FCC Certification Test Report

FCC Certification Test Report for PRT Manufacturing Ltd. OMS-RFWH

August 20, 2003

Prepared for:

PRT Manufacturing Ltd.
Unit 1204, 12F, Fo Tan Industrial Centre
Fo Tan, Shatin, NT Hong Kong

Prepared By:

Washington Laboratories, Ltd.
7560 Lindbergh Drive
Gaithersburg, Maryland 20879

FCC Certification Test Program

FCC Certification Test Report
for the
PRT Manufacturing Ltd.
3D2 Wireless Controller Host
OMS-RFWH

August 20, 2003

WLL JOB# 7688

Prepared by: Brian J. Dettling
Documentation Specialist

Reviewed by: Gregory M. Snyder
Wireless/Telco Services Manager & Chief EMC Engineer

Abstract

This report has been prepared on behalf of PRT Manufacturing Ltd. to support the attached Application for Equipment Authorization. The test report and application are submitted for a Intentional Radiator under Part 15.249 of the FCC Rules and Regulations. This Federal Communication Commission (FCC) Certification Test Report documents the test configuration and test results for a PRT Manufacturing Ltd. 3D2 Wireless Controller Host.

Testing was performed on an Open Area Test Site (OATS) of Washington Laboratories, Ltd, 7560 Lindbergh Drive, Gaithersburg, MD 20879. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. Washington Laboratories, Ltd. has been accepted by the FCC and approved by NIST NVLAP (NVLAP Lab Code: 200066-0) as an independent FCC test laboratory.

The PRT Manufacturing Ltd. 3D2 Wireless Controller Host complies with the limits for a Intentional Radiator device under Part 15.249 of the FCC Rules and Regulations.

Table of Contents

List of Tables

List of Figures

1 Introduction

1.1 Compliance Statement

The PRT Manufacturing Ltd. 3D2 Wireless Controller Host complies with the limits for a Intentional Radiator device under Part 15.249 of the FCC Rules and Regulations.

This test report reflects the testing performed for the certification of the 3D2 Host. Separate testing was performed for the digital and receiver portion under the DoC process.

1.2 Test Scope

Tests for radiated and conducted emissions were performed. All measurements were performed according to the 2001 version of ANSI C63.4. The measurement equipment conforms to ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation.

1.3 Contract Information

Customer: PRT Manufacturing Ltd.
Unit 1204, 12F, Fo Tan Industrial Centre
Fo Tan, Shatin, NT Hong Kong

Quotation Number: 60967

1.4 Test Dates

Testing was performed from July 16 to August 12, 2003.

1.5 Test and Support Personnel

Washington Laboratories, LTD Chad Beattie, James Ritter

1.6 Abbreviations

A	Ampere
Ac	alternating current
AM	Amplitude Modulation
Amps	Amperes
b/s	bits per second
BW	Bandwidth
CE	Conducted Emission
cm	centimeter
CW	Continuous Wave
dB	decibel
dc	direct current
EMI	Electromagnetic Interference
EUT	Equipment Under Test
FM	Frequency Modulation
G	giga - prefix for 10^9 multiplier
Hz	Hertz
IF	Intermediate Frequency
k	kilo - prefix for 10^3 multiplier
M	Mega - prefix for 10^6 multiplier
m	Meter
μ	micro - prefix for 10^{-6} multiplier
NB	Narrowband
LISN	Line Impedance Stabilization Network
RE	Radiated Emissions
RF	Radio Frequency
rms	root-mean-square
SN	Serial Number
S/A	Spectrum Analyzer
V	Volt

2 Equipment Under Test

2.1 EUT Identification & Description

The PRT Manufacturing Ltd. 3D2 Wireless Controller Host is part of a wireless controller system for the Nintendo® Game Cube™ video game console. The Host is used as the console interface that receives play commands from the 3D2 wireless Controller (separate certification) to the game system. The only information transmitted by the Host is a "rumble" command sent to the Controller for controller pad rumble action.

The Controller Host is powered via the game system and has 4 selectable channels. Channels are selectable via slide switches on the Controller Host.

Table 1. Device Summary

ITEM	DESCRIPTION
Manufacturer:	PRT Manufacturing Ltd.
FCC ID Number	OMS-RFWH
EUT Name:	Wireless Controller Host
Model:	3D2
FCC Rule Parts:	§15.249
Frequency Range:	4 Channels: CH1: 903MHz, CH2: 909.5MHz, CH3: 916.5MHz, CH4: 923.5MHz
Maximum Output Power:	<1mW
Modulation:	FSK
Occupied Bandwidth:	176.5 kHz
Keying:	Automatic
Type of Information:	Control
Number of Channels:	4
Power Output Level	Fixed
Antenna Type	Integral
Interface Cables:	None
Power Source & Voltage:	120VAC via the game console

2.2 Test Configuration

The 3D2 was configured with a Nintendo® Game Cube™ and a companion 3D2 Controller. The video game device was connected to a television set and a sample game was set to run in normal mode.

2.3 Testing Algorithm

The 3D2 was operated continuously by transmitting play commands to the interface/game console.

The 3D2, Nintendo® Game Cube™ and television were powered on and a game was inserted into the Nintendo® Game Cube™. Once communication was established the 3D2 Controller continuously transmitted to the 3D2 Host connected to the Nintendo® Game

Cube™ console. The Host was set up to continuously transmit rumble data. This is different than in normal use since the game will only occasionally call for rumble data to be transmitted.

Worst case emission levels are provided in the test results data.

2.4 Test Location

All measurements herein were performed at Washington Laboratories, Ltd. test center in Gaithersburg, MD. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. Washington Laboratories, Ltd. has been accepted by the FCC and approved by NIST NVLAP (NVLAP Lab Code: 200066-0) as an independent FCC test laboratory.

2.5 Measurements

2.5.1 References

ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation

ANSI C63.4 American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

Land Mobile FM or PM Communications Equipment Measurement and Performance Standards (ANSI/TIA/EIA-603-93)

2.6 Measurement Uncertainty

All results reported herein relate only to the equipment tested. For the purposes of the measurements performed by Washington Laboratories, the measurement uncertainty is ±2.3 dB. This has been calculated for a *worst-case situation* (radiated emissions measurements performed on an open area test site).

