APPLICATION FOR FCC CERTIFICATION

DIRECT SEQUENCE SPREAD SPECTRUM TRANSMITTER

Samsung Electro-Mechanics
314, Maetan-3Dong, Paldal-Gu, Suwon,
Kyunggi-Do, Korea, 442-743
+82-331-210-6662

Model: Magic Wave PCMCIA
Frequency Range: 2414-2463GHz
Output Power: 2.152

FCC ID: E2XWSL-1000N

March 18, 1999

This report concerns (check one): **Equipment Type**: **PCMCIA Board**	**Original Grant:**	**Class II Change:** X
Deferred grant requested per 47 CFR 0.457 (d) (1) (ii)? **If yes, defer until:**	**Yes:** ______ ***Date***	**No**: X
Company name agrees to notify the Commission by: ______________________**(date) of the intended date of announcement of the product so that the grant can be issued on that date.**		
Transition Rules Request per 15.37? Yes: **If no, assumed Part 15, subpart B for unintentional radiators - the new 47 CFR [10-1-90 Edition] provision..**	**No:** X	

REPORT PREPARED BY:

EMI Technician: **Daniel W. Baltzell**
Administrative Writer: **Dixie L. Shetter**

Rhein Tech Laboratories, Inc.

Document Number: 990164
Reference Number: QRTL99-056

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1.0 GENERAL INFORMATION

The following Application for FCC Certification of a Class II Permissive Change for a Direct Sequence Spread Spectrum transmitter is prepared on behalf of Samsung Electro-Mechanics in accordance with Part 15.247 of the Federal Communications Commissions rules and regulations. The Equipment Under Test (EUT) was the Samsung Electro-Mechanics Magic Wave PCMCIA, FCC ID: E2XWSL-1000N. The test results reported in this document relate only to the item that was tested.

All measurements contained in this Application were conducted in accordance with ANSI C63.4 Methods of Measurement of Radio Noise Emissions, 1992. The instrumentation utilized for the measurements conforms to the ANSI C63.4 standard for EMI and Field Strength Instrumentation. Some accessories are used to increase sensitivity and prevent overloading of the measuring instrument. These are explained in the appendix of this report. Calibration checks are performed regularly on the instruments, and all accessories including the high pass filter, preamplifier and cables.

All radiated and conducted emissions measurement were performed manually at Rhein Tech, Incorporated. The radiated emissions measurements required by the rules were performed on the three meter, open field, test range maintained by Rhein Tech Laboratories, Inc., 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. Complete description and site attenuation measurement data have been placed on file with the Federal Communications Commission. The power line conducted emission measurements were performed in a shielded enclosure also located at the Herndon, Virginia facility. Rhein Tech, Labs, Inc. is on the FCC accepted lab list as a Facility available to do measurement work for others on a contract basis.

1.1 PRODUCT DESCRIPTION

The model SWL-1000N (referred to as the EUT in this report) is a Direct Sequence Spread Spectrum wireless LAN, PCMCIA network card. The EUT provides wireless communications between computers. The EUT is designed to be plugged into an PCMCIA slot in a desktop computer with a PCMCIA slot or laptop computer. The EUT communicates with other wireless LAN cards using the frequency range from 2.414 GHz to 2.463 GHz. The EUT is powered from the desktop computer, and does not have an external power supply. The EUT uses a 5” stub antenna or an internal patch antenna attached to a left-turn SMA connector.

1.2 RELATED SUBMITTAL(S)/GRANT(S)

The original grant is dated September 15, 1998. The EUT was tested as a digital interface card. An FCC Class B Declaration of Conformity (DoC) report is on file.

1.2.1 CLASS II PERMISSIVE CHANGES

The following are the changes for which the Class II Permissive change is sought:

Item	Old	New
IF Mod/Demod IC	HFA3724	HFA3726
Mix AM AMP	HFA3624	Discrete Mixer AT32032
AMP	AT42086 CMM2301	UPC2762T ITT2205AFI
LNA	SMP22203	MGA-85563
Rx/Tx Switch	SW239	UPG152TA
External antenna		5” stub

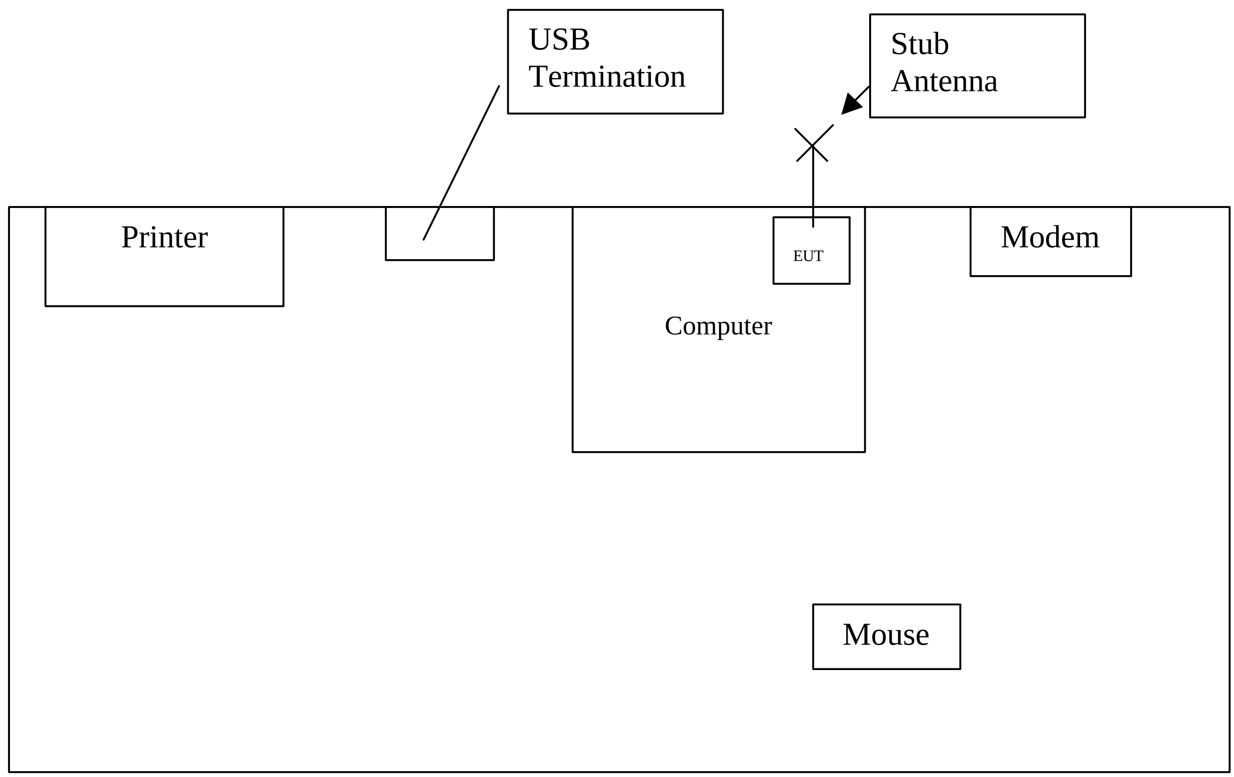
1.3 TEST SYSTEM DETAILS

The FCC Identifiers for all equipment, plus descriptions of all cables used in the tested system (including inserted cards, which have grants) are:

External Components

Part	Manufacturer	Model	Serial Number	FCC ID	Cable Description	RTL Bar Code
SYSTEM	METROBOOK	VL	91BJ500486Z	A3LS590	UNSHIELDED POWER	
MOUSE	MICROSOFT	INTELLIMOUSE 1.1A	00332324	C3KKMP5	SHIELDED I/O	900589
MODEM	US ROBOTICS	0413	8390364644992	DOC	SHIELDED I/O UNSHIELDED POWER	900427
PRINTER	HEWLETT PACKARD	THINK JET 2225C	2841S26339	DSI6XU2225	SHIELDED I/O UNSHIELDED POWER	900139
PCMCIA CARD (EUT-1)	**SAMSUNG**	**PCMCIA WIRELESS LAN CARD**	**6WLN00AHA00A45**	**SAMPLE**	**N/A**	**010419**
TERMINATION	GATEWAY 2000, INC.	USB HIGH/LOW SPEED	N/A	SAMPLE	SHIELDED I/O	010367
REMOVABLE ANTENNA (EUT-2)	**SAMSUNG**	**N/A**	**N/A**	**SAMPLE**	**N/A**	**010424**

1.4 CONFIGURATION OF TESTED SYSTEM



1.5 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. Emissions above 1 GHz were video averaged.

1.6 TEST FACILITY

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of Rhein Tech Laboratories, Inc. 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report dated March 3, 1994, submitted to and approved by the Federal Communication Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 1992).

2.0 PRODUCT LABELING

FIGURE 1: FCC ID LABEL

The information only exists in the original grant (FCC ID: E2XWSL-1000N) dated August 12, 1998.

FIGURE 2: LOCATION OF LABEL ON EUT

3.0 SYSTEM TEST CONFIGURATION

3.1 JUSTIFICATION

The EUT was tested in all three orthogonal planes in order to determine worst case emission. Channel 1 at 2.414GHz, Channel 6 at 2.437GHz and Channel 11 at 2.463GHz were tested and investigated from 9kHz to 24GHz. All three channels were investigated and tested. Channel 1 (the worst case profile) was used for final testing during antenna conducted spurious emissions measurements and conducted emissions measurements. Data for all three channels is presented in this report.

To complete the configuration required by the FCC, the transmitter was tested in a mini-tower computer with the patch antenna connected to the antenna port similar to its intended use.

The transmitter external antenna connector is a unique reverse-thread and is non-interchangeable.

The EUT was investigated with the 5” stub and patch antennas. The 5” stub antenna was considered the worst case configuration. The worst case radiated spurious noise with the patch antenna was measured when the EUTs Channel 6 was enabled.

3.2 EUT EXERCISE SOFTWARE

The EUT was enabled to continuously transmit, which was verified by a receiving unit during testing. The carrier was also checked to verify that the information was being transmitted.

3.3 SPECIAL ACCESSORIES

N/A.

3.4 MODULATED BANDWIDTH

The minimum 6 dB bandwidth per FCC 15.247(a)(2) was measured using a 50 ohm spectrum analyzer with the resolution bandwidth set at 100 kHz, and the video bandwidth set at 100 kHz. The Minimum 6 dB modulated bandwidth are the following:

Channel 1= 10.2MHz
Channel 6= 10.1MHz
Channel 11=10.1MHz

The 6dB bandwidth is listed in figures 3, 4 and 5.

3.5 POWER OUTPUT

The power output per FCC 15.247(b) was measured on the EUT using a 50 ohm spectrum analyzer with the resolution bandwidth set at 3 MHz, and the video bandwidth set at 3 MHz. The Peak power measured for modulated output power are the following:

Channel 1=14.0dBm
Channel 6=11.5dBm
Channel 11=8.8dBm

See attached power output plot in figure 6, 7, and 8.

3.6 ANTENNA CONDUCTED SPURIOUS EMISSIONS

Antenna spurious emission per FCC 15.247(c) was measured from the EUT antenna port using a 50 ohm spectrum analyzer with the resolution bandwidth set at 100 kHz, and the video bandwidth set at 300 kHz. The modulated carrier were identified at 2.412GHz for Channel 1, 2.437GHz for Channel 6 and 2.462GHz for Channel 11 with peak amplitude at 121.0dBuV, 118.5dBuV and 115.8dBuV. No other harmonics or spurs were found within 20 dB of the carrier level, and from 9kHz to the carriers 10th harmonic. See antenna conducted spurious noise plots, figures 9 through 14.

3.7 RADIATED SPURIOUS EMISSIONS

Radiated Spurious Emissions applies to harmonics and spurious emissions that fall in the restricted and non-restricted bands. The restricted bands are listed in Section 15.205. The maximum permitted average field strength for the restricted band is listed in Section 15.209.

Please, refer to section 3.7 for data test results.

3.8 POWER SPECTRAL DENSITY

The Power spectral density per FCC 15.247(d) was measured from the antenna port of the EUT using a 50 ohm spectrum analyzer with the resolution bandwidth set at 3kHz, the video bandwidth set at 3kHz, and the sweep time set at 17 second. The spectral lines were resolved for the modulated carriers at 2.412GHz, 2.437GHz and 2.462GHz with amplitudes of -17.4dBm, -19.3dBm and -23.9dBm, respectively. These levels are well below the +8 dBm limit. See power spectral density plots, figures 16 through 18.

3.9 PROCESSING GAIN:

Processing gain is a measure of the increase in signal-to-noise ration produced by the spread spectrum modulation. It must be at least 10dB. One method of measuring it, detailed in the FCC's notice, is the "CW jamming margin method." As shown in section 3.8.1, the test configuration consists of the EUT transmitter/receiver pair, a signal generator, an audio signal generator, signal-combining pad, and attenuators. The signal generator is used as an unmodulated (CW) jamming signal.

For this test, the signal generator is stepped in 50 kHz increments across the passband of the system. At each frequency, the generator level is adjusted to produce the BER desired for the system, that is 1/1000 for voice transmission. This is the jammer level (J). The output power (S) of the transmitting unit is measured at the same test point, and the jammer-to-signal ration (J/S) is calculated. The lowest 20% of J/S data points are discarded, and the lowest remaining J/S ration is used in calculating the processing gain.

Processing gain (Gp) is thus defined by the following equation:

Gp=(S/N)o + Mj + Lsys

Processing gain = 11.6dB (measured using Channel 1)

Note: The processing gain was taken from measurements performed by the manufacturer.

3.10 CONFORMANCE STATEMENT

I, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this attached test record. No modifications were made during testing to the equipment in order to achieve compliance with these standards.

Furthermore, there was no deviation from, additions to or exclusions from the ANSI C63.4 test methodology.

Typed/Printed Name: Desmond A. Fraser
Signature

Date: March 20, 1999
Position: President, (NVLAP Signatory)

Accredited by the National Voluntary Accreditation Program for the specific scope of accreditation under Lab Code 20061-0.

