

FCC PART 15, CLASS B
MEASUREMENT AND TEST REPORT

For

Turning Technologies

255 West Federal Street, Youngstown, OH 44503, USA

FCC ID: R4WTTTB10

Report Type: Original Report	Product Type: Touch Board Plus
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Report Number: RSZ140801001-00	
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Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Turning Technologies*'s product, model number: *TTTB-10* (FCC ID: **R4WTTTB10**) or the "EUT" in this report is an *Touch Board Plus*, which was measured approximately: 208 cm (L) x 133 cm (W) x 3 cm (H), rated with input voltage: *DC 5.0V from USB port*. The highest operation frequency is 72 MHz.

** All measurement and test data in this report was gathered from production sample serial number:1408001 (Assigned by the BACL, Shenzhen). The EUT supplied by the applicant was received on 2014-08-20.*

Objective

This report is prepared on behalf of *Turning Technologies* in accordance with Part 2-Subpart J, and Part 15-Subparts A and B of the Federal Communication Commissions rules.

The objective of the manufacturer is to determine the compliance of EUT with FCC Part 15, Class B.

Related Submittal(s)/Grant(s)

No related submittal(s).

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2009, 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 measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

The test site used by Bay Area Compliance Laboratories Corp.(Shenzhen) to collect test data is located on the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on December 06, 2010. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION (FCC §15.27)

Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

EUT Exercise Software

No exercise software was used.

Special Accessories

No special accessory was used.

Equipment Modifications

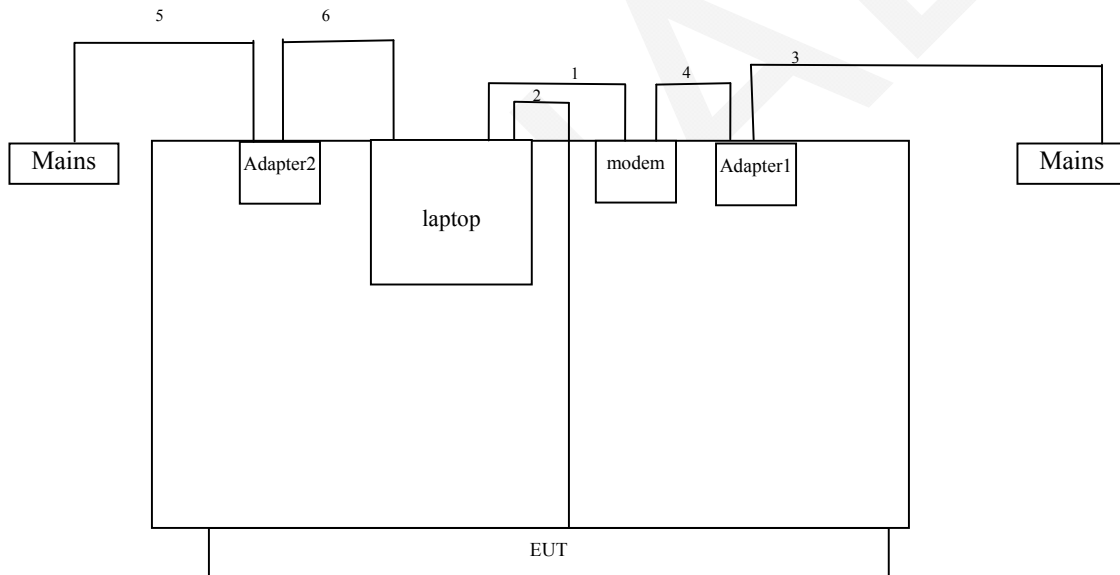
No modification was made to the EUT tested.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
DELL	laptop	PP05L	N/A
Longway	Modem	N/A	LW157621
Longway	Adapter	TYP60-1207000Z	LW516654

External I/O Cable

Cable Description		Length (m)	From / Port	To
1	Shielding Detachable RS232 cable	1.0	Computer	modem
2	Un-shielding Detachable USB cable	4.4	EUT	computer
3	Un-shielding Detachable AC cable	1.2	Adapter1	mains
4	Un-shielding Un-detachable DC cable	0.5	Adapter1	modem
5	Un-shielding Detachable AC cable	1.2	Adapter2	mains
6	Un-shielding Un-detachable DC cable	1.2	Adapter2	laptop