The following measurement uncertainty calculation is provided:

$$\text{Total Uncertainty} = (A^2 + B^2 + C^2)^{1/2}/(n-1)$$

where:

A = Antenna calibration uncertainty, in dB = 2 dB

B = Spectrum Analyzer uncertainty, in dB = 1 dB

C = Site uncertainty, in dB = 4 dB

n = number of factors in uncertainty calculation = 3

Thus, Total Uncertainty = $0.5\ (2^2 + 1^2 + 4^2)^{1/2}$ = ±2.3 dB.

3 Test Equipment

Table 2 shows a list of the test equipment used for measurements along with the calibration information.

Table 2: Test Equipment List

Equipment	Serial Number	Calibration Due
Sunol JB1 Biconilog Antenna	A090501	10/03/03
Hewlett-Packard Spectrum Analyzer: HP 8568B (Site 1)	2928A04750	7/02/04
Hewlett-Packard Quasi-Peak Adapter: HP 85650A (Site 1)	3303A01786	7/08/04
Hewlett-Packard RF Preselector: HP 85685A (Site 1)	3146A01296	7/02/04
Hewlett-Packard Spectrum Analyzer: HP 8593A	3009A00739	6/25/04
Solar Electronics LISN 8012-50-R-24-BNC	8379493	8/20/03

4 Test Results

4.1 Duty Cycle Correction

Measurements may be adjusted where pulsed RF is utilized to find the average level associated with a quantity. This calculation is applied to limits for pulsed licensed and unlicensed devices.

On time = $N_1L_1 + N_2L_2 + \ldots + N_{N-1}L_{N-1} + N_NL_N$, where N_1 is number of type 1 pulses, L_1 is length of type 1 pulses, etc.

- For Licensed Transmitters basic formula can be stated as 20log[Duty Cycle]
- For Unlicensed Intentional Radiators under 47CFR Part 15, all duty cycle measurements compared to a 100 millisecond period
- i.e. duty cycle = on time/100 milliseconds or period, whichever is less
- Restating the basic formula:
    - Duty cycle = $(N_1L_1 + N_2L_2 + \ldots + N_{N-1}L_{N-1} + N_NL_N)/100$ or T, whichever is less

Where T is the period of the pulse train.

The following Figures show the plots of the modulated carrier. The spectrum analyzer was set to Zero Span and the video triggered to collect the pulse train of the modulation. Calculations of the duty cycle correction factor were obtained from time data provided by the plots.

To obtain the maximum possible repetition rate of transmit for the Dongle, it was necessary to have the Controller Pad nearby communicating to the Dongle. This situation caused the emissions from the controller pad to appear in the plots for the duty cycle.