Note: This report may not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

4.0 MEASUREMENT PLOTS

FIGURE 3: 6dB Occupied Bandwidth (Channel 1)

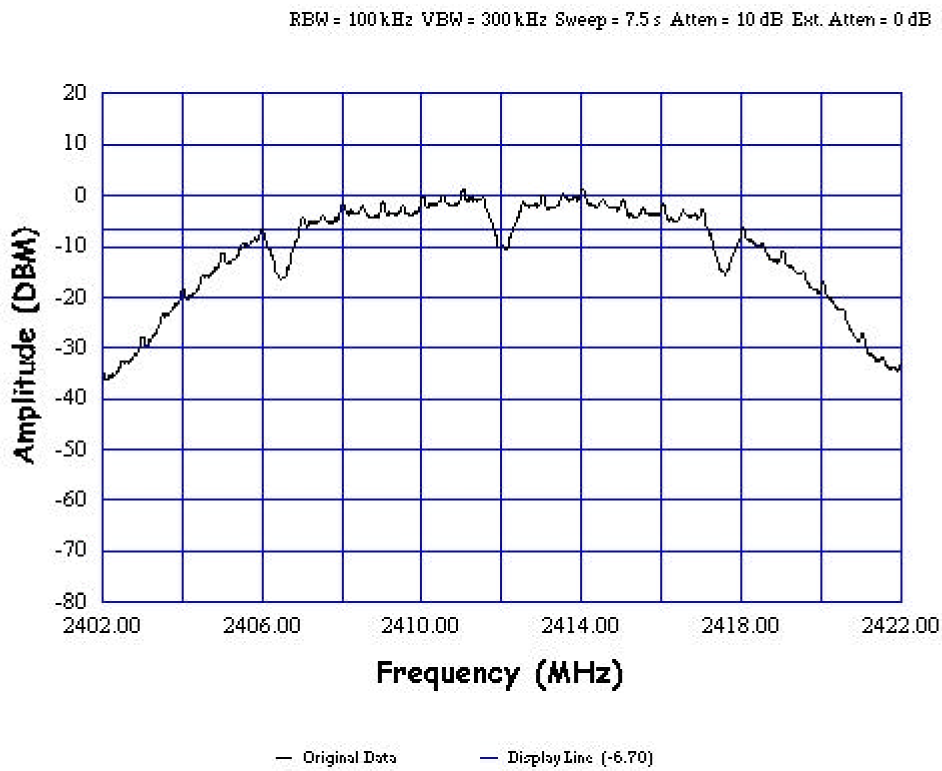


FIGURE 4: 6dB Occupied Bandwidth (Channel 6)

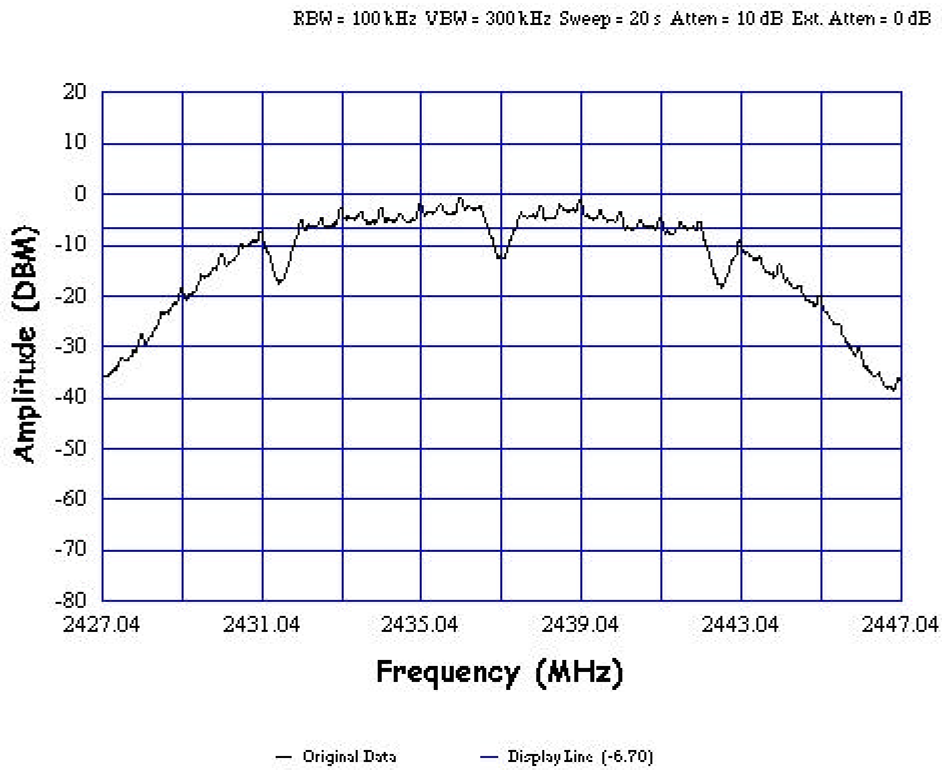


FIGURE 5: 6dB Occupied Bandwidth (Channel 11)

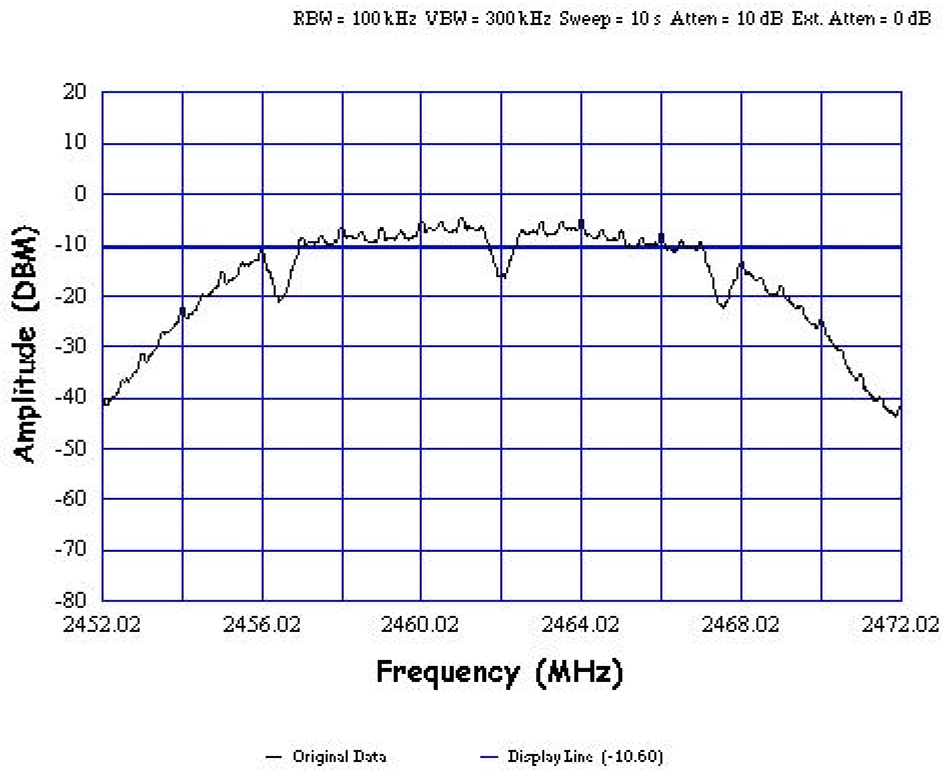


FIGURE 6: Output Power Plots (Channel 1)

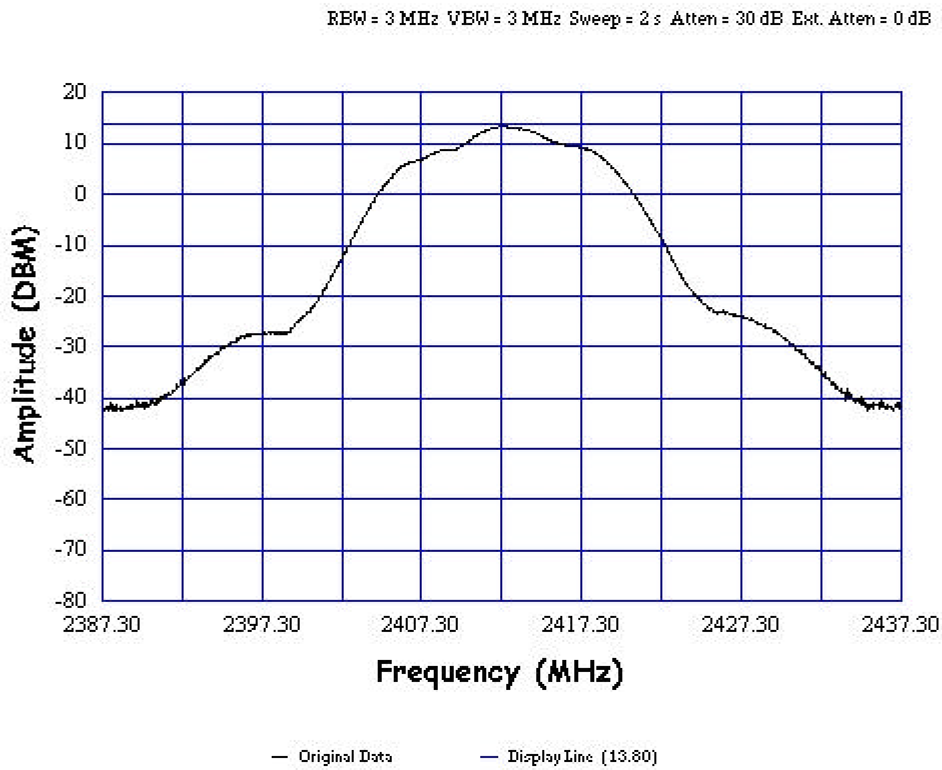


FIGURE 7: Output Power Plots (Channel 6)

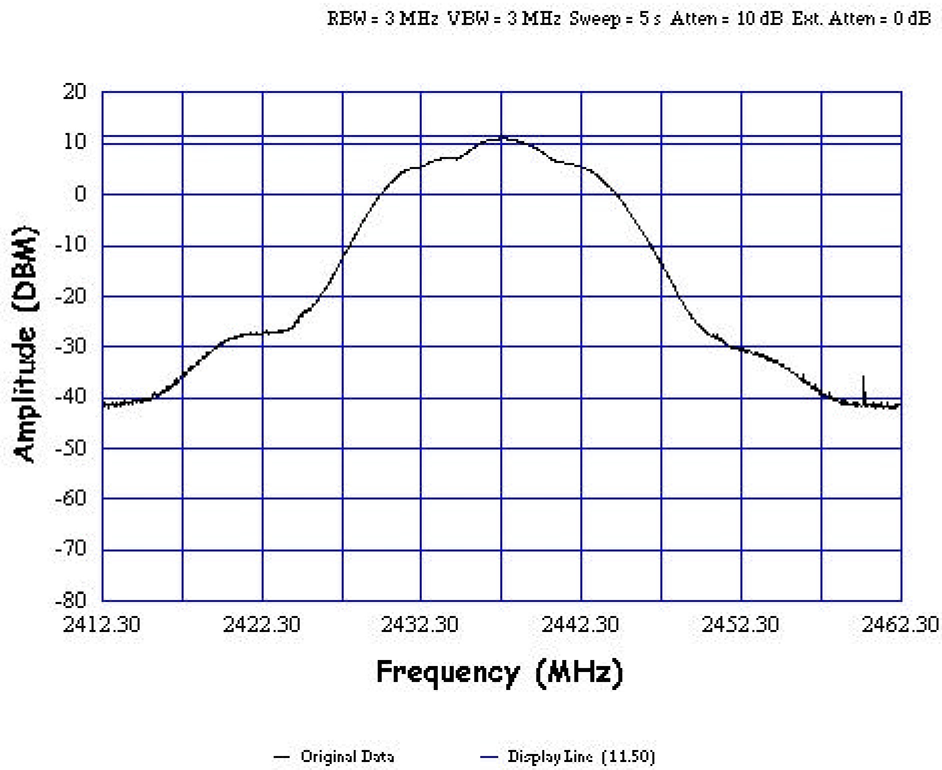


FIGURE 8: Output Power Plots (Channel 11)

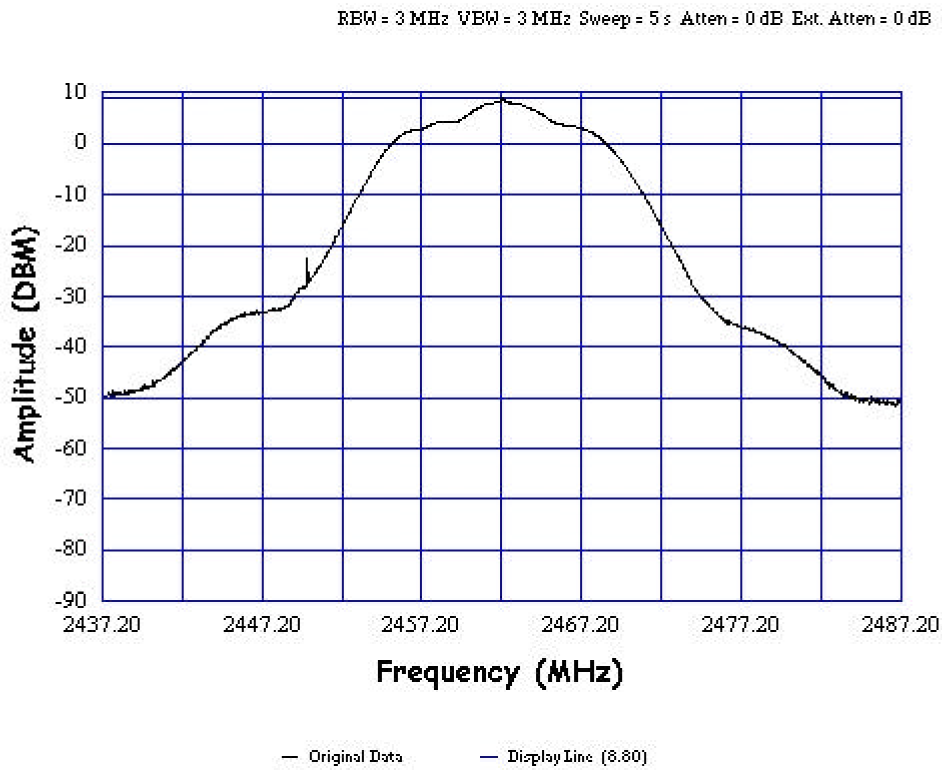


FIGURE 9: Conducted Spurious Emission (9kHz-30MHz)

