

FCC PART 15 CLASS B EMI MEASUREMENT AND TEST REPORT

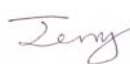
For

NMB TECHNOLOGIES INC.

9730 Independence Ave.,
Chatsworth, CA 91311

FCC ID: AQ6-2910

2004-02-23

This Report Concerns: ☒ Original Report	Equipment Type: Keyboard - ITE
Test Engineer: Jerry Wang / 	
Report No.: R0402063	
Test Date: 2003-02-19	
Reviewed By:  Hans Mellberg/	
Prepared By: Bay Area Compliance Laboratory Corporation (BACL) 230 Commercial Street Sunnyvale, CA 94085 Tel: (408) 732-9162 Fax: (408) 732-9164	

Note: This test report is specially limited to the use of the above client company and the product model only. It may not be duplicated without prior written consent of Bay Area Compliance Laboratory Corporation. This report **must not** be used by the client to claim product Endorsement by NVLAP or any agency of the U.S. Government.

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *NMB TECHNOLOGIES INC.*'s product, model: RT2910, or the "EUT" as referred to this report is a Keyboard which measures approximately 17.75" L x 6.00"W x 1.25"H.

**The test data gathered are from production sample, serial number: 2252, provided by the manufacturer.*

Objective

This test report is prepared on behalf of *NMB TECHNOLOGIES INC.* in accordance with Part 2, Subpart J, and Part 15, Subparts A and B of the Federal Communication Commissions rules and regulations and to ICES-003 of the Canadian Interference-Causing Equipment Regulations.

The objective is to determine compliance with FCC Class B limits for Information Technology Equipment.

Related Submittal(s)/Grant(s)

No Related Submittals.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2001, 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.

All radiated and conducted emissions measurements were performed at BACL. The radiated testing was performed at an antenna-to-EUT distance of 3 Meters.

Test Facility

The Open Area Test site used by BACL to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, Sunnyvale, California, USA.

Test site at BACL has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2001.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The scope of the accreditation covers the FCC Method - 47 CFR Part 15 - Digital Devices, CISPR 22: 1997: Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment test methods under NVLAP Lab Code 200167-0.

Host System Configuration List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
Dell PC System	Motherboard	N/A	MX-03E851-12416-18Q-048J	DoC
Dell	POWER SUPPLY	HP-P2507F3P	TH-01E115-12782-17S-6294	DoC
IBM	Hard Drive	IC35L020AVER0	TH-01FNM-12567-17K-7R85	DoC
Samsung	CD-ROM	SM-308	KR-00J304-36521	DoC
Sony	Floppy Drive	MPF920-F	20080561	DoC
Dell	Chassis	Mid Tower ATX	US-03F364-03731	None

Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
Dell	PC System	8100X	MX-03E851-12416-18Q-048J	DoC
Dell	Mouse	1.3APS/2Compatible	X06-08477	DoC
Dell	Flat Panel	Ultra	TW-09E249-46635-2CJ-0GFL	DoC
HP	ThinkJet	2225C	2821S14783	DS16XU2225
Everex	Modem	EV-945	None	E3E5UVEV-945

External I/O Cabling List and Details

Cable Description	Length (M)	Port/From	To
Shielded Cable	1.6	Keyboard Port/Host	Keyboard/EUT
Shielded Cable	1.5	Mouse Port/ Host	Dell Mouse
Shielded Video Cable	1.5	Flat Panel Port/ Host	Dell Flat Panel
Shielded Serial Cable	1.5	Serial Port / Host	Everex Modem
Shielded Printer Cable	2.0	Parallel Port / Host	HP Printer

SYSTEM TEST CONFIGURATION

Justification

The system was configured for testing according to ANSI C63.4-2001.

EUT Exercise Software

The EUT exercising program used during radiated and conducted testing was designed to exercise the various system components.

Special Accessories

As shown in test setup block diagram, interface cable used for compliance testing are shielded and supplied by applicant and/or its respective support equipment manufacturers.

