donnelly

Freq. (MHz)	EUT Azimuth (Degrees)	Antenna Height (cm)	Antenna Polarity (H/V)	Meter Reading (dBuV)	Cable Loss (dB)	Antenna Factor (dB/m)	Ambient Level (dBuV/m)	Field Intensity (dBuV/m)	Spec Limit (dBuV/m)	Margin (dB)
Channel 16, Base										
1810	258	267	V	22.0	0.0	26.9	0*	48.9	54.0	5.1
2715	163	100	V	19.0	0.0	29.1	0*	48.1	54.0	5.9
2715	194	118	H	12.0	0.0	29.1	0*	41.1	54.0	12.9
3620	271	133	V	12.0	0.0	31.1	0*	43.1	54.0	10.9
4525	252	100	V	9.0	0.0	31.6	0*	40.6	54.0	13.4
Channel 16, Handset										
1831	269	205	V	23.0	0.0	26.9	0*	49.9	54.0	4.1
1831	233	117	H	17.0	0.0	26.9	0*	43.9	54.0	10.1
2745	323	110	H	20.0	0.0	29.1	0*	49.1	54.0	4.9
2745	341	146	V	15.0	0.0	29.1	0*	44.1	54.0	9.9
4575	304	116	H	14.0	0.0	31.6	0*	45.6	54.0	8.4
4575	323	132	V	15.0	0.0	31.6	0*	46.6	54.0	7.4

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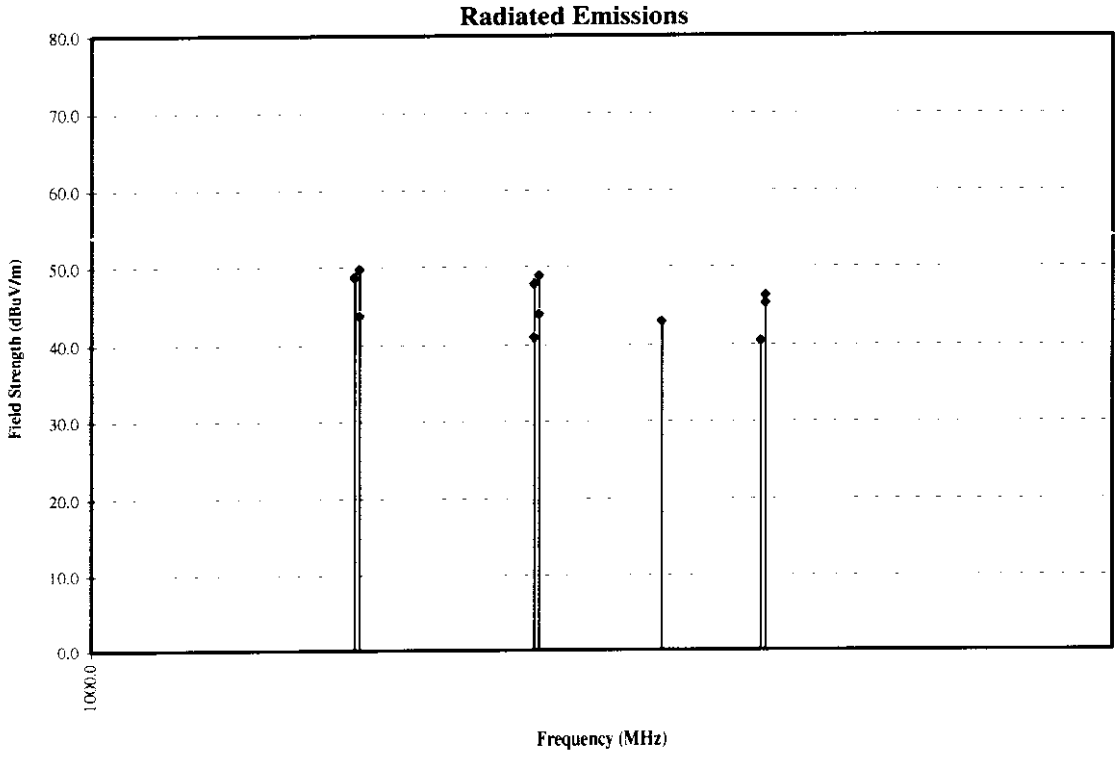
Channel 16, Base and Handset



D.7 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG

where FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Attenuation Factor

Assume a receiver reading of 23.5 dBuV is obtained. The Antenna Factor of 7.4 and a Cable Factor of 1.1 is added., giving a field strength of 32 dBuV/m.