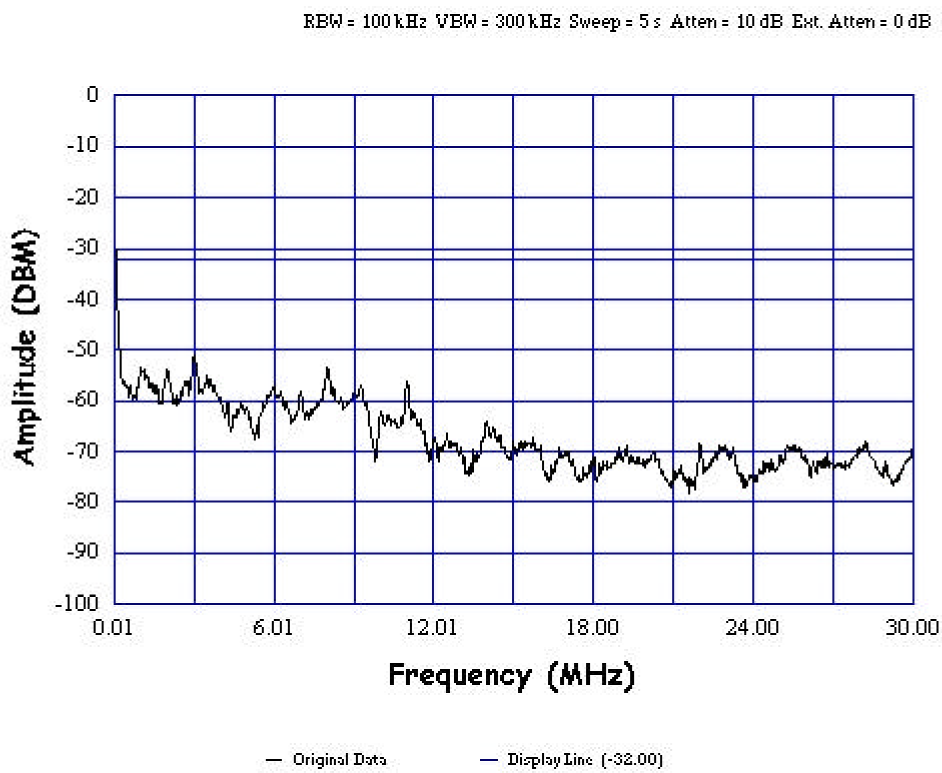


FIGURE 10: Conducted Spurious Emission (30MHz-2GHz)

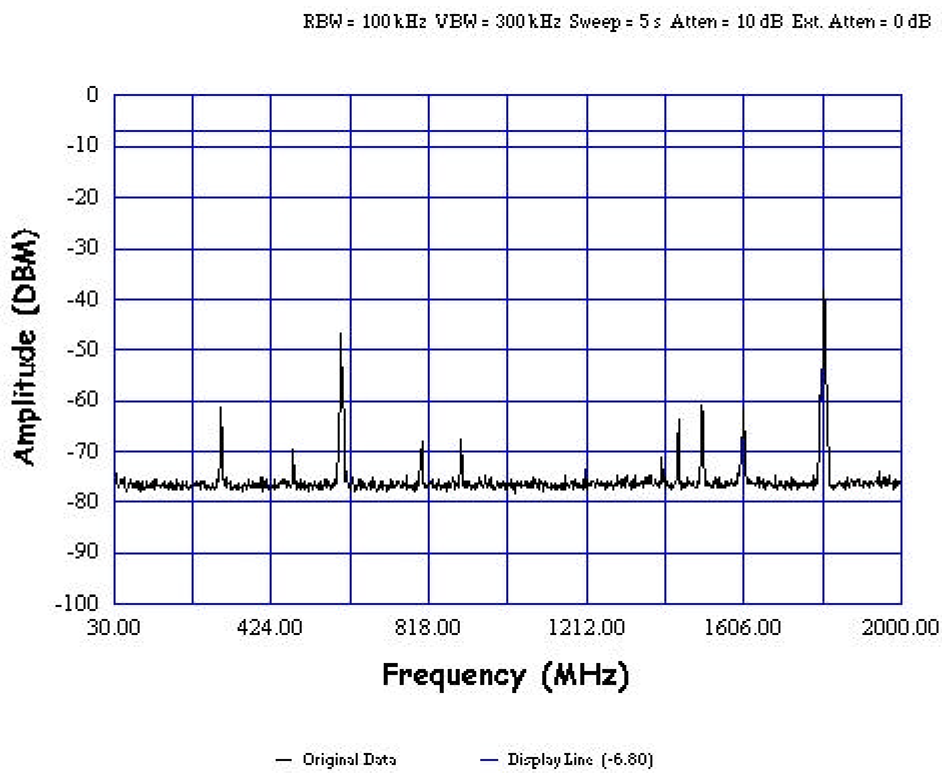


FIGURE 11: Conducted Spurious Emission (2GHz-5GHz)

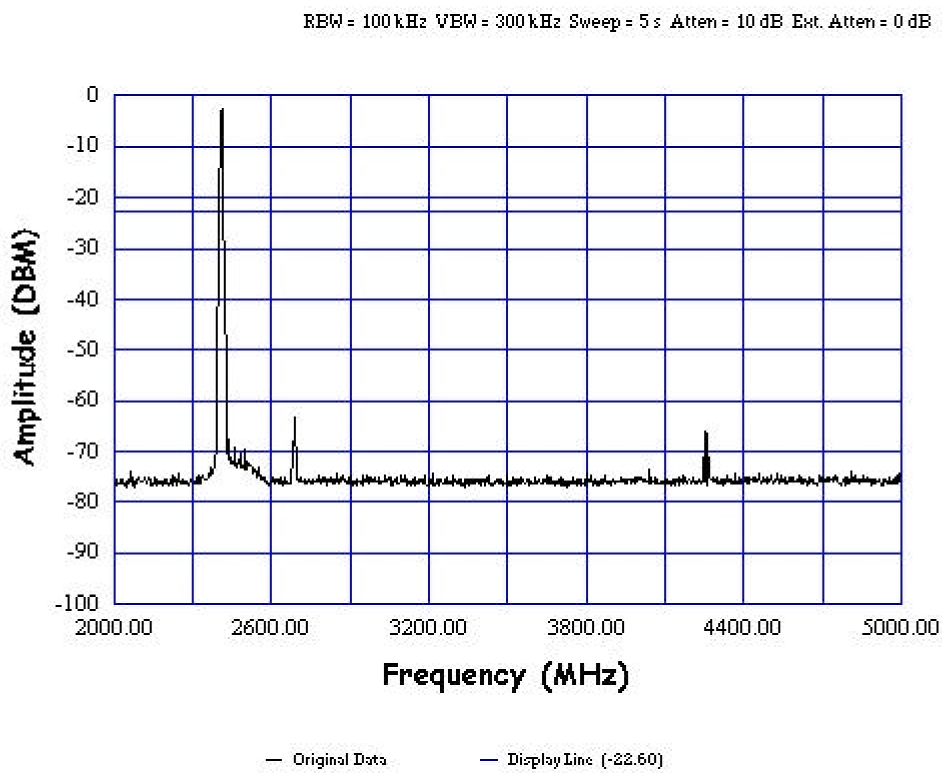


FIGURE 12: Conducted Spurious Emission (5GHz-10GHz)

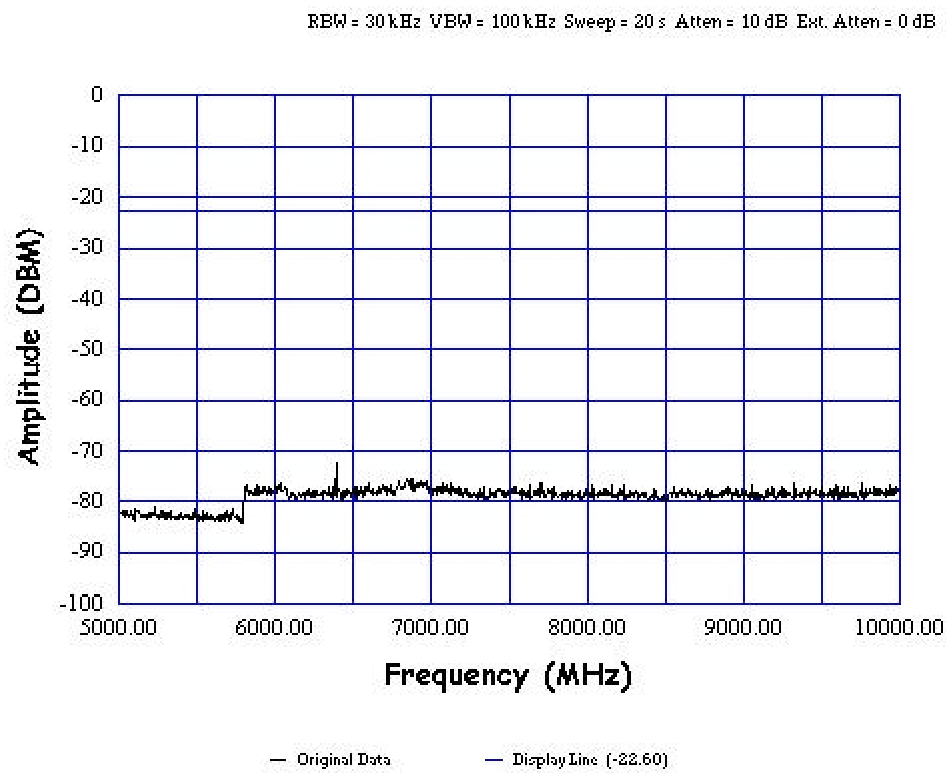


FIGURE 13: Conducted Spurious Emission (10GHz-15GHz)

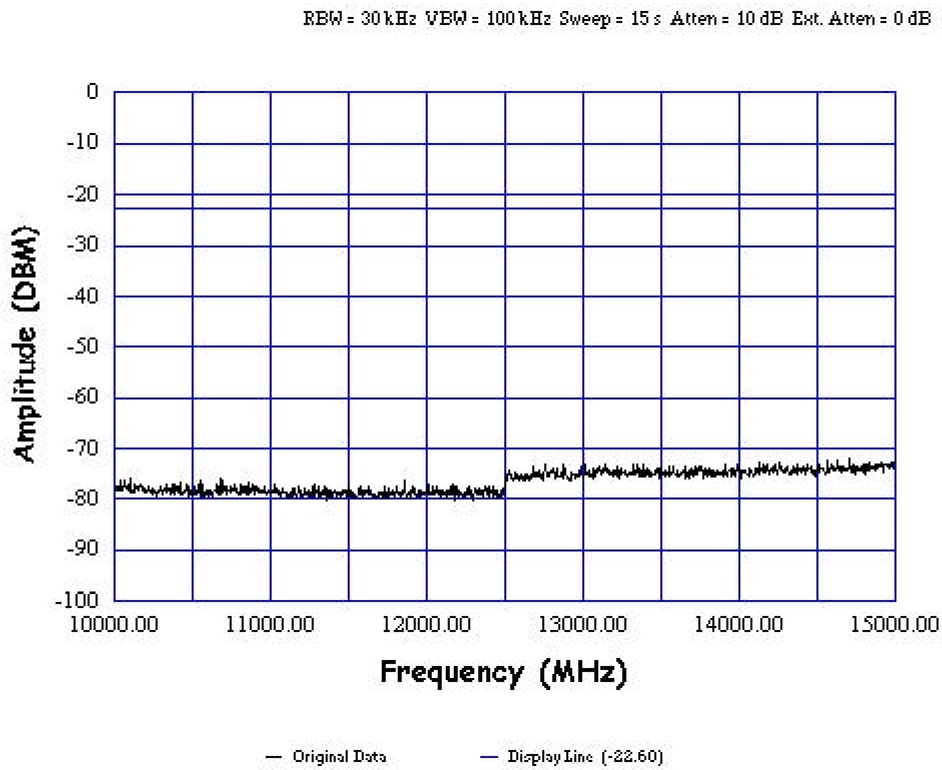


FIGURE 14: Conducted Spurious Emission (15GHz-23GHz)