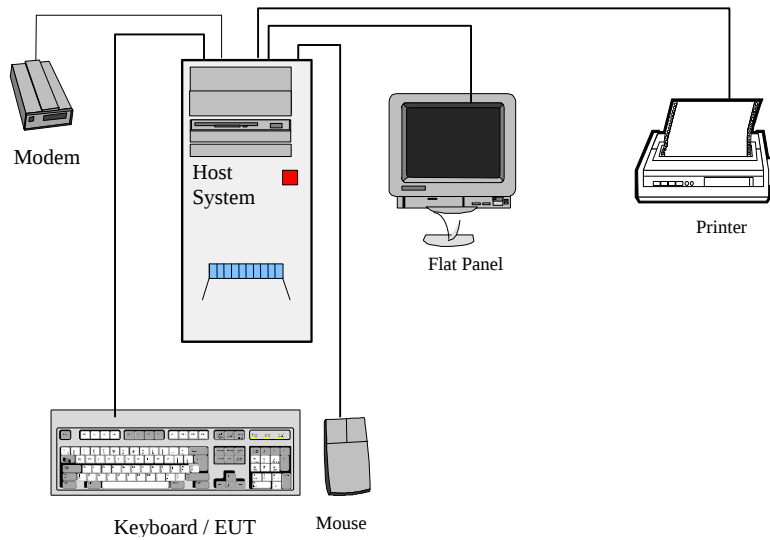
Schematics / Block Diagram

Please refer to Exhibit C.

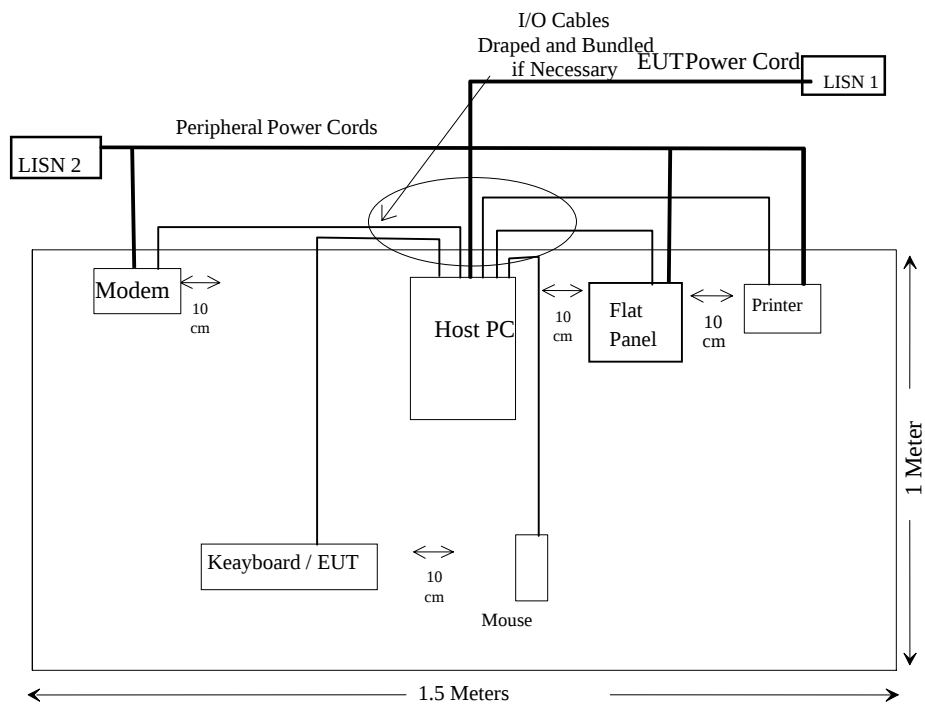
Equipment Modifications

No modifications were made to the EUT.

Configuration of Test System



Test Setup Block Diagram



§15.107 - CONDUCTED EMISSIONS

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at BACL is ± 2.4 dB.

EUT Setup

The measurement was performed in the shield room, using the same setup per ANSI C63.4-2001 measurement procedure. The specification used was the FCC15 Class B limits.

The spacing between the peripherals was 10 cm.

The external I/O cables were draped along the test table and bundled as required.

The host PC was connected to 110Vac/60Hz power source.

Spectrum Analyzer Setup

The spectrum analyzer was set to investigate the spectrum from 150 kHz to 30Mhz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Rohde & Schwarz	Artificial LISN	ESH2-Z5	871884/039	2003-03-28
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2003-05-06
Fluke	Calibrated Voltmeter	189	18485-38	2003-07-18

* **Statement of Traceability:** BACL Corp. certifies that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Procedure

During the conducted emission test, the power cord of the host system was connected to the auxiliary outlet of the first LISN.

Maximizing procedure were performed on the six (6) highest emissions of the EUT.

All data was recorded in the peak detection mode, quasi-peak and average. Average readings are distinguished with an "Ave". Quasi-peak readings are distinguished with an "Qp".