Block Diagram of Test Setup

SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§15.107	AC Line Conducted Emissions	Compliance
§15.109	Radiated Emissions	Compliance

FCC §15.107 – AC LINE CONDUCTED EMISSIONS

Applicable Standard

According to FCC§15.107

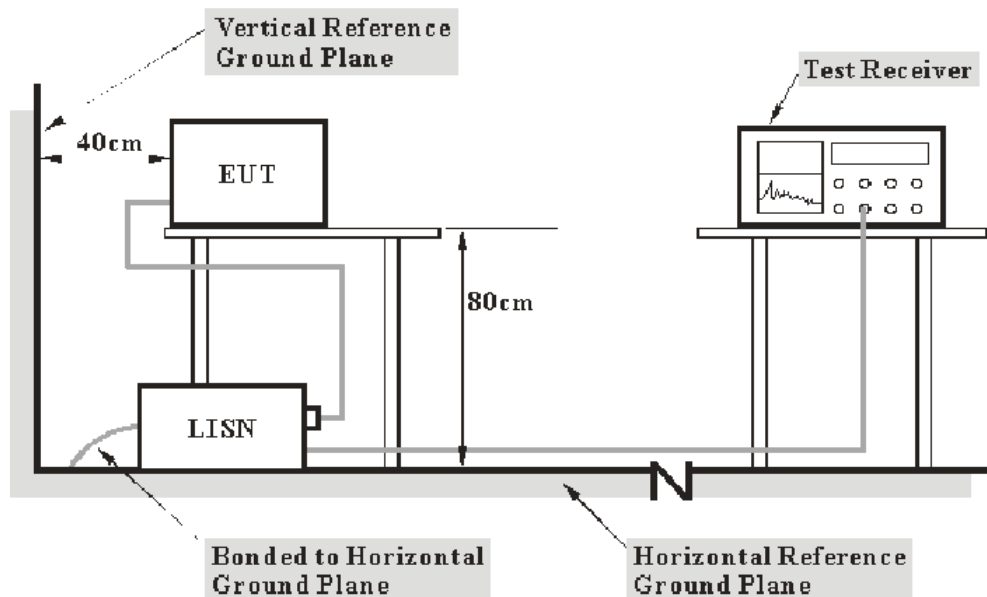
Measurement Uncertainty

Input quantities to be considered for conducted disturbance measurements maybe receiver reading, attenuation of the connection between LISN and receiver, LISN voltage division factor, LISN VDF frequency interpolation and receiver related input quantities, etc.

Based on CISPR 16-4-2:2011, the expended combined standard uncertainty of conducted disturbance test at Bay Area Compliance Laboratories Corp. (Shenzhen) is shown as below. And the uncertainty will not be taken into consideration for the test data recorded in the report.

Port	Measurement uncertainty
AC Mains	3.26 dB (k=2, 95% level of confidence)

EUT Setup



- Note: 1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The measurement procedure of EUT setup is according with ANSI C63.4-2009. The related limit was specified in FCC Part 15.107 Class B.

The socket was connected to an AC 120V/60 Hz power source.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the socket was connected to the outlet of the LISN.

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

All final data was recorded in the Quasi-peak and average detection mode.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2014-06-03	2015-06-03
Rohde & Schwarz	LISN	ESH3-Z5	100113	NCR	NCR
Rohde & Schwarz	LISN	ENV216	3560.6650.12-10 1613-Yb	2014-06-09	2015-06-09
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2014-05-14	2015-05-14
Rohde & Schwarz	CE Test software	EMC 32	V8.53	-	-

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

$$\text{Correction Factor} = \text{LISN VDF} + \text{Cable Loss} + \text{Transient Limiter Attenuation}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Results Summary

According to the recorded data in following table, the worst margin reading as below:

6.2 dB at 9.259070 MHz in the Line conducted mode

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level is in compliance with the limit if

$$L_m + U_{(L_m)} \leq L_{\text{lim}} + U_{\text{cispr}}$$

In BACL., $U_{(L_m)}$ is less than U_{cispr} , if L_m is less than L_{lim} , it implies that the EUT complies with the limit.

