Deutscher Akkreditierungs Rat
REGISTRATION NO. DAT-P-051/95-10e

ACCREDITED
EMC/SAFETY

CERTIFICATION TEST REPORT

FOR THE

BLT TRANSCEIVER, 26-0612
(TRANSMITTER PORTION ONLY)

FCC PART 15.247/15.209

COMPLIANCE

DATE OF ISSUE: MARCH 20, 2000

PREPARED FOR:

CellNet Data Systems
125 Shoreway Road
San Carlos, CA 94070

W.O. No: 73813

Report No: FC00-025

PREPARED BY:

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Date of test: March 3 & 6, 2000

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Dennis Ward

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Director of Laboratories
CKC Laboratories, Inc.

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ADMINISTRATIVE INFORMATION

DATE OF TEST:	March 3 & 6, 2000
PURPOSE OF TEST:	To demonstrate the compliance of the BLT Transceiver, 26-0612, with the requirements for FCC Part 15.247 and 15.209 devices.
MANUFACTURER:	CellNet Data Systems 125 Shoreway Road San Carlos, CA 94070
REPRESENTATIVE:	Gordon Furze
TEST LOCATION:	CKC Laboratories, Inc. 1653 Los Viboras Road Hollister, CA 95023
TEST PERSONNEL:	Art Rice
TEST METHOD:	ANSI C63.4 1992
FREQUENCY RANGE TESTED:	450 kHz – 9200 MHz
EQUIPMENT UNDER TEST:	**BLT Transceiver** Manuf: CellNet Data Systems Model: 26-0612 Serial: B001 FCC ID: H6N26061200 (pending)

SUMMARY OF RESULTS

The CellNet Data Systems BLT Transceiver, 26-0612, was tested in accordance with ANSI C63.4 1992 for compliance with FCC Part 15.247 and 15.209.

As received, the above equipment was found to be fully compliant with the limits of FCC Part 15.247 and 15.209. The results in this report apply only to the items tested, as identified herein.

EQUIPMENT UNDER TEST (EUT) DESCRIPTION

Spread spectrum transceiver operating in the 902-928 MHz band. The EUT uses an external 5/4 wavelength whip antenna fed with a 0.25 meter coax cable having 0.8 dB loss. The EUT uses DC power from 10.5 to 15.5V from an external battery.

MEASUREMENT UNCERTAINTY

Associated with data in this report is a ±4dB measurement uncertainty.

EUT OPERATING FREQUENCY

The EUT was operating at 911.58 – 917.58 MHz.

TEMPERATURE AND HUMIDITY DURING TESTING

The temperature during testing was within +15°C and + 35°C.
The relative humidity was between 20% and 75%.

PERIPHERAL DEVICES

The EUT was tested with the following peripheral device(s):

Battery
Manuf: Genesis
Model: G12V12aH10EP
Serial: none
FCC ID: N/A

Laptop PC
Manuf: Dell
Model: PPS
Serial: 04949
FCC ID: AK8PD475SC

Antenna
Manuf: Antenna Specialists
Model: ASPG918
Serial: none
FCC ID: N/A

AC Adaptor
Manuf: Dell
Model: 73463
Serial: M5055818
FCC ID: N/A

REPORT OF MEASUREMENTS

The following tables report the highest worst case levels recorded during the tests performed on the BLT Transceiver, 26-0612. All readings taken are peak readings unless otherwise noted by a "Q" or "A". The data sheets from which these tables were compiled are contained in Appendix B.

Table 1: Peak Output Power of the Fundamental

FREQUENCY MHz	METER READING dBm	CORRECTION FACTORS Ant dB	Amp dB	Cable dB	Dist dB	CORRECTED READING dBm	SPEC LIMIT dBm	MARGIN dB	NOTES
911.450	26.3					26.3	30.0	-3.7	N
917.539	25.6					25.6	30.0	-4.4	N

Test Method: ANSI C63.4 1992
Spec Limit : FCC Part 15.247(b)
Test Distance: No Distance

NOTES:
H = Horizontal Polarization
V = Vertical Polarization
N = No Polarization
D = Dipole Reading
Q = Quasi Peak Reading
A = Average Reading

COMMENTS: The EUT and ancillary equipment were set up and tested in accordance with ANSI C63.4 and FCC DSSS test procedure Public Notice 54797 (CKC Training Procedure LP042007). The EUT is a wireless half duplex LAN transceiver operating on 911.58, 914.58, or 917.58 MHz. It is powered by a 12 Volt battery. An RJ45 SIO (Serial Input/Output) cable connects the EUT to the support PC. The SIO port normally connects to another transceiver operating in the 950 MHz range. Note 1) Testing transmit fundamental peak power in dBm. 30 dBm is 1 watt. 10 dB attenuator external to S.A. Transmitter is connected directly. S.A. resolution BW=3 MHz.

Table 2: Six Highest RF Conducted Emission Levels									
	METER	CORRECTION FACTORS				CORRECTED	SPEC		
FREQUENCY MHz	READING dBm	Ant dB	Amp dB	Cable dB	Dist dB	READING dB	LIMIT dB	MARGIN dB	NOTES
1823.140	-26.6					-26.6	1.3	-27.9	N
1835.160	-28.3					-28.3	1.3	-27.0	N
2752.670	-38.5					-38.5	1.3	-37.2	N
8204.271	-36.8					-36.8	1.3	-38.1	N
8258.340	-36.6					-36.6	1.3	-35.3	N
9175.870	-37.7					-37.7	1.3	-36.4	N

Test Method: ANSI C63.4 1992
Spec Limit : FCC Part 15.247(c)
Test Distance: No Distance

NOTES:
H = Horizontal Polarization
V = Vertical Polarization
N = No Polarization
D = Dipole Reading
Q = Quasi Peak Reading
A = Average Reading

COMMENTS: The EUT and ancillary equipment was set up and tested in accordance with ANSI C63.4 and FCC DSSS test procedure Public Notice 54797 (CKC Training Procedure LP042007). The EUT is a wireless half duplex LAN transceiver operating on 911.58, 914.58, or 917.58 MHz. It is powered by a 12 Volt battery. An RJ45 SIO cable connects the EUT to the support PC. The SIO port normally connects to another transceiver operating in the 950 MHz range. Note 1) Testing transmit harmonics and spurious signals in dBm. 10 dB attenuator external to S.A. Transmitter is connected directly. S.A. resolution BW=100 kHz. Scanned 450 kHz to 9116 MHz. Note 2) Transmit frequency is 911.58 MHz. Measured level at fundamental was 21.3 dBm. Also scanned 450 kHz to 9176 MHz. Note 3) Transmit frequency is 917.58 MHz. Measured level at fundamental was 20.5 dBm. Table represents both scans. See Appendix B for individual data sheets.

Table 3: Six Highest Radiated Emission Levels - 450kHz-30 MHz

FREQUENCY MHz	METER READING dBµV	CORRECTION FACTORS Mag dB	Amp dB	Cable dB	Dist dB	CORRECTED READING dBµV/m	SPEC LIMIT dBµV/m	MARGIN dB	NOTES
0.430	40.1	10.0				50.1	94.9	-44.8	N
0.450	40.5	10.0				50.5	94.6	-44.1 (ambient)	N
2.000	26.4	10.1				36.5	69.5	-33.0 (ambient)	N
9.710	37.8	9.3				47.1	69.5	-22.4	N
19.420	23.7	8.1				31.8	69.5	-37.7	N
29.130	23.7	6.1				29.8	69.5	-39.7	N

Test Method: ANSI C63.4 1992
Spec Limit : FCC Part 15.209
Test Distance: 3 Meters

NOTES:
H = Horizontal Polarization
V = Vertical Polarization
N = No Polarization
D = Dipole Reading
Q = Quasi Peak Reading
A = Average Reading

COMMENTS: The EUT and ancillary equipment was set up and tested in accordance with ANSI C63.4 and FCC DSSS test procedure Public Notice 54797 (CKC Training Procedure LP042007). The EUT is a wireless half duplex LAN transceiver operating on 911.58, 914.58, or 917.58 MHz. It is powered by a 12 Volt battery. A vertical antenna with 5 dBi gain is attached to the EUT. An RJ45 SIO cable connects the EUT to the support PC. The SIO port normally connects to another transceiver operating in the 950 MHz range. "Receiver noise level" data is transferred over the SIO port to the support PC. Note 1) Testing on the OATS for spurious emissions .45 to 30 MHz range while the unit is in the transceive mode when it transmits for 20 mS and receives for 80 mS and then repeats. Note: only worst case readings are included, which were from the 917.58 MHz transmitting frequency (per PCC 15.209, levels 20 dB below spec are not required to be shown).

Table 4: Highest Radiated Emission Levels - 30-1000MHz									
	METER	CORRECTION FACTORS				CORRECTED	SPEC		
FREQUENCY	READING	Bicon	Amp	Cable	Dist	READING	LIMIT	MARGIN	NOTES
MHz	dBµV	dB	dB	dB	dB	dBµV/m	dBµV/m	dB	
73.976	52.0	7.9	-26.6	1.1		34.4	40.0	-5.6	V
73.976	52.0	7.9	-26.6	1.1		34.4	40.0	-5.6	V
74.986	52.5	7.8	-26.6	1.2		34.9	40.0	-5.1	V
74.986	52.5	7.8	-26.6	1.2		34.9	40.0	-5.1	V

Test Method: ANSI C63.4 1992
Spec Limit : FCC Part 15.209
Test Distance: 3 Meters

NOTES:
H = Horizontal Polarization
V = Vertical Polarization
N = No Polarization
D = Dipole Reading
Q = Quasi Peak Reading
A = Average Reading

COMMENTS: The EUT and ancillary equipment was set up and tested in accordance with ANSI C63.4 and FCC DSSS test procedure Public Notice 54797 (CKC Training Procedure LP042007). The EUT is a wireless half duplex LAN transceiver operating on 911.58, 914.58, or 917.58 MHz. It is powered by a 12 Volt battery. A vertical antenna with 5 dBi gain is attached to the EUT. An RJ45 SIO cable connects the EUT to the support PC. The SIO port normally connects to another transceiver operating in the 950 MHz range. "Receiver noise level" data is transferred over the SIO port to the support PC. Note 1) Testing on the OATS for spurious emissions in the restricted bands from 30-1000 MHz while the unit is in the normal transceive mode where it transmits for 20 mS, and receives for 80 mS, and then repeats. Transmitting at both 911.58 MHz and 917.58 MHz. Note 2). To prevent spurious signals from being generated in test equipment: 10 dB attenuator between antenna and preamp, 10 dB attenuation internal to spectrum analyzer. See Appendix B for individual test data sheets. Note 3) Stewart ferrite 28A2025-0A0 used on DC power cord.