Environmental Conditions

Temperature:	13 ° C
Relative Humidity:	59%
ATM Pressure:	1031 mbar

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Conducted limits for a Class B device, with the worst margin reading of:

-14.2 dB at 0.19 MHz on the Neutral conductor.

Conducted Emissions Test Data

LINE CONDUCTED EMISSIONS				FCC CLASS B	
Frequency MHz	Amplitude dBμV	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dBμV	Margin dB
0.190	41.8	Ave	Neutral	56	-14.2
0.630	27.9	Ave	Line	46	-18.1
0.315	31.4	Ave	Neutral	50	-18.6
9.100	29.9	Ave	Line	50	-20.1
9.300	29.7	Ave	Neutral	50	-20.3
0.190	34.6	Ave	Line	56	-21.4
9.100	35.2	Qp	Line	60	-24.8
0.190	40.9	Qp	Neutral	66	-25.1
0.630	30.1	Qp	Line	56	-25.9
9.300	33.8	Qp	Neutral	60	-26.2
0.315	30.5	Qp	Neutral	60	-29.5
0.190	34.5	Qp	Line	66	-31.5

Plots of Conducted Emission

The plots of conducted emission are presented hereinafter as reference.

Bay Area Compliance Laboratory Corp
Class B

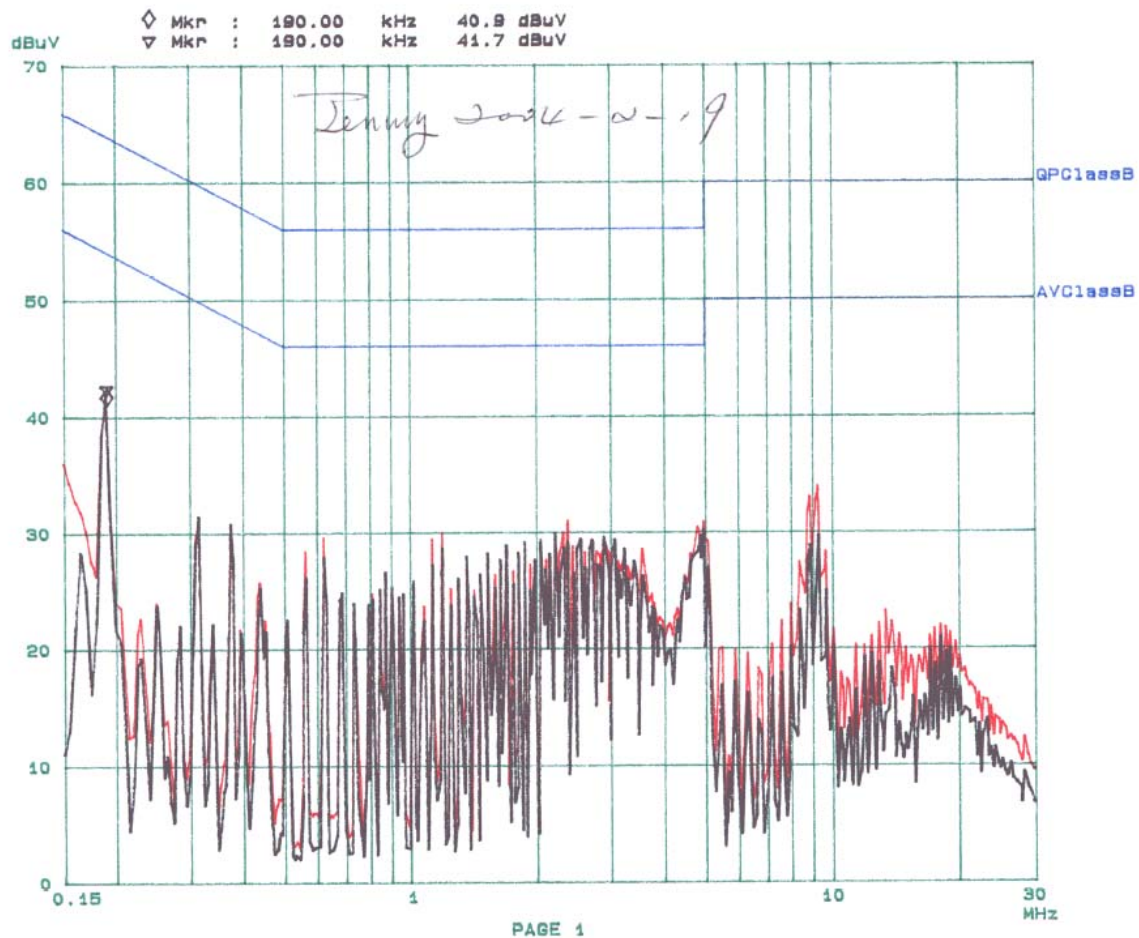
19. Feb 04 11:49

EUT: KB RT2910
Manuf: NMB
Op Cond: Normal
Operator: Jerry
Comment: N
CE

Scan Settings (3 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	5k	9k	QP+AV	20ms	15dB LN	OFF
1M	5M	10k	9k	QP+AV	1ms	15dB LN	OFF
5M	30M	100k	9k	QP+AV	1ms	15dB LN	OFF