FS = 23.5 + 7.4 + 1.1 = 32 dBuV/m

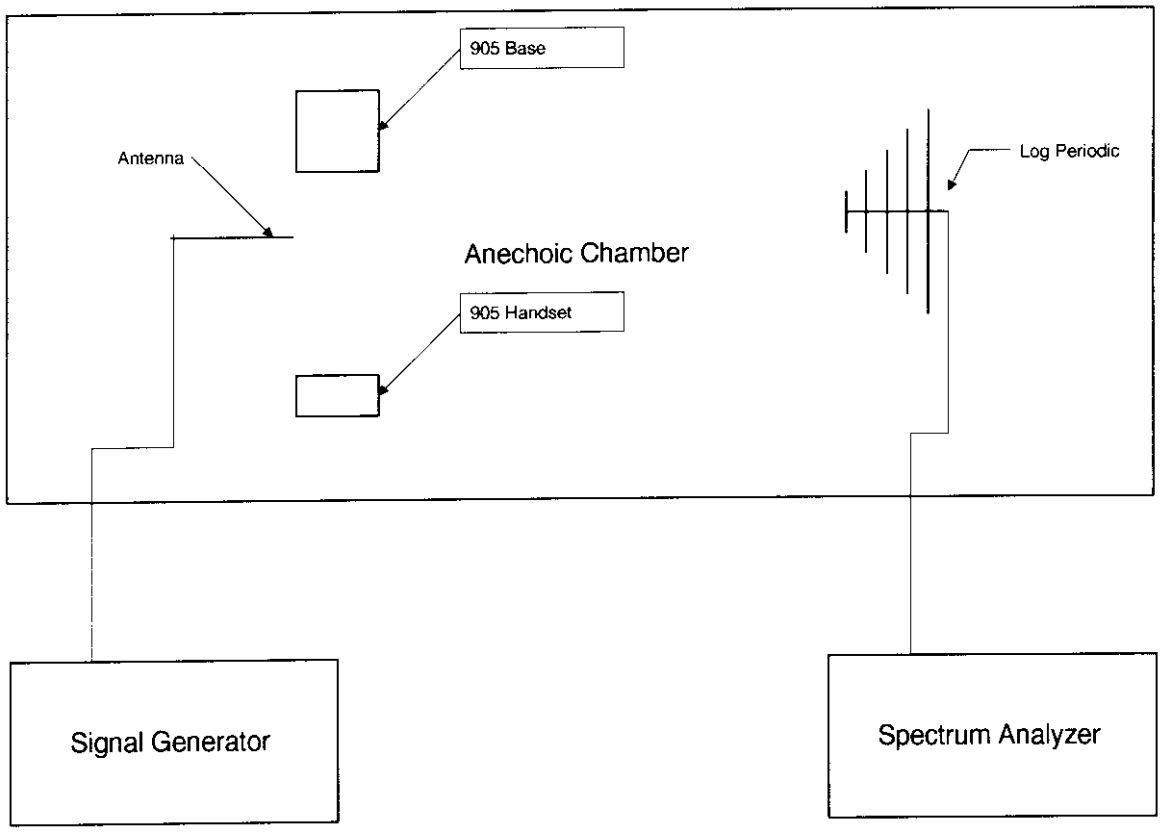
Figure D.4.1 Radiated Emissions Test Configuration Photographs

D.8 AUTOMATIC CHANNEL SELECTION 47 CFR §15.233(b)(2)

NOT Applicable to a 15.249 device

The BUSINESS CORDLESS 905 telephone was tested for Automatic Channel Selection. The test configuration below was utilized to test the BUSINESS CORDLESS 905 for occupied channel avoidance.

The signal generator was set at each handset and base carrier frequency. Each carrier was tested for avoidance the results were monitored on a spectrum analyzer. The BUSINESS CORDLESS 905 base and handset automatically avoided the occupied frequencies generated by the signal generator.



Measurement and Test Instrumentation

Manufacturer	Model Number	Serial Number	Description	Cal Cycle Month
Hewlett Packard	53181A	3548A02400	RF Counter	12
Hewlett Packard	8591A	3034A01473	RF Spectrum Analyzer	12
Hewlett Packard	33120A	US36005460	Function Generator	12
Electro-Metrics	EMC-60		Test Receiver 1-26 GHz	12
EMCO	3110	9104-1331	Biconical Antenna 26- 300 MHz	12
OMEGA	RH 411	NA	Digital Thermo-hygrometer	12
Hewlett-Packard	E3612A	KR15000324	DC Power Supply	12
Fluke	79	67210387	Digital Multimeterr	12
Polarad	ESVP	879807/049	Test Receiver 20 MHz - 1.3 GHz	12
Rhode & Schwarz	Panorama Adapter EPM	883613/014	Display Monitor (IF 10.75 MHz)	12
EMCO	3146	2082	Log Periodic Antenna 200 - 1000 MHz	12
Eaton	96002		Biconical Antenna 20 - 220 MHz	12
Hewlett Packard	8447	2944A08774	Pre Amplifier	12
Hewlett Packard	11947A		Transient Limiter	12
EMCO	3816/2NM		LISN	12