Table 5: Six Highest Radiated Emission Levels - 1-9.2GHz									
	METER	CORRECTION FACTORS				CORRECTED	SPEC		
FREQUENCY MHz	READING dBµV	Horn dB	Amp dB	Cable dB	HPF dB	READING dBµV/m	LIMIT dBµV/m	MARGIN dB	NOTES
2735.020	41.4	29.7	-38.5	12.5	0.3	45.4	54.0	-8.6	V
2752.753	41.4	29.8	-38.5	12.7	0.3	45.7	54.0	-8.3	V
3646.600	37.5	32.5	-38.6	14.8	0.3	46.5	54.0	-7.5	V
4557.980	36.4	32.2	-37.6	16.7	0.5	48.2	54.0	-5.8	V
4587.730	36.0	32.3	-37.4	16.8	0.6	48.3	54.0	-5.7	V
4587.913	36.3	32.3	-37.4	16.8	0.6	48.6	54.0	-5.4	H

Test Method: ANSI C63.4 1992
Spec Limit : FCC Part 15.209
Test Distance: 3 Meters

NOTES:
H = Horizontal Polarization
V = Vertical Polarization
N = No Polarization
D = Dipole Reading
Q = Quasi Peak Reading
A = Average Reading

COMMENTS: The EUT and ancillary equipment was set up and tested in accordance with ANSI C63.4 and FCC DSSS test procedure Public Notice 54797 (CKC Training Procedure LP042007). The EUT is a wireless half duplex LAN transceiver operating on 911.58, 914.58, or 917.58 MHz. It is powered by a 12 Volt battery. A vertical antenna with 5 dBi gain is attached to the EUT. An RJ45 SIO cable connects the EUT to the support PC. The SIO port normally connects to another transceiver operating in the 950 MHz range. "Receiver noise level" data is transferred over the SIO port to the support PC. Note 1) Testing on the OATS for spurious emissions in the restricted bands from 1000-9176 MHz range while the unit is in the transceive mode when it transmits for 20 mS and receives for 80 mS, and then repeats. Note 2) To prevent overloading the preamp from the transmit signal at 911.58 to 917.58 MHz, an HP 1.5 GHz High Pass filter is installed at the preamp input. P/N 84300-80037, s/n 3643A00027. Table includes data transmitting at 911.58 and 917.58 MHz. See Appendix B for individual data sheets.

TABLE A

LIST OF TEST EQUIPMENT

Hollister Site A

Function	S/N	Calibration Date	Cal Due Date	Asset #
HP 85650A QP Adaptor	2430A00541	04/09/1999	04/09/2000	0
HP 85662A Display	2112A02174	04/09/1999	04/09/2000	0
HP 85680A S. A.	2049A01408	04/09/1999	04/09/2000	0
HP 8447F Preamp	2944A03850	03/22/1999	03/22/2000	501
HP 8596E S.A.	3346A00225	05/10/1999	05/10/2000	783
Log Periodic, A.H. SAS200/510	318	04/23/1999	04/23/2000	0
Mag Loop Ant, Emco 6502	2078	06/17/1999	06/17/2000	432
Cable, 10m	Cbl10mha00	01/18/2000	01/18/2001	0
Cable, 3m	Cbl3mha00	01/18/2000	01/18/2001	0
Cable,100 ft Andrews FSJ1P-50A-4A	Cable #7	09/23/1999	09/23/2000	0
Cable, 25 ft Andrews FSJ1P-50A-4A	Cable #12	09/23/1999	09/23/2000	0
Bicon , Emco 3104	2683	04/22/1999	04/22/2000	732
Horn Ant, EMC 3110DRG	9602-4660	09/23/1999	09/23/2000	2113
Preamp, HP83017A	3123A00281	07/27/1999	07/27/2000	786
Hollister site A.		09/01/1999	09/01/2000	
Test software, EMI Test 3.09.		N/A	N/A	

EUT SETUP

The equipment under test (EUT) and the peripheral(s) listed were set up in a manner that represented their normal use. Any special conditions required for the EUT to operate normally are identified in the comments that accompany Tables 1-5 for radiated emissions. Additionally, a complete description of all the ports and I/O cables is included on the information sheets contained in Appendix A.

During radiated emissions testing, the EUT was mounted on a nonconductive, rotating table 80 cm above the conductive grid. The nonconductive table dimensions were 1 meter by 1.5 meters. This configuration is typical for radiated emissions testing of table top devices.

I/O cables were connected to the EUT and peripherals in the manner required for normal operation of the system. Excess cabling was bundled in the center in a serpentine fashion using 30-40 centimeter lengths.

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed in Table A were used to collect the radiated emissions data for the BLT Transceiver, 26-0612. Frequencies below 30 MHz were scanned using the mag loop antenna. For radiated measurements between 30 to 300 MHz, the biconical antenna was used. For frequencies from 300 to 1000 MHz, the log periodic antenna was used. Frequencies above 1000 MHz were scanned using a horn antenna. All antennas were located at a distance of 3 meters from the edge of the EUT.

The HP spectrum analyzer was used for all measurements. Table B shows the analyzer bandwidth settings that were used in designated frequency bands. During radiated testing, the measurements were made with 0 dB of attenuation, a reference level of 97 dBµV, and a vertical scale of 10 dB per division.

TABLE B : ANALYZER BANDWIDTH SETTINGS PER FREQUENCY RANGE

TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
RADIATED EMISSIONS	450 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	9.2 GHz	1 MHz

SPECTRUM ANALYZER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in Tables 1-5 indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "Peak" mode. Whenever a "Quasi-Peak" or "Average" reading is listed as one of the highest readings, this is indicated as a "Q" or an "A" in the appropriate table. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data for the BLT Transceiver, 26-0612.

Peak

In this mode, the Spectrum Analyzer or test engineer recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature of the analyzer called "peak hold," the analyzer had the ability to measure transients or low duty cycle transient emission peak levels. In this mode the analyzer made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

When the true peak values exceeded or were within 2 dB of the specification limit, quasi-peak measurements were taken using the HP Quasi-Peak Adapter for the HP Spectrum Analyzer. The detailed procedure for making quasi peak measurements contained in the HP Quasi-Peak Adapter manual were followed.

Average

When the frequencies exceed 1 GHz, average measurements may be made using the spectrum analyzer. To make these measurements, the test engineer reduces the video bandwidth on the analyzer until the modulation of the signal is filtered out. At this point the analyzer is set into the linear mode and the scan time is reduced.

TEST METHODS

The radiated emissions data of the BLT Transceiver, 26-0612, was taken with the HP Spectrum Analyzer. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the "Sample Calculations". The corrected data was then compared to the FCC Part 15.247 and Part 15.209 emissions limits to determine compliance.

Preliminary and final measurements were taken in order to better ensure that all emissions from the EUT were found and maximized.

Radiated Emissions Testing

During the preliminary radiated scan, the EUT was powered up and operating in its defined FCC test mode with the I/O cables and line cords facing the antenna. Frequencies below 30 MHz were scanned using a mag loop antenna. The frequency range of 30 MHz - 88 MHz was then scanned with the biconical antenna located about 1.5 meter above the ground plane in the vertical configuration. During this scan, the turntable was rotated and all peaks which were at or near the limit were recorded. The frequency range of 100 - 300 MHz was scanned with the biconical antenna in the same manner, and the peaks recorded. Lastly, a scan of the FM band from 88 - 110 MHz was made, using a reduced resolution bandwidth and a reduced frequency span. The biconical antenna was changed to the horizontal polarity and the above steps were repeated. After changing to the log periodic antenna in the horizontal configuration, the frequency range of 300 - 1000 MHz was scanned. The log periodic antenna was changed to the vertical polarity and the frequency range of 300 - 1000 MHz was again scanned. The horn antenna was used to scanned frequencies above 1000 MHz. Care was taken to ensure that no frequencies were missed within the FM and TV bands. An analysis was performed to determine if the signals that were at or near the limit were caused by an ambient transmission. If unable to determine by analysis, the equipment was powered down to make the final determination if the EUT was the source of the emission.

For the final radiated scan, the equipment was again positioned with its I/O and power cables facing the antenna. A thorough scan of all frequencies was manually made using a small frequency span, rotating the turntable as needed. Comparison with the previously recorded measurements was then made.

Using the peak readings from both scans as a guide, the test engineer then maximized the readings with respect to the table rotation, antenna height and configuration of the peripheral(s) and cables. Maximizing of the cables was achieved by monitoring the spectrum analyzer on a closed circuit television monitor while the EUT cables were being moved and rearranged on the EUT table for maximum emissions. Photographs showing the final worst case configuration of the EUT are contained in Appendix A.

TRANSMITTER CHARACTERISTICS

Occupied Bandwidth Measurements

The fundamental frequency was kept within the permitted band 902-928MHz or 2400-2483.5 MHz. Refer to Appendix B for the occupied bandwidth plots.

Power Output

Frequency of Transmitter: 902 MHz or 2.4 GHz

The RF conducted test, was measured using a direct connection between the antenna port of the transmitter and the spectrum analyzer, through suitable attenuation. The resolution bandwidth was adjusted to greater than the 6 dB bandwidth of the emissions.

Frequency	Measurement in dBm	Measurement in mW
911.450	26.3	426.6
917.539	25.6	363.07

The limit used was determined by the method stated in FCC Part 15.247(b).

Spectral Density

Spectral density testing was performed per FCC Public Notice 54797. A span of 3 kHz and resolution BW = 300 Hz was used in order to resolve 5 individual spectral lines. For 911.58 MHz, the power was normalized to 3 kHz bandwidth by adding a power correction factor using 10log(5)=7 dB, since all 5 spectral lines were within 1.3 dB. Therefore, a 7 dB offset was entered into the spectrum analyzer to correct the reading. In addition, a 10 dB of external attenuation was added to the spectrum analyzer to make the measurement. The display line was set to the +8 dBm limit set by FCC Part 15.247(d). For 917.58 MHz, it was assumed all spectral lines were equal to the worst case line. Therefore, a 10log(5) =7 dB correction was also made, in addition to the 10 dB of external attenuation added to the spectrum analyzer.

SAMPLE CALCULATIONS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in Tables 1-5. For radiated emissions in dBµV/m, the spectrum analyzer reading in dBµV was corrected by using the following formula:

Meter reading (dBµV)
+ Antenna Factor (dB)
+ Cable Loss (dB)
- Distance Correction (dB)
- Pre-amplifier Gain (dB)

= Corrected Reading (dBµV/m)

This reading was then compared to the applicable specification limit to determine compliance.

A typical data sheet will display the following in column format:

#	Freq MHz	Rdng dBuV	Cable	Amp	Bicon	Horn	Mag	Dist	Corr dBuV/m	Spec	Margin	Polar
	HPF											

means reading number
Freq MHz is the frequency in MHz of the obtained reading.
Rdng dBuV is the reading obtained on the spectrum analyzer in dBµV.
Amp is short for the preamplifier factor or gain in dB.
Bicon is the biconical antenna factor in dB.
Mag is the mag loop antenna factor in dB.
Horn is the horn antenna factor in dB.
Cable is the cable loss in dB of the coaxial cable on the OATS.
Dist is the distance factor (in dB). It is used when testing at a different test distance than the one stated in the spec.
Corr dBµV/m is the corrected reading which is now in dBµV/m (field strength).
Spec is the specification limit (dB) stated in the agency's regulations.
Margin is the closeness to the specified limit in dB; + is over and - is under the limit.
Polar is the Polarity of the antenna with respect to earth.
HPF is the high pass filter.

APPENDIX A

INFORMATION ABOUT THE EQUIPMENT UNDER TEST

INFORMATION ABOUT THE EQUIPMENT UNDER TEST	
Test Software/Firmware:	N/A
CRT was displaying:	N/A
Power Supply Manufacturer:	N/A
Power Supply Part Number:	N/A
AC Line Filter Manufacturer:	N/A
AC Line Filter Part Number:	N/A
The EUT has no power cord.	