Test Data

Environmental Conditions

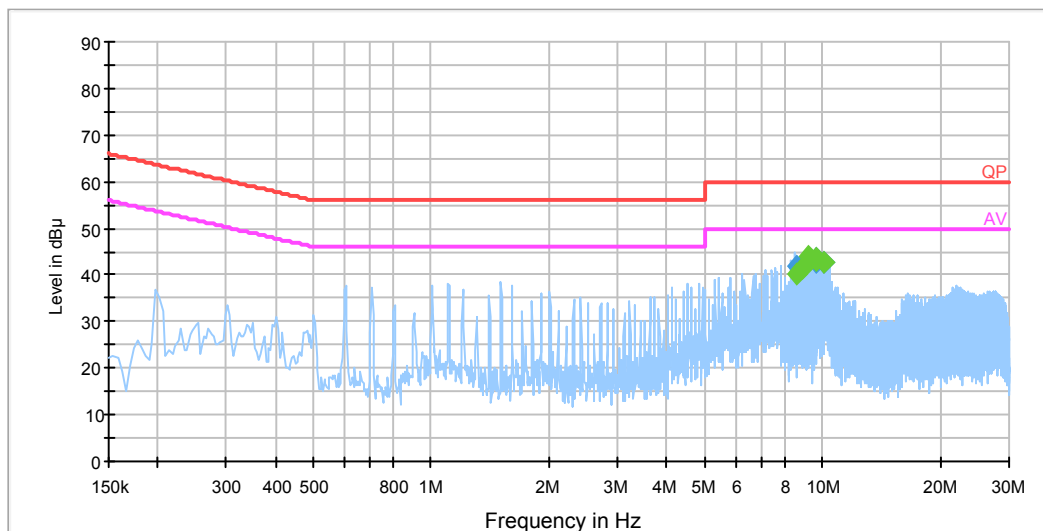
Temperature:	25°C
Relative Humidity:	53 %
ATM Pressure:	101.0 kPa

The testing was performed by Webb Liu on 2014-10-11

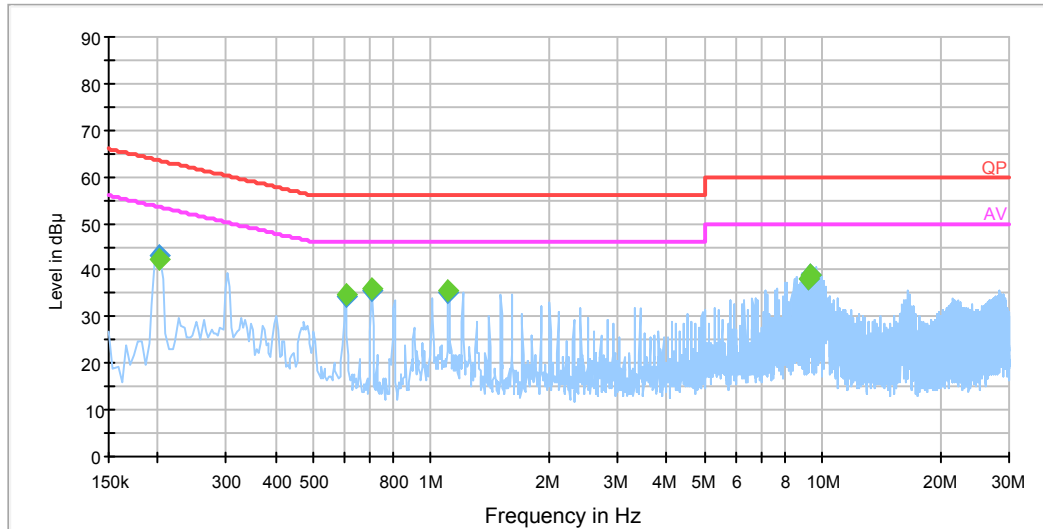
EUT operation mode: Touching EUT and connecting to Notebook

AC120V/60Hz, Line

EMI Auto Test L



Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
8.555190	41.8	19.7	60.0	18.2	QP
8.555190	40.3	19.7	50.0	9.7	Ave.
8.854630	42.0	19.7	60.0	18.0	QP
8.854630	41.6	19.7	50.0	8.4	Ave.
9.259070	43.6	19.7	60.0	16.4	QP
9.259070	43.8	19.7	50.0	6.2	Ave.
9.661010	43.6	19.7	60.0	16.4	QP
9.661010	43.6	19.7	50.0	6.4	Ave.
9.662510	42.8	19.7	60.0	17.2	QP
9.662510	43.1	19.7	50.0	6.9	Ave.
10.062950	42.9	19.7	60.0	17.1	QP
10.062950	42.7	19.7	50.0	7.3	Ave.