EXHIBIT F Theory of Operation

Frequency Plan

The BUSINESS CORDLESS 905 utilizes a 16 channel frequency plan as shown below:

Channel Number	BaseTX/HandRX (MHz)	HandTX/BaseRX (MHz)
1..	902.200	912.900
2..	902.400	913.100
3..	902.600	913.300
4..	902.800	913.500
5..	903.000	913.700
6..	903.200	913.900
7..	903.400	914.100
8..	903.600	914.300
9..	903.800	914.500
10..	904.000	914.700

Channel Number	BaseTX/HandRX (MHz)	HandTX/BaseRX (MHz)
11..	904.200	914.900
12..	904.400	915.100
13..	904.600	915.300
14..	904.800	915.500
15..	905.000	915.700
16..	905.200	915.900

INTRODUCTION

This document outlines the circuit description for the BUSINESS CORDLESS 905 System. The document is divided into three sections: base, handset and radio.

Base Telephone Line Interface

This section of the circuit comprises the telephone line interface. Starting with the hook-switch, signal /OFHK (a slash is used to indicate that a signal is active low) is used to control the relay.

The telephone hybrid (or network interface) is composed of IC7a, IC7d and Q300. The transformer provides voltage isolation between the telephone and the line. R318 sets the impedance of the interface since the driver is a current source. Transmit audio appears on signal TX where it is summed with test inputs (TXSUM) and a DC bias voltage by IC7a. The output of IC7a drives the current source formed by Q300. Gain is controlled by R315 while additional gain (and compensation) are provided by R526 and C522. The balance network is provided by R317, C308, R316, C307 and R3134. The RX signal and the inverted TX signal are summed by IC7d and the receive signal appears on RCVHYB. The telephone interface attempts to minimize sidetone. Direct sidetone is provided within the handset.

Base Baseband Controller

The baseband controller, IC3, is the heart of the system. This device provides the microcomputer, the TDD and the ADPCM codecs.

Analog audio input to IC3 is at IC3 pin 3 and analog audio output is at IC3 pin 2.

TDD I/Os

TDD I/Os on IC3 are in the area of pins 67 through 82. The number in parenthesis is the pin number of the 84 PLCC package. Specifically, the signals function as follows:

MREF (81)

This is the analog modulation reference and it sits at 1.5 volts whenever the radio is active.

TXQ/TXI (82/80)

This set operates in NRZI mode, thus the I and Q signals are complimentary and are not offset relative to each other by 90 degrees. Instead, these modulation output signals are complimentary in nature. When not actively transmitting data they both rest at 1.5 volts. For data value "1" one goes to 2.0 volts and the other goes to 1.0 volts. For data value "0" the signal levels are reversed (one to 1.0 volts and the other to 2.0 volts).

RSSI (79)

The Receive Signal Strength Indicator (RSSI) is an A/D input that the microcomputer can read. The firmware uses this signal to identify channels with activity on them during the link establishment and re-establishment process.

SHCTRL (77)

The Sample and Hold Control (SHCTRL) signal is designed to be used to control a sample and hold gate for the reference voltage of the data slicer.. When SHCTRL is low (inactive) the TDD is positive that the data are not valid. When SHCTRL is high (active) the data are valid if a link is established. If a link has not been established then SHCTRL is high as the TDD attempts to find signals to frame on.

TXPWR (76)

This is an output under control of the microcomputer that can be used to set the transmitter to normal power or reduced power. We ignore this signal in the BUSINESS CORDLESS 905 system.

MCLK (75)

This is the 12.8 MHz clock signal that drives IC3.

RXEN (73)

This is the output of the TDD that commands the radio receiver front end to be activated.

TXEN (72)

This is the output of the TDD that commands the radio transmitter and antenna switch to be activated.

RXDATA (67)

Demodulated digital data from the data slicer.

SERIAL BUS I/Os

SDOUT (66)

Serial data output. Drives the synthesizer, the EEPROM and the TAP.

SDIN (65)

Serial data input from the EEPROM

SCLK (64)

Serial clock output. Drives the synthesizer, the EEPROM and the TAP.

Base Power Distribution and Battery Charging

There are two potential sources of power for the base, AC mains and battery. First is the AC mains power pack with an input on J2 at location 3A8. The second power source is an optional 3.6 VDC NiCad battery

Handset baseband

The handset baseband functions of the TDD controller are similar to those of the base unit.

Radio Subsystem

The radio for handset and base have identical circuits. The only substantial difference is that the handset radio includes the acoustical alerter and the base does not.