I/O PORTS	
Type	#
DC Power from external battery	1
SIO from/to controller	1
Antenna(TX/RX Diversity)	2

CRYSTAL OSCILLATORS	
Type	Freq. In MHz
TCXO	38.839364

PRINTED CIRCUIT BOARDS				
Function	Model & Rev	Clocks, MHz	Layers	Location
LAN Transceiver	25-0612	38.839364	4	

REQUIRED EUT CHANGES TO COMPLY:
2 turns through Steward ferrite 28A2025-0A0 on DC power cord.

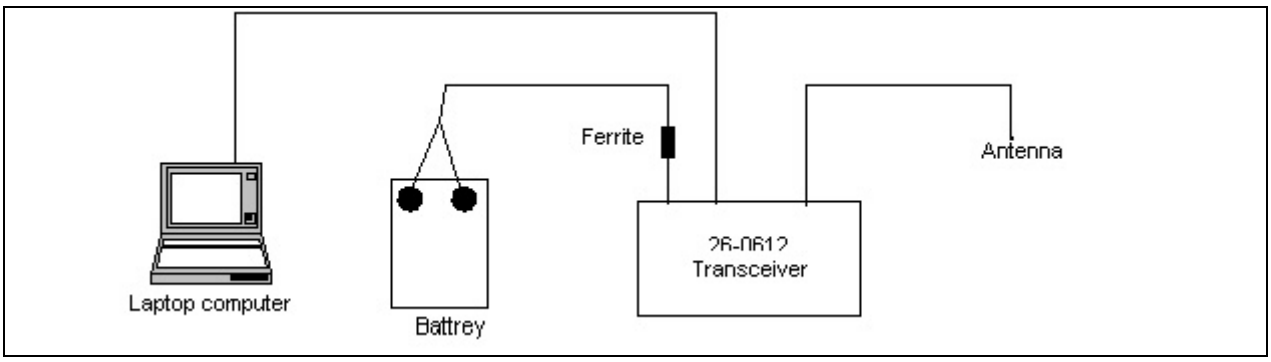
CABLE INFORMATION

RF Cable #:	1	Cable(s) of this type:	2
Cable Type:	RG316	Shield Type:	Braded
Construction:	Coax	Length In Meters:	0.25
Connected To End (1):	Yes	Connected To End (2):	Yes
Connector At End (1):	OSX-M	Connector At End (2):	Type N-M
Shield Grounded At (1):	Yes	Shield Grounded At (2):	Yes
Part Number:		Number of Conductors:	
Notes:	Insertion loss at 917 MHz is typically 0.7 dB.		

SIO Cable #: (Serial Input/Output)	2	Cable(s) of this type:	1
Cable Type:	8 Cond Ribbon	Shield Type:	None
Construction:	Ribbon	Length In Meters:	0.5
Connected To End (1):	Yes	Connected To End (2):	Yes
Connector At End (1):	RJ45-M	Connector At End (2):	RJ45-M
Shield Grounded At (1):	N/A	Shield Grounded At (2):	N/A
Part Number:		Number of Conductors:	
Notes:	Control of receive and transmit functions and data in/out.		

Power Cable #:	3	Cable(s) of this type:	1
Cable Type:	2 Cond	Shield Type:	None
Construction:	Twisted Pair	Length In Meters:	0.5
Connected To End (1):	Yes	Connected To End (2):	Yes
Connector At End (1):	Molex Type 5557	Connector At End (2):	
Shield Grounded At (1):	N/A	Shield Grounded At (2):	
Part Number:	39-01-2025	Number of Conductors:	
Notes:	Power (DC) 4 pin connector. Pins 3 & 4 used only.		