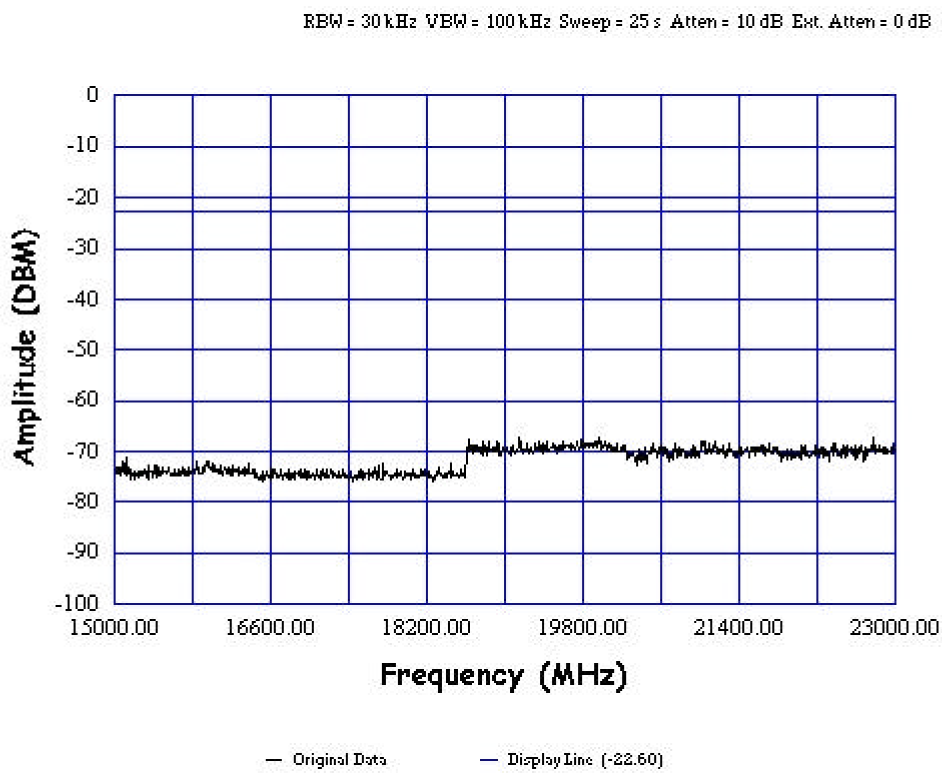


FIGURE 16: Power Spectral Density (Channel 1)

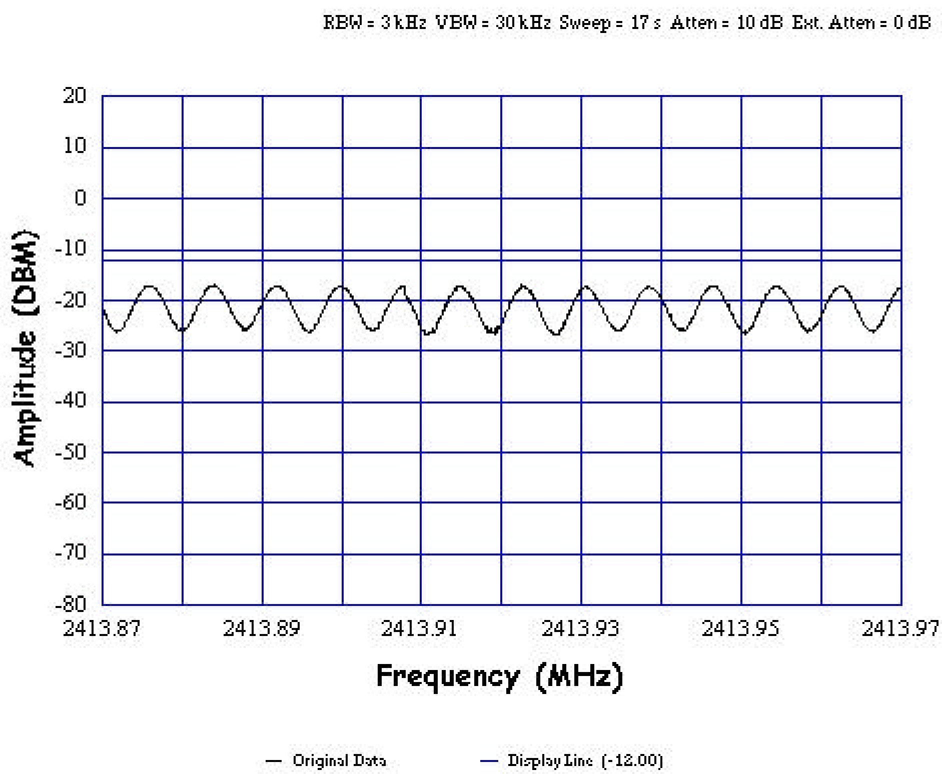


FIGURE 17: Power Spectral Density (Channel 6)

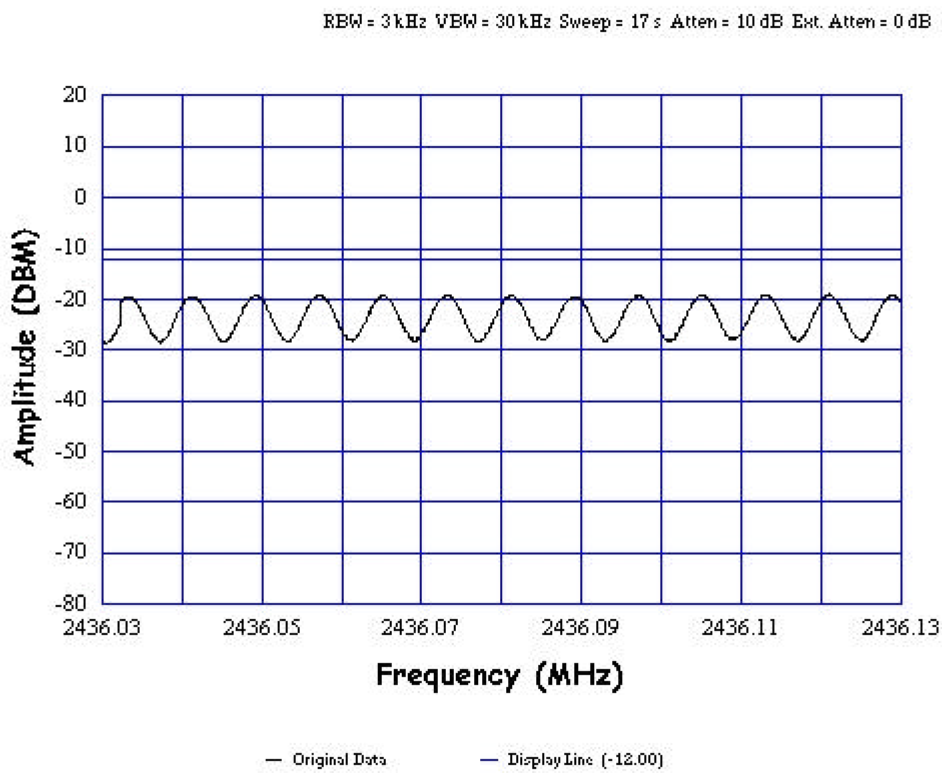
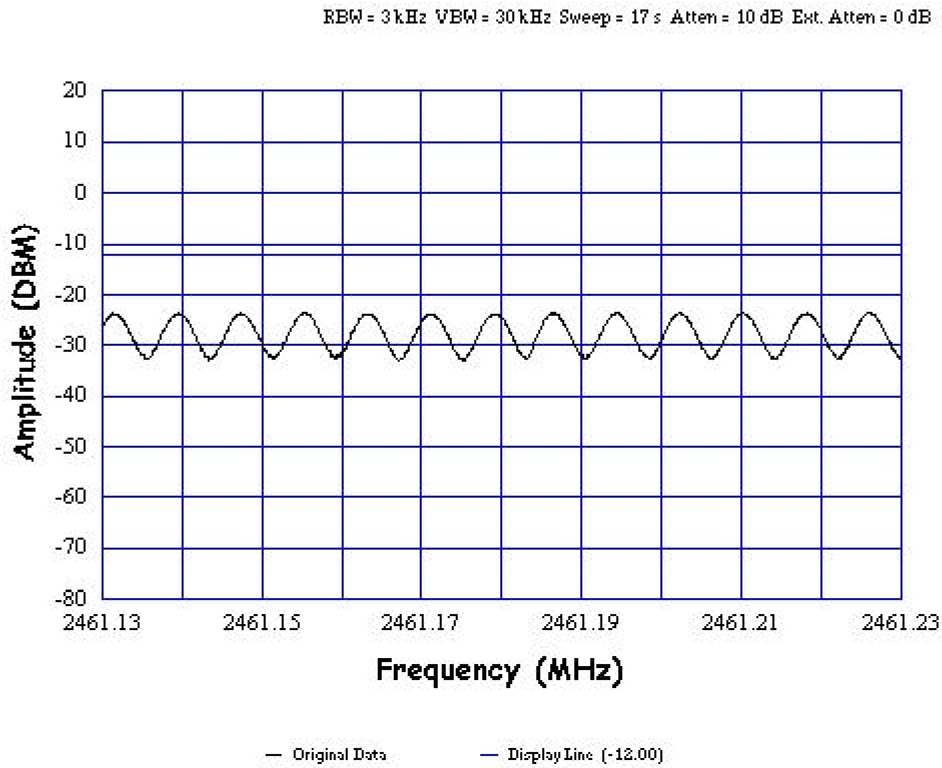


FIGURE 18: Power Spectral Density (Channel 11)



5.0 ANTENNA SPECIFICATIONS

5” Stub Antenna

Electrical Specifications:

Model No.	ACE-2450R
Frequency Range	2.4-2.5GHz
Bandwidth	100MHz
Gain	2±1dBi
V.S.W.R	<1.9
Radiation Pattern	Omni-Directional
Polarization	Vertical
Impedance	50ohms
Operating Temperature	-30C – 60C

Electrical Specifications:

Dimension	124 ± 2.0mm
Pulling Strength	More than 3kgf
Swivel Torque	More than 3kgf
Input Connector	SMA-Male (REVERSE)

Patch Antenna

Electrical Specifications:

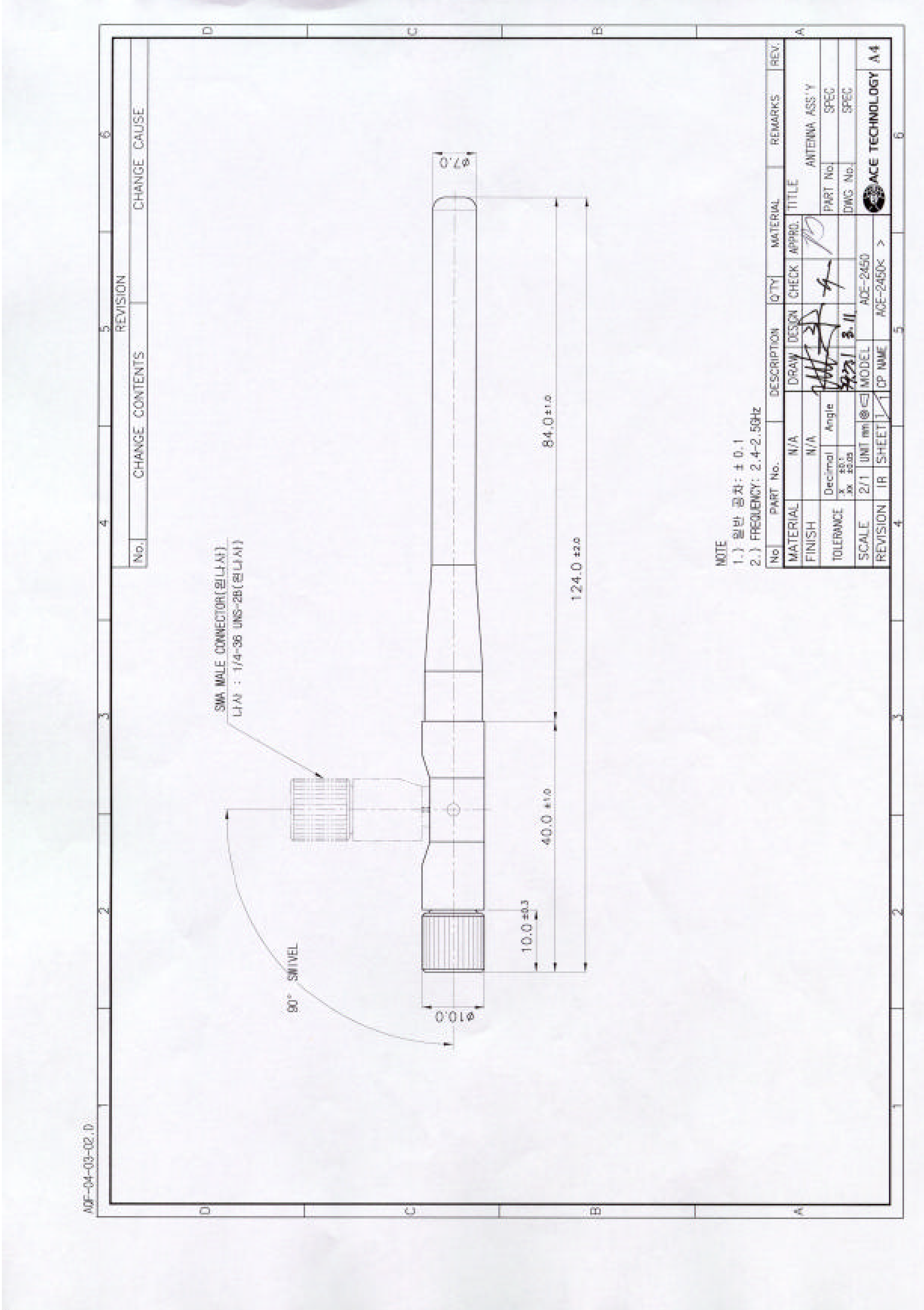
Model No.	Samsung Internal Antenna
Frequency Range	2.4-2.5GHz
Bandwidth	100MHz
Gain	0dBi
V.S.W.R	<1.9
Radiation Pattern	Omni-Directional
Polarization	Horizontal
Impedance	50ohms
Operating Temperature	-30C – 60C