Handset Radio

The radio module IC silicon operates from 3.0 VDC and this power is derived from the voltage regulator shown at 2A7

The system oscillator, 12.8 MHz is shown at location 2B6. This oscillator drives the TDD controller as well as the synthesizer.

The synthesizer, IC204, is shown at location 2C6. It controls a single VCO which does not change frequency during TDD. It only changes frequency when going to a new channel (at link or ring/page time, when user presses CHANNEL button, when signal is lost during a phone call).

The transmit modulation appears on TXI and TXQ on the connector at location 2D7. Since the I and Q signals are 180 degrees out of phase when they are added via superposition by R207 and R208 (location 2D6) they are effectively subtracting one from the other. The resultant signal level at the junction of R207 and R208 is approximately 200 mVpp with a DC bias of 1.5 volts. This data signal is then low pass filtered and reduced in amplitude by the linear phase filter formed by IC201a and IC201b (location 2D4).

The acoustical alerter (handset only) is shown at location 2C8.

Handset Radio

The VCO oscillator gain block is contained within IC104, MC13142 at location 1D5 with the resonator shown at 1C7. The synthesizer control signal from the loop filter is applied via signal PLL-IN at location 1C8 while the filtered data modulation is applied via TXMOD at location 1C8. These two signals are combined by superposition via resistors R146 and R145, respectively.

The buffered VCO output drives the RX mixer within IC104 as well as an additional VCO buffer amplifier formed by Q100 at location 1B5. The output of the VCO buffer drives the Fin input of the synthesizer as well as the input of the transmit final amplifier, IC106. The output of the final amp passes through the T/R switch, IC102, to the antenna. The final amp and the T/R switch are controlled by the TXEN signal which is driven by the TDD controller on the main board.

The receive signal passes from the antenna through the T/R switch to the front end filter, FL100. From there the signal passes through the LNA, IC103 at location 1D7, to the post LNA amplifier, Q103 at location 1D6, to the RX mixer within IC104.

The output of the RX mixer at 10.7 MHz is impedance matched by Q101 (location 1C5) and then filtered by FL105. The IF amplification and FM detection is provided by IC105, an MC13158, at location 1C3 (refer to the Motorola data sheet for more information on the MC13158). The IF amplifier chain is split such that FL105 is inserted in the middle of the chain to limit noise and provide additional filtering.

A ceramic resonator is used along with the quadrature detector within IC105 to form a frequency to voltage converter. The conversion ratio is approximately 3 mV/kHz. Typical outputs from IC105 pin 17 in this system are 350 mVpp.

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D.4 RADIATED EMISSION DATA 47 CFR §15.209 and 15.249

D.5 Test Procedure

The following data lists the significant emission frequencies, measured levels, correction factor (includes cable correction and antenna factors), the corrected reading, plus the limit. Explanation of the Correction Factor is given in paragraph D.7. The frequency range investigated was 30 MHz to 1000 MHz.

D.6 Test Data

Radiated Emissions OATS

Name of EUT:	905		
Serial Number:		Date of Test:	May 12, 1998
Temperature:	21°C	Relative Humidity:	41%
Product Class:	B	Test Facility:	Open Area Test Site
Test Specification:	CFR 47, Part 15	Measurement Distance:	3 Meters
File Number:	98022	Test Engineer:	T. Donnelly

Freq. (MHz)	EUT Azimuth (Degrees)	Antenna Height (cm)	Antenna Polarity (H/V)	Meter Reading (dBuV)	Cable Loss (dB)	Antenna Factor (dB/m)	Ambient Level (dBuV/m)	Field Intensity (dBuV/m)	Spec Limit (dBuV/m)	Margin (dB)
902.4	57.0	223	H	54.3	6.54	26.25	0*	87.09	94	6.91
902.4	153.6	131	V	59.7	6.54	26.25	0*	92.49	94	1.51
903.6	49.8	250	H	55.7	6.55	26.27	0*	88.52	94	5.48
903.6	150.61	131	V	59.3	6.55	26.27	0*	92.12	94	1.88
905.2	64.8	251	H	56.3	6.56	26.30	0*	89.16	94	4.84
905.2	153	127	V	59.0	6.56	26.30	0*	91.86	94	2.14
913.1	313.2	200	H	51.5	6.59	26.46	0*	84.56	94	9.44
913.1	328.2	195	V	49.4	6.59	26.46	0*	82.46	94	11.54