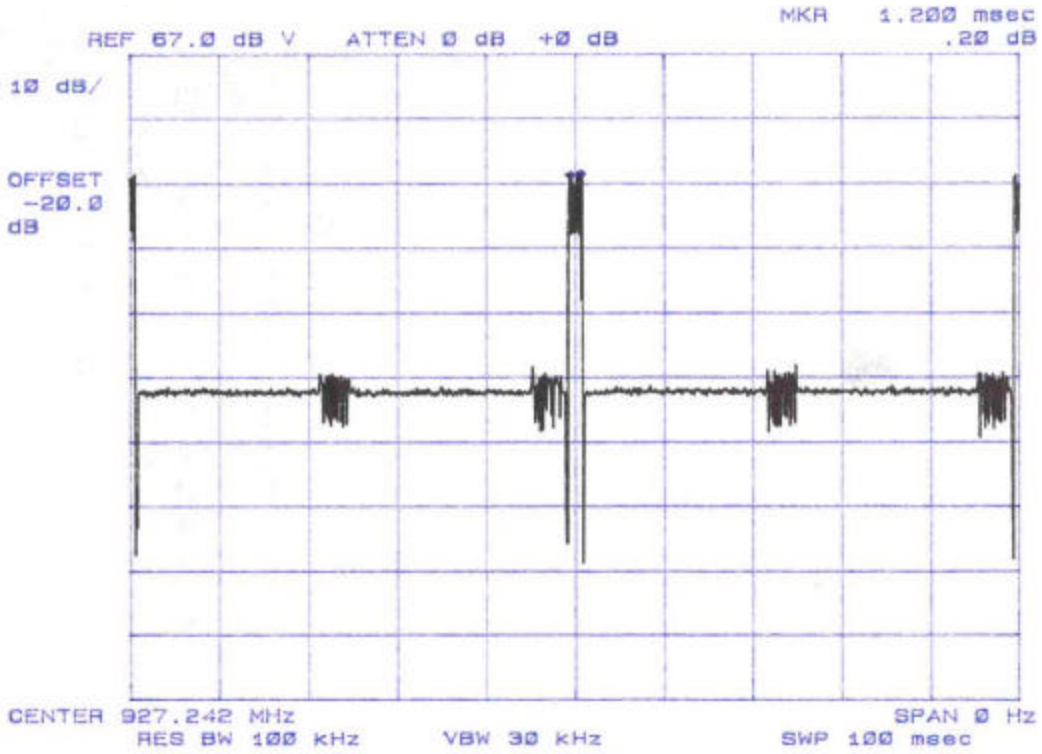

Figure 1. Duty Cycle Plot – Worst Case 100ms and Pulse Train

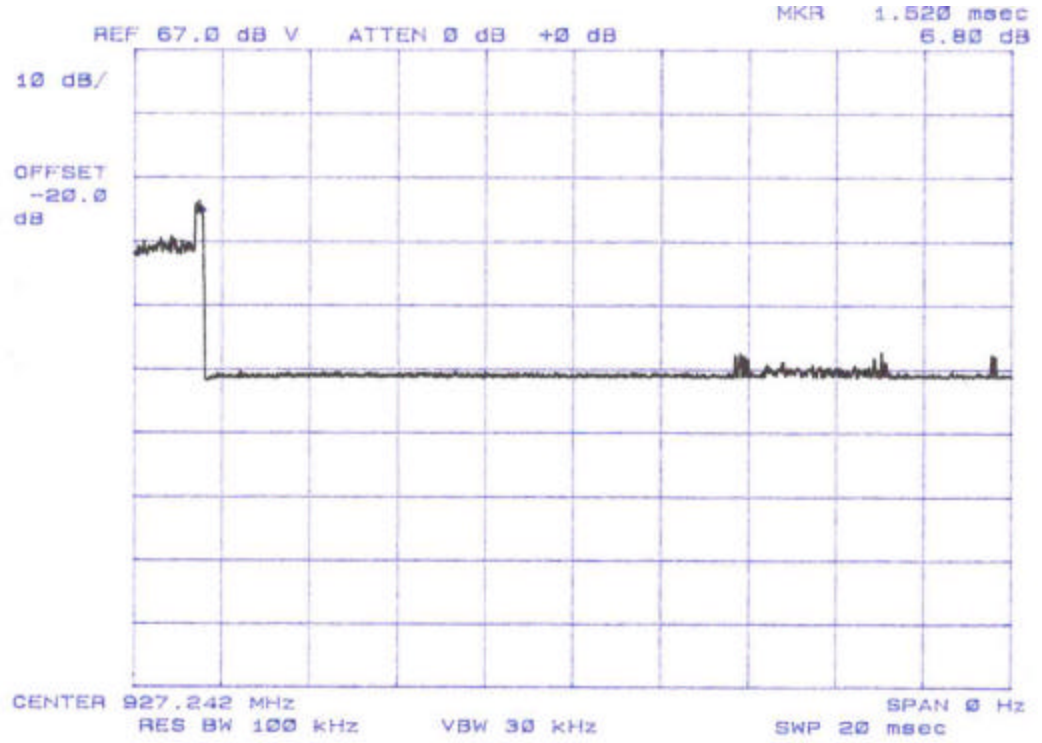

Figure 2. Duty Cycle Plot – Pulse Width

From the data in Figure 1 and Figure 2, the following calculations are made.

On Time Per 100ms (worst case):

3 x 1.52ms = 4.56ms

Duty cycle calculation:

4.56ms/100ms = 4.56% on time = -26.8dB duty cycle correction (maximum applied duty cycle correction = 20dB)

4.2 Occupied Bandwidth: (FCC Part §2.1049)

Occupied bandwidth was performed by coupling the output of the EUT to the input of a spectrum analyzer.

At full modulation, the occupied bandwidth was measured as shown:

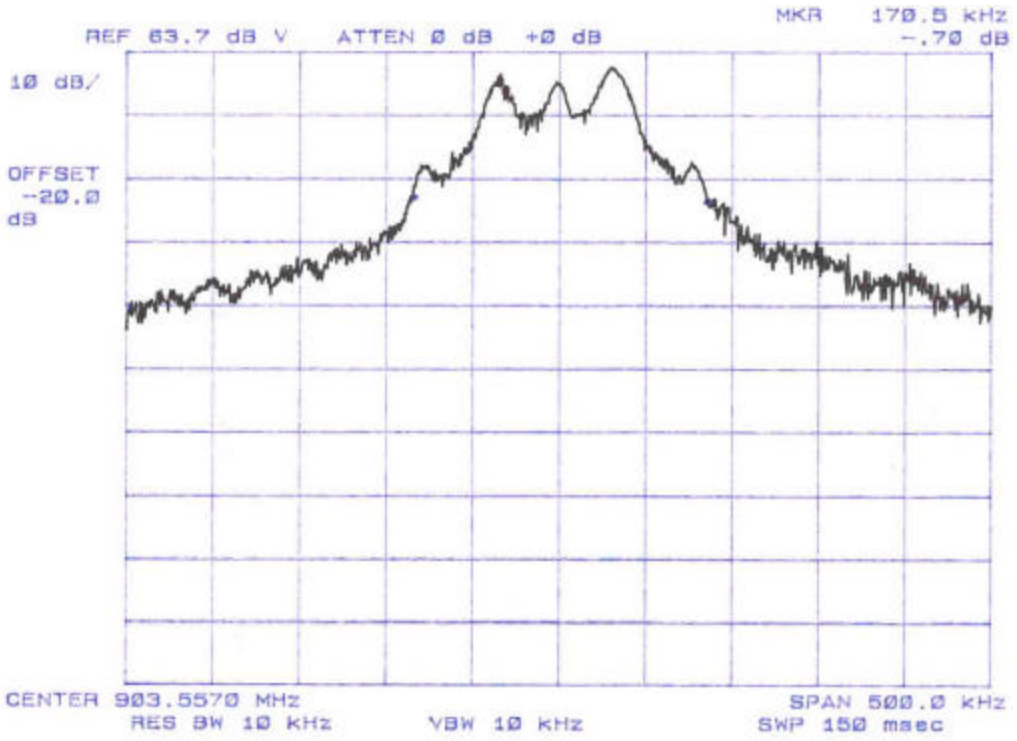

Figure 3. Occupied Bandwidth, Channel 1

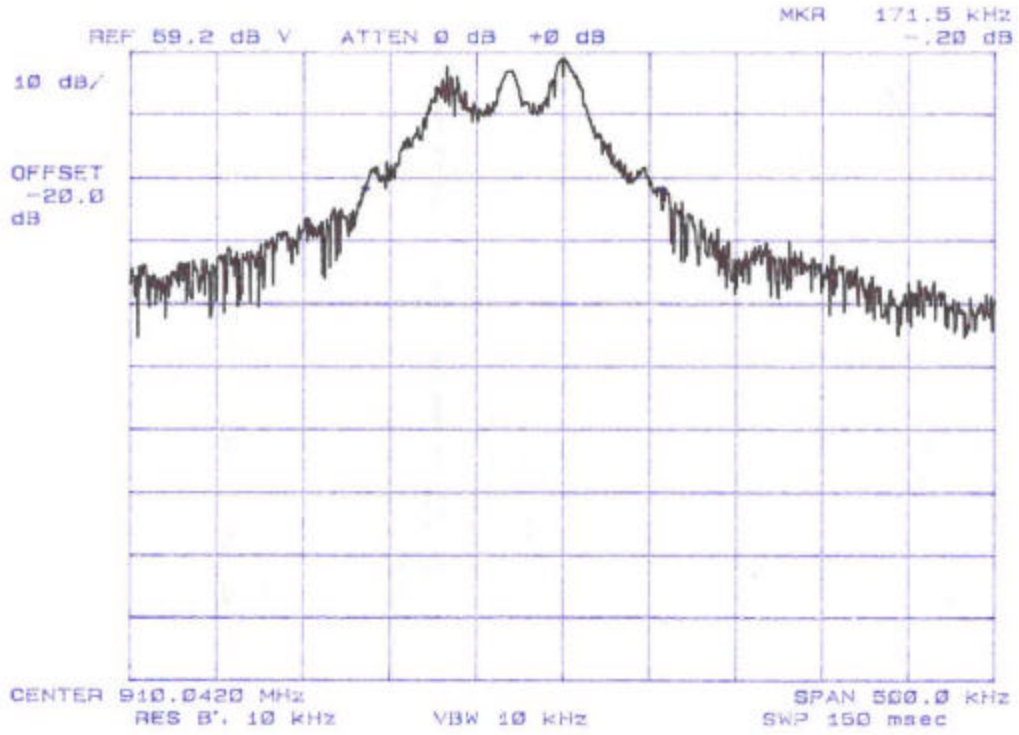

Figure 4. Occupied Bandwidth, Channel 2

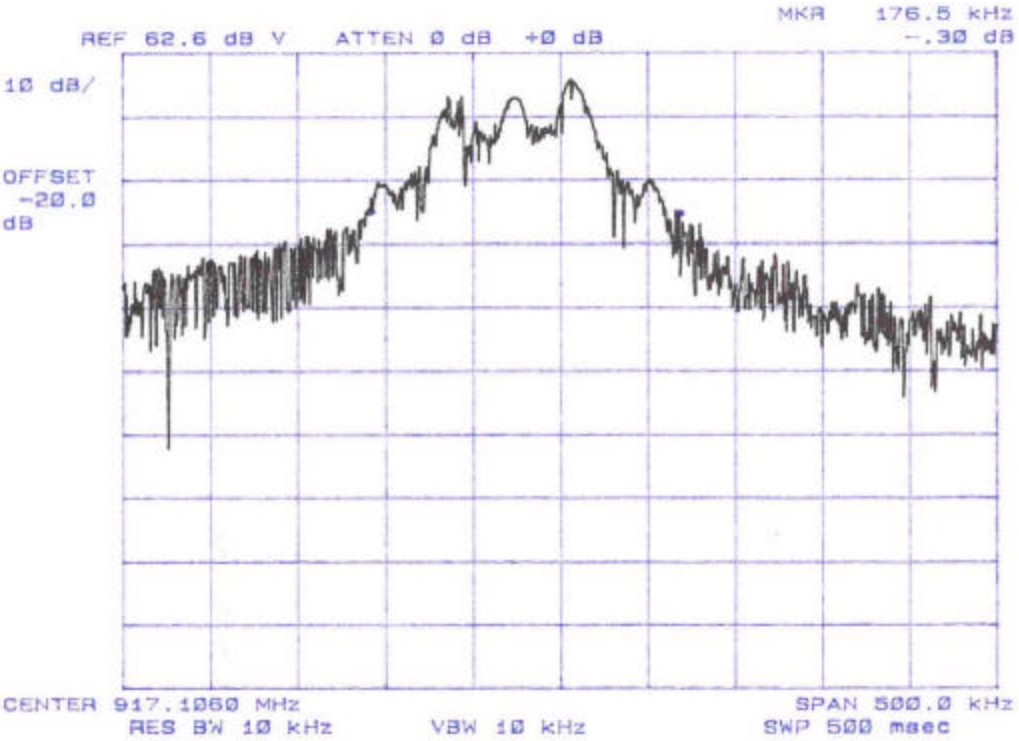

Figure 5. Occupied Bandwidth, Channel 3

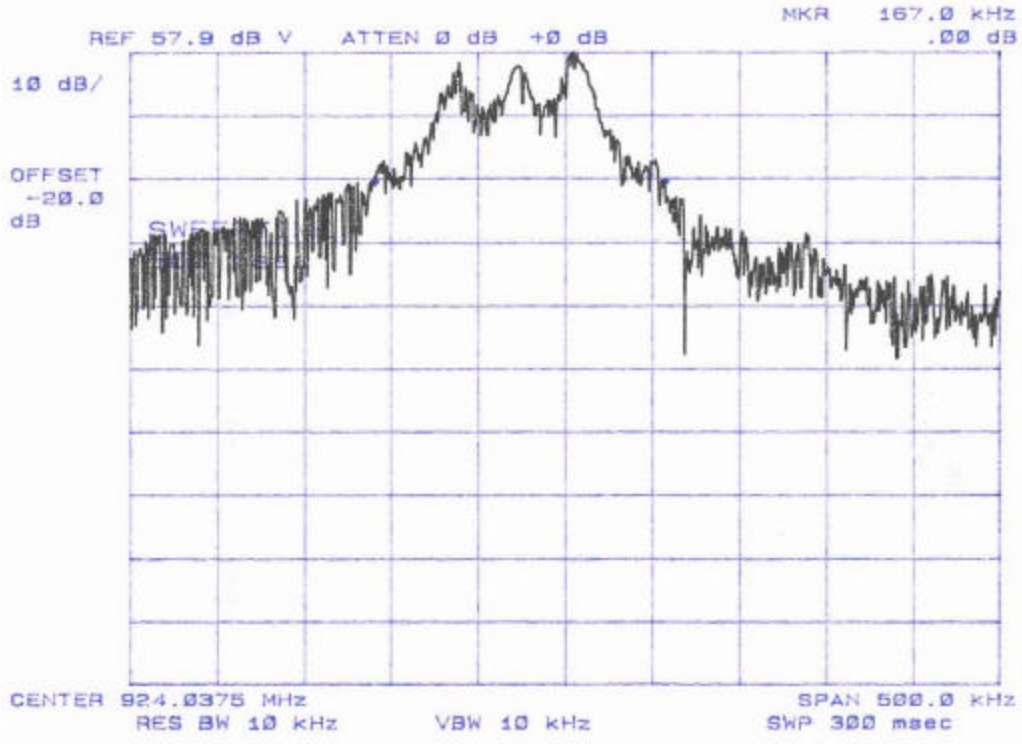

Figure 6. Occupied Bandwidth, Channel 4

Table 3 provides a summary of the Occupied Bandwidth Results.