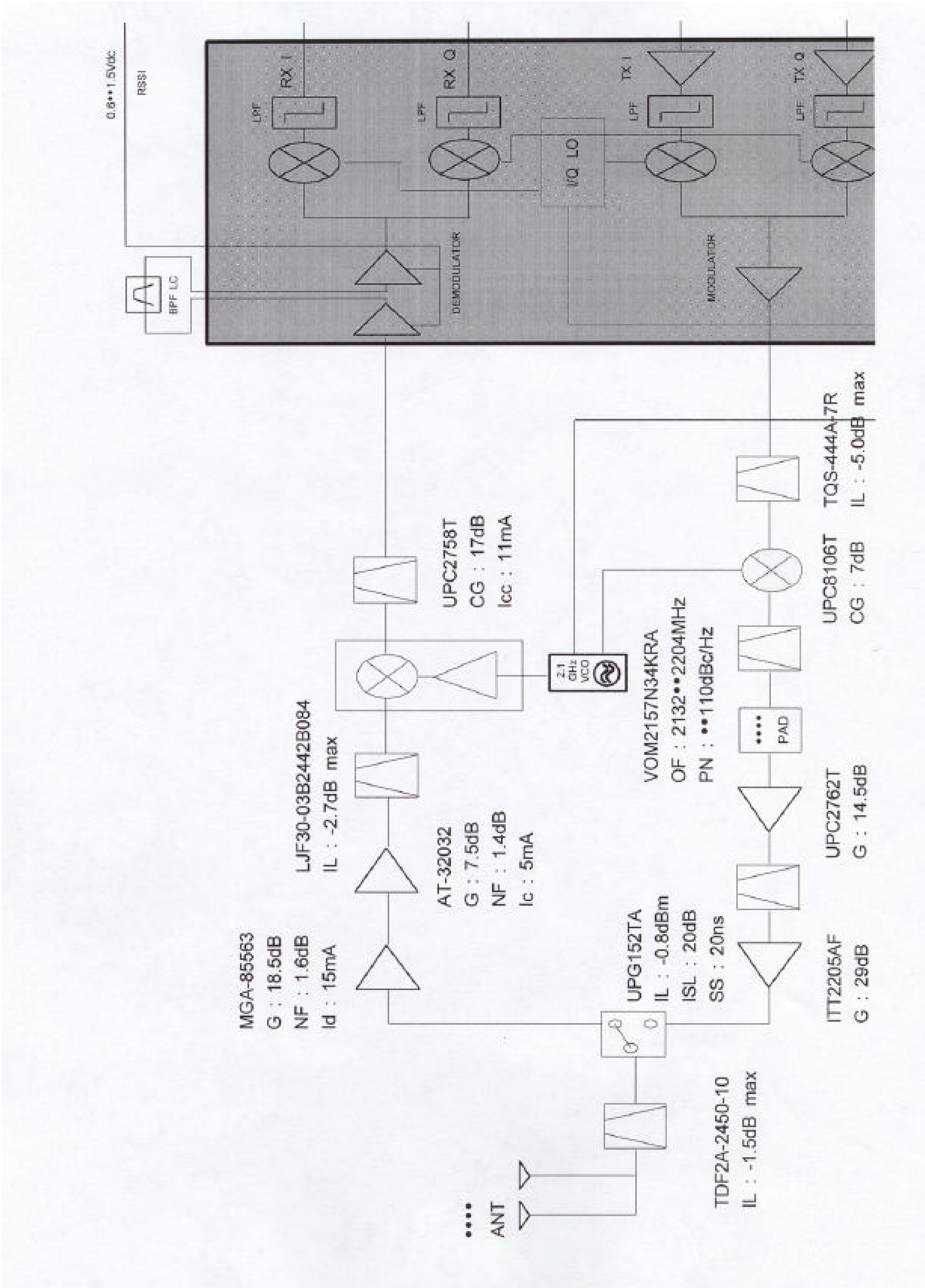
Electrical Specifications:

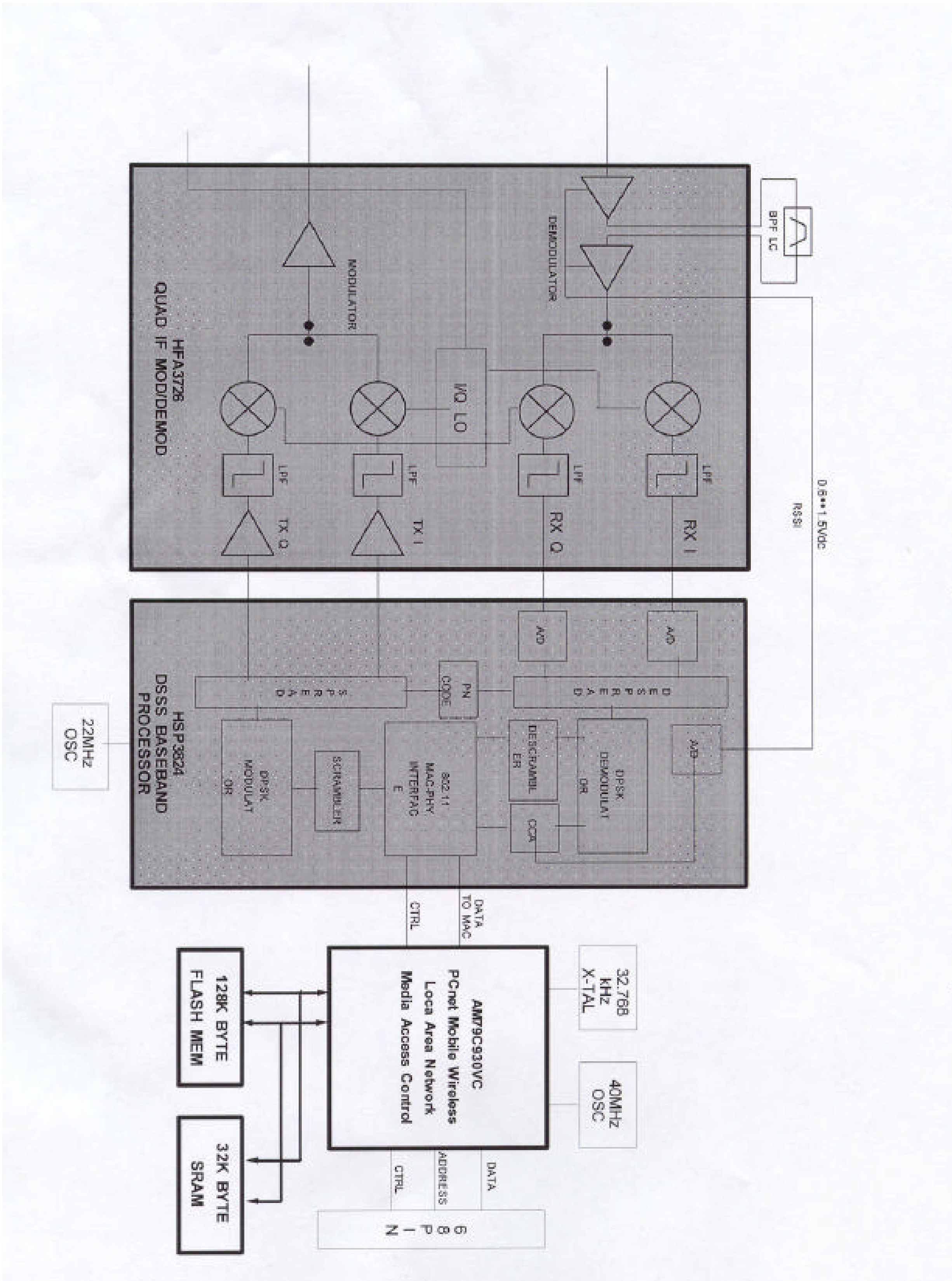
Dimension	26 ± 2.0mm
Pulling Strength	N/A
Swivel Torque	N/A
Input Connector	Directly etched on PCB board

6.0 BLOCK DIAGRAM/SCHEMATICS OF

MAGIC WAVE PCMCIA


SMA MALE CONNECTOR
1/4-36 UNS-2B
90° SWIVEL
ø10.0
ø7.0
10.0
40.0
84.0
124.0
NOTE
2.) FREQUENCY: 2.4-2.5GHz
ANTENNA ASS'Y
ACE-2450
ACE TECHNOLOGY
AQF-04-03-02.0


ANT
TDF2A-2450-10
IL : -1.5dB max
MGA-85563
G : 18.5dB
NF : 1.6dB
Id : 15mA
UPG152TA
IL : -0.8dBm
ISL : 20dB
SS : 20ns
ITT2205AF
G : 29dB
AT-32032
G : 7.5dB
NF : 1.4dB
Ic : 5mA
LJF30-03B2442B084
IL : -2.7dB max
UPC2762T
G : 14.5dB
PAD
VOM2157N34KRA
OF : 2132••2204MHz
PN : ••110dBc/Hz
2.1 GHz VCO
UPC2758T
CG : 17dB
Icc : 11mA
UPC8106T
CG : 7dB
TQS-444A-7R
IL : -5.0dB max
BPF LC
DEMODULATOR
MODULATOR
I/Q LO
LPF
RX I
RX Q
TX I
TX Q
RSSI
0.6••1.5Vdc