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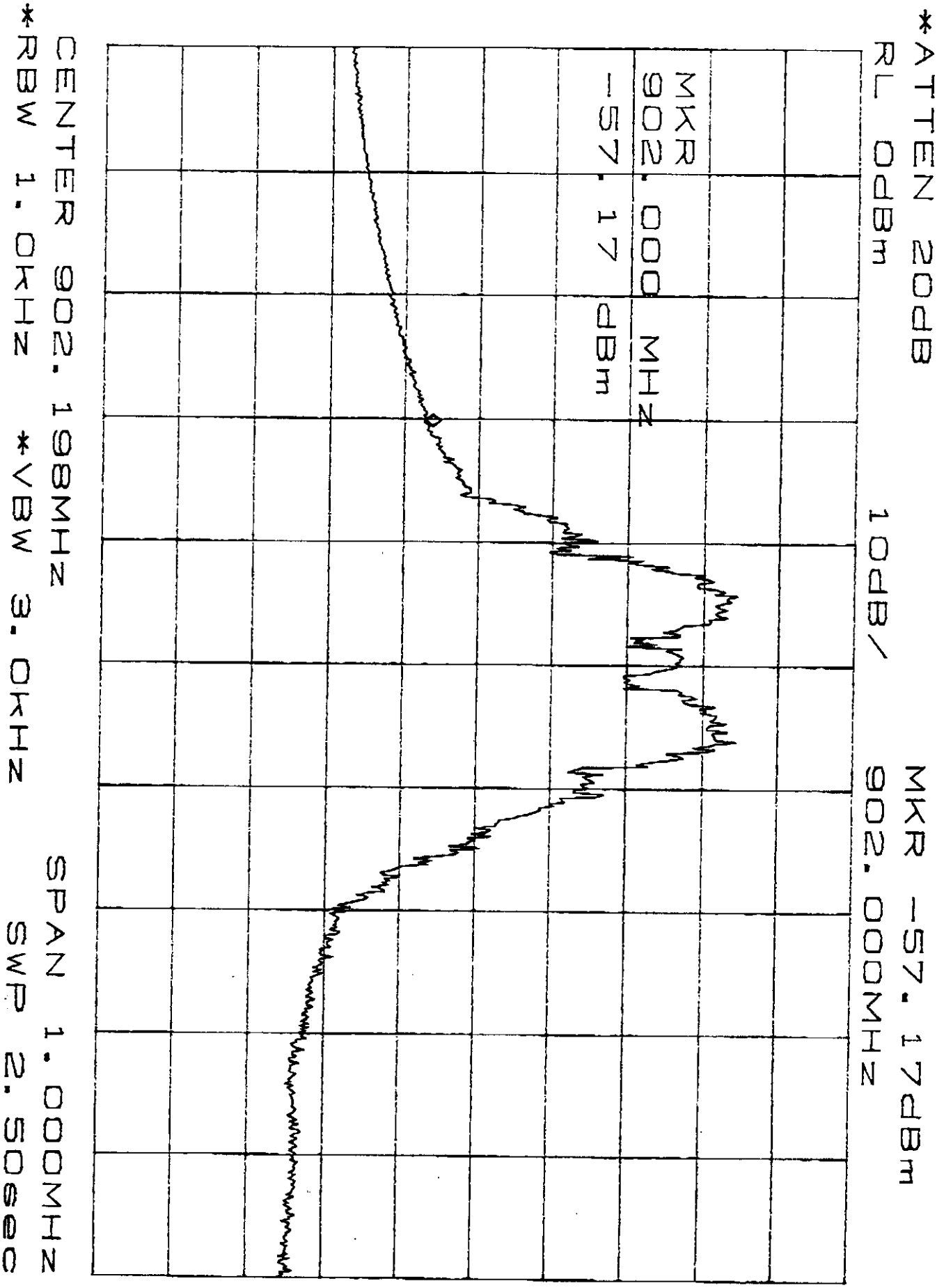
914.3	346.8	183	V	52.4	6.60	26.49	0*	85.49	94	8.51
914.3	352.61	193	H	49.7	6.60	26.49	0*	82.79	94	11.21
915.9	316.8	197	H	49.9	6.61	26.52	0*	83.03	94	10.97
915.9	330.61	195	V	49.5	6.61	26.52	0*	82.63	94	11.37