Final Measurement: x QP / + AV
Meas Time: 1 s
Subranges: 25
Acc Margin: 6dB



Bay Area Compliance Laboratory Corp
Class B

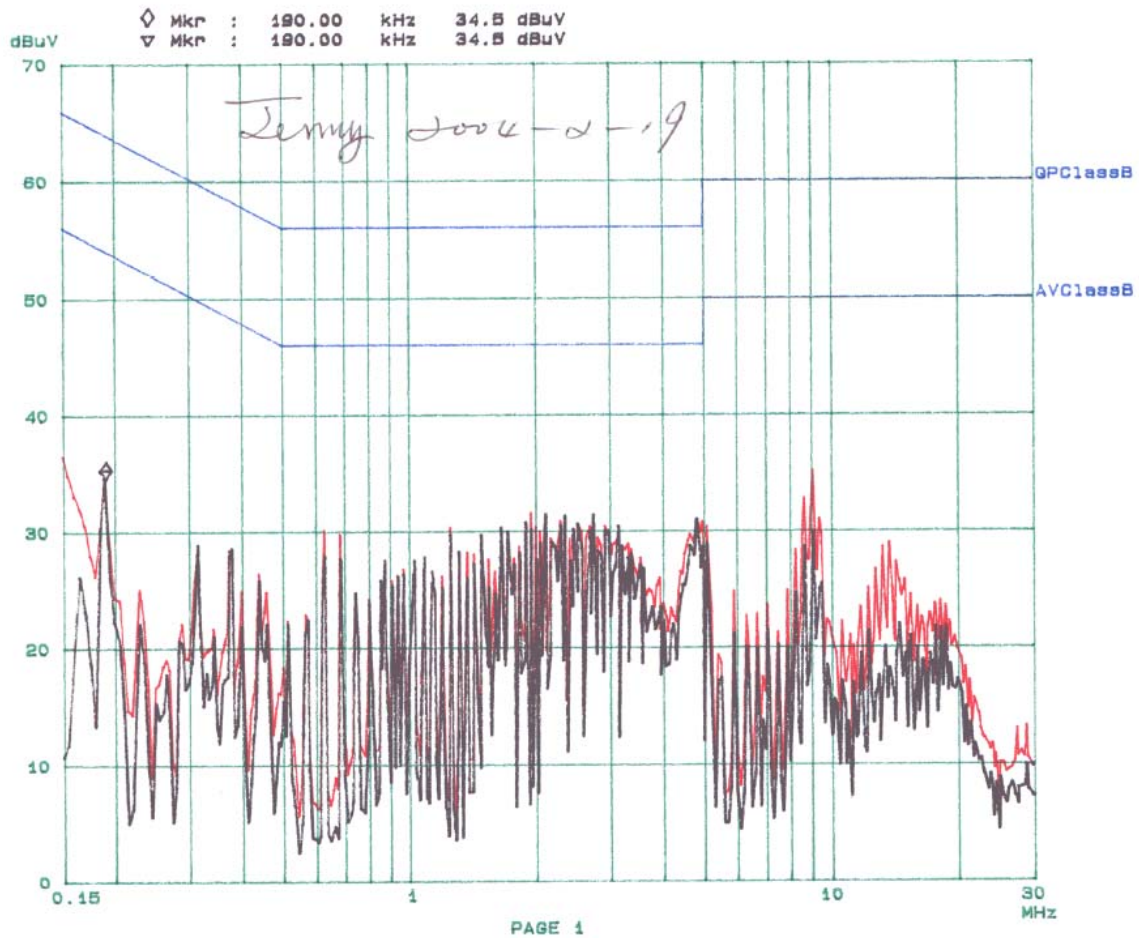
19. Feb 04 13: 21

EUT: KB RT2910
Manuf: NMB
Op Cond: Normal
Operator: Jerry
Comment: L
CE

Scan Settings (3 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	5k	9k	QP+AV	20ms	15dBLN	OFF
1M	5M	10k	9k	QP+AV	1ms	15dBLN	OFF
5M	30M	100k	9k	QP+AV	1ms	15dBLN	OFF

Final Measurement: X QP / + AV
Meas Time: 1 s
Subranges: 25
Acc Margin: 6dB



§15.109 - RADIATED EMISSIONS

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at BACL is ± 4.0 dB.