HFA3726
QUAD IF MOD/DEMOD
MODULATOR
DEMODULATOR
I/Q LO
LPF
TX Q
TX I
RX Q
RX I
BPF LC
RSSI
HSP3824
DSSS BASEBAND
PROCESSOR
A/D
PN CODE
SPREAD
DESPREAD
DESCRAMBLER
DPSK DEMODULATOR
DPSK MODULATOR
SCRAMBLER
802.11 MAC-PHY INTERFACE
CCA
22MHz OSC
DATA TO MAC
CTRL
AM79C930VC
PCnet Mobile Wireless
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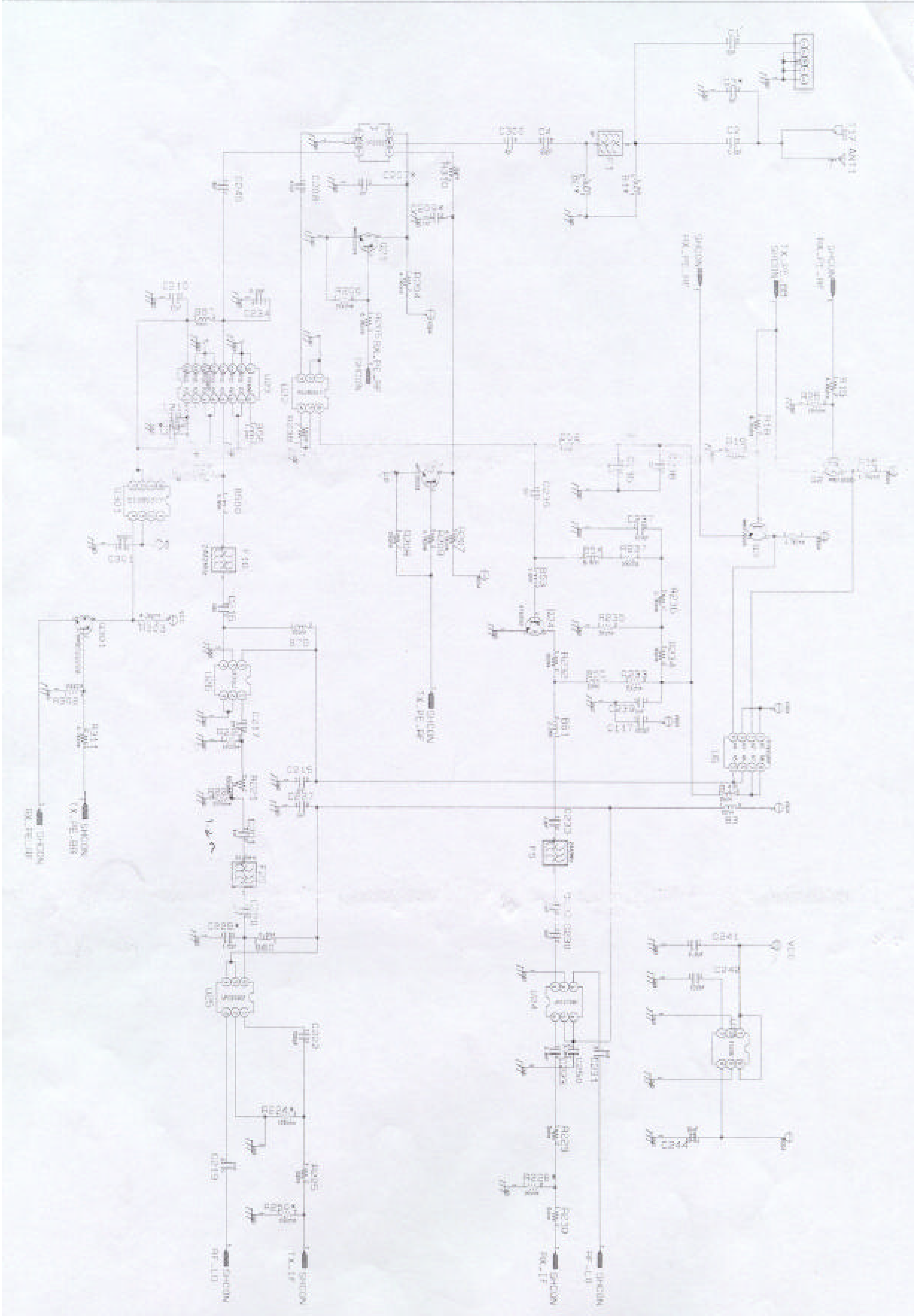
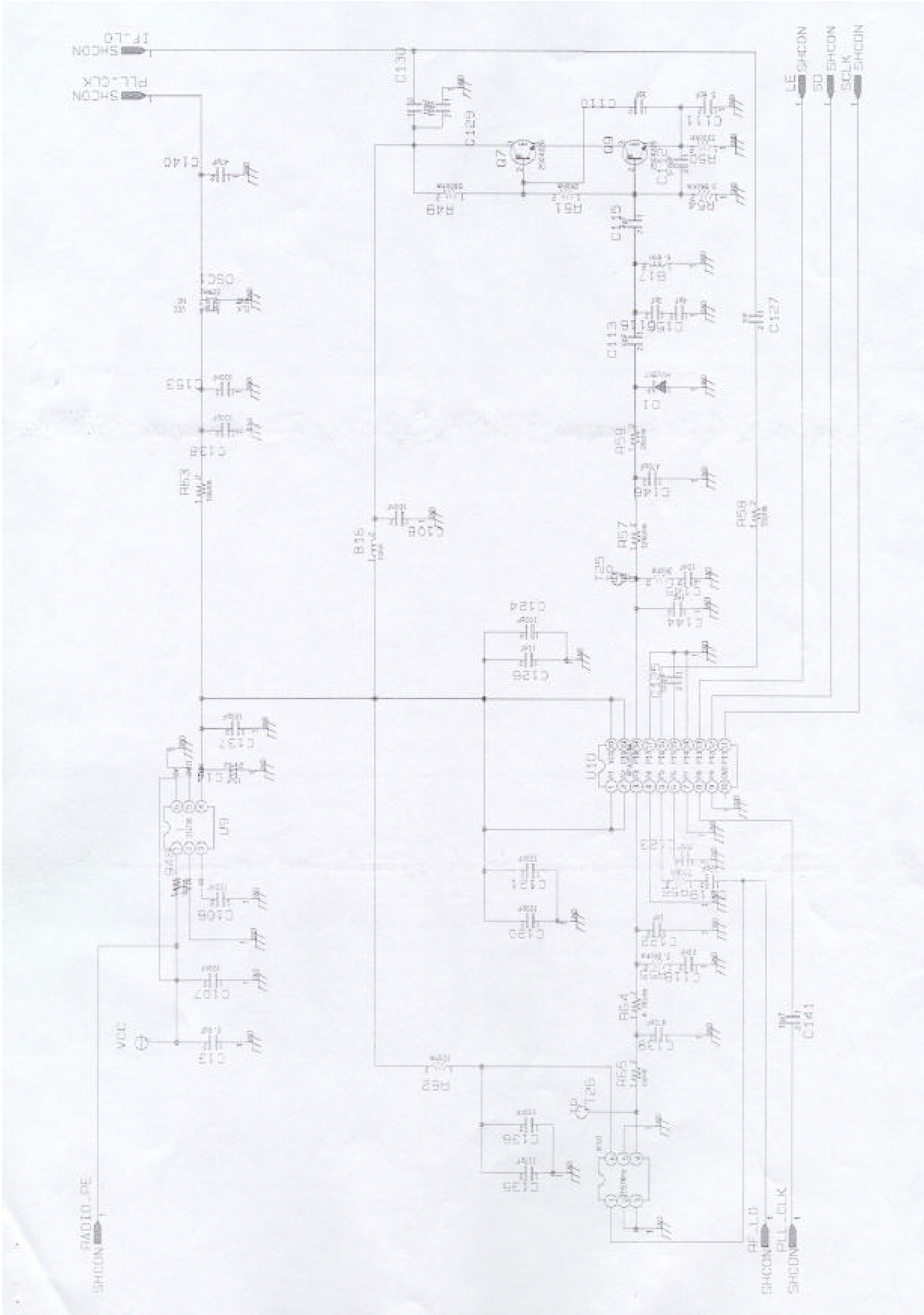
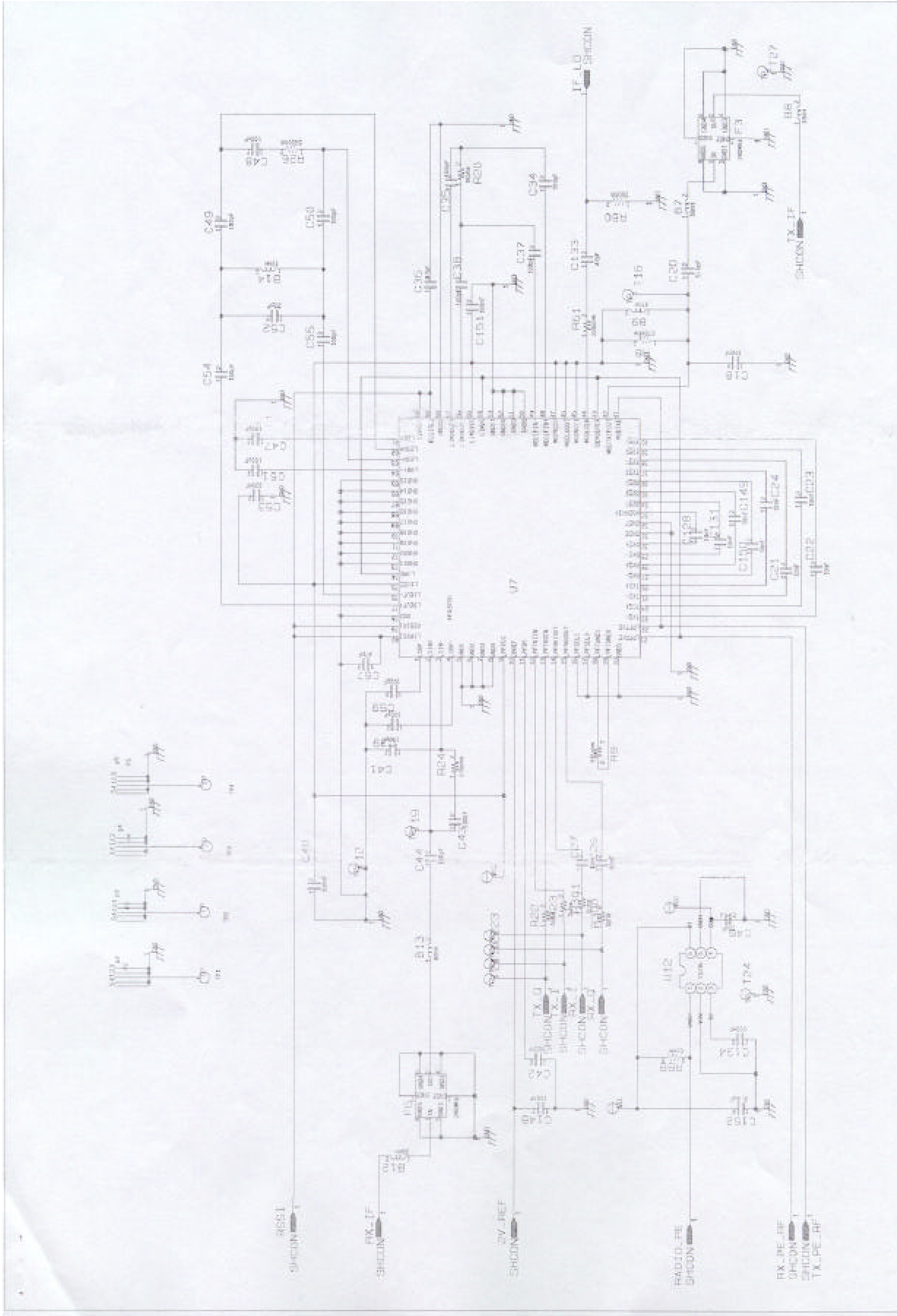
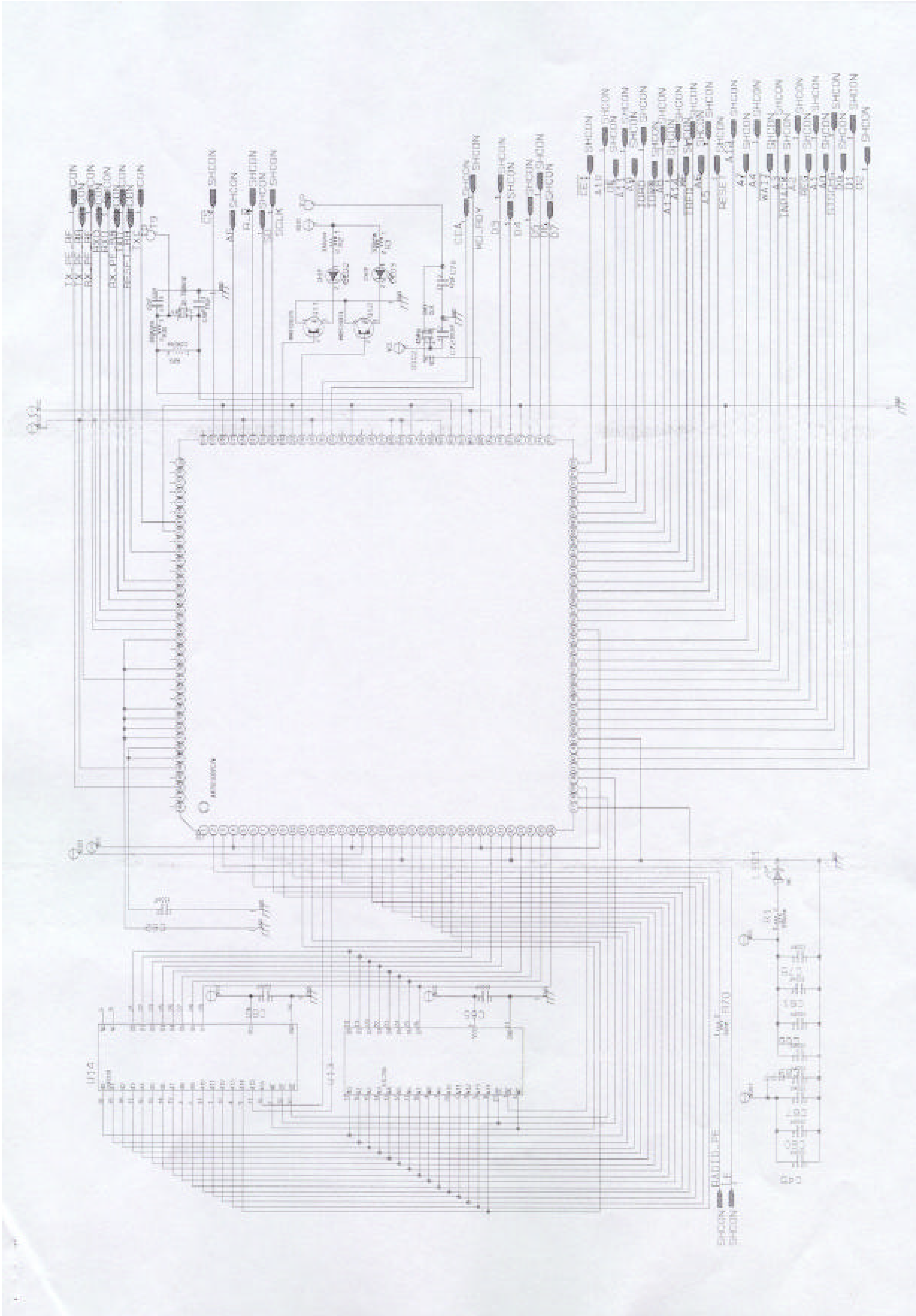
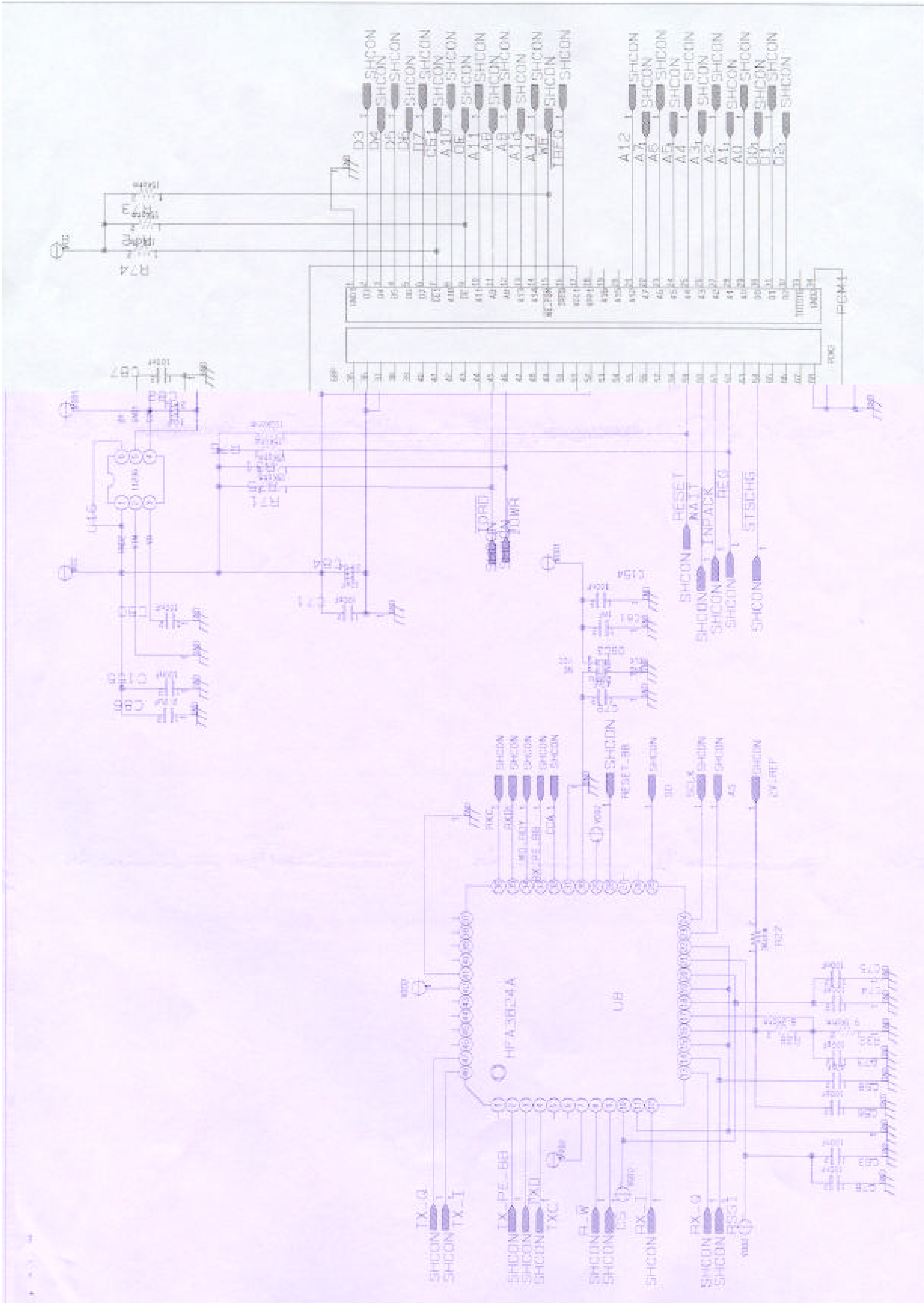
32K BYTE SRAM
DATA
ADDRESS
CTRL
68 PIN










HFA3824A
U8
PCM1
SHCON
RESET
INPACK
REG
STSCHG
IORD
IOWR
RESET_BB
TX_Q
TX_I
TX_PE_BB
TXD
TXC
R_W
CS
RX_I
RX_Q
RSSI

7.0 Conducted Field Strength Calculation, and Radiated Test Methodology

7.1 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:

FI(dBuV/m) = SAR(dBuV) + SCF(dB/m)
FI = Field Intensity
SAR = Spectrum Analyzer Reading
SCF = Site Correction Factor

The Site Correction Factor (SCF) used in the above equation is determined empirically, and is expressed in the following equation:

SCF(dB/m) = - PG(dB) + AF(dB/m) + CL(dB)

SCF = Site Correction Factor
PG = Pre-amplifier Gain
AF = Antenna Factor
CL = Cable Loss

The field intensity in microvolts per meter can then be determined according to the following equation:

$$FI(uV/m) = 10^{FI(dBuV/m)/20}$$

For example, assume a signal at a frequency of 125 MHz has a received level measured as 49.3 dBuV. The total Site Correction Factor (antenna factor plus cable loss minus preamplifier gain) for 125 MHz is -11.5 dB/m. The actual radiated field strength is calculated as follows:

49.3 dBuV - 11.5 dB/m = 37.8 dBuV/m

$$10^{37.8/20} = 10^{1.89} = 77.6 \text{ uV/m}$$

7.2 Radiated measurement

Before final measurements of radiated emissions were made on the open-field three/ten meter range, the EUT was scanned indoors at one meter and three meter distances if necessary in order to determine its emissions spectrum signature. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. This process was repeated during final radiated emissions measurements on the open-field range, at each frequency, in order to insure that maximum emission amplitudes were attained.