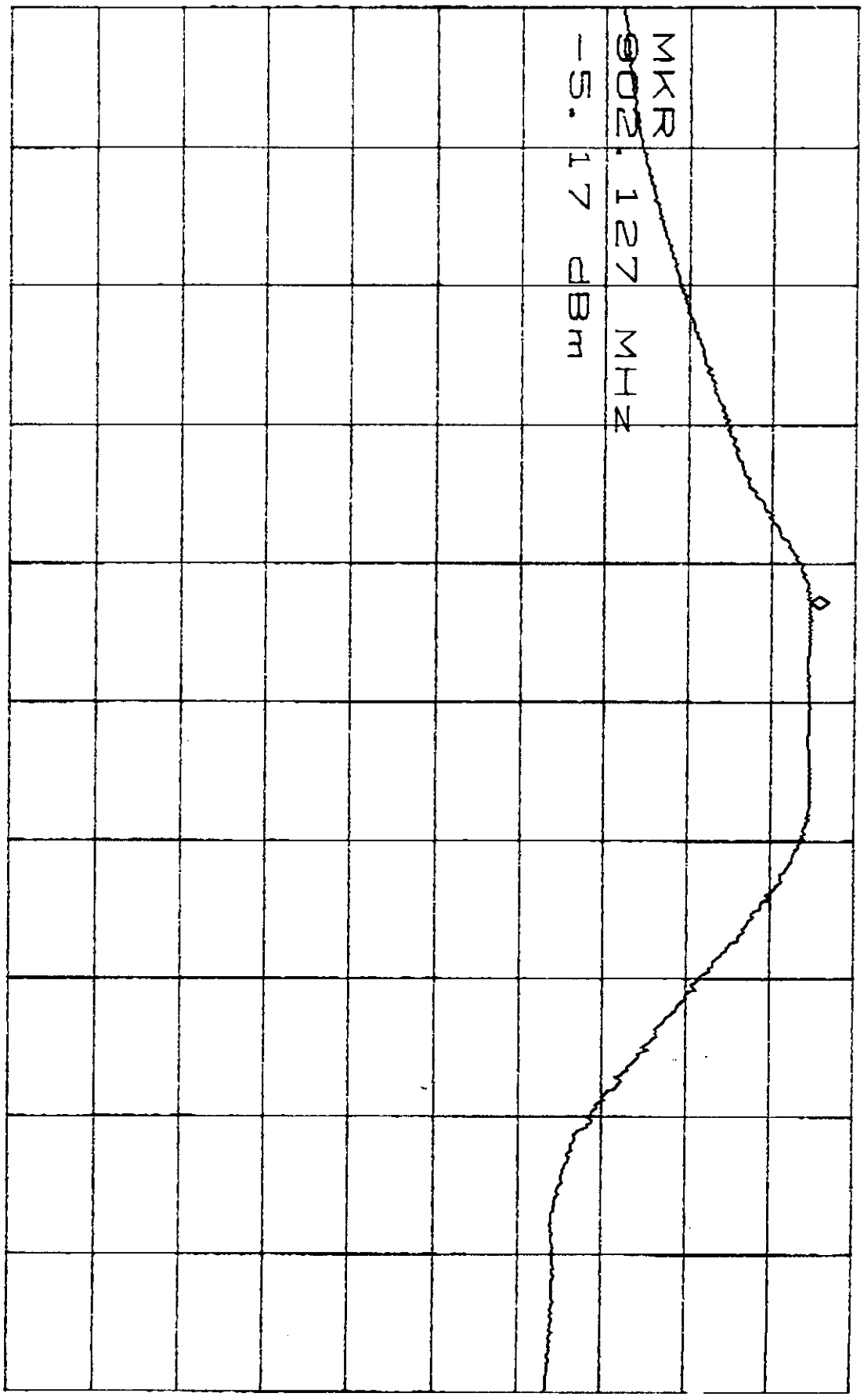
Radiated Emissions OATS

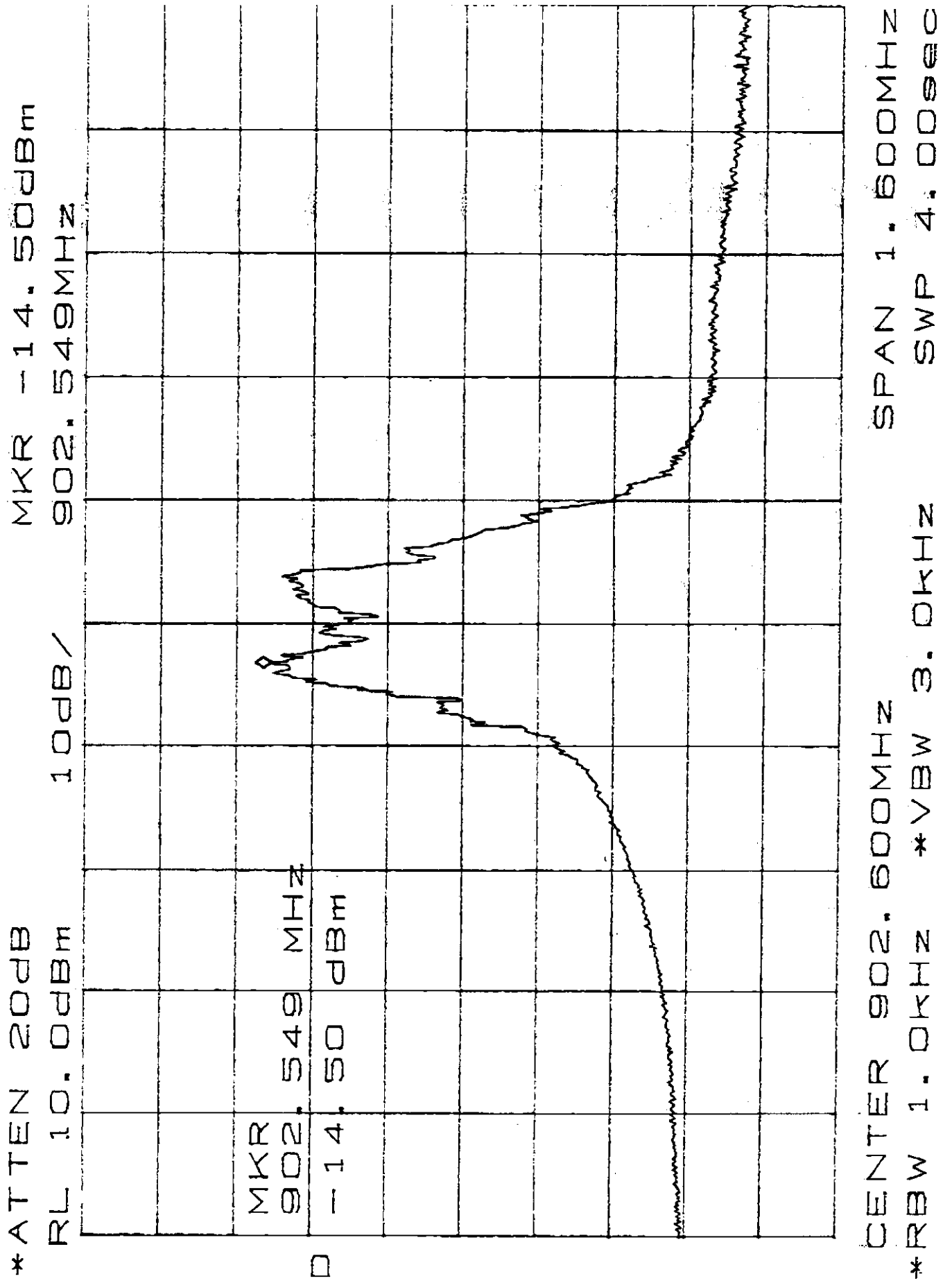
Name of EUT: 905
Serial Number:
Temperature: 22°C
Product Class: B
Test Specification: CFR 47, Part 15