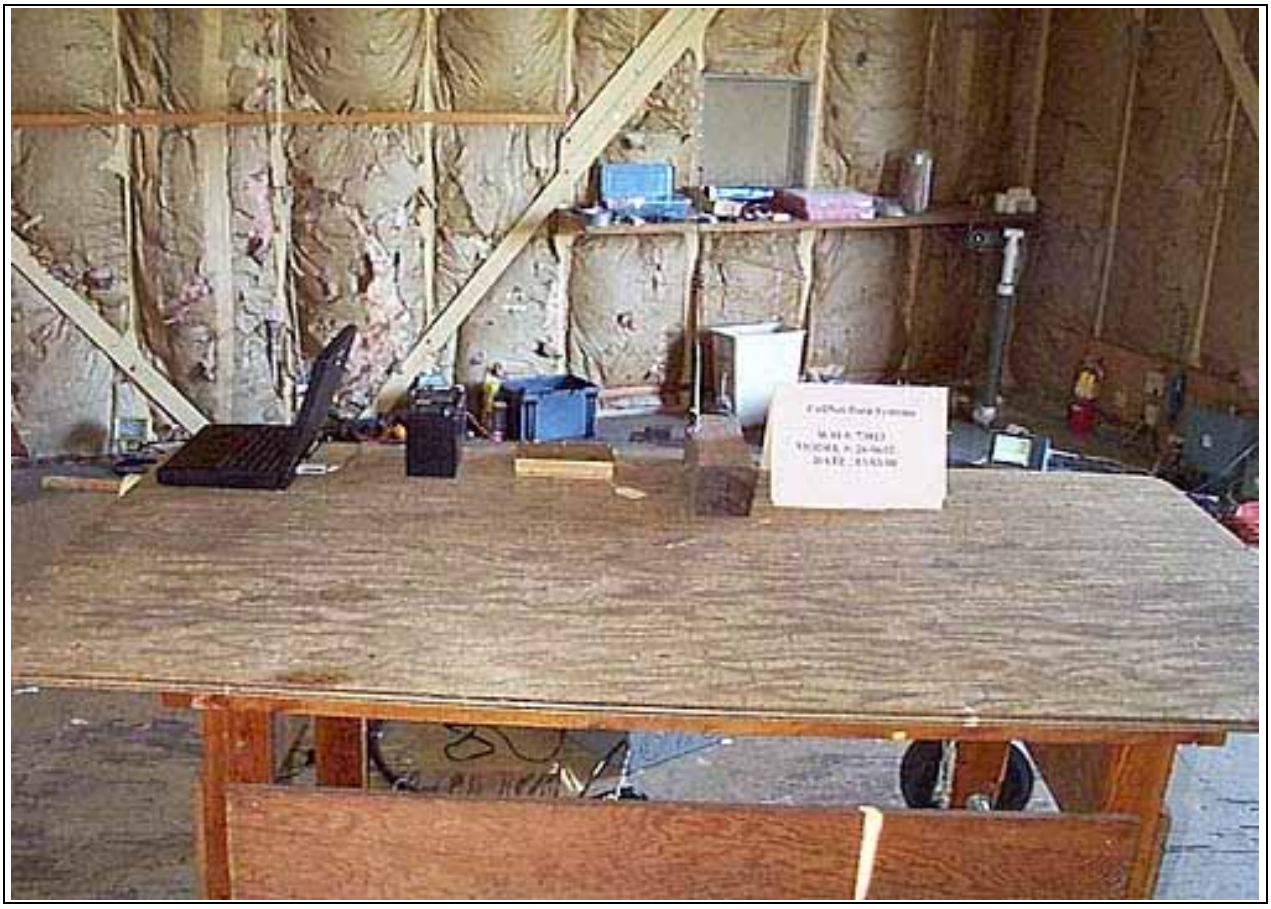
EQUIPMENT CONFIGURATION BLOCK DIAGRAM



PHOTOGRAPH SHOWING RADIATED EMISSIONS

RF Conducted

PHOTOGRAPH SHOWING RADIATED EMISSIONS

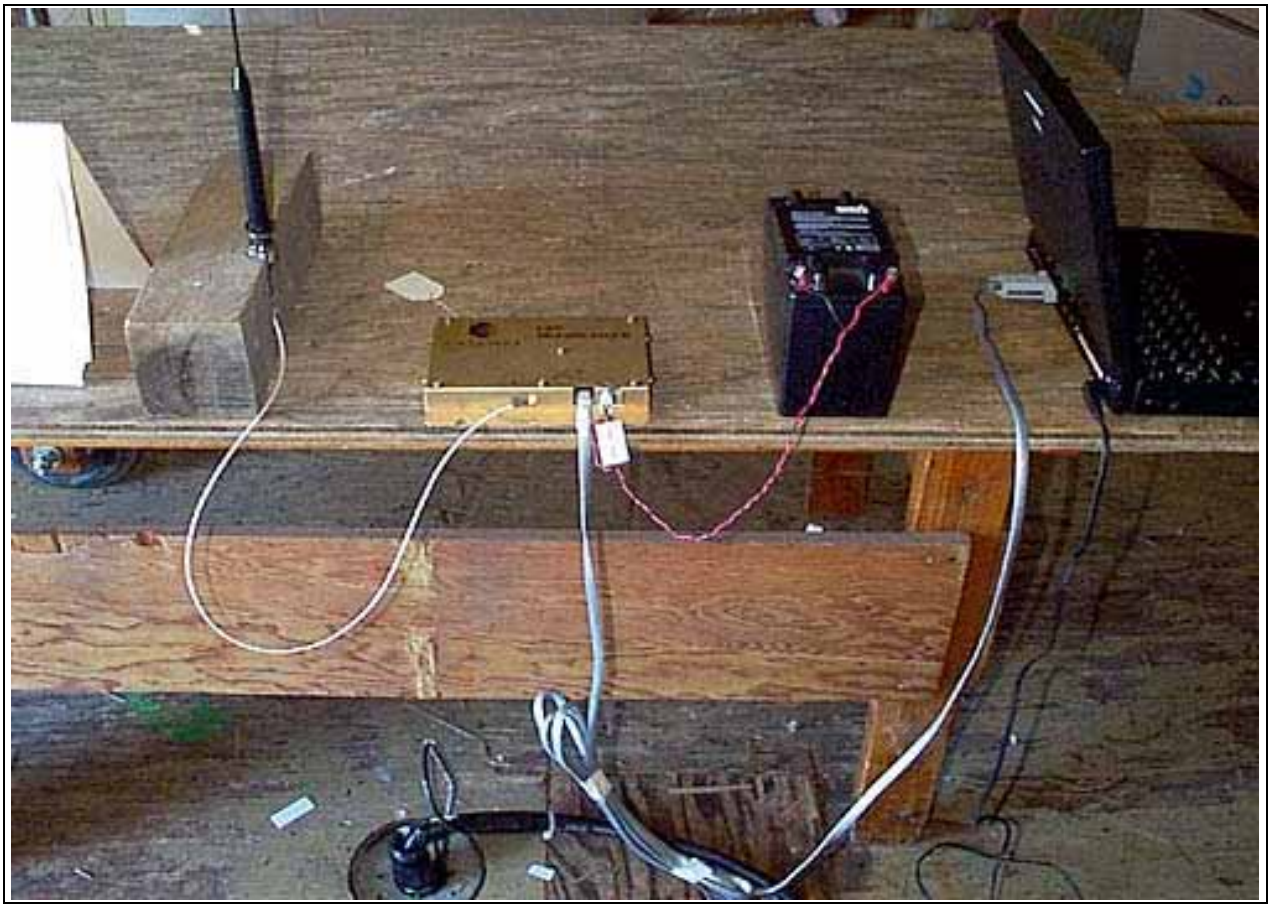


Radiated Emissions - Front View

PHOTOGRAPH SHOWING RADIATED EMISSIONS

Radiated Emissions - Back View

PHOTOGRAPH SHOWING RADIATED EMISSIONS

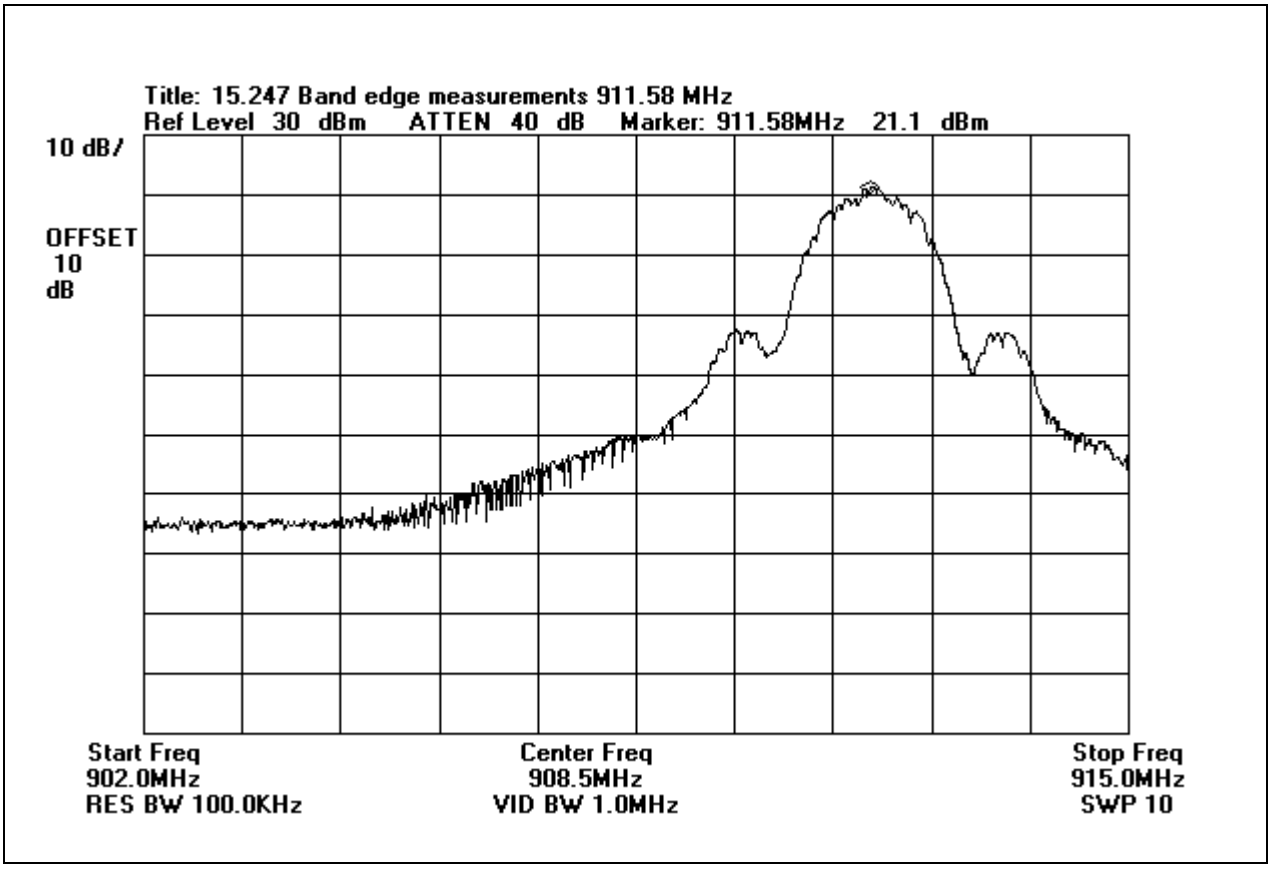


Radiated Emissions - Close-up of Back View

APPENDIX B

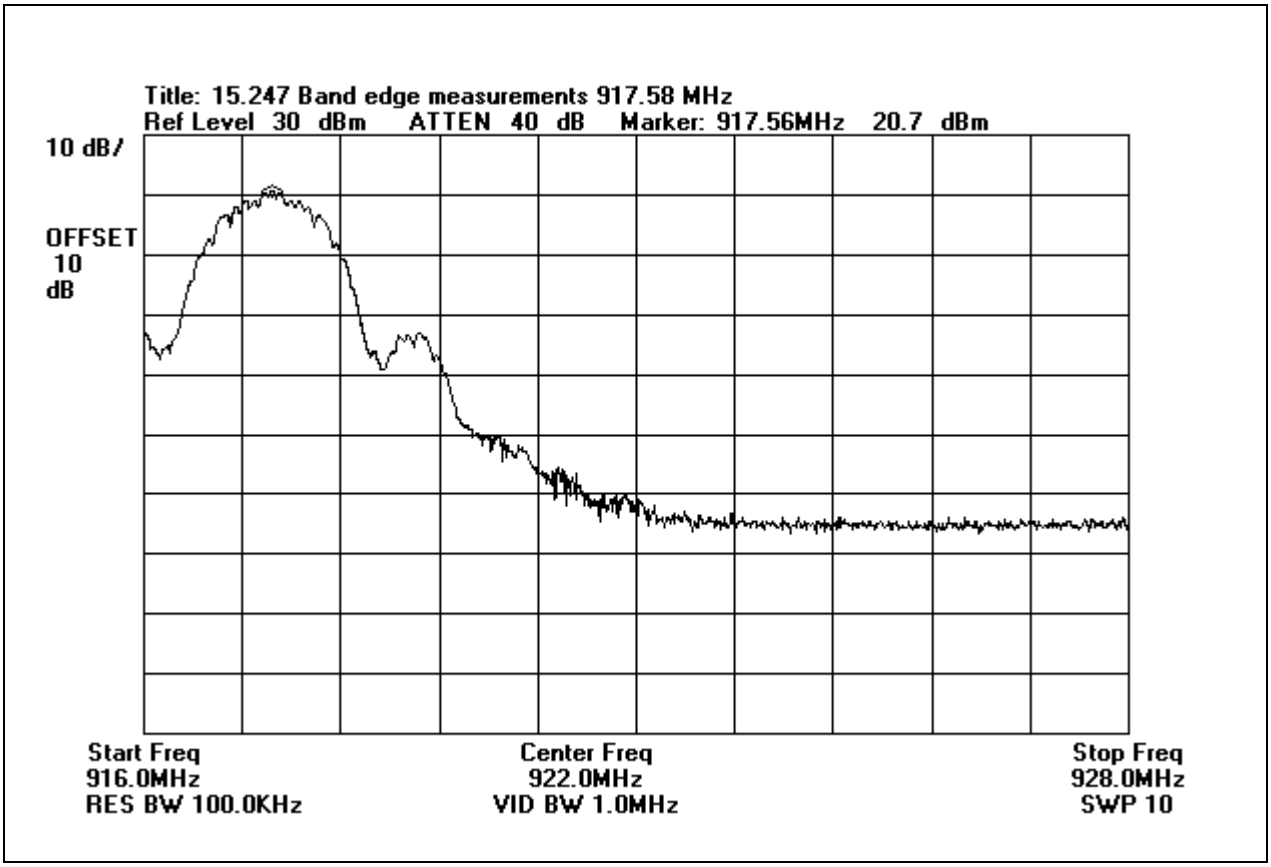
MEASUREMENT DATA SHEETS

FCC Part 15.247 – Band Edge



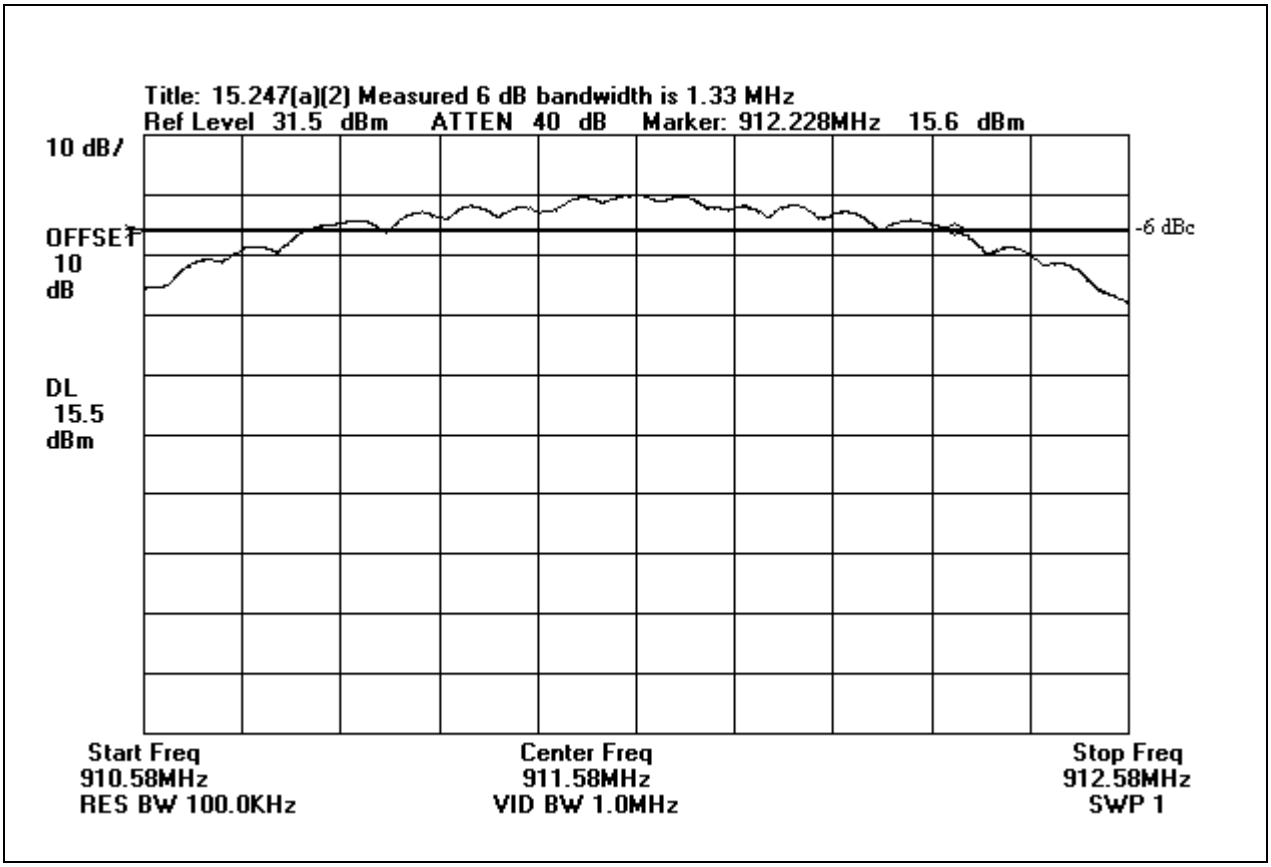
Lowest Frequency - 911.58 MHz

FCC Part 15.247 – Band Edge



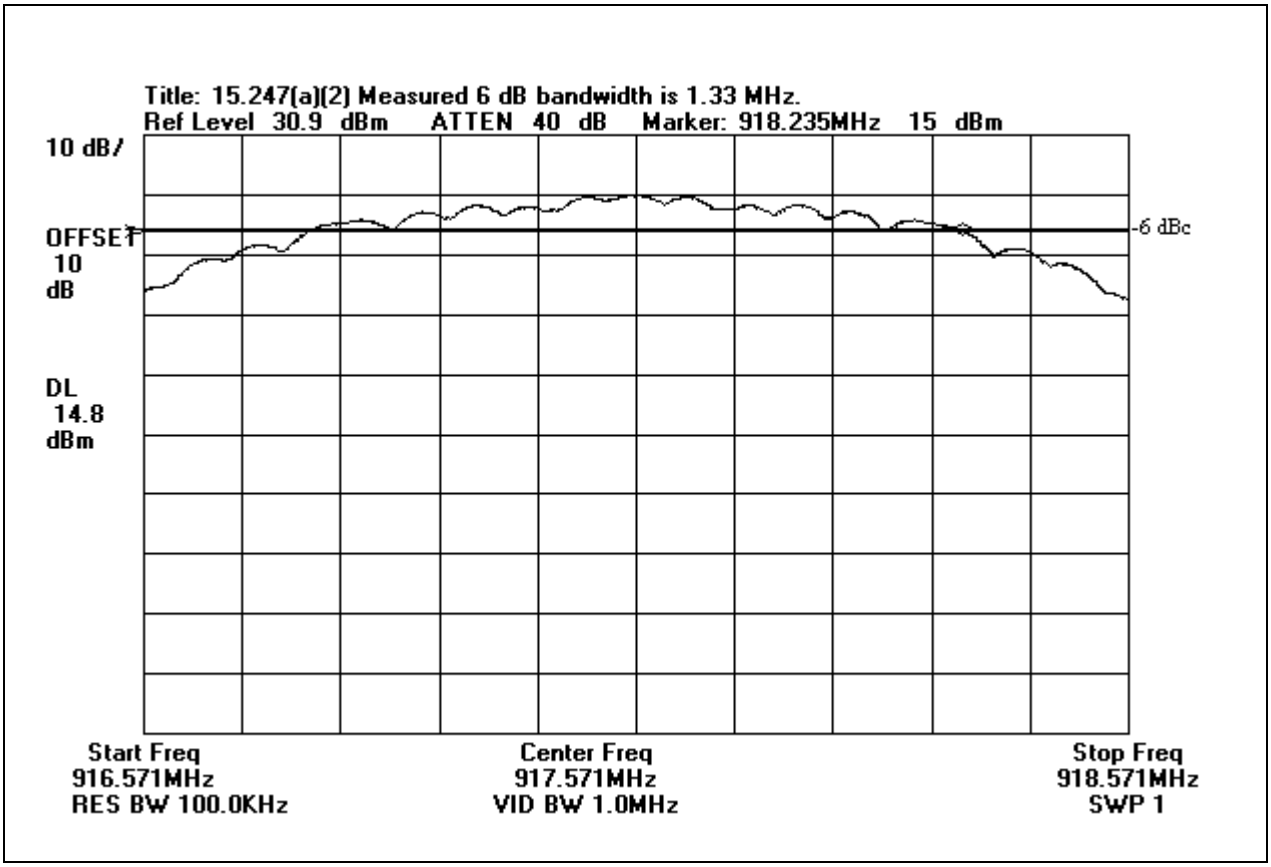
Highest Frequency - 917.58 MHz

FCC Part 15.247(a)(2) – Bandwidth



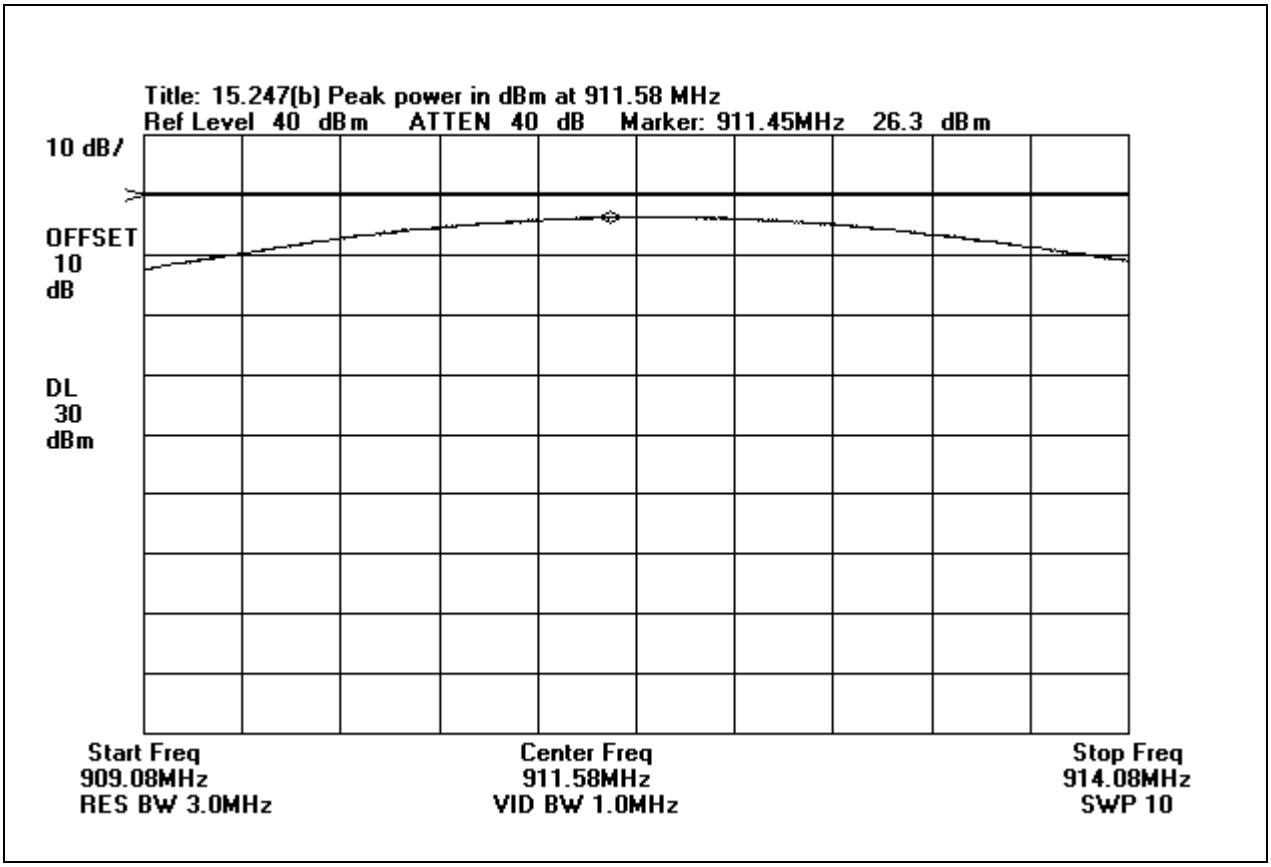
Lowest Frequency - 911.58 MHz

FCC Part 15.247(a)(2) – Bandwidth



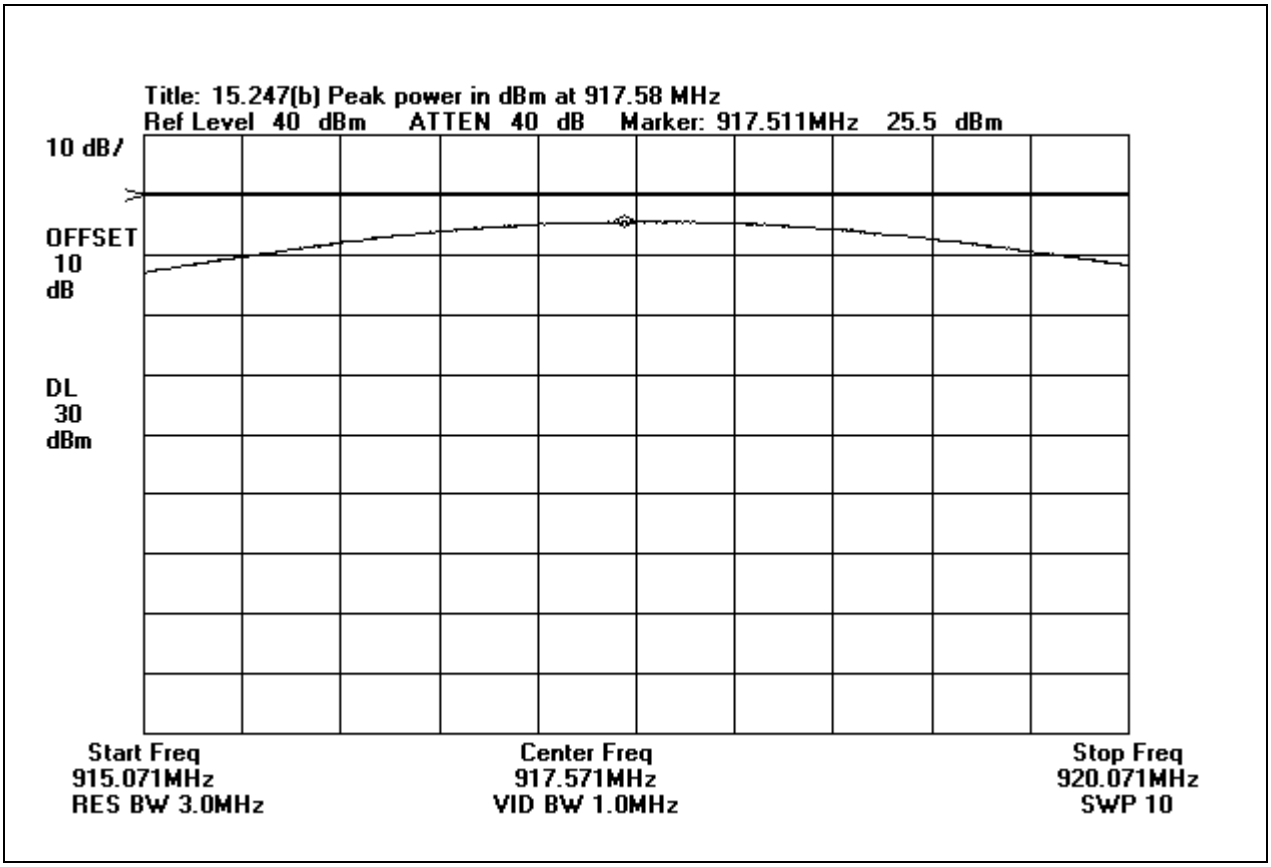
Highest Frequency - 917.58 MHz

FCC Part 15.247(b) – Peak Power

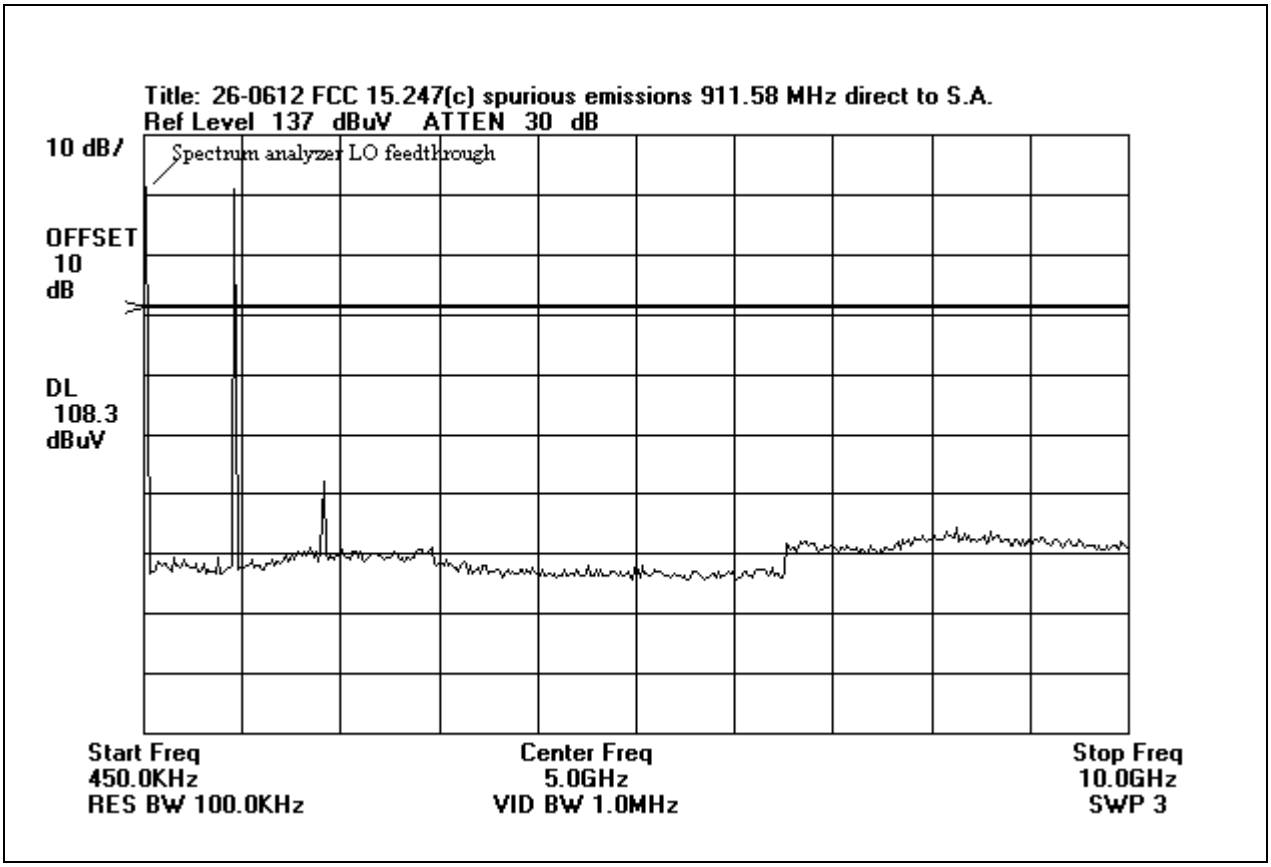


Lowest Frequency - 911.58 MHz

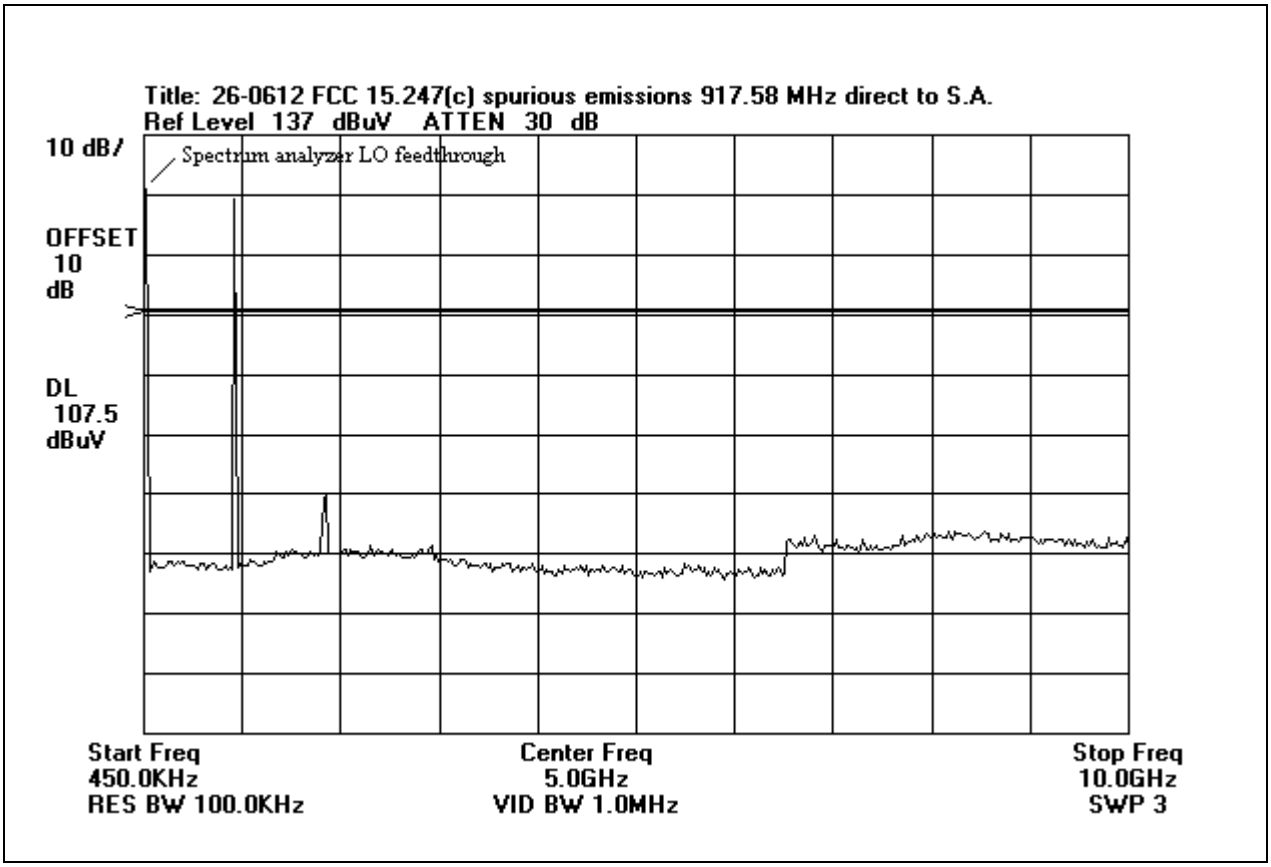
FCC Part 15.247(b) – Peak Power



Highest Frequency - 917.58 MHz

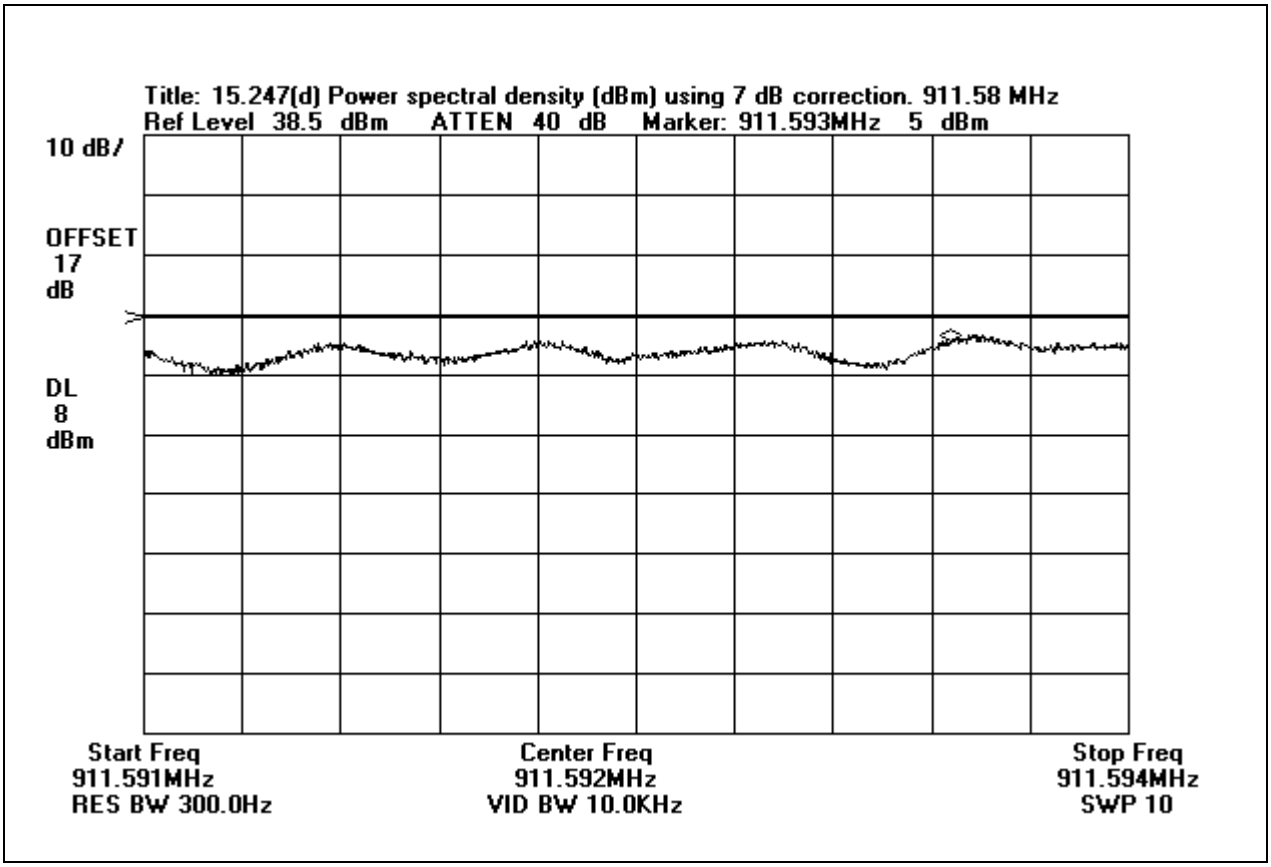


Lowest Frequency - 911.58 MHz



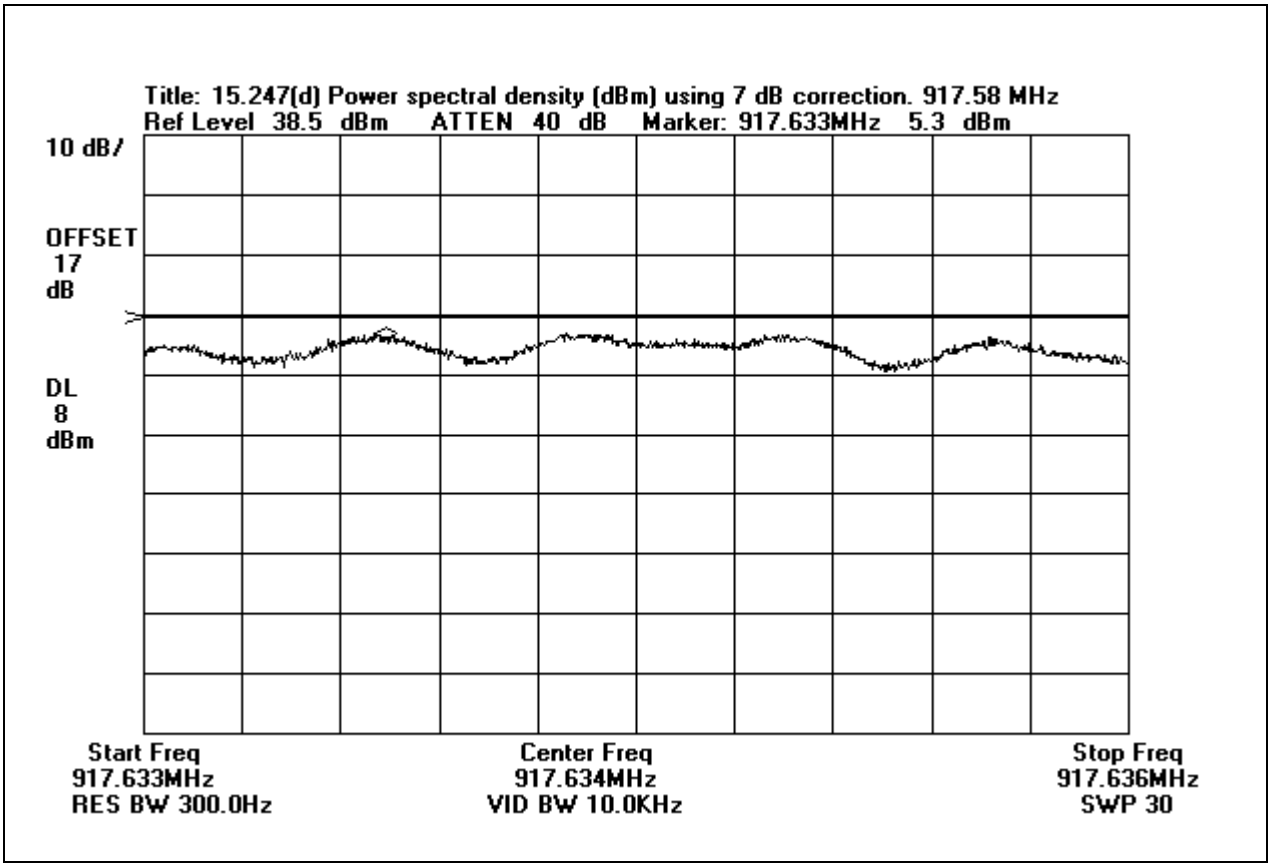
Highest Frequency - 917.58 MHz

FCC Part 15.247(d) – Spectral Density



Lowest Frequency - 911.58 MHz
EUT is continuously transmitting.

FCC Part 15.247(d) – Spectral Density



Highest Frequency - 917.58 MHz
EUT is continuously transmitting.

Test Location:	CKC Laboratories, Inc. • 1653 Los Viboras Rd., Site A • Hollister, Ca 95023 • (831) 637-0485		
Customer:	**CellNet Data Systems**		
Specification:	**FCC 15.247**		
Work Order #:	**73813**	Date:	03/03/2000
Test Type:	**Peak Output Power**	Time:	16:22:49
Equipment:	**LAN Transceiver**	Sequence#:	2
Manufacturer:	CellNet Data Systems	Tested By:	Art Rice
Model:	26-0612		
S/N:	B001		

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
LAN Transceiver*	CellNet Data Systems	26-0612	B001

Support Devices:

Function	Manufacturer	Model #	S/N
Battery	Genesis	G12V12aH10EP	None