Table 3. Occupied Bandwidth Results

Frequency	Bandwidth
Channel 1 903.6MHz	170kHz
Channel 2 910MHz	171.5kHz
Channel 3 917.1MHz	176.5kHz
Channel 4 924MHz	167kHz

4.3 Radiated Emissions: (FCC Part §2.1053)

The EUT must comply with the radiated emission limits of 15.249(a). The limits are as shown in the following table.

Table 4. Radiated Emissions Limits

Fundamental Frequency	Field Strength of Fundamental (µV/m)	Field Strength of Harmonics (µV/m)
902 – 928 MHz	50,000	500
2400 – 2483.5 MHz	50,000	500
5725 – 5875 MHz	50,000	500
24.00 – 24.25 MHz	250,000	2500

4.3.1 Test Procedure

The EUT was placed on motorized turntable for radiated testing on a 3-meter open field test site. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. Receiving antennas were mounted on an antenna mast to determine the height of maximum emissions. The height of the antenna was varied between 1 and 4 meters. The peripherals were placed on the table in accordance with ANSI C63.4-2001. Cables were varied in position to produce maximum emissions. Both the horizontal and vertical field components were measured.

The emissions were measured using the following resolution bandwidths:

Frequency Range	Resolution Bandwidth	Video Bandwidth
30MHz-1000 MHz	100kHz	>100kHz
>1000 MHz	1 MHz	1MHz (peak)

Emissions were measured to the 10th harmonic of the transmit frequency. Worst case emission levels are reported.

The following is a sample calculation used in the data tables for calculating the final field strength of spurious emissions and comparing these levels to the specified limits.

Sample Calculation:

Spectrum Analyzer Voltage (SA Level): V dBµV

Antenna Factor (Ant Corr): AFdB/m

Cable Loss Correction (Cable Corr): CCdB

Duty Cycle Correction (Average)	DCCdB
Amplifier Gain:	GdB
Electric Field (Corr Level):	EdBµV/m = VdBµV + AFdB/m + CCdB + DCCdB - GdB

Table 5. Radiated Emissions Test Data, Low Frequency

CLIENT:	PRT	DATE:	8/11/03
TESTER:	James Ritter	JOB #:	7688
EUT Information:		**Test Requirements:**	
EUT:	3D2 Host Unit	TEST STD:	FCC Part 15
CONFIGURATION:	carrier field strength	DISTANCE:	3m
CLOCKS:		CLASS:	B
Test Equipment/Limit:			
ANTENNA:	A_00425	LIMIT:	LFCC_3m_Class_B
CABLE:	CSITE1_HF	AMPLIFIER (dB)	A_00066

Frequency (MHz)	Polarity H/V	Azimuth Degree	Ant. Height (m)	SA Level (QP) (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin dB
Host Channel 1										
903.60	H	270.0	2.6	59.3	22.2	6.9	88.3	26109.6	50000.0	-5.6
903.60	V	180.0	1.6	62.4	22.2	6.9	91.4	37307.9	50000.0	-2.5
Host Channel 3										
917.02	V	220.0	2.0	61.0	22.7	6.8	90.4	33274.7	50000.0	-3.5
917.02	H	180.0	1.3	60.0	22.7	6.8	89.4	29656.1	50000.0	-4.5
Host Channel 4										
924.06	H	270.0	1.3	59.8	22.8	6.8	89.5	29723.1	50000.0	-4.5
924.06	V	345.0	1.2	60.5	22.8	6.8	90.2	32217.6	50000.0	-3.8

Table 6. Radiated Emissions Data, Channel 1 Harmonics

CLIENT:	PRT	DATE:	8/12/03
TESTER:	James Ritter	JOB #:	7688
EUT Information:		**Test Requirements:**	
EUT:	3D2 controller Host	TEST STRD:	FCC Part 15
CONFIGURATION:	Group A channel 1- 903.6 MHz with game cube& RCA TV	DISTANCE:	3m
CLOCKS:	903.6 MHz	CLASS:	B
S/N:	1.0	**a** = Ambient	

Test Equipment/Limit:

ANTENNA: A_00425 LIMIT: LFCC_3m_Class_B
CABLE: CSITE1_HF AMPLIFIER (dB) A_00066

Average Data:

Frequency (MHz)	Polarity H/V	Azimuth Degree	Ant. Hght (m)	SA Level (Peak) (dBµV)	Duty Cycle Corr. (dB)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin dB
CH1 903.6MHz												
1807.20	H	30.0	1.0	58.2	20.0	28.6	2.4	35.6	33.6	47.8	500.0	-20.4
1807.20	V	20.0	1.0	65.2	20.0	28.6	2.4	35.6	40.6	106.6	500.0	-13.4
2710.80	H	45.0	1.0	52.4	20.0	30.3	3.2	35.6	30.2	32.5	500.0	-23.7
2710.80	V	10.0	1.0	54.2	20.0	30.3	3.2	35.6	32.0	40.0	500.0	-21.9
3614.40	H	180.0	1.0	53.5	20.0	31.0	3.7	35.5	32.7	43.3	500.0	-21.3
3614.40	V	180.0	1.0	51.7	20.0	31.0	3.7	35.5	30.9	35.1	500.0	-23.1
4518.00	H	350.0	1.0	49.7	20.0	32.6	4.0	35.7	30.5	33.4	500.0	-23.5
4518.00	V	45.0	1.0	47.5	20.0	32.6	4.0	35.7	28.3	26.0	500.0	-25.7
5421.60	H	0.0	1.0	44.2	20.0	34.4	4.2	35.8	27.0	22.3	500.0	-27.0 **a**
5421.60	V	0.0	1.0	44.7	20.0	34.4	4.2	35.8	27.5	23.6	500.0	-26.5 **a**
6325.20	H	0.0	1.0	43.8	20.0	36.0	4.6	35.6	28.8	27.6	500.0	-25.2 **a**
6325.20	V	0.0	1.0	43.8	20.0	36.0	4.6	35.6	28.8	27.6	500.0	-25.1 **a**
7228.80	H	0.0	1.0	44.5	20.0	37.6	5.0	35.9	31.2	36.5	500.0	-22.7 **a**
7228.80	V	0.0	1.0	43.3	20.0	37.6	5.0	35.9	30.1	31.9	500.0	-23.9 **a**
8132.40	H	0.0	1.0	46.1	20.0	38.4	5.3	36.1	33.6	48.1	500.0	-20.3 **a**
8132.40	V	0.0	1.0	44.7	20.0	38.4	5.3	36.1	32.2	40.8	500.0	-21.8 **a**
9036.00	H	0.0	1.0	47.4	20.0	39.0	5.5	36.2	35.8	61.3	500.0	-18.2 **a**
9036.00	V	0.0	1.0	43.2	20.0	39.0	5.5	36.2	31.6	37.8	500.0	-22.4 **a**