File Number: 98022

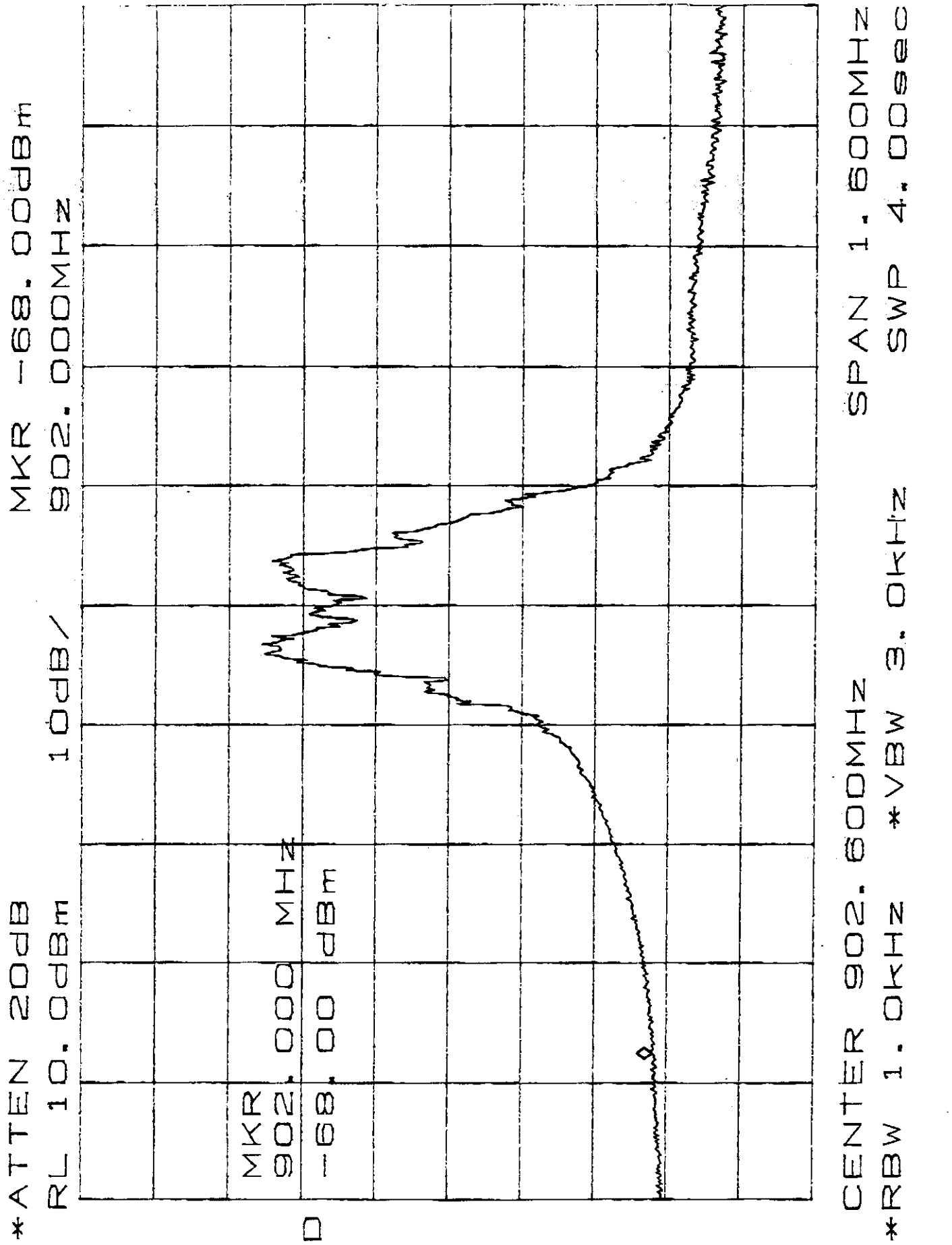
Date of Test: May 19, 1998
Relative Humidity: 42%
Test Facility: Open Area Test Site
Measurement Distance: 3 Meters
Test Engineer: T. Donnelly