Laptop PC	Dell	PPS	04949
AC Adaptor	Dell	73463	M5055818

Test Conditions / Notes:

The EUT and ancillary equipment was set up and tested in accordance with ANSI C63.4 and FCC DSSS test procedure Public Notice 54797 (CKC Training Procedure LP042007). The EUT is a wireless half duplex LAN transceiver operating on 911.58, 914.58, or 917.58 MHz. It is powered by a 12 Volt battery. An RJ45 SIO cable connects the EUT to the support PC. The SIO port normally connects to another transceiver operating in the 950 MHz range. Note 1) Testing transmit fundamental peak power in dBm. 30 dBm is 1 watt. 10 dB attenuator external to S.A. Transmitter is connected directly. S.A. resolution BW=3 MHz.

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBm	dB	dB	dB	dB	Dist Table	Corr dBm	Spec dBm	Margin dB	Polar Ant
1	911.450M	26.3					+0.0	26.3	30.0	-3.7	None
2	917.539M	25.6					+0.0	25.6	30.0	-4.4	None

Test Location:	CKC Laboratories, Inc. • 1653 Los Viboras Rd., Site A • Hollister, Ca 95023 • (831) 637-0485		
Customer:	**CellNet Data Systems**		
Specification:	**FCC 15.247(c) Spurious**		
Work Order #:	**73813**	Date:	03/06/2000
Test Type:	**Transmit Spurious-Conducted**	Time:	11:05:05
Equipment:	**LAN Transceiver**	Sequence#:	4
Manufacturer:	CellNet Data Systems	Tested By:	Art Rice
Model:	26-0612		
S/N:	B001		

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
LAN Transceiver*	CellNet Data Systems	26-0612	B001

Support Devices:

Function	Manufacturer	Model #	S/N
Battery	Genesis	G12V12aH10EP	none
Laptop PC	Dell	PPS	04949
AC Adaptor	Dell	73463	M5055818

Test Conditions / Notes:

The EUT and ancillary equipment was set up and tested in accordance with ANSI C63.4 and FCC DSSS test procedure Public Notice 54797 (CKC Training Procedure LP042007). The EUT is a wireless half duplex LAN transceiver operating on 911.58, 914.58, or 917.58 MHz. It is powered by a 12 Volt battery. An RJ45 SIO cable connects the EUT to the support PC. The SIO port normally connects to another transceiver operating in the 950 MHz range. Note 1) Testing transmit harmonics and spurious signals in dBm. 10 dB attenuator external to S.A. Transmitter is connected directly. S.A. resolution BW=100 kHz. Scanned 450 kHz to 9116 MHz. Note 2) Transmit frequency is 911.58 MHz. Measured level at fundamental was 21.3 dBm in a resolution BW of 100 kHz.