Peak Data, Channel 1:

Frequency (MHz)	Polarity H/V	Azimuth Degree	Ant. Hght (m)	SA Level (Peak) (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin dB
CH1 903.6MHz											
1807.20	H	30.0	1.0	58.2	28.6	2.4	35.6	53.6	477.6	50000.0	-40.4
1807.20	V	20.0	1.0	65.2	28.6	2.4	35.6	60.6	1065.6	50000.0	-33.4
2710.80	H	45.0	1.0	52.4	30.3	3.2	35.6	50.2	324.9	50000.0	-43.7
2710.80	V	10.0	1.0	54.2	30.3	3.2	35.6	52.0	399.7	50000.0	-41.9
3614.40	H	180.0	1.0	53.5	31.0	3.7	35.5	52.7	432.9	50000.0	-41.3
3614.40	V	180.0	1.0	51.7	31.0	3.7	35.5	50.9	350.7	50000.0	-43.1
4518.00	H	350.0	1.0	49.7	32.6	4.0	35.7	50.5	333.7	50000.0	-43.5
4518.00	V	45.0	1.0	47.5	32.6	4.0	35.7	48.3	260.0	50000.0	-45.7
5421.60	H	0.0	1.0	44.2	34.4	4.2	35.8	47.0	223.4	50000.0	-47.0 **a**
5421.60	V	0.0	1.0	44.7	34.4	4.2	35.8	47.5	235.9	50000.0	-46.5 **a**
6325.20	H	0.0	1.0	43.8	36.0	4.6	35.6	48.8	275.5	50000.0	-45.2 **a**
6325.20	V	0.0	1.0	43.8	36.0	4.6	35.6	48.8	276.5	50000.0	-45.1 **a**
7228.80	H	0.0	1.0	44.5	37.6	5.0	35.9	51.2	364.5	50000.0	-42.7 **a**
7228.80	V	0.0	1.0	43.3	37.6	5.0	35.9	50.1	318.6	50000.0	-43.9 **a**
8132.40	H	0.0	1.0	46.1	38.4	5.3	36.1	53.6	480.6	50000.0	-40.3 **a**
8132.40	V	0.0	1.0	44.7	38.4	5.3	36.1	52.2	407.7	50000.0	-41.8 **a**
9036.00	H	0.0	1.0	47.4	39.0	5.5	36.2	55.8	613.4	50000.0	-38.2 **a**
9036.00	V	0.0	1.0	43.2	39.0	5.5	36.2	51.6	378.2	50000.0	-42.4 **a**

Table 7. Radiated Emissions Data, Channel 3 Harmonics

CLIENT:	PRT	DATE:	8/12/03
TESTER:	James Ritter	JOB #:	7688
EUT Information:		**Test Requirements:**	
EUT:	3D2 Controller Host	TEST STD:	FCC Part 15
CONFIGURATION:	Group A channel 3- 917.02MHz with game cube& RCA TV	DISTANCE:	3m
CLOCKS:	917.02 MHz	CLASS:	B
S/N:	1.0	**a** = Ambient	
Test Equipment/Limit:			
ANTENNA:	A_0042	LIMIT:	LFCC_3m_Class_B
CABLE:	CSITE1_HF	AMPLIFIER (dB)	A_00066

Average Data:

Frequency (MHz)	Polarity H/V	Azimuth Degree	Ant. Hght (m)	SA Level (Peak) (dBµV)	Duty Cycle Corr. (dB)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin dB
CH3 917.02MHz												
1834.04	H	45.0	1.0	60.1	20.0	28.7	2.4	35.6	35.6	60.3	500.0	-18.4
1834.04	V	20.0	1.0	62.8	20.0	28.7	2.4	35.6	38.3	82.6	500.0	-15.6
2751.06	H	10.0	1.0	55.1	20.0	30.4	3.2	35.7	33.0	44.7	500.0	-21.0
2751.06	V	0.0	1.0	53.7	20.0	30.4	3.2	35.7	31.6	38.1	500.0	-22.4
3668.08	H	350.0	1.0	53.5	20.0	31.0	3.7	35.5	32.8	43.6	500.0	-21.2
3668.08	V	260.0	1.0	51.5	20.0	31.0	3.7	35.5	30.8	34.6	500.0	-23.2
4585.10	H	10.0	1.0	47.2	20.0	32.7	4.0	35.8	28.1	25.4	500.0	-25.9
4585.10	V	45.0	1.0	46.5	20.0	32.7	4.0	35.8	27.4	23.5	500.0	-26.5
5502.12	H	0.0	1.0	43.3	20.0	34.5	4.2	35.7	26.3	20.7	500.0	-27.7 **a**
5502.12	V	0.0	1.0	43.2	20.0	34.5	4.2	35.7	26.2	20.3	500.0	-27.8 **a**
6419.14	H	0.0	1.0	42.8	20.0	36.2	4.7	35.6	28.0	25.2	500.0	-26.0 **a**
6419.14	V	0.0	1.0	44.3	20.0	36.2	4.7	35.6	29.5	29.9	500.0	-24.5 **a**
7336.16	H	0.0	1.0	46.7	20.0	37.7	5.0	35.9	33.5	47.3	500.0	-20.5 **a**
7336.16	V	0.0	1.0	45.0	20.0	37.7	5.0	35.9	31.8	39.1	500.0	-22.1 **a**
8253.18	H	0.0	1.0	47.2	20.0	38.5	5.3	36.1	34.8	55.3	500.0	-19.1 **a**
8253.18	V	0.0	1.0	46.0	20.0	38.5	5.3	36.1	33.6	48.1	500.0	-20.3 **a**
9170.20	H	0.0	1.0	47.0	20.0	39.2	5.6	36.2	35.5	59.6	500.0	-18.5 **a**
9170.20	V	0.0	1.0	44.7	20.0	39.2	5.6	36.2	33.2	45.6	500.0	-20.8 **a**

