

# FCC PART 15, CLASS B TEST REPORT

For

**Guangde Ledup Enterprise Inc.**

Jingtang Road, Economic Development Zone, Guangde, Xuancheng, Anhui

**FCC ID:2AEBHR21501B2C**

<b>Report Type:</b> Original Report	<b>Product Type:</b> Control box for light string
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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

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### Product Description for Equipment under Test (EUT)

The *Guangde Ledup Enterprise Inc.*'s product, model number: *56R2-1501B2 (FCC ID: 2AEBHR21501B2C)* or the "EUT" in this report was a *control box for light string*, which was measured approximately: 9.8 cm (L) x 5.0 cm (W) x 2.9 cm (H), the input power is DC5V from adapter.

*\*All measurement and test data in this report was gathered from production sample serial number: 1504030 (Assigned by Shenzhen BACL). The EUT supplied by the applicant was received on 2015-04-28.*

### Objective

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

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

### Related Submittal(s)/Grant(s)

Part 15.231 DSC submissions with transmitter FCC ID: 2AEBHR21501B2.

### 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

### Description of Test Configuration

The system was configured for testing in a manufacturer testing fashion.

EUT operation mode: Receiving single and control light

### EUT Exercise Software

N/A

### Special Accessories

No special accessory.

### Equipment Modifications

No modification was made to the EUT tested.

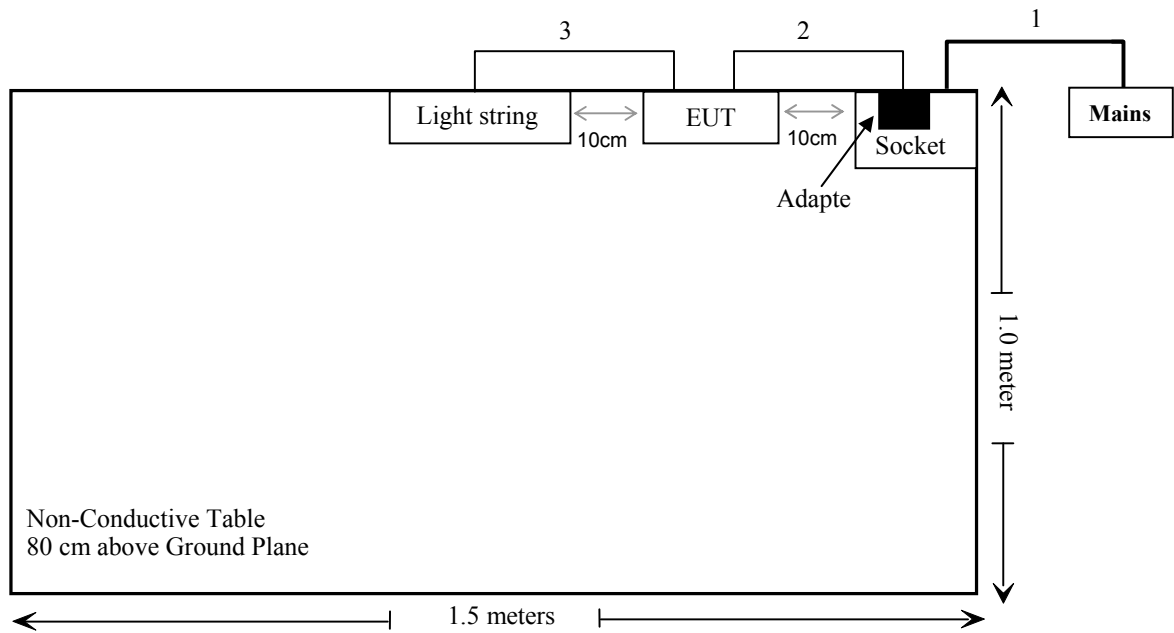
### Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
N/A	Socket	N/A	CZ001
Ledup	Adapter	J-5V30W	N/A
Ledup	Light string	DP30-S1000	N/A

### External I/O Cable

Cable Description		Length (m)	From/Port	To
1	Un-shielding Un-Detachable AC Cable	1.0	Mains	Socket
2	Un-shielding Un-Detachable DC Cable	0.8	Adapter	EUT
3	Un-shielding Un-Detachable DC Cable	0.8	EUT	Light string