EUT Setup

The radiated emission tests were performed in the open area 10-meter test site, using the setup in accordance with ANSI C63.4-2001. The specification used in this report was the FCC 15 Class B limits.

The spacing between the peripherals was 10 cm.

The external I/O cables were draped along the test table and bundled as required.

The host PC was connected to 110Vac/60Hz power source.

Spectrum Analyzer Setup

The system was tested to 1000 MHz.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

<i>Frequency Range</i>	<i>RBW</i>	<i>Video B/W</i>
Below 30MHz	10kHz	10kHz
30 – 1000MHz	100kHz	100kHz
Above 1000MHz	1MHz	1MHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal Date
HP	Spectrum Analyzer	8568B	3019A05393	2003-06-13
HP	Spectrum Analyzer Display	85662A	3026A20081	2003-06-13
HP	Quasi-Peak Adapter	85650A	3107A01505	2003-09-30
Agilent	Amplifier (0.1 – 1300MHz)	8447D	2944A10198	2003-09-23
EMCO	Biconical Antenna	3110B	9309-1165	2003-10-11
EMCO	Logperiodic Antenna	3146	2101	2003-10-11
HP	Plotter	7475A	2517A05739	N/R

*** Statement of Traceability: BACL Corp.** certifies that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Procedure

For the radiated emissions test, the power cord of the host system and all support equipment were connected to the AC floor outlet.

Maximizing procedure was performed on the six (6) highest emissions in the described configurations.

All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB μ V of specification limits), and are distinguished with a "Qp" in the data table.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB μ V means the emission is 7dB μ V below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Class B Limit}$$

Summary of Test Results

According to the data in following tables, the EUT complied with the FCC 15 Class B standards, and had the worst margin of:

-5.8 dB at 45 MHz in the Vertical polarization

Testing performed by Jerry Wang on 2004-2-19, originally saved on server.

Radiated Emissions Test Data

INDICATED		TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC PART 15 CLASS B	
Freq. MHz	Ampl. dB μ V/m	Angle Degree	Height Meter	Polar H/ V	Antenna dB μ V/m	Cable dB	Amp. dB	Corr. Ampl. dB μ V/m	Limit dB μ V/m	Margin dB
45	47.6	200	1.2	V	11.3	2.2	26.9	34.2	40	-5.8
45	46.9	180	3	H	11.3	2.2	26.9	33.5	40	-6.5
51.02	48.2	90	1.2	V	10.5	2.0	27.3	33.4	40	-6.6
81.36	46.2	270	3	H	9.6	2.7	27.5	31.0	40	-9.0
172.22	44.6	0	1.2	V	13.3	4.0	27.5	34.4	43.5	-9.1
172.21	44.6	180	3	H	13.3	4.0	27.5	34.4	43.5	-9.1
275	46.5	200	1.2	V	12.6	4.9	27.2	36.8	46	-9.2
126.95	45.7	200	1.2	V	12.3	3.5	27.5	34.0	43.5	-9.5
126.95	44.5	200	3	H	12.3	3.5	27.5	32.8	43.5	-10.7
227	46.9	180	3	H	11.3	4.0	27.2	35.0	46	-11.0
142.01	43.2	0	1.2	V	13.2	3.6	27.5	32.5	43.5	-11.0
230	46.4	160	3	H	11.3	4.4	27.2	34.9	46	-11.1
217.6	46.8	200	3	H	10.1	4.2	27.0	34.1	46	-11.9
239	45.5	180	3	H	11.3	4.5	27.2	34.1	46	-11.9
120	43.1	180	3	H	12.1	3.4	27.7	30.9	43.5	-12.6
221	45.8	180	3	H	10.1	4.5	27.0	33.4	46	-12.6
242	44.7	0	3	H	11.3	4.6	27.2	33.4	46	-12.6
227	44.6	200	1.2	V	11.3	4.0	27.2	32.7	46	-13.3
221	43.5	250	1.2	V	10.1	4.5	27.0	31.1	46	-14.9
230	42.0	180	1.2	V	11.3	4.4	27.2	30.5	46	-15.5