Final radiated emissions measurements were made on the three-meter, open-field test site. The EUT was placed on a nonconductive turntable approximately 0.8 meters above the ground plane. The spectrum was examined from 9 kHz to 10GHz MHz (10^{th} harmonic of carrier frequency) using a Hewlett Packard 8566B spectrum analyzer, a Hewlett Packard 85650A quasi-peak adapter, HP11790 mixers, and EMCO log periodic, EMCO horn antennas and biconical antenna. In order to gain sensitivity, a cougar preamplifier (from 30 to 2GHZ), and an HP preamplifier (from 1GHz to 26.5 GHz) was connected in series between the antenna and the input of the spectrum analyzer.

At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters in order to determine the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarizations. The spectrum analyzer's 6 dB resolution bandwidth was set to 120 kHz for measurements below 1GHz, and 1MHz for measurements above 1GHz. The analyzer was operated in peak detection mode below 1GHz and in the peak mode with 10Hz video averaging above 1 GHz. No video filter less than 10 times the resolution bandwidth was used when measuring below 1GHz. The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report.

Note: Rhein Tech Laboratories, Inc. has implemented procedures to minimize errors that occur from test instruments, calibration, procedures, and test setups. Test instrument and calibration errors are documented from the manufacturer or calibration lab. Other errors have been defined and calculated within the Rhein Tech quality manual, section 6.1. Rhein Tech implements the following procedures to minimize errors that may occur: yearly as daily calibration methods, technician training, and emphasis to employees on avoiding error.

8.0 CONDUCTED EMISSION DATA

The following table lists worst case conducted emission date. Specifically: Emission Frequency, Test Detector, Analyzer Reading, Site Correction Factor, corrected Emission Level, Quasi Peak Limit and Margin, and the Average Limit and Margin.

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. If the conducted emissions exceed the limit with the instrument set to the quasi-peak mode, then measurements are made in the average mode.

The conducted test was performed with the EUT exercise program loaded, and the emissions were scanned between 150 kHz to 30 MHz on the NEUTRAL SIDE and HOT SIDE, herein referred to as L1 and L2, respectively.

TABLE 1: CONDUCTED EMISSIONS (CHANNEL 1)

NEUTRAL SIDE (Line 1)

EMISSION FREQUENCY (MHz)	TEST DETECTOR	ANALYZER READING (dBuV)	SITE CORRECTION FACTOR (dB)	EMISSION LEVEL (dBuV)	FCC LIMIT (dBuV)	FCC MARGIN (dBuV)
0.450	Pk	39.2	0.6	39.8	48.0	-8.2
0.595	Pk	37.0	0.6	37.6	48.0	-10.4
0.896	Pk	35.7	0.7	36.4	48.0	-11.6
1.264	Pk	35.7	0.9	36.6	48.0	-11.4
1.340	Pk	35.1	0.9	36.0	48.0	-12.0
1.418	Pk	36.1	1.0	37.1	48.0	-10.9
18.415	Pk	32.4	3.4	35.8	48.0	-12.2
25.878	Pk	31.2	3.9	35.1	48.0	-12.9

HOT SIDE (Line 2)

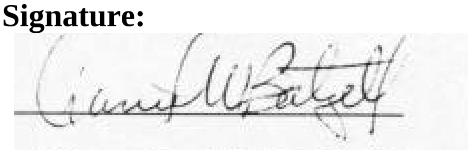
EMISSION FREQUENCY (MHz)	TEST DETECTOR	ANALYZER READING (dBuV)	SITE CORRECTION FACTOR (dB)	EMISSION LEVEL (dBuV)	FCC LIMIT (dBuV)	FCC MARGIN (dBuV)
0.450	Pk	39.4	0.6	40.0	48.0	-8.0
0.746	Pk	34.8	0.7	35.5	48.0	-12.5
0.747	Pk	33.8	0.7	34.5	48.0	-13.5
0.895	Pk	35.2	0.8	36.0	48.0	-12.0
1.119	Pk	35.5	0.9	36.4	48.0	-11.6
1.568	Pk	35.0	1.1	36.1	48.0	-11.9
18.832	Pk	32.2	3.6	35.8	48.0	-12.2
25.892	Pk	31.5	4.0	35.5	48.0	-12.5

[1]Pk = Peak; QP = Quasi-Peak; Av = Average

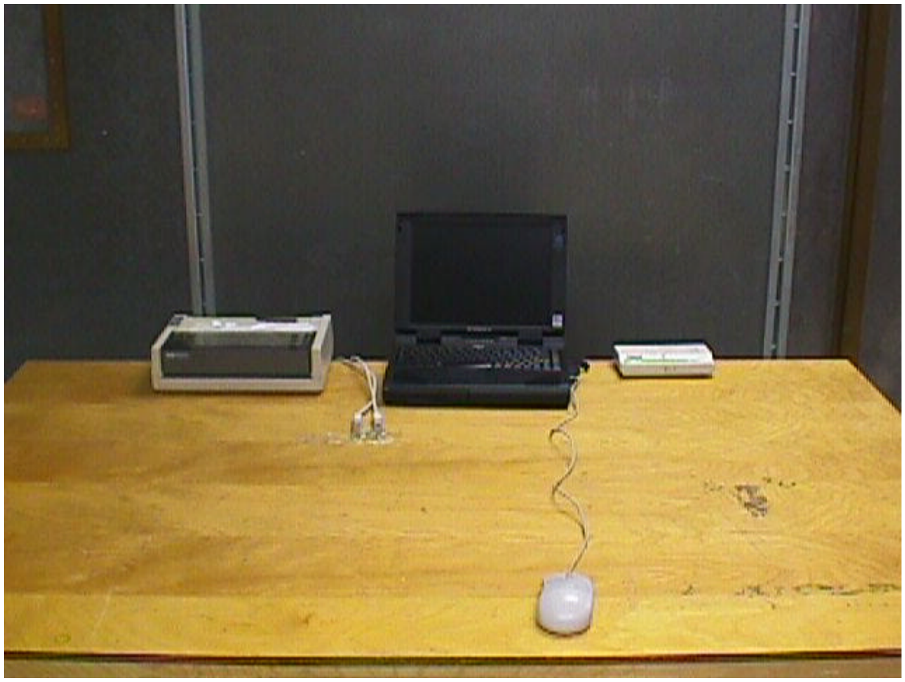
TEST PERSONNEL:

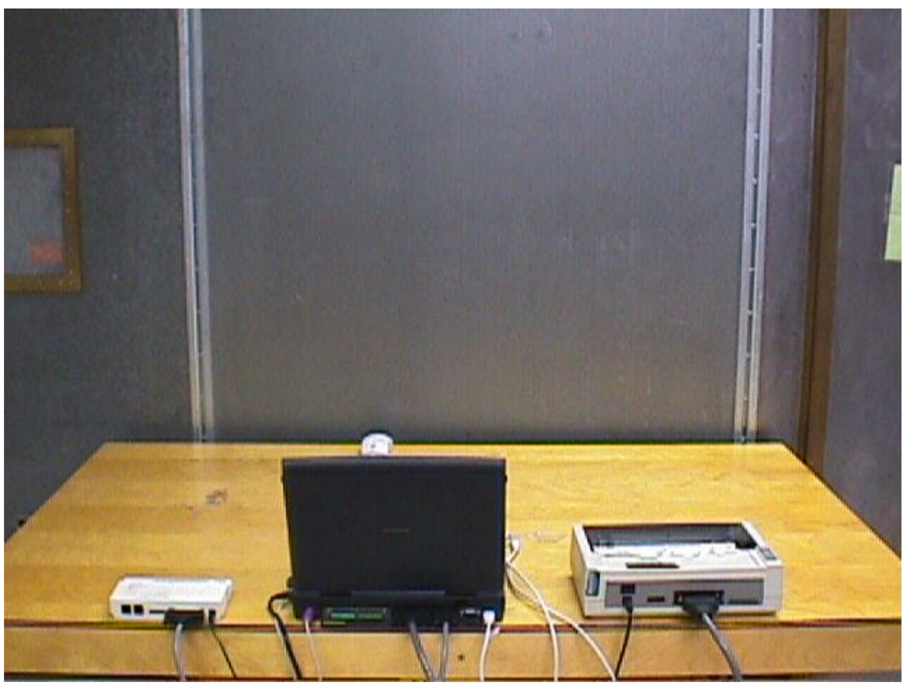
Typed/Printed Name: Daniel W. Baltzell **Date:** March 18, 1999

Signature:



8.1 Conducted Measurement Photos





9.0 RADIATED EMISSION DATA

The following data lists the significant emission frequencies, measured levels, correction factor (includes cable and antenna corrections), the corrected reading, plus the limit. Explanation of the Correction Factor is given in paragraph 6.3.

TABLE 2: RADIATED EMISSIONS (CHANNEL 1)

EMISSION FREQUENCY (MHz)	ANTENNA POLARITY (H/V)	ANALYZER READING (dBuV)	SITE CORRECTION FACTOR (dB/m)	EMISSION LEVEL (dBuV/m)	FCC LIMIT (dBuV/m)	FCC MARGIN (dBuV/m)
279.385	H	56.7	-14.6	42.1	46.0	-3.9
330.865	V	48.7	-12.8	35.9	46.0	-10.1
395.130	H	51.1	-11.3	39.8	46.0	-6.2
399.950	V	52.3	-11.1	41.2	46.0	-4.8
599.925	V	48.5	-6.2	42.3	46.0	-3.7
799.910	V	45.2	-2.3	42.9	46.0	-3.1
999.891	V	44.8	-2.5	42.3	54.0	-11.7
1199.840	V	31.1	.6	31.7	54.0	-22.3
4264.05	V	51.9	-3.6	48.3	54.0	-5.7
10660.11	H	28.5	4.5	33.0	54.0	-21.0
4314.0	H	52.7	-4.0	48.7	54.0	-5.3
4883.48	H	36.6	-3.5	33.1	54.0	-20.9
10785.075	H	31.3	4.1	35.4	54.0	-18.7
4911.218	H	32.4	-3.5	28.9	54.0	-25.1
4364.08	H	53.8	-4.0	49.8	54.0	-4.2
4883.54	H	37.0	-3.5	33.5	54.0	-20.5
10910.088	H	31.5	5.0	36.5	54.0	-17.5

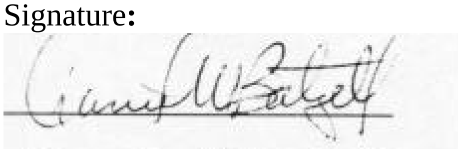
TABLE 3: RADIATED EMISSIONS (CHANNEL 6 WITH PATCH ANTENNA)

EMISSION FREQUENCY (MHz)	ANTENNA POLARITY (H/V)	ANALYZER READING (dBuV)	SITE CORRECTION FACTOR (dB/m)	EMISSION LEVEL (dBuV/m)	FCC LIMIT (dBuV/m)	FCC MARGIN (dBuV/m)
4314.000	H	49.9	-4.0	45.9	54.0	-8.1
4823.970	H	48.6	-3.5	45.1	54.0	-8.9
4874.00	H	40.1	-3.5	36.6	54.0	-17.4