## 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 Spurious Emissions	Compliance

## FCC §15.107 – AC LINE CONDUCTED EMISSIONS

### Applicable Standard

According to FCC §15.107

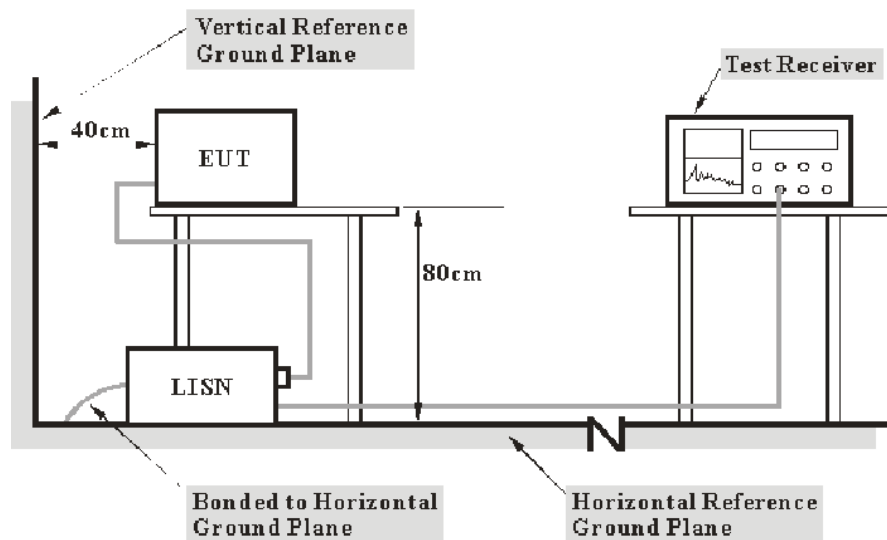
### Measurement Uncertainty

Input quantities to be considered for conducted disturbance measurements maybe receiver reading, attenuation of the connection between LISN/ISN and receiver, LISN/ISN voltage division factor, LISN/ISN 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	Expanded Measurement uncertainty
AC Mains	3.26 dB (k=2, 95% level of confidence)
CAT 3	3.70 dB (k=2, 95% level of confidence)
CAT 5	3.86 dB (k=2, 95% level of confidence)
CAT 6	4.64 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 per ANSI C63.4-2009. The related limit was specified in FCC Part 15.107 Class B.

The spacing between the peripherals was 10 cm.

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

The adapter was connected to a 120 VAC/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 host PC was connected to the first LISN and the other relevant equipments were connected to the second LISN.

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

All 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	ENV216	3560.6650.12-101613-Yb	2014-12-01	2015-12-01
Rohde & Schwarz	LISN	ESH3-Z5	100113	NCR	NCR
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2014-10-15	2015-10-15
Rohde & Schwarz	CE Test software	EMC 32	V8.53	NCR	NCR

\* **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/ISN 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 7 dB 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 EUT complied with the FCC Part 15.107, the worst margin reading as below:

**8.0 dB at 0.664010 MHz** in the **Neutral** conducted mode

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

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

in BACL.,  $U_{(Lm)}$  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

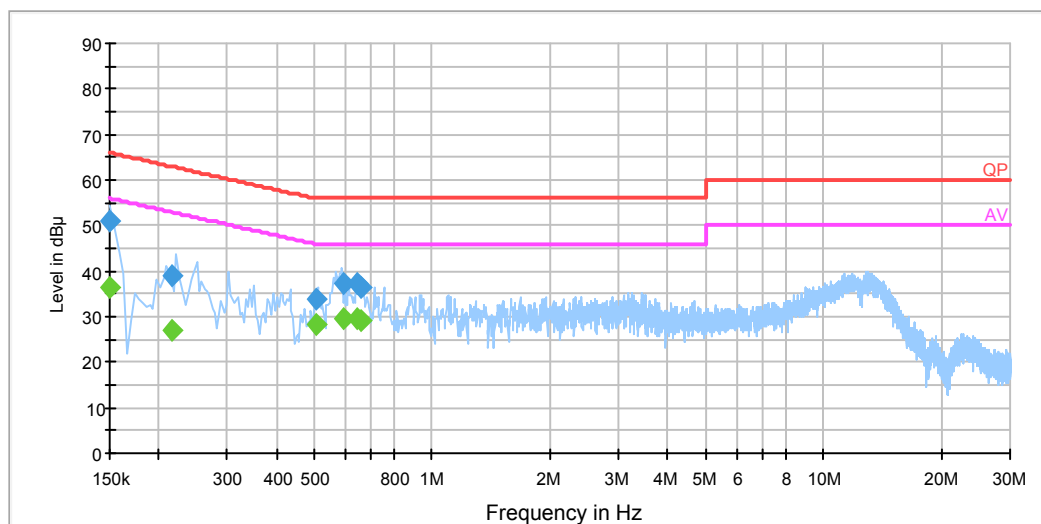
<b>Temperature:</b>	25 °C
<b>Relative Humidity:</b>	50 %
<b>ATM Pressure:</b>	101.0 kPa