Peak Data, Channel 3:

Frequency (MHz)	Polarity H/V	Azimuth Degree	Ant. Hght (m)	SA Level (Peak) (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin dB
CH3 917.02MHz											
1834.04	H	45.0	1.0	60.1	28.7	2.4	35.6	55.6	603.1	50000.0	-38.4
1834.04	V	20.0	1.0	62.8	28.7	2.4	35.6	58.3	825.8	50000.0	-35.6
2751.06	H	10.0	1.0	55.1	30.4	3.2	35.7	53.0	447.2	50000.0	-41.0
2751.06	V	0.0	1.0	53.7	30.4	3.2	35.7	51.6	380.6	50000.0	-42.4
3668.08	H	350.0	1.0	53.5	31.0	3.7	35.5	52.8	436.0	50000.0	-41.2
3668.08	V	260.0	1.0	51.5	31.0	3.7	35.5	50.8	346.3	50000.0	-43.2
4585.10	H	10.0	1.0	47.2	32.7	4.0	35.8	48.1	254.3	50000.0	-45.9
4585.10	V	45.0	1.0	46.5	32.7	4.0	35.8	47.4	235.5	50000.0	-46.5
5502.12	H	0.0	1.0	43.3	34.5	4.2	35.7	46.3	207.1	50000.0	-47.7 **a**
5502.12	V	0.0	1.0	43.2	34.5	4.2	35.7	46.2	203.3	50000.0	-47.8 **a**
6419.14	H	0.0	1.0	42.8	36.2	4.7	35.6	48.0	251.8	50000.0	-46.0 **a**
6419.14	V	0.0	1.0	44.3	36.2	4.7	35.6	49.5	299.3	50000.0	-44.5 **a**
7336.16	H	0.0	1.0	46.7	37.7	5.0	35.9	53.5	473.3	50000.0	-40.5 **a**
7336.16	V	0.0	1.0	45.0	37.7	5.0	35.9	51.8	390.5	50000.0	-42.1 **a**
8253.18	H	0.0	1.0	47.2	38.5	5.3	36.1	54.8	552.7	50000.0	-39.1 **a**
8253.18	V	0.0	1.0	46.0	38.5	5.3	36.1	53.6	481.4	50000.0	-40.3 **a**
9170.20	H	0.0	1.0	47.0	39.2	5.6	36.2	55.5	596.4	50000.0	-38.5 **a**
9170.20	V	0.0	1.0	44.7	39.2	5.6	36.2	53.2	456.1	50000.0	-40.8 **a**

Table 8. Radiated Emissions Data, Channel 4 Harmonics

CLIENT:	PRT	DATE:	8/12/03
TESTER:	James Ritter	JOB #:	7688
EUT Information:		**Test Requirements:**	
EUT:	3D2 controller Host	TEST STD:	FCC Part 15
CONFIGURATION:	group A channel 4- 924.06MHz with game cube& RCA TV	DISTANCE:	3m
CLOCKS:	924 MHz	CLASS:	B
S/N:	1.0	**a** = Ambient	
Test Equipment/Limit:			
ANTENNA:	A_00425	LIMIT:	LFCC_3m_Class_B
CABLE:	CSITE1_HF	AMPLIFIER (dB)	A_00066

Average Data:

Frequency (MHz)	Polarity H/V	Azimuth Degree	Ant. Hght (m)	SA Level (Peak) (dBµV)	Duty Cycle Corr. (dB)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin dB
CH4 924MHz												
924.06	H	270.0	1.3	59.8	0.0	22.8	6.8	0.0	89.5	29723.1	50000.0	-4.5
924.06	V	345	1.2	60.5	0	22.8	6.8	0.0	90.2	32217.6	50000.0	-3.8
1848.12	H	0.0	1.0	56.2	20.0	28.7	2.4	35.6	31.7	38.7	500.0	-22.2
1848.12	V	20.0	1.0	62.3	20.0	28.7	2.4	35.6	37.9	78.3	500.0	-16.1
2772.18	H	200.0	1.0	50.8	20.0	30.4	3.2	35.7	28.7	27.4	500.0	-25.2
2772.18	V	10.0	1.0	52.3	20.0	30.4	3.2	35.7	30.2	32.5	500.0	-23.7
3696.24	H	350.0	1.0	47.8	20.0	31.1	3.7	35.5	27.2	22.8	500.0	-26.8
3696.24	V	180.0	1.0	50.3	20.0	31.1	3.7	35.5	29.7	30.4	500.0	-24.3
4620.30	H	345.0	1.0	48.2	20.0	32.8	4.0	35.8	29.2	28.8	500.0	-24.8
4620.30	V	10.0	1.0	45.7	20.0	32.8	4.0	35.8	26.7	21.6	500.0	-27.3
5544.36	H	0.0	1.0	43.1	20.0	34.6	4.3	35.7	26.2	20.4	500.0	-27.8 **a**
5544.36	V	0.0	1.0	43.2	20.0	34.6	4.3	35.7	26.3	20.7	500.0	-27.7 **a**
6468.42	H	0.0	1.0	44.1	20.0	36.3	4.7	35.6	29.4	29.6	500.0	-24.5 **a**
6468.42	V	0.0	1.0	44.3	20.0	36.3	4.7	35.6	29.6	30.3	500.0	-24.3 **a**
7392.48	H	0.0	1.0	45.1	20.0	37.8	5.1	35.9	32.0	39.7	500.0	-22.0 **a**
7392.48	V	0.0	1.0	45.6	20.0	37.8	5.1	35.9	32.5	42.1	500.0	-21.5 **a**
8316.54	H	0.0	1.0	46.0	20.0	38.5	5.3	36.1	33.7	48.5	500.0	-20.3 **a**
8316.54	V	0.0	1.0	46.3	20.0	38.5	5.3	36.1	34.0	50.2	500.0	-20.0 **a**
9240.60	H	0.0	1.0	46.1	20.0	39.3	5.6	36.3	34.7	54.3	500.0	-19.3 **a**
9240.60	V	0.0	1.0	45.8	20.0	39.3	5.6	36.3	34.4	52.4	500.0	-19.6 **a**