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBm	dB	dB	dB	dB	Dist Table	Corr dBm	Spec dBm	Margin dB	Polar Ant
1	1823.140M	-26.6					+0.0	-26.6	1.3	-27.9	None
2	8204.271M	-36.8					+0.0	-36.8	1.3	-38.1	None
3	2734.790M	-37.9					+0.0	-37.9	1.3	-39.2	None
4	9115.850M	-38.6					+0.0	-38.6	1.3	-39.9	None
5	7292.720M	-40.5					+0.0	-40.5	1.3	-41.8	None

6	6381.140M	-42.8	+0.0	-42.8	1.3	-44.1	None
7	3646.400M	-44.2	+0.0	-44.2	1.3	-45.5	None
8	4557.980M	-44.3	+0.0	-44.3	1.3	-45.6	None
9	5469.560M	-44.5	+0.0	-44.5	1.3	-45.8	None

Test Location:	CKC Laboratories, Inc. • 1653 Los Viboras Rd., Site A • Hollister, Ca 95023 • (831) 637-0485		
Customer:	**CellNet Data Systems**		
Specification:	**FCC 15.247(c) Spurious**		
Work Order #:	**73813**	Date:	03/06/2000
Test Type:	**Transmit Spurious-Conducted**	Time:	10:36:11
Equipment:	**LAN Transceiver**	Sequence#:	3
Manufacturer:	CellNet Data Systems	Tested By:	Art Rice
Model:	26-0612		
S/N:	B001		

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
LAN Transceiver*	CellNet Data Systems	26-0612	B001

Support Devices:

Function	Manufacturer	Model #	S/N
Battery	Genesis	G12V12aH10EP	none
Laptop PC	Dell	PPS	04949
AC Adaptor	Dell	73463	M5055818

Test Conditions / Notes:

The EUT and ancillary equipment was set up and tested in accordance with ANSI C63.4 and FCC DSSS test procedure Public Notice 54797 (CKC Training Procedure LP042007). The EUT is a wireless half duplex LAN transceiver operating on 911.58, 914.58, or 917.58 MHz. It is powered by a 12 Volt battery. An RJ45 SIO cable connects the EUT to the support PC. The SIO port normally connects to another transceiver operating in the 950 MHz range. Note 1) Testing transmit harmonics and spurious signals in dBm. 10 dB attenuator external to S.A. Transmitter is connected directly. S.A. resolution BW=100 kHz. Scanned 450 kHz to 9176 MHz. Note 2) Transmit frequency is 917.58 MHz. Measured level at fundamental was 20.5 dBm in a resolution BW of 100 kHz.