*The testing was performed by Joanna Jiao on 2015-05-04.*

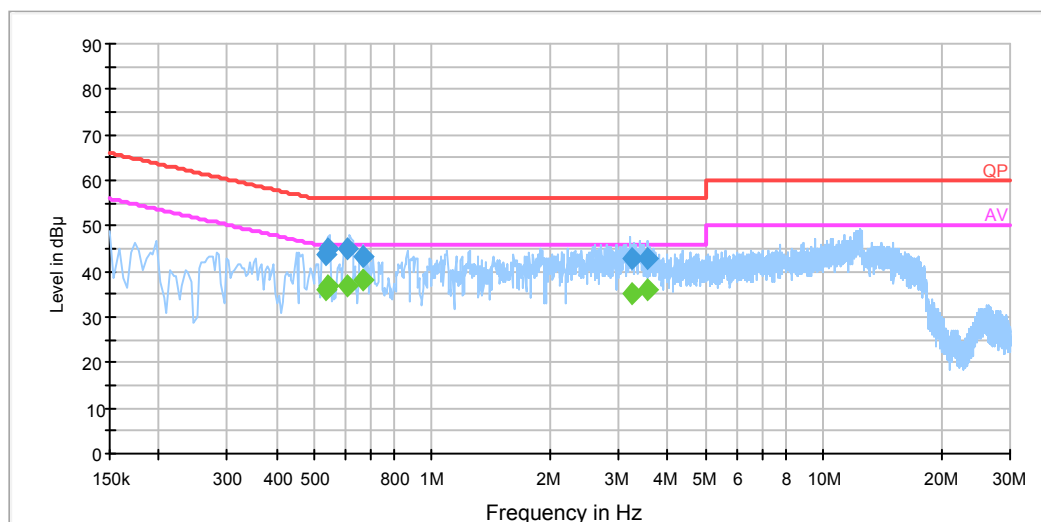
EUT Operation Mode: Receiving single and control light

**AC 120V/60 Hz, Line**

EMI Auto Test L



Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.150000	50.8	19.2	66.0	15.2	QP
0.150000	36.2	19.2	56.0	19.8	Ave.
0.217500	38.9	19.3	62.9	24.0	QP
0.217500	27.1	19.3	52.9	25.9	Ave.
0.506350	34.1	19.3	56.0	21.9	QP
0.506350	28.4	19.3	46.0	17.6	Ave.
0.597150	37.4	19.3	56.0	18.6	QP
0.597150	29.7	19.3	46.0	16.3	Ave.
0.640250	37.3	19.3	56.0	18.7	QP
0.640250	29.8	19.3	46.0	16.2	Ave.
0.656070	36.2	19.3	56.0	19.8	QP
0.656070	29.3	19.3	46.0	16.7	Ave.

**AC 120V/60 Hz, Neutral****EMI Auto Test N**

Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.537990	43.6	19.2	56.0	12.4	QP
0.537990	35.8	19.2	46.0	10.2	Ave.
0.541810	45.0	19.2	56.0	11.0	QP
0.541810	37.0	19.2	46.0	9.0	Ave.
0.608730	45.2	19.3	56.0	10.8	QP
0.608730	37.0	19.3	46.0	9.0	Ave.
0.664010	43.2	19.3	56.0	12.8	QP
0.664010	38.0	19.3	46.0	8.0	Ave.
3.245970	43.0	19.4	56.0	13.0	QP
3.245970	35.3	19.4	46.0	10.8	Ave.
3.548450	43.0	19.4	56.0	13.0	QP
3.548450	35.9	19.4	46.0	10.1	Ave.

**Note:**

- 1) Correction Factor = LISN VDF (Voltage Division Factor) + Cable Loss + Transient Limiter Attenuation  
The corrected factor has been input into the transducer of the test software.
- 2) Corrected Amplitude = Reading + Correction Factor
- 3) Margin = Limit – Corrected Amplitude