Freq. (MHz)	EUT Azimuth (Degrees)	Antenna Height (cm)	Antenna Polarity (H/V)	Meter Reading (dBuV)	Cable Loss (dB)	Antenna Factor (dB/m)	Ambient Level (dBuV/m)	Field Intensity (dBuV/m)	Spec Limit (dBuV/m)	Margin (dB)
Channel 2										
44.54	58.2	100	V	21.6	1.8	11.7	0*	35.1	40.0	4.9
76.80	229.2	118	V	16.8	2.2	7.7	0*	26.7	40.0	13.3
87.55	291.6	147	V	17.4	2.3	8.0	0*	27.7	40.0	12.3
113.66	309.0	122	V	7.9	2.6	11.5	0*	22.1	43.5	21.4
122.88	0.0	100	V	9.4	2.7	12.2	0*	24.3	43.5	19.2
124.42	219.0	100	V	10.2	2.7	12.3	0*	25.2	43.5	18.3
243.20	31.2	100	V	9.2	3.7	12.6	0*	25.5	46.1	20.6
243.20	130.2	118	H	7.7	3.7	12.6	0*	24.0	46.1	22.1
268.80	61.2	101	V	11.9	3.9	13.9	0*	29.7	46.1	16.4
268.80	78.0	100	H	12.4	3.9	13.9	0*	30.2	46.1	15.9
320.00	319.8	100	H	8.6	4.3	14.7	0*	27.6	46.1	18.5
320.00	238.8	149	V	14.6	4.3	14.7	0*	33.6	46.1	12.5


*ATTEN 20dB
RL 0dBm
10dB/
MKR -157.17dBm
902.000MHz
MKR
902.000 MHz
-157.17 dBm
CENTER 902.198MHz
*RBW 1.0KHz
*VBW 3.0KHz
SPAN 1.000MHz
SWP 2.50sec


*ATTEN 20dB
RL 0dBm
10dB/
MKR -5.17dBm
902.127MHz
MKR
902.127 MHz
-5.17 dBm
D
CENTER 902.198MHz
*RBW 100KHz
*VBW 300KHz
SPAN 1.000MHz
SWP 50.0ms


*ATTEN 20dB
RL 10.0dBm
10dB/
MKR -14.50dBm
902.549MHz
MKR
902.549 MHz
-14.50 dBm
CENTER 902.600MHz
*RBW 1.0kHz
*VBW 3.0kHz
SPAN 1.600MHz
SWP 4.00sec


*ATTEN 20dB
RL 10.0dBm
10dB/
MKR -68.00dBm
902.000MHz
MKR
902.000 MHz
-68.00 dBm
CENTER 902.600MHz
*RBW 1.0kHz
*VBW 3.0kHz
SPAN 1.600MHz
SWP 4.00sec