Peak Data, Channel 4:

Frequency (MHz)	Polarity H/V	Azimuth Degree	Ant. Hght (m)	SA Level (Peak) (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin dB
CH4 924MHz											
1848.12	H	0.0	1.0	56.2	28.7	2.4	35.6	51.7	386.7	50000.0	-42.2
1848.12	V	20.0	1.0	62.3	28.7	2.4	35.6	57.9	783.2	50000.0	-36.1
2772.18	H	200.0	1.0	50.8	30.4	3.2	35.7	48.7	273.8	50000.0	-45.2
2772.18	V	10.0	1.0	52.3	30.4	3.2	35.7	50.2	325.4	50000.0	-43.7
3696.24	H	350.0	1.0	47.8	31.1	3.7	35.5	47.2	227.8	50000.0	-46.8
3696.24	V	180.0	1.0	50.3	31.1	3.7	35.5	49.7	303.8	50000.0	-44.3
4620.30	H	345.0	1.0	48.2	32.8	4.0	35.8	49.2	287.8	50000.0	-44.8
4620.30	V	10.0	1.0	45.7	32.8	4.0	35.8	46.7	215.8	50000.0	-47.3
5544.36	H	0.0	1.0	43.1	34.6	4.3	35.7	46.2	204.2	50000.0	-47.8 **a**
5544.36	V	0.0	1.0	43.2	34.6	4.3	35.7	46.3	206.6	50000.0	-47.7 **a**
6468.42	H	0.0	1.0	44.1	36.3	4.7	35.6	49.4	296.3	50000.0	-44.5 **a**
6468.42	V	0.0	1.0	44.3	36.3	4.7	35.6	49.6	303.2	50000.0	-44.3 **a**
7392.48	H	0.0	1.0	45.1	37.8	5.1	35.9	52.0	397.4	50000.0	-42.0 **a**
7392.48	V	0.0	1.0	45.6	37.8	5.1	35.9	52.5	420.9	50000.0	-41.5
8316.54	H	0.0	1.0	46.0	38.5	5.3	36.1	53.7	484.6	50000.0	-40.3 **a**
8316.54	V	0.0	1.0	46.3	38.5	5.3	36.1	54.0	501.7	50000.0	-40.0 **a**
9240.60	H	0.0	1.0	46.1	39.3	5.6	36.3	54.7	542.7	50000.0	-39.3 **a**
9240.60	V	0.0	1.0	45.8	39.3	5.6	36.3	54.4	524.3	50000.0	-39.6 **a**

4.4 Conducted Emissions (AC Power Line)

The EUT was placed on an 80 cm high 1 x 1.5 m non-conductive table above a ground plane. Power to the EUT was provided through a Solar Corporation 50 /50 µH Line Impedance Stabilization Network bonded to a 3 x 2 meter ground plane. The LISN has its AC input supplied from a filtered AC power source. Power and data cables were moved about to obtain maximum emissions.

The 50 output of the LISN was connected to the input of the spectrum analyzer and the emissions in the frequency range of 150 kHz to 30 MHz was measured. The detector function was set to quasi-peak or peak, as appropriate, and the resolution bandwidth during testing was at least 9 kHz, with all post-detector filtering no less than 10 times the resolution bandwidth.

.

AC Power Line conducted emissions test data are included in Table 9.

Table 9: AC Power Line Conducted Emissions Test Data Sheet

CLIENT:	PRT	DATE:	8/12/03
MODEL:	3D2 Controller Host with Game Cube and RCA TV	JOB #:	7688
		TEST VOLTAGE:	120 VAC
TEST STANDARD:	FCC Part 15	CLASS:	FCC_B
TESTER:	James Ritter	TEST SITE:	CSITE1_CE

LINE 1 - NEUTRAL

Frequency MHz	Level QP dBuV	Cable Loss dB	Limit QP dBuV	Margin QP dB	Level AVG dBuV	Cable Loss dB	Limit AVG dBuV	Margin AVG dB
0.153	41.9	10.5	65.8	-13.4	32.9	10.5	55.8	-12.4
0.201	45.9	10.6	63.6	-7.1	31.5	10.6	53.6	-11.5
0.406	33.8	10.7	57.7	-13.2	27.1	10.7	47.7	-9.9
1.228	30.1	10.8	56.0	-15.1	29.2	10.8	46.0	-6.0
2.796	31.9	10.9	56.0	-13.2	30.7	10.9	46.0	-4.4
3.203	34.5	11.1	56.0	-10.4	31.5	11.1	46.0	-3.4
3.473	34.0	10.9	56.0	-11.1	30.8	10.9	46.0	-4.3
13.633	25.5	11.7	60.0	-22.8	25.5	11.7	50.0	-12.8

LINE 2 - PHASE

Frequency MHz	Level QP dBuV	Cable Loss dB	Limit QP dBuV	Margin QP dB	Level AVG dBuV	Cable Loss dB	Limit AVG dBuV	Margin AVG dB
0.153	42.7	10.5	65.8	-12.6	36.0	10.5	55.8	-9.3
0.201	46.4	10.6	63.6	-6.6	32.4	10.6	53.6	-10.6
0.406	34.7	10.7	57.7	-12.3	27.9	10.7	47.7	-9.1
1.228	28.3	10.8	56.0	-16.9	28.3	10.8	46.0	-6.9
2.796	34.7	10.9	56.0	-10.4	30.3	10.9	46.0	-4.8
3.203	35.6	11.1	56.0	-9.3	31.5	11.1	46.0	-3.4
3.473	34.4	10.9	56.0	-10.7	30.6	10.9	46.0	-4.5
13.633	29.9	11.7	60.0	-18.4	29.9	11.7	50.0	-8.4