## FCC §15.109 - RADIATED SPURIOUS EMISSIONS

### Applicable Standard

FCC §15.109

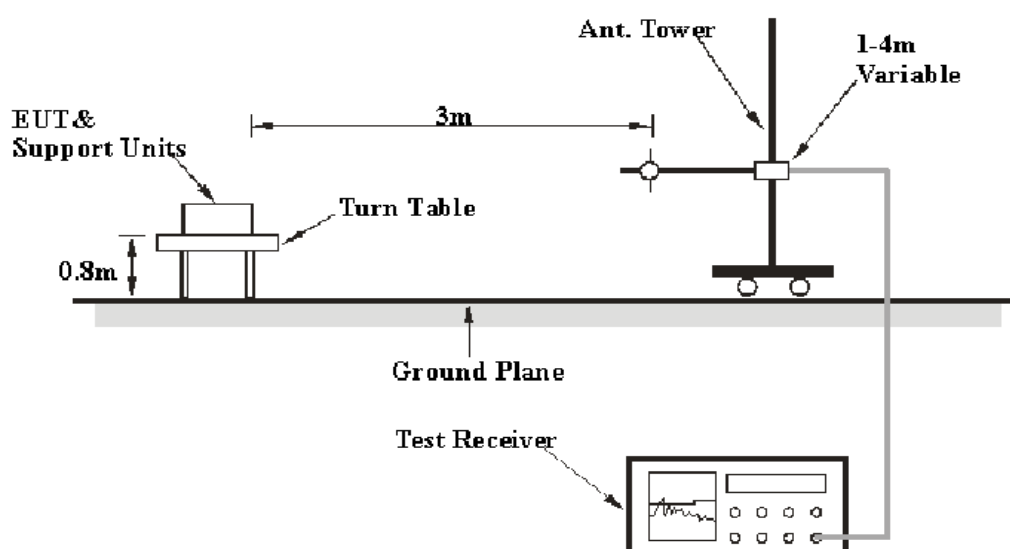
### Measurement Uncertainty

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	Measurement uncertainty
30 MHz~200 MHz	Horizontal	4.62 dB (k=2, 95% level of confidence)
	Vertical	4.54 dB (k=2, 95% level of confidence)
200 MHz~1 GHz	Horizontal	4.84 dB (k=2, 95% level of confidence)
	Vertical	5.91 dB (k=2, 95% level of confidence)
1 GHz~6 GHz	Horizontal/Vertical	4.68 dB (k=2, 95% level of confidence)
Above 6 GHz	Horizontal/Vertical	4.92 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 specification used was the FCC Part 15.109 Class B limits.

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

The spacing between the peripherals was 10 cm.

The adapter was connected to a 120 VAC/60 Hz power source.

### EMI Test Receiver Setup

The system was investigated from 30 MHz to 6GHz.

During the radiated emission test, the EMI test receiver 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
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

### Test Procedure

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

All data was recorded in the Quasi-peak detector mode from 30 MHz to 1 GHz and PK and average detector modes for frequencies above 1 GHz.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	HP8447E	1937A01046	2014-05-06	2015-05-06
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2014-11-03	2015-11-03
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2014-12-07	2017-12-06
Mini	Amplifier	ZVA-183-S+	5969001149	2015-04-23	2016-04-23
A.H. System	Horn Antenna	SAS-200/571	135	2013-02-11	2016-02-10
Rohde & Schwarz	Signal Analyzer	FSIQ26	837405/023	2014-08-22	2015-08-22
TDK	Chamber	Chamber A	2#	2012-10-15	2015-10-15
TDK	Chamber	Chamber B	1#	2014-07-22	2015-07-22
R&S	Auto test Software	EMC32	V9.10	NCR	NCR

\* **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 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 7 dB 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 data in the following table, the EUT complied with the FCC §15.109 Class B, the worst margin reading as below:

**6.36 dB at 40.54 MHz in the Vertical polarization mode**

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

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

In BACL,  $U_{(Lm)}$  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:	50 %
ATM Pressure:	101.0 kPa

*The testing was performed by Joanna Jiao on 2015-05-04.*

*EUT Operation Mode: Receiving single and control light*

**30 MHz ~ 6GHz**

Frequency (MHz)	Reading (dBμV)	Detector (PK/QP/Ave.)	Turntable Degree	Height (m)	Polar (H/V)	Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
35.71	35.87	QP	117.0	1.0	V	-10.6	25.27	40	14.73
40.54	47.44	QP	82.0	1.1	V	-13.8	33.64	40	6.36
42.29	47.56	QP	230.0	1.0	V	-15.1	32.46	40	7.54
53.38	43.77	QP	201.0	1.7	V	-20.1	23.67	40	16.33
81.23	44.67	QP	197.0	4.0	H	-19.3	25.37	40	14.63
108.86	41.67	QP	0.0	2.8	H	-14.6	27.07	43.5	16.43
1617.23	39.65	PK	343	1.2	V	1.91	41.56	74	32.44
1617.23	25.71	Ave.	343	1.2	V	1.91	27.62	54	26.38
1603.20	39.41	PK	37	2.5	H	1.71	41.12	74	32.88
1603.20	26.24	Ave.	37	2.5	H	1.71	27.95	54	26.05
1797.59	39.56	PK	293	1.4	H	-0.03	39.53	74	34.47
1797.59	25.65	Ave.	293	1.4	H	-0.03	25.62	54	28.38

Note:

- 1) Correction Factor=Antenna factor (RX) + cable loss – amplifier factor
- 2) Corrected Amplitude = Correction Factor + Reading
- 3) Margin = Limit - Corrected Amplitude

**\*\*\*\*\* END OF REPORT \*\*\*\*\***