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBm	dB	dB	dB	dB	Dist Table	Corr dBm	Spec dBm	Margin dB	Polar Ant
1	1835.160M	-28.3					+0.0	-28.3	1.3	-27.0	None
2	8258.340M	-36.6					+0.0	-36.6	1.3	-35.3	None
3	9175.870M	-37.7					+0.0	-37.7	1.3	-36.4	None
4	2752.670M	-38.5					+0.0	-38.5	1.3	-37.2	None
5	7340.620M	-38.8					+0.0	-38.8	1.3	--37.5	None

6	5505.660M	-41.9	+0.0	-41.9	1.3	-40.6	None
7	3670.250M	-42.8	+0.0	-42.8	1.3	-41.5	None
8	6423.140M	-43.2	+0.0	-43.2	1.3	-41.9	None
9	4587.800M	-43.5	+0.0	-43.5	1.3	-42.2	None

Test Location:	CKC Laboratories, Inc. • 1653 Los Viboras Rd., Site A • Hollister, Ca 95023 • (831) 637-0485		
Customer:	**CellNet Data Systems**		
Specification:	**FCC15.209**		
Work Order #:	**73813**	Date:	03/06/2000
Test Type:	**Emissions-Radiated**	Time:	19:08:42
Equipment:	**LAN Transceiver**	Sequence#:	11
Manufacturer:	CellNet Data Systems	Tested By:	Art Rice
Model:	26-0612		
S/N:	B001		

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
LAN Transceiver*	CellNet Data Systems	26-0612	B001

Support Devices:

Function	Manufacturer	Model #	S/N
Battery	Genesis	G12V12aH10EP	none
Laptop PC	Dell	PPS	04949
AC Adaptor	Dell	73463	M5055818
Antenna	Antenna Specialists	ASPG918	none

Test Conditions / Notes:

The EUT and ancillary equipment was set up and tested in accordance with ANSI C63.4 and FCC DSSS test procedure Public Notice 54797 (CKC Training Procedure LP042007). The EUT is a wireless half duplex LAN transceiver operating on 911.58, 914.58, or 917.58 MHz. It is powered by a 12 Volt battery. A vertical antenna with 5 dBi gain is attached to the EUT. An RJ45 SIO cable connects the EUT to the support PC. The SIO port normally connects to another transceiver operating in the 950 MHz range. "Receiver noise level" data is transferred over the SIO port to the support PC. Note 1) Testing on the OATS for spurious emissions .45 to 30 MHz range while the unit is in the transceive mode when it transmits for 20 mS and receives for 80 mS, and then repeats. Transmitting at 917.58 MHz.