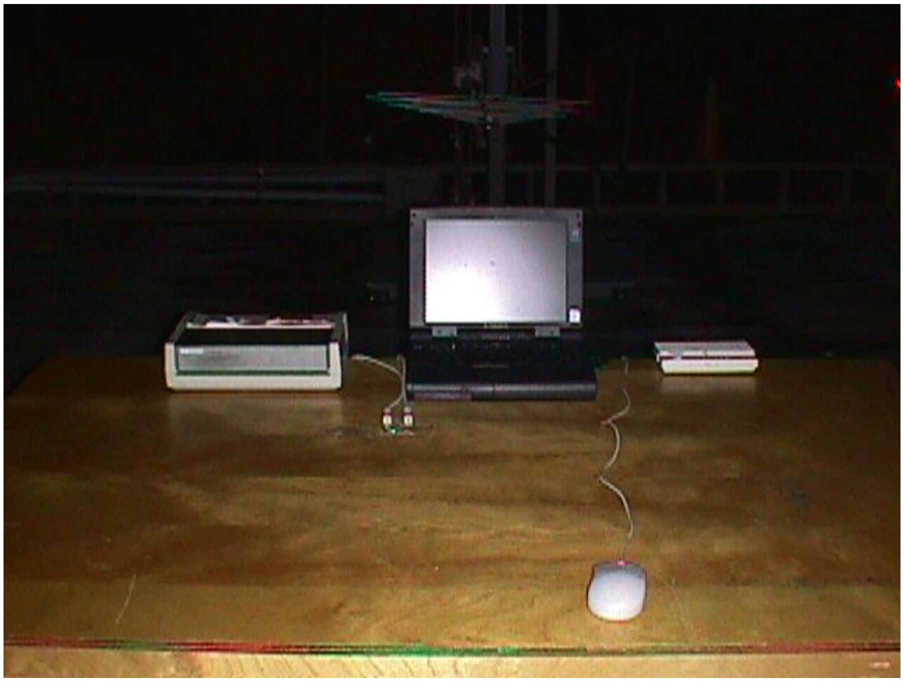
TEST PERSONNEL:

Typed/Printed Name: Daniel W. Baltzell Date: March 18, 1999

Signature:



9.1 Radiated Measurement Photos



APPENDIX A: Emissions Equipment List

DESCRIPTION	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. LAB
Amplifier	Hewlett Packard	11975A	2304A00348	TEST EQUITY
Amplifier (S/A 1)	Rhein Tech	PR-1040	00001	RTL
Amplifier (S/A 2)	Rhein Tech	RTL2	900723	RTL
Amplifier (S/A 3)	Rhein Tech	8447F	2944A03783	RTL
Amplifier (S/A 4)	Rhein Tech	8447D	2727A05397	RTL
Biconical/Log Antenna 1	Antenna Research	LPB-2520	1037	LIBERTY LABS
Biconical/Log Antenna 2	Antenna Research	LPB-2520	1036	LIBERTY LABS
Field Site Source	EMCO	4610	9604-1313	RTL
Filter (Room 1)	Solar	8130	947305	RTL
Filter (Room 2)	Solar	8130	947306	RTL
Harmonic Mixer 1	Hewlett Packard	11970K	2332A00563	TELOGY
Harmonic Mixer 2	Hewlett Packard	11970A	2332A01199	TELOGY
Horn Antenna 1	EMCO	3160-10	9606-1033	EMCO
Horn Antenna 2	EMCO	3160-9	9605-1051	EMCO
Horn Antenna 3	EMCO	3160-7	9605-1054	EMCO
Horn Antenna 4	EMCO	3160-8	9605-1044	EMCO
Horn Antenna 5	EMCO	3160-03	9508-1024	EMCO
LISN (Room 1/L1)	Solar	7225-1	900727	ACUCAL
LISN (Room 1/L2)	Solar	7225-1	900726	ACUCAL
LISN (Room 2/L1)	Solar	7225-1	900078	ACUCAL
LISN (Room 2/L2)	Solar	7225-1	900077	ACUCAL
Pre-Amplifier	Hewlett Packard	8449B OPT	3008A00505	TELOGY
Quasi-Peak Adapter (S/A 1)	Hewlett Packard	85650A	3145A01599	ACUCAL
Quasi-Peak Adapter (S/A 2)	Hewlett Packard	85650A	2811A01276	ACUCAL
Quasi-Peak Adapter (S/A 3)	Hewlett Packard	85650A	2521A00473	ACUCAL
Quasi-Peak Adapter (S/A 4)	Hewlett Packard	85650A	2521A01032	ACUCAL
RF Preselector (S/A 1)	Hewlett Packard	85685A	3146A01309	ACUCAL
Signal Generator (HP)	Hewlett Packard	8660C	1947A02956	ACUCAL
Signal Generator (Wavetek)	Wavetek	3510B	4952044	ACUCAL
Spectrum Analyzer 1	Hewlett Packard	8566B	3138A07771	ACUCAL
Spectrum Analyzer 2	Hewlett Packard	8567A	2841A00614	ACUCAL
Spectrum Analyzer 4	Hewlett Packard	8567A	2727A00535	ACUCAL
Tunable Dipole	EMCO	3121	274	LIBERTY LABS
Antenna	ATM	WR08	08443-6	ATM
Mixer	Oleson	M08HW	F80814-1	Oleson
Mixer	Oleson	M05HW	G80814-1	Oleson
Diplexer	Oleson	M05HW	G80814-1	Oleson
Mixer	Hewlett Packard	11970U	2332A01110	ACUCAL
Mixer	Hewlett Packard	11970V	2521A00512	Telogy
Mixer	Hewlett Packard	11970W	2521A00710	Telogy
Antenna	ATM	WR15	15-443-6	ATM
Antenna	ATM	WR10	10-443-6	ATM
Antenna	ATM	WR05	05-443-6	ATM
Sweep Generator	Hewlett Packard	83752A	3610A00866	Hewlett Packard

Calibration Certification available upon request.

10.0 PHOTOS OF TESTED EUT

Figure 19: PCM Antenna

Figure 20: PCM (Back)

Figure 21: PCM Front & Back

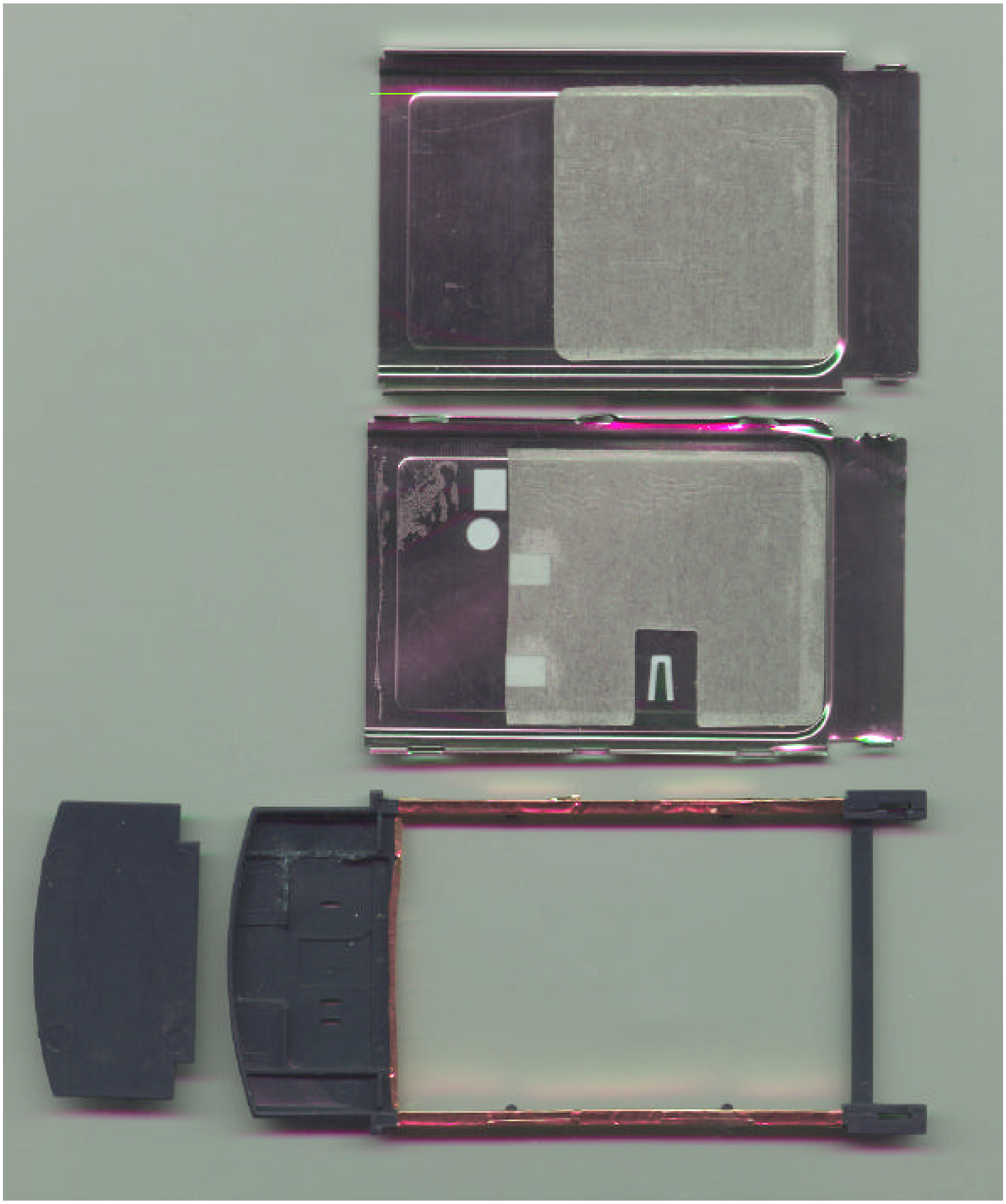


Figure 22: PCM Inside Bracket & Cover

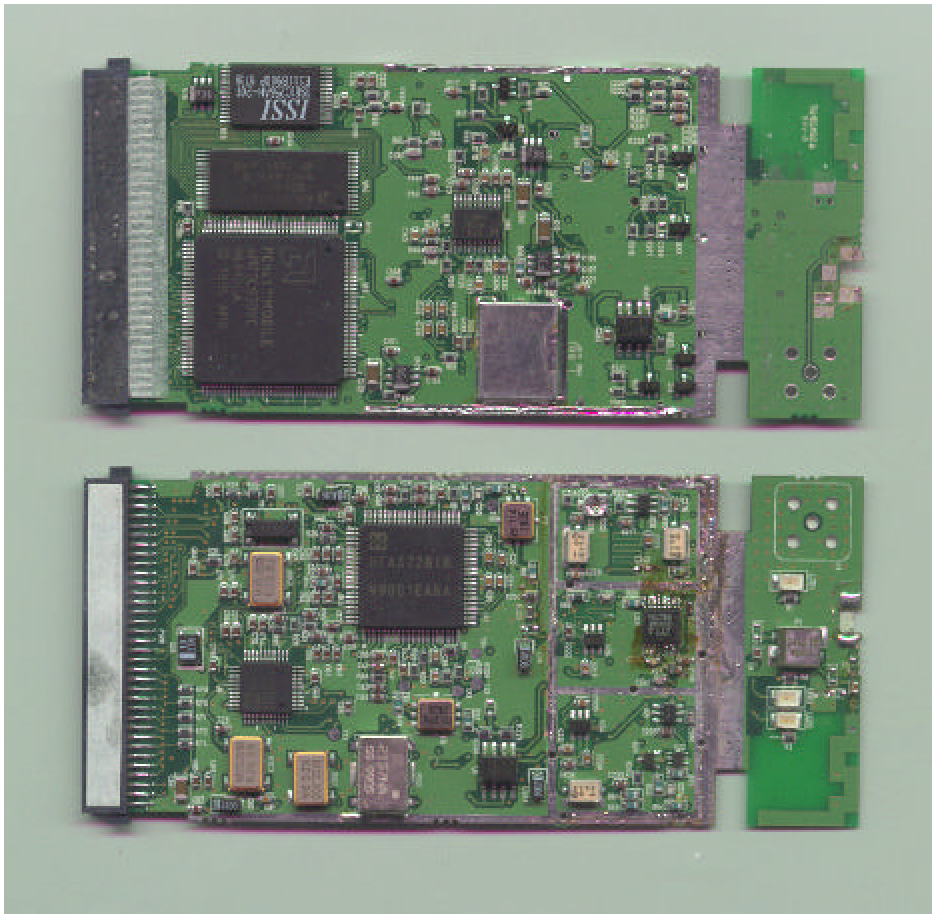


Figure 23: PCM Inside Front & Back

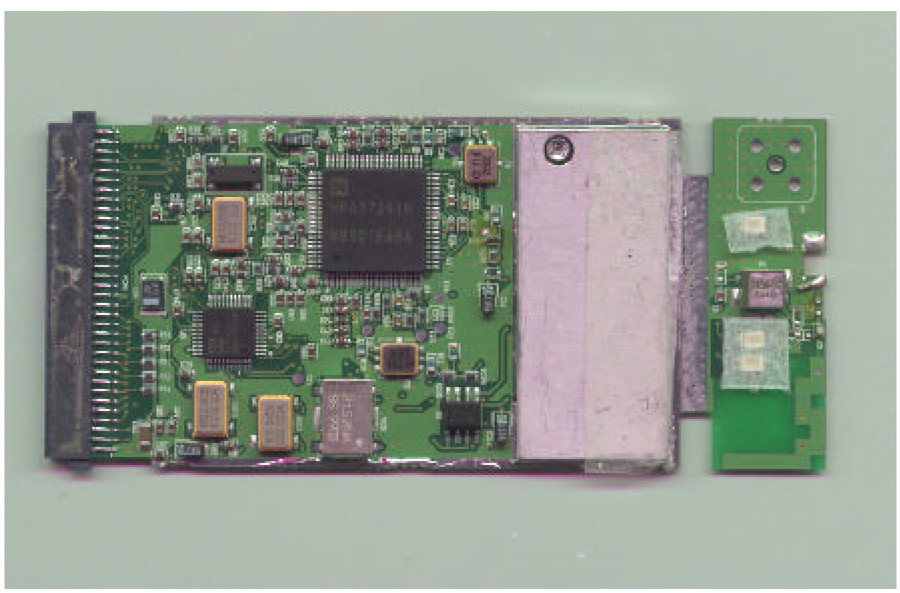


Figure 24: PCM Front with Cover

Figure 25: PCM Outside Cover & Bracket

Figure 26: PCM with Stub, Back

Figure 27: PCM with Stub, Front

Figure 28: ISA Solder Side

APPENDIX B:

USER'S MANUAL