AC120V/60Hz, Neutral**EMI Auto Test N**

Note:

- 1) Corrected Amplitude = Reading + Correction Factor
- 2) Correction Factor = LISN VDF (Voltage Division Factor) + Cable Loss + Transient Limiter Attenuation
- 3) Margin = Limit – Corrected Amplitude

FCC§15.109 - RADIATED EMISSIONS

Applicable Standard

FCC §15.109

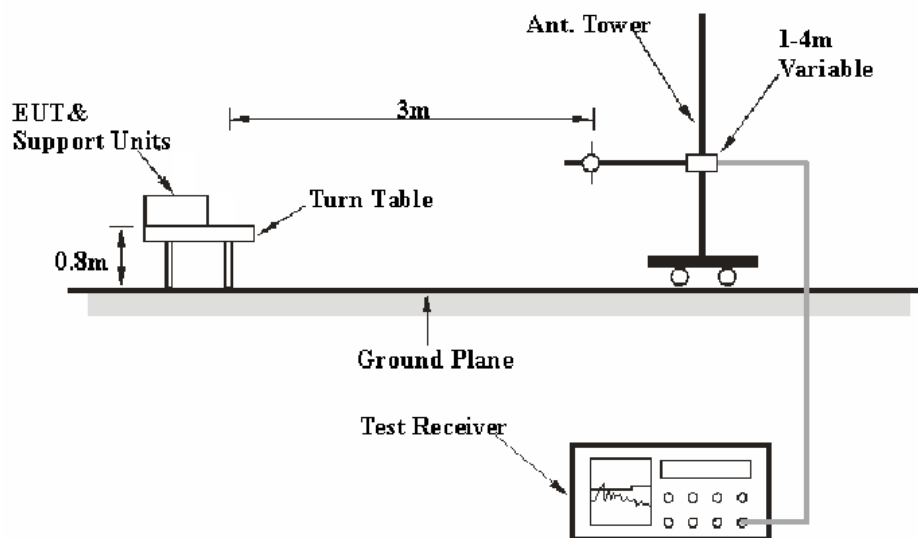
Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in 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 CISPR 16-4-2:2011, the expended combined standard uncertainty of radiation emissions at Bay Area Compliance Laboratories Corp. (Shenzhen) is shown in below table. And the uncertainty will not be taken into consideration for the test data recorded in the report

Frequency	Polarity	Expanded Measurement uncertainty
30MHz~200MHz	Horizontal	4.62 dB (k=2, 95% level of confidence)
	Vertical	4.54 dB (k=2, 95% level of confidence)
200MHz~1GHz	Horizontal	4.84 dB (k=2, 95% level of confidence)
	Vertical	5.91 dB (k=2, 95% level of confidence)

EUT Setup



The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance

with the ANSI C63.4-2009. The related limit was specified in FCC Part 15.109 Class B.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

EMI Test Receiver Setup

According to FCC 15.33 requirements, the EUT system was measured from 30 MHz to 1 GHz.

During the radiated emission test, the EMI test receiver Setup was set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP

Test Procedure

During the radiated emission test, the socket was connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All final data was recorded in the Quasi-peak detection mode for below 1 GHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
TDK	Chamber	Chamber A	2#	2012-10-15	2015-10-15
HP	Amplifier	HP8447E	1937A01046	2015-05-06	2015-05-06
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2013-11-12	2014-11-12
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2011-11-28	2014-11-27
R&S	Auto test Software	EMC32	V9.10	-	-

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

Corrected Amplitude & Margin Calculation

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

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Results Summary

According to the data in the following table, the EUT complied with the FCC §15.109, the worst margin reading as below:

3.86dB at 135.542750 MHz in Vertical polarization

Test Data

Environmental Conditions

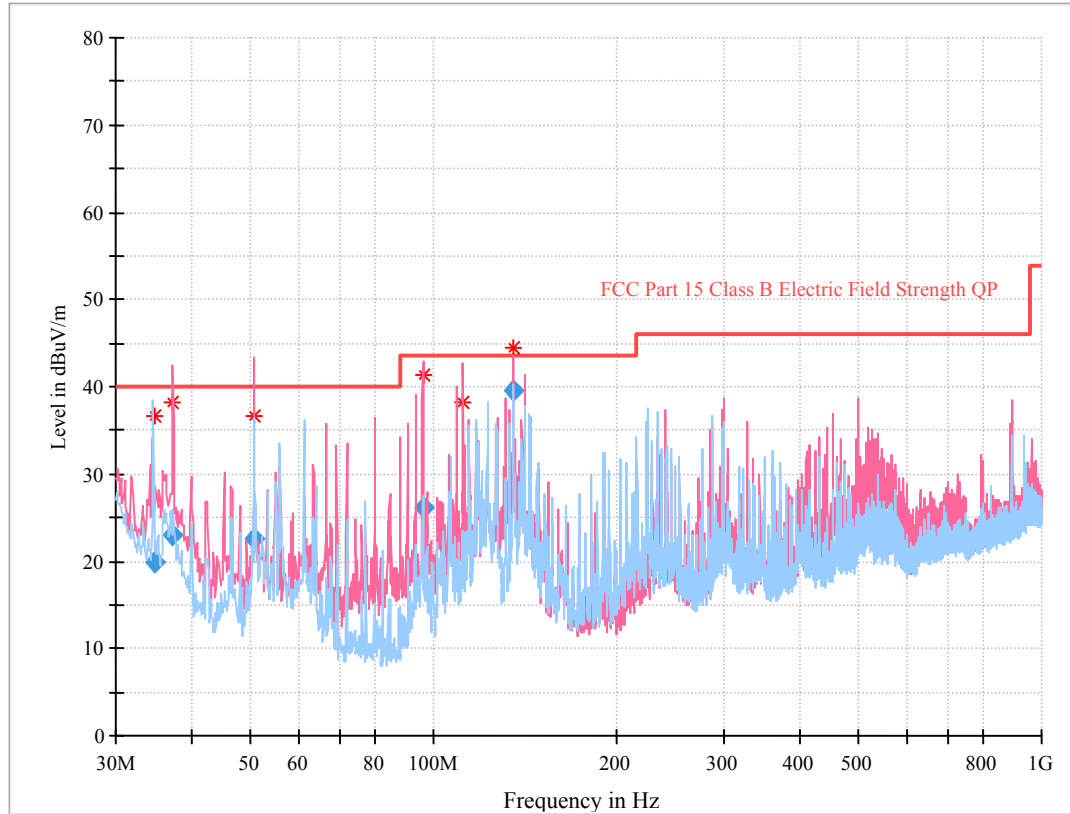
Temperature:	25°C
Relative Humidity:	53 %
ATM Pressure:	101.0kPa

The testing was performed by Webb Liu on 2014-10-11.

EUT operation mode: Touching EUT and connecting to notebook

30 MHz ~ 1000 MHz

Full Spectrum



Frequency (MHz)	Corrected Amplitude (dBμV/m)	Antenna height (cm)	Antenna Polarity	Turntable position (deg)	Correction Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
34.662125	19.88	321.0	H	328.0	-9.8	40.00	20.12
37.252375	23.07	100.0	V	58.0	-11.6	40.00	16.93
50.686625	22.59	100.0	V	88.0	-19.8	40.00	17.41
96.024875	26.07	164.0	V	43.0	-17.6	43.50	17.43
111.923125	22.88	121.0	V	256.0	-13.8	43.50	20.62
135.542750	39.64	152.0	V	340.0	-13.0	43.50	3.86

Note:

- 1) Correction Factor = Antenna Factor + Cable Loss - Amplifier Gain
- 2) Corrected Amplitude = Meter Reading + Correction Factor
- 3) Margin = Limit – Corrected Amplitude

****END OF REPORT****