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	Mag dB	dB	dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	9.710M	37.8	+9.3				+0.0	47.1	69.5	-22.4	None
									Crystal freq divided by four.		
2	2.000M	26.4	+10.1				+0.0	36.5	69.5	-33.0	None
									Ambient level.		
3	19.420M	23.7	+8.1				+0.0	31.8	69.5	-37.7	None
									Crystal frequency divided by two.		
4	29.130M	23.7	+6.1				+0.0	29.8	69.5	-39.7	None
5	450.000k	40.5	+10.0				+0.0	50.5	94.6	-44.1	None
									Ambient level at DC-DC converter frequency.		
6	430.000k	40.1	+10.0				+0.0	50.1	94.9	-44.8	None

Test Location:	CKC Laboratories, Inc. • 1653 Los Viboras Rd., Site A • Hollister, Ca 95023 • (831) 637-0485		
Customer:	**CellNet Data Systems**		
Specification:	**FCC15.209**		
Work Order #:	**73813**	Date:	3/3/2000
Test Type:	**Emissions-Radiated**	Time:	15:18:28
Equipment:	**LAN Transceiver**	Sequence#:	7
Manufacturer:	CellNet Data Systems	Tested By:	Art Rice
Model:	26-0612		
S/N:	B001		

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
LAN Transceiver*	CellNet Data Systems	26-0612	B001

Support Devices:

Function	Manufacturer	Model #	S/N
Battery	Genesis	G12V12aH10EP	none
Laptop PC	Dell	PPS	04949
AC Adaptor	Dell	73463	M5055818
Antenna	Antenna Specialists	ASPG918	none

Test Conditions / Notes:

The EUT and ancillary equipment was set up and tested in accordance with ANSI C63.4 and FCC DSSS test procedure Public Notice 54797 (CKC Training Procedure LP042007). The EUT is a wireless half duplex LAN transceiver operating on 911.58, 914.58, or 917.58 MHz. It is powered by a 12 Volt battery. A vertical antenna with 5 dBi gain is attached to the EUT. An RJ45 SIO cable connects the EUT to the support PC. The SIO port normally connects to another transceiver operating in the 950 MHz range. "Receiver noise level" data is transferred over the SIO port to the support PC. Note 1) Testing on the OATS for spurious emissions in the restricted bands from 30-1000 MHz while the unit is in the normal transceive mode where it transmits for 20 mS, and receives for 80 mS, and then repeats. Transmitting at 911.58 MHz. Note 2) To prevent spurious signals from being generated in test equipment: 10 dB attenuator between antenna and preamp, 10 dB attenuation internal to spectrum analyzer.

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	Amp dB	Bicon dB	Log dB	Cable dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	74.986M	52.5	-26.6	+7.8	+0.0	+1.2	+0.0	34.9	40.0	-5.1	Vert
									2 turns through Steward ferrite 28A2025-0A0 on DC power cord.		
2	73.976M	52.0	-26.6	+7.9	+0.0	+1.1	+0.0	34.4	40.0	-5.6	Vert
									2 turns through Steward ferrite 28A2025-0A0 on DC power cord.		

Test Location:	CKC Laboratories, Inc. • 1653 Los Viboras Rd., Site A • Hollister, Ca 95023 • (831) 637-0485		
Customer:	**CellNet Data Systems**		
Specification:	**FCC15.209**		
Work Order #:	**73813**	Date:	03/03/2000
Test Type:	**Emissions-Radiated**	Time:	15:18:28
Equipment:	**LAN Transceiver**	Sequence#:	6
Manufacturer:	CellNet Data Systems	Tested By:	Art Rice
Model:	26-0612		
S/N:	B001		

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
LAN Transceiver*	CellNet Data Systems	26-0612	B001

Support Devices:

Function	Manufacturer	Model #	S/N
Battery	Genesis	G12V12aH10EP	none
Laptop PC	Dell	PPS	04949
AC Adaptor	Dell	73463	M5055818
Antenna	Antenna Specialists	ASPG918	none

Test Conditions / Notes:

The EUT and ancillary equipment was set up and tested in accordance with ANSI C63.4 and FCC DSSS test procedure Public Notice 54797 (CKC Training Procedure LP042007). The EUT is a wireless half duplex LAN transceiver operating on 911.58, 914.58, or 917.58 MHz. It is powered by a 12 Volt battery. A vertical antenna with 5 dBi gain is attached to the EUT. An RJ45 SIO cable connects the EUT to the support PC. The SIO port normally connects to another transceiver operating in the 950 MHz range. "Receiver noise level" data is transferred over the SIO port to the support PC. Note 1) Testing on the OATS for spurious emissions in the restricted bands from 30-1000 MHz while the unit is in the normal transceive mode where it transmits for 20 mS, and receives for 80 mS, and then repeats. Transmitting at 917.58 MHz. Note 2) To prevent spurious signals from being generated in test equipment: 10 dB attenuator between antenna and preamp, 10 dB attenuation internal to spectrum analyzer.

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	Amp dB	Bicon dB	Log dB	Cable dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	74.986M	52.5	-26.6	+7.8	+0.0	+1.2	+0.0	34.9	40.0	-5.1	Vert
									2 turns through Steward ferrite 28A2025-0A0 on DC power cord.		
2	73.976M	52.0	-26.6	+7.9	+0.0	+1.1	+0.0	34.4	40.0	-5.6	Vert
									2 turns through Steward ferrite 28A2025-0A0 on DC power cord.		

Test Location:	CKC Laboratories, Inc. • 1653 Los Viboras Rd., Site A • Hollister, Ca 95023 • (831) 637-0485		
Customer:	**CellNet Data Systems**		
Specification:	**FCC15.209**		
Work Order #:	**73813**	Date:	03/06/2000
Test Type:	**Emissions-Radiated**	Time:	17:14:35
Equipment:	**LAN Transceiver**	Sequence#:	9
Manufacturer:	CellNet Data Systems	Tested By:	Art Rice
Model:	26-0612		
S/N:	B001		

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
LAN Transceiver*	CellNet Data Systems	26-0612	B001

Support Devices:

Function	Manufacturer	Model #	S/N
Battery	Genesis	G12V12aH10EP	none
Laptop PC	Dell	PPS	04949
AC Adaptor	Dell	73463	M5055818
Antenna	Antenna Specialists	ASPG918	none

Test Conditions / Notes:

The EUT and ancillary equipment was set up and tested in accordance with ANSI C63.4 and FCC DSSS test procedure Public Notice 54797 (CKC Training Procedure LP042007). The EUT is a wireless half duplex LAN transceiver operating on 911.58, 914.58, or 917.58 MHz. It is powered by a 12 Volt battery. A vertical antenna with 5 dBi gain is attached to the EUT. An RJ45 SIO cable connects the EUT to the support PC. The SIO port normally connects to another transceiver operating in the 950 MHz range. "Receiver noise level" data is transferred over the SIO port to the support PC. Note 1) Testing on the OATS for spurious emissions in the restricted bands from 1000-9176 MHz range while the unit is in the transceive mode when it transmits for 20 mS and receives for 80 mS, and then repeats. Note 2) To prevent overloading the preamp from the transmit signal at 911.58 to 917.58 MHz, an HP 1.5 GHz High Pass filter is installed at the preamp input. P/N 84300-80037, s/n 3643A00027. Transmitting at 911.58 MHz.

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	Amp HPF dB	Cable dB	Cable dB	Horn dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	4557.980M	36.4	-37.6 +0.5	+3.8	+12.9	+32.2	+0.0	48.2	54.0	-5.8	Vert
2	4557.938M	36.2	-37.6 +0.5	+3.8	+12.9	+32.2	+0.0	48.0	54.0	-6.0	Horiz
3	3646.600M	37.5	-38.6 +0.3	+3.4	+11.4	+32.5	+0.0	46.5	54.0	-7.5	Vert
4	7292.640M	23.3	-35.8 +0.4	+4.9	+16.4	+36.5	+0.0	45.7	54.0 Ambient level.	-8.3	Vert
5	2735.020M	41.4	-38.5 +0.3	+2.8	+9.7	+29.7	+0.0	45.4	54.0	-8.6	Vert

6	2734.640M	40.9	-38.5 +0.3	+2.8	+9.7	+29.7	+0.0	44.9	54.0	-9.1	Horiz
7	3646.425M Ave	27.9	-38.6 +0.3	+3.4	+11.4	+32.5	+0.0	36.9	54.0	-17.1	Horiz
^	3646.420M	42.4	-38.6 +0.3	+3.4	+11.4	+32.5	+0.0	51.4	54.0	-2.6	Horiz

Test Location:	CKC Laboratories, Inc. • 1653 Los Viboras Rd., Site A • Hollister, Ca 95023 • (831) 637-0485		
Customer:	**CellNet Data Systems**		
Specification:	**FCC15.209**		
Work Order #:	**73813**	Date:	03/06/2000
Test Type:	**Emissions-Radiated**	Time:	18:14:11
Equipment:	**LAN Transceiver**	Sequence#:	10
Manufacturer:	CellNet Data Systems	Tested By:	Art Rice
Model:	26-0612		
S/N:	B001		

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
LAN Transceiver*	CellNet Data Systems	26-0612	B001

Support Devices:

Function	Manufacturer	Model #	S/N
Battery	Genesis	G12V12aH10EP	none
Laptop PC	Dell	PPS	04949
AC Adaptor	Dell	73463	M5055818
Antenna	Antenna Specialists	ASPG918	none

Test Conditions / Notes:

The EUT and ancillary equipment was set up and tested in accordance with ANSI C63.4 and FCC DSSS test procedure Public Notice 54797 (CKC Training Procedure LP042007). The EUT is a wireless half duplex LAN transceiver operating on 911.58, 914.58, or 917.58 MHz. It is powered by a 12 Volt battery. A vertical antenna with 5 dBi gain is attached to the EUT. An RJ45 SIO cable connects the EUT to the support PC. The SIO port normally connects to another transceiver operating in the 950 MHz range. "Receiver noise level" data is transferred over the SIO port to the support PC. Note 1) Testing on the OATS for spurious emissions in the restricted bands from 1000-9176 MHz range while the unit is in the transceive mode when it transmits for 20 mS and receives for 80 mS, and then repeats. Note 2) To prevent overloading the preamp from the transmit signal at 911.58 to 917.58 MHz, an HP 1.5 GHz High Pass filter is installed at the preamp input. P/N 84300-80037, s/n 3643A00027. Transmitting at 917.58 MHz.

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	Amp HPF dB	Cable dB	Cable dB	Horn dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	4587.913M	36.3	-37.4 +0.6	+3.9	+12.9	+32.3	+0.0	48.6	54.0	-5.4	Horiz
2	4587.730M	36.0	-37.4 +0.6	+3.9	+12.9	+32.3	+0.0	48.3	54.0	-5.7	Vert
3	2752.753M	41.4	-38.5 +0.3	+2.9	+9.8	+29.8	+0.0	45.7	54.0	-8.3	Vert
4	2752.778M	41.0	-38.5 +0.3	+2.9	+9.8	+29.8	+0.0	45.3	54.0	-8.7	Horiz

5	3670.345M Ave	26.3	-38.5 +0.4	+3.4	+11.4	+32.5	+0.0	35.5	54.0	-18.5	Vert
^	3670.345M	43.7	-38.5 +0.4	+3.4	+11.4	+32.5	+0.0	52.9	54.0	-1.1	Vert
7	4583.919M Ave	22.6	-37.5 +0.6	+3.9	+12.9	+32.3	+0.0	34.8	54.0	-19.2	Vert
8	3670.345M Ave	25.6	-38.5 +0.4	+3.4	+11.4	+32.5	+0.0	34.8	54.0	-19.2	Horiz
^	3670.308M	42.0	-38.5 +0.4	+3.4	+11.4	+32.5	+0.0	51.2	54.0	-2.8	Horiz
10	4589.445M Ave	22.3	-37.4 +0.6	+3.9	+12.9	+32.3	+0.0	34.6	54.0	-19.